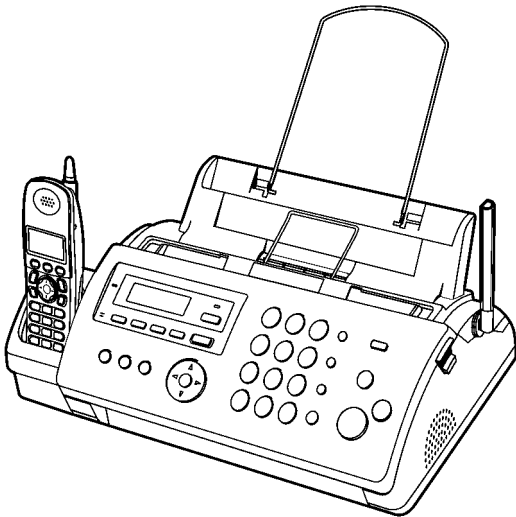


Service Manual

2.4 GHz Cordless Phone System with FAX and Copier

KX-FG2452CX

(for Asia, Middle Near East and Other areas)



⚠ 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 Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

IMPORTANT INFORMATION ABOUT LEAD FREE, (PbF), SOLDERING

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

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

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

Panasonic[®]

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1 Safety Precautions

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

1.1. For Service Technicians

ICs and LSIs are vulnerable to static electricity.

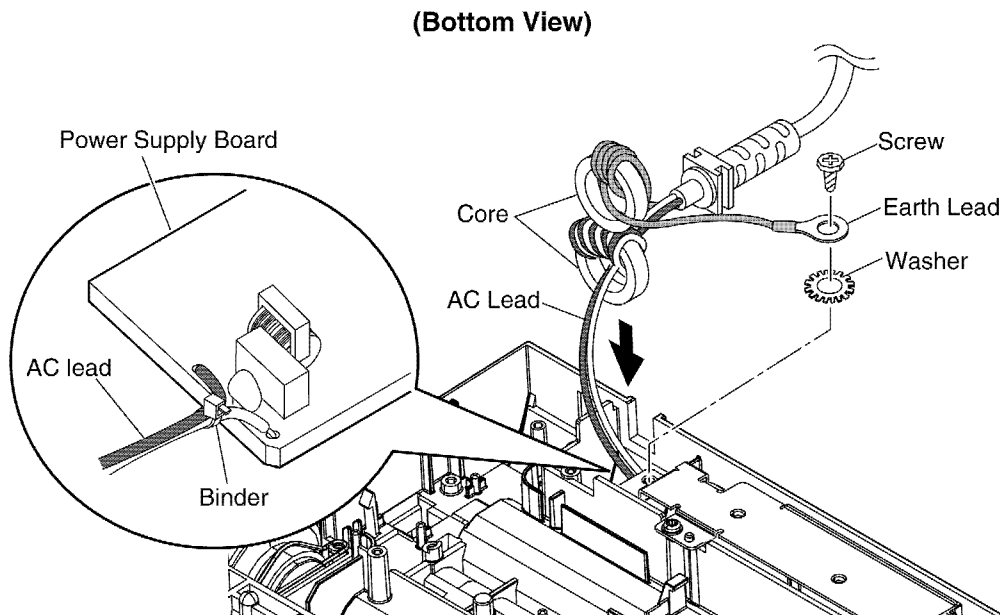
When repairing, the following precautions will help prevent recurring malfunctions.

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

1.2. AC Caution

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

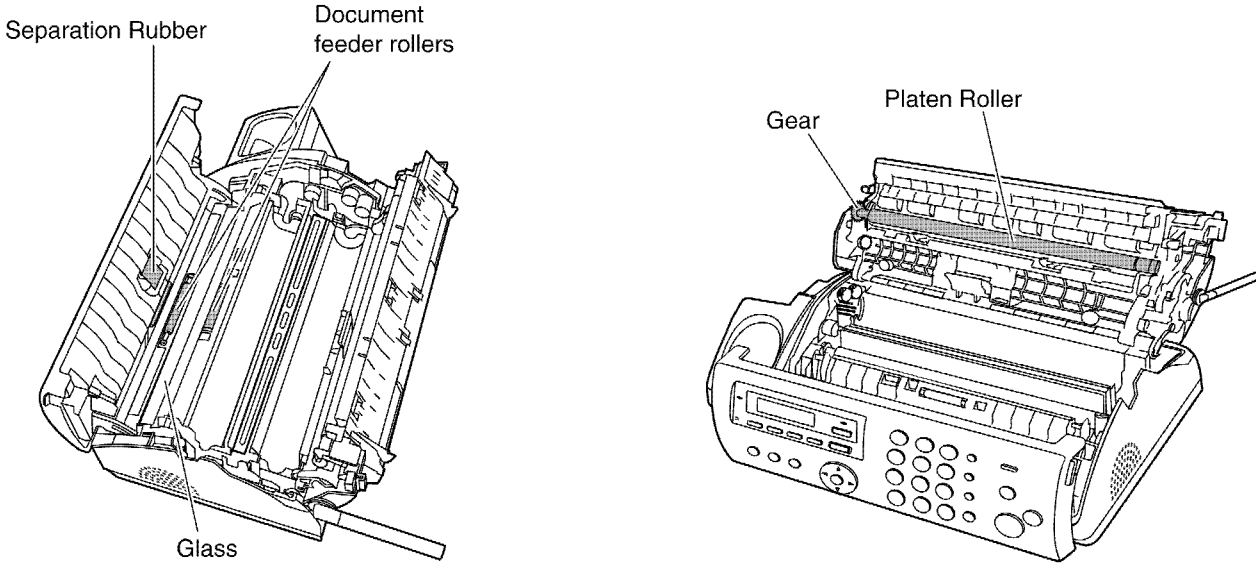
1. The earth lead is fixed with the screw.
2. The AC lead is connected properly to power supply board.
3. Wrap the earth lead around the core 5 times.
4. Wrap the AC lead around the core 5 times.



1.3. Personal Safety Precautions

1.3.1. Moving Sections of the Unit

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



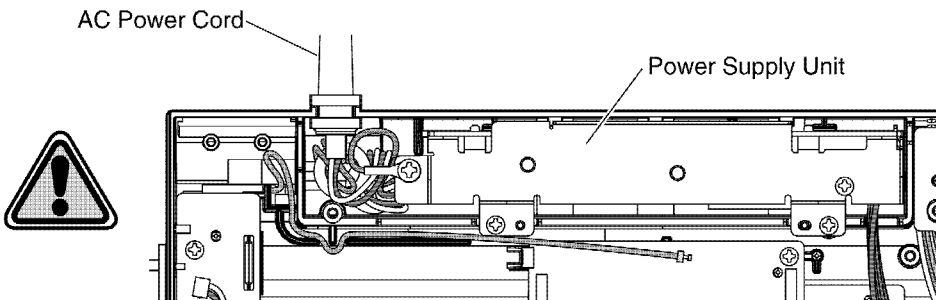
1.3.2. Live Electrical Sections

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

CAUTION:

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

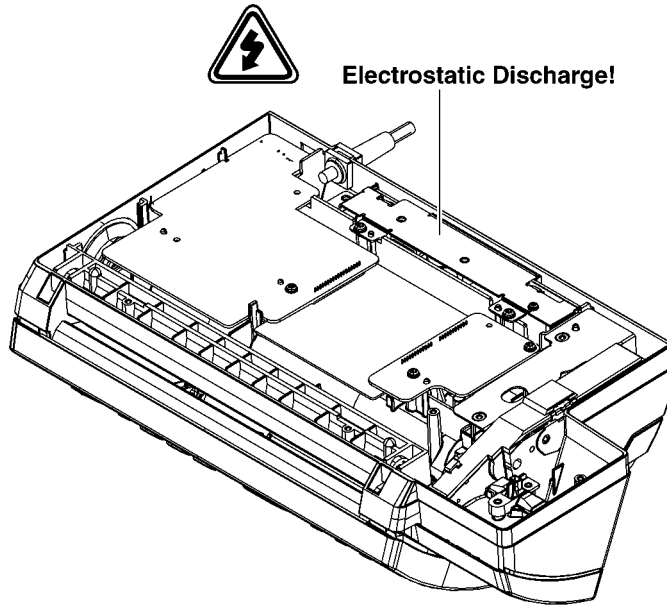
(Bottom View)



1.4. Service Precautions

1.4.1. Precautions to Prevent Damage from Static Electricity

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



2 Warning

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

Note:

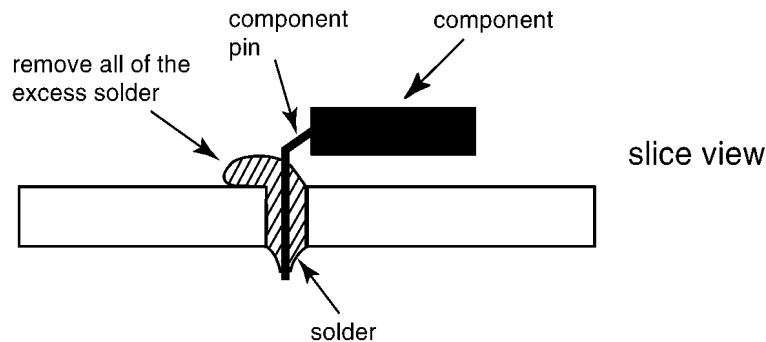
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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

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

Caution

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



2.1.1. 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.

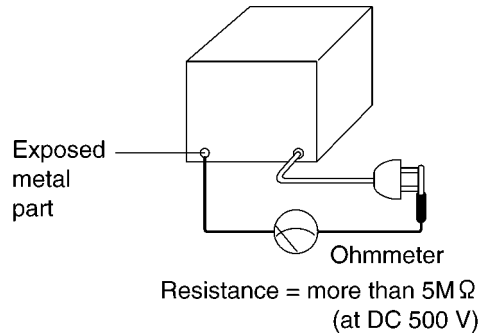
0.3mm X 100g	0.6mm X 100g	1.0mm X 100g

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

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 Instructions.

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

3 Specifications

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

3.1. Base Unit

Applicable Lines:	Public Switched Telephone Network
Document Size:	Max. 216 mm in width, Max. 600 mm in length
Effective Scanning Width:	208 mm
Recording Paper Size:	A4: 210 mm × 297 mm
Effective Printing Width:	A4: 202 mm
Recording Paper Weight:	60 g/m ² to 90 g/m ²
Transmission Speed*¹:	Approx. 15 s/page* 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)
Modem Speed:	9,600 / 7,200 / 4,800 / 2,400 bps; Automatic Fallback
Operating Environment:	5—35°C, 20—80 % RH (Relative Humidity)
Frequency:	2.4 GHz — 2.48 GHz
RF (Radio Frequency) Power Output Level:	0.04W — 0.1W
Dimensions:	Approx. height 106 mm × width 374 mm × depth 200 mm
Mass (Weight):	Approx. 2.5 kg
Power Consumption:	Standby: Approx. 5.0 W Transmission: Approx. 15 W Reception: Approx. 40 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—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.)
Voice Memory Capacity*⁴:	Approx. 18 minutes of recording time including greeting messages

*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 long. (Refer to **ITU-T No.1 Test Chart (P.223)**.)

*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.

3.2. Cordless Handset

Operating Environment:	5°C—40°C
Frequency:	2.4 GHz—2.48 GHz
RF (Radio Frequency) Power Output Level:	0.04W — 0.1W
Dimensions:	Approx. height 167 mm × width 48 mm × depth 31 mm
Mass (Weight):	Approx. 107 g
Power Supply:	Ni-MH battery (2.4 V, 830 mAh)
Security codes:	520,000

4 General/Introduction

4.1. Optional Accessories

Model No.	Description	Specification
KX-FA52A, KX-FA52E	Replacement Film ^{*1}	30 m × 2 rolls (Each roll will print about 90 A4 sized pages)
HHR-P105	Battery	-----
KX-TCA89BX	Headset	Allows hands-free telephone conversations.

^{*1} To ensure the unit operates properly, we recommend the use of a 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

- 15 second transmission speed *
- A4, G3 compatible
- Automatic document feeder (up to 10 sheets)
- Quick scan
- Resolution: Standard/Fine/Super fine/Photo (64 level)
- Broadcast
- 20-sheet recording paper capacity
- Automatic fax/phone switching

* The 15 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
- Digital duplex speakerphone
- Voice muting
- Redialing function
- The Base unit and cordless handset provide a phonebook (50 items each)
- Caller ID

The calling party's name or telephone number will be displayed after the 1st ring. You have the option of whether or not to answer the call.

The unit will automatically store caller information (name, telephone number, date and time of the call, the number of times called) from the 30 (base unit)/50 (cordless handset) most recent callers.

It is possible to view caller information one at a time on the display or print the entire Caller ID list.

Enhanced Copier Function

- Multi-copy function (up to 20 copies)
- Enlargement and reduction
- Collate
- 64-Level halftone

Digital Answering System

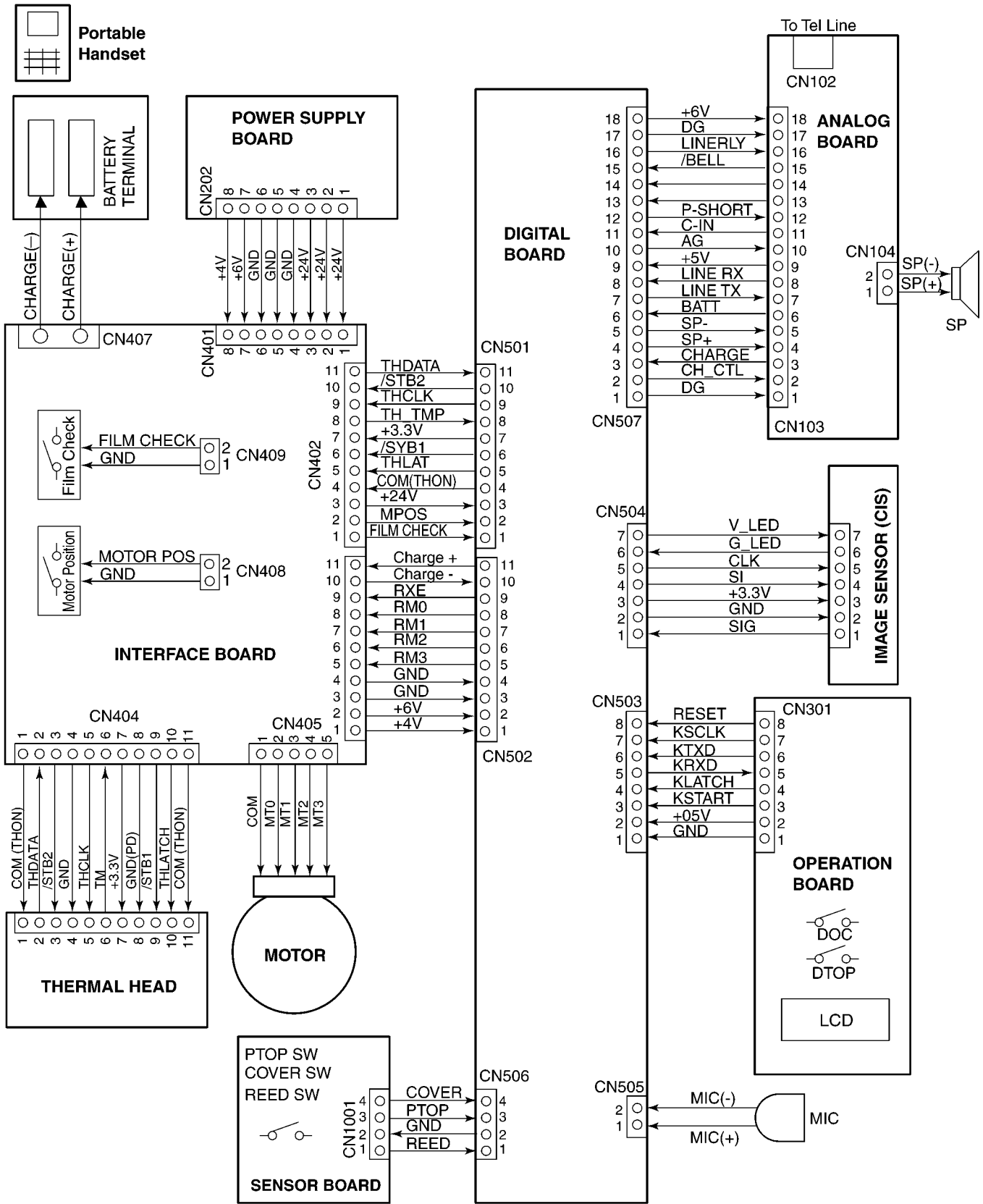
- Voice Time / Day Stamp
- 18-Minutes recording time

2.4 GHz Cordless

- Fax activation from handset
- 11 day battery life

6 Technical Descriptions

6.1. Connection Diagram

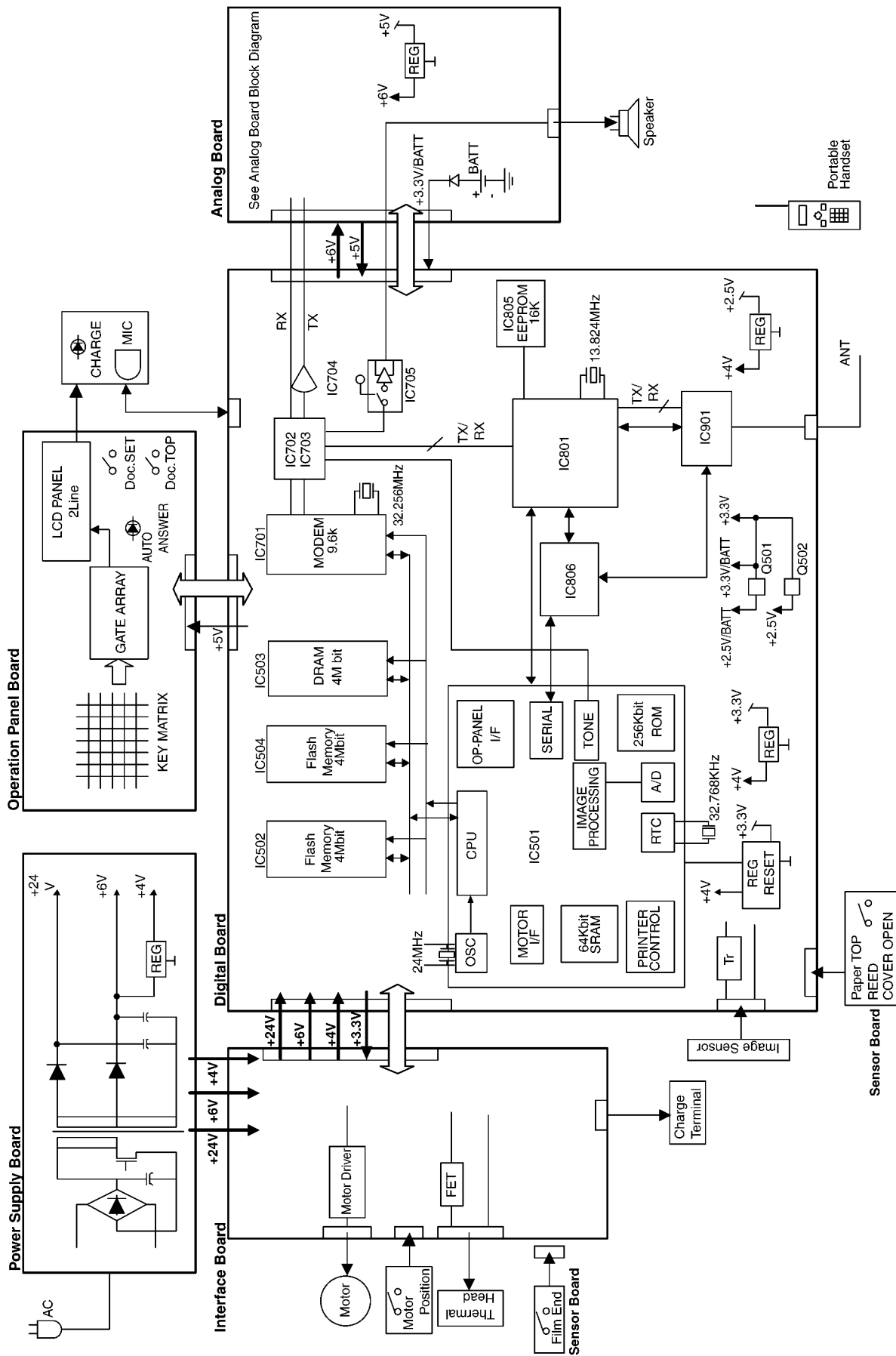


6.2. General Block Diagram

The following is an outline of each device IC on the digital board. (Refer to **General Block Diagram** (P.12).).

1. ASIC (IC501)
 - 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
2. Flash ROM (IC502)
 - 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 (IC503)
 - This memory is used mainly for the parameter working in the storage area.
4. MODEM (IC701)
 - Performs the modulation and the demodulation for FAX communication.
5. Read Section
 - CIS image sensor to read transmitted documents.
6. Motor Driver (IC401)
 - 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 and film end switch, a document set switch, a document top switch, a paper top sensor.
10. Power Supply Board Switching Section
 - Supplies +4V, +6V and +24V to the unit.
11. Flash Memory (IC504)
 - This memory is used for voice prompt.

6.2.1. General Block Diagram

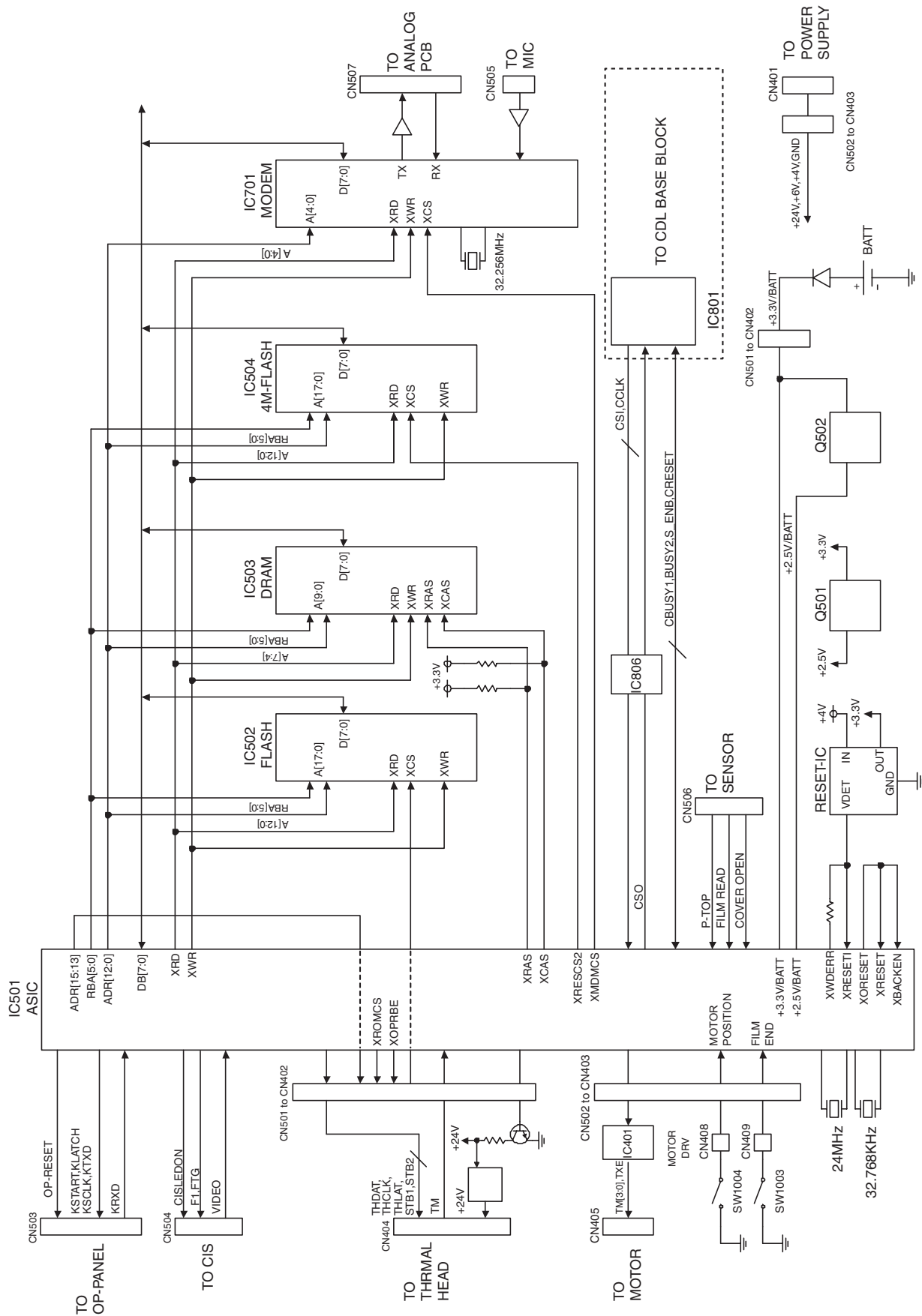


REFERENCE:

- Analog Board Block Diagram (P.41)
- Cordless Base Block Diagram (P.56)

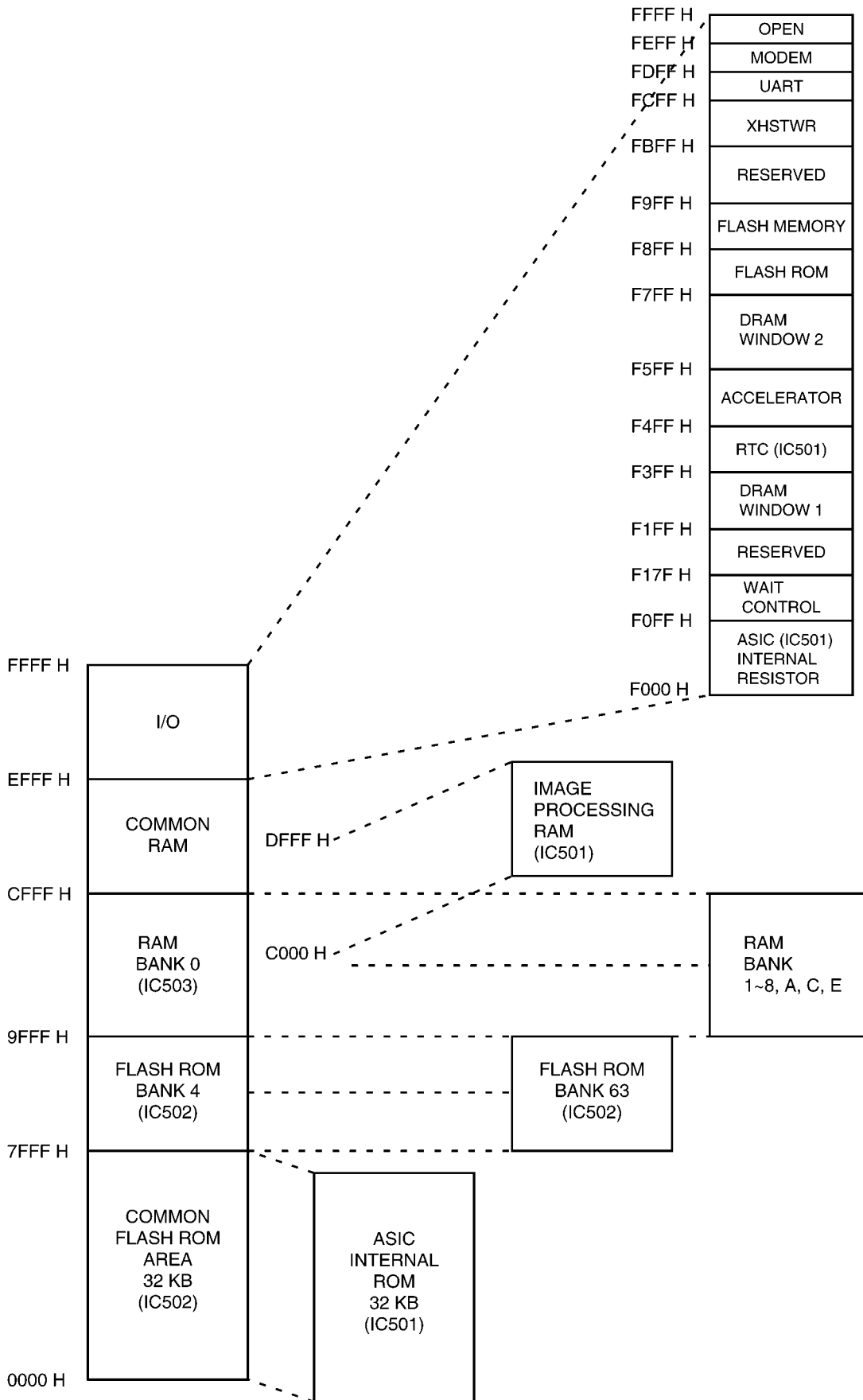
6.3. Control Section

6.3.1. Block Diagram



KX-FG2452CX : CONTROL SECTION BLOCK DIAGRAM

6.3.2. Memory Map



6.3.3. ASIC (IC501)

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. ANALOG UNIT:

Electronic volume for the handset and the monitor.
Sends beep tones, etc.

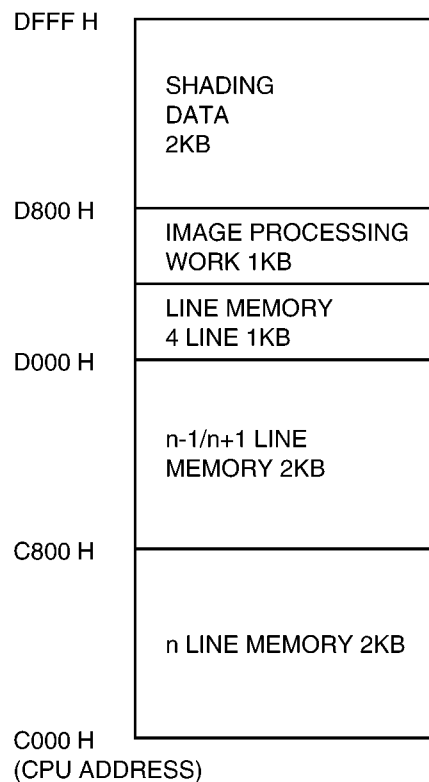


Fig. A

Note:

This memory is incorporated into the ASIC (IC501) and used for the image processing. Fig. A shows the memory map of the Image Data RAM.

Descriptions of Pin Distribution (IC501)

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	CCD IMAGE SIGNAL INPUT
4	AIN2	A	3.3V	THERMISTOR TEMPERATURE WATCH INPUT
5	AIN3	A	3.3V	-----
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	SH SIGNAL OUTPUT FOR CIS (SI)
16	F1	O	3.3V	01 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/IP	I	3.3V	INPUT PORT (BELL)
20	RVN	I	3.3V	INPUT PORT (REED)
21	IRDATXD/IOP81	O	3.3V	OUTPUT PORT (BELL-TX)
22	IRDARXD/IOP80	I	3.3V	INPUT PORT (CSI)
23	TXD/IOP30	O	3.3V	OUTPUT PORT (TXD)
24	RXD/IOP31	I	3.3V	INPUT PORT (RXD)
25	XRTS/IOP32	I	3.3V	INPUT PORT (COVER OPEN)
26	XCTS/IOP33	I	3.3V	INPUT PORT (FILM CHECK)
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/IOP26/CBUSY2	O	3.3V	OUTPUT PORT (CBUSY2)
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/IOP45	I/O	3.3V	INPUT / OUTPUT PORT (OPRESET)
40	MICLK/IOP46	I/O	3.3V	INPUT / OUTPUT PORT (INTERCOM)
41	MILAT/IOP47	I/O	3.3V	INPUT / OUTPUT PORT (XINTERCOM)
42	20KOSC/IOP56/CSO	O	3.3V	OUTPUT PORT (CSO)
43	XWAIT/IOP60	I	3.3V	INPUT PORT (PTOP)
44	HSTRD/IOP40	O	3.3V	OUTPUT PORT (LINERLY)
45	HSTWR/IOP41	I/O	3.3V	INPUT/OUTPUT PORT (SPMUTE)
46	XOPRBE/MFCS	O	3.3V	MFCS
47	ADR15/OP	O	3.3V	CPU ADDRESS BUS 15 (NOT USED)
48	ADR14/OP	O	3.3V	CPU ADDRESS BUS 14 (NOT USED)
49	ADR13/OP	O	3.3V	CPU ADDRESS BUS 13 (NOT USED)
50	VDD (2.5V)		-----	POWER SOURCE (+2.5V)
51	XOUT	O	3.3V	SYSTEM CLOCK (24.00MHz)
52	XIN	I	3.3V	SYSTEM CLOCK (24.00MHz)
53	VSS		GND	POWER SOURCE (GND)
54	VDD (3.3V)		-----	POWER SOURCE (+3.3V)
55	XTEST	O	3.3V	24.576MHz 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/IOP42	O	3.3V	DRAM (IC503) ROW ADDRESS STROBE
63	XCAS1/IOP/43	O	3.3V	DRAM (IC503) CULUM ADDRESS STROBE
64	XCAS2/IOP44	O	3.3V	OUTPUT PORT (CIS ON)
65	XRESCS2/OP71	O	3.3V	IC504 CHIP SELECT
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 (IC502) 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/OP	O	3.3V	ROM/RAM BANK ADDRESS 5
102	RBA6/IOP96	O	3.3V	A19
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	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
117	THCLK	O	3.3V	CLOCK OUTPUT FOR DATA TRANSFER
118	THLAT	O	3.3V	PULSE OUTPUT FOR DATA LATCH
119	STBNP	I	3.3V	INPUT PORT (CHARGE)
120	RM0/IOP00	O	3.3V	MOTOR A PHASE
121	RM1/IOP01	O	3.3V	MOTOR B PHASE
122	RM2/IOP02	O	3.3V	MOTOR /A PHASE
123	RM3/IOP03	O	3.3V	MOTOR /B PHASE
124	RXE/IP04	O	3.3V	MOTOR ENABLE SIGNAL
125	TMO/IOP10	O	3.3V	OUTPUT PORT(CRESET)
126	VDD (2.5V)		----	POWER SOURCE (+2.5V)
127	VSS		GND	POWER SOURCE (GND)
128	TM1/IOP11	O	3.3V	OUTPUT PORT(S-ENB)
129	TM2/IOP12	O	3.3V	OUTPUT PORT(TELRXEN)
130	TM3/IOP13	O	3.3V	OUTPUT PORT(TONE2EN)
131	TXE/IP14	I	3.3V	INPUT PORT(MOTOR-PS)
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/IOP24/CCLK	I	3.3V	INPUT PORT (CCLK)
138	FMEMDI/IOP25/CBUSY1	I	3.3V	INPUT PORT (CBUSY1)
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 ROM (IC502)

The 512KB ROM (FLASH ROM) 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 (IC503)

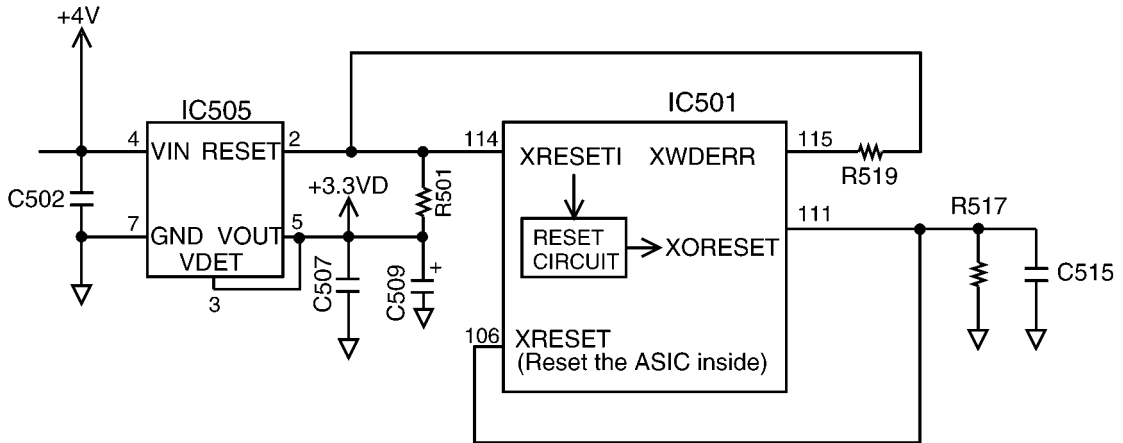
The DRAM serves as CPU and receives memory.

The address is F200H~F3FFH (DRAM access window 1) and F600H~F7FFH (DRAM access window 2).

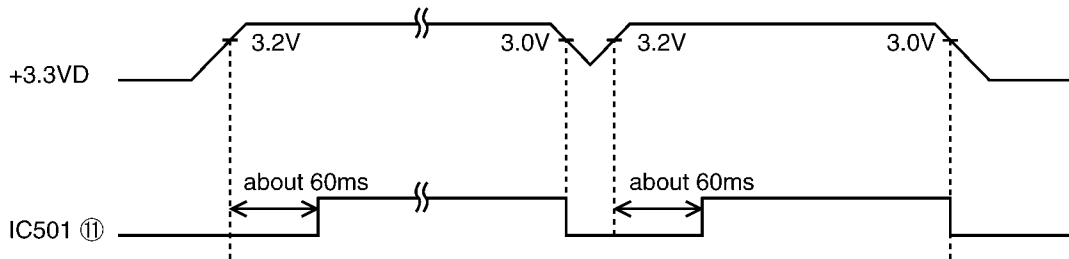
6.3.6. Reset Circuit (Watch dog timer)

The output signal (reset) from pin 2 of the voltage detect IC (IC505) is input to the ASIC (IC501) 114 pin.

Circuit Diagram



1. During a momentary power interruption, a reset pulse of 60 msec is generated and the system is reset completely.



2. The watch dog timer, built-in the ASIC (IC501), is initialized by the CPU about every 1.5 ms. When a watch dog error occurs, pin 115 of the ASIC (IC501) 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

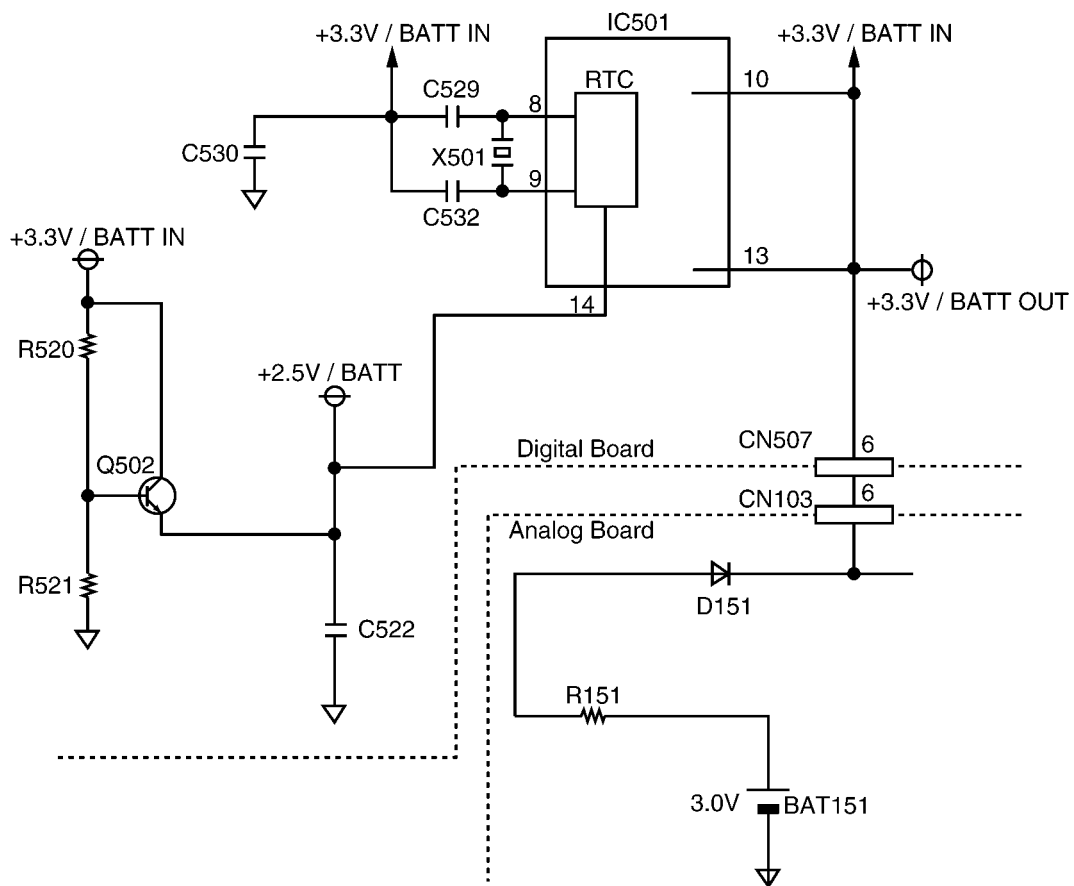
1. Function

This unit has a lithium battery (BAT151 on Analog Board) which works for Real Time Clock IC (RTC: inside IC501). 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 (IC502).

2. RTC Inside (IC501) Backup Circuit Operation

When the power switch is turned ON, power is supplied through Q502 to the RTC (inside IC501). At this time, the voltage at pin 14 of the IC501 is +2.5V. When the power switch is turned OFF, the BAT151 supplies power to RTC through D151 and Q502. The voltage at pin 14 of IC501 is about +2.2V. When the power switch is OFF and the voltage of +3.3V decreases, pin 14 of RTC (IC501) becomes roughly the same voltage as the battery voltage. RTC goes into the backup mode, in which the power consumption is lower.

Circuit Diagram



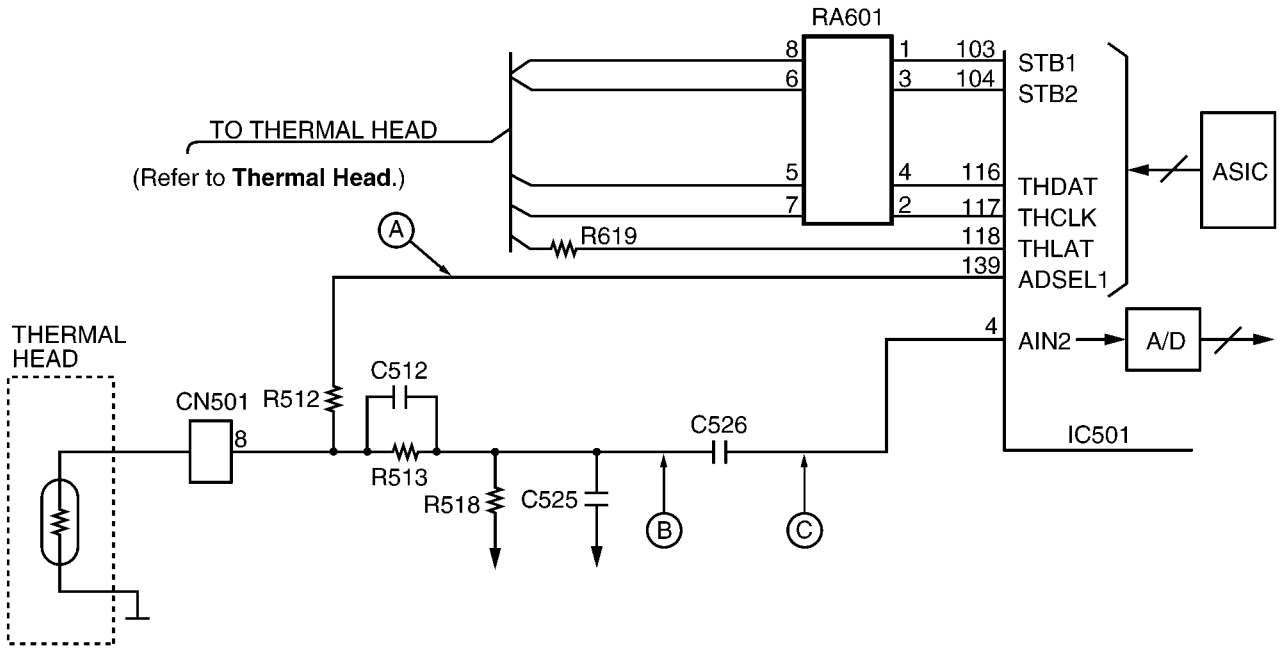
6.3.8. Supervision Circuit for the Thermal Head Temperature

1. Function

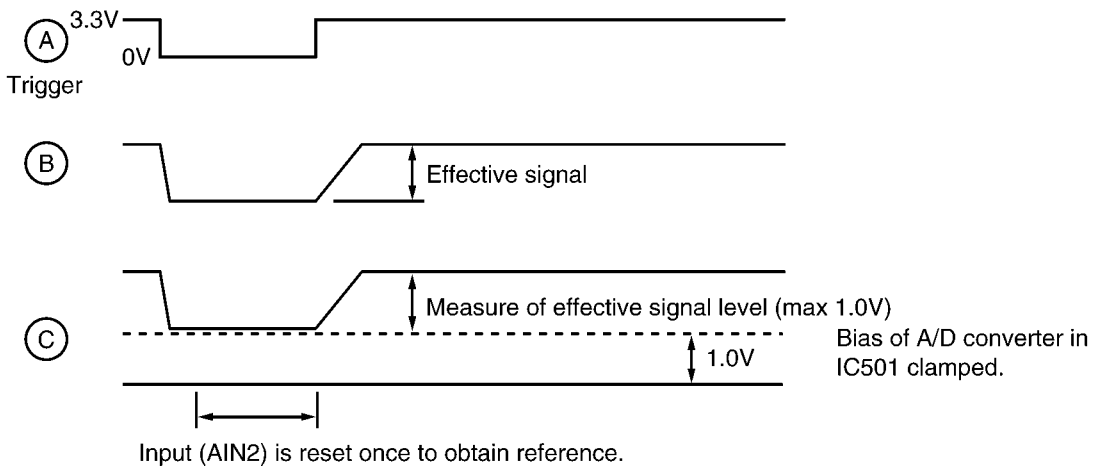
The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 139 of IC501 becomes a low level. Then when it becomes a high level, it triggers point A In point C, according to the voltage output time, the thermal head's temperature is detected.

After the thermal head temperature is converted to voltage in B, it is then changed to digital data in the A/D converter inside IC501. The CPU decides the strobe width of the thermal head according to this value. Therefore, this circuit can keep the thermal head at an even temperature in order to stabilize the printing density and prevent the head from being overheated.

Circuit Diagram



Timing Chart



REFERENCE:
Thermal Head (P.24)

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 CIS (to be used as the reference white level) via route1, and is input to IC501. Refer to **Block Diagram** (P.23)
2. In IC501, the data is adjusted to a suitable level for A/D conversion in the Analog 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 IC501 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 and 8 is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via 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

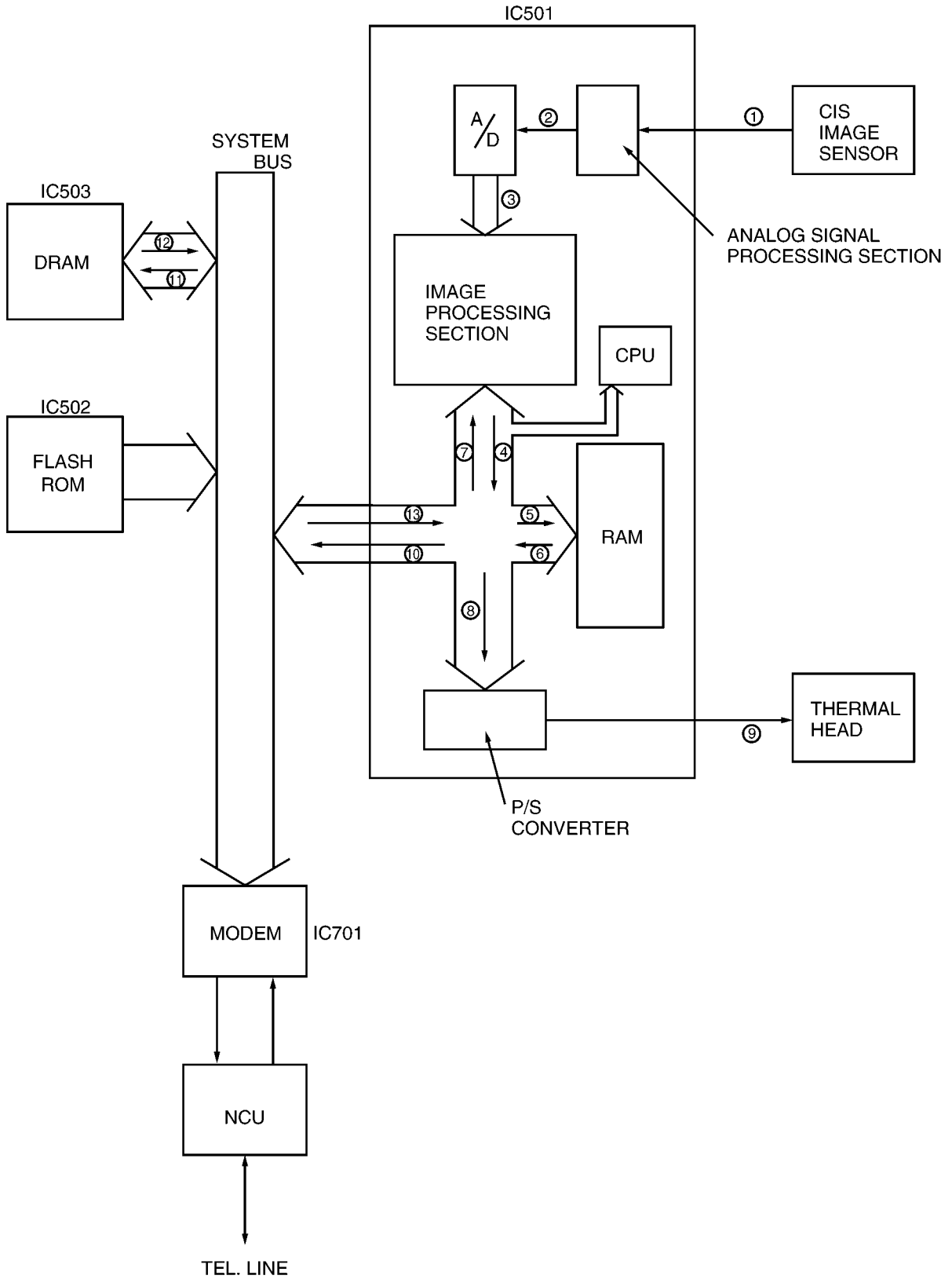
Transmission

1. Same processing as **Copy** items 1 - 3.
2. The data stored in the RAM of IC501 is output from IC501 via routes6 and 10, and is stored in the system bus. Via route11, it is stored in the communication buffer inside DRAM (IC503).
3. While retrieving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route12, where it is converted to serial analog data and forwarded over the telephone lines via the NCU Section.

Reception

1. The serial analog image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route12.
2. The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route12, and is stored in DRAM (IC503) via routes13 and 5.
3. Same processing as **Copy** item 4.

6.4.2. Block Diagram



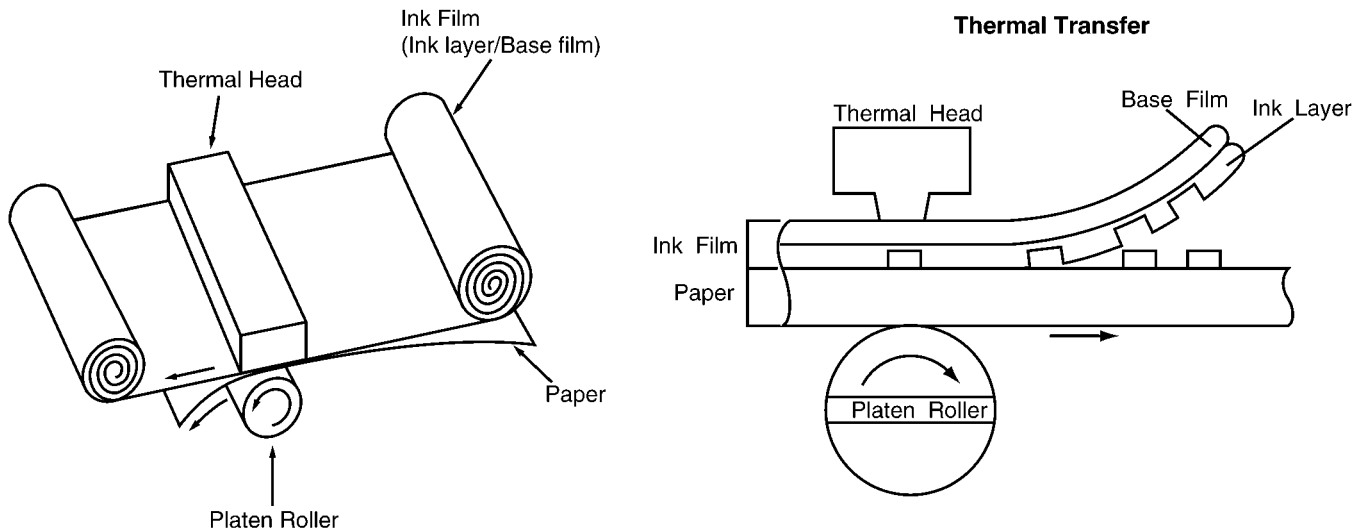
6.4.3. Thermal Head

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)



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 $192 \times 9 = 1728$ dots = (8 dots/mm).

White/Black (white=0, black=1) data in one line increment is synchronized at IC501 pin 117 (THCLK), and sent from IC501 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 the 1728 dot increment, the shift register becomes filled with data, and a latch pulse is emitted to each IC from IC501 pin 118 (THLAT).

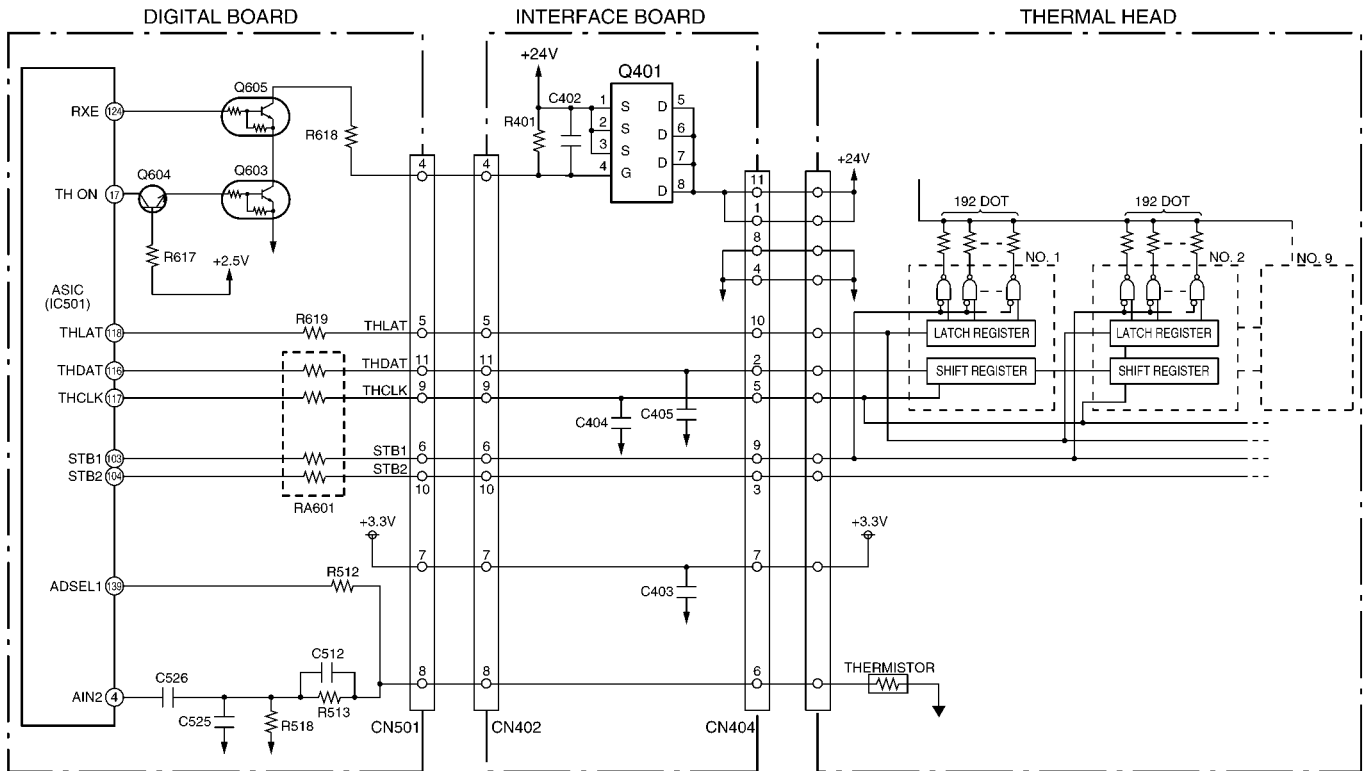
With this latch pulse, all the contents of the shift registers are latched to the latch registers. Thereafter, through the addition of strobes from the IC501 pins (103, 104), only the dot location of black (=1) among latched data activates the driver, and the current passes to heat the emitting body to cause heat emission.

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

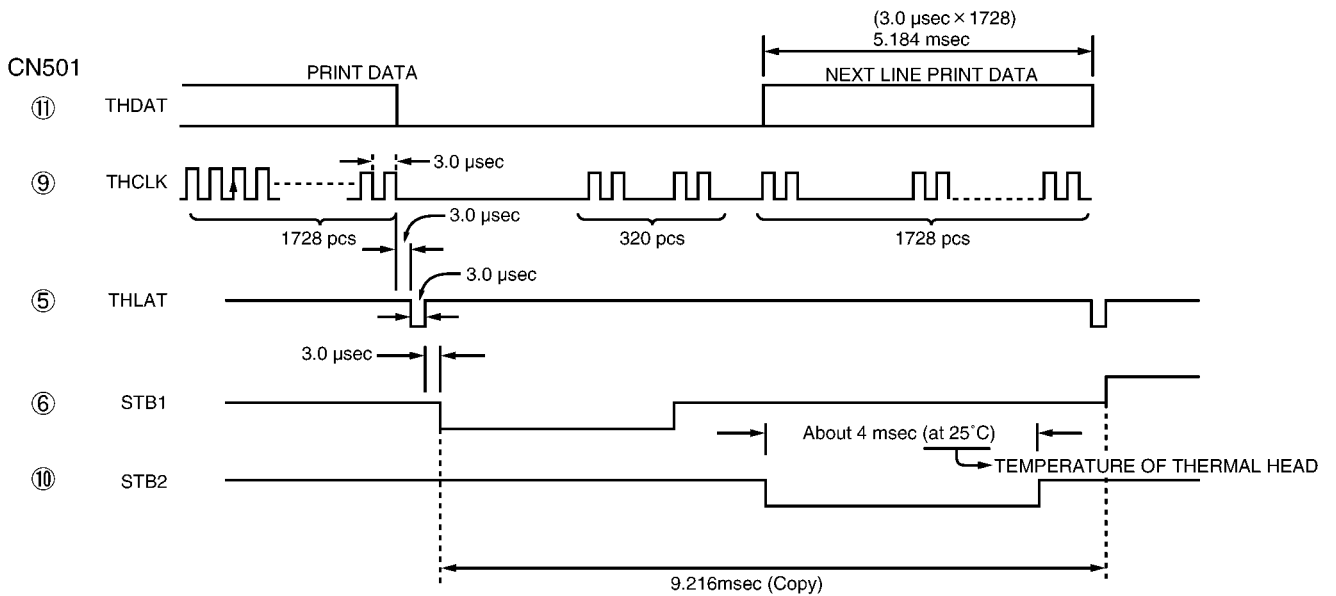
The sequence is shown on the next page. [Moreover, for the strobe width, the thermistor value inside the thermal head is detected according to IC501 pin 4. Depending on that value, the strobe width is recorded in FLASH ROM (IC502). Accordingly, the strobe width is determined.]

When the thermal head is not used, the IC501 (17, THON) becomes low, Q603 turns OFF, Q401 turns OFF, and the +24V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram



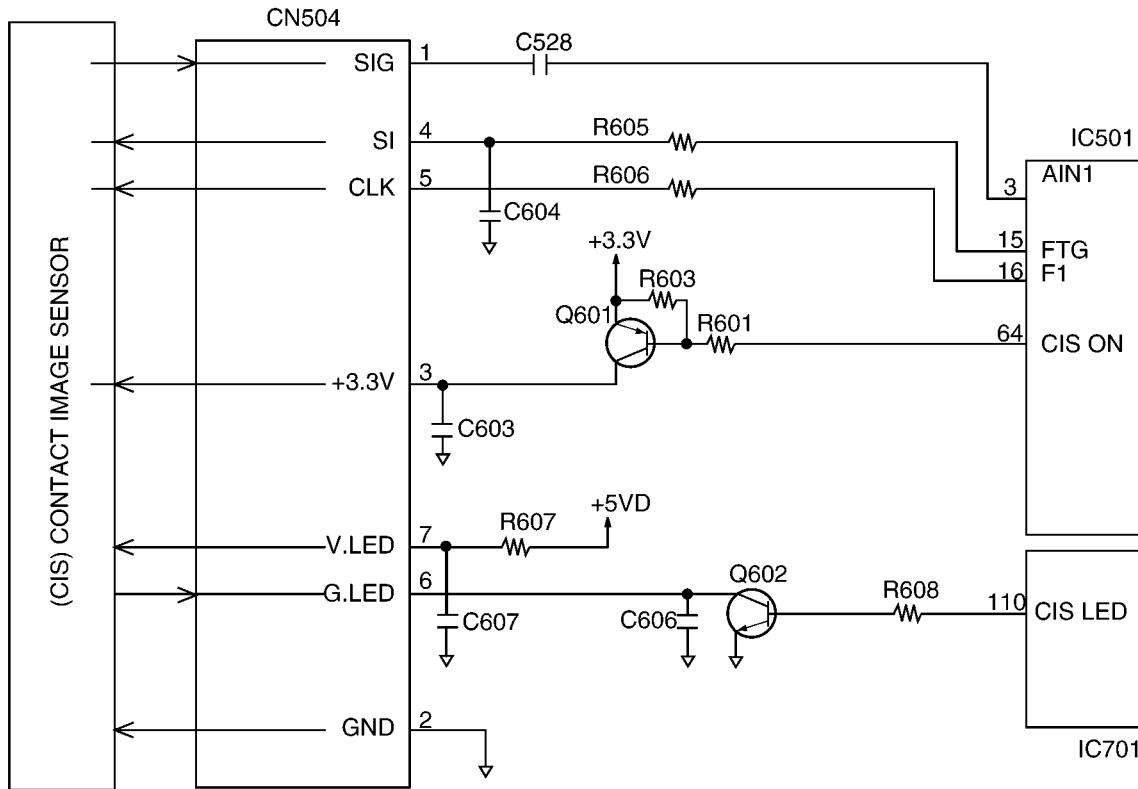
Timing Chart



6.4.4. Scanning Block

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

Circuit Diagram



When an original document is inserted and the start button pressed, pin 64 of IC501 goes to a low level and Q601 are turned ON, pin 110 of IC701 goes to a high level and the transistor Q602 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 IC501, and the original image illuminated by the LED array undergoes photoelectric conversion to output an analog image signal (SIG). The analog image signal is input to the system ASIC on AIN1 (pin 3 of IC501) and converted into 8-bit data by the A/D converter inside IC501. Then this signal undergoes digital processing in order to obtain a high-quality image.

6.4.5. Stepping Motor Drive Circuit

1. **Function**

The stepping motor works for both transmission and reception.

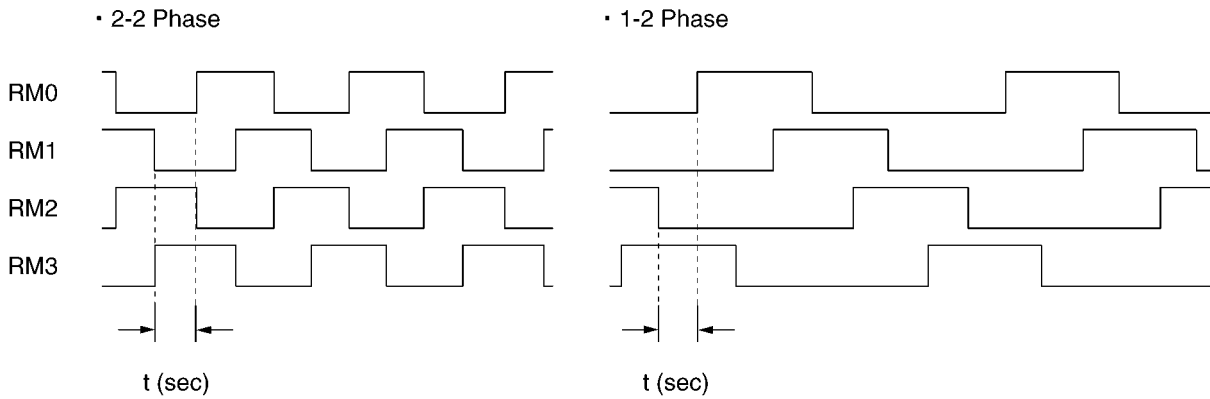
2. **Motor**

During motor driving, pin 124 of ASIC IC501 becomes a high level, and Q403, Q402 turns ON. As a result, +24V is supplied to the motor coil.

Stepping pulses are output from ASIC IC501 pins, 120~123, causing driver IC401 pins, 11~14 to drive the Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper.

The timing chart is below.

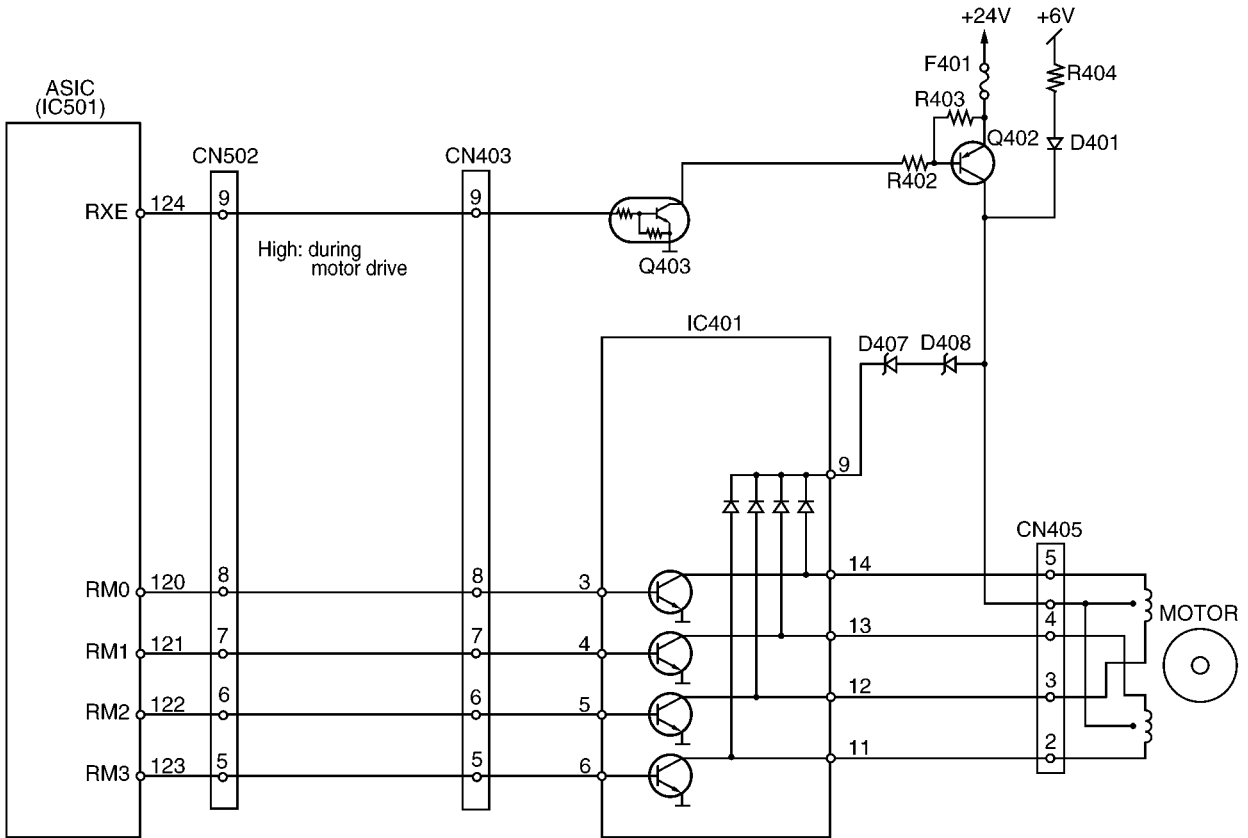
Stepping Monitor Timing Chart



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	2-2	432 pps (t=1/432)
	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)
Document Feed	——	1-2	432 pps (t=1/432)
Stand-by	——	All phases are currently off.	None

Circuit Diagram



When the motor suspends while it is in the receive mode (about 70~80 msec), pin 124 of ASIC IC501 becomes a low level and Q403 turns OFF. Then Q402 also 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.

6.5. Sensors and Switches

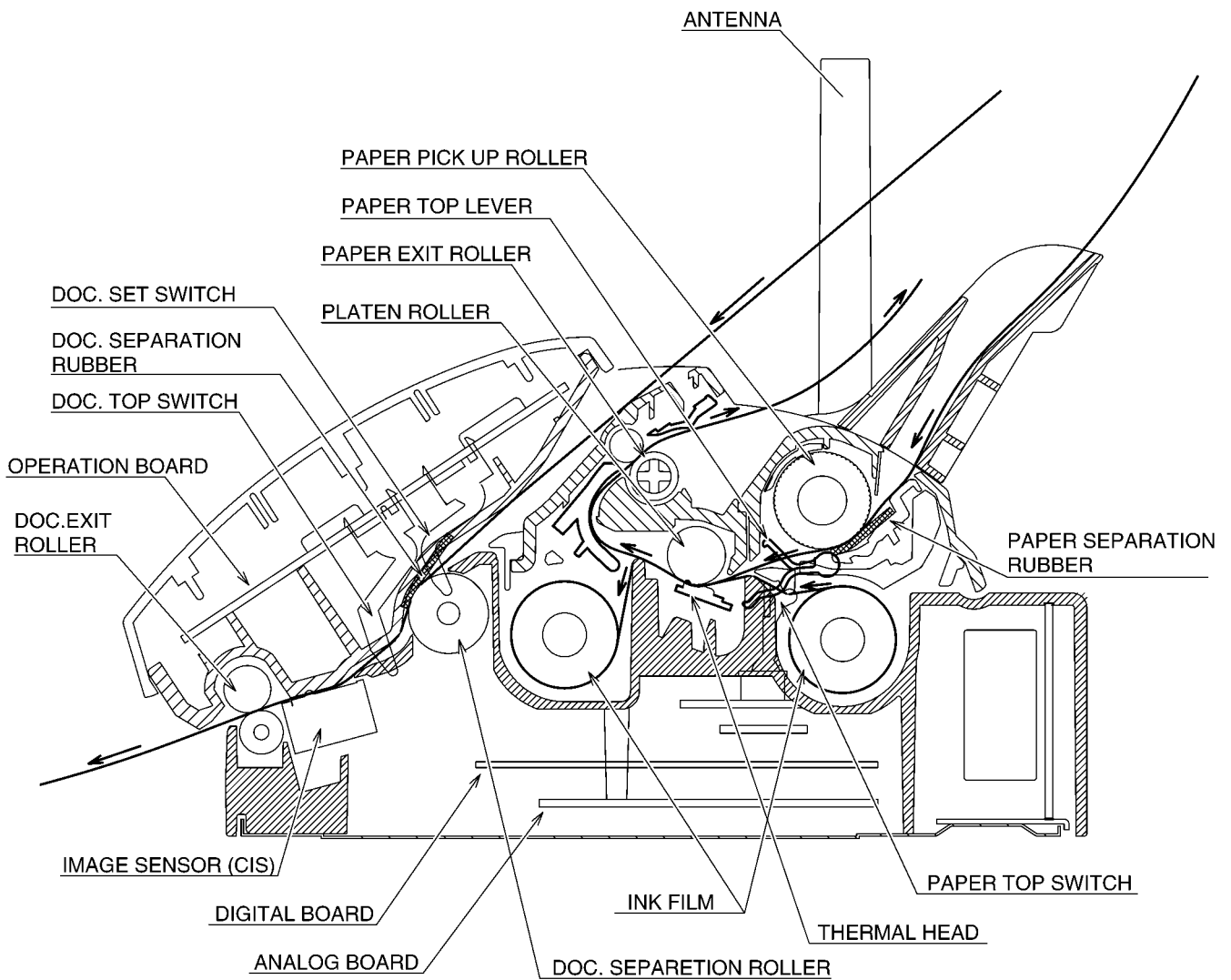
All of the sensor and switches are shown below.

Sensor Circuit Location	Sensor	Sensor or Switch Name	Error Message
Operation Panel	SW351	Document top sensor	[REMOVE DOCUMENT]
	SW352	Document set sensor	[CHECK DOCUMENT]
Sensor P.C.Board	SW1001	Cover Open sensor Paper Top sensor	[CHECK COVER] [PAPER JAMMED]
	SW1002	Film Detection sensor	[FILM EMPTY]
Film End Sensor P.C.Board	SW1003	Film End sensor	[CHECK FILM]
Gear Block	SW1004	Motor Position sensor	[CALL SERVICE2]

Note:

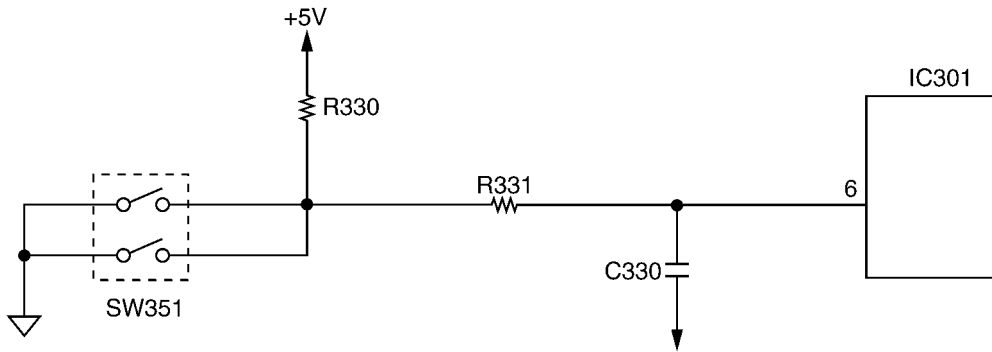
See **Test Mode (P.77)**. (#815: Sensor Check)

Sensor Locations



6.5.1. Document Top Sensor (SW351)

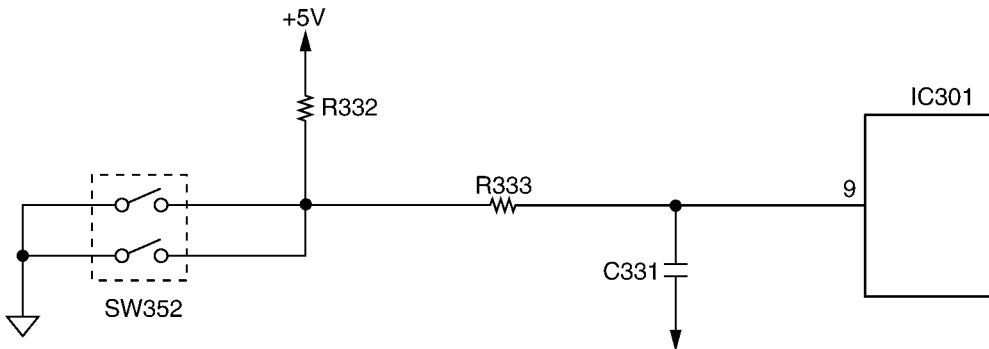
When a document is brought to the read position, the SW turns ON, and the input signal of IC301-6 pin (Operation Board) becomes a low level. When there is no document at the read position, the SW turns OFF, and the input signal of IC301-6 pin (Operation Board) becomes a high level.



	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 (SW352)

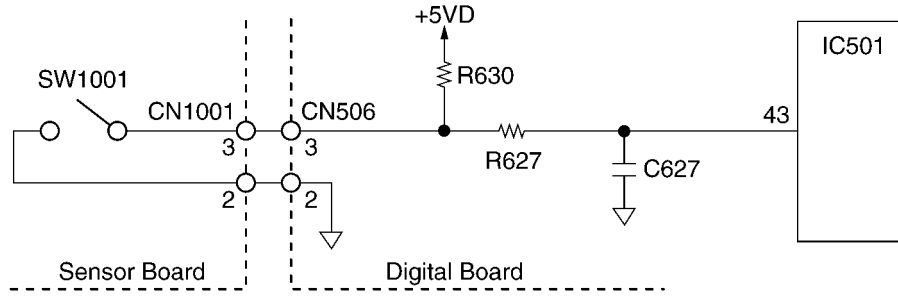
When a document is set, the SW turns ON, and the input signal of IC301-9 pin (Operation Board) becomes a low level. When there is no document, the SW turns ON, and the input signal of IC301-9 pin (Operation Board) becomes a high level.



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

6.5.3. Paper Top Sensor (SW1001)

When the recording paper is loaded on the print head or the recording paper cover is opened, the paper top sensor SW turns ON, and the input signal of IC501-43 pin (Digital Board) becomes a low level. Usually, the SW turns OFF, and the input signal of IC501-43 pin (Digital Board) becomes a high level.

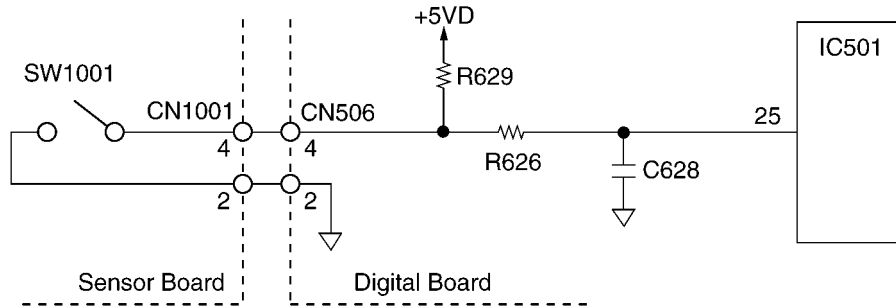


	SW	Signal (IC501-43 pin)
Set recording paper or paper cover is opened	ON	Low level
No recording paper or paper cover is closed	OFF	High level

6.5.4. Cover Open Sensor (SW1001)

When the u-TURN BLOCK is closed, the SW becomes ON, and the input signal of IC501-25 pin (Digital Board) becomes a low level.

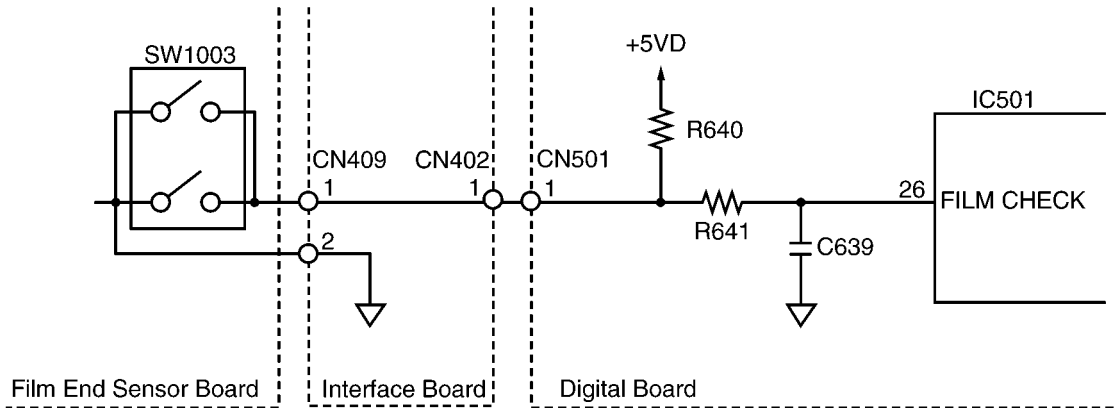
When the cover is opened, the SW becomes OFF, and the input signal of IC501-25 (Digital Board) pin becomes a high level.



	SW	Signal (IC501-25 pin)
Cover is opened	OFF	High level
Cover is closed	ON	Low level

6.5.5. Film End Sensor (SW1003)

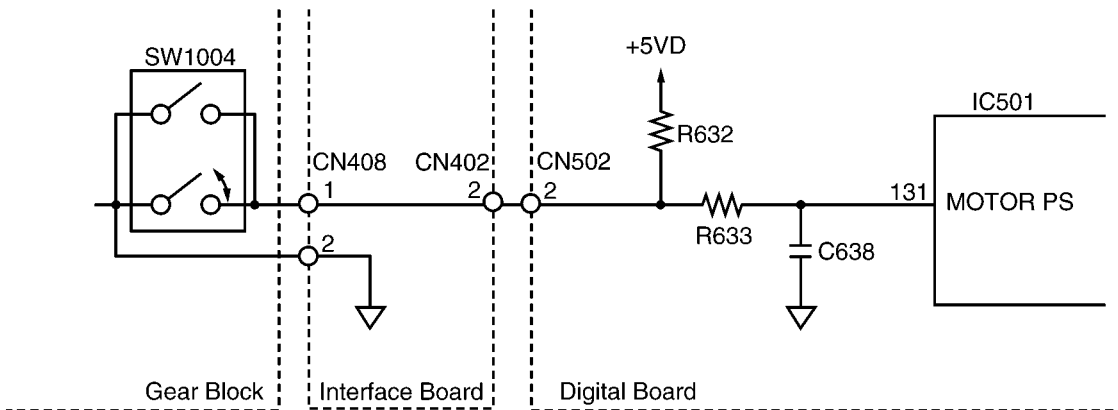
When the operation panel cover is closed and a film is set, the SW turns ON, and the input signal of IC501-26 pin (Digital Board) becomes a low level. When the cover is opened, the SW turns OFF, and the input signal of IC501-26 pin (Digital Board) becomes a high level.



	SW	Signal (IC501-26 pin)
No film	OFF	High level
Set a film	ON	Low level

6.5.6. Motor Position Sensor (SW1004)

When the recording paper is loaded on the print head, the SW turns ON, and the input signal of IC501-131 pin (Digital Board) becomes a low level. When the recording paper is not loaded on the print head, the SW turns OFF, and the input signal of IC501-131 pin (Digital Board) becomes a high level.



	SW	Signal (IC501-131 pin)
Home position	ON	Low level
Other	OFF	High level

6.6. Modem Section

6.6.1. Function

The unit uses a 1 chip modem (IC701) 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 analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by ITU-T. This 1 chip modem (IC701) has hardware which sends and detects all of the necessary signals for FAX communication.

It can be controlled by writing commands from the CPU (IC501: inside ASIC) to the register in the modem (IC505).

This modem (IC701) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

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

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

The No. XIV Group of 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.

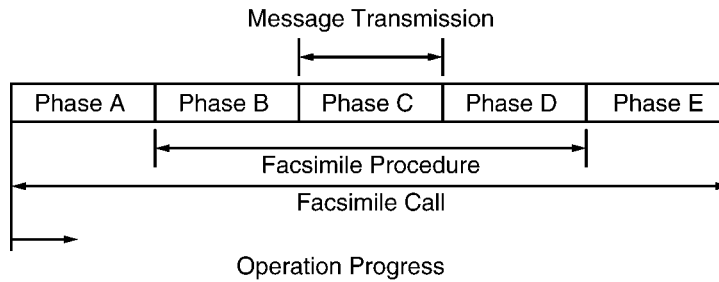
- Group IV (G4)

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

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

Transmission time consists of the following.

Control time:

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

Image transmission time:

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

Hold time:

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

5. Facsimile Standards

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

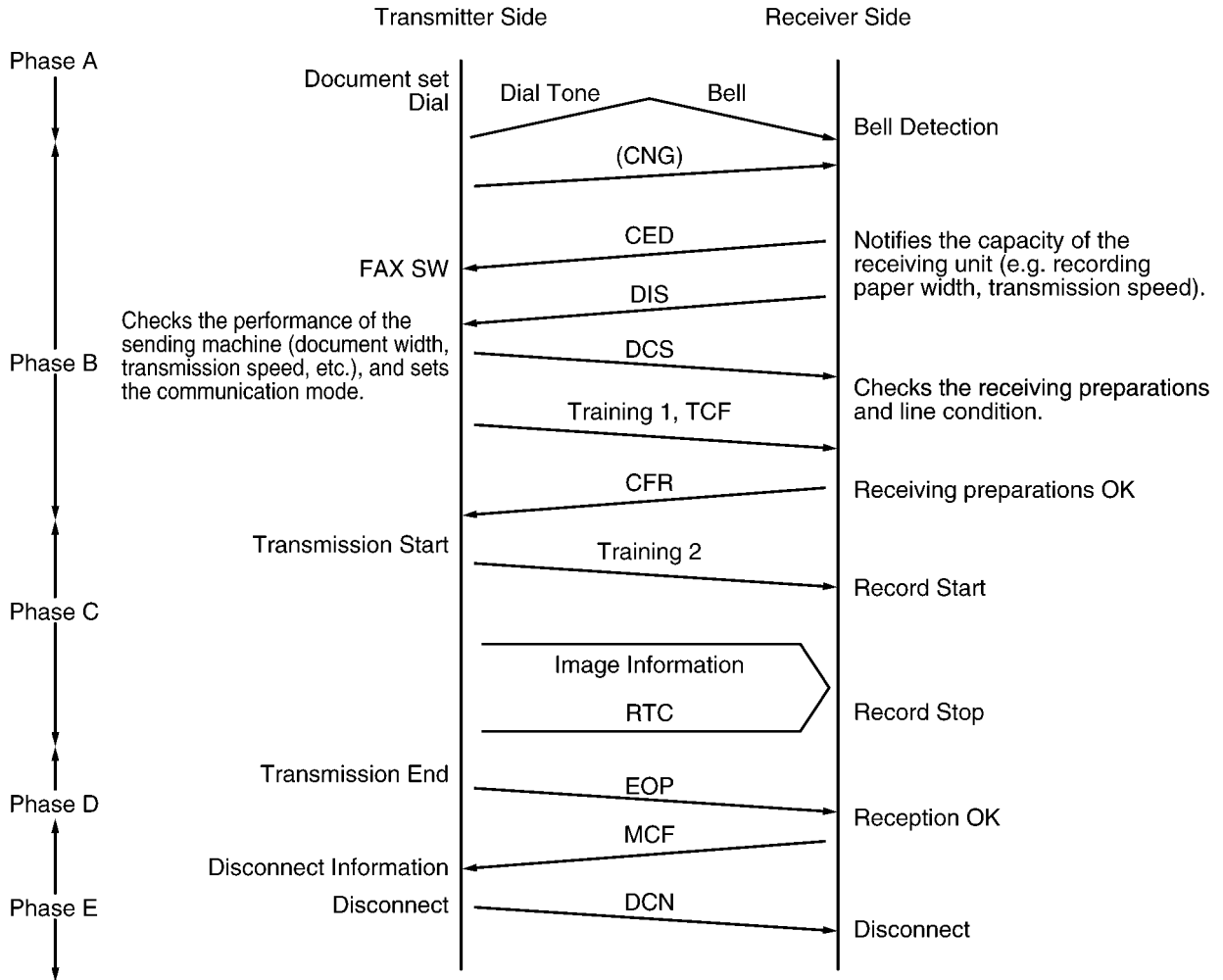
6. Explanation of Communication and Compression Technology

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

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

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

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



Explanation of Signals

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

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

Identification Signal Format.....00000001

Function:

Notifies the capacity of the receiving unit. The added data signals are as follows.

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

Identification Signal Format.....X1000001

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

Bit No.	DIS/DTC	DCS
1	Transmitter --- T.2 operation	
2	Receiver --- T.2 operation	Receiver --- T.2 operation
3	T.2 IOC = 176	T.2 IOC = 176
4	Transmitter --- T.3 operation	
5	Receiver --- T.3 operation	Receiver --- T.3 operation
6	V.8 features	Invalid
7	Reserved for future T.3 operation features.	Invalid
8	Reserved for future T.3 operation features.	
9	Transmitter --- T.4 operation	
10	Receiver --- T.4 operation	Receiver --- T.4 operation

Bit No.	DIS/DTC	DCS
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	Invalid	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.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%	2432 picture elements along scan line length of 303 mm ± 1%
	2048 picture elements along scan line length of 255 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	Reserved	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	Reserved	Reserved
30	Reserved	Reserved
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	
39	Reserved	

Bit No.	DIS/DTC	DCS
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" : neuritic 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.

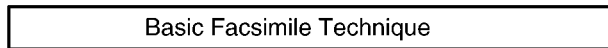
Note 3 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

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.

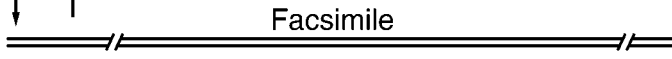
b. Redundancy Compression Process Coding Mode

This unit uses one-dimensional MH format.

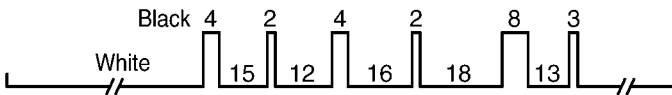
(a) Document



(b) Part of document



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



Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

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

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

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

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

6.6.2. Modem Circuit Operation

The modem (IC701) has all the hardware satisfying the ITU-T standards mentioned previously.

When the ASIC IC501 (61) is brought to a low level, the modem (IC701) is chip-selected and the resistors inside IC are selected by the select signals from ASIC (IC501) ADR0-ADR4(pin 83~87). Commands are written through the data bus, and all processing is controlled by the ASIC (IC501) according to ITU-T procedures. Here, the INT signal dispatched from IRQ (pin 108 and 121 of IC701) to the ASIC (IC501) implements post processing.

This modem (IC701) has an automatic application equalizer. With training signal 1 or 2 at the time of G3 reception, it can automatically establish the optimum equalizer. The modem (IC701) clock is supplied by X701(32.256MHz).

1. Facsimile Transmission/DTMF Line Send

The digital image data on the data bus is modulated in the modem (IC701), and sent from pin 69 via, Analog SW IC702(8→9), amplifier IC704(6→7) and the NCU section to the telephone line.

Refer to **Check Sheet for Signal Route** (P.148).

2. Facsimile Reception

The analog image data which is received from the telephone line passes through the NCU section and enters pin 60 of the modem (IC701). The signals that enter pin 60 of the modem (IC701) 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 around 3 kHz and maintain a constant receiving sensitivity.

It can be set in the service mode.

Refer to **Check Sheet for Signal Route** (P.148).

3. DTMF Transmission (Monitor tone)

The DTMF signal generated in the modem (IC701) is output from pin 69, and the NCU section to the telephone line the same as facsimile transmission signals.

(DTMF Monitor Tone)

Refer to **Check Sheet for Signal Route** (P.148).

4. 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 (IC701) becomes 1, and this status is monitored by ASIC (IC501).

6.7. Analog Section

1. Function

The analog section serves as an interface between the telephone line. The digital board (IC701) for transmission and reception of FAX signals, switches between the digital board (IC701) and other sections by means of a multiplexer in the NCU section. The control signals to the individual analog sections are output mainly from ASIC IC501, and the status information for the various sections is also held in ASIC IC501.

Simple explanations for the various sections are given below.

2. Circuit Operation

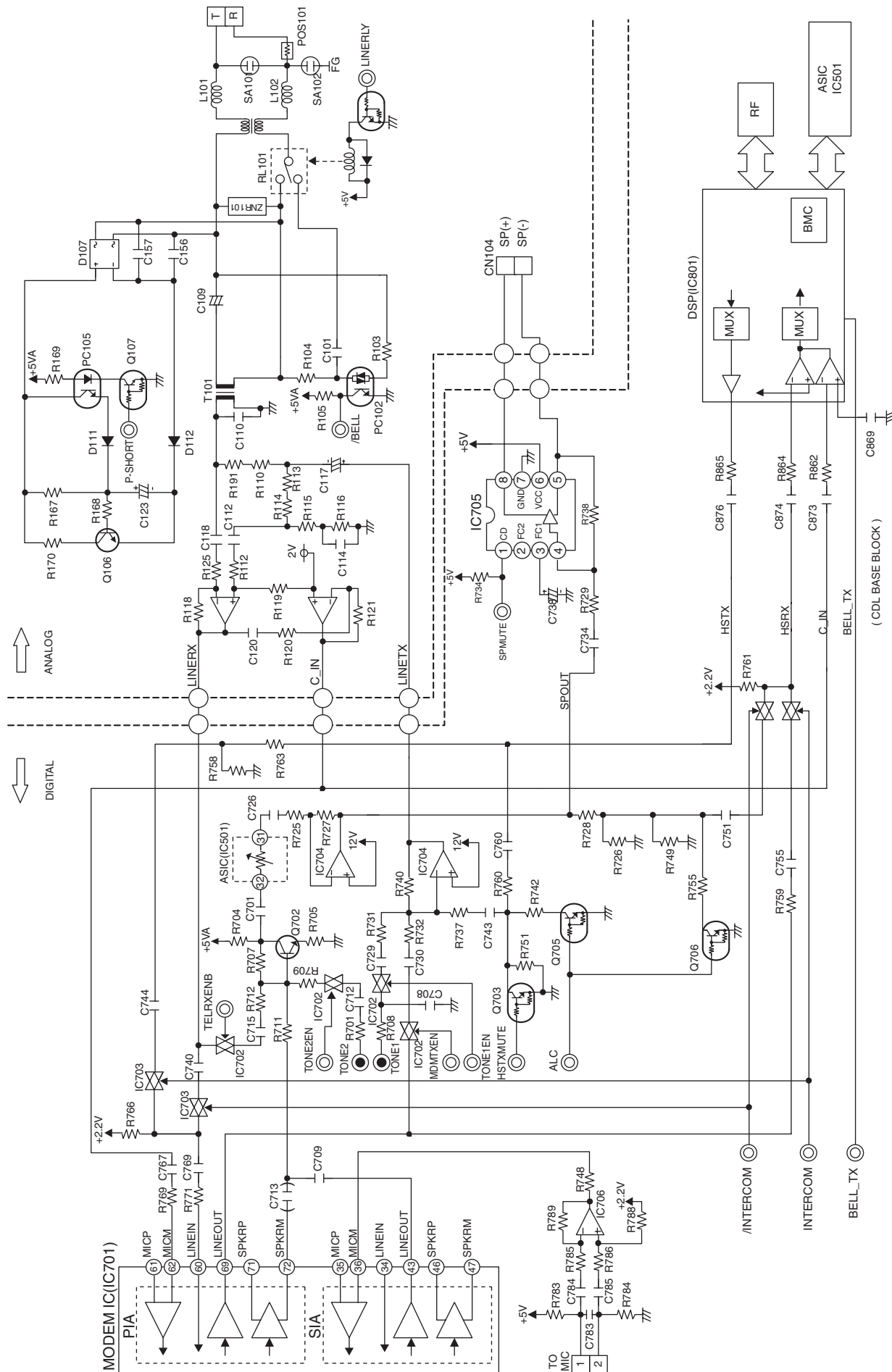
[NCU Section]

This is composed of a bell detection circuit, pulse dial generation circuit, CPC detect circuit, vox circuit, amplifier circuit for line transmission and reception, sidetone circuit, Extension phone line off-hook detection circuit, Remote FAX activation circuit.

[Modem (IC701)]

This is used for FAX signal tone modulation, DTMF signal transmission. The DTMF signal is placed into the TX system.

6.7.1. Analog Board Block Diagram



KX-FG2452CX : ANALOG BOARD BLOCK DIAGRAM

6.8. NCU Section

6.8.1. General

It is composed of bell detection circuit, pulse dial circuit, TAM interface circuit, line amplifier, sidetone circuits, Remote FAX activation circuit, CPC detection, and a multiplexer.

6.8.2. Remote Fax Activation Circuit

1. Circuit Operation

After detecting the bell signal, another telephone connected to the same line switches to the FAX mode by DTMF signal.

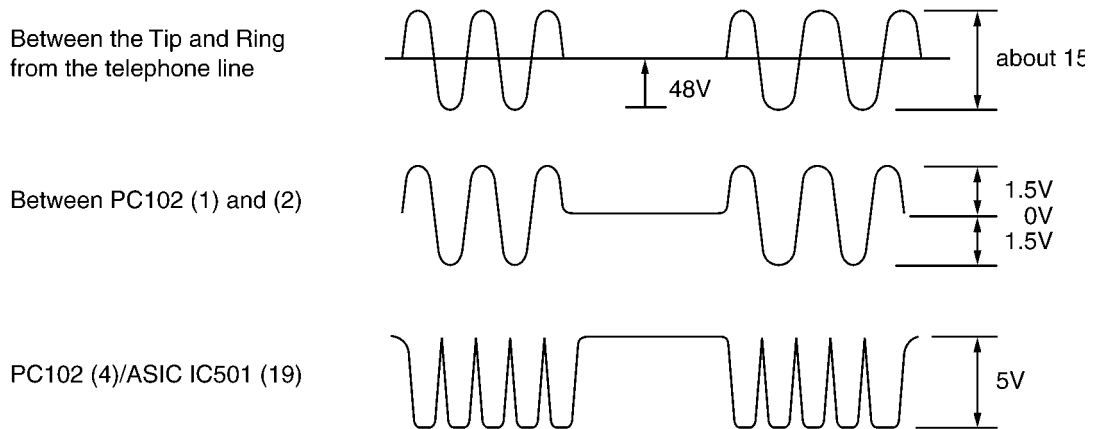
TEL LINE → T101 → C118 → R125 → IC101(6-7) → C120 → R120 → IC101(2-1) → L111 → CN103(11) → {CN507(11) → C767 → R769 → IC701(62)}

6.8.3. Bell Detection Circuit

1. Circuit Operation

The signal waveform for each point is indicated below. The signal (low level section) input to pin 19 of ASIC IC501 on the digital board is read by ASIC and judged as a bell.

TEL LINE → PC102(1, 2 - 4) → {IC501(19)}



Note:

{ } : Inside the Digital Board

6.8.4. Pulse Dial Circuit and ON/OFF Hook Circuit

While OFF-HOOK, RL101 is ON. Q103 turns on by pin (44) of IC501 as well. On the other hand, while ON-HOOK, Q103 turns OFF by pin (44) of IC501, then the line turns OFF. ON/OFF-HOOK, controlled by pin (44) of IC501, makes the pulse dial operation possible.

{IC501 (44) LINE RLY Low Level → CN507 (16)} → CN103 (16) → Q103 OFF → RL101 OFF : DC Loop OFF

{IC501 (44) LINE RLY High Level → CN507 (16)} → CN103 (16) → Q103 ON → RL101 ON : DC Loop ON

Note:

{ } : Inside the Digital Board

6.8.5. Line Amplifier and Side Tone Circuit

1. Circuit Operation

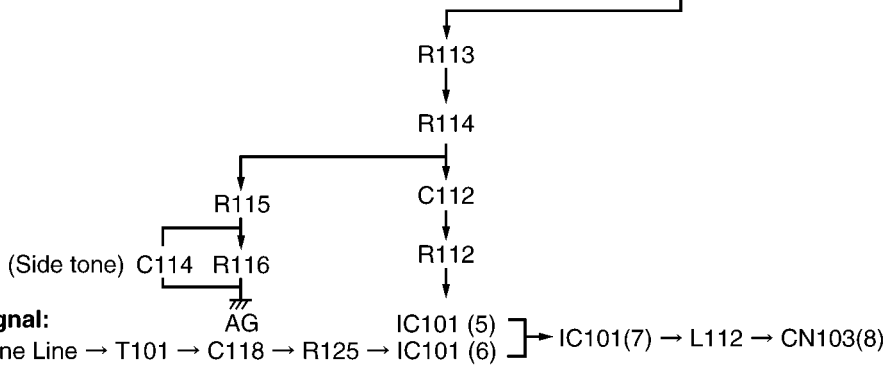
The reception signal output from the line transformer T101 is input to pin (6) of IC101 via C118, R125 and then the signal is amplified at pin (7) of IC101 and sent to the reception system at 3dB.

The transmission signal goes through C730 and R732 and enters IC704-pin (6), where the signal is amplified to about 24dB. Then, it is output from pin (7) of IC704 and transmitted to T101 via C117, R110 and R191. If the side tone circuit is not applied, the transmission signal will return to the reception amplifier via C118 and R125. When the side tone circuit is active, the signal output from IC704 pin (7) passes through C117, R113, R114, C112 and R112 and goes into the amplifier IC101 pin (5). This circuit is used to cancel the transmission return signal.

Side Tone Circuit

Transmission Signal:

{C730 → R732 → IC704(6-7) → CN507(7)} → CN103(7) → L113 → C117 → R110 → R191 → T101 → Telephone Line



Reception Signal:

Telephone Line → T101 → C118 → R125 → IC101 (6) → IC101 (7) → L112 → CN103(8)

Note:

{ } : Inside the digital board

6.8.6. 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.

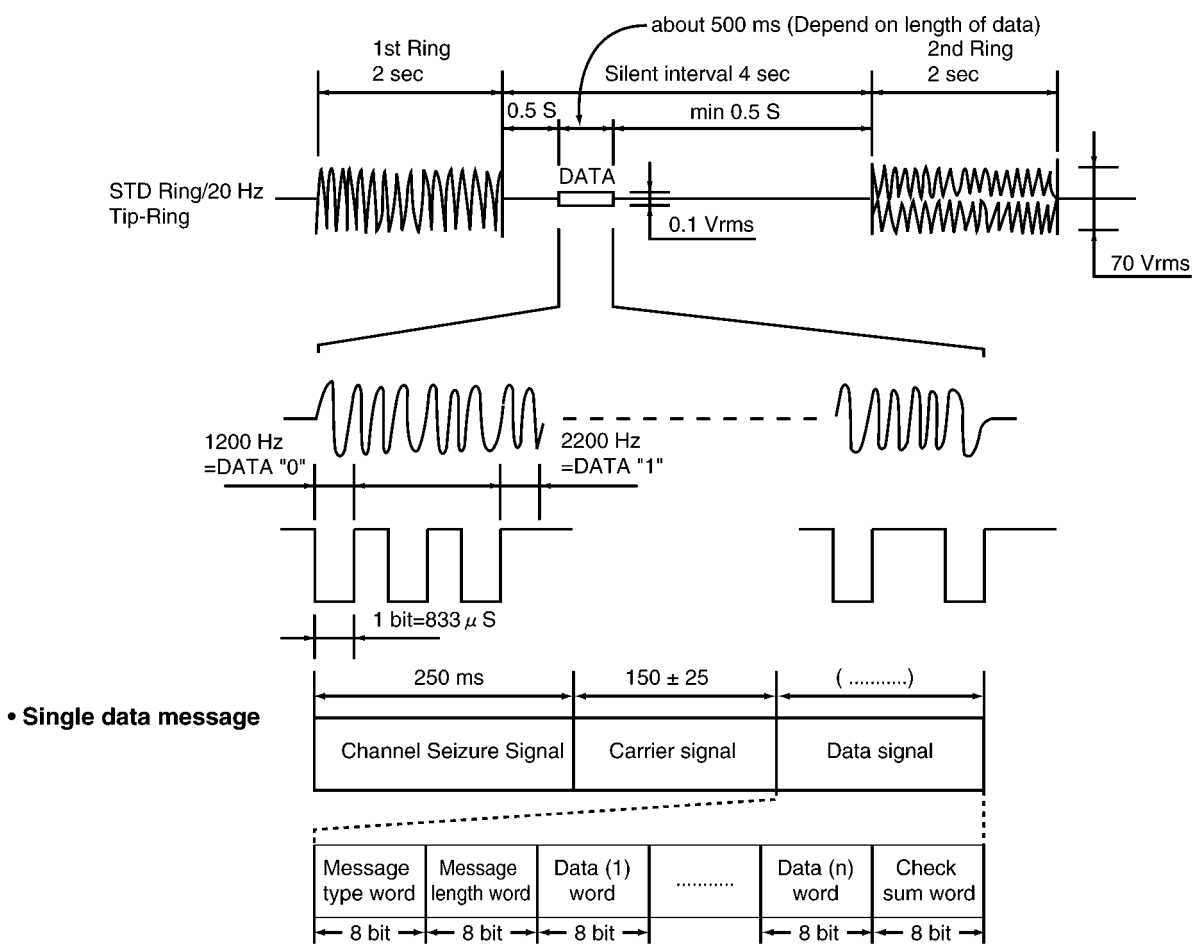
When there is multiple data in the unit, the name or telephone number are displayed.

2. Circuit Operation:

The caller ID signal input from TEL LINE is processed with IC801.

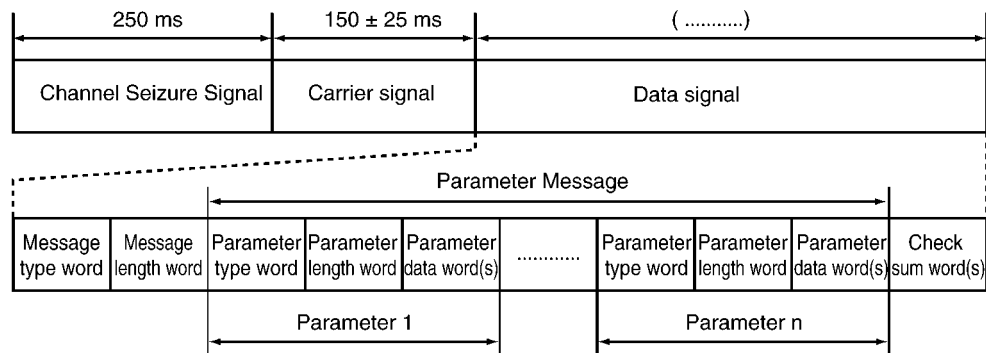
Refer to **Check Sheet for Signal Route** (P.148) for the route of caller ID signal.

Timing Chart



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

· Multiple data message



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

6.8.7. Calling Line Identification Circuit (DTMF)

1. **Function**

1. 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.

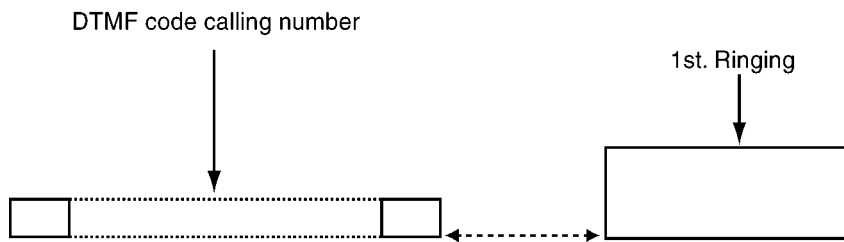
1.

1. **Circuit Operation:**

1. The Caller ID signal from TEL LINE is processed with IC801.

1. Refer to **Check Sheet for Signal Route** (P.148) for the route of Caller ID (DTMF) signal.

Timing Chart



6.9. ITS (Integrated Telephone System) and Monitor Section

6.9.1. General

During the monitor operation, the speaker output passes through the power amplifier (IC705) [Digital board]. The DTMF signal is output from the modem (IC701: digital board). The alarm tone, the key tone, bell tone, and beep are output from gate array IC501 (digital board). During a pulse dial operation, the monitor tone is output from gate array IC501.

6.9.2. 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.148).

6.9.3. 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 (Transmission signal)

Refer to **Check Sheet for Signal Route** (P.148).

3. Signal path (Reception signal)

Refer to **Check Sheet for Signal Route** (P.148).

6.9.4. Monitor Circuit

1. Function

This circuit monitors various tones, such as 1 DTMF tone, 2 Alarm/Beep/Key tone/Bell 3 Dummy ring back tone.

2. Signal path

a. DTMF MONITOR

(Speaker Operation)

Refer to **Check Sheet for Signal Route** (P.148).

(Handset Operation)

Refer to **Check Sheet for Signal Route** (P.148).

b. ALARM/BEEP/KEY TONE/BELL

Refer to **Check Sheet for Signal Route** (P.148).

c. DUMMY RING BACK TONE

Refer to **Check Sheet for Signal Route** (P.148).

6.10. ATAS (Automatic Telephone Answering System) Section

1. Function

The ATAS main operation is performed by the special IC701 (MODEM). IC504 (FLASH MEMORY) control signals are input from ASIC IC501.

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

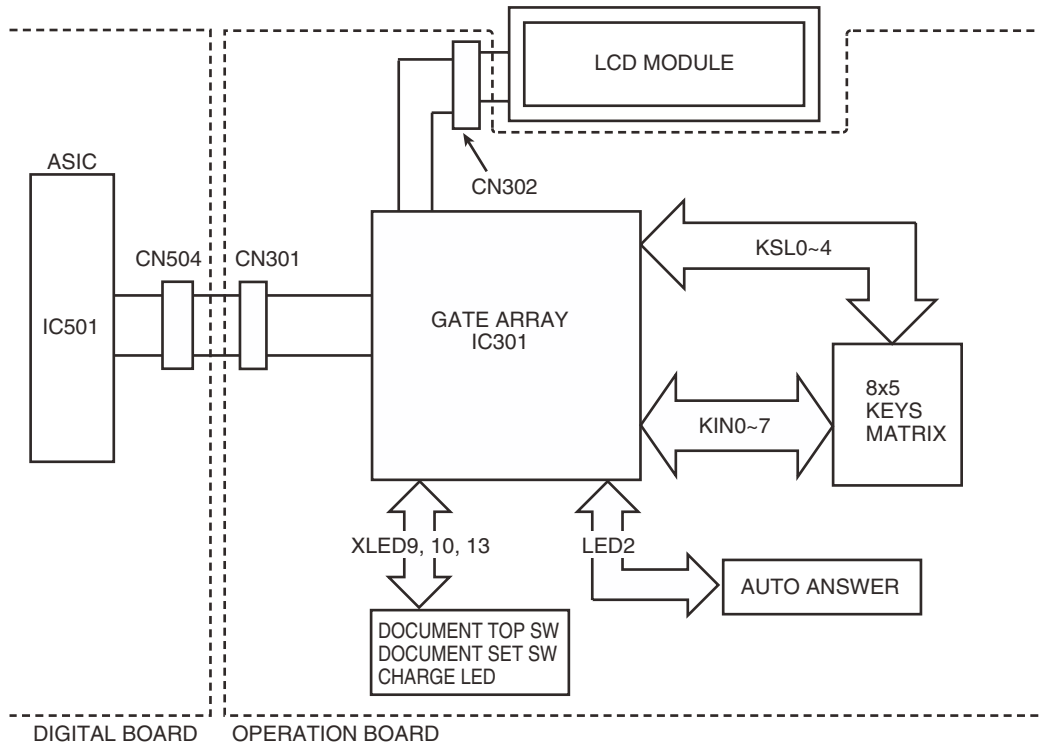
2. Signal Path

Refer to **Check Sheet for Signal Route** (P.148).

6.11. 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 (IC501: on the DIGITAL BOARD).

The key matrix table is shown below.



KX-FG2452CX : OPERATION BOARD BLOCK DIAGRAM

Key Matrix

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

XLED

	XLED10	XLED9	XL13
	DOCUMENT SET	DOCUMENT TOP	CHARGE LED

LED

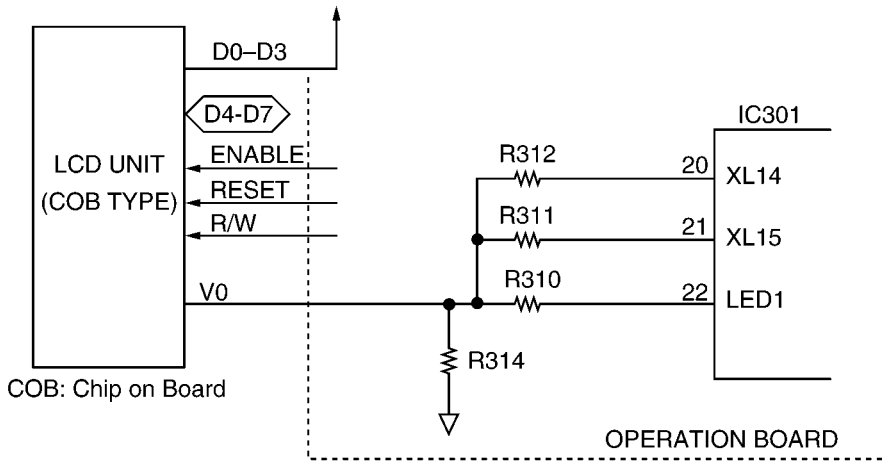
	LED2	LED3	LED4	LED5
	AUTO ANSWER	/	/	/

6.12. LCD Section

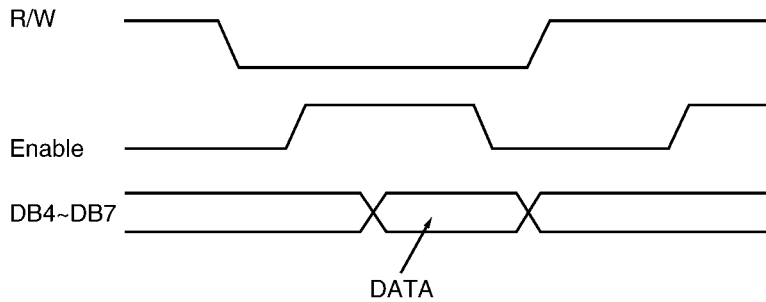
The Gate Array (IC301) works only for writing the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive. R310, R311 and R312 are density control resistors.

Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry in the gate array (IC301).

Circuit Diagram



Timing Chart

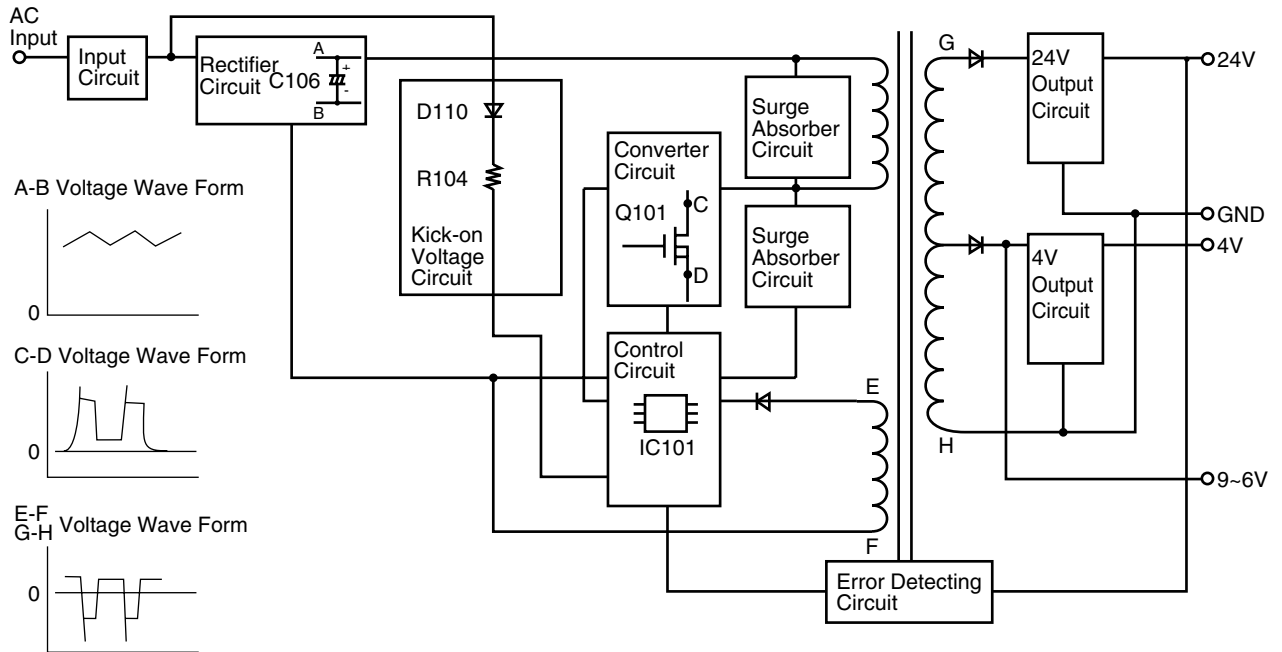


Display mode	Density	Normal	Dark
2 lines (X1.0)	LED1 (IC301-22pin)	H	L
	XL14 (IC301-20pin)	Hi-Z	L
	XL15 (IC301-21pin)	L	L
1 line (X1.5)	LED1	H	H
	XL14	Hi-Z	Hi-Z
	XL15	Hi-Z	L

6.13. Power Supply Board Section

This power supply board uses the switching regulator method.

Block Diagram



[Input Circuit]

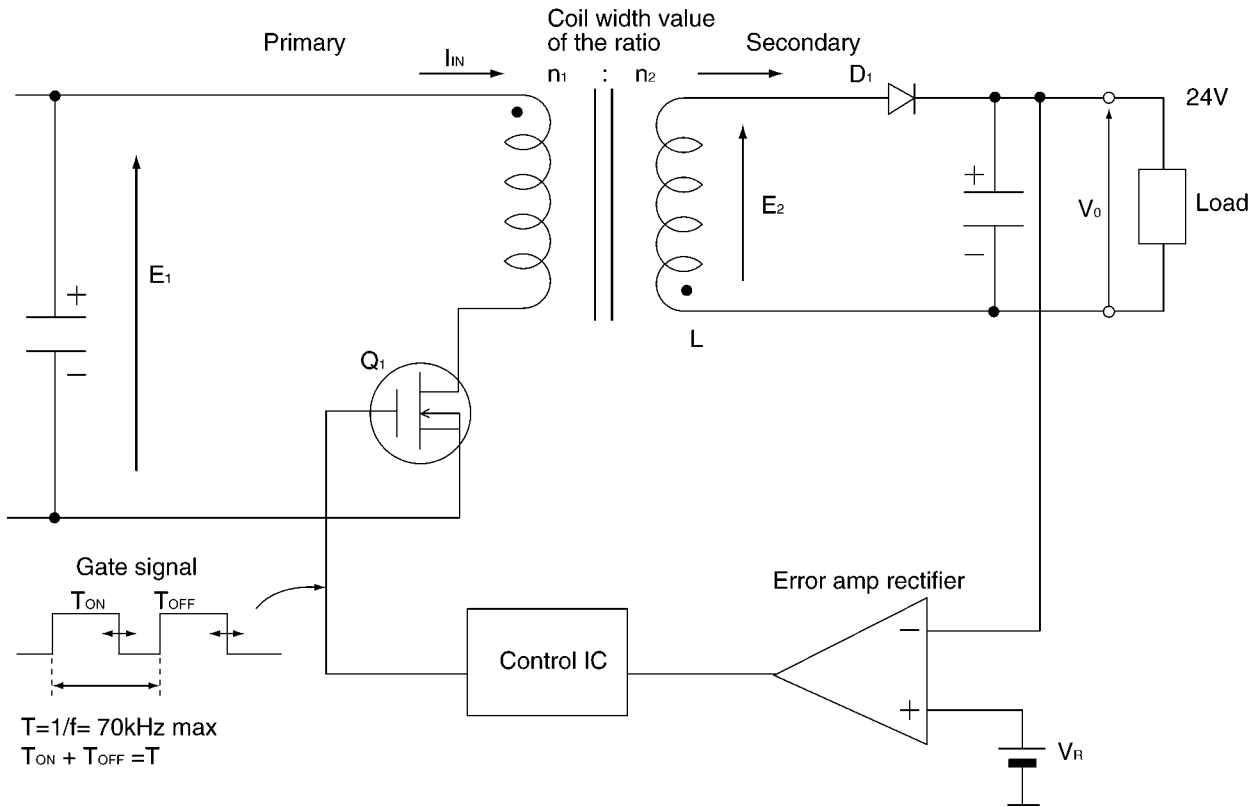
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.

[Rectifier Circuit]

The input current is rectified by 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.



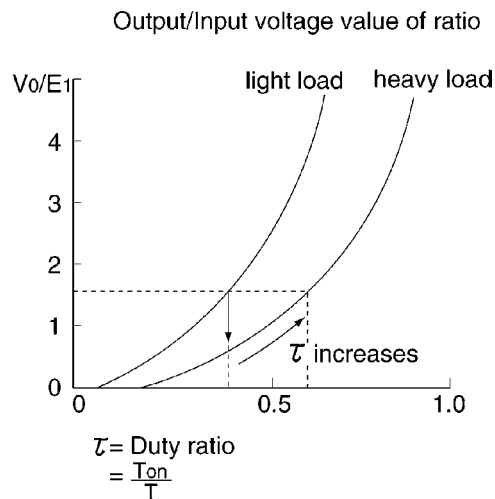
The following is an overview of how the power supply unit is controlled.
 The control method of this power supply unit is pulse width modulation.

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

$L \rightarrow D_1 \rightarrow \text{Load} \rightarrow L$

Then the power is supplied to the Load. When Q_1 is ON, power is not output from the secondary side. The output voltage is fed back in the control 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: T_{on}/T_{off} of Q_1 controls the output voltage.



[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.153).

6.14. Cordless Section

6.14.1. Frequency

The frequency range of 2400MHz~2480MHz is used. Transmitting and receiving channel between base unit and handset is same frequency. Refer to the **Frequency Table** (P.204).

6.14.2. FHSS (Frequency Hopping Spread Spectrum)

This telephone is using an IC chip which has similar specification to WDCT (World Digital Cordless Telephone) and is the cordless telephone system that can use multiple portable unit simultaneously.

The explanation of this system is mentioned below.

This system uses a Time Division Multiple Access/Time Division Duplex (**TDMA/TDD**) scheme:

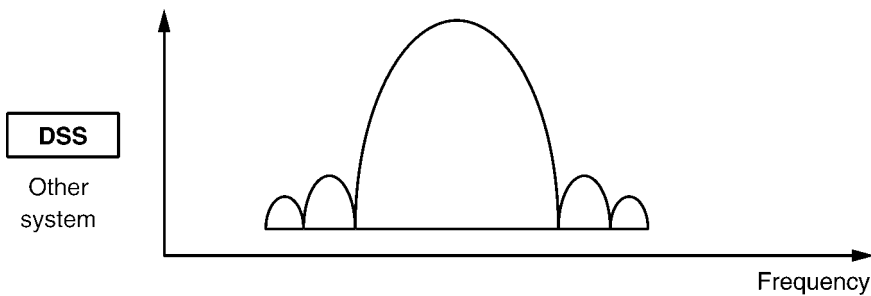
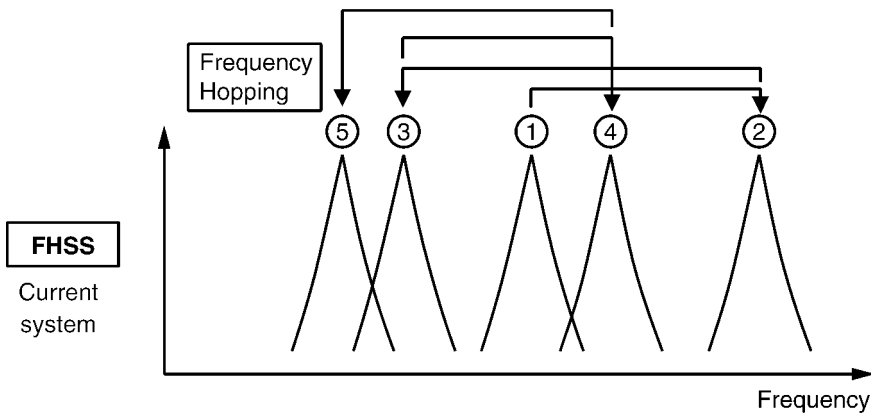
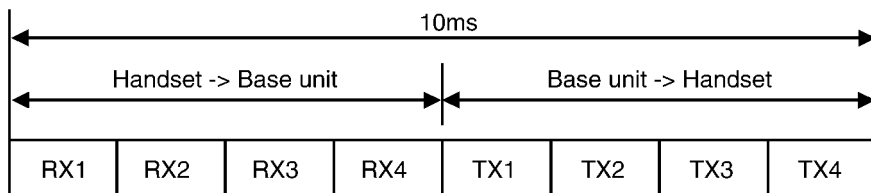
Transmitting and receiving frequencies of the base unit and cordless handset are shared in the same frequency. The construction of RX/TX frequency data is shown below. It consists

of 4 slots from the base unit to the cordless handset, and 4 slots from the cordless handset to the base unit, total 8 slots in 10ms. By this slot system, simultaneous air link and communication between 4 cordless handsets and the base unit can be realized. One communication between cordless handset and the base unit is done by one slot from the base unit to cordless handset, and another slot from cordless handset to the base unit.

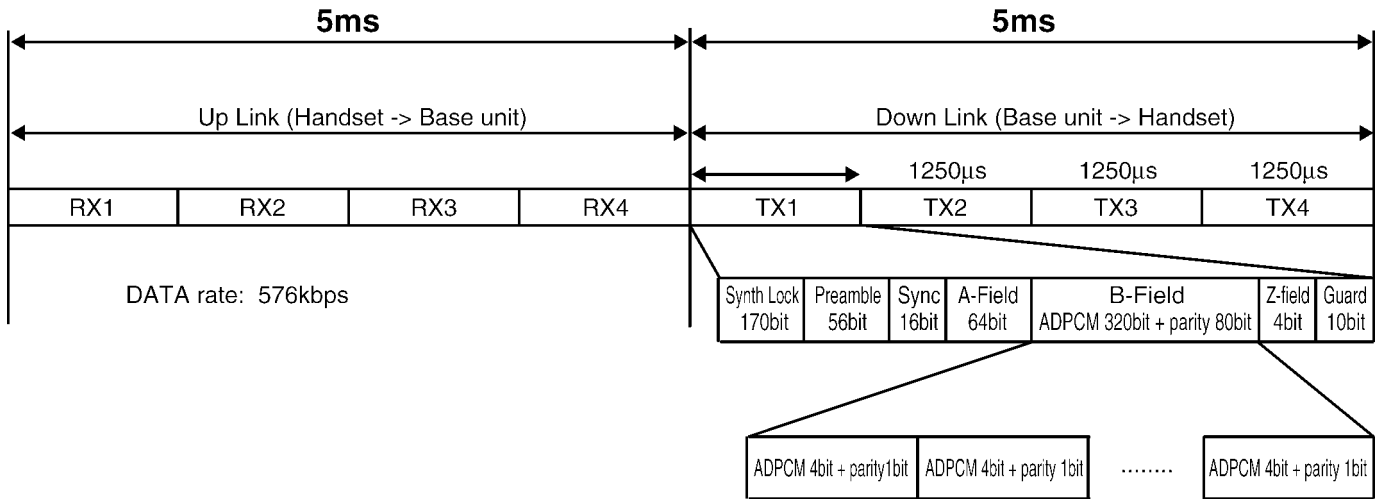
DSS makes spectrum spread by multiplying carrier signal by PN code.

The purpose to make spectrum spread is to reduce power density per time and per band.

On the other hand, **FHSS** makes spectrum spread by changing channel every 10ms according to Hopping table. Also the purpose to make spectrum spread is to reduce power density per time and per band.



6.14.2.1. TDD Frame Format



Sync Field (32Bit): Preamble16Bit + SyncWord16Bit

Base set (handset) adjusts the timing of reception so that reception of base set (handset) can correspond to transmission of handset (base unit). It is necessary for sync-field that handset gets synchronization.

A - field (64bit) : Each kinds of DATA: ch data, line condition, etc

B - field (420bit + 80bit) : Sound data + parity

Z - Filed (4Bit) : Parity Check

6.14.2.2. TDMA system

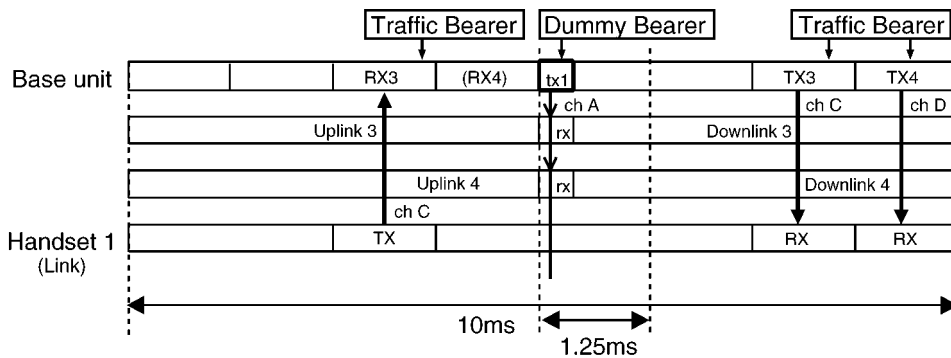
This system is the cycles of 10ms, and has four duplex paths, so it is possible to perform four duplex communications simultaneously.

In 1 slot 1.25ms, the 10ms of voice data is transmitted.

Each slot makes every frame frequency hop. (100hops/sec)

Although each slot (UpLink3 and UpLink4) is different frequency, UpLink3 and DownLink3 use the same frequency.

• 2 - Handsets Link



Traffic Bearer

A link is established between Base set and handset.

The state where duplex communication is performed.

The hopping pattern of a 1800hops (18 seconds) cycle.

Dummy Bearer

The Base unit send Dummy-data to the all stand-by state Handsets.

The Handsets receive that data for keeping synchronization and monitoring request from the Base unit.

Dummy Bearer doesn't contain B-field (sound) data.

6.14.2.3. Signal Flowchart in the Whole System

Reception

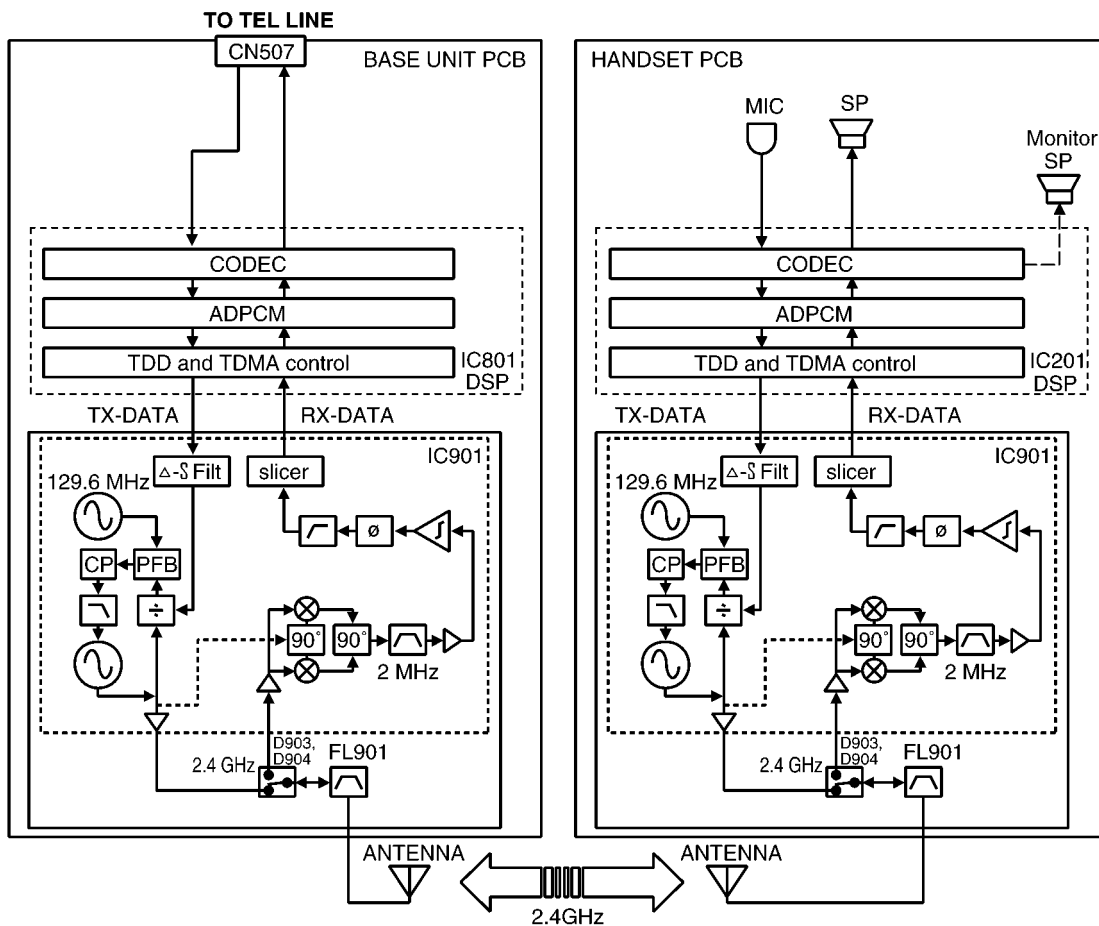
CN507 of the base unit is connected to the line from TEL line. While talking, the signal through analog board and digital board, then led to DSP (IC801). The DSP encodes ADPCM and TDD/TDMA with FHSS to TX-DATA. The TX-DATA signal is entered to IC901 of RF UNIT, and modulated to 2.4GHz. The RF signal is fed into Tx/Rx switch (D903/D904). The RF signal is passed through filter (FL901) and fed to ANTENNA.

As for the handset, RF signal from the antenna passes through filter (FL901), then is routed by Tx/Rx switch (D903/D904) and led to IC901. The RF signal is amplified by LNA and down-converted to IF signal in IC901. The IF signal passing through internal filter is demodulated into RX-DATA, then enters DSP (IC201). The DSP performs TDD/TDMA and ADPCM decoding to convert the RX-DATA into the voice signal, then it is output to the speaker.

Transmission

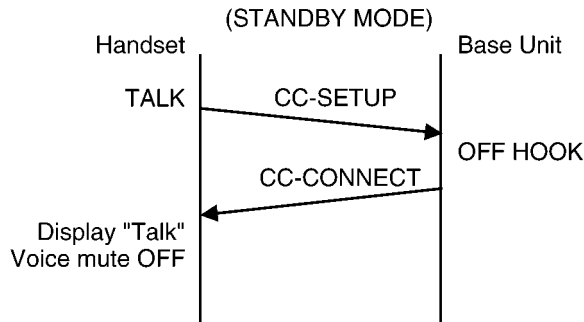
The voice signal entering from the microphone is led to DSP (IC201). The DSP encodes ADPCM and TDD/TDMA with FHSS to TX-DATA. The TX-DATA signal enters IC901 of RF UNIT, and is modulated to 2.4GHz. The RF signal is fed into Tx/Rx switch (D903/D904). The RF signal is passed through filter (FL901) and fed to ANTENNA.

As for the base unit, RF signal from the antenna passes through filter (FL901), then is routed by Tx/Rx switch (D903/D904) and led to IC901. The RF signal is amplified by LNA and down-converted to IF signal in IC901. The IF signal passing through internal filter is demodulated into, then enters DSP (IC801). The DSP performs TDD/TDMA and ADPCM decoding to convert the RX-DATA into the voice signal. The voice signal is outputted to the TEL line through digital board and analog board.



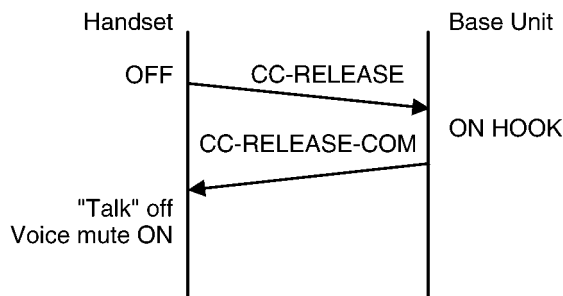
6.14.3. Explanation of Link Data Communication

6.14.3.1. Calling



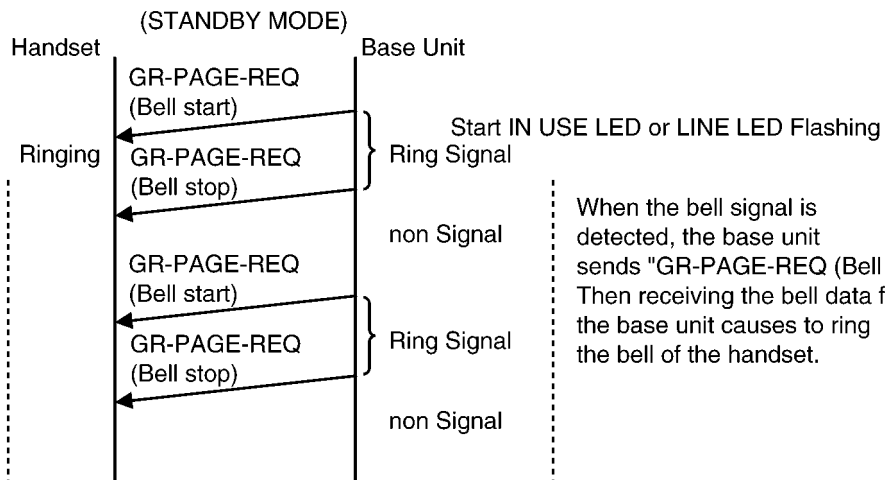
When calling, a communication request DATA (CC-SETUP) is transmitted from the Handset, and a permitting DATA (CC-CONNECT) is returned from the Base Unit to it. At that time the audio path opens.

6.14.3.2. To Terminate Communication



When the OFF button on the Handset is pressed during communication, a LINK terminating DATA (CC-RELEASE) is sent to terminate the communication. Then DATA (CC-RELEASE-COM) is returned from Base Unit. Handset receives it and reset the link.

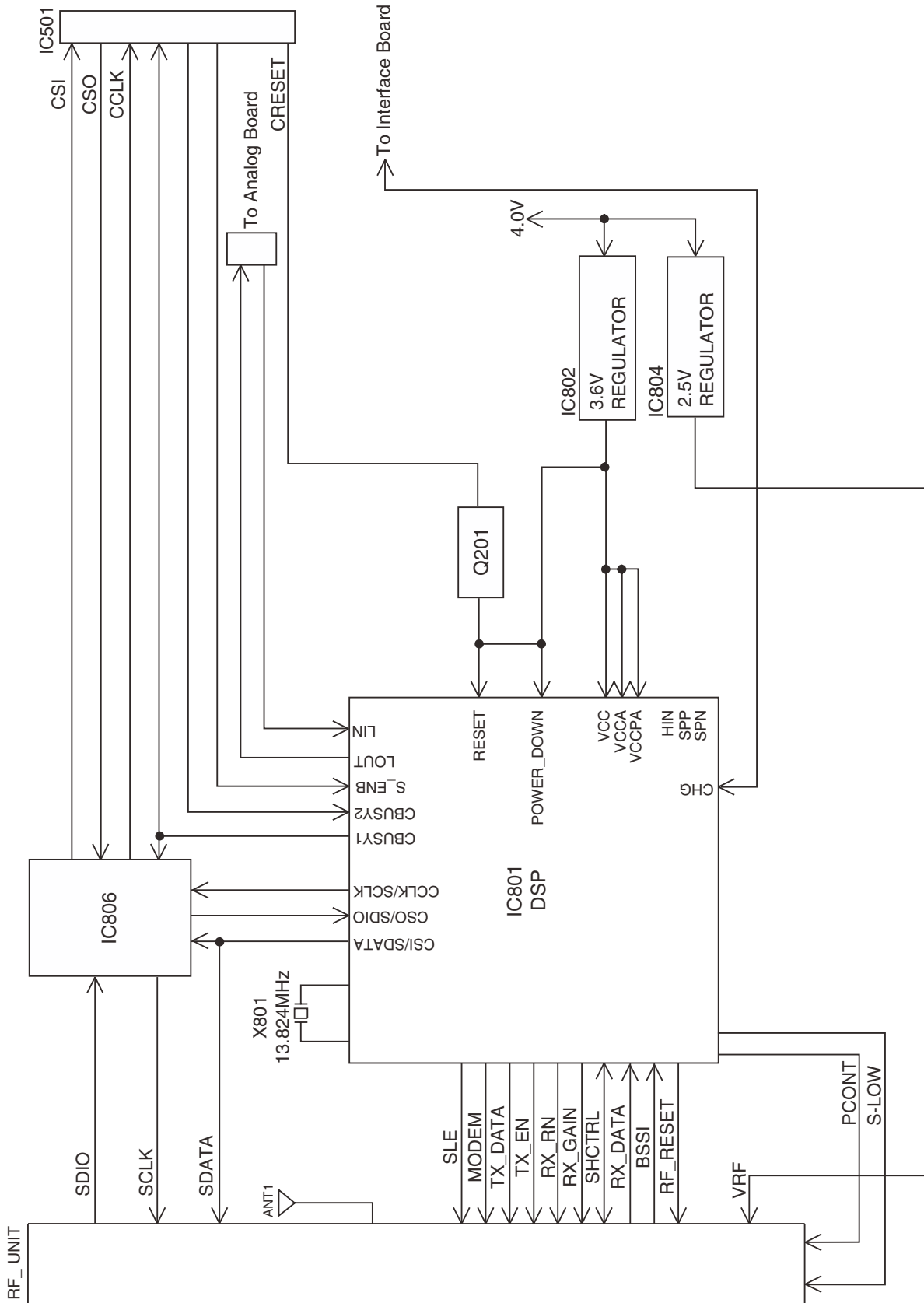
6.14.3.3. Ringing



When the bell signal is detected, the base unit sends "GR-PAGE-REQ (Bell start)". Then receiving the bell data from the base unit causes to ring the bell of the handset.

6.14.4. Base Section

6.14.4.1. Cordless Base Block Diagram

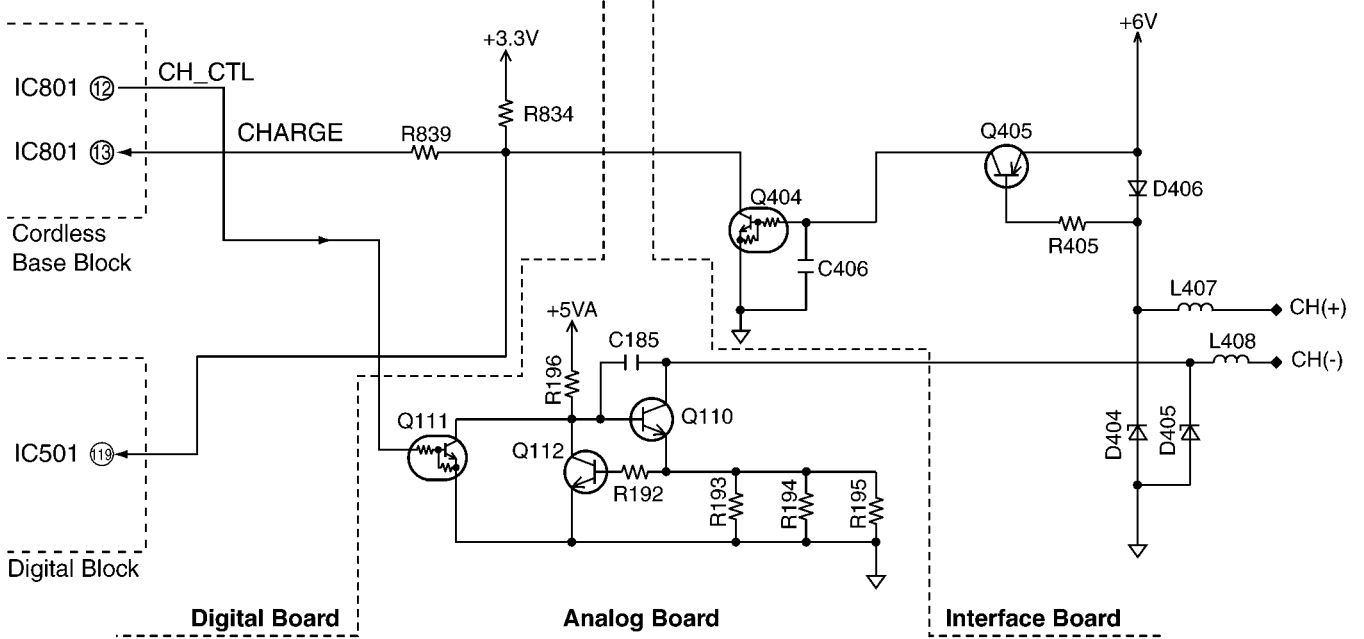


KX-FG2452CX: CORDLESS BASE SECTION BLOCK DIAGRAM

6.14.4.2. Charge Circuit

Ultra charge (170 mA) of maximum 6 hours is started soon after the Handset is placed on the base unit. Finally the mode changes to trickle charge (6 mA) to prevent overcharging.

Circuit Diagram



6.14.4.3. Line Sending Signal

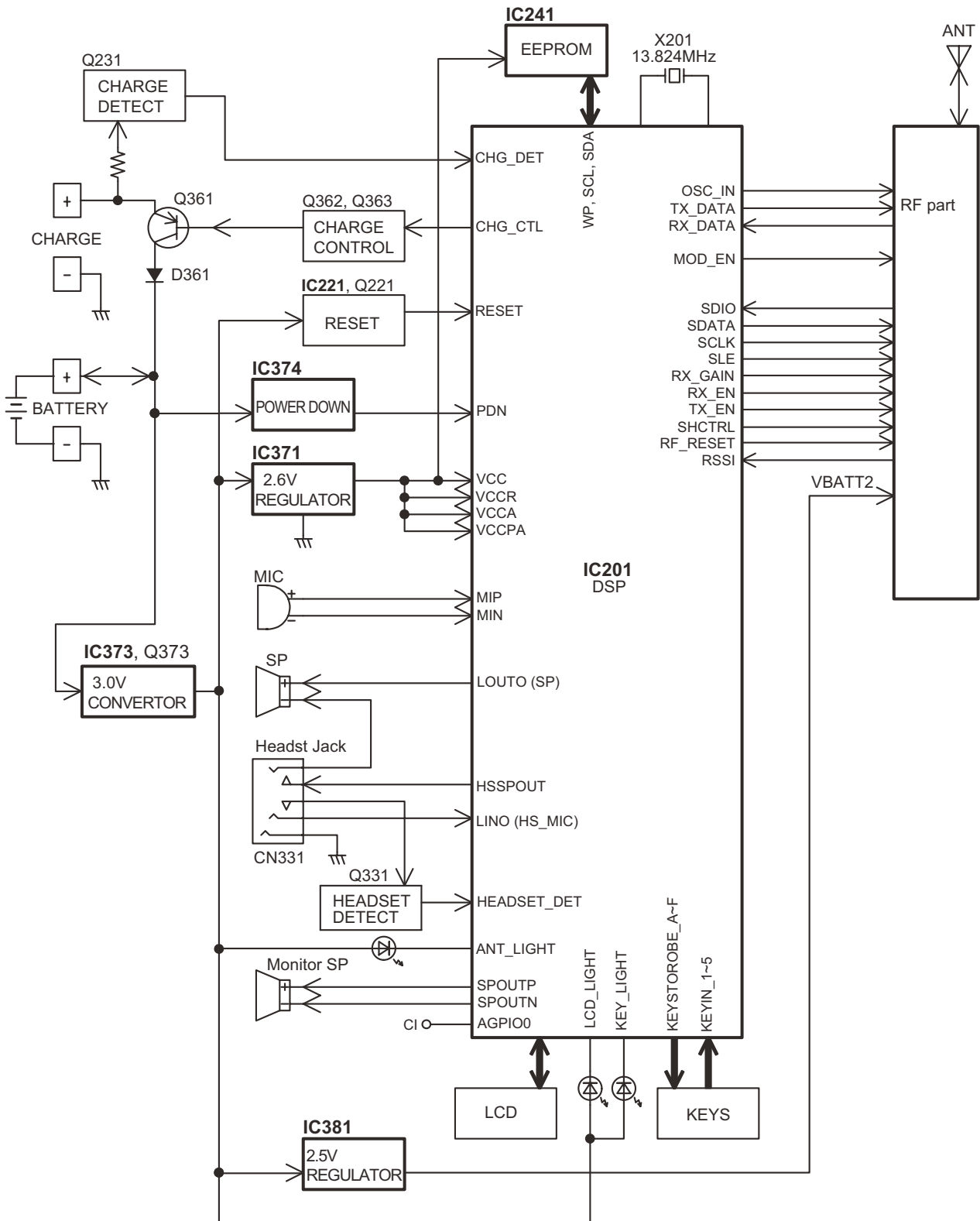
Refer to **Signal Flowchart in the Whole System** (P.54).

6.14.4.4. Line Receiving Signal

Refer to **Signal Flowchart in the Whole System** (P.54).

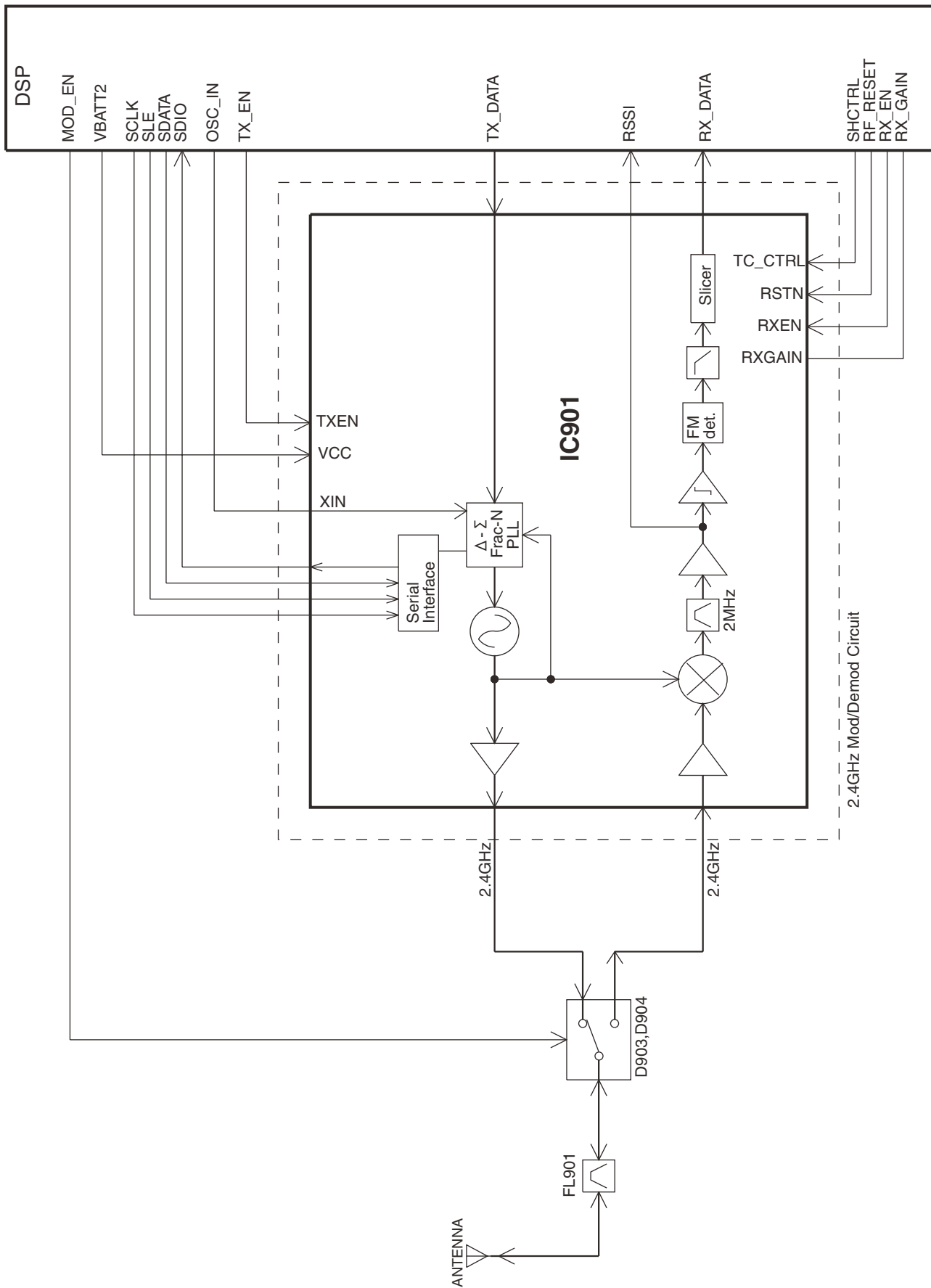
6.14.5. Handset Section

6.14.5.1. Block Diagram (Handset)



KX-FG2452CX: HNADSET BLOCK DIAGRAM

6.14.5.2. Block Diagram (Handset_RF part)



KX-FG2452CX : Handset_RF Part BLOCK DIAGRAM

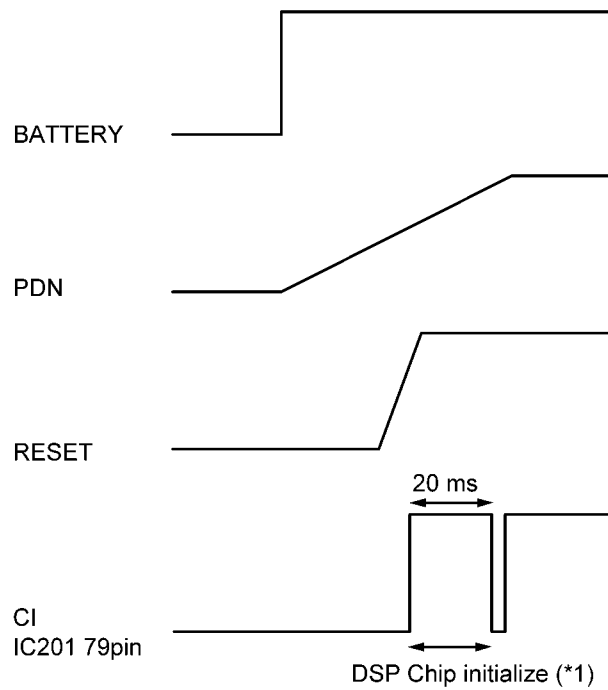
6.14.5.3. Construction

The circuit mainly consists of DSP and RF unit as shown in the block diagram.

6.14.5.4. DSP: IC201

Function

- Battery Low, Power down detect circuit
 - Ringer Generation
 - Interface circuit
- RF unit, speaker, Mic, LED, Key scan, LCD, Headset



Note:

(*1) The initializing time of the DSP chip is 20ms under normal conditions.

6.14.5.5. RF Unit

Mainly voice signal is modulated to RF, or it goes the other way.

6.14.5.6. EEPROM: IC241

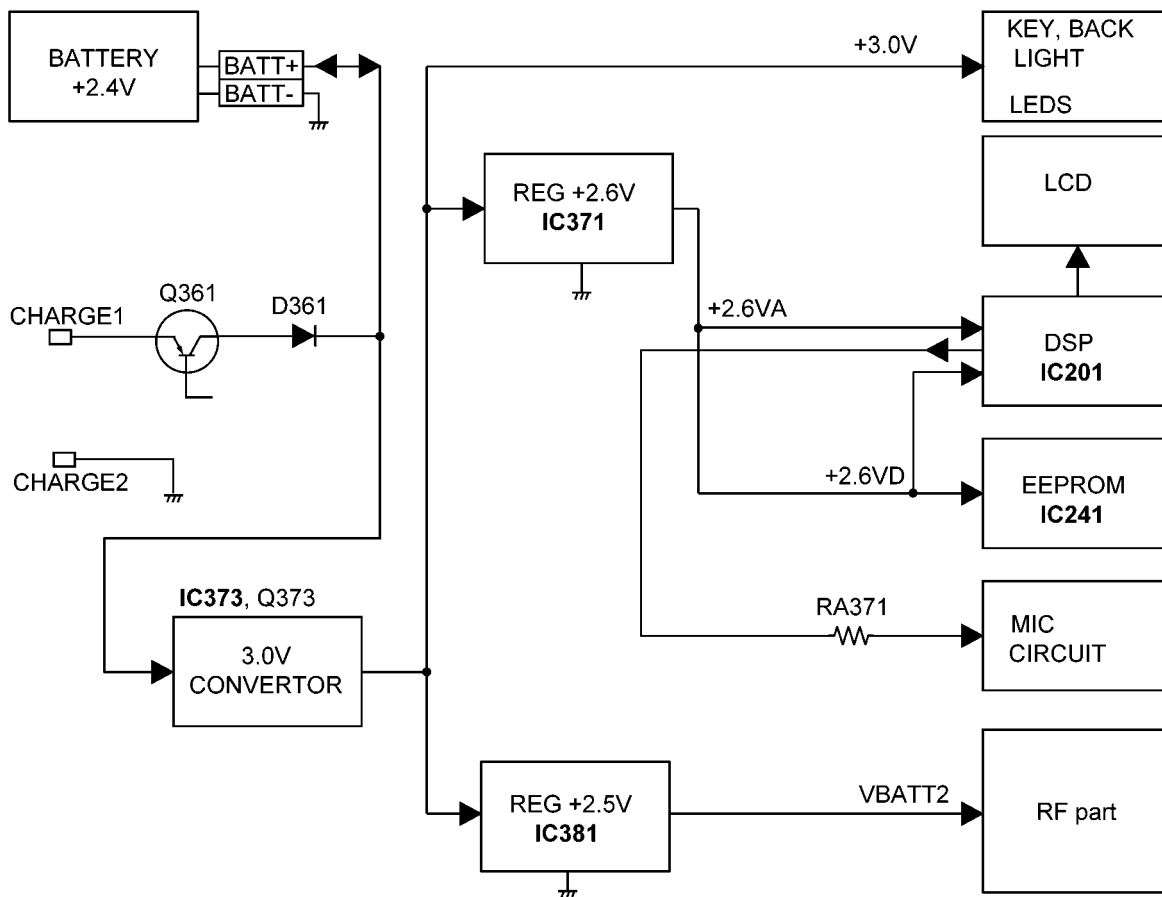
All setting data is stored.

ex: ID code, User setting (Phonebook, Caller ID data)

6.14.5.7. Power Supply Circuit

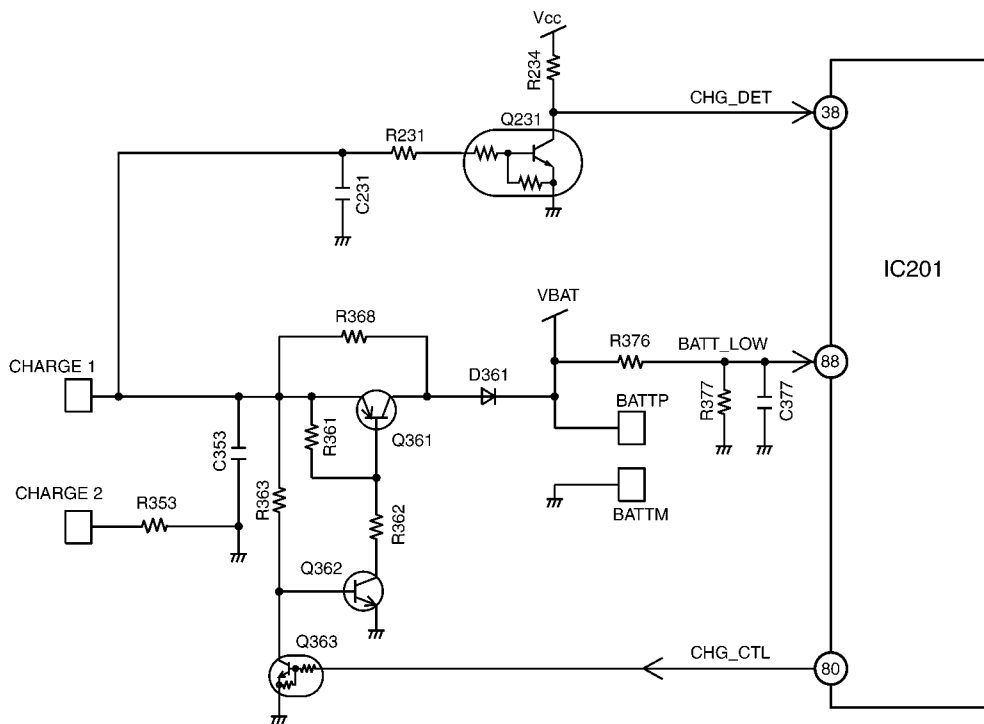
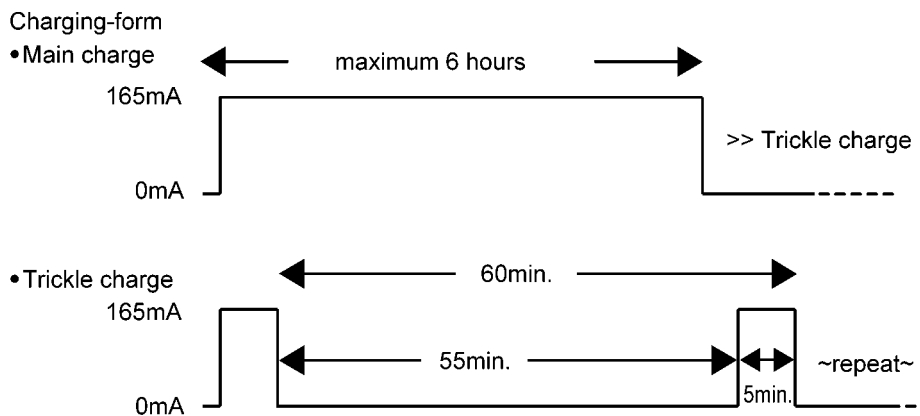
Voltage is supplied separately to each block.

Block Diagram (Handset Power)



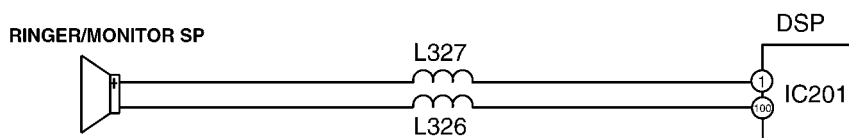
6.14.5.8. Charge Circuit

When the Handset is put on the cradle of the Base unit or the charger, the power is supplied from CHARGE+ and CHARGE- terminals to charge the battery via R368 or Q361, and D361. The voltage between CHARGE+ and CHARGE- flows R231 → Q231 → pin38 of IC201, where the charge is detected. Then IC201 calculates the battery consumption amount from the previous charge, and it controls Q361/Q362/Q363 by pin80 of IC201 until charging is complete. When charging is complete, the control pattern is switched to Trickle charging form from Operational charging form.



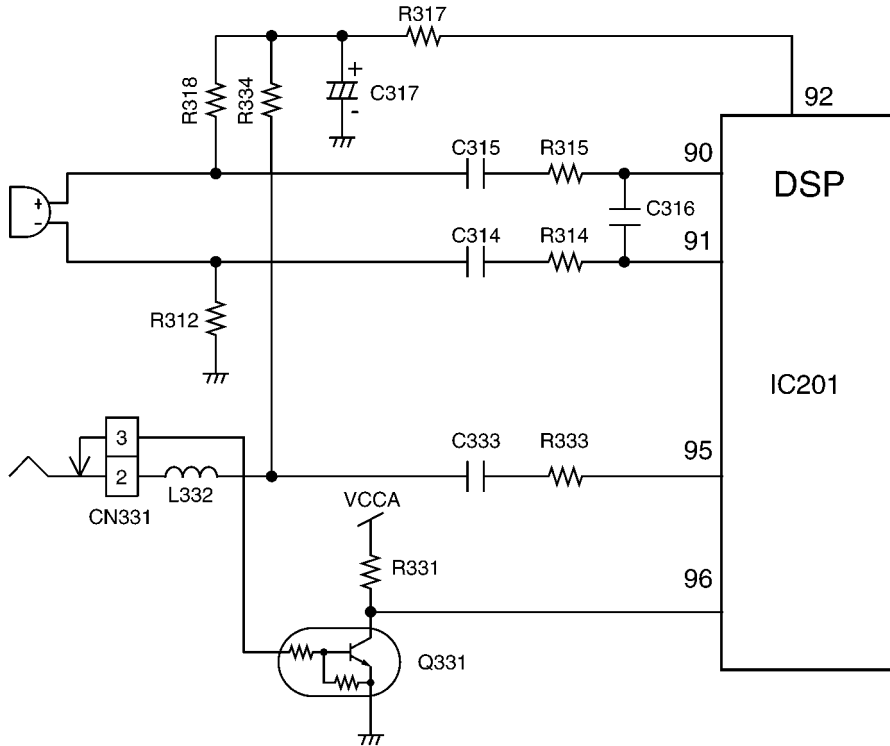
Pin 88 of IC201 monitors the battery voltage and detects BATT LOW at 2.34V.

6.14.5.9. Ringer and Handset SP-Phone



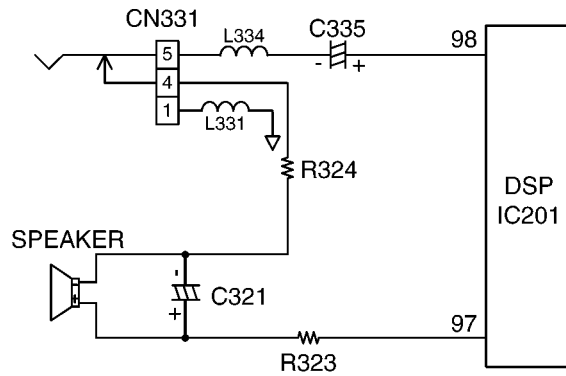
6.14.5.10. Sending Signal

The voice signal from the microphone is input to DSP (90, 91). CN331 is the headset jack. When the headset is connected, Q331 detects it. The input from the microphone of the Handset (MIN, MIP) is cut and the microphone signal from the headset is input to DSP (95). Also the power for the microphone is supplied from DSP (92) and the power is turned OFF on standby.



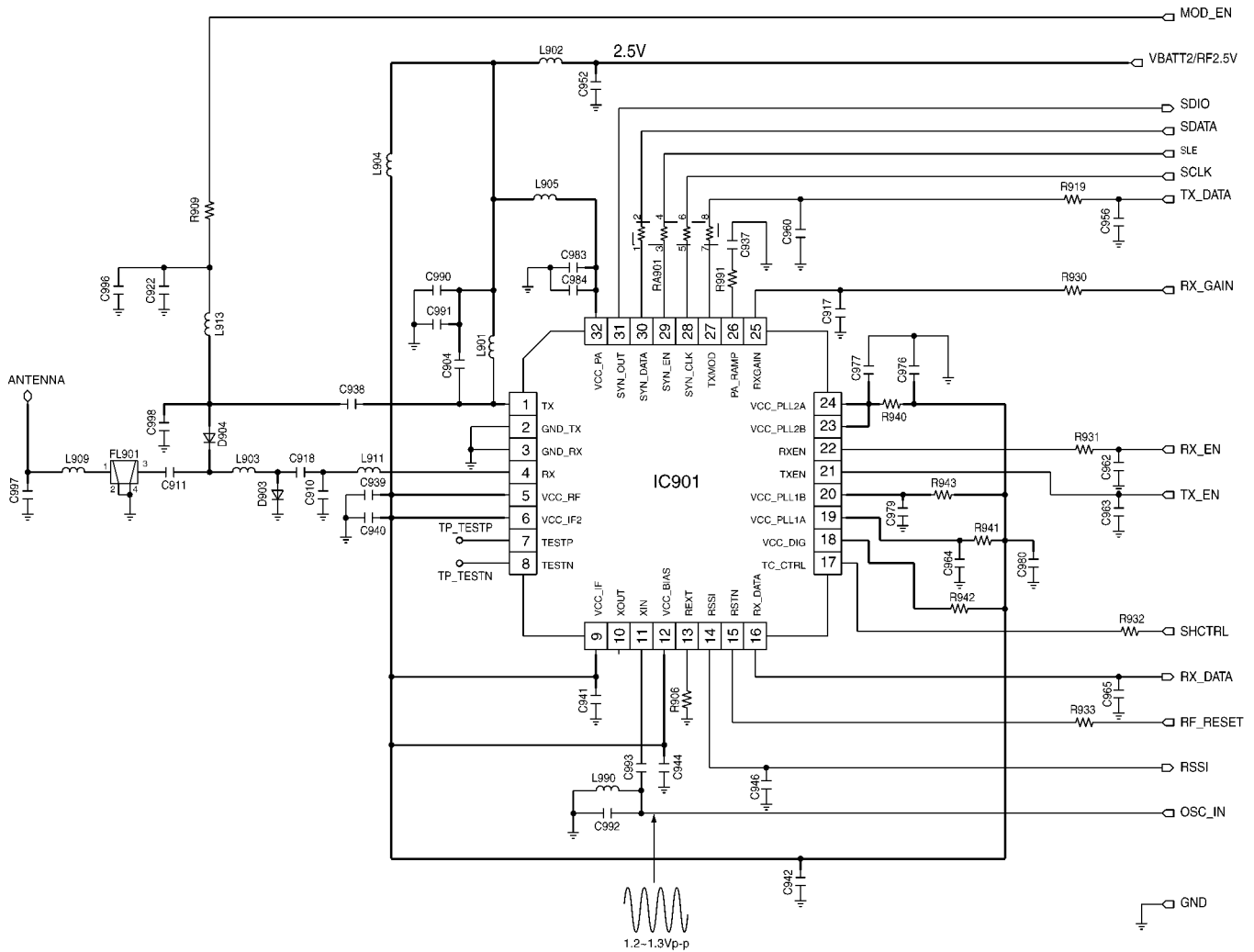
6.14.5.11. Reception Signal

The voice signal from the Base Unit is output to DSP (98) (HSSPOUT). This signal is led to the headset jack (CN331). The signal through the headset jack and the other signal output from DSP (97) drives the speaker. When the headset is inserted into the jack, the voice signal is cut at the jack, so the sound does not come out from the speaker, but from the headset only.



6.14.5.12. 2.4GHz Mod/Demod Circuit (RF Part)

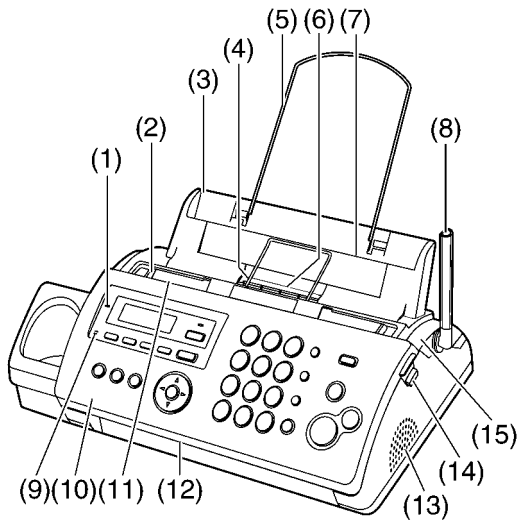
IC901 incorporates all of the modulation and demodulation functions. TX Digital data (TX_DATA) from DSP is supplied to pin 27 of IC901, and then 2.4GHz TX modulated signal is output from pin1. This TX signal is filtered by BPF (FL901) and supplied to Antenna. 2.4GHz RX signal from the Antenna is filtered by BPF (FL901) and supplied to pin4 of IC901, then demodulated signal (RX_DATA) comes out from pin 16. At the same time, RSSI (Received Signal Strength Indicator) outputs from pin 14. Reference clock (13.824MHz) from DSP block is supplied to pin 11 of IC901. VBATT2/RF2.5V supplies 2.5V regulated voltage.



7 Location of Controls and Components

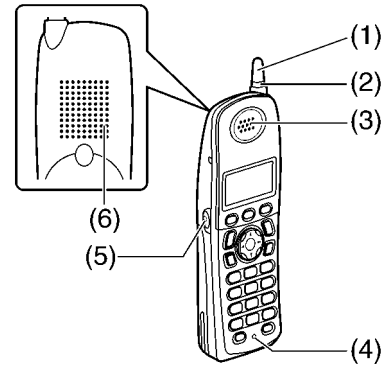
7.1. Overview

7.1.1. Base Unit



- (1) CHARGE indicator
- (2) Document guides
- (3) Paper tray
- (4) Metal recording paper guide
- (5) Paper support
- (6) Recording paper exit
- (7) Recording paper entrance
- (8) Antenna
- (9) Microphone
- (10) Front cover
- (11) Document entrance
- (12) Document exit
- (13) Speaker
- (14) Green button (Back cover release button)
- (15) Back cover

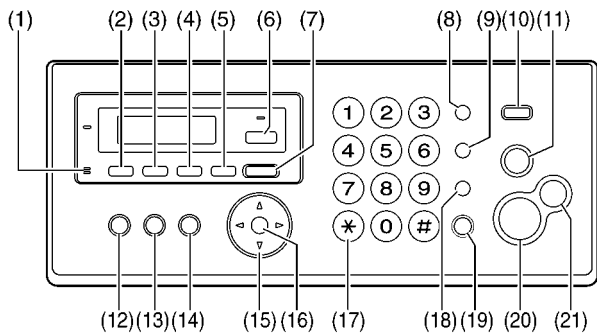
7.1.2. Handset



- (1) Antenna
- (2) Ringer indicator
Message indicator
- (3) Receiver
- (4) Microphone
- (5) Headset jack
- (6) Speaker

7.2. Control Panel

7.2.1. Base Unit



(1) [MIC] (Microphone)

- The built-in microphone.

(2) [GREETING REC]

- To record a greeting message.

(3) [GREETING CHECK]

- To check a greeting message.

(4) [MEMO]

- To record a memo message.

(5) [ERASE]

- To erase messages.

(6) [AUTO ANSWER]

- To turn the auto answer setting ON/OFF.

(7) [PLAYBACK]

- To play messages.

(8) [REDIAL] [PAUSE]

- To redial the last number dialed from the base unit.
- To insert a pause during dialing.

(9) [FLASH]

- To flash time can be changed. (feature #72 or feature #052)
(Refer to **Cordless Handset Programming** (P.75) and **Program Mode Table** (P.123).)

(10) [CALLER ID]

- To use Caller ID features.

(11) [STOP]

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

(12) [LOCATOR] [INTERCOM]

- To make/answer intercom calls.
- To locate the cordless handset.
- To put a call on hold.

(13) [PRINT REPORT]

- To print lists and reports for reference purposes.

(14) [MENU]

- To start or exit programming.

(15) [PHONEBOOK] [VOLUME]

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

(16) [SET]

- To store a setting during programming.

(17) [TONE]

- To change from pulse to tone temporarily during dialing when your line has rotary pulse service. You can also use tone dial service by changing feature #13 or feature 051. (Refer to **Cordless Handset Programming** (P.75) and **Program Mode Table** (P.123).)

(18) [MUTE]

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

(19) [SP-PHONE]

- For speakerphone operation.

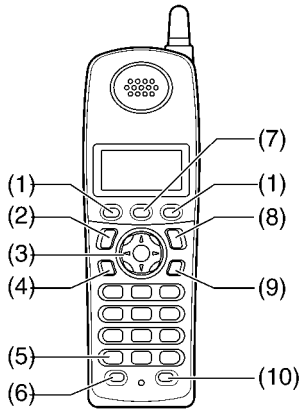
(20) [FAX START]

- To send or receive a fax.

(21) [COPY]

- To copy a document.

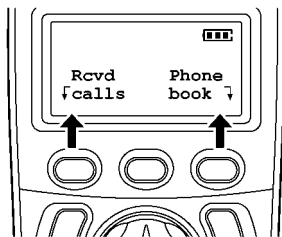
7.2.2. Handset



(1) [Soft keys]

- Two soft keys are used to select the functions displayed directly above each key.

Example:



(2) [TALK]

- To make/answer calls.

(3) Navigator

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

(4) [SP-PHONE]

- For speakerphone operation.

(5) [TONE]

- To change from pulse to tone temporarily during dialing when your line has rotary pulse service. You can also use tone dial service by changing feature #13 or feature 051. (Refer to **Cordless Handset Programming (P.75)** and **Program Mode Table (P.123).**)

(6) [PAUSE] [REDIAL]

- To redial one of the last 5 numbers dialed from the cordless handset.
- To insert a pause during dialing.

(7) [MENU]

- To start programming.

(8) [OFF]

- To hang up.
- To stop an operation or programming.

(9) [MUTE] [CLEAR]

- To mute your voice during a conversation. Press again to resume the conversation.
- To erase a character/number. Press and hold to erase all characters/numbers.

(10) [HOLD] [INTERCOM]

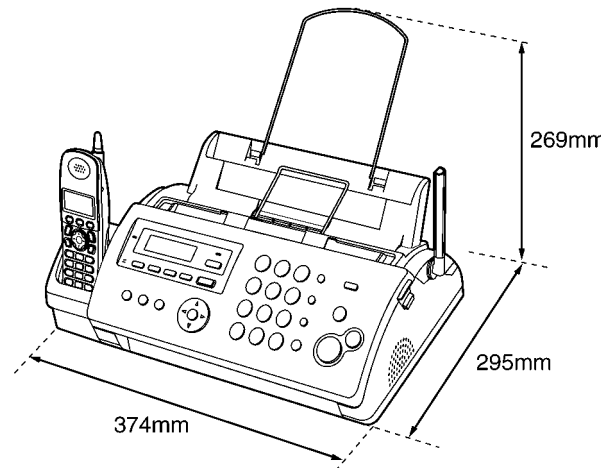
- To put a call on hold.

8 Installation Instructions

8.1. Installation Space

The space required to install the unit is shown below.

The dimensions given are necessary for the unit to operate efficiently.



Note:

- Avoid excessive heat or humidity.
- Use the unit within the following ranges of temperature and humidity.
- Ambient temperature: 5°C to 35°C
- Relative humidity: 20% to 80% (without condensation)
- 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.

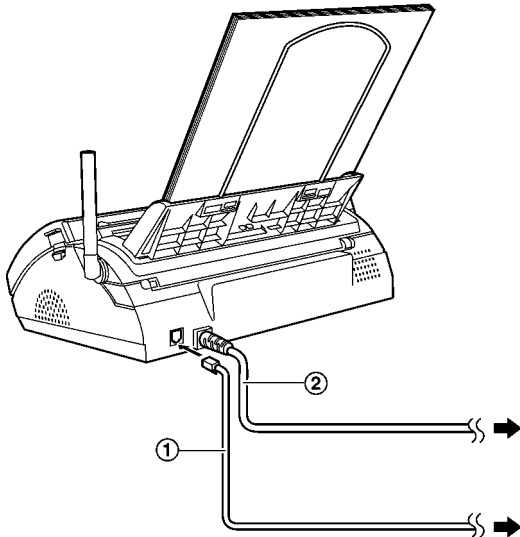
8.2. Connections

Caution:

- When you operate this product, the power outlet should be near the product and easily accessible.

8.2.1. Base Unit

- ① Telephone line cord
 - Connect to a single telephone line jack.
- ② Power cord
 - Connect to the power outlet (220-240 V, 50/60 Hz).



Note:

- To avoid malfunction, do not position the fax machine near appliances such as TVs or speakers which generate an intense magnetic field.
- If any other device is connected to the same telephone line, this unit may disturb the network condition of the device.

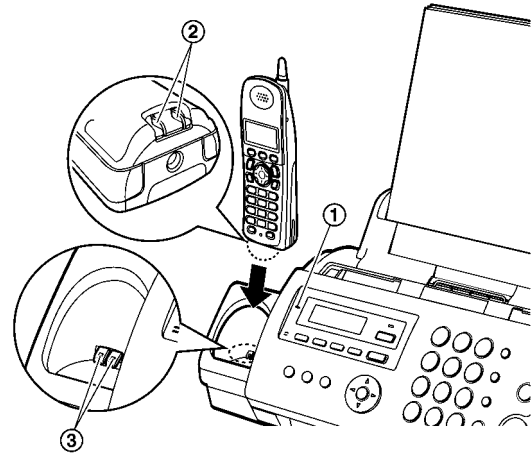
If the fax machine shares a single telephone line with a computer modem or a DSL service:

- Fax transmission/reception may be disturbed, noise interference may be heard during telephone conversations, or Caller ID may not function properly. A filter to prevent this is provided by your provider. Please attach the filter to the telephone line cord of the unit.

8.3. Battery Charge

Place the cordless handset on the cradle of the base unit for about **6 hours** before initial use.

- The unit will beep once, the **[CHARGE]** indicator (①) will light, and “Charging” will be displayed on the cordless handset display.
- After the cordless handset is fully charged, displaying “Charge completed”, it may be left on the base unit without any will effect on the battery.



Note:

- To ensure the battery charges properly, clean the charge contacts of the cordless handset (②) and the charger (③) with a soft, dry cloth once a month. Clean more often if the unit is subject to grease, dust or high humidity.

Battery strength

Handset Display	Battery strength
	Fully charged
	Medium
	Low • When flashing: Needs to be charged
	Discharged


Note:

- When the battery is low, the cordless handset beeps intermittently while it is in use.

Panasonic battery performance

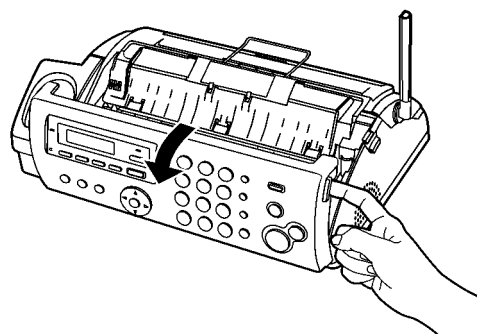
It should last up to 5 hours while in use (in conversation).
 It should last up to about 11 days while not in use (off the base unit). feature.
 It should last up to 3 hours while using the clarity booster feature.

Note:

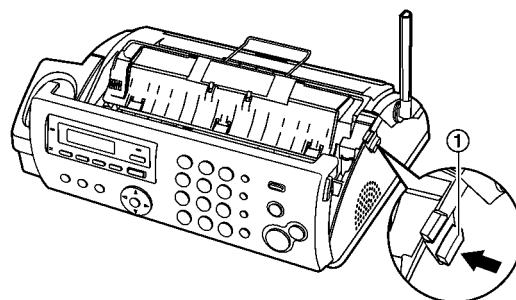
- Battery power is consumed whenever the cordless handset is off the base unit, even when the cordless handset is not in use. The longer you leave the cordless handset off the base unit, the shorter you can actually talk using the cordless handset.
- Once the battery is fully charged, you should not have to charge it again until "Recharge battery" is displayed and/or  flashes. This will maximize the battery life.

8.4. Installing the Ink Film

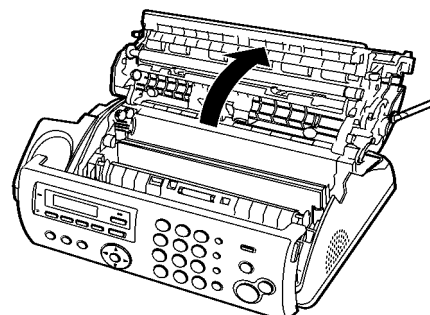
1. Open the front cover.



2. Release the back cover by pushing the green button (①).

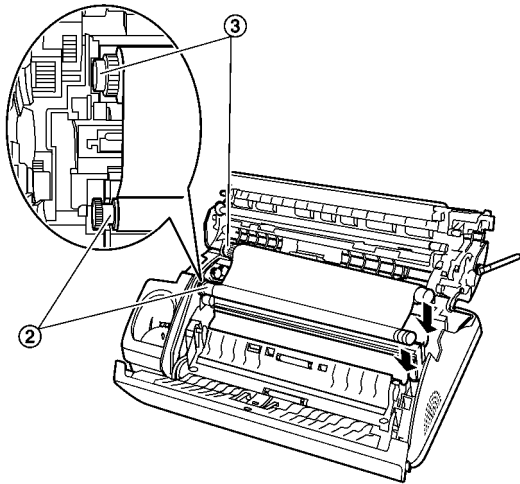


3. Open the back cover.

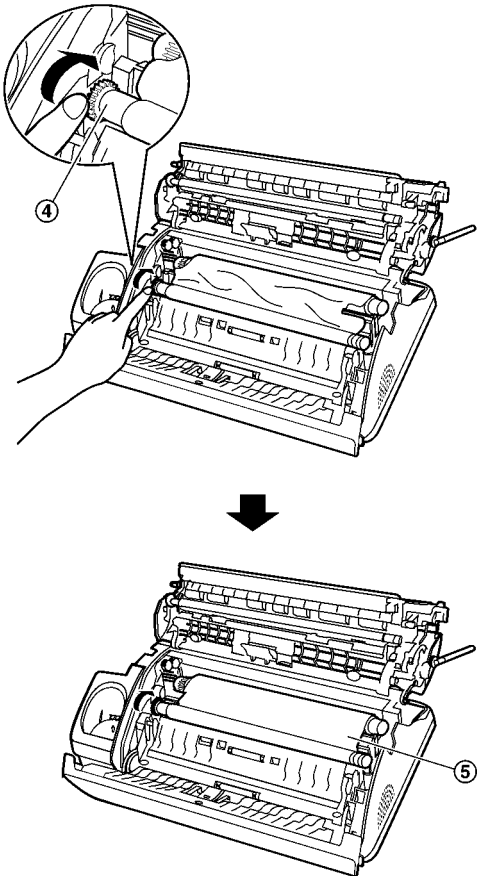


4. Insert the blue gear of the ink film roll into the front left slot of the unit (②) and the white gear of the ink film roll into the rear left slot of the unit (③).
 - The ink film is safe to touch and will not rub off on your hands like carbon paper.

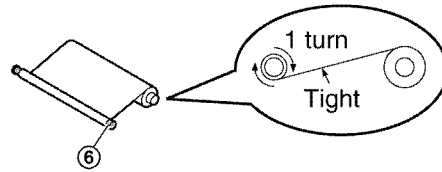
- Make sure the blue gear (2) and white gear (3) are installed as shown.



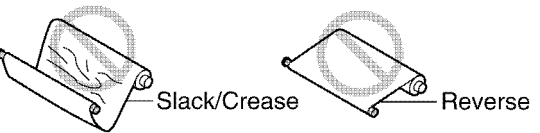
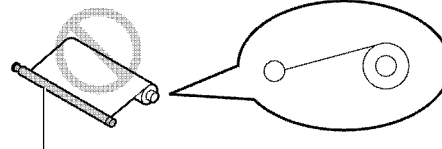
5. Turn the blue gear (4) in the direction of the arrow until the ink film is tight (5) and at least one layer of ink film is wrapped around the blue core (6).



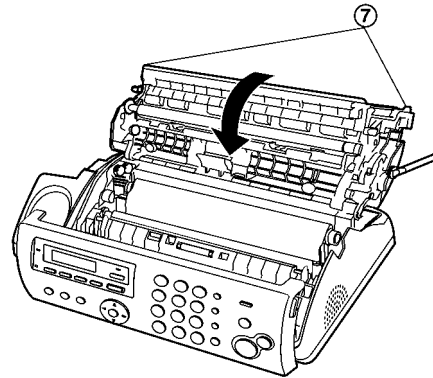
Correct



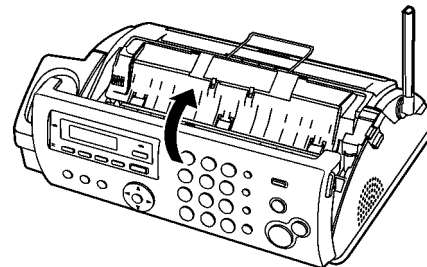
Incorrect



6. Close the back cover securely by pushing down on the dotted area at both ends (7).

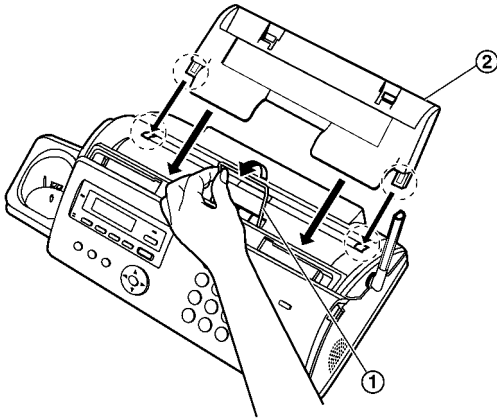


7. Close the front cover securely.

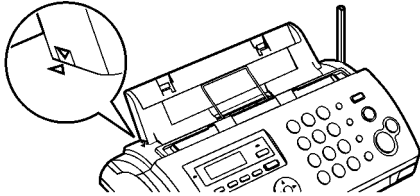


8.5. Installing the Paper Tray

Pull up the metal recording paper guide (①), then install the paper tray (②).

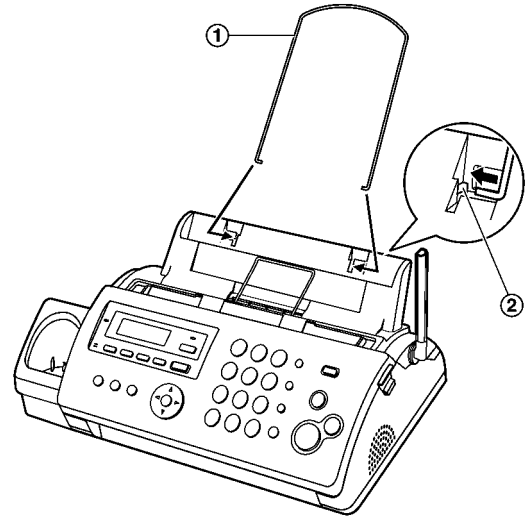


- Make sure the arrows on the paper tray and the unit match.



8.6. Paper Support

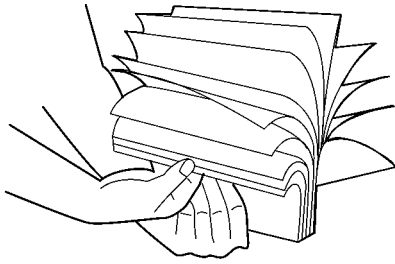
Hold open the paper support (①), then insert the ends into the holes on the paper tray (②).



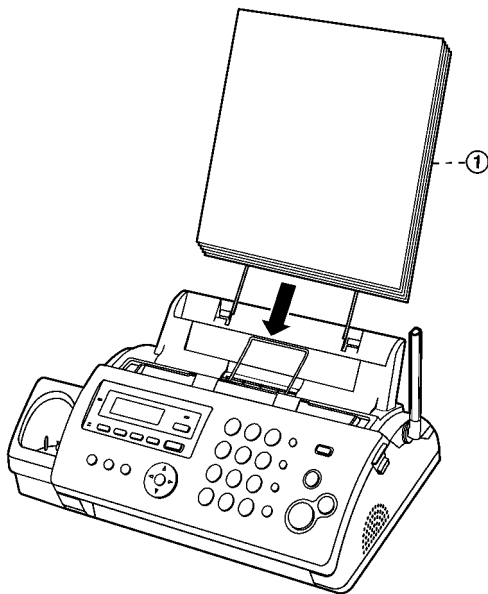
8.7. Installing the Recording Paper

The unit can hold up to 20 sheets of 60 g/m² to 90 g/m² paper.

1. Fan the paper to prevent paper jams.

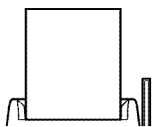


2. Insert the paper gently, print-side down (1).
 - Do not force the paper into the paper tray.

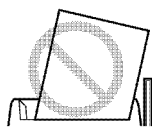


- If the paper is not inserted correctly, remove all of the installed paper, and re-install it gently. Otherwise the paper may jam.

Correct



Incorrect

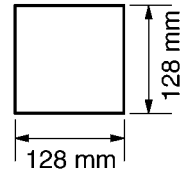


Note:

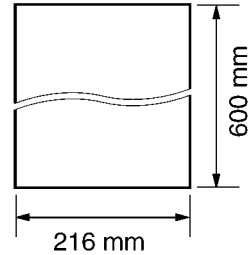
- Remove all of the installed paper before adding paper.

Document requirements

Minimum document size

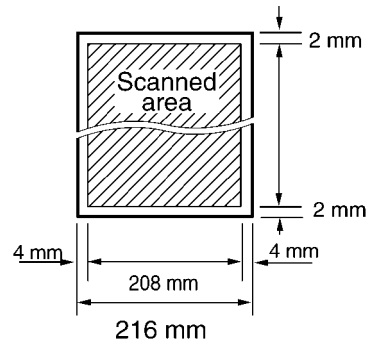


Maximum document size



Effective scanning area

- Shaded area will be scanned.



Document weight

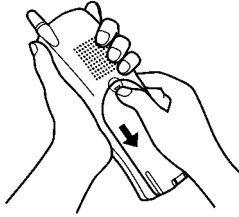
- When faxing a single sheet:
45 g/m² to 90 g/m²
- When faxing a multiple sheet:
60 g/m² to 80 g/m²

Note:

- Remove chips, staples or other fasteners.
- Do not send the following types of documents. (Make a copy of the document 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 transmit a document with a width of less than 210 mm, we recommend using a copy machine to copy the original document onto A4 or letter-sized paper, then sending the copied document.

8.8. Battery Installation / Replacement

1. Press the notch on the battery cover firmly, and slide the cover.



2. Installation:

Insert the battery (①), and press it down until it snaps into the compartment (②).

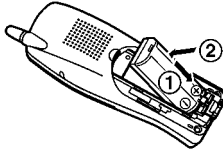
OR

Replacement:

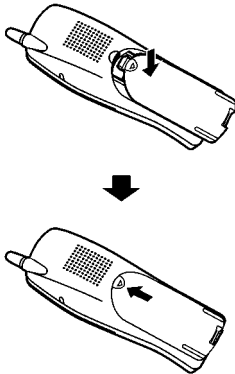
Replace the old battery with a new one.

Important:

Please use only a Panasonic battery. See Optional Accessories (P.9).



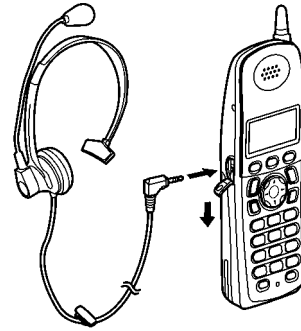
3. Close the battery cover.



8.9. Headset (optional)

Connecting an optional headset to the cordless handset allows hands-free phone conversations.

We recommend using a Panasonic headset. See Optional Accessories (P.9).



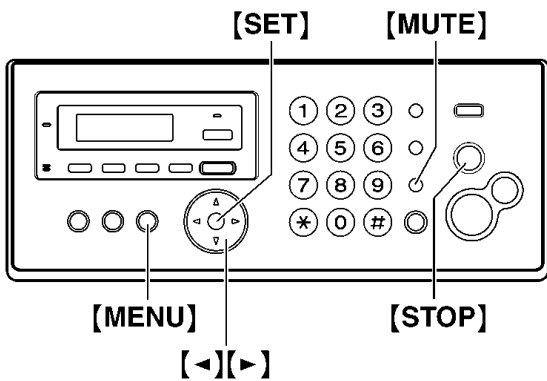
- Model shown is KX-TCA89BX.

To switch to the speakerphone while using the headset:
Press [SP-PHONE]. To return to the headset, press [TALK].

9 Operation 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]



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

To enter your logo

Example: "BILL"

1. Press [2] 5 times.



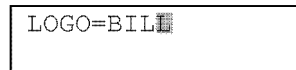
2. Press [4] 6 times.



3. Press [5] 6 times.



4. Press [→] to move the cursor to the next space and press [5] 6 times.



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].

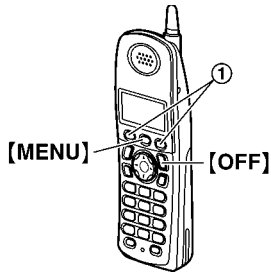
To select characters with the dial keypad

Keypad	Characters
[1]	& ' () , - . / 1
[2]	a b c A B C 2
[3]	d e f D E F 3
[4]	g h i G H I 4
[5]	j k l J K L 5
[6]	m n o M N O 6
[7]	p q r s P Q R S 7
[8]	t u v T U V 8
[9]	w x y z W X Y Z 9
[0]	0 (Space)
[*]	*
[#]	#
[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.

9.2. Cordless Handset Programming



- 1 Press **[MENU]**.
- 2 Press the code number (**[0]** to **[9]** and **[#]**).
- 3 Press the desired direct command to display the desired setting.
 - This step may be slightly different depending on the feature.
- 4 **[Save]** (Soft key ①) → **[OFF]**

Note:

- To exit programming, press **[OFF]** at any time.

9.2.1. Basic Features

Feature	Feature code	Selection
Changing the ring count in TAM/FAX mode ^{*1}	Cordless handset: [0][6][1]	[0] "Toll saver" [2] "2" (default) [3] "3" [4] "4" [5] "5" [6] "6" [7] "7"
Changing the maximum recording time for incoming messages ^{*1}	Cordless handset: [0][6][2]	[0] "Greeting only": The unit plays the greeting message but does not record any incoming messages. [1] "1min": 1 minute [2] "2min": 2 minutes [3] "3min" (default): 3 minutes
Setting the remote operation ID ^{*1}	Cordless handset: [0][6][3]	1. [MENU] → [0][6][3] 2. Enter a 2-digit number (00–99). • The default setting is "11". 3. [Save] (soft key) → [OFF]
Setting the dialing mode ^{*1}	Cordless handset: [0][5][1]	[1] "Pulse": For rotary pulse dial service. [2] "Tone" (default): For tone dial service.
Setting the ringer tone for outside calls	Cordless handset: [1][2]	For the cordless handset ringer tone only: [1] "Tone 1" (default) [2] "Tone 2" [3] "Tone 3" [4] "Melody 1" [5] "Melody 2" [6] "Melody 3" [7] "Melody 4"

9.2.2. Advanced Features

^{*1} When this setting is changed using the base unit, the setting for the cordless handset will also be changed, and vice versa.

Feature	Feature code	Selection
Changing the LCD display contrast	Cordless handset: [0][1]	For the cordless handset display contrast only: [1] Level 1 [2] Level 2 [3] Level 3 (default) [4] Level 4 [5] Level 5 [6] Level 6
Setting flash time ^{*1}	Cordless handset: [0][5][2]	[1] "700ms" (default) [2] "600ms" [3] "400ms" [4] "300ms" [5] "250ms" [6] "110ms" [7] "100ms" [8] "90ms"

9.2.3. Other Features

Feature	Code	Selection
Changing the ringer volume	[1][1]	[0] Off [1] Low [2] Medium [3] High (default) See Operating Instructions for details.
Setting the voice enhancer feature	[5]	[0] "Off" (default) [1] "On" See Operating Instructions for details.
Copying one phonebook item (from the cordless handset to the base unit)	—	See Operating Instructions for details.
Copying all the phonebook items (from the cordless handset to the base unit)	—	See Operating Instructions for details.
Setting the key tone	[0][2]	You can select whether or not key tones are heard when keys are pressed. Includes confirmation tones and error tones. [0] "Off" [1] "On" (default)
Setting auto talk feature	[0][3]	This feature allows you to answer a call by lifting the cordless handset off the base unit without pressing [TALK] or [SP-PHONE] . [0] "Off" (default) [1] "On"
Setting the message alert	[0][†]	You can select whether or not the message indicator on the cordless handset will flash when new messages have been recorded. [0] "Off" (default) [1] "On" Note: <ul style="list-style-type: none"> • The message indicator will not flash for new messages while the cordless handset is in use. • Battery life may be shortened when using this feature.
Registering the cordless handset	[0][0]	See Operating Instructions for details.

10 Test Mode

10.1. Facsimile Section

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.87).) 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.90).
		SET	
FLASH MEMORY CHECK	Service Mode	"5" "5" "1"	Indicates the version and checks the sum of the FLASH MEMORY.
		SET	
DTMF SINGLE 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 Single Tone Transmit Selection (P.78).
		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) 9600bps 3)7200bps 4) 4800bps 5) 2400bps 6) 300bps 7) 2100Hz 8)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 02: TX 05: Pickup 08: Rx 10: Copy 11: Assist 13: Home position 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. Indicates the button code on the LCD while the button is pressed. Refer to Button Code Table (P.78).
		SET (any key)	
MEMORY CLEAR (except History data)	Service Mode	"7" "1" "0"	Refer to Memory Clear Specification (P.90).
		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, Mo, Pt, Ri, Vx) For each sensor's operation, refer to Sensors and Switches (P.29). <u>Do Sn Co Mo Pt Ri Vx</u> : LCD DISPLAY Do: Document set sensor :Turns on when the front cover is opened and a document is inserted. Sn: Read position sensor. :Turned on when the front cover is opened and the starts to read a document. Co: Cover open sensor :Turned off when the cover is opened. Mo: Motor home position sensor :A home position detection sensor that is used when shifting the motor mode. Pt: Paper top sensor :Turned on when the cover is opened and the detects a recording paper on the right side end. Ri: Film sensor :Turned off when the film are run out. 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 SPEAKER-PHONE RX & TX CHECK	Service Mode	"8" "4" "1"	Please refer to Digital Speakerphone (P.151)
		SPEAKERPHONE	
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.79))
		SET	
CORDLESS CHECK	Service Mode	"9" "5" "8"	Please refer to Test Mode Flow Chart for Cordless Base Unit (P.80)
		SET	

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

10.1.1. DTMF Single Tone Transmit Selection

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

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

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

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

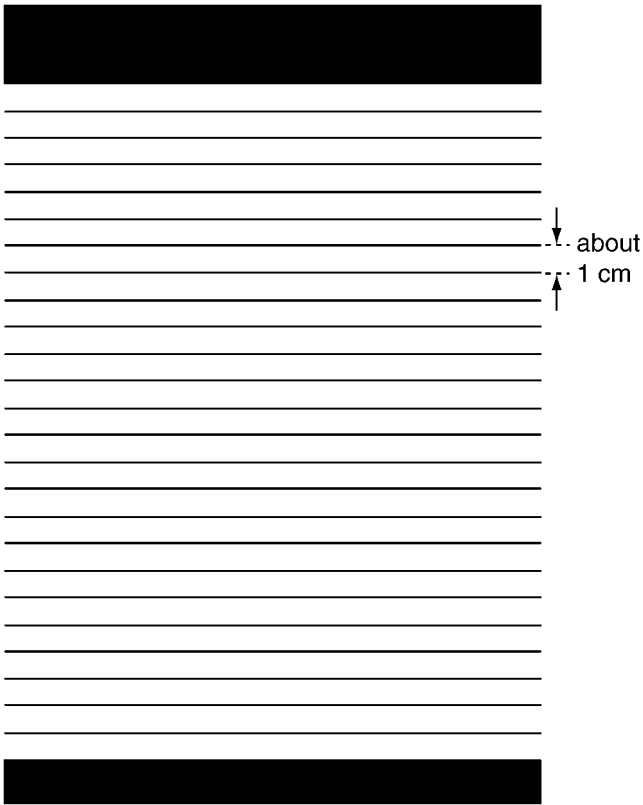
Note:
After performing this check, do not forget to turn the setting off.
Otherwise, dialing in DTMF signal will not work.

10.1.2. Button Code Table

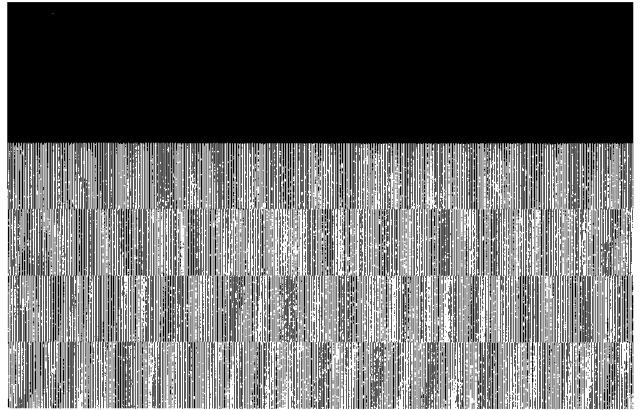
Code	Button Name	Code	Button Name	Code	Button Name
00	NO INPUT	12	GREETING RECORD	31	1
01	STOP	14	MEMO	32	2
04	FAX START	15	GREETING CHECK	33	3
06	COPY	16	ERASE	34	4
08	SP-PHONE	18	PLAY BACK	35	5
09	LOCATOR / INTERCOM			36	6
0A	MUTE			37	7
0C	AUTO ANSWER	20	MENU	38	8
0D	SET	22	PRINT REPORT	39	9
		25	[+] VOLUME	3A	0
		26	[-] VOLUME	3B	* (X)
1E	[▶]			3C	#
1F	[◀]			3D	REDIAL / PAUSE
				3E	FLASH
				47	CALLER ID

10.1.3. Print Test Pattern

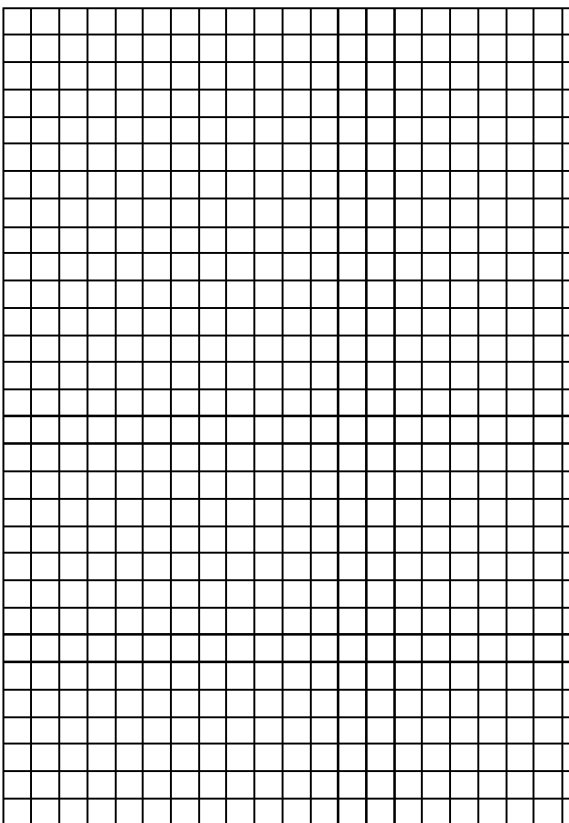
1. Platen roller



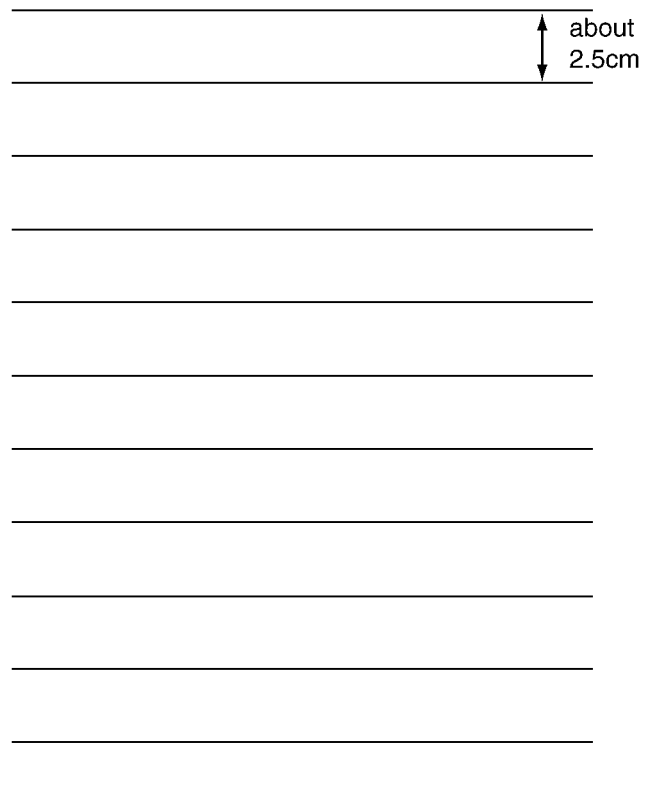
3. Thermal head 1 dot



2. Left margin / Top margin



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



10.2. Cordless Section

10.2.1. Test Mode Flow Chart for Cordless Base Unit

1. Press the [MENU] [#] [9] [0] [0] [0] [0] [*] [9] [5] [8] keys.
LCD display:

CORDLESS TEST

2. Press the [SET] key and select test items by pressing [▼] key.

LCD display:

1. Normal Mode
2. RCV Mode
3. SND Data Mode
4. Talk Mode

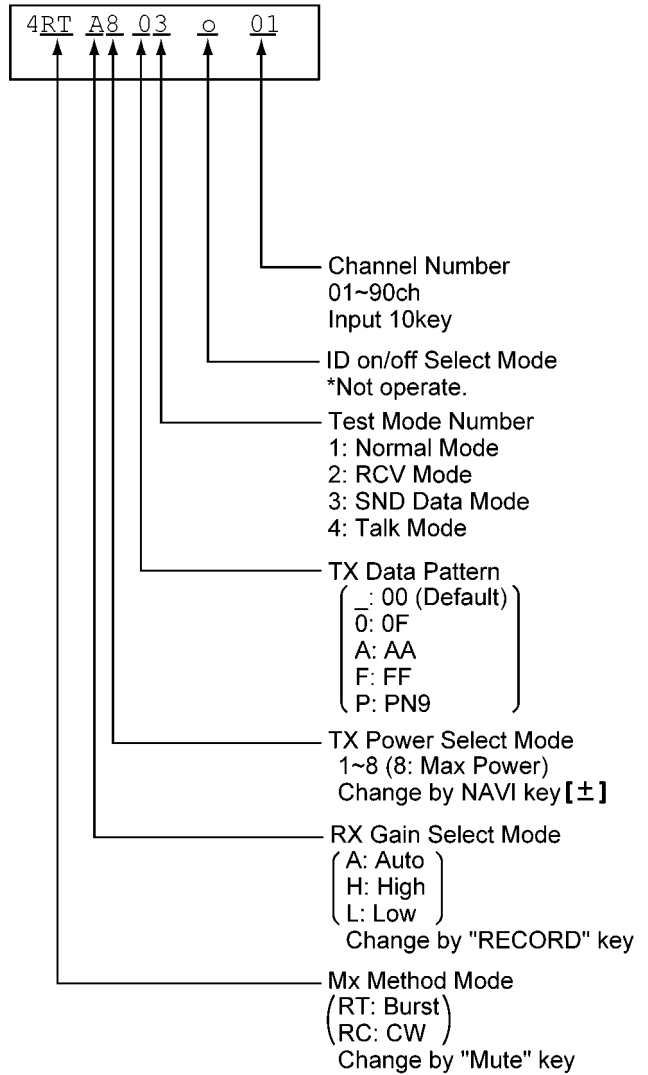
3. Press the [SET] key and select the channel by [0]~[9] key input.

LCD display:

Channel=01

4. Press the [SET] key to start test.

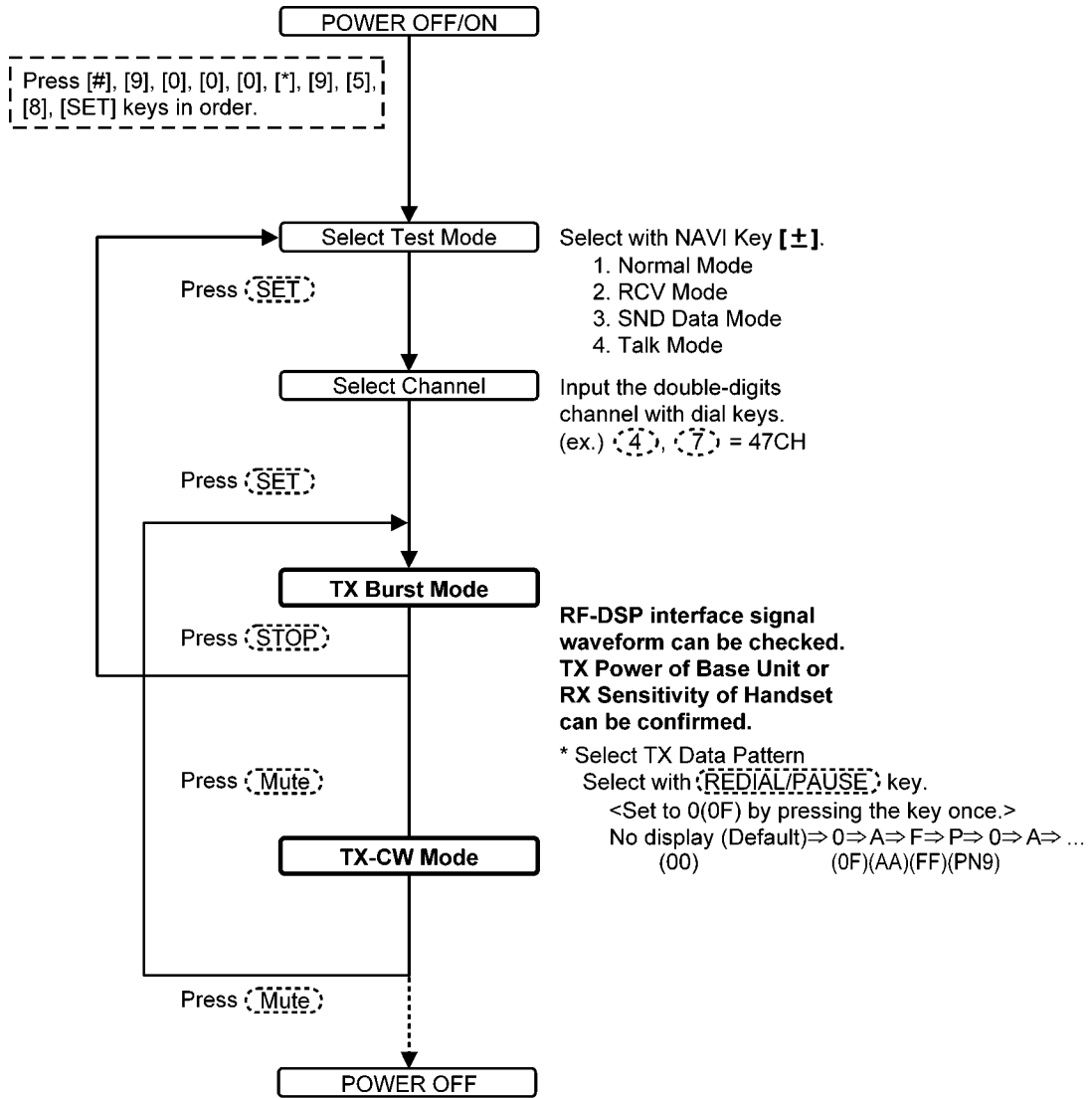
LCD display on the cordless test mode



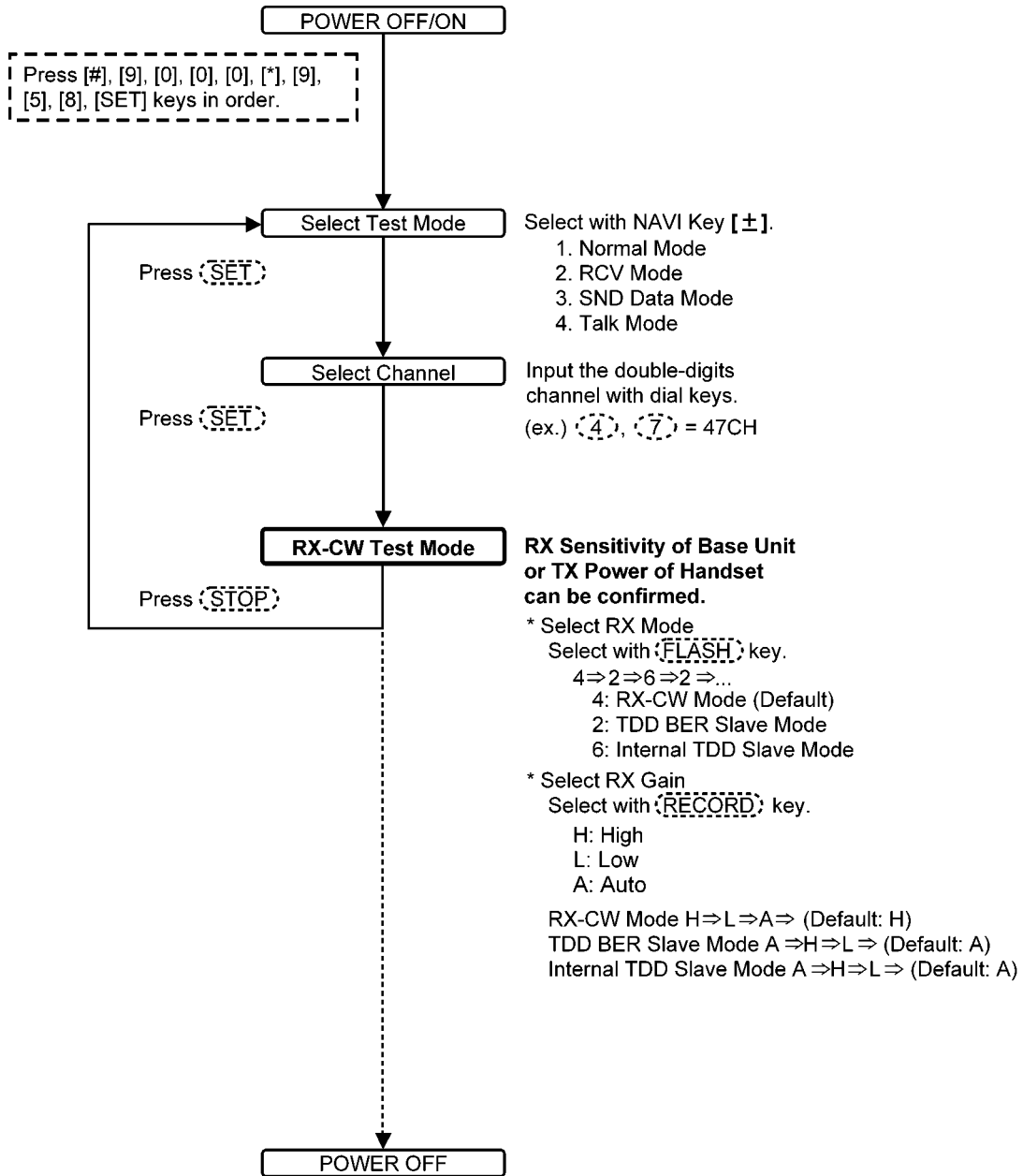
Note:

- In case of measurement except test mode: Turn the Power OFF/ON
- Channel setting (Transmitting-Receiving Frequency) of this cordless check need to change on account of Environment.

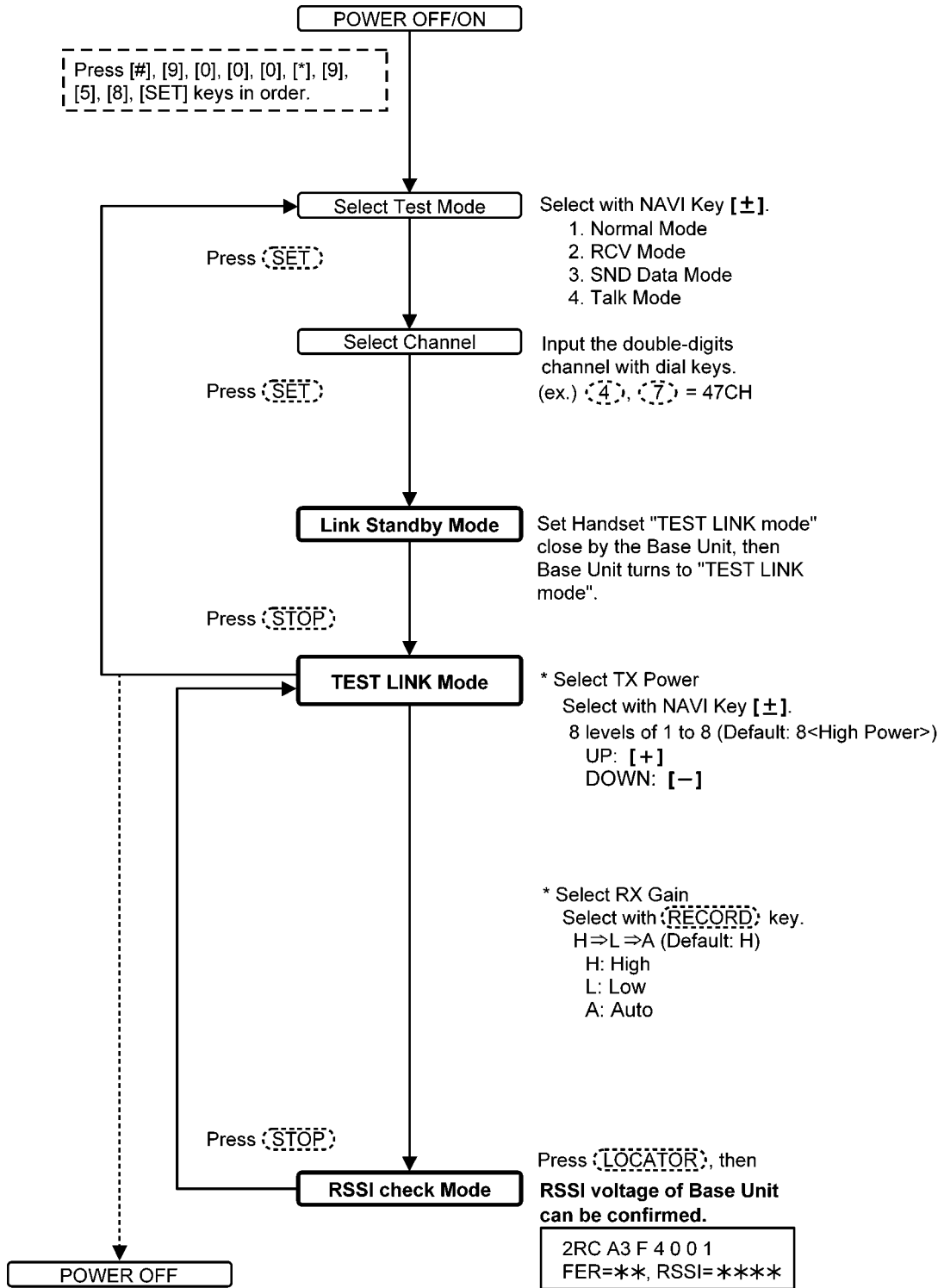
10.2.1.1. Test Burst Mode and Test TX-CW Mode



10.2.1.2. RX-CW Test Mode

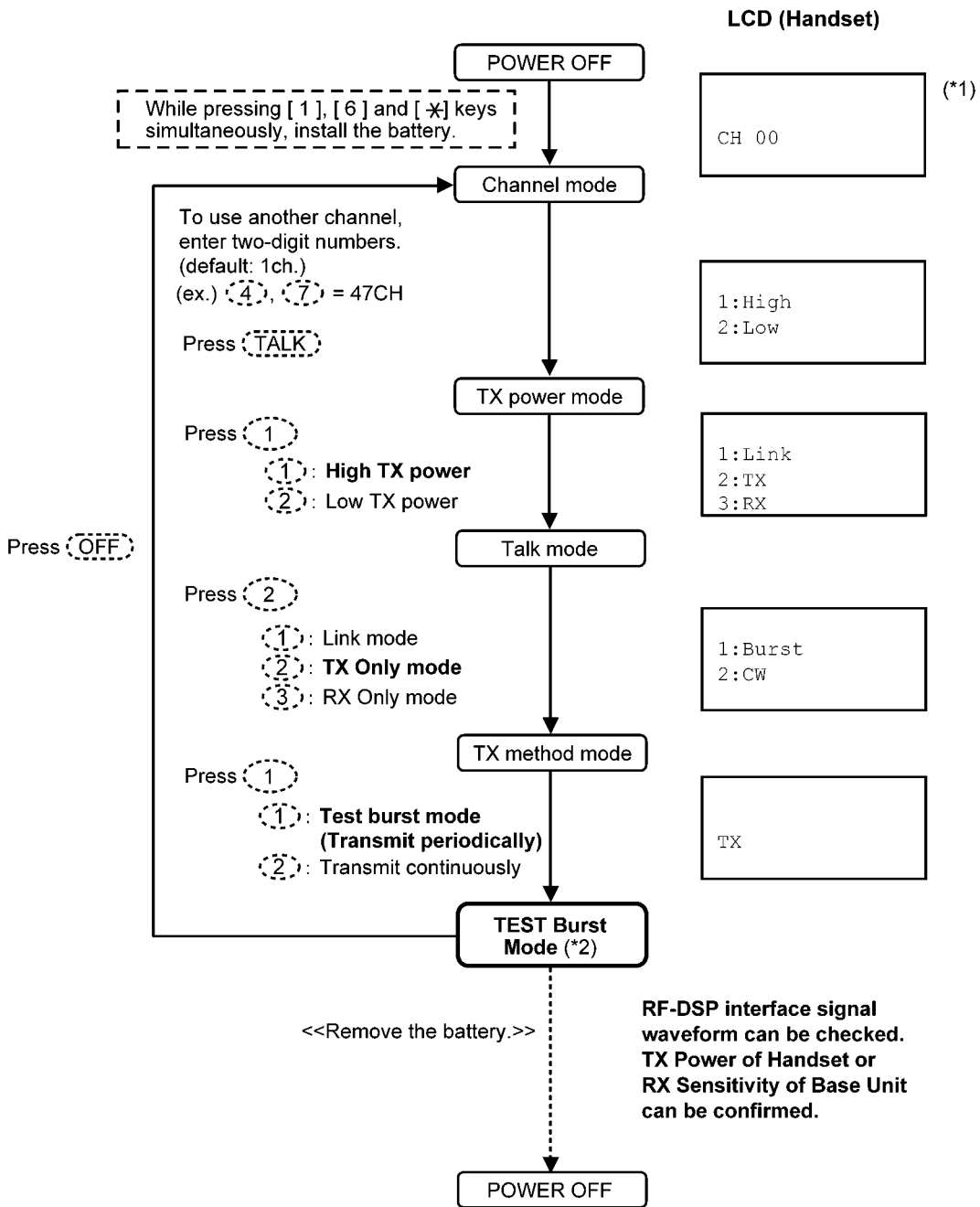


10.2.1.3. Test Link Mode



10.2.2. Test Mode Flow Chart for Handset

10.2.2.1. TX Burst Mode



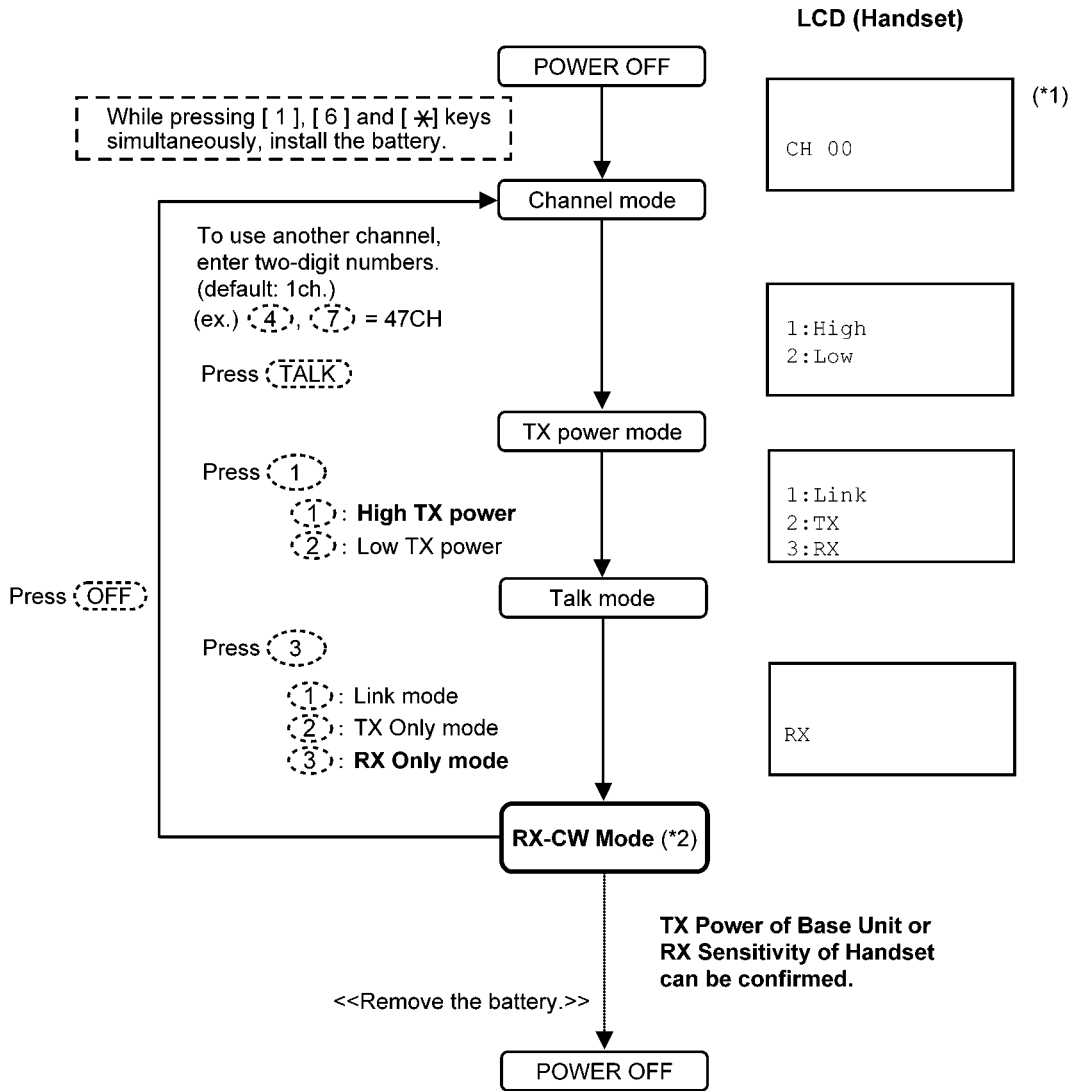
Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

(*2) Refer to **Check Table for RF Part** (P.165) and **RX-CW Test Mode** (P.82) for proper Base Unit settings.

10.2.2.2. RX-CW Test Mode



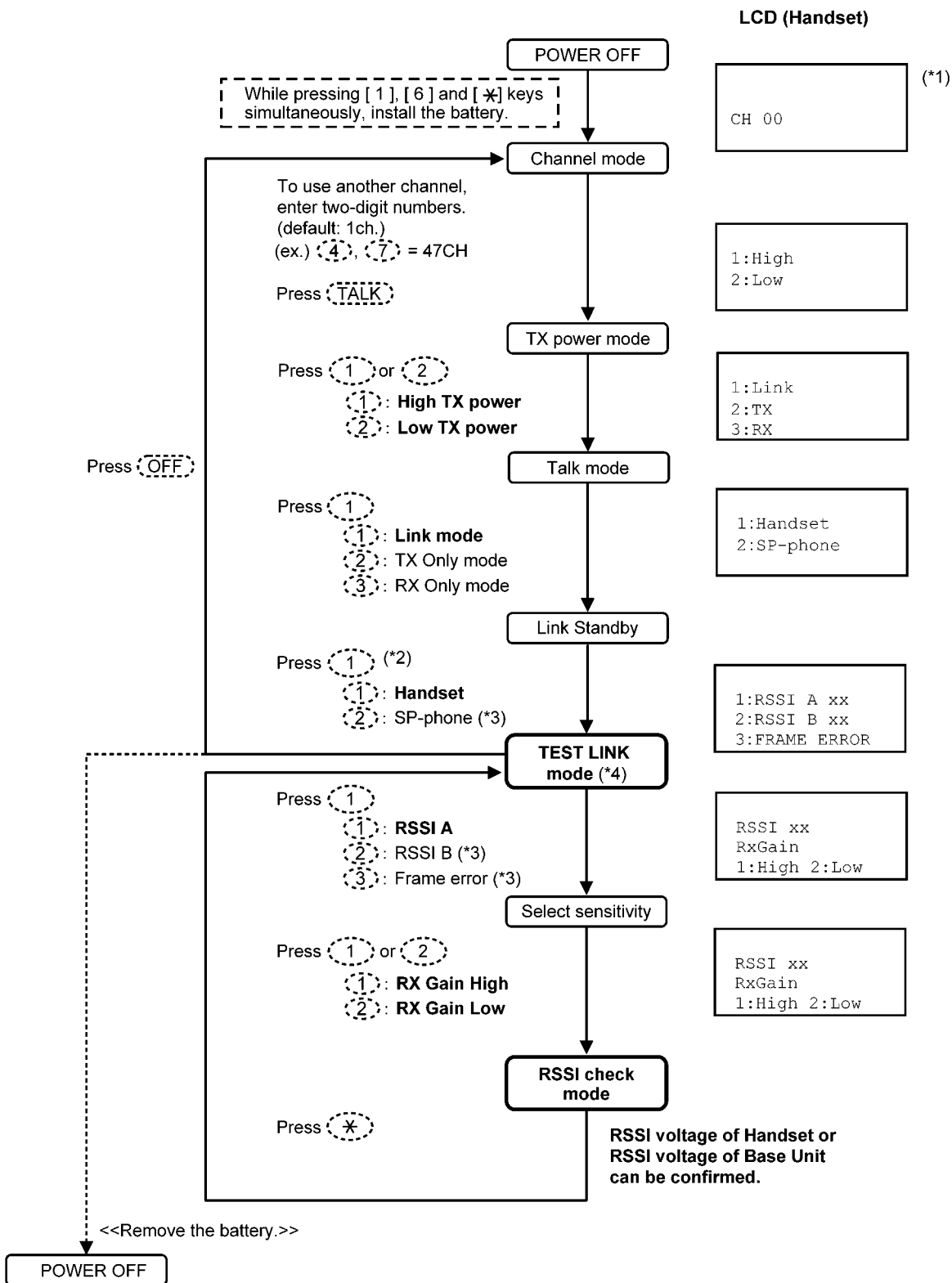
Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

(*2) Refer to **Check Table for RF Part** (P.165) and **Test Burst Mode and Test TX-CW Mode** (P.81) for proper Base Unit settings.

10.2.2.3. Test Link Mode



Note:

- (*1) LCD displays the Channel number. (exception: default/ CH00 = 1ch.)
- (*2) If can not proceed to the next step, refer to **Re-registering the Cordless Handset** (P.163).
- (*3) For factory use only.
- (*4) Refer to **Check Table for RF Part** (P.165) and **Test Link Mode** (P.83) for proper Base Unit settings.

11 Service Mode

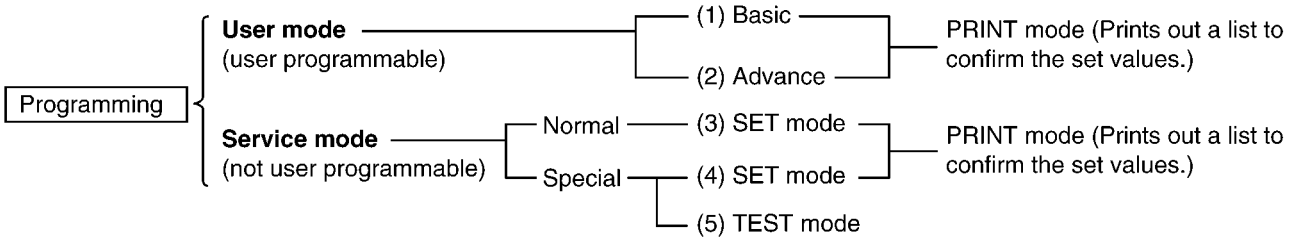
The programming functions are used to program the various features and functions of the machine, and to test the machine. This facilitates communication between the user and the service man while programming the unit.

11.1. Programming and Lists

11.1.1. Operation

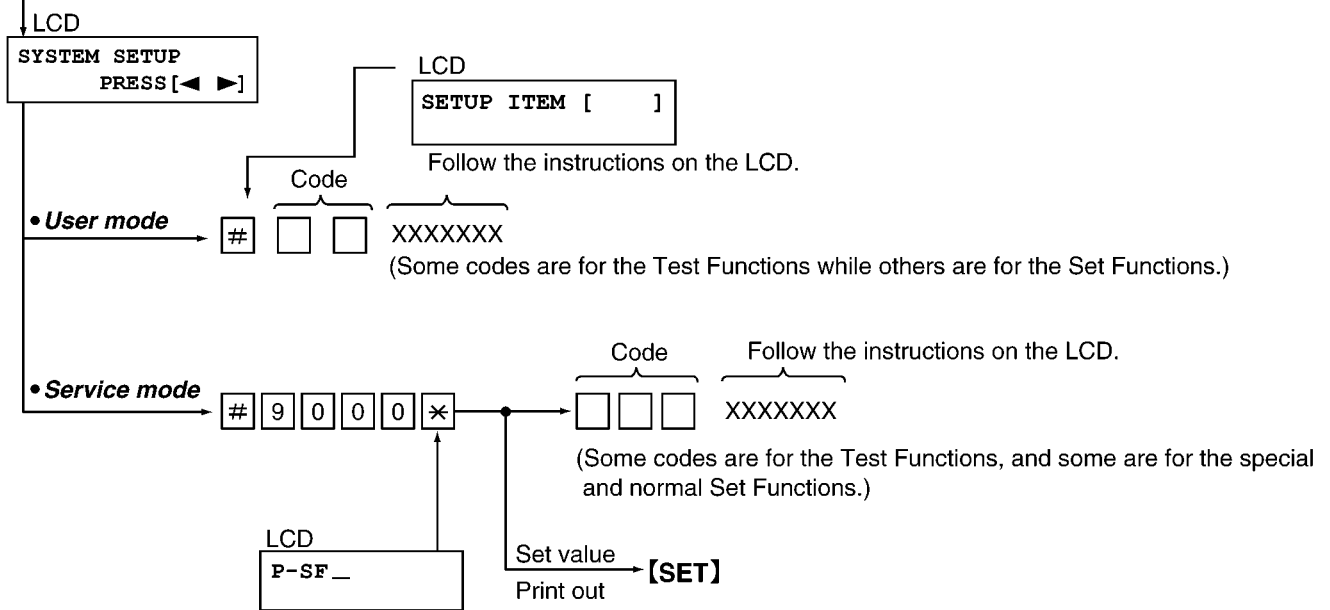
There are 2 basic categories of programming functions, the User Mode and the Service Mode. The Service Mode is further broken down into the normal and special programs. The normal programs are those listed in the Operating Instructions and are available to the user. The special programs are only those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

11.1.2. Operation Flow

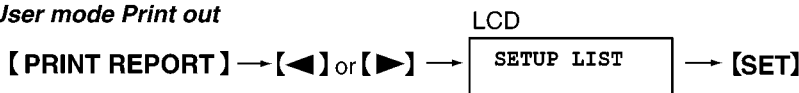


■ Operating Procedure

[MENU]



• User mode Print out



11.1.3. Service Function Table

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time set	X 100 msec	001~600	35	-----
503	Dial speed select	1: 10 pps 2: 20 pps	1, 2	1	-----
510	VOX time	1:6 sec 2:4sec	1, 2	1	-----
511	VOX sense	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".
514	Bell detection time	X 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 either transmit/receive long distance or international communications (P.118).
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 either transmit/receive long distance or international communications (P.118).
522	Auto standby select	1:ON 2:OFF	1, 2	1	The resolution reverts to the default when transmission is complete.
523	Receive equalizer select	1: 0 km 2: 1.8 km 3: 3.6 km 4: 7.2 km	1~4	1	When the telephone station is far from the unit or reception cannot be performed correctly, adjust accordingly.
524	Transmission equalizer select	1: 0 km 2: 1.8 km 3: 3.6 km 4: 7.2 km	1~4	1	When the telephone station is far from the unit or transmission cannot be performed correctly, adjust accordingly.
544	Document feed position adjustment value set	1~9 mm	1~9	5	When the ADF function is in correct, adjust the feed position.
550	Memory clear				See Memory Clear Specification (P.90).
551	ROM check				See Test Mode (P.77).
552	DTMF single tone test	1:ON 2:OFF	1, 2	2	See Test Mode (P.77).
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.77).
555	Scan check				See Test Mode (P.77).
556	Motor test			0	See Test Mode (P.77).
557	LED test				See Test Mode (P.77).
558	LCD test				See Test Mode (P.77).
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.77).
567	T0 timer	X 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	X number of times	00~99	5	Selects the number of times that ITS is redialed (not including the first dial).
572	ITS auto redial line disconnection time set	X second	001~999	065	Sets the interval of ITS redialing.
573	Remote turn-on ring number set	X number of rings	01~99	10	Sets the number of rings before the unit starts to receive a document in the TEL mode.
574	Dial tone detect check	1:ON 2:OFF	1, 2	2	-----
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	X number of times	00~99	05	Selects the number of redial times during FAX communication (not including the first dial).
591	FAX auto redial time disconnection time set	X second	001~999	065	Sets the FAX redial interval during FAX communication.

Code	Function	Set Value	Effective Range	Default	Remarks
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.115).
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 either transmit/receive long distance or international communications (P.118). Refer to Receive Problem (P.116) .
594	Overseas DIS detection select	1:detects at the 1st time 2:detects at the 2st time	1, 2	1	See Symptom/Countermeasure Table for long distance and international calls in The unit can copy, but cannot either transmit/receive long distance or international communications (P.118). Refer to Sometime There is a Transmit Problem (P.115).
595	Receive error limit value set	1:5 % 2:10 % 3:15 % 4:20%	1~4	2	Refer to Receive Problem (P.116).
596	Transmit level set	X dbm (10 = -10 dbm)	- 15~00	10	Selects the FAX transmission level. Refer to Sometime There is a Transmit Problem (P.115) and Receive Problem (P.116).
598	Receiving sensitivity	X dbm (40 = -40 dbm)	-20~-48	40	Used when there is an error problem. Refer to The unit can copy, but cannot either transmit/receive long distance or international communications (P.118). Power is OFF/ON after changing this set value.
710	Memory clear except History data				See Memory Clear Specification (P.90).
717	Transmit speed selection	1:9600BPS 2:7200BPS 3:4800BPS 4:2400BPS	1~4	1	Adjusts the speed to start training during FAX transmission. Refer to Sometime There is a Transmit Problem (P.115) and The unit can copy, but the transmission and reception image are incorrect (P.120).
718	Receive speed selection	1:9600BPS 2:7200BPS 3:4800BPS 4:2400BPS	1~4	1	Adjusts the speed to start training during FAX reception. Refer to Receive Problem (P.116) and The unit can copy, but the transmission and reception image are incorrect (P.120).
722	Redial tone detect	1:ON 2:OFF	1, 2	1	Sets the tone detection mode after redialing.
745	Power ON film feed	1:ON 2:OFF	1, 2	1	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-DIC interval	1: 500msec 2: 200msec	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	X 100 msec	00~99	0	Use this function when delay occurs in the line and communication (ex. Mobile comm) does not work well.
784	Voice prompt test				You can hear the voice prompt from speaker after pressing "START" key.
815	Sensor & Vox check				See Test Mode (P.77).
841	Digital SP-phone check				See Digital Speakerphone (P.151).
852	Print test pattern				See Test Mode (P.77).
853	Top margin		1~9	5	-----
861	Paper size	1:A4 2:Letter	1, 2	1	-----
874	DTMF ON time	X 10 msec	06~20	18	-----
875	DTMF OFF time	X 10 msec	06~20	09	-----
880	History list				See History (P.94).
881	Journal 2 list				See Printout Example (P.111).
882	Journal 3 list				See Printout Example (P.111).
958	Cordless test				See Test Mode (P.77).

11.1.4. Memory Clear Specification

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

— : Not changed

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

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

Note:

- Please restart a power supply after clearing a memory.
- Refer to **Base Unit** (P.91) for Handset memory clear.

11.2. How to Clear User Setting

Units are reset to the Factory settings by this operation (Erase recorded Voice messages, stored Phone numbers, Caller list and etc.).

This operation should not be performed for a usual repair.

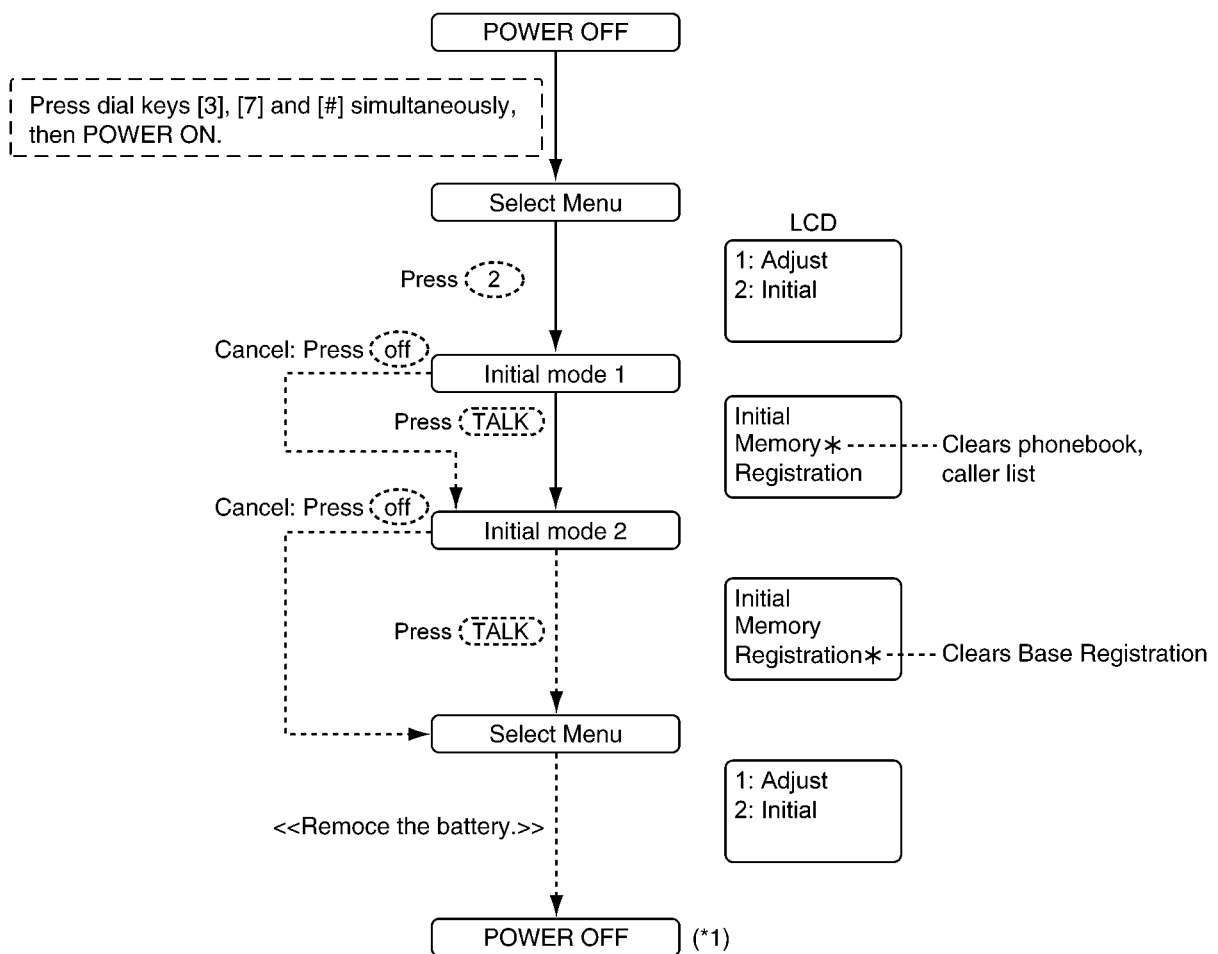
11.2.1. Base Unit

1. Press **[MENU]**, then **[#][9][0][0][0]**.
2. Press **[*]**, then **[7][1][0]**.
3. Press **[SET]**.
4. POWER OFF.

Note:

Refer to **Memory Clear Specification** (P.90).

11.2.2. Handset



Note:

(*1) Be sure to short the battery terminals of the Handset with a lead wire, etc. for 2 seconds for discharge after removing the battery.

11.3. The Example of the Printed List

11.3.1. User Mode

SETUP LIST

[BASIC FEATURE LIST]

NO.	FEATURE	CURRENT SETTING
#01	SET DATE & TIME	Jan. 1 2006 12:00AM
#02	YOUR LOGO	
#03	YOUR FAX NUMBER	
#04	PRINT SENDING REPORT	ERROR [ERROR, ON, OFF]
#06	TAM/FAX RING COUNT	2 [2...7, TOLL SAVER]
#10	RECORDING TIME	3 MIN [1...3 MIN, GREETING ONLY]
#11	REMOTE TAM ID	11
#13	DIAL MODE	TONE [TONE, PULSE]
#17	RINGER TONE	TONE 1 [TONE 1...3]

Set Value

[ADVANCED FEATURE LIST]

NO.	FEATURE	CURRENT SETTING
#22	JOURNAL AUTO PRINT	ON [ON, OFF]
#23	OVERSEAS MODE	ERROR [NEXT FAX, ERROR, OFF]
#25	DELAYED TRANSMISSION	OFF [ON, OFF]
	DESTINATION =	
	START TIME =	12:00AM
#26	AUTO CALLER ID 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 CODE	ON [ON, OFF]
	CODE =	*#9
#44	MEMORY RECEIVE ALERT	ON [ON, OFF]
#46	FRIENDLY RECEPTION	ON [ON, OFF]
#47	FAX VOICE GUIDANCE	ON [ERROR, ON, OFF]
#49	AUTO DISCONNECT	ON [ON, OFF]
	CODE =	*0
#54	GREETING MSG. RECORDING 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]
#59	COPY PHONEBOOK	1 ITEM [1 ITEM, ALL ITEMS]
#67	ICM MONITOR	ON [ON, OFF]
#72	SET FLASH TIME	700ms [90, 100, 110, 250, 300, 400, 600, 700]
#76	CONNECTING TONE	ON [ON, OFF]
#77	AUTO ANSWER MODE	TAM/FAX [TAM/FAX, FAX ONLY]
#80	SET DEFAULT	

Set Value

Note:
The above values are the default values.

11.3.2. Service Mode Settings

【 SERVICE DATA LIST 】

Code	Setting Name	Set Value	Range
501	PAUSE TIME	035*100ms	{001...600}*100ms
503	DIAL SPEED	10pps	{1=10 2=20}pps
510	VOX TIME	5sec	{1=6 2=4}sec
520	CEQ 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 】

Code	511	514	544	552	553	559	567	570	571	572	573	580	590
	1	6	5	2	1	1	046	1	05	065	10	1	05
	591	592	593	594	595	596	598	717	718	722	745	763	771
	065	2	1	1	2	10	40	1	1	1	1	3	1
	773	774	861	874	875								
	2	00	1	18	09								

USAGE TIME = 00000 HOURS

Note:

The above values are the default values.

11.3.3. History

【 HISTORY 】

```

[Ver 1.5] (1) [9 2 E 4] (2)
[NONE] (3)
[NONE] (4)
[NONE] (5)
(6) [0 0 0 0] [0 1] (7) [0 1] (8) [2 0 0 6] (9) [0 0 0 0] (10)
(11) [0 0 0 0] [0 0 0 0] (12)
(13) [0 0 0 0] [0 0 0 0] [NONE] [0 0 0 0] (16) [TAM / FAX] (17)
Factory use only [0 0 0 0] [0 0 0 0] [TONE] (18) [9 2 %] (19) [0 0 0 0] (20)
(21) [0 0 0 0] [0 0 0 0] [0 0 0 0] [0 0 0 0] (24) [0 0 0 0] (25)
(26) [NONE] [NONE] (27) [NONE] (28) [NONE] (29)
(30) [0 0 0] (31) [0 0 0] (32) [0 0 0 0] [NONE] (33)
(34) [0 0 0 0] [0 0 0 0] [0 0 0 0] [0 0 0 0] (37) (38) [0 0 0 0] [0 0 0 0] (39)
(40) [0 0 0 0] [0 0 0 0] [0 0 0 0] [0 0 0 0] (43) [0 0 0 0] (44)

```

NAME _____ DATE _____ DEALER _____ FILM _____

CUSTOMER COMPLAINT

SURVEY RESULT : OKOK (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.95).

11.3.3.1. Descriptions of the History Report

- | | |
|---|--|
| <p>(1) SOFTWARE VERSION
FLASH ROM version</p> <p>(2) SUM
FLASH ROM internal data calculation.</p> <p>(3) YOUR LOGO
The user logo recorded in the unit. If it is not recorded, NONE will be displayed.</p> <p>(4) YOUR TELEPHONE NUMBER
The user telephone number recorded in the unit. If it is not recorded, NONE will be displayed.</p> <p>(5) FAX PAGER NUMBER
If you program a pager number into the unit, the pager number will be displayed here.</p> <p>(6) FACTORY - CUSTOMER
This shows how many days from factory production until the user turns ON the unit.</p> <p>(7) MONTH
The shows the very first month, date, year and time set by the user after they purchased the unit.</p> <p>(8) DAY
The shows the very first month, date, year and time set by the user after they purchased the unit.</p> <p>(9) YEAR
The shows the very first month, date, year and time set by the user after they purchased the unit.</p> <p>(10) TIME
The shows the very first month, date, year and time set by the user after they purchased the unit.</p> <p>(11) USAGE TIME
The amount of time the unit has been powered ON.</p> <p>(12) FACTORY - NOW
This shows how many days from factory production until the user prints out this history list.</p> <p>(13) TEL MODE
The amount of time the TEL mode setting was used.</p> <p>(14) FAX MODE
The amount of time the FAX mode setting was used.</p> <p>(15) TEL/FAX MODE
The amount of time the TEL/FAX mode setting was used.</p> <p>(16) ANS/FAX MODE
The amount of time the ANS/FAX mode setting was used.</p> <p>(17) FINAL RECEIVE MODE
The last set receiving mode by the user.</p> <p>(18) TONE/PULSE SELECTION
The most recently used setting used, either TONE or PULSE.</p> <p>(19) RECEIVE REDUCTION
The compression rate when receiving.</p> <p>(20) SETTING NO. OF DIRECTORY
The recorded directory stations.</p> <p>(21) NUMBER OF COPY
The number of pages copied.</p> | <p>(22) NUMBER OF RECEIVE
The number of pages received.</p> <p>(23) NUMBER OF SENDING
The number of pages sent.</p> <p>(24) NUMBER OF CALLER ID
The number of times Caller ID was received.</p> <p>(25) NUMBER OF RECORDING MESSAGE
The number of messages recorded in TAM.</p> <p>(26)~(29) Not Used</p> <p>(30) NUMBER OF PRINTING WARNING LIST
The number of warning lists printed until now.</p> <p>(31) NUMBER OF PRINTING HELP
The number of help lists printed until now.</p> <p>(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.</p> <p>(33) Not used</p> <p>(34) FAX MODE
Means the unit received a fax message in the FAX mode.</p> <p>(35) MAN RCV
Means the unit received a fax message by manual operation.</p> <p>(36) FRN RCV
Means the unit received a fax message by friendly signal detection.</p> <p>(37) VOX
Means the unit detected silence or no voice.</p> <p>(38) RMT DTMF
Means the unit detected DTMF (Remote Fax activation code) entered remotely.</p> <p>(39) PAL DTMF
Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.</p> <p>(40) TURN-ON
Means the unit started to receive after 10 rings. (Remote Turn On: Service Code #573)</p> <p>(41) TIME OUT
Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.</p> <p>(42) IDENT
Means the unit detected Ring Detection.</p> <p>(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 ANS/FAX mode.</p> <p>(44) CNG ICM
Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.</p> |
|---|--|

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 case 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.

12.2.1. Base Unit

“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.]

“CALL SERVICE 2”

- [This error is displayed when the gear is not in an idle state. Check the GEAR BLOCK.]
(Refer to **Gear Section** (P.207).)

“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/recording paper feeder/scanner glass cleaning** (P.215).)
- The document is longer than 600 mm ($23\frac{5}{8}$ ""). 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.88).)

“CHECK FILM”

- The ink film is empty. Replace the ink film with a new one.
- The ink film is not installed. Install it.
- The ink film is slack or creased. Tighten it.
(Refer to step 5 on **Installing the Ink Film** (P.69).)

“CHECK MEMORY”

- The base unit memory (telephone numbers, parameters, etc.) has been erased. Re-program.

“CHECK PAPER”

- The recording paper is not installed or the unit has run out of paper. Install paper and **[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.215).) Reinstall paper and press **[SET]** to clear the message.
(Refer to **Installing the Recording Paper** (P.72).)
- 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.214).)

“ERROR ! !”

- The cordless handset tried to copy phonebook items but the copy has been stopped.

“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.72) and **Installing the Ink Film** (P.69) and **Recording Paper Jams** (P.214).)

“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.72) and **Installing the Ink Film** (P.69) and **Recording Paper Jams** (P.214).)
- 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.69).) 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.9).)

“INCOMPLETE”

- The phonebook copy stopped because the destination cordless handset was out of range. Press **[STOP]** to clear the message.

“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.77) and **Digital Board Section** (P.141).)

“NO FAX REPLY”

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

“NO ITEMS STORED”

- You tried to copy your phonebook items to the cordless handset, but your phonebook was empty.

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

- Please use genuine Panasonic replacement film. (Refer to **Optional Accessories** (P.9).)
- The ink film is slack. Tighten it (See step 5 on **Installing the Ink Film** (P.69)) and install again.
- 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.214).)
- You forced the recording paper into the paper tray too strongly. Remove all of the installed paper, and re-install it gently.

“PHONEBOOK FULL”

- There is no space to store new items in the phonebook. Erase unnecessary items.
- The phonebook memory of the cordless handset is already full, or became full when copying phonebook items. Copying was stopped. Press **[STOP]** to exit the mode. Erase other stored items in the cordless handset phonebook, then try again.

“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.

“RECORDING ERROR”

- You recorded your greeting message or memo message less than 1 second in length and recording has failed. Try again.

“REDIAL TIME OUT”

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

“REMOVE DOCUMENT”

- The document is jammed. Remove the jammed document. (Refer to **Document Jams - sending** (P.215).)
- Press **[STOP]** to eject the jammed paper.

“SERIAL ERROR”

- There is something wrong with the unit and the base unit will not work. (Refer to **Digital Board Section** (P.141).)

“TRANSMIT ERROR”

- A transmission error occurred. Try again.
- If you send a fax overseas, try the following:
 - Make sure the other party's number is a fax number.
 - Use the overseas transmission mode (feature #23 on **Program Mode Table** (P.123)).
 - 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.

12.2.2. Handset

“Busy”

- The called base unit is in use.

“Error!!”

- When you tried to register the cordless handset, the cordless handset and the base unit could not link for some reason, such as interference from electrical appliances. Move the cordless handset and the base unit away from the electrical appliances and try again.

“---Incomplete--- Phonebook full”

- When the phonebook item(s) was (were) sent to the base unit, the base unit's phonebook memory was full and copying stopped. Press **[OFF]** to exit. Erase items from the base unit's phonebook. When phonebook memory is available, you can copy all phonebook items or individual items one by one.

“No link to base. Move closer to base, try again.”

- The cordless handset has lost communication with the base unit. Move closer to the base unit, and try again.
- Confirm that the base unit's power cord is plugged in.
- Raise the base unit antenna.
- The cordless handset's registration may have been canceled. Re-register the cordless handset.

“Phonebook full”

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

“No item stored”

- Your phonebook or redial list is empty.

“Please lift up and try again.”

- A cordless handset button was pressed while the cordless handset was on the base unit. Lift the cordless handset and press the button again.

“System is busy. Please try again later.”

- The cordless handset has lost communication with the base unit. Move closer to the base unit and try again.
- Another user is listening to messages. Try again later.

12.3. Error Messages-Report

12.3.1. 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 [PRINT REPORT].
2. Press [◀] or [▶] repeatedly to display " JOURNAL REPORT ".
3. Press [SET].
4. The report is printed out.

JOURNAL							
						Jan. 20 2006 01:19PM	
				YOUR LOGO :			
				YOUR FAX NO:			
NO.	OTHER FACSIMILE	START TIME	USAGE TIME	MODE	PAGES	RESULT	*CODE
01	2345678	Jan. 20 01:18PM	00'51	SND	00	COMMUNICATION ERROR	(43)

(3)	SND: Sent directly.	(2) Communication message	(1) Error code
	RCV: Received directly		

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.	
	THE COVER WAS OPENED	SND & RCV	The cover is open.	
	OTHER FAX NOT RESPONDING	SND	Transmission is finished when the T1 TIMER expires.	1
28	COMMUNICATION ERROR	SND & RCV		
41	COMMUNICATION ERROR	SND	DCN is received after DCS transmission.	2
42	COMMUNICATION ERROR	SND	FTT is received after transmission of a 2400BPS training signal.	3
43	COMMUNICATION ERROR	SND	No response after post message is transmitted three times.	4
44	COMMUNICATION ERROR	SND	RTN and PIN are received.	5
46	COMMUNICATION ERROR	RCV	No response after FTT is transmitted.	6
48	COMMUNICATION ERROR	RCV	No post message.	7
49	COMMUNICATION ERROR	RCV	RTN is transmitted.	8
50	COMMUNICATION ERROR	RCV	PIN is transmitted (to PRI-Q).	8
51	COMMUNICATION ERROR	RCV	PIN is transmitted.	8
	OTHER FAX NOT RESPONDING	RCV	Reception is finished when the T1 TIMER expires.	9
54	ERROR-NOT YOUR UNIT	RCV	DCN is received after DIS transmission.	11
58	COMMUNICATION ERROR	RCV	DCN is received after FTT transmission.	13
59	ERROR-NOT YOUR UNIT	SND	DCN responds to the post message.	14
65	COMMUNICATION ERROR	SND	DCN is received before DIS reception.	2
65	COMMUNICATION ERROR	RCV	Reception is not EOP, EOM PIP, PIN, RTP or RTN.	2
68	COMMUNICATION ERROR	RCV	No response at the other party after MCF or CFR is transmitted.	13
70	ERROR-NOT YOUR UNIT	RCV	DCN is received after CFR transmission.	13
72	COMMUNICATION ERROR	RCV	Carrier is cut when the image signal is received.	16
	MEMORY FULL	RCV	The document was not received due to memory full.	
	JUNK FAX PROH. REJECT	RCV	The fax was rejected by the junk fax prohibitor feature.	
	CANCELLED	SND	The multi-station transmission was rejected by the user.	
FF	COMMUNICATION ERROR	SND & RCV	Modem error. For the DCN, DCN, etc. abbreviations, refer to Modem Section (P.33).	12

SND=TRANSMISSION RCV=RECEPTION

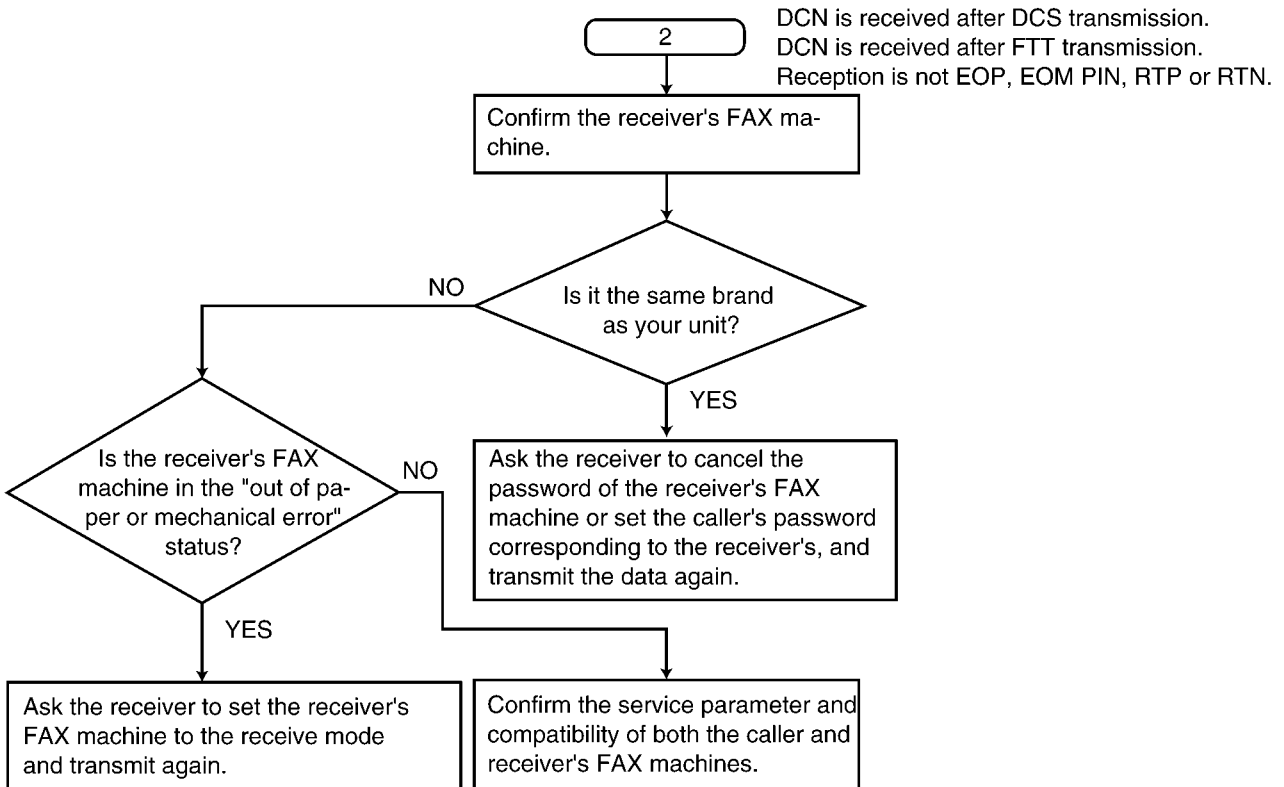
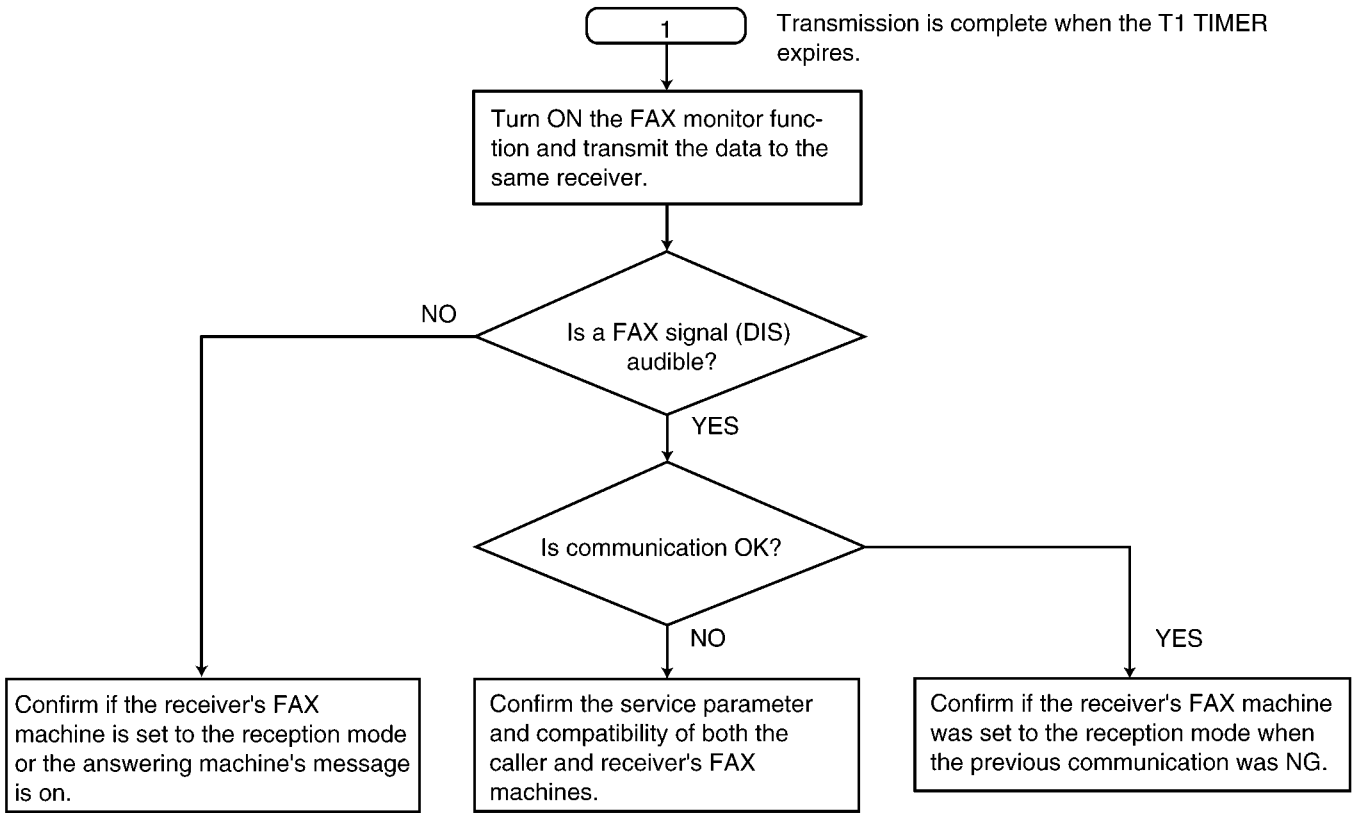
Most fax communication problems can be resolved by the following steps.

1. Change the transmit level. (Service code: 596, refer to **Service Function Table** (P.88).)
2. Change the TX speed/RX speed. (Service code: 717/718, refer to **Service Function Table** (P.88).)

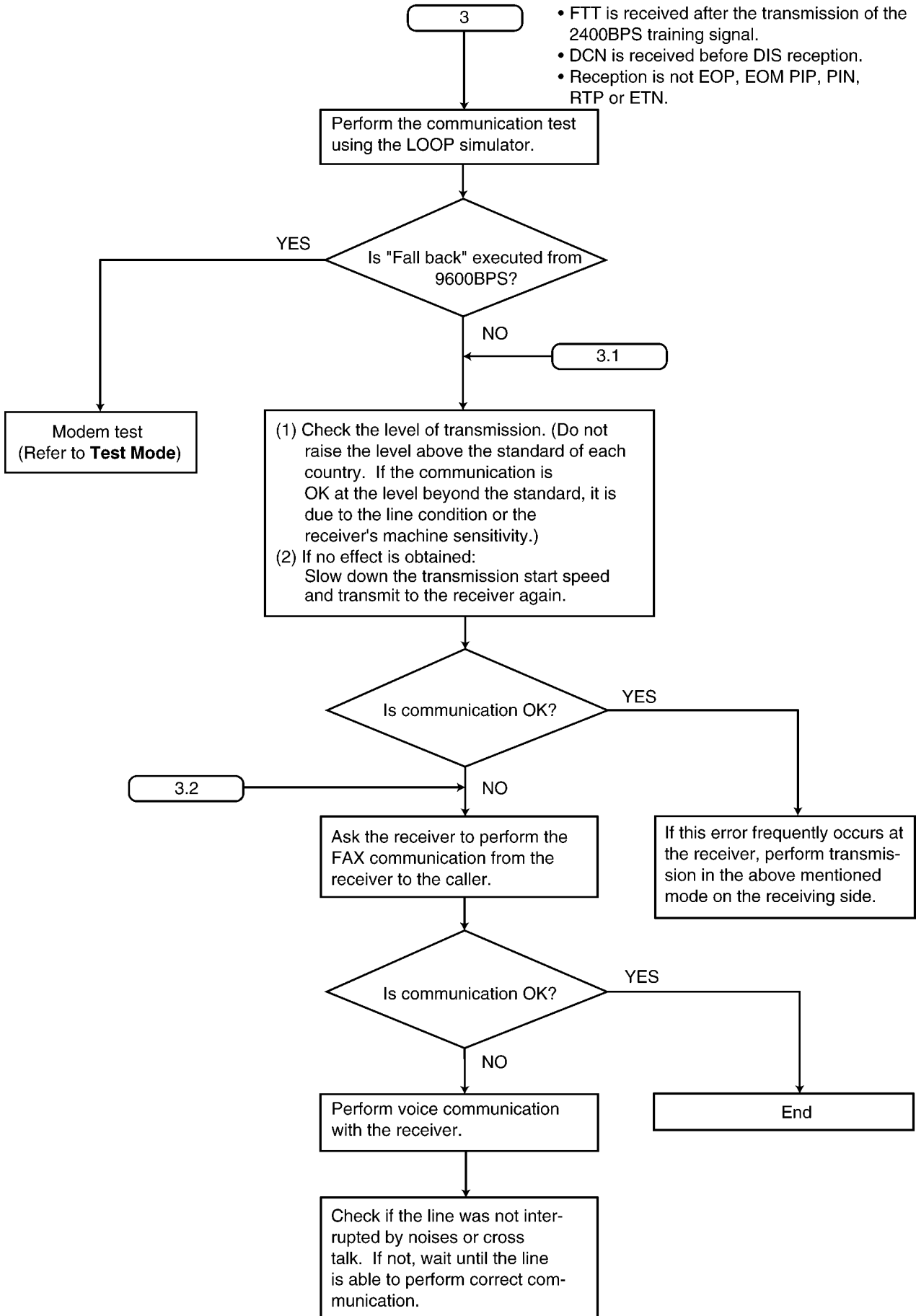
Note:

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

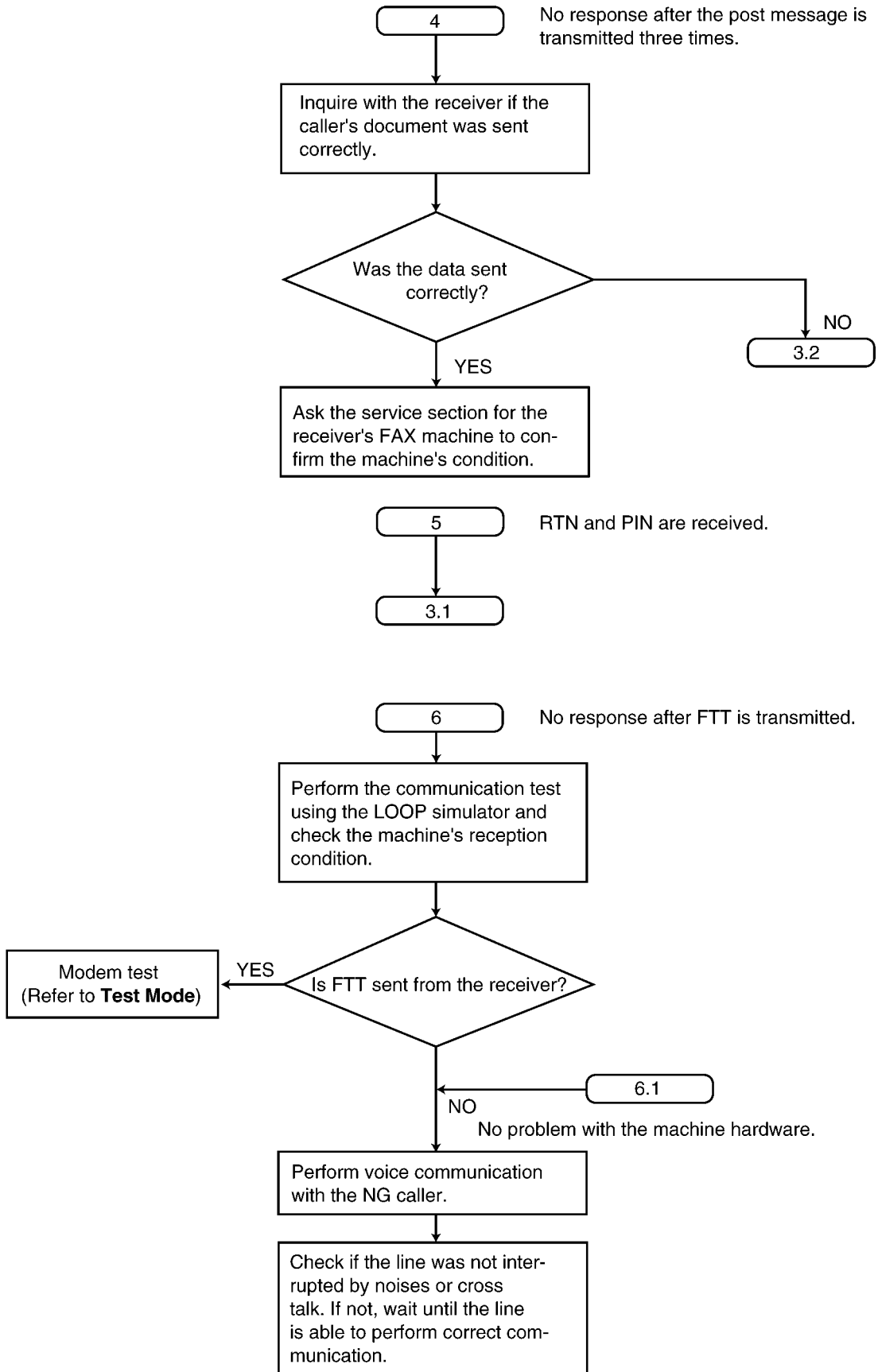
Countermeasure



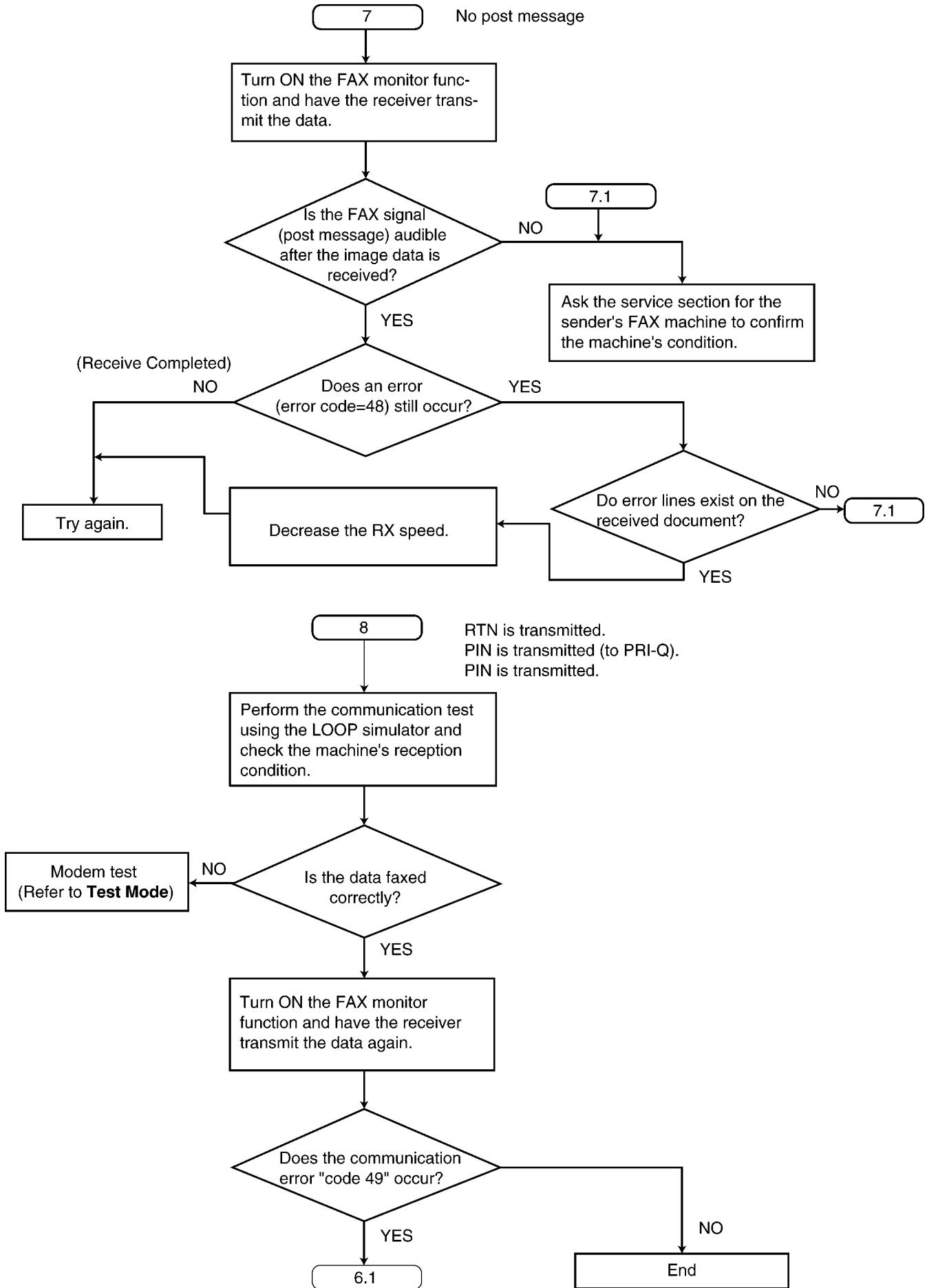
- FTT is received after the transmission of the 2400BPS training signal.
- DCN is received before DIS reception.
- Reception is not EOP, EOM PIP, PIN, RTP or ETN.



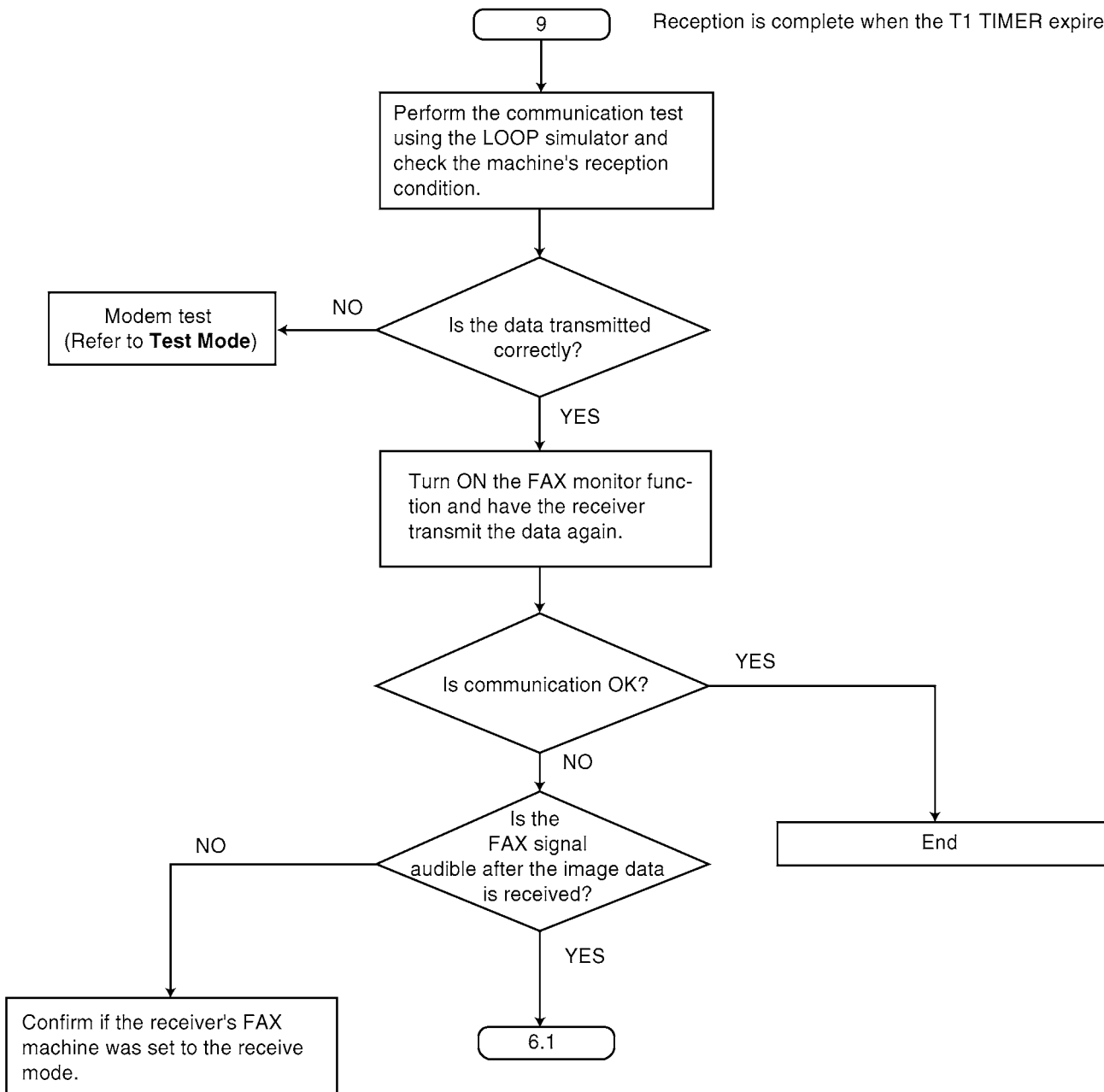
REFERENCE:
Test Mode (P.77)



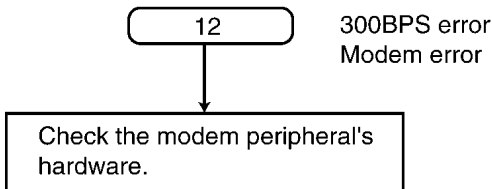
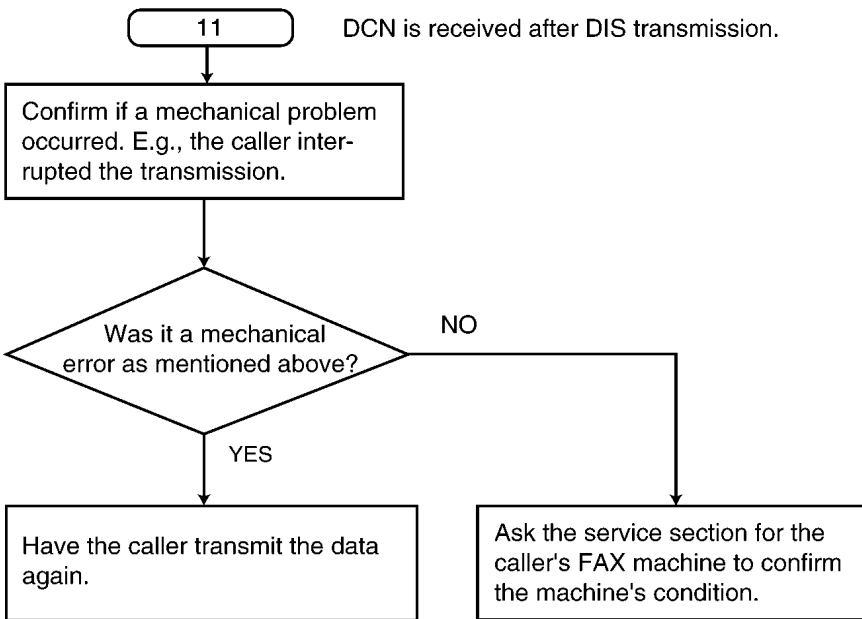
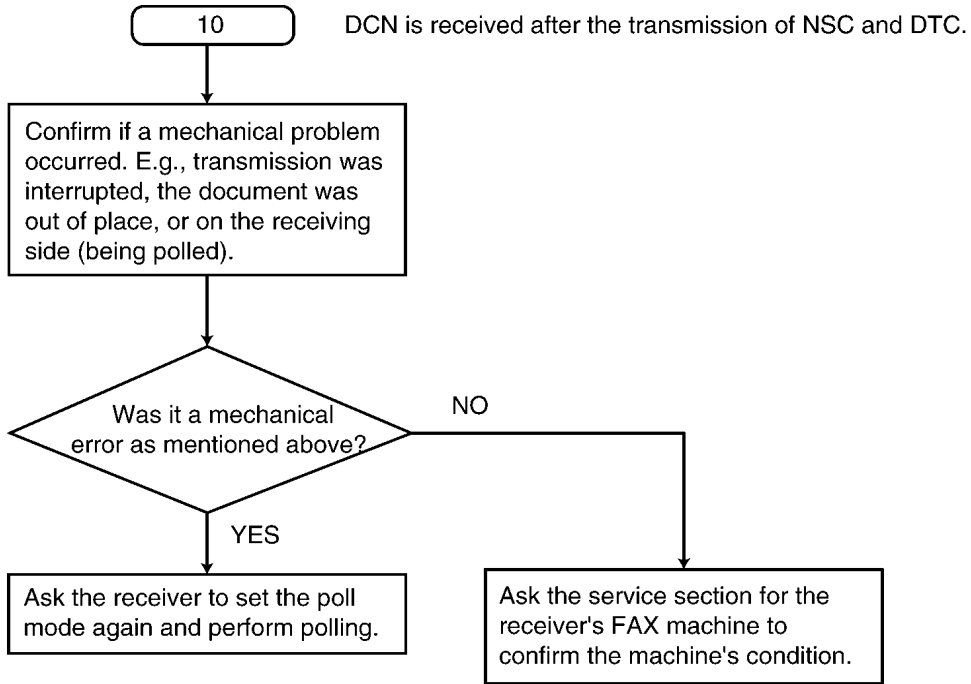
REFERENCE:
Test Mode (P.77)

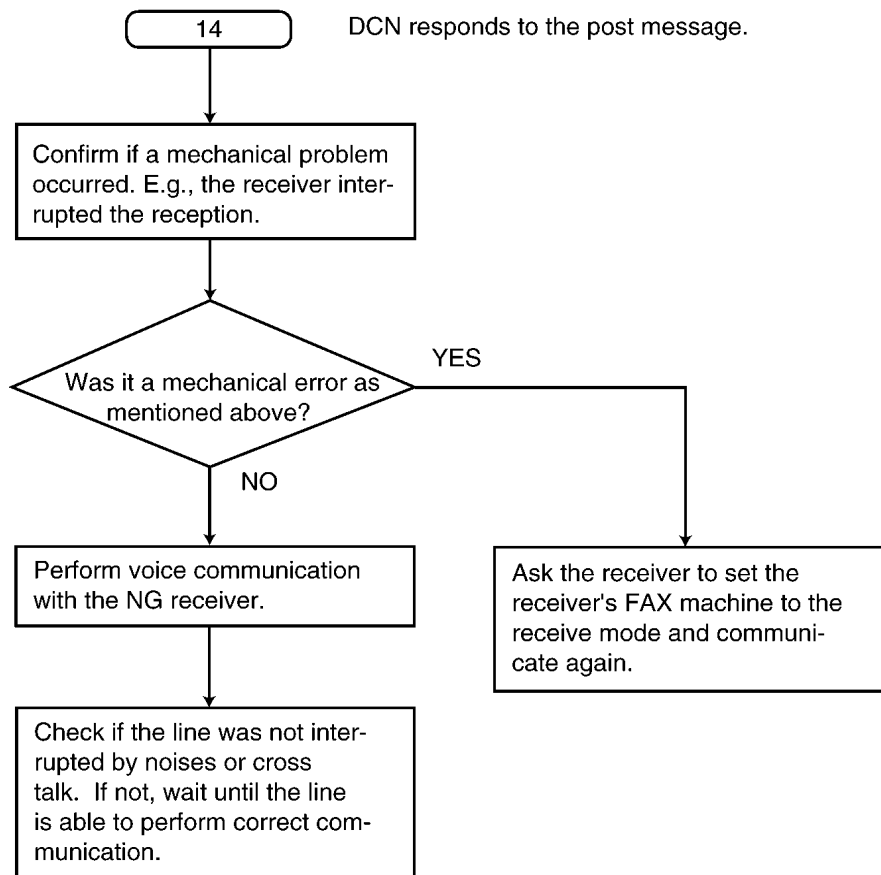
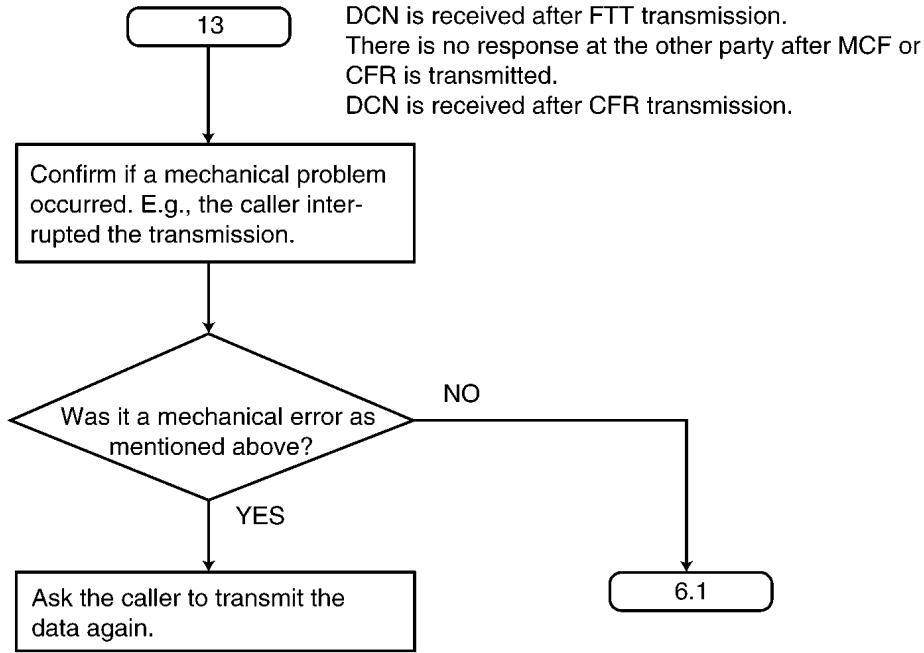


REFERENCE:
Test Mode (P.77)

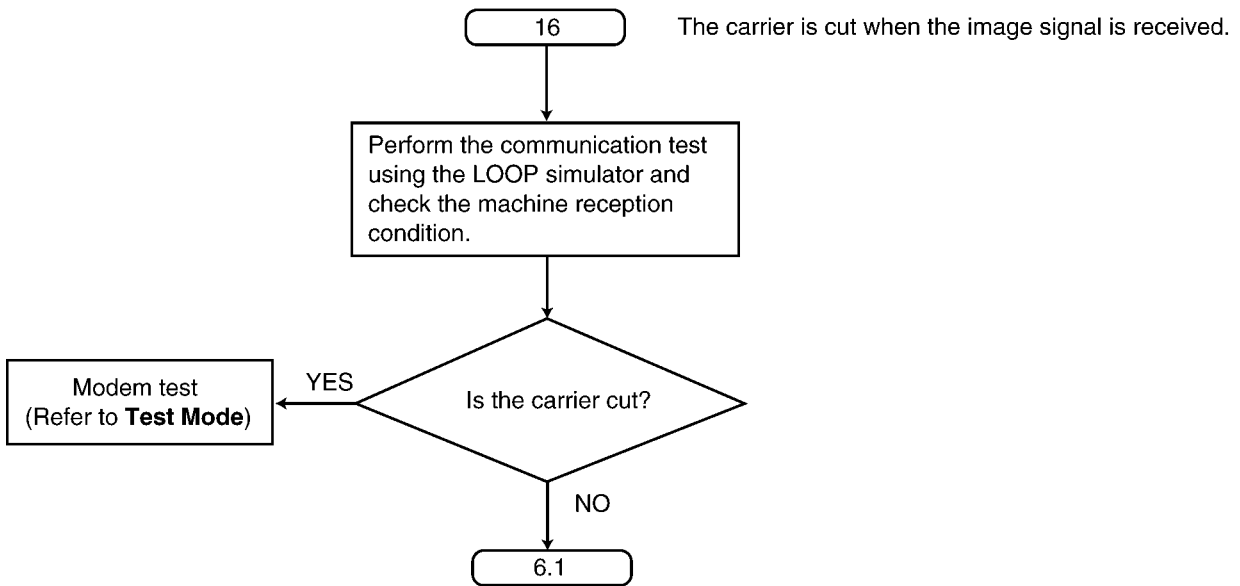
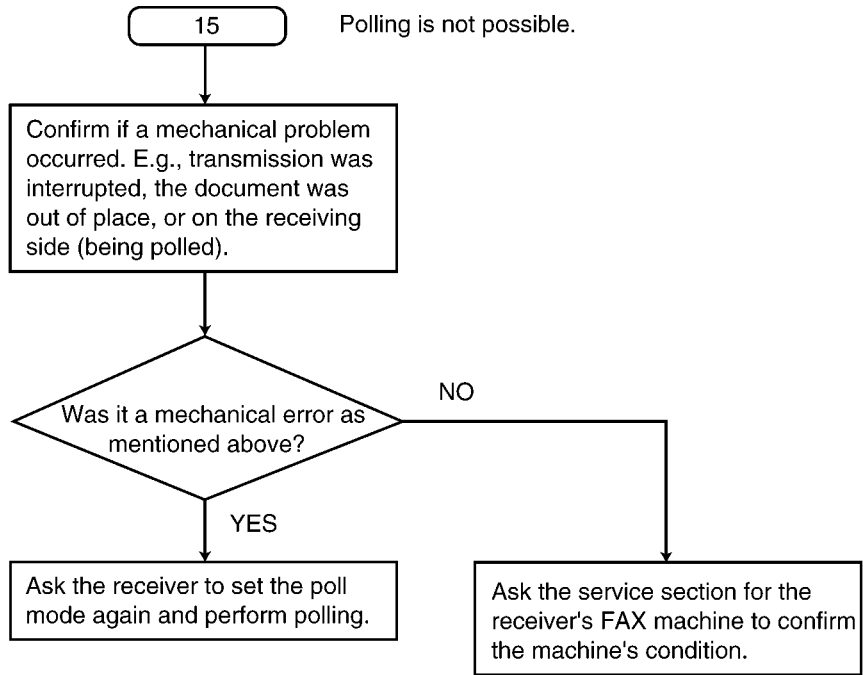


REFERENCE:
Test Mode (P.77)





REFERENCE:
Test Mode (P.77)



REFERENCE:
Test Mode (P.77)

12.3.2. Special Service Journal Reports

Journal 2 and Journal 3 shown below, which are special journals giving the additional detailed information about the latest 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.122).) 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).

Jan. 23 2006 09:51AM
YOUR LOGO :
YOUR FAX NO:

NO.	OTHER FACSIMILE	START TIME	USAGE TIME	MODE	PAGES	RESULT	*CODE
01	3332222	Jan. 21 02:14PM	00'45	SND	01	OK	
02	9998765	Jan. 21 03:17PM	00'58	SND	02	OK	
03	John	Jan. 21 05:18PM	00'48	RCV	01	OK	
04	555556677	Jan. 22 10:35AM	02'45	RCV	03	COMMUNICATION ERROR	(46)

Jan. 23 2006 09:51AM

NO.	(1) RCV. MODE	(2) SPEED (CNT.)	(3) RESOLUTION	(4) RCV-TRIG. (CNT.)	(5) 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

NO.	(1) START TIME	(4) RCV MODE	(4) RCV-TRIG (CNT.)
	YOUR LOGO		
	YOUR FAX NUMBER		

Jan. 23 2006 09:51AM

NO.	(6) ENCODE	(7) MSLT	(8) EQM (RX)	(9) ERROR LINE (RX)	(10) 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.110) and **Journal 3** (P.111).

12.3.2.1. Journal 2

Refer to JOURNAL 2 in **Printout Example** (P.111).

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.111). 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.
9	IDENT	Means the unit detected Ring Detection.
10	CNG OGM	Means the unit detected the CNG while it was sending the OGM in the TAM/FAX mode.
11	CNG ICM	Means the unit detected the CNG while it was recording the ICM in the TAM/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.111), it shows the fax message was received in memory due to "PAPER OUT" error.

NO RESPONSE DISAPPEARED ON JOURNAL

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

When a fax transmission cannot be performed because the other party's unit is set to the TEL mode, "No response" will be printed.

12.3.2.2. Journal 3

Refer to JOURNAL 3 in **Printout Example** (P.111).

Descriptions:

(6) ENCODE

Compression Code: MH/MR

(7) MSLT

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

(8) EQM

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

(9) ERROR LINE(RX)

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

(10) MAKER CODE

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

0E: "KX" model

00: Unknown

79: "UF" model

19: "Xerox" model

12.3.2.3. Printout Example

JOURNAL2

Mar. 25 2006 01:59PM

NO.	RCU MODE	SPEED (CNT.)	RESOLUTION	RCU-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	
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	RCU MODE	RCU-TRIG. (CNT.)
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JOURNAL3

Mar. 25 2006 01:58PM

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

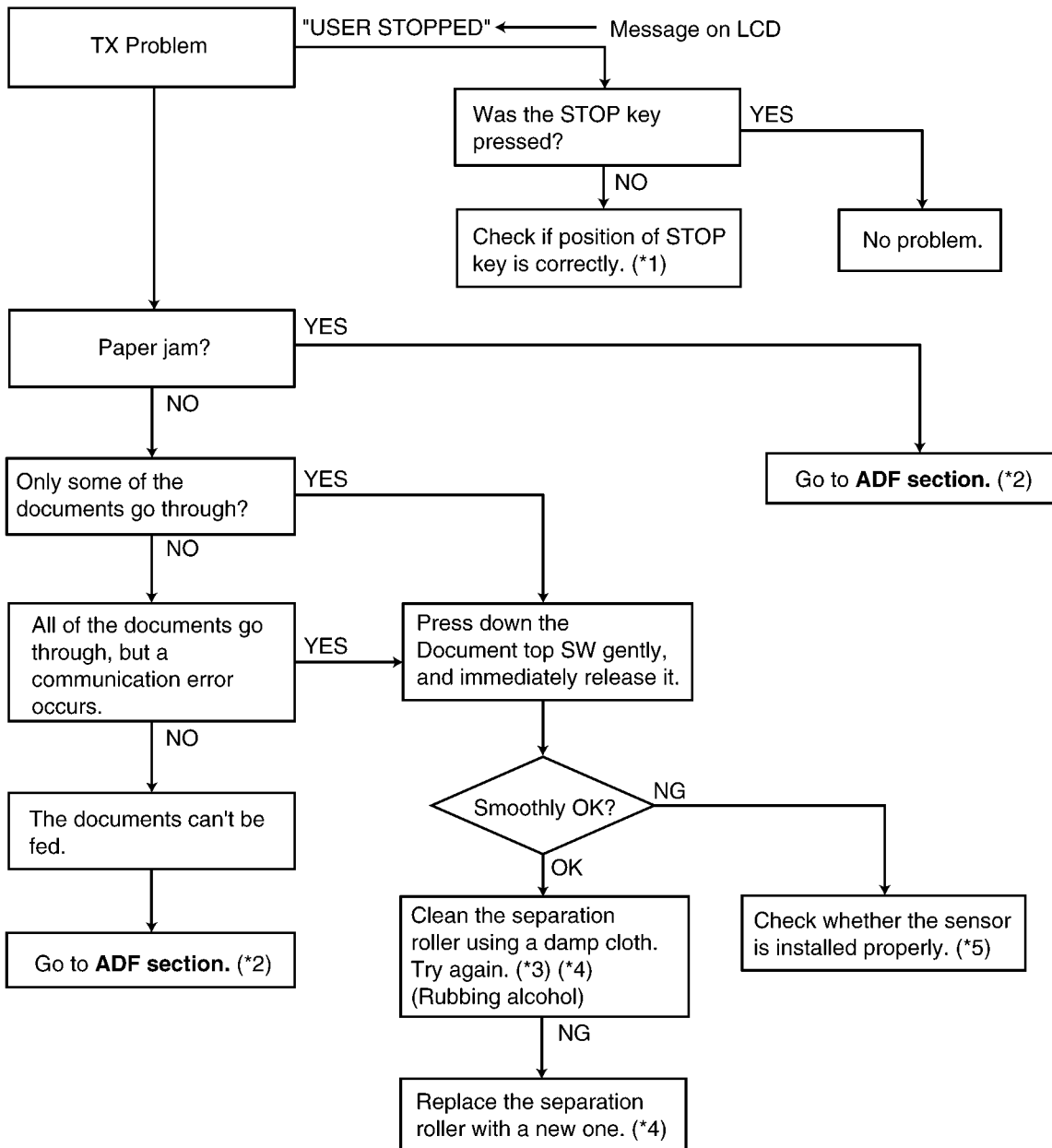
12.3.3. Communication Section

Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in **Defective Facsimile Section** (P.114).

No	Symptom	Reference Content	Possible cause
1	The paper is not fed properly when faxing. (Not in the copy mode.)	Transmit Problem (P.114)	Problem with the feeding mechanism. Refer to ADF (Auto Document Feed) Section (P.128).
2	The fax usually transmits successfully but sometimes fails. (The unit can copy documents.)	Sometime There is a Transmit Problem (P.115)	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.116)	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.117)	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.118)	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.120)	
7	No.1~No.5	<ul style="list-style-type: none"> • The troubleshooting procedure for each error code will be printed on the communication result report. • Error Messages-Report (P.100) 	

12.3.3.1. Defective Facsimile Section

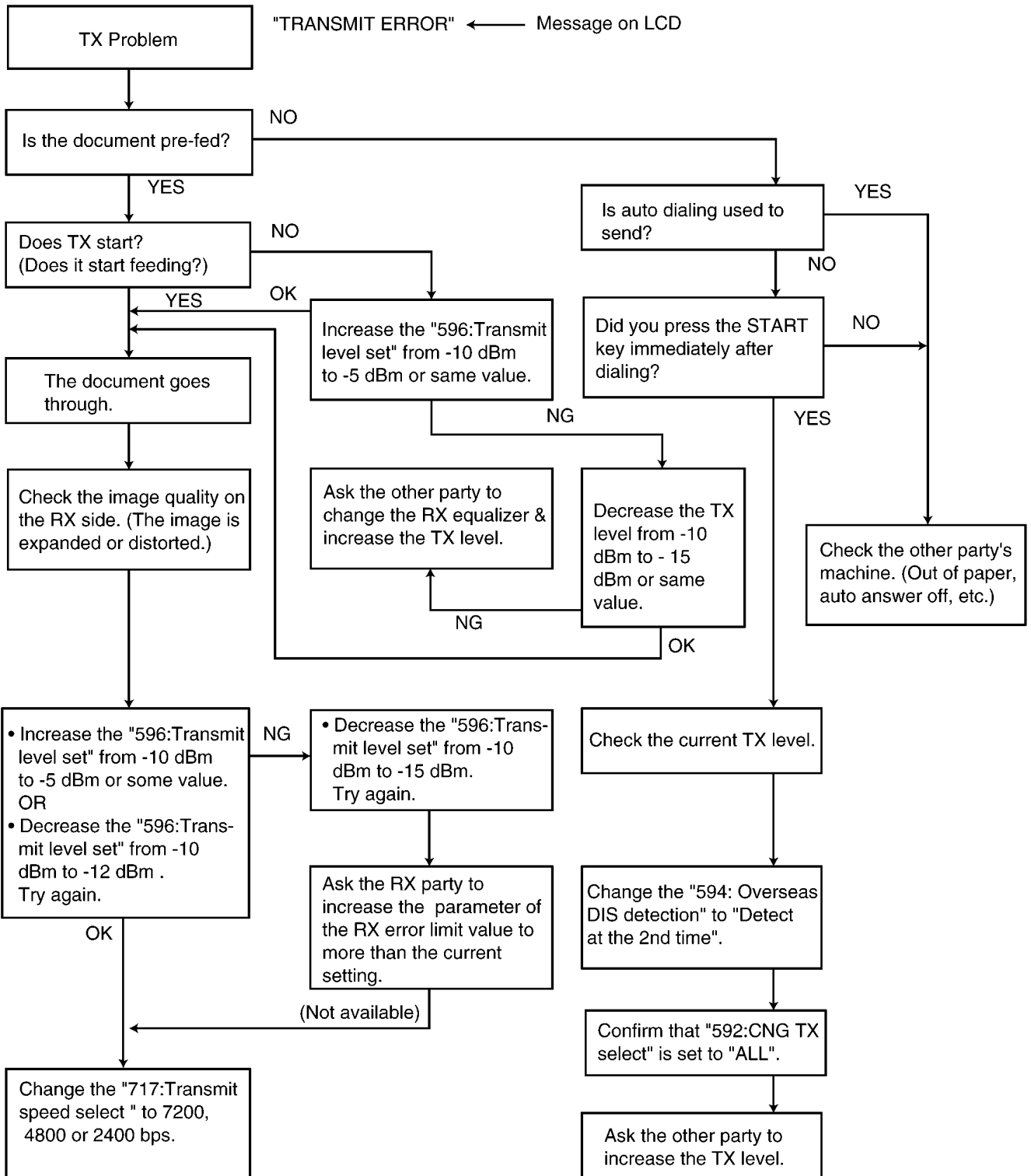
12.3.3.1.1. Transmit Problem



REFERENCE:

- (*1): Operation Panel Section (P.156)
- (*2): ADF (Auto Document Feed) Section (P.128)
- (*3): Maintenance (P.205)
- (*4): How to Remove the Gear Block and Separation Roller (P.180)
- (*5): How to Remove the Operation Board, MIC Board and LCD (P.189)

12.3.3.1.2. Sometime There is a Transmit Problem

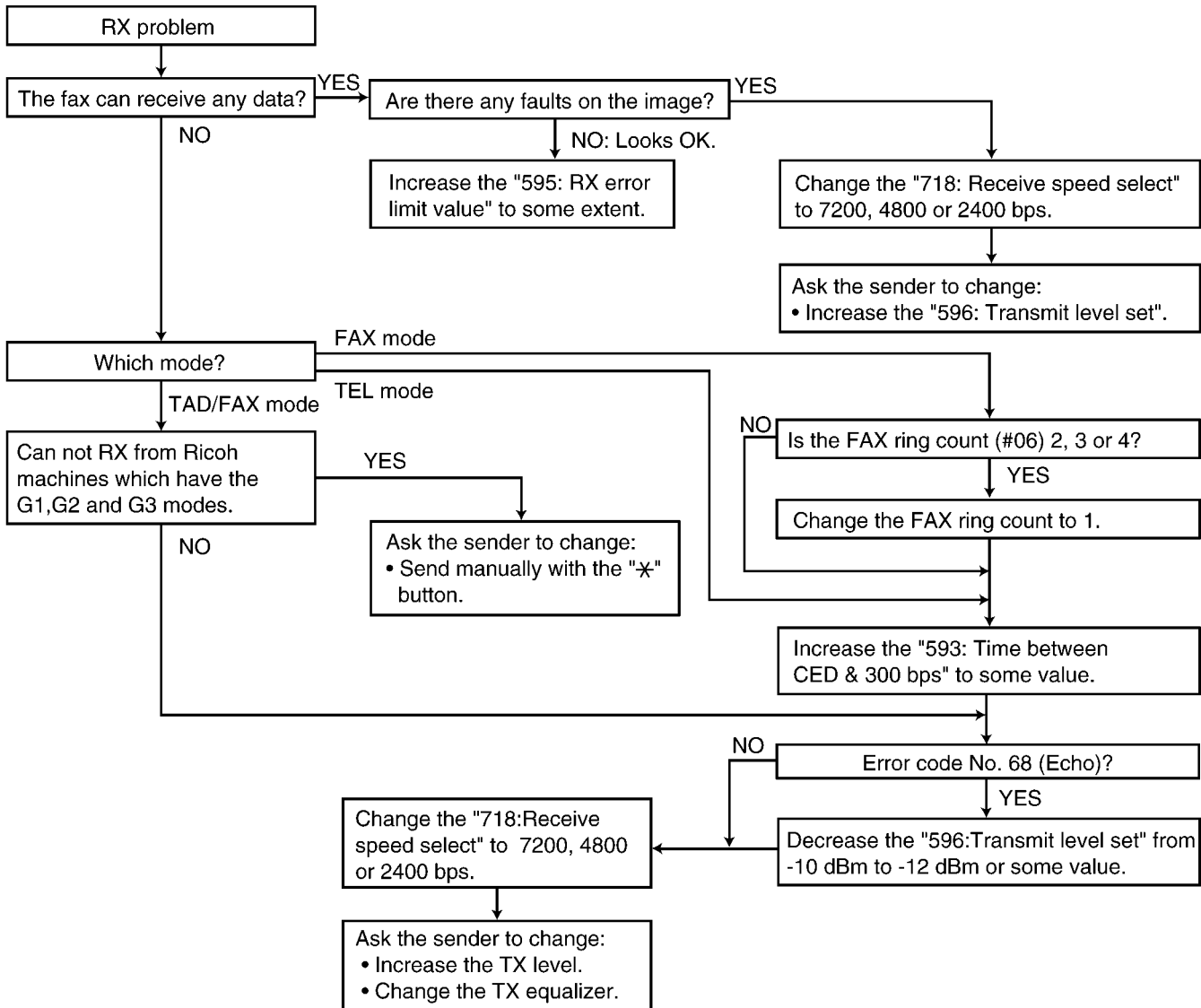


Note:

"596: Transmit level set" represents a service code. (Refer to **Service Function Table** (P.88).)

12.3.3.1.3. Receive Problem

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



Note:

- "596: Transmit level set" represents a service code. (Refer to **Service Function Table** (P.88).)
- #06 : Refer to for **Program Mode Table** (P.123) 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 "OUT OF PAPER" when the fax switches to the memory receiving mode and the memory capacity becomes full of the unprintable data. In this case, error messages [MEMORY FULL] and its main cause, for example "CHECK PAPER" are displayed on the LCD. Once you solve the main problem, [MEMORY FULL] will be cancelled and the reception problem will be resolved.

LCD display messages indicating the error causes are shown below.

CHECK PAPER

COVER OPEN

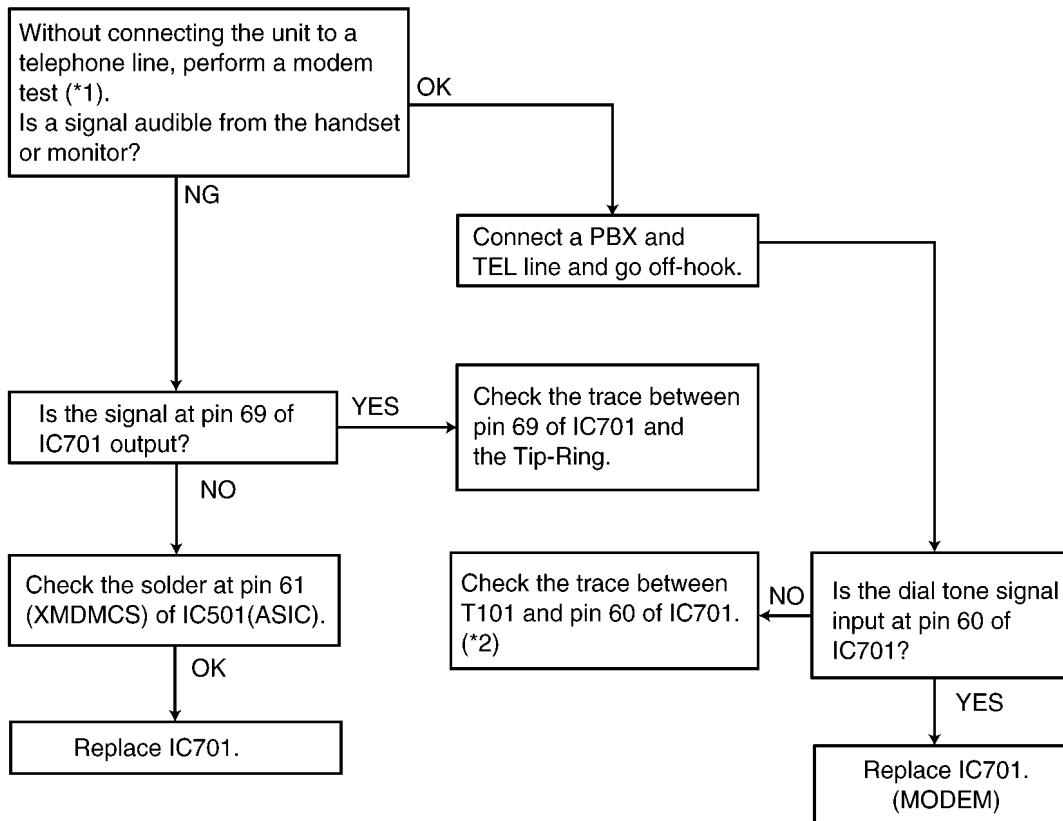
UNIT OVERHEATED (COVER OPEN, etc.)...Reset the unit.

PAPER JAMMED

CHECK FILM

Please refer to **Error Messages-Display** (P.97) for the above items. If it turns out to be a hardware deformity, please check each sensor. (Refer to **Test Mode** (P.77).)

12.3.3.1.4. The Unit can copy, but cannot Transmit / Receive



REFERENCE:

(*1): **Test Mode** (P.77)

(*2): **Analog Board Section** (P.148)

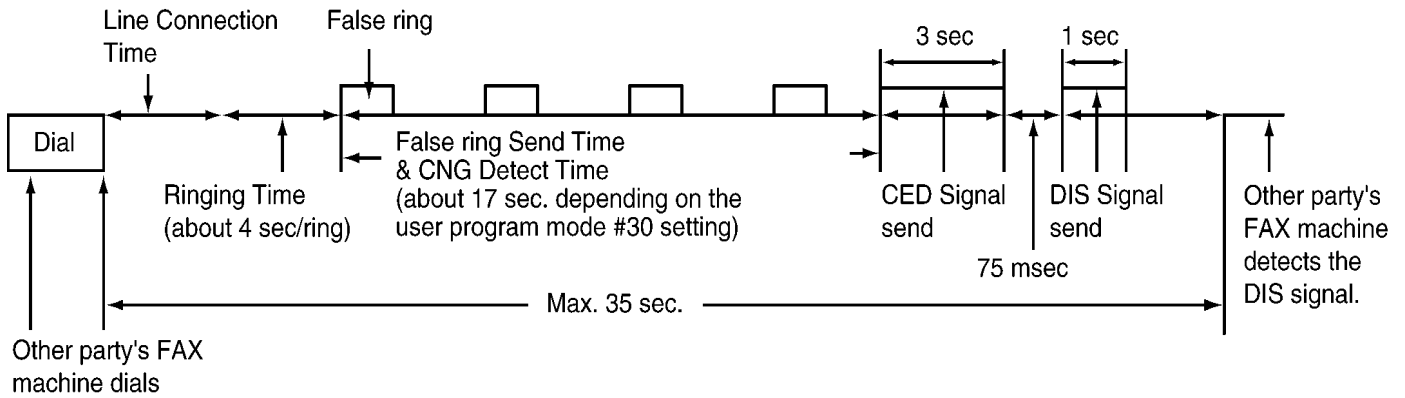
12.3.3.1.5. The unit can copy, but cannot either transmit/receive long distance or international communications

The following two causes can be considered for this symptom.

Cause 1:

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

(Response Time)

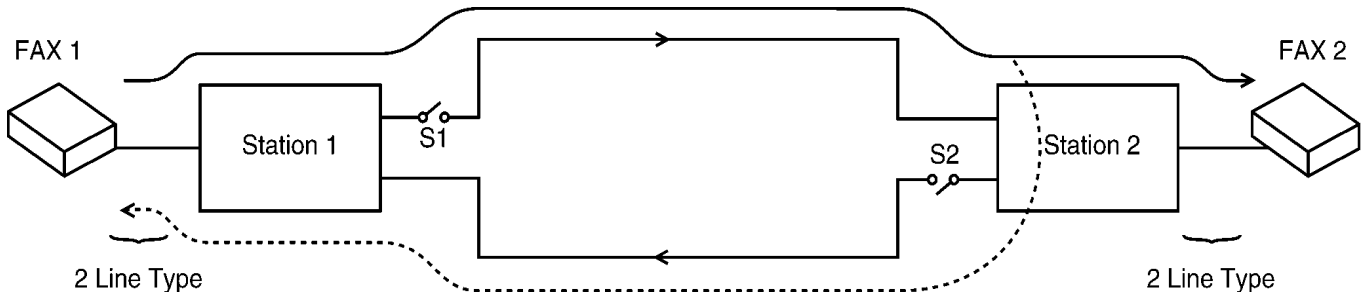


(Cause and Countermeasure)

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



(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 be received.	Service code (598) (Receiving sensitivity)
5	Sending side Receiving side	There are some cases (e.g. Mobil comms.) which cause the collision of TX / RX signals due to the delay / echo and noise of the network / terminal. (Refer to Fig. e)	Set additional Pause time (Service mode: code No. 774) in between the original and its repeated signals, to prevent the collision of the signals at both end.	Service code (774) (T4 timer)

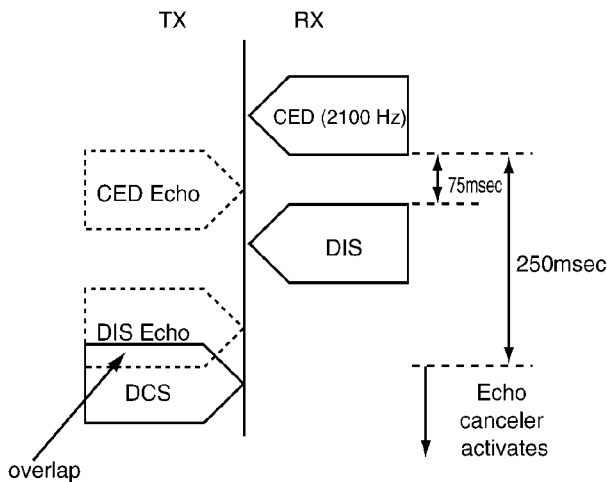


Fig. a

(Overlapping the Echo of the DIS signal and DCS signal)

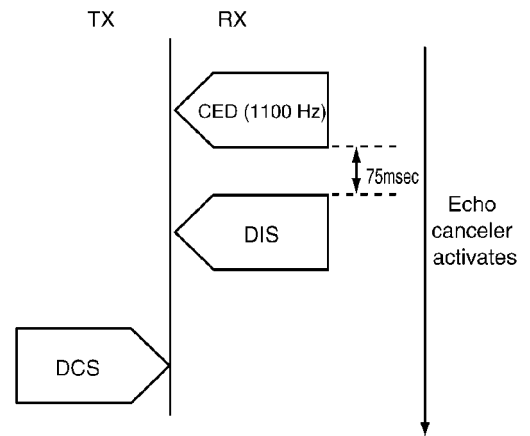


Fig. b

(Countermeasure by Changing the CED Frequency)

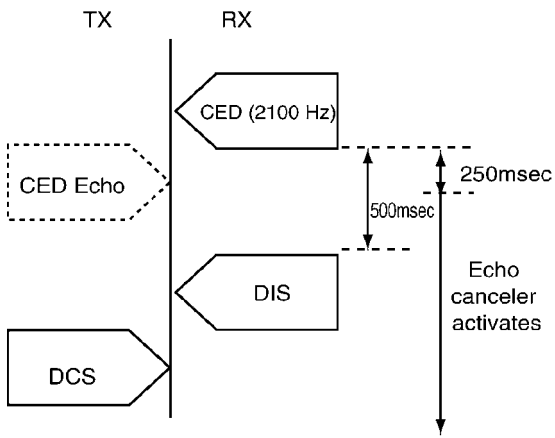


Fig. c
(Countermeasure by Changing the Interval Between CED and DIS)

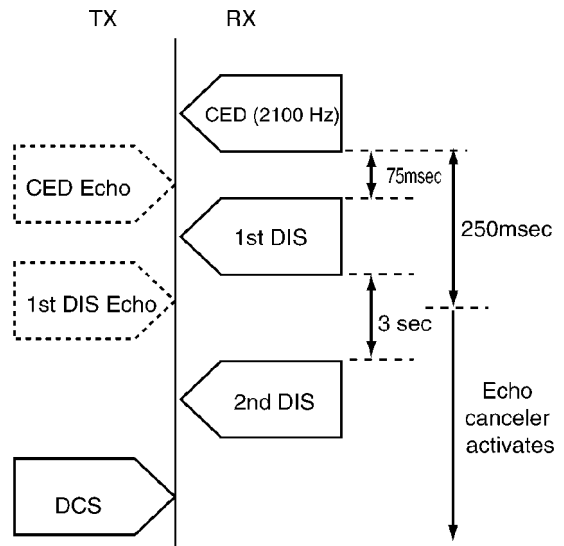
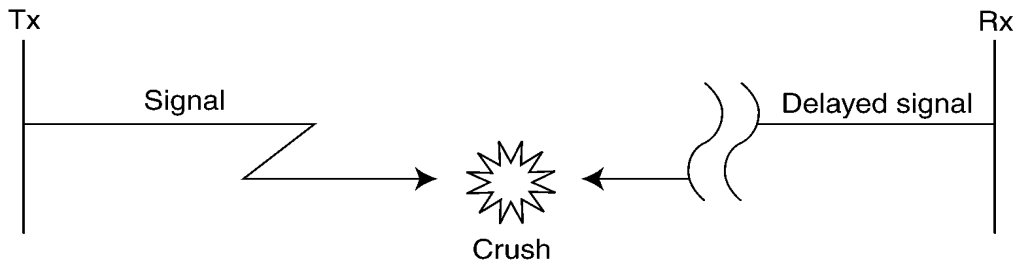


Fig. d
(Countermeasure by Ignoring the 1st DIS)

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



(Fig. e)

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

(Long distance or international communication operation)

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

Transmission Operation:

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

Reception Operation:

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

- Refer to **Service Function Table** (P.88).

12.3.3.1.7. How To Record Fax Signal by Using PC

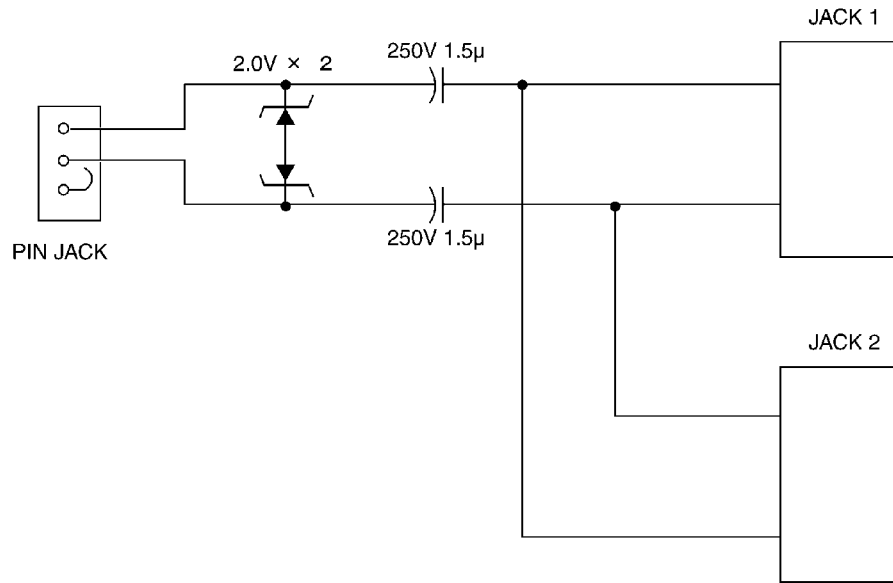
Recording FAX signal is one of the useful analysis measures to solve communication problems. The way of recording easily by using PC is shown as follows.

1. Equipment

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

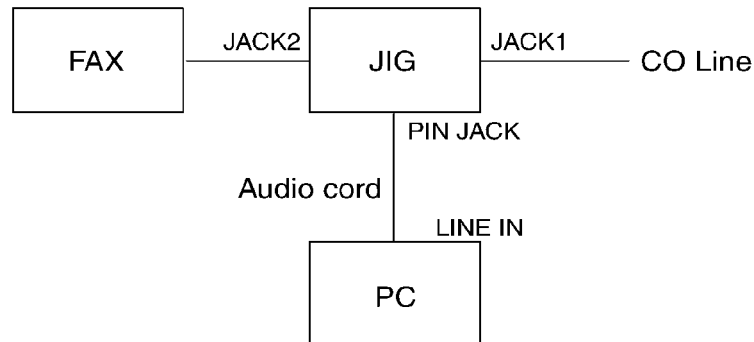
Parts No.	Parts Name & Description	Qt'y
PQJJ1T004Z	JACK1, JACK2	2
PQJJ1D010Z	PIN JACK	1
ECQE2155KF or ECQE2E155KC	CAPACITOR	2
MA4020	DIODE	2

2. Setting up



FAX SIGNAL RECORDING JIG

3. Connecting PC and JIG



4. PC setting and recording

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

Note:

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

12.4. Remote Programming

If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (**Program Mode Table** (P.123)). 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.

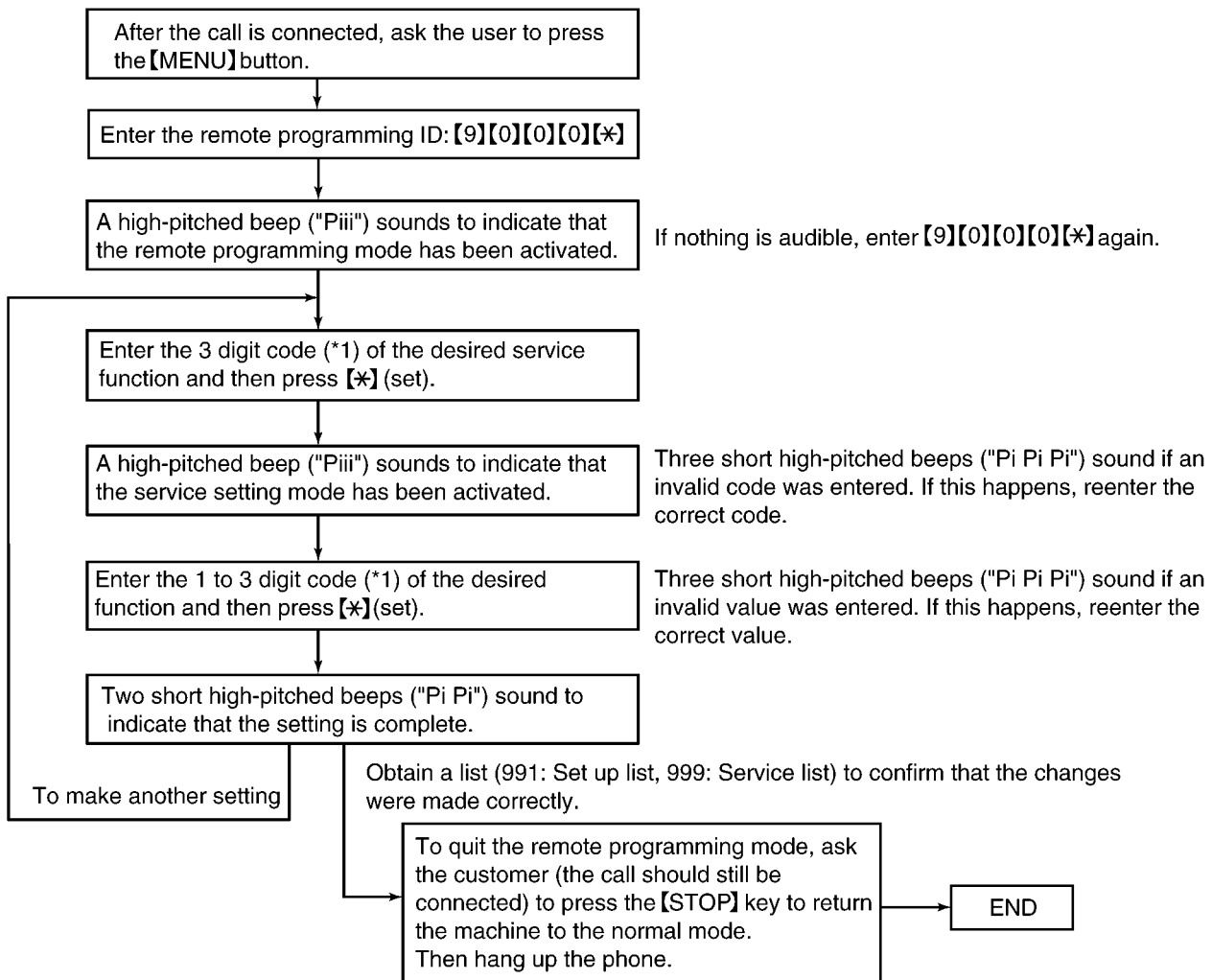
Based on this, the parameters for the desired codes can be changed.

The procedure for changing and listing parameters is described on **Entering the Remote Programming Mode and Changing Service Codes** (P.122). Also, before exiting the remote programming mode, it is advisable to obtain a new list to confirm that the changes were made correctly.

Hint:

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

12.4.1. Entering the Remote Programming Mode and Changing Service Codes



Note:

(*1): Refer to **Program Mode Table** (P.123)

12.4.2. Program Mode Table

Code	Function	Set Value	Default	Remote Setting
001	Set date and time	mm/dd/yy hh:mm	Jan/01/2006	NG
002	Your logo	-----	None	NG
003	Your FAX number	-----	None	NG
004	Print sending report	1:ERROR / 2:ON / 3:OFF	ERROR	OK
006	FAX ring count	1~9	2	OK
	TAM/FAX ring count	2~7 / 0:TOLL SAVER	2	OK
010	Recording time	1:GREETING ONLY / 2: 1 MIN 3: 2 MIN / 4: 3 MIN	3 MIN	OK
011	Remote TAM ID	-----	ID=11	NG
013	Dialing mode	1:PULSE / 2:TONE	TONE	OK
017	Ringer tone	TONE 1 / TONE 2 / TONE 3	TONE 1	NG
022	Journal auto print	1:ON / 2:OFF	ON	OK
023	Overseas mode	1:NEXT FAX / 2:ERROR / 3:OFF	ERROR	OK
025	Delayed transmission	ON / OFF	OFF	NG
026	Auto caller ID list	1:ON / 2:OFF	OFF	OK
034	Quick scan	1:ON / 2:OFF	OFF	OK
036	RCV reduction	1:92% / 2:86% / 3:72% / 4:100%	92%	OK
039	LCD contrast	NORMAL / DARKER	NORMAL	NG
041	FAX activation code	ON / OFF	ON ID= X #9	NG
044	Memory receive alert	1:ON / 2:OFF	ON	OK
046	Friendly reception	1:ON / 2:OFF	ON	OK
047	FAX voice guidance	1:ERROR / 2:ON / 3:OFF	ON	OK
049	Auto disconnect	1:ON / 2:OFF	ON CODE= X 0	OK
054	Greeting MSG. REC. time	1:16s / 2:60s	16s	OK
058	Scan contrast	1: Normal / 2: Light / 3: Darker	Normal	OK
059	Copy phone book	1 ITME / ALL ITEM	1 ITEM	NG
067	ICM monitor	1:ON / 2:OFF	ON	OK
072	Set flash mode	1:90ms / 2:100ms / 3: 110ms / 4:250ms 5:300ms / 6: 400ms / 7: 600ms / 8:700ms	700ms	OK
076	Connecting tone	1:ON / 2:OFF	ON	OK
077	Auto answer mode	2: FAX Only / 3:TAM/FAX	TAM/FAX	OK
080	Set default	YES / NO	NO	NG
501	Pause time set	001~600 x 100msec	035 x 100msec	OK
503	Dial speed	1:10pps / 2:20 pps	10pps	OK
510	Vox time	1:6sec / 2:4sec	6sec	OK
511	Vox sense	1:High / 2:Low	High	OK
514	Bell detection time	1~9 x 100msec	6 x 100msec	OK
520	CED frequency select	1:2100Hz / 2:1100Hz	2100Hz	OK
521	International mode select	1:ON / 2:OFF	ON	OK
522	Auto standby select	1:ON / 2:OFF	ON	OK
523	Receive equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
524	Transmission equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
544	Document feed position adjustment value set	1~9	5	OK
550	Memory clear	-----	-----	NG
551	ROM check	-----	-----	NG
552	DTMF signal tone test	1:ON / 2:OFF	OFF	OK
553	Monitor on FAX communication	1:OFF / 2:Phase B / 3:ALL	OFF	OK
554	Modem test	-----	-----	NG
555	Scanner test	-----	-----	NG
556	Motor test	-----	-----	NG
557	LED test	-----	-----	NG
558	LCD test	-----	-----	NG
559	Document jam detection	1:ON / 2:OFF	ON	OK
561	Key test	-----	-----	NG
567	T0 timer	1~255 s	046s	OK
570	Break % select	1:61% / 2:67%	61%	OK
571	ITS auto redial time set	00~99	5	OK
572	ITS auto redial line disconnection time set	001~999sec	065sec	OK

Code	Function	Set Value	Default	Remote Setting
573	Remote turn-on ring number	01~99	10	OK
574	Dial tone detect check	1:ON / 2:OFF	OFF	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	001~999sec	065sec	OK
592	CNG transmit select	1:OFF / 2:ALL / 3:AUTO	ALL	OK
593	Time between CED and 300 bps	1:75ms / 2:500ms / 3:1sec	75ms	OK
594	Overseas DIS detection	1:1st / 2:2nd	1st	OK
595	Receive error limit value	1:5% / 2:10% / 3:15% / 4:20%	10%	OK
596	Transmit level set	-15~00dbm	-10dbm	OK
598*1	Receiving Sensitivity	-20~-48dbm	-40dbm	OK
710	Memory clear except history data	-----	-----	NG
717	Transmit speed select	1:9600/ 2:7200/ 3:4800/ 4:2400	9600bps	OK
718	Receive speed select	1:9600/ 2:7200/ 3:4800/ 4:2400	9600bps	OK
722	Redial tone detect	1:ON / 2:OFF	ON	OK
745	Power on film feed	1:ON / 2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s / 2:20s / 3:30s	30s	OK
773	DIS-DCS interval	1:500msec / 2:200msec	200ms	OK
774	T4 timer	00~99 x 100ms	00ms	OK
784	Voice prompt	1:Start	-----	NG
815	Sensor & VOX test	-----	-----	NG
841	Digital SP-Phone RX & TX check	1:SP-Phone	-----	NG
852	Print test pattern	-----	-----	NG
853	Top margin	1~9 mm	5	OK
861	Paper size	1:A4 / 2:Letter	A4	OK
874	DTMF ON time	06~20 x 10msec	18 x 10msec	OK
875	DTMF OFF time	06~20 x 10msec	09 x 10msec	OK
880	History list	1:Start	-----	NG
881	Journal 2	1:Start	-----	NG
882	Journal 3	1:Start	-----	NG
958	Cordless test mode	-----	-----	NG
991	Remote Setup list	1:Start	-----	OK
994	Remote Journal list	1:Start	-----	OK
995	Remote Journal 2 list	1:Start	-----	OK
996	Remote Journal 3 list	1:Start	-----	OK
998	Remote History list	1:Start	-----	OK
999	Remote 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.88) for descriptions of the individual codes.

Example:

If you want to set value in the "004 Print confirmation 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)

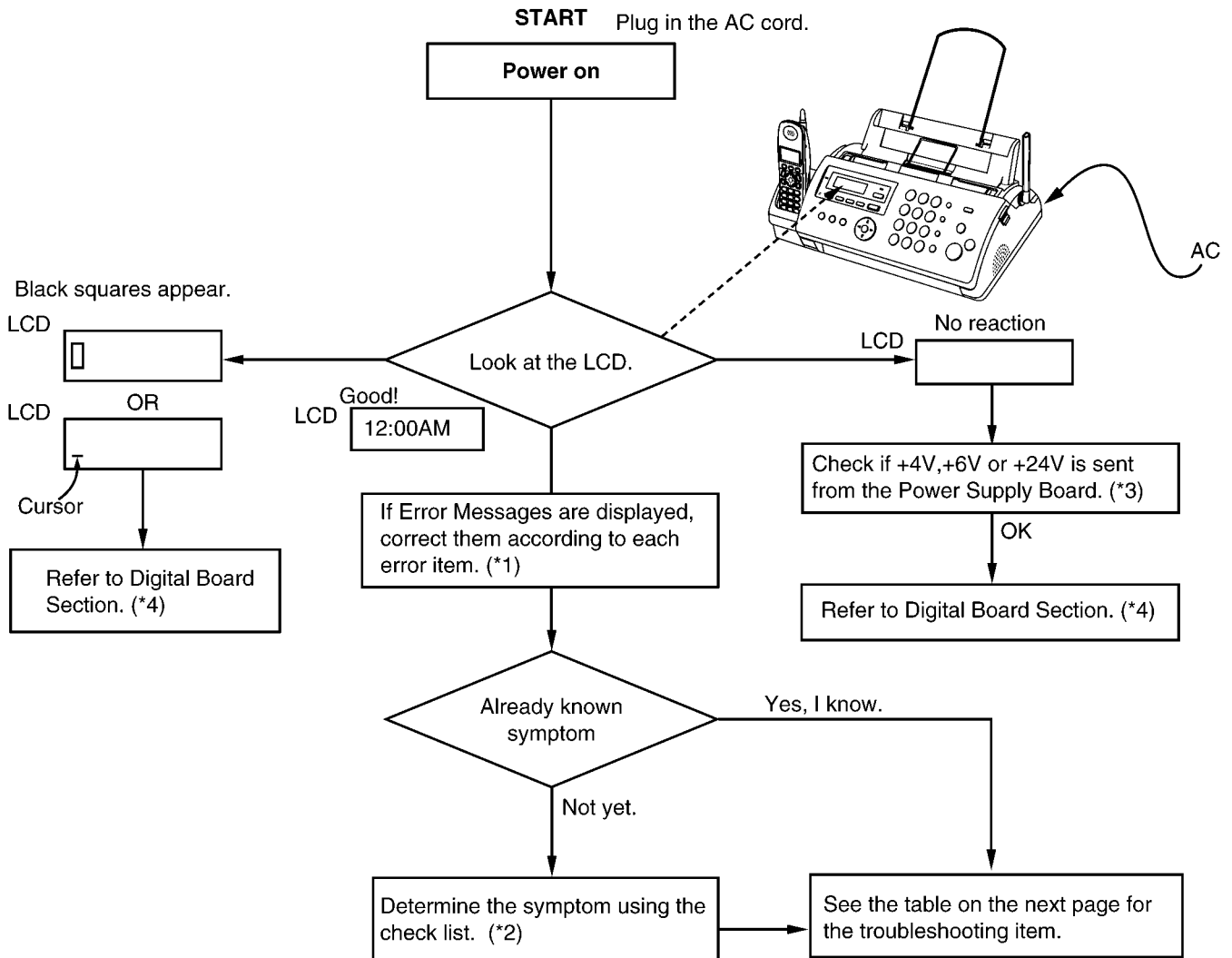
12.5. Troubleshooting Details

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

12.5.2. Starting Troubleshooting

Determine the symptom and the troubleshooting method.



REFERENCE:

- (*1): **Error Messages-Display** (P.97)
- (*2): **Simple Check List** (P.127)
- (*3): **Power Supply Board Section** (P.153)
- (*4): **Digital Board Section** (P.141)

12.5.3. Troubleshooting Items Table

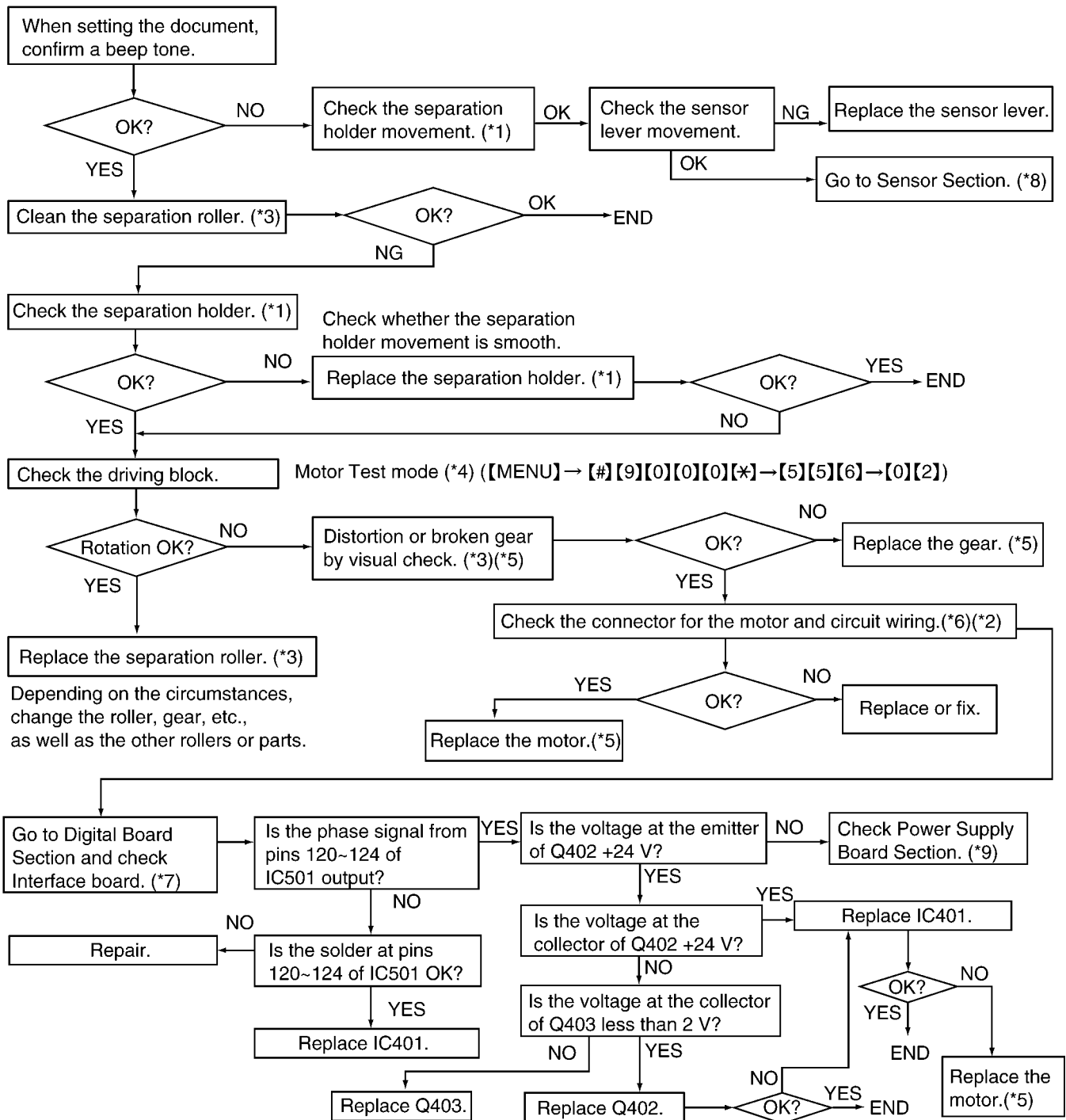
ITEM	SYMPTOM	REFERENCE
ADF (Auto Document Feeder)	The document does not feed.	See No Document Feed (P.128)
	Document jam	See Document Jam (P.129)
	Multiple feed	See Multiple Document Feed (P.130)
	Skew	See Document Skew (P.131)
Recording paper feed	The recording paper does not feed.	See The Recording Paper does not Feed (P.132)
	Paper jam	See Paper Jam (P.133)
	Multiple feed and skew	See Recording Paper Multiple Feed and Skew (P.134)
Printing	The sent fax data is skewed.	See The Sent Fax Data is Skewed (P.134)
	The received fax data is skewed.	See The Received Fax Data is Skewed (P.134)
	The received or copied data is expanded.	See Received or Copied Data is Expanded (P.135)
	A black page is copied.	See A Blank Page is Copied (P.136)
	A blank page is received.	See A Blank Page is Received (P.138)
	Black or white vertical line	See Black or White Vertical Line (P.138)
	Black or white lateral line on print out	See Black or White Lateral Line on Print Out (P.139)
	An abnormal image is printed	See An Abnormal Image is Printed (P.140)
Communication FAX, TEL (Analog board)	Cannot communicate by fax. An error code is displayed.	See Communication Section (P.113) and Journal Report (P.100)
	Cannot talk. The DTMF tone doesn't work. The handset / monitor doesn't work, etc.	See Analog Board Section (P.148)
Operation panel	Keys are not accepted.	See Operation Panel Section (P.156)
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	See Sensor Section (P.157)
Cordless (Digital board)	No link	See Check Link (P.162)
	Battery won't charge	See Battery won't Charge (Digital, Interface, Analog Board) (P.161) and Battery won't Charge (Handset) (P.161)
	No voice reception	See No Voice Reception (P.161)
	No voice transmission	See No Voice Transmission (P.162)

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	
	SP-PHONE sound	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.77).)
Operation Panel	Key check	OK / NG	Service code #561 (Refer to Test Mode (P.77).)
	LED check	OK / NG	Service code #557 (Refer to Test Mode (P.77).)
	LCD check	OK / NG	Service code #558 (Refer to Test Mode (P.77).)
Sensor	Sensor check	OK / NG	Service code #815 (Refer to Test Mode (P.77).)
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.77).) Check whether voice prompt is play or not.
Cordless Operation	Portable handset	OK / NG	
	Link	OK / NG	
	Battery charge	OK / NG	

12.5.4. ADF (Auto Document Feed) Section

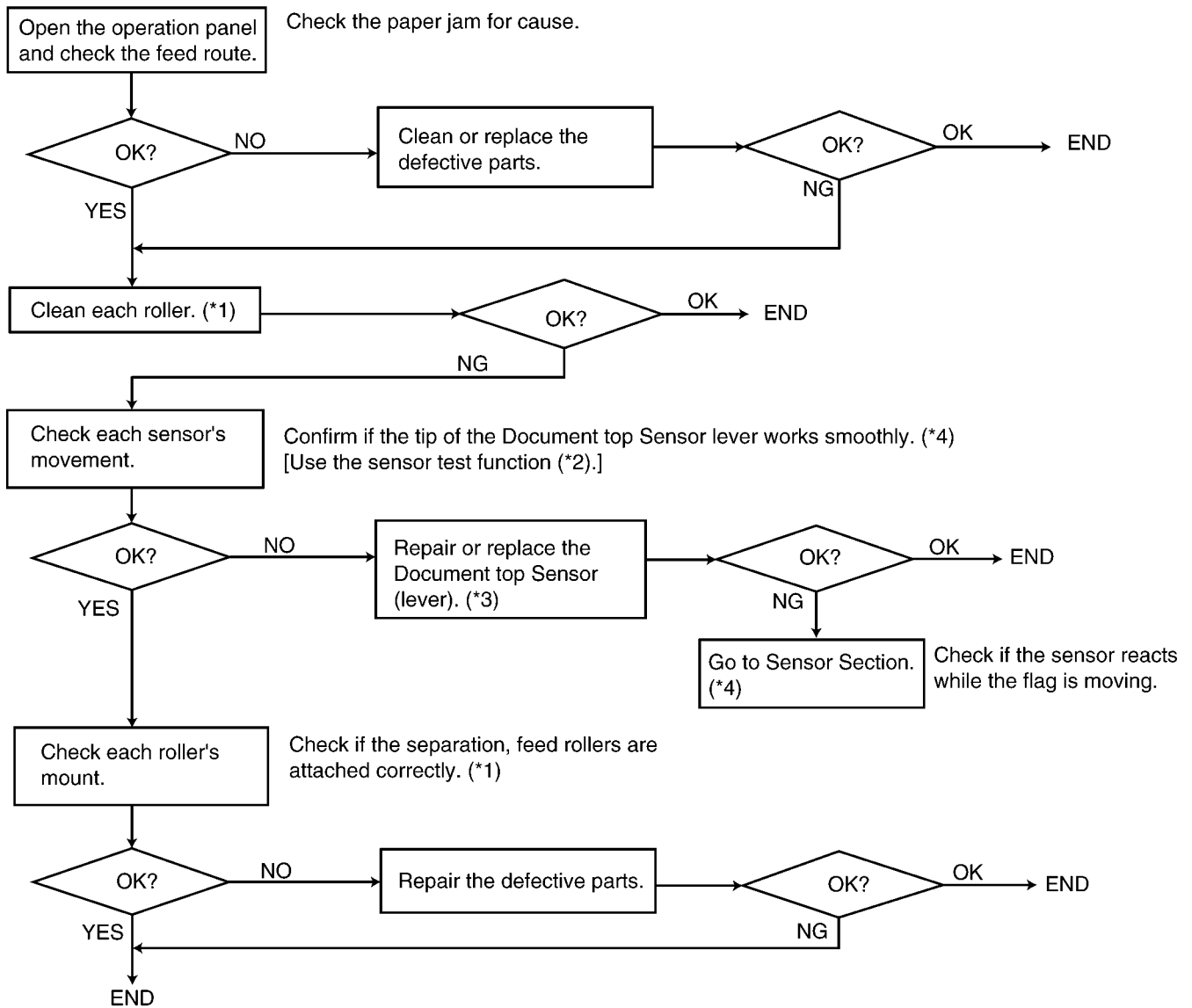
12.5.4.1. No Document Feed



REFERENCE:

- (*1): How to Remove the Separation Holder and Exit Roller (P.190)
- (*2): Installation Position of the Lead Wires (P.191)
- (*3): How to Remove the Gear Block and Separation Roller (P.180)
- (*4): Test Mode (P.77)
- (*5): How to Remove the Gears, Motors and Arms of the Gear Block (P.181)
- (*6): Stepping Motor Drive Circuit (P.27)
- (*7): Digital Board Section (P.141)
- (*8): Sensor Section (P.157)
- (*9): Power Supply Board Section (P.153)

12.5.4.2. Document Jam

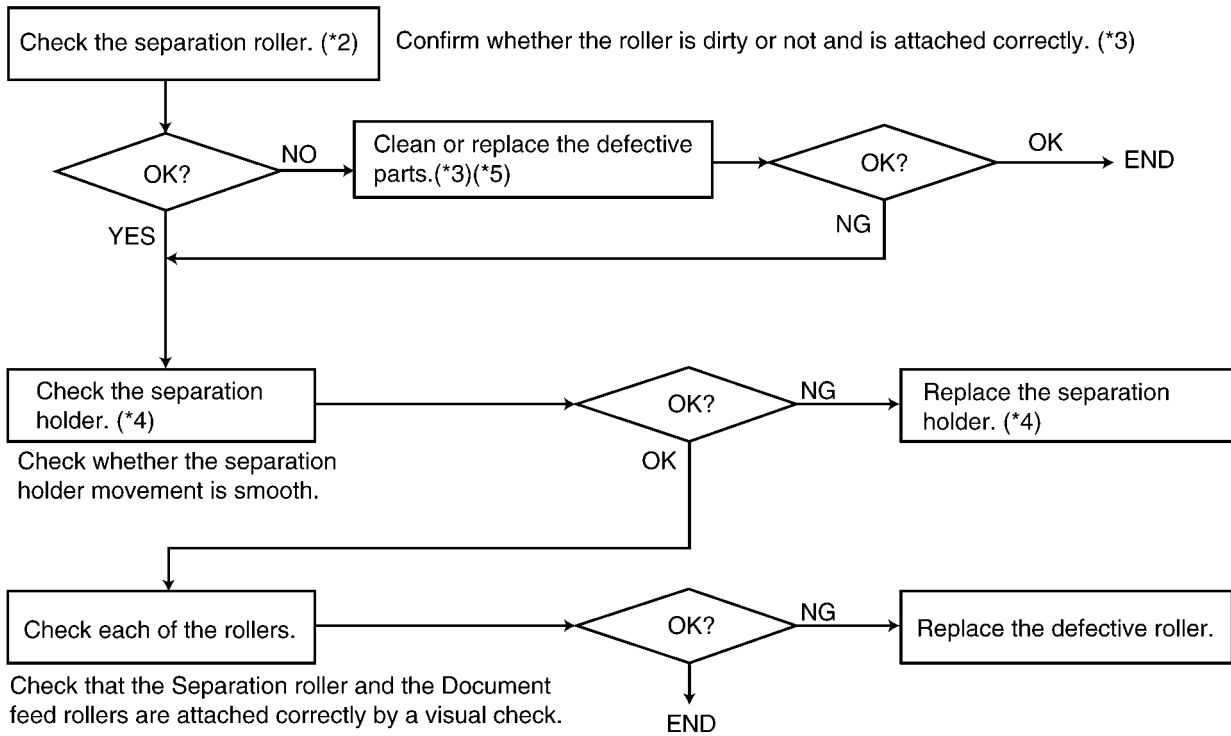


REFERENCE:

- (*1): **Disassembly and Assembly Instructions** (P.170)
- (*2): **Test Mode** (P.77)
- (*3): **How to Remove the Separation Holder and Exit Roller** (P.190)
- (*4): **Sensor Section** (P.157)

12.5.4.3. Multiple Document Feed

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

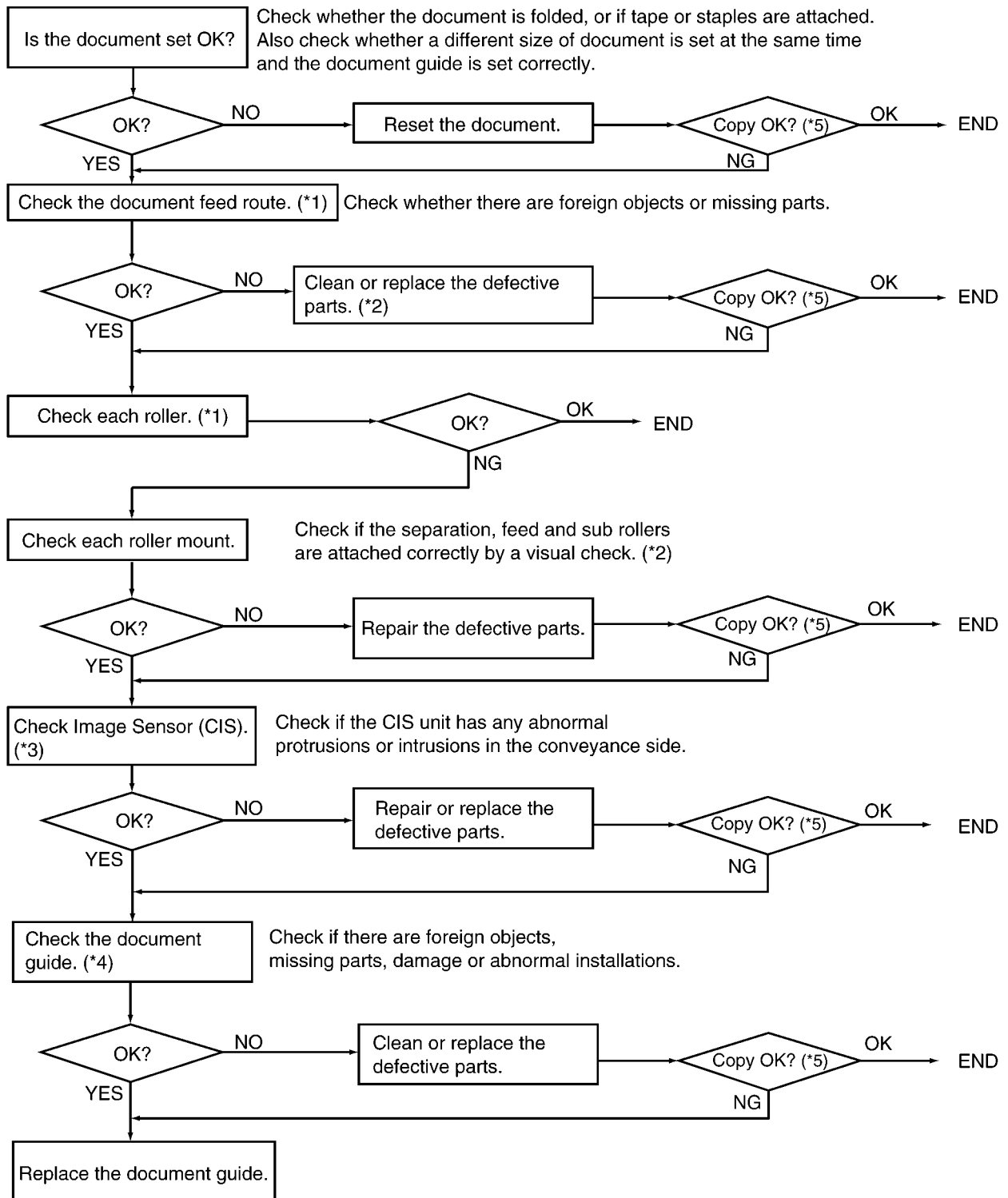


REFERENCE:

- (*1): **Installing the Recording Paper** (P.72)
- (*2): **How to Remove the Gear Block and Separation Roller** (P.180)
- (*3): **Disassembly and Assembly Instructions** (P.170)
- (*4): **How to Remove the Separation Holder and Exit Roller** (P.190)
- (*5): **Maintenance** (P.205)

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.225).)

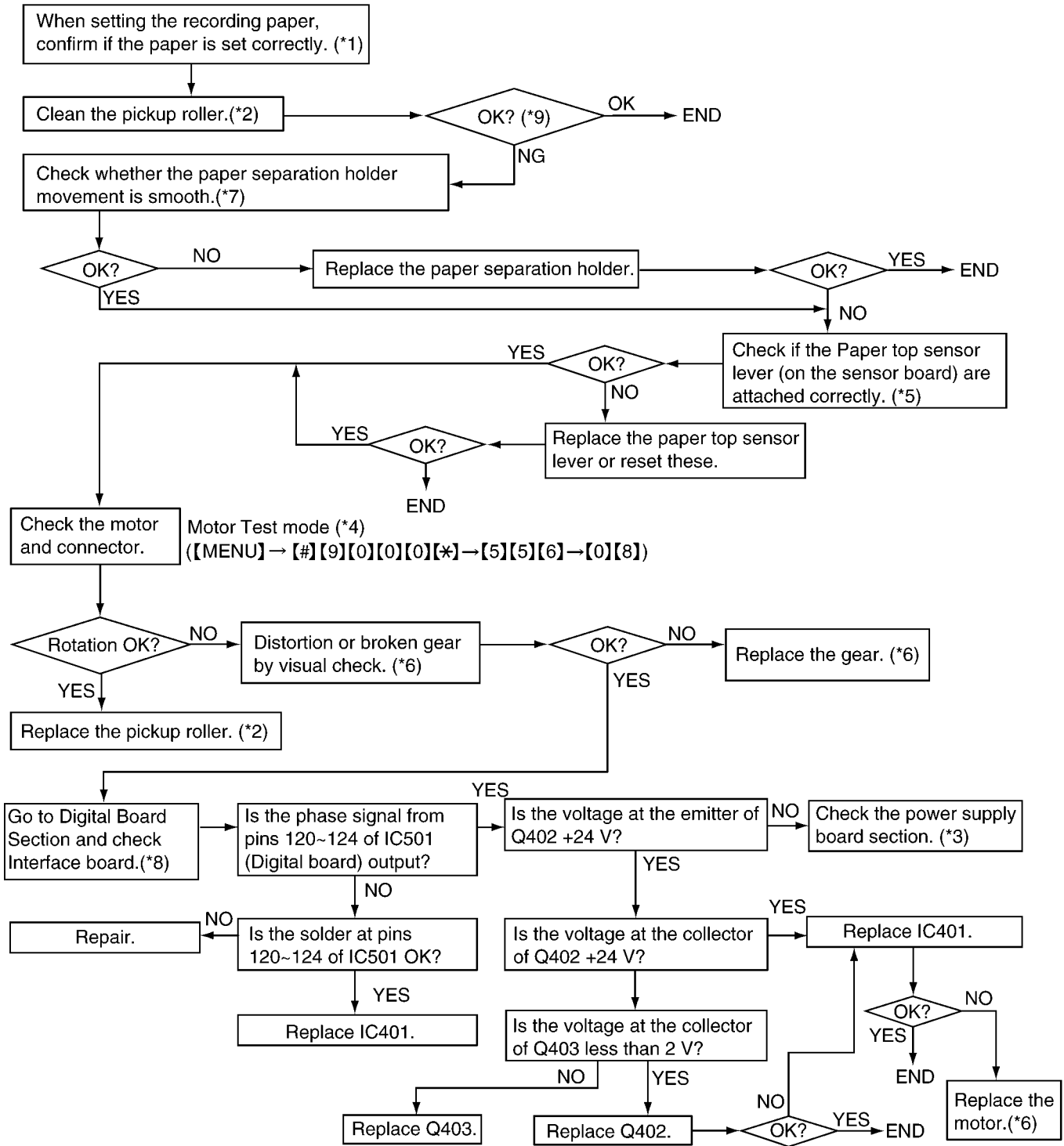
12.5.4.4. Document Skew



REFERENCE:

- (*1): **Maintenance Check Items/Component Locations** (P.205)
- (*2): **Disassembly and Assembly Instructions** (P.170)
- (*3): **How to Remove the Image Sensor (CIS)** (P.174)
- (*4): **Overview** (P.65)
- (*5): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.

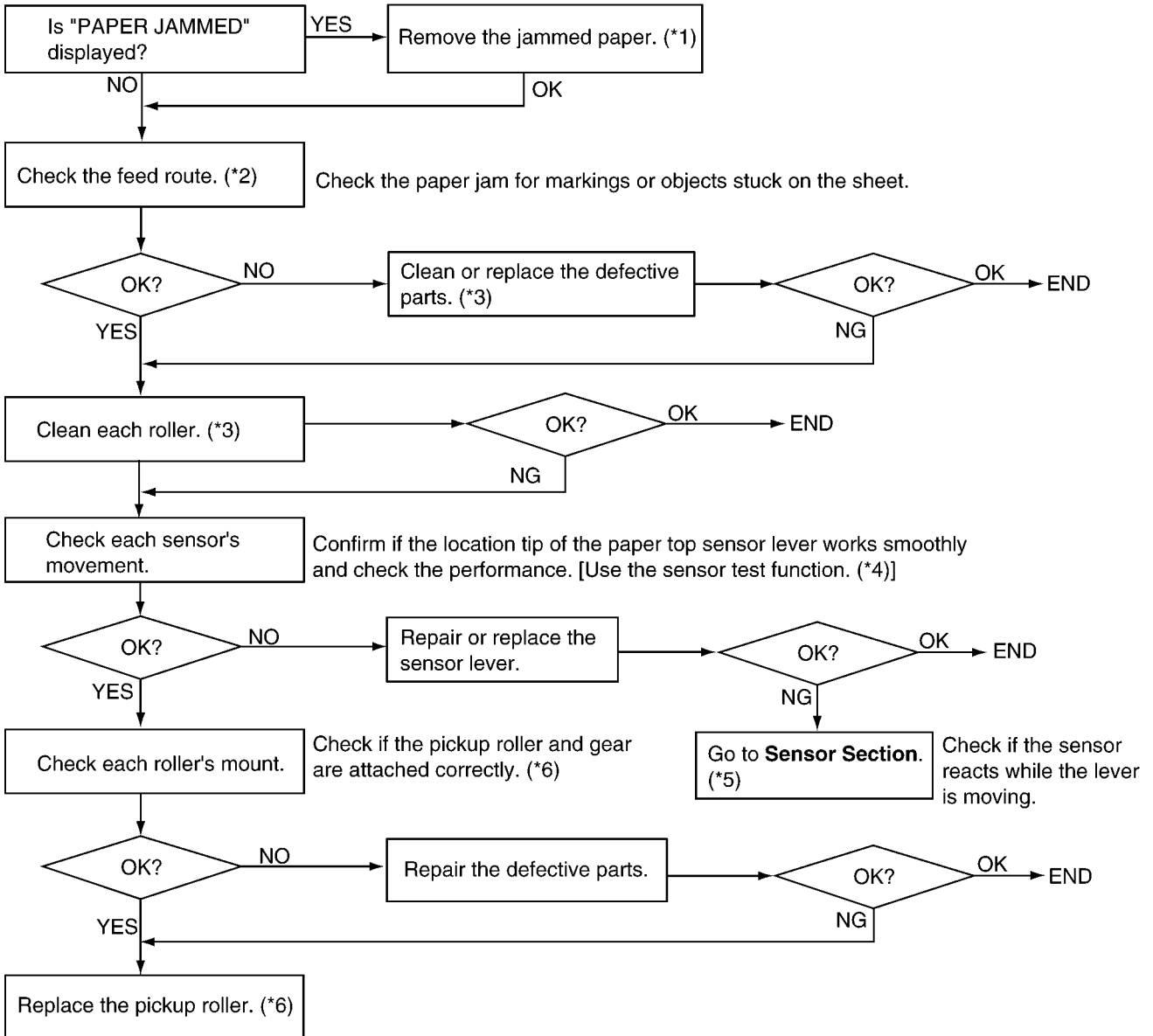
12.5.4.5. The Recording Paper does not Feed



REFERENCE:

- (*1): **Installing the Recording Paper** (P.72)
- (*2): **How to Remove the Pickup Roller and Antenna** (P.187)
- (*3): **Power Supply Board Section** (P.153)
- (*4): **Test Mode** (P.77)
- (*5): **How to Remove the P.C. Boards and Speaker** (P.178)
- (*6): **How to Remove the Gears, Motors and Arms of the Gear Block** (P.181)
- (*7): **How to Remove the Platen Roller and Lock Lever** (P.185)
- (*8): **Digital Board Section** (P.141)
- (*9): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.

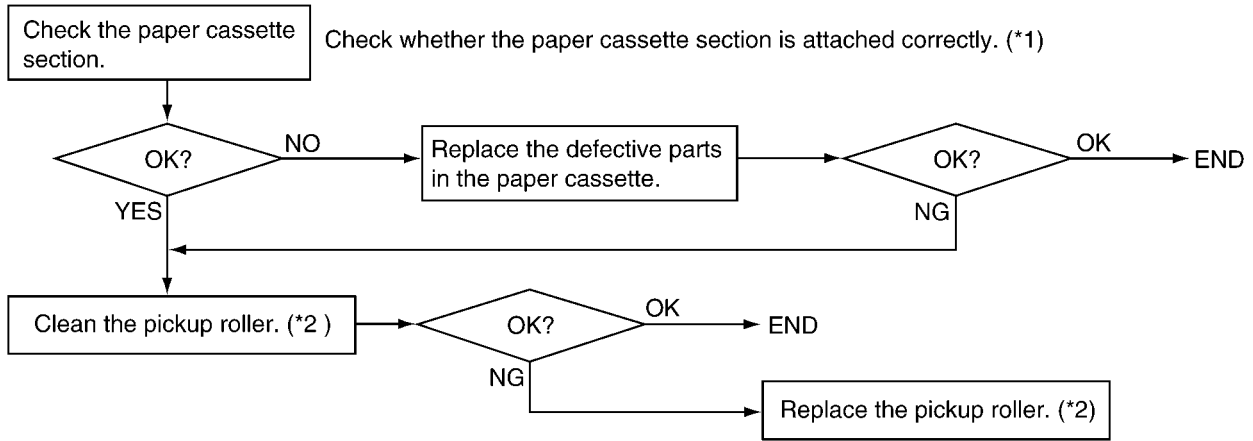
12.5.4.6. Paper Jam



REFERENCE:

- (*1): Jams (P.214)
- (*2): Maintenance Check Items/Component Locations (P.205)
- (*3): Disassembly and Assembly Instructions(P.170)
- (*4): Test Mode (P.77)
- (*5): Sensors and Switches (P.29)
- (*6): How to Remove the Pickup Roller and Antenna (P.187)

12.5.4.7. Recording Paper Multiple Feed and Skew

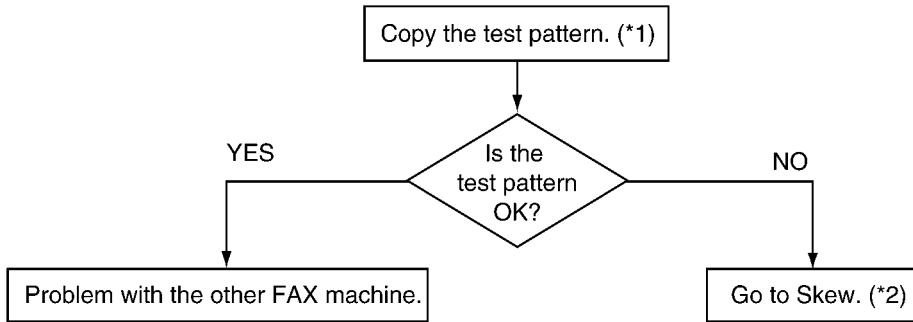


REFERENCE:

(*1): **How to Remove the Platen Roller and Lock Lever** (P.185)

(*2): **How to Remove the Pickup Roller and Antenna** (P.187)

12.5.4.8. The Sent Fax Data is Skewed

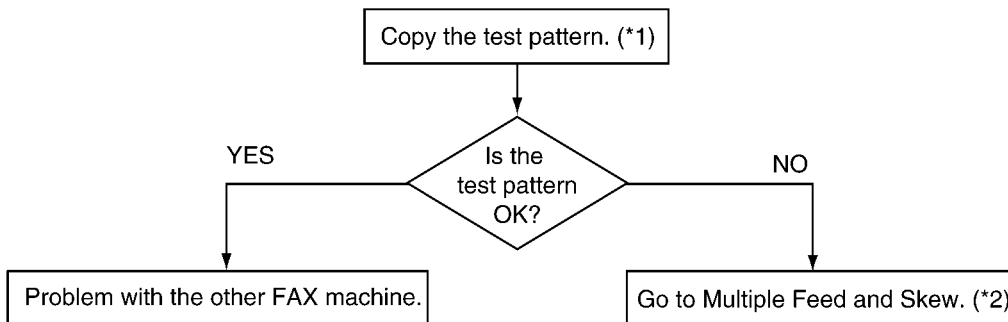


REFERENCE:

(*1): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.

(*2): **Document Skew** (P.131)

12.5.4.9. The Received Fax Data is Skewed

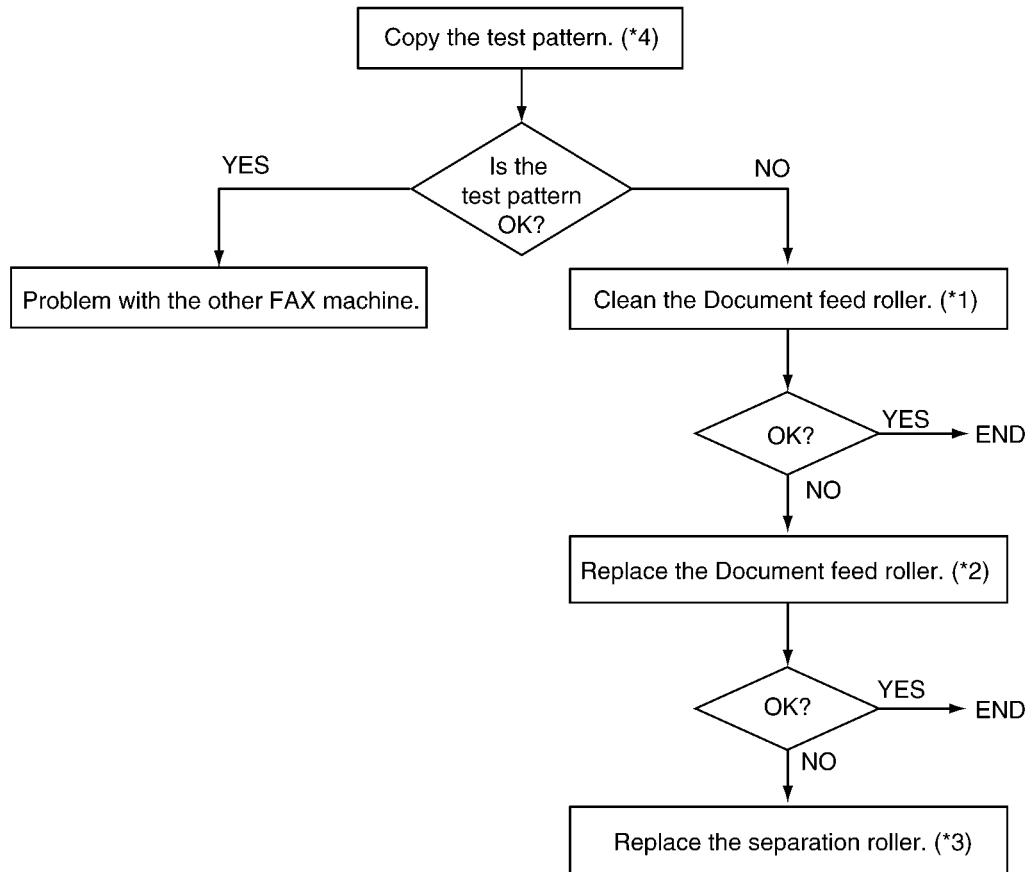


REFERENCE:

(*1): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.

(*2): **Recording Paper Multiple Feed and Skew** (P.134)

12.5.4.10. Received or Copied Data is Expanded



REFERENCE:

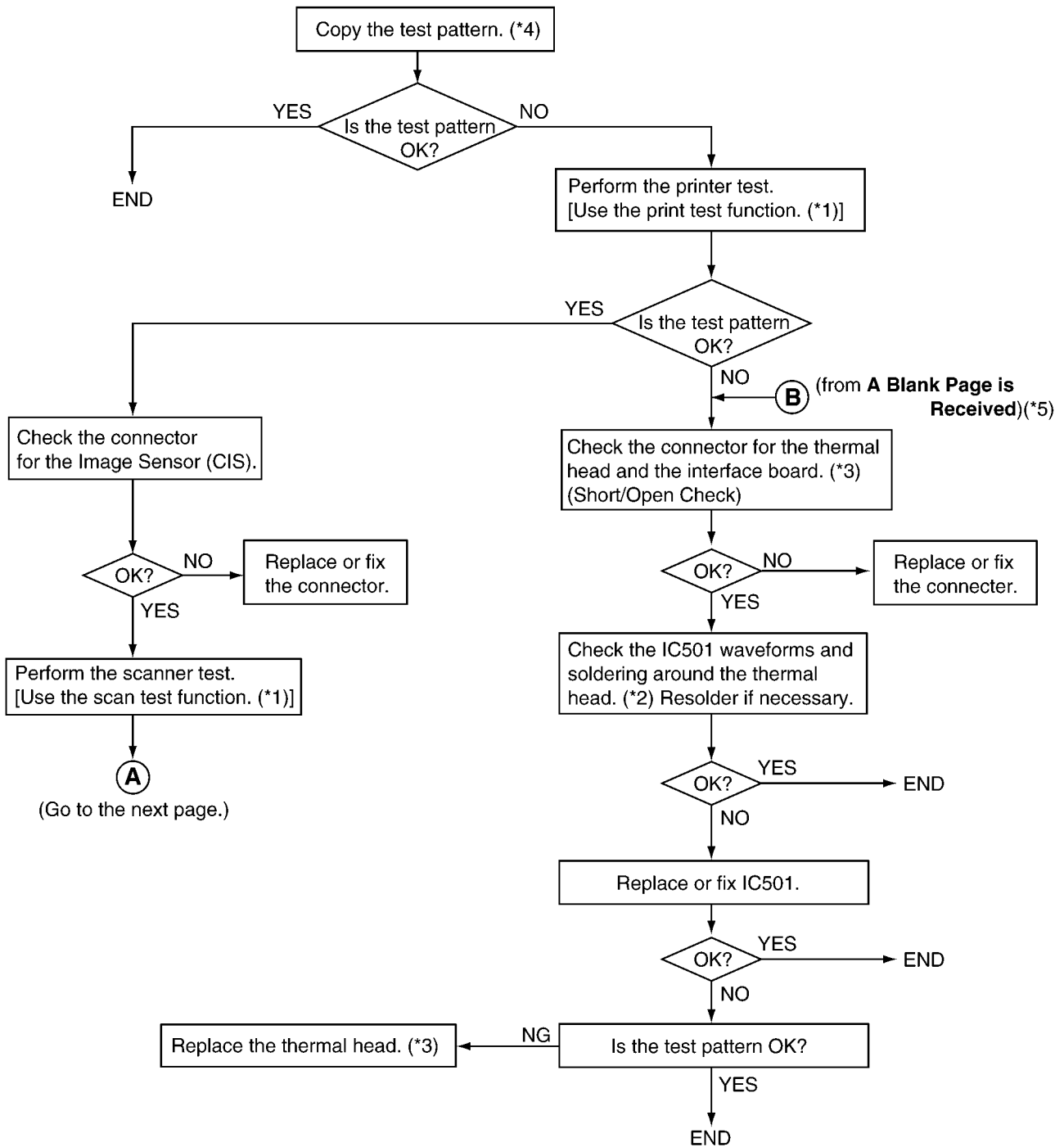
(*1): Document feeder/recording paper feeder/scanner glass cleaning (P.215)

(*2): Disassembly and Assembly Instructions (P.170)

(*3): How to Remove the Separation Holder and Exit Roller (P.190)

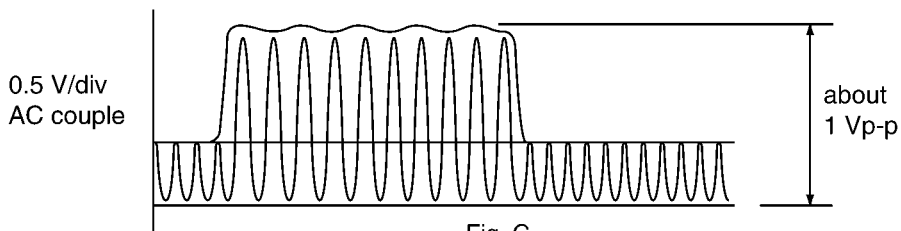
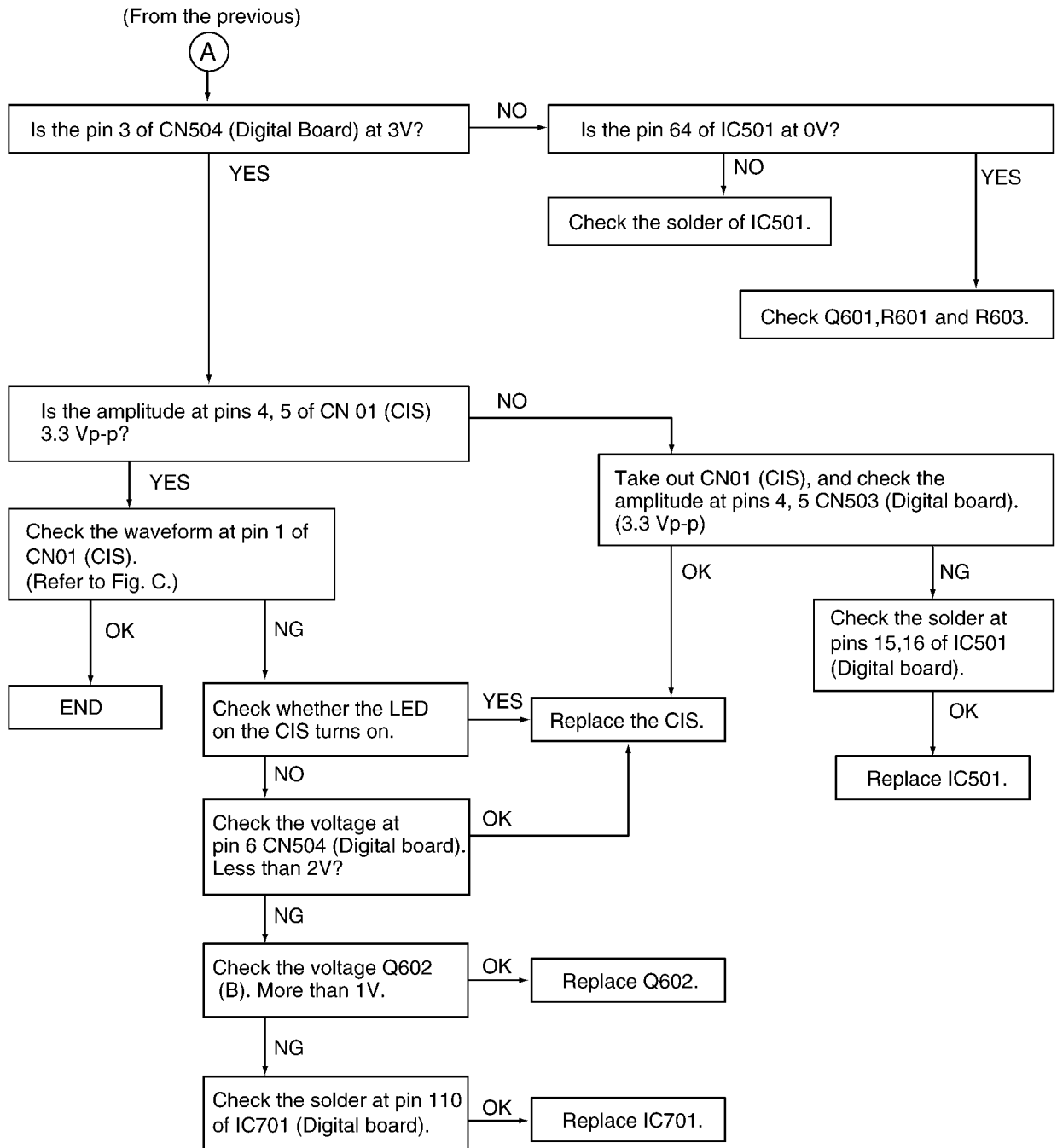
(*4): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.

12.5.4.11. A Blank Page is Copied

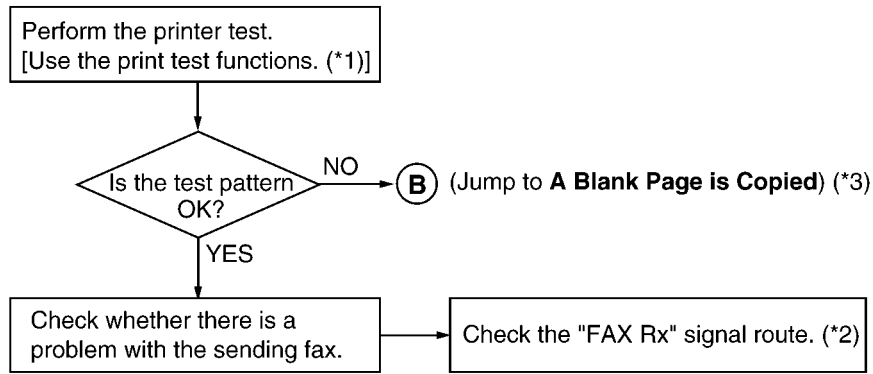


REFERENCE:

- (*1): **Test Mode** (P.77)
- (*2): **Thermal Head** (P.24)
- (*3): **How to Remove the Thermal Head** (P.175)
- (*4): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.
- (*5): **A Blank Page is Received** (P.138)



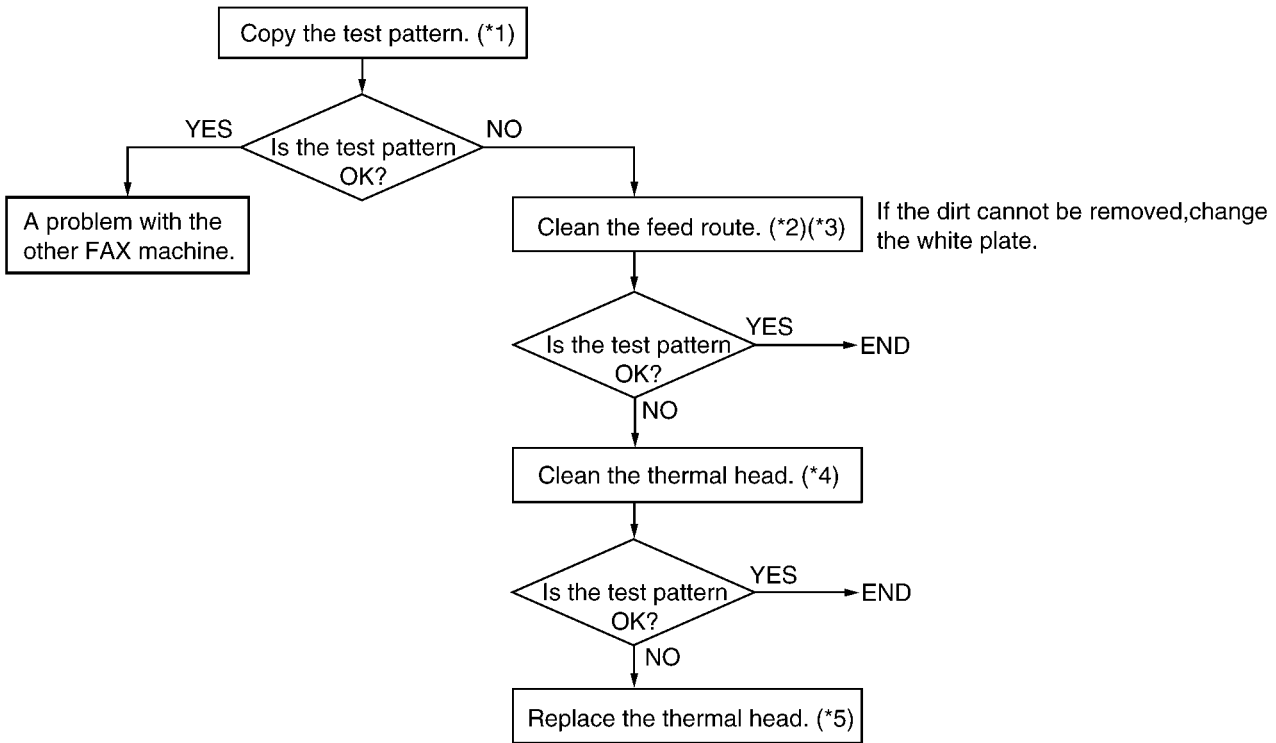
12.5.4.12. A Blank Page is Received



REFERENCE:

- (*1): **Test Mode** (P.77)
- (*2): **Check Sheet for Signal Route** (P.148)
- (*3): **A Blank Page is Copied** (P.136)

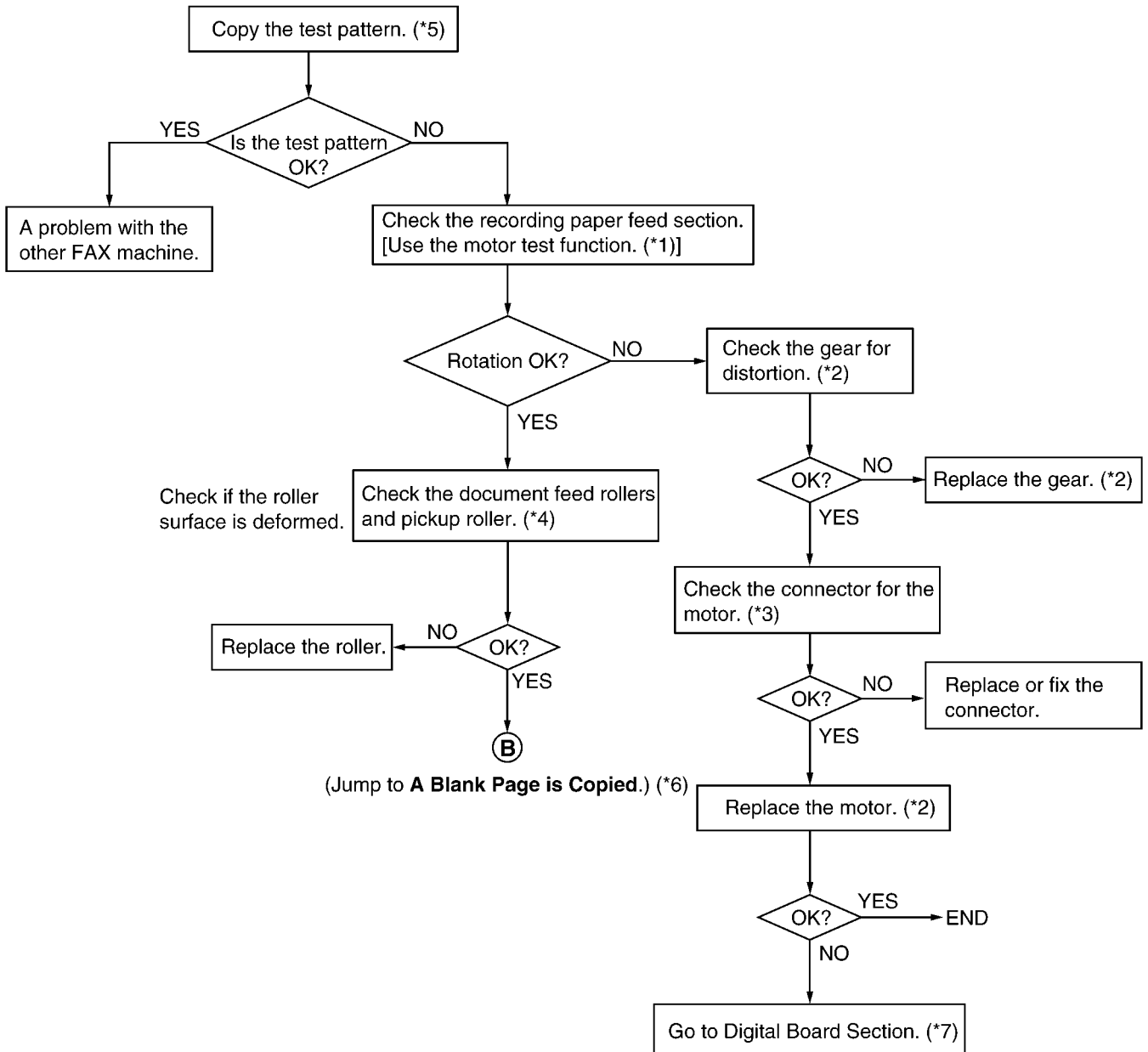
12.5.4.13. Black or White Vertical Line



REFERENCE:

- (*1): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.
- (*2): **Maintenance Check Items/Component Locations** (P.205)
- (*3): **Document feeder/recording paper feeder/scanner glass cleaning** (P.215)
- (*4): **Thermal Head Cleaning** (P.217)
- (*5): **How to Remove the Thermal Head** (P.175)

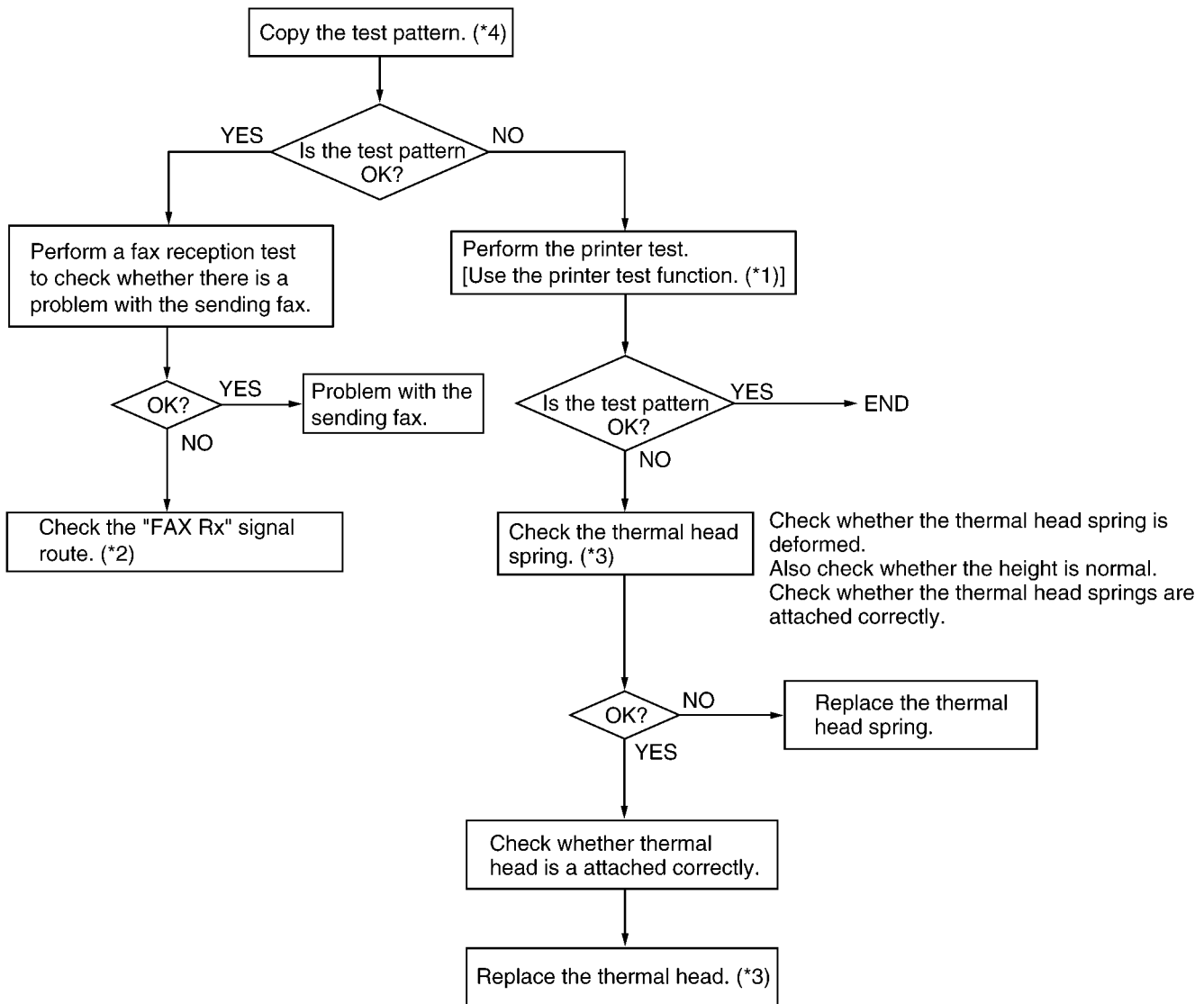
12.5.4.14. Black or White Lateral Line on Print Out



REFERENCE:

- (*1): **Test Mode** (P.77)
- (*2): **How to Remove the Gears, Motors and Arms of the Gear Block** (P.181)
- (*3): **Installation Position of the Lead Wires** (P.191)
- (*4): **Disassembly and Assembly Instructions** (P.170)
- (*5): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it..
- (*6): **A Blank Page is Copied** (P.136)
- (*7): **Digital Board Section** (P.141)

12.5.4.15. An Abnormal Image is Printed



REFERENCE:

(*1): **Test Mode** (P.77)

(*2): **Check Sheet for Signal Route** (P.148)

(*3): **How to Remove the Thermal Head** (P.175)

(*4): We recommend making a copy of the test chart in **Test Chart** (P.225) and using it.

12.5.5. Digital Board Section

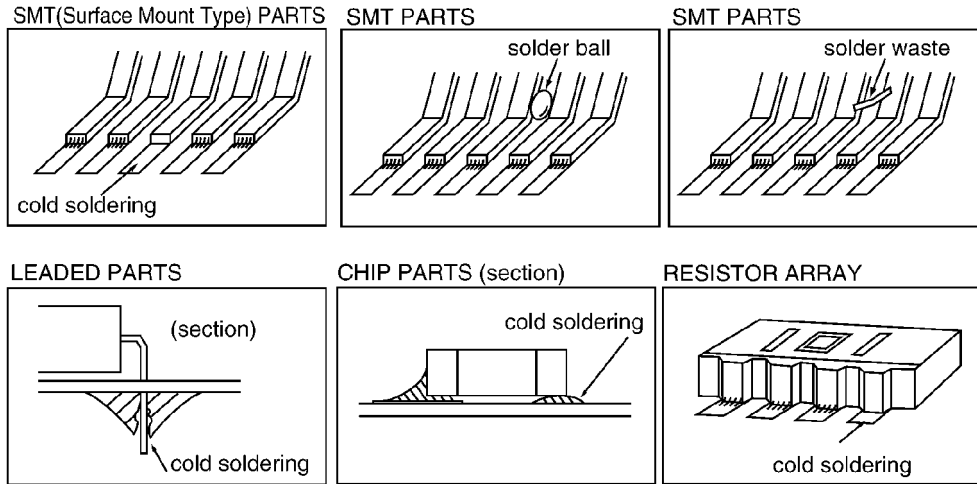
When the unit fails to boot up the system, take the troubleshooting procedures very carefully. It may have a serious problem.

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).



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.142).

The ASIC (IC501) controls all the other digital ICs. When the power is turned on, the ASIC retrieves the operation code stored in the FLASH ROM (IC502), 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

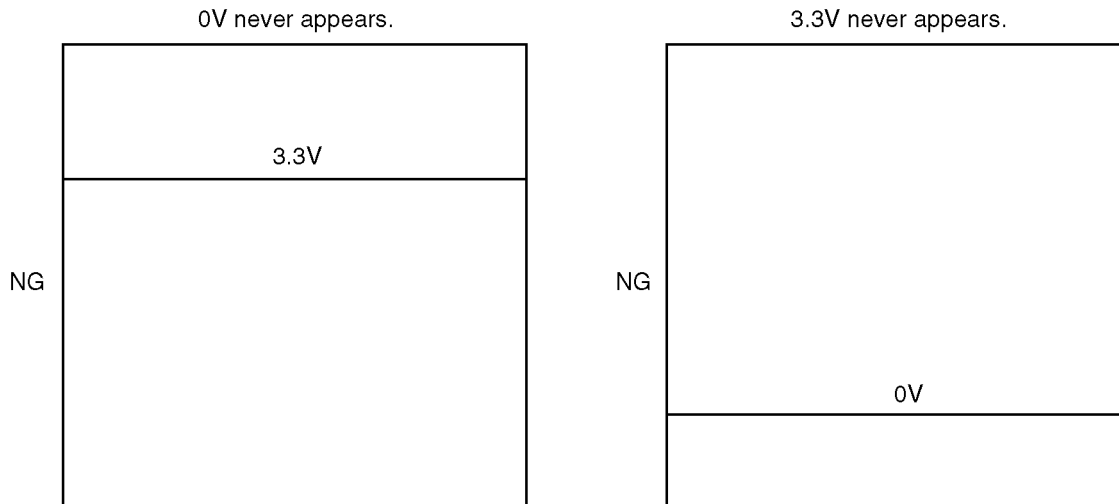
You also need to check the signal lines listed here [List 1] when the unit fails to boot up the system. Those signal lines should remain normal. Other signal lines are not directly related to that failure even if they have faults or troubles.

[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	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.

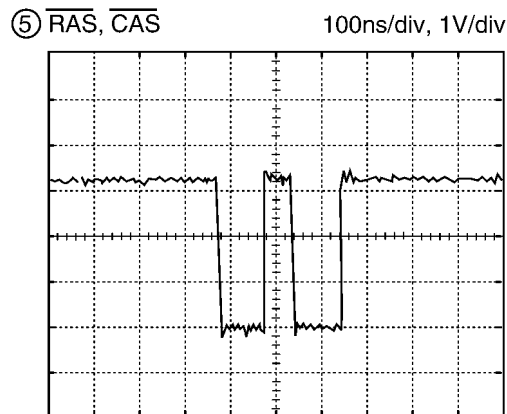
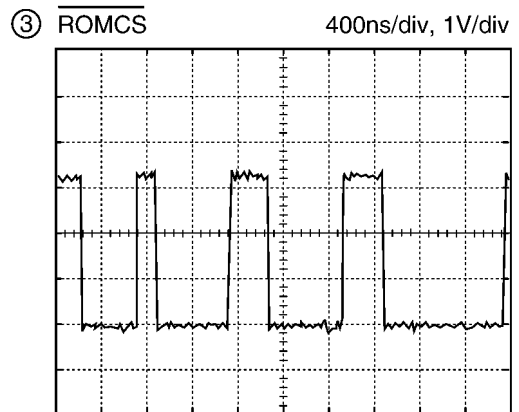
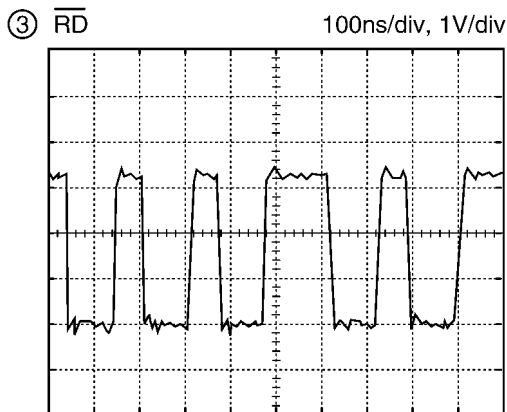
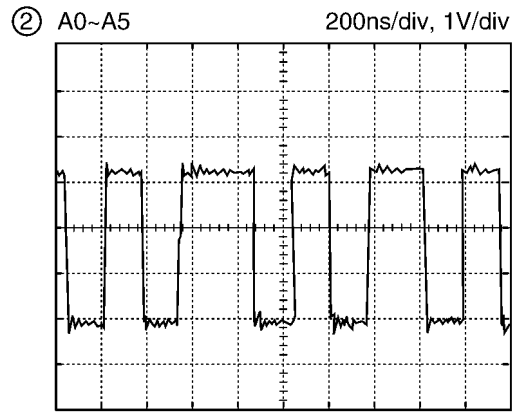
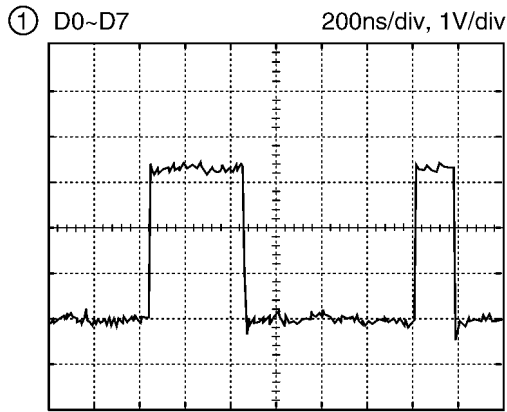
NG Wave pattern



Note:

Refer to **NG Example** (P.147).

Normal Wave Patterns

**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.)

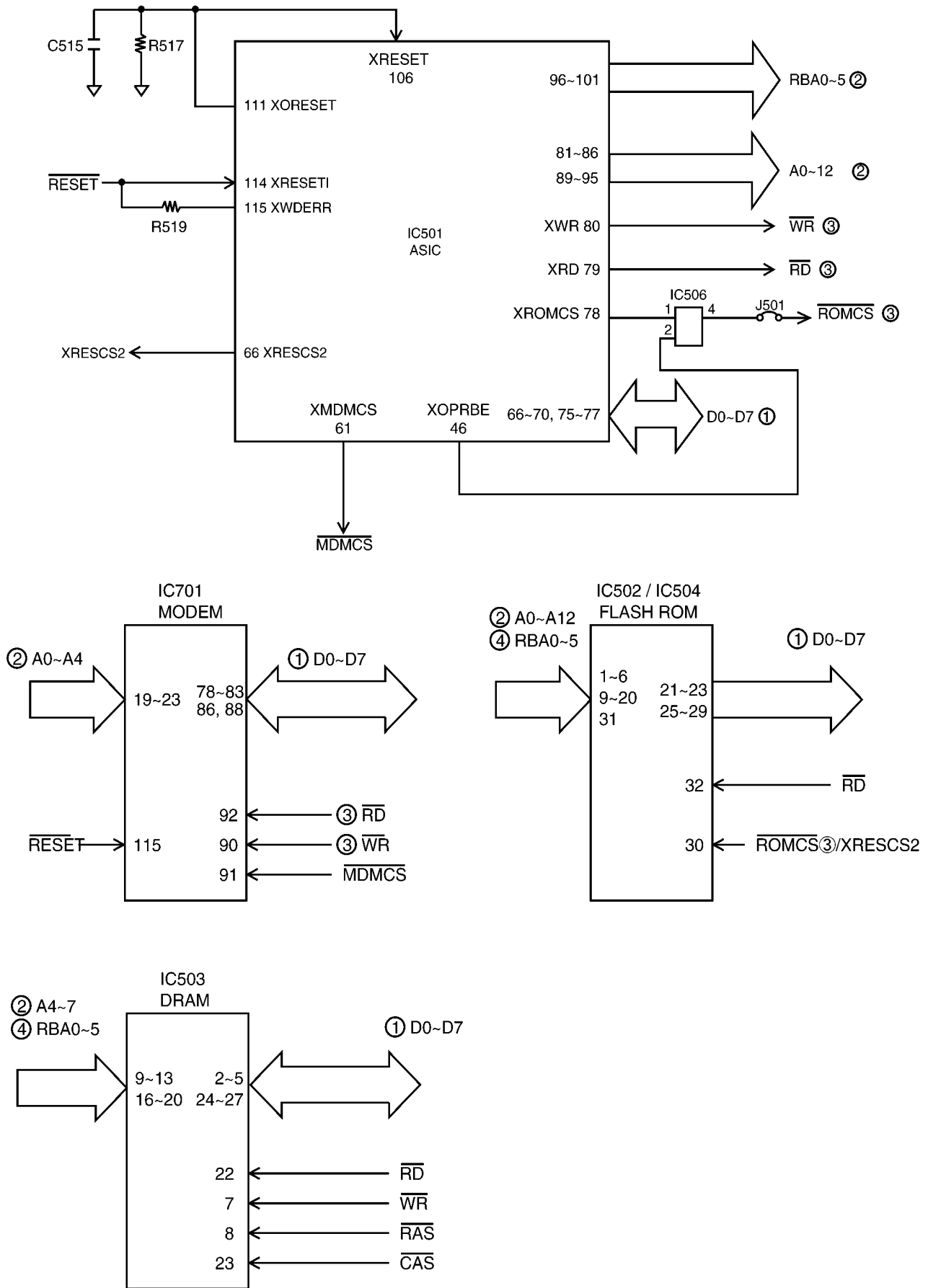
The digital circuit actually operates according to the timing combinations of these signals. If the timing of these signals is even slightly delayed, the circuit will not work. Nor will it if the IC is defective and the output voltage level is not normal although the timing of these signals is accurate 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.

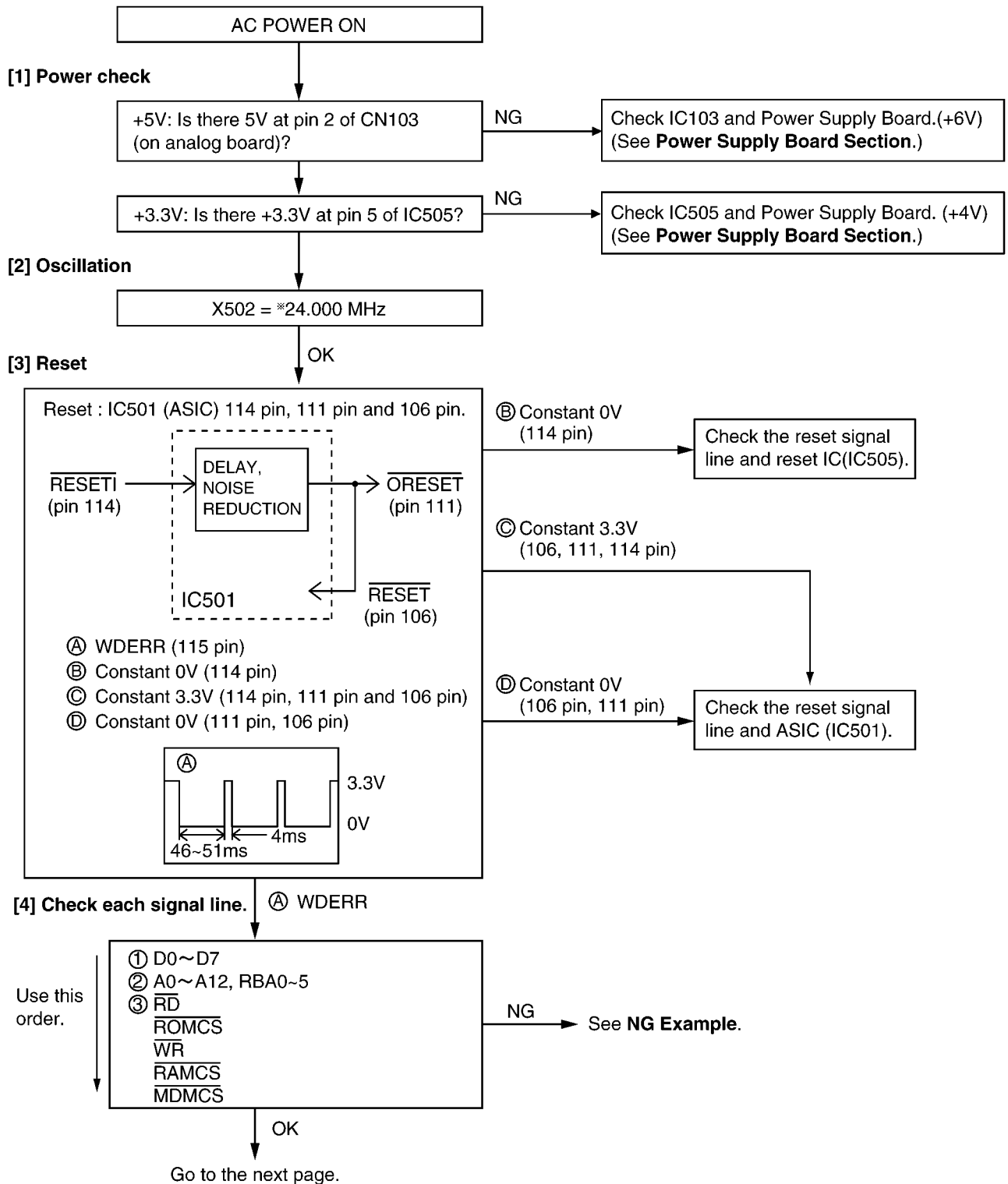
Note:

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

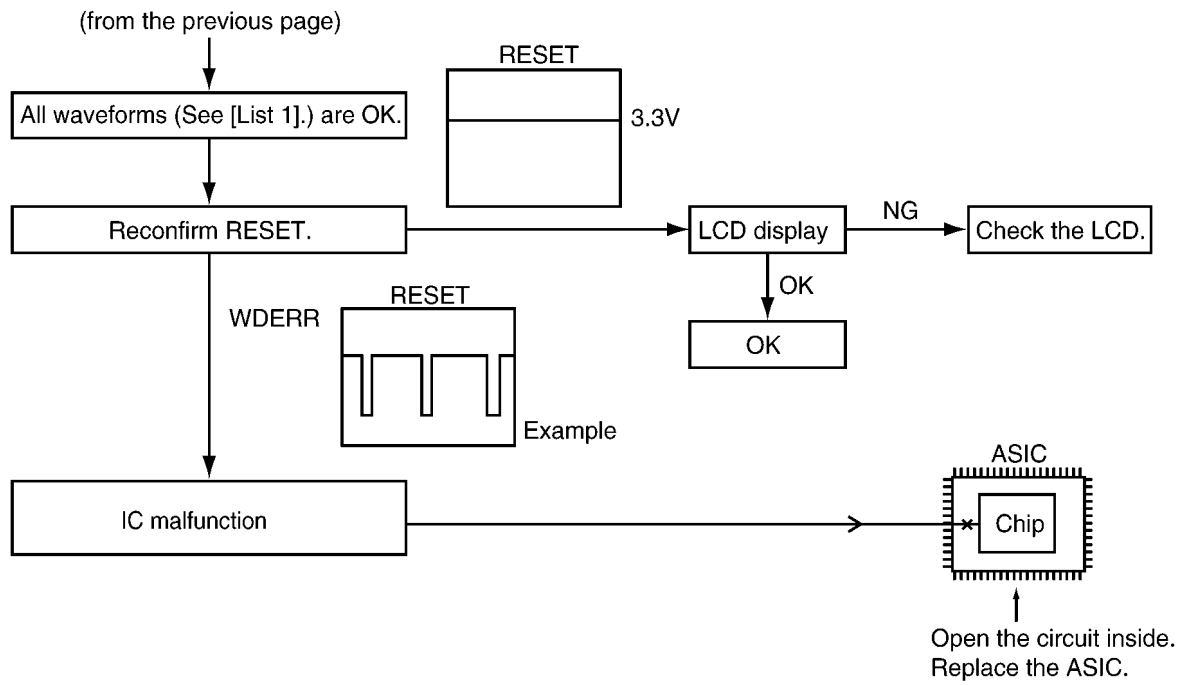
I/O and Pin No. Diagram



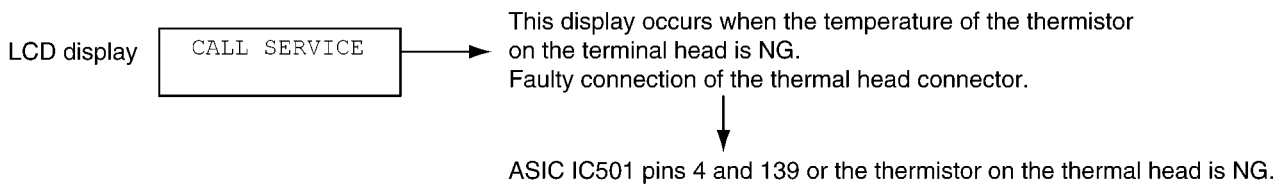
After the power is turned on, the ASIC initializes and checks each IC.
 The ROM, DRAM, and modem are checked.
 If initialization fails for the ICs, the system will not boot up.
 In this case, please find the cause as follows.



REFERENCE:
NG Example (P.147)
Power Supply Board Section (P.153)

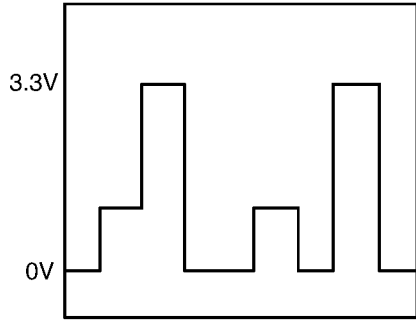


Other NG example while the power is ON and the LCD displays the following.

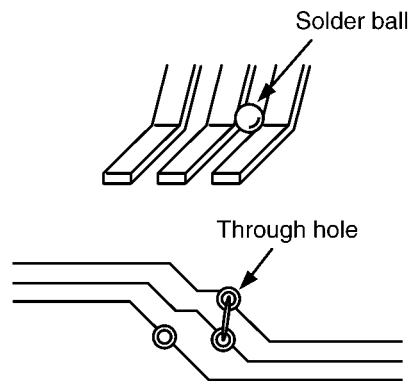


12.5.5.2. NG Example

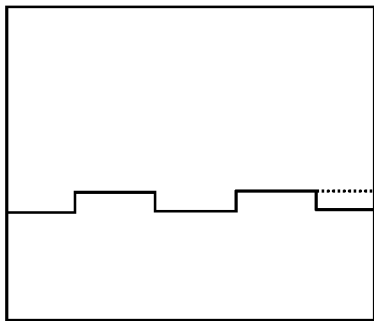
1.



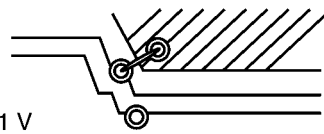
Short circuit from the adjacent signal wires.
Check for a short circuit in the IC leads and the signal wire at the through hole.



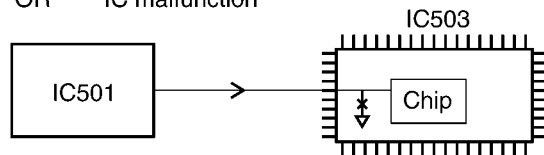
2.



Short between the signal line and GND.



OR IC malfunction



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 H/S, 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
SP-PHONE Tx	MIC → { L716/L715 → CN505(1,2) → (C784 - R785)/(C785 - R786) → IC706(2,3 - 1) → R748 → C756 → IC701(36 - 69) → IC702(8 - 9) → C730 → R732 → IC704(6 → 7) → CN507(7) } → CN103(7) → L113 → C117 → R110 → R191 → T101 → TEL LINE
SP-PHONE Rx	TEL LINE → T101 → C118 → R125 → IC101(6 - 7) → L112 → CN103(8) → { CN507(8) → C740 → IC703(4 - 3) → C769 → R771 → IC701(60 - 43) → C709 → R711 → Q702(B - C) → C701 → IC501(32 - 31) → C726 → R725 → IC704(2 - 1) → C734 → R729 → IC705(4 - 5,8) → CN507(4,5) } → CN103(4,5) → CN104(1,2) → SPEAKER
DTMF MONITOR SPEAKER	{IC701(43) → C709 → R711 → Q702(B - C) → C701 → IC501(32 - 31) → C726 → R725 → IC704(2 - 1) → C734 → R729 → IC705(4 - 5,8) → CN507(4,5)} → CN103(4,5) → CN104(1,2) → SPEAKER
FAX Tx DTMF for TEL Line Greeting for TEL LINE Message for TEL LINE	{IC701(69) → IC702(8 - 9) → C730 → R732 → IC704(6 - 7) → CN507(7)} → CN103(7) → L113 → C117 → R110 → R191 → T101 → TEL LINE
FAX Rx CNG / DTMF / VOX detection, ICM REC., Call waiting (OFF-HOOK)	TEL LINE → T101 → C118 → R125 → IC101(6 - 7) → L112 → CN103(8) → {CN507(8) → C740 → IC703(4 - 3) → C769 → R771 → IC701(60)}
DTMF detection (ON-HOOK)	TEL LINE → C101 → R104- T101 → C118 → R125 → IC101(6 - 7) → C120 → R120 → IC101(2 - 1) → L111 → CN103(11) → {CN507(11) → C767 → R769 → IC701(62)}
Greeting / Memo Record	MIC → {L716/L715 → CN505(1,2) → (C784 - R785)/(C785 - R786) → IC706(2,3 - 1) → R748 → C756 → IC701(36)}
Caller ID	TEL LINE → C101 → R104 → T101 → C118 → R125 → IC101(6 - 7) → C120 → R120 → IC101(2 - 1) → L111 → CN103(11) → {CN507(11) → R877 → C873 → R862 → IC801(40)}
Beep for TEL LINE DTMF for TEL LINE	{IC501(28) → R708 → IC702(11 - 10) → C729 → R731 → IC704(6 - 7) → CN507(7)} → CN103(7) → L113 → C117 → R110 → R191 → T101 → TEL LINE
Ringing / Beep / Alarm/Key Tones Speaker	{IC501(29) → R701 → C712 → IC702(2 - 1) → R709 → Q702(B - C) → C701 → IC501(32 - 31) → C726 → R725 → IC704(2 - 1) → C734 → R729 → IC705(4 - 5,8) → CN507(4,5)} → CN103(4,5) → CN104(1,2) → SPEAKER

Note:

- { } : Inside the Digital board
- [] : Inside the Handset board
- Nothing: Inside the Analog board

(SYMPTOM) ITEMS TO CHECK	IN	signal	ROUTE	OUT
Portable Handset Tx			<p>【HANDSET MIC → (C314 - R314)/(C315 - R315) → IC201(91/90 - 20) → <HANDSET_RF_TX_ROUTE> → ANT. ---】 → {---ANT. → <BASE UNIT_RF_RX_ROUTE> → IC801(66 - 34) → R865 → C876 → C760 → R760 - R753 → C743 → R737 → IC704(6 - 7) → CN507(7)} → CN103(7) → L113 → C117 → R110 → R191 → T101 → TEL LINE</p>	
Portable Handset Rx			<p>TEL LINE → T101 → C118 → R125 → IC101(6 - 7) → L112 - CN103(8) → {CN507(8) → R716 → IC702(3 - 4) → C715 → R712 → Q702(B - C) → C701 → IC501(32 - 31) → C726 → R725 → IC704(2 - 1) → R728 → C751 → IC703(8 - 9) → C874 → R864 → IC801(36 - 57) → <BASEUNIT_RF_TX_ROUTE> → ANT.--- } → 【---ANT. → <HANDSET_RF_RX_ROUTE> → IC201(36 - 97/98) → R323 /{C335 → L334 → HEADSET_ JACK(5 - 4) → R324} → HANDSET SPEAKER】</p>	
Intercom Handset → Base Unit			<p>【HANDSET MIC → (C314 - R314)/(C315 - R315) → IC201(91/90 - 20) → <HANDSET_RF_TX_ROUTE> → ANT. ---】 → {---ANT. → <BASE UNIT_RF_RX_ROUTE> → IC801(66 - 34) → R865 → C876 → R763 → C744 → IC703(1 - 2) → C769 → R771 → IC701(60 - 43) → C709 → R711 → Q702(B - C) → C701 → IC501(32 - 31) → C726 → R725 → IC704(2 - 1) → C734 → R729 → IC705(4 - 5,8) → CN507(4,5)} → CN103(4,5) → CN104(1,2) → SPEAKER</p>	
Intercom Base Unit → Handset			<p>MIC → {CN505(1,2) → (C784 - R785)/(C785 - R786) → IC706(2,3 - 1) → R748 → C756 → IC701(36 - 69) → R759 → C755 → IC703(11 - 10) → C874 → R864 → IC801(36 - 57) → <BASEUNIT_RF_TX_ROUTE> → ANT.--- } → 【---ANT. → <HANDSET_RF_RX_ROUTE> → IC201(36 - 97/98) → R323 /{C335 - L334 → HEADSET_ JACK(5 - 4) → R324} → HANDSET SPEAKER】</p>	

■ RF Part Signal Route

(SYMPTOM) ITEMS TO CHECK	IN	signal	ROUTE	OUT
HANDSET_RF _TX_ROUTE			<p>【R919 → RA901 → IC901(27 - 1) → C938 → D904 → C911 → FL901 → L909】</p>	
HANDSET_RF _RX_ROUTE			<p>【L909 → FL901 → C911 → L903 → C918 → L911 → IC901(4 → 16)】</p>	
BASE UNIT_RF _TX_ROUTE			<p>{R919 → RA901 → IC901(27 - 1) → C938 → D904 → C911 → FL901 → L909}</p>	
BASE UNIT_RF _RX_ROUTE			<p>{L909 → FL901 → C911 → L903 → C918 → L911 → IC901(4 → 16)}</p>	

Note:

{ } : Inside the Digital board

【 】 : Inside the Handset board

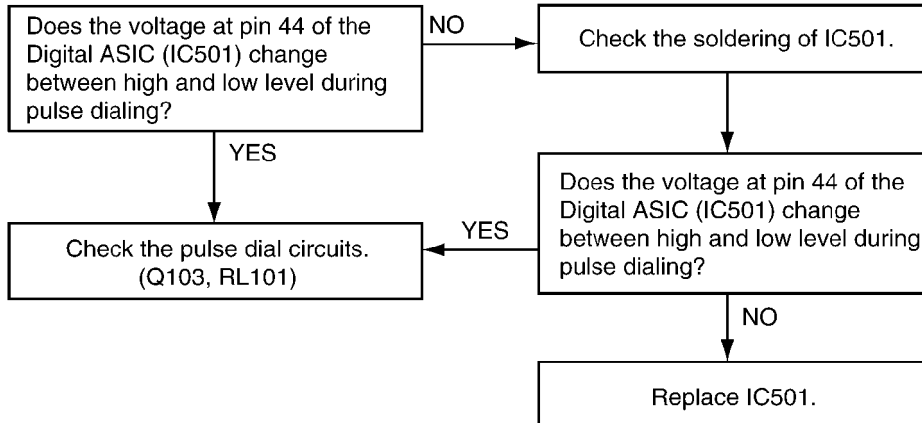
Nothing: Inside the Analog board

12.5.6.2. Defective ITS (Integrated Telephone System) Section

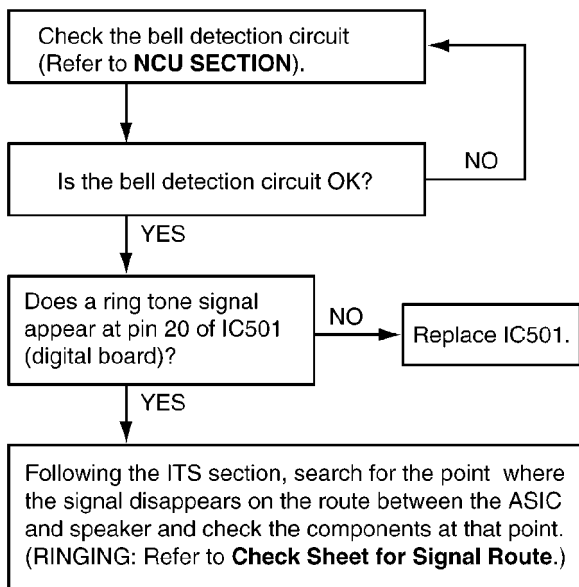
1. No handset transmission / reception and no monitor reception

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.148) is useful for this investigation.

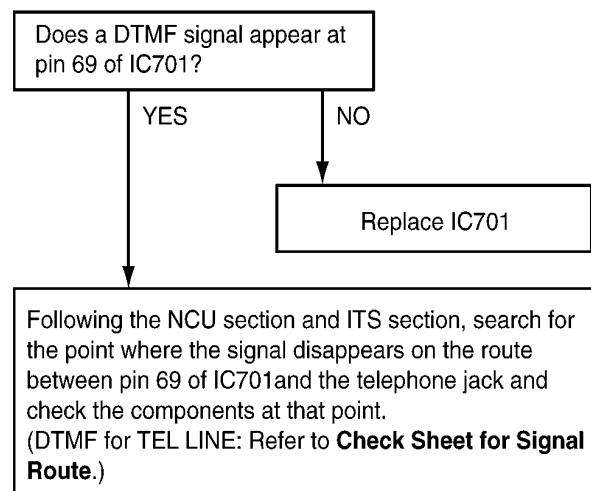
2. No pulse dialing



3. No ring tone (or No bell)



4. No tone dialing



REFERENCE:
Check Sheet for Signal Route (P.148)

REFERENCE:
Check Sheet for Signal Route (P.148)
NCU Section (P.42)

12.5.7. Digital Speakerphone

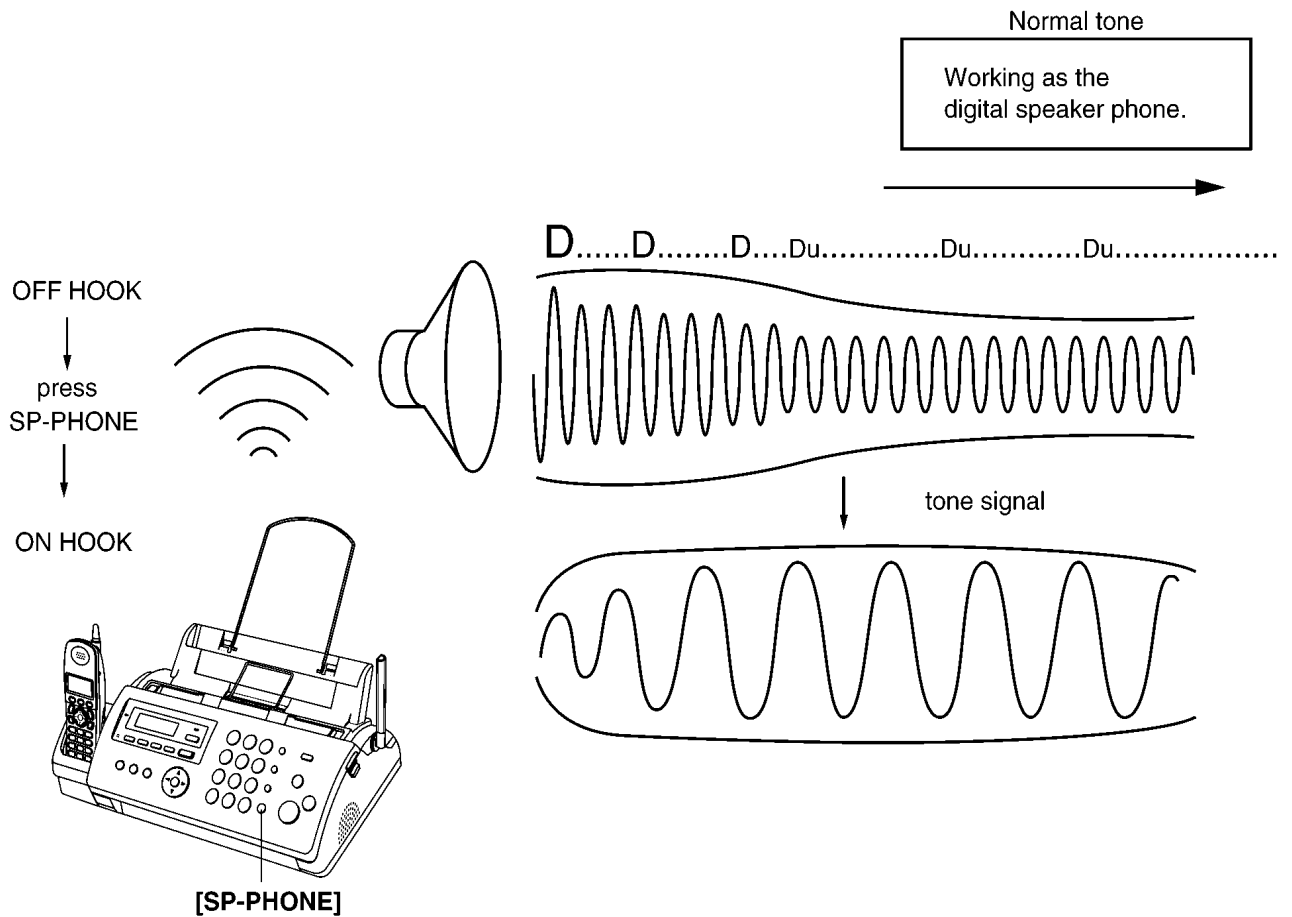
The digital speakerphone has different features from the analog speakerphone.

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.

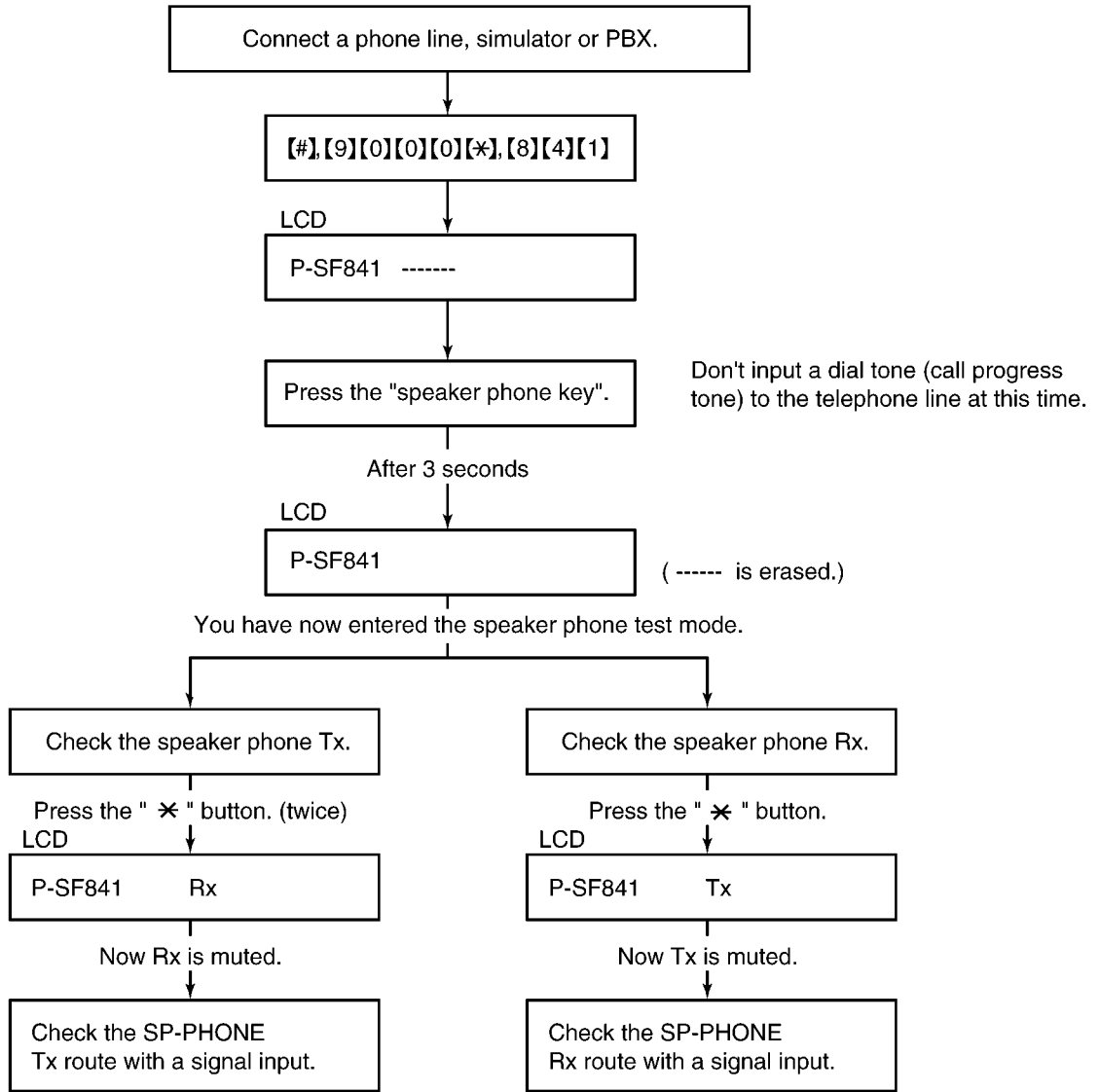


You cannot check the digital speaker phone by the signal route test mentioned in the Analog Board Section because the level is always changing as stated above.

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])



Note: Check to the SP-Phone Rx/Tx signal routes. (Refer to **Check Sheet for Signal Route** (P.148)).

12.5.8. Power Supply Board Section

12.5.8.1. Key Components for Troubleshooting

Check the following parts first: F101, D101-D104, C106, Q101 and IC101.

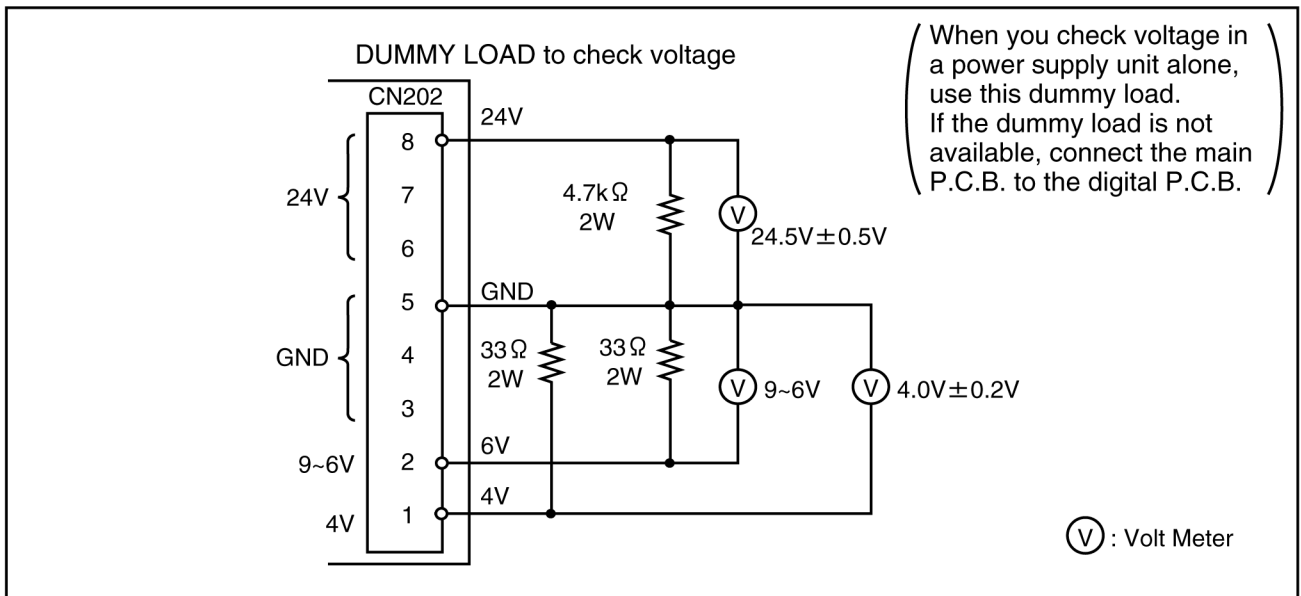
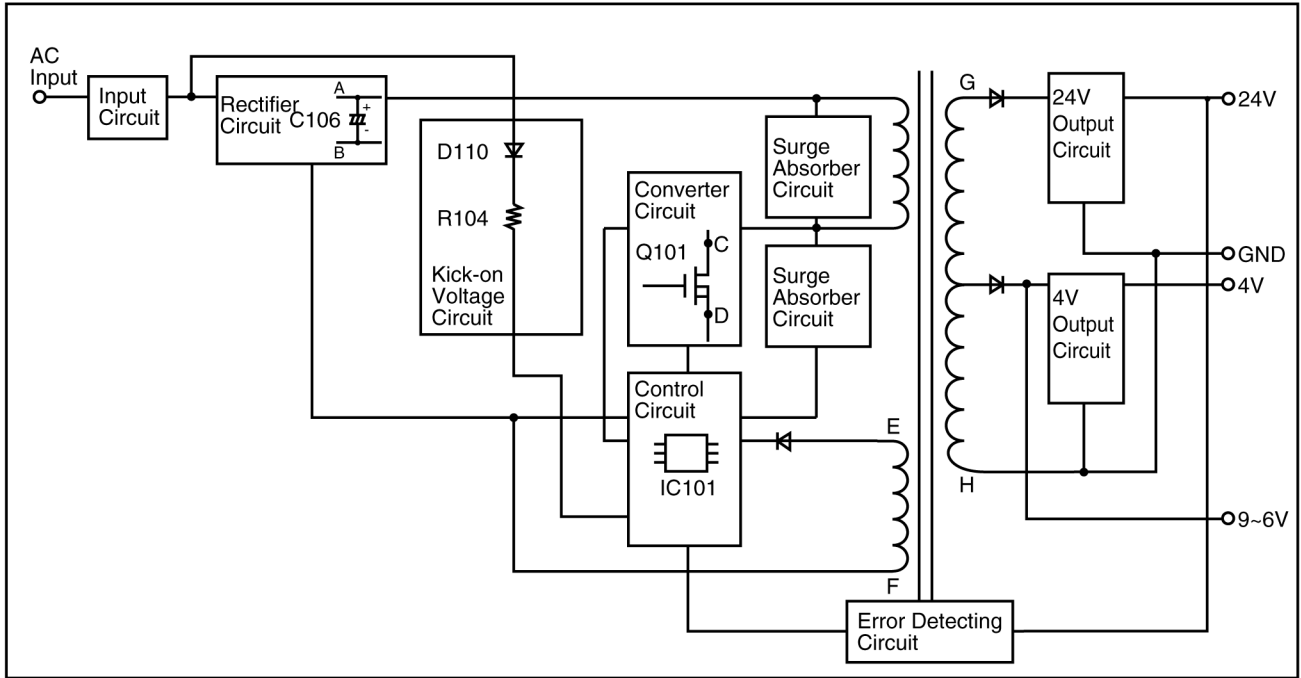
This comes from our experience with experimental tests. For example: power supply and lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.

Caution:

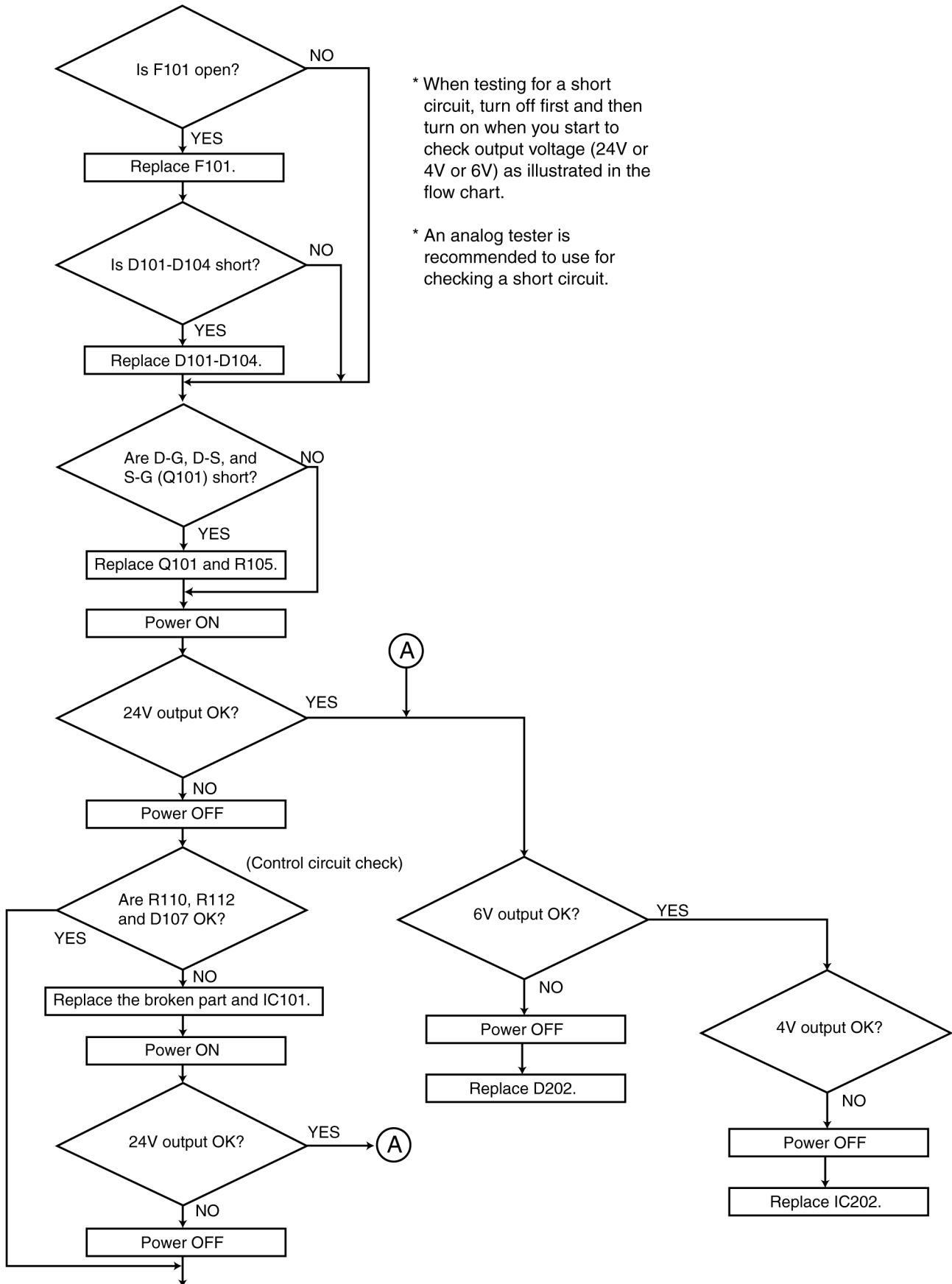
If you find a melted fuse in the unit, do not turn on the power until you locate and repair the faulty parts (except for the fuse); otherwise the fuse will melt again and you cannot pinpoint the faulty point.

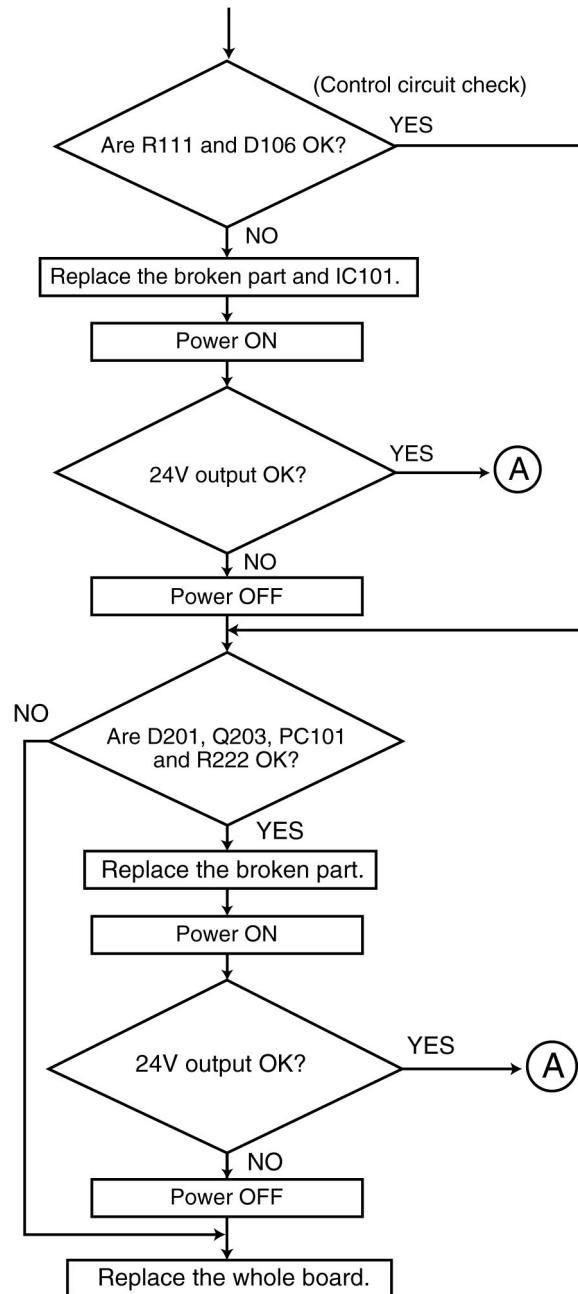
In most cases, the symptom is that nothing is output. It is more likely that the fault is in the primary side rather than the secondary side. Check the primary side first.

POWER SUPPLY BLOCK DIAGRAM



12.5.8.2. Troubleshooting Flow Chart





12.5.8.3. Broken Parts Repair Details

(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.

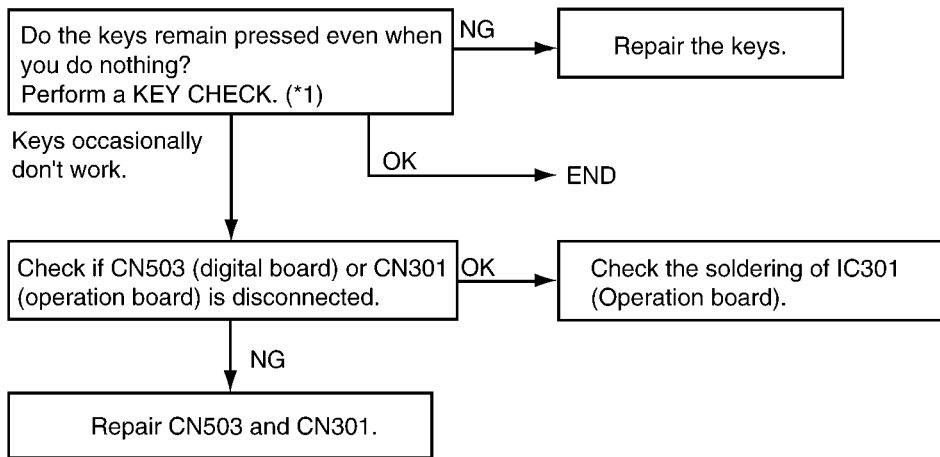
F101, Q101, R110, R112, D107, IC101

(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

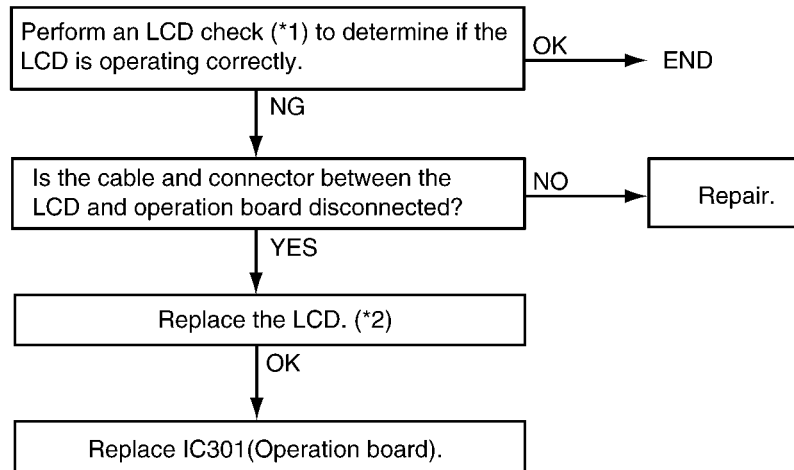
12.5.9.1. No Key Operation



REFERENCE:

(*1): Test Mode (P.77)

12.5.9.2. No LCD Indication



REFERENCE:

(*1): Test Mode (P.77)

(*2): How to Remove the Operation Board, MIC Board and LCD (P.189)

12.5.10. Sensor Section

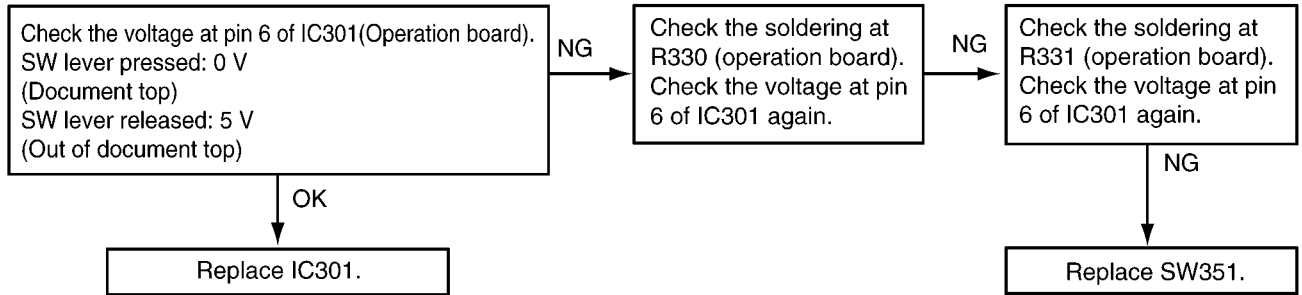
Refer to **Sensors and Switches** (P.29) for the circuit descriptions.

The Test Function makes the sensor circuit check easier. (Refer to **Test Mode** (P.77).)

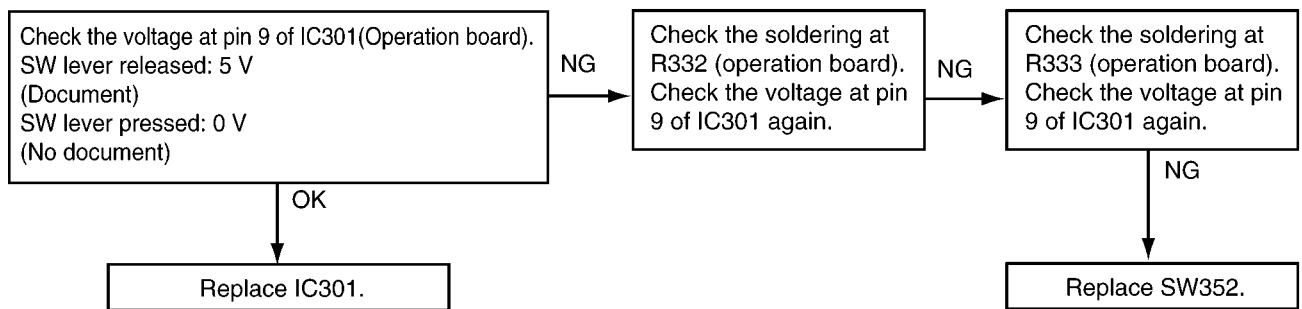
For example, as for "FILM END/COVER OPEN SENSOR", "CO" is turned ON/OFF on the display when you open or close the cover. Also, document sensor, read position sensor, recording paper sensor are turned ON/OFF by the copy operation. Therefore, each sensor can be checked for proper mechanical operation.

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

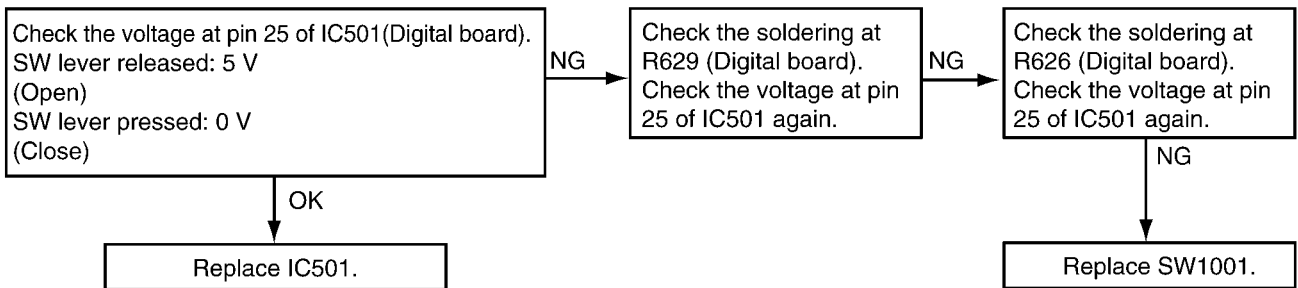
12.5.10.1. Check the Document Top Sensor (SW351)....."REMOVE DOCUMENT"



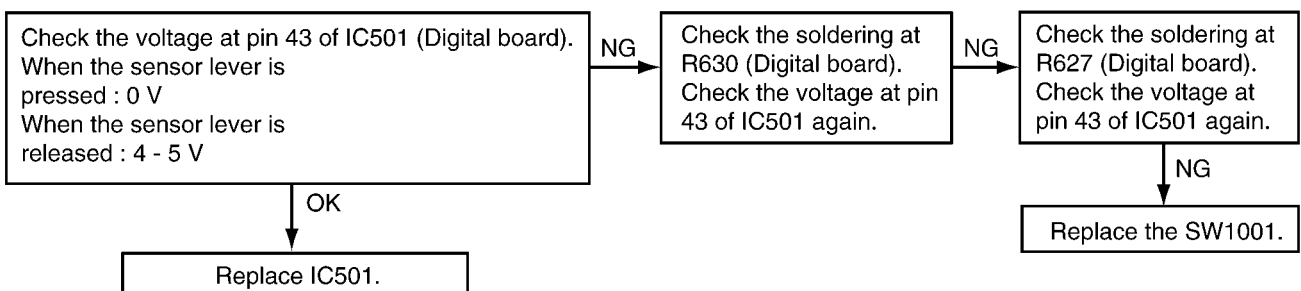
12.5.10.2. Check the Document Set Sensor (SW352)....."CHECK DOCUMENT"



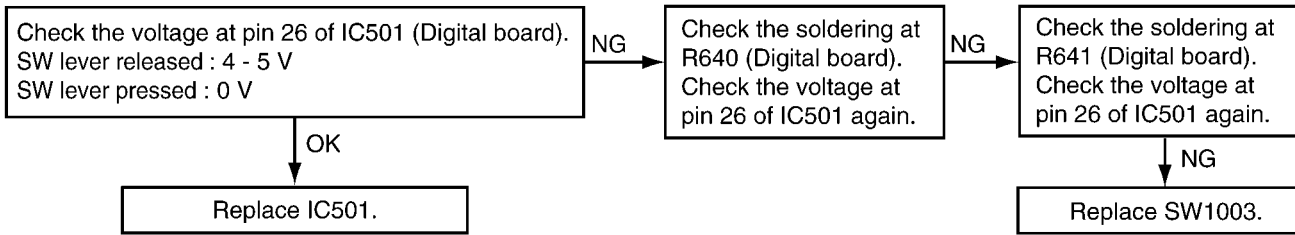
12.5.10.3. Check the Cover Open Sensor (SW1001)....."COVER OPEN"



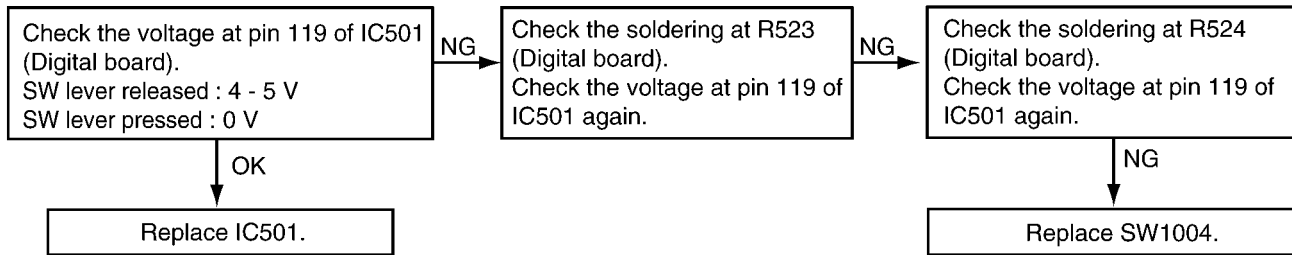
12.5.10.4. Check the Paper Top Sensor (SW1001)....."PAPER JAMMED"



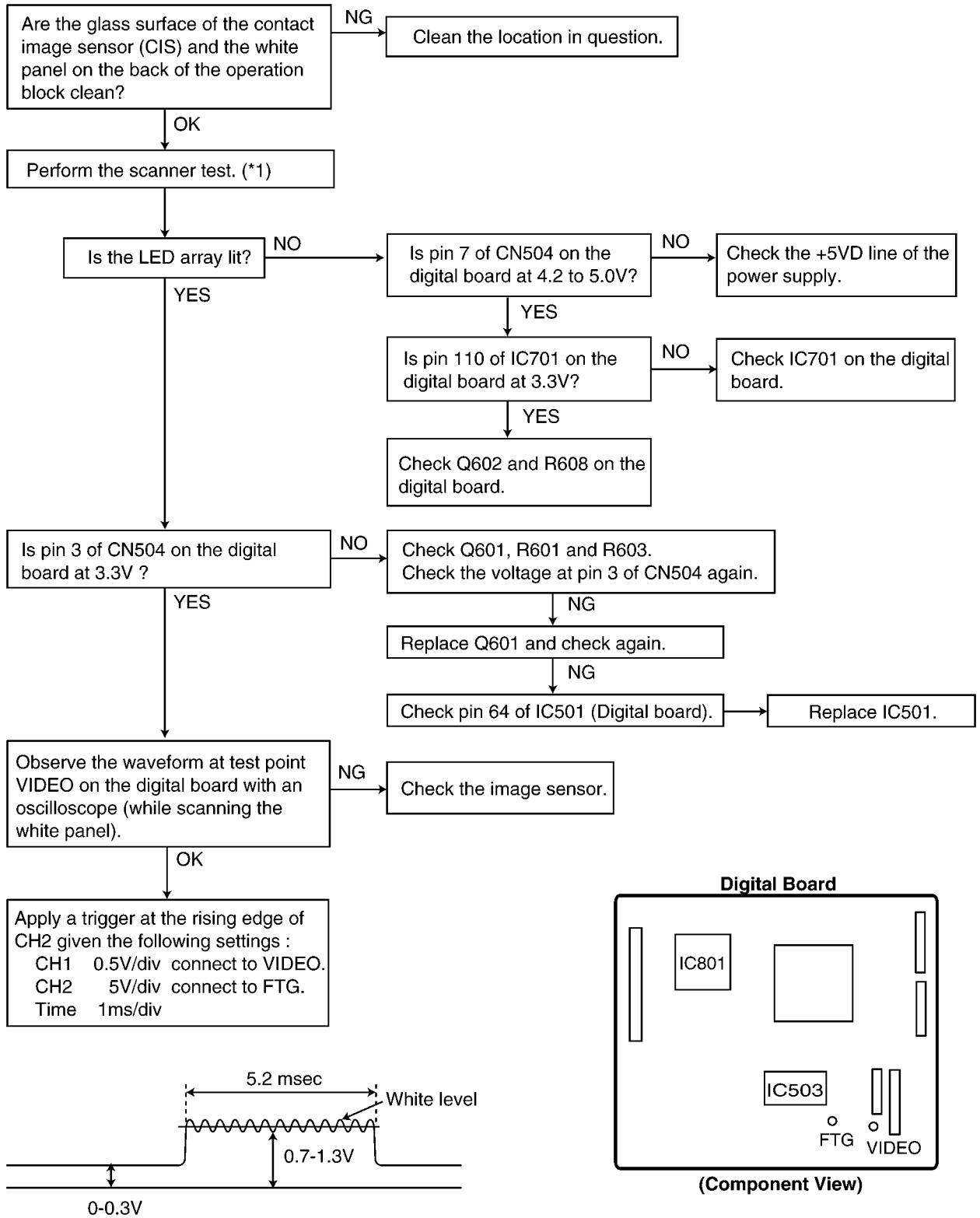
12.5.10.5. Check the Film End Sensor (SW1003)....."CHECK FILM"



12.5.10.6. Check the Motor Position Sensor (SW1004)....."CALL SERVICE2"



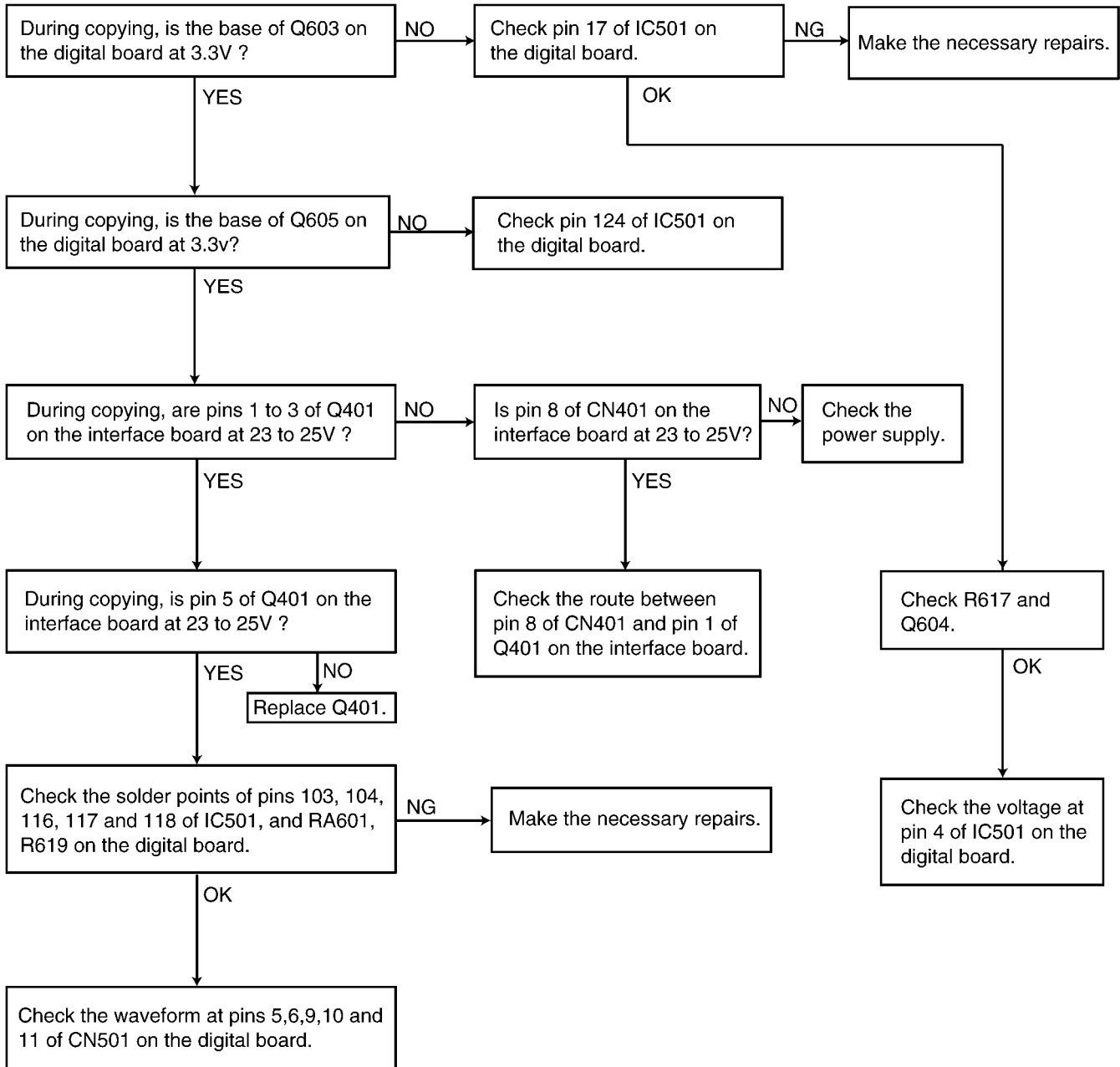
12.5.11. CIS (Contact Image Sensor) Section



Note:

- (*1): **Test Mode** (P.77)
- Refer to **Scanning Block**(P.26).

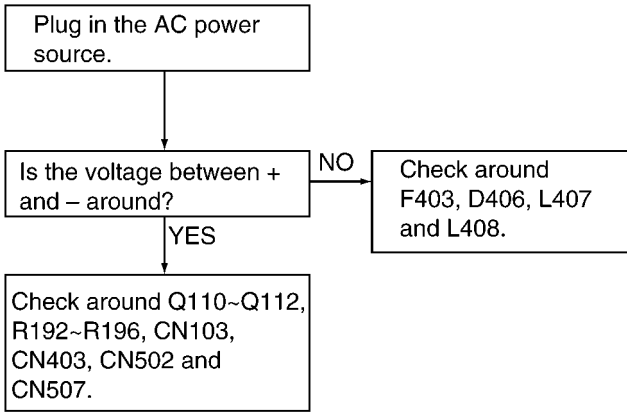
12.5.12. Thermal Head Section



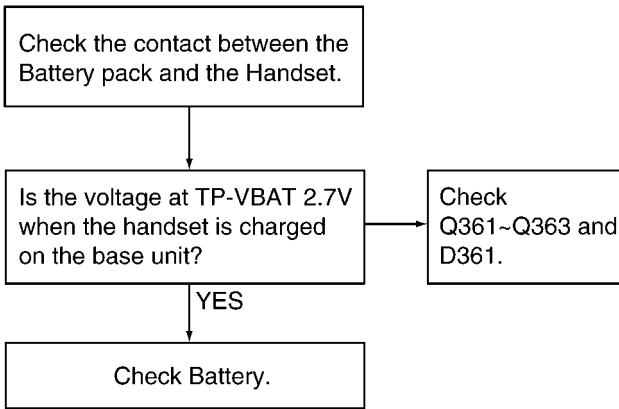
Note:
Refer to **Thermal Head** (P.24).

12.5.13. Cordless Section

12.5.13.1. Battery won't Charge (Digital, Interface, Analog Board)

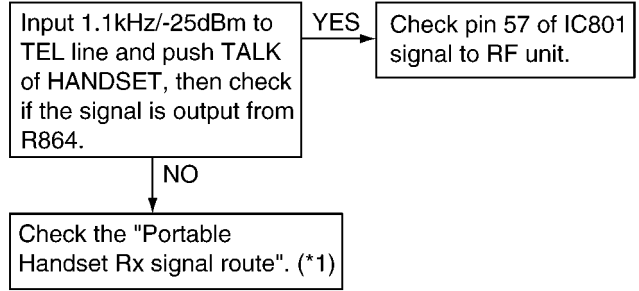


12.5.13.2. Battery won't Charge (Handset)

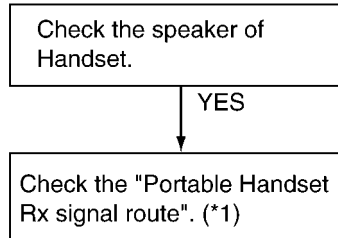


12.5.13.3. No Voice Reception

BASE UNIT



HANDSET

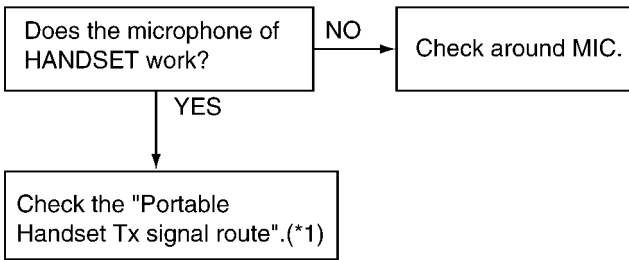


REFERENCE:

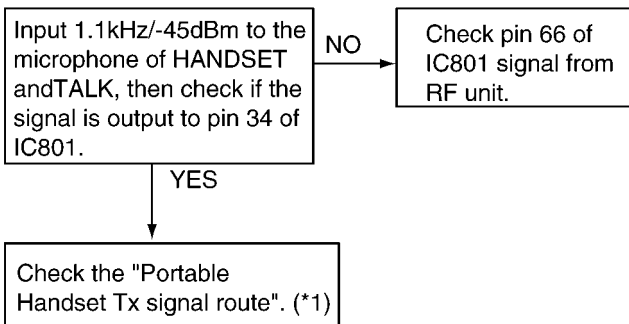
(*1): **Check Sheet for Signal Route** (P.148).

12.5.13.4. No Voice Transmission

HANDSET



BASE UNIT

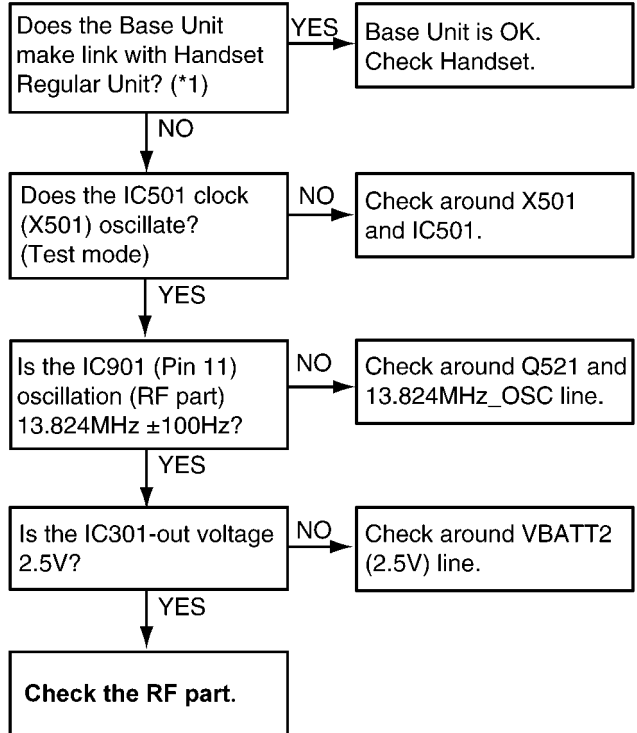


REFERENCE:

(*1): **Check Sheet for Signal Route** (P.148).

12.5.14. Check Link

BASE UNIT



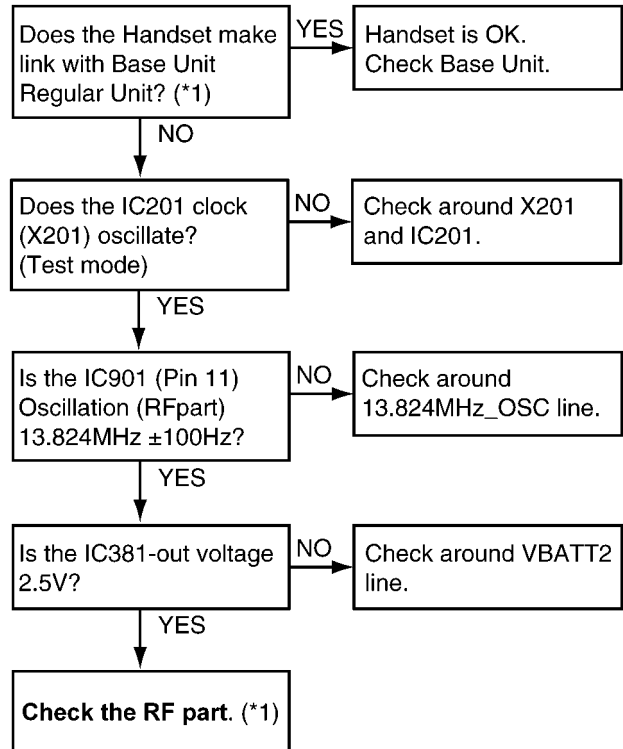
REFERENCE:

Flash Memory is IC601.

DSP is IC501.

(*1): Refer to **Finding out the Defective Part** (P.163).

HANDSET



REFERENCE:

(*1): **Check the RF Part** (P.163).

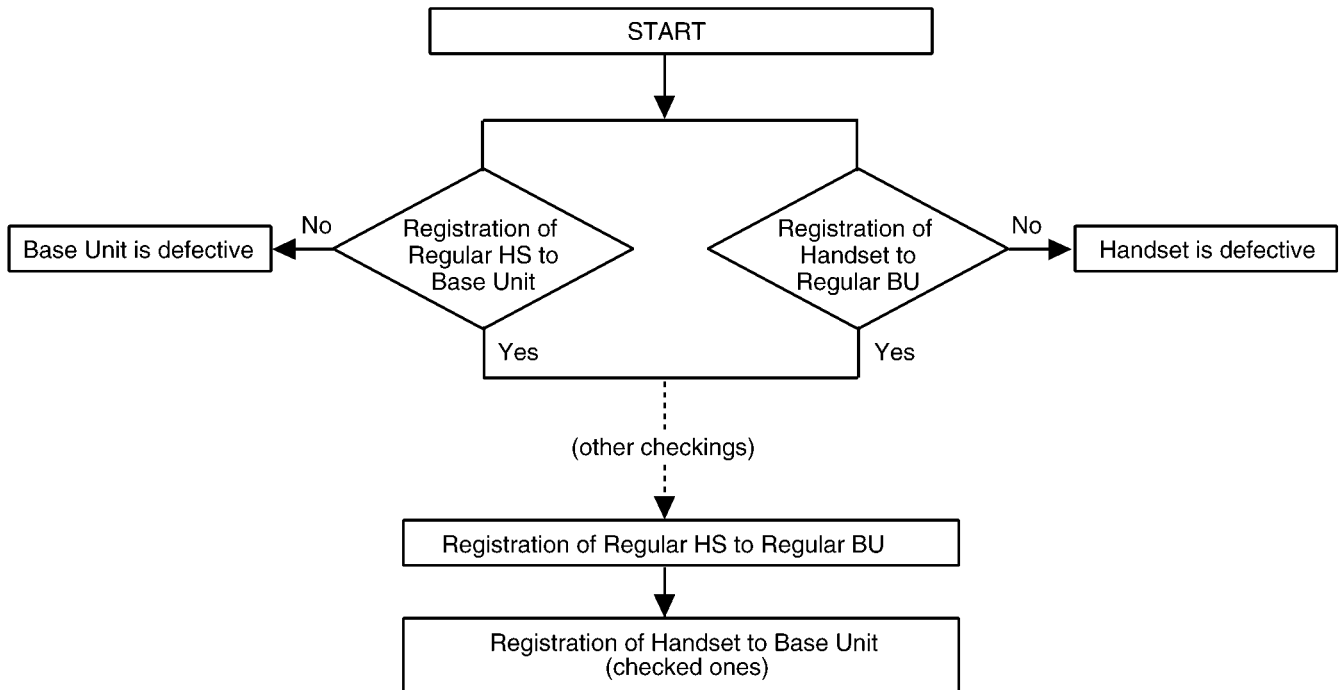
12.5.15. Check the RF Part

12.5.15.1. Finding out the Defective Part

1. Prepare Regular HS (*1) and Regular BU (*2).
 - a. Re-register regular HS (Normal mode) to Base unit (to be checked).
If this operation fails in some ways, the Base Unit is defective.
 - b. Re-register Handset (to be checked) to regular BU (Normal mode).
If this operation fails in some ways, the Handset is defective.

After All the Checking or Repairing

1. Re-register the checked Handset to the checked Base Unit, and Regular HS to Regular BU.



Note:

- (*1) HS: Handset
- (*2) BU: Base Unit

12.5.15.1.1. Re-registering the Cordless Handset

Important

- Make sure the base unit and the cordless handset are near each other and not being used.

1. Cordless Handset:

Press [MENU] → [0] [0]

- The rest of the procedure must be completed within 1 minute.

2. Base unit:

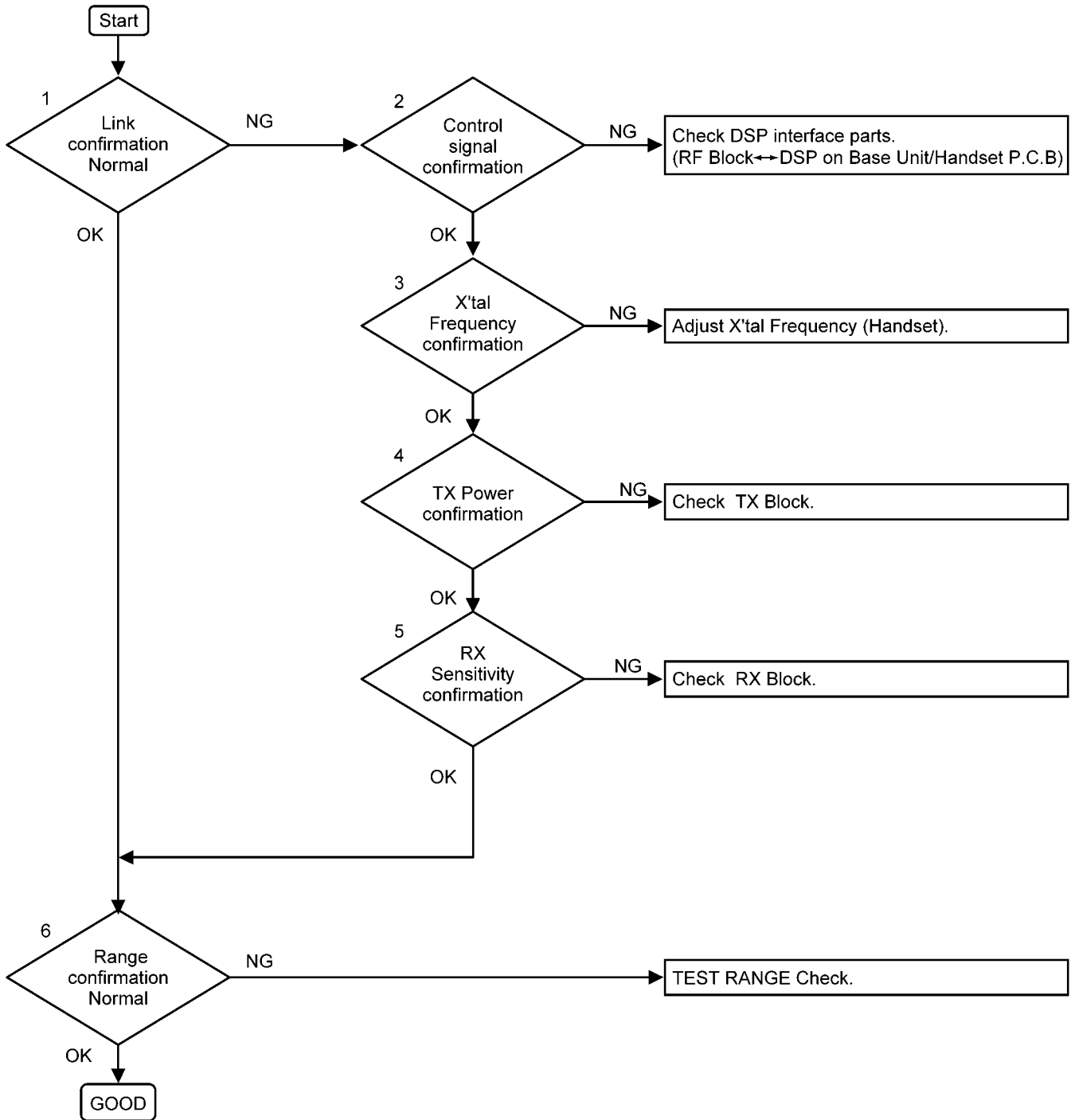
Press and hold [LOCATOR].

3. Cordless Handset:

Press [OK], then wait until the cordless handset beeps.

12.5.15.1.2. RF Check Flowchart

Each item (1 ~ 6) of RF Check Flowchart corresponds to **Check Table for RF Part** (P.165).
Please refer to the each item.



12.5.15.1.3. Check Table for RF Part

No.	Item	BU (Base Unit) Check	HS (HandSet) Check
1	Link Confirmation Normal HS, BU Mode [Normal Mode]	<ol style="list-style-type: none"> 1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link. 	<ol style="list-style-type: none"> 1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link.
2	Control signal confirmation HS, BU Mode: [Test Burst Mode] (*1)	Check DSP interface. (*2)	Check DSP interface. (*2)
3	X'tal Frequency confirmation HS, BU Mode: [Adjustment] (*3)	Check RF Frequency at 45 CH in TX-CW mode. (2439,966797 MHz \pm 50KHz)	Check X'tal Frequency. (13.824000MHz \pm 100Hz)
4	TX Power confirmation Regular HS, BU Mode: [RX-CW Mode.] (*4) HS, BU (to be checked) Mode: [Test Burst Mode.] (*1)	<ol style="list-style-type: none"> 1. Place the Regular HS about 15cm away from the BU. 2. Confirm that RSSI of the Regular HS is approximately 2V by Oscilloscope. (*5) 	<ol style="list-style-type: none"> 1. Place the HS about 15cm away from the Regular BU. 2. Confirm that RSSI of the Regular BU is approximately 2V by Oscilloscope. (*6)
5	RX Sensitivity confirmation Regular HS, BU Mode: [Test Burst Mode.] (*1) HS, BU (to be checked) Mode: [RX-CW Mode.] (*4)	<ol style="list-style-type: none"> 1. Place the Regular HS about 15cm away from the BU. 2. Confirm that RSSI of the BU is approximately 2V by Oscilloscope. (*5) 	<ol style="list-style-type: none"> 1. Place the HS about 15cm away from the Regular BU. 2. Confirm that RSSI of the HS is approximately 2V by Oscilloscope. (*6)
6	Range Confirmation Normal HS, BU Mode: [Normal Mode]	<ol style="list-style-type: none"> 1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link. 3. Compare the range of the BU (being checked) with that of the Regular BU. 	<ol style="list-style-type: none"> 1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link. 3. Compare the range of the HS (being checked) with that of the Regular HS.

Note:

(*1)(*3)(*4): **Test Mode** (P.77)

(*2): **RF-DSP Interface Signal Wave Form** (P.167)

(*5): **Cordless Base Reference Drawing** (P.202)

(*6): **Handset Reference Drawing** (P.203)

12.5.15.1.4. Test Range Check

Circuit block which range is defective can be found by the following check.

Item	BU (Base Unit) Check	HS (HandSet) Check
Range Confirmation TX TEST (TX Power check) HS, BU Mode: [Test Link Mode] (*1)	<ol style="list-style-type: none"> 1. Register Regular HS to BU (to be checked). 2. Set BU to "Test Link mode". 3. Set Regular HS to "Test Link mode". <p>*Set TX Power and RX Sensitivity of the BU and the Regular HS by CHART1.</p> <p>* At distance of about 20m between HS and BU, Link OK = TX Power of the BU is OK. No Link = TX Power of the BU is NG.</p>	<ol style="list-style-type: none"> 1. Register HS (to be checked) to Regular BU. 2. Set Regular BU to "Test Link mode". 3. Set HS to "Test Link mode". <p>*Set TX Power and RX Sensitivity of the HS and the Regular BU by CHART1.</p> <p>* At distance of about 20m between HS and BU, Link OK = TX Power of the HS is OK. No Link = TX Power of the HS is NG.</p>
Range Confirmation RX TEST (RX sensitivity check) HS, BU Mode: [Test Link Mode] (*1)	<ol style="list-style-type: none"> 1. Register Regular HS to BU (to be checked). 2. Set BU to "Test Link mode". 3. Set Regular HS to "Test Link mode". <p>*Set TX Power and RX Sensitivity of the BU and Regular HS by CHART1.</p> <p>* At distance of about 20m between HS and BU, Link OK= RX Sensitivity of the BU is OK. No Link = RX Sensitivity of the BU is NG.</p>	<ol style="list-style-type: none"> 1. Register HS (to be checked) to Regular BU. 2. Set Regular BU to "Test Link mode". 3. Set HS to "Test Link mode". <p>* Set TX Power and RX Sensitivity of Checking_HS and Regular_BU by CHART1.</p> <p>* At distance of about 20m between HS and BU, Link OK= RX Sensitivity of the HS is OK. No Link = RX Sensitivity of the HS is NG</p>

CHART1: Setting of TX Power and RX Sensitivity in Range Confirmation TX TEST, RX TEST

	BU (to be checked)		Regular_HS	
	TX Power	RX Sens.	TX Power	RX Sens.
BU (Base Unit) TX Power Check	High	High	High	Low
BU (Base Unit) RX Sensitivity Check	High	High	Low	High

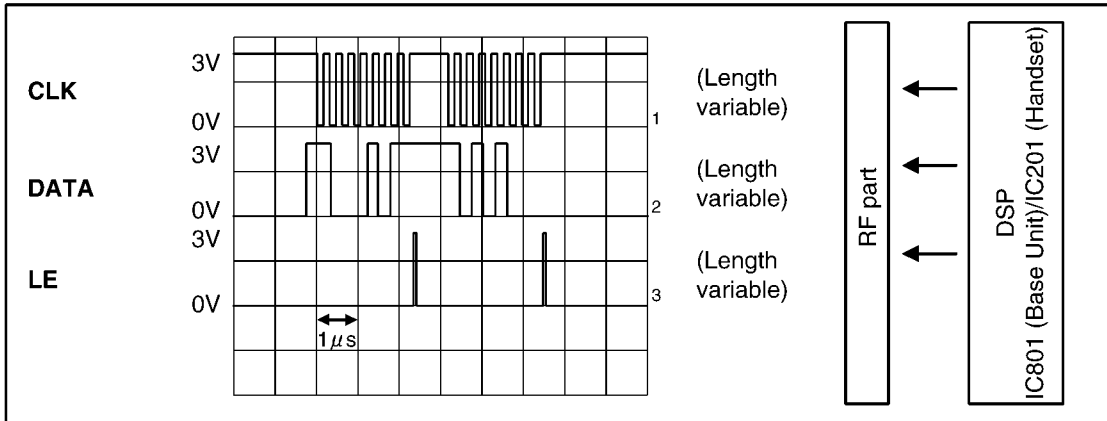
	HS (to be checked)		Regular_BU	
	TX Power	RX Sens.	TX Power	RX Sens.
HS (Handset) TX Power Check	High	High	High	Low
HS (Handset) RX Sensitivity Check	High	High	Low	High

Note:
 (*1): **Test Mode** (P.77)

12.5.15.1.5. RF-DSP Interface Signal Wave Form

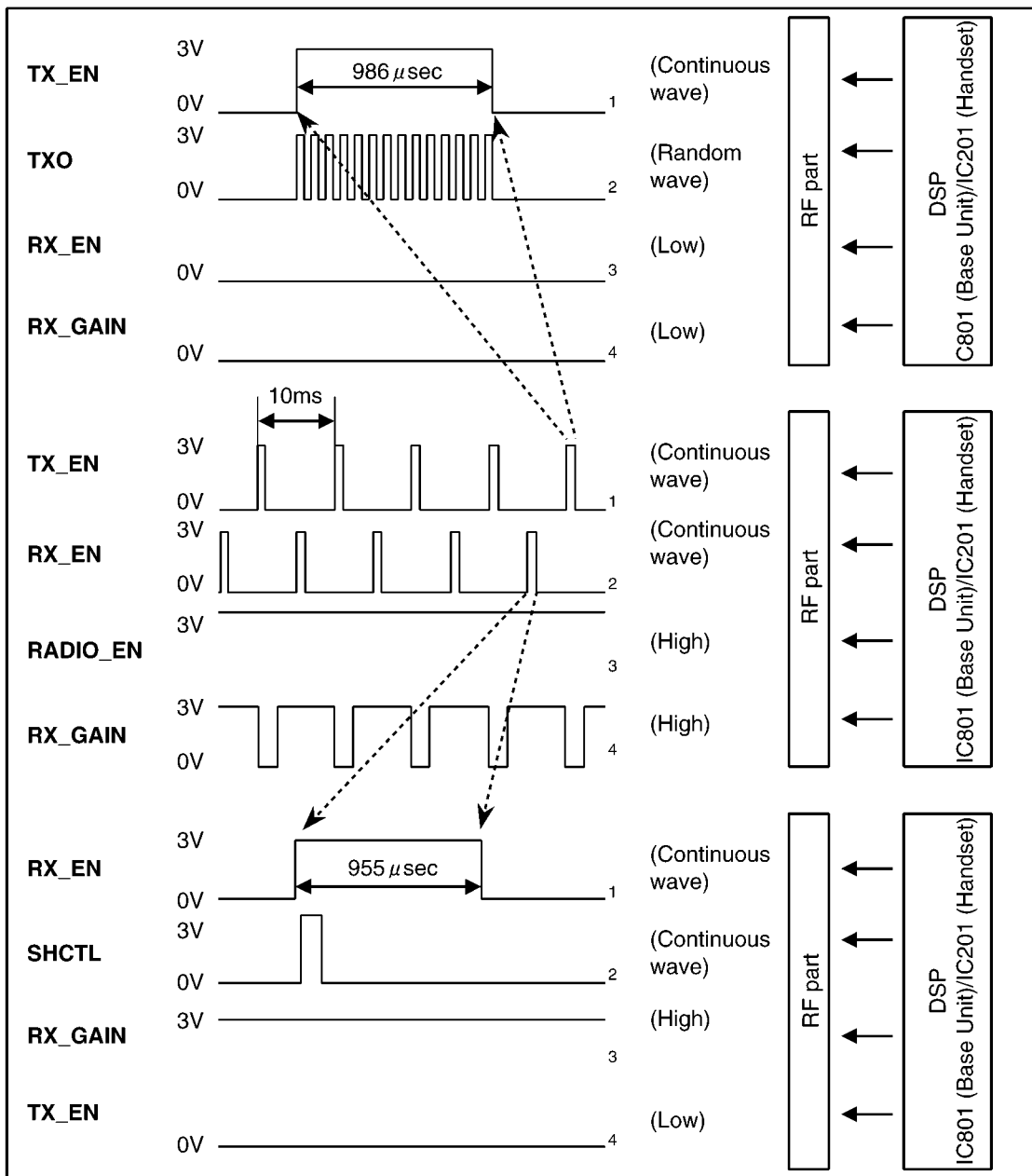
< Test Burst mode >

CLK&DATA

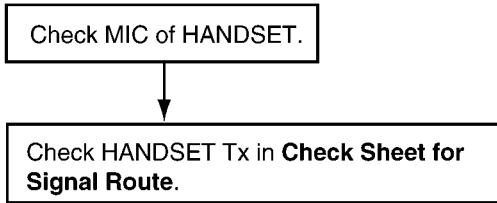


< Test Burst mode >

TX&RX



12.5.15.2. Check Handset Transmission



REFERENCE:

Check Sheet for Signal Route (P.148).

12.5.15.3. Check Handset Reception



REFERENCE:

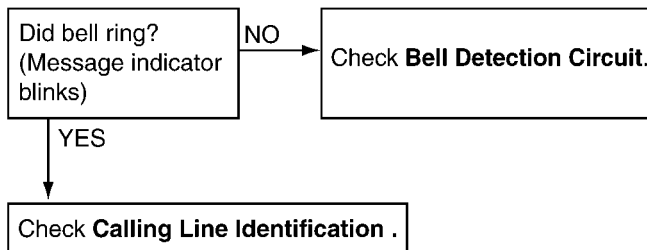
Check Sheet for Signal Route (P.148).

Note:

When checking the RF UNIT, Refer to **Check the RF Part** (P.163)

12.5.15.4. Check Caller ID

BASE UNIT



REFERENCE:

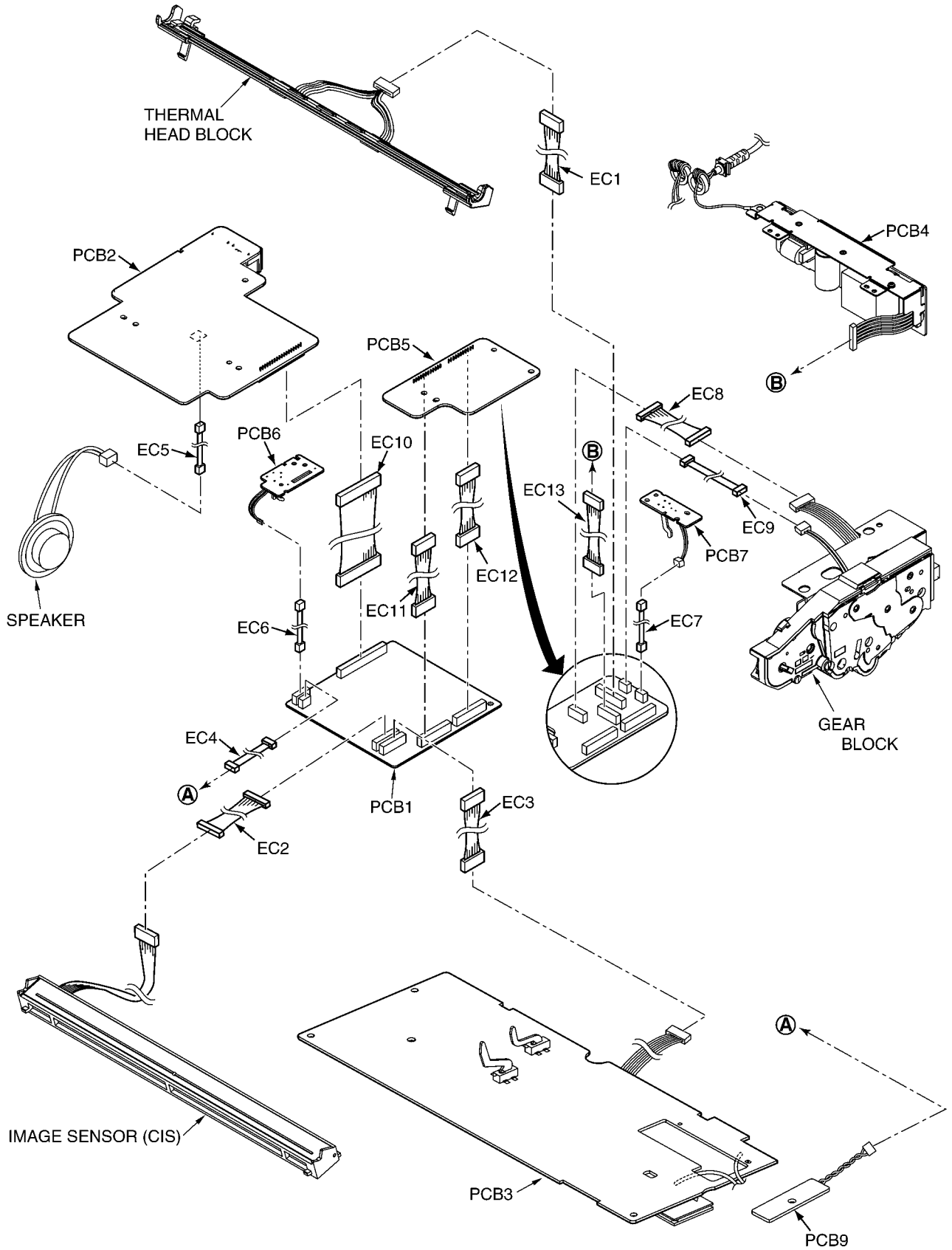
Bell Detection Circuit (P.42)

Calling Line Identification Circuit (FSK) (P.44)

Note:

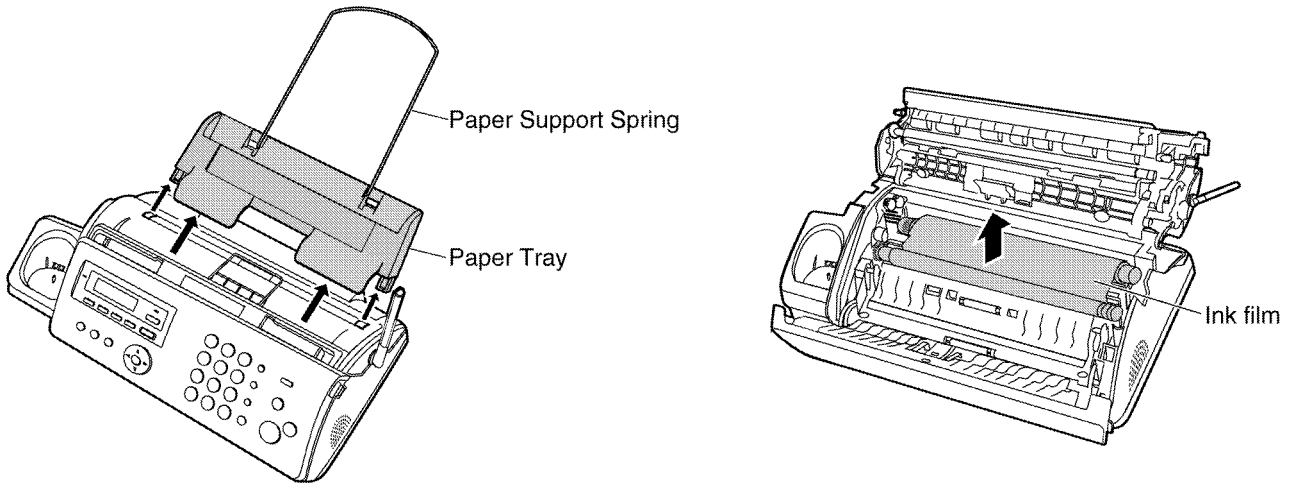
- Make sure the format of the Caller ID or Call Waiting Caller ID service of the Telephone company that the customer subscribed to.
- Also we recommend to confirm that the customer is really a subscriber of the service.

13 Service Fixture & Tools

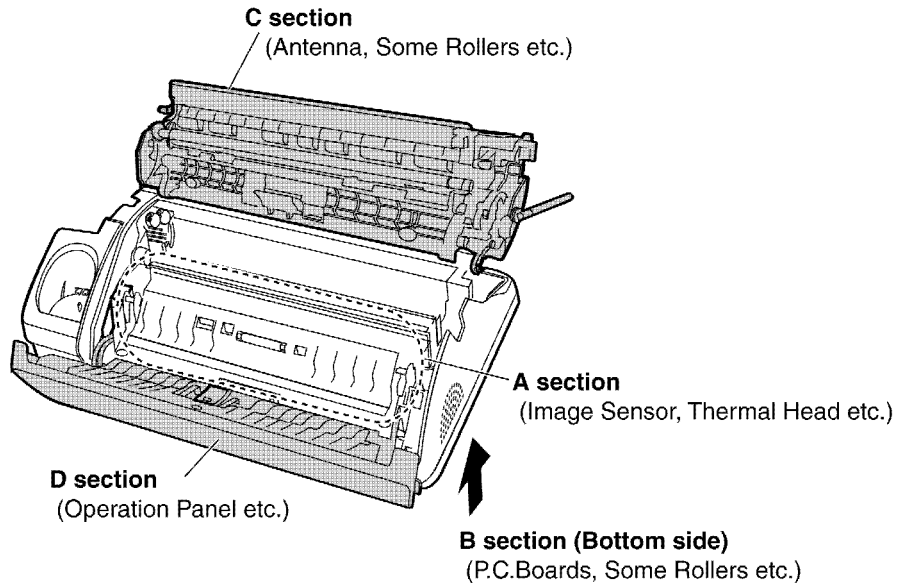


14 Disassembly and Assembly Instructions

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

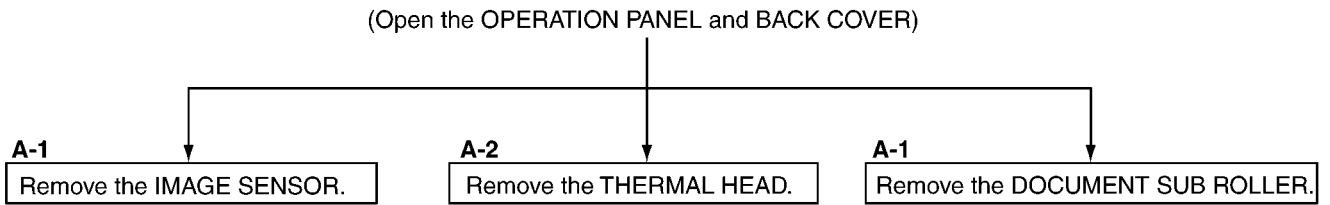


14.1. General Section



14.2. Disassembly Flowchart

14.2.1. Upper Cabinet Section

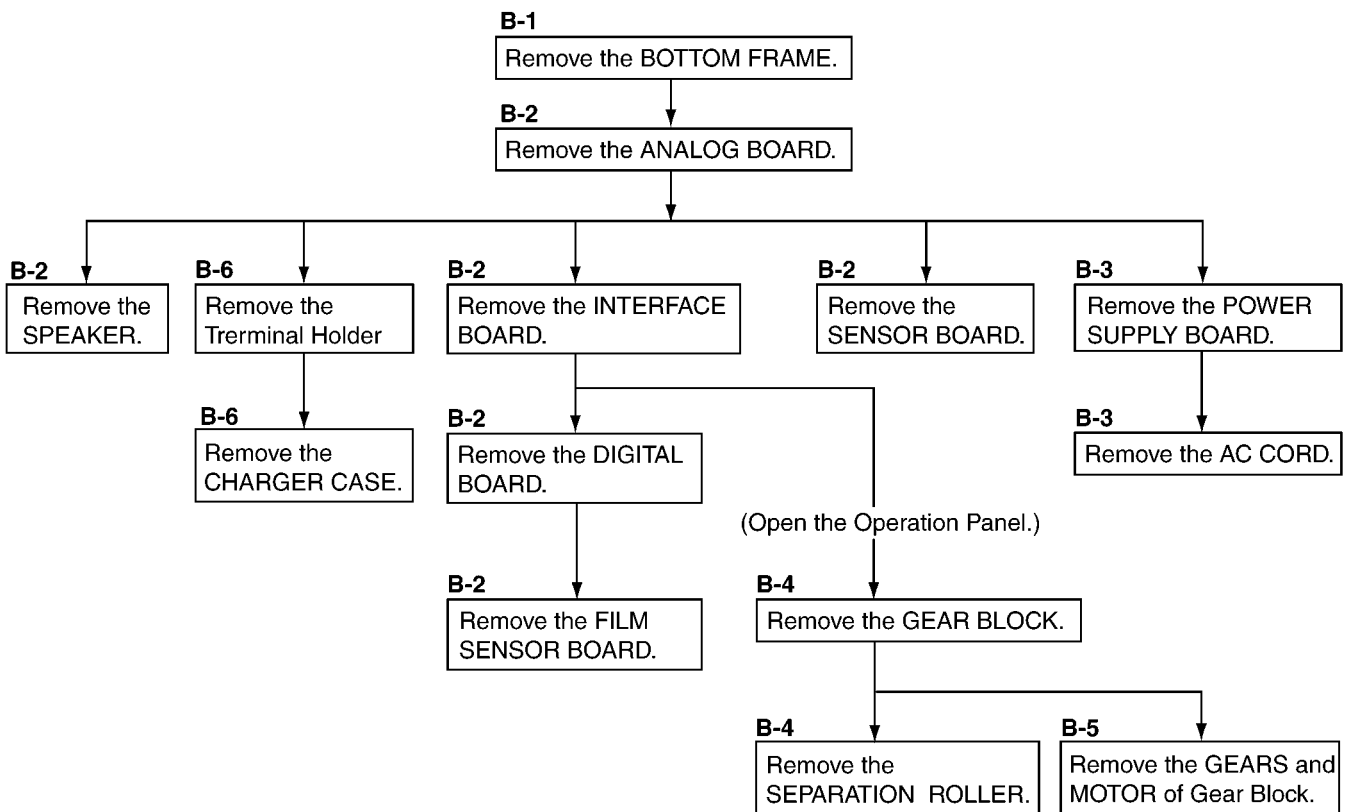


REFERENCE:

A-1: How to Remove the Image Sensor (CIS) (P.174)

A-2: How to Remove the Thermal Head (P.175)

14.2.2. Lower Cabinet Section



REFERENCE:

B-1: How to Remove the Bottom Frame (P.177)

B-2: How to Remove the P.C. Boards and Speaker (P.178)

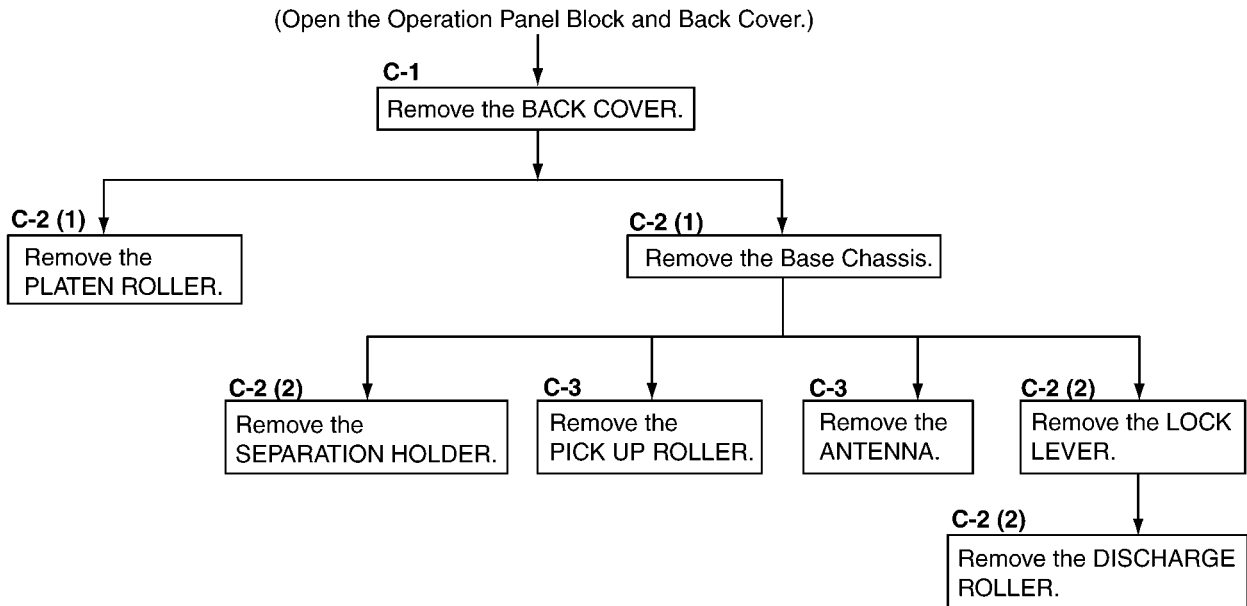
B-3: How to Remove the Power Supply Board and AC Cord (P.179)

B-4: How to Remove the Gear Block and Separation Roller (P.180)

B-5: How to Remove the Gears, Motors and Arms of the Gear Block (P.181)

B-6: How to Remove the Charger Case (P.183)

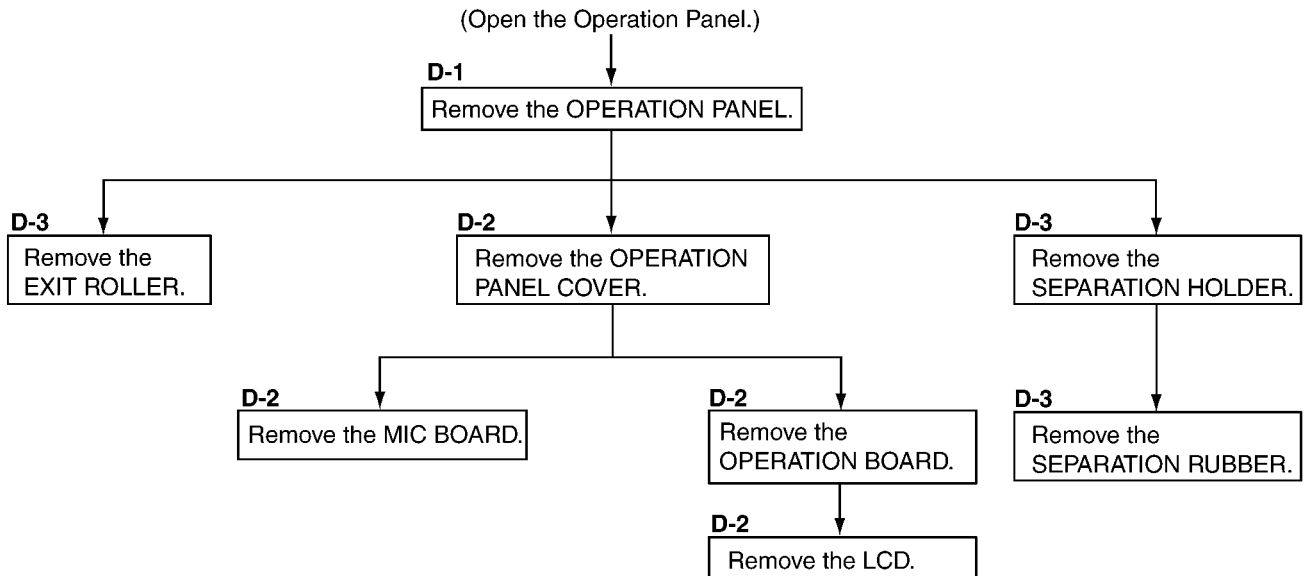
14.2.3. Back Cover Section



REFERENCE:

- C-1: How to Remove the Back Cover (P.184)
- C-2: How to Remove the Platen Roller and Lock Lever (P.185)
- C-3: How to Remove the Pickup Roller and Antenna (P.187)

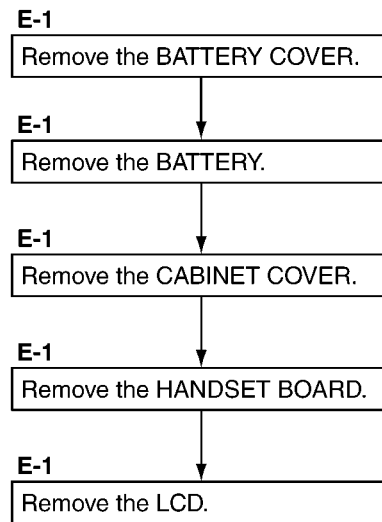
14.2.4. Operation Panel Section



REFERENCE:

- D-1: How to Remove the Operation Panel (P.188)
- D-2: How to Remove the Operation Board, MIC Board and LCD (P.189)
- D-3: How to Remove the Separation Holder and Exit Roller (P.190)

14.2.5. Handset Section

**REFERENCE:**

E-1: How to Remove the Handset Board (P.197)

14.3. Disassembly Procedure

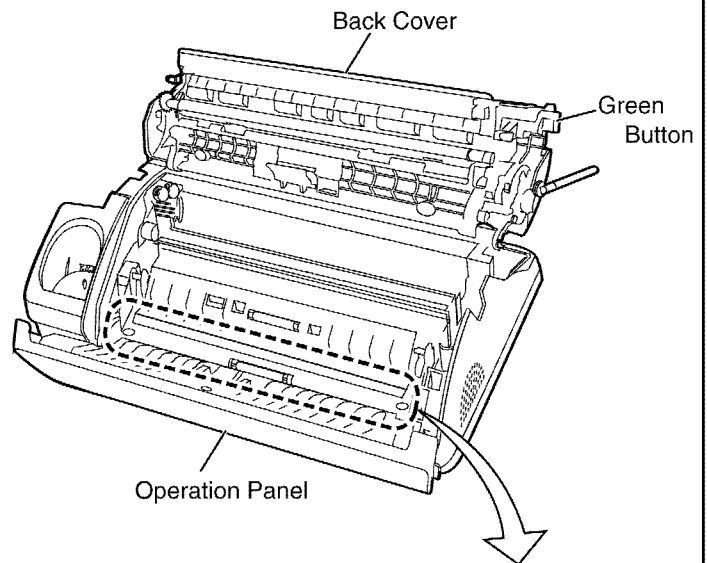
14.3.1. How to Remove the Image Sensor (CIS)

PROCEDURE: A-1

Ref. No. A-1

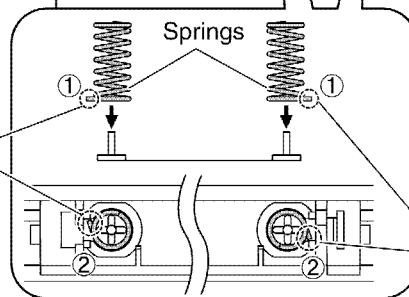
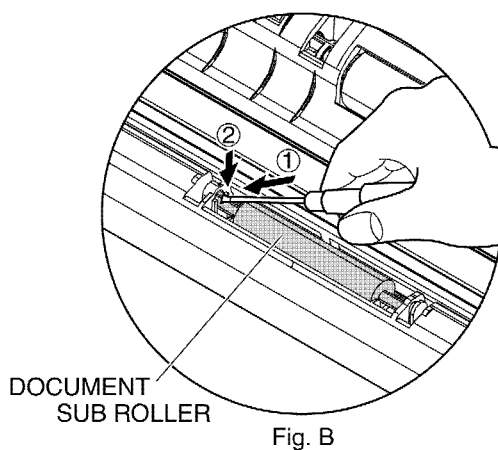
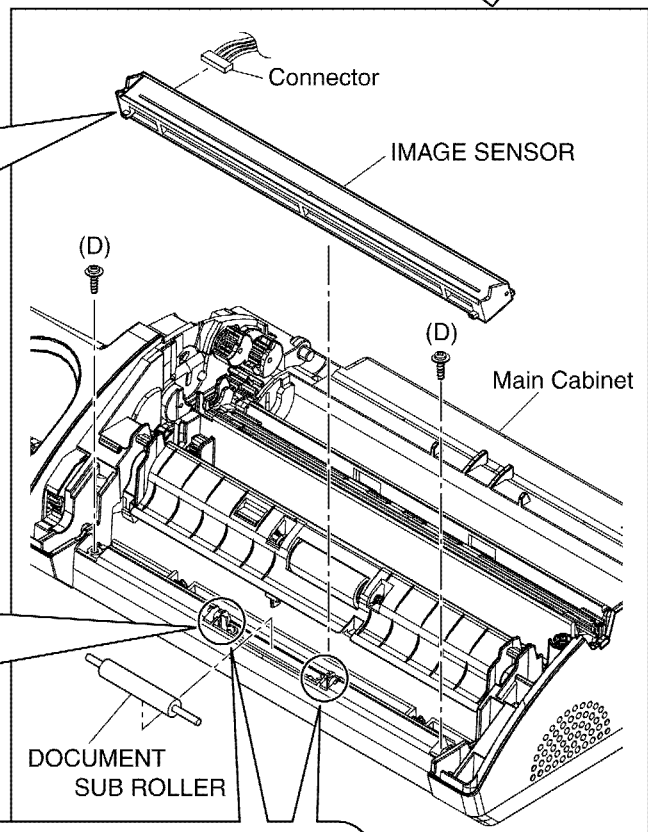
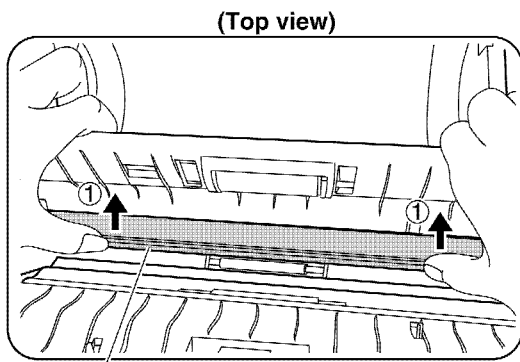
IMAGE SENSOR

- 1) Push the Green Button to open the Operation Panel and Back Cover.
- 2) Remove the 2 screws (D).
- 3) Remove the IMAGE SENSOR from the Main Cabinet, as shown in a Fig. A.
- 4) Disconnect the Connector.



DOCUMENT SUB ROLLER

- 1) Push the Green Button to open the Operation Panel and Back Cover.
- 2) Remove the DOCUMENT SUB ROLLER, as shown in a Fig. B.



Note for Assembly:

- ① Be careful up-down direction of spring.
- ② Install the tip of the spring in the direction, as shown in the Fig. E.

14.3.2. How to Remove the Thermal Head

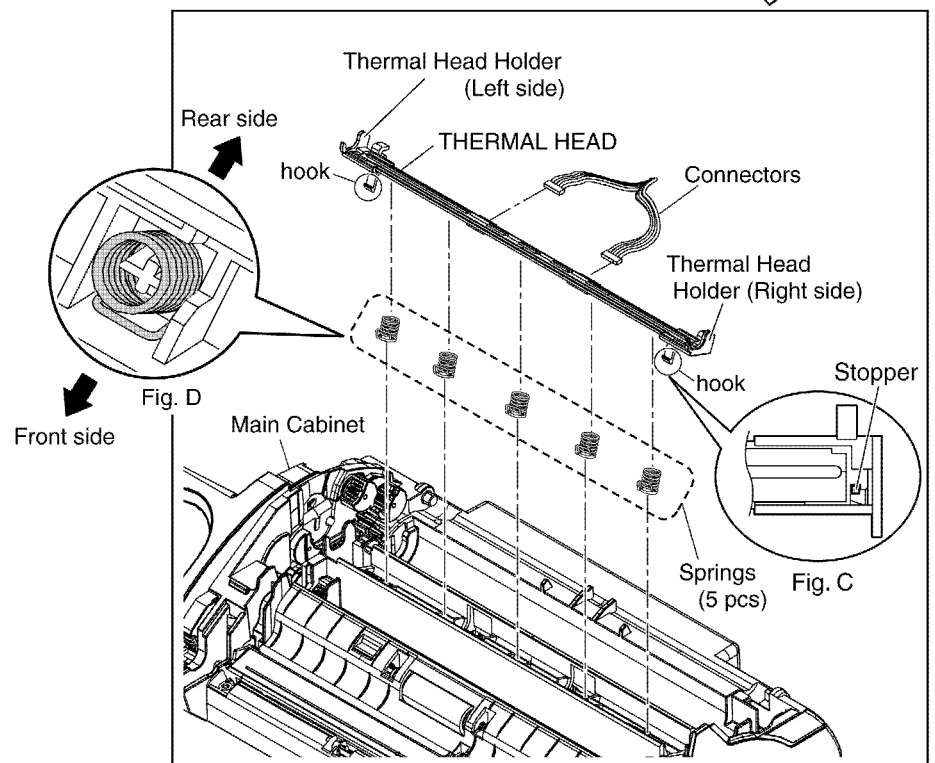
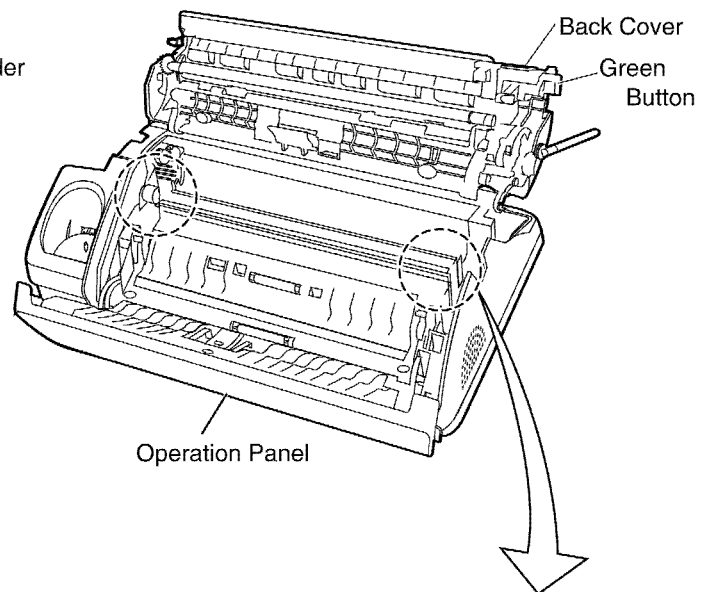
PROCEDURE: A-2

Ref. No. A-2 (1)

- 1) Push the Green Button to open the Operation Panel and Back Cover.
- 2) Release the both-side hooks of Thermal Head Holder from Main Cabinet. (Refer to next page.)
Remove the holder from thermal head after releasing this stopper. (Fig. C)
- 3) Disconnect the Connectors.
- 4) Remove the THERMAL HEAD.

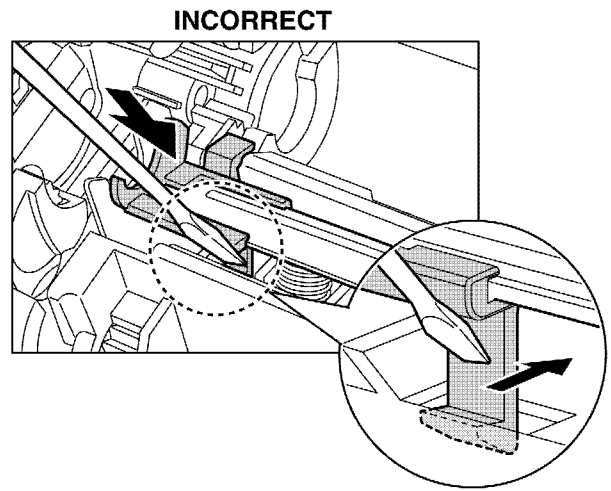
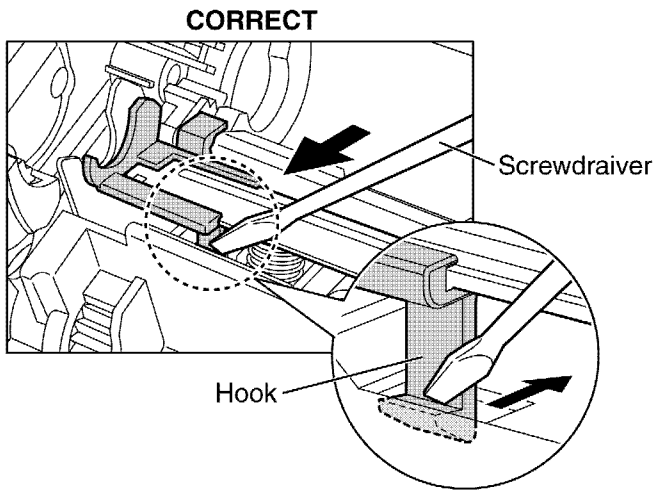
Note for Assembly:

- When springs are inserted in the Main Cabinet, be careful in the direction of springs. (See Fig. D)

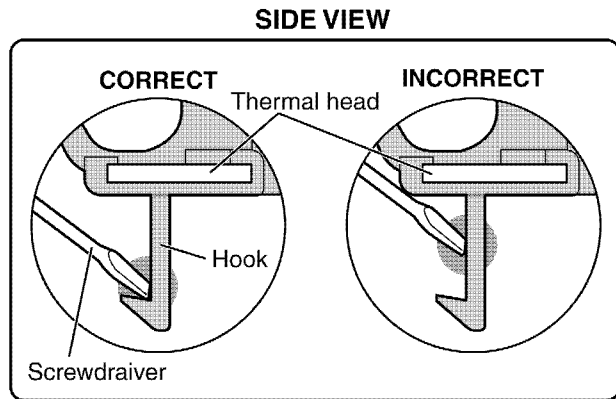
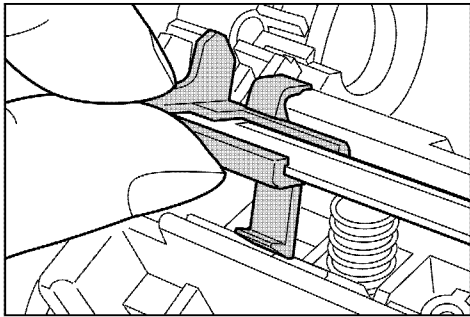


Ref. No. A-2 (2)

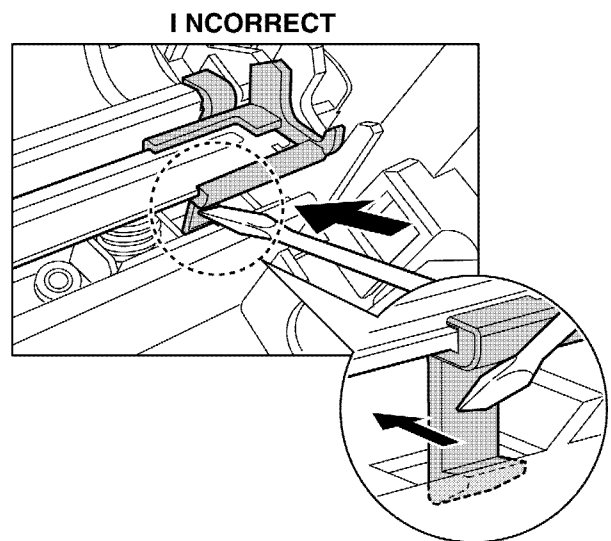
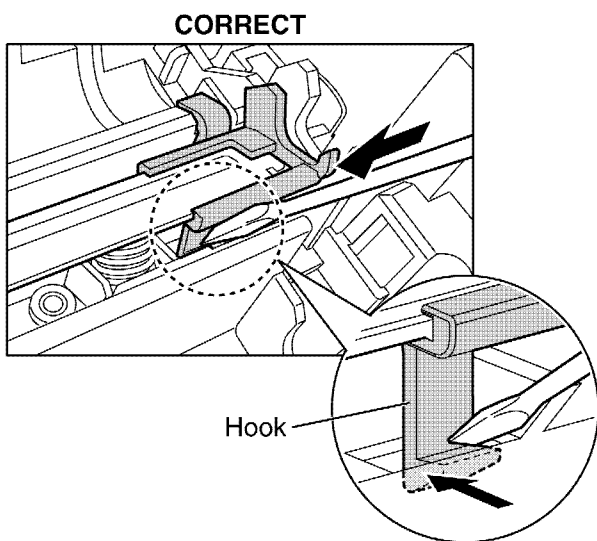
① Push the left side hook first, as shown in a figure.



② Keep a left side hook situation and push the right side hook, as shown in a figure.



③ Push the right side hook, as shown in a figure. The both side hooks release from Main Cabinet.



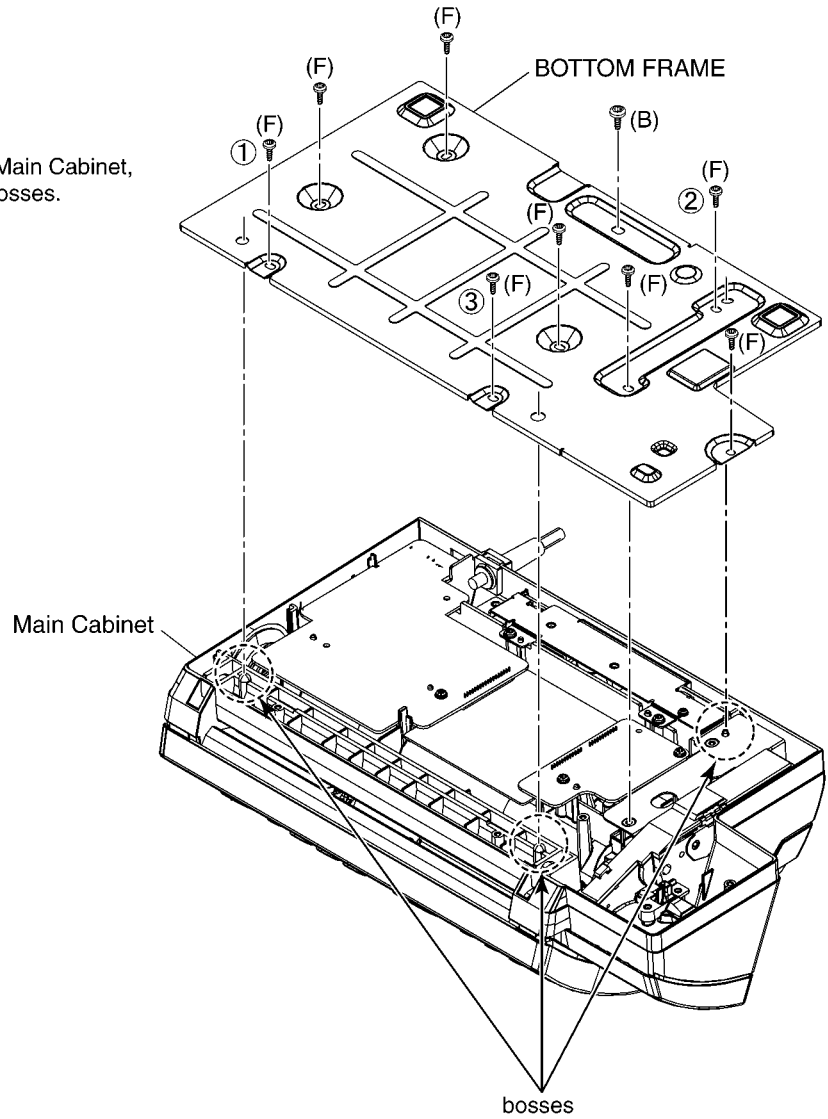
14.3.3. How to Remove the Bottom Frame

PROCEDURE: B-1**Ref. No. B-1**

- 1) Remove the 8 screws (F) and 1 screw (B).
- 2) Remove the BOTTOM FRAME.

Note for Assembly:

- Fasten ①, ② and ③ screws first.
(Order is ①→②→③.)
- When Bottom Frame is installed in the Main Cabinet, be careful not to run aground into the bosses.



14.3.4. How to Remove the P.C. Boards and Speaker

PROCEDURE: B-1→B-2

Ref. No. B-2

ANALOG BOARD

- 1) Remove the 1 screw (F)-a.
- 2) Disconnect the Connector on the Analog Board.
- 3) Remove the ANALOG BOARD.

INTERFACE BOARD

- 1) Remove the 1 screw (F)-b.
- 2) Disconnect the Connectors on the Interface Board.
- 3) Remove the INTERFACE BOARD.

DIGITAL BOARD

- 1) Remove the Analog Board.
- 2) Remove the Interface Board.
- 3) Remove the 1 screw (F)-c.
- 4) Disconnect the Connectors on the Digital Board.
- 5) Unsolder the Antenna lead wire. (See Fig. E)
- 6) Release the hooks of the Main Cabinet.
- 7) Remove the DIGITAL BOARD.

FILM END SENSOR BOARD

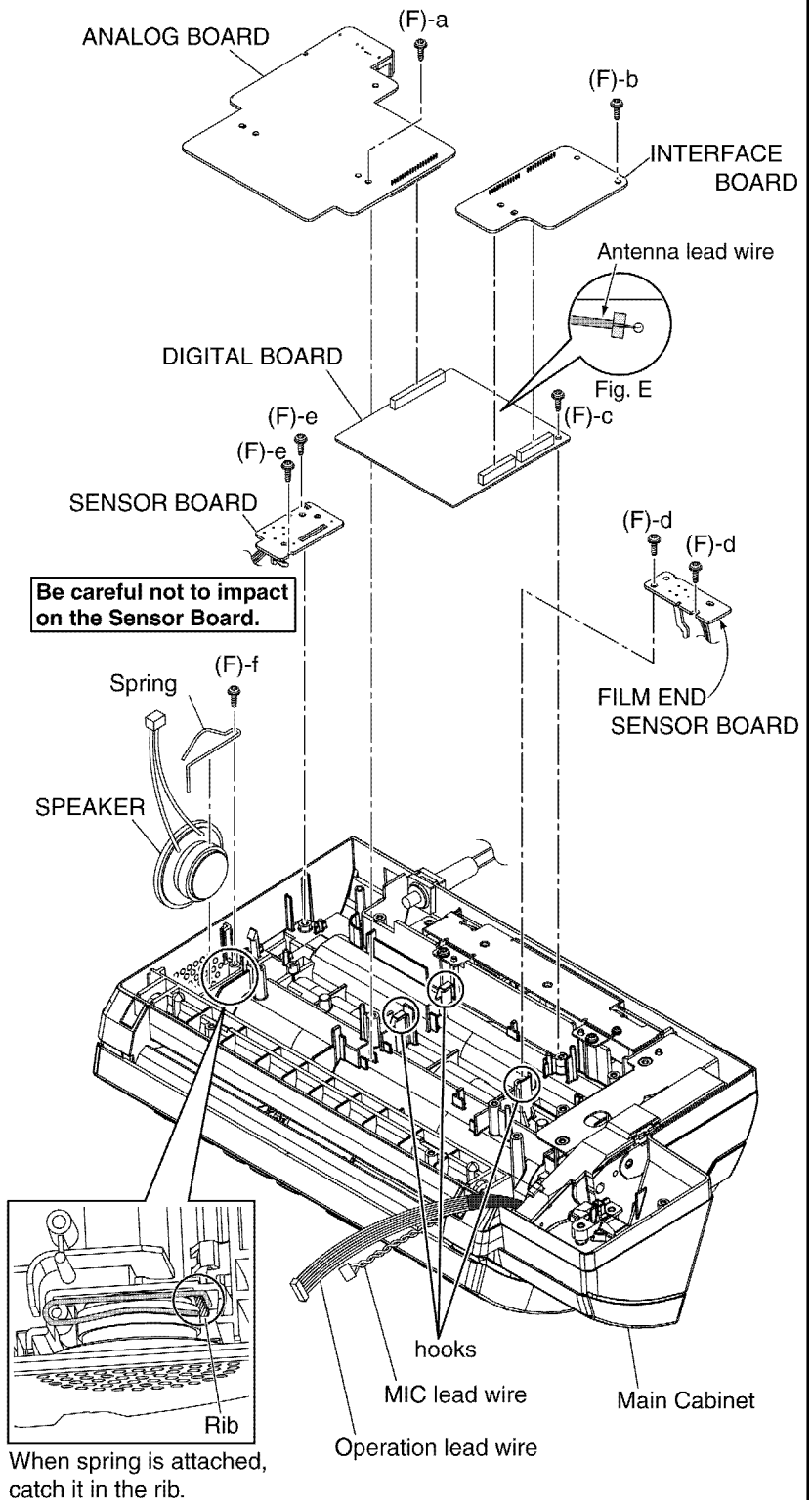
- 1) Remove the Analog Board.
- 2) Remove the Interface Board.
- 3) Remove the Digital Board.
- 4) Remove the 2 screws (F)-d.
- 5) Disconnect the Connectors on the Film End Sensor Board.
- 6) Remove the FILM END SENSOR BOARD.

SENSOR BOARD

- 1) Remove the Analog Board.
- 2) Remove the 2 screws (F)-e.
- 3) Remove the SENSOR BOARD.

SPEAKER

- 1) Remove the Analog Board.
- 2) Remove the 1 screw (F)-f.
- 3) Remove the SPEAKER.



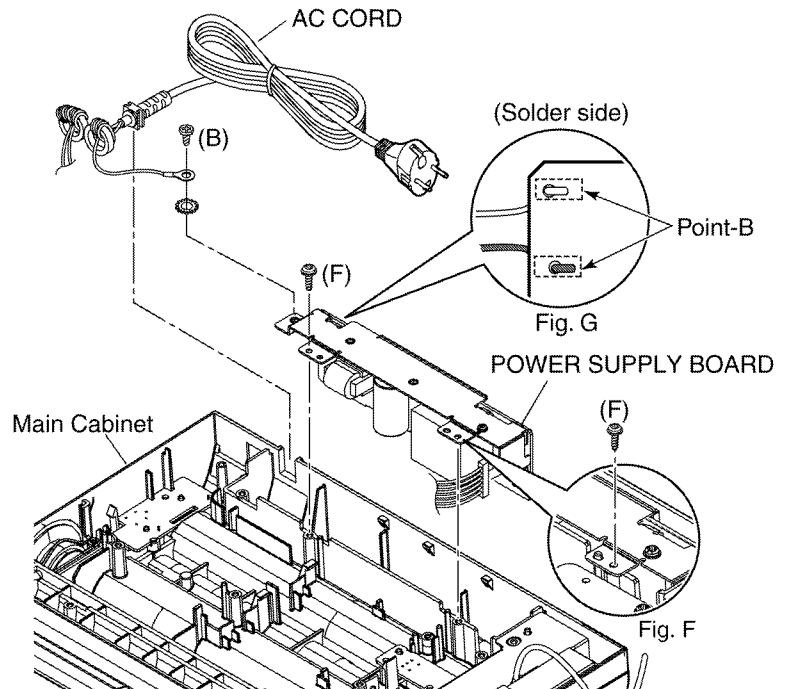
When spring is attached, catch it in the rib.

14.3.5. How to Remove the Power Supply Board and AC Cord

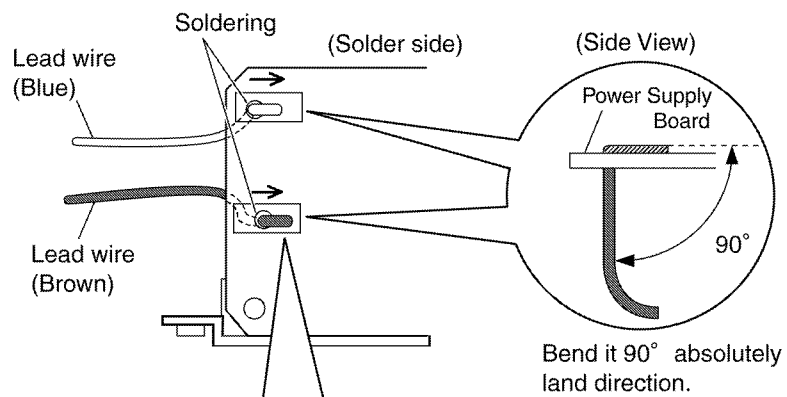
PROCEDURE: B-1→B-2→B-3

Ref. No. B-3

- 1) Remove the Analog Board. (Refer to B-2.)
- 2) Remove the 2 screws (F). (See Fig. F)
- 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. G)
- 6) Remove the POWER SUPPLY BOARD and AC CORD.



The soldering of AC Cord



Correct	Incorrect

land

Note:

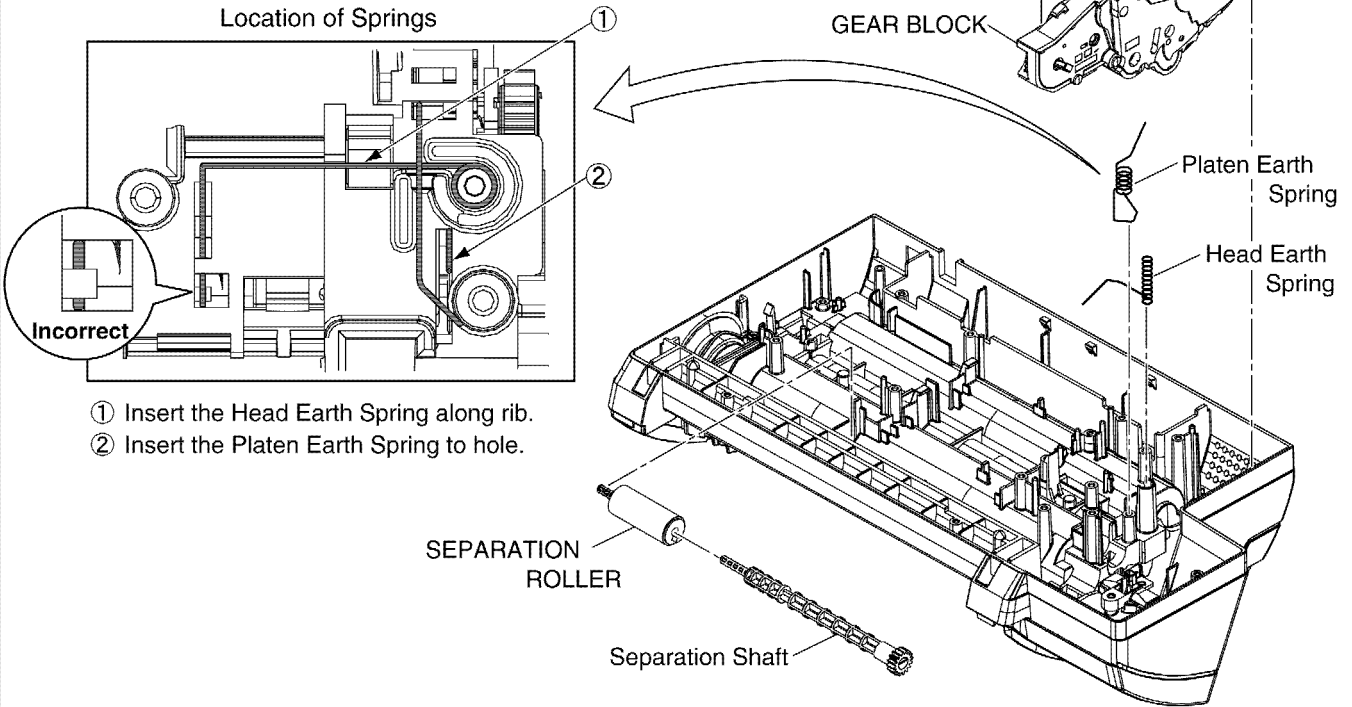
- As to the lead wires, take care not to protrude from the land area.
- Check lead wire situation and confirm no-cut and no-whiskers.

14.3.6. How to Remove the Gear Block and Separation Roller

PROCEDURE: B-1→B-2→B-4

Ref. No. B-4

- 1) Remove the Interface Board. (Refer to **B-2**.)
- 2) Remove the 3 screws (F).
- 3) Open the Operation Panel. (See Fig. H)
- 4) Remove the GEAR BLOCK.
- 5) Release the hook, as shown in a Fig. J.
- 6) Pull out the Separation Shaft.
- 7) Remove the SEPARATION ROLLER.



- ① Insert the Head Earth Spring along rib.
- ② Insert the Platen Earth Spring to hole.

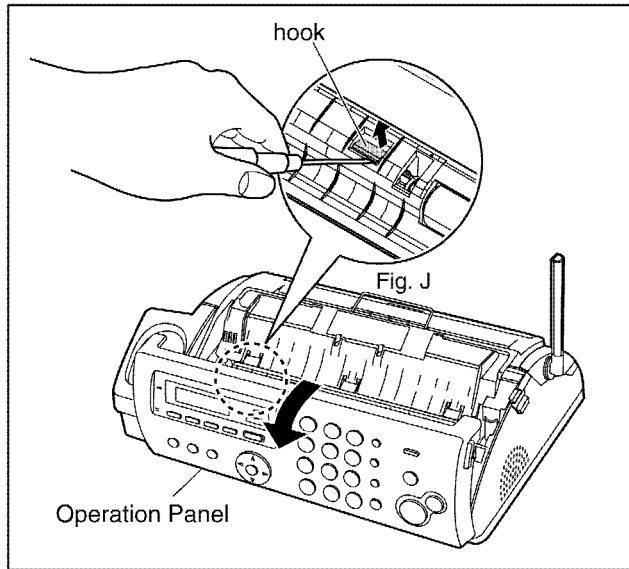


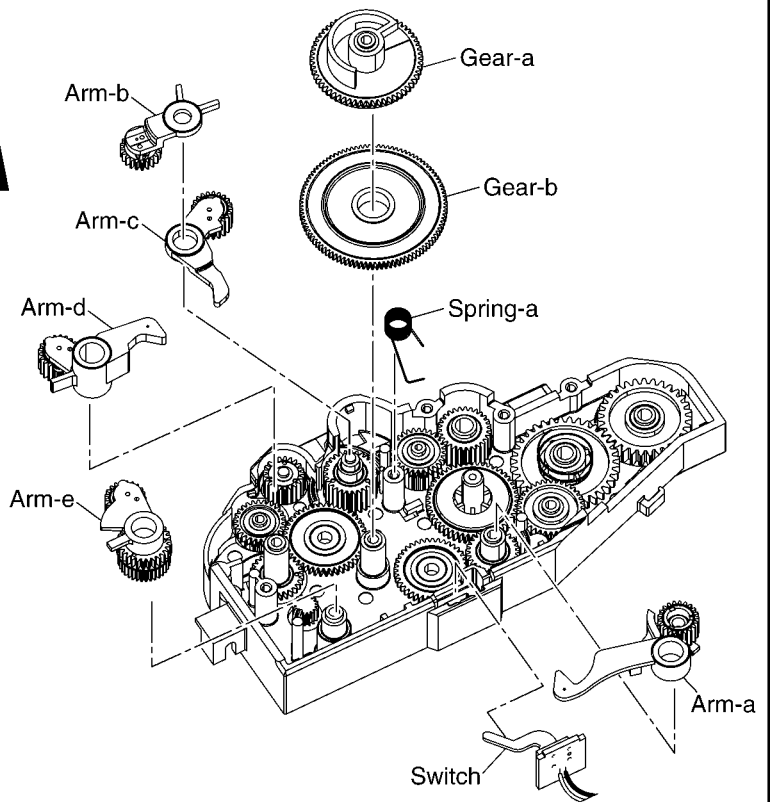
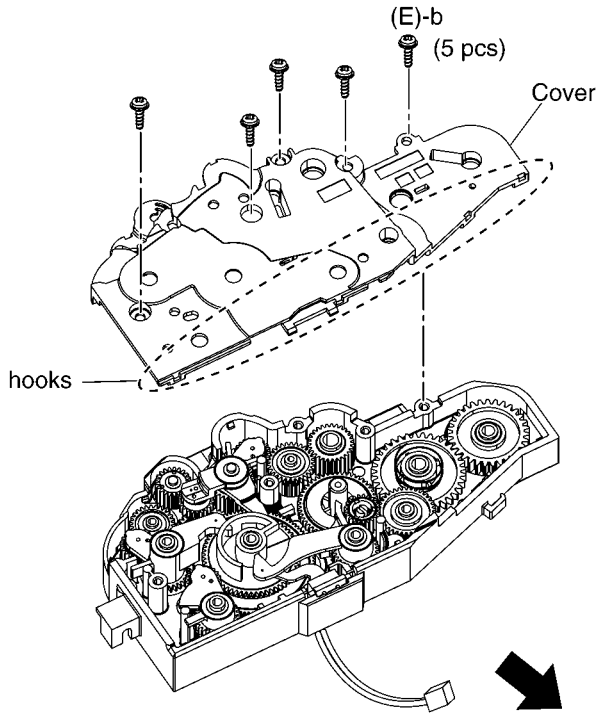
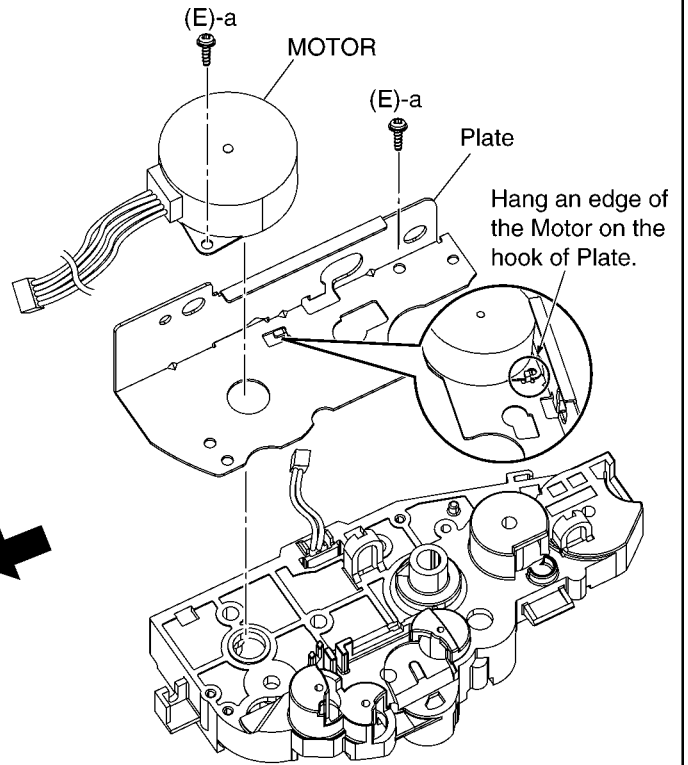
Fig. H

14.3.7. How to Remove the Gears, Motors and Arms of the Gear Block

PROCEDURE: B-1→B-2→B-4→B-5

Ref. No. B-5 (1)

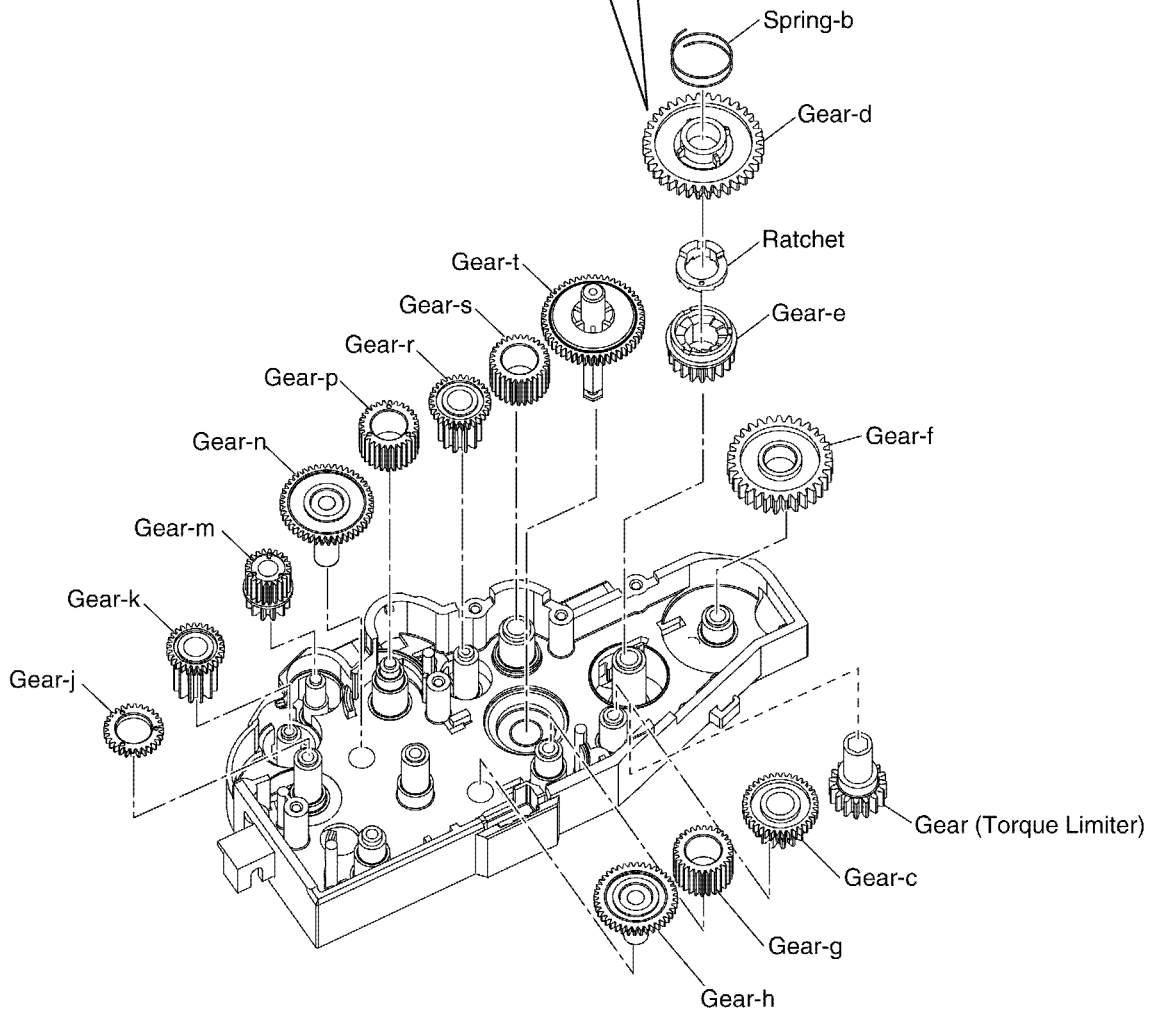
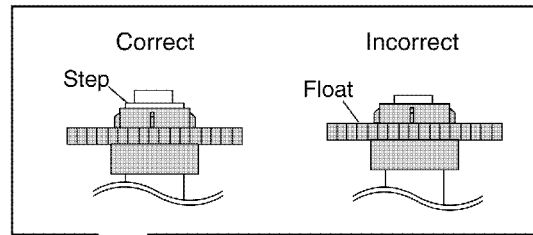
- 1) Remove the 2 screws (E)-a.
- 2) Remove the Plate and MOTOR.
- 3) Remove the 5 screws (E)-b.
- 4) Remove the Cover after release the hooks.



- 5) Remove the Arm-a.
- 6) Remove the Switch.
- 7) Remove the Arm-b and Arm-c.
- 8) Remove the Arm-d and Arm-e.
- 9) Remove the Gear-a.
- 10) Remove the Spring-a.
- 11) Remove the Gear-b.

Ref. No. B-5 (2)

- 12) Remove the Gear-c.
- 13) Remove the Spring-b.
- 14) Remove the Gear-d.
- 15) Remove the Ratchet and Gear-e.
- 16) Remove the Gear (Torque Limiter).
- 17) Remove the Gear-f.
- 18) Remove the Gear-g and Gear-h.
- 19) Remove the Gear-j.
- 20) Remove the Gear-k.
- 21) Remove the Gear-m.
- 22) Remove the Gear-n.
- 23) Remove the Gear-p.
- 24) Remove the Gear-r.
- 25) Remove the Gear-s.
- 26) Remove the Gear-t.



14.3.8. How to Remove the Charger Case

PROCEDURE: B-1→B-6

Ref. No. B-6

- 1) Remove the 3 screws (F)-a.
- 2) Remove the Terminal Holder.
- 3) Remove the 1 screw (F)-b.
- 4) Release the Stopper from Main Cabinet, as shown in a Fig. K.
- 5) Remove the CHARGER CASE.

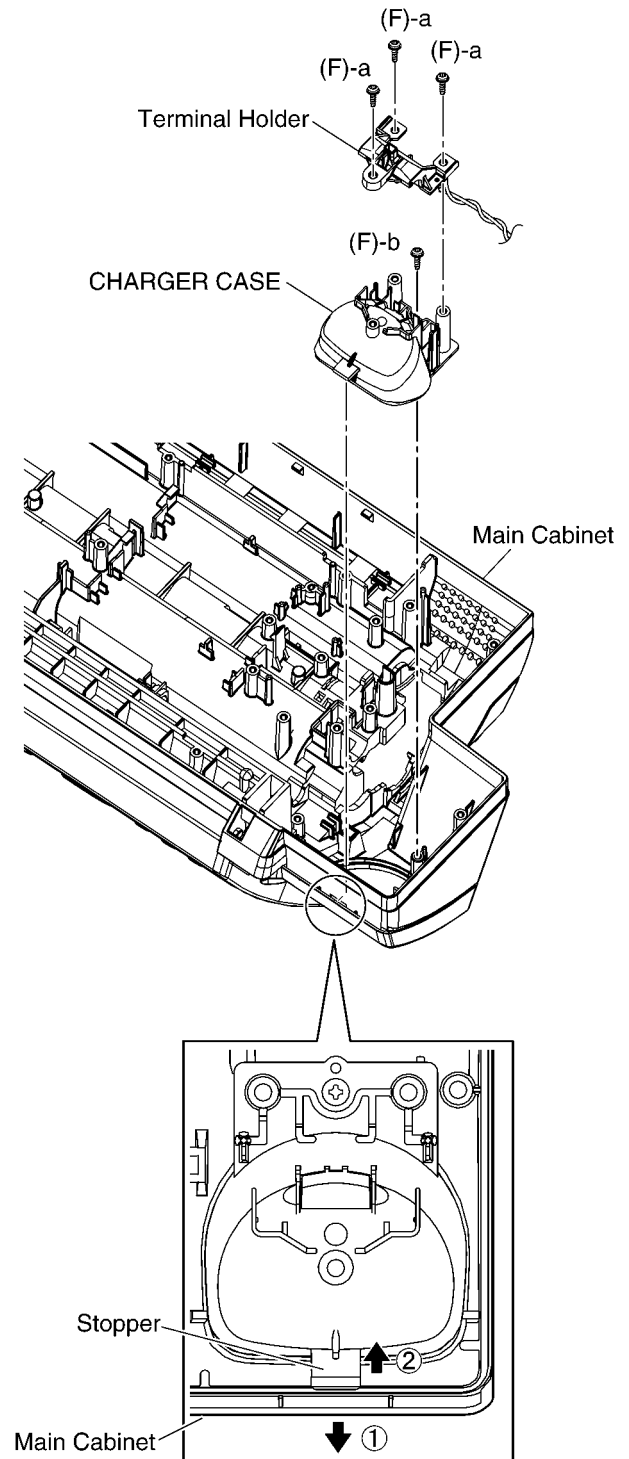


Fig. K

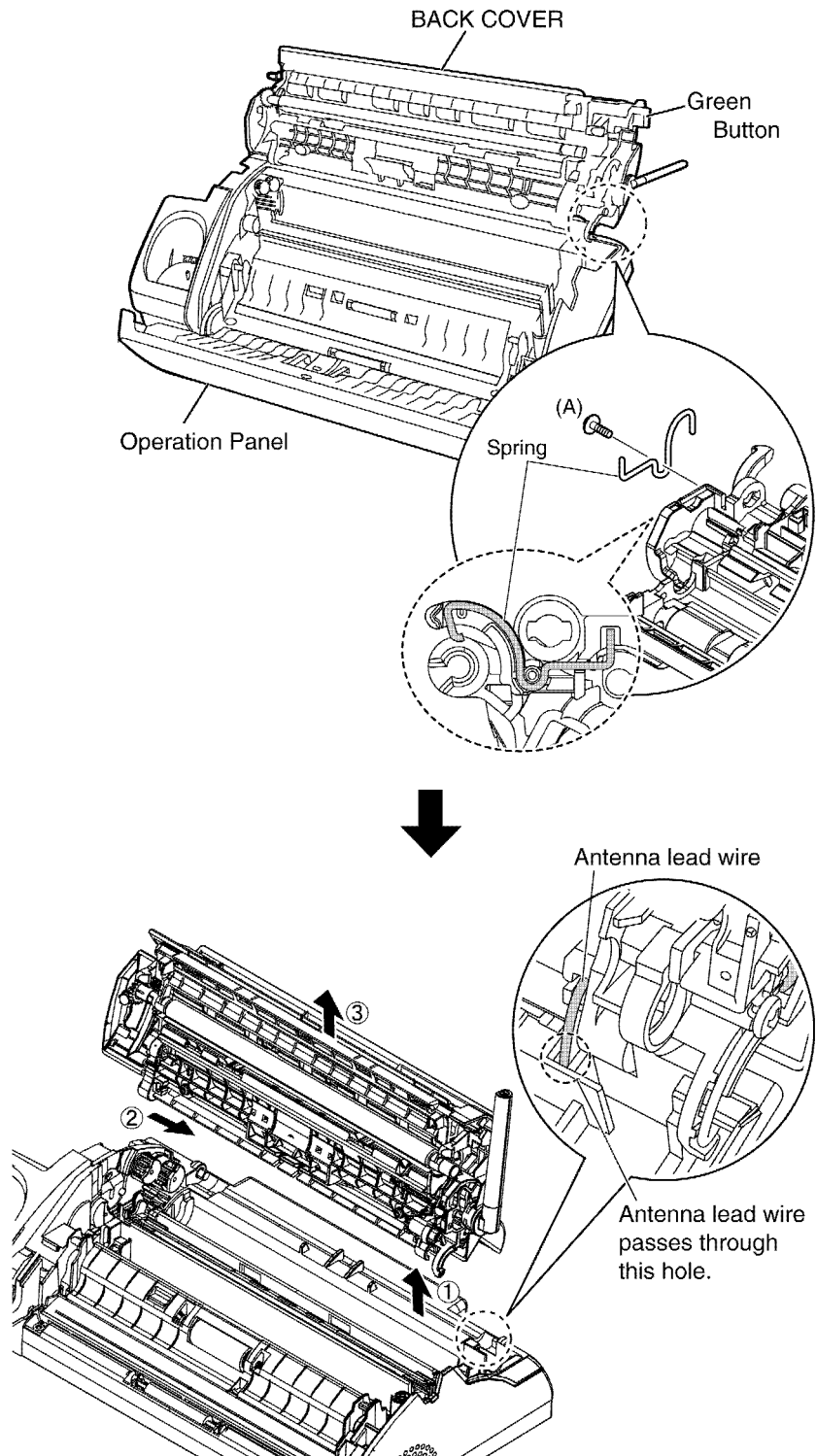
- ① Pull the Main cabinet in the direction of arrow.
- ② Release the Stopper.

14.3.9. How to Remove the Back Cover

PROCEDURE: B-1→B-2→C-1

Ref. No. C-1

- 1) Unsolder the Antenna lead wire on the Digital Board. (Refer to B-2.)
- 2) Push the Green Button to open the Operation Panel and Back Cover.
- 3) Remove the 1 screw (A).
- 4) Remove the Spring.
- 5) Remove the BACK COVER.



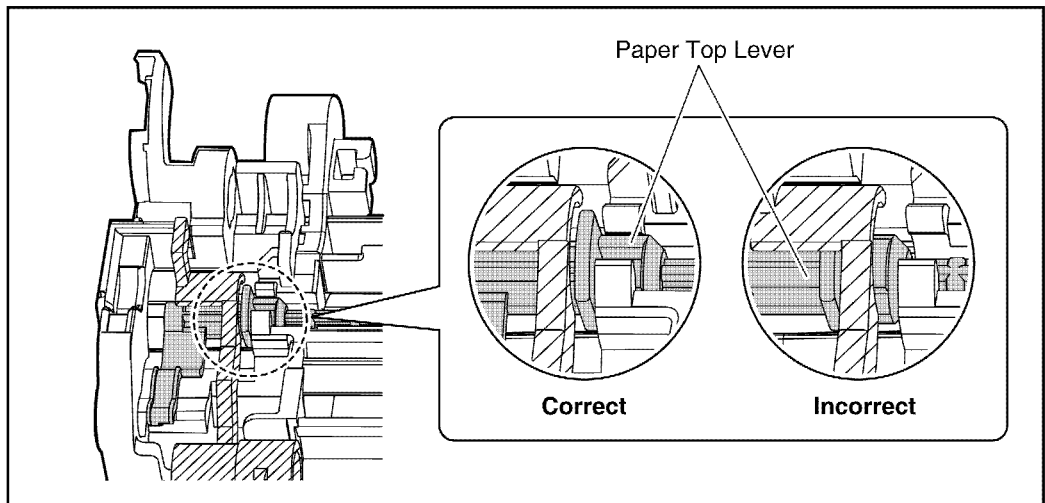
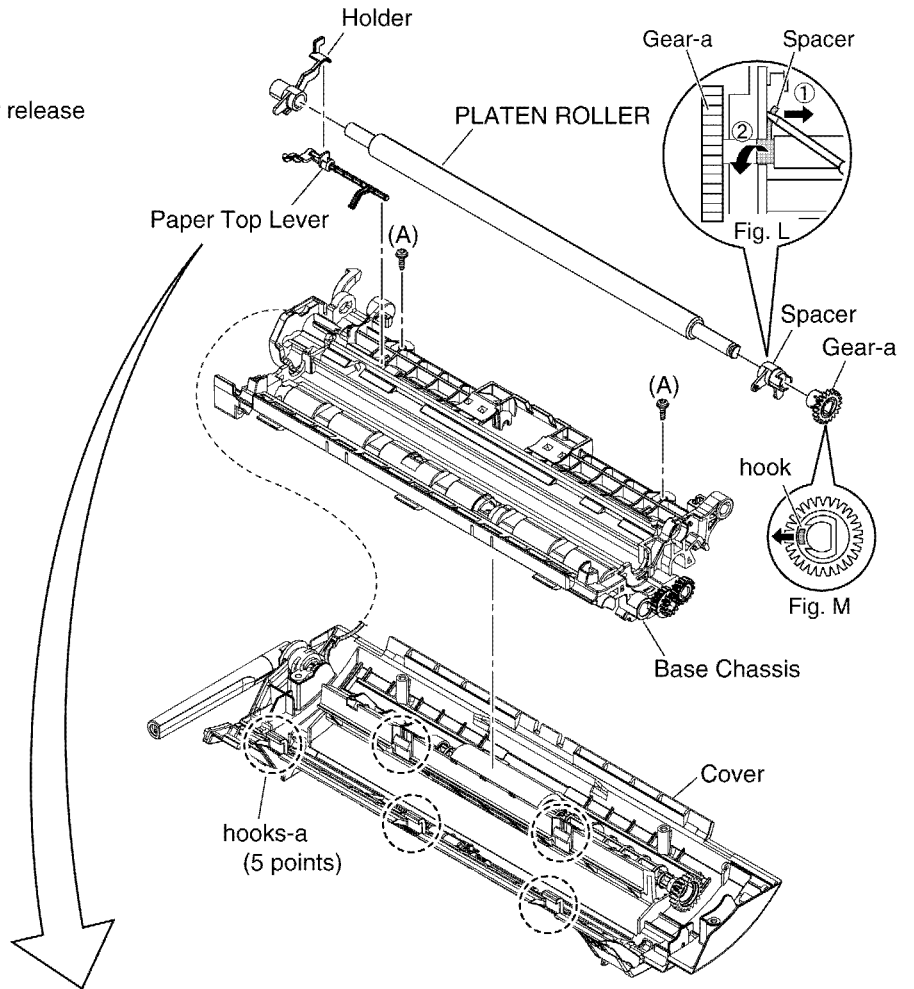
14.3.10. How to Remove the Platen Roller and Lock Lever

PROCEDURE: B-1→B-2→C-1→C-2

Ref. No. C-2 (1)

- 1) Release the Spacer, as shown in a Fig. L.
- 2) Release the hook of Gear-a, as shown in a Fig. M.
- 3) Remove the Gear-a.
- 4) Remove the PLATEN ROLLER.
- 5) Remove the 2 screws (A).
- 6) Remove the Base Chassis after release the 5 hooks-a.

(Lower Side View)



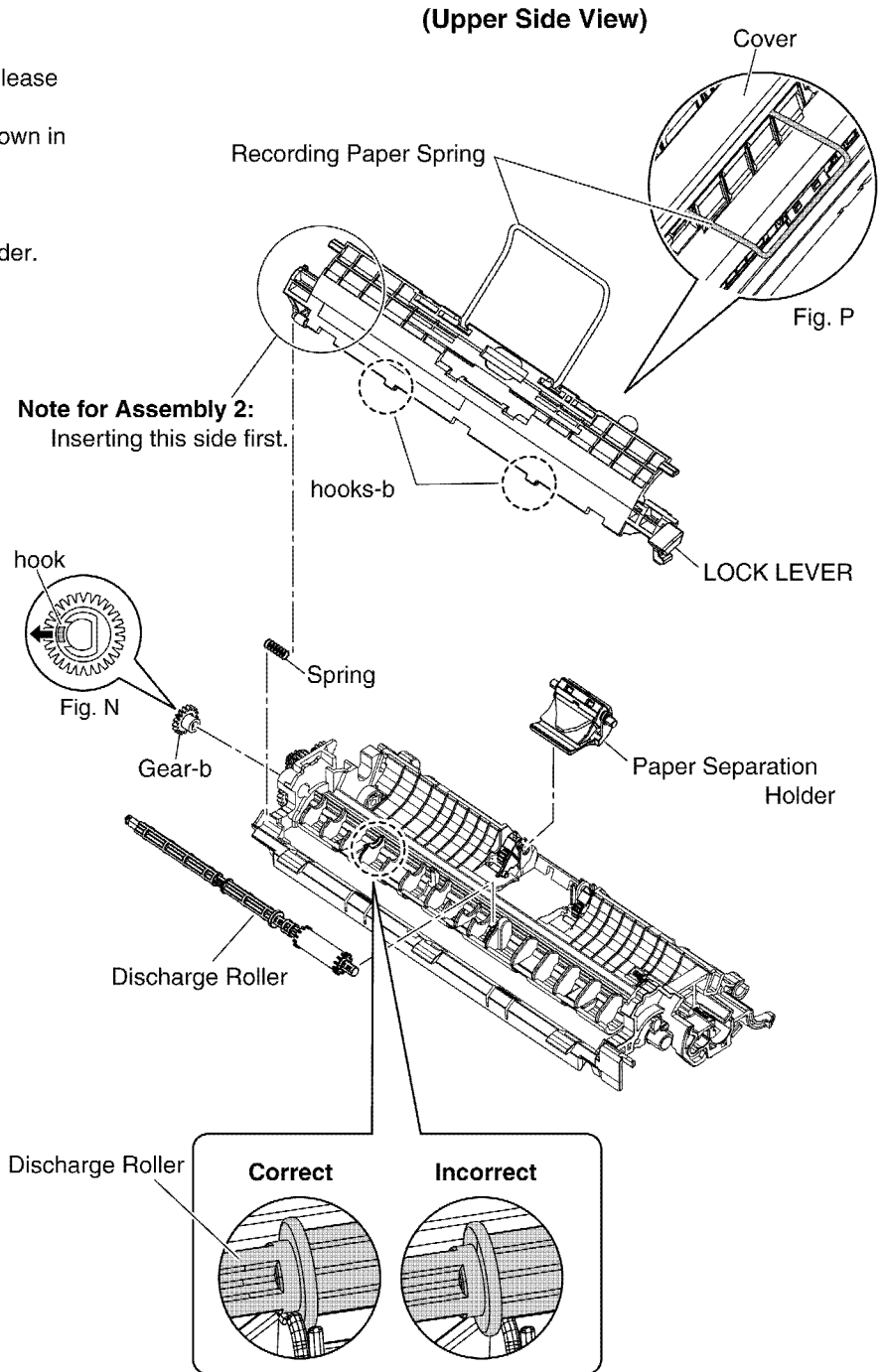
Ref. No. C-2 (2)

- 7) Remove the Spring.
- 8) Remove the LOCK LEVER after release the 2 hooks-b.
- 9) Release the hook of Gear-b, as shown in a Fig. N.
- 10) Remove the Gear-b.
- 11) Remove the Discharge Roller.
- 12) Remove the Paper Separation Holder.

Note for Assembly 1:

- When Base Chassis is inserted in the Cover, be careful of the insertion of Recording paper spring. (See Fig. P)

Note for Assembly 2:
Inserting this side first.



14.3.11. How to Remove the Pickup Roller and Antenna

PROCEDURE: B-1→B-2→C-1→C-2→C-3

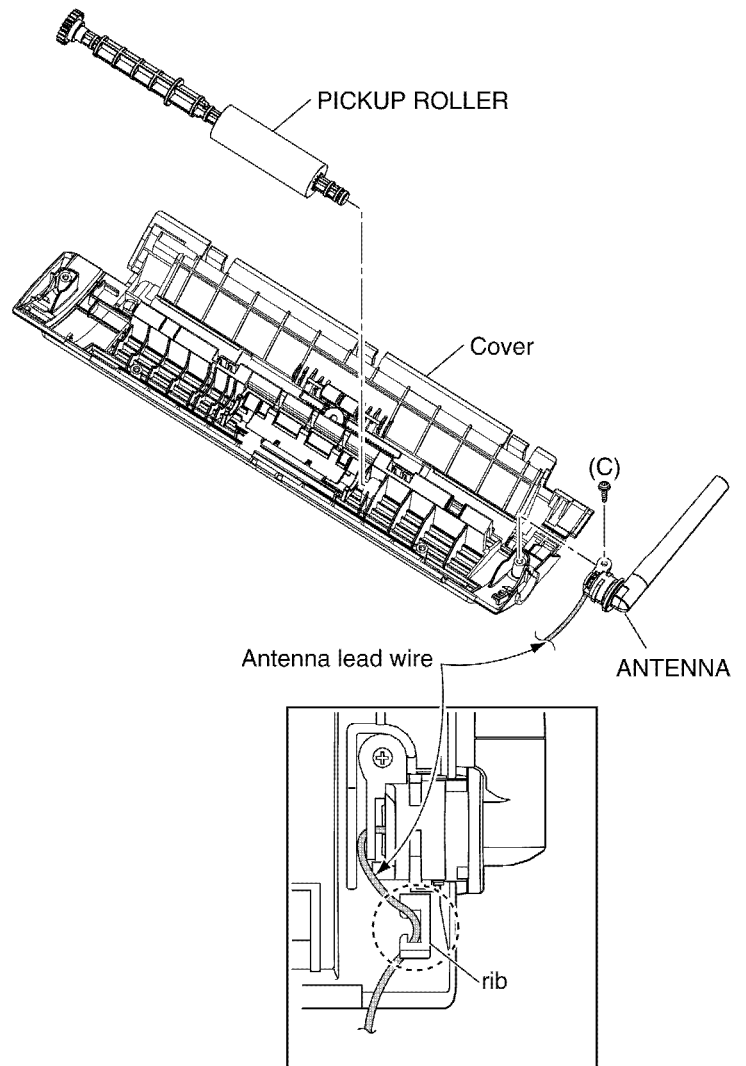
Ref. No. C-3

PICK UP ROLLER

- 1) Remove the PICK UP ROLLER.

ANTENNA

- 1) Remove the 1 screw (C).
- 2) Remove the ANTENNA.



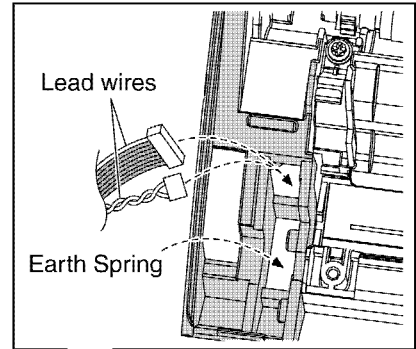
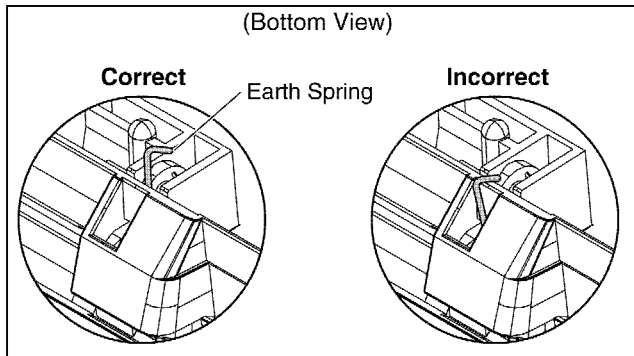
- Hook a Antenna lead wire on the rib, as shown in a figure.

14.3.12. How to Remove the Operation Panel

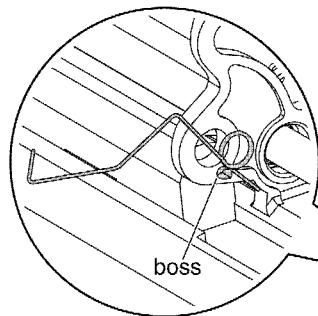
PROCEDURE: B-1→B-2→D-1

Ref. No. D-1

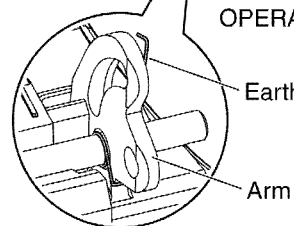
- 1) Disconnect the Operation lead wire and Mic lead wire on the Digital Board. (Refer to B-2.)
And remove the Core on the Operation lead wire.
- 2) Open the Operation Panel.
- 3) Release the both Arms, as shown in a Fig. Q.
- 4) **Release the Earth Spring from the Main Cabinet certainly.**
- 5) Remove the OPERATION PANEL from Main Cabinet.



Note for Assembly:
Insert the Lead Wires and Earth Spring, as shown in a figure.



Note for Assembly:
Install the Operation Panel in the Main Cabinet as a Earth Spring hangs on boss.



Caution:
Please remove the Operation Panel after releasing Earth Spring from Main Cabinet so that spring may not be deformed.

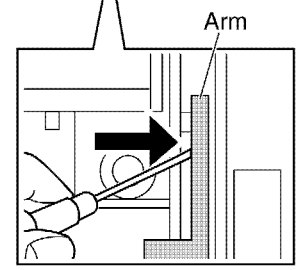
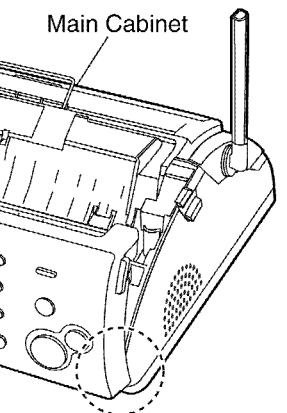


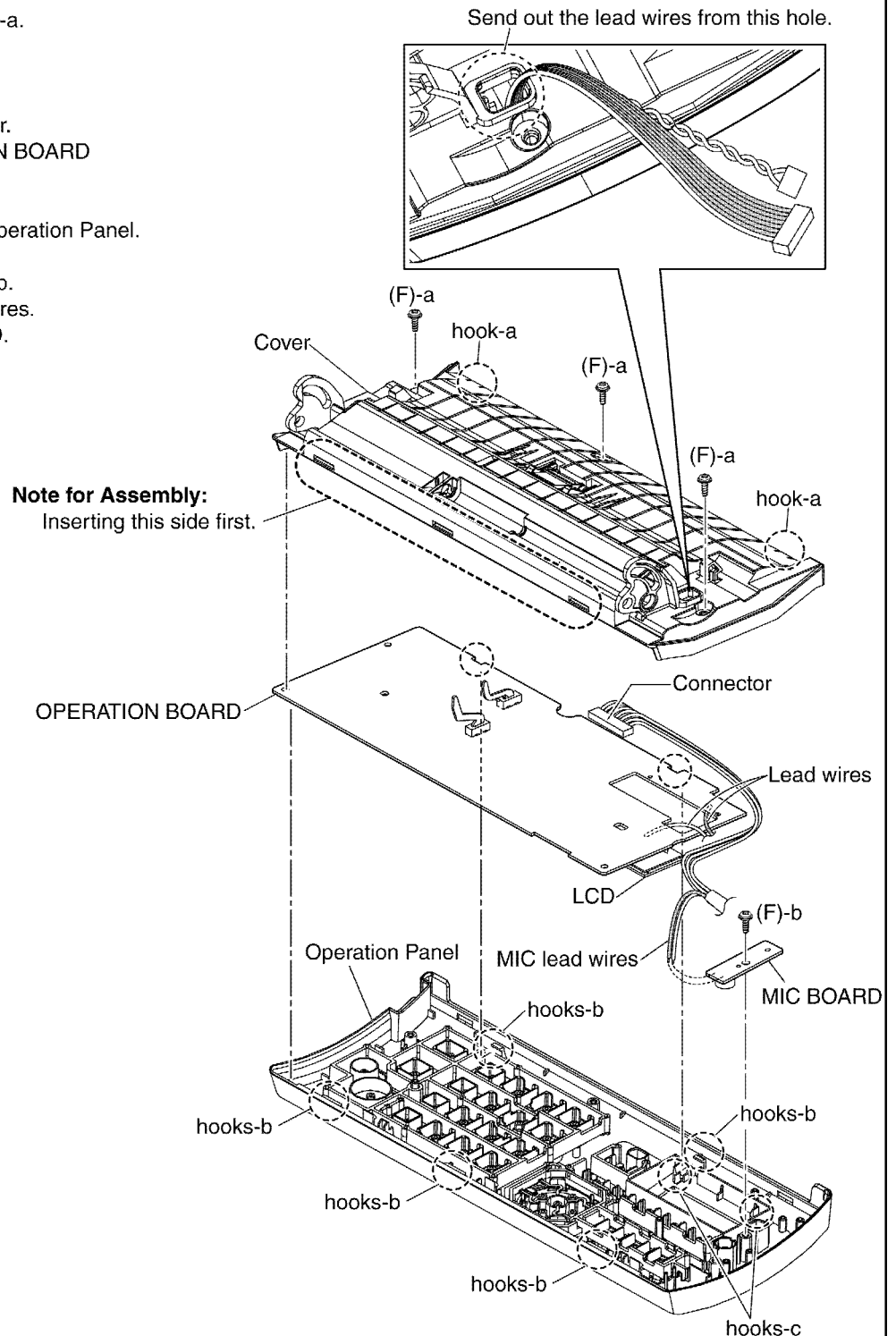
Fig. Q

14.3.13. How to Remove the Operation Board, MIC Board and LCD

PROCEDURE: B-1→B-2→D-1→D-2

Ref. No. D-2

- 1) Remove the 3 screws (F)-a.
- 2) Release the 2 hooks-a.
- 3) Remove the Cover.
- 4) Release the 5 hooks-b.
- 5) Disconnect the Connector.
- 6) Remove the OPERATION BOARD from Operation Panel.
- 7) Release the 2 hooks-c.
- 8) Remove the LCD from Operation Panel.
- 9) Unsolder the Lead wires.
- 10) Remove the 1 screw (F)-b.
- 11) Unsolder the MIC lead wires.
- 12) Remove the MIC BOARD.



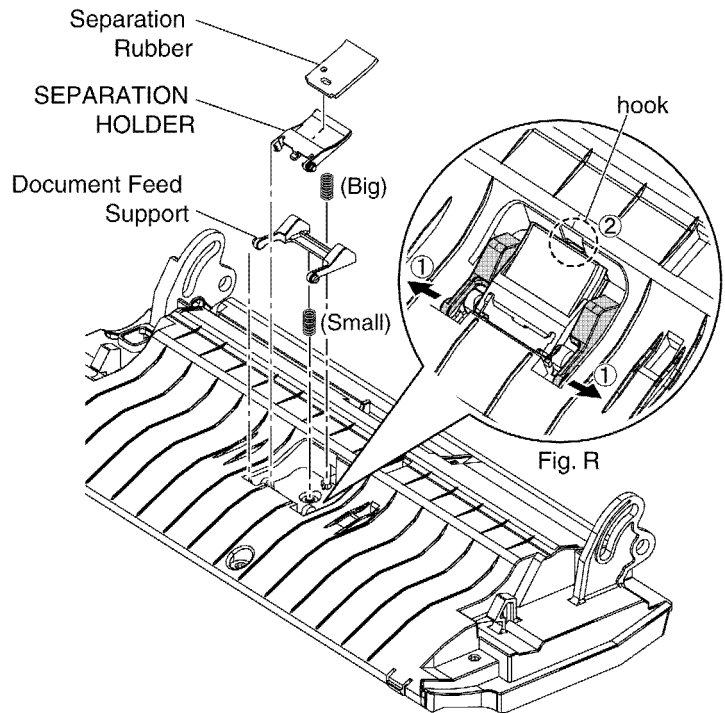
14.3.14. How to Remove the Separation Holder and Exit Roller

PROCEDURE: B-1→B-2→D-1→D-3

Ref. No. D-3

SEPARATION HOLDER

- 1) Release the hook. (See Fig. R)
- 2) Remove the Document Feed Support. (See Fig. R)
- 3) Remove the SEPARATION HOLDER.

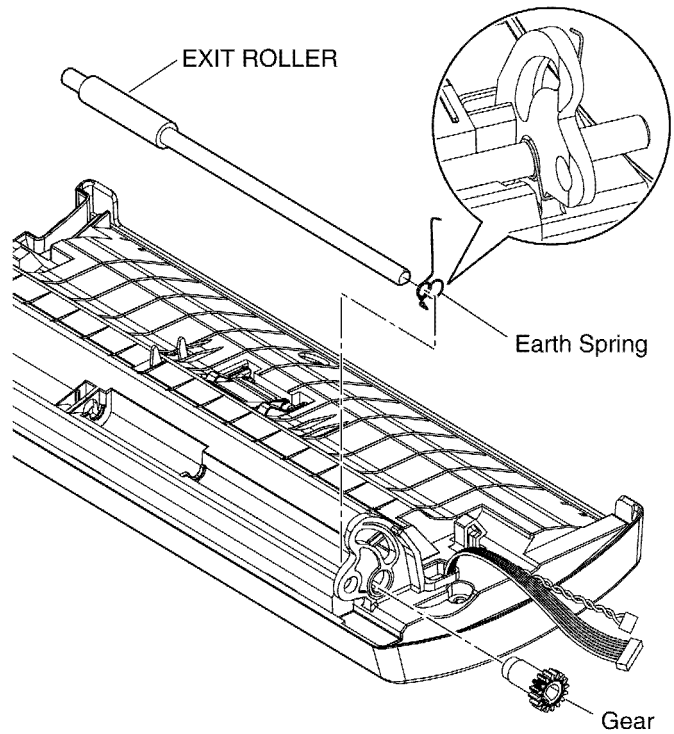


EXIT ROLLER

- 1) Pull out the Gear from Exit Roller.
- 2) Remove the EXIT ROLLER.

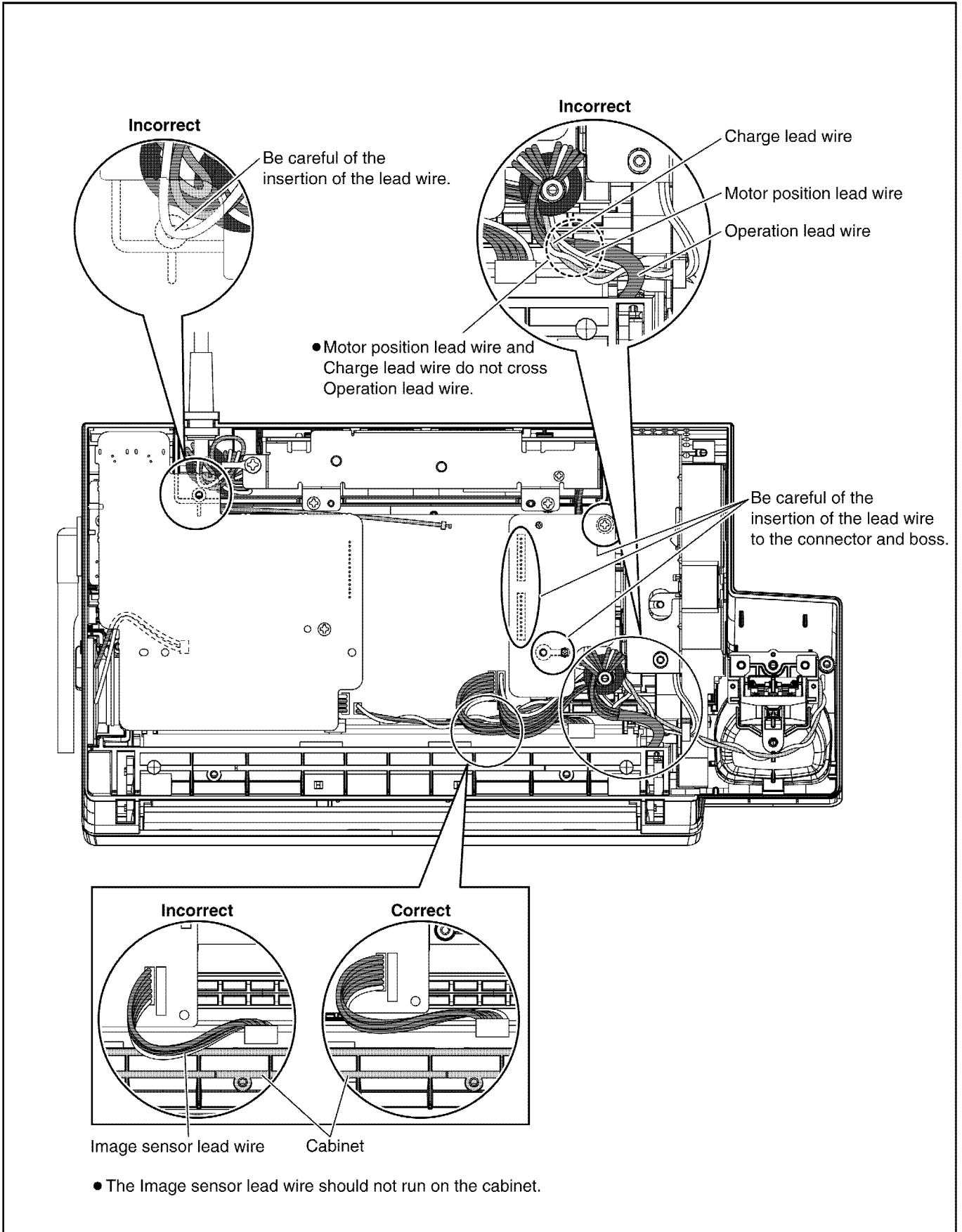
Caution:

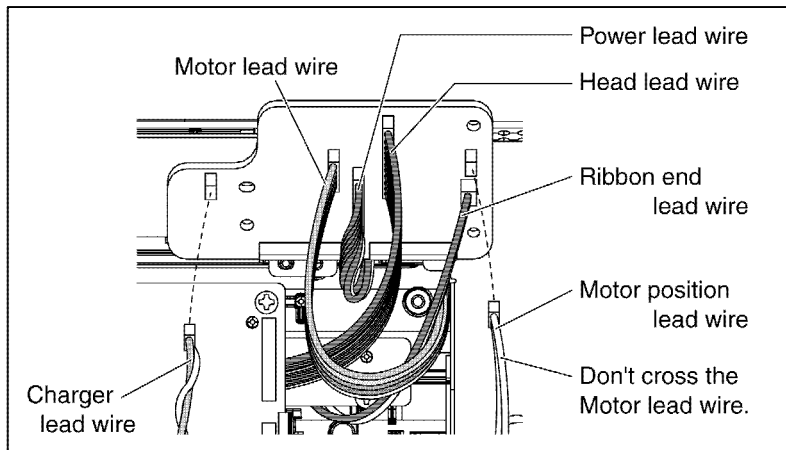
Be careful not to deform the Earth Spring.



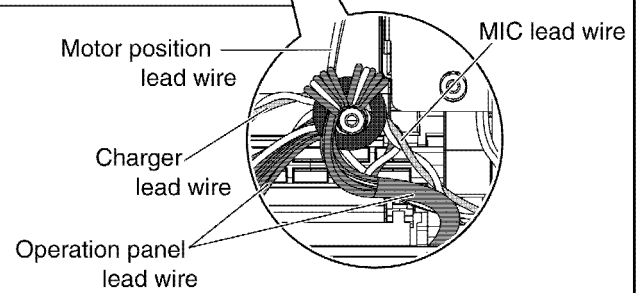
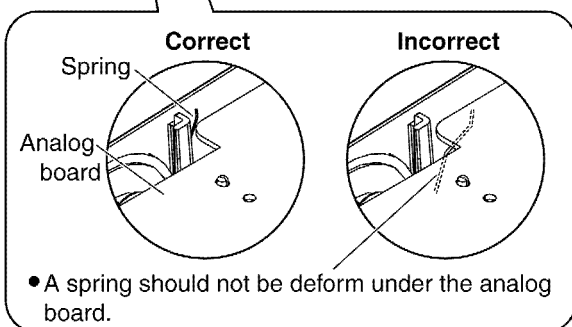
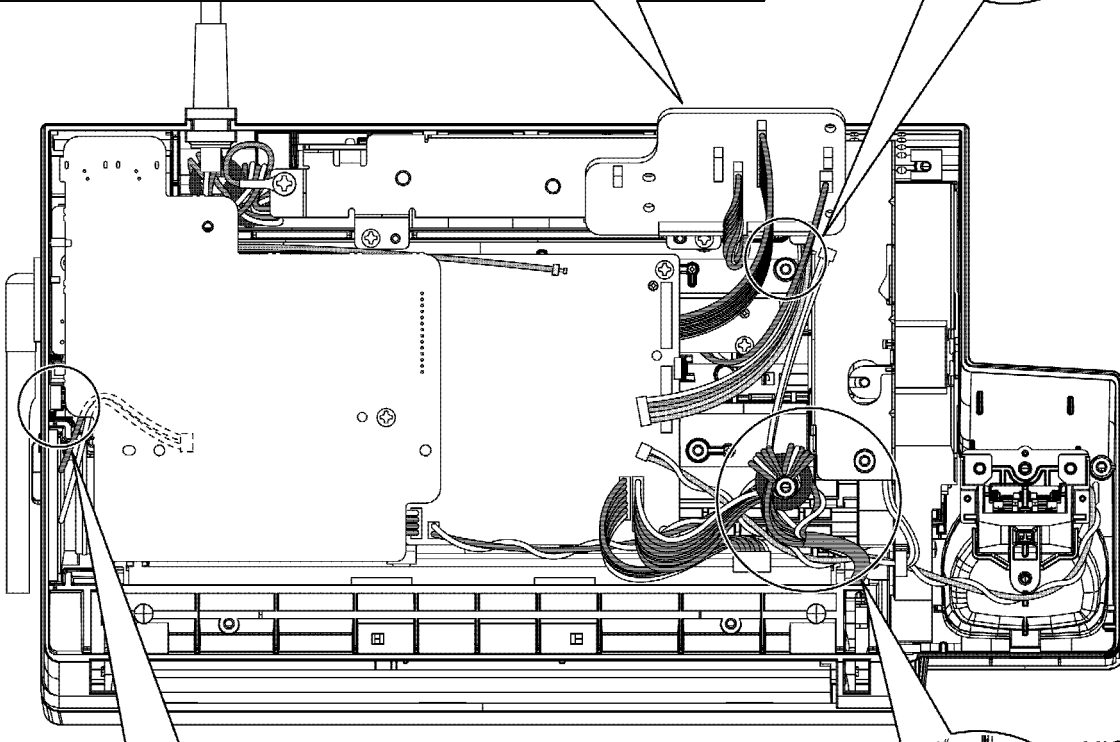
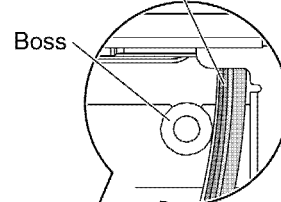
14.3.15. Installation Position of the Lead Wires

14.3.15.1. Lower Section

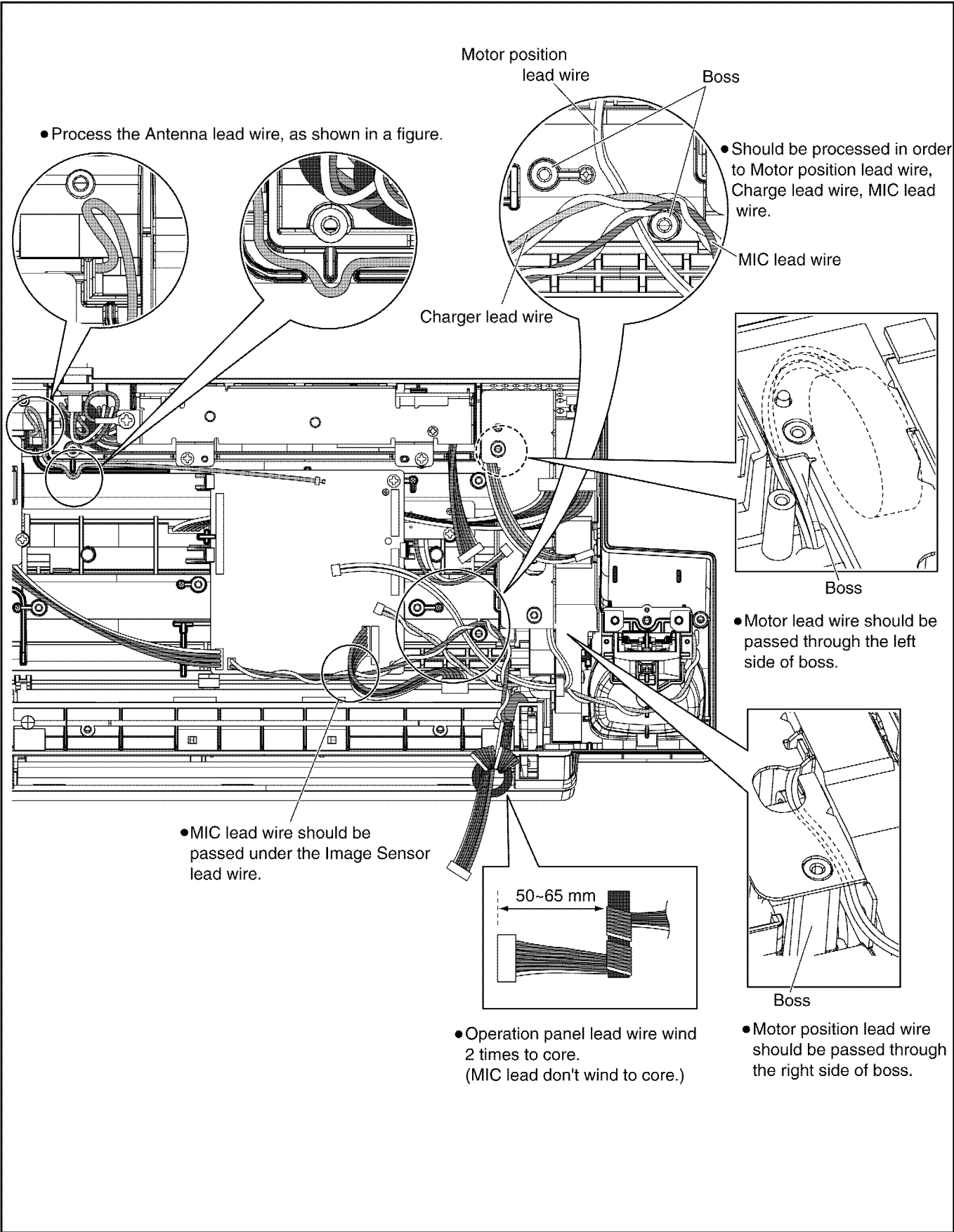




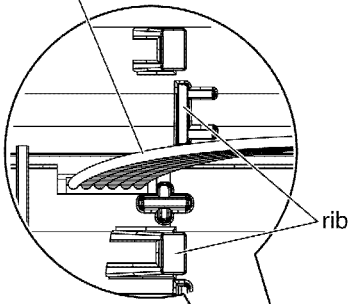
• Motor lead wire should be passed through the right side of boss.



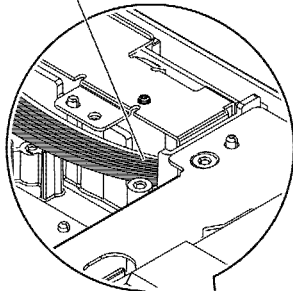
• Insert the Core in boss after processing the lead wire.



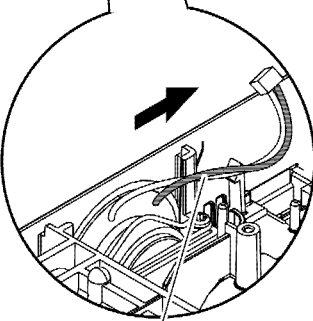
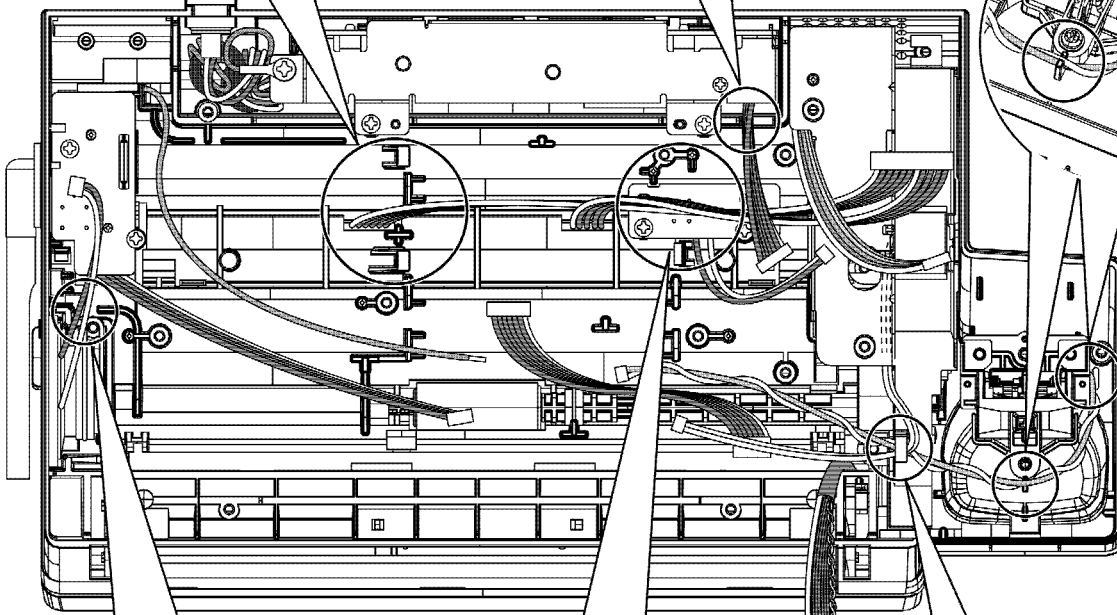
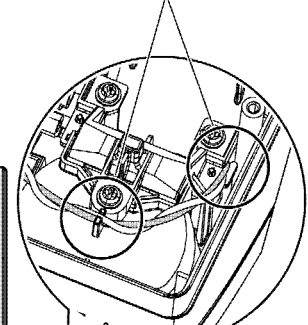
• Head lead wire should be passed between the rib.



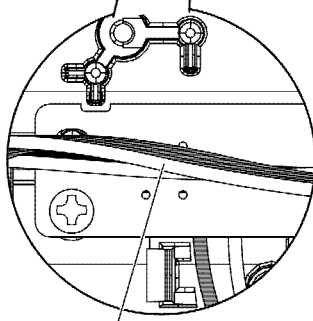
• Power lead wire should be passed through the notch part.



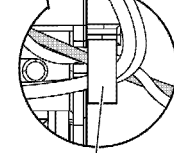
• Charger lead wire is to be caught in rib, as shown in a figure.



• Push the Speaker lead wire into the direction of the arrow when installing in the Analog board.

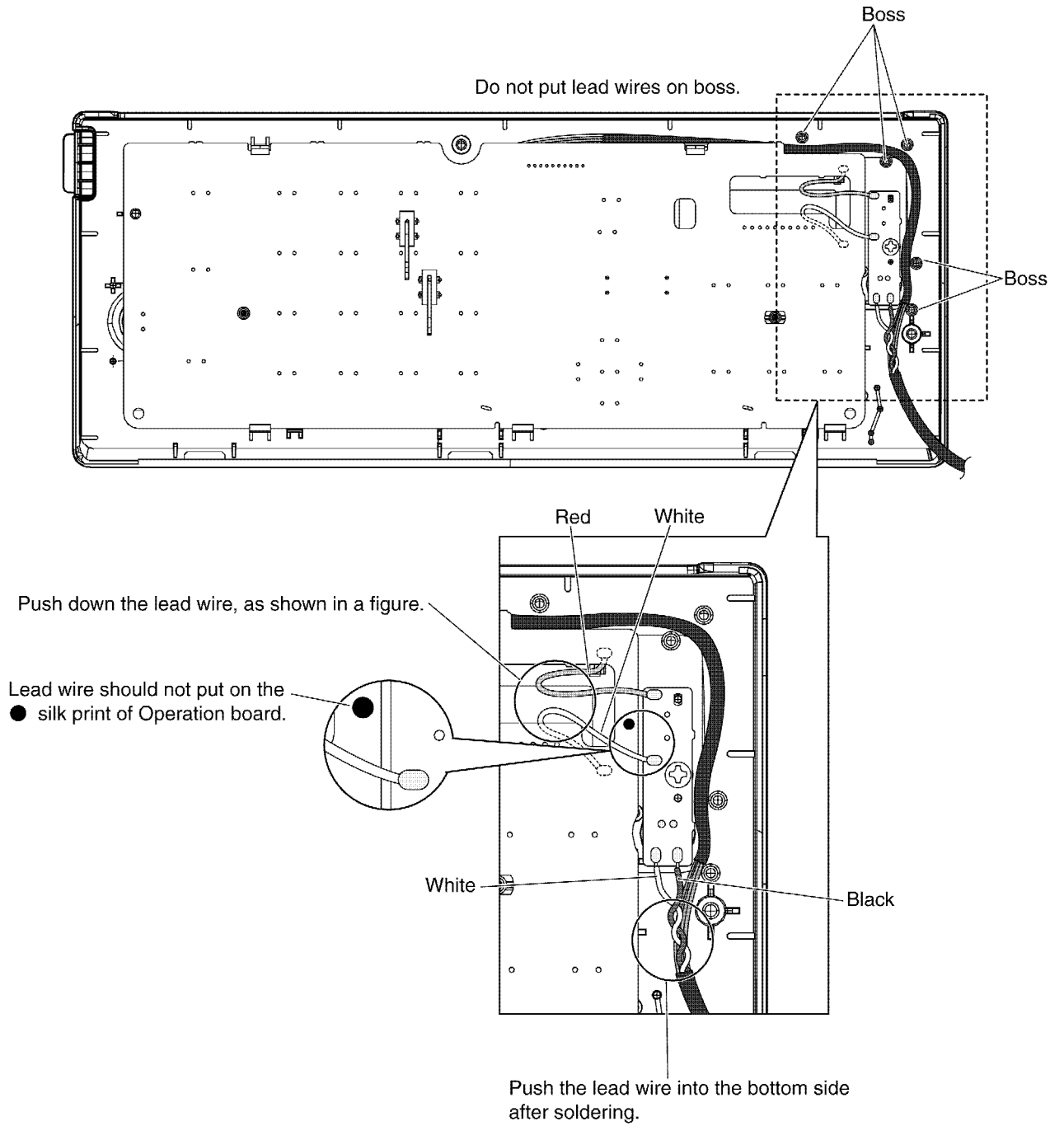


• Head lead wire should be passed on the Film end sensor board.

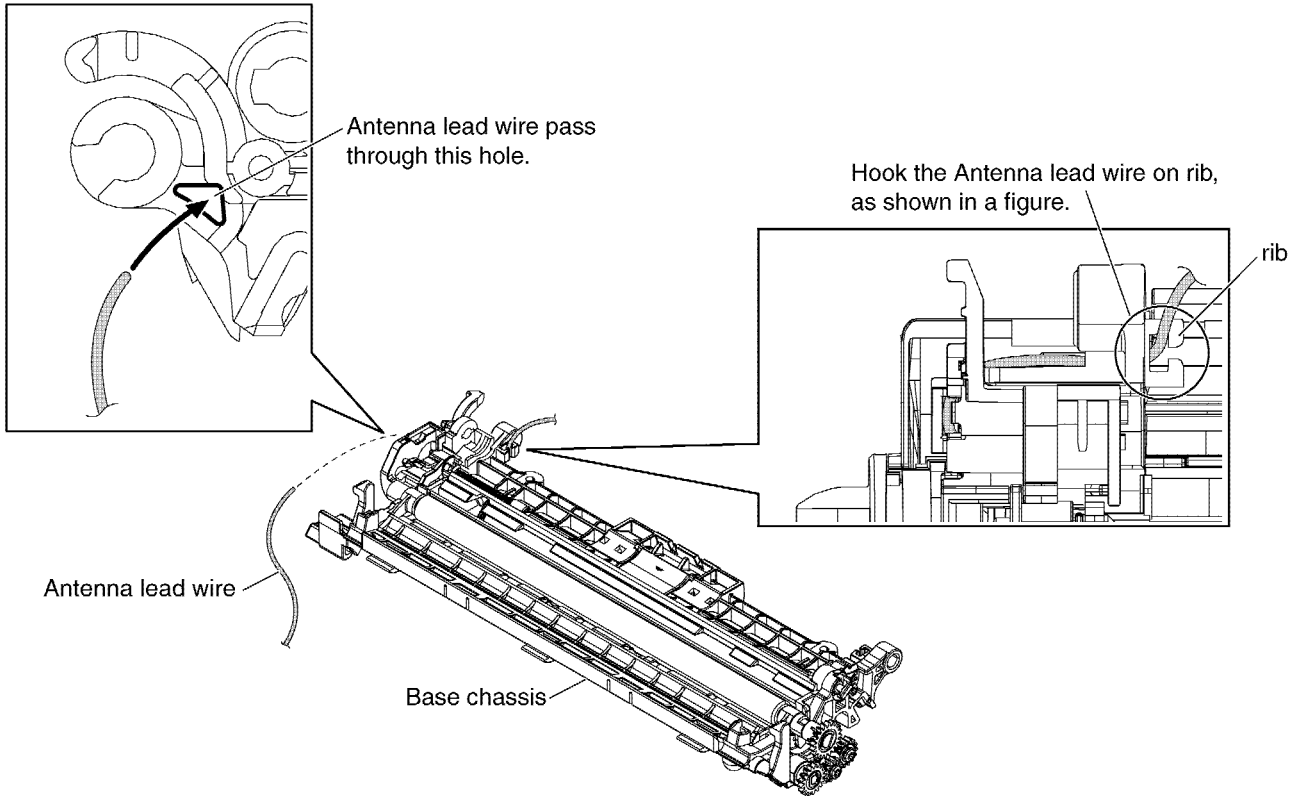


• Hook the Motor position lead wire and Charge lead wire on rib, as shown in a figure.

14.3.15.2. Operation Panel Section



14.3.15.3. Back Cover Section

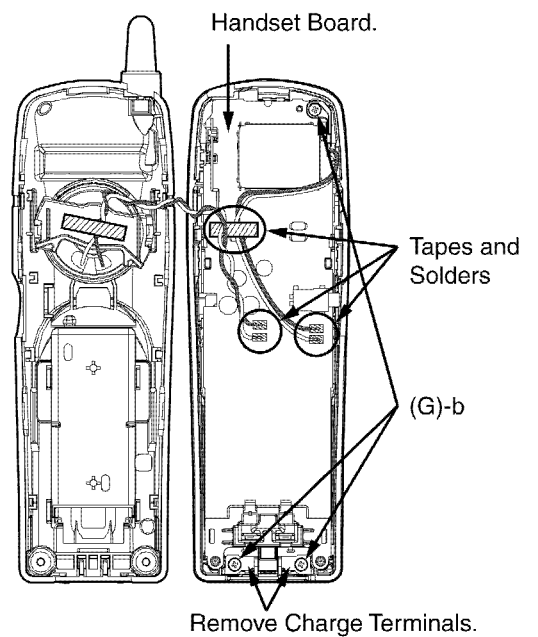
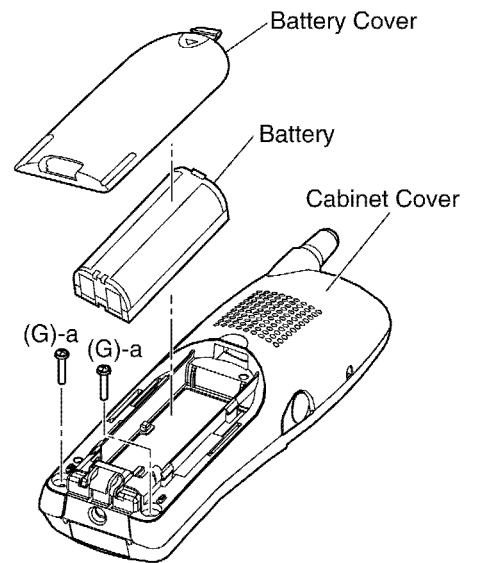
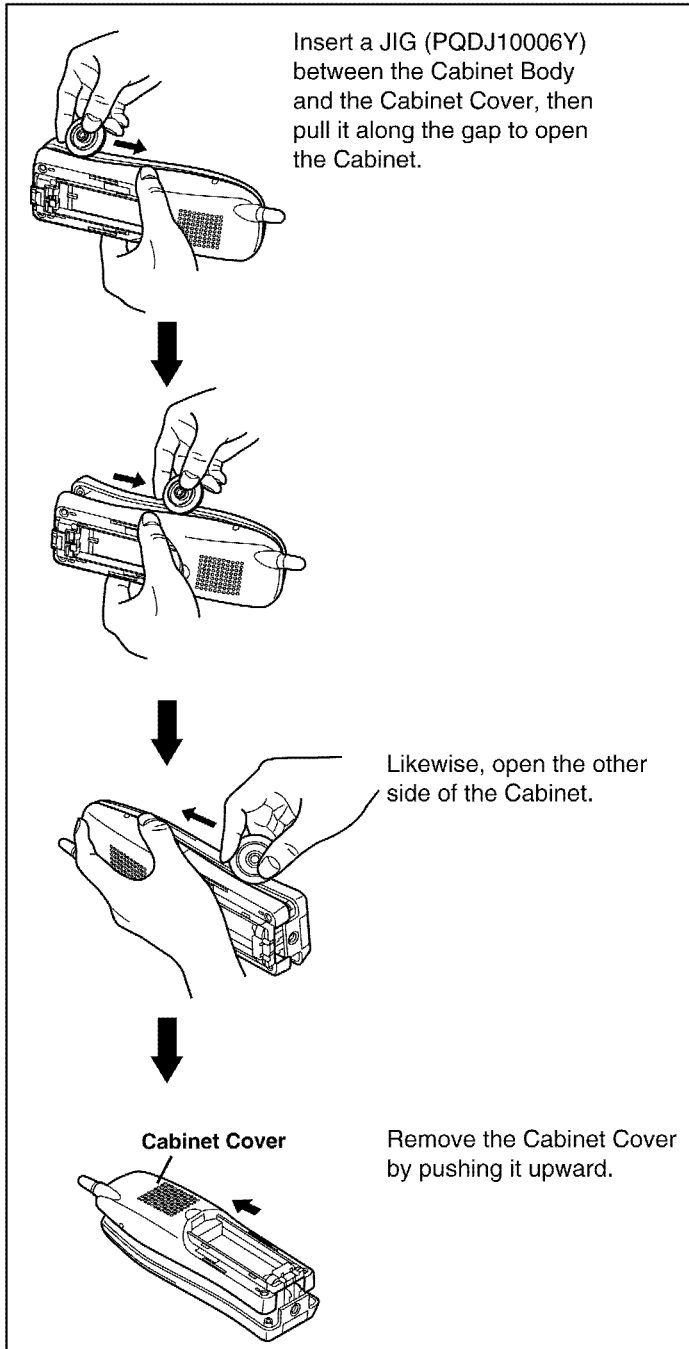


14.3.16. How to Remove the Handset Board

PROCEDURE: E-1

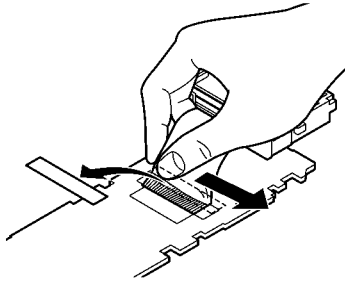
Ref. No. E-1

- 1) Remove the Battery Cover.
- 2) Remove the Battery.
- 3) Remove the 2 screws (G)-a.
- 4) Remove the Cabinet Cover. (See Fig. S)
- 5) Remove the Tapes and Solders.
- 6) Remove the 3 screws (G)-b.
- 7) Remove the Charge Terminals.
- 8) Remove the Handset Board.



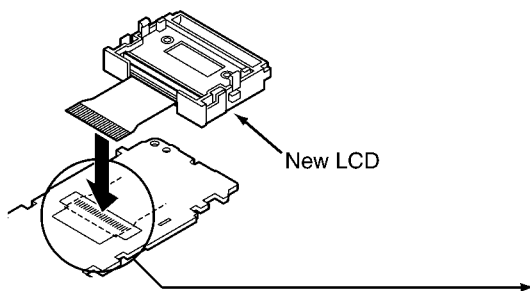
14.3.16.1. How to Replace the Handset LCD

①



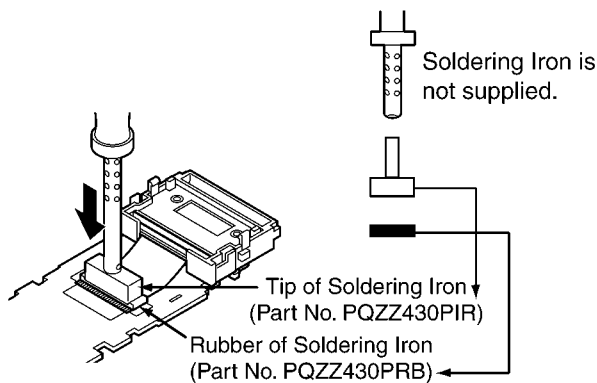
Remove the tape, and then peel off the FFC of LCD in the direction of the arrow not to damage the foil on the P.C. Board.

②



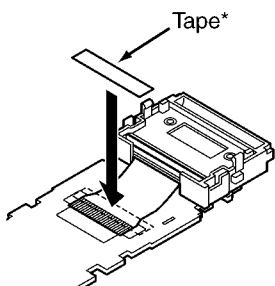
Fit the Heatseal of a New LCD to the P.C. Board.

③

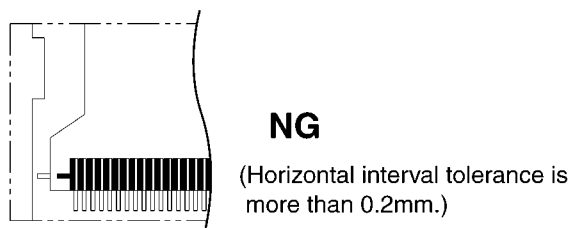
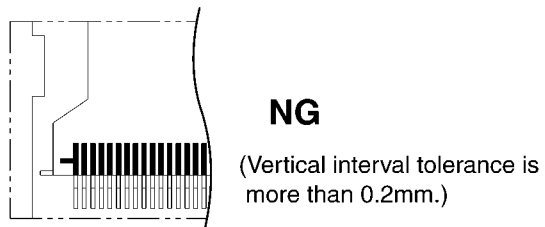
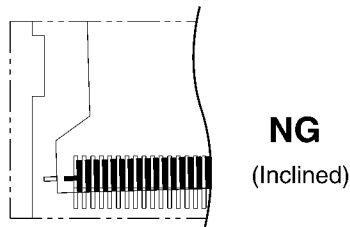
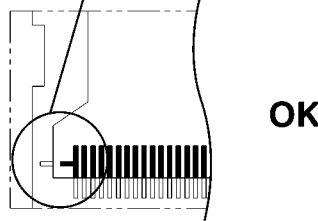
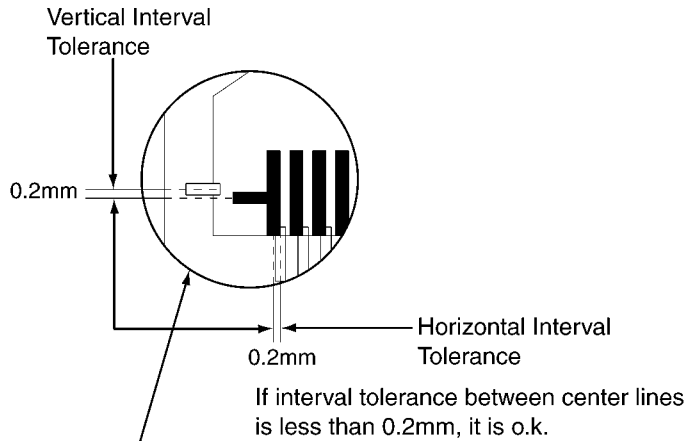


Heatweld with the Tip of Soldering Iron about 5 to 10 seconds (in case of 60W soldering iron).

④



Stick the Tape* over the FFC.
* Use the Tape which was removed first.



15 Measurements and Adjustments

15.1. Things to Do after Replacing IC

15.1.1. X201 (Handset RF) Check

Equipment: Frequency counter

Check Point for measurement: BCK (Handset)

Checking tolerance: 13.824MHz \pm 100Hz (Handset)

15.1.1.1. Check and Adjust X201 (Handset RF) Frequency

1. Set DC power supply to 2.6V.
2. Set up Handset in TEST mode (Adjustment flow).
3. Press [1] key to Adjust Crystal mode. ("Clock Adj" is displayed on LCD)
 - * Check BCK frequency.
4. If the BCK frequency is out of the checking tolerance (\pm 100Hz), adjust to Adjustment tolerance (\pm 30Hz) by pressing [▲] or [▼] key.
 - Adjustment Tolerance: 13.824MHz \pm 30Hz
5. Press [TALK] key to write the new frequency factor in EEPROM.
6. Turn the power off. Then this value is available.

When you have replaced IC201 and IC241, adjust X201 by the procedure above.

Cross Reference:

Adjustment Mode Flow Chart for Handset (P.201)

15.1.1.2. X801 (Base RF Check)

Equipment: Frequency counter

Check Point for measurement: BCK (Base)

Checking tolerance: 13.824 MHz \pm 100 Hz (Base)

15.1.1.3. Check and Adjust X801 (Base RF) Frequency

1. Set up Base Unit in TEST mode. (CORDLESS TEST)
2. Press [SET] key and select "3. SND Data mode" by pressing [▼] key.
3. Press the [SET] key 2 times.
 - Adjustment Tolerance: 13.824MHz \pm 30Hz
4. If the BCK frequency is out of the checking tolerance (\pm 100Hz), adjust to Adjustment tolerance (\pm 30Hz) by follows;

Adjustment tolerance (\pm 30Hz)

1. Press the [MUTE] Key.

LCD

4RC A8 3 0 01

2. Press the [HELP] Key 2 times.

4RC A8 3 0 01
#98 FRQ = 25

Adjust the frequency by pressing number with number key or [▼][▲] key.

Note: Need to press [SET] key to set the frequency.

Adjustment Tolerance : 13.824MHz \pm 30Hz

3. Turn the power off. Then this value is available.

When you have replaced IC801 and IC805, adjust X801 by the procedure above.

15.1.2. Adjust Battery Low Detector Voltage (Handset)

After Handset's DSP (IC201) or EEPROM (IC202) replacement, Re-writing Battery Low voltage to EEPROM is required. With following Handset Adjustment Flow, adjust DC power supply and DC voltmeter by the procedure below.

1. Set DC power supply to 2.6V.
2. Set up Handset in TEST mode (Adjustment flow).
3. Press [1] key and [OFF] key to Adjust Batt Low mode. ("Bat Adj" is displayed on LCD)
4. Change the voltage of the DC power supply to 2.3V accurately.
 - * Check the voltage at P.C. board pads because some voltage drops occur due to the usage of long or thin cables.
5. Press [TALK] key to write voltage value in EEPROM.
6. Turn the power off. Then this value is available.

Note:

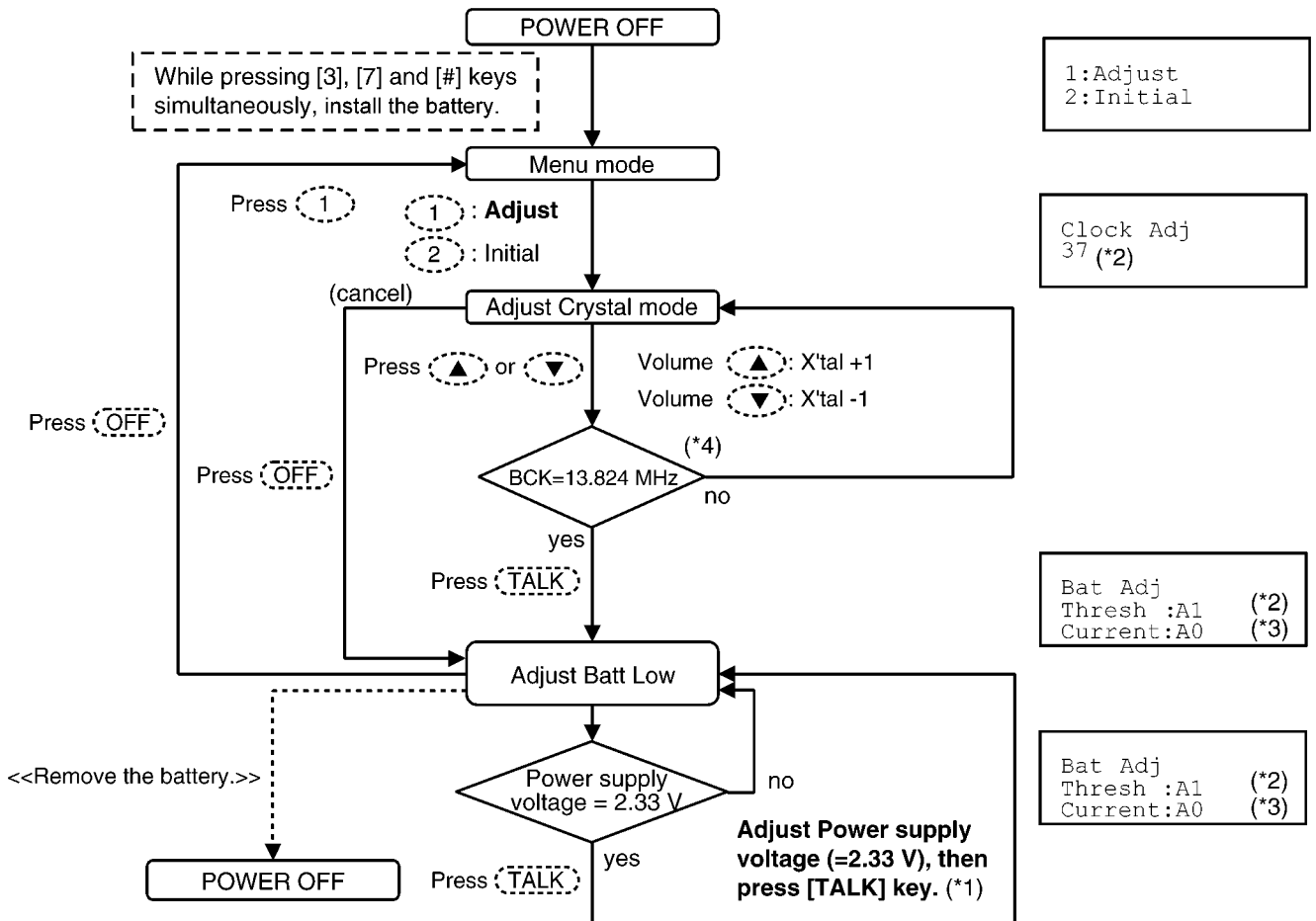
Refer to **Handset Reference Drawing** (P.203) for connection of DC power supply and voltmeter.

Cross Reference:

Adjustment Mode Flow Chart for Handset (P.201)

15.1.3. Adjustment Mode Flow Chart for Handset

LCD (Handset)



Cross Reference

(*1) **Adjust Battery Low Detector Voltage (Handset)** (P.200)

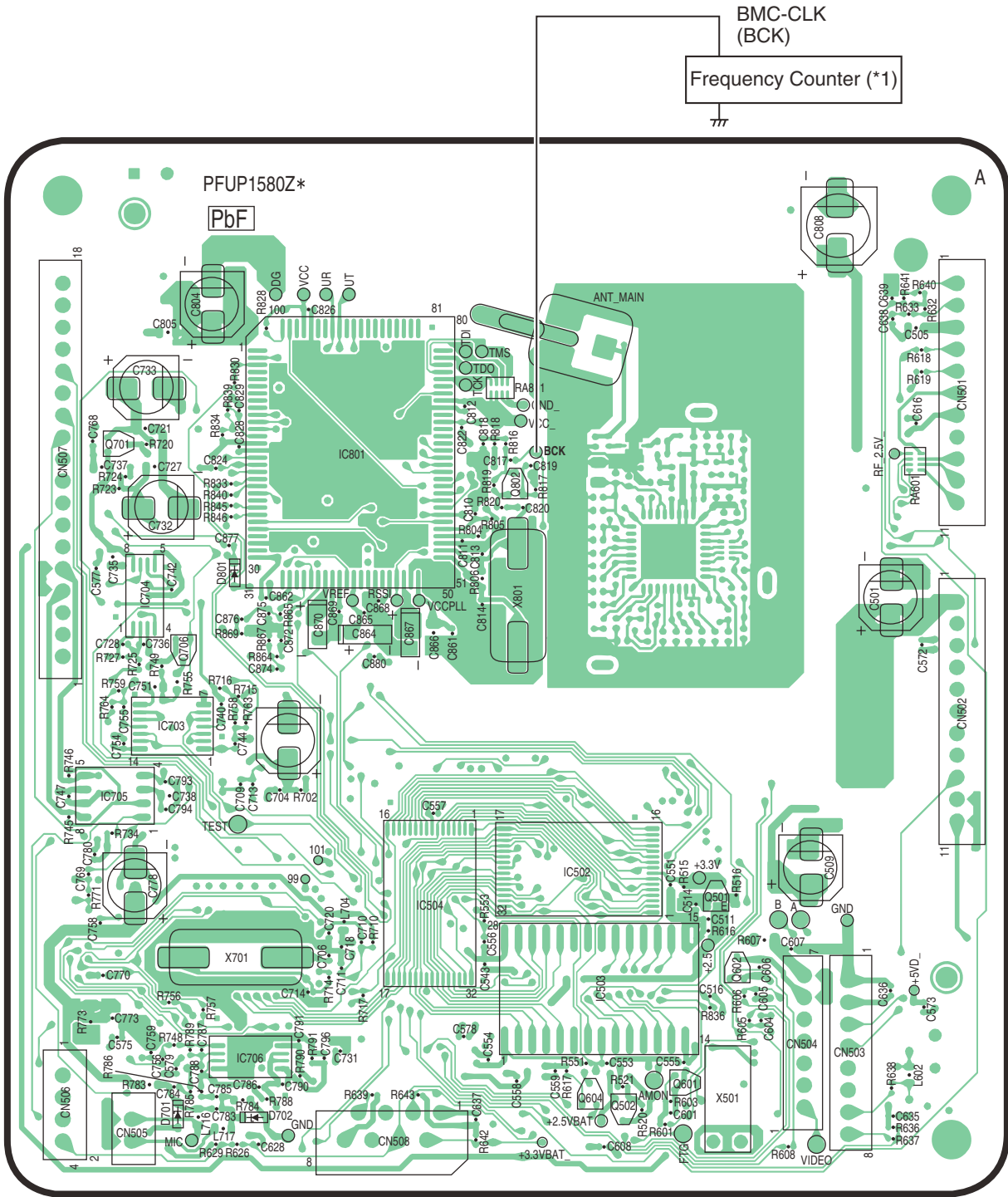
Note:

- (*2) These are the default values.
- (*3) These values may not be fixed depending on the battery strength.
- (*4) Refer to the table below if using Spectrum Analyzer for checking.

	BCK	TEST MODE Frequency 1 Channel (at Antenna)
	13.824 MHz	→ 2400.724512 MHz
Adjustment Tolerance	±30 Hz	→ ±5.20 kHz
Checking Tolerance	±100 Hz	→ ±17.36 kHz

15.2. Cordless Base Reference Drawing

When connection the Simulator and Equipment for checking, please refer to below.

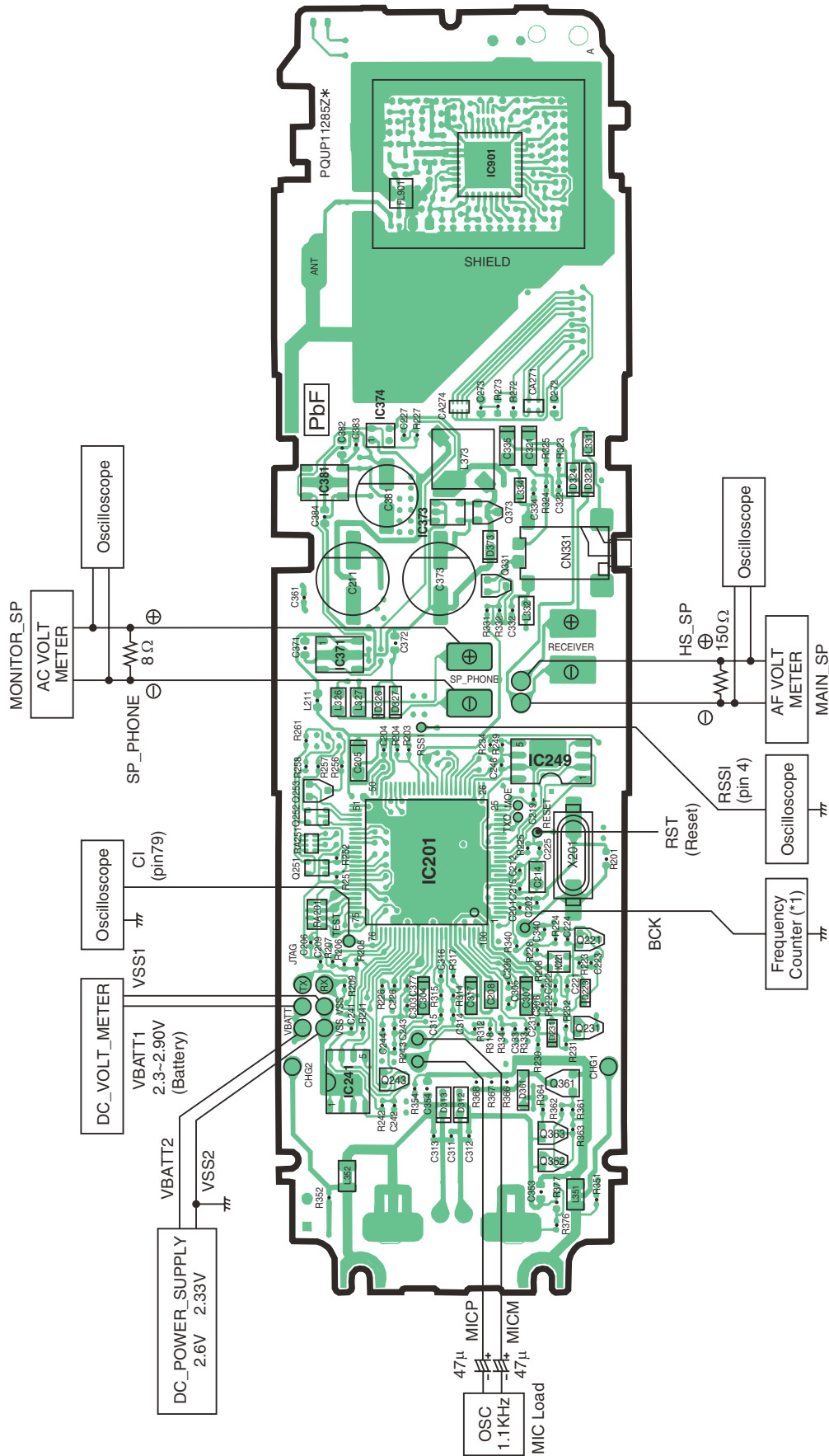


(Digital Board: Bottom View)

Note: (*1) is referred to No.3 of Check Table for RF Part (P.165)

15.3. Handset Reference Drawing

When connecting the Simulator and Equipment for checking, please refer to the illustration below.



Note: (*1) is referred to No.3 of Check Table for RF Part (P.165)

15.4. Frequency Table

Channel	TX/RX Frequency (MHz)	TEST MODE Frequency (MHz)
1	2400.914355	2400.724512
2	2401.808203	2401.618359
3	2402.698096	2402.508252
4	2403.591943	2403.402100
5	2404.481836	2404.291992
6	2405.375684	2405.185840
7	2406.265576	2406.075732
8	2407.159424	2406.969580
9	2408.049316	2407.859473
10	2408.943164	2408.753320
11	2409.833057	2409.643213
12	2410.726904	2410.537061
13	2411.616797	2411.426953
14	2412.510645	2412.320801
15	2413.400537	2413.210693
16	2414.294385	2414.104541
17	2415.184277	2414.994434
18	2416.078125	2415.888281
19	2416.968018	2416.778174
20	2417.861865	2417.672021
21	2418.751758	2418.561914
22	2419.645605	2419.455762
23	2420.535498	2420.345654
24	2421.429346	2421.239502
25	2422.319238	2422.129395
26	2423.213086	2423.023242
27	2424.102979	2423.913135
28	2424.996826	2424.806982
29	2425.886719	2425.696875
30	2426.780566	2426.590723
31	2427.670459	2427.480615
32	2428.564307	2428.374463
33	2429.454199	2429.264355
34	2430.348047	2430.158203
35	2431.237939	2431.048096
36	2432.131787	2431.941943
37	2433.021680	2432.831836
38	2433.915527	2433.725684
39	2434.805420	2434.615576
40	2435.699268	2435.509424
41	2436.589160	2436.399316
42	2437.483008	2437.293164
43	2438.372900	2438.183057
44	2439.266748	2439.076904
45	2440.156641	2439.966797
46	2441.050488	2440.860645
47	2441.940381	2441.750537
48	2442.834229	2442.644385
49	2443.724121	2443.534277
50	2444.617969	2444.428125

Channel	TX/RX Frequency (MHz)	TEST MODE Frequency (MHz)
51	2445.507861	2445.318018
52	2446.401709	2446.211865
53	2447.291602	2447.101758
54	2448.185449	2447.995605
55	2449.075342	2448.885498
56	2449.969189	2449.779346
57	2450.859082	2450.669238
58	2451.752930	2451.563086
59	2452.642822	2452.452979
60	2453.536670	2453.346826
61	2454.426563	2454.236719
62	2455.320410	2455.130566
63	2456.210303	2456.020459
64	2457.104150	2456.914307
65	2457.994043	2457.804199
66	2458.887891	2458.698047
67	2459.777783	2459.587939
68	2460.671631	2460.481787
69	2461.561523	2461.371680
70	2462.455371	2462.265527
71	2463.345264	2463.155420
72	2464.239111	2464.049268
73	2465.129004	2464.939160
74	2466.022852	2465.833008
75	2466.912744	2466.722900
76	2467.806592	2467.616748
77	2468.696484	2468.506641
78	2469.590332	2469.400488
79	2470.480225	2470.290381
80	2471.374072	2471.184229
81	2472.263965	2472.074121
82	2473.157813	2472.967969
83	2474.047705	2473.857861
84	2474.941553	2474.751709
85	2475.831445	2475.641602
86	2476.725293	2476.535449
87	2477.615186	2477.425342
88	2478.509033	2478.319189
89	2479.398926	2479.209082
90	2480.292773	2480.102930

16 Maintenance

16.1. Maintenance Items and Component Locations

16.1.1. Outline

Maintenance and repairs are reformed 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

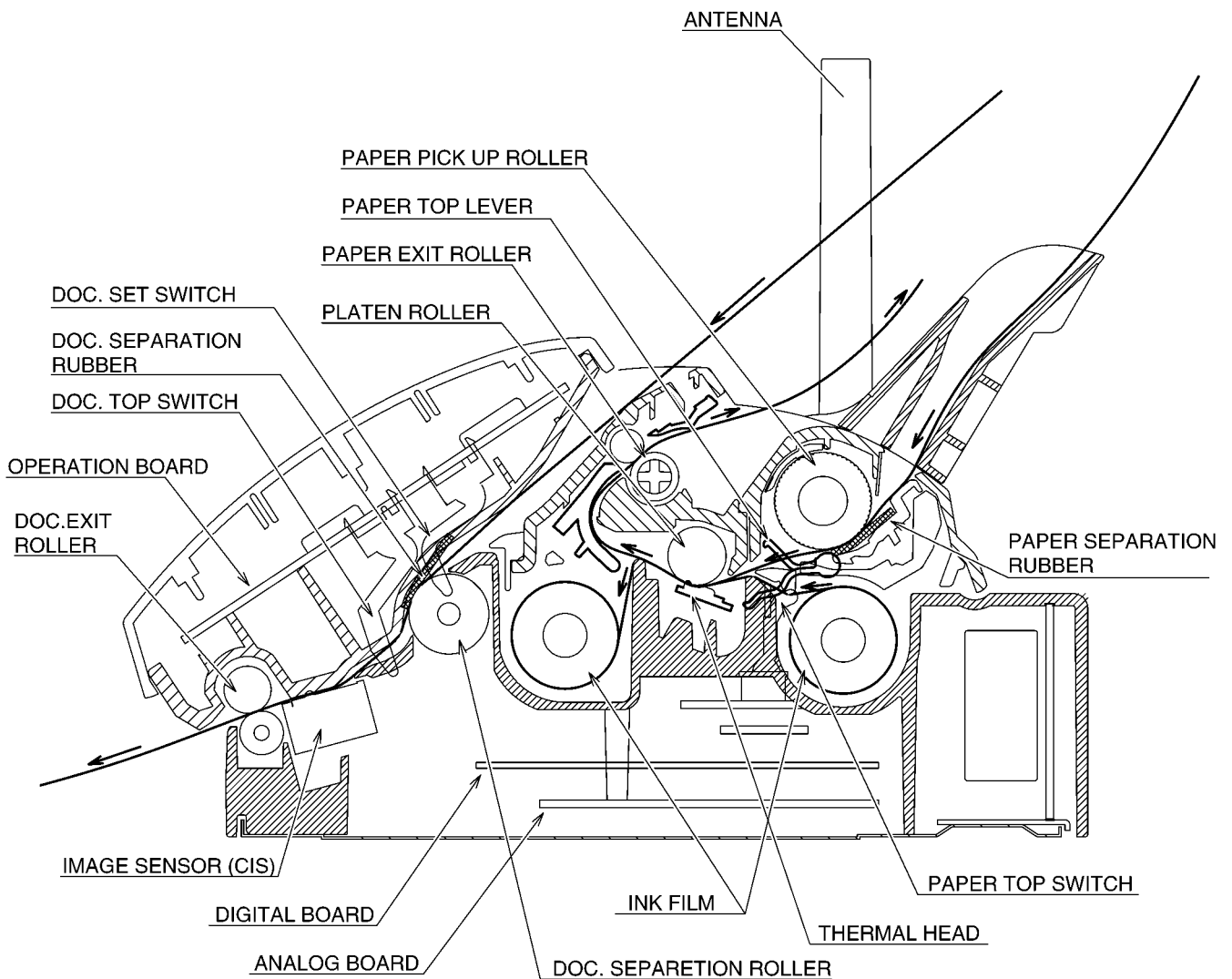
6. Confirm normal operation of the equipment

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.

16.1.2. Maintenance Check Items/Component Locations



16.1.2.1. 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/recording paper feeder/scanner glass cleaning (P.215).
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.217).
5	Sensors	Document top sensor (SW351), Document set sensor (SW352), Cover open sensor (SW1001), Paper top sensor (SW1001), Film detection sensor (SW1002), Film end sensor (SW1003) . Confirm the operation of the sensors.	See Maintenance Check Items/Component Locations (P.205) and How to Remove the P.C. Boards and Speaker (P.178).
6	Glass	If the glass is dirty, clean them with a dry soft cloth.	Refer to Document feeder/recording paper feeder/scanner glass cleaning (P.215).
7	Abnormal, wear and tear or loose parts	Replace the part. Check if the screws are tight on all parts.	—

16.1.2.2. Maintenance Cycle

No.	Item	Cleaning Cycle	Replacement	
			Cycle	Procedure
1	Separation Roller (Ref. No. 145)* ²	3 months	7 years* ¹ (31,500 documents)	Refer to How to Remove the Gear Block and Separation Roller (P.180).
2	Separation Rubber (Ref. No. 13)	3 months	7 years (31,500 documents)	Refer to Document feeder/recording paper feeder/scanner glass cleaning (P.215).
3	Feed Rollers (Ref. No. 11, 56, 94)	3 months	7 years (31,500 documents)	Refer to Disassembly and Assembly Instructions (P.170).
4	Thermal Head (Ref. No. 40)	3 months	7 years (31,500 documents)	Refer to How to Remove the Thermal Head (P.175).
5	Platen Roller (Ref. No. 70)	3 months	7 years (31,500 documents)	Refer to How to Remove the Platen Roller and Lock Lever (P.185).
6	Pickup Roller (Ref. No. 96)	3 months	7 years (31,500 documents)	Refer to How to Remove the Pickup Roller and Antenna (P.187).

Note:

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

*² Refer to **Cabinet, Mechanical and Electrical Parts Location** (P.252).

16.2. Gear Section

This model provides a motor-driven gear mechanism for transmitting/copying documents and printing fax data. In this chapter, you will see how the gears work to select and operate a mode and how the gear section, sensors and rollers mechanically work during the main operations (FAX transmission, FAX reception and Copy).

16.2.1. Mode Selection

When a motor with Drive Motor Gear attached rotates clockwise (CW), Swing Gear E engages CAM Gear to rotate clockwise (CW). This operation provide five mode options (**A**: Transmit mode, **B**: Paper-Pickup mode, **C**: Assist mode **D**: Receive mode and **E**: Copy mode) selected by the Sensor Switch. (The Sensor Switch Lever's position in the CAM Gear controlled by the software selects a specific mode.) You can see which mode is selected by confirming the Mode Marker's position as shown in Fig. 1.

(Ex. If the Mode Marker is in position **A**, a transmit mode is selected.)

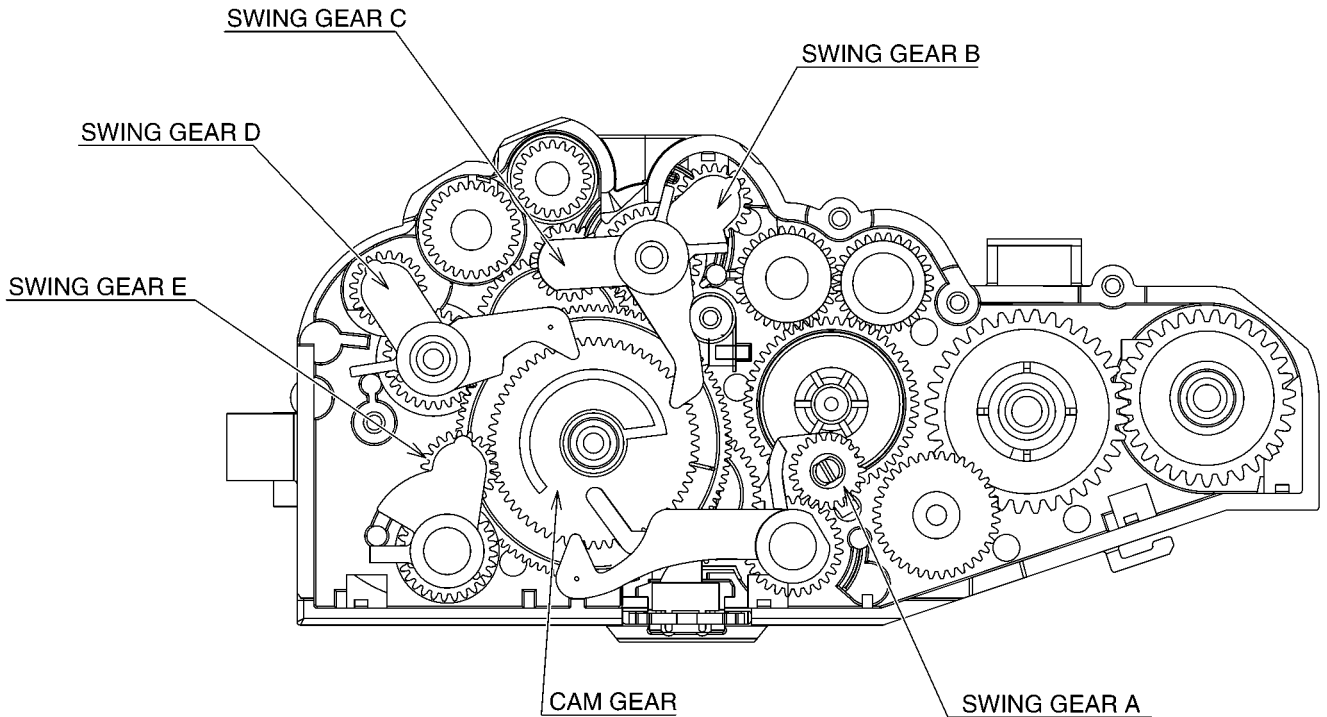


Fig. 1: Mode Selection

16.2.2. Mode Operation

Once a mode is selected, the Drive Motor Gear rotates counterclockwise (CCW) and then the controlling positions of Swing Gears A, B and C, D, E determine which gears convey their drive power in each mode. See "Sensor Location" in **Sensors and Switches** (P.29).

A. Transmit mode (See Fig. A.):

The Swing Gear A engages with the next gear to drive Document Separation Roller and Document Exit Roller.
The Swing Gear C engages with the next gear to drive Paper Exit Roller.

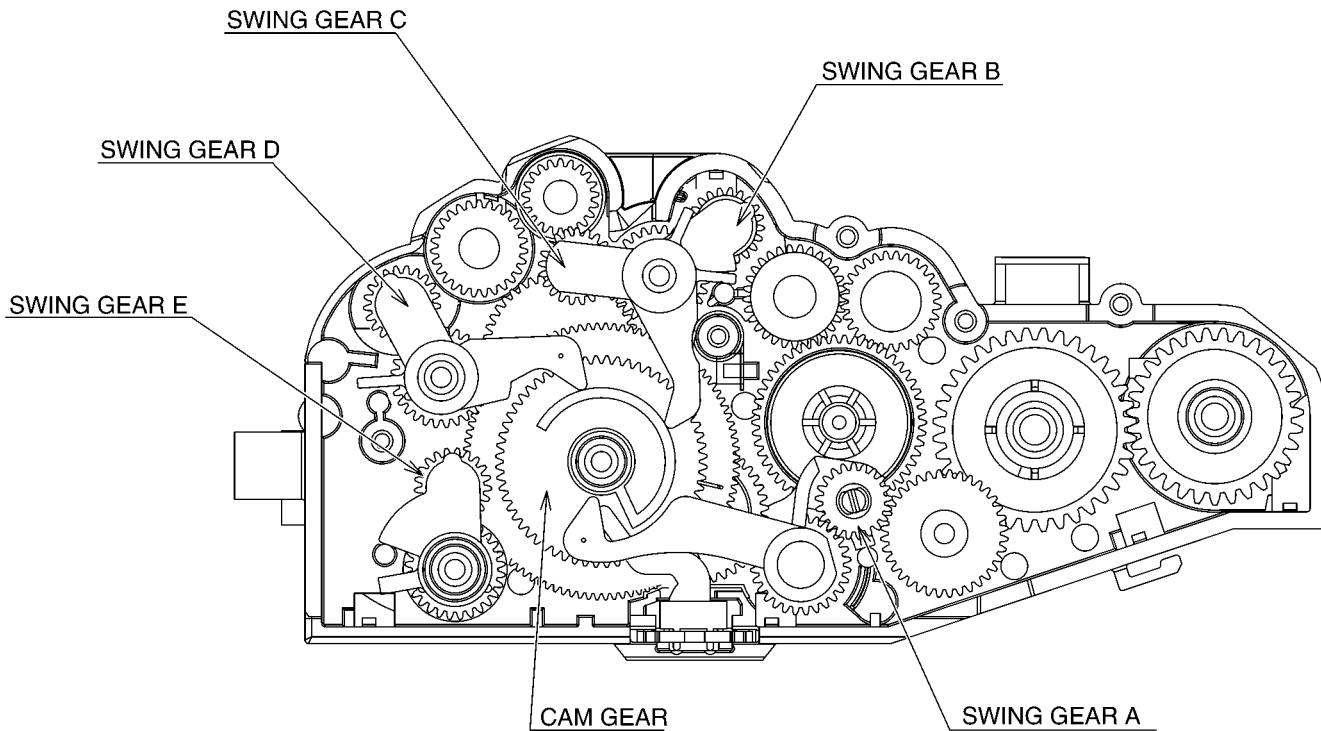


Fig. A: Transmit mode

B. Paper-Pickup mode (See Fig. B):

The Swing Gear C engages with the next gear to drive Paper Exit Roller.
The Swing Gear D engages with the next gear to drive Pickup Roller.

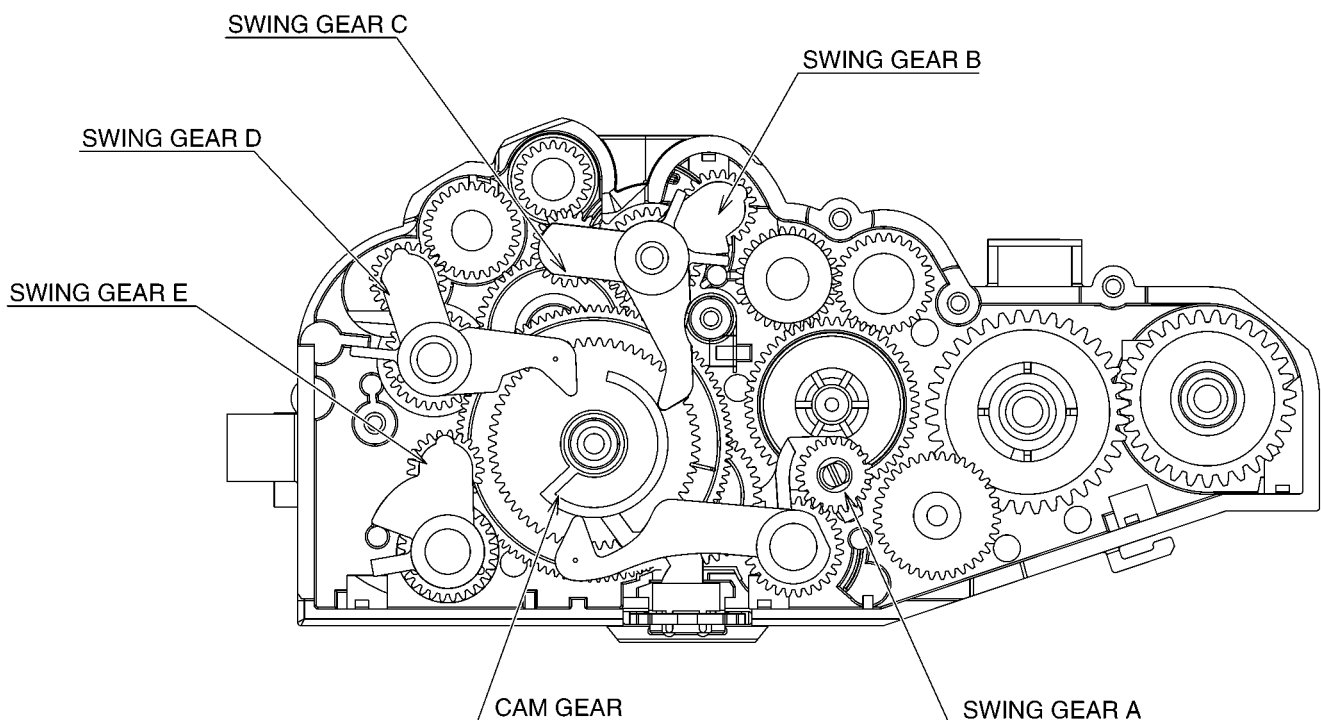


Fig. B: Paper-Pickup mode

C. Assist mode (See Fig. C.):

The Swing Gear D engages with the next gear to drive Pickup Roller.
 The Swing Gear B engages with the next gear to drive Platen Roller gear and Ribbon Drive Gear.
 The Swing Gear C engages with the next gear to drive Paper Exit Roller Gear.

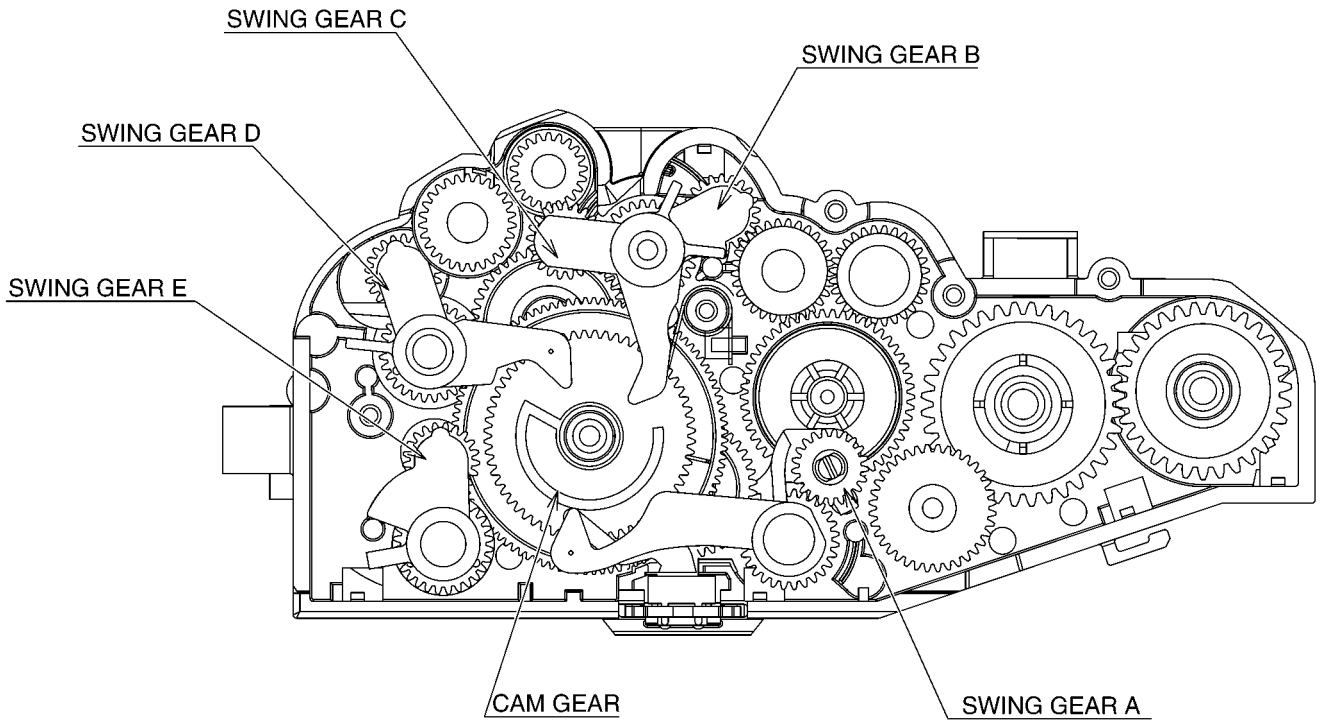


Fig. C: Assist mode

D. Receive mode (See Fig. D.):

The Swing Gear B engages with the next gear to drive Platen Roller gear and Ribbon Drive Gear.
 The Swing Gear C engages with the next gear to drive Paper Exit Roller Gear.

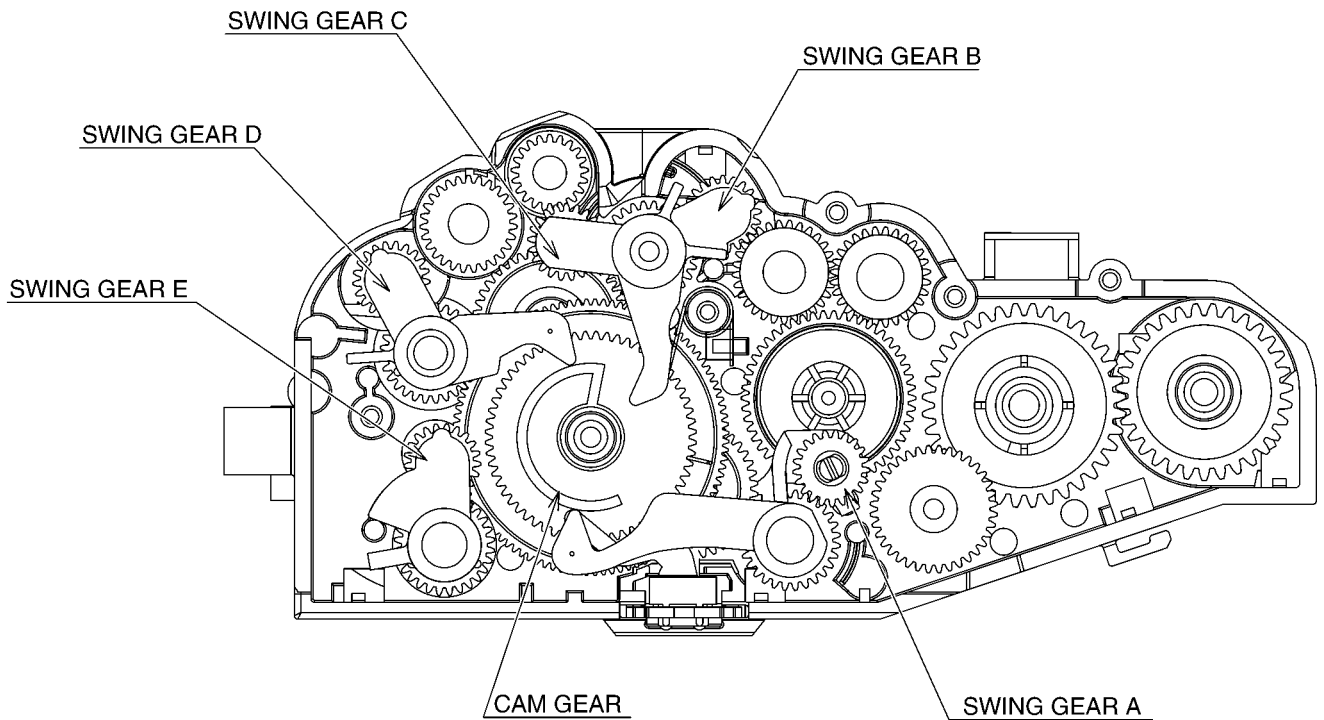


Fig. D: Receive mode

E. Copy mode (See Fig. E.):

“Copy mode” = “Transmit mode” + “Receive mode”

The Swing Gear A engages with the next gear to drive Document Separation Roller and Document Exit Roller.

The Swing Gear B engages with the next gear to drive Platen Roller gear and Ribbon Drive Gear.

The Swing Gear C engages with the next gear to drive Paper Exit Roller.

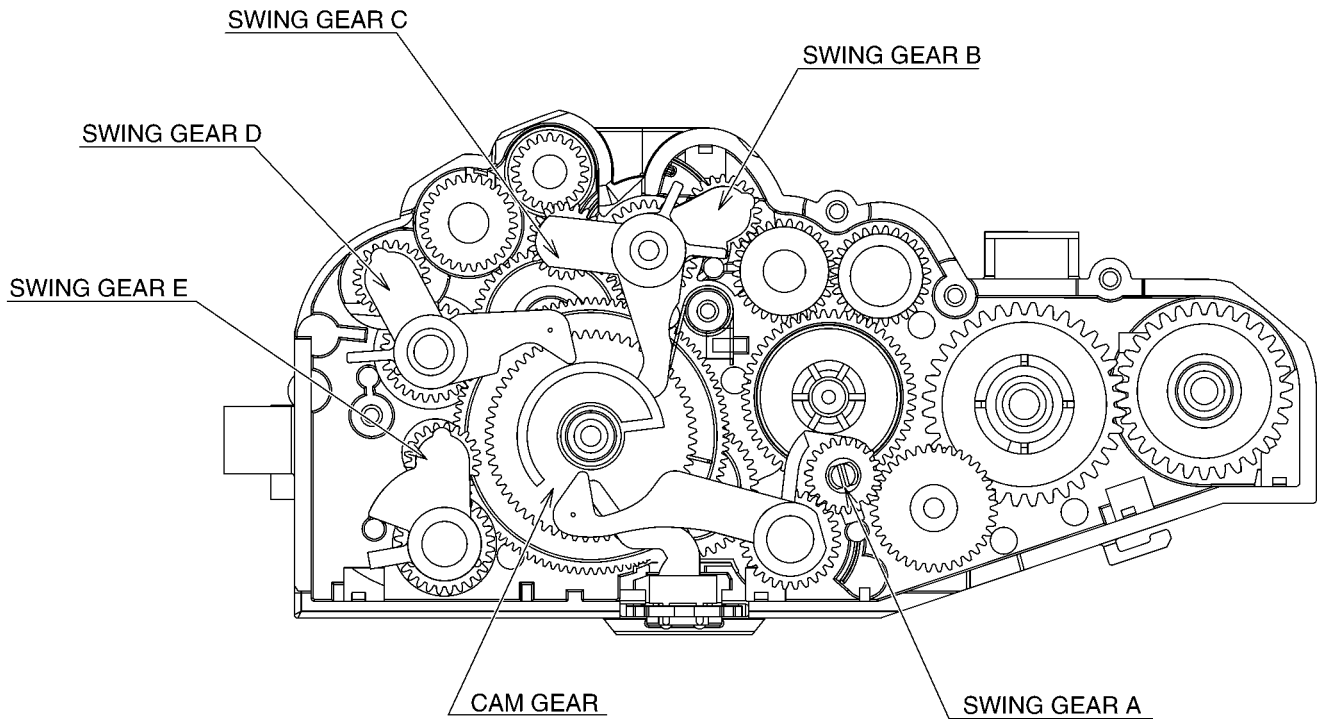
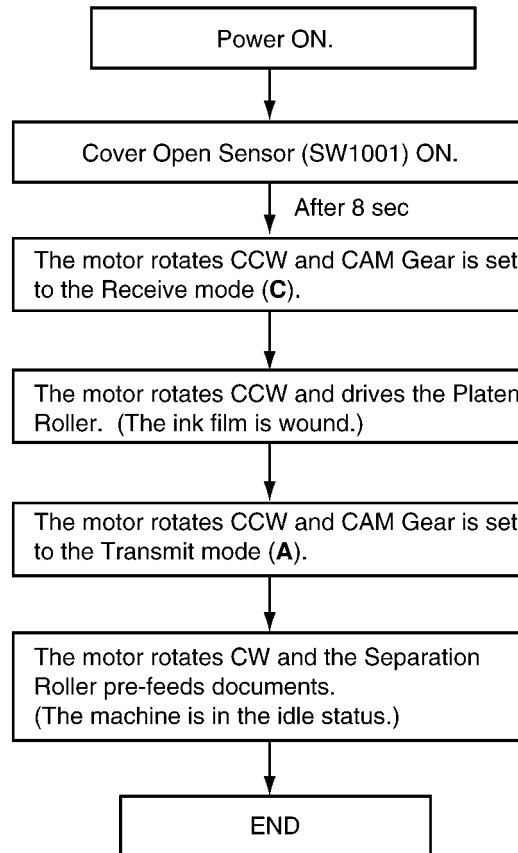


Fig. E: Copy mode

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

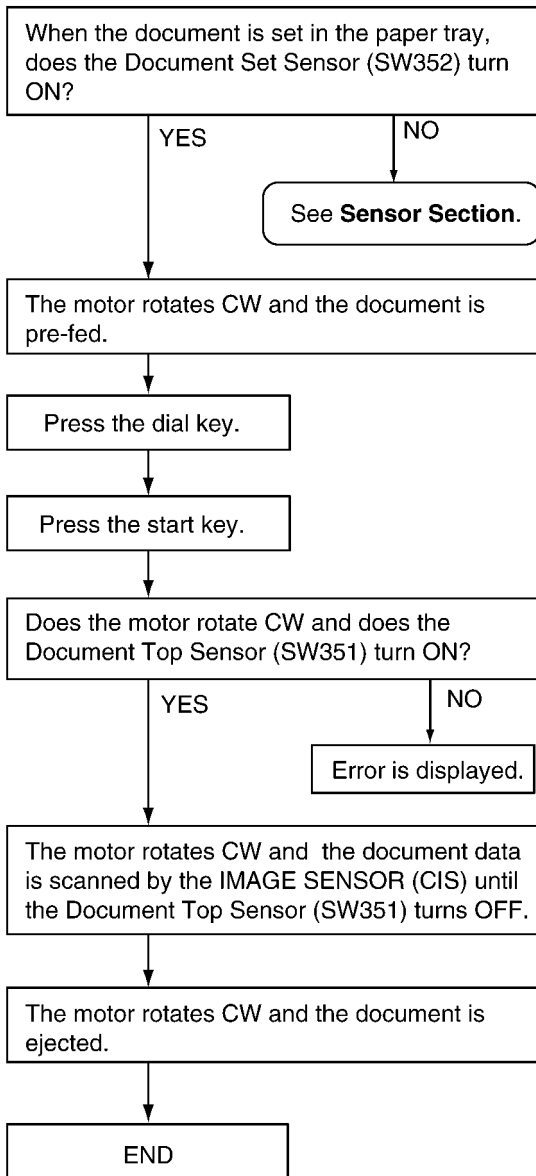
16.2.3.1. Idle Status



Note:

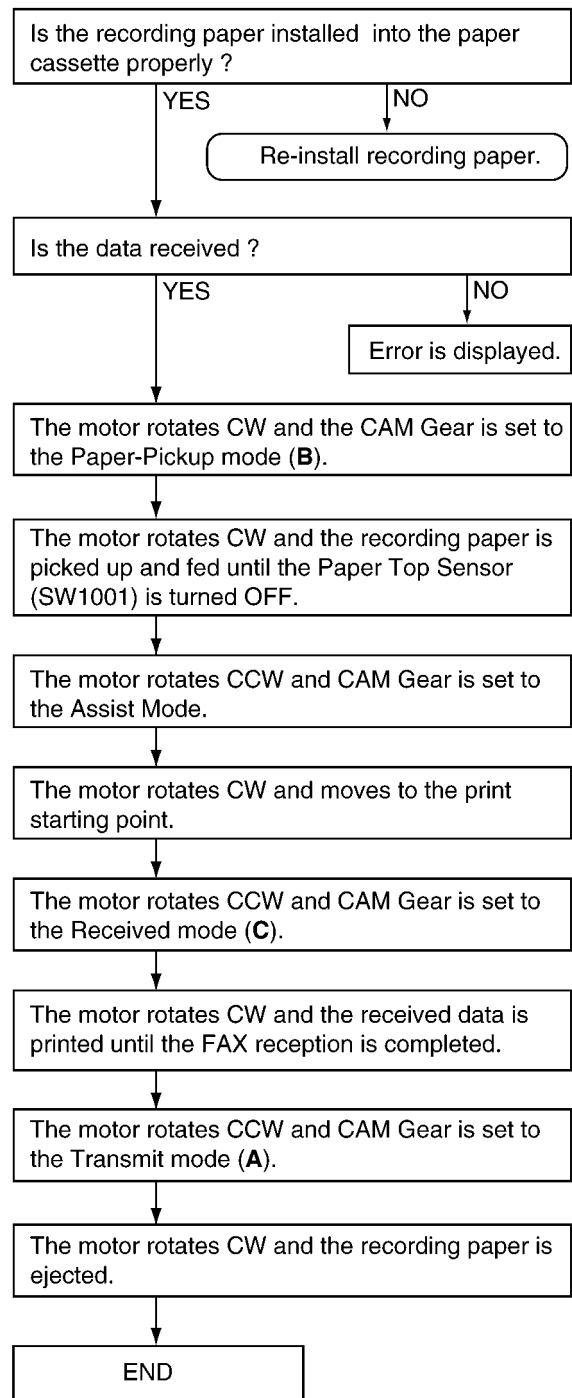
- See “**Sensor Locations**” in **Sensors and Switches** (P.29).
- CW.....clockwise
- CCW....counterclockwise

16.2.3.2. Transmitting Documents



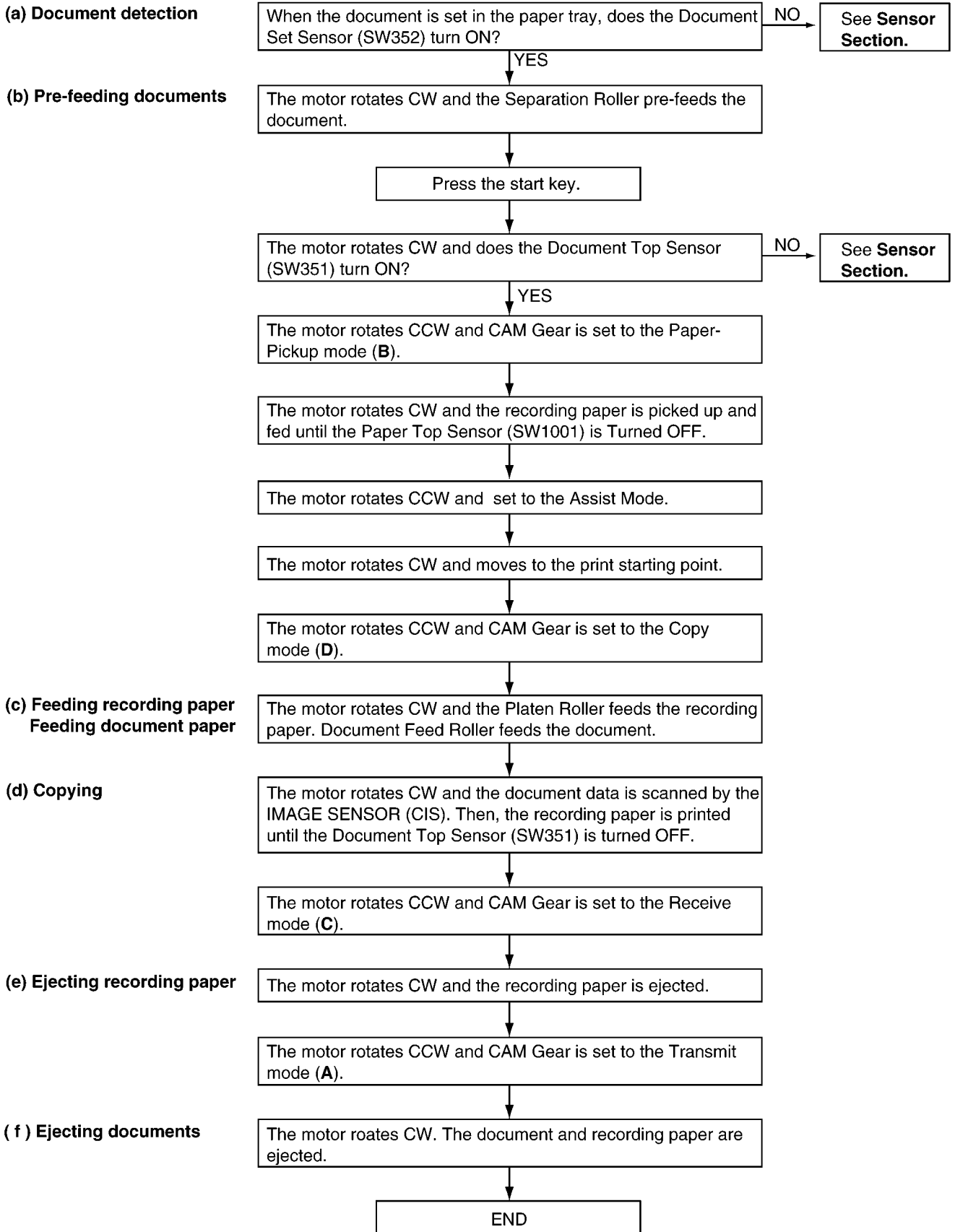
REFERENCE:
Sensor Section (P.157).

16.2.3.3. Receiving Fax



Note:
See "Sensor Locations" in Sensors and Switches (P.29).

16.2.3.4. Copying



Note:

See "Sensor Locations" in **Sensors and Switches (P.29)**.

REFERENCE:

Sensor Section (P.157)

16.3. Jams

16.3.1. Recording Paper Jams

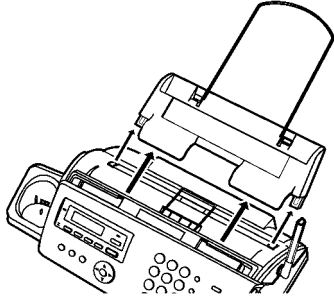
16.3.1.1. When the recording paper has jammed in the unit

The display will show the following.

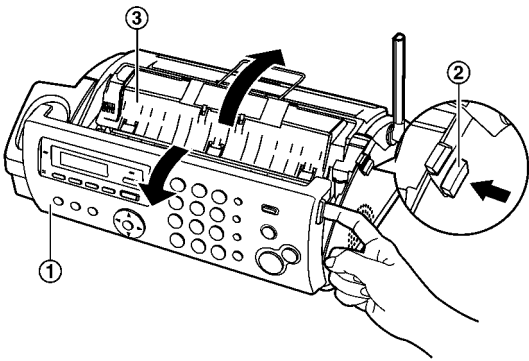
PAPER JAMMED

Important:

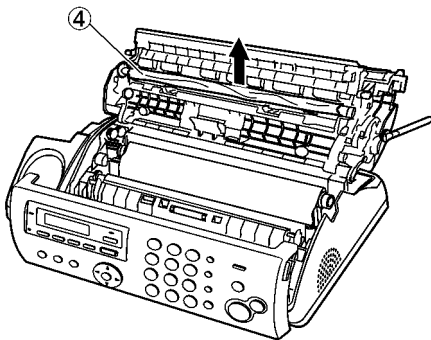
- Remove the recording paper, then remove the paper tray beforehand, otherwise the paper may misfeed or jam.



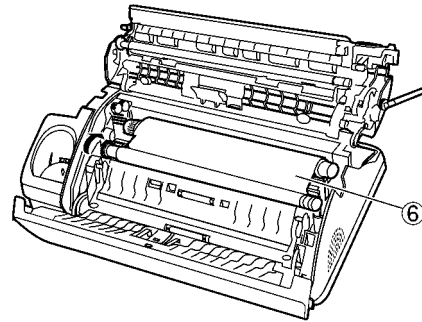
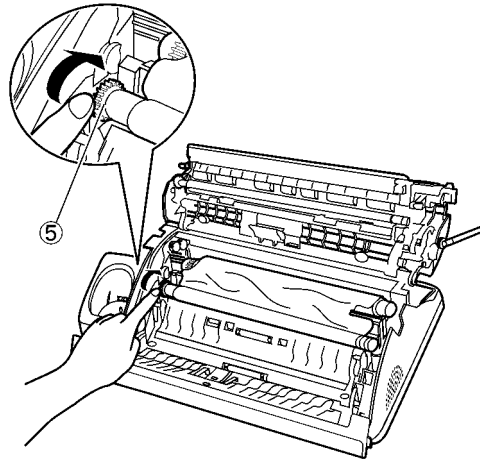
1. Open the front cover (①), push the green lever (②), then open the back cover (③).



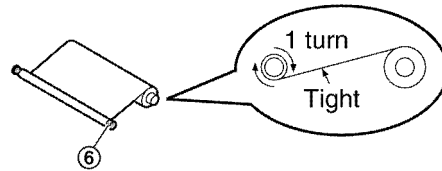
2. Remove the jammed recording paper (④).



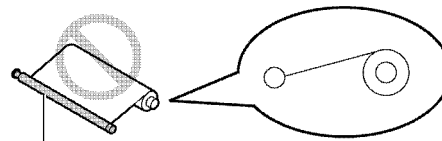
3. Turn the gear of the blue core (⑤) in the direction of the arrow until the ink film is tight (⑥) and at least one layer of ink film is wrapped around the blue core (⑦).



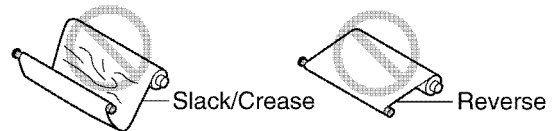
Correct



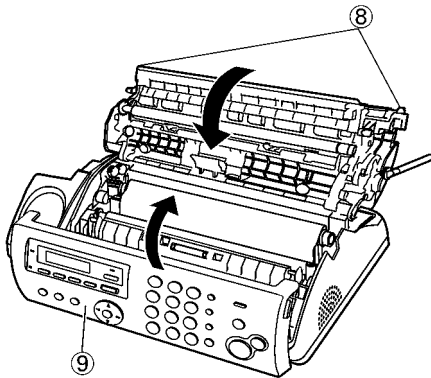
Incorrect



No ink film is wrapped around the blue core.



4. Close the back cover securely by pushing down on the dotted area at both ends (⑧), then close the front cover securely (⑨).



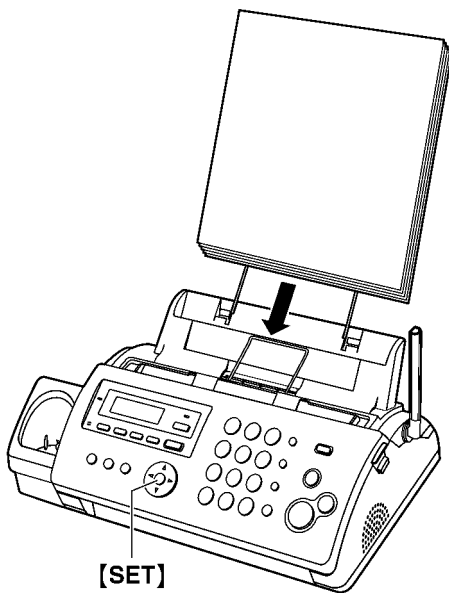
5. Install the paper tray, then insert the recording paper gently.
(See **Installing the Paper Tray (P.71)** and **Installing the Recording Paper (P.72)**)

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

The display will show the following.

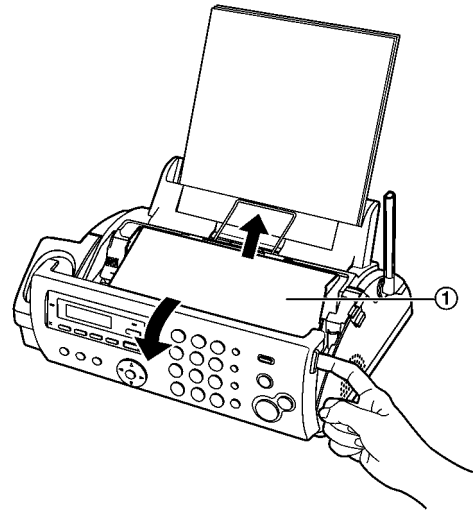


Remove the recording paper and straighten. Insert the paper, then press **[SET]** to clear the message.



16.3.2. Document Jams - sending

1. Open the front cover. 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.

16.4. Cleaning

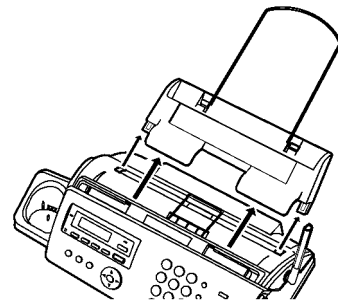
16.4.1. Document feeder/recording paper feeder/scanner glass cleaning

Clean the document feeder/scanner glass when:

- Documents or recording paper frequently misfeed.
- Smudges or black/white lines appear on the original document when sending or copying.

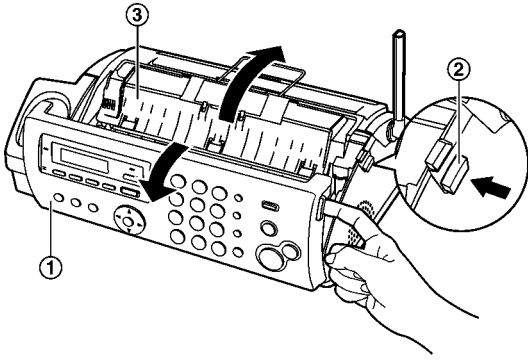
Important:

- Remove the recording paper, then remove the paper tray beforehand, otherwise the paper may misfeed or jam.



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

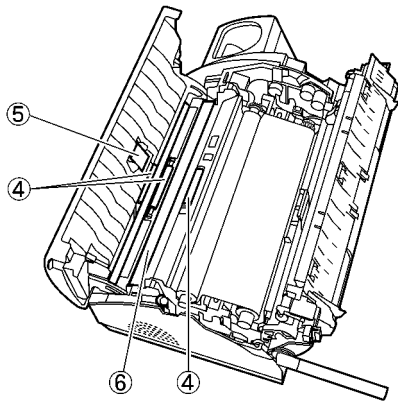
2. Open the front cover (①), push the green lever (②), then open the back cover (③).



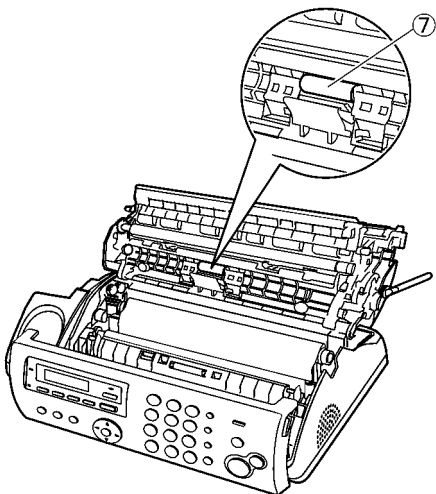
3. Clean the document feeder rollers (④) and rubber flap (⑤) with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly. Clean the scanner glass (⑥) with a soft, dry cloth.

Caution:

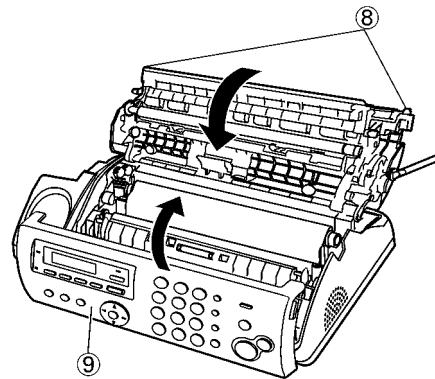
- Do not use paper products, such as paper towels or tissues.



4. Clean the recording paper feeder roller (⑦) with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly.



5. Close the back cover securely by pushing down on the dotted area at both ends (⑧), then close the front cover securely (⑨).



6. Install the paper tray, then insert the recording paper gently.
(See **Installing the Paper Tray (P.71)** and **Installing the Recording Paper (P.72)**)

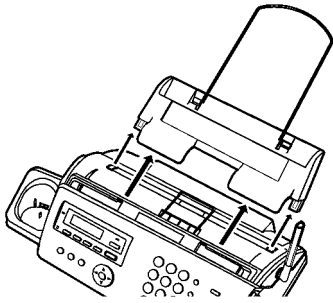
7. Connect the power cord and the telephone line cord.

16.4.2. Thermal Head Cleaning

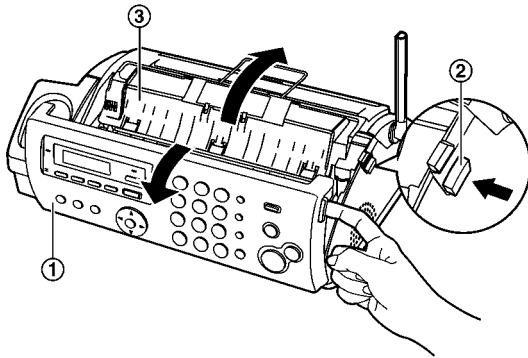
If smudges or black/white lines appear on a copied/received document, check whether there is dust on the thermal head. Clean the thermal head to remove the dust.

Important:

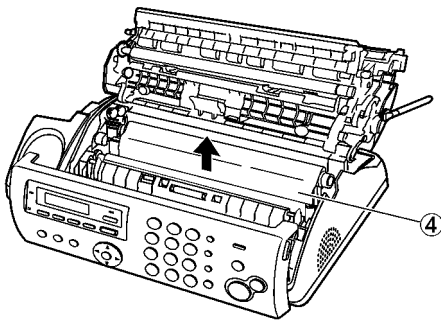
- Remove the recording paper, then remove the paper tray beforehand, otherwise the paper may misfeed or jam.



1. Disconnect the power cord and the telephone line cord.
2. Open the front cover (①), push the green lever (②), then open the back cover (③).



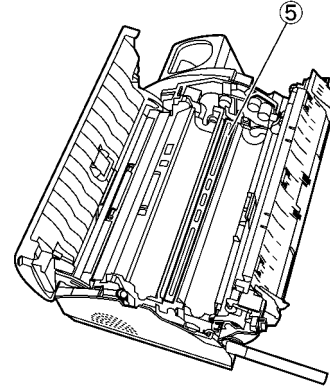
3. Remove the ink film (④).



4. Clean the thermal head (⑤) 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.

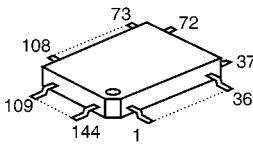
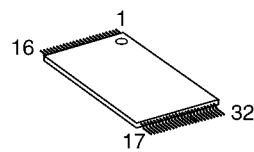
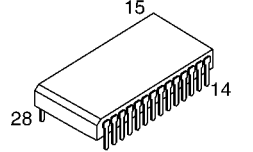
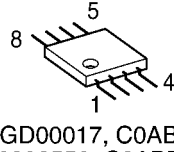
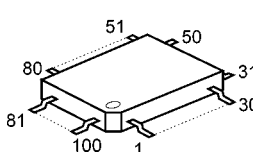
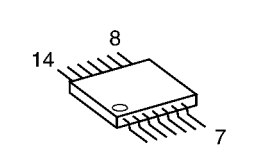
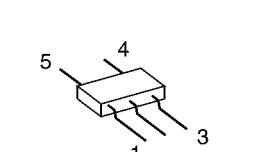
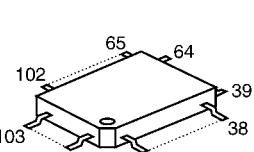
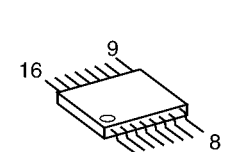
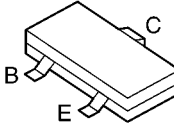


5. Re-install the ink film and close the covers (see step 4 to 7 on **Installing the Ink Film** (P.69)).
6. Install the paper tray, then insert the recording paper gently. (See **Installing the Paper Tray** (P.71) and **Installing the Recording Paper** (P.72))
7. Connect the power cord and the telephone line cord.

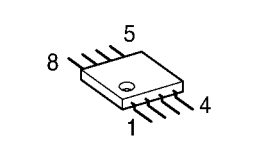
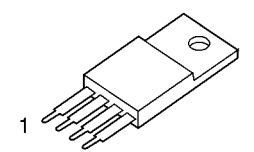
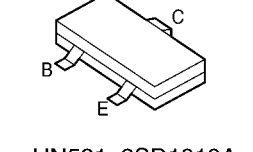
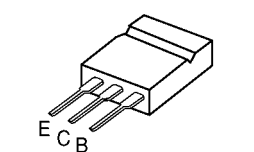
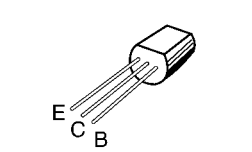
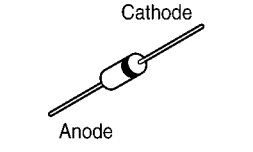
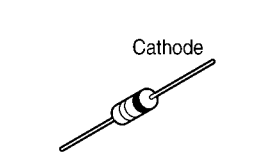
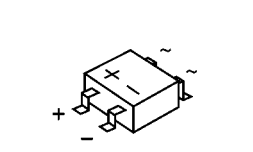
17 Miscellaneous

17.1. Terminal Guide of the ICs, Transistors and Diodes

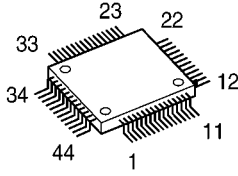
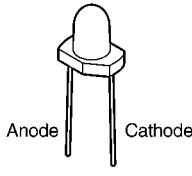
17.1.1. Digital Board

 <p>C1ZBZ0003300</p>	 <p>PFWI1G2452CX C3FBKC000135</p>	 <p>C3ABKC000034</p>	 <p>C0DBFGD00017, C0ABBB000265, C1AB00002556, C0ABBB000184, C0DBFGD00017, C0CBAAD00054, PFWI3G2452CX</p>	
 <p>C2HBBY000036</p>	 <p>C0JBAS000128</p>	 <p>C0JBAA000393</p>	 <p>C1CB00001921</p>	 <p>PQVISN7AH157</p>
 <p>2SC39300CL, 2SB1218ARL, B1ABDF000026, PQVTDTC143E, B1ABDF000025</p>				

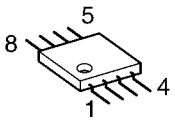
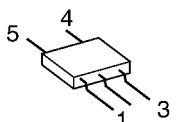
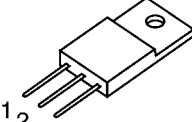
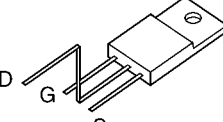
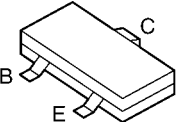
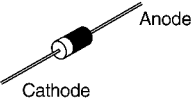
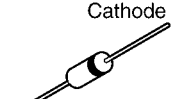
17.1.2. Analog Board

 <p>C0ABEB000052</p>	 <p>C0DAZYY00010</p>	 <p>UN521, 2SD1819A, PQVTDTC143E, PQVTDTC114TU</p>	 <p>2SD2137</p>	 <p>B1AAKL000006</p>
 <p>1SS133, B0BA2R000018</p>	 <p>MA4056, MA4030</p>	 <p>B0EDER000009</p>		

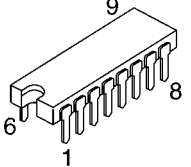
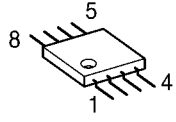
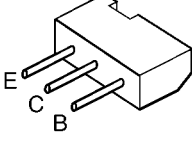
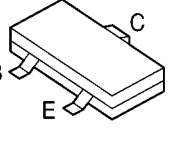
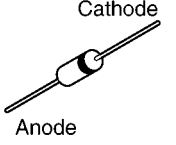
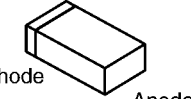

17.1.3. Operation Board / Microphone Board

 <p>C1ZBZ0002089</p>	 <p>B3AAA0000534</p>			
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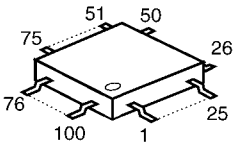
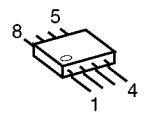
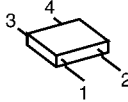
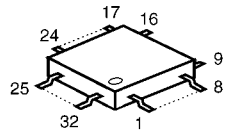
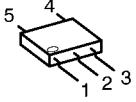
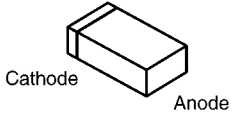
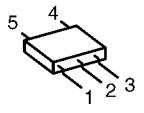
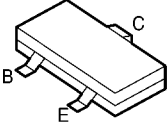
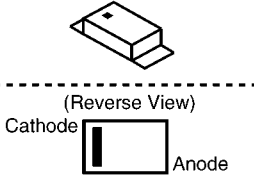
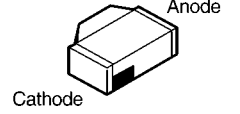
17.1.4. Power Supply Board

 <p>PFVIFA5518N</p>	 <p>TL431CDBVR</p>	 <p>TA7804</p>	 <p>FQPF4N90C</p>	 <p>2SC3928</p>
 <p>PFVD1N4005 PFVDD1NL20U PR1007, HER503</p>	 <p>MA165, HZS6R2NB2</p>			

17.1.5. Interface Board

 <p>B1HAGFF00015</p>	 <p>B1DHDD000026</p>	 <p>2SB1322</p>	 <p>PQVTDTC143E PQVTDTC144TU 2SB1218A</p>	 <p>1SS133 B0BA7R900004</p>
 <p>B0ECKM000008</p>	 <p>MA4200</p>			

17.1.6. Handset Board

 <p>C2HBBY000030</p>	 <p>PQWIG2420BXR</p>	 <p>PQVIC61CC22N PQVIC61CC20N</p>	 <p>C1CB00001657</p>	 <p>C0DBAGZ00053 C0CBCAD00071 C0CBCAD00070</p>
 <p>Cathode Anode</p> <p>MA111 MA21D3400L B0JCMD000010 B0DCCD000011</p>	 <p>PSVTUMG11NTR</p>	 <p>B1GBCFJA0029, PQVTDTC143E PQVTXP151A13, UN521, B1ABDF000025, 2SD1819A, 2SB1197KQ</p>	 <p>(Reverse View) Cathode Anode</p> <p>B3ACB0000115</p>	
 <p>Cathode Anode</p> <p>B3ACB0000134</p>				

17.2. 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.

17.2.1. Preparation

- PbF (: Pb free) Solder

- Soldering Iron

Tip Temperature of $662^{\circ}\text{F} \pm 50^{\circ}\text{F}$ ($350^{\circ}\text{C} \pm 10^{\circ}\text{C}$)

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 \rightarrow 0.82.

Type \rightarrow RMA (lower residue, non-cleaning type)

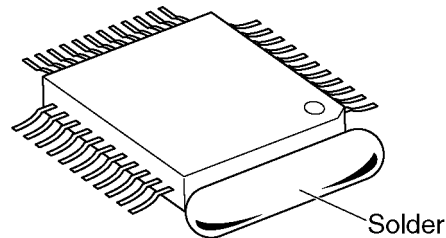
Note: See **About Lead Free Solder (PbF: Pb free)** (P.6).

17.2.2. Flat Package IC Removal Procedure

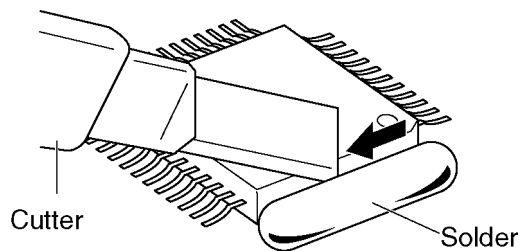
1. Put plenty of solder on the IC pins so that the pins can be completely covered.

Note:

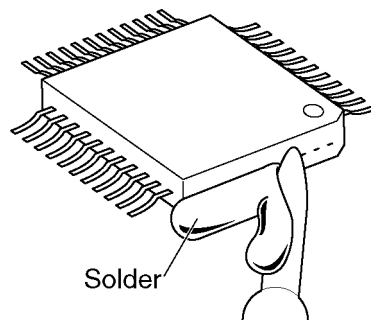
If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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



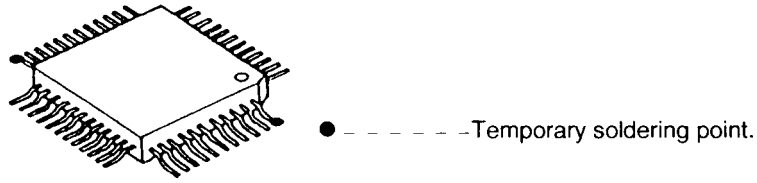
3. While the solder melts, remove it together with the IC pins.



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.

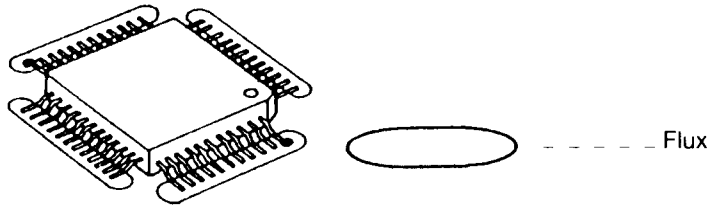
17.2.3. Flat Package IC Installation Procedure

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

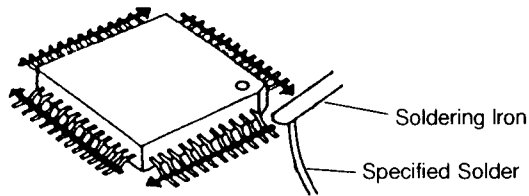


*Check the accuracy of the IC setting with the corresponding soldering foil.

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

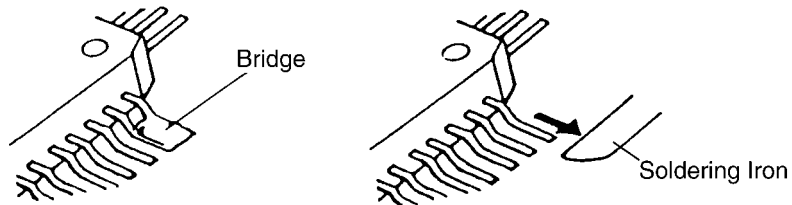


3. Solder the pins, sliding the soldering iron in the direction of the arrow.



17.2.4. 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.



17.3. Test Chart

17.3.1. 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,

P.J. CROSS
Group Leader - Facsimile Research

17.3.2. ITU-T No.2 Test Chart

21

22

CCITT N° 2: Mire pour test de Transmission

23

24

25

26

27

28

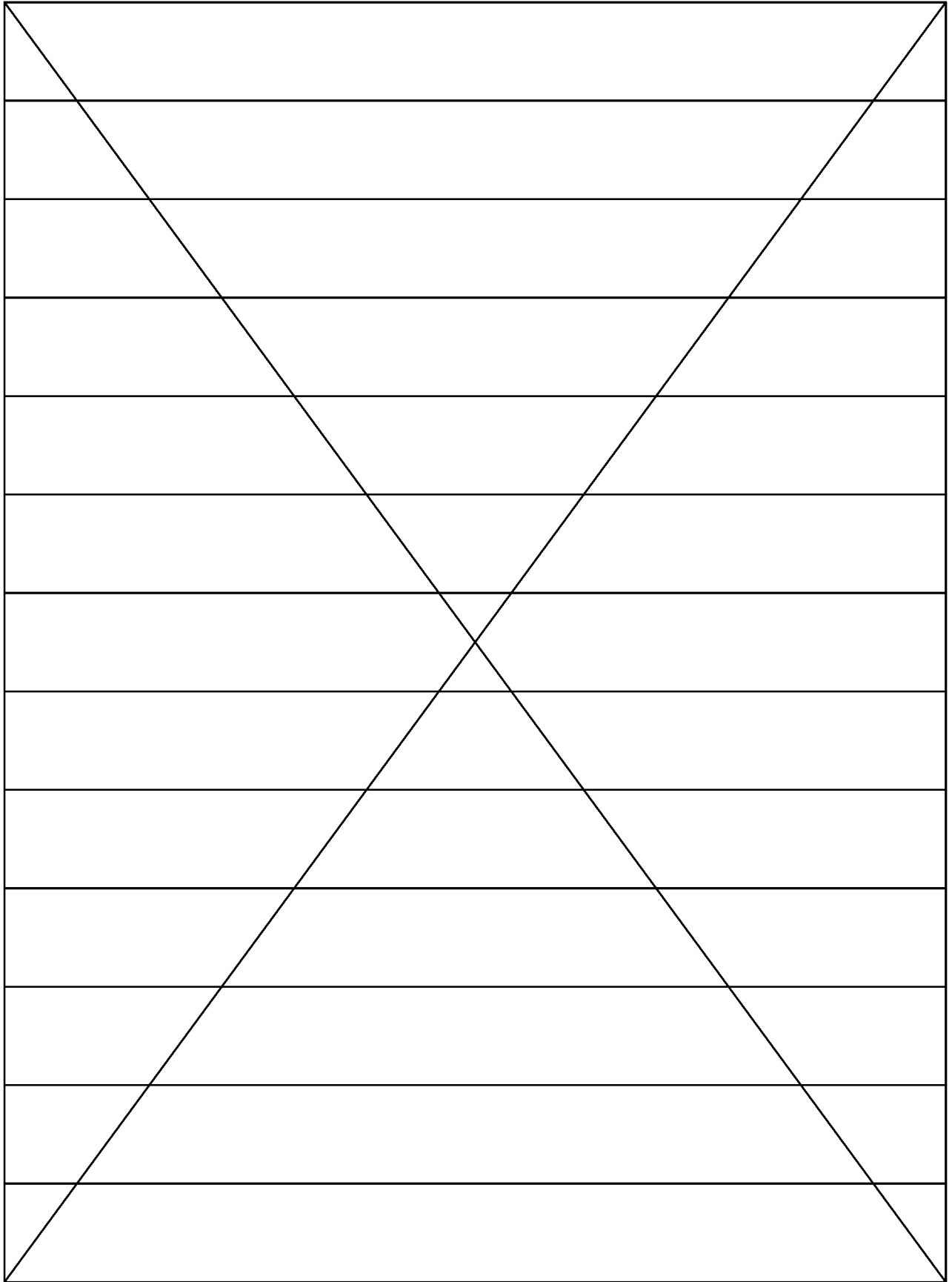
29

30

31

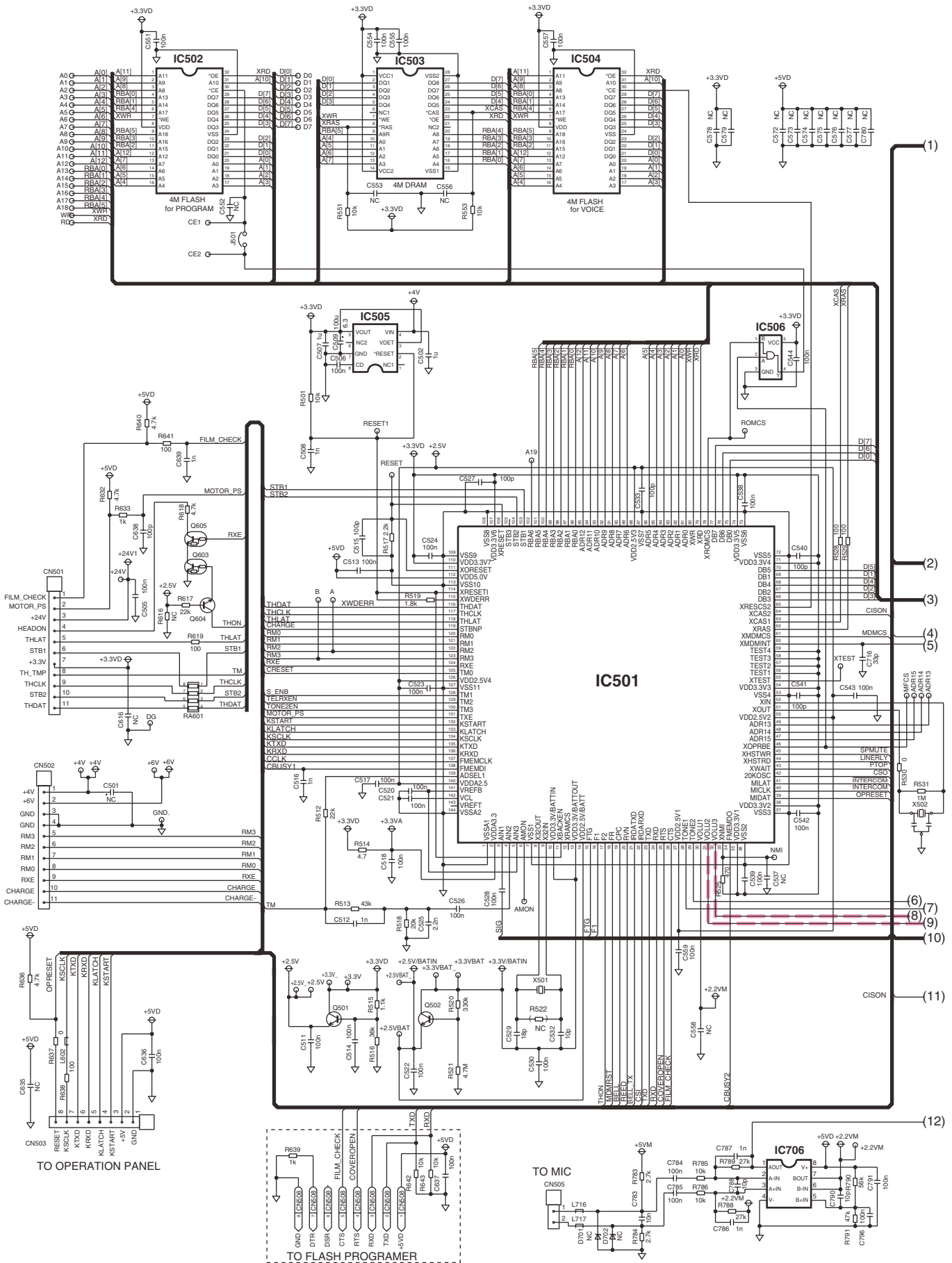
<p>QS2DR QS2DR KWJ4H KWJ4H S5TR7 S5TR7 QS2DR KWJ4H S5TR7</p>	<p>BC6IT ZP3FM XB8UG BC6IT ZP3FM XB8UG</p>				
<p>Transmission Test Group n° I Character UNIVERS SIZE 8 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s t u v w x y z 0 1 2 3 4 5 6 7 8 9 S^{2,3} œ ♦ [] Ç □ . £ - ± × : ° ● ■ ₪ _ é + = \$ / () & % *</p>	<p>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 S^{2,3} œ ♦ [] Ç □ . £ - ± × : ° ● ■ ₪ _ é + = \$ / () & % *</p>				
<p>Transmission Test Group n° II Character UNIVERS SIZE 10</p>	<p>Transmission Test Group n° IV Character ENGLISH-TIMES SIZE 10</p>				
<p>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 S^{2,3} œ ♦ [] Ç □ . £ - ± × : ° ● ■ ₪ _ é + = \$ / () & % *</p>	<p>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 S^{2,3} œ ♦ [] Ç □ . £ - ± × : ° ● ■ ₪ _ é + = \$ / () & % *</p>				
<p>Groupe n° II pour test de transmission caractères UNIVERS 10 POINTS</p>	<p>Groupe n° IV pour test de transmission composé de caractères ENGLISH-TIMES 10 POINTS</p>				
<p>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 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 S^{2,3} œ ♦ [] Ç □ . £ - ± × : ° ● ■ ₪ _ é + = \$ / () & % *</p>	<p>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 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 S^{2,3} œ ♦ [] Ç □ . £ - ± × : ° ● ■ ₪ _ é + = \$ / () & % *</p>				
<p>Grupo n° II para prueba de transmisión de los caracteres UNIVERS 10 PUNTOS</p>	<p>Grupo n° IV para prueba de transmisión de los caracteres ENGLISH-TIMES 10 PUNTOS</p>				
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"> <p>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 主要内容 世界各国 普通教育</p> </td> <td style="width: 50%;"> <p>傳輸試驗用字第二組 10.5P 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 主要内容 世界各国 普通教育</p> </td> </tr> <tr> <td style="width: 50%;"> <p>傳輸試驗用字第三組 7.875P 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 主要内容 世界各国 普通教育</p> </td> <td style="width: 50%;"></td> </tr> </table>		<p>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 主要内容 世界各国 普通教育</p>	<p>傳輸試驗用字第二組 10.5P 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 主要内容 世界各国 普通教育</p>	<p>傳輸試驗用字第三組 7.875P 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 主要内容 世界各国 普通教育</p>	
<p>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 主要内容 世界各国 普通教育</p>	<p>傳輸試驗用字第二組 10.5P 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 主要内容 世界各国 普通教育</p>				
<p>傳輸試驗用字第三組 7.875P 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 主要内容 世界各国 普通教育</p>					
<p>المجموعة الثانية خط الرقعة 213</p> <p style="text-align: center;">آء أ ب ج ح ذ ز ر س ش ص ض ط</p> <p style="text-align: center;">ظ ع ف ق ك ل م ن ه و ث ج ح</p> <p style="text-align: center;">خ س ش ص ض ع ف ق ك ل م ن ه ي لا لا</p> <p style="text-align: center;">9 8 7 6 5 4 3 2 1 0 ؟ > = < ، ± / +</p>					
<p>ГРУППА № 1-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ БУКВА КЕГЛЬ 8 АБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЫЬЭЮЯ абвгдежзийклмнопрстуфхцчшщъыьэюя 1234567890</p>	<p>ГРУППА № 3-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ БУКВА КЕГЛЬ 8 АБВГДЕЖЗИЙКЛМНОПРСТУФХЦЧШЩЪЫЬЭЮЯ абвгдежзийклмнопрстуфхцчшщъыьэюя 1234567890</p>				
<p>ГРУППА № 2-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ БУКВА КЕГЛЬ 10</p>	<p>ГРУППА № 4-ДЛЯ ИСПЫТАНИЯ ПЕРЕДАЧИ БУКВА КЕГЛЬ 10</p>				
<p>215</p>					

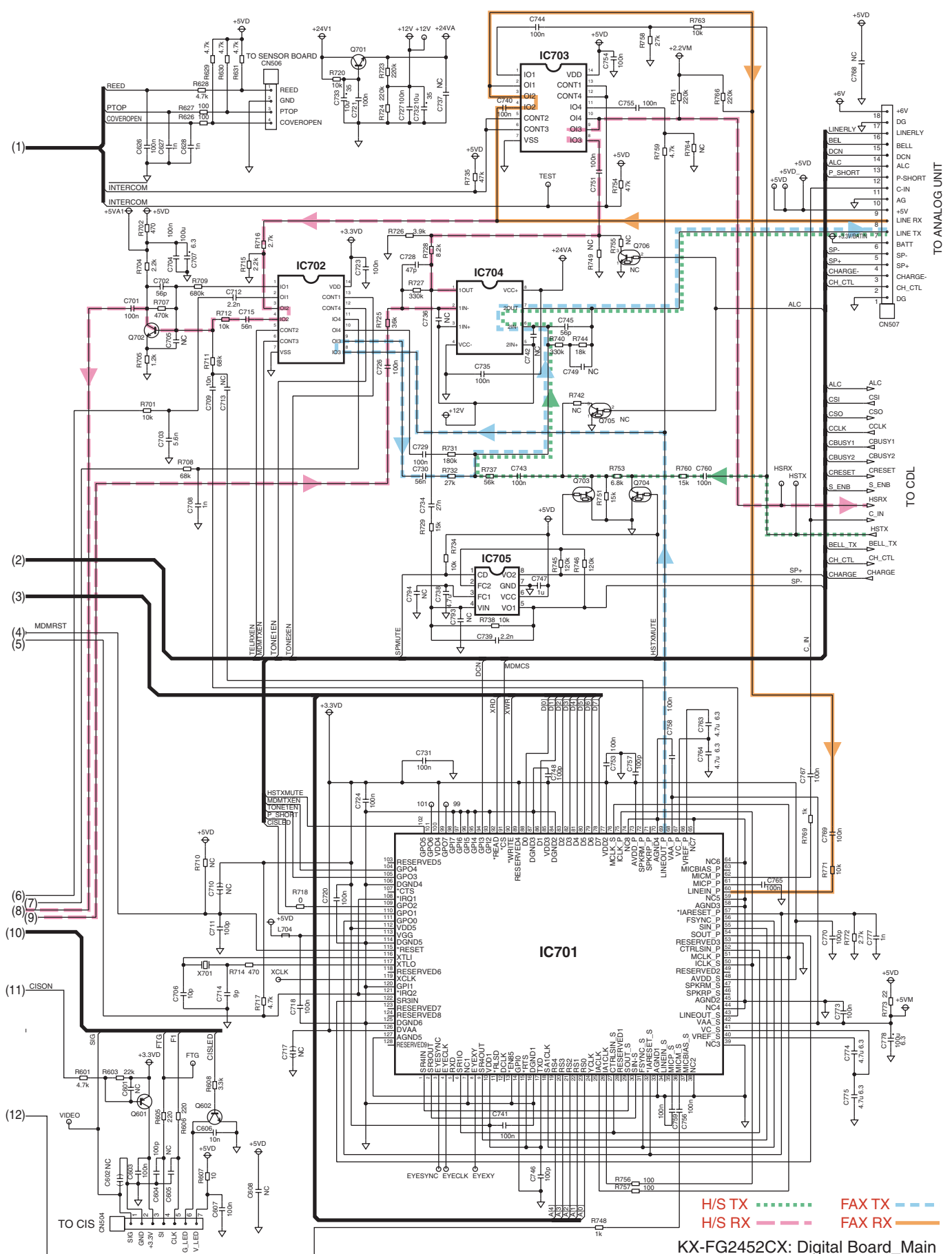
17.3.3. Test Chart



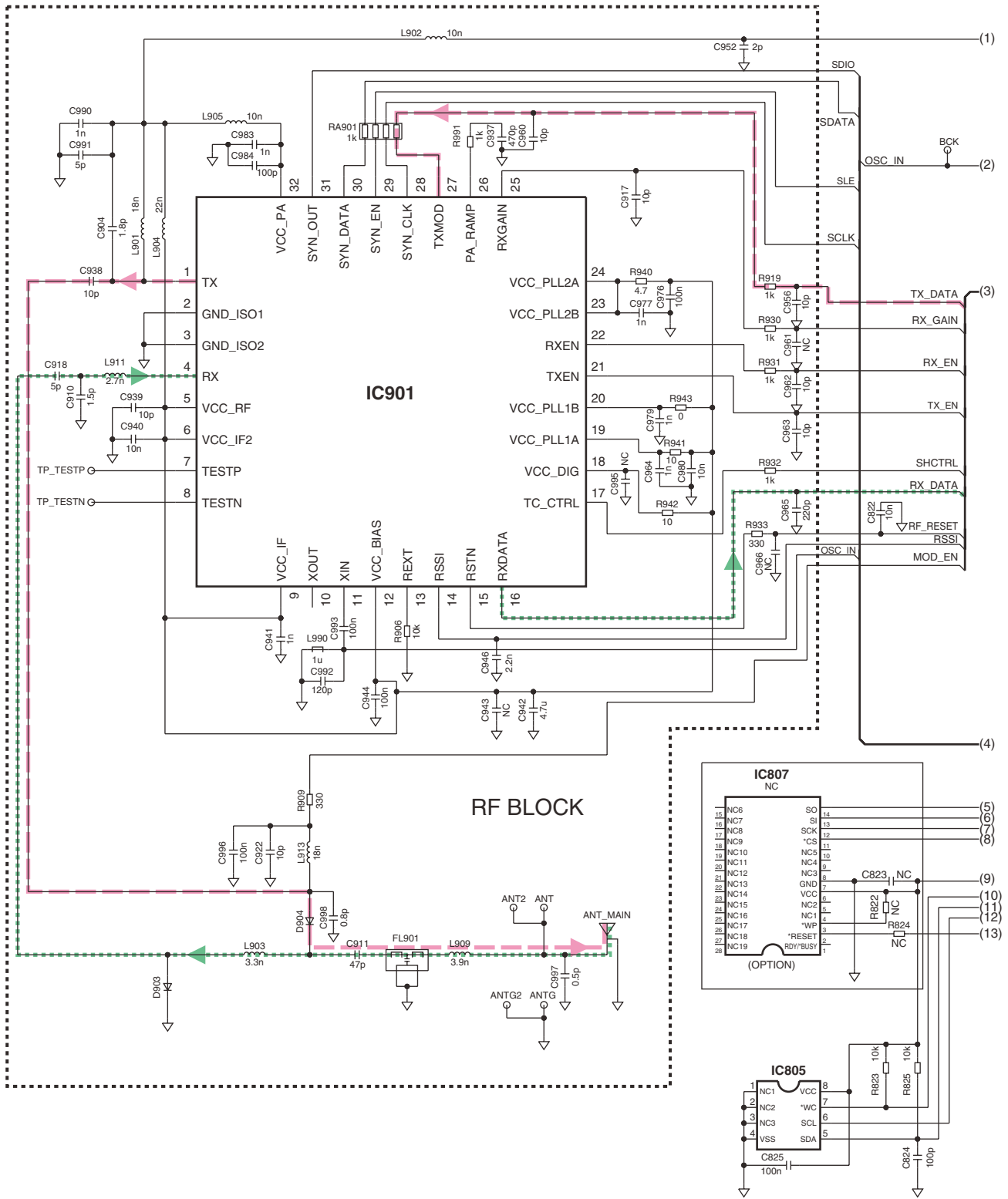
18 Schematic Diagram

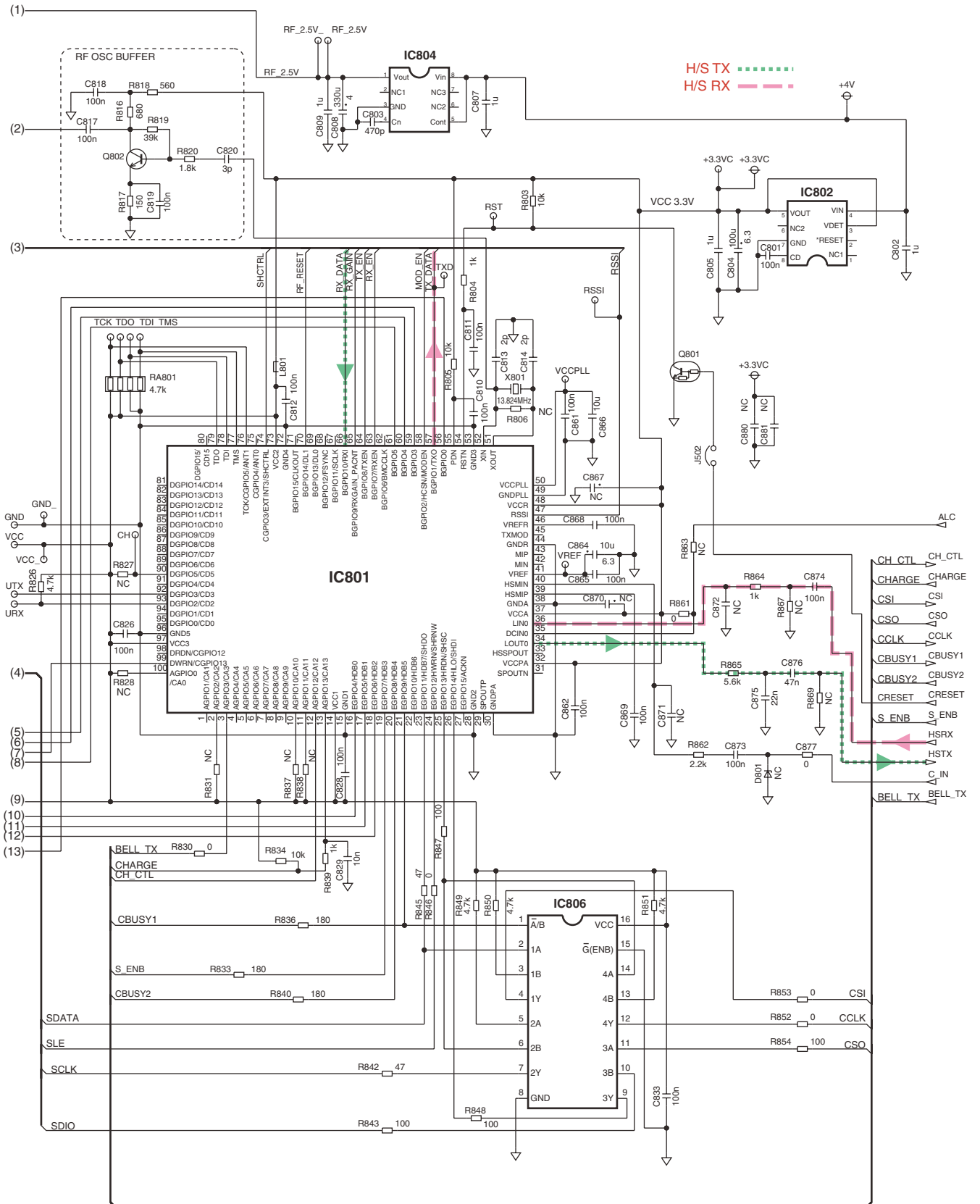
18.1. Digital Board (PCB1)





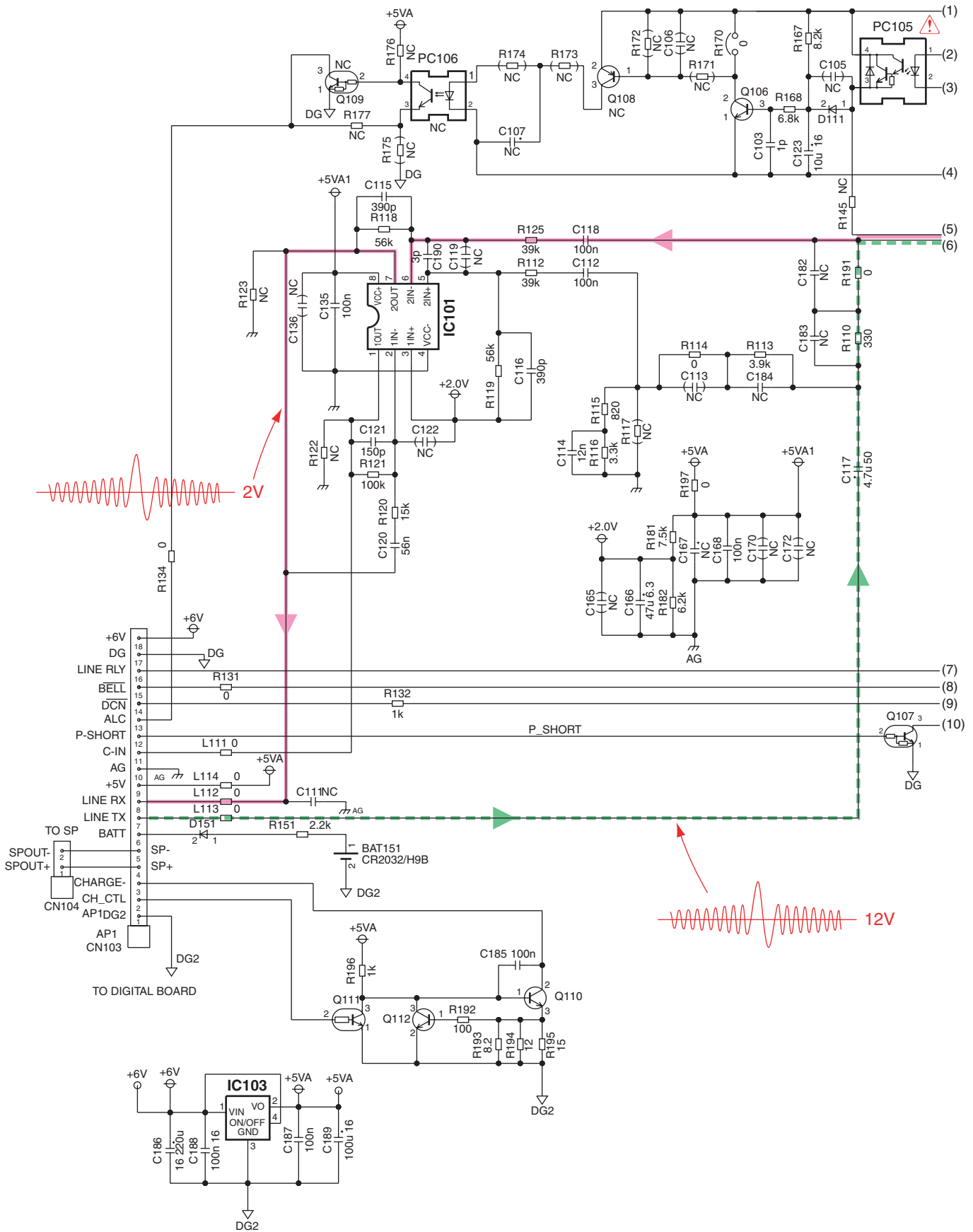
H/S TX FAX TX
 H/S RX FAX RX
 KX-FG2452CX: Digital Board_Main

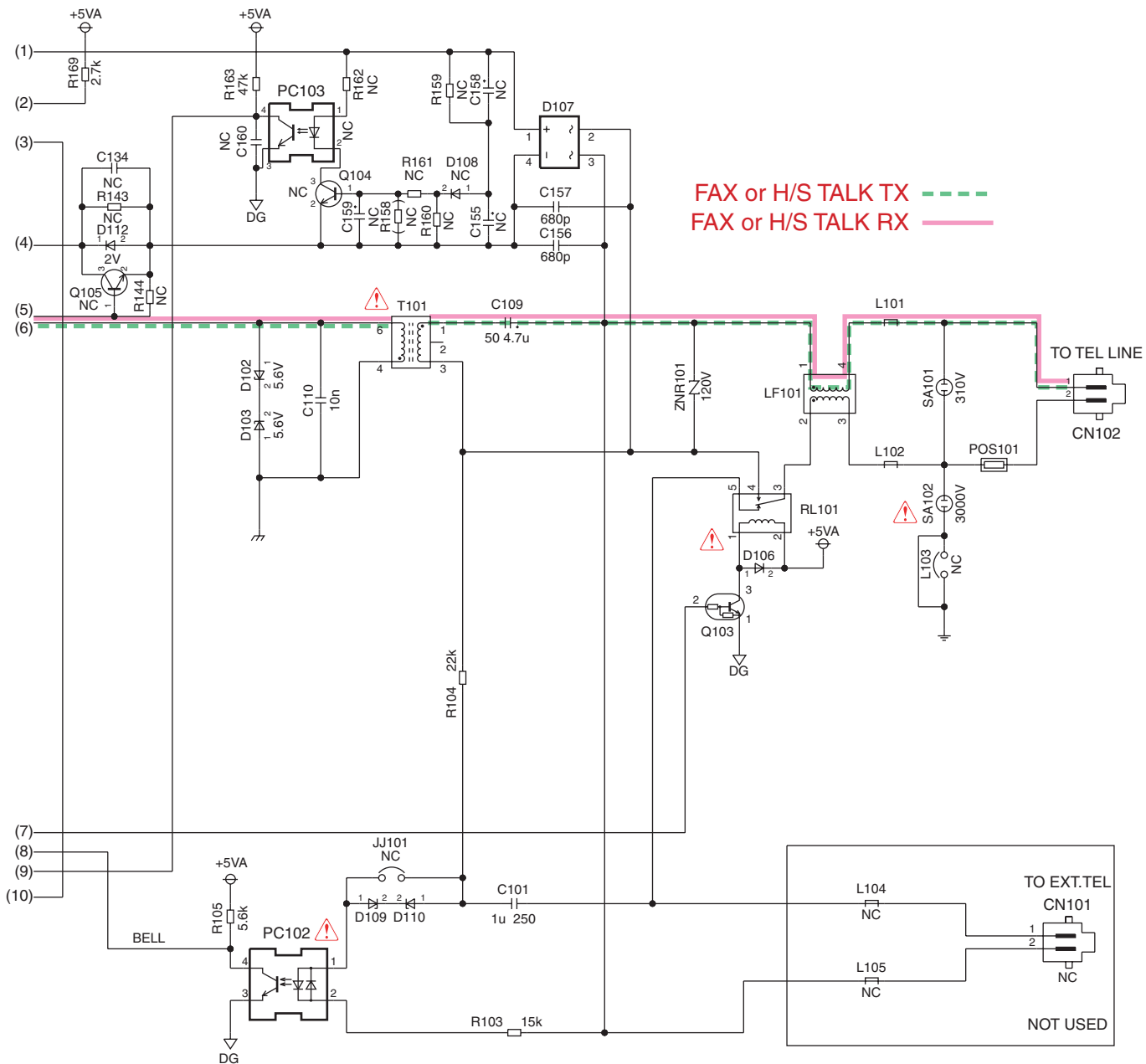




KX-FG2452CX: Digital Board_Cordless Base

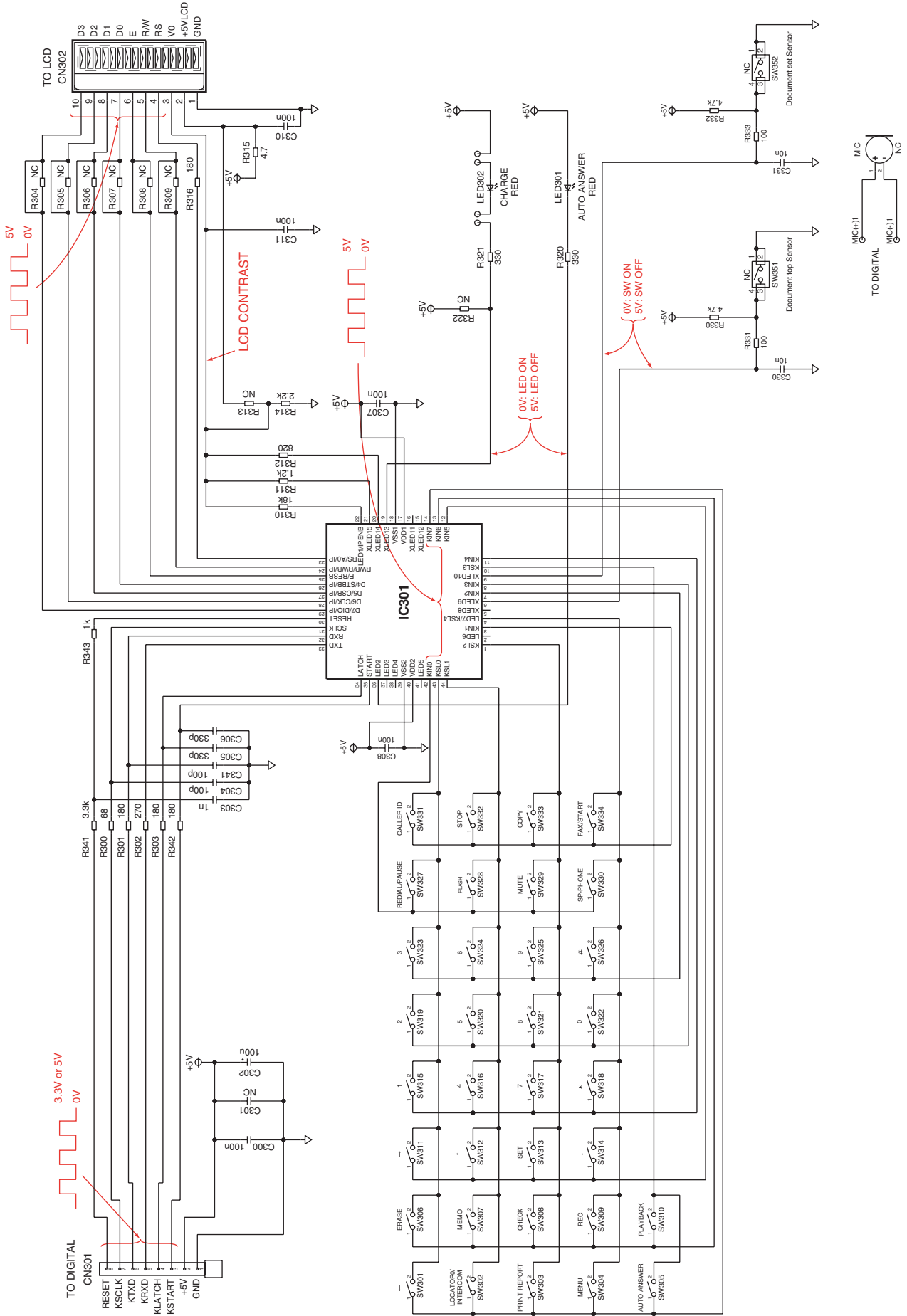
18.2. Analog Board (PCB2)





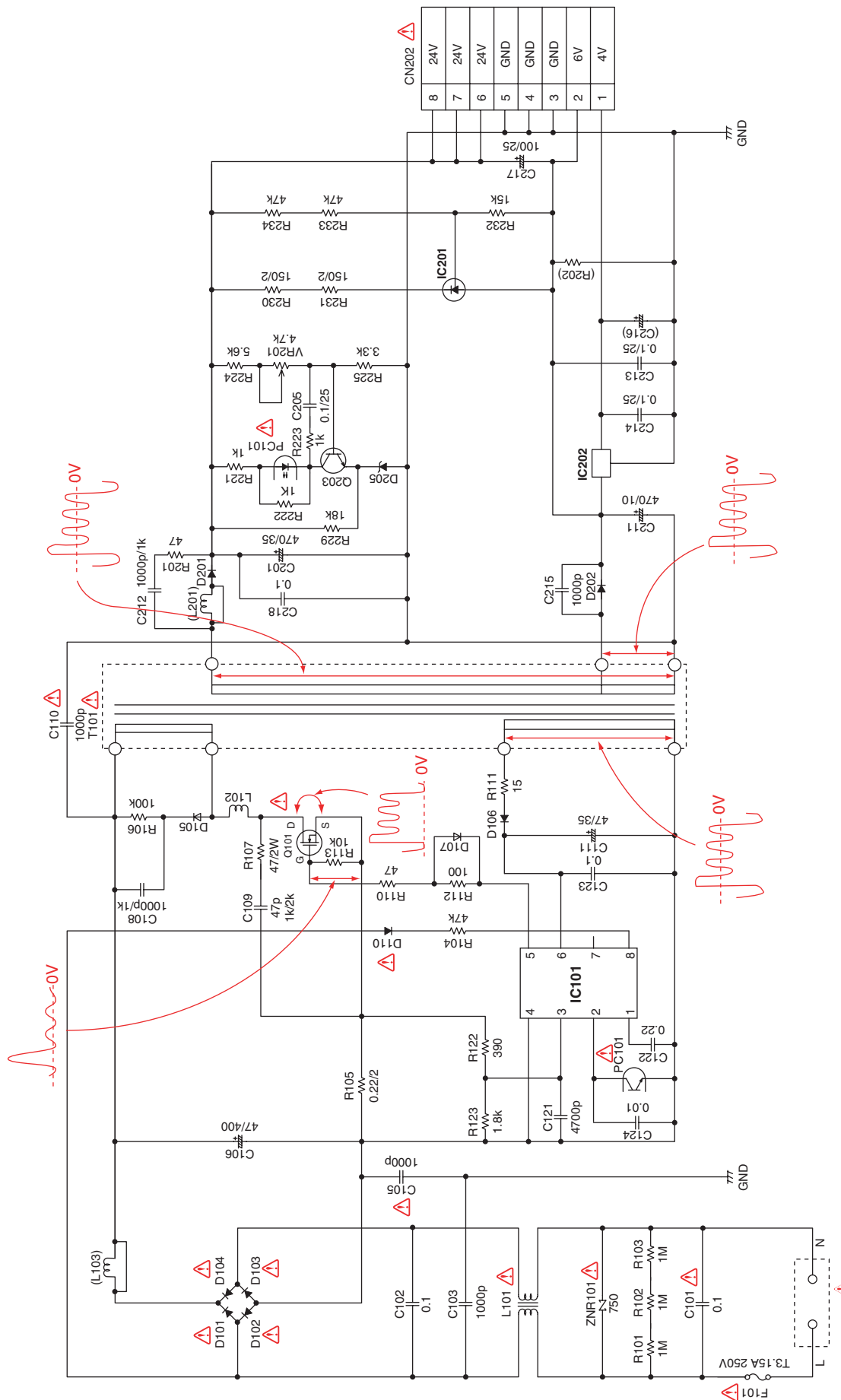
KX-FG2452CX: Analog Board

18.3. Operation Board (PCB3) / MIC Board (PCB9)



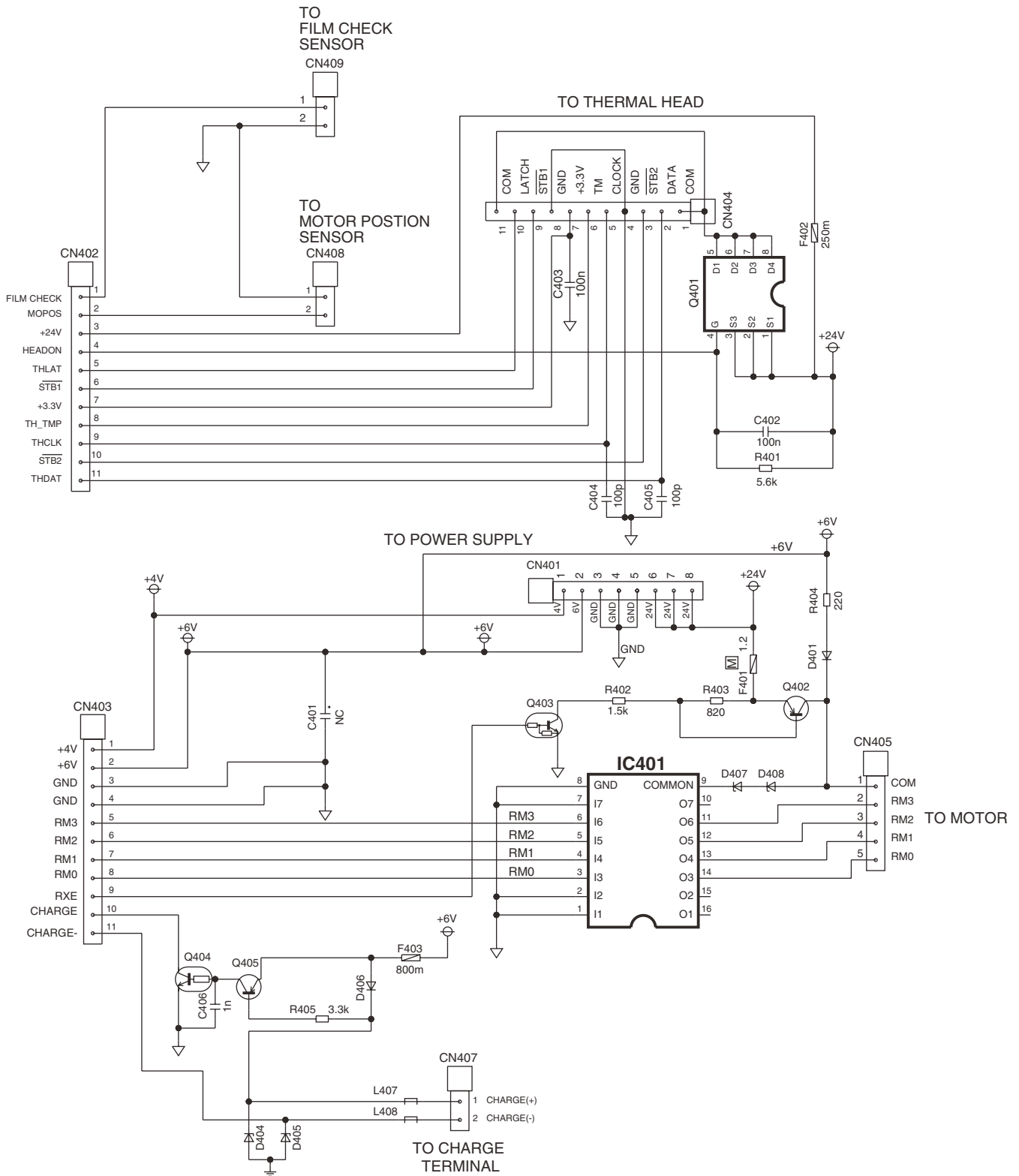
KX-FG2452CX: Operation Board

18.4. Power Supply Board (PCB4)



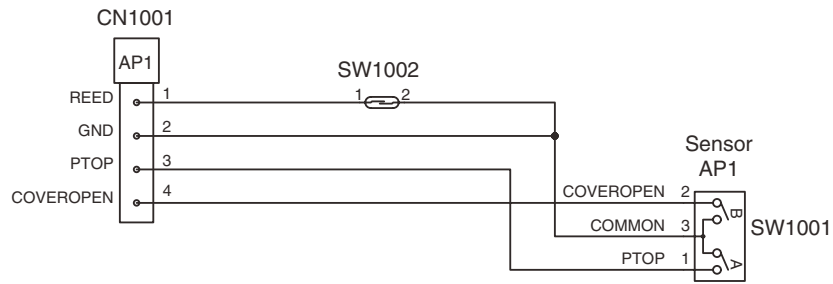
KX-FG2452CX: POWER SUPPLY BOARD

18.5. Interface Board (PCB5)



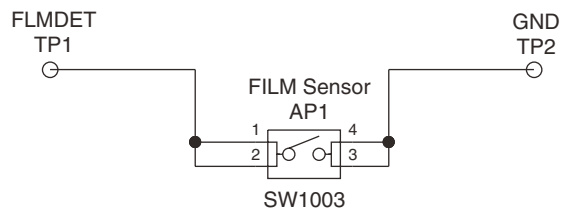
KX-FG2452CX: Interface Board

18.6. Sensor Board (PCB6)



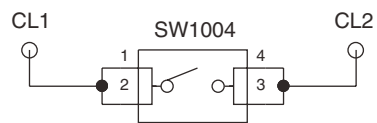
KX-FG2452CX: Sensor Board

18.7. Film End Sensor Board (PCB7)



KX-FG2452CX: Film End Sensor Board

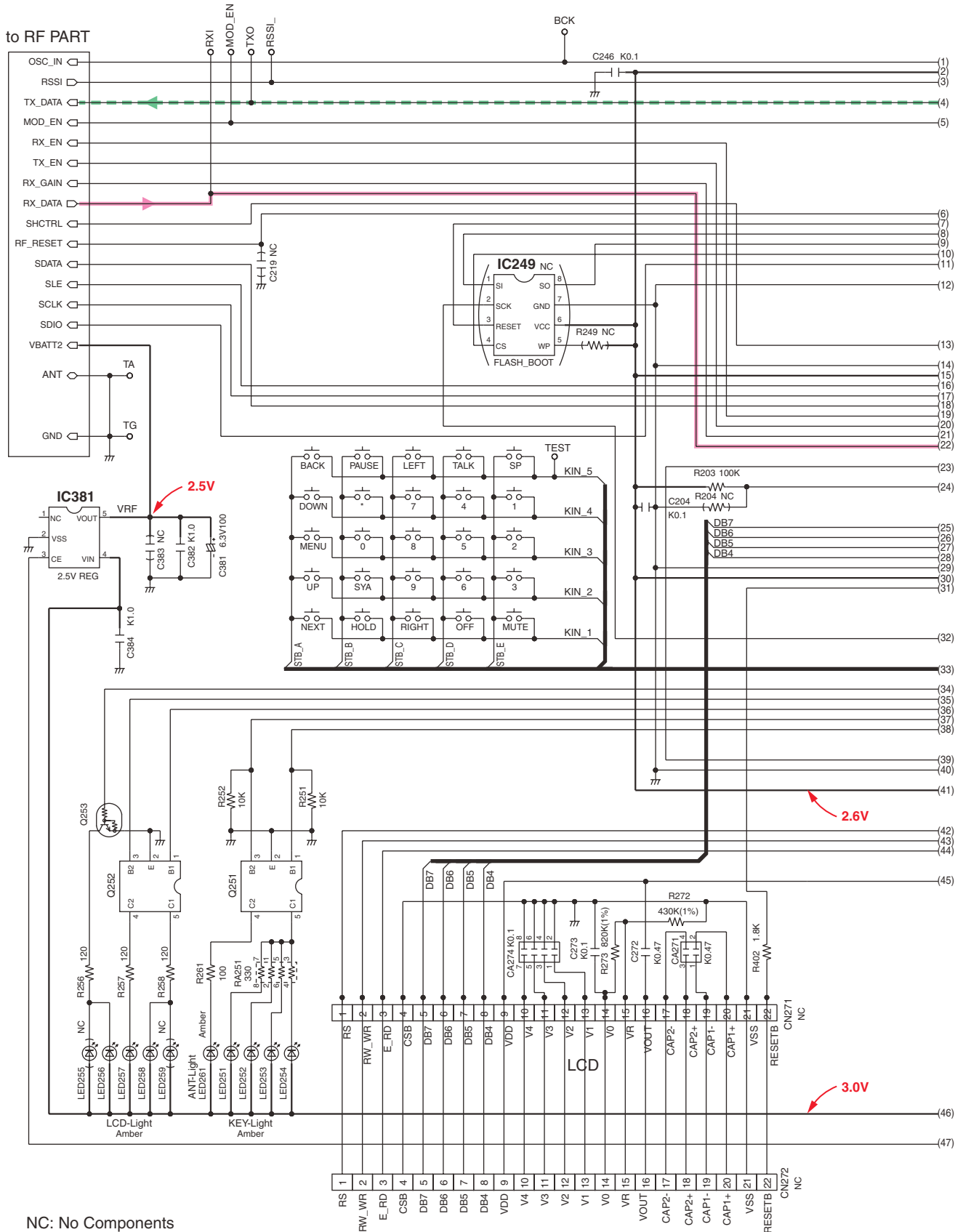
18.8. Motor Position Sensor Board (PCB8)



KX-FG2452CX: Motor Position Sensor Board

18.9. Handset Board (PCB100)

18.9.1. Handset_Main



NC: No Components

TEST SIGNAL
FREQUENCY:1KHz

Headset TX
-37dBm/600Ω IN
50mVp-p

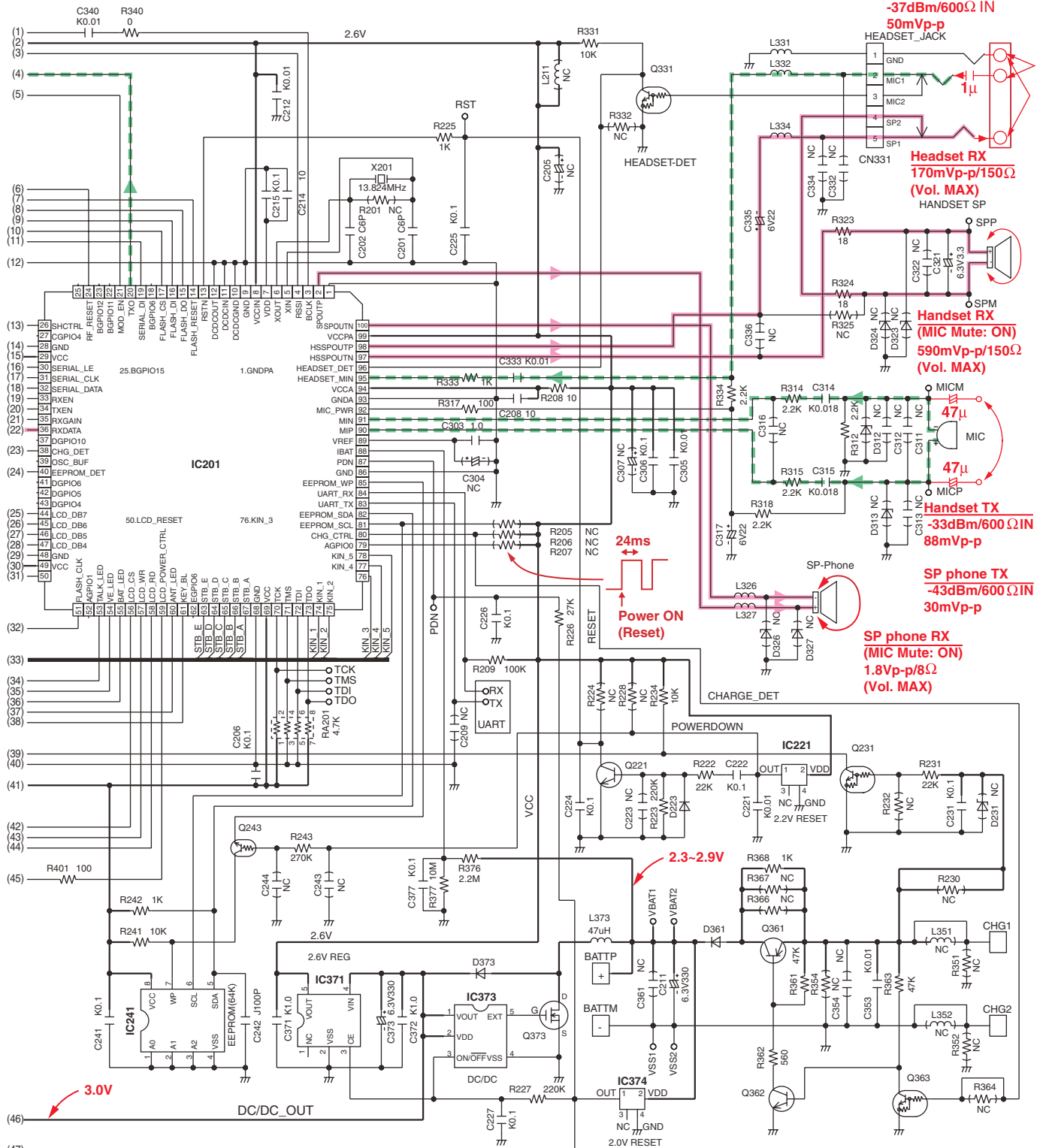
Headset RX
170mVp-p/150Ω
(Vol. MAX)
HANDSET SP

Handset RX
(MIC Mute: ON)
590mVp-p/150Ω
(Vol. MAX)

Handset TX
-33dBm/600Ω IN
88mVp-p

SP phone TX
-43dBm/600Ω IN
30mVp-p

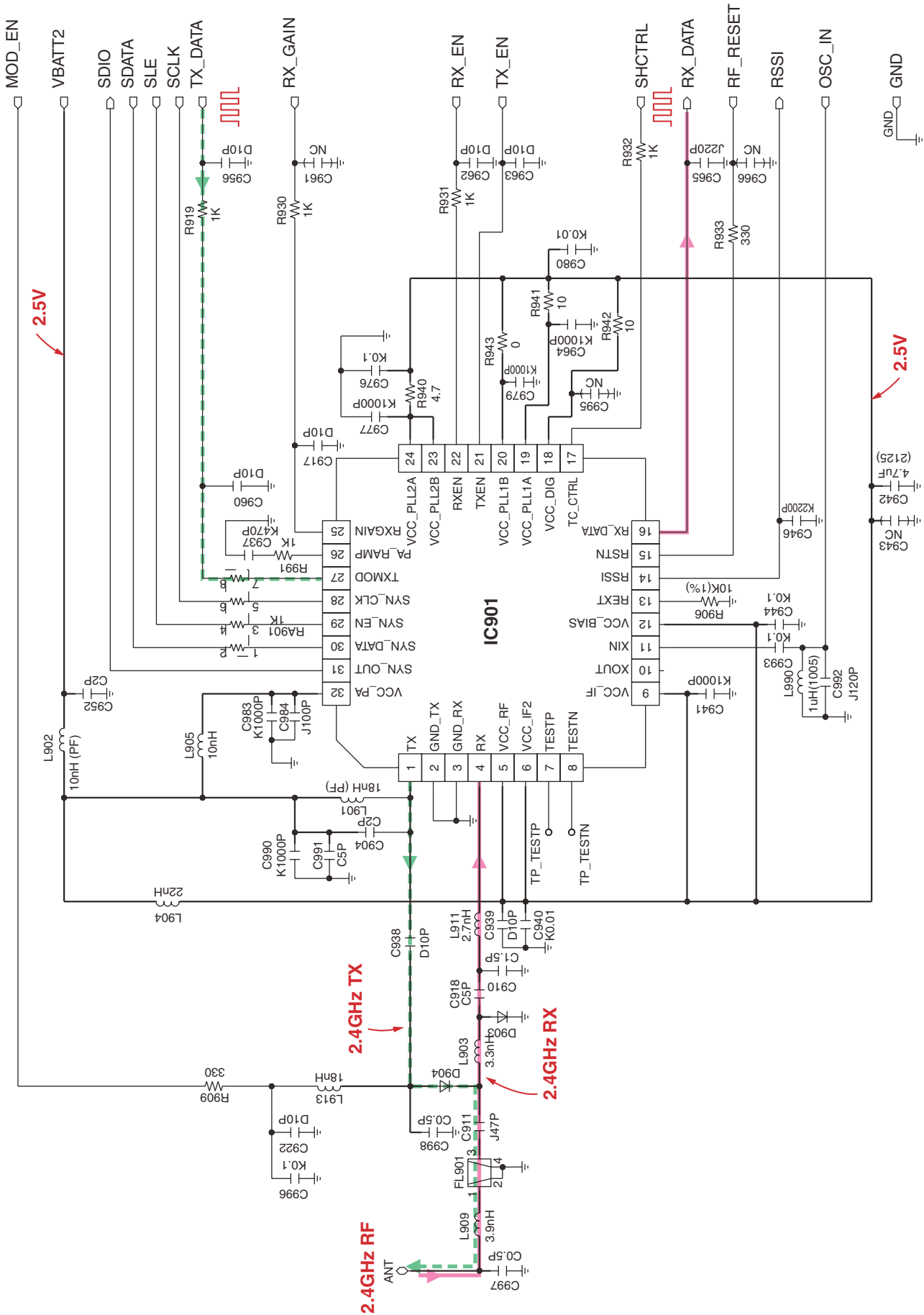
SP phone RX
(MIC Mute: ON)
1.8Vp-p/8Ω
(Vol. MAX)



NC: No Components

KX-FG2452CX : Handset Board_Main

18.9.2. Handset_RF Part



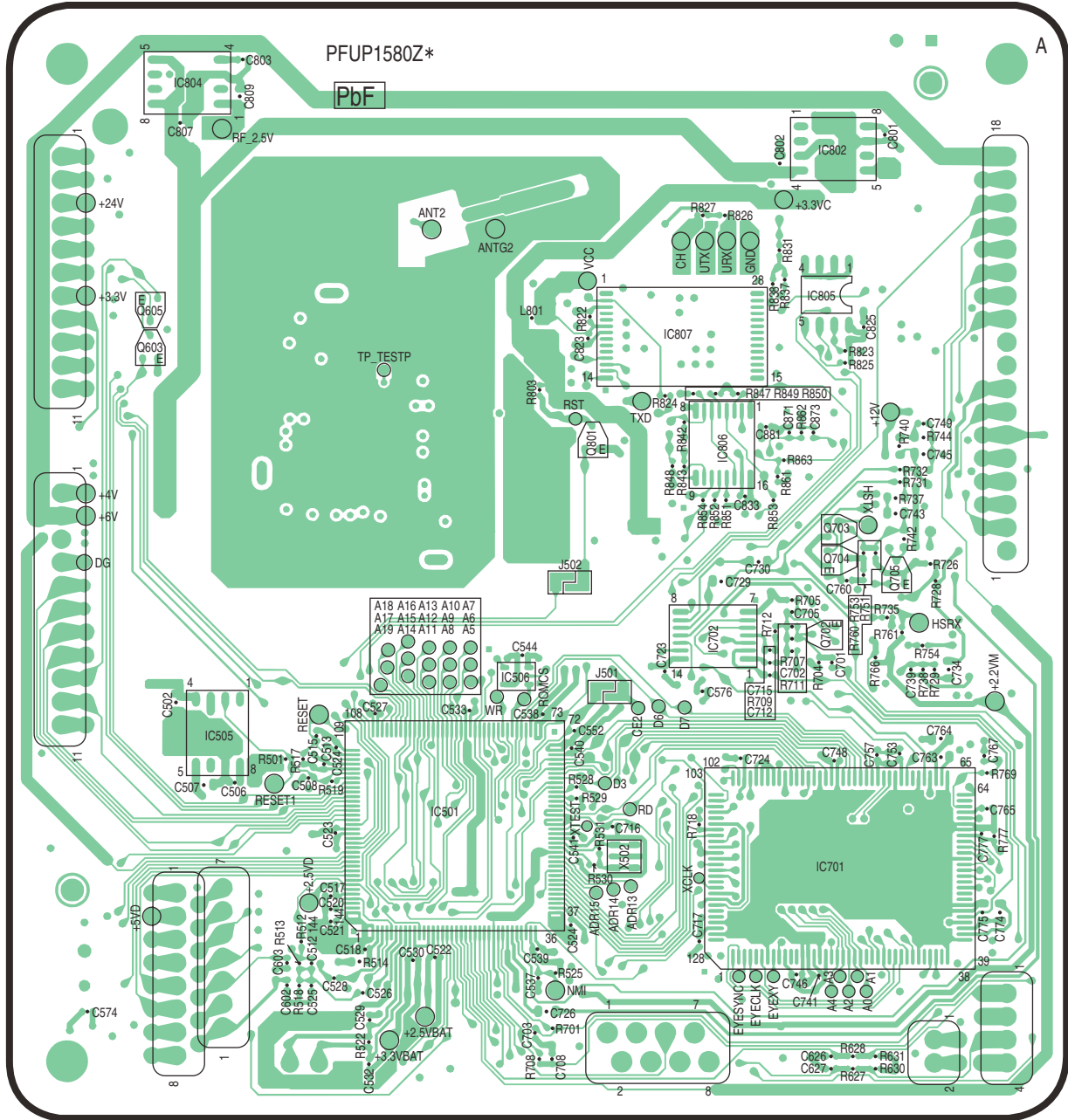
KX-FG2452CX : Handset_RF Part

NC: No Components

19 Printed Circuit Board

19.1. Digital Board (PCB1)

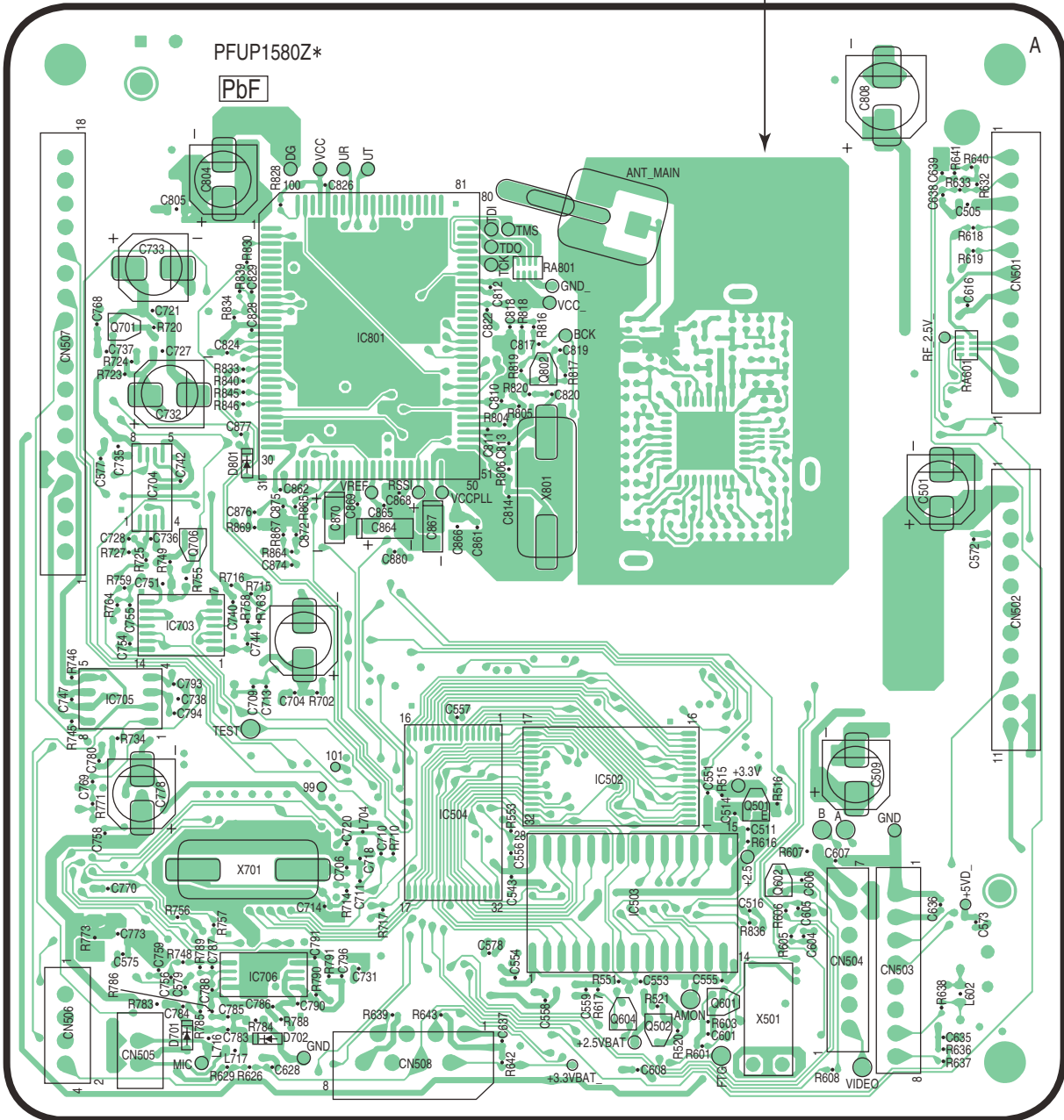
19.1.1. Bottom View



KX-FG2452CX: Digital Board (Bottom View)

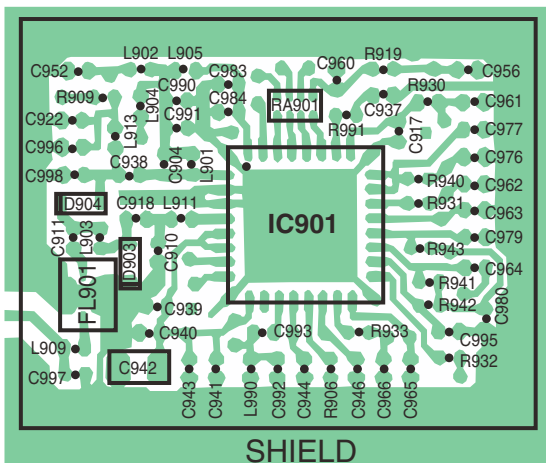
19.1.2. Component View

Refer to "RF Part".



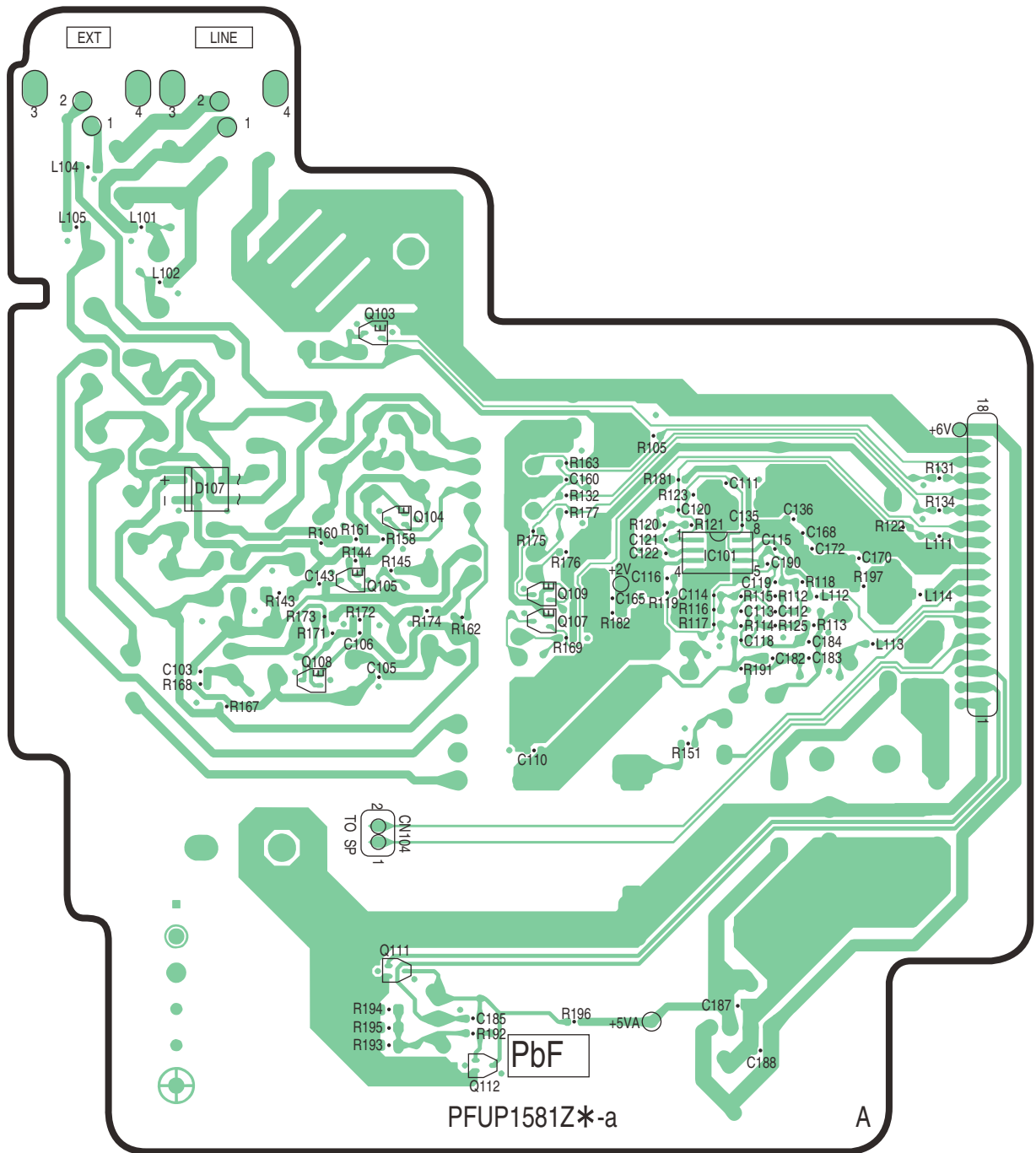
KX-FG2452CX: Digital Board (Component View)

(RF Part)



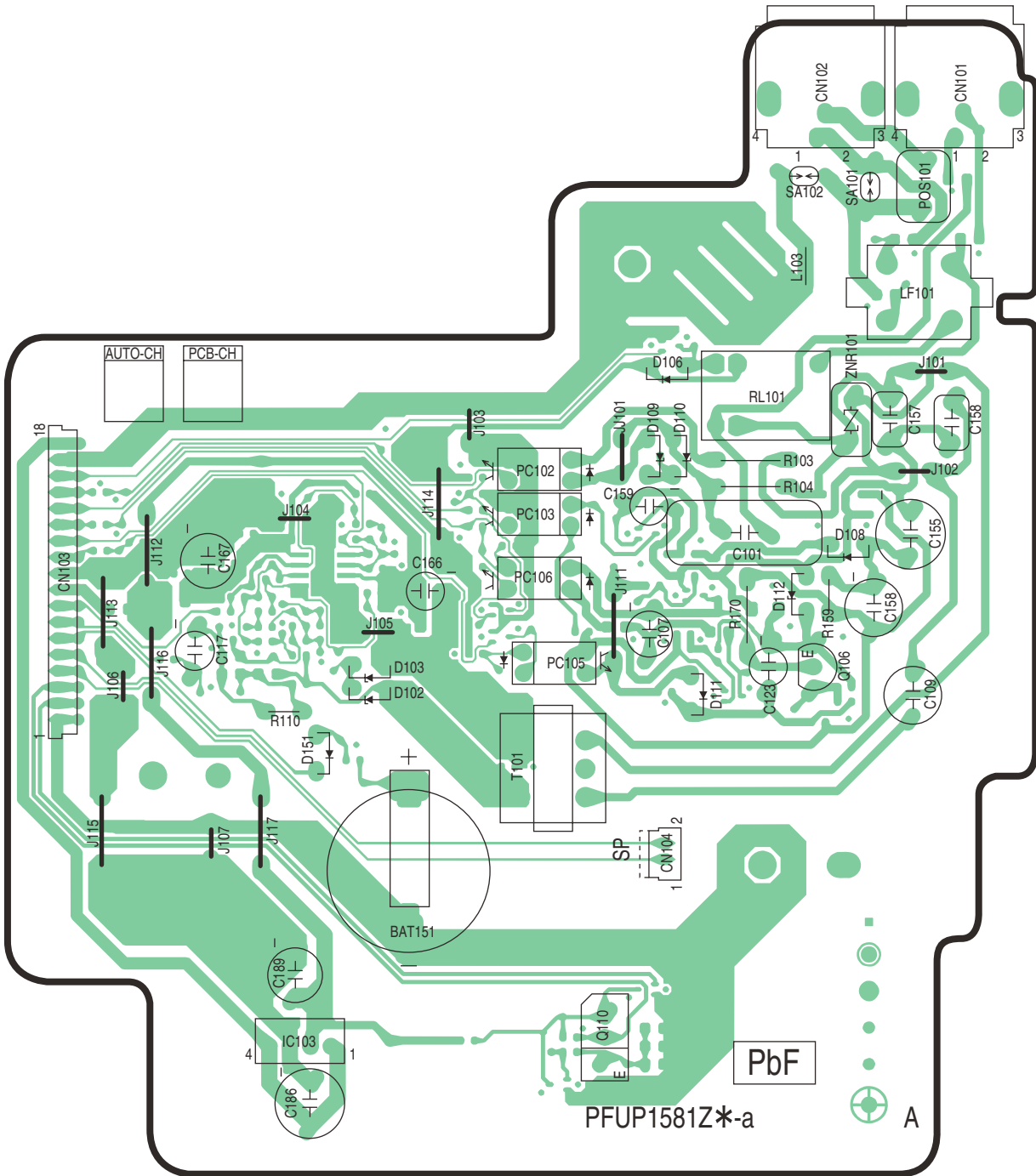
19.2. Analog Board (PCB2)

19.2.1. Bottom View



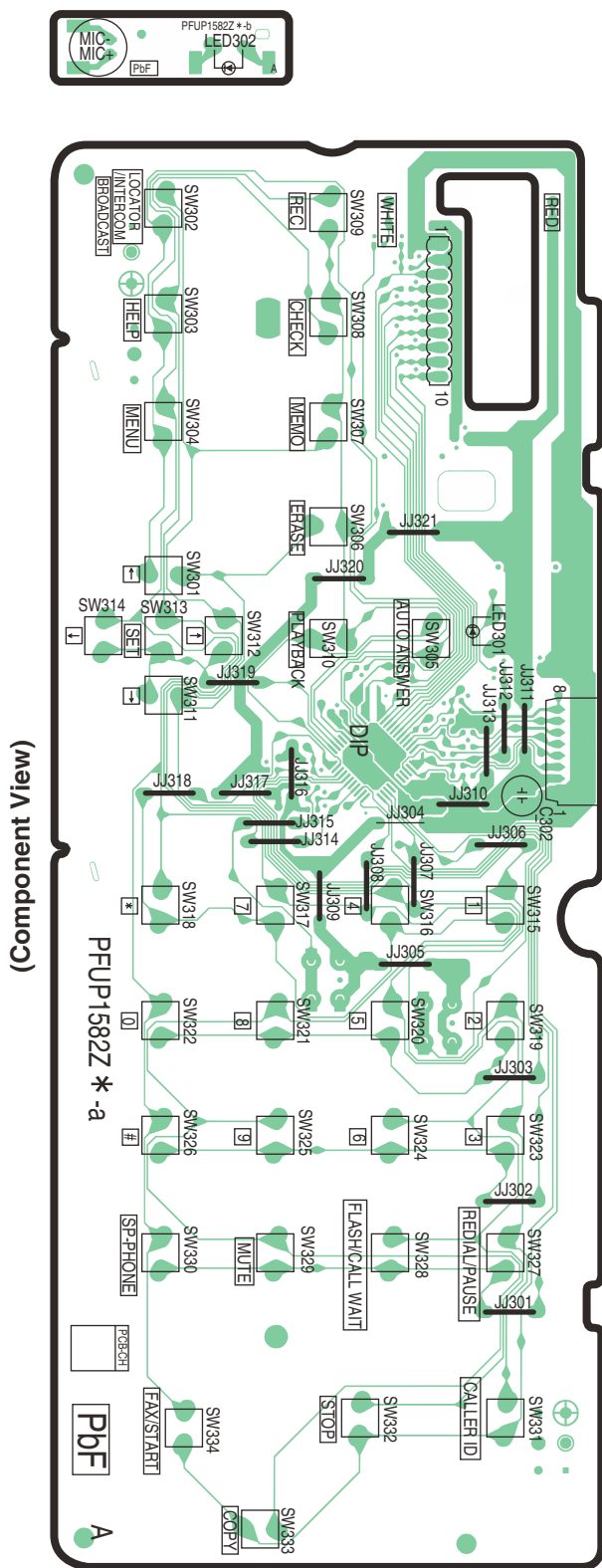
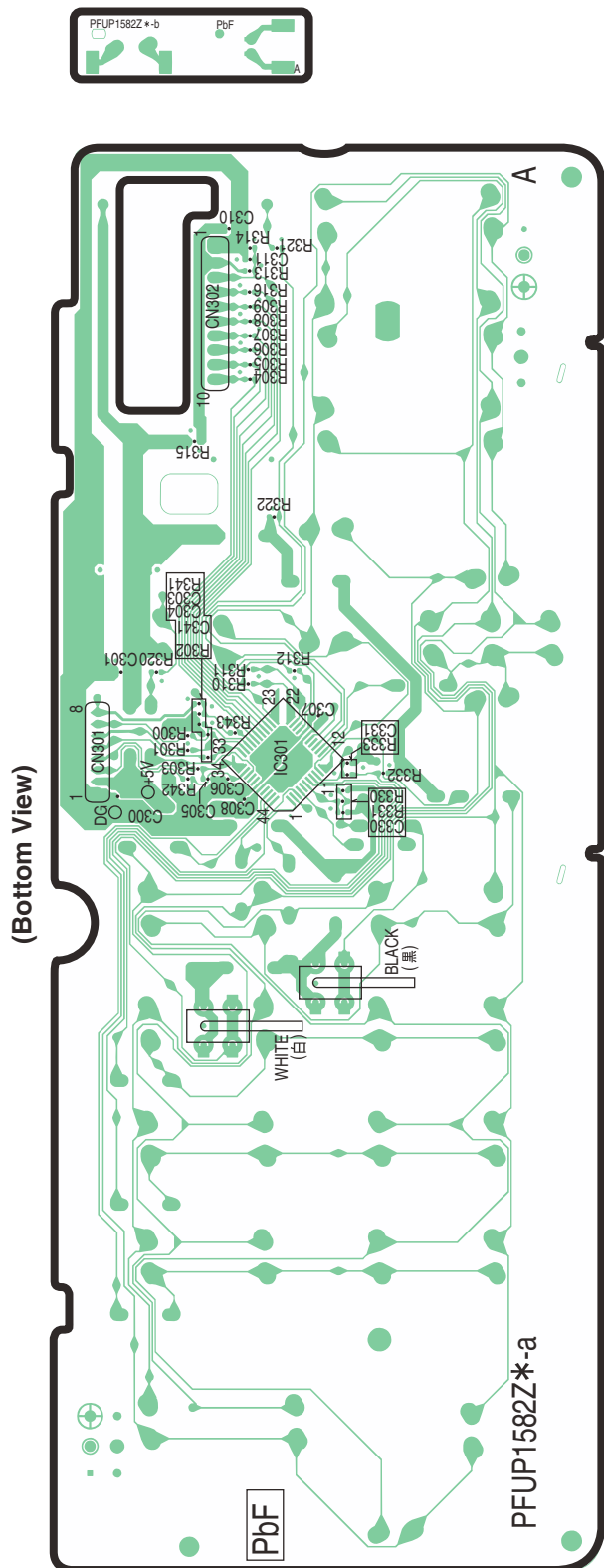
KX-FG2452CX: Analog Board (Bottom View)

19.2.2. Component View



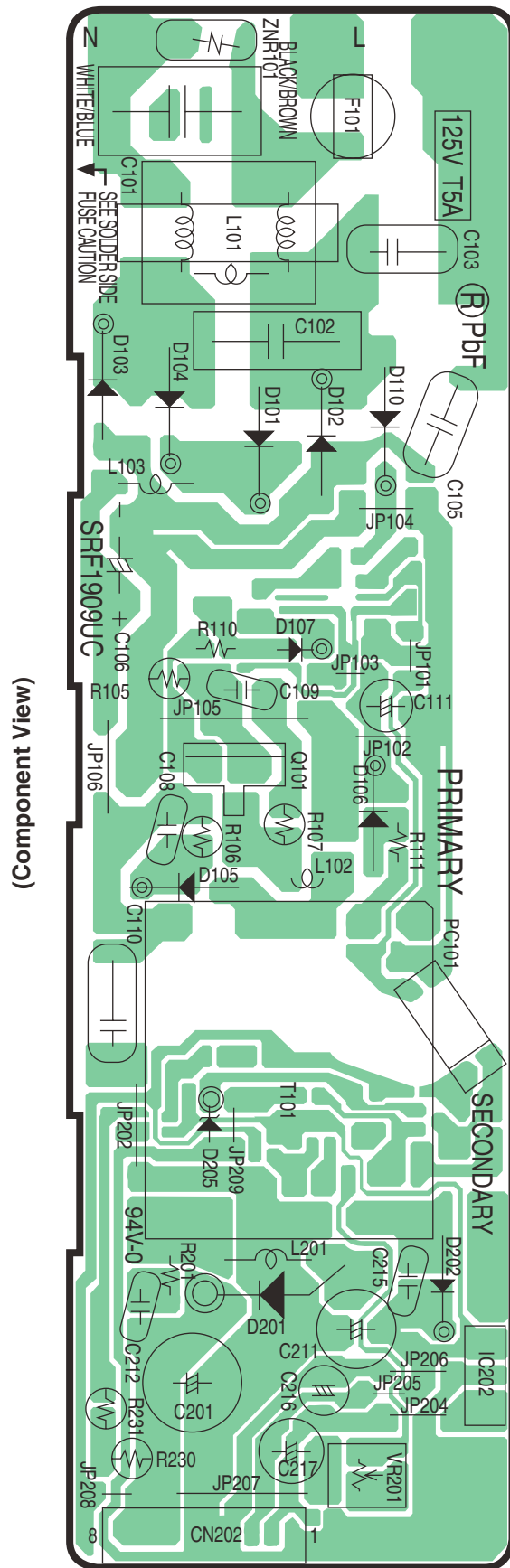
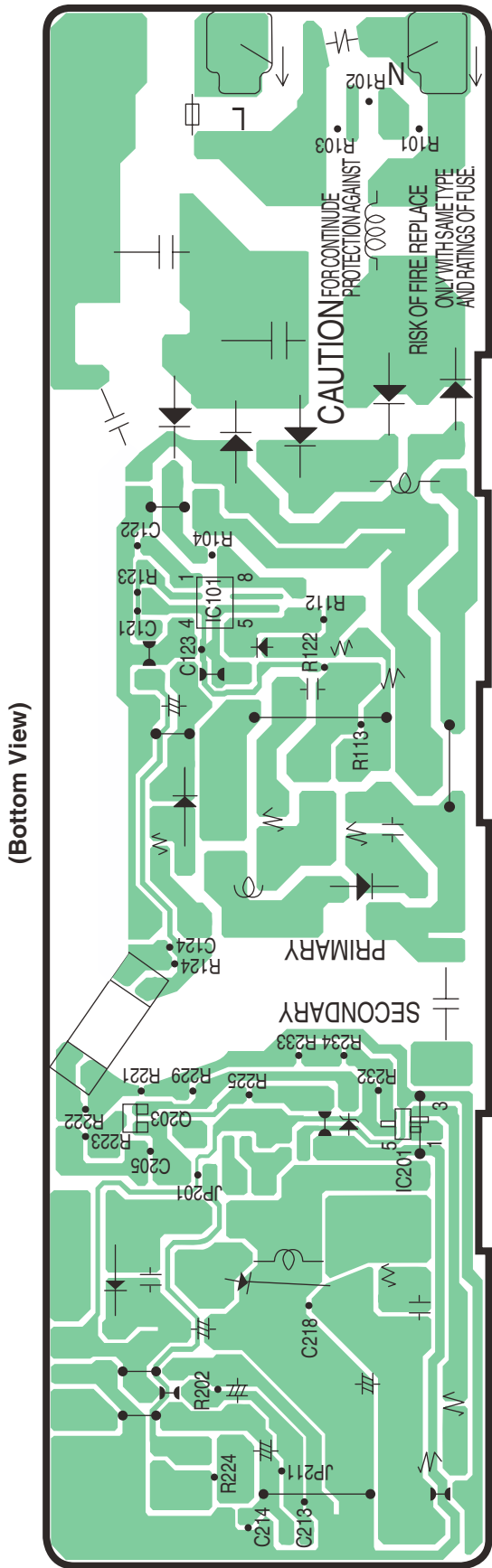
KX-FG2452CX: Analog Board (Component View)

19.3. Operation Board (PCB3) / MIC Board (PCB9)



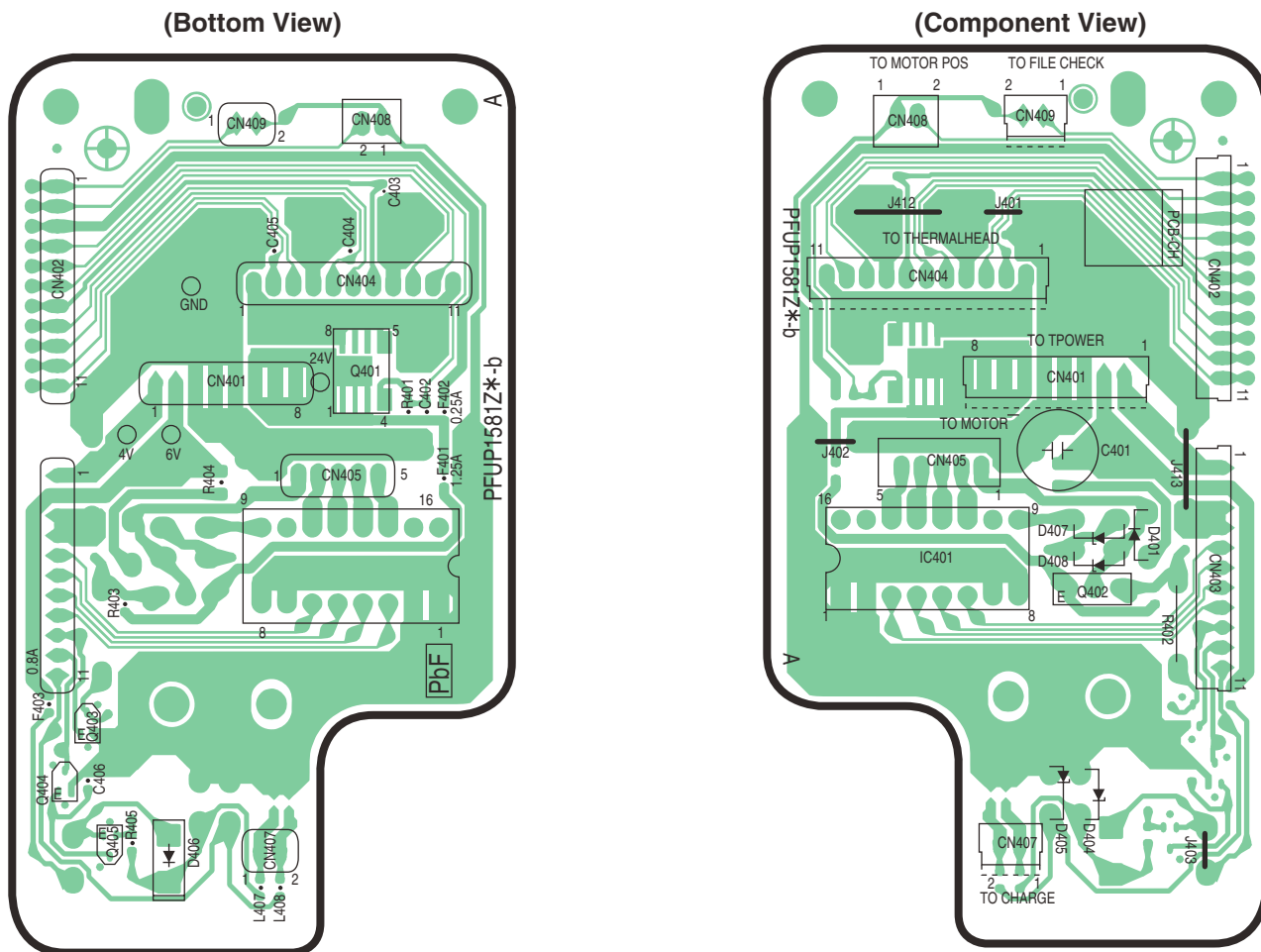
KX-FG2452CX: Operation Board / MIC Board

19.4. Power Supply Board (PCB4)



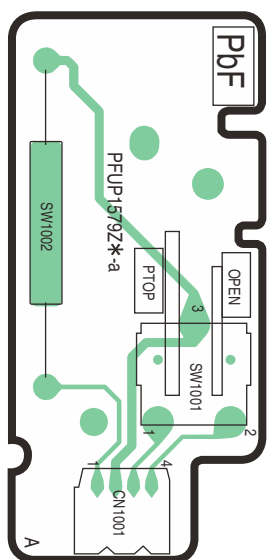
KX-FG2452CX: Power Supply Board

19.5. Interface Board (PCB5)



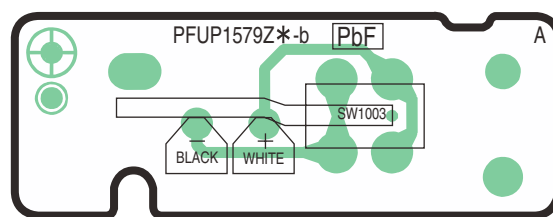
KX-FG2452CX: Interface Board

19.6. Sensor Board (PCB6)



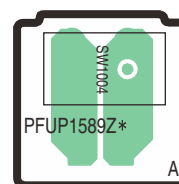
KX-FG2452CX: Sensor Board

19.7. Film End Sensor Board (PCB7)



KX-FG2452CX: Film End Sensor Board

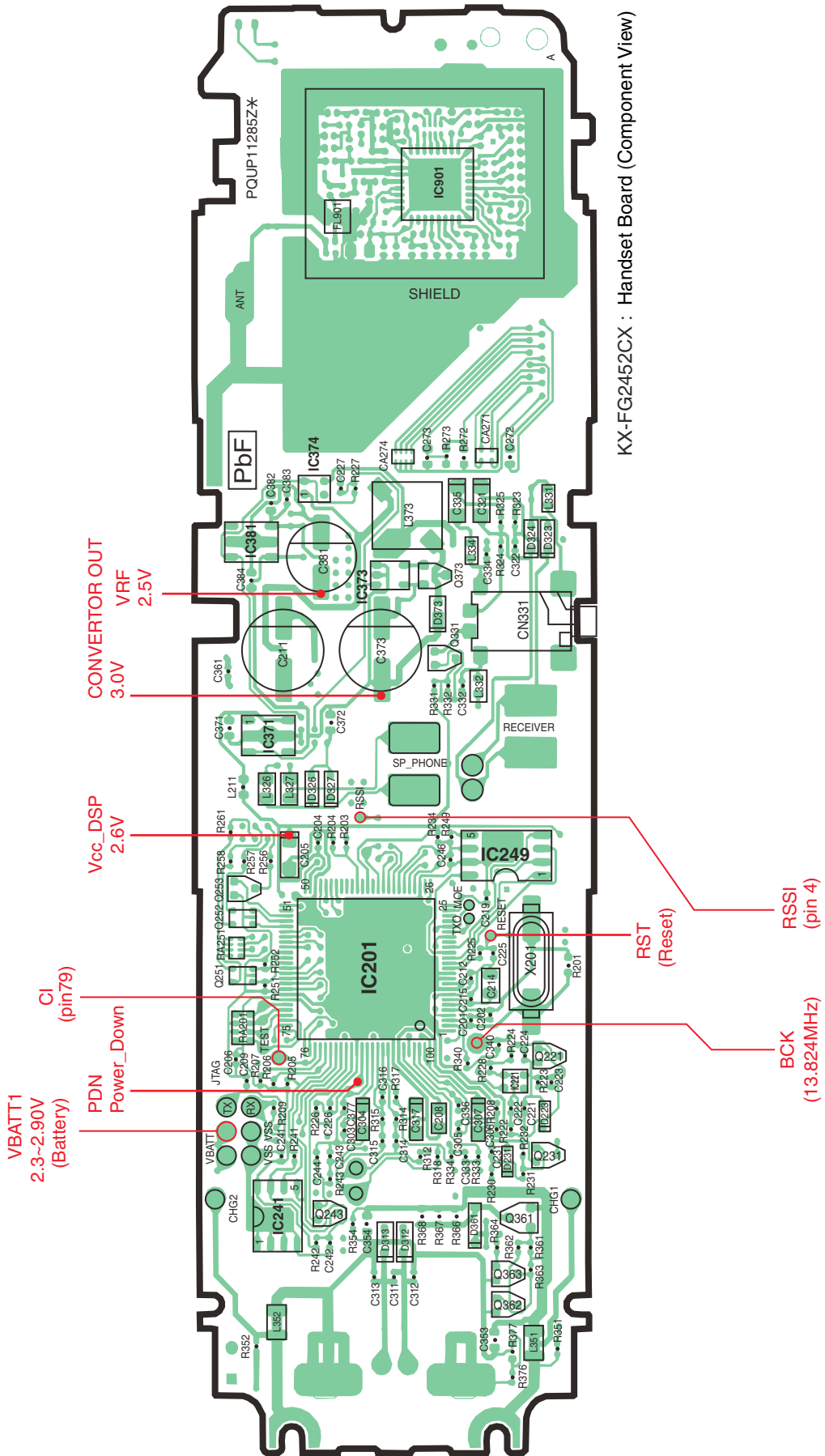
19.8. Motor Position Sensor Board (PCB8)



KX-FG2452CX: Motor position Board

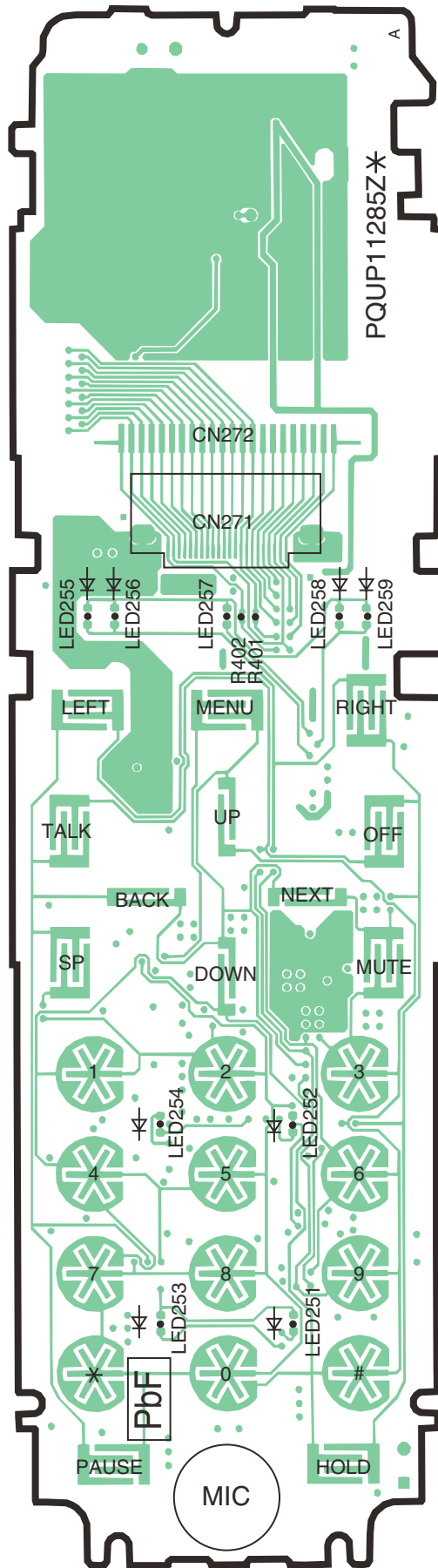
19.9. Handset Board (PCB100)

19.9.1. Component View



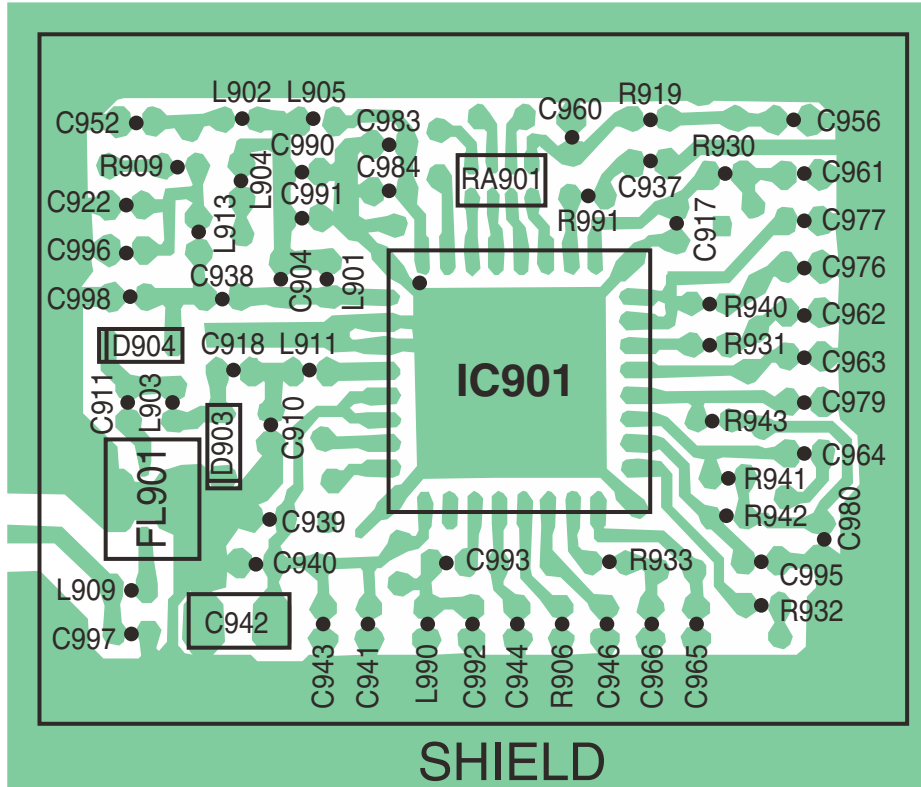
KX-FG2452CX : Handset Board (Component View)

19.9.2. Flow Solder Side View



KX-FG2452CX : Handset Board (Flow Solder Side View)

19.9.3. Handset_RF Part



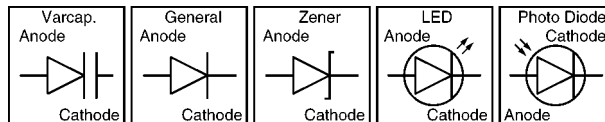
KX-FG2452CX: RF Part in Handset Board (Component View)

20 Appendix Information of Schematic Diagram

20.1. For 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.



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

20.2. CPU Data

20.2.1. IC801 (Digital Board)

Pin	Description	I/O	High	High_Z	Low
1	INT0	D.I	High	-	LOW
2	NC	-	-	-	-
3	BELL_TX	D.I	High	-	LOW
4	NC	-	-	-	-
5	NC	-	-	-	-
6	NC	-	-	-	-
7	NC	-	-	-	-
8	NC	-	-	-	-
9	NC	-	-	-	-
10	NC	-	-	-	-
11	NC	-	-	-	-
12	CHARGE_CTL	D.O	Tricle	-	Normal
13	CHAGE_DET	D.I	Off_charge	-	On_charge
14	VCC	VCC	VCC	-	-
15	GND	GND	-	-	GND
16	EROM_WP	D.O	Hlgh	-	LOW
17	EEPROM_DATA	D.O	Hlgh	-	LOW
18	EEPROM_CLK	D.O	Hlgh	-	LOW
19	S_ENB	D.I	Hlgh	-	LOW
20	CBUSY2	D.I	Hlgh	-	LOW
21	CBUSY1	D.O	Hlgh	-	LOW
22	NC	-	-	-	-
23	CSI/SDATA	D.O	Hlgh	-	LOW
24	SLE	D.O	Hlgh	-	LOW
25	CCLK/SCLK	D.O	Hlgh	-	LOW
26	CSO/SDIO	D.I	Hlgh	-	LOW
27	NC	-	-	-	-
28	GND	GND	-	-	GND
29	NC	-	-	-	-
30	GNDPA	GND	-	-	GND
31	-	-	-	-	-
32	VCCPA	VCC	VCC	-	-
33	NC	-	-	-	-
34	LOUT0	A.O	-	-	-
35	DCIN0	A.I	-	-	-
36	LIN0	A.I	-	-	-
37	VCCA	VCC	VCC	-	-
38	GND	GND	-	-	GND
39	HSMIP	A.I	-	-	-
40	HSMIN	A.I	-	-	-
41	VREF	A.O	-	-	-
42	NC	-	-	-	-
43	NC	-	-	-	-
44	GNDR	GND	-	-	-
45	TXMOD	A.O	-	-	-
46	VREFR	A.O	-	-	-
47	RSSI	A.I	-	-	-
48	VCCR	A.I	-	-	-
49	GNDPLL	GND	-	-	-
50	VCCPLL	VCC	-	-	-
51	XOUT	A.O	-	-	-
52	XIN	A.I	-	-	-
53	GND	GND	-	-	-
54	RSIN	D.I	Normal	-	Reset
55	PDN	D.I	Power ON	-	Power Down
56	NC	-	-	-	-
57	TXOUT	D.O	High	-	Low
58	MOD_EN	D.O	High	-	Low
59	NC	-	-	-	-
60	NC	-	-	-	-
61	NC	-	-	-	-
62	NC	-	-	-	-

Pin	Description	I/O	High	High_Z	Low
63	RXEN	D.O	Enable	-	Disable
64	TXEN	D.O	Enable	-	Disable
65	RX_GAIN	D.O	High_Gain	-	Low_gain
66	RXI	D.I	High	-	Low
67	NC	-	-	-	-
68	NC	-	-	-	-
69	NC	-	-	-	-
70	RF_RESET	D.O	Normal	-	Reset
71	RADIO_EN	D.O	Enable	-	Disable
72	GND	GND	-	-	GND
73	VCC	VCC	VCC	-	-
74	SHCTRL	D.O	High	-	Low
75	NC	-	-	-	-
76	TCK	D.O	-	-	-
77	TMS	D.O	-	-	-
78	TDI	D.I	-	-	-
79	TDO	D.O	-	-	-
80	NC	-	-	-	-
81	NC	-	-	-	-
82	NC	-	-	-	-
83	NC	-	-	-	-
84	NC	-	-	-	-
85	NC	-	-	-	-
86	NC	-	-	-	-
87	NC	-	-	-	-
88	NC	-	-	-	-
89	NC	-	-	-	-
90	NC	-	-	-	-
91	NC	-	-	-	-
92	UART_TX	D.O	-	-	-
93	UART_RX	D.I	-	-	-
94	NC	-	-	-	-
95	NC	-	-	-	-
96	GND	GND	-	-	GND
97	VCC	VCC	VCC	-	-
98	NC	-	-	-	-
99	NC	-	-	-	-
100	NC	-	-	-	-

Note:

- The mark “*” in the I/O column means the port is controlled by the firmware.
- Data in the blank columns are omitted because of the Analog I/O.

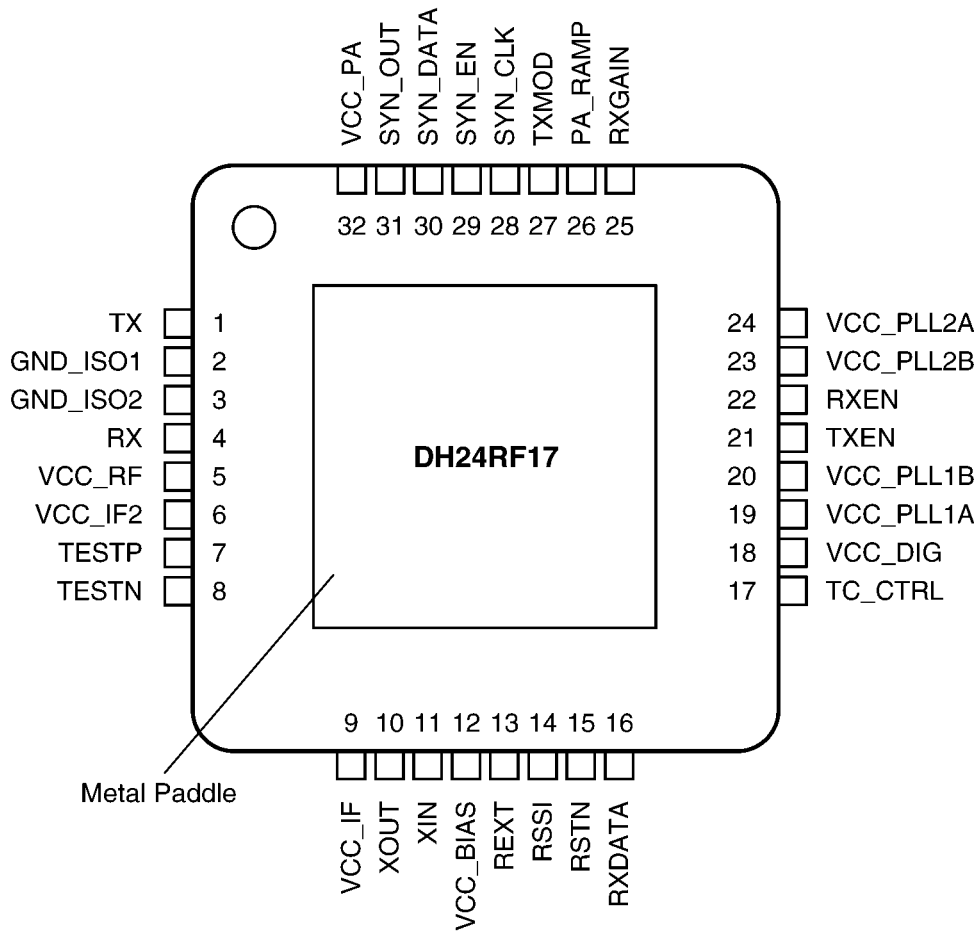
20.2.2. IC201 (Handset Board)

PIN	Description	I/O	High	High_Z	Low
1	GNDPA	GND	--	--	GND
2	SPOUTP	A.O	--	--	--
3	BCLK	A.O	--	--	--
4	RSSI	A.I	--	--	--
5	XIN	A.I	--	--	--
6	XOUT	A.O	--	--	--
7	VDD	VDD	--	--	--
8		VCC	VCC	--	--
9	GND	GND	--	--	GND
10	GND	GND	--	--	GND
11	DCIN0	A.I	--	--	--
12	DCOUT	A.O	--	--	--
13	RESET	D.I	Normal	--	Reset
14	(FLASH_RESET)	D.O	--	--	Normal
15	(FLASH_SO)	D.O	--	--	Normal
16	(FLASH_SI)	D.O	High	--	Low
17	(FLASH_CS)	D.O	--	--	Normal
18	NC	D.O	--	--	Normal
19	SERIAL DI	D.I	High	--	Low
20	TX OUT	D.O	High	--	Low
21	MOD_EN	D.O	On	--	Off
22	NC	D.O	--	--	Normal
23	NC	D.O	--	--	Normal
24	RF RESET	D.O	Normal	--	Reset
25	NC	D.O	--	--	Normal
26	SHCTRL	D.O	On	--	Off
27	NC	D.O	--	--	Normal
28	GND	GND	--	--	GND
29	VCC	VCC	VCC	--	--
30	SERIAL_LE	D.O	High	--	Low
31	SERIAL_CLK	D.O	High	--	Low
32	SERIAL_DATA	D.I	High	--	Low
33	RXEN	D.O	Active	--	Off
34	TXEN	D.O	Active	--	Off
35	RXGAIN	D.O	High	--	Low
36	RXI	D.I	--	--	--
37	NC	D.O	--	--	Normal
38	CHARGE_DET	D.I	Off Charge	--	On Charge
39	OSC_Buf	D.O	--	--	--
40	EEPROM_DET	D.O	64K	--	16K
41	NC	D.O	--	--	Normal
42	NC	D.O	--	--	Normal
43	NC	D.O	--	--	Normal
44	DOT_LCD_D7	D.O	High	--	Low
45	DOT_LCD_D6	D.O	High	--	Low
46	DOT_LCD_D5	D.O	High	--	Low
47	DOT_LCD_D4	D.O	High	--	Low
48	GND	GND	--	--	GND
49	VCC	VCC	VCC	--	--
50	DOT_LCD_RESET	D.O	Normal	--	Reset
51	(FLASH_SCK)	D.O	High	--	Low
52	NC	D.O	--	--	Normal
53	LED_BL1	D.O	On	--	Off
54	LED_BL2	D.O	On	--	Off
55	LED_BL3	D.O	On	--	Off
56	DOT_LCD_RS	D.O	Data	--	Instruct
57	DOT_LCD_RW_WR	D.O	Read	--	Write
58	DOT_LCD_E_RD	D.O	Active	--	Not
59	DOT_LCD_POWER_SW	D.O	On	--	Off

PIN	Description	I/O	High	High_Z	Low
60	ANT_LED	D.O	On	--	Off
61	LIGHTED	D.O	On	--	Off
62	NC	D.O	--	--	Normal
63	KEYSTROBE_E	D.O	--	Not	Active
64	KEYSTROBE_D	D.O	--	Not	Active
65	KEYSTROBE_C	D.O	--	Not	Active
66	KEYSTROBE_B	D.O	--	Not	Active
67	KEYSTROBE_A	D.O	--	Not	Active
68	GND	GND	--	--	GND
69	VCC	VCC	VCC	--	--
70	TEST_CLK	D.I	--	--	--
71	TEST_MODE_SELECT	D.I	--	--	--
72	TEST_DATA_IN	D.I	--	--	--
73	TEST_DATA_OUT	D.O	--	--	--
74	KEYIN1	D.I	Non	--	Key In
75	KEYIN2	D.I	Non	--	Key In
76	KEYIN3	D.I	Non	--	Key In
77	KEYIN4	D.I	Non	--	Key In
78	KEYIN5	D.I	Non	--	Key In
79	NC	D.O	--	--	Normal
80	CHARGE_CNT	D.O	Trickle	--	Normal
81	EEPROM_CLK	D.O	High	--	Low
82	EEPROM_DATA	D.I.O	High	--	Low
83	UART_TX	D.O	High	--	Low
84	UART_RX	D.I	High	--	Low
85	EEPROM_WP	D.O	WP	--	Write
86	GND	GND	--	--	GND
87	PDN	A.I	--	--	--
88	Battlow	A.I	--	--	--
89	VREF	A.O	--	--	--
90	MIP	A.I	--	--	--
91	MIN	A.I	--	--	--
92	DCIN2	A.I	--	--	--
93	GND_A	GND	--	--	GND
94	VCCA	VCC	VCC	--	--
95	Headset_MIC_in	A.I	--	--	--
96	HEADSET_DET	A.I	--	--	--
97	ROUT0	A.O	--	--	--
98	HSSPOUT	A.O	--	--	--
99	VCCPA	VCC	VCC	--	--
100	SPOUTN	A.O	--	--	--

20.3. Explanation of RF unit Terminals (RF Unit)

20.3.1. IC901

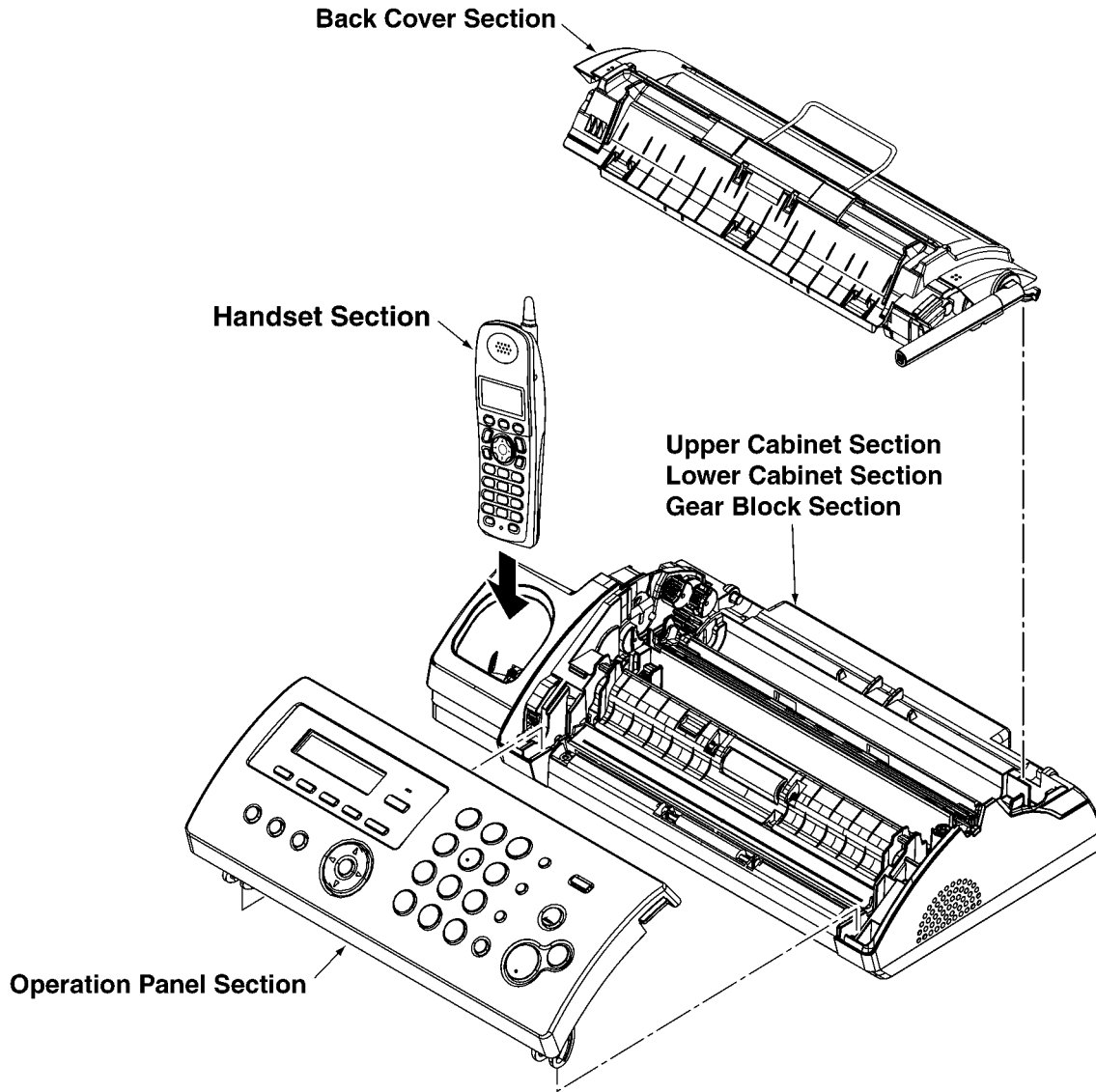


Pin	Description	I/O	Pin	Description	I/O
1	TX	O & VCC	18	VCC_DIG	VCC
2	GND_ISO1	GND	19	VCC_PLL1A	VCC
3	GND_ISO2	GND	20	VCC_PLL1B	VCC
4	RX	I	21	TXEN	I
5	VCC_RF	VCC	22	RXEN	I
6	VCC_IF2	VCC	23	VCC_PLL2B	VCC
7	TESTP	O	24	VCC_PLL2A	VCC
8	TESTN	O	25	RXGAIN	I
9	VCC_IF	VCC	26	PA_RAMP	I
10	XOUT	XI/XO	27	TXMOD	I
11	XIN	XI/XO	28	SYN_CLK	I
12	VCC_BIAS	VCC	29	SYN_EN	I
13	REXT	I	30	SYN_DATA	I
14	RSSI	O	31	SYN_OUT	O
15	RSTN	I	32	VCC_PA	VCC
16	RXDATA	O	PKG	PADDLE_GND	GND
17	TC_CTRL	I			

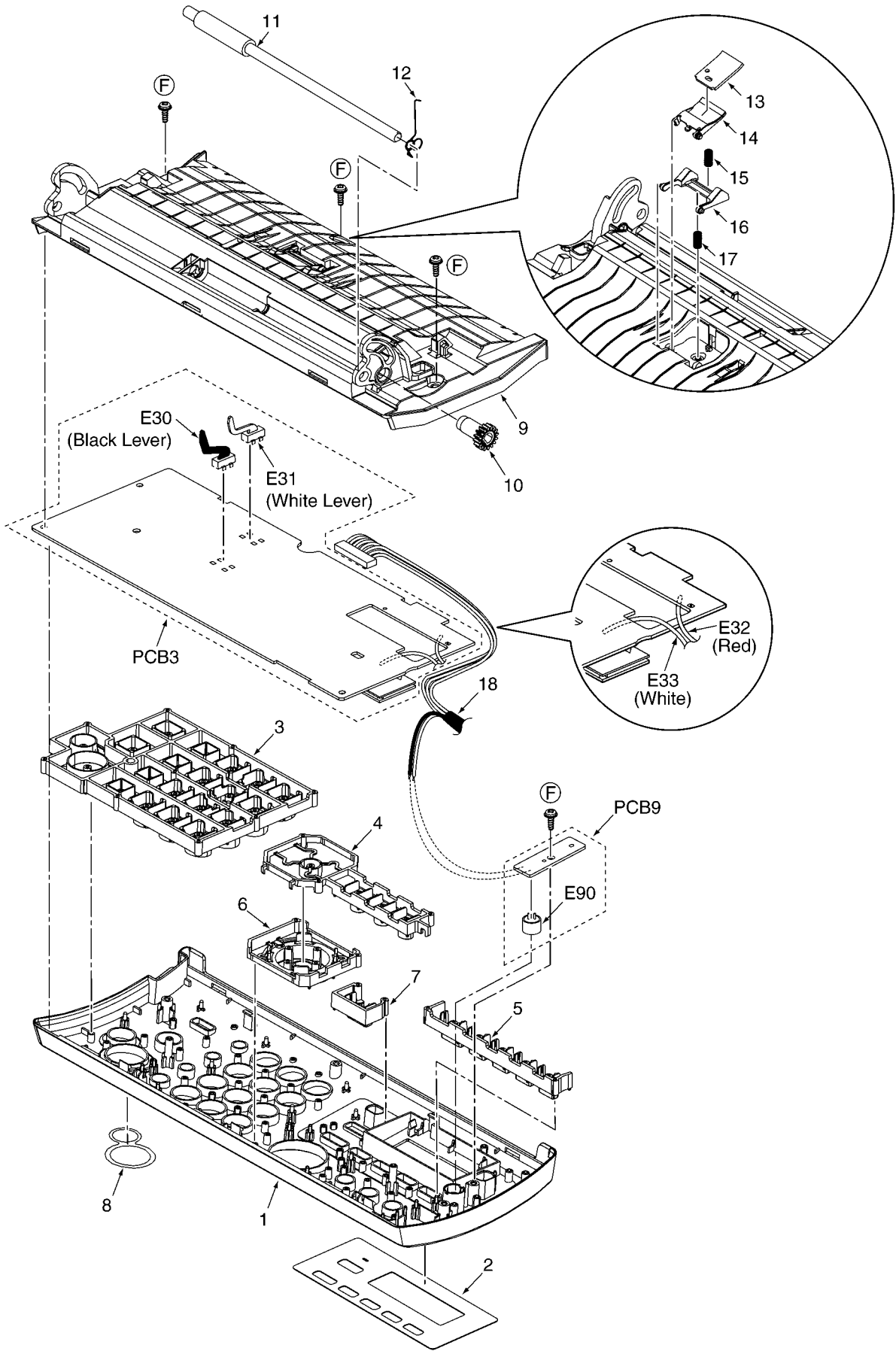
21 Exploded View and Replacement Parts List

21.1. Cabinet, Mechanical and Electrical Parts Location

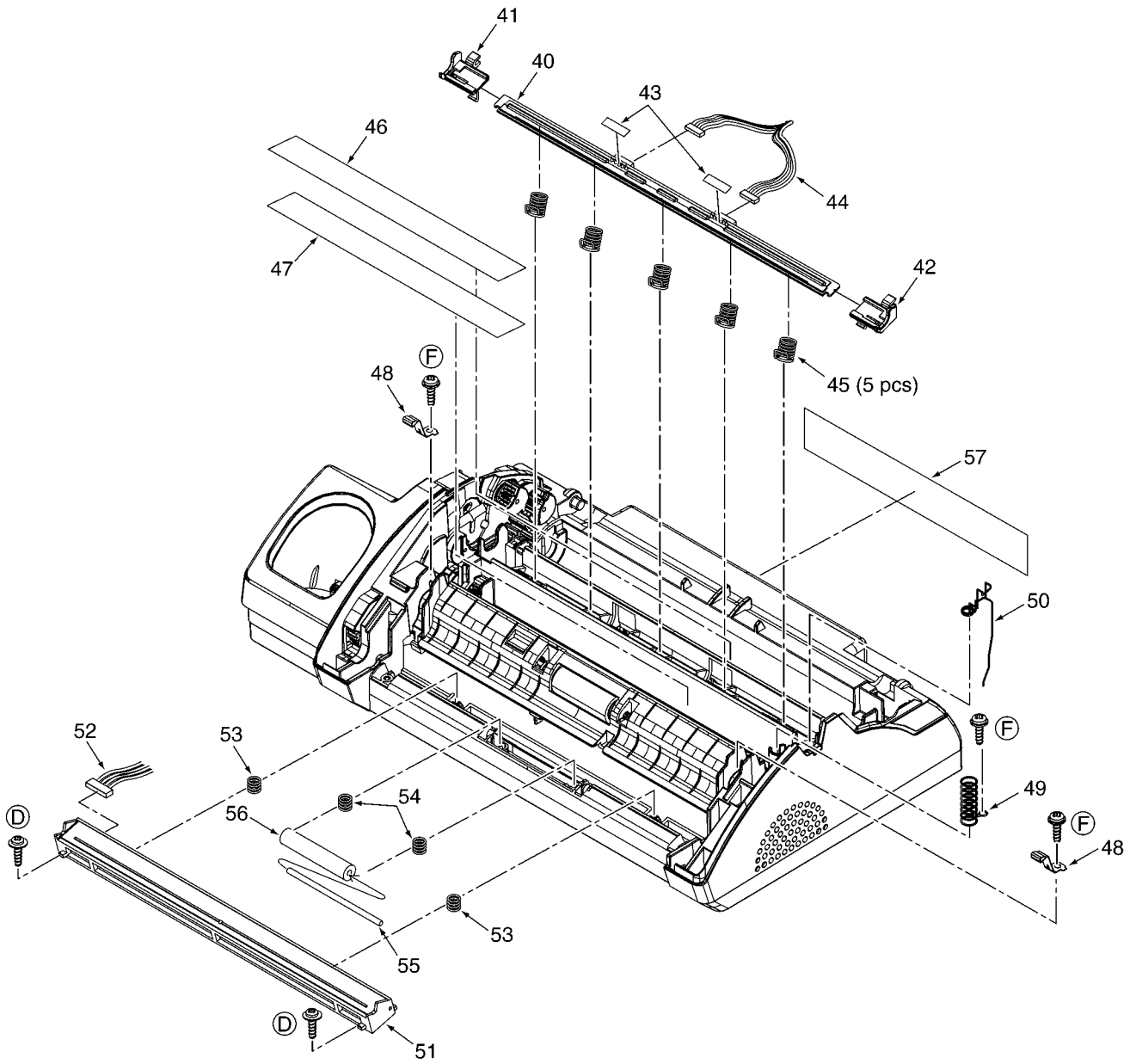
21.1.1. General Section



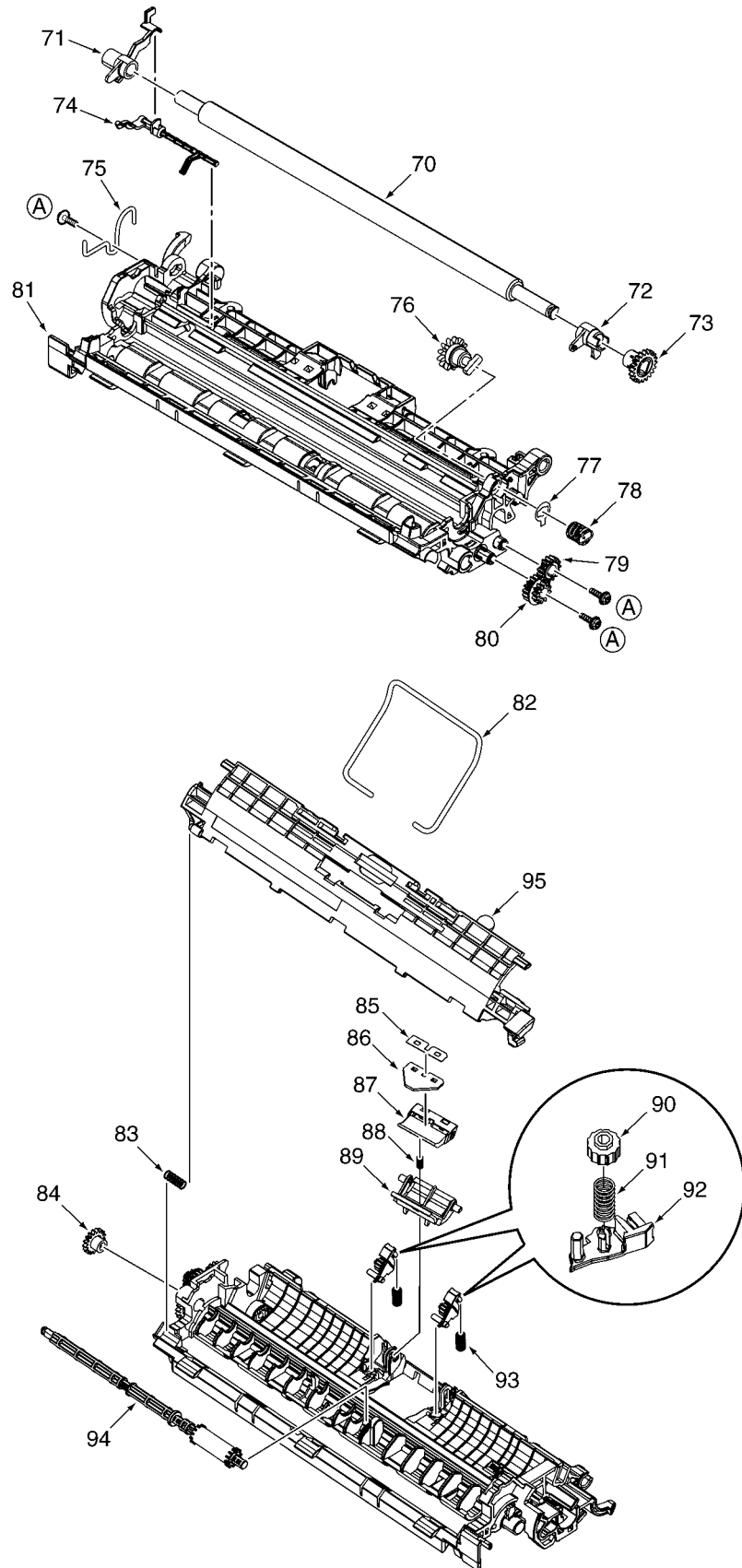
21.1.2. Operation Panel Section

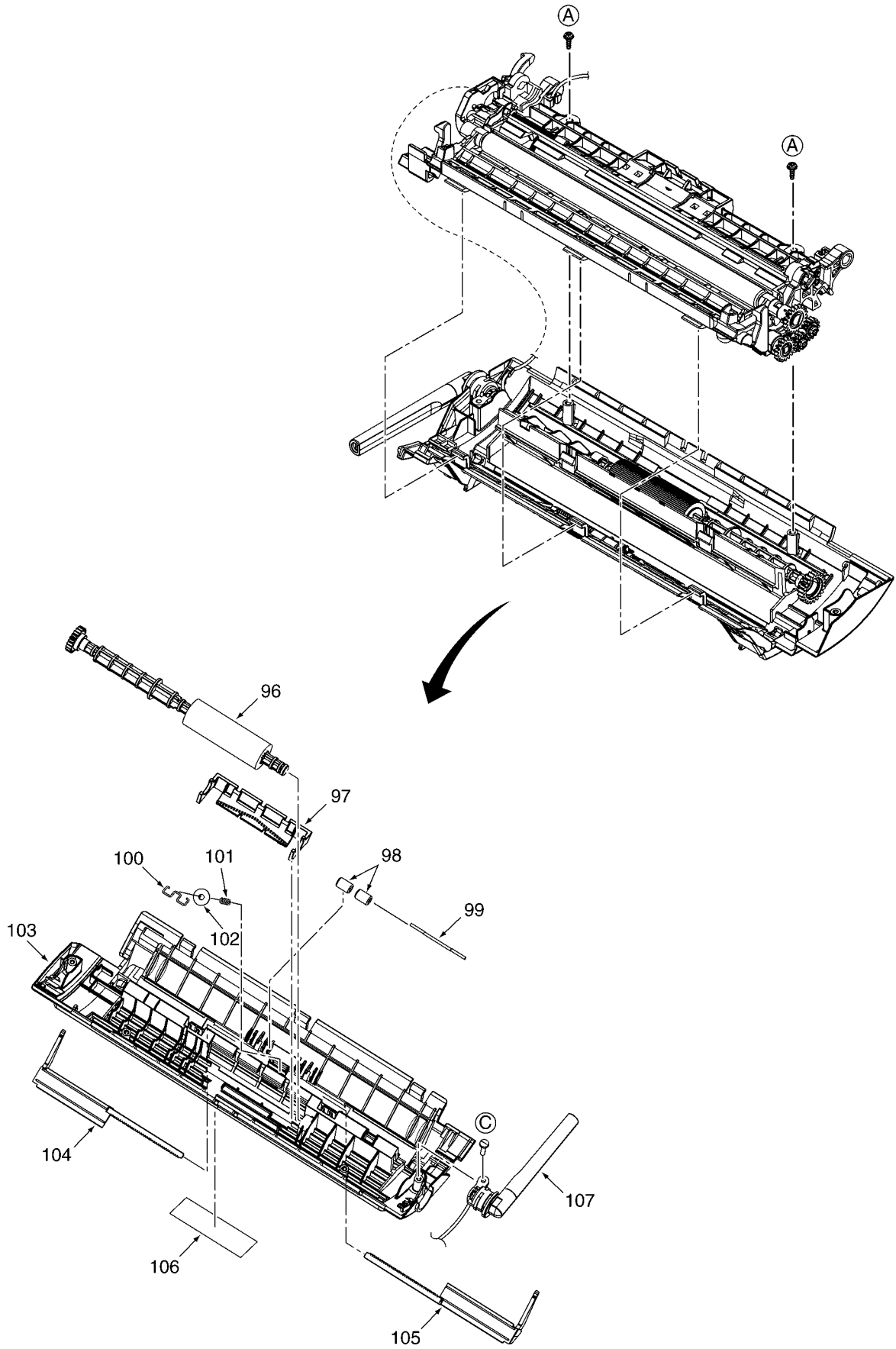


21.1.3. Upper Cabinet Section

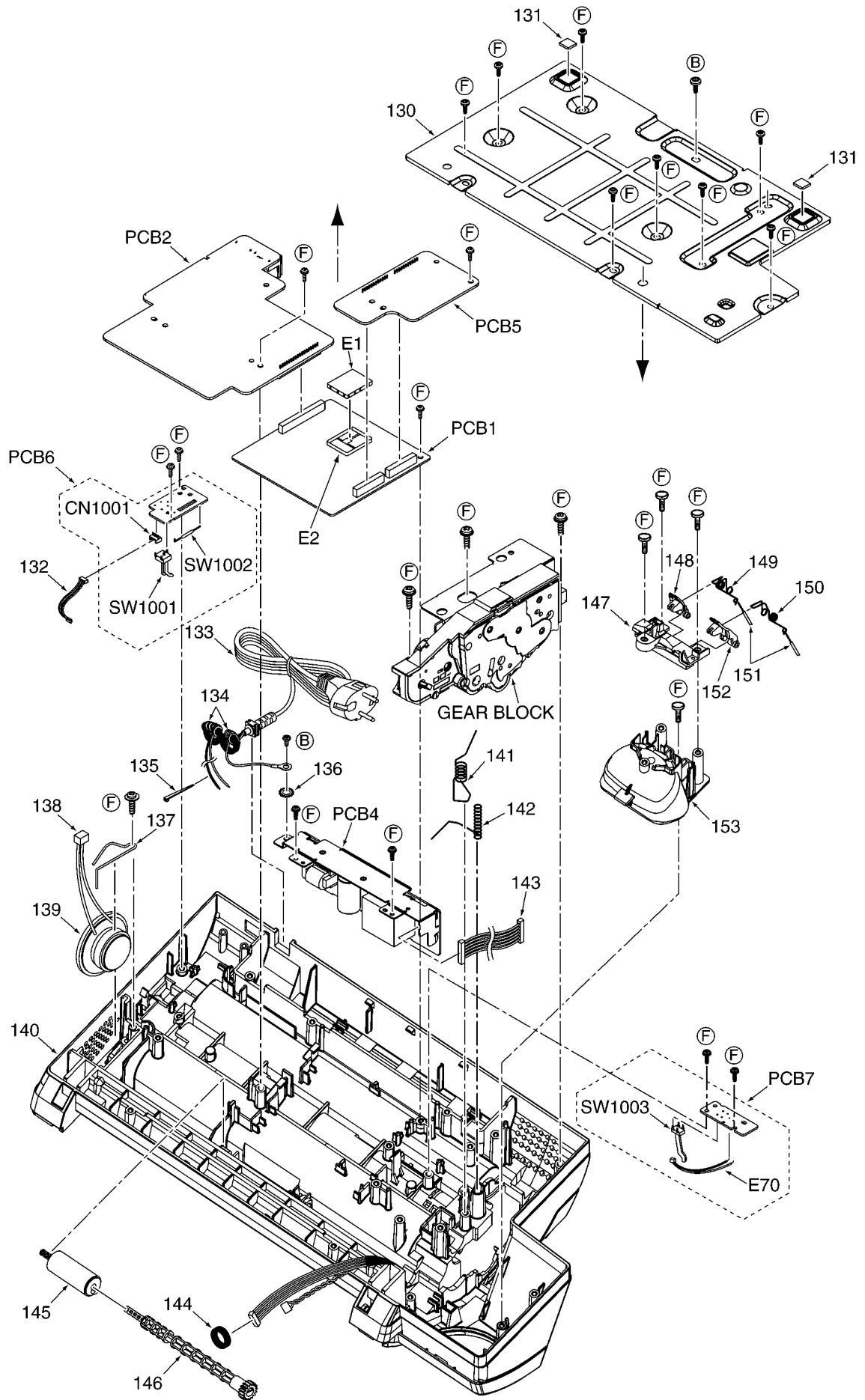


21.1.4. Back Cover Section

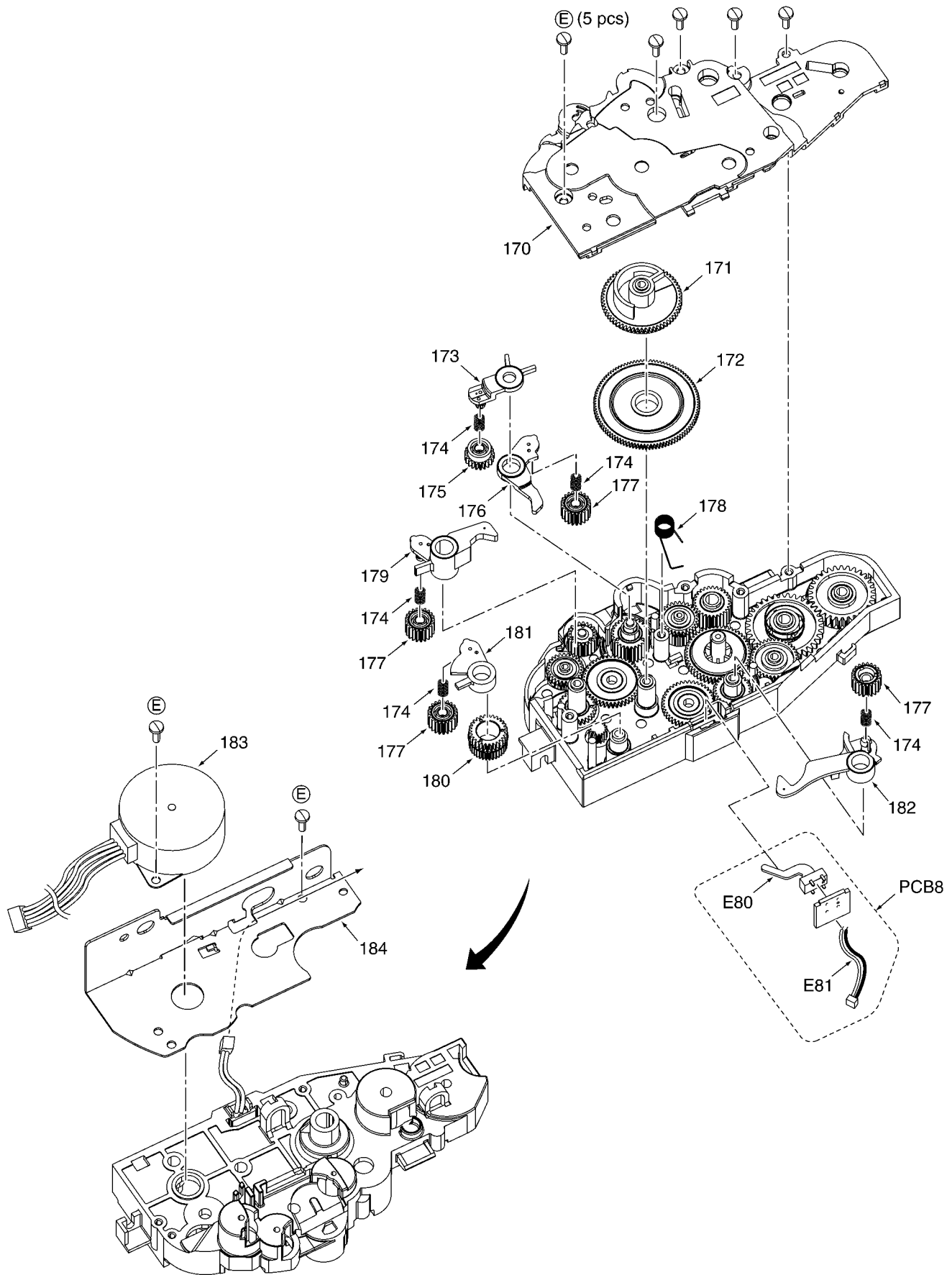


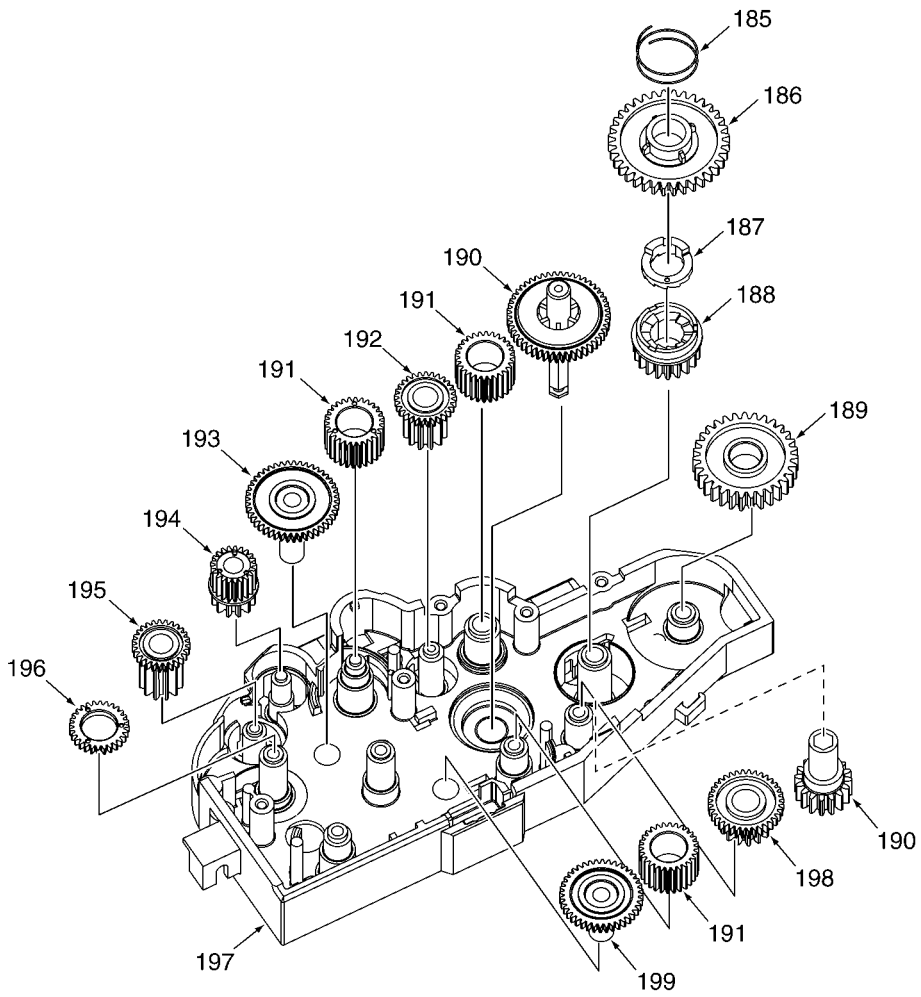


21.1.5. Lower Cabinet Section

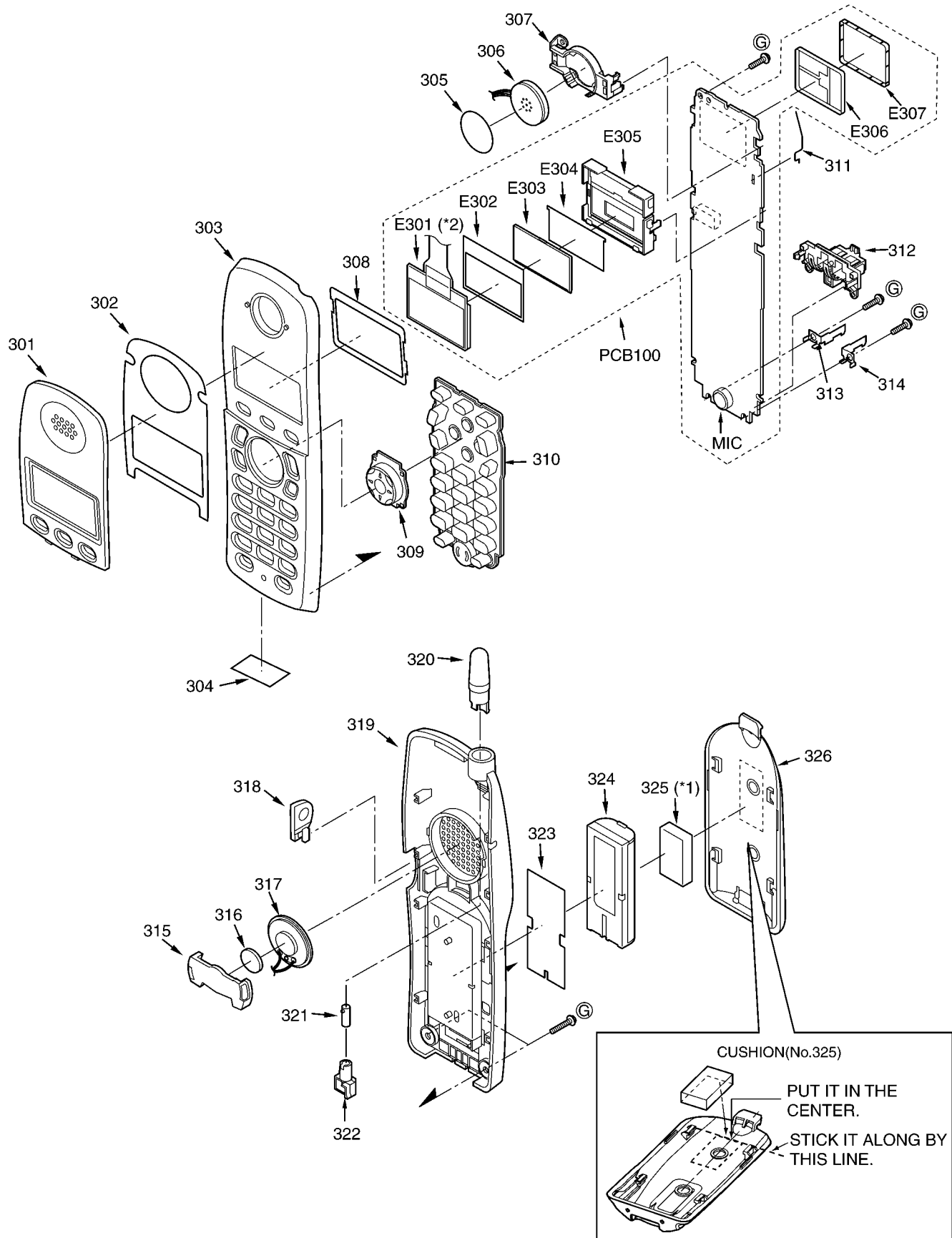


21.1.6. Gear Block Section





21.1.7. Handset Section

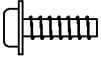




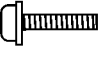



Note:

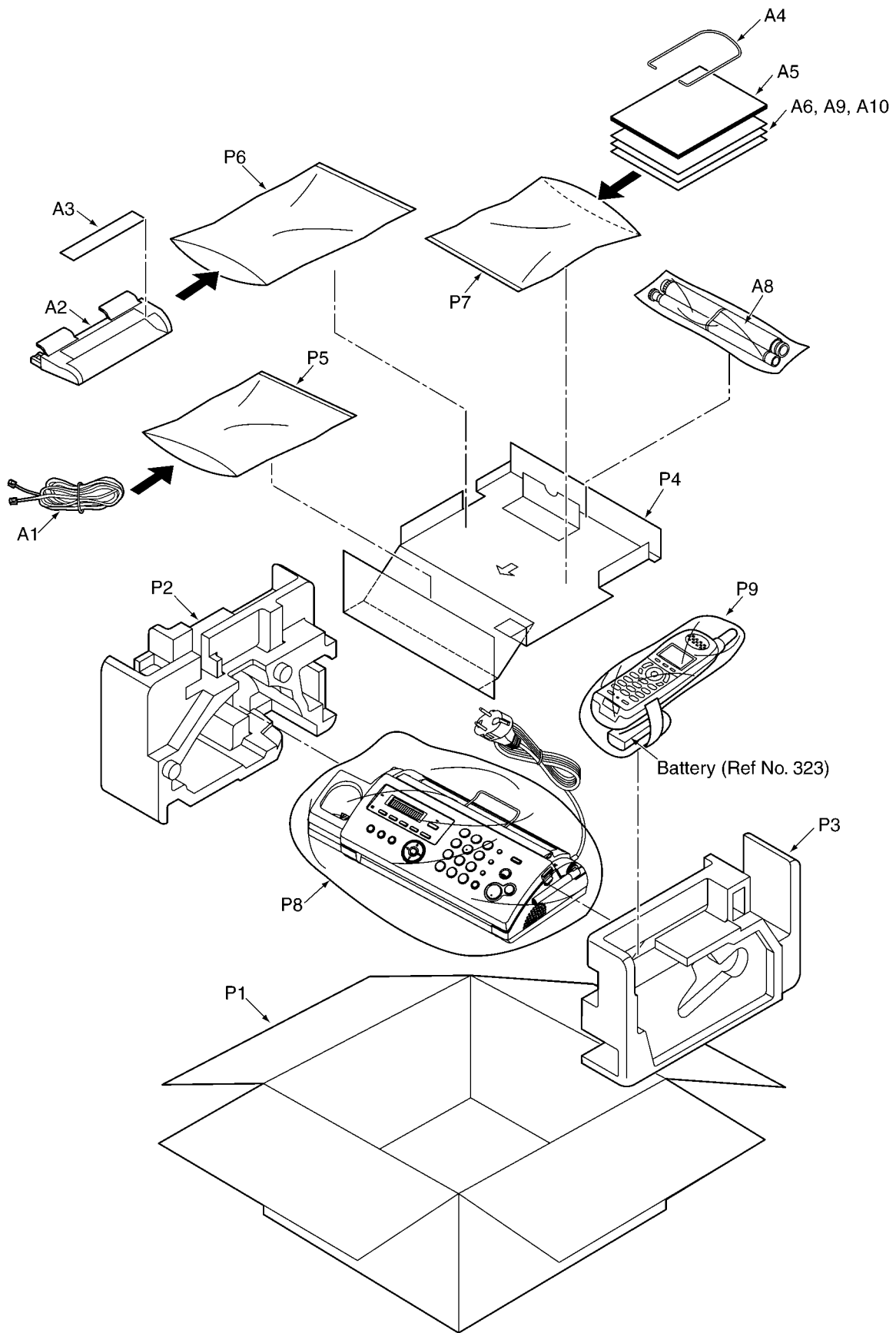
(*1) Attach the spacer (No. 325) to the exact location described above.

(*2) This cable is fixed by welding. Refer to **How to Replace the Handset LCD (P.198)**.

21.1.8. Screws

	Part No.	Figure
Ⓐ	XTW3+10PFJ7	 $\phi 3 \times 10 \text{ mm}$
Ⓑ	XSB4+6FJ	 $\phi 4 \times 6 \text{ mm}$
Ⓒ	XTW26+14PFJ7	 $\phi 2.6 \times 14 \text{ mm}$
Ⓓ	XTW3+W8PFJ	 $\phi 3 \times 8 \text{ mm}$
Ⓔ	XTB26+8GFJ	 $\phi 2.6 \times 8 \text{ mm}$
Ⓕ	XTB3+10GFJ	 $\phi 3 \times 10 \text{ mm}$
Ⓖ	XTW2+R10PFJ	 $\phi 2 \times 10 \text{ mm}$

21.1.9. Accessories and Packing Materials



21.2. Replacement Parts List

1. RTL (Retention Time Limited)

Note:

The marking (RTL) indicates that the Retention Time is limited for this item.

After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing parts and product retention.

After the end of this period, the assembly will no longer be available.

2. Important safety notice

Components identified by \triangle 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. ISO code (Example: ABS-HB) of the remarks column shows quality of the material and a flame resisting grade about plastics.

5. RESISTORS & CAPACITORS

Unless otherwise specified;

All resistors are in ohms (Ω) K=1000 Ω , M=1000k Ω

All capacitors are in MICRO FARADS (μ F) P= μ μ F

*Type & Wattage of Resistor

Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ER0:Metal Film	ERF:Cement Resistor

Wattage

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

*Type & Voltage of Capacitor

Type

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

Voltage

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

21.2.1. Cabinet and Mechanical Parts

21.2.1.1. Operation Panel Section

Ref. No.	Part No.	Part Name & Description	Remarks
1	PFGG1296T4	GRILLE	PS-HB
2	PFGP1349Z	PANEL, LCD	PC
3	PFBX1255Y1	BUTTON, 20 KEY	ABS-HB
4	PFBX1256Y1	BUTTON, 4 KEY	ABS-HB
5	PFBX1257Z1	BUTTON, 5 KEY	ABS-HB
6	PFBC1168Z1	BUTTON	ABS-HB
7	PFBC1169Z1	BUTTON	ABS-HB
8	PFHX1957Z1	SPACER, SHEET	PC
9	PFUV1103Z	COVER, OPERATION	PS-HB
10	PFDG1494Z	GEAR, DOC. EXIT	POM-HB
11	PFDR1089Y	ROLLER, EXIT	
12	PFUS1717Z	SPRING, DOC. EXIT EARTH	SUS

Ref. No.	Part No.	Part Name & Description	Remarks
13	PFHG1249Z	SPACER, PAD (RUBBER)	
14	PFHR1573Z	COVER, SEPARATION HOLDER	ABS-HB
15	PFUS1712Z	COIL SPRING	SUS
16	PFHR1575Z	SPACER, DOC. FEED SUPPORT	POM-HB
17	PFUS1713Z	COIL SPRING, DOC. FEED	SUS
18	PFJS10M35Z	CONNECTOR, 10 PIN	

21.2.1.2. Upper Cabinet Section

Ref. No.	Part No.	Part Name & Description	Remarks
40	LICC00000063	PRINTER UNITS, THERMAL HEAD	
41	PFHR1569X	GUIDE, HOLDER (LEFT)	POM-HB
42	PFHR1570Z	GUIDE, HOLDER (RIGHT)	POM-HB
43	PFHX1350Z	SPACER, SHEET	
44	PFJS11M16Z	CONNECTOR, 11 PIN	
45	PFUS1710Z	COIL SPRING	SUS
46	PFQT2701Z	LABEL, INK RIBBON	
47	PFQT2708Z	LABEL, INK RIBBON SET	
48	PFUS1699Z	LEAF SPRING	SUS
49	PFUS1708Z	COIL SPRING	SUS
50	PFUS1716Z	SPRING, LOCK EARTH	SUS
51	N2GZBE000013	IMAGE SENSOR (CIS)	
52	PFJS07M18Z	CONNECTOR, 7 PIN	
53	PFUS1494Z	SPRING, CIS	SUS
54	PFUS1756Z	COIL SPRING	SUS
55	PFDF1017Z	SHAFT	SUS
56	PFDR1045Z	ROLLER, DOC. SUB	POM-HB
57	PFGT3238Z-M	NAME PLATE	

21.2.1.3. Back Cover Section

Ref. No.	Part No.	Part Name & Description	Remarks
70	PFDN1082Z	ROLLER, PLATEN	
71	PFHR1572Z	SPACER, HOLDER (RIGHT)	POM-HB
72	PFHR1571Z	SPACER, HOLDER (LEFT)	POM-HB
73	PFDG1368Z	GEAR	POM-HB
74	PFHR1574Z	LEVER, PAPER TOP	POM-HB
75	PFUS1743Z	TORSION SPRING	SUS
76	PFDG1518Z	GEAR	POM-HB
77	PFHX1968Z	SPACER, SHEET	
78	PFUS1740Z	COIL SPRING	SUS
79	PFDG1496Z	GEAR	POM-HB
80	PFDG1497Z	GEAR	POM-HB
81	PFUA1082Y	CHASSIS	PS-HB
82	PFUS1703Y	SPRING, RECORDING PAPER	SUS
83	PFUS1705Z	COIL SPRING	SUS
84	PFDG1365Z	GEAR	POM-HB
85	PFHX1757Z	COVER, SHEET	
86	PFHG1263Z	SPACER, SEPARATION RUBBER	
87	PFHR1446Z	COVER, SEPARATION HOLDER	ABS
88	PFUS1746Z	COIL SPRING	SUS
89	PFHR1567Z	CASE	PS-HB
90	PFDR1056Z	ROLLER	POM-HB
91	PFUS1540Z	COIL SPRING	SUS
92	PFHR1447Z	LEVER	POM-HB
93	PFUS1539Z	COIL SPRING	SUS
94	PFDR1088Z	ROLLER, DISCHARGE	POM-HB/ EPDM
95	PFKE1057Y2	LEVER, LOCK	ABS+GF2 0-HB
96	PFDR1087Z	ROLLER, PICKUP	POM/ EPDM
97	PFKV1142Z1	COVER, ROLLER	PS-HB
98	PFDR1057Z	ROLLER, SUPPORT	POM
99	PFUS1706Z	BAR SPRING	SUS
100	PFUS1750Z	TORSION SPRING	SUS

Ref. No.	Part No.	Part Name & Description	Remarks
101	PFUS1553Z	LEAF SPRING	PS-HB
102	PFDG1015X	SPACER	POM-HB
103	PFKVL143W1	COVER	PS-HB
104	PFKR1100Z1	GUIDE, RIGHT	ABS-HB
105	PFKR1099Z1	GUIDE, LEFT	ABS-HB
106	PFQT2670Z	LABEL, SENDING	
107	PFSA1051Z	ANTENNA	

21.2.1.4. Lower Cabinet Section

Ref. No.	Part No.	Part Name & Description	Remarks
130	PFMD1104Z	FRAME, BOTTOM	SECC
131	PFHG1050Z	RUBBER PART, LEG	PORON
132	PFJS04M36Z	CONNECTOR, 4 PIN	
133	PFJA03A016Z	POWER CORD	△
134	PQLB1E1	INSULATOR	S
135	PQHR945Z	BAND	
136	XWC4BFJ	WASHER	
137	PFUS1707Z	TORSION SPRING	SUS
138	PFJS02M17Z	CONNECTOR, 2 PIN	
139	PFAS50P006Z	SPEAKER	S
140	PFKM1204Z1	CABINET BODY	PS-VO
141	PFUS1715Z	SPRING, PLATEN EARTH	SUS
142	PFUS1709Z	SPRING, HEAD EARTH	SUS
143	PFJS08M14Z	CONNECTOR, 8 PIN	
144	PQLB1E1	INSULATOR	S
145	PFDR1086Z	ROLLER, DOC. SEPARATION	POM-HB/ EPDM
146	PFDF1151Z	SHAFT, SEPARATION	POM-HB
147	PFHR1626Z	CASE/COVER	PS-HB
148	PQKE10384Z2	HOLDER	POM-HB
149	PQJT10218W	TERMINAL-TERMINAL PLATE	SUS
150	PQJT10219W	TERMINAL-TERMINAL PLATE	SUS
151	PFJS02M37Z	CONNECTOR, 2 PIN	
152	PQKE10385Z2	HOLDER, CHARGE TERMINAL	POM-HB
153	PFKE1072Z1	CASE, CHARGE	PS-HB

21.2.1.5. Gear Block Section

Ref. No.	Part No.	Part Name & Description	Remarks
170	PFUV1102Z	COVER	POM-HB
171	PFDG1491Z	GEAR	POM-HB
172	PFDG1478Z	GEAR	POM-HB
173	PFHR1578Z	ARM	POM-HB
174	PFUS1545Z	BAR SPRING	SUS
175	PFDG1485Z	GEAR	POM-HB
176	PFHR1579Z	ARM	POM-HB
177	PFDG1484Z	GEAR	POM-HB
178	PFUS1718Z	COIL SPRING	SUS
179	PFHR1577Z	ARM	POM-HB
180	PFDG1483Z	GEAR	POM-HB
181	PFHR1576Z	ARM	POM-HB
182	PFHR1580Z	ARM	POM-HB
183	L6HAYYYK0006	DC MOTOR	
184	PFMH1199Z	FRAME	SECC
185	PFUS1714Z	COIL SPRING	SUS
186	PFDG1492Z	GEAR	POM-HB
187	PFDE1289Z	SPACER	POM-HB
188	PFDG1493Z	GEAR	POM-HB
189	PFDG1490Z	GEAR	POM-HB
190	PFDX1075Z	GEAR	POM+SUS
191	PFDG1482Z	GEAR	POM-HB
192	PFDG1486Z	GEAR	POM-HB
193	PFDG1480Z	GEAR	POM-HB
194	PFDG1488Z	GEAR	POM-HB
195	PFDG1487Z	GEAR	POM-HB
196	PFDG1481Z	GEAR	POM-HB

Ref. No.	Part No.	Part Name & Description	Remarks
197	PFUA1081Z	CHASSIS	ABS+PBT -V0
198	PFDG1489Z	GEAR	POM-HB
199	PFDG1479Z	GEAR	POM-HB

21.2.1.6. Handset Section

Ref. No.	Part No.	Part Name & Description	Remarks
301	PQGP10269Z8	PANEL, LCD	AS-HB
302	PQHS10691Y	TAPE, DOUBLE SIDED (LCD)	
303	PQKM10669S3	CABINET BODY	ABS-HB
304	PQGT17947Z	NAME PLATE (made in Malaysia)	
	PQGT19010Z	NAME PLATE (made in China)	
305	PQHS10658Z	SPACER, RECEIVER	
306	LOAD02A00023	RECEIVER	
307	PQHR11106Z	GUIDE, RECEIVER	ABS-HB
308	PQHS10652Z	SPACER, CUSHION LCD	
309	PQBC10422Z1	BUTTON, NAVI KEY	ABS-HB
310	PQXS10280E	KEYBOARD SWITCH	
311	PQSA10162Y	ANTENNA	
312	PQWE10036Z	BATTERY TERMINAL	
313	PQJT10216Y	CHARGE TERMINAL (R)	
314	PQJT10217Y	CHARGE TERMINAL (L)	
315	PQHR10778Z	GUIDE, SP HOLDER	ABS-HB
316	PQHG10689Z	SPACER, SPEAKER	
317	LOAD02A00026	SPEAKER	
318	PQKE10391Z4	COVER, EARPHONE CAP	
319	PQKF10655Z3	CABINET COVER	ABS-HB
320	PQKE10394Z7	COVER, LED CAP	PC+ABS- HB
321	PQHR11080Z	OPTIC CONDUCTIVE PARTS, LED LENS	PMMA-HB
322	PQHR11081X	SPACER, LED CAP	ABS-HB
323	PQHX11294U	PLASTIC PARTS, BATTERY COVER SHEET	
324	HHR-P105A	BATTERY	
325	PQHS10681Y	SPACER, BATTERY	
326	PQKK10586Z6	LID, BATTERY COVER	ABS-HB

21.2.1.7. Accessories and Packing Materials

Ref. No.	Part No.	Part Name & Description	Remarks
A1	PFJA02B002Y	CORD, TELEPHONE	
A2	PFKS1145Z1	TRAY	ABS-HB
A3	PFQT2825Z	LABEL, PAPER SET	
A4	PFUS1704Z	SPRING, TRAY	SUS
A5	PFQX2582Z	INSTRUCTION BOOK	
A6	PFQW2495Z	QUICK REFERENCE GUIDE (for Arabic)	
A7	Not Used		
A8	PFPE1490Z	INK RIBBON (10M)	PET
A9	PFQW2496Z	QUICK REFERENCE GUIDE (for Farsi)	
A10	PFQW2497Z	QUICK REFERENCE GUIDE (for Thai)	
	PQKE10393Z6	BELT CLIP (Option)	
P1	PFZE1638Z-M	GIFT BOX	S
P2	PFPN1437Z	CUSHION, LEFT	EPS
P3	PFPN1438Z	CUSHION, RIGHT	EPS
P4	PFPD1293Z	ACCESSORY BOX	
P5	XZB20X35A04	PROTECTION COVER	
P6	XZB20X35A04	PROTECTION COVER (for TRAY)	
P7	PQPP10005Z	PROTECTION COVER, (for PRINTED MATTER)	
P8	PFPH1085Z	PACKING SHEET	
P9	XZB10X35A02	PROTECTION COVER (for H/S)	

21.2.2. Digital Board Parts

Note:

(1*) When you have replaced IC502 or IC805, adjust X801.

Refer to **Check and Adjust X801 (Base RF) Frequency** (P.199).

Ref. No.	Part No.	Part Name & Description	Remarks
PCB1	PFWP1G2452CX	DIGITAL BOARD ASS'Y (RTL)	
		(ICs)	
IC501	C1ZBZ0003300	IC	
IC502	PFWI1G2452CX	IC (1*)	
IC503	C3ABKC000034	IC	
IC504	C3FBKC000135	IC	
IC505	C0DBFGD00017	IC	
IC506	C0JBAA000393	IC	
IC701	C1CB00001921	IC	
IC702	C0JBAS000128	IC	
IC703	C0JBAS000128	IC	
IC704	C0ABBB000265	IC	
IC705	C1AB00002556	IC	
IC706	C0ABBB000184	IC	
IC801	C2HBBY000036	IC	
IC802	C0DBFGD00017	IC	
IC804	C0CBAAD00054	IC	
IC805	PFWI3G2452CX	IC (1*)	
IC806	PQVISN7AH157	IC	S
IC901	C1CB00001657	IC	
		(TRANSISTORS)	
Q501	B1ABDF000025	TRANSISTOR (SI)	
Q502	B1ABDF000025	TRANSISTOR (SI)	
Q601	2SB1218ARL	TRANSISTOR (SI)	
Q602	B1ABDF000026	TRANSISTOR (SI)	
Q603	PQVTDTC143E	TRANSISTOR (SI)	S
Q604	B1ABDF000025	TRANSISTOR (SI)	
Q605	PQVTDTC143E	TRANSISTOR (SI)	S
Q701	B1ABDF000025	TRANSISTOR (SI)	
Q702	B1ABDF000025	TRANSISTOR (SI)	
Q703	PQVTDTC143E	TRANSISTOR (SI)	S
Q704	PQVTDTC143E	TRANSISTOR (SI)	S
Q801	PQVTDTC143E	TRANSISTOR (SI)	S
Q802	2SC39300CL	TRANSISTOR (SI)	
		(DIODES)	
D903	B0DCCD000011	DIODE (SI)	
D904	B0DCCD000011	DIODE (SI)	
		(CONNECTORS)	
CN501	K1KA11A00170	CONNECTOR, 11 PIN	
CN502	K1KA11A00170	CONNECTOR, 11 PIN	
CN503	K1KA08A00440	CONNECTOR, 8 PIN	
CN504	K1KA07A00257	CONNECTOR, 7 PIN	
CN505	K1KA02A00587	CONNECTOR, 2 PIN	
CN506	K1KA04A00527	CONNECTOR, 4 PIN	
CN507	K1KA18A00101	CONNECTOR, 18 PIN	
CN508	K1MN08A00017	CONNECTOR, 8 PIN	
		(COILS)	
L602	PQLQR2KA20T	COIL	S
L704	PQLQR2KA20T	COIL	S
L716	PQLQR2KA113	COIL	S
L717	PQLQR2KA113	COIL	S
L801	PQLQR2KA213	COIL	S
L901	MQLPF18NJFB	COIL	
L902	MQLPF10NJFB	COIL	
L903	MQLRF3N3DFB	COIL	
L904	MQLRF22NJFB	COIL	
L905	MQLRF10NJFB	COIL	
L909	MQLRF3N9DFB	COIL	
L911	MQLRF2N7DFB	COIL	
L913	MQLRF18NJFB	COIL	

Ref. No.	Part No.	Part Name & Description	Remarks
L990	GC1R0KA0096	COIL	
		(COMPONENTS PARTS)	
RA601	EXB28V101JX	RESISTOR ARRAY	
RA801	D1H84724A013	RESISTOR ARRAY	S
RA901	D1H810240004	RESISTOR ARRAY	S
		(CRYSTAL OSCILLATORS)	
X501	H0A327200147	CRYSTAL OSCILLATOR	
X502	H2C240500006	CRYSTAL OSCILLATOR	
X701	H0J322500006	CRYSTAL OSCILLATOR	
X801	H0J138500003	CRYSTAL OSCILLATOR (1*)	
		(IC FILTER)	
FL901	J0E2457B0008	IC FILTER	
		(ELECTRICAL PARTS)	
E1	PQMC10493Z	MAGNETIC SHIELD	
E2	PQMC10494Z	MAGNETIC SHIELD	
		(RESISTORS)	
R501	ERJ2GEJ103	10k	
R512	ERJ2GEJ223	22k	
R513	ERJ2GEJ433	43k	
R514	ERJ3GEYJ4R7	4.7	
R515	ERJ3EKF1101	1.1k	
R516	ERJ3EKF3602	36k	
R517	ERJ2GEJ222	2.2k	
R518	ERJ2GEJ203	20k	
R519	ERJ2GEJ182	1.8k	
R520	ERJ2GEJ334	330k	
R521	ERJ2GEJ475	4.7M	
R525	ERJ2GEJ471	470	
R528	ERJ2GEJ101	100	
R529	ERJ2GEJ101	100	
R530	ERJ2GE0R00	0	
R531	ERJ2GEJ105X	1M	
R551	ERJ2GEJ103	10k	
R553	ERJ2GEJ103	10k	
R601	ERJ2GEJ472X	4.7k	
R603	ERJ2GEJ223	22k	
R605	ERJ2GEJ221	220	
R606	ERJ2GEJ221	220	
R607	PQ4R10XJ100	10	S
R608	ERJ2GEJ332	3.3k	
R617	ERJ2GEJ223	22k	
R618	ERJ2GEJ472X	4.7k	
R619	ERJ2GEJ101	100	
R626	ERJ2GEJ101	100	
R627	ERJ2GEJ101	100	
R628	ERJ2GEJ472X	4.7k	
R629	ERJ2GEJ472X	4.7k	
R630	ERJ2GEJ472X	4.7k	
R631	ERJ2GEJ472X	4.7k	
R632	ERJ2GEJ472X	4.7k	
R633	ERJ2GEJ102	1k	
R636	ERJ2GEJ472X	4.7k	
R637	ERJ2GE0R00	0	
R638	ERJ2GEJ101	100	
R639	ERJ2GEJ102	1k	
R640	ERJ2GEJ472X	4.7k	
R641	ERJ2GEJ101	100	
R642	ERJ2GEJ103	10k	
R643	ERJ2GEJ103	10k	
R701	ERJ2GEJ103	10k	
R702	ERJ2GEJ471	470	
R704	ERJ2GEJ222	2.2k	
R705	ERJ2GEJ122	1.2k	
R707	ERJ2GEYJ474	470k	S
R708	ERJ2GEJ683	68k	
R709	ERJ2GEJ684	680k	
R711	ERJ2GEJ683	68k	
R712	ERJ2GEJ103	10k	

Ref. No.	Part No.	Part Name & Description	Remarks
R714	ERJ2GEJ471	470	
R715	ERJ2GEJ222	2.2k	
R716	ERJ2GEJ272	2.7k	
R717	ERJ2GEJ472X	4.7k	
R718	ERJ2GEOR00	0	
R720	ERJ2GEJ103	10k	
R723	ERJ2GEJ224	220k	
R724	ERJ2GEJ224	220k	
R725	ERJ2GEJ363	36k	
R726	ERJ2GEJ392	3.9k	
R727	ERJ2GEJ334	330k	
R728	ERJ2GEJ822	8.2k	
R729	ERJ2GEJ153	15k	
R731	ERJ2GEJ184	180k	
R732	ERJ2GEJ273X	27k	
R734	ERJ2GEJ103	10k	
R735	ERJ2GEJ473	47k	
R737	ERJ3GEYJ563	56k	
R738	ERJ2GEJ103	10k	
R740	ERJ3GEYJ334	330k	
R744	ERJ3GEYJ183	18k	
R745	ERJ2GEJ124	120k	
R746	ERJ2GEJ124	120k	
R748	ERJ2GEJ102	1k	
R751	ERJ2GEJ153	15k	
R753	ERJ2GEJ682	6.8k	
R754	ERJ2GEJ473	47k	
R756	ERJ2GEJ101	100	
R757	ERJ2GEJ101	100	
R758	ERJ2GEJ273X	27k	
R759	ERJ2GEJ472X	4.7k	
R760	ERJ2GEJ153	15k	
R761	ERJ2GEJ224	220k	
R763	ERJ2GEJ103	10k	
R766	ERJ2GEJ224	220k	
R769	ERJ2GEJ102	1k	
R771	ERJ2GEJ103	10k	
R772	ERJ2GEJ272	2.7k	
R773	PQ4R18XJ220	22	S
R783	ERJ3GEYJ272	2.7k	
R784	ERJ3GEYJ272	2.7k	
R785	ERJ2GEJ103	10k	
R786	ERJ2GEJ103	10k	
R788	ERJ2GEJ273X	27k	
R789	ERJ2GEJ273X	27k	
R790	ERJ2GEJ563	56k	
R791	ERJ2GEJ473	47k	
R803	ERJ2GEJ103	10k	
R804	ERJ2GEJ102	1k	
R805	ERJ2GEJ103	10k	
R816	ERJ2GEJ681	680	
R817	ERJ2GEJ151	150	
R818	ERJ2GEJ561	560	
R819	ERJ2GEJ393X	39k	
R820	ERJ2GEJ182	1.8k	
R823	ERJ2GEJ103	10k	
R825	ERJ2GEJ103	10k	
R826	ERJ2GEJ472X	4.7k	
R830	ERJ2GEOR00	0	
R833	ERJ2GEJ181	180	
R834	ERJ2GEJ103	10k	
R836	ERJ2GEJ181	180	
R839	ERJ2GEJ102	1k	
R840	ERJ2GEJ181	180	
R842	ERJ2GEJ470	47	
R843	ERJ2GEJ101	100	
R845	ERJ2GEJ470	47	
R846	ERJ2GEOR00	0	
R847	ERJ2GEJ101	100	
R848	ERJ2GEJ101	100	
R849	ERJ2GEJ472X	4.7k	
R850	ERJ2GEJ472X	4.7k	
R851	ERJ2GEJ472X	4.7k	

Ref. No.	Part No.	Part Name & Description	Remarks
R852	ERJ2GEOR00	0	
R853	ERJ2GEOR00	0	
R854	ERJ2GEJ101	100	
R861	ERJ2GEOR00	0	
R862	ERJ2GEJ222	2.2k	
R864	ERJ2GEJ102	1k	
R865	ERJ2GEJ562X	5.6k	
R906	ERJ2RKF103X	10k	
R909	ERJ2GEJ331	330	
R919	ERJ2GEJ102	1k	
R930	ERJ2GEJ102	1k	
R931	ERJ2GEJ102	1k	
R932	ERJ2GEJ102	1k	
R933	ERJ2GEJ331	330	
R940	ERJ2GEJ4R7	4.7	
R941	ERJ2GEJ100	10	
R942	ERJ2GEJ100	10	
R943	ERJ2GEOR00	0	
R991	ERJ2GEJ102	1k	
		(CAPACITORS)	
C502	ECUV1A105KBV	1	
C505	ECJ1VFLH104Z	0.1	
C506	ECJ0EB1A104K	0.1	
C507	ECUV1A105KBV	1	
C508	ECJ0EB1H102K	0.001	
C509	F2G0J1010042	100	
C511	ECJ0EF1C104Z	0.1	
C512	ECJ0EB1H102K	0.001	
C513	ECJ0EF1C104Z	0.1	
C514	ECJ0EF1C104Z	0.1	
C515	ECJ0EC1H101J	100P	
C516	ECJ0EB1H102K	0.001	
C517	ECJ0EF1C104Z	0.1	
C518	ECJ0EF1C104Z	0.1	
C520	ECJ0EF1C104Z	0.1	
C521	ECJ0EF1C104Z	0.1	
C522	ECJ0EF1C104Z	0.1	
C523	ECJ0EF1C104Z	0.1	
C524	ECJ0EF1C104Z	0.1	
C525	ECJ0EB1H222K	0.0022	
C526	ECJ0EB1A104K	0.1	
C527	ECJ0EC1H101J	100P	
C528	ECJ0EB1A104K	0.1	
C529	ECJ0EC1H180J	18P	
C530	ECJ0EF1C104Z	0.1	
C532	ECJ0EC1H100D	10P	
C533	ECJ0EC1H101J	100P	
C538	ECJ0EF1C104Z	0.1	
C539	ECJ0EF1C104Z	0.1	
C540	ECJ0EC1H101J	100P	
C541	ECJ0EC1H101J	100P	
C542	ECJ0EF1C104Z	0.1	
C543	ECJ0EF1C104Z	0.1	
C544	ECJ0EF1C104Z	0.1	
C551	ECJ0EF1C104Z	0.1	
C554	ECJ0EF1C104Z	0.1	
C555	ECJ0EF1C104Z	0.1	
C557	ECJ0EF1C104Z	0.1	
C559	ECJ0EF1C104Z	0.1	
C603	ECJ0EF1C104Z	0.1	
C604	ECJ0EC1H101J	100P	
C606	ECUV1H103KBV	0.01	
C607	ECJ0EF1C104Z	0.1	
C626	ECJ0EB1A104K	0.1	
C627	ECJ0EB1H102K	0.001	
C628	ECJ0EB1H102K	0.001	
C636	ECJ0EF1C104Z	0.1	
C637	ECJ0EF1C104Z	0.1	
C638	ECJ0EC1H101J	100P	
C639	ECJ0EB1H102K	0.001	
C701	ECJ0EB1A104K	0.1	
C702	ECJ0EC1H560J	56P	

Ref. No.	Part No.	Part Name & Description	Remarks
C703	FIG1E562A086	0.0056	
C704	ECJ0EF1C104Z	0.1	
C706	ECJ0EC1H100D	10P	
C707	F2G0J1010042	100	
C708	ECJ0EB1H102K	0.001	
C709	ECJ0EB1C103K	0.01	
C711	ECJ0EC1H101J	100P	
C712	ECJ0EB1H222K	0.0022	
C714	FIG1H9R0A420	9P	
C715	ECJ0EB1A563K	0.056	
C716	ECJ0EC1H330J	33P	
C718	ECJ0EF1C104Z	0.1	
C720	ECJ0EF1C104Z	0.1	
C721	ECJ1VF1H104Z	0.1	
C723	ECJ0EF1C104Z	0.1	
C724	ECJ0EF1C104Z	0.1	
C726	ECUV1C104KBV	0.1	
C727	ECJ1VF1H104Z	0.1	
C728	ECJ0EC1H470J	47P	
C729	ECUV1C104KBV	0.1	
C730	ECUV1C563KBV	0.056	
C731	ECJ0EF1C104Z	0.1	
C732	F2G1V1000007	10	
C733	F2G1V1000007	10	
C734	ECUV1C273KBV	0.027	
C735	ECJ1VF1H104Z	0.1	
C738	ECJ1VB0J475K	4.7	
C739	ECJ0EB1H222K	0.0022	
C740	ECJ0EB1A104K	0.1	
C741	ECJ0EF1C104Z	0.1	
C743	ECUV1C104KBV	0.1	
C744	ECJ0EB1A104K	0.1	
C745	ECUV1H560JCV	56P	
C746	ECJ0EC1H101J	100P	
C747	FIG0J1050003	1	
C748	ECJ0EC1H101J	100P	
C751	ECUV1C104KBV	0.1	
C753	ECJ0EF1C104Z	0.1	
C754	ECJ0EF1C104Z	0.1	
C755	ECJ0EB1A104K	0.1	
C756	ECJ0EB1A104K	0.1	
C757	ECJ0EC1H101J	100P	
C758	ECJ0EF1C104Z	0.1	
C759	ECJ0EB1A104K	0.1	
C760	ECJ0EB1A104K	0.1	
C763	ECJ1VB0J475K	4.7	
C764	ECJ1VB0J475K	4.7	
C765	ECJ0EB1A104K	0.1	
C767	ECJ0EB1A104K	0.1	
C769	ECJ0EB1A104K	0.1	
C770	ECJ0EC1H101J	100P	
C773	ECJ0EF1C104Z	0.1	
C774	ECJ1VB0J475K	4.7	
C775	ECJ1VB0J475K	4.7	
C777	ECJ0EB1H102K	0.001	
C778	F2G0J1010042	100	
C783	ECJ0EB1C103K	0.01	
C784	ECJ0EB1A104K	0.1	
C785	ECJ0EB1A104K	0.1	
C786	ECJ0EB1H102K	0.001	
C787	ECJ0EB1H102K	0.001	
C788	ECJ0EC1H100D	10P	
C790	ECJ0EC1H100D	10P	
C791	ECJ0EF1C104Z	0.1	
C796	ECJ0EF1C104Z	0.1	
C801	ECJ0EB1A104K	0.1	
C802	ECUV1A105KBV	1	
C803	ECJ0EB1H471K	470P	
C804	F2G0J1010042	100	
C805	ECUV1A105KBV	1	
C807	ECUV1A105KBV	1	
C808	EEE0GA331WP	330	
C809	ECUV1A105KBV	1	

Ref. No.	Part No.	Part Name & Description	Remarks
C810	ECJ0EB1A104K	0.1	
C811	ECJ0EB1A104K	0.1	
C812	ECJ0EB1A104K	0.1	
C813	ECJ0EC1H020C	2P	
C814	ECJ0EC1H020C	2P	
C817	ECJ0EB1A104K	0.1	
C818	ECJ0EB1A104K	0.1	
C819	ECJ0EB1A104K	0.1	
C820	ECJ0EC1H030C	3P	
C822	ECJ0EB1C103K	0.01	
C824	ECJ0EC1H101J	100P	
C825	ECJ0EB1A104K	0.1	
C826	ECJ0EB1A104K	0.1	
C828	ECJ0EB1A104K	0.1	
C829	ECJ0EB1C103K	0.01	
C833	ECJ0EB1A104K	0.1	
C861	ECJ0EB1A104K	0.1	
C862	ECJ0EB1A104K	0.1	
C864	ECST0JY106	10	S
C865	ECJ0EB1A104K	0.1	
C866	FIJ0J1060006	10	S
C868	ECJ0EB1A104K	0.1	
C869	ECJ0EB1A104K	0.1	
C873	ECJ0EB1A104K	0.1	
C874	ECJ0EB1A104K	0.1	
C875	ECJ0EB1C223K	0.022	
C876	ECJ0EB1A473K	0.047	
C877	ERJ2GE0R00	0	
C904	FIG1H1R8A561	1.8P	
C910	ECJ0EC1H1R5C	1.5	
C911	ECJ0EC1H470J	47P	
C917	ECJ0EC1H100D	10P	
C918	ECJ0EC1H050C	5P	
C922	ECJ0EC1H100D	10P	
C937	ECJ0EB1H471K	470P	
C938	ECJ0EC1H100D	10P	
C939	ECJ0EC1H100D	10P	
C940	ECJ0EB1C103K	0.01	
C941	ECJ0EB1H102K	0.001	
C942	PQCUV0J475MB	4.7	S
C944	ECJ0EB1A104K	0.1	
C946	ECJ0EB1H222K	0.0022	
C952	ECJ0EC1H020C	2P	
C956	ECJ0EC1H100D	10P	
C960	ECJ0EC1H100D	10P	
C962	ECJ0EC1H100D	10P	
C963	ECJ0EC1H100D	10P	
C964	ECJ0EB1H102K	0.001	
C965	ECJ0EC1H221J	220P	
C976	ECJ0EB1A104K	0.1	
C977	ECJ0EB1H102K	0.001	
C979	ECJ0EB1H102K	0.001	
C980	ECJ0EB1C103K	0.01	
C983	ECJ0EB1H102K	0.001	
C984	ECJ0EC1H101J	100P	
C990	ECJ0EB1H102K	0.001	
C991	ECJ0EC1H050C	5P	
C992	ECJ0EC1H121J	120P	
C993	ECJ0EB1A104K	0.1	
C996	ECJ0EB1A104K	0.1	
C997	ECJ0EC1H0R5C	0.5	
C998	FIG1HR75A561	0.75	

21.2.3. Analog Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB2	PFLP1796CX-A	ANALOG BOARD ASS'Y (RTL)	△
		(ICs)	
IC101	C0ABEB000052	IC	
IC103	C0DAZYY00010	IC	

Ref. No.	Part No.	Part Name & Description	Remarks
		(TRANSISTORS)	
Q103	UN521	TRANSISTOR (SI)	S
Q106	B1AAKL000006	TRANSISTOR (SI)	
Q107	PQVTDTC143E	TRANSISTOR (SI)	S
Q110	2SD2137	TRANSISTOR (SI)	
Q111	PQVTDTC114TU	TRANSISTOR (SI)	S
Q112	2SD1819A	TRANSISTOR (SI)	
		(DIODES)	
D102	MA4056	DIODE (SI)	S
D103	MA4056	DIODE (SI)	S
D106	1SS133	DIODE (SI)	S
D107	B0EDER000009	DIODE (SI)	
D109	MA4030	DIODE (SI)	S
D110	MA4030	DIODE (SI)	S
D111	1SS133	DIODE (SI)	S
D112	B0BA2R000018	DIODE (SI)	
D151	1SS133	DIODE (SI)	S
		(BATTERY)	
BAT151	PQPCR2032H09	LITHIUM BATTERY	S
		(JACK AND CONNECTORS)	
CN102	PFJJ1T01Z	JACK	S
CN103	PQJS18A10Z	CONNECTOR, 18 PIN	S
CN104	K1KA02A00587	CONNECTOR, 2 PIN	
		(COILS)	
L101	PFVF2B182SDF	COIL	S
L102	PFVF2B182SDF	COIL	S
LF101	PFLE003	COIL	S
		(PHOTO ELECTRIC TRANSDUCERS)	
PC102	ON3181	PHOTO COUPLER	S ▲
PC105	B3PAB0000058	PHOTO COUPLER	▲
		(RELAY)	
RL101	K6B1CYY00005	RELAY	▲
		(THERMISTOR)	
POS101	PFRT002	THERMISTOR	
		(TRANSFORMER)	
T101	G4A1A0000170	TRANSFORMER	▲
		(VARISTORS)	
SA101	PFZR3A311P6T	VARISTOR	S
SA102	J0LS00000024	VARISTOR	▲
ZNR101	ERZVA7D121	VARISTOR	
		(RESISTORS)	
L111	ERJ3GEY0R00	0	
L112	ERJ3GEY0R00	0	
L113	ERJ3GEY0R00	0	
L114	ERJ6GEY0R00	0	
R103	ERDS1TJ153	15k	
R104	ERDS1TJ223	22k	
R105	ERJ3GEYJ562	5.6k	
R110	ERDS2TJ331	330	
R112	ERJ3GEYJ393	39k	
R113	ERJ3GEYJ392	3.9k	
R114	ERJ3GEY0R00	0	S
R115	ERJ3GEYJ821	820	
R116	ERJ3GEYJ332	3.3k	
R118	ERJ3GEYJ563	56k	
R119	ERJ3GEYJ563	56k	
R120	ERJ3GEYJ153	15k	
R121	ERJ3GEYJ104	100k	
R125	ERJ3GEYJ393	39k	
R131	ERJ3GEY0R00	0	S
R132	ERJ3GEYJ102	1k	

Ref. No.	Part No.	Part Name & Description	Remarks
R134	ERJ3GEY0R00	0	
R151	ERJ3GEYJ222	2.2k	
R163	ERJ3GEYJ473	47k	
R167	ERJ3GEYJ822	8.2k	
R168	ERJ3GEYJ682	6.8k	
R169	ERJ3GEYJ272	2.7k	
R181	ERJ3GEYJ752	7.5k	
R182	ERJ3GEYJ622	6.2k	
R191	ERJ3GEY0R00	0	
R192	ERJ3GEYJ101	100	
R193	ERJ6GEYJ8R2	8.2	S
R194	PQ4R10XJ120	12	
R195	PQ4R10XJ150	15	S
R196	ERJ3GEYJ102	1k	
R197	ERJ6GEY0R00	0	S
		(CAPACITORS)	
C101	F0C2E1050005	1	
C103	ECUV1H010CCV	1P	
C109	ECEA1HN4R7S	4.7	S
C110	ECUV1H103KBV	0.01	
C112	ECUV1C104KBV	0.1	
C114	ECUV1H123KBV	0.012	
C115	ECUV1H391JCV	390P	S
C116	ECUV1H391JCV	390P	S
C117	ECEA1HKA4R7	4.7	
C118	ECUV1C104KBV	0.1	
C120	ECUV1C563KBV	0.056	
C121	ECUV1H151JCV	150P	
C123	ECEA1CKA100	10	
C135	ECUV1E104ZFV	0.1	
C156	ECKD2H681KB	680P	S
C157	ECKD2H681KB	680P	S
C166	ECEA0JKA470	47	
C168	ECUV1E104ZFV	0.1	
C185	ECUV1H104ZFV	0.1	
C186	ECEA1CKA221	220	S
C187	ECUV1C104ZFV	0.1	
C188	ECUV1C104ZFV	0.1	
C189	ECEA1CK101	100	S
C190	ECUV1H030CCV	3P	

21.2.4. Operation Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB3	PFWP2FG2451M	OPERATION BOARD ASS'Y (RTL)	
		(IC)	
IC301	C1ZBZ0002089	IC	
		(DIODES)	
LED301	B3AAA0000534	LED	
		(LIQUID CRYSTAL DISPLAY)	
CN302	L5DAAF000001	LIQUID CRYSTAL DISPLAY	S
		(CONNECTOR)	
CN301	K1KA08B00243	CONNECTOR, 8 PIN	
		(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	

Ref. No.	Part No.	Part Name & Description	Remarks
SW313	KOH1BA000259	SPECIAL SWITCH	
SW314	KOH1BA000259	SPECIAL SWITCH	
SW315	KOH1BA000259	SPECIAL SWITCH	
SW316	KOH1BA000259	SPECIAL SWITCH	
SW317	KOH1BA000259	SPECIAL SWITCH	
SW318	KOH1BA000259	SPECIAL SWITCH	
SW319	KOH1BA000259	SPECIAL SWITCH	
SW320	KOH1BA000259	SPECIAL SWITCH	
SW321	KOH1BA000259	SPECIAL SWITCH	
SW322	KOH1BA000259	SPECIAL SWITCH	
SW323	KOH1BA000259	SPECIAL SWITCH	
SW324	KOH1BA000259	SPECIAL SWITCH	
SW325	KOH1BA000259	SPECIAL SWITCH	
SW326	KOH1BA000259	SPECIAL SWITCH	
SW327	KOH1BA000259	SPECIAL SWITCH	
SW328	KOH1BA000259	SPECIAL SWITCH	
SW329	KOH1BA000259	SPECIAL SWITCH	
SW330	KOH1BA000259	SPECIAL SWITCH	
SW331	KOH1BA000259	SPECIAL SWITCH	
SW332	KOH1BA000259	SPECIAL SWITCH	
SW333	KOH1BA000259	SPECIAL SWITCH	
SW334	KOH1BA000259	SPECIAL SWITCH	
		(RESISTORS)	
R300	ERJ3GEYJ680	68	
R301	ERJ3GEYJ181	180	
R302	ERJ3GEYJ271	270	
R303	ERJ3GEYJ181	180	
R310	ERJ3GEYJ183	18k	
R311	ERJ3GEYJ122	1.2k	
R312	ERJ3GEYJ821	820	
R314	ERJ3GEYJ222	2.2k	
R315	ERJ3GEYJ477	4.7	
R316	ERJ3GEYJ181	180	
R320	ERJ3GEYJ331	330	
R321	ERJ3GEYJ331	330	
R330	ERJ3GEYJ472	4.7k	
R331	ERJ3GEYJ101	100	
R332	ERJ3GEYJ472	4.7k	
R333	ERJ3GEYJ101	100	
R341	ERJ3GEYJ332	3.3k	
R342	ERJ3GEYJ181	180	
R343	ERJ3GEYJ102	1k	
		(CAPACITORS)	
C300	ECUV1C104ZJV	0.1	
C302	ECEA0JKS101	100	S
C303	ECUV1H102KBV	0.001	
C304	ECUV1H101JCV	100P	
C305	ECUV1H331JCV	330P	
C306	ECUV1H331JCV	330P	
C307	ECUV1C104ZJV	0.1	
C308	ECUV1C104ZJV	0.1	
C310	ECUV1C104ZJV	0.1	
C311	ECUV1C104ZJV	0.1	
C330	ECUV1H103KBV	0.01	
C331	ECUV1H103KBV	0.01	
C341	ECUV1H101JCV	100P	
		(OTHERS)	
E30	KOL1BA000126	SWITCH, SENSOR LEVER	
E31	KOL1BA000127	SWITCH, SENSOR LEVER	
E32	WLK26YR05AA	LEAD WIRE (Red)	
E33	WLK26YW05AA	LEAD WIRE (White)	

21.2.5. Power Supply Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB4	N0AC3GJ00012	POWER SUPPLY BOARD ASS'Y (RTL)	△

Ref. No.	Part No.	Part Name & Description	Remarks
		(ICs)	
IC101	PFVIFA5518N	IC	S
IC201	TL431CDBVR	IC	
IC202	TA7804	IC	
		(TRANSISTORS)	
Q101	FQPF4N90C	TRANSISTOR (SI)	△
Q203	2SC3928	TRANSISTOR (SI)	
		(DIODES)	
D101	PFVD1N4005	DIODE (SI)	S △
D102	PFVD1N4005	DIODE (SI)	S △
D103	PFVD1N4005	DIODE (SI)	S △
D104	PFVD1N4005	DIODE (SI)	S △
D105	PQVDP1007	DIODE (SI)	S
D106	PFVDD1NL20U	DIODE (SI)	S
D107	MA165	DIODE (SI)	S
D110	PFVD1N4005	DIODE (SI)	S
D201	SF50DG	DIODE (SI)	
D202	PFVDD1NL20U	DIODE (SI)	S
D205	MTZJ6R2B	DIODE (SI)	S
		(CONNECTOR)	
CN202	2921618	CONNECTOR, 8 PIN	S △
		(COIL)	
L101	ELF15N004A	COIL	△
		(COMPONENTS PARTS)	
L102	EXCELD35	COMPONENTS PARTS	
		(FUSE)	
F101	PFBAST250315	FUSE	S △
		(PHOTO ELECTRIC TRANSDUCER)	
PC101	PFVIPC123	PHOTO COUPLER	S △
		(TRANSFORMER)	
T101	A044A2801	TRANSFORMER	S △
		(VARIABLE RESISTOR)	
VR201	EVNCYAA03B53	VARIABLE RESISTOR	S
		(VARISTOR)	
ZNR101	ERZV10D751	VARISTOR	△
		(RESISTORS)	
JP201	ERJ3GEYOR00	0	
R101	ERJ8GEYJ105	1M	
R102	ERJ8GEYJ105	1M	
R103	ERJ8GEYJ105	1M	
R104	ERJ3GEYJ473	47k	
R105	ERX2SJR22E	0.22	
R106	ERG2SJ104	100k	
R107	ERG2SJ470	47	
R110	ERDS2TJ470	47	
R111	ERDS2TJ150	15	
R112	ERJ3GEYJ101	100	
R113	ERJ3GEYJ103	10k	
R122	ERJ3GEYJ391	390	
R123	ERJ3GEYJ182	1.8k	
R201	ERDS2TJ470	47	
R221	ERJ3GEYJ102	1k	
R222	ERJ3GEYJ102	1k	
R223	ERJ3GEYJ102	1k	
R224	ERJ3GEYJ562	5.6k	
R225	ERJ3GEYJ332	3.3k	
R229	ERJ3GEYJ183	18k	
R230	ERG2SJ151	150	
R231	ERG2SJ151	150	
R232	ERJ3GENF153	15k	
R233	ERJ3GENF473	47k	

Ref. No.	Part No.	Part Name & Description	Remarks
R234	ERJ3GENF473	47k	
		(CAPACITORS)	
C101	ECQU2A104MLA	0.1	
C102	ECQU2A104MLA	0.1	△
C103	DE1E102MN4AL	0.001	S △
C105	DE1E102MN4AL	0.001	S
C106	400SXW47MM71	47	
C108	PFCEA33102N2	0.001	S
C109	PFKDD3DD470J	47P	S
C110	DE1E102MN4AL	0.001	S
C111	35YXA47M71TA	47	S
C121	ECJ1VB1H472K	0.0047	
C122	ECJ1VB1A224K	0.22	
C123	ECJ1VB1H104K	0.1	
C124	ECJ1VB1H103K	0.01	
C201	KY35VB470M	470	
C205	ECJ1VB1E104K	0.1	
C211	KY10VB470M	470	
C212	PFCEA33102N2	0.001	S
C213	ECJ1VB1E104K	0.1	
C214	ECJ1VB1E104K	0.1	
C215	PFCEA33102N2	0.001	S
C217	KY25VB100M	100	
C218	ECJ1VB1H104K	0.1	

21.2.6. Interface Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB5	PFLP1796MZ-B	INTERFACE BOARD ASS'Y (RTL)	
		(TRANSISTORS)	
Q401	B1DHDD000026	TRANSISTOR (SI)	
Q402	2SB1322	TRANSISTOR (SI)	S
Q403	PQVTDTC143E	TRANSISTOR (SI)	S
Q404	PQVTDTC144TU	TRANSISTOR (SI)	S
Q405	2SB1218A	TRANSISTOR (SI)	
IC401	B1HAGFF00015	TRANSISTOR (SI)	
		(DIODES)	
D401	1SS133	DIODE (SI)	S
D404	MA4200	DIODE (SI)	S
D405	MA4200	DIODE (SI)	S
D406	B0ECKM000008	DIODE (SI)	
D407	B0BA7R900004	DIODE (SI)	
D408	B0BA7R900004	DIODE (SI)	
		(CONNECTORS)	
CN401	K1KA08A00440	CONNECTOR, 8 PIN	
CN402	PQJS11A10Z	CONNECTOR, 11 PIN	S
CN403	PQJS11A10Z	CONNECTOR, 11 PIN	S
CN404	K1KA11A00158	CONNECTOR, 11 PIN	
CN405	K1KA05AA0193	CONNECTOR, 5 PIN	
CN407	K1KA02A00587	CONNECTOR, 2 PIN	
CN408	K1KA02AA0193	CONNECTOR, 2 PIN	
CN409	K1KA02A00587	CONNECTOR, 2 PIN	
		(COILS)	
L407	J0JCC0000288	COIL	
L408	J0JCC0000288	COIL	
		(FUSES)	
F401	K5H122200005	FUSE	
F402	K5H251200003	FUSE	
F403	K5H801200001	FUSE	
		(RESISTORS)	
R401	ERJ3GEYJ562	5.6k	
R402	ERDS1TJ152	1.5k	
R403	ERJ3GEYJ821	820	
R404	PQ4R10XJ221	220	S
R405	ERJ3GEYJ332	3.3k	

Ref. No.	Part No.	Part Name & Description	Remarks
		(CAPACITORS)	
C402	ECJ1VF1H104Z	0.1	
C403	ECJ1VF1H104Z	0.1	
C404	ECJ1VC1H101J	100P	
C405	ECJ1VC1H101J	100P	
C406	ECJ1VB1H102K	0.001	

21.2.7. Sensor Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB6	FFWP4FG2451M	SENSOR BOARD ASS'Y (RTL)	
CN1001	K1KA04B00225	CONNECTOR, 4 PIN	
SW1001	K0L2BA000001	SWITCH, SENSOR LEVER	
SW1002	K0MA11000041	REED SWITCH	

21.2.8. Film End Sensor Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB7	FFWP5FG2451M	FILM END SENSOR BOARD ASS'Y (RTL)	
E70	PFJS02M17Z	CONNECTOR, 2 PIN	
SW1003	K0L1BA000111	SWITCH, SENSOR LEVER	

21.2.9. Motor Position Sensor Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB8	FFWP6FG2451M	MOTOR POSITION SENSOR BOARD ASS'Y (RTL)	
E80	K0L1BA000128	SWITCH, SENSOR LEVER	
E81	PFJS02M15Z	CONNECTOR, 2 PIN	

21.2.10. Microphone Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB9	FFWP3FG2451M	MICROPHONE BOARD ASS'Y (RTL)	
LED302	B3AAA0000534	LED	
E90	L0CBAB000052	MICROPHONE	

21.2.11. Handset Board Parts

Note:

(2*) When you have replaced IC201 or IC241, adjust X201. Refer to **Check and Adjust X201 (Handset RF) Frequency** (P.199) and **Adjust Battery Low Detector Voltage (Handset)** (P.200).

(3*) When replacing the Handset LCD, see **How to Replace the Handset LCD** (P.198).

Ref. No.	Part No.	Part Name & Description	Remarks
PCB100	PQWPG2423BXR	HANDSET BOARD ASS'Y (RTL)	
		(ICs)	
IC201	C2HBBY000030	IC (*2)	
IC221	PQVIC61CC22N	IC	S

Ref. No.	Part No.	Part Name & Description	Remarks
IC241	PQWIG2420BXR	IC (*2)	
IC371	C0CBCAD00071	IC	
IC373	C0DBAGZ00053	IC	
IC374	PQVIC61CC20N	IC	S
IC381	C0CBCAD00070	IC	
IC901	C1CB00001657	IC	
		(TRANSISTORS)	
Q221	2SD1819A	TRANSISTOR (SI)	
Q231	UN521	TRANSISTOR (SI)	S
Q243	B1GBCFJA0029	TRANSISTOR (SI)	
Q251	PSVTUMG11NTR	TRANSISTOR (SI)	S
Q252	PSVTUMG11NTR	TRANSISTOR (SI)	S
Q253	UN521	TRANSISTOR (SI)	S
Q331	B1GBCFGG0028	TRANSISTOR (SI)	
Q361	2SB1197KQ	TRANSISTOR (SI)	S
Q362	B1ABDF000025	TRANSISTOR (SI)	
Q363	PQVTDTC143E	TRANSISTOR (SI)	S
Q373	PQVTPX151A13	TRANSISTOR (SI)	S
		(DIODES)	
D223	MA111	DIODE (SI)	S
D361	BOJCMD000010	DIODE (SI)	S
D373	MA21D3400L	DIODE (SI)	
D903	B0DCCD000011	DIODE (SI)	
D904	B0DCCD000011	DIODE (SI)	
LED251	B3ACB0000115	DIODE (SI)	
LED252	B3ACB0000115	DIODE (SI)	
LED253	B3ACB0000115	DIODE (SI)	
LED254	B3ACB0000115	DIODE (SI)	
LED256	B3ACB0000115	DIODE (SI)	
LED257	B3ACB0000115	DIODE (SI)	
LED258	B3ACB0000115	DIODE (SI)	
LED261	B3ACB0000134	DIODE (SI)	
		(COILS)	
L326	G1CR47J00005	COIL	
L327	G1CR47J00005	COIL	
L331	PQLQR2KB113T	COIL	S
L332	PQLQR2KB113T	COIL	S
L334	PQLQR2KB113T	COIL	S
L373	G1C470MA0176	COIL	
L901	MQLPF18NJFB	COIL	
L902	MQLPF10NJFB	COIL	
L903	MQLRF3N3DFB	COIL	
L904	MQLRF22NJFB	COIL	
L905	MQLRF10NJFB	COIL	
L909	MQLRF3N9DFB	COIL	
L911	MQLRF2N7DFB	COIL	
L913	MQLRF18NJFB	COIL	
L990	G1C1R0KA0096	COIL	
		(COMPONENTS PARTS)	
CA271	F5A424740002	COMPONENTS PARTS	
CA274	F5A841040004	COMPONENTS PARTS	
RA201	EXRV8V472JV	COMPONENTS PARTS	
RA251	D1H83314A013	COMPONENTS PARTS	
RA901	D1H810240004	COMPONENTS PARTS	
		(ELECTRICAL PARTS)	
MIC	L0CBAB000052	BUILTIN-MICROPHONE	
E301	L5DCBDC00022	LIQUID CRYSTAL DISPLAY (*3)	
E302	PQH11327Z	COVER, LCD COVER SHEET	
E303	PQHR11065Z	TRANSPARENT PLATE, LCD PLATE	
E304	PQH11292Z	PLASTIC PARTS, LCD SHEET	
E305	PQHR11078Z	GUIDE, LCD	
E306	PQMC10494Z	MAGNETIC SHIELD, FRAME	
E307	PQMC10493Z	MAGNETIC SHIELD, COVER	
		(RESISTORS)	
R203	ERJ2GEJ104	100k	
R208	ERJ2GEJ100	10	
R209	ERJ2GEJ104	100k	

Ref. No.	Part No.	Part Name & Description	Remarks
R222	ERJ2GEJ223	22k	
R223	ERJ2GEJ224	220k	
R225	ERJ2GEJ102	1k	
R226	ERJ2GEJ273X	27k	
R227	ERJ2GEJ224	220k	
R231	ERJ2GEJ223	22k	
R234	ERJ2GEJ103	10k	
R241	ERJ2GEJ103	10k	
R242	ERJ2GEJ102	1k	
R243	ERJ2GEJ274	270k	
R251	ERJ2GEJ103	10k	
R252	ERJ2GEJ103	10k	
R256	ERJ2GEJ121	120	
R257	ERJ2GEJ121	120	
R258	ERJ2GEJ121	120	
R261	ERJ2GEJ101	100	
R272	D1BB4303A055	430k	
R273	D1BB8203A055	820k	
R312	ERJ2GEJ222	2.2k	
R314	ERJ2GEJ222	2.2k	
R315	ERJ2GEJ222	2.2k	
R317	ERJ2GEJ101	100	
R318	ERJ2GEJ222	2.2k	
R323	ERJ2GEJ180	18	
R324	ERJ2GEJ180	18	
R331	ERJ2GEJ103	10k	
R333	ERJ2GEJ102	1k	
R334	ERJ2GEJ222	2.2k	
R340	D0GAR00Z0001	0	
R361	ERJ2GEJ473	47k	
R362	ERJ2GEJ561	560	
R363	ERJ2GEJ473	47k	
R368	ERJ3GEYJ102	1k	
R376	ERJ2GEJ225	2.2M	
R377	ERJ3GEYJ106	10M	
R401	ERJ2GEJ101	100	
R402	ERJ2GEJ182	1.8k	
R906	ERJ2RKF103X	10k	
R909	ERJ2GEJ331	330	
R919	ERJ2GEJ102	1k	
R930	ERJ2GEJ102	1k	
R931	ERJ2GEJ102	1k	
R932	ERJ2GEJ102	1k	
R933	ERJ2GEJ331	330	
R940	ERJ2GEJ4R7	4.7	
R941	ERJ2GEJ100	10	
R942	ERJ2GEJ100	10	
R943	D0GAR00Z0001	0	
R991	ERJ2GEJ102	1k	
		(CAPACITORS)	
C201	FIG1H6R0A445	6P	
C202	FIG1H6R0A445	6P	
C204	FIG1A1040003	0.1	
C206	FIG1A1040003	0.1	
C208	FIG1J0J1060006	10	S
C211	EEEFK0J331P	330P	
C212	ECUE1C103KBQ	0.01	S
C214	FIG1J0J1060006	10	S
C215	FIG1A1040003	0.1	
C221	ECUE1C103KBQ	0.01	S
C222	FIG1A1040003	0.1	
C224	FIG1A1040003	0.1	
C225	FIG1A1040003	0.1	
C226	FIG1A1040003	0.1	
C227	FIG1A1040003	0.1	
C231	FIG1A1040003	0.1	
C241	FIG1A1040003	0.1	
C242	ECUE1H101JCQ	100P	S
C246	FIG1A1040003	0.1	
C272	ECUV1C474KBV	0.47	
C273	ECUV1C104KBV	0.1	
C303	FIG0J1050007	1	S

Ref. No.	Part No.	Part Name & Description	Remarks
C305	ECUE1C103KBQ	0.01	S
C306	F1G1A1040003	0.1	
C314	F1G1C183A081	0.018	
C315	F1G1C183A081	0.018	
C317	ECST0JY226	22	
C321	ECST0JY335	3.3	
C333	ECUE1C103KBQ	0.01	S
C335	ECST0JY226	22	
C340	ECUE1C103KBQ	0.01	S
C353	ECUV1H103KBV	0.01	
C371	ECUV1A105KBV	1	
C372	ECUV1A105KBV	1	
C373	EEEFK0J331P	330P	
C377	F1G1A1040003	0.1	
C381	EEEEJA101SP	100P	
C382	ECUV1A105KBV	1	
C384	ECUV1A105KBV	1	
C904	ECUE1H020CCQ	2P	S
C910	ECUE1H1R5CCQ	1.5	S
C911	ECUE1H470JCQ	47P	S
C917	ECUE1H100DCQ	10P	S
C918	ECUE1H5R0CCQ	5	
C922	ECUE1H100DCQ	10P	S
C937	ECUE1H471KBQ	470P	S
C938	ECUE1H100DCQ	10P	S
C939	ECUE1H100DCQ	10P	S
C940	ECUE1C103KBQ	0.01	S
C941	ECUE1H102KBQ	0.001	S
C942	PQCUV0J475MB	4.7	S
C944	F1G1A1040003	0.1	
C946	ECUE1H222KBQ	0.0022	S
C952	ECUE1H020CCQ	2P	S
C956	ECUE1H100DCQ	10P	S
C960	ECUE1H100DCQ	10P	S
C962	ECUE1H100DCQ	10P	S
C963	ECUE1H100DCQ	10P	S
C964	ECUE1H102KBQ	0.001	S
C965	ECJOEC1H221J	220P	
C976	F1G1A1040003	0.1	
C977	ECUE1H102KBQ	0.001	S
C979	ECUE1H102KBQ	0.001	S
C980	ECUE1C103KBQ	0.01	S
C983	ECUE1H102KBQ	0.001	S
C984	ECUE1H101JCQ	100P	S
C990	ECUE1H102KBQ	0.001	S
C991	ECJOEC1H050C	5P	
C992	F1G1H121A444	120P	
C993	F1G1A1040003	0.1	
C996	F1G1A1040003	0.1	
C997	ECUE1H0R5CCQ	0.5	S
C998	ECUE1H0R5CCQ	0.5	S
		(OTHERS)	
CN331	K2HD103D0001	JACK	
FL901	JOE2457B0008	IC FILTER	
X201	H0J138500003	CRYSTAL OSCILLATOR	

Ref. No.	Part No.	Part Name & Description	Remarks
EC9	PQZZ2K6Z	EXTENSION CORD, 2 PIN	
EC10	PFZZ18K2Z	EXTENSION CORD, 18 PIN	
EC11	PQZZ11K8Z	EXTENSION CORD, 11 PIN	
EC12	PQZZ11K8Z	EXTENSION CORD, 11 PIN	
EC13	PQZZ8K15Z	EXTENSION CORD, 8 PIN	
	PQZZ430PIR	TIP OF SOLDERING IRON (*4)	
	PQZZ430PRB	RUBBER OF SOLDERING IRON (*4)	
	KM79811245C0	BASIC FACSIMILE TECHNIQUE (for training service technicians)	

Note:

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

21.2.12. Service Fixture and Tools

Note:

(4*) When replacing the Handset LCD, see **How to Replace the Handset LCD** (P.198).

Ref. No.	Part No.	Part Name & Description	Remarks
EC1	PFZZ11K13Z	EXTENSION CORD, 11 PIN	
EC2	PQZZ7K11Z	EXTENSION CORD, 7 PIN	
EC3	PQZZ8K15Z	EXTENSION CORD, 8 PIN	
EC4	PQZZ2K12Z	EXTENSION CORD, 2 PIN	
EC5	PQZZ2K12Z	EXTENSION CORD, 2 PIN	
EC6	PQZZ4K7Z	EXTENSION CORD, 4 PIN	
EC7	PQZZ2K12Z	EXTENSION CORD, 2 PIN	
EC8	PFZZ5K13Z	EXTENSION CORD, 5 PIN	