

# Service Manual

Telephone Equipment

Caller ID Compatible

**KX-TS620BX1**

Telephone Answering System

1: White Version  
(for UAE and Saudi Arabia)



**Panasonic**<sup>®</sup>

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of law.

**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.

# TABLE OF CONTENTS

|                                                                 | PAGE      |
|-----------------------------------------------------------------|-----------|
| <b>1 Safety Precaution</b> .....                                | <b>4</b>  |
| 1.1. For Service Technicians .....                              | 4         |
| <b>2 Warning</b> .....                                          | <b>4</b>  |
| 2.1. Battery Caution .....                                      | 4         |
| 2.2. About Lead Free Solder (Pbf: Pb free) .....                | 4         |
| 2.3. Discarding of P. C. Board .....                            | 5         |
| <b>3 Specifications</b> .....                                   | <b>6</b>  |
| <b>4 Technical Descriptions</b> .....                           | <b>7</b>  |
| 4.1. Block Diagram (Base Unit) .....                            | 7         |
| 4.2. Circuit Operation (Base Unit) .....                        | 8         |
| 4.3. Ringer IC .....                                            | 10        |
| 4.4. Module Block Diagram .....                                 | 11        |
| 4.5. Signal Route .....                                         | 12        |
| <b>5 Location of Controls and Components</b> .....              | <b>13</b> |
| <b>6 Installation Instructions</b> .....                        | <b>13</b> |
| <b>7 Operating Instructions</b> .....                           | <b>13</b> |
| 7.1. For Service Hint .....                                     | 13        |
| <b>8 Troubleshooting Guide</b> .....                            | <b>14</b> |
| 8.1. Troubleshooting Guide .....                                | 14        |
| <b>9 Disassembly and Assembly Instructions</b> .....            | <b>21</b> |
| 9.1. Disassembly Instructions .....                             | 21        |
| <b>10 Miscellaneous</b> .....                                   | <b>22</b> |
| 10.1. How to Replace the Flat Package IC .....                  | 22        |
| 10.2. How to Remove the IC .....                                | 22        |
| 10.3. How to Install the IC .....                               | 23        |
| 10.4. How to Remove a Solder Bridge .....                       | 23        |
| 10.5. Terminal Guide of the Ics, Transistor and<br>Diodes ..... | 24        |
| <b>11 Schematic Diagram</b> .....                               | <b>25</b> |
| 11.1. For Schematic Diagram .....                               | 25        |
| 11.2. Schematic Diagram (Main) .....                            | 26        |
| 11.3. Schematic Diagram (Operation) .....                       | 28        |
| <b>12 Printed Circuit Board</b> .....                           | <b>29</b> |
| 12.1. Circuit Board (Main) .....                                | 29        |
| 12.2. Circuit Board (Operation) .....                           | 31        |
| <b>13 Exploded View and Replacement Parts List</b> .....        | <b>33</b> |
| 13.1. Cabinet and Electric Parts .....                          | 33        |
| 13.2. Accessories and Packing Materials .....                   | 34        |
| 13.3. Replacement Part List .....                               | 35        |

# 1 Safety Precaution

## 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 parts boxes with aluminum foil.
2. Ground the soldering irons.
3. Use a conductive mat on the worktable.
4. Do not touch IC or LSI pins with bare fingers.

# 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 manufacture's Instructions.

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

### Note:

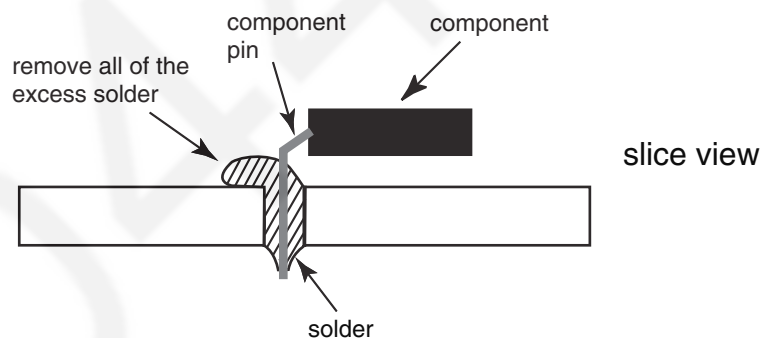
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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.

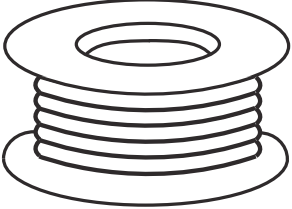
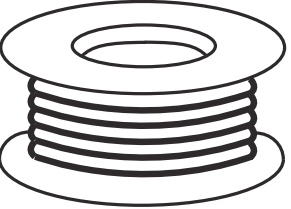
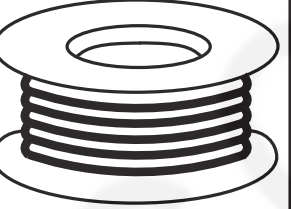
### Caution

- 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 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: 0.3 mm, 0.6 mm and 1.0 mm.

| 0.3 mm X 100 g                                                                    | 0.6 mm X 100 g                                                                    | 1.0 mm X 100 g                                                                      |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |

### 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

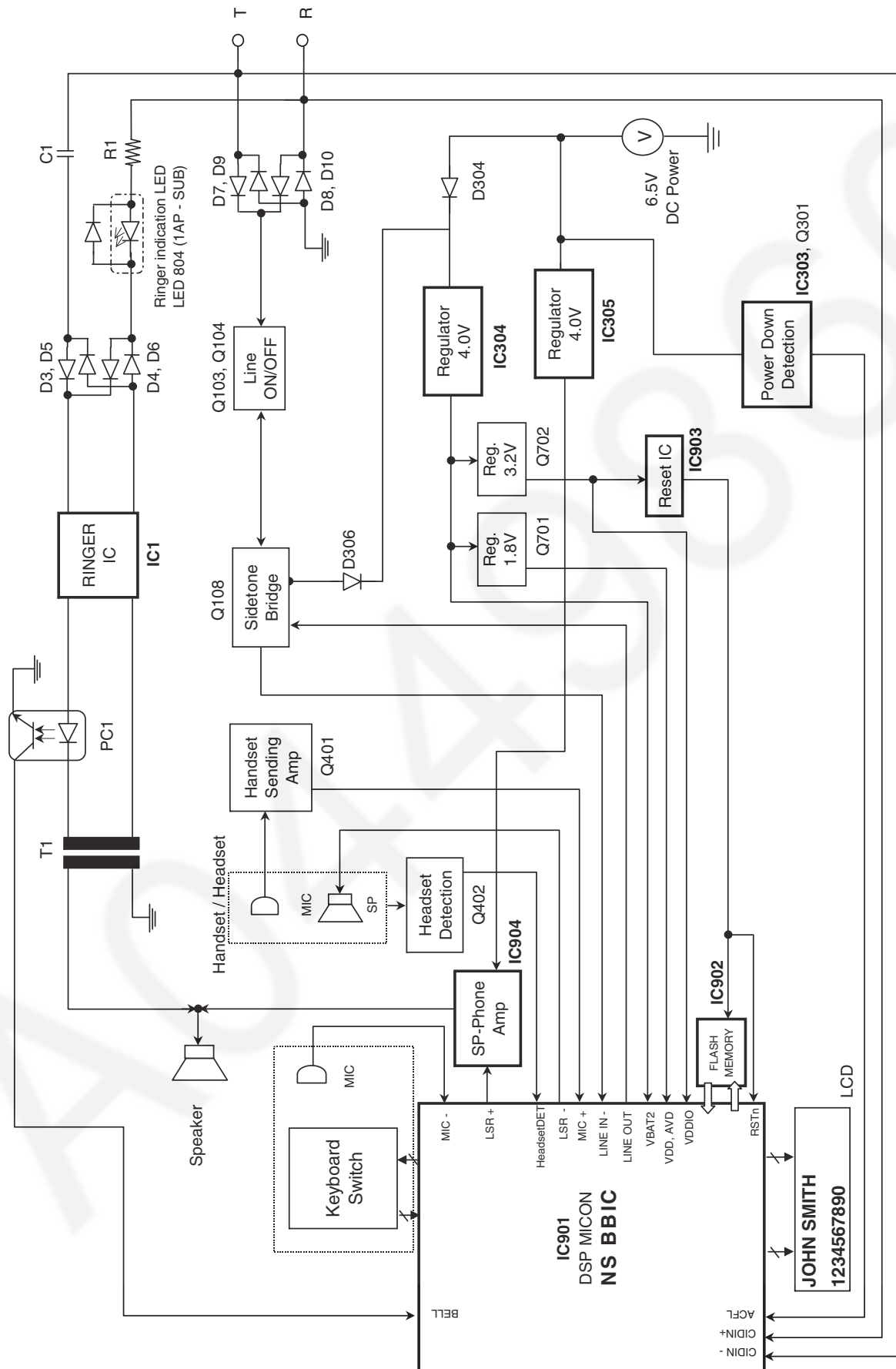
|                                      |                                                      |
|--------------------------------------|------------------------------------------------------|
| <b>Power Supply:</b>                 | AC adaptor (AC 220 V — 240 V, 50/60 Hz)<br>PQLV219EW |
| <b>Power Consumption:</b>            | Standby: Approx. 2.4 W<br>Maximum: Approx. 3.0 W     |
| <b>Dimensions (H x W x D):</b>       | Approx. 91 mm x 165 mm x 220 mm                      |
| <b>Mass (Weight):</b>                | Approx. 670 g                                        |
| <b>Dialing Mode:</b>                 | Tone (DTMF)/Pulse                                    |
| <b>Operating Environment:</b>        | 5°C – 40°C                                           |
| <b>Ringer Equivalence No. (REN):</b> | 1.0 B                                                |

**Note:**

- Design and specifications are subject to change without notice.

## 4 Technical Descriptions

### 4.1. Block Diagram (Base Unit)



KX-TS620 BLOCK DIAGRAM

## 4.2. Circuit Operation (Base Unit)

### 4.2.1. Outline

The unit consists of the following ICs as shown in the **Block Diagram (Base Unit)** (P.7).

• **BBIC (Base Band IC): IC901**

- Handling all the audio, signal and data processing needed
- ADPCM codec filter for speech encoding and speech decoding (DSP section)
- Echo-cancellation and Echo-suppression (DSP section)
- Any tones (tone, sidetone, ringing tone, etc.) generation (DSP section)
- DTMF receiver (DSP section)
- ADC, DAC, timer and power control circuitry
- All interfaces (eg: LCD, LED, Analog Front End, etc.)

• **FLASH MEMORY: IC902**

- Voice Prompt (TAM) Download Area
- Program D/L Area

• **RINGER IC: IC1**

- Bell signal generator (for bell detection purpose)
- Refer to **Ringer IC** (P.10)

• **SP AMP: IC904**

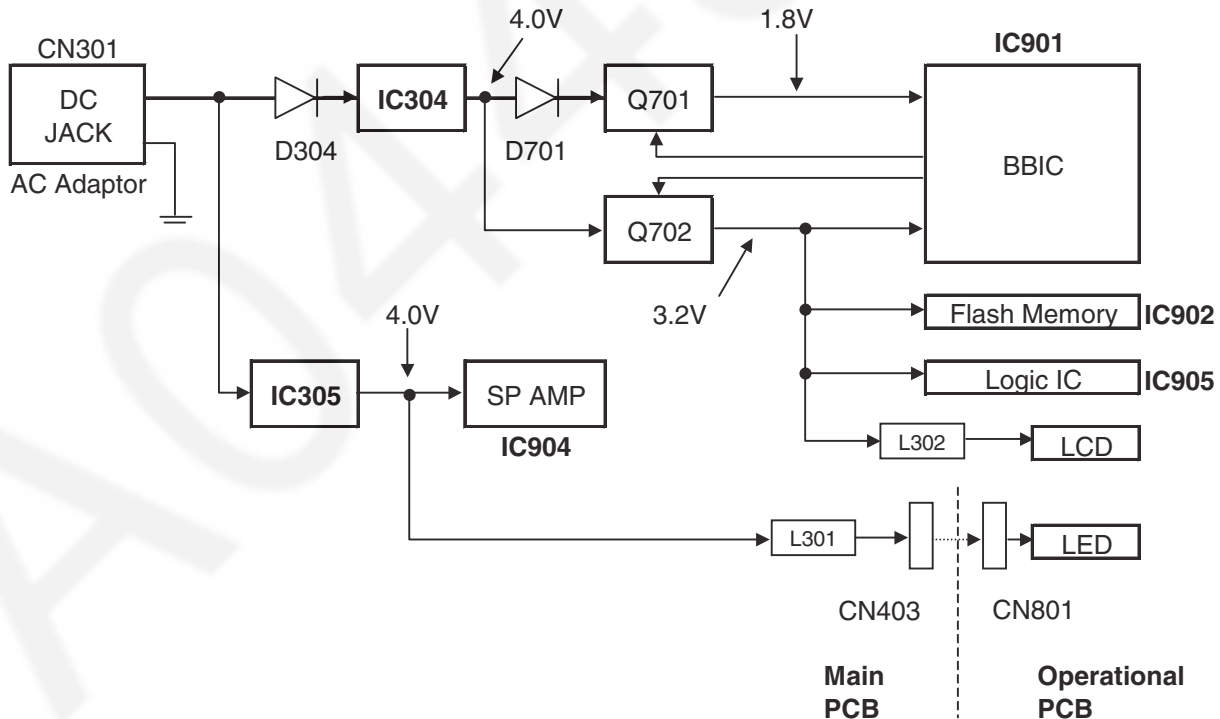
- Low voltage audio power amplifier

• **Additionally,**

- Power Supply Circuit (+4.0V, +4.0V, +3.2V, +1.8V output)
- Telephone Line Interface Circuit
- Bell Detection Circuit
- SP-Phone Circuit
- Handset Circuit
- TAM Circuit

### 4.2.2. Power Supply Circuit

The power is supplied to the BBIC, Flash ROM, SP AMP, Logic IC, LCD, LED from AC adaptor (6.5V) as below:



- BBIC (IC901): CN301 -> D304 -> IC304 -> Q702 -> IC901
- Flash Memory (IC902): CN301 -> D304 -> IC304 -> Q702 -> IC902
- Logic IC (IC905): CN301 -> D304 -> IC304 -> Q702 -> IC905
- SP AMP (IC904): CN301 -> IC305 -> IC904
- LCD (LCD): CN301 -> D304 -> IC304 -> Q702 -> L302 -> LCD
- LED (LED801, LED802): CN301 -> IC305 -> L301 -> CN403 -> CN801 -> LED

### 4.2.3. Telephone Line Interface

#### Function:

- Bell Signal Detection
- Caller ID Detection
- ON/OFF hook Circuit
- Audio Circuit

#### 4.2.3.1. Bell Detection Circuit

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

T -> D3 -> IC1(1) -> IC1(8) -> C4 -> R6 -> PC1(1) -> PC1(4) -> IC901(63)

R -> R1 -> LED804 -> D4 -> IC1(1) -> IC1(8) -> C4 -> R6 -> PC1(1) -> PC1(4) -> IC901(63)

After bell signal detected at IC901(63), the bell ringing signal is output at the speaker via the following path:

IC901(110) -> C930 -> R925 -> IC904(4)  $\begin{cases} \rightarrow \text{IC904(8)} \rightarrow \text{C925} \rightarrow \text{SP(+)} \\ \rightarrow \text{IC904(5)} \rightarrow \text{SP(-)} \end{cases}$

#### 4.2.3.2. Caller ID Detection Circuit

Normally, FSK caller ID data is followed after the 1st bell signal.

When the bell signal is detected by BBIC, Caller ID signal is sent through the circuit via following path:

T -> C501 -> R503 -> R905 -> IC901(107)

R -> C502 -> R504 -> R908 -> IC901(112)

#### 4.2.3.3. On/Off Hook Circuit

In standby mode, SW101 is open and Q104 is OFF. Consequently Q103 is open and cut the DC loop current and voice signal. This is an **on-hook condition**.

When handset is picked up or SP-Phone key is pressed, Q104 turns on and then Q103 turns on, thus providing an **off-hook condition**. A DC loop is made and current flows through the circuit via following path:

T -> D7 -> Q103 -> Q108 -> R124 -> D106 -> D10 -> R

Pulse signal is generated by repeated switches between high (3.2V) and low (0V) logic output from IC901(79), switching the line loop on and off.

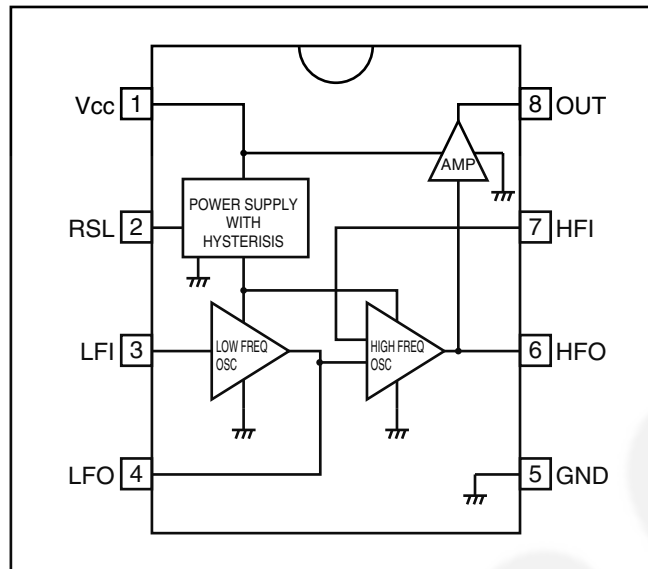
#### 4.2.3.4. Handset Circuit

\* Refer to **Signal Route** (P.12).

#### 4.2.3.5. Speakerphone Circuit

\* Refer to **Signal Route** (P.12).

### 4.3. Ringer IC

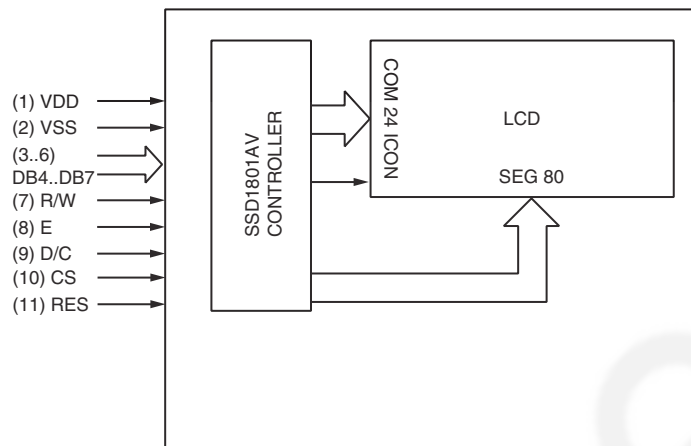


Pin descriptions

| 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 ( $\oplus$ ) 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 ( $\ominus$ ) 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.                          |

## 4.4. Module Block Diagram

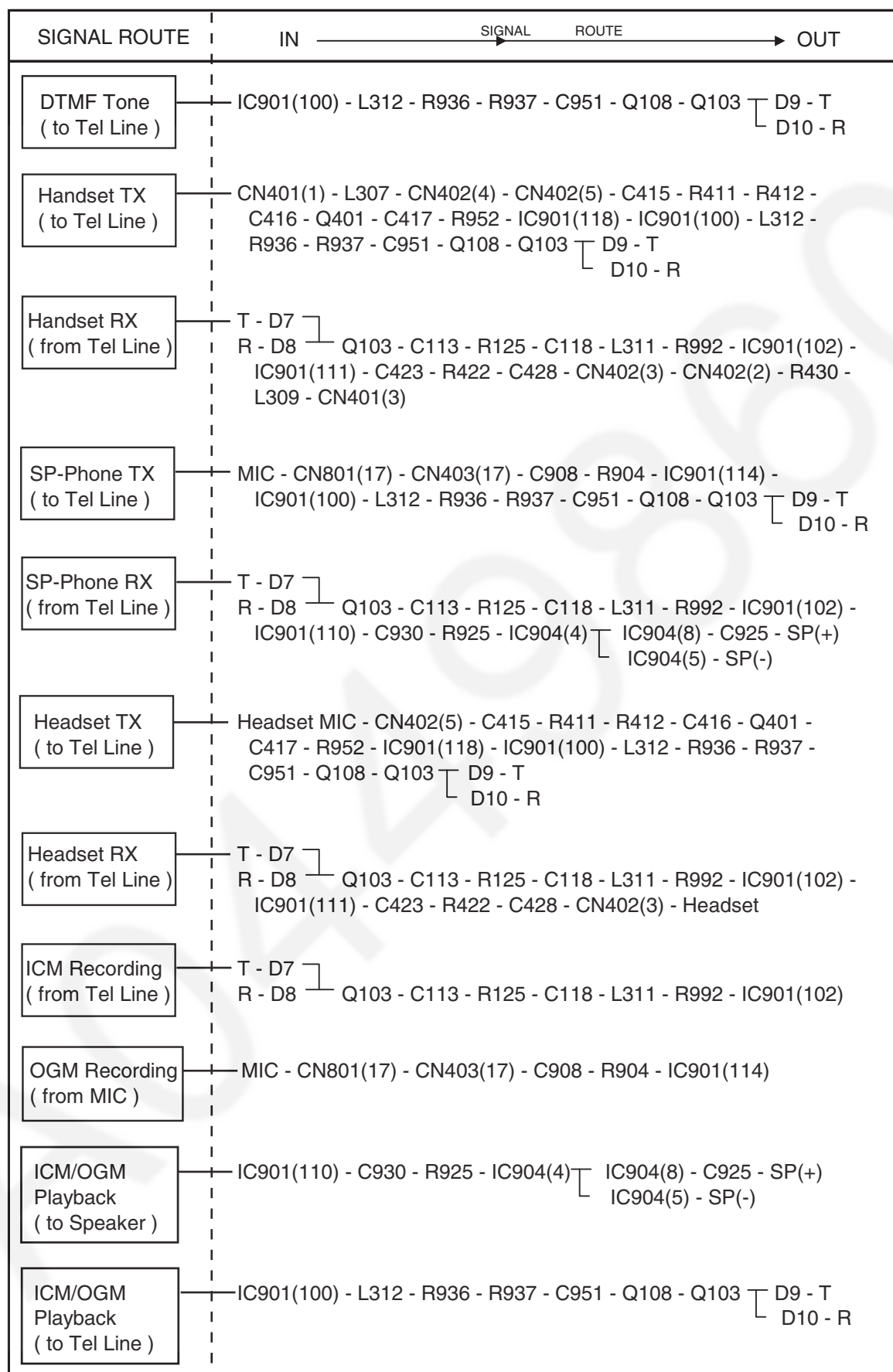
### 4.4.1. LCD Module Block



### 4.4.2. Connector Pin Assignment

| Pin no. | Signal | Function               | Enable |
|---------|--------|------------------------|--------|
| 1       | VDD    | +3V Power Supply       | —      |
| 2       | VSS    | 0V Power Supply        | —      |
| 3       | DB4    | Data Bus Line          | H/L    |
| 4       | DB5    | Data Bus Line          | H/L    |
| 5       | DB6    | Data Bus Line          | H/L    |
| 6       | DB7    | Data Bus Line          | H/L    |
| 7       | R/W    | Read / Write           | H/L    |
| 8       | E      | Enable Signal          | H      |
| 9       | D/C    | Data / Command Control | H/L    |
| 10      | CS     | Chip Signal            | L      |
| 11      | RES    | Reset Signal Input     | L      |

## 4.5. Signal Route



## 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.

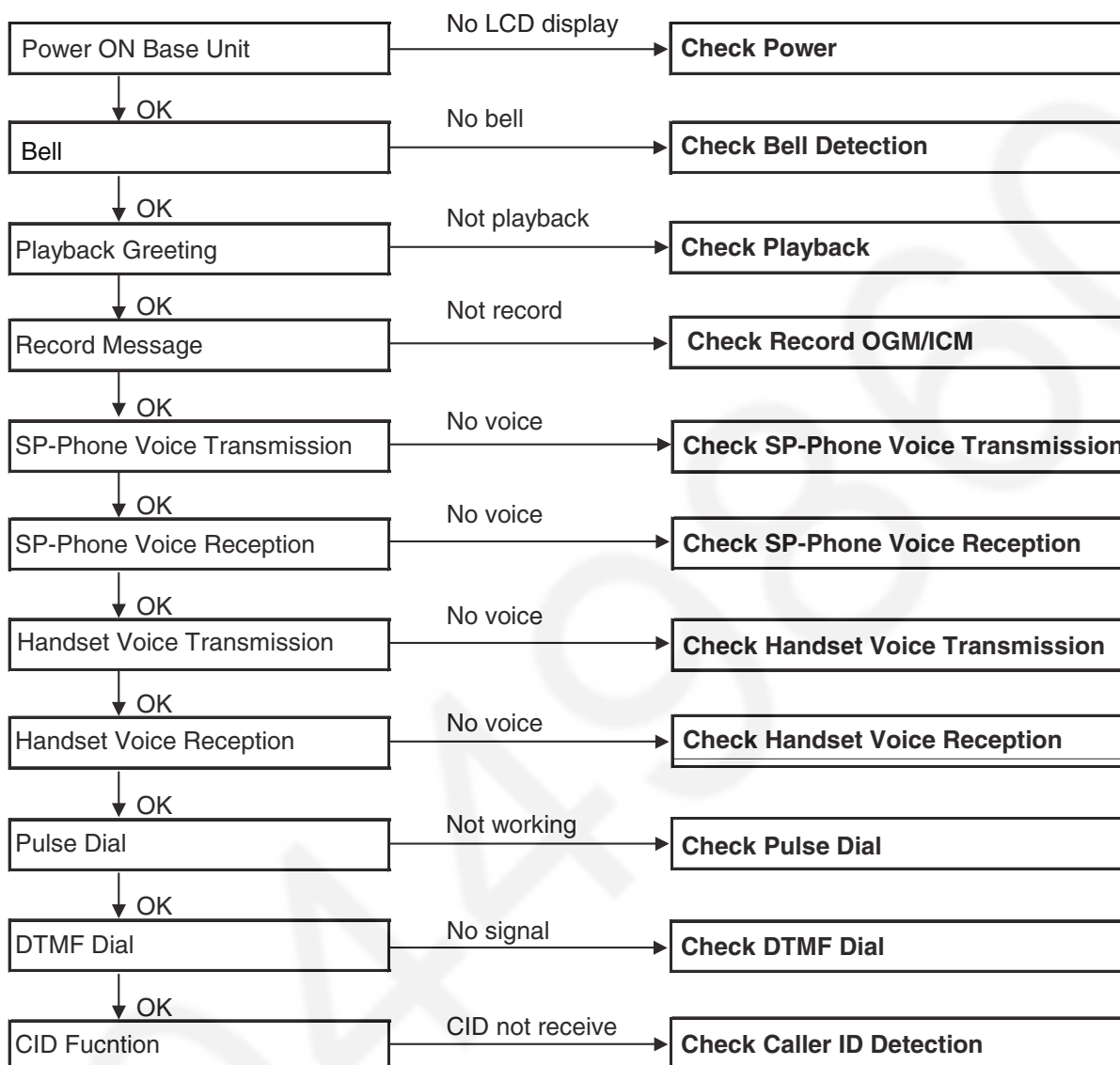
### 7.1. For Service Hint

(\*1): If the current password is forgotten, enter "726276642" 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. Troubleshooting Guide

### Flow Chart

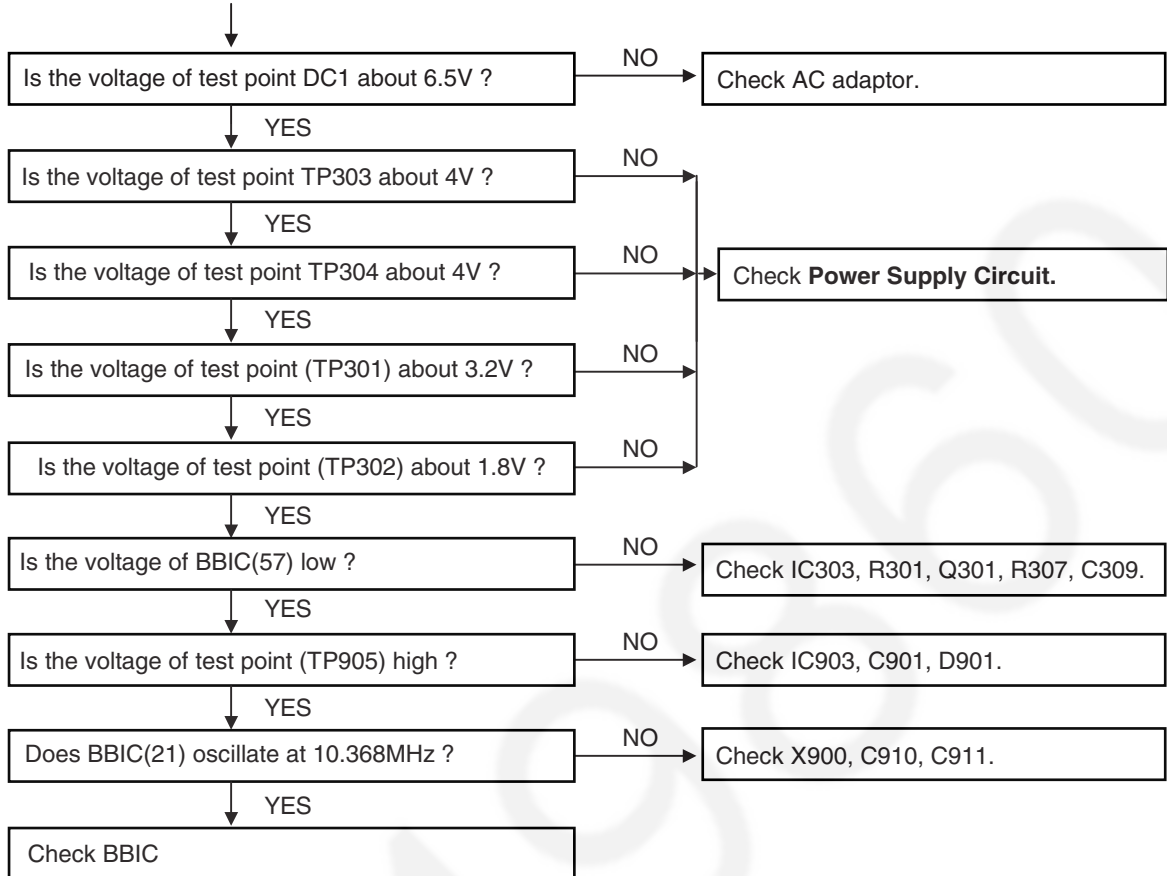


### Cross Reference:

- Check Power (P.15)
- Check Bell Detection (P.15)
- Check Playback (P.16)
- Check Record OGM/IGM (P.16)
- Check SP-phone Voice Transmission (P.17)
- Check SP-phone Voice Reception (P.17)
- Check Handset Voice Transmission (P.18)
- Check Handset Voice Reception (P.18)
- Check Pulse Dial (P.19)
- Check DTMF Dial (P.19)
- Check Caller ID Detection (P.20)

### 8.1.1. Check Power

Is the AC adaptor inserted into AC outlet ? (\*1)

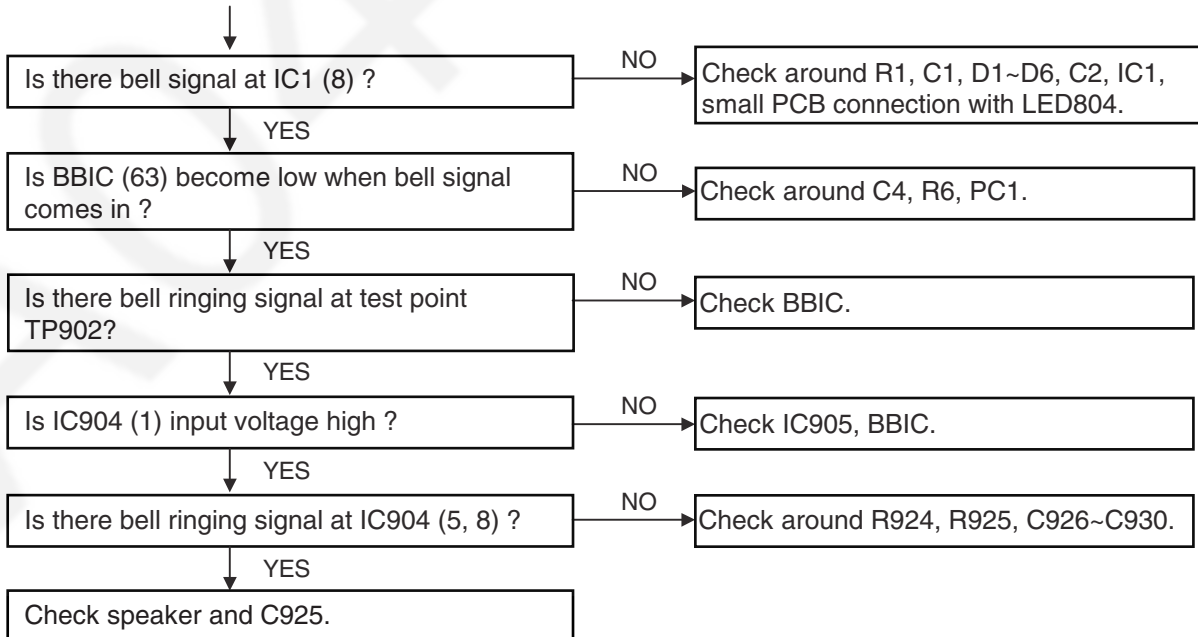


**Cross Reference:**  
Power Supply Circuit (P.8)

**Note:**  
BBIC is IC901.  
(\*1) Refer to "SPECIFICATIONS" on the cover page for part number and supply voltage of AC adaptor.

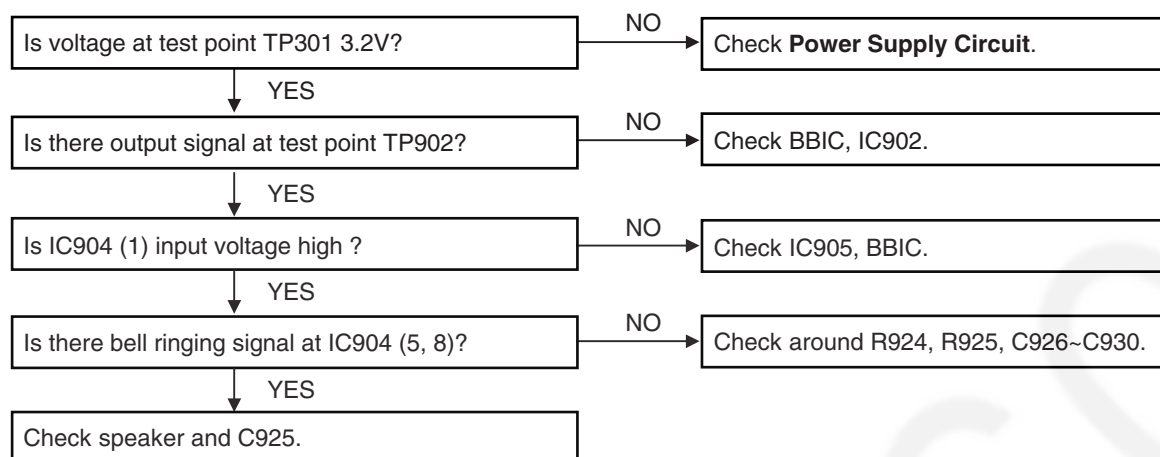
### 8.1.2. Check Bell Detection

( Input bell signal from LINE )



**Note:**  
BBIC is IC901.

### 8.1.3. Check Playback

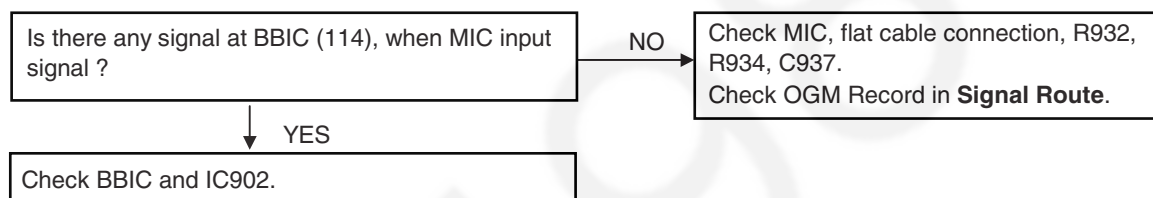


**Cross Reference:**  
**Power Supply Circuit (P.8)**

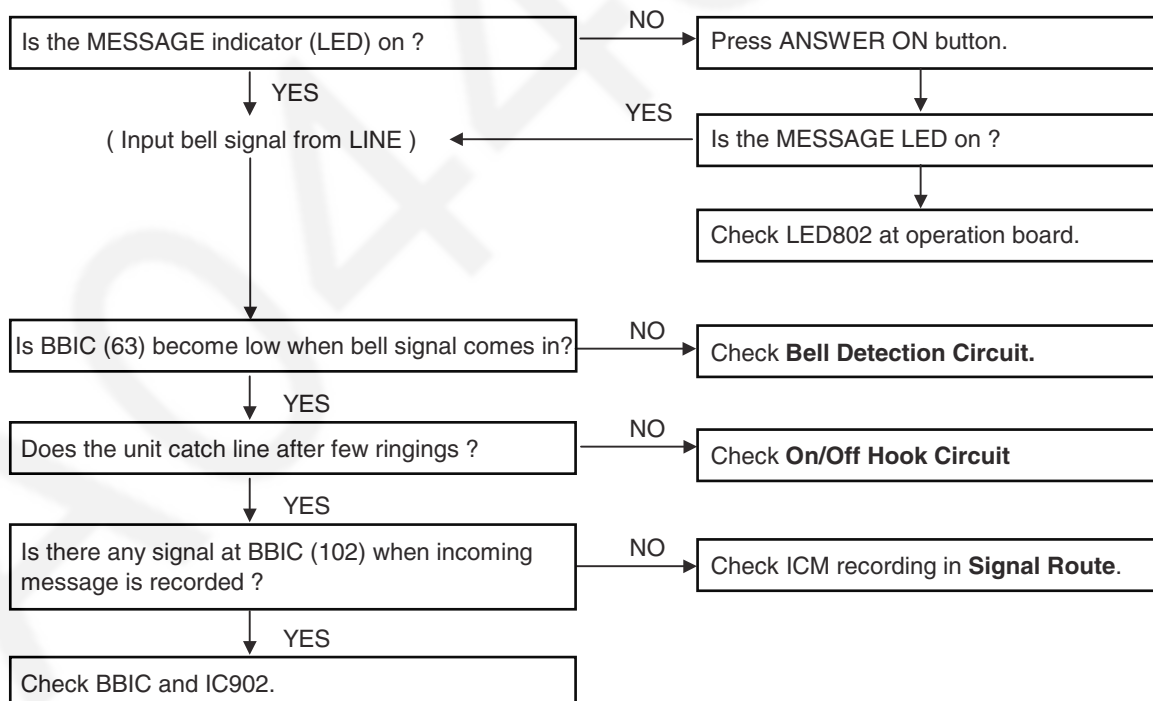
**Note:**  
 BBIC is IC901.  
 Flash Memory is IC902.

### 8.1.4. Check Record OGM/IGM

#### Greeting Message (OGM) not recorded



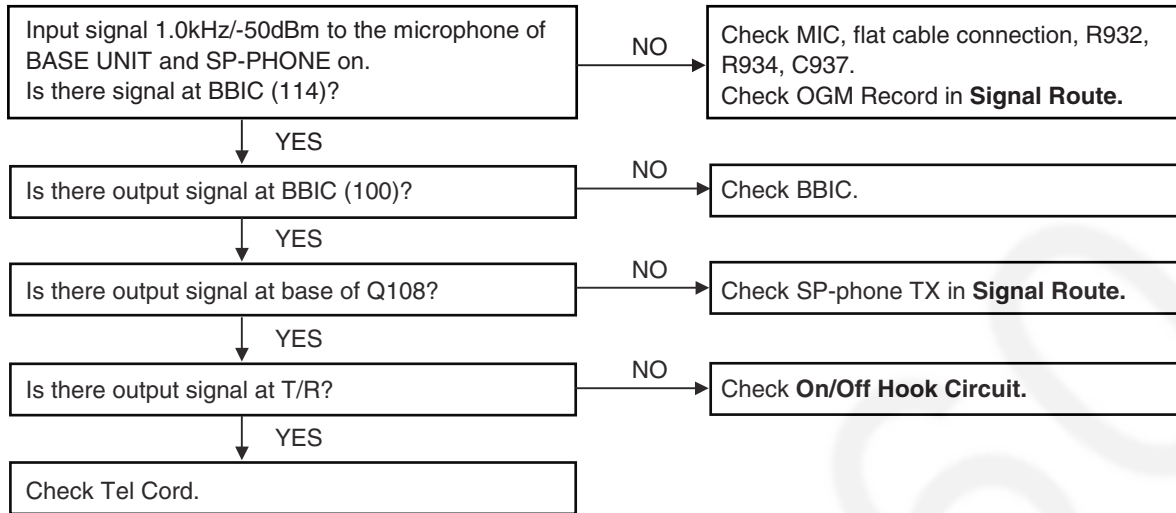
#### Incoming Message (ICM) not recorded



**Cross Reference:**  
**Signal Route (P.12)**  
**Bell Detection Circuit (P.9)**  
**On/Off Hook Circuit (P.9)**

**Note:**  
 BBIC is IC901.  
 Flash Memory is IC902

### 8.1.5. Check SP-phone Voice Transmission



**Cross Reference:**

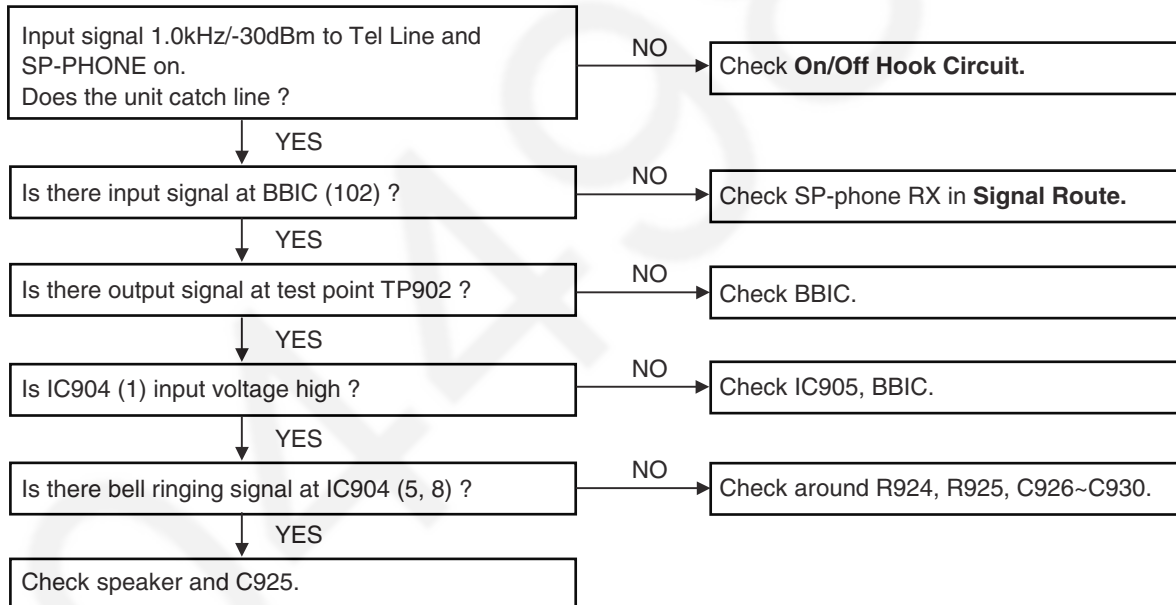
**Signal Route** (P.12)

**On/Off Hook Circuit** (P.9)

**Note:**

BBIC is IC901.

### 8.1.6. Check SP-phone Voice Reception



**Cross Reference:**

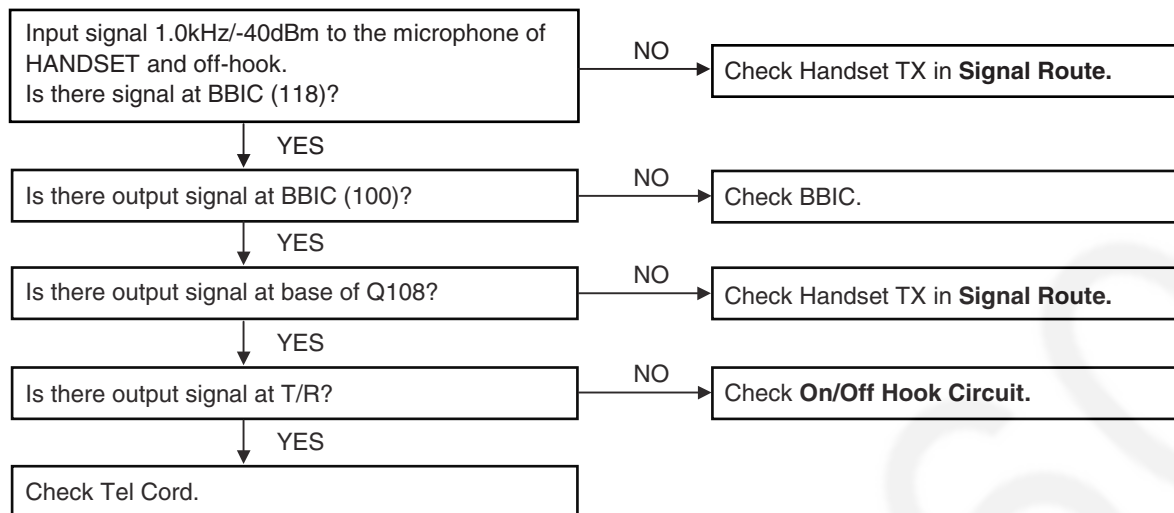
**On/Off Hook Circuit** (P.9)

**Signal Route** (P.12)

**Note:**

BBIC is IC901.

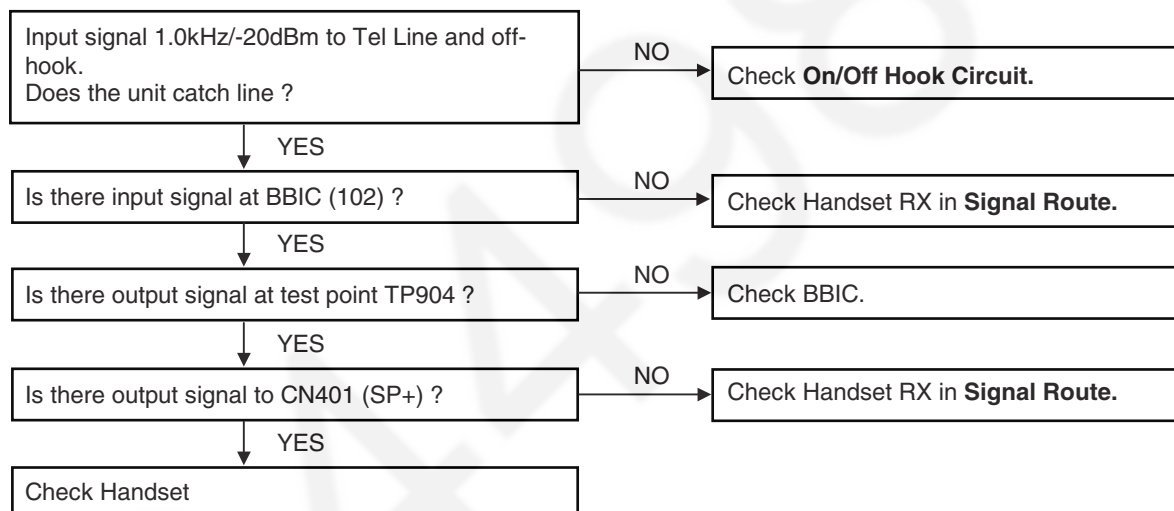
### 8.1.7. Check Handset Voice Transmission



**Cross Reference:**  
**Signal Route** (P.12)  
**On/Off Hook Circuit** (P.9)

**Note:**  
 BBIC is IC901.

### 8.1.8. Check Handset Voice Reception

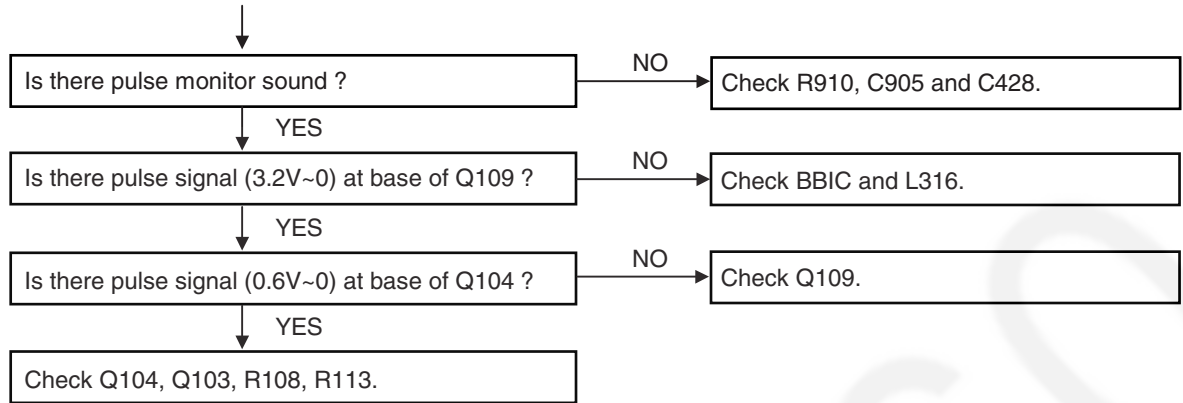


**Cross Reference:**  
**On/Off Hook Circuit** (P.9)  
**Signal Route** (P.12)

**Note:**  
 BBIC is IC901.

### 8.1.9. Check Pulse Dial

( Set dial mode to PULSE mode, dial a number )

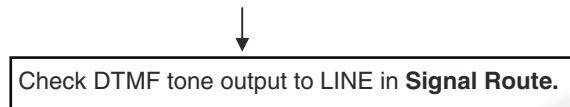


**Note:**

BBIC is IC901.

### 8.1.10. Check DTMF Dial

( Set dial mode to TONE mode, dial a number )

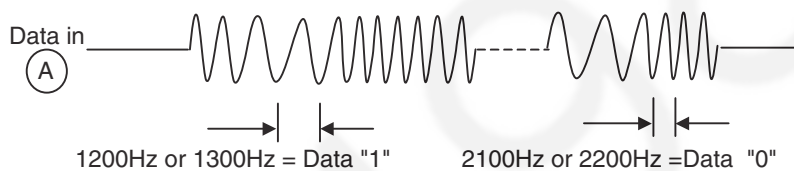
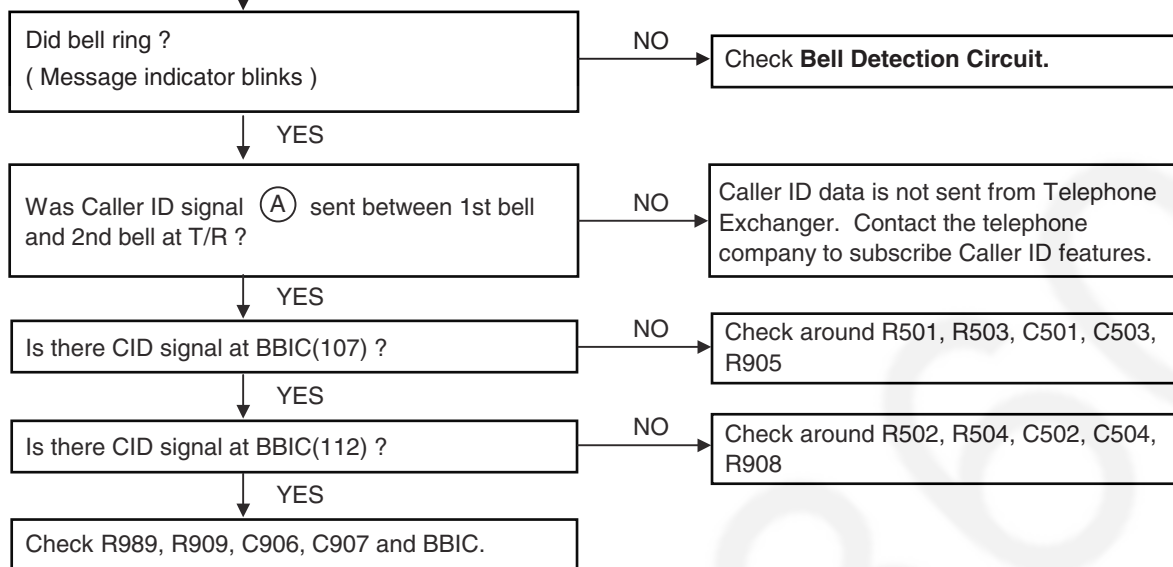


**Cross Reference:**

**Signal Route** (P.12)

### 8.1.11. Check Caller ID Detection

( Input Caller ID signal )



#### Cross Reference:

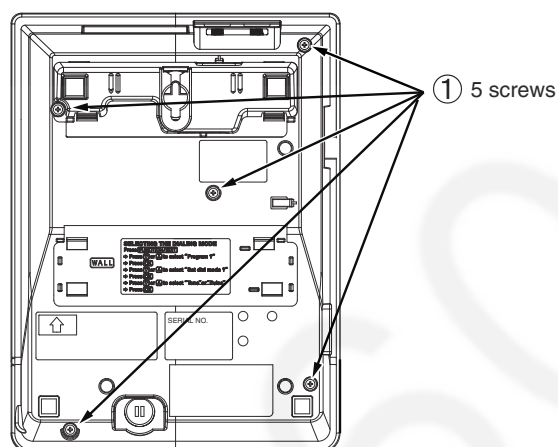
**Bell Detection Circuit** (P.9)

**Caller ID Detection Circuit** (P.9)

## 9 Disassembly and Assembly Instructions

### 9.1. Disassembly Instructions

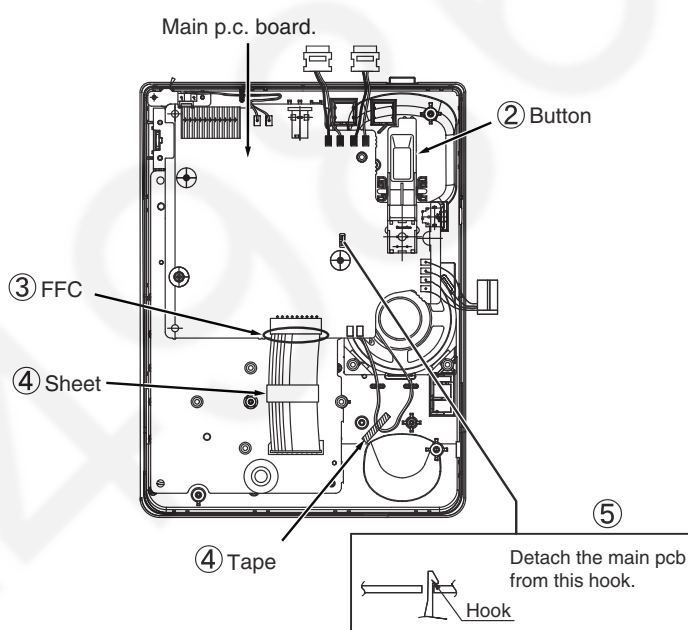
- ① Remove the 5 screws to remove the cabinet cover.



- ② Take off the button.

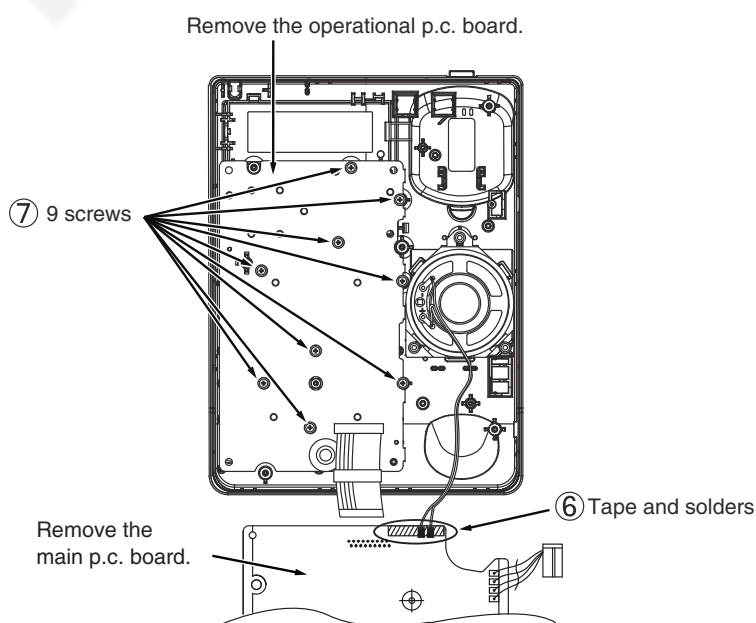
- ③ Remove the FFC (Flexible Flat cable).

- ④ Remove the sheet and the tape.



- ⑥ Remove the tape and solders to remove the main p.c. board.

- ⑦ Remove the 9 screws to remove the operational p.c. board.



## 10 Miscellaneous

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.

### 10.1. How to Replace the Flat Package IC

- PbF (: Pb free) Solder

- Soldering Iron

Tip Temperature of  $700^{\circ}\text{F} \pm 20^{\circ}\text{F}$  ( $370^{\circ}\text{C} \pm 10^{\circ}\text{C}$ )

**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)

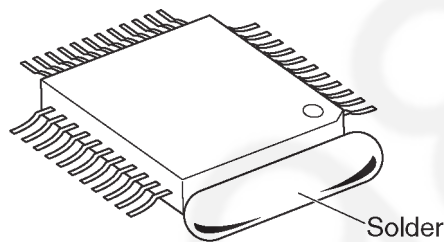
**Note:** See **About Lead Free Solder (Pbf: Pb free)** (P.4).

#### 10.1.1. How to Remove the IC

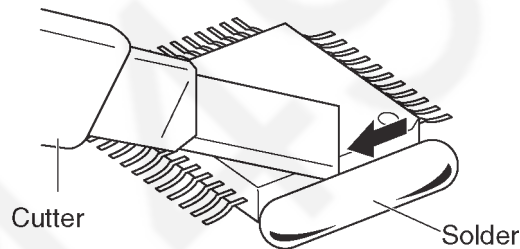
1. Put plenty of solder on the IC pins so that the pins can be completely covered.

**Note:**

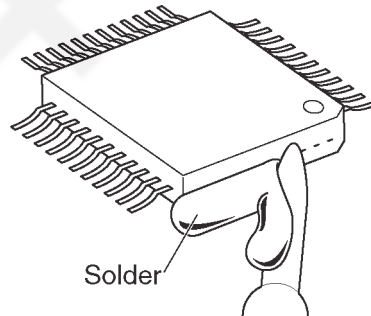
If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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 board 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.

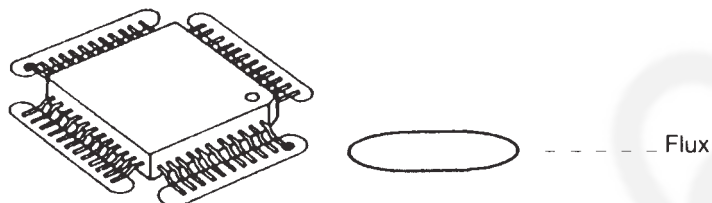
### 10.1.2. How to Install the IC

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

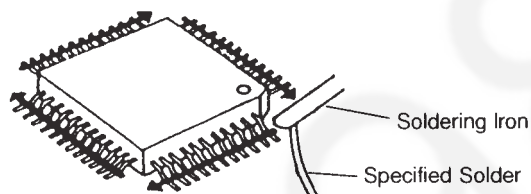


\*Check the accuracy of the IC setting with the corresponding soldering foil.

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

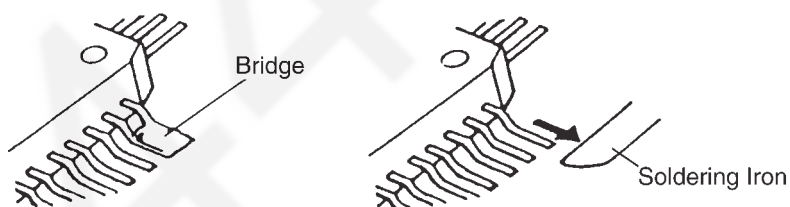


3. Solder the pins, sliding the soldering iron in the direction of the arrow.

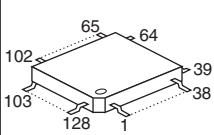
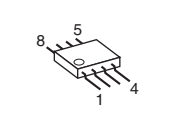
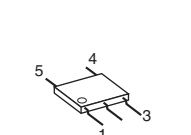
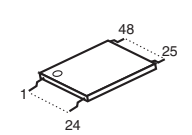
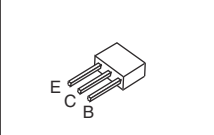
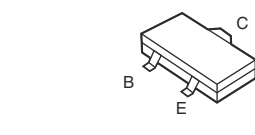
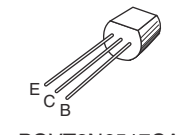
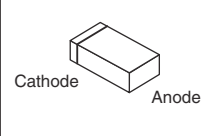
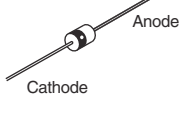
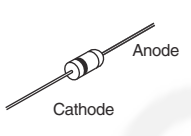
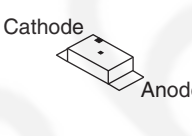
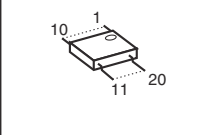
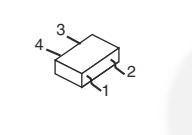


### 10.1.3. How to Remove a Solder Bridge

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



## 10.2. Terminal Guide of the Ics, Transistor and Diodes

|                                                                                                                         |                                                                                                                                |                                                                                                                    |                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>C1CB00001879</p>                   |  <p>C1BB00001024<br/>C1CB00002315</p>         |  <p>C0CBACC00036</p>              |  <p>PQWITS620BX</p>                                    |
|  <p>B1CEDF000003</p>                   |  <p>B1ABDF000026, UN5213<br/>B1ADGE000004</p> |                                                                                                                    |  <p>PQVT2N6517CA<br/>B1ACGP000007<br/>B1AAKD000013</p> |
|  <p>MA8047, MA111<br/>B0JCDD000002</p> |  <p>B0EAAD000001<br/>PQVD1T4R1T</p>           |  <p>MA4047<br/>MA4180, MA4300</p> |  <p>PSVD1SRCT</p>                                      |
|  <p>PSVISNLV273A</p>                   |  <p>PQVIPS3450UT<br/>PQVIPS3327UT</p>         |                                                                                                                    |                                                                                                                                          |

# 11 Schematic Diagram

## 11.1. For Schematic Diagram

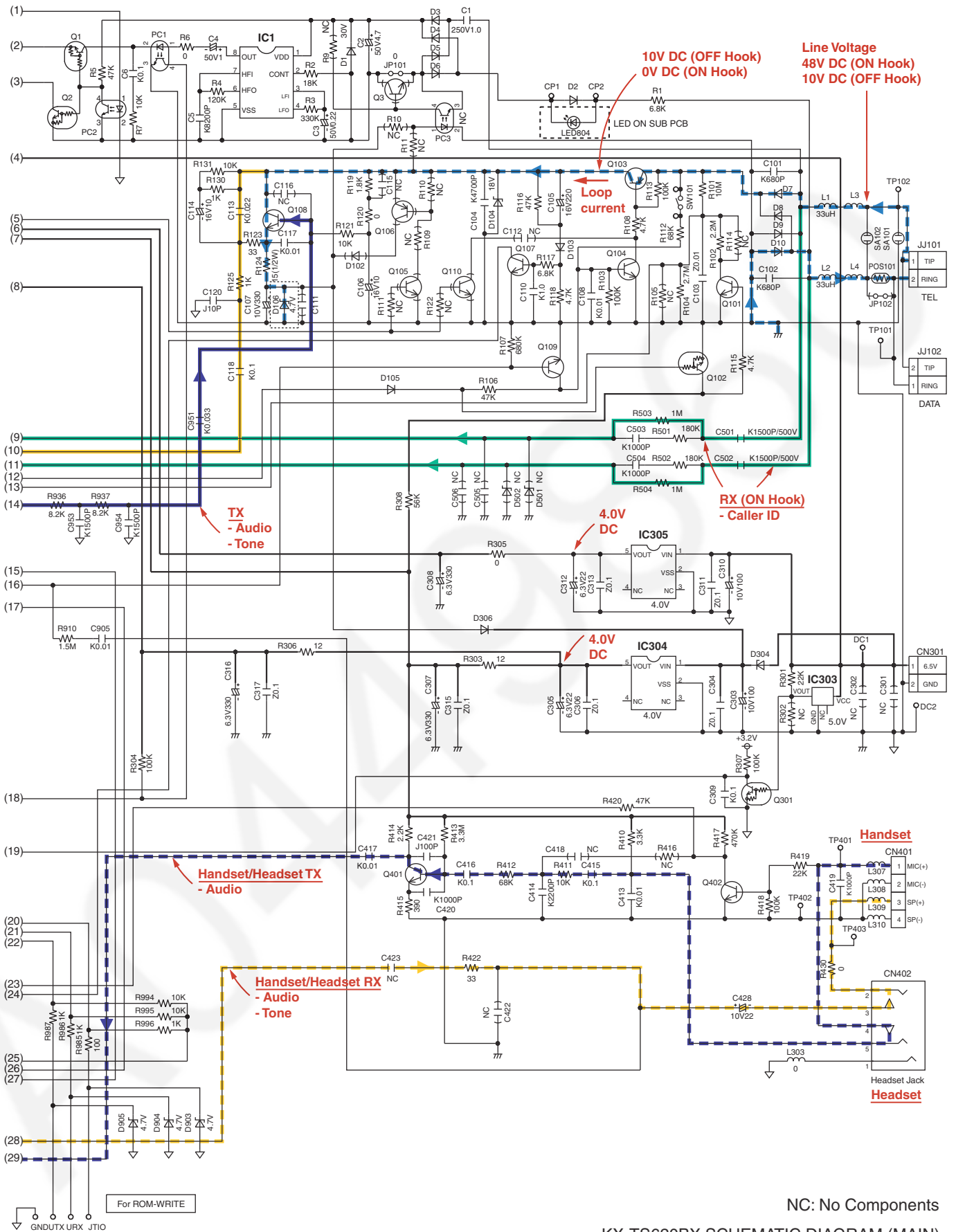
1. DC voltage measurements are taken with electronic voltmeter from negative terminal.

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.





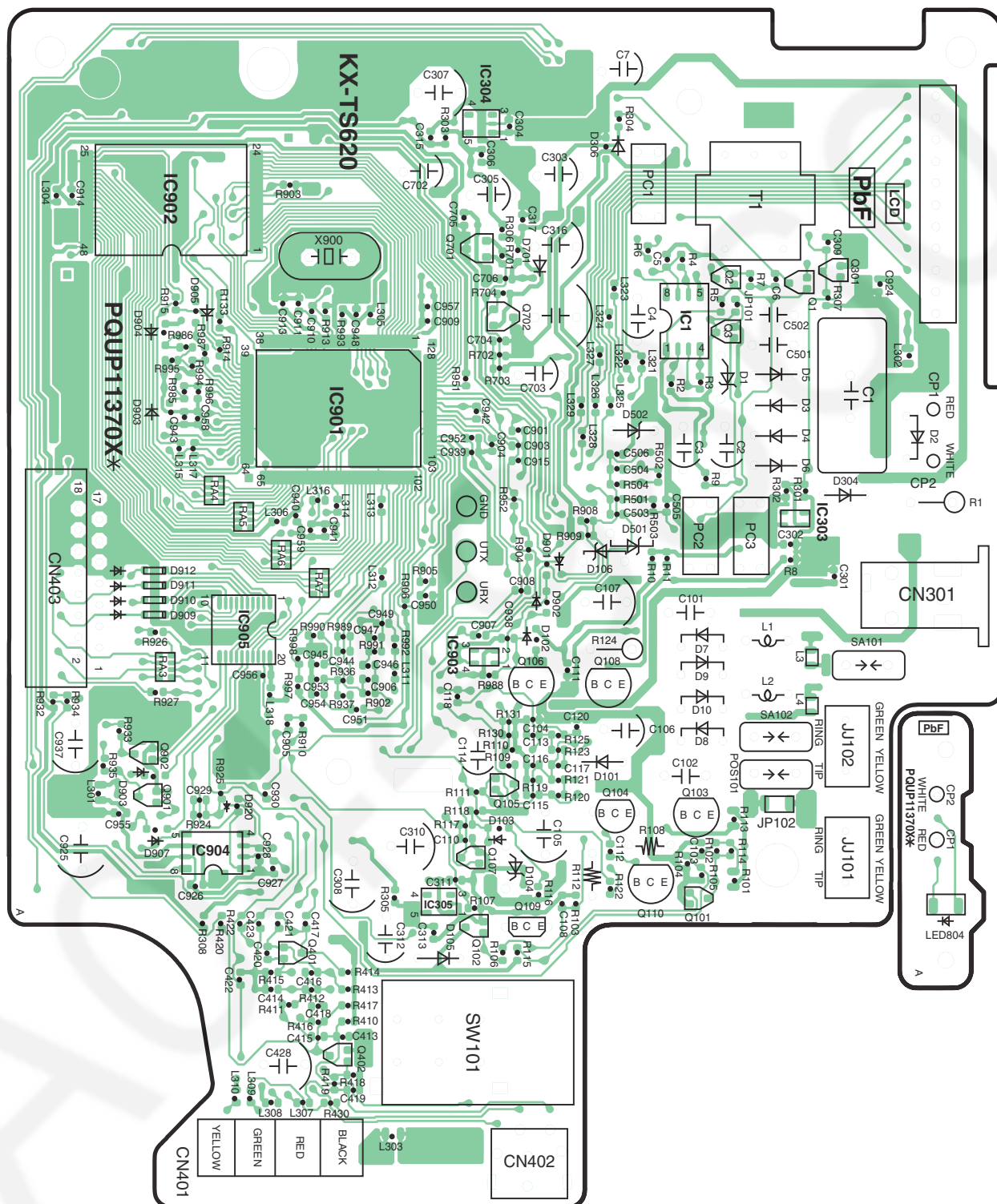


### KX-TS620 SCHEMATIC DIAGRAM (OPERATION)

## 12 Printed Circuit Board

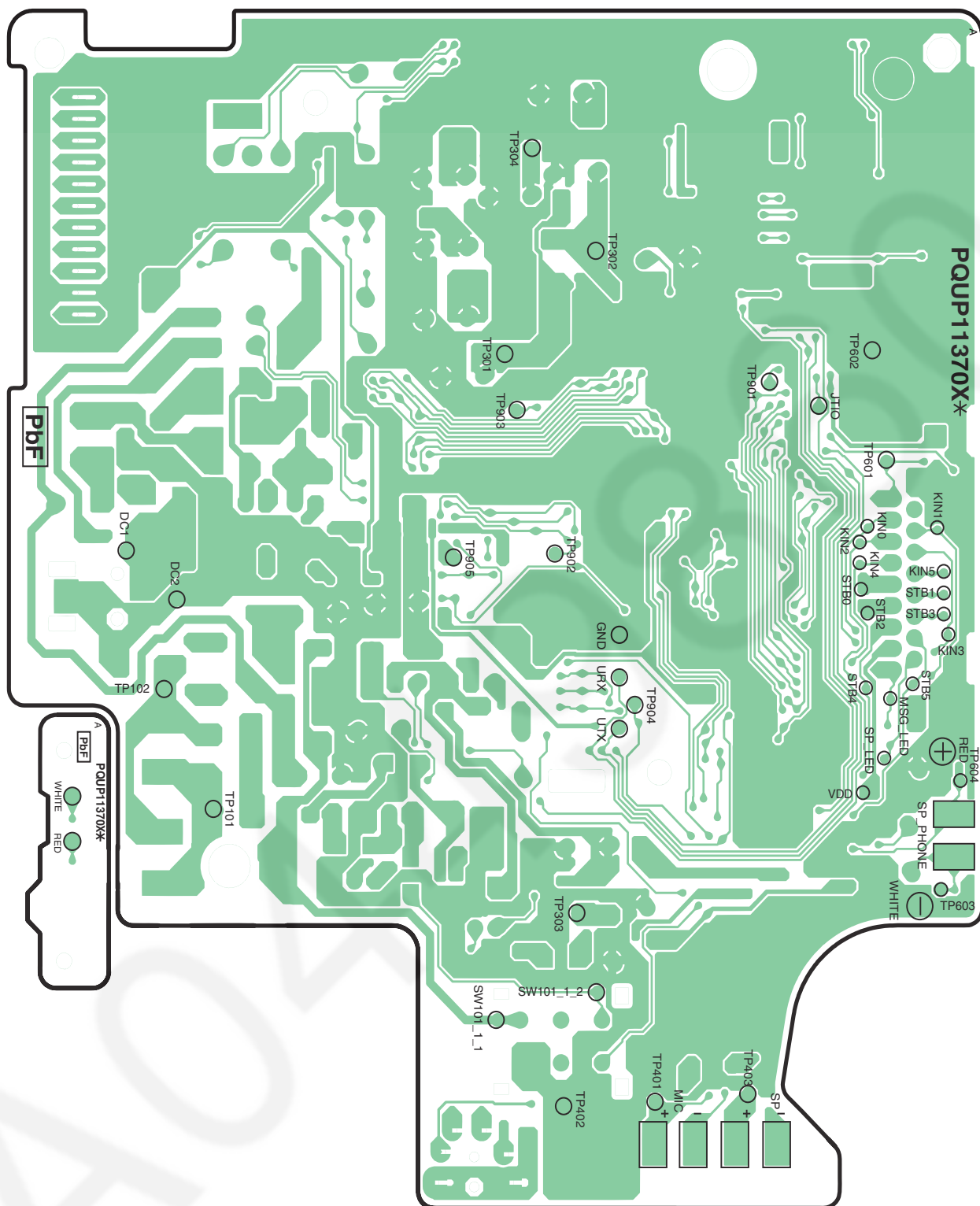
## 12.1. Circuit Board (Main)

### 12.1.1. Component View



KX-TS620 CIRCUIT BOARD (MAIN) Component View

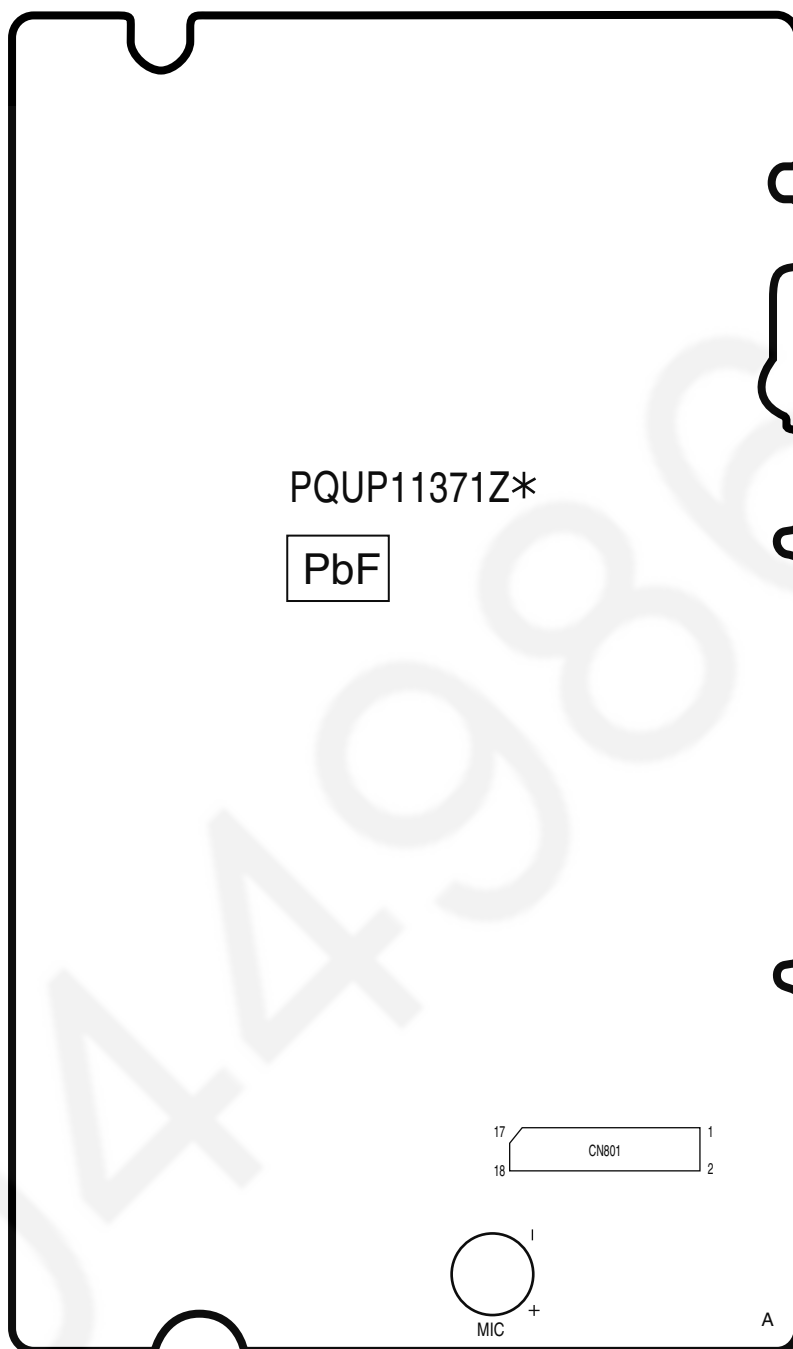
## 12.1.2. Flow Solder Side View



KX-TS620 CIRCUIT BOARD (MAIN) Flow Solder Side View

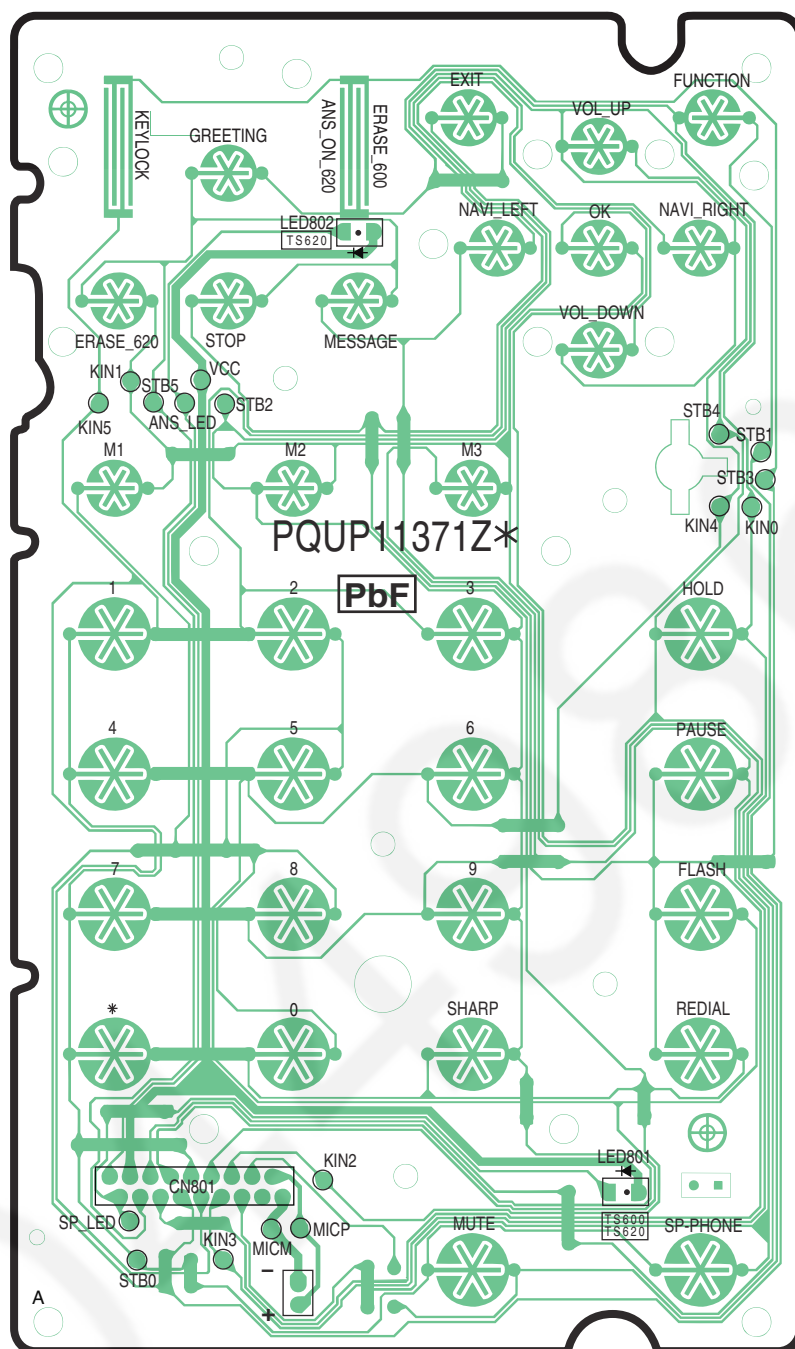
## 12.2. Circuit Board (Operation)

### 12.2.1. Component View



KX-TS620 CIRCUIT BOARD (OPERATION) Component View

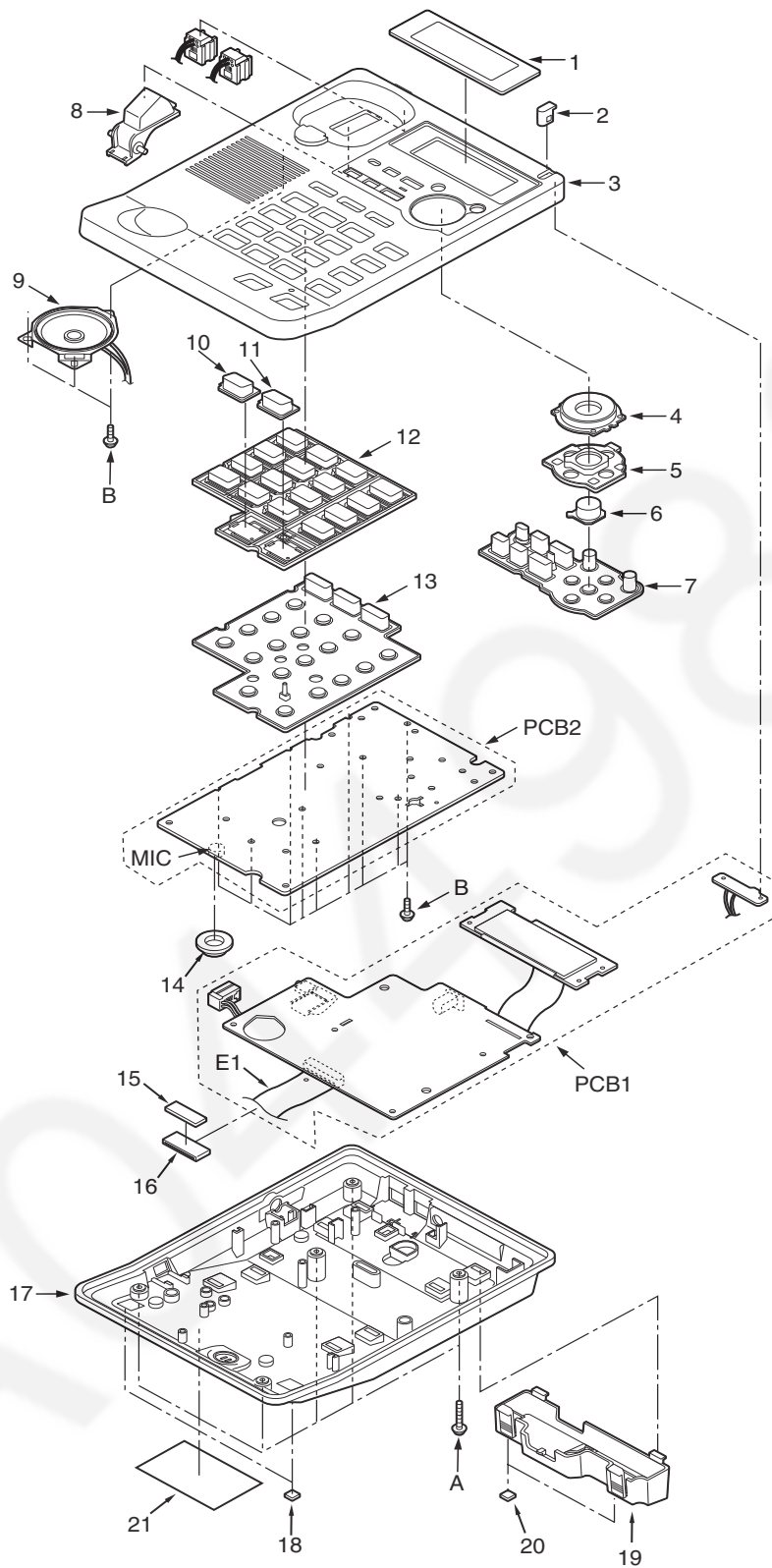
## 12.2.2. Flow Solder Side View



KX-TS620 CIRCUIT BOARD (OPERATION) Flow Solder Side View

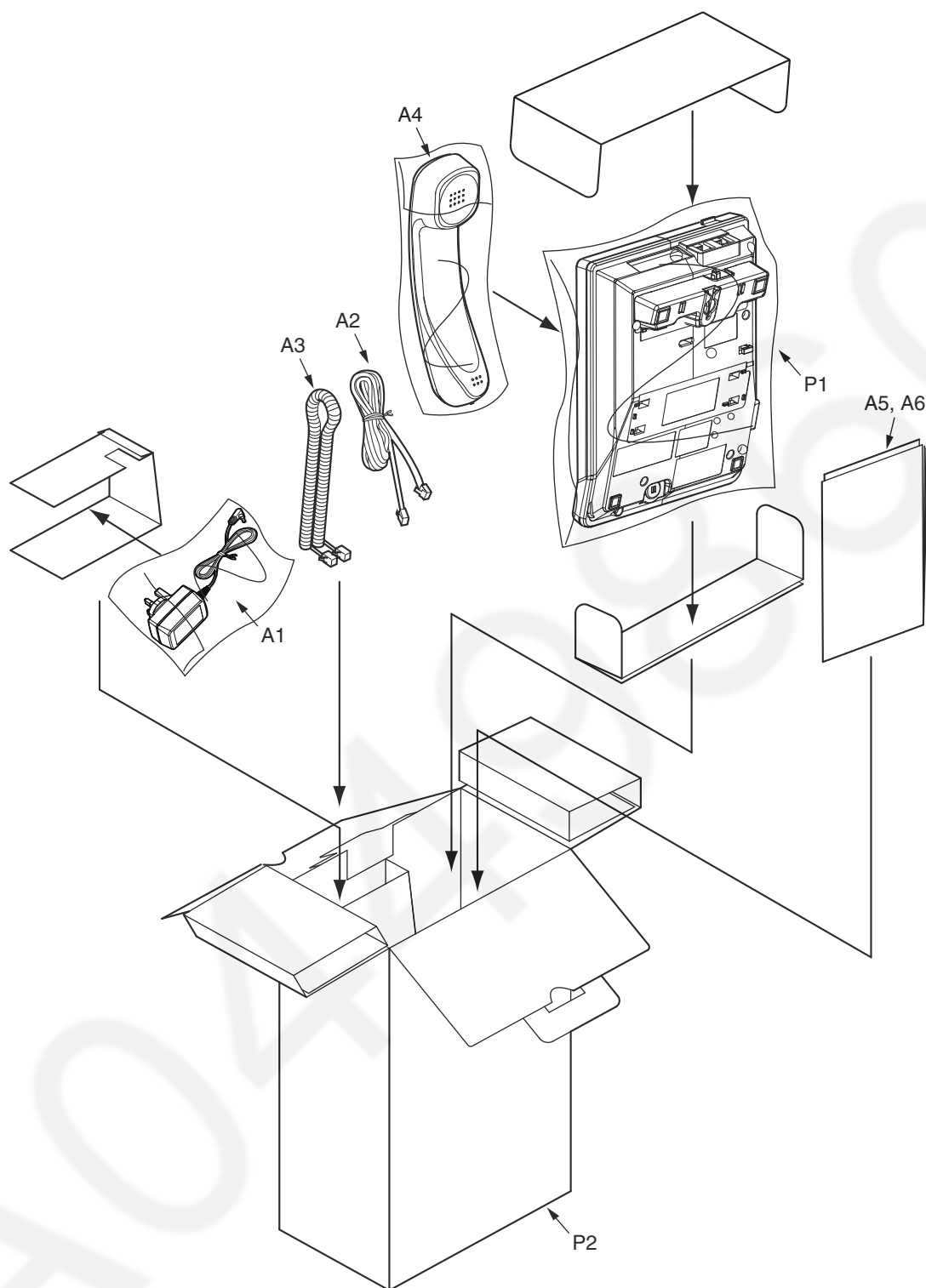
# 13 Exploded View and Replacement Parts List

## 13.1. Cabinet and Electric Parts



| Ref.No. | Figure                                                                                              |
|---------|-----------------------------------------------------------------------------------------------------|
| A       | <br>2.6 x 12mm |
| B       | <br>2.6 x 8mm  |

## 13.2. Accessories and Packing Materials



## 13.3. Replacement Part 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 dependant on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.

### 2. Important safety notice

Components identified by the  $\Delta$  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 ( $\Omega$ ) K=1000 $\Omega$ , M=1000k $\Omega$

All capacitors are in MICRO FARADS ( $\mu$ F)P= $\mu$ F

\*Type & Wattage of Resistor

#### Type

|             |                 |                      |
|-------------|-----------------|----------------------|
| ERC:Solid   | ERX:Metal Film  | PQ4R:Chip            |
| ERDS:Carbon | ERG:Metal Oxide | ERS:Fusible Resistor |
| ERJ:Chip    | 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,F1K,ECUV:Ceramic |
| ECQS:Styrol          | ECQE,ECQV,ECQG:Polyester        |
| ECUV,PQCUV,ECUE:Chip | ECEA,ECST,EEE:Electlytic        |
| ECQMS:Mica           | ECQP:Polypropylene              |

#### Voltage

| ECQ Type | ECQG<br>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 :16V   |  |
| 2H:500V  |                   | 0J:6.3V   | 1E,25:25V | 2A :100V  |  |

## 13.3.1. Cabinet and Electrical Parts

### 13.3.1.1. Cabinet and Electrical Parts

| Ref. No. | Part No.    | Part Name & Description          | Remarks |
|----------|-------------|----------------------------------|---------|
| 1        | PQGP10298Z1 | PANEL, LCD                       |         |
| 2        | PQHR11185Z  | OPTIC CONDUCTIVE PARTS, LED LENS | PS-HB   |
| 3        | PQKM10704Y1 | CABINET BODY                     | ABS-HB  |
| 4        | PQBC10456Y1 | BUTTON, NAVIGTOR KEY             | PS-HB   |
| 5        | PQHR11184Z  | HOLDER, NAVIGTOR KEY             | POM-HB  |
| 6        | PQBC10455Y2 | BUTTON, SP PHONE                 | ABS-HB  |
| 7        | PQSX10308Z  | KEYBOARD SWITCH, 21 KEY          |         |
| 8        | PQBH10043Z1 | BUTTON, HOOK                     | ABS-HB  |
| 9        | PQAS57P03Z  | SPEAKER                          |         |
| 10       | PQBC10455Z1 | BUTTON, MUTE                     | ABS-HB  |
| 11       | PQBC10454Z1 | BUTTON, OK                       | PS-HB   |
| 12       | PQBX10389W1 | BUTTON, DIAL KEY                 | ABS-HB  |

| Ref. No. | Part No.     | Part Name & Description    | Remarks |
|----------|--------------|----------------------------|---------|
| 13       | PQSX10309Z   | KEYBOARD SWITCH, 13 KEY    |         |
| 14       | PQMG10025W   | RUBBER PARTS, MIC          |         |
| 15       | PQHG10622Z   | RUBBER PARTS, SHEET        |         |
| 16       | JKKD00000070 | FILTER                     |         |
| 17       | PQKF10696U1  | CABINET COVER              | PS-HB   |
| 18       | PQHA10025Z   | RUBBER PARTS, FOOT CUSHION |         |
| 19       | PQKL10072Z1  | STAND, WALL MOUNT          | PS-HB   |
| 20       | PQHA10018Y   | RUBBER PARTS, FOOT CUSHION |         |
| 21       | PNGT6926Z    | NAME PLATE                 |         |

### 13.3.1.2. Main P. C. Board Parts

| Ref. No. | Part No.     | Part Name & Description     | Remarks |
|----------|--------------|-----------------------------|---------|
| PCB1     | PQWP1TS620BX | MAIN P.C. BOARD ASS'Y (RTL) |         |
|          |              | (ICs)                       |         |
| IC1      | C1CB00002315 | IC                          |         |
| IC303    | PQVIPS3450UT | IC                          |         |
| IC304    | C0CBACC00036 | IC                          |         |
| IC305    | C0CBACC00036 | IC                          |         |
| IC901    | C1CB00001879 | IC                          |         |
| IC902    | PQWITS620BX  | IC                          |         |
| IC903    | PQVIPS3327UT | IC                          |         |
| IC904    | C1BB00001024 | IC                          |         |
| IC905    | PSVISNLV273A | IC                          | S       |
|          |              | (TRANSISTORS)               |         |
| Q1       | UN5213       | TRANSISTOR(SI)              | S       |
| Q2       | UN5213       | TRANSISTOR(SI)              | S       |
| Q101     | B1ABDF000026 | TRANSISTOR(SI)              |         |
| Q102     | UN5213       | TRANSISTOR(SI)              | S       |
| Q103     | B1ACGP000007 | TRANSISTOR(SI)              |         |
| Q104     | PQVT2N6517CA | TRANSISTOR(SI)              | S       |
| Q107     | B1ABDF000026 | TRANSISTOR(SI)              |         |
| Q108     | B1AAKD000013 | TRANSISTOR(SI)              |         |
| Q109     | B1CEDF000003 | TRANSISTOR(SI)              |         |
| Q301     | UN5213       | TRANSISTOR(SI)              | S       |
| Q401     | B1ABDF000026 | TRANSISTOR(SI)              |         |
| Q402     | B1ABDF000026 | TRANSISTOR(SI)              |         |
| Q701     | B1ADGE000004 | TRANSISTOR(SI)              |         |
| Q702     | B1ADGE000004 | TRANSISTOR(SI)              |         |
| Q901     | UN5213       | TRANSISTOR(SI)              | S       |
| Q902     | UN5213       | TRANSISTOR(SI)              | S       |
|          |              | (DIODES)                    |         |
| D1       | MA4300       | DIODE (SI)                  | S       |
| D2       | B0EAAD000001 | DIODE (SI)                  |         |
| D3       | B0EAAD000001 | DIODE (SI)                  |         |
| D4       | B0EAAD000001 | DIODE (SI)                  |         |
| D5       | B0EAAD000001 | DIODE (SI)                  |         |
| D6       | B0EAAD000001 | DIODE (SI)                  |         |
| D7       | PQVD1T4R1T   | DIODE (SI)                  |         |
| D8       | PQVD1T4R1T   | DIODE (SI)                  |         |
| D9       | PQVD1T4R1T   | DIODE (SI)                  |         |
| D10      | PQVD1T4R1T   | DIODE (SI)                  |         |
| D102     | MA111        | DIODE (SI)                  | S       |
| D103     | MA111        | DIODE (SI)                  | S       |
| D104     | MA4180       | DIODE (SI)                  | S       |
| D105     | B0EAAD000001 | DIODE (SI)                  |         |
| D106     | MA4047       | DIODE (SI)                  | S       |
| D304     | B0EAAD000001 | DIODE (SI)                  |         |
| D306     | MA111        | DIODE (SI)                  | S       |
| D701     | MA111        | DIODE (SI)                  | S       |
| D901     | MA111        | DIODE (SI)                  | S       |
| D902     | MA111        | DIODE (SI)                  | S       |
| D903     | MA8047       | DIODE (SI)                  | S       |
| D904     | MA8047       | DIODE (SI)                  | S       |
| D905     | MA8047       | DIODE (SI)                  | S       |
| D907     | MA111        | DIODE (SI)                  | S       |
| D908     | MA111        | DIODE (SI)                  | S       |
| D909     | MA111        | DIODE (SI)                  | S       |
| D910     | MA111        | DIODE (SI)                  | S       |
| D911     | MA111        | DIODE (SI)                  | S       |
| D912     | MA111        | DIODE (SI)                  | S       |

| Ref. No. | Part No.     | Part Name & Description     | Remarks |
|----------|--------------|-----------------------------|---------|
| D920     | B0JCDD000002 | DIODE (SI)                  |         |
| LED804   | PSVD1SRCT    | LED                         | S       |
|          |              | (COILS)                     |         |
| L1       | PQLQXF330K   | COIL                        | S       |
| L2       | PQLQXF330K   | COIL                        | S       |
| L3       | PQLQR2BT     | COIL                        | S       |
| L4       | PQLQR2BT     | COIL                        | S       |
| L301     | PQLQR2KA213  | COIL                        | S       |
| L302     | PQLQR2KA213  | COIL                        | S       |
| L304     | PQLQR2KA20T  | COIL                        | S       |
| L305     | PQLQR2KB113T | COIL                        | S       |
| L306     | PQLQR2KB113T | COIL                        | S       |
| L313     | PQLQR2KB113T | COIL                        | S       |
| L314     | PQLQR2KB113T | COIL                        | S       |
| L315     | PQLQR2KB113T | COIL                        | S       |
| L316     | PQLQR2KB113T | COIL                        | S       |
| L317     | PQLQR2KB113T | COIL                        | S       |
| L318     | PQLQR2KA20T  | COIL                        | S       |
| L321     | PQLQR2KB113T | COIL                        | S       |
| L322     | PQLQR2KB113T | COIL                        | S       |
| L323     | PQLQR2KB113T | COIL                        | S       |
| L324     | PQLQR2KB113T | COIL                        | S       |
| L325     | PQLQR2KB113T | COIL                        | S       |
| L326     | PQLQR2KB113T | COIL                        | S       |
| L327     | PQLQR2KB113T | COIL                        | S       |
| L328     | PQLQR2KB113T | COIL                        | S       |
| L329     | PQLQR2KB113T | COIL                        | S       |
|          |              | (CONNECTOR)                 |         |
| CN403    | PQJS18X53Z   | CONNECTOR                   | S       |
|          |              | (JACKS)                     |         |
| CN401    | PQJJ1T030Y   | JACK/SOCKET, HANDSET        |         |
| CN402    | PQJJ1C001Z   | JACK/SOCKET, HEADSET        |         |
| JJ101    | PQJJ1T029Z   | JACK/SOCKET MODULAR         |         |
| JJ102    | PQJJ1T029Z   | JACK/SOCKET MODULAR         |         |
| CN301    | K2ECYB000001 | JACK                        |         |
|          |              | (LCR FILTERS)               |         |
| L307     | PFVF1B252SDT | LCR FILTER                  | S       |
| L308     | PFVF1B252SDT | LCR FILTER                  | S       |
| L309     | PFVF1B252SDT | LCR FILTER                  | S       |
| L310     | PFVF1B252SDT | LCR FILTER                  | S       |
| L311     | J0JCC0000309 | LCR FILTER                  |         |
| L312     | J0JCC0000309 | LCR FILTER                  |         |
|          |              | (COMPONENTS PARTS)          |         |
| RA3      | EXB38V221J   | RESISTOR ARRAY              |         |
| RA4      | EXB38V221J   | RESISTOR ARRAY              |         |
| RA5      | EXB38V221J   | RESISTOR ARRAY              |         |
| RA6      | EXB38V221J   | RESISTOR ARRAY              |         |
| RA7      | EXB38V221J   | RESISTOR ARRAY              |         |
|          |              | (TRANSFORMER)               |         |
| T1       | PQLT2D2A     | TRANSFORMER                 | S       |
|          |              | (VARISTOR)                  |         |
| SA101    | PQVDDSS301L  | VARISTOR (SURGE ABSORBER)   | S       |
| SA102    | PQVDDSS301L  | VARISTOR (SURGE ABSORBER)   | S       |
|          |              | (PHOTO ELECTRIC TRANSDUCER) |         |
| PC1      | ON3181       | PHOTO ELECTRIC TRANSDUCER   | S       |
| PC2      | ON3181       | PHOTO ELECTRIC TRANSDUCER   | S       |
|          |              | (RESISTORS)                 |         |
| R1       | ERDS1VJ682   | 6.8K                        |         |
| R2       | ERJ3GSYJ183  | 18K                         |         |
| R3       | ERJ3GEYJ334  | 330K                        |         |
| R4       | ERJ3GSYJ124  | 120K                        |         |
| R5       | D0GB473JA057 | 47K                         |         |
| R6       | ERJ3GEY0R00  | 0                           |         |
| R7       | D0GB103JA057 | 10K                         |         |
| R8       | ERJ3GEYJ102  | 1K                          |         |
| R101     | PQ4R10XJ106  | 10M                         |         |
| R102     | ERJ3GEYJ225  | 2.2M                        |         |
| R103     | D0GB104JA057 | 100K                        |         |
| R104     | ERJ3GEYJ275  | 2.7M                        |         |
| R106     | D0GB473JA057 | 47K                         |         |
| R107     | ERJ3GEYJ684  | 680K                        |         |
| R108     | ERDS2TJ472   | 4.7K                        |         |
| R112     | ERDS2TJ683   | 68K                         |         |

| Ref. No. | Part No.     | Part Name & Description | Remarks |
|----------|--------------|-------------------------|---------|
| R113     | PQ4R10XJ104  | 100K                    | S       |
| R115     | ERJ3GEYJ472  | 4.7K                    |         |
| R116     | D0GB473JA057 | 47K                     |         |
| R117     | ERJ3GSYJ682  | 6.8K                    |         |
| R118     | ERJ3GEYJ472  | 4.7K                    |         |
| R119     | ERJ3GEYJ182  | 1.8K                    |         |
| R120     | ERJ3GEY0R00  | 0                       |         |
| R121     | D0GB103JA057 | 10K                     |         |
| R123     | ERJ3GSYJ330  | 33                      |         |
| R124     | ERDS1TJ150   | 15                      | S       |
| R125     | ERJ3GEYJ102  | 1K                      |         |
| R130     | ERJ3GEYJ102  | 1K                      |         |
| R131     | D0GB103JA057 | 10K                     |         |
| R133     | ERJ3GSYJ105  | 1M                      |         |
| R301     | ERJ3GEYJ223  | 22K                     |         |
| R303     | ERJ3GEYJ120  | 12                      |         |
| R304     | D0GB104JA057 | 100K                    |         |
| R305     | ERJ3GEY0R00  | 0                       |         |
| R306     | ERJ3GEYJ120  | 12                      |         |
| R307     | D0GB104JA057 | 100K                    |         |
| R308     | ERJ3GEYJ563  | 56K                     |         |
| R410     | ERJ3GEYJ332  | 3.3K                    |         |
| R411     | D0GB103JA057 | 10K                     |         |
| R412     | ERJ3GSYJ683  | 68K                     |         |
| R413     | ERJ3GEYJ335  | 3.3M                    |         |
| R414     | ERJ3GEYJ222  | 2.2K                    |         |
| R415     | ERJ3GSYJ391  | 390                     |         |
| R417     | ERJ3GEYJ474  | 470K                    |         |
| R418     | D0GB104JA057 | 100K                    |         |
| R419     | ERJ3GEYJ223  | 22K                     |         |
| R420     | D0GB473JA057 | 47K                     |         |
| R422     | ERJ3GSYJ330  | 33                      |         |
| R430     | ERJ3GEY0R00  | 0                       |         |
| R501     | D0GB184JA057 | 180K                    |         |
| R502     | D0GB184JA057 | 180K                    |         |
| R503     | ERJ3GSYJ105  | 1M                      |         |
| R504     | ERJ3GSYJ105  | 1M                      |         |
| R701     | D0GB153JA057 | 15K                     |         |
| R702     | D0GB562JA057 | 5.6K                    |         |
| R703     | ERJ3GEYJ222  | 2.2K                    |         |
| R704     | D0GB562JA057 | 5.6K                    |         |
| R902     | D0GB104JA057 | 100K                    |         |
| R903     | ERJ3GEYJ101  | 100                     |         |
| R904     | ERJ3GEYJ102  | 1K                      |         |
| R905     | ERJ3GEYJ101  | 100                     |         |
| R906     | ERJ3GEYJ102  | 1K                      |         |
| R908     | ERJ3GEYJ101  | 100                     |         |
| R909     | D0GB104JA057 | 100K                    |         |
| R910     | ERJ3GEYJ155  | 1.5M                    |         |
| R914     | ERJ3GEY0R00  | 0                       |         |
| R915     | ERJ3GEY0R00  | 0                       |         |
| R924     | ERJ3GSYJ124  | 120K                    |         |
| R925     | ERJ3GSYJ393  | 39K                     |         |
| R926     | ERJ3GSYJ221  | 220                     |         |
| R927     | ERJ3GSYJ221  | 220                     |         |
| R932     | ERJ3GEYJ101  | 100                     |         |
| R933     | ERJ3GEYJ102  | 1K                      |         |
| R934     | ERJ3GEYJ222  | 2.2K                    |         |
| R935     | ERJ3GEYJ102  | 1K                      |         |
| R936     | ERJ3GEYJ822  | 8.2K                    |         |
| R937     | ERJ3GEYJ822  | 8.2K                    |         |
| R951     | ERJ3GEYJ222  | 2.2K                    |         |
| R952     | ERJ3GEYJ222  | 2.2K                    |         |
| R985     | ERJ3GEYJ101  | 100                     |         |
| R986     | ERJ3GEYJ102  | 1K                      |         |
| R987     | ERJ3GEYJ102  | 1K                      |         |
| R988     | D0GB104JA057 | 100K                    |         |
| R989     | D0GB104JA057 | 100K                    |         |
| R991     | ERJ3GEYJ101  | 100                     |         |
| R992     | ERJ3GEYJ101  | 100                     |         |
| R993     | ERJ3GEYJ101  | 100                     |         |
| R994     | D0GB103JA057 | 10K                     |         |
| R995     | D0GB103JA057 | 10K                     |         |

| Ref. No. | Part No.     | Part Name & Description | Remarks |
|----------|--------------|-------------------------|---------|
| R996     | ERJ3GEYJ102  | 1K                      |         |
| R997     | D0GB103JA057 | 10K                     |         |
| R998     | D0GB103JA057 | 10K                     |         |
| L303     | PQ4R10XJ000  | 0                       |         |
| JP101    | ERJ3GEY0R00  | 0                       |         |
|          |              | (CAPACITORS)            |         |
| C1       | F0C2E105A146 | 1                       |         |
| C2       | ECEA1HKA4R7  | 4.7                     |         |
| C3       | ECEA1HKS22   | 0.22                    | S       |
| C4       | ECEA1HKA010  | 1                       |         |
| C5       | ECUV1H822KBV | 0.0082                  |         |
| C6       | ECUV1C104KBV | 0.1                     |         |
| C7       | ECEA1CKA100  | 10                      |         |
| C101     | F1B2H681A070 | 680P                    | S       |
| C102     | F1B2H681A070 | 680P                    | S       |
| C103     | ECJ1VF1H103Z | 0.01                    | S       |
| C104     | ECUV1H472KBV | 0.0047                  |         |
| C105     | ECEA1CU221   | 220                     |         |
| C106     | ECEA1CKA100  | 10                      |         |
| C107     | ECEA1AU331   | 330                     |         |
| C108     | ECUV1H103KBV | 0.01                    |         |
| C110     | ECUV0J105KBV | 1                       |         |
| C113     | ECUV1E223KBV | 0.022                   |         |
| C114     | ECEA1CKA100  | 10                      |         |
| C117     | ECUV1H103KBV | 0.01                    |         |
| C118     | ECUV1C104KBV | 0.1                     |         |
| C120     | ECUV1H100JCV | 10P                     |         |
| C303     | ECEA1AU101   | 100                     |         |
| C304     | ECUV1C104ZFB | 0.1                     |         |
| C305     | ECEA0JKS220  | 22                      | S       |
| C306     | ECUV1C104ZFB | 0.1                     |         |
| C307     | ECA0JM331    | 330P                    | S       |
| C308     | ECA0JM331    | 330P                    | S       |
| C309     | ECUV1C104ZFB | 0.1                     |         |
| C310     | ECEA1AU101   | 100                     |         |
| C312     | ECEA0JKS220  | 22                      | S       |
| C313     | ECUV1C104ZFB | 0.1                     |         |
| C315     | ECUV1C104ZFB | 0.1                     |         |
| C316     | ECA0JM331    | 330P                    | S       |
| C317     | ECUV1C104ZFB | 0.1                     |         |
| C311     | ECUV1C104ZFB | 0.1                     |         |
| C413     | ECUV1H103KBV | 0.01                    |         |
| C414     | ECUV1H222KBV | 0.0022                  |         |
| C415     | ECUV1C104KBV | 0.1                     |         |
| C416     | ECUV1C104KBV | 0.1                     |         |
| C417     | ECUV1H103KBV | 0.01                    |         |
| C419     | ECUV1H102KBV | 0.001                   |         |
| C420     | ECUV1H102KBV | 0.001                   |         |
| C421     | ECUV1H101JCV | 100P                    |         |
| C428     | ECEA1CKS220  | 22                      | S       |
| C501     | F1B2H152A048 | 1500P                   |         |
| C502     | F1B2H152A048 | 1500P                   |         |
| C503     | ECUV1H102KBV | 0.001                   |         |
| C504     | ECUV1H102KBV | 0.001                   |         |
| C702     | ECEA1CKA100  | 10                      |         |
| C703     | ECEA1CKA100  | 10                      |         |
| C704     | ECUV1C104KBV | 0.1                     |         |
| C706     | ECUV1C104KBV | 0.1                     |         |
| C707     | ECA0JM102    | 0.001                   | S       |
| C901     | ECUV1C224ZFB | 0.22                    |         |
| C903     | ECUV1C563KBV | 0.056                   |         |
| C904     | ECUV1H332KBV | 0.0033                  |         |
| C905     | ECUV1H103KBV | 0.01                    |         |
| C906     | ECUV1H223KBV | 0.022                   |         |
| C907     | ECJ1VB1H221K | 220P                    |         |
| C908     | ECUV1C473KBV | 0.047                   |         |
| C909     | ECJ1VF1H103Z | 0.01                    | S       |
| C910     | ECUV1H180JCV | 18P                     |         |
| C911     | ECUV1H150JCV | 15P                     |         |
| C913     | ECUV1C104ZFB | 0.1                     |         |
| C914     | ECUV1C104ZFB | 0.1                     |         |
| C915     | ECUV1H332KBV | 0.0033                  |         |
| C924     | ECUV1C104ZFB | 0.1                     |         |

| Ref. No. | Part No.     | Part Name & Description | Remarks |
|----------|--------------|-------------------------|---------|
| C925     | ECEA0JKA221  | 220                     |         |
| C926     | ECUV1C104KBV | 0.1                     |         |
| C927     | ECUV1C105ZFB | 1                       |         |
| C928     | ECUV1C105ZFB | 1                       |         |
| C929     | ECJ1VB1H221K | 220P                    |         |
| C930     | ECUV1H153KBV | 0.015                   |         |
| C937     | ECEA0JU220   | 22                      |         |
| C938     | ECUV1C104ZFB | 0.1                     |         |
| C939     | ECUV1C104ZFB | 0.1                     |         |
| C940     | ECUV1C104ZFB | 0.1                     |         |
| C941     | ECUV1C104ZFB | 0.1                     |         |
| C943     | ECUV1C104ZFB | 0.1                     |         |
| C944     | ECJ1VB1H221K | 220P                    |         |
| C945     | ECUV1C104KBV | 0.1                     |         |
| C946     | ECUV1C104KBV | 0.1                     |         |
| C947     | ECUV1H100JCV | 10P                     |         |
| C948     | ECUV1C104ZFB | 0.1                     |         |
| C949     | ECUV1H102KBV | 0.001                   |         |
| C950     | ECUV1H100JCV | 10P                     |         |
| C951     | ECUV1C333KBV | 0.033                   |         |
| C952     | ECUV1H100JCV | 10P                     |         |
| C953     | ECUV1H152KBV | 0.0015                  |         |
| C954     | ECUV1H152KBV | 0.0015                  |         |
| C955     | ECUV1C104ZFB | 0.1                     |         |
| C956     | ECUV1C104KBV | 0.1                     |         |
| C957     | ECUV1H102KBV | 0.001                   |         |
| C958     | ECUV1H102KBV | 0.001                   |         |
| C959     | ECUV1H102KBV | 0.001                   |         |
|          |              | (OTHERS)                |         |
| E1       | PQJE10159Z   | LEAD WIRE, FFC          |         |
| LCD      | L5DCAYY00006 | LIQUID CRYSTAL DISPLAY  |         |
| SW101    | PQSH2B105Z   | PUSH SWITCH, HOOK       |         |
| POS101   | PFRT002      | THERMISTOR              | S       |
| X900     | H0D103500004 | CRYSTAL OSCILLATOR      |         |

### 13.3.1.3. Operational P. C. Board Parts

| Ref. No. | Part No.     | Part Name & Description           | Remarks |
|----------|--------------|-----------------------------------|---------|
| PCB2     | PQWP2TS620BX | OPERATIONAL P.C.BOARD ASS'Y (RTL) |         |
|          |              | (LEDS)                            |         |
| LED801   | PSVD1SRCT    | LED                               | S       |
| LED802   | PSVD1SRCT    | LED                               | S       |
|          |              | (CONNECTOR)                       |         |
| CN801    | PQJS18X54Z   | CONNECTOR                         | S       |
|          |              | (OTHERS)                          |         |
| MIC      | PQJM122Z     | MICROPHONE                        |         |

### 13.3.2. Accessories and Packing Materials

#### Note:

(\*1) You can download and refer to the Operating Instructions (Instruction book) on TSN Server.

| Ref. No. | Part No.   | Part Name & Description                  | Remarks |
|----------|------------|------------------------------------------|---------|
| A1       | PQLV219EW  | AC ADAPTOR                               | ⚠       |
| A2       | PQJA10075Z | CORD, TELEPHONE                          |         |
| A3       | PQJA212M   | CORD, HANDSET                            |         |
| A4       | PQJXF0102Z | HANDLE/HANDSET                           |         |
| A5       | PQOX14911X | INSTRUCTION BOOK (*1)                    |         |
| A6       | PQQW15014Y | LEAFLET, QUICK GUIDE (for Arabic/ Farsi) |         |
| P1       | PQPH10076Y | PROTECTION COVER                         |         |
| P2       | PQPK15005Y | GIFT BOX                                 |         |

### 13.3.3. Screws

| Safety | Ref.<br>No. | Part No.     | Part Name & Description | Remarks |
|--------|-------------|--------------|-------------------------|---------|
|        | A           | PQHV2612PJ65 | TAPPING SCREW           |         |
|        | B           | XTW26+8PFJ7  | TAPPING SCREW           |         |