ORDER NO. KM41010283CE

Service Manual

Telephone Equipment

AOH and Caller ID Compatible

Model No. KX-TS2388RUB
KX-TS2388RUW
KX-TS2388CAB
KX-TS2388CAW
KX-TS2388UAB
KX-TS2388UAW

Integrated Telephone System

B: Black Version
W: White Version
(for Russia, Central Asia and Ukraine)

Panasonic®

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⚠ 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.
- The illustrations in this Service Manual may vary slightly from the actual product.

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1 Safety Precautions

1.1. For Service Technicians

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

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

2 Warning

2.1. Battery Caution

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

2.2. About Lead Free Solder (Pbf: Pb free)

Note:

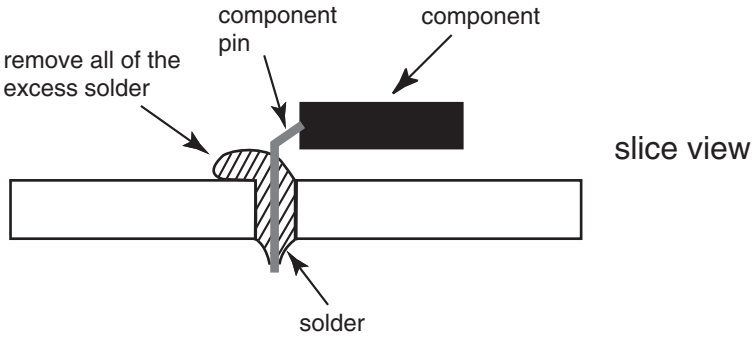
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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.

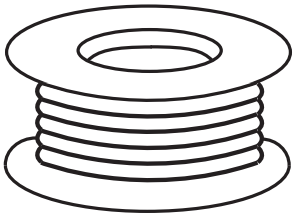
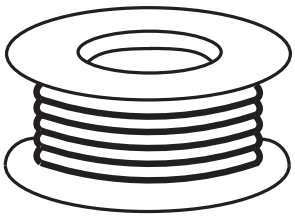
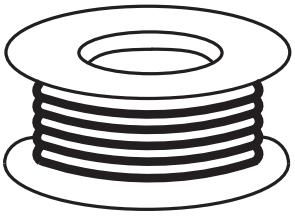
Caution

- PbF solder has a melting point that is 50 °F ~ 70 °F (30 °C ~ 40 °C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700 °F ± 20 °F (370 °C ± 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 the figure below).



2.2.1. 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 manufac turer'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: 0.3 mm, 0.6 mm and 1.0 mm.

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

2.3. Discarding of P. C. Board

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

3 Specifications

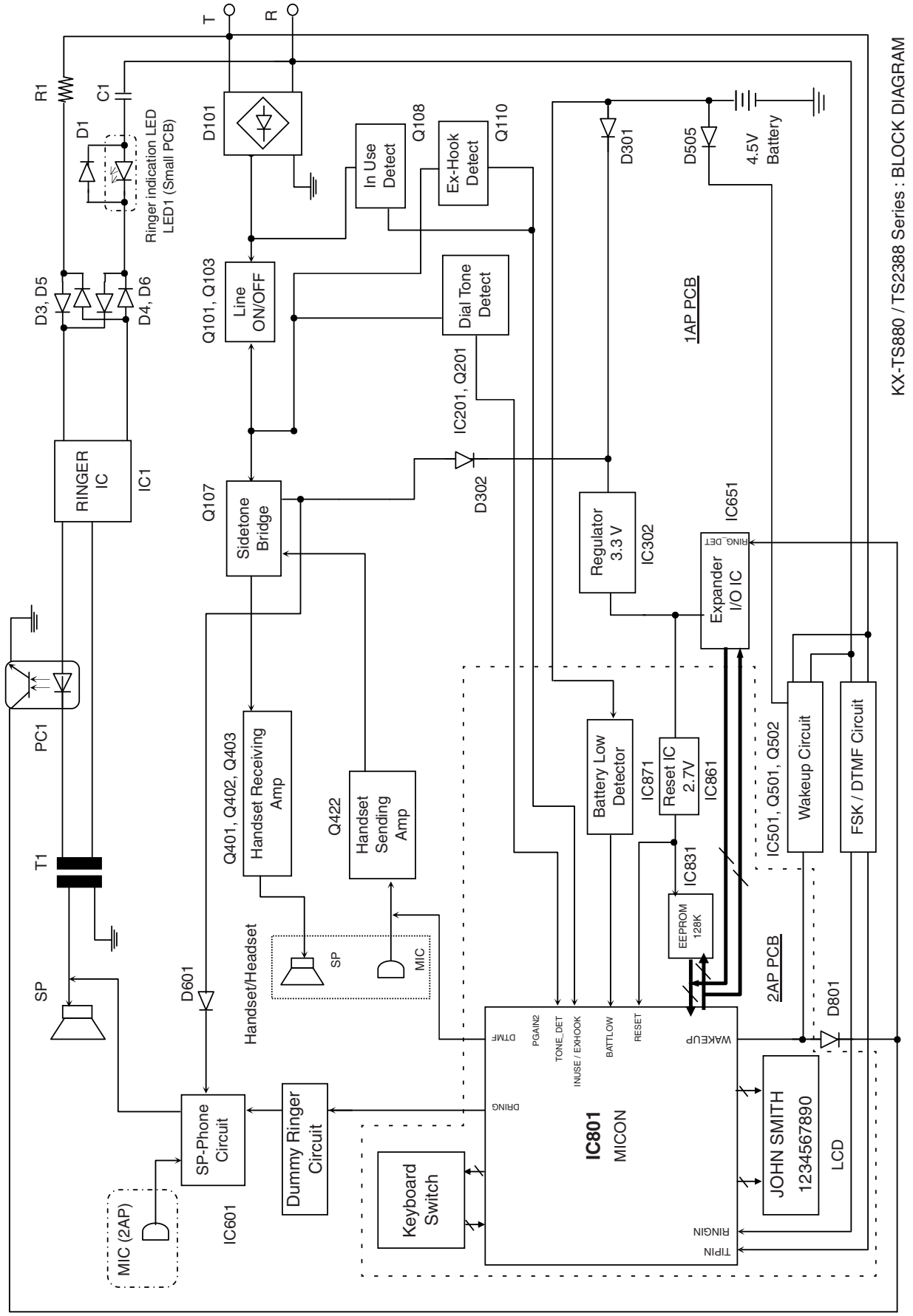
Power Source:	From telephone line From 3 AA (LR6, R6, UM-3) batteries
Memory Capacity:	50 Caller ID memory, 50 Directory memory.
Redial:	The unit redials the last dialed number
Speaker Unit:	Unit: 5.7cm (2.5") PM magnetic type 32 Ω Handset: 3 cm ($1\frac{13}{16}$") PM dynamic type 150 Ω
Microphone:	Electret condenser microphone
Input Jack:	Telephone Line
Dimensions (H x W x D):	Approx. 93 mm x 172 mm x 220 mm
Mass (weight):	Approx. 550 g
Operating Enviroment:	0 °C - 40 °C, 20 % - 80 % relative air humidity (dry)

Note:

- Design and specifications are subject to change without notice.

4 Technical Descriptions

4.1. Block Diagram



4.2. Circuit Operation

4.2.1. Bell Detector Circuit

When the bell signal is input from LINE to T/R (when the telephone rings), the signal is output at the speaker via the following path :

T/R → R1/C1 → D1/LED1 (small PCB) → D3/D4 → IC1 (pin8) → IC1 (pin5) → PC1 → C5 → SW2 (R7/R8/R9)→ T1 → Speaker

4.2.2. Dummy Ringer Circuit

When **【AOH】** button is pressed during incoming call (Caller ID AOH mode), dummy ring function will be activated.
The bell signal from LINE stops and Caller ID is received.
Set will keep on ringing by the dummy ring function until the handset is picked up / speakerphone is on.

The dummy ring signal is generated from IC801 via the following path :
(Speakerphone will be activated during dummy ring)
IC801 (pin 89)→ R901 → Q2 → SW2 (R11/R12/R13) → C8 → R615 → C616 → IC601 (pin 19) → IC601 (pin 15)→ C618 → Speaker

4.2.3. Telephone Line Interface

4.2.3.1. Circuit operation

- **On hook**
  Q101 is OFF, on-hook condition where DC loop is disconnected and voice signal flow is cut.
- **Off hook**
  During Off-Hook, pin 1_3 of SW101 and Q101 is ON, providing an off-hook condition (active DC current flow through the circuit) and the following is the signal flow :
  T → POS101 → L101 → D101(+) → Q101 → R180 → Q107 → R119 → D103 → D101(-) → L102 → R
- **Receiving signal flows:**
  LINE → Q101 → R180 → C109 → C401 → R401 → L412 → L401 → Q401 → C404 → R405 → R417 → L405 → C405 → L406 → Q402 → C408 → R413 → L409 → Q403 → C410 → VR401 → SP (handset)
- **Transmission signal flows:**
  MIC (handset) → C422 → VR402 → R423 → C425 → L421 → R430 → Q422 → R429 → C429 → L107 → Q107 → Q101 → R180 → LINE
- **Pulse Dial**
  A pulse signal switches repeatedly between high and low logic is output from IC801 (pin 73), on and off the line loop, generating the pulse dial signal.

4.2.4. Speakerphone Circuit

4.2.4.1. 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.

4.2.4.2. Circuit Operation

The speakerphone can only provide a one-way communication path.
In other words, it can either transmit an outgoing signal or receive an incoming signal at a given time, but cannot do both simultaneously. Therefore, a switching circuit is necessary to control the flow of the outgoing and incoming signals.
This switching circuit is contained in IC601 and consists of a Voice Detector, TX Attenuator, RX Attenuator, Comparator and Attenuator Control. The circuit analyzes whether the TX(transmit) or the RX(receive) signal is louder, and then it processed the signals such that the louder signal is given precedence.
The Voice Detector provides a DC input to the Attenuator Control corresponding to the TX signal.
The Comparator receives a TX and a RX signal, and supplies a DC input to the Attenuator Control corresponding to the RX signal.
The Attenuator Control provides a control signal to the TX and the RX attenuator to switch the appropriate signals on and off.
The Attenuator Control also detects the level of the volume control to automatically adjust for changing ambient conditions.

1. **Transmission signal path:**
   The input signal from the microphone is sent through the circuit via the following path: MIC → Pin 9 of IC601 → Pin 10 of IC601 → Pin 3 of IC601 → Pin 4 of IC601 → R601 → C602 → L107 → Q107 → Tel line.
2. **Reception signal path:**
   Signals receive from the telephone line are outputted at the speaker via the following path: Tel line → Q107 → Q401 → C404 → R600 → C603 → Pin 27 of IC601 → Pin 26 of IC601 → Pin 19 of IC601 → Pin 15 of IC601 → Speaker.
3. **Transmission/Reception switching**
   The comparison result between TX and RX outputs as a DC level of Pin 25 of IC601. TX level is high ..... Pin 25 = Pin 21 - 6mV RX level is high ..... Pin 25 = Pin 21 - 150mVComparator output is connected to the attenuator control inside of IC601.
4. **Voice detector**
   The output of the mic amp (Pin 10 of IC601) is supplied to Pin 13 of IC601 as a control signal for the voice detector.
5. **Attenuator control**
   The attenuator control detects the setting of the volume control through Pin 24 of IC601 to automatically adjust for changing ambient conditions.

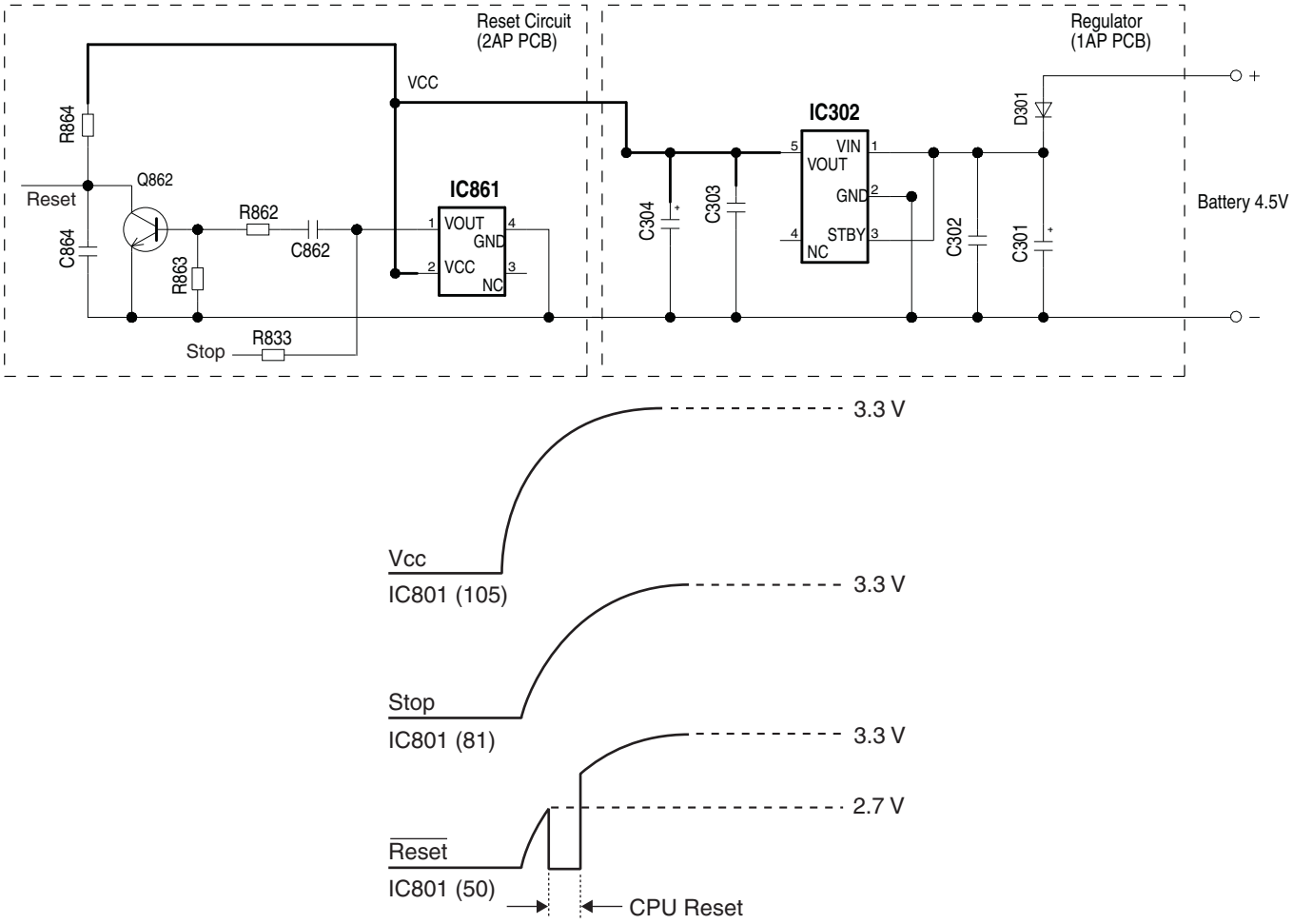
4.2.5. Initializing Circuit

4.2.5.1. Function

This circuit is used to initialize the CPU when the batteries are installed.

4.2.5.2. Circuit Operation

When the batteries is inserted into the unit, then the voltage is regulated by IC302 and power is supplied to the CPU. The set can operate in the circuit voltage diagram.

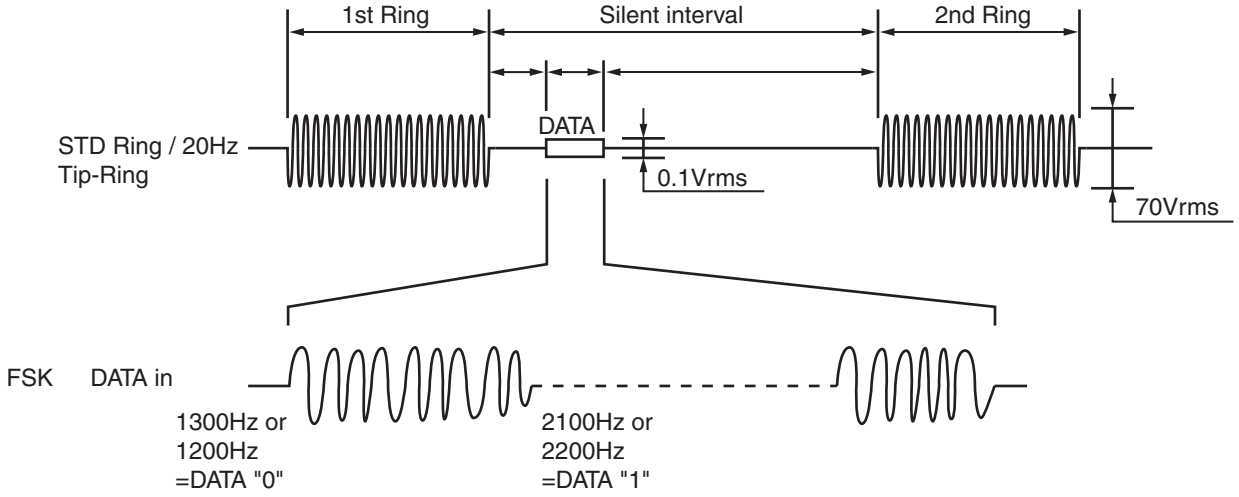


4.2.6. Caller ID Detect Circuit

4.2.6.1. Function (FSK Signal)

The caller ID is a changeable ID which the user of a telephone circuit obtains by entering a contract with the telephone company to utilize a caller ID service. For this reason, the operation of this circuit assumes that a caller ID service contract has been entered for the circuit being used. 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 types of the message format which can be received: i.e. the single message format and plural message format. The plural message format allows to transmit the name and data code information in addition to the time and telephone number data.

• **FSK (Frequency Shift Keying) format**



4.2.6.2. Circuit Operation

Caller ID signal is sent through the circuit via the following path :

LINE → C500/C520 → C551/C552 → R551/R552 → R553/R554 → IC801 (pin 92, 93)

5 Location of Controls and Components

Refer to the Operating Instructions.

Note:

You can download and refer to the Operating Instructions (Instruction book) on TSN Server.

6 Installation Instructions

Refer to the Operating Instructions.

Note:

You can download and refer to the Operating Instructions (Instruction book) on TSN Server.

7 Operating Instructions

Refer to the Operating Instructions.

Note:

You can download and refer to the Operating Instructions (Instruction book) on TSN Server.

7.1. For Service Hint

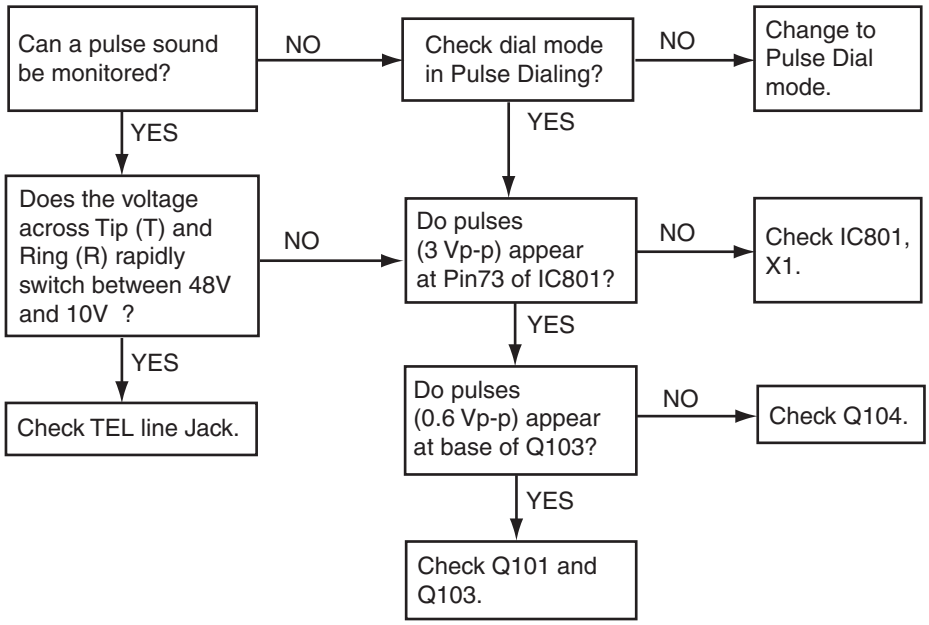
If the current password is forgotten, key in " *7000 " then **【ENTER】** at the change password menu and you will be able to change the password. After you enter a new password, you will be able to cancel the dial lock.

8 Troubleshooting Guide

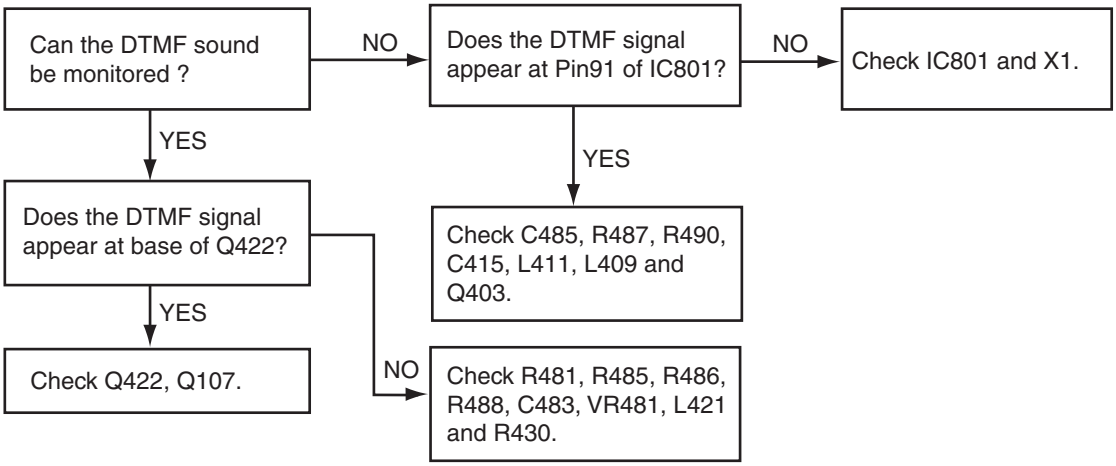
8.1. Service Hints

SYMPTOM	CURE
Dead.	Check IC801, X1.
Can't hear the voice from handset.	Check Q401, Q402, Q403.
No voice transmit.	Check Q422, Q107.
Can't tone dial.	Check IC801 (91), R481, R485.
Can't pulse dial.	Check Q101, Q103, Q104.
No rings.	Check D3, D4, D5, D6, IC1, Q1
Can't speak with the handset.	Check Handset jack.
Can't change the volume for Handset or Speakerphone.	Check IC801, R407~R409, IC601, Q406, Q407, C412~C414, R619~R621.
No volume handset or speakerphone.	Check IC801, Q107, Q401.
Caller ID Function doesn't work.	Check C551, C552, R551, R552, D551~D554, IC801.
Caller ID Function doesn't work. (DTMF)	Check around IC501, Q501, Q502.
Can't auto redial.	Check IC201, Q201.
Can't hold.	Check Q110.
Can't speak with the speakerphone.	Check IC601.

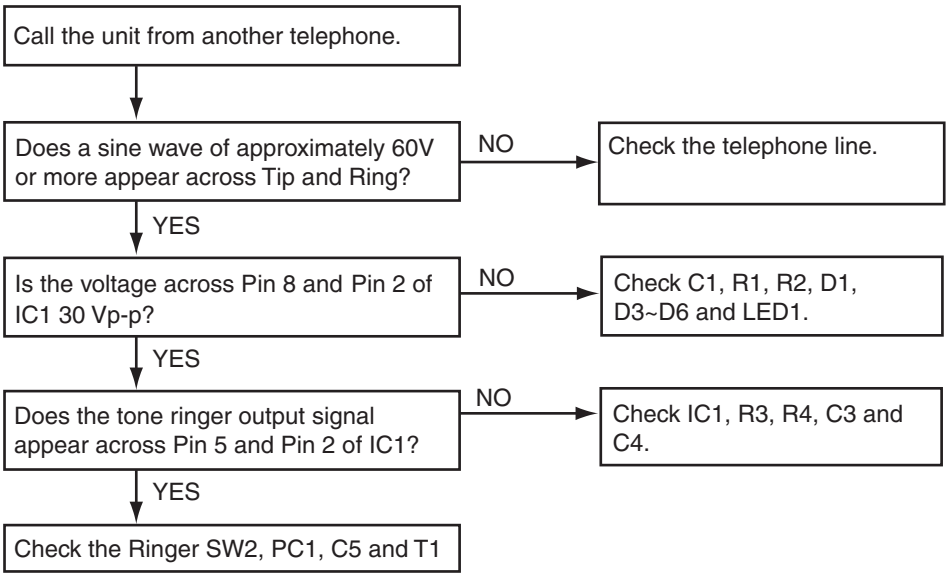
8.2. Pulse Dialing Problems



8.3. Tone Dialing Problems



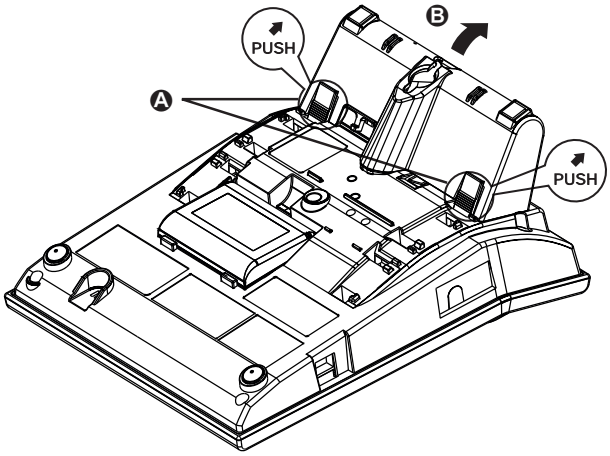
8.4. No Ringing Sound When Ring Signal is Input



9 Disassembly and Assembly Instructions

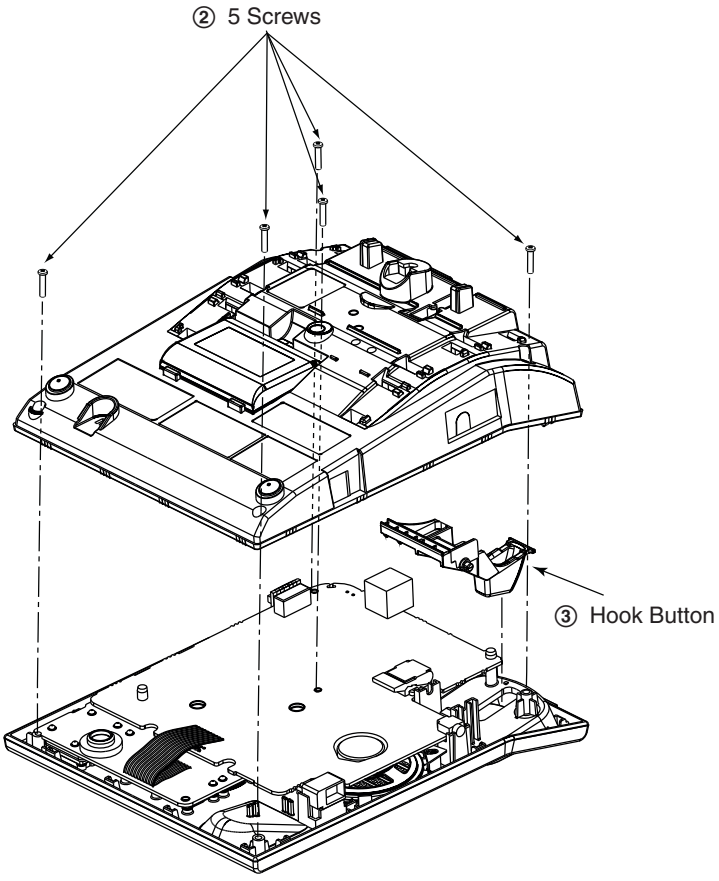
9.1. Disassembly Instructions

① Press the catches (Ⓐ) and rotate the stand in the direction (Ⓑ) to remove the Stand.
Note:
When the Stand is in Low position, the screws can be taken out just as it is.

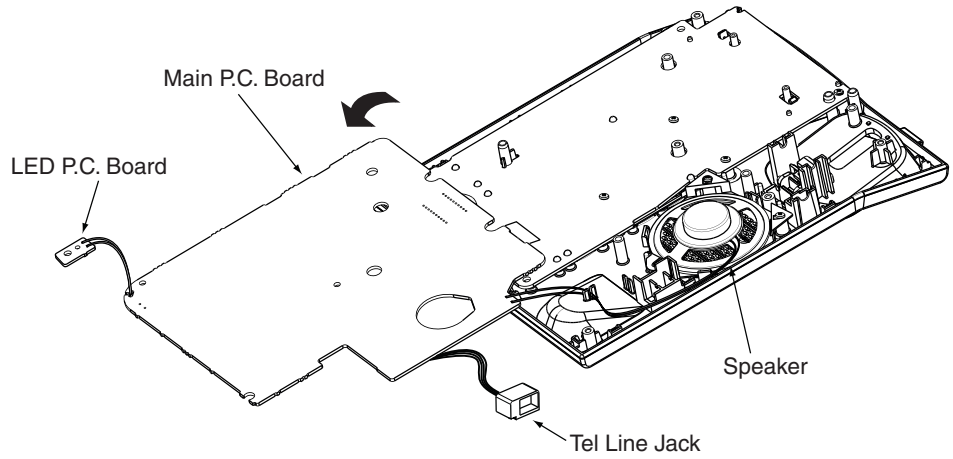


② Remove 5 Screws to remove the Cabinet Cover.

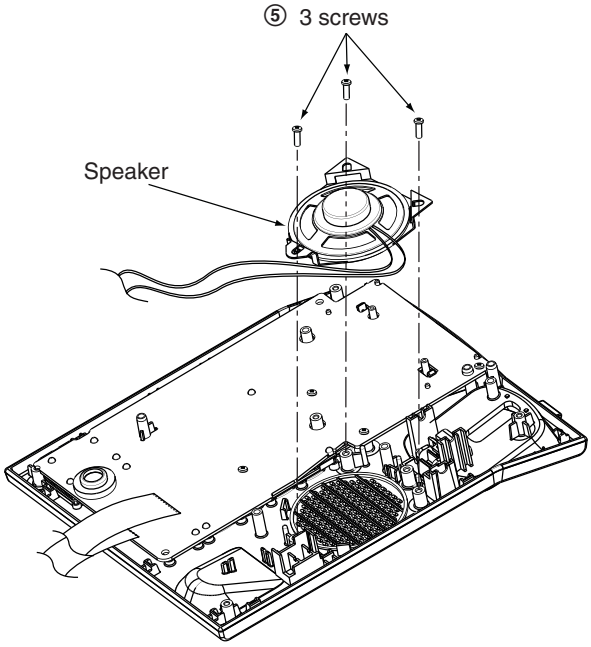
③ Remove the Hook Button.



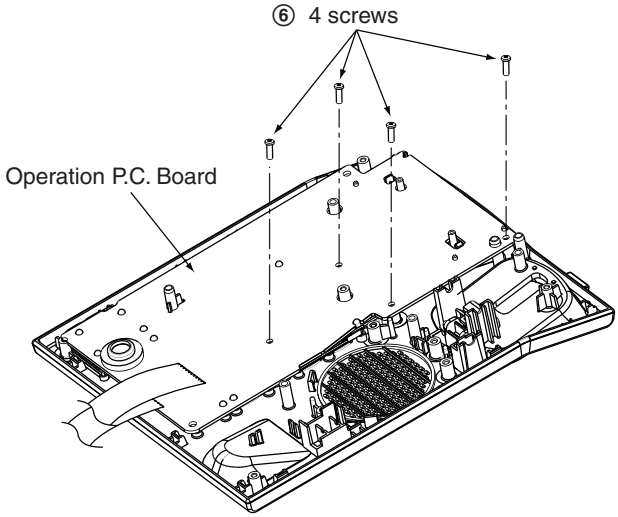
④ Remove Main P.C. Board, then unhook the LED P.C. Board and Tel Line Jack.



⑤ Remove the 3 screws to remove the speaker.



⑥ Remove the 4 screws to remove the Operational P.C. Board.

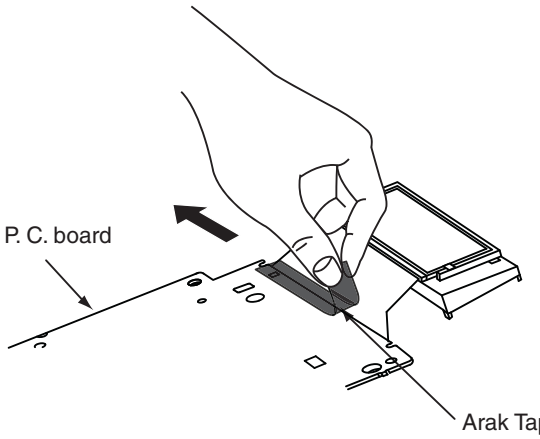


9.2. Assembly Instruction

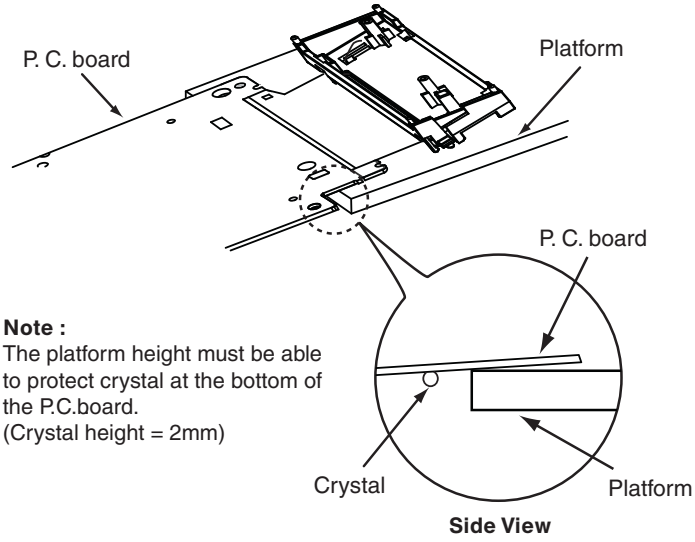
9.2.1. How to Replace the Base Unit LCD

Note:
- Make sure to cut the length of the rubber of the soldering iron to become 23mm to 25mm.
- Preheat the soldering iron for 10 minutes for the Rubber of Soldering Iron to reached around 180~200°C.
- The illustrations are simplified in this page. They may differ from the actual product.

① Peel off the arak tape at the front of P.C.board.



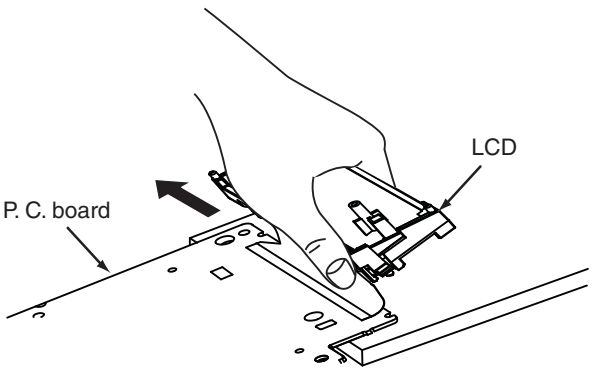
② Turn over the P.C. board and place a platform as shown to protect the crystal at the bottom side of the P.C.board.



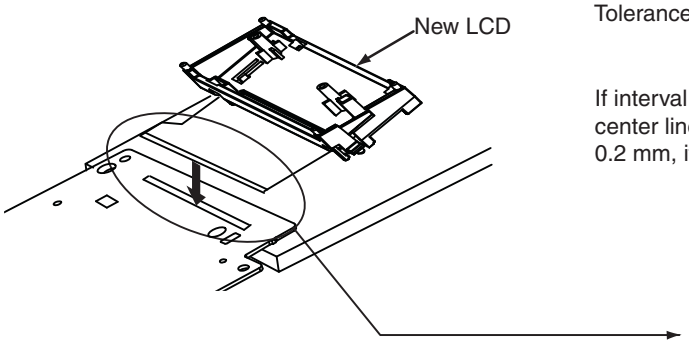
Note :
The platform height must be able to protect crystal at the bottom of the P.C.board.
(Crystal height = 2mm)

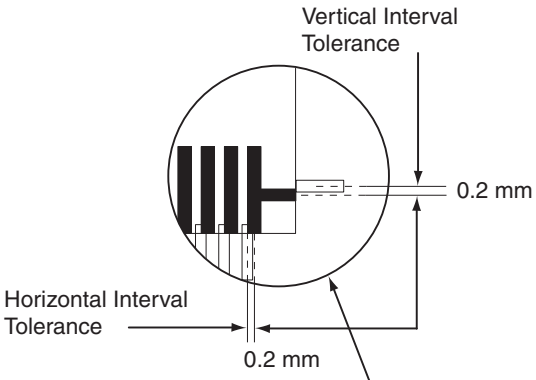
Side View

③ Peel off the HSC (Heat Seal Connector) from the P.C. board, in the direction of the arrow. Use some IPA alcohol to gently remove glue stain on the P.C. board.



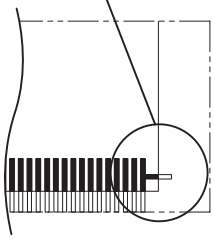
④ Fit the heatseal of the new LCD.





If interval tolerance between center lines is less than 0.2 mm, it is o.k.

OK



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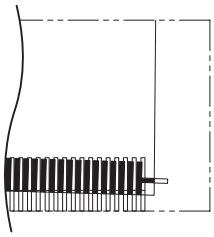

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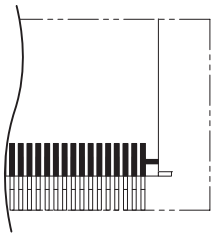
(Vertical interval tolerance is more than 0.2 mm.)



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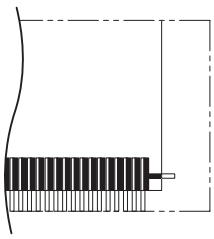
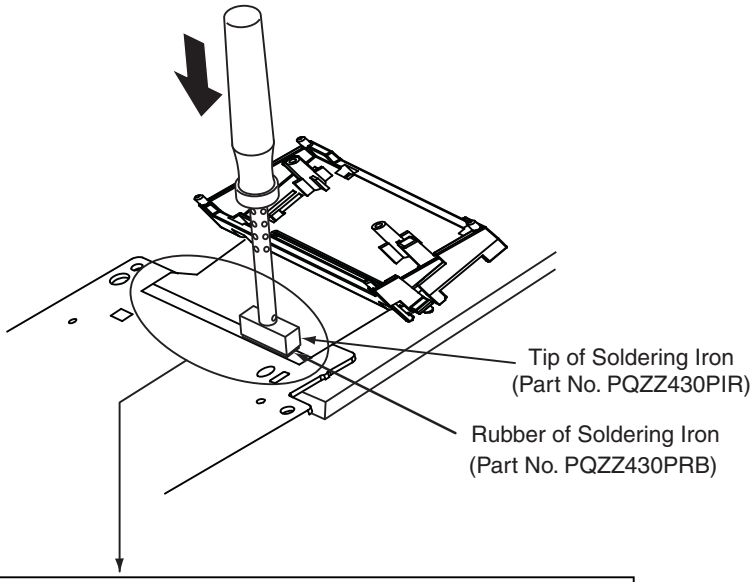
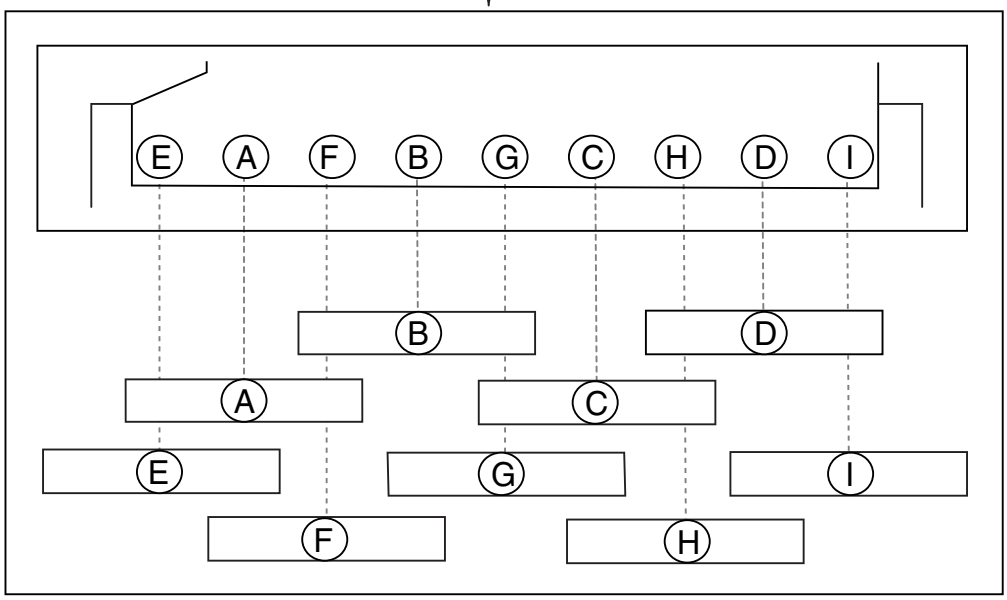
(Horizontal interval tolerance is more than 0.2 mm.)



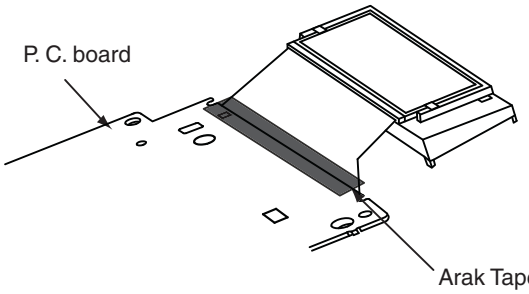
⑤ Heatweld with the tip of the soldering iron for 10 seconds each position (in case of 60W soldering iron) with 10kg pressure applied 9 times on position (A)~(I), as shown below.





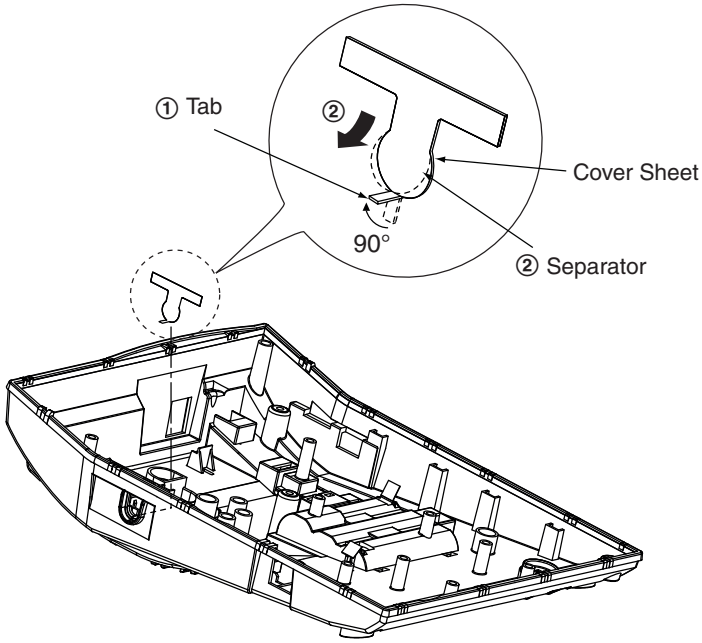
Note :
Make sure copper part of solder jig is not touch the new LCD which will cause burn.

⑥ Replace back the arak tape.

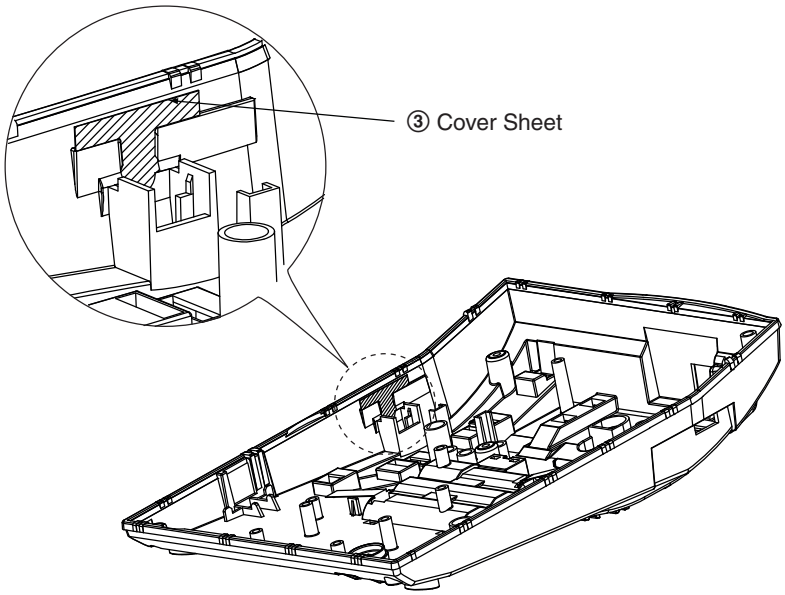


9.2.2. How to Install the Headset Cover

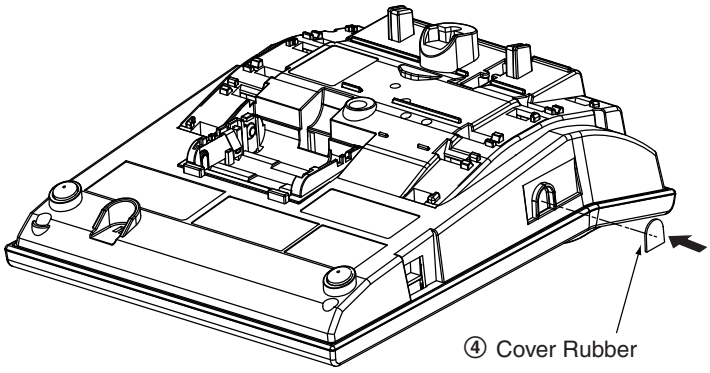
① Before install, bend the tab 90° towards adhesive side.
② Peel off the separator from the headset cover.



③ Install the headset cover sheet.



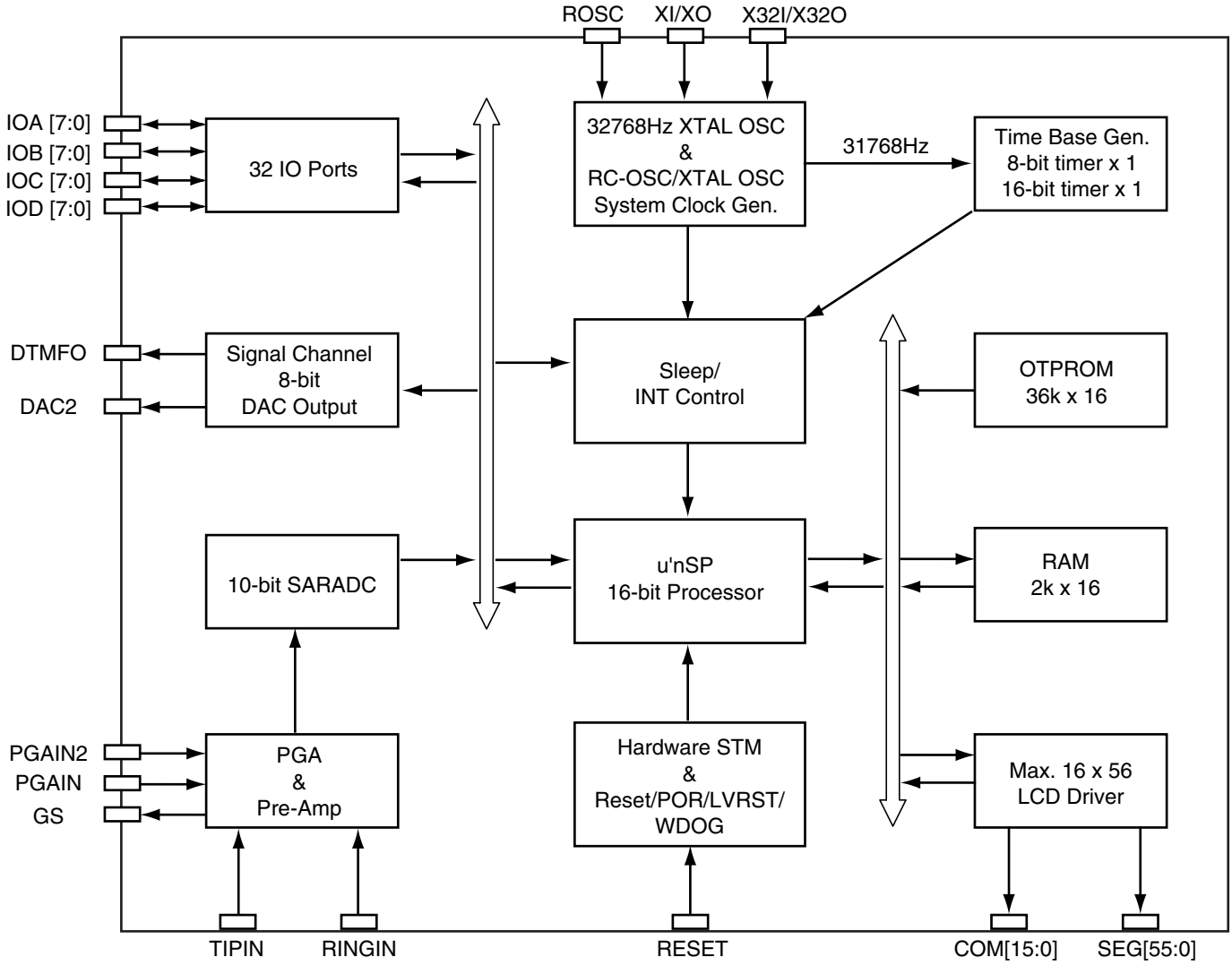
④ Then, install the headset cover rubber to lower cabinet as shown.
Press the rubber harder to ensure rubber attach firmly with headset cover sheet.



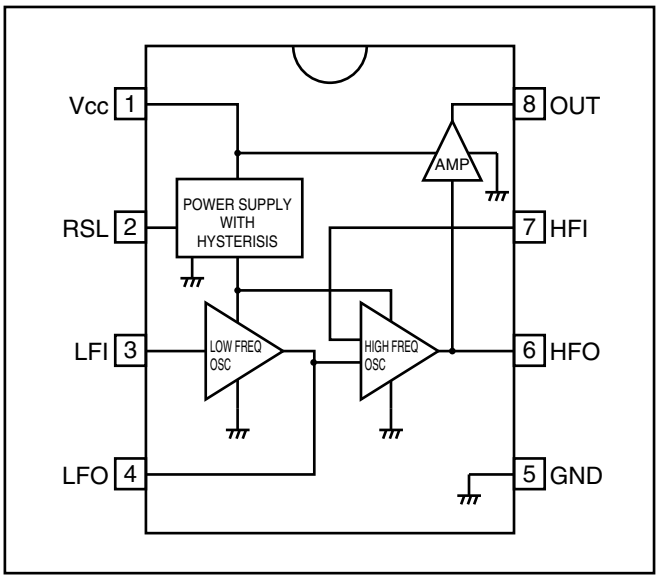
10 Miscellaneous

10.1. IC Block diagram

10.1.1. IC 801



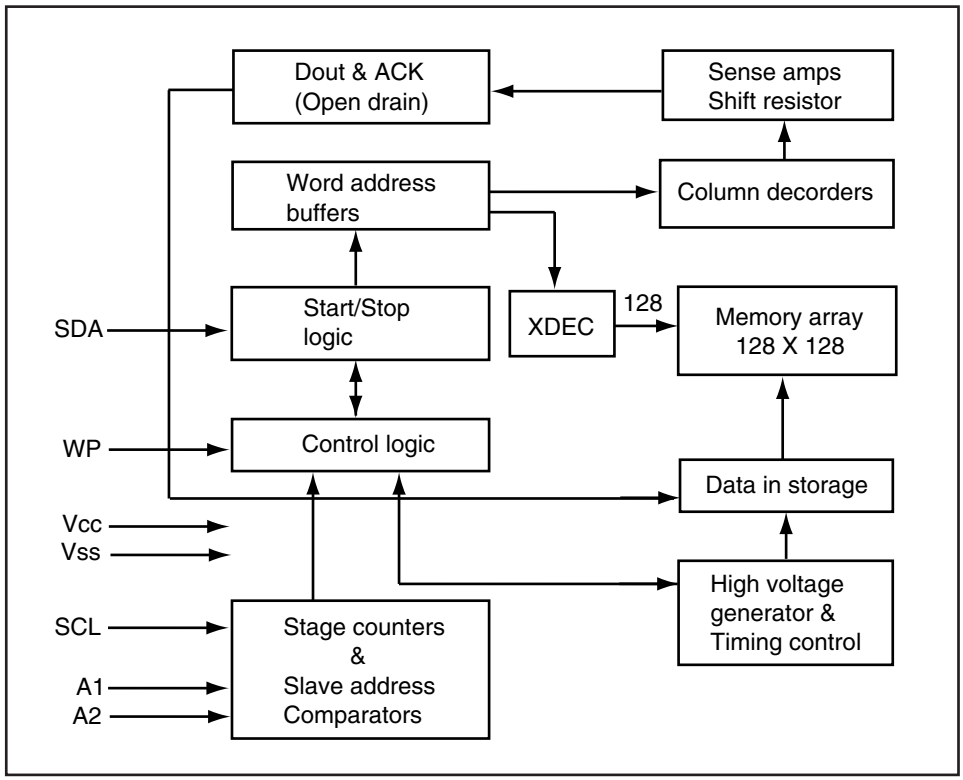
10.1.2. RINGER IC (IC1)



Pin descriptions

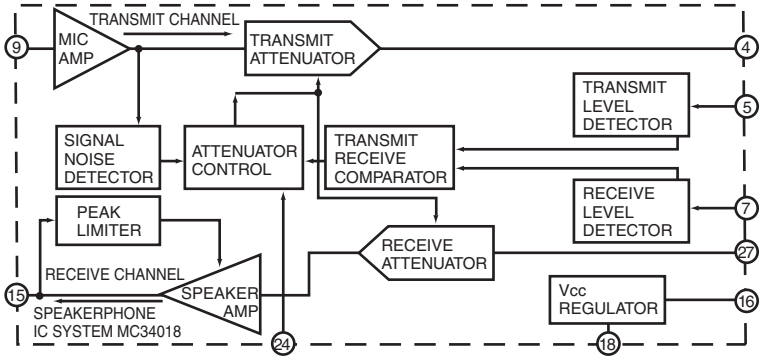
Pin No.	Pin name	Name	Function
1	Vcc	Power supply pin	This is the power supply pin for the IC. It is connected to the (⊕) pin of the diode bridge.
2	RSL	RSL pin	This is used to change the operation initiation current when connected to the GND pin.
3	LFI	Low-frequency time constant connector pin	This is connected to the time constant that determines the oscillation frequency on the warble.
4	LFO		
5	GND	GND pin	This pin has the lowest potential on the IC. It is connected to the (⊖) pin of the diode bridge.
6	HFO	High-frequency time constant connector pin	This is connected to the time constant that determines the oscillation frequency on the tone side (the audible frequency side).
7	HFI		
8	OUT	Output pin	This is used to connect a piezoelectric buzzer, or to connect a dynamic speaker through a transformer.

10.1.3. EEPROM (IC851)



1. SCL
   SCL terminal is input terminal of Serial Clock to control transmit and receipt between Master and Slave.
2. SDA
   SDA terminal is input terminal, to forward the address and the mutual data between Master Device and Slave Device the mutual.
   This terminal needs the pull-up resistance external because output circuit of SDA uses Open Drain.
3. A0, A1, A2
   A0, A1, and A2 terminal is not used.
4. WP
   WP terminal controls writing action. It is possible to do only reading action when high level input and it is possible to do reading and writing action when low level input.

10.1.4. Speakerphone IC Data (IC601)



Pin NO.	Name	Description
1	RR	A resistor to ground provides a reference current for the transmit and receive attenuators.
2	RTX	A resistor to ground determines the nominal gain of the transmit attenuator. The transmit channel gain is inversely proportional to the RTX resistance.
3	TXI	Input to the transmit attenuator. Input resistance is nominally 5.0 kohms.
4	TXO	Output to the transmit attenuator. The TXO output signal drives the input of the transmit level detector, as well as the external circuit which drives the telephone line.
5	TLI	Input of the transmit level detector. An external resistor ac coupled to the TLI pin sets the detection level. Decreasing this resistor increases the sensitivity to transmit channel signals.
6	TLO	Output of the transmit level detector. An external resistor and capacitor set the time the comparator will hold the system in the transmit mode after speech ceases.
7	RLI	Input of the receive level detector. An external resistor ac coupled to the RLI pin sets the detection level. Decreasing this resistor increases the sensitivity to receive channel signals.
8	RLO	Output of the receive level detector. An external resistor and capacitor set the time the comparator will hold the system in the receive mode after the receive signal ceases.
9	MCI	Microphone amplifier input. Input impedance is nominally 10 kohms and the dc bias voltage is approximately equal to VB.
10	MCO	Microphone amplifier output. The mic amp gain is internally set at 34 dB (50 V/V).
11	CP1	A parallel resistor and capacitor connected between this pin and Vcc holds a voltage corresponding to the background noise level. The transmit detector compares the CP1 voltage with the speech signal from CP2.
12	CP2	A capacitor at this pin peak detects the speech signals for comparison with the background noise level held at CP1.
13	XDI	Input to the transmit detector system. The microphone amplifier output is ac coupled to the XDI pin through an external resistor.
14	SKG	High current ground pin for the speaker amp output stage. The SKG voltage should be within 10 mV of the ground voltage at pin 22.
15	SKO	Speaker amplifier output. The SKO pin will source and sink up to 100 mA when ac coupled to the speaker. The speaker amp gain is internally set at 34 dB (50 V/V).
16	V+	Input dc supply voltage. V+ can be powered from Tip and Ring if an ac decoupling inductor is used to prevent loading ac line signals. The required V+ voltage is 6.0 to 11 V (7.5 V nominal) at 7.0 mA.
17	AGC	A capacitor from this pin to VB stabilizes the speaker amp gain control loop, and additionally controls the attack and decay time of this circuit. The gain control loop limits the speaker amp input to prevent clipping at SKO. The internal resistance at the AGC pin is nominally 110 kohms.
18	CS	Digital chip select input. When at a Logic "0" (<0.7 V) the Vcc regulator is enabled. When at a Logic "1" (>1.6 V), the chip is in the standby mode drawing 0.5 mA. An open CS pin is a Logic "0". Input impedance is nominally 140 kohms. The input voltage should not exceed 11 V.
19	SKI	Input to the speaker amplifier. Input impedance is nominally 20 kohms.
20	Vcc	A 5.4 V regulated output which powers all circuit expect the speaker amplifier output stage. Vcc can be used to power external circuitry such as a microprocessor (3.0 mA max). A filter capacitor is required. The MC 34018 can be powered by a separate regulated supply by connecting V+ and Vcc to a voltage between 4.5 V and 6.5 V while maintaining CS at a Logic "1".
21	VB	An output voltage equal to approximately Vcc/2 which serves as an analogue ground for the speakerphone system. Up to 1.5 mA of external load current may be sourced from VB. Output impedance is 250 ohms. A filter capacitor is required.
22	Gnd	Ground pin for the IC (except the speaker amplifier).
23	XDC	Transmit detector output. A resistor and capacitor at this pin hold the system in the transmit mode during pauses between words or phrases. When the XDC pin voltage decays to ground, the attenuators switch from the transmit mode to the idle mode. The internal resistor at XDC is nominally 2.6 kohms.
24	VLC	Volume control input. Connecting this pin to the slider of a variable resistor provides receive mode volume control. The VLC pin voltage should be less than or equal to VB.
25	ACF	Attenuator control filter. A capacitor connected to this pin reduces noise transients as the attenuator control switches levels of attenuation.
26	RXO	Output of the receive attenuator. Normally this pin is ac coupled to the input of the speaker amplifier.
27	RXI	Input of the receive attenuator. Input resistance is nominally 5.0 kohms.
28	RRX	A resistor to ground determines the nominal gain of the receive attenuator. The receive channel gain is directly proportional to the RRX resistance.

10.2. How to Replace the Flat Package IC

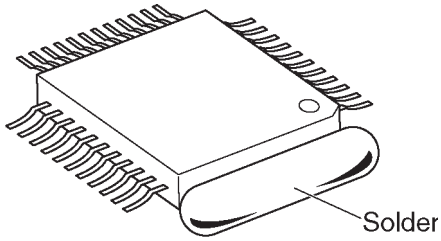
Even if you do not have the special tools (for example, a spot heater) to remove the Flat IC, with some solder (large amount), a soldering iron and a cutter knife, you can easily remove the ICs that have more than 100 pins.

10.2.1. Preperation

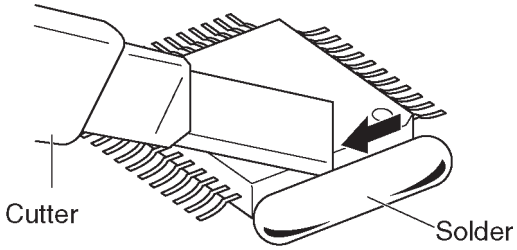
- PbF (: Pb free) Solder
- Soldering Iron
  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)
  Note: We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
- Flux
  Recommended Flux: Specific Gravity → 0.82.
  Type → RMA (lower residue, non-cleaning type)
  Note: See **About Lead Free Solder (Pbf: Pb free)** (P.4).

10.2.2. How to Remove the IC

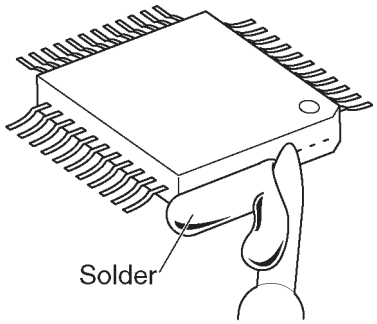
1. Put plenty of solder on the IC pins so that the pins can be completely covered.
   Note:
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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



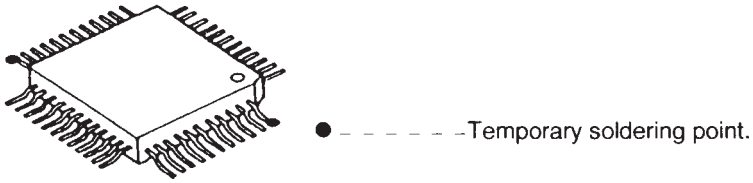
3. While the solder melts, remove it together with the IC pins.



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.

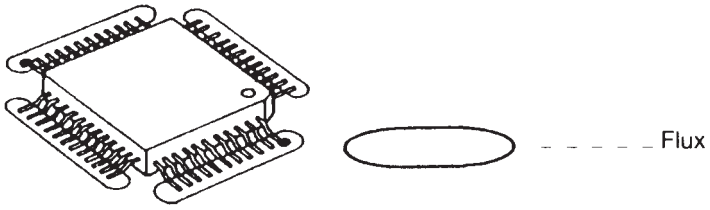
10.2.3. How to Install the IC

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

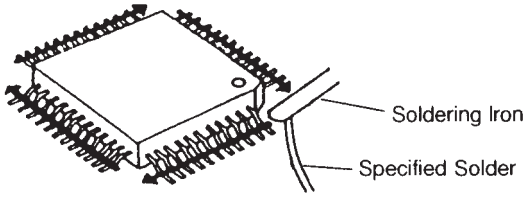


*Check the accuracy of the IC setting with the corresponding soldering foil.

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

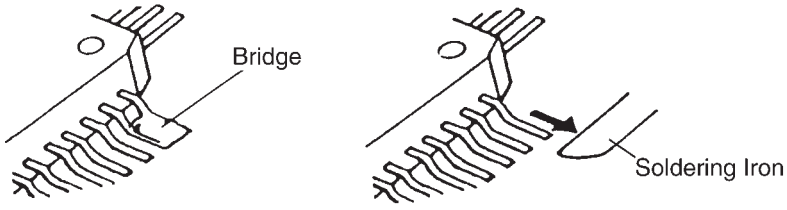


3. Solder the pins, sliding the soldering iron in the direction of the arrow.

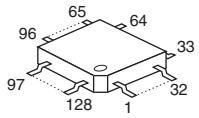


10.2.4. How to Remove a Solder Bridge

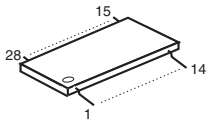
1. Lightly resolder the bridged portion.
2. Remove the remaining solder along the pins using a soldering iron as shown in the figure below.



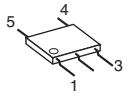
10.3. Terminal Guide of the ICs, Transistors and Diodes



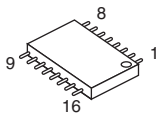
C2CBYY000895



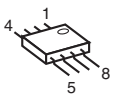
C1CB00001673



PQVIPS3238NT,
C0DBZGC00067



C0ZBZ0001747



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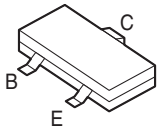
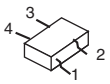
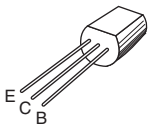
PQVINJU7014R, PNWITS2388RU,
PNWITS2388CA, PNWITS2388UA



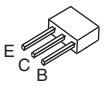
UNR5213J0L, B1ABDF000026, PQVTDTC144TU,
PQVTBF822T7, B1GBJCFJ0003,B1GBJCJJ0003,
UNR5113J0L,2SD1819KSL,2SB1218KSL



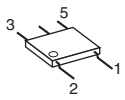
PQVIPS3327UT



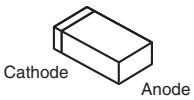
B1AAKD000013



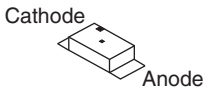
2SA1776P



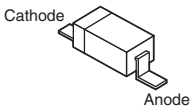
PQVTFMG2T148



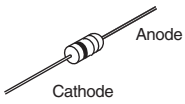
MA111,
MA728



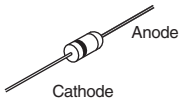
PSVD1SRCT



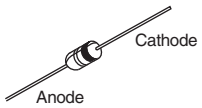
B0JCME000038



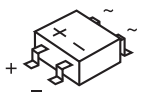
MA4051



MA4180



1SS133



B0EDER000009

11 Schematic Diagram

11.1. For Schematic Diagram

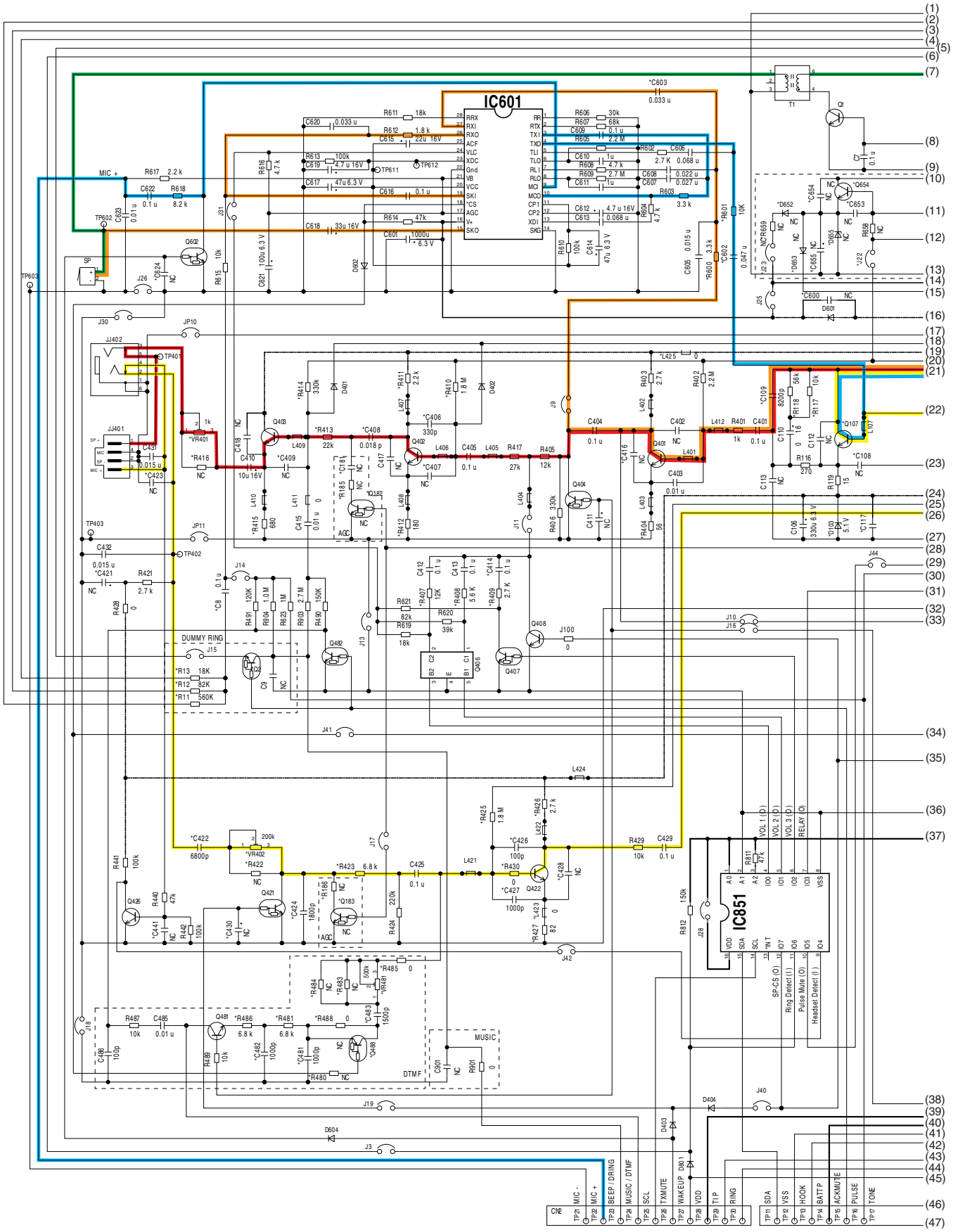
1. DC voltage measurements are takens with electronic voltmeter from negative terminal.

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

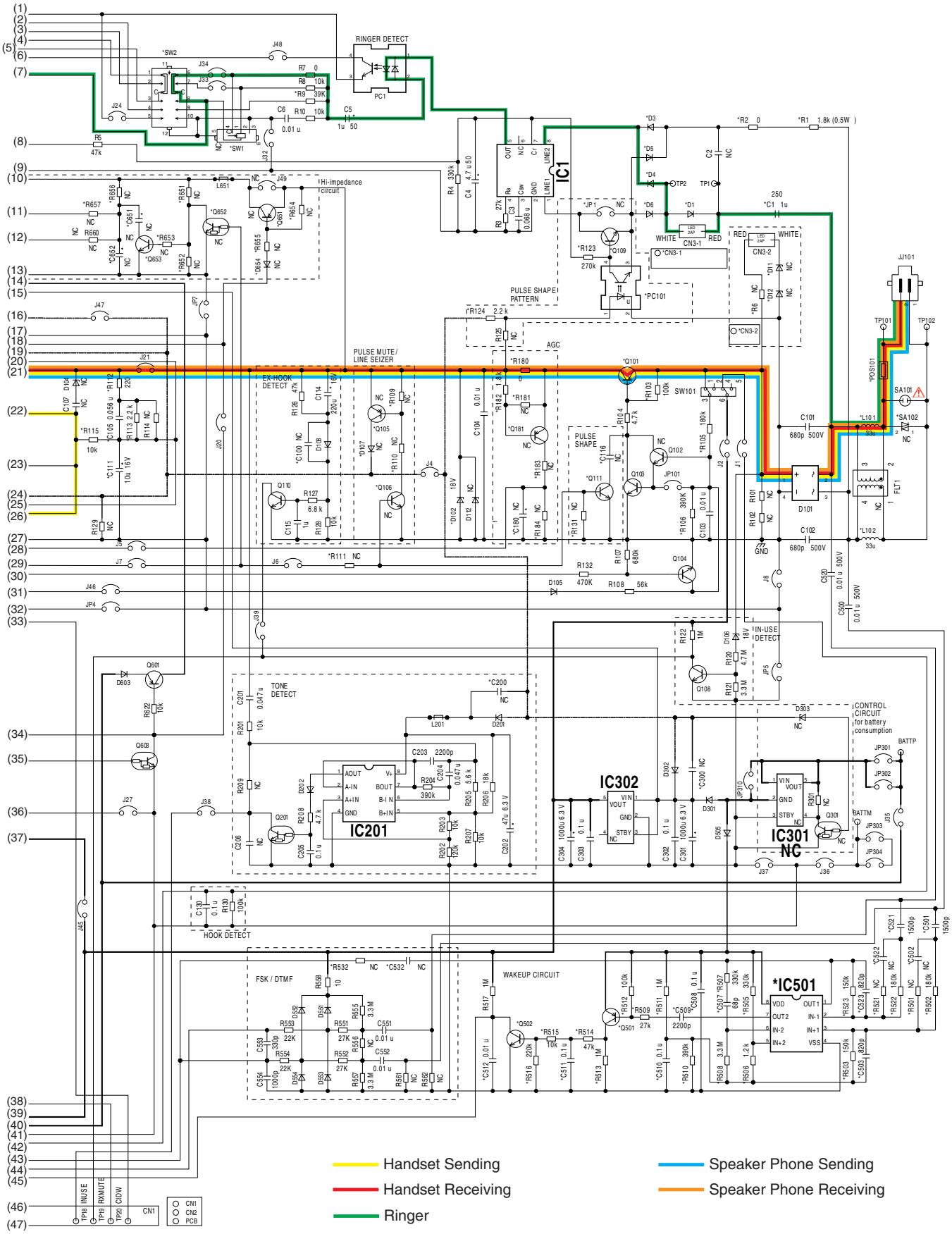
2. This schematic diagram may be modified at any time with the development of new technology.

Memo

11.2. Schematic Diagram (Main)



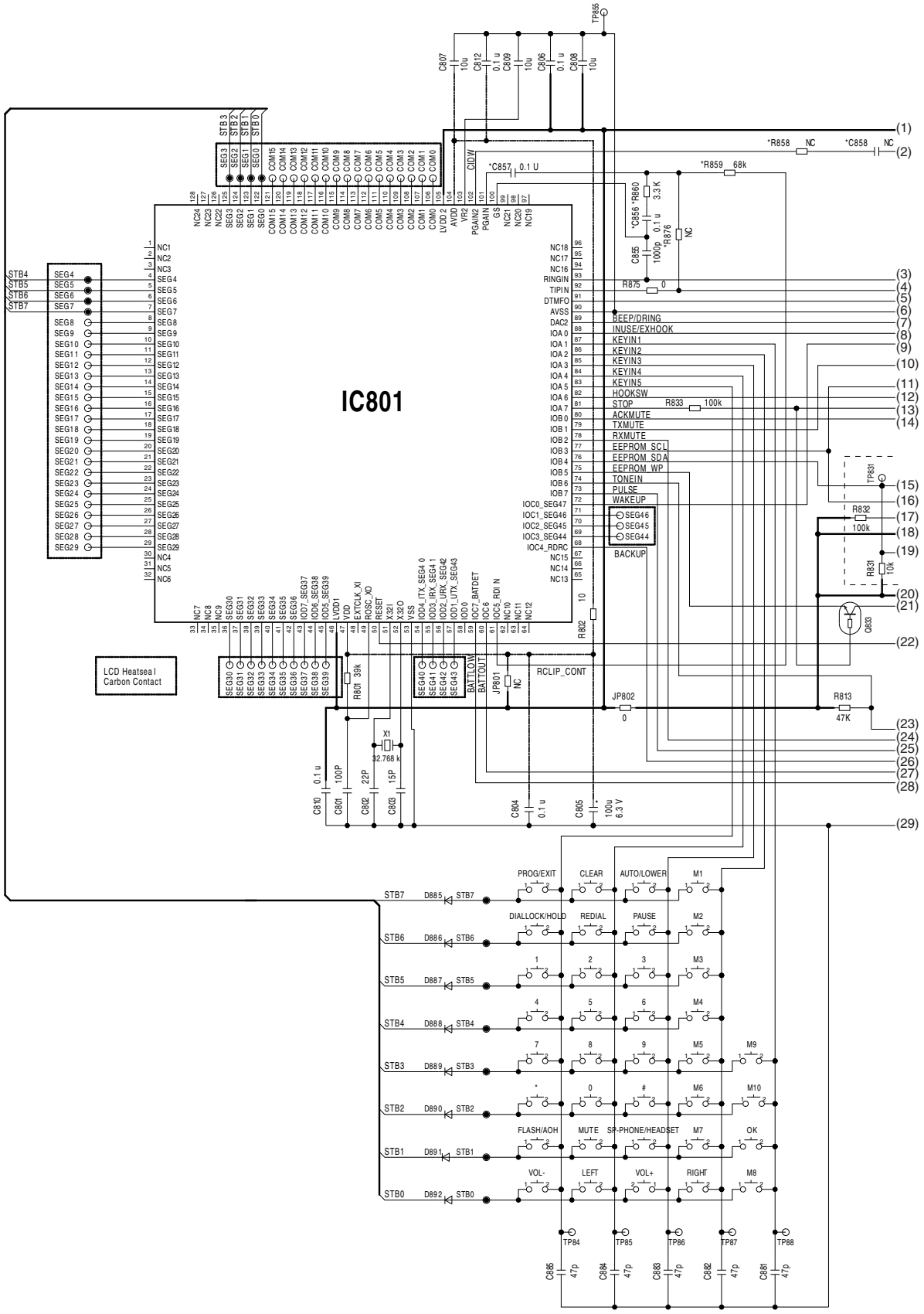
NC: No Components

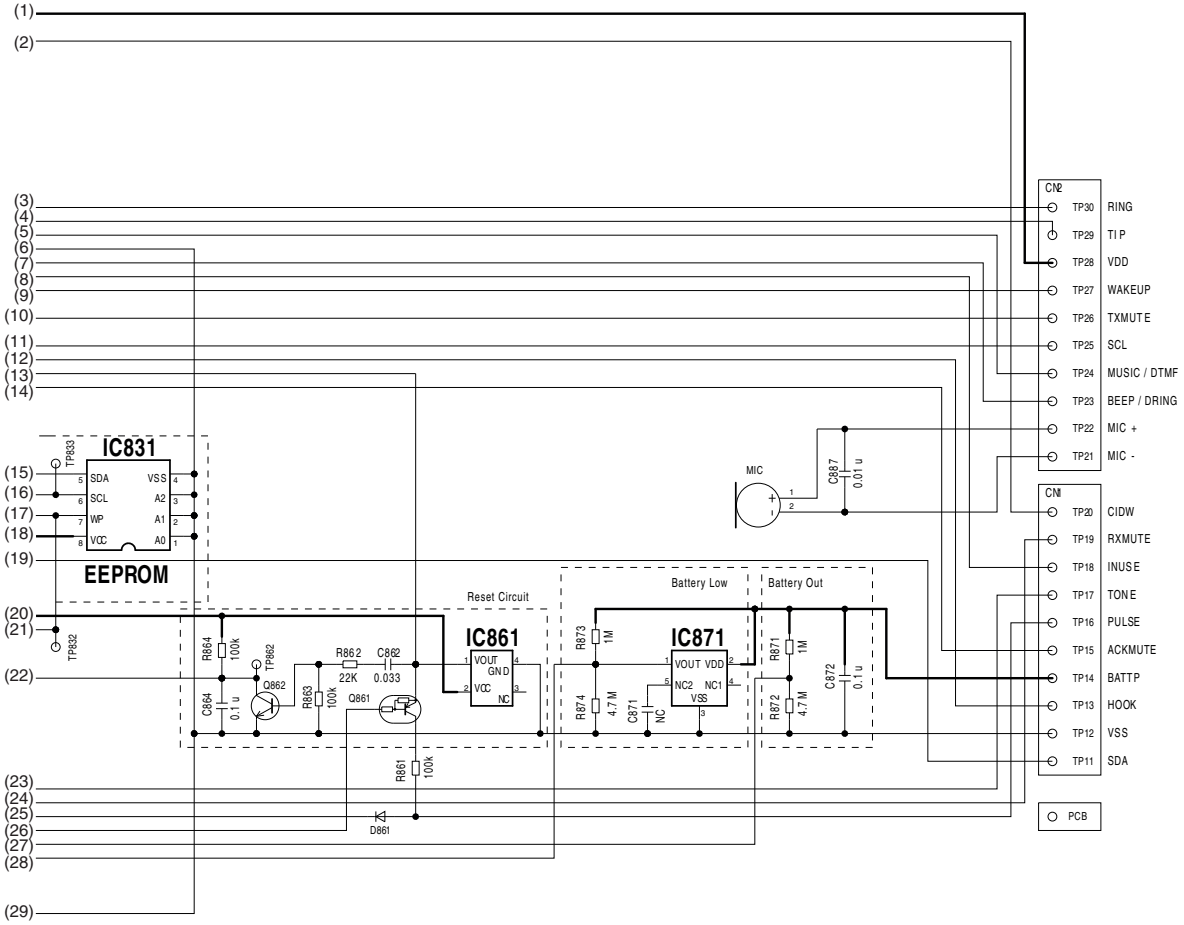


NC: No Components

KX-TS2388RU/UA/CA SCHEMATIC DIAGRAM (Main)

11.3. Schematic Diagram (Operation)





NC: No Components

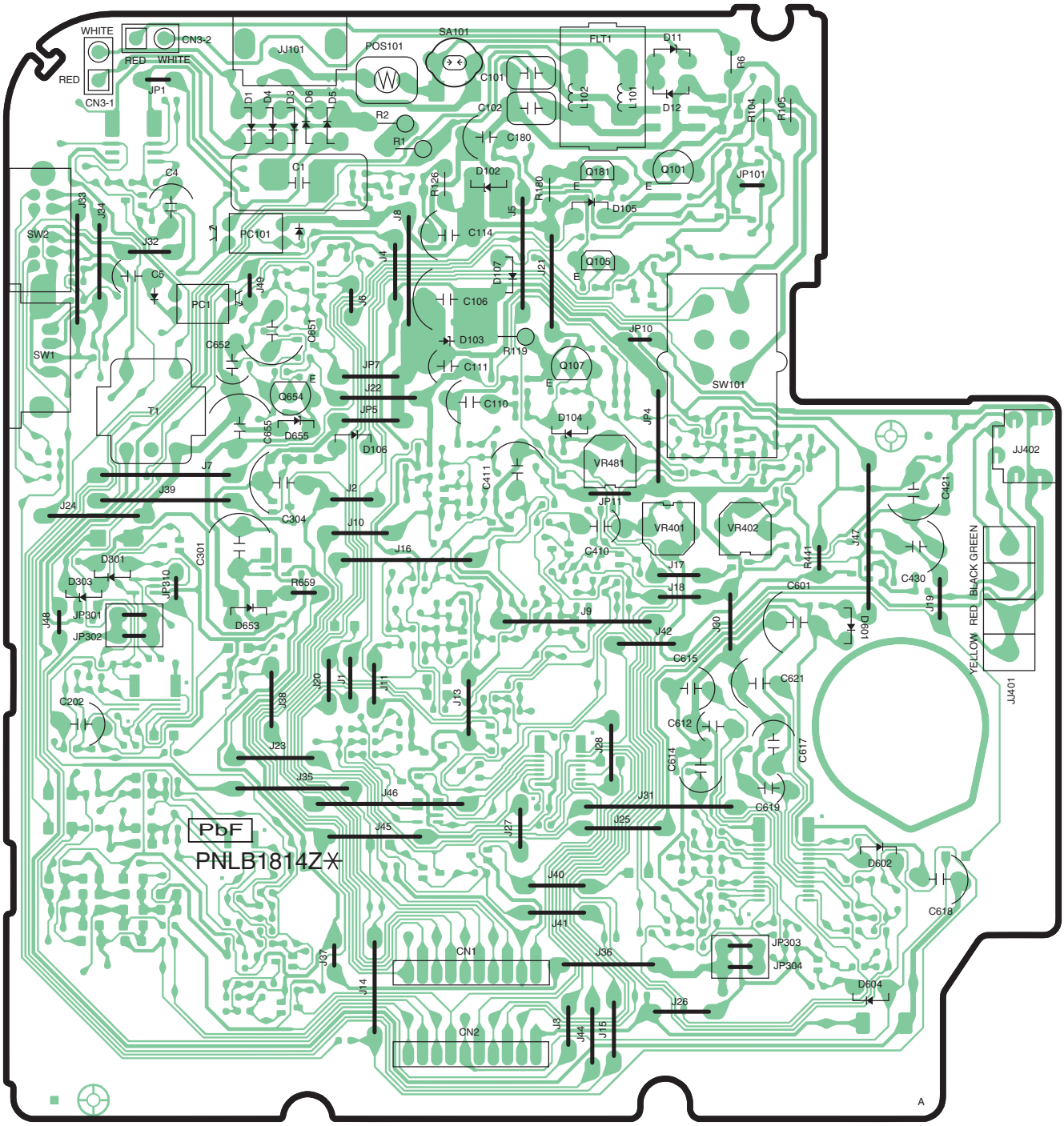
KX-TS2388RU/UA/CA SCHEMATIC DIAGRAM (Operation)

Memo

12 Printed Circuit Board

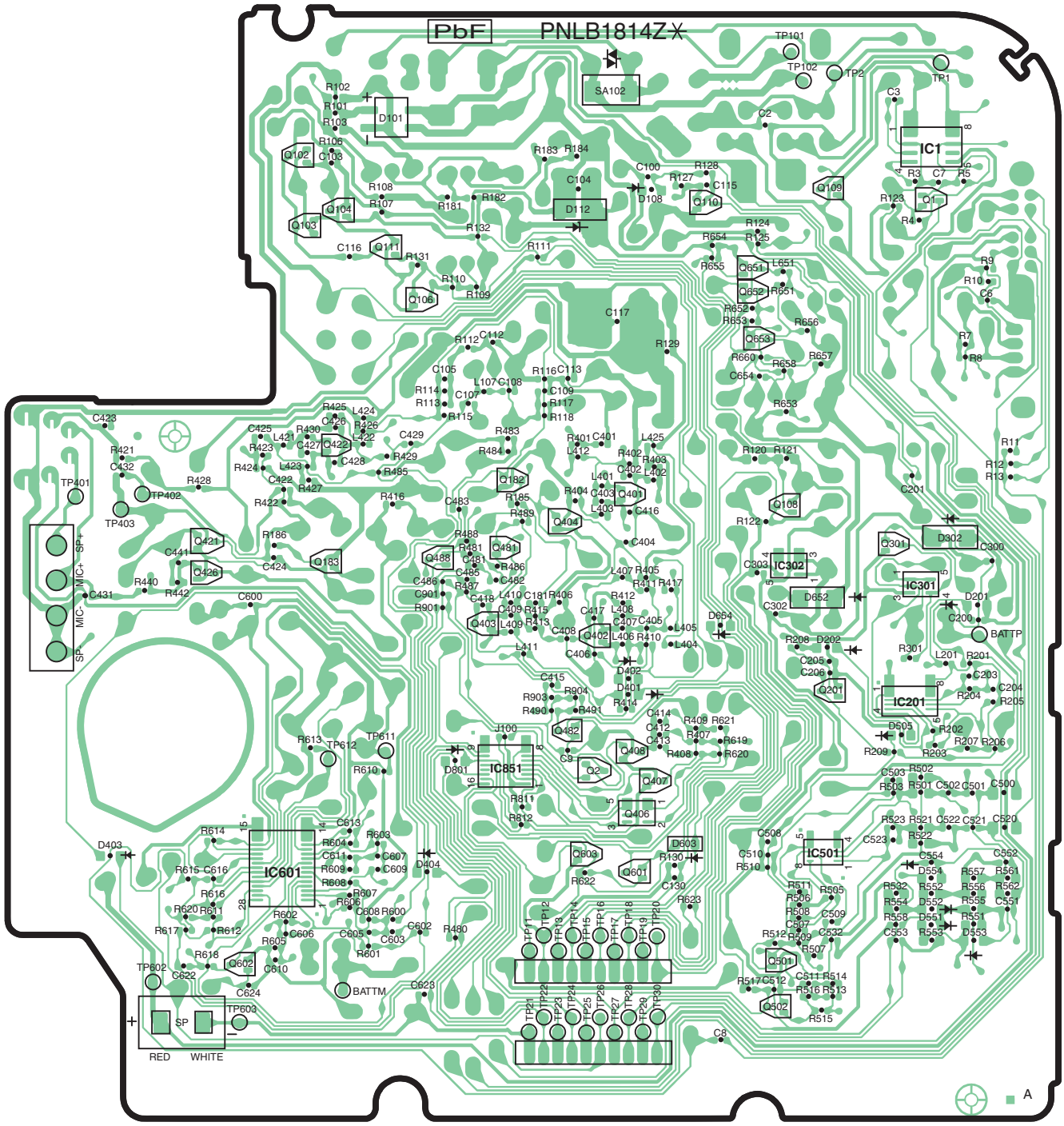
12.1. Circuit Board (Main)

12.1.1. Component View



KX-TS2388 CIRCUIT BOARD (Main (Component View))

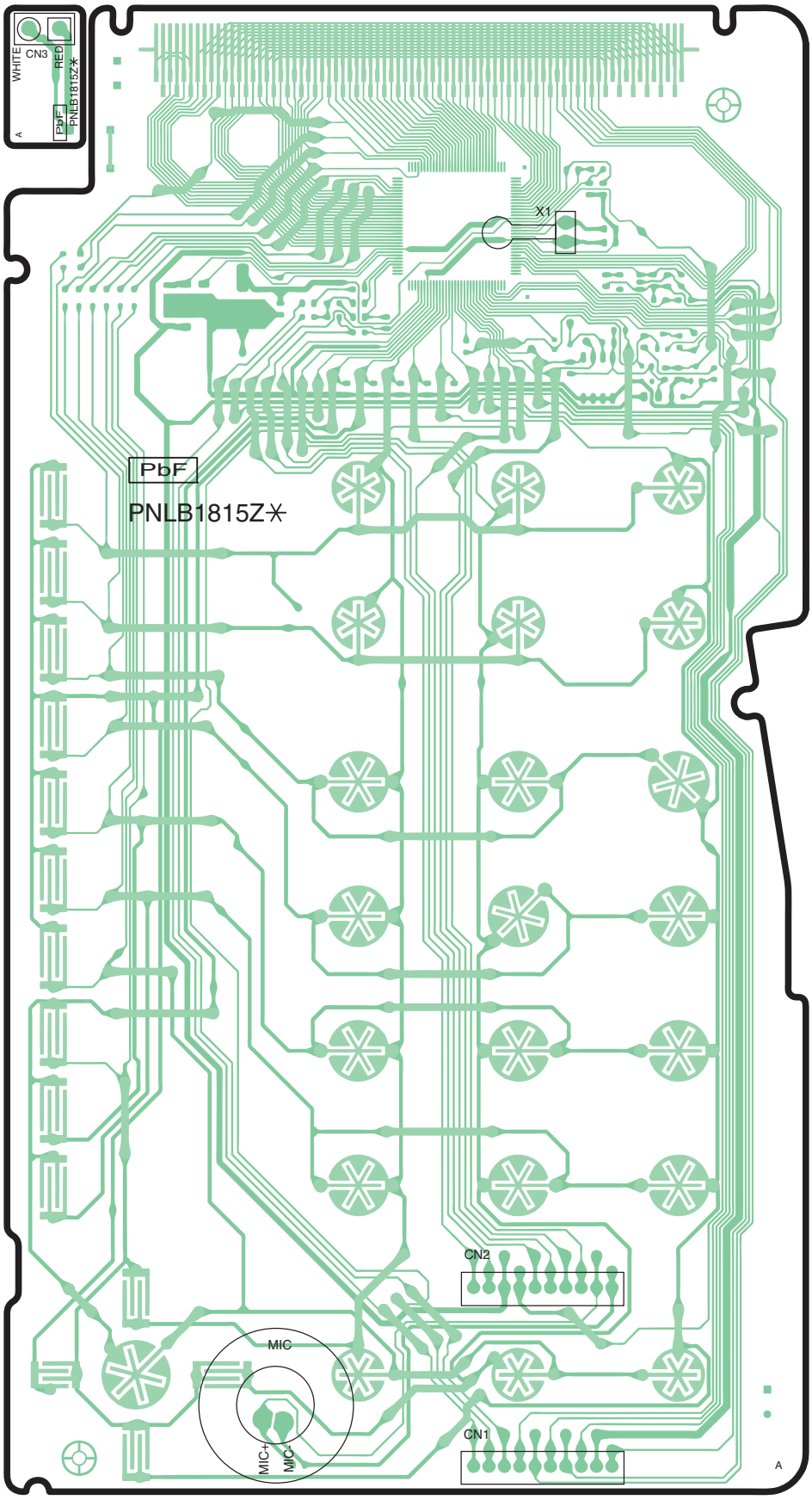
12.1.2. Bottom View



KX-TS2388 CIRCUIT BOARD (Main (Bottom View))

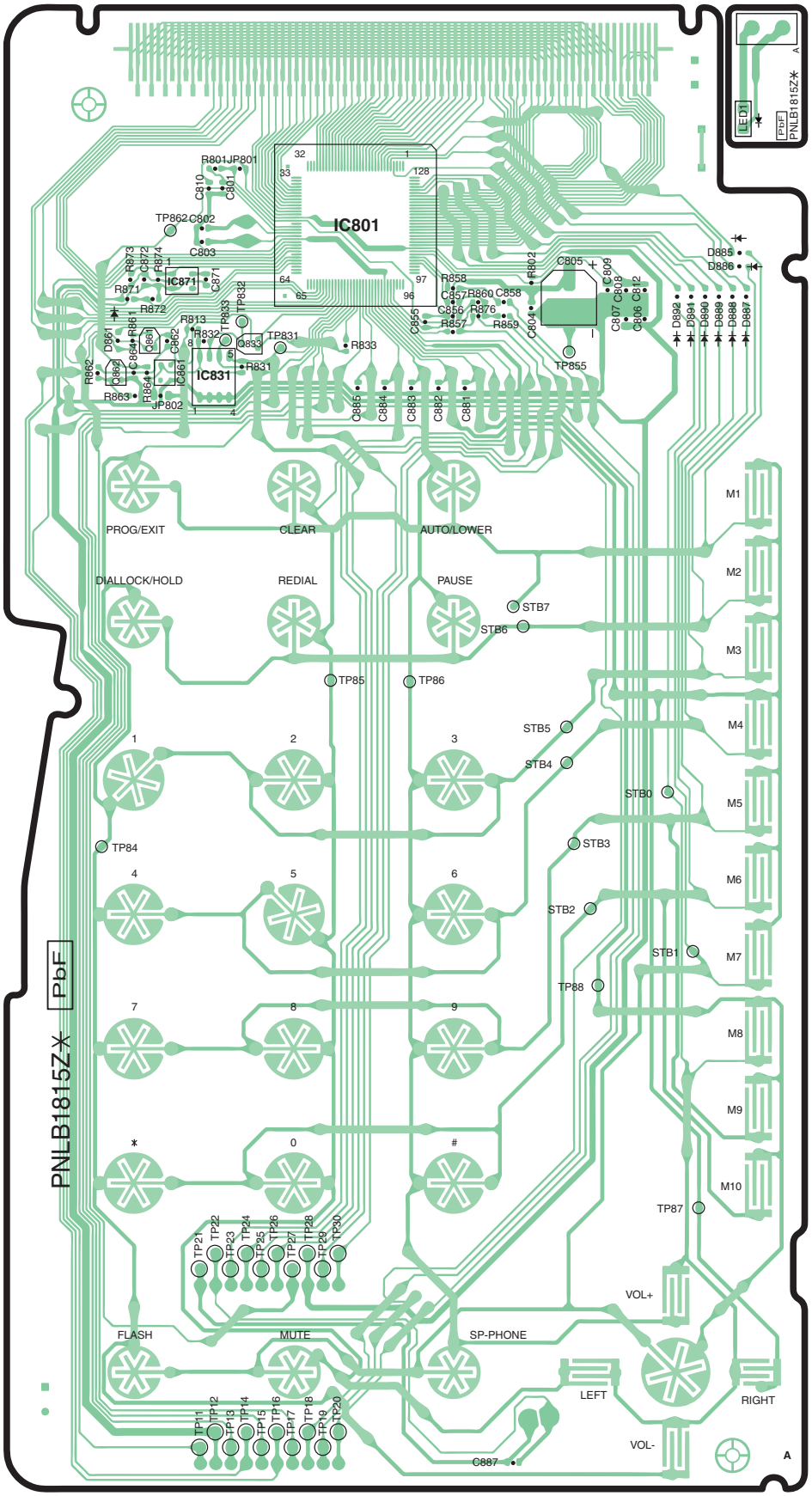
12.2. Circuit Board (Operation)

12.2.1. Component View



KX-TS2388 CIRCUIT BOARD (Base Unit_Operation (Component View))

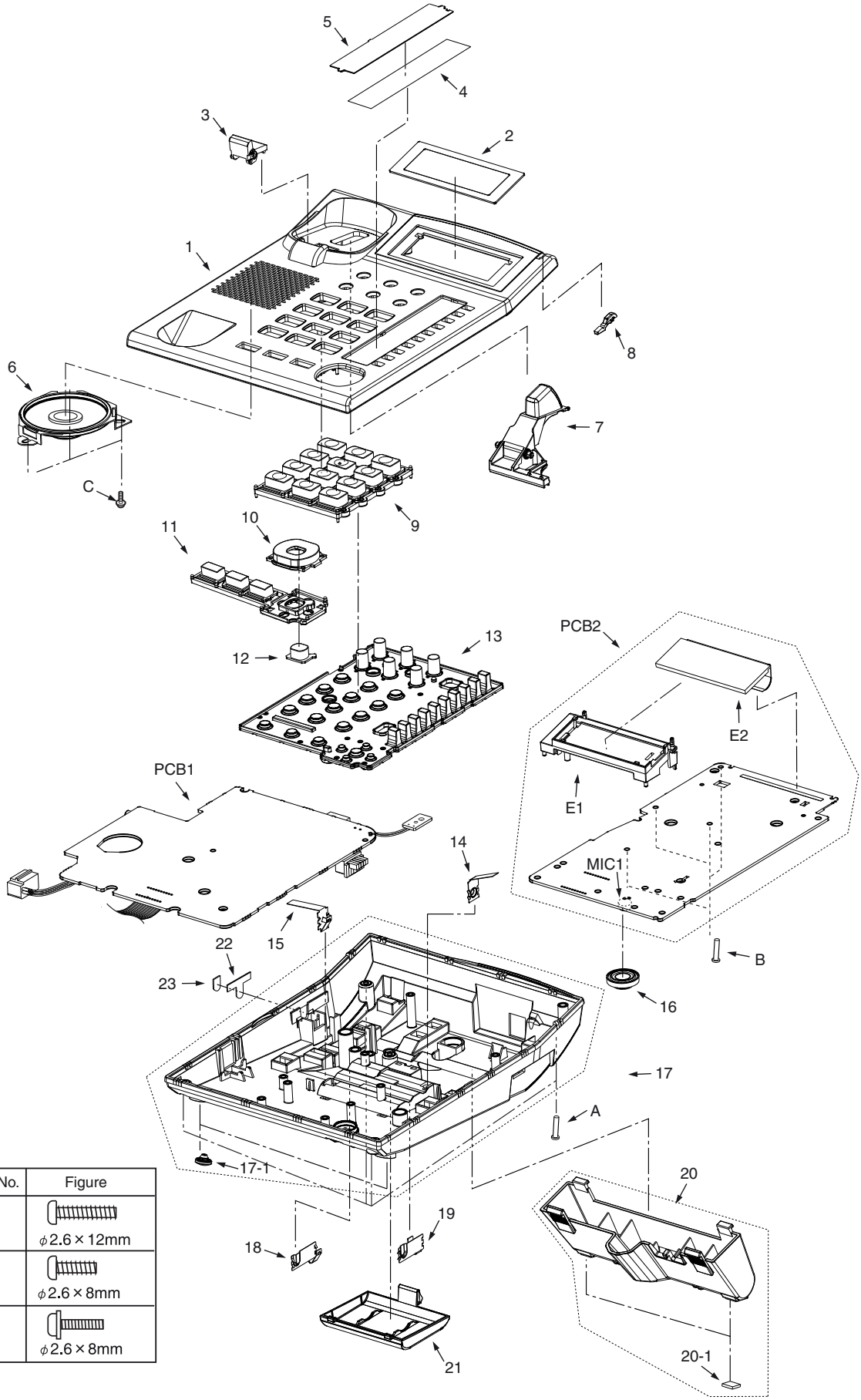
12.2.2. Bottom View



KX-TS2388 CIRCUIT BOARD (Base Unit_Operation (Bottom View))

13 Exploded View and Replacement Parts List

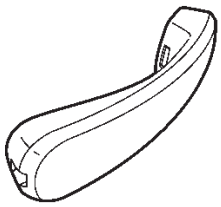
13.1. Cabinet and Electrical Parts



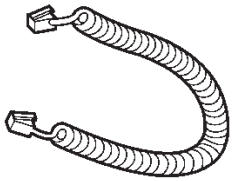
Ref.No.	Figure
A	ϕ2.6 × 12mm
B	ϕ2.6 × 8mm
C	ϕ2.6 × 8mm

13.2. Accessories

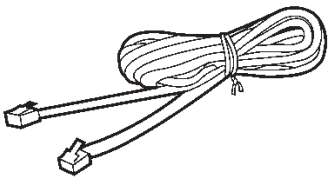
A1



A2



A3



13.3. Replacement Part List

1. RTL (Retention Time Limited)

   Note:

   The “RTL” marking indicates that its Retention Time is Limited. When production is discontinued, this item will continue to be available only for a specific period of time. This period of time depends on the type of item, and the local laws governing parts and product retention. At the end of this period, the item will no longer be available.

2. Important safety notice

   Components identified by the ⚠ mark indicates special characteristics important for safety. When replacing any of these components, only use specified manufacture's 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-94HB) 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=1000Ω, M=1000kΩ

   All capacitors are in MICRO FARADS (μF) p=μμF

   *Type & Wattage of Resistor

Type

ERC:Solid ERDS:Carbon ERJ:Chip	ERX:Metal Film ERG:Metal Oxide ER0:Metal Film	PQ4R:Chip ERS:Fusible Resistor ERF:Cement Resistor

Wattage

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

*Type & Voltage Of Capacitor

Type

ECFD:Semi-Conductor ECQS:Styrol ECUV,PQCUV,ECUE:Chip ECQMS:Mica	ECCD,ECKD,ECBT,F1K,ECUV:Ceramic ECQE,ECQV,ECQG:Polyester ECEA,ECST,EEE:Electlytic ECQP:Polypropylene

Voltage

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

13.3.1. Base Unit

13.3.1.1. Cabinet and Electrical Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	1	PNKM1157Z2	CABINET BODY (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	PS-HB
	1	PNKM1157Z1	CABINET BODY (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	PS-HB
	2	PNGP1171Z2	PANEL, LCD (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	PC CLEAR
	2	PNGP1171Z1	PANEL, LCD (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	PC CLEAR
	3	PQKE10070Z1	HANGER, HOOK (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	ABS-HB
	3	PQKE10070Z3	HANGER, HOOK (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	ABS-HB
	4	PNGD1018Z	CARD, TEL	
	5	PNGV1009Z	TEL CARD COVER	
	6	PQAS57P03Z	SPEAKER	
	7	PNBH1011Z2	PUSH BUTTON, HOOK (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	ABS-HB
	7	PNBH1011Z1	PUSH BUTTON, HOOK (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	ABS-HB
	8	PNHR1243Z	COVER, LED LENS	PS-HB
	9	PNBX1078Z2	PUSH BUTTON, 12 KEYS (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	ABS-HB
	9	PNBX1078Z1	PUSH BUTTON, 12 KEYS (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	ABS-HB
	10	PNBC1323Z2	PUSH BUTTON, NAVI KEY (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	PS-HB
	10	PNBC1323Z1	PUSH BUTTON, NAVI KEY (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	PS-HB
	11	PNBX1098Z2	PUSH BUTTON, LOWER KEY (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	ABS-HB
	11	PNBX1098Z1	PUSH BUTTON, LOWER KEY (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	ABS-HB
	12	PNBC1324Z2	PUSH BUTTON, ENTER KEY (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	PS-HB
	12	PNBC1324Z1	PUSH BUTTON, ENTER KEY (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	PS-HB
	13	PNJK1089Y	KEYBOARD SWITCH, RUBBER KEY (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	
	13	PNJK1089Z	KEYBOARD SWITCH, RUBBER KEY (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	
	14	PQJC10064Z	BATTERY TERMINAL, BATTERY CONTACT(+)	
	15	PQJC10045Z	BATTERY TERMINAL, BATTERY CONTACT(-)	
	16	PQMG10025W	RUBBER PARTS, MIC	
	17	PNYF1026X2	CABINET COVER (for KX-TS2388RUB) (for KX-TS2388CAB)	PS-HB
	17	PNYF1026X1	CABINET COVER (for KX-TS2388RUW) (for KX-TS2388CAW)	PS-HB
	17	PNYF1026V2	CABINET COVER (for KX-TS2388UAB)	PS-HB
	17	PNYF1026V1	CABINET COVER (for KX-TS2388UAW)	PS-HB
	17-1	PQHA10011Z	RUBBER PARTS, FOOT CUSHION	
	18	PQJC313Y	BATTERY TERMINAL, BATTERY CONTACT(+)(-)	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	19	PQJC314Y	BATTERY TERMINAL, BATTERY CONTACT(-)(+)	
	20	PNYL1005Z2	STAND, WALLMOUNT (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	PS-HB
	20	PNYL1005Z1	STAND, WALLMOUNT (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	PS-HB
	20-1	PNHA1002Y	RUBBER PARTS, FOOT CUSHION	
	21	PQKK10105Z2	DOOR-LID, BATTERY (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	ABS-HB
	21	PQKK10105Z1	DOOR-LID, BATTERY (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	ABS-HB
	22	PNHX1425Z	CASE/COVER, HEADSET COVER SHEET	
	23	PNHA1021Z	RUBBER PARTS, HEADSET COVER	

13.3.1.2. Main P.C. Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB1	PNWP1S2388RU	MAIN P.C. BOARD ASS'Y (RTL) (for KX-TS2388RU)	
	PCB1	PNWP1S2388CA	MAIN P.C. BOARD ASS'Y (RTL) (for KX-TS2388CA)	
	PCB1	PNWP1S2388UA	MAIN P.C. BOARD ASS'Y (RTL) (for KX-TS2388UA)	
			(IC)	
	IC1	C1CB00002903	IC	
	IC201	C0ABBA000025	IC	
	IC302	C0DBZGC00067	IC	
	IC501	PQVINJU7014R	IC	
	IC601	C1CB00001673	IC	
	IC851	C0ZBZ0001747	IC	
			(TRANSISTORS)	
	Q1	2SD1819KSL	TRANSISTOR(SI)	
	Q2	B1GBJCFJ0003	TRANSISTOR(SI)	
	Q101	2SA1776P	TRANSISTOR(SI)	S
	Q103	PQVTBF822T7	TRANSISTOR(SI)	
	Q104	2SD1819KSL	TRANSISTOR(SI)	
	Q107	B1AAKD000013	TRANSISTOR(SI)	
	Q108	2SD1819KSL	TRANSISTOR(SI)	
	Q109	2SD1819KSL	TRANSISTOR(SI)	
	Q110	2SD1819KSL	TRANSISTOR(SI)	
	Q201	UNR5213J0L	TRANSISTOR(SI)	
	Q401	B1ABDF000026	TRANSISTOR(SI)	S
	Q402	B1ABDF000026	TRANSISTOR(SI)	S
	Q403	B1ABDF000026	TRANSISTOR(SI)	S
	Q404	B1GBJCFJ0003	TRANSISTOR(SI)	
	Q406	PQVTFMG2T148	TRANSISTOR(SI)	S
	Q407	UNR5213J0L	TRANSISTOR(SI)	
	Q408	B1GBJCFJ0003	TRANSISTOR(SI)	
	Q421	B1GBJCJJ0003	TRANSISTOR(SI)	
	Q422	B1ABDF000026	TRANSISTOR(SI)	S
	Q426	B1ABDF000026	TRANSISTOR(SI)	S
	Q481	B1ABDF000026	TRANSISTOR(SI)	S
	Q482	UNR5213J0L	TRANSISTOR(SI)	
	Q501	2SB1218KSL	TRANSISTOR(SI)	
	Q502	2SD1819KSL	TRANSISTOR(SI)	
	Q601	2SB1218KSL	TRANSISTOR(SI)	
	Q602	UNR5213J0L	TRANSISTOR(SI)	
	Q603	UNR5213J0L	TRANSISTOR(SI)	
			(DIODES)	
	D1	1SS133	DIODE(SI)	S
	D3	1SS133	DIODE(SI)	S
	D4	1SS133	DIODE(SI)	S
	D5	1SS133	DIODE(SI)	S
	D6	1SS133	DIODE(SI)	S
	D101	B0EDER000009	DIODE(SI)	
	D102	MA4180	DIODE(SI)	S
	D103	MA4051	DIODE(SI)	S
	D105	1SS133	DIODE(SI)	S
	D106	MA4180	DIODE(SI)	S
	D108	MA111	DIODE(SI)	S
	D201	MA111	DIODE(SI)	S
	D202	MA111	DIODE(SI)	S
	D301	1SS133	DIODE(SI)	S
	D302	B0JCME000038	DIODE(SI)	
	D401	MA111	DIODE(SI)	S
	D402	MA111	DIODE(SI)	S
	D403	MA111	DIODE(SI)	S
	D404	MA111	DIODE(SI)	S
	D505	MA111	DIODE(SI)	S
	D551	MA111	DIODE(SI)	S
	D552	MA111	DIODE(SI)	S
	D553	MA111	DIODE(SI)	S
	D554	MA111	DIODE(SI)	S
	D601	1SS133	DIODE(SI)	S
	D602	1SS133	DIODE(SI)	S
	D603	MA728	DIODE(SI)	S
	D604	1SS133	DIODE(SI)	S
	D801	MA111	DIODE(SI)	S
			(JACKS)	
	JJ101	PFJJ1T01Z	JACK/SOCKET	S
	JJ401	PQJJ1T030P	JACK/SOCKET	
	JJ402	PQJJ1C001Z	JACK/SOCKET	
			(SWITCHES)	
	SW2	K0D124B00007	SLIDE SWITCH	
	SW101	PQSH2B105Z	PUSH SWITCH	S
			(VARISTOR)	
⚠	SA101	J0LF00000026	VARISTOR	
			(VARIABLE RESISTOR)	
	VR401	PQNVZ6TLTB13	VARIABLE RESISTOR	S
	VR402	EVNDXAA03B25	VARIABLE RESISTOR	
	VR481	EVNDXAA03B55	VARIABLE RESISTOR	
			(RESISTORS)	
	R1	ERDS1VJ182	1.8k	
	R3	ERJ3GEYJ273	27k	S
	R4	ERJ3GEYJ334	330k	S
	R5	ERJ3GEYJ473	47k	S
	R7	ERJ3GEY0R00	0	S
	R8	ERJ3GEYJ103	10k	S
	R9	ERJ3GEYJ393	39k	S
	R10	ERJ3GEYJ103	10k	S
	R11	ERJ3GEYJ564	560k	S
	R12	ERJ3GEYJ823	82k	S
	R13	ERJ3GEYJ183	18k	S
	R103	PQ4R10XJ104	100k	S
	R104	ERDS2TJ472	4.7k	
	R105	ERDS2TJ184	180k	
	R106	ERJ3GEYJ394	390k	S
	R107	ERJ3GEYJ684	680k	S
	R108	ERJ3GEYJ563	56k	S
	R112	ERJ3GEYJ221	220	S
	R113	ERJ3GEYJ222	2.2k	S
	R115	ERJ3GEYJ103	10k	S
	R116	ERJ3GEYJ271	270	S
	R117	ERJ3GEYJ103	10k	S
	R118	ERJ3GEYJ563	56k	S
	R119	ERDS1TJ150	15	S
	R120	PQ4R10XJ475	4.7M	S
	R121	PQ4R10XJ335	3.3M	S
	R122	ERJ3GEYJ105	1M	S
	R123	ERJ3GEYJ274	270k	S
	R124	ERJ3GEYJ222	2.2k	S
	R126	ERDS2TJ473	47k	
	R127	ERJ3GEYJ682	6.8k	S
	R128	ERJ3GEYJ103	10k	S
	R130	ERJ3GEYJ104	100k	S
	R132	ERJ3GEYJ474	470k	S
	R201	ERJ3GEYJ103	10k	S

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	R202	ERJ3GEYJ124	120k	S
	R203	ERJ3GEYJ103	10k	S
	R204	ERJ3GEYJ394	390k	S
	R205	ERJ3GEYJ562	5.6k	S
	R206	ERJ3GEYJ183	18k	S
	R207	ERJ3GEYJ103	10k	S
	R208	ERJ3GEYJ472	4.7k	S
	R401	ERJ3GEYJ102	1k	S
	R402	ERJ3GEYJ225	2.2M	S
	R403	ERJ3GEYJ272	2.7k	S
	R404	ERJ3GEYJ560	56	S
	R405	ERJ3GEYJ123	12k	S
	R406	ERJ3GEYJ334	330k	S
	R407	ERJ3GEYJ123	12k	S
	R408	ERJ3GEYJ562	5.6k	S
	R409	ERJ3GEYJ272	2.7k	S
	R410	ERJ3GEYJ185	1.8M	S
	R411	ERJ3GEYJ222	2.2k	S
	R412	ERJ3GEYJ181	180	S
	R413	ERJ3GEYJ223	22k	S
	R414	ERJ3GEYJ334	330k	S
	R415	ERJ3GEYJ681	680	S
	R417	ERJ3GEYJ273	27k	S
	R421	ERJ3GEYJ272	2.7k	S
	R423	ERJ3GEYJ682	6.8k	S
	R424	ERJ3GEYJ224	220k	S
	R425	ERJ3GEYJ185	1.8M	S
	R426	ERJ3GEYJ272	2.7k	S
	R427	ERJ3GEYJ820	82	S
	R428	ERJ3GEY0R00	0	S
	R429	ERJ3GEYJ103	10k	S
	R430	ERJ3GEY0R00	0	S
	R440	ERJ3GEYJ473	47k	S
	R441	ERDS2TJ104	100k	
	R442	ERJ3GEYJ104	100k	S
	R481	ERJ3GEYJ682	6.8k	S
	R485	ERJ3GEY0R00	0	S
	R486	ERJ3GEYJ682	6.8k	S
	R487	ERJ3GEYJ103	10k	S
	R488	ERJ3GEY0R00	0	S
	R489	ERJ3GEYJ103	10k	S
	R490	ERJ3GEYJ154	150k	S
	R491	ERJ3GEYJ124	120k	S
	R502	PQ4R10XJ184	180k	S
	R503	ERJ3GEYJ154	150k	S
	R505	ERJ3GEYJ334	330k	S
	R506	ERJ3GEYJ122	1.2k	S
	R507	ERJ3GEYJ334	330k	S
	R508	ERJ3GEYJ335	3.3M	S
	R509	ERJ3GEYJ273	27k	S
	R510	ERJ3GEYJ394	390k	S
	R511	ERJ3GEYJ105	1M	S
	R512	ERJ3GEYJ104	100k	S
	R513	ERJ3GEYJ105	1M	S
	R514	ERJ3GEYJ473	47k	S
	R515	ERJ3GEYJ103	10k	S
	R516	ERJ3GEYJ224	220k	S
	R517	ERJ3GEYJ105	1M	S
	R522	PQ4R10XJ184	180k	S
	R523	ERJ3GEYJ154	150k	S
	R551	PQ4R10XJ273	27k	S
	R552	PQ4R10XJ273	27k	S
	R553	PQ4R10XJ223	22k	S
	R554	PQ4R10XJ223	22k	S
	R555	PQ4R10XJ335	3.3M	S
	R557	PQ4R10XJ335	3.3M	S
	R558	ERJ3GEYJ100	10	S
	R600	ERJ3GEYJ332	3.3k	S
	R601	ERJ3GEYJ103	10k	S
	R602	ERJ3GEYJ272	2.7k	S
	R603	ERJ3GEYJ332	3.3k	S
	R604	ERJ3GEYJ472	4.7k	S
	R605	ERJ3GEYJ225	2.2M	S

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	R606	ERJ3GEYJ303	30k	S
	R607	ERJ3GEYJ683	68k	S
	R608	ERJ3GEYJ472	4.7k	S
	R609	ERJ3GEYJ275	2.7M	S
	R610	ERJ3GEYJ104	100k	S
	R611	ERJ3GEYJ183	18k	S
	R612	ERJ3GEYJ182	1.8k	S
	R613	ERJ3GEYJ104	100k	S
	R614	ERJ3GEYJ473	47k	S
	R615	ERJ3GEYJ103	10k	S
	R616	ERJ3GEYJ472	4.7k	S
	R617	ERJ3GEYJ222	2.2k	S
	R618	ERJ3GEYJ822	8.2k	S
	R619	ERJ3GEYJ183	18k	S
	R620	ERJ3GEYJ393	39k	S
	R621	ERJ3GEYJ823	82k	S
	R622	ERJ3GEYJ103	10k	S
	R623	ERJ3GEYJ105	1M	S
	R811	ERJ3GEYJ473	47k	S
	R812	ERJ3GEYJ154	150k	S
	R901	ERJ3GEYJ103	10k	S
	R903	ERJ3GEYJ275	2.7M	S
	R904	ERJ3GEYJ105	1M	S
	J100	ERJ3GEY0R00	0	S
	L411	ERJ3GEY0R00	0	S
	L423	ERJ3GEY0R00	0	S
	L425	ERJ3GEY0R00	0	S
			(CAPACITORS)	
	C1	F0C2E1050005	1	
	C3	ECUV1C683KBV	0.068	
	C4	ECEA1HKS4R7	4.7	
	C5	ECEA1HKA010	1	
	C6	ECUV1H103KBV	0.01	
	C7	ECUV1C104KBV	0.1	
	C8	ECUV1C104KBV	0.1	
	C101	F1B2H681A070	680p	
	C102	F1B2H681A070	680p	
	C103	ECUV1H103KBV	0.01	
	C104	ECUV1H103KBV	0.01	
	C105	ECUV1C563KBV	0.056	
	C106	ECEA0JK331	330	S
	C109	ECUV1H822KBV	0.0082	
	C111	ECEA1CKA100	10	
	C114	ECA1CM221	220p	
	C115	ECUV0J105KBV	1	
	C130	ECUV1C104KBV	0.1	
	C201	ECUV1C473KBV	0.047	
	C202	ECEA0JKS470	47	S
	C203	ECUV1H222KBV	0.0022	
	C204	ECUV1C473KBV	0.047	
	C205	ECUV1C104KBV	0.1	
	C301	ECA0JM102	0.001	S
	C302	ECUV1C104KBV	0.1	
	C303	ECUV1C104KBV	0.1	
	C304	ECA0JM102	0.001	S
	C401	ECUV1C104KBV	0.1	
	C403	ECUV1H103KBV	0.01	
	C404	ECUV1C104KBV	0.1	
	C405	ECUV1C104KBV	0.1	
	C406	ECUV1H331JCV	330p	
	C408	ECUV1H183KBV	0.018	
	C410	ECEA1CKA100	10	
	C412	ECUV1C104KBV	0.1	
	C413	ECUV1C104KBV	0.1	
	C414	ECUV1C104KBV	0.1	
	C415	ECUV1H103KBV	0.01	
	C422	ECUV1H682KBV	0.0068	
	C424	ECUV1H182KBV	0.0018	
	C425	ECUV1C104KBV	0.1	
	C426	ECUV1H101JCV	100p	
	C427	ECUV1H102KBV	0.001	
	C429	ECUV1C104KBV	0.1	
	C431	ECUV1H153KBV	0.015	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C432	ECUV1H153KBV	0.015	
	C481	ECUV1H102KBV	0.001	
	C482	ECUV1H102KBV	0.001	
	C483	ECUV1H152KBV	0.0015	
	C485	ECUV1H103KBV	0.01	
	C486	ECUV1H222KBV	0.0022	
	C500	F1K2H103A008	0.01	
	C501	ECUV1H152KBV	0.0015	
	C503	ECUV1H821JCV	820p	
	C507	ECUV1H680JCV	68p	
	C508	ECUV1C104KBV	0.1	
	C509	ECUV1H222KBV	0.0022	
	C510	ECUV1C104KBV	0.1	
	C511	ECUV1C104KBV	0.1	
	C512	ECUV1H103KBV	0.01	
	C520	F1K2H103A008	0.01	
	C521	ECUV1H152KBV	0.0015	
	C523	ECUV1H821JCV	820p	
	C551	ECUV1H103KBV	0.01	
	C552	ECUV1H103KBV	0.01	
	C553	ECUV1H331JCV	330p	
	C554	ECUV1H102KBV	0.001	
	C601	ECA0JM102	0.001	S
	C602	ECUV1C473KBV	0.047	
	C603	ECUV1H223KBV	0.022	
	C605	ECUV1H153KBV	0.015	
	C606	ECUV1C683KBV	0.068	
	C607	ECUV1C273KBV	0.027	
	C608	ECUV1E223KBV	0.022	
	C609	ECUV1C104KBV	0.1	
	C610	ECUV0J105KBV	1	
	C611	ECUV0J105KBV	1	
	C612	ECEA1CKS4R7	4.7	S
	C613	ECUV1C683KBV	0.068	
	C614	ECEA0JKS470	47	S
	C615	ECEA1CKS220	22	S
	C616	ECUV1C104KBV	0.1	
	C617	ECEA0JKS470	47	S
	C618	ECEA1AKS330	33	S
	C619	ECEA1CKS4R7	4.7	S
	C620	ECUV1C333KBV	0.033	
	C621	ECEA0JKS101	100	S
	C622	ECUV1C104KBV	0.1	
	C623	ECUV1H103KBV	0.01	
	C901	ECUV1H472KBV	0.0047	
			(OTHER)	
	CN1	PNWHK10DS60Y	LEAD WIRE	
	CN2	PNWHK10DS60Y	LEAD WIRE	
	L101	PQLQXF330K	COIL	S
	L102	PQLQXF330K	COIL	S
	PC1	B3PAA0000330	PHOTO ELECTRIC TRANS-DUCER	
	PC101	B3PAA0000352	PHOTO ELECTRIC TRANS-DUCER	
	T1	G4AYA0000027	TRANSFORMER	

13.3.1.3. Operational P.C. Board Parts

Note:

(*1) When replacing the Base Unit LCD, See **How to Replace the Base Unit LCD** (P.17).

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB2	PNWP2S2388RU	OPERATION P.C. BOARD ASS'Y (RTL) (for KX-TS2388RU)	
	PCB2	PNWP2S2388CA	OPERATION P.C. BOARD ASS'Y (RTL) (for KX-TS2388CA)	
	PCB2	PNWP2S2388UA	OPERATION P.C. BOARD ASS'Y (RTL) (for KX-TS2388UA)	
			(IC)	
	IC801	C2CBYY000895	IC	
	IC831	PNWITS2388RU	IC (EEPROM) (for KX-TS2388RU)	
	IC831	PNWITS2388CA	IC (EEPROM) (for KX-TS2388CA)	
	IC831	PNWITS2388UA	IC (EEPROM) (for KX-TS2388UA)	
	IC861	PQVIPS3327UT	IC	
	IC871	PQVIPS3238NT	IC	S
			(TRANSISTORS)	
	Q833	PQVTDTC144TU	TRANSISTOR(SI)	S
	Q861	UNR5113J0L	TRANSISTOR(SI)	
	Q862	2SD1819KSL	TRANSISTOR(SI)	
			(DIODES)	
	D861	MA111	DIODE(SI)	S
	D885	MA111	DIODE(SI)	S
	D886	MA111	DIODE(SI)	S
	D887	MA111	DIODE(SI)	S
	D888	MA111	DIODE(SI)	S
	D889	MA111	DIODE(SI)	S
	D890	MA111	DIODE(SI)	S
	D891	MA111	DIODE(SI)	S
	D892	MA111	DIODE(SI)	S
	LED1	PSVD1SRCT	DIODE(SI)	S
			(RESISTORS)	
	R801	ERJ3GEYJ393	39k	S
	R802	ERJ3GEYJ100	10	S
	R813	ERJ3GEYJ473	47k	S
	R831	ERJ3GEYJ103	10k	S
	R832	ERJ3GEYJ104	100k	S
	R833	ERJ3GEYJ104	100k	S
	R859	ERJ3GEYJ683	68k	S
	R860	ERJ3GEYJ332	3.3k	S
	R861	ERJ3GEYJ104	100k	S
	R862	ERJ3GEYJ223	22k	S
	R863	ERJ3GEYJ104	100k	S
	R864	ERJ3GEYJ104	100k	S
	R871	ERJ3GEYJ105	1M	S
	R872	ERJ3GEYJ475	4.7M	S
	R873	ERJ3GEYJ105	1M	S
	R874	ERJ3GEYJ475	4.7M	S
	R875	ERJ3GEY0R00	0	S
	JP802	ERJ6GEY0R00	0	S
			(CAPACITORS)	
	C801	ECUV1H101JCV	100p	
	C802	ECUV1H220JCV	22p	
	C803	ECUV1H150JCV	15p	
	C804	ECUV1C104KBV	0.1	
	C805	F2G0J1010014	100	
	C806	ECUV1C104KBV	0.1	
	C807	PQCUV0J106KB	10	
	C808	PQCUV0J106KB	10	
	C809	PQCUV0J106KB	10	
	C810	ECUV1C104KBV	0.1	
	C812	ECUV1C104KBV	0.1	
	C855	ECUV1H102KBV	0.001	
	C856	ECUV1C104KBV	0.1	
	C857	ECUV1C104KBV	0.1	
	C862	ECUV1C333KBV	0.033	
	C864	ECUV1C104KBV	0.1	
	C872	ECUV1C104KBV	0.1	
	C881	ECUV1H470JCV	47p	
	C882	ECUV1H470JCV	47p	
	C883	ECUV1H470JCV	47p	
	C884	ECUV1H470JCV	47p	
	C885	ECUV1H470JCV	47p	
	C887	ECUV1H103KBV	0.01	
			(CRYSTAL OSCILLATOR)	
	X1	H0A327200147	CRYSTAL OSCILLATOR	
			(OTHER)	
	MIC1	L0CBAY000016	MICROPHONE	
	E1	PNHR1312Z	GUIDE, LCD	PS-HB
	E2	L5AYAYY00083	LIQUID CRYSTAL DISPLAY (*1)	

13.3.2. Accessories

Note:

You can download and refer to the Operating Instructions (Instruction Book) on TSN Server.

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	A1	PQJXF0201Z	HANDLE/HANDSET (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	
	A1	PQJXF0202Z	HANDLE/HANDSET (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	
	A2	PQJA10152W	CORD, HANDSET (for KX-TS2388RUB) (for KX-TS2388CAB) (for KX-TS2388UAB)	
	A2	PQJA10152Z	CORD, HANDSET (for KX-TS2388RUW) (for KX-TS2388CAW) (for KX-TS2388UAW)	
	A3	PQJA10075Z	CORD, TELEPHONE	

13.3.3. Screws

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	A	XTB26+12GFJ	TAPPING SCREW	
	B	XTB26+8GFJ	TAPPING SCREW	
	C	XTW26+8PFJ7	TAPPING SCREW	

13.3.4. Fixtures and Tools

Note:

(*1) When replacing the Base Unit LCD, See **How to Replace the Base Unit LCD** (P.17)**.**

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
		PQZZ430PIR	TIP OF SOLDERING IRON (*1)	
		PQZZ430PRB	RUBBER OF SOLDERING IRON (*1)	

MIN/N
KXTS2388RUB
KXTS2388RUW
KXTS2388CAB
KXTS2388CAW
KXTS2388UAB
KXTS2388UAW