# Service Manual

**Telephone Equipment**

Caller ID Compatible

**Model No. KX-TG3721BXB**
**KX-TG3721BXN**
**KX-TG3722BXB**
**KX-TG3722BXN**
**KX-TGA371BXB**
**KX-TGA371BXN**

2.4 GHz Digital Cordless Answering System
B: Black Version
N: Platinum Silver Version
(for Asia, Middle Near East and Other areas)

KX-TGA371BXB/BXN
(Portable)

KX-TG3721BXB/BXN
(Base Unit)

(Charger Unit)

**Configuration for each model**

| Model No | Base Unit | Handset | Charger Unit |
|---|---|---|---|
| KX-TG3721 | 1 (TG3721) | 1 (TGA371) | |
| KX-TG3722 | 1 (TG3721) | 2 (TGA371) | 1 |
| KX-TGA371* | | 1 (TGA371) | 1 |

*KX-TGA371 is also an optional accessory, which contains a handset and a charger.

# Panasonic ®

⚠ **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 manufacture's Instructions.

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

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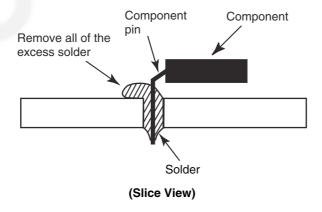
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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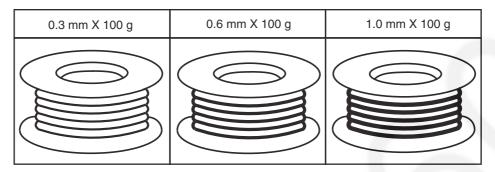
- PbF solder has a melting point that is 50 °F ~ 70 °F (30 °C ~ 40 °C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700 °F ± 20 °F (370 °C ± 10 °C).
- Exercise care while using higher temperature soldering irons.:
  Do not heat the PCB for too long time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



**(Slice View)**

## 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

| | Base Unit | Handset | Charger |
|---|---|---|---|
| Power Supply | AC Adaptor (PNLV226BX0Z, 100-240 V AC, 50/60 Hz) | Rechargeable Ni-MH battery (2 x 1.2 V, 550 mAh) | AC Adaptor (PNLV226BX0Z, 100-240 V AC, 50/60 Hz) |
| Receiving/Transmitting Frequency | 91 channels within 2.4 GHz - 2.48 GHz | 91 channels within 2.4 GHz - 2.48 GHz | —— |
| Receiving Method | Super Heterodyne | Super Heterodyne | —— |
| Oscillation Method | PLL synthesizer | PLL synthesizer | —— |
| Detecting Method | Quadrature Discriminator | Quadrature Discriminator | —— |
| Tolerance of OSC Frequency | 10.368 MHz ± 41 Hz | 10.368 MHz ± 41 Hz | —— |
| Modulation Method | Frequency Modulation | Frequency Modulation | —— |
| Spread spectrum Method | Frequency Hopping Spread spectrum | Frequency Hopping Spread spectrum | —— |
| ID Code | 19 bit | 22 bit | —— |
| Security Codes | —— | 1,000,000 | —— |
| Ringer Equivalence No. (REN) | 0.1 | —— | —— |
| Dialing Mode | —— | Tone (DTMF)/Pulse | —— |
| Redial | —— | Up to 24 digits | —— |
| Speed Dialer | —— | Up to 24 digits (Phonebook) | —— |
| Power Consumption | Standby: Approx. 1.0 W, Maximum: Approx. 3.0 W | 6 days at Standby, 10 hours at Talk | Standby: Approx. 0.1 W, Maximum: Approx. 2.0 W |
| Operating Environment | 0 °C - 40 °C, 20% - 80% relative air humidity (dry) | 0 °C - 40 °C, 20% - 80% relative air humidity (dry) | 0 °C - 40 °C, 20% - 80% relative air humidity (dry) |
| Dimensions (H x W x D) | Approx. 77 mm x 150 mm x 90 mm | Approx. 159 mm x 49 mm x 29 mm | Approx. 43 mm x 73 mm x 76 mm |
| Mass (Weight) | Approx. 200 g | Approx. 130 g | Approx. 50 g |

**Note:**
● Design and specifications are subject to change without notice.

**Note for Service:**
● Optional headset: KX-TCA94EX, RP-TCA400, RP-TCA430

# 4 Technical Descriptions

## 4.1. FHSS Description

### 4.1.1. Frequency
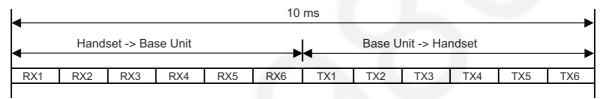
The frequency range of 2.4 GHz-2.48 GHz is used. Transmitting and receiving channel between base unit and handset is same frequency.
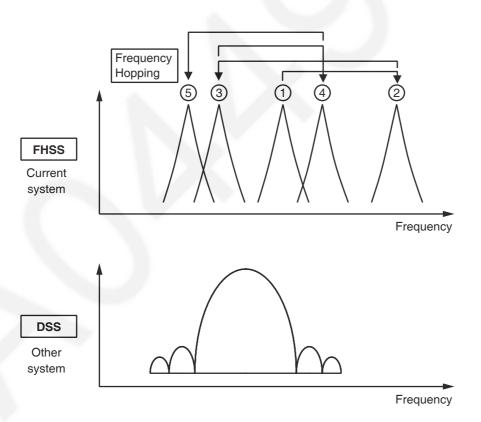
### 4.1.2. FHSS (Frequency Hopping Spread Spectrum)

This telephone is using an IC chip which has similar specification to WDCT (World Digital Cordless Telephone) and is the telephone system that can use multiple portable unit simultaneously. The explanation of this system is mentioned below. This system uses a Time Division Multiple Access/Time Division Duplex (**TDMA/TDD**) scheme:
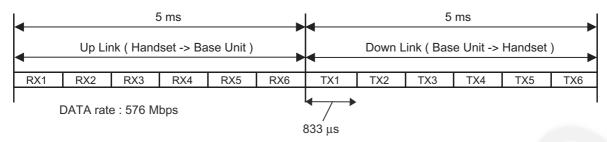
transmitting and receiving frequencies of the base unit and handset are shared in the same frequency. The construction of RX/TX frequency data is shown below. It consists of 6 slots from the base unit to the handset, and 6 slots from the handset to the base unit, total 12 slots in 10 ms. By this slot system, simultaneous air link and communication between 6 handsets and the base unit can be realized. One communication between handset and the base unit is done by one slot from the base unit to handset, and another slot from handset to the base unit.

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

## 4.1.2.1. TDD Frame Format



DATA rate : 576 Mbps

833 µs

## 4.1.2.2. TDMA system

This system is the cycles of 10 ms, and has 6 duplex paths,
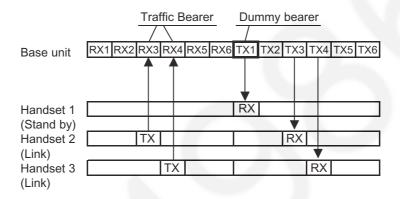
but maximum duplex communication path is 5 because of dummy bearer use.

In 1 slot 833 us, the 10 ms of voice data is transmitted.

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

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

• **2 - Handsets Link**



**Traffic Bearer**

A link is established between base unit and handset.

The state where duplex communication is performed.

The hopping pattern of a 75 hops (750 mseconds) cycle.
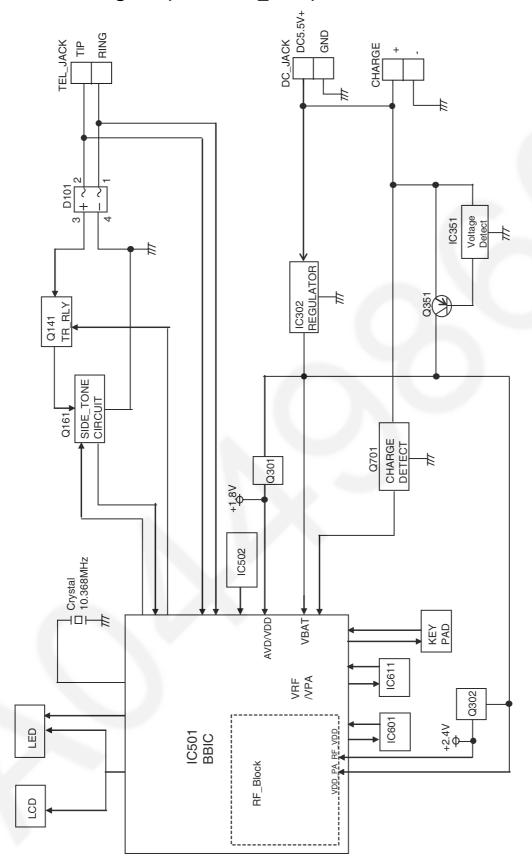
**Dummy Bearer**

The base unit sends Dummy-data to the all stand-by state handsets.

The handsets receive that data for keeping synchronization and monitoring request from the base unit.
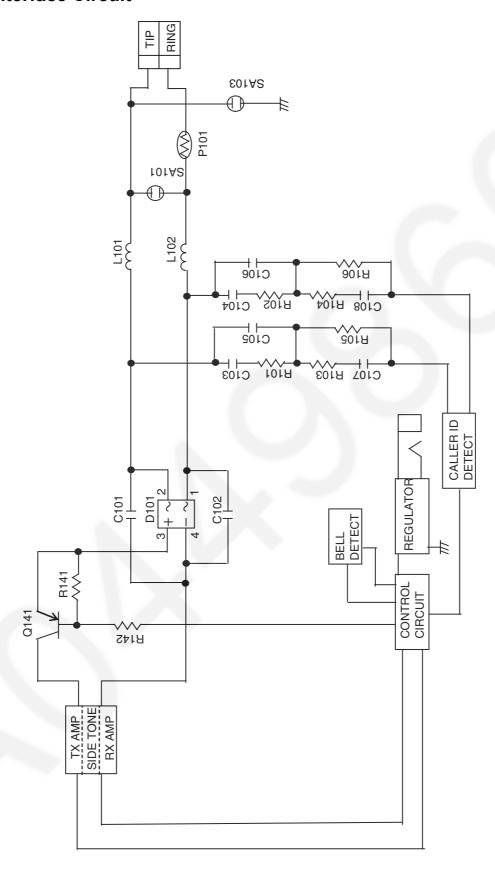
Dummy Bearer doesn't contain B-field (sound) data.

## 4.2. Block Diagram (Base Unit_Main)
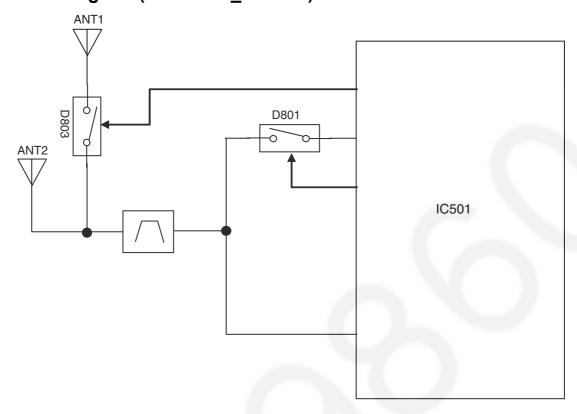


KX-TG3721/3722 BLOCK DIAGRAM (Base Unit_Main)

## 4.3.    Tel Interface Circuit

## 4.4. Block Diagram (Base Unit_RF Part)
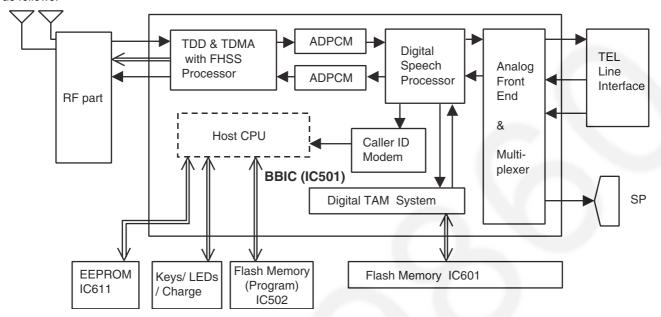


KX-TG3721/3722 BLOCK DIAGRAM (Base Unit_RF Part)

# 4.5. Circuit Operation (Base Unit)

**General Description:**

(BBIC Flash Memory, EEPROM) is a digital speech/signal processing system that implements all the functions of speech compression, record and playback, and memory management required in a digital telephone answering machine.

The BBIC system is fully controlled by a host processor. The host processor provides activation and control of all that functions as follows.



## 4.5.1. BBIC (Base Band IC: IC501)

- **Voice Message Recording/Play back**

  The BBIC system uses a proprietary speech compression technique to record and store voice message in Flash Memory. An error correction algorithm is used to enable playback of these messages from the Flash Memory.

- **DTMF Generator**

  When the DTMF data from the handset is received, the DTMF signal is output.

- **Synthesized Voice (Pre-recorded message)**

  The BBIC implements synthesized Voice, utilizing the built in speech detector and a Flash Memory, which stored the vocabulary.

- **Caller ID demodulation**

  The BBIC implements monitor and demodulate the FSK/DTMF signals that provide CID information from the Central Office.

- **Digital Switching**

  The voice signal from telephone line is transmitted to the handset or the voice signal from the handset is transmitted to the Telephone line, etc. They are determined by the signal path route operation of voice signal.

- **Block Interface Circuit**

  RF part, LED, Key scan, Speaker, Telephone line.

## 4.5.2. Flash Memory (IC502)

Main program data is stored.

## 4.5.3. Flash Memory (IC601)

Following information data is stored.

- **Voice signal**

  ex: Pre-recorded Greeting message, Incoming message

## 4.5.4. EEPROM (IC611)

Following information data is stored.
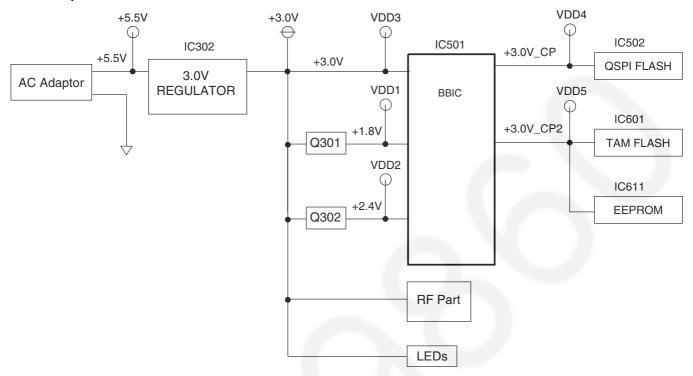
- **Settings**
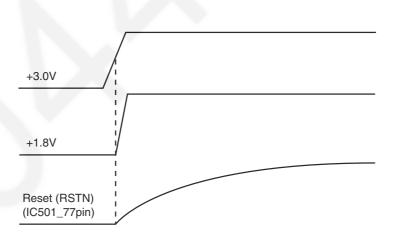
  ex: message numbers, ID code, Flash Time, Tone/Pulse

## 4.5.5. Power Supply Circuit/Reset Circuit

The power supply voltage from AC adaptor is converted to VBAT (3.0V) in IC302. And +3.0V for peripherals and analog part is insulated from VBAT by Doubler of BBIC.

**Circuit Operation:**
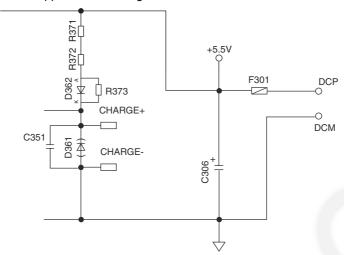
## 4.5.5.1.   Charge Circuit

The voltage from the AC adaptor is supplied to the charge circuits.

## 4.5.6. Telephone Line Interface

**Telephone Line Interface Circuit:**

**Function**
- Bell signal detection
- ON/OFF hook and pulse dial circuit
- Side tone circuit

**Bell (RINGING) signal detection and OFF HOOK circuit:**

In the idle mode, Q141 is open to cut the DC loop current and decrease the ring load. When ring voltage appears at the Tip (T) and Ring (R) leads (When the telephone rings), the AC ring voltage is transferred as follows:

L1T→L101→C105→R105→R110→R111→R112→BBIC pin18(RINGING)

When the CPU (BBIC) detects a ring signal, Q141 turns on, thus providing an off-hook condition (active DC current flow through the circuit). Following signal flow is the DC current flow.

T → L101 → D101 → Q141 → Q161 → R163 → R167 → D101 → L102 → P101 → R

**ON HOOK Circuit:**
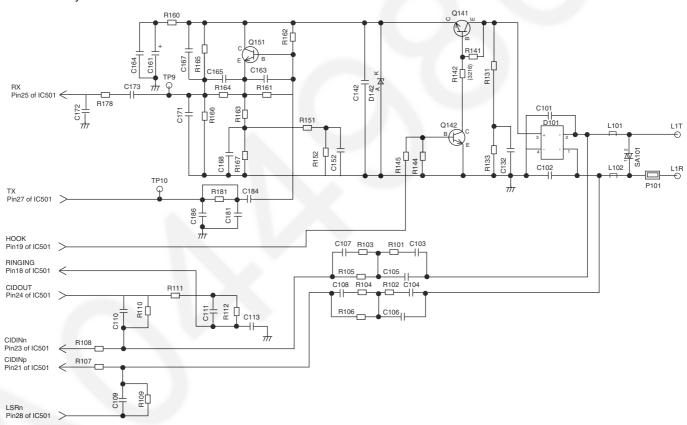
Q141 is open, Q141 is connected as to cut the DC loop current and to cut the voice signal. The unit is consequently in an on-hook condition.

**Pulse Dial Circuit:**

Pin 19 of BBIC turns Q141 ON/OFF to make the pulse dialing.

**Side Tone Circuit:**

Basically this circuit prevents the TX signal from feeding back to RX signal. As for this unit, TX signal feed back from Q161 is canceled by the canceller circuit of BBIC.

## 4.5.7. Parallel Connection Detect Circuit/Auto Disconnect Circuit

**Function:**

In order to disable call waiting and stutter tone functions when using telephones connected in parallel, it is necessary to have a circuit that judges whether a telephone connected in parallel is in use or not. This circuit determines whether the telephone connected in parallel is on hook or off hook by detecting changes in the T/R voltage.

**Circuit Operation:**
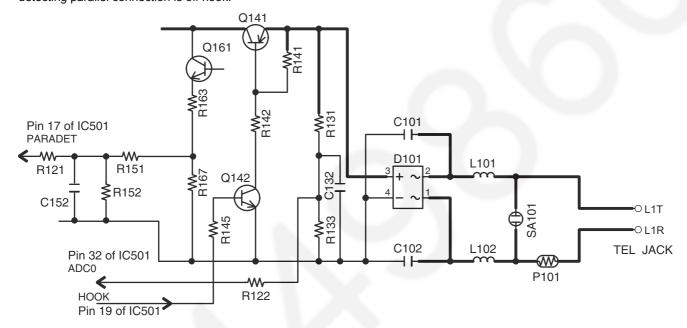
Parallel connection detection when on hook:

When on hook, the voltage is monitored at pin 32 of IC501. There is no parallel connection if the voltage is 0.54 V or higher, while a parallel connection is deemed to exist if the voltage is lower.


Parallel connection detection when off hook:

When off hook, the voltage is monitored at pin 17 of IC501; the presence/absence of a parallel connection is determined by detecting the voltage changes.

If the Auto disconnect function is ON and statuses are Hold, receiving ICM, OGM transmitting, BBIC disconnects the line after detecting parallel connection is off hook.
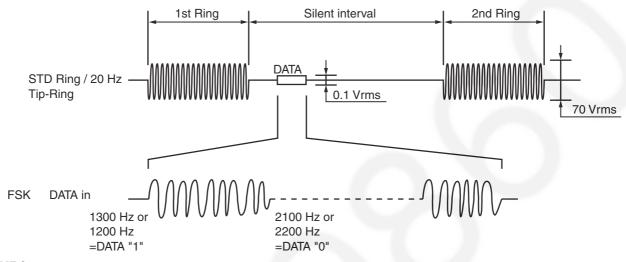
## 4.5.8. Calling Line Identification (Caller ID)/Call Waiting Caller ID

**Function:**

The caller ID is a chargeable 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.
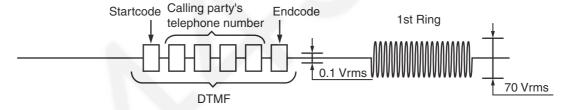
The Caller-ID data from exchange is supplied to the telephone using either method of FSK or DTMF. The method is chosen according to the exchange of telephone office. This unit is available to receive the data with both methods and displays the received data on LCD.

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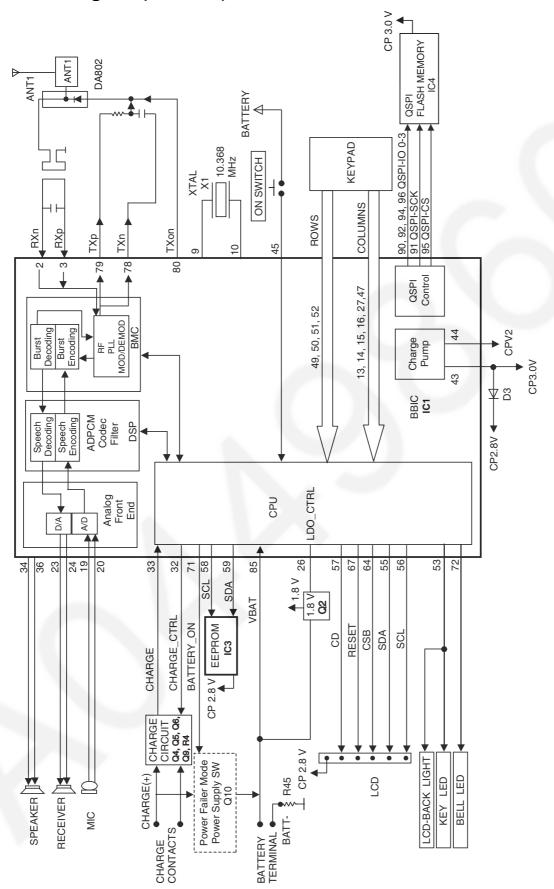


• **DTMF format**

It is the method to send the telephone number of calling party with DTMF to the telephone. DTMF is sent before the first bell signal. The data is sent in turn; first the start code, secondly the telephone number of calling party, lastly end code.

The DTMF is chosen from A (1633 Hz and 697 Hz), B (1633 Hz and 770 Hz), C (1633 Hz and 852 Hz) and D (1633 Hz and 941Hz) as the start code and end code according to the exchange.
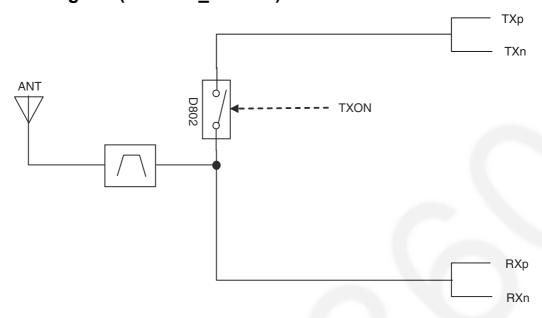
# 4.6. Block Diagram (Handset)



KX-TGA371 BLOCK DIAGRAM (Handset)

## 4.7. Block Diagram (Handset_RF Part)



KX-TGA371 BLOCK DIAGRAM (Handset_RF Part)

# 4.8. Circuit Operation (Handset)

## 4.8.1. Outline

Handset consists of the following ICs as shown in **Block Diagram (Handset)** (P.18).

• DECT BBIC (**B**ase **B**and IC): IC1
- All data signals (forming/analyzing ACK or CMD signal)
- All interfaces (ex: Key, Detector Circuit, Charge, EEPROM, LCD)

• EEPROM: IC3
- Setting data is stored. (e.g. ID, user setting)
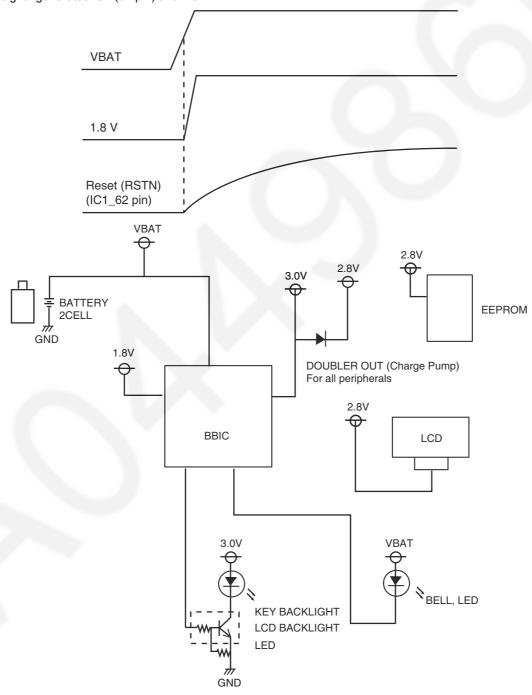
## 4.8.2. Power Supply Circuit/Reset Circuit

**Circuit Operation:**

When power on the Handset, the voltage is as follows;

BATTERY(2.2 V ~ 2.6 V: BATT+) → F1 → BBIC (IC1) 41 pin

The Reset signal generates IC1 (62 pin) and 1.8 V.

## 4.8.3. Charge Circuit
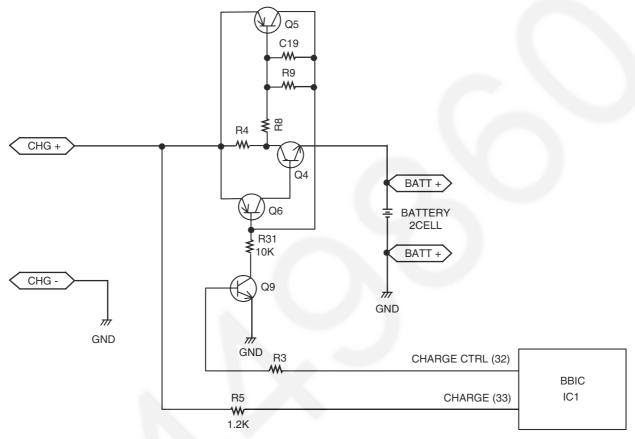
**Circuit Operation:**

When charging the handset on the Base Unit, the charge current is as follows;

DCP+(5.5 V) → F301 → R371 → R372 → D362 → CHARGE+(Base) → CHARGE+(Handset) → $\left\{ \begin{matrix} Q5 \\ R4 \end{matrix} \right\}$ → Q4 → F1 →

BATTERY+... Battery...

BATTERY- → R45 → GND → CHARGE-(Handset)→ CHARGE-(Base) → GND → DCM

In this way, the BBIC on Handset detects the fact that the battery is charged.

The charge current is controlled by switching Q9 of Handset.



## 4.8.4. Battery Low/Power Down Detector

**Circuit Operation:**

"Battery Low" and "Power Down" are detected by BBIC which check the voltage from battery.

The detected voltage is as follows;

• Battery Low

Battery voltage: V(Batt) ≤ 2.25 V ± 50 mV

The BBIC detects this level and "⌞▪⌟" starts flashing.

• Power Down
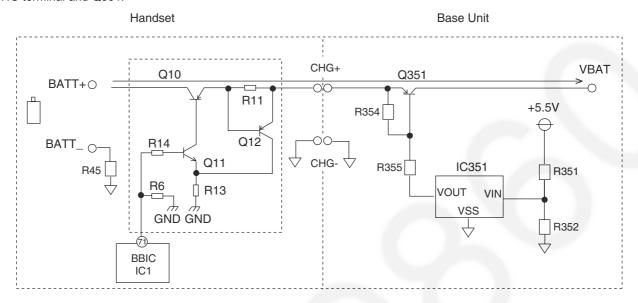
Battery voltage: V(Batt) ≤ 2.0 V ± 50 mV

The BBIC detects this level and power down.

# 4.9. Behavior of Electric Power Failure

In case that the power from AC adaptor is lost and lose radio waves, BBIC (IC1) turns Q11 and Q10 ON since handset presumes that base unit's power is failed.

Base unit detects that power voltage of AC adaptor +5.5V is OFF at IC351, then turns Q351 ON.

It's possible to use the units during the power failure, supplying power to VBAT of base unit from battery of handset through IC6, CHG terminal and Q351.



# 4.10. Circuit Operation (Charger Unit)

Charge control is executed at handset side so that the operation when using charger is also controlled by handset.
Refer to **Circuit Operation (Handset)**



AC Adaptor

The route for this is as follows: DC+pin of J1(+) → F1 → R1 → CHARGE+pad → Handset → CHARGE-pad → DC-pin of J1(-).

# 4.11. Signal Route

| SIGNAL ROUTE | IN → ROUTE → OUT |
|---|---|
| HANDSET TX | HANDSET MIC - C11/13 - RA4 - IC1(19/20) - **\<HANDSET_RF_TX_ROUTE\>** - ANT. --- |
| | ANT. - **\<BASE_UNIT_RF_RX_ROUTE\>** - IC501(2/3 - 27) - C184 - Q161 -Q141 - D101 - L101/[L102-P101] - T/R (TEL LINE) |
| HANDSET RX | T/R (TEL LINE) - L101/[P101-L102] - D101 - Q141 - R165 - C173 - R178 - IC501(25 - 94/95) - **\<BASE_UNIT_RF_TX_ROUTE\>** - ANT |
| | --- ANT. - **\<HANDSET_RF_RX_ROUTE\>** - IC1(23/24) - L9  -  HANDSET SPEAKER |
| HANDSET SP-Phone TX | HANDSET MIC -  C11/13 - RA4 - IC1(19/20) - **\<HANDSET_RF_TX_ROUTE\>** - ANT. --- |
| | ANT. - **\<BASE_UNIT_RF_RX_ROUTE\>** - IC501(2/3 - 27) - C184 - Q161 -Q141 - D101 - L101/[L102-P101] - T/R (TEL LINE) |
| HANDSET SP-Phone RX | T/R (TEL LINE) - L101/[P101-L102] - D101 - Q141 - R165 - C173 - R178 - IC501(25 - 94/95) - **\<BASE_UNIT_RF_TX_ROUTE\>** - ANT |
| | --- ANT. **-\<HANDSET_RF_RX_ROUTE\>** - IC1(34/36) - Backside SP |

**Note:**

☐ : inside of Handset

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| SIGNAL ROUTE | IN | → | ROUTE | → | OUT |
|---|---|---|---|---|---|

**GREETING RECORDING**
HANDSET MIC - C11/13 - RA4 - IC1(19/20) - **<HANDSET_RF_TX_ROUTE>** - ANT. ---

ANT - **<BASE_UNIT_RF_RX_ROUTE>** - IC501(2/3 - 69/70) - IC601

**GREETING PLAY TO TEL LINE**
IC601 - IC501(69/70 - 27) - C184 - Q161 -Q141- D101 - L101/[L102-P101]  - T/R (TEL LINE)

**ICM RECORDING**
T/R (TEL LINE) - L101/[P101-L102] - D101 - Q141 - R165 - C173 - R178 - IC501(25 - 69/70) - IC601

**ICM PLAY TO SPEAKER**
IC601 - IC501(69/70 - 41/43) - SPEAKER

**DTMF SIGNAL TO TEL LINE**
IC501(27) - C184 - Q161 -Q141- D101 - L101/[L102-P101] - T/R (TEL LINE)

**CALLER ID**
T/R(TEL LINE) - L101/[P101 - L102] - C105/C106 - R105/R106 - R108/R107 -IC501(23/21)

**BELL DETECTION**
T/R(TEL LINE) - L101 - C105 - R105 - R110 - R111 - R112 - IC501(18)

**HANDSET RF [ TX_ROUTE ]**
IC1(78/79) - L802 - C812 - D802 -  ANT

**HANDSET RF [ RX_ROUTE ]**
ANT - C838 - C826 - IC1(2/3)

**BASE UNIT RF [ TX_ROUTE ]**
IC501(95/94) - L802/C813 - C812 - D801 - C852/C853 - ANT1/ANT2

**BASE UNIT RF [ RX_ROUTE ]**
ANT1/ANT2 - C852/C853 - C828 - L805/L806 - IC501(3/2)

**Note:**

⬜ : inside of Handset

# 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.

| Items | Contents |
|---|---|
| Battery | You could use other rechargeable batteries sold in a market, but the unit is not guaranteed to work properly. |
| | The battery strength may not be indicated correctly if the battery is disconnected and connected again, even after it is fully charged. In that case, by recharging the battery as mentioned in the Operating Instructions, you will get a correct indication of the battery strength. |
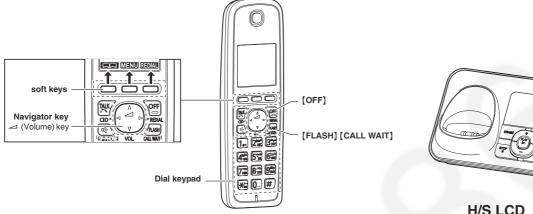
# 8  Test Mode

## 8.1.  Engineering Mode

### 8.1.1.  Base Unit

**Important:**
Make sure the address on LCD is correct when entering new data. Otherwise, you may ruin the unit.



**soft keys**

**Navigator key**
⊿ (Volume) key

**[OFF]**

**[FLASH] [CALL WAIT]**

**Dial keypad**

**H/S key operation**

**H/S LCD**

1). Press MENU .

2). Select "Initial Setup" using [▲]or[▼] then press OK or [►].

   Select "Line Setup" using [▲]or[▼] then press OK or [►].

3). Enter "7", "2", "6", "2", "7", "6", "6", "4".
   **Note:** 7262 7664 = PANA SONI
   (see letters printed on dial keys)

4). Select "Write EEP" using [▲]or[▼] then press OK or [►].

5). Enter "●", "●", "●", "●" (Address). (*1)

6). Enter "∗", "∗" (New Data). (*1)

Caller List — INT OK

Initial Setup — INT OK

Line Setup — BACK OK

Dial mode — BACK OK

See next page

Service Mode / Read EEP / Write EEP — BACK OK

Set Addr.: ●●●● ∗∗ ← Default Data — CLEAR OK

7). Press **OK** , a long confirmation beep
will be heard.

Set Addr.:
●●●● **✳✳** ←——— New Data

CLEAR OK

8). Press **[OFF]** to return to standby mode.

After that, turn the base unit power off and then power on.

Set Addr.:
_ _ _ _  _ _

BACK

Note: * To enter "Dial mode", press **OK** or **[►]** at " Line Setup".
It is necessary to turn on the power of base unit.

**Frequently Used Items (Base Unit)**
ex.)

| Items | Address | Default Data | New Data | | Remarks |
|---|---|---|---|---|---|
| Frequency | 00 07/00 08 | 70/02 | - | - | Use these items in a **READ-ONLY** mode to confirm the contents. Careless rewriting may cause serious damage to the computer system. |
| ID | 00 02~00 06 | Given value | - | - | |
| C-ID (FSK) sensitivity | 075B | 00 | 01 (6dB up) | 02 (12 dB up) | When hex changes from "00" to "01" or "02", gain increases by 6 dB or 12 dB. |
| C-ID (DTMF) sensitivity | 0790 | 50 | 60 (6dB up) | 70 (12 dB up) | When hex changes from "50" to "60" or "70" gain increases by 6 dB or 12 dB. |

**Note:**
(*1) When you enter the address or New Data, please refer to the table below.
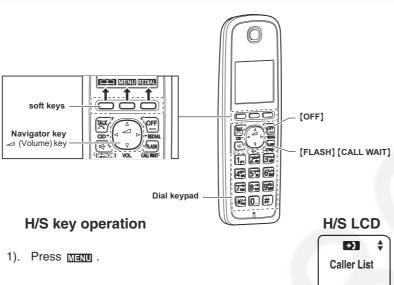
| Desired Number (hex) | Input Keys | Desired Number (hex) | Input Keys |
|---|---|---|---|
| 0 | 0 | A | [FLASH] + 0 |
| 1 | 1 | B | [FLASH] + 1 |
| . | . | C | [FLASH] + 2 |
| . | . | D | [FLASH] + 3 |
| . | . | E | [FLASH] + 4 |
| 9 | 9 | F | [FLASH] + 5 |

## 8.1.2. Handset

> **Important:**
> Make sure the address on LCD is correct when entering new data. Otherwise, you may ruin the unit.

**soft keys**

**Navigator key**
⊿ (Volume) key

**Dial keypad**

【OFF】

【FLASH】【CALL WAIT】

### H/S key operation

1). Press MENU .

2). Select "Initial Setup" using 【▲】or【▼】
   then press OK or 【►】.

3). Enter "7", "2", "6", "2", "7", "6", "6", "4".
   **Note:** 7262 7664 = PANA SONI
   (see letters printed on dial keys)

4). Select "Write EEP" using【▲】or【▼】
   then press OK or 【►】.
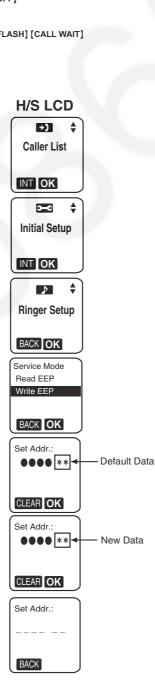
5). Enter "●", "●", "●", "●" (Address). (*1)

6). Enter "＊", "＊" (New Data). (*1)

7). Press OK , a long confirmation beep
   will be heard.

8). Press 【OFF】 to return to standby mode.
   After that, remove and reinsert the batteries.

### H/S LCD

➔〕  ⬍
**Caller List**
INT OK

⚒  ⬍
**Initial Setup**
INT OK

♪  ⬍
**Ringer Setup**
BACK OK

Service Mode
Read EEP
Write EEP
BACK OK

Set Addr.:
●●●● ＊＊  ← Default Data
CLEAR OK

Set Addr.:
●●●● ＊＊  ← New Data
CLEAR OK

Set Addr.:
＿ ＿ ＿ ＿ ＿ ＿
BACK

**Frequently Used Items (Handset)**
ex.)

| Items | Address | Default Data | New Data | Possible Adjusted Value MAX (hex) | Possible Adjusted Value MIN (hex) | Remarks |
|---|---|---|---|---|---|---|
| Battery Low | 00 09 | 70 | - | - | - | |
| Frequency | 00 07/00 08 | 70/02 | - | - | - | (*2) |
| ID | 00 02~00 06 | Given value | - | - | - | |

**Note:**
(*1) When you enter the address or New Data, please refer to the table below.
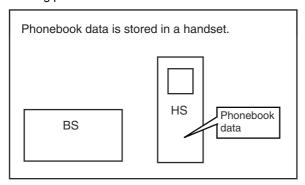
| Desired Number (hex.) | Input Keys | Desired Number (hex.) | Input Keys |
|---|---|---|---|
| 0 | 0 | A | [FLASH] + 0 |
| 1 | 1 | B | [FLASH] + 1 |
| . | . | C | [FLASH] + 2 |
| . | . | D | [FLASH] + 3 |
| . | . | E | [FLASH] + 4 |
| 9 | 9 | F | [FLASH] + 5 |

(*2) Use these items in a READ-ONLY mode to confirm the contents. Careless rewriting may cause serious damage to the handset.

# 8.2. Copying Phonebook Items when Repairing
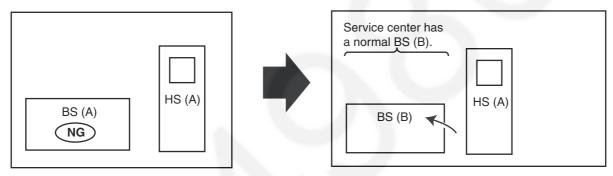
You can copy the handset phonebook to another (compatible Panasonic) handset. This will help to save the original phonebook data which the customer has registered.

Refer to the following procedures.



Phonebook data is stored in a handset.
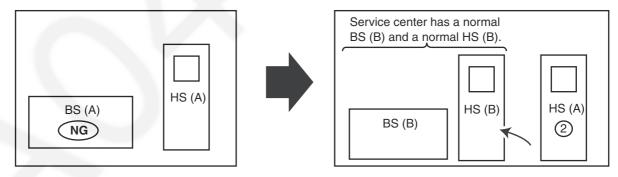
**Case 1:** A base unit has a defect.
(Replacing a base unit PCB etc...)



Service center has a normal BS (B).

1. Register HS (A) to BS (B).
   HS (A) is normal, therefore no need to copy the phonebook data.

**Case 2:** A base unit has a defect.
(Replacing both a base unit and a handset)



Service center has a normal BS (B) and a normal HS (B).
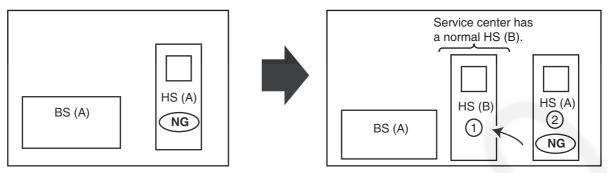
1. Register HS (A) to BS (B) as a handset no. 2.
2. Copy the phonebook data from HS (A) to HS (B).
3. Cancel the HS 2 (HS (A)).

**Note:**
- BS=Base Unit, HS=Handset
- If the max number of handsets are already registered to the base unit, a new handset cannot be registered.
- To register the handset, refer to **Registering a Handset to the Base Unit** (P.42).
- To cancel the handset, refer to **Deregistering All Handsets by the Base Unit** (P.42).
- To copy the handset phonebook, refer to **Copying All Entries** (P.42).
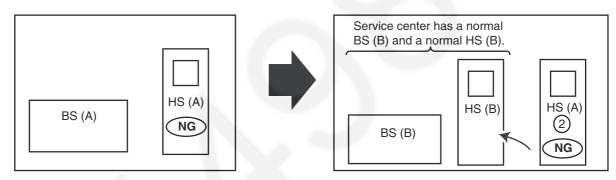
**Case 3:** A handset has a defect.
(Radio transmission is functioning.)



1. Cancel HS (A).
2. Register HS (B) as a handset no. 1.
3. Register HS (A) as a handset no. 2.
4. Copy the phonebook data from HS (A) to HS (B).
5. Cancel HS 2 (HS (A)).

**Case 4:** A handset has a defect.
(Radio transmission is functioning.)



1. Register HS (A) as a handset no. 2.
2. Copy the phonebook data from HS (A) to HS (B).
3. Cancel HS 2 (HS (A)).

**Note:**
 • BS=Base Unit, HS=Handset
 • If the max number of handsets are already registered to the base unit, a new handset cannot be registered.
 • To register the handset, refer to **Registering a Handset to the Base Unit** (P.42).
 • To cancel the handset, refer to **Deregistering All Handsets by the Base Unit** (P.42).
 • To copy the handset phonebook, refer to **Copying All Entries** (P.42).

# 9 Service Mode

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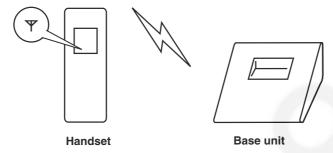
Units are reset to the Factory settings by this operation (Erase recorded Voice messages, stored Phone numbers, Caller list and etc.)

**Note:**
- Some menus are not reset. Refer to **Operating Instructions** (P.25).
- The reset menus differ depending on the following operations.
- **This operation should not be performed for a usual repair.**

### 9.1.1. Resetting both base unit and handset

Both the base unit and the registered handset which you did the following steps ① to ④ are reset. Other registered handsets will not be reset.



**Handset**          **Base unit**
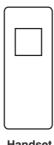
① Connect the AC adaptor to the base unit and install the charged batteries into the handset.

② Confirm the handset is registered to the base unit ( ⊻ lights).
  If the handset is not registered to the base unit ( ⊻ flashes), register it. (*1)

③ Lift the handset and press 【OFF】 to put the handset in standby mode.

④ Press ①, ⑤, ⑨ and ✳ key of the handset simultaneously until a confirmation tone is heard.

⑤ Disconnect the AC adaptor, then remove the battery.

**Note:**
(*1) Refer to **Registering a Handset to the Base Unit** (P.42).

### 9.1.2. Resetting only handset

The only handset is reset by doing the following steps ① to ④.



**Handset**

① Install the charged batteries into the handset.

② Lift the handset and press 【OFF】 to put the handset in standby mode.

③ Press ①, ⑤, ⑧ and # key of the handset simultaneously until a confirmation tone is heard. (*2)

④ Remove the battery.
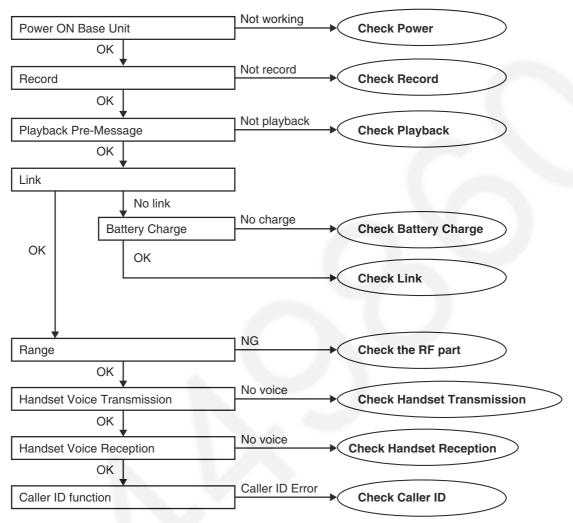
**Note:** (*2)
- The handset registration to the base unit is cancelled.
- If the handset needs to be registered to the base unit, refer to **Registering a Handset to the Base Unit** (P.42).
- If users do not bring the base unit with them, the registration procedure has to be done by users themselves.

# 10 Troubleshooting Guide

## 10.1. Troubleshooting Flowchart

**FLOW CHART**

| | | |
|---|---|---|
| Power ON Base Unit | Not working → | **Check Power** |
| ↓ OK | | |
| Record | Not record → | **Check Record** |
| ↓ OK | | |
| Playback Pre-Message | Not playback → | **Check Playback** |
| ↓ OK | | |
| Link | No link | |
| | Battery Charge | No charge → **Check Battery Charge** |
| OK | OK → **Check Link** | |
| Range | NG → | **Check the RF part** |
| ↓ OK | | |
| Handset Voice Transmission | No voice → | **Check Handset Transmission** |
| ↓ OK | | |
| Handset Voice Reception | No voice → | **Check Handset Reception** |
| ↓ OK | | |
| Caller ID function | Caller ID Error → | **Check Caller ID** |

**Cross Reference:**
  **Check Power** (P.34)
  **Check Record** (P.35)
  **Check Playback** (P.36)
  **Check Battery Charge** (P.36)
  **Check Link** (P.38)
  **Check the RF part** (P.40)
  **Check Handset Transmission** (P.43)
  **Check Handset Reception** (P.43)
  **Check Caller ID** (P.43)
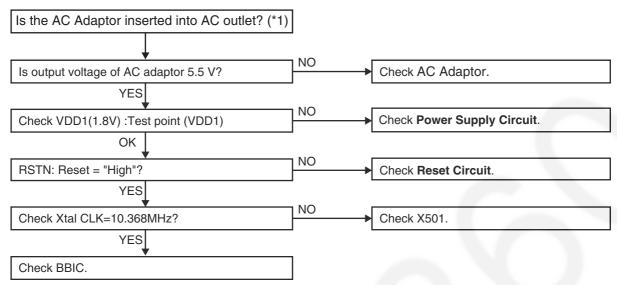
## 10.1.1. Check Power

### 10.1.1.1. Base Unit

Is the AC Adaptor inserted into AC outlet? (*1)

↓

Is output voltage of AC adaptor 5.5 V? —NO→ Check AC Adaptor.

↓ YES

Check VDD1(1.8V) :Test point (VDD1) —NO→ Check **Power Supply Circuit**.

↓ OK

RSTN: Reset = "High"? —NO→ Check **Reset Circuit**.

↓ YES

Check Xtal CLK=10.368MHz? —NO→ Check X501.

↓ YES

Check BBIC.
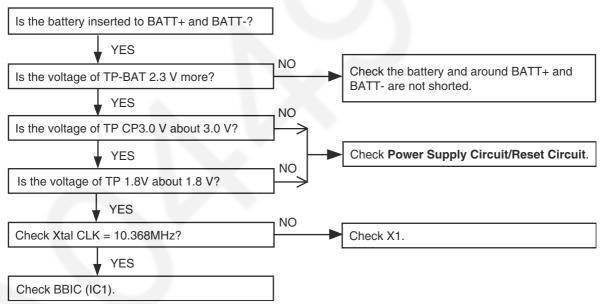
**Cross Reference:**
    **Power Supply Circuit/Reset Circuit** (P.13)

**Note:**
    BBIC is IC501.
    (*1) Refer to **Specifications** (P.6) for part number and supply voltage of AC adaptor.
    (*2) Refer to **Circuit Board (Base Unit_Main)** (P.81).

### 10.1.1.2. Handset

Is the battery inserted to BATT+ and BATT-?

↓ YES

Is the voltage of TP-BAT 2.3 V more? —NO→ Check the battery and around BATT+ and BATT- are not shorted.

↓ YES

Is the voltage of TP CP3.0 V about 3.0 V? —NO→

↓ YES

Is the voltage of TP 1.8V about 1.8 V? —NO→ Check **Power Supply Circuit/Reset Circuit**.

↓ YES

Check Xtal CLK = 10.368MHz? —NO→ Check X1.

↓ YES

Check BBIC (IC1).

**Cross Reference:**
    **Power Supply Circuit/Reset Circuit** (P.20)

34
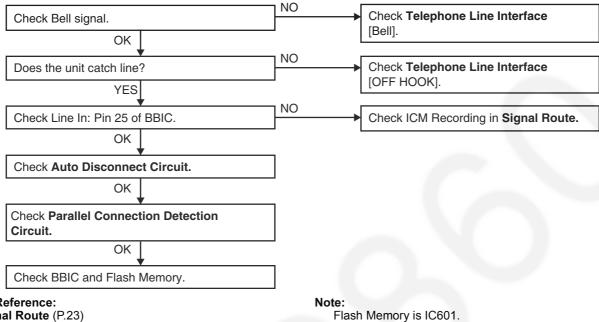
## 10.1.2. Check Record

### 10.1.2.1. Base Unit

**Not record Incoming Message**

| Check Bell signal. | NO → | Check **Telephone Line Interface** [Bell]. |

OK ↓

| Does the unit catch line? | NO → | Check **Telephone Line Interface** [OFF HOOK]. |

YES ↓

| Check Line In: Pin 25 of BBIC. | NO → | Check ICM Recording in **Signal Route.** |

OK ↓

Check **Auto Disconnect Circuit.**

OK ↓

Check **Parallel Connection Detection Circuit.**

OK ↓

Check BBIC and Flash Memory.

**Cross Reference:**
　　**Signal Route** (P.23)
　　**Telephone Line Interface** (P.15)
　　**Parallel Connection Detect Circuit/Auto Disconnect Circuit** (P.16)
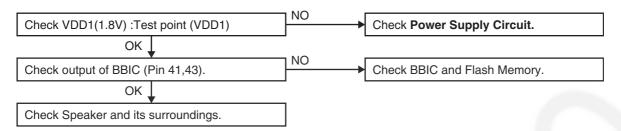
**Note:**
　　Flash Memory is IC601.
　　BBIC is IC501.

## 10.1.3. Check Playback

## 10.1.3.1. Base Unit

| Check VDD1(1.8V) :Test point (VDD1) | →NO→ | Check **Power Supply Circuit.** |

OK ↓

| Check output of BBIC (Pin 41,43). | →NO→ | Check BBIC and Flash Memory. |

OK ↓

| Check Speaker and its surroundings. |

**Cross Reference:**
  **Power Supply Circuit/Reset Circuit** (P.13)
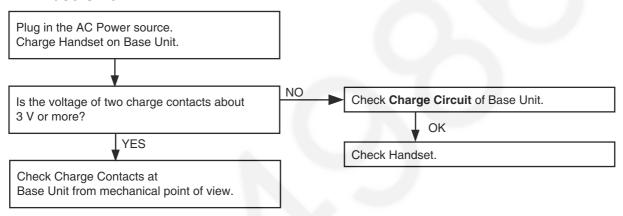
**Note:**
  Flash Memory is IC601.
  BBIC is IC501.

  (*1) Refer to **Circuit Board (Base Unit_Main)** (P.81).

## 10.1.4. Check Battery Charge

## 10.1.4.1. Base Unit

| Plug in the AC Power source. Charge Handset on Base Unit. |

↓

| Is the voltage of two charge contacts about 3 V or more? | →NO→ | Check **Charge Circuit** of Base Unit. |

YES ↓

| Check Charge Contacts at Base Unit from mechanical point of view. |

OK ↓

| Check Handset. |
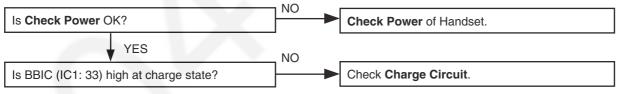
**Cross Reference:**
  **Charge Circuit** (P.14)

## 10.1.4.2. Handset

| Is **Check Power** OK? | →NO→ | **Check Power** of Handset. |

YES ↓

| Is BBIC (IC1: 33) high at charge state? | →NO→ | Check **Charge Circuit**. |
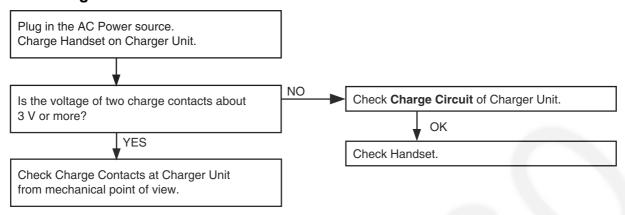
**Cross Reference:**
  **Check Power** (P.34)
  **Charge Circuit** (P.21)

## 10.1.4.3. Charger Unit

Plug in the AC Power source.
Charge Handset on Charger Unit.

↓

Is the voltage of two charge contacts about 3 V or more? ──NO──▶ Check **Charge Circuit** of Charger Unit.

│YES                                        │OK

Check Charge Contacts at Charger Unit from mechanical point of view.

Check Handset.
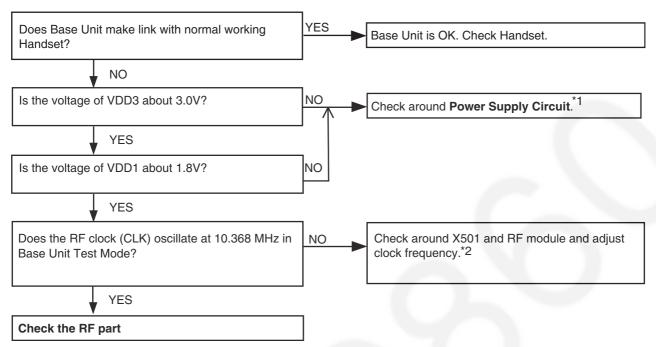
**Cross Reference:**
   **Charge Circuit** (P.21)

## 10.1.5.  Check Link

## 10.1.5.1.  Base Unit

| Does Base Unit make link with normal working Handset? | YES → | Base Unit is OK. Check Handset. |

NO ↓

| Is the voltage of VDD3 about 3.0V? | NO → | Check around **Power Supply Circuit**.[*1] |

YES ↓

| Is the voltage of VDD1 about 1.8V? | NO → |

YES ↓

| Does the RF clock (CLK) oscillate at 10.368 MHz in Base Unit Test Mode? | NO → | Check around X501 and RF module and adjust clock frequency.[*2] |

YES ↓

**Check the RF part**

**Cross Reference:**
> **Power Supply Circuit/Reset Circuit** (P.13)
> **Check the RF part** (P.40)

**Note:**
> *1 VDD1 can be adjusted.
> Refer to **Adjustment of Base Unit** (P.55).
> *2 How to adjust the frequency of X501:
> To see the frequency, execute the command "SFR", then check the TP_CKM (IC501-57pin).
> To adjust frequency, Refer to **Adjustment of Base Unit** (P.55).

## 10.1.5.2. Handset

```
┌─────────────────────────────────────────┐   YES   ┌─────────────────────────────────────┐
│ Does Handset make link with Base Unit?   │ ──────▶ │ Handset is OK. Check Base Unit.     │
│ (Correct working unit)                   │         │                                     │
└─────────────────────────────────────────┘         └─────────────────────────────────────┘
                    │ NO
                    ▼
┌─────────────────────────────────────────┐   NO    ┌─────────────────────────────────────┐
│ Is the voltage of TP BAT about 2.2~2.8 V?│ ──────▶ │ Check the batteries.                │
└─────────────────────────────────────────┘         └─────────────────────────────────────┘
                    │ YES
                    ▼
┌─────────────────────────────────────────┐   NO    ┌─────────────────────────────────────┐
│ Is the voltage of TP 1.8V about 1.8 V?   │ ──────▶ │ Check around Power Supply Circuit/  │
└─────────────────────────────────────────┘         │ Reset Circuit.                      │
                    │ YES                            └─────────────────────────────────────┘
                    ▼                        OR
┌─────────────────────────────────────────┐         ┌─────────────────────────────────────┐
│ Is the voltage of TP CP3.0 about 3.0 V?  │ ──────▶ │ Adjust +3.0V Vottage  to 3.0V *1    │
└─────────────────────────────────────────┘         └─────────────────────────────────────┘
                    │ YES
                    ▼
┌─────────────────────────────────────────┐   NO    ┌─────────────────────────────────────┐
│ Does the RF clock (CLK) oscillate: 10.368│ ──────▶ │ Check around X1 and RF module and   │
│ MHz in Handset Test Mode?                │         │ adjust clock frequency. *2          │
└─────────────────────────────────────────┘         └─────────────────────────────────────┘
                    │ YES
                    ▼
┌─────────────────────────────────────────┐
│ Check the RF part                        │
└─────────────────────────────────────────┘
```

**Cross Reference:**

    **Power Supply Circuit/Reset Circuit** (P.20)

    **Check the RF part** (P.40)

**Note:**

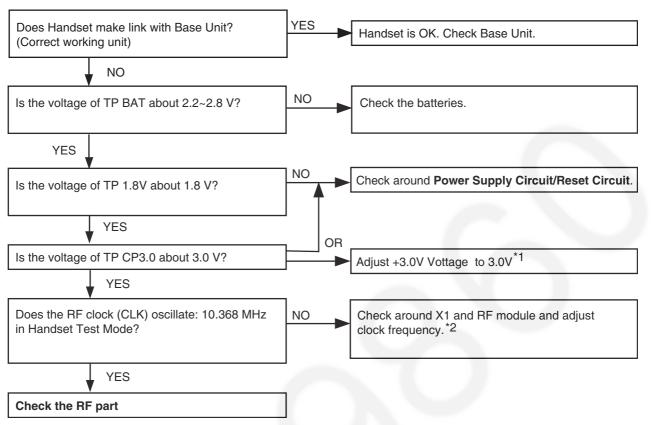    *1 3.0V can be adjusted along with bandgap voltage adjustment.

    Refer to **Adjustment of Handset** (P.56).

    *2 How to adjust the frequency of X1:

    To see the frequency, execute the command "SFR", then check the TP_CKM (IC1-57pin).

    To adjust frequency, Refer to **Adjustment of Handset** (P.56).
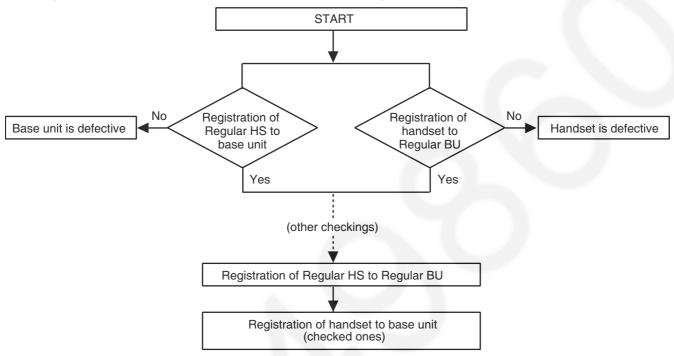
## 10.1.6. Check the RF part

## 10.1.6.1. Finding out the Defective part

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

**After All the Checkings or Repairing**

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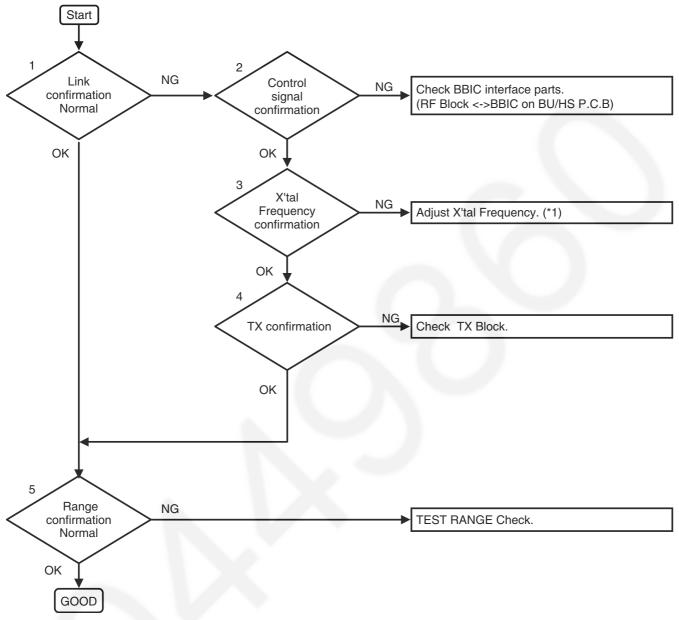


**Note:**

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

## 10.1.6.2.  RF Check Flowchart

Please refer to the each item.

```
                    ┌─────────┐
                    │  Start  │
                    └─────────┘
                         │
                         ▼
   1  ╱Link╲          NG     2  ╱Control╲      NG    ┌──────────────────────────────────┐
     ╱confirmation╲ ────────→  ╱signal╲ ──────────→  │ Check BBIC interface parts.      │
     ╲Normal╱                  ╲confirmation╱         │ (RF Block <->BBIC on BU/HS P.C.B)│
      ╲    ╱                     ╲        ╱            └──────────────────────────────────┘
        │ OK                       │ OK
        │                          ▼
        │            3  ╱X'tal╲          NG    ┌──────────────────────────────────┐
        │              ╱Frequency╲ ──────────→  │ Adjust X'tal Frequency. (*1)     │
        │              ╲confirmation╱            └──────────────────────────────────┘
        │                 ╲      ╱
        │                   │ OK
        │                   ▼
        │       4  ╱TX confirmation╲   NG    ┌──────────────────────────────────┐
        │         ╲              ╱ ────────→  │ Check  TX Block.                 │
        │           ╲          ╱              └──────────────────────────────────┘
        │              │ OK
        │              ▼
        │◄─────────────┘
        ▼
   5  ╱Range╲              NG    ┌──────────────────────────────────┐
     ╱confirmation╲ ──────────→  │ TEST RANGE Check.                │
     ╲Normal╱                    └──────────────────────────────────┘
      ╲    ╱
        │ OK
        ▼
   ┌─────────┐
   │  GOOD   │
   └─────────┘
```

**Note:**
   (*1) Refer to **Check Link** (P.38).

## 10.1.7. Registering a Handset to the Base Unit

**1 Handset:**
**[MENU]** → #130

**2 Base unit:**
Press and hold **[LOCATOR]** for about 5 seconds until the registration tone sounds.

● If all registered handsets start ringing, press **[LOCATOR]** again to stop, then repeat this step.
● The next step must be completed within 90 seconds.

**3 Handset:**
Press **[OK]**, then wait until a long beep sounds.

**Note:**

● While registering, "**Base in registering**" is displayed on all registered handsets.
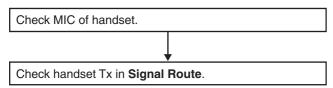
## 10.1.8. Deregistering All Handsets by the Base Unit

**1** **[MENU]** → #131
● All handsets registered to the base unit are displayed.

**2** **[⬍]**: Select the handset you want to cancel. → **[OK]**

**3** **[⬍]**: "**Yes**" → **[OK]**

**4** **[OFF]**

## 10.1.9. Copying All Entries

**1** **[📖]** → **[MENU]**

**2** **[⬍]**: "**Copy All**" → **[OK]**

**3** **[⬍]** : Select the handset you want to send the phonebook entry to. → **[OK]**

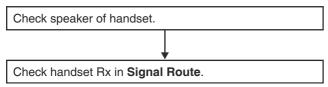● When all entries have been copied, "**Completed**" is displayed.

**4** **[OFF]**

## 10.1.10.  Check Handset Transmission

```
Check MIC of handset.
```

```
Check handset Tx in Signal Route.
```

**Cross Reference:**
     **Signal Route** (P.23)

## 10.1.11.  Check Handset Reception

```
Check speaker of handset.
```

```
Check handset Rx in Signal Route.
```
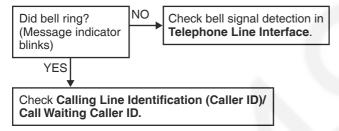
**Cross Reference:**
     **Signal Route** (P.23)
**Note:**
     When checking the RF part, Refer to **Check the RF part**
     (P.40).

## 10.1.12.  Check Caller ID

**BASE UNIT**

```
Did bell ring?        NO     Check bell signal detection in
(Message indicator    ─────▶ Telephone Line Interface.
blinks)

  │ YES
  ▼
Check Calling Line Identification (Caller ID)/
Call Waiting Caller ID.
```

**Cross Reference:**
     **Telephone Line Interface** (P.15)
     **Calling Line Identification (Caller ID)/Call Waiting Caller
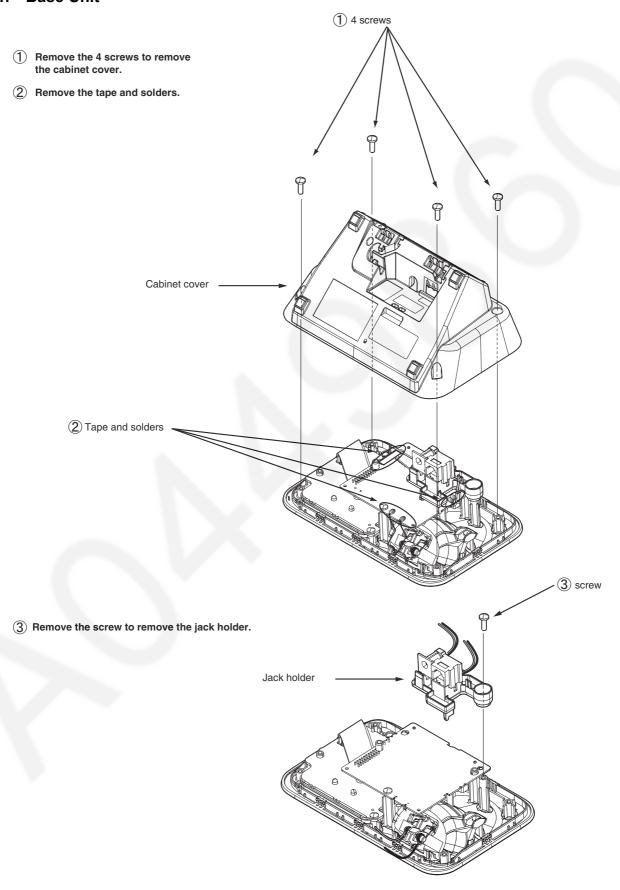     ID** (P.17)
**Note:**
 • Make sure the format of the Caller ID service of the
   Telephone company that the customer subscribes to.
 • It is also recommended to confirm that the customer is really
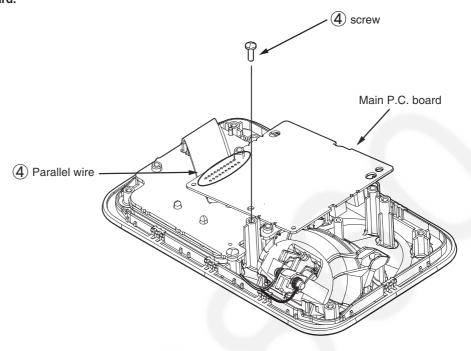   a subscriber of the service.
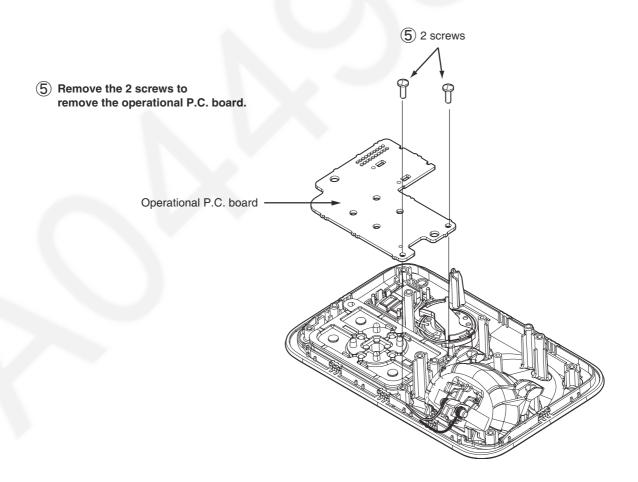
# 11 Disassembly and Assembly Instructions

## 11.1.    Disassembly Instructions

### 11.1.1.    Base Unit

① 4 screws

① **Remove the 4 screws to remove the cabinet cover.**

② **Remove the tape and solders.**

Cabinet cover

② Tape and solders

③ screw

③ **Remove the screw to remove the jack holder.**

Jack holder

④ **Remove the parallel wire and screw to remove the main P.C. board.**

④ screw

Main P.C. board

④ Parallel wire

⑤ 2 screws

⑤ **Remove the 2 screws to remove the operational P.C. board.**

Operational P.C. board
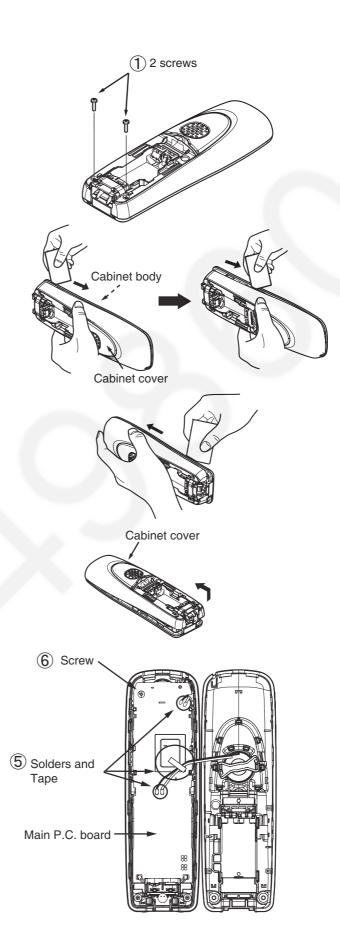
## 11.1.2. Handset

① **Remove the 2 screws.**

① 2 screws

② **Insert a plastic card. (Ex. Used SIM card etc.) between the cabinet body and the cabinet cover, then pull it along the gap to open the cabinet.**

Cabinet body

Cabinet cover

③ **Likewise, open the other side of the cabinet.**

④ **Remove the cabinet cover by pushing it upward.**

Cabinet cover

⑥ Screw
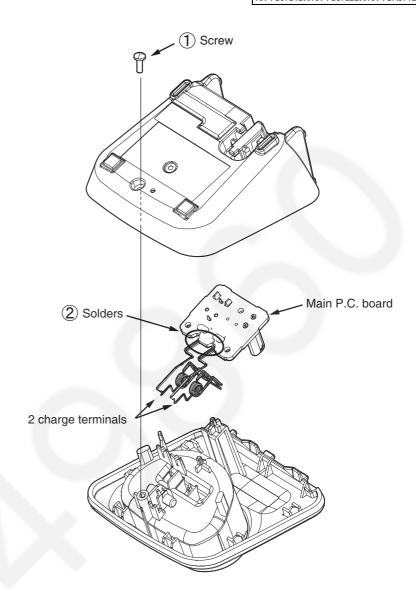
⑤ **Remove the solders and tape.**

⑤ Solders and Tape

⑥ **Remove the screw to remove the main P. C. board.**

Main P.C. board

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## 11.1.3. Charger Unit

① Screw
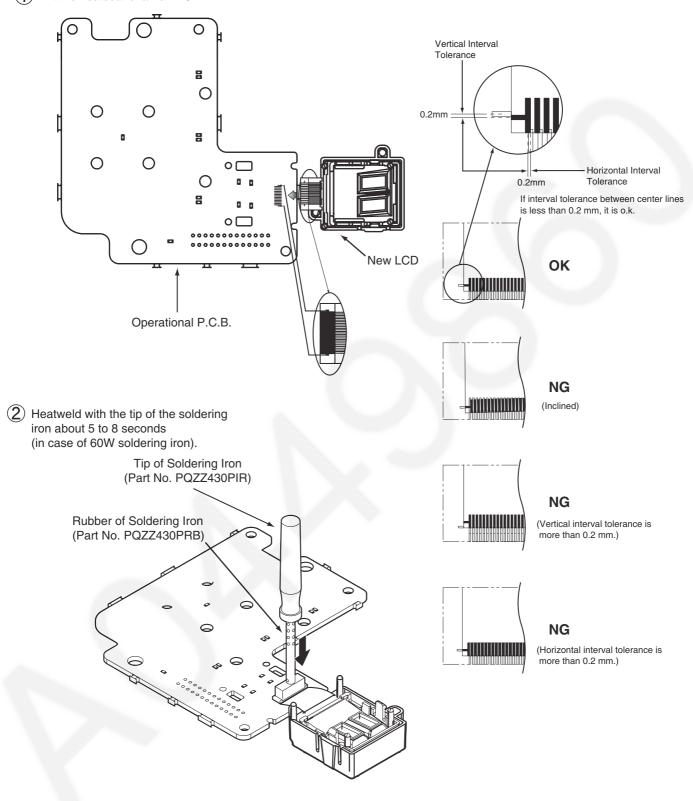
① **Remove the screw to remove the cabinet cover.**

② Solders

Main P.C. board

② **Remove the solders to remove the 2 charge terminals.**

2 charge terminals
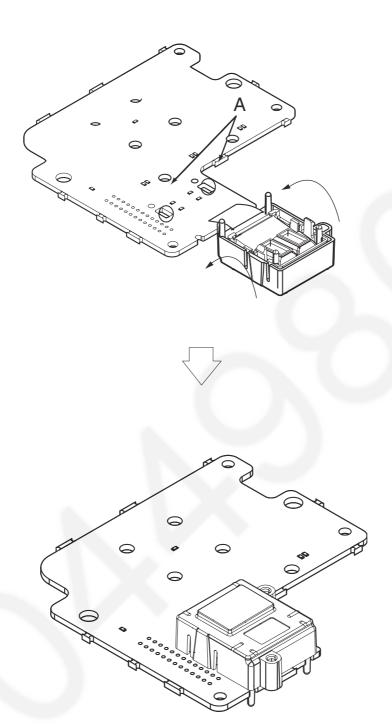
## 11.2. How to Replace the Base unit LCD

① Fit the heatseal of a new LCD.

Vertical Interval
Tolerance

0.2mm

Horizontal Interval
Tolerance

0.2mm

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

New LCD

Operational P.C.B.

**OK**

**NG**
(Inclined)

② Heatweld with the tip of the soldering
iron about 5 to 8 seconds
(in case of 60W soldering iron).

Tip of Soldering Iron
(Part No. PQZZ430PIR)

Rubber of Soldering Iron
(Part No. PQZZ430PRB)

**NG**
(Vertical interval tolerance is
more than 0.2 mm.)

**NG**
(Horizontal interval tolerance is
more than 0.2 mm.)

③ Attach the LCD and fix by hook A (two points).
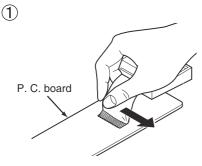
## 11.3.  How to Replace the Handset LCD
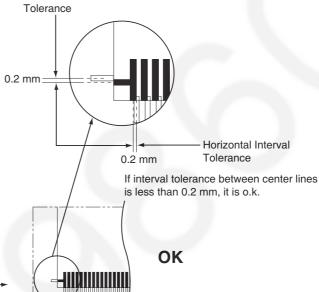
**Note:**
The illustrations are simplified in this page.
They may differ from the actual product.

①

P. C. board
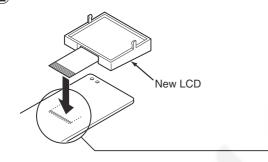
Peel off the FFC (Flexible Flat Cable) from
the LCD, in the direction of the arrow. Take
care to ensure that the foil on the P.C. board
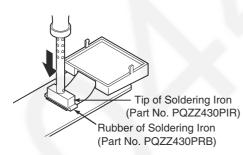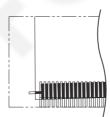is not damaged.

②

New LCD

Fit the heatseal of a new LCD.

③

Tip of Soldering Iron
(Part No. PQZZ430PIR)
Rubber of Soldering Iron
(Part No. PQZZ430PRB)

Heatweld with the tip of the soldering
iron about 5 to 8 seconds
(in case of 60W soldering iron).

Vertical Interval
Tolerance

0.2 mm

Horizontal Interval
Tolerance

0.2 mm

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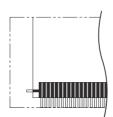is less than 0.2 mm, it is o.k.

**OK**

**NG**

(Inclined)

**NG**

(Vertical interval tolerance is
more than 0.2 mm.)

**NG**

(Horizontal interval tolerance is
more than 0.2 mm.)

# 12 Measurements and Adjustments

This chapter explains the measuring equipment, the JIG connection, and the PC setting method necessary for the measurement in **Troubleshooting Guide** (P.33)

## 12.1. Equipment Required

- Digital multi-meter (DMM): it must be able to measure voltage and current.
- Oscilloscope.
- Frequency counter: It must be precise enough to measure intervals of 1 Hz (precision; ±4 ppm)
  Hewlett Packard, 53131A is recommended.
  This equipment may be useful in order to precisely adjust like a mass production.

## 12.2. The Setting Method of JIG

<Preparation>
- Serial JIG cable: PQZZ1CD300E*
- PC which runs in DOS mode
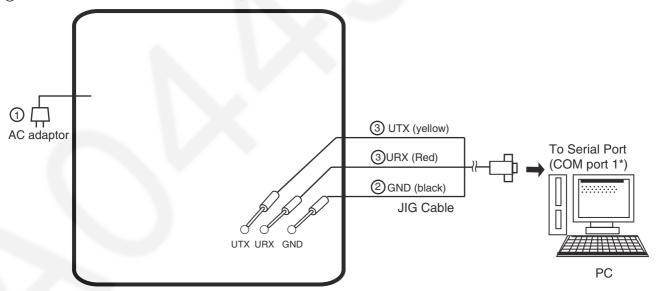- **Batch file CD-ROM** for setting: PNZZTG3721BX

**Note:**
*: If you have the JIG Cable for TCD500 series (PQZZ1CD505E), change the following values of resistance. Then you can use it as a JIG Cable for both TCD300 and TCD500 series. (It is an upper compatible JIG Cable.)

| Resistor | Old value (kΩ) | New value (kΩ) |
|----------|----------------|----------------|
| R2 | 22 | 3.3 |
| R3 | 22 | 3.3 |
| R4 | 22 | 4.7 |
| R7 | 4.7 | 10 |

### 12.2.1. Connections (Base Unit)

① Connect the AC adaptor.
② Connect the JIG Cable GND (black).
③ Connect the JIG Cable RX (red) and TX (yellow).



**Base unit P. C. board**

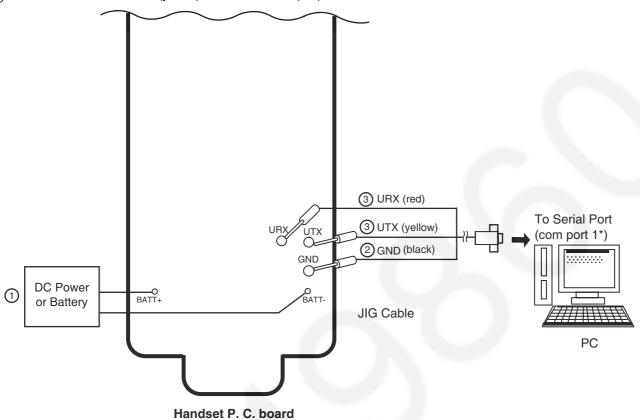**Note:**
*: COM port names may vary depending on what your PC calls it.

## 12.2.2. Connections (Handset)

① Connect the DC Power or Battery to BATT+ and BATT-.

② Connect the JIG cable GND (black) to GND.

③ Connect the JIG cable UTX (yellow) to UTX and URX (red) to URX.



**Handset P. C. board**

**Note:**

\*: COM port names may vary depending on what your PC calls it.

## 12.2.3. How to install Batch file into P.C.

**1.** Insert the Batch file CD-ROM into CD-ROM drive and
copy PNZZTG**** folder to your PC (example: D drive).

**<Example for Windows>**

**2.** Open an MS-DOS mode window.

On your computer, click **[Start]**, select **Programs**
(**All Programs** for Windows XP/Windows Server 2003),
then click
**MS-DOS Prompt**. (for Windows 95/Windows 98)
Or
**Accessories-MS-DOS Prompt**. (for Windows Me)
Or
**Command Prompt**. (for Windows NT 4.0)
Or
**Accessories-Command Prompt**.
(for Windows 2000/Windows XP/Windows Server 2003)

**3.** At the DOS prompt, type "**D:**" (for example) to select the
drive, then press the **Enter** key.

**4.** Type "**CD ¥PNZZTG****", then press the **Enter** key.

**<Example>**

**5.** Type "**SET_COM=X**", then press the **Enter** key
(**X**: COM port number used for the serial connection on your PC).

```
C: ¥Documents and Settings>D:
D: ¥>CD ¥PNZZTG****
D: ¥PNZZTG**** >SET_COM=X
D: ¥PNZZTG****>READID
00 52 4F A8 A8
D: ¥PNZZTG****>DOSKEY
D: ¥PNZZTG****>_
```

**6.** Type "**READID**", then press the **Enter** key.
 ・If any error messages appear, change the port number or
 check the cable connection.
 ・If any value appear, go to next step.

**7.** Type "**DOSKEY**", then press the **Enter** key.

**<Example: error happens>**

```
C: ¥Documents and Settings>D:
D: ¥>CD ¥PNZZTG****
D: ¥PNZZTG**** >SET_COM=X
D: ¥PNZZTG****>READID
  CreateFile error
ERROR 10: Can't open serial port
D: ¥PNZZTG ****>_
```

**Note:**
• "*****" varies depending on the country or models.

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## 12.2.4. Commands

See the table below for frequently used commands.

| Command name | Function | Example |
|---|---|---|
| rdeeprom | Read the data of EEPROM | Type "rdeeprom 00 00 FF", and the data from address "00 00" to "FF" is read out. |
| readid | Read ID (RFPI) | Type "readid", and the registered ID is read out. |
| writeid | Write ID (RFPI) | Type "writeid 00 18 E0 0E 98", and the ID "0018 E0 0E 98" is written. |
| getchk | Read checksum | Type "getchk". |
| wreeprom | Write the data of EEPROM | Type "wreeprom 01 23 45". "01 23" is address and "45" is data to be written. |

# 12.3.  Adjustment of Base Unit

When IC501 (BBIC) or IC611 (EEPROM) is exchanged, the Bandgap adjustment and the Frequency adjustment are necessary.
When X501 (X'tal) is exchanged, the Frequency adjustment is necessary.

● **Procedure:**

1. Open a window of MS-DOS mode from the start-up menu.
2. Change directory to the copied folder.
3. Type "**SET_COM 1**" from the keyboard (when COM port 1 is used for the connection).
4. Type "**sendchar RFR**". Check ID code on PC screen.

   If OK (ID is displayed), go to advances to the adjustment process.

   If NG (ID is not displayed), you have to stop this procedure, and check your PC environment.

● **BandGAP Voltage Adjustment:**

1. Check BandGap voltage. (VDD1-GND)
2. If voltage value is 1.8 V ± 0.02 V then OK, go to **Frequency Adjustment** process.

   If voltage value is not 1.8 V ± 0.02 V then, go to step 3.
3. Type "**sendchar VDD**", you can check registered value of parameter.

   When you want to up the voltage: "Value+1".

   When you want to down the voltage: "Value-1".
4. Type "**sendchar VDD nn**", you can register a new parameter value.
5. Please operate step1 to 5 again until the voltage becomes it within the range.

Example

```
D:\PNZZTG****>sendchar VDD
08
D:\PNZZTG****>sendchar VDD 09
OK
D:\PNZZTG****>
```

Please confirm the following item when the adjustment does not go well.

| Symptom | item |
|---|---|
| Can not Adjust Bandgap Voltage | Please check **Power Supply Circuit**. |

When it does not improve even if the above-mentioned is confirmed, IC501 might be defective.
Please check soldering.

● **Frequency Adjustment:**

1. Type "sendchar SFR" then set to RF burst mode. (Respons "OK")
2. Check Frequency. (STM/CKM/P15 - GND)
3. If Frequency value is 10.368000 MHz ± 41 Hz then OK, finished Adjustment process
   - Please turn off the power of PCB board.

   If Frequency value is not 10.368000 MHz ± 41 Hz then, go to step 4.
4. You can check registered value of parameter.

   When you want to up the frequency: "Value -1".

   When you want to down the frequency: "Value +1".
5. Type "**sendchar SFR nn nn**", you can register a new parameter value.
6. Please operate step1 to 6 again until the Frequency becomes it within the range.

Example

```
D:\PNZZTG****>sendchar SFR
0270
D:\PNZZTG****>sendchar SFR 02⊔71
OK
D:\PNZZTG****>
```

Please confirm the following item when the adjustment does not go well.

| Symptom | item |
|---|---|
| Can not Adjust RFCLK Frequency | Please check<br><br>STM/CKM/P15 (R508) |

When it does not improve even if the above-mentioned is confirmed, IC501 might be defective.
Please check soldering.

**Cross Reference:**
**Power Supply Circuit/Reset Circuit** (P.13)

# 12.4. Adjustment of Handset

When IC5(BBIC) or IC3 (EEPROM) is exchanged, the Bandgap adjustment and the Frequency adjustment are necessary.
When X1 (X'tal) is exchanged, the Frequency adjustment is necessary.

● **Procedure:**

1. Open a window of MS-DOS mode from the start-up menu.
2. Change directory to the copied folder.
3. Type "**SET_COM 1**" from the keyboard (when COM port 1 is used for the connection).
4. Type "**sendchar IDR**". Check ID code on PC screen.
   If OK (ID is displayed), go to advances to the adjustment process.
   If NG (ID is not displayed), you have to stop this procedure, and check your PC environment.

● **BandGAP Voltage Adjustment:**

1. Check BandGap voltage. (TP: +1.8V- GND)
2. If voltage value is 1.8 V ± 0.02 V then OK, go to **Frequency Adjustment** process.
   If voltage value is not 1.8 V ± 0.02 V then, go to step 3.
3. Type "**sendchar VDD**", you can check registered value of parameter.
   When you want to up the voltage: "Value+1".
   When you want to down the voltage: "Value-1".
4. Type "**sendchar VDD nn**", you can register a new parameter value.
5. Please operate step1 to 5 again until the voltage becomes it within the range.

Example

```
D:\PNZZTG****>sendchar VDD
08
D:\PNZZTG****>sendchar VDD
OK
D:\PNZZTG****>
```

Please confirm the following item when the adjustment does not go well.

| Symptom | item |
|---|---|
| Can not Adjust Bandgap Voltage | Please check **Power Supply Circuit**. |

When it does not improve even if the above-mentioned is confirmed, IC5 might be defective.
Please check soldering.

● **Frequency Adjustment:**

1. Type "sendchar SFR" then set to RF burst mode. (Respons "OK")
2. Check Frequency. (TP: CKM-GND)
3. If Frequency value is 10.368000 MHz ± 41 Hz then OK , finished Adjustment process
   - Please turn off the power of PCB board.
   If Frequency value is not  10.368000 MHz ± 41 Hz then, go to step 4.
4. You can check registered value of parameter.
   When you want to up the frequency: "Value -1".
   When you want to down the frequency: "Value +1".
5. Type "**sendchar SFR nn nn**", you can register a new parameter value.
6. Please operate step1 to 6 again until the Frequency becomes it within the range.

Example

```
D:\PNZZTG****>sendchar SFR
0270
D:\PNZZTG****>sendchar SFR ⌴02 ⌴7A
OK
D:\PNZZTG****>
```

Please confirm the following item when the adjustment does not go well.

| Symptom | item |
|---|---|
| Can not Adjust RFCLK Frequency | Please check CKM (R20) |

When it does not improve even if the above-mentioned is confirmed, IC5 might be defective.
Please check soldering.

● **Battery Monitor Check:**

1. Apply 2.25V between BATT+ and BATT-.
2. Execute the command
   sendchar PAD
   sendchar LED 0
   sendchar CRX 0 1
   sendchar AD1
   It assumes that the return value is XX.
   a) 6c ≤ XX ≤ 71: No need to adjust
   b) XX: 6A ~ 6B: Need to adjust
   XX: 72 ~74: Need to adjust
   Write AD value of 2.25 V to EEPROM.
   ex) read data: XX=6A, write data: YY=6A
   read data: XX=73, write data: YY=73
   EEPROM=0009(Low Voltage) write "YY"
   Execute the command "wreeprom 00 09 01 YY".
   EEPROM =000A (No Voltage) write "YY-C"
   Execute the command "wreeprom 00 0A 01 ZZ".
   Note:
       ZZ = YY-C
   No Voltage writing data limit is "00".
   c) XX: 00 ~ 69: Reject
   XX: 75 ~ FF: Reject

● **Battery Low Confirmation:**

1. Apply 2.40 V between BATT+ and BATT-.
2. Confirm that there is no flashing of Battery Icon.
3. Apply 2.25 V ± 0.08 V between BATT+ and BATT-.
4. Confirm that there is flashing of Battery Icon.

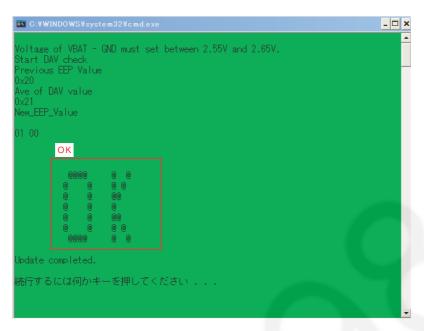**Cross Reference:**

● **Adjustment of backup power supply:**

Supply a handset with 2.6V power, then connect serial JIG cables.

The power should be DC 2.6V ± 0.02V between BAT and GND.

Run the batch file "DAVchk_TGA371_381.bat", which is found in the CD-ROM.

Read and confirm the display data. If successful, "OK" is displayed as below.

Press any key, and verify backup power supply.



In case "FAIL" is displayed, read description in the next line.

Refer to the picture below.

Shut down and restart the handset, then try the adjustment again if "EEPROM writing error. "Try again." is shown.

Check model number if "Wrong model. Check model No." is shown.
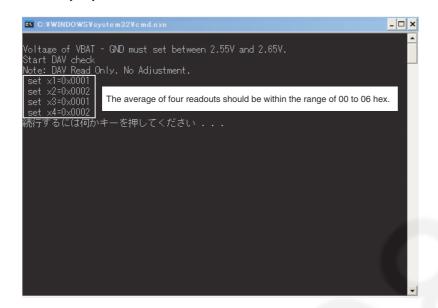
Reject the handset if "Return value of DAV command is wrong" is shown. In this case, the handset is defective.
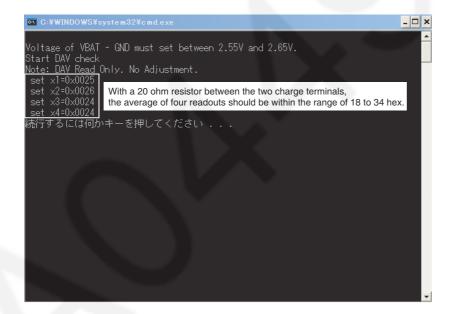
You can press any key to continue.



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- **Verifying backup power supply:**
  Run the batch file "DAVread_only_TGA371_381.bat", which is found in the CD-ROM.
  As shown in the picture below, the readout of four times detection are displayed.
  The average should be within the range of 00 to 06 hex.
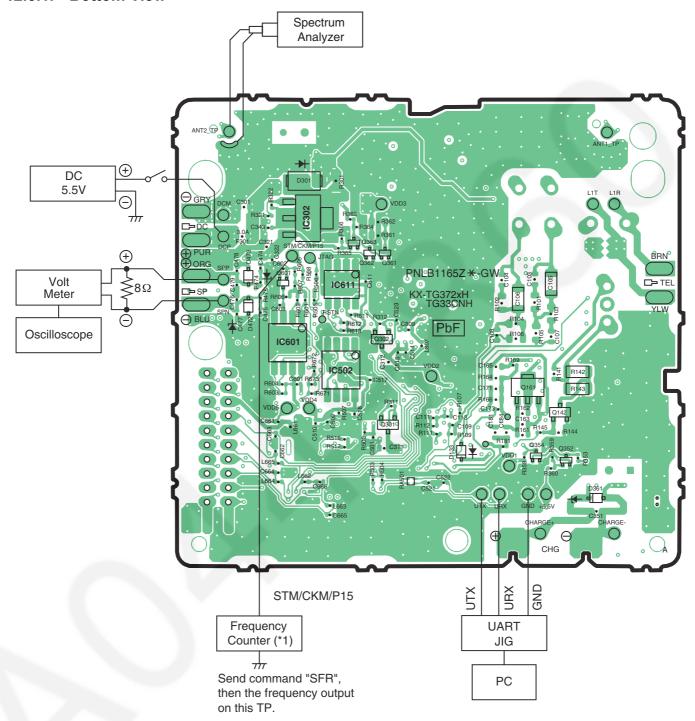  Press any key to continue.



Then connect a 20 ohm resistor between the two charge terminals.
Run the batch file "DAVread_only_TGA371_381.bat" again.
The average should be within the range of 18 to 34 hex.
Press any key, and shut the handset down. Remove the 20 ohm resistor.

# 12.5. Adjustment Standard (Base Unit)

When connecting the simulator equipment for checking, please refer to below.
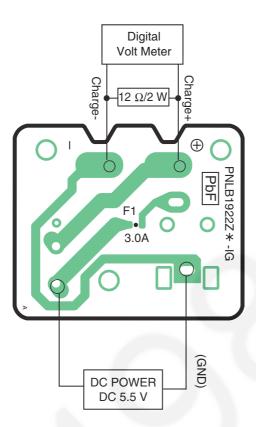
## 12.5.1. Bottom View



Send command "SFR",
then the frequency output
on this TP.

## 12.6. Adjustment Standard (Charger Unit)

When connecting the simulator equipment for checking, please refer to below.
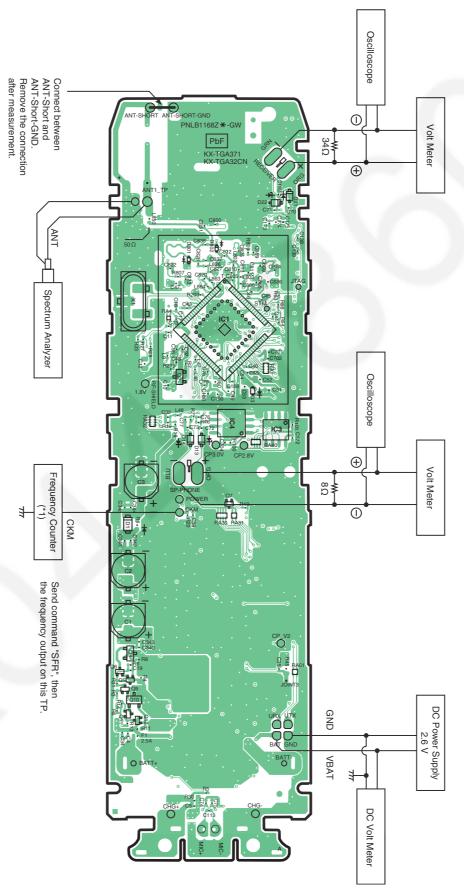
### 12.6.1. Bottom View

# 12.7.  Adjustment Standard (Handset)

When connecting the simulator equipment for checking, please refer to below.

## 12.7.1.  Component View

# 12.8.  Things to Do after Replacing IC or X'tal

If repairing or replacing EEPROM or X'tal, it is necessary to download the required data such as Programming data or adjustment data, etc. in memory.
The set doesn't operate if it is not executed.

## 12.8.1.  How to download the data

### 12.8.1.1.  Base Unit

First, operate the PC setting according to **The Setting Method of JIG** (P.51).
Then download the appropriate data according to the following procedures.

| Items | | How to download/Required adjustment |
|---|---|---|
| FLASH (IC502) | Programming data is stored in memory. | 1) Make sure to connect the JIG cable, then disconnect the DC Power in order to download the data.<br>2) Execute the command "flw441 *********.hex".<br>3) Connect the DC Power.<br>4) Press the PC Enter key once.<br>5) After a few minutes, "Successful upgrade" is displayed on the PC indicating downloading has finished.<br>6) Detach the JIG cable, then disconnect the DC Power.<br>7) Connect the DC Power.<br>8) Connect the JIG cable again, and execute the command "getchk", then confirm the checksum value is correct. If the downloading fails, start again from step 1).<br>9) Default batch file: Execute the command "default.bat".<br>10) Country version batch file: Execute the command "TG3721_BX_RevXXX_YYY.bat". (*1)<br>11) Bandgap voltage & frequency adjustment: Refer to **Adjustment of Base Unit** (P.55). |
| EEPROM (IC611) | Adjusted parameter data is stored in memory. (country version batch file, default batch file, etc.) | 1) Change the address "0001" of EEPROM to "55" to download the data.<br>2) Default batch file: Execute the command "default.bat".<br>3) Country version batch file: Execute the command "TG3721_BX_RevXXX_YYY.bat".<br>4) Bandgap voltage & frequency adjustment: Refer to **Adjustment of Base Unit** (P.55). |
| FLASH(IC601) | Voice prompt data is stored in memory. (vary depending on country version) | 1) Wait more than 15 seconds after connecting the JIG Cable.<br>2) Execute the command "VPDL2011 -57600 ZZ.bin" (*1).<br>3) Wait until "VP file transfer complete." is displayed on the P.C. (writing time: aprox. About 1 min)<br>4) Detach the JIG cable to disconnect DC Power. Then reconnect the DC Power and confirm whether the download is successfully completed. |
| X'tal (X501) | System clock | Clock adjustment data is in EEPROM, adjust the data again after replacing it.<br>1) Frequency adjustment: Refer to **Adjustment of Base Unit** (P.55). |

**Note:**
  (*1) XXX_YYY: revision number, ZZ: Voice Prompt
  "XXX_YYY" and "ZZ" vary depending on the country version. You can find them in the batch file, PNZZ- mentioned in **The Setting Method of JIG** (P.51).

## 12.8.1.2. Handset

First, operate the PC setting according to **The Setting Method of JIG** (P.51).

Then download the appropriate data according to the following procedures.

| Items | | How to download/Required adjustment |
|---|---|---|
| FLASH (IC4) | Program D/L | 1) Make sure to connect the JIG cable, then disconnect the DC Power in order to download the data. <br> 2) Execute the command "flw441 *********.hex". <br> 3) Connect the DC Power. <br> 4) Press and hold the handset Power key. <br> 5) While holding down the handset Power key, press the PC Enter key once. <br> 6) After a few minutes, "Successful upgrade" is displayed on the PC indicating downloading has finished. <br> 7) Detach the JIG cable, then press the handset Power key to turn it on. <br> 8) Connect the JIG cable again, and execute the command "getchk", then confirm the checksum value is correct. <br> • If the downloading fails, start again from step 1). <br> 9) Default batch file: Execute the command "default.bat". <br> 10) Default batch file (remaining): Execute the command "TGA371_DEF_RevXXX_YYY.bat". (*2). <br> 11) Country version batch file: Execute the command "TGA371_BX_RevXXX_YYY.bat". (*2). <br> 12) Bandgap voltage, frequency adjustment, battery monitor check, battery low confirmation & Adjustment of backup power supply: Refer to **Adjustment of Handset** (P.56). |
| EEPROM (IC3) | Adjusted parameter data is stored in memory. (country version batch file, default batch file, etc.) | 1) Change the address "0001" of EEPROM to "55" to download the data. <br> 2) Default batch file: Execute the command "default.bat". <br> 3) Default batch file (remaining): Execute the command "TGA371_DEF_RevXXX_YYY.bat". (*2) <br> 4) Country version batch file: Execute the command "TGA371_BX_RevXXX_YYY.bat". (*2) <br> 5) Bandgap voltage, frequency adjustment, battery monitor check, battery low confirmation & Adjustment of backup power supply: Refer to **Adjustment of Handset** (P.56). |
| X'tal (X1) | System clock | Clock adjustment data is in EEPROM, adjust the data again after replacing it. <br> 1) Frequency adjustment: Refer to **Adjustment of Handset** (P.56). |
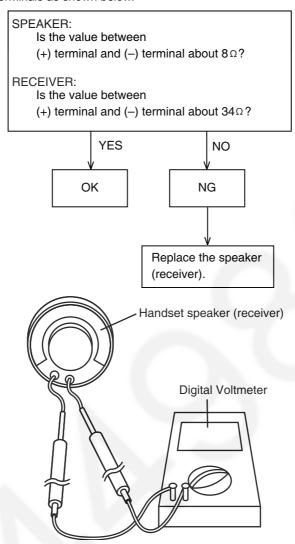
**Note:**

(*2) XXX_YYY: revision number

"XXX_YYY" vary depending on the country version. You can find them in the batch file, PNZZ- mentioned in **The Setting Method of JIG** (P.51).

## 12.9. How to Check the Handset Receiver

1. Prepare the digital voltmeter, and set the selector knob to ohm meter.
2. Put the probes at the speaker terminals as shown below.

SPEAKER:
  Is the value between
  (+) terminal and (−) terminal about 8Ω?

RECEIVER:
  Is the value between
  (+) terminal and (−) terminal about 34Ω?

YES → OK

NO → NG

Replace the speaker (receiver).

Handset speaker (receiver)

Digital Voltmeter

# 12.10. Frequency Table (MHz)

| Channel | Center Frequency (MHz) | RX Local Frequency (MHz) |
|---|---|---|
| 2 (02H) | 2402.784 | 2403.648 |
| 3 (03H) | 2403.648 | 2404.512 |
| 4 (04H) | 2404.512 | 2405.376 |
| 5 (05H) | 2405.376 | 2406.24 |
| 6 (06H) | 2406.24 | 2407.104 |
| 7 (07H) | 2407.104 | 2407.968 |
| 8 (08H) | 2407.968 | 2408.832 |
| 9 (09H) | 2408.832 | 2409.696 |
| 10 (0AH) | 2409.696 | 2410.56 |
| 11 (0BH) | 2410.56 | 2411.424 |
| 12 (0CH) | 2411.424 | 2412.288 |
| 13 (0DH) | 2412.288 | 2413.152 |
| 14 (0EH) | 2413.152 | 2414.016 |
| 15 (0FH) | 2414.016 | 2414.88 |
| 16 (10H) | 2414.88 | 2415.744 |
| 17 (11H) | 2415.744 | 2416.608 |
| 18 (12H) | 2416.608 | 2417.472 |
| 19 (13H) | 2417.472 | 2418.336 |
| 20 (14H) | 2418.336 | 2419.2 |
| 21 (15H) | 2419.2 | 2420.064 |
| 22 (16H) | 2420.064 | 2420.928 |
| 23 (17H) | 2420.928 | 2421.792 |
| 24 (18H) | 2421.792 | 2422.656 |
| 25 (19H) | 2422.656 | 2423.52 |
| 26 (1AH) | 2423.52 | 2424.384 |
| 27 (1BH) | 2424.384 | 2425.248 |
| 28 (1CH) | 2425.248 | 2426.112 |
| 29 (1DH) | 2426.112 | 2426.976 |
| 30 (1EH) | 2426.976 | 2427.84 |
| 31 (1FH) | 2427.84 | 2428.704 |
| 32 (20H) | 2428.704 | 2429.568 |
| 33 (21H) | 2429.568 | 2430.432 |
| 34 (22H) | 2430.432 | 2431.296 |
| 35 (23H) | 2431.296 | 2432.16 |
| 36 (24H) | 2432.16 | 2433.024 |
| 37 (25H) | 2433.024 | 2433.888 |
| 38 (26H) | 2433.888 | 2434.752 |
| 39 (27H) | 2434.752 | 2435.616 |
| 40 (28H) | 2435.616 | 2436.48 |
| 41 (29H) | 2436.48 | 2437.344 |
| 42 (2AH) | 2437.344 | 2438.208 |
| 43 (2BH) | 2438.208 | 2439.072 |
| 44 (2CH) | 2439.072 | 2439.936 |
| 45 (2DH) | 2439.936 | 2440.8 |
| 46 (2EH) | 2440.8 | 2441.664 |
| 47 (2FH) | 2441.664 | 2442.528 |
| 48 (30H) | 2442.528 | 2443.392 |
| 49 (31H) | 2443.392 | 2444.256 |
| 50 (32H) | 2444.256 | 2445.12 |
| 51 (33H) | 2445.12 | 2445.984 |
| 52 (34H) | 2445.984 | 2446.848 |
| 53 (35H) | 2446.848 | 2447.712 |
| 54 (36H) | 2447.712 | 2448.576 |
| 55 (37H) | 2448.576 | 2449.44 |
| 56 (38H) | 2449.44 | 2450.304 |
| 57 (39H) | 2450.304 | 2451.168 |
| 58 (3AH) | 2451.168 | 2452.032 |
| 59 (3BH) | 2452.032 | 2452.896 |
| 60 (3CH) | 2452.896 | 2453.76 |
| 61 (3DH) | 2453.76 | 2454.624 |
| 62 (3EH) | 2454.624 | 2455.488 |
| 63 (3FH) | 2455.488 | 2456.352 |
| 64 (40H) | 2456.352 | 2457.216 |

| Channel | Center Frequency (MHz) | RX Local Frequency (MHz) |
|---|---|---|
| 65 (41H) | 2457.216 | 2458.08 |
| 66 (42H) | 2458.08 | 2458.944 |
| 67 (43H) | 2458.944 | 2459.808 |
| 68 (44H) | 2459.808 | 2460.672 |
| 69 (45H) | 2460.672 | 2461.536 |
| 70 (46H) | 2461.536 | 2462.4 |
| 71 (47H) | 2462.4 | 2463.264 |
| 72 (48H) | 2463.264 | 2464.128 |
| 73 (49H) | 2464.128 | 2464.992 |
| 74 (4AH) | 2464.992 | 2465.856 |
| 75 (4BH) | 2465.856 | 2466.72 |
| 76 (4CH) | 2466.72 | 2467.584 |
| 77 (4DH) | 2467.584 | 2468.448 |
| 78 (4EH) | 2468.448 | 2469.312 |
| 79 (4FH) | 2469.312 | 2470.176 |
| 80 (50H) | 2470.176 | 2471.04 |
| 81 (51H) | 2471.04 | 2471.904 |
| 82 (52H) | 2471.904 | 2472.768 |
| 83 (53H) | 2472.768 | 2473.632 |
| 84 (54H) | 2473.632 | 2474.496 |
| 85 (55H) | 2474.496 | 2475.36 |
| 86 (56H) | 2475.36 | 2476.224 |
| 87 (57H) | 2476.224 | 2477.088 |
| 88 (58H) | 2477.088 | 2477.952 |
| 89 (59H) | 2477.952 | 2478.816 |
| 90 (5AH) | 2478.816 | 2479.68 |
| 91 (5BH) | 2479.68 | 2480.544 |
| 92 (5CH) | 2480.544 | 2481.408 |

# 13 Miscellaneous

## 13.1. How to Replace the LLP (Leadless Leadframe Package) IC

**Note:**
This description is only applied on the model with Shield case.

### 13.1.1. Preparation

• PbF (: Pb free) Solder
• Soldering Iron
Tip Temperature of 700 °F ± 20 °F (370 °C ± 10 °C)
**Note:**
We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
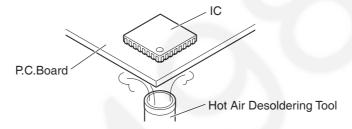• Hot Air Desoldering Tool
Temperature: 608 °F ± 68 °F (320 °C ± 20 °C)

### 13.1.2. Caution

• To replace the IC efficiently, choose the right sized nozzle of the hot air desoldering tool that matches the IC package.
• Be careful about the temperature of the hot air desoldering tool not to damage the PCB and/or IC.

### 13.1.3. How to Remove the IC
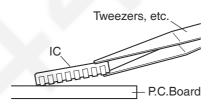
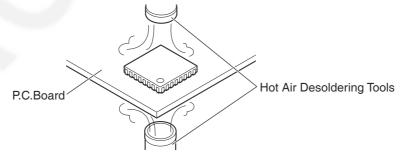1. Heat the IC with a hot air desoldering tool through the P.C.Board.



2. Pick up the IC with tweezers, etc. when the solder is melted completely.
   **Note:**
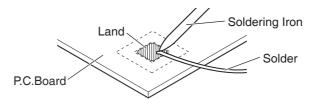   • Be careful not to touch the peripheral parts with tweezers, etc. They are unstable.



When it is hard to melt the solder completely, heat it with a hot air desoldering tool through the IC besides through the P.C.Board.
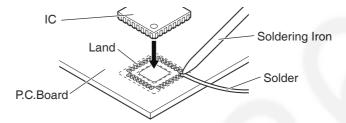


3. After removing the IC, clean the P.C.Board of residual solder.
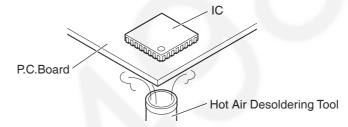
## 13.1.4.  How to Install the IC

1. Place the solder a little on the land where the radiation GND pad on IC bottom is to be attached.



2. Place the solder a little on the land where IC pins are to be attached, then place the IC.
   **Note:**
   • When placing the IC, the positioning should be done very carefully.



3. Heat the IC with a hot air desoldering tool through the P.C.Board until the solder on IC bottom is melted.
   **Note:**
   • Be sure to place it precisely, controlling the air volume of the hot air desoldering tool.



4. After soldering, confirm there are no short and open circuits with visual inspection.

# 13.2. 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.

## 13.2.1. Preparation

• PbF (: Pb free) Solder

• Soldering Iron

Tip Temperature of 700 °F ± 20 °F (370 °C ± 10 °C)

**Note:** We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.

• Flux

Recommended Flux: Specific Gravity → 0.82.
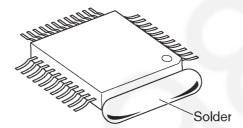
Type → RMA (lower residue, non-cleaning type)

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

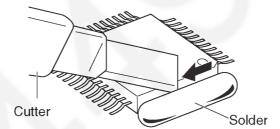## 13.2.2. How to Remove the IC

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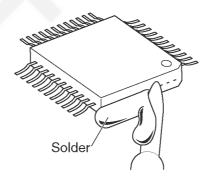
   **Note:**
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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 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.
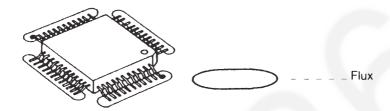
### 13.2.3. How to Install the IC

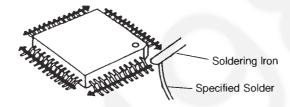1. Temporarily fix the FLAT PACKAGE IC, soldering the two marked pins.



● – – – – – – –Temporary soldering point.

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

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



– – – – – Flux

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



Soldering Iron

Specified Solder

### 13.2.4. 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.



Bridge

Soldering Iron

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## 13.3. How to Replace the Shield Case

### 13.3.1. Preparation
• PbF (: Pb free) Solder
• Soldering Iron
  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)
  **Note:**
  We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
• Hot Air Desoldering Tool
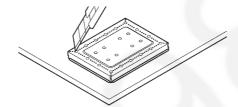  Temperature: 608°F ± 68°F (320°C ± 20°C)

### 13.3.2. Caution
• To replace the IC efficiently, choose the right sized nozzle of the hot air desoldering tool that matches the IC package.
• Be careful about the temperature of the hot air desoldering tool not to damage the PCB and/or IC.
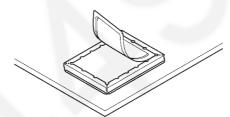
### 13.3.3. How to Remove the Shield Case
**Note:**
  If you don't have special tools (ex. Hot air disordering tool), conduct the following operations.
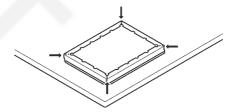
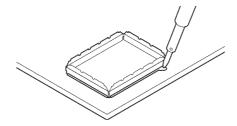1. Cut the case along perforation.

2. Remove the cut part.

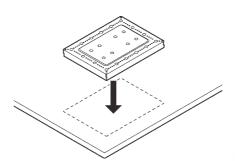3. Cut the four corners along perforation.

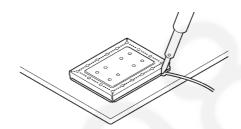4. Remove the reminds by melting solder.

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## 13.3.4.   How to Install the Shield Case

**Note:**
  • If you don't have special tools (ex. Hot air disordering tool), conduct the following operations.
  • Shield case's No. : PNMC1032Z, PNMC1033Z

  1. Put the shield case.
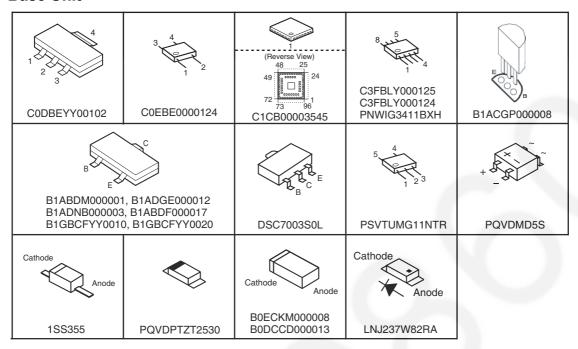
  2. Solder the surroundings.

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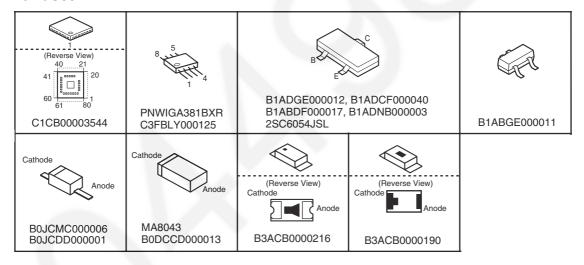
# 13.4. Terminal Guide of the ICs, Transistors and Diodes

## 13.4.1. Base Unit

| | | | | |
|---|---|---|---|---|
| C0DBEYY00102 | C0EBE0000124 | C1CB00003545 | C3FBLY000125 C3FBLY000124 PNWIG3411BXH | B1ACGP000008 |
| B1ABDM000001, B1ADGE000012 B1ADNB000003, B1ABDF000017 B1GBCFYY0010, B1GBCFYY0020 | DSC7003S0L | PSVTUMG11NTR | PQVDMD5S | |
| 1SS355 | PQVDPTZT2530 | B0ECKM000008 B0DCCD000013 | LNJ237W82RA | |

## 13.4.2. Handset

| | | | |
|---|---|---|---|
| C1CB00003544 | PNWIGA381BXR C3FBLY000125 | B1ADGE000012, B1ADCF000040 B1ABDF000017, B1ADNB000003 2SC6054JSL | B1ABGE000011 |
| B0JCMC000006 B0JCDD000001 | MA8043 B0DCCD000013 | B3ACB0000216 | B3ACB0000190 |

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# 14 Schematic Diagram

## 14.1. For Schematic Diagram

### 14.1.1. Base Unit (Schematic Diagram (Base Unit_Main))

**Notes:**

1. DC voltage measurements are taken with voltmeter from the negative voltage line.

Important Safety Notice:

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

2. The schematic diagrams may be modified at any time with the development of new technology.

### 14.1.2. Handset (Schematic Diagram (Handset_Main))

**Notes:**

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

### 14.1.3. Charger Unit (Schematic Diagram (Charger Unit))

**Notes:**
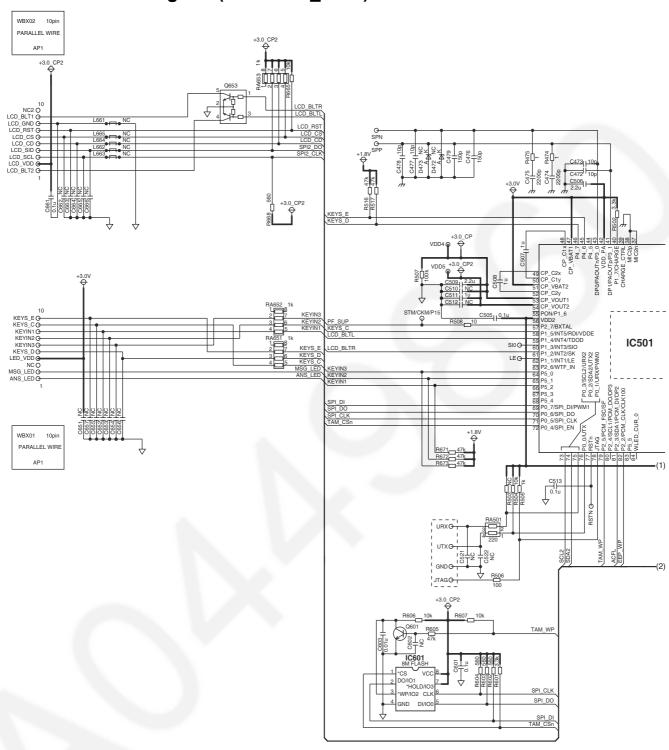
1. DC voltage measurements are taken with voltmeter from the negative voltage line.

Important Safety Notice:

Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only the manufacture's specified parts.
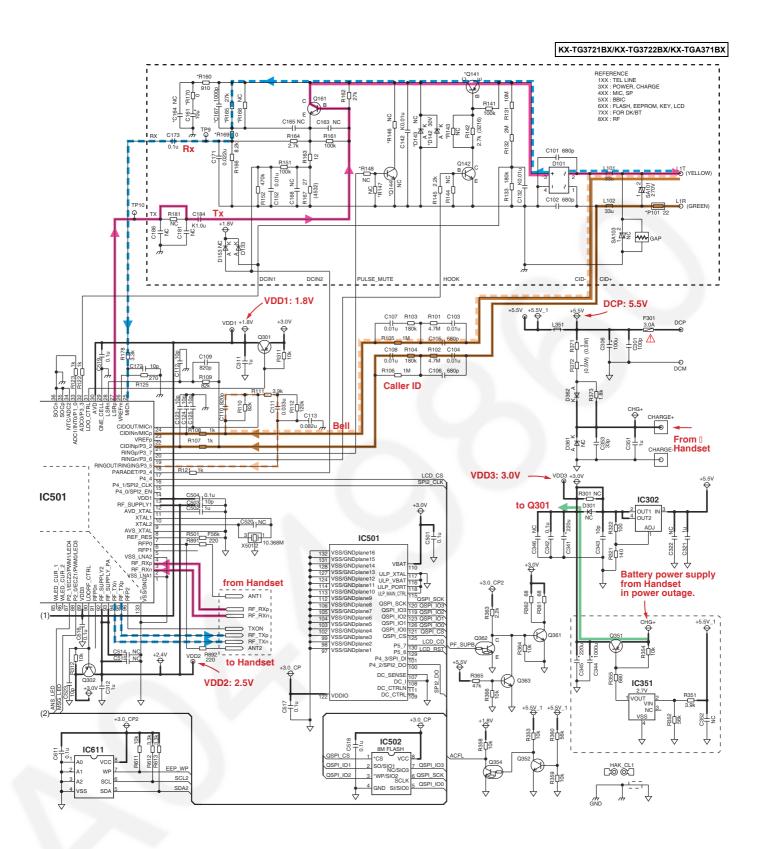
2. The schematic diagrams may be modified at any time with the development of new technology.

# 14.2. Schematic Diagram (Base Unit_Main)



NC: No Components

REFERENCE
1XX : TEL LINE
3XX : POWER, CHARGE
4XX : MIC, SP
5XX : BBIC
6XX : FLASH, EEPROM, KEY, LCD
7XX : FOR DK/BT
8XX : RF

NC: No Components

KX-TG3721/3722BX  SCHEMATIC DIAGRAM (Base Unit_Main)

# 14.3. Schematic Diagram (Base Unit_RF)

ANT_1 ANT1_TP GND ANT2_TP GND ANT_2
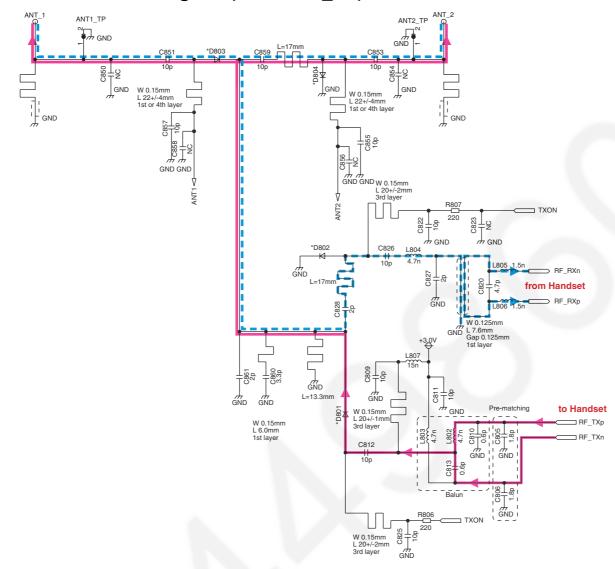
C851 10p *D803 C859 10p L=17mm C853 10p

C850 NC GND C854 NC GND

GND W 0.15mm L 22+/-4mm 1st or 4th layer *D804 GND W 0.15mm L 22+/-4mm 1st or 4th layer GND

C857 10p C855 10p

C858 NC C856 NC

GND GND GND GND

ANT1 ANT2 W 0.15mm L 20+/-2mm 3rd layer

R807 220 TXON

C822 10p C823 NC

GND GND

*D802 C826 10p L804 4.7n L805 1.5n RF_RXn

GND L=17mm C827 2p C820 4.7p **from Handset**

RF_RXp

C828 2p L806 1.5n

W 0.125mm L 7.6mm Gap 0.125mm 1st layer

GND

+3.0V

L807 15n

C809 10p C811 10p Pre-matching **to Handset**

C861 2p C860 3.3p GND GND RF_TXp

GND GND L=13.3mm *D801 W 0.15mm L 20+/-1mm 3rd layer L803 4.7n L802 4.7n C810 0.6p C805 1.8p RF_TXn

W 0.15mm L 6.0mm 1st layer C812 10p C813 0.6p GND GND

Balun C806 1.3p

R806 220 TXON GND
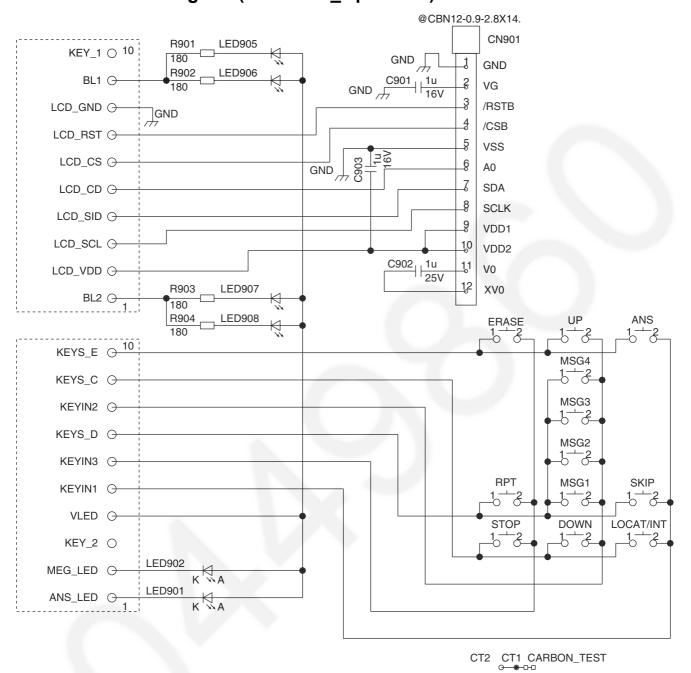
C825 10p

W 0.15mm L 20+/-2mm 3rd layer GND

*ZA1 Shield

10 9 8 7
11
12 6
1 2 3 4 5

GND

NC: No Components

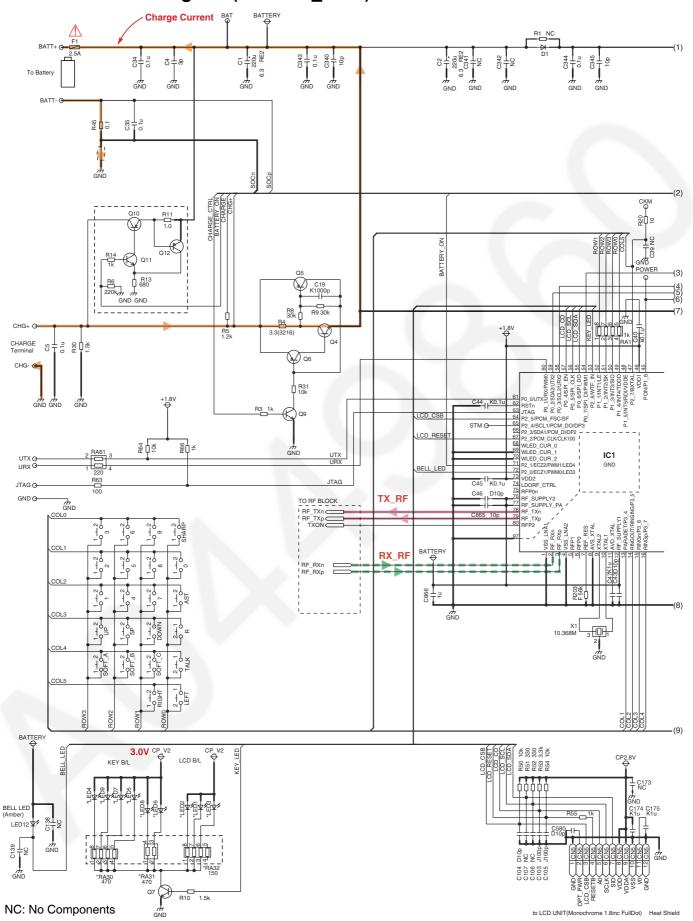KX-TG3721/3722  SCHEMATIC DIAGRAM (Base Unit_RF)

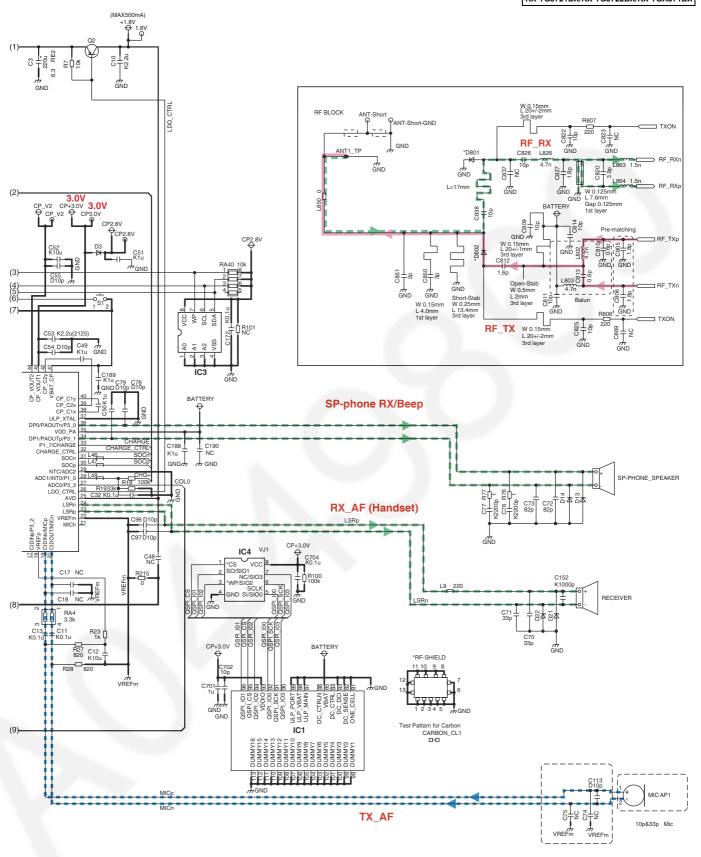# 14.4. Schematic Diagram (Base Unit_Operation)

@CBN12-0.9-2.8X14.



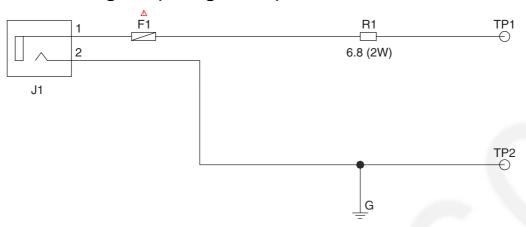NC: No Components

KX-TG3721/3722 SCHEMATIC DIAGRAM (Base Unit_Opearation)

# 14.5. Schematic Diagram (Handset_Main)



NC: No Components

to LCD UNIT(Monochrome 1.8inc FullDot)    Heat Shield

NC: No Components

KX-TGA371 SCHEMATIC DIAGRAM (Handset_Main)

## 14.6. Schematic Diagram (Charger Unit)
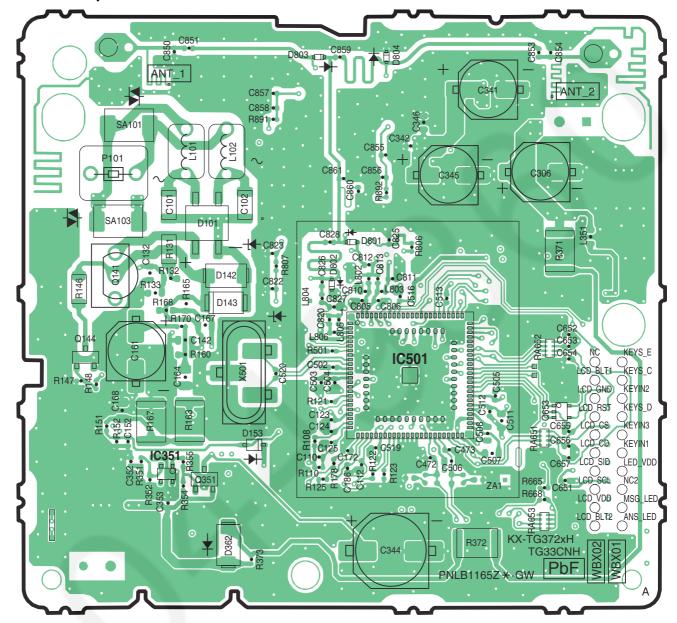
F1

1

2

J1

R1

6.8 (2W)

TP1

TP2

G

SCHEMATIC DIAGRAM (Charger Unit)

# 15 Printed Circuit Board
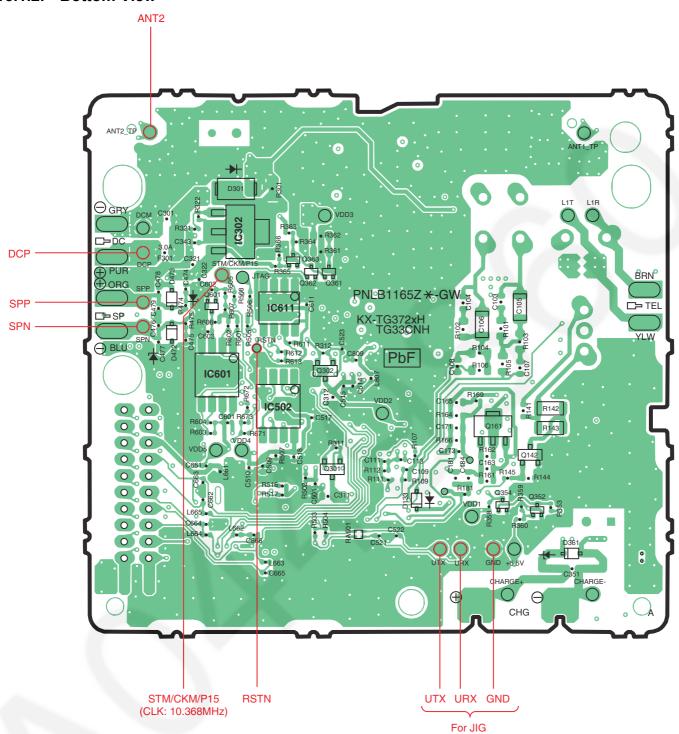
## 15.1.  Circuit Board (Base Unit_Main)

### 15.1.1.  Component View



KX-TG3721/3722  CIRCUIT BOARD (Base Unit_Main (Component View))

## 15.1.2. Bottom View



KX-TG3721/3722 CIRCUIT BOARD (Base Unit_Main (Bottom View))

## 15.2. Circuit Board (Base Unit_Operation)
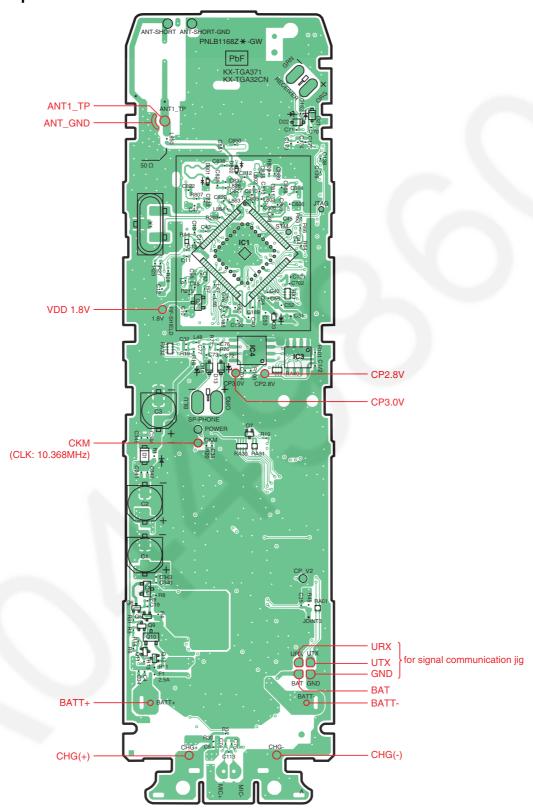


KX-TG3721/3722 CIRCUIT BOARD (Base Unit_Operation (Component View))

KX-TG3721BX/KX-TG3722BX/KX-TGA371BX

**Memo**

# 15.3. Circuit Board (Handset_Main)

## 15.3.1. Component View
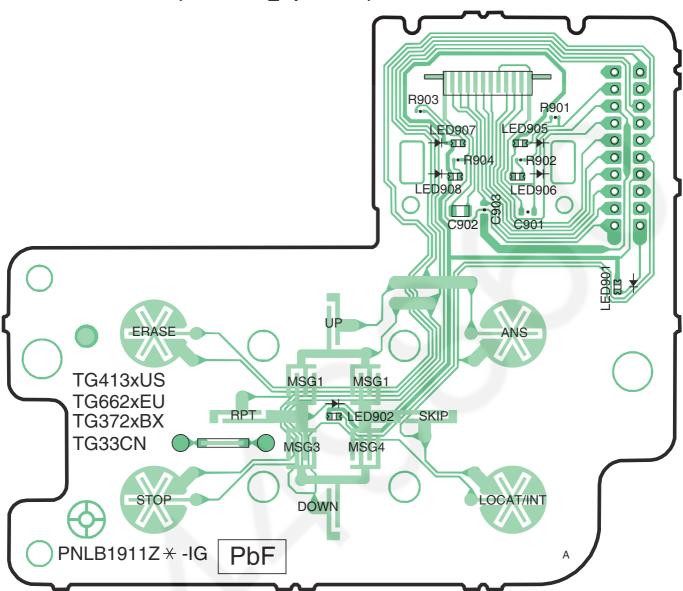


KX-TGA371 CIRCUIT BOARD (Handset_Main (Component View))
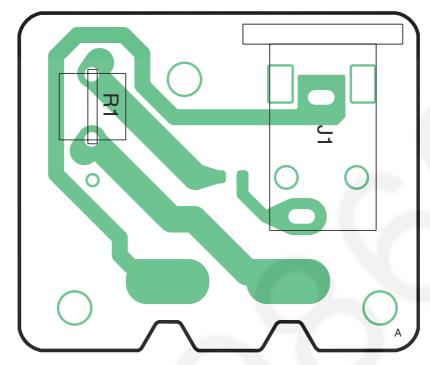
## 15.3.2. Bottom View



KX-TGA371 CIRCUIT BOARD (Handset_Main (Bottom View))
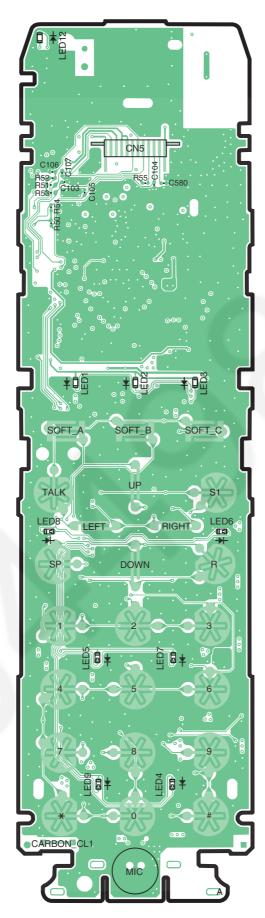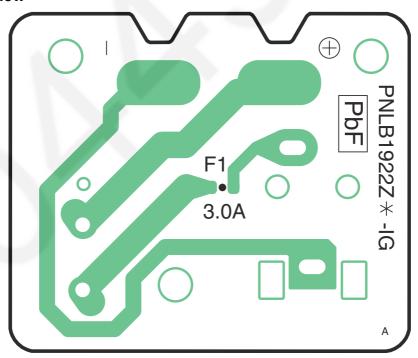
## 15.4.  Circuit Board (Charger Unit)

### 15.4.1.  Component View



CIRCUIT BOARD (Charger Unit (Component View))
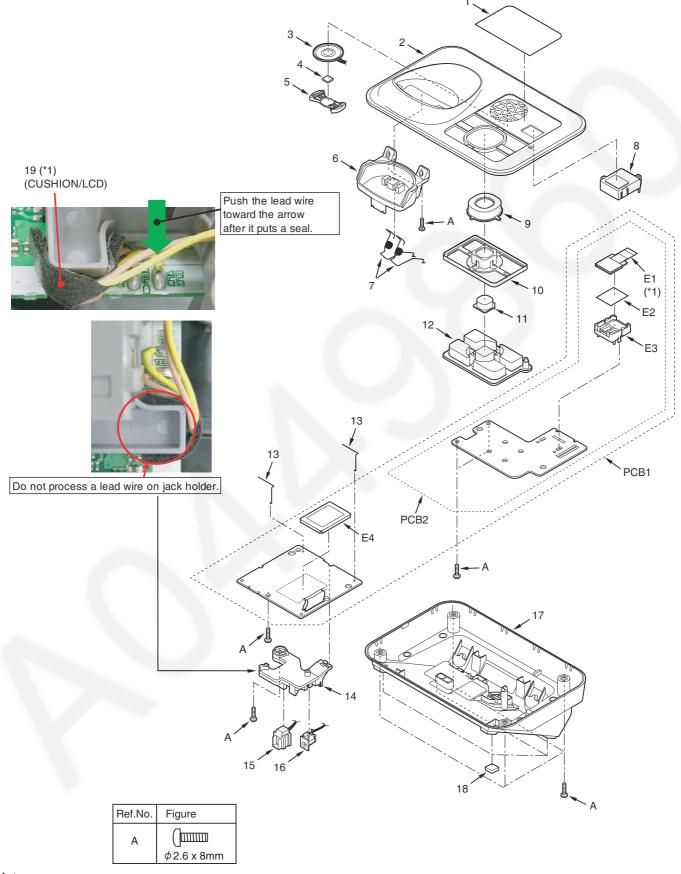
### 15.4.2.  Bottom View



CIRCUIT BOARD (Charger Unit (Bottom View))

# 16 Exploded View and Replacement Parts List
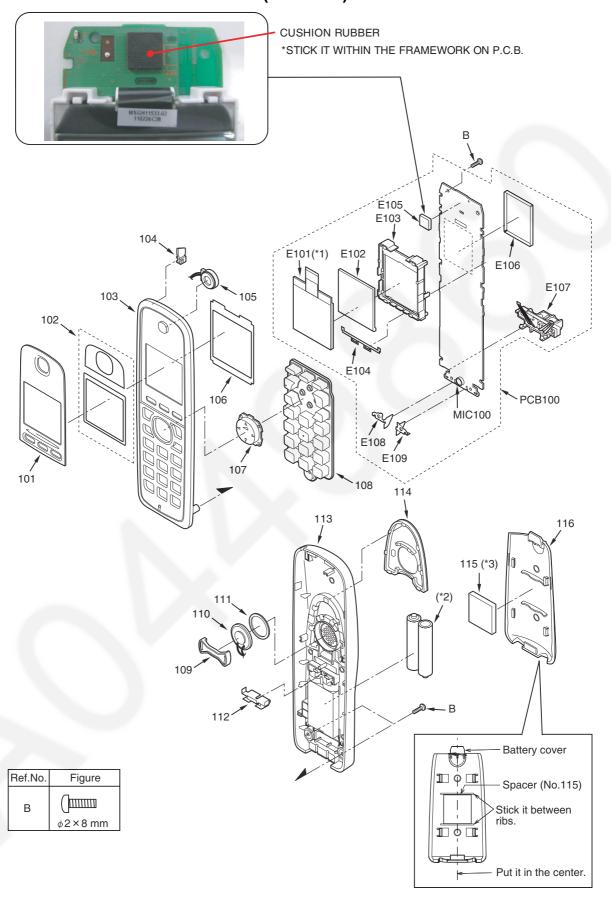
## 16.1. Cabinet and Electrical Parts (Base Unit)

19 (*1)
(CUSHION/LCD)

Push the lead wire toward the arrow after it puts a seal.

Do not process a lead wire on jack holder.

PCB1

PCB2

E1
(*1)

E2

E3

E4

| Ref.No. | Figure |
|---------|--------|
| A | $\phi$ 2.6 x 8mm |

**Note:**

　(*1) This cable is fixed by welding. Refer to **How to Replace the Base unit LCD** (P.48)
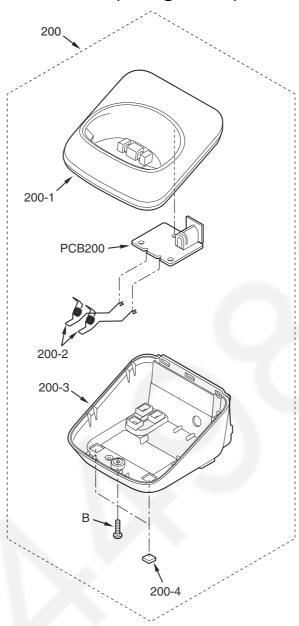
## 16.2. Cabinet and Electrical Parts (Handset)

CUSHION RUBBER

*STICK IT WITHIN THE FRAMEWORK ON P.C.B.

MSGH11533-02
110226C38

B

E105
E103

E101(*1)   E102

E106

E107

104

105

103

102

106

E104

107

108

PCB100

MIC100

E108

E109

101

114

113

116

111

115 (*3)

110

(*2)

109

112

B

| Ref.No. | Figure |
|---------|--------|
| B | $\phi 2 \times 8$ mm |

Battery cover

Spacer (No.115)

Stick it between ribs.

Put it in the center.

**Note:**

(*1) This cable is fixed by welding. Refer to **How to Replace the Handset LCD** (P.50).

(*2) The rechargeable Ni-MH battery HHR-4MRT is available through sales route of Panasonic.
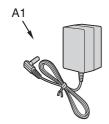
(*3) Attach the SPACER (No. 115) to the exact location described above.

# 16.3. Cabinet and Electrical Parts (Charger Unit)

200

200-1

PCB200 →

200-2

200-3

B →

200-4

# 16.4. Accessories

A1

A2

# 16.5. Replacement Parts 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 | 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 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 |

## 16.5.1. Base Unit

## 16.5.1.1. Cabinet and Electrical Parts

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | 1 | PNGS1003Z | NET,MESH SHEET (for KX-TG3721BXB)(for KX-TG3722BXB) | PC-VO |
| | 1 | PNGS1003X | NET,MESH SHEET (for KX-TG3721BXN)(for KX-TG3722BXN) | PC-VO |
| | 2 | PNKM1190N1 | CABINET BODY (for KX-TG3721BXB)(for KX-TG3722BXB) | PS-HB |
| | 2 | PNKM1190M3 | CABINET BODY (for KX-TG3721BXN)(for KX-TG3722BXN) | PS-HB |
| | 3 | L0AA02A00087 | SPEAKER | |
| | 4 | PQHG10729Z | RUBBER PARTS, SPEAKER | |

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | 5 | PQHR11313Z | GUIDE, SPEAKER | ABS-HB |
| | 6 | PNKE1090Z1 | CASE, CHARGE TERMINAL (for KX-TG3721BXB)(for KX-TG3722BXB) | PS-HB |
| | 6 | PNKE1090Z3 | CASE, CHARGE TERMINAL (for KX-TG3721BXN)(for KX-TG3722BXN) | PS-HB |
| | 7 | PNJT1064Z | CHARGE TERMINAL | |
| | 8 | PNGP1135Z1 | PANEL, LCD | PMMA-HB |
| | 9 | PNBC1353Z1 | BUTTON, NAVIGATOR KEY (for KX-TG3721BXB)(for KX-TG3722BXB) | ABS-HB |
| | 9 | PNBC1353Y3 | BUTTON, NAVIGATOR KEY (for KX-TG3721BXN)(for KX-TG3722BXN) | ABS-HB |
| | 10 | PNHR1385Z | GUIDE, BUTTON | PS-HB |
| | 11 | PNBC1345Z1 | BUTTON, MESSAGE (for KX-TG3721BXB)(for KX-TG3722BXB) | PS-HB |
| | 11 | PNBC1345Z4 | BUTTON, MESSAGE (for KX-TG3721BXN)(for KX-TG3722BXN) | PS-HB |
| | 12 | PNJK1103Z | KEYBOARD SWITCH (for KX-TG3721BXB)(for KX-TG3722BXB) | |
| | 12 | PNJK1103W | KEYBOARD SWITCH (for KX-TG3721BXN)(for KX-TG3722BXN) | |
| | 13 | PNLA1083Z | ANTENNA | |
| | 14 | PNHR1387Z | GUIDE, JACK | PS-HB |
| | 15 | PQJJ1T039M | JACK, MODULAR | |
| | 16 | K2ECYZ000001 | JACK, DC | |
| | 17 | PNKF1132Y1 | CABINET COVER (for KX-TG3721BXB)(for KX-TG3722BXB) | PS-HB |
| | 17 | PNKF1132Y2 | CABINET COVER (for KX-TG3721BXN)(for KX-TG3722BXN) | PS-HB |
| | 18 | PQHA10023Z | RUBBER PARTS, FOOT CUSHION | |
| | 19 | PNYE1029Z | SPACER, CUSHION LCD | |

## 16.5.1.2. Main P.C. Board Parts

**Note:**

(*1) When replacing IC502, IC601, IC611 or X501, make the adjustment using PNZZTG3721BX. Refer to **How to download the data** (P.62) of Things to Do after Replacing IC or X'tal.

(*2) When replacing the Base Unit LCD, See **How to Replace the Base unit LCD** (P.48).

(*3) When removing E4, use special tools (ex. Hot air disordering tool).

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | PCB1 | PNWP13721BXH | MAIN P.C.BOARD ASS'Y (RTL) | |
| | | | (ICs) | |
| | IC302 | C0DBEYY00102 | IC | |
| | IC351 | C0EBE0000124 | IC | |
| | IC501 | C1CB00003545 | IC | |
| | IC502 | C3FBLY000125 | IC(FLASH) | |
| | IC601 | C3FBLY000124 | IC(FLASH) (*1) | |
| | IC611 | PNWIG3411BXH | IC(EEPROM) (*1) | |
| | | | (TRANSISTORS) | |
| | Q141 | B1ACGP000008 | TRANSISTOR(SI) | |
| | Q142 | B1ABDM000001 | TRANSISTOR(SI) | |
| | Q161 | DSC7003S0L | TRANSISTOR(SI) | |
| | Q301 | B1ADGE000012 | TRANSISTOR(SI) | |
| | Q302 | B1ADGE000012 | TRANSISTOR(SI) | |
| | Q351 | B1ADNB000003 | TRANSISTOR(SI) | |
| | Q352 | B1ABDF000017 | TRANSISTOR(SI) | |
| | Q354 | B1GBCFYY0010 | TRANSISTOR(SI) | |
| | Q361 | B1ABDF000017 | TRANSISTOR(SI) | |
| | Q362 | B1GBCFYY0020 | TRANSISTOR(SI) | |

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | Q363 | B1ABDF000017 | TRANSISTOR(SI) | |
| | Q601 | B1ABDF000017 | TRANSISTOR(SI) | |
| | Q653 | PSVTUMG11NTR | TRANSISTOR(SI) | S |
| | | | (DIODES) | |
| | D101 | PQVDMD5S | DIODE(SI) | |
| | D133 | 1SS355 | DIODE(SI) | S |
| | D142 | PQVDPTZT2530 | DIODE(SI) | S |
| | D362 | B0ECKM000008 | DIODE(SI) | |
| | D801 | B0DCCD000013 | DIODE(SI) | |
| | D802 | B0DCCD000013 | DIODE(SI) | |
| | D803 | B0DCCD000013 | DIODE(SI) | |
| | D804 | B0DCCD000013 | DIODE(SI) | |
| | | | (COILS) | |
| | L101 | PQLQXF330K | COIL | S |
| | L102 | PQLQXF330K | COIL | S |
| | L351 | PQLQR2KA113 | COIL | S |
| | L802 | G1C4N7Z00006 | COIL | |
| | L803 | G1C4N7Z00006 | COIL | |
| | L804 | G1C4N7Z00006 | COIL | |
| | L805 | G1C1N5Z00007 | COIL | |
| | L806 | G1C1N5Z00007 | COIL | |
| | L807 | PQLQR4C15NJ | COIL | S |
| | | | (RESISTOR ARRAYS) | |
| | RA501 | D1H422120001 | RESISTOR ARRAY | |
| | RA651 | D1H810240004 | RESISTOR ARRAY | S |
| | RA652 | D1H810240004 | RESISTOR ARRAY | S |
| | RA653 | D1H810240004 | RESISTOR ARRAY | S |
| | | | (VARISTOR) | |
| | SA101 | J0LF00000048 | VARISTOR (SURGE ABSORBER) | |
| | | | (RESISTORS) | |
| | R101 | PQ4R10XJ475 | 4.7M | S |
| | R102 | PQ4R10XJ475 | 4.7M | S |
| | R103 | PQ4R10XJ184 | 180k | S |
| | R104 | PQ4R10XJ184 | 180k | S |
| | R105 | PQ4R10XJ105 | 1M | S |
| | R106 | PQ4R10XJ105 | 1M | S |
| | R107 | ERJ2GEJ102 | 1k | S |
| | R108 | ERJ2GEJ102 | 1k | S |
| | R109 | ERJ2GEJ823 | 82k | S |
| | R110 | ERJ2GEJ823 | 82k | S |
| | R111 | ERJ2GEJ392 | 3.9k | S |
| | R112 | ERJ2GEJ124 | 120k | S |
| | R121 | ERJ2GEJ102 | 1k | S |
| | R122 | ERJ2GEJ102 | 1k | S |
| | R123 | ERJ2GEJ102 | 1k | S |
| | R125 | ERJ2GEJ271 | 270 | S |
| | R131 | PQ4R18XJ106 | 10M | S |
| | R132 | ERJ3GEYJ205 | 2M | S |
| | R133 | ERJ3GEYJ184 | 180k | S |
| | R141 | ERJ3GEYJ104 | 100k | S |
| | R142 | PQ4R18XJ272 | 2.7k | S |
| | R145 | ERJ2GEJ222 | 2.2k | S |
| | R151 | ERJ2GEJ104 | 100k | S |
| | R152 | ERJ2GEJ474X | 470k | S |
| | R160 | ERJ3GEYJ911 | 910 | S |
| | R161 | ERJ3GEYJ104 | 100k | S |
| | R162 | ERJ3GEYJ273 | 27k | S |
| | R163 | ERJ12YJ120 | 12 | |
| | R164 | ERJ3GEYJ272 | 2.7k | S |
| | R165 | ERJ3GEYJ273 | 27k | S |
| | R166 | ERJ3GEYJ822 | 8.2k | S |
| | R167 | ERJ12YJ270 | 27 | |
| | R169 | ERJ2GE0R00 | 0 | S |
| | R170 | ERJ2GE0R00 | 0 | S |
| | R178 | ERJ2GEJ332 | 3.3k | S |
| | R311 | ERJ2GEJ103 | 10k | S |
| | R312 | ERJ2GEJ103 | 10k | S |
| | R321 | ERJ2RKF1400 | 140 | |
| | R322 | ERJ2RKF1000 | 100 | |
| | R351 | ERJ2GEJ392 | 3.9k | S |
| | R352 | ERJ2GEJ563 | 56k | S |
| | R353 | ERJ2GEJ103 | 10k | S |

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | R354 | ERJ2GEJ103 | 10k | S |
| | R355 | ERJ2GEJ681 | 680 | S |
| | R358 | ERJ2GEJ103 | 10k | S |
| | R359 | ERJ2GEJ103 | 10k | S |
| | R360 | ERJ2GEJ563 | 56k | S |
| | R361 | PQ4R10XJ680 | 68 | S |
| | R362 | PQ4R10XJ680 | 68 | S |
| | R363 | ERJ2GEJ222 | 2.2k | S |
| | R364 | ERJ2GEJ103 | 10k | S |
| | R365 | ERJ2GEJ473 | 47k | S |
| | R366 | ERJ2GEJ103 | 10k | S |
| | R371 | ERJ12YJ1R0 | 1 | |
| | R372 | ERJ12YJ1R0 | 1 | |
| | R373 | ERJ2GEJ182 | 1.8k | S |
| | R474 | ERJ2GEJ1R0 | 1 | S |
| | R475 | ERJ2GEJ1R0 | 1 | S |
| | R501 | D0GA563ZA006 | 56k | |
| | R502 | ERJ2GEJ332 | 3.3k | S |
| | R504 | ERJ2GEJ103 | 10k | S |
| | R505 | ERJ2GEJ102 | 1k | S |
| | R506 | ERJ2GEJ101 | 100 | S |
| | R507 | ERJ2GEJ104 | 100k | S |
| | R508 | ERJ2GEJ100 | 10 | S |
| | R516 | ERJ2GEJ473 | 47k | S |
| | R517 | ERJ2GEJ473 | 47k | S |
| | R601 | ERJ2GEJ332 | 3.3k | S |
| | R602 | ERJ2GEJ561 | 560 | S |
| | R603 | ERJ2GEJ561 | 560 | S |
| | R604 | ERJ2GEJ561 | 560 | S |
| | R605 | ERJ2GEJ473 | 47k | S |
| | R606 | ERJ2GEJ103 | 10k | S |
| | R607 | ERJ2GEJ103 | 10k | S |
| | R611 | ERJ2GEJ103 | 10k | S |
| | R612 | ERJ2GEJ332 | 3.3k | S |
| | R613 | ERJ2GEJ332 | 3.3k | S |
| | R665 | ERJ2GEJ103 | 10k | S |
| | R668 | ERJ2GEJ561 | 560 | S |
| | R671 | ERJ2GEJ473 | 47k | S |
| | R672 | ERJ2GEJ473 | 47k | S |
| | R673 | ERJ2GEJ473 | 47k | S |
| | R806 | ERJ2GEJ221 | 220 | S |
| | R807 | ERJ2GEJ221 | 220 | S |
| | R891 | ERJ2GEJ221 | 220 | S |
| | R892 | ERJ2GEJ221 | 220 | S |
| | | | (CAPACITORS) | |
| | C101 | ECUV2H681KB | 680p | S |
| | C102 | ECUV2H681KB | 680p | S |
| | C103 | ECUV1C103KBV | 0.01 | |
| | C104 | ECUV1C103KBV | 0.01 | |
| | C105 | ECUV2H681KB | 680p | S |
| | C106 | ECUV2H681KB | 680p | S |
| | C107 | ECUV1C103KBV | 0.01 | |
| | C108 | ECUV1C103KBV | 0.01 | |
| | C109 | ECUE1H821KBQ | 820p | |
| | C110 | ECUE1H821KBQ | 820p | |
| | C111 | ECUE1A333KBQ | 0.033 | |
| | C112 | ECUE1H100DCQ | 10p | |
| | C113 | ECUE1A823KBQ | 0.082 | |
| | C123 | ECUE1H100DCQ | 10p | |
| | C124 | ECUE1H100DCQ | 10p | |
| | C125 | ECUE1H100DCQ | 10p | |
| | C132 | ECUV1C105KBV | 1 | |
| | C142 | ECUV1H103KBV | 0.01 | |
| | C152 | ECUE1C103KBQ | 0.01 | |
| | C161 | EEE1HA100SP | 10 | |
| | C167 | ECUV1H102KBV | 0.001 | |
| | C171 | ECUV1C223KBV | 0.022 | |
| | C172 | ECUE1H100DCQ | 10p | |
| | C173 | ECUE1A104KBQ | 0.1 | |
| | C184 | ECUV1A105KBV | 1 | |
| | C301 | ECUV1H101JCV | 100p | |
| | C306 | F2G1C1010034 | 100 | |
| | C311 | ECUV1C105KBV | 1 | |

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | C312 | ECUV1C105KBV | 1 | |
| | C321 | ECUV1A105KBV | 1 | |
| | C341 | EEE0JA221WP | 220 | |
| | C342 | ECUE1A104KBQ | 0.1 | |
| | C343 | ECUE1H100DCQ | 10p | |
| | C344 | F2G0J1020022 | 1000 | |
| | C345 | EEE0JA221WP | 220 | |
| | C351 | ECUV1C105KBV | 1 | |
| | C353 | ECUE1H330JCQ | 33p | |
| | C472 | ECUE1H100DCQ | 10p | |
| | C473 | ECUE1H100DCQ | 10p | |
| | C474 | ECUE1H222KBQ | 0.0022 | |
| | C475 | ECUE1H222KBQ | 0.0022 | |
| | C476 | ECUE1H151JCQ | 150p | |
| | C477 | ECUE1H100DCQ | 10p | |
| | C478 | ECUE1H100DCQ | 10p | |
| | C479 | ECUE1H151JCQ | 150p | |
| | C501 | ECUE1A104KBQ | 0.1 | |
| | C502 | ECUE0J105KBQ | 1 | |
| | C503 | ECUE1H100DCQ | 10p | |
| | C504 | ECUE1A104KBQ | 0.1 | |
| | C505 | ECUE1A104KBQ | 0.1 | |
| | C506 | ECUV1A225KBV | 2.2 | |
| | C507 | ECUV1A105KBV | 1 | |
| | C508 | ECUV1A105KBV | 1 | |
| | C509 | ECUV0J225KBV | 2.2 | |
| | C511 | ECUV1A105KBV | 1 | |
| | C513 | ECUE1A104KBQ | 0.1 | |
| | C516 | ECUE1A104KBQ | 0.1 | |
| | C517 | ECUE1A104KBQ | 0.1 | |
| | C518 | ECUE1A104KBQ | 0.1 | |
| | C519 | ECUE1A104KBQ | 0.1 | |
| | C523 | F1G1H100A722 | 10p | |
| | C601 | ECUE1A104KBQ | 0.1 | |
| | C603 | ECUE1C103KBQ | 0.01 | |
| | C611 | ECUE1A104KBQ | 0.1 | |
| | C661 | ECUE1A104KBQ | 0.1 | |
| | C805 | F1G1H1R8A798 | 1.8p | |
| | C806 | F1G1H1R8A798 | 1.8p | |
| | C809 | ECUE1H100DCQ | 10p | S |
| | C810 | F1G1HR60A798 | 0.6p | |
| | C811 | ECUE1H100DCQ | 10p | S |
| | C812 | ECUE1H100DCQ | 10p | S |
| | C813 | F1G1HR60A798 | 0.6p | |
| | C820 | F1G1H4R7A798 | 4.7p | |
| | C822 | ECUE1H100DCQ | 10p | S |
| | C825 | ECUE1H100DCQ | 10p | S |
| | C826 | F1G1H100A722 | 10p | |
| | C827 | F1G1H2R0A798 | 2p | |
| | C828 | F1G1H2R0A798 | 2p | |
| | C851 | ECUE1H100DCQ | 10p | S |
| | C853 | ECUE1H100DCQ | 10p | S |
| | C855 | ECUE1H100DCQ | 10p | S |
| | C857 | ECUE1H100DCQ | 10p | S |
| | C859 | ECUE1H100DCQ | 10p | S |
| | C860 | F1G1H3R3A798 | 3.3p | |
| | C861 | F1G1H2R0A798 | 2p | |
| | | | (OTHERS) | |
| | E1 | L5DYBYY00021 | LIQUID CRYSTAL DISPLAY (*2) | |
| | E2 | PNHX1406Z | COVER, LCD | |
| | E3 | PNHR1386Z | GUIDE, LCD | ABS-HB |
| | E4 | PNMC1033Z | CASE, MAGNETIC SHIELD (*3) | |
| | P101 | D4DAY220A022 | THERMISTOR (POSISTOR) | |
| ⚠ | F301 | K5H302Y00003 | FUSE | |
| | X501 | H0J103500037 | CRYSTAL OSCILLATOR (*1) | |

## 16.5.1.3. Operational P.C.Board parts

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | PCB2 | PNWP23721BXH | OPERATIONAL P.C.BOARD ASS'Y (RTL) | |
| | | | (LEDS) | |
| | LED901 | LNJ237W82RA | LED | |
| | LED902 | LNJ237W82RA | LED | |
| | LED905 | LNJ237W82RA | LED | |
| | LED906 | LNJ237W82RA | LED | |
| | LED907 | LNJ237W82RA | LED | |
| | LED908 | LNJ237W82RA | LED | |
| | | | (RESISTORS) | |
| | R901 | ERJ2GEJ181 | 180 | S |
| | R902 | ERJ2GEJ181 | 180 | S |
| | R903 | ERJ2GEJ181 | 180 | S |
| | R904 | ERJ2GEJ181 | 180 | S |
| | | | (CAPACITORS) | |
| | C901 | ECUV1C105KBV | 1 | |
| | C902 | F1J1E105A197 | 1 | |
| | C903 | ECUV1C105KBV | 1 | |

## 16.5.2. Handset

## 16.5.2.1. Cabinet and Electrical Parts

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | 101 | PNGP1137Z1 | PANEL, LCD (for KX-TGA371BXB) | PMMA-HB |
| | 101 | PNGP1137Z3 | PANEL, LCD (for KX-TGA371BXN) | PMMA-HB |
| | 102 | PNYE1041Z | TAPE, DOUBLESIDED | |
| | 103 | PNKM1191Z1 | CABINET BODY (for KX-TGA371BXB) | ABS-HB |
| | 103 | PNKM1191U3 | CABINET BODY (for KX-TGA371BXN) | ABS-HB |
| | 104 | PNHR1391Z | OPTIC CONDUCTIVE PARTS, LED LENS | PS-HB |
| | 105 | L0AD01A00024 | RECEIVER | |
| | 106 | PNYE1029Z | SPACER, CUSHION LCD | |
| | 107 | PNBC1354Z1 | BUTTON, NAVIGATOR KEY (for KX-TGA371BXB) | ABS-HB |
| | 107 | PNBC1354Y3 | BUTTON, NAVIGATOR KEY (for KX-TGA371BXN) | ABS-HB |
| | 108 | PNJK1113R | KEYBOARD SWITCH (for KX-TGA371BXB) | |
| | 108 | PNJK1113Q | KEYBOARD SWITCH (for KX-TGA371BXN) | |
| | 109 | PQHR11315Z | GUIDE, SPEAKER | ABS-HB |
| | 110 | L0AA02A00095 | SPEAKER | |
| | 111 | PQHS10784Y | SPACER, SPEAKER NET | |
| | 112 | PNJC1018Z | BATTERY TERMINAL | |
| | 113 | PNKF1134Z1 | CABINET COVER (for KX-TGA371BXB) | ABS-HB |
| | 113 | PNKF1134Z2 | CABINET COVER (for KX-TGA371BXN) | ABS-HB |
| | 114 | PNKE1093Z1 | COVER, RUBBER GRIP (for KX-TGA371BXB) | |
| | 114 | PNKE1093Z2 | COVER, RUBBER GRIP (for KX-TGA371BXN) | |
| | 115 | PNHS1079Z | SPACER, BATTERY | |
| | 116 | PNKK1053Z1 | LID, BATTERY (for KX-TGA371BXB) | ABS-HB |
| | 116 | PNKK1053Z2 | LID, BATTERY (for KX-TGA371BXN) | ABS-HB |

## 16.5.2.2. Main P.C. Board Parts

**Note:**

(*1) When replacing IC4, IC3 or X1, make the adjustment using PNZZTG3721BX. Refer to **Handset** (P.63) of Things to Do after Replacing IC or X'tal.

(*2) When replacing the handset LCD, See **How to Replace the Handset LCD** (P.50).

(\*3) When removing E106, use special tools (ex. Hot air disordering tool).

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | PCB100 | PNWPGA371BXR | MAIN P.C.BOARD ASS'Y (RTL) | |
| | | | (ICs) | |
| | IC1 | C1CB00003544 | IC | |
| | IC3 | PNWIGA381BXR | IC(EEPROM) (*1) | |
| | IC4 | C3FBLY000125 | IC (*1) | |
| | | | (TRANSISTORS) | |
| | Q2 | B1ADGE000012 | TRANSISTOR(SI) | |
| | Q4 | B1ABGE000011 | TRANSISTOR(SI) | |
| | Q5 | B1ADCF000040 | TRANSISTOR(SI) | |
| | Q6 | B1ADCF000040 | TRANSISTOR(SI) | |
| | Q7 | B1ABDF000017 | TRANSISTOR(SI) | |
| | Q9 | B1ABDF000017 | TRANSISTOR(SI) | |
| | Q10 | B1ADNB000003 | TRANSISTOR(SI) | |
| | Q11 | 2SC6054JSL | TRANSISTOR(SI) | S |
| | Q12 | B1ADCF000040 | TRANSISTOR(SI) | |
| | | | (DIODES) | |
| | D1 | B0JCMC000006 | DIODE(SI) | |
| | D3 | B0JCDD000001 | DIODE(SI) | |
| | D13 | MA8043 | DIODE(SI) | S |
| | D14 | MA8043 | DIODE(SI) | S |
| | D21 | MA8043 | DIODE(SI) | S |
| | D22 | MA8043 | DIODE(SI) | S |
| | D801 | B0DCCD000013 | DIODE(SI) | |
| | D802 | B0DCCD000013 | DIODE(SI) | |
| | | | (LEDS) | |
| | LED1 | B3ACB0000216 | LED | |
| | LED2 | B3ACB0000216 | LED | |
| | LED3 | B3ACB0000216 | LED | |
| | LED4 | B3ACB0000190 | LED | |
| | LED5 | B3ACB0000190 | LED | |
| | LED6 | B3ACB0000190 | LED | |
| | LED7 | B3ACB0000190 | LED | |
| | LED8 | B3ACB0000190 | LED | |
| | LED9 | B3ACB0000190 | LED | |
| | LED12 | B3ACB0000216 | LED | |
| | | | (COILS) | |
| | L802 | G1C4N7Z00006 | COIL | |
| | L803 | G1C4N7Z00006 | COIL | |
| | L826 | G1C4N7Z00006 | COIL | |
| | L863 | G1C1N5Z00007 | COIL | |
| | L864 | G1C1N5Z00007 | COIL | |
| | | | (RESISTOR ARRAYS) | |
| | RA1 | D1H810240004 | RESISTOR ARRAY | S |
| | RA4 | D1H433220001 | RESISTOR ARRAY | |
| | RA30 | D1H84714A013 | RESISTOR ARRAY | S |
| | RA31 | D1H447120002 | RESISTOR ARRAY | |
| | RA32 | EXB28V151JX | RESISTOR ARRAY | |
| | RA40 | EXB28V103 | RESISTOR ARRAY | |
| | RA61 | D1H422120001 | RESISTOR ARRAY | |
| | | | (IC FILTERS) | |
| | L9 | J0JCC0000287 | IC FILTER | |
| | L46 | J0JDC0000045 | IC FILTER | |
| | L47 | J0JDC0000045 | IC FILTER | |
| | L48 | J0JDC0000045 | IC FILTER | |
| | | | (RESISTORS) | |
| | R3 | ERJ2GEJ102 | 1k | S |
| | R4 | ERJ8GEYJ3R3 | 3.3 | S |
| | R5 | ERJ2GEJ122 | 1.2k | S |
| | R6 | ERJ2GEJ224 | 220k | S |
| | R7 | ERJ2GEJ103 | 10k | S |
| | R8 | ERJ2GEJ303 | 30k | S |
| | R9 | ERJ2GEJ303 | 30k | S |
| | R10 | ERJ2GEJ152 | 1.5k | S |
| | R11 | ERJ3GEYJ1R0 | 1 | S |
| | R13 | ERJ2GEJ681 | 680 | S |
| | R14 | ERJ2GEJ102 | 1k | S |
| | R18 | ERJ2RKF1003 | 100k | |
| | R19 | ERJ2RKF3302 | 33k | |

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | R20 | ERJ2GEJ100 | 10 | S |
| | R23 | ERJ2GEJ102 | 1k | S |
| | R27 | ERJ2GEJ821 | 820 | S |
| | R28 | ERJ2GEJ821 | 820 | S |
| | R30 | ERJ2GEJ152 | 1.5k | S |
| | R31 | ERJ2GEJ103 | 10k | S |
| | R45 | ERJ6RSJR10V | 0.1 | |
| | R50 | ERJ2GEJ103 | 10k | S |
| | R51 | ERJ3GEYJ331 | 330 | S |
| | R52 | ERJ2GEJ331 | 330 | S |
| | R53 | ERJ3GEYJ332 | 3.3k | S |
| | R54 | ERJ2GEJ103 | 10k | S |
| | R55 | ERJ2GEJ102 | 1k | S |
| | R63 | ERJ2GEJ101 | 100 | S |
| | R64 | ERJ2GEJ103 | 10k | S |
| | R66 | ERJ2GEJ102 | 1k | S |
| | R76 | ERJ2GEJ1R0 | 1 | S |
| | R77 | ERJ2GEJ1R0 | 1 | S |
| | R100 | ERJ2GEJ104 | 100k | S |
| | R203 | D0GA563ZA006 | 56k | |
| | R215 | ERJ2GE0R00 | 0 | S |
| | R806 | ERJ2GEJ221 | 220 | S |
| | R807 | ERJ2GEJ221 | 220 | S |
| | L850 | ERJ3GEY0R00 | 0 | S |
| | | | (CAPACITORS) | |
| | C1 | EEE0JA221WP | 220 | |
| | C2 | EEE0JA221WP | 220 | |
| | C3 | EEE0JA221WP | 220 | |
| | C4 | F1G1H3R0A798 | 3p | |
| | C5 | ECUE1A104KBQ | 0.1 | |
| | C10 | ECUV1A225KBV | 2.2 | |
| | C11 | ECUE1A104KBQ | 0.1 | |
| | C12 | PQCUV0J106KB | 10 | |
| | C13 | ECUE1A104KBQ | 0.1 | |
| | C19 | ECUE1H102KBQ | 0.001 | |
| | C32 | ECUE1A104KBQ | 0.1 | |
| | C34 | ECUE1A104KBQ | 0.1 | |
| | C35 | ECUE1A104KBQ | 0.1 | |
| | C40 | ECUE1A104KBQ | 0.1 | |
| | C43 | ECUE1H100DCQ | 10p | |
| | C44 | ECUE1A104KBQ | 0.1 | |
| | C45 | ECUE1A104KBQ | 0.1 | |
| | C46 | ECUE1H100DCQ | 10p | |
| | C47 | ECUV1A105KBV | 1 | |
| | C49 | ECUV1A105KBV | 1 | |
| | C50 | ECUV1A105KBV | 1 | |
| | C51 | ECUV1A105KBV | 1 | |
| | C52 | PQCUV0J106KB | 10 | |
| | C53 | PQCUV1A225KB | 2.2 | |
| | C54 | ECUE1H100DCQ | 10p | |
| | C55 | ECUE1H100DCQ | 10p | |
| | C70 | ECUE1H330JCQ | 33p | |
| | C71 | ECUE1H330JCQ | 33p | |
| | C72 | ECUE1H820JCQ | 82p | |
| | C73 | ECUE1H820JCQ | 82p | |
| | C76 | ECUE1H222KBQ | 0.0022 | |
| | C77 | ECUE1H222KBQ | 0.0022 | |
| | C78 | ECUE1H100DCQ | 10p | |
| | C79 | ECUE1H100DCQ | 10p | |
| | C96 | ECUE1H100DCQ | 10p | |
| | C97 | ECUE1H100DCQ | 10p | |
| | C103 | ECUE1H101JCQ | 100p | |
| | C104 | ECUE1H100DCQ | 10p | |
| | C105 | ECUE1H101JCQ | 100p | |
| | C113 | ECUE1H100DCQ | 10p | |
| | C152 | ECUE1H102KBQ | 0.001 | |
| | C172 | ECUE1A104KBQ | 0.1 | |
| | C174 | ECUV1C105KBV | 1 | |
| | C175 | ECUV1C105KBV | 1 | |
| | C188 | ECUE0J105KBQ | 1 | |
| | C189 | ECUE0J105KBQ | 1 | |
| | C340 | ECUE1H100DCQ | 10p | |
| | C343 | ECUE1A104KBQ | 0.1 | |

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | C344 | ECUE1A104KBQ | 0.1 | |
| | C345 | ECUE1H100DCQ | 10p | |
| | C580 | ECUE1H100DCQ | 10p | S |
| | C701 | ECUV1A105KBV | 1 | |
| | C702 | ECUE1H100DCQ | 10p | |
| | C704 | ECUE1A104KBQ | 0.1 | |
| | C805 | F1G1H1R8A798 | 1.8p | |
| | C806 | F1G1H1R8A798 | 1.8p | |
| | C809 | F1G1H100A722 | 10p | |
| | C810 | F1G1HR60A798 | 0.6p | |
| | C811 | F1G1H100A722 | 10p | |
| | C812 | F1G1H1R6A798 | 1.6p | |
| | C813 | F1G1HR60A798 | 0.6p | |
| | C814 | F1G1H100A722 | 10p | |
| | C820 | F1G1H3R9A798 | 3.9p | |
| | C822 | F1G1H100A722 | 10p | |
| | C825 | F1G1H100A722 | 10p | |
| | C826 | F1G1H100A722 | 10p | |
| | C827 | F1G1H1R8A798 | 1.8p | |
| | C838 | F1G1H100A722 | 10p | |
| | C850 | F1G1H3R0A798 | 3p | |
| | C851 | F1G1H2R0A798 | 2p | |
| | C865 | ECUE1H100DCQ | 10p | |
| | C866 | ECUV1A105KBV | 1 | |
| | | | (OTHERS) | |
| | MIC100 | L0CBAY000053 | MICROPHONE | |
| | E101 | L5DYBYY00001 | LIQUID CRYSTAL DISPLAY (*2) | |
| | E102 | PNHR1114Z | TRANSPARENT PLATE, LCD | PMMA-HB |
| | E103 | PNHR1392Z | GUIDE, LCD | ABS-HB |
| | E104 | PNHX1136Z | COVER, LCD | |
| | E105 | PQHG10729Z | RUBBER PARTS, RECEIVER | |
| | E106 | PNMC1032Z | CASE, MAGNETIC SHIELD (*3) | |
| | E107 | PNVE1011Z | BATTERY TERMINAL | ABS-HB |
| | E108 | PNJT1059Z | CHARGE TERMINAL (L) | |
| | E109 | PNJT1060Z | CHARGE TERMINAL (R) | |
| ⚠ | F1 | K5H252Y00002 | FUSE | |
| | X1 | H0J103500039 | CRYSTAL OSCILLATOR (*1) | |

## 16.5.3. Charger Unit

## 16.5.3.1. Cabinet and Electrical Parts

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | 200 | PNLC1018ZB | CHARGER UNIT ASS'Y without NAME PLATE (RTL)(for KX-TG3722BXB)(for KX-TGA371BXB) | |
| | 200 | PNLC1018ZN | CHARGER UNIT ASS'Y without NAME PLATE (RTL)(for KX-TG3722BXN)(for KX-TGA371BXN) | |
| | 200-1 | PNKM1204Z1 | CABINET BODY (for KX-TG3722BXB)(for KX-TGA371BXB) | PS-HB |
| | 200-1 | PNKM1204Y3 | CABINET BODY (for KX-TG3722BXN)(for KX-TGA371BXN) | PS-HB |
| | 200-2 | PNJT1066Z | CHARGE TERMINAL | |
| | 200-3 | PNKF1150Z1 | CABINET COVER (for KX-TG3722BXB)(for KX-TGA371BXB) | PS-HB |
| | 200-3 | PNKF1150Z2 | CABINET COVER (for KX-TG3722BXN)(for KX-TGA371BXN) | PS-HB |
| | 200-4 | PQHA10023Z | RUBBER PARTS, FOOT CUSHION | |

## 16.5.3.2. Main P.C. Board Parts

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | PCB200 | PNWPTGA660CH | MAIN P.C.BOARD ASS'Y (RTL) | |
| | | | (JACK) | |
| | J1 | K2ECYB000001 | JACK | S |
| | | | (RESISTOR) | |
| | R1 | ERX2SJ6R8 | 6.8 | |
| | | | (FUSE) | |
| ⚠ | F1 | K5H302Y00003 | FUSE | |

## 16.5.4. Accessories

**Note:**

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

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| ⚠ | A1 | PNLV226BX0Z | AC ADAPTOR | |
| | A2 | PQJA10075Z | CORD, TELEPHONE | |

## 16.5.5. Screws

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | A | XTB26+8GFJ | TAPPING SCREW | |
| | B | XTB2+8GFJ | TAPPING SCREW | |

## 16.5.6. Fixtures and Tools

**Note:**

(*1) See **Equipment Required** (P.51), and **The Setting Method of JIG** (P.51)

(*2) When replacing the Handset LCD, See **How to Replace the Handset LCD** (P.50)

| Safety | Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|---|
| | | PQZZ1CD300E | JIG CABLE (*1) | |
| | | PNZZTG3721BX | BATCH FILE CD-ROM (*1) | |
| | | PQZZ430PIR | TIP OF SOLDERING IRON (*2) | |
| | | PQZZ430PRB | RUBBER OF SOLDERING IRON (*2) | |

T.I/N

KXTG3721BXB
KXTG3721BXN
KXTG3722BXB
KXTG3722BXN
KXTGA371BXB
KXTGA371BXN