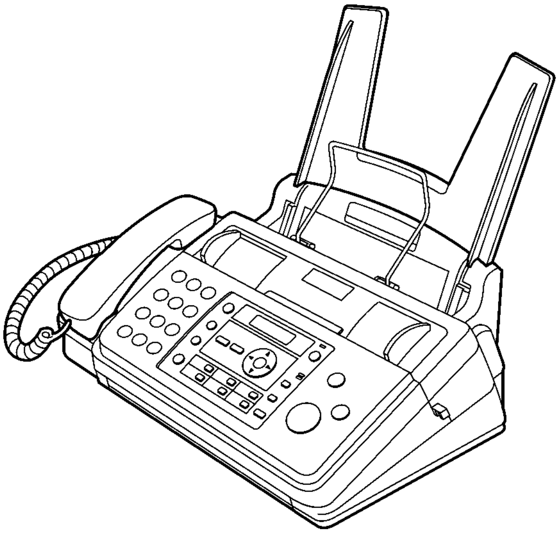
ORDER NO. KMF0812214CE

Service Manual

Plain Paper Fax with Digital Answering System / Multi-function Plain Paper Fax

Model No. KX-FP365CX
KX-FM388CX

(for Middle Near East)



⚠ 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.

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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

- **Repair service shall be provided in accordance with repair technology information such as service manual so as to prevent fires, injury or electric shock, which can be caused by improper repair work**.
  1. When repair services are provided, neither the products nor their parts or members shall be remodeled.
  2. If a lead wire assembly is supplied as a repair part, the lead wire assembly shall be replaced.
  3. FASTON terminals shall be plugged straight in and unplugged straight.

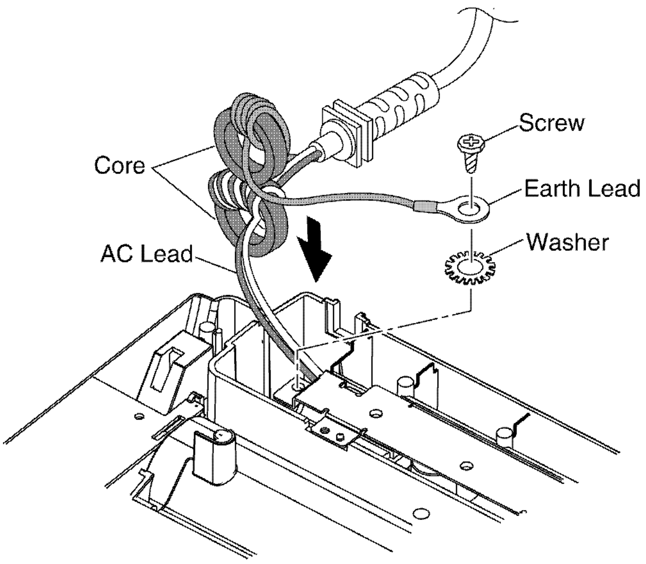
- **ICs and LSIs are vulnerable to static electricity.**
  When repairing, the following precautions will help prevent recurring malfunctions.
  1. Cover plastic parts boxes with aluminum foil.
  2. Ground the soldering irons.
  3. Use a conductive mat on worktable.
  4. Do not grasp IC or LSI pins with bare fingers.

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 board.
3. Wrap the earth lead around the core 5 times.
4. Wrap the AC lead around the core 5 times.

(Bottom View)

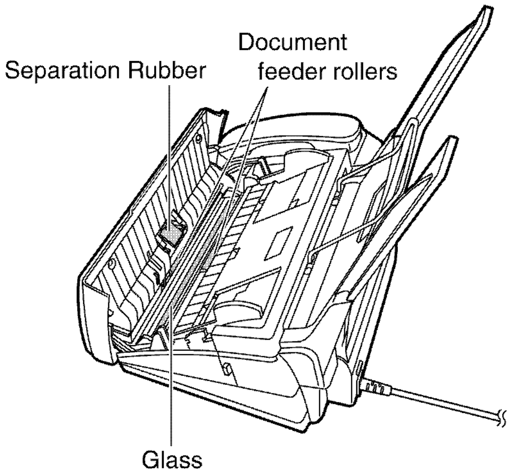


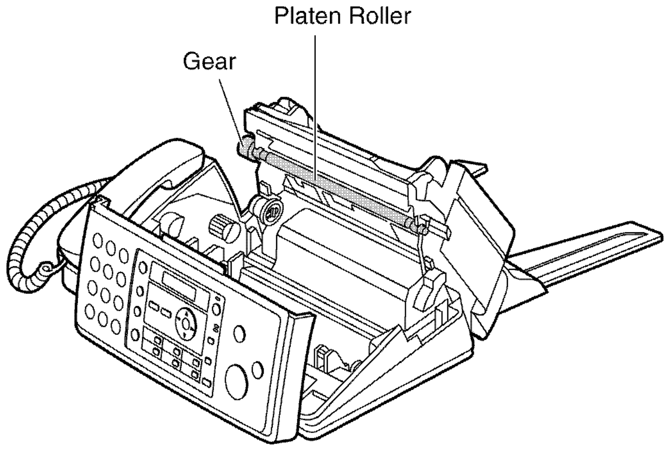
1.3. Personal Safety Precautions

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.


Document
feeder rollers
Separation Rubber
Glass


Platen Roller
Gear

1.3.2. Live Electrical Sections

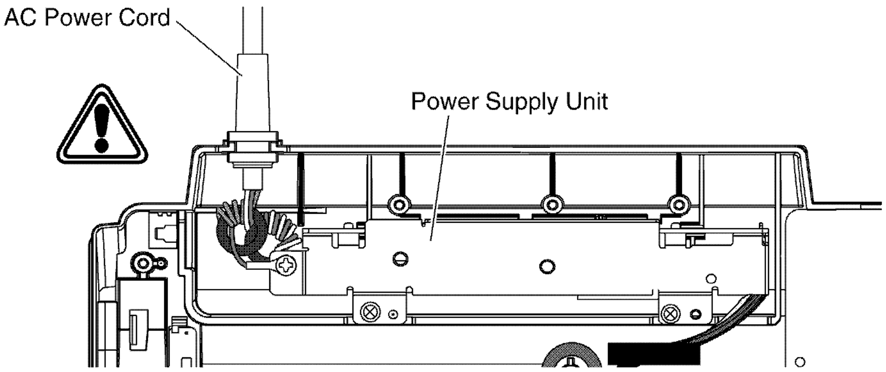
All the electrical sections of the unit supplied with AC power by the AC power cord are live.

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.

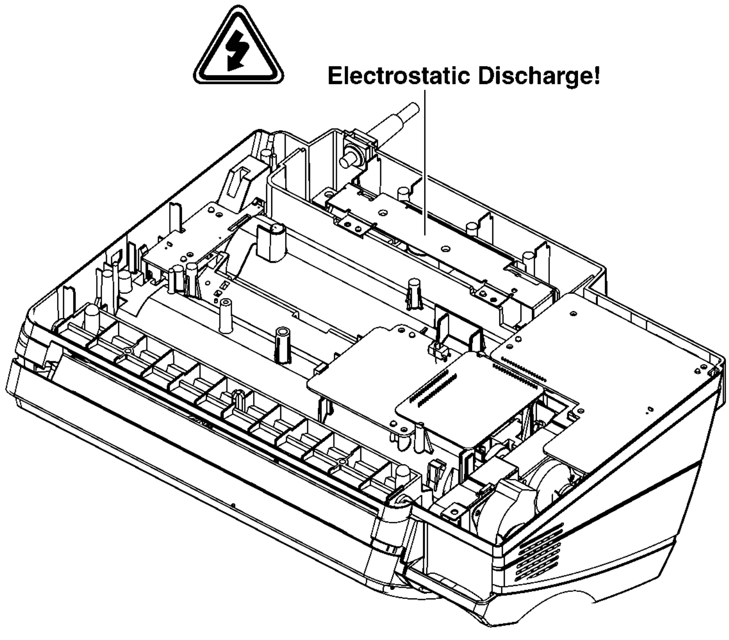
(Bottom View)


AC Power Cord
Power Supply Unit

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:

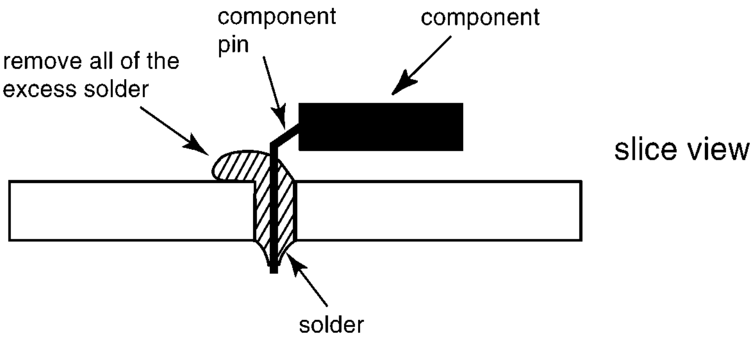
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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

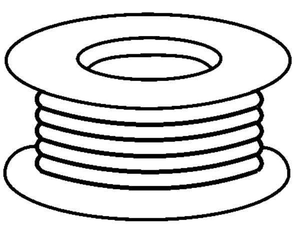
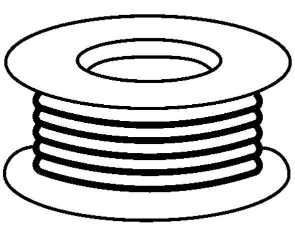
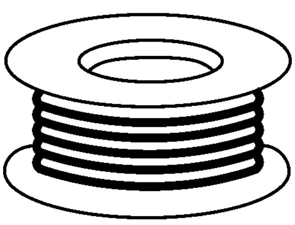
- PbF solder has a melting point that is 50° ~ 70° F, (30° ~ 40°C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700° ± 20° F, (370° ± 10°C).
- Exercise care while using higher temperature soldering irons.: Do not heat the PCB for too long time in order 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).



2.1.1. Suggested PbF Solder

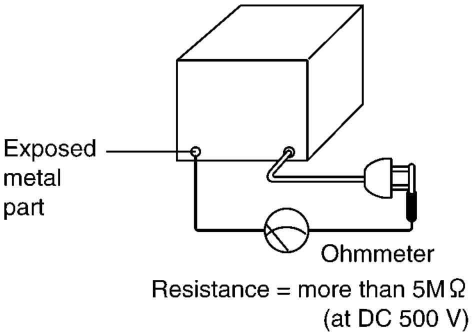
There are several types of PbF solder available commercially. While this product is manufactured using Tin, Silver, and Copper, (Sn + Ag + Cu), you can also use Tin and Copper, (Sn + Cu), or Tin, Zinc, and Bismuth, (Sn + Zn + Bi). Please check the manufacturer's specific instructions for the melting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

0.3mm X 100g	0.6mm X 100g	1.0mm X 100g
		

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

Danger of explosion if 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 instruction.

CAUTION:

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.

2.4. Discarding of P. C. Board

When discarding P. C. Board, delete all personal information such as telephone directory and caller list or scrap P. C. Board.

3 Specifications

Any details given in these instructions are subject to change without notice.

Applicable Lines:	Public Switched Telephone Network
Document Size:	Max. 216 mm in width, Max. 600 mm in length
Effective Scanning Width:	208 mm
Effective Printing Width:	202 mm
Recording Paper Size:	A4: 210 mm × 297 mm
Recording Paper Weight:	64 g/m^2 to 80 g/m^2
Transmission Speed[*1]:	Approx. 8 s/page (ECM-MMR)[*2]
Scanning Density:	Horizontal: 8 pels/mm Vertical: 3.85 lines/mm (standard resolution) 7.7 lines/mm (fine/photo resolution) 15.4 lines/mm (super fine resolution)
Photo Resolution:	64 levels
Scanner Type:	Contact Image Sensor
Printer Type:	Thermal Transfer on plain paper
Data Compression System:	Modified Huffman (MH), Modified READ (MR), Modified Modified READ (MMR)
Modem Speed:	14,400 / 12,000 / 9,600 / 7,200 / 4,800 / 2,400 bps; Automatic Fallback
Operating Environment:	5°C—35°C, 20%—80% RH (Relative Humidity)
Dimensions:	Approx. height 185 mm × width 355 mm × depth 272 mm
Mass (Weight):	Approx. 3.5 kg
Power Consumption:	Standby: Approx. 1.8 W Transmission: Approx. 12 W Reception: Approx. 30 W (When receiving a 20% black document) Copy: Approx. 40 W (When copying a 20% black document) Maximum: Approx. 135 W (When copying a 100% black document)
Power Supply:	220 V - 240 V AC, 50/60 Hz
Fax Memory Capacity[*3]:	Transmission: Approx. 25 pages Reception: Approx. 28 pages (Based on the ITU-T No. 1 Test Chart in standard resolution, without using the Error Correction Mode.)
Voice Memory Capacity[*4]:	Approx. 18 minutes of recording time including greeting message.

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

[*2] Transmission speed is based on 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. (Refer to **ITU-T No.1 Test chart** (P.170).)

[*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.

[*4] Recording time may be reduced by the calling party's background noise.

Note:

Design and specifications are subject to change without notice.

4 General/Introduction

4.1. Optional Accessories

Model No.	Description	Specification
KX-FA57E / KX-FA57A	Replacement Film[1]	70 m × 1 roll (Prints about 210 A4-sized pages)

[1] To ensure the unit operates properly, we recommend using the Panasonic replacement film.
The ink film is not reusable. Do not rewind and use the ink film again.

5 Features

General
- LCD (Liquid Crystal Display) readout

Plain Paper Facsimile Machine
- 8 second transmission speed[1]
- A4, G3 compatible
- Automatic document feeder (up to 10 sheets)
- Quick scan
- Resolution: Standard/Fine/Super fine/Photo (64 level)
- Broadcast
- 50-sheet recording paper capacity
- Automatic fax/phone switching

[1] The 8 second speed is based upon the ITU-T No. 1 Test Chart on the condition that memory transmission is performed.

Large Memory... Performed by DRAM
Approx. 28 pages of memory reception
Approx. 25 pages of memory transmission

Integrated Telephone System
- On-hook dialing
- Voice muting
- Redialing function
- 110-station telephone directory with Phonebook (including 10 one touch dial items)
- Digital SP-Phone
- Caller ID service

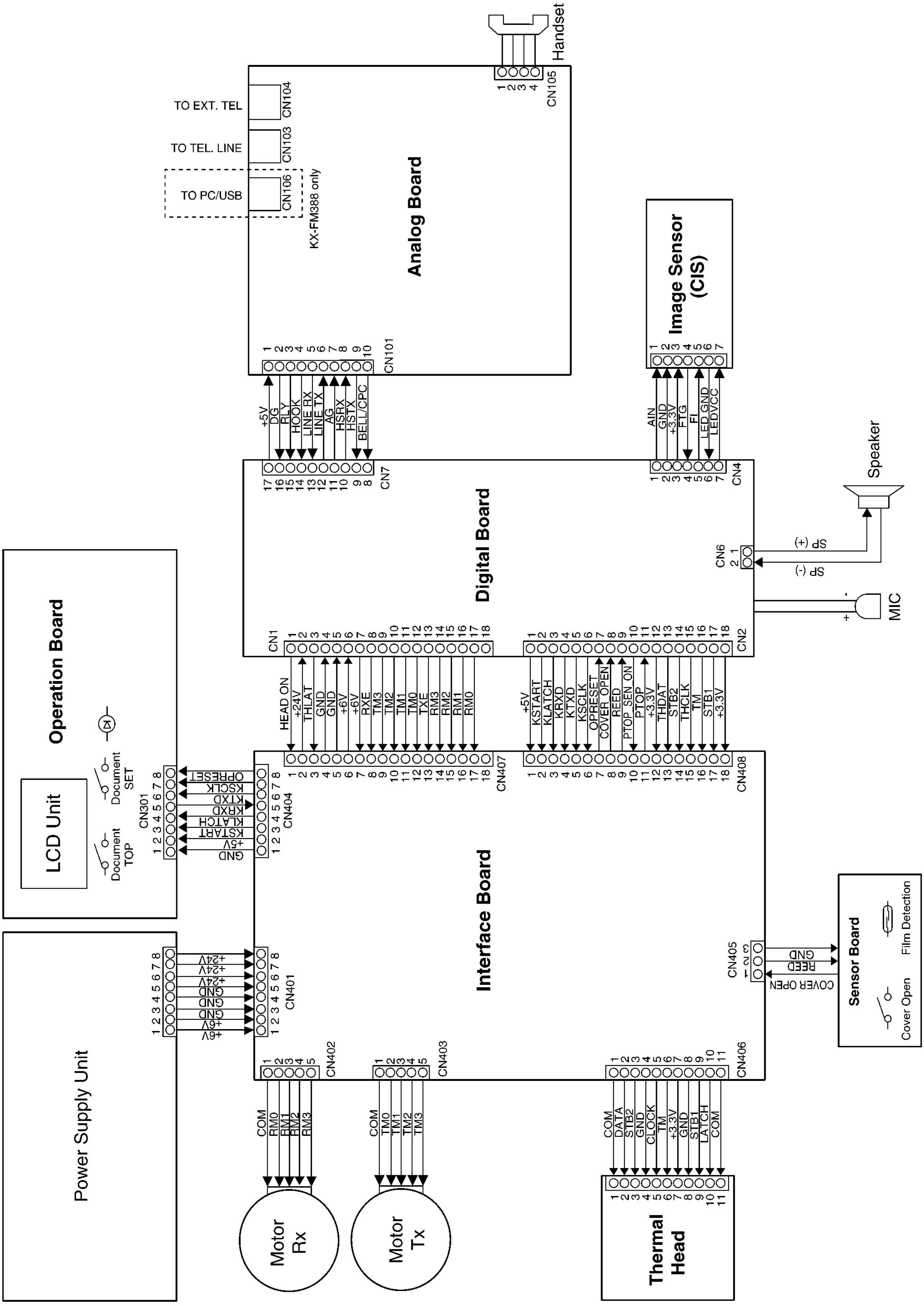
Enhanced Copier Function
- Multi-copy function (up to 50 copies)
- Enlargement and reduction
- Collate
- 64-Level halftone

Digital Answering System
- Voice Time/Day Stamp
- 18-Minutes recording time

PC Fax (KX-FM388 only)
Panasonic PANA LINK software enables your fax machine to carry out the following functions:
- Sending fax documents created on your PC
- Receiving faxes on your PC
- Storing fax and phone numbers into the directory
- Using the fax machine as a printer and a scanner

6 Technical Descriptions

6.1. Connection Diagram


Handset
CN105
1 2 3 4
Analog Board
TO EXT. TEL
CN104
TO TEL. LINE
CN103
TO PC/USB
CN106
KX-FM388 only
CN101
1 2 3 4 5 6 7 8 9 10
+5V
DG
RLY
HOOK
LINE RX
LINE TX
AG
HSRX
HSTX
BELL/CPC
CN7
17 16 15 14 13 12 11 10 9 8
Image Sensor (CIS)
1 2 3 4 5 6 7
AIN
GND
+3.3V
FTG
FI
LED GND
LEDVCC
CN4
Digital Board
Speaker
CN6
2 1
SP (+)
SP (-)
MIC
+
-
CN1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
HEAD ON
+24V
THLAT
GND
GND
+6V
RXE
TM3
TM2
TM1
TM0
TXE
RM3
RM2
RM1
RM0
CN407
CN2
+5V
KSTART
KLATCH
KRXD
KTXD
KSCLK
OPRESET
COVER OPEN
REED
PTOP SEN ON
PTOP
+3.3V
THDAT
STB2
THCLK
TM
STB1
+3.3V
CN408
Operation Board
LCD Unit
Document TOP
Document SET
CN301
1 2 3 4 5 6 7 8
GND
+5V
KSTART
KLATCH
KRXD
KTXD
KSCLK
OPRESET
CN404
Interface Board
Power Supply Unit
CN401
+6V
+6V
GND
GND
GND
+24V
+24V
+24V
CN405
1 2 3
COVER OPEN
REED
GND
Sensor Board
Cover Open
Film Detection
CN402
1 2 3 4 5
COM
RM0
RM1
RM2
RM3
Motor Rx
CN403
COM
TM0
TM1
TM2
TM3
Motor Tx
CN406
1 2 3 4 5 6 7 8 9 10 11
COM
DATA
STB2
GND
CLOCK
TM
+3.3V
GND
STB1
LATCH
COM
Thermal Head

6.2. General Block Diagram

The following is an outline of each device IC on the digital board. (Refer to **General Block Diagram** (P.14).).

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 (IC6)**
   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**
   Contact Image Sensor (CIS) to read transmitted documents.

6. **Motor Driver (IC401, IC402)**
   Drives the transmission motor and the reception motor.

7. **Thermal Head**
   Contains heat-emitting elements for dot matrix image printing.

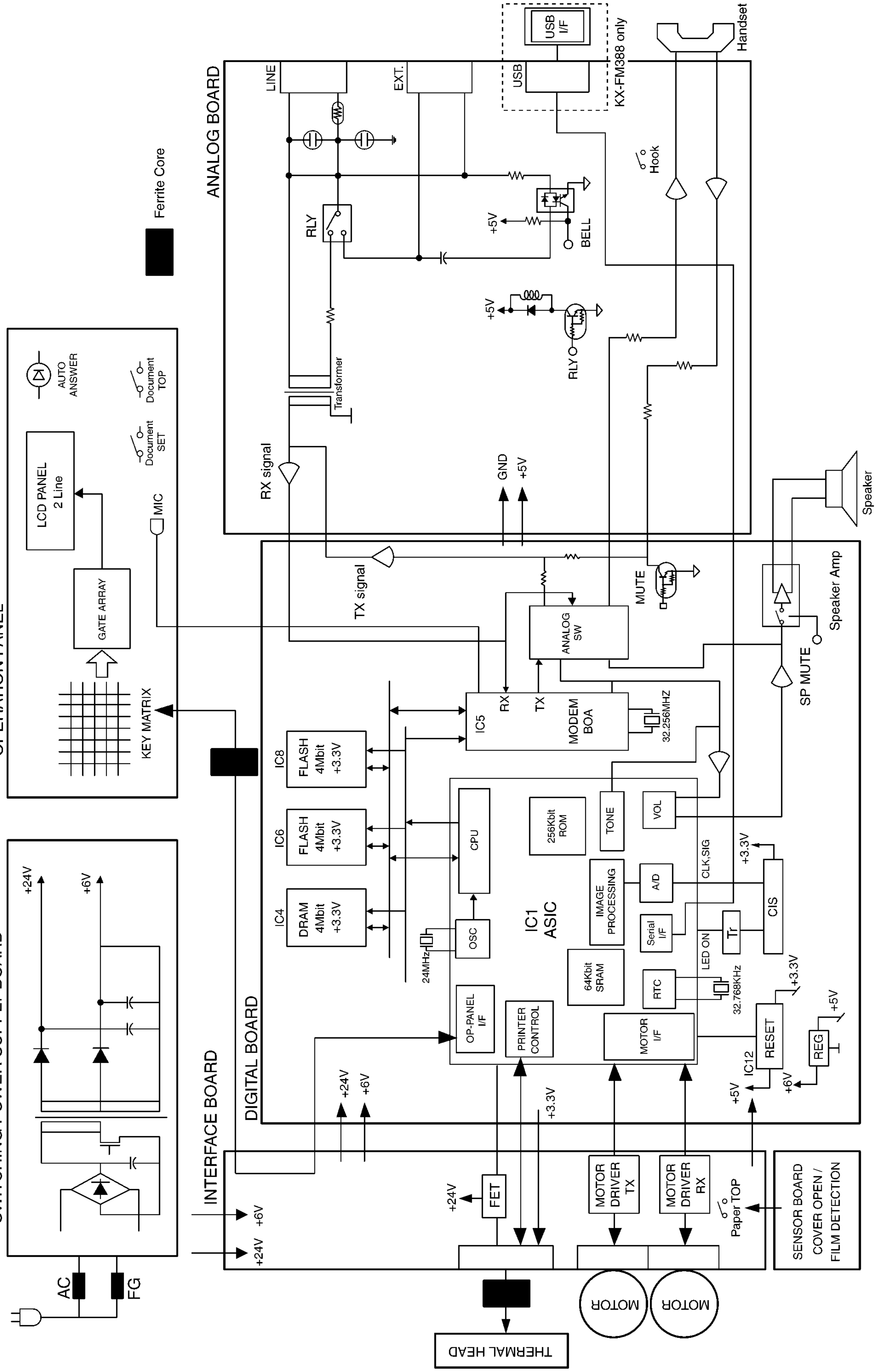
8. **Analog Board**
   Composed of ITS circuit and NCU circuit.

9. **Sensor Section**
   Composed of a cover open, a document set switch, a document top switch, a paper top sensor.

10. **Power Supply Board Switching Section**
    Supplies +6V and +24V to the unit.

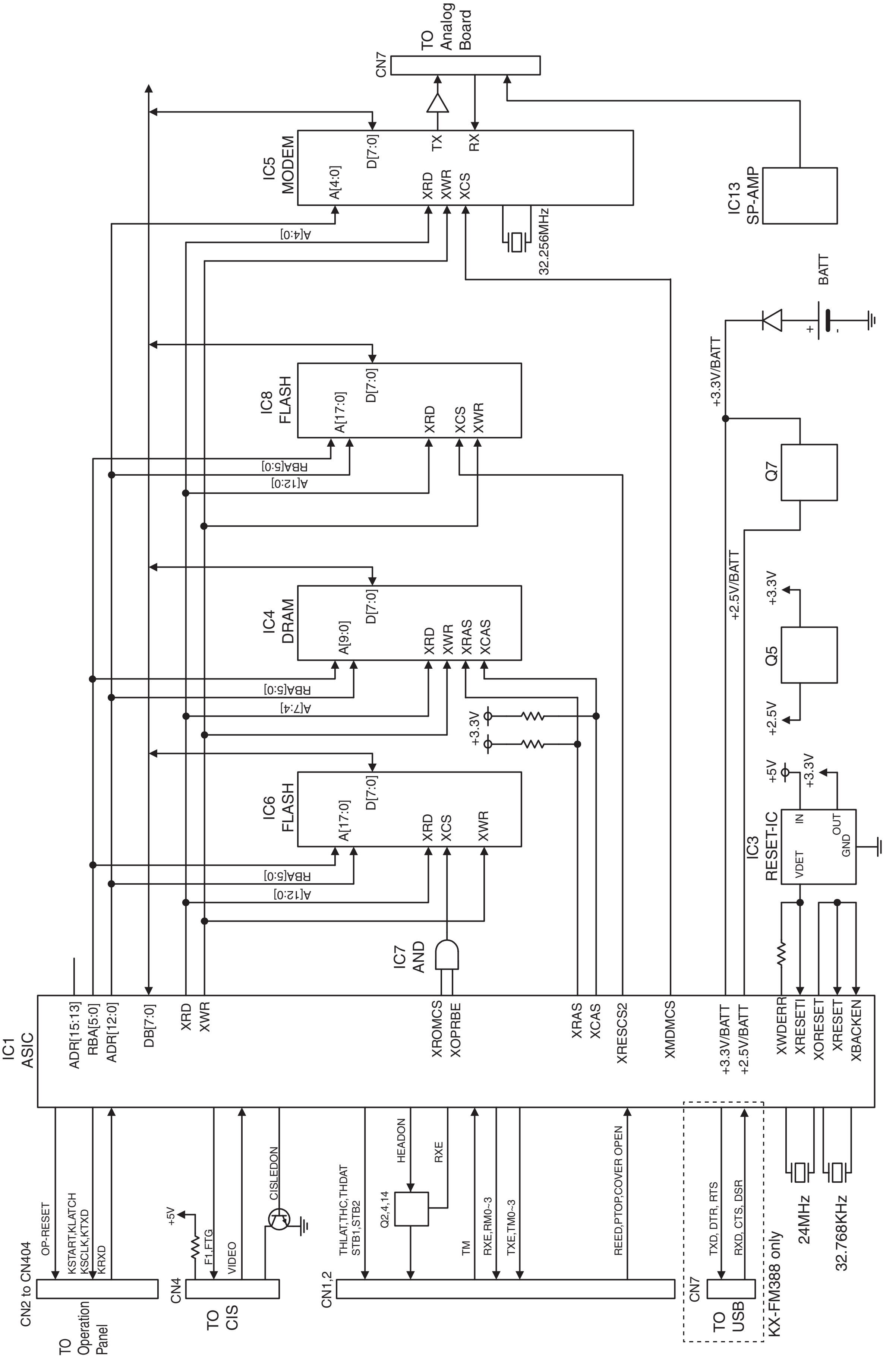
11. **Flash Memory (IC8)**
    Voice Prompt (TAM) D/L (DownLoad) area.

6.2.1. General Block Diagram


SWITCHING POWER SUPPLY BOARD
+24V
+6V
AC
FG
OPERATION PANEL
LCD PANEL
2 Line
GATE ARRAY
KEY MATRIX
MIC
AUTO ANSWER
Document SET
Document TOP
Ferrite Core
ANALOG BOARD
LINE
EXT.
USB
USB I/F
KX-FM388 only
Handset
Hook
RLY
+5V
BELL
+5V
RLY
Transformer
RX signal
GND
+5V
Speaker
DIGITAL BOARD
TX signal
MUTE
ANALOG SW
Speaker Amp
SP MUTE
IC5
RX
TX
MODEM BOA
32.256MHZ
IC8
FLASH 4Mbit +3.3V
IC6
FLASH 4Mbit +3.3V
IC4
DRAM 4Mbit +3.3V
CPU
256Kbit ROM
TONE
VOL
IMAGE PROCESSING
A/D
CLK,SIG
+3.3V
CIS
Tr
LED ON
Serial I/F
OSC
24MHz
IC1 ASIC
64Kbit SRAM
RTC
32.768KHz
+3.3V
OP-PANEL I/F
PRINTER CONTROL
MOTOR I/F
RESET
IC12
REG
+5V
+6V
+5V
+24V
+6V
+3.3V
INTERFACE BOARD
+6V
+24V
+24V
FET
MOTOR DRIVER TX
MOTOR DRIVER RX
Paper TOP
SENSOR BOARD
COVER OPEN / FILM DETECTION
MOTOR
MOTOR
THERMAL HEAD

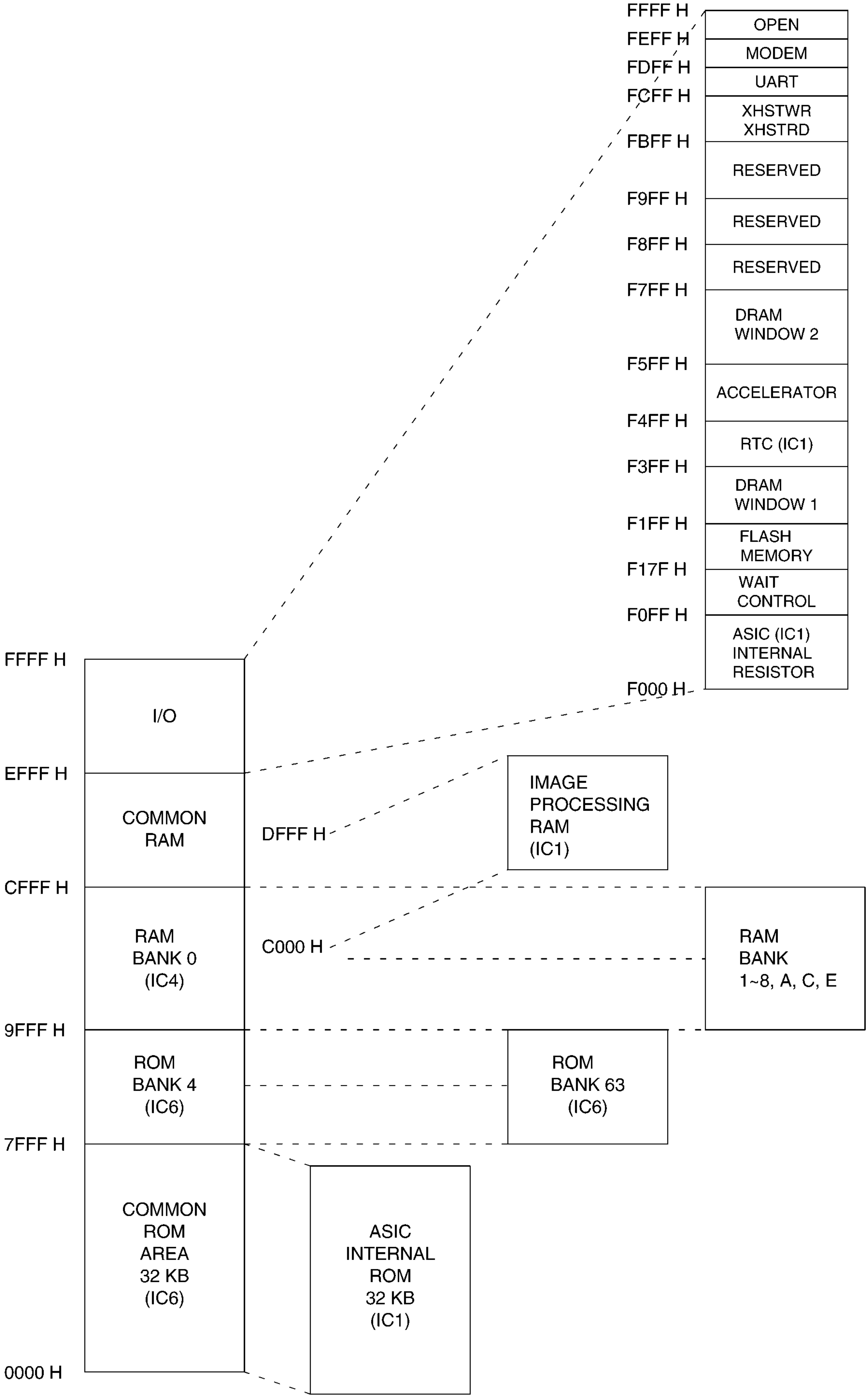
6.3. Control Section

6.3.1. Block Diagram


TO
Analog
Board
CN7
IC5
MODEM
A[4:0]
D[7:0]
XRD
XWR
XCS
TX
RX
32.256MHz
IC13
SP-AMP
BATT
+
-
+3.3V/BATT
IC8
FLASH
A[17:0]
D[7:0]
XRD
XCS
XWR
RBA[5:0]
A[12:0]
Q7
IC4
DRAM
A[9:0]
D[7:0]
XRD
XWR
XRAS
XCAS
RBA[5:0]
A[7:4]
+3.3V
+2.5V/BATT
+3.3V
Q5
+2.5V
IC6
FLASH
A[17:0]
D[7:0]
XRD
XCS
XWR
RBA[5:0]
A[12:0]
+5V
+3.3V
IC3
RESET-IC
VDET
IN
OUT
GND
IC7
AND
IC1
ASIC
ADR[15:13]
RBA[5:0]
ADR[12:0]
DB[7:0]
XRD
XWR
XROMCS
XOPRBE
XRAS
XCAS
XRESCS2
XMDMCS
+3.3V/BATT
+2.5V/BATT
XWDERR
XRESETI
XORESET
XRESET
XBACKEN
OP-RESET
KSTART,KLATCH
KSCLK,KTXD
KRXD
CN2 to CN404
TO
Operation
Panel
+5V
F1,FTG
VIDEO
CISLEDON
CN4
TO
CIS
THLAT,THC,THDAT
STB1,STB2
Q2,4,14
HEADON
RXE
TM
RXE,RM0~3
TXE,TM0~3
REED,PTOP,COVER OPEN
CN1,2
TXD, DTR, RTS
RXD, CTS, DSR
CN7
TO
USB
KX-FM388 only
24MHz
32.768KHz

KX-FP365CX / KX-FM388CX : CONTROL SECTION BLOCK DIAGRAM

6.3.2. Memory Map


FFFF H
FEFF H
FDFF H
FCFF H
FBFF H
F9FF H
F8FF H
F7FF H
F5FF H
F4FF H
F3FF H
F1FF H
F17F H
F0FF H
F000 H
OPEN
MODEM
UART
XHSTWR
XHSTRD
RESERVED
RESERVED
RESERVED
DRAM WINDOW 2
ACCELERATOR
RTC (IC1)
DRAM WINDOW 1
FLASH MEMORY
WAIT CONTROL
ASIC (IC1) INTERNAL RESISTOR
FFFF H
EFFF H
CFFF H
9FFF H
7FFF H
0000 H
I/O
COMMON RAM
RAM BANK 0 (IC4)
ROM BANK 4 (IC6)
COMMON ROM AREA 32 KB (IC6)
DFFF H
C000 H
IMAGE PROCESSING RAM (IC1)
RAM BANK 1~8, A, C, E
ROM BANK 63 (IC6)
ASIC INTERNAL ROM 32 KB (IC1)

6.3.3. 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. (See Fig. A.*)
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.

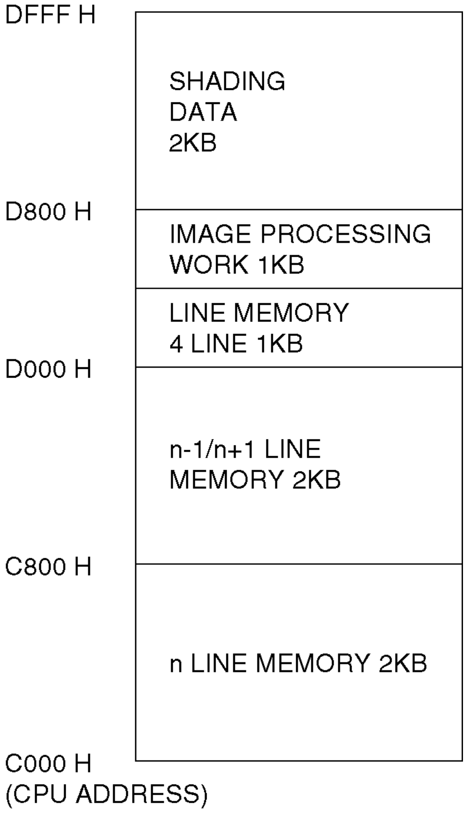

DFFF H
SHADING DATA 2KB
D800 H
IMAGE PROCESSING WORK 1KB
LINE MEMORY 4 LINE 1KB
D000 H
n-1/n+1 LINE MEMORY 2KB
C800 H
n LINE MEMORY 2KB
C000 H
(CPU ADDRESS)

Fig. A

Note:
This memory is incorporated into the ASIC (IC1) and used for the image processing.
Fig. A shows the memory map of the Image Data RAM.

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 (SIG)
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	NOT USED
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	START SIGNAL OUTPUT FOR CIS (SI)
16	F1	O	3.3V	CLOCK SIGNAL OUTPUT FOR CIS (CLK)
17	F2/OP	O	3.3V	OUTPUT PORT (THON)
18	FR/OP	O	3.3V	OUTPUT PORT (MDMRST)
19	CPC	I	3.3V	INPUT PORT (BELL/CPC)
20	RVN	I	3.3V	INPUT PORT (REED)
21	IRDATXD/IOP	O	3.3V	OUTPUT PORT (NOT USED)
22	IRDARXD/IOP80	O	3.3V	OUTPUT PORT (NOT USED)
23	TXD/IOP	O	3.3V	OUTPUT PORT (FILMEND)
24	RXD/IOP	O	3.3V	OUTPUT PORT (NOT USED)
25	XRTS/IOP	O	3.3V	OUTPUT PORT (NOT USED)
26	XCTS/IOP	O	3.3V	OUTPUT PORT (NOT USED)
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 (CISLED)
35	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
36	VSS		GND	POWER SOURCE (GND)
37	VSS		GND	POWER SOURCE (GND)
38	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
39	MIDAT/IOP	O	3.3V	OUTPUT PORT (TONE1EN)
40	MICLK/IOP	O	3.3V	OUTPUT PORT (HSTX MUTE)
41	MILAT/IOP	O	3.3V	OUTPUT PORT (HS RX EN)
42	20KOSC/IOP	O	3.3V	OUTPUT PORT (CIS ON)
43	XWAIT	I	3.3V	INPUT PORT (HOOK)
44	HSTRD/IOP	O	3.3V	OUTPUT PORT (RLY)
45	HSTWR/IOP	O	3.3V	OUTPUT PORT (NOT USED)
46	XOPRBE	O	3.3V	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

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
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 (IC4) ROW ADDRESS STROBE
63	XCAS1/IOP	O	3.3V	DRAM (IC4) CULUMN ADDRESS STROBE
64	XCAS2/IOP	O	3.3V	OUTPUT PORT (NOT USED)
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	ROM (IC6) 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 (PTOP SEN ON)
103	STB1	O	3.3V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
104	STB2	O	3.3V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
105	STB3	O	3.3V	(NOT USED)
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	SYSTEM RESET OUTPUT
112	VDD(5V)		-----	POWER SOURCE (+5V)
113	VSS		GND	POWER SOURCE (GND)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
114	XRESETI	I	3.3V	RESET INPUT
115	WDERR	O	3.3V	WATCHED ERROR OUTPUT SIGNAL
116	THDAT	O	3.3V	RECORDED IMAGE OUTPUT (XTHDAT)
117	THCLK	O	3.3V	CLOCK OUTPUT FOR DATA TRANSFER (XTHCLK)
118	THLAT	O	3.3V	PULSE OUTPUT FOR DATA LATCH (XTHLAT)
119	STBNP	I	0V	INPUT PORT (NOT USED)
120	RM0/IOP	O	3.3V	RX MOTOR A PHASE
121	RM1/IOP	I/O	3.3V	RX MOTOR B PHASE
122	RM2/IOP	I/O	3.3V	RX MOTOR /A PHASE
123	RM3/IOP	I/O	3.3V	RX MOTOR /B PHASE
124	RXE/IOP	O	3.3V	RX MOTOR ENABLE
125	TMO	O	3.3V	TX MOTOR A PHASE
126	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
127	VSS		GND	POWER SOURCE (GND)
128	TM1/IOP	O	3.3V	TX MOTOR B PHASE
129	TM2/IOP	O	3.3V	TX MOTOR /A PHASE
130	TM3/IOP	O	3.3V	TX MOTOR /B PHASE
131	TXE/IOP	O	3.3V	TX MOTOR ENABLE
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 (OP RESET)
138	FMEMDI/IOP	O	3.3V	OUTPUT PORT (SP MUTE)
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)

6.3.4. Flash Memory (IC6)

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.

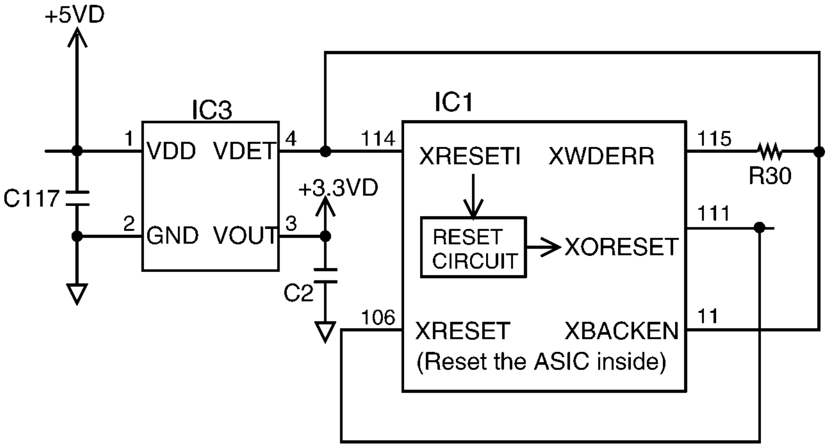
6.3.5. Dynamic RAM (IC4)

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

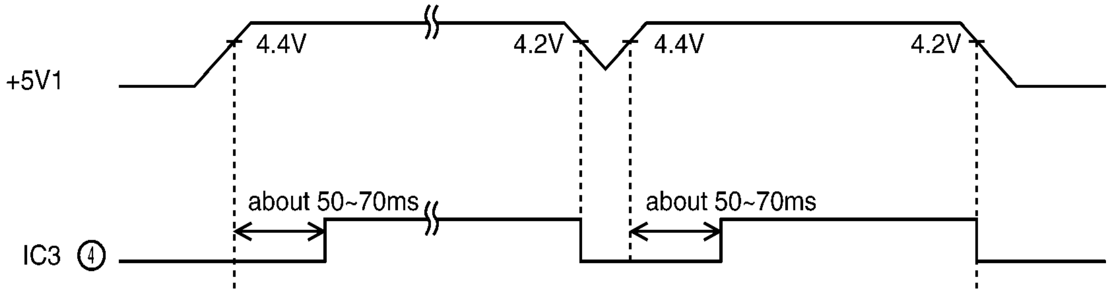
6.3.6. Reset Circuit (Watch dog timer)

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

Circuit Diagram


+5VD
IC3
1
VDD
VDET
4
2
GND
VOUT
3
C117
+3.3VD
C2
IC1
114
XRESETI
XWDERR
115
R30
RESET CIRCUIT
XORESET
111
106
XRESET
XBACKEN
11
(Reset the ASIC inside)

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


+5V1
4.4V
4.2V
4.4V
4.2V
about 50~70ms
about 50~70ms
IC3 ④

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.

6.3.7. RTC Backup Circuit

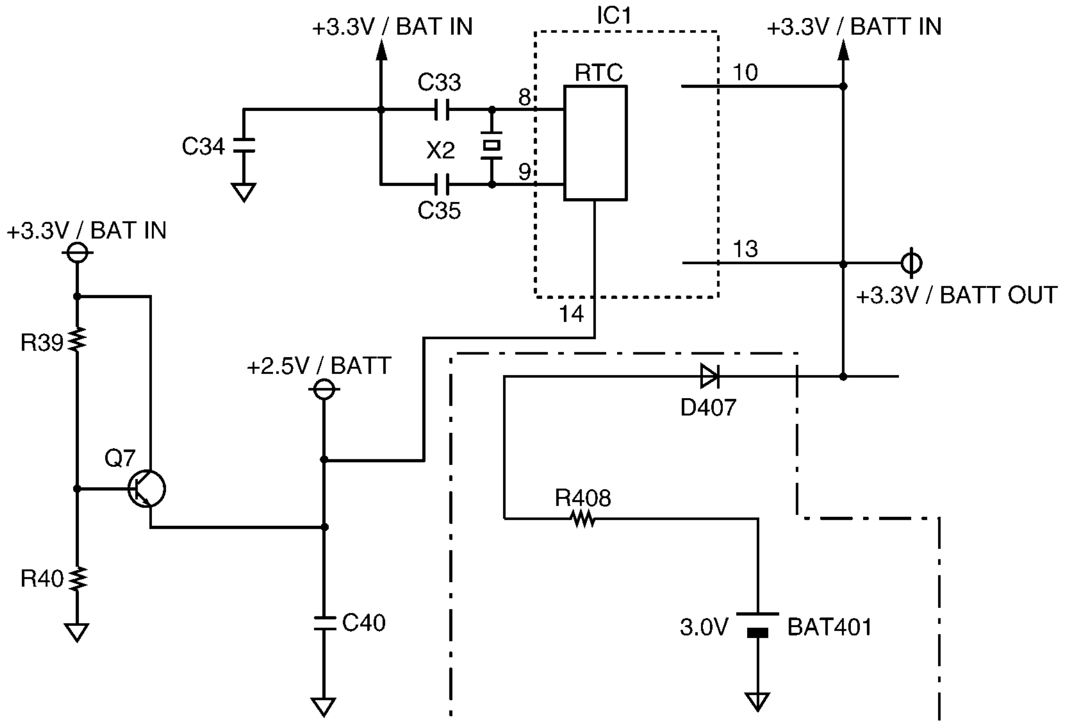
1. **Function**

   This unit has a lithium battery (BAT401) which works for Real Time Clock IC (RTC: inside IC1).
   The RTC continues to work, backed up by a lithium battery even when the power switch is OFF.
   The user parameters for autodial numbers, the system setup data and others are in the FLASH MEMORY (IC6).

2. **RTC Inside (IC1) Backup Circuit Operation**

   When the power switch is turned ON, power is supplied through Q7 to the RTC (inside IC1). At this time, the voltage at pin 14 of the IC1 is +2.5V. When the power switch is turned OFF, the BAT401 supplies power to RTC through D407 and Q505. The voltage at pin 14 of IC1 is about +2.2V. When the power switch is OFF and the voltage of +3.3V decreases, pin 14 of RTC (IC1) becomes roughly the same voltage as the battery voltage. RTC goes into the backup mode, in which the power consumption is lower.

Circuit Diagram


+3.3V / BAT IN
IC1
+3.3V / BATT IN
C33
RTC
10
8
C34
X2
9
C35
+3.3V / BAT IN
13
+3.3V / BATT OUT
14
R39
+2.5V / BATT
D407
Q7
R408
R40
C40
3.0V
BAT401

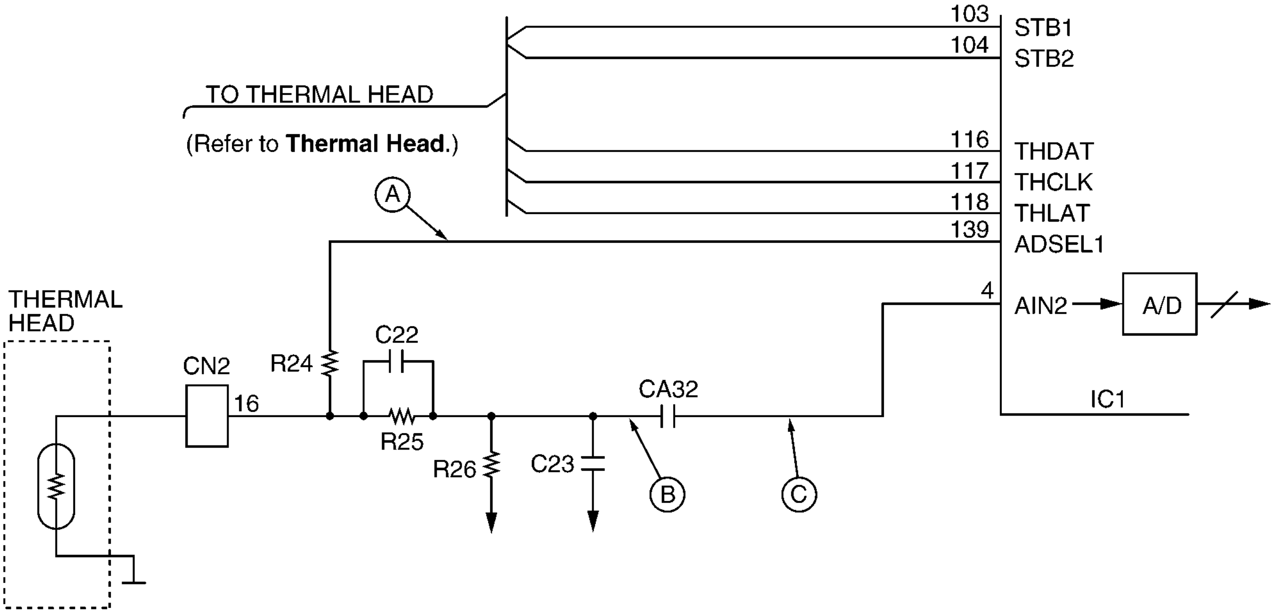
6.3.8. Supervision Circuit for the Thermal Head Temperature

1. **Function**

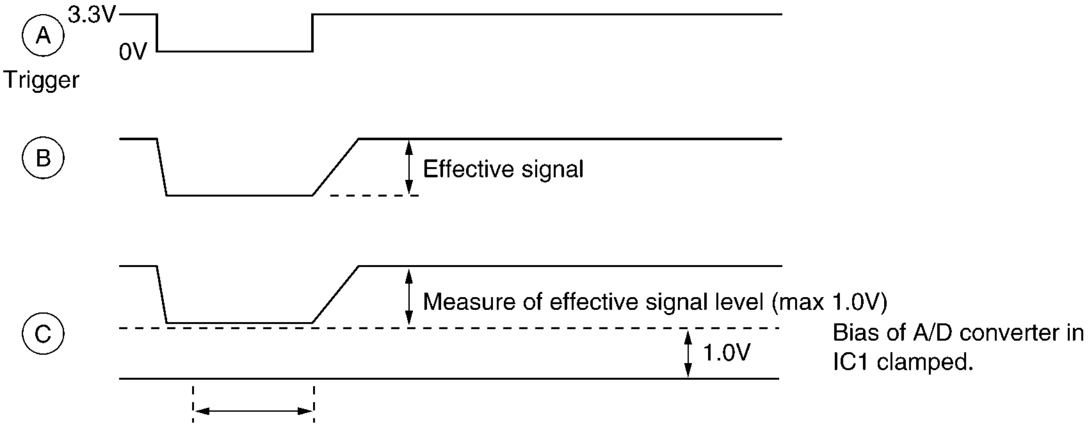
The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 139 of IC1 becomes a low level. Then when it becomes a high level, it triggers point A In point C, according to the voltage output time, the thermal head's temperature is detected.

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


103
104
STB1
STB2
TO THERMAL HEAD
(Refer to Thermal Head.)
116
117
118
139
THDAT
THCLK
THLAT
ADSEL1
Ⓐ
THERMAL HEAD
4
AIN2
A/D
CN2
16
R24
C22
R25
R26
C23
CA32
Ⓑ
Ⓒ
IC1

Timing Chart


Ⓐ
3.3V
0V
Trigger
Ⓑ
Effective signal
Ⓒ
Measure of effective signal level (max 1.0V)
Bias of A/D converter in IC1 clamped.
1.0V
Input (AIN2) is reset once to obtain reference.

REFERENCE:

Thermal Head (P.26)

6.4. Facsimile Section

6.4.1. Image Data Flow During Facsimile Operation

Copy (Fine, Super-Fine, Half Tone)

1. Line information is read by Contact Image Sensor (to be used as the reference white level) via route1, and is input to IC1. Refer to **Block Diagram** (P.25)
2. In IC1, the data is adjusted to a suitable level for A/D conversion in the Analogue Signal Processing Section, and via route2 it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route3. Then via route4 and route5, it is stored in RAM as shading data.
3. The draft's information that is read by CIS is input to IC1 via route1. After it is adjusted to a suitable level for A/D conversion via route2, 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 route6 and route7, 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 routes4 and 5, they are stored in RAM.
4. The white/black data stored as above via routes6 and8 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 route9 and is printed out on recording paper.

   Note:

   Standard: Reads 3.85 times/mm
   Fine: Reads 7.7 times/mm
   Super-Fine: Reads 15.4 times/mm

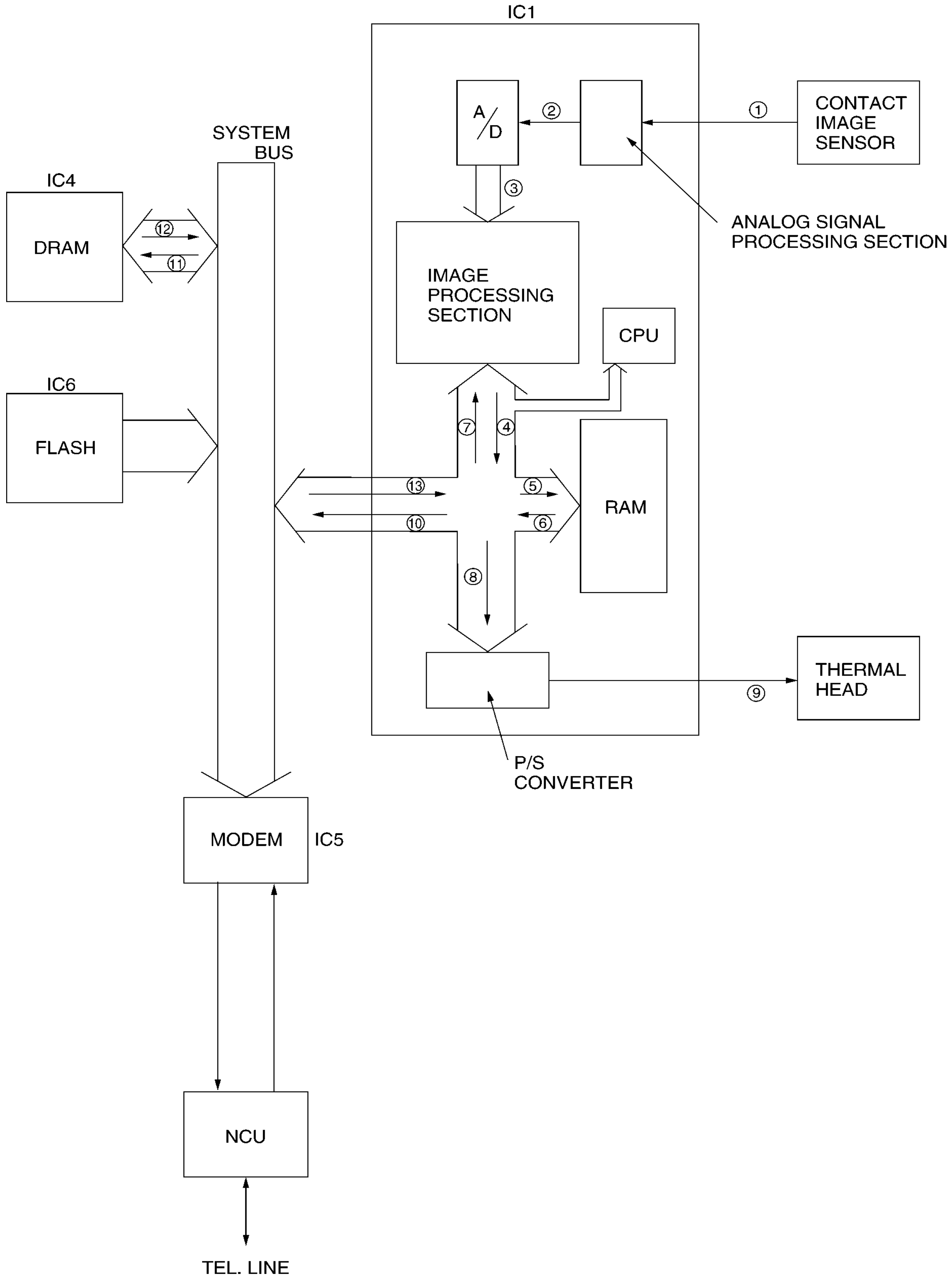
Transmission

1. Same processing as **Copy** items 1 - 3.
2. The data stored in the RAM of IC1 is output from IC1 via routes6 and 10, and is stored in the system bus.
   Via route11, 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 route12, where it is converted to serial analogue data and forwarded over the telephone lines via the NCU Section.

Reception

1. The serial analogue 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 route12.
2. The data stored in DRAM (IC4) is decoded by the CPU (IC1) via route12, and is stored in DRAM (IC4) via routes13 and 5.
3. Same processing as **Copy** item 4.

6.4.2. Block Diagram


IC1
A/D
②
①
CONTACT IMAGE SENSOR
③
ANALOG SIGNAL PROCESSING SECTION
IMAGE PROCESSING SECTION
CPU
SYSTEM BUS
IC4
DRAM
⑫
⑪
IC6
FLASH
⑦
④
⑬
⑩
⑤
⑥
RAM
⑧
THERMAL HEAD
⑨
P/S CONVERTER
MODEM
IC5
NCU
TEL. LINE

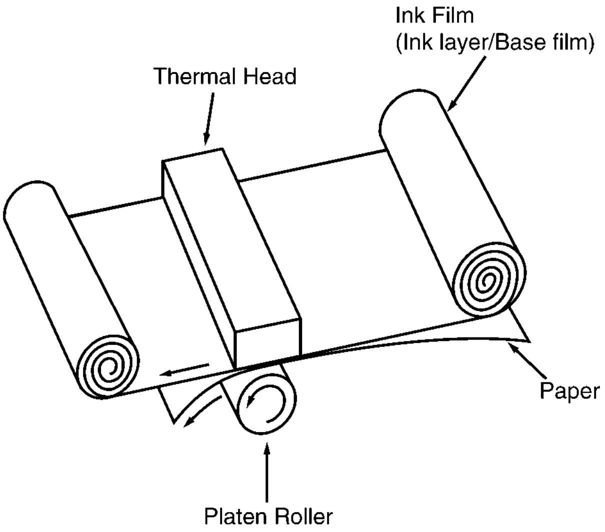
6.4.3. Thermal Head

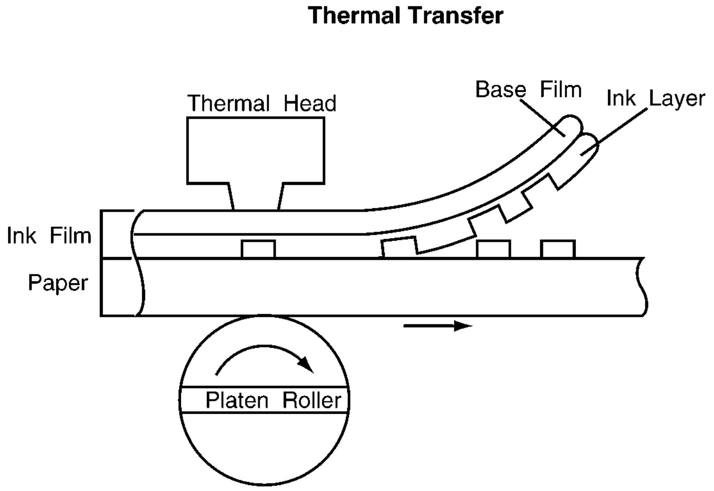
1. **Function**

   This unit utilizes the state of the art thermal printer technology.

   The ink film is chemically processed. The ink film is comprised of two parts: an ink layer and a base film. When the thermal head contacts this ink film, it emits heat momentarily, and the ink layer is melted and transferred to 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)




Thermal Transfer

2. **Circuit Operation**

   Refer to the block diagram and the timing chart on the following page.

   There are 9 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 192 heat emitting registers. This means that one line is at a density of 192×9=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 9 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.

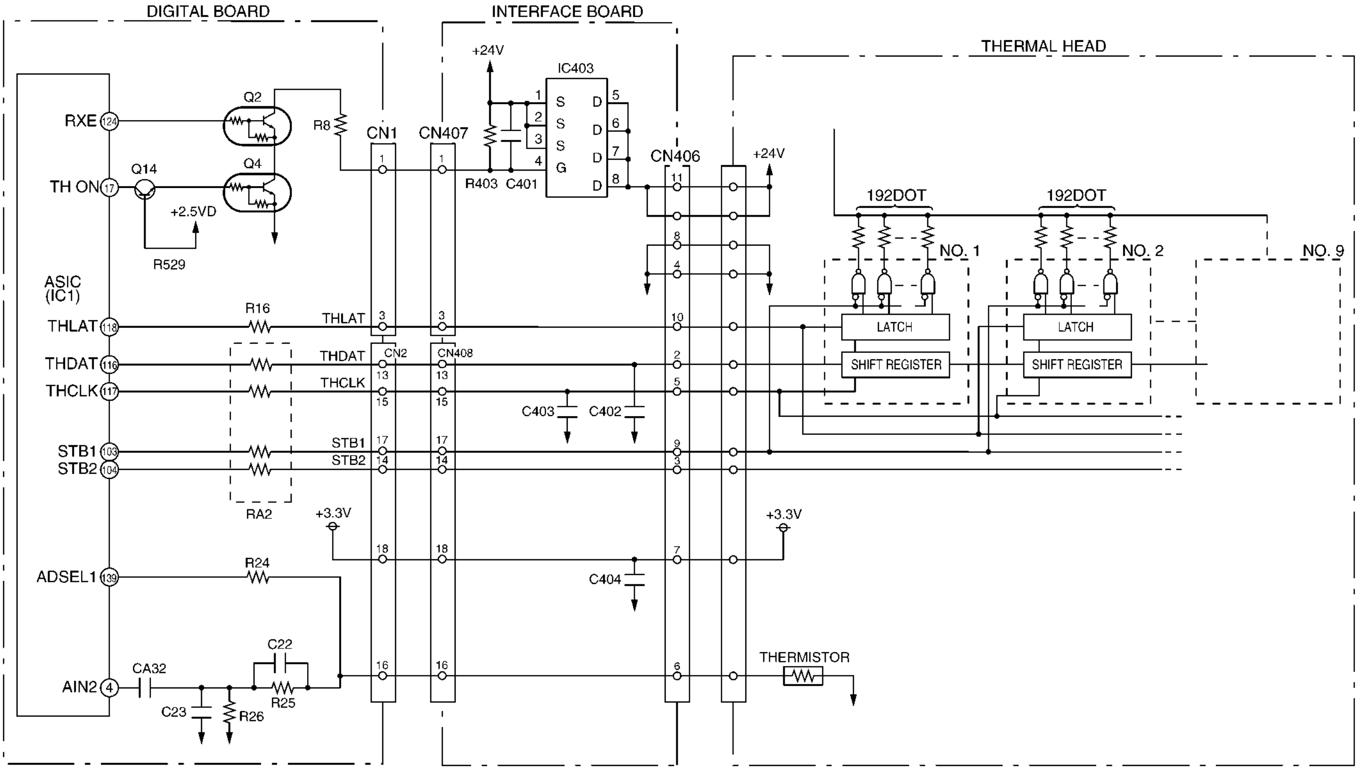
   Here, the two line strobes, STB1 and STB2, impress at intervals of 9.216 msec, as required for one-line printout.

   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. Depending on that value, the strobe width is recorded in ROM (IC6).

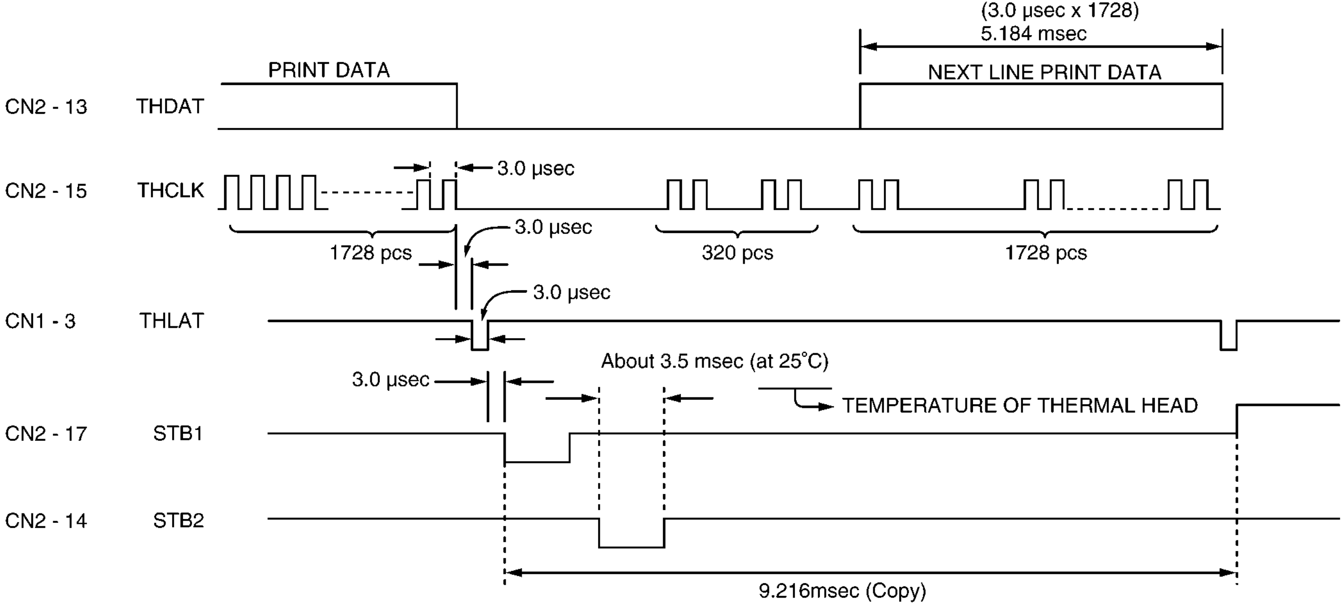
   Accordingly, the strobe width is determined.

   When the thermal head is not used, the IC1 (17, THON) becomes low, Q502 turns OFF, Q401 turns OFF, and the +24 V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram


DIGITAL BOARD
INTERFACE BOARD
THERMAL HEAD
RXE 124
TH ON 17
Q2
Q4
Q14
+2.5VD
R529
R8
CN1
CN407
+24V
IC403
S
S
S
G
D
D
D
D
R403
C401
CN406
+24V
192DOT
192DOT
NO. 1
NO. 2
NO. 9
ASIC
(IC1)
THLAT 118
THDAT 116
THCLK 117
STB1 103
STB2 104
R16
THLAT
THDAT
THCLK
CN2
CN408
LATCH
LATCH
SHIFT REGISTER
SHIFT REGISTER
C403
C402
STB1
STB2
RA2
+3.3V
+3.3V
ADSEL1 139
R24
C404
C22
CA32
AIN2 4
R25
C23
R26
THERMISTOR

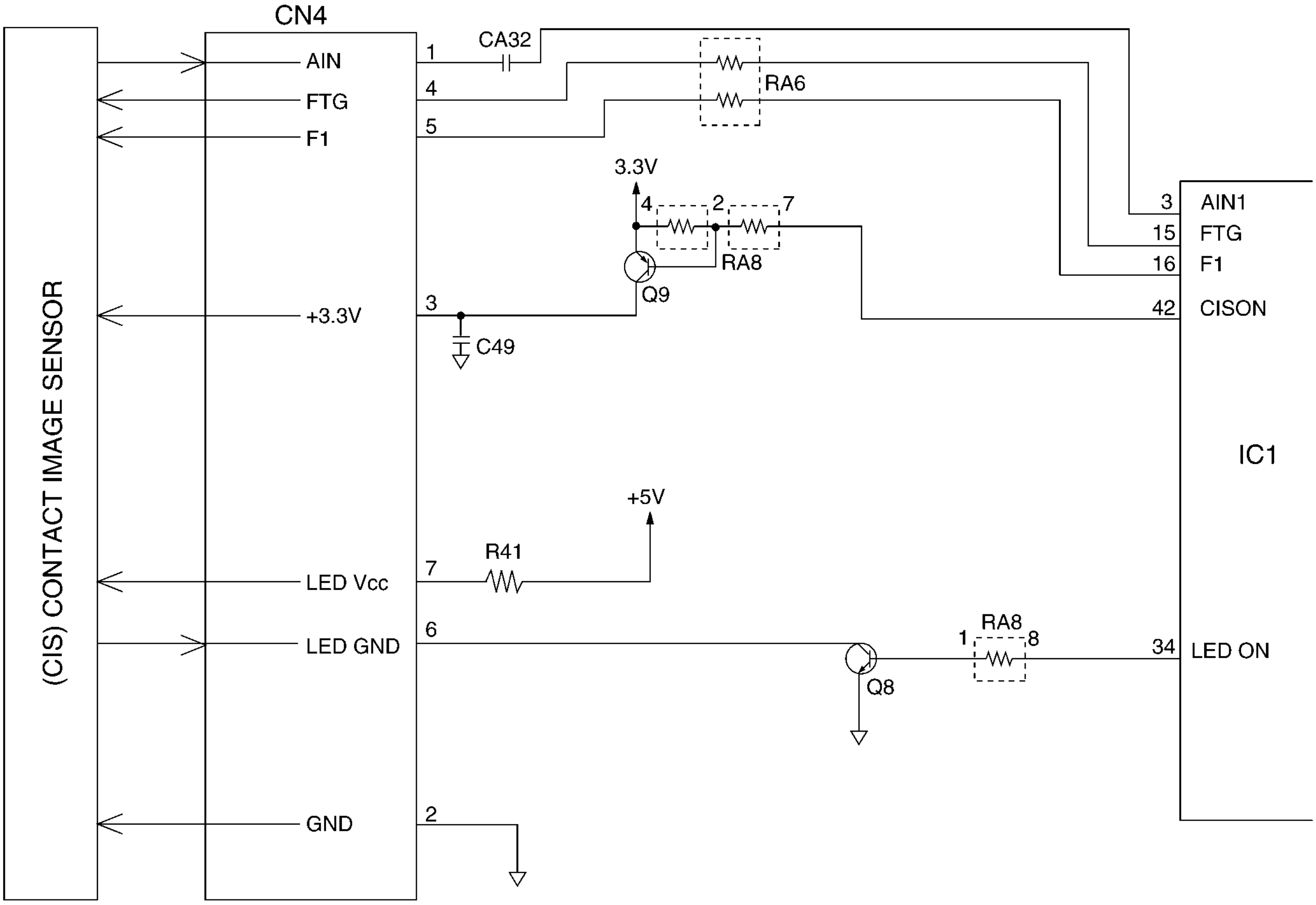
Timing Chart



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, an LED array, and photoelectric conversion elements.

Circuit Diagram

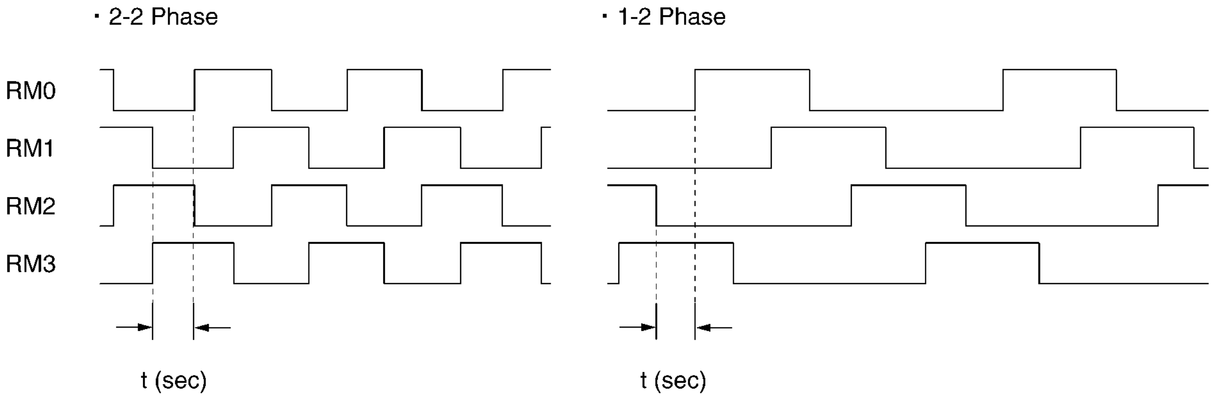

CN4
(CIS) CONTACT IMAGE SENSOR
AIN
FTG
F1
+3.3V
LED Vcc
LED GND
GND
1
4
5
3
7
6
2
CA32
RA6
3.3V
4
2
7
RA8
Q9
C49
+5V
R41
RA8
1
8
Q8
3
AIN1
15
FTG
16
F1
42
CISON
IC1
34
LED ON

When an original document is inserted and the start button pressed, pin 34 of IC1 goes to a high level and the transistor Q8 turns on.This applies voltage to the LED array 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 LED array 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 (RX)

1. **Function**
   The stepping motor works for reception and copy.
2. **Motor**
   During motor driving, pin 124 of ASIC IC1 becomes high level, IC401 10pin becomes low level, and Q401 turns ON. As a result, +24V is supplied to the motor coil.
   Stepping pulses are output from ASIC IC1 pins, 124, 120~123, causing driver IC401 pins, 16~13 to drive the Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation.
   The timing chart is below.

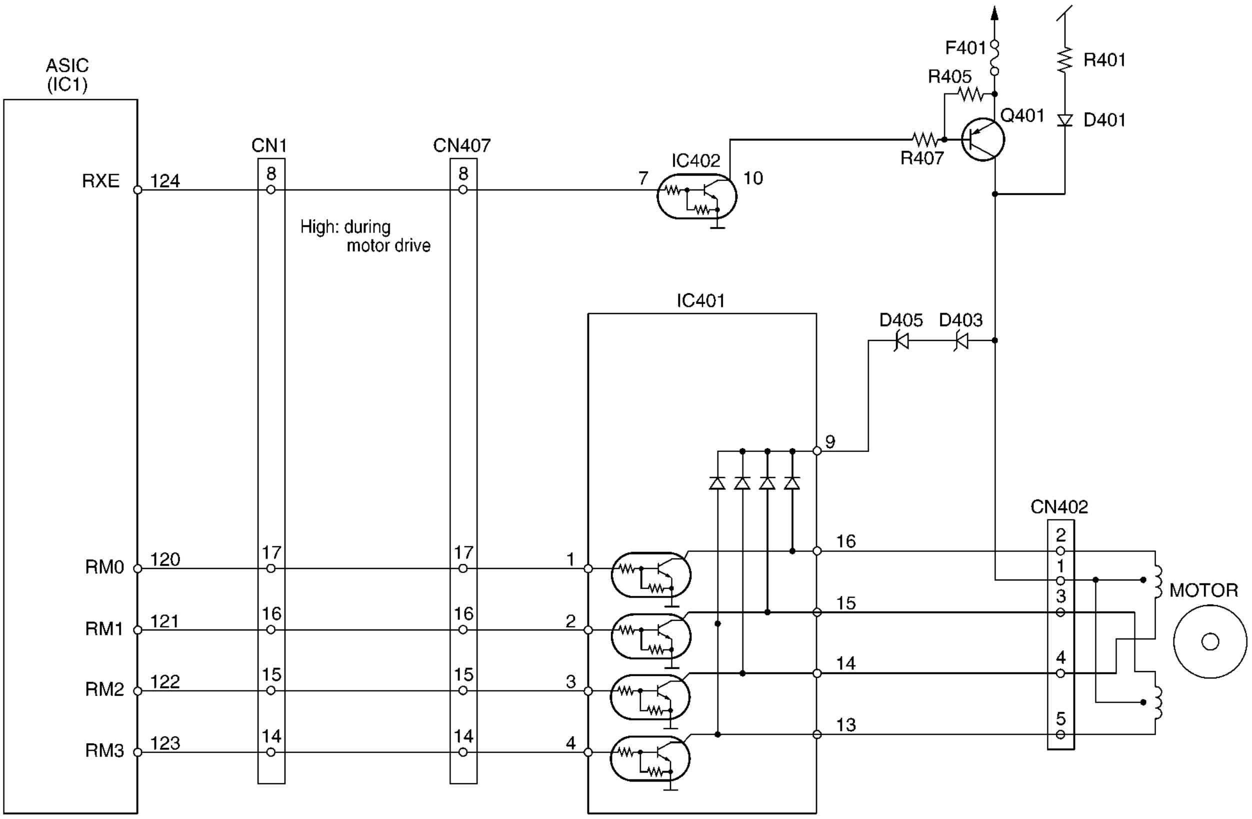
Stepping Monitor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine, Photo	1-2	432 pps (t=1/432)
	Super Fine	1-2	216 pps (t=1/216)
FAX Receiving	Standard, Fine, Photo	1-2	432 pps (t=1/432)
	Super Fine	1-2	216 pps (t=1/216)
Paper Feed	———	1-2	432 pps (t=1/432)
Stand-by	———	All phases are currently off.	None

Circuit Diagram


+24V
+6V
F401
R405
R401
Q401
D401
R407
ASIC
(IC1)
RXE
124
CN1
8
CN407
8
IC402
7
10
High: during
motor drive
IC401
D405
D403
9
CN402
16
15
14
13
RM0
120
RM1
121
RM2
122
RM3
123
17
16
15
14
1
2
3
4
2
1
3
4
5
MOTOR

When the motor suspends while it is in the receive mode (about 70~80 msec), pin 124 of ASIC IC1 becomes a low level and Q401 turns OFF, and instead of +24 V, +6 V is supplied through D401 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors turn OFF. Consequently, the motor current stops.

6.4.6. Stepping Motor Drive Circuit (TX)

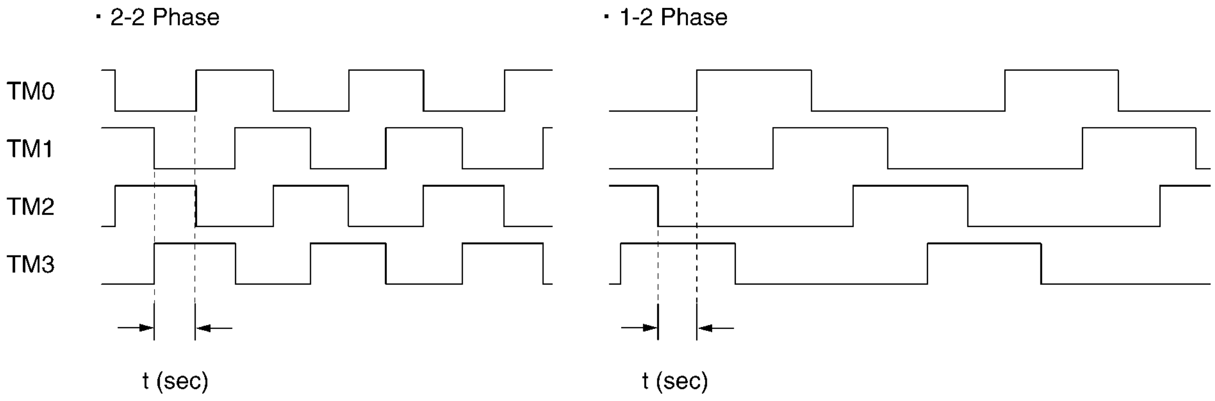
1. **Function**

   The stepping motor works for reception and copy.

2. **Motor**

   During motor driving, pin 131 of ASIC IC1 becomes high level, IC401 10pin becomes low level, and Q402 turns ON. As a result, +24V is supplied to the motor coil.
   Stepping pulses are output from ASIC IC1 pins, 131, 125, 128~130, causing driver IC402 pins, 16~13 to drive the Motor Coil.
   The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation.
   The timing chart is below.

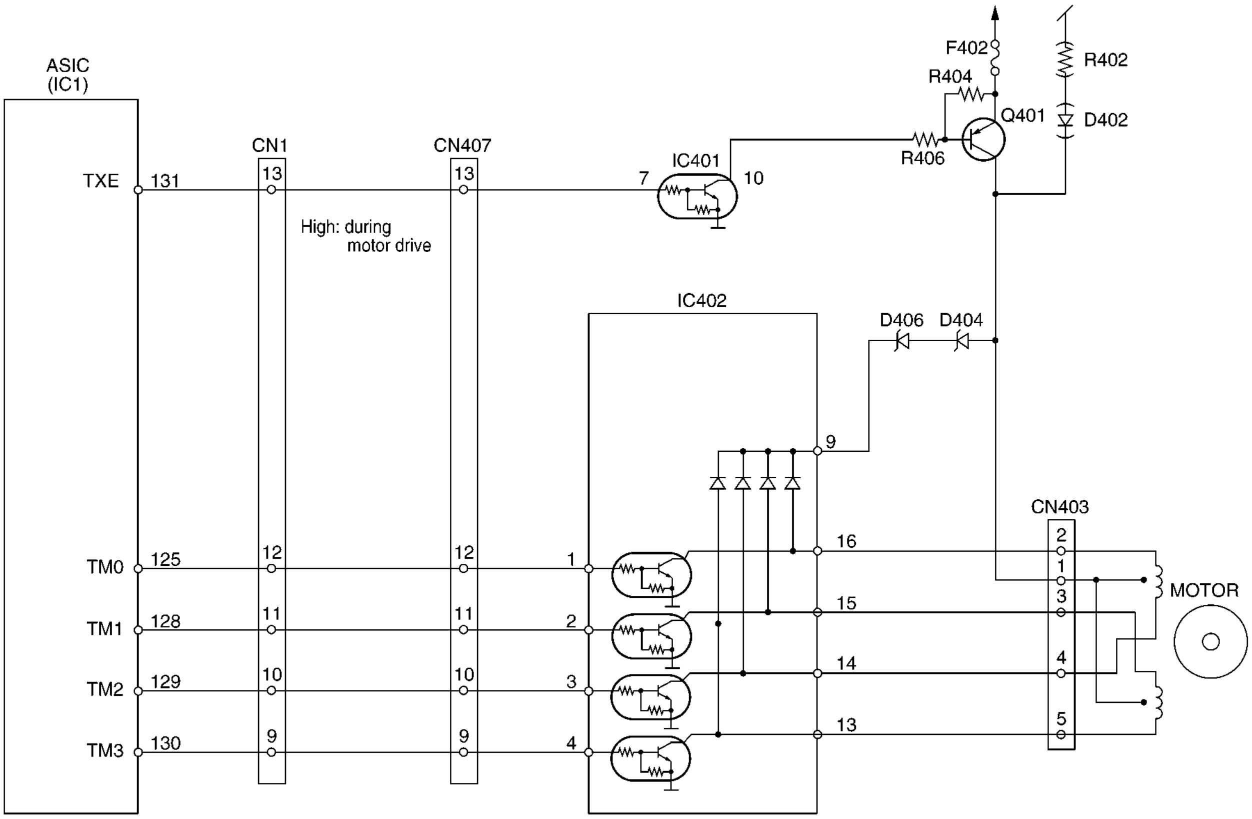
Stepping Monitor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine, Photo	1-2	432 pps (t=1/432)
	Super Fine	1-2	216 pps (t=1/216)
FAX Sending	Standard	1-2	432 pps (t=1/432)
	Fine, Photo	1-2	432 pps (t=1/432)
	Super Fine	1-2	216 pps (t=1/216)
Document Feed	———	1-2	432 pps (t=1/432)
Stand-by	———	All phases are currently off.	None

Circuit Diagram


+24V
+6V
F402
R404
R402
Q401
D402
R406
ASIC
(IC1)
CN1
CN407
IC401
TXE
131
13
13
7
10
High: during
motor drive
IC402
D406
D404
9
CN403
TM0
125
12
12
1
16
2
1
3
MOTOR
TM1
128
11
11
2
15
TM2
129
10
10
3
14
4
TM3
130
9
9
4
13
5

When the motor suspends while it is in the sending mode (about 70~80 msec), pin 131 of ASIC IC1 becomes a low level and Q402 turns OFF. When the system is in the stand-by mode, all of the motor drive transistors turn OFF. Consequently, the motor current stops.

6.5. Sensors and Switches

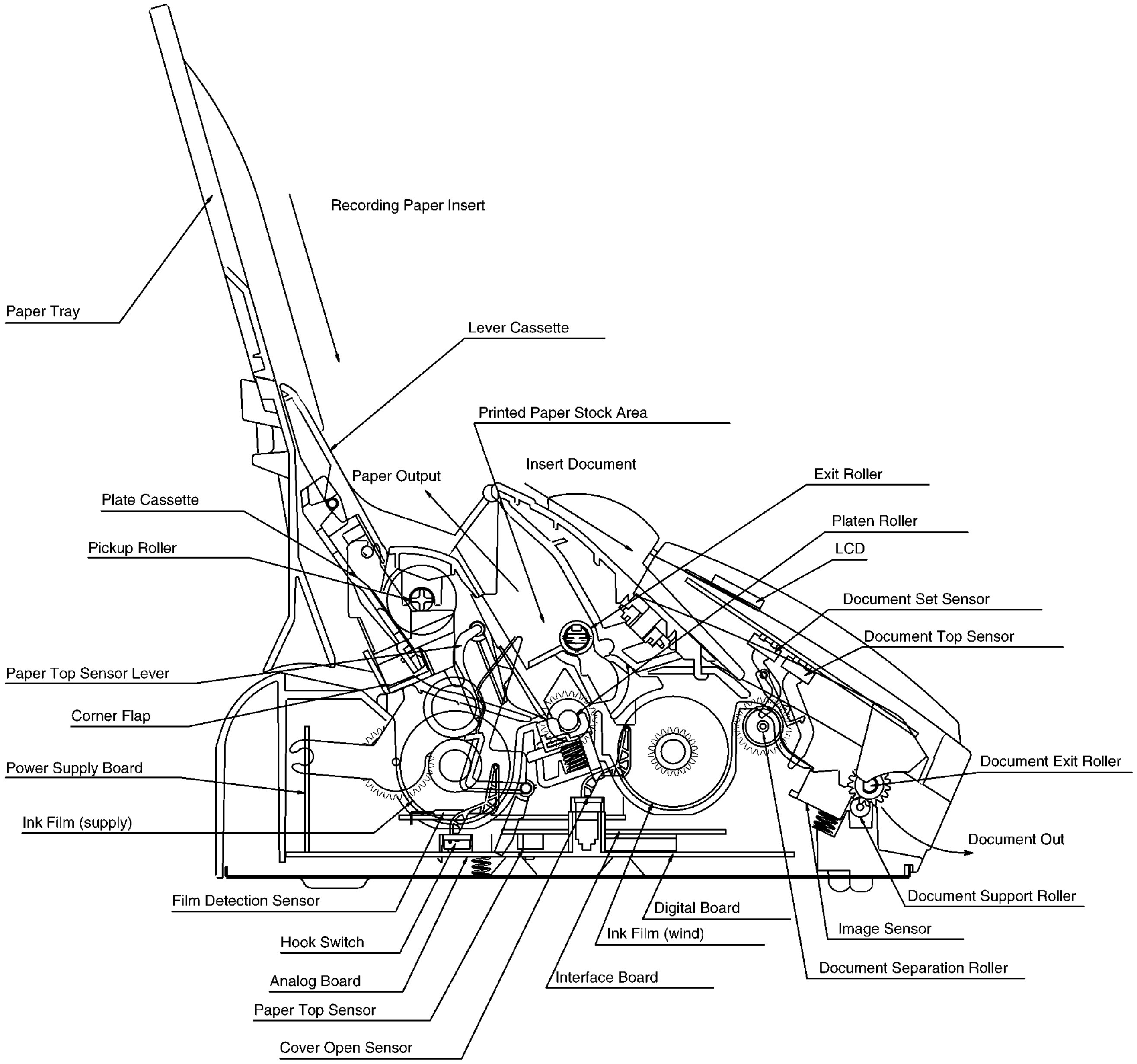
All of the sensor and switches are shown below.

Sensor Circuit Location	Sensor	Sensor or Switch Name	Error Message
Operation Panel	SW337	Document top sensor	[REMOVE DOCUMENT]
	SW338	Document set sensor	[CHECK DOCUMENT]
Sensor P.C.Board	SW502	Cover Open sensor	[BACK COVER OPEN]
	SW501	Film Detection sensor	[FILM EMPTY] [CHECK FILM]
Analog Board	SW101	Hook switch	————
Interface Board	PS401	Paper Top sensor	[PAPER JAMMED]

Note:

See **Test Mode** (P.63). (#815: Sensor Check)

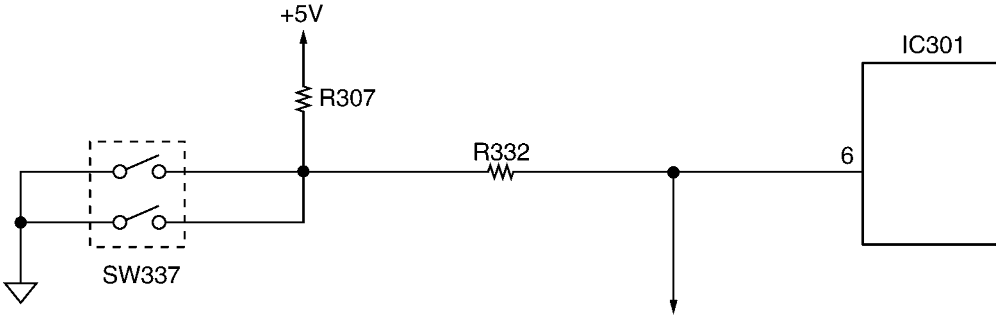
Sensor Locations


Recording Paper Insert
Paper Tray
Lever Cassette
Printed Paper Stock Area
Insert Document
Paper Output
Exit Roller
Plate Cassette
Platen Roller
LCD
Pickup Roller
Document Set Sensor
Document Top Sensor
Paper Top Sensor Lever
Corner Flap
Document Exit Roller
Power Supply Board
Document Out
Ink Film (supply)
Document Support Roller
Film Detection Sensor
Digital Board
Image Sensor
Hook Switch
Ink Film (wind)
Document Separation Roller
Analog Board
Interface Board
Paper Top Sensor
Cover Open Sensor

6.5.1. Document Top Sensor (SW337)

When a document is brought to the read position, the SW turns ON, and the input signal of IC301-6 pin (Operation Board) becomes a low level. When there is no document at the read position, the SW turns OFF, and the input signal of IC301-6 pin (Operation Board) becomes a high level.

Circuit Diagram

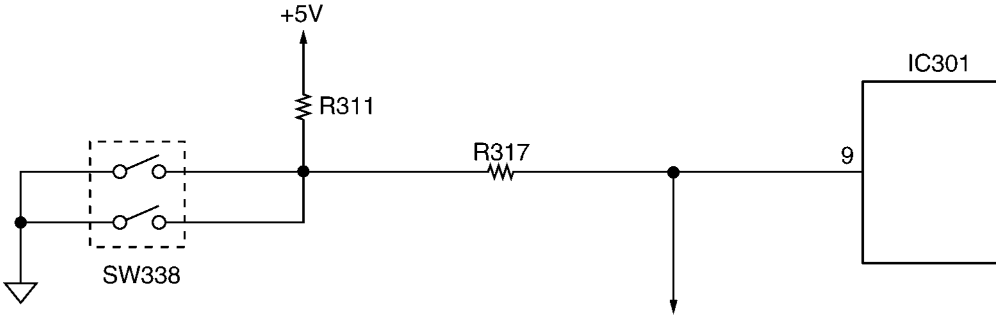


	SW	Signal (IC301-6 pin)
Out of the Read Position	OFF	High level
At the Read Position	ON	Low level

6.5.2. Document Set Sensor (SW338)

When a document is set, the SW turns ON, and the input signal of IC301-9 pin (Operation Board) becomes a low level. When there is no document, the SW turns ON, and the input signal of IC301-9 pin (Operation Board) becomes a high level.

Circuit Diagram



	SW	Signal (IC301-9 pin)
No document	OFF	High level
Set document	ON	Low level

6.5.3. Paper Top Sensor (PS401)

When the recording paper is loaded on the print head, the shelter plate shuts the sensor light, and the photo transistor turns OFF. The input signal of IC5-65 pin becomes a high level. Usually, the shelter plate is lifted, the photo transistor turns ON, and the input signal of IC1-102 pin becomes a low level.

Circuit Diagram

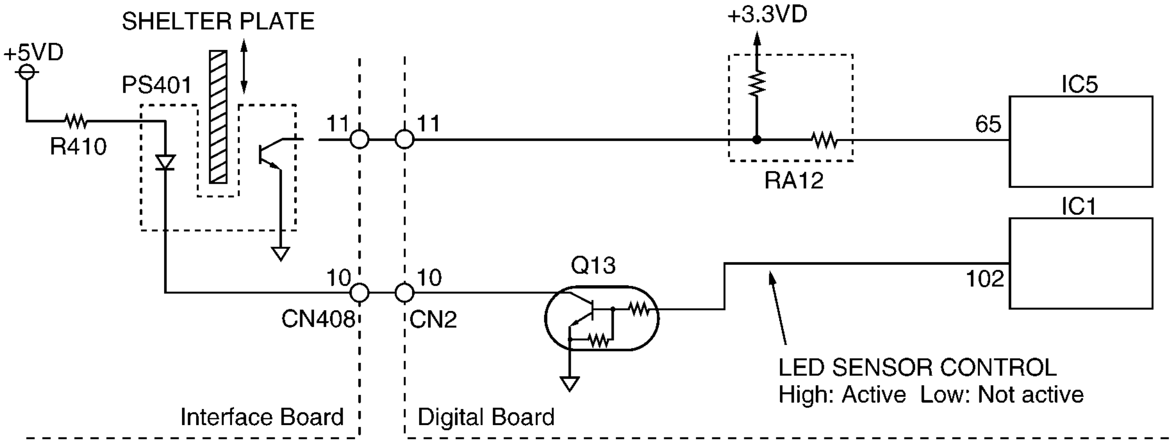
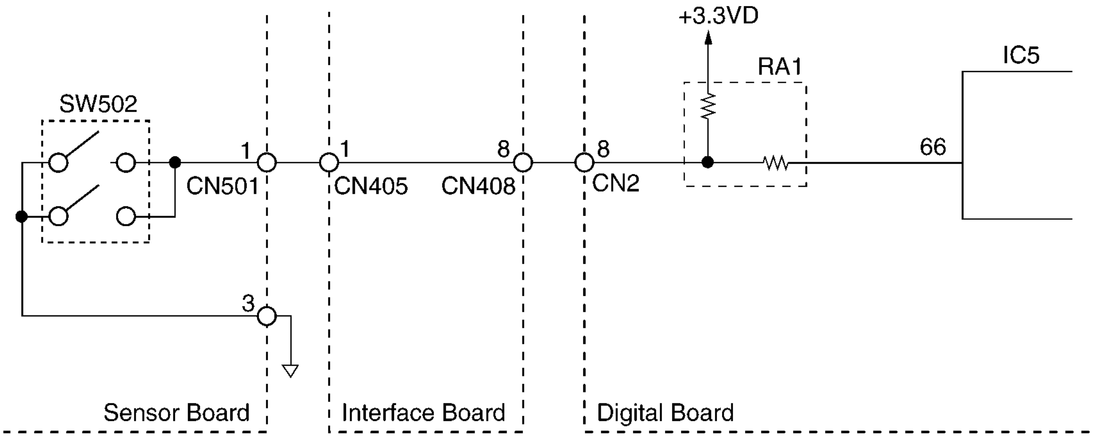

SHELTER PLATE
+5VD
PS401
R410
+3.3VD
IC5
65
RA12
IC1
102
11
11
10
10
CN408
CN2
Q13
LED SENSOR CONTROL
High: Active Low: Not active
Interface Board
Digital Board

	Photo transistor	Signal (IC5-65 pin)
Recording paper top	OFF	High level
No recording paper	ON	Low level

6.5.4. Cover Open Sensor (SW502)

When the u-TURN BLOCK is closed, the SW becomes ON, and the input signal of IC5-66 pin (Digital Board) becomes a low level. When the cover is opened, the SW becomes OFF, and the input signal of IC5-66 (Digital Board) pin becomes a high level.

Circuit Diagram

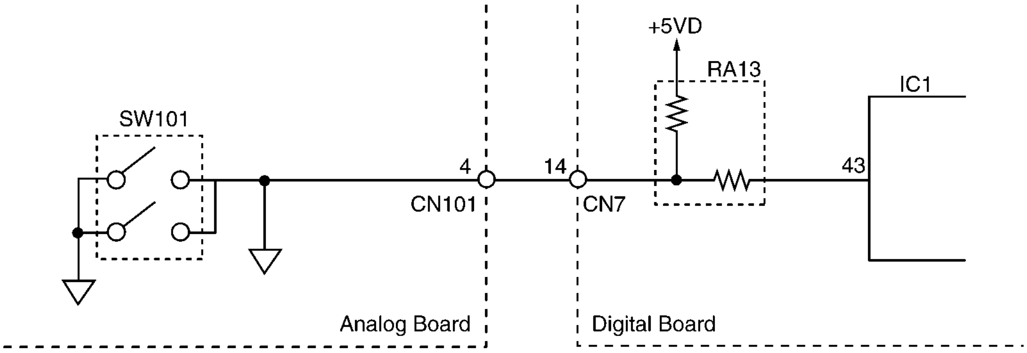

+3.3VD
RA1
IC5
SW502
1
1
8
8
66
CN501
CN405
CN408
CN2
3
Sensor Board
Interface Board
Digital Board

	SW	Signal (IC5-66 pin)
Cover is opened	OFF	High level
Cover is closed	ON	Low level

6.5.5. Hook Switch (SW101)

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


+5VD
RA13
IC1
SW101
4
14
43
CN101
CN7
Analog Board
Digital Board

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

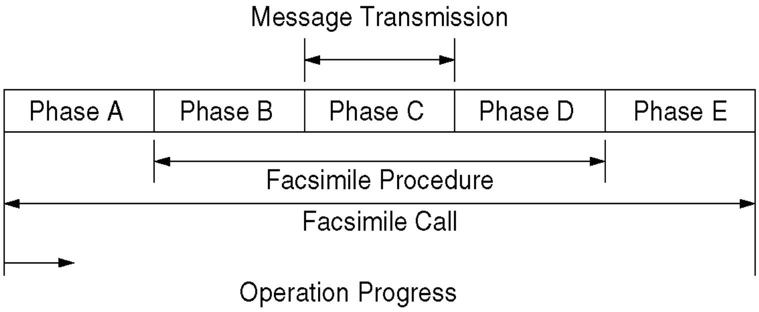
The No. XIV Group of ITU-T, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimiles.

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

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

Transmission time consists of the following.

Control time:
This is time at the start of transmission when 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, 12000, 14400bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension: MH Mode 2 dimension: MR Mode (K=2.4), MMR
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.

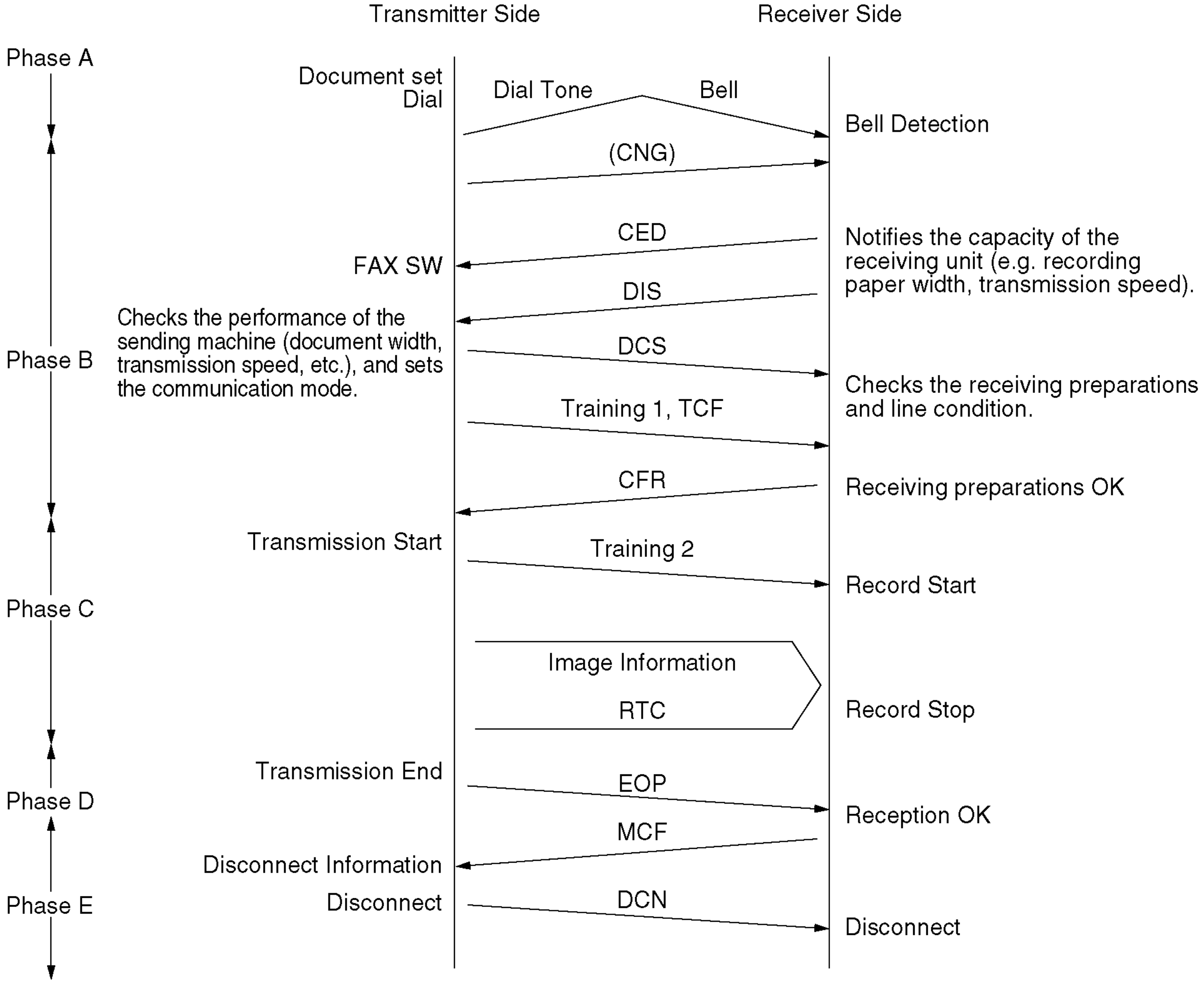
6. **Explanation of Communication and Compression Technology**

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.


Transmitter Side
Receiver Side
Phase A
Phase B
Phase C
Phase D
Phase E
Document set
Dial
Dial Tone
Bell
Bell Detection
(CNG)
CED
FAX SW
Notifies the capacity of the receiving unit (e.g. recording paper width, transmission speed).
DIS
Checks the performance of the sending machine (document width, transmission speed, etc.), and sets the communication mode.
DCS
Checks the receiving preparations and line condition.
Training 1, TCF
CFR
Receiving preparations OK
Transmission Start
Training 2
Record Start
Image Information
RTC
Record Stop
Transmission End
EOP
Reception OK
MCF
Disconnect Information
Disconnect
DCN
Disconnect

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.

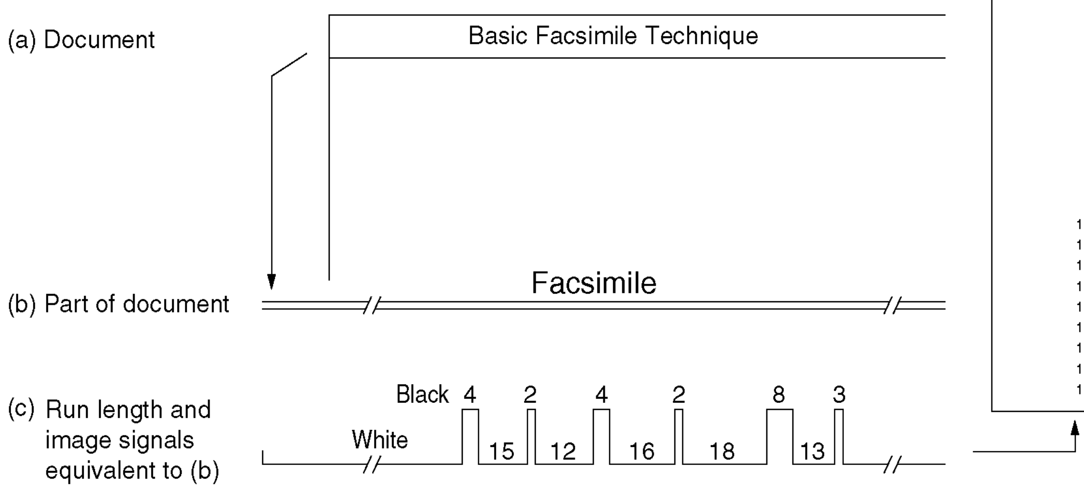
Note 3 - Standard facsimile units conforming to T.4 must have the following capability: Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————	A fixed pattern is transmitted to the receiving side at a speed (2400 to 14400 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	0000110111
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000


(a) Document
Basic Facsimile Technique
(b) Part of document
Facsimile
(c) Run length and image signals equivalent to (b)
Black 4 2 4 2 8 3
White
15
12
16
18
13

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

001101111101010	011	110101	11	001000	011	101010
(White 400)	(Black 4)	(White 15)	(Black 2)	(White 12)	(Black 4)	(White 16)

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

(c) Total bit number before MH codification (497 bit)

(d) Total bit number after MH codification (63 bit)

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 IRQn (pin 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 (X4).

1. **Facsimile Transmission**

   The digital image data on the data bus is modulated in the modem (IC5), and sent from pin 56 via Analogue SW IC11, amplifier IC10 and the NCU section to the telephone line.

   Refer to **Check Sheet for Signal Route** (P.125).

2. **Facsimile Reception**

   The analogue 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 **Check Sheet for Signal Route** (P.125).

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 **Check Sheet for Signal Route** (P.125).

   (DTMF Monitor Tone)
   Refer to **Check Sheet for Signal Route** (P.125).

4. **Call Tone Transmission**

   This is the call signal which is generated in the ASIC (IC1) and sent to the speaker.

   Refer to **Check Sheet for Signal Route** (P.125).

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 IC101 pin (2-1). And it enters pin 50 of the modem (IC5).

6.7. NCU Section

6.7.1. General

NCU is the interface with the telephone line. It is composed of Bell detection circuit, Pulse dial circuit, Line amplifier and sidetone circuits. The following is a brief explanation of each circuit.

6.7.2. EXT. TEL. Line Relay (RLY101)

1. **Circuit Operation**

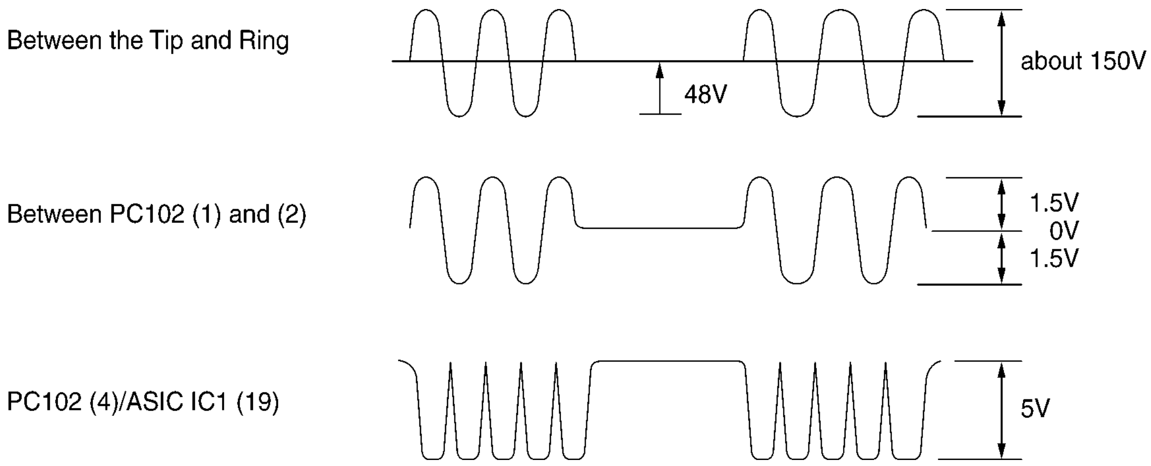
   Normally, this relay switches to the external telephone side (break) and switches to the tel line side (make) while OFF-HOOK.

   {IC1 (44) High Level → CN7 (15) High Level} → CN101 (3) High Level → Q106 ON → RLY101 (make)

6.7.3. Bell Detection Circuit

1. **Circuit Operation**

   The signal waveform for each section is indicated below. The signal (low level section) input to pin 19 of ASIC IC1 on the digital board is illustrated.



   TEL LINE → PC102 (1, 2 → 4) → IC1 (19): Bell

6.7.4. Pulse Dial Circuit and ON/OFF Hook Circuit

IC1 (130) → LOW LEVEL (MAKE) → Q106 ON (MAKE) → RLY101 ON (MAKE) → TEL LINE
IC1 (130) → HIGH LEVEL (BREAK) → Q106 OFF (BREAK) → RLY101 OFF (BREAK) → TEL LINE

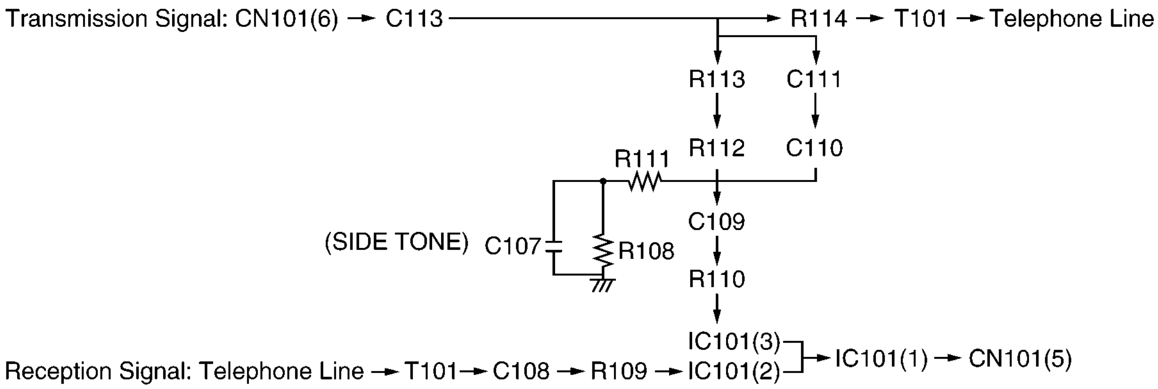
6.7.5. Line Amplifier and Side Tone Circuit

1. **Circuit Operation**

   The reception signal output from the line transformer T101 is input to pin (2) of IC101 via C108 and R109 and then the signal is amplified at pin (2) of IC101 and sent to the reception system at 0dB.

   The transmission signal is output from CN101 (6) and transmitted to T101 via R114. If the side tone circuit is not applied, the transmission signal will return to the reception amplifier via C108 and R109. When the side tone circuit is active, the signal output from IC101 pin (1) passes through R113, C110, C109 and R110 and goes into the amplifier IC101 pin (3). This circuit is used to cancel the transmission return signal.

Side Tone Circuit


Transmission Signal: CN101(6) → C113
R114 → T101 → Telephone Line
R113
C111
R112
C110
R111
C109
(SIDE TONE) C107
R108
R110
IC101(3)
Reception Signal: Telephone Line → T101 → C108 → R109 → IC101(2)
IC101(1) → CN101(5)

6.7.6. Calling Line Identification Circuit (FSK)

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.

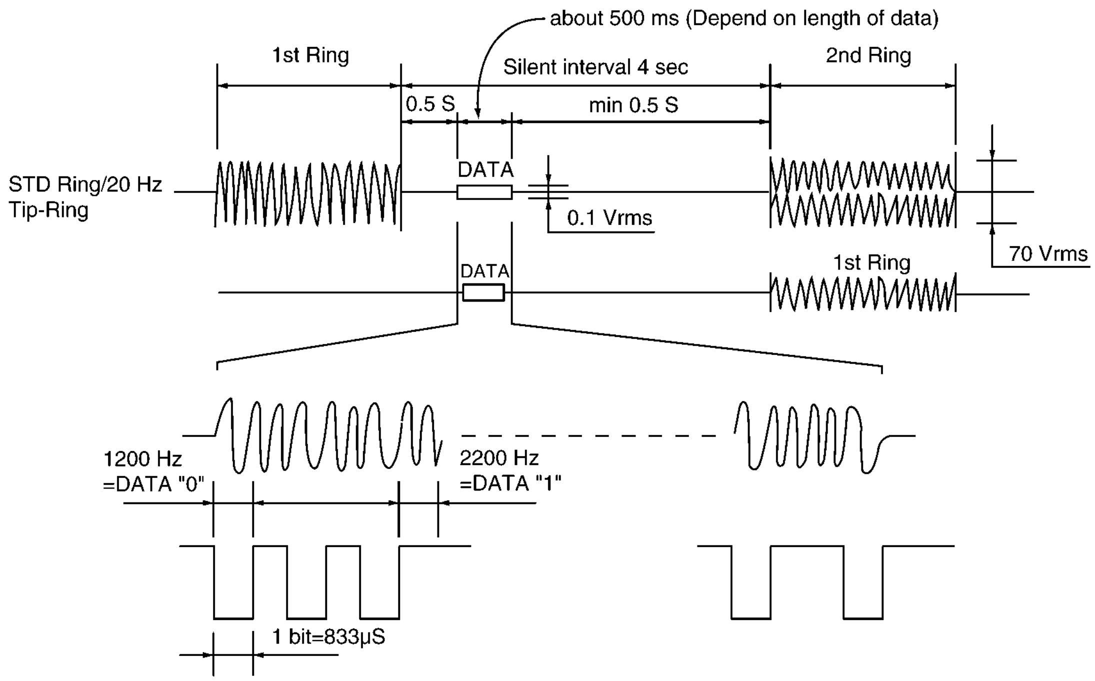
   When there is multiple data in the unit, the name or telephone number are displayed.

2. **Circuit Operation:**

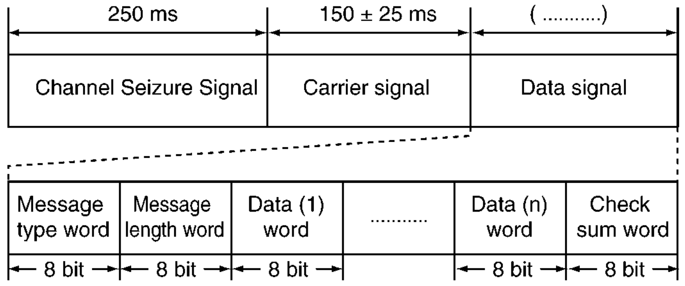
   The Caller ID signal input from TEL LINE is processed with MODEM (IC5).

   Refer to **Check Sheet for Signal Route** (P.125) for the route of Caller ID signal.

Timing Chart

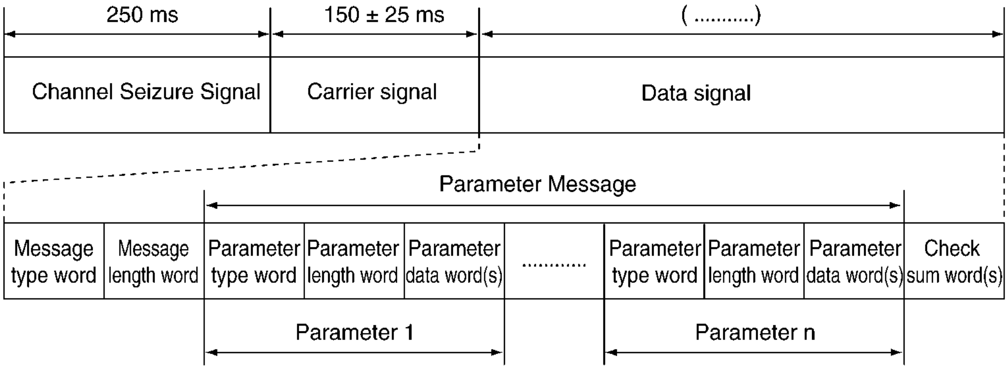

about 500 ms (Depend on length of data)
1st Ring
Silent interval 4 sec
2nd Ring
0.5 S
min 0.5 S
STD Ring/20 Hz
Tip-Ring
DATA
0.1 Vrms
70 Vrms
DATA
1st Ring
1200 Hz
=DATA "0"
2200 Hz
=DATA "1"
1 bit=833μS

•Single data message


250 ms
150 ± 25 ms
(...........)
Channel Seizure Signal
Carrier signal
Data signal
Message type word
Message length word
Data (1) word
....
Data (n) word
Check sum word
8 bit
8 bit
8 bit
8 bit
8 bit

- •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


250 ms
150 ± 25 ms
(...........)
Channel Seizure Signal
Carrier signal
Data signal
Parameter Message
Message type word
Message length word
Parameter type word
Parameter length word
Parameter data word(s)
....
Parameter type word
Parameter length word
Parameter data word(s)
Check sum word(s)
Parameter 1
Parameter n

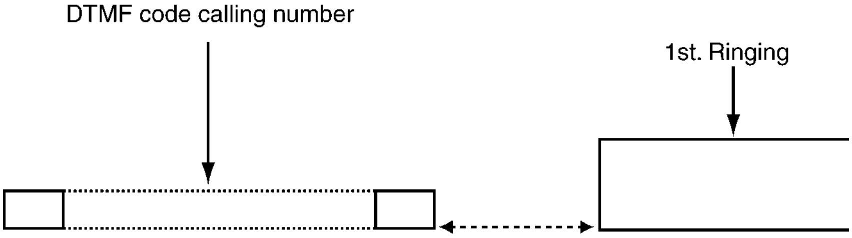
·1 word = All 8 bit data
·Message Type = Fixed value "10000000"
·Message Length Word = number of the Parameter Message word
·Parameter Type Word = Kind of data (ex. the time, phone number)
·Parameter Length Word = number of the Parameter data word
·Parameter Word (s) = the data value

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 **Check Sheet for Signal Route** (P.125) for the route of Caller ID (DTMF) signal.

Timing Chart


DTMF code calling number
1st. Ringing

6.8. ITS (Integrated telephone System) and Monitor Section

6.8.1. General

The general ITS operation is performed by the special IC5 which has a handset circuit. The alarm tone, the key tone, and the beep are output from the ASIC IC1 (digital board). During the pulse dial operation, the monitor tone is output from the ASIC IC1.

6.8.2. Speakerphone Circuit

1. **Function**
   The circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.
2. **Circuit Operation**
   The speakerphone can only provide duplex.
3. **Signal path**
   Refer to **Check Sheet for Signal Route** (P.125).

6.8.3. 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 **Check Sheet for Signal Route** (P.125).

6.8.4. Monitor Circuit for Each Signals

1. **Function**
   This circuit monitors various tones, such as **1** DTMF tone, **2** Alarm/Beep/Key tone/Bell.
2. **Signal path**
   Refer to **Check Sheet for Signal Route** (P.125).

6.9. ATAS (Automatic Telephone Answering System) Section

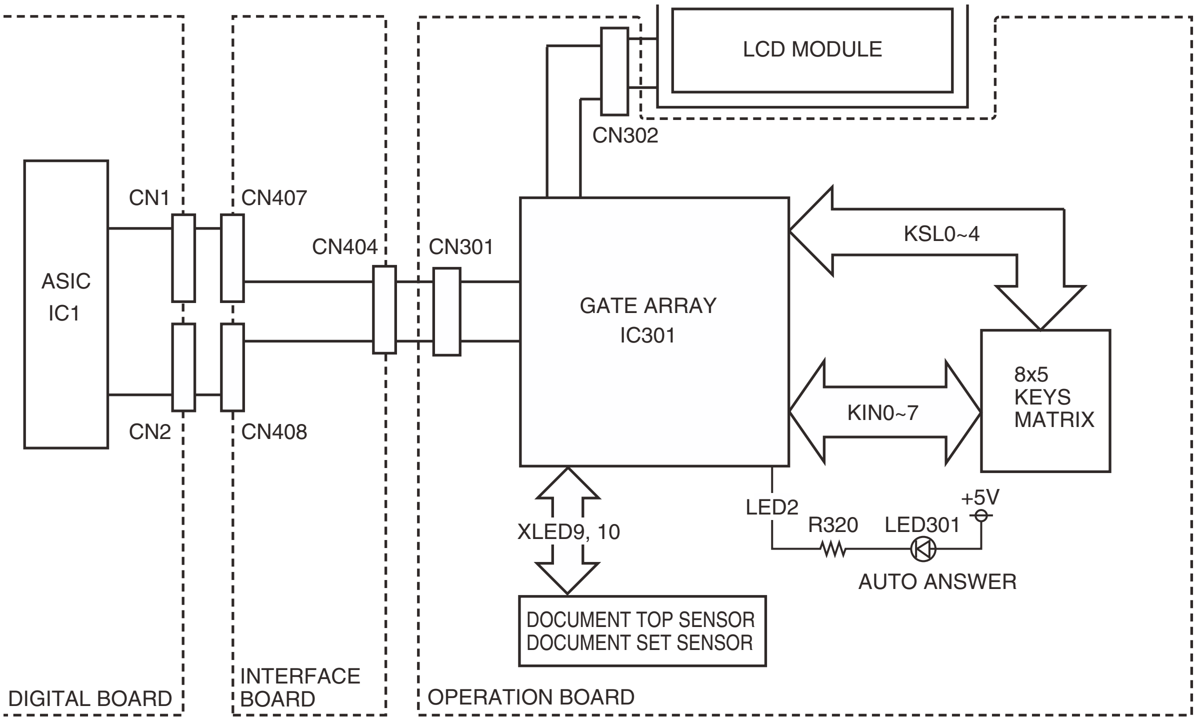
1. **Function**
   The ATAS main operation is performed by the special IC5 (MODEM). IC8 (FLASH MEMORY) control signals are input from ASIC IC1.
   a. Greeting/Message Recording
   b. ICM Recording
   c. Greeting/Message/ICM play to speaker
   d. Greeting/Message/ICM play to Tel Line
   e. Vox Detection

2. **Signal Path**
   Refer to **Check Sheet for Signal Route** (P.125).

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 (IC301) and ASIC (IC1: on the Digital BOARD).

The key matrix table is shown below.


LCD MODULE
CN302
ASIC
IC1
CN1
CN407
CN404
CN301
CN2
CN408
GATE ARRAY
IC301
KSL0~4
KIN0~7
8x5
KEYS
MATRIX
XLED9, 10
LED2
R320
LED301
+5V
AUTO ANSWER
DOCUMENT TOP SENSOR
DOCUMENT SET SENSOR
DIGITAL BOARD
INTERFACE
BOARD
OPERATION BOARD

KX-FP365CX / KX-FM388CX: OPERATION BOARD BLOCK DIAGRAM

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6	KIN7
KSL0	SW301 1	SW305 2	SW309 3	SW313 REDIAL/PAUSE	SW317 CALLER ID	SW322 SET	SW327 Station Key4	SW335 START
KSL1	SW304 4	SW306 5	SW310 6	SW314 FLASH	SW318 MENU	SW323 →	SW328 Station Key5	SW333 STOP
KSL2	SW302 7	SW307 8	SW311 9	SW315 MUTE	SW319 ←	SW324 Station Key1/ BROADCAST	SW329 LOWER	SW334 COPY
KSL3				SW336 PLAYBACK	SW321 ↓	SW326 Station Key3	SW331 ERASE	
KSL4	SW303 *	SW308 0	SW312 #	SW316 DIGITAL SP-PHONE	SW320 ↑	SW325 Station Key2	SW330 RECORD	SW332 AUTO ANSWER

LED

LED2	AUTO ANSWER

LED Port Setting :
LED ON : Low , LED OFF : High

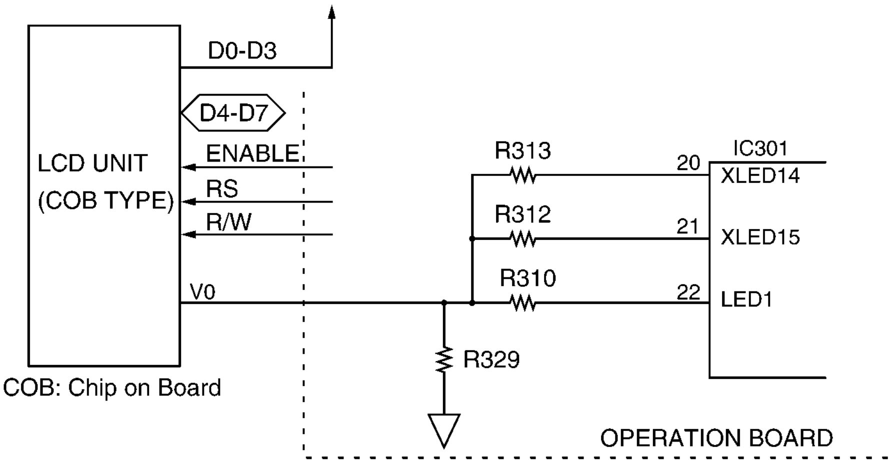
SENSOR

Sensor Name	Type	Sensor Setting
Document Top Sensor	Mechanical Switch	XLED9 = High : DOCUMENT TOP undetect XLED9 = Low : DOCUMENT TOP detect
Document Set Sensor	Mechanical Switch	XLED10 = High : DOCUMENT not available XLED10 = Low : DOCUMENT available

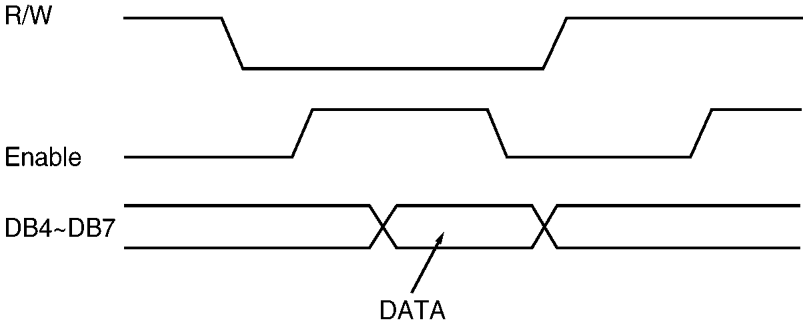
6.11. LCD Section

The Gate Array (IC301) works only for writing the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive. R310, R312, R313 and R329 are density control resistors.
Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry in the gate array (IC301).

Circuit Diagram


LCD UNIT
(COB TYPE)
D0-D3
D4-D7
ENABLE
RS
R/W
V0
R313
R312
R310
R329
20
21
22
IC301
XLED14
XLED15
LED1
COB: Chip on Board
OPERATION BOARD

Timing Chart

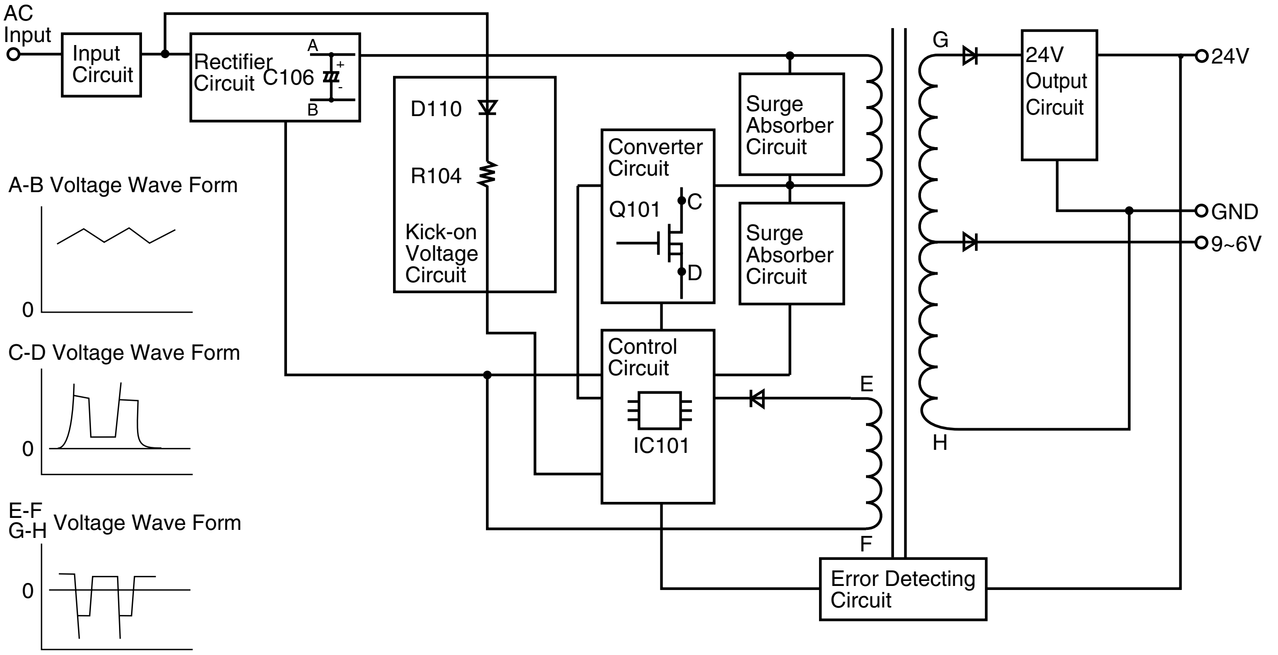

R/W
Enable
DB4~DB7
DATA

DIsplay mode	Density	Normal	Dark
2 lines (X1. 0)	LED1 (IC301-22pin)	H	L
	XLED15 (IC301-21pin)	L	L
	XLED14 (IC301-20pin)	Hi-Z	L
X1. 5	LED1	H	H
	XLED15	Hi-Z	L
	XLED14	Hi-Z	Hi-Z

6.12. Power Supply Board Section

This power supply board uses the switching regulator method.

Block Diagram


AC Input
Input Circuit
Rectifier Circuit
A
B
C106
+
-
D110
R104
Kick-on Voltage Circuit
Converter Circuit
Q101
C
D
Surge Absorber Circuit
Surge Absorber Circuit
Control Circuit
IC101
G
H
E
F
24V Output Circuit
24V
GND
9~6V
Error Detecting Circuit
A-B Voltage Wave Form
0
C-D Voltage Wave Form
0
E-F
G-H Voltage Wave Form
0

[Input Circuit]

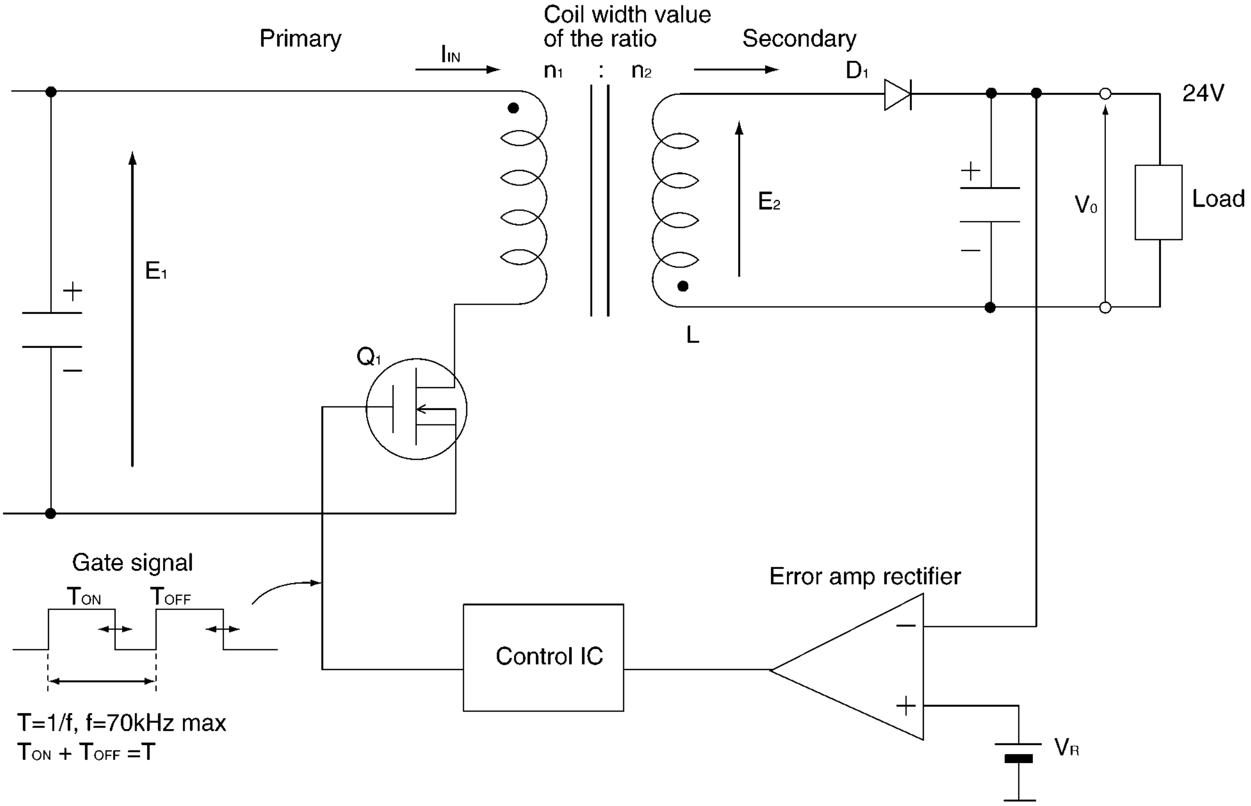
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.

[Rectifier Circuit]

The input current is rectified by D101, D102, D103 and D104 and charges C106 to make DC voltage. Then it supplies power to the converter circuit.

[Kick-on voltage circuit]

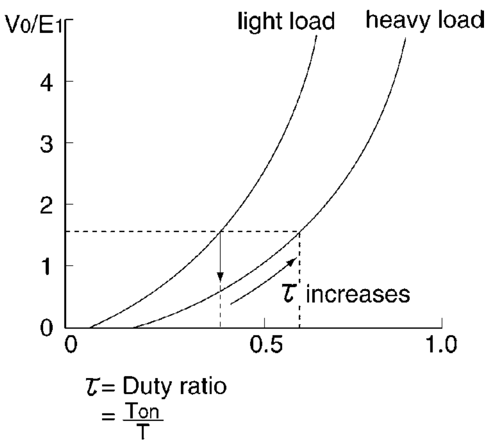
Bias is applied to the Q101 gate via this circuit when the AC power is turned on and Q101 begins operating.


Primary
Coil width value of the ratio
Secondary
IIN
n1 : n2
D1
24V
E1
E2
V0
Load
L
Q1
Gate signal
TON
TOFF
T=1/f, f=70kHz max
TON + TOFF =T
Control IC
Error amp rectifier
VR

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 → D_1 → Load → 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 IC according to the error amp rectifier. Then depending on how T_{ON} is controlled, stabilization occurs. Also, when the current load becomes too large, in order to decrease the voltage output, the increase in τ is controlled and the output voltage is stabilized.
Therefore, basically the timing: Ton/Toff of Q1 controls the output voltage.

Output/Input voltage value of ratio



[Surge Absorber Circuit]

This circuit is for absorbing surge voltage generated by the transformer.

[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 duty ratio is defined by changing the ON period of the main transistor.

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 IC becomes narrower and the ON period of Q101 becomes shorter.

[Over Current Limiter (O.C.L)]

The highest drain current (Q101) is limited by a limiter circuit (IC101) of 24V. The 24V output is limited by this circuit.

[Over Voltage Circuit]

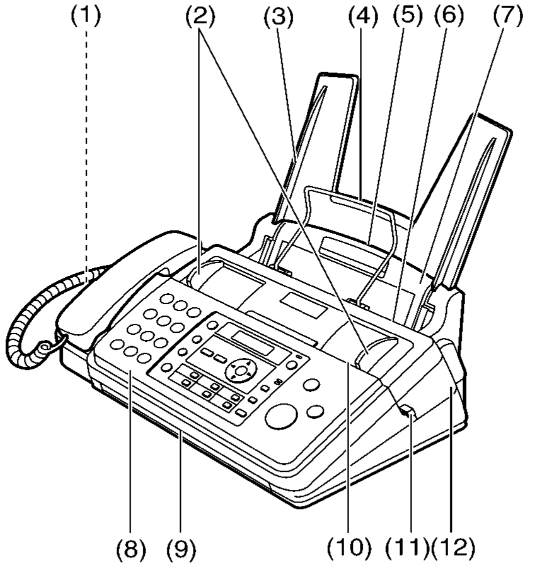
If the 24V output increases because the error detecting circuit or control circuit is broken, IC101 will recognize this signal and output becomes 0V.

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

Refer to **Power Supply Board Section** (P.129).

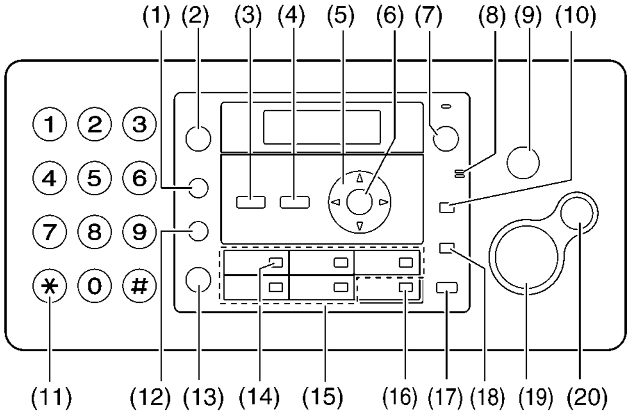
7 Location of Controls and Components

7.1. Overview



(1) Speaker
(2) Document guides
(3) Paper tray
(4) Paper support
(5) Recording paper entrance
(6) Recording paper exit
(7) Tension plate
(8) Front cover
(9) Document exit
(10) Document entrance
(11) Green button (Back cover release button)
(12) Back cover

7.2. Control Panel



(1) [FLASH]

- To access special telephone services or for transferring extension calls.
- The recall/flash time can be changed (feature #072 on **Program Mode Table** (P.100)).

(2) [REDIAL] [PAUSE]

- To redial the last number dialed. If the line is busy when you make a phone call using the **[DIGITAL SP-PHONE]** button, or when you send a fax, the unit will automatically redial the number 2 or more times.
- To insert a pause during dialing.

(3) [CALLER ID]

- To use Caller ID features.

(4) [MENU]

- To start or exit programming.

(5) Navigator key

[+][−][▲][▼][◄][►][PHONEBOOK][VOLUME]

- To adjust volume.
- To search for a stored item.

(6) [SET]

- To store a setting during programming.

(7) [AUTO ANSWER]

- To turn the auto answer setting ON/OFF.

(8) [MIC]

- The built-in microphone.

(9) [STOP]

- To stop an operation or programming session.
- To erase a character/number.

(10) [RECORD]

- To record your greeting message.
- To record your voice memo.

(11) [TONE]

- To change from pulse to tone temporarily during dialing when your line has rotary/pulse service.

(12) [MUTE]

- To mute your voice during a conversation. Press again to resume the conversation.

(13) [DIGITAL SP-PHONE]

- For speakerphone operation.

(14) [BROADCAST]

- To send a document to multiple parties.

(15) Station keys

- To use the one touch dial feature.

(16) [LOWER]

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

(17) [PLAYBACK]

- To play messages.

(18) [ERASE]

- To erase messages.
- To erase a stored item.

(19) [FAX START]

- To send or receive a fax.

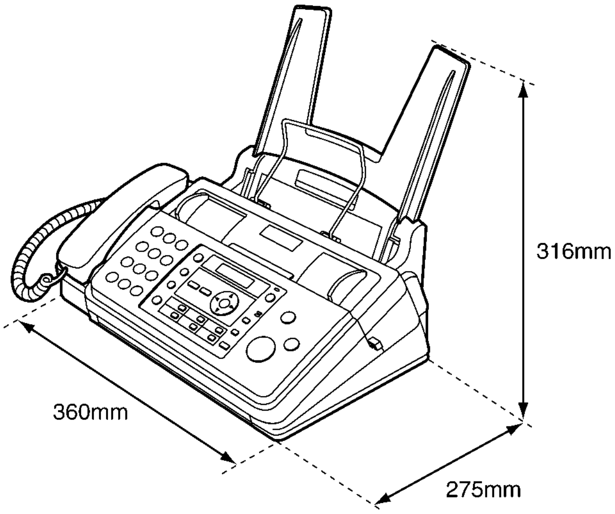
(20) [COPY]

- To copy a document.

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. (When the recording paper is not inserted to the unit.)



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)
- 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

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 supplied with this unit.**
- **Do not extend the telephone line cord.**

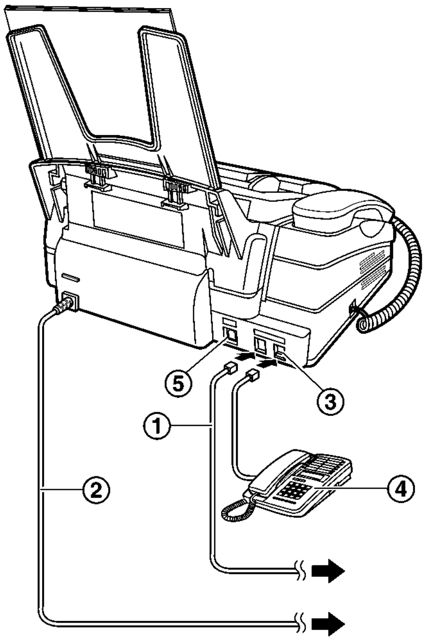
① Telephone line cord
•Connect to a single telephone line jack.

② Power cord
•Connect to a power outlet (220 V - 240 V, 50/60 Hz).

③ [EXT] jack
•You can connect an extension telephone.
Remove the stopper if attached.

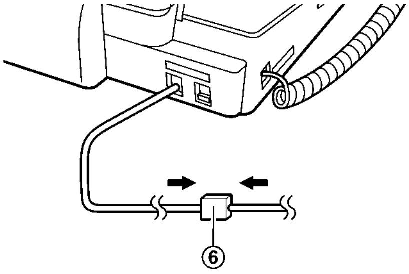
④ Extension telephone (not included)

⑤ USB interface connector (KX-FM388 only)



(The pictured model is KX-FM388.)

Note:
- If any other device is connected to the same telephone line, this unit may disturb the network condition of the device.
- If you use the unit with a computer and your internet provider instructs you to install a filter (⑥), please connect it as follows.



8.2.1. Connecting to a Computer (KX-FM388 only)

Panasonic PANA LINK software enables the unit to carry out the following functions:
.— Sending fax documents created on your computer
— Receiving faxes on your computer
— Storing fax and phone numbers into the directory
— Using the unit as a printer and a scanner
To use PANA LINK software on your computer, the following are required:

Operating System:
Windows 98/Windows Me/Windows 2000/Windows XP/ Windows Vista® x86 (32bit)
- It does not work with Windows XP x64 (64bit) and Windows Vista x64 (64bit).

CPU:
Windows 98: Pentium® 90 MHz or faster
Windows Me: Pentium 150 MHz or faster
Windows 2000: Pentium 166 MHz or faster
Windows XP: Pentium 300 MHz or faster
Windows Vista: Recent Processor (x86) 800 MHz or higher processor

RAM:
Windows 98: 24 MB (32 MB or more recommended)
Windows Me: 32 MB (64 MB or more recommended)
Windows 2000: 64 MB or more
Windows XP: 128 MB or more
Windows Vista: 512 MB or more

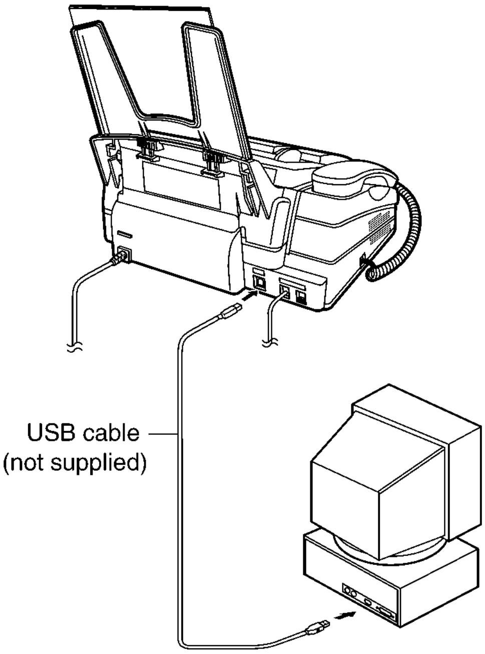
Other Hardware:
CD-ROM drive
Hard disk drive with at least 40 MB of available space
USB interface

Other:
Internet Explorer® 5.0 or later

Warning:
- To assure continued emission limit compliance;
  - use only shielded USB cable (Example: Hi-Speed USB 2.0 certified cable).
- To protect the unit, use only shielded USB cable in areas where thunderstorms occur.

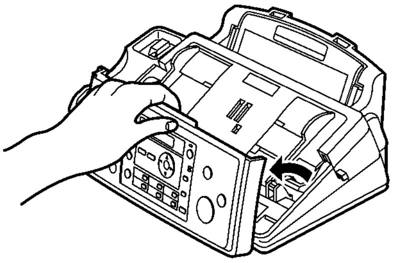
Note:

- A USB cable is not supplied for KX-FM388. Please purchase a shielded Type-A male/Type-B male USB cable.

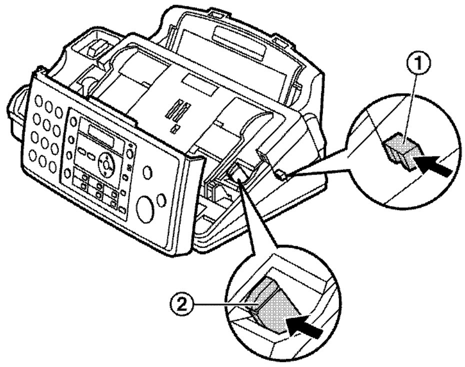


8.3. Installing the Ink Film

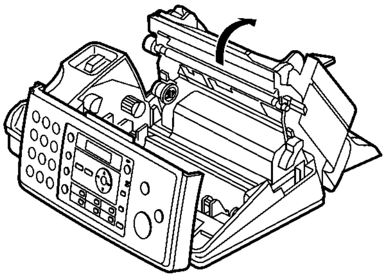
1. Open the front cover by pulling up the centre part.



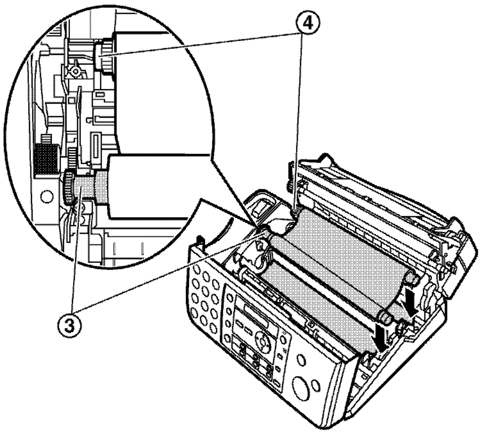
2. Release the back cover by pushing the green button (①).
   - You can also release the back cover by pushing in the green lever (②).



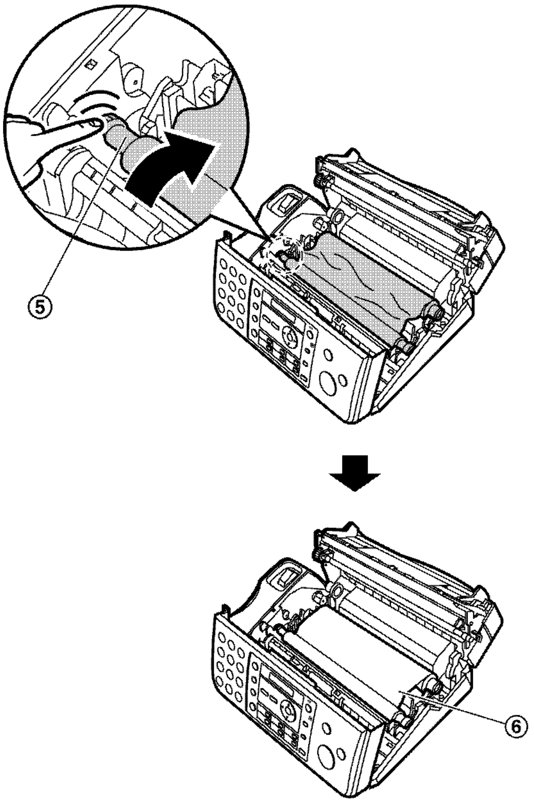
3. Open the back cover.



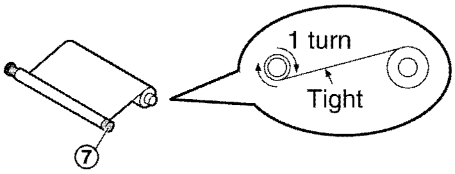
4. Insert the blue gear of the ink film roll into the front left slot of the unit (③) and the white gear of the ink film roll into the rear left slot of the unit (④).
   - The ink film is safe to touch and will not rub off on your hands like carbon paper.
   - Make sure the blue gear (③) and white gear (④) are installed as shown.



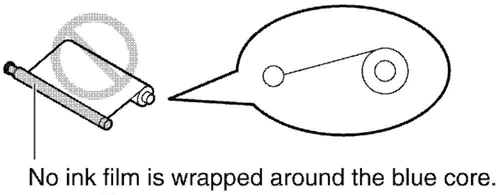
5. Turn the blue gear (⑤) in the direction of the arrow until the ink film is tight (⑥) and at least one layer of ink film is wrapped around the blue core (⑦).

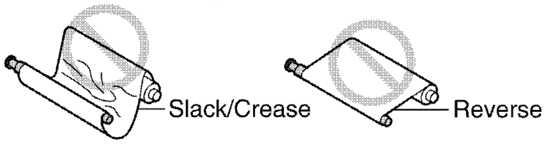


Correct

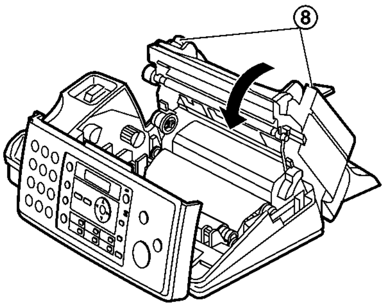

1 turn
Tight
⑦

Incorrect

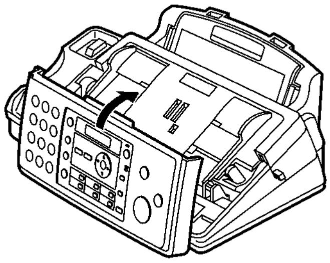

No ink film is wrapped around the blue core.


Slack/Crease
Reverse

6. Close the back cover securely by pushing down on the dotted area at both ends (⑧).

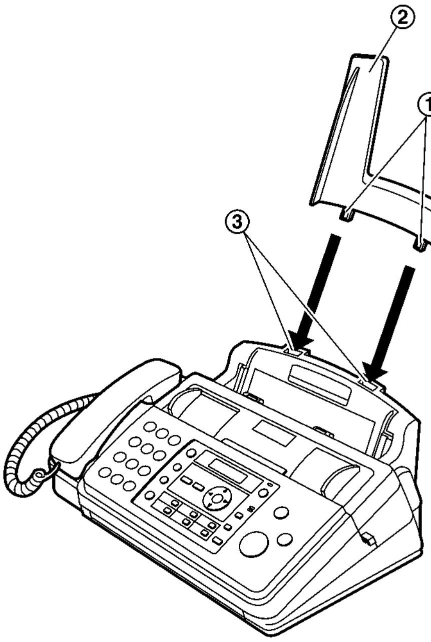


7. Close the front cover securely.



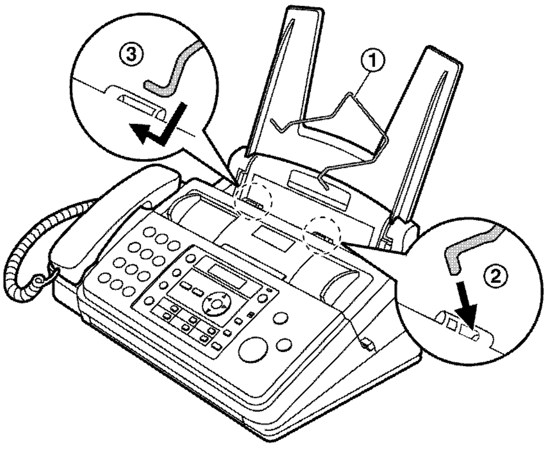
8.4. Installing the Paper Tray

Insert the tabs (①) on the paper tray (②) into the slots on the back of the unit (③).



8.5. Paper Support

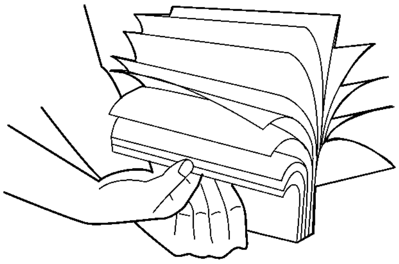
Insert the recording paper support (①) into the slot to the right of the recording paper exit (②). then into the left slot (③).



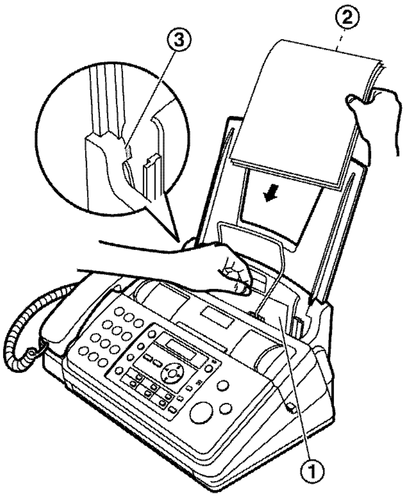
8.6. Installing the Recording Paper

The unit can hold up to 50 sheets of 64 g/m^2 to 80 g/m^2 paper.

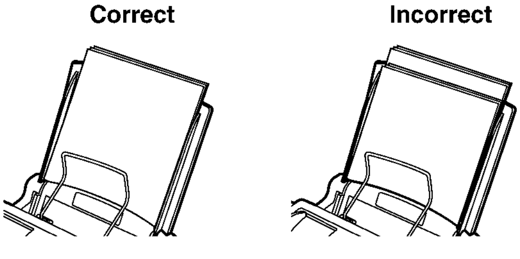
1. Fan the paper to prevent paper jams.



2. Pull the tension plate forward (①) and insert the paper gently, print-side down (②).
   - The paper should not be over the tab (③).



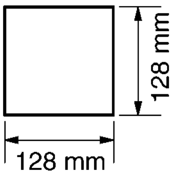
- If the paper is not inserted correctly, remove all of the installed paper, and re-install it gently. Otherwise the paper may jam.



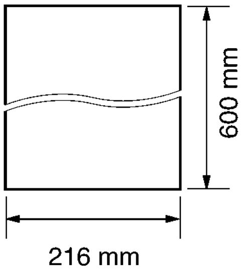
Note:
- Remove all of the installed paper before adding paper.

■Document requirements

Minimum document size

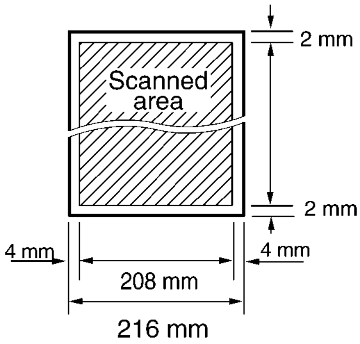


Maximum document size



Effective scanning area

- ●Shaded area will be scanned.



Document weight

- When faxing a single sheet:
  45 g/m^2 to 90 g/m^2
- When faxing a multiple sheet:
  60 g/m^2 to 80 g/m^2

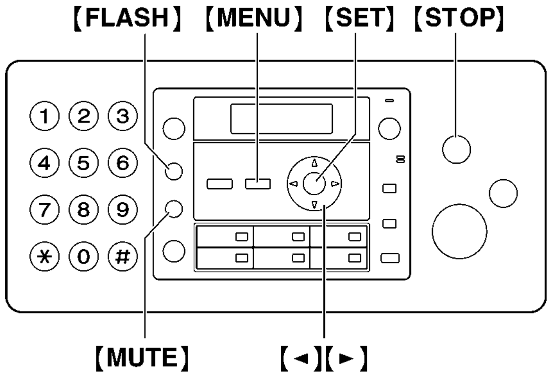
Note:

- Remove chips, staples or other fasteners.
- Do not send the following types of documents. (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, than sending the copied document.

9 Operating Instructions

9.1. Setting Your Logo

You can program your logo (name, company name, etc.) so that it appears on the top of each page sent.



1. **[MENU]** → **[#][0][2]** → **[SET]**

```
LOGO=
```

2. Enter your logo, up to 30 characters. See the following character table for details. → **[SET]**
3. Press **[MENU]** to exit.

To select characters with the 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 0

Keypad	Characters
[*]	To switch between uppercase or lowercase letters.
[FLASH]	Hyphen.
[MUTE]	To insert a space.
[STOP]	To delete a character.

Note:

- To enter a character that is located on the same dial key as the previously entered character, you must first press **[▶]** to move the cursor to the next space.

To enter your logo

Example: “BILL“

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

```
LOGO=B
```

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

```
LOGO=BI
```

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

```
LOGO=BIL
```

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

```
LOGO=BILL
```

To switch between uppercase or lowercase letters

Pressing the [*] button will change the letter input to uppercase or lowercase alternately.

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

```
LOGO=B
```

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

```
LOGO=BI
```

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

```
LOGO=Bi
```

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

```
LOGO=Bil
```

To correct a mistake

Press **[◀]** or **[▶]** to move the cursor to the incorrect character, and make the correction.

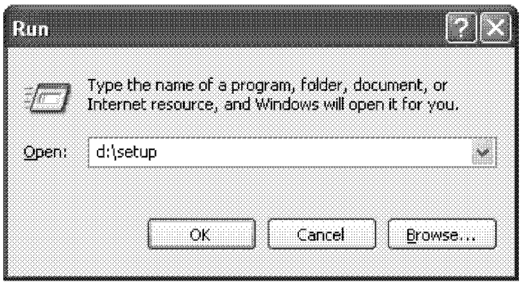
- To erase all of the characters, press and hold **[STOP]**.

9.2. Installing PANA LINK Software

- **Install PANA LINK software (CD-ROM) before connecting the unit to a computer with USB cable. If the unit is connected to a computer with USB cable before installing PANA LINK software, the [Found New Hardware Wizard] dialogue box will appear. Click [Cancel] to close it.**
- **The screenshots shown in these instructions are included for reference only.**
- **The screenshots shown in these instructions may differ slightly from those of the actual product.**
- **Software features and appearance are subject to change without notice.**

1. Start Windows and exit all other applications.
   - For Windows 2000, Windows XP and Windows Vista users, you must be logged in as an administrator in order to install PANA LINK software.

2. Insert the supplied CD-ROM into your CD-ROM drive.
   - If the **[Choose Setup Language]** dialogue box appears, select the desired language that you want to use with this software. Click **[OK]**.
   - If the installation does not start automatically:
     Click **[Start]**. Choose **[Run...]**. Type "**d:\setup**" (where "**d:**" is the drive letter of your CD-ROM drive). Click **[OK]**.
     (If you are not sure what the drive letter is for your CD-ROM drive, use Windows Explorer and look for the CD-ROM drive.)

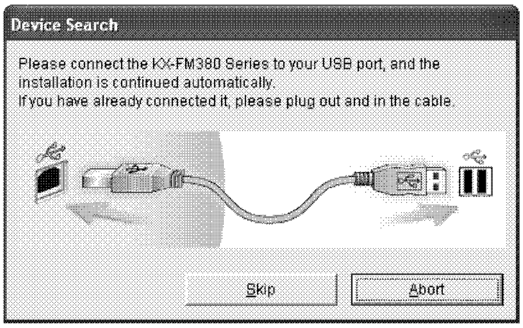

Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: d:\setup

   The installation will start.

3. Follow the instructions on the screen until all files have been installed.

4. Connect the unit to your computer when the following dialogue box appears.


Please connect the KX-FM380 Series to your USB port, and the installation is continued automatically.
If you have already connected it, please plug out and in the cable.

   - If you have already connected it and above dialogue box does not disappear, plug out and in the cable.

Important notice

If you use Windows XP or Windows Vista, a message may appear after connecting the unit with the USB cable. This is normal and the software will not cause any difficulties with your operating system. You can continue the installation with no problem. This kind of message is displayed:

- **For Windows XP users**
  "The software you are installing for this hardware has not passed Windows Logo testing to verify its compatibility with Windows XP."
- **For Windows Vista users**
  "Would you like to install this device software?"

To uninstall the software

For Windows 2000, Windows XP and Windows Vista users, you must be logged in as an administrator in order to uninstall PANA LINK software.

1. **For Windows 98/Windows Me/Windows 2000**:
   [Start] → **[Settings]** → **[Control Panel]**
   For Windows XP/Windows Vista:
   [Start] → **[Control Panel]**
2. **For Windows 98/Windows Me/Windows 2000/Windows XP:**
   Double-click **[Add or Remove Programs]**.
   For Windows Vista:
   Click **[Uninstall a program]**.
3. Select **[PANA LINK]** from the list.
4. **For Windows 98/Windows Me:**
   Click **[Add/Remove...]**, then follow the instructions on the screen.
   For Windows 2000/Windows XP:
   Click **[Change/Remove]**, then follow the instructions on the screen.
   For Windows Vista:
   Click **[Uninstall/Change]**, then follow the instructions on the screen.

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.66).) first, then operate the below test items.

Test Mode	Type of Mode	Code	Function
		Operation after code input	
MEMORY CLEAR	Service Mode	[5] [5] [0]	Refer to **Memory Clear Specification** (P.69).
		[SET]	
FLASH MEMORY CHECK	Service Mode	[5] [5] [1]	Indicates the version and checks the sum of the FLASH MEMORY.
		[SET]	
DTMF SINGLE TONE TEST	Service Mode	[5] [5] [2]	Outputs the DTMF as single tones. Used to check the frequencies of the individual DTMF tones. Refer to **DTMF Signal Tone Transmit Selection** (P.64).
		[1]....ON [2]...OFF	
MODEM TEST	Service Mode	[5] [5] [4]	Telephone line circuit is connected automatically, output the following signals on the circuit line. 1) OFF 2) 14400bps 3) 12000bps 4) 9600bps (V17) 5) 7200bps (V17) 6) 9600bps 7) 7200bps 8) 4800bps 9) 2400bps 10) 300bps 11) 2100Hz 12) 1100Hz
		[SET]	
SCAN CHECK	Service Mode	[5] [5] [5]	Turns on the LEDs of the CIS and operates the read systems.
		[SET]	
MOTOR TEST	Service Mode	[5] [5] [6]	Rotates the transmission and reception motor to check the operation of the motor. 00: Stop 13: TX 23: Pickup 33: Rx 43: Copy • Press **[STOP]** button to quit.
		[SET]	
LED CHECK	Service Mode	[5] [5] [7]	All LEDs above the operation panel board flash on and off, or are illuminated.
		[SET]	
LCD CHECK	Service Mode	[5] [5] [8]	Checks the LCD indication. Illuminates all the dots to check if they are normal.
		[SET]	
KEY CHECK	Service Mode	[5] [6] [1]	Checks the button operation except “STOP” key. Indicates the button code on the LCD while the button is pressed. Refer to **Button Code Table** (P.64).
		The available key is any one that except [STOP] key.	
MEMORY CLEAR (except History data)	Service Mode	[7] [1] [0]	Refer to **Memory Clear Specification** (P.69).
		[SET]	
VOICE PROMPT TEST	Service Mode	[7] [8] [4]	You can hear the voice prompt from speaker after pressing **[SET]”** key.
		[SET]	
SENSOR CHECK & VOX CHECK	Service Mode	[8] [1] [5]	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. (Do, Sn, Co, Pt, Vx) For each sensor’s operation, refer to **Sensors and Switches** (P.33). Do Sn Co Pt Vx: LCD DISPLAY **Do: Document set sensor** :Turns on when the front cover us opened and a document is inserted. **Sn: Read position sensor.** :Turned on when the front cover is opened and starts to read a document. **Co: Cover open sensor** :Turned off when the cover is opened. **Pt: Paper top sensor** :Turned on when the cover is opened and detects a recording paper on the right side end. **Vx: Vox signal** :Detection signal for the tone on the line. Turns on when there is a tone signal on the line. • Press **[STOP]** button to quit.
		[SET]	

Test Mode	Type of Mode	Code	Function
		Operation after code input	
DIGITAL SPEAKERPHONE RX & TX CHECK	Service Mode	[8] [4] [1]	Refer to **Digital Speakerphone** (P.127).
		[DIGITAL SP-PHONE]	
PRINT TEST PATTERN	Service Mode	[8] [5] [2]	Prints out the test pattern. Used mainly at the factory to test the print quality. You can select 1~4. (See **Print Test Pattern** (P.65))
		[SET]	

Note:

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

10.1. DTMF Signal 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

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

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

Note:

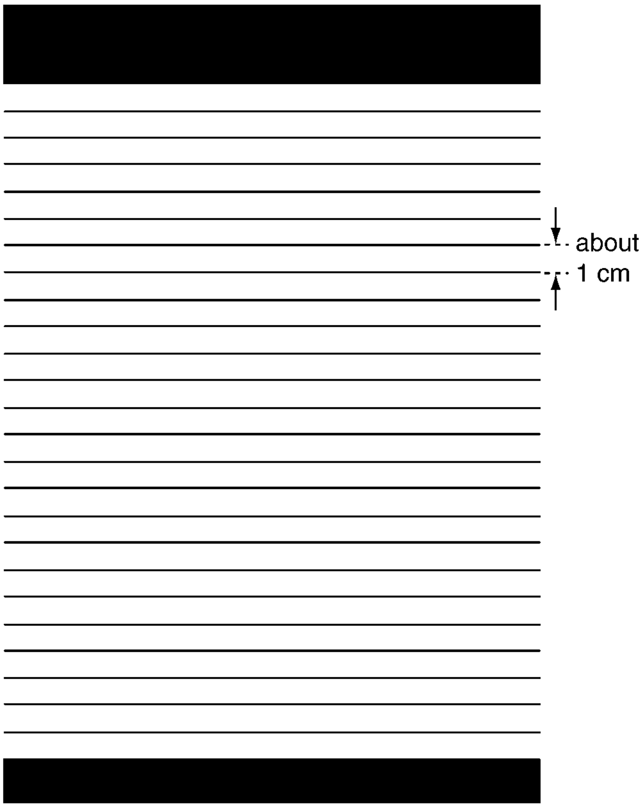
After performing this check, do not forget to turn the setting off.
Otherwise, dialing in DTMF signal will not work.

10.2. Button Code Table

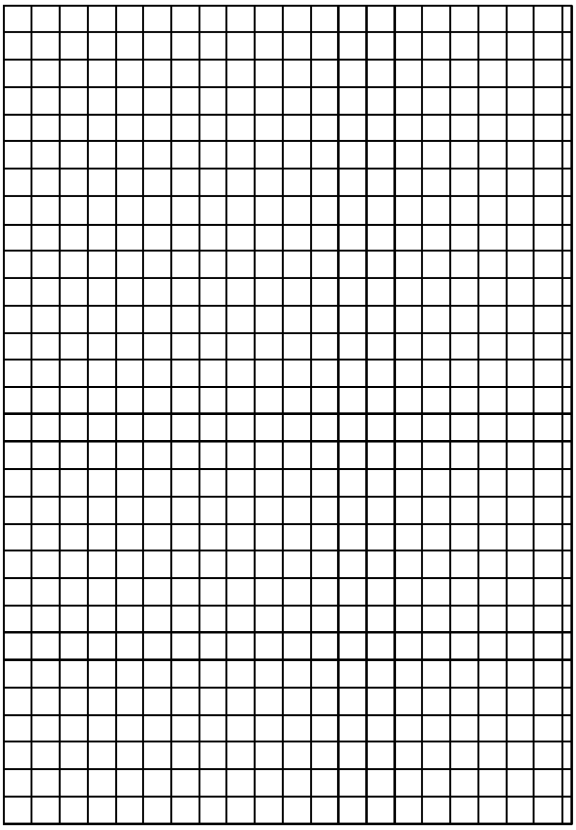
Code	Button Name	Code	Button Name	Code	Button Name
04	FAX /START	31	1	47	CALLER ID
05	LOWER	32	2		
06	COPY	33	3	64	STATION KEY 1 / BROADCAST
08	DIGITAL SP-PHONE	34	4	65	STATION KEY 2
		35	5	66	STATION KEY 3
0A	MUTE	36	6	67	STATION KEY 4
0C	AUTO ANSWER	37	7	68	STATION KEY 5
0D	SET	38	8		
1E	[▶] NEXT	39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

10.3. Print Test Pattern

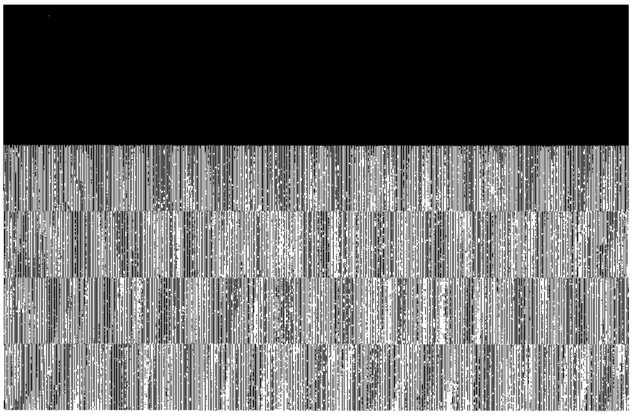
1. Platen roller



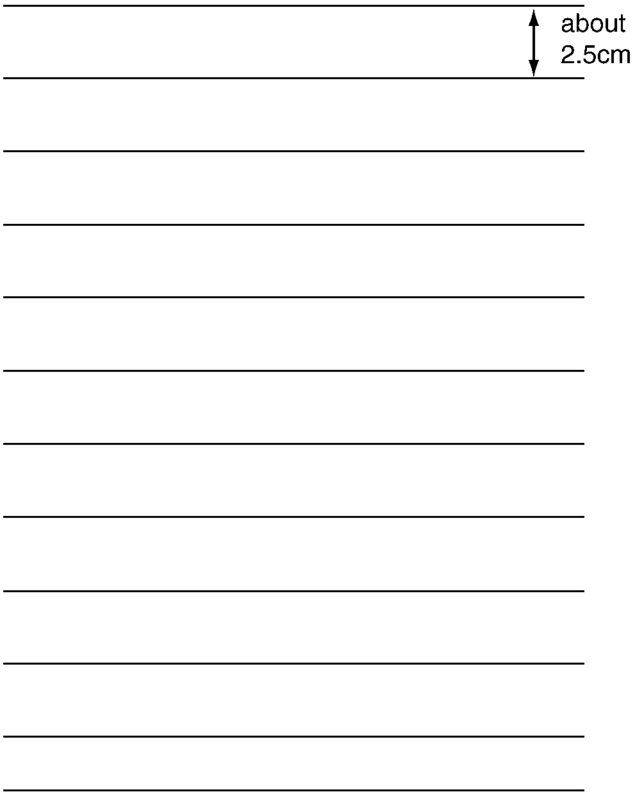
2. Left margin / Top margin



3. Thermal head 1 dot



4. Use this test pattern to confirm the torque limiter for Ink film and platen roller timing.



11 Service Mode

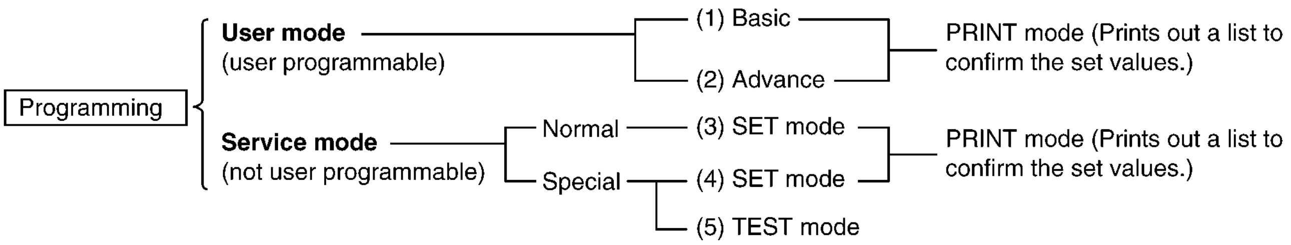
The programming functions are used to program the various features and functions of the machine, and to test the machine. This facilitates communication between the user and the service man while programming the unit.

11.1. Programing and Lists

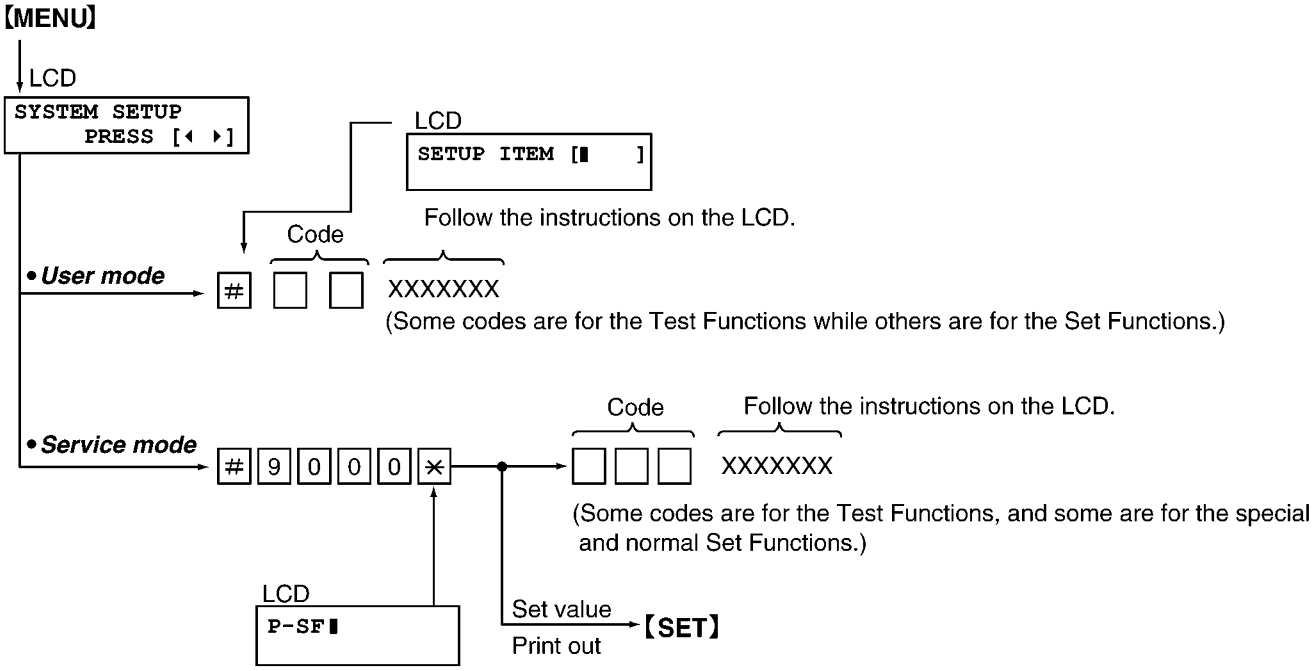
11.1.1. Operation

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


Programming
User mode
(user programmable)
Service mode
(not user programmable)
Normal
Special
(1) Basic
(2) Advance
(3) SET mode
(4) SET mode
(5) TEST mode
PRINT mode (Prints out a list to confirm the set values.)
PRINT mode (Prints out a list to confirm the set values.)

■Operating Procedure


【MENU】
LCD
SYSTEM SETUP
PRESS [◂ ▸]
LCD
SETUP ITEM [▮]
Code
• *User mode*
# □ □
XXXXXXX
• *Service mode*
# 9 0 0 0 ✳
Code
□□□
XXXXXXX
LCD
P-SF▮
Set value
Print out
【SET】

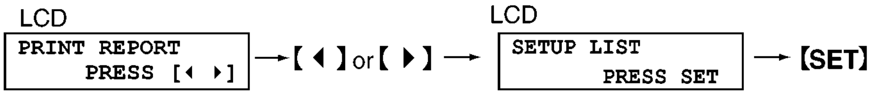
Follow the instructions on the LCD.

(Some codes are for the Test Functions while others are for the Set Functions.)

Follow the instructions on the LCD.

(Some codes are for the Test Functions, and some are for the special and normal Set Functions.)

•User mode Print out


LCD
PRINT REPORT
PRESS [◂ ▸]
【◂】or【▸】
LCD
SETUP LIST
PRESS SET
【SET】

11.1.3. Service Function Table

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time	× 100 msec	001~600	030	----------
503	Dial speed select	1: 10 pps 2: 20 pps	1, 2	1	----------
510	VOX time	1: 6 sec 2: 4 sec	1, 2	1	Setting of the end of call confirmation VOX.
511	VOX sensitivity	1: High 2: Low	1, 2	1	When the TAM (or EXT TAM) does not stop recording the ICM because noise is detected on the telephone line, change this setting to “LOW”.
512	VOX mode Detection	1: A 2: B	1, 2	1	----------
514	Bell detection time	× 100 msec	1~9	6	----------
520	CED frequency select	1: 2100 Hz 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.94).
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.94).
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	× mm	1~9	5	When the ADF function is in correct, adjust the feed position.
550	Memory Clear				See **Memory Clear Specification** (P.69).
551	Flash memory check				See **Test Mode** (P.63).
552	DTMF single tone test	1: ON 2: OFF	1, 2	2	See **Test Mode** (P.63).
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.63).
555	Scan test				See **Test Mode** (P.63).
556	Motor test				See **Test Mode** (P.63).
557	LED test				See **Test Mode** (P.63).
558	LCD test				See **Test Mode** (P.63).
559	Document jam detection select	1: ON 2: OFF	1, 2	1	Sets whether or not to detect a paper jam. If a document with a length longer than 600 mm is copied or transmitted, the unit stops copying or transmitting as a paper jamming because a document over 600 mm is not normal. In the factory, transmitting or copying a document longer than 600 mm is done as an aging test. In this case, OFF is selected.
561	KEY test				See **Test Mode** (P.63).
567	T0 timer	× second	001~255	046	----------
570	BREAK % select	1: 61% 2: 67%	1, 2	1	Sets the % break of pulse dialing according PBX.
571	ITS auto redial time set	× 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	× second	001~999	185	Sets the interval of ITS redialing.
573	Remote turn-on ring number set	× number of rings	00~99	10	Sets the number of rings before the unit starts to receive a document in the TEL mode.

Code	Function	Set Value	Effective Range	Default	Remarks
580	TAM continuous tone detection	1: ON 2: OFF	1, 2	1	ON: Stops TAM operation when Dial tone, etc are detected.
590	FAX auto redial time set	× number of times	00~99	05	Selects the number of redial times during FAX communication (not including the first dial).
591	FAX auto redial line disconnection time set	× second	001~999	185	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.92).
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.94). Refer to **Receive Problem** (P.93) and **The unit can copy, but cannot transmit / receive** (P.94).
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.94). Refer to **Sometime there is a transmit problem** (P.92) and **The unit can copy, but cannot transmit / receive** (P.94).
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.93).
596	Transmit level set	× -1 dBm	00~15	11	Selects the FAX transmission level. Refer to **Sometime there is a transmit problem** (P.92) and **Receive Problem** (P.93).
598	Receiving sensitivity	× -1 dBm	20~48	42	Used when there is an error problem. Refer to **The unit can copy, but the transmission and reception image are incorrect** (P.97).
599	ECM frame size	1: 256 byte 2: 64 byte	1, 2	1	----------
624	AT ring time out (KX-FM388 only)	1: 3 sec 2: 5 sec	1, 2	1	----------
625	Setting printing density	1: Default 2: Lighter 3: Darker	1~3	1	The set value “2” means lighter than default density. The set value “3” means darker than default density.
710	Memory clear except History data				Refer to **Memory Clear Specification** (P.69).
717	Transmit speed select	1: 14400 BPS 2: 12000 BPS 3: 9600 BPS 4: 7200 BPS 5: 4800 BPS 6: 2400 BPS	1~6	1	Adjusts the speed to start training during FAX transmission. Refer to **Sometime there is a transmit problem** (P.92) and **The unit can copy, but the transmission and reception image are incorrect** (P.97).
718	Receive speed select	1: 14400 BPS 2: 12000 BPS 3: 9600 BPS 4: 7200 BPS 5: 4800 BPS 6: 2400 BPS	1~6	1	Adjusts the speed to start training during FAX reception. Refer to **Receive Problem** (P.93) and **The unit can copy, but the transmission and reception image are incorrect** (P.97).
722	Redial tone detect	1: ON 2: OFF	1, 2	1	Sets the tone detection mode after redialing.
724	PC-SEND busy tone detection (KX-FM388 only)	1: ON 2: OFF	1, 2	2	----------
745	Power ON film feed	1: ON 2: OFF	1, 2	1	When the power is turned on, the film is wound to take up any slack.
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.
773	DIS-DCS interval	1: 500 msec 2: 200 msec	1, 2	2	This is similar to #594. The time interval from receiving DIS to sending DCS can be changed to wait for the echo canceler to recover.
774	T4 timer	× 100 msec	00~99	00	Use this function when delay occurs in the line and communication (ex. Mobile comm) does not work well.

Code	Function	Set Value	Effective Range	Default	Remarks
784	Voice Prompt Test				See **Test Mode** (P.63).
815	Sensor test & Vox test				See **Test Mode** (P.63).
841	Digital SP-Phone check				See **Digital Speakerphone** (P.127).
845	Setting scanning density	00~32	00~32	08	Select scanning density when the code No.58 is set "Normal". If you want darker, select smaller value. If you want fainter, select larger value. Refer to **Program Mode Table** (P.100).
852	Print test pattern				See **Test Mode** (P.63).
853	Top margin	× mm	1~9	5	----------
861	Paper size	1: A4 2: LETTER	1, 2	1	----------
874	DTMF ON time	× 10 msec	06~20	10	----------
875	DTMF OFF time	× 10 msec	06~20	10	----------
880	History list				----------
881	Journal 2 list				See **Special Service Journal Report** (P.86).
882	Journal 3 list				See **Special Service Journal Report** (P.86).
961	The time transmitting the false ring back tone	× sec	01~10	07	Set the time transmitting the false ring back tone to the line in TEL/FAX mode.
962	The operator calling time	× sec	05~30	10	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 Phonebook	—	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.

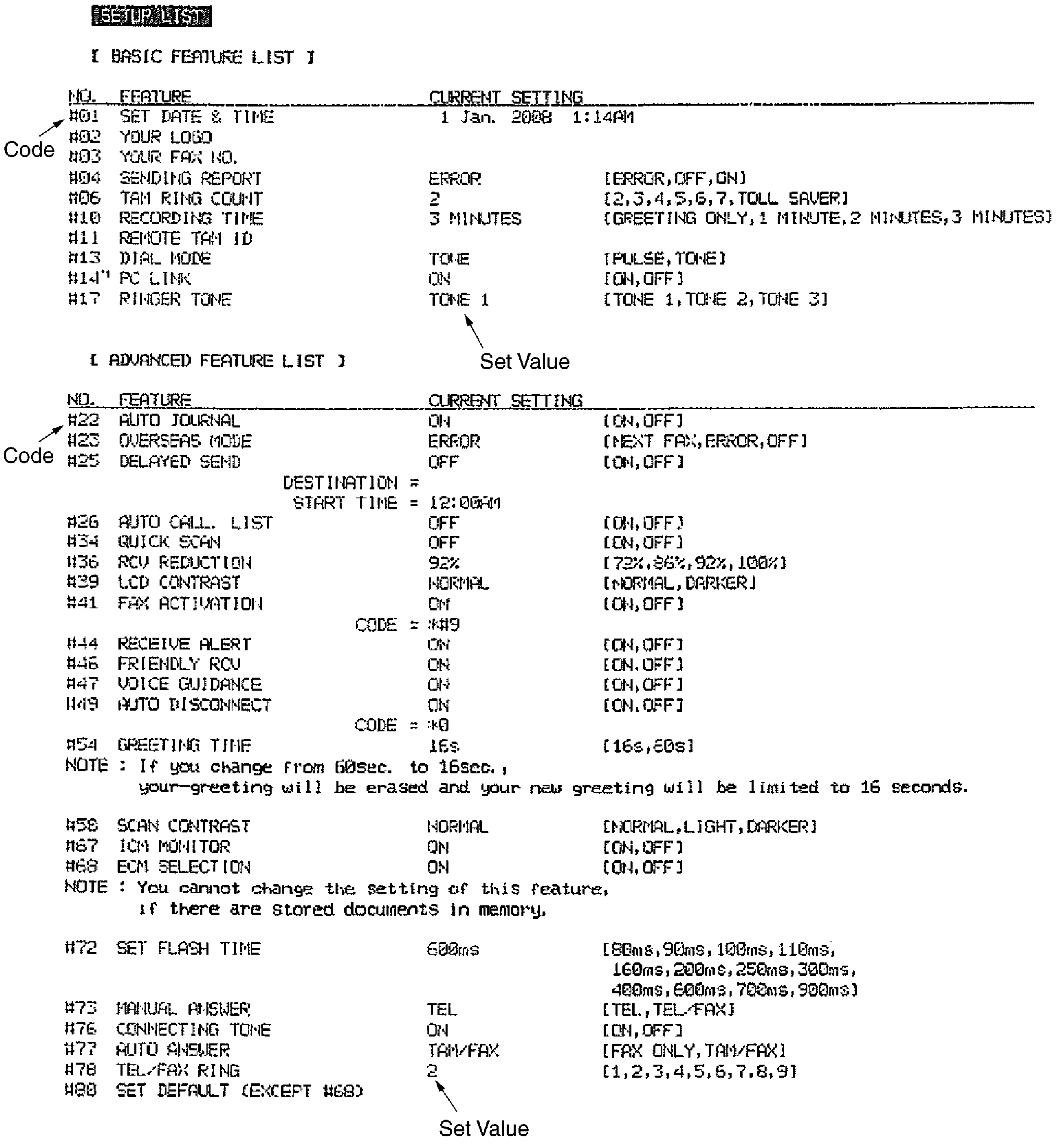
[*2] Execute Service Mode #710 to clear the user information in case that Main Unit is recycled.

Note:

- Please restart a power supply after clearing a memory.

11.2. The Example of the Printed List

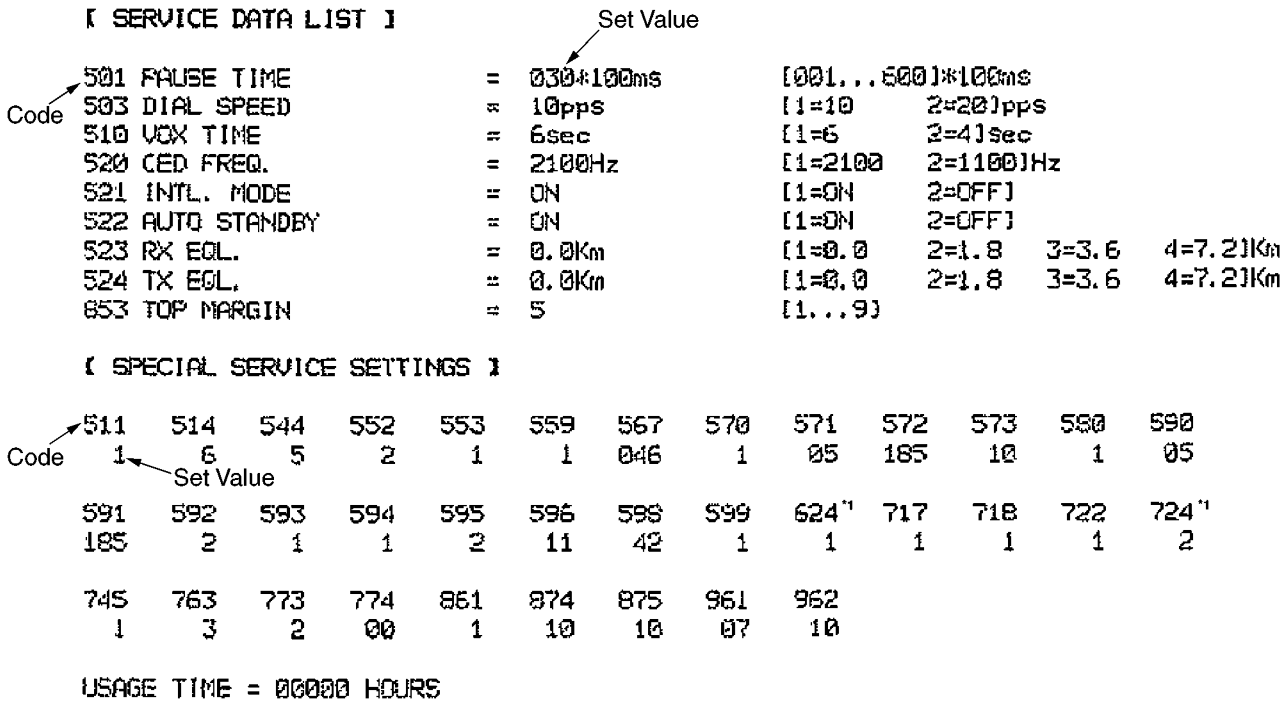
11.2.1. User Mode


Code
Set Value
Code
Set Value

```
SETUP LIST

  [ BASIC FEATURE LIST ]

NO.  FEATURE                        CURRENT SETTING
#01  SET DATE & TIME                 1 Jan. 2008  1:14AM
#02  YOUR LOGO
#03  YOUR FAX NO.
#04  SENDING REPORT                 ERROR           [ERROR,OFF,ON]
#06  TAM RING COUNT                 2               [2,3,4,5,6,7,TOLL SAVER]
#10  RECORDING TIME                 3 MINUTES       [GREETING ONLY,1 MINUTE,2 MINUTES,3 MINUTES]
#11  REMOTE TAM ID
#13  DIAL MODE                      TONE            [PULSE,TONE]
#14*1 PC LINK                       ON              [ON,OFF]
#17  RINGER TONE                    TONE 1          [TONE 1,TONE 2,TONE 3]

  [ ADVANCED FEATURE LIST ]

NO.  FEATURE                        CURRENT SETTING
#22  AUTO JOURNAL                   ON              [ON,OFF]
#23  OVERSEAS MODE                  ERROR           [NEXT FAX,ERROR,OFF]
#25  DELAYED SEND                   OFF             [ON,OFF]
                     DESTINATION =
                      START TIME = 12:00AM
#26  AUTO CALL. LIST                OFF             [ON,OFF]
#34  QUICK SCAN                     OFF             [ON,OFF]
#36  RCV REDUCTION                  92%             [72%,86%,92%,100%]
#39  LCD CONTRAST                   NORMAL          [NORMAL,DARKER]
#41  FAX ACTIVATION                 ON              [ON,OFF]
                            CODE = *#9
#44  RECEIVE ALERT                  ON              [ON,OFF]
#46  FRIENDLY RCV                   ON              [ON,OFF]
#47  VOICE GUIDANCE                 ON              [ON,OFF]
#49  AUTO DISCONNECT                ON              [ON,OFF]
                            CODE = *0
#54  GREETING TIME                  16s             [16s,60s]
NOTE : If you change from 60sec. to 16sec.,
       your-greeting will be erased and your new greeting will be limited to 16 seconds.

#58  SCAN CONTRAST                  NORMAL          [NORMAL,LIGHT,DARKER]
#67  ICM MONITOR                    ON              [ON,OFF]
#68  ECM SELECTION                  ON              [ON,OFF]
NOTE : You cannot change the setting of this feature,
       if there are stored documents in memory.

#72  SET FLASH TIME                 600ms           [80ms,90ms,100ms,110ms,
                                                     160ms,200ms,250ms,300ms,
                                                     400ms,600ms,700ms,900ms]
#73  MANUAL ANSWER                  TEL             [TEL.,TEL/FAX]
#76  CONNECTING TONE                ON              [ON,OFF]
#77  AUTO ANSWER                    TAM/FAX         [FAX ONLY,TAM/FAX]
#78  TEL/FAX RING                   2               [1,2,3,4,5,6,7,8,9]
#80  SET DEFAULT (EXCEPT #68)
```

Note:
- The above values are the default values.
- *1 KX-FM388 only.

11.2.2. Service Mode Settings

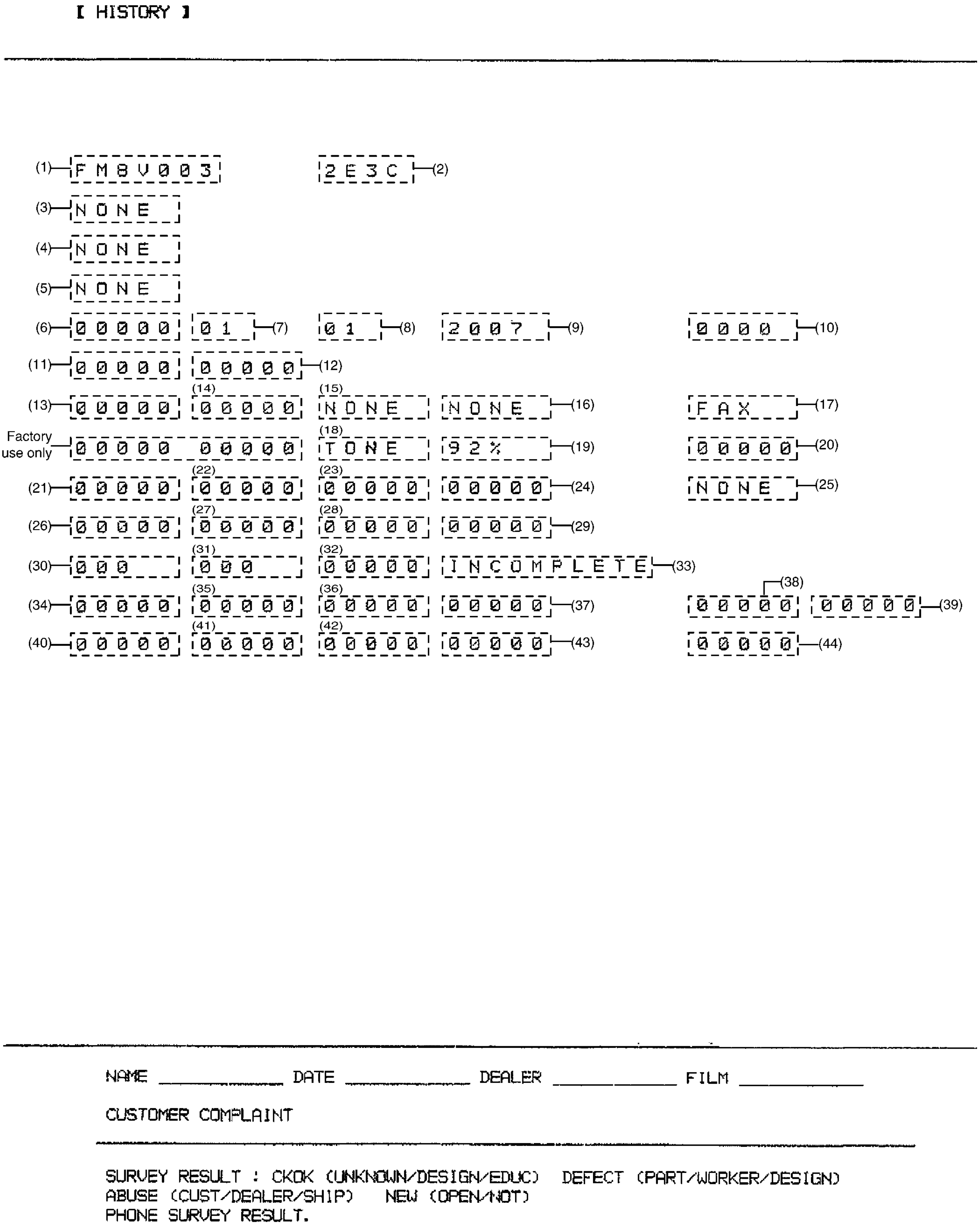

Set Value
Code
Code
Set Value

```
[ SERVICE DATA LIST ]

501 PAUSE TIME          =  030*100ms     [001...600]*100ms
503 DIAL SPEED          =  10pps         [1=10     2=20]pps
510 VOX TIME            =  6sec          [1=6      2=4]sec
520 CED FREQ.           =  2100Hz        [1=2100   2=1100]Hz
521 INTL. MODE          =  ON            [1=ON     2=OFF]
522 AUTO STANDBY        =  ON            [1=ON     2=OFF]
523 RX EQL.             =  0.0Km         [1=0.0    2=1.8    3=3.6    4=7.2]Km
524 TX EQL.             =  0.0Km         [1=0.0    2=1.8    3=3.6    4=7.2]Km
853 TOP MARGIN          =  5             [1...9]

[ SPECIAL SERVICE SETTINGS ]

511   514   544   552   553   559   567   570   571   572   573   580   590
  1     6     5     2     1     1   046     1    05   185    10     1    05

591   592   593   594   595   596   598   599   624*1 717   718   722   724*1
185     2     1     1     2    11    42     1     1     1     1     1     2

745   763   773   774   861   874   875   961   962
  1     3     2    00     1    10    10    07    10

USAGE TIME = 00000 HOURS
```

Note:

- The above values are the default values.
- *1 KX-FM388 only.

11.2.3. History



[HISTORY]

(1) FM8V003 (2) 2E3C

(3) NONE

(4) NONE

(5) NONE

(6) 00000 (7) 01 (8) 01 (9) 2007 (10) 0000

(11) 00000 (12) 00000

(13) 00000 (14) 00000 (15) NONE (16) NONE (17) FAX

Factory use only 00000 00000 (18) TONE (19) 92% (20) 00000

(21) 00000 (22) 00000 (23) 00000 (24) 00000 (25) NONE

(26) 00000 (27) 00000 (28) 00000 (29) 00000

(30) 000 (31) 000 (32) 00000 (33) INCOMPLETE

(34) 00000 (35) 00000 (36) 00000 (37) 00000 (38) 00000 (39) 00000

(40) 00000 (41) 00000 (42) 00000 (43) 00000 (44) 00000

NAME ____________ DATE ____________ DEALER ____________ FILM ____________

CUSTOMER COMPLAINT

SURVEY RESULT : CKOK (UNKNOWN/DESIGN/EDUC) DEFECT (PART/WORKER/DESIGN)
ABUSE (CUST/DEALER/SHIP) NEW (OPEN/NOT)
PHONE SURVEY RESULT.

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.73).

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) TAM/FAX MODE
The amount of time the TAM/FAX mode setting was 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) NUMBER OF RECORDING MESSAGE
The number of messages recorded in TAM.

(26) NUMBER OF PC SCAN
The number of times multifunction was used for the Scanner. (The number of pages scanned. If the unit does not have a PC interface, NONE will be printed.)

(27) NUMBER OF PC-PRINT
The number of times multifunction was used for the Printer.(The number of pages printed. If the unit does not have a PC interface, NONE will be printed.)

(28) NUMBER OF RECEIVING TO PC
The number of times received in the PC through the FAX USB interface. (The number of pages received. If the unit does not have a PC interface, NONE will be printed.)

(29) NUMBER OF SENDING FROM PC
The number of times transmitted from the PC through the FAX USB interface. (The number of pages transmitted.If the unit does not have a PC interface, NONE will be printed.)

(30) NUMBER OF PRINTING WARNING LIST
The number of warning lists printed until now.

(31) NUMBER OF PRINTING HELP
The number of help lists printed until now.

(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) FAX MODE
Means the unit received a fax message in the FAX mode

(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) CNG OGM
Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode, or while answering a call in the EXT-TAM mode. Or means the unit detected the CNG while it was sending the OGM in the TAM/FAX mode

(44) CNG ICM
Means the unit detected the CNG while it was recording the ICM in the TAM/FAX mode.

12 Troubleshooting Guide

12.1. Troubleshooting Summary

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

12.1.1. 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.

"BACK COVER OPEN"

- The back cover is open. Close the back cover firmly.

"CALL SERVICE"

- [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 feeder/scanner glass cleaning** (P.165).)
- The document is 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.67).)

"CHECK PAPER"

- The recording paper is not installed or the unit has run out of paper. Install paper and press **[SET]** to clear the message.
- The recording paper was not fed into the unit properly. (Refer to **When the recording paper was not fed into the unit properly** (P.164).) Re-install paper and press **[SET]** to clear the message.
  (Refer to **Installing the Recording Paper** (P.59).)
- The recording paper has jammed near the recording paper entrance. Remove the jammed paper and press **[SET]** to clear the message.
  (Refer to **Recording Paper Jams** (P.163).)

"FAX IN MEMORY"

- See the other displayed message instructions to print out the document.
  Received documents are stored in memory due to a lack of recording paper, a lack of ink film or a recording paper jam. Install paper, install ink film or remove the jammed paper. You will lose all faxes in memory if the power is removed. Check with power connected.
  (Refer to **Installing the Recording Paper** (P.59) and **Installing the Ink Film** (P.57) and **Recording Paper Jams** (P.163).)

"FAX MEMORY FULL"

- The memory is full of received documents due to a lack of recording paper, a lack of ink film or a recording paper jam. Install paper, install ink film or remove the jammed paper. You will lose all faxes in memory if the power is removed. Check with power connected. (Refer to **Installing the Recording Paper** (P.59) and **Installing the Ink Film** (P.57) and **Recording Paper Jams** (P.163).)
- When performing memory transmission, the document being stored exceeded the memory capacity of the unit. Send the entire document manually.

"FILM EMPTY"

- The ink film is empty. Replace the ink film with a new one.
- The ink film is slack. Tighten it (See step 5 on **Installing the Ink Film** (P.57).) and install again.
- The fax machine is positioned near appliances such as TVs or speakers which generate an intense magnetic field.

"FILM NEAR EMPTY"

- The remaining ink film is low. Prepare a new ink film.
  (Refer to **Optional Accessories** (P.11).)

"MEMORY FULL"

- When making a copy, the document being stored exceeded the memory capacity of the unit. Press **[STOP]** to clear the message. Divide the document into sections.

"MESSAGE FULL"

- There is no room left in memory to record voice messages. Erase unnecessary messages.

"MODEM ERROR"

- There is something wrong with the unit's modem.
  (Refer to **Test Mode** (P.63) and **Digital Board Section** (P.118).)

"NO FAX REPLY"

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

“NO TAM GREETING”

- Your TAM/FAX greeting message is not recorded. Record a message
- The voice guidance feature is set to off. Activate feature #047 on **Program Mode Table** (P.100).
  Prerecorded greeting message will be adopted.

“OPEN CABINET CHECK FILM SLACK” “OPEN CABINET CHECK FILM TYPE”

- Please use genuine Panasonic replacement film.
  (Refer to **Optional Accessories** (P.11).)
- The ink film is empty. Replace the ink film with a new one.
  (Refer to **Installing the Ink Film** (P.57).)
- The ink film is not installed. Install it.
  (Refer to **Installing the Ink Film** (P.57).)
- The ink film is slack or creased. Tighten it.
  (See step 5 on **Installing the Ink Film** (P.57).)
- The fax machine is positioned near appliances such as TVs or speakers which generate an intense magnetic field..

“PAPER JAMMED”

- A recording paper jam occurred. Remove the jammed paper. (Refer to **Recording Paper Jams** (P.163).)
- You forced the recording paper into the paper tray too strongly. Remove all of the installed paper, and re-install it gently.

“PC FAIL OR BUSY”

- The cable or the computer power cord is not connected correctly. Check the connections. (Refer to **Connecting to a Computer (KX-FM388 only)** (P.56).)
- The software is not running on the computer. Restart the software and try again.

“PHONEBOOK FULL”

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

“PLEASE WAIT”

- The unit is checking that there is no slack or crease in the ink film. Wait for a moment while the check is completed.

“POLLING ERROR”

- The other party’s fax machine does not offer the polling function. Check with the other party.

“RECORDING ERROR”

- The greeting message or memo message you recorded was under 1 second long. Record a longer message.

“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** (P.164).)
- Press **[STOP]** to eject the jammed paper.

“TRANSMIT ERROR”

- A transmission error occurred. Try again.
- If you send a fax overseas, try the following:
  —Use the overseas transmission mode (feature #023 on **Program Mode Table** (P.100)).
  —Add 2 pauses at the end of the telephone number or dial manually.

“UNIT OVERHEATED”

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

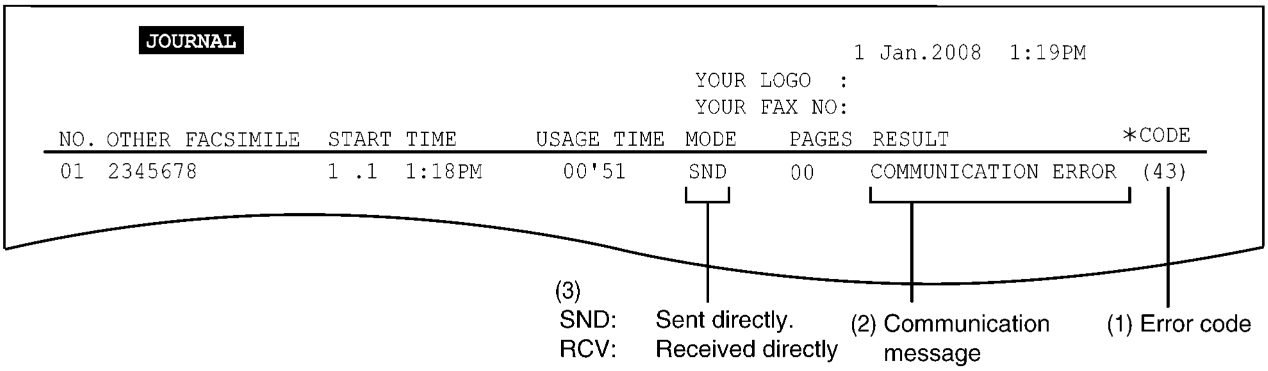
12.3. Error Messages-Report

Journal Report

If a problem occurs during fax transmission or reception, one of the following messages will be printed on the sending and journal reports.

How to output the Journal Report

1. Press **[MENU]** repeatedly to display “PRINT REPORT”.
2. Press **[◄]** or **[►]** repeatedly to display “JOURNAL REPORT”.
3. Press **[SET]**.
4. The report is printed out.



```
JOURNAL
                                                   1 Jan.2008  1:19PM
                                        YOUR LOGO  :
                                        YOUR FAX NO:
NO. OTHER FACSIMILE  START TIME     USAGE TIME MODE    PAGES  RESULT              *CODE
01  2345678          1 .1  1:18PM     00'51     SND     00    COMMUNICATION ERROR  (43)
```

Error code table:

(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
52	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
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
75	MEMORY FULL	RCV	The document was not received due to memory full.	
74	JUNK FAX PROH. REJECT	RCV	The fax was rejected by the junk fax prohibitor feature.	
FF	COMMUNICATION ERROR	SND & RCV	Modem error. For the DCN, DCN, etc. abbreviations, refer to **Modem Section** (P.37).	12

SND=TRANSMISSION RCV=RECEPTION

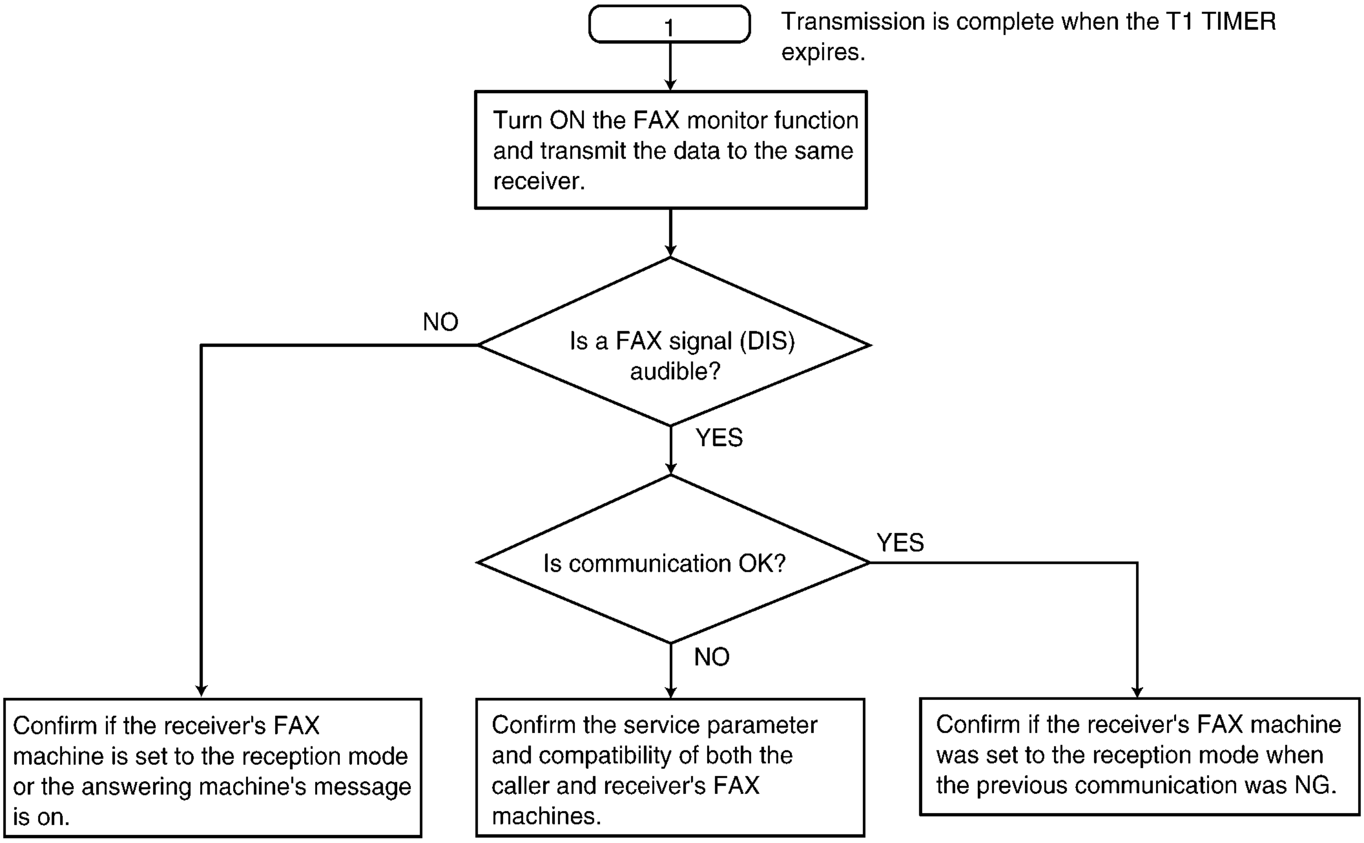
Most fax communication problems can be resolved by the following steps.

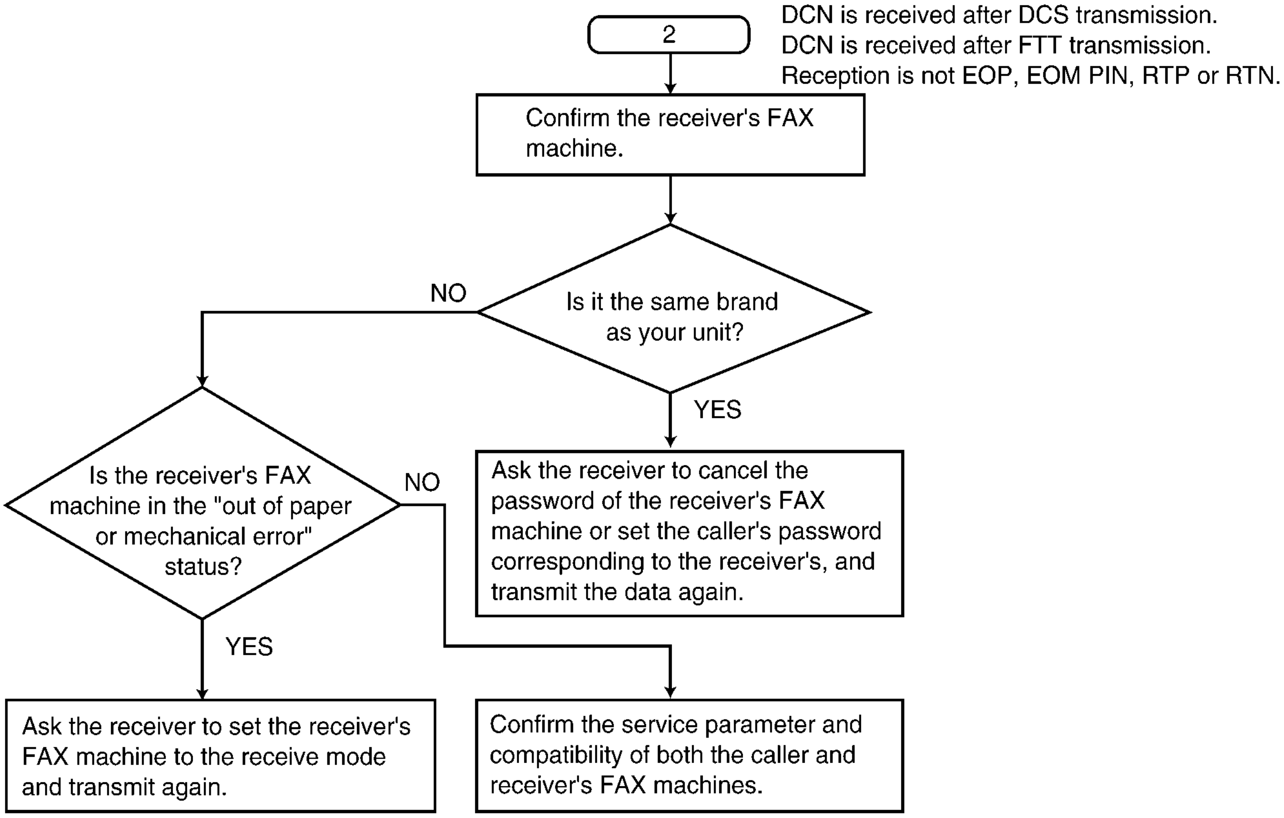
1. Change the transmit level. (Service code: 596, refer to **Service Function Table** (P.67).)
2. Change the TX speed/RX speed. (Service code: 717/718, refer to **Service Function Table** (P.67).)

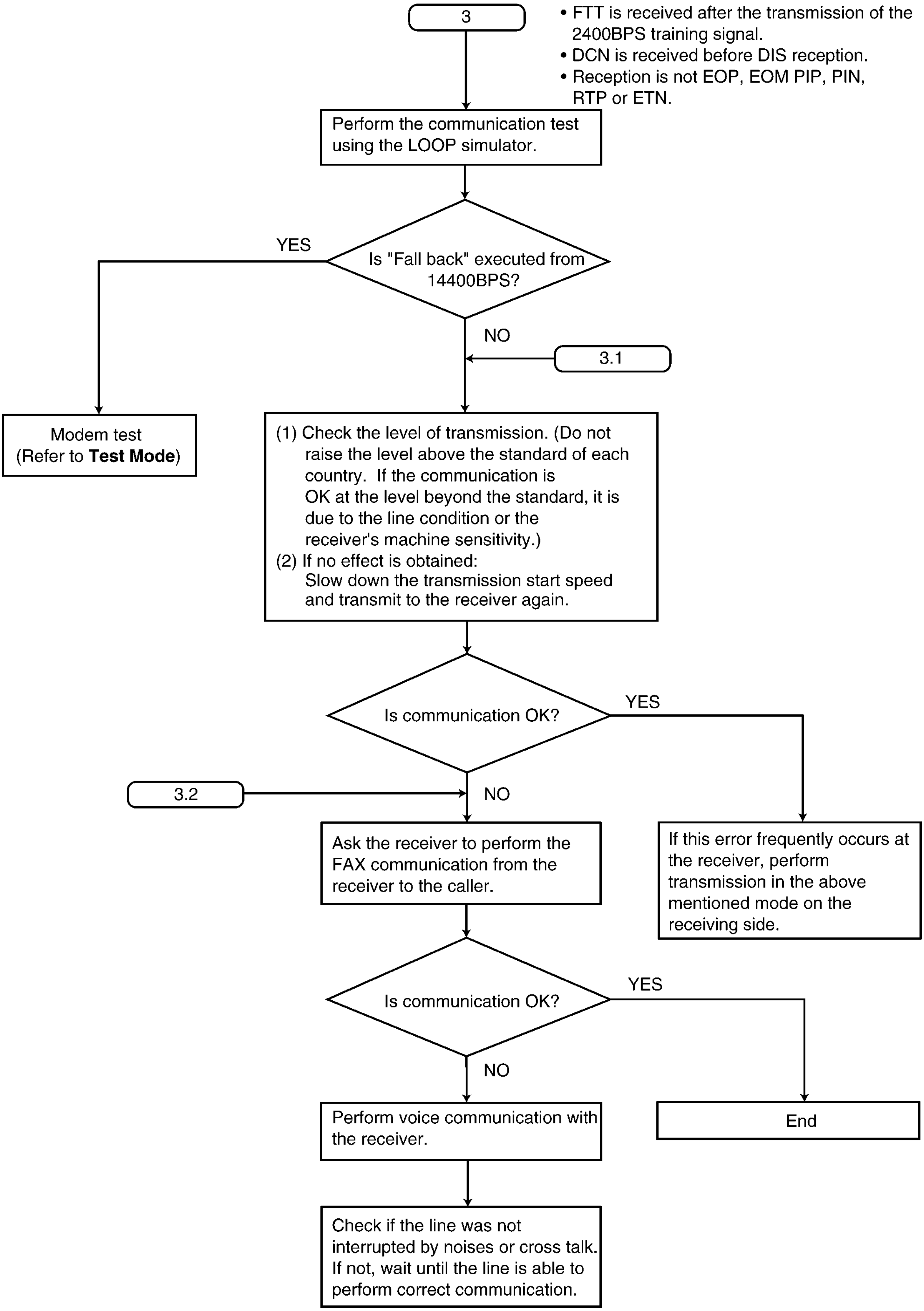
Note*:

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

Countermeasure


1
Transmission is complete when the T1 TIMER expires.
Turn ON the FAX monitor function and transmit the data to the same receiver.
Is a FAX signal (DIS) audible?
NO
YES
Is communication OK?
YES
NO
Confirm if the receiver's FAX machine is set to the reception mode or the answering machine's message is on.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.
Confirm if the receiver's FAX machine was set to the reception mode when the previous communication was NG.

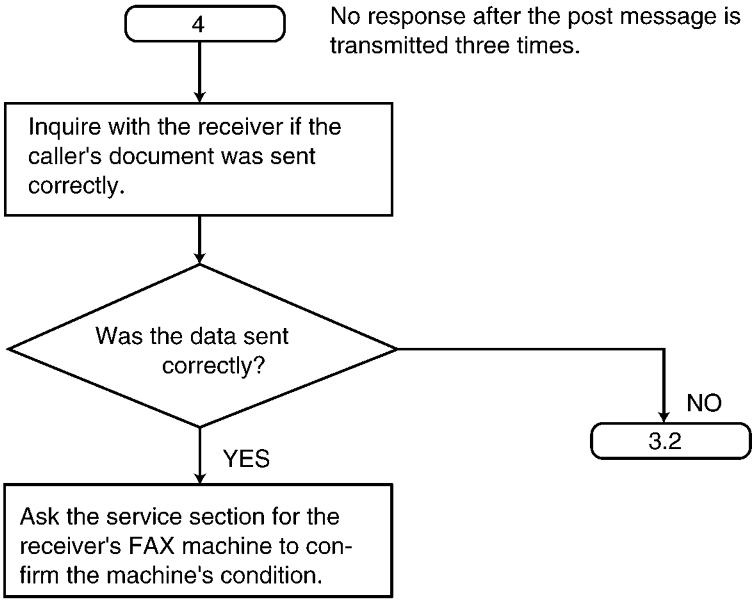

2
DCN is received after DCS transmission.
DCN is received after FTT transmission.
Reception is not EOP, EOM PIN, RTP or RTN.
Confirm the receiver's FAX machine.
Is it the same brand as your unit?
NO
YES
Is the receiver's FAX machine in the "out of paper or mechanical error" status?
NO
YES
Ask the receiver to cancel the password of the receiver's FAX machine or set the caller's password corresponding to the receiver's, and transmit the data again.
Ask the receiver to set the receiver's FAX machine to the receive mode and transmit again.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.

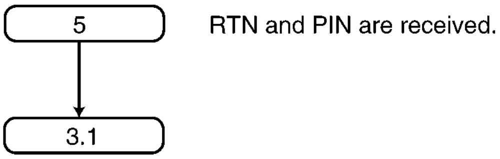

3
Perform the communication test using the LOOP simulator.
YES
Is "Fall back" executed from 14400BPS?
NO
3.1
Modem test
(Refer to **Test Mode**)
(1) Check the level of transmission. (Do not raise the level above the standard of each country. If the communication is OK at the level beyond the standard, it is due to the line condition or the receiver's machine sensitivity.)
(2) If no effect is obtained:
Slow down the transmission start speed and transmit to the receiver again.
Is communication OK?
YES
3.2
NO
Ask the receiver to perform the FAX communication from the receiver to the caller.
If this error frequently occurs at the receiver, perform transmission in the above mentioned mode on the receiving side.
Is communication OK?
YES
NO
Perform voice communication with the receiver.
End
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

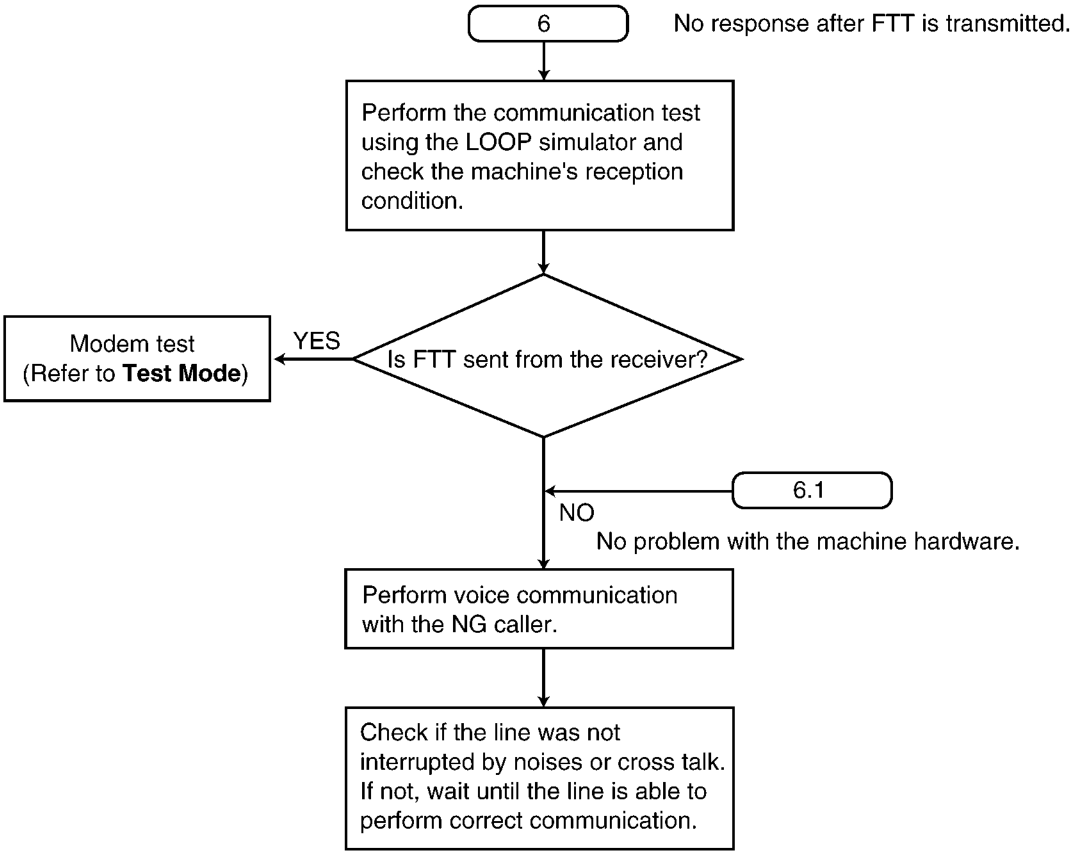
- FTT is received after the transmission of the 2400BPS training signal.
- DCN is received before DIS reception.
- Reception is not EOP, EOM PIP, PIN, RTP or ETN.

REFERENCE:

Test Mode (P.63)

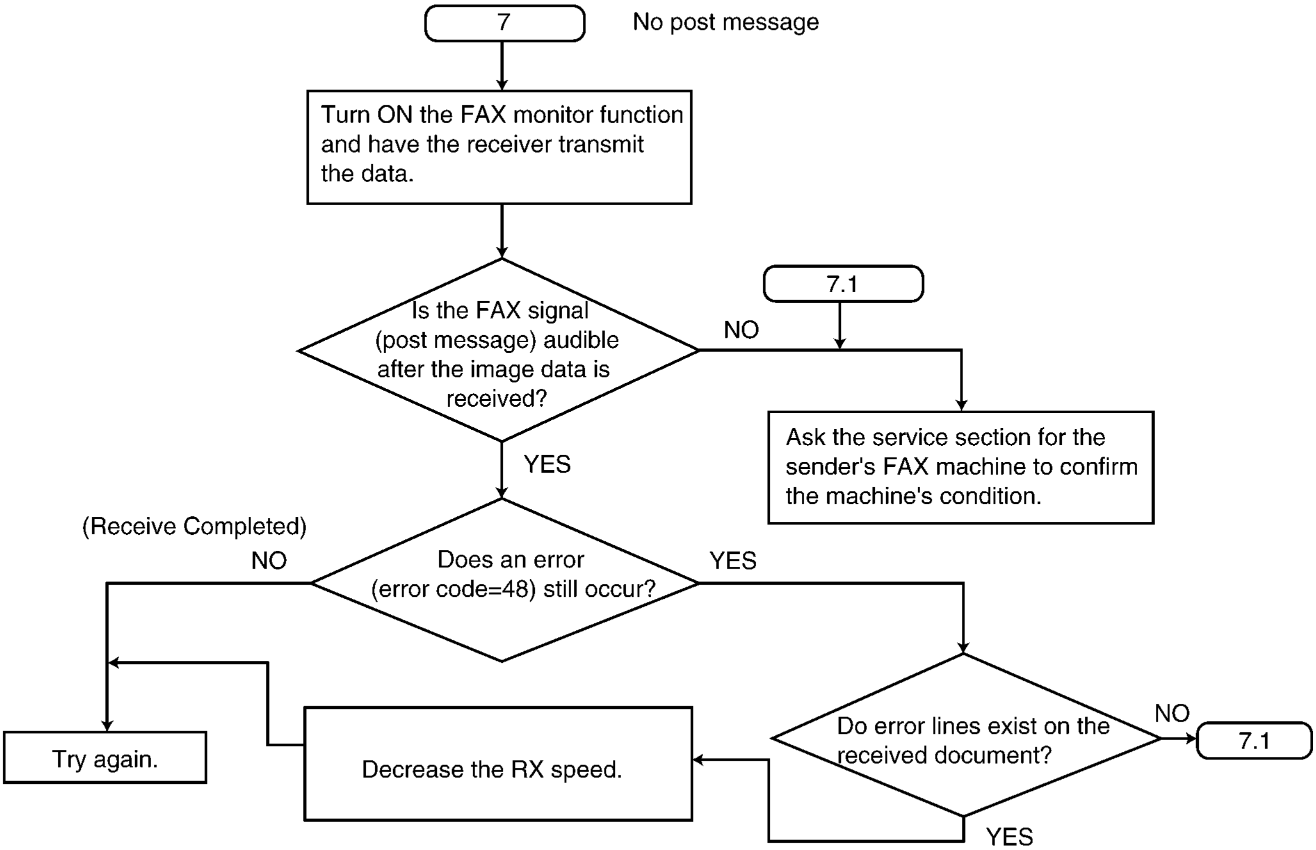

4
No response after the post message is transmitted three times.
Inquire with the receiver if the caller's document was sent correctly.
Was the data sent correctly?
NO
3.2
YES
Ask the service section for the receiver's FAX machine to confirm the machine's condition.

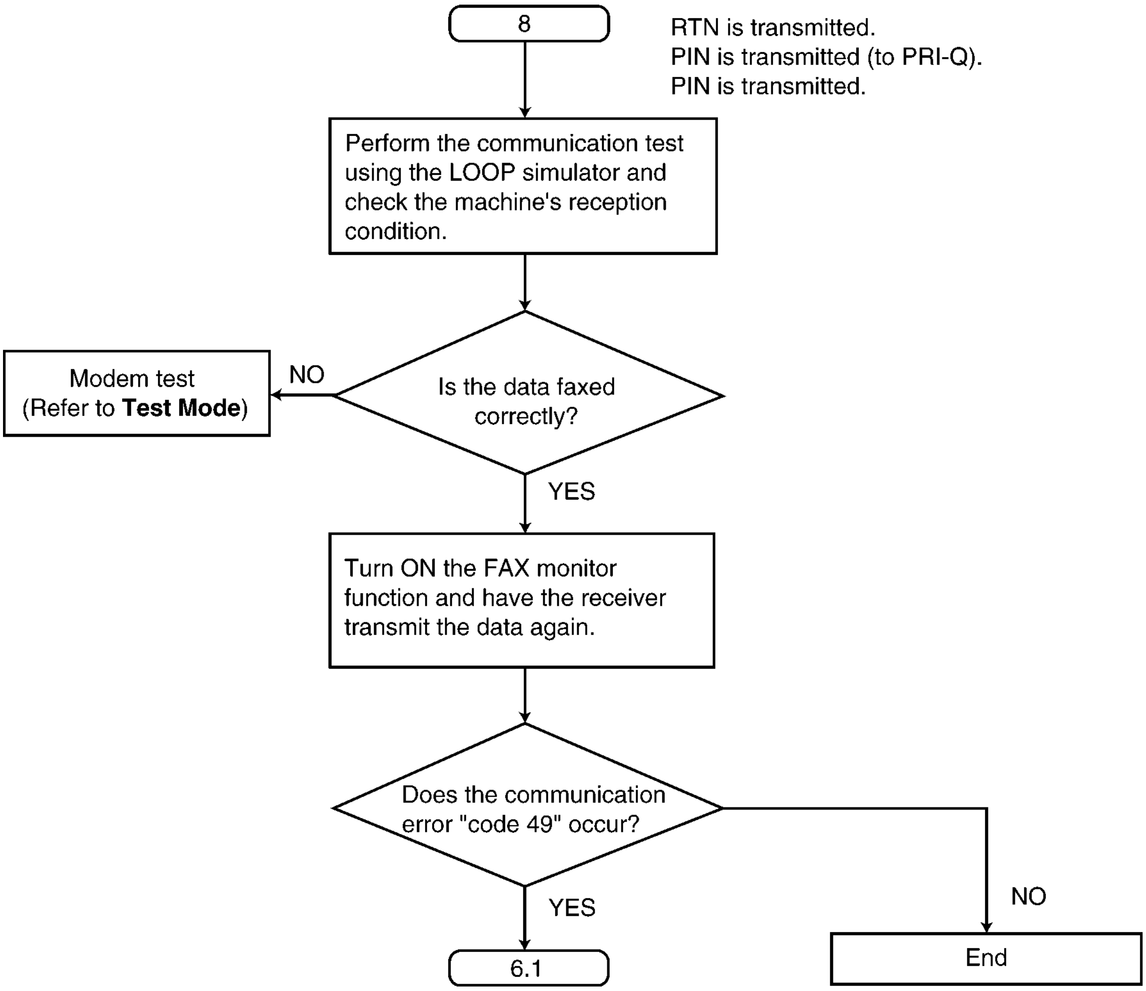

5
RTN and PIN are received.
3.1


6
No response after FTT is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Is FTT sent from the receiver?
YES
Modem test
(Refer to Test Mode)
6.1
NO
No problem with the machine hardware.
Perform voice communication with the NG caller.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

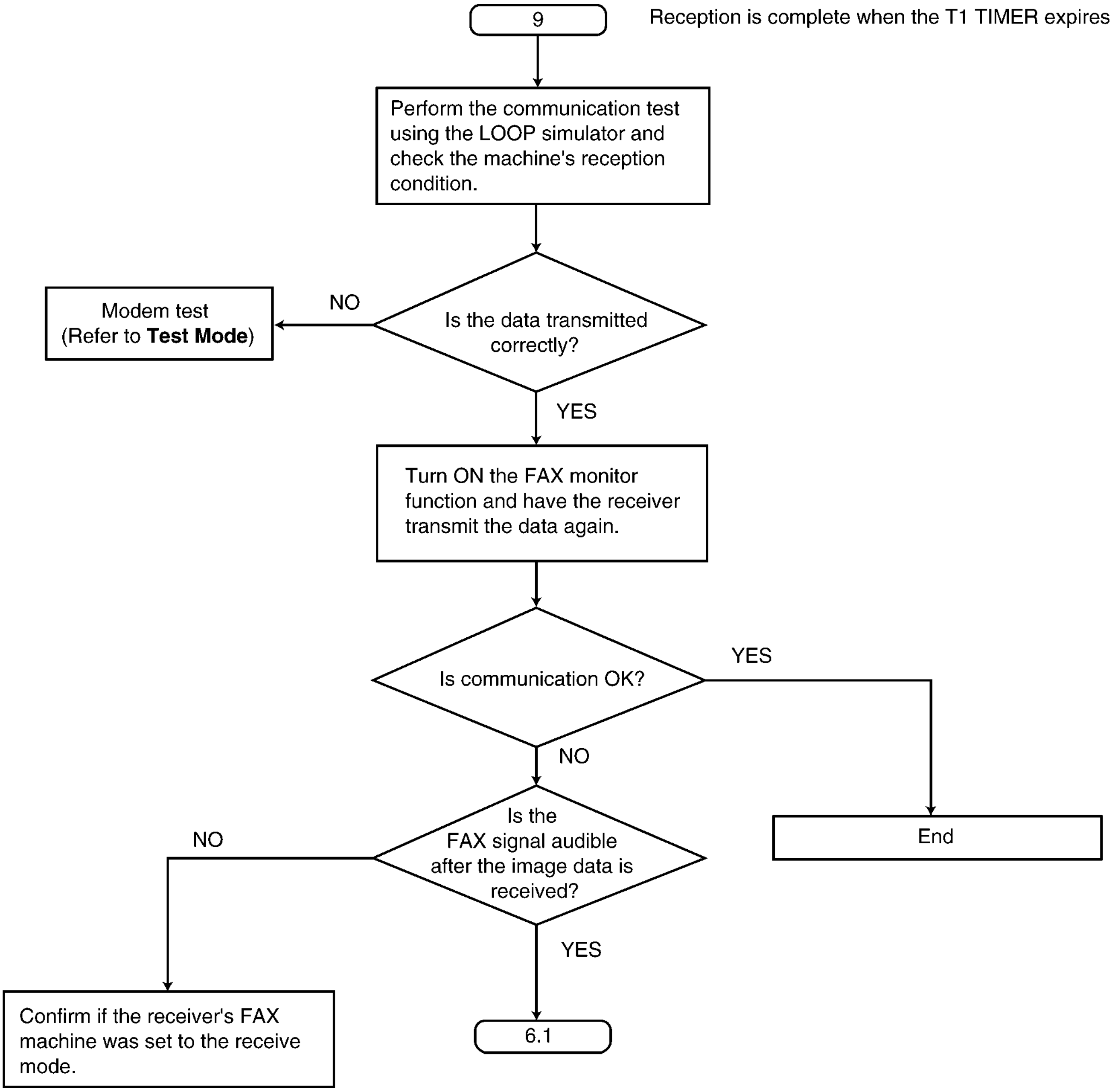
REFERENCE:

Test Mode (P.63)


No post message
7
Turn ON the FAX monitor function and have the receiver transmit the data.
Is the FAX signal (post message) audible after the image data is received?
NO
7.1
Ask the service section for the sender's FAX machine to confirm the machine's condition.
YES
(Receive Completed)
NO
Does an error (error code=48) still occur?
YES
Try again.
Decrease the RX speed.
Do error lines exist on the received document?
NO
7.1
YES

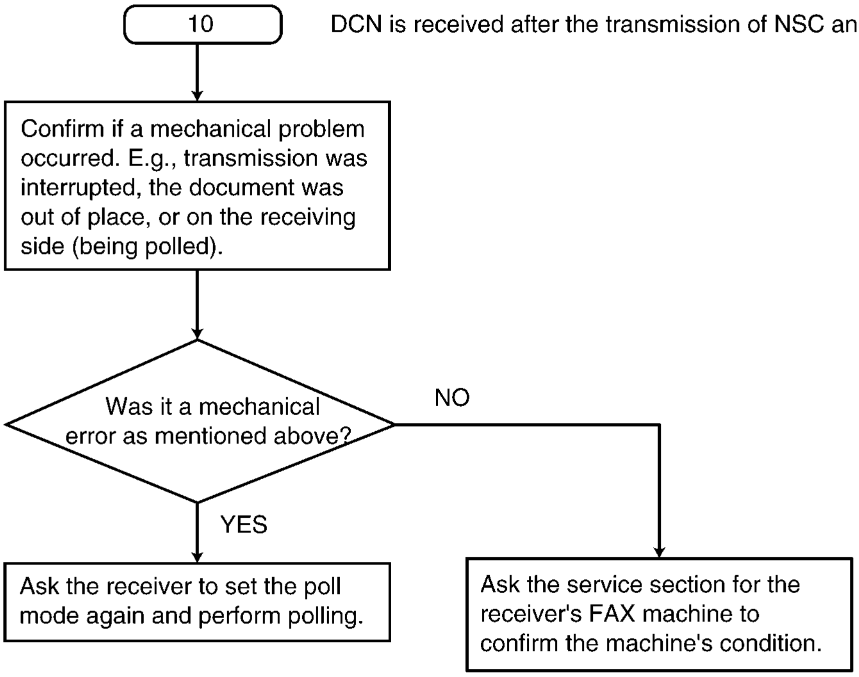

RTN is transmitted.
PIN is transmitted (to PRI-Q).
PIN is transmitted.
8
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test (Refer to Test Mode)
NO
Is the data faxed correctly?
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Does the communication error "code 49" occur?
YES
NO
6.1
End

REFERENCE:
Test Mode (P.63)

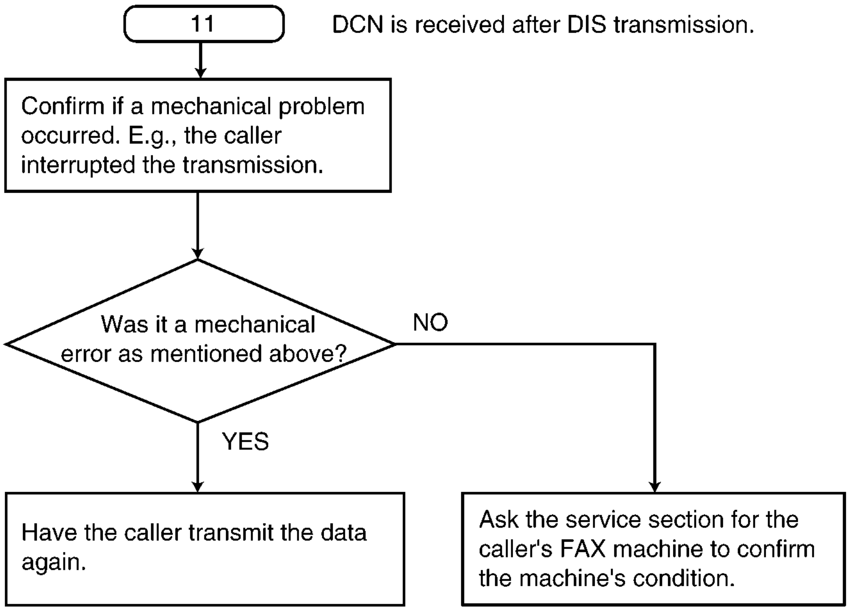

Reception is complete when the T1 TIMER expires.

9
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 Mode)
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

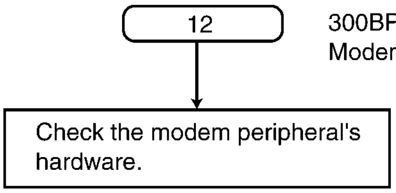
REFERENCE:
Test Mode (P.63)


10
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.

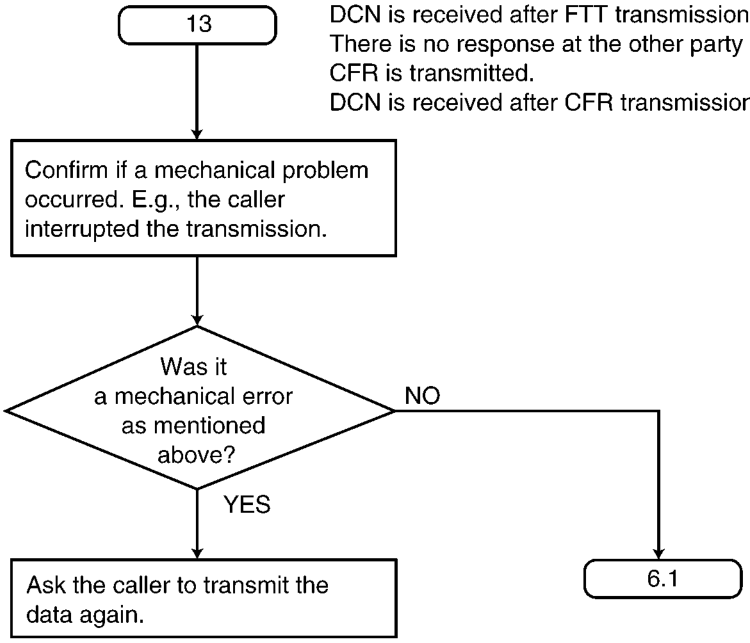
DCN is received after the transmission of NSC and DTC.


11
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.

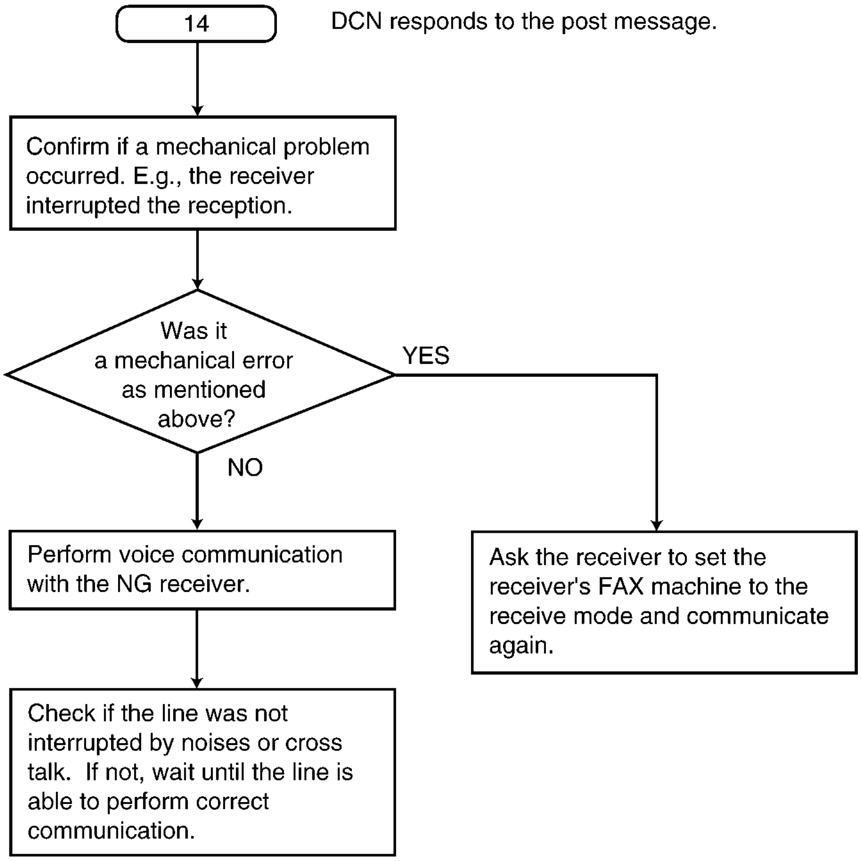
DCN is received after DIS transmission.


12
Check the modem peripheral's hardware.

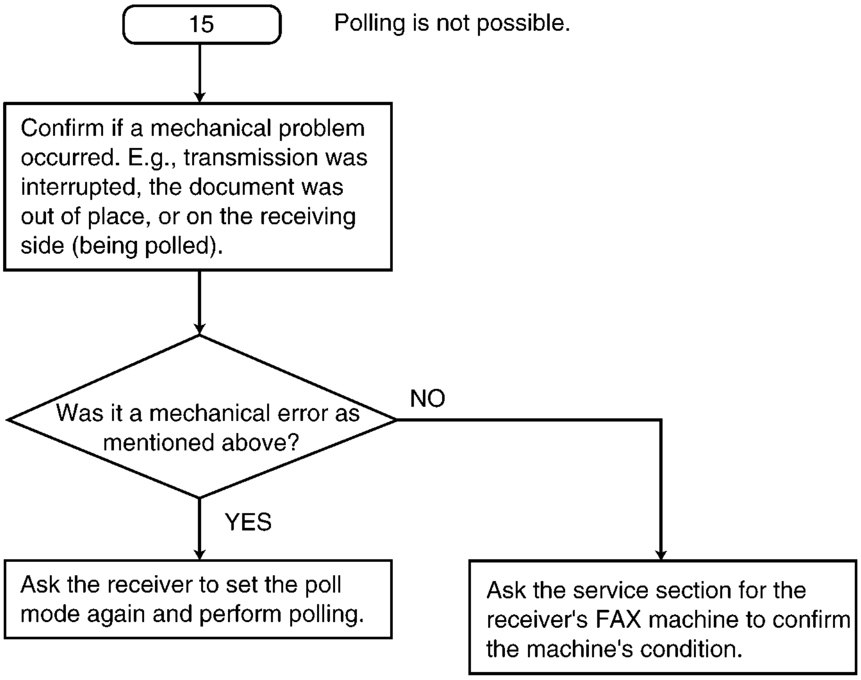
300BPS error
Modem error

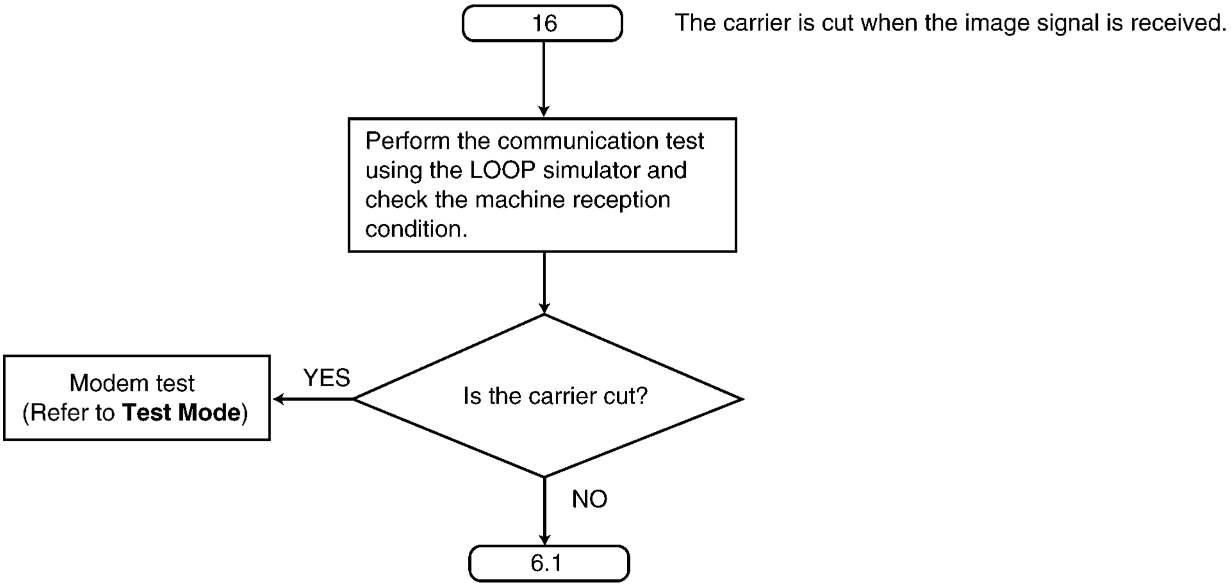

13
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Ask the caller to transmit the data again.
6.1

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.


14
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.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.
Ask the receiver to set the receiver's FAX machine to the receive mode and communicate again.

DCN responds to the post message.

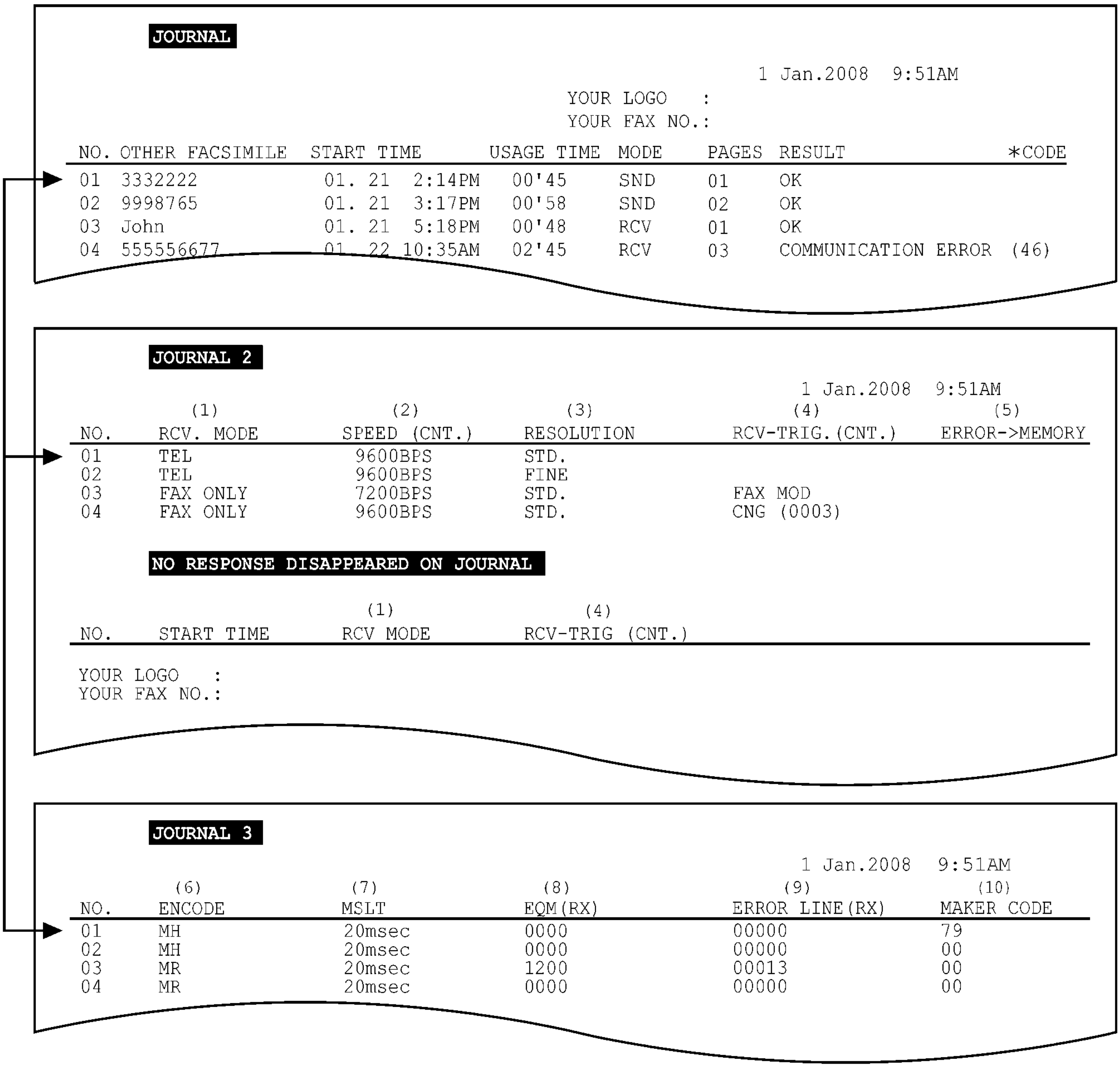

Polling is not possible.
15
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the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


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

REFERENCE:
Test Mode (P.63)

12.3.1. Special Service Journal Report

Journal 2 and Journal 3 shown below, which are special journals giving the additional detailed information about the latest 35 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.99).) 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).



```
JOURNAL

                                                    1 Jan.2008  9:51AM
                                     YOUR LOGO    :
                                     YOUR FAX NO.:
NO. OTHER FACSIMILE  START TIME      USAGE TIME  MODE    PAGES  RESULT              *CODE
01  3332222           01. 21  2:14PM  00'45     SND     01     OK
02  9998765           01. 21  3:17PM  00'58     SND     02     OK
03  John              01. 21  5:18PM  00'48     RCV     01     OK
04  555556677         01. 22 10:35AM  02'45     RCV     03     COMMUNICATION ERROR (46)
```

```
JOURNAL 2

                                                          1 Jan.2008  9:51AM
        (1)              (2)              (3)              (4)               (5)
NO.     RCV. MODE        SPEED (CNT.)     RESOLUTION       RCV-TRIG.(CNT.)   ERROR->MEMORY
01      TEL               9600BPS         STD.
02      TEL               9600BPS         FINE
03      FAX ONLY          7200BPS         STD.             FAX MOD
04      FAX ONLY          9600BPS         STD.             CNG (0003)

NO RESPONSE DISAPPEARED ON JOURNAL

                         (1)              (4)
NO.     START TIME       RCV MODE         RCV-TRIG (CNT.)

YOUR LOGO    :
YOUR FAX NO.:
```

```
JOURNAL 3

                                                          1 Jan.2008  9:51AM
        (6)              (7)              (8)              (9)               (10)
NO.     ENCODE           MSLT             EQM(RX)          ERROR LINE(RX)    MAKER CODE
01      MH               20msec           0000             00000             79
02      MH               20msec           0000             00000             00
03      MR               20msec           1200             00013             00
04      MR               20msec           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.87) and **Journal 3** (P.88).

12.3.1.1. Journal 2

Refer to JOURNAL 2 in **Printout Example** (P.88).
Journal 2 displays the additional detailed information about the last 35 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.88). 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.88), 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.

12.3.1.2. Journal 3

Refer to JOURNAL 3 in **Printout Example** (P.88).

Descriptions:

(6) ENCODE

Compression Code: MH/MR/MMR

(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.

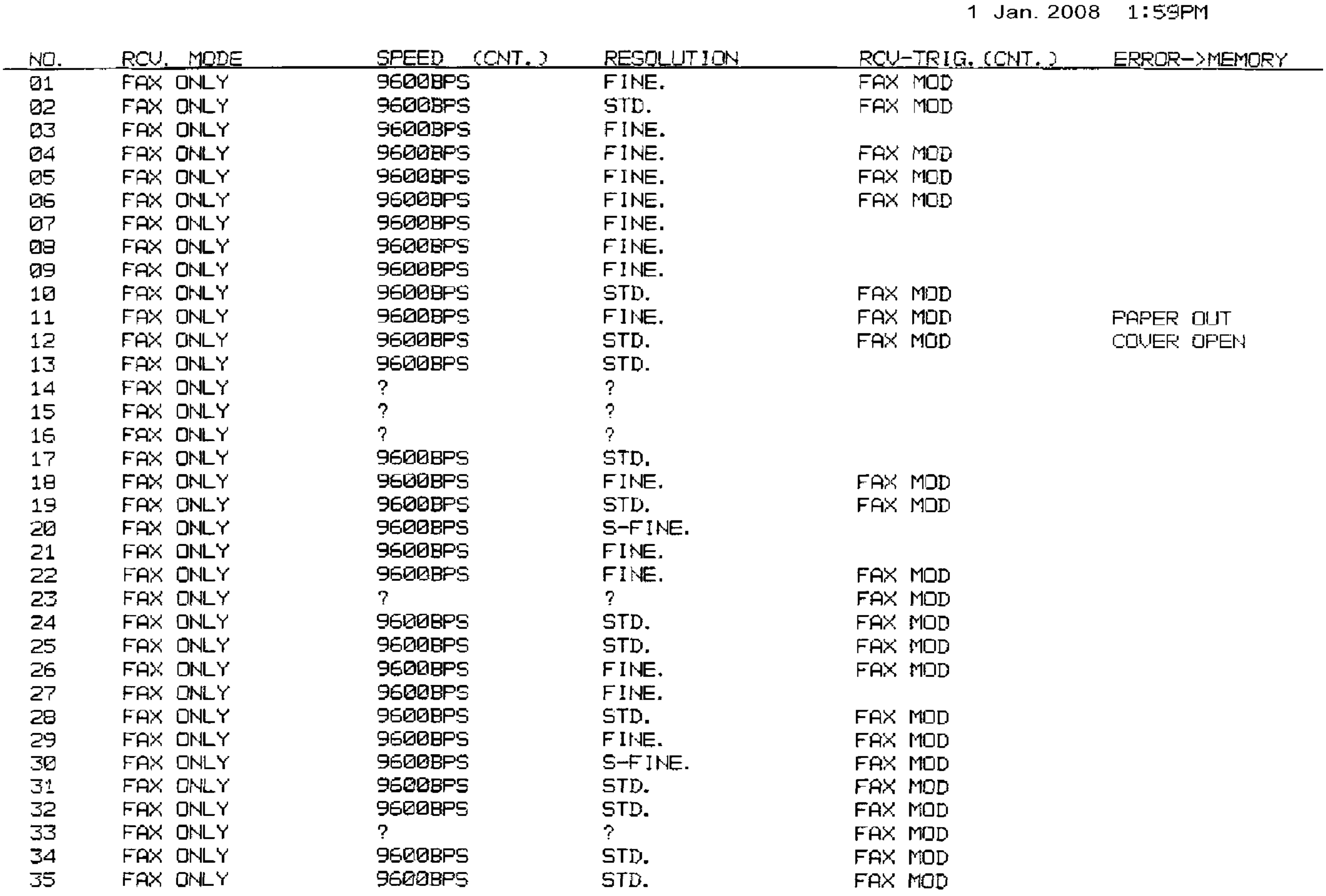
(10) MAKER CODE

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

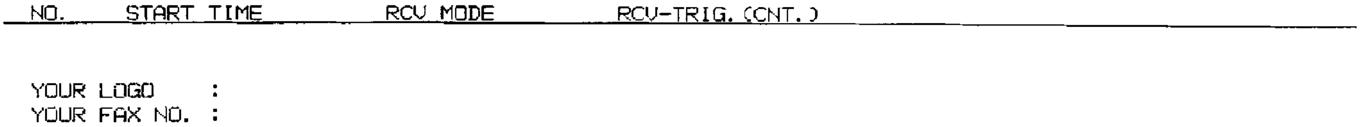
12.3.1.3. Printout Example

JOURNAL2



```
                                                          1 Jan. 2008   1:59PM

NO.  RCV. MODE      SPEED  (CNT.)   RESOLUTION    RCV-TRIG.(CNT.)   ERROR->MEMORY
01   FAX ONLY       9600BPS         FINE.         FAX MOD
02   FAX ONLY       9600BPS         STD.          FAX MOD
03   FAX ONLY       9600BPS         FINE.
04   FAX ONLY       9600BPS         FINE.         FAX MOD
05   FAX ONLY       9600BPS         FINE.         FAX MOD
06   FAX ONLY       9600BPS         FINE.         FAX MOD
07   FAX ONLY       9600BPS         FINE.
08   FAX ONLY       9600BPS         FINE.
09   FAX ONLY       9600BPS         FINE.
10   FAX ONLY       9600BPS         STD.          FAX MOD
11   FAX ONLY       9600BPS         FINE.         FAX MOD           PAPER OUT
12   FAX ONLY       9600BPS         STD.          FAX MOD           COVER OPEN
13   FAX ONLY       9600BPS         STD.
14   FAX ONLY       ?               ?
15   FAX ONLY       ?               ?
16   FAX ONLY       ?               ?
17   FAX ONLY       9600BPS         STD.
18   FAX ONLY       9600BPS         FINE.         FAX MOD
19   FAX ONLY       9600BPS         STD.          FAX MOD
20   FAX ONLY       9600BPS         S-FINE.
21   FAX ONLY       9600BPS         FINE.
22   FAX ONLY       9600BPS         FINE.         FAX MOD
23   FAX ONLY       ?               ?             FAX MOD
24   FAX ONLY       9600BPS         STD.          FAX MOD
25   FAX ONLY       9600BPS         STD.          FAX MOD
26   FAX ONLY       9600BPS         FINE.         FAX MOD
27   FAX ONLY       9600BPS         FINE.
28   FAX ONLY       9600BPS         STD.          FAX MOD
29   FAX ONLY       9600BPS         FINE.         FAX MOD
30   FAX ONLY       9600BPS         S-FINE.       FAX MOD
31   FAX ONLY       9600BPS         STD.          FAX MOD
32   FAX ONLY       9600BPS         STD.          FAX MOD
33   FAX ONLY       ?               ?             FAX MOD
34   FAX ONLY       9600BPS         STD.          FAX MOD
35   FAX ONLY       9600BPS         STD.          FAX MOD
```

NO RESPONSE DISAPPEARED ON JOURNAL



```
NO.  START TIME      RCV MODE        RCV-TRIG.(CNT.)

YOUR LOGO     :
YOUR FAX NO.  :
```

JOURNAL3

1 Jan. 2008 1:58PM

NO.	ENCODE	MSLT	EQM(RX)	ERROR LINE(RX)	MAKER CODE
01	MR	10msec	007A	00000	0E
02	MR	20msec	016B	00000	00
03	MH	10msec	0000	00000	00
04	MR	20msec	019B	00003	00
05	MR	20msec	0156	00011	00
06	MR	20msec	0113	00000	00
07	MR	5msec	0000	00000	79
08	MR	5msec	0000	00000	79
09	MR	0msec	0000	00000	19
10	MR	20msec	0100	00000	00
11	MR	10msec	0073	00000	0E
12	MR	20msec	012B	00000	00
13	MH	20msec	0000	00000	79
14	MH	20msec	0000	00000	00
15	MH	20msec	0000	00000	00
16	MH	20msec	0000	00000	00
17	MR	5msec	0000	00000	79
18	MR	10msec	00AB	00004	0E
19	MR	20msec	0124	00000	00
20	MR	20msec	0000	00000	00
21	MR	20msec	0000	00000	00
22	MR	20msec	0135	00000	00
23	MR	20msec	0000	00000	00
24	MR	20msec	01BC	00000	00
25	MR	20msec	01AC	00000	00
26	MR	20msec	020F	00000	00
27	MR	10msec	0000	00000	0E
28	MR	20msec	01DF	00000	00
29	MR	20msec	01EA	00000	00
30	MR	20msec	00CD	00000	00
31	MR	20msec	02F8	00000	0E
32	MR	10msec	04F8	00000	0E
33	MR	10msec	0000	00000	00
34	MR	20msec	03B6	00000	0E
35	MH	20msec	00E0	00000	00

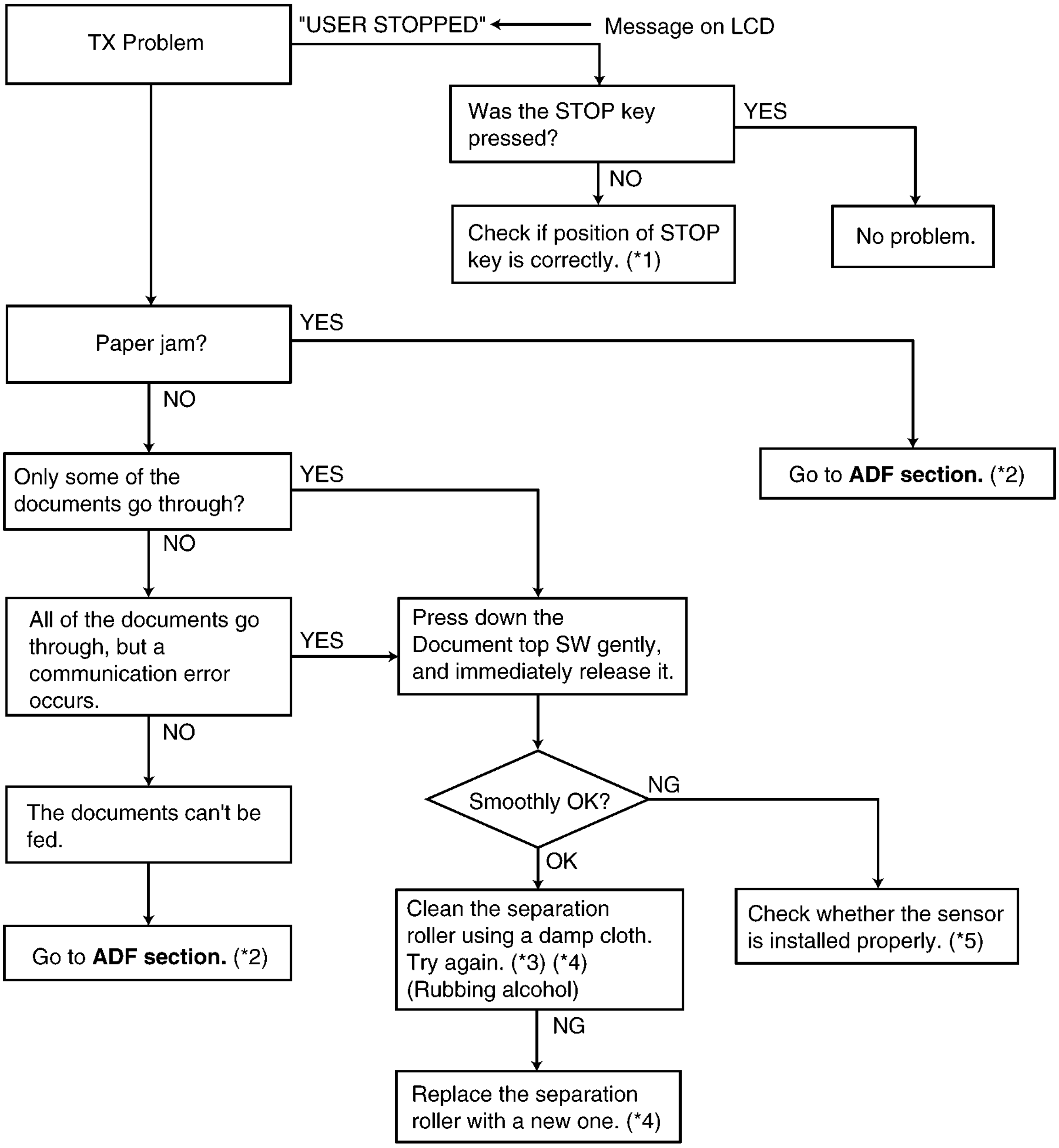
12.3.2. Communication Section

Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in **Defective Facsimile Section** (P.91).

No.	Symptom	Reference Content	Possible cause
1	The paper is not fed properly when faxing. (Not in the copy mode.)	**Transmit Problem** (P.91)	Problem with the feeding mechanism. Refer to **ADF (Auto Document Feed) Section** (P.105).
2	The fax usually transmits successfully but sometimes fails. (The unit can copy documents.)	**Sometime there is a transmit problem** (P.92)	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.)	**Receive Problem** (P.93)	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.)	**The unit can copy, but cannot transmit / receive** (P.94)	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.)	**The unit can copy, but cannot either transmit/receive long distance or international communications** (P.95)	Problem with the service line.
6	The fax image is poor when transmitting or receiving during a long distance or an international call.	**The unit can copy, but the transmission and reception image are incorrect** (P.97)	
7	No.1~No.5	• The troubleshooting procedure for each error code will be printed on the communication result report. • **Error Messages-Report** (P.77)	

12.3.2.1. Defective Facsimile Section

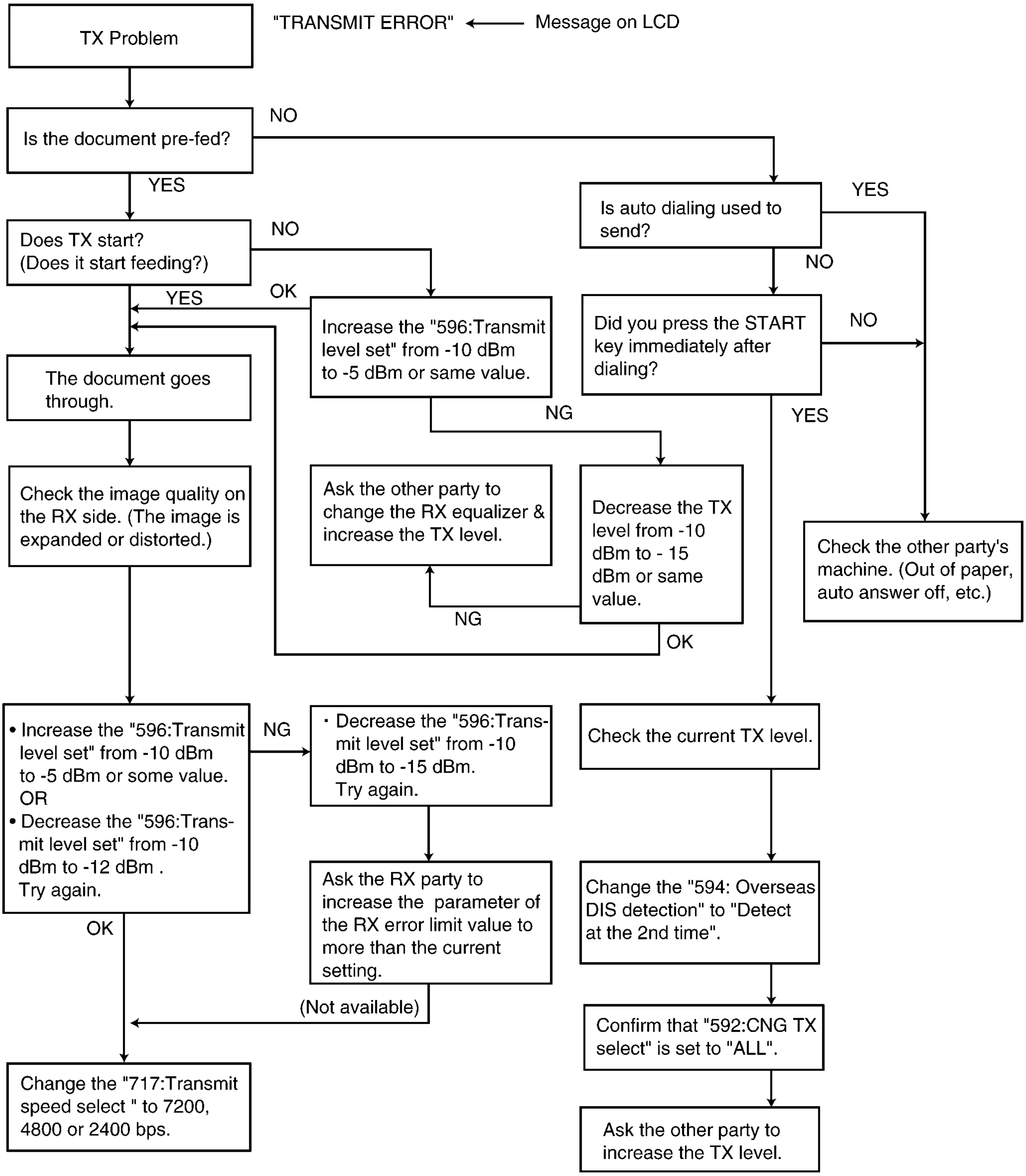
12.3.2.1.1. Transmit Problem


TX Problem
"USER STOPPED"
Message on LCD
Was the STOP key pressed?
YES
NO
Check if position of STOP key is correctly. (*1)
No problem.
Paper jam?
YES
NO
Go to **ADF section.** (*2)
Only some of the documents go through?
YES
NO
All of the documents go through, but a communication error occurs.
YES
NO
Press down the Document top SW gently, and immediately release it.
Smoothly OK?
NG
OK
The documents can't be fed.
Go to **ADF section.** (*2)
Clean the separation roller using a damp cloth. Try again. (*3) (*4) (Rubbing alcohol)
NG
Check whether the sensor is installed properly. (*5)
Replace the separation roller with a new one. (*4)

REFERENCE:

(*1): **Operation Panel Section** (P.132)
(*2): **ADF (Auto Document Feed) Section** (P.105)
(*3): **Maintenance** (P.156)
(*4): **How to Remove the Gear Block and Separation Roller** (P.149)
(*5): **How to Remove the Operation Board, LCD, MIC Board and Document Exit Roller** (P.152)

12.3.2.1.2. Sometime there is a transmit problem

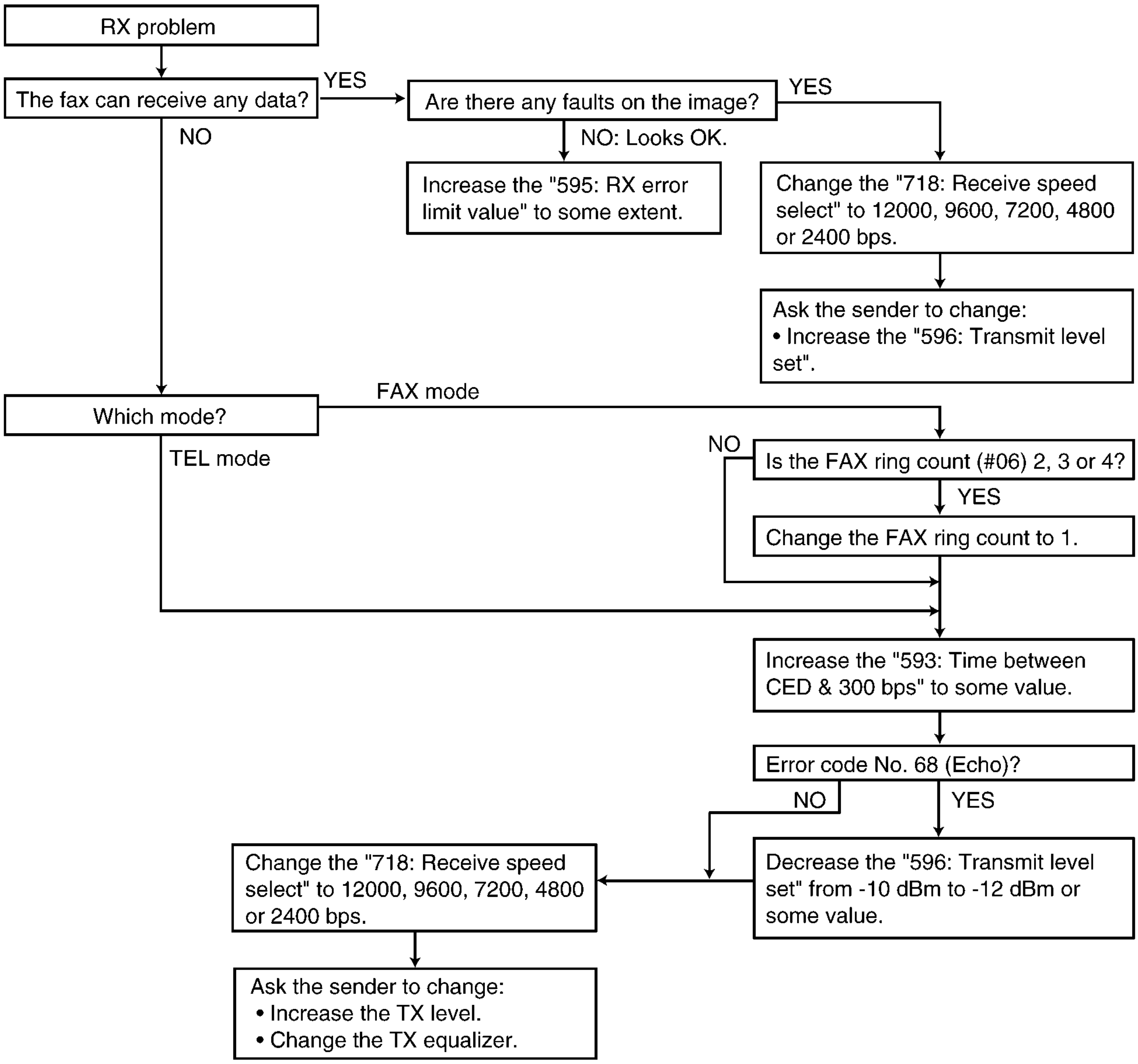

TX Problem
"TRANSMIT ERROR"
Message on LCD
Is the document pre-fed?
NO
YES
Does TX start? (Does it start feeding?)
NO
YES
OK
Increase the "596:Transmit level set" from -10 dBm to -5 dBm or same value.
NG
The document goes through.
Check the image quality on the RX side. (The image is expanded or distorted.)
Ask the other party to change the RX equalizer & increase the TX level.
Decrease the TX level from -10 dBm to - 15 dBm or same value.
NG
OK
Is auto dialing used to send?
YES
NO
Did you press the START key immediately after dialing?
NO
YES
Check the other party's machine. (Out of paper, auto answer off, etc.)
• Increase the "596:Transmit level set" from -10 dBm to -5 dBm or some value. OR • Decrease the "596:Trans-mit level set" from -10 dBm to -12 dBm . Try again.
NG
OK
· Decrease the "596:Trans-mit level set" from -10 dBm to -15 dBm. Try again.
Ask the RX party to increase the parameter of the RX error limit value to more than the current setting.
(Not available)
Change the "717:Transmit speed select " to 7200, 4800 or 2400 bps.
Check the current TX level.
Change the "594: Overseas DIS detection" to "Detect at the 2nd time".
Confirm that "592:CNG TX select" is set to "ALL".
Ask the other party to increase the TX level.

Note:

“596: Transmit level set” represents a service code. (Refer to **Service Function Table**(P.67).)

12.3.2.1.3. Receive Problem

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


RX problem
The fax can receive any data?
YES
NO
Are there any faults on the image?
YES
NO: Looks OK.
Increase the "595: RX error limit value" to some extent.
Change the "718: Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the "596: Transmit level set".
Which mode?
FAX mode
TEL mode
NO
Is the FAX ring count (#06) 2, 3 or 4?
YES
Change the FAX ring count to 1.
Increase the "593: Time between CED & 300 bps" to some value.
Error code No. 68 (Echo)?
NO
YES
Decrease the "596: Transmit level set" from -10 dBm to -12 dBm or some value.
Change the "718: Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the TX level.
• Change the TX equalizer.

Note:

- “596: Transmit level set” represents a service code. (Refer to **Service Function Table** (P.67).)
- #06: Refer to for **Program Mode Table** (P.100) Fax ring count.

Remarks:

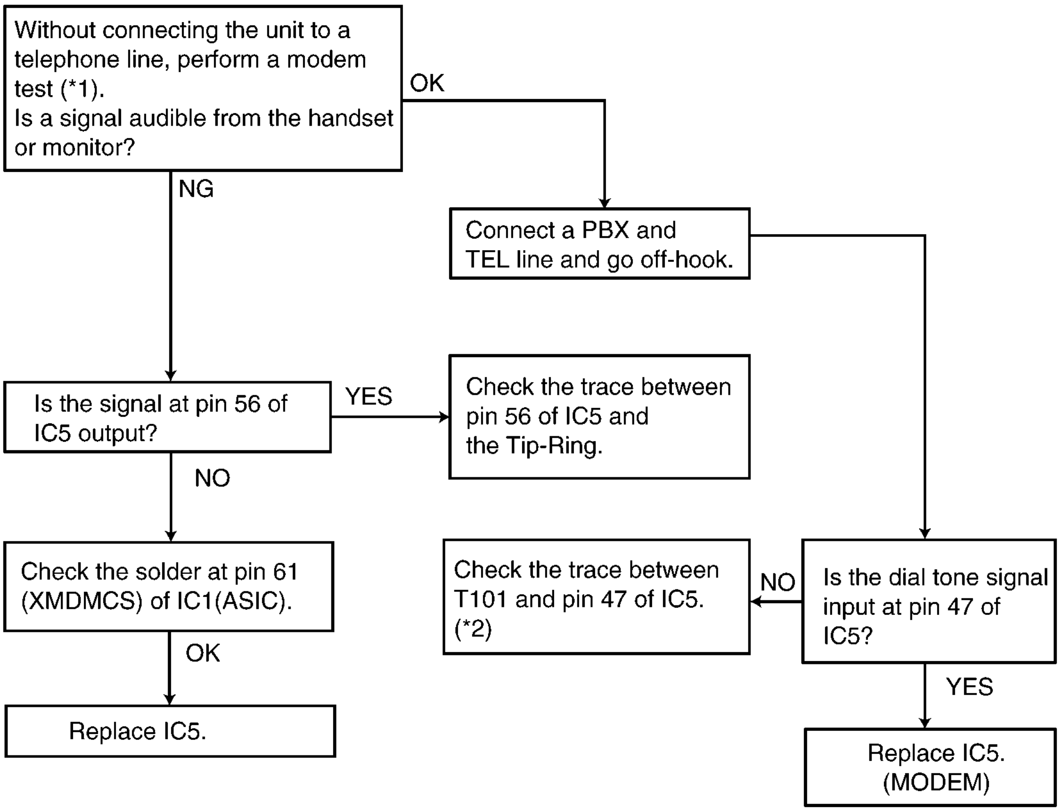
Regarding the reception problem, we have investigated the conceivable causes in the flow chart except for the software-related errors. However, some troubles may occur due to the software-related problems such as “CHECK PAPER” when the fax switches to the memory receiving mode and the memory capacity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

LCD display messages indicating the error causes are shown below.

CHECK PAPER
BACK COVER OPEN
UNIT OVERHEATED (COVER OPEN, etc.)...Reset the unit.
PAPER JAMMED
FILM EMPTY

Please refer to **Error Messages-Display** (P.75) for the above items. If it turns out to be a hardware deformity, please check each sensor. (Refer to **Test Mode** (P.63).)

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


Without connecting the unit to a telephone line, perform a modem test (*1).
Is a signal audible from the handset or monitor?
OK
NG
Connect a PBX and TEL line and go off-hook.
Is the signal at pin 56 of IC5 output?
YES
Check the trace between pin 56 of IC5 and the Tip-Ring.
NO
Check the solder at pin 61 (XMDMCS) of IC1(ASIC).
OK
Replace IC5.
Check the trace between T101 and pin 47 of IC5. (*2)
NO
Is the dial tone signal input at pin 47 of IC5?
YES
Replace IC5. (MODEM)

REFERENCE:

(*1): **Test Mode** (P.63)

(*2): **Analog Board Section** (P.125)

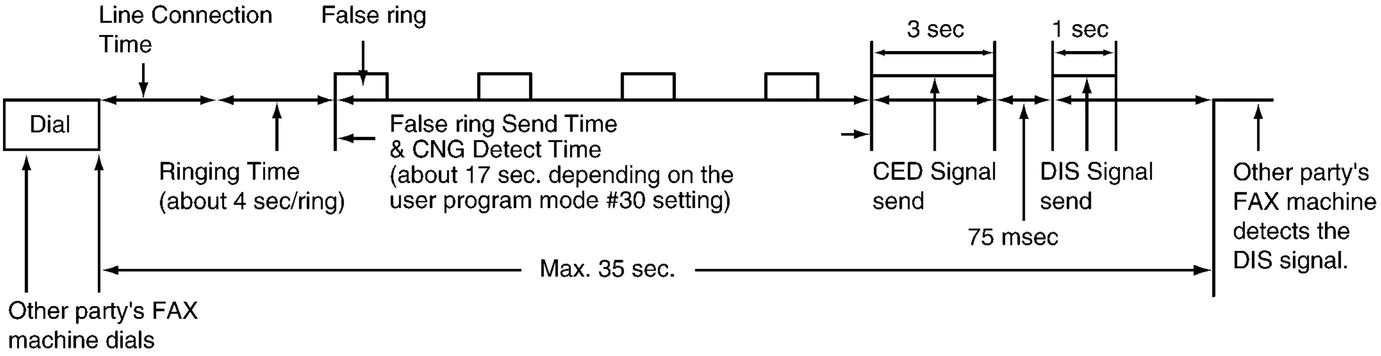
12.3.2.1.5. The unit can copy, but cannot either transmit/receive long distance or international communications

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)


Line Connection Time
False ring
3 sec
1 sec
Dial
False ring Send Time & CNG Detect Time (about 17 sec. depending on the user program mode #30 setting)
Ringing Time (about 4 sec/ring)
CED Signal send
DIS Signal send
75 msec
Other party's FAX machine detects the DIS signal.
Max. 35 sec.
Other party's FAX machine dials

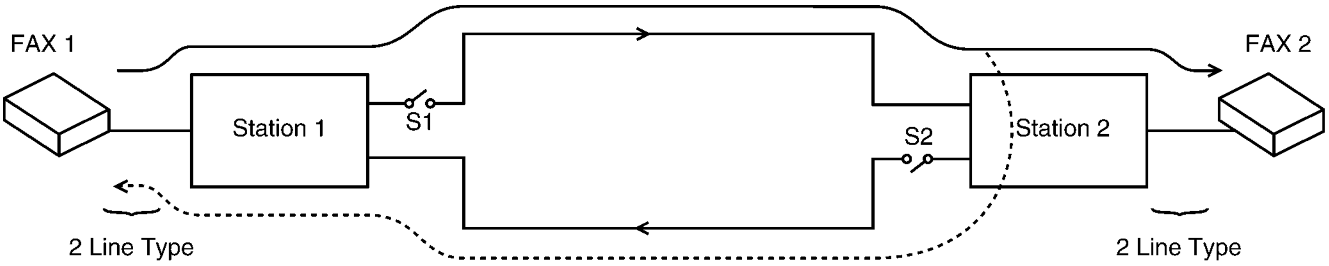
(Cause and Countermeasure)

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 35 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.


FAX 1
FAX 2
Station 1
Station 2
S1
S2
2 Line Type
2 Line Type

(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 -10 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)

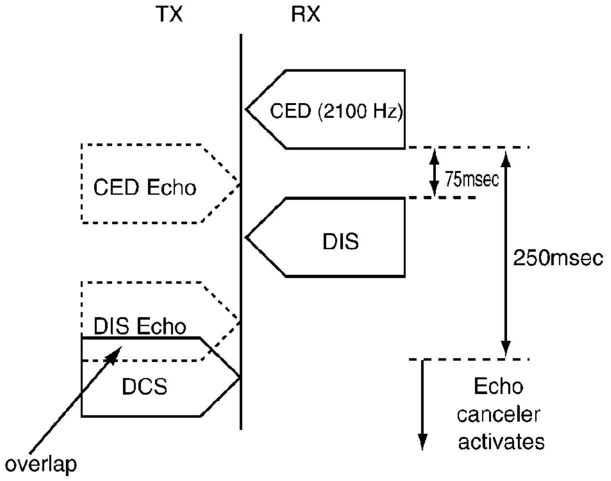


Fig. a
(Overlapping the Echo of the DIS signal and DCS signal)

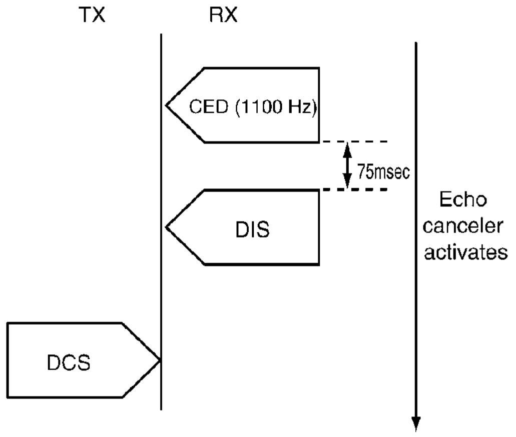


Fig. b
(Countermeasure by Changing the CED Frequency)

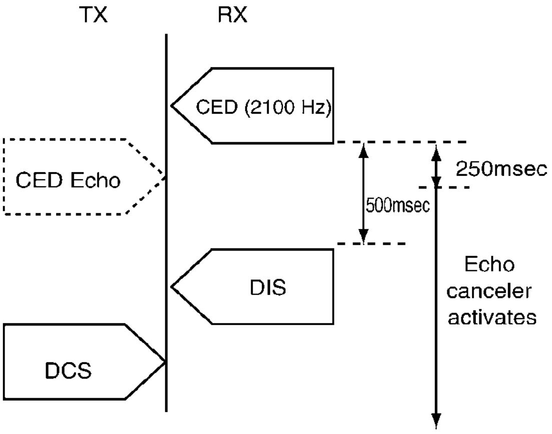

TX
RX
CED (2100 Hz)
CED Echo
250msec
500msec
DIS
Echo canceler activates
DCS

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

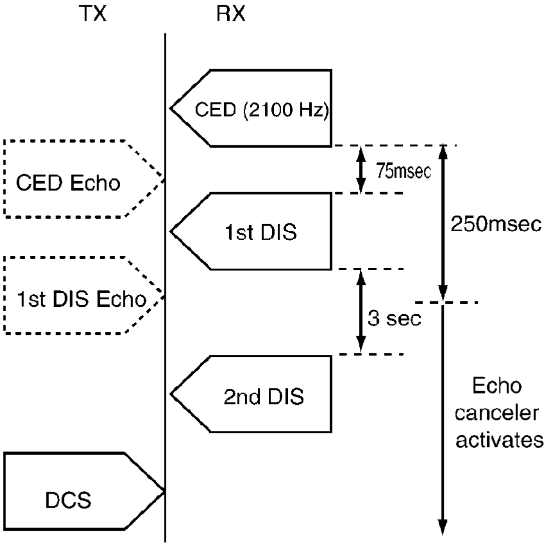
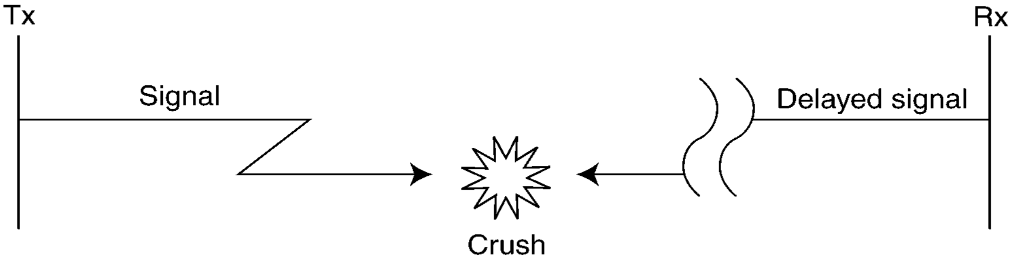

TX
RX
CED (2100 Hz)
CED Echo
75msec
1st DIS
250msec
1st DIS Echo
3 sec
2nd DIS
Echo canceler activates
DCS

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


Tx
Rx
Signal
Delayed signal
Crush

(Fig. e)

12.3.2.1.6. 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.67).

12.3.2.1.7. How to record fax signal by using PC

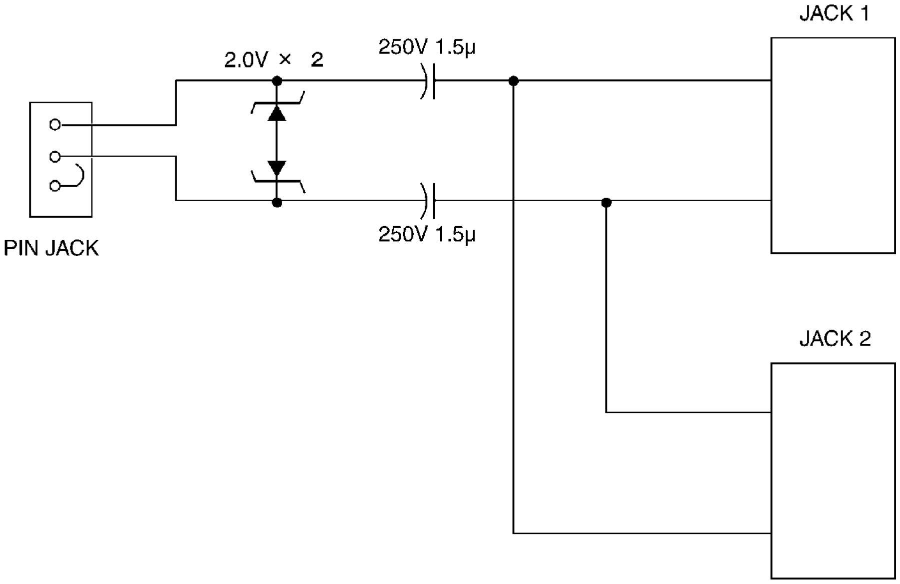
Recording FAX signal is one of the useful analysis measures to solve communication problems.
The way of recording easily by using PC is shown as follows.

1. Equipment

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

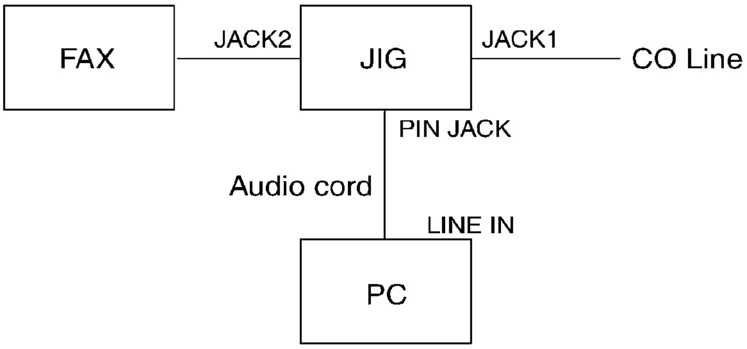
Parts No.	Parts Name & Description	Qt'y
PQJJ1T004Z	JACK1, JACK2	2
PQJJ1D010Z	PIN JACK	1
ECQE2155KF or ECQE2E155KC	CAPACITOR	2
MA4020	DIODE	2

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

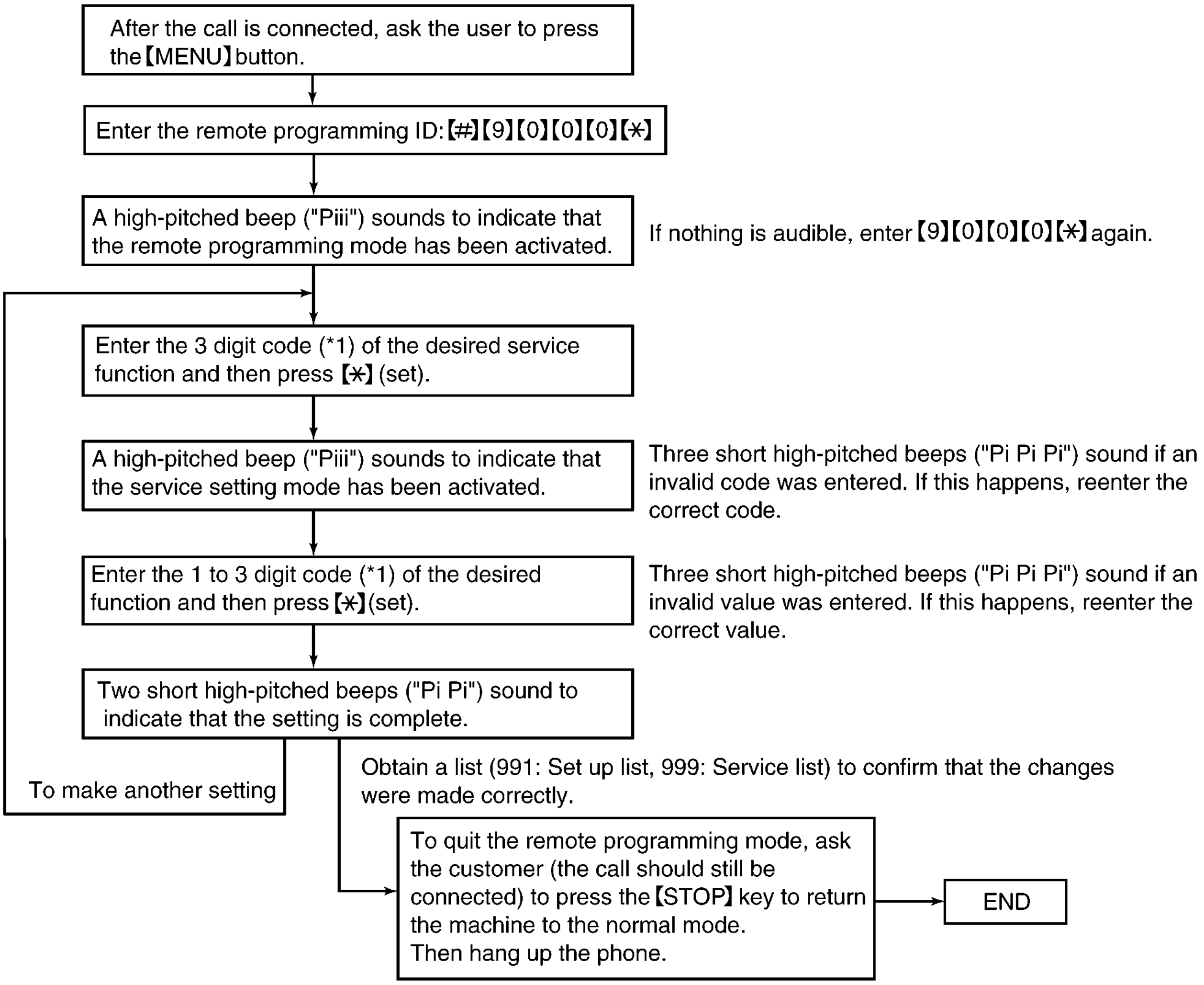
If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (**Program Mode Table** (P.100)). 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.99). Also, before exiting the remote programming mode, it is advisable to obtain a new list to confirm that the changes were made correctly.

Hints:

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


After the call is connected, ask the user to press the 【MENU】 button.
Enter the remote programming ID: 【#】【9】【0】【0】【0】【*】
A high-pitched beep ("Piii") sounds to indicate that the remote programming mode has been activated.
If nothing is audible, enter 【9】【0】【0】【0】【*】 again.
Enter the 3 digit code (*1) of the desired service function and then press 【*】 (set).
A high-pitched beep ("Piii") sounds to indicate that the service setting mode has been activated.
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid code was entered. If this happens, reenter the correct code.
Enter the 1 to 3 digit code (*1) of the desired function and then press 【*】(set).
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid value was entered. If this happens, reenter the correct value.
Two short high-pitched beeps ("Pi Pi") sound to indicate that the setting is complete.
To make another setting
Obtain a list (991: Set up list, 999: Service list) to confirm that the changes were made correctly.
To quit the remote programming mode, ask the customer (the call should still be connected) to press the 【STOP】 key to return the machine to the normal mode. Then hang up the phone.
END

Note:

(*1): Refer to **Program Mode Table** (P.100)

12.4.2. Program Mode Table

Code	Function	Set Value	Default	Remote Setting
001	Date and time	dd/mm/yy hh:mm	01/01/08	NG
002	Your logo	---------	None	NG
003	Your FAX number	---------	None	NG
004	Sending report	1: ERROR / 2: ON / 3: OFF	ERROR	OK
006	FAX ring count	1 ~ 9	2	OK
	TAM ring count	0: Tall Saver / 2~7	2	OK
010	Recording time	1: GREETING ONLY / 2: 1 minute / 3: 2 minutes / 4: 3 minutes	3 minutes	OK
011	Remote TAM ID	---------	---------	NG
013	Dialing mode	1: PULSE / 2: TONE	TONE	OK
014	PC LINK (KX-FM388 only)	1: ON / 2: OFF	ON	OK
017	Ringer tone	TONE 1 / TONE 2 / TONE 3	TONE 1	NG
022	Automatic journal report	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
047	Voice guidance	1: ON / 2: OFF	ON	OK
049	Auto disconnection	0: OFF / 1: ON	ON CODE=*0	NG
054	Common greeting MSG. REC. time	1: 16 sec / 2: 60 sec	16 sec	OK
058	Scan contrast	1: NORMAL / 2: DARKER / 3: LIGHT	NORMAL	OK
059	Print contrast	1: NORMAL / 2: DARKER	NORMAL	OK
067	ICM monitor	1: ON / 2: OFF	ON	OK
072	Recall/Flash time	1:90 / 2:100 / 3:110 / 4:160 / 5:200 / 6:250 / 7:300 / 8:400 / 9:600 / 0:80 / 10:700 / 11:900	600 ms	OK
073	Manual receive mode	1: TEL / 2: TEL/FAX	TEL	OK
076	Connecting tone	1: ON / 2: OFF	ON	OK
077	Auto answer mode	2: FAX only / 3: TAM/FAX	TAM/FAX	OK
078	TEL/FAX ring setting	1 ~ 9	2	OK
080	Set default	YES / NO	NO	NG
501	Pause time	001 ~ 600 × 100 msec	030 × 100 msec	OK
503	Dial speed select	1: 10 pps / 2: 20 pps	10 pps	OK
510	Vox time	1: 6 sec / 2: 4 sec	6 sec	OK
511	Vox Sensitivity	1: High / 2: Low	High	OK
512	Vox mode detection	1: A / 2: B	A	OK
514	Bell detection time	1 ~ 9 × 100 msec	6 × 100 msec	OK
520	CED frequency select	1: 2100 Hz / 2: 1100 Hz	2100 Hz	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: 0 km / 2: 1.8 km / 3: 3.6 km / 4: 7.2 km	0 km	OK
524	Transmission equalizer select	1: 0 km / 2: 1.8 km / 3: 3.6 km / 4: 7.2 km	0 km	OK
544	Document feed position	1 ~ 9 mm	5 mm	OK
550	Memory clear	---------	---------	NG
551	Flash memory check	---------	---------	NG
552	DTMF signal tone test	1: ON / 2: OFF	OFF	OK
553	Monitor on FAX communication select	1: OFF / 2: Phase B / 3: ALL	OFF	OK
554	Modem test	---------	---------	NG
555	Scan test	---------	---------	NG
556	Motor test	---------	---------	NG
557	LED test	---------	---------	NG
558	LCD test	---------	---------	NG
559	Document jam detection select	1: ON / 2: OFF	ON	OK
561	Key test	---------	---------	NG

Code	Function	Set Value	Default	Remote Setting
567	T0 timer	001 ~ 255 sec	046 sec	OK
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 ~ 999 sec	185 sec	OK
573	Remote turn-on ring number set	00 ~ 99	10	OK
580	TAM continuous tone detection	1: ON / 2: OFF	ON	OK
590	FAX auto redial time set	00 ~ 99	05	OK
591	FAX auto redial line disconnection time set	001 ~ 999 sec	185 sec	OK
592	CNG transmit select	1: OFF / 2: ALL / 3: AUTO	ALL	OK
593	Time between CED and 300 bps	1: 75 msec / 2: 500 msec / 3: 1 sec	75 msec	OK
594	Overseas DIS detection select	1: 1st / 2: 2nd	1st	OK
595	Receive error limit value set	1: 5% / 2: 10% / 3: 15% / 4: 20%	10%	OK
596	Transmit level set	00 ~ 15 × -1 dBm	11 × -1 dBm	OK
598[*1]	Receiving Sensitivity	20 ~ 48 × -1 dBm	42 × -1 dBm	OK
599	ECM Frame size	1:256 byte / 2: 64 byte	256 byte	OK
624	AT ring time out (KX-FM388 only)	1: 3 sec / 2: 5 sec	3 sec	OK
625	Setting printing density	1: Default / 2: Lighter / 3: Darker	Default	OK
710	Memory clear except History data	---------	---------	NG
717	Transmit speed select	1: 14400 / 2: 12000 / 3: 9600 / 4: 7200 / 5: 4800 / 6: 2400 bps	14400 bps	OK
718	Receive speed select	1: 14400 / 2: 12000 / 3: 9600 / 4: 7200 / 5: 4800 / 6: 2400 bps	14400 bps	OK
722	Redial tone detect	1: ON / 2: OFF	ON	OK
724	PC-SEND busy tone detection (KX-FM388 only)	1: ON / 2: OFF	OFF	OK
745	Power on film feed	1: ON / 2: OFF	ON	OK
763	CNG detect time for friendly reception	1: 10 sec / 2: 20 sec / 3: 30 sec	30 sec	OK
773	DIS-DCS interval	1: 500 msec / 2: 200 msec	200 ms	OK
774	T4 timer	00~99 × 100 msec	00 × 100 ms	OK
784	Voice Prompt Test	---------	---------	NG
815	Sensor test & Vox test	---------	---------	NG
841	Digital SP-Phone RX & TX check	---------	---------	NG
845	Setting scanning density	00 ~ 32	08	OK
852	Print test pattern	---------	---------	NG
853	Top margin	1 ~ 9 mm	5 mm	OK
861	Paper size	1: A4 / 2: LETTER	A4	OK
874	DTMF ON time	06 ~ 20 × 10msec	10 × 10 msec	OK
875	DTMF OFF time	06 ~ 20 × 10msec	10 × 10 msec	OK
880	History list	---------	---------	NG
881	Journal 2	---------	---------	NG
882	Journal 3	---------	---------	NG
961	The time transmitting the false ring back tone	01~10 sec	07 sec	OK
962	The operator calling time	05~30 sec	10 sec	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:

- [*1] Power is OFF/ON after changing this set value.
- Refer to **Service Function Table** (P.67) for descriptions of the individual codes.

Example:

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

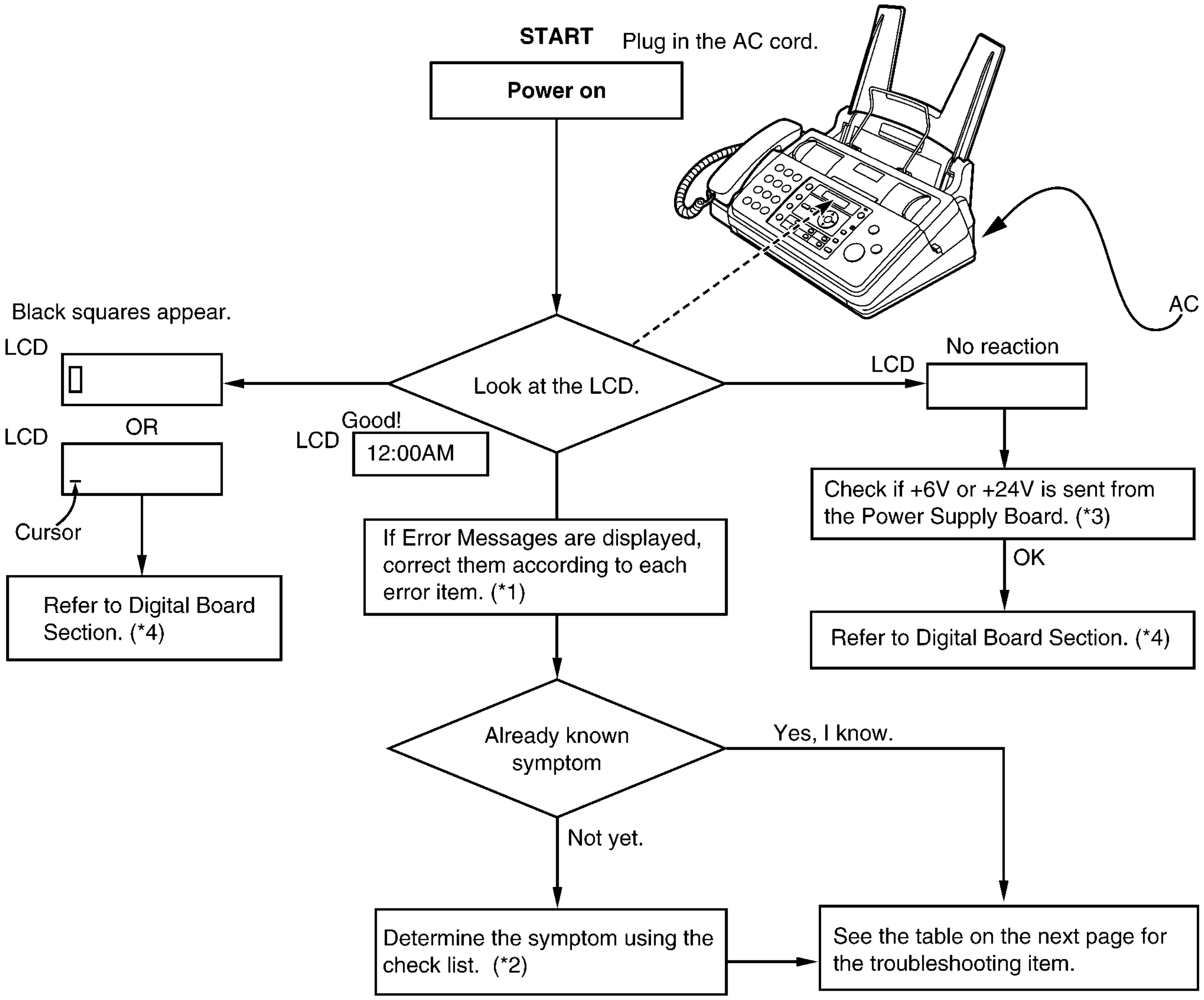
12.5. Troubleshooting Details

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.104). Difficult problems may be hard to determine, so repeated testing is necessary.

12.5.2. Starting Troubleshooting

Determine the symptom and the troubleshooting method.


START
Plug in the AC cord.
Power on
AC
Look at the LCD.
Black squares appear.
LCD
LCD
OR
Cursor
Refer to Digital Board Section. (*4)
LCD
Good!
12:00AM
If Error Messages are displayed, correct them according to each error item. (*1)
No reaction
LCD
Check if +6V or +24V is sent from the Power Supply Board. (*3)
OK
Refer to Digital Board Section. (*4)
Already known symptom
Yes, I know.
Not yet.
Determine the symptom using the check list. (*2)
See the table on the next page for the troubleshooting item.

REFERENCE:

(*1): **Error Messages-Display** (P.75)
(*2): **Simple Check List** (P.104)
(*3): **Power Supply Board Section** (P.129)
(*4): **Digital Board Section** (P.118)

12.5.3. Troubleshooting Items Table

ITEM	SYMPTOM	REFERENCE
ADF (Auto Document Feeder)	The document does not feed.	See **No Document Feed** (P.105)
	Document jam	See **Document Jam** (P.106)
	Multiple feed	See **Multiple Document Feed** (P.107)
	Skew	See **Document Skew** (P.108)
Recording paper feed	The recording paper does not feed.	See **The Recording Paper does not Feed** (P.109)
	Paper jam	See **Paper Jam** (P.110)
	Multiple feed and skew	See **Recording Paper Multiple Feed and Skew** (P.111)
Printing	The sent fax data is skewed.	See **The Sent Fax Data is Skewed** (P.111)
	The received fax data is skewed.	See **The Received Fax Data is Skewed** (P.111)
	The received or copied data is expanded.	See **Received or Copied Data is Expanded** (P.112)
	A black page is copied.	See **A Blank Page is Copied** (P.113)
	A blank page is received.	See **A Blank Page is Received** (P.115)
	Black or white vertical line	See **Black or White Vertical Line** (P.115)
	Black or white lateral line on print out	See **Black or White Lateral Line on Print Out** (P.116)
	An abnormal image is printed	See **An Abnormal Image is Printed** (P.117)
Communication FAX, TEL (Analog board)	Cannot communicate by fax. An error code is displayed.	See **Communication Section** (P.90) and **Journal Report** (P.77)
	Cannot talk. The DTMF tone doesn't work. The handset / monitor doesn't work, etc.	See **Analog Board Section** (P.125)
Operation panel	Keys are not accepted.	See **Operation Panel Section** (P.132)
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	See **Sensor Section** (P.133)

12.5.3.1. Simple Check List

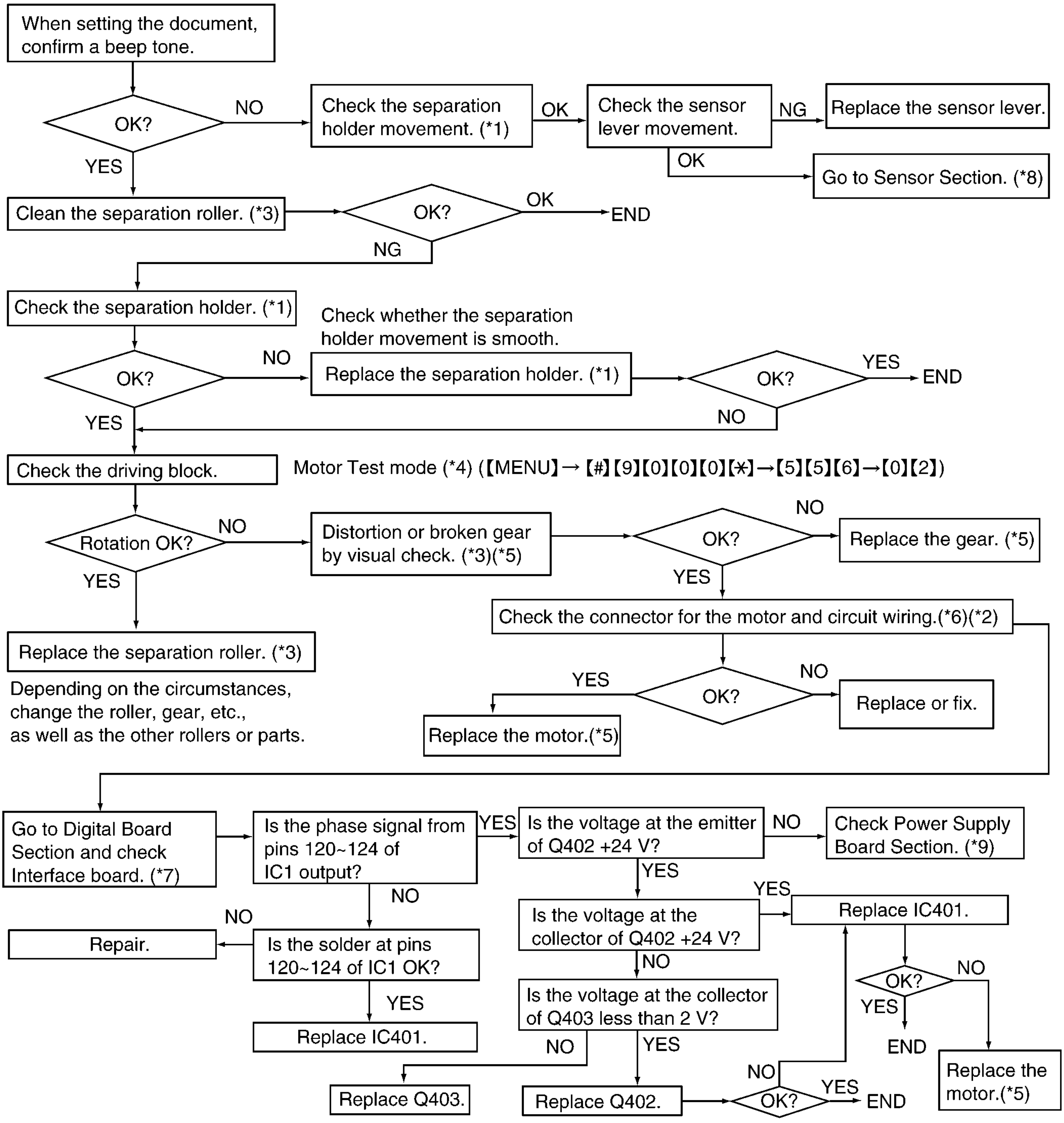
SERIAL NO.		DATE	
FUNCTION		JUDGEMENT	REFERENCE
FAX operation	Transmission	OK / NG	
	Receiving	OK / NG	
Copy operation		OK / NG	
Telephone operation	Handset transceiver / receiver	OK / NG	
	Digital SP-Phone	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
	Vox detection	OK / NG	Service code #815 (Refer to **Test Mode** (P.63).)
Operation Panel	Key check	OK / NG	Service code #561 (Refer to **Test Mode** (P.63).)
	LED check	OK / NG	Service code #557 (Refer to **Test Mode** (P.63).)
	LCD check	OK / NG	Service code #558 (Refer to **Test Mode** (P.63).)
Sensor	Sensor check	OK / NG	Service code #815 (Refer to **Test Mode** (P.63).)
Clock	Display changing	OK / NG	Is the time kept correctly? Check with another clock.
Digital TAM	Greeting REC / PLAY	OK / NG	
	Incoming message REC / PLAY	OK / NG	
	Memo REC / PLAY	OK / NG	
Voice prompt		OK / NG	Service code #784 (Refer to **Test Mode**(P.63).) Check whether voice prompt is play or not.
External Telephone	Handset transceiver/receiver	OK / NG	
	Remote control	OK / NG	Change to FAX receiving by pressing **[*] [#] [9]**. (default fax activation code) (Refer to #041 on **Program Mode Table** (P.100).)

Note:

- Check according to the service code referring to the **Test Mode** (P.63).

12.5.4. ADF (Auto Document Feed) Section

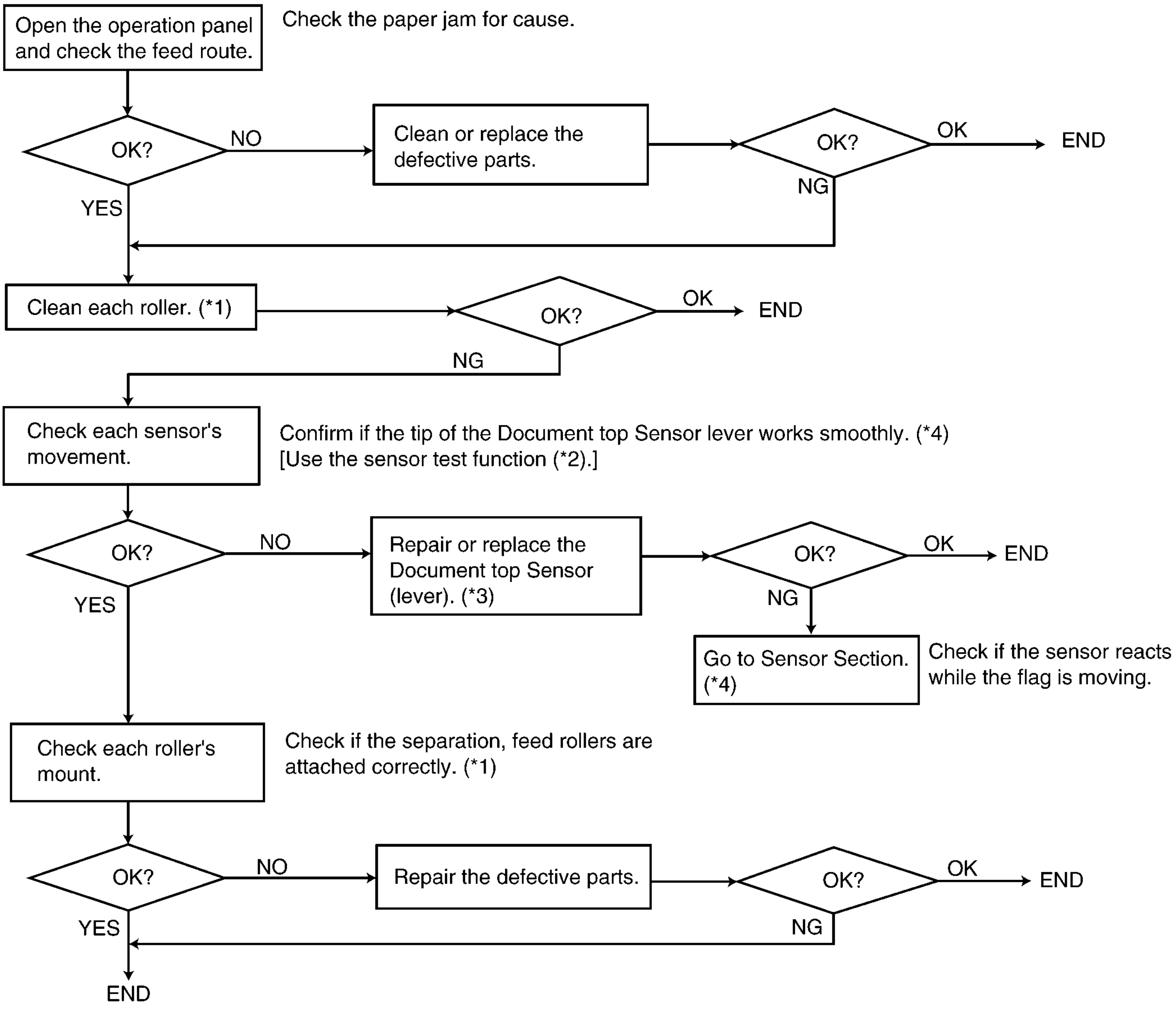
12.5.4.1. No Document Feed


When setting the document, confirm a beep tone.
OK?
NO
YES
Check the separation holder movement. (*1)
OK
Check the sensor lever movement.
NG
Replace the sensor lever.
OK
Go to Sensor Section. (*8)
Clean the separation roller. (*3)
OK?
OK
END
NG
Check the separation holder. (*1)
Check whether the separation holder movement is smooth.
OK?
NO
Replace the separation holder. (*1)
OK?
YES
END
NO
YES
Check the driving block.
Motor Test mode (*4) (【MENU】→【#】【9】【0】【0】【0】【*】→【5】【5】【6】→【0】【2】)
Rotation OK?
NO
Distortion or broken gear by visual check. (*3)(*5)
OK?
NO
Replace the gear. (*5)
YES
YES
Check the connector for the motor and circuit wiring.(*6)(*2)
Replace the separation roller. (*3)
Depending on the circumstances, change the roller, gear, etc., as well as the other rollers or parts.
YES
OK?
NO
Replace or fix.
Replace the motor.(*5)
Go to Digital Board Section and check Interface board. (*7)
Is the phase signal from pins 120~124 of IC1 output?
YES
Is the voltage at the emitter of Q402 +24 V?
NO
Check Power Supply Board Section. (*9)
YES
YES
NO
Is the voltage at the collector of Q402 +24 V?
Replace IC401.
NO
Repair.
Is the solder at pins 120~124 of IC1 OK?
NO
OK?
NO
YES
Is the voltage at the collector of Q403 less than 2 V?
YES
Replace IC401.
NO
YES
END
Replace the motor.(*5)
NO
Replace Q403.
Replace Q402.
OK?
YES
END

REFERENCE:

(*1): **How to Remove the Separation Rubber** (P.153)
(*2): **Installation Position of the Lead Wires** (P.154)
(*3): **How to Remove the Gear Block and Separation Roller** (P.149)
(*4): **Test Mode** (P.63)
(*5): **How to Remove the Component parts of Gear Block** (P.150)
(*6): **Stepping Motor Drive Circuit (RX)** (P.29)
(*7): **Digital Board Section** (P.118)
(*8): **Sensor Section** (P.133)
(*9): **Power Supply Board Section** (P.129)

12.5.4.2. Document Jam


Open the operation panel and check the feed route.
OK?
NO
YES
Clean or replace the defective parts.
OK?
OK
NG
END
Clean each roller. (*1)
OK?
OK
NG
END
Check each sensor's movement.
OK?
NO
YES
Repair or replace the Document top Sensor (lever). (*3)
OK?
OK
NG
END
Go to Sensor Section. (*4)
Check each roller's mount.
OK?
NO
YES
Repair the defective parts.
OK?
OK
NG
END
END

Check the paper jam for cause.

Confirm if the tip of the Document top Sensor lever works smoothly. (*4)
[Use the sensor test function (*2).]

Check if the sensor reacts while the flag is moving.

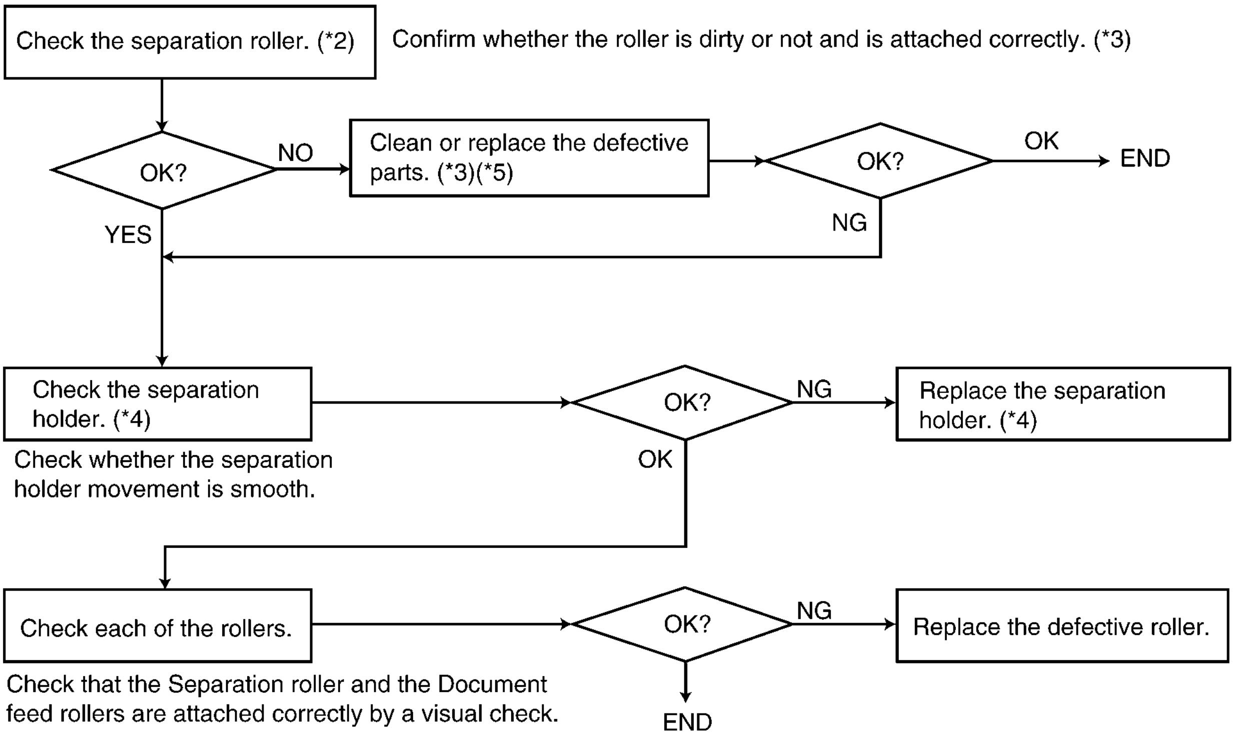
Check if the separation, feed rollers are attached correctly. (*1)

REFERENCE:

(*1): **Disassembly and Assembly Instructions** (P.140)
(*2): **Test Mode** (P.63)
(*3): **How to Remove the Operation Board, LCD, MIC Board and Document Exit Roller** (P.152)
(*4): **Sensor Section** (P.133)

12.5.4.3. Multiple Document Feed

- When using thick paper etc., sometimes the document will not be fed. (*1)


Check the separation roller. (*2)
Confirm whether the roller is dirty or not and is attached correctly. (*3)
OK?
NO
YES
Clean or replace the defective parts. (*3)(*5)
OK?
OK
END
NG
Check the separation holder. (*4)
Check whether the separation holder movement is smooth.
OK?
NG
OK
Replace the separation holder. (*4)
Check each of the rollers.
Check that the Separation roller and the Document feed rollers are attached correctly by a visual check.
OK?
NG
Replace the defective roller.
END

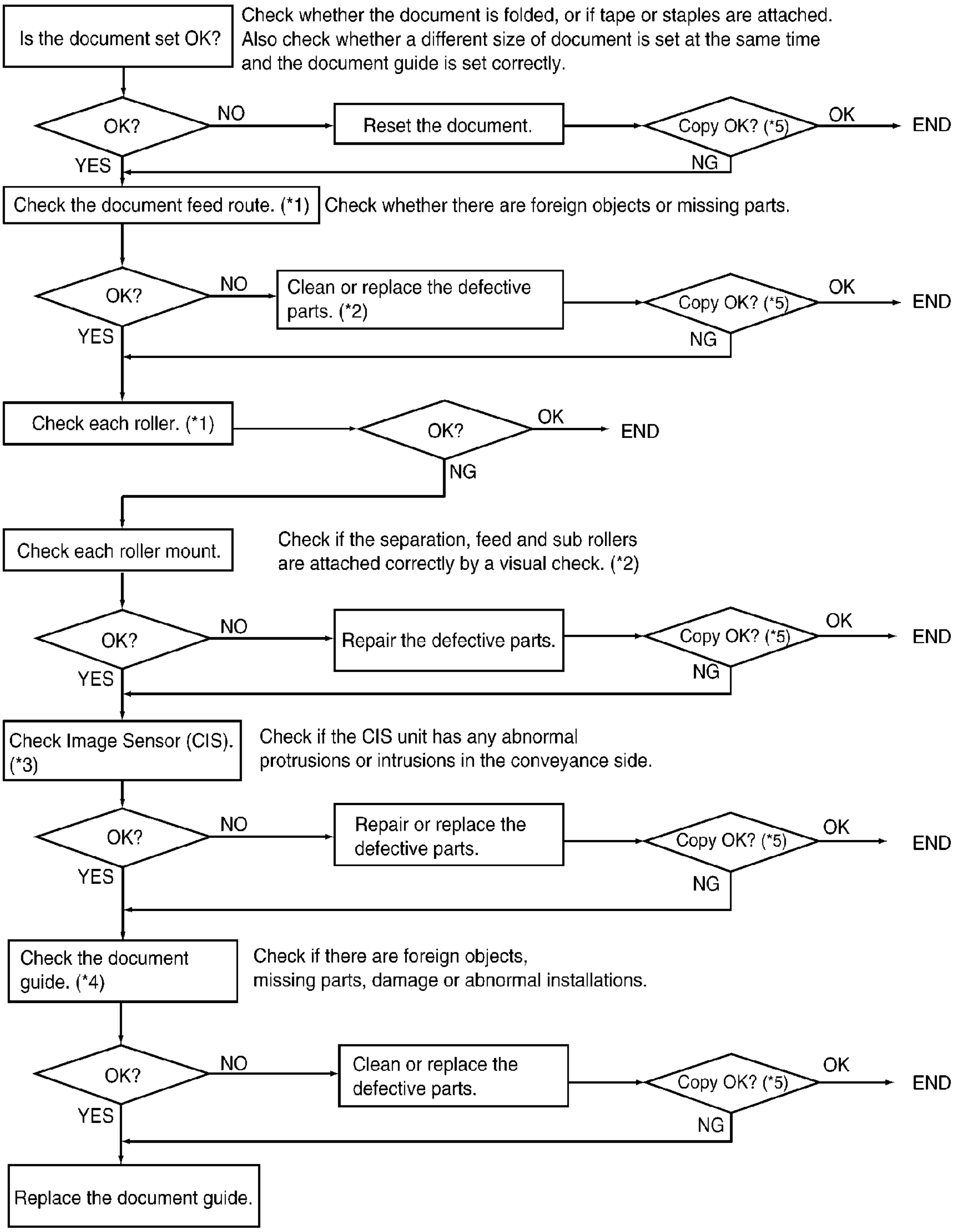
REFERENCE:

(*1): **Installing the Recording Paper** (P.59)
(*2): **How to Remove the Gear Block and Separation Roller** (P.149)
(*3): **Disassembly and Assembly Instructions** (P.140)
(*4): **How to Remove the Separation Rubber** (P.153)
(*5): **Maintenance** (P.156)

Note:

When confirming if the characters are extended or distorted, or if the feed problem is occurred, use this test chart format. (Refer to **Test Chart** (P.172).)

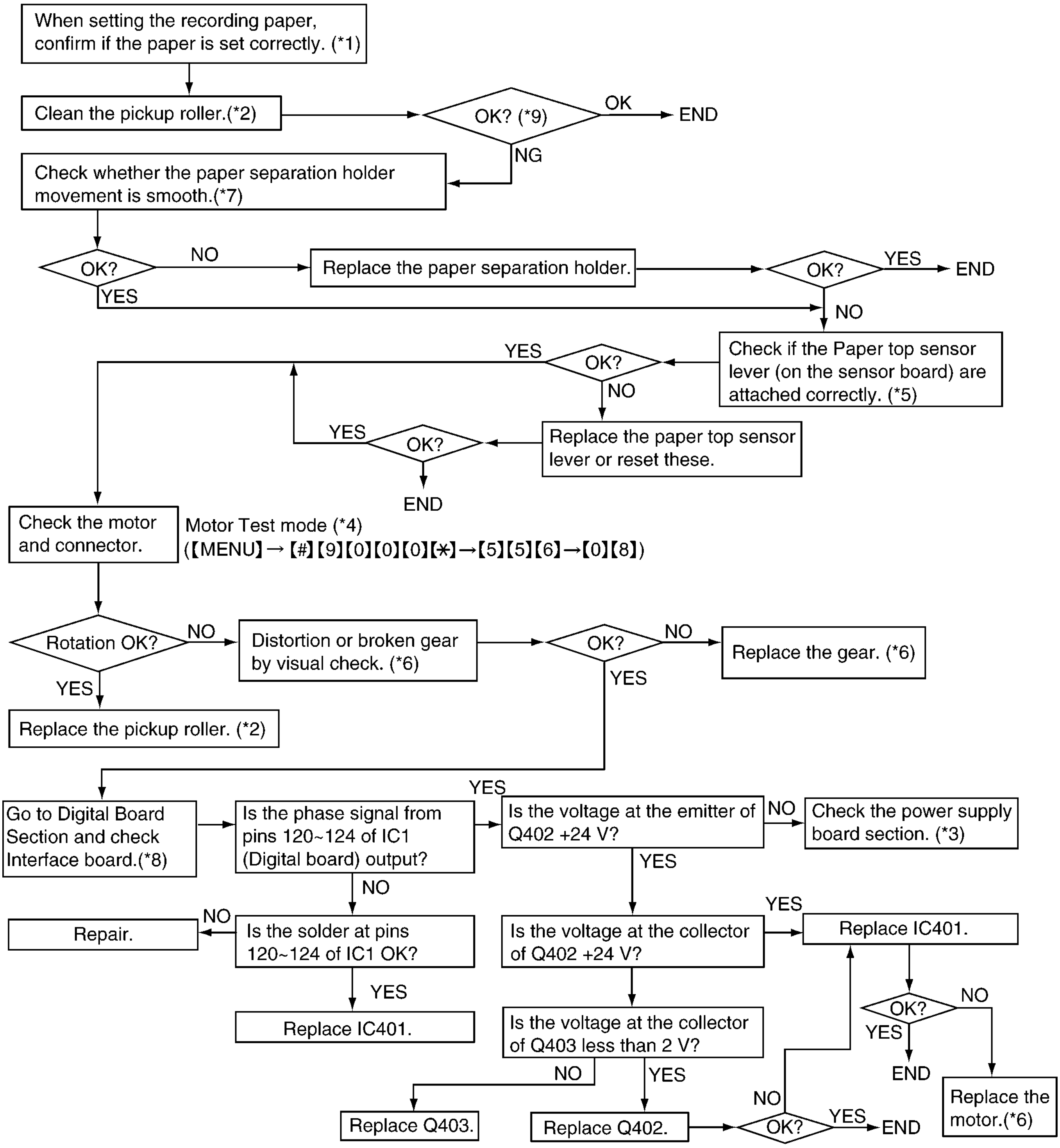
12.5.4.4. Document Skew


Is the document set OK?
Check whether the document is folded, or if tape or staples are attached.
Also check whether a different size of document is set at the same time and the document guide is set correctly.
OK?
NO
Reset the document.
Copy OK? (*5)
OK
END
NG
YES
Check the document feed route. (*1)
Check whether there are foreign objects or missing parts.
OK?
NO
Clean or replace the defective parts. (*2)
Copy OK? (*5)
OK
END
NG
YES
Check each roller. (*1)
OK?
OK
END
NG
Check each roller mount.
Check if the separation, feed and sub rollers are attached correctly by a visual check. (*2)
OK?
NO
Repair the defective parts.
Copy OK? (*5)
OK
END
NG
YES
Check Image Sensor (CIS). (*3)
Check if the CIS unit has any abnormal protrusions or intrusions in the conveyance side.
OK?
NO
Repair or replace the defective parts.
Copy OK? (*5)
OK
END
NG
YES
Check the document guide. (*4)
Check if there are foreign objects, missing parts, damage or abnormal installations.
OK?
NO
Clean or replace the defective parts.
Copy OK? (*5)
OK
END
NG
YES
Replace the document guide.

REFERENCE:

(*1): **Maintenance Items and Component Locations** (P.156)
(*2): **Disassembly and Assembly Instructions** (P.140)
(*3): **How to Remove the Image Sensor (CIS)** (P.141)
(*4): **Overview** (P.54)
(*5): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.

12.5.4.5. The Recording Paper does not Feed


When setting the recording paper, confirm if the paper is set correctly. (*1)
Clean the pickup roller.(*2)
OK? (*9)
OK
END
NG
Check whether the paper separation holder movement is smooth.(*7)
OK?
NO
YES
Replace the paper separation holder.
OK?
YES
END
NO
Check if the Paper top sensor lever (on the sensor board) are attached correctly. (*5)
OK?
YES
NO
Replace the paper top sensor lever or reset these.
OK?
YES
END
Check the motor and connector.
Motor Test mode (*4)
([MENU] → [#][9][0][0][0][✱]→[5][5][6]→[0][8])
Rotation OK?
NO
YES
Distortion or broken gear by visual check. (*6)
OK?
NO
YES
Replace the gear. (*6)
Replace the pickup roller. (*2)
Go to Digital Board Section and check Interface board.(*8)
Is the phase signal from pins 120~124 of IC1 (Digital board) output?
YES
NO
Is the voltage at the emitter of Q402 +24 V?
NO
Check the power supply board section. (*3)
YES
Repair.
NO
Is the solder at pins 120~124 of IC1 OK?
YES
Replace IC401.
Is the voltage at the collector of Q402 +24 V?
YES
Replace IC401.
OK?
NO
YES
END
Replace the motor.(*6)
Is the voltage at the collector of Q403 less than 2 V?
NO
YES
Replace Q403.
Replace Q402.
OK?
NO
YES
END

REFERENCE:

(*1): **Installing the Recording Paper** (P.59)

(*2): **How to Remove the Pickup Roller** (P.144)

(*3): **Power Supply Board Section** (P.129)

(*4): **Test Mode** (P.63)

(*5): **How to Remove the Digital, Analog, Interface and Sensor Boards** (P.147)

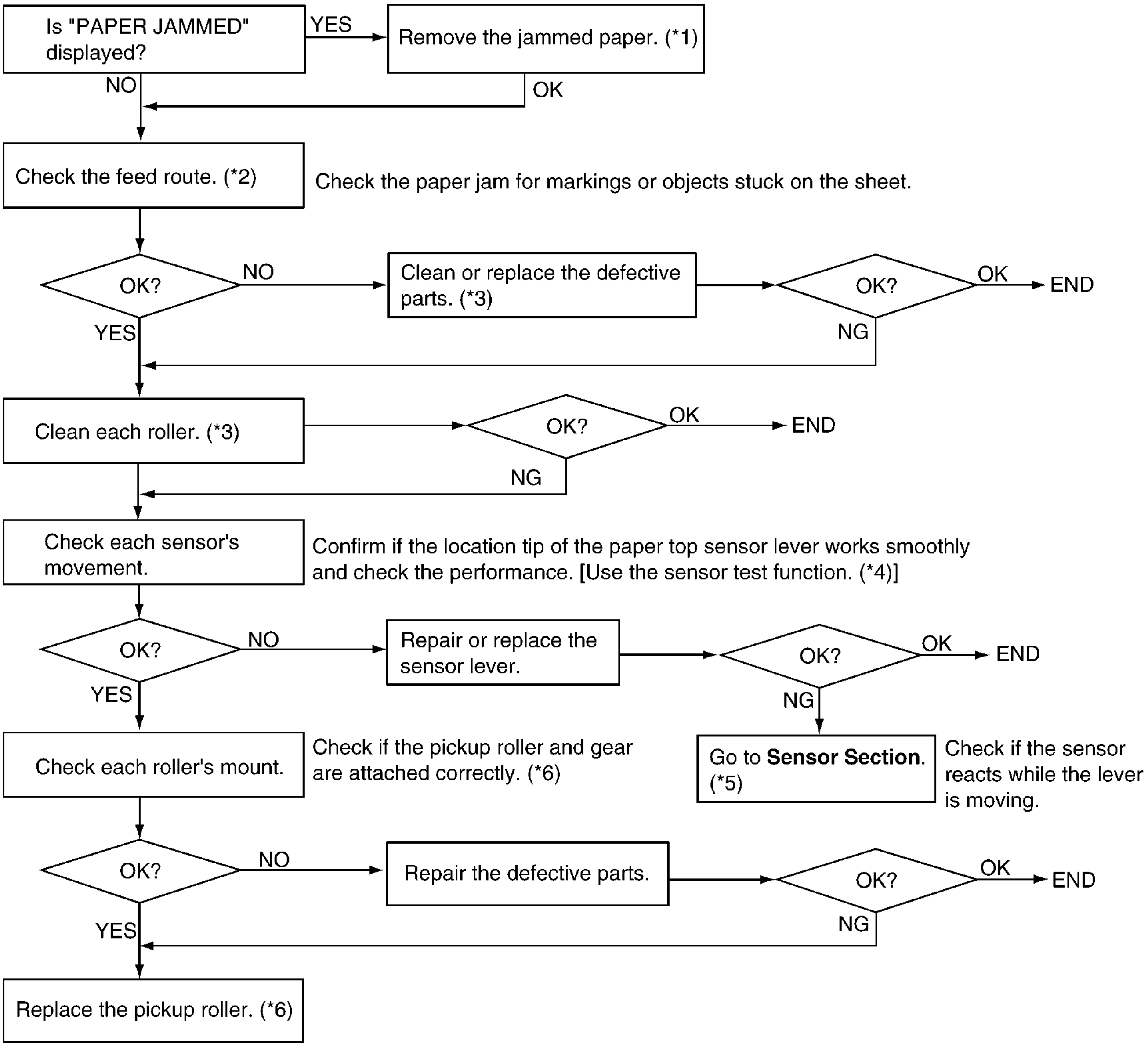
(*6): **How to Remove the Component parts of Gear Block** (P.150)

(*7): **How to Remove the Back Cover and Platen Roller** (P.143)

(*8): **Digital Board Section** (P.118)

(*9): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.

12.5.4.6. Paper Jam



Is "PAPER JAMMED" displayed?

Remove the jammed paper. (*1)

Check the feed route. (*2)

Check the paper jam for markings or objects stuck on the sheet.

Clean or replace the defective parts. (*3)

Clean each roller. (*3)

Check each sensor's movement.

Confirm if the location tip of the paper top sensor lever works smoothly and check the performance. [Use the sensor test function. (*4)]

Repair or replace the sensor lever.

Go to **Sensor Section**. (*5)

Check if the sensor reacts while the lever is moving.

Check each roller's mount.

Check if the pickup roller and gear are attached correctly. (*6)

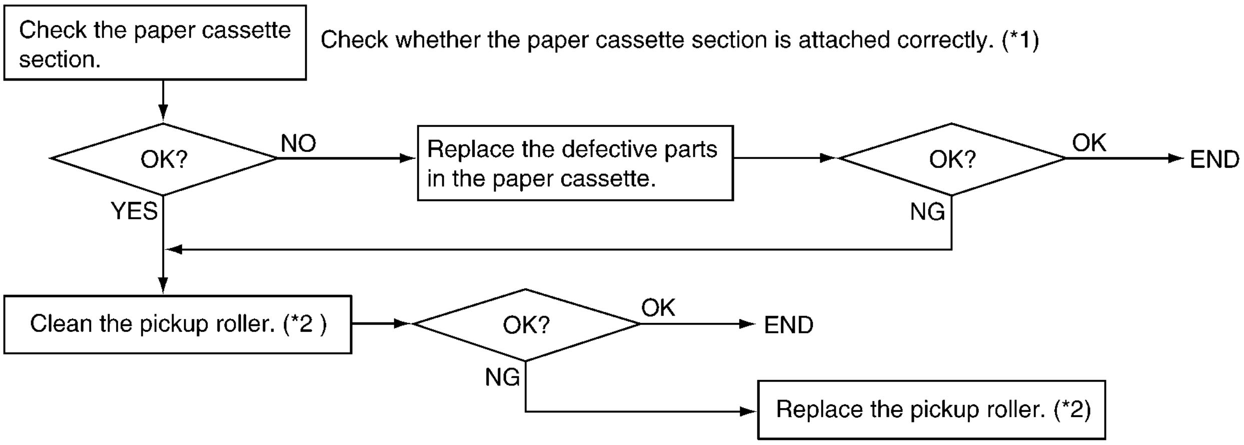
Repair the defective parts.

Replace the pickup roller. (*6)

REFERENCE:

(*1): **Jams** (P.163)
(*2): **Maintenance Items and Component Locations** (P.156)
(*3): **Disassembly and Assembly Instructions** (P.140)
(*4): **Test Mode** (P.63)
(*5): **Sensors and Switches** (P.33)
(*6): **How to Remove the Pickup Roller** (P.144)

12.5.4.7. Recording Paper Multiple Feed and Skew

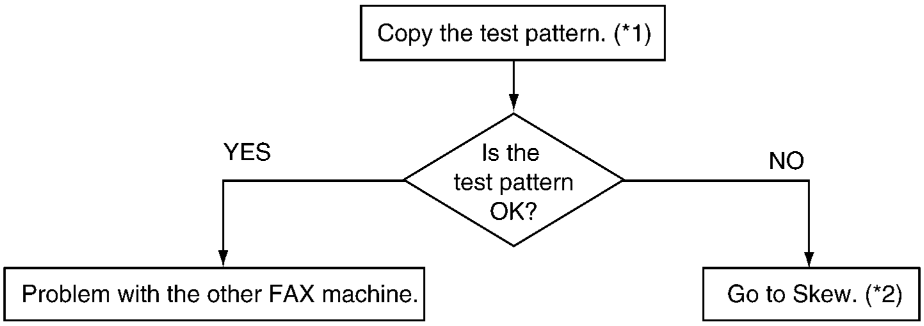

Check the paper cassette section.
Check whether the paper cassette section is attached correctly. (*1)
OK?
NO
YES
Replace the defective parts in the paper cassette.
OK?
OK
END
NG
Clean the pickup roller. (*2)
OK?
OK
END
NG
Replace the pickup roller. (*2)

REFERENCE:

(*1): **How to Remove the Back Cover and Platen Roller** (P.143)

(*2): **How to Remove the Pickup Roller** (P.144)

12.5.4.8. The Sent Fax Data is Skewed

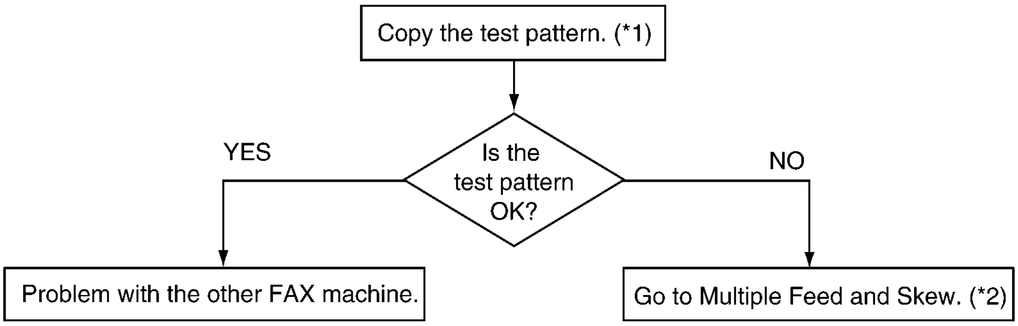

Copy the test pattern. (*1)
Is the test pattern OK?
YES
NO
Problem with the other FAX machine.
Go to Skew. (*2)

REFERENCE:

(*1): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.

(*2): **Document Skew** (P.108)

12.5.4.9. The Received Fax Data is Skewed

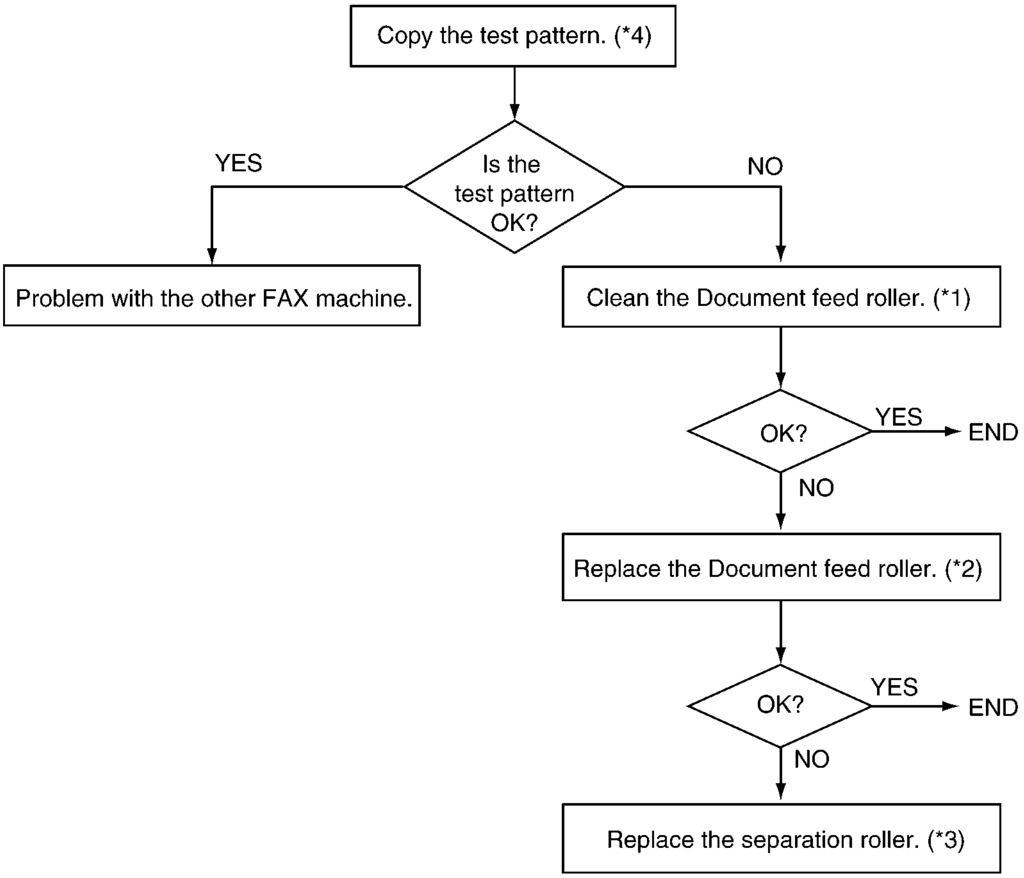

Copy the test pattern. (*1)
Is the test pattern OK?
YES
NO
Problem with the other FAX machine.
Go to Multiple Feed and Skew. (*2)

REFERENCE:

(*1): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.

(*2): **Recording Paper Multiple Feed and Skew** (P.111)

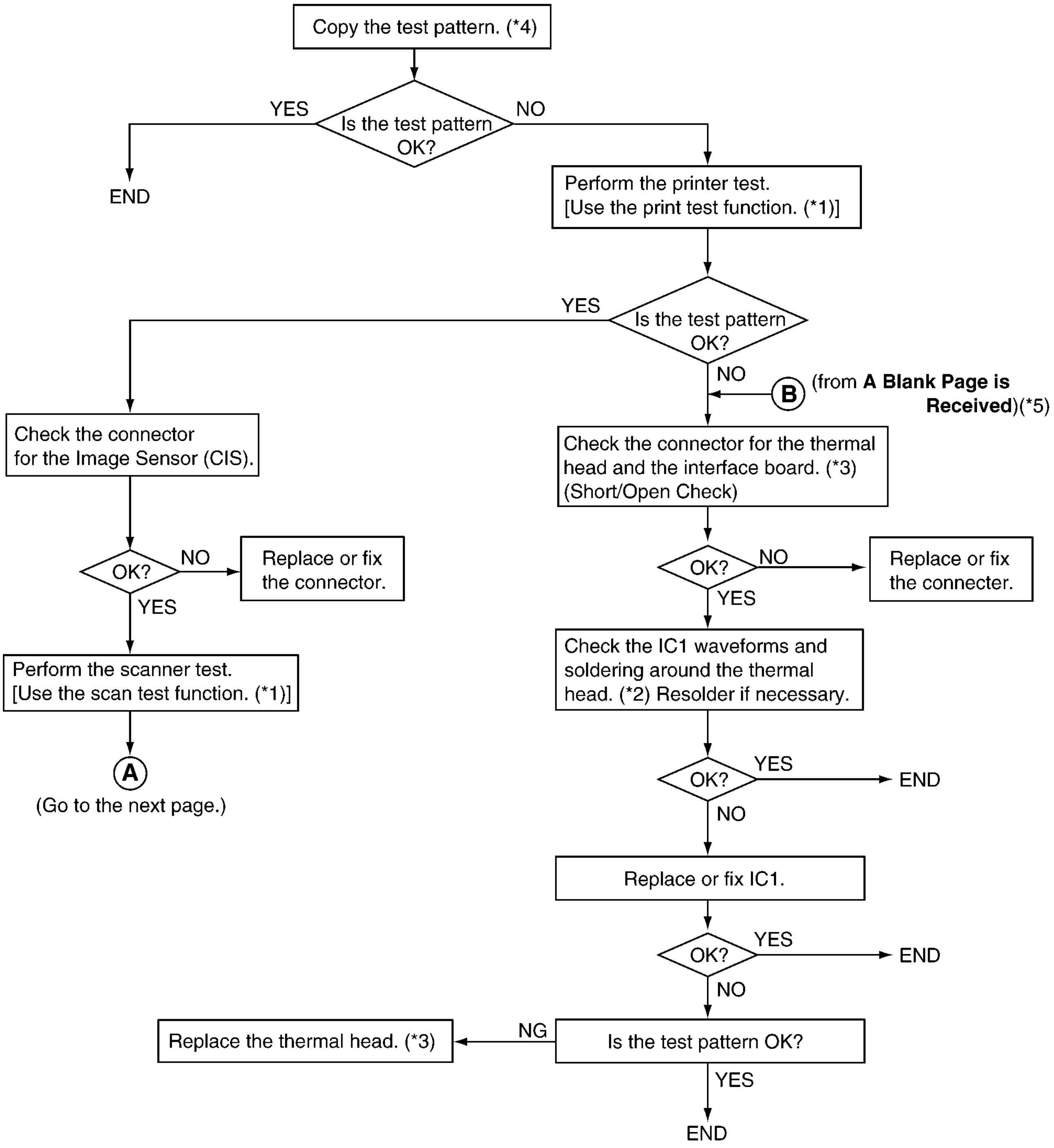
12.5.4.10. Received or Copied Data is Expanded


Copy the test pattern. (*4)
Is the test pattern OK?
YES
NO
Problem with the other FAX machine.
Clean the Document feed roller. (*1)
OK?
YES
END
NO
Replace the Document feed roller. (*2)
OK?
YES
END
NO
Replace the separation roller. (*3)

REFERENCE:

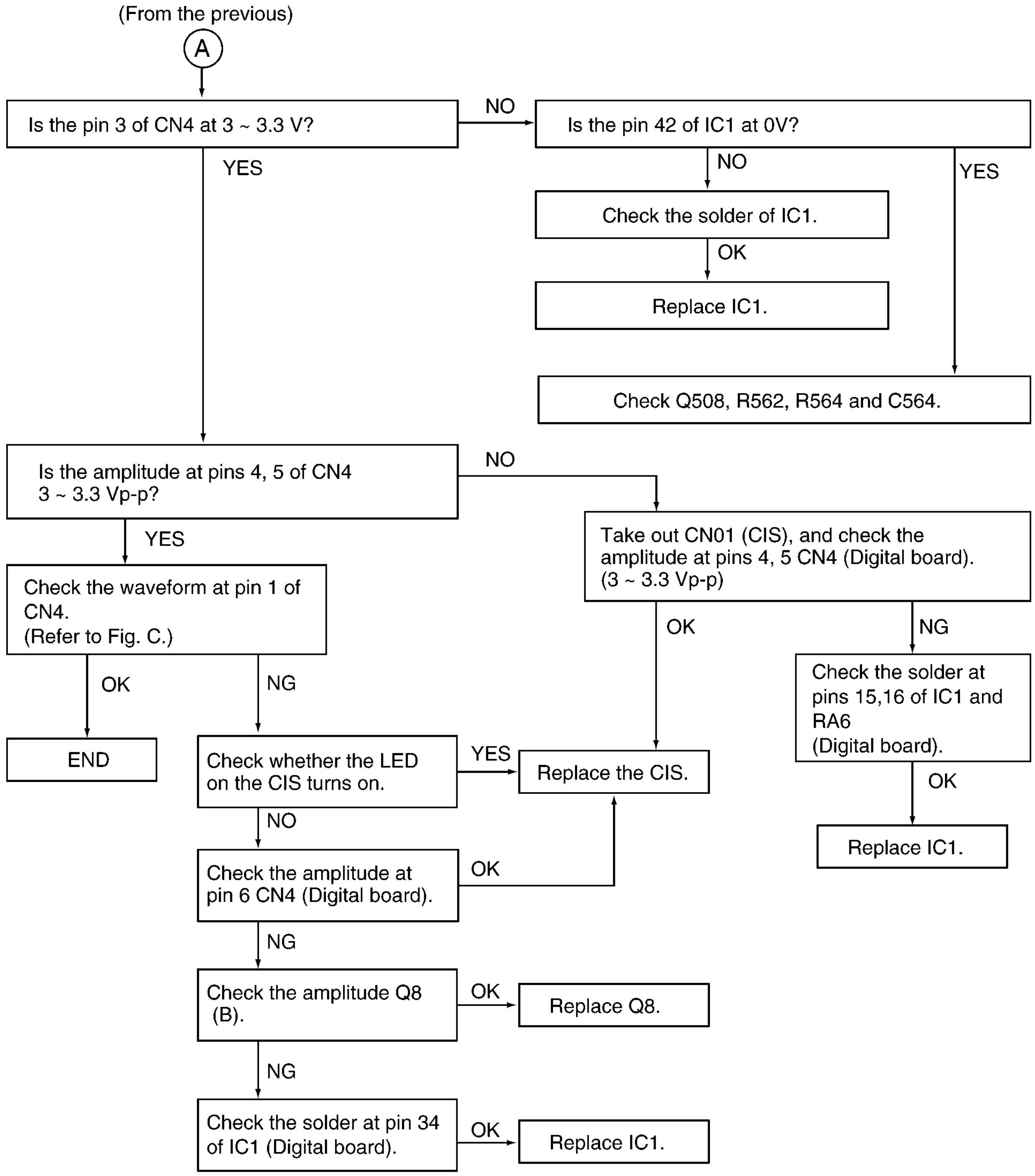
(*1): **Document feeder/scanner glass cleaning** (P.165)
(*2): **Disassembly and Assembly Instructions** (P.140)
(*3): **How to Remove the Gear Block and Separation Roller** (P.149)
(*4): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.

12.5.4.11. A Blank Page is Copied


Copy the test pattern. (*4)
Is the test pattern OK?
YES
NO
END
Perform the printer test.
[Use the print test function. (*1)]
Is the test pattern OK?
YES
NO
B
(from A Blank Page is Received)(*5)
Check the connector for the Image Sensor (CIS).
OK?
NO
YES
Replace or fix the connector.
Perform the scanner test.
[Use the scan test function. (*1)]
A
(Go to the next page.)
Check the connector for the thermal head and the interface board. (*3) (Short/Open Check)
OK?
NO
YES
Replace or fix the connecter.
Check the IC1 waveforms and soldering around the thermal head. (*2) Resolder if necessary.
OK?
YES
END
NO
Replace or fix IC1.
OK?
YES
END
NO
Is the test pattern OK?
NG
Replace the thermal head. (*3)
YES
END

REFERENCE:

(*1): **Test Mode** (P.63)
(*2): **Thermal Head** (P.26)
(*3): **How to Remove the Thermal Head** (P.142)
(*4): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.
(*5): **A Blank Page is Received** (P.115)


(From the previous)
A
Is the pin 3 of CN4 at 3 ~ 3.3 V?
NO
Is the pin 42 of IC1 at 0V?
NO
Check the solder of IC1.
OK
Replace IC1.
YES
Check Q508, R562, R564 and C564.
YES
Is the amplitude at pins 4, 5 of CN4 3 ~ 3.3 Vp-p?
NO
Take out CN01 (CIS), and check the amplitude at pins 4, 5 CN4 (Digital board). (3 ~ 3.3 Vp-p)
OK
NG
Check the solder at pins 15,16 of IC1 and RA6 (Digital board).
OK
Replace IC1.
YES
Check the waveform at pin 1 of CN4. (Refer to Fig. C.)
OK
END
NG
Check whether the LED on the CIS turns on.
YES
Replace the CIS.
NO
Check the amplitude at pin 6 CN4 (Digital board).
OK
NG
Check the amplitude Q8 (B).
OK
Replace Q8.
NG
Check the solder at pin 34 of IC1 (Digital board).
OK
Replace IC1.

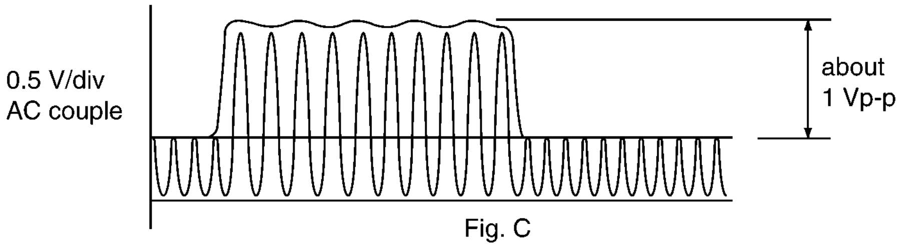
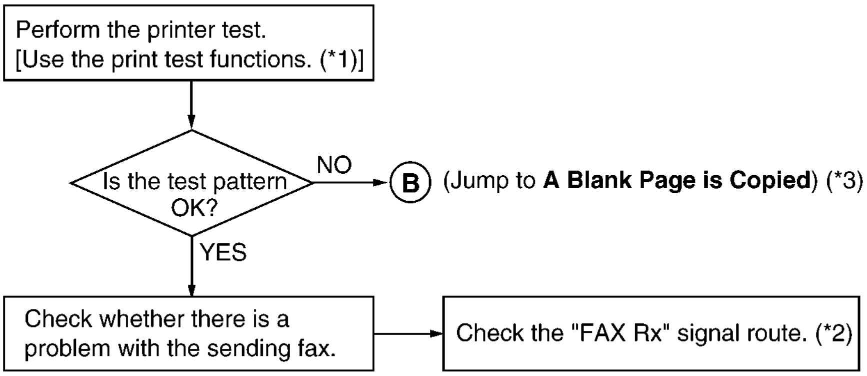

0.5 V/div
AC couple
about
1 Vp-p

Fig. C

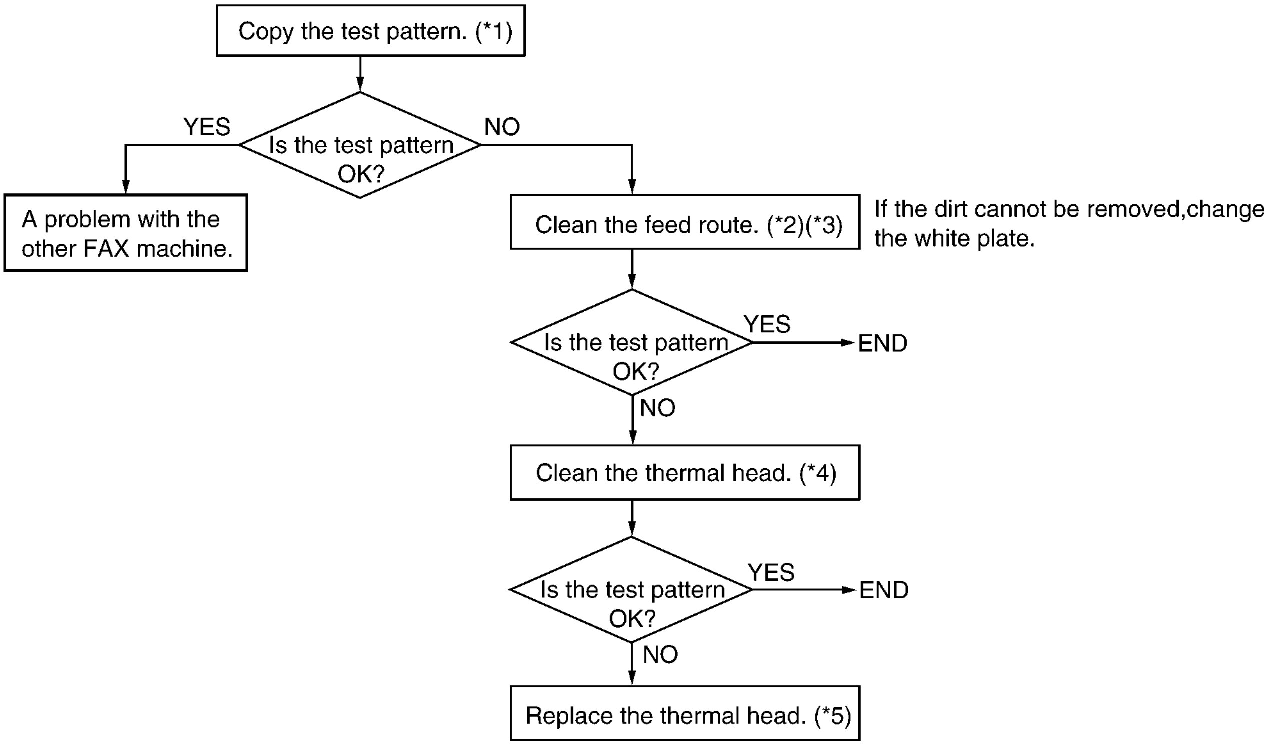
12.5.4.12. A Blank Page is Received


Perform the printer test.
[Use the print test functions. (*1)]
Is the test pattern OK?
NO
B
(Jump to **A Blank Page is Copied**) (*3)
YES
Check whether there is a problem with the sending fax.
Check the "FAX Rx" signal route. (*2)

REFERENCE:

(*1): **Test Mode** (P.63)
(*2): **Check Sheet for Signal Route** (P.125)
(*3): **A Blank Page is Copied** (P.113)

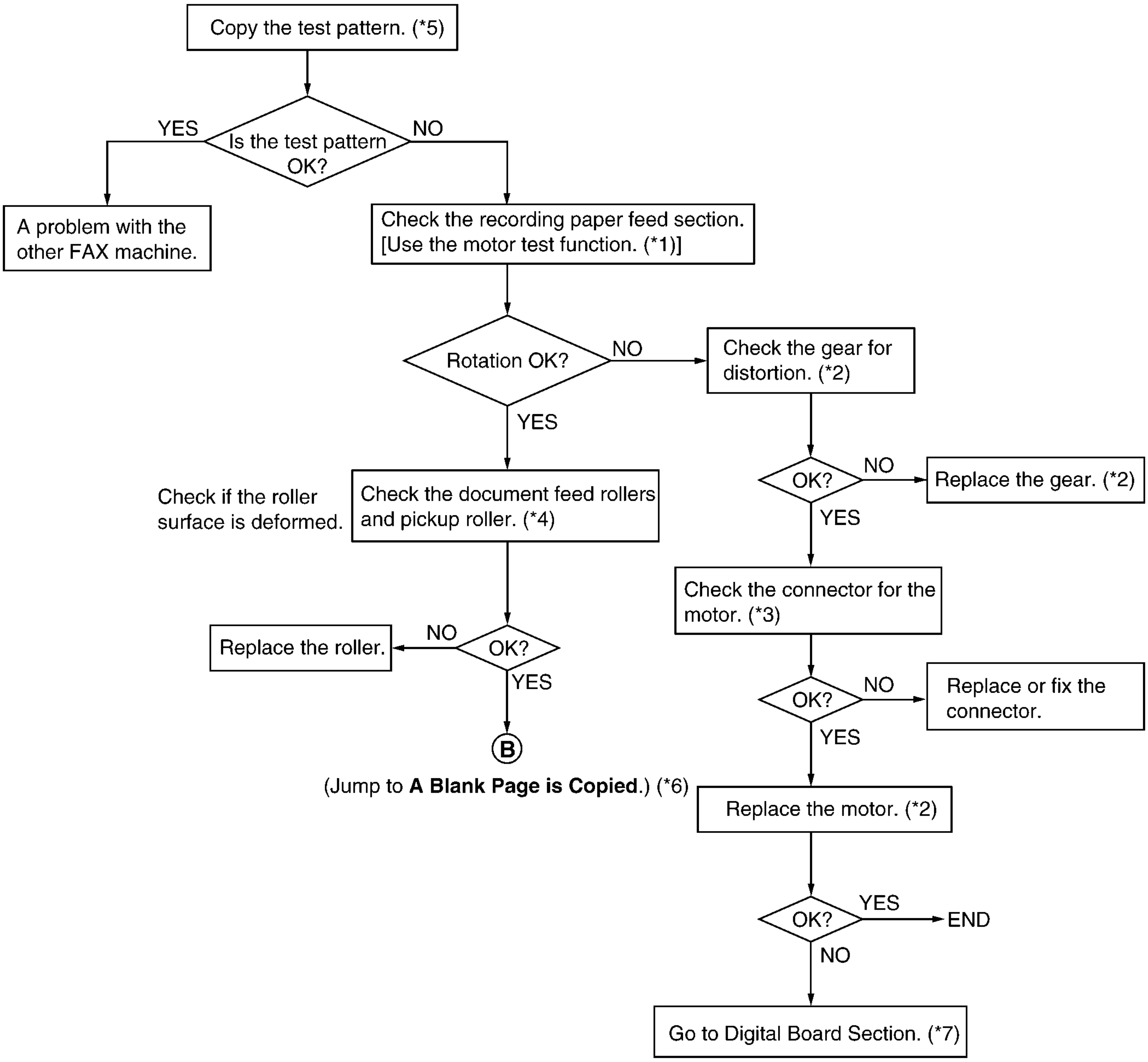
12.5.4.13. Black or White Vertical Line


Copy the test pattern. (*1)
YES
Is the test pattern OK?
NO
A problem with the other FAX machine.
Clean the feed route. (*2)(*3)
If the dirt cannot be removed,change the white plate.
Is the test pattern OK?
YES
END
NO
Clean the thermal head. (*4)
Is the test pattern OK?
YES
END
NO
Replace the thermal head. (*5)

REFERENCE:

(*1): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.
(*2): **Maintenance Items and Component Locations** (P.156)
(*3): **Document feeder/scanner glass cleaning** (P.165)
(*4): **Thermal Head Cleaning** (P.166)
(*5): **How to Remove the Thermal Head** (P.142)

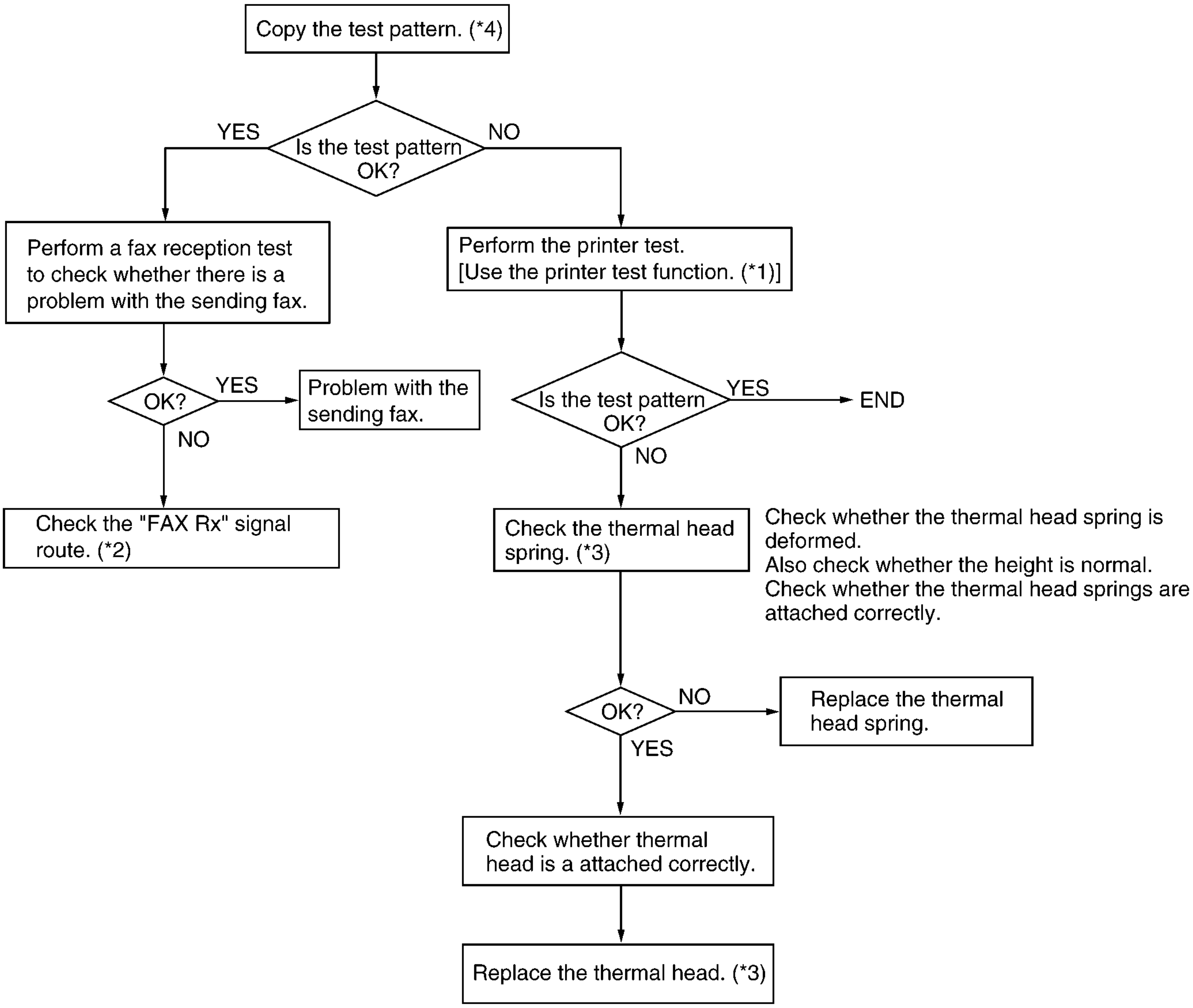
12.5.4.14. Black or White Lateral Line on Print Out


Copy the test pattern. (*5)
Is the test pattern OK?
YES
NO
A problem with the other FAX machine.
Check the recording paper feed section. [Use the motor test function. (*1)]
Rotation OK?
NO
YES
Check the gear for distortion. (*2)
OK?
NO
Replace the gear. (*2)
YES
Check if the roller surface is deformed.
Check the document feed rollers and pickup roller. (*4)
Check the connector for the motor. (*3)
Replace the roller.
NO
OK?
YES
OK?
NO
Replace or fix the connector.
YES
B
(Jump to **A Blank Page is Copied**.) (*6)
Replace the motor. (*2)
OK?
YES
END
NO
Go to Digital Board Section. (*7)

REFERENCE:

(*1): **Test Mode** (P.63)
(*2): **How to Remove the Component parts of Gear Block** (P.150)
(*3): **Installation Position of the Lead Wires** (P.154)
(*4): **Disassembly and Assembly Instructions** (P.140)
(*5): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.
(*6): **A Blank Page is Copied** (P.113)
(*7): **Digital Board Section** (P.118)

12.5.4.15. An Abnormal Image is Printed


Copy the test pattern. (*4)
Is the test pattern OK?
YES
NO
Perform a fax reception test to check whether there is a problem with the sending fax.
Perform the printer test. [Use the printer test function. (*1)]
OK?
YES
NO
Problem with the sending fax.
Is the test pattern OK?
YES
END
NO
Check the "FAX Rx" signal route. (*2)
Check the thermal head spring. (*3)
Check whether the thermal head spring is deformed.
Also check whether the height is normal.
Check whether the thermal head springs are attached correctly.
OK?
NO
YES
Replace the thermal head spring.
Check whether thermal head is a attached correctly.
Replace the thermal head. (*3)

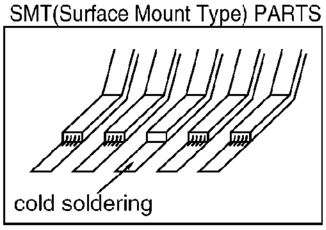
REFERENCE:

(*1): **Test Mode** (P.63)
(*2): **Check Sheet for Signal Route** (P.125)
(*3): **How to Remove the Thermal Head** (P.142)
(*4): We recommend making a copy of the test chart in **Test Chart** (P.172) and using it.

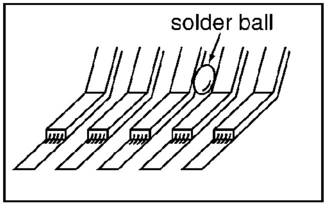
12.5.5. Digital Board Section

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).

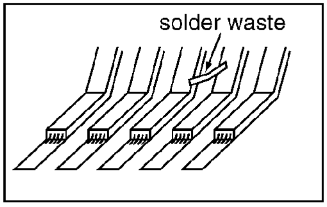
SMT(Surface Mount Type) PARTS



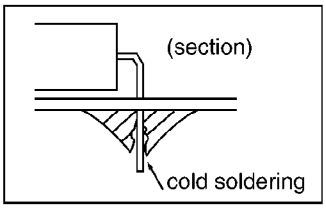
SMT PARTS



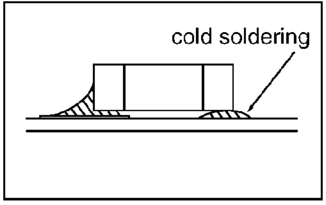
SMT PARTS



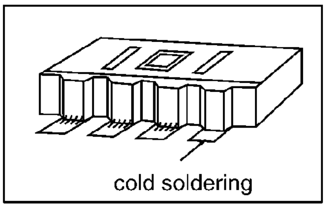
LEADED PARTS



CHIP PARTS (section)



RESISTOR ARRAY



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 Block Diagram** (P.119).
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 (IC6), 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

You also need to check the signal lines listed here [List 1] when the unit fails to boot up the system. Those signal lines should remain normal. Other signal lines are not directly related to that failure even if they have faults or troubles.

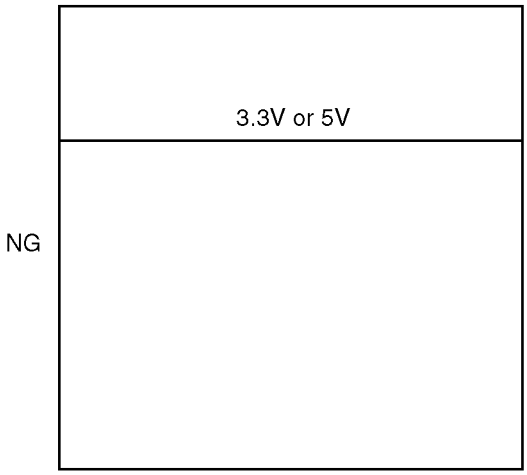
[List 1]

①	D0~D7	(Data Bus)
②	A0~A15	(Address Bus)
③	$\overline{RD}$	(Read Signal)
	$\overline{ROMCS}$	(ROM Select Signal)
	$\overline{WR}$	(Write Signal)
④	RBA0~RBA5	(Bank Address Signal)
⑤	$\overline{RAS}$	(DRAM Row Address Strobe Signal)
	$\overline{CAS}$	(DRAM Column Address Strobe Signal)
⑥	$\overline{MDMCS}$	(Modem Select Signal)

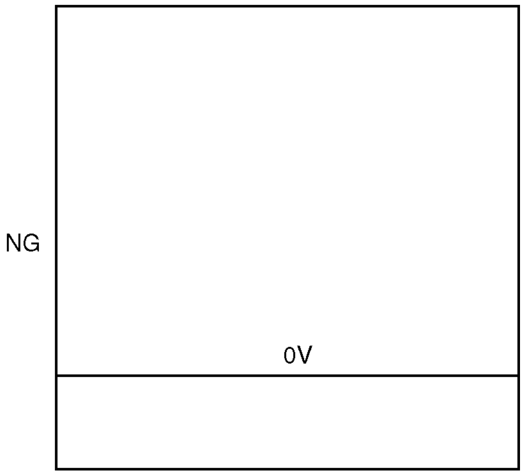
As long as these signals remain normal, once the power is turned on, each IC can repeatedly output 3.3V (H) and 0V (L). The following shows NG and normal wave patterns.

NG Wave pattern (Refer to NG EXAMPLE)

0V never appears.

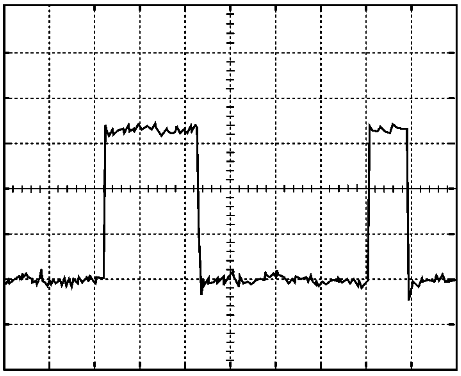


3.3V or 5V never appears.

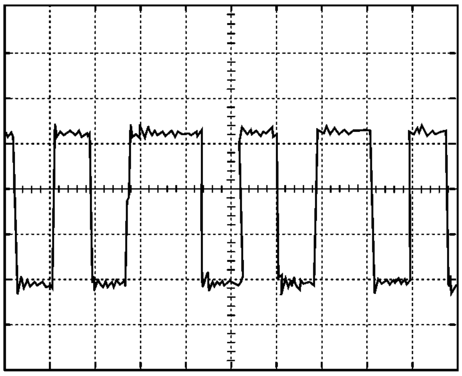


Normal Wave Patterns

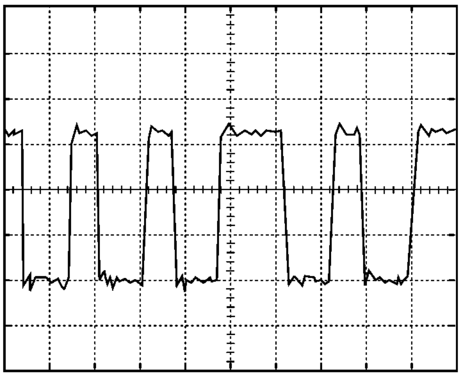
① D0~D7 200ns/div, 1V/div



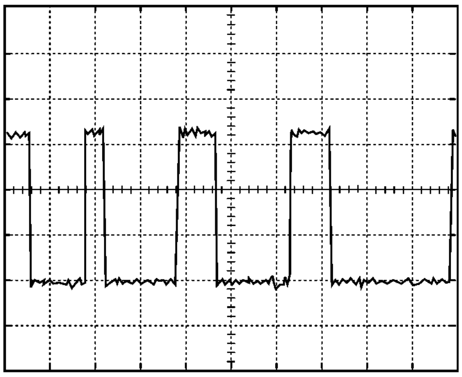
② A0~A5 200ns/div, 1V/div



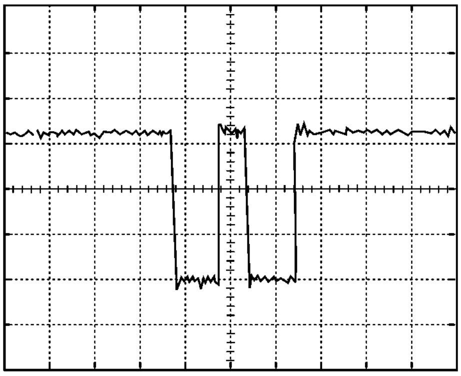
③ $\overline{\text{RD}}$ 100ns/div, 1V/div



③ $\overline{\text{ROMCS}}$ 400ns/div, 1V/div



⑤ $\overline{\text{RAS}}$, $\overline{\text{CAS}}$ 100ns/div, 1V/div



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 FLASH ROM, the ASIC cannot access DRAM normally.)

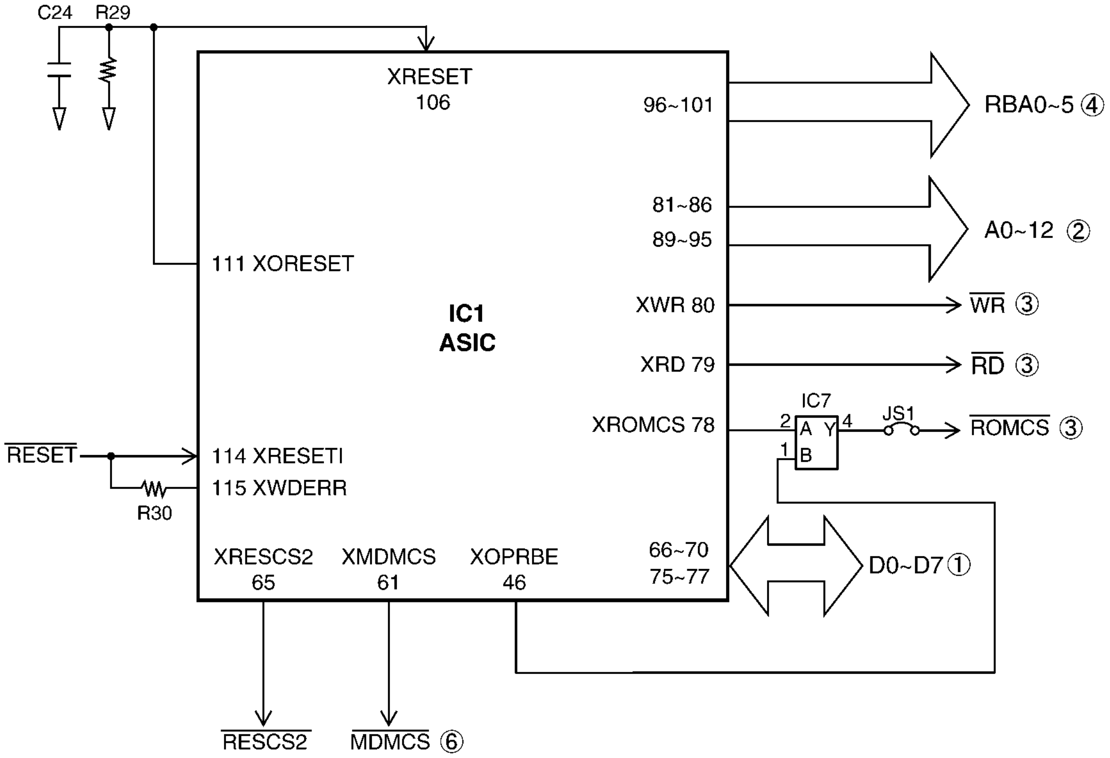
The digital circuit actually operates according to the timing combinations of these signals. If the timing of these signals is even slightly delayed, the circuit will not work. Nor will it if the IC is defective and the output voltage level is not normal although the timing of these signals is accurate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

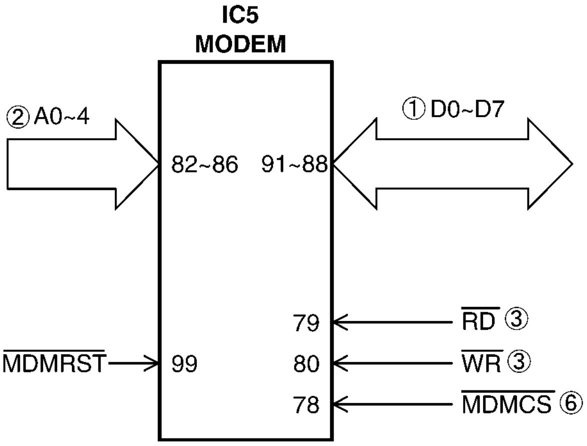
Therefore, it is imperative to confirm whether each IC outputs the signal at the correct level. (See the **I/O Pin No. Diagram**.) The signal level should be constantly output at between 3.3V (H) and 0V (L) as described earlier.

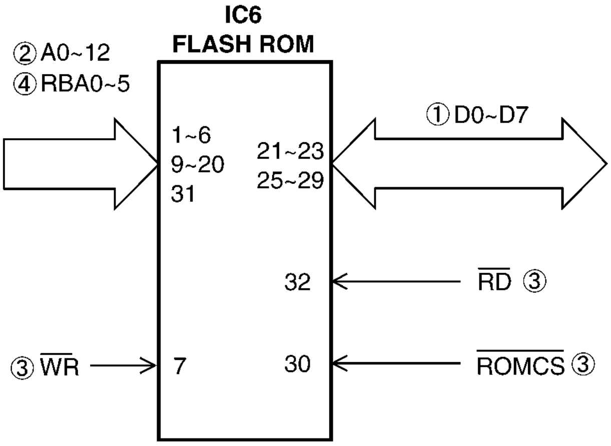
Note:

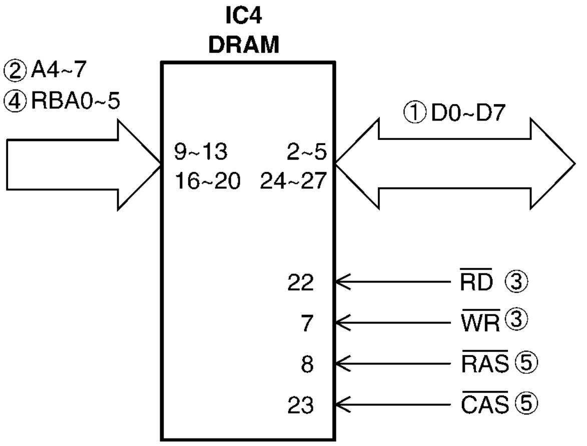
Simply check the output level and make sure if the IC repeatedly outputs the signal at between 3.3V (H) and 0V (L).

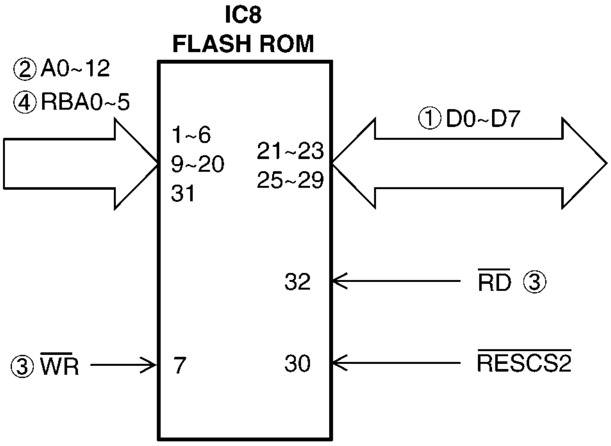
I/O and Pin No. Diagram


C24
R29
XRESET
106
96~101
RBA0~5 ④
81~86
89~95
A0~12 ②
111 XORESET
IC1
ASIC
XWR 80
WR ③
XRD 79
RD ③
IC7
XROMCS 78
2
A
Y
4
JS1
ROMCS ③
1
B
RESET
114 XRESETI
115 XWDERR
R30
XRESCS2
65
XMDMCS
61
XOPRBE
46
66~70
75~77
D0~D7 ①
RESCS2
MDMCS ⑥

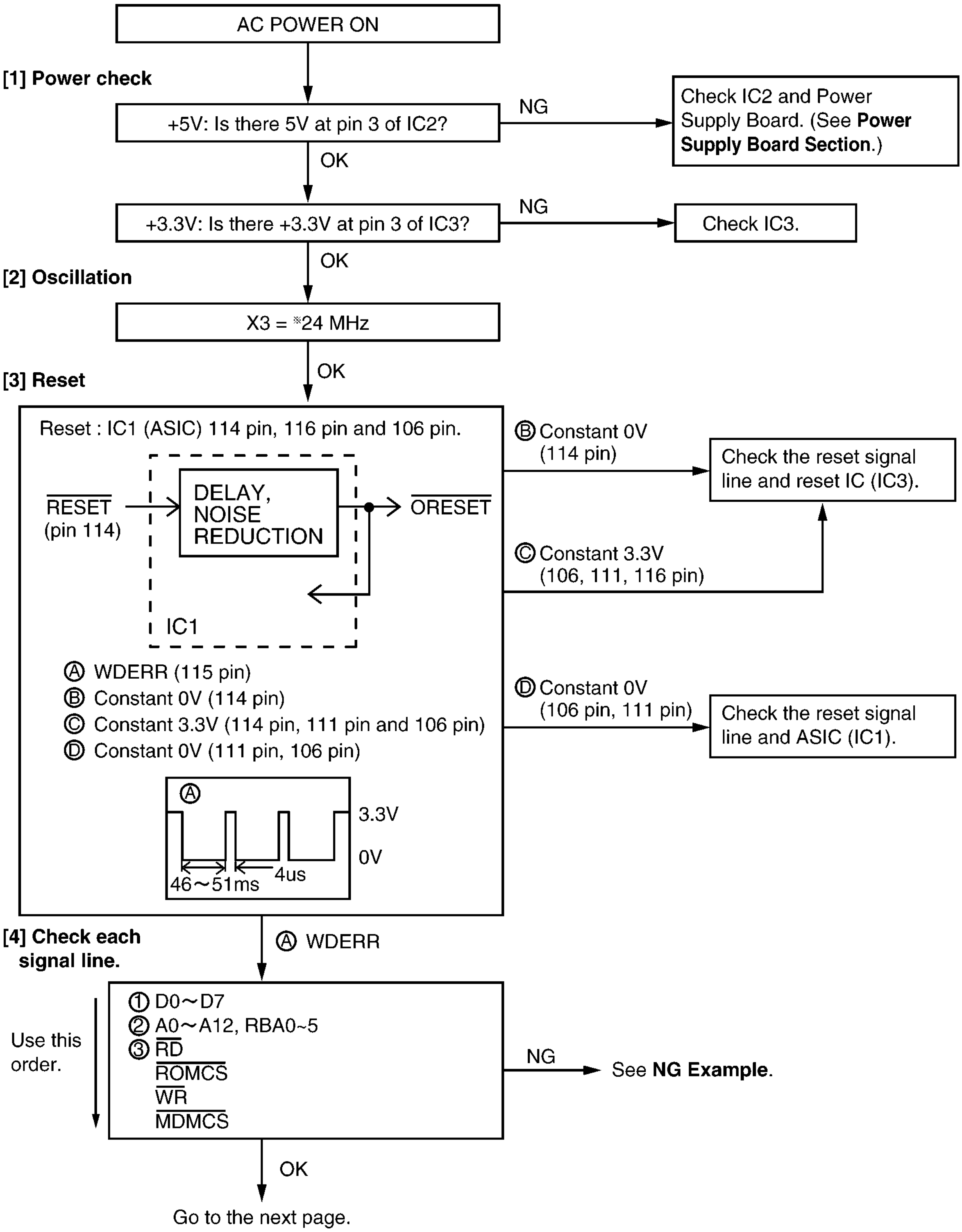

IC5
MODEM
② A0~4
82~86
91~88
① D0~D7
79
RD ③
MDMRST
99
80
WR ③
78
MDMCS ⑥


IC6
FLASH ROM
② A0~12
④ RBA0~5
1~6
9~20
31
21~23
25~29
① D0~D7
32
RD ③
③ WR
7
30
ROMCS ③


IC4
DRAM
② A4~7
④ RBA0~5
9~13
16~20
2~5
24~27
① D0~D7
22
RD ③
7
WR ③
8
RAS ⑤
23
CAS ⑤


IC8
FLASH ROM
② A0~12
④ RBA0~5
1~6
9~20
31
21~23
25~29
① D0~D7
32
RD ③
③ WR
7
30
RESCS2

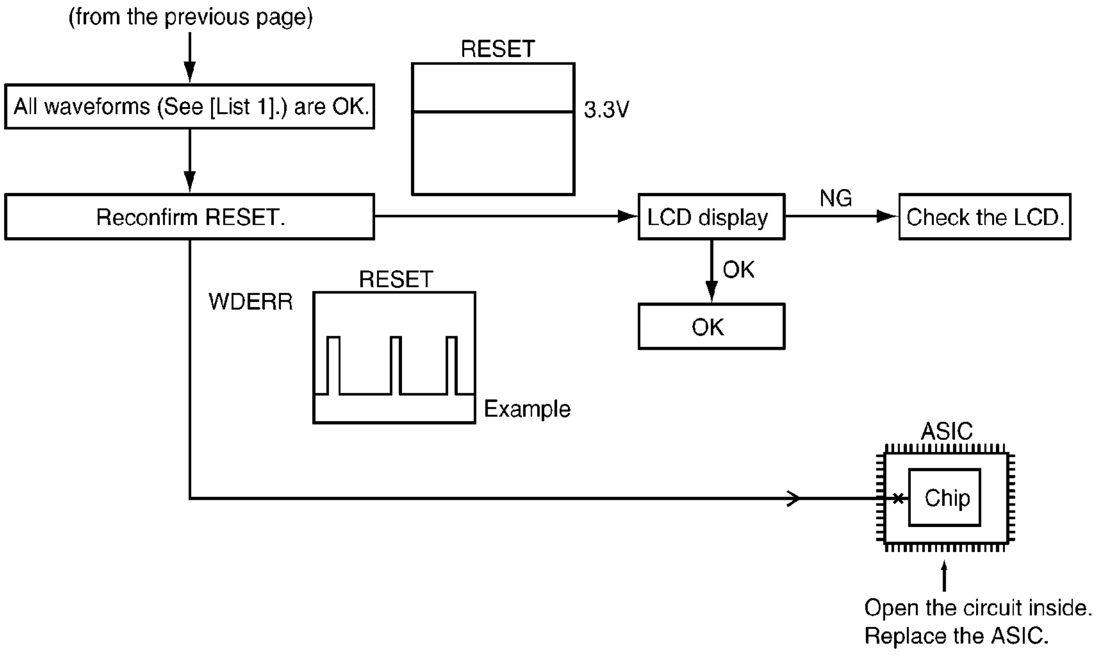
After the power is turned on, the ASIC initializes and checks each IC.
The ROM, DRAM, and modem are checked.
If initialization fails for the ICs, the system will not boot up.
In this case, please find the cause as follows.


AC POWER ON
[1] Power check
+5V: Is there 5V at pin 3 of IC2?
NG
Check IC2 and Power Supply Board. (See Power Supply Board Section.)
OK
+3.3V: Is there +3.3V at pin 3 of IC3?
NG
Check IC3.
OK
[2] Oscillation
X3 = ※24 MHz
OK
[3] Reset
Reset : IC1 (ASIC) 114 pin, 116 pin and 106 pin.
RESET (pin 114)
DELAY, NOISE REDUCTION
ORESET
IC1
Ⓐ WDERR (115 pin)
Ⓑ Constant 0V (114 pin)
Ⓒ Constant 3.3V (114 pin, 111 pin and 106 pin)
Ⓓ Constant 0V (111 pin, 106 pin)
Ⓐ
3.3V
0V
46~51ms
4us
Ⓑ Constant 0V (114 pin)
Check the reset signal line and reset IC (IC3).
Ⓒ Constant 3.3V (106, 111, 116 pin)
Ⓓ Constant 0V (106 pin, 111 pin)
Check the reset signal line and ASIC (IC1).
[4] Check each signal line.
Ⓐ WDERR
Use this order.
① D0~D7
② A0~A12, RBA0~5
③ RD
ROMCS
WR
MDMCS
NG
See NG Example.
OK
Go to the next page.

REFERENCE:

NG Example (P.124)

Power Supply Board Section (P.129)


(from the previous page)
All waveforms (See [List 1].) are OK.
RESET
3.3V
Reconfirm RESET.
LCD display
NG
Check the LCD.
OK
OK
WDERR
RESET
Example
ASIC
Chip
Open the circuit inside.
Replace the ASIC.

Other NG example while the power is ON and the LCD displays the following.

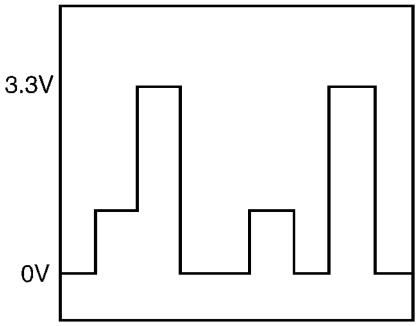
LCD display `CALL SERVICE` → This display occurs when the temperature of the thermistor on the terminal head is NG.
Faulty connection of the thermal head connector.

↓

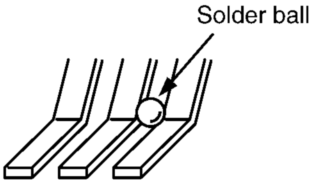
ASIC IC1 pins 4 and 139 or the thermistor on the thermal head is NG.

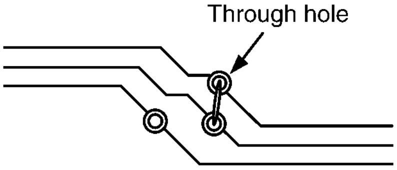
12.5.5.2. NG Example

1.

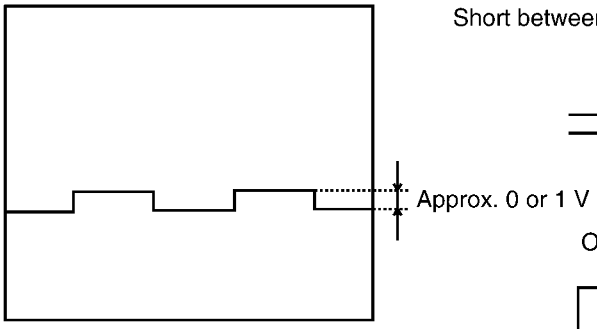


Short circuit from the adjacent signal wires.
Check for a short circuit in the IC leads and the signal wire at the through hole.

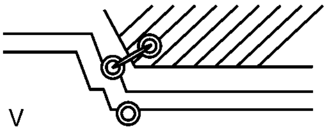

Solder ball


Through hole

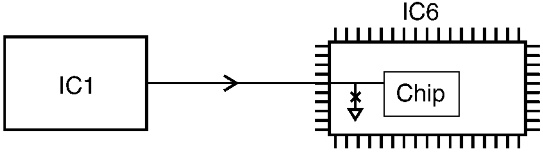
2.



Short between the signal line and GND.



OR IC malfunction


IC6
IC1
Chip

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 Handset, trace that signal route locally with the following Check Sheet and locate the faulty point.

12.5.6.1. Check Sheet for Signal Route

(SYMPTOM) ITEMS TO CHECK	IN signal → ROUTE → OUT
SPEAKER Tx	[MIC] ┬→ {C90 ┬→ IC5(34-35, 56) → IC11(8-9) → C77 → R65 → IC10(6-7) → CN7(12)} → └→ {C95 ┘ CN101(6) → C113 → R114 → T101 → TEL LINE
SPEAKER Rx	TEL LINE → T101 → C108 → R109 → IC101(2-1) → CN101(5) → {CN7(13) → R92 → RA10 → C102 → IC5(47-42) → C58 → R51 → IC10(2-1) → C83 → R74 → IC12(4-5,8) → CN6(1,2)} → Speaker
HANDSET Tx	Handset MIC ┬→ L110 → C129 → R138 → IC101(6) ┬→ IC101(7) → R118 → CN101(9) → └→ L107 → C130 → R139 → IC101(5) ┘ {CN7(9) → R88 → C104 → R82 → C78 → R69 → IC10(6-7) → CN7(12)} → CN101(6) → C113 → R114 → T101 → TEL LINE
HANDSET Rx	TEL LINE → T101 → C108 → R109 → IC101(2-1) → CN101(5) → {CN7(13) → R92 → R55 → C54 → IC1(32-31) → C51 → R49 → IC10(2-1) → R60 → IC11(10-11) → CN7(10)} → CN101(8) → C116 → R128 → Q105(B-E) → C128 → R144 → L108 → Handset Speaker
DTMF for Handset Speaker	{IC5(58) → C57 → R51 → IC10(2-1) → R60 → IC11(10-11) → CN7(10)} → CN101(8) → C116→ R128 → Q105(B-E) → C128 → R144 → L108 → Handset Speaker
DTMF for Speaker	{IC5(58) → C57 → R51 → IC10(2-1) → C83 → R74 → IC13(4-5,8) → CN6(1,2)} → Speaker
FAX Tx / DTMF for TEL LINE	{IC5(56) → IC11(8-9) → C77 → R65 → IC10(6-7) → CN7(12)} → CN101(6) → C113 → R114 → T101 → TEL LINE
FAX Rx/CNG/DTMF Detection (OFF-HOOK)	TEL LINE → T101 → C108 → R109 → IC101(2-1) → CN101(5) → {CN7(13) → R92 → RA10 → C102 → IC5(47)}
Ringing/BEEP/ Alarm/Key Tones	{IC1(29) → C52 → R50 → IC10(2-1) → C83 → R74 → IC13(4-5,8) → CN6(1,2)} → Speaker
Caller ID/FAX Activate (ON-HOOK)	TEL LINE → C136 → R122 → T101 → C108 → R109 → IC101(2-1) → CN101(5) → {CN7(13) → R92 → R93 → RA10 → C101 → IC5(50)}
Greeting / MEMO Record	[MIC] ┬→ {C90 ┬→ IC5(34, 35)} └→ {C95 ┘
BEEP for TEL LINE / Dummy Ring Back Tone	{IC1(28) → IC11(1,2) → C74 → R64 → IC10(6,7) → CN7(12)} → CN101(6) → C113 → R114 → T101 → TEL LINE

Note:

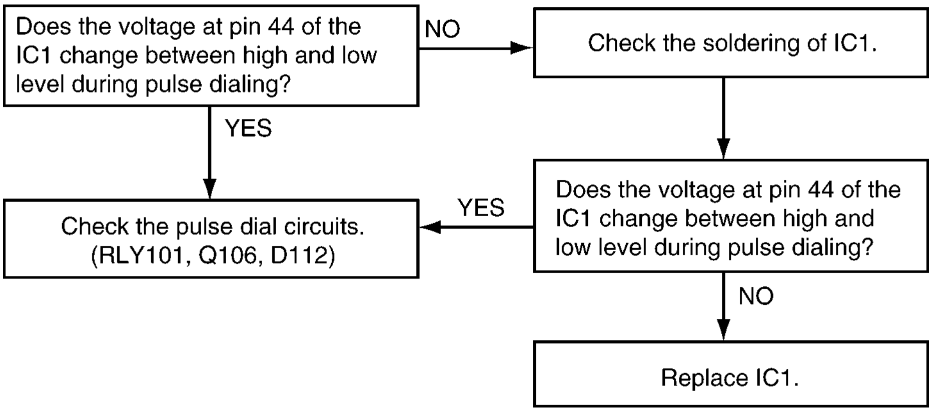
{ }: Inside the Digital Board

12.5.6.2. Defective ITS (Integrated Telephone System) Section

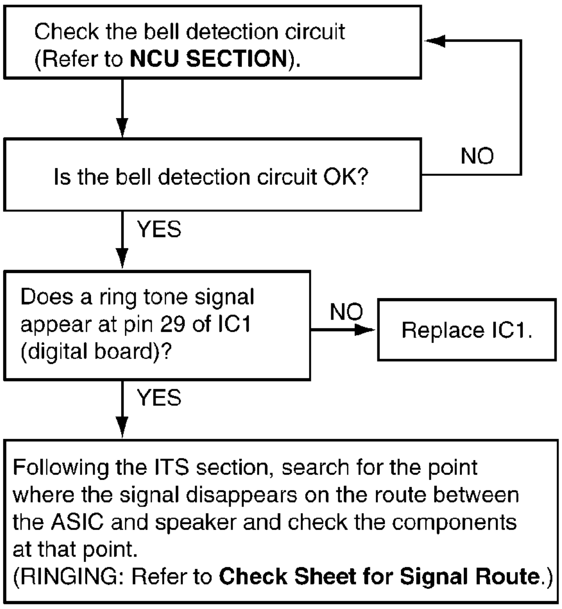
1. No handset transmission / reception and no monitor reception

Perform a signal test in the **ITS or the NCU section** and locate a defective point (where the signal disappears) on each route between the handset microphone and telephone line (sending), or between the telephone line and the handset speaker (receiving), or between the microphone and the telephone line (sending), or between the telephone line and the speaker (receiving). Check the components at that point. **Check Sheet for Signal Route** (P.125) is useful for this investigation.

2. No pulse dialing


Does the voltage at pin 44 of the IC1 change between high and low level during pulse dialing?
NO
Check the soldering of IC1.
YES
Does the voltage at pin 44 of the IC1 change between high and low level during pulse dialing?
YES
Check the pulse dial circuits. (RLY101, Q106, D112)
NO
Replace IC1.

3. No ring tone (or No bell)

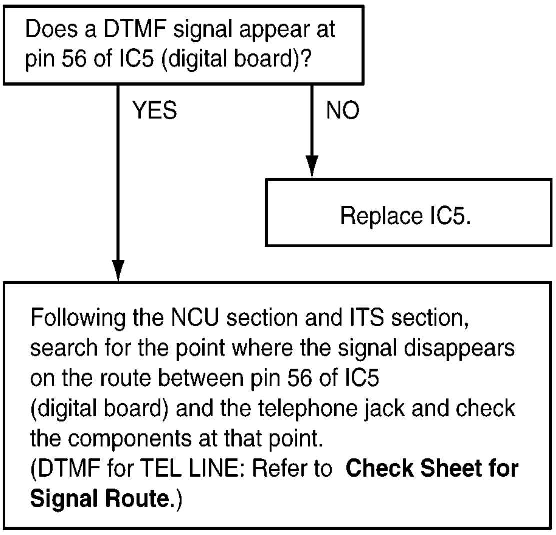

Check the bell detection circuit (Refer to NCU SECTION).
Is the bell detection circuit OK?
NO
YES
Does a ring tone signal appear at pin 29 of IC1 (digital board)?
NO
Replace IC1.
YES
Following the ITS section, search for the point where the signal disappears on the route between the ASIC and speaker and check the components at that point.
(RINGING: Refer to Check Sheet for Signal Route.)

REFERENCE:

Check Sheet for Signal Route (P.125)

NCU Section (P.44)

4. No tone dialing


Does a DTMF signal appear at pin 56 of IC5 (digital board)?
YES
NO
Replace IC5.
Following the NCU section and ITS section, search for the point where the signal disappears on the route between pin 56 of IC5 (digital board) and the telephone jack and check the components at that point.
(DTMF for TEL LINE: Refer to Check Sheet for Signal Route.)

REFERENCE:

Check Sheet for Signal Route (P.125)

12.5.7. Digital Speakerphone

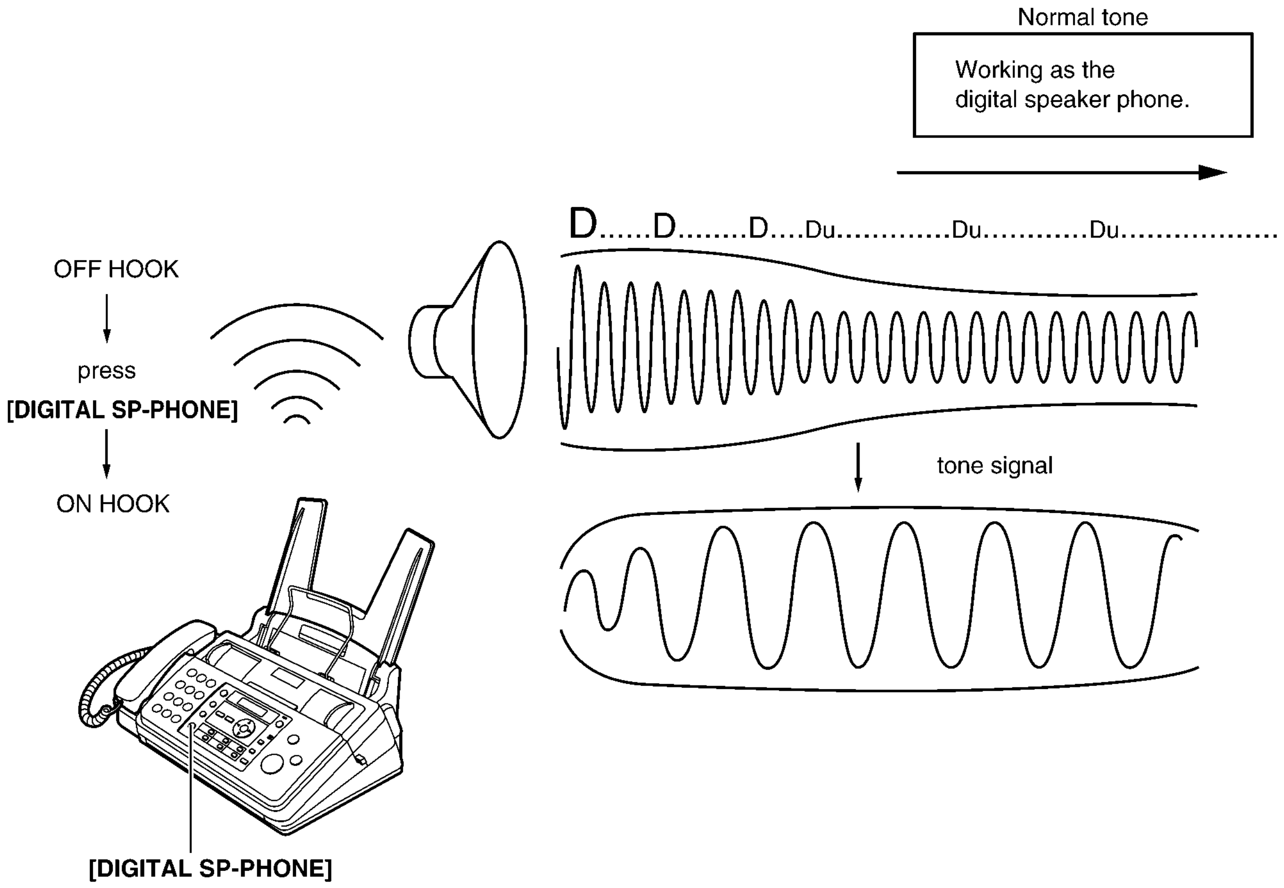
The digital speakerphone has different features from the analog speakerphone.

The analog speakerphone switches between Tx or Rx. Either Tx or Rx is able to pass through a telephone line or speaker, depending on the Tx and Rx signal (voice) level. The higher-level signal (either TX or RX) can pass through the route.

Therefore, you never hear the other party's voice while you are talking. However, the digital speakerphone allows you to hear the other party's voice while you are talking. So both Tx and Rx are active at the same time. There is also a difference in the troubleshooting procedures between the two types.

At the start of communication, during the initial 2~3 correspondences, the digital speakerphone performs half-duplex operation, alternating between transmission (Tx) and reception (Rx). Then duplex communication becomes available.

Learning occurs during the initial 2~3 correspondences in order to set the appropriate parameters for duplex communication.

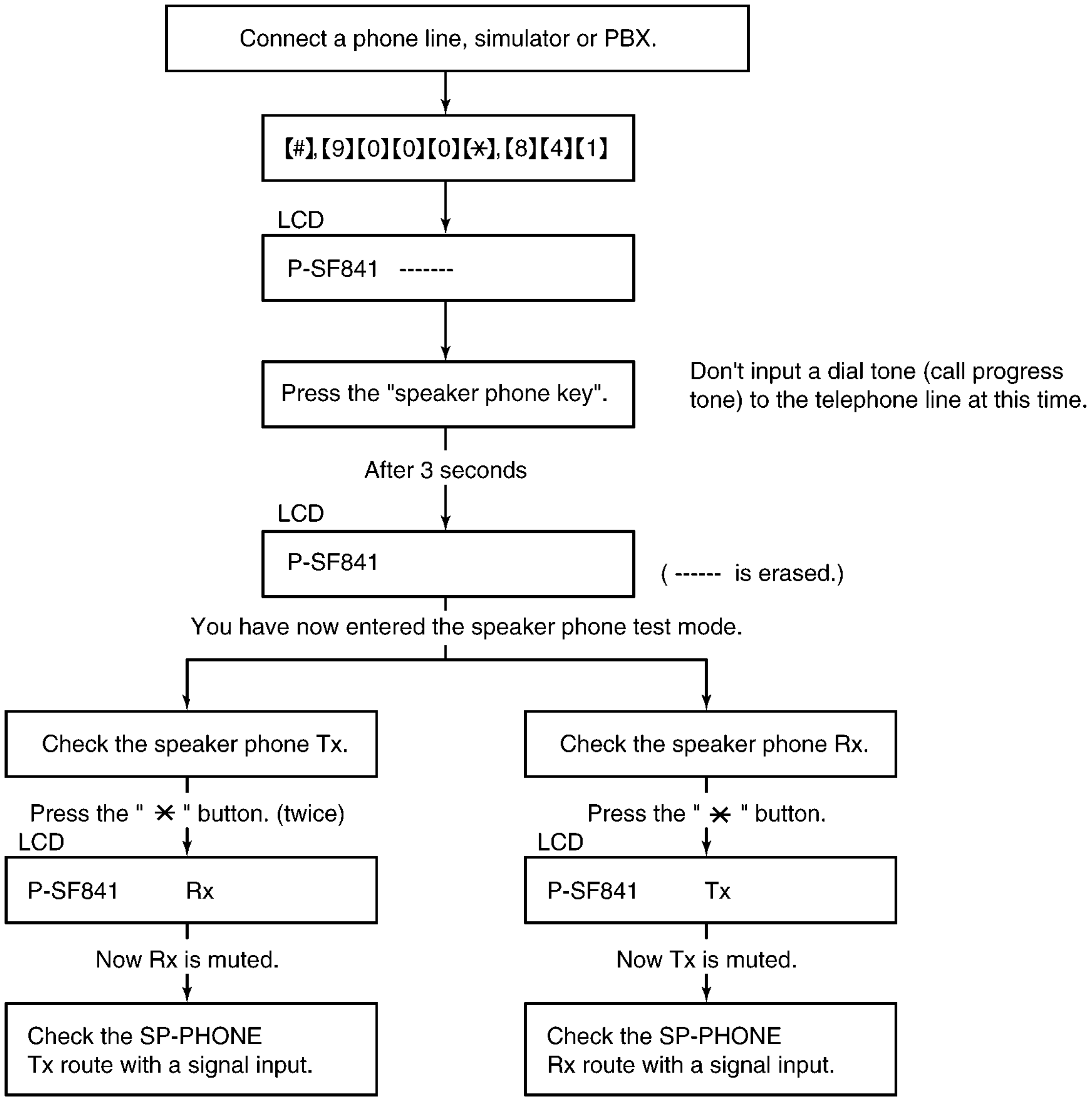

Normal tone
Working as the digital speaker phone.
D......D........D....Du.............Du............Du..................
OFF HOOK
press
[DIGITAL SP-PHONE]
ON HOOK
tone signal
[DIGITAL SP-PHONE]

You cannot check the digital speaker phone by the signal route test mentioned in the Analog Board Section because the level is always changing as stated above.

Therefore, there is a service function for this troubleshooting. In this service mode, you can set the mute to either Tx or Rx. Then you can check the signal route of the speaker phone Tx or the speaker phone Rx without any disturbances.

HOW TO USE THE **#841** SERVICE FUNCTION for THE DIGITAL SPEAKER PHONE

Please check by using the service function (【#】,【9】【0】【0】【0】【*】,【8】【4】【1】)


Connect a phone line, simulator or PBX.
【#】,【9】【0】【0】【0】【*】,【8】【4】【1】
LCD
P-SF841 -------
Press the "speaker phone key".
Don't input a dial tone (call progress tone) to the telephone line at this time.
After 3 seconds
LCD
P-SF841
(------ is erased.)
You have now entered the speaker phone test mode.
Check the speaker phone Tx.
Press the " * " button. (twice)
LCD
P-SF841 Rx
Now Rx is muted.
Check the SP-PHONE Tx route with a signal input.
Check the speaker phone Rx.
Press the " * " button.
LCD
P-SF841 Tx
Now Tx is muted.
Check the SP-PHONE Rx route with a signal input.

Note:

Check to the SP-Phone Rx/Tx signal routes. (Refer to **Check Sheet for Signal Route** (P.125)).

12.5.8. Power Supply Board Section

12.5.8.1. Key Components for Troubleshooting

Check the following parts first: F101, D101-D104, C106, Q101and IC101.

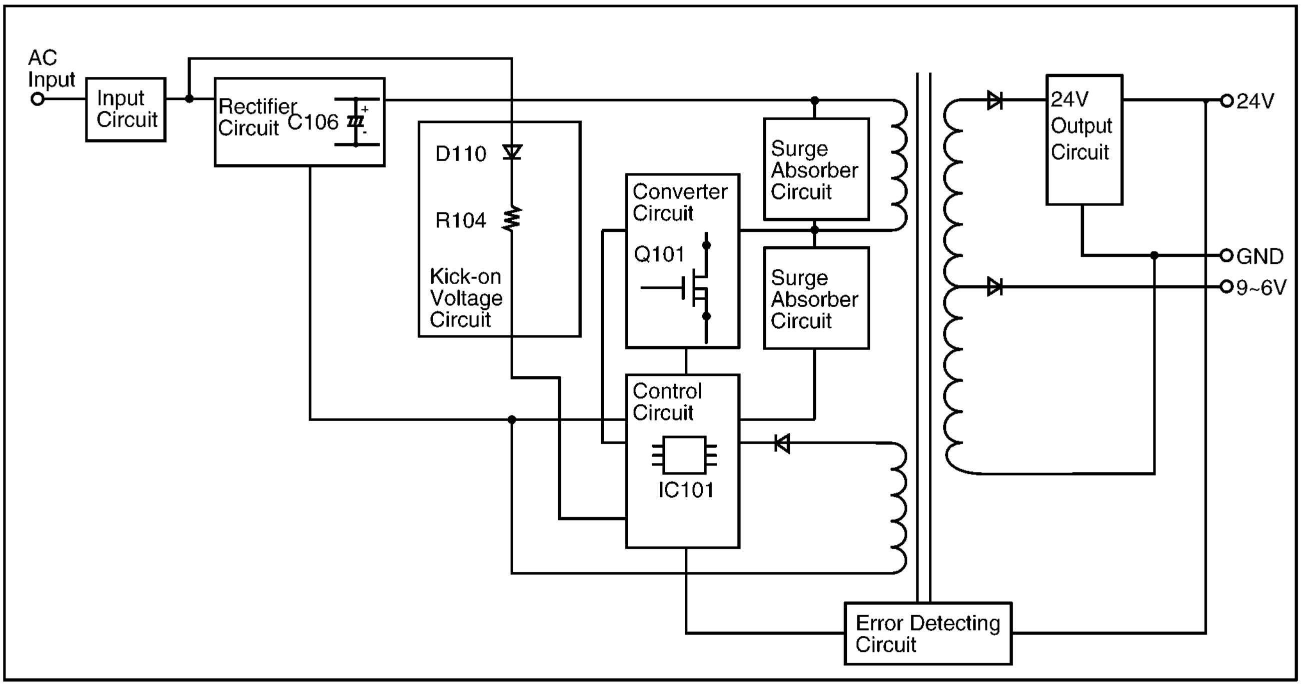
This comes from our experience with experimental tests. For example: power supply and lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.

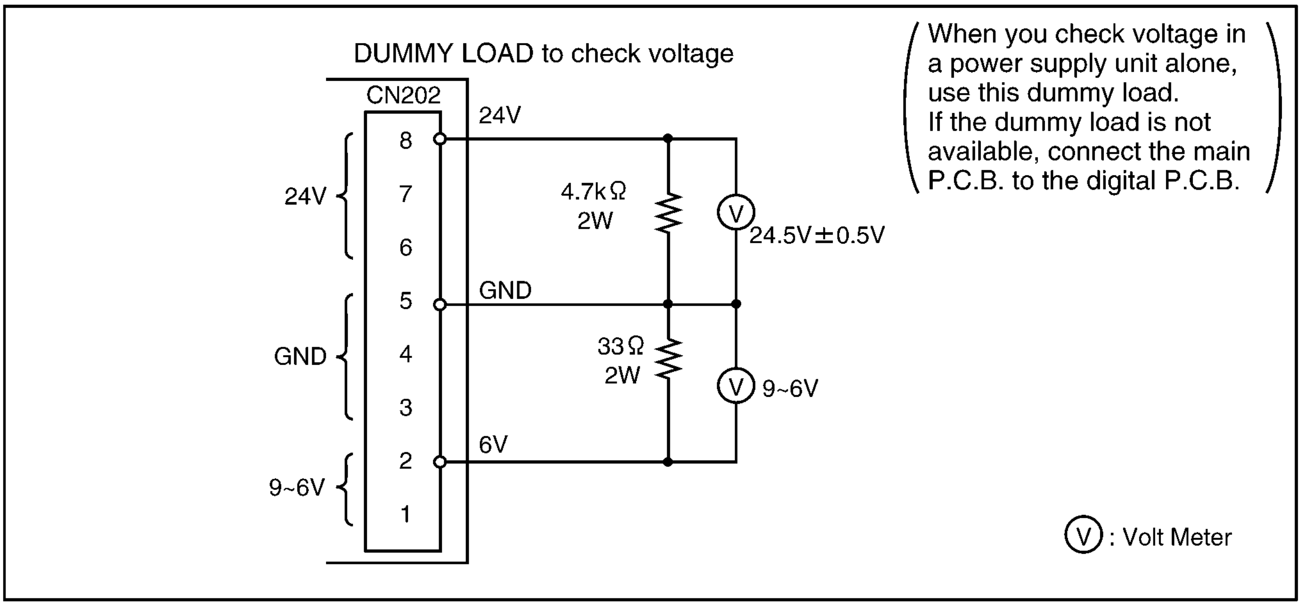
Caution:

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.

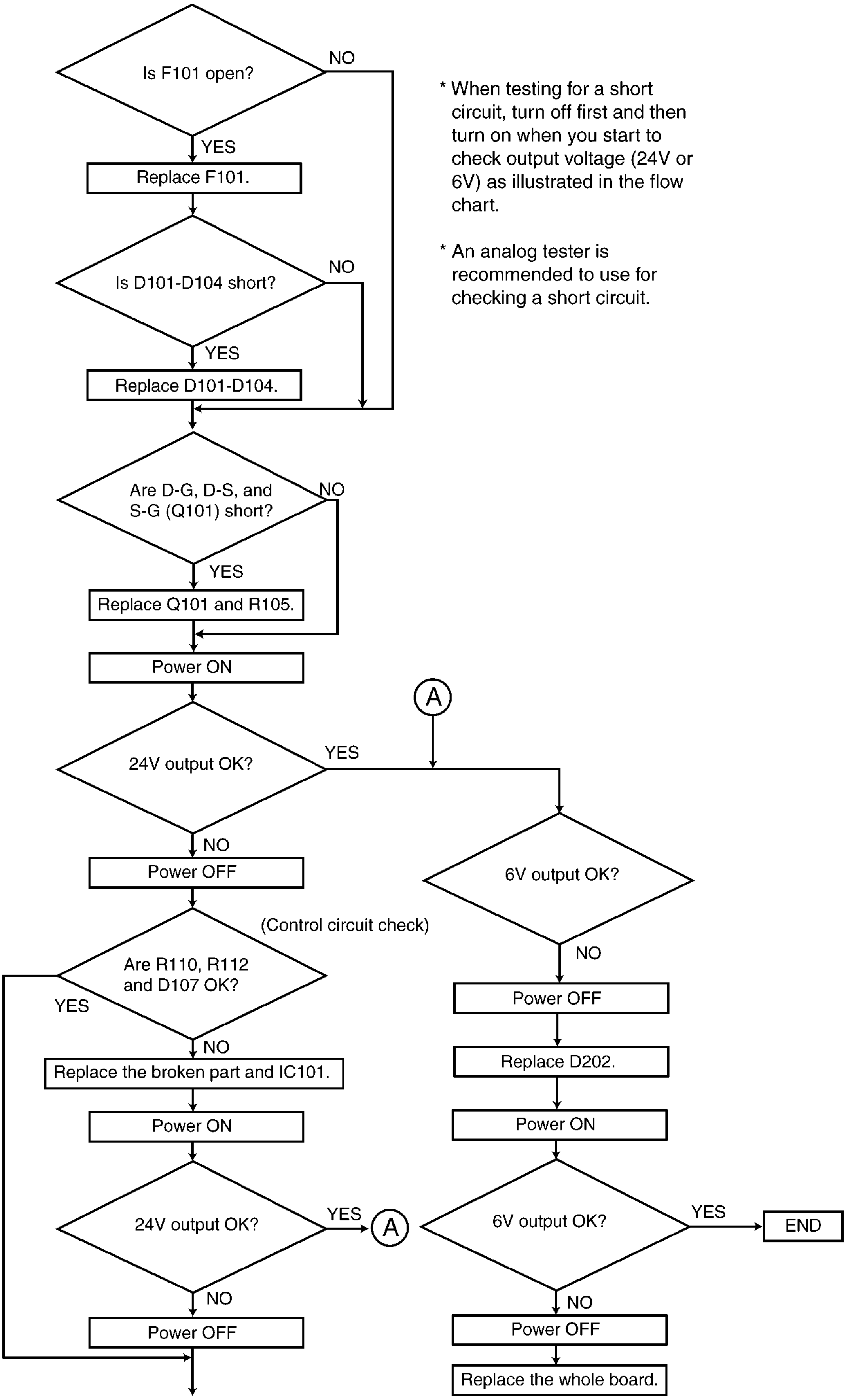
POWER SUPPLY BLOCK DIAGRAM


AC Input
Input Circuit
Rectifier Circuit
C106
D110
R104
Kick-on Voltage Circuit
Converter Circuit
Q101
Surge Absorber Circuit
Surge Absorber Circuit
Control Circuit
IC101
24V Output Circuit
24V
GND
9~6V
Error Detecting Circuit


DUMMY LOAD to check voltage
CN202
24V
8
7
6
GND
5
4
3
9~6V
2
1
24V
GND
6V
4.7kΩ
2W
33Ω
2W
V
24.5V±0.5V
V
9~6V
V : Volt Meter

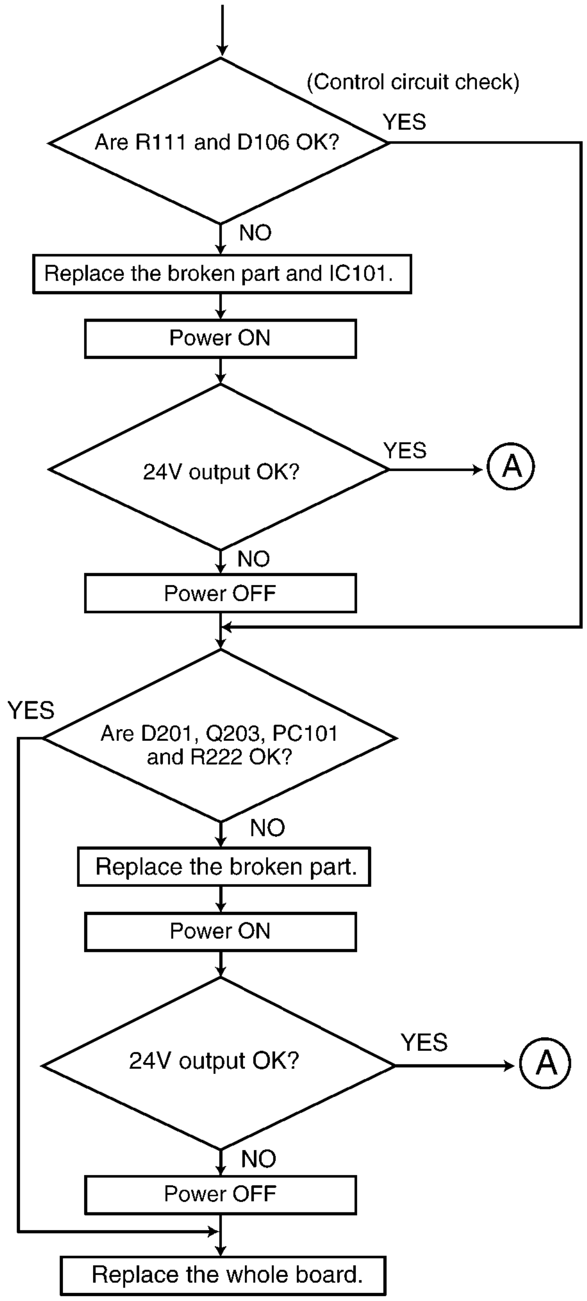
When you check voltage in a power supply unit alone, use this dummy load.
If the dummy load is not available, connect the main P.C.B. to the digital P.C.B.

12.5.8.2. Troubleshooting Flow Chart


Is F101 open?
NO
YES
Replace F101.
Is D101-D104 short?
NO
YES
Replace D101-D104.
Are D-G, D-S, and S-G (Q101) short?
NO
YES
Replace Q101 and R105.
Power ON
A
24V output OK?
YES
NO
Power OFF
6V output OK?
(Control circuit check)
Are R110, R112 and D107 OK?
YES
NO
Replace the broken part and IC101.
Power OFF
Replace D202.
Power ON
Power ON
24V output OK?
YES
A
6V output OK?
YES
END
NO
NO
Power OFF
Power OFF
Replace the whole board.

* 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.


(Control circuit check)
Are R111 and D106 OK?
YES
NO
Replace the broken part and IC101.
Power ON
24V output OK?
YES
A
NO
Power OFF
YES
Are D201, Q203, PC101 and R222 OK?
NO
Replace the broken part.
Power ON
24V output OK?
YES
A
NO
Power OFF
Replace the whole board.

12.5.8.3. Broken Parts Repair Details

(ZNR101, C106)
Check for a short-circuit in terminals.
Visually check these parts for damages.

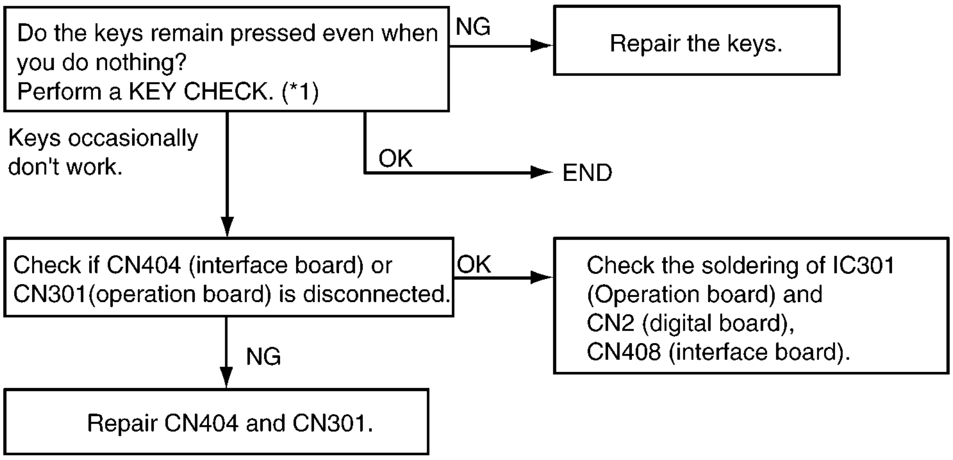
(D101, D102, D103, D104)
Check for a short-circuit in terminal 4. If D101, D102, D103 and D104 are short-circuits, F101 will melt (open).
In this case, replace all of the parts (D101, D102, D103, D104, F101).

(Q101)
The worst case of Q101 is a short-circuit between the Drain and Gate because damage expands to the peripheral circuit of Q101.
This is due to a very high voltage through the Gate circuit which is composed of R110, R112, D107 and IC101.
You should change all of the parts listed as follows.
F101, Q101, R110, R112, D107, IC101

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

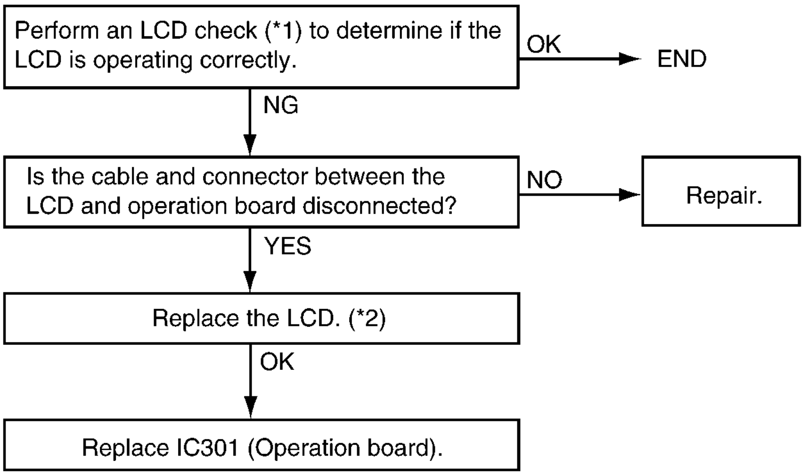
12.5.9. Operation Panel Section

12.5.9.1. No Key Operation


Do the keys remain pressed even when you do nothing?
Perform a KEY CHECK. (*1)
NG
Repair the keys.
OK
END
Keys occasionally don't work.
Check if CN404 (interface board) or CN301(operation board) is disconnected.
OK
Check the soldering of IC301 (Operation board) and CN2 (digital board), CN408 (interface board).
NG
Repair CN404 and CN301.

REFERENCE:
(*1): **Test Mode** (P.63)

12.5.9.2. No LCD Indication


Perform an LCD check (*1) to determine if the LCD is operating correctly.
OK
END
NG
Is the cable and connector between the LCD and operation board disconnected?
NO
Repair.
YES
Replace the LCD. (*2)
OK
Replace IC301 (Operation board).

REFERENCE:
(*1): **Test Mode** (P.63)
(*2): **How to Remove the Operation Cover** (P.151)

12.5.10. Sensor Section

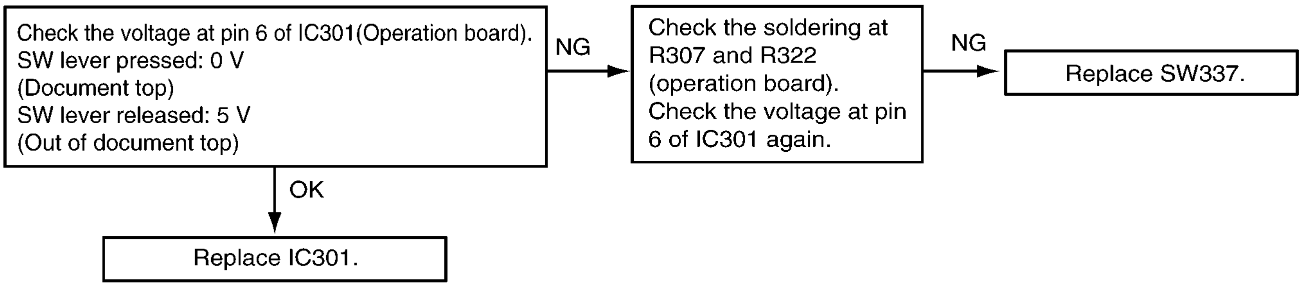
Refer to **Sensors and Switches** (P.33) for the circuit descriptions.

The Test Function makes the sensor circuit check easier. (Refer to **Test Mode** (P.63).)

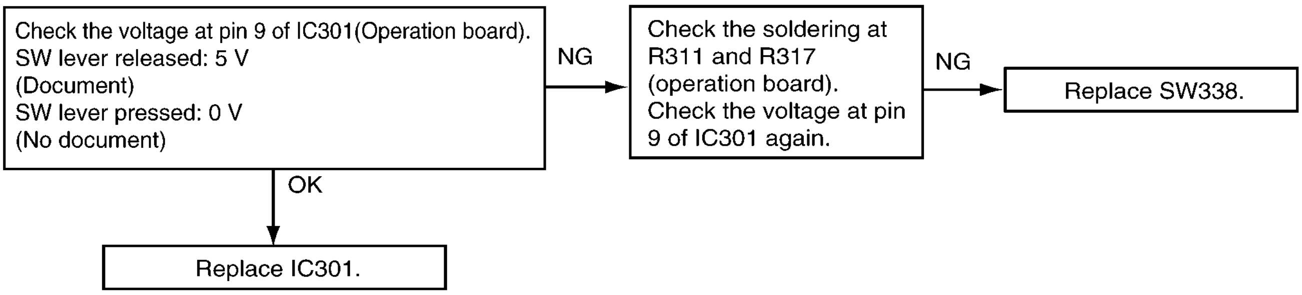
For example, as for “COVER OPEN SENSOR”, “CO” is turned ON/OFF on the display when you open or close the front cover. Also, document sensor, read position sensor, recording paper sensor and jam sensor are turned ON/OFF by the copy operation. Therefore, each sensor can be checked for proper mechanical operation.

As for the electric check, check whether each voltage is right or not with following flowchart turning each sensor lever ON/OFF manually.

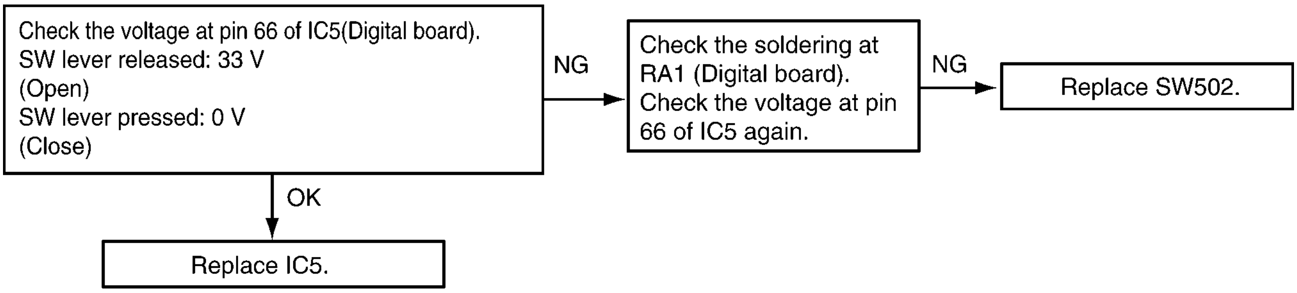
12.5.10.1. Check the Document Top Sensor (SW337)................. “REMOVE DOCUMENT”


Check the voltage at pin 6 of IC301(Operation board).
SW lever pressed: 0 V
(Document top)
SW lever released: 5 V
(Out of document top)
NG
Check the soldering at R307 and R322 (operation board). Check the voltage at pin 6 of IC301 again.
NG
Replace SW337.
OK
Replace IC301.

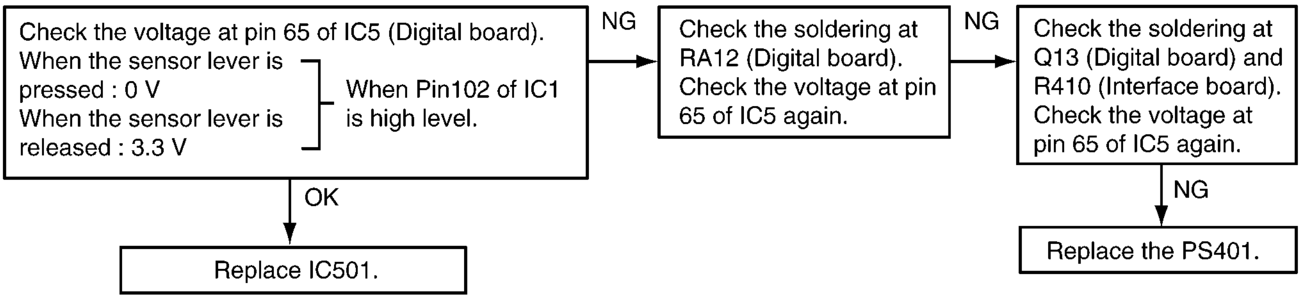
12.5.10.2. Check the Document Set Sensor (SW338)................. “CHECK DOCUMENT”


Check the voltage at pin 9 of IC301(Operation board).
SW lever released: 5 V
(Document)
SW lever pressed: 0 V
(No document)
NG
Check the soldering at R311 and R317 (operation board). Check the voltage at pin 9 of IC301 again.
NG
Replace SW338.
OK
Replace IC301.

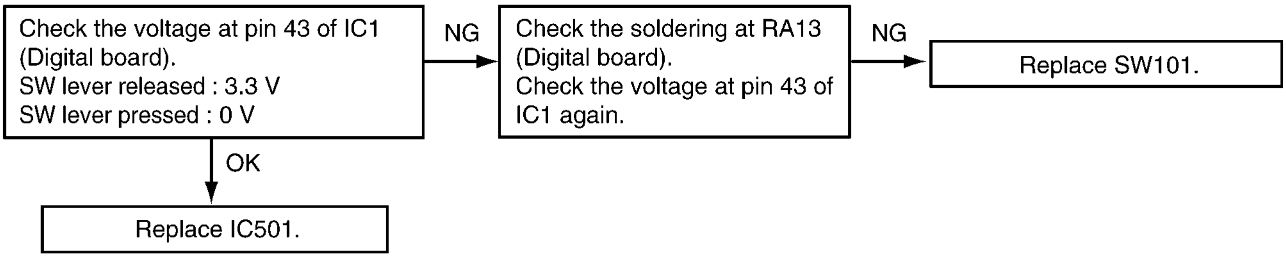
12.5.10.3. Check the Cover Open Sensor (SW502)................. “BACK COVER OPEN”


Check the voltage at pin 66 of IC5(Digital board).
SW lever released: 33 V
(Open)
SW lever pressed: 0 V
(Close)
NG
Check the soldering at RA1 (Digital board). Check the voltage at pin 66 of IC5 again.
NG
Replace SW502.
OK
Replace IC5.

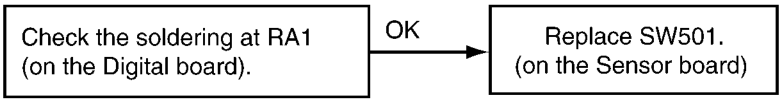
12.5.10.4. Check the Paper Top Sensor (PS401)........................ “PAPER JAMMED”


Check the voltage at pin 65 of IC5 (Digital board).
When the sensor lever is pressed : 0 V
When the sensor lever is released : 3.3 V
When Pin102 of IC1 is high level.
NG
Check the soldering at RA12 (Digital board). Check the voltage at pin 65 of IC5 again.
NG
Check the soldering at Q13 (Digital board) and R410 (Interface board). Check the voltage at pin 65 of IC5 again.
NG
Replace the PS401.
OK
Replace IC501.

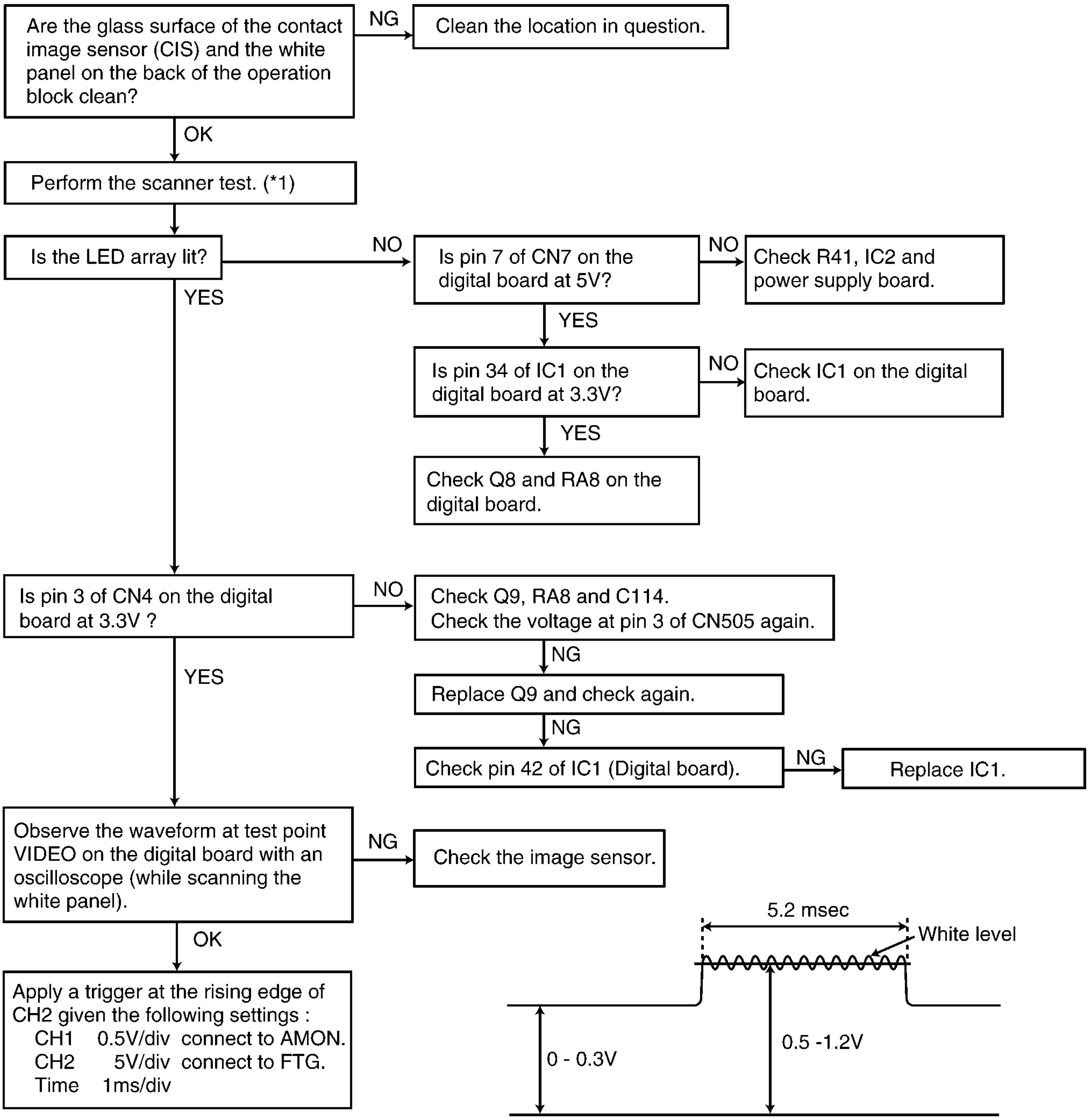
12.5.10.5. Check the HOOK Switch (SW101)


Check the voltage at pin 43 of IC1 (Digital board).
SW lever released : 3.3 V
SW lever pressed : 0 V
NG
Check the soldering at RA13 (Digital board).
Check the voltage at pin 43 of IC1 again.
NG
Replace SW101.
OK
Replace IC501.

12.5.10.6. Check the Film Detection Sensor (SW501)..... “FILM EMPTY” or “CHECK FILM”


Check the soldering at RA1 (on the Digital board).
OK
Replace SW501. (on the Sensor board)

12.5.11. CIS (Contact Image Sensor) Section



Are the glass surface of the contact image sensor (CIS) and the white panel on the back of the operation block clean?

Clean the location in question.

Perform the scanner test. (*1)

Is the LED array lit?

Is pin 7 of CN7 on the digital board at 5V?

Check R41, IC2 and power supply board.

Is pin 34 of IC1 on the digital board at 3.3V?

Check IC1 on the digital board.

Check Q8 and RA8 on the digital board.

Is pin 3 of CN4 on the digital board at 3.3V ?

Check Q9, RA8 and C114.
Check the voltage at pin 3 of CN505 again.

Replace Q9 and check again.

Check pin 42 of IC1 (Digital board).

Replace IC1.

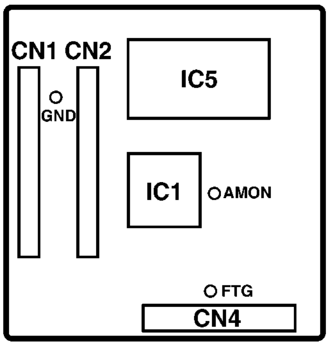
Observe the waveform at test point VIDEO on the digital board with an oscilloscope (while scanning the white panel).

Check the image sensor.

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)

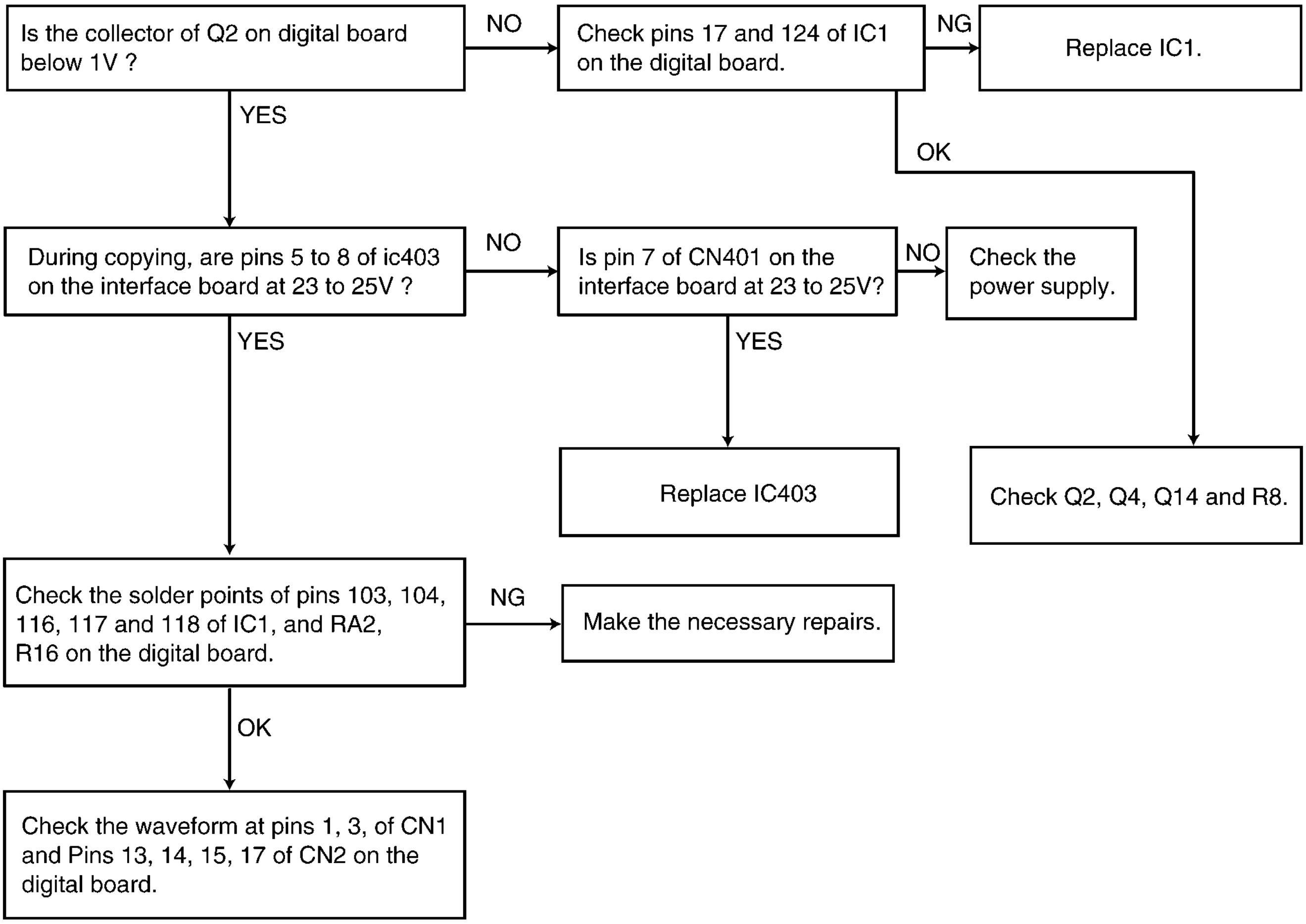


REFERENCE:

(*1): **Test Mode** (P.63)

Refer to **Scanning Block** (P.28).

12.5.12. Thermal Head Section


Is the collector of Q2 on digital board below 1V ?
NO
Check pins 17 and 124 of IC1 on the digital board.
NG
Replace IC1.
YES
OK
During copying, are pins 5 to 8 of ic403 on the interface board at 23 to 25V ?
NO
Is pin 7 of CN401 on the interface board at 23 to 25V?
NO
Check the power supply.
YES
YES
Replace IC403
Check Q2, Q4, Q14 and R8.
Check the solder points of pins 103, 104, 116, 117 and 118 of IC1, and RA2, R16 on the digital board.
NG
Make the necessary repairs.
OK
Check the waveform at pins 1, 3, of CN1 and Pins 13, 14, 15, 17 of CN2 on the digital board.

Note:

Refer to **Thermal Head** (P.26).

12.6. Problem with PANA LINK (KX-FM388 only)

Problem	Cause & Solution
I cannot send a fax from the computer at the specified time.	• The date and time of the computer may be set incorrectly. Adjust it. If it cannot be set correctly, consult your computer supplier.
The date and time that prints on the top of each page sent from the computer is incorrect.	• The date and time of the computer may be set incorrectly. Adjust it. If it cannot be set correctly, consult your computer supplier.
I do not know how to move the main panel, because there is no title bar.	• Point to an area with no buttons and drag to the desired space.
I do not know whether the main panel is active or not.	• The brightness of the main panel display shows you whether or not the main panel is active. <Active — bright, Non active — dark>
A quick tip does not appear when I hold the mouse pointer over a button in the main panel, although I have set to display this.	• If the main panel is non-active, the quick tip does not appear. Confirm again after making the main panel active by clicking anywhere on it.
The telephone number set in the main panel display disappears, and the display shows [For storing a phone or fax number.] explanation of the button and so on.	• The quick tip is displayed. Move the mouse cursor out of the main panel. If you do not need quick tips, Click **[Setup]** in the main panel, and select **[OFF]** of **[Quick Tip]** in the **[System]** tab.
The main panel disappears.	• Look in the task bar. If you do not find the **[PANA LINK]** icon, it is closed. If you do find the icon, it is just minimized. Click the icon in the task bar.
The main panel disappears just after initializing.	• The main panel is set to minimize when PANA LINK starts. Click the icon in the task bar. If you do not want this to happen each time you start PANA LINK, click **[Setup]** in the main panel, and leave the **[Start minimized]** check box blank in the **[Program start-up settings]** in the **[System]** tab.
I want to delete all of the telephone numbers set in the main panel display.	• Press **[STOP]** button.
I cannot recognize the last part of an entry in the list of the [Address Book] or [Communication Log].	• Put the cursor on the line between the buttons, the cursor changes shape and you can expand the area by dragging, or double-clicking.
I do not want to send a cover page with every fax.	• The setting of the cover page is on. To deactivate the setting, click **[Setup]** in the main panel, and remove the check **[Default Add Cover Page at every Transmission]** in the **[Cover Page]** tab.
I wanted to select a telephone number from [Address Book] onto the main panel, but I selected a fax number by mistake.	• You can change your selection in the main panel. Double-click on the number in the main panel display until the telephone number appears. You can also right-click the entry to select a specific number.
I cannot use the [DIAL] button, even though I specified a telephone number.	• If there is transmission data or a document is set in the fax, you can only use the fax transmission function. If you want to make a phone call, delete the transmission data.
When I exit PANA LINK, the [Viewer] window does not close.	• The **[Viewer]** can be operated separately. Click the **[X]** button to close the window.
PANA LINK does not work properly.	• Click the **[X]** button to exit PANA LINK, and restart. If PANA LINK still does not close, restart the computer. • PANA LINK may not work properly if other printer drivers have been installed in your computer. Uninstall the printer drivers and PANA LINK software, then re-install PANA LINK software. • If you connect the USB cable to USB hub, connect it to the USB port of your computer directly. • Confirm the BIOS setting of your computer. Please refer to your computer operating instructions or consult the manufacturer about USB port mode. • If you have any other multifunction softwares installed on your computer, uninstall them.
[Sending a fax failed.] message is displayed.	• Possible causes are as follows. - Telephone circuit is not good. - You received a call-waiting signal. - The other party stopped reception. - The other party ran out of recording paper. Transmit again after checking with the other party.

Problem	Cause & Solution
[No response] message is displayed.	• The other party did not answer the call or the line was busy. Transmit again after waiting a while. • The dialling mode setting (tone or pulse) is not correct. Click **[Setup]** in the main panel and check the setup box in the **[Line]** tab.
I cannot send a fax overseas.	• Use the overseas transmission mode of feature #023 [*1].
The length of the transmitted image differs slightly from the original.	• Set the **[Print Quality]** to **[Fine]** (200 × 200 dpi) and transmit again.
The fax machine receives a fax, but I want to receive it on the computer.	• You may have checked **[Receive directly to facsimile unit]** in the **[Reception]** tab in the **[Setup]** dialogue box. If so, click this check box to deactivate. • The setting of the PC LINK on the fax machine is off. Activate feature #014 [*1]. • PANA LINK is not operate. Start PANA LINK.
The computer receives a fax, but I want to receive it on the fax machine.	• Click **[Setup]** in the main panel, and check **[Receive directly to facsimile unit]** in the **[Reception]** tab.
I want to print out the received fax with another printer.	• Print after selecting the desired printer from the **[Print]** dialogue box.
[Receiving a fax failed.] message is displayed.	• Possible causes are as follows. - The line condition was not good. - The reception was interrupted by a call-waiting signal. Check with the other party and try again.
I cannot scan.	• The fax machine is in use. Try later on. • There is not enough space on the hard disk. Delete unnecessary files and try again. • There is not enough memory. Close some applications and try again. • Restart the computer, and try again.
The document does not feed into the fax machine.	• Remove the document and reinsert it.
A document is jammed.	• You attempted to scan a document longer than 600 mm. Remove the jammed document and try again.
The recording paper is jammed.	• Remove the jammed recording paper, reinsert it, and try again.
Even after clicking [Stop], scanning continues.	• Please wait. It may take a while for the cancel request to be accepted.
[Initialization failed.] is displayed.	• Check the connection of the computer and the unit. • The setting of the PC LINK on the unit is off. Activate feature #014 [*1].

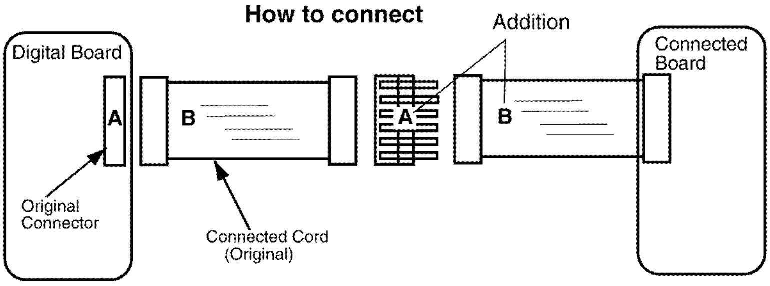
[*1] Refer to **Program Mode Table** (P.100).

13 Service Fixture & Tools

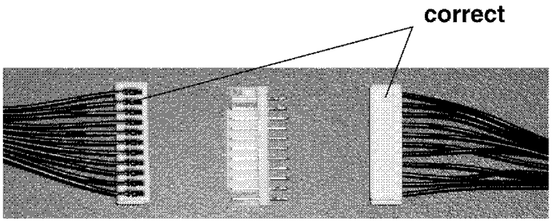
How to extend cords

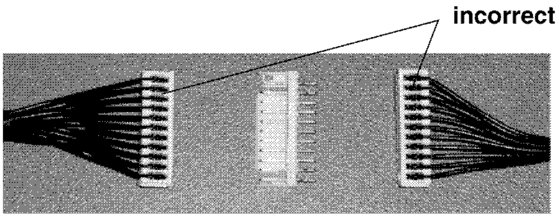
When extending cords, you need 2 pairs of A,B (A=connector,B=cord)
(One pair is connected to the Main board.)
If you do not have 2 pairs, order the necessary parts.

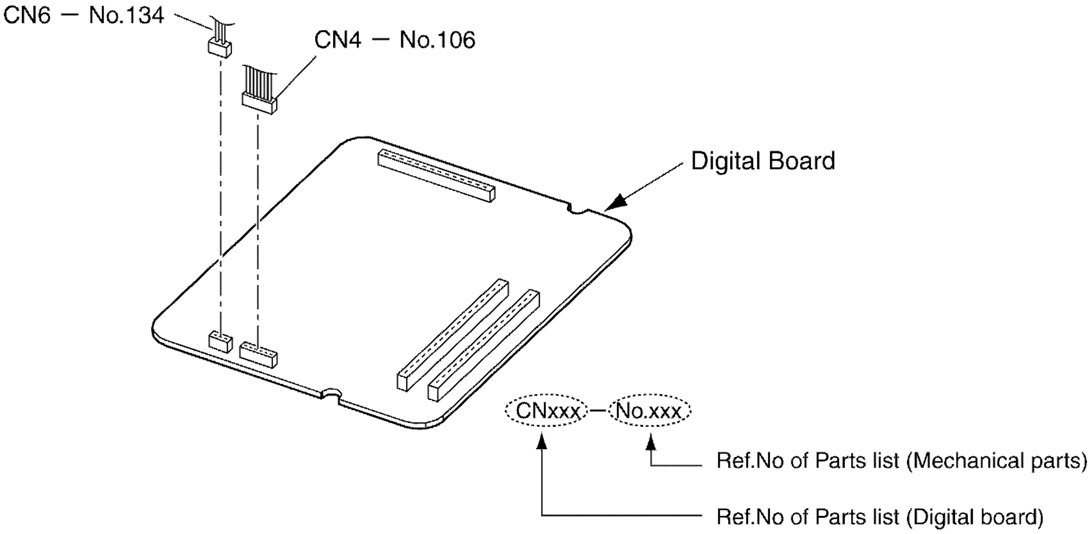
How to connect


Addition
Digital Board
A
B
A
B
Connected Board
Original Connector
Connected Cord (Original)

Note:
Be sure if the direction of the connectors is correct.

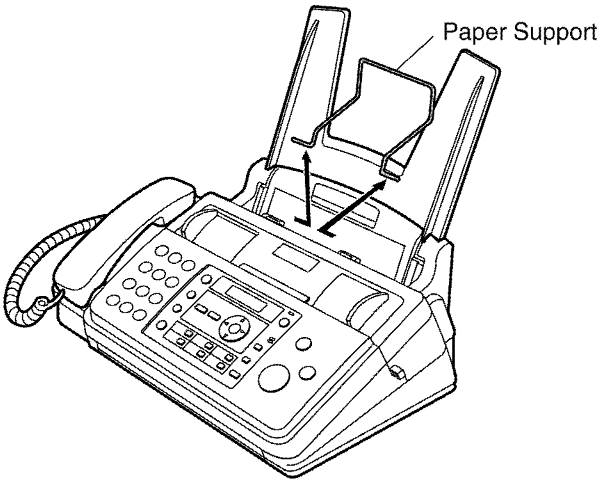


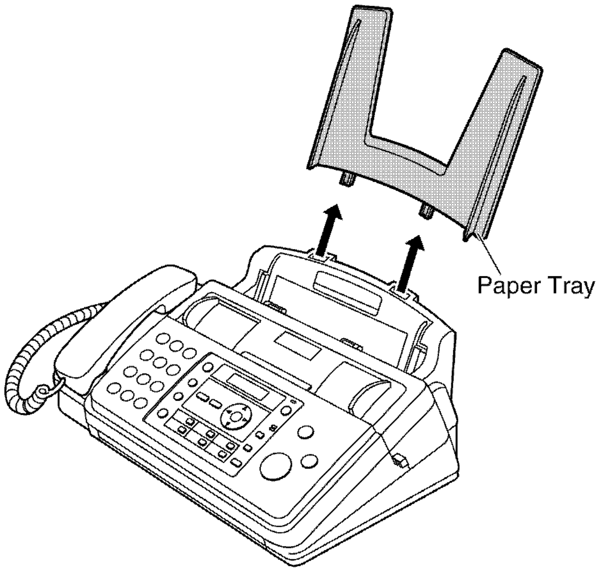


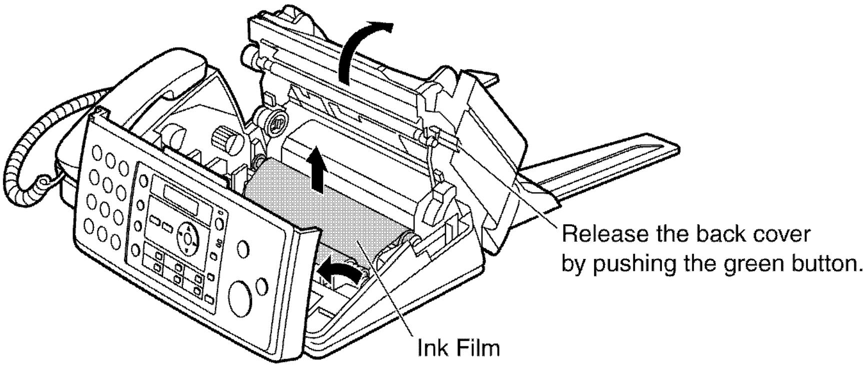

CN6 — No.134
CN4 — No.106
Digital Board
CNxxx — No.xxx
Ref.No of Parts list (Mechanical parts)
Ref.No of Parts list (Digital board)

14 Disassembly and Assembly Instructions

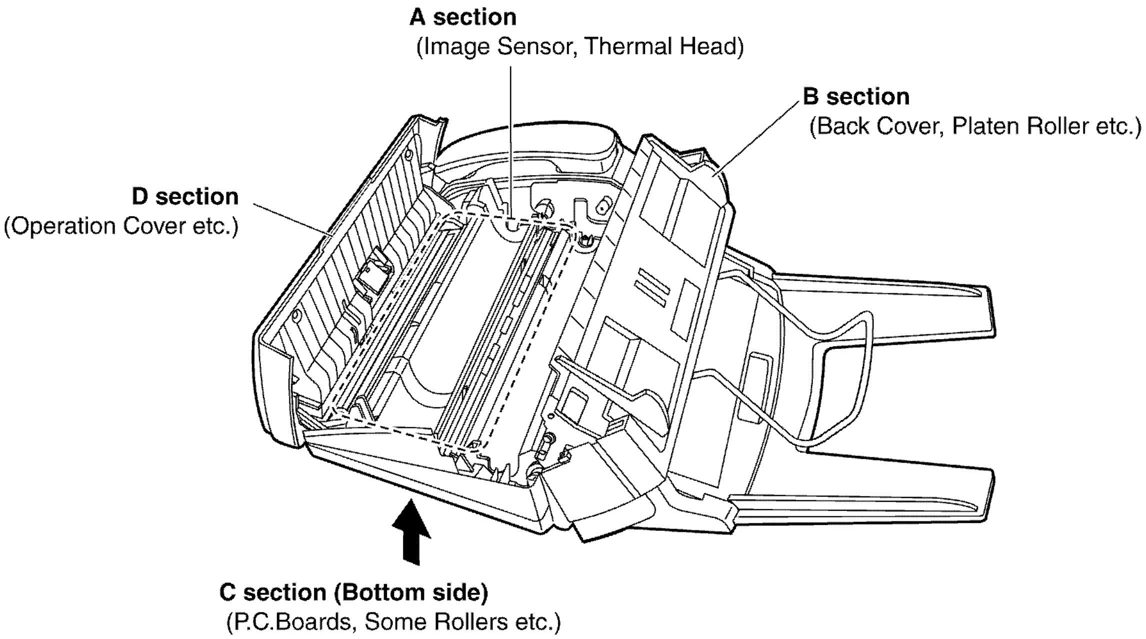
Note:
Please remove the Paper Support, Paper Tray and Ink Film before disassembling.


Paper Support

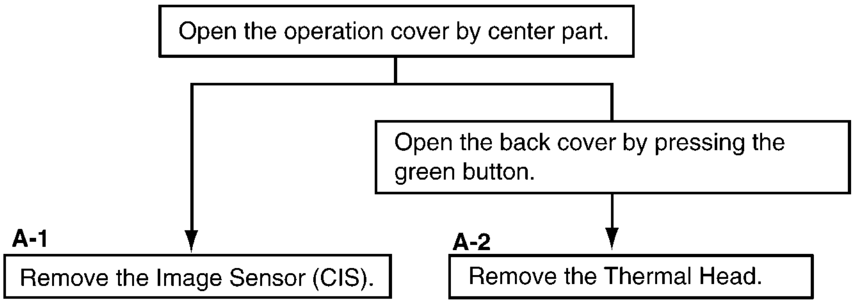



Release the back cover
by pushing the green button.
Ink Film

■ GENERAL SECTION


A section
(Image Sensor, Thermal Head)
B section
(Back Cover, Platen Roller etc.)
D section
(Operation Cover etc.)
C section (Bottom side)
(P.C.Boards, Some Rollers etc.)

14.1. Upper Cabinet Section


Open the operation cover by center part.
Open the back cover by pressing the green button.
A-1
Remove the Image Sensor (CIS).
A-2
Remove the Thermal Head.

14.1.1. How to Remove the Image Sensor (CIS)

Ref. No. A-1

1) Open the operation cover by center part.
2) Remove the 2 screws (C).
3) Remove the IMAGE SENSOR (CIS), as shown in a Fig. A.
4) Disconnect the connector.

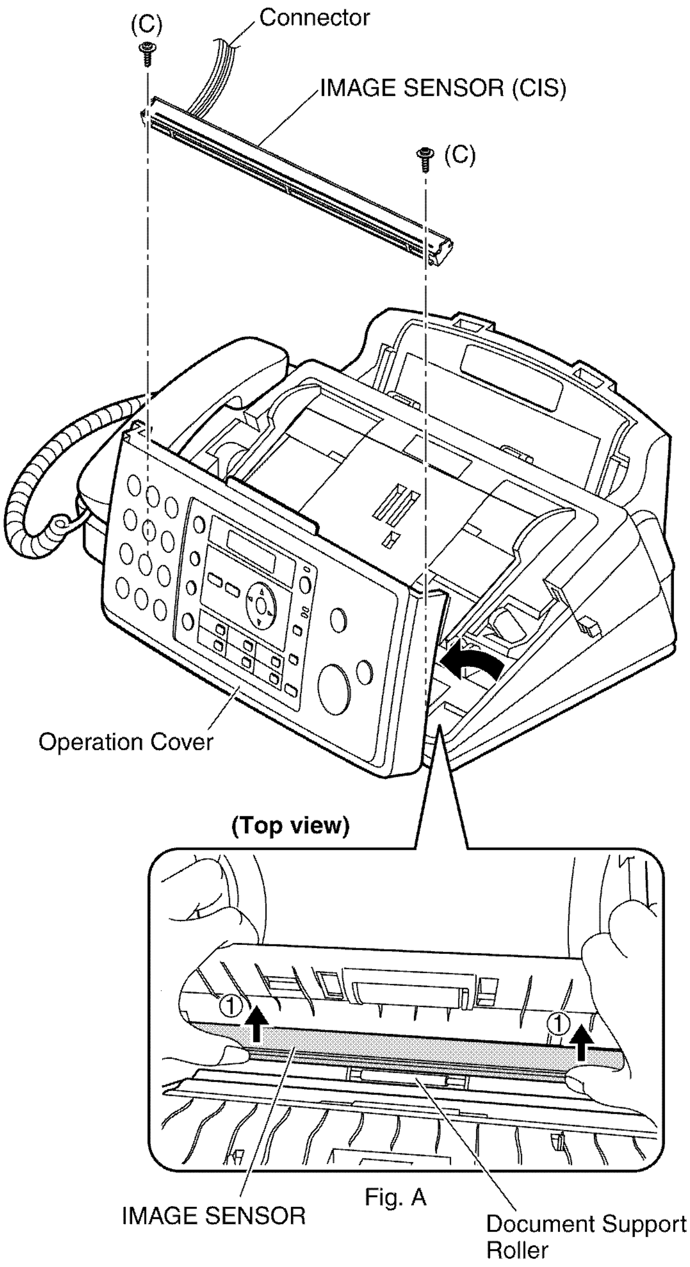

(C)
Connector
IMAGE SENSOR (CIS)
(C)
Operation Cover
(Top view)
①
①
IMAGE SENSOR
Document Support Roller

Fig. A

14.1.2. How to Remove the Thermal Head

Ref. No. A-2

1) Open the operation cover by center part.
2) Open the back cover by pressing the green button.
3) Remove the Thermal Head Holders, as shown in a Fig. B.
4) Disconnect the connectors.
5) Remove the Thermal Head Holders from Thermal Head.

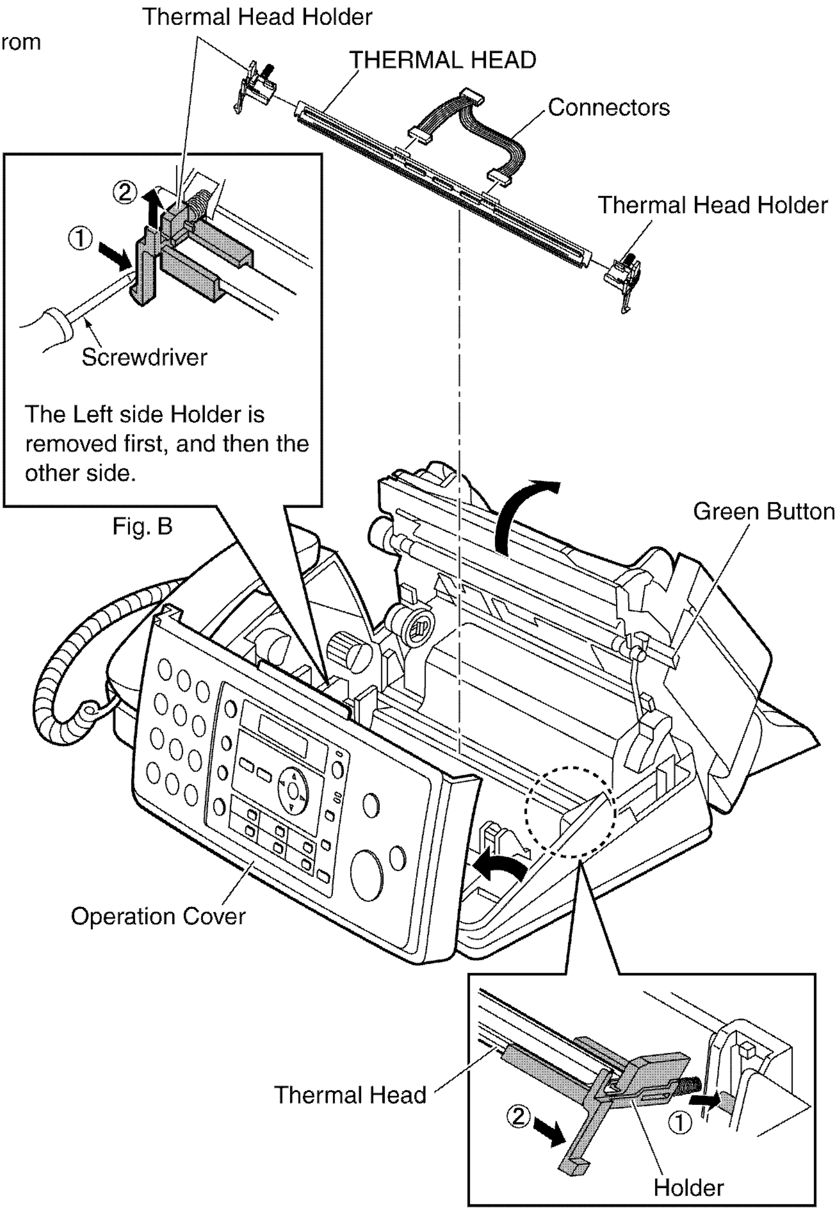
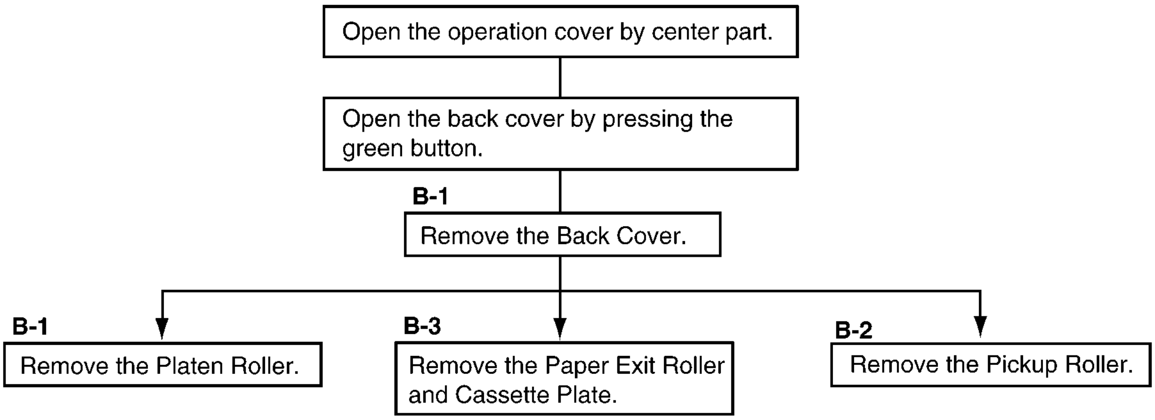

Thermal Head Holder
THERMAL HEAD
Connectors
Thermal Head Holder
②
①
Screwdriver
The Left side Holder is removed first, and then the other side.
Fig. B
Green Button
Operation Cover
Thermal Head
②
①
Holder

Fig. C

■ **How to install the THERMAL HEAD**

1. Insert the right side Holder first, as shown in a Fig. C.
2. Insert the other side Holder similarly.

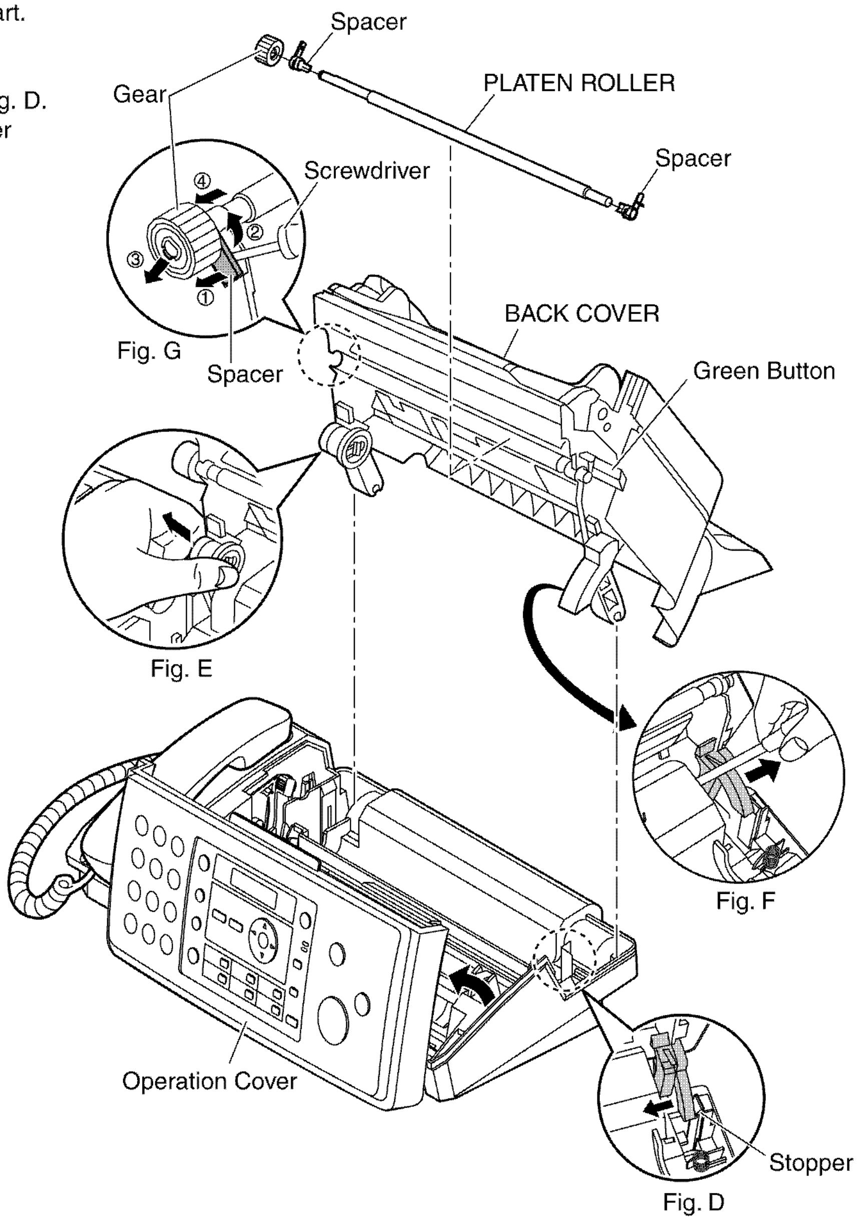
14.2. Back Cover Section


Open the operation cover by center part.
Open the back cover by pressing the green button.
B-1
Remove the Back Cover.
B-1
Remove the Platen Roller.
B-3
Remove the Paper Exit Roller and Cassette Plate.
B-2
Remove the Pickup Roller.

14.2.1. How to Remove the Back Cover and Platen Roller

Ref. No. B-1

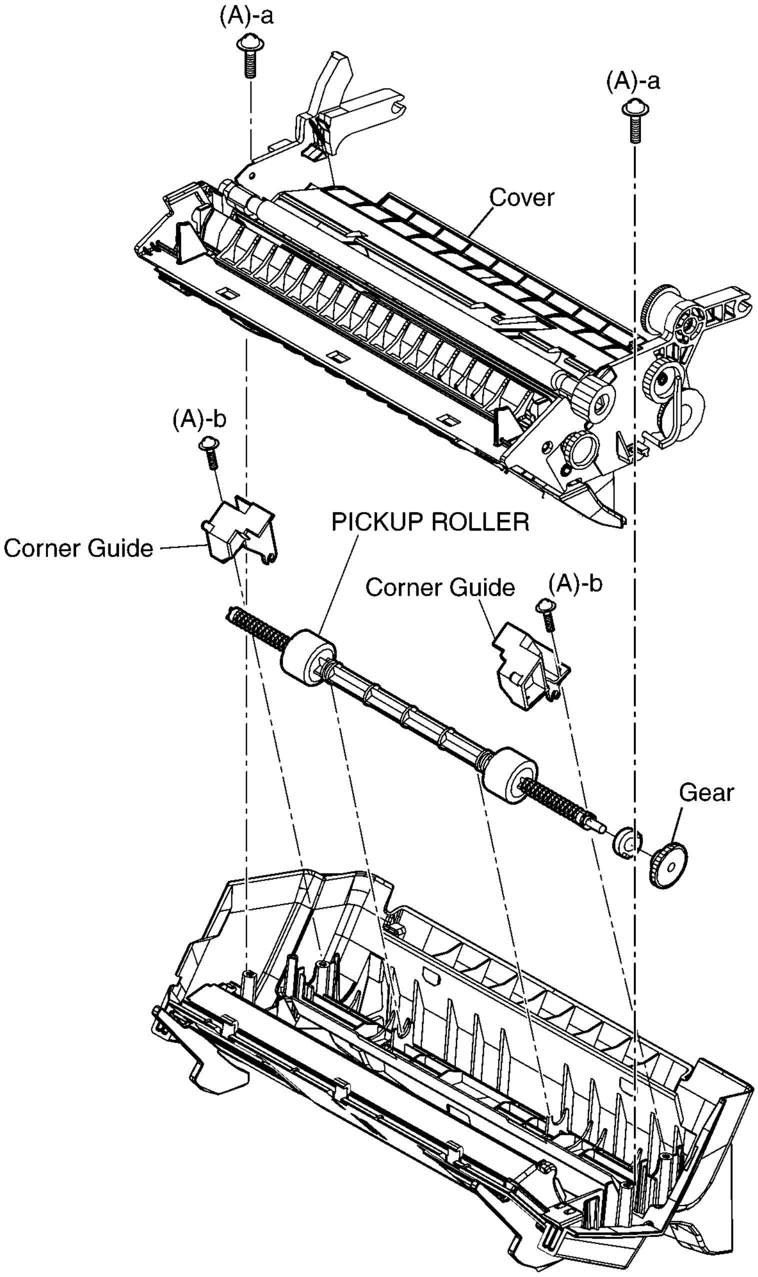
1) Open the operation cover by center part.
2) Open the back cover by pressing the green button.
3) Release the stopper, as shown in a Fig. D.
4) Push both side arms of the Back Cover to outside, then move the cover up, as shown in a Fig. E and Fig.F.
5) Remove the BACK COVER.
6) Remove the Gear and 2 Spacers, as shown in a Fig. G.
7) Remove the PLATEN ROLLER.


Spacer
Gear
PLATEN ROLLER
Screwdriver
Spacer
④
②
③
①
Fig. G
Spacer
BACK COVER
Green Button
Fig. E
Fig. F
Operation Cover
Stopper
Fig. D

14.2.2. How to Remove the Pickup Roller

Ref. No. B-2

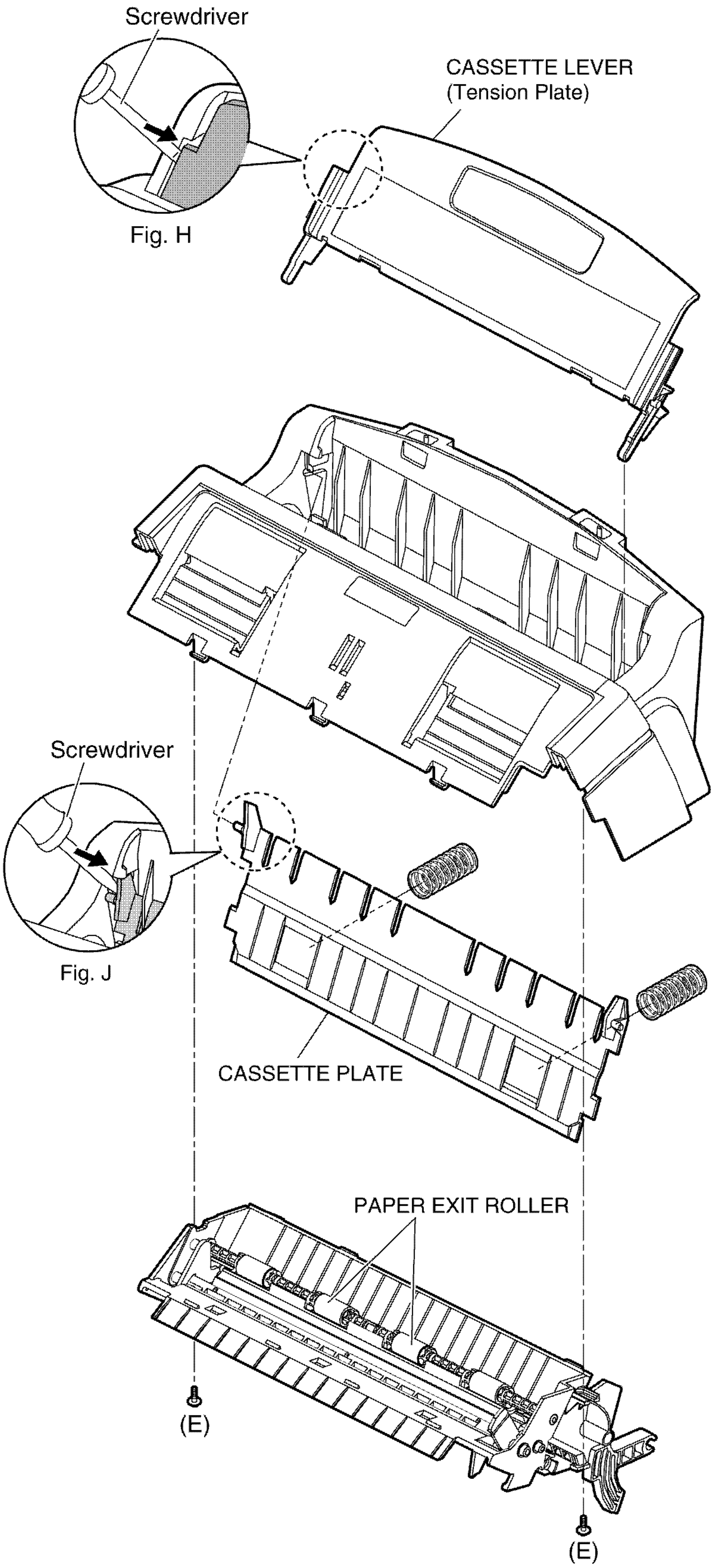
1) Remove the 2 screws (A)-a.
2) Remove the COVER.
3) Remove the screws (A)-b.
4) Remove the 2 Corner Guides.
5) Remove the Gear.
6) Remove the PICKUP ROLLER.


(A)-a
(A)-a
Cover
(A)-b
Corner Guide
PICKUP ROLLER
Corner Guide
(A)-b
Gear

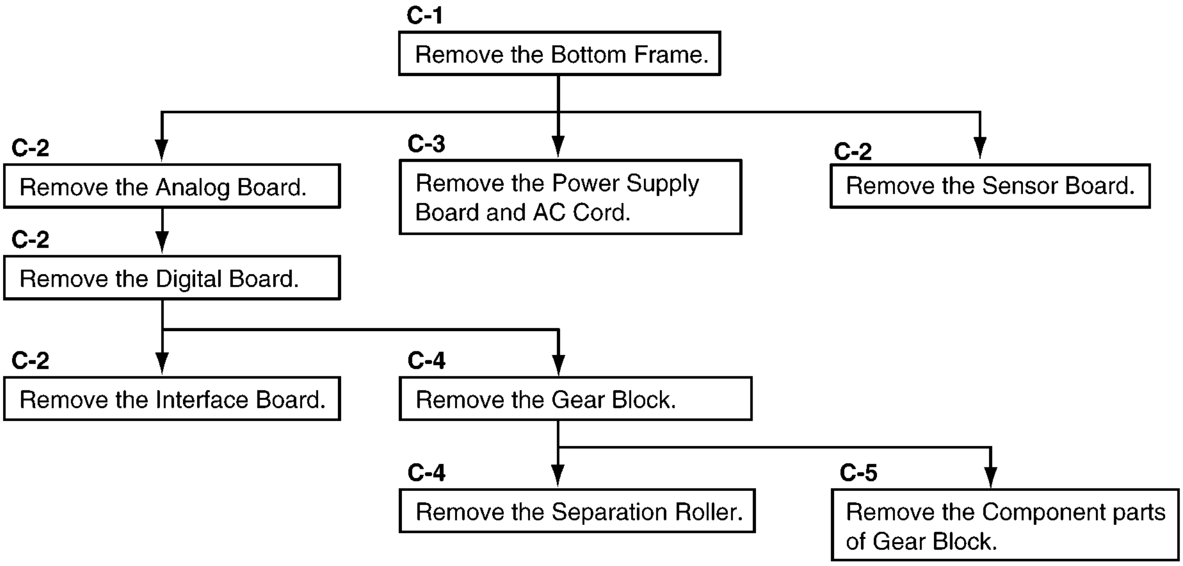
14.2.3. How to Remove the Paper Exit Roller and Cassette Lever

Ref. No. B-3

1) Remove the 2 Screws (E).
2) Remove the PAPER EXIT ROLLER.
3) Remove the 2 Springs.
4) Pull up and remove the CASSETTE LEVER, as shown in a Fig. H.
5) Pull up and remove the CASSETTE PLATE, as shown in a Fig. J.


Screwdriver
Fig. H
CASSETTE LEVER
(Tension Plate)
Screwdriver
Fig. J
CASSETTE PLATE
PAPER EXIT ROLLER
(E)
(E)

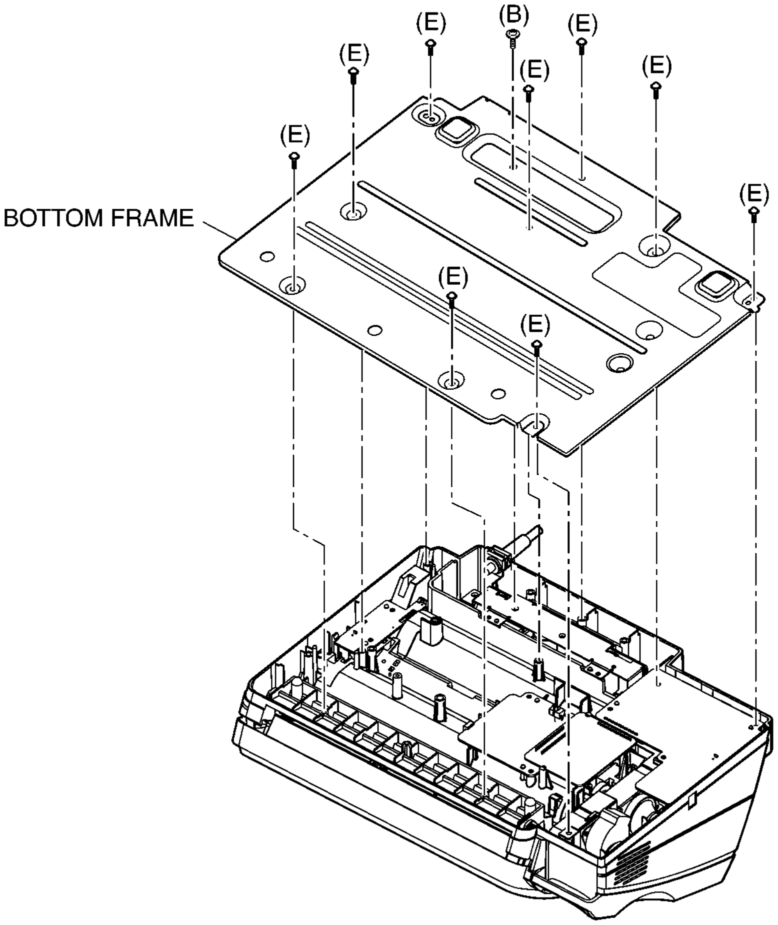
14.3. Lower Cabinet Section


C-1
Remove the Bottom Frame.
C-2
Remove the Analog Board.
C-3
Remove the Power Supply Board and AC Cord.
C-2
Remove the Sensor Board.
C-2
Remove the Digital Board.
C-2
Remove the Interface Board.
C-4
Remove the Gear Block.
C-4
Remove the Separation Roller.
C-5
Remove the Component parts of Gear Block.

14.3.1. How to Remove the Bottom Frame

Ref. No. C-1

1) Remove the 9 screws (E).
2) Remove the 1 screws (B).
3) Remove the BOTTOM FRAME.


(E)
(B)
(E)
(E)
(E)
(E)
(E)
BOTTOM FRAME
(E)
(E)
(E)

14.3.2. How to Remove the Digital, Analog, Interface and Sensor Boards

Ref. No. C-2

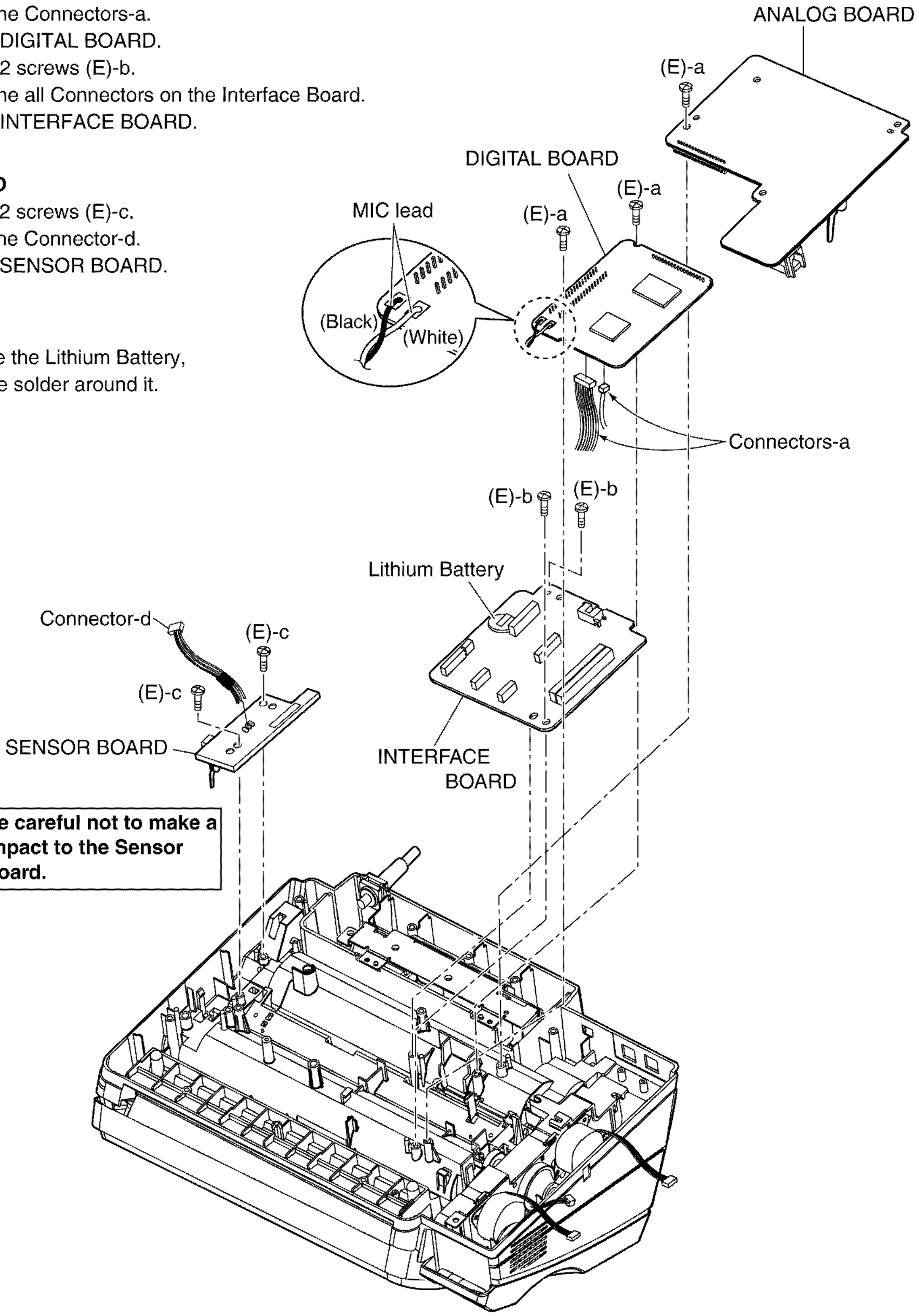
ANALOG / DIGITAL / INTERFACE BOARD

1) Remove the 3 screws (E)-a.
2) Unsolder the MIC lead.
3) Remove the ANALOG BOARD.
4) Disconnect the Connectors-a.
5) Remove the DIGITAL BOARD.
6) Remove the 2 screws (E)-b.
7) Disconnect the all Connectors on the Interface Board.
8) Remove the INTERFACE BOARD.

SENSOR BOARD

1) Remove the 2 screws (E)-c.
2) Disconnect the Connector-d.
3) Remove the SENSOR BOARD.

Note:
When you remove the Lithium Battery, please remove the solder around it.

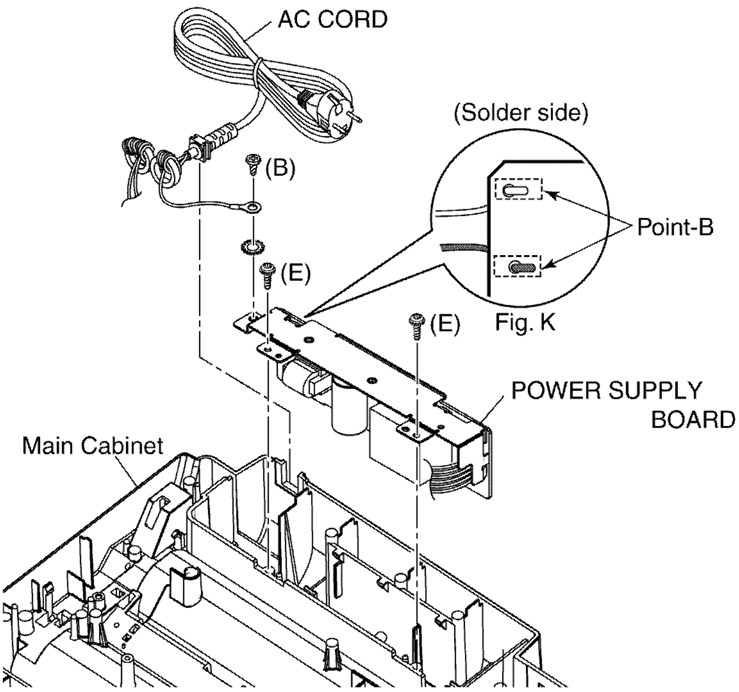

ANALOG BOARD
(E)-a
DIGITAL BOARD
(E)-a
MIC lead
(E)-a
(Black)
(White)
Connectors-a
(E)-b
(E)-b
Lithium Battery
Connector-d
(E)-c
(E)-c
SENSOR BOARD
INTERFACE BOARD

Be careful not to make a impact to the Sensor Board.

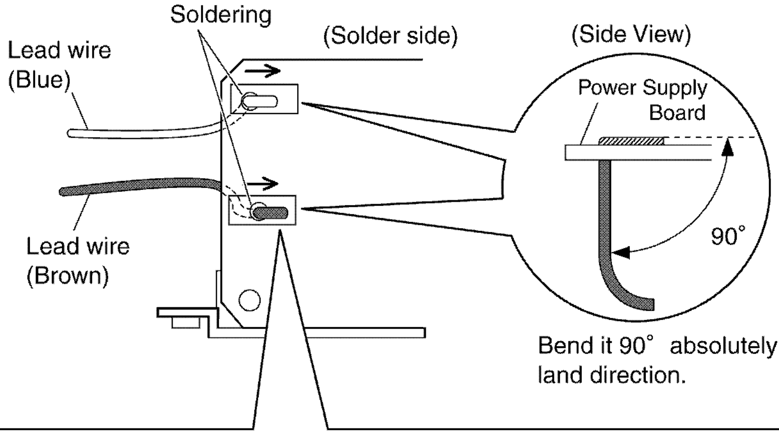
14.3.3. How to Remove the Power Supply Board and AC cord

Ref. No. C-3

1) Remove the Connector-c. (Refer to **C-2**.)
2) Remove the 2 screws (E).
3) Remove the Power Supply Board with AC Cord from Main Cabinet.
4) Remove the 1 screw (B).
5) Unsolder the Point-B. (See Fig. K)
6) Remove the POWER SUPPLY BOARD and AC CORD.

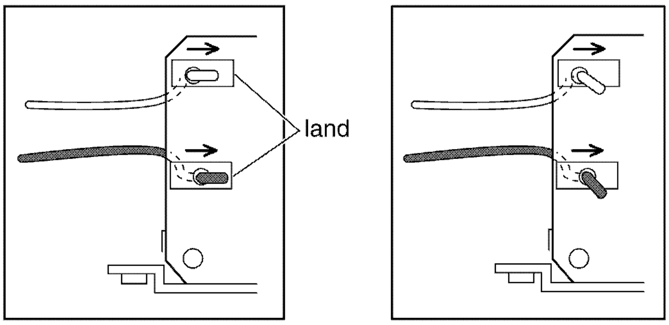

AC CORD
(Solder side)
(B)
Point-B
(E)
(E)
Fig. K
POWER SUPPLY BOARD
Main Cabinet

The soldering of AC Cord


Soldering
Lead wire (Blue)
(Solder side)
(Side View)
Power Supply Board
90°
Lead wire (Brown)

Bend it 90° absolutely land direction.

Correct **Incorrect**



Note:
- As to the lead wires, take care not to protrude from the land area.
- Check lead wire situation and confirm no-cut and no-whiskers.

14.3.4. How to Remove the Gear Block and Separation Roller

Ref. No. C-4

1) Remove the 4 screws (E)-a.
2) Remove the GEAR BLOCK.
3) Remove the SEPARATION ROLLER, as shown in a Fig L.

Note for Assembly:

- When install the Separation Roller Shaft, it inserted fully until the click is heard.
- Order of screw attachment is as follows.
  ① → ② → ③ → ④

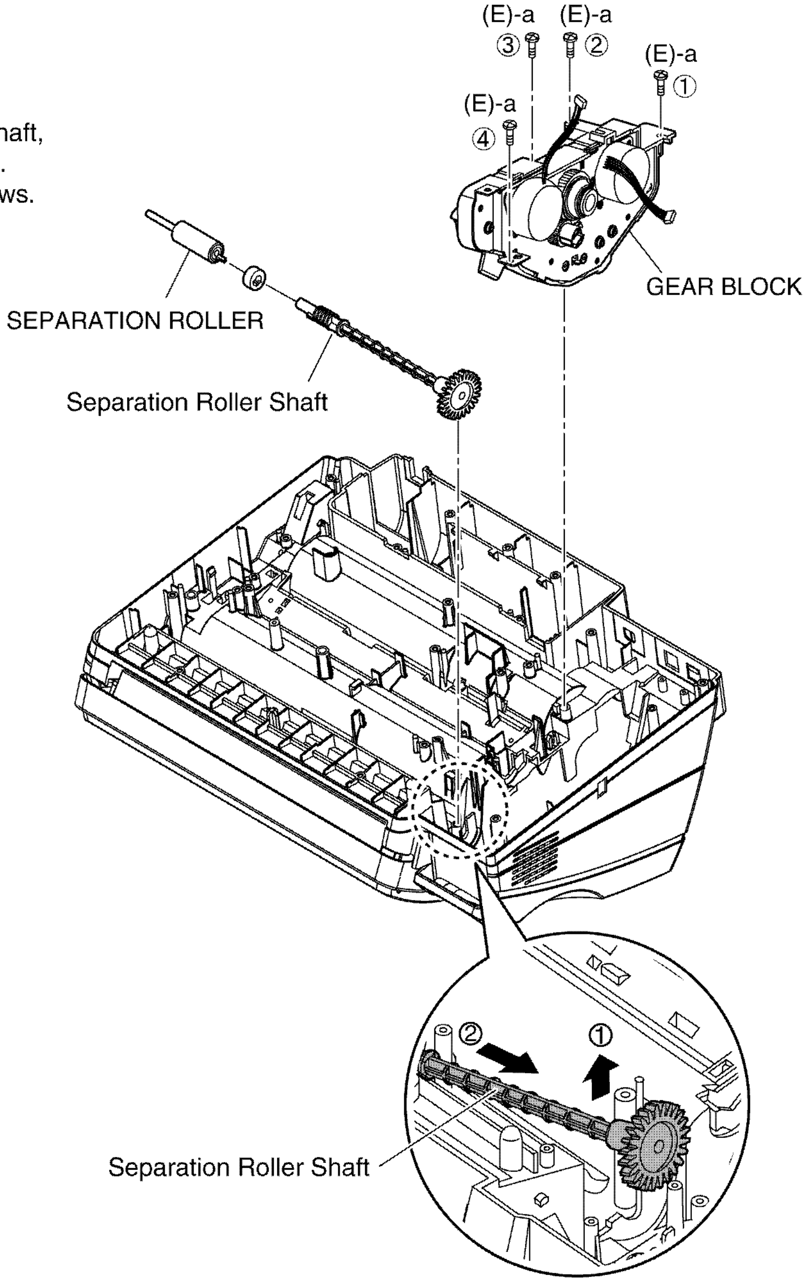
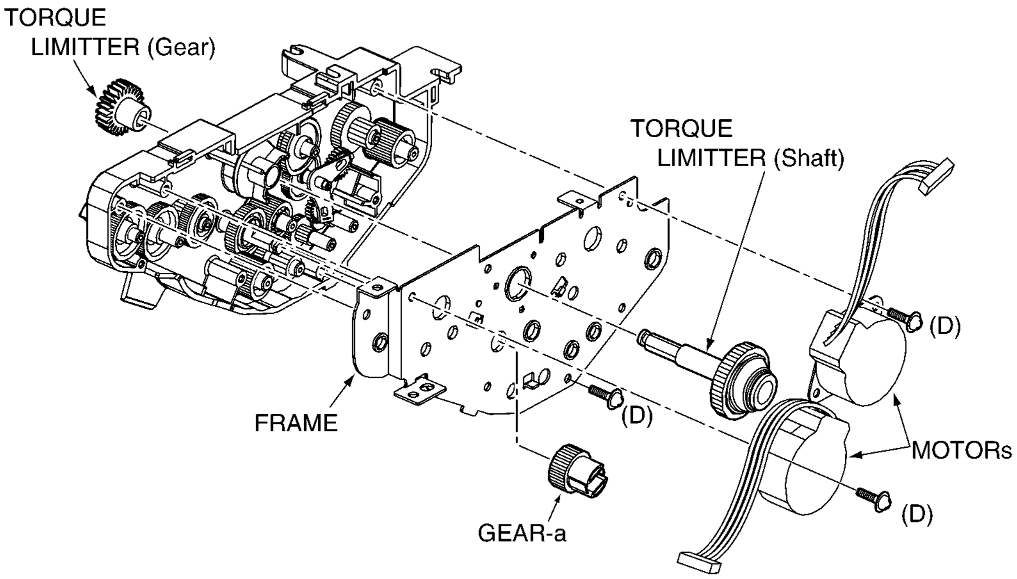

(E)-a
③
(E)-a
②
(E)-a
①
(E)-a
④
GEAR BLOCK
SEPARATION ROLLER
Separation Roller Shaft
②
①
Separation Roller Shaft

Fig. L

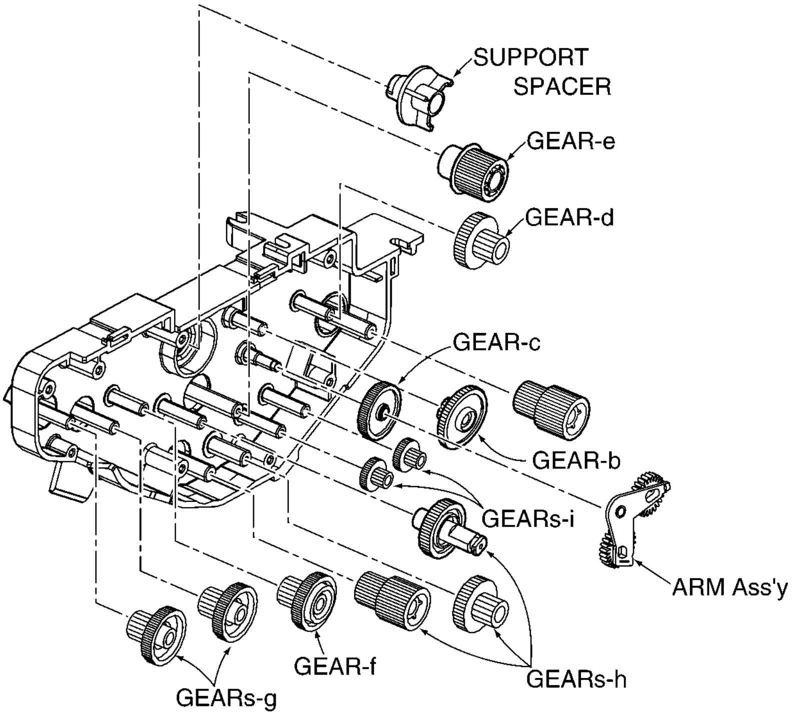
14.3.5. How to Remove the Component parts of Gear Block

Ref. No. C-5

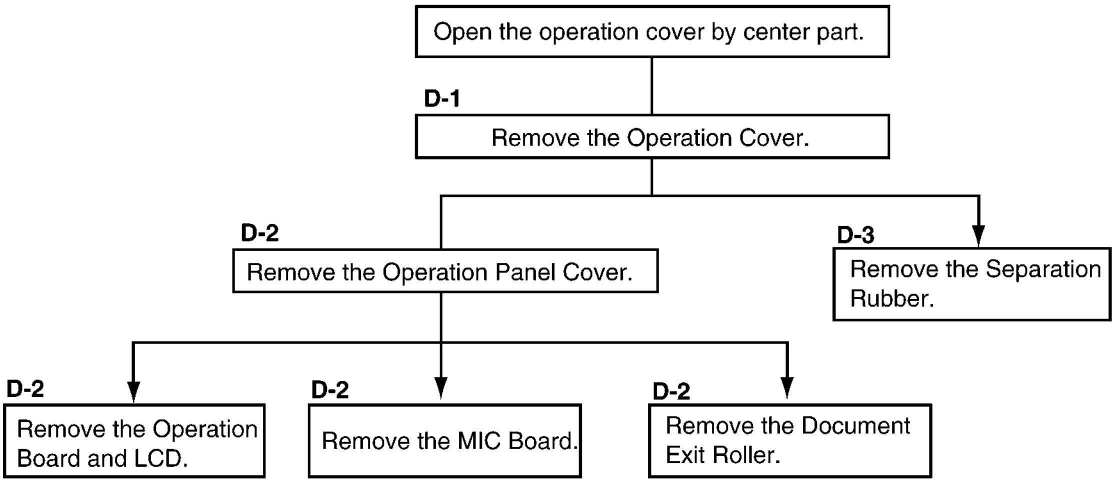
1) Remove the 3 screws (D).
2) Unlock the claws with TORQUE LIMITTER (Gear), then pull the TORQUE LIMITTER (Shaft).
3) Remove the 2 MOTORs and FRAME.
4) Remove the GEAR-a.


TORQUE LIMITTER (Gear)
TORQUE LIMITTER (Shaft)
(D)
(D)
FRAME
MOTORs
(D)
GEAR-a

5) Remove the ARM Ass'y.
6) Remove the GEAR-b.
7) Remove the GEAR-c.
8) Remove the SUPPORT SPACER.
9) Remove the GEAR-d.
10) Remove the GEAR-e.
11) Remove the GEAR-f.
12) Remove the GEARs-g.
13) Remove the GEARs-h.
14) Remove the GEARs-i.


SUPPORT SPACER
GEAR-e
GEAR-d
GEAR-c
GEAR-b
GEARs-i
ARM Ass'y
GEAR-f
GEARs-h
GEARs-g

14.4. Operation Cover Section


Open the operation cover by center part.
D-1
Remove the Operation Cover.
D-2
Remove the Operation Panel Cover.
D-3
Remove the Separation Rubber.
D-2
Remove the Operation Board and LCD.
D-2
Remove the MIC Board.
D-2
Remove the Document Exit Roller.

14.4.1. How to Remove the Operation Cover

Ref. No. D-1

1) Unhook all the connectors connecting the main cabinet with the Operation Cover. (Ref No. **C-1**)
2) Open the operation cover by center part.
3) Pull out both sides of the arms, as shown in a Fig. M.
4) Remove the OPERATION COVER.

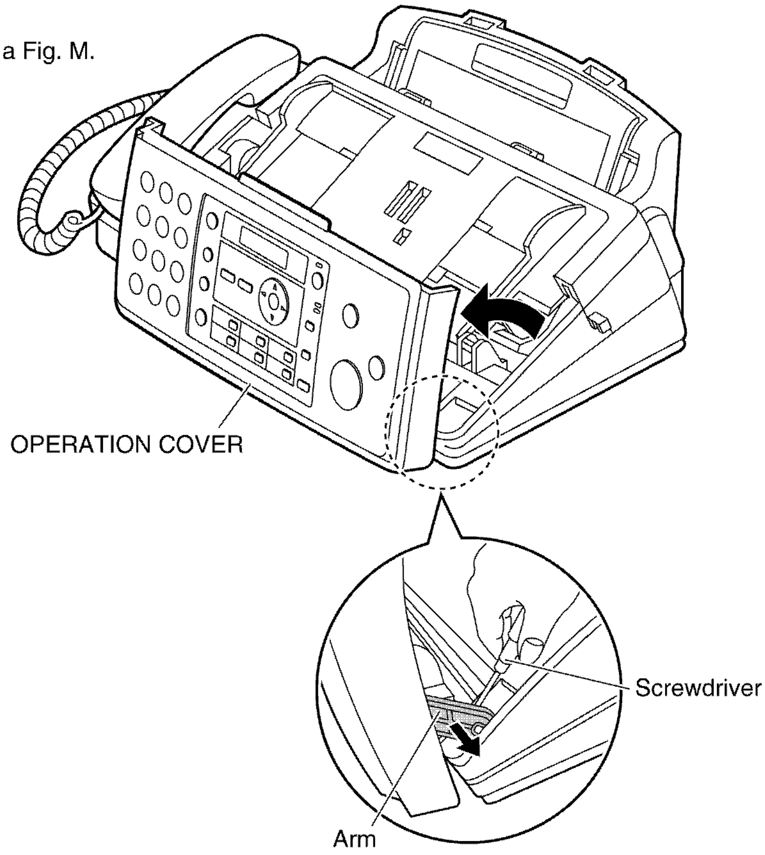

OPERATION COVER
Screwdriver
Arm

Fig. M

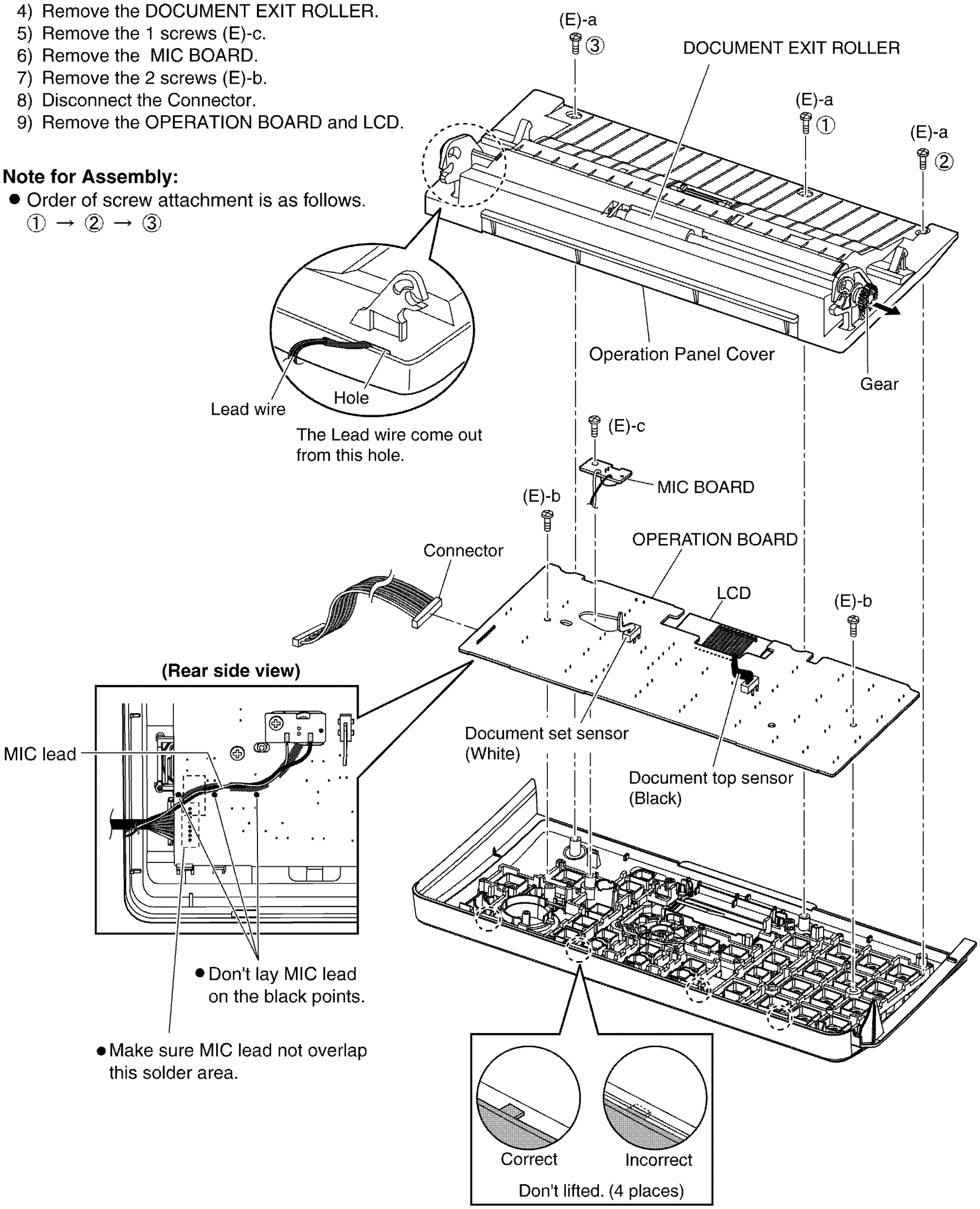
14.4.2. How to Remove the Operation Board, LCD, MIC Board and Document Exit Roller

Ref. No. D-2

1) Remove the 3 screws (E)-a.
2) Remove the Operation Panel Cover.
3) Remove the Gear.
4) Remove the DOCUMENT EXIT ROLLER.
5) Remove the 1 screws (E)-c.
6) Remove the MIC BOARD.
7) Remove the 2 screws (E)-b.
8) Disconnect the Connector.
9) Remove the OPERATION BOARD and LCD.

Note for Assembly:

- Order of screw attachment is as follows. ① → ② → ③

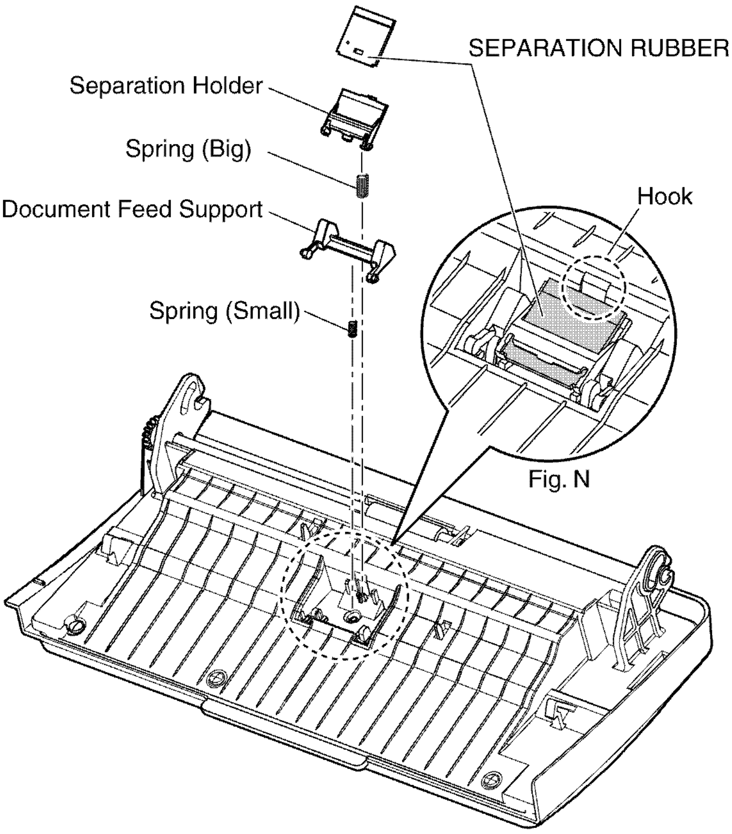

(E)-a
③
DOCUMENT EXIT ROLLER
(E)-a
①
(E)-a
②
Lead wire
Hole
The Lead wire come out from this hole.
Operation Panel Cover
Gear
(E)-c
MIC BOARD
(E)-b
Connector
OPERATION BOARD
LCD
(E)-b
(Rear side view)
MIC lead
Document set sensor (White)
Document top sensor (Black)
● Don't lay MIC lead on the black points.
● Make sure MIC lead not overlap this solder area.
Correct
Incorrect
Don't lifted. (4 places)

14.4.3. How to Remove the Separation Rubber

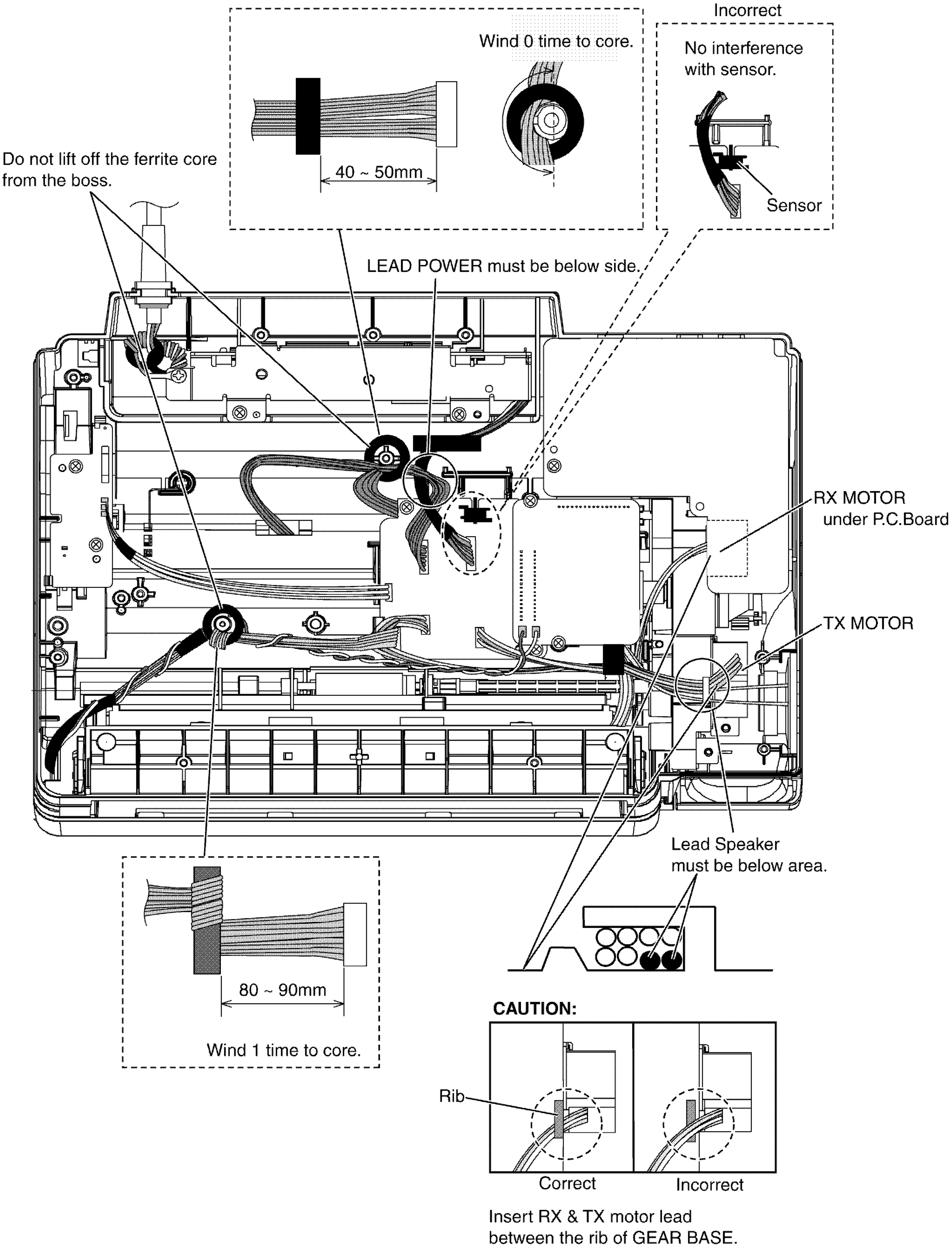
Ref. No. D-3

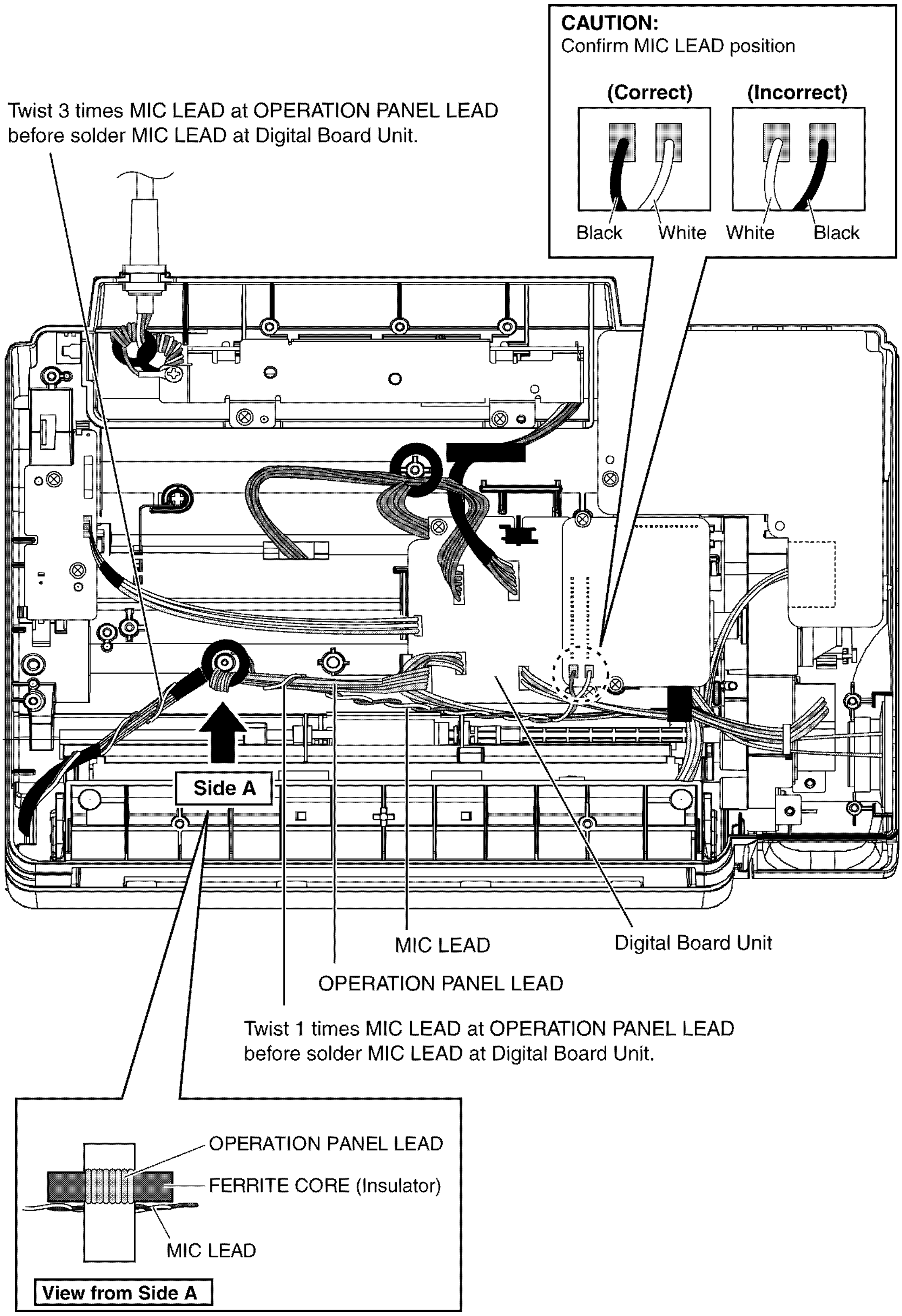
SEPARATION RUBBER

1) Release the hook. (See Fig. N)
2) Remove the SEPARATION RUBBER.


SEPARATION RUBBER
Separation Holder
Spring (Big)
Hook
Document Feed Support
Spring (Small)
Fig. N

14.5. Installation Position of the Lead Wires


Wind 0 time to core.
40 ~ 50mm
Incorrect
No interference with sensor.
Sensor
Do not lift off the ferrite core from the boss.
LEAD POWER must be below side.
RX MOTOR under P.C.Board
TX MOTOR
Lead Speaker must be below area.
80 ~ 90mm
Wind 1 time to core.
CAUTION:
Rib
Correct
Incorrect
Insert RX & TX motor lead between the rib of GEAR BASE.



CAUTION:
Confirm MIC LEAD position

(Correct)
(Incorrect)
Black
White
White
Black

Twist 3 times MIC LEAD at OPERATION PANEL LEAD before solder MIC LEAD at Digital Board Unit.

Side A
MIC LEAD
Digital Board Unit
OPERATION PANEL LEAD

Twist 1 times MIC LEAD at OPERATION PANEL LEAD before solder MIC LEAD at Digital Board Unit.

OPERATION PANEL LEAD
FERRITE CORE (Insulator)
MIC LEAD
View from Side A

15 Maintenance

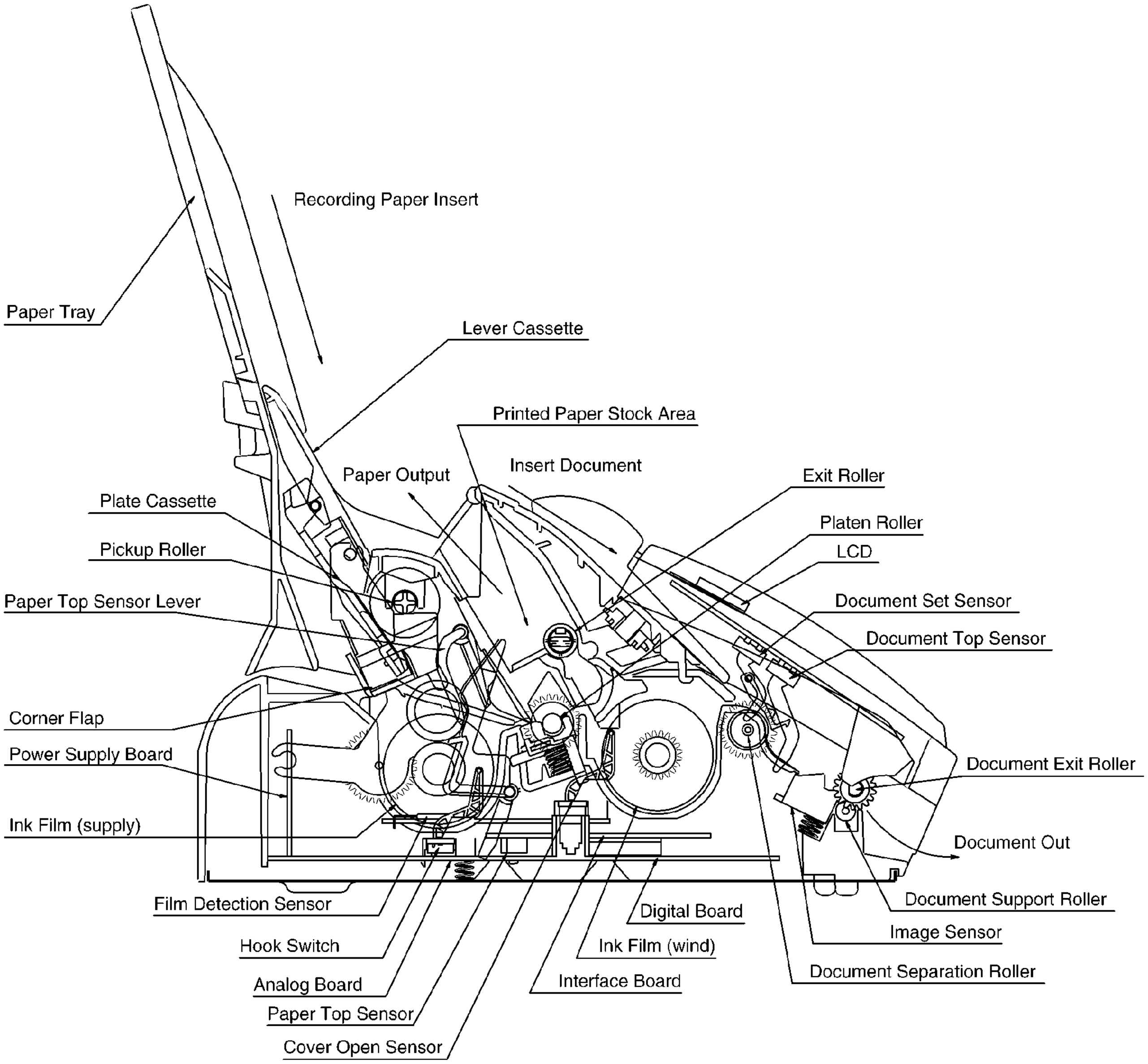
15.1. Maintenance Items and Component Locations

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 trouble-shooting.
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/Component Locations


Recording Paper Insert
Paper Tray
Lever Cassette
Printed Paper Stock Area
Paper Output
Insert Document
Exit Roller
Plate Cassette
Platen Roller
Pickup Roller
LCD
Paper Top Sensor Lever
Document Set Sensor
Document Top Sensor
Corner Flap
Power Supply Board
Document Exit Roller
Ink Film (supply)
Document Out
Film Detection Sensor
Digital Board
Document Support Roller
Hook Switch
Ink Film (wind)
Image Sensor
Analog Board
Interface Board
Document Separation Roller
Paper Top Sensor
Cover Open Sensor

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 **Document feeder/scanner glass cleaning** (P.165).
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.	—
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 **Thermal Head Cleaning** (P.166).
5	Sensors	Confirm the operation of the following sensors. • Document top sensor (SW337) on the Operation Board • Document set sensor (SW338) on the Operation Board • Film detection sensor (SW501) on the Sensor Board • Cover open sensor (SW502) on the Sensor Board • Paper top sensor (PS401) on the Interface Board	Refer to **Maintenance Check Items/Component Locations** (P.156).
6	Glass	If the glass is dirty, clean them with a dry soft cloth.	Refer to **Document feeder/scanner glass cleaning** (P.165).
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. 137)*2	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Gear Block and Separation Roller** (P.149).
2	Separation Rubber (Ref. No. 10)	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Separation Rubber** (P.153).
3	Document Exit Roller (Ref. No. 8)	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Operation Board, LCD, MIC Board and Document Exit Roller** (P.152).
4	Paper Exit Rollers (Ref. No. 68, 69)	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Paper Exit Roller and Cassette Lever** (P.145).
5	Document Support Roller (Ref. No.104)	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Image Sensor (CIS)** (P.141).
6	Thermal Head (Ref. No. 96)	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Thermal Head** (P.142).
7	Platen Roller (Ref. No. 54)	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Back Cover and Platen Roller** (P.143).
8	Pickup Roller (Ref. No. 46)	3 months	7 years*1 (31,500 documents)	Refer to **How to Remove the Pickup Roller** (P.144).

Note:

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

*2 Refer to **Cabinet, Mechanical and Electrical Parts Location** (P.193).

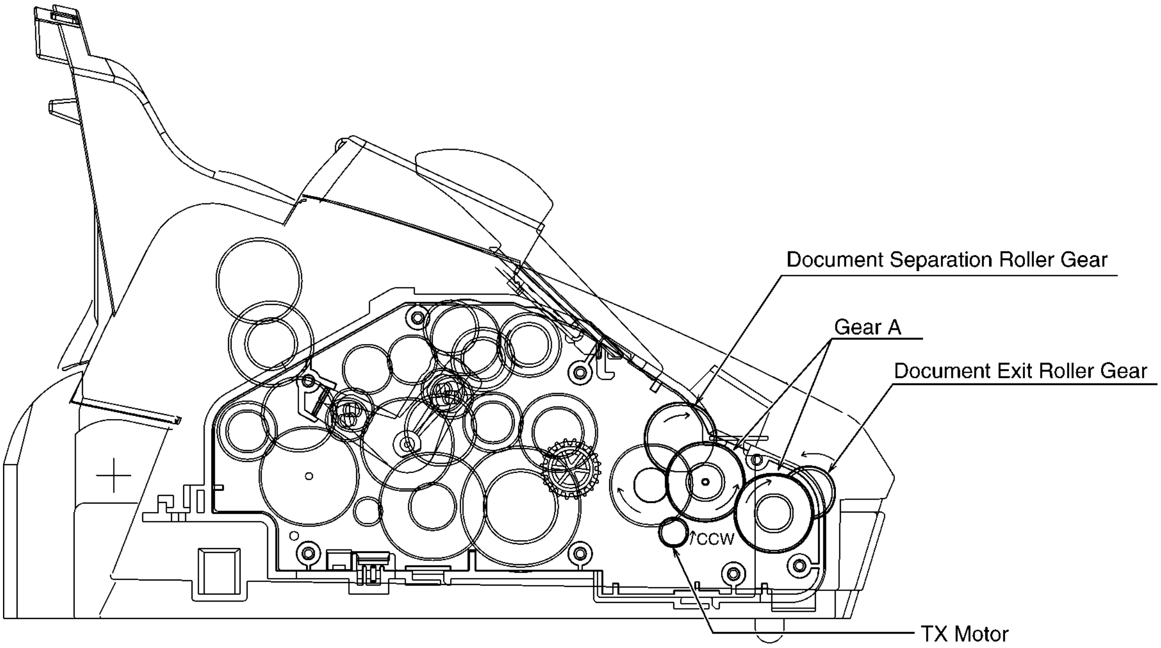
15.2. Gear Section

15.2.1. Gear Operation

Once a mode is selected, the Drive Motor Gear rotates clockwise (CW) and then the controlling positions of Swing Gears A, B and C determine which gears convey their drive power in each mode. See **"Sensor Location"** in **Sensors and Switches** (P.33).

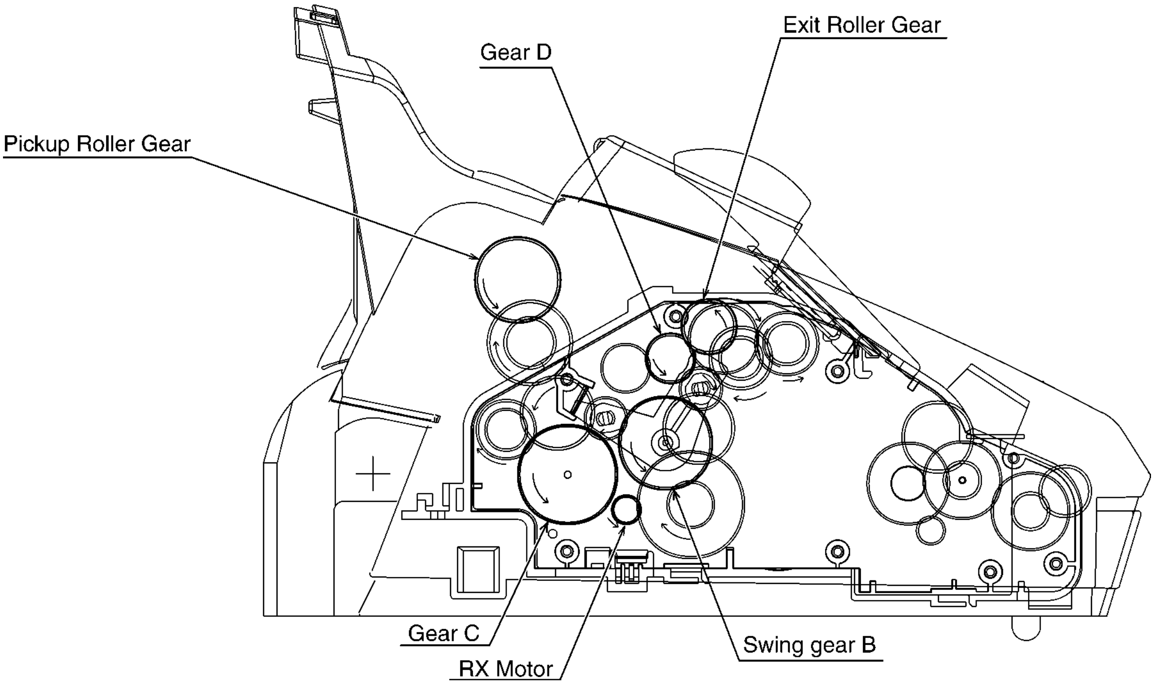
15.2.1.1. Transmit Mode

The TX MOTOR rotate CCW and conveys its power to the document separation roller gear and document Exit Roller Gear.


Document Separation Roller Gear
Gear A
Document Exit Roller Gear
CCW
TX Motor

15.2.1.2. Paper Pick up and Paper Exit Mode

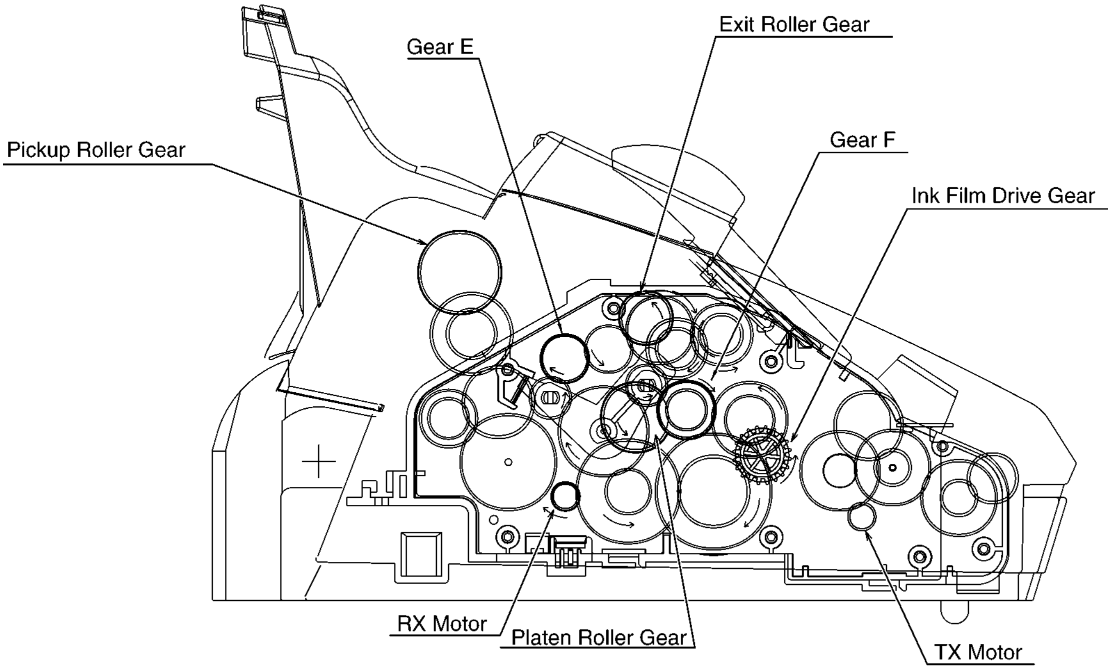
The RX MOTOR rotate CCW and swing Gear B engages Gear C, and conveys its power to the Pickup Roller Gear.
The Swing Gear B engages Gear D, and conveys its power to the Exit Roller Gear.


Exit Roller Gear
Gear D
Pickup Roller Gear
Gear C
RX Motor
Swing gear B

15.2.1.3. Print Mode

The RX MOTOR rotate CW and Swing Gear B engages Gear F, and conveyers its power to Platen Roller Gear and Ink Film Driver Gear.

The Swing Gear B engages Gear E, and conveys its power to the Exit Roller Gear.


Gear E
Exit Roller Gear
Pickup Roller Gear
Gear F
Ink Film Drive Gear
RX Motor
Platen Roller Gear
TX Motor

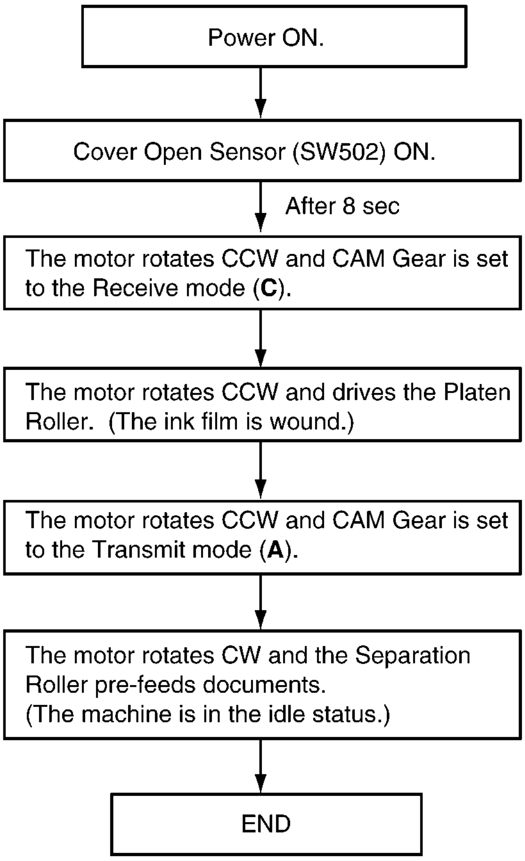
15.2.1.4. Copy Mode

RX side: Paper Pickup mode →Print mode → Paper Exit mode.

TX side: Transmit mode.

15.2.2. Mechanical Movements in the Main Operations (transmitting documents, receiving faxes and copying)

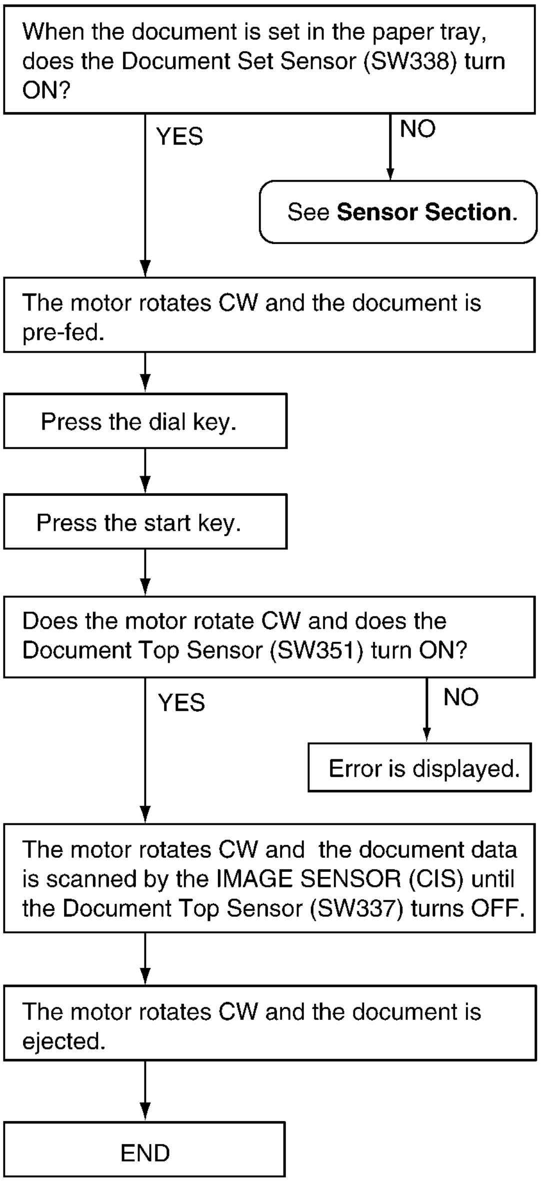
15.2.2.1. Idle Status


Power ON.
Cover Open Sensor (SW502) ON.
After 8 sec
The motor rotates CCW and CAM Gear is set to the Receive mode (C).
The motor rotates CCW and drives the Platen Roller. (The ink film is wound.)
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
The motor rotates CW and the Separation Roller pre-feeds documents. (The machine is in the idle status.)
END

Note:

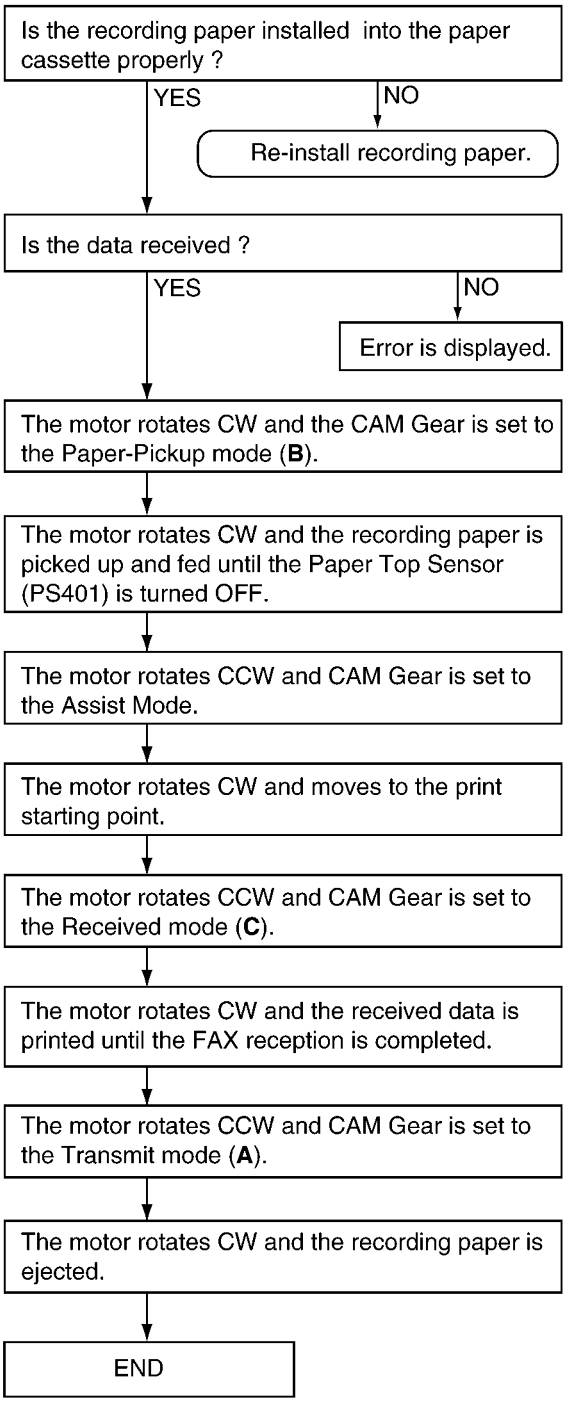
- See “**Sensor Locations**” in **Sensors and Switches** (P.33).
- CW......clockwise
- CCW....counterclockwise

15.2.2.2. Transmitting Documents


When the document is set in the paper tray, does the Document Set Sensor (SW338) turn ON?
YES
NO
See **Sensor Section**.
The motor rotates CW and the document is pre-fed.
Press the dial key.
Press the start key.
Does the motor rotate CW and does the Document Top Sensor (SW351) turn ON?
YES
NO
Error is displayed.
The motor rotates CW and the document data is scanned by the IMAGE SENSOR (CIS) until the Document Top Sensor (SW337) turns OFF.
The motor rotates CW and the document is ejected.
END

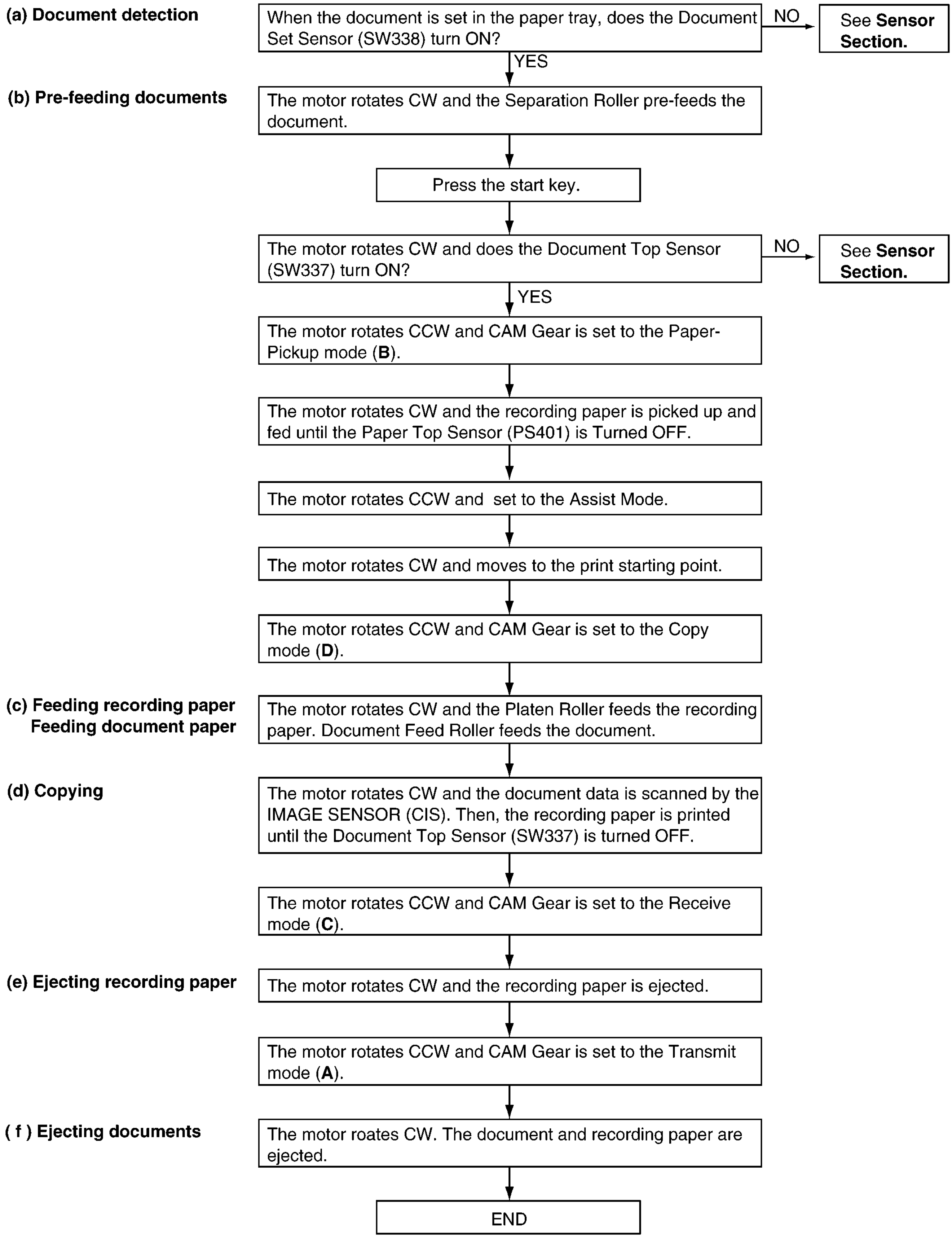
REFERENCE:
Sensor Section (P.133).

15.2.2.3. Receiving Fax


Is the recording paper installed into the paper cassette properly ?
YES
NO
Re-install recording paper.
Is the data received ?
YES
NO
Error is displayed.
The motor rotates CW and the CAM Gear is set to the Paper-Pickup mode (**B**).
The motor rotates CW and the recording paper is picked up and fed until the Paper Top Sensor (PS401) is turned OFF.
The motor rotates CCW and CAM Gear is set to the Assist Mode.
The motor rotates CW and moves to the print starting point.
The motor rotates CCW and CAM Gear is set to the Received mode (**C**).
The motor rotates CW and the received data is printed until the FAX reception is completed.
The motor rotates CCW and CAM Gear is set to the Transmit mode (**A**).
The motor rotates CW and the recording paper is ejected.
END

Note:
See "**Sensor Locations**" in **Sensors and Switches** (P.33).

15.2.2.4. Copying


(a) Document detection
When the document is set in the paper tray, does the Document Set Sensor (SW338) turn ON?
NO
See Sensor Section.
YES
(b) Pre-feeding documents
The motor rotates CW and the Separation Roller pre-feeds the document.
Press the start key.
The motor rotates CW and does the Document Top Sensor (SW337) turn ON?
NO
See Sensor Section.
YES
The motor rotates CCW and CAM Gear is set to the Paper-Pickup mode (B).
The motor rotates CW and the recording paper is picked up and fed until the Paper Top Sensor (PS401) is Turned OFF.
The motor rotates CCW and set to the Assist Mode.
The motor rotates CW and moves to the print starting point.
The motor rotates CCW and CAM Gear is set to the Copy mode (D).
(c) Feeding recording paper Feeding document paper
The motor rotates CW and the Platen Roller feeds the recording paper. Document Feed Roller feeds the document.
(d) Copying
The motor rotates CW and the document data is scanned by the IMAGE SENSOR (CIS). Then, the recording paper is printed until the Document Top Sensor (SW337) is turned OFF.
The motor rotates CCW and CAM Gear is set to the Receive mode (C).
(e) Ejecting recording paper
The motor rotates CW and the recording paper is ejected.
The motor rotates CCW and CAM Gear is set to the Transmit mode (A).
(f) Ejecting documents
The motor roates CW. The document and recording paper are ejected.
END

Note:

See “**Sensor Locations**” in **Sensors and Switches** (P.33).

REFERENCE:

Sensor Section (P.133)

15.3. Jams

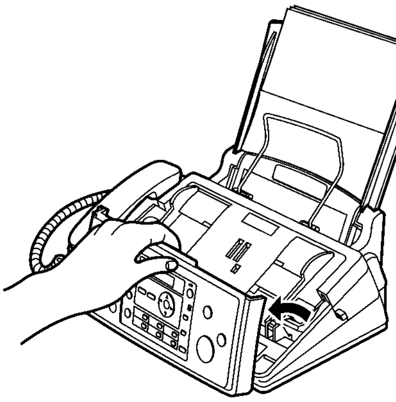
15.3.1. Recording Paper Jams

15.3.1.1. When the recording paper has jammed in the unit

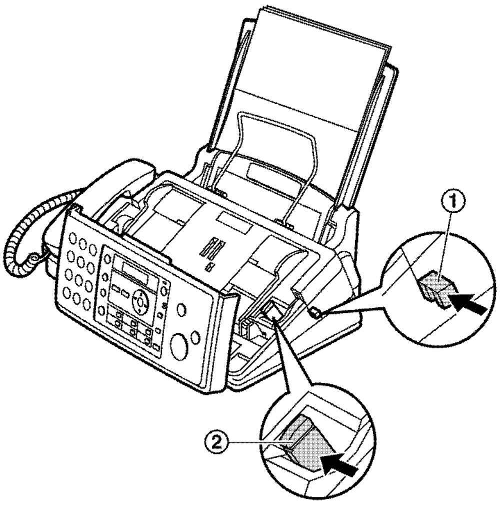
The display will show the following.

```
PAPER JAMMED
```

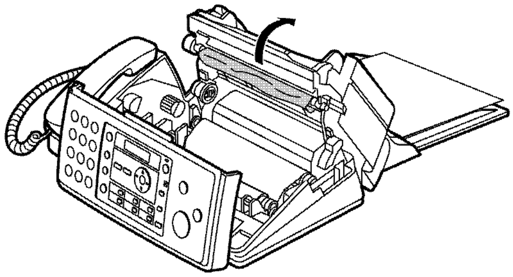
1. Open the front cover by pulling up the centre part.



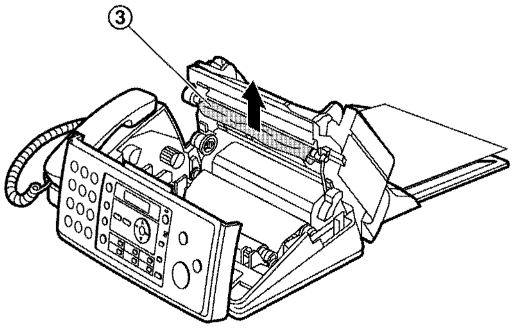
2. Release the back cover by pushing the green button (①).
   - You can also release the back cover by pushing in the green lever (②).



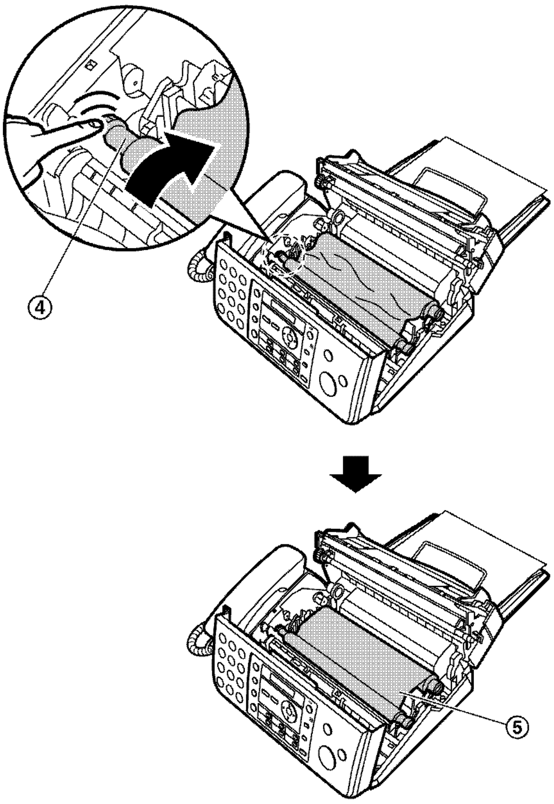
3. Open the back cover.



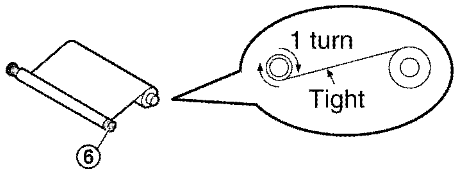
4. Remove the jammed recording paper (③).



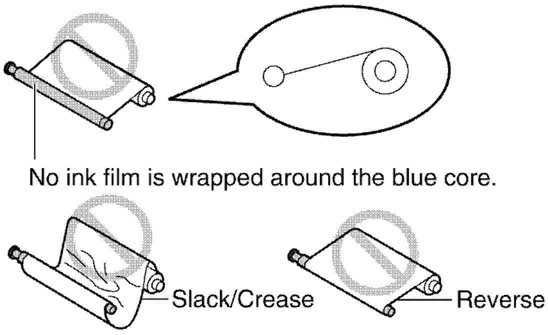
5. Turn the blue gear (④) in the direction of the arrow until the ink film is tight (⑤) and at least one layer of ink film is wrapped around the blue core (⑥).



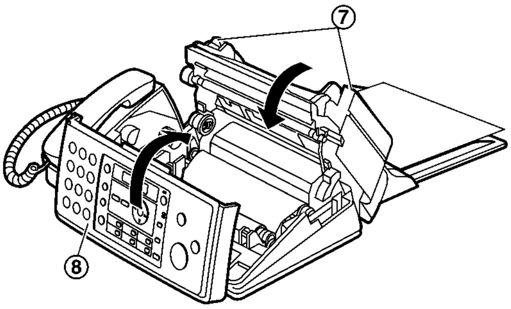
Correct


1 turn
Tight
⑥

Incorrect


No ink film is wrapped around the blue core.
Slack/Crease
Reverse

6. Close the back cover securely by pushing down on the dotted area at both ends (⑦), then close the front cover securely (⑧).

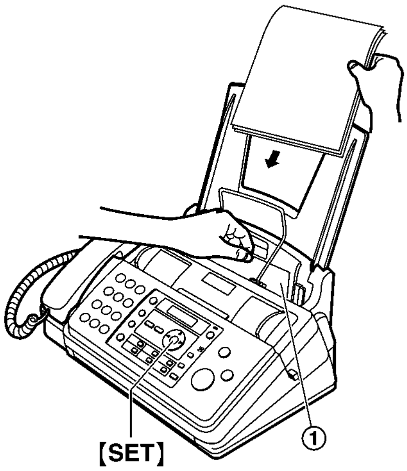


15.3.1.2. When the recording paper was not fed into the unit properly

The display will show the following.

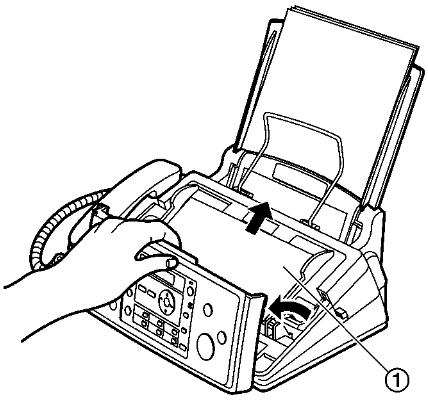
```
CHECK PAPER
```

Remove the recording paper and straighten. Pull the tension plate (①) forward and hold open while inserting paper, then press **[SET]** to clear the message.



15.3.2. Document Jams

1. Open the front cover by pulling up the centre part. Remove the jammed document carefully (①).



2. Close the front cover securely.

Note:

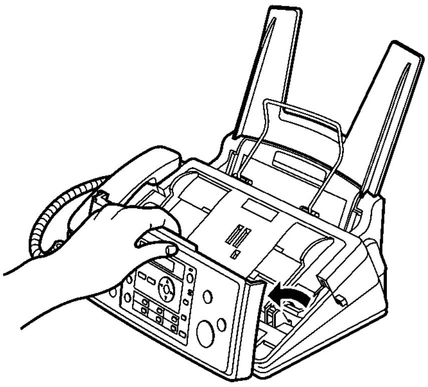
- Do not pull out the jammed paper forcibly before opening the front cover.

15.4. Cleaning

15.4.1. Document feeder/scanner glass cleaning

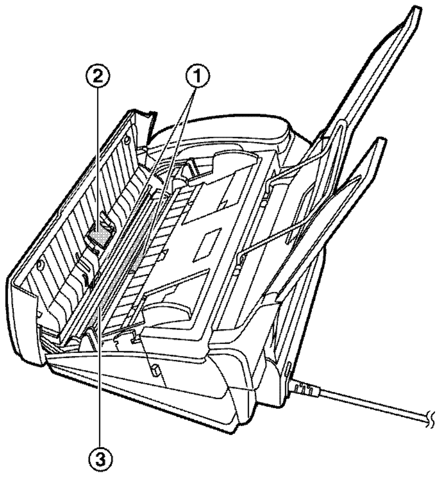
Clean the document feeder/scanner glass when:
— Documents frequently misfeed.
— Smudges or black/white lines appear on the original document when sending or copying.

1. Disconnect the power cord and the telephone line cord.
2. Open the front cover by pulling up the centre part.

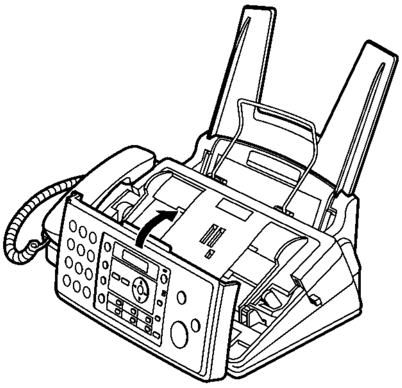


3. Clean the document feeder rollers (①) and rubber flap (②) with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly. Clean the scanner glass (③) with a soft, dry cloth.

   Caution:
   - **Do not use paper products, such as paper towels or tissues.**



4. Close the front cover securely.



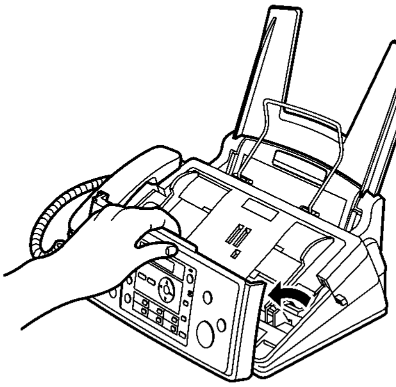
5. Insert the recording paper gently.
6. Connect the power cord and the telephone line cord.

15.4.2. Thermal Head Cleaning

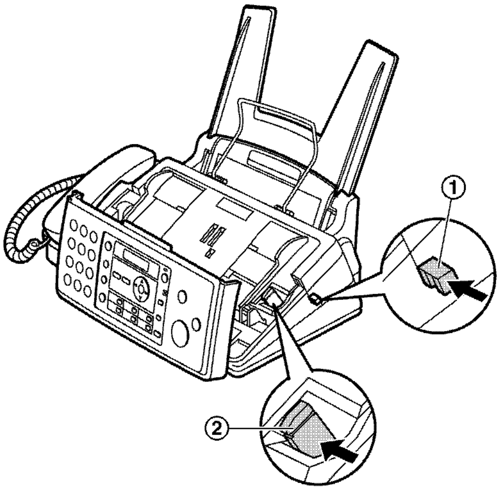
If smudges or black/white lines appear on a copied/received document, check whether there is dust on the thermal head. Clean the thermal head to remove the dust.

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

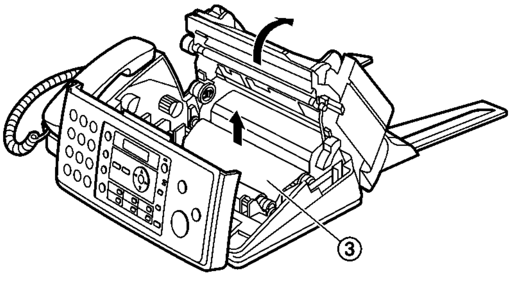
2. Open the front cover by pulling up the centre part.



3. Release the back cover by pushing the green button (①).
   - You can also release the back cover by pushing in the green lever (②).

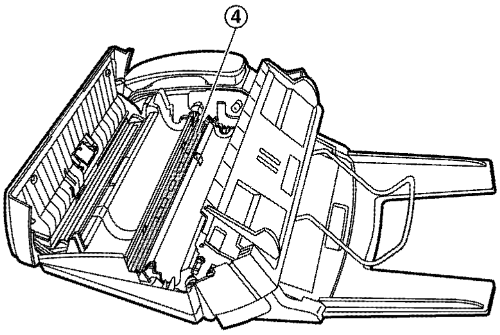


4. Open the back cover. Remove the ink film (③).



5. Clean the thermal head (④) with a cloth moistened with isopropyl rubbing alcohol, and let it 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.



6. Re-install the ink film and close the covers.
   (See step 4 to 7 on **Installing the Ink Film** (P.57).)

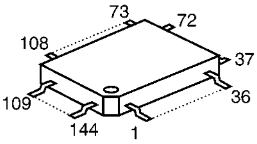
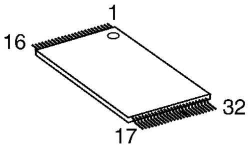
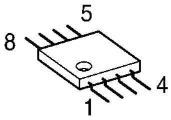
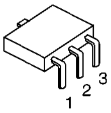
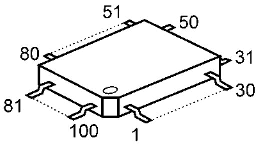
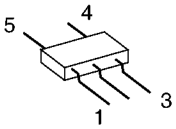
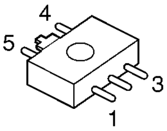
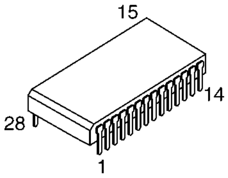
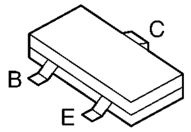
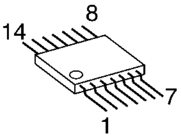
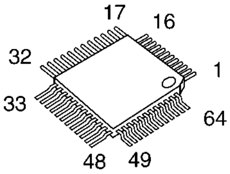
7. Insert the recording paper gently.

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

16 Miscellaneous

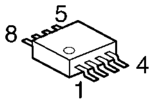
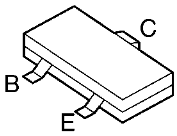
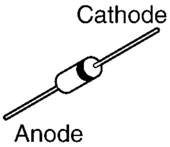
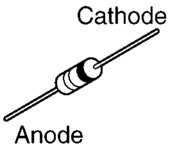
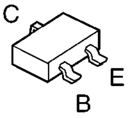
16.1. Terminal Guide of the ICs Transistors and Diodes

16.1.1. Digital Board

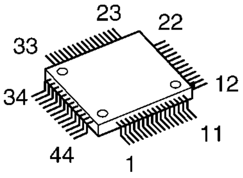
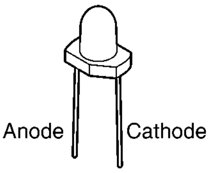
 73 72 108 37 109 36 144 1 C1ZBZ0003300	 PNWIFP365CX PNWIFM388CX C3FBKC000135	 C0ABEB000023 C1AB00002556	 C0CBADD00009	 51 50 80 31 30 81 100 1 C1CB00002325
 C0JBAA000393 C0JBAE000333	 C0CBCBD00047	 C3ABKY000001	 B1GBCFGG0028, B1ABDF000026, 2SB1218ARL B1GBCFJJ0048, B1ABDF000025, UNR521700L UN5213[*1], UN5113[*1]	
 C0JBAS000128	 17 16 32 1 33 64 48 49 C2BBFE000153[*1]			

[*1] KX-FM388 only

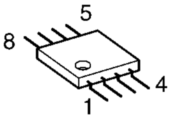
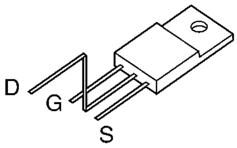
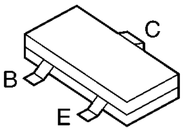
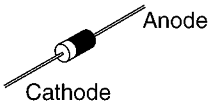
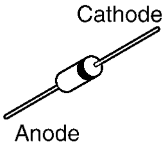
16.1.2. Analog Board

 C0ABEB000083	 B1ABDF000026 B1GBCFEN0010	 Cathode Anode 1SS133	 Cathode Anode MA4120, MA4030	 B0ADEJ000026

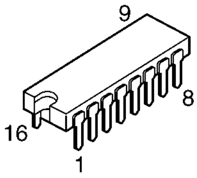
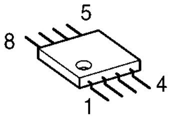
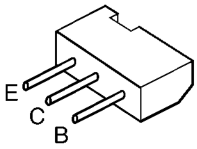
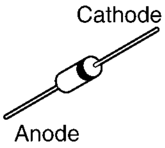
16.1.3. Operation Board

 23 22 33 12 34 11 44 1 C1ZBZ0003876	 Anode Cathode B3AAA0000534			

16.1.4. Power Supply Board

 PFVIFA5518N	 FQPF4N90C	 2SC3928	 Anode Cathode PFVD1N4005 PFVDD1NL20U SF50DG	 Cathode Anode MA165

16.1.5. Interface Board

 B1HAGFF00015	 B1CHRD000003	 2SB1322	 Cathode Anode 1SS133 B0BA7R900004	

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.

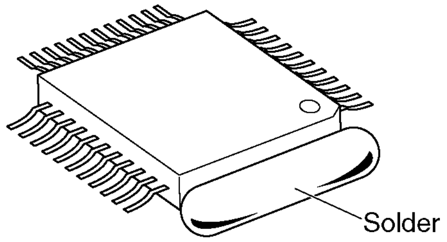
16.2.1. Preparation

- 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)

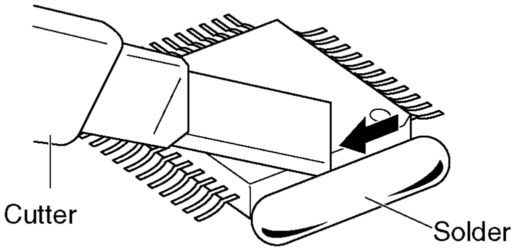
Note: See **About Lead Free Solder (PbF: Pb free)** (P.8).

16.2.2. Flat Package IC Removal Procedure

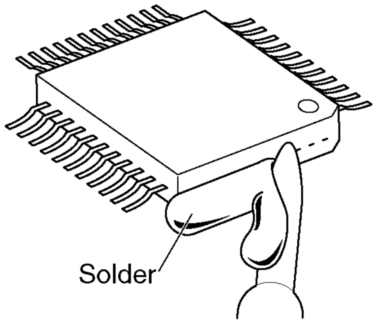
1. Put plenty of solder on the IC pins so that the pins can be completely covered.
   Note:
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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



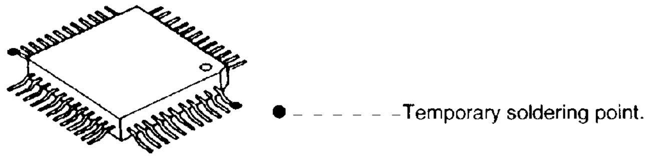
3. While the solder melts, remove it together with the IC pins.



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.

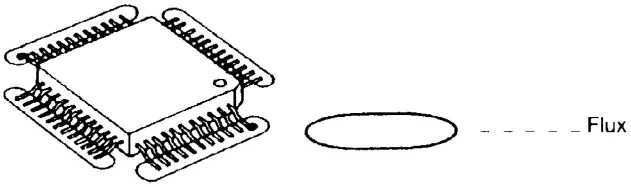
16.2.3. Flat Package IC Installation Procedure

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

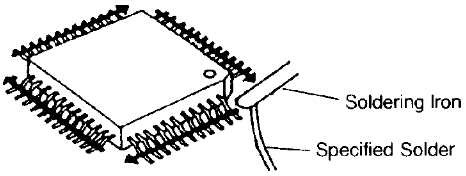


- Check the accuracy of the IC setting with the corresponding soldering foil.

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

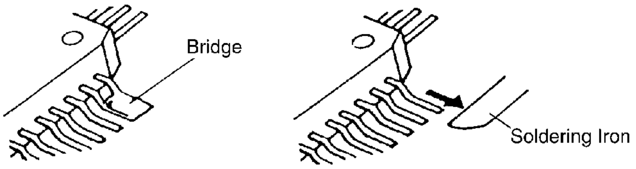


3. Solder the pins, sliding the soldering iron in the direction of the arrow.



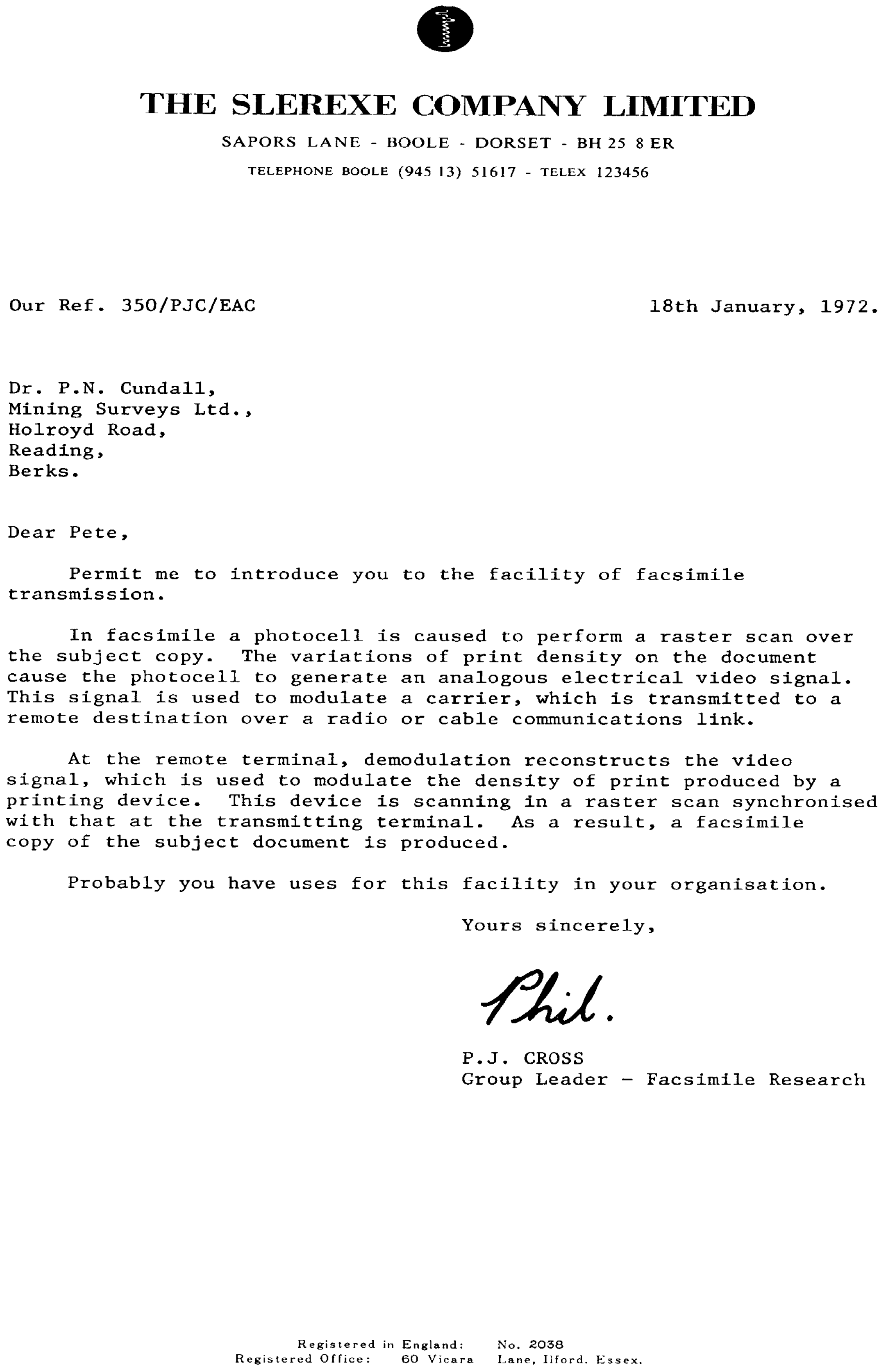
16.2.4. Bridge Modification Procedure

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.

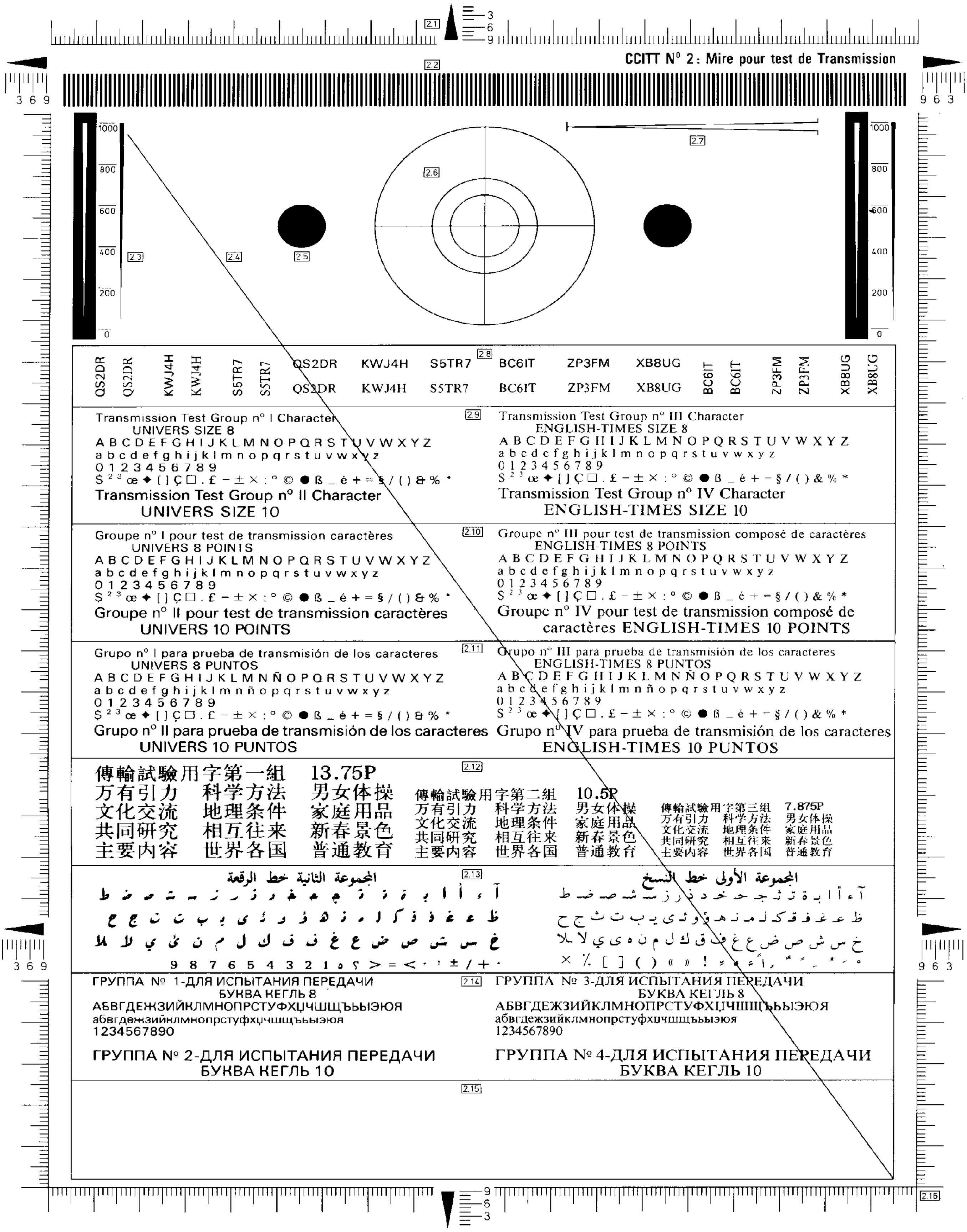
Yours sincerely,

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



Transmission Test Group n° I Character
UNIVERS SIZE 8
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
§ ^{2} ^{3} œ ✦ [ ] Ç □ . £ − ± × : ° © ● ß _ é + = § / ( ) & % *
Transmission Test Group n° II Character
UNIVERS SIZE 10

Transmission Test Group n° III Character
ENGLISH-TIMES SIZE 8
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
§ ^{2} ^{3} œ ✦ [ ] Ç □ . £ − ± × : ° © ● ß _ é + = § / ( ) & % *
Transmission Test Group n° IV Character
ENGLISH-TIMES SIZE 10

Groupe n° I pour test de transmission caractères
UNIVERS 8 POINTS
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
§ ^{2} ^{3} œ ✦ [ ] Ç □ . £ − ± × : ° © ● ß _ é + = § / ( ) & % *
Groupe n° II pour test de transmission caractères
UNIVERS 10 POINTS

Groupe n° III pour test de transmission composé de caractères
ENGLISH-TIMES 8 POINTS
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
§ ^{2} ^{3} œ ✦ [ ] Ç □ . £ − ± × : ° © ● ß _ é + = § / ( ) & % *
Groupe n° IV pour test de transmission composé de caractères ENGLISH-TIMES 10 POINTS

Grupo n° I para prueba de transmisión de los caracteres
UNIVERS 8 PUNTOS
A B C D E F G H I J K L M N Ñ O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n ñ o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
§ ^{2} ^{3} œ ✦ [ ] Ç □ . £ − ± × : ° © ● ß _ é + = § / ( ) & % *
Grupo n° II para prueba de transmisión de los caracteres
UNIVERS 10 PUNTOS

Grupo n° III para prueba de transmisión de los caracteres
ENGLISH-TIMES 8 PUNTOS
A B C D E F G H I J K L M N Ñ O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n ñ o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9
§ ^{2} ^{3} œ ✦ [ ] Ç □ . £ − ± × : ° © ● ß _ é + = § / ( ) & % *
Grupo n° IV para prueba de transmisión de los caracteres
ENGLISH-TIMES 10 PUNTOS

傳輸試驗用字第一組 13.75P
万有引力 科学方法 男女体操
文化交流 地理条件 家庭用品
共同研究 相互往来 新春景色
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共同研究 相互往来 新春景色
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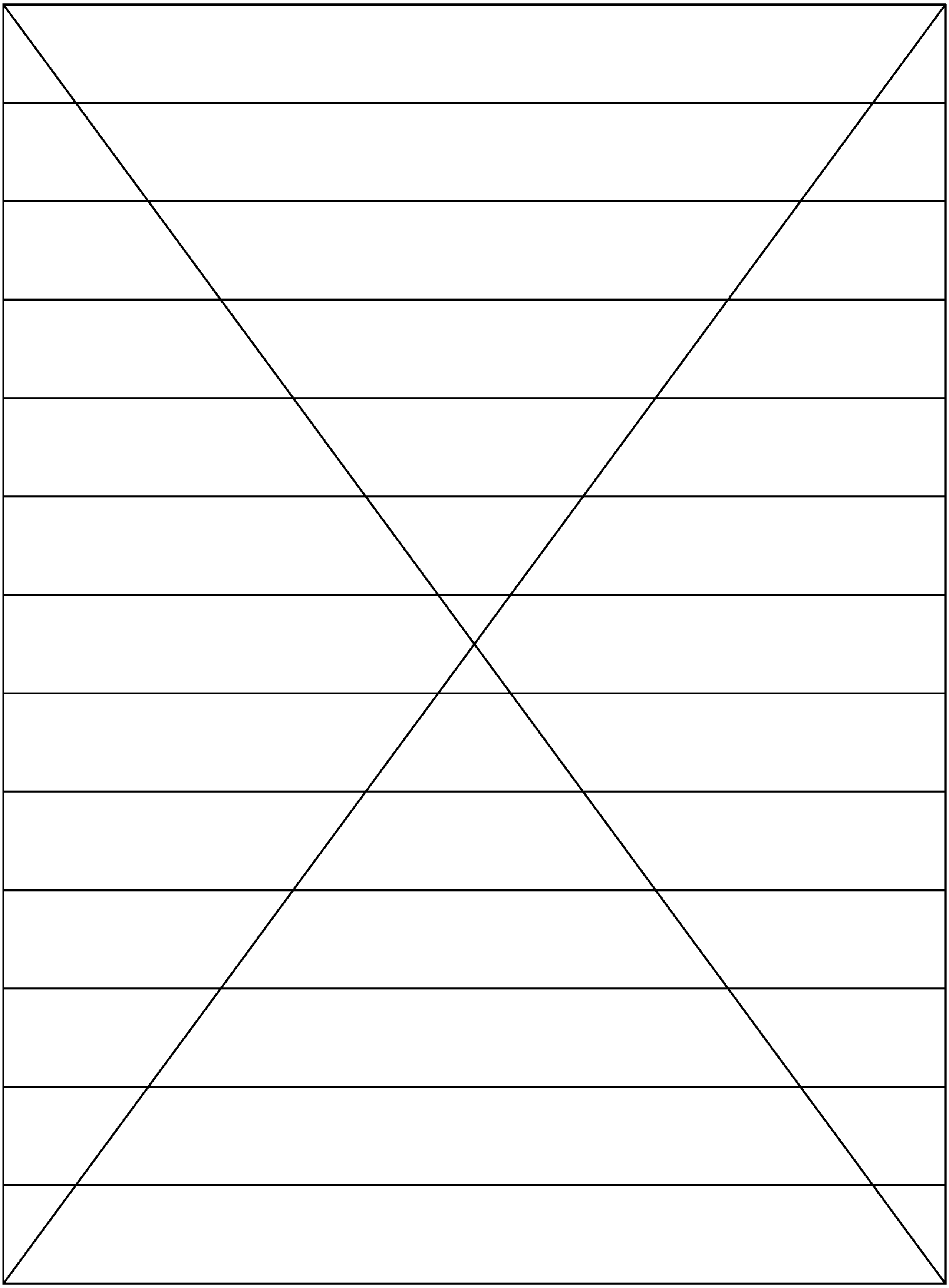
المجموعة الثانية خط الرقعة

المجموعة الأولى خط النسخ

ГРУППА № 1-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 8
АБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЬЫЭЮЯ
абвгдежзийклмнопрстуфхцчшщъьыэюя
1234567890
ГРУППА № 2-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 10

ГРУППА № 3-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 8
АБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЬЫЭЮЯ
абвгдежзийклмнопрстуфхцчшщъьыэюя
1234567890
ГРУППА № 4-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ
БУКВА КЕГЛЬ 10

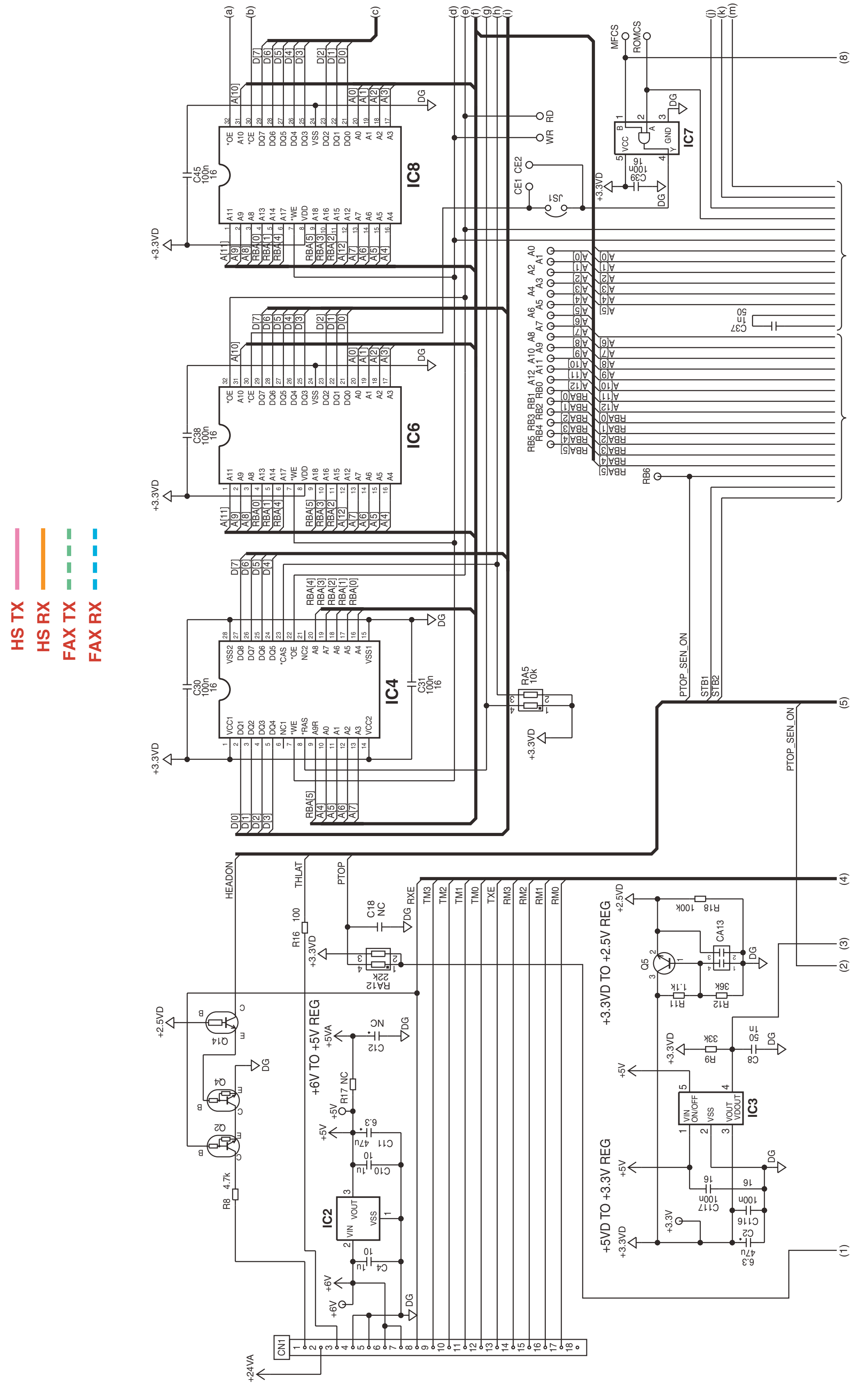
16.3.3. Test Chart



Memo

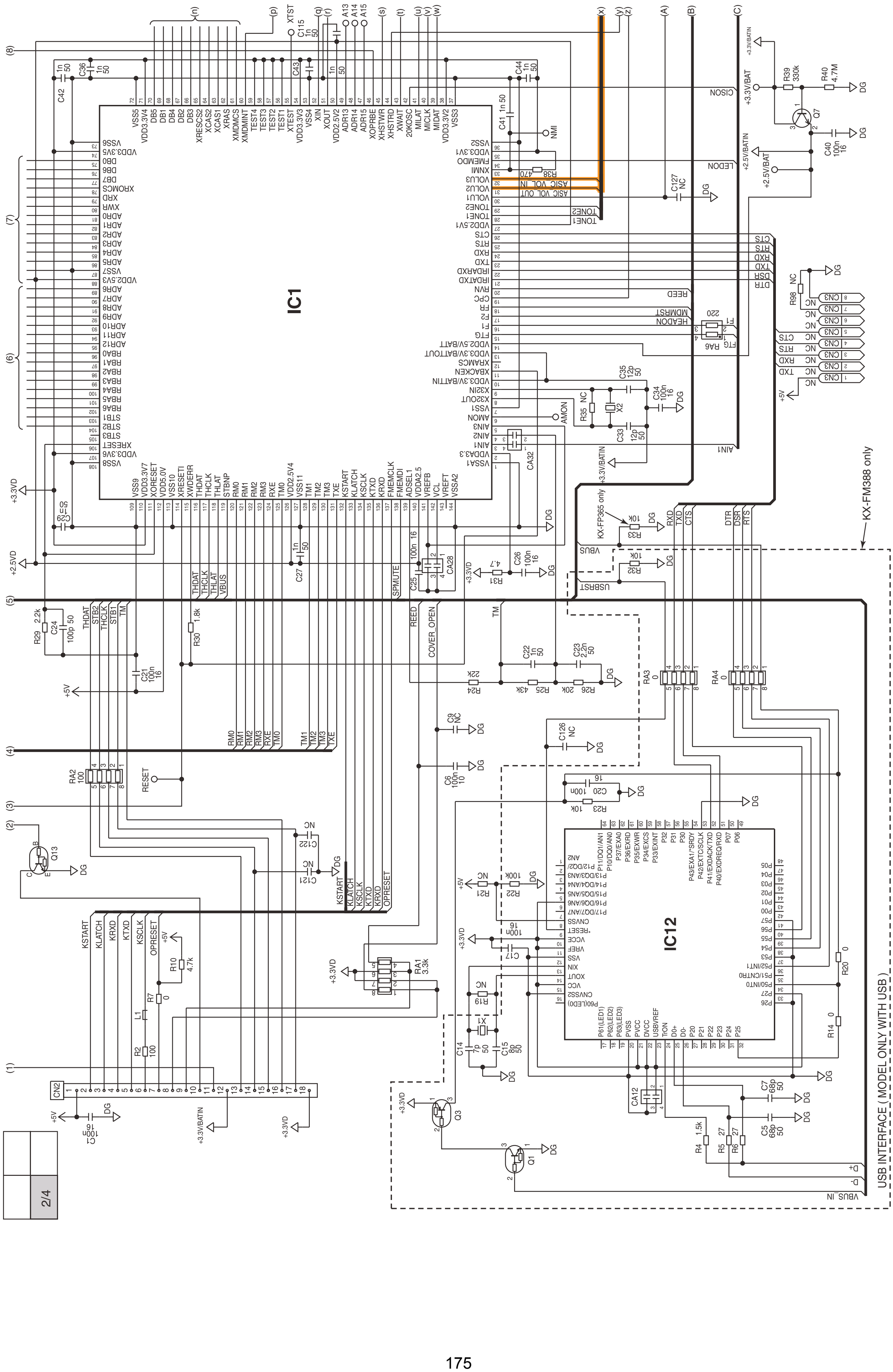
17 Schematic Diagram

17.1. Digital Board (PCB1)


HS TX
HS RX
FAX TX
FAX RX
IC8
IC6
IC4
IC7
IC2
IC3
+6V TO +5V REG
+5VD TO +3.3V REG
+3.3VD TO +2.5V REG
CN1
+24VA
+3.3VD
+2.5VD
+5V
+6V
+5VA
DG
HEADON
THLAT
PTOP
PTOP_SEN_ON
STB1
STB2
MFCS
ROMCS
WR
RD
CE1
CE2
JS1
RA5 10k
RA12 22K
R16 100
R8 4.7k
R17 NC
R18 100K
R11 1.1K
R12 36K
R9 33K
Q2
Q4
Q5
Q14
C45 100n 16
C38 100n 16
C30 100n 16
C31 100n 16
C39 100n 16
C37 50 1n
C18 NC
C12 NC
C11 47u 6.3
C10 1u 10
C4 1u 10
C117 100n 16
C116 100n 16
C2 47u 6.3
C8 1n 50
CA13
RXE
TM3
TM2
TM1
TM0
TXE
RM3
RM2
RM1
RM0
(a)
(b)
(c)
(d)
(e)
(f)
(g)
(h)
(i)
(j)
(k)
(m)
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)

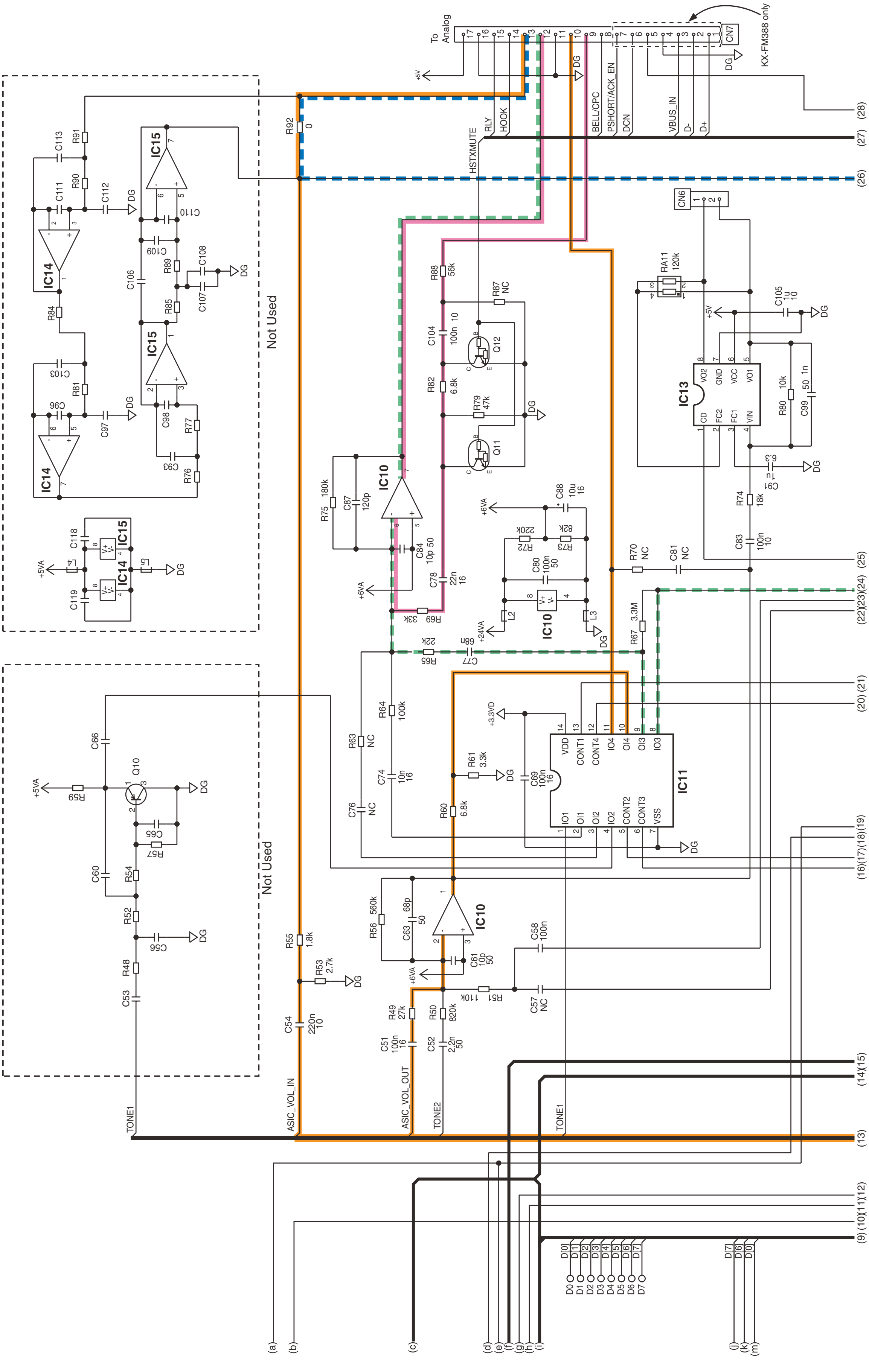
KX-FP365CX / KX-FM388CX : DIGITAL BOARD (1/4)

1/4

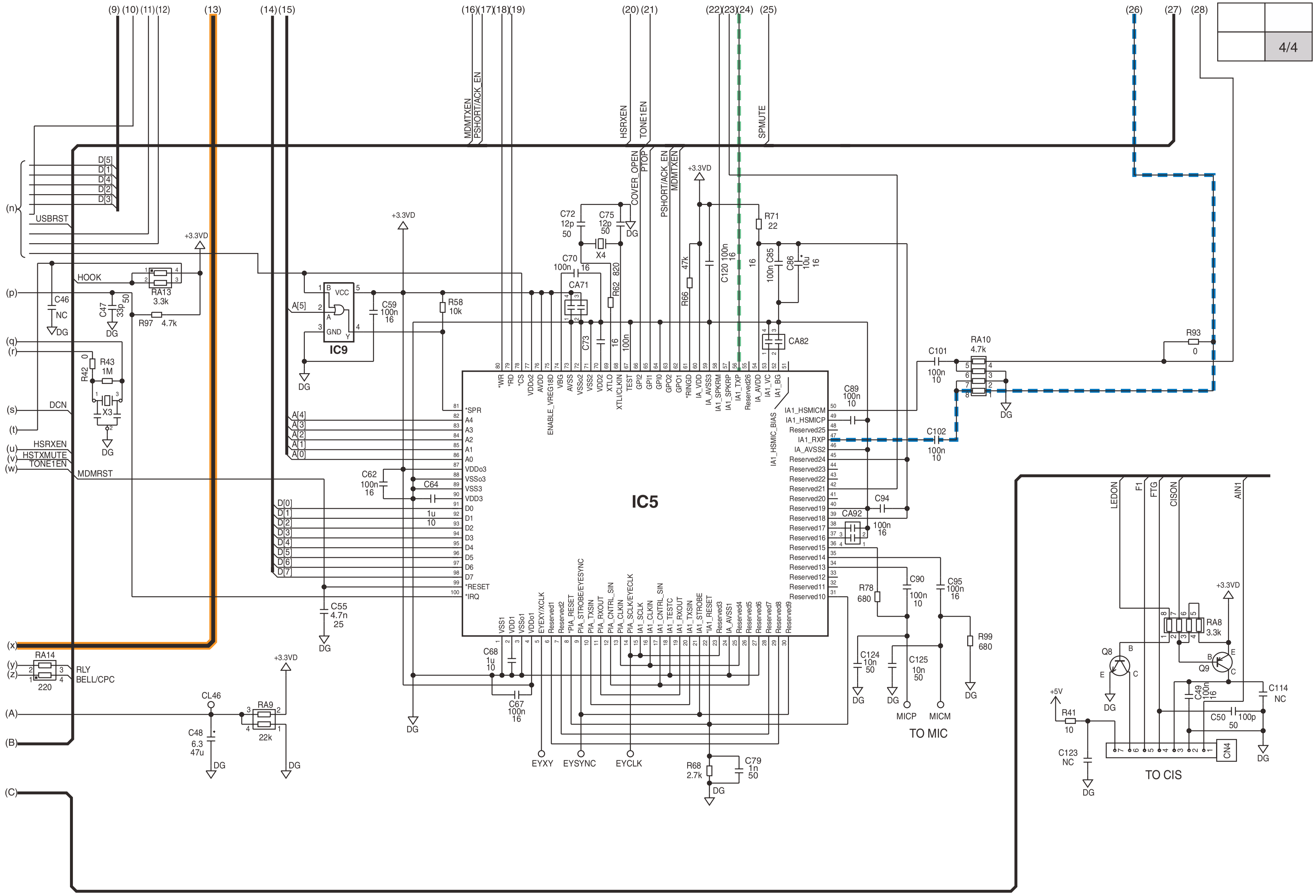

IC1
IC12
USB INTERFACE (MODEL ONLY WITH USB)
KX-FM388 only
KX-FP365 only
2/4
CN2
CN3
RA1 3.3k
RA2 100
RA3 0
RA4 0
RA6 220
Q1
Q3
Q7
Q13
X1
X2
CA12
CA28
CA32
ASIC VOL IN
ASIC VOL OUT
TONE1
TONE2
+3.3VD
+2.5VD
+5V
+3.3V/BATIN
+3.3V/BAT
+2.5V/BATIN
+2.5V/BAT
DG
VBUS
VBUS_IN
USBRST
D+
D-
RESET
NMI
AMON
AIN1
CISON
LEDON
REED
MDMRST
HEADON
FTG
CTS
RTS
RXD
TXD
DSR
DTR
KSTART
KLATCH
KRXD
KTXD
KSCLK
OPRESET
THDAT
THCLK
THLAT
STB1
STB2
TM
RM0
RM1
RM2
RM3
RXE
TM0
TM1
TM2
TM3
TXE
SPMUTE
COVER_OPEN
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(n)
(p)
(q)
(r)
(s)
(t)
(u)
(v)
(w)
(x)
(y)
(z)
(A)
(B)
(C)
XTST
A13
A14
A15

KX-FP365CX / KX-FM388CX : DIGITAL BOARD (2/4)

3/4

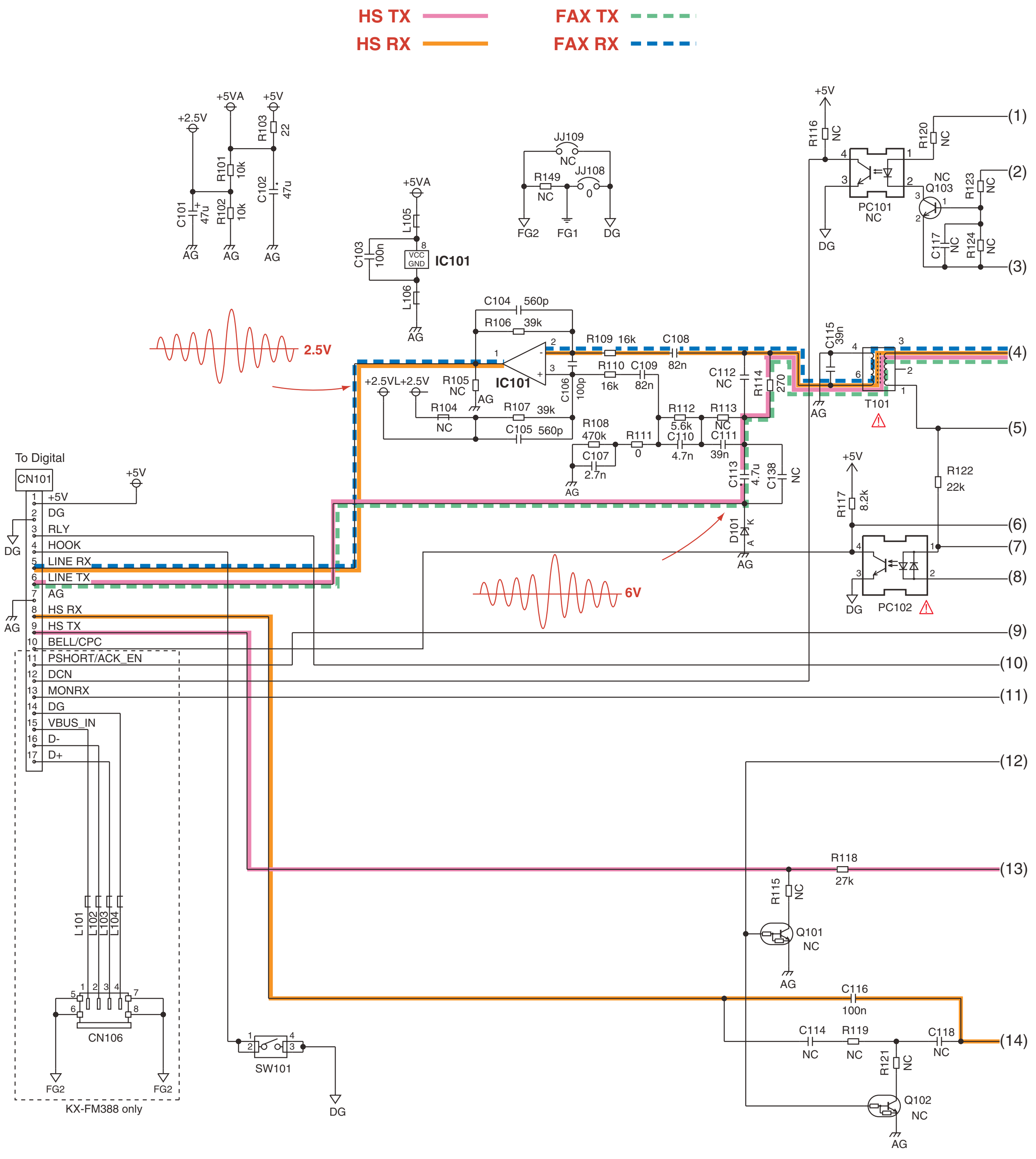

To Analog
CN7
KX-FM388 only
+5V
DG
RLY
HOOK
HSTXMUTE
BELL/CPC
PSHORT/ACK_EN
DCN
VBUS_IN
D-
D+
CN6
RA11 120k
C105 1u 10
IC13
CD FC2 FC1 VIN
VO2 GND VCC VO1
R80 10k
C99 50 1n
C91 1u 6.3
R74 18k
C83 100n 10
R70 NC
C81 NC
R67 3.3M
R92 0
IC15
IC14
C113 R91 R90 C111 C112
C110 C109 C108 C107 C106
R89 R85 R84
C103 R81 C96 C97 C98
R77 R76 C93
C118 C119
+5VA
Not Used
R88 56k
R87 NC
C104 100n 10
Q12
R82 6.8k
R79 47k
Q11
IC10
R75 180k
C87 120p
C84 10p 50
C78 22n 16
R69 33K
+6VA
R72 220k
R73 82k
C88 10u 16
C80 100n 50
L2 L3
+24VA
R65 22k
C77 68n
R64 100k
R63 NC
C76 NC
C74 10n 16
+3.3VD
R61 3.3k
C69 100n 16
R60 6.8k
IC11
VDD CONT1 CONT4 IO4 OI4 OI3 IO3
IO1 OI1 OI2 IO2 CONT2 CONT3 VSS
C66 Q10 R59 C65 R57 C60 R54 R52 C56 R48 C53
R56 560k
C63 68p 50
C61 10p 50
C58 100n
R55 1.8k
R53 2.7k
R51 110k
C57 NC
C54 220n 10
R49 27k
R50 820k
C51 100n 16
C52 2.2n 50
TONE1
ASIC_VOL_IN
ASIC_VOL_OUT
TONE2
(28) (27) (26) (25) (24) (23) (22) (21) (20) (19) (18) (17) (16) (15) (14) (13) (12) (11) (10) (9)
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (m)
D0 D1 D2 D3 D4 D5 D6 D7
D[0] D[1] D[2] D[3] D[4] D[5] D[6] D[7]
D[7] D[6] D[0]

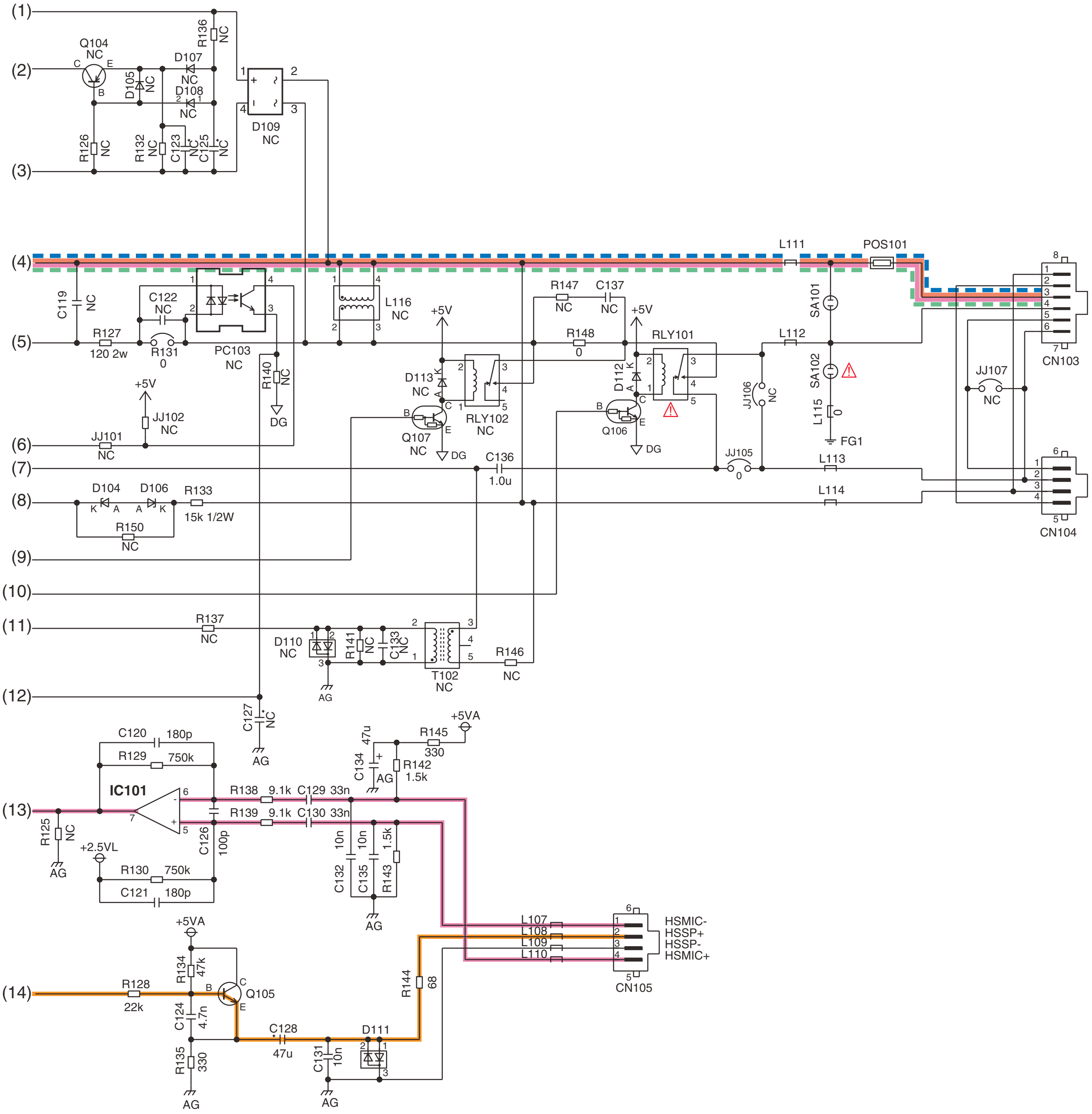
KX-FP365CX / KX-FM388CX : DIGITAL BOARD (3/4)


4/4
(9) (10) (11) (12)
(13)
(14) (15)
(16)(17)(18)(19)
(20) (21)
(22)(23)(24)
(25)
(26)
(27)
(28)
(n)
(p)
(q)
(r)
(s)
(t)
(u)
(v)
(w)
(x)
(y)
(z)
(A)
(B)
(C)
MDMTXEN
PSHORT/ACK_EN
HSRXEN
TONE1EN
SPMUTE
COVER_OPEN
PTOP
D[5]
D[1]
D[4]
D[2]
D[3]
USBRST
HOOK
DCN
HSRXEN
HSTXMUTE
TONE1EN
MDMRST
RLY
BELL/CPC
RA13
3.3k
R97
4.7k
C46
NC
C47
33p
50
R42
0
R43
1M
X3
RA14
220
CL46
C48
6.3
47u
RA9
22k
+3.3VD
DG
A[5]
A[4]
A[3]
A[2]
A[1]
A[0]
D[0]
D[1]
D[2]
D[3]
D[4]
D[5]
D[6]
D[7]
IC9
VCC
GND
C59
100n
16
R58
10k
C62
100n
16
C64
1u
10
C55
4.7n
25
C72
12p
50
C75
12p
50
X4
C70
100n
16
CA71
C73
R62
820
R66
47k
C120
100n
16
R71
22
C85
100n
C86
10u
16
CA82
IC5
*SPR
A4
A3
A2
A1
A0
VDDo3
VSSo3
VSS3
VDD3
D0
D1
D2
D3
D4
D5
D6
D7
*RESET
*IRQ
*WR
*RD
*CS
VDDo2
AVDD
ENABLE_VREG18D
VBG
AVSS
VSSo2
VSS2
VDD2
XTLO
XTLI/CLKIN
TEST
GPI2
GPI1
GPI0
GPO2
GPO1
*RINGD
IA_VDD
IA_AVSS3
IA1_SPKRM
IA1_SPKRP
IA1_TXP
Reserved26
IA_AVDD
IA1_VC
IA1_BG
IA1_HSMIC_BIAS
IA1_HSMICM
IA1_HSMICP
Reserved25
IA1_RXP
IA_AVSS2
Reserved24
Reserved23
Reserved22
Reserved21
Reserved20
Reserved19
Reserved18
Reserved17
Reserved16
Reserved15
Reserved14
Reserved13
Reserved12
Reserved11
Reserved10
VSS1
VDD1
VSSo1
VDDo1
EYEXY/XCLK
Reserved1
Reserved2
*PIA_RESET
PIA_STROBE/EYESYNC
PIA_TXSIN
PIA_RXOUT
PIA_CNTRL_SIN
PIA_CLKIN
PIA_SCLK/EYECLK
IA1_SCLK
IA1_CLKIN
IA1_CNTRL_SIN
IA1_TESTC
IA1_RXOUT
IA1_TXSIN
IA1_STROBE
*IA1_RESET
Reserved3
IA_AVSS1
Reserved4
Reserved5
Reserved6
Reserved7
Reserved8
Reserved9
C68
1u
10
C67
100n
16
EYXY
EYSYNC
EYCLK
R68
2.7k
C79
1n
50
C89
100n
10
C101
100n
10
C102
100n
10
RA10
4.7k
R93
0
C94
100n
16
CA92
R78
680
C90
100n
10
C95
100n
16
R99
680
C124
10n
50
C125
10n
50
MICP
MICM
TO MIC
LEDON
F1
FTG
CISON
AIN1
RA8
3.3k
Q8
Q9
B
C
E
+5V
R41
10
C123
NC
C49
100n
16
C50
100p
50
C114
NC
CN4
TO CIS

KX-FP365CX / KX-FM388CX : DIGITAL BOARD (4/4)

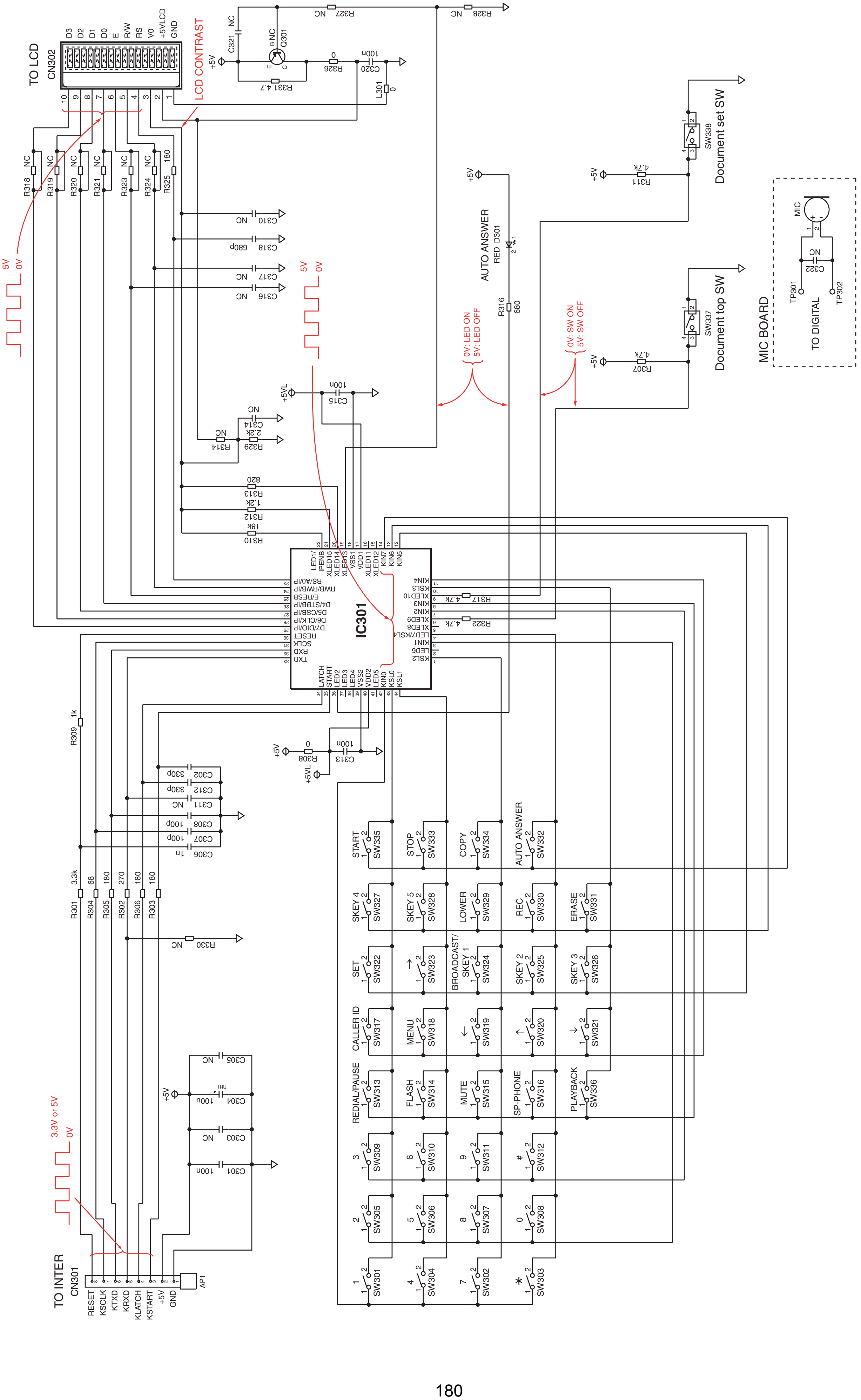
17.2. Analog Board (PCB2)


HS TX
HS RX
FAX TX
FAX RX
+2.5V
+5VA
+5V
R103 22
R101 10k
R102 10k
C101 47u
C102 47u
AG
L105
L106
C103 100n
VCC GND
IC101
JJ109 NC
JJ108 0
R149 NC
FG2
FG1
DG
C104 560p
R106 39k
R109 16k
C108 82n
R110 16k
C109 82n
C106 100p
C112 NC
R114 270
R105 NC
R104 NC
R107 39k
C105 560p
+2.5VL
+2.5V
R108 470k
C107 2.7n
R111 0
R112 5.6k
C110 4.7n
R113 NC
C111 39n
C113 4.7u
C138 NC
D101
K
A
2.5V
6V
C115 39n
T101
R116 NC
R120 NC
PC101 NC
Q103 NC
R123 NC
R124 NC
C117 NC
R117 8.2k
R122 22k
PC102
To Digital
CN101
1 +5V
2 DG
3 RLY
4 HOOK
5 LINE RX
6 LINE TX
7 AG
8 HS RX
9 HS TX
10 BELL/CPC
11 PSHORT/ACK_EN
12 DCN
13 MONRX
14 DG
15 VBUS_IN
16 D-
17 D+
L101
L102
L103
L104
CN106
KX-FM388 only
SW101
R118 27k
R115 NC
Q101 NC
C116 100n
C114 NC
R119 NC
C118 NC
R121 NC
Q102 NC
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)
(11)
(12)
(13)
(14)


(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)
(11)
(12)
(13)
(14)
Q104 NC
R136 NC
D107 NC
D105 NC
D108 NC
R126 NC
R132 NC
C123 NC
C125 NC
D109 NC
L111
POS101
C119 NC
C122 NC
R127 120 2w
R131 0
PC103 NC
L116 NC
R147 NC
C137 NC
+5V
R148 0
RLY101
L112
SA101
SA102
CN103
JJ107 NC
D113 NC
RLY102 NC
Q107 NC
D112
Q106
DG
JJ106 NC
L115 0
FG1
R140 NC
JJ102 NC
JJ101 NC
C136 1.0u
JJ105 0
L113
L114
CN104
D104
D106
R133 15k 1/2W
R150 NC
R137 NC
D110 NC
R141 NC
C133 NC
T102 NC
R146 NC
AG
C127 NC
+5VA
R145 330
C134 47u
R142 1.5k
C120 180p
R129 750k
IC101
R138 9.1k
C129 33n
R139 9.1k
C130 33n
R125 NC
+2.5VL
C126 100p
R130 750k
C121 180p
C132 10n
C135 10n
R143 1.5k
L107
L108
L109
L110
HSMIC-
HSSP+
HSSP-
HSMIC+
CN105
R134 47k
Q105
R128 22k
C124 4.7n
R144 68
R135 330
C128 47u
D111
C131 10n

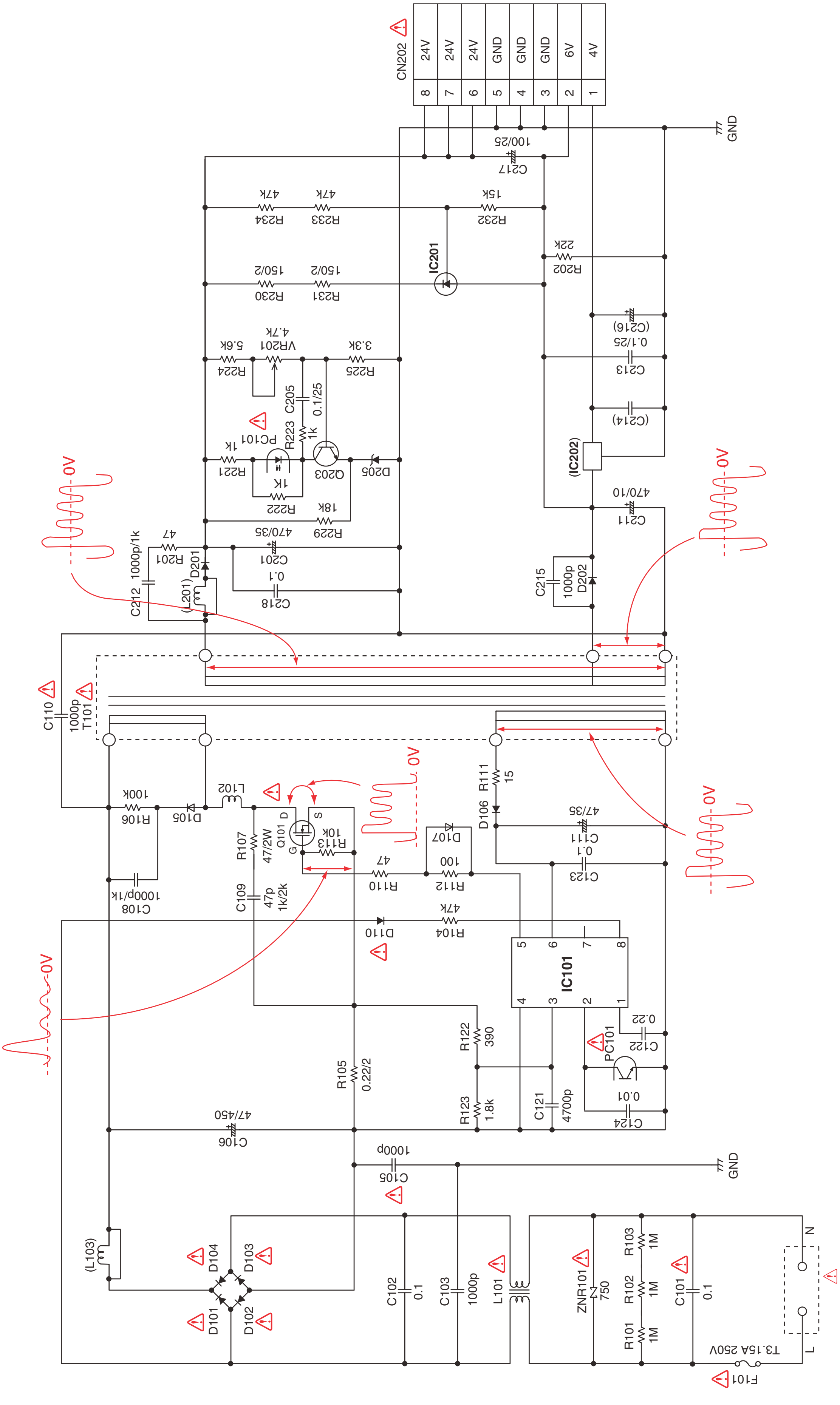
KX-FP365CX / KX-FM388CX : ANALOG BOARD

17.3. Operation Board (PCB3) / MIC Board (PCB7)


TO LCD
CN302
D3
D2
D1
D0
E
R/W
RS
V0
+5VLCD
GND
LCD CONTRAST
+5V
C321 NC
Q301
B NC
E
C
R331 4.7
R326 0
C320 100n
L301 0
R327 NC
R328 NC
R318 NC
R319 NC
R320 NC
R321 NC
R323 NC
R324 NC
R325 180
5V
0V
C310 NC
C318 680p
C317 NC
C316 NC
+5VL
C315 100n
C314 NC
R329 2.2K
R314 NC
R313 820
R312 1.2K
R310 18K
AUTO ANSWER
RED D301
R316 680
0V: LED ON
5V: LED OFF
0V: SW ON
5V: SW OFF
+5V
R311 4.7K
SW338
Document set SW
R307 4.7K
SW337
Document top SW
MIC BOARD
MIC
C322 NC
TP301
TP302
TO DIGITAL
IC301
LED1/
IPENB
XLED15
XLED14
XLED13
VSS1
VDD1
XLED11
XLED12
KIN7
KIN6
KIN5
RS/A0/IP
RWB/RWB/IP
E/RESB
D4/STBB/IP
D5/CSB/IP
D6/CLK/IP
D7/DIO/IP
RESET
SCLK
RXD
TXD
KIN4
KSL3
XLED10
KIN3
KIN2
XLED9
XLED8
LED7/KSL4
KIN1
LED6
KSL2
LATCH
START
LED2
LED3
LED4
VSS2
VDD2
LED5
KIN0
KSL0
KSL1
R317 4.7K
R322 4.7K
R309 1k
+5V
R308 0
C313 100n
+5VL
C302 330p
C312 330p
C311 NC
C308 100p
C307 100p
C306 1n
R301 3.3k
R304 68
R305 180
R302 270
R306 180
R303 180
R330 NC
C305 NC
C304 100u
C303 NC
C301 100n
3.3V or 5V
0V
TO INTER
CN301
RESET
KSCLK
KTXD
KRXD
KLATCH
KSTART
+5V
GND
AP1
START SW335
STOP SW333
COPY SW334
AUTO ANSWER SW332
SKEY 4 SW327
SKEY 5 SW328
LOWER SW329
REC SW330
ERASE SW331
SET SW322
→ SW323
BROADCAST/ SKEY 1 SW324
SKEY 2 SW325
SKEY 3 SW326
CALLER ID SW317
MENU SW318
← SW319
↑ SW320
↓ SW321
REDIAL/PAUSE SW313
FLASH SW314
MUTE SW315
SP-PHONE SW316
PLAYBACK SW336
3 SW309
6 SW310
9 SW311
# SW312
2 SW305
5 SW306
8 SW307
0 SW308
1 SW301
4 SW304
7 SW302
* SW303

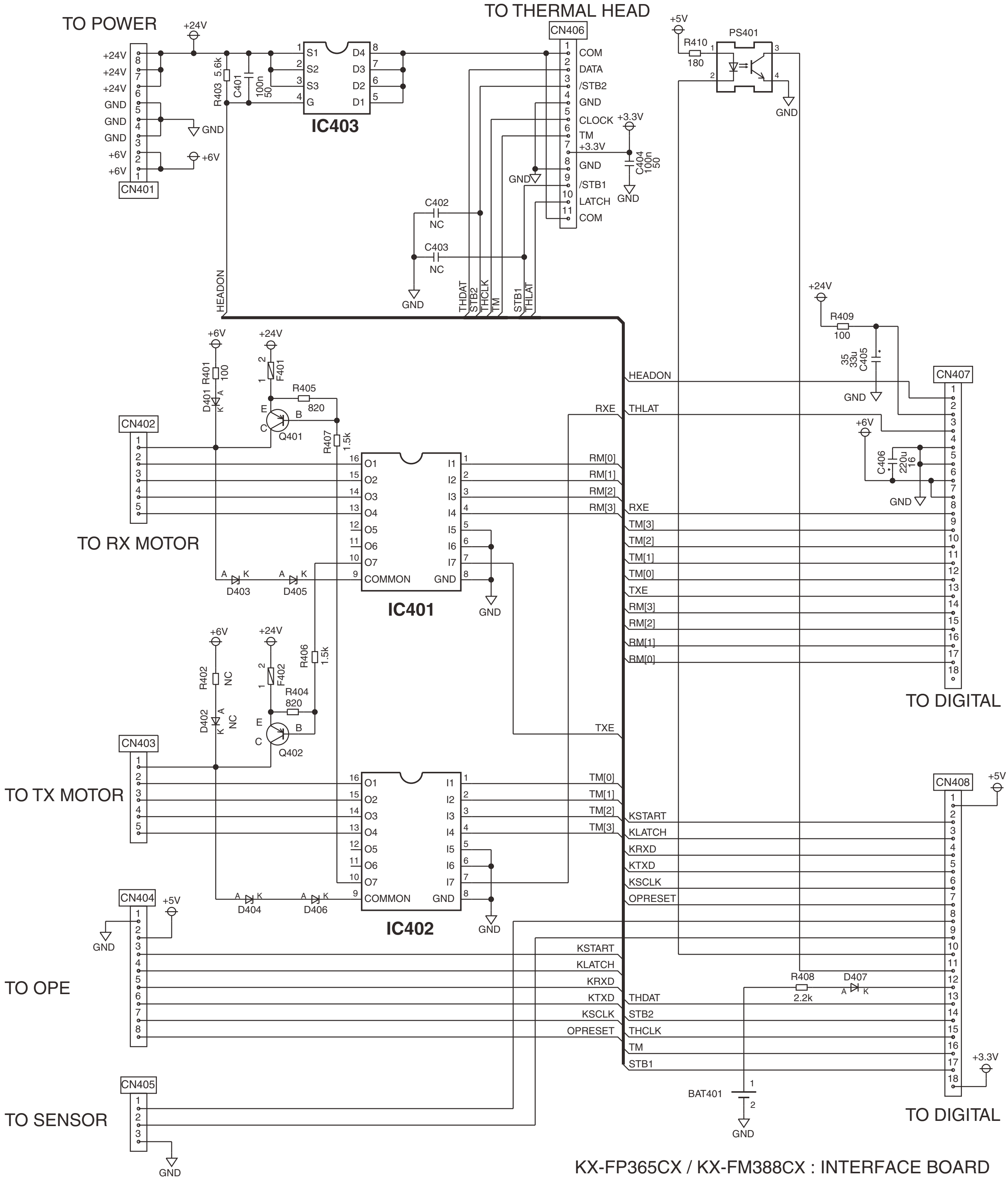
KX-FP365CX / KX-FM388CX : OPERATION BOARD & MIC BOARD

17.4. Power Supply Board (PCB4)


CN202
8 24V
7 24V
6 24V
5 GND
4 GND
3 GND
2 6V
1 4V
GND
C217 100/25
R234 47K
R233 47K
R232 15K
IC201
R202 22K
R230 150/2
R231 150/2
(C216)
C213 0.1/25
(C214)
R224 5.6K
VR201 4.7K
R225 3.3K
C205 0.1/25
R223 1k
PC101
R221 1K
R222 1K
Q203
D205
(IC202)
R229 18K
C211 470/10
C201 470/35
C218 0.1
R201 47
D201
(L201)
C212 1000p/1k
C215 1000p
D202
0V
C110 1000p
T101
R106 100K
D105
L102
R107 47/2W
Q101 D G S
R113 10K
D107
R111 15
D106
C111 47/35
C123 0.1
R110 47
R112 100
C108 1000p/1k
C109 47p 1k/2k
D110
R104 47K
IC101
5 6 7 8
4 3 2 1
C122 0.22
PC101
R122 390
R105 0.22/2
R123 1.8k
C121 4700p
C124 0.01
C106 47/450
C105 1000p
GND
(L103)
D104
D103
D101
D102
C102 0.1
C103 1000p
L101
ZNR101 750
R103 1M
R102 1M
R101 1M
C101 0.1
N
L
F101 T3.15A 250V

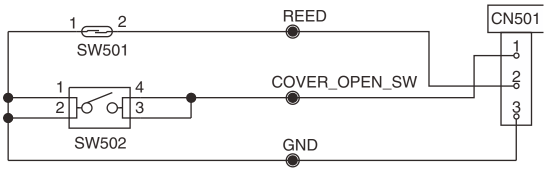
KX-FP365CX / KX-FM388CX : POWER SUPPLY BOARD

17.5. Interface Board (PCB5)


TO POWER
TO THERMAL HEAD
CN401
+24V
+24V
+24V
GND
GND
GND
+6V
+6V
+6V
GND
R403 5.6k
C401 100n 50
IC403
S1
S2
S3
G
D4
D3
D2
D1
CN406
COM
DATA
/STB2
GND
CLOCK
TM
+3.3V
GND
/STB1
LATCH
COM
+3.3V
C404 100n 50
GND
C402 NC
C403 NC
GND
HEADON
THDAT
STB2
THCLK
TM
STB1
THLAT
+5V
R410 180
PS401
GND
+24V
R409 100
C405 35 33u
GND
CN407
HEADON
THLAT
RXE
+6V
C406 220u 16
GND
RM[0]
RM[1]
RM[2]
RM[3]
RXE
TM[3]
TM[2]
TM[1]
TM[0]
TXE
RM[3]
RM[2]
RM[1]
RM[0]
TO DIGITAL
+6V
+24V
R401 100
D401
F401
R405 820
E
B
C
Q401
R407 1.5k
CN402
TO RX MOTOR
IC401
O1
O2
O3
O4
O5
O6
O7
COMMON
I1
I2
I3
I4
I5
I6
I7
GND
D403
D405
GND
+6V
+24V
R406 1.5k
R402 NC
D402 NC
F402
R404 820
Q402
CN403
TO TX MOTOR
TXE
IC402
TM[0]
TM[1]
TM[2]
TM[3]
D404
D406
GND
CN404
+5V
GND
TO OPE
KSTART
KLATCH
KRXD
KTXD
KSCLK
OPRESET
CN408
+5V
KSTART
KLATCH
KRXD
KTXD
KSCLK
OPRESET
R408 2.2k
D407
THDAT
STB2
THCLK
TM
STB1
+3.3V
BAT401
GND
TO DIGITAL
CN405
TO SENSOR
GND

KX-FP365CX / KX-FM388CX : INTERFACE BOARD

17.6. Sensor Board (PCB6)

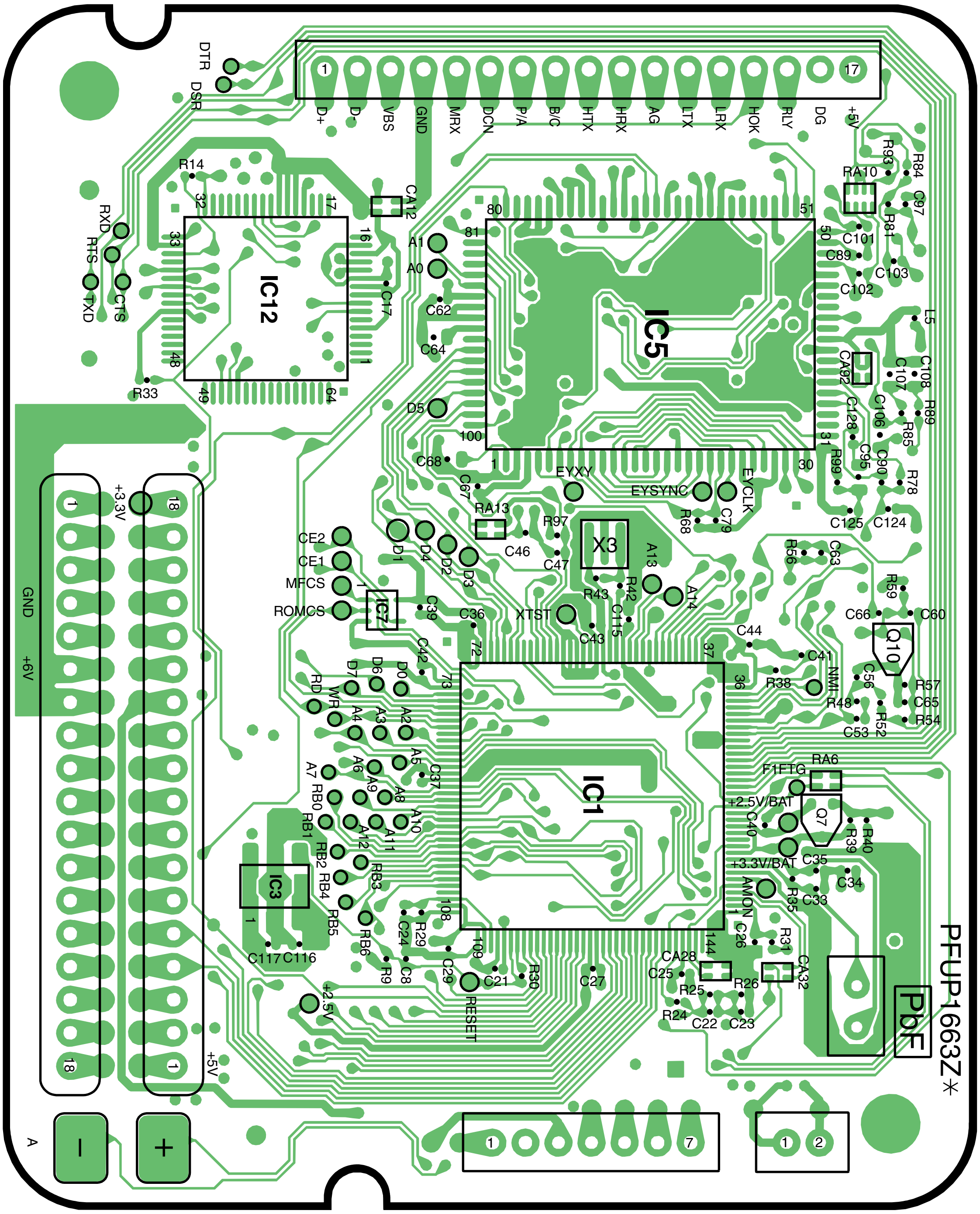

SW501
REED
CN501
SW502
COVER_OPEN_SW
GND
1
2
3
4

KX-FP365CX / KX-FM388CX : SENSOR BOARD

18 Printed Circuit Board

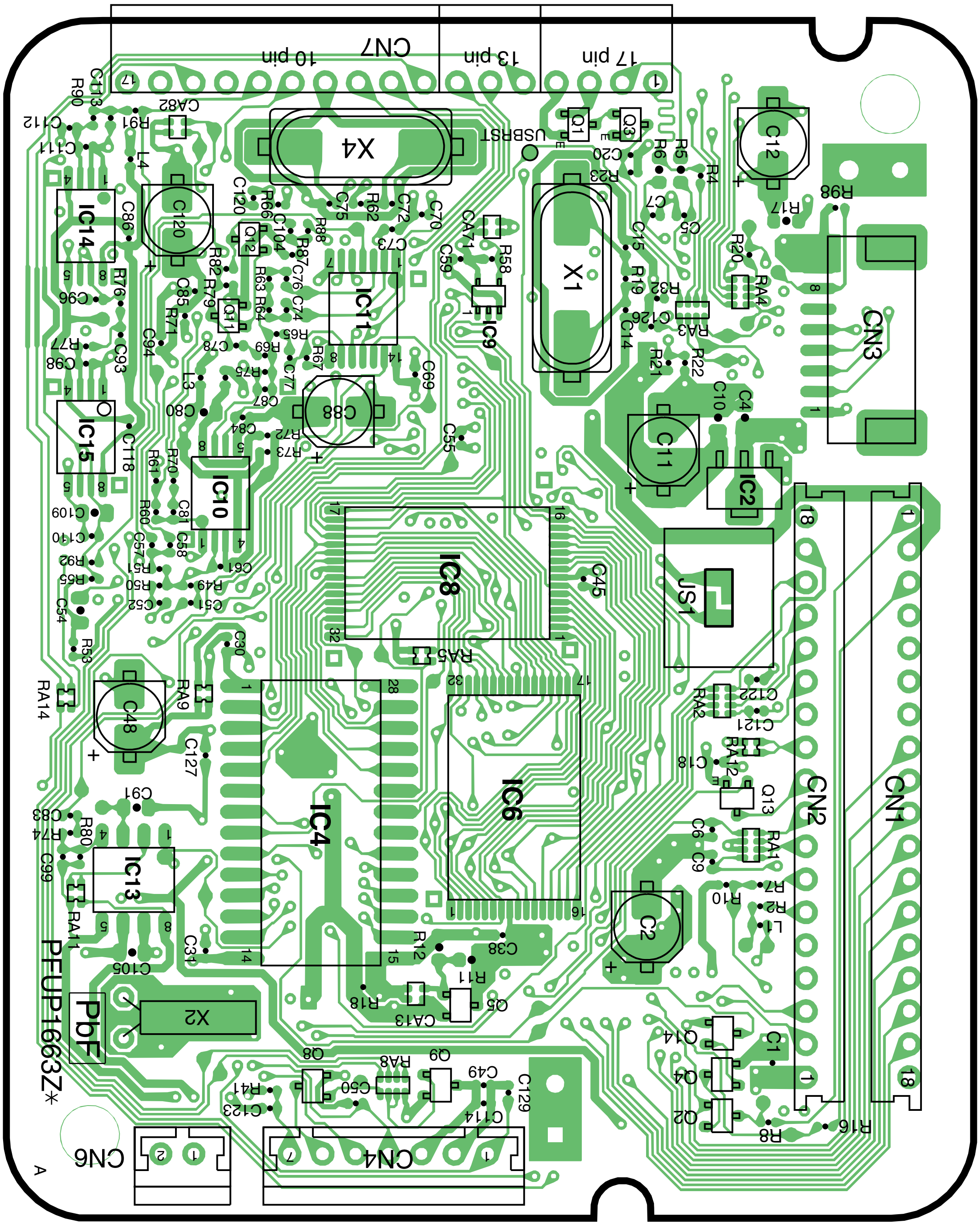
18.1. Digital Board (PCB1)

18.1.1. Bottom View


DTR
DSR
1
D+
D-
VBS
GND
MRX
DCN
P/A
B/C
HTX
HRX
AG
LTX
LRX
HOK
RLY
DG
+5V
17
R93
R84
RA10
C97
R81
C101
C89
C103
C102
L5
R14
32
17
CA12
16
33
IC12
A1
A0
C17
C62
C64
1
48
49
64
R33
RXD
RTS
TXD
CTS
80
51
81
50
IC5
CA92
C107
C108
C128
C106
R89
R85
D5
100
31
R99
C95
C90
R78
C68
1
30
C67
EYXY
EYSYNC
EYCLK
C79
R68
C125
C124
RA13
R97
C46
C47
X3
A13
R42
R43
A14
C115
R56
C63
R59
CE2
CE1
MFCS
ROMCS
1
IC7
D1
D4
D2
D3
C39
C36
XTST
C43
C44
C66
C60
Q10
C41
NMI
C56
R57
C65
R38
R48
R52
C54
C53
72
C42
37
36
73
D7
D6
D0
RD
WR
A4
A3
A2
A5
A6
A7
A9
A8
C37
RB0
RB1
A12
A11
A10
RB2
RB4
RB3
RB5
RB6
IC1
F1FTG
RA6
+2.5V/BAT
C40
Q7
R39
R40
+3.3V/BAT
C35
C34
AMON
R35
C33
108
C24
R29
C26
R31
144
109
CA28
CA32
C29
C21
R30
C27
C25
R25
R26
R24
C22
C23
R9
C8
RESET
IC3
1
C117
C116
+2.5V
+3.3V
1
18
GND
+6V
18
1
+5V
A
−
+
1
7
1
2
PFUP1663Z＊
PbF

KX-FP365CX / KX-FM388CX : DIGITAL BOARD (Bottom View)

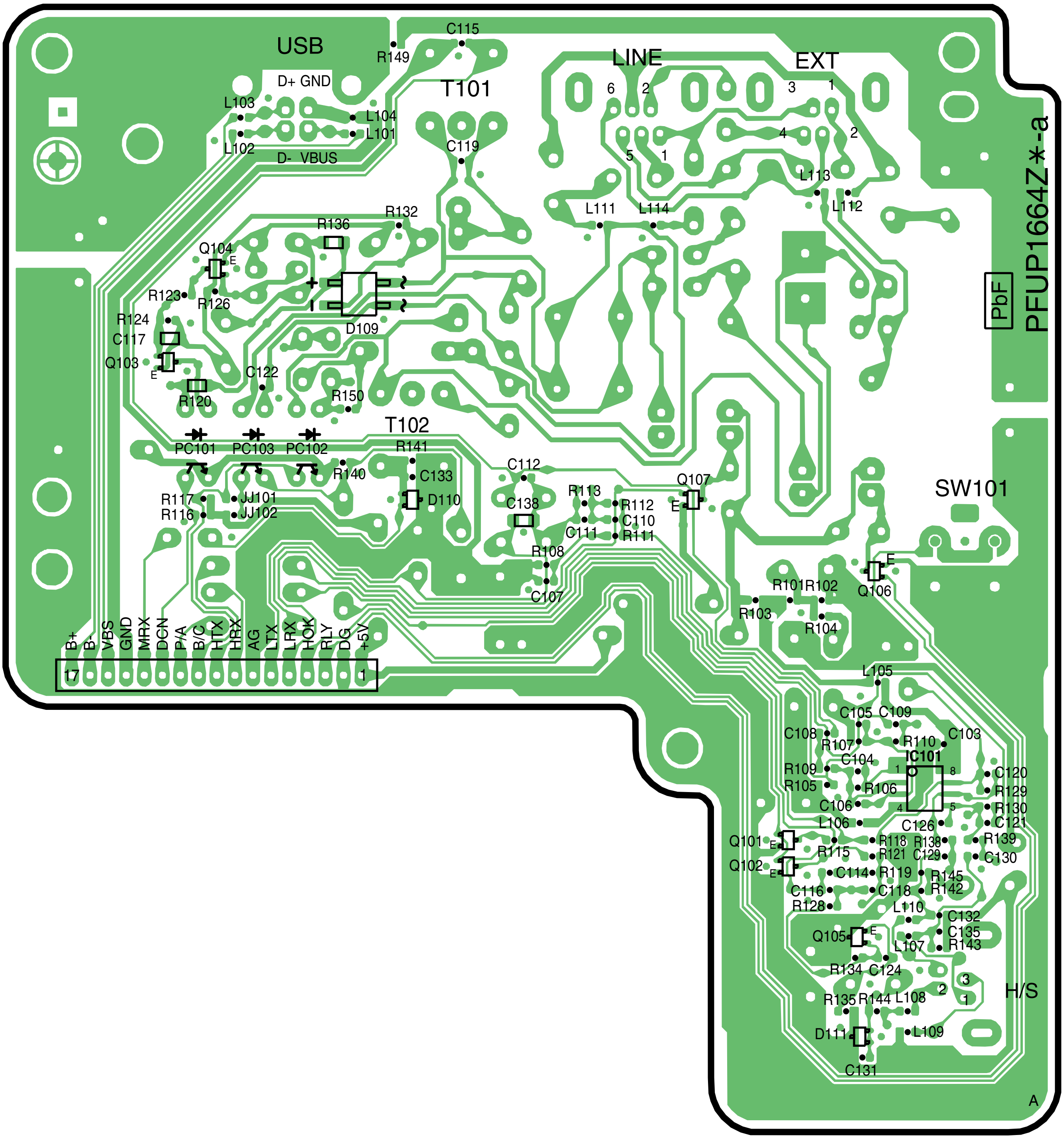
18.1.2. Component View


CN7
10 pin
13 pin
17 pin
X4
X1
X2
USBRST
IC14
IC15
IC11
IC10
IC9
IC8
IC4
IC6
IC13
IC2
JS1
CN1
CN2
CN3
CN4
CN6
C12
C11
C2
C88
C120
C48
R98
RA5
RA9
RA14
RA1
RA2
RA3
RA4
RA8
RA11
RA12
CA82
CA71
CA13
Q1
Q3
Q2
Q4
Q5
Q8
Q9
Q11
Q12
Q13
Q14
C129
PbF
PFUP1663Z*
A

KX-FP365CX / KX-FM388CX : DIGITAL BOARD (Component View)

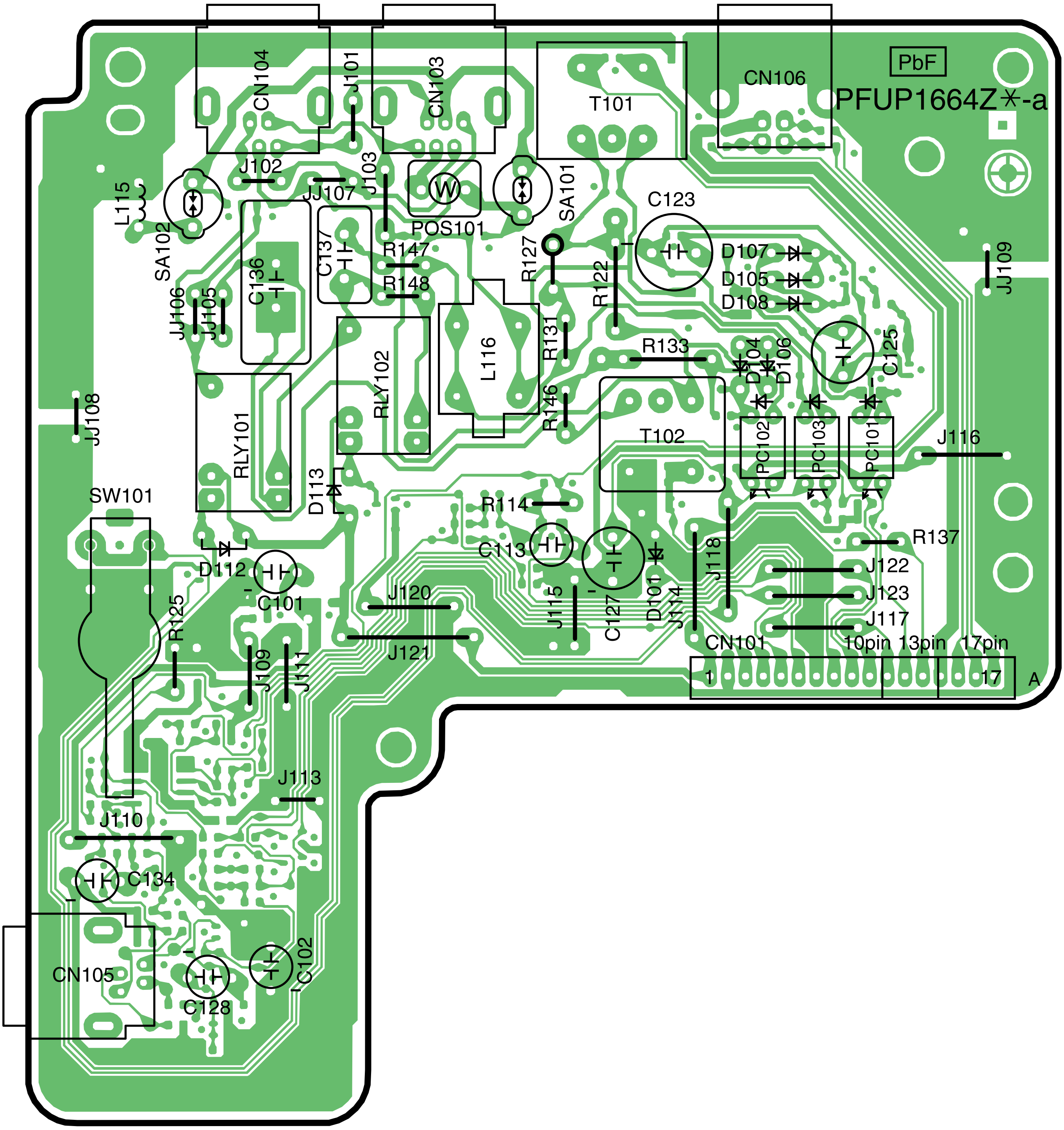
18.2. Analog Board (PCB2)

18.2.1. Bottom View


USB
D+ GND
D- VBUS
L103
L102
L104
L101
R149
C115
T101
C119
LINE
EXT
6
2
3
1
5
1
4
2
L113
L112
L111
L114
R132
R136
Q104
E
R123
R126
R124
C117
Q103
E
R120
C122
D109
R150
T102
PC101
PC103
PC102
R141
R140
C133
D110
R117
R116
JJ101
JJ102
C112
C138
R113
R112
C110
C111
R111
R108
C107
Q107
E
SW101
R101
R102
Q106
E
R103
R104
PbF
PFUP1664Z∗-a
B+
B-
VBS
GND
MRX
DCN
P/A
B/C
HTX
HRX
AG
LTX
LRX
HOK
RLY
DG
+5V
17
1
L105
C105
C109
C108
R107
R110
C103
IC101
C104
R109
R105
R106
1
8
4
5
C120
R129
R130
C121
C106
L106
C126
Q101
E
R118
R138
R139
R115
R121
C129
C130
Q102
E
C114
R119
R145
C116
C118
R142
R128
L110
C132
Q105
E
C135
L107
R143
R134
C124
3
2
1
H/S
R135
R144
L108
D111
L109
C131
A

KX-FP365CX / KX-FM388CX : ANALOG BOARD (Bottom View)

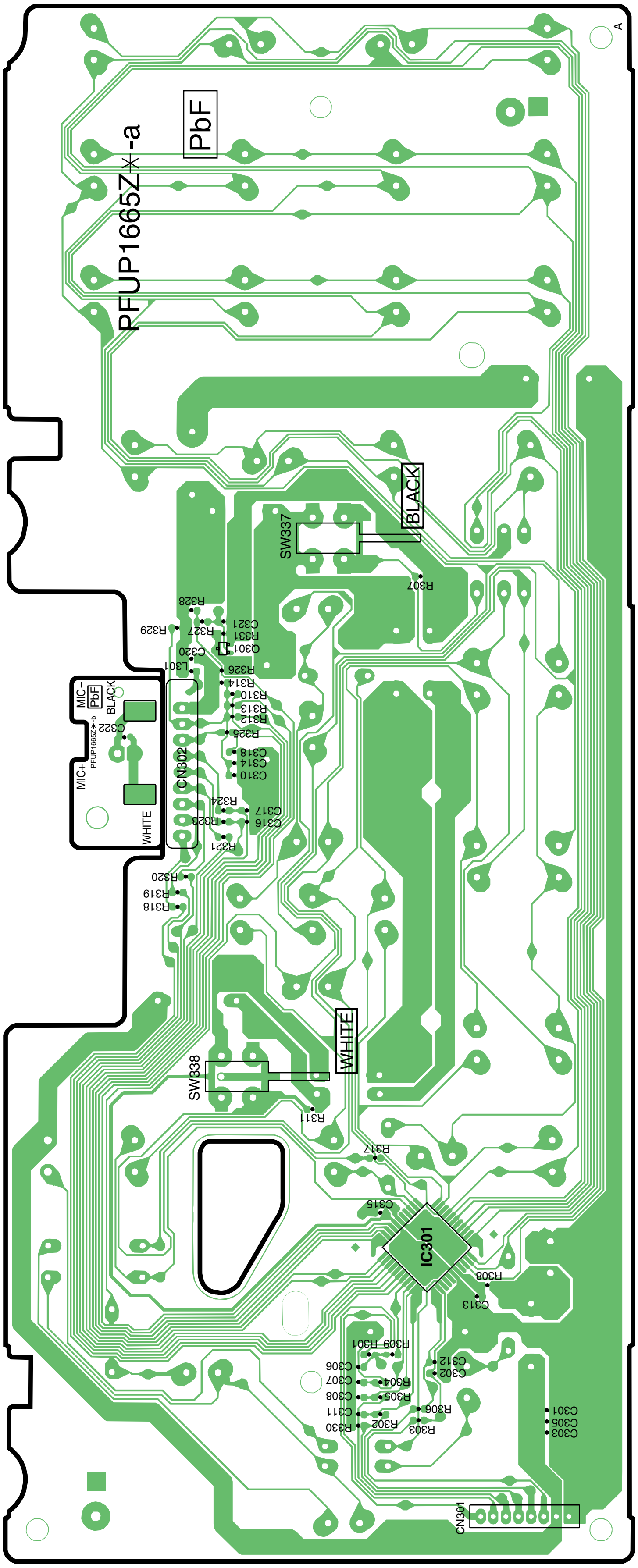
18.2.2. Component View


CN104
J101
CN103
T101
CN106
PbF
PFUP1664Z✳-a
J102
JJ107
J103
L115
SA102
W
POS101
SA101
C123
C137
R147
R148
R127
R122
D107
D105
D108
JJ109
JJ106
JJ105
C136
RLY102
L116
R131
R133
D104
D106
C125
JJ108
RLY101
R146
T102
PC102
PC103
PC101
J116
D113
SW101
R114
R137
C113
J118
J122
D112
C101
J120
J115
C127
D101
J114
J123
J117
R125
J109
J111
J121
CN101
10pin
13pin
17pin
1
17
A
J113
J110
C134
CN105
C128
C102

KX-FP365CX / KX-FM388CX : ANALOG BOARD (Component View)

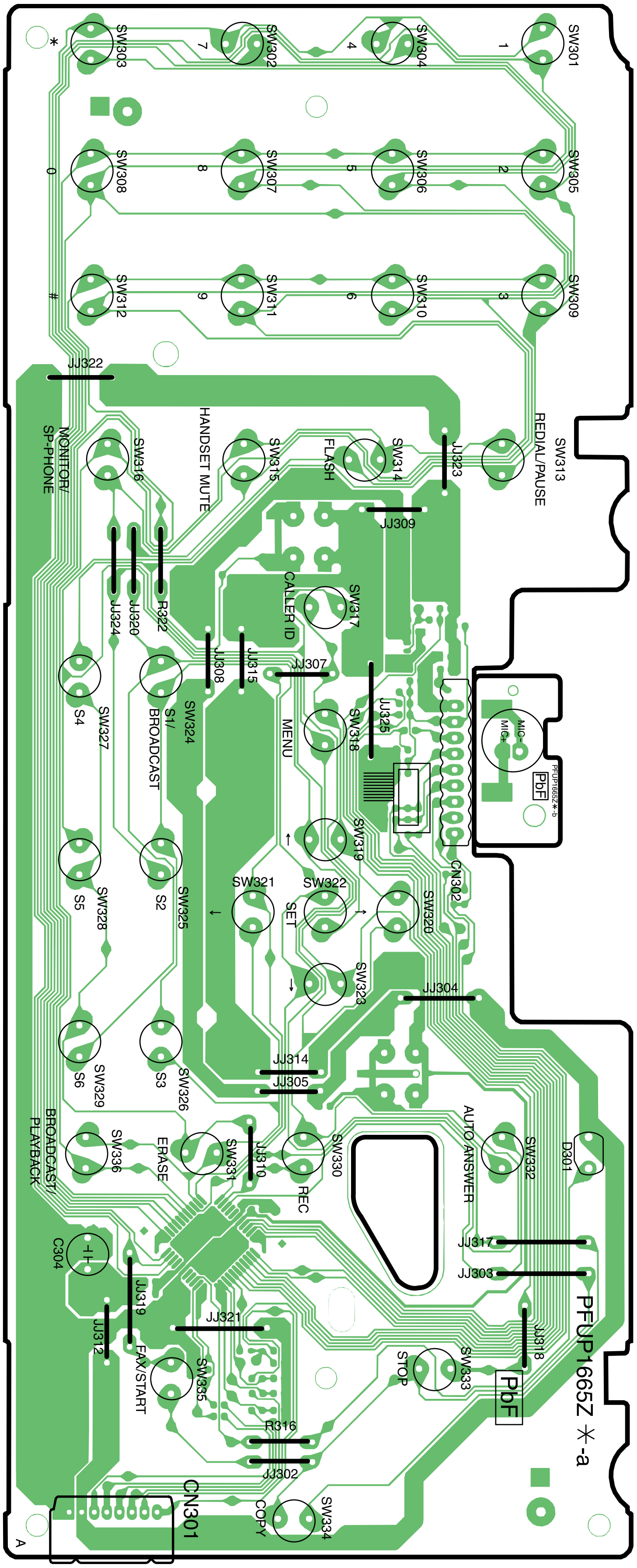
18.3. Operation Board (PCB3) / MIC Board (PCB7)

18.3.1. Bottom View


PFUP1665Z✻-a
PbF
A
SW337
BLACK
R307
R328
R329
R327
C321
R331
Q301
C320
L301
R326
R314
R310
R313
R312
R325
C318
C314
C310
CN302
R324
C317
R323
C316
R321
R320
R319
R318
MIC-
PbF
BLACK
PFUP1665Z✻-b
C322
MIC+
WHITE
SW338
WHITE
R311
R317
C315
IC301
R308
C313
R309
R301
C306
C307
C308
C311
R330
R304
R305
R302
R306
R303
C312
C302
C301
C305
C303
CN301

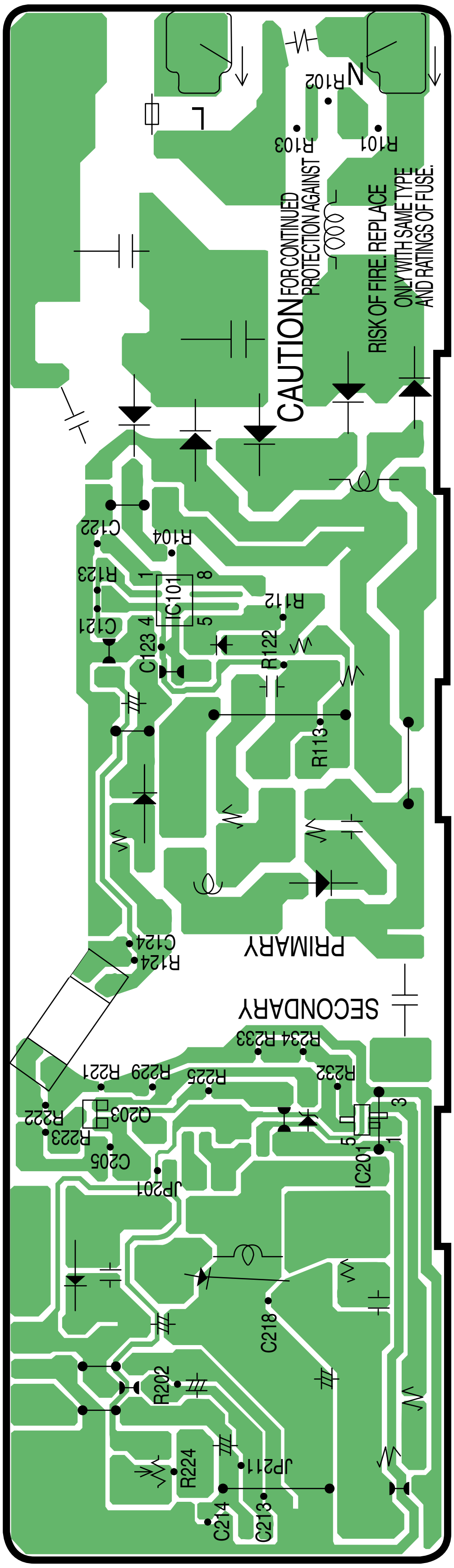
KX-FP365CX / KX-FM388CX : OPERATION BOARD (Bottom View)

18.3.2. Component View

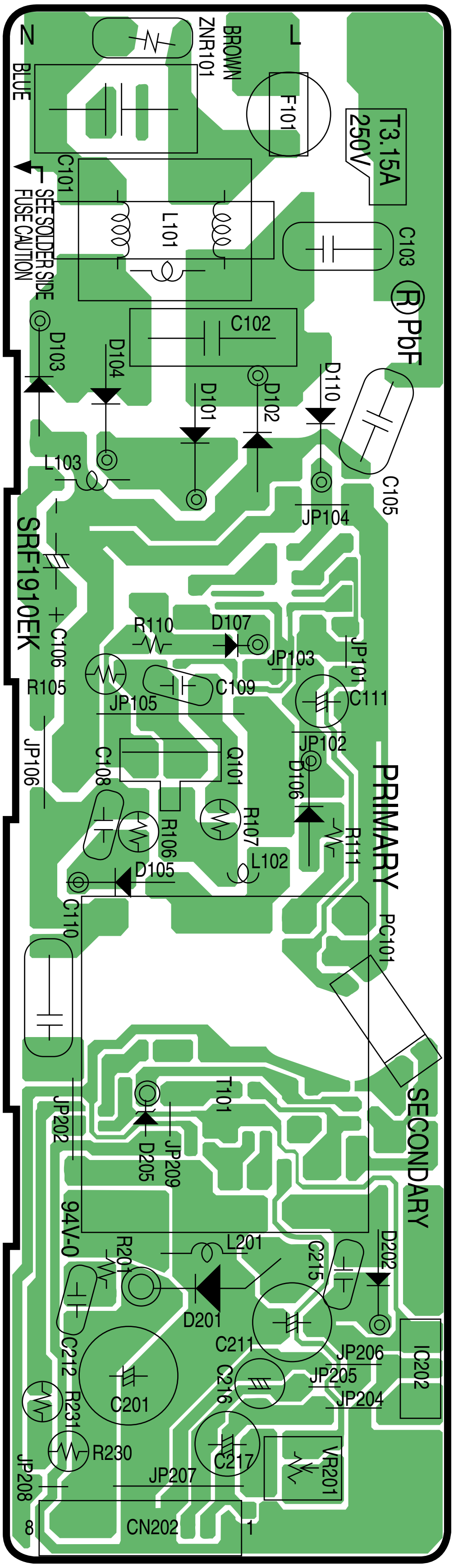

SW301
1
SW304
4
SW302
7
SW303
*
SW305
2
SW306
5
SW307
8
SW308
0
SW309
3
SW310
6
SW311
9
SW312
#
JJ322
SW313
REDIAL/PAUSE
JJ323
SW314
FLASH
SW315
HANDSET MUTE
SW316
MONITOR/
SP-PHONE
JJ309
SW317
CALLER ID
JJ324
JJ320
R322
JJ308
JJ315
JJ307
JJ325
SW318
MENU
SW324
S1/
BROADCAST
SW327
S4
MIC-
MIC+
PFUP1665Z✱-b
PbF
SW319
CN302
SW320
SW322
SET
SW321
SW325
S2
SW328
S5
SW323
JJ304
JJ314
JJ305
SW326
S3
SW329
S6
D301
SW332
AUTO ANSWER
SW330
REC
JJ310
SW331
ERASE
SW336
BROADCAST
PLAYBACK
C304
JJ317
JJ303
JJ319
JJ312
JJ321
JJ318
SW333
STOP
PFUP1665Z ✱-a
PbF
SW335
FAX/START
R316
JJ302
CN301
SW334
COPY
A

KX-FP365CX / KX-FM388CX : OPERATION BOARD (Component View)

18.4. Power Supply Board (PCB4)


N
L
R102
R103
R101
CAUTION FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATINGS OF FUSE.
C122
R104
R123
IC101
1
4
5
8
R112
C121
C123
R122
R113
C124
R124
PRIMARY
SECONDARY
R234 R233
R221
R229
R225
R232
R222
Q203
R223
C205
JP201
IC201
3
1
5
C218
R202
R224
JP211
C214
C213

(Bottom View)

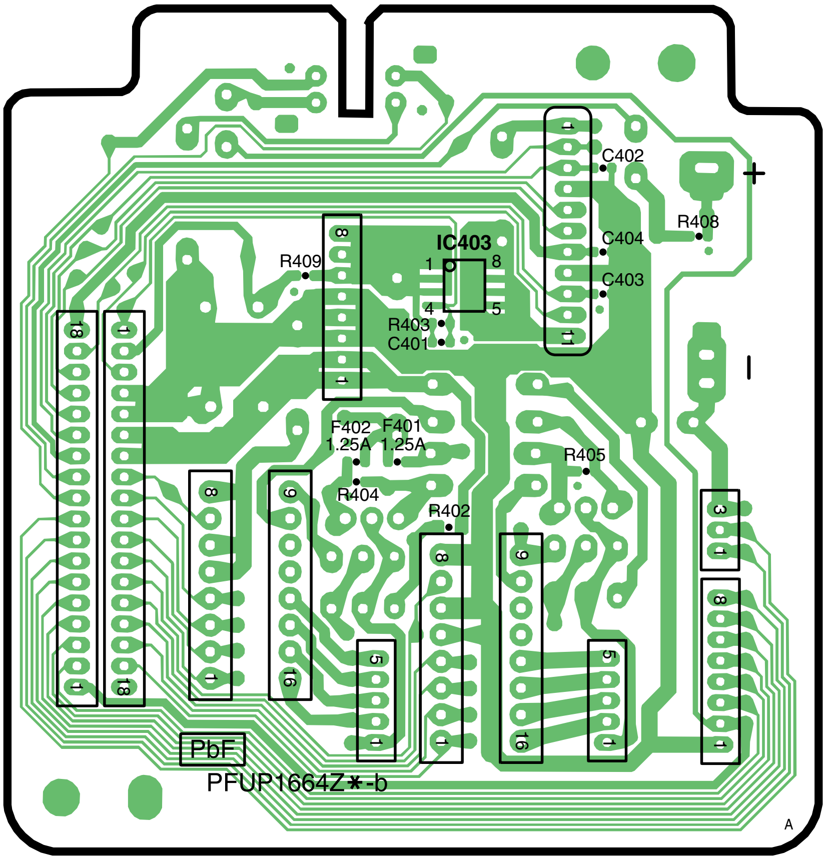

N
BLUE
BROWN
ZNR101
L
F101
T3.15A 250V
C101
SEE SOLDER SIDE FUSE CAUTION
L101
C103
PbF
C102
D103
D104
D101
D102
D110
C105
L103
JP104
SRF1910EK
C106
R110
D107
JP103
JP101
R105
JP105
C109
C111
JP106
C108
Q101
JP102
D106
R106
R107
R111
PRIMARY
D105
L102
C110
PC101
T101
JP202
D205
JP209
SECONDARY
94V-0
R201
L201
C215
D202
D201
C212
C211
C216
IC202
R231
C201
JP206
JP205
JP204
R230
C217
VR201
JP208
JP207
CN202
8
1

(Component View)

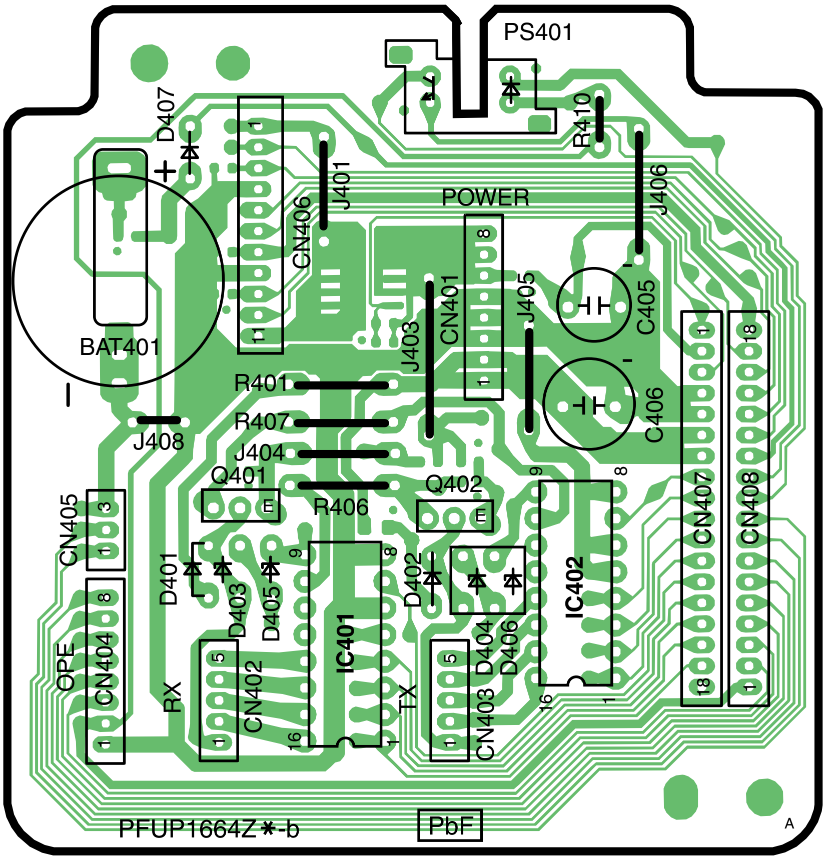
KX-FP365CX / KX-FM388CX : Power Supply Board

18.5. Interface Board (PCB5)

(Bottom View)

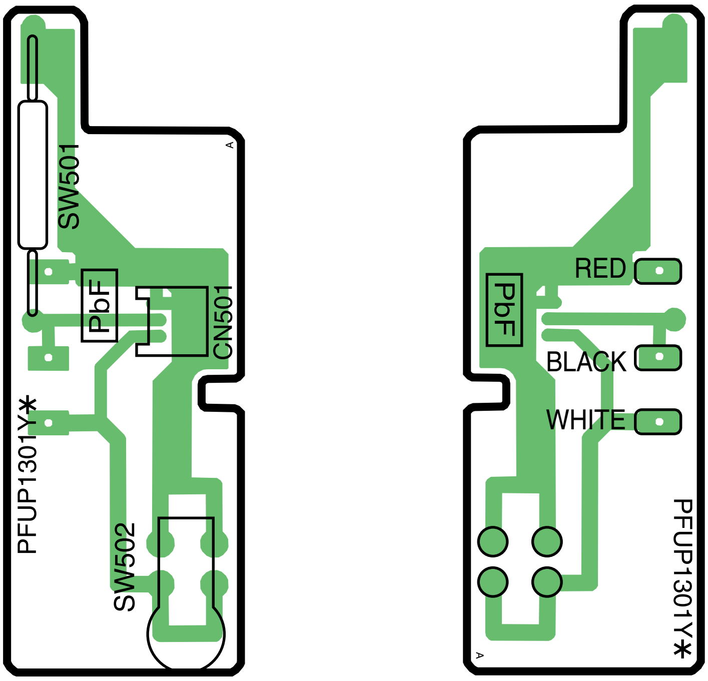

C402
+
R408
C404
C403
IC403
1
8
4
5
R409
R403
C401
18
1
1
18
8
1
F402 F401
1.25A 1.25A
R404
R405
R402
9
16
8
1
5
1
8
1
9
16
5
1
3
1
8
1
11
1
PbF
PFUP1664Z✱-b
A

(Component View)


PS401
D407
R410
+
J401
CN406
J406
POWER
BAT401
CN401
J405
C405
J403
C406
R401
R407
J404
J408
Q401
E
R406
Q402
E
CN405
3
1
D401
D403
D405
IC401
D402
D404
D406
IC402
OPE
CN404
8
1
RX
CN402
5
1
TX
CN403
5
1
9
8
16
1
CN407
CN408
1
18
18
1
PFUP1664Z✱-b
PbF
A

KX-FP365CX / KX-FM388CX : INTERFACE BOARD

18.6. Sensor Board (PCB6)


(Bottom View)

(Component View)

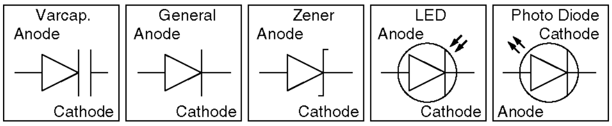
SW501
PbF
CN501
PFUP1301Y∗
SW502
A
RED
PbF
BLACK
WHITE
PFUP1301Y∗
A

KX-FP365CX / KX-FM388CX : SENSOR 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.

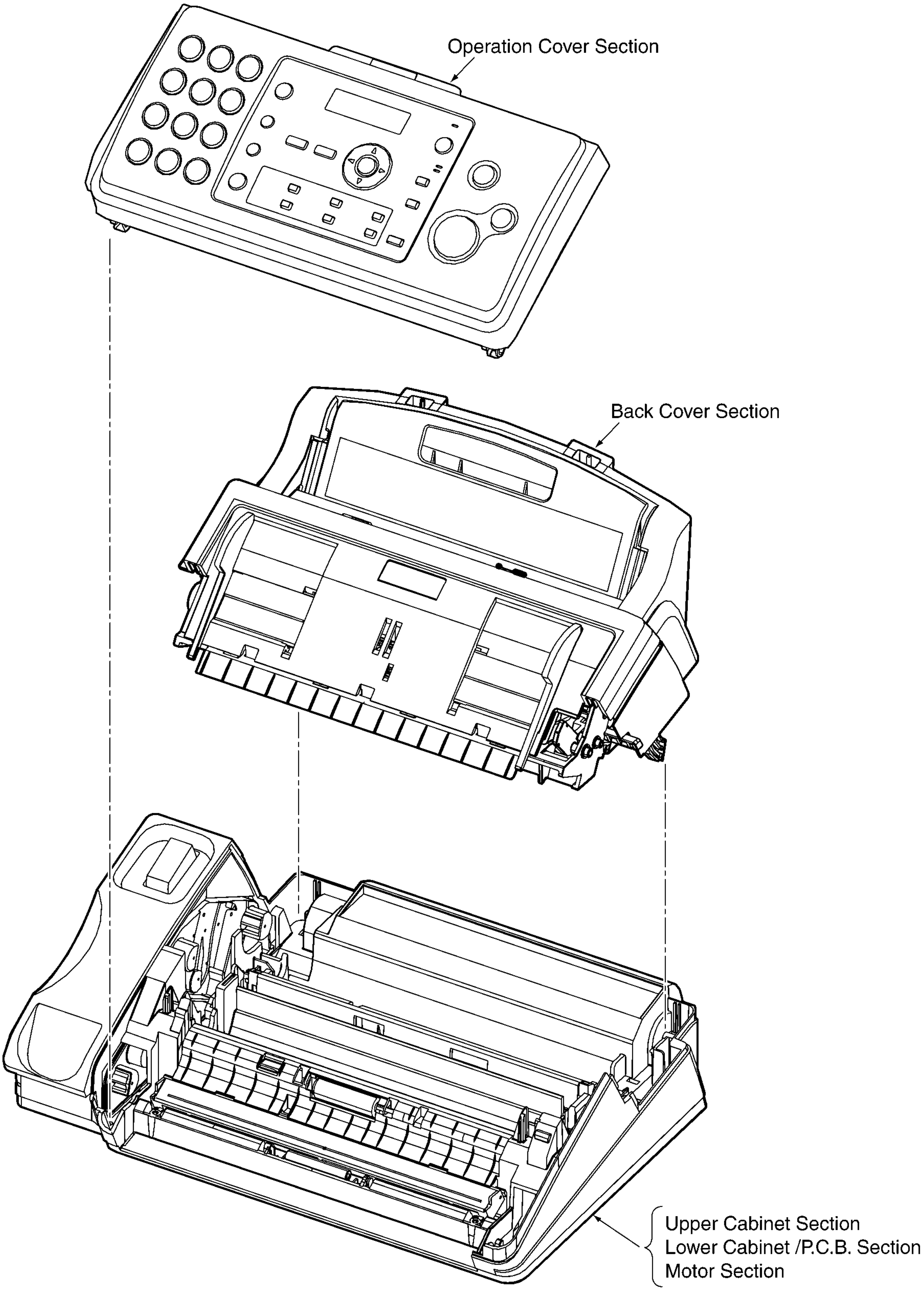

Varcap.
Anode
Cathode
General
Anode
Cathode
Zener
Anode
Cathode
LED
Anode
Cathode
Photo Diode
Cathode
Anode

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.

20 Exploded View and Replacement Parts List

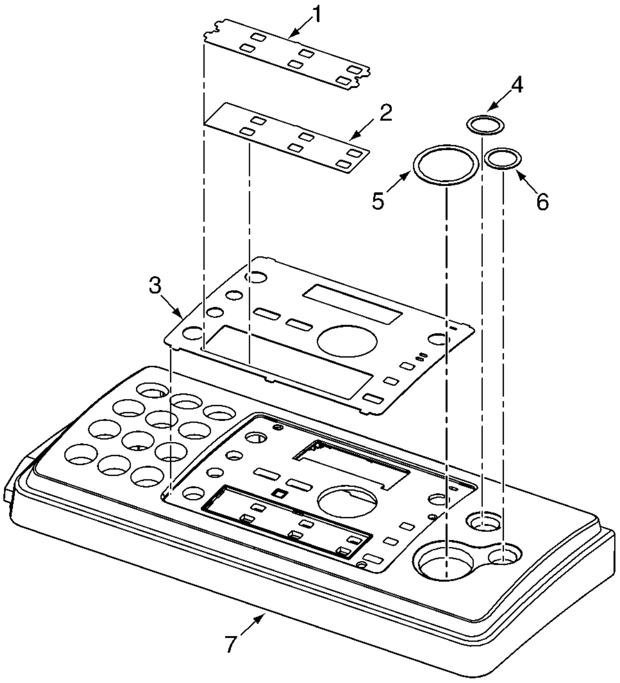
20.1. Cabinet, Mechanical and Electrical Parts Location

20.1.1. General Section

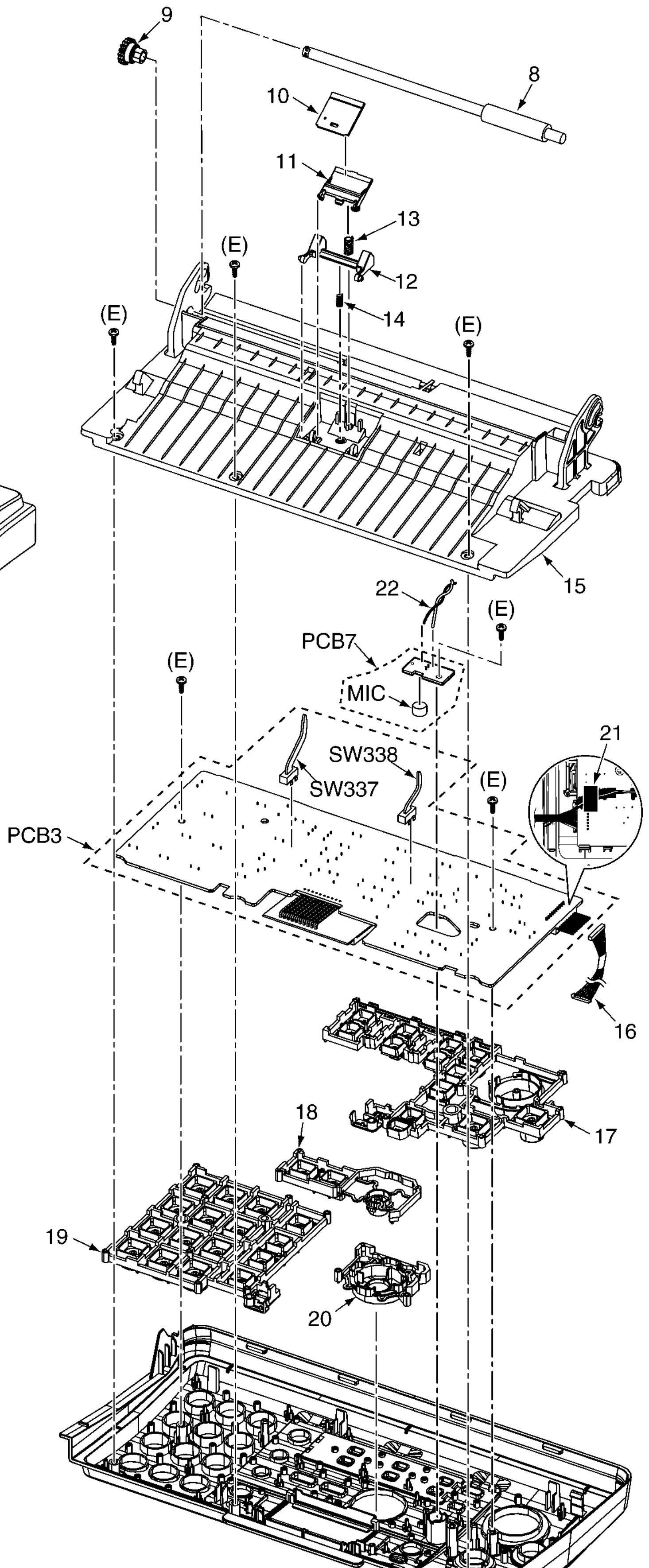

Operation Cover Section
Back Cover Section
Upper Cabinet Section
Lower Cabinet /P.C.B. Section
Motor Section

20.1.2. Operation Cover Section

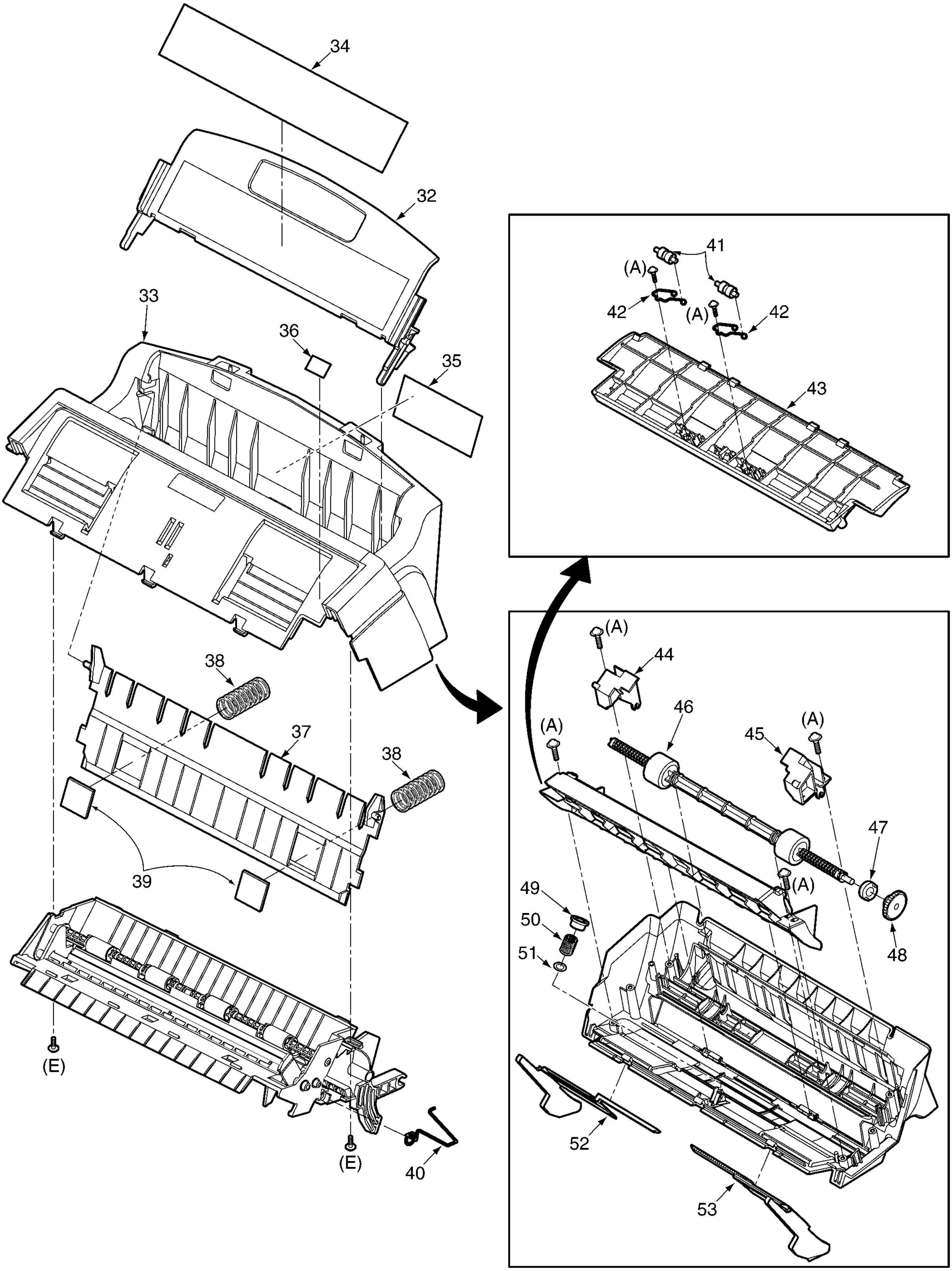
(Front side)

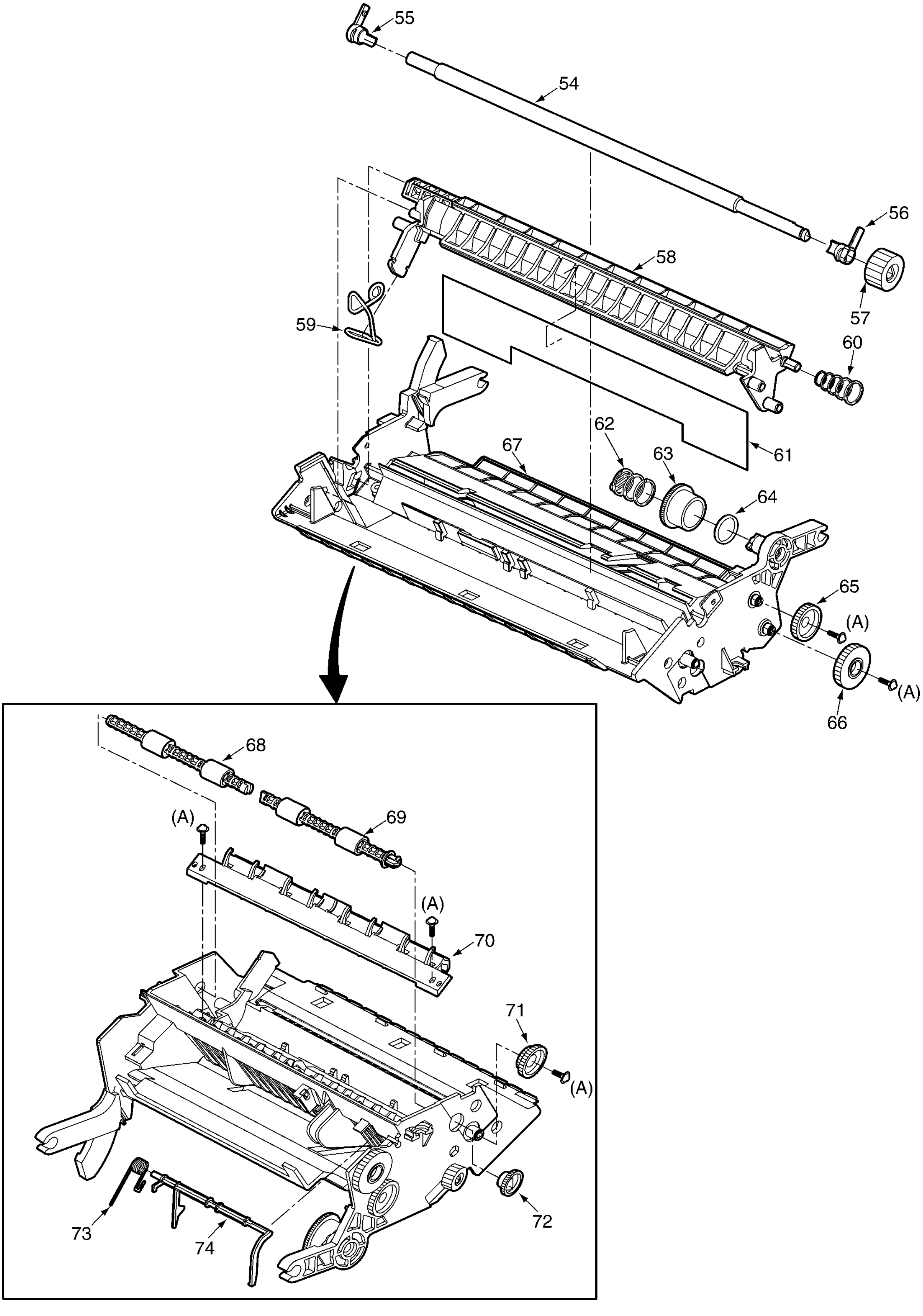


(Rear side)

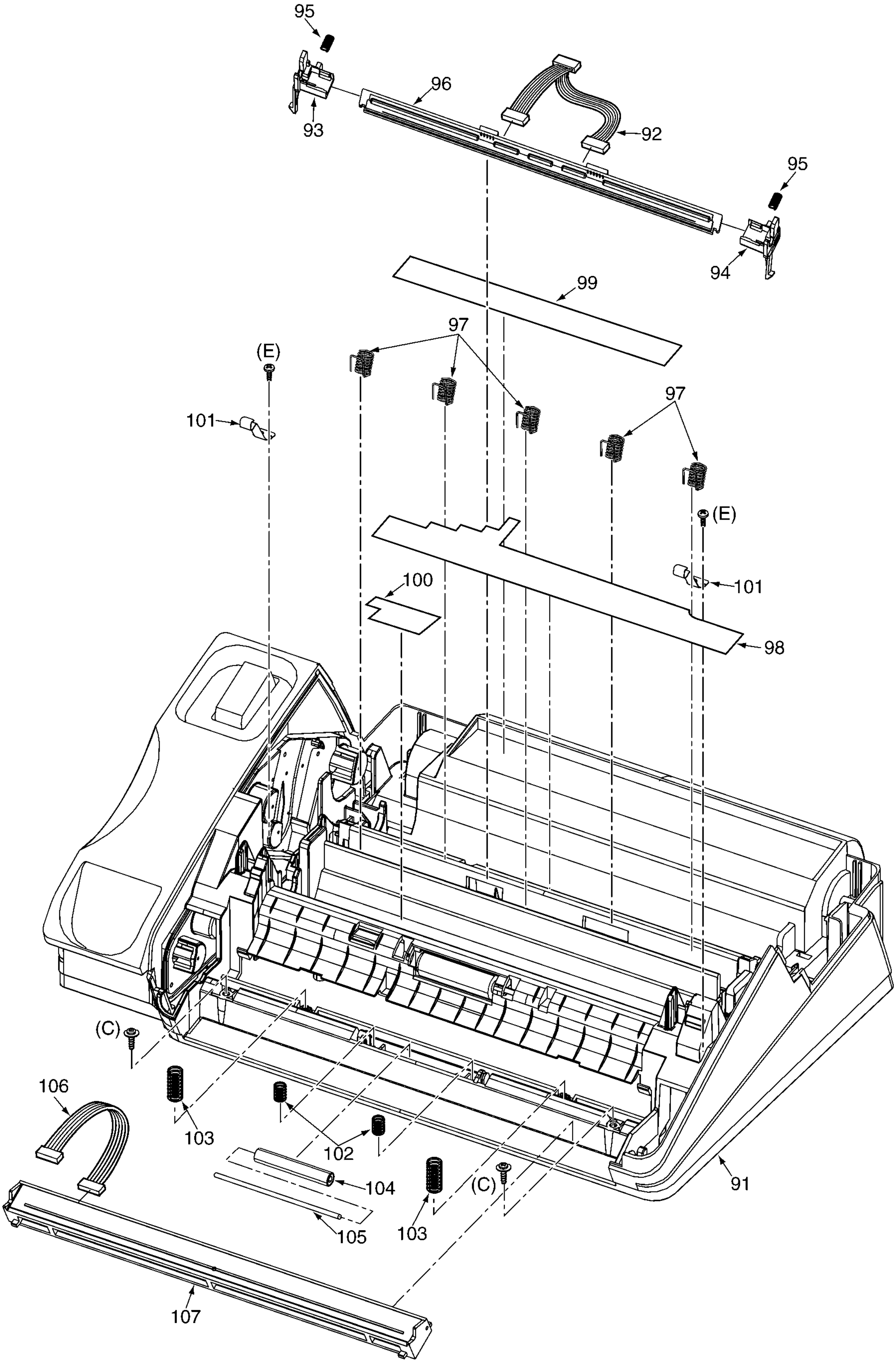

9
8
10
11
13
(E)
12
(E)
14
(E)
15
22
(E)
PCB7
(E)
MIC
21
SW338
(E)
SW337
PCB3
16
17
18
19
20

20.1.3. Back Cover Section

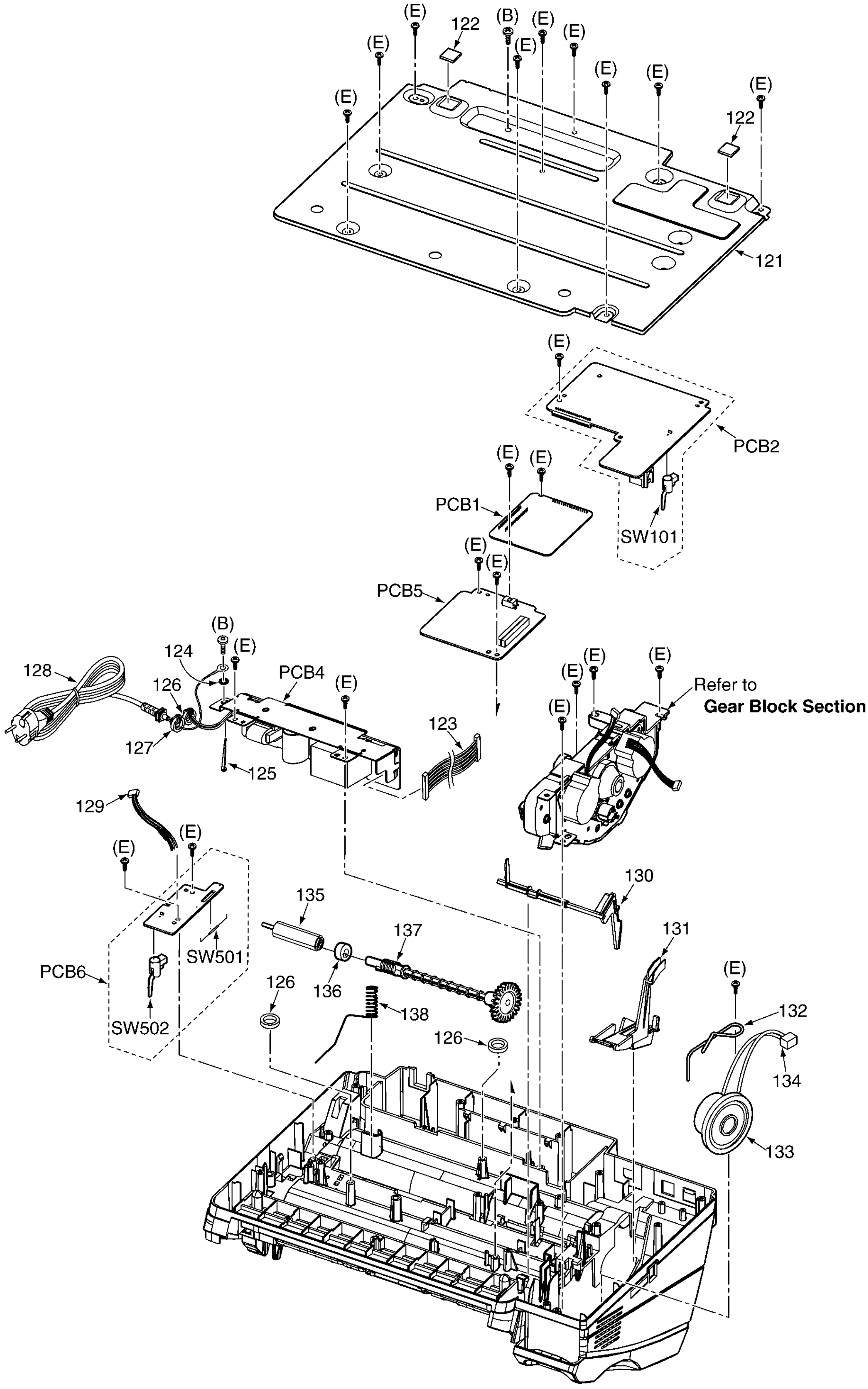

34
32
33
36
35
38
37
38
39
(E)
(E)
40
41
(A)
42
(A)
42
43
(A)
44
46
(A)
(A)
45
47
(A)
49
50
51
48
52
53


(A)
(A)
(A)
(A)
(A)

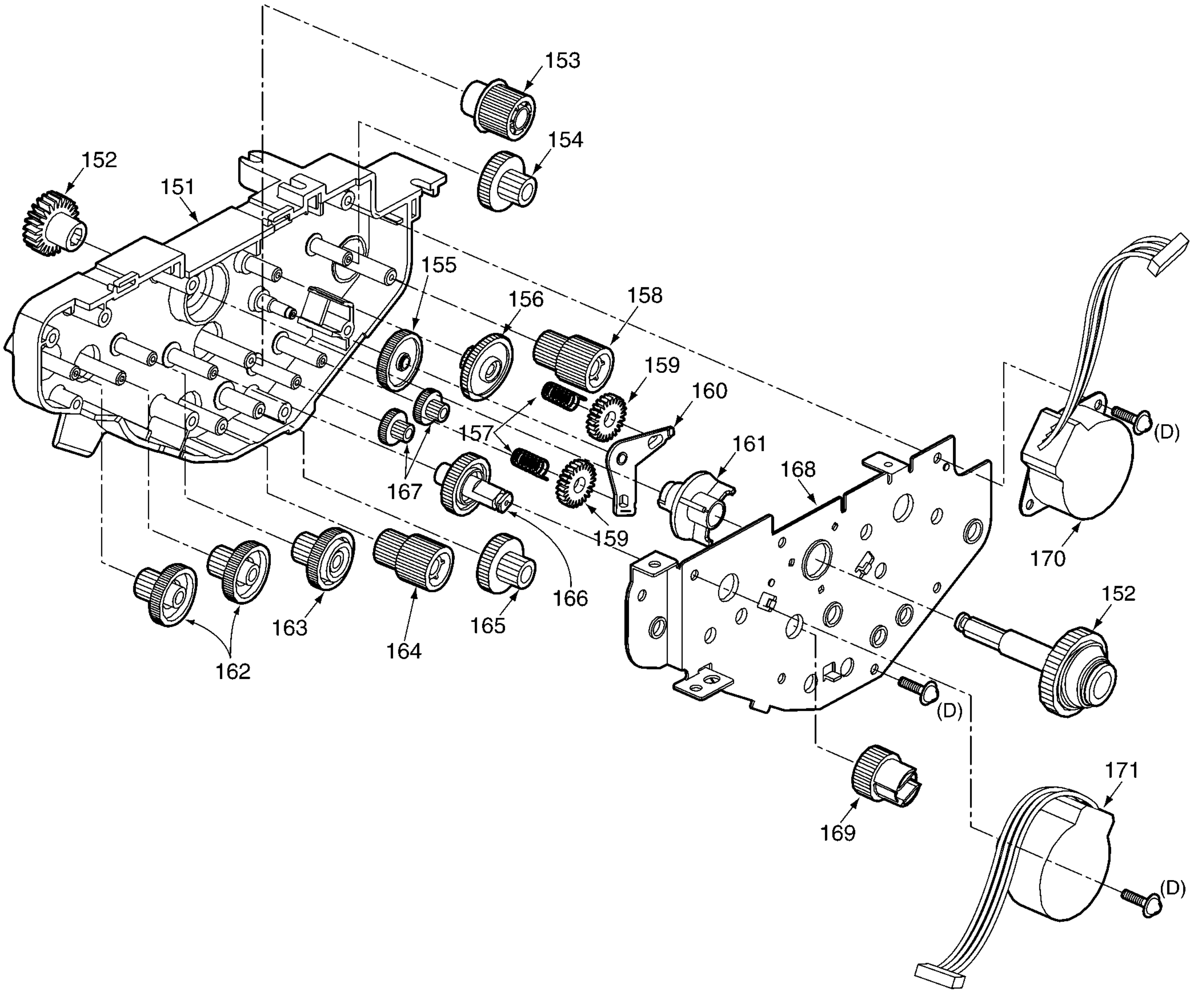
20.1.4. Upper Cabinet Section


95
96
93
92
95
94
99
97
(E)
101
97
(E)
100
101
98
(C)
106
103
102
104
(C)
91
105
103
107

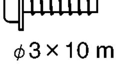
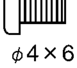
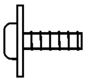
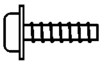
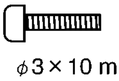
20.1.5. Lower Cabinet Section


(E)
122
(B)
(E)
(E)
(E)
(E)
(E)
(E)
(E)
(E)
122
121
(E)
PCB2
(E)
(E)
PCB1
SW101
(E)
(E)
PCB5
(B)
124
(E)
128
126
PCB4
(E)
(E)
(E)
(E)
Refer to
Gear Block Section
(E)
123
127
125
129
(E)
(E)
130
135
137
131
SW501
PCB6
136
126
(E)
138
132
126
SW502
134
133

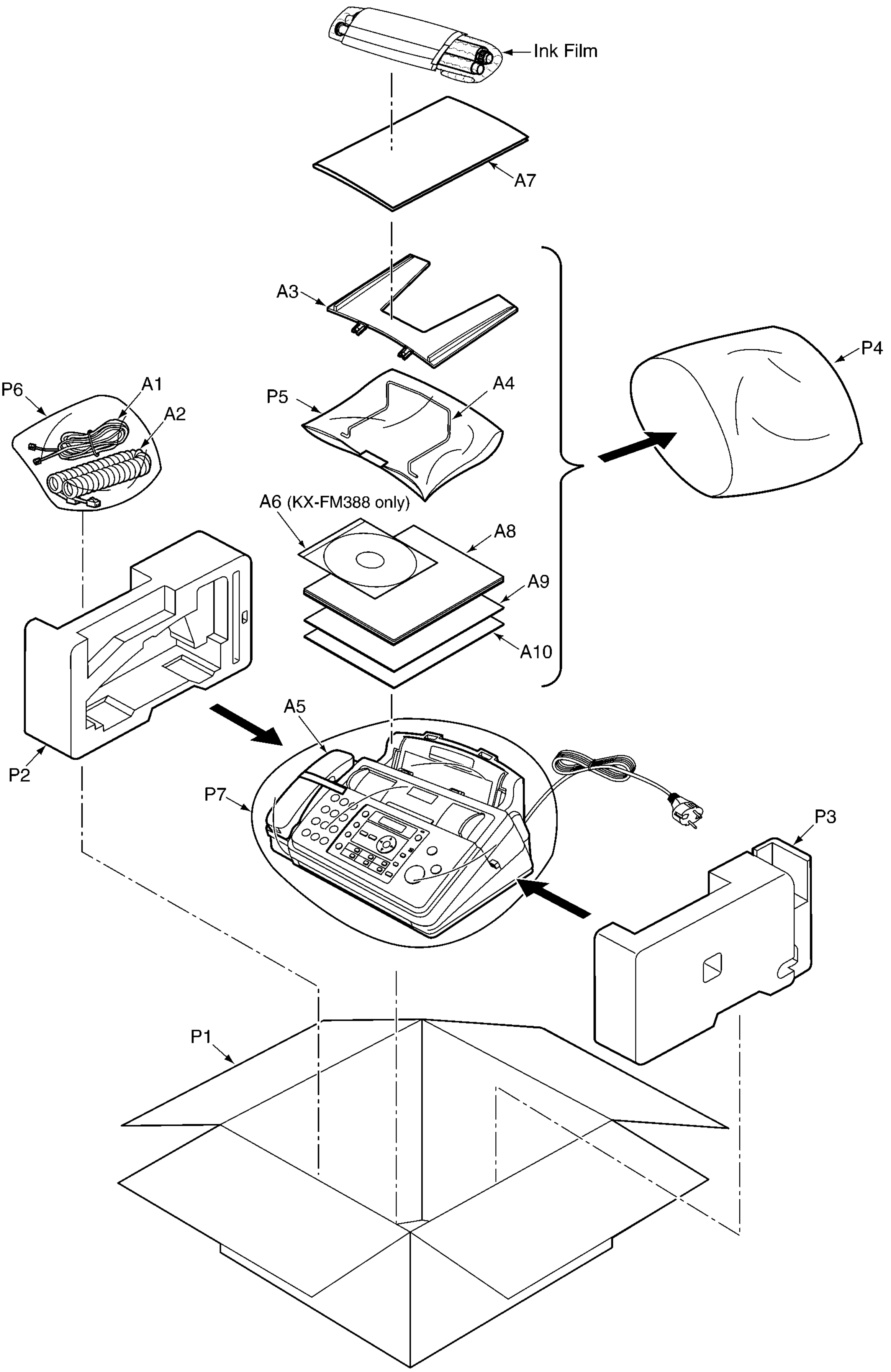
20.1.6. Gear Block Section


153
154
152
151
155
156
158
159
160
(D)
161
157
168
167
159
170
166
152
163
165
164
162
(D)
171
169
(D)

20.1.7. Screws

	Figure
(A)	 φ3 × 10 mm
(B)	 φ4 × 6 mm
(C)	 φ3 × 8 mm
(D)	 φ2.6 × 10 mm
(E)	 φ3 × 10 mm

20.1.8. Accessories and Packing Materials


Ink Film
A7
A3
P4
P6
A1
A2
P5
A4
A6 (KX-FM388 only)
A8
A9
A10
A5
P2
P7
P3
P1

20.2. Replacement Parts List

Notes:

1. The “RTL” marking indicates that its Retention Time is Limited.
   When production is discontinued, this item will continue to be available only for a specific period of time. This period of time depends on the type of item, and the local laws governing parts and product retention.
   At the end of this period, the item 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 PQRD:Carbon	ERX:Metal Film ERG:Metal Oxide ER0:Metal Film	PQ4R:Carbon ERS:Fusible Resistor ERF:Cement Resistor

Wattage

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

*Type & Voltage of Capacitor

Type

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

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

20.2.1. Cabinet and Electrical Parts

20.2.1.1. Operation Cover Section

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	1	PFGV1022Y	TRANSPARENT PLATE	PC
	2	PNGD1012Z	CARD, TEL	
	3	PNGP1056Z	PANEL, LCD (for KX-FP365)	PC
	3	PNGP1057Z	PANEL, LCD (for KX-FM388)	PC
	4	PFHX2102Z	PLASTIC PARTS, RING STOP	PC
	5	PFHX2104Z	PLASTIC PARTS, RING START	PC
	6	PFHX2103Z	PLASTIC PARTS, RING COPY	PC
	7	PFGG1315D1	GRILLE, OPERATION PANEL (for KX-FP365)	PS-HB
	7	PFGG1315B1	GRILLE, OPERATION PANEL (for KX-FM388)	PS-HB
	8	PFDR1105Z	ROLLER, DOCUMENT EXIT	
	9	PFDG1148Z	GEAR, DOCUMENT EXIT ROLLER	POM-HB
	10	PFHG1283Z	RUBBER SPACER, PAD	
	11	PFHR1719Z	COVER, SEPARATION HOLDER	ABS
	12	PFHR1720Z	SPACER, DOCUMENT FEED SUPPORT	POM-HB
	13	PFUS1836Z	SPRING	
	14	PFUS1837Z	SPRING, DOCUMENT FEED	
	15	PFUV1112Z	COVER, OPERATION PANEL	PS-HB
	16	PFJS08M93Z	CONNECTOR, 8 PIN	
	17	PFBX1290Y1	PUSH BUTTON, 11 KEY	ABS
	18	PFBX1289Y3	PUSH BUTTON, 3 KEY	ABS
	19	PFBX1291Z1	PUSH BUTTON, 16 KEY	ABS
	20	PFBC1203Z3	PUSH BUTTON, NAVIGATOR	ABS
	21	PNHX1164Z	TAPE	
	22	PNJS021027Z	CONNECTOR	

20.2.1.2. Back Cover Section

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	32	PFDE1189X2	LEVER, CASSETTE	S PS-HB
	33	PFKV1071X2	COVER, U TURN	S PS-HB
	34	PFQT2999Z	INDICATION LABEL, PAPER SET	
	35	PNGT1909Y-M	NAME PLATE (for KX-FP365)	
	35	PNGT1923Y-M	NAME PLATE (for KX-FM388)	
	36	PFQT2980Z	INDICATION LABEL, OPEN	
	37	PFKS1039Z	TRAY, CASSETTE PLATE	PS-HB
	38	PFUS1414Z	SPRING, PICK UP	
	39	PFHG1088Z	RUBBER PARTS, PAPER SEPARATION	
	40	PFUS1409Z	SPRING, EARTH	
	41	PFDR1040Z	ROLLER, SUPPORT	POM-HB
	42	PFUS1407Y	SPRING, EXIT SUB ROLLER	
	43	PFUV1055Y	COVER, GUIDE	PS-HB
	44	PFHR1221Y	GUIDE, CORNER (RIGHT)	POM-HB
	45	PFHR1220X	GUIDE, CORNER (LEFT)	POM-HB
	46	PFDN1062Z	ROLLER, PICK UP	POM-N
	47	PFDE1188Z	SPACER, PICK UP DELAY	POM-HB
	48	PFDG1290Z	GEAR, PICK UP ROLLER	POM-HB
	49	PFDG1293Z	GEAR, DOCUMENT	POM-HB
	50	PFUS1034Z	SPRING, GUIDE DOCUMENT	
	51	PFHX1605Z	SPACER, SLIDER GEAR SHEET	PET
	52	PFKR1028Y1	GUIDE, DOCUMENT (RIGHT)	ABS-HB
	53	PFKR1027X1	GUIDE, DOCUMENT (LEFT)	ABS-HB
	54	PFDN1043Z	ROLLER, PLATEN	
	55	PFHR1717Z	SPACER, PLATEN ROLLER (LEFT)	POM-HB
	56	PFHR1718Z	SPACER, PLATEN ROLLER (RIGHT)	POM-HB
	57	PFDG1165Y	GEAR, PLATEN ROLLER	POM-HB
	58	PFDE1192Y1	LEVER, LOCK	ABS-HB
	59	PFUS1404Z	SPRING, EARTH LEVER	
	60	PFUS1258Z	SPRING, LOCK LEVER	
	61	PFHX1596Z	SPACER, LOCK LEVER SHEET	PET
	62	PFUS1232Z	SPRING, BACK TENSION	
	63	PFDG1160Z	GEAR BACK TENSION	POM-HB
	64	PFHS1029Z	COVER, BACK TENSION	GS
	65	PFDG1291Z	GEAR, PICK UP IDLER	POM-HB
	66	PFDG1292Z	GEAR, PICK UP IDLER	POM-HB
	67	PFUA1042X	CHASSIS, U TURN	PS-HB
	68	PFDN1061Z	ROLLER, EXIT (RIGHT)	POM-N
	69	PFDN1060Z	ROLLER, EXIT (LEFT)	POM-N
	70	PFUG1015Y	GUIDE, BASE	PS-HB
	71	PFDG1289Z	GEAR, EXIT IDLER	POM-HB
	72	PFDG1288Z	GEAR, EXIT ROLLER	POM-HB
	73	PFUS1237Z	SPRING, PAPER TOP	
	74	PFDE1128Y	LEVER, PAPER TOP SENSOR	POM-HB

20.2.1.3. Upper Cabinet Section

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	91	PFKM1231Z1	CABINET BODY, MAIN (for KX-FP365)	PBT+ABS-V1

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	91	PFKM1231Y1	CABINET BODY, MAIN (for KX-FM388)	PBT+ABS-V1
	92	PFJS11M16Z	CONNECTOR, 11 PIN	
	93	PFHR1715Y	GUIDE, HOLDER HEAD/L	POM
	94	PFHR1716Y	GUIDE, HOLDER HEAD/R	POM
	95	PFUS1835Z	SPRING, HEAD/B	
	96	L1CC00000069	PRINTER UNITS, THERMAL HEAD	S
	97	PFUS1834Z	SPRING, HEAD/A	
	98	PFHX2161Z	SHEET, STATIC ELECTRICITY	
	99	PFQT1934Z	INDICATION LABEL, INK FILM	
	100	PFQT2990Z	INDICATION LABEL, BLUE GEAR	
	101	PFUS1418Z	SPRING, OPERATION PANEL LOCK	
	102	PFUS1756Z	SPRING, SP EXIT ROLLER	
	103	PFUS1833Z	SPRING, CIS	
	104	PFDR1098Z	ROLLER, DOCUMENT SUPPORT	
	105	PFDF1017Z	SHAFT	S
	106	PFJS07M91Z	CONNECTOR, 7 PIN	
	107	N2GZYY000003	IMAGE SENSOR (CIS)	

20.2.1.4. Lower Cabinet Section

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	121	PFMD1114Z	FRAME, BOTTOM	
	122	PFHG1050Z	RUBBER LEG	
	123	PFJS08M92Z	CONNECTOR, 8 PIN	
	124	XWC4BFJ	WASHER	
	125	PQHR945Z	BAND	
	126	J0KE00000101	INSULATOR	S
	127	PQLB1E1	INSULATOR	S
⚠	128	PFJA03A016Z	POWER CORD	
	129	PFJS03M90Z	CONNECTOR, 3 PIN	
	130	PFDE1191Y	LEVER, PAPER TOP SENSOR	POM-HB
	131	PFBH1022Y1	PUSH BUTTON, HOOK	POM-HB
	132	PFUS1338Y	SPRING, SPEAKER	
	133	L0AA05A00048	SPEAKER	S
	134	PFJS02L04Z	CONNECTOR, 2 PIN	
	135	PFDR1014Z	ROLLER, DOCUMENT SEPARATION	POM
	136	PFDE1133Z	SPACER, DELAY	POM-HB
	137	PFDF1087Z	SHAFT, DOCUMENT SEPARATION	POM-HB
	138	PFUS1839Z	SPRING, HEAD EARTH	

20.2.1.5. Gear Block Section

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	151	PFUA1041X	CHASSIS, GEAR BASE	PBT+ABS-V1
	152	PFDX1029Z	GEAR ASS'Y, TORQUE LIMIT	
	153	PFDG1151Z	GEAR	POM-HB
	154	PFDG1287Z	GEAR	POM-HB
	155	PFDG1150Z	GEAR	POM-HB
	156	PFDG1149Z	GEAR	POM-HB
	157	PFUS1231Y	COIL SPRING	
	158	PFDG1158Z	GEAR	POM-HB
	159	PFDG1159Z	GEAR	POM-HB
	160	PFHR1355Y	ARM	POM-HB
	161	PFHR1186Z	SPACER, SUPPORT BASE	POM-HB
	162	PFDG1282Z	GEAR	POM-HB
	163	PFDG1283Z	GEAR	POM-HB
	164	PFDG1284Z	GEAR	POM-HB
	165	PFDG1285Z	GEAR	POM-HB
	166	PFDG1153Z	GEAR	POM-HB
	167	PFDG1286Z	GEAR	POM-HB
	168	PFMD1062Y	FRAME	
	169	PFDG1154Z	GEAR	POM-HB
	170	L6HAYYYK0017	DC MOTOR, RX	
	171	L6HAYYYK0018	DC MOTOR, TX	

20.2.1.6. Screws

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	(A)	XTW3+10PFJ7	TAPPING SCREW	
	(B)	XSB4+6FJ	SMALL SCREW	
	(C)	XTW3+W8PFJ	TAPPING SCREW	
	(D)	PQHV2610PJ65	TAPPING SCREW	S
	(E)	XTB3+10GFJ	TAPPING SCREW	

20.2.1.7. Accessories and Packing Materials

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	A1	PFJA02B002Y	CORD, TELEPHONE	
	A2	PQJA212M	CORD, HANDSET	
	A3	PFKS1094Z2	TRAY, RECORDING PAPER	
	A4	PFUS1406Z	TRAY, DOCUMENT	
	A5	PFJXE1441Z	HANDSET ASS'Y	
	A6	PNJKFM387Z	CD-ROM (KX-FM388 only)	S
	A7	PNQW1605Z	QUICK START SHEET	
	A8	PNQX1786Z	INSTRUCTION BOOK	
	A9	PNQW1602Z	QUICK REFERENCE GUIDE (for Arabic)	
	A10	PNQW1604Z	QUICK REFERENCE GUIDE (for Frasi)	
	P1	PNZE1107Z-M	GIFT BOX (for KX-FP365)	
	P1	PNZE1110Z-M	GIFT BOX (for KX-FM388)	
	P2	PFPN1467Y	CUSHION, LEFT	
	P3	PFPN1468Z	CUSHION, RIGHT	
	P4	XZB32X45A04	PROTECTION COVER	S
	P5	XZB20X30A04	PROTECTION COVER	S
	P6	XZB20X35A04	PROTECTION COVER	S
	P7	PFPH1085Z	PACKING SHEET	

20.2.2. Digital Board Parts (KX-FP365CX)

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB1	PNWP1FP365CX	DIGITAL BOARD ASS'Y (RTL)	
			(ICs)	
	IC1	C1ZBZ0003300	IC	
	IC2	C0CBADD00009	IC	
	IC3	C0CBCBD00047	IC	
	IC4	C3ABKY000001	IC	S
	IC5	C1CB00002325	IC	
	IC6	PNWIFP365CX	FLASH MEMORY	
	IC7	C0JBAA000393	IC	S
	IC8	C3FBKC000135	IC	S
	IC9	C0JBAE000333	IC	S
	IC10	C0ABEB000023	IC	
	IC11	C0JBAS000128	IC	
	IC13	C1AB00002556	IC	
			(TRANSISTORS)	
	Q2	B1GBCFGG0028	TRANSISTOR(SI)	S
	Q4	B1GBCFGG0028	TRANSISTOR(SI)	S
	Q5	B1ABDF000025	TRANSISTOR(SI)	S
	Q7	B1ABDF000025	TRANSISTOR(SI)	S
	Q8	B1ABDF000026	TRANSISTOR(SI)	
	Q9	2SB1218ARL	TRANSISTOR(SI)	S

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	Q11	B1GBCFJJ0048	TRANSISTOR(SI)	S
	Q12	B1GBCFJJ0048	TRANSISTOR(SI)	S
	Q13	B1GBCFGG0028	TRANSISTOR(SI)	S
	Q14	UNR521700L	TRANSISTOR(SI)	S
			(CONNECTORS)	
	CN1	PQJS18A10Z	CONNECTOR, 18 PIN	S
	CN2	PQJS18A10Z	CONNECTOR, 18 PIN	S
	CN4	K1KA07A00257	CONNECTOR, 7 PIN	
	CN6	K1KA02A00587	CONNECTOR, 2 PIN	
	CN7	K1KY10BA0094	CONNECTOR, 10 PIN	
			(COMPONENTS PARTS)	
	CA13	F5A421040004	CAPACITOR ARRAY	
	CA28	F5A421040004	CAPACITOR ARRAY	
	CA32	F5A421040004	CAPACITOR ARRAY	
	CA71	F5A421040004	CAPACITOR ARRAY	
	CA82	F5A421040004	CAPACITOR ARRAY	
	CA92	F5A421040004	CAPACITOR ARRAY	
	RA1	EXB28V332JX	RESISTOR ARRAY	
	RA2	EXB28V101JX	RESISTOR ARRAY	
	RA5	EXB24V103JX	RESISTOR ARRAY	
	RA6	EXB24V221JX	RESISTOR ARRAY	
	RA8	EXB28V332JX	RESISTOR ARRAY	
	RA9	EXB24V223JX	RESISTOR ARRAY	
	RA10	D1H84724A013	RESISTOR ARRAY	S
	RA11	EXB24V124JX	RESISTOR ARRAY	
	RA12	EXB24V223JX	RESISTOR ARRAY	
	RA13	EXB24V332JX	RESISTOR ARRAY	
	RA14	EXB24V221JX	RESISTOR ARRAY	
			(IC FILTERS)	
	L1	J0JCC0000308	IC FILTER	
	L2	J0JCC0000286	IC FILTER	
	L3	J0JCC0000286	IC FILTER	
			(CRYSTAL OSCILLATORS)	
	X2	H0A327200147	CRYSTAL OSCILLATOR	
	X3	H2C240500006	CRYSTAL OSCILLATOR	
	X4	H0J322500006	CRYSTAL OSCILLATOR	
			(RESISTORS)	
	R2	ERJ2GEJ101	100	
	R7	ERJ2GE0R00	0	
	R8	ERJ2GEJ472X	4.7k	
	R9	ERJ2GEJ333	33k	
	R10	ERJ2GEJ472X	4.7k	
	R11	ERJ3EKF1101	1.1k	
	R12	ERJ3EKF3602	36k	
	R16	ERJ2GEJ101	100	
	R18	ERJ2GEJ104	100k	
	R24	ERJ2GEJ223	22k	
	R25	ERJ2GEJ433	43k	
	R26	ERJ2GEJ203	20k	
	R29	ERJ2GEJ222	2.2k	
	R30	ERJ2GEJ182	1.8k	
	R31	ERJ2GEJ4R7	4.7	
	R33	ERJ2GEJ103	10k	
	R38	ERJ2GEJ471	470	
	R39	ERJ2GEJ334	330k	
	R40	ERJ2GEJ475	4.7M	
	R41	ERJ2GEJ100	10	
	R42	ERJ2GE0R00	0	
	R43	ERJ2GEJ105X	1M	
	R49	ERJ2GEJ273X	27k	
	R50	ERJ2GEJ824	820k	
	R51	ERJ2GEJ114	110k	
	R53	ERJ2GEJ272	2.7k	
	R55	ERJ2GEJ182	1.8k	
	R56	ERJ2GEJ564	560k	
	R58	ERJ2GEJ103	10k	
	R60	ERJ2GEJ682	6.8k	
	R61	ERJ2GEJ332	3.3k	
	R62	ERJ2GEJ821	820	
	R64	ERJ2GEJ104	100k	
	R65	ERJ2GEJ223	22k	
	R66	ERJ2GEJ473	47k	
	R67	ERJ2GEJ335	3.3M	
	R68	ERJ2GEJ272	2.7k	
	R69	ERJ2GEJ333	33k	
	R71	ERJ2GEJ220	22	
	R72	ERJ2GEJ224	220k	
	R73	ERJ2GEJ823	82k	
	R74	ERJ2GEJ183	18k	
	R75	ERJ2GEJ184	180k	
	R78	ERJ2GEJ681	680	
	R79	ERJ2GEJ473	47k	
	R80	ERJ2GEJ103	10k	
	R82	ERJ2GEJ682	6.8k	
	R88	ERJ2GEJ563	56k	
	R92	ERJ2GE0R00	0	
	R93	ERJ2GE0R00	0	
	R97	ERJ2GEJ472X	4.7k	
	R99	ERJ2GEJ681	680	
			(CAPACITORS)	
	C2	F2G0J4700032	47	
	C4	ECUV1A105ZFV	1	
	C6	ECUE1A104KBQ	0.1	
	C8	ECUE1H102KBQ	0.001	
	C10	ECUV1A105ZFV	1	
	C11	F2G0J4700032	47	
	C21	ECUE1C104ZFQ	0.1	
	C22	ECUE1H102KBQ	0.001	
	C23	ECUE1H222KBQ	0.0022	
	C24	ECUE1H101JCQ	100P	
	C25	ECUE1C104ZFQ	0.1	
	C26	ECUE1C104ZFQ	0.1	
	C27	ECUE1H102KBQ	0.001	
	C29	ECUE1H102KBQ	0.001	
	C30	ECUE1C104ZFQ	0.1	
	C31	ECUE1C104ZFQ	0.1	
	C33	ECUE1H120JCQ	12P	
	C34	ECUE1C104ZFQ	0.1	
	C35	ECUE1H120JCQ	12P	
	C36	ECUE1H102KBQ	0.001	
	C37	ECUE1H102KBQ	0.001	
	C38	ECUE1C104ZFQ	0.1	
	C39	ECUE1C104ZFQ	0.1	
	C40	ECUE1C104ZFQ	0.1	
	C41	ECUE1H102KBQ	0.001	
	C42	ECUE1H102KBQ	0.001	
	C43	ECUE1H102KBQ	0.001	
	C44	ECUE1H102KBQ	0.001	
	C45	ECUE1C104ZFQ	0.1	
	C47	ECUE1H330JCQ	33P	
	C48	F2G0J4700032	47	
	C49	ECUE1C104ZFQ	0.1	
	C50	ECUE1H101JCQ	100P	
	C51	ECUE1A104KBQ	0.1	S
	C52	ECUE1H222KBQ	0.0022	
	C54	ECUV1A224KBV	0.22	
	C55	ECUE1E472KBQ	0.0047	
	C58	ECUE1A104KBQ	0.1	
	C59	ECUE1C104ZFQ	0.1	
	C61	ECUE1H100DCQ	10P	
	C62	ECUE1C104ZFQ	0.1	
	C63	ECUE1H680JCQ	68P	
	C64	ECUV1A105ZFV	1	
	C67	ECUE1C104ZFQ	0.1	
	C68	ECUV1A105ZFV	1	
	C69	ECUE1C104ZFQ	0.1	
	C70	ECUE1C104ZFQ	0.1	
	C72	ECUE1H120JCQ	12P	
	C73	ECUE1C104ZFQ	0.1	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C74	ECUE1C103KBQ	0.01	
	C75	ECUE1H120JCQ	12P	
	C77	ECUE1A683KBQ	0.068	
	C78	ECUE1C223KBQ	0.022	
	C79	ECUE1H102KBQ	0.001	
	C80	ECUV1H104ZFV	0.1	
	C83	ECUE1A104KBQ	0.1	
	C84	ECUE1H100DCQ	10P	
	C85	ECUE1C104ZFQ	0.1	
	C86	F2G1C1000014	10	S
	C87	ECUE1H121JCQ	120P	
	C88	F2G1C1000014	10	S
	C89	ECUE1A104KBQ	0.1	
	C90	ECUE1A104KBQ	0.1	
	C91	ECUV0J105KBV	1	
	C94	ECUE1C104ZFQ	0.1	
	C95	ECUV1C104KBV	0.1	
	C99	ECUE1H102KBQ	0.001	
	C101	ECUE1A104KBQ	0.1	
	C102	ECUE1A104KBQ	0.1	
	C104	ECUE1A104KBQ	0.1	
	C105	ECUV1A105ZFV	1	
	C115	ECUE1H102KBQ	0.001	
	C116	ECUE1C104ZFQ	0.1	
	C117	ECUE1C104ZFQ	0.1	
	C120	ECUE1C104ZFQ	0.1	
	C124	ECUE1C103KBQ	0.01	
	C125	ECUE1C103KBQ	0.01	

20.2.3. Digital Board Parts (KX-FM388CX)

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB1	PNWP1FM388CX	DIGITAL BOARD ASS'Y (RTL)	
			(ICs)	
	IC1	C1ZBZ0003300	IC	
	IC2	C0CBADD00009	IC	
	IC3	C0CBCBD00047	IC	
	IC4	C3ABKY000001	IC	S
	IC5	C1CB00002325	IC	
	IC6	PNWIFM388CX	FLASH MEMORY	
	IC7	C0JBAA000393	IC	S
	IC8	C3FBKC000135	IC	S
	IC9	C0JBAE000333	IC	S
	IC10	C0ABEB000023	IC	
	IC11	C0JBAS000128	IC	
	IC12	C2BBFE000153	IC	
	IC13	C1AB00002556	IC	
			(TRANSISTORS)	
	Q1	UN5213	TRANSISTOR(SI)	S
	Q2	B1GBCFGG0028	TRANSISTOR(SI)	S
	Q3	UN5113	TRANSISTOR(SI)	S
	Q4	B1GBCFGG0028	TRANSISTOR(SI)	S
	Q5	B1ABDF000025	TRANSISTOR(SI)	S
	Q7	B1ABDF000025	TRANSISTOR(SI)	S
	Q8	B1ABDF000026	TRANSISTOR(SI)	
	Q9	2SB1218ARL	TRANSISTOR(SI)	S
	Q11	B1GBCFJJ0048	TRANSISTOR(SI)	S
	Q12	B1GBCFJJ0048	TRANSISTOR(SI)	S
	Q13	B1GBCFGG0028	TRANSISTOR(SI)	S
	Q14	UNR521700L	TRANSISTOR(SI)	S
			(CONNECTORS)	
	CN1	PQJS18A10Z	CONNECTOR, 18 PIN	S
	CN2	PQJS18A10Z	CONNECTOR, 18 PIN	S
	CN4	K1KA07A00257	CONNECTOR, 7 PIN	
	CN6	K1KA02A00587	CONNECTOR, 2 PIN	
	CN7	K1KY17BA0094	CONNECTOR, 17 PIN	
			(COMPONENTS PARTS)	
	CA12	F5A421040004	CAPACITOR ARRAY	
	CA13	F5A421040004	CAPACITOR ARRAY	
	CA28	F5A421040004	CAPACITOR ARRAY	
	CA32	F5A421040004	CAPACITOR ARRAY	
	CA71	F5A421040004	CAPACITOR ARRAY	
	CA82	F5A421040004	CAPACITOR ARRAY	
	CA92	F5A421040004	CAPACITOR ARRAY	
	RA1	EXB28V332JX	RESISTOR ARRAY	
	RA2	EXB28V101JX	RESISTOR ARRAY	
	RA3	EXB28V221JX	RESISTOR ARRAY	
	RA4	EXB28V221JX	RESISTOR ARRAY	
	RA5	EXB24V103JX	RESISTOR ARRAY	
	RA6	EXB24V221JX	RESISTOR ARRAY	
	RA8	EXB28V332JX	RESISTOR ARRAY	
	RA9	EXB24V223JX	RESISTOR ARRAY	
	RA10	D1H84724A013	RESISTOR ARRAY	S
	RA11	EXB24V124JX	RESISTOR ARRAY	
	RA12	EXB24V223JX	RESISTOR ARRAY	
	RA13	EXB24V332JX	RESISTOR ARRAY	
	RA14	EXB24V221JX	RESISTOR ARRAY	
			(IC FILTERS)	
	L1	J0JCC0000308	IC FILTER	
	L2	J0JCC0000286	IC FILTER	
	L3	J0JCC0000286	IC FILTER	
			(CRYSTAL OSCILLATORS)	
	X1	H0J600400020	CRYSTAL OSCILLATOR	
	X2	H0A327200147	CRYSTAL OSCILLATOR	
	X3	H2C240500006	CRYSTAL OSCILLATOR	
	X4	H0J322500006	CRYSTAL OSCILLATOR	
			(RESISTORS)	
	R2	ERJ2GEJ101	100	
	R4	ERJ2GEJ152	1.5k	
	R5	ERJ3EKF27R0	27	
	R6	ERJ3EKF27R0	27	
	R7	ERJ2GE0R00	0	
	R8	ERJ2GEJ472X	4.7k	
	R9	ERJ2GEJ333	33k	
	R10	ERJ2GEJ472X	4.7k	
	R11	ERJ3EKF1101	1.1k	
	R12	ERJ3EKF3602	36k	
	R14	ERJ2GE0R00	0	
	R16	ERJ2GEJ101	100	
	R18	ERJ2GEJ104	100k	
	R20	ERJ2GE0R00	0	
	R22	ERJ2GEJ104	100k	
	R23	ERJ2GEJ103	10k	
	R24	ERJ2GEJ223	22k	
	R25	ERJ2GEJ433	43k	
	R26	ERJ2GEJ203	20k	
	R29	ERJ2GEJ222	2.2k	
	R30	ERJ2GEJ182	1.8k	
	R31	ERJ2GEJ4R7	4.7	
	R32	ERJ2GEJ103	10k	
	R38	ERJ2GEJ471	470	
	R39	ERJ2GEJ334	330k	
	R40	ERJ2GEJ475	4.7M	
	R41	ERJ2GEJ100	10	
	R42	ERJ2GE0R00	0	
	R43	ERJ2GEJ105X	1M	
	R49	ERJ2GEJ273X	27k	
	R50	ERJ2GEJ824	820k	
	R51	ERJ2GEJ114	110k	
	R53	ERJ2GEJ272	2.7k	
	R55	ERJ2GEJ182	1.8k	
	R56	ERJ2GEJ564	560k	
	R58	ERJ2GEJ103	10k	
	R60	ERJ2GEJ682	6.8k	
	R61	ERJ2GEJ332	3.3k	
	R62	ERJ2GEJ821	820	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	R64	ERJ2GEJ104	100k	
	R65	ERJ2GEJ223	22k	
	R66	ERJ2GEJ473	47k	
	R67	ERJ2GEJ335	3.3M	
	R68	ERJ2GEJ272	2.7k	
	R69	ERJ2GEJ333	33k	
	R71	ERJ2GEJ220	22	
	R72	ERJ2GEJ224	220k	
	R73	ERJ2GEJ823	82k	
	R74	ERJ2GEJ183	18k	
	R75	ERJ2GEJ184	180k	
	R78	ERJ2GEJ681	680	
	R79	ERJ2GEJ473	47k	
	R80	ERJ2GEJ103	10k	
	R82	ERJ2GEJ682	6.8k	
	R88	ERJ2GEJ563	56k	
	R92	ERJ2GE0R00	0	
	R93	ERJ2GE0R00	0	
	R97	ERJ2GEJ472X	4.7k	
	R99	ERJ2GEJ681	680	
			(CAPACITORS)	
	C2	F2G0J4700032	47	
	C4	ECUV1A105ZFV	1	
	C5	ECUE1H680JCQ	68P	
	C6	ECUE1A104KBQ	0.1	
	C7	ECUE1H680JCQ	68P	
	C8	ECUE1H102KBQ	0.001	
	C10	ECUV1A105ZFV	1	
	C11	F2G0J4700032	47	
	C14	ECUE1H7R0DCQ	7	
	C15	ECUE1H8R0DCQ	8	
	C17	ECUE1C104ZFQ	0.1	
	C20	ECUE1C104ZFQ	0.1	
	C21	ECUE1C104ZFQ	0.1	
	C22	ECUE1H102KBQ	0.001	
	C23	ECUE1H222KBQ	0.0022	
	C24	ECUE1H101JCQ	100P	
	C25	ECUE1C104ZFQ	0.1	
	C26	ECUE1C104ZFQ	0.1	
	C27	ECUE1H102KBQ	0.001	
	C29	ECUE1H102KBQ	0.001	
	C30	ECUE1C104ZFQ	0.1	
	C31	ECUE1C104ZFQ	0.1	
	C33	ECUE1H120JCQ	12P	
	C34	ECUE1C104ZFQ	0.1	
	C35	ECUE1H120JCQ	12P	
	C36	ECUE1H102KBQ	0.001	
	C37	ECUE1H102KBQ	0.001	
	C38	ECUE1C104ZFQ	0.1	
	C39	ECUE1C104ZFQ	0.1	
	C40	ECUE1C104ZFQ	0.1	
	C41	ECUE1H102KBQ	0.001	
	C42	ECUE1H102KBQ	0.001	
	C43	ECUE1H102KBQ	0.001	
	C44	ECUE1H102KBQ	0.001	
	C45	ECUE1C104ZFQ	0.1	
	C47	ECUE1H330JCQ	33P	
	C48	F2G0J4700032	47	
	C49	ECUE1C104ZFQ	0.1	
	C50	ECUE1H101JCQ	100P	
	C51	ECUE1A104KBQ	0.1	S
	C52	ECUE1H222KBQ	0.0022	
	C54	ECUV1A224KBV	0.22	
	C55	ECUE1E472KBQ	0.0047	
	C58	ECUE1A104KBQ	0.1	
	C59	ECUE1C104ZFQ	0.1	
	C61	ECUE1H100DCQ	10P	
	C62	ECUE1C104ZFQ	0.1	
	C63	ECUE1H680JCQ	68P	
	C64	ECUV1A105ZFV	1	
	C67	ECUE1C104ZFQ	0.1	
	C68	ECUV1A105ZFV	1	
	C69	ECUE1C104ZFQ	0.1	
	C70	ECUE1C104ZFQ	0.1	
	C72	ECUE1H120JCQ	12P	
	C73	ECUE1C104ZFQ	0.1	
	C74	ECUE1C103KBQ	0.01	
	C75	ECUE1H120JCQ	12P	
	C77	ECUE1A683KBQ	0.068	
	C78	ECUE1C223KBQ	0.022	
	C79	ECUE1H102KBQ	0.001	
	C80	ECUV1H104ZFV	0.1	
	C83	ECUE1A104KBQ	0.1	
	C84	ECUE1H100DCQ	10P	
	C85	ECUE1C104ZFQ	0.1	
	C86	F2G1C1000014	10	S
	C87	ECUE1H121JCQ	120P	
	C88	F2G1C1000014	10	S
	C89	ECUE1A104KBQ	0.1	
	C90	ECUE1A104KBQ	0.1	
	C91	ECUV0J105KBV	1	
	C94	ECUE1C104ZFQ	0.1	
	C95	ECUV1C104KBV	0.1	
	C99	ECUE1H102KBQ	0.001	
	C101	ECUE1A104KBQ	0.1	
	C102	ECUE1A104KBQ	0.1	
	C104	ECUE1A104KBQ	0.1	
	C105	ECUV1A105ZFV	1	
	C115	ECUE1H102KBQ	0.001	
	C116	ECUE1C104ZFQ	0.1	
	C117	ECUE1C104ZFQ	0.1	
	C120	ECUE1C104ZFQ	0.1	
	C124	ECUE1C103KBQ	0.01	
	C125	ECUE1C103KBQ	0.01	

20.2.4. Analog Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB2	PFWP2FP701CX	ANALOG BOARD ASS'Y (RTL) (for KX-FP365)	
	PCB2	PNWP2FM387CX	ANALOG BOARD ASS'Y (RTL) (for KX-FM388)	
			(IC)	
	IC101	C0ABEB000083	IC	
			(TRANSISTORS)	
	Q105	B1ABDF000026	TRANSISTOR(SI)	S
	Q106	B1GBCFEN0010	TRANSISTOR(SI)	S
			(DIODES)	
	D101	MA4120	DIODE(SI)	S
	D104	MA4030	DIODE(SI)	S
	D106	MA4030	DIODE(SI)	S
	D111	B0ADEJ000026	DIODE(SI)	S
	D112	1SS133	DIODE(SI)	S
			(JACKS AND CONNECTORS)	
	CN101	K1KY10BA0093	CONNECTOR, 10 PIN (for KX-FP365)	
	CN101	K1KY17BA0093	CONNECTOR, 17 PIN (for KX-FM388)	
	CN103	K2LB1YYB0002	JACK, TEL. LINE	S
	CN104	K2LB1YYB0002	JACK, EXT. TEL	S
	CN105	K2LA1YYB0001	JACK, HANDSET	S
	CN106	K1FA104B0017	CONNECTOR, USB I/F (KX-FM388 only)	S
			(SWITCH)	
	SW101	PFSH1A011Z	PUSH SWITCH, HOOK LEVER	
			(COILS)	
	L105	PQLQR2KA113	COIL	S
	L106	PQLQR2KA113	COIL	S

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	L107	PQLQR2KA113	COIL	S
	L108	PQLQR2KA113	COIL	S
	L109	PQLQR2KA113	COIL	S
	L110	PQLQR2KA113	COIL	S
	L111	PQLQR2KA20T	COIL	S
	L112	PQLQR2KA20T	COIL	S
	L113	PQLQR2KA20T	COIL	S
	L114	PQLQR2KA20T	COIL	S
	R104	PQLQR2KA113	COIL	S
			(IC FILTERS)	
	L102	J0JCC0000117	IC FILTER (KX-FM388 only)	
	L103	J0JCC0000117	IC FILTER (KX-FM388 only)	
			(PHOTO ELECTRIC TRANSDUCER)	
⚠	PC102	0N3181	PHOTO COUPLER	S
			(THERMISTOR)	
	POS101	PFRT002	THERMISTOR	S
			(RELAY)	
⚠	RLY101	K6B1CYY00005	RELAY	
			(VARISTORS)	
	SA101	PFRZRA311P6T	VARISTOR (Surge Absorber)	S
⚠	SA102	PFRZRA102P6T	VARISTOR (Surge Absorber)	S
			(TRANSFORMER)	
⚠	T101	G4AYA0000016	TRANSFORMER	
			(RESISTORS)	
	L101	ERJ3GEY0R00	0 (KX-FM388 only)	
	L104	ERJ3GEY0R00	0 (KX-FM388 only)	
	R101	ERJ3GEYJ103	10k	
	R102	ERJ3GEYJ103	10k	
	R103	ERJ3GEYJ220	22	
	R106	ERJ3GEYJ393	39k	
	R107	ERJ3GEYJ393	39k	
	R108	ERJ3GEYJ474	470k	
	R109	ERJ3GEYJ163	16k	
	R110	ERJ3GEYJ163	16k	
	R111	ERJ3GEY0R00	0	
	R112	ERJ3GEYJ562	5.6k	
	R114	ERDS2TJ271	270	S
	R117	ERJ3GEYJ822	8.2k	
	R118	ERJ3GEYJ273	27k	
	R122	ERDS1TJ223	22k	S
	R127	ERG2SJ121	120	
	R128	ERJ3GEYJ223	22k	
	R129	ERJ3GEYJ754	750k	
	R130	ERJ3GEYJ754	750k	
	R133	ERDS1TJ153	15k	S
	R134	ERJ3GEYJ473	47k	
	R135	ERJ3GEYJ331	330	
	R138	ERJ3GEYJ912	9.1k	
	R139	ERJ3GEYJ912	9.1k	
	R142	ERJ3GEYJ152	1.5k	
	R143	ERJ3GEYJ152	1.5k	
	R144	ERJ3GEYJ680	68	
	R145	ERJ3GEYJ331	330	
			(CAPACITORS)	
	C101	ECEA0JKA470	47	S
	C102	ECEA0JKA470	47	S
	C103	ECUV1E104ZFV	0.1	
	C104	ECUV1H561KBV	560P	
	C105	ECUV1H561KBV	560P	
	C106	ECUV1H101JCV	100P	
	C107	ECUV1H272KBV	0.0027	
	C108	ECUV1C823KBV	0.082	
	C109	ECUV1C823KBV	0.082	
	C110	ECUV1H472KBV	0.0047	
	C111	ECUV1C393KBV	0.039	
	C113	ECEA1HKA4R7	4.7	S
	C115	ECUV1C393KBV	0.039	
	C116	ECUV1C104KBV	0.1	
	C120	ECUV1H181JCV	180P	
	C121	ECUV1H181JCV	180P	
	C124	ECUV1H472KBV	0.0047	
	C126	ECUV1H101JCV	100P	
	C128	ECEA0JKA470	47	S
	C129	ECUV1C333KBV	0.033	
	C130	ECUV1C333KBV	0.033	
	C131	ECUV1H103KBV	0.01	
	C132	ECUV1H103KBV	0.01	
	C134	ECEA0JKA470	47	S
	C135	ECUV1H103KBV	0.01	
	C136	F0C2E105A216	1	

20.2.5. Operation Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB3	PNWP3FP365CX	OPERATION BOARD ASS'Y (RTL)	
			(IC)	
	IC301	C1ZBZ0003876	IC	
			(DIODE)	
	D301	B3AAA0000534	DIODE(SI)	
			(CONNECTOR)	
	CN301	K1KA08B00243	CONNECTOR, 8 PIN	
			(LIQUID CRYSTAL DISPLAY)	
	CN302	L5DAAFB00001	LIQUID CRYSTAL DISPLAY	S
			(SWITCHES)	
	SW301	K0H1BA000259	SPECIAL SWITCH	
	SW302	K0H1BA000259	SPECIAL SWITCH	
	SW303	K0H1BA000259	SPECIAL SWITCH	
	SW304	K0H1BA000259	SPECIAL SWITCH	
	SW305	K0H1BA000259	SPECIAL SWITCH	
	SW306	K0H1BA000259	SPECIAL SWITCH	
	SW307	K0H1BA000259	SPECIAL SWITCH	
	SW308	K0H1BA000259	SPECIAL SWITCH	
	SW309	K0H1BA000259	SPECIAL SWITCH	
	SW310	K0H1BA000259	SPECIAL SWITCH	
	SW311	K0H1BA000259	SPECIAL SWITCH	
	SW312	K0H1BA000259	SPECIAL SWITCH	
	SW313	K0H1BA000259	SPECIAL SWITCH	
	SW314	K0H1BA000259	SPECIAL SWITCH	
	SW315	K0H1BA000259	SPECIAL SWITCH	
	SW316	K0H1BA000259	SPECIAL SWITCH	
	SW317	K0H1BA000259	SPECIAL SWITCH	
	SW318	K0H1BA000259	SPECIAL SWITCH	
	SW319	K0H1BA000259	SPECIAL SWITCH	
	SW320	K0H1BA000259	SPECIAL SWITCH	
	SW321	K0H1BA000259	SPECIAL SWITCH	
	SW322	K0H1BA000259	SPECIAL SWITCH	
	SW323	K0H1BA000259	SPECIAL SWITCH	
	SW324	K0H1BA000259	SPECIAL SWITCH	
	SW325	K0H1BA000259	SPECIAL SWITCH	
	SW326	K0H1BA000259	SPECIAL SWITCH	
	SW327	K0H1BA000259	SPECIAL SWITCH	
	SW328	K0H1BA000259	SPECIAL SWITCH	
	SW329	K0H1BA000259	SPECIAL SWITCH	
	SW330	K0H1BA000259	SPECIAL SWITCH	
	SW331	K0H1BA000259	SPECIAL SWITCH	
	SW332	K0H1BA000259	SPECIAL SWITCH	
	SW333	K0H1BA000259	SPECIAL SWITCH	
	SW334	K0H1BA000259	SPECIAL SWITCH	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	SW335	K0H1BA000259	SPECIAL SWITCH	
	SW336	K0H1BA000259	SPECIAL SWITCH	
	SW337	K0L1BB000029	SWITCH, DOC. TOP SENSOR	
	SW338	K0L1BB000030	SWITCH, DOC. SET SENSOR	
			(RESISTORS)	
	L301	ERJ3GEY0R00	0	
	R301	ERJ3GEYJ332	3.3k	
	R302	ERJ3GEYJ271	270	
	R303	ERJ3GEYJ181	180	
	R304	ERJ3GEYJ680	68	
	R305	ERJ3GEYJ181	180	
	R306	ERJ3GEYJ181	180	
	R307	ERJ3GEYJ472	4.7k	
	R308	ERJ3GEY0R00	0	
	R309	ERJ3GEYJ102	1k	
	R310	ERJ3GEYJ183	18k	
	R311	ERJ3GEYJ472	4.7k	
	R312	ERJ3GEYJ122	1.2k	
	R313	ERJ3GEYJ821	820	
	R316	ERDS2TJ681	680	S
	R317	ERJ3GEYJ472	4.7k	
	R322	ERDS2TJ472	4.7k	S
	R325	ERJ3GEYJ181	180	
	R326	ERJ3GEY0R00	0	
	R329	ERJ3GEYJ222	2.2k	
	R331	ERJ3GEYJ4R7	4.7	
			(CAPACITORS)	
	C301	ECUV1C104ZFV	0.1	
	C302	ECUV1H331JCV	330P	
	C306	ECUV1H102KBV	0.001	
	C307	ECUV1H101JCV	100P	
	C308	ECUV1H101JCV	100P	
	C312	ECUV1H331JCV	330P	
	C313	ECUV1C104ZFV	0.1	
	C315	ECUV1C104ZFV	0.1	
	C318	ECUV1H681KBV	680P	
	C320	ECUV1C104ZFV	0.1	

20.2.6. Power Supply Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
⚠	PCB4	N0AC2GJ00006	POWER SUPPLY BOARD ASS'Y (RTL)	
			(IC)	
	IC101	PFVIFA5518N	IC	
			(TRANSISTORS)	
⚠	Q101	FQPF4N90C	TRANSISTOR(SI)	
	Q203	2SC3928	TRANSISTOR(SI)	
			(DIODES)	
⚠	D101	PFVD1N4005	DIODE(SI)	
⚠	D102	PFVD1N4005	DIODE(SI)	
⚠	D103	PFVD1N4005	DIODE(SI)	
⚠	D104	PFVD1N4005	DIODE(SI)	
	D106	PFVDD1NL20U	DIODE(SI)	S
	D107	MA165	DIODE(SI)	S
	D201	SF50DG	DIODE(SI)	S
	D202	PFVDD1NL20U	DIODE(SI)	S
			(FUSE)	
⚠	F101	PFBAST250315	FUSE	
			(PHOTO ELECTRIC TRANSDUCER)	
⚠	PC101	PFVIPC123	PHOTO COUPLER	S
			(VARISTOR)	
⚠	ZNR101	ERZV10D751	VARISTOR	S
			(RESISTORS)	
	R105	ERX2SJR22E	0.22	
	R110	ERDS2TJ470	47	S
	R111	ERDS2TJ150	15	S
	R112	ERJ3GEYJ101	100	S
	R222	ERJ3GEYJ102	1k	S
			(CAPACITOR)	
	C106	EEUGH2W470U	47	S

20.2.7. Interface Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB5	PFLP1915CX-B	INTERFACE BOARD ASS'Y (RTL) (for KX-FP365)	
	PCB5	PNLP2129CX-B	INTERFACE BOARD ASS'Y (RTL) (for KX-FM388)	
			(TRANSISTORS)	
	IC401	B1HAGFF00015	TRANSISTOR(SI)	S
	IC402	B1HAGFF00015	TRANSISTOR(SI)	S
	IC403	B1CHRD000003	TRANSISTOR(SI)	
	Q401	2SB1322	TRANSISTOR(SI)	S
	Q402	2SB1322	TRANSISTOR(SI)	S
			(DIODES)	
	D401	1SS133	DIODE(SI)	S
	D403	B0BA7R900004	DIODE(SI)	
	D404	B0BA7R900004	DIODE(SI)	
	D405	B0BA7R900004	DIODE(SI)	
	D406	B0BA7R900004	DIODE(SI)	
	D407	1SS133	DIODE(SI)	S
			(BATTERY)	
	BAT401	CR2032/H9B	LITHIUM BATTERY	S
			(PHOTO ELECTRIC TRANSDUCER)	
	PS401	CNA1006N	PHOTO COUPLER	S
			(CONNECTORS)	
	CN401	K1KA08A00440	CONNECTOR, 8 PIN	
	CN402	K1KA05AA0193	CONNECTOR, 5 PIN	S
	CN403	K1KA05AA0223	CONNECTOR, 5 PIN	
	CN404	K1KA08A00498	CONNECTOR, 8 PIN	
	CN405	K1KA03A00495	CONNECTOR, 3 PIN	
	CN406	K1KA11A00158	CONNECTOR, 11 PIN	
	CN407	K1KA18A00101	CONNECTOR, 18 PIN	
	CN408	K1KA18A00101	CONNECTOR, 18 PIN	
			(FUSES)	
	F401	K5H122Y00002	FUSE	S
	F402	K5H122Y00002	FUSE	S
			(RESISTORS)	
	R401	ERDS1TJ101	100	S
	R403	ERJ3GEYJ562	5.6k	
	R404	ERJ3GEYJ821	820	
	R405	ERJ3GEYJ821	820	
	R406	ERDS1TJ152	1.5k	S
	R407	ERDS1TJ152	1.5k	S
	R408	ERJ3GEYJ222	2.2k	
	R409	ERJ3GEYJ101	100	
	R410	ERDS2TJ181	180	S
			(CAPACITORS)	
	C401	ECUV1H104ZFV	0.1	
	C404	ECUV1H104ZFV	0.1	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C405	ECEA1VKA330	33	
	C406	ECEA1CKA221	220	S

20.2.8. Sensor Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB6	PFWP4FP706CN	SENSOR BOARD ASS'Y (RTL)	
	SW501	K0MA11000041	SIGNAL SWITCH	S
	SW502	PFSH1A011Z	SWITCH HOOK LEVER	

20.2.9. Microphone Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB7	PNWP5FP365CX	MICROPHONE BOARD ASS'Y (RTL)	
	MIC	L0CBAB000070	BUILTIN-MICROPHONE	