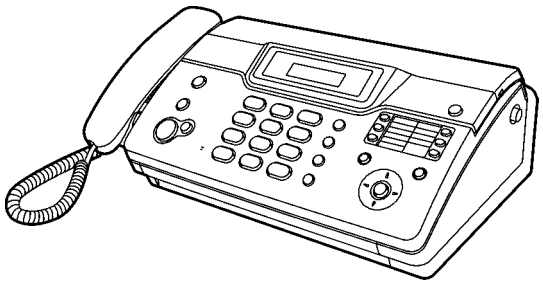
Order No.KMF0605960CE

Service Manual

Personal Facsimile



KX-FT931LA-B

B: Black Version
(for Latin America)

⚠ 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.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacements Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

IMPORTANT INFORMATION ABOUT LEAD FREE, (PbF), SOLDERING

If lead free solder was used in the manufacture of this product the printed circuit boards will be marked PbF. Standard leaded, (Pb), solder can be used as usual on boards without the PbF mark.

When this mark does appear please read and follow the special instructions described in this manual on the use of PbF and how it might be permissible to use Pb solder during service and repair work.

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

Panasonic®

KX-FT931LA-B

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1 Safety Precautions

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

1.1. For Service Technicians

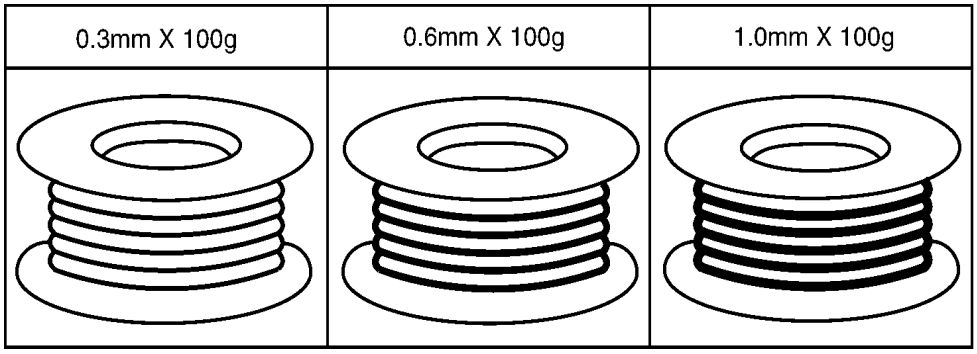
ICs and LSIs are vulnerable to static electricity.
When repairing, the following precautions will help prevent recurring malfunctions.

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

1.1.1. Suggested PBF Sloder

There are several types of PbF solder available commercially. While this product is manufactured using Tin, Silver, and Copper, (Sn+Ag+Cu), you can also use Tin and Copper, (Sn+Cu), or Tin, Zinc, and Bismuth, (Sn+Zn+Bi). Please check the manufacturer's specific instructions for the melting points of their products and any precautions for using their product with other materials.

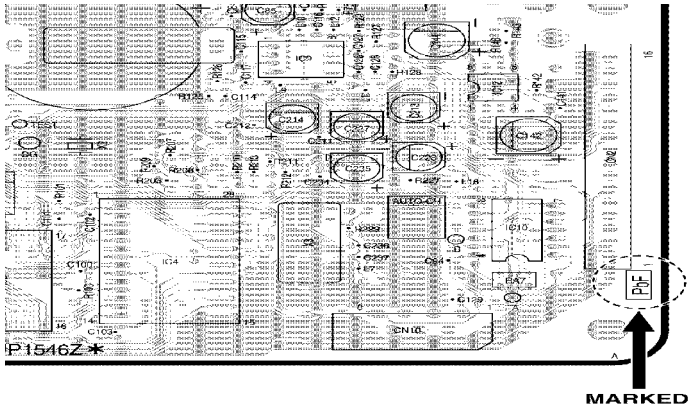
The following lead free (PbF) solder wire sizes are recommended for service of this product: 0.3mm, 0.6mm and 1.0mm.



1.1.2. How to recognize that Pb Free Solder is Used

P.C.Boards marked as “PbF” use Pb Free solder. (See the figure below.)

(Example:Digital board)

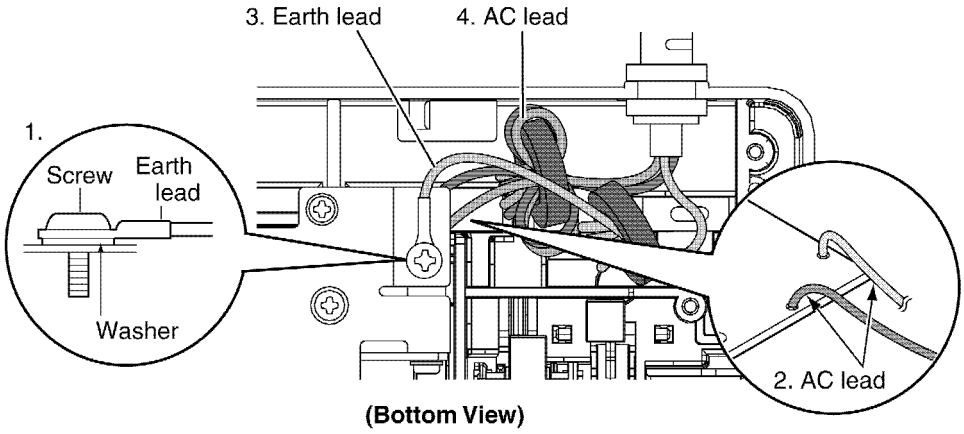


Note: The “PbF” marked may be found on different areas of the same P.C.Board,depending on manufacture date.

1.2. AC Caution

For safety, before closing the lower cabinet, please make sure of the following precautions.

1. The earth lead is fixed with the screw.
2. The AC lead is connected properly to power supply unit.
3. Wrap the earth lead around the core 5 times.
4. Wrap the AC lead around the core 5 times.



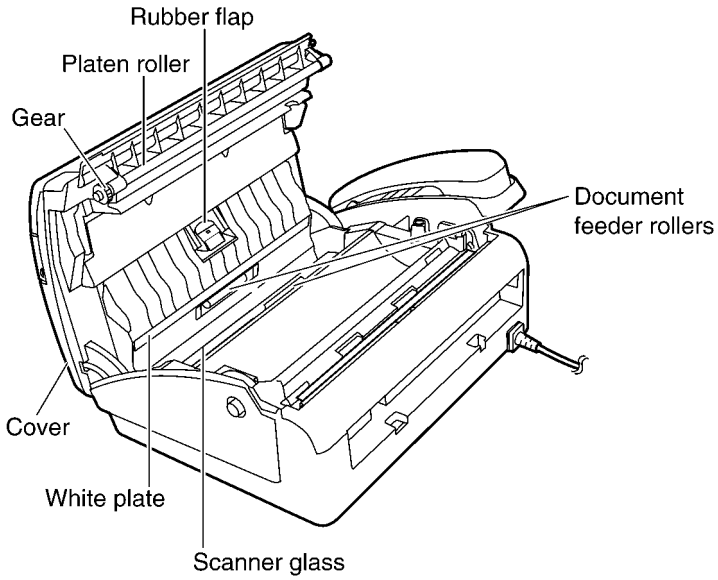
(Bottom View)

1.3. Personal Safety Precautions

1.3.1. Moving Sections of the Unit

Be careful not to let your hair, clothes, fingers, accessories, etc., become caught in any moving sections of the unit.

The moving sections of the unit are the rollers and a gear. There is a separation roller and a document feed roller which are rotated by the document feed motor. A gear rotates the two rollers. Be careful not to touch them with your hands, especially when the unit is operating.



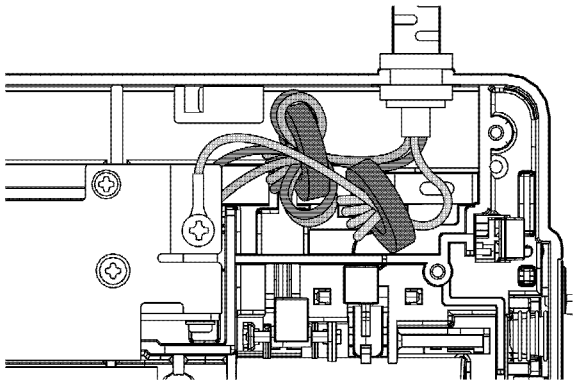
1.3.2. Live Electrical Sections

All the electrical sections of the unit supplied with AC power by the AC power cord are live.

Never disassemble the unit for service with the AC power supply plugged in.

CAUTION:

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

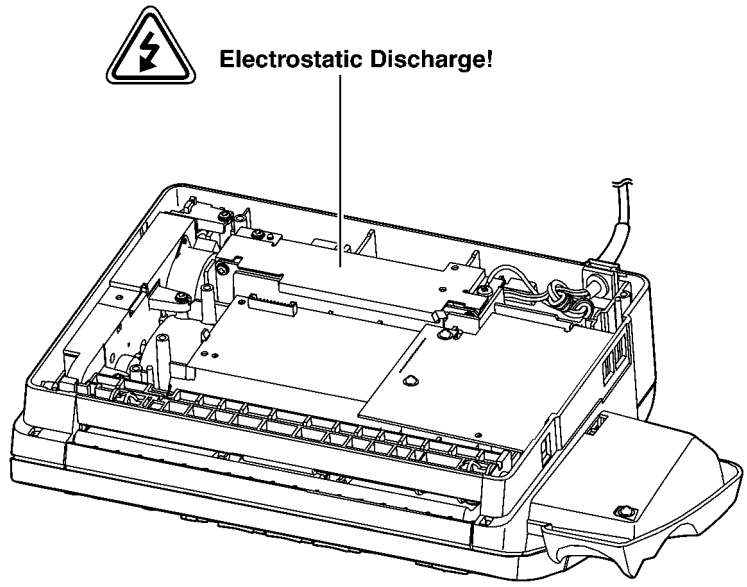


(Bottom View)

1.4. Service Precautions

1.4.1. Precautions to Prevent Damage from Static Electricity

Electrical charges accumulate on a person. For instance, clothes rubbing together can damage electric elements or change their electrical characteristics. In order to prevent static electricity, touch a metallic part that is grounded to release the static electricity. Never touch the electrical sections such as the power supply unit, etc.



2 Warning

2.1. About Lead Free Solder (PbF: Pb free)

Note:

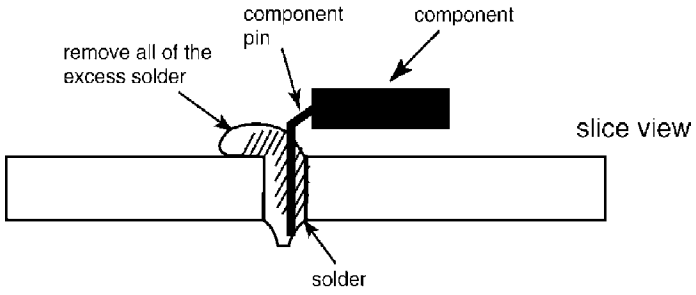
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

We will use PbF solder when discussing the lead free solder used in our manufacturing process which is made from Tin, (Sn), Silver, (Ag), and Copper, (Cu).

This model, and others like it, manufactured using lead free solder will have PbF stamped on the PCB. For service and repair work we suggest using the same type of solder.

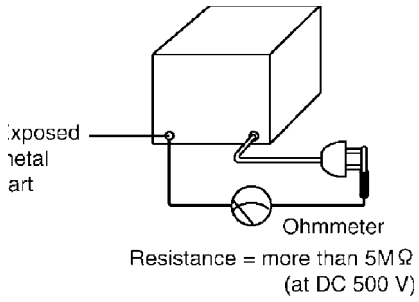
Caution

- PbF solder has a melting point that is 50° ~ 70° F, (30° ~ 40°C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700° ± 20° F, (370° ± 10°C).
- Exercise care while using higher temperature soldering irons.: Do not heat the PCB for too long time in order to prevent solder splash or damage to the PCB.
- PbF solder will tend to splash if it is heated much higher than its melting point, approximately 1100°F, (600°C).
- When applying PbF solder to double layered boards, please check the component side for excess which may flow onto the opposite side (See figure, below).



2.2. 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 (screw heads, control shafts, bottom frame, 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.



2.3. Battery Caution

CAUTION

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's Instructions.

The lithium battery is a critical component (type No. CR2032). Please observe for the proper polarity and the exact location when replacing it and soldering the replacement lithium battery in.

KX-FT931LA-B

3 Specifications

Applicable Lines:	Public Switched Telephone Network
Document Size:	Max. 216 mm in width Max. 600 mm in length
Effective Scanning Width:	208 mm
Recording Paper Size:	216 × max. 30 m roll
Effective Printing Width:	208 mm
Transmission Time*1:	Approx. 15 s/page (Original mode)*2
Scanning Density:	Horizontal: 8 pels/mm Vertical: 3.85 lines/mm - in standard resolution, 7.7 lines/mm - in fine/photo resolution, 15.4 lines/mm - in super fine resolution
Photo resolution:	64-level
Scanner Type:	Contact Image Sensor
Printer Type:	Thermal printing
Data Compression System:	Modified Huffman (MH), Modified READ (MR)
Modem Speed:	9,600 / 7,200 / 4,800 / 2,400 bps; Automatic Fallback
Operating Environment:	5 - 35°C, 20 - 80% RH (Relative Humidity)
Dimensions (H×W×D):	Approx. height 121 mm × width 352 mm × depth 224 mm
Mass (Weight):	Approx. 2.7 kg
Power Consumption:	Standby: Approx. 1.2 W Transmission: Approx. 13 W Reception: Approx. 30 W (When receiving a 20% black document) Copy: Approx. 35 W (When copying a 20% black document) Maximum: Approx. 120 W (When copying a 100% black document)
Power Supply:	120 V AC, 60 Hz
Fax Memory Capacity*3:	Approx. 28 pages of memory reception (Based on the ITU-T No. 1 Test Chart in standard resolution, with original mode.)

* 1 Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of the other party's machine.

* 2 Transmission speed is based upon the ITU-T No. 1 Test Chart with original mode. If the capability of the other party's machine is inferior to your unit, the transmission time may be longer.

* 3 If an error occurs during fax reception, such as a paper jam or if the recording paper runs out, the fax and subsequent faxes will be retained in memory.

Note:

Design and specifications are subject to change without notice.

4 General/Introduction

4.1. Optional Accessories

Model No.	Item	Specifications/Usage
KX-A106	Standard thermal recording paper*1	216 mm × 30 m roll, with 25 mm core

***1 Use only the included or specified recording paper. Using other recording paper may affect print quality and/or cause excessive wear to the thermal head.**

4.2. Translation Lists

4.2.1. Other

ENGLISH	SPANISH
PRINT REPORT	IMPRIME REPORTE
SETUP ITEM [ ]	NO. PROG. [_ _]
SETUP LIST	LISTA PARAM
SYSTEM SETUP	PROG. SISTEMA
USER STOPPED	ALTO X USUARIO
YOUR FAX NO.	SU NO. DE FAX
YOUR LOGO	SU LOGO

4.2.2. Error Message (Report)

ENGLISH	SPANISH
COMMUNICATION ERROR	ERROR DE COMUNICACION
DOCUMENT JAMMED	DOCUMENTO ATASCADO
ERROR-NOT YOUR UNIT	ERRO DE OTRA UNIDAD
MEMORY FULL	MEMORIA LLENA
NO DOCUMENT	NO HAY DOCUMENTO
OTHER FAX NOT RESPONDING	NO HAY RESPUESTA
PRESSED THE STOP KEY	TECLA PARAR PRESIONADA
OK	OK

4.2.3. Error Message (Display)

ENGLISH	SPANISH
CALL SERVICE	LLAME SERVICIO
CHECK DOCUMENT	REVISAR DOC.
CHECK MEMORY	REVISAR MEMORIA
COVER OPEN	TAPA ABIERTA
CHECK PAPER	REVISAR PAPEL
FAX IN MEMORY	FAX EN MEMORIA
FAX MEMORY FULL	MEM. FAX LLENA
MEMORY FULL	MEMORIA LLENA
MODEM ERROR	MODEM ERROR
NO FAX REPLY	SIN RESP FAX
PAPER JAMMED	PAPEL ATASCADO
PLEASE WAIT	FAVOR ESPERAR
POLLING ERROR	ERROR DE RECUP.
REDIAL TIME OUT	CANCELA REDISC
REMOVE DOCUMENT	REMOVER DOC.
SYSTEM IS BUSY	SISTEMA OCUPADO
TRANSMIT ERROR	ERROR DE TRANS.
UNIT OVERHEATED	SOBRECALENTADO

5 Features

5.1.

General
- LCD (Liquid Crystal Display) readout

Facsimile
- Automatic document feeder (10 sheets)
- Resolution: Standard/Fine/Photo/Super Fine (64 level)
- Broad cast

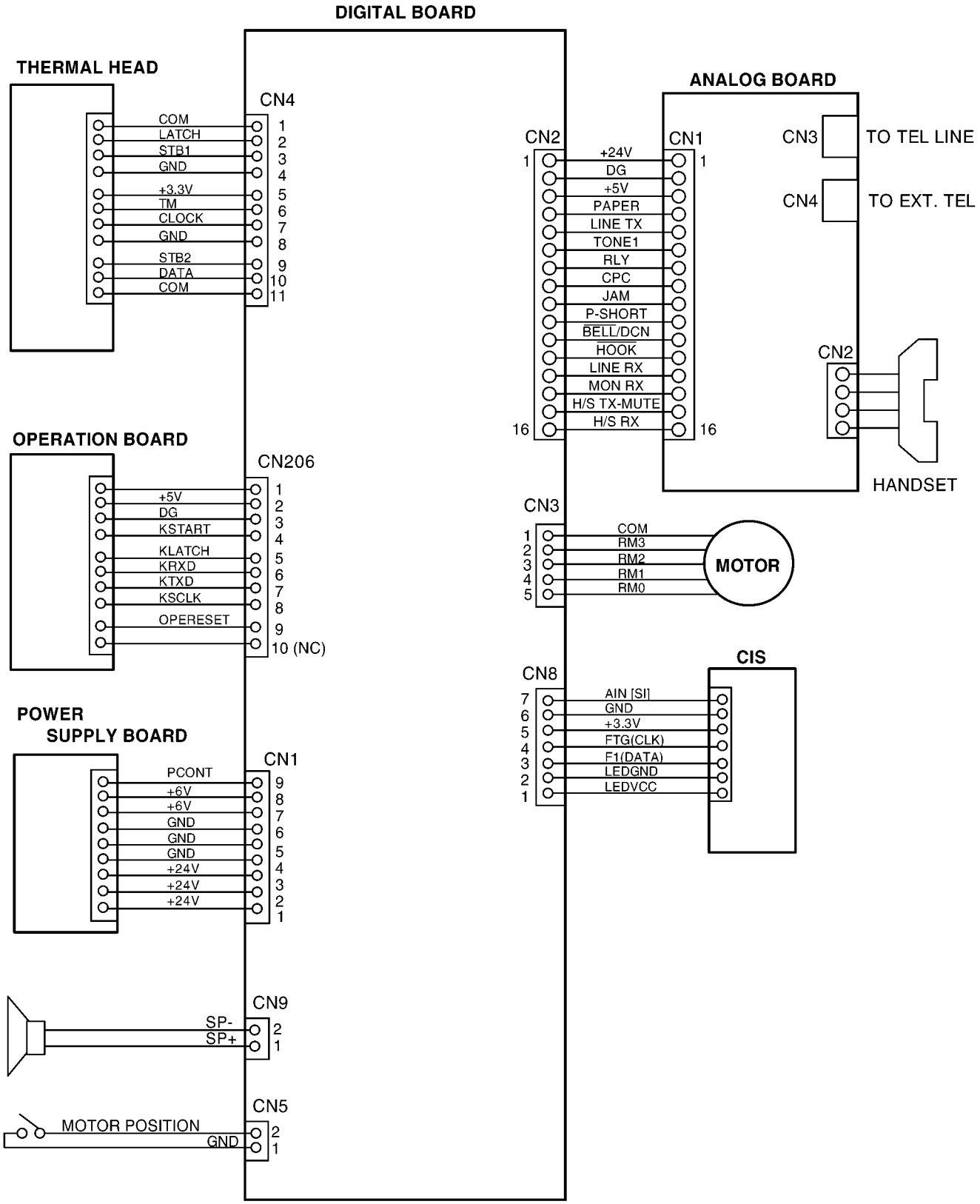
Integrated Telephone System
- Redialing function
- Phonebook function (100 names)
- Caller ID compatible**

  **Feature requires a subscription to caller identification services offered by certain local telephone companies for a tee. You and your caller(s) must be in areas that provide caller identification services, and compatible equipment must be used by both telephone companies. Feature not available when the unit is connected to a PBX system.

Enhanced Copier Function
- 64-Level halftone

6 Technical Descriptions

6.1. Connection Diagram

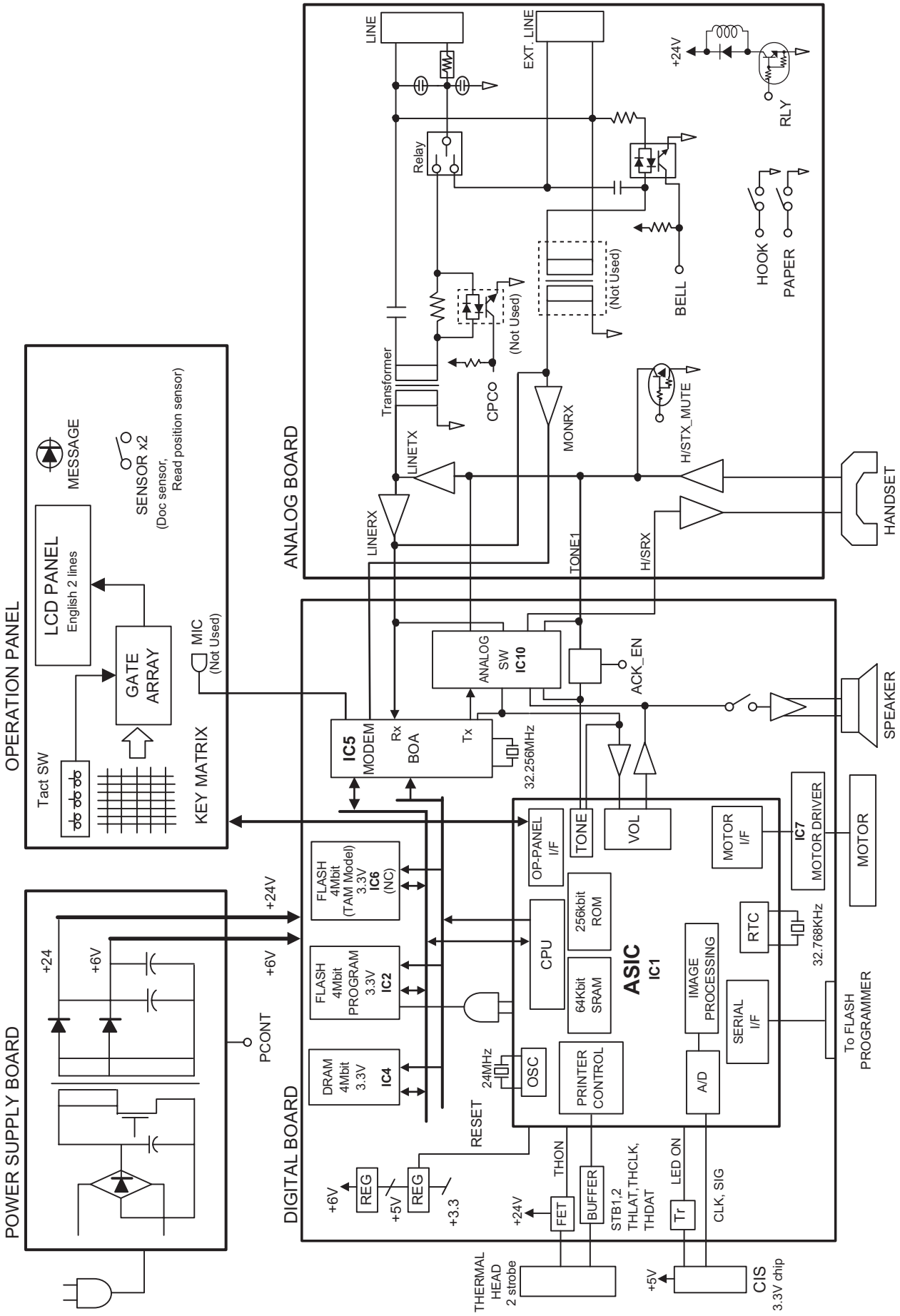


6.2. General Block Diagram

The following is an outline of each device IC on the digital board. (Refer to **General Block Diagram** (P.13).).

1. ASIC (IC1)
   Composed mainly of an address decoder and a modem control.
   Controls the general FAX operations.
   Controls the operation panel I/F.
   Controls the thermal head I/F and CIS I/F.
   Performs the image processing.
   CPU and Real time clock
   Provides the reset pulse for each of the major ICs.
2. Flash ROM (IC2)
   Contains all of the program instructions on the unit operations.
   This memory is used mainly for the parameter working in the storage area.
3. Dynamic RAM (IC4)
   This memory is used mainly for the parameter working in the storage area.
4. MODEM (IC5)
   Performs the modulation and the demodulation for FAX communication.
5. Read Section
   CIS image sensor to read transmitted documents.
6. Motor Driver (IC7)
   Drives the transmission motor and the reception motor.
7. Thermal Head
   Contains heat-emitting elements for dot matrix image printing.
8. Sensor Section
   Composed of a cover open and film end switch, a document set switch, a document top switch, a paper top sensor and a motor position switch.
9. Power Supply Board Switching Section
   Supplies +6V and +24V to the unit.

6.2.1. General Block Diagram



6.3. Control Section

6.3.1. ASIC (IC1)

This custom IC is used for the general FAX operations.

1. CPU:
   This model uses a Z80 equivalent to the CPU operating at 12 MHz. Most of the peripheral functions are performed by custom-designed LSIs. Therefore, the CPU only works for processing the results.
2. RTC:
   Real Time Clock
3. DECODER:
   Decodes the address.
4. ROM/RAM I/F:
   Controls the SELECT signal of ROM or RAM and the bank switching.
5. CIS I/F:
   Controls the document reading.
6. IMAGE DATA RAM:
   This memory is programmed into the ASIC and uses 8 KB for the image processing.
7. THERMAL HEAD I/F:
   Transmits the recorded data to the thermal head.
8. MOTOR I/F:
   Controls the transmission motor which feeds the document.
   Controls the receiving motor which feeds the recording paper.
9. OPERATION PANEL I/F:
   Serial interface with Operation Panel.
10. I/O PORT:
    I/O Port Interface.
11. ANALOGUE UNIT:
    Electronic volume for the monitor.
    Sends beep tones, etc.

Note*:
This memory is incorporated into the ASIC (IC1) and used for the image processing.

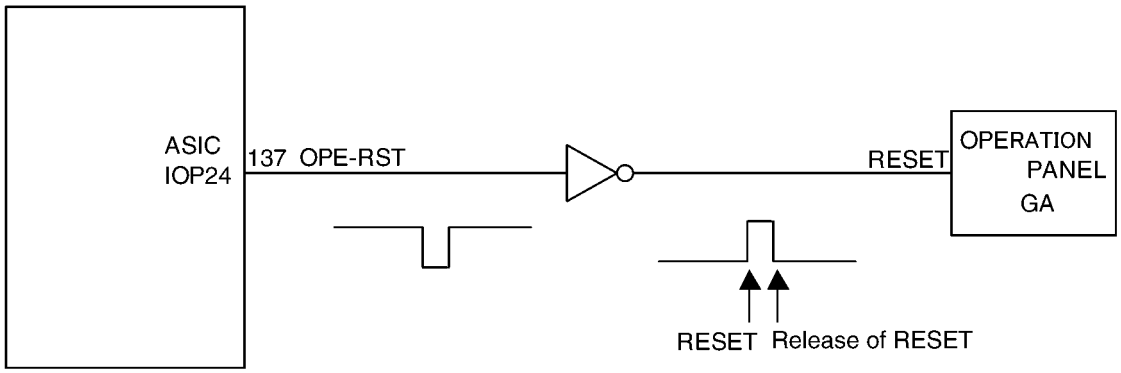
Descriptions of Pin Distribution (IC1)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
1	VSSA		GND	POWER SOURCE (ANALOG GND)
2	VDDA 3.3		3.3V	POWER SOURCE (ANALOG +3.3V)
3	AIN1	A	3.3V	CIS IMAGE SIGNAL INPUT (ATN1)
4	AIN2	A	3.3V	THERMISTOR TEMPERATURE WATCH INPUT
5	AIN3	A	3.3V	LINE VOLTAGE DETECTION SIGNAL INPUT (DCIN)
6	AMON	A	3.3V	ANALOG SIGNAL MONITOR TERMINAL
7	VSS		GND	POWER SOURCE (GND)
8	X32OUT	O	3.3V/BATT	RTC (32.768KHz) CONNECTION
9	X32IN	I	3.3V/BATT	RTC (32.768KHz) CONNECTION
10	VDD (3.3V / B)		-----	POWER SOURCE (+3.3V/LITHIUM BATTERY)
11	XBACEN	I	3.3V/BATT	BACKUP ENABLE
12	XRAMCS	O	3.3V/BATT	XRAMCS
13	VDD (3.3V / B)		-----	POWER SOURCE(+3.3V / LITHIUM BATTERY)
14	VDD (2.5V/B)		-----	POWER SOURCE (+2.5V / LITHIUM BATTERY)
15	FTG	O	3.3V	SH SIGNAL OUTPUT FOR CIS (FTG)
16	F1	O	3.3V	01 SIGNAL OUTPUT FOR CIS (F1)
17	F2/OP	O	3.3V	OUTPUT PORT (HEADON)
18	FR/OP	O	3.3V	OUTPUT PORT (MDMRST)
19	CPC	I	3.3V	INPUT PORT (CPC)
20	RVN	I	3.3V	INPUT PORT (PAPER)
21	IRDATXD/IOP	I	3.3V	INPUT PORT (JAM)
22	IRDARXD/IOP80	O	3.3V	OUTPUT PORT (HSTX MUTE)
23	TXD/IOP	I	3.3V	INPUT PORT (BELL)
24	RXD/IOP	I/O	3.3V	PORT (TELRXEN)
25	XRTS/IOP	I	3.3V	INPUT PORT (PSHORT)
26	XCTS/IOP	I/O	3.3V	PORT (MDMTXEN)
27	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
28	TONE1	A	3.3V	TONE OUTPUT
29	TONE2	A	3.3V	TONE OUTPUT
30	VOLUREF	A	3.3V	ANALOG REF VOLTAGE
31	VOLUOUT	A	3.3V	VOLUME OUTPUT
32	VOLUIN	A	3.3V	VOLUME INPUT
33	XNMI	I	3.3V	HIGH FIXED
34	FMEMDO/IOP	O	3.3V	OUTPUT PORT (LED ON)
35	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
36	VSS		GND	POWER SOURCE (GND)
37	VSS		GND	POWER SOURCE (GND)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
38	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
39	MIDAT/IOP	I/O	3.3V	PORT (TONE1EN)
40	MICLK/IOP	O	3.3V	OUTPUT PORT (TONE2EN)
41	MILAT/IOP	I/O	3.3V	PORT (HSRXEN)
42	20KOSC/IOP	O	3.3V	OUTPUT PORT (PWRCNT)
43	XWAIT	I	3.3V	INPUT PORT (HOOK)
44	HSTRD/IOP	I	3.3V	INPUT PORT (TEST)
45	HSTWR/IOP	O	3.3V	OUTPUT PORT (BLEEDER_ON)
46	XOPRBE	O	3.3V	OUTPUT PORT (MFCS)
47	ADR15	O	3.3V	CPU ADDRESS BUS 15 (NOT USED)
48	ADR14	O	3.3V	CPU ADDRESS BUS 14 (NOT USED)
49	ADR13	O	3.3V	CPU ADDRESS BUS 13 (NOT USED)
50	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
51	XOUT	O	3.3V	SYSTEM CLOCK (24MHz)
52	XIN	I	3.3V	SYSTEM CLOCK (24MHz)
53	VSS		GND	POWER SOURCE (GND)
54	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
55	XTEST	O	3.3V	24MHz CLOCK
56	TEST1	I	3.3V	HIGH FIXED
57	TEST2	I	3.3V	HIGH FIXED
58	TEST3	I	3.3V	HIGH FIXED
59	TEST4	I	3.3V	HIGH FIXED
60	XMDMINT	I	3.3V	MODEM INTERRUPT
61	XMDMCS	O	3.3V	MODEM CHIP SELECT
62	XRAS/IOP	O	3.3V	DRAM ROW ADDRESS STROBE (RAS)
63	XCAS1/IOP	O	3.3V	DRAM COLUMN ADDRESS STROBE (CAS)
64	XCAS2/IOP	I	3.3V	PORT (SPMUTE)
65	XRESCS2	O	3.3V	FLASH CHIP SELECT (XRESCS2)
66	DB3	I/O	3.3V	CPU DATA BUS 3
67	DB2	I/O	3.3V	CPU DATA BUS 2
68	DB4	I/O	3.3V	CPU DATA BUS 4
69	DB1	I/O	3.3V	CPU DATA BUS 1
70	DB5	I/O	3.3V	CPU DATA BUS 5
71	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
72	VSS		GND	POWER SOURCE (GND)
73	VSS		GND	POWER SOURCE (GND)
74	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
75	DB0	I/O	3.3V	CPU DATA BUS 0
76	DB6	I/O	3.3V	CPU DATA BUS 6
77	DB7	I/O	3.3V	CPU DATA BUS 7
78	XROMCS	O	3.3V	FLASH (IC2) CHIP SELECT
79	RD	O	3.3V	CPU RD
80	WR	O	3.3V	CPU WR
81	ADR0	O	3.3V	CPU ADDRESS BUS 0
82	ADR1	O	3.3V	CPU ADDRESS BUS 1
83	ADR2	O	3.3V	CPU ADDRESS BUS 2
84	ADR3	O	3.3V	CPU ADDRESS BUS 3
85	ADR4	O	3.3V	CPU ADDRESS BUS 4
86	ADR5	O	3.3V	CPU ADDRESS BUS 5
87	VSS		GND	POWER SOURCE (GND)
88	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
89	ADR6	O	3.3V	CPU ADDRESS BUS 6
90	ADR7	O	3.3V	CPU ADDRESS BUS 7
91	ADR8	O	3.3V	CPU ADDRESS BUS 8
92	ADR9	O	3.3V	CPU ADDRESS 9
93	ADR10	O	3.3V	CPU ADDRESS 10
94	ADR11	O	3.3V	CPU ADDRESS 11
95	ADR12	O	3.3V	CPU ADDRESS 12
96	RBA0	O	3.3V	ROM/RAM BANK ADDRESS 0
97	RBA1	O	3.3V	ROM/RAM BANK ADDRESS 1
98	RBA2	O	3.3V	ROM/RAM BANK ADDRESS 2
99	RBA3	O	3.3V	ROM/RAM BANK ADDRESS 3
100	RBA4	O	3.3V	ROM/RAM BANK ADDRESS 4
101	RBA5	O	3.3V	ROM/RAM BANK ADDRESS 5
102	RBA6/IOP96	O	3.3V	OUTPUT PORT (NC)
103	STB1	O	3.3V	STROBE SIGNAL OUTPUT TO THERMAL HEAD

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
104	STB2	O	3.3V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
105	STB3	O	3.3V	OUTPUT PORT (NC)
106	XRESET	I	3.3V	RESET INPUT
107	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
108	VSS		GND	POWER SOURCE (GND)
109	VSS		GND	POWER SOURCE (GND)
110	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
111	XORESET	O	3.3V	NOT USED
112	VDD(5V)		-----	POWER SOURCE (+5V)
113	VSS		GND	POWER SOURCE (GND)
114	XRESETI	I	3.3V	RESET INPUT
115	WDERR	O	3.3V	WATCHED ERROR OUTPUT SIGNAL
116	THDAT	O	3.3V	RECORDED IMAGE OUTPUT (THDAT)
117	THCLK	O	3.3V	CLOCK OUTPUT FOR DATA TRANSFER (THCLK)
118	THLAT	O	3.3V	PULSE OUTPUT FOR DATA LATCH (THLAT)
119	STBNP	I	3.3V	INPUT PORT (MOT-POS)
120	RM0/IOP	O	3.3V	MOTOR A PHASE
121	RM1/IOP	O	3.3V	MOTOR B PHASE
122	RM2/IOP	O	3.3V	MOTOR /A PHASE
123	RM3/IOP	O	3.3V	MOTOR /B PHASE
124	RXE/IOP	O	3.3V	MOTOR ENABLE
125	TMO	O	3.3V	OUTPUT PORT (NC)
126	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
127	VSS		GND	POWER SOURCE (GND)
128	TM1/IOP	O	3.3V	OUTPUT PORT (ACK_EN)
129	TM2/IOP	O	3.3V	OUTPUT PORT (CISON)
130	TM3/IOP	O	3.3V	OUTPUT PORT (RLY)
131	TXE/IOP	I	3.3V	INPUT PORT (CUT_POS)
132	KSTART	O	3.3V	OPERATION PANEL CONTROL
133	KLATCH	O	3.3V	OPERATION PANEL CONTROL
134	KSCLK	O	3.3V	OPERATION PANEL CONTROL
135	KTXD	O	3.3V	OPERATION PANEL CONTROL
136	KRXD	I	3.3V	OPERATION PANEL CONTROL
137	FMEMCLK/IOP	O	3.3V	OUTPUT PORT (OPRESET)
138	FMEMDI/IOP	O	3.3V	OUTPUT PORT (NC)
139	ADSEL1	O	3.3V	CHANNEL SELECT SIGNAL FOR AIN2
140	VDDA (2.5V)		2.5V	POWER SOURCE (ANALOG +2.5V)
141	VREFB	A	3.3V	A/D CONVERTER'S ZERO STANDARD VOLTAGE OUTPUT
142	VCL	A	3.3V	ANALOG PART STANDARD VOLTAGE SIGNAL
143	VREFT	A	3.3V	A/D CONVERTER'S FULL SCALE VOLTAGE OUTPUT
144	VSSA		GND	POWER SOURCE (ANALOG GND)

Connection to operation reset circuit



6.3.2. Flash Memory (IC2)

This 512KB ROM (FLASH MEMORY) carries a common area of 32KB and bank areas which each have 8KB (BK4~BK63). The addresses from 0000H to 7FFFH are for the common area and from 8000H to 9FFFH are for the bank areas.

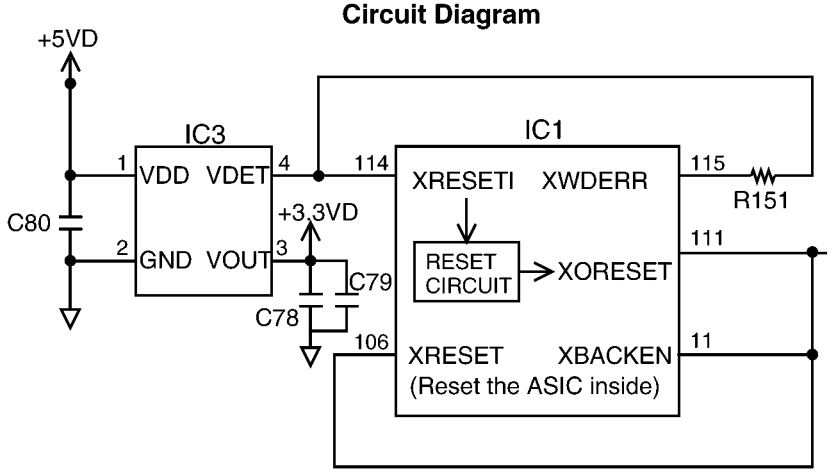
6.3.3. Dynamic RAM (IC4)

The DRAM serves as CPU and receives memory.
The address is F200H~F3FFH (DRAM access window 1) and F600H~F7FFH (DRAM access window 2).

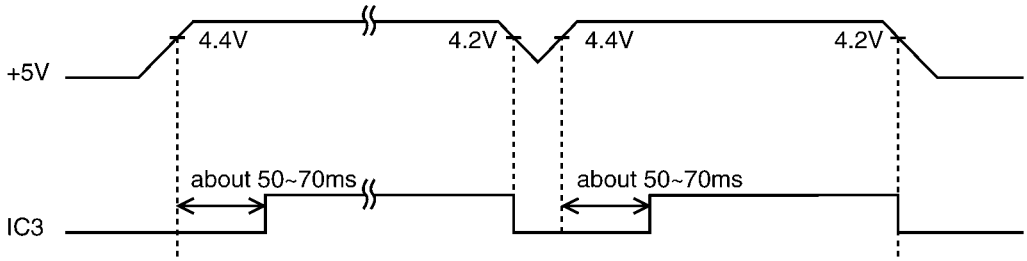
6.3.4. Reset Circuit (Watch dog timer)

The output signal (reset) from pin 4 of the voltage detect IC (IC3) is input to the ASIC (IC1) 114 pin.

Circuit Diagram



1. During a momentary power interruption, a positive reset pulse of 50~70 msec is generated and the system is reset completely.



2. The watch dog timer, built-in the ASIC (IC1), is initialized by the CPU about every 1.5 ms.
   When a watch dog error occurs, pin 115 of the ASIC (IC1) becomes low level.
   The terminal of the 'WDERR' signal is connected to the reset line, so the 'WDERR' signal works as the reset signal.

6.3.5. RTC Back up Circuit

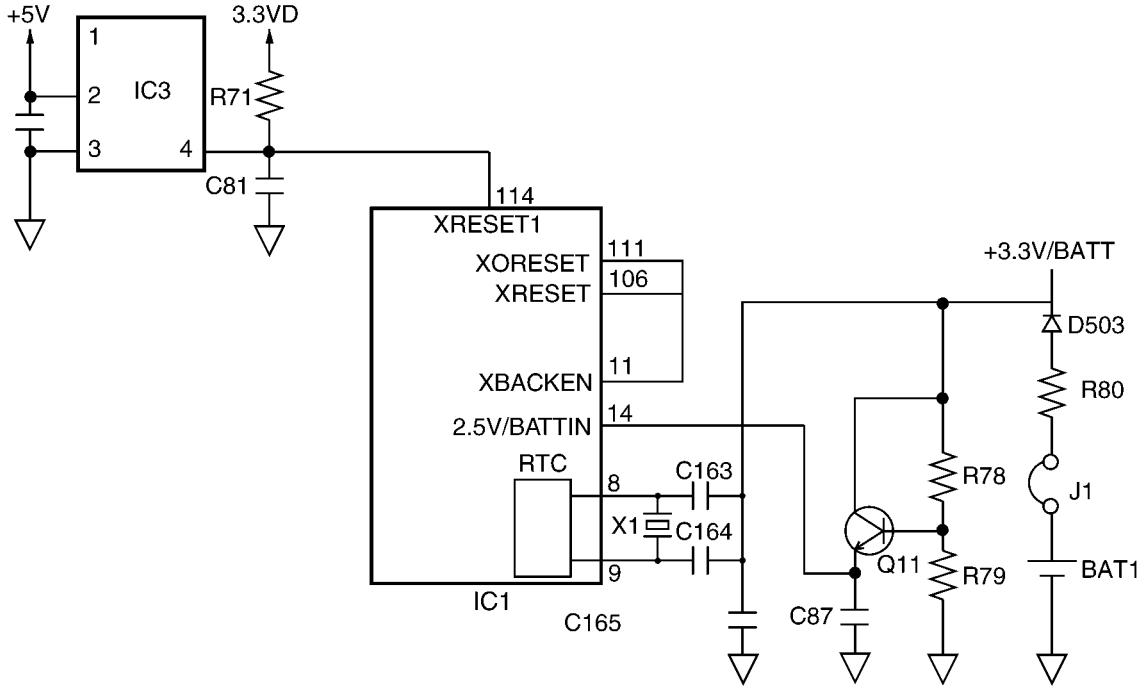
1. **Function**

   This unit has a lithium battery (BAT1) which works for the Real Time Clock (RTC, Integrated into ASIC:IC1).
   The RTC continues functioning, even when the power switch is OFF, backed up by a lithium battery.

2. **Circuit Operation**

   When the power is turned ON, power is supplied to RTC (IC1).
   At this time, the voltage at pin 14 of RTC (IC1) is +3.3V. When the power is turned OFF, the battery supplies the power to RTC through J1, R80, D503. At that time, the voltage at pin 14 of IC1 are about +2.5V. When the power is OFF and the +5V and +3.3V voltages decrease, the LOW is input to pin 114 of IC1. Pin 111 of IC1 outputs the reset signals. Pin 11 of IC1 become low, then RTC (IC1) go into the back up mode, when the power consumption is lower.

Circuit Diagram



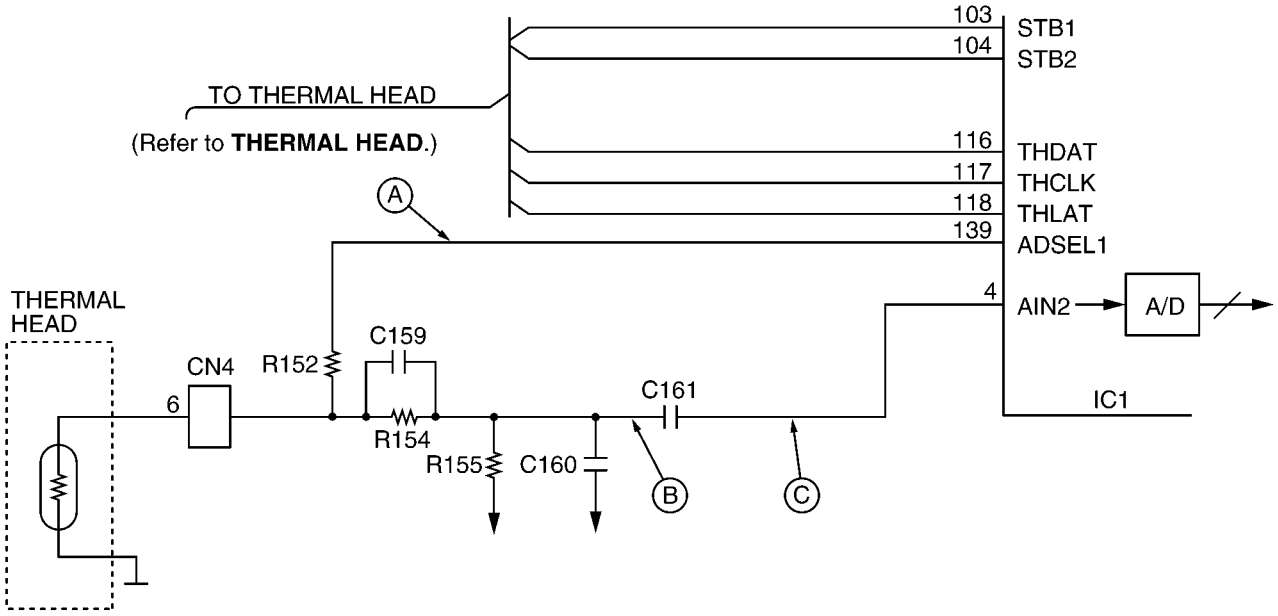
6.3.6. Supervision Circuit for the Thermal Head Temperature

1. **Function**

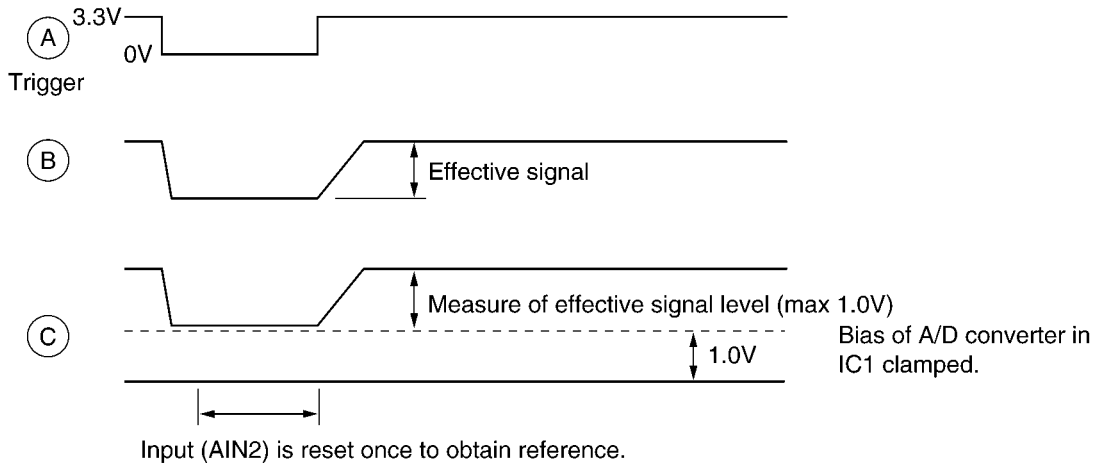
The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 139 of IC1 becomes a low level. Then when it becomes a high level, it triggers point A. In point C, according to the voltage output time, the thermal head's temperature is detected.

After the thermal head temperature is converted to voltage in B, it is then changed to digital data in the A/D converter inside 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



CROSS REFERENCE:

Thermal Head(P.22)

6.4. Facsimile Section

6.4.1. Image Dara Flow During Facsimile Operation

Copy (Fine, Super-Fine, Photo)

1. Line information is read by CIS (to be used as the reference white level) via route (1), and is input to IC1. Refer to **Block Diagram** (P.21)
2. In IC1, the data is adjusted to a suitable level for A/D conversion in the Analog Signal Processing Section, and via route (2) it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route (3). Then via route (4) and route (5), it is stored in RAM as shading data.
3. The draft's information that is read by CIS is input to IC1 via route (1). After it is adjusted to a suitable level for A/D conversion via route (2), the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via route (6) and route (7), is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Then via routes (4) and (5), they are stored in RAM.
4. The white/black data stored as above via routes (6) and (8) is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route (9) and is printed out on recording paper.

   Note:

   Fine: Reads 3.85 lines/mm
   Super Fine: Reads 7.7 lines/mm
   Photo: Reads 15.4 lines/mm

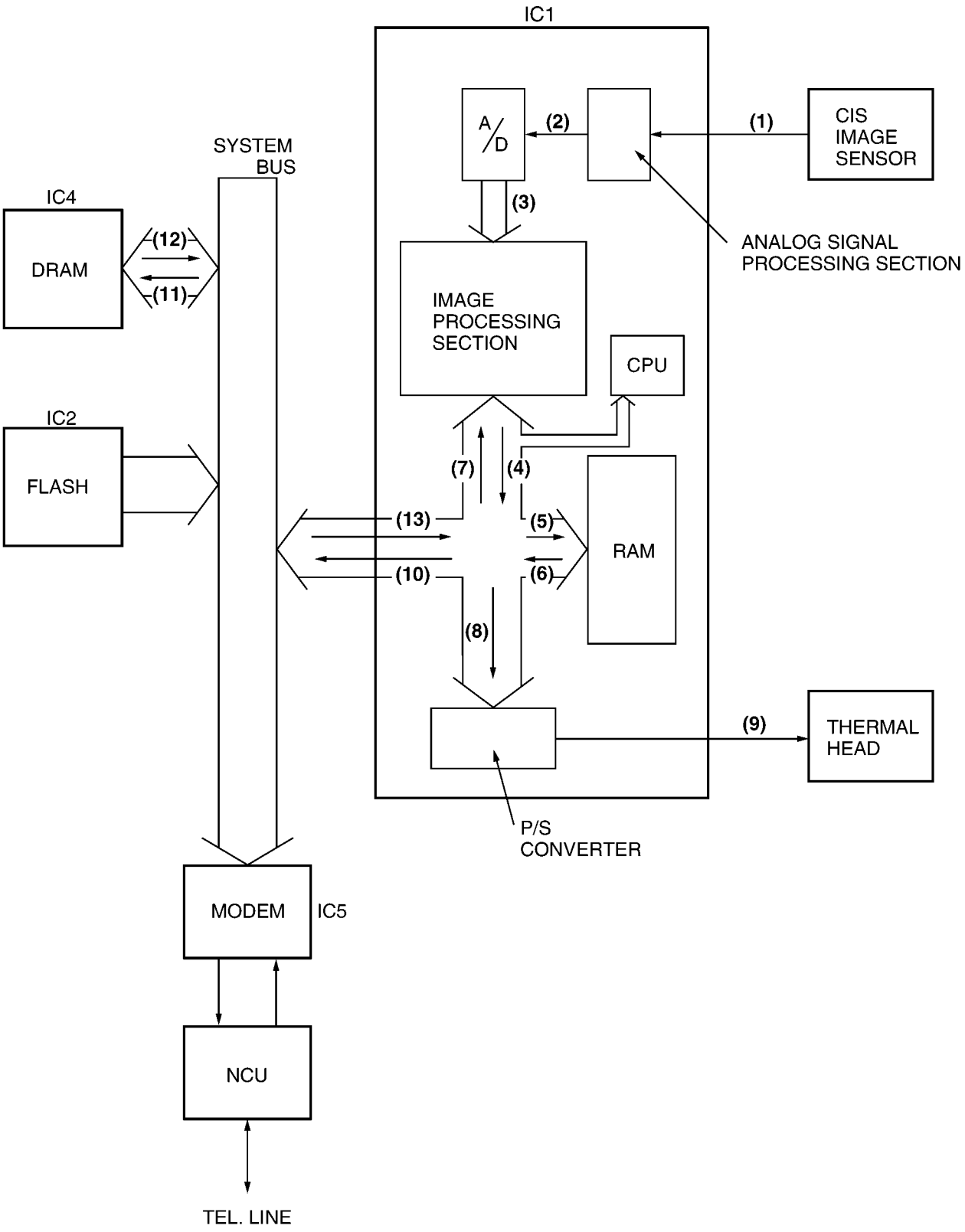
Transmission

1. Same processing as **Copy** items 1 - 3.
2. The data stored in the RAM of IC1 is output from IC1 via routes (6) and (10), and is stored in the system bus. Via route (11), it is stored in the communication buffer inside DRAM (IC4).
3. While retrieving data stored in the communication buffer synchronous with the modem, the CPU (inside IC1) inputs the data to the modem along route (12), where it is converted to serial analogue data and forwarded over the telephone lines via the NCU Section.

Reception

1. The serial analog image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC1) stores the data in the communication buffer DRAM (IC4) along route (11).
2. The data stored in DRAM (IC4) is decoded by the CPU (IC1) via route (12), and is stored in RAM via routes (13) and (5).
3. Same processing as **Copy** item 4.

6.4.2. Block Diagram



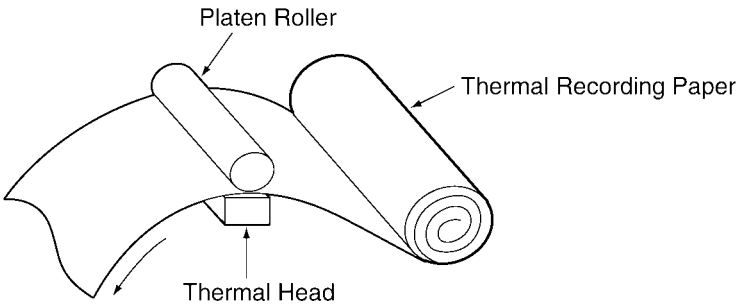
6.4.3. Thermal Head

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 momentarily, and black dots (appearing like points) are printed on the paper. If this continues, letters and/or diagrams appear, and the original document is reproduced.

Composition of the Receive Record Section (Thermal Recording Format)



2. **Circuit Operation**

There are 27 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 64 heat emitting registers. This means that one line is at a density of 64×27=1728 dots=(8 dots/mm).

White/Black (white=0, black=1) data in one line increments is synchronized at IC1 pin 117 (THCLK), and sent from IC1 pin 116 (THDAT) to the shift register of the ICs. The shift registers of the 27 ICs are connected in series, and upon the shift of dot increment 1728, all the shift registers become filled with data, and a latch pulse is emitted to each IC from IC1 pin 118 (THLAT).With this latch pulse, all the contents of the shift registers are latched to the latch registers. Thereafter, through the addition of strobes from the IC1 pins (103 - 104) only black dot locations (=1) among latched data activates the driver, and the current passes to heat the emitting body causing heat emission.

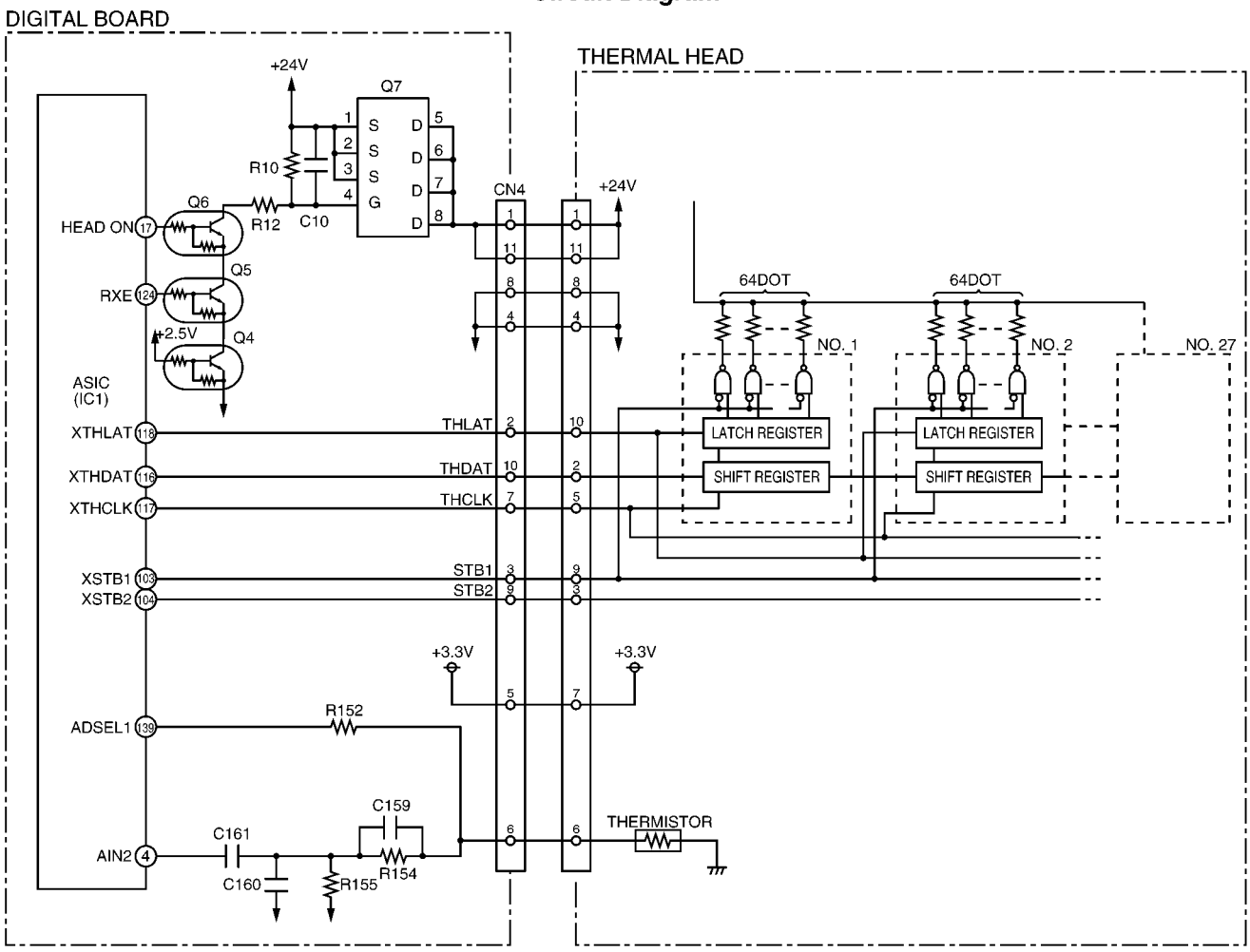
Here, the two line strobes, STB1 and STB2, impress at intervals of 9.216 msec, as required for one-line printout.

The sequence is shown on the next page. [Moreover, for the strobe width, the thermistor value inside the thermal head is detected according to IC1 pin 4. (See **Block Diagram** (P.21).) Depending on that value, the strobe width is recorded in FLASH (IC2).

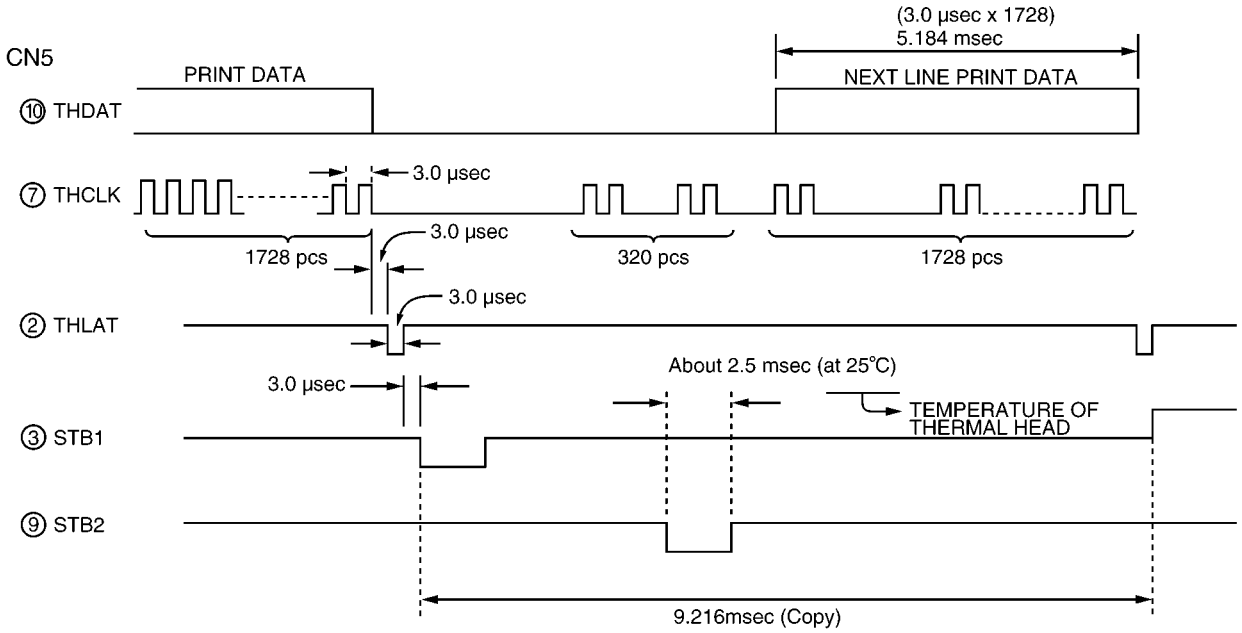
Accordingly, the strobe width is determined.

When the thermal head is not used, the IC1 (17, HEADON) becomes low, Q6 turns OFF, Q7 turns OFF, and the +24 V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram



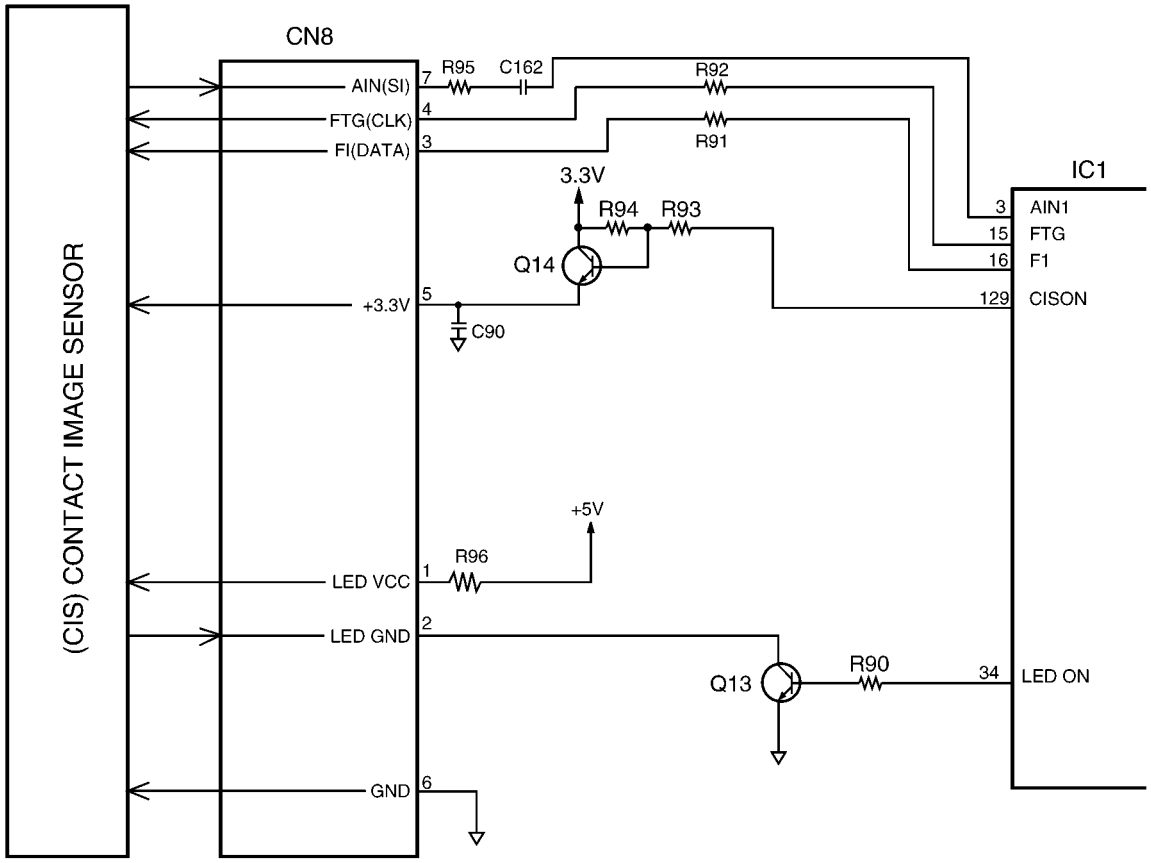
Timing Chart



6.4.4. Scanning Block

The scanning block of this device consists of a control circuit and a contact image sensor made up of a celfoc lens array, a light source, and photoelectric conversion elements.

Circuit Diagram



When an original document is inserted and the start button pressed, pin 129 of IC1 goes to a high level and the transistor Q14 turns on.This applies voltage to the light source to light it. The contact image sensor is driven by each of the FTG-F1 signals output from IC1, and the original image illuminated by the light source undergoes photoelectric conversion to output an analogue image signal (AIN). The analogue image signal is input to the system ASIC on AIN1 (pin 3 of IC1) and converted into 8-bit data by the A/D converter inside IC1. Then this signal undergoes digital processing in order to obtain a high-quality image.

6.4.5. Stepping Motor Drive Circuit

1. **Function**

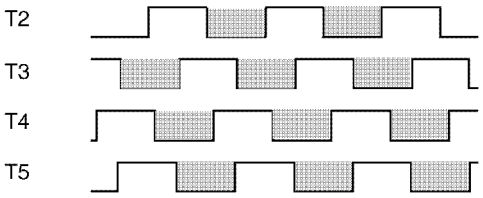
   One individual stepping motor is used for transmission and reception. It feeds the document or recording paper synchronized for reading or printing.

2. **Circuit Operation**

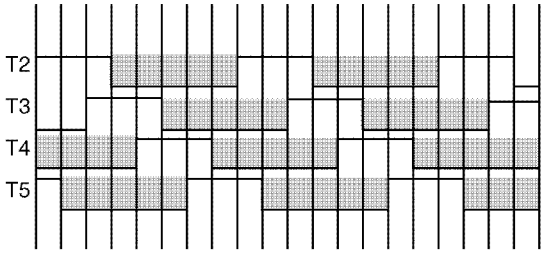
   During motor drive, ASIC IC1 pin 124 becomes a high level, and Q2 and Q1 go ON as a result. +24 V is supplied tothe motor coil.

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

Timing chart (2 Phase)



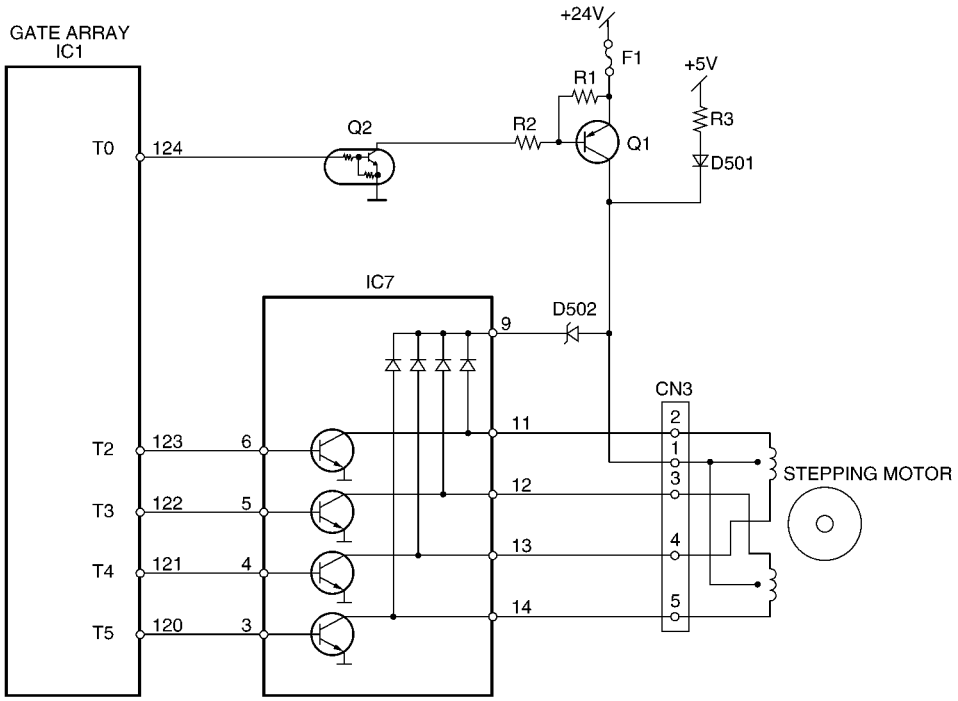
1-2 Phase (Asic T2-T5, output)



Stepping Motor Phase Pattern

Function	Mode	Phase Pattern	Speed
Copy	Fine/Photo	1-2	432 pps
	Super Fine	1-2	216 pps
FAX	STD	2	432 pps
	Fine/Photo	1-2	432 pps
	Super Fine	1-2	216 pps
———	Paper Feed	2	432 pps

Circuit Diagram

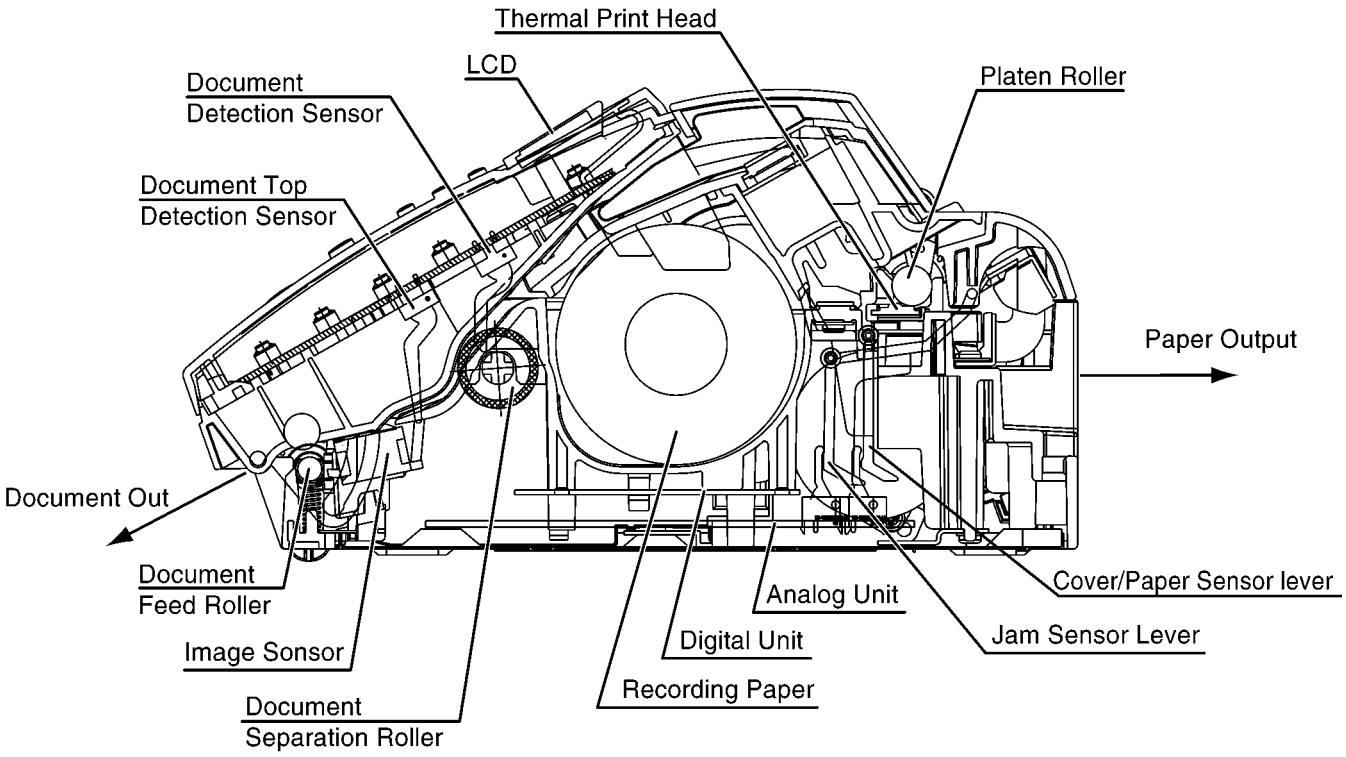


When the motor is OFF, gate array IC1 pin 124 becomes a low level and Q2 and Q1 also turns OFF. Instead of +24V, +5V is suplied through D501 so that the motor is held in place.

6.5. Sensors and Switches

All of the sensors and switches are shown below.

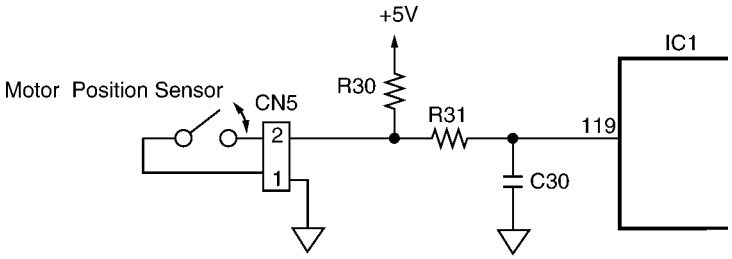
Sensor Circuit Location	Sensor	Sensor or Switch Name	Message Error
DIGITAL	CN5	Motor Position Sensor	[CALL SERVICE]
ANALOG	SW1	Recording Paper Sensor	[CHECK COVER] and [OUT OF PAPER]
	SW2	Hook SW	————
	SW3	JAM Sensor	[PAPER JAMED]
Operation Panel	SW39	Document Top Sensor	[REMOVE DOCUMENT]
	SW38	Document Set Sensor	[CHECK DOCUMENT]



6.5.1. Motor Position Sensor

This sensor is a detection switch for recording the position of the CAM.

Circuit Diagram



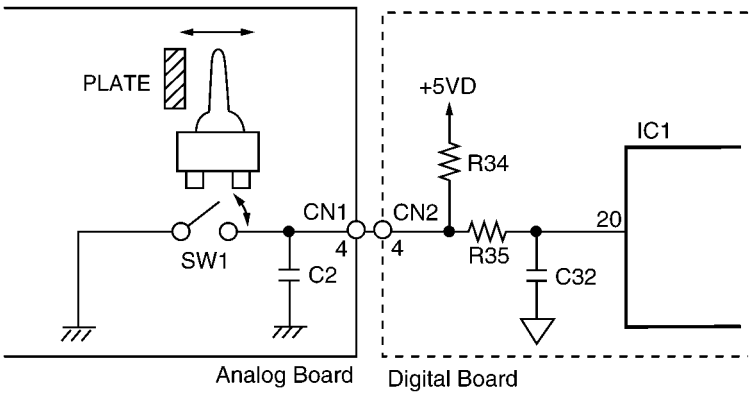
Digital Board

	Signal (IC1-119 Pin)
Home position	Low level
Other	High level

6.5.2. Recording Paper Sensor (SW1)

When there is no recording paper, the plate is separated from the switch lever and the switch turns off. Pin 20 of IC1 becomes a high level. When there is recording paper, the plate pushes the switch lever and the switch turns ON. Pin 20 of IC1 becomes a low level.

Circuit Diagram



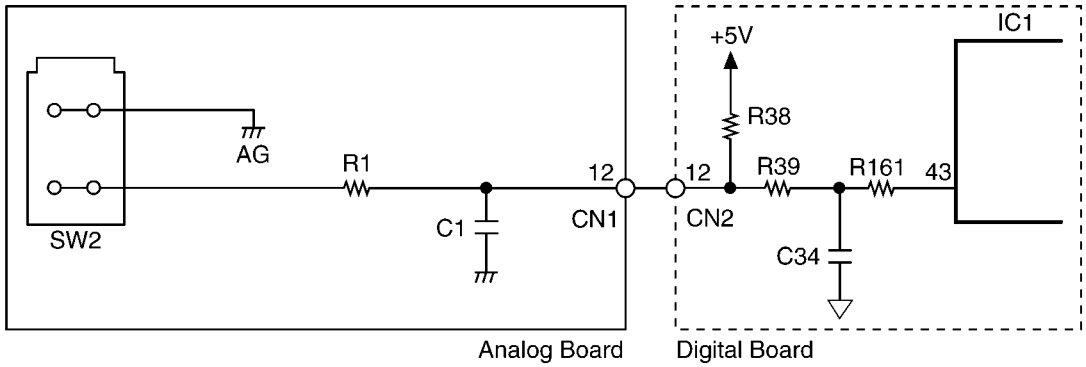
Analog Board

	Signal (IC1-20 Pin)
Paper	Low level
No paper	High level

6.5.3. Hook Switch (SW2)

When the handset is lifted, the switch turns ON, and the signal at pin 43 of IC1 becomes low.
When the handset is returned, the switch turns OFF, and the signal at pin 43 of IC1 becomes high.

Circuit Diagram



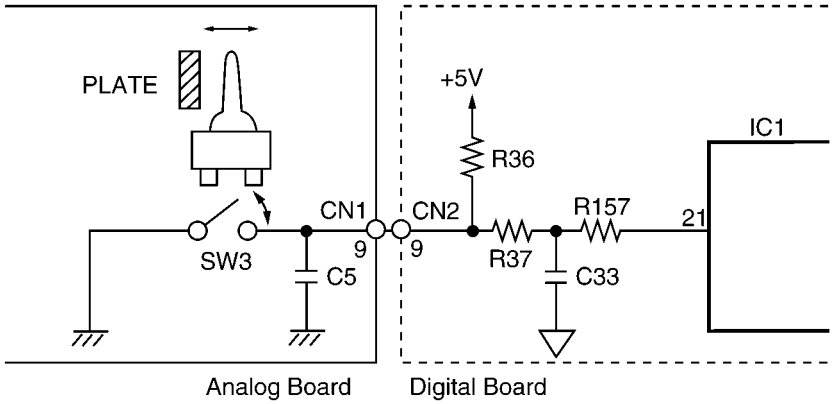
Digital Board

	SW	Signal
ON-Hook	OFF	High level (IC1-43 pin)
OFF-Hook	ON	Low level

6.5.4. Jam Sensor (SW3)

The JAM sensor is a detection switch for determining whether the recording paper edge is in the correct position or not. If the recording paper cannot be detected correctly at the JAM sensor position even when recording paper is present, then JAM is displayed. If the recording paper is at the sensor position, then the switch turns on the IC1-21pin switches to a high level.

Circuit Diagram



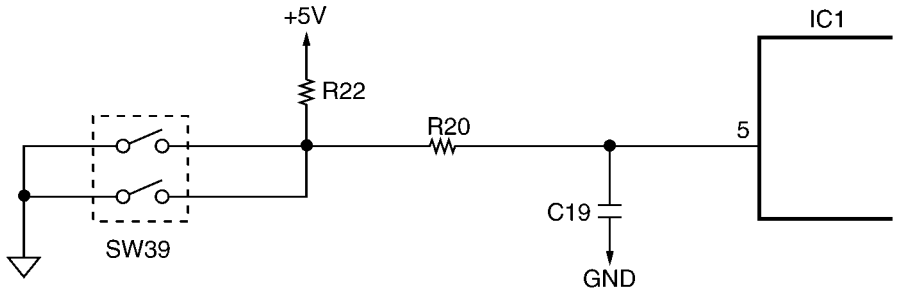
Analog Board

	Signal (IC1-21 Pin)
Paper	Low level
No paper	High level

6.5.5. Document Top Sensor (SW39)

When a document is brought to the read position, the SW becomes ON, and the input signal of IC1-5 pin (Operation) becomes a low level. When there is no document at the read position, the SW becomes OFF, and the input signal of IC1-5 pin (Operation) becomes a high level.

Circuit Diagram



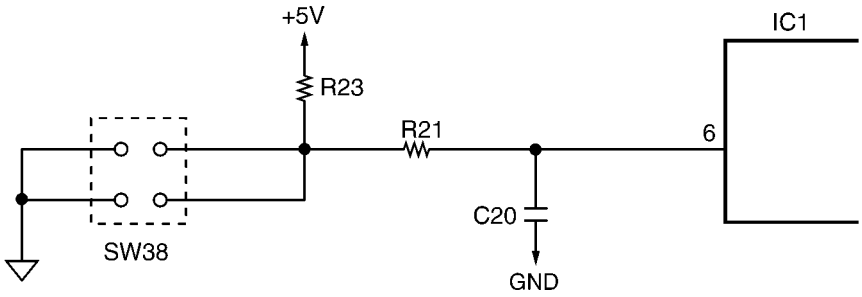
Operation Board

	Signal (IC1-5 pin)
Out of the Read Position	High level
At the Read Position	Low level

6.5.6. Document Set Sensor (SW38)

When a document is set, the SW becomes ON, and input signal of IC1-6 pin (Operation) becomes a low level.
When there is no document, the SW becomes OFF, and the input signal of IC1-6 pin (Operation) becomes a high level.

Circuit Diagram



Operation Board

	Signal (IC1-6 pin)
No document	High level
Set document	Low level

6.6. Modem Section

6.6.1. Function

The unit uses a 1 chip modem (IC5) that serves as an interface between the control section for FAX transmission and reception and the telephone line. During a transmitting operation, the digital image signals are modulated and sent to the telephone line. During a receiving operation, the analogue 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 (IC5) has hardware which sends and detects all of the necessary signals for FAX communication (DTMF).
It can be controlled by writing commands from the CPU (IC1: inside ASIC) to the register in the modem (IC5).
This modem (IC5) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

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

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

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

2. **Definition of Each Group**

- Group I (G1)

Official A-4 size documents without using formats which reduce the band width of a signal are sent over telephone lines.Determined in 1968.
Transmission for about 6 minutes at a scanning line density of 3.85 lines/mm.

- Group II (G2)

Using reduction technology in the modulation/demodulation format, an 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)

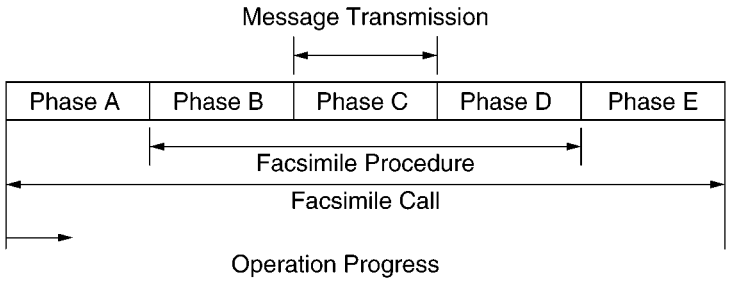
Method of suppressing redundancy in the image signal prior to modulation is used. An A-4 size document is sent within about one minute.
Determined in 1980.

- Group IV (G4)

Transmission is via the data network. A method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.
The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

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 sequence for confirming the status of the terminal, transmission route, etc., and for terminal 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 the transmitting facsimile messages.
Phase D: Post message procedure
Phase D is the procedure for confirming that the message is completed and received. For continuous transmission, phase B or phase C is repeated for transmission.
Phase E: Call retrieval
Phase E is the procedure for call retrieval, that is for circuit disconnection.

4. **Concerning Transmission Time**

$$\text{Transmission Time} = \text{Control Time} + \text{Image Transmission Time} + \text{Hold Time}$$

Transmission time consists of the following.

Control time:
This is time at the start of transmission when the functions at the sending and receiving sides are confirmed, the transmission mode is established, and transmission and reception are synchronized.

Image transmission time:
This is the time required for the transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

Hold time:
This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/or the existence of continuous transmission.

5. **Facsimile Standards**

Item	Telephone Network Facsimile
	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 the degree of data reduction. Minimum Value: 10, 20 Can be recognized in 40ms.

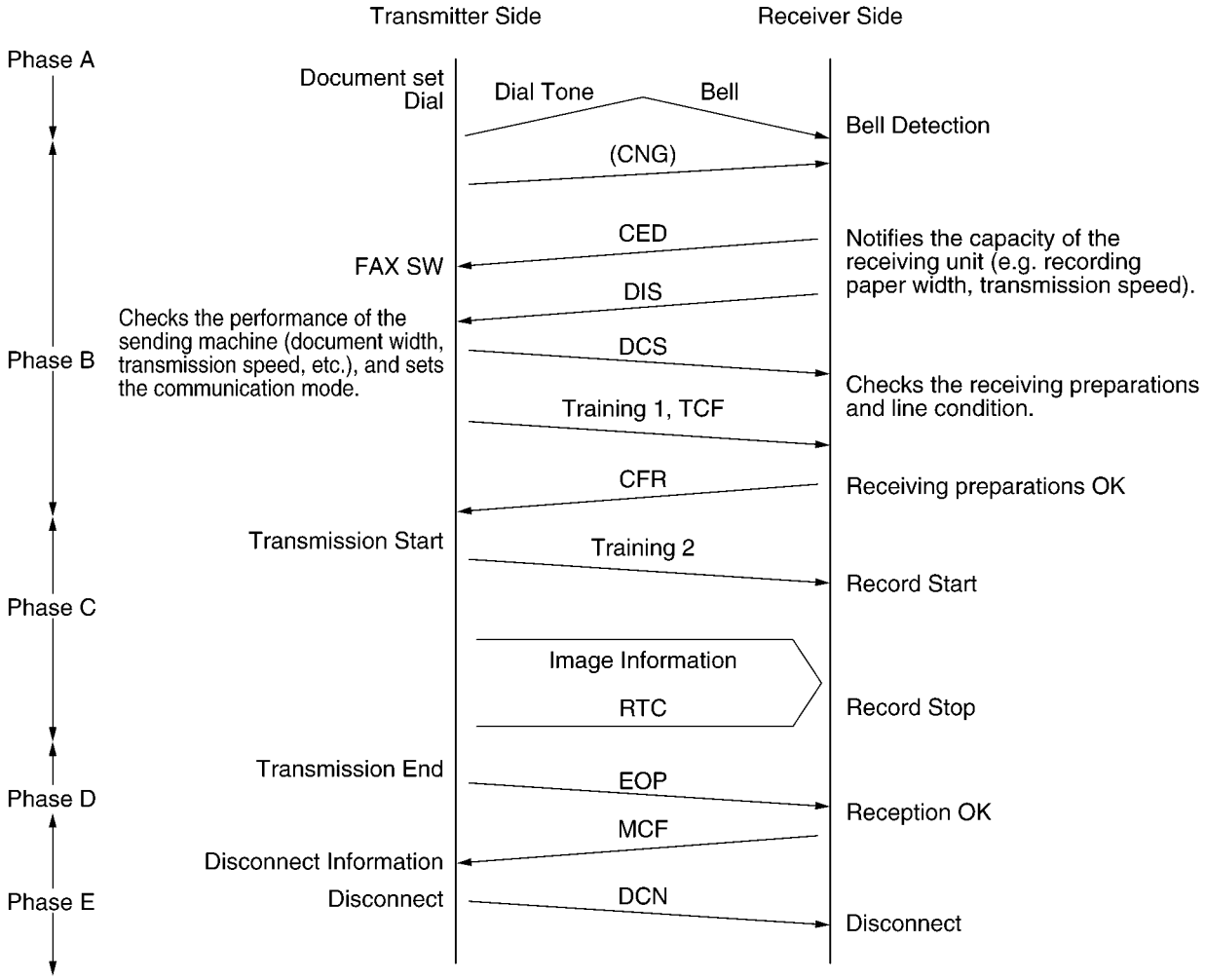
6. **Explanation of Communication and Compression Technology**

a. **G3 Communication Signals (T. 30 Binary Process)**

For G3 Facsimile communication, this is the procedure for exchanging control signals between the sending and receiving machines both before and after transmission of image signals.

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

An example of a 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 the capacity of the receiving unit. The added data signals are as follows.

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

Identification Signal Format.....X1000001

Example (Some models do not support the following items.):

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	
7	Reserved for future T.3 operation features.	
8	Reserved for future T.3 operation features.	
9	Transmitter --- T.4 operation	

Bit No.	DIS/DTC	DCS
10	Receiver --- T.4 operation	Receiver --- T.4 operation
11,12,13,14	Data signaling rate	Data signaling rate
0,0,0,0	V.27 ter fall back mode	2400 bit/s, V.27 ter
0,1,0,0	V.27 ter	4800 bit/s, V.27 ter
1,0,0,0	V.29	9600 bit/s, V.29
1,1,0,0	V.27 ter and V.29	7200 bit/s, V.29
0,0,1,0	Not used	14400 bit/s, V.33
0,1,1,0	Reserved	12000 bit/s, V.33
1,0,1,0	Not used	Reserved
1,1,1,0	V.27 ter and V.29 and V.33	Reserved
0,0,0,1	Not used	14400 bit/s, V.17
0,1,0,1	Reserved	12000 bit/s, V.17
1,0,0,1	Not used	9600 bit/s, V.17
1,1,0,1	V.27 ter and V.29 and V.33 and V.17	7200 bit/s, V.17
0,0,1,1	Not used	Reserved
0,1,1,1	Reserved	Reserved
1,0,1,1	Not used	Reserved
1,1,1,1	Reserved	Reserved
15	R8×7.7 lines/mm and/or 200×200 pels/25.4mm	R8×7.7 lines/mm and/or 200×200 pels/25.4mm
16	Two-dimensional coding capability	Two-dimensional coding capability
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% 2048 picture elements along scan line length of 255 mm ± 1% 2432 picture elements along scan line length of 303 mm ± 1%	2432 picture elements along scan line length of 303 mm ± 1%
(1, 0)	1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1%	2048 picture elements along scan line length of 255 mm ± 1%
(1, 1)	Invalid	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
21, 22, 23	Minimum scan line time capability of the receiver	Minimum scan line time
(0, 0, 0)	20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	20 ms
(0, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	40 ms
(0, 1, 0)	10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	10 ms
(1, 0, 0)	5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	5 ms
(0, 1, 1)	10 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 0)	20 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$	
(1, 1, 1)	0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	0 ms
24	Extend field	Extend field
25	2400 bit/s handshaking	2400 bit/s handshaking
26	Uncompressed mode	Uncompressed mode
27	Error correction mode	Error correction mode
28	Set to “0”.	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	Error limiting mode
30	Reserved for G4 capability on PSTN	Reserved for G4 capability on PSTN
31	T.6 coding capability	T.6 coding enabled
32	Extend field	Extend field
33	Validity of bits 17, 18	Recording width
(0)	Bits 17, 18 are valid	Recording width indicated by bits 17, 18
(1)	Bits 17, 18 are invalid	Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of 151 ± mm 1%	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of 107 ± mm 1%	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of 151 ± mm 1%	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 ± mm 1%	Invalid
38	Reserved for future recording width capability.	

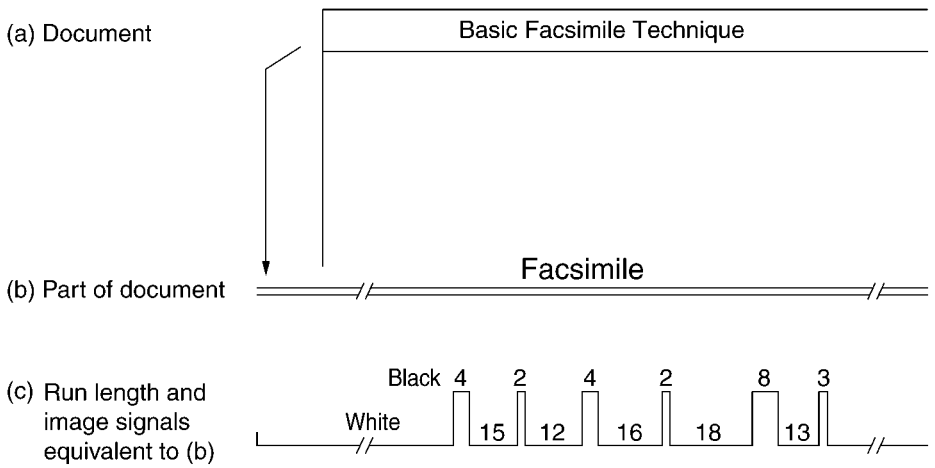
Bit No.	DIS/DTC	DCS
39	Reserved for future recording width capability.	
40	Extend field	Extend field
41	R8×15.4 lines/mm	R8×15.4 lines/mm
42	300×300 pels/25.4 mm	300×300 pels/25.4 mm
43	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm
44	Inch based resolution preferred	Resolution type selection “0”: neritic based resolution “1”: inch based resolution
45	Metric based resolution preferred	Don’t care
46	Minimum scan line time capability for higher resolutions “0”: $T_{15.4} = T_{7.7}$ “1”: $T_{15.4} = 1/2T_{7.7}$	Don’t care
47	Selective Polling capability	Set to “0”.
48	Extend field	Extend field

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 3 - Standard facsimile units conforming to T.4 must have the following capability: Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————————	A fixed pattern is transmitted to the receiving side at a speed (2400 bps 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 the sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to the sender. The sender then reduces the transmission speed by one stage and initiates training once again.
Training 2	————————	Used for reconfirming the receiving side like training 1.
Image Signal	Refer to the next page.	————————
RTC (Return to Control)	————————	Sends 12 bits (0...01 × 6 times) to the receiver at the same speed as the image signal and notifies completion of transmission of the 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, the sender transmits an image signal of the 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	This is output when an operator call is received.

b. **Redundancy Compression Process Coding Mode**

This unit uses one-dimensional MH format.



Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	000011011
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

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

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

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

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

6.6.2. Modem Circuit Operation

The modem (IC5) has all the hardware satisfying the CCITT standards mentioned previously.
When the ASIC IC1 (61) is brought to a low level, the modem (IC5) is chip-selected and the resistors inside IC are selected by the select signals from ASIC (IC1) ADR0-ADR4. The commands are written through the data bus, and all the processing is controlled by the ASIC (IC1) according to CCITT procedures. The INT signal dispatched from IRQ (pins 100 of IC5) to ASIC (IC1) when the transmission data is accepted and the received data is demodulated, the ASIC (IC1) implements post processing. This modem (IC5) has an automatic application equalizer.
With training signal 1 or 2 during G3 reception, it can automatically establish the optimum equalizer. The modem (IC5) operates using the 32.256 MHz clock (X3).

1. **Facsimile Transmission**
   The digital image data on the data bus is modulated in the modem (IC5), and sent from pin 69 via Analog SW IC10, amplifier IC9 and the NCU section to the telephone line.

   Refer to **Block Diagram**(P.21).

2. **Facsimile Reception**
   The analog image data which is received from the telephone line passes through the NCU section and enters pin 47 of the modem (IC5). The signals that enter pin 47 of the modem (IC5) are demodulated in the board to digital image signals, then placed on the data bus.
   In this case, the image signals from the telephone line are transmitted serially. Hence, they are placed on the bus in 8 bit units. Here, the internal equalizer circuit reduces the image signals to a long-distance receiving level.
   This 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.

   Refer to **Sgnal Route**(P.107).

3. **DTMF Transmission (Monitor tone)**
   The DTMF signal generated in the modem (IC5) is output from pin 56, and is then sent to the circuit on the same route as used for facsimile transmission.

   Refer to **Sgnal Route**(P.107).

   (DTMF Monitor Tone)
   Refer to **Sgnal Route**(P.107).

4. **Call Tone Transmission**
   This is the call signal which is generated in the ASIC (IC1) and sent to the speaker.

   Refer to **Sgnal Route**(P.107).

5. **Busy/Dial Tone Detection**
   The path is the same as FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC5) becomes 1, and this status is monitored by the ASIC (IC1).

6. **Caller ID Detection**
   The caller ID signal which is received from the telephone line/passes through IC1 pin (2-1). And it enters pin 50 of the modem (IC5).

6.7. NCU Section

6.7.1. General

It is composed of bell detection circuit, pulse dial circuit, line amplifier, sidetone circuits.

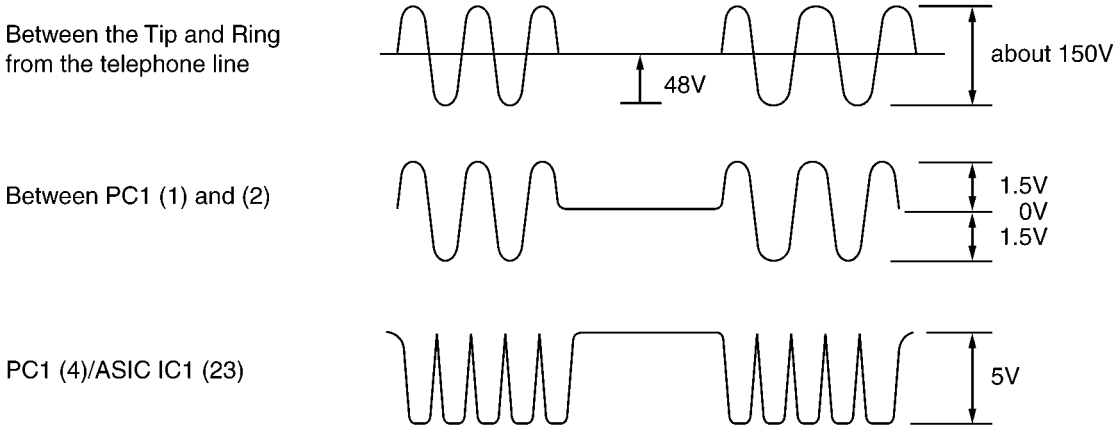
6.7.2. Bell Detection Circuit

1. **Circuit Operation**

   The signal waveform for each point is indicated below. The signal (low level section) input to pin 23 of ASIC IC1 on the digital board.

   TEL LINE → PC1 (1, 2 → 4) → CN1 (11) → {CN2 (11) → IC1 (23)}

   Note:{ } : inside the digital board



6.7.3. ON/OFF Hook Circuit

Normally (ON-HOOK condition), LINE RELAY (RLY1) is OFF. While OFF-HOOK, RLY1 turns ON. This LINE RELAY is controlled by pin 130 of IC1 through the Q7.

ON-HOOK:

IC1 (130) Low Level → Q7 OFF → RLY1 OFF

OFF-HOOK:

IC1 (130) High Level → Q7 ON → RLY1 ON

6.7.4. Pulse Dial Circuit

Make state:

IC1 (130) High Level → Q7 ON → RLY1 ON

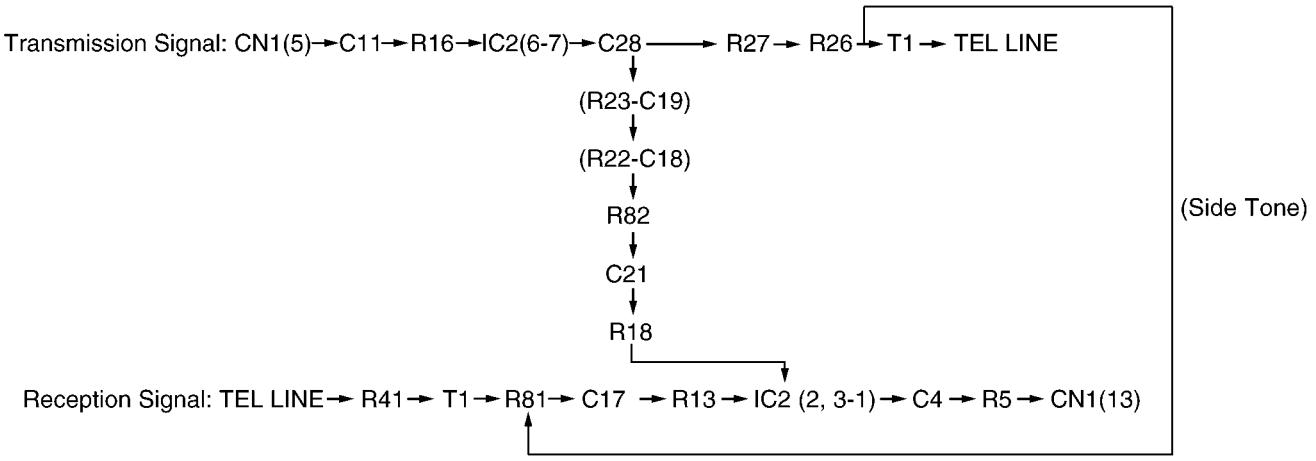
Break state:

IC1 (130) Low Level → Q7 OFF → RLY1 OFF

6.7.5. Line Amplifier and Side Tone Circuits

1. **Circuit Operation**

The reception signal received as output from line transformer T1 is given as input to R81, C17, R13 and IC2(2).
Then it is input to the reception system at an amplifier gain of 2.5 dB from pin (2).
The transmission signal is input from CN1 pin (5), and output to the TEL line through C11, R16, IC2(6,7) and T1. Without a side tone circuit, the transmission signal would return to the reception amplifier via C28, R27 and R26. Here, the signal output from CN1 pin (5) passes through C28, R23, R22, R82, C21 and R18, and enters the amplifier IC2 pin (3). This is used to cancel the return portion of the transmission signal. This is the side tone circuit.



6.7.6. Calling Line Identification Circuit

1. **Function**

   This unit is compatible with the Caller ID service offered by your local telephone company. To use this feature, you must subscribe to a Caller ID service. The data for the caller ID from the telephone exchange is sent during the interval between the first and second rings of the bell signal. The data from the telephone exchange is a modem signal which is modulated in an FSK (Frequency Shift Keying) format. Data “0” is a 1200 Hz sine wave, and data 1 a 2200 Hz sine wave.

   There are two type of the message format which can be received:i.e.the single data message format and multiple data message format.

   The multiple data format allows to transmit the name and data code information in addition to the time and telephone number data.

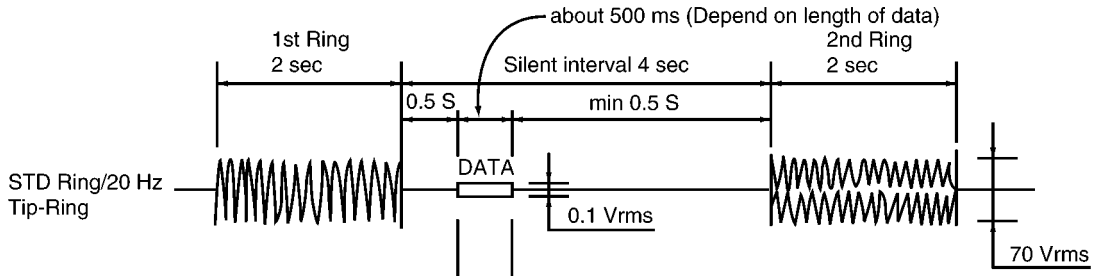
   When there is multiple data in the unit, the name or telephone number are displayed.

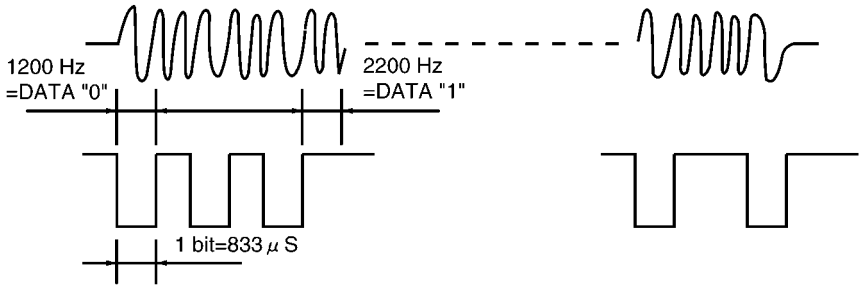
2. **Circuit Operation:**

   The caller ID signal input from TEL LINE is processed with IC5.

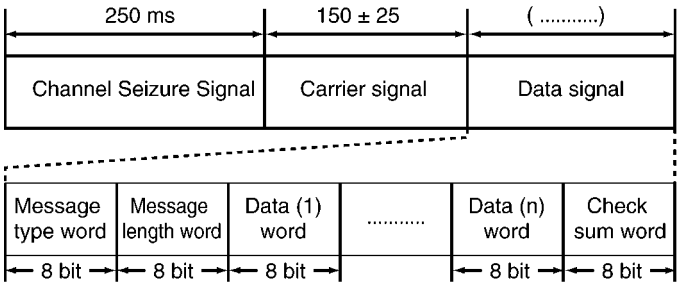
   Refer to **Sgnal Route** (P.107) for the route of caller ID signal.

Timing Chart



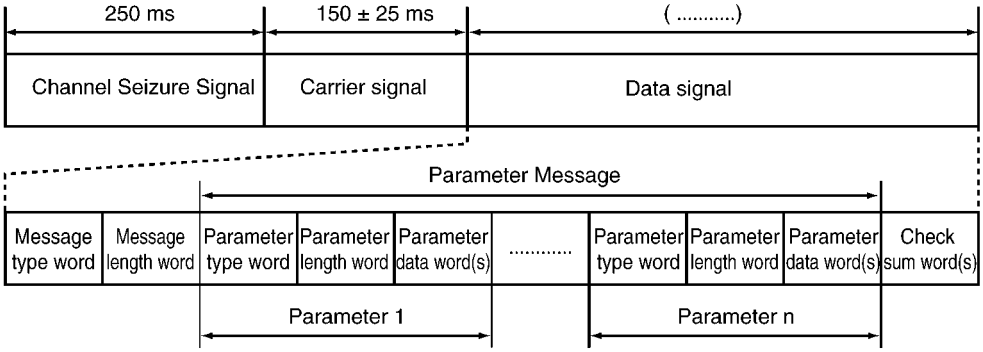


• Single data message



•1 word = All 8 bit data
•Message Type Word = Fixed value "00000100"
•Message Length Word = number of the data word
•Data word = The data value (month, day, hour, minute, telephone number)

· **Multiple data message**



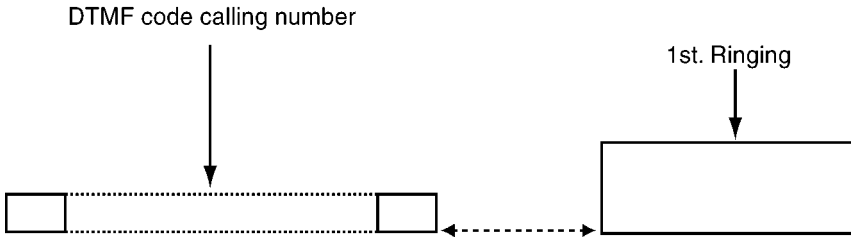
·1 word = All 8 bit data
·Message Type = Fixed value "10000000"
·Message Length Word = number of the Parameter Message word
·Parameter Type Word = Kind of data (ex. the time, phone number)
·Parameter Length Word = number of the Parameter data word
·Parameter Word (s) = the data value

6.7.7. Calling Line Identification Circuit (DTMF)

1. **Function**
   This unit is compatible with the Caller ID service offered by your local telephone company. To use this feature, you must subscribe to a Caller ID service. The data for the Caller ID from the telephone exchange is sent before the first ring signal. The data from the telephone exchange is sent by DTMF signal.

2. **Circuit Operation:**
   The Caller ID signal from TEL LINE is processed with MODEM (IC5).
   Refer to **Sgnal Route** (P.107) for the route of Caller ID (DTMF) signal.

Timing Chart



6.8. ITS (Integrated Telephone System) and Monitor Section

6.8.1. General

The general ITS operation is performed by the modem IC5. The alarm tone, the key tone, the calling tone and the beep are output from the ASIC IC1 (digital board).

6.8.2. Handset Circuit

1. **Function**
   This circuit controls the conversation over the handset, i.e. the transmitted and received voices to and from the handset.
2. **Signal path**
   Refer to **Sgnal Route** (P.107)

6.8.3. Monitor Circuit for Each Signals

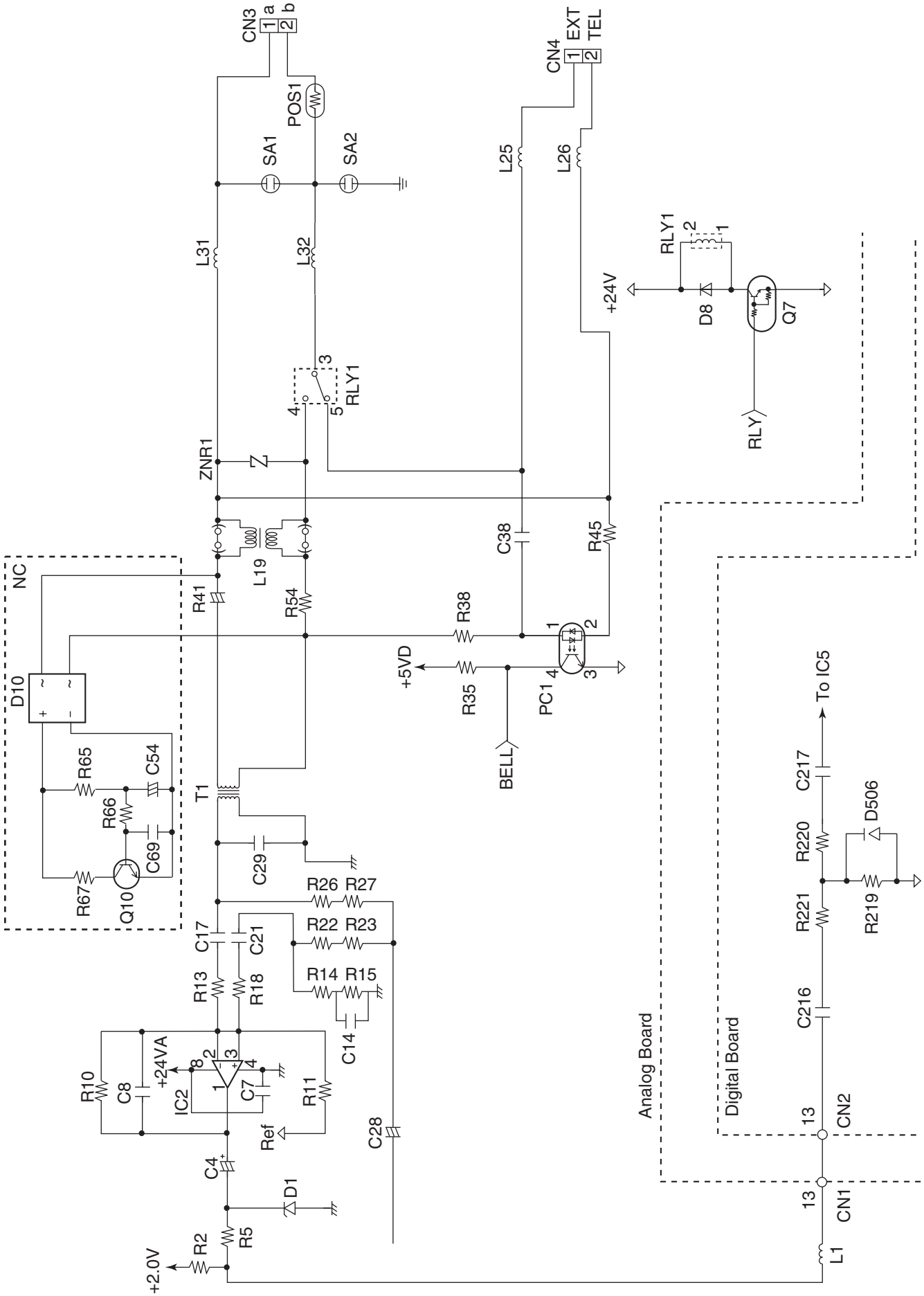
1. **Function**
   This circuit monitors various tones, such as **1** DTMF tone, **2** Alarm/Beep/Key tone/Bell **3** Dummy ring back tone.
2. **Signal path**
   Refer to **Sgnal Route** (P.107)

6.9. ATAS (Automatic Telephone Answering System) Section

6.9.1. Remote Receiving

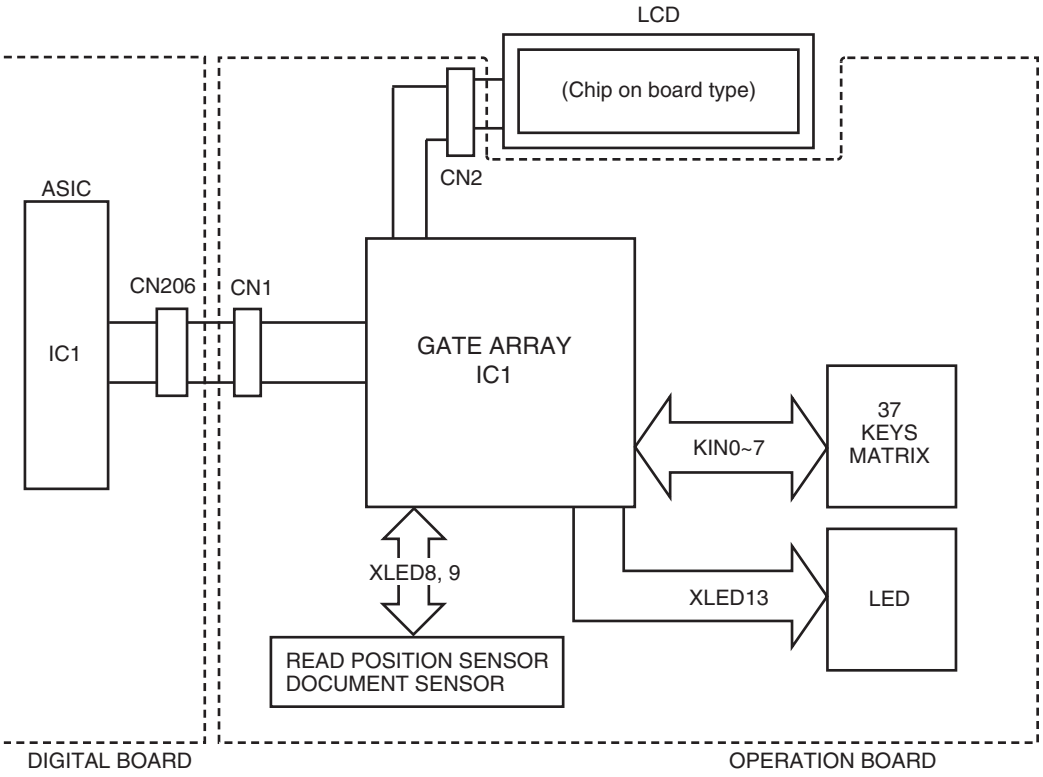
1. **Function**
   This is the parallel connection DTMF signal for the TEL mode between a and b. When the other party is a FAX, the unit changes to FAX receiving.
2. **Signal Path**
   Refer to **Sgnal Route** (P.107)

6.9.2. Circuit Diagram



6.10. Operation Board Section

The unit consists of a LCD (Liquid crystal display), KEYs and LEDs (light-emitting diodes). They are controlled by the Gate Array (IC1) and ASIC (IC1: on the DIGITAL BOARD). The key matrix table is shown below.



KX-FT931LA-B OPERATION BOARD: BLOCK DIAGRAM

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6	KIN7
KSL0	FAX/START (SW1)	BROADCAST (SW26)	# (SW16)	0 (SW11)	* (SW6)		SKEY 6 (SW31)	NAVI LEFT (SW21)
KSL1	COPY (SW2)	SKEY 3 (SW27)	MONITOR (SW17)	8 (SW12)	7 (SW7)		MENU (SW32)	NAVI DOWN (SW22)
KSL2	STOP (SW3)	SKEY 2 (SW28)	PAUSE (SW18)	9 (SW13)	4 (SW8)		AUTO ANSWER (SW33)	NAVI UP (SW23)
KSL3	1 (SW4)		FLASH (SW19)	3 (SW14)	2 (SW9)		SKEY 5 (SW34)	NAVI RIGHT (SW24)
KSL4	CALLER ID (SW5)	SKEY 1 (SW30)	REDIAL (SW20)	6 (SW15)	5 (SW10)		SKEY 4 (SW35)	NAVI CENTER (SW25)

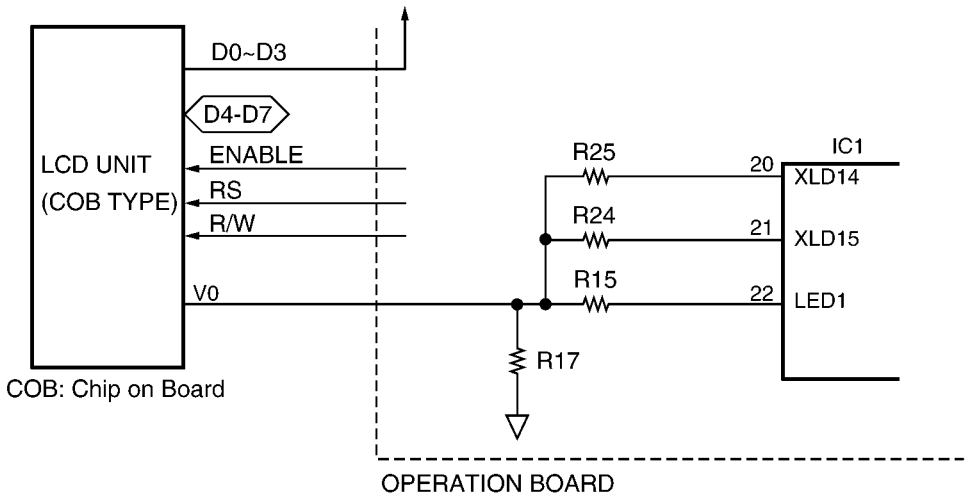
LED

	XLED13
	LED1

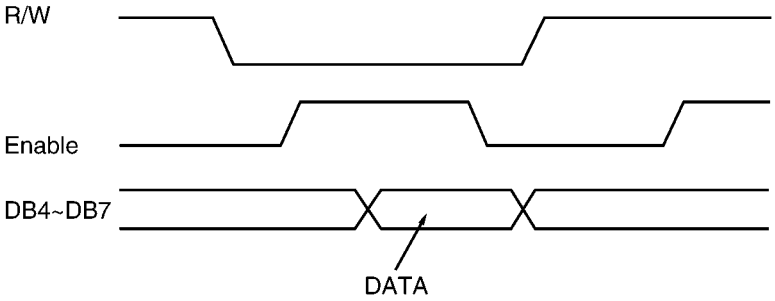
6.11. LCD Section

The Gate Array IC(IC1) works only for writing the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive.
R25, R24, R15 and R17 are density control resistors.
Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry in the gate array (IC1).

Circuit Diagram



Timing Chart

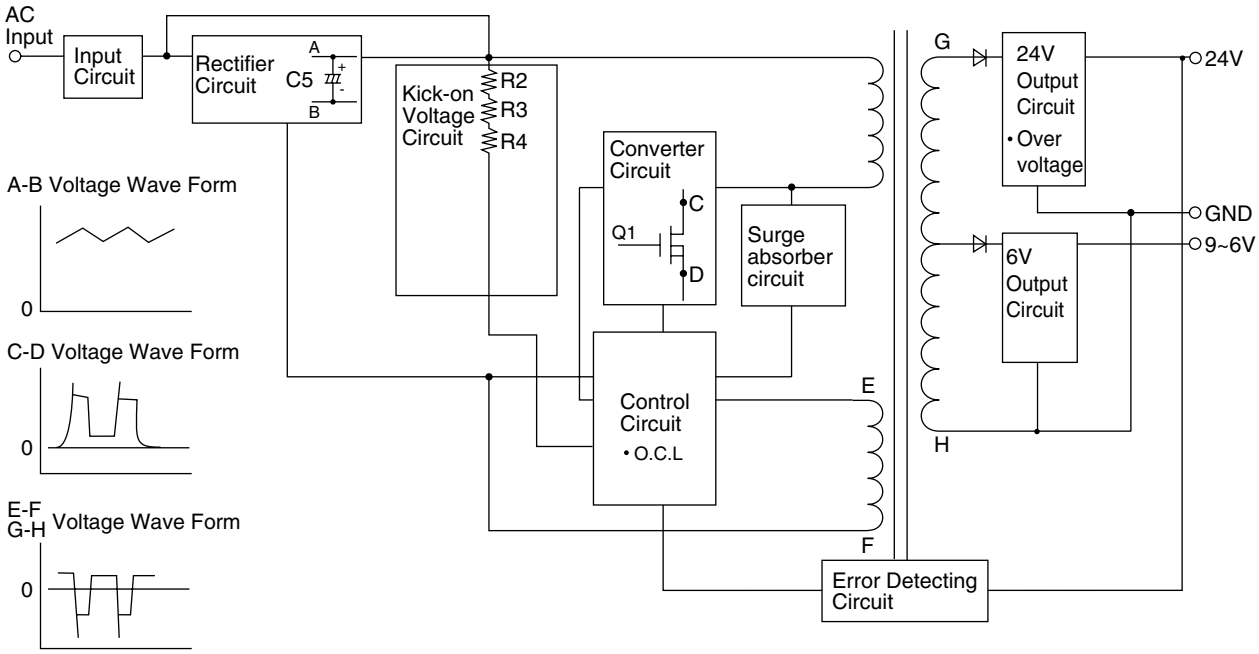


DIsplay mode	Density	Normal	Dark
English font (Global) 2 lines	LED1 (IC1-22pin)	H	L
	LED15 (IC1-21pin)	L	L
	LED14 (IC1-20pin)	Hi-Z	L
Chinese font 2 lines	LED1	L	H
	LED15	Hi-Z	H
	LED14	Hi-Z	H

6.12. Power Supply Board Section

This power supply board uses the switching regulator method.

Block Diagram



[Input Circuit]

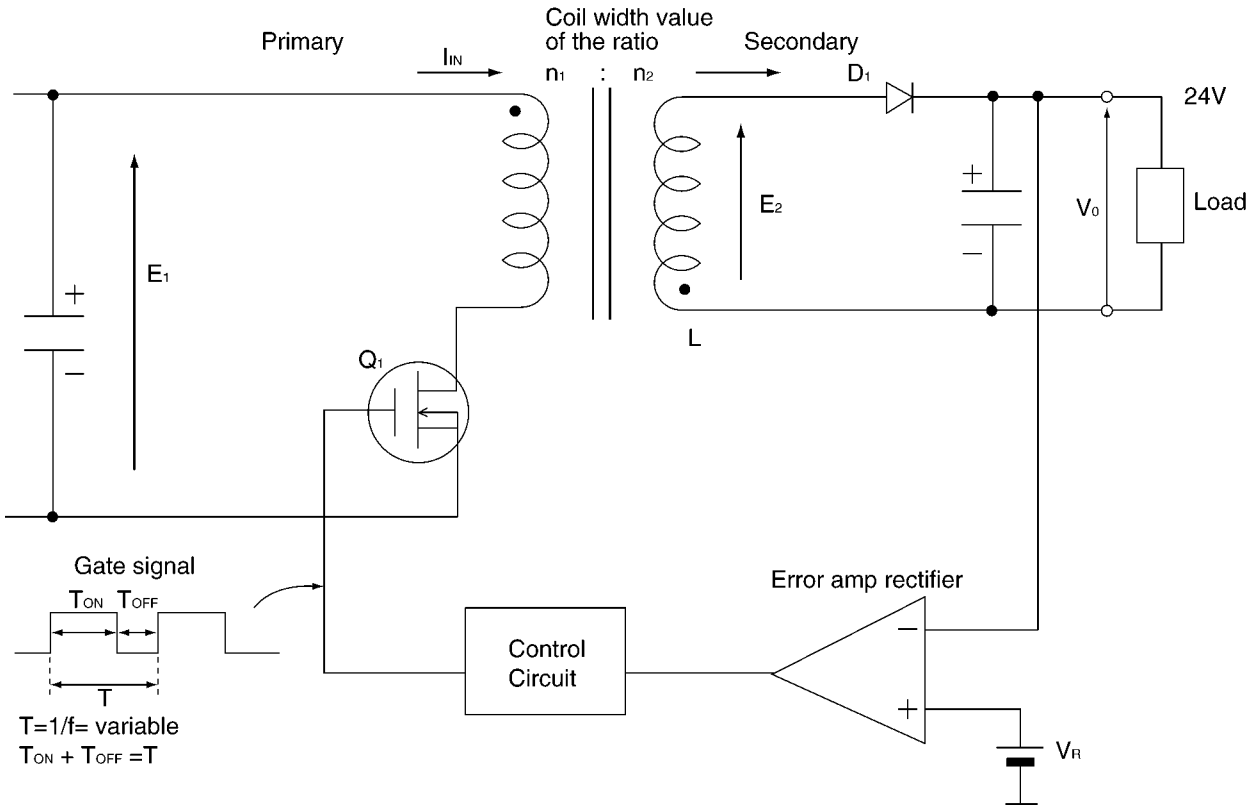
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.

[Rectifier Circuit]

The input current is rectified by D10, D11, D12 and D13 and charges C5 to make DC voltage. Then it supplies power to the converter circuit.

[Kick-on voltage circuit]

Bias is applied to the Q1 gate via this circuit when the AC power is turned on and Q1 begins operating.



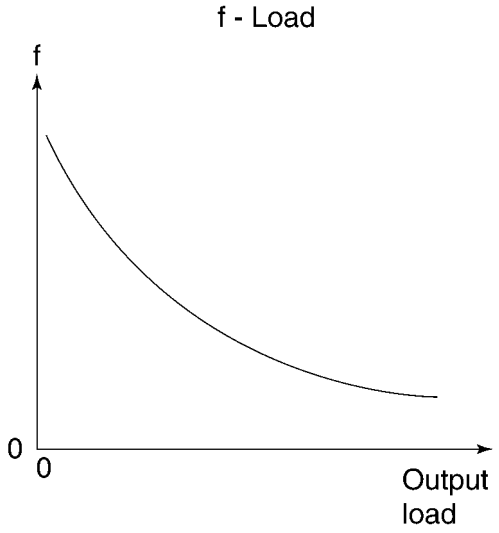
The following is an overview of how the power supply unit is controlled.
The control method of this power supply unit is pulse width modulation.

When Q_1 is ON, the energy is charged in the transfer primary coil according to E_1. When Q_1 is OFF, the energy is output from the secondary transfer as follows.

$L \rightarrow D_1 \rightarrow Load \rightarrow L$

Then the power is supplied to the Load. When Q_1 is ON, power is not output from the secondary side. The output voltage is fed back in the control circuit according to the error amp rectifier. Then depending on how **f** is controlled, stabilization occurs. Also, when the current load becomes too large, in order to decrease the voltage output, the increase in **f** is controlled and the output voltage is stabilized.

Therefore, basically the timing: **f** of Q1 controls the output voltage.



[Surge Absorber Circuit]
This circuit is for absorbing surge voltage generated by the Q1.

[Control Circuit and Detecting Circuit]
The control circuit amplifies the output with increased voltage detected in the error detecting circuit. Then it drives the main transistor.
In this power supply, the oscillation frequency(f) of the main transistor is defined by changing the output load.
This is shown as follows.
When the output voltage of the 24V circuit increases, the current of the photo coupler PC101 increases, the pulse width of the output control circuit becomes higher and the ON period of Q101 becomes shorter.

[Over Current Limiter (O.C.L)]
The highest drain current (Q1) is limited by controlling f of Q1 of 24V. The 24V output is limited by this circuit.

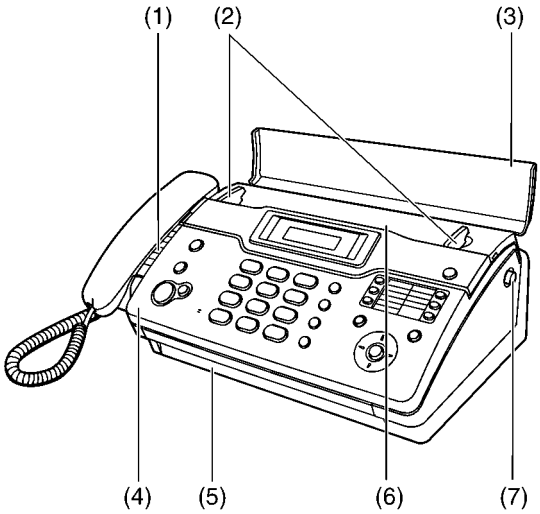
[Over Voltage Circuit]
If the 24V output increases because the error detecting circuit or control circuit is broken, output becomes 0V by turning on the zener diode D105.

Dummy load method (to quickly check the power supply output)

Refer to **Power Supply Board Section** (P.109).

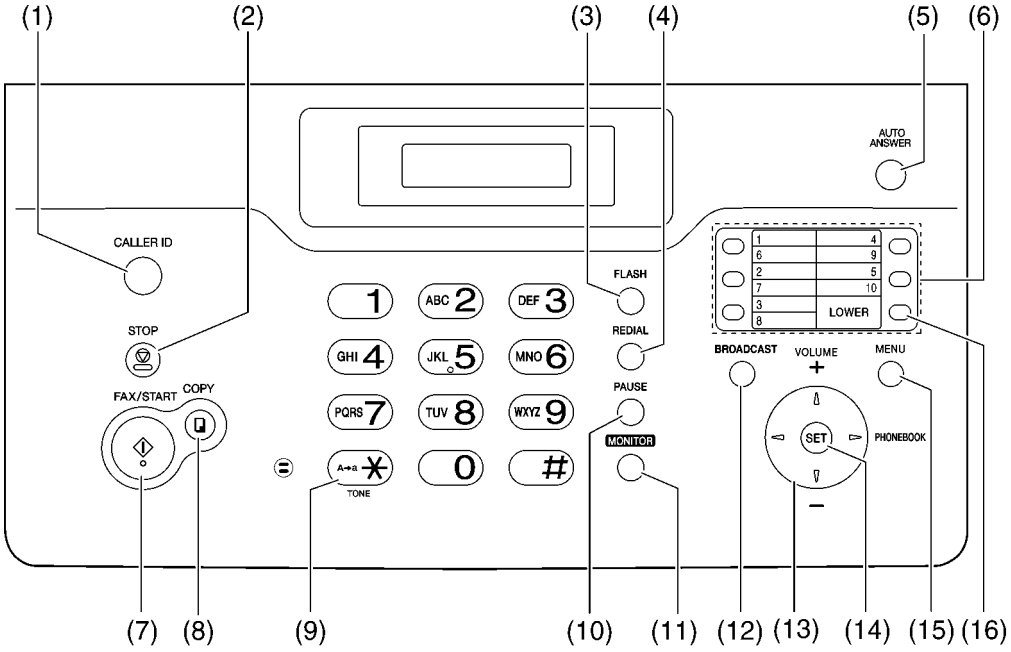
7 Location of Controls and Components

7.1. Overview



(1) Speaker
(2) Document guides
(3) Document feeder tray
(4) Top cover
(5) Document exit
(6) Document entrance
(7) Top cover release button

7.2. Control Panel



Buttons

(1) [CALLER ID]

- To use Caller ID features.

(2) [STOP]

- To stop an operation or programming session.
- To erase a character/number. Press and hold to erase all characters/numbers.

(3) [FLASH]

- To access special telephone services or for transferring extension calls.

(4) [REDIAL]

- To redial the last number dialled. If the line is busy when you make a phone call using the **[MONITOR]** button, the unit will automatically redial the number up to 5 times.

(5) [AUTO ANSWER]

- To turn the auto answer setting ON/OFF.

(6) Station keys

- To use one-touch dial feature.

(7) [FAX/START]

- To start sending or receiving a fax.

(8) [COPY]

- To copy a document.

(9) [TONE]

- To change from pulse to tone temporarily during dialling when your line has rotary pulse services.

(10) [PAUSE]

- To insert a pause during dialing.

(11) [MONITOR]

- To initiate dialing without lifting the handset.

(12) [BROADCAST]

- To transmit a document to multiple parties.

(13) Navigator/ [VOLUME] [PHONEBOOK]

- To search for a stored item.
- To select features or feature settings during programming.
- To adjust volume.
- To access the phonebook.

(14) [SET]

- To store a setting during programming.

(15) [MENU]

- To initiate or exit programming.

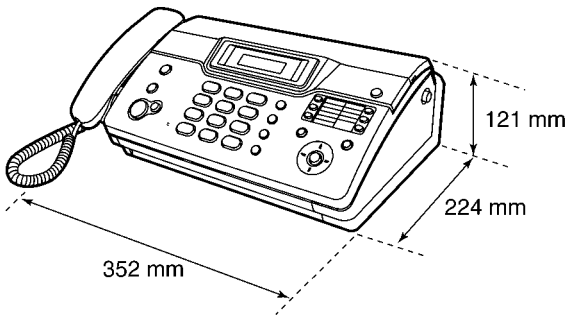
(16) [LOWER]

- To select stations 6-10 for the one-touch dial feature.

8 Installation Instructions

8.1. Installation Space

The space required to install the unit is shown below.
The dimensions given are necessary for the unit to operate efficiently.



Note:

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

8.2. Connections

Important:

- **The unit will not function when there is a power failure. To make calls in emergency situations, you should connect a telephone that can function during a power failure to the telephone line.**

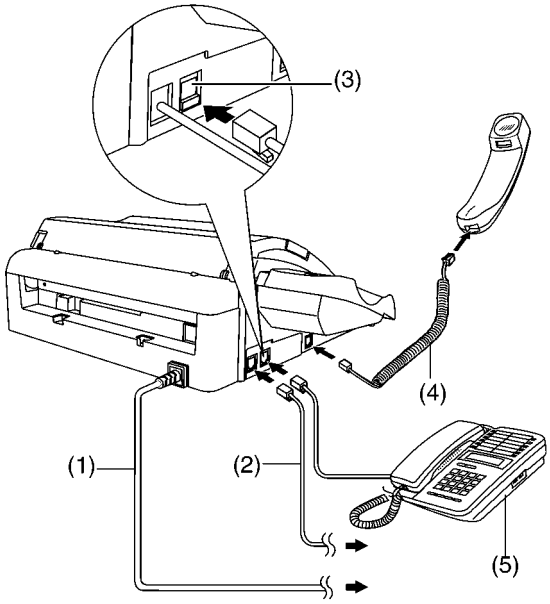
(1) Power cord
- Connect to the power outlet (120V, 60 Hz).

(2) Telephone line cord
- Connect to **[LINE]** jack and single telephone line jack.

(3) **[EXT]** jack
- Remove the stopper if attached.

(4) Handset cord

(5) Extension telephone (not included)



Caution:

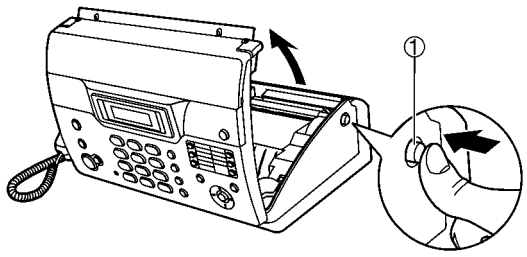
- **When you operate this product, the power outlet should be near the product and easily accessible.**
- **Be sure to use the telephone line cord included in this unit.**
- **Do not extend the telephone line cord.**
- **Keep the unit away from walls as far as possible to prevent a recording paper jam.**

Note:

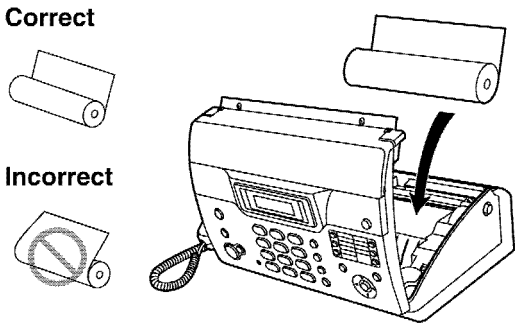
Before you can make calls, the dialling mode setting may need to be changed.

8.3. Installing the Recording Paper

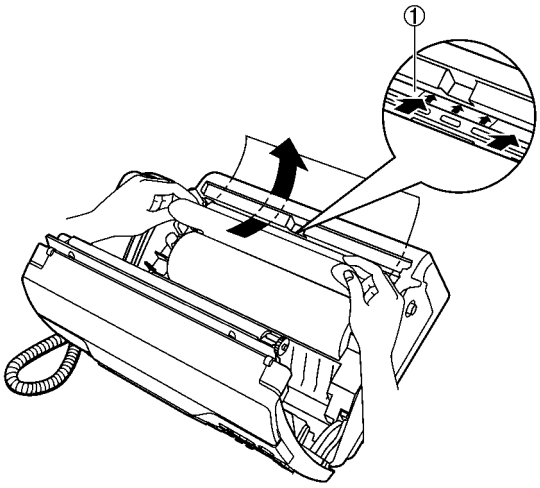
1. Open the top cover by pressing the top cover release button (①).



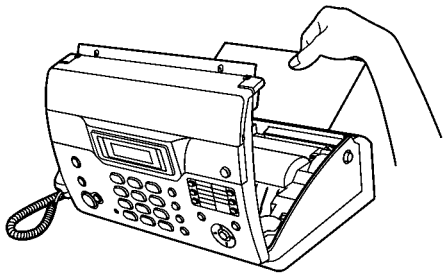
2. Install the recording paper.



3. Insert the leading edge of the paper into the opening above the thermal head (①).

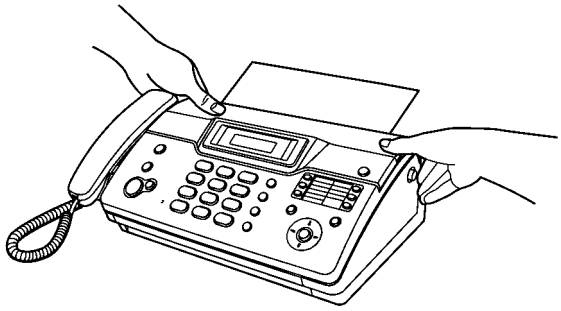


4. Pull the paper out of the unit.

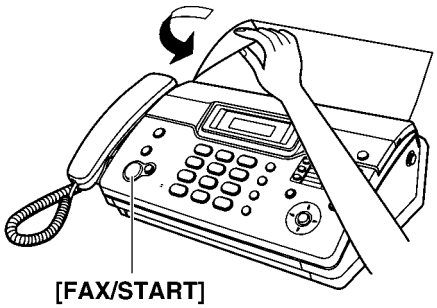


• Make sure that there is no slack in the paper roll.

5. Close the top cover securely by pushing down on both sides.



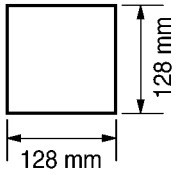
6. Press **[FAX/START]**, then tear off the excess paper by pulling it towards you.



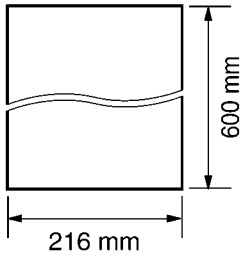
Note:

- If the paper is secured with glue or tape, cut approximately 15 cm from the beginning of the roll before installing it.
- When the power cord is connected, a message is printed each time the top cover is opened then closed. If the recording paper is installed upside down, the message will not be printed. Install the paper correctly.
- For accessory information, see **Optional Accessories** (P.9).

Minimum size

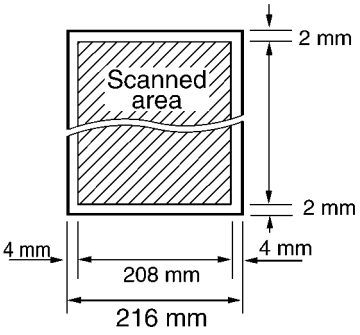


Maximum document size



Effective scanning area

- Shaded area will be scanned.



Document weight

- Single sheet: 45 g/m^2 to 90 g/m^2
- Multiple sheest: 60 g/m^2 to 80 g/m^2

Note:

- Remove clips, staples or other fasteners.
- Do not send or copy documents that are on the following types of paper: (Make a copy of the document using another copier and send the copy.)
  — Chemically treated paper such as carbon or carbonless duplicating paper
  — Electrostatically charged paper
  — Badly curled, creased or torn paper
  — Paper with a coated surface
  — Paper with a faint image
  — Paper with printing on the opposite side that can be seen through the other side, such as newsprint.
- Check that ink, paste or correction fluid has dried completely.
- To send a document with a width of less than 210 mm, we recommend using a copy machine to copy the original document onto A4 or letter-sized paper, then sending the copied document.

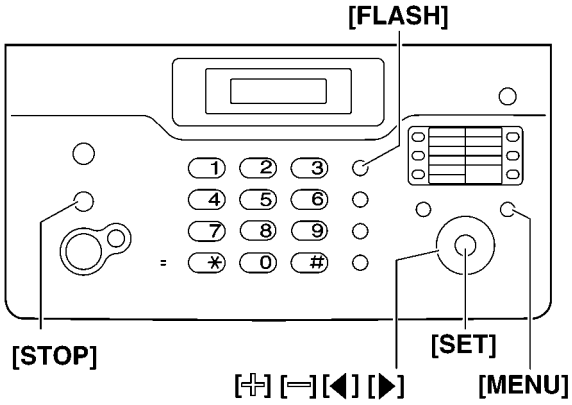
9 Operation Instructions

9.1. Setting Your Logo

Your logo will be printed on the top of each page sent from your unit. The logo can be your name or the name of your company.

Note:

Refer to **Other** (P.9) for display message.



1. Press **[MENU]**.

```
SYSTEM SETUP
    PRESS [◄ ►]
```

2. Press **[◄]** or **[►]** repeatedly to display the following.

```
YOUR LOGO
       PRESS SET
```

3. Press **[SET]**.
   - The cursor (▒) will appear on the display.

```
LOGO=▒
```

4. Enter your logo, up to 30 characters. See the following character table below for details.

5. Press **[SET]**.
   - The next feature will be displayed.

6. Press **[MENU]**.

To select characters with dial keypad

Keypad	Characters
[1]	Space # & ' ( ) * , – . / 1
[2]	A B C 2
	a b c 2
[3]	D E F 3
	d e f 3
[4]	G H I 4
	g h i 4
[5]	J K L 5
	j k l 5
[6]	M N O 6
	m n o 6
[7]	P Q R S 7
	p q r s 7
[8]	T U V 8
	t u v 8
[9]	W X Y Z 9
	w x y z 9
[0]	Space Ñ ñ á é í ó ú 0
[✳]	To change uppercase or lowercase letter.
[FLASH]	To enter a hyphen.
[STOP]	To delete a digit.

Note:

To enter another character that is located on the same dial key, press **[▶]** to move the cursor to the next space.

If you select **"PORTUGESE"** for the language, you can select the following characters using **[0]**.

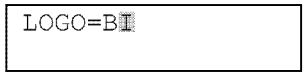
[0]	Space Ã Õ Ç ã õ ç Á É Í Ó Ú á é í ó ú 0

To enter your logo

Example: "BILL"

1. Press **[2]** 2 times.

2. Press **[4]** 3 times.



3. Press **[5]** 3 times.

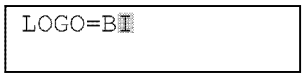
4. Press **[▶]** to move the cursor to the next space and press **[5]** 3 times.

To change uppercase or lowercase letters

Pressing the **[✳]** button will change to uppercase or lowercase letters alternately.

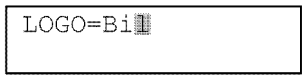
1. Press **[2]** 2 times.

2. Press **[4]** 3 times.



3. Press **[✳]** .

4. Press **[5]** 3 times.



To correct a mistake

1. Press **[◀]** or **[▶]** to move the cursor to the incorrect character.
2. Press **[STOP]**.
   - To erase all characters, press and hold **[STOP]**.
3. Enter the correct character.

To select characters using [+] or [—]

Instead of pressing the dial keys, you can select characters using **[+]** or **[—]**.

1. Press **[—]** repeatedly to display the desired character. Characters will be displayed in the following order:
   (1) Uppercase letters
   (2) Number
   (3) Symbol
   (4) Lowercase letters
   - If you press **[+]**, the order will be reversed.
2. Press **[▶]** to insert the character.
3. Return to step 1 to enter the next character.

10 Test Mode

The codes listed below can be used to perform simple checks for some of the unit's functions. When complaints are received from customers, they provide an effective tool for identifying the locations and causes of malfunctions. To do this, you set the Service mode (Refer to **Operation Flow** (P.56).) first, then operate the below test items.

Test Mode	Type of Mode	Code Operation after code input	Function
FACTORY SET	Service Mode	"5" "5" "0" SET	Refer to **Memory Clear Specification** (P.58).
FLASH MEMORY CHECK	Service Mode	"5" "5" "1" SET	Indicates the version and checks the sum of the FLASH MEMORY.
MODEM TEST	Service Mode	"5" "5" "4" SET	Telephone line circuit is connected automatically, output the following signals on the circuit line. 1) OFF 2) 9600bps 3) 7200bps 4) 4800bps 5) 2400bps 6) 300bps 7) 2100Hz 8) 1100Hz
SCAN CHECK	Service Mode	"5" "5" "5" SET	Turns on the LEDs of the CIS and operates the read systems. Refer to **CIS (Contact Image Sensor) Section** (P.114).
MOTOR TEST	Service Mode	"5" "5" "6" SET	Rotates the transmission and reception motor to check the operation of the motor. 12: FAX TX / Reading memory 52: Recording paper is fed 22: Copy 44: Recording Paper reverse Press **[STOP]** button to quit.
LED CHECK	Service Mode	"5" "5" "7" SET	All LEDs above the operation panel board flash on and off, or are illuminated.
LCD CHECK	Service Mode	"5" "5" "8" SET	Checks the LCD indication. Illuminates all the dots to check if they are normal. Refer to **Operation Panel Section** (P.112).
KEY CHECK	Service Mode	"5" "6" "1" START (any key)	Checks the button operation. Indicates the button code on the LCD while the button is pressed. Refer to **Button Code Table** (P.55). Refer to **Operation Panel Section** (P.112).
MEMORY CLEAR (except History data)	Service Mode	"7" "1" "0" SET	Refer to **Memory Clear Specification** (P.58).
SENSOR CHECK	Service Mode	"8" "1" "5" SET	If you enter this mode and operate sensor levers with your hands, the LCD display of the related sensor (or switch) turns ON / OFF. Also, when copying a document, the related sensor will turn ON / OFF. For each sensor's operation, refer to **Sensors and Switches** (P.26). Do Sn Co Jm : LCD DISPLAY **Do: Document set sensor** :Paper inserted. Turns on when a document is inserted. **Sn: Read position sensor.** :At the read position, turns on when the front cover is opened and the sensor lever is pressed directory. **Co: Cover open sensor** :Turns on and off when the front cover is opened and closed. **Jm: JAM sensor** :When JAM sensor is on "Jm" functions.
PRINT TEST PATTERN	Service Mode	"8" "5" "2" SET	Prints out the test pattern. Used mainly at the factory to test the print quality. You can select 1~9. (See **Print Test Pattern** (P.55))

Note:

The numbers in the boxes (XXX) indicate the keys to be input for the various test modes.

10.1. DTMF Single Tone Transmit Selection

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

key	High Frequency (Hz)	key	Low Frequency (Hz)
“1”	697	“5”	1209
“2”	770	“6”	1336
“3”	852	“7”	1477
“4”	941	“8”	1633

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

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

Note:

After performing this check, do not forget to turn the setting off. Otherwise, dialing in DTMF signal will not work.

10.2. Button Code Table

Code	Button Name	Code	Button Name	Code	Button Name
04	FAX /START	31	1	3D	PAUSE
05	LOWER	32	2	3E	FLASH (RECALL)
06	COPY	33	3	47	CALLER ID
08	MONITOR	34	4	64	STATION 1
0C	AUTO ANSWER	35	5	65	STATION 2
0F	REDIAL	36	6	66	STATION 3
1E	**[▶]** NEXT	37	7	67	STATION 4
1F	[◀] PREV	38	8	68	STATION 5
		39	9	00	NO INPUT
20	MENU	3A	0	Exit	STOP
25	**[+]** VOLUME	3B	*	F8	SET
26	**[—]** VOLUME	3C	#	FA	BROADCAST

10.3. Print Test Pattern

11 Service Mode

The programming functions are used to program the various features and functions of the machine, and to test the machine. This facilitates communication between the user and the service man while programming the unit.

11.1. Programming and Lists

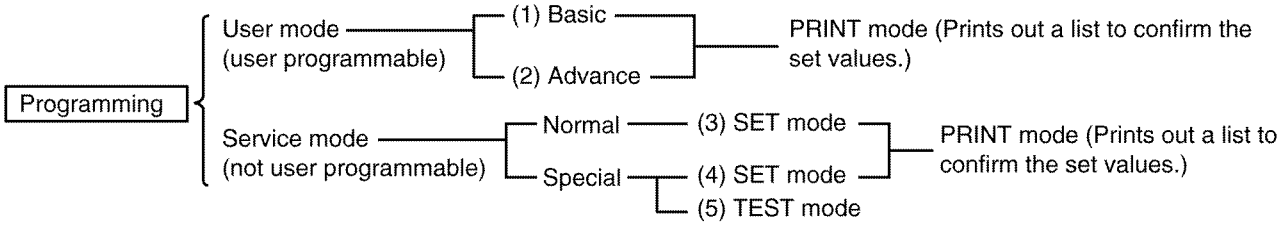
11.1.1. Operation

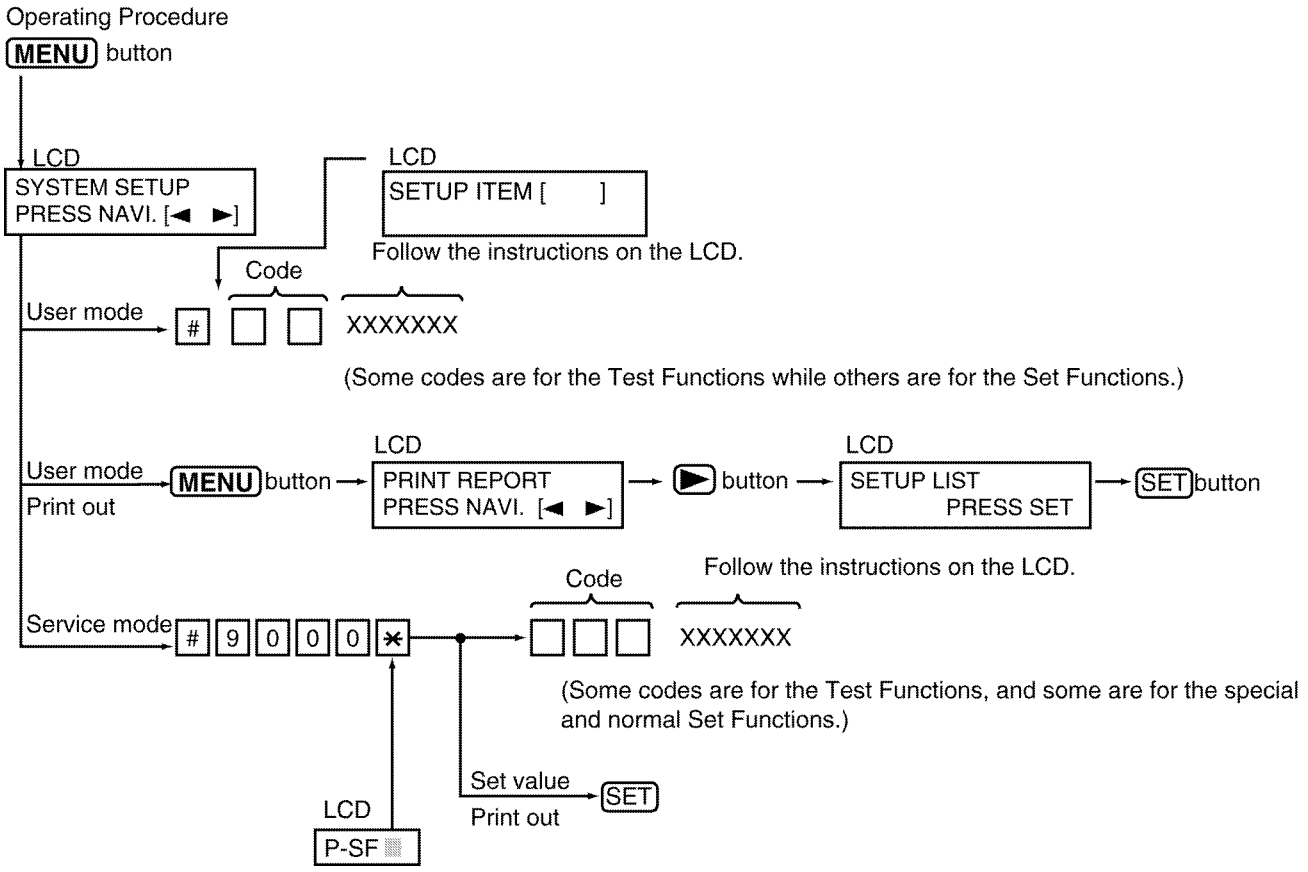
There are 2 basic categories of programming functions, the User Mode and the Service Mode. The Service Mode is further broken down into the normal and special programs. The normal programs are those listed in the Operating Instructions and are available to the user. The special programs are only those listed here and not displayed to the user. In both the User and Service Modes, 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 the 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.

11.1.2. Operation Flow

Note:

Refer to **Other** (P.9) for display message.





11.1.3. Service Function Table

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time	X 100 msec	001~600	50	----------
502	Flash time	X 10 ms	01~99	70	----------
503	Dial speed select	1: 10 pps 1: 20 pps	1, 2	1	----------
514	Bell detection time	X 100 msec	1~9	6	----------
520	CED frequency select	1:2100Hz 2:1100 Hz	1, 2	1	See Symptom/Countermeasure Table for long distance and international calls in **The unit can copy, but cannot transmit/receive** (P.82).
521	International mode select	1:ON 2:OFF	1, 2	1	See Symptom/Countermeasure Table for long distance and international calls in **The unit can copy, but cannot transmit/receive** (P.82).
522	Auto standby select	1:ON 2:OFF	1, 2	1	The resolution reverts to the default when transmission is complete.
523	Receive equalizer select	1: 0 km 2: 1.8 km 3: 3.6 km 4: 7.2 km	1~4	1	When the telephone station is far from the unit or reception cannot be performed correctly, adjust accordingly.
524	Transmission equalizer select	1: 0 km 2: 1.8 km 3: 3.6 km 4: 7.2 km	1~4	1	When the telephone station is far from the unit or transmission cannot be performed correctly, adjust accordingly.
544	Document feed position adjustment value set	1: 3 mm 2: 4 mm 3: 5 mm 4: 6 mm 5: 7 mm	1~5	3	If it is difficult to feed documents, raise the set value. If multi documents feed occurs, lower the set value.
550	Memory Clear				See **Memory Clear Specification** (P.58).
551	ROM check				See **Test Mode**(P.54).
552	DTMF single tone test	1:ON 2:OFF	1, 2	2	See **Test Mode**(P.54).
553	Monitor on FAX communication select	1:OFF 2:PHASE B 3:ALL	1~3	1	Sets whether to monitor the line signal with the unit's speaker during FAX communication or not.
554	Modem test				See **Test Mode**(P.54).
555	Scan check				See **Test Mode**(P.54).
556	Motor test			0	See **Test Mode**(P.54).
557	LED test				See **Test Mode**(P.54).
558	LCD test				See **Test Mode**(P.54).
559	Document jam detection select	1:ON 2:OFF	1, 2	1	See **Test Mode**(P.54).
561	KEY test				See **Test Mode**(P.54).
570	BREAK % select	1:61% 2:67%	1, 2	1	Sets the % break of pulse dialing according PBX.
571	ITS auto redial time set	X number of times	00~99	05	Selects the number of times that ITS is redialed (not including the first dial).
572	ITS auto redial line disconnection time set	X second	001~999	065	Sets the interval of ITS redialing.
573	Remote turn-on ring number set	X number of rings	01~99	10	Sets the number of rings before the unit starts to receive a document in the TEL mode.
590	FAX auto redial time set	X number of times	00~99	05	Selects the number of redial times during FAX communication (not including the first dial).
591	FAX auto redial time disconnection time set	X second	001~999	065	Sets the FAX redial interval during FAX communication.
592	CNG transmit select	1:OFF 2:ALL 3:AUTO	1~3	2	Lets you select the CNG output during FAX transmission. ALL: CNG is output at phase A. AUTO: CNG id output only when automatic dialing is performed. OFF: CNG id not output at phase A. Refer to **Sometime there is a transmit problem** (P.80).
593	Time between CED and 300bps	1:75 msec 2:500 msec 3:1 sec	1~3	1	See **Symptom/Countermeasure Table** for long distance and international calls in **The unit can copy, but cannot transmit/receive** (P.82). Refer to Receive Problem(P.81) and **The unit can copy, but cannot transmit/receive** (P.82).
594	Overseas DIS detection select	1:detects at the 1st time 2:detects at the 2nd time	1, 2	1	See **Symptom/Countermeasure Table** for long distance and international calls in **The unit can copy, but cannot transmit/receive** (P.82). Refer to **Sometime there is a transmit problem**(P.80) and **The unit can copy, but cannot transmit/receive** (P.82).

Code	Function	Set Value	Effective Range	Default	Remarks
595	Receive error limit value set	1: 5 % 2: 10 % 3: 15 % 4: 20 %	1~4	2	Sets the number of acceptable error lines when the FAX reconstructs the received data. Refer to **Receive Problem** (P.81).
596	Transmit level set	10 = -10 dBm	00~15	10	Selects the FAX transmission level. Refer to **Sometime there is a transmit problem** (P.80) and **Receive Problem** (P.81).
598	Receiving sensitivity	43 = -43 dBm	20~48	42	Used when there is an error problem. Refer to **The unit can copy, but cannot either transmit/receive long distance or international communications** (P.83).
710	Memory clear except History data				Refer to **Memory Clear Specification** (P.58).
717	Transmit speed selection	1:9600BPS 2:7200BPS 3:4800BPS 4:2400BPS	1~4	1	Adjusts the speed to start training during FAX transmission. Refer to **Sometime there is a transmit problem** (P.80)and **The unit can copy, but the transmission and reception image are incorrect** (P.85).
718	Receive speed selection	1:9600BPS 2:7200BPS 3:4800BPS 4:2400BPS	1~4	1	Adjusts the speed to start training during FAX reception. Refer to **Receive Problem** (P.81) and **The unit can copy, but the transmission and reception image are incorrect** (P.85).
722	Redial tone detect	1:ON 2:OFF	1, 2	1	Sets the tone detection mode after redialing.
745	Power ON film feed	1:ON 2:OFF	1, 2	1	Invalid function for thermal model.
763	CNG detect time for friendly reception	1:10 sec 2:20 sec 3:30 sec	1~3	3	Selects the CNG detection tone of friendly reception.
774	T4 timer	X 100 msec	00~99	00	Use this function when delay occurs in the line and communication (ex. Mobile comm) does not work well.
815	Sensor check				See **Test Mode**(P.54).
852	Print test pattern				See **Test Mode**(P.54).
853	Top margin		1~9	3	----------
874	DTMF ON time	X msec	60~20	10	----------
875	DTMF OFF time	X msec	60~20	10	----------
880	History list				----------
881	Journal 2 list				See **Special service journal reports** (P.75).
882	Journal 3 list				See **Special service journal reports** (P.75).
961	The time transmitting the false ring back tone	X sec	01~10	05	Set the time transmitting the false ring back tone to the line in TEL/FAX mode.
962	The operator calling time	X sec	05~30	13	Set the operator calling time through the speaker in TEL/FAX mode.

11.1.4. Memory Clear Specification

Item	Status after Memory Clear	
	Service Mode **#550**[*1]	Service Mode **#710**[*2]
Date and time (user mode #001)	—	Default
Your logo (user mode #002)	—	Default
Your Fax Number (user mode #003)	—	Default
One touch dial and Directory	—	Default
History	—	—
Top margin (service mode #853)	—	—
Other Setting data (User setting and Service setting data)	Default	Default

— : Not changed

*1 Execute Service Mode #550 when you want to reset the all setting data keeping the user information.

*2 Execute Service Mode #710 to clear the user information in case that Main Unit is recycled.

Note:

Please restart a power supply after clearing a memory.

11.2. The Example of the Printed List

11.2.1. User Mode (Example of a printed out list)

LISTA DE ADJUSTE

[CARACTERISTICAS BASICAS]

NO.	CARACTERISITCA	PROGRAMACION ACTUAL	
#01	FECHA Y HORA	01 ENE. 2006 12:04AM	
#02	SU LOGO		
#03	SU NUMERO DE FAX		
#04	IMPRIMIR REPORTE DE ENVIO	ERROR	[ERROR,ON,OFF]
#06	NÚMERO DE TIMBRADOS EN FAX	2	[1...5] *5 PARA CONTESTADORA EXTERNA
#13	MODO MARCACION	TONO	[TONO,PULSO]
#17	TIPO EXTERNO DEL TIMBRE	TIMBRE 1	[TIMBRE 1...3]

Code (#01)

Set Value (TIMBRE 1)

[CARACTERISTICAS AVANZADAS]

NO.	CARACTERISITCA	PROGRAMACION ACTUAL	
#22	IMPRESION DE REPORTE DIARIO	ON	[ON,OFF]
#23	MODO DE LARGA DISTANCIA	ERROR	[NEXT FAX,ERROR,OFF]
#25	TRANSMISION DIFERIDA	OFF	[ON,OFF]
	DESTINO =		
	HORA DE INICIO =	12:00AM	
#26	LISTA DE AUTO CALLER ID	OFF	[ON,OFF]
#36	REDUCCION DE RECEPCION	ON	[ON,OFF]
#39	CONTRASTE DE LA PANTALLA	NORMAL	[NORMAL,OSCURO]
#41	CODIGO DE ACTIVACION REMOTA DE FAX	ON	[ON,OFF]
	CODIGO =	*#9	
#44	ALERTA DE RECEPCION	ON	[ON,OFF]
#46	RECEPCION AMISTOSA	ON	[ON,OFF]
#48	IDIOMA	ESPAÑOL	[ESPAÑOL,PORTUGUES]
#58	CONTRASTE DE SCANÉO	NORMAL	[NORMAL,CLARO,OSCURO]
#59	CONTRASTE DE IMPRESIÓN	NORMAL	[NORMAL,OSCURO]
#73	MODO DE RECEPCION MANUAL	TEL	[TEL,TEL/FAX]
#76	TONO DE CONEXION	ON	[ON,OFF]
#78	TIMBRADO RETARDADO EN TEL/FAX	2	[1...9]
#80	RE-ESTABLECE A ORIGINAL (EXCEPTO #48)		

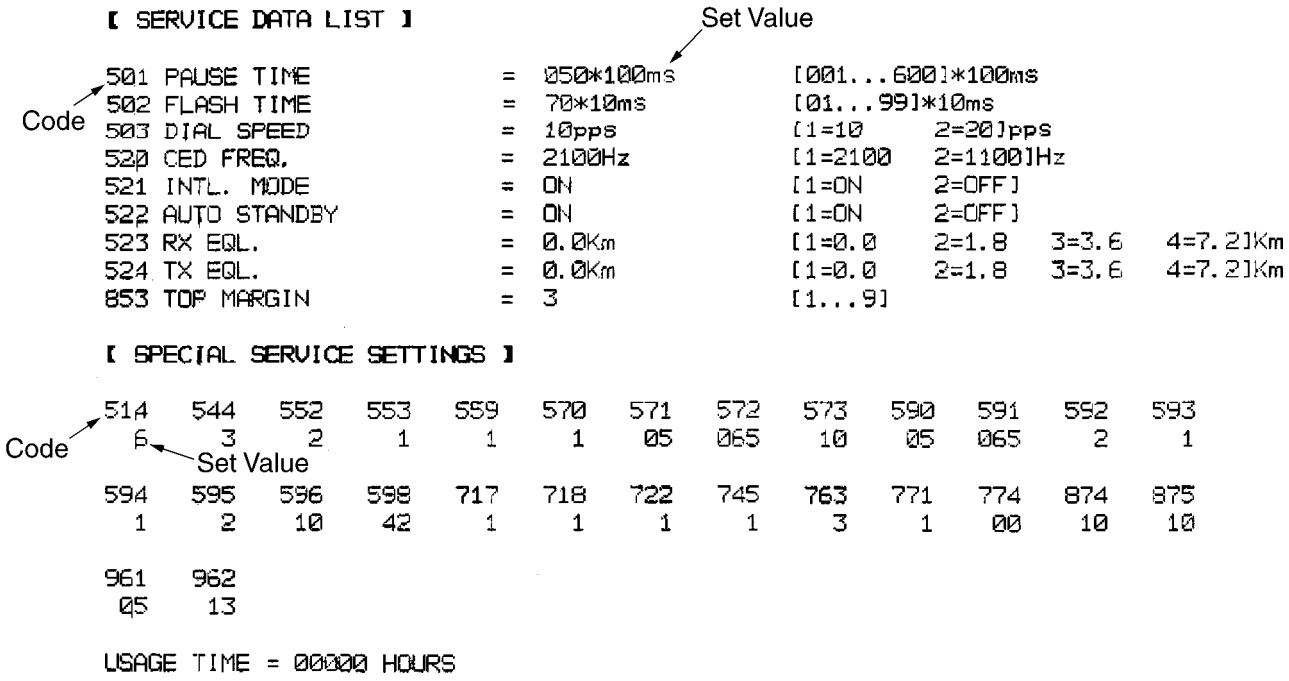
Code (#22)

Set Value (2)

Note:

The above values are the default values.

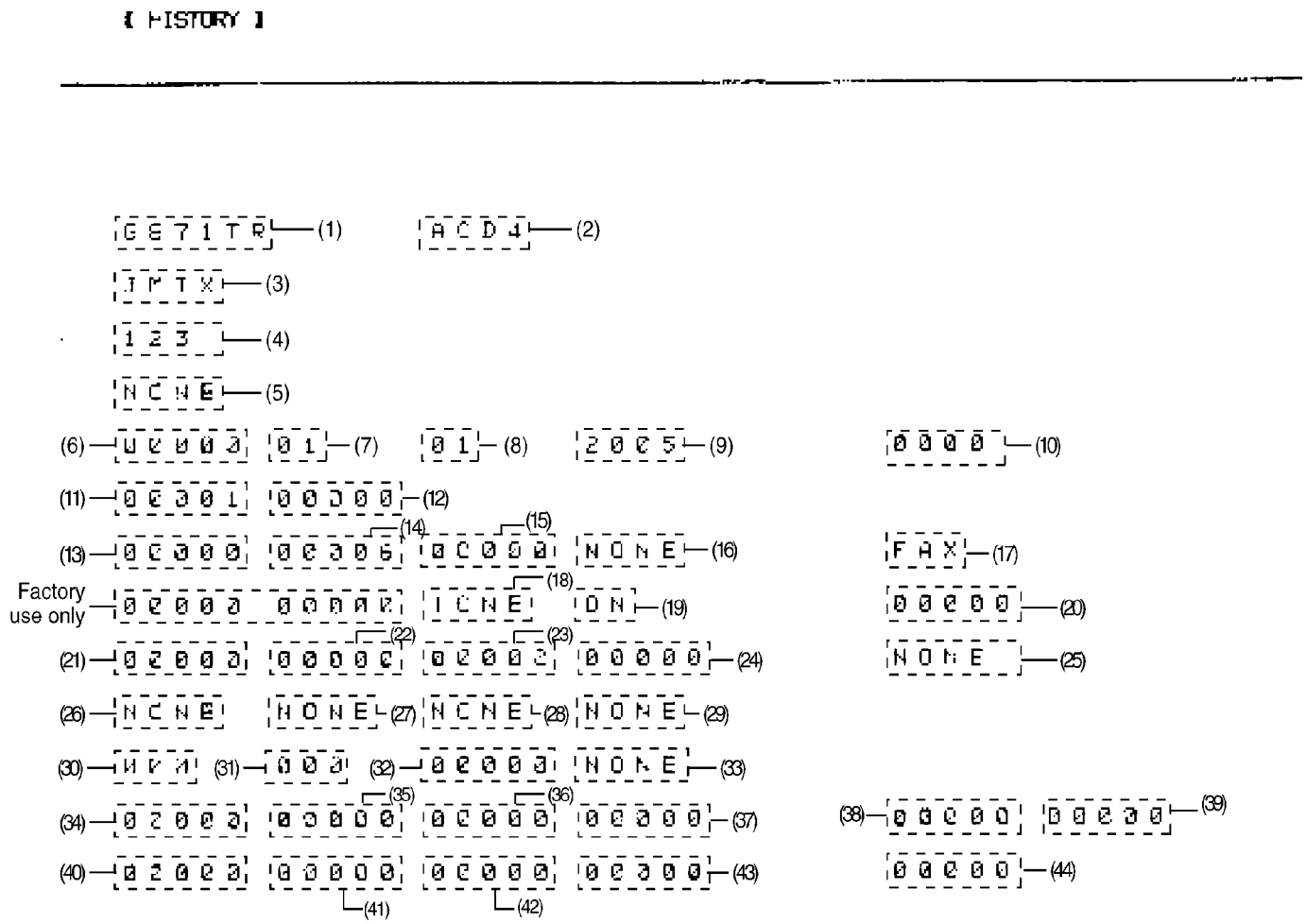
11.2.2. Service Mode Settings (Example of a printed out list)



Note:

The above values are the default values.

11.2.3. History (Example of a printed out list)



Note:

See the following descriptions of this report. Item No. (1) ~ (44) are corresponding to the listed items in **Descriptions of the History Report** (P.62).

11.2.3.1. Descriptions of the History Report

(1) SOFTWARE VERSION
FLASH ROM version
(2) SUM
FLASH ROM internal data calculation.
(3) YOUR LOGO
The user logo recorded in the unit. If it is not recorded, NONE will be displayed.
(4) YOUR TELEPHONE NUMBER
The user telephone number recorded in the unit. If it is not recorded, NONE will be displayed.
(5) FAX PAGER NUMBER
If you program a pager number into the unit, the pager number will be displayed here.
(6) FACTORY - CUSTOMER
This shows how many days from factory production until the user turns ON the unit.
(7) MONTH
The shows the very first month, date, year and time set by the user after they purchased the unit.
(8) DAY
The shows the very first month, date, year and time set by the user after they purchased the unit.
(9) YEAR
The shows the very first month, date, year and time set by the user after they purchased the unit.
(10) TIME
The shows the very first month, date, year and time set by the user after they purchased the unit.
(11) USAGE TIME
The amount of time the unit has been powered ON.
(12) FACTORY - NOW
This shows how many days from factory production until the user prints out this history list.
(13) TEL MODE
The amount of time the TEL mode setting was used.
(14) FAX ONLY MODE
The amount of time the FAX mode setting was used.
(15) TEL/FAX MODE
The amount of time the TEL/FAX mode setting was used.
(16) Not used
(17) FINAL RECEIVE MODE
The last set receiving mode by the user.
(18) TONE/PULSE SELECTION
The most recently used setting used, either TONE or PULSE.
(19) RECEIVE REDUCTION
The compression rate when receiving.
(20) SETTING NO. OF DIRECTORY
The recorded directory stations.
(21) NUMBER OF COPY
The number of pages copied.
(22) NUMBER OF RECEIVE
The number of pages received.
(23) NUMBER OF SENDING
The number of pages sent.
(24) NUMBER OF CALLER ID
The number of times Caller ID was received.
(25) Not used
(26)~(29) Not Used
(30) NUMBER OF PRINTING WARNING LIST
The number of warning lists printed until now.
(31) Not used
(32) NUMBER OF DIVIDED PRINTING IN FAX RECEPTION
The number of faxes received that were divided into more than one sheet since the unit was purchased.
(33) Not used
(34) Not used
(35) MAN RCV
Means the unit received a fax message by manual operation.
(36) FRN RCV
Means the unit received a fax message by friendly signal detection.
(37) VOX
Means the unit detected silence or no voice.
(38) RMT DTMF
Means the unit detected DTMF (Remote Fax activation code) entered remotely.
(39) PAL DTMF
Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
(40) TURN-ON
Means the unit started to receive after 10 rings. (Remote Turn On: Service Code #573)
(41) TIME OUT
Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.
(42) IDENT
Means the unit detected Ring Detection.
(43) Not used

(44) Not used

12 Troubleshooting Guide

12.1. Troubleshooting summary

12.1.1. Troubleshooting

After confirming the problem by asking the user, troubleshoot according to the instructions and observe the following precautions.

12.1.2. Precautions

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

12.2. Error Messages-Display

If the unit detects a problem, one or more of the following messages will appear on the display.
The explanations given in the [ ] are for servicemen only.

Note:
Refer to **Error Message (Display)** (P.10) for display message.

"CALL SERVICE"

- There is something wrong with the unit.
  [This error is displayed when the thermal head does not warm up. Check the thermistor on the thermal head and connector lead.]

"CHECK DOCUMENT"

- The document was not fed into the unit properly. Re-insert the document. If misfeeding occurs frequently, clean the document feeder rollers and try again.
  (Refer to **Document Jams - Sending** (P.136).)
- Attempted to send a document longer than 600 mm. Press **[STOP]** to remove the document. Divide the document into two or more sheets and try again.
  [Alternately, turn off service code #559 to enable sending of documents longer than 600 mm] (Refer to **Service Function Table** (P.57).)

"CHECK MEMORY"

- Memory (telephone numbers, parameters, etc.) has been erased. Re-program.

"COVER OPEN"
"CHECK PAPER"

- The cover is open. Close it and press **[FAX/START]** to clear the message.
- The unit has run out of recording paper. Install recording paper and press **[FAX/START]** to clear the message.

"FAX IN MEMORY"

- The unit has a document in memory. See the other displayed message instructions to print out the document. For fax memory capacity, (Refer to **Specifications** (P.8)).

"FAX MEMORY FULL"

- The memory is full of received documents due to lack of recording paper or a recording paper jam. Install paper or clear the jammed paper. (Refer to **Jams** (P.136.)
- When performing broadcast transmission, the document being stored exceeded the memory capacity of the unit. Send the entire document manually.

"MEMORY FULL"

- There is no space to store new items in the phonebook. Erase unnecessary items.

"MODEM ERROR"

- There is something wrong with the unit's modem.
  [Refer to #554 on **Test Mode** (P.54) and **Digital Board Section** (P.99)]

"NO FAX REPLY"

- The other party's fax machine is busy or has run out of recording paper. Try again.

"PAPER JAMMED"

- A recording paper jam occurred. Clear the jammed paper. (Refer to **Jams** (P.136).)

"PLEASE WAIT"

- The unit is checking and initializing the paper cutter. Wait for a moment while the check is completed.

"POLLING ERROR"

- The other party's fax machine does not support polling. Check with the other party.

"REDIAL TIME OUT"

- The other party's fax machine is busy or has run out of recording paper. Try again.

"REMOVE DOCUMENT"

- The document is jammed. Remove the jammed document. (Refer to **Document Jams - Sending** (P.136).)
- Press **[STOP]** to eject the jammed document.

"SYSTEM IS BUSY"

- The system is busy. Replace the handset or stop using monitor, then try again.

"TRANSMIT ERROR"

- A transmission error occurred. Try again.

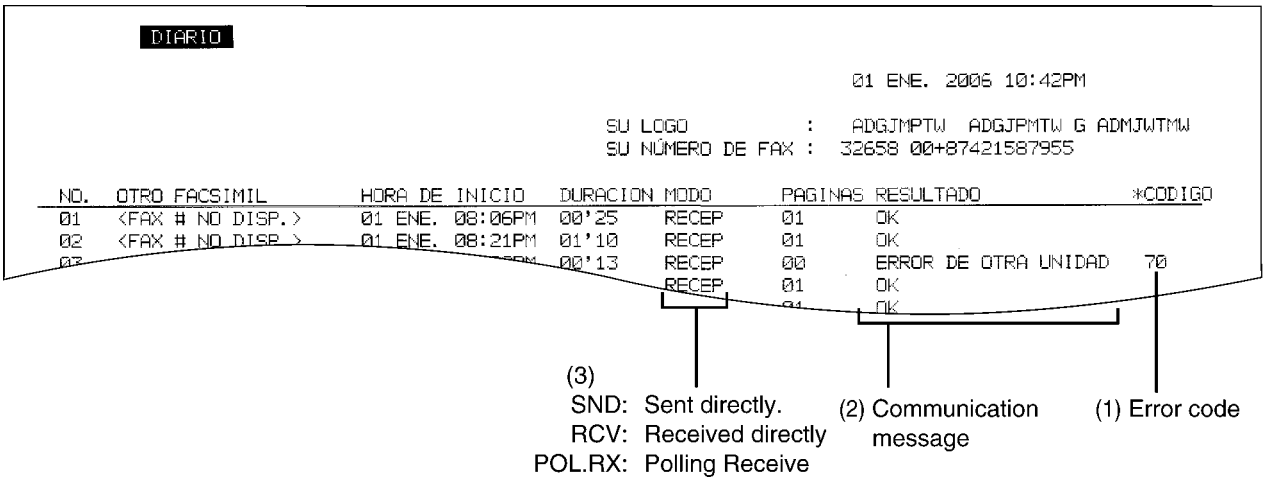
"UNIT OVERHEATED"

- The unit is too hot. Stop using the unit for a while and let the unit cool down.

12.3. Error Messages Report

12.3.1. Journal Report

1. Press **[MENU]** repeatedly to display “PRINT REPORT”.
2. Press **[◀]** or **[▶]** until the “JOURNAL REPORT” is displayed.
3. Press **[SET]**.
4. The report is printed out.



Note:

Refer to **Error Message (Report)** (P.9) for display message.

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Counter-measure*
	PRESSED THE STOP KEY	SND & RCV	Communication was interrupted by the STOP button.	
	DOCUMENT JAMMED	SND	The document paper is jammed.	
	NO DOCUMENT	SND	No document paper.	
	OTHER FAX NOT RESPONDING	SND	Transmission is finished when the T1 TIMER expires.	1
28	COMMUNICATION ERROR	SND & RCV	---------	
41	COMMUNICATION ERROR	SND	DCN is received after DCS transmission.	2
42	COMMUNICATION ERROR	SND	FTT is received after transmission of a 2400BPS training signal.	3
43	COMMUNICATION ERROR	SND	No response after post message is transmitted three times.	4
44	COMMUNICATION ERROR	SND	RTN and PIN are received.	5
46	COMMUNICATION ERROR	RCV	No response after FTT is transmitted.	6
48	COMMUNICATION ERROR	RCV	No post message.	7
49	COMMUNICATION ERROR	RCV	RTN is transmitted.	8
50	COMMUNICATION ERROR	RCV	PIN is transmitted (to PRI-Q).	8
51	COMMUNICATION ERROR	RCV	PIN is transmitted.	8
	OTHER FAX NOT RESPONDING	RCV	Reception is finished when the T1 TIMER expires.	9
54	ERROR-NOT YOUR UNIT	RCV	DCN is received after DIS transmission.	11
58	COMMUNICATION ERROR	RCV	DCN is received after FTT transmission.	13
59	ERROR-NOT YOUR UNIT	SND	DCN responds to the post message.	14
64	COMMUNICATION ERROR	POL.RX	Polling is not possible.	15
65	COMMUNICATION ERROR	SND	DCN is received before DIS reception.	2
65	COMMUNICATION ERROR	RCV	Reception is not EOP, EOM PIP, PIN, RTP or RTN.	2
68	COMMUNICATION ERROR	RCV	No response at the other party after MCF or CFR is transmitted.	13
70	ERROR-NOT YOUR UNIT	RCV	DCN is received after CFR transmission.	13
72	COMMUNICATION ERROR	RCV	Carrier is cut when the image signal is received.	16
	MEMORY FULL	RCV	The document was not received due to memory full.	
	CANCELLED	SND	The multi-station transmission was rejected by the user.	
FF	COMMUNICATION ERROR	SND & RCV	Modem error. For the DCN, DCN, etc. abbreviations, refer to **Modem Section** (P.30).	12

SND=TRANSMISSION RCV=RECEPTION

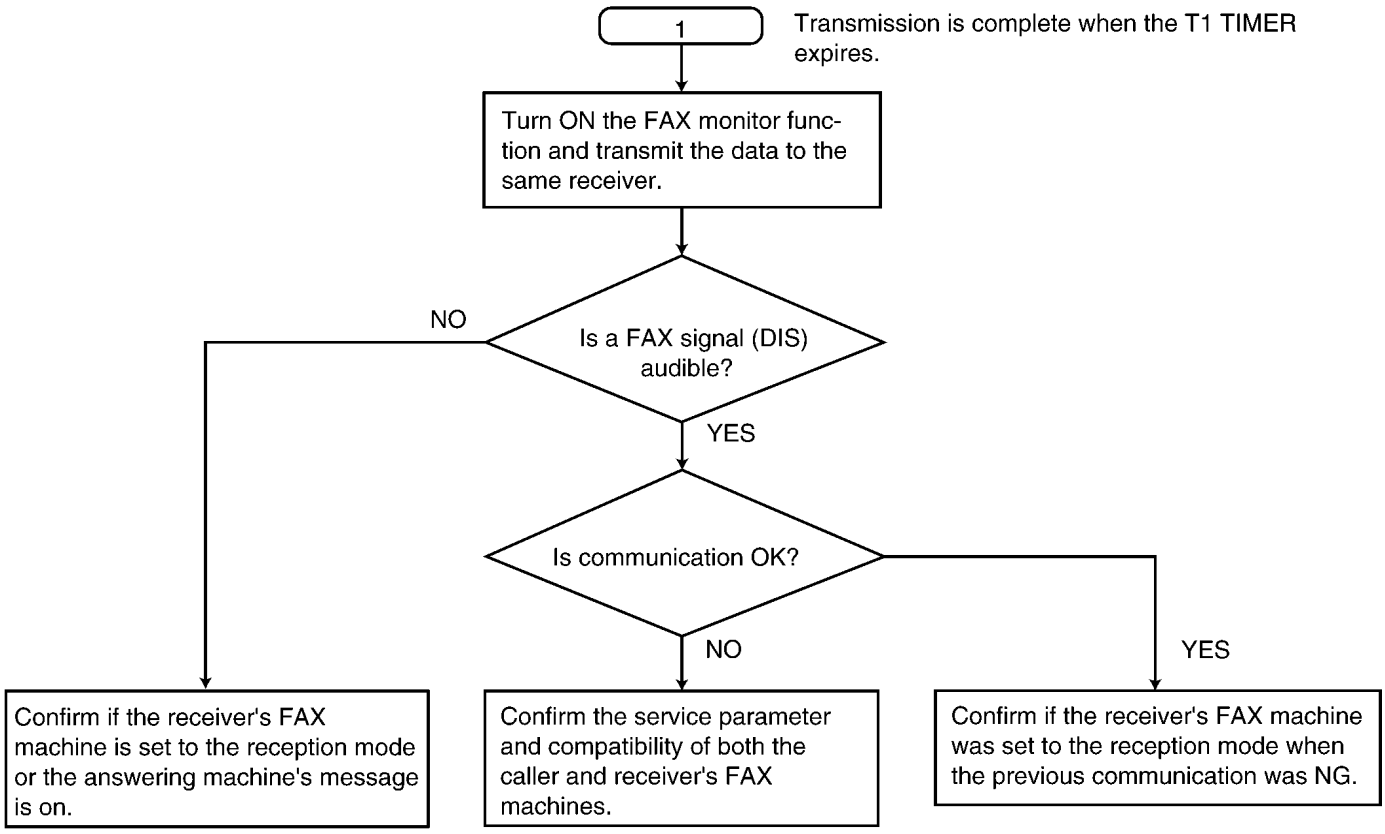
Most fax communication problems can be resolved by the following steps.

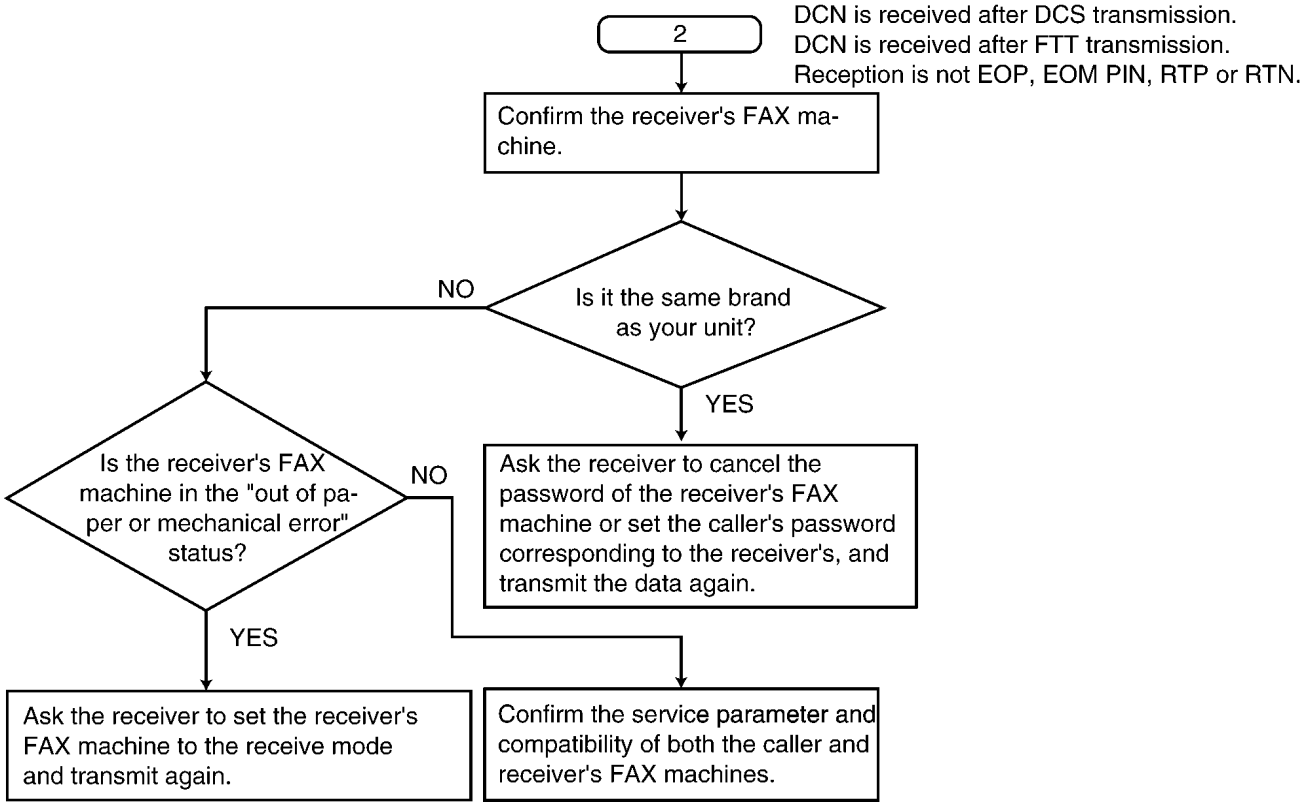
1. Change the transmit level. (Service code: 596, refer to **Service Function Table**(P.57).)
2. Change the TX speed/RX speed. (Service code: 717/718, refer to **Service Function Table** (P.57).)

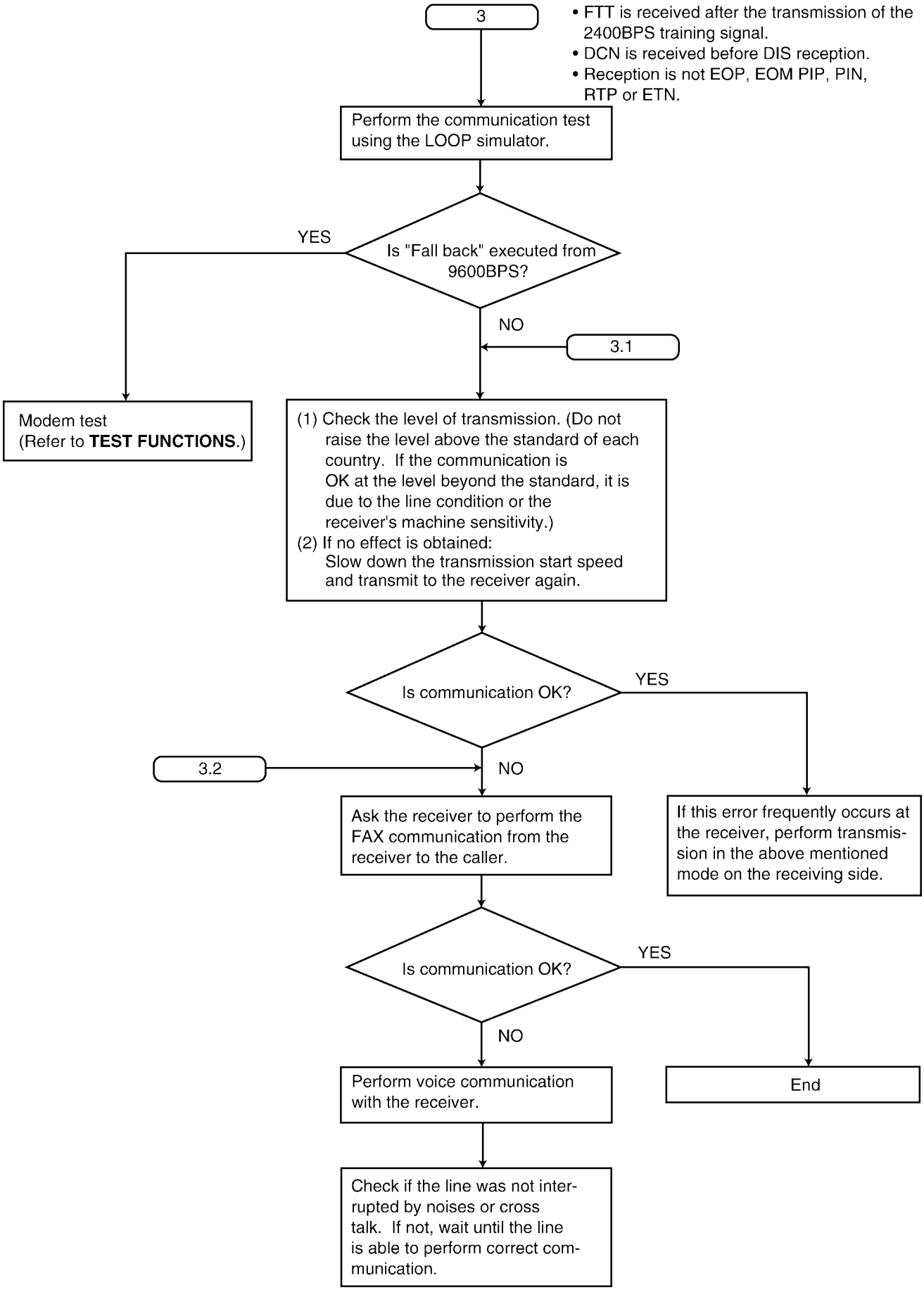
Note*:

If the problem remains, see the following **“Countermeasure”** flow chart.

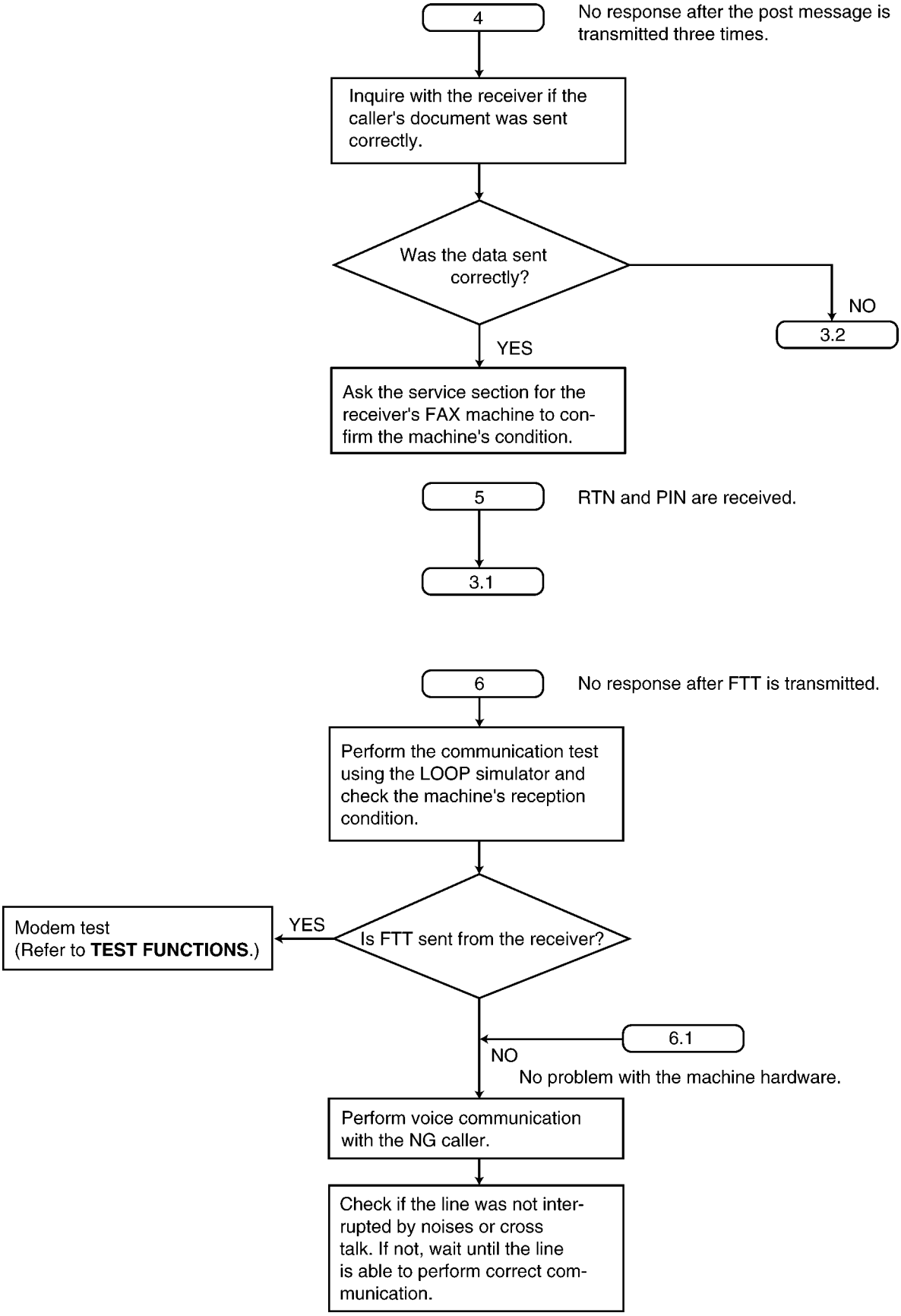
Countermeasure



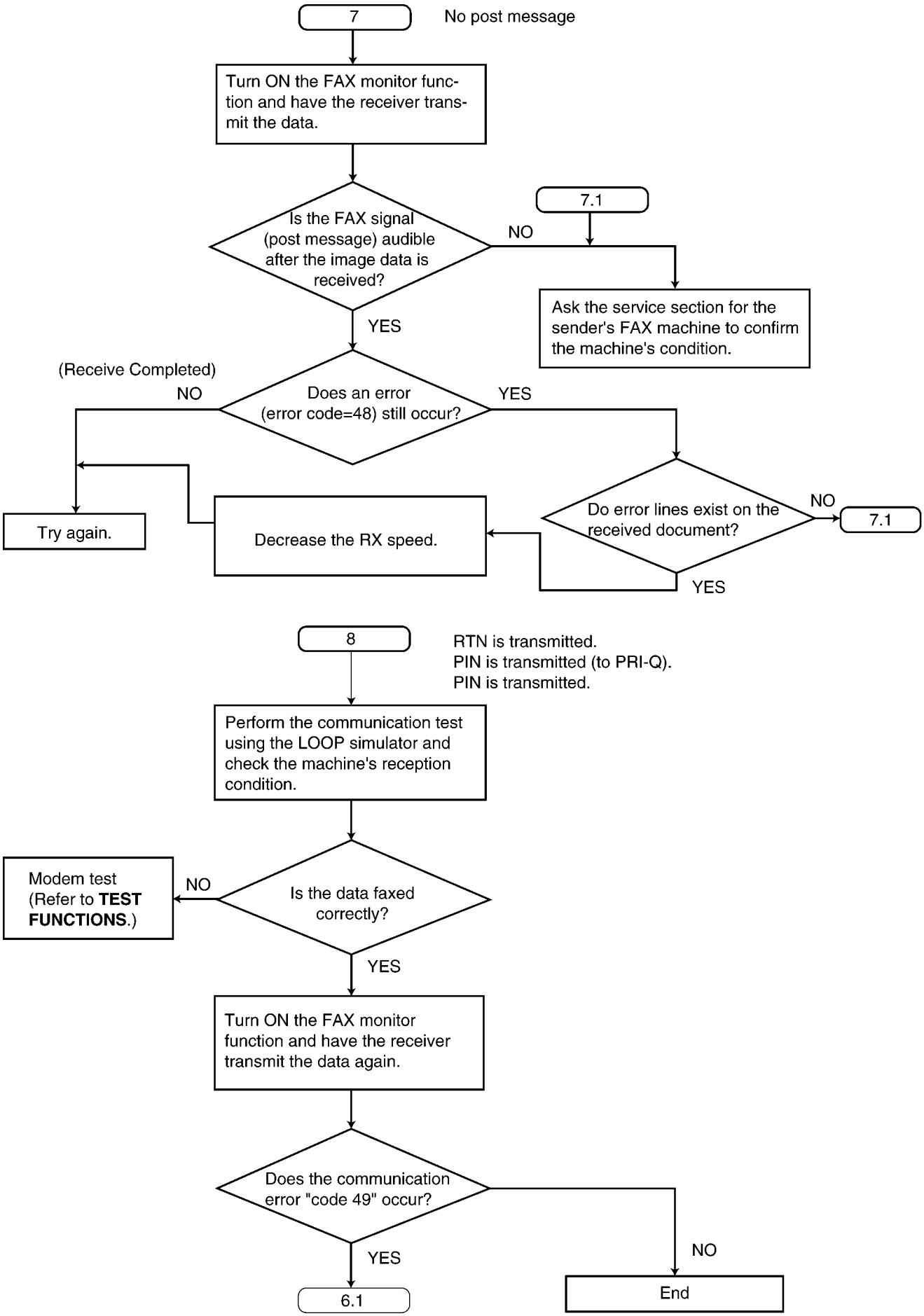




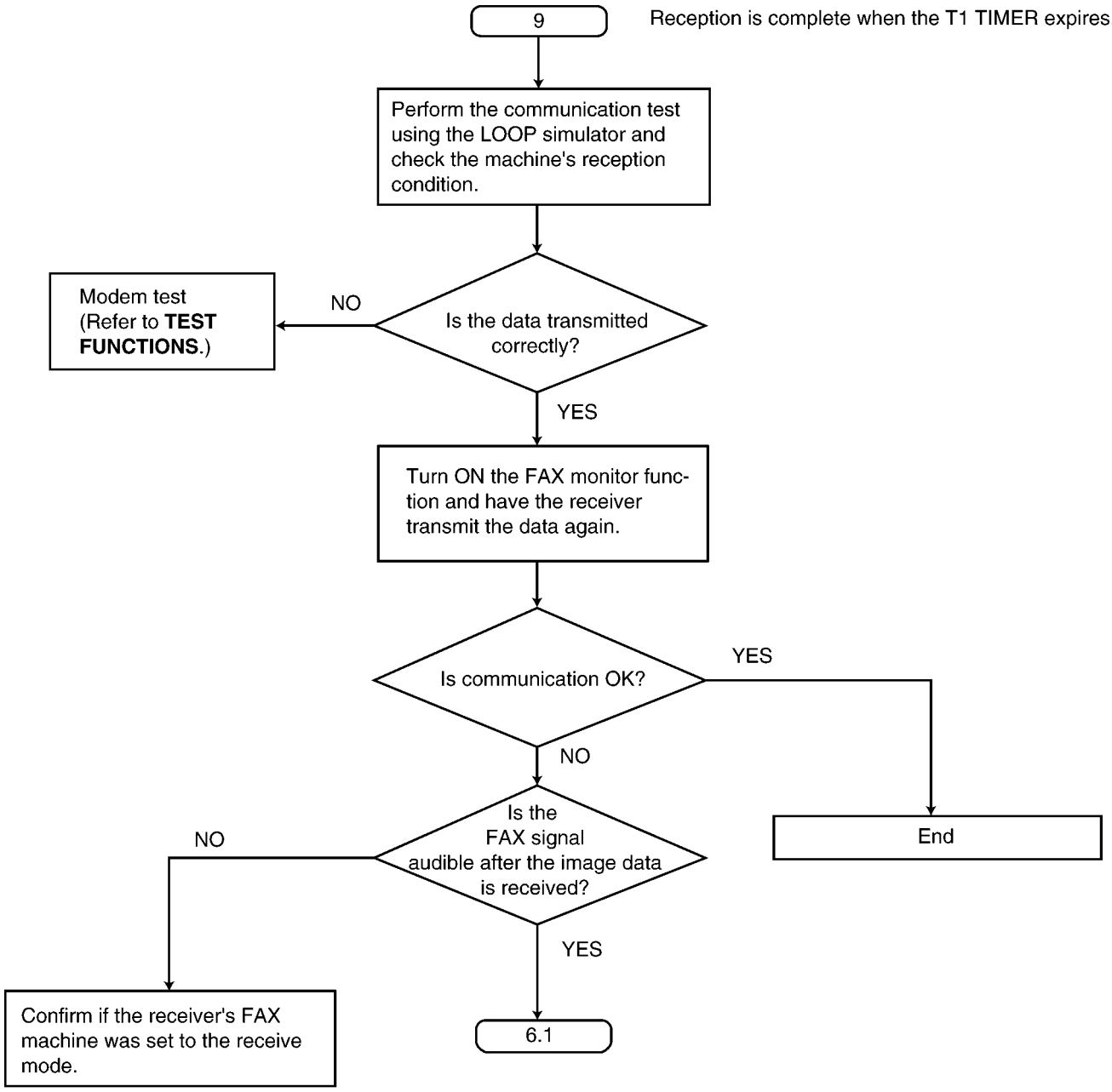
CROSS REFERENCE:
Test Mode(P.54)

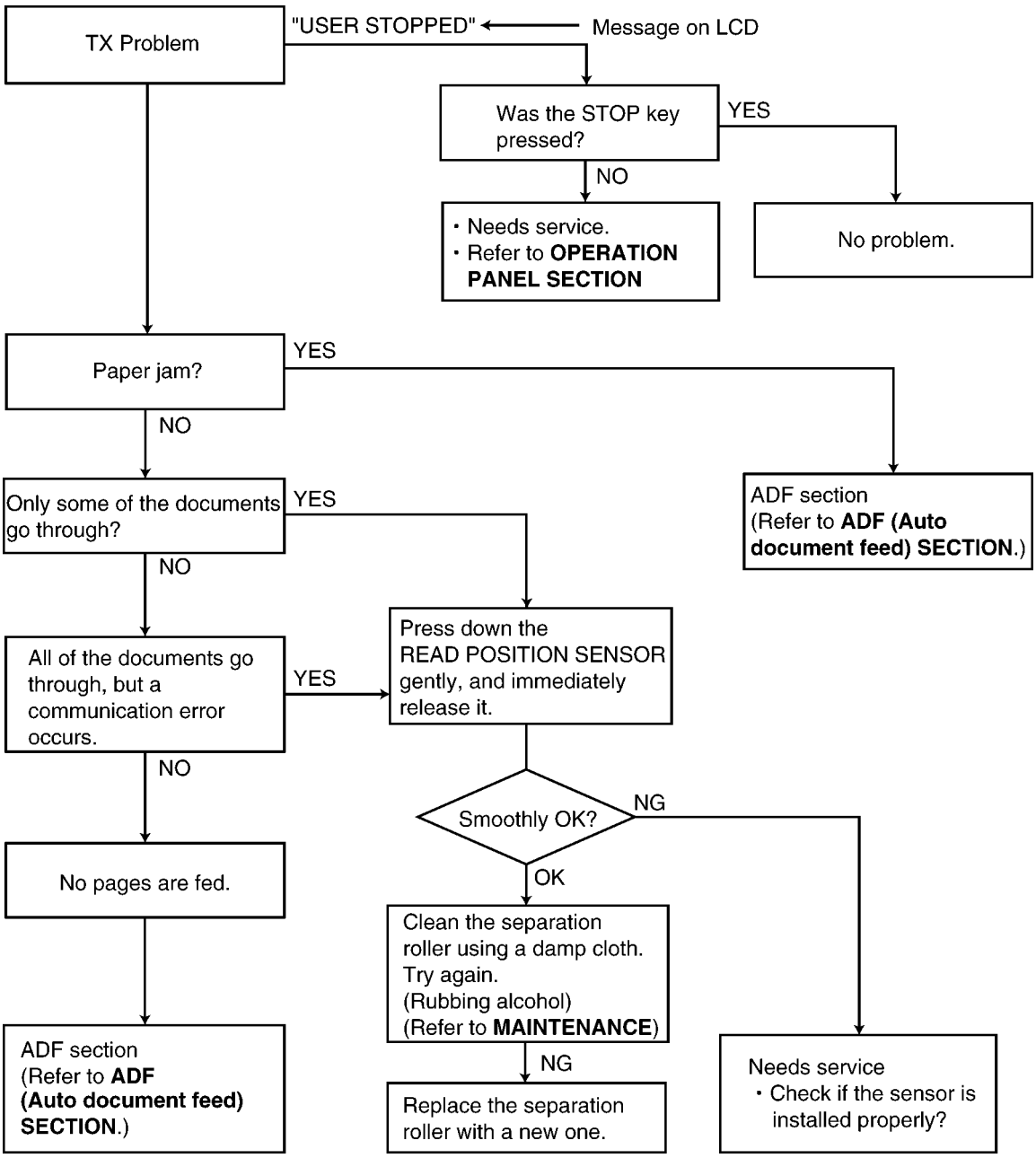


CROSS REFERENCE:
Test Mode(P.54)



CROSS REFERENCE:
Test Mode(P.54)


9
Reception is complete when the T1 TIMER expires.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Is the data transmitted correctly?
NO
Modem test (Refer to **TEST FUNCTIONS**.)
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Is communication OK?
YES
End
NO
Is the FAX signal audible after the image data is received?
NO
Confirm if the receiver's FAX machine was set to the receive mode.
YES
6.1



CROSS REFERENCE:

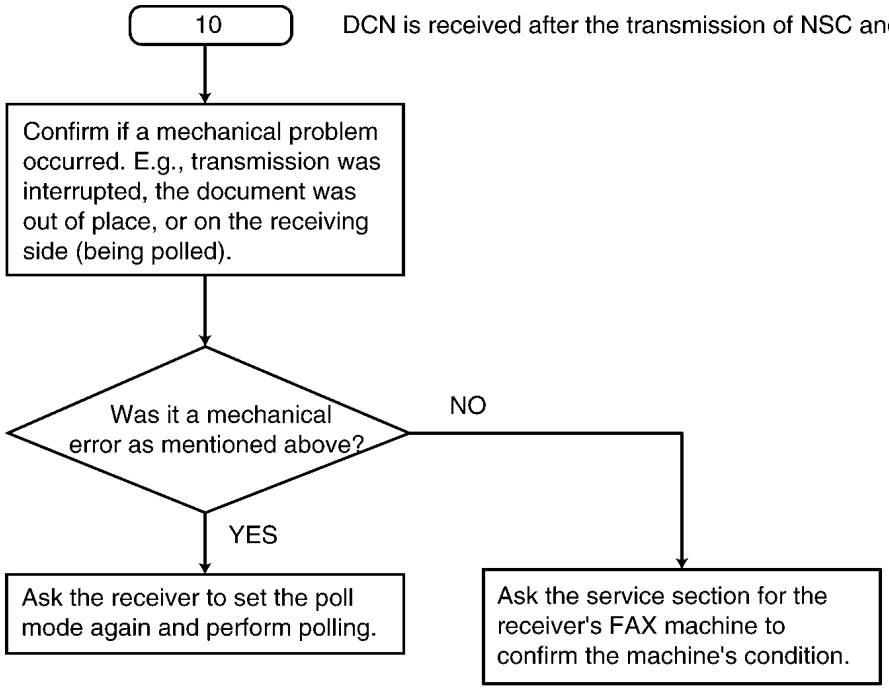
Maintenance(P.128)

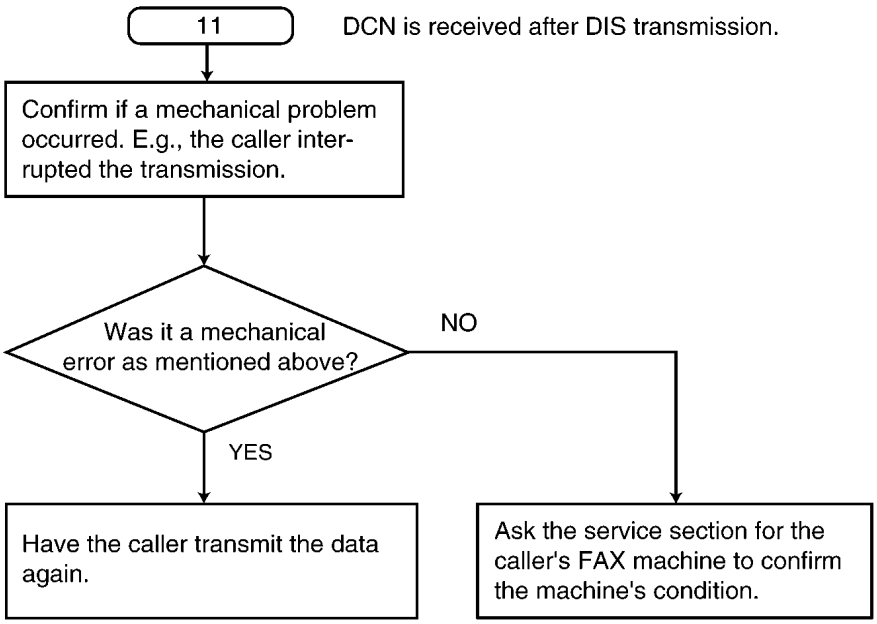
ADF (Auto Document Feed) Section(P.92)

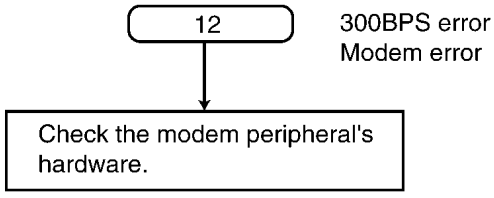
Operation Panel Section(P.167)

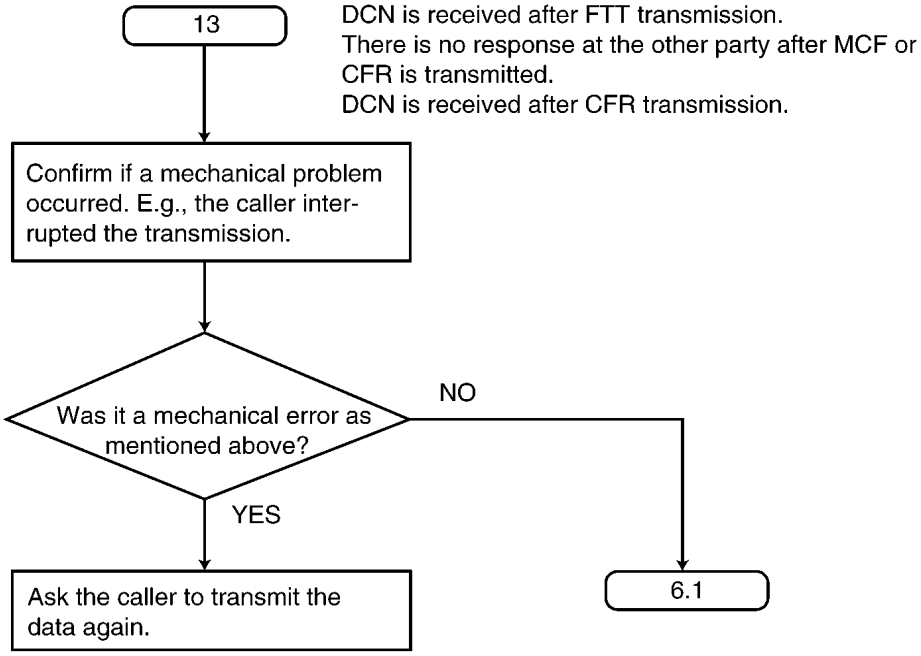
CROSS REFERENCE:

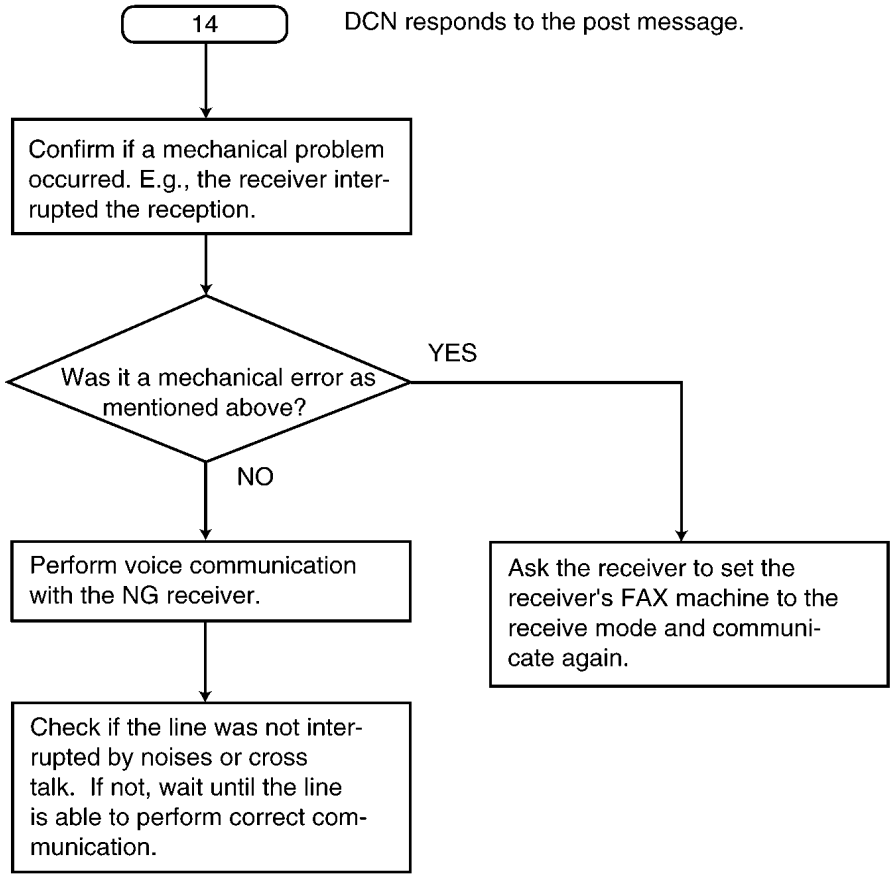
Test Mode(P.54)

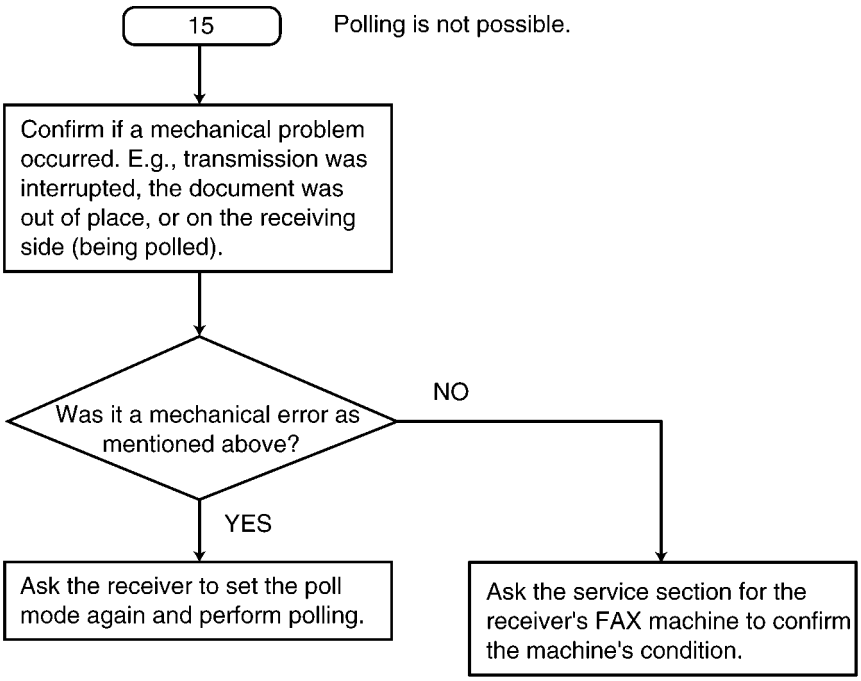

10
DCN is received after the transmission of NSC and DTC.
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again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

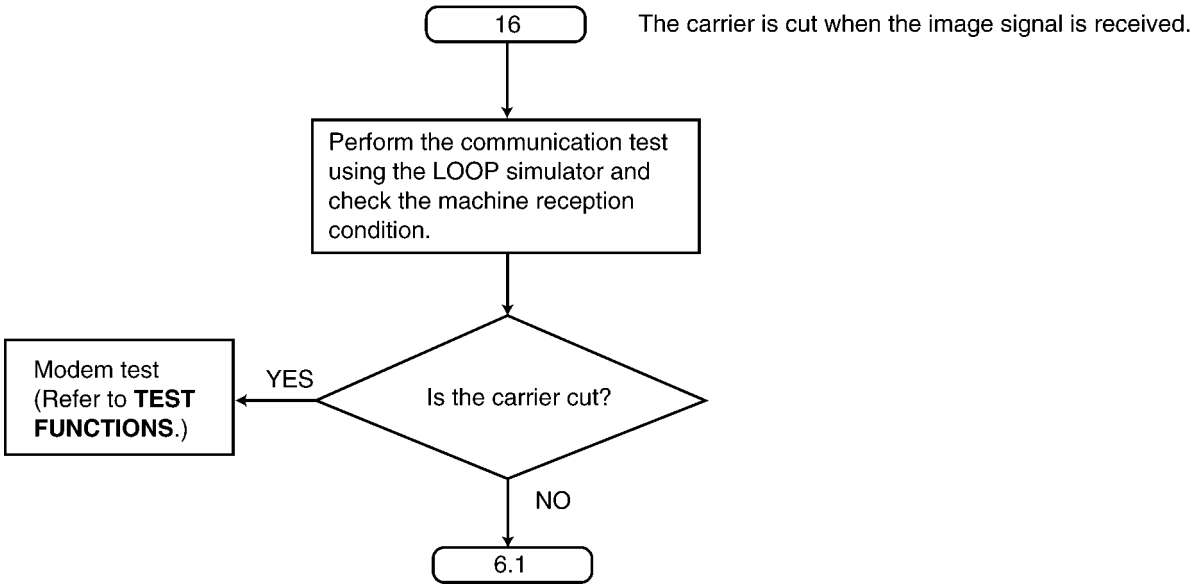

11
DCN is received after DIS transmission.
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Have the caller transmit the data again.
Ask the service section for the caller's FAX machine to confirm the machine's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


12
300BPS error
Modem error
Check the modem peripheral's hardware.


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


14
DCN responds to the post message.
Confirm if a mechanical problem 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 receive mode and communicate again.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

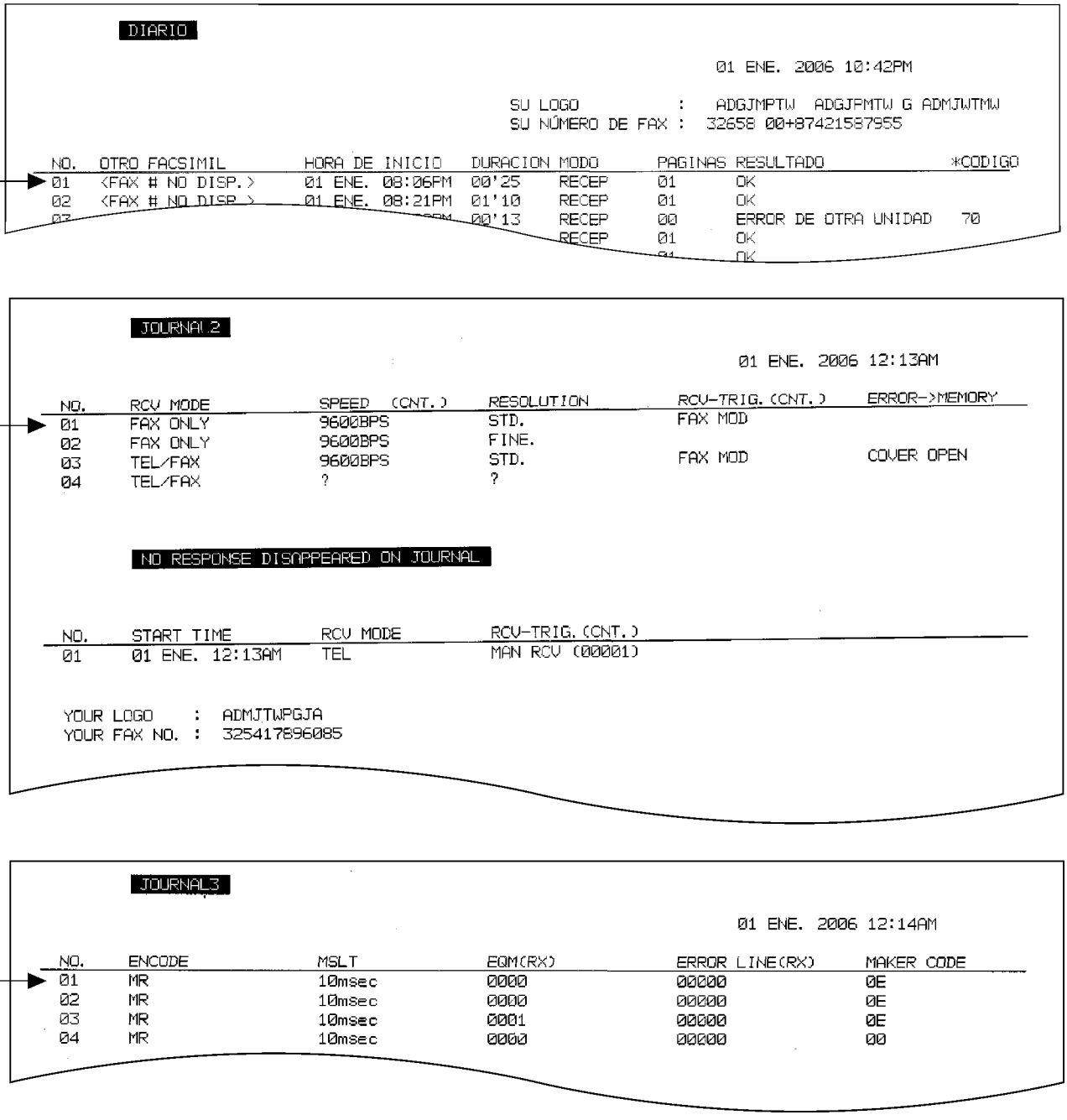




CROSS REFERENCE:
Test Mode(P.54)

12.3.2. Special service journal reports

Journal 2 and Journal 3 shown below, which are special journals giving the additional detailed information about the latest 30 communications, can be printed by Service Code 881 or 882. Remote printing function for the journal reports (JOURNAL, JOURNAL 2 and JOURNAL 3) is also available for service technicians. (Refer to **Remote Programming**(P.87).) The JOURNAL report only gives you basic information about a communication, but the other two journal reports provide different information on the same item (communication).



DIARIO

01 ENE. 2006 10:42PM

SU LOGO : ADGJMPTW ADGJPMTW G ADMJWTMW
SU NÚMERO DE FAX : 32658 00+87421587955

NO.	OTRO FACSIMIL	HORA DE INICIO	DURACION	MODO	PAGINAS	RESULTADO	*CODIGO
01	<FAX # NO DISP.>	01 ENE. 08:06PM	00'25	RECEP	01	OK	
02	<FAX # NO DISP.>	01 ENE. 08:21PM	01'10	RECEP	01	OK	
03		PM	00'13	RECEP	00	ERROR DE OTRA UNIDAD	70
				RECEP	01	OK	
					01	OK	

JOURNAL 2

01 ENE. 2006 12:13AM

NO.	RCV MODE	SPEED (CNT.)	RESOLUTION	RCV-TRIG. (CNT.)	ERROR->MEMORY
01	FAX ONLY	9600BPS	STD.	FAX MOD	
02	FAX ONLY	9600BPS	FINE.		
03	TEL/FAX	9600BPS	STD.	FAX MOD	COVER OPEN
04	TEL/FAX	?	?		

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	RCV MODE	RCV-TRIG. (CNT.)
01	01 ENE. 12:13AM	TEL	MAN RCV (00001)

YOUR LOGO : ADMJTWPGJA
YOUR FAX NO. : 325417896085

JOURNAL3

01 ENE. 2006 12:14AM

NO.	ENCODE	MSLT	EQM(RX)	ERROR LINE(RX)	MAKER CODE
01	MR	10msec	0000	00000	0E
02	MR	10msec	0000	00000	0E
03	MR	10msec	0001	00000	0E
04	MR	10msec	0000	00000	00

HOW TO READ JOURNAL REPORTS:

Example:

1. Look at **NO. 01** in the JOURNAL. If you want to know about the details about that item, see **NO. 01** in the JOURNAL 2 and the JOURNAL 3. You can get the following information.
   * MODE: Fax transmission
   * RCV. MODE: TEL
   * TX SPEED: 9.6 kbps
   * RESOLUTION: standard
   * ENCODE: MH
   * MAKER CODE: 79
2. Look at **NO. 04** in the JOURNAL 2. CNG (0003) indicates that the CNG signal has been received three times since the purchase date.

For further details, see **Journal 2**(P.76) and **Journal 3**(P.77).

12.3.2.1. Journal 2

Refer to JOURNAL 2 in **Printout Example**(P.77).
Journal 2 displays the additional detailed information about the last 30 communications.

Descriptions:

(1) RCV. MODE

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

(2) SPEED

Indicates the speed of the communication. If multiple pages are transmitted or received, it indicates the last page's communication speed. If there is a communication error, "?" is displayed.

(3) RESOLUTION

Indicates the resolution of the communication. If multiple pages are transmitted or received, it indicates the last page's resolution. If there is a communication error, "?" is displayed.

(4) RCV-TRIG. (CNT.)

Indicates the trigger that causes the unit to switch to the fax receive mode. The available options are listed in JOURNAL 2 in **Printout Example**(P.77). The values in parentheses indicate how many times the trigger has been used. (For example, "0003" means three times.)

No.	Display	Function
1	FAX MODE	Means the unit received a fax message in the FAX mode.
2	MAN RCV	Means the unit received a fax message by manual operation.
3	FRN RCV	Means the unit received a fax message by friendly signal detection.
4	VOX	Means the unit detected silence or no voice.
5	RMT DTMF	Means the unit detected DTMF (Remote Fax activation code) entered remotely.
6	PAL DTMF	Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
7	TURN-ON	Means the unit started to receive after 10 rings. (Remote Turn On: Service Code #573)
8	TIME OUT	Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.
9	IDENT	Means the unit detected Ring Detection.
10	CNG OGM	Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode. OR Means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.
11	CNG ICM	Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.

(5) ERROR→MEMORY

Indicates the reason why the unit received a fax message in memory.
If you look at No.11 in the JOURNAL 2 in **Printout Example**(P.77), it shows the fax message was received in memory due to "PAPER OUT" error.

NO RESPONSE DISAPPEARED ON JOURNAL

The "**NO RESPONSE DISAPPEARED ON JOURNAL**" displays the information about the last 10 communications terminated by "No Response". (Some of the communications terminated by "No Response" were not displayed in the JOURNAL.)
When a fax transmission cannot be performed because the other party's unit is set to the TEL mode, "No response" will be printed.

12.3.2.2. Journal 3

Refer to JOURNAL 3 in **Printout Example** (P.77).

Descriptions:

(6) ENCODE

Compression Code: MH/MR

(7) MSLT

MSLT means Minimum Scan Line Time. Used only at the factory.

(8) EQM

EQM means Eye Quality Monitor. Used only at the factory.

(9) ERROR LINE(RX)

When an error occurs while receiving a fax, this shows the number of error lines.

(10) MAKER CODE

This shows a 2 digit code of the other party's fax machine brand.

0E: “KX” model
00: Unknown
79: “UF” model
19: “Xerox” model

12.3.2.3. Printout Example

JOURNAL2

01 ENE. 2006 12:13AM

NO.	RCV MODE	SPEED (CNT.)	RESOLUTION	RCV-TRIG. (CNT.)	ERROR->MEMORY
01	FAX ONLY	9600BPS	STD.	FAX MOD	
02	FAX ONLY	9600BPS	FINE.		
03	TEL/FAX	9600BPS	STD.	FAX MOD	COVER OPEN
04	TEL/FAX	?	?		

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	RCV MODE	RCV-TRIG. (CNT.)
01	01 ENE. 12:13AM	TEL	MAN RCV (00001)

YOUR LOGO : ADMJTWPGJA
YOUR FAX NO. : 325417896085

JOURNAL3

01 ENE. 2006 12:14AM

NO.	ENCODE	MSLT	EQM(RX)	ERROR LINE(RX)	MAKER CODE
01	MR	10msec	0000	00000	0E
02	MR	10msec	0000	00000	0E
03	MR	10msec	0001	00000	0E
04	MR	10msec	0000	00000	00

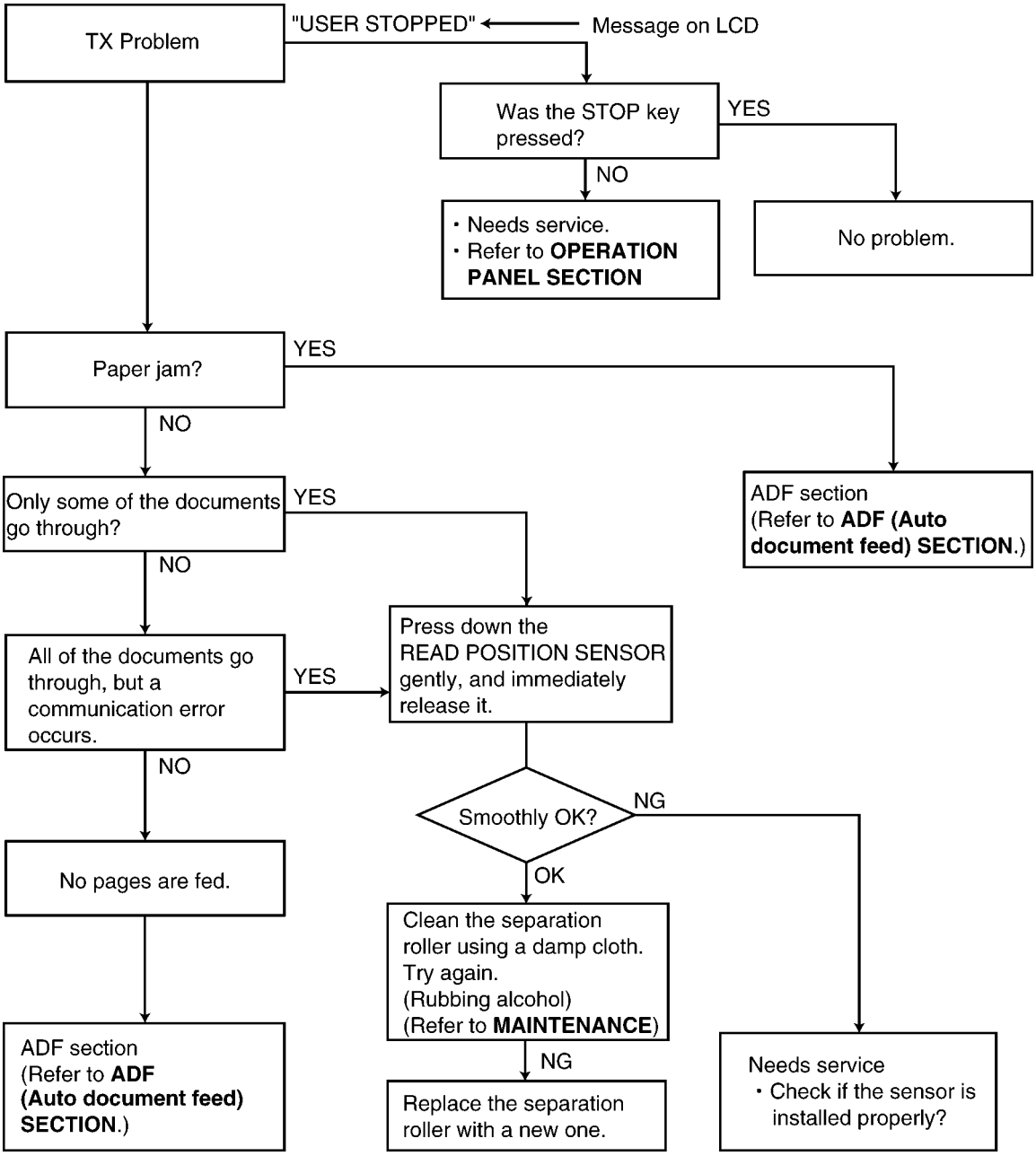
12.3.3. Communication Section

Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in **Defective Facsimile Section** (P.79).

No.	Symptom	Content	Possible cause
1	The paper is not fed properly when faxing. (Nor in the copy mode.)	Troubleshooting	Problem with the feeding mechanism.
2	The fax usually transmits successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the receiver's fax.
3	The fax usually receives successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the transmitter's fax.
4	The fax completely fails to transmit or receive. (The unit can copy documents.)	Troubleshooting	Problem with the electric circuit.
5	The fax fails either to transmit or receive when making a long distance or an international call. (The unit can copy documents.)	Detailed description of the possible causes (Similar to troubleshooting items No.2 and No.3.)	Problem with the service line.
6	The fax image is poor when transmitting or receiving during a long distance or an international call.		
7	No.1-No.5	The troubleshooting procedure for each error code will be printed on the communication result report.	

12.3.3.1. Defective Facsimile Section

12.3.3.1.1. Transmit Problem



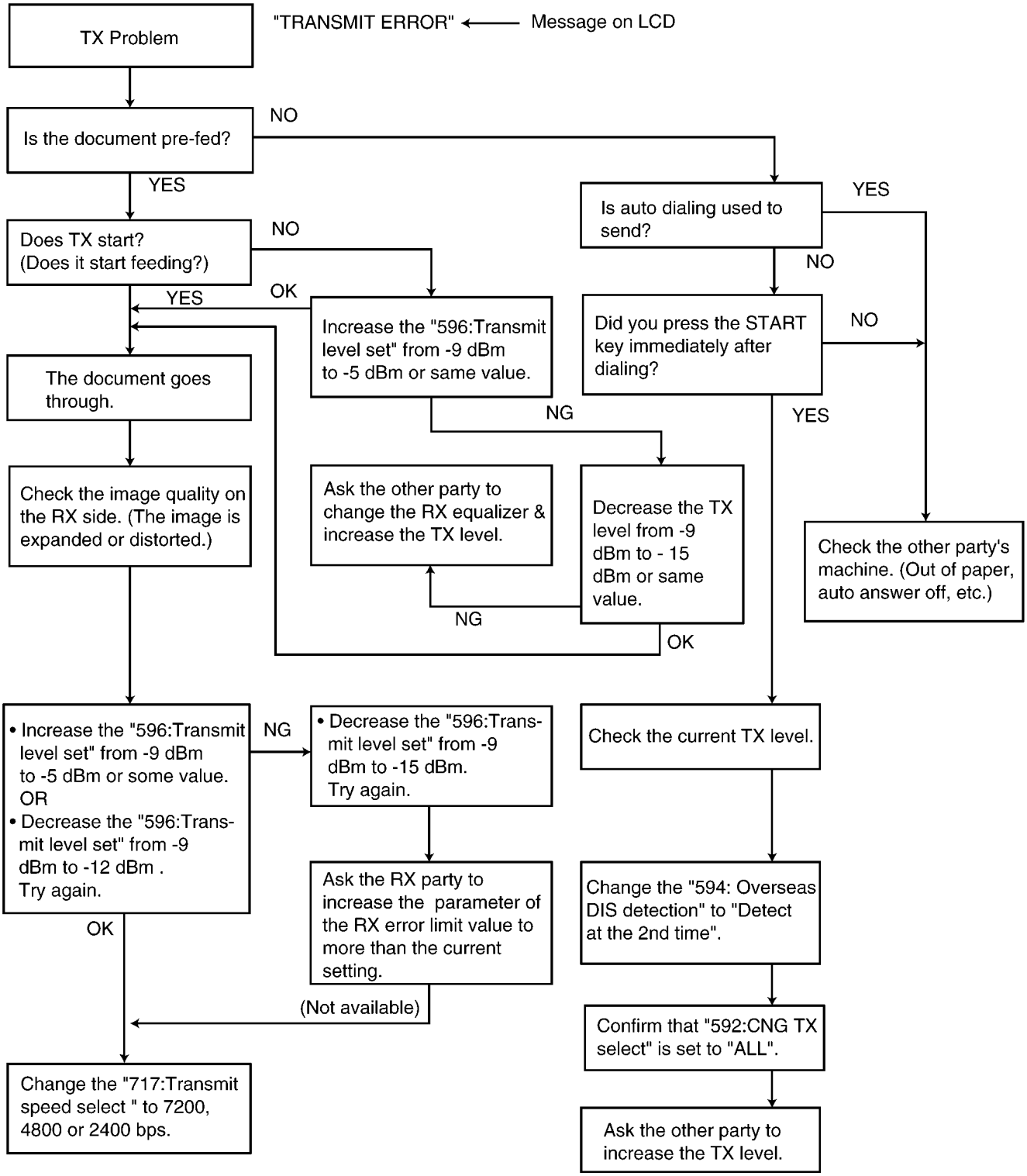
CROSS REFERENCE:

Operation Panel Section(P.112)
ADF (Auto Document Feed) Section(P.92)
Maintenance(P.128)

12.3.3.1.2. Sometime there is a transmit problem

Note:

Refer to **Error Message (Display)** (P.10) for display message.

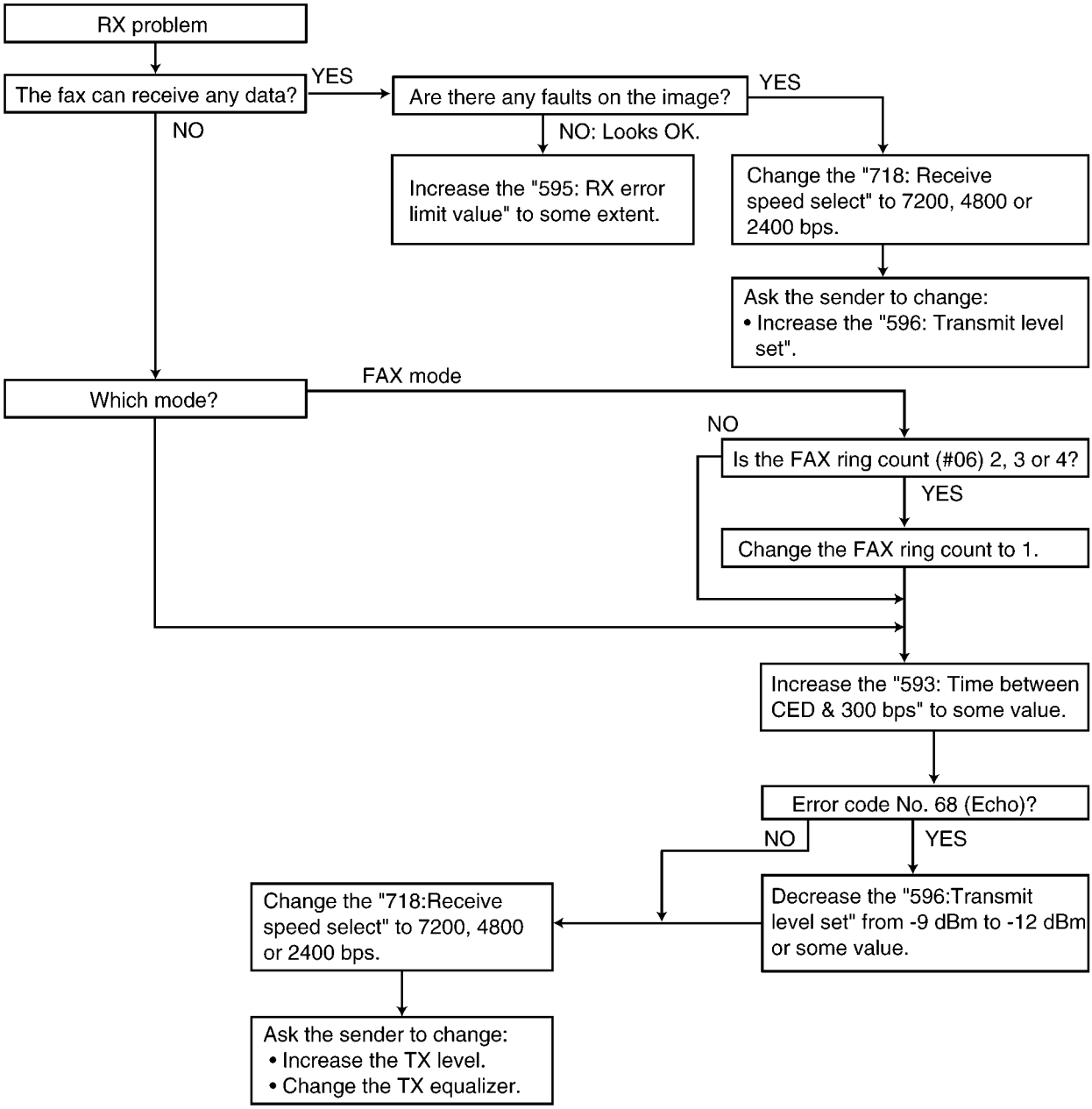


Note:

• “596: Transmit level set” represents a service code. (Refer to **Service Function Table**(P.57).)

12.3.3.1.3. Receive Problem

First confirm whether the recording paper is installed properly or not before starting troubleshooting. (Refer to "**Remarks**".)



Note:

"596: Transmit level set" represents a service code. (Refer to **Service Function Table** (P.57).)

Remarks:

Regarding the reception problem, we have investigated the conceivable causes in the flow chart except for the software-related errors. However, some troubles may occur due to the software-related problems such as "OUT OF PAPER" when the fax switches to the memory receiving mode and the memory capacity becomes full of the unprintable data. In this case, error messages [MEMORY FULL] and its main cause, for example "CHECK PAPER" are displayed on the LCD. Once you solve the main problem, [MEMORY FULL] will be cancelled and the reception problem will be resolved.

LCD display messages indicating the error causes are shown below.

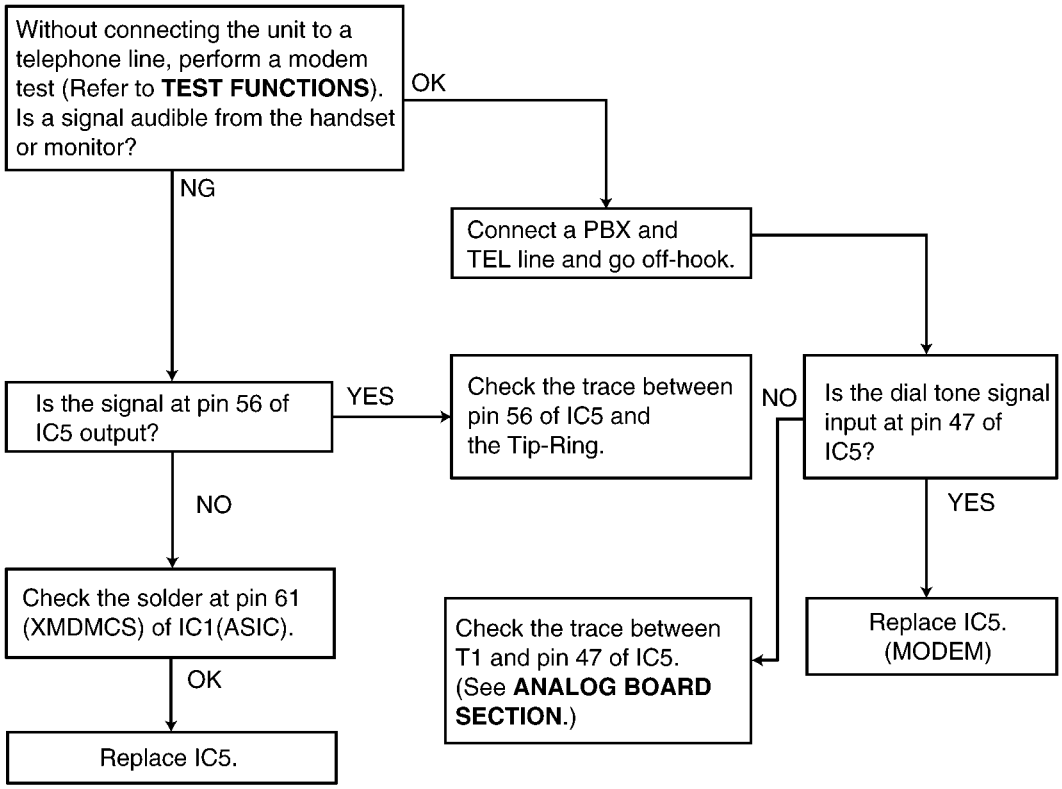
COVER OPEN

UNIT OVERHEATED (COVER OPEN, etc.)...Reset the unit.

PAPER JAMMED

Please refer to **Error Messages-Display** (P.64) for the above items. If it turns out to be a hardware deformity, please check each sensor. (Refer to **Test Mode** (P.54).)

12.3.3.1.4. The unit can copy, but cannot transmit/receive



CROSS REFERENCE:

Analog Board Section(P.107)
Test Mode(P.54)

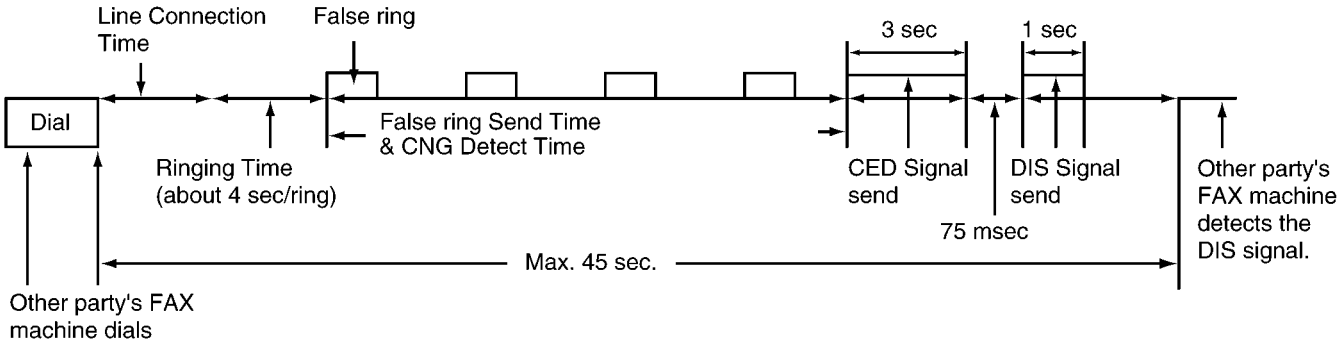
12.3.3.1.5. The unit can copy, but cannot either transmit/receive long distance or international communications

The following two causes can be considered for this symptom.

Cause 1:

The other party is executing automatic dialing, the call has been received by this unit, and the CED or DIS signal response time is too long. (In most cases, this unit detects the CNG signal and can respond to CED or DIS.) (According to the ITU-T standard, the communication procedure is cancelled when there is no response from the other party within 35 sec, so that the other party releases the line.)

(Response Time)

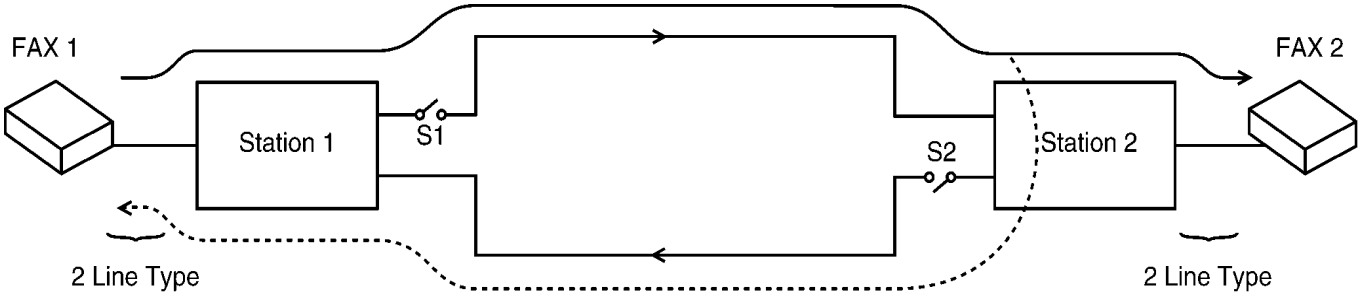


(Cause and Countermeasure)

As shown in the chart above, the total handshaking time must be reduced, but because of the long distance connection and linking of several stations, the line connection time cannot be reduced. Accordingly, the following countermeasures should be tried.
(A)... As the 45 sec. count 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 entering two pauses at the end of the auto dial number on the transmission side. Then the count start time can be delayed for 2 pauses (about 10 sec.).

Cause 2:

Erroneous detection because of an echo or an echo canceler.



(Echo/Echo Canceler)

The signal from FAX1 reaches FAX2 via 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 far, the echo returns to FAX 1 at a max of 600 msec after transmission. There is a possibility that this signal is detected erroneously as the signal from FAX2. For a normal call, there is also a possibility that the echo of their own voice will make the call difficult to understand. For this reason, each station (station 1 and station 2) attaches echo cancelers (S1 and S2) for 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 FAX2. When the transmission signal is larger, S1 is closed while S2 is opened when it is smaller. In other words, for transmission from FAX1, S1 is closed and S2 is open, so that the echo does not return to FAX1.

(Causes and Countermeasures)

No.	Countermeasure Side	Echo Communication Problem Example	Countermeasure	Service Code
1	Sending side	Some time is needed to compare the level of the receiving and sending signals for the echo canceler. The header of the training signal lacks due to a switching delay to close S1.	Add a dummy signal to the beginning of the training signal.	Service code (521) (International mode select) This countermeasure becomes the default value.
2	Receiving side	The echo canceler function stops according to a CED signal frequency of 2100Hz (S1 and S2 are both ON), a DIS signal is returned as an echo, and a DCS signal from the sending side overlaps the DIS echo. Then the receiving side FAX cannot retrieve the DCS signal. (Refer to Fig. a)	Change to a 1100Hz CED signal frequency. (Refer to Fig. b)	Service code (520) (CED frequency select)
	Receiving side		Change the regular rime of 75 msec between the CED signal and DIS signal to 500 msec. This will give at least 250 msec to recover the echo canceler operation. (Refer to Fig. c)	Service code (593) (Time between CED and 300 bps)
	Sending side		The sending side FAX sends a DCS signal not after receiving the 1st DIS signal but after receiving the 2nd DIS signal. (Refer to Fig. d)	Service code (594) (Overseas DIS detection select)
3	Sending side	Communication failure occurs in a long distance communication on the telephone line without an echo canceler.	Decrease the transmission level from -9 dBm to -15 dBm and the echo level will decrease.	Service code (596) (Transmit level set)
4	Sending side Receiving side	or	Decrease the receiving sensitivity from -13 dBm to about -32 dBm so an echo signal will not received.	Service code (598) (Receiving sensitivity)
5	Sending side Receiving side	There are some cases (e.g. Mobil comms.) which cause the collision of TX / RX signals due to the delay / echo and noise of the network / terminal. (Refer to Fig. e)	Set additional Pause time (Service mode: code No. 774) in between the original and its repeated signals, to prevent the collision of the signals at both end.	Service code (774) (T4 timer)

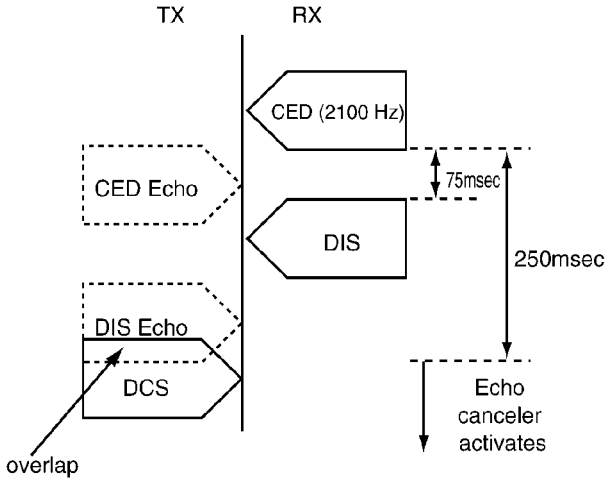


Fig. a (Overlapping the Echo of the DIS signal and DCS signal)

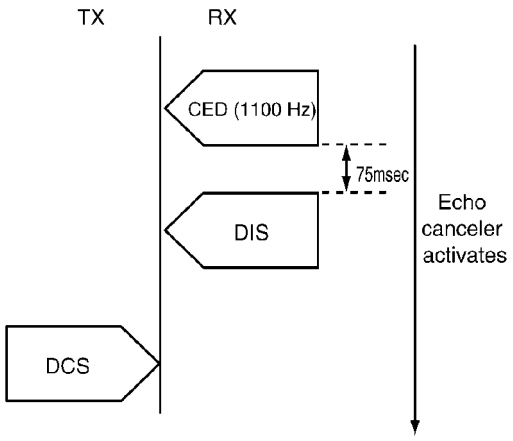


Fig. b (Countermeasure by Changing the CED Frequency)

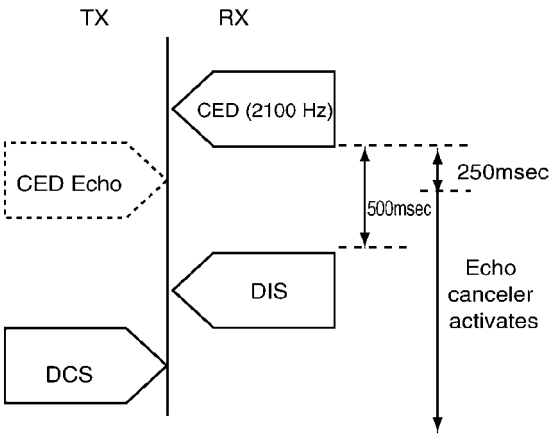


Fig. c (Countermeasure by Changing the Interval Between CED and DIS)

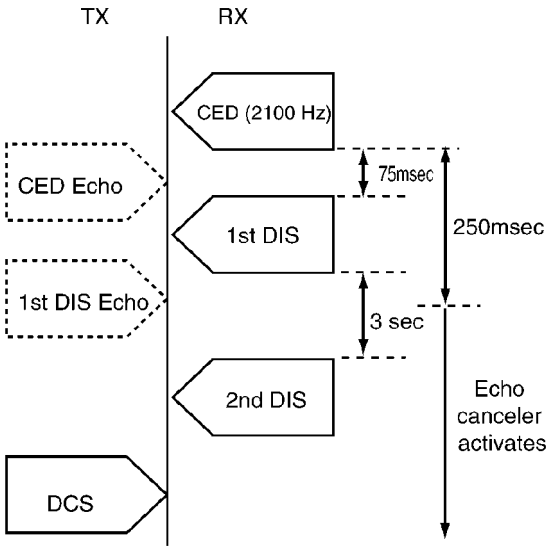
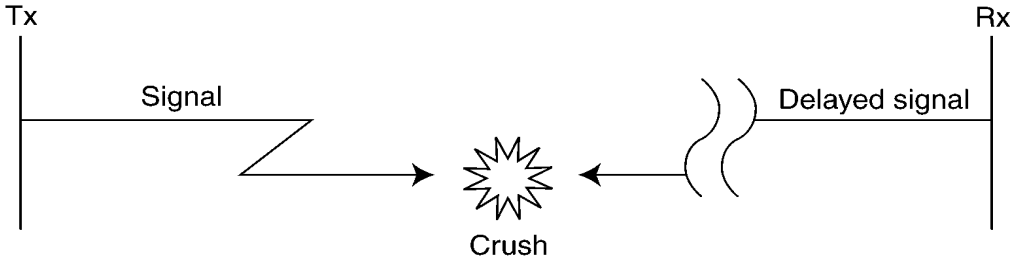


Fig. d (Countermeasure by Ignoring the 1st DIS)

<TX side signal>	<RX side signal>	<Countermeasure>
2nd / 3rd DCS / Training	& delayed CFR / FTT	at TX side
2nd / 3rd EOP / EOM / MPS	& delayed MCF / PIP / PIN / RTP / RTN	at TX side
delayed DCS	& 2nd / 3rd / --- DIS	at RX side



(Fig. e)

12.3.3.1.6. The unit can copy, but the transmission and reception image are incorrect

(Long distance or international communication operation)

This symptom highly depends on the transmission and reception capability of the other FAX unit and the line conditions. The countermeasures for this unit are shown below.

Transmission Operation:

Set the transmitting speed to 4800BPS (service mode: code No. 717) or select the overseas mode.

Reception Operation:

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

• Refer to **Service Function Table**(P.57).

12.3.3.1.7. How to record fax signal by using PC

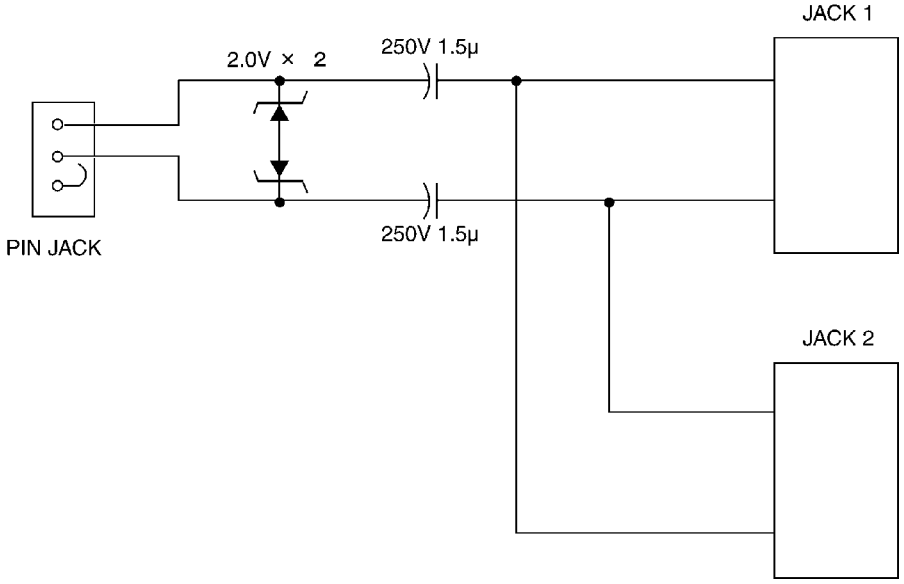
Recording FAX signal is one of the useful analysis measures to solve communication problems.
The way of recording easily by using PC is shown as follows.

1. Equipment

- 1 jig
- 1 PC (with LINE IN)
- 1 audio cord (mini jack supported)
- 2 tel cords

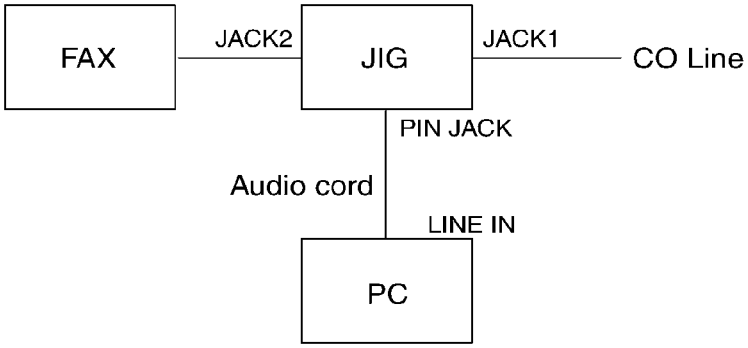
Parts No.	Parts Name & Description	Qt'y
PQJJ1T004Z	JACK1, JACK2	2
PQJJ1D010Z	PIN JACK	1
ECQE2155KF or ECQE2E155KC	CAPACITOR	2
MA4020	DIODE	2

2. Setting up



FAX SIGNAL RECORDING JIG

3. Connecting PC and JIG



4. PC setting and recording

1. Set LINE IN to be valid in the volume control setting.
   Refer to the PC instruction book.
2. Start up the PC software "SOUND RECORDER". (This software is bundled to Windows OS, which can create WAV file.)
   Set the audio format "PCM 22.050kHz, 8bit, mono".
3. Click the record button and start recording after acquisition the signal.

Note:

- Not to be wind wave patterns on the wave monitor.
- Please compress the recording data when you send attaching to E-Mail because the data size will be so heavy.
- Any software which can create WAV files is available.

12.4. Remote Programming

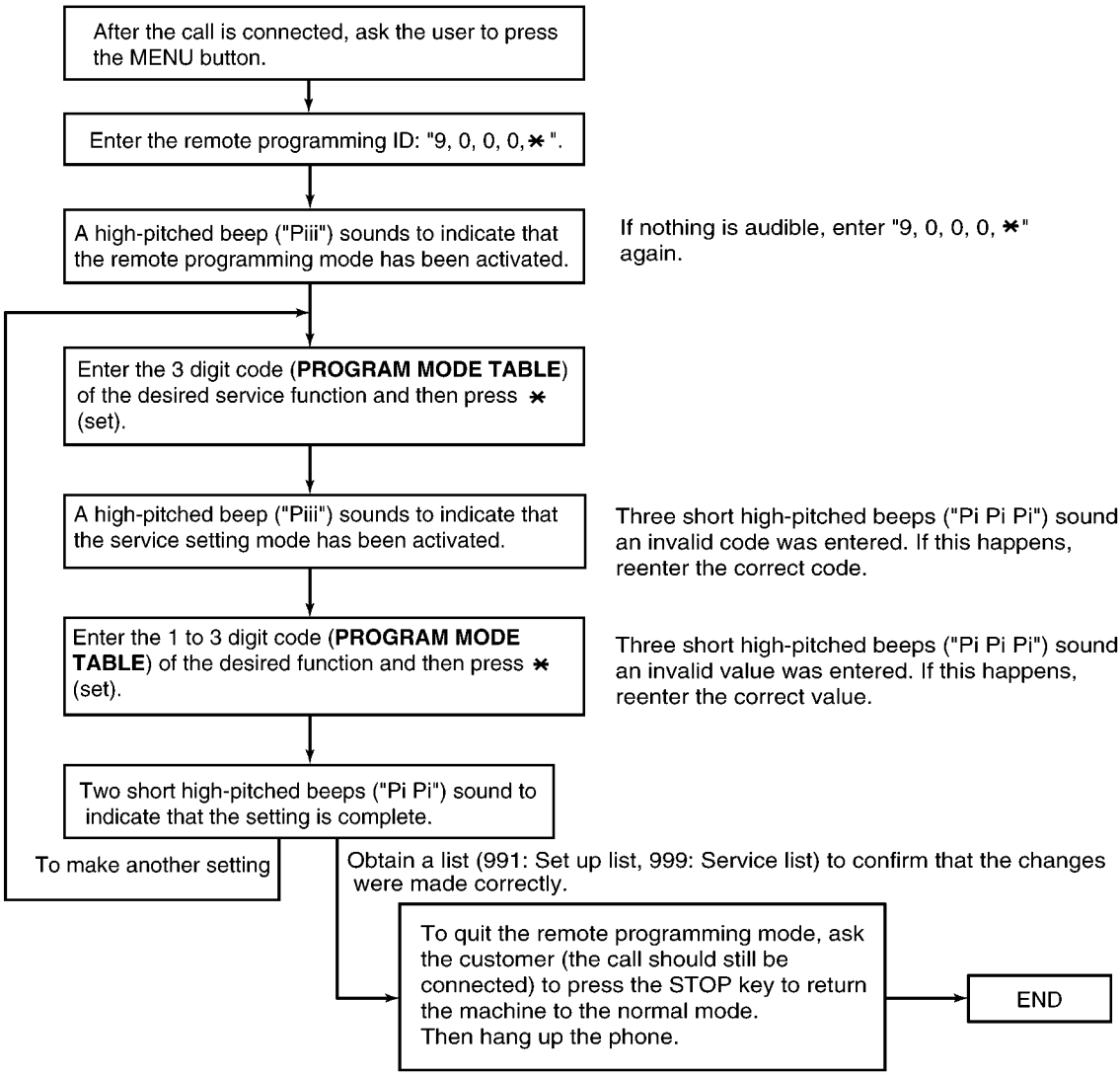
If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (**Program Mode Table** (P.88)). The function used to accomplish this is remote programming.

First, in order to check the current status of the service code parameter, print out the setup list (code: 991) and the service list (code: 999) from the customer's fax machine.
Based on this, the parameters for the desired codes can be changed.
The procedure for changing and listing parameters is described on **Entering the Remote Programming Mode and Changing Service Codes** (P.87). Also, before exiting the remote programming mode, it is advisable to obtain a new list to confirm that the changes were made correctly.

Hint:

Since the connected telephone is in use during the remote programming mode, it may be helpful to ask the customer to switch to the speakerphone. This frees the customer from the need to remain right next to the fax while you are making parameter settings. When finished, inform the customer. Also note that in very noisy locations where the DTMF tones are not audible, the remote programming function will not work.

12.4.1. Entering the Remote Programming Mode and Changing Service Codes



CROSS REFERENCE:

Program Mode Table (P.88)

12.4.2. Program Mode Table

Code	Function	Set Value	Default	Remote Setting
001	Set date and time	dd/mm/yy hh:mm	01/01/06	NG
002	Your logo	---------	None	NG
003	Your FAX number	---------	None	NG
004	Print sending report	1:ON / 2:OFF / 3:ERROR	ERROR	OK
006	FAX ring count	1-4 / 5: EXT.TAM	2	OK
013	Dialing mode	1:PULSE / 2:TONE	TONE	OK
017	Ringer pattern	RINGER 1~3	RINGER 1	NG
022	Journal auto print	1:ON / 2:OFF	ON	OK
023	Overseas mode	1:NEXT FAX / 2:ERROR / 3:OFF	ERROR	OK
025	Delayed transmission	ON / OFF	OFF	NG
026	Auto CALLER ID list	1:ON / 2:OFF	OFF	OK
036	Receiving reduction	1:ON / 4:OFF	ON	OK
039	Display contrast	NORMAL / DARKER	NORMAL	NG
041	FAX activation code	ON / OFF	ON ID=✱#9	NG
044	Memory receive alert	1:ON / 2:OFF	ON	OK
046	Friendly reception	1:ON / 2:OFF	ON	OK
048	Language	1:SPANISH / 2:PORTUGUESE	SPANISH	OK
058	Scan contrast	1:NORMAL / 2:LIGHT / 3:DARKER	NORMAL	OK
059	Print contrast	1:NORMAL / 2:DARKER	NORMAL	OK
073	Manual receive mode	1:TEL 2: TEL/FAX	TEL	OK
076	Connecting tone	1:ON / 2:OFF	ON	OK
078	TEL/FAX ring setting	1~9	2	OK
080	Set default	YES / NO	NO	NG
501	Pause time set	001~600 x 100msec	050 x 100msec	OK
502	Flash time	01~99 x 10ms	70 x 10ms	OK
503	Dial speed	1:10pps / 2:20 pps	10pps	OK
514	Bell detection time	1~9 x 100msec	6 x 100msec	OK
520	CED frequency select	1:2100Hz / 2:1100Hz	2100Hz	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	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
524	Transmission equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
544	Document feed position adjustment value set	1:3mm / 2:4mm / 3:5mm / 4:6mm / 5:7mm	5mm	OK
550	Memory clear	---------	---------	NG
551	ROM check	---------	---------	NG
552	DTMF signal tone test	1:ON / 2:OFF	OFF	OK
553	Monitor on FAX communication	1:OFF / 2:Phase B / 3:ALL	OFF	OK
554	Modem test	---------	---------	NG
555	Scanner test	---------	---------	NG
556	Motor test	---------	---------	NG
557	LED test	---------	---------	NG
558	LCD test	---------	---------	NG
559	Document jam detection	1:ON / 2:OFF	ON	OK
561	Key test	---------	---------	NG
570	Break % select	1:61% / 2:67%	61%	OK
571	ITS auto redial time set	00-99	05	OK
572	ITS auto redial line disconnection time set	001-255sec	065sec	OK
573	Remote turn-on ring number	01-99	10	OK
590	FAX auto redial time set	00-99	05	OK
591	FAX auto redial line disconnection time set	001-999sec	065sec	OK
592	CNG transmit select	1:OFF / 2:ALL / 3:AUTO	ALL	OK
593	Time between CED and 300 bps	1:75ms / 2:500ms / 3:1sec	75ms	OK
594	Overseas DIS detection	1:1st / 2:2nd	1st	OK
595	Receive error limit value	1: 5% / 2: 10% / 3: 15% / 4: 20%	10%	OK
596	Transmit level set	from -15 to 00dBm	-10dBm	OK
598	Receiving Sensitivity	20~48 dBm	42	OK
710	Memory clear except History data	---------	---------	NG
717	Transmit speed select	1:9600/ 2:7200/ 3:4800/ 4:2400	9600bps	OK
718	Receive speed select	1:9600/ 2:7200/ 3:4800/ 4:2400	9600bps	OK
722	Redial tone detect	1:ON / 2:OFF	ON	OK
745	Power on film feed	1:ON / 2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s / 2:20s / 3:30s	30s	OK
774	T4 timer	00~99 x 100ms	00ms	OK

Code	Function	Set Value	Default	Remote Setting
815	Sensor test	---------	---------	NG
852	Print test pattern	---------	---------	NG
853	Top margin	1~9 mm	3	OK
874	DTMF ON time	060~200	10ms	OK
875	DTMF OFF time	060~200	10ms	OK
880	History list	1:SET	---------	NG
881	Journal 2	1:SET	---------	NG
882	Journal 3	1:SET	---------	NG
961	The time transmitting the false ring back tone	01~10 x sec	05sec	OK
962	The operator calling time	05~30 x sec	13sec	OK
991	Setup list	1:Start	---------	OK
994	Journal list	1:Start	---------	OK
995	Journal 2 list	1:Start	---------	OK
996	Journal 3 list	1:Start	---------	OK
998	History list	1:Start	---------	OK
999	Service list	1:Start	---------	OK

OK means “can set”.
NG means “can not set”.

Note:
Refer to **Service Function Table** (P.57) for descriptions of the individual codes.

Example:
If you want to set value in the “004 Transmission report mode”, press the dial key number 1, 2 or 3 corresponding to the Set Value you want to select. (1:ON/2:OFF/3:ERROR)

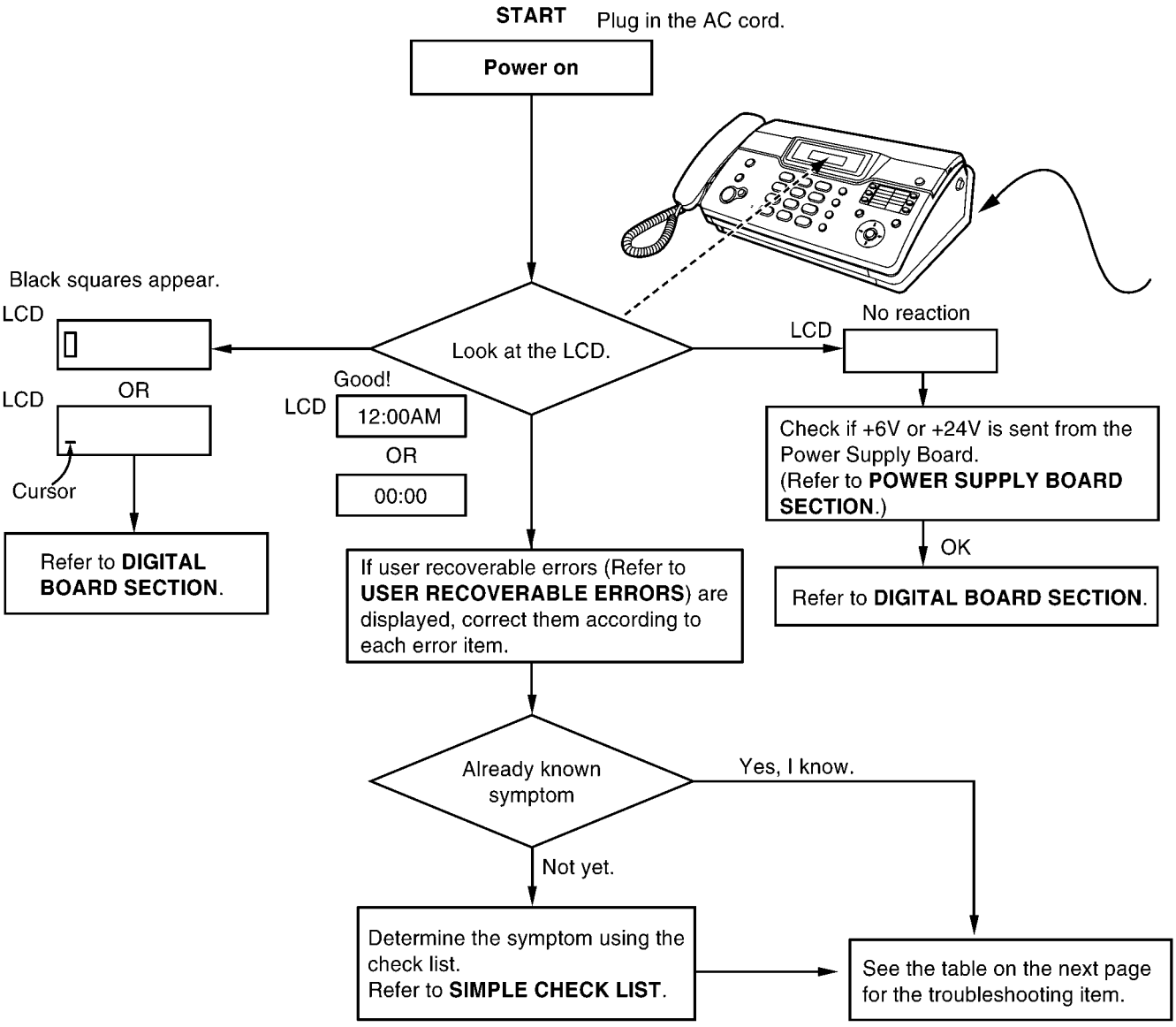
12.5. Troubleshooting Details

12.5.1. Outline

Troubleshooting is for recovering quality and reliability by determining the broken component and replacing, adjusting or cleaning it as required. First, determine the problem then decide the troubleshooting method. If you have difficulty finding the broken part, determine which board is broken. (For example: the Digital PCB, Analog PCB, etc.) The claim tag from a customer or dealer may use different expressions for the same problem, as they are not a technician or engineer. Using your experience, test the problem area corresponding to the claim. Also, returns from a customer or dealer often have a claim tag. For these cases as well, you need to determine the problem. Test the unit using the simple check list on **Simple Check List**(P.91). Difficult problems may be hard to determine, so repeated testing is necessary.

12.5.2. Starting Troubleshooting

Determine the symptom and the troubleshooting method.



CROSS REFERENCE:

Error Messages-Display(P.64)
Simple Check List(P.91)
Digital Board Section(P.99)
Power Supply Board Section(P.109)

12.5.3. Troubleshooting Items

ITEM	SYMPTOM	REFERENCE
ADF (Auto Document Feeder)	No feed	See **No Document Feed** (P.92)
	Paper jam	See **Document Jam** (P.93)
	Multiple feed	See **Multiple Feed** (P.94)
	Skew	See **Skew** (P.95)
Printing	Skewed receiving image.	See **Skewed Receiving Image** (P.97)
	Image is distorted.	See **Image is Distorted (When printing)** (P.96)
	Black or white vertical lines appear	See **Black or White Vertical Lines Appear** (P.97)
Communication FAX, TEL (analog board)	Cannot communicate by fax.	See **Defective ITS (Integrated Telephone System) Section** (P.108) and **Journal Report** (P.65)
	Error code is displayed.	See **Journal Report** (P.65)
	Cannot talk.	See **Analog Board Section** (P.107)
	DTMF tone doesn't work.	
	Handset/Monitor sound, volume.	
Abnormal mechanical sound	Abnomal sound from the product	See **When Coping or Printing, an Abnormal Sound is Heard from the Unit** (P.98)
Power supply	Voltage output is abnormal.	See **Power Supply Board Section** (P.109)
Operation panel	Keys are not accepted.	See **Operation Panel Section** (P.112)
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	See **Sensor Section** (P.113)

12.5.3.1. Simple Check List

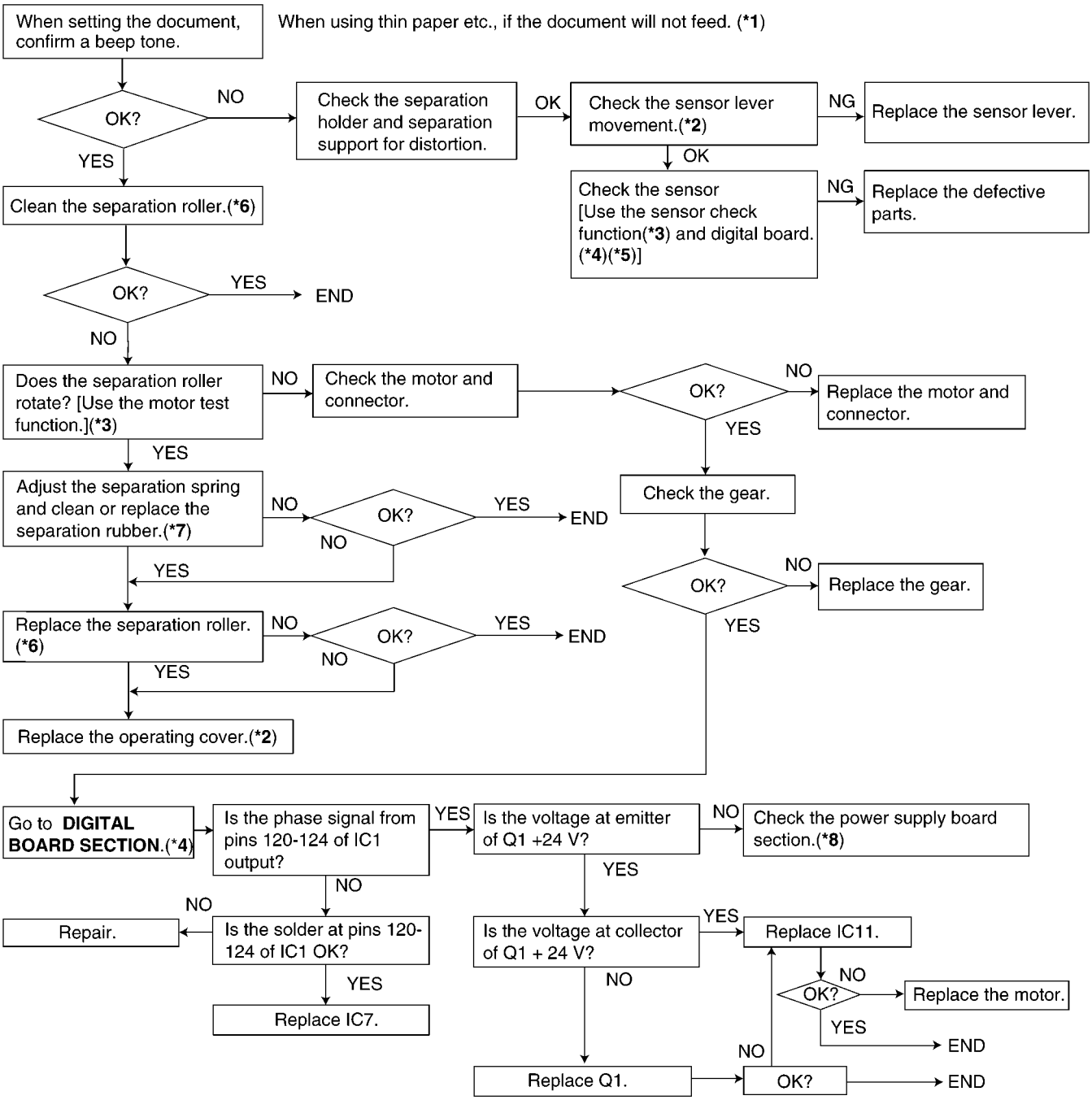
SERIAL NO.		DATE	
FUNCTION		JUDGEMENT	REFERENCE
FAX operation	Transmission	OK / NG	
	Receiving	OK / NG	
Copy operation	FINE mode	OK / NG	
	PHOTO mode	OK / NG	
Telephone operation	Handset MIC/receiver	OK / NG	
	Monitor sound	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
Operation Panel	Key check	OK / NG	Service code #561 (Refer to **Test Mode** (P.54).)
	LED check	OK / NG	Service code #557 (Refer to **Test Mode** (P.54).)
	LCD check	OK / NG	Service code #558 (Refer to **Test Mode** (P.54).)
Sensor	Sensor check	OK / NG	Service code #815 (Refer to **Test Mode** (P.54).)
Clock	Time goes by	OK / NG	Is the time kept correctly? Check with another clock.
External Telephone	Handset transceiver/receiver	OK / NG	
	Remote control	OK / NG	Change to FAX receiving by pressing "✳#9". (Refer to code no. 041.on **Program Mode Table** (P.88).)

Note:

- Check according to the sevvice code referring to the **Test Mode** (P.54).

12.5.4. ADF (Auto Document Feed) Section

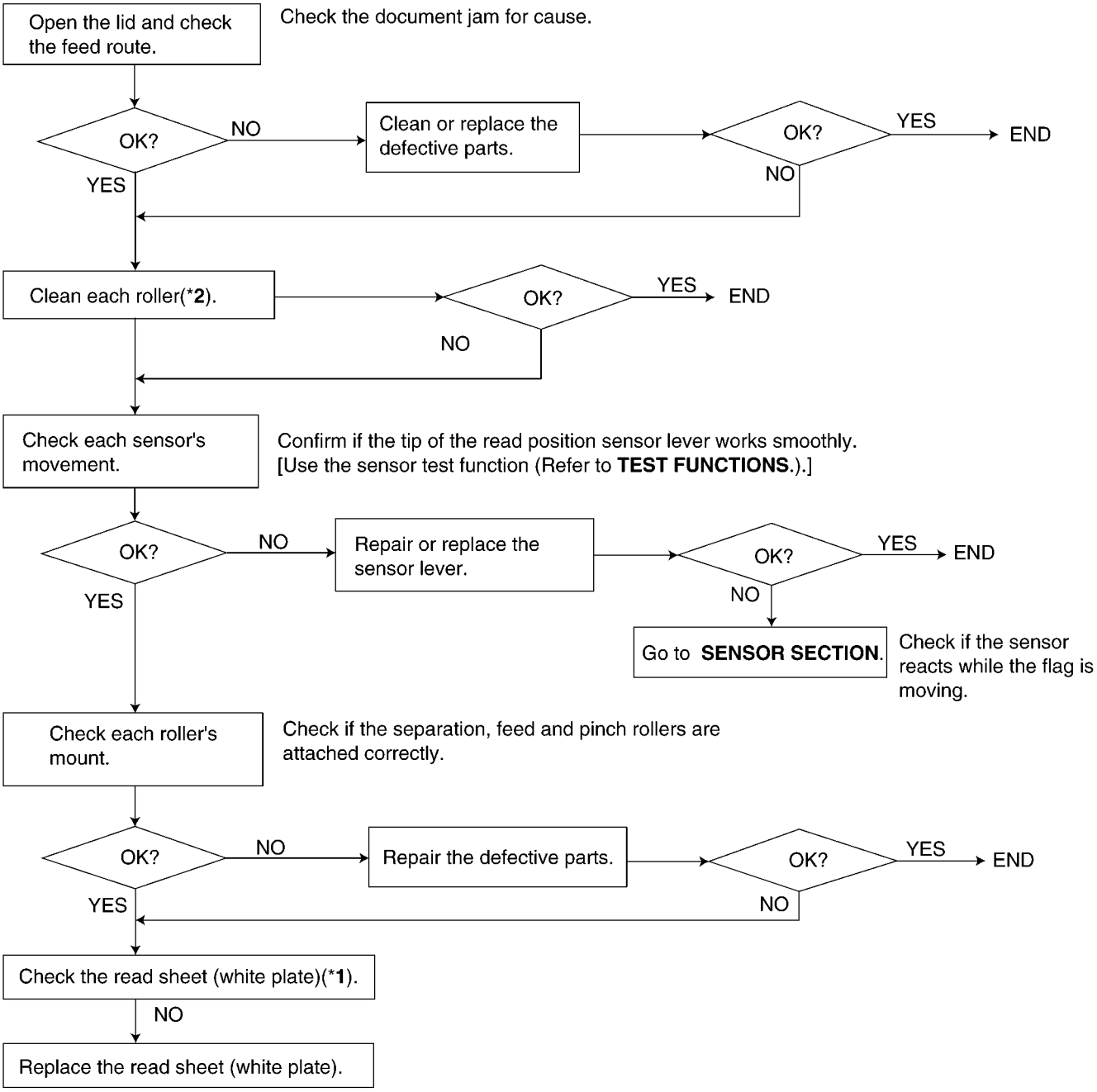
12.5.4.1. No Document Feed



Note:

(***1**) : Refer to **Multiple Feed** (P.94)
(***2**) : Refer to **How to Remove the Operation Board, LCD and Platen Roller** (P.120)
(***3**) : Refer to **Test Mode** (P.54)
(***4**) : Refer to **Digital Board Section** (P.99)
(***5**) : Refer to **Sensor Section** (P.113)
(***6**) : Refer to **How to Remove the Gear Block and Separation Roller** (P.126)
(***7**) : Refer to **How to Remove the Separation Holder and Document Feed Support** (P.121)
(***8**) : Refer to **Power Supply Board Section** (P.109)

12.5.4.2. Document Jam



CROSS REFERENCE:

Test Mode (P.54)

Sensor Section (P.113)

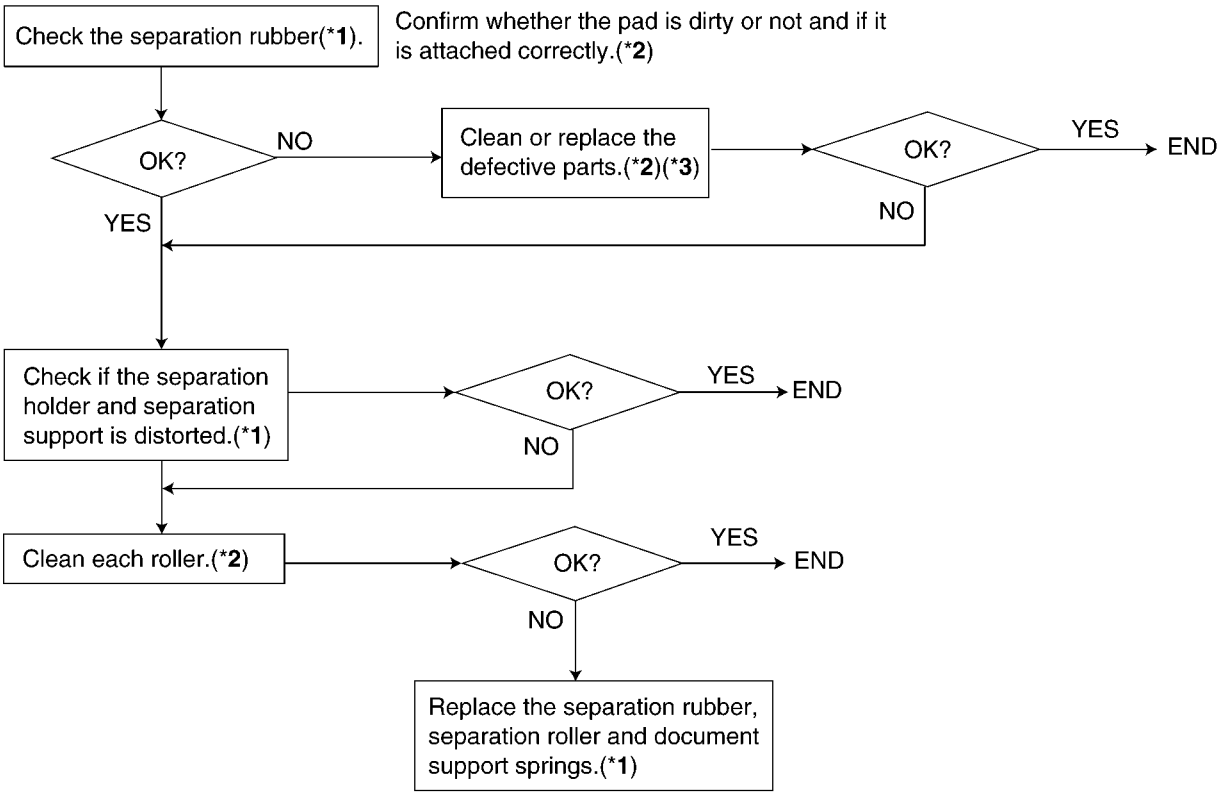
Note:

(***1**) : Refer to **How to Remove the Operation Board, LCD and Platen Roller** (P.120)

(***2**) : Refer to **Disassembly and Assembly Instructions** (P.117)

12.5.4.3. Multiple Feed

When using thick paper etc., if the document will not feed.



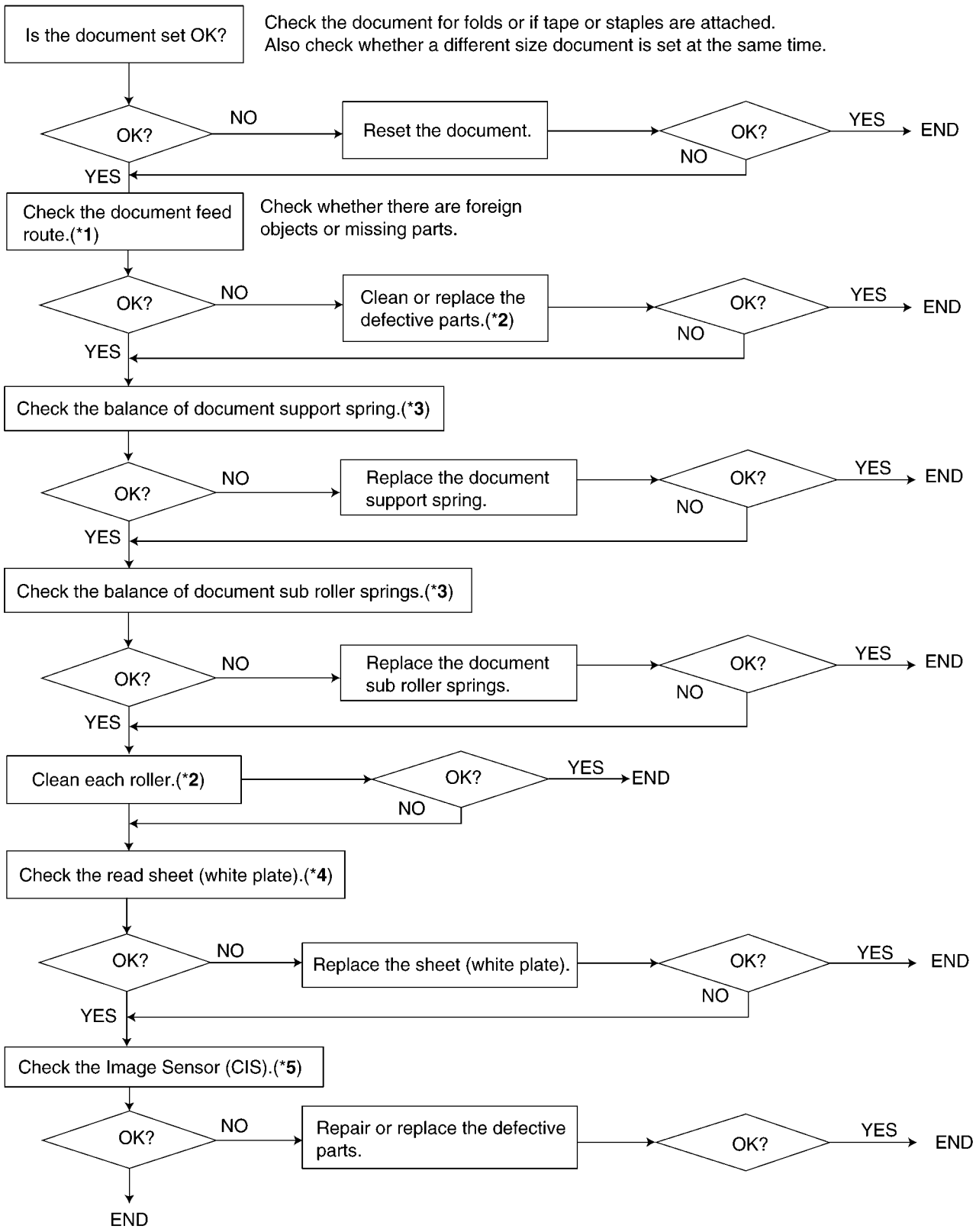
Note:

(***1***) : Refer to **How to Remove the Separation Holder and Document Feed Support** (P.121)

(***2***) : Refer to **Disassembly and Assembly Instructions** (P.117)

(***3***) : Refer to **Maintenance** (P.128)

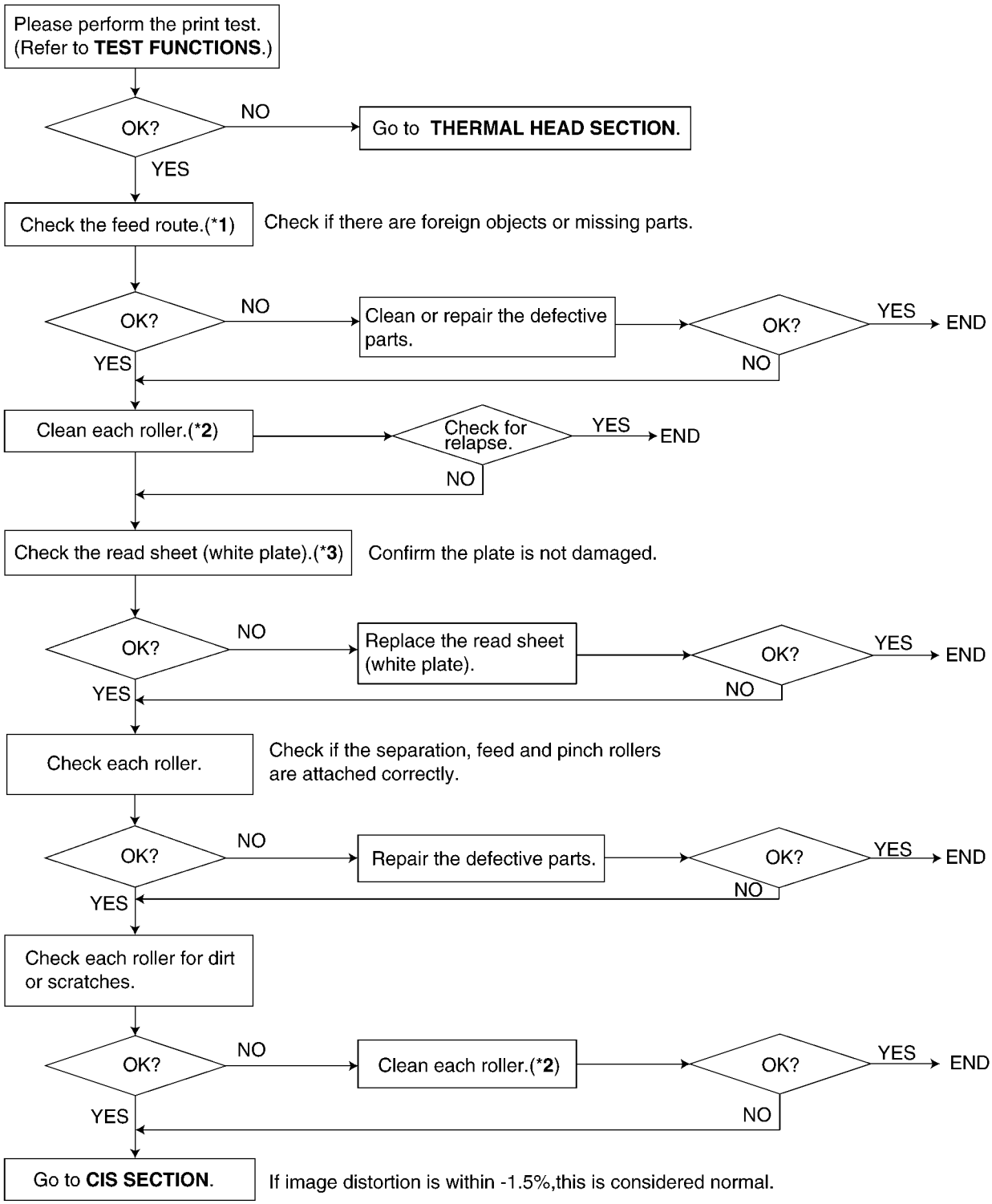
12.5.4.4. Skew



Note:

(***1***) : Refer to **Maintenance Items and Componet Locations** (P.128)
(***2***) : Refer to **Disassembly and Assembly Instructions** (P.117)
(***3***) : Refer to **How to Remove the Separation Holder and Document Feed Support** (P.121)
(***4***) : Refer to **How to Remove the Operation Board, LCD and Platen Roller** (P.120)
(***5***) : Refer to **How to Remove the Image Sensor (CIS) and Feed Roller** (P.122)

12.5.4.5. Image is Distorted (When printing)



CROSS REFERENCE:

Thermal Head Section (P.115).

Test Mode(P.54)

CIS (Contact Image Sensor) Section (P.114).

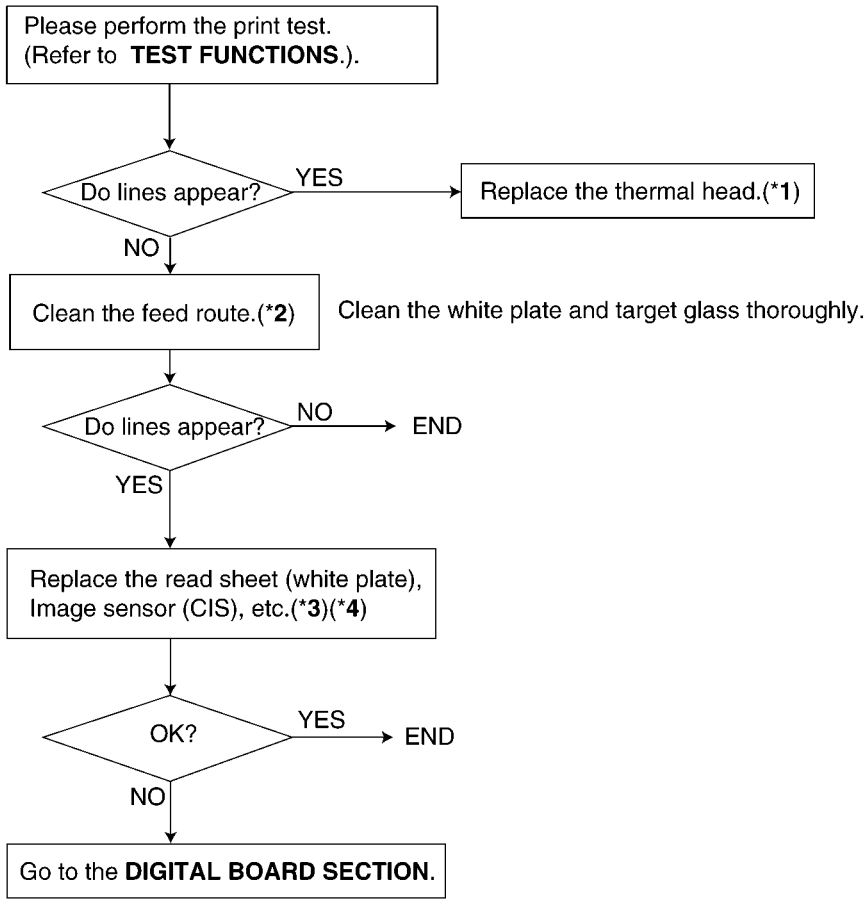
Note:

(***1**) : Refer to **Maintenance Items and Componet Locations** (P.128)

(***2**) : Refer to **Disassembly and Assembly Instructions** (P.117)

(***3**) : Refer to **How to Remove the Operation Board, LCD and Platen Roller** (P.120)

12.5.4.6. Black or White Vertical Lines Appear



CROSS REFERENCE:

Test Mode(P.54)

Digital Board Section (P.99)

Note:

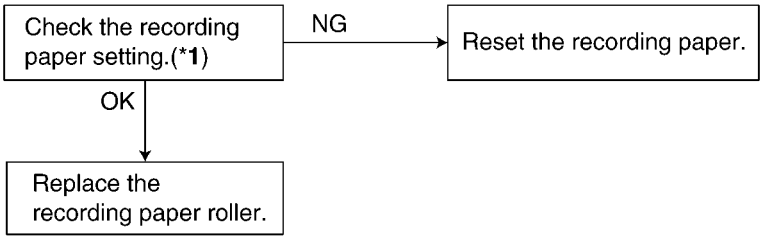
(***1**) : Refer to **How to Remove the Lock Lever and Thermal Head** (P.123)

(***2**) : Refer to **Maintenance Items and Componet Locations** (P.128)

(***3**) : Refer to **How to Remove the Operation Board, LCD and Platen Roller** (P.120)

(***4**) : Refer to **How to Remove the Image Sensor (CIS) and Feed Roller** (P.122)

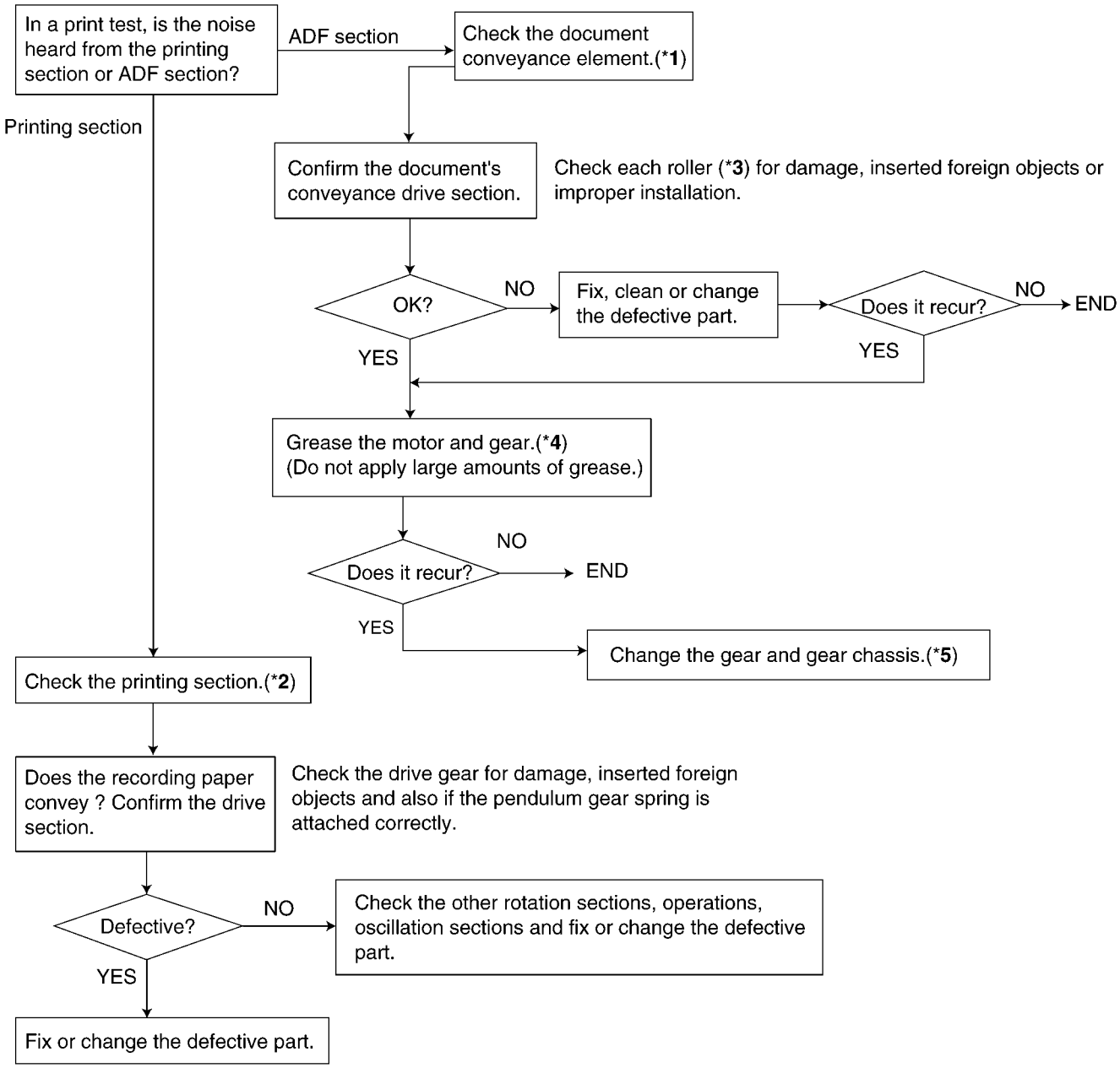
12.5.4.7. Skewed Receiving Image



Note:

(***1**) : Refer to **Installing the Recording Paper** (P.51)

12.5.4.8. When Coping or Printing, an Abnormal Sound is Heard from the Unit

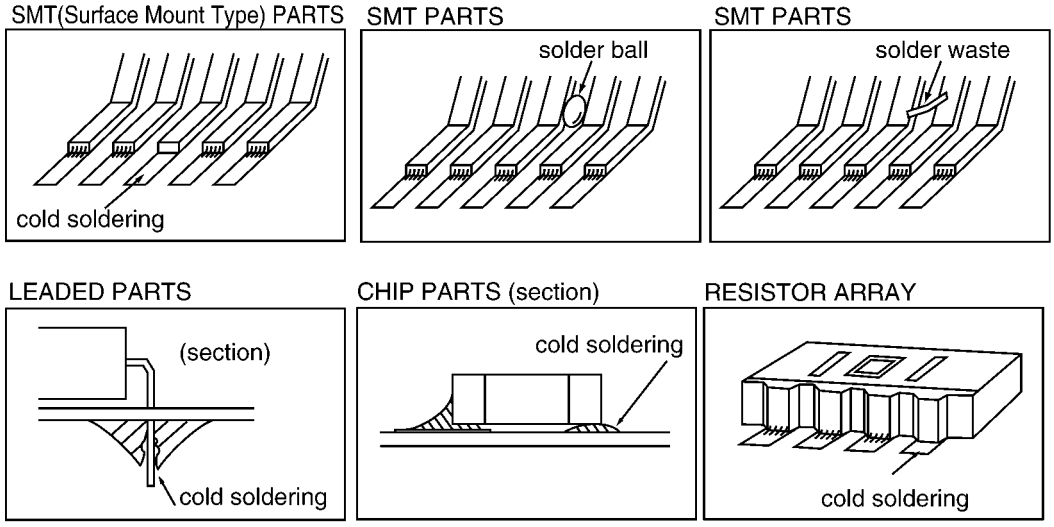


Note:

(***1***) : Refer to **Document Feeder Cleaning** (P.137)
(***2***) : Refer to **Thermal Head Cleaning** (P.137)
(***3***) : Refer to **Disassembly and Assembly Instructions** (P.117)
(***4***) : Refer to **How to Remove the Motor of Gear Block** (P.126)
(***5***) : Refer to **How to Remove the Gear Block and Separation Roller** (P.126)

12.5.5. Digital Board Section

When the unit fails to boot up the system, take the troubleshooting procedures very carefully. It may have a serious problem.
The symptom: No response when the power is turned on. (No LCD display, and keys are not accepted.)
The first step is to check the power source. If there is no problem with the power supply unit, the problem may lie in the digital unit (main board).
As there are many potential causes in this case (ASIC, DRAM, etc.), it may be difficult to specify what you should check first. If a mistake is made in the order of checks, a normal part may be determined faulty, wasting both time and money.
Although the tendency is to regard the problem as a serious one (IC malfunction, etc.), usually most cases are caused by solder faults (poor contact due to a tunnel in the solder, signal short circuit due to solder waste).



Note:

1. Electrical continuity may have existed at the factory check, but a faulty contact occurred as a result of vibration, etc., during transport.
2. Solder waste remaining on the board may get caught under the IC during transport, causing a short circuit.

Before we begin mass production, several hundred trial units are produced at the plant, various tests are applied and any malfunctions are analyzed. (In past experiences, digital IC (especially DRAM and FLASH ROM) malfunctions are extremely rare after installation in the product.)
This may be repaired by replacing the IC, (DRAM etc.). However, the real cause may not have been an IC malfunction but a soldering fault instead.
Soldering faults difficult to detect with the naked eye are common, particularly for ASIC and RA (Resistor Array). But if you have an oscilloscope, you can easily determine the problem site or IC malfunction by checking the main signal lines.
Even if you don't have such a measuring instrument, by checking each main signal line and resoldering it, in many cases the problem will be resolved.
An explanation of the main signals (for booting up the unit) is presented below.

Don't replace ICs or stop repairing until checking the signal lines.
An IC malfunction rarely occurs. (By understanding the necessary signals for booting up the unit, the "Not Boot up" display is not a serious problem.)

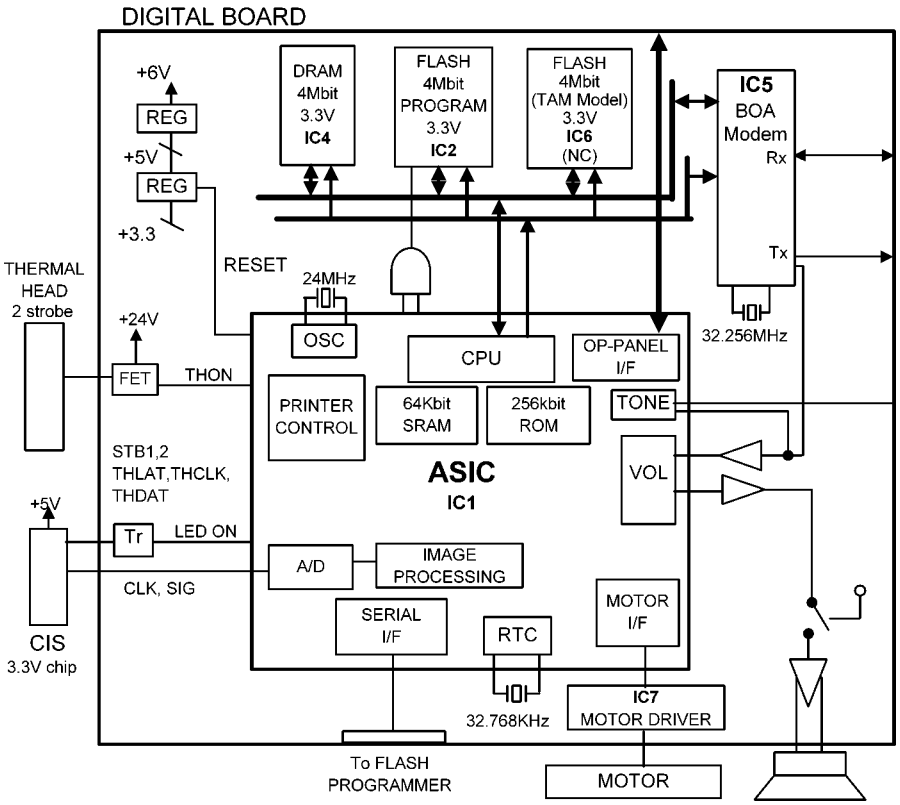
What are the main signals for booting up the unit?

Please refer to **Digital Board Section** (P.99).
The ASIC (IC1) controls all the other digital ICs. When the power is turned on, the ASIC retrieves the operation code stored in the FLASH ROM (IC2), then follows the instructions for controlling each IC. All ICs have some inner registers that are assigned to a certain address.
It is the address bus by which the ASIC designates the location inside each IC. And the data bus reads or writes the data in order to transmit the instructions from the ASIC to the ICs.
These signal lines are all controlled by voltages of 3.3V (H) or 0V (L).

12.5.5.1. Digital Block Diagram

Digital board is including analog system. All analog signals (Telephone, CID and TAM) excepting Fax communications. Another one is ASIC system for mechanical functions: Copy, Fax and UI (LCD/Key). And serial interface (UART) connects both systems.

Flash memory IC2 in the ASIC system is for software and also for user memory (settings, Phone book, CID memory) DRAM IC4 in the ASIC system is for work memory and also for fax memory.



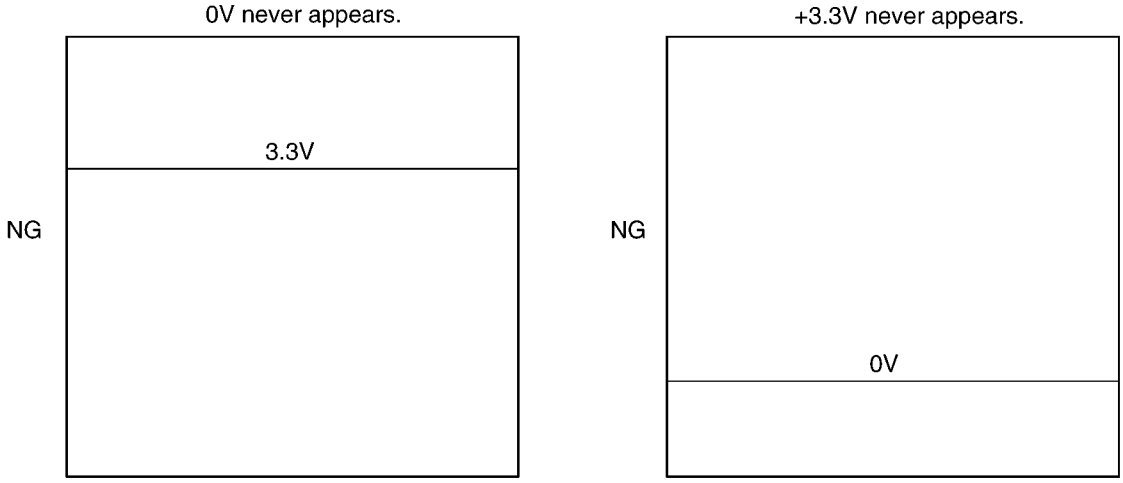
The signal lines that must be normal for the system to boot up are listed here [List 1].
For signal lines other than these, even if they malfunction they do not directly affect booting up the system.

[List 1]

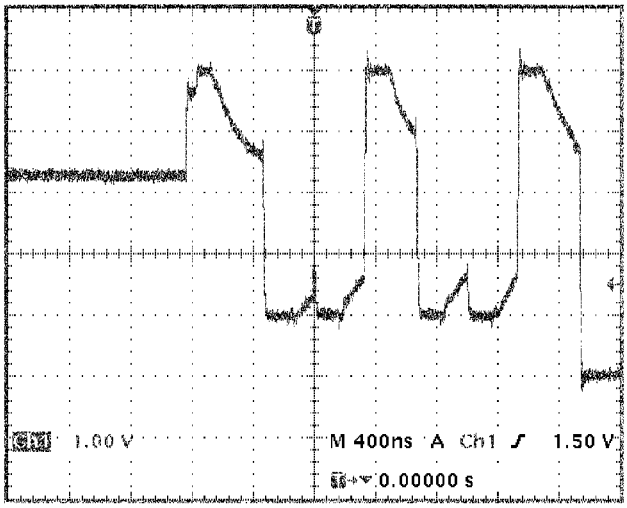
(1)	D0~D7	(Data Bus)
(2)	A0~A12, RBA0~RBA5	(Address Bus)
(3)	$\overline{RD}$	(Read Signal)
(4)	$\overline{ROMCS}$	(ROM Select Signal)
(5)	$\overline{WR}$	(Write Signal)
(6)	$\overline{RAS}$	(DRAM Row Address Select)
(7)	$\overline{CAS}$	(DRAM Column Address Select)
(8)	$\overline{MDMCS}$	(MODEM Select Signal)

If these signals are normal, once the power is turned on, each IC repeatedly outputs 3.3V (H) and 0V (L). The following page shows NG and normal wave patterns.

NG Wave pattern



For a short between D0 and D1

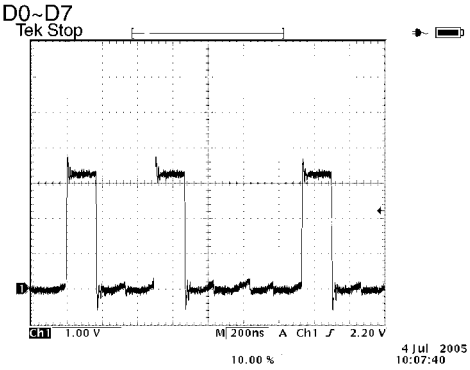


Note:

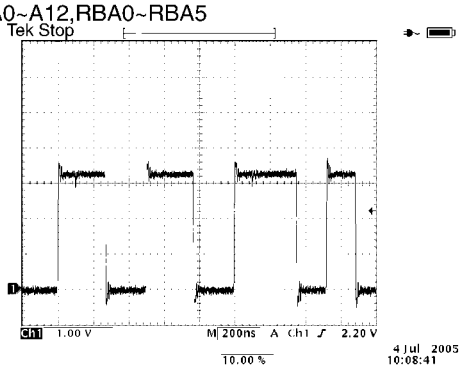
Refer to **NG Example** (P.106).

Normal Wave Patterns

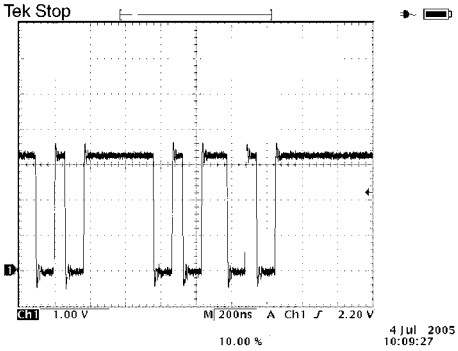
(1) D0~D7



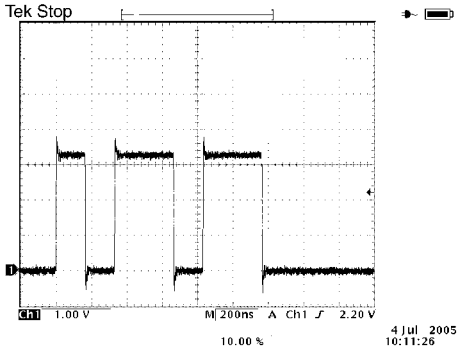
(2) A0~A12,RBA0~RBA5



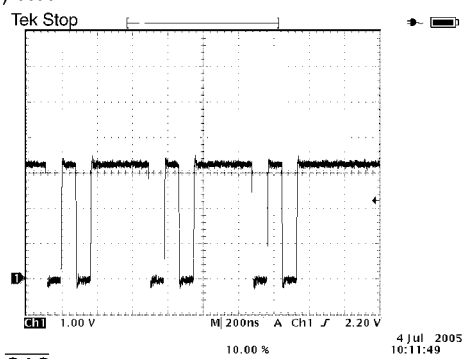
(3) $\overline{RD}$



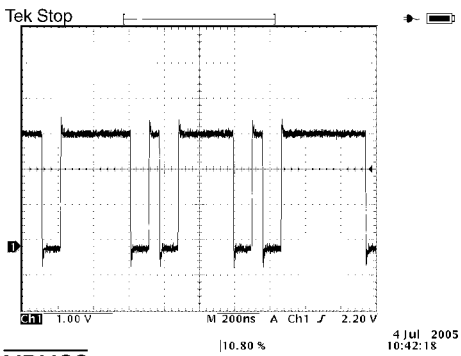
(4) $\overline{ROMCS}$



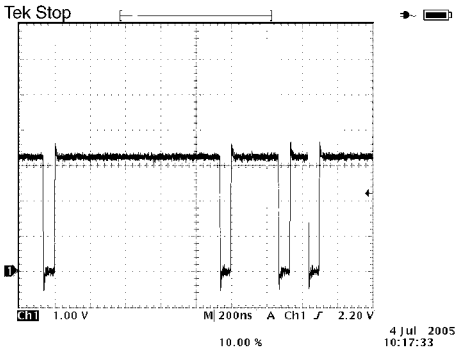
(5) $\overline{WR}$



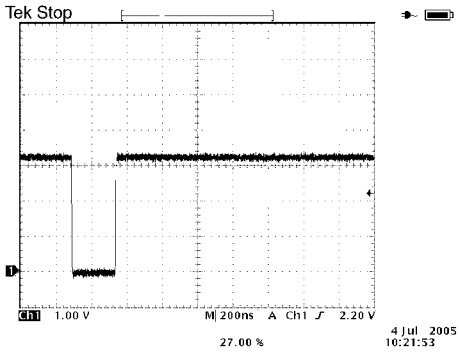
(6) $\overline{RAS}$



(7) $\overline{CAS}$



(8) $\overline{MDMCS}$



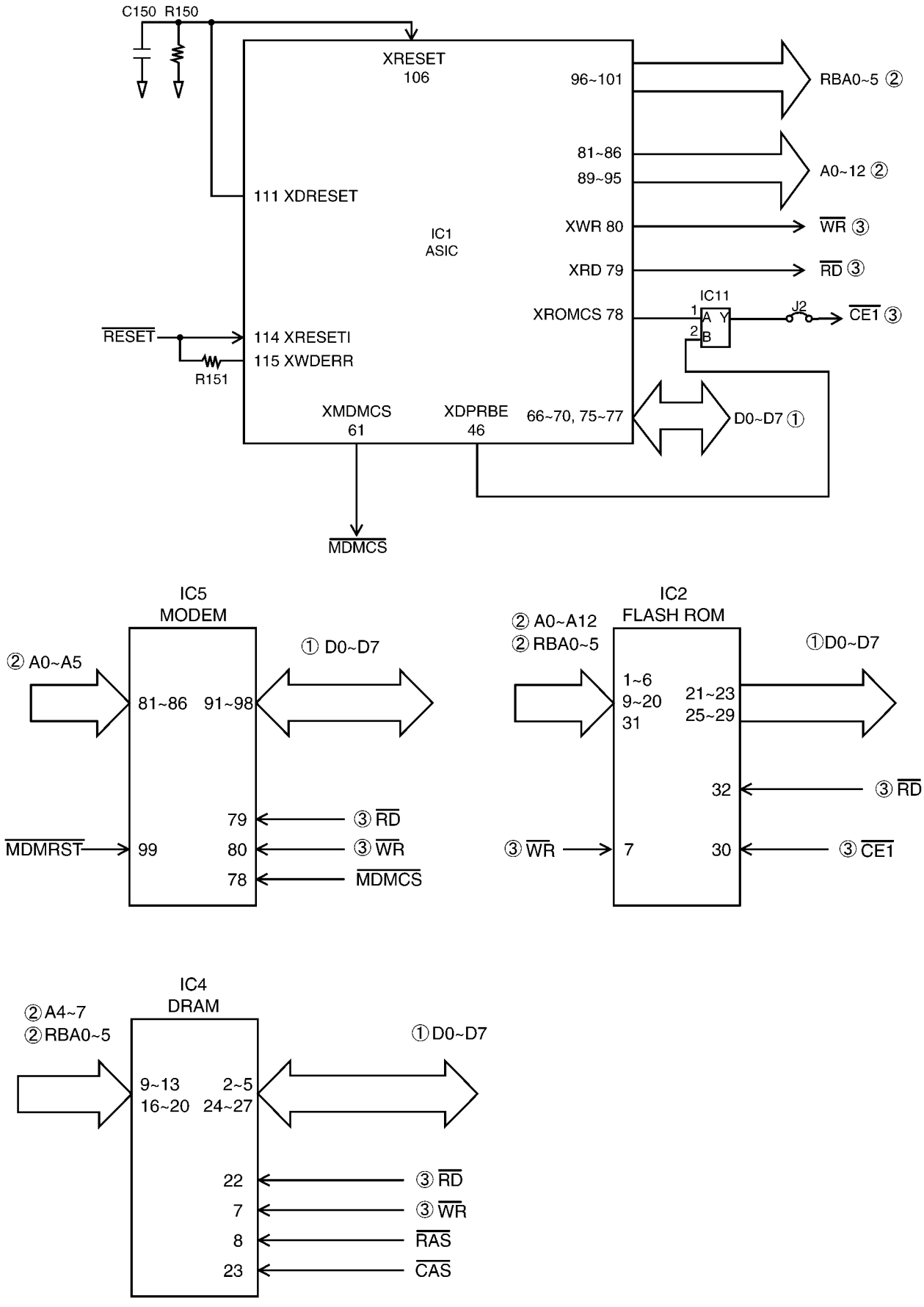
Remarks:

When you use an oscilloscope to judge whether a signal to be tested is normal or NG, perform the signal check in exactly the same order as in [List 1]. (If the ASIC fails to access the ROM, the ASIC cannot access DRAM normally.)

The digital circuit actually operates according to the timing combinations of these signals. If the timing of these signals is even slightly delayed, the circuit will not work. Nor will it if the IC is defective and the output voltage level is not normal although the timing of these signals is accurate enough to meet the specifications. (Make sure that your oscilloscope is calibrated before starting a test.)

Therefore, it is imperative to confirm whether each IC outputs the signal at the correct level. (See the **I/O Pin No. Diagram**.) The signal level should be constantly output at between 3.3V (H) and 0V (L) as described earlier.

I/O and Pin No. Diagram



12.5.5.2. Check the Status of the Digital Board

First, please check voltages and oscillation whether they are correct as follows.

[1] Voltages check

+5V, +3.3V, +2.5V :
check voltages between voltage test point and GND test point.

NG → Please check resistance between voltages test point and GND test point.
If resistance is 0Ω, please check solder faults (short circuit due to solder waste).

OK

[2] Oscillation

X1 = 32.768KHz
X2 = 24MHz
X3 = 32.256MHz

NG → Please check solder faults (short circuit due to solder waste).
If there are no solder faults, please replace the oscillator.

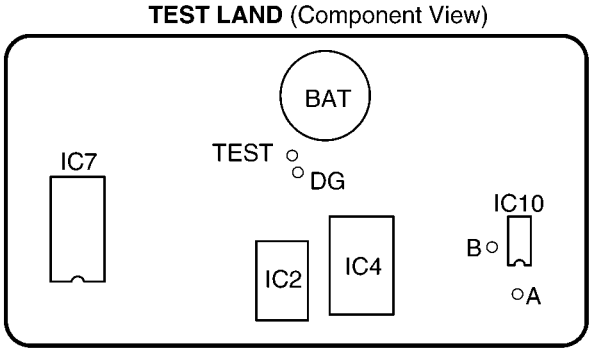
OK

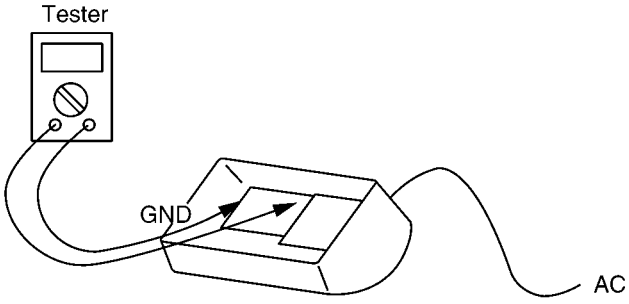
AC POWER OFF

Next, please check voltages of test points A and B.
The result may tell you a defective point.

[3] Status check

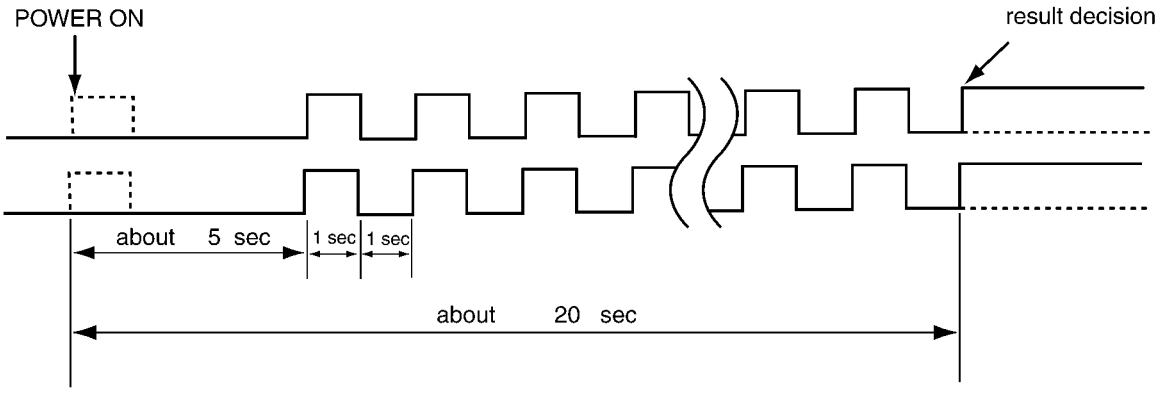
Please make a short circuit between the TEST point and DG point using a metallic object, such as tweezers.
Then , turn on the AC power, and a few seconds later, remove the metallic object.
Check the following waveform using an oscilloscope or tester.





A : pin 26 of IC1
B : pin 24 of IC1

"A" and "B" signals will be carrying out a toggle after AC POWER ON until a result is decided.
The cycle of the toggle is 2 seconds (HIGH: 1 sec, LOW: 1sec)



If "A" and "B" signal do not carry out a toggle, CPU may not be operating.
In that case, please check solder faults (poor contact due to a tunnel in the solder, signal short circuit due to solder waste.)
The result of check, if you cannot find solder faults, please replace IC because it may be IC malfunctions.
The order of IC replacement is as follows.

① IC1 (ASIC)
② IC3 (RESET IC)
③ IC4 (DRAM)
④ IC2 (FLASH)

- If "A" and "B" signal carry out a toggle, correctly, then "A" and "B" will show the result of the check.
- Check the following voltages using an oscilloscope or tester.
- To cancel the status check mode, turn off the AC power.

Check point voltage		Defective point	Check items
A	B		
3.3V	0	MODEM (IC5)	IC1(61 pin), IC5 (78, 79, 80 ,99 pin), R200, C200, C201, R165
3.3V	3.3V	ALL OK	

- To enable the status check mode, it is necessary that RAM, ROM, and MODEM are controlled from the ASIC correctly.
- If it does not show above mentioned status, please check solder faults again.

Please check the soldering condition of those components.
If there is no problem, replace the IC5.

If you still have a problem with the digital board, please refer to NG wave pattern.

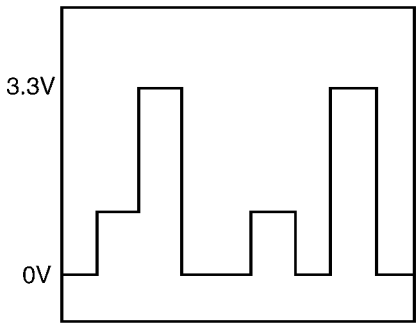
LCD display: CALL SERVICE

This display occurs when the temperature of the thermistor on the thermal head is NG.
Faulty connection of the thermal head connector.

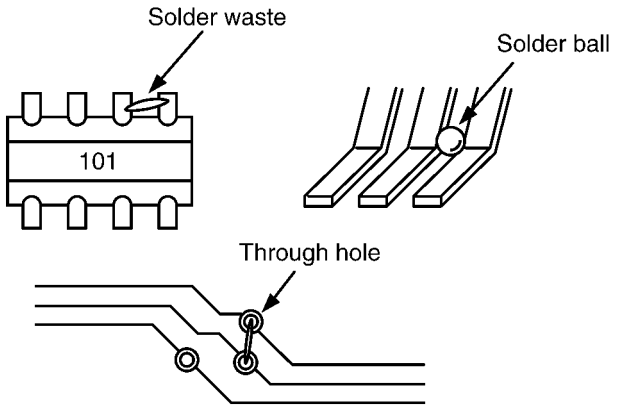
ASIC IC1 pins 4 and 139 or the thermistor on the thermal head is NG.

12.5.5.3. NG Example

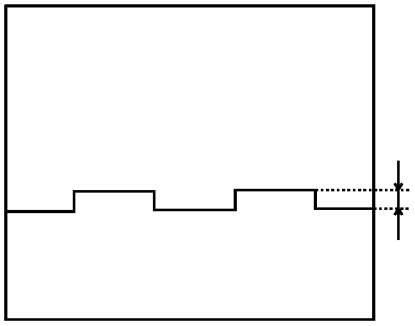
1.



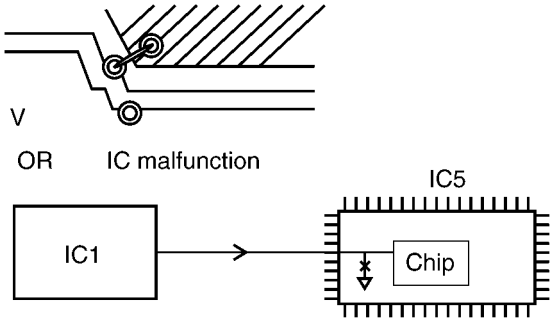
Short circuit from the adjacent signal wires.
Check for a short circuit in the RA and IC leads and the signal wire at the through hole.



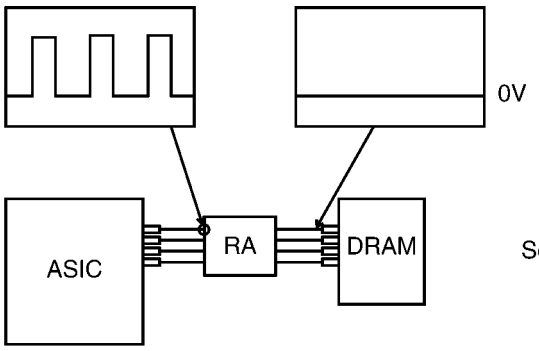
2.



Short between the signal line and GND.



3.



Solder fault on RA.

12.5.6. Analog Board Section

This chapter provides the testing procedures required for the analog parts. A signal route to be tested is determined depending upon purposes. For example, the handset TX route begins at the handset microphone and the signal is output to the telephone line. The signal mainly flowing on this route is analog. You can trace the signal with an oscilloscope. The signal flow on each route is shown in the Check Sheet here. If you find a specific problem in the unit, for example if you cannot communicate with the MONITOR, trace that signal route locally with the following Check Sheet and locate the faulty point.

12.5.6.1. Sgnal Route

(SYMPTOM) ITEMS TO CHECK	signal IN → ROUTE → OUT
MONITOR RX (TEL LINE to SP)	TEL LINE (JACK:CN3) → R41 → T1 → R81 → C17 → R13 → IC2(2-1) → C4 → R5 → CN1(13) → {CN2(13) → R130 → IC10(2-1) → C112 → R131 → IC9(2-1) → C114 → R178 → IC1(32-31) → C125 → R128 → IC9(6-7) → C140 → R140 → IC12(4-8) → CN9(1,2)}
HANDSET TX	HANDSET MIC → CN2(1,4) → (L21 → C40 → R50) / (L24 → C41 → R49) → IC1(5,6-7) → C30 → R32 → L10 → R29 → C25 → R21 → IC2(6-7) → C28 → R27 → R26 → T1 → R41 → (JACK:CN3) TEL LINE
HANDSET RX	TEL LINE (JACK:CN3) → R41 → T1 → R81 → C17 → R13 → IC2(2-1) → C4 → R5 → CN1(13) → {CN2(13) → R130 → IC10(2-1) → C112 → R131 → IC9(2-1) → C114 → R178 → IC1(32-31) → C125 → R128 → IC9(6-7) → IC10(10-11) → C128 → CN2(16)} → CN1(16) → R30 → R34 → L11 → C33 → R46 → Q6 → C45 → R58 → L22 → CN2(2)
FAX TX	{IC5(56) → C225 → R226 → IC10(8-9) → CN2(5) } → CN1(5) → C11 → R16 → IC2(6-7) → C28 → R27 → R26 → T1 → R41 → (JACK:CN3) TEL LINE
FAX RX	TEL LINE (JACK:CN3) → R41→ T1 → R81 → C17 → R13 → IC2(2-1) → C4 → R5 → L1 → CN1(13) → {CN2(13) → C216 → R221 → R220 → C217 → IC5(47)}
DTMF to HANDSET	{IC5(58) → C118 → R124 → IC9(2-1) → C114 → R178 → IC1(32-31) → C125 → R128 → IC9(6-7) → IC10(10-11) → C128 → CN2(16)} → CN1(16) → R30 → R34 → L11 → C33 → R46 → Q6 → C45 → R58 → L22 → CN2(2)
DTMF to SPEAKER	{IC5(58) → C118 → R124 → IC9(2-1) → C114 → R178 → IC1(32-31) → C125 → R128 → IC9(6-7) → C140 → R140 → IC12(4-8) → CN9(1, 2)}
CALLER ID	TELLINE (JACK:CN3) → R41 → T1 → R81 → C17 → R13 → IC2(2-1) → C4 → R5 → R60 → C51 → C50 → R48 → IC1(2-1) → CN1(14) → {CN2(14) → R224 → C221 → R223 → R222 → C222 → IC5(50)}

Note:

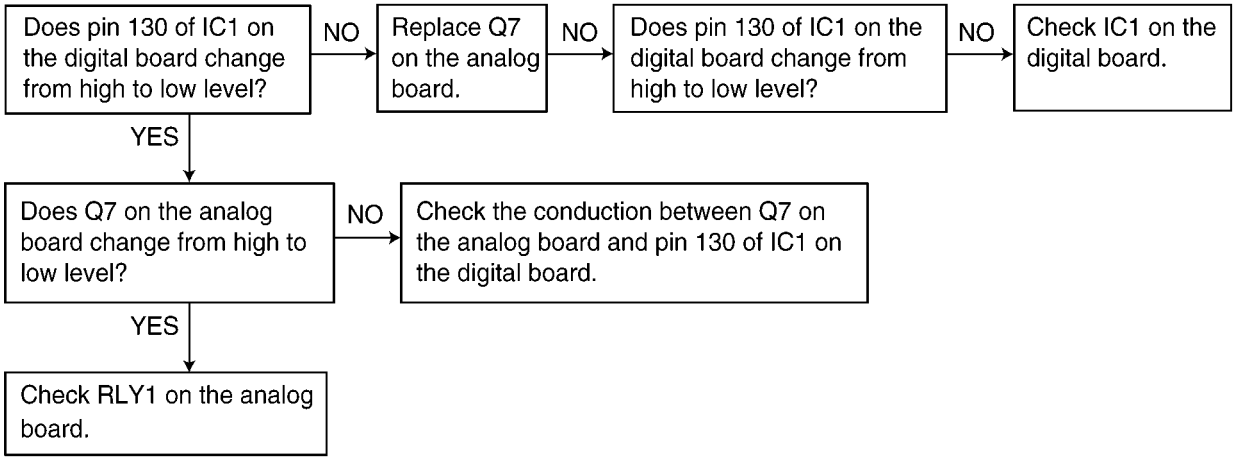
{ }: Inside the digital board

12.5.6.2. Defective ITS (Integrated Telephone System) Section

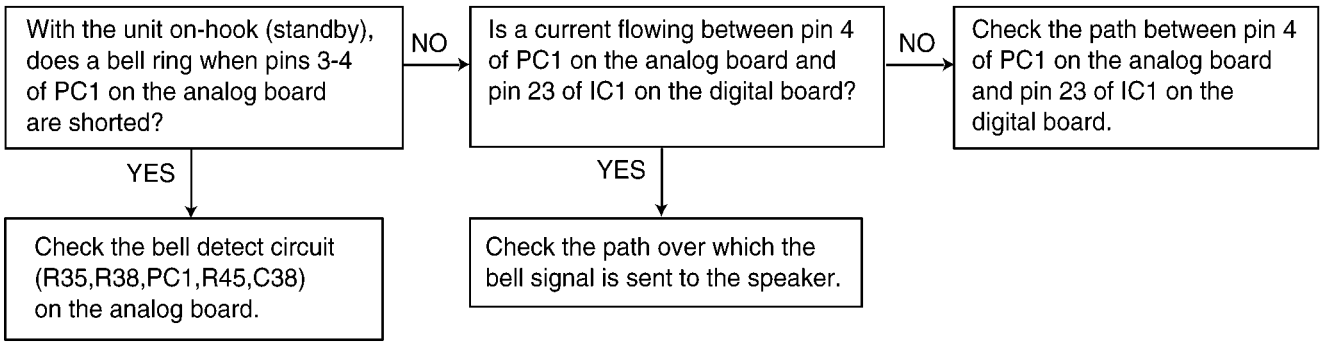
1. No handset and monitor transmission / reception

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.

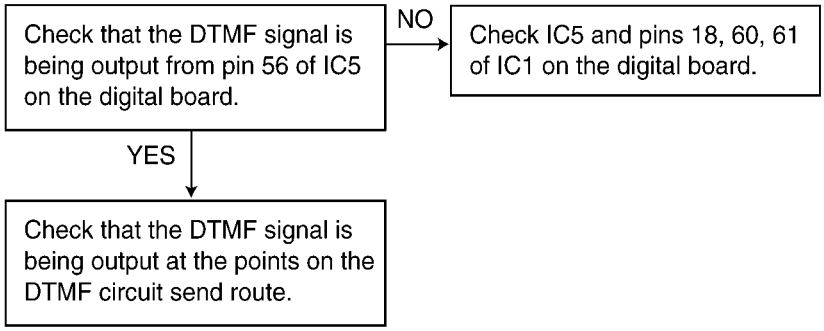
2. No pulse dialing



3. No ring tone (or No bell)



4. No tone dialing

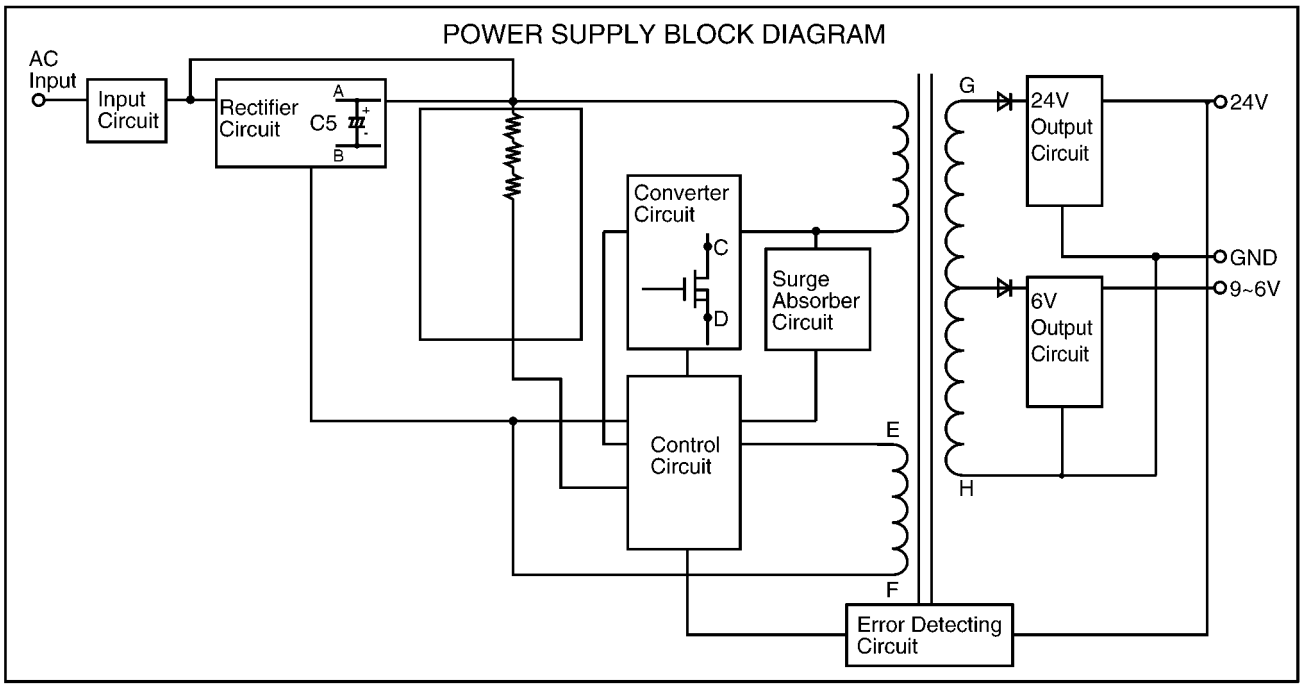


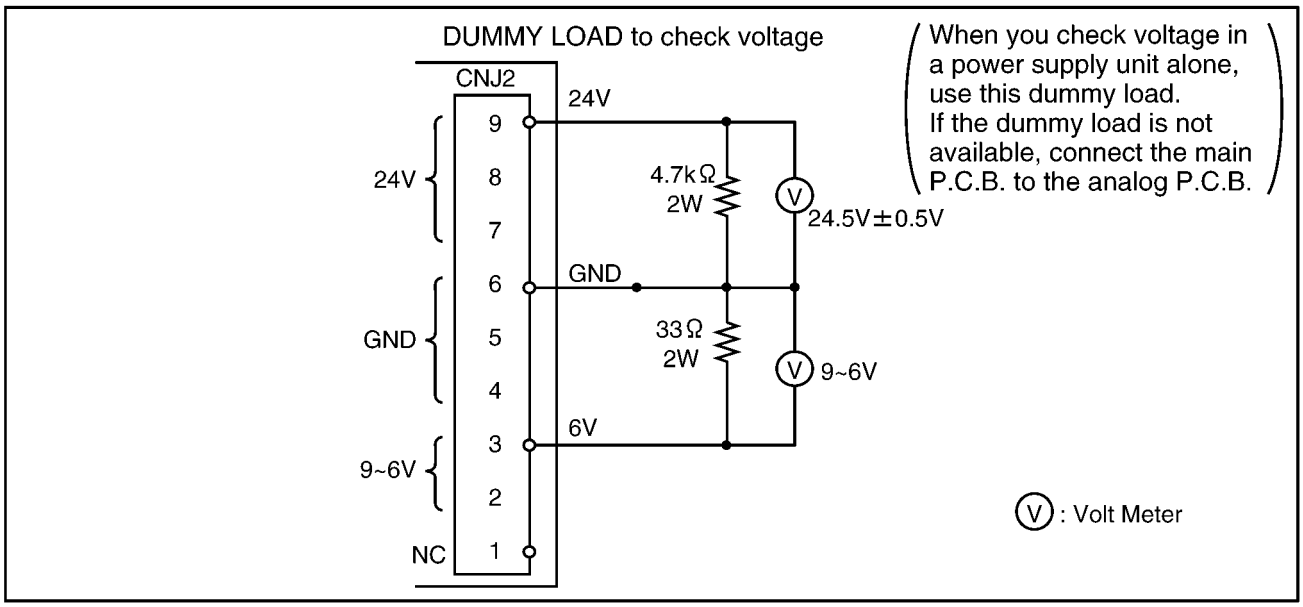
12.5.7. Power Supply Board Section

12.5.7.1. Key components for troubleshooting

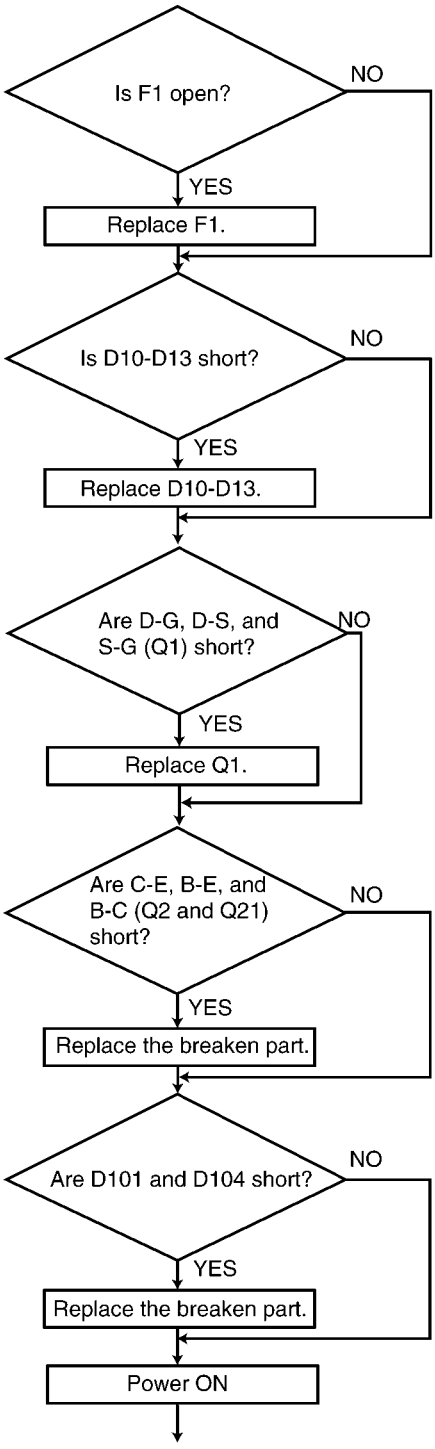
Check the following parts first: F1, D10-D13, C5, and Q1.
This comes from our experience with experimental tests. For example: power supply and lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.
Caution:
If you find a melted fuse in the unit, do not turn on the power until you locate and repair the faulty parts (except for the fuse); otherwise the fuse will melt again and you cannot pinpoint the faulty point.

In most cases, the symptom is that nothing is output. It is more likely that the fault is in the primary side rather than the secondary side. Check the primary side first.



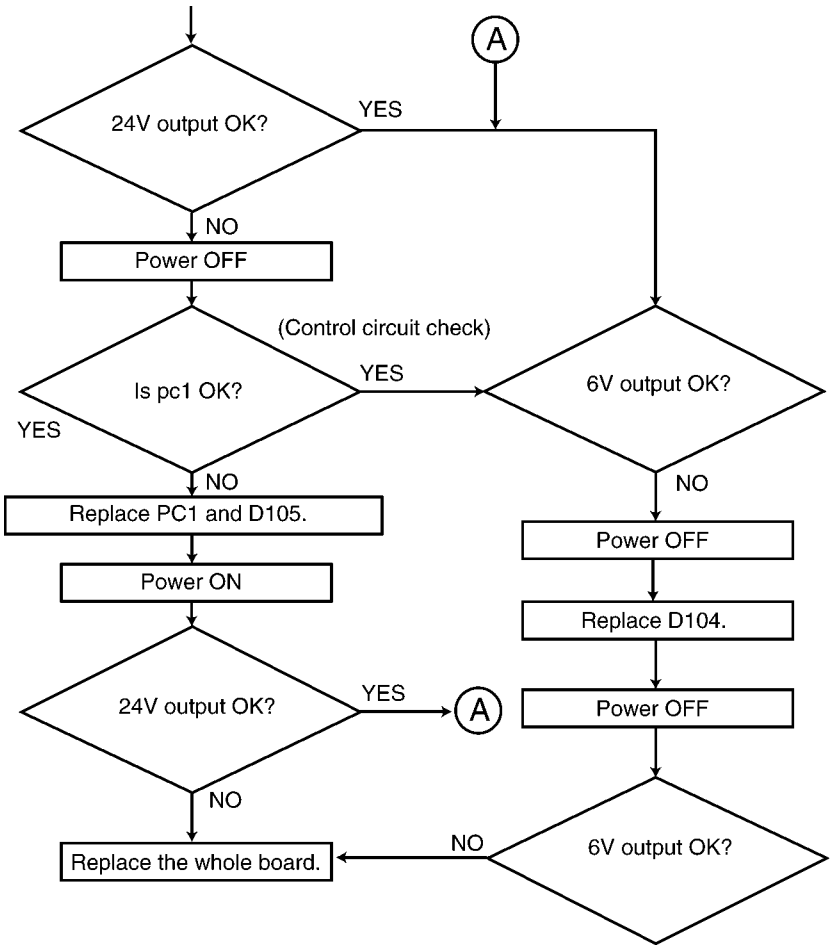


12.5.7.2. Troubleshooting Flow Chart



* When testing for a short circuit, turn off first and then turn on when you start to check output voltage (24V or 6V) as illustrated in the flow chart.

* An analog tester is recommended to use for checking a short circuit.



12.5.7.3. Broken Parts Repair Details

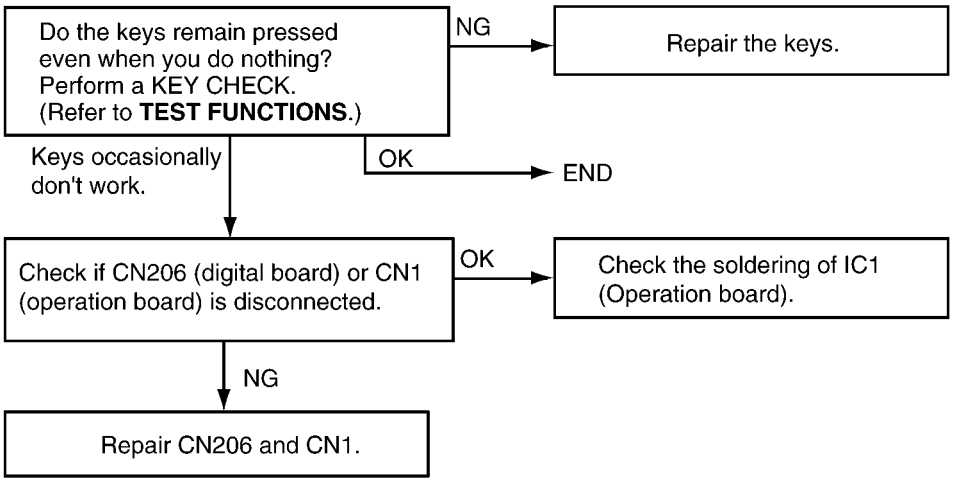
(D10, D11, D12, D13)
Check for a short-circuit in terminal 4. If D10, D11, D12 and D13 are short-circuits, F1 will melt (open).
In this case, replace all of the parts (D10, D11, D12, D13, F1).

(Q1)
The worst case of Q1 is a short-circuit between the Drain and Gate because damage expands to the peripheral circuit of Q1.
This is due to a very high voltage through the Gate circuit which is composed of R19, Q2, and Q21 etc.
You should change all of the parts listed as follows.
F1, Q1, R19, Q2, Q21

(D101, D104)
If D101 and D104 are broken, the oscillation circuit in the power supply cannot operate. Check it with an electric tester.

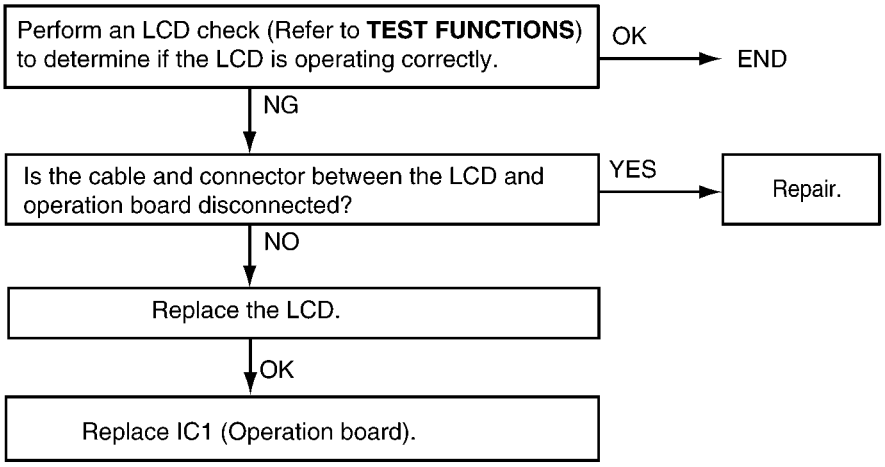
12.5.8. Operation Panel Section

12.5.8.1. No Key Operation



CROSS REFERENCE:
Test Mode(P.54)

12.5.8.2. No LCD Indication



CROSS REFERENCE:
Test Mode(P.54)

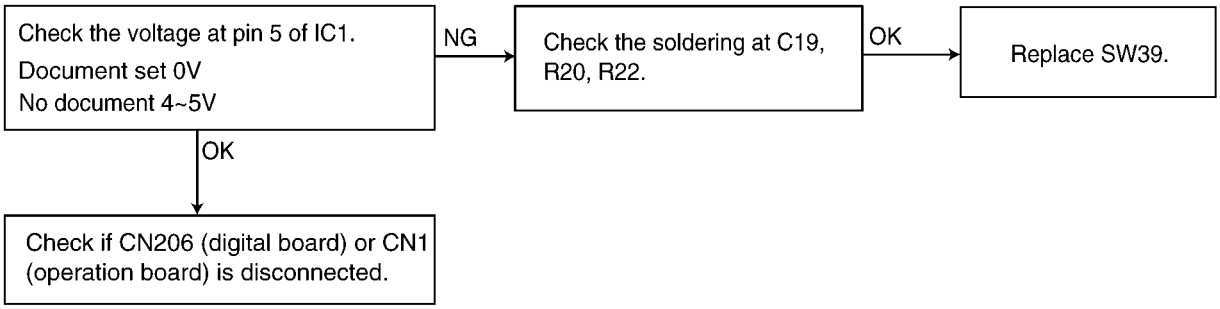
12.5.9. Sensor Section

Refer to **Sensors and Switches** (P.26) for the circuit descriptions.

12.5.9.1. Check the Document Sensor (SW39).....“CHECK DOCUMENT”

Note:

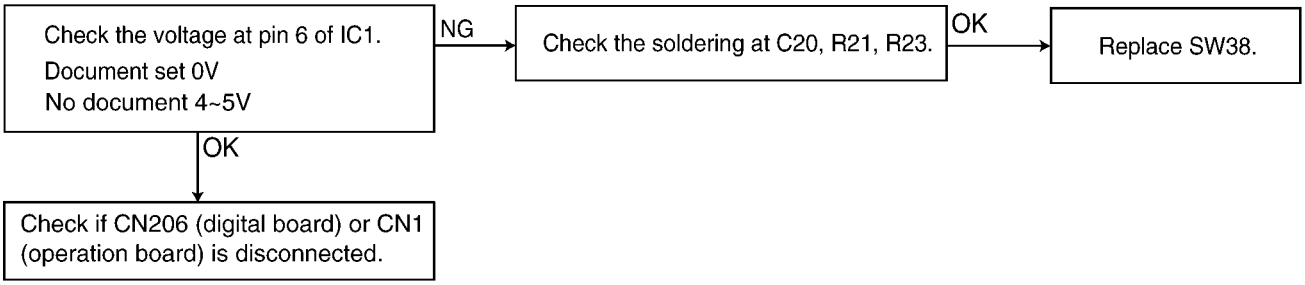
Refer to **Error Message (Display)** (P.10) for display message.



12.5.9.2. Check the Read Position Sensor (SW38).....“REMOVE DOCUMENT”

Note:

Refer to **Error Message (Display)** (P.10) for display message.



12.5.10. CIS (Contact Image Sensor) Section

Refer to **Scanning Block** (P.24).

Are the glass surface of the contact image sensor (CIS) and the white panel on the back of the operation block clean?
NG → Clean the location in question.
OK

Conduct a scanner test in service mode "555". (Refer to **TEST FUNCTIONS**.)

Is the LED array lit?
NO → Is pin 1 of CN8 on the digital board at 4 to 5V?
NO → Check the 5V line of the power supply.
YES

Is pin 34 of IC1 on the digital board at 3.3V?
NO → Check IC1 on the digital board.
YES

Check Q13 and R90 on the digital board.

Is pin 5 of CN8 on the digital board at 3.3V ?
NO → Check Q14, R93 and R94.
Check the voltage at pin 5 of CN8 again.
NG

Replace Q14 and check again.
NG

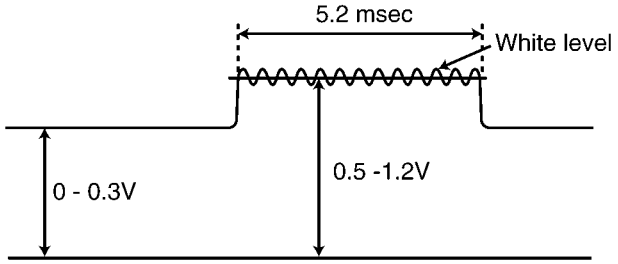
Check pin 129 of IC1 (Digital board).
NG

Replace IC1.

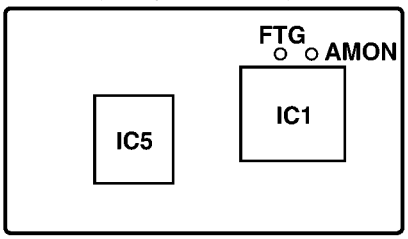
YES

Observe the waveform at test point AMON on the digital board with an oscilloscope (while scanning the white panel).
NO → Check the image sensor.
YES

Apply a trigger at the rising edge of CH2 given the following settings :
CH1 0.5V/div connect to AMON.
CH2 5V/div connect to FTG.
Time 1ms/div



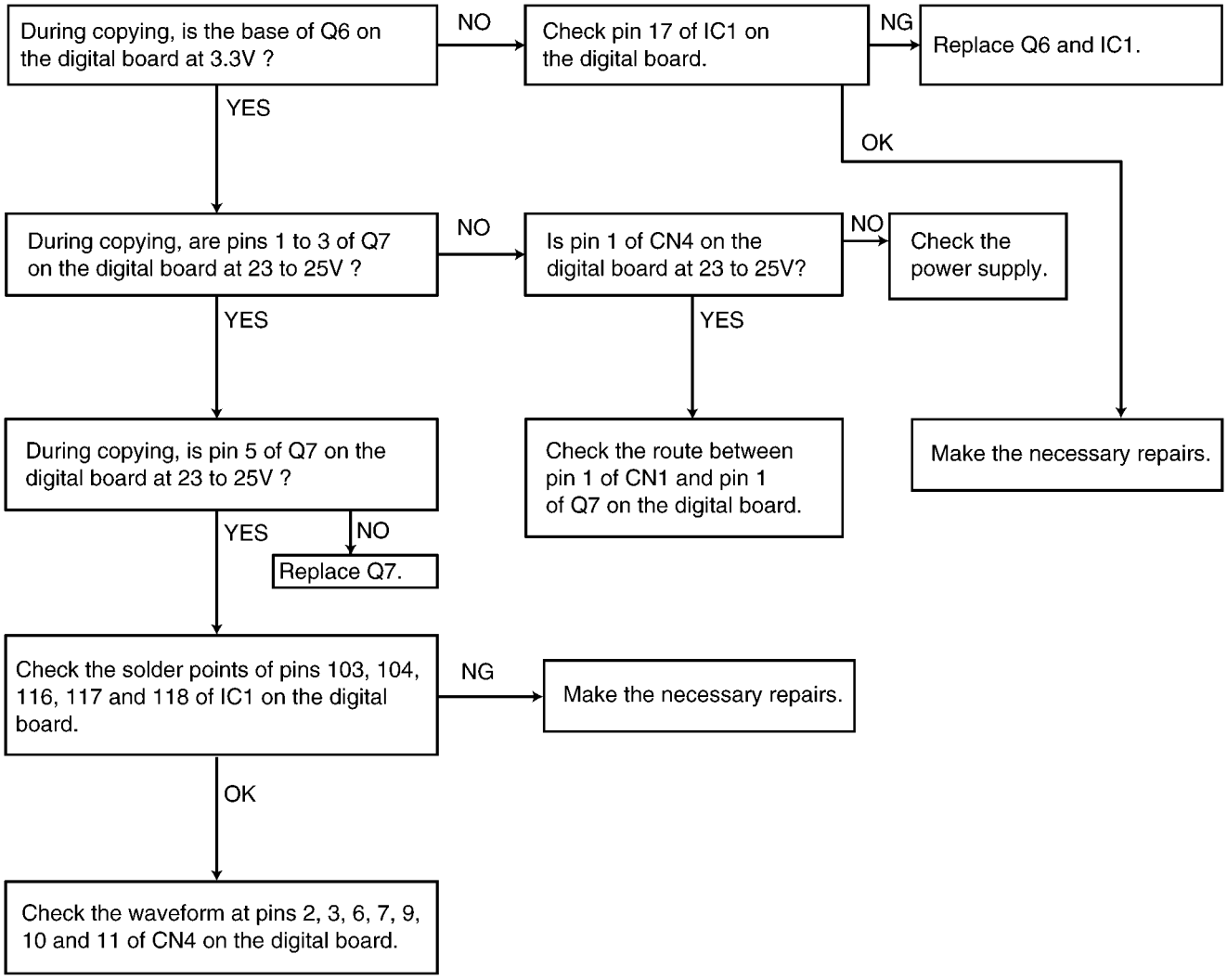
Digital Board
(Component View)



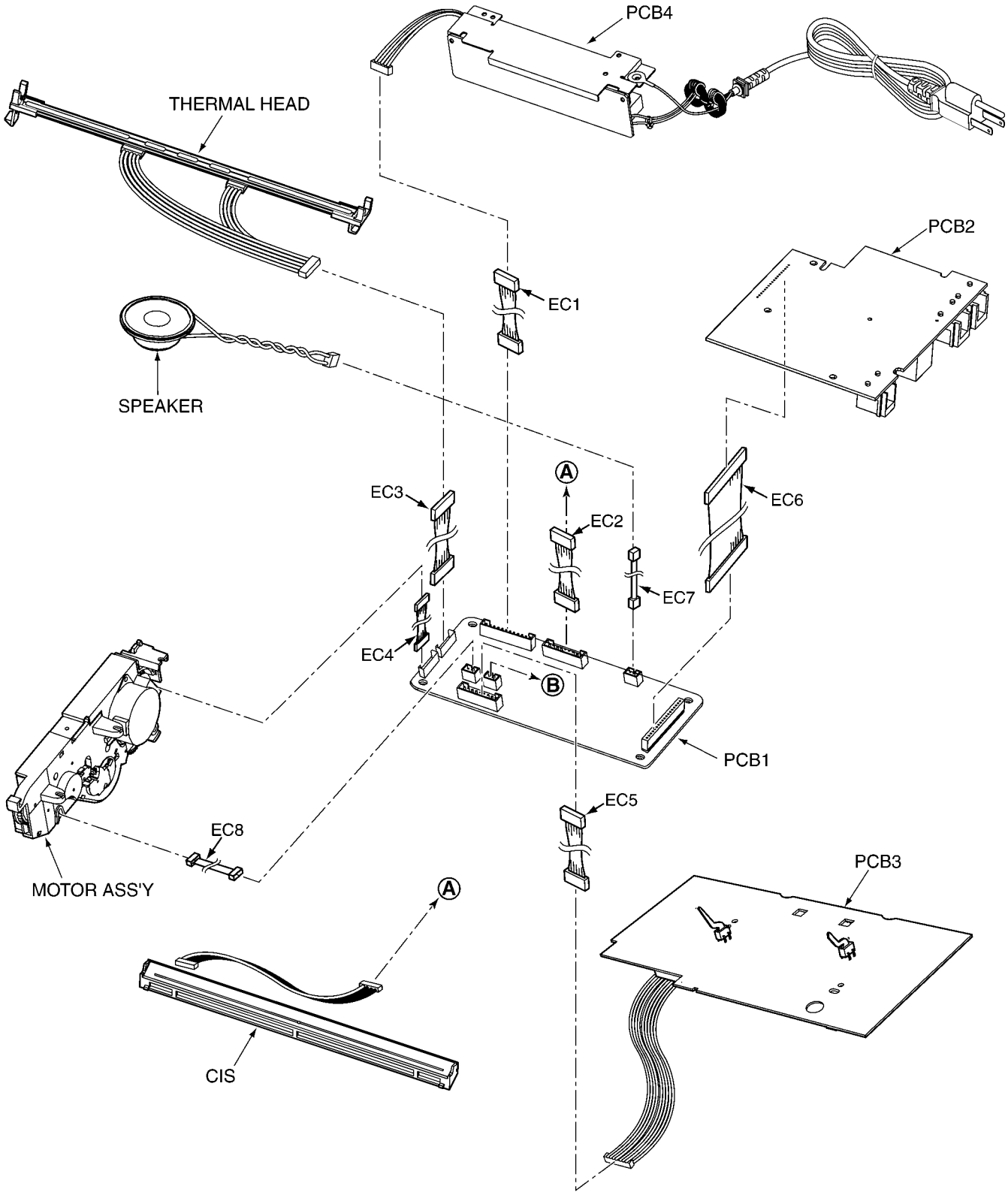
CROSS REFERENCE:
Test Mode(P.54)

12.5.11. Thermal Head Section

Refer to **Thermal Head**(P.22).



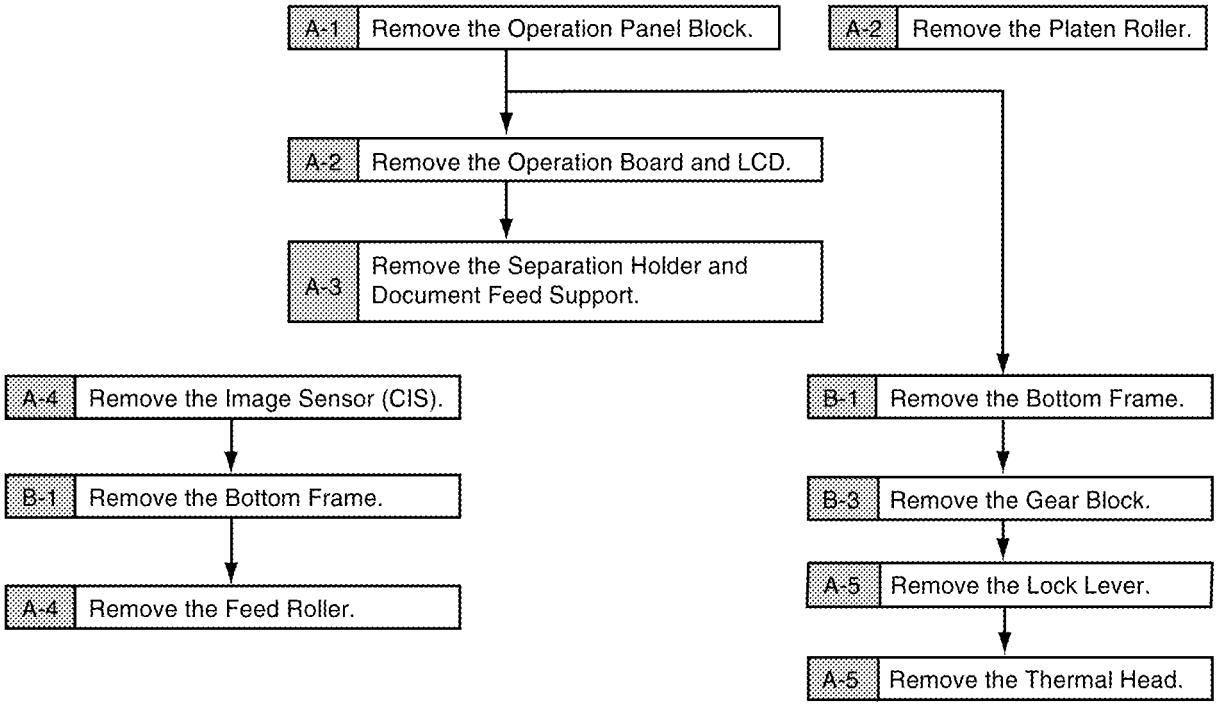
13 Service Fixture & Tools



14 Disassembly and Assembly Instructions

14.1. Disassembly Flowchart

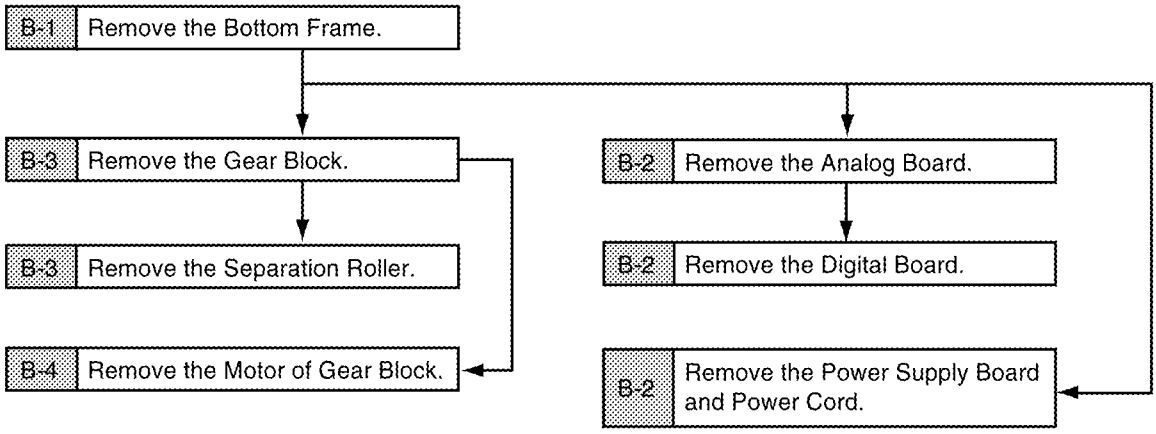
14.1.1. Upper Cabinet Section



CROSS REFERENCE:

- **A-1 : How to Remove the Operation Panel Block** (P.119)
- **A-2 : How to Remove the Operation Board, LCD and Platen Roller** (P.120)
- **A-3 : How to Remove the Separation Holder and Document Feed Support** (P.121)
- **A-4 : How to Remove the Image Sensor (CIS) and Feed Roller** (P.122)
- **A-5 : How to Remove the Lock Lever and Thermal Head** (P.123)
- **B-1 : How to Remove the Bottom Frame** (P.124)
- **B-3 : How to Remove the Gear Block and Separation Roller** (P.126)

14.1.2. Lower Cabinet Section



CROSS REFERENCE:

B-1 : How to Remove the Bottom Frame (P.124)

B-2 : How to Remove the Analog Board, Digital Board, Power Supply Board and Power Cord (P.125)

B-3 : How to Remove the Gear Block and Separation Roller (P.126)

B-4 : How to Remove the Motor of Gear Block (P.126)

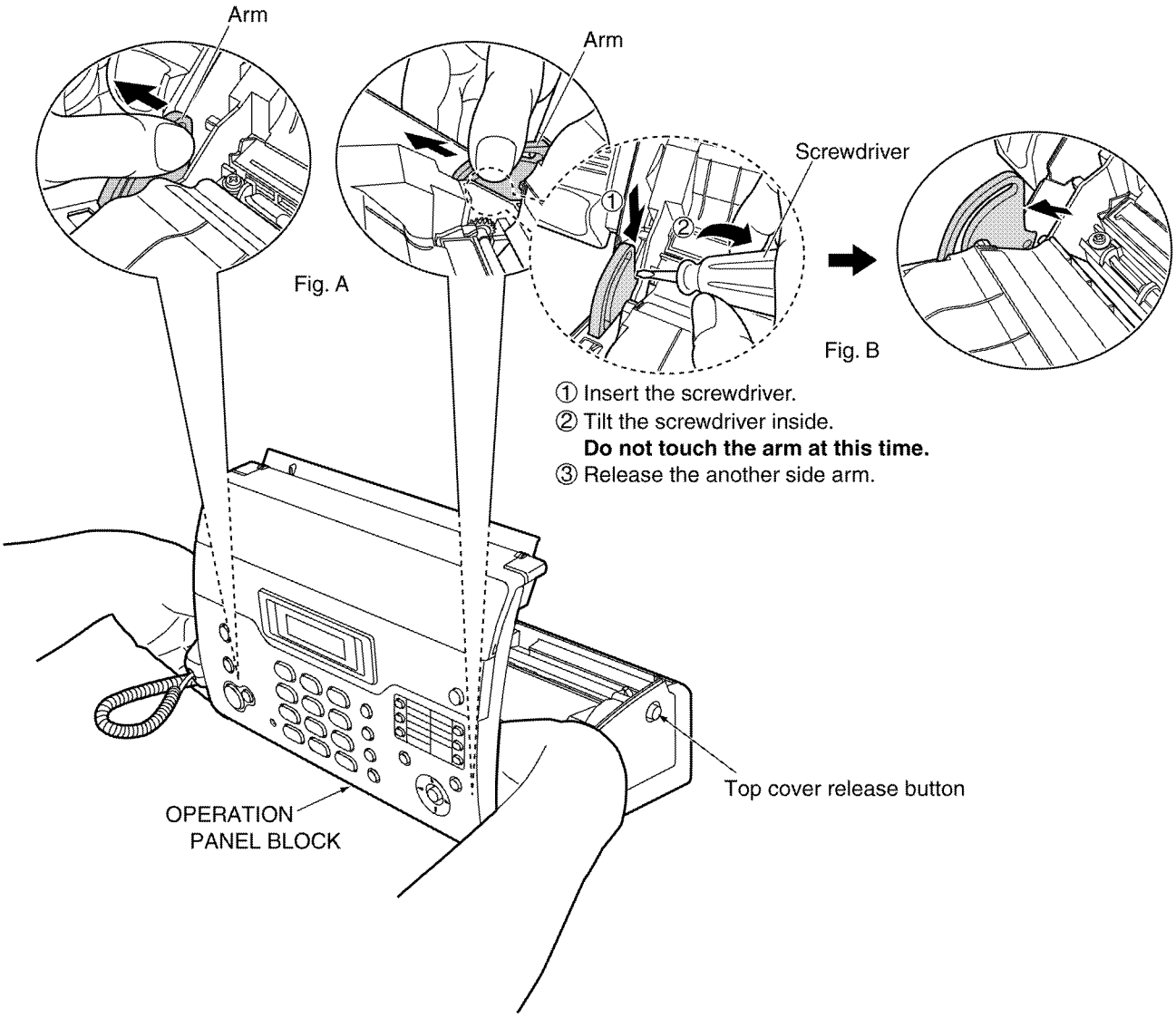
14.2. Disassembly Procedurel

14.2.1. How to Remove the Operation Panel Block

PROCEDURE: A-1

Ref. No. A-1

1) Unhook all the connectors connecting the main cabinet with the OPERATION PANEL BLOCK. (Refer to **Ref. No. B-1**)
2) Push the Top cover release button.
3) Push the both side arms (in the direction of the arrow shown in Fig. A) simultaneously to release the top of arms.
4) Release the both side arms, as shown in a Fig. B.
5) Remove the OPERATION PANEL BLOCK.



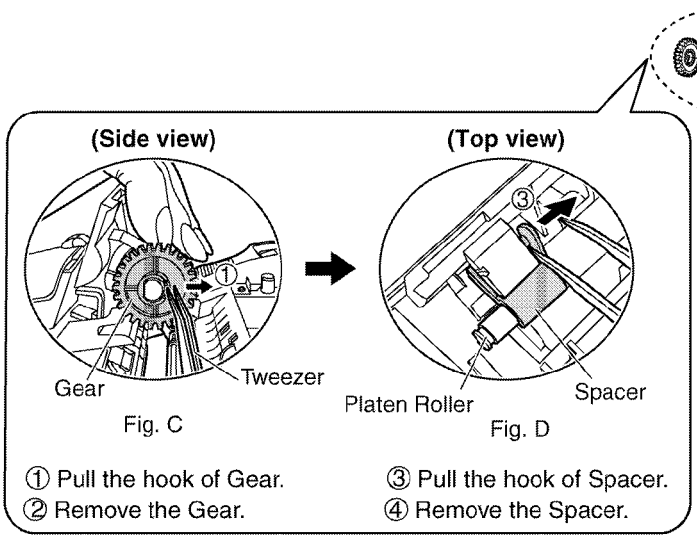
14.2.2. How to Remove the Operation Board, LCD and Platen Roller

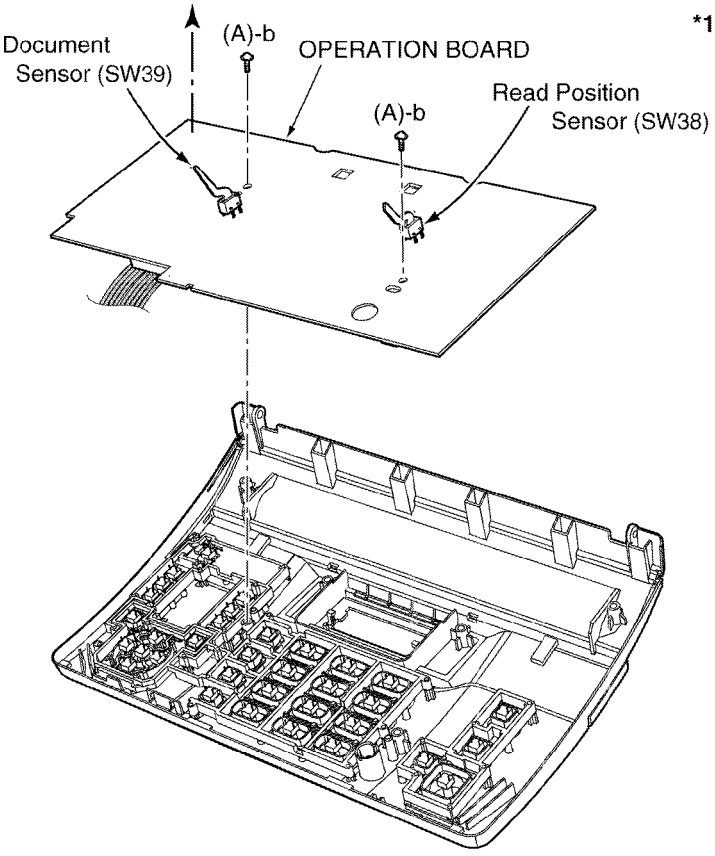
PROCEDURE: A-1 → A-2

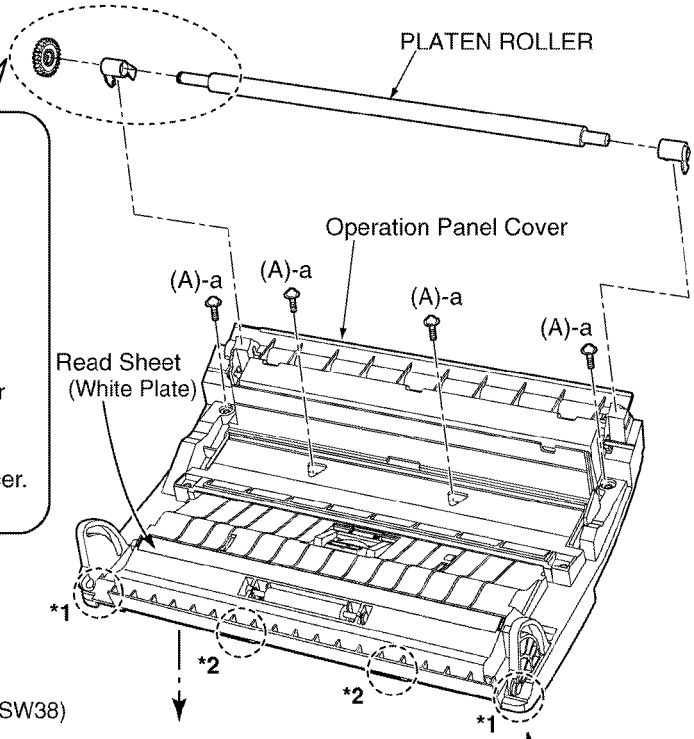
Ref. No. A-2

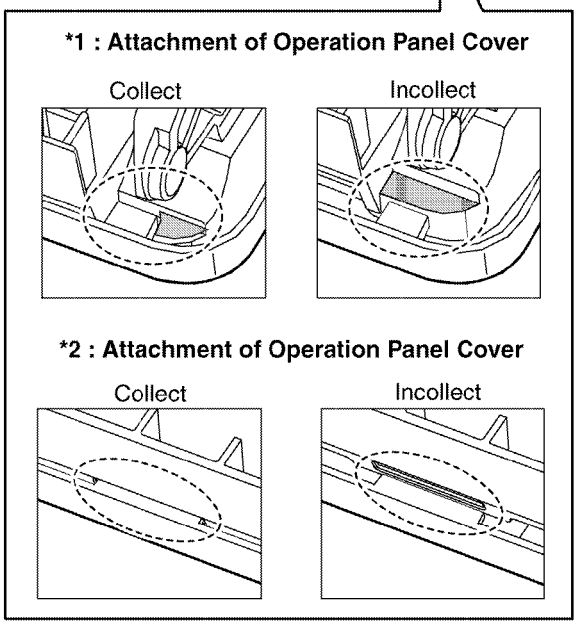
1) Remove the 4 screws (A)-a.
2) Remove the OPERATION PANEL COVER.
3) Remove the 2 screws (A)-b.
4) Remove the OPERATION BOARD and LCD.

1) Remove the Gear, as shown in a Fig. C .
2) Remove the Spacer, as shown in a Fig. D.
3) Remove the PLATEN ROLLER.







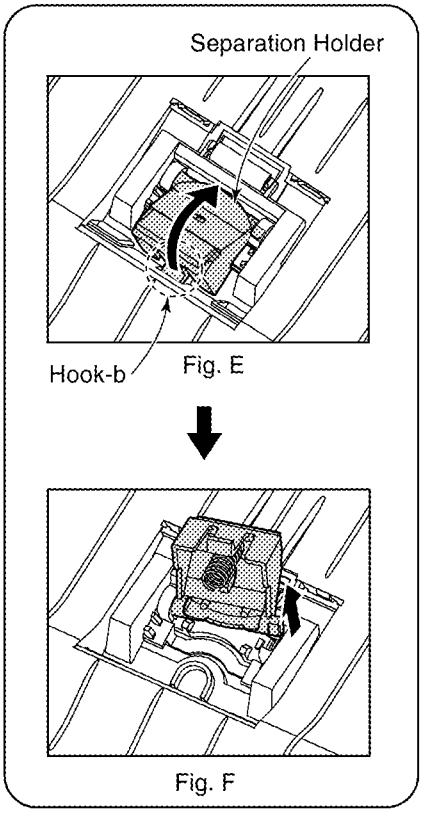


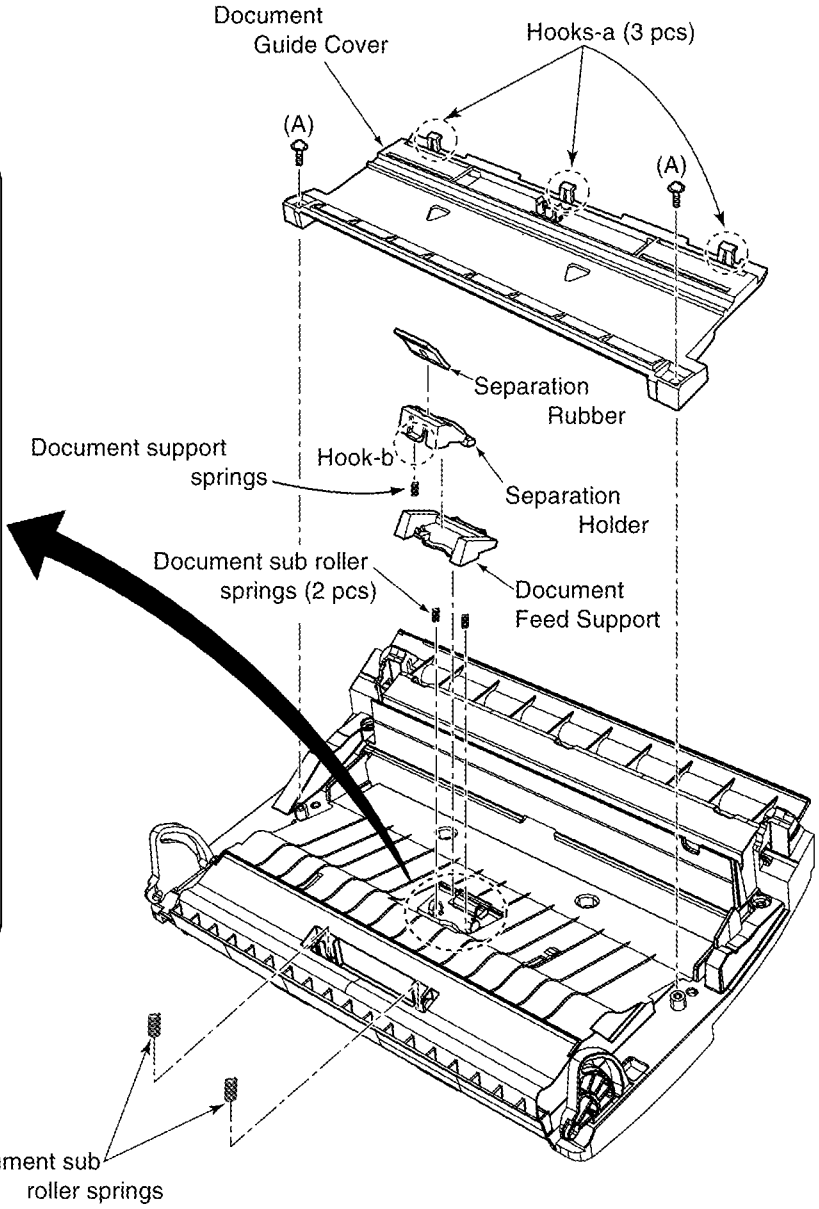
14.2.3. How to Remove the Separation Holder and Document Feed Support

PROCEDURE: A-1 → A-2 → A-3

Ref. No. A-3

1) Remove the 2 screws (A).
2) Release the 3 Hooks-a from rear side.
3) Remove the Document Guide Cover.
4) Release the Hook-b of Separation Holder, as shown in Fig. E.
5) Remove the Separation Holder.
6) Remove the Document Feed Support.





14.2.4. How to Remove the Image Sensor (CIS) and Feed Roller

PROCEDURE: A-1 → B-1 → A-4

Ref. No. A-4

1) Push the Top cover release button.
2) Release the top of Operation Panel Block arms.
   (Refer to Fig. A on **Ref. No. A-2**)
3) Remove the 1 screw (E).
4) Remove the IMAGE SENSOR, as shown in a Fig. G.
5) **Remove the BOTTOM FRAME.** (Refer to **Ref. No. B-1**)
6) Remove the FEED ROLLER, as shown in a Fig. H.

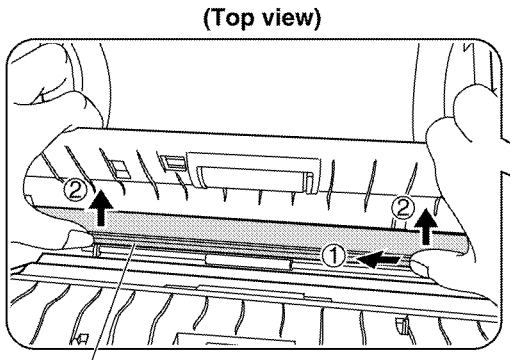


Fig. G

IMAGE SENSOR

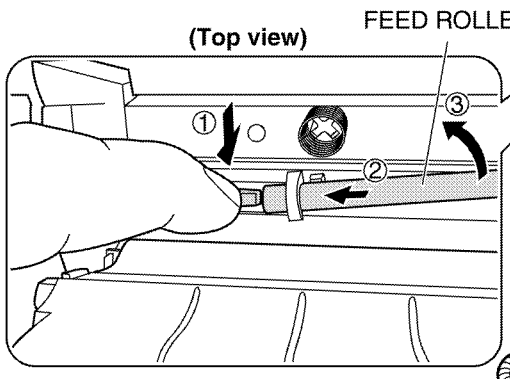
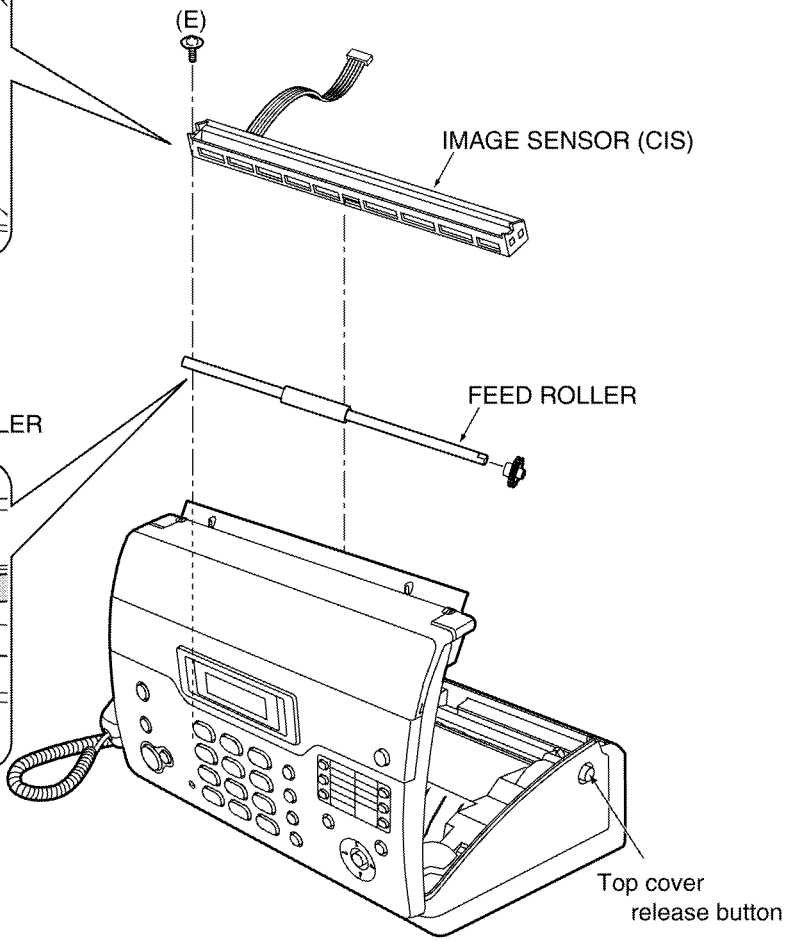


Fig. H



14.2.5. How to Remove the Lock Lever and Thermal Head

PROCEDURE: B-3 → A-7

Ref. No. A-7

1) Remove the **GEAR BLOCK**. (Refer to **Ref No. B-3**)
2) Remove the 1 screw (L).
3) Remove the LOCK LEVER.
4) Remove the THERMAL HEAD, as shown in a Fig. K.

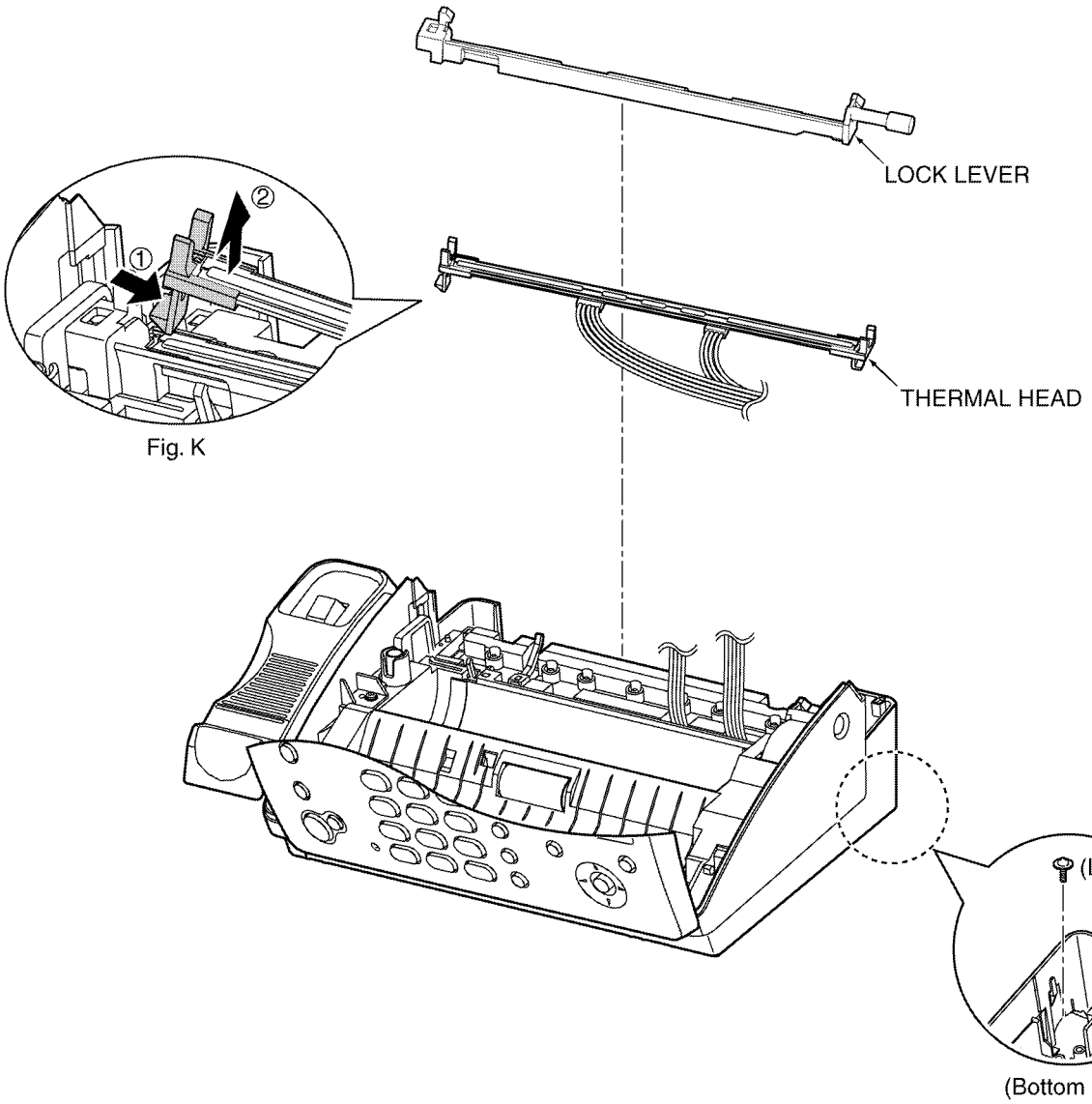


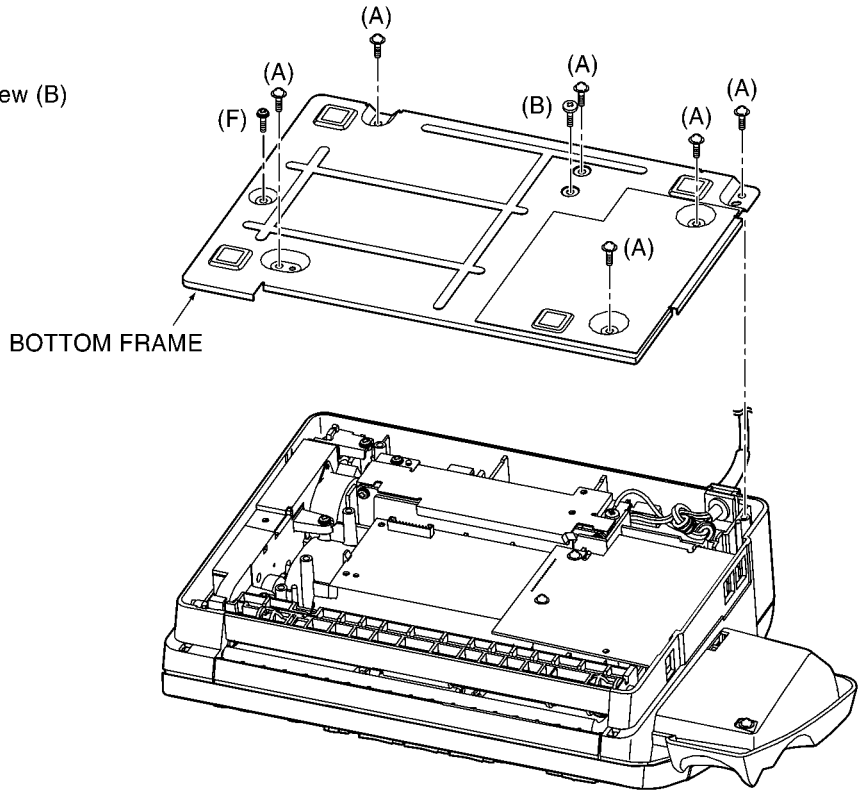
Fig. K

14.2.6. How to Remove the Bottom Frame

PROCEDURE: B-1

Ref. No. B-1

1) Remove the 6 screws (A), 1 screw (B) and 1 screw (F).
2) Remove the BOTTOM FRAME.



14.2.7. How to Remove the Analog Board, Digital Board, Power Supply Board and Power Cord

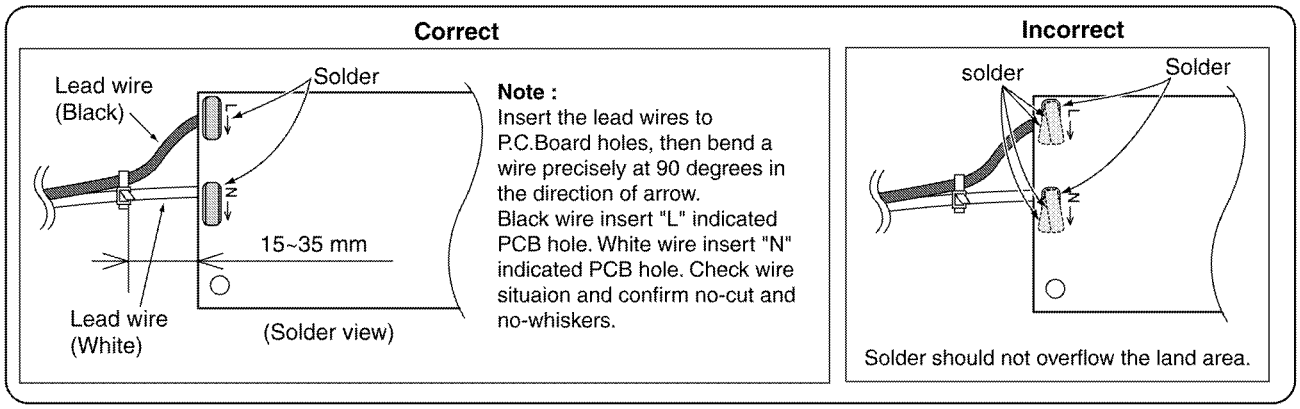
PROCEDURE: B-1 → B-2

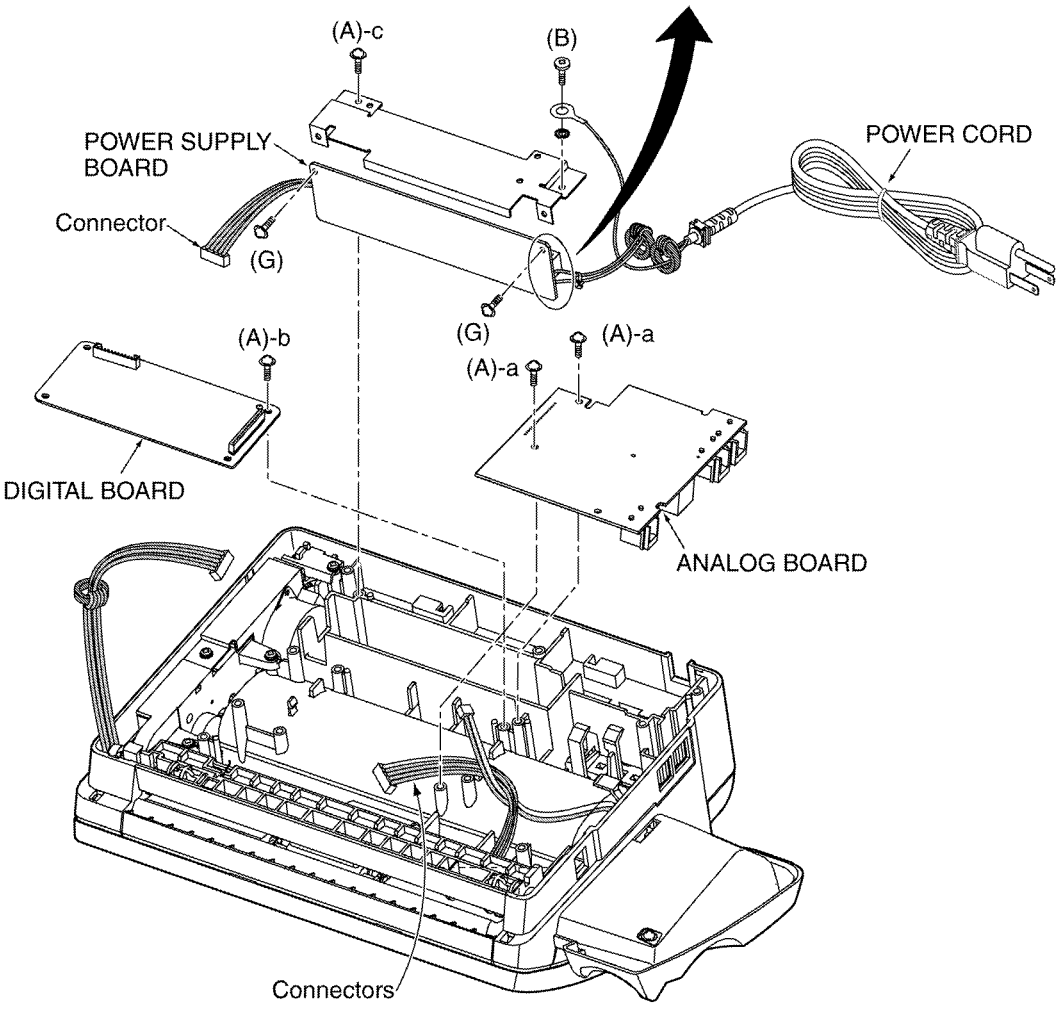
Ref. No. B-2

1) Remove the 2 screws (A)-a.
2) Remove the ANALOG BOARD.
3) Remove the Connectors on the Digital Board.
4) Remove the 1 screw (A)-b.
5) Remove the DIGITAL BOARD.

1) Remove the 1 screw (A)-c and 1 screw (B).
2) Remove the 2 screws (G).
3) Remove the Connector on the Power Supply Board.
4) Remove the POWER SUPPLY BOARD and POWER CORD.

Soldering the lead wire of Power Cord



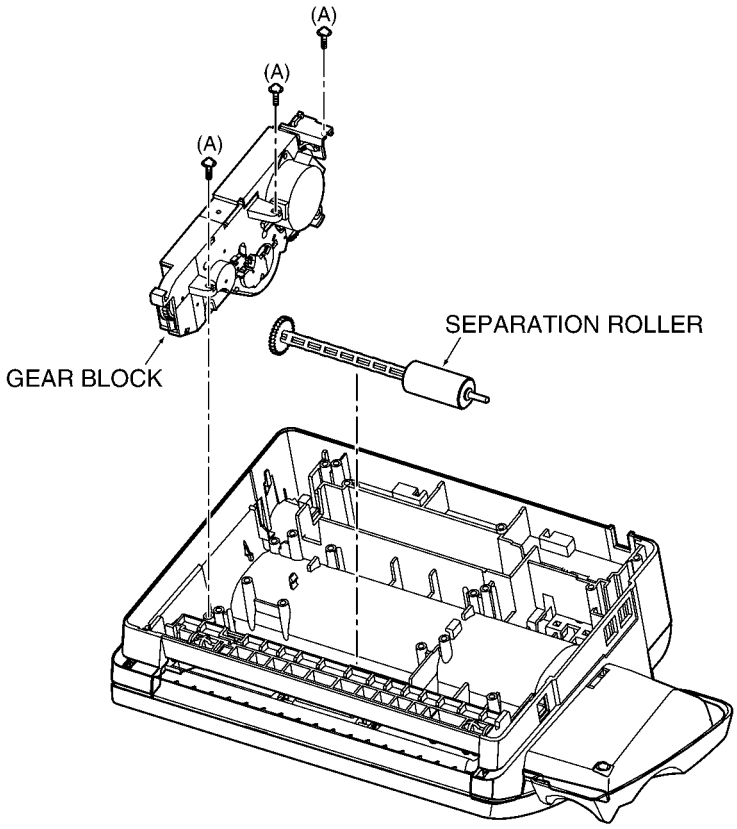


14.2.8. How to Remove the Gear Block and Separation Roller

PROCEDURE: B-1 → B-3

Ref. No. B-3

1) Remove the 3 screws (A).
2) Remove the GEAR BLOCK.
3) Remove the SEPARATION ROLLER.

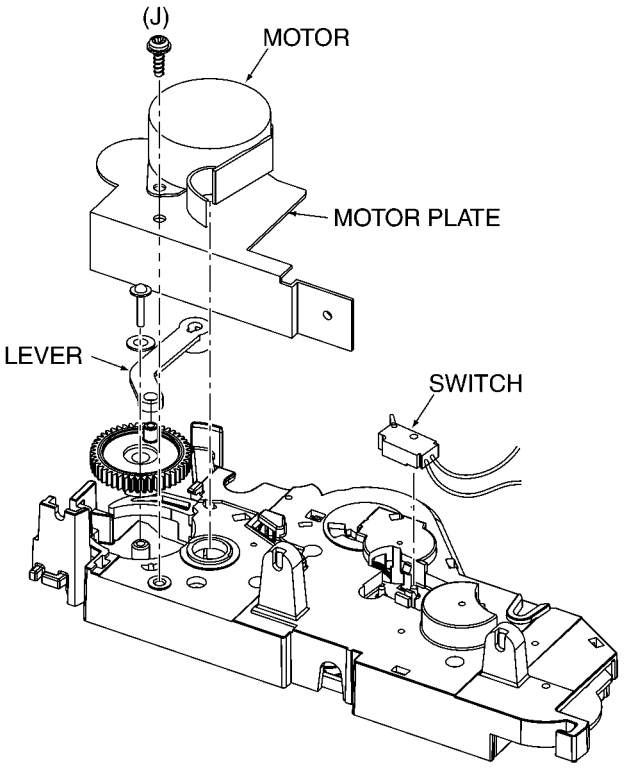


14.2.9. How to Remove the Motor of Gear Block

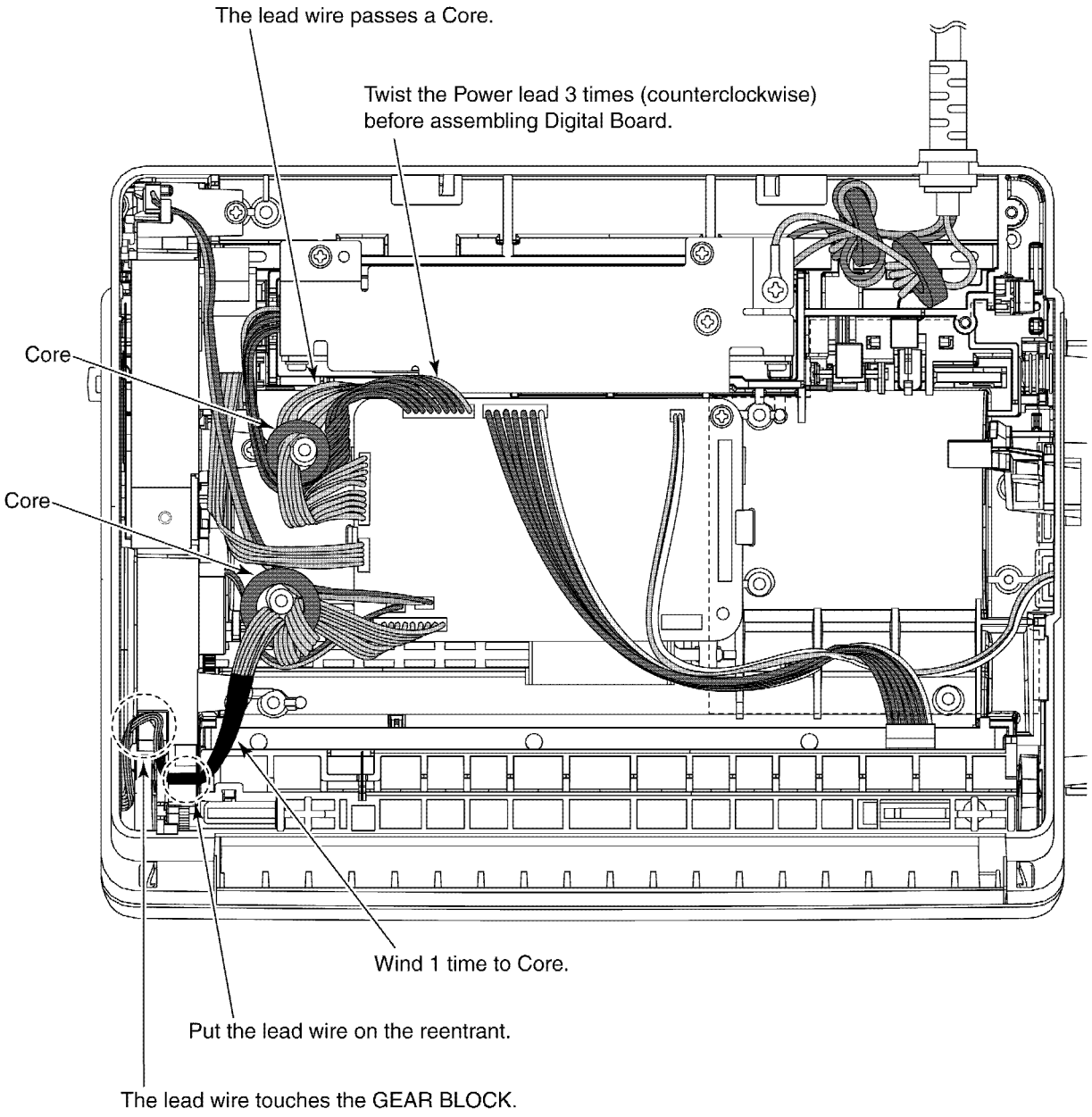
PROCEDURE: B-1 → B-3 → B-4

Ref. No. B-4

1) Remove the 1 screw (J).
2) Remove the MOTOR.
3) Remove the MOTOR PLATE.
4) Remove the SWITCH.



14.2.10. Installation Position of the Lead Wires



15 Maintenance

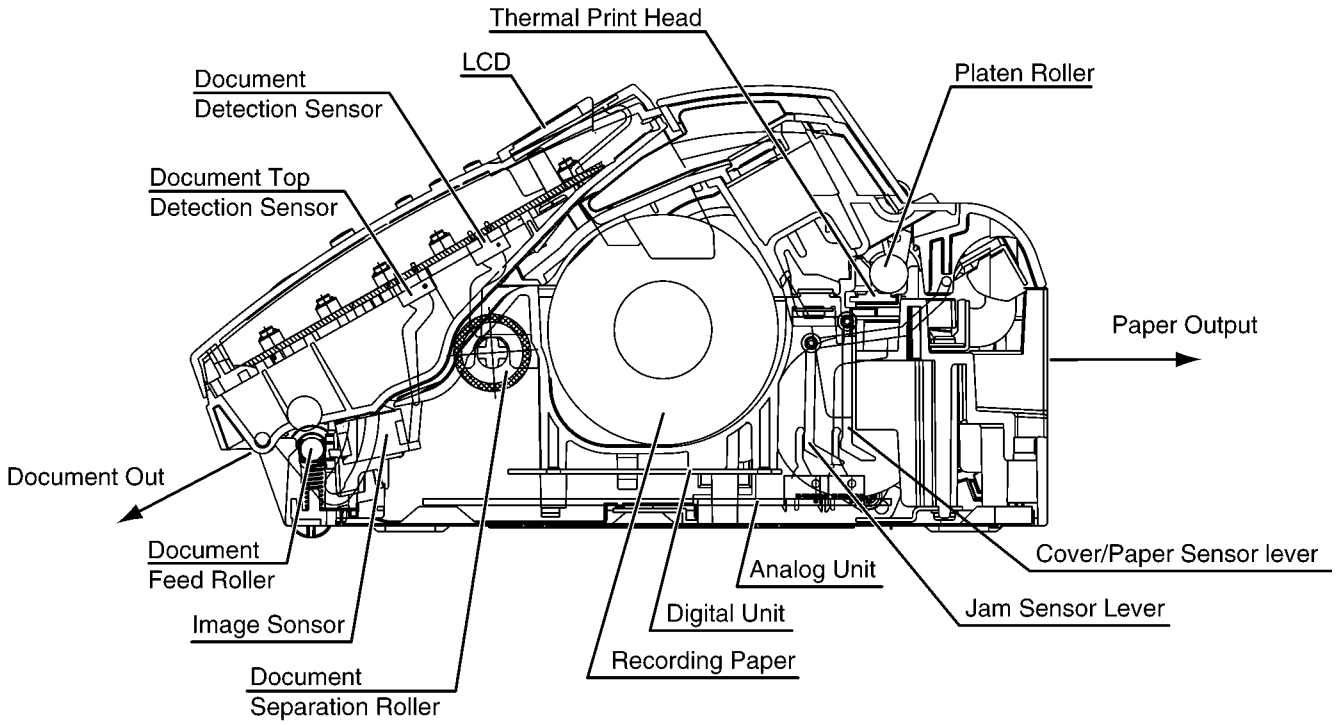
15.1. Maintenance Items and Componet Locations

15.1.1. 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 problems and consider how they arose.
   If the equipment can be still used, perform copying, self testing or communication testing.
3. **Check equipment**
   Perform copying, self testing and communication testing to determine if the problem originates from the transmitter, receiver or the telephone line.
4. **Determine causes**
   Determine the causes of the equipment problem by troubleshooting.
5. **Equipment repairs**
   Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem will not recur.
6. **Confirm normal operation of the equipment**
   After completing the repairs, conduct copying, self testing and communication testing to confirm that the equipment operates normally.
7. **Record keeping**
   Make a record of the measures taken to rectify the problem for future reference.

15.1.2. Maintenance check Items/Componet Locations



15.1.2.1. Maintenance List

NO.	OPERATION	CHECK	REMARKS
1	Document Path	Remove any foreign matter such as paper.	----------
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	Refer to **How to Remove the Image Sensor (CIS) and Feed Roller** (P.122).
3	Platen Roller	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper and film cartridge before cleaning.	Refer to **How to Remove the Operation Board, LCD and Platen Roller** (P.120).
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	Refer to **How to Remove the Lock Lever and Thermal Head** (P.123).
5	Sensors	Document sensor (SW39), Read position sensor (SW38), Recording paper/cover open sensor (SW1), Jam sensor (SW3), Hook switch (SW2) Confirm the operation of the sensors.	See **Maintenance check Items/Componet Locations** (P.128).
6	Glass	If the glass is dirty, clean them with a dry soft cloth.	Refer to **Document Feeder Cleaning** (P.137).
7	Abnormal, wear and tear or loose parts	Replace the part. Check if the screws are tight on all parts.	----------

15.1.2.2. Maintenance Cycle

No.	Item	Cleaning Cycle	Replacement	
			Cycle	Procedure
1	Separation Roller (Ref. No. 110)	3 months	7 years* (31,500 documents)	Refer to **How to Remove the Gear Block and Separation Roller** (P.126)
2	Separation Rubber (Ref. No.23)	3 months	7 years (31,500 documents)	Refer to **How to Remove the Separation Holder and Document Feed Support** (P.121)
3	Feed Rollers (Ref. No. 30, 78)	3 months	7 years (31,500 documents)	Refer to **How to Remove the Image Sensor (CIS) and Feed Roller**(P.122).
4	Thermal Head (Ref. No. 58)	3 months	7 years (31,500 documents)	Refer to **How to Remove the Lock Lever and Thermal Head** (P.123).

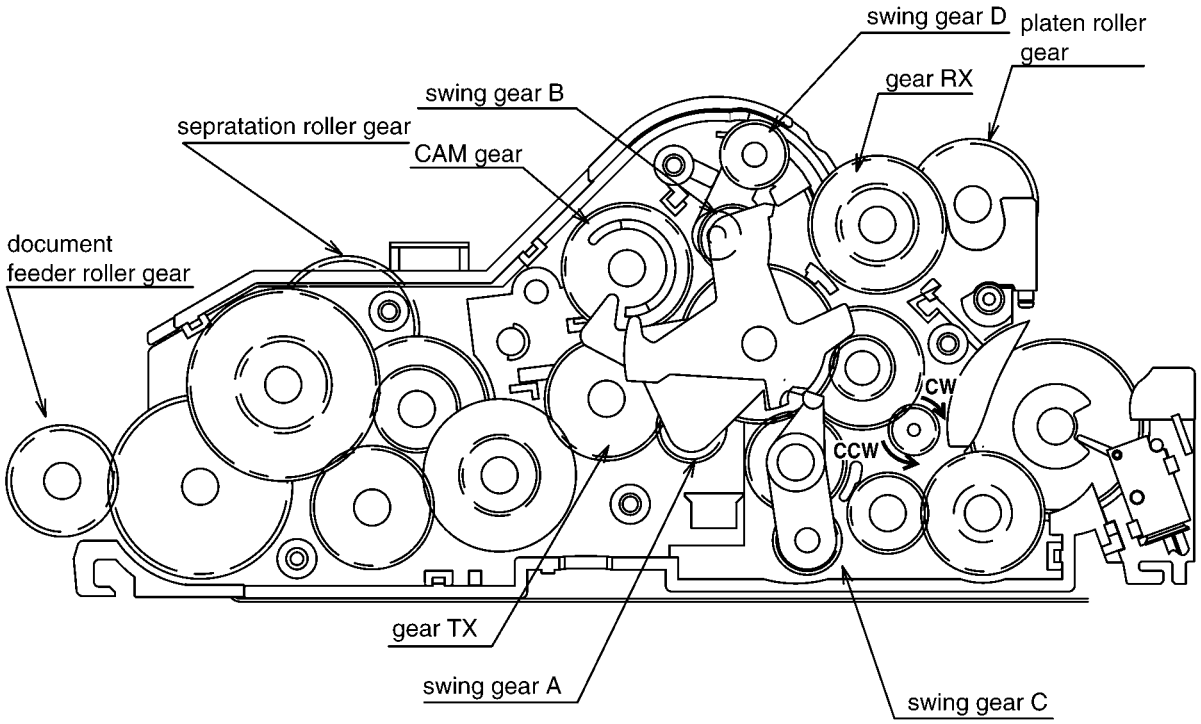
* These values are standard and may vary depending on usage conditions.

15.2. Gear Section

This section shows how the motor-driven gear mechanism works in the main operations: FAX transmission, FAX reception the motor and copying.

15.2.1. Mode Selection

When the motor attached to the Drive Motor Gear rotates counterclockwise (CCW), Swing Gear A engages the CAM and the CAM turns counterclockwise to select a mode. (See **Fig. A.**) There are three mode options controlled by the Switch: **A**: Transmit mode, **B**: Receive mode and **C**: Copy mode. In **Fig. B**, you can see which mode is selected by the position of the rib in the CAM.



<Fig. A>

15.2.2. Mode Operation

Once a mode is selected, the Drive Motor Gear rotates clockwise (CW) and then the Swing Gear A-1 controls the mode operation.

15.2.2.1. TX Mode

Swing Gear A engages Gear TX and conveys its drive power to the Separation Roller Gear for pre-feeding documents.

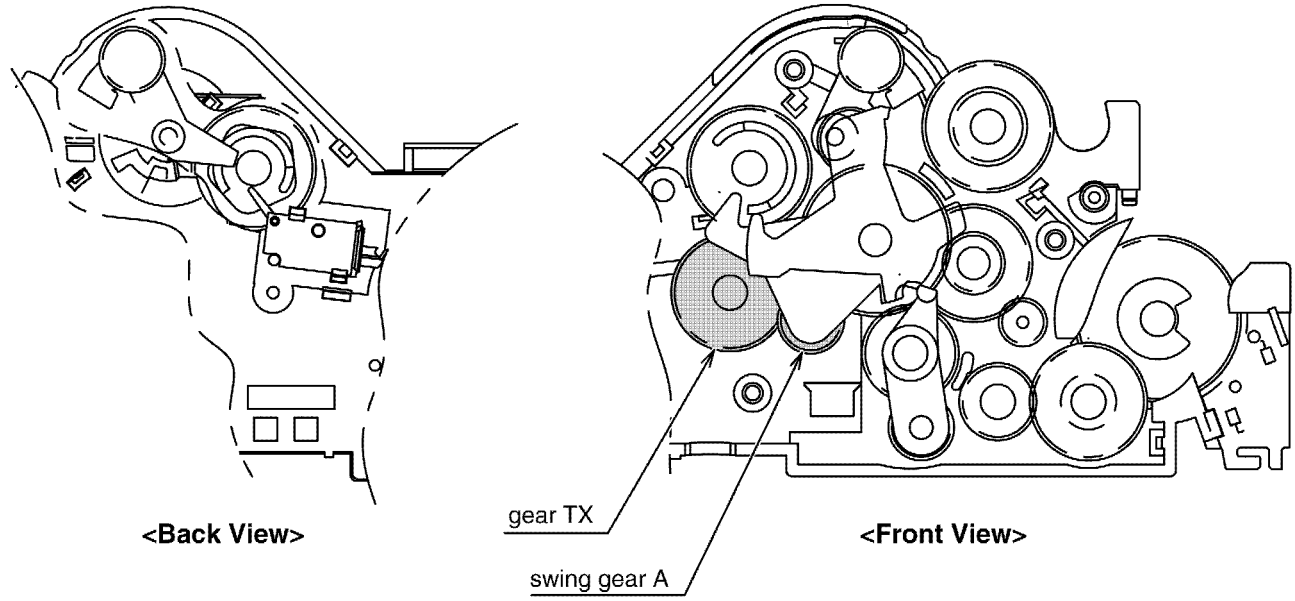


Fig. B: TX mode

15.2.2.2. RX Mode

Swing Gear B engages Gear RX and conveys its drive power to the Platen Roller Gear for printing the received data.

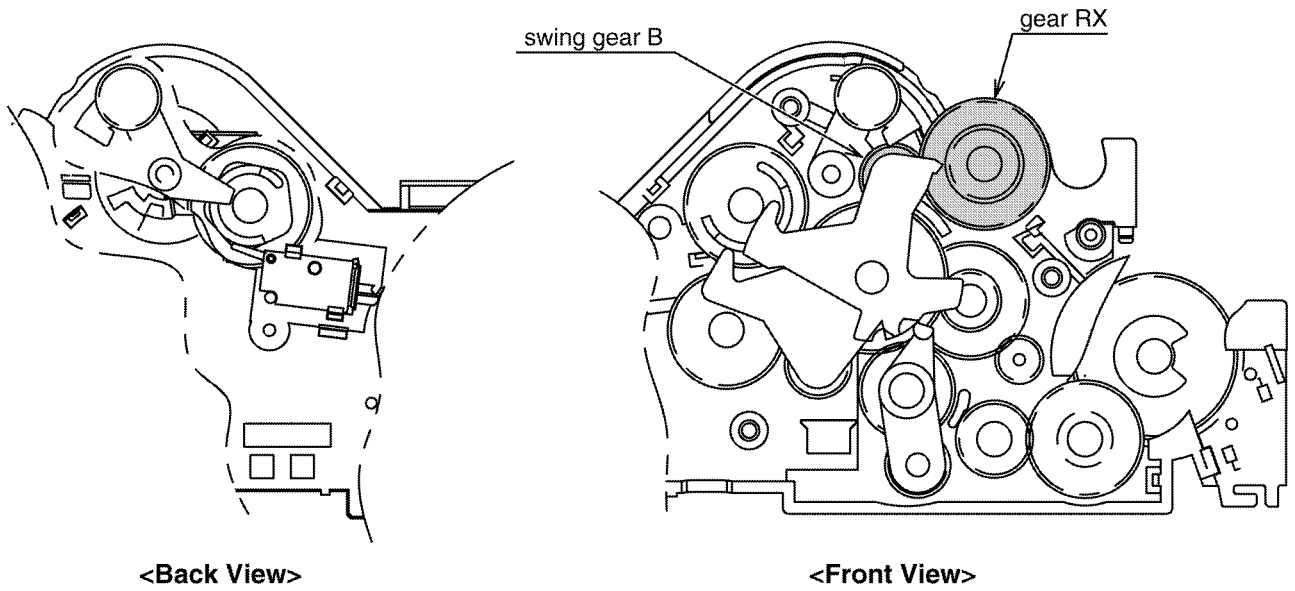


Fig. C: RX mode

15.2.2.3. Copy Mode

Swing Gear A and B engage Gear TX and Gear RX respectively and drive both the Separation Roller Gear and the Platen Roller Gear for feeding documents and recording paper in the copying operation.

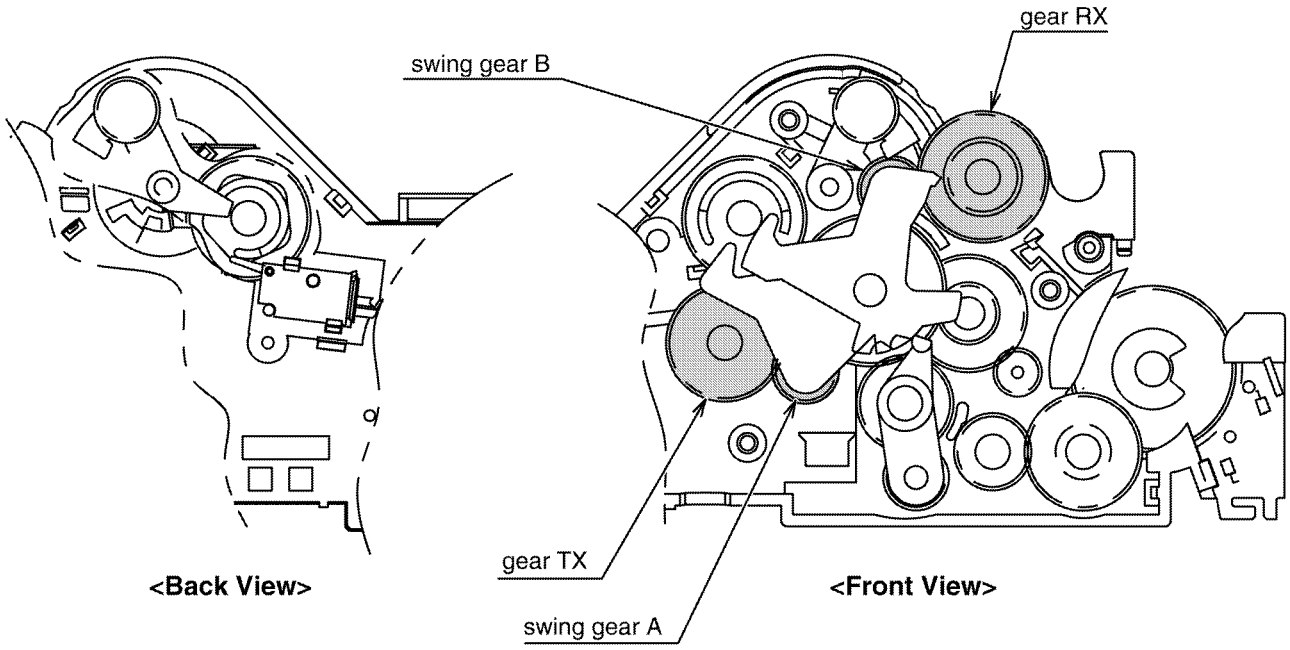


Fig. D: Copy mode

15.2.2.4. Reverse Mode

Swing gear D engages between swing gear B and gear RX, and conveys its drive power to the platen roller gear for reversing the recording paper.

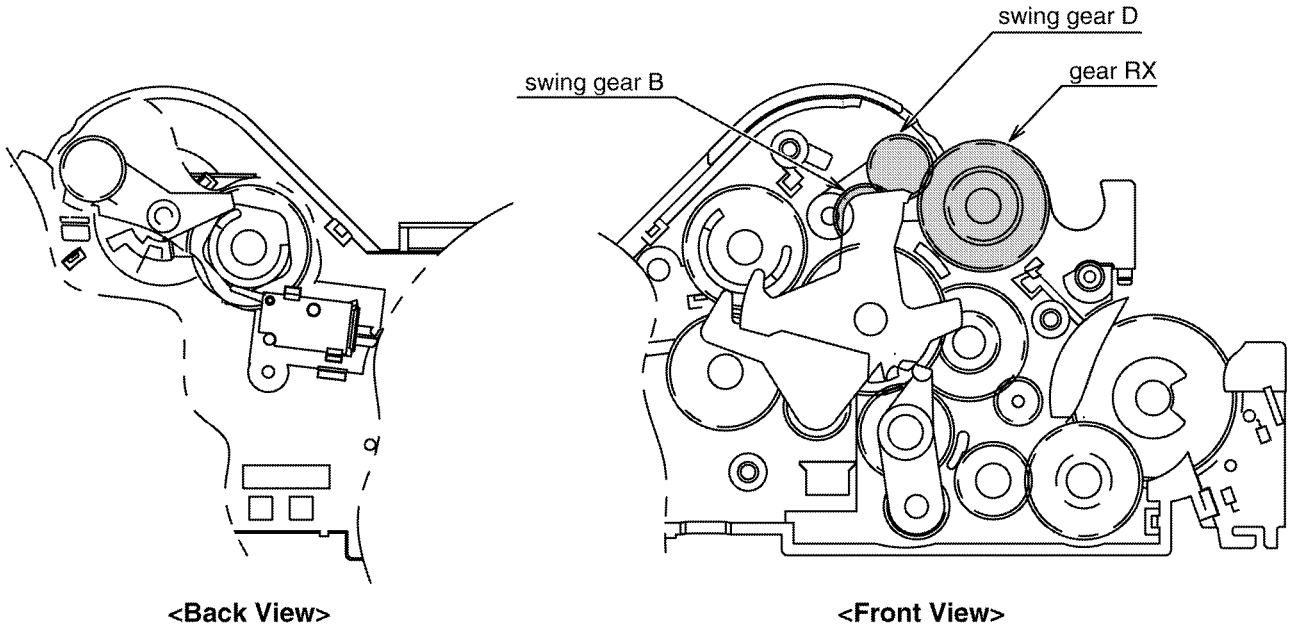
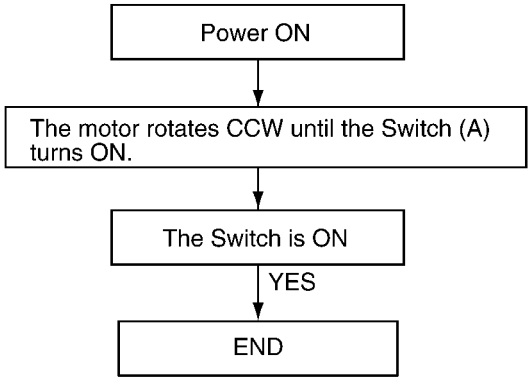


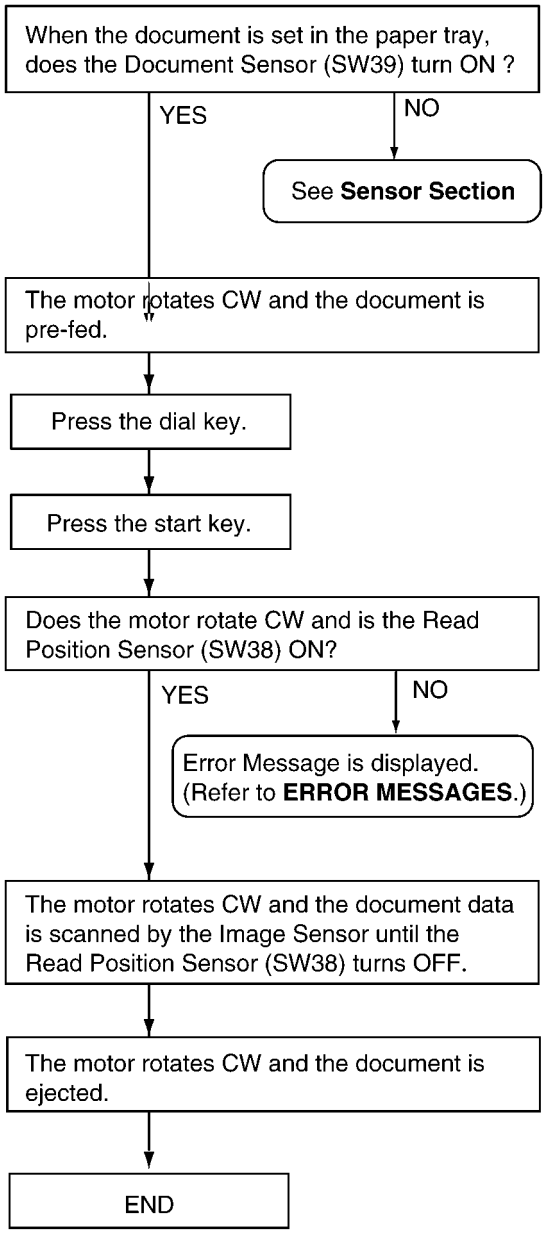
Fig. E: Reverse mode

15.2.3. Mechanical Movements in the Main Operations

15.2.3.1. Idle Status



15.2.3.2. Scanning

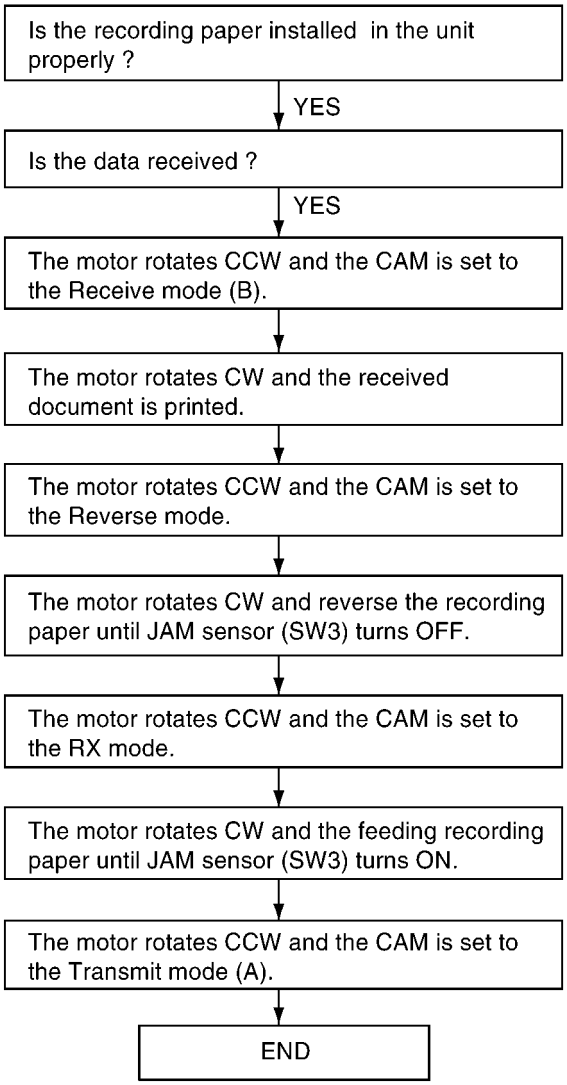


CROSS REFERENCE:

Sensor Section (P.113)

Error Messages-Display (P.64)

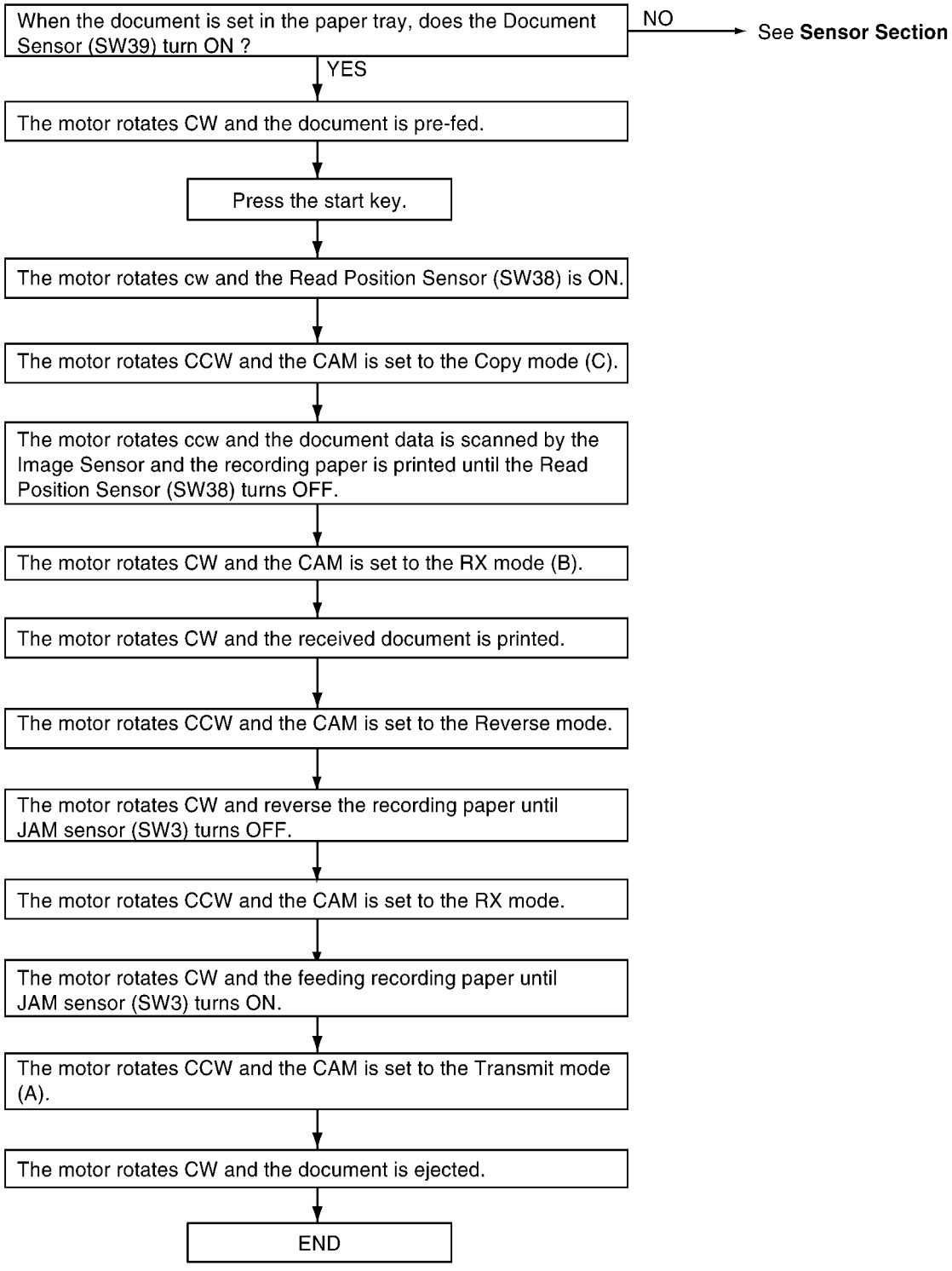
15.2.3.3. Printing



Note:

See **Sensors and Switches** (P.26)

15.2.3.4. Copying

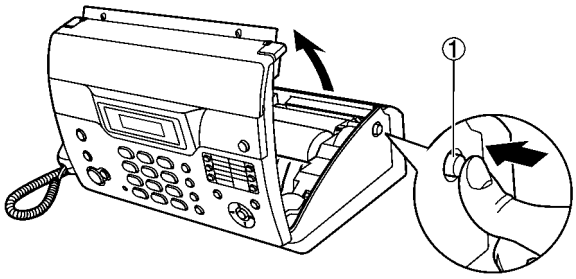


CROSS REFERENCE:
Sensor Section (P.113)

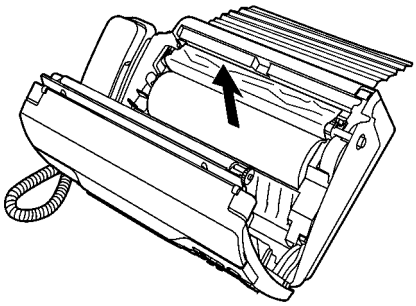
15.3. Jams

15.3.1. Recording Paper Jams

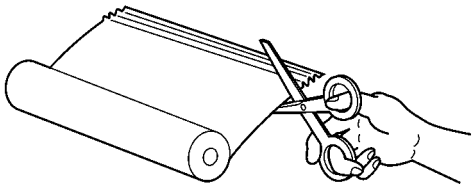
1. Open the top cover by pressing the top cover release button (①).



2. Remove the recording paper.



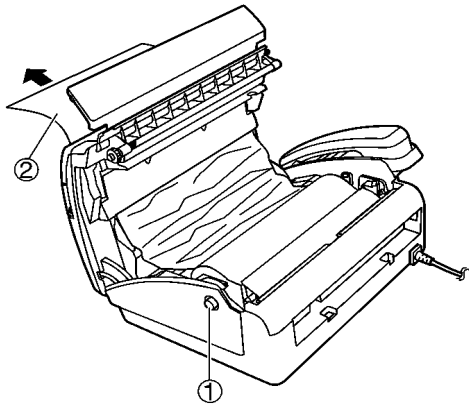
3. Cut off the wrinkled portion.



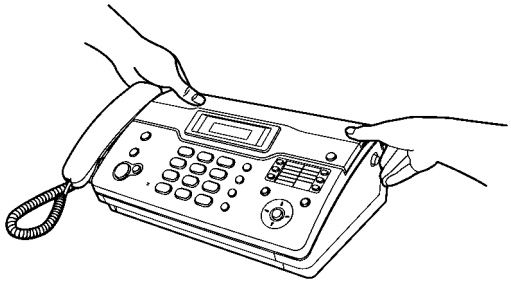
4. Install the recording paper and close the top cover securely by pushing down on both sides.
(See page **Installing the Recording Paper** (P.51))

15.3.2. Document Jams - Sending

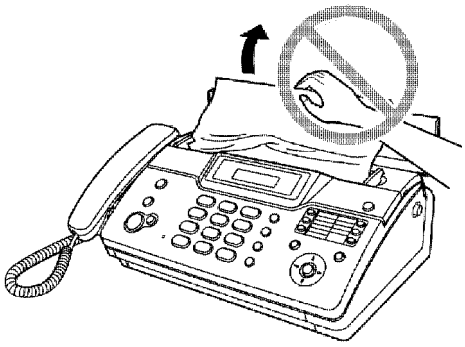
1. Open the top cover by pressing the top cover release button (①) and remove the jammed document carefully (②).



2. Close the top cover securely by pushing down on both sides.



Note:
- Do not pull out the jammed paper forcibly before opening top cover.



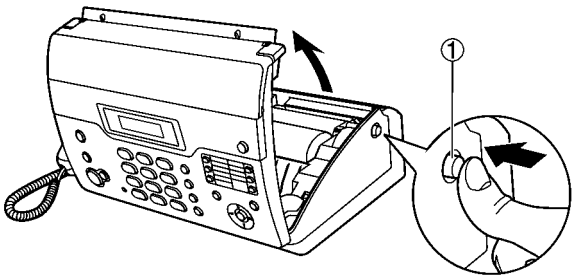
15.4. Cleaning

15.4.1. Document Feeder Cleaning

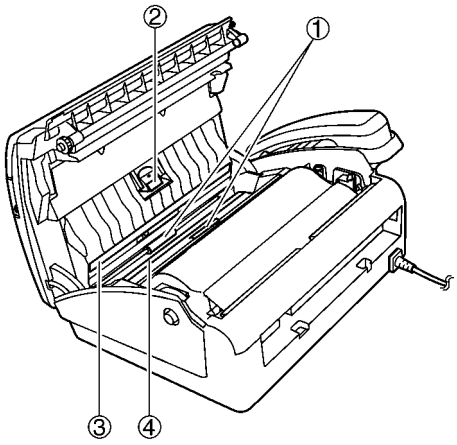
Clean the document feeder when:
- Documents frequently misfeed.
- Smudges or black/white lines appear on the original document when sending or copying.

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

2. Open the top cover by pressing the top cover release button (①).



3. Clean the document feeder rollers (①) and rubber flap (②) with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly. Clean the white plate (③) and scanner glass (④) with a soft and dry cloth.
   Caution:
   - **Do not use paper products, such as paper towels or tissues.**



4. Connect the power cord and the telephone line cord.

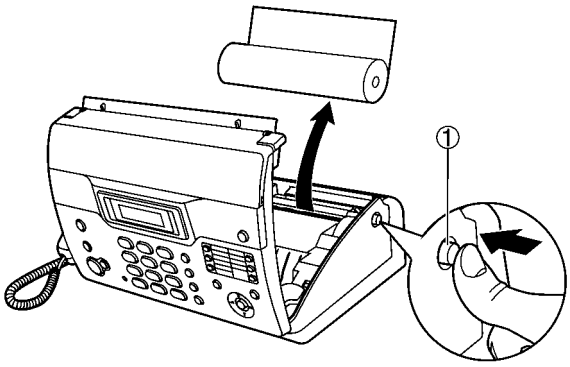
5. Close the top cover securely by pushing down on both sides.

15.4.2. Thermal Head Cleaning

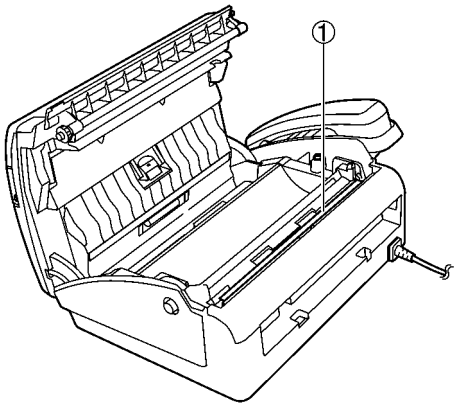
If smudges or black/white lines appear on a copied/received document, check whether there is dust on the thermal head. Clean it to remove the dust.

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

2. Open the top cover by pressing the top cover release button (①) and remove the recording paper.

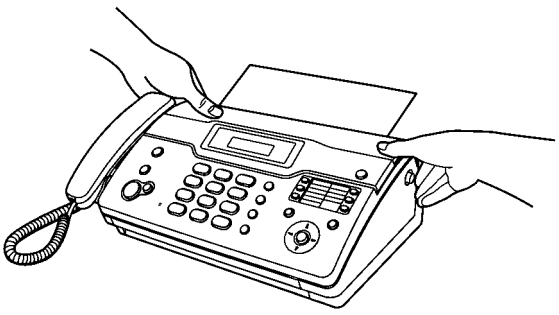


3. Clean the thermal head (①) with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly.
   Caution:
   - **To prevent a malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly.**



4. Connect the power cord and the telephone line cord.

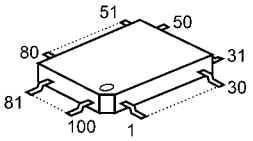
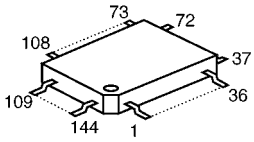
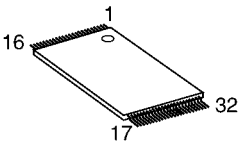
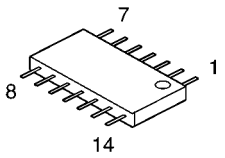
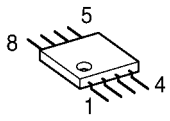
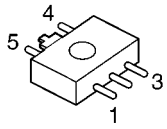
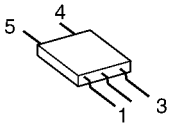
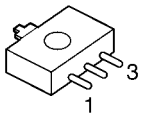
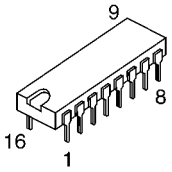
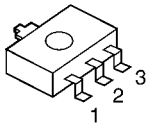
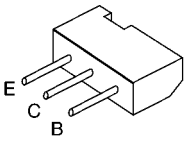
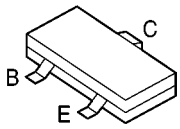
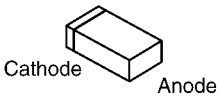
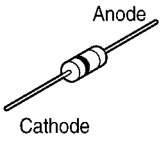
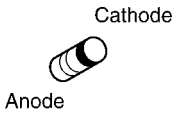
5. Install the recording paper and close the top cover securely by pushing down on both sides.



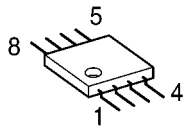
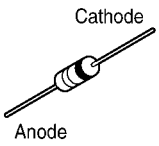
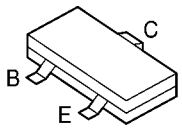
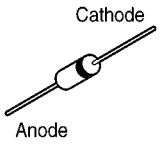
16 Miscellaneous

16.1. Terninal Guide of the ICs, Transistors and Diodes

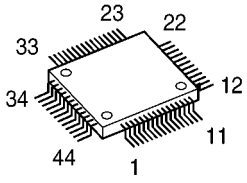
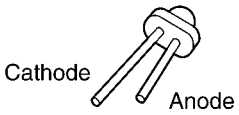
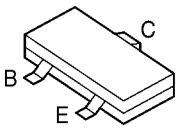
16.1.1. Digital Board

 C1CB00001959	 C1ZBZ0001896	 PFWIFT931LA	 C0JBAS000252	 B1DHDD000026 C0ABEB000052 C1BB00000129
 C0CBCBD00047	 C0JBAA000474 C0JBAA000393	 C0CBADD00009	 B1HAGFF00015	 C3ABKC000034
 2SB1322	 PQVTDTC143E B1ABDF000025 2SB1218ARL	 MA729	 MAZ720000F	 PFVDRMRLS245

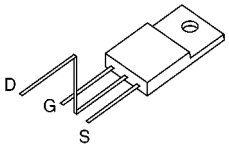
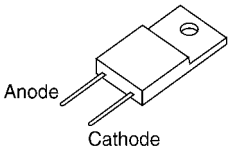
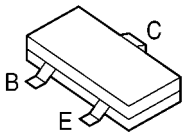
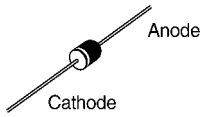
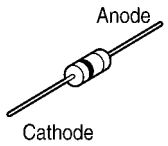
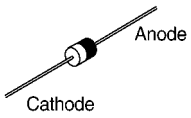
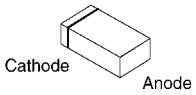
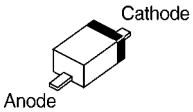
16.1.2. Analog Board

 C0ABBB000047 C0ABAA000005	 MA4056, MA4047	 B1ABDF000025,B1ABDF000026 B1GBCFJJ0047,PQVTDTC143E	 B0EAAD000001

16.1.3. Operation Board

 C1ZBZ0002089	 LNJ801LPDJA	 2SB1218ARL		

16.1.4. Power Supply Board

 2SK3407	 PFVDYG911S2R	 2SK3407, 2SC4081F 2SC4097F	 PFVDERA9102	 PFVDTZPT8130
 PSVDERA1506	 MA8091	 PFVDEC31QS04		

16.2. How to Replace the Flat Package IC

Even if you do not have the special tools (for example, a spot heater) to remove the Flat IC, with some solder (large amount), a soldering iron and a cutter knife, you can easily remove the ICs that have more than 100 pins.

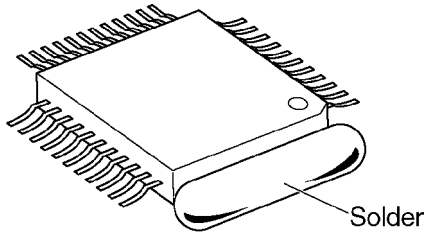
16.2.1. Preparation

- PbF (: Pb free) Solder
- Soldering Iron
  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)
  Note: We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
- Flux
  Recommended Flux: Specific Gravity → 0.82.
  Type → RMA (lower residue, non-cleaning type)

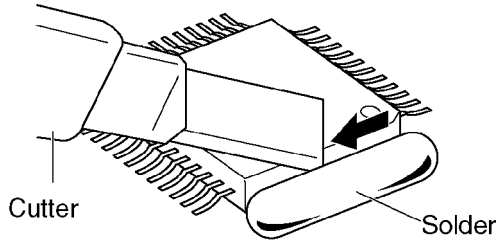
Note: See **About Lead Free Solder (PbF: Pb free)** (P.7).

16.2.2. Flat Package IC Removal Procedure

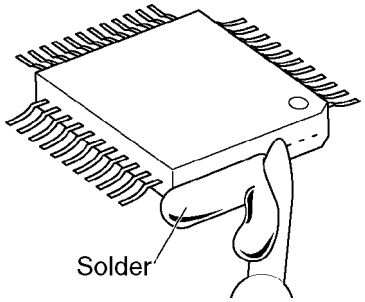
1. Put plenty of solder on the IC pins so that the pins can be completely covered.
   Note:
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



2. Make a few cuts into the joint (between the IC and its pins) first and then cut off the pins thoroughly.



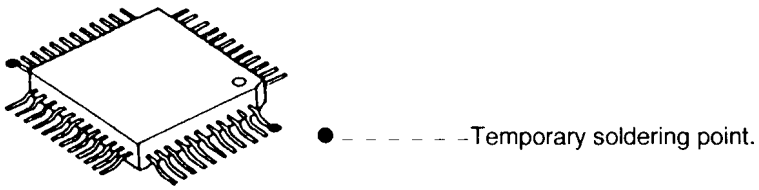
3. While the solder melts, remove it together with the IC pins.



When you attach a new IC to the board, remove all solder left on the land with some tools like a soldering wire. If some solder is left at the joint on the board, the new IC will not be attached properly.

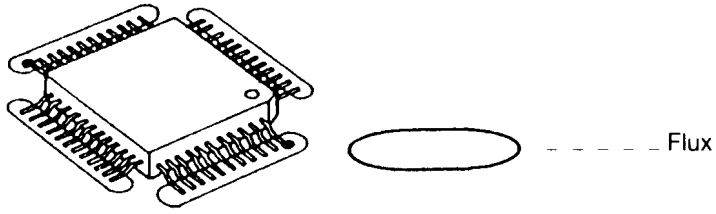
16.2.3. Flat Package IC Installation Procedure

1. Temporarily fix the FLAT PACKAGE IC, soldering the two marked pins.

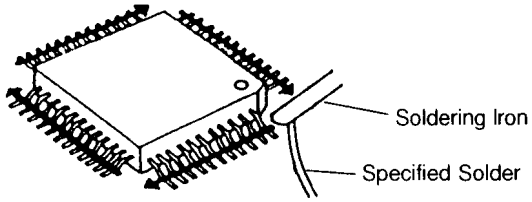


*Check the accuracy of the IC setting with the corresponding soldering foil.

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

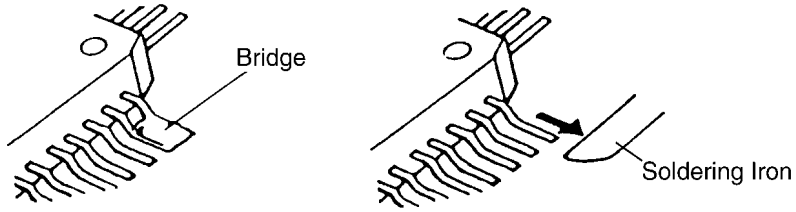


3. Solder the pins, sliding the soldering iron in the direction of the arrow.



16.2.4. Bridge Modification Procedure

1. Lightly resolder the bridged portion.
2. Remove the remaining solder along the pins using a soldering iron as shown in the figure below.



16.3. Test Chart

16.3.1. ITU-T No.1 Test Chart

THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC 18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

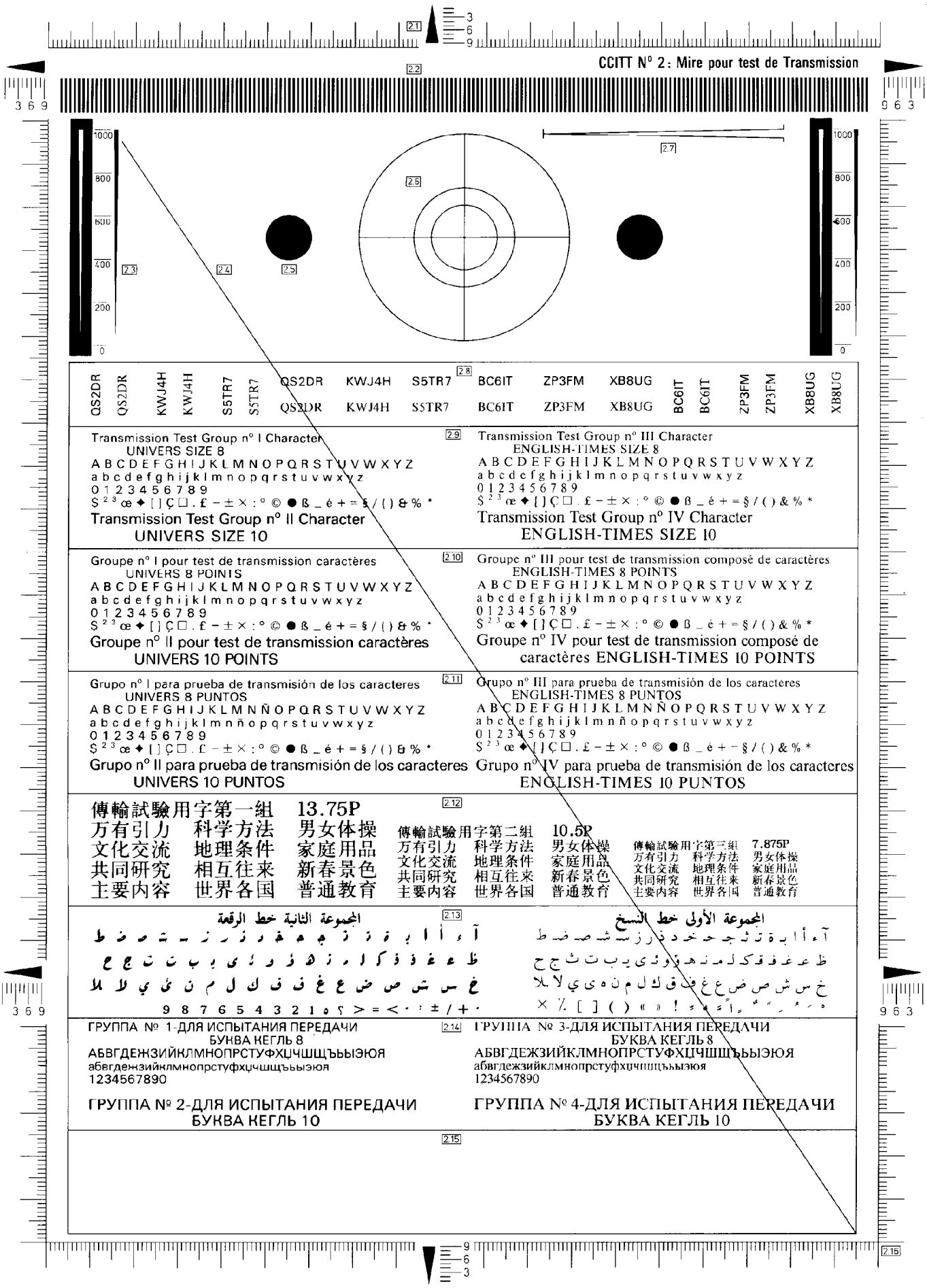
Yours sincerely,

Phil.

P.J. CROSS
Group Leader - Facsimile Research

Registered in England: No. 2038
Registered Office: 60 Vicara Lane, Ilford. Essex.

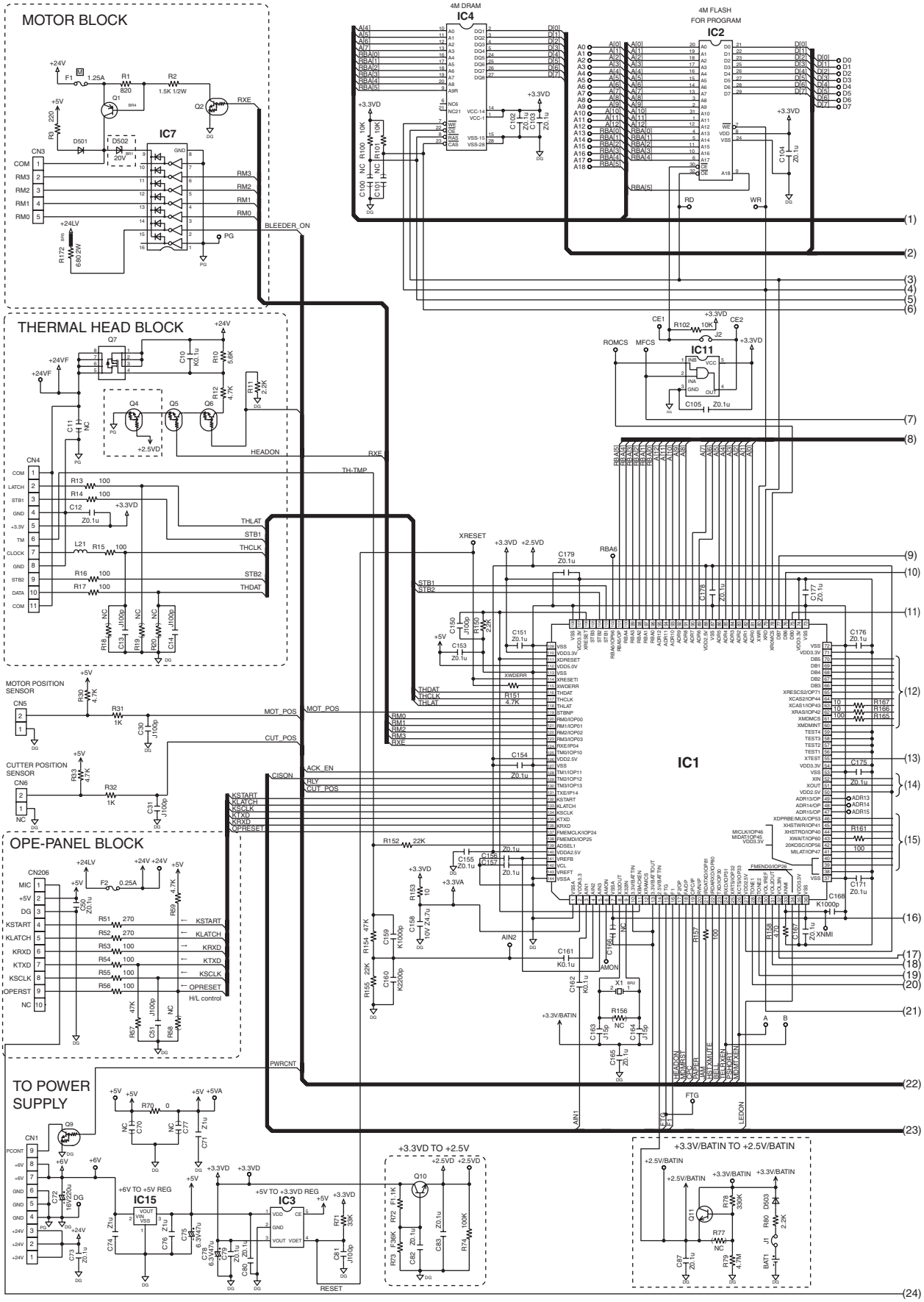
16.3.2. ITU-T No.2 Test Chart

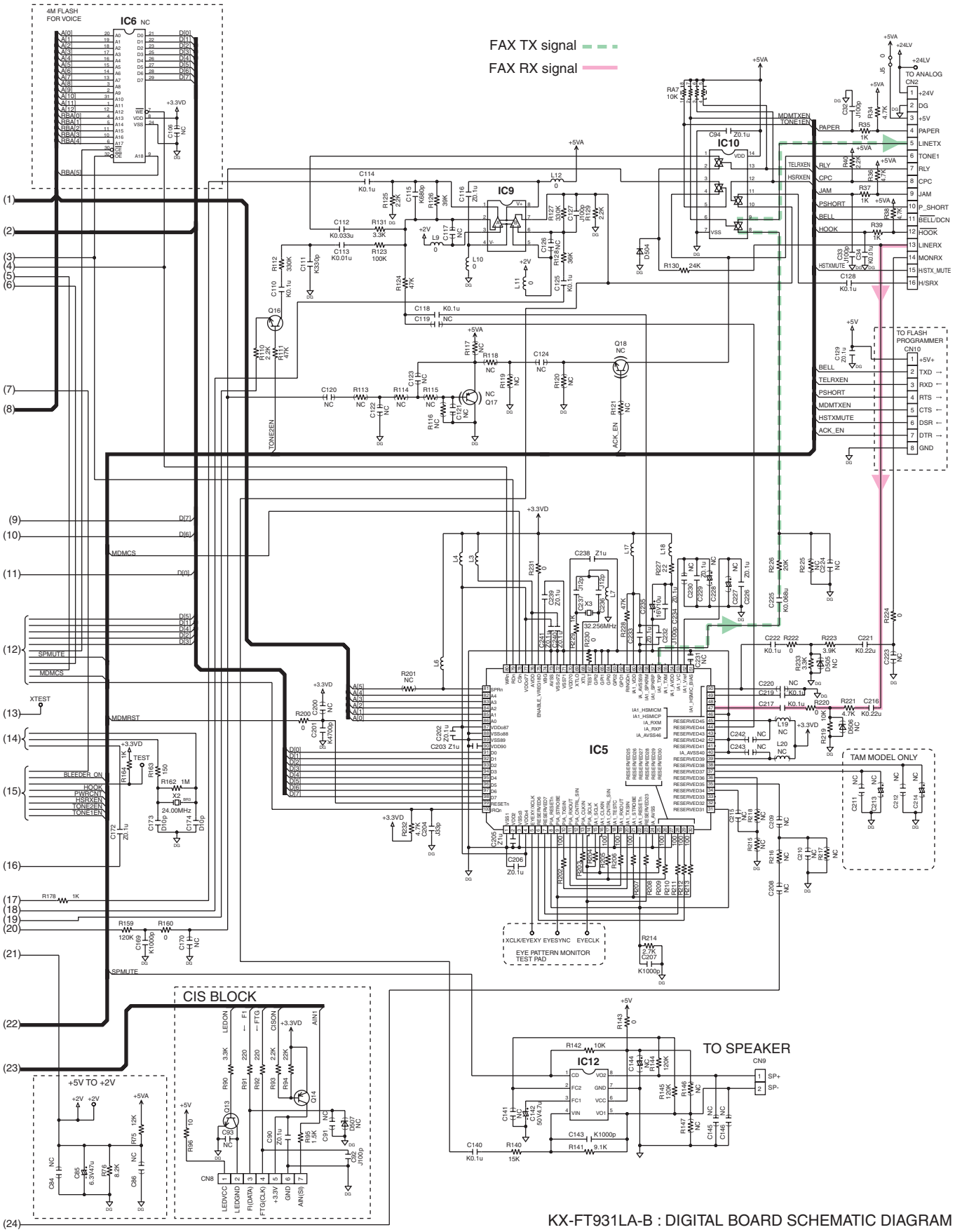


MEMO:

17 Schematic Diagram

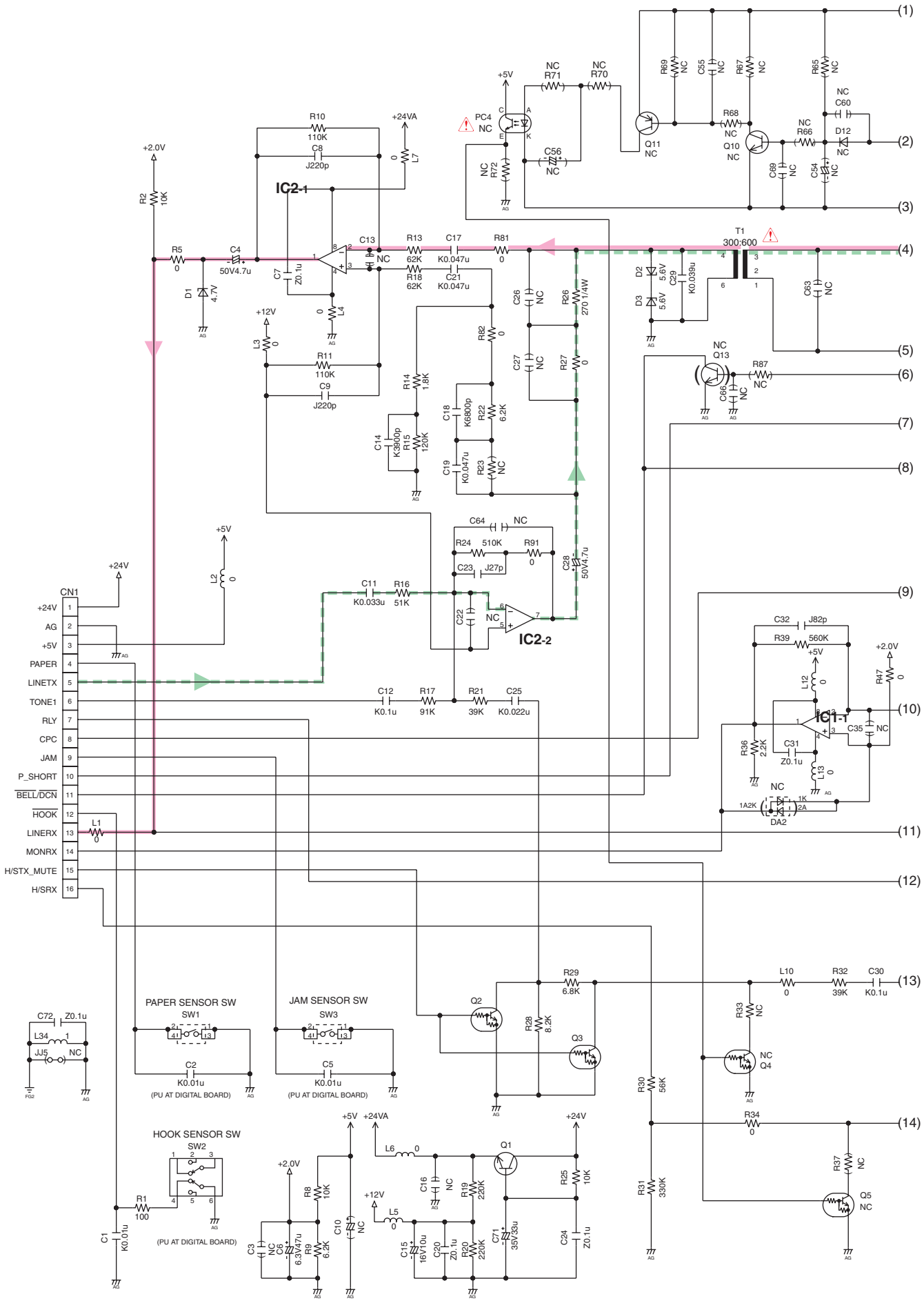
17.1. Digital Board

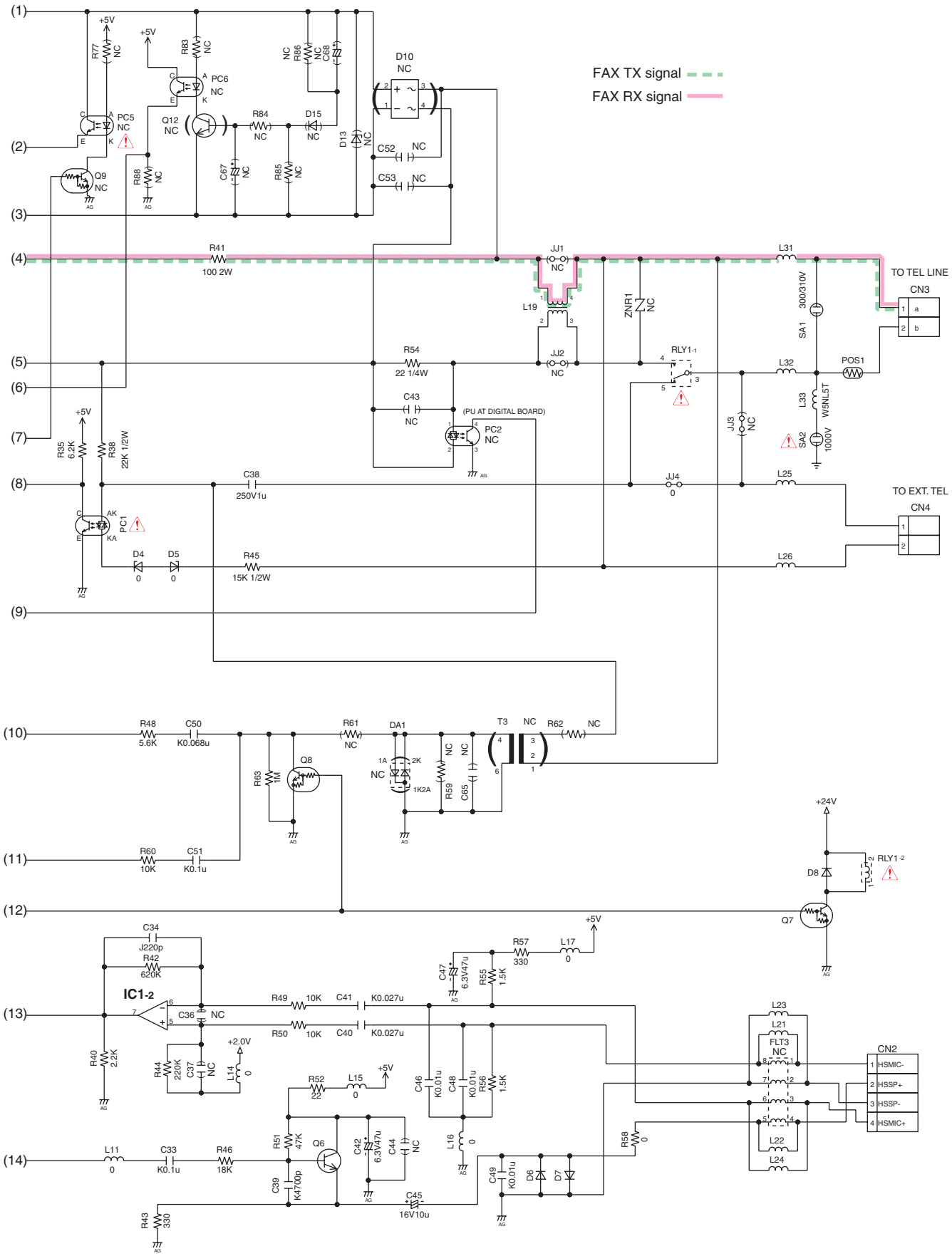




KX-FT931LA-B : DIGITAL BOARD SCHEMATIC DIAGRAM

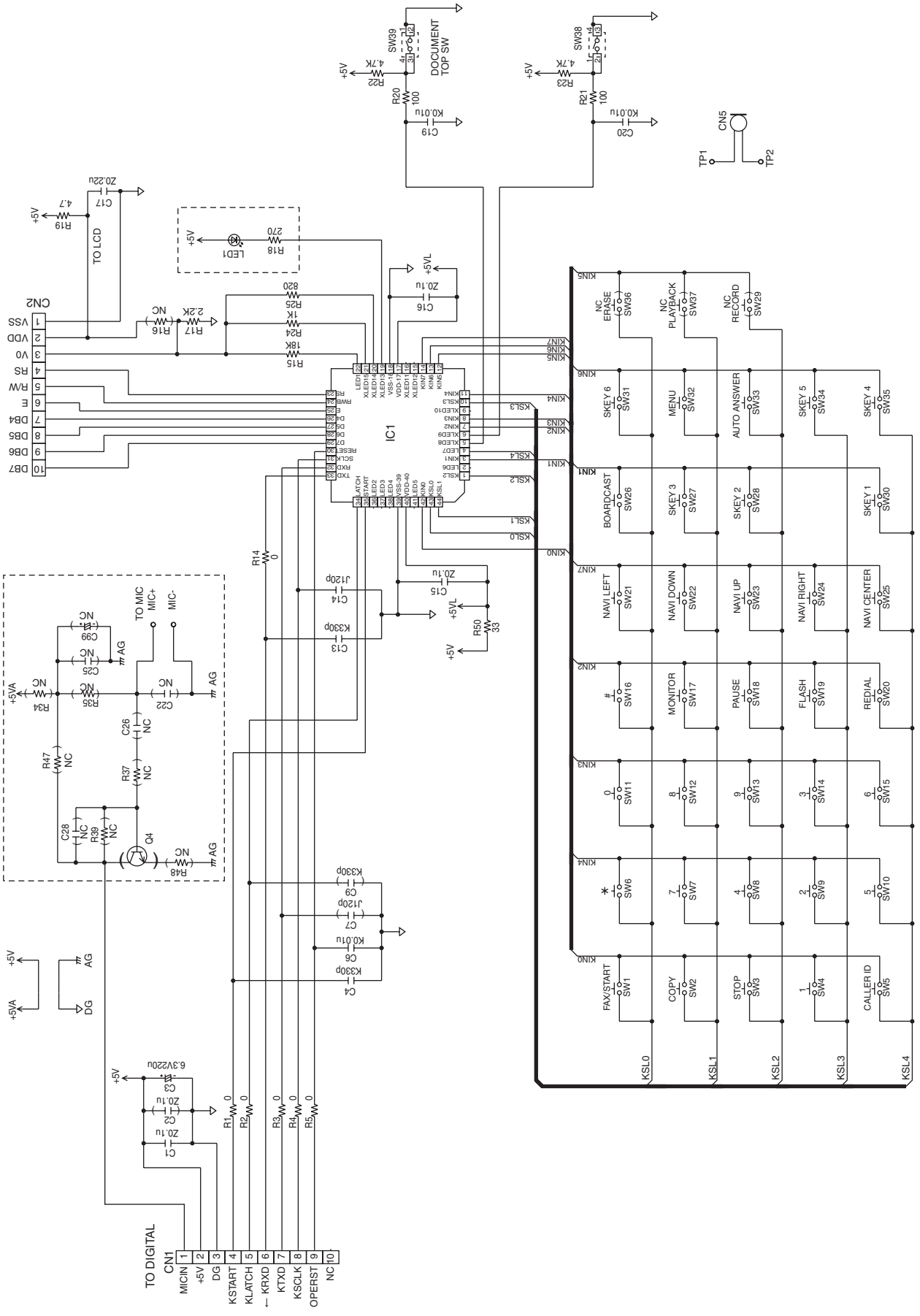
17.2. Analog Board



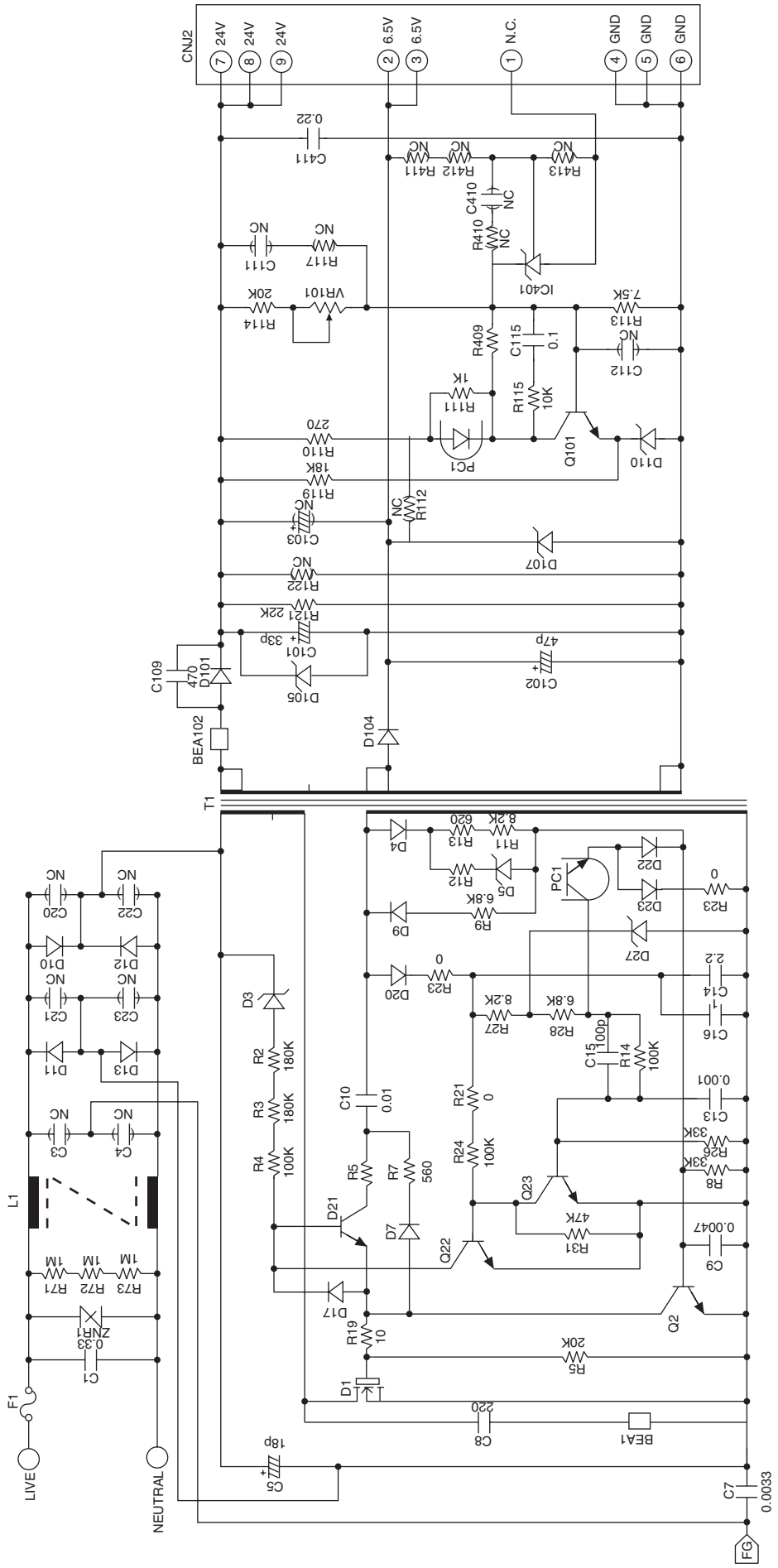


KX-FT931LA-B : ANALOG BOARD SCHEMATIC DIAGRAM

17.3. Operation Board



17.4. Power Supply Board



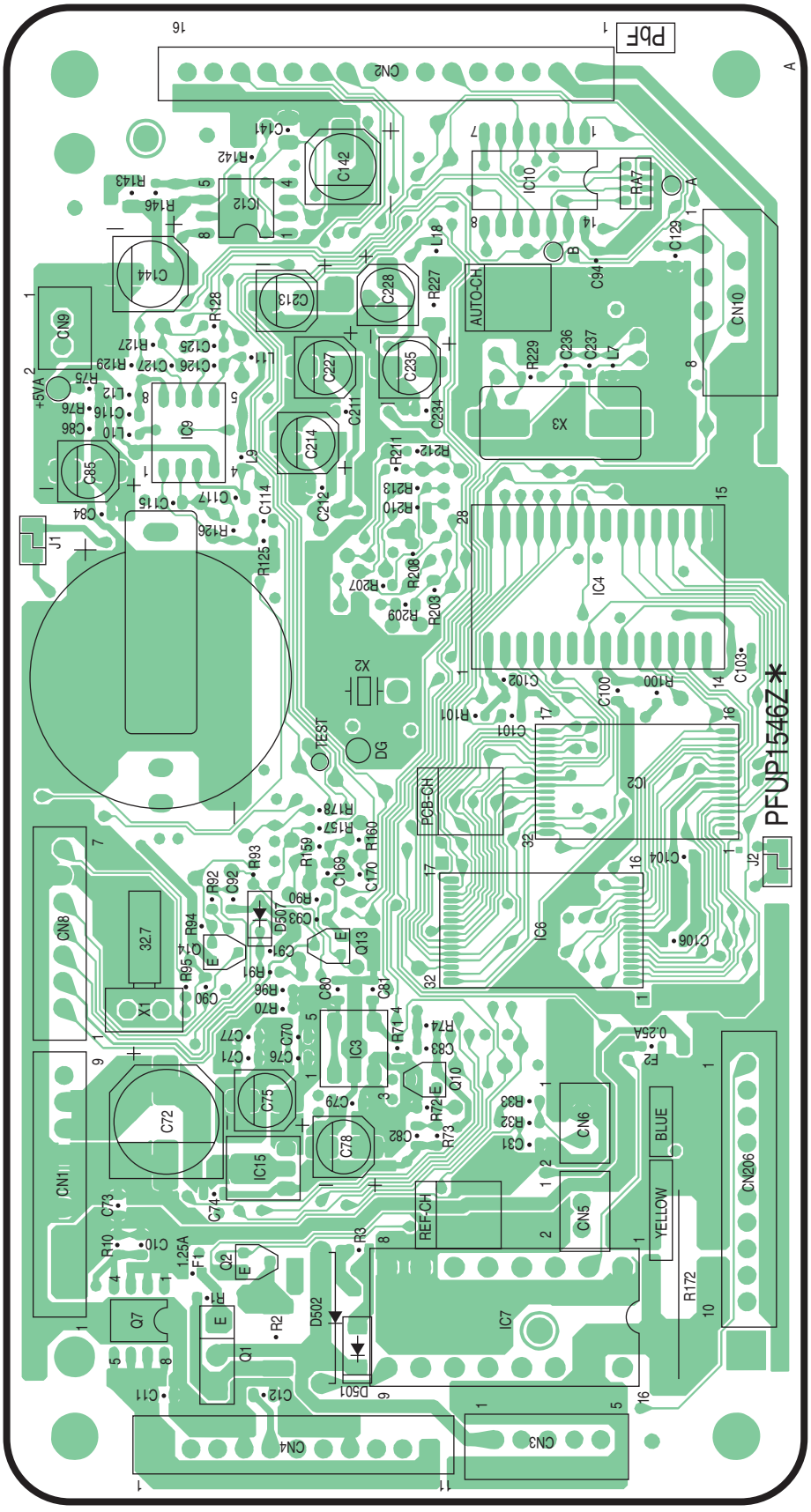
KX-FT931LA-B : POWER SUPPLY BOARD SCHEMATIC DIAGRAM

MEMO:

18 Printed Circuit Board

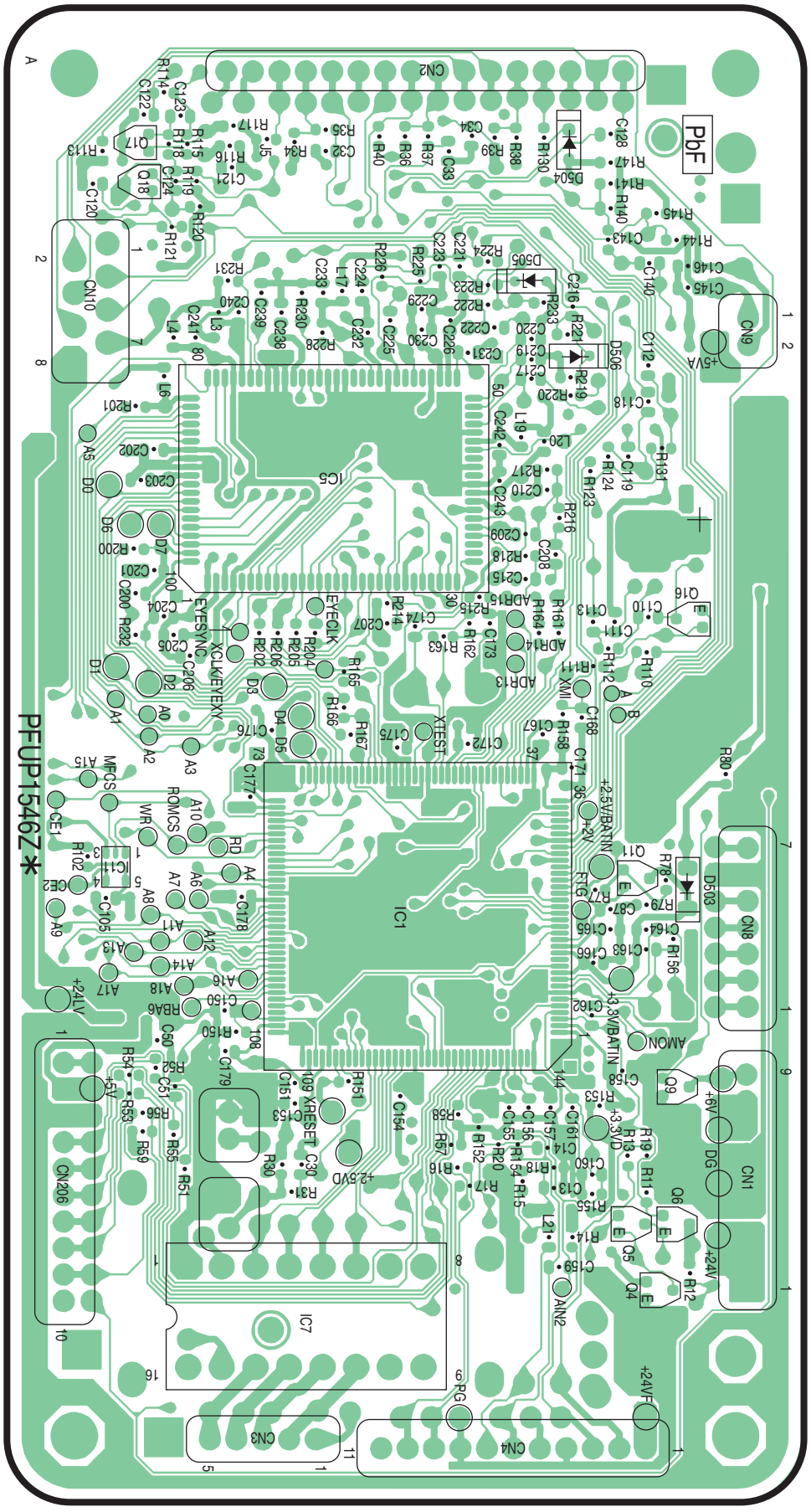
18.1. Digital Board

18.1.1. Component View



KX-FT931LA-B: Digital Board (Component View)

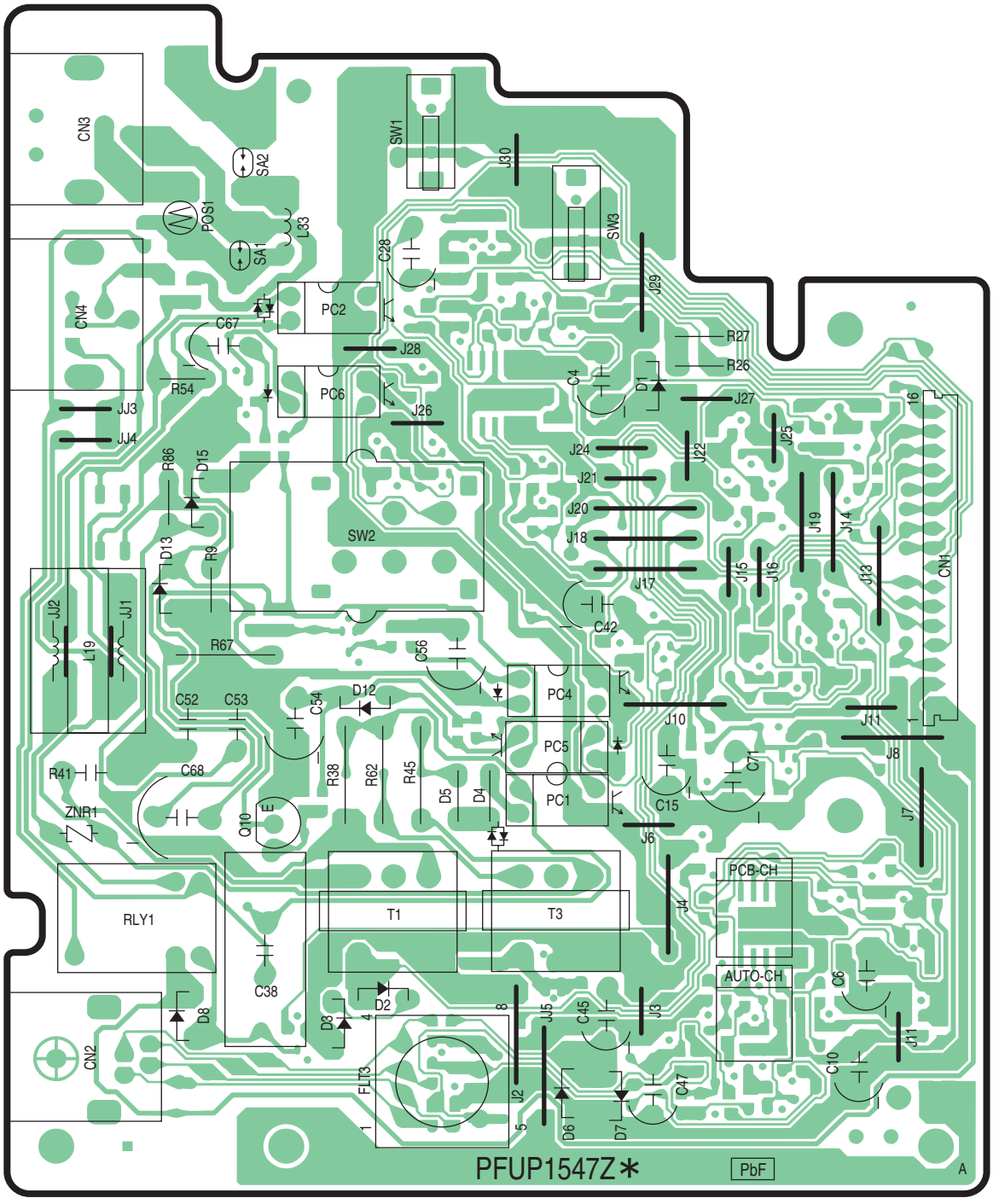
18.1.2. Bottom View



KX-FT931LA-B: Digital Board (Bottom View)

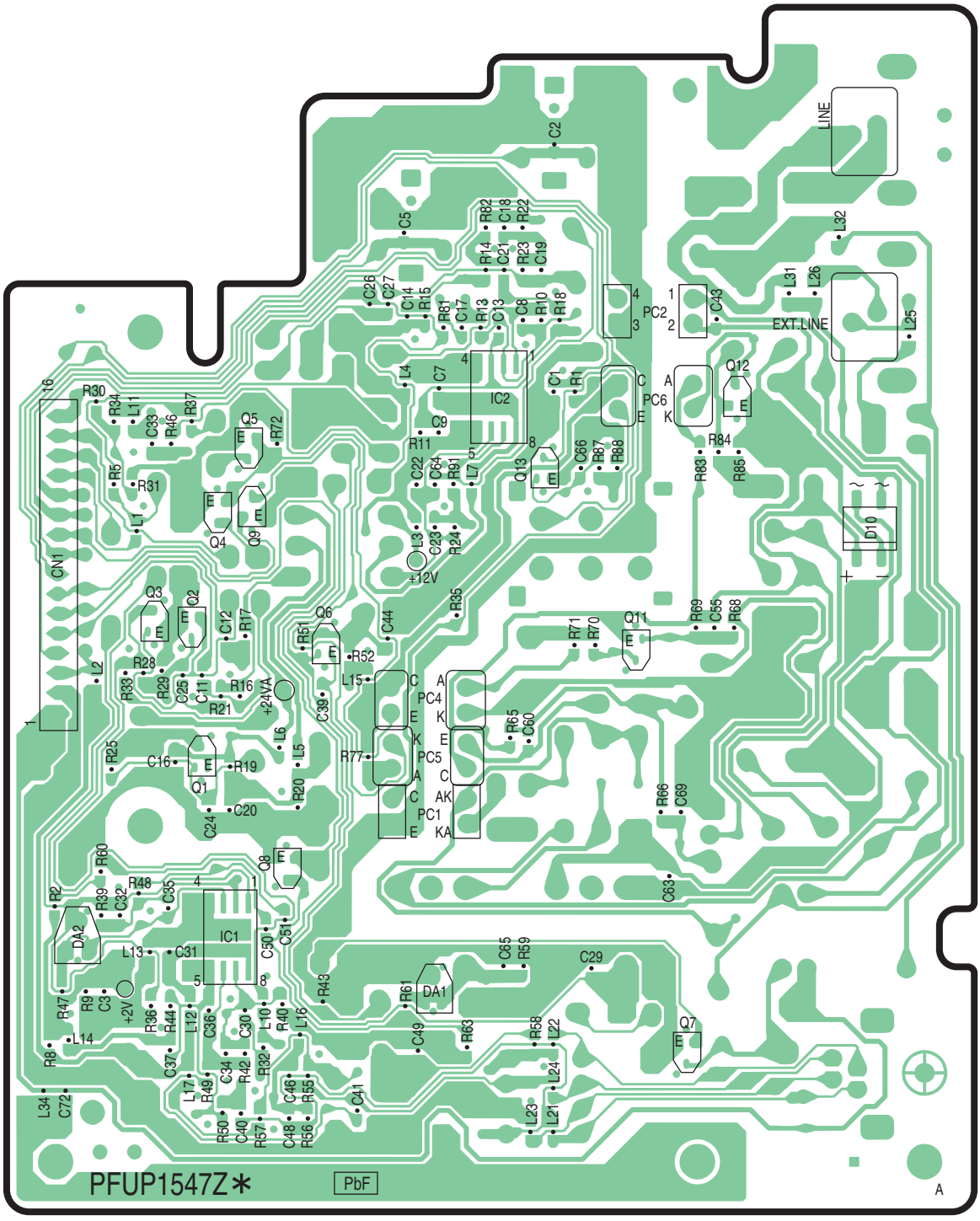
18.2. Analogue Board

18.2.1. Component View



KX-FT931LA-B: Analog Board (Component View)

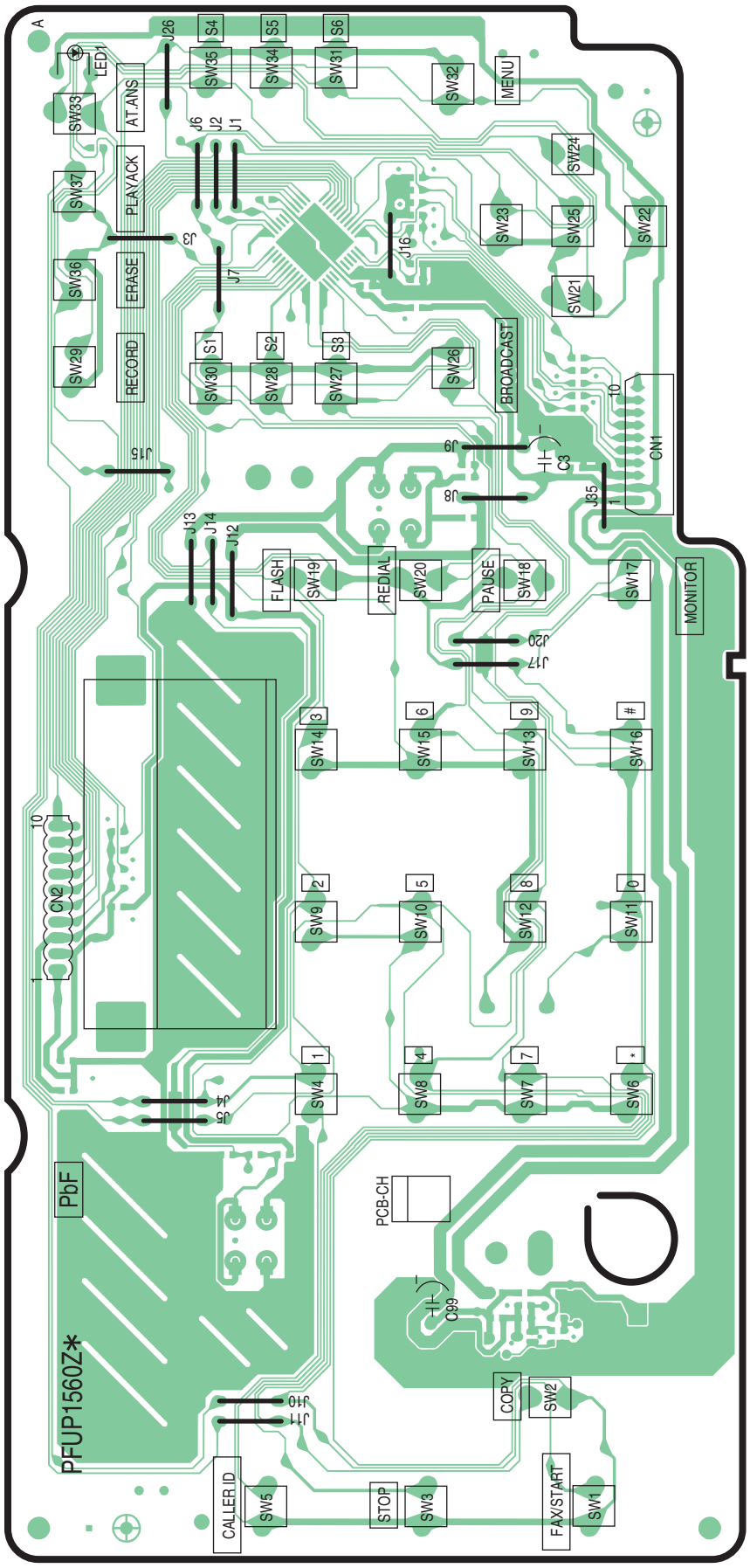
18.2.2. Bottom View



KX-FT931LA-B: Analog Board (Bottom View)

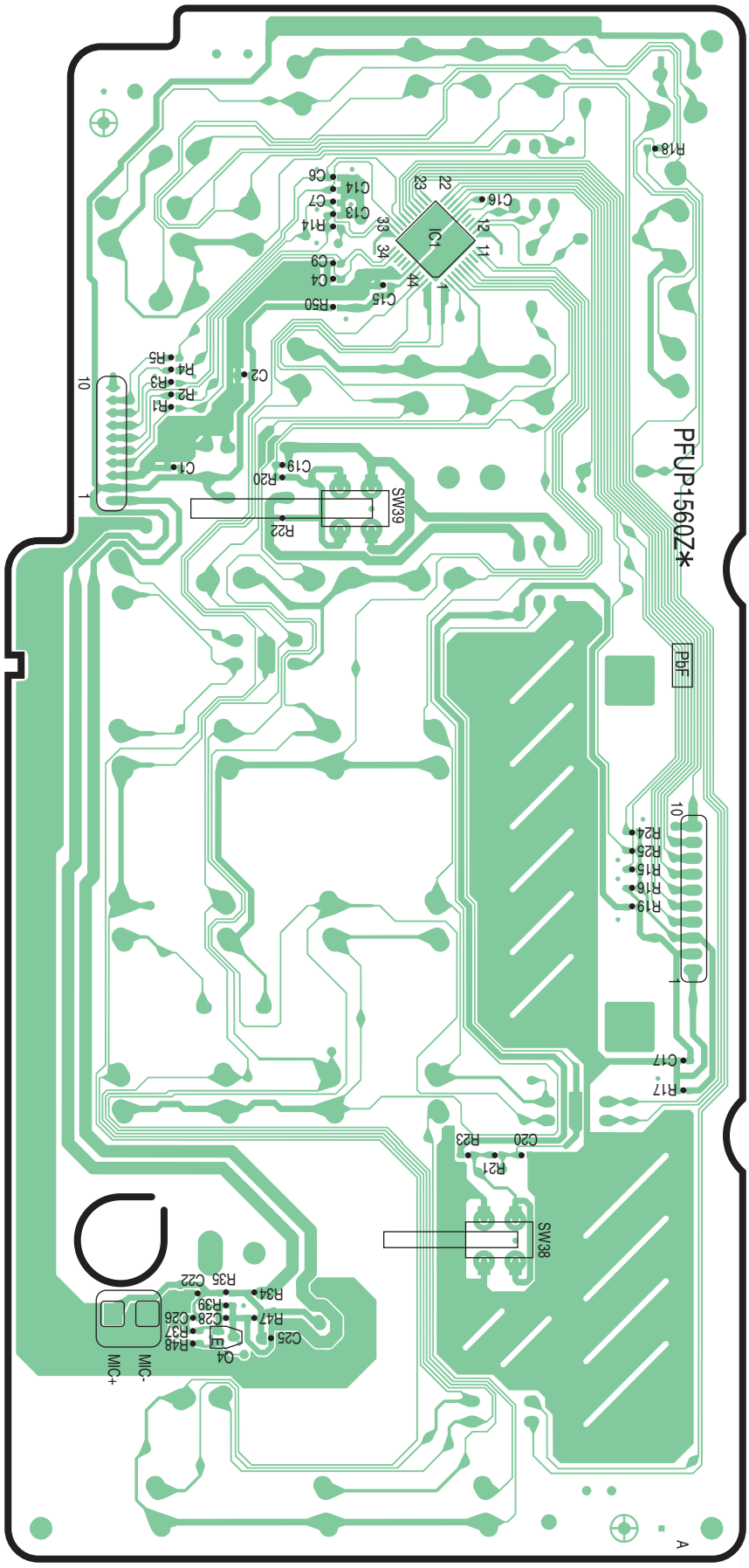
18.3. Operation Board

18.3.1. Component View

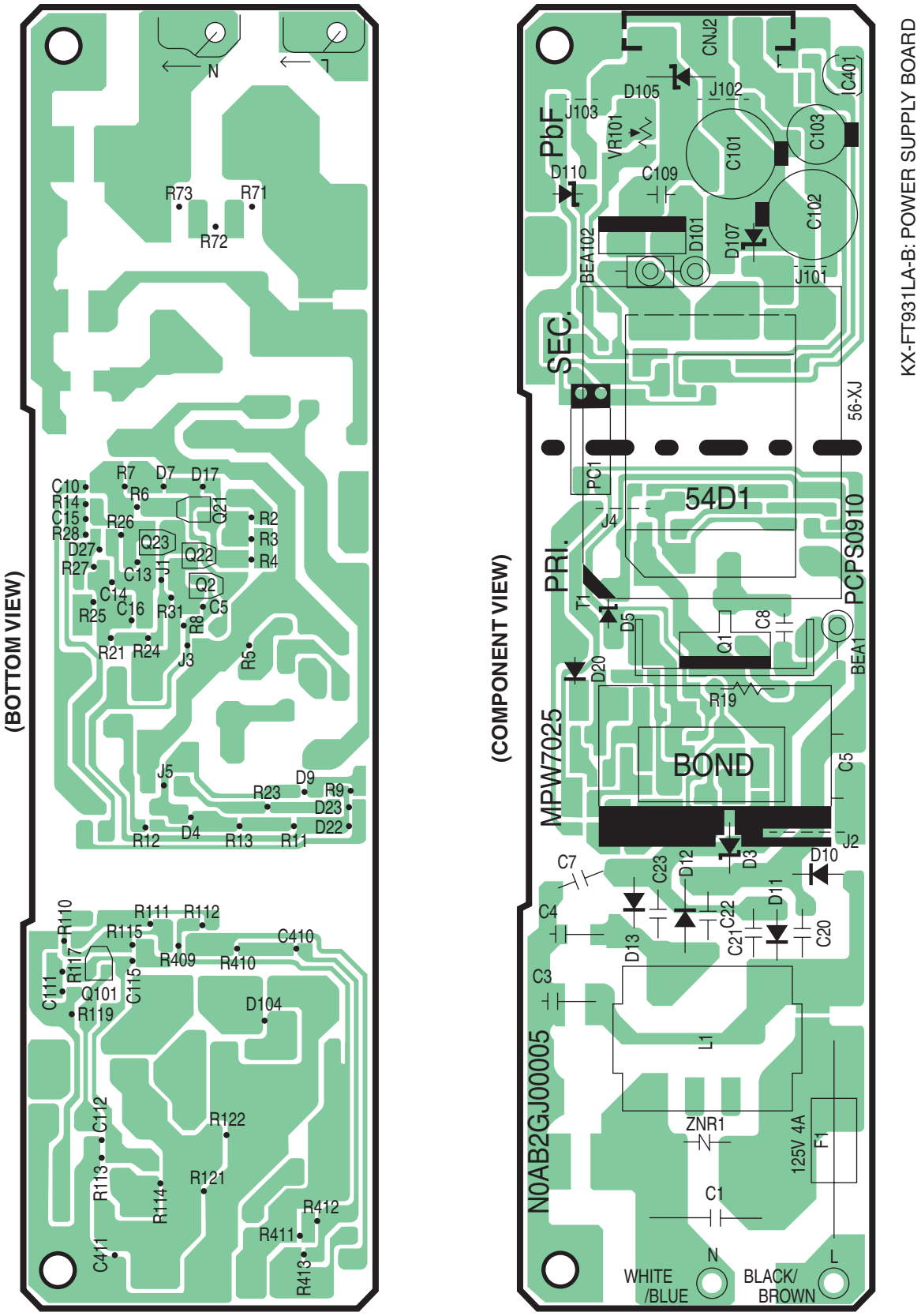


KX-FT931LA-B: Operation Board (Component View)

18.3.2. Bottom View



18.4. Power Supply Board

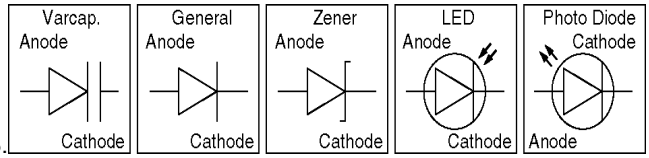


19 Appendix Information of Schematic Diagram

Note:

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

3.



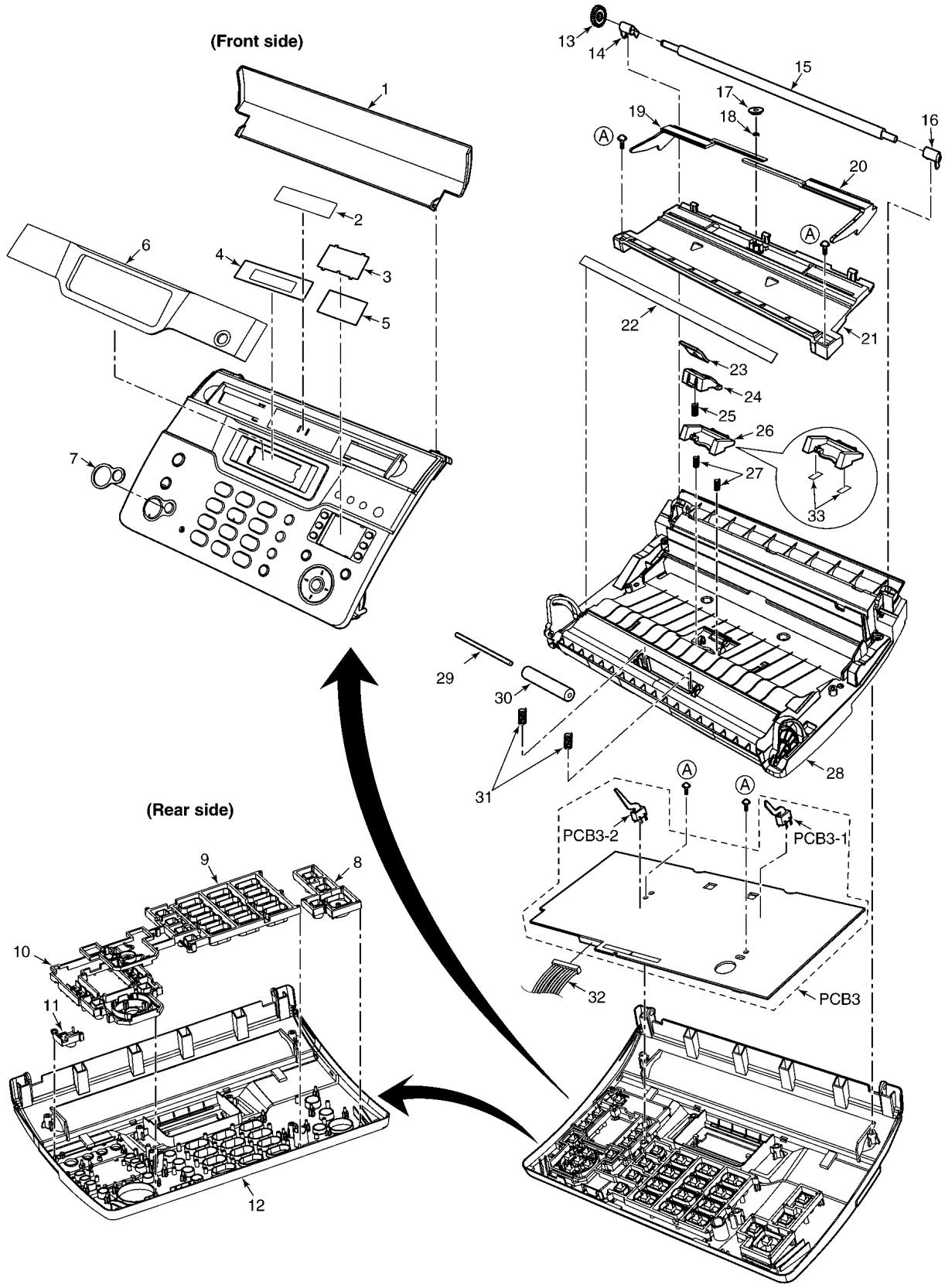
Important safety notice
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only the manufacturer's specified parts.

MEMO

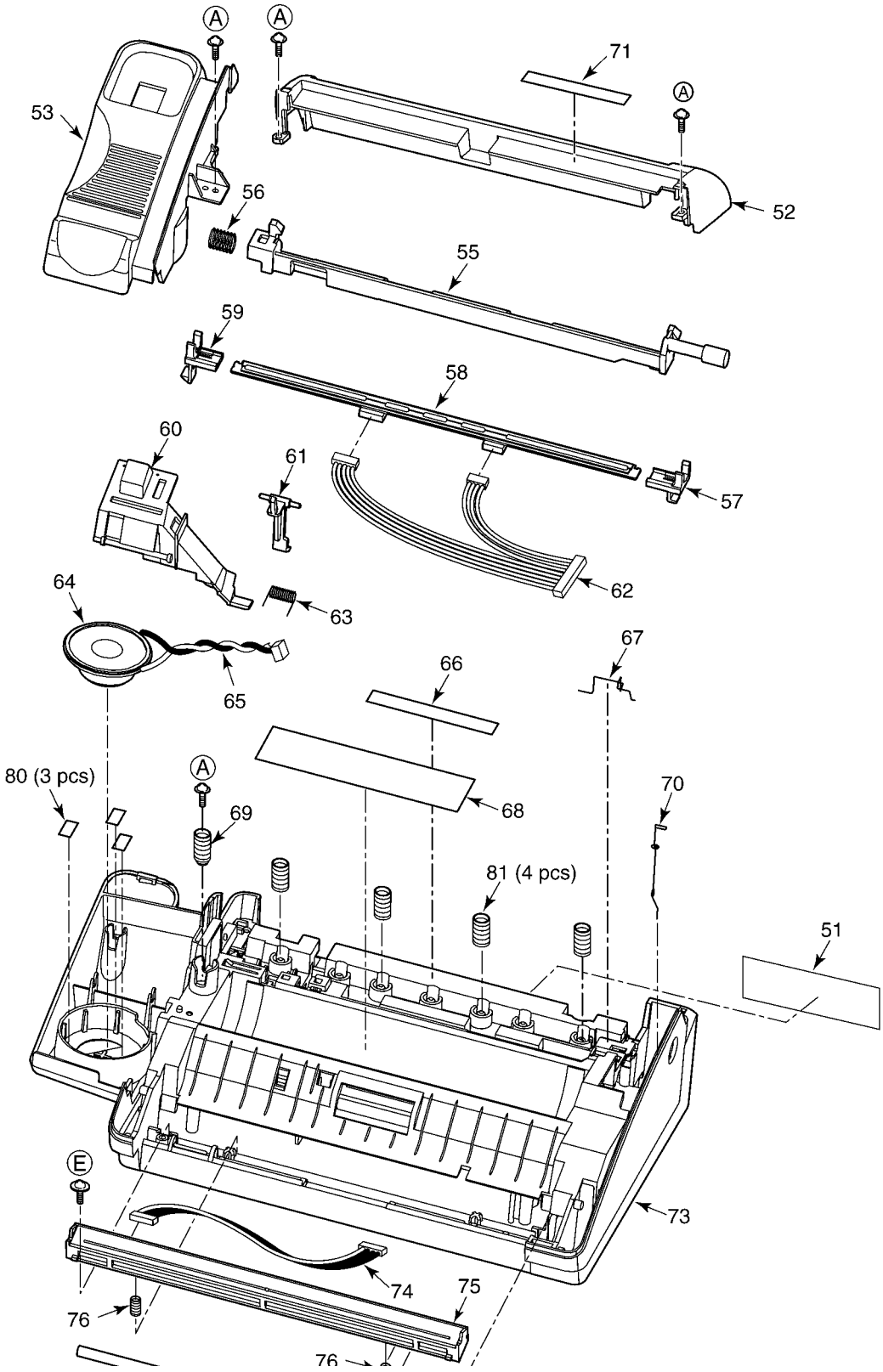
20 Exploded View and Replacement Parts List

20.1. Cabinet, Mechanical and Electrical Parts Location

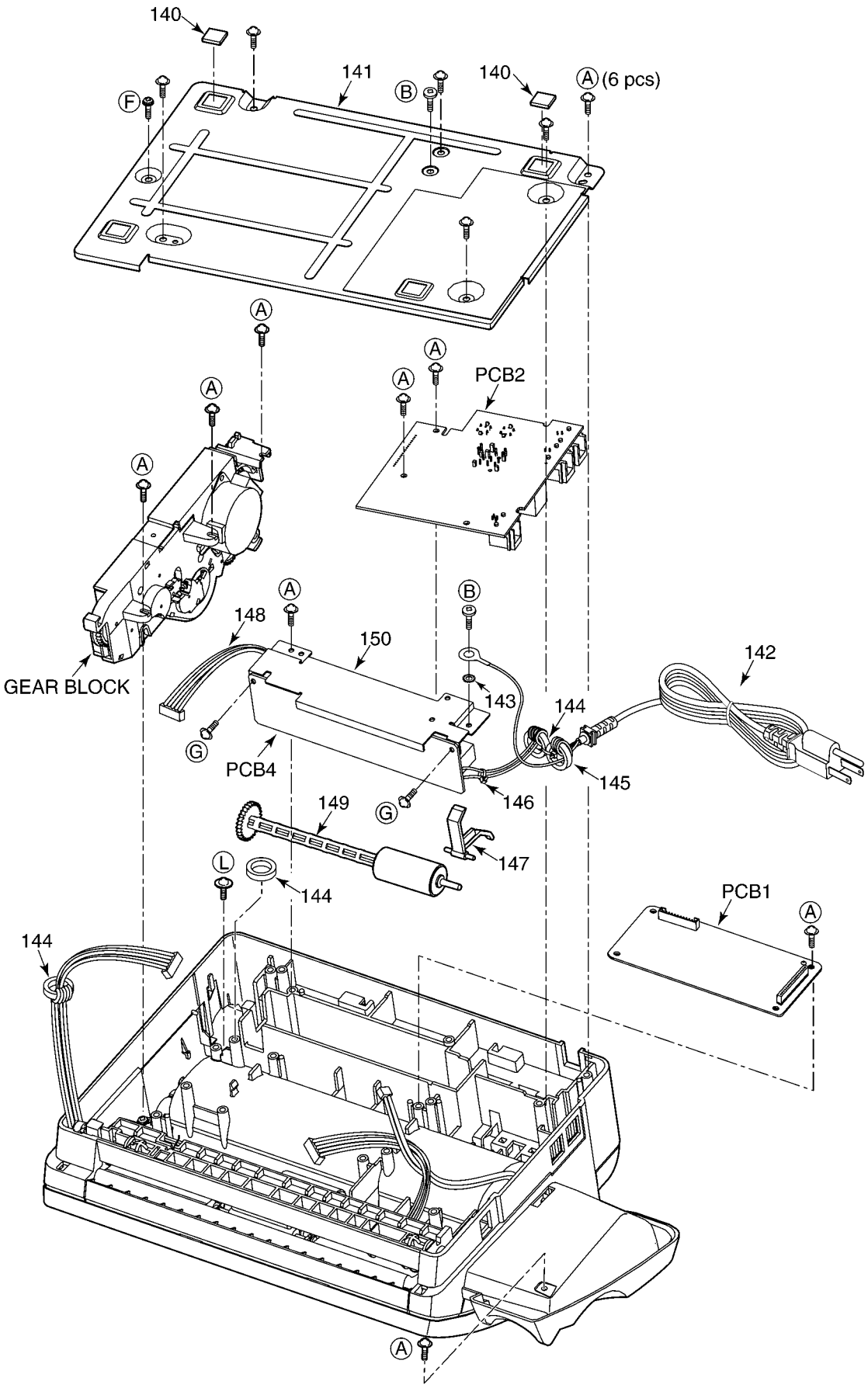
20.1.1. Operation Panel Section



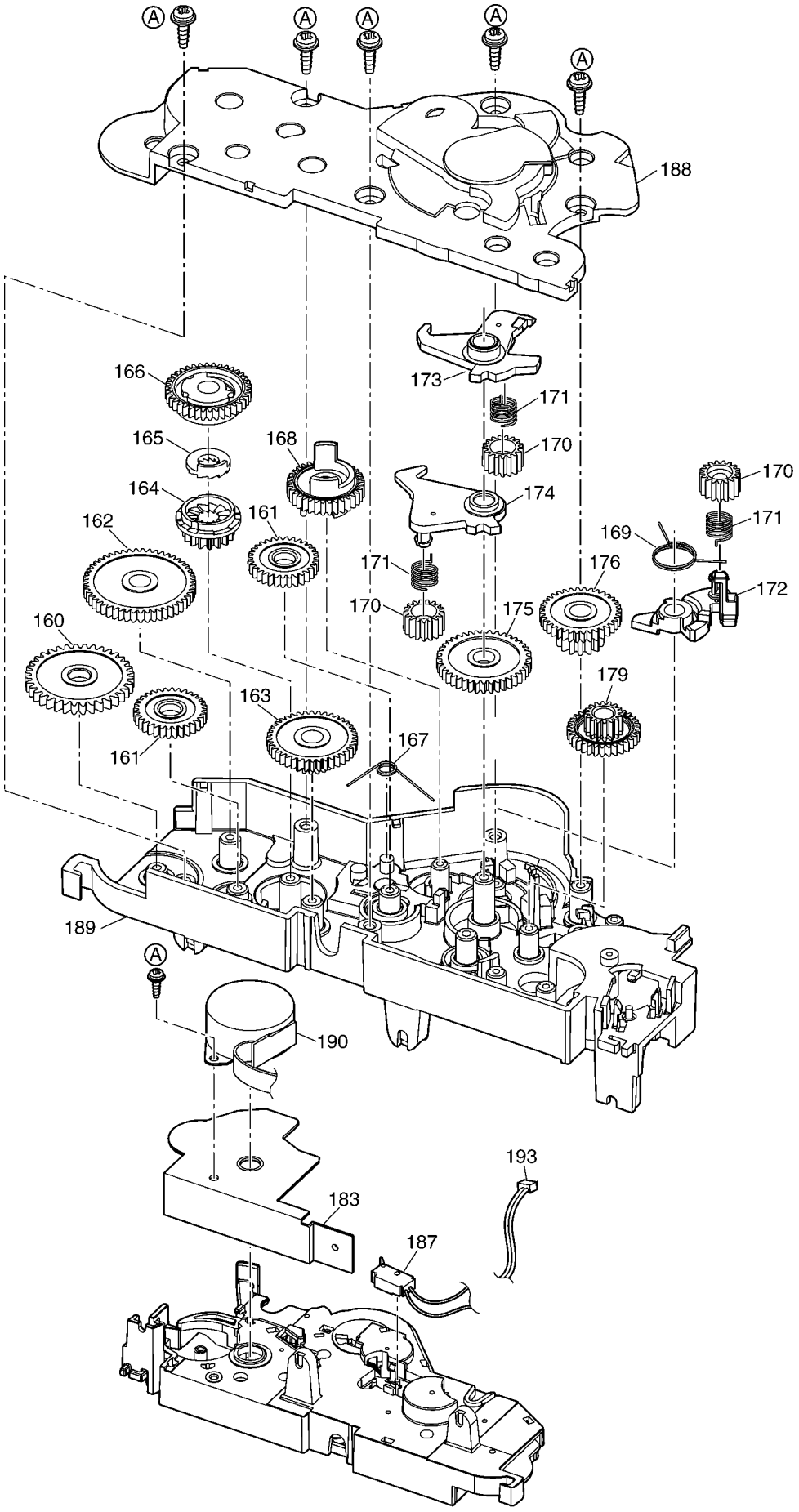
20.1.2. Upper Cabinet Section



20.1.3. Lower Cabinet Section



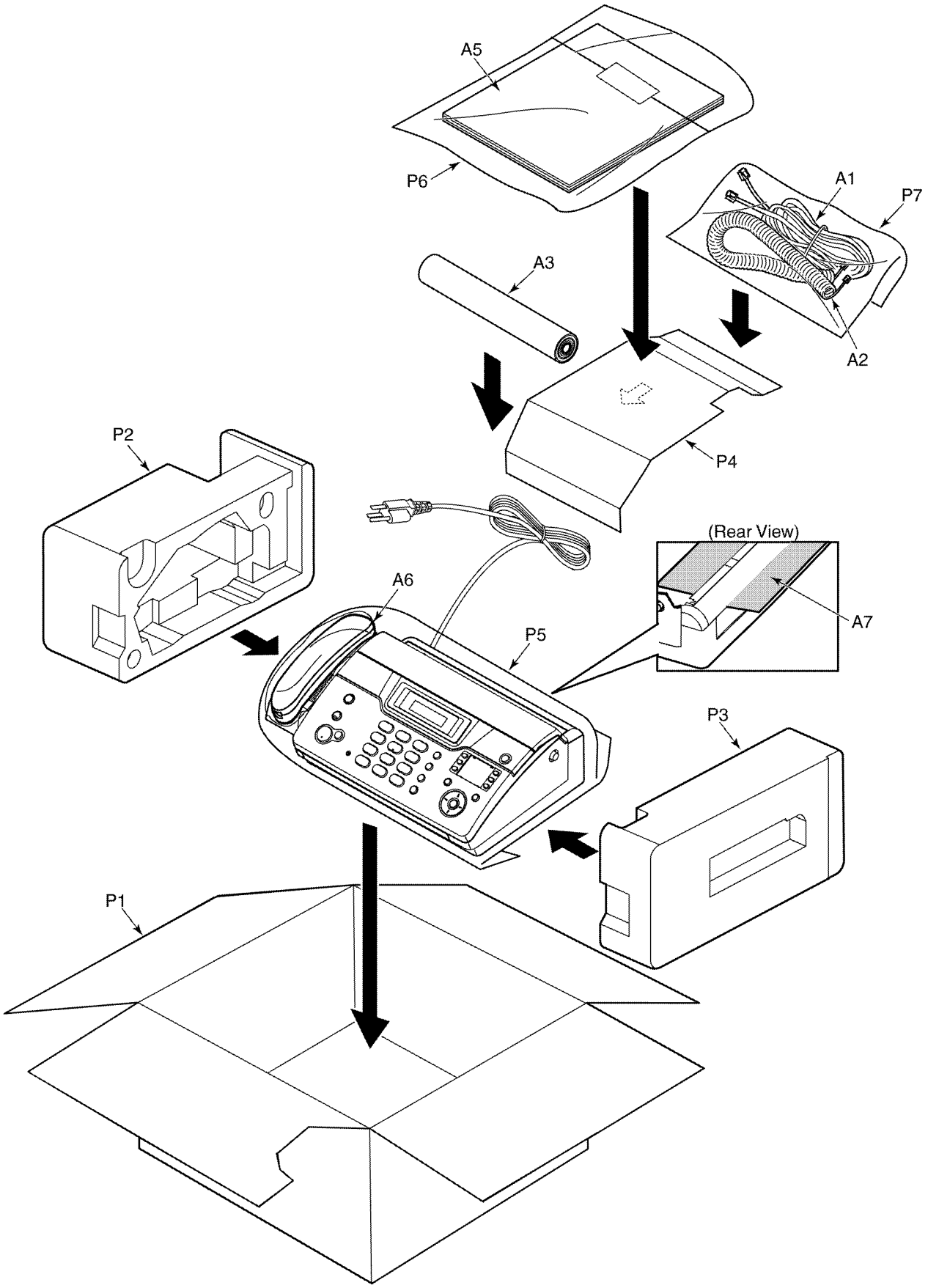
20.1.4. Gear Block Section



20.1.5. Screws

	Part No.	Figure
Ⓐ	XTW3+10PFJ7	 ϕ3 × 10 mm
Ⓑ	XSB4+6FJ	 ϕ4 × 6 mm
Ⓔ	XTW3+W8PFJ	 ϕ3 × 8 mm
Ⓕ	XTW3+6LFJK (Black)	 ϕ3 × 6 mm
Ⓖ	XTW3+6LFJ	 ϕ3 × 6 mm
Ⓙ	XTN2+14FJK	 ϕ2 × 14 mm
Ⓛ	XTW26+U8PFJ	 ϕ2.6 × 8 mm

20.1.6. Accessories and Packing Materials



20.2. Replacement Parts List

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item.
   After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing parts and product retention.
   After the end of this period, the assembly will no longer be available.
2. Important safety notice
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacture's specified parts.
3. The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.
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 ERD:Carbon PQ4R:Chip	ERX:Metal Film ERG:Metal Oxide ERO:Metal Film	PQRD:Carbon PQRQ:Fuse ERF:Wire Wound

Wattage

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

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

Voltage

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

20.3. Cabinet and Mechaical Parts

20.3.1. Operation Panel Section

Ref. No.	Part No.	Part Name & Description	Remarks
1	PFKS1139Z2	TRAY, DOCUMENT	
2	PFQT2393Y	LABEL, FACE DOWN	
3	PFGV1018Z	TRANSPARENT PLATE	
4	PFGP1303V	PANEL, LCD	
5	PFGD1067Z	TELEPHONE CARD	
6	PFGG1280N2	GRILLE, Sub	
7	PFHX1947Z1	SPACER, RING SHEET	
8	PFBX1238Z5	BUTTON, START KEY	
9	PFBX1237X3	BUTTON, DIAL KEY	
10	PFBX1239Y3	BUTTON, FUNCTION KEY	
11	PFBC1140Z1	BUTTON, ABSENT KEY	
12	PFGG1278T2	GRILLE, OPERATION PANEL	
13	PFDG1450Z	GEAR, PLATEN	
14	PFDJ1097Z	SPACER, PLATEN ROLLER (Right)	
15	PFDN1077Z	ROLLER, PLATEN ROLLER	
16	PFDJ1096Z	SPACER, PLATEN ROLLER (Left)	
17	PFDG1015Y	GEAR	
18	PFUS1222Z	SPRING	
19	PFKR1087Z1	GUIDE, RIGHT	
20	PFKR1086Z1	GUIDE, LEFT	
21	PFUV1088Z2	COVER, DOCUMENT GUIDE	
22	PFHX1834Z	READ SHEET (WHITE PLATE)	
23	PFHG1210Z	RUBBER, SEPARATION	
24	PFHR1504Y	COVER, SEPARATION HOLDER	
25	PFUS1588Z	SPRING, SEP. HOLDER	
26	PFHR1503Z	COVER, DOC. FEED SUPPORT	
27	PFUS1631Z	SPRING, DOC. SUPPORT	
28	PFUV1105Z2	COVER, OPERATION PANEL	
29	PFDF1017Z	SHAFT	
30	PFDR1045Z	ROLLER, DOCUMENT SUB	
31	PFUS1587Z	SPRING, DOCUMENT SUB ROLLER	
32	PFJS09M27Z	CONNECTOR, 9 PIN	
33	PFHX1973Z	SPACER, SHEET	

20.3.2. Upper Cabinet Section

Ref. No.	Part No.	Part Name & Description	Remarks
51	PFGT3129Z-M	NAME PLATE	
52	PFKV1135Z2	COVER	
53	PFKM1173Z2	CABINET, HANDSET CRADLE	
54	Not Used		
55	PFDE1254Y1	LEVER	S
56	PFUS1585Z	SPRING, LOCK LEVER	
57	PFDE1261Z	SPACER, HOLDER (RIGHT)	
58	L1CC00000061	PRINTER UNITS	
59	PFDE1260Z	SPACER, HOLDER (LEFT)	
60	PFBH1031Z2	BUTTON, HOOK	
61	PFDE1248Y	LEVER, PAPER SENSOR	
62	PFJS11N16Y	CONNECTOR, 11 PIN	
63	PFUS1589Z	SPRING, HOOK LVER	
64	PFAS50P003Z	SPEAKER	S
65	PFJS02N77Z	CONNECTOR, 2 PIN	S
66	PFQT2425Z	LABEL, ARROW	
67	PFUS1583Y	SPRING, EARTH HEAD	
68	PFQT2528Z	LABEL, PAPER CAUTION	
69	PFUS1254Z	SPRING, POP UP	
70	PFUS1581Z	SPRING, EARTH LOCK LEVER	
71	PFQT2751Z	LABEL, PAPER SET	
72	Not Used		
73	PFKM1189Z2	CABINET, MAIN	
74	PFJS07N09Y	CONNECTOR, 7 PIN	
75	N2GZBE000013	IMAGE SENSOR (CIS)	
76	PFUS1702Z	SPRING, POP UP	
77	PFDG1449Z	GEAR, FEED ROLLER	
78	PFDN1078Z	ROLLER, FEED	
79	PFUS1584X	SPRING, EARTH	
80	PFHX1350Z	SPACER, SHEET	
81	PFUS1318Z	SPRING, THERMAL HEAD	

20.3.3. Lower Cabinet Section

Ref. No.	Part No.	Part Name & Description	Remarks
140	PFHA1001Z	RUBBER, LEGS	
141	PFMD1088Z	BOTTOM FRAME	
142	PFJA03A012Z	POWER CORD	⚠
143	XWC4BFJ	WASHER	
144	PQLB1E1	INSULATOR, FERRITE CORE	
145	J0KE00000101	FILTER	
146	PQHR945Z	BAND	
147	PFDE1253Y	LEVER, JAM SENSOR	
148	PFJS09P92X	CONNECTOR, 9 PIN	
149	PFDR1072Y	ROLLER, SEPARATION	
150	PFMH1173Z	COVER, POWER SUPPLY BOARD	
151	Not Used		

20.3.4. Gear Block Section

Ref. No.	Part No.	Part Name & Description	Remarks
160	PFDG1447Z	GEAR,TX4	
161	PFDG1444Z	GEAR,TX1	
162	PFDG1446Z	GEAR,TX3	
163	PFDG1445Z	GEAR,TX2	
164	PFDG1442Z	GEAR,DOC2	
165	PFDE1259Z	ARM	
166	PFDG1441Y	GEAR,DOC1	
167	PFUS1579Z	SPRING	
168	PFDG1448Z	GEAR,CAM	
169	PFUS1591Z	SPRING	
170	PFDG1438Z	GEAR, D	
171	PFUS1231Y	SPRINT, GEAR 1	
172	PFHR1500Z	ARM4	
173	PFHR1497Y	ARM1 (Black)	
174	PFHR1498Z	ARM2	
175	PFDG1436Z	GEAR, B	
176	PFDG1443Z	GEAR, RX	
177	Not Used		
178	Not Used		
179	PFDG1435Z	GEAR, A	
180	Not Used		
181	Not Used		
182	Not Used		
183	PFMH1171Z	COVER	
184	Not Used		
185	Not Used		
186	Not Used		
187	PQST2A04Z	SENSOR, MOTOR	
188	PFHR1488Y	COVER, GEAR BASE (Black)	
189	PFUA1066Y	GEAR BASE	
190	L6HAGCLK0008	MOTOR	
191	Not Used		
192	Not Used		
193	PFJS03Q43Y	CONNECTOR for CAM SENSOR	
194	Not Used		
195	Not Used		

20.3.5. Accessories and packing materials

Ref. No.	Part No.	Part Name & Description	Remarks
A1	PFJA02B002Y	CORD, TELEPHONE	
A2	PQJA212V	CORD, HANDSET	
A3	PFHP1123Z	SHEET PAPER, RECORDING PAPER (10M)	
A4	Not Used		
A5	PFQX2468Y	INSTRUCTION BOOK	
A6	PFJXH0901Z	HANDSET ASS'Y	
A7	PFHP1147Z	SHEET PAPER	
P1	PFZE1534Z-M	GIFT BOX	
P2	PFPN1405Z	CUSHION	
P3	PFPN1406Z	CUSHION	
P4	PFPD1277Z	CUSHION	
P5	PFPH1085Z	PACKING SHEET	
P6	PQPP10005Z	PROTECTION COVER	
P7	XZB20X35A04	PROTECTION COVER	

20.4. Digital Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB1	PFWP1FT931LA	DIGITAL BOARD ASS'Y (RTL)	
		(ICs)	
IC1	C1ZBZ0001896	IC	
IC2	PFWIFT931LA	IC	
IC3	C0CBCBD00047	IC	
IC4	C3ABKC000034	IC	
IC5	C1CB00001959	IC	
IC7	B1HAGFF00015	IC	
IC9	C0ABEB000052	IC	
IC10	C0JBAS000252	IC	
IC11	C0JBAA000474	IC	
IC12	C1BB00000129	IC	⚠
IC15	C0CBADD00009	IC	
		(TRANSISTORS)	
Q1	2SB1322	TRANSISTOR(SI)	S
Q2	PQVTDTC143E	TRANSISTOR(SI)	S
Q4	PQVTDTC143E	TRANSISTOR(SI)	S
Q5	PQVTDTC143E	TRANSISTOR(SI)	S
Q6	PQVTDTC143E	TRANSISTOR(SI)	S
Q7	B1DHDD000026	TRANSISTOR(SI)	
Q9	PQVTDTC143E	TRANSISTOR(SI)	S
Q10	B1ABDF000025	TRANSISTOR(SI)	
Q11	B1ABDF000025	TRANSISTOR(SI)	
Q13	B1ABDF000025	TRANSISTOR(SI)	
Q14	2SB1218ARL	TRANSISTOR(SI)	
Q16	B1ABDF000025	TRANSISTOR(SI)	
		(BATTERY)	
BAT1	BR2032/1HF1	BATTERY	⚠ S
		(DIODES)	
D501	PFVDRMRLS245	DIODE(SI)	S
D502	MAZ720000F	DIODE(SI)	
D503	PFVDRMRLS245	DIODE(SI)	S
D504	MA729	DIODE(SI)	S
		(CAPACITORS)	
C10	ECJ1VB1C104K	0.1	
C12	ECJ1VF1C104Z	0.1	
C13	ECJ1VC1H101J	100P	
C14	ECJ1VC1H101J	100P	
C30	ECJ1VC1H101J	100P	
C31	ECJ1VC1H101J	100P	
C32	ECJ1VC1H101J	100P	
C33	ECJ1VC1H101J	100P	
C34	ECJ1VB1C103K	0.01	
C50	ECJ1VF1C104Z	0.1	
C51	ECJ1VC1H101J	100P	
C71	ECJ1VF1A105Z	1	
C72	F2G1C2210008	220	
C73	ECJ1VF1H104Z	0.1	
C74	ECJ1VF1A105Z	1	
C75	F2G0J4700032	47	
C76	ECJ1VF1A105Z	1	
C78	F2G0J4700032	47	
C79	ECJ1VF1H104Z	0.1	
C80	ECJ1VF1H104Z	0.1	
C81	ECJ1VC1H101J	100P	
C82	ECJ1VF1C104Z	0.1	
C83	ECJ1VF1C104Z	0.1	
C85	F2G0J4700032	47	
C87	ECJ1VF1C104Z	0.1	
C90	ECJ1VF1C104Z	0.1	
C92	ECJ1VC1H101J	100P	
C94	ECJ1VF1E104Z	0.1	
C102	ECJ1VF1C104Z	0.1	
C103	ECJ1VF1C104Z	0.1	
C104	ECJ1VF1C104Z	0.1	
C105	ECJ1VF1C104Z	0.1	
C110	ECJ1VB1C104K	0.1	
C111	ECJ1VB1H331K	330P	
C112	ECJ1VB1C333K	0.033	
C113	ECJ1VB1C103K	0.01	
C114	ECJ1VB1C104K	0.1	
C115	ECJ1VB1H681K	680P	
C116	ECJ1VF1C104Z	0.1	
C118	ECJ1VB1C104K	0.1	

Ref. No.	Part No.	Part Name & Description	Remarks
C125	ECJ1VB1C104K	0.1	
C127	ECJ1VC1H101J	100P	
C128	ECJ1VB1C104K	0.1	
C129	ECJ1VF1E104Z	0.1	
C140	ECJ1VB1C104K	0.1	
C142	F2G1H4R70017	0.1	S
C143	ECJ1VB1H102K	0.001	
C150	ECJ1VC1H101J	100P	
C151	ECJ1VF1C104Z	0.1	
C153	ECJ1VF1C104Z	0.1	
C154	ECJ1VF1C104Z	0.1	
C155	ECJ1VF1C104Z	0.1	
C156	ECJ1VF1C104Z	0.1	
C157	ECJ1VF1C104Z	0.1	
C158	F1J1A4750003	4.7M	
C159	ECJ1VB1H102K	0.001	
C160	ECJ1VB1H222K	0.0022	
C161	ECJ1VB1C104K	0.1	
C162	ECJ1VB1C104K	0.1	
C163	ECJ1VC1H150J	15P	
C164	ECJ1VC1H150J	15P	
C165	ECJ1VF1C104Z	0.1	
C167	ECJ1VF1C104Z	0.1	
C168	ECJ1VB1H102K	0.001	
C169	ECJ1VB1H102K	0.001	
C171	ECJ1VF1C104Z	0.1	
C172	ECJ1VF1C104Z	0.1	
C173	ECJ1VC1H100D	10P	
C174	ECJ1VC1H100D	10P	
C175	ECJ1VF1C104Z	0.1	
C176	ECJ1VF1C104Z	0.1	
C177	ECJ1VF1C104Z	0.1	
C178	ECJ1VF1C104Z	0.1	
C179	ECJ1VF1C104Z	0.1	
C201	ECJ1VB1H472K	0.0047	
C202	ECJ1VF1C104Z	0.1	
C203	ECJ1VF1A105Z	1	
C204	ECJ1VC1H330J	33P	
C205	ECJ1VF1A105Z	1	
C206	ECJ1VF1C104Z	0.1	
C207	ECJ1VB1H102K	0.001	
C216	ECUV1C224KBV	0.22	
C217	ECJ1VB1C104K	0.1	
C219	ECJ1VB1C104K	0.1	
C221	ECUV1C224KBV	0.22	
C222	ECJ1VB1C104K	0.1	
C225	ECJ1VB1C683K	0.068	
C226	ECJ1VF1C104Z	0.1	
C229	ECJ1VF1C104Z	0.1	
C232	ECJ1VC1H101J	100P	
C233	ECJ1VF1C104Z	0.1	
C234	ECJ1VF1C104Z	0.1	
C235	F2G1C1000014	10	
C236	ECJ1VC1H120J	12P	
C237	ECJ1VC1H120J	12P	
C238	ECJ1VF1A105Z	1	
C239	ECJ1VF1C104Z	0.1	
C240	ECJ1VF1C104Z	0.1	
C241	ECJ1VF1C104Z	0.1	
		(CONNECTORS)	
CN1	K1KA09A00204	CONNECTOR	
CN2	K1KA16A00206	CONNECTOR	
CN3	K1KA05AA0193	CONNECTOR	
CN4	K1KA11A00158	CONNECTOR	
CN5	K1KA02A00746	CONNECTOR	
CN8	K1KA07A00257	CONNECTOR	
CN9	K1KA02A00587	CONNECTOR	
CN10	K1MN08A00017	CONNECTOR	
CN206	K1KA10A00412	CONNECTOR	
		(FUSES)	
F1	K5H122200005	FUSE	

Ref. No.	Part No.	Part Name & Description	Remarks
F2	K5H251200003	FUSE	
		(COILS)	
L3	PQLQR2KA113	COIL	S
L4	PQLQR2KA113	COIL	S
L6	PQLQR2KA20T	COIL	S
L7	J0JCC0000042	COIL	
L17	PQLQR2KA20T	COIL	S
L18	PQLQR2KA20T	COIL	S
L21	PQLQR2KA113	COIL	S
R203	PQLQR2KA20T	COIL	S
R204	PQLQR2KA20T	COIL	S
R208	PQLQR2KA20T	COIL	S
R209	PQLQR2KA20T	COIL	S
		(RESISTORS)	
J5	ERJ3GEY0R00	0	
L9	ERJ3GEY0R00	0	
L10	ERJ3GEY0R00	0	
L11	ERJ3GEY0R00	0	
L12	ERJ3GEY0R00	0	
R1	ERJ3GEYJ821	820	
R2	D0GN152JA016	1.5K	
R3	ERJ3GEYJ221	220	
R10	ERJ3GEYJ562	5.6K	
R11	ERJ3GEYJ222	2.2K	
R12	ERJ3GEYJ472	4.7K	
R13	ERJ3GEYJ101	100	
R14	ERJ3GEYJ101	100	
R15	ERJ3GEYJ101	100	
R16	ERJ3GEYJ101	100	
R17	ERJ3GEYJ101	100	
R30	ERJ3GEYJ472	4.7K	
R31	ERJ3GEYJ102	1K	
R32	ERJ3GEYJ102	1K	
R33	ERJ3GEYJ472	4.7K	
R34	ERJ3GEYJ472	4.7K	
R35	ERJ3GEYJ102	1K	
R36	ERJ3GEYJ472	4.7K	
R37	ERJ3GEYJ102	1K	
R38	ERJ3GEYJ472	4.7K	
R39	ERJ3GEYJ102	1K	
R40	ERJ3GEYJ222	2.2K	
R51	ERJ3GEYJ271	270	
R52	ERJ3GEYJ271	270	
R53	ERJ3GEYJ101	100	
R54	ERJ3GEYJ101	100	
R55	ERJ3GEYJ101	100	
R56	ERJ3GEYJ101	100	
R57	ERJ3GEYJ473	47K	
R59	ERJ3GEYJ472	4.7K	
R70	ERJ3GEY0R00	0	
R71	ERJ3GEYJ333	33K	
R72	ERJ3EKF1101	1.1k	
R73	ERJ3EKF3602	36k	
R74	ERJ3GEYJ104	100K	
R75	ERJ3GEYJ123	12K	
R76	ERJ3GEYJ822	8.2K	
R78	ERJ3GEYJ334	330K	
R79	ERJ3GEYJ475	4.7M	
R80	ERJ3GEYJ222	2.2K	
R90	ERJ3GEYJ332	3.3K	
R91	ERJ3GEYJ221	220	
R92	ERJ3GEYJ221	220	
R93	ERJ3GEYJ222	2.2K	
R94	ERJ3GEYJ223	22K	
R95	ERJ3GEYJ152	1.5K	
R96	ERJ3GEYJ100	10	
R100	ERJ3GEYJ103	10K	
R101	ERJ3GEYJ103	10K	
R102	ERJ3GEYJ103	10K	
R110	ERJ3GEYJ222	2.2K	
R111	ERJ3GEYJ473	47K	

Ref. No.	Part No.	Part Name & Description	Remarks
R112	ERJ3GEYJ334	330K	
R123	ERJ3GEYJ104	100K	
R124	ERJ3GEYJ473	47K	
R125	ERJ3GEYJ222	2.2K	
R126	ERJ3GEYJ393	39K	
R127	ERJ3GEYJ334	330K	
R128	ERJ3GEYJ363	36K	
R129	ERJ3GEYJ222	2.2K	
R130	ERJ3GEYJ243	24K	
R131	ERJ3GEYJ332	3.3K	
R140	ERJ3GEYJ153	15K	
R141	ERJ3GEYJ912	9.1K	
R142	ERJ3GEYJ103	10K	
R143	ERJ6GEY0R00	0	
R144	ERJ3GEYJ124	120K	
R145	ERJ3GEYJ124	120K	
R150	ERJ3GEYJ222	2.2K	
R151	ERJ3GEYJ472	4.7K	
R152	ERJ3GEYJ223	22K	
R153	ERJ3GEYJ100	10	
R154	ERJ3GEYJ473	47K	
R155	ERJ3GEYJ223	22K	
R157	ERJ3GEYJ101	100	
R158	ERJ3GEYJ471	470	
R159	ERJ3GEYJ124	120K	
R160	ERJ3GEY0R00	0	
R161	ERJ3GEYJ101	100	
R162	ERJ3GEYJ105	1M	
R163	ERJ3GEYJ151	150	
R164	ERJ3GEYJ102	1K	
R165	ERJ3GEYJ101	100	
R166	ERJ3GEYJ100	10	
R167	ERJ3GEYJ100	10	
R172	ERG2SJ681	680	
R178	ERJ3GEYJ102	1K	
R200	ERJ3GEY0R00	0	
R202	ERJ3GEYJ101	100	
R205	ERJ3GEYJ101	100	
R206	ERJ3GEYJ101	100	
R207	ERJ3GEYJ101	100	
R210	ERJ3GEYJ101	100	
R211	ERJ3GEYJ101	100	
R212	ERJ3GEYJ101	100	
R213	ERJ3GEYJ101	100	
R214	ERJ3GEYJ272	2.7K	
R219	ERJ3GEYJ103	10K	
R220	ERJ3GEY0R00	0	
R221	ERJ3GEYJ472	4.7K	
R222	ERJ3GEY0R00	0	
R223	ERJ3GEYJ392	3.9K	
R224	ERJ3GEY0R00	0	
R226	ERJ3GEYJ203	20K	
R227	PQ4R18XJ220	22	S
R228	ERJ3GEYJ473	47K	
R229	ERJ3GEYJ102	1K	
R230	ERJ3GEY0R00	0	
R231	ERJ3GEY0R00	0	
R232	ERJ3GEYJ472	4.7K	
R233	ERJ3GEYJ332	3.3K	
		(COMPONENTS PARTS)	
RA7	EXB38V103JV	COMPONENTS PARTS	
		(CRYSTAL OSCILLATORS)	
X1	H0A327200096	CRYSTAL OSCILLATOR	
X2	H2A240500005	CRYSTAL OSCILLATOR	
X3	H0J322500004	CRYSTAL OSCILLATOR	

20.5. Analog Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB2	PFLP1754LAZ	ANALOG BOARD ASS'Y (RTL)	
		(ICs)	
IC1	PFVINJM2904M	IC	S
IC2	C0ABBB000047	IC	S
		(TRANSISTORS)	
Q1	B1ABDF000025	TRANSISTOR(SI)	
Q2	B1GBCFJJ0047	TRANSISTOR(SI)	
Q3	B1GBCFJJ0047	TRANSISTOR(SI)	
Q6	B1ABDF000026	TRANSISTOR(SI)	
Q7	PQVTDTC143E	TRANSISTOR(SI)	S
Q8	PQVTDTC143E	TRANSISTOR(SI)	S
		(DIODES)	
D1	MA4047	DIODE(SI)	S
D2	MA4056	DIODE(SI)	S
D3	MA4056	DIODE(SI)	S
D6	B0EAAD000001	DIODE(SI)	
D7	B0EAAD000001	DIODE(SI)	
D8	B0EAAD000001	DIODE(SI)	
		(JACKS AND CONNECTOR)	
CN1	PQJS16A10Z	CONNECTOR	S
CN2	K2LA1YYB0001	JACK/SOCKET	
CN3	K2LB1YYB0002	JACK/SOCKET	
CN4	K2LB1YYB0002	JACK/SOCKET	
		(SWITCHES)	
SW1	PFSH1A03Z	PUSH SWITCH	S
SW2	K0L1KA000007	PUSH SWITCH	
SW3	PFSH1A03Z	PUSH SWITCH	S
		(COILS)	
L19	PFLE003	COIL	S
L21	PQLQR2KA113	COIL	S
L22	PQLQR2KA113	COIL	S
L23	PQLQR2KA113	COIL	S
L24	PQLQR2KA113	COIL	S
L25	PQLQR2BT	COIL	S
L26	PQLQR2BT	COIL	S
L31	PQLQR2BT	COIL	S
L32	PQLQR2BT	COIL	S
		(PHOTO ELECTRIC TRANSDUCERS)	
PC1	B3PAA0000330	PHOTO ELECTRIC TRANSDUCER	
		(THERMISTOR)	
POS1	PFRT002	THERMISTOR	⚠ S
		(RELAY)	
RLY1	PFSL003Z	RELAY	S
		(TRANSFORMER)	
T1	G4AYA0000016	TRANSFORMER	
		(VARISTORS)	
SA1	PQVDDSS301L	VARISTOR	⚠ S
SA2	PFRZRA102P6T	VARISTOR	S
		(RESISTORS)	
L1	ERJ3GEY0R00	0	
L2	ERJ3GEY0R00	0	
L3	ERJ3GEY0R00	0	
L4	ERJ3GEY0R00	0	
L5	ERJ3GEY0R00	0	
L6	ERJ3GEY0R00	0	
L7	ERJ3GEY0R00	0	
L10	ERJ3GEY0R00	0	
L11	ERJ3GEY0R00	0	

Ref. No.	Part No.	Part Name & Description	Remarks
L12	ERJ3GEY0R00	0	
L13	ERJ3GEY0R00	0	
L14	ERJ3GEY0R00	0	
L15	ERJ3GEY0R00	0	
L16	ERJ3GEY0R00	0	
L17	ERJ3GEY0R00	0	
L34	ERJ6GEYJ1R0	0	
R1	ERJ3GEYJ101	100	
R2	ERJ3GEYJ103	10K	
R5	ERJ3GEY0R00	0	
R10	ERJ3GEYJ114	110K	
R11	ERJ3GEYJ114	110K	
R13	ERJ3GEYJ623	62K	
R14	ERJ3GEYJ182	1.8K	
R15	ERJ3GEYJ124	120K	
R16	ERJ3GEYJ513	51K	
R17	ERJ3GEYJ913	91K	
R18	ERJ3GEYJ623	62K	
R19	ERJ3GEYJ224	220K	
R20	ERJ3GEYJ224	220K	
R21	ERJ3GEYJ393	39K	
R22	ERJ3GEYJ622	6.2K	
R24	ERJ3GEYJ514	510K	
R25	ERJ3GEYJ103	10K	
R26	ERDS2TJ271	270	S
R28	ERJ3GEYJ822	8.2K	
R29	ERJ3GEYJ682	6.8K	
R30	ERJ3GEYJ563	56K	
R31	ERJ3GEYJ334	330K	
R32	ERJ3GEYJ393	39K	
R34	ERJ3GEY0R00	0	
R35	ERJ3GEYJ622	6.2K	
R36	ERJ3GEYJ222	2.2K	
R38	ERDS1TJ223	22K	S
R39	ERJ3GEYJ564	560K	
R40	ERJ3GEYJ222	2.2K	
R41	ERG2SJ101	100	
R42	ERJ3GEYJ624	620K	
R43	ERJ3GEYJ331	330	
R44	ERJ3GEYJ224	220K	
R45	ERDS1TJ153	15K	S
R46	ERJ3GEYJ183	18K	
R47	ERJ3GEY0R00	0	
R48	ERJ3GEYJ562	5.6K	
R49	ERJ3GEYJ103	10K	
R50	ERJ3GEYJ103	10K	
R51	ERJ3GEYJ473	47K	
R52	ERJ3GEYJ220	22	
R54	ERDS2TJ220	22	S
R55	ERJ3GEYJ152	1.5K	
R56	ERJ3GEYJ152	1.5K	
R57	ERJ3GEYJ331	330	
R58	ERJ3GEY0R00	0	
R60	ERJ3GEYJ103	10K	
R63	ERJ3GEYJ105	1M	
R8	ERJ3GEYJ103	10K	
R81	ERJ3GEY0R00	0	
R82	ERJ3GEY0R00	0	
R9	ERJ3GEYJ622	6.2K	
R91	ERJ3GEY0R00	0	
		(CAPACITORS)	
C1	ECJ1VB1H103K	0.01	
C2	ECJ1VB1H103K	0.01	
C4	ECEA1HKA4R7	4.7	S
C5	ECJ1VB1H103K	0.01	
C6	ECEA0JKA470	47	S
C7	ECJ1VF1E104Z	0.1	
C8	ECJ1VC1H221J	220P	
C9	ECJ1VC1H221J	220P	
C11	ECJ1VB1C333K	0.033	
C12	ECJ1VB1C104K	0.1	
C14	ECJ1VB1H392K	0.0039	
C15	F2A1C1000030	10	
C17	ECJ1VB1C473K	0.047	
C18	ECJ1VB1H682K	0.0068	
C19	ECJ1VB1C473K	0.047	
C20	ECJ1VF1E104Z	0.1	
C21	ECJ1VB1C473K	0.047	
C23	ECJ1VC1H270J	27P	
C24	ECJ2VF1H104Z	0.1	
C25	ECJ1VB1C223K	0.022	
C28	ECEA1HKA4R7	4.7	S
C29	ECJ1VB1C393K	0.039	
C30	ECJ1VB1C104K	0.1	
C31	ECJ1VF1E104Z	0.1	
C32	ECJ1VC1H820J	82P	
C33	ECJ1VB1C104K	0.1	
C34	ECJ1VC1H221J	220P	
C38	F0C2E105A146	1	
C39	ECJ1VB1H472K	0.0047	
C40	ECJ1VB1C273K	0.027	
C41	ECJ1VB1C273K	0.027	
C42	ECEA0JKA470	47	S
C45	F2A1C1000030	10	
C46	ECJ1VB1H103K	0.01	
C47	ECEA0JKA470	47	S
C48	ECJ1VB1H103K	0.01	
C49	ECJ1VB1H103K	0.01	
C50	ECJ1VB1C683K	0.068	S
C51	ECJ1VB1C104K	0.1	
C71	ECEA1VKA330	33	
C72	F1J1H104A578	0.1	

20.6. Operation Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB3	PFWP2FT932CN	OPERATION BOARD ASS'Y (RTL)	
PCB3-1	K0L1BA000095	SWITCH, SENSOR	
PCB3-2	K0L1AA000002	SWITCH, SENSOR	
		(IC)	
IC1	C1ZBZ0002089	IC	
		(DIODE)	
LED1	LNJ801LPDJA	LED	
		(CONNECTOR)	
CN1	K1KA10B00215	CONNECTOR, 10 PIN	
		(LIQUID CRYSTAL DISPLAY)	
CN2	L5DAAFB00001	LIQUID CRYSTAL DISPLAY	
		(SWITCHES)	
SW1	EVQ11Y05B	SPECIAL SWITCH	S
SW2	EVQ11Y05B	SPECIAL SWITCH	S
SW3	EVQ11Y05B	SPECIAL SWITCH	S
SW4	EVQ11Y05B	SPECIAL SWITCH	S
SW5	EVQ11Y05B	SPECIAL SWITCH	S
SW6	EVQ11Y05B	SPECIAL SWITCH	S
SW7	EVQ11Y05B	SPECIAL SWITCH	S
SW8	EVQ11Y05B	SPECIAL SWITCH	S
SW9	EVQ11Y05B	SPECIAL SWITCH	S
SW10	EVQ11Y05B	SPECIAL SWITCH	S
SW11	EVQ11Y05B	SPECIAL SWITCH	S
SW12	EVQ11Y05B	SPECIAL SWITCH	S
SW13	EVQ11Y05B	SPECIAL SWITCH	S
SW14	EVQ11Y05B	SPECIAL SWITCH	S
SW15	EVQ11Y05B	SPECIAL SWITCH	S
SW16	EVQ11Y05B	SPECIAL SWITCH	S
SW17	EVQ11Y05B	SPECIAL SWITCH	S
SW18	EVQ11Y05B	SPECIAL SWITCH	S
SW19	EVQ11Y05B	SPECIAL SWITCH	S

Ref. No.	Part No.	Part Name & Description	Remarks
SW20	EVQ11Y05B	SPECIAL SWITCH	S
SW21	EVQ11Y05B	SPECIAL SWITCH	S
SW22	EVQ11Y05B	SPECIAL SWITCH	S
SW23	EVQ11Y05B	SPECIAL SWITCH	S
SW24	EVQ11Y05B	SPECIAL SWITCH	S
SW25	EVQ11Y05B	SPECIAL SWITCH	S
SW26	EVQ11Y05B	SPECIAL SWITCH	S
SW27	EVQ11Y05B	SPECIAL SWITCH	S
SW28	EVQ11Y05B	SPECIAL SWITCH	S
SW30	EVQ11Y05B	SPECIAL SWITCH	S
SW31	EVQ11Y05B	SPECIAL SWITCH	S
SW32	EVQ11Y05B	SPECIAL SWITCH	S
SW33	EVQ11Y05B	SPECIAL SWITCH	S
SW34	EVQ11Y05B	SPECIAL SWITCH	S
SW35	EVQ11Y05B	SPECIAL SWITCH	S
		(RESISTORS)	
R1	ERJ3GEY0R00	0	
R2	ERJ3GEY0R00	0	
R3	ERJ3GEY0R00	0	
R4	ERJ3GEY0R00	0	
R5	ERJ3GEY0R00	0	
R14	ERJ3GEY0R00	0	
R15	ERJ3GEYJ183	18K	
R17	ERJ3GEYJ222	2.2K	
R18	ERJ3GEYJ271	270	
R19	ERJ3GEYJ4R7	4.7	
R20	ERJ3GEYJ101	100	
R21	ERJ3GEYJ101	100	
R22	ERJ3GEYJ472	4.7K	
R23	ERJ3GEYJ472	4.7K	
R24	ERJ3GEYJ102	1K	
R25	ERJ3GEYJ821	820	
R50	ERJ3GEYJ330	33	
		(CAPACITORS)	
C1	ECJ1VF1E104Z	0.1	
C3	ECEA0JKA221	220	S
C4	ECJ1VB1H331K	330P	
C6	ECJ1VB1H103K	0.01	
C13	ECJ1VB1H331K	330P	
C14	ECJ1VC1H121J	120P	
C15	ECJ1VF1E104Z	0.1	
C16	ECJ1VF1E104Z	0.1	
C17	ECJ1VF1C224Z	0.22	
C19	ECJ1VB1H103K	0.01	
C20	ECJ1VB1H103K	0.01	

20.7. Power Supply Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB4	N0AB2GJ00005	POWER SUPPLY BOARD ASS'Y (RTL)	⚠
		(TRANSISTOR)	
Q1	2SK3407	TRANSISTOR(SI)	
Q2	2SC4097F	TRANSISTOR(SI)	
Q21	2SC4081F	TRANSISTOR(SI)	
Q22	2SC4081F	TRANSISTOR(SI)	
Q23	2SC4081F	TRANSISTOR(SI)	
Q101	2SC4081F	TRANSISTOR(SI)	
		(DIODES)	
D4	1SS355F	DIODE(SI)	
D5	PFVDHZS9	DIODE(SI)	S
D7	1SS355F	DIODE(SI)	
D9	1SS355F	DIODE(SI)	
D10	PSVDERA1506	DIODE(SI)	S
D11	PSVDERA1506	DIODE(SI)	S
D12	PSVDERA1506	DIODE(SI)	S
D13	PSVDERA1506	DIODE(SI)	S
D17	1SS355F	DIODE(SI)	
D20	PFVDERA9102	DIODE(SI)	S
D22	1SS355F	DIODE(SI)	
D23	1SS355F	DIODE(SI)	
D27	MA8091	DIODE(SI)	
D101	PFVDYG911S2R	DIODE(SI)	S
D104	PFVDEC31QS04	DIODE(SI)	S
D105	PFVDTZPT8130	DIODE(SI)	S
D110	PFVDHZS6	DIODE(SI)	S
		(CONNECTORS)	
CNJ2	PFJPB9BPHKL	CONNECTOR	S
		(COIL)	
BEA1	PSLEBL02RN1	COIL	S
L1	OR7A103F20	COIL	
		(FUSE)	
F1	PFBA51MS40L	FUSE	S
		(PHOTO ELECTRIC TRANSDUCER)	
PC1	PS2581AL1	PHOTO ELECTRIC TRANSDUCER	
		(TRANSFORMER)	
T1	PFLT54D1	TRANSFORMER	S
		(VARISTOR)	
VR101	ECNCYAA03B53	VARIABLE RESISTOR	S
ZNR1	ECN471D07A	VARISTOR	S
		(RESISTORS)	
J1	ERJ6GEY0R00	0	
J3	ERJ6GEY0R00	0	
J5	ERJ6GEY0R00	0	
R2	RK73H2A1803F	180K	
R3	RK73H2A1803F	180K	
R4	RK73H2A1003F	100K	
R5	PQ4R10XJ203	20K	S
R6	PQ4R18XJ271	270	S
R7	PQ4R10XJ561	560	S
R8	ERJ3GEYJ333	33K	
R9	ERJ3GEYJ682	6.8K	
R11	PQ4R10XJ822	8.2K	S
R12	ERJ3GEYJ203	20K	
R13	ERJ3GEYJ621	620	
R14	RK73B1J104J	100K	
R19	ERDS2TJ100	10	
R21	ERJ3GEY0R00	0	
R23	ERJ3GEY0R00	0	
R24	RK73B1J104J	100K	
R25	ERJ6GEY0R00	0	
R26	ERJ3GEYJ333	33K	
R27	ERJ3GEYJ822	8.2K	
R28	ERJ3GEYJ682	6.8K	
R31	ERJ3GEYJ473	47K	
R71	RK73B2B105J	1M	
R72	RK73B2B105J	1M	
R73	RK73B2B105J	1M	
R110	PQ4R10XJ271	270	S
R111	ERJ3GEYJ102	1K	
R113	ERJ3GEYJ752	7.5K	
R114	ERJ3GEYJ203	20K	
R115	ERJ3GEYJ103	10K	
R119	PQ4R18XJ183	18K	S
R121	PQ4R18XJ223	22K	S
		(CAPACITORS)	
C1	PFCKDLE334M	0.33	S
C5	PFCKDVB180M	180	S
C7	DE2E3KH332	0.0033	
C8	DEHR33A221	220P	
C9	PFCKDB11H472	0.0047	S
C10	PFCKD8BH103	0.01	S
C13	PFCKDB11H102	0.001	S

Ref. No.	Part No.	Part Name & Description	Remarks
C14	PFCKD31E225	2.2	S
C15	PFCKD2C1H101	100P	S
C16	PFCKD31E105	1	S
C411	PFCKD71H224	0.22	S
C101	PFCEA35L330M	330	S
C102	PFCEA16ZL470	470	S
C109	DEHC32H471	470P	
C115	PFCKDB31H104	0.1	S

20.8. Fixtures and Tools

Ref. No.	Part No.	Part Name & Description	Remarks
EC1	PQZZ9K7Z	EXTENSION CORD, 9 PIN	
EC2	PQZZ7K11Z	EXTENSION CORD, 7 PIN	
EC3	PFZZ11K13Z	EXTENSION CORD, 11 PIN	
EC4	PFZZ5K13Z	EXTENSION CORD, 5 PIN	
EC5	PQZZ10K8Z	EXTENSION CORD, 10 PIN	
EC6	PFZZ16K5Z	EXTENSION CORD, 16 PIN	
EC7	PQZZ2K12Z	EXTENSION CORD, 2 PIN	
EC8	PQZZ2K12Z	EXTENSION CORD, 2 PIN	
	KM79811245C0	BASIC FACSIMILE TECHNIQUE (for training service technicians)	

Note:

Tools and Extension Cords are useful for servicing.
(They make servicing easy.)