ORDER NO. KM41203554CE

Service Manual

Telephone Equipment

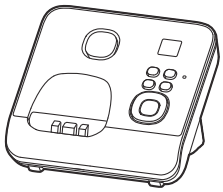
DECT 6.0

Model No. KX-TG8162ALB
KX-TG8163ALB
KX-TGA815AZB

Digital Cordless Answering System

B: Black Version
(for Australia)

KX-TGA815
(Handset)



KX-TG8161
(Base Unit)

(Charger Unit)

Configuration for each model

Model No	Base Unit	Handset	Charger Unit	Expandable
KX-TG8162	1 (TG8161)	2 (TGA815)	1	Up to 6
KX-TG8163	1 (TG8161)	3 (TGA815)	2	Up to 6
KX-TGA815*		1 (TGA815)	1	

*KX-TGA815 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.

TABLE OF CONTENTS

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:

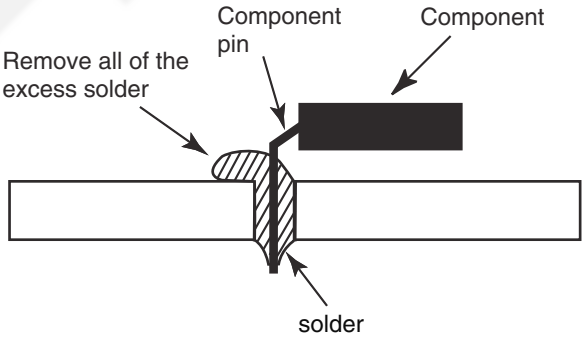
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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

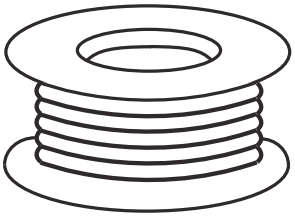
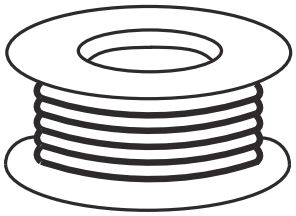
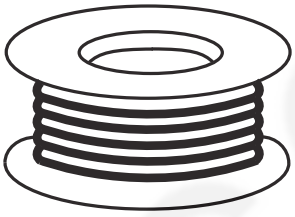
- PbF solder has a melting point that is 50 °F ~ 70 °F (30 °C ~ 40 °C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700 °F ± 20 °F (370 °C ± 10 °C).
- Exercise care while using higher temperature soldering irons.:
  Do not heat the PCB for too long time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

Standard:	GAP (Generic Access Profile)
Number of Channels:	120 Duplex Channels
Frequency Range:	1.88 GHz to 1.90 GHz
Duplex Procedure:	TDMA (Time Division Multiple Access)
Channel Spacing:	1,728 kHz
Bit Rate:	1,152 kbit/s
Modulation:	GFSK (Gaussian Frequency Shift Keying)
RF Transmission Power:	Approx. 10mW (average power per channel)
Voice Coding:	ADPCM 32 kbit/s
Operating conditions:	0°C - 40°C, 20 % - 80 % RH (Relative Humidity)
Power source (AC Adaptor):	220 - 240 V AC, 50/60 Hz Base unit: PNLV226AL0Z Charger: PNLV226AL0Z
Power consumption:	**Base unit:** Standby: Approx. 0.48 W Maximum: Approx. 2.5 W **Charger:** Standby: Approx. 0.1 W Maximum: Approx. 1.8 W
Dimensions:	Base unit: Approx. 108 mm x 91 mm x 82 mm Handset: Approx. 48 mm x 30 mm x 160 mm Charger unit: Approx. 72 mm x 81 mm x 43 mm
Mass (Weight):	Base unit: Approx. 160 g Handset: Approx. 130 g Charger: Approx. 50 g

Note:

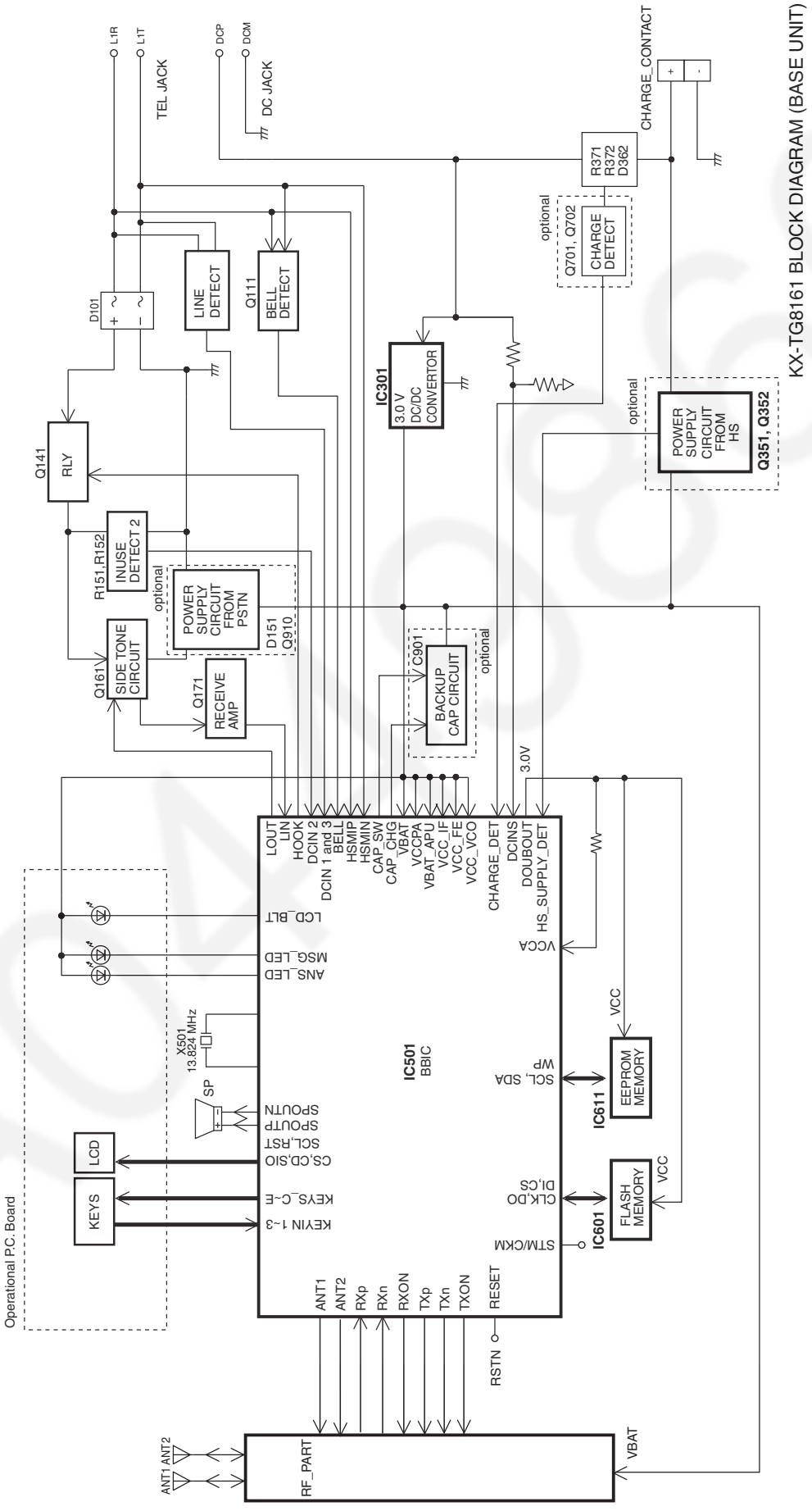
- Design and specifications are subject to change without notice.

Note for Service:

- **Operation range:** Up to 300 m outdoors, Up to 50 m indoors, depending on the condition.
- **Analog telephone connection:** Telephone Line
- **DECT repeater:** KX-A405AL
- **Optional headset:** KX-TCA89, RP-TCA430, RP-TCA400

4 Technical Descriptions

4.1. Block Diagram (Base Unit)



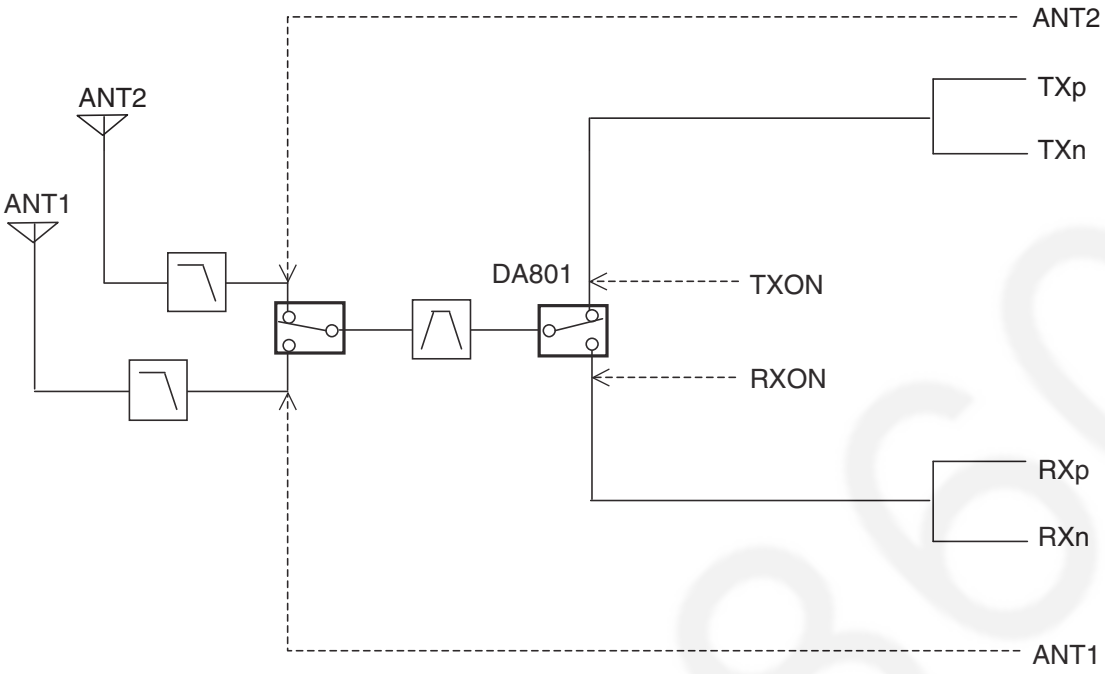
4.2. Circuit Operation (Base Unit)

4.2.1. Outline

Base Unit consists of the following ICs as shown in **Block Diagram (Base Unit)** (P.8).

- DECT BBIC (**B**ase **B**and IC): IC501
  - Handling all the audio, signal and data processing needed in a DECT base unit
  - Controlling the DECT specific physical layer and radio section (**B**urst **M**odule **C**ontroller section)
  - ADPCM code filter for speech encoding and speech decoding (DSP section)
  - Echo-cancellation and Echo-suppression (DSP section)
  - Any tones (tone, sidetone, ringing tone, etc.) generation (DSP section)
  - DTMF receiver (DSP section)
  - Clock Generation for RF Module
  - ADC, DAC, timer, and power control circuitry
  - PLL Oscillator
  - Detector
  - Compress/Expander
  - First Mixer
  - All interfaces (ex: QSPI FLASH MEMORY, EEPROM, LED, Analog Front End, etc.)
  - Integrated 1.9GHz PA for DECT
- EEPROM: IC611
  - Temporary operating parameters (for RF, etc.)
- FLASH MEMORY: IC601
  - Voice Prompt (TAM) D/L Area
  - ICM/OGM Recording Area
- Additionally,
  - Power Supply Circuit (+3.0 V output)
  - Crystal Circuit (13.824 MHz)
  - Charge Circuit
  - Telephone Line Interface Circuit

4.3. Block Diagram (Base Unit RF Part)

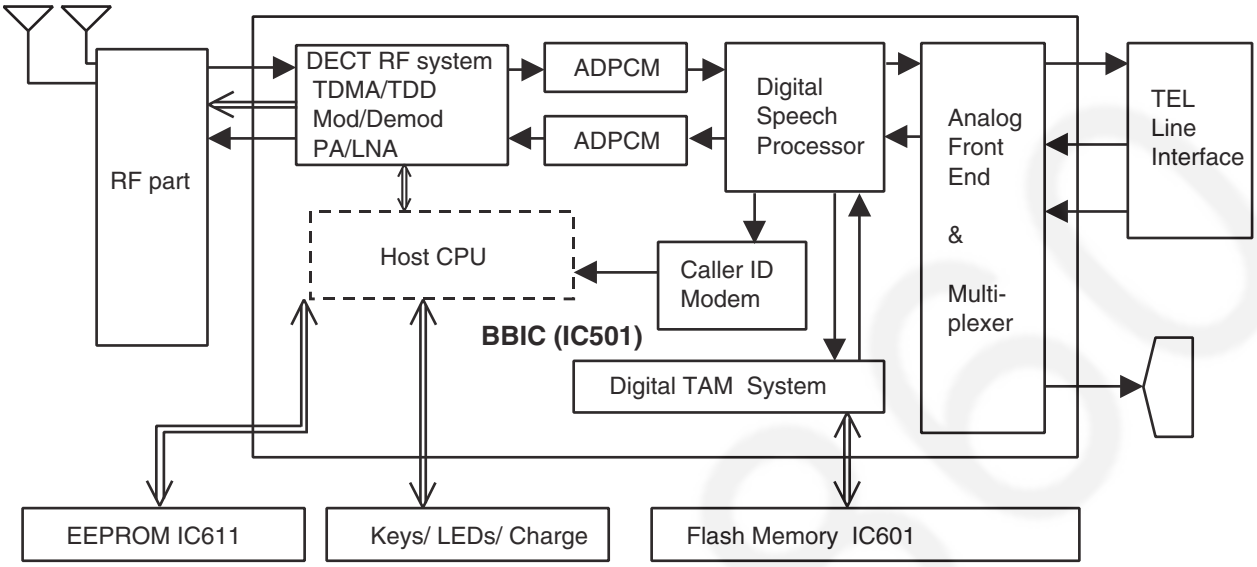


KX-TG8161 BLOCK DIAGRAM (Base Unit_RF Part)

4.4. Circuit Operation (Base Unit)

General Description:

(BBIC, Flash Memory, EERROM) is a digital speech/signal processing system that implements all the functions of speechcompression, 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 functionsas follows.



4.4.1. 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 theTelephone 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.

4.4.2. Flash Memory (IC601)

Following information data is stored.

- **Voice signal**
  ex: Pre-recorded Greeting message, Incoming message

4.4.3. EEPROM (IC611)

Following information data is stored.

- **Settings**
  ex: message numbers, ID code, Flash Time, Tone/Pulse

4.4.4. Telephone Line Interface

Telephone Line Interface Circuit:

Function

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

Bell 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:

R → P101 → R111 → C111 → Q111 → BBIC pin 5

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

T → D101 → Q141 → Q161 → R163 → R167 → R168 → D101 → 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 6 of BBIC turns Q141 ON/OFF to make the pulse dialing.

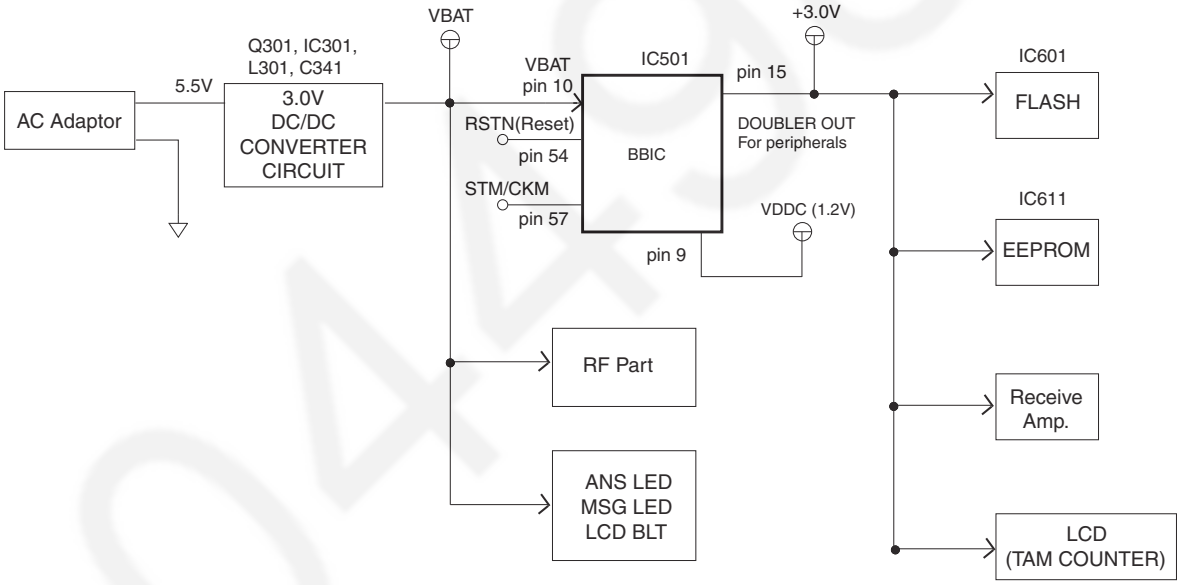
Side Tone Circuit:

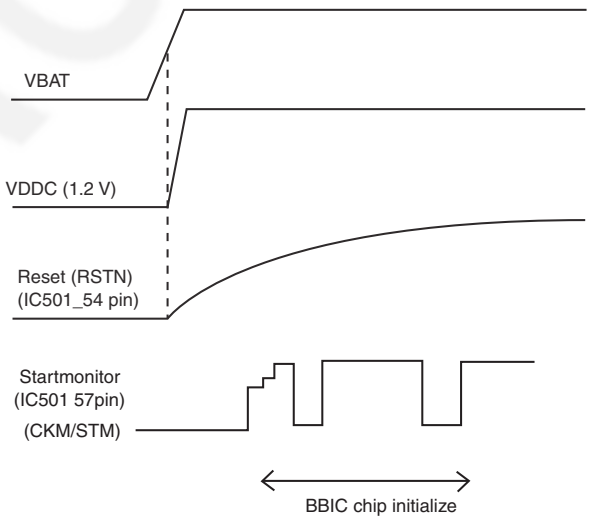
Basically this circuit prevents the TX signal from feeding back to RX signal. As for this unit, TX signal feed back from Q161 is canceled by the canceller circuit of BBIC.

4.4.5. Power Supply Circuit

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

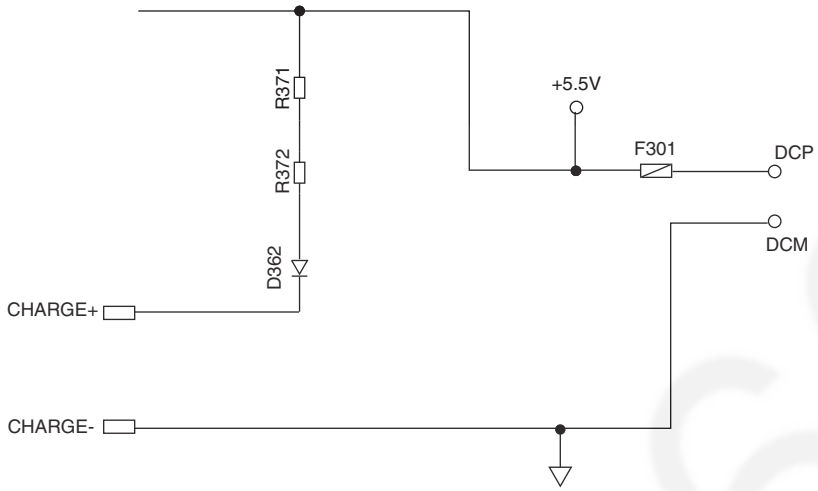
Circuit Operation:



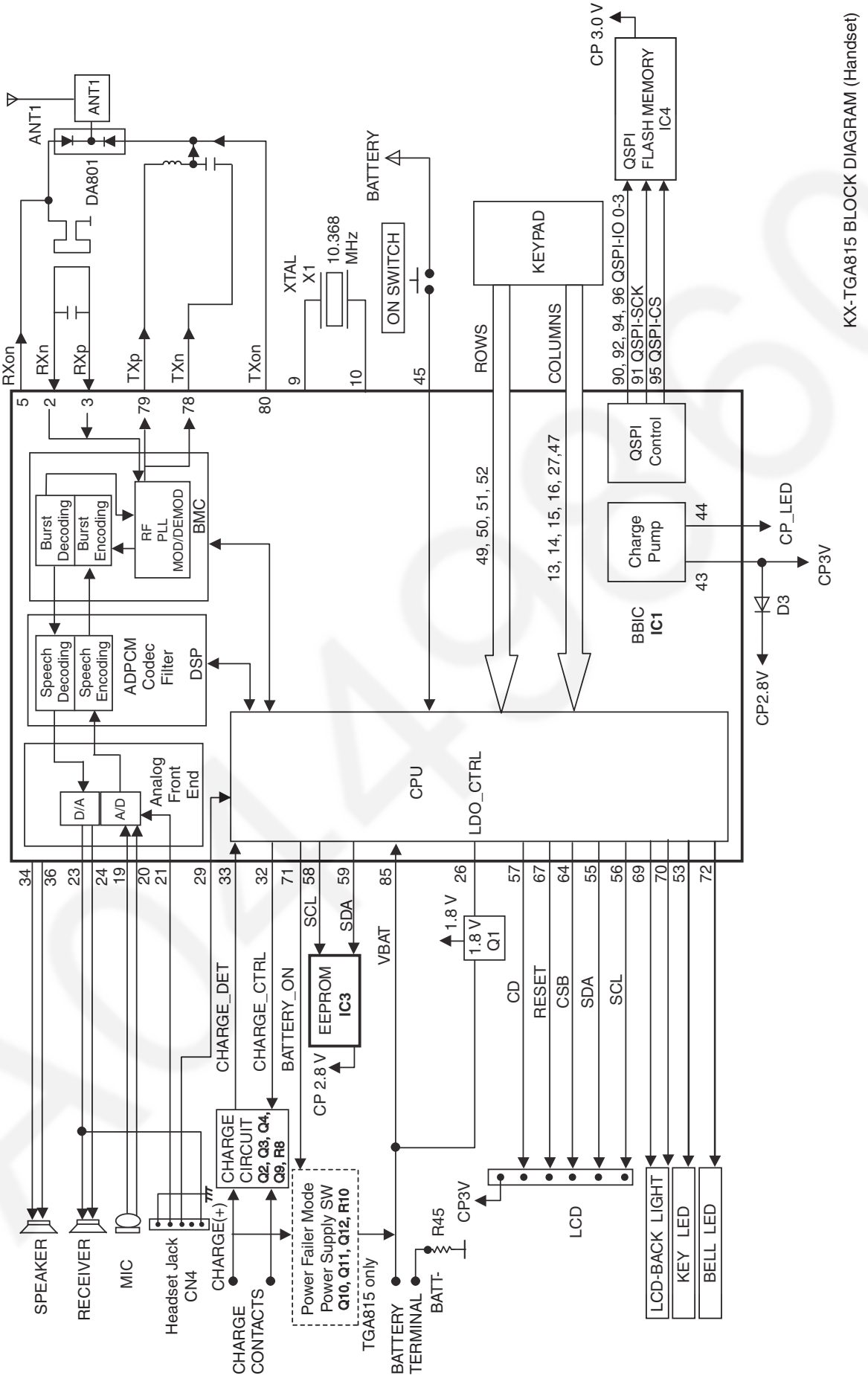


4.4.5.1. Charge Circuit

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



4.5. Block Diagram (Handset)



4.6. Circuit Operation (Handset)

4.6.1. Outline

Handset consists of the following ICs as shown in **Block Diagram (Handset)** (P.14).

- DECT BBIC (**B**ase **B**and IC): IC1
  - All data signals (forming/analyzing ACK or CMD signal)
  - All interfaces (ex: Key, Detector Circuit, Charge, DC/DC Converter, EEPROM, LCD, RF Power Amp.)
  - PLL Oscillator
  - Detector
  - Compress/Expander
  - Reception
  - Integrated 1.9 GHz PA for DECT
- QSPI FLASH MEMORY: IC4
  - Main Program D/L Area
- EEPROM: IC3
  - Temporary operating parameters (for RF, etc.)

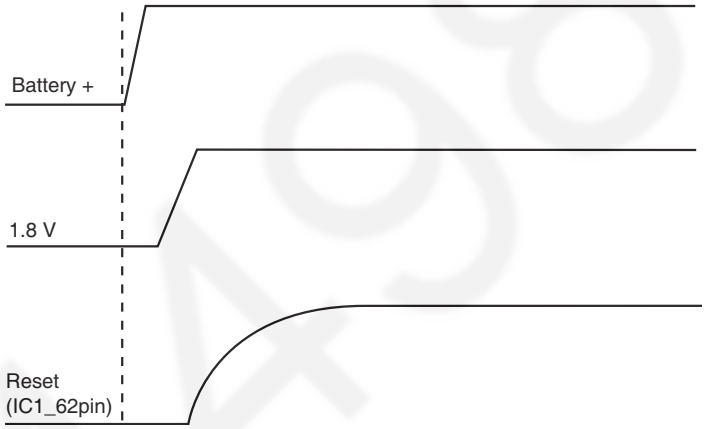
4.6.2. Power Supply Circuit/Reset Circuit

Circuit Operation:

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

BATTERY(2.2 V ~ 2.6 V: BATT+) → F1 → Q2 (1.8 V), IC1-43pin (3.0V)

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



4.6.3. Charge Circuit

Circuit Operation:

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

DC+(5.5 V) → R371 → R372 → [R373 / D362] → CHARGE+(Base) → CHARGE+(Handset) → [Q2 / R8] → Q3 → F1 → BATTERY+... Battery...

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

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.

Refer to Fig.101 in **Power Supply Circuit** (P.12).

4.6.4. 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.

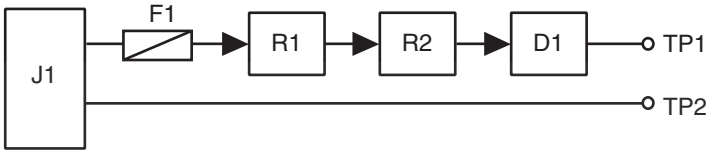
4.6.5. Speakerphone

The hands-free loudspeaker at SP+ and SP- is used to generate the ring alarm.

4.7. Circuit Operation (Charger Unit)

4.7.1. Power Supply Circuit

The power supply is as shown.



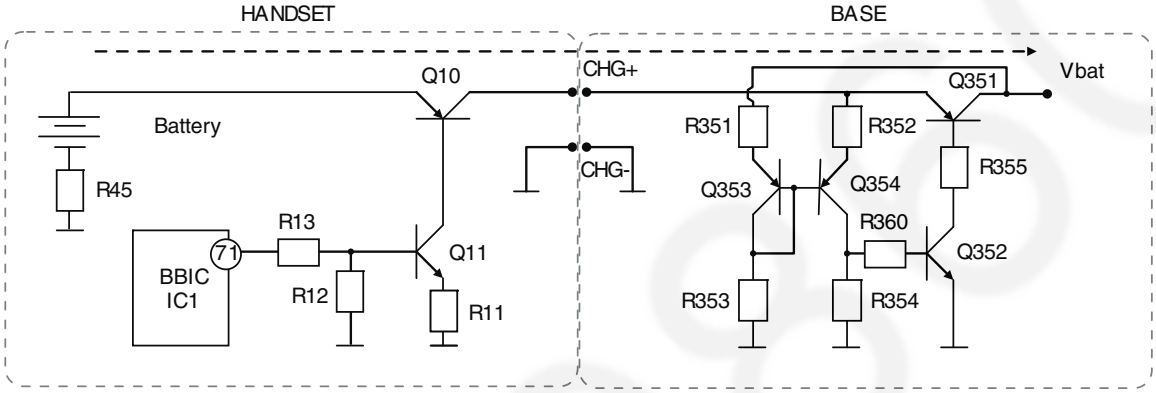
AC Adaptor

4.8. Behavior of Electric Power Failure

This model can operate in power failure state by two temporary power sources.
One is supply from handset, the other is supply from large capacitor.

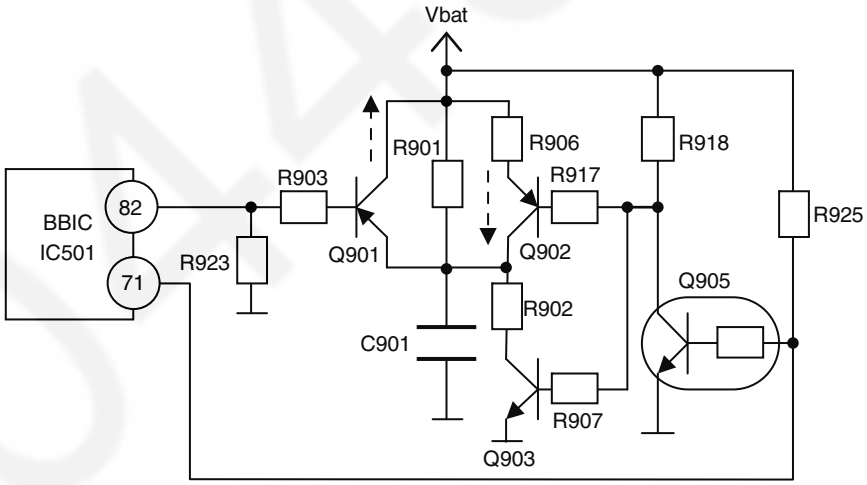
4.8.1. Supply from handset

When AC power is lost, base unit sends power failure information to handset. BBIC(IC1) turns Q11 on and, battery voltage appear to CHG terminal.
When CHG+ (supply voltage from handset) is higher than Vbat, Q351 is on. And, this unit continues working in power failure condition.
It's possible to use the units during the power failure, supplying power to VBAT of base unit from battery of handset through Q10, CHG terminal and Q351.
If emitter voltage is lower than collector, Q351 is OFF for the backflow prevention.

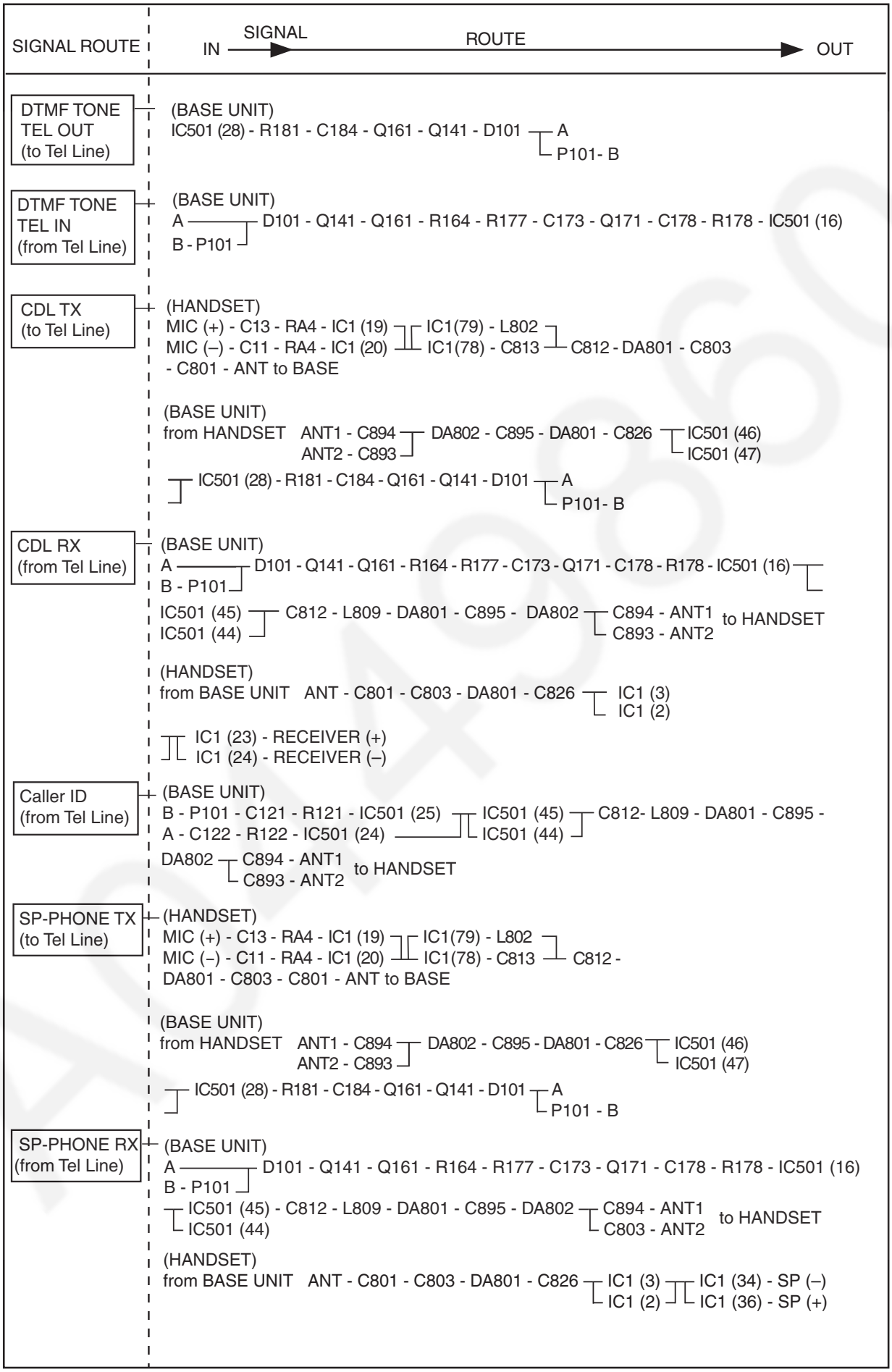


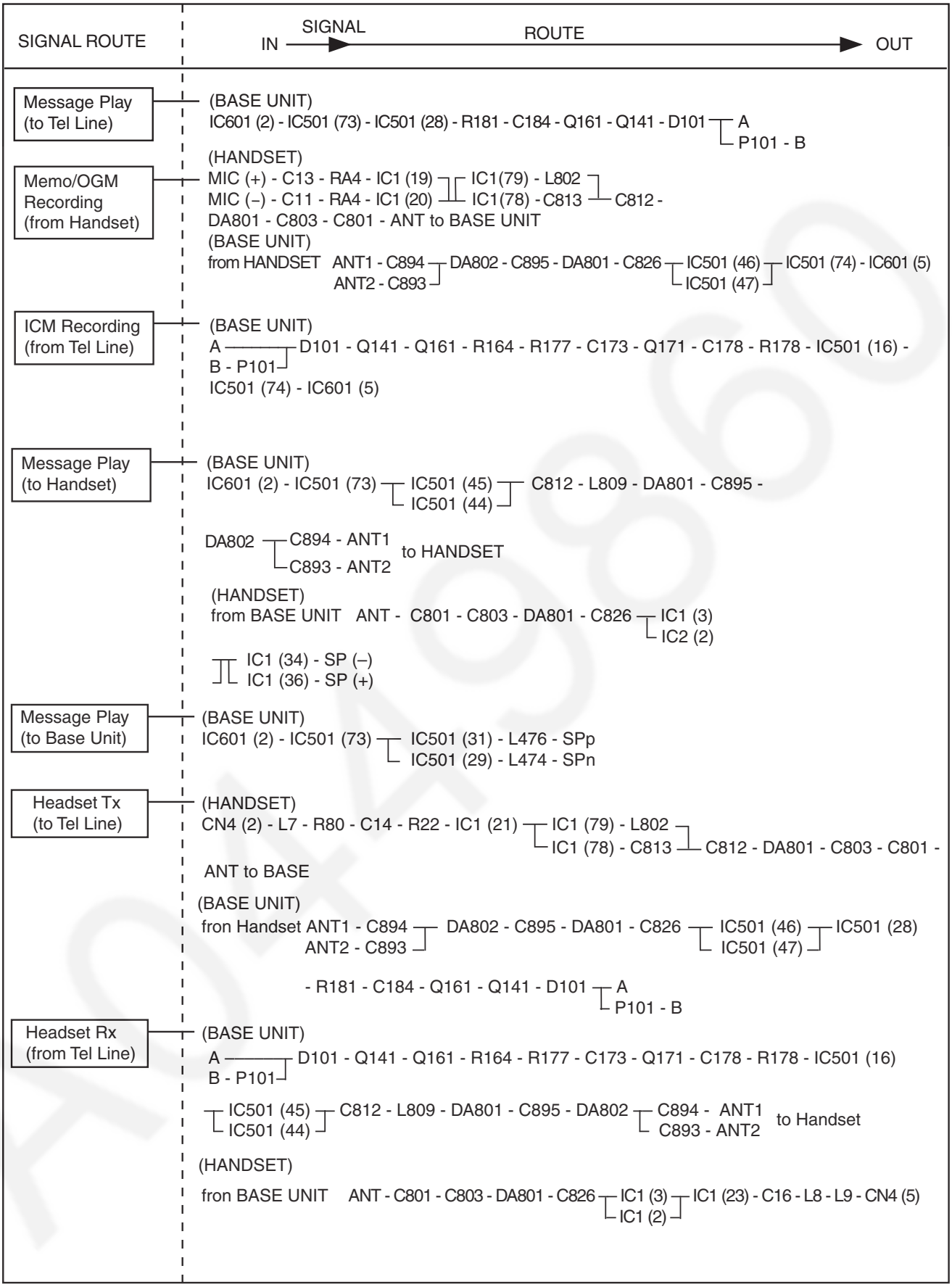
4.8.2. Supply from large capacitor

This model has PAS capacitor (CAP) to keep talking for only a limited time under the sudden power failure state.
CAP is charged at 2.5V in standby mode and charged at up to 3.0V in talk mode. Charge voltage is controlled by Q901 and Q902 to extend the life time of CAP.
In case that the power from AC adapter is lost, BBIC(IC501) turns Q901 ON instantly and CAP supplies current to Vbat.



4.9. Signal Route




SIGNAL ROUTE
IN
SIGNAL
ROUTE
OUT
Message Play (to Tel Line)
(BASE UNIT)
IC601 (2) - IC501 (73) - IC501 (28) - R181 - C184 - Q161 - Q141 - D101 - A, P101 - B
Memo/OGM Recording (from Handset)
(HANDSET)
MIC (+) - C13 - RA4 - IC1 (19)
MIC (–) - C11 - RA4 - IC1 (20)
IC1(79) - L802
IC1(78) - C813
C812 - DA801 - C803 - C801 - ANT to BASE UNIT
(BASE UNIT)
from HANDSET ANT1 - C894, ANT2 - C893 - DA802 - C895 - DA801 - C826 - IC501 (46), IC501 (47) - IC501 (74) - IC601 (5)
ICM Recording (from Tel Line)
(BASE UNIT)
A, B - P101 - D101 - Q141 - Q161 - R164 - R177 - C173 - Q171 - C178 - R178 - IC501 (16) - IC501 (74) - IC601 (5)
Message Play (to Handset)
(BASE UNIT)
IC601 (2) - IC501 (73) - IC501 (45), IC501 (44) - C812 - L809 - DA801 - C895 -
DA802 - C894 - ANT1, C893 - ANT2 to HANDSET
(HANDSET)
from BASE UNIT ANT - C801 - C803 - DA801 - C826 - IC1 (3), IC2 (2)
IC1 (34) - SP (–)
IC1 (36) - SP (+)
Message Play (to Base Unit)
(BASE UNIT)
IC601 (2) - IC501 (73) - IC501 (31) - L476 - SPp
IC501 (29) - L474 - SPn
Headset Tx (to Tel Line)
(HANDSET)
CN4 (2) - L7 - R80 - C14 - R22 - IC1 (21) - IC1 (79) - L802, IC1 (78) - C813 - C812 - DA801 - C803 - C801 - ANT to BASE
(BASE UNIT)
fron Handset ANT1 - C894, ANT2 - C893 - DA802 - C895 - DA801 - C826 - IC501 (46), IC501 (47) - IC501 (28)
- R181 - C184 - Q161 - Q141 - D101 - A, P101 - B
Headset Rx (from Tel Line)
(BASE UNIT)
A, B - P101 - D101 - Q141 - Q161 - R164 - R177 - C173 - Q171 - C178 - R178 - IC501 (16)
IC501 (45), IC501 (44) - C812 - L809 - DA801 - C895 - DA802 - C894 - ANT1, C893 - ANT2 to Handset
(HANDSET)
fron BASE UNIT ANT - C801 - C803 - DA801 - C826 - IC1 (3), IC1 (2) - IC1 (23) - C16 - L8 - L9 - CN4 (5)

5 Location of Controls and Components

Refer to the Operating Instructions.

Note:

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

6 Installation Instructions

Refer to the Operating Instructions.

Note:

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

7 Operating Instructions

Refer to the Operating Instructions.

Note:

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

7.1. For Service Hint

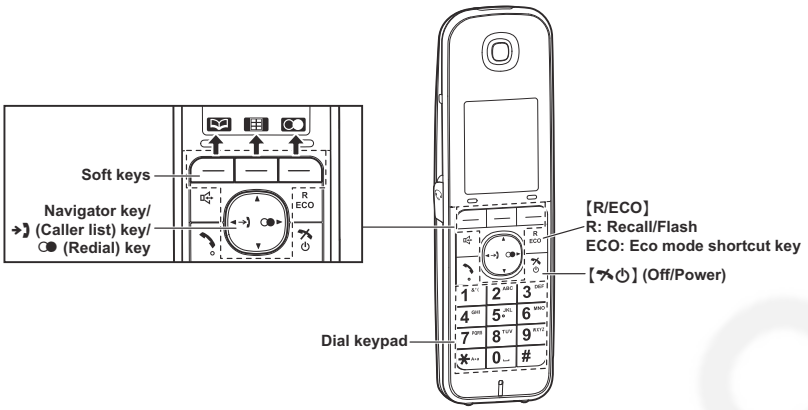
Items	Contents
Battery	You could use other rechargeable batteries sold in a market, but the unit is not guaranteed to work properly.
	The battery strength may not be indicated correctly if the battery is disconnected and connected again, even after it is fully charged. In that case, by recharging the battery as mentioned in the Operating Instructions, you will get a correct indication of the battery strength.
Recall	Earth Recall feature is not supported in this model.
PIN Code	● Change the PIN using the following method. **1** (middle soft key) # 1 3 2 **2** * 7 0 0 0 **3** Enter the new 4-digit base unit PIN. → OK → 【 】

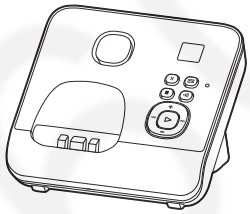
8 Service Mode

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.





H/S key operation

1). Register a Handset to a Base Unit. (*1)

2). Press .

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

4). Select "Line Setup" using 【▲】or【▼】
then press OK or 【►】.

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

6). Select "Write EEP" using 【▲】or【▼】
then press OK or 【►】.

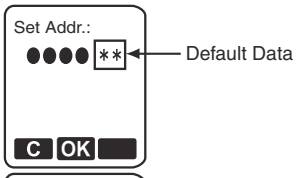
7). Enter "●", "●", "●", "●" (Address). (*2)

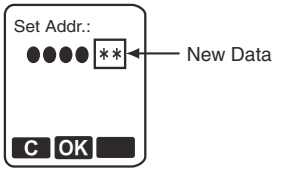
8). Enter "＊", "＊" (New Data). (*2)

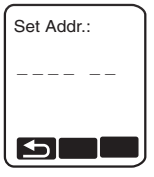
9). Press OK , a long confirmation beep
will be heard.

10). Press 【 】(off) to return to standby mode.
After that, turn the base unit power off and then power on.

H/S LCD







Frequently Used Items (Base Unit)

ex.)

Items	Address	Default Data	New Data		Remarks
C-ID (FSK) sensitivity	06 64/06 63	00/28	00/1C (3 dB up)	00/14 (6 dB up)	When hex changes from “00/28” to “00/1C” or “00/14”, gain increases by 3 dB or 6 dB.
Frequency	00 08/00 07	01/00	-	-	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	-	-	
Bell length	02 9A	32 (5 sec) (*3)	1E (3 sec)	14 (2 sec)	This is time until bell stops ringing. (Unit: 100 ms)

Note:

(*1) Refer to **Registering a Handset to a Base Unit** in the Operating Instructions.

(*2) When you enter the address or New Data, please refer to the table below.

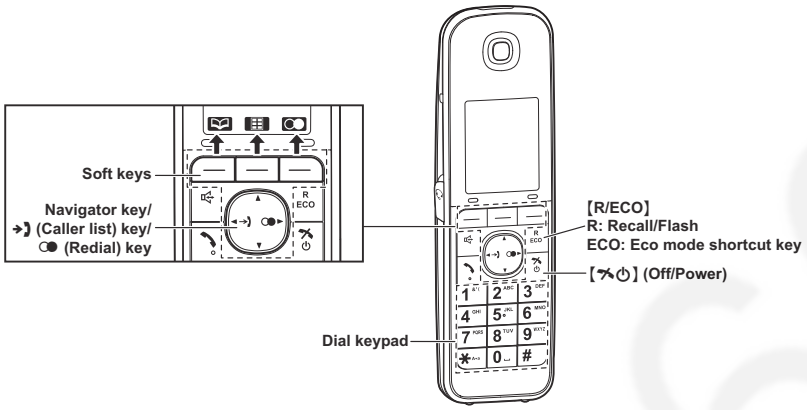
Desired Number (hex)	Input Keys	Desired Number (hex)	Input Keys
0	0	A	[R] + 0
1	1	B	[R] + 1
.	.	C	[R] + 2
.	.	D	[R] + 3
.	.	E	[R] + 4
9	9	F	[R] + 5

(*3)

Bell length	32 (hex) = 50 (dec) $\rightarrow$ 50 $\times$ 100 msec = 5000 msec (5 sec)

8.1.2. Handset

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



H/S key operation

1). Press .

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【►】.

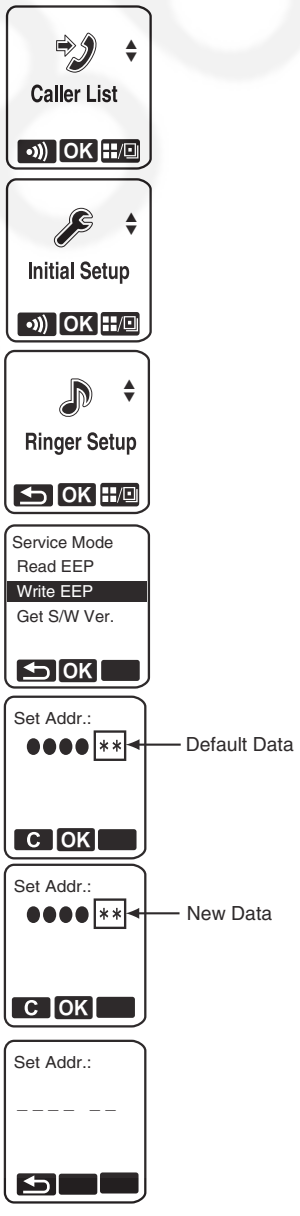
5). Enter "●", "●", "●", "●" (Address). (*1)

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. Press the Power button for about 1 second if the power is not turned on.

H/S LCD



Frequently Used Items (Handset)

ex.)

Items	Address	Default Data	New Data	Possible Adjusted Value MAX (hex)	Possible Adjusted Value MIN (hex)	Remarks
Sending level	05 3F	Adjusted value	Given value	FF	D0	(*2)
Receiving level	05 40	Adjusted value	Given value	FF	D0	(*3)
Battery Low	00 09	70	-	-	-	(*4)
Frequency	00 08/00 07	02/70	-	-	-	
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	[R] + 0
1	1	B	[R] + 1
.	.	C	[R] + 2
.	.	D	[R] + 3
.	.	E	[R] + 4
9	9	F	[R] + 5

(*2) When adding “01” (hex) to default value, sending level increases by 0.25 dB.

ex.)

Item	Default Data	New Data	
	E7	EB	E3
Sending level	-3 dBm	-2 dBm	-4 dBm

(*3) When reducing “01” (hex) from default value, receiving level increases by 0.25 dB.

ex.)

Item	Default Data	New Data	
	E4	E8	E0
Receiving level	-24 dBm	-23 dBm	-25 dBm

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

8.2. EEPROM LAYOUT (Handset)

8.2.1. Scope

The purpose of this section is to describe the layout of the EEPROM (IC3) for the KX-TGA816/TGA815 Handset.
The EEPROM contains hardware, software, and user specific parameters. Some parameters are set during production of the handset, some are set by the user when configuring the handset, and some during normal use of the phone.

8.2.2. Introduction

The handset uses a 128k bit serial EEPROM (IC3) for storing volatile parameters. All parameters are set up before the handset the factory. Some of these are vital for the operation of the hardware so a set of default parameters is programmed before the actual hardware fine-tuning can be initiated. This document lists all default settings with a short description.
This document lists all default parameters with a short description.

Initial Type	Description
F	The data initialized by only F command
0	The data initialized by F and 0 command
1	The data initialized by F, 0 and 1 command
2	The data initialized by F, 0, 1 and 2 command
3	The data initialized by all command (F, 0, 1, 2, 3)

Country Setting	Description
x	Default - no specific country setting, so revert to default value.

8.2.3. EEPROM contents

MMI Setting:

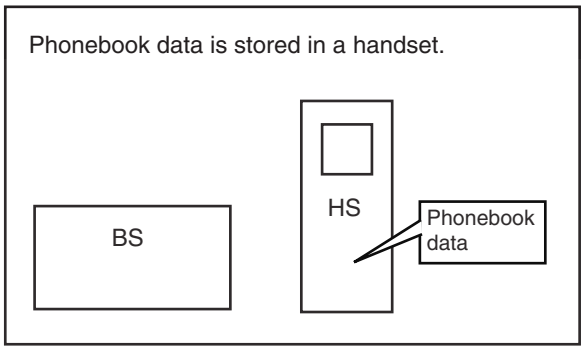
Address	Initial Type	Name	Description	Default value	Country Setting
04AF	3	EEP_Language	**Selected Language for LCD** GERMAN:0 ENGLISH:1 SPANISH:2 NORWEGIAN:3 FRENCH:4 ITALIAN:5 DENISH:6 DUTCH:7 SWEDISH:8 FINNISH:9 GREEK:10 TURKISH:11 HUNGARIAN:12 PORTUGUESE:13 RUSSIAN:14 POLISH:15 SLOVAKIAN:16 CZECH:17 CROATIAN:18 CATALAN:19 UKRINIAN:20 SPANISHMEX:21 SLOVENIAN:22 ESTNIAN:23 LITHUANIAN:24 LATVIAN:25 ROMANIAN:26 BULGARIAN:27 SERBIAN:28 MACEDONIAN:29 ALBANIAN:30 PORTUGUESEMEX:31 Reserve:32 HEBREW:33 ARABIC:34 PERSIA:35 HANTAI:36 HANTAI(HK):37 RUSSIAN(BX):38 BELARUS:39 KAZAKHSTAN:40 UZBEKISTAN:41 TAJIKISTAN:42 TURKMENISTAN:43 AZERBAIJAN:44 ARMENIA:45 MOLDOV:46 Reserve:47 CANADAENGLISH:48 USSPANISH:49 USFRENCH:50	0x01	x

MMI1 Setting:

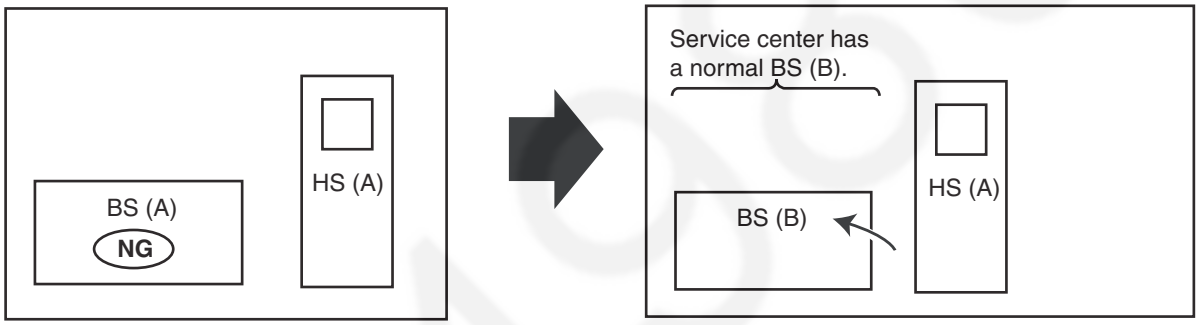
Address	Initial Type	Name	Description	Default value	Country Setting
0040	F	EEP_LcdContrastOffset	**LCD contrast**	0x7B	x

8.3. 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.

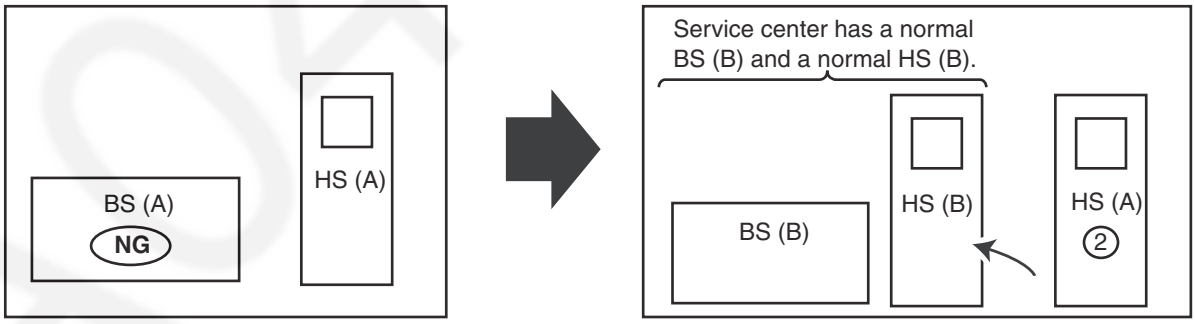


Case 1: A base unit has a defect.
(Replacing a base unit PCB etc...)



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)

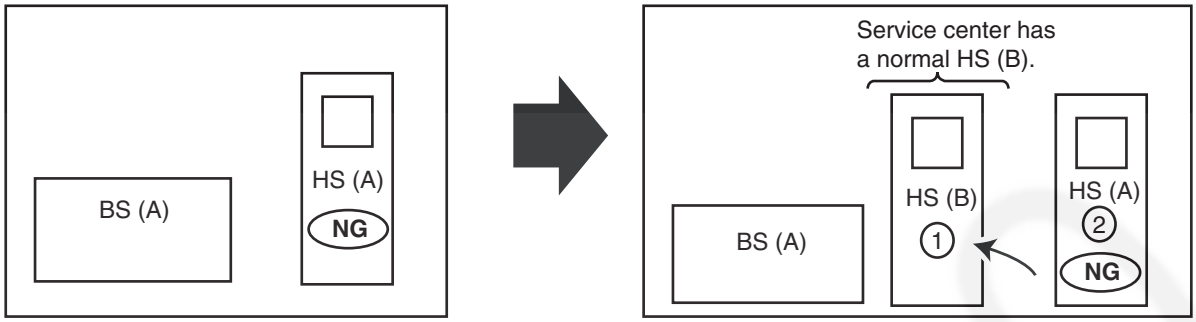


1. Register HS (A) to BS (B) as a handset no. 2.
2. Copy the phonebook data from HS (A) to HS (B).
3. Cancel the HS 2 (HS (A)).

Note:

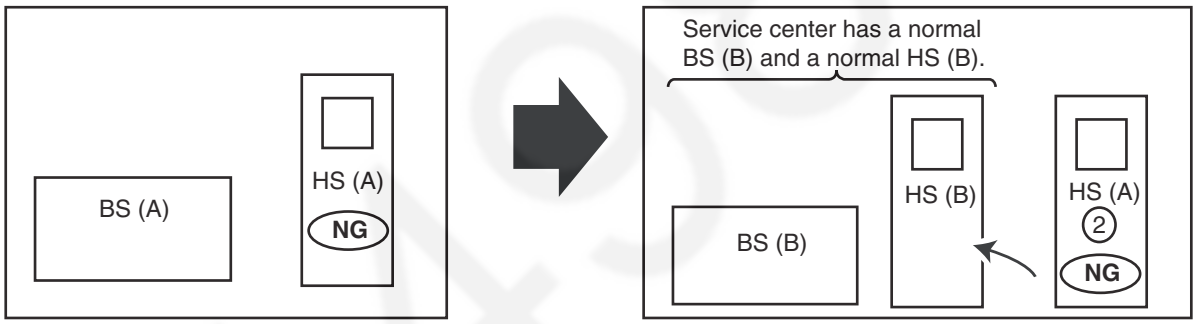
- BS=Base Unit, HS=Handset
- If the max number of handsets are already registered to the base unit, a new handset cannot be registered.
- To register the handset, refer to **Registering a Handset to a Base Unit** in the Operating Instructions.
- To cancel the handset, refer to **Deregistering a Handset** in the Operating Instructions.
- To copy the handset phonebook, refer to **Copying Phonebook Entries** in the Operating Instructions.

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 a Base Unit** in the Operating Instructions.
- To cancel the handset, refer to **Deregistering a Handset** in the Operating Instructions.
- To copy the handset phonebook, refer to **Copying Phonebook Entries** in the Operating Instructions.

8.4. How to Clear User Setting

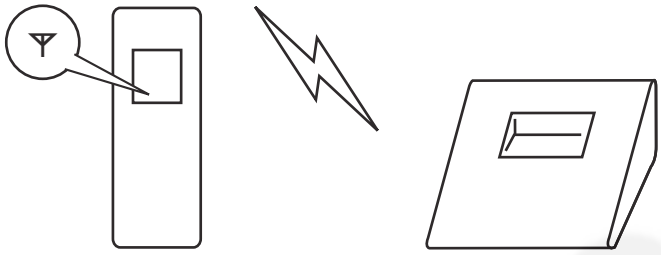
Units are reset to the Factory settings by this operation (Erase recorded Voice messages, stored Phone numbers, Caller list and etc.)

Note:

- Some menus are not reset. Refer to **Operating Instructions** (P.20).
- The reset menus differ depending on the following operations.
- **This operation should not be performed for a usual repair.**

8.4.1. 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 (lights), register it. (*1)

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

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

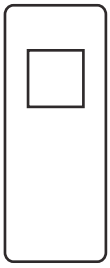
⑤ Disconnect the AC adaptor, then remove the battery.

Note:

(*1) Refer to **Registering a Handset to a Base Unit** in the Operating Instructions.

8.4.2. 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 【】 to put the handset in standby mode.

③ Press 3, 5, 7 and # key of the handset simultaneously until a confirmation tone is heard. (*2)

④ Remove the battery.

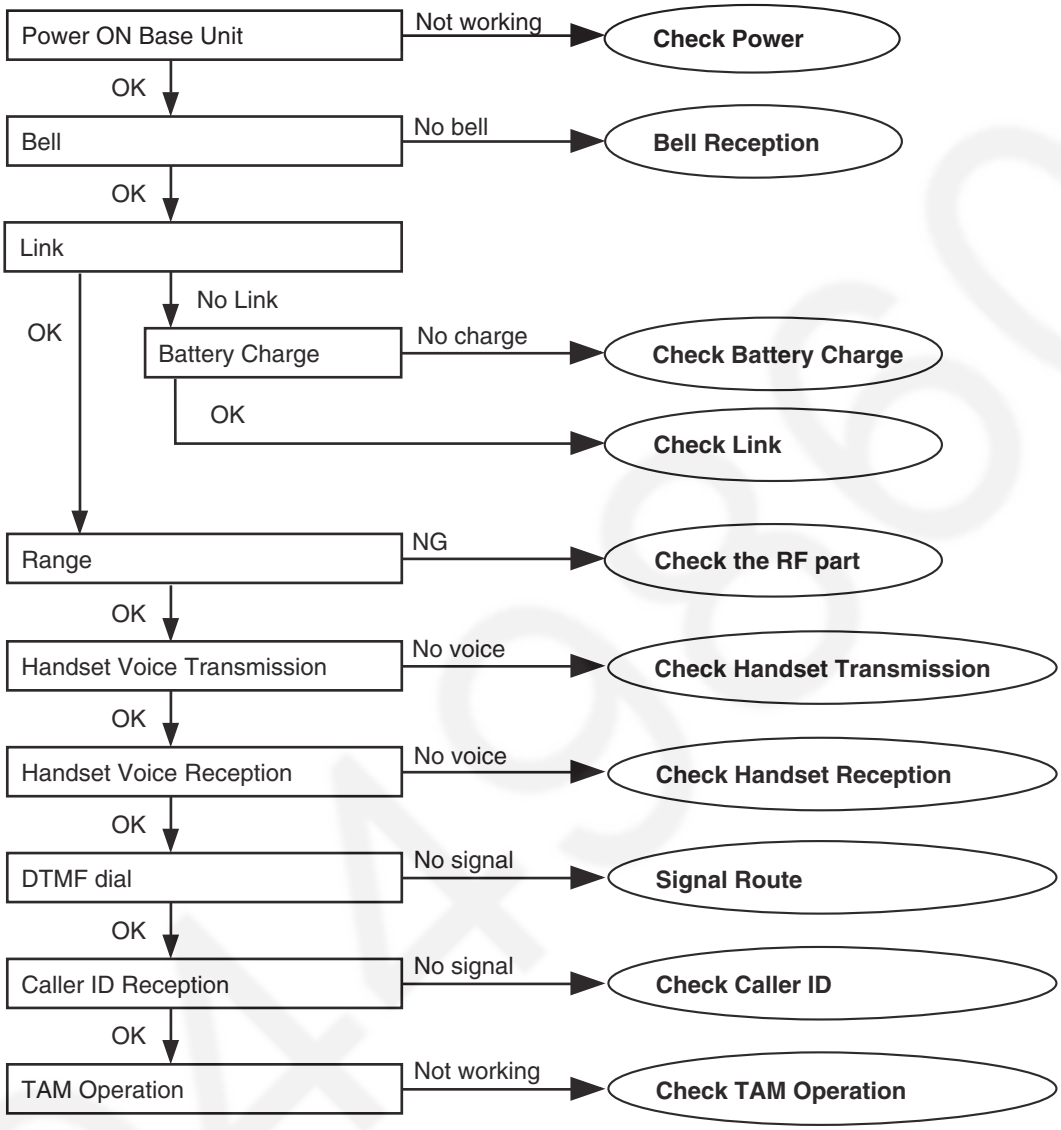
Note: (*2)

- 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 a Base Unit** in the Operating Instructions.
- If users do not bring the base unit with them, the registration procedure has to be done by users themselves.

9 Troubleshooting Guide

9.1. Troubleshooting Flowchart

Flow Chart



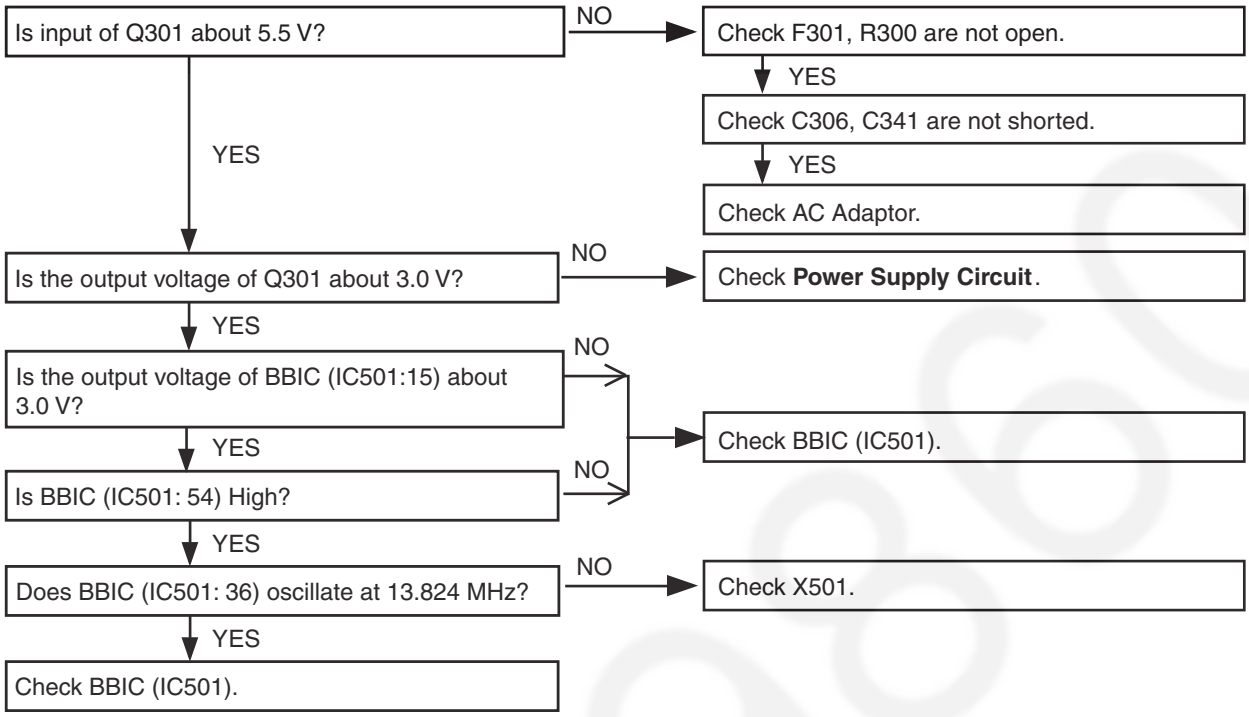
Cross Reference:

- **Check Power** (P.30)
- **Bell Reception** (P.39)
- **Check Battery Charge** (P.31)
- **Check Link** (P.32)
- **Check the RF part** (P.35)
- **Check Handset Transmission** (P.38)
- **Check Handset Reception** (P.38)
- **Signal Route** (P.18)
- **Check Caller ID** (P.38)
- **Check TAM Operation** (P.39)

9.1.1. Check Power

9.1.1.1. Base Unit

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



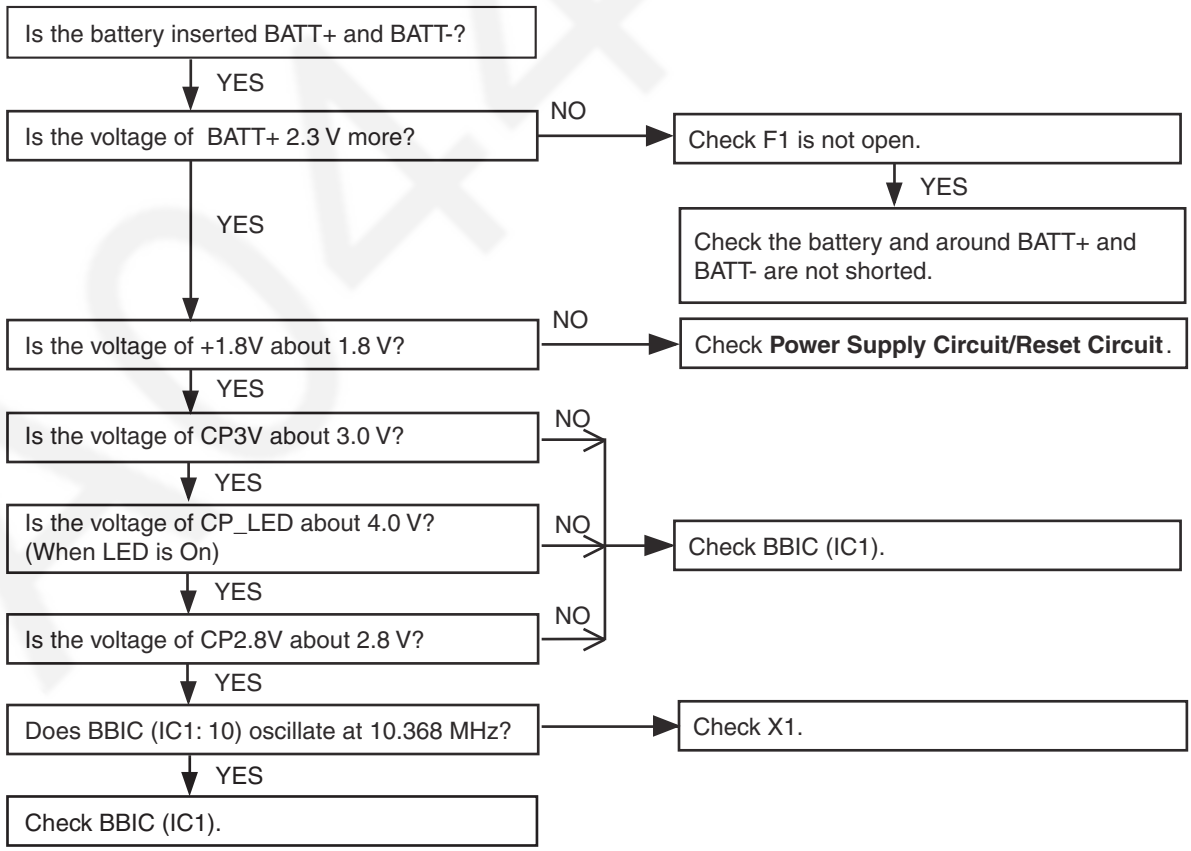
Cross Reference:

Power Supply Circuit (P.12)

Note:

(*1) Refer to **Specifications** (P.7) for part number and supply voltage of AC Adaptor.

9.1.1.2. Handset

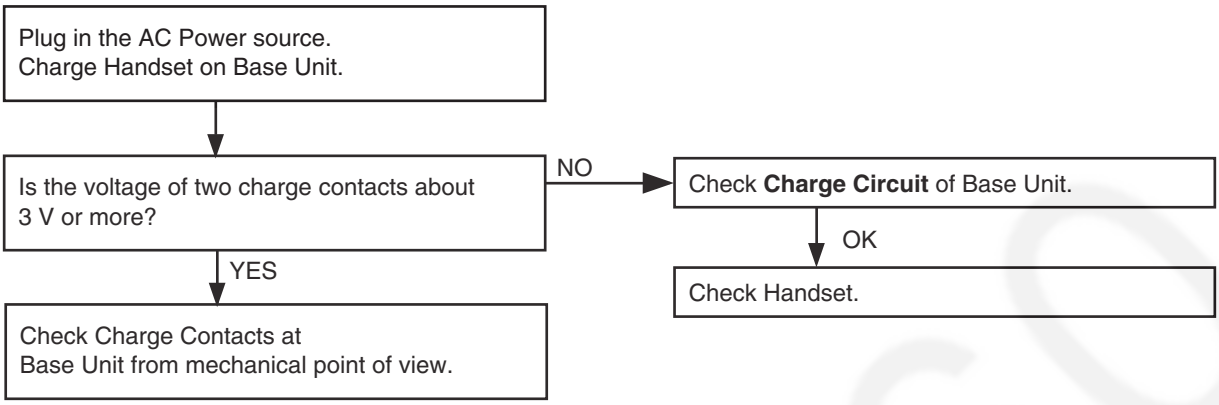


Cross Reference:

Power Supply Circuit/Reset Circuit (P.15)

9.1.2. Check Battery Charge

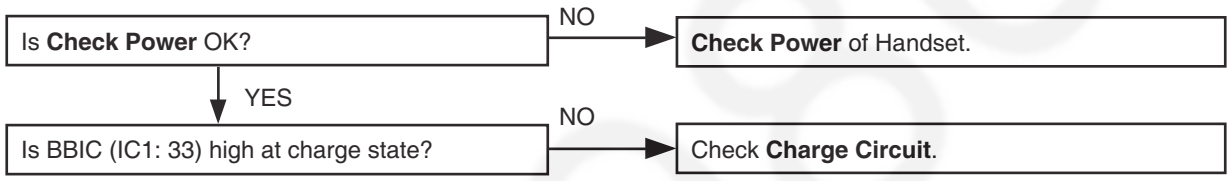
9.1.2.1. Base Unit



Cross Reference:

Charge Circuit (P.15)

9.1.2.2. Handset

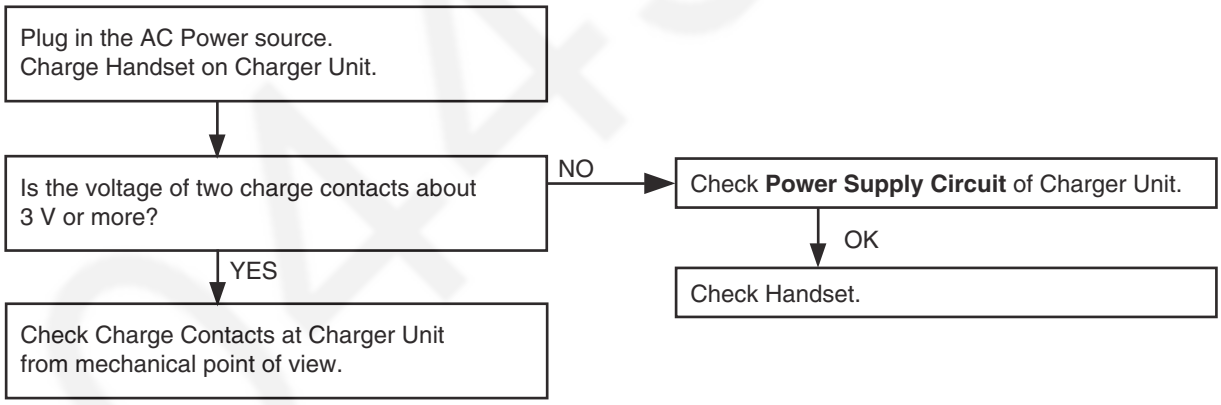


Cross Reference:

Check Power (P.30)

Charge Circuit (P.15)

9.1.2.3. Charger Unit

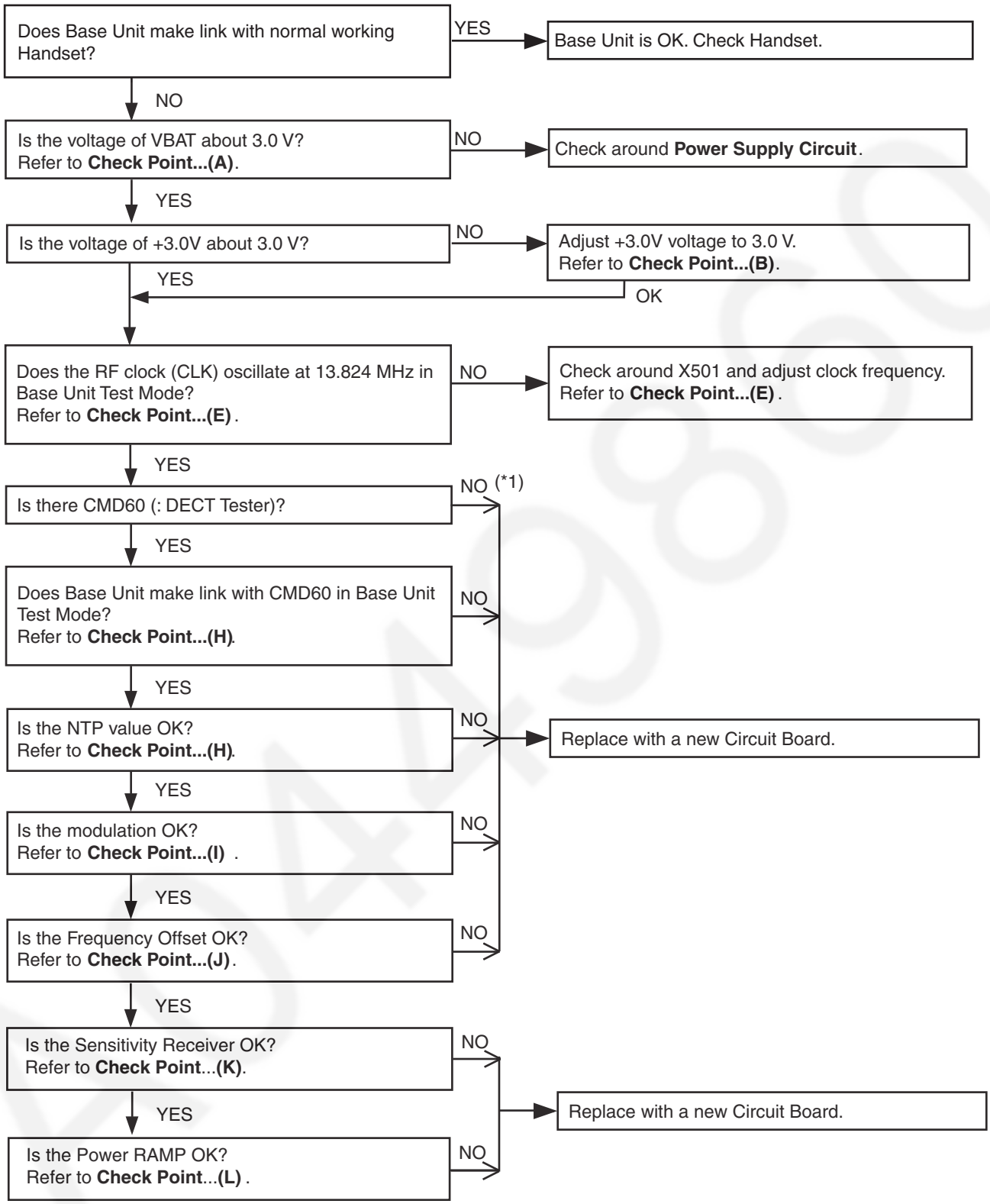


Cross Reference:

Power Supply Circuit (P.16)

9.1.3. Check Link

9.1.3.1. Base Unit



Note:

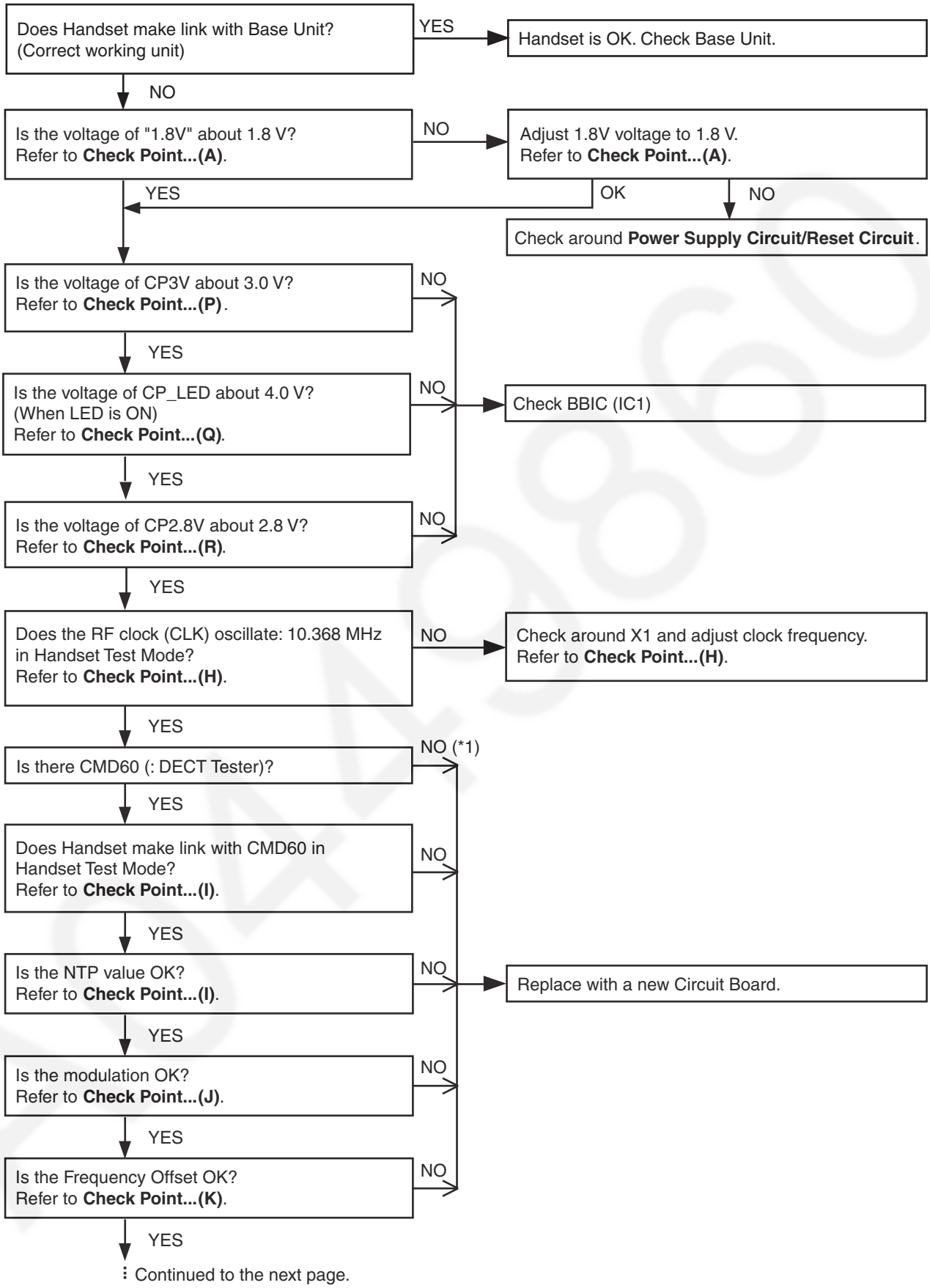
(*1) Refer to **Troubleshooting by Symptom (Base Unit and Charger Unit)** (P.41)

Cross Reference:

Check Point (Base Unit) (P.41)

Power Supply Circuit (P.12)

9.1.3.2. Handset



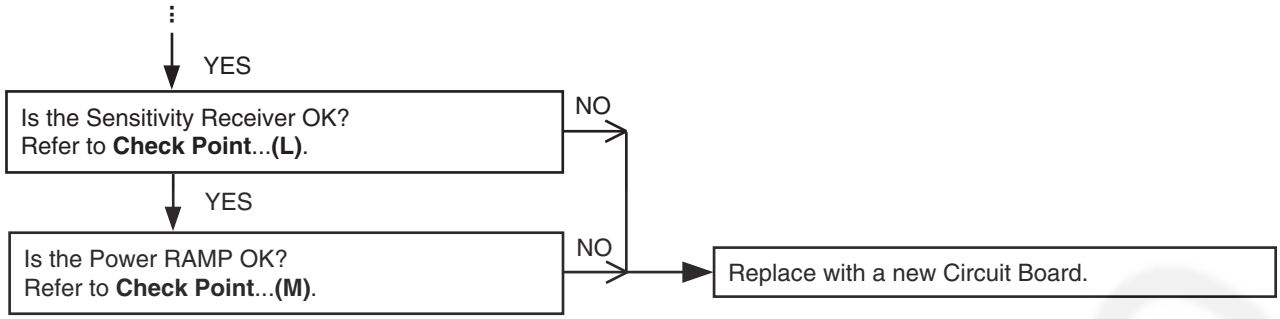
Note:

(*1) Refer to **Troubleshooting by Symptom (Handset)** (P.43)

Cross Reference:

Check Point (Handset) (P.43)

Power Supply Circuit/Reset Circuit (P.15)



Cross Reference:

Check Point (Handset) (P.43)

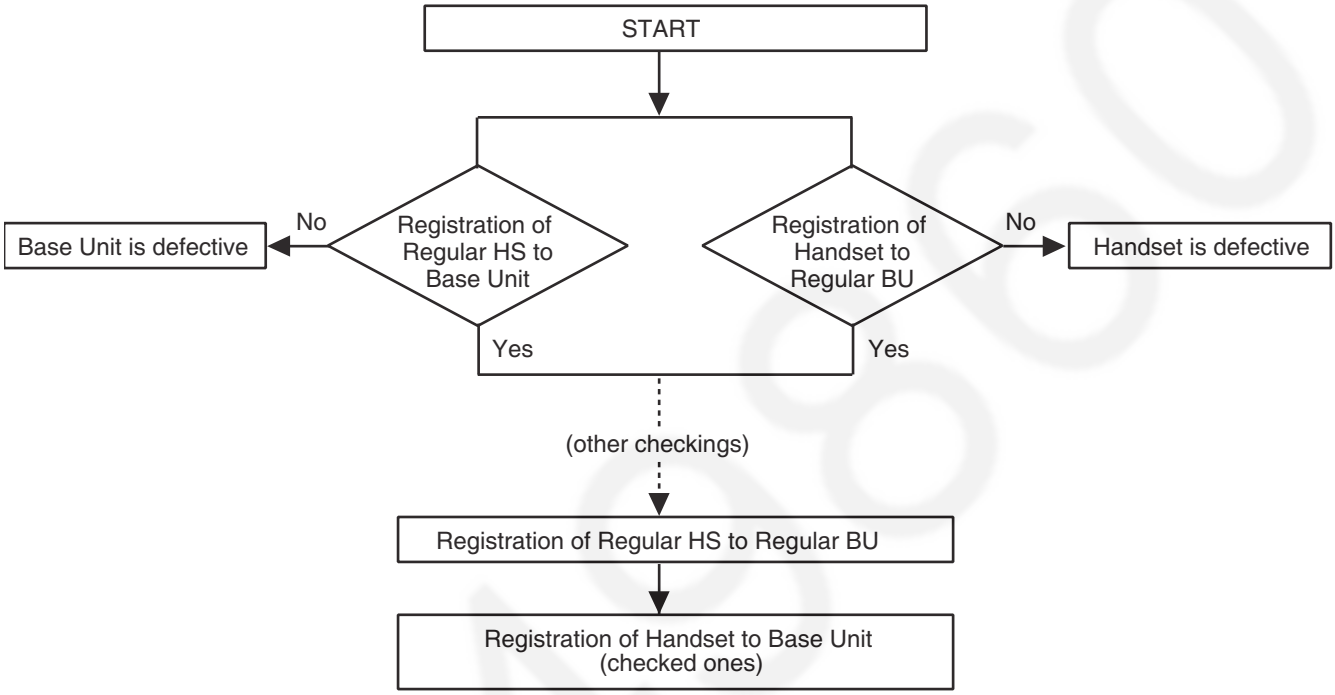
9.1.4. Check the RF part

9.1.4.1. Finding out the Defective part

1. Prepare Regular HS (Handset) and Regular BU (Base unit).
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.

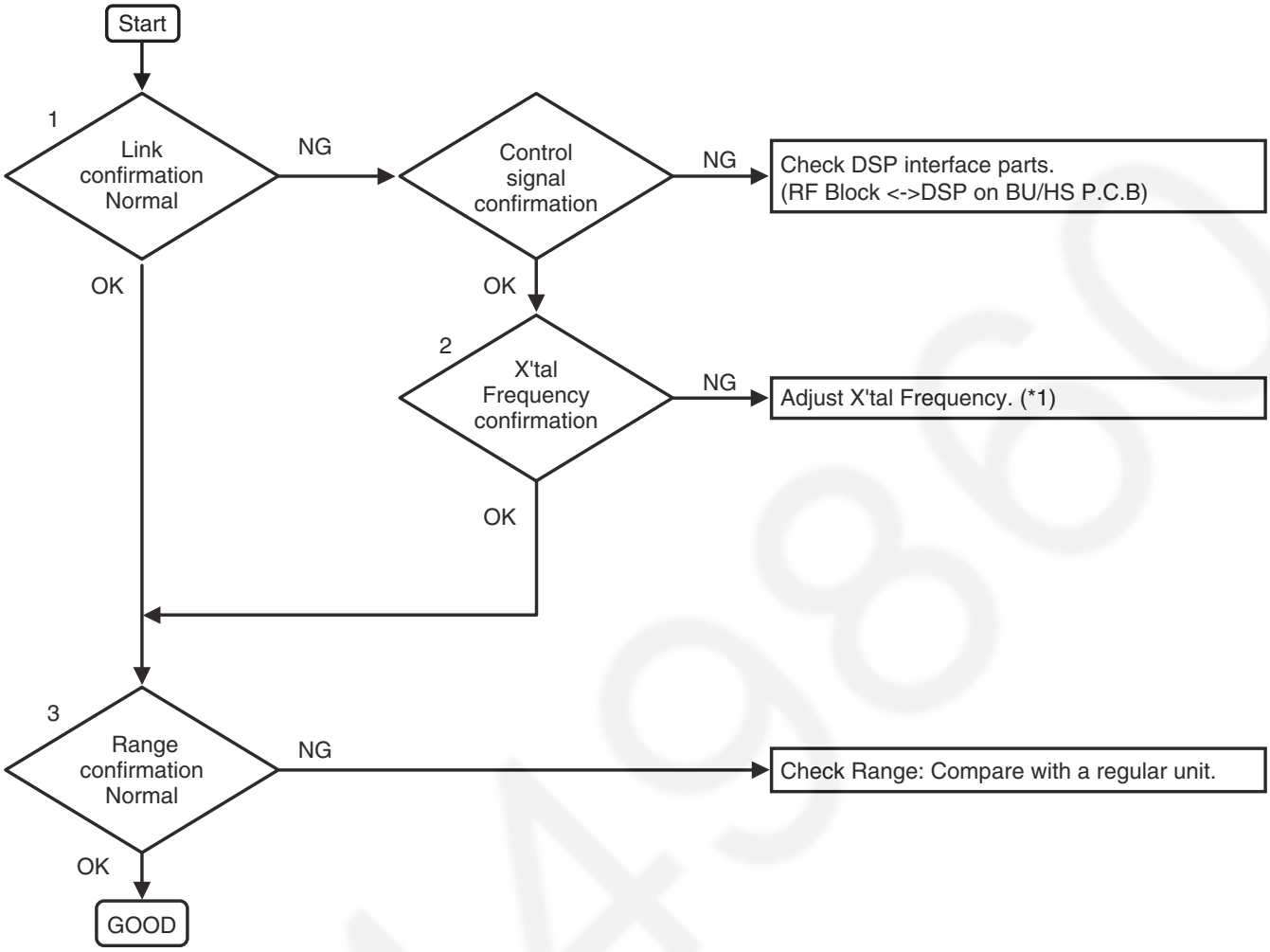


Note:

If you need to register a handset, refer to **Registering a Handset to a Base Unit** in the Operating Instructions.

9.1.4.2. RF Check Flowchart

Each item (1 ~ 3) of RF Check Flowchart corresponds to **Check Table for RF part** (P.37).
Please refer to the each item.



Note:

(*1) Base unit - refer to (E) of **Check Point (Base Unit)** (P.41)
Handset - refer to (H) of **Check Point (Handset)** (P.43)

9.1.4.3. Check Table for RF part

No.	Item	BU (Base Unit) Check	HS (Handset) Check
1	Link Confirmation Normal HS, BU Mode: [Normal mode]	1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link.	1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link.
2	X'tal Frequency confirmation HS, BU Mode: [Test mode]	1. Check X'tal Frequency. (*1) (13.824 MHz ± 100 Hz)	1. Check X'tal Frequency. (*2) (10.368 MHz ± 100Hz)
3	Range Confirmation Normal HS, BU Mode: [Normal mode]	1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link. 3. Compare the range of the BU (being checked) with that of the Regular BU.	1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link. 3. Compare the range of the HS (being checked) with that of the Regular HS.

Note:

(*1) Refer to **Adjustment Standard (Base Unit)** (P.56)

(*2) Refer to **Adjustment Standard (Handset)** (P.60)

9.1.5. Check Handset Transmission

Check MIC of Handset.

↓ OK

Check CDL TX (HANDSET) in **Signal Route**.

Cross Reference:
Signal Route (P.18)

9.1.6. Check Handset Reception

Check Handset Speaker in **How to check the Handset Speaker or Receiver**.

↓ OK

Check CDL RX (HANDSET) in **Signal Route**.

Cross Reference:
How to Check the Handset Speaker or Receiver (P.64).
Signal Route (P.18)

9.1.7. Check Caller ID

Check Caller ID in **Signal Route**.

Cross Reference:
Signal Route (P.18)

9.1.8. Check Headset Transmission

Check CN4 of Handset.

↓ OK

Check Headset Tx (Handset) in **Signal Route**.

Cross Reference:
Signal Route (P.18)

9.1.9. Check Headset Reception

Check CN4 of Handset.

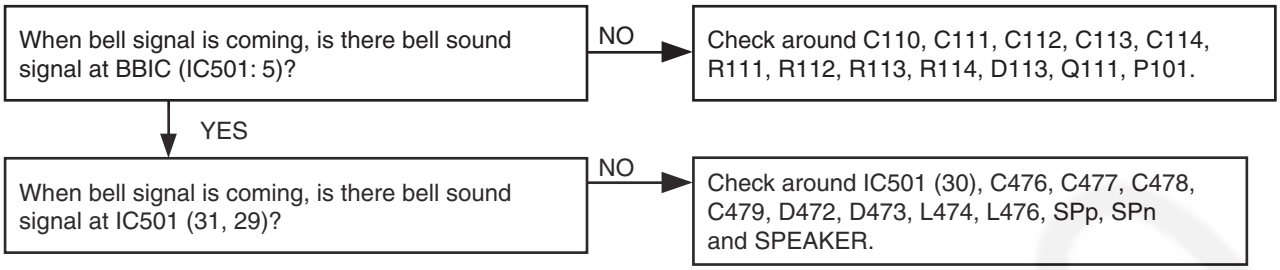
↓ OK

Check Headset Rx (Handset) in **Signal Route**.

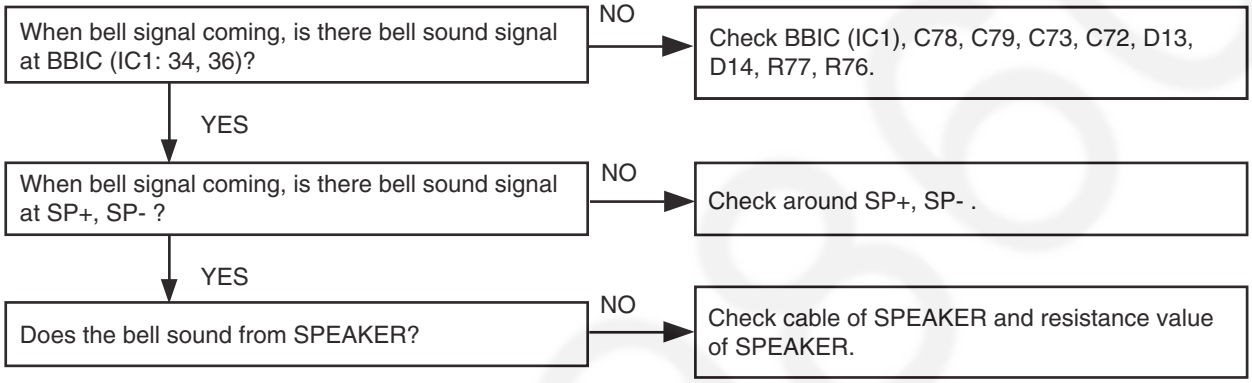
Cross Reference:
Signal Route (P.18)

9.1.10. Bell Reception

9.1.10.1. Base Unit



9.1.10.2. Handset



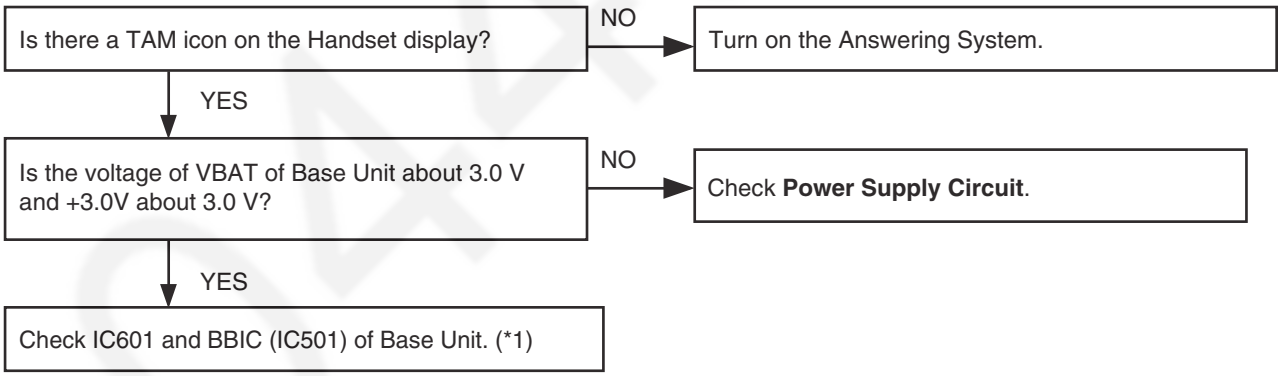
Cross Reference:

Telephone Line Interface (P.12)

Check Link (P.32)

How to Check the Handset Speaker or Receiver (P.64)

9.1.11. Check TAM Operation



Cross Reference:

Power Supply Circuit (P.12)

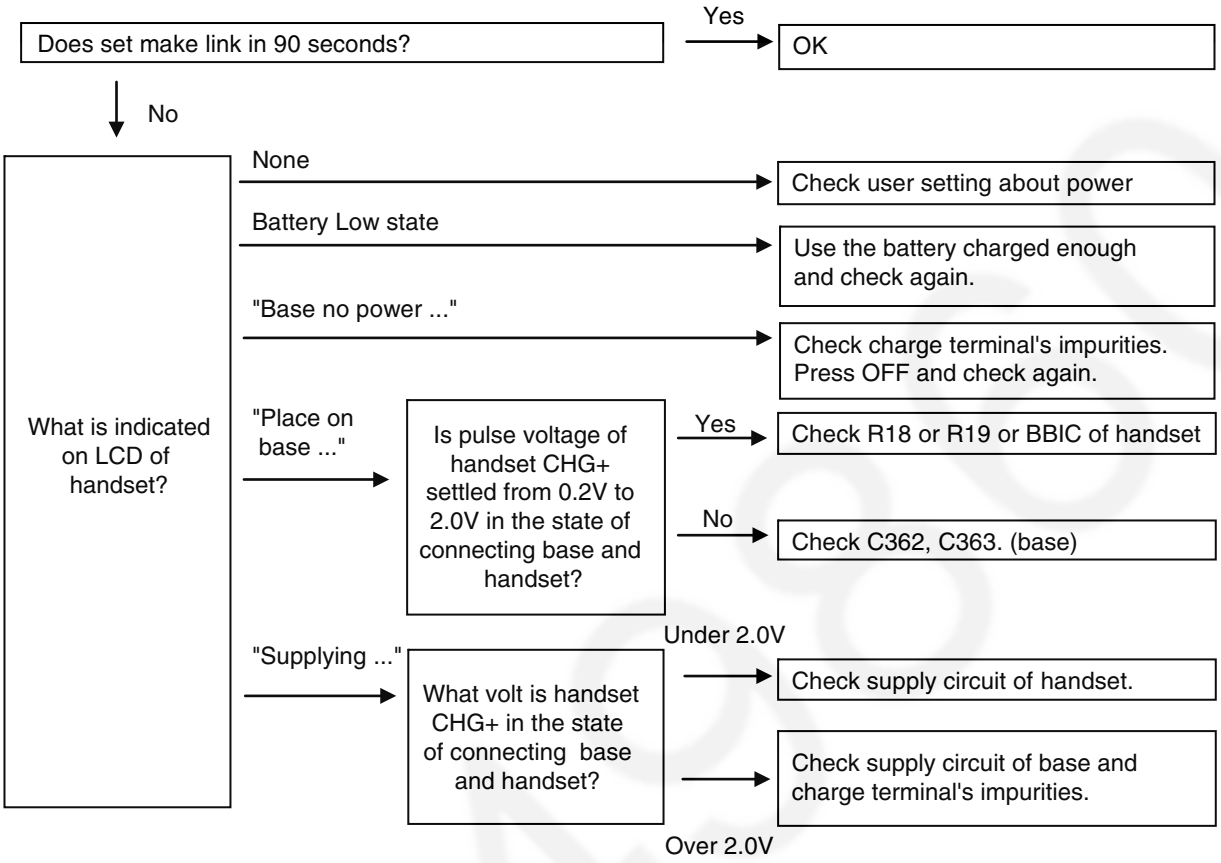
Note:

(*1) When replacing FLASH MEMORY (IC601), TAM data need to be written to it. Refer to **Base Unit** of **Things to Do after Replacing IC or X'tal** (P.61)

9.1.12. Power failure mode

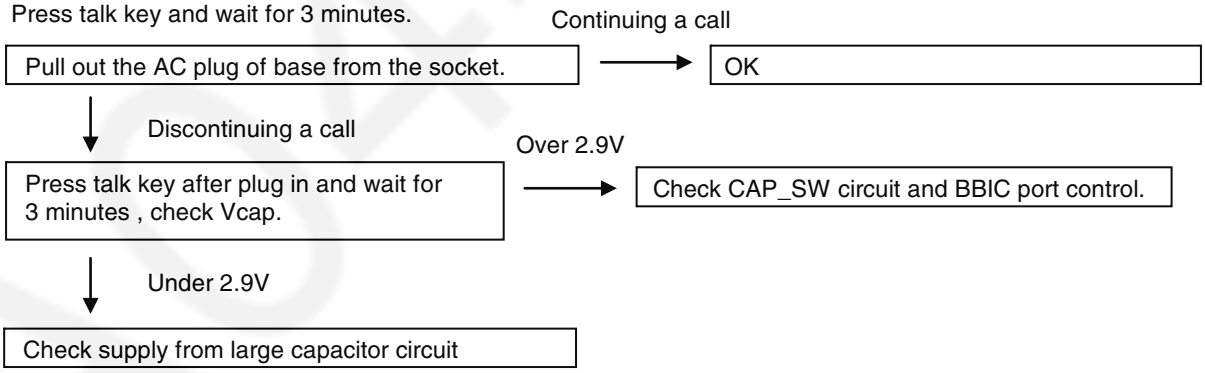
9.1.12.1. Operation with supply from handset under electric power failure

After base and handset make link, pull out AC plug of base from the socket.
Put handset on base under electric power failure.



Cross Reference:
Supply from handset (P.17)

9.1.12.2. Continuing a call during power failure



Cross Reference:
Supply from large capacitor (P.17)

9.2. Troubleshooting by Symptom (Base Unit and Charger Unit)

If your unit has below symptoms, follow the instructions in remedy column. Remedies depend on whether you have DECT tester (*1) or not.

Symptom	Remedy (*2)	
	You don't have DECT Tester.	You have DECT Tester. (Model Number: CMD60)
You cannot dial.	Check item (A) - (G).	Check item (A) - (G), (H) - (L).
You cannot hear the caller's voice.	Check item (A) - (E), (M).	Check item (A) - (E), (H) - (L), (M).
You cannot use the handset a little away from base unit even if the handset is within range of the base unit.	-	Check item (H) - (L).
The acoustic transmit level is high or low.	Check item (M).	Check item (M).
The acoustic reception level is high or low.	Check item (M).	Check item (M).
Base unit and handset do not link to each other.	Check item (A) - (G).	Check item (A) - (L).
The unit cannot charge.	Check item (N).	Check item (N).
TAM does not work.	Check item (O).	Check item (O).

Note:

(*1) A general repair is possible even if you don't have the DECT tester because it is for confirming the levels, such as Acoustic level in detail.

(*2) Refer to **Check Point (Base Unit)** (P.41)

9.2.1. Check Point (Base Unit)

Please follow the items below when BBIC or EEPROM or FLASH is replaced.

Note:

After the measuring, suck up the solder of TP.

*: **The Setting Method of JIG (Base Unit)** (P.54) is required beforehand.

The connections of simulator equipment are as shown in **Adjustment Standard (Base Unit)** (P.56).

	Items	Check Point	Procedure	Check or Replace Parts
(**A**)	3.0 V Supply Confirmation	VBAT	1. Confirm that the voltage between test point VBAT and GND is 3.0 V ± 0.2 V.	Q301, IC301, Q302, C306, C304, C341, R300, R301, R302, R303, R306, R311, D301
(**B**)	3.0 V Supply Confirmation	+3.0V	1. Confirm that the voltage between test point +3.0V and GND is 3.0 V ± 0.02 V. 2. Adjust the 3.0 V voltage of +3.0V executing command "VDA".	IC501, C503
(**C**)*	BBIC Confirmation	-	1. BBIC Confirmation (Execute the command "getchk"). 2. Confirm the returned checksum value. Connection of checksum value and program number is shown below. ex.) checksum value: 7E36 / program number: DCW1EN	IC501, X501, R505, RA504
(**D**)*	EEPROM Confirmation	-	1. EEP-ROM Confirmation (Execute the command "sendchar EPV"). 2. Confirm the returned Value. (Value for reference is written at "EEPROM C/SUM" in Software_Version_Table.xls).	IC501, IC611, C611, R605, R606, R612
(**E**)*	BBIC Clock Adjustment	CKM	1. Input Command " sendchar sfr", then you can confirm the current value. 2. Check X'tal Frequency. (13.824 MHz ± 100 Hz). 3. If the frequency is not 13.824 MHz ± 100Hz, adjust the frequency of CKM executing the command "sendchar sfr xx xx (where xx is the value)" so that the reading of the frequency counter is 13.824000 MHz ± 7 Hz.	IC501, X501, C508, C509
(**F**)*	Hookswitch Check with DC Characteristics	-	1. Connect Telephone Socket to Tel-simulator which is connected with 600 Ω. 2. Set line voltage to 48 V and line current to 40mA at off-hook condition of normal telephone. 3. Execute the command "hookoff" 4. Confirm that the line current is 40 mA ± 5 mA. 5. Execute the command "hookon". 6. Confirm that the line current is less than + 0.8 mA.	P101, D101, Q141, Q161, Q142, D141, R141~R145, R159~R169, D151
(**G**)	DTMF Generator Check	-	1. Connect Telephone Socket to DTMF tester. (Load=600 Ω) 2. Link Handset and push dial key. 3. Confirm DTMF character. 4. Confirm that the high Group is -8.0 dBm ± 2.0 dB. 5. Confirm that the low Group is -10.0 dBm ± 2.0 dB.	IC501, R181, C184, D141

	Items	Check Point	Procedure	Check or Replace Parts
(**H**)*	Transmitted Power Confirmation	ANT1	Short ANT1/2 pattern to GND. 1. Configure the DECT tester (CMD60) as follows; <Setting> • Test mode: FP • Traffic Carrier: 5 • Traffic Slot: 4 • Mode: Loopback • PMID: 00000 • RF LEVEL = -70 dBm. 2. Execute the command ”sendchar TST”. 3. Execute the command “sendchar dmv 2 2”. 4. Check that “Signalling Status” has been set to “Locked”, then press “ACCEPT RFPI”. 5. Initiate connection from Dect tester (“set up connect”) 6. Execute the command “ANT1”. 7. Confirm that the NTP value at ANT is 18.5 dBm ~ 25.0 dBm.	IC501, C805, C806, C810, C811, C812, C820, C822, C825, C826, C827, C859, C863, C891, C892, C893, C894, C895, C896, R806, R807, R891, R892, DA801, DA802, L809
(**I**)*	Modulation Check	ANT1	Follow steps 1 to 6 of **(H)**. 7.Confirm that the B-Field Modulation is -350 ± 50/+350 ± 50 kHz/div using data type Fig31.	Refer to (**H**)
(**J**)*	Frequency Offset Check	ANT1	Follow steps 1 to 6 of **(H)**. 7.Confirm that the frequency offset is < ±20 kHz.	Refer to (**H**)
(K)*	Sensitivity Receiver Confirmation	ANT1	Follow steps 1 to 6 of **(H)**. 7.Set DECT tester power to -88 dBm. 8.Confirm that the BER is < 1000 ppm.	Refer to (**H**)
(**L**)*	Power RAMP Confirmation	-	Follow steps 1 to 6 of **(H)**. 7.Confirm that Power RAMP is matching.	Refer to (**H**)
(**M**)	Audio Check	-	1. Link with Handset which is connected to Line Simulator. 2. Set line voltage to 48 V and line current to 50 mA. 3. Input -45 dBm (600 Ω)/1 kHz to MIC of Handset. Measure the Level at Line I/F and distortion level. 4. Confirm that the level is -3 dBm ± 5 dB and that the distortion level is < 5 % at TEL Line (600 Ω Load). 5. Input -20 dBm (600 Ω)/1 kHz to Line I/F. Measure the Level at Receiver of Handset and distortion level (Receive volume set to second position from minimum). 6. Confirm that the level is -24 dBm ± 4 dB and that the distortion level is < 5 % at Receiver (34 Ω Load).	IC501, SA101, P101, D101, Q141, Q142, Q161, Q171, R141, R142, R144, R145, D141, R181, C184, R164, R177, C173, R171, R172, R175, R176, R178
(**N**)	Charging Check	-	1. Connect Charge Contact 12 Ω/2 W resistor between charge+ and charge-. 2. Measure and confirm voltage across the resistor is 3.9 V ± 0.4 V.	R371, R372, D362, C361
(**O**)	TAM Operation Confirmation	-	1. TAM Confirmation (Execute the command "sendchar VPI"). 2. Confirm the returned Value (Value is "DCU7EA 08").	IC501, IC601, C601

9.2.2. Check Point (Charger Unit)

	Items	Check Point	Procedure	Check or Replace Parts
(**A**)	Charging Check	-	1. Connect Charge Contact 12 Ω/2 W resistor between charge+ and charge-. 2. Measure and confirm voltage across the resistor is 3.9 V ± 0.4 V.	R1, R2, D1, F1

Note:

After the measuring, suck up the solder of TP.

The connection of adjustment equipment is as shown in **Adjustment Standard (Charger Unit)** (P.57).

9.3. Troubleshooting by Symptom (Handset)

If your unit has below symptoms, follow the instructions in remedy column. Remedies depend on whether you have DECT tester (*1) or not.

Symptom	Remedy (*2)	
	You don't have DECT Tester.	You have DECT Tester. (Model Number: CMD60)
Battery strength is not indicated correctly by Battery icon.	Check item (A) - (D), (E) - (G).	Check item (A) - (D), (E) - (G).
You cannot hear the caller's voice.	Check item (A) - (C), (H), (N).	Check item (A) - (C), (H - (L)) - (N).
You cannot use handset little away from base unit even if the handset is within range of the base unit.	-	Check item (I) - (M).
the Audio level is high or low.	Check item (N).	Check item (N).
The SP-Phone level is high or low.	Check item (O).	Check item (O).

Note:

(*1) A general repair is possible even if you don't have the DECT tester because it is for confirming the levels, such as Acoustic level in detail.

(*2) Refer to **Check Point (Handset)** (P.43)

9.3.1. Check Point (Handset)

Please follow the items below when BBIC or EEPROM is replaced.

Note:

After the measuring, suck up the solder of TP.

*: **Connections** (P.58) is required beforehand.

The connections of adjustment equipment are as shown in **Adjustment Standard (Handset)** (P.60).

	Items	Check Point	Procedure	Check or Replace Parts
(**A**)*	1.8 V Supply Adjustment	1.8V	1. Confirm that the voltage between test point 1.8V and GND is 1.8 V ± 0.02 V. 2. Execute the command "VDD", then check the current value. 3. Adjust the 1.8V voltage of 1.8V executing command "VDD XX"(XX is the value).	IC1, Q1, D1, C1, C44, R45, C40, C45, F1
(**B**)*	BBIC Confirmation	-	1. BBIC Confirmation (Execute the command "getchk"). 2. Confirm the returned checksum value. Connection of checksum value and program number is shown below. ex.) checksum value: 72B3 / program number: DCY2EP	IC1, X1, RA6, R60, R61
(**C**)*	EEP-ROM Confirmation	-	1. EEP-ROM Confirmation (Execute the command "sendchar EPV"). 2. Confirm the returned Value. (Value for reference is written at "EEPROM C/SUM" in Software_Version_Table.xls).	IC1, IC3, RA5, C69
(**D**)	Charge Control Check & Charge Current Monitor Check	-	1. Apply 5.0 V between CHG(+) and CHG(-) with DC power supply and set current limit to 150 mA. Confirm the indication of "charging" on LCD. 2. Confirm that the current limit LED of DC power supply is ON/OFF. Confirm it after waiting over 1 minute at least. (If charge control cannot be confirmed by this procedure, please use battery to handset power supply and try again.)	IC1, Q4 Q9, Q2, Q3, R2, R3, R7, R8, R6, R9, C19, F1, C1, R45
(**E**)*	Charge Detection (OFF) Check	-	1. Stop supplying 5.0 V to CHG (+) and CHG (-). 2. Confirm the indication of "charging" has been cleared.	IC1, Q4 Q9, Q2, Q3, R2, R3, R7, R8, R6, R9, C19, F1, C1, R45

	Items	Check Point	Procedure	Check or Replace Parts
(**F**)*	Battery Monitor Check	-	1. Apply 2.25 V 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) XX: 70: No need to adjust b) XX: 66 ~ 6F: Need to adjust XX: 71 ~ 7A: 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”. EEPROM = 000B (Low Voltage for PSPLY) Write YY + A Execute the command "wreeprom 00 0B 01 XX". **Note:** ZZ = YY - C XX = YY + A c) XX: 00 ~ 65: Reject XX: 7B ~ FF: Reject	IC1, F1, C1, R45
(**G**)	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.	IC1, F1, C1, R45
(**H**)*	BBIC Clock Adjustment	CKM	1. Apply 2.6 V between BATT+ and BATT- with DC power. 2. Input Command “sendchar sfr”, then you can confirm the current value. 3. Check X’tal Frequency. (10.368 MHz ± 100 Hz). 4. If the frequency is not 10.368 MHz ± 100 Hz, adjust the frequency of CKM executing the command “sendchar sfr xx xx (where xx is the value)” so that the reading of the frequency counter is 10.368000 MHz ± 5 Hz. Note: Clear the registered information for Base Unit before measurement, because the Frequency will not possibly get stable due to the registered information. Pressing the button of "3" "5" "7" "#"clears the registration. Register to it on Base Unit after measurement.	IC1, X1, C47
(**I**)*	Transmitted Power Confirmation	-	Short Antenna pattern to GND. 1. Configure the DECT tester (CMD60) as follows; <Setting> • Test mode: PP • RFPI: 0102030405 • Traffic Carrier: 5 • Traffic Slot: 4 • Mode: Loopback • RF LEVEL = -70 dBm • PACKET: PP32Z 2. Execute the command “sendchar TST 01 02 03 04 05". 3. Initiate connection from DECT tester. 4. Confirm that the NTP value at ANT is 19 dBm ~ 24 dBm.	IC1, C802~C806, C809~C814, C820, C822, C823, C825~C826, L802, L803, DA801, R806, R807
(**J**)*	Modulation Check and Adjustment	-	Follow steps 1 to 3 of **(I)**. 4.Confirm that the B-Field Modulation is -350 ± 50/+350 ± 50 kHz/div using data type Fig 31.	Refer to (**I**)
(**K**)*	Frequency Offset Confirmation	-	Follow steps 1 to 3 of **(I)**. 4.Confirm that the frequency Offset is < ± 20 kHz.	Refer to (**I**)
(**L**)*	Sensitivity Receiver Confirmation	-	Follow steps 1 to 3 of **(I)**. 4.Set DECT tester power to -88 dBm. 5.Confirm that the BER is < 1000 ppm.	Refer to (**I**)
(**M**)*	Power RAMP Confirmation	-	Follow steps 1 to 3 of **(I)**. 4.Confirm that Power RAMP is matching.	Refer to (**I**)

	Items	Check Point	Procedure	Check or Replace Parts
(**N**)	Audio Check and Confirmation	-	1. Link to BASE which is connected to Line Simulator. 2. Set line voltage to 48 V and line current to 50 mA. 3. Input -45 dBm (600 Ω)/1 kHz to MIC of Handset. Measure the Level at Line I/F and distortion level. 4. Confirm that the level is -3 dBm ± 5 dB and that the distortion level is < 5 % at TEL Line (600 Ω Load). 5. Input -20 dBm (600 Ω)/1 kHz to Line I/F. Measure the Level at Receiver of Handset and distortion level (Receive volume set to second position from minimum). 6. Confirm that the level is -24 dBm ± 4 dB and that the distortion level is < 5 % at Receiver (34 Ω Load).	IC1, C12, C96, C97, R5, R27, RA4, C11, C13, R28, MIC
(**O**)	SP phone Audio Check and Confirmation	-	1. Link to Base which is connected to Line Simulator. 2. Set line voltage to 48 V and line current to 50 mA. 3. Set the handset off-hook using SP-Phone key. 4. Input -30 dBm (600 Ω)/1 KHz to Line I/F and measure Receiving level at SP+ and SP-. 5. Confirm that the level is -8 dBm ± 3 dB and that the distortion level is < 5 %. (vol = Max at SP (8 Ω Load))	IC1, C12, C73, D13, D14, MIC, C11, C13, RA4, R27, R28, C96, C97, R5, C72, C73
(**P**)	Charge Pump 3.0 V Supply Confirmation	CP3V	1. Confirm that the voltage between testpoint CP3.0V and GND is 3.0 V ± 0.3 V.	C30, C53, C54
(**Q**)	Charge Pump CP_LED 4.0V Supply Confirmation	CP_LED	1. Confirm that the voltage between testpoint CP_LED and GND is 4.0 V ± 0.3 V. (Power is supplied when LED in on)	C52, C55
(**R**)	Charge Pump CP2.8V Supply Confirmation	CP2.8V	1. Confirm that the voltage between testpoint CPV2.8V and GND is 2.8V ± 0.3 V.	C30, C53, C54, D3, C51
(S)	Headset Audio Check and Confirmation	-	1. Link to Base which is connected to Line Simulator. 2. Set line voltage to 48 V and line current to 50 mA. 3. Input -45 dBm (600 Ω)/1 kHz to MIC of Headset. Measure the Level at Line I/F and distortion level. 4. Confirm that level is -8 dBm ± 3 dB and that the distortion level is < 5 % at TEL Line (600 Ω Load). 5. Input -20 dBm (600 Ω)/1 KHz to Line I/F. Measure the Level at Receiver of Headset and distortion level (Receive volume set to second position form minimum). 6. Confirm that the level is -21.5 dBm ± 3 dB and that the distortion level is < 5 % at Headset Receiver (150 Ω Load).	IC1, R29, C37, C180, R22, C14, R25, C16, C83, C32, R80, L7, L9, C87, C84, CN4

9.3.2. Troubleshooting for Speakerphone

When the customer's telephone line corresponds to the following conditions, and the transmission signal of SP-Phone is interrupted, performing the next set up to a cordless handset will improve it to some extent.

Conditions

1. When customer's line has less line loss.
   ex.) The customer is using optical fiber, ISDN terminal adaptor, or PBX.
   In this case, receiving signal is strong and it may affect transmission signal.
2. When the other party is talking from noisy place.
   ex.) The other party is using cellular phone. The background noise is very loud.
   In this case, the noise from the other party (i.e. surrounding noise) may affect transmission signal.

Setting Method

Model	Content	Address	Default Data	New Data
TGA815 / TGA816	TX 6dB Louder	02 AC	F5	8A
		02 AD	32	19
		02 A8	FC	FC
		02 A9	5F	5F
		02 AA	01	02
		02 AB	00	00
	TX 12dB Louder	02 AC	F5	CC
		02 AD	32	CC
		02 A8	FC	FC
		02 A9	5F	5F
		02 AA	01	03
		02 AB	00	00
	TX 6dB Lower	02 AC	F5	AC
		02 AD	32	65
		02 A8	FC	FC
		02 A9	5F	5F
		02 AA	01	00
		02 AB	00	00

* Do not enter New Data if the Default Data is different from the table above.

Note

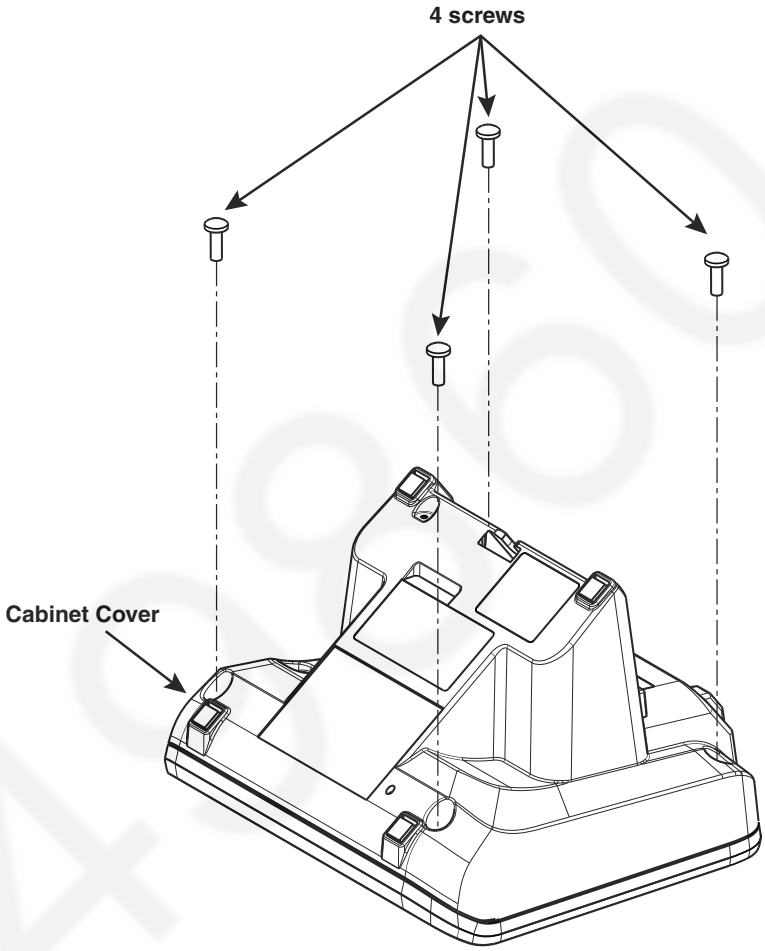
(*1) Refer to **Handset** (P.23) of **Engineering Mode** to enter the Address or New Data.

10 Disassembly and Assembly Instructions

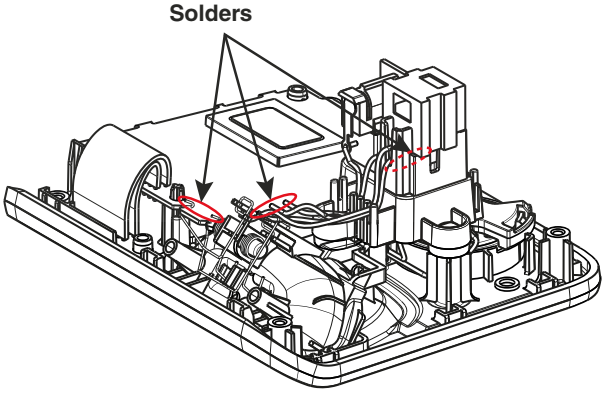
10.1. Disassembly Instructions

10.1.1. Base Unit

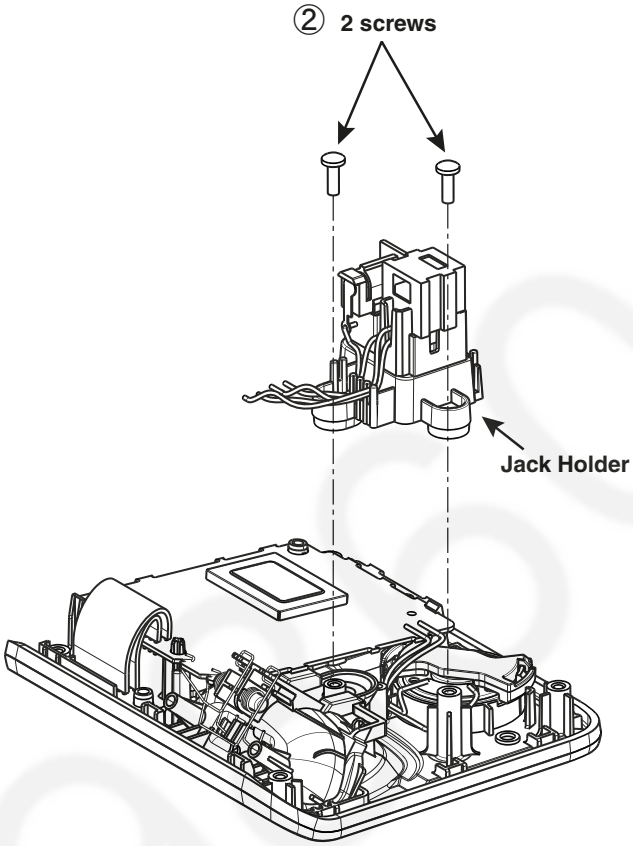
① **Remove the 4 screws to remove the cabinet cover.**



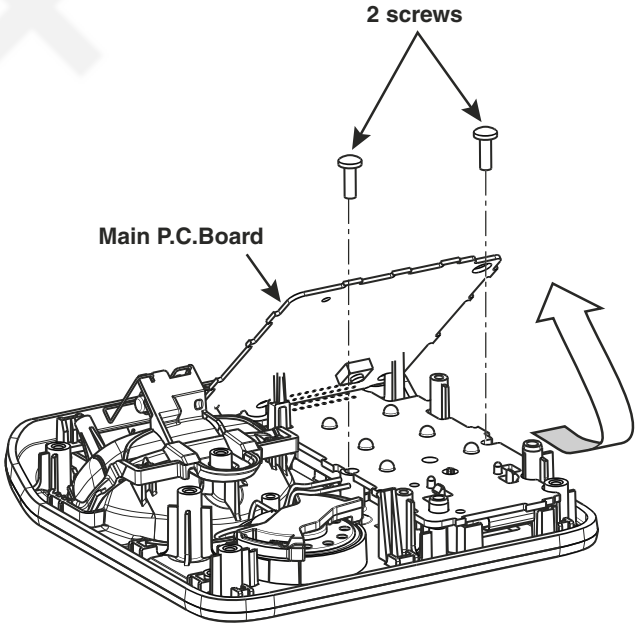
② **Remove the solders.**



③ **Remove the 2 screws to remove the Jack Holder.**

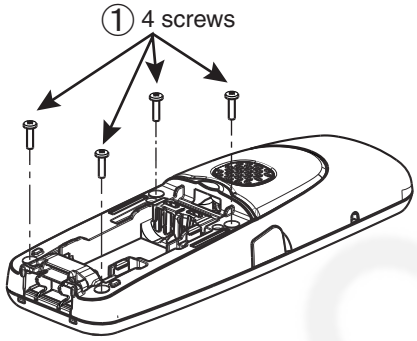


④ **Unhook the Main P.C.Board, then remove the 2 screws to remove the Operational P.C.Board.**

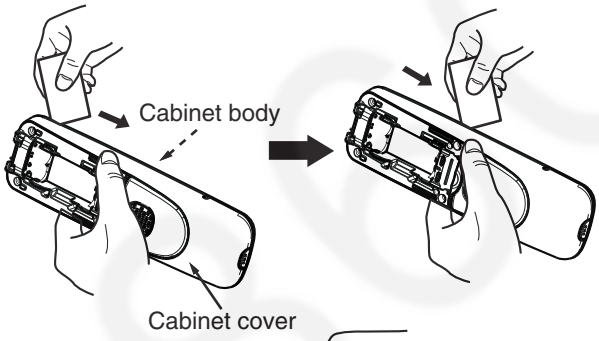


10.1.2. Handset

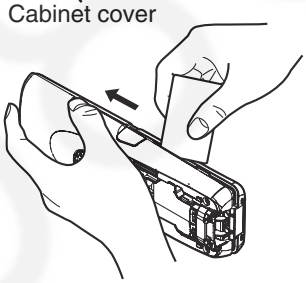
① **Remove the 4 screws.**



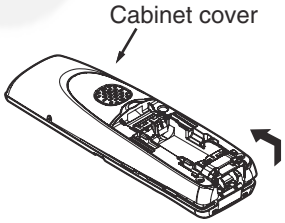
② **Insert a plastic card. (Ex. Used SIM card etc.) between the cabinet body and the cabinet cover, then pull it along the gap to open the cabinet.**



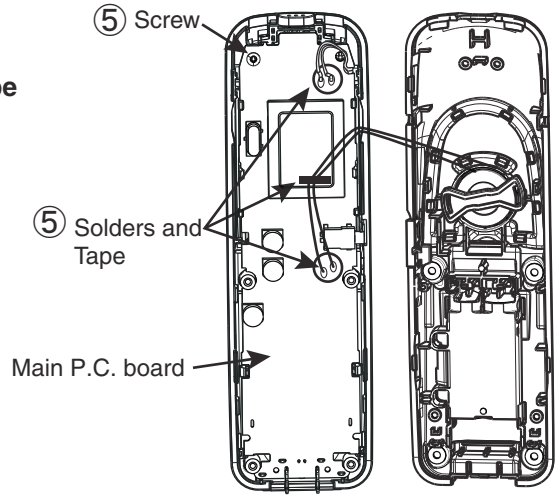
③ **Likewise, open the other side of the cabinet.**



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



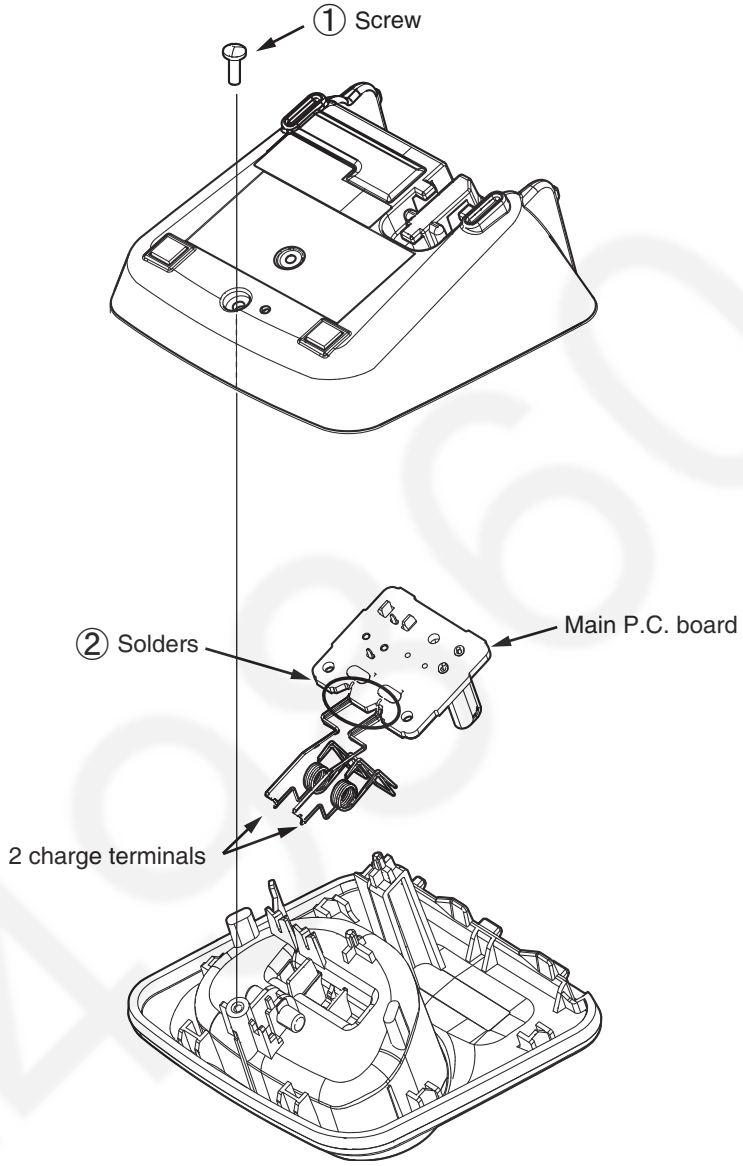
⑤ **Remove the screw, solders and tape to remove the main P. C. board.**



10.1.3. Charger Unit

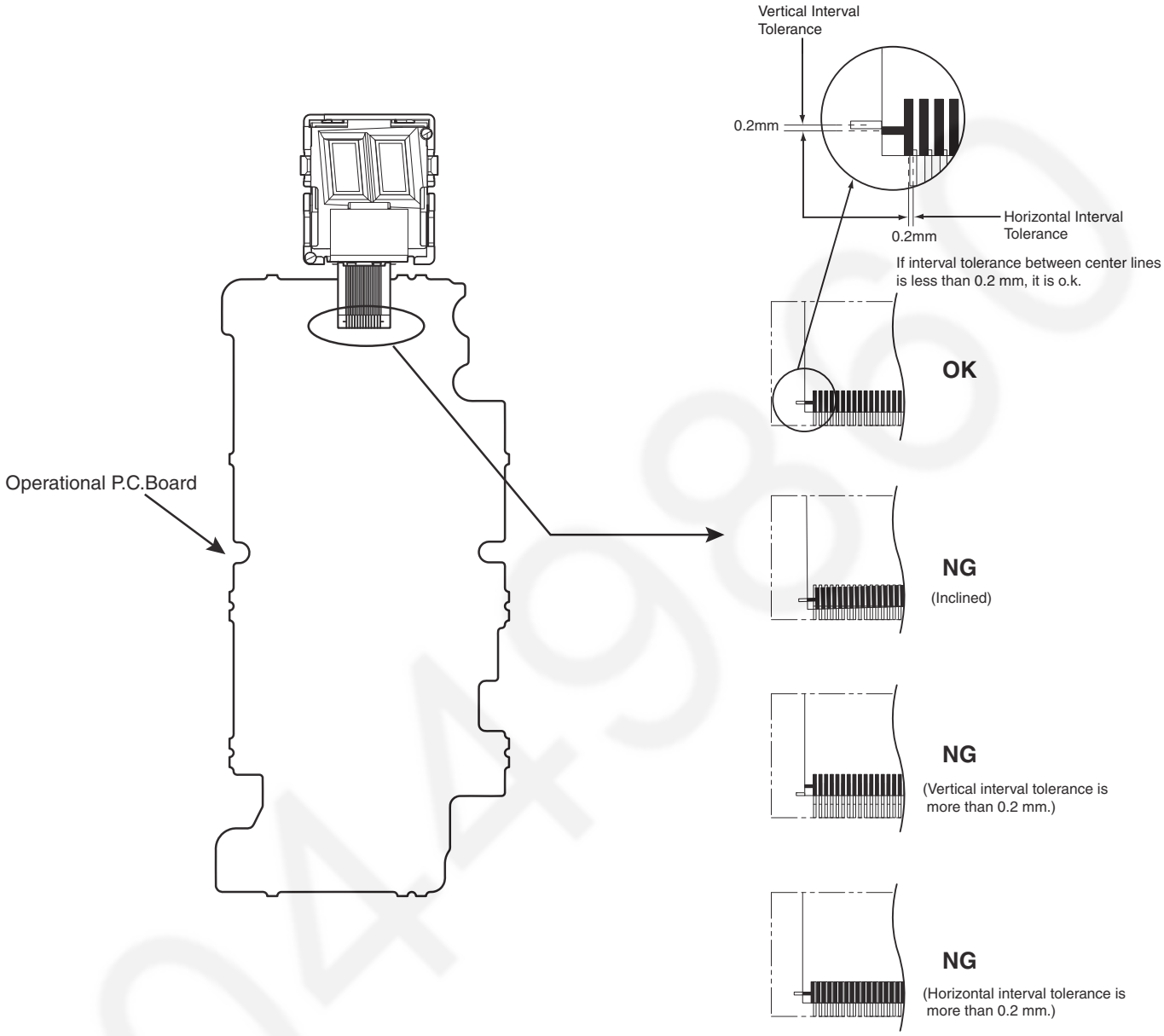
① **Remove the screw to remove the cabinet cover.**

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

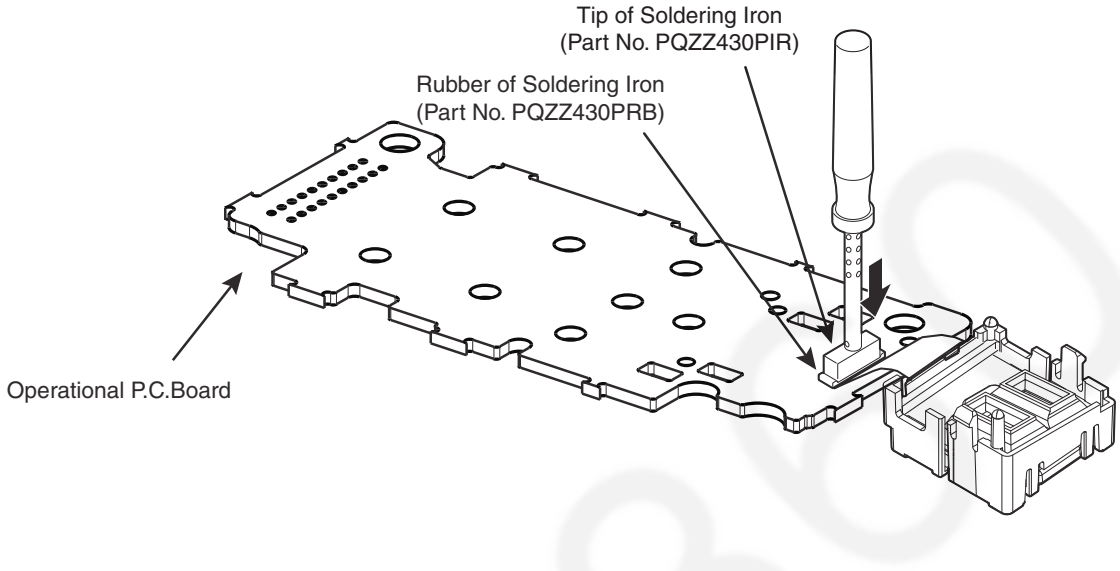


10.2. How to Replace the Base Unit LCD

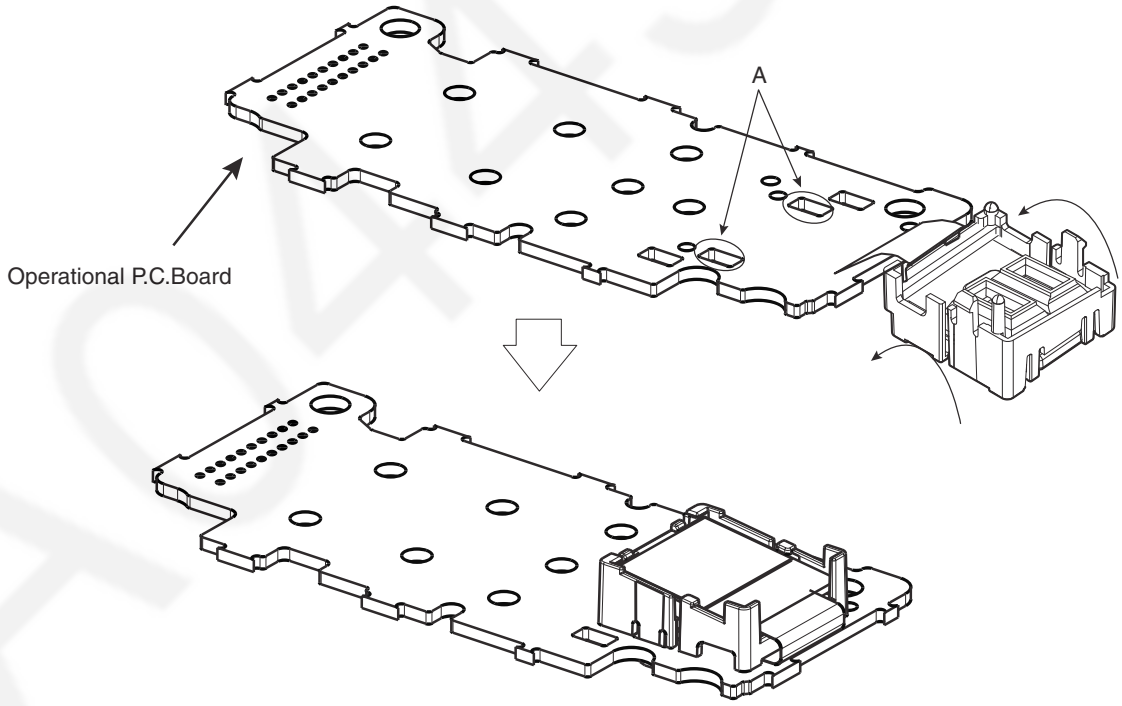
① Fit the heatseal of a new LCD.



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



③ Attach the LCD and fix by hook A (two points).

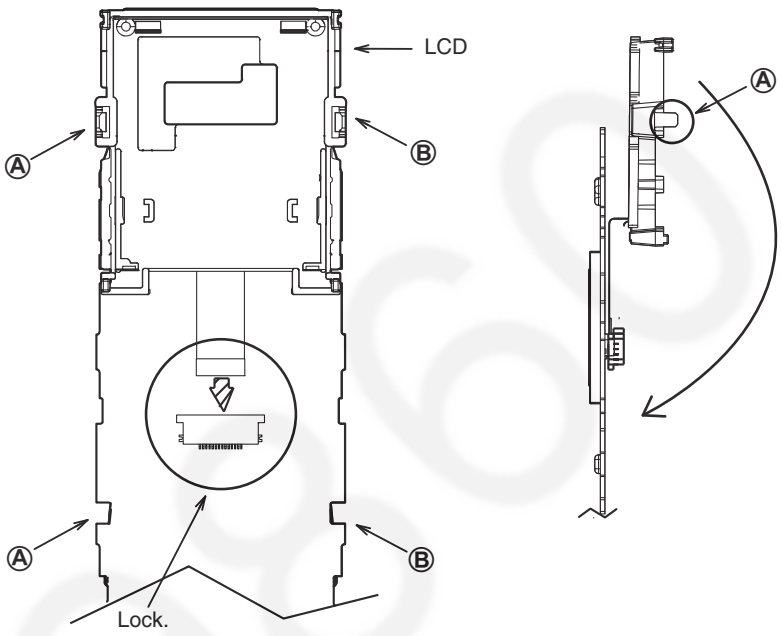


10.3. How to Replace the Handset LCD

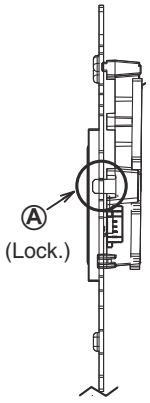
Note:

The illustrations are simplified in this page.
They may differ from the actual product.

① Attach LCD to P.C.B.
*When attaching the LCD holder,
don't pull the FPC (Flexible Print Circuit).



② Locate the Flat Cable inside as shown.



11 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.29)

11.1. 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.
- DECT tester: Rohde & Schwarz, CMD 60 is recommended.

  This equipment may be useful in order to precisely adjust like a mass production.

11.2. The Setting Method of JIG (Base Unit)

This section explains the PC setting to use command required in **Check Point (Base Unit)** (P.41).

<Preparation>

- Serial JIG cable: PQZZ1CD300E*
- PC which runs in DOS mode
- **Batch file CD-ROM** for setting: PNZZTG8161AL

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.)

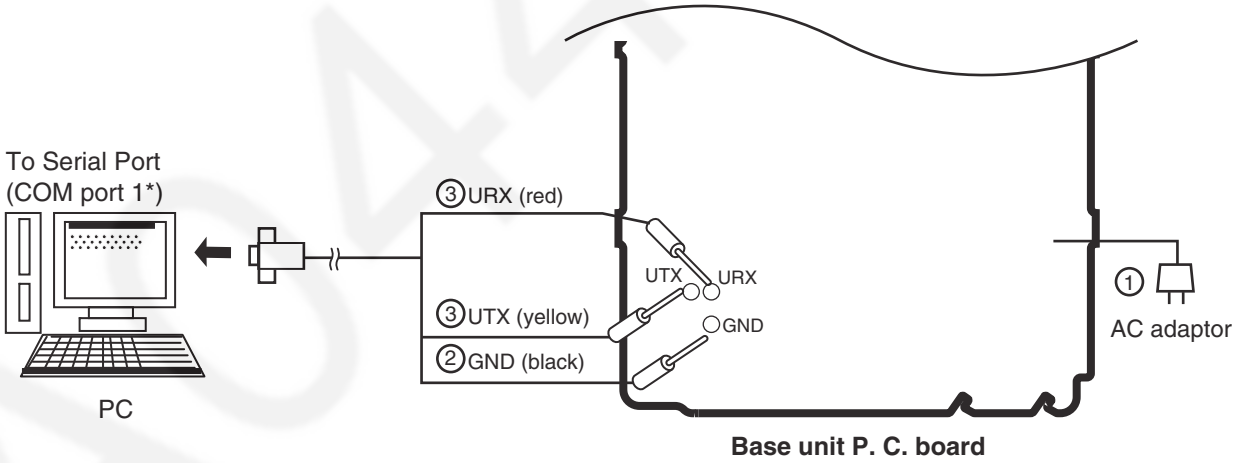
Resistor	Old value (kΩ)	New value (kΩ)
R2	22	3.3
R3	22	3.3
R4	22	4.7
R7	4.7	10

11.2.1. Connections

① Connect the AC adaptor to DC-JACK (base unit).

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

③ Connect the JIG Cable RX (red) to URX and TX (yellow) to UTX.



Note:

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

11.2.2. 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).

2. Open an MS-DOS mode window.

<Example for Windows>

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.

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

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>

```
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****>
```

<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.

11.2.3. Commands

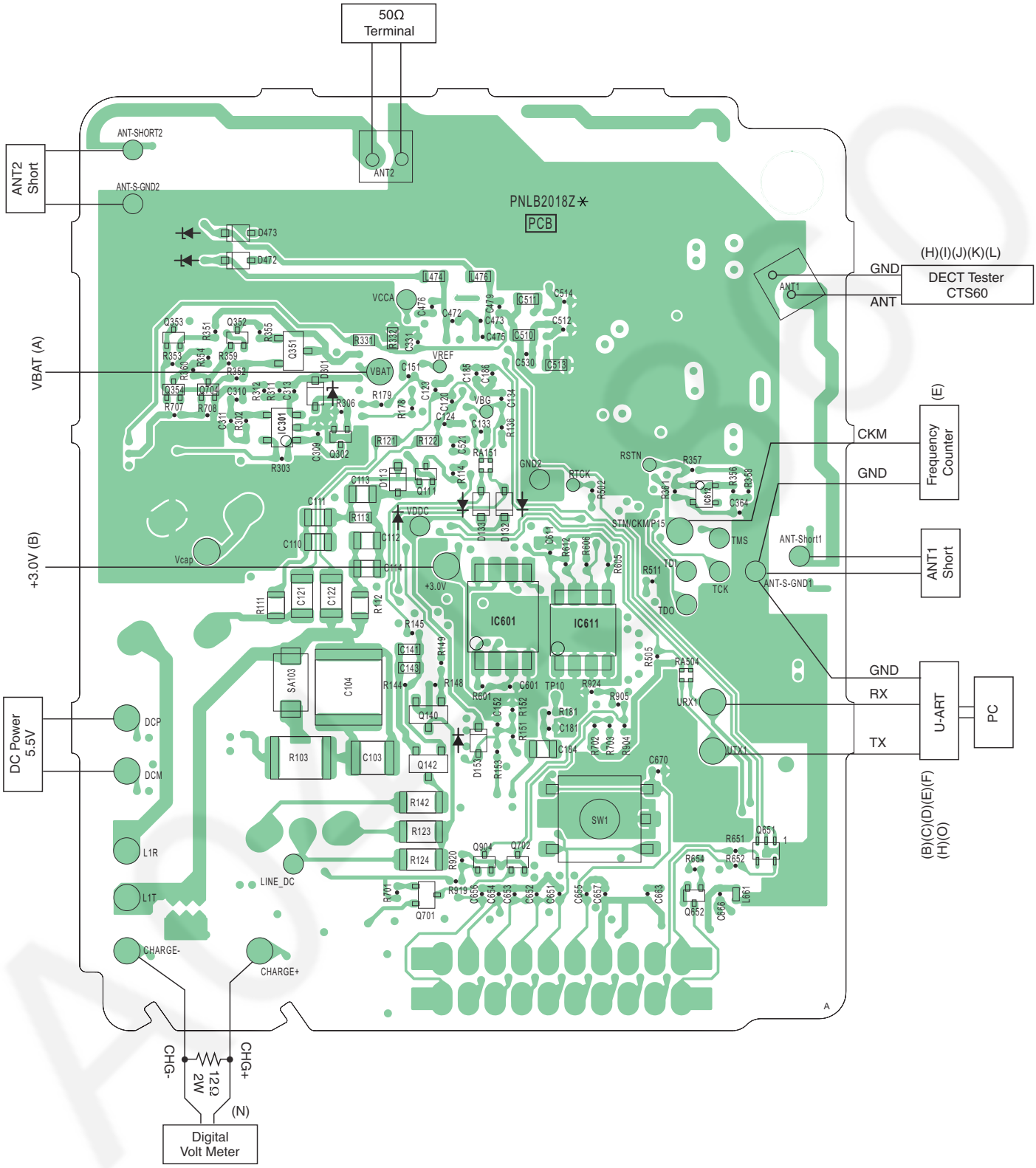
See the table below for frequently used commands.

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.
hookoff	Off-hook mode on Base	Type "hookoff".
hookon	On-hook mode on Base	Type "hookon".
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.

11.3. Adjustment Standard (Base Unit)

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

11.3.1. Bottom View



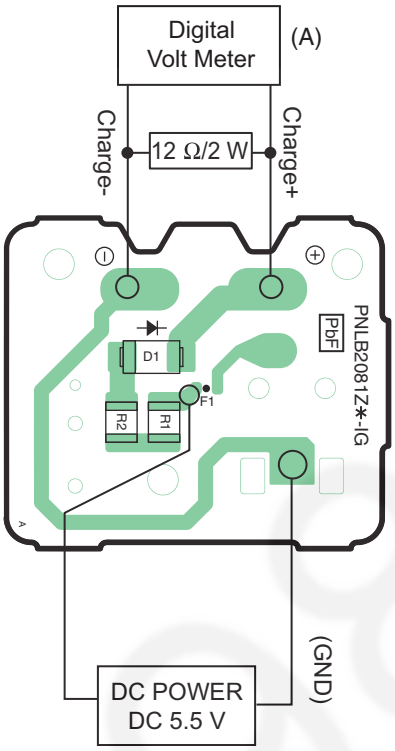
Note:

(**A**) - (**O**) is referred to **Check Point (Base Unit)** (P.41)

11.4. Adjustment Standard (Charger Unit)

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

11.4.1. Bottom View



Note:

(**A**) is referred to **Check Point (Charger Unit)** (P.42)

11.5. The Setting Method of JIG (Handset)

This section explains the PC setting to use command required in **Check Point (Handset)(**P.43).

<Preparation>

- Serial JIG cable: PQZZ1CD300E*
- PC which runs in DOS mode
- **Batch file CD-ROM** for setting: PNZZTG8161AL

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.)

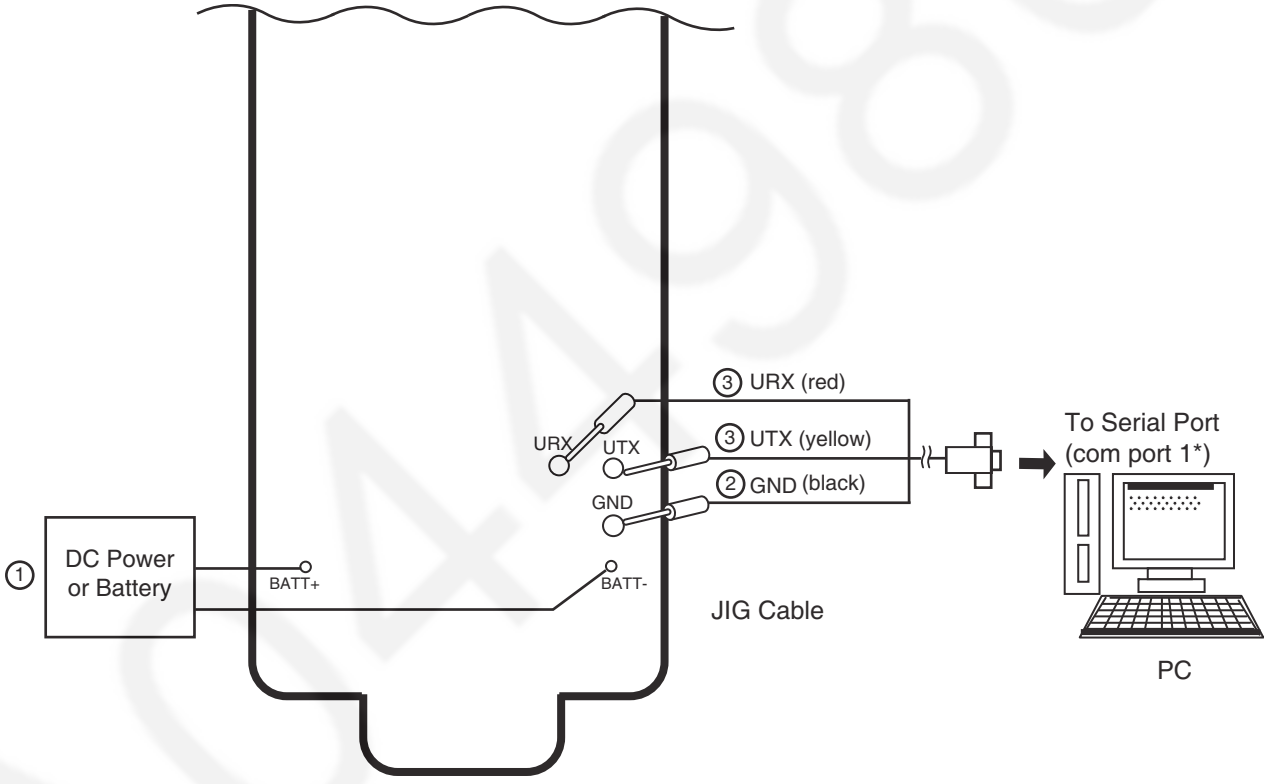
Resistor	Old value (kΩ)	New value (kΩ)
R2	22	3.3
R3	22	3.3
R4	22	4.7
R7	4.7	10

11.5.1. Connections

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.

11.5.2. 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).

2. Open an MS-DOS mode window.

<Example for Windows>

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.

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

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>

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

<Example: Error happens>

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

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

11.5.3. Commands

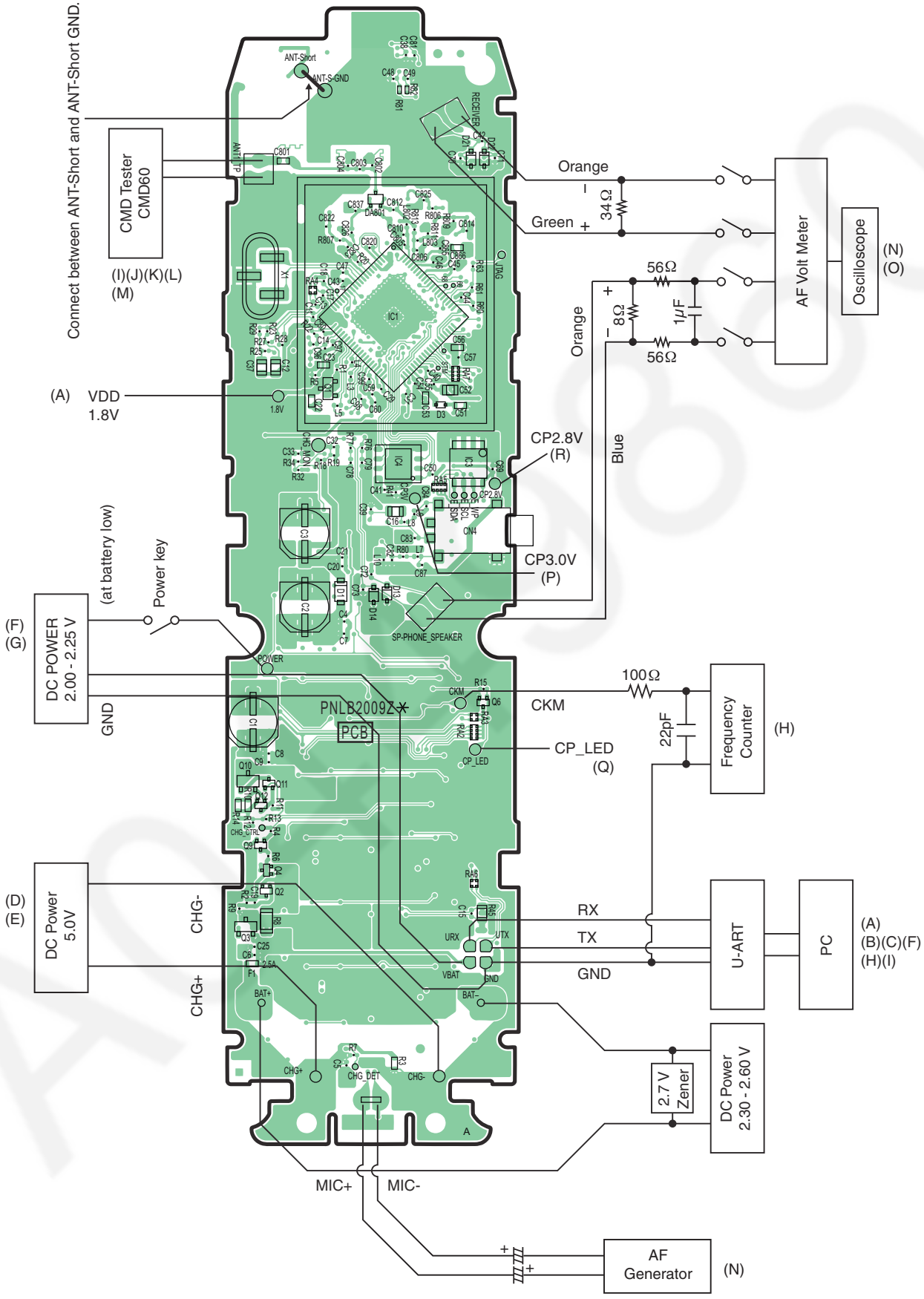
See the table below for frequently used commands.

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.

11.6. Adjustment Standard (Handset)

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

11.6.1. Component View



Note:

(**A**) - (**R**) is referred to **Check Point (Handset)** (P.43)

11.7. Things to Do after Replacing IC or X'tal

If repairing or replacing BBIC (FLASH type), EEPROM and 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.

11.7.1. How to download the data

11.7.1.1. Base Unit

First, operate the PC setting according to **The Setting Method of JIG (Base Unit)(**P.54).
Then download the appropriate data according to the following procedures.

Items		How to download/Required adjustment
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. 2) Default batch file: Execute the command “default.bat”. 3) Country version batch file: Execute the command “TG6721EU_WW_RevXXX_YYY.bat” (*1) 4) Clock adjustment: Refer to Check Point (E). (*2)
X'tal (X501)	System clock	Clock adjustment data is in EEPROM, adjust the data again after replacing it. 1) Apply 5.5V between DCP ad DCM with DC power. 2) Input Command "sendchar sfr", then you can confirm the current value. 3) Check X'tal Frequency.(13.824 MHz ± 100 Hz). 4) If the frequency is not 13.824 MHz ± 100 Hz, adjust the frequency of CKM executing the command "sendchar sfr xx xx (where xx is the value)" so that the reding of the frequency counter is 13.824000 MHz ± 7 Hz.

Note:

(*1)WW: Destination code XXX_YYY: revision number
‘WW’, “XXX_YYY” vary depending on the country version. You can find them in the batch file, PNZZ- mentioned in **The Setting Method of JIG (Base Unit)** (P.54).

(*2) Refer to **Check Point (Base Unit)** (P.41)

11.7.1.2. Handset

First, operate the PC setting according to **The Setting Method of JIG (Handset)(**P.58).
Then download the appropriate data according to the following procedures.

Items		How to download/Required adjustment
FLASH(IC4)	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. 2) Execute the command “flw441 *********.hex”. 3) Connect the DC Power. 4) Press and hold the handset Power key. 5) While holding down the handset Power key, press the PC Enter key once. 6) After a few minutes, “Successful upgrade” is displayed on the PC indicating downloading has finished. 7) Detach the JIG cable, then press the handset Power key to turn it on. 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). 9) Default batch file: Execute the command “default.bat”. 10) Default batch file (remaining): Execute the command “TGA816EX_DEF_RevXXX_YYY.bat”. (*3). 11) Country version batch file: Execute the command “TGA816EX_WW_RevXXX_YYY.bat”. (*3). 12) Clock adjustment: Refer to Check Point (H). (*4). 13) 1.8 V setting and battery low detection: Refer to Check Point (A), (F) and (G). (*4).
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 “AA” to download the data. 2) Default batch file: Execute the command “default.bat”. 3) Default batch file (remaining): Execute the command “TGA816EX_DEF_RevXXX_YYY.bat”. (*3) 4) Country version batch file: Execute the command “TGA816EX_WW_RevXXX_YYY.bat”. (*3) 5) Clock adjustment: Refer to Check Point (H). (*4) 6) 1.8 V setting and battery low detection: Refer to Check Point (A), (F) and (G). (*4)
X'tal (X1)	System clock	Clock adjustment data is in EEPROM, adjust the data again after replacing it. 1) Refer to Check Point (C). (*4)

Note:

(*3) WW: Destination code XXX_YYY: revision number
“WW”, “XXX_YYY” vary depending on the country version. You can find them in the batch file, PNZZ- mentioned in **The Setting Method of JIG (Handset)** (P.58).

(*4) Refer to **Check Point (Handset)** (P.43)

11.8. RF Specification

11.8.1. Base Unit

Item	Value	Refer to -. *
TX Power	18.5 dBm ~ 25 dBm	**Check Point (Base Unit) (H)**
Modulation	-350 ± 50/+350 ± 50 kHz/div	**Check Point (Base Unit) (I)**
Frequency Offset	±20 kHz	**Check Point (Base Unit) (J)**
RX Sensitivity	< 1000 ppm	**Check Point (Base Unit) (K)**
Power RAMP	Power RAMP is matching	**Check Point (Base Unit) (L)**

*: Refer to **Check Point (Base Unit)** (P.41)

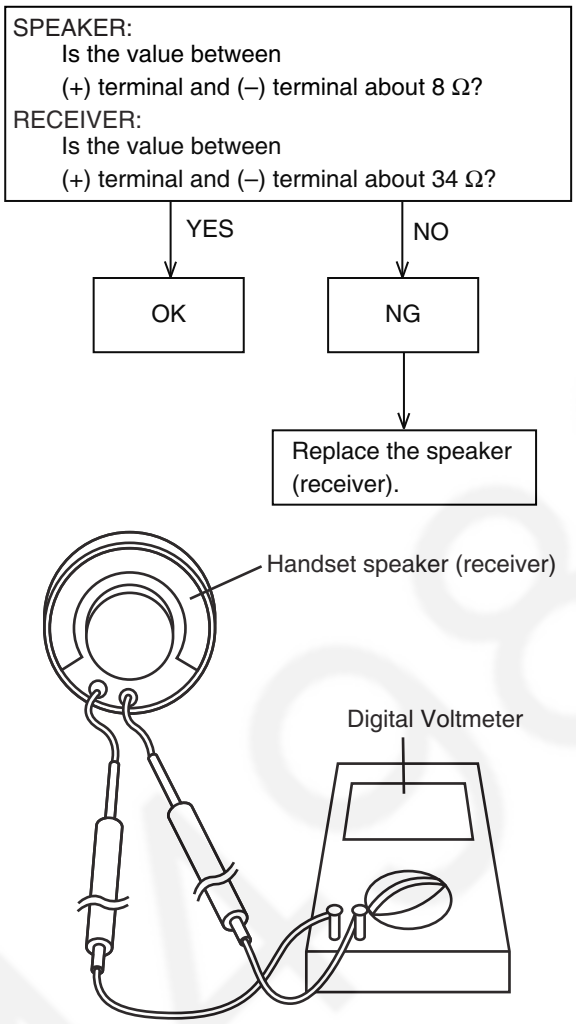
11.8.2. Handset

Item	Value	Refer to -. **
TX Power	19 dBm ~ 24 dBm	**Check Point (Handset) (I)**
Modulation	-350 ± 50/+350 ± 50 kHz/div	**Check Point (Handset) (J)**
Frequency Offset	±20 kHz	**Check Point (Handset) (K)**
RX Sensitivity	< 1000 ppm	**Check Point (Handset) (L)**
Power RAMP	Power RAMP is matching	**Check Point (Handset) (M)**

: Refer to **Check Point (Handset) (P.43)

11.9. How to Check the Handset Speaker or 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.



11.10. Frequency Table (MHz)

	BASE UNIT		HANDSET	
Channel No	**Transmit Frequency**	Receive Frequency	**Transmit Frequency**	**Receive Frequency**
1	1897.344	1897.344	1897.344	1897.344
2	1895.616	1895.616	1895.616	1895.616
3	1893.888	1893.888	1893.888	1893.888
4	1892.160	1892.160	1892.160	1892.160
5	1890.432	1890.432	1890.432	1890.432
6	1888.704	1888.704	1888.704	1888.704
7	1886.976	1886.976	1886.976	1886.976
8	1885.248	1885.248	1885.248	1885.248
9	1883.520	1883.520	1883.520	1883.520
10	**1881.792**	**1881.792**	**1881.792**	**1881.792**

Note:

Channel No. 10: In the Test Mode on Base Unit and Handset.

12 Miscellaneous

12.1. 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.

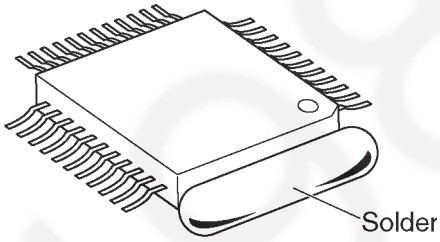
12.1.1. Preparation

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

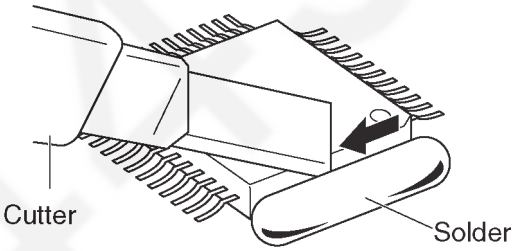
Note: See **About Lead Free Solder (Pbf: Pb free)** (P.5)

12.1.2. How to Remove the IC

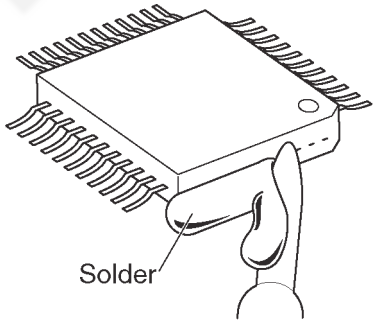
1. Put plenty of solder on the IC pins so that the pins can be completely covered.
   Note:
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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



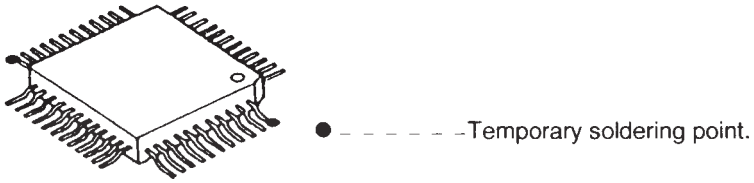
3. While the solder melts, remove it together with the IC pins.



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.

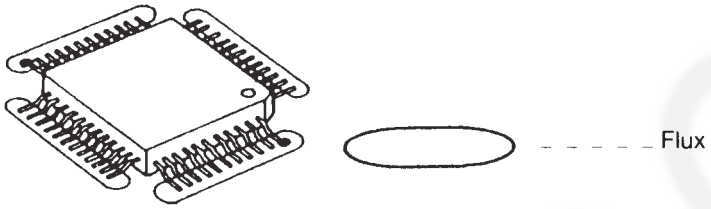
12.1.3. How to Install the IC

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

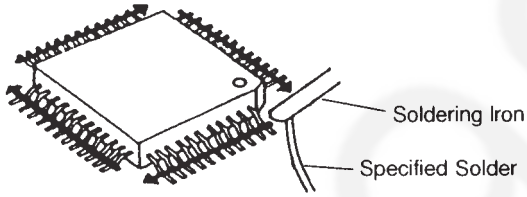


*Check the accuracy of the IC setting with the corresponding soldering foil.

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

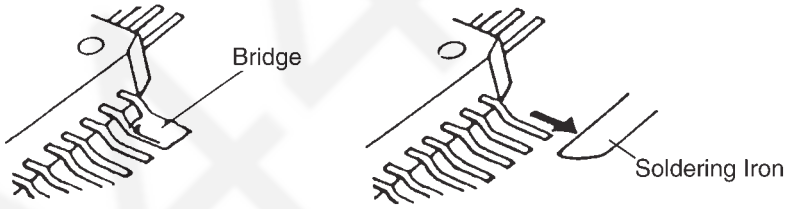


3. Solder the pins, sliding the soldering iron in the direction of the arrow.



12.1.4. 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.



12.2. How to Replace the Shield Case

12.2.1. 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.
- Hot Air Desoldering Tool
  Temperature: 608 °F ± 68 °F (320 °C ± 20 °C)

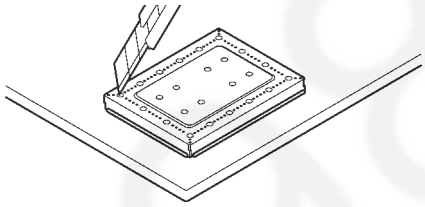
12.2.2. Caution

- 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.

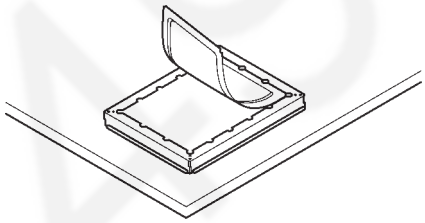
12.2.3. How to Remove the Shield Case

Note:
If you don't have special tools (ex. Hot air disordering tool), conduct the following operations.

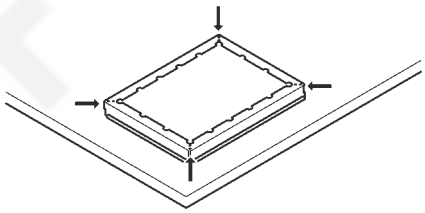
1. Cut the case along perforation.



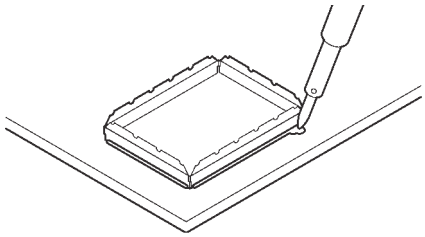
2. Remove the cut part.



3. Cut the four corners along perforation.



4. Remove the reminds by melting solder.

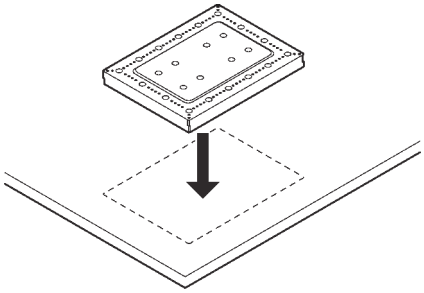


12.2.4. How to Install the Shield Case

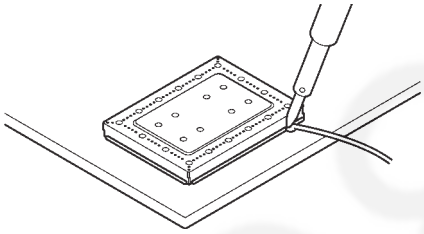
Note:

- If you don't have special tools (ex. Hot air disordering tool), conduct the following operations.
- Shield case's No. : PNMC1018Z, PNMC1032Z

1. Put the shield case.

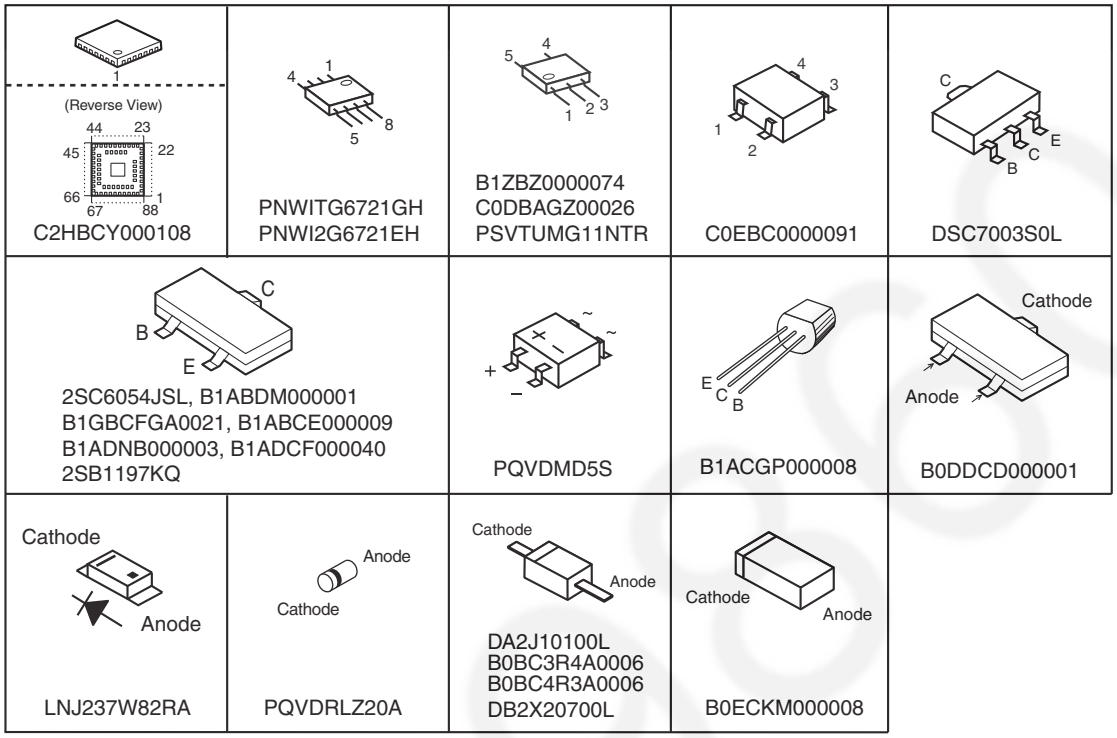


2. Solder the surroundings.

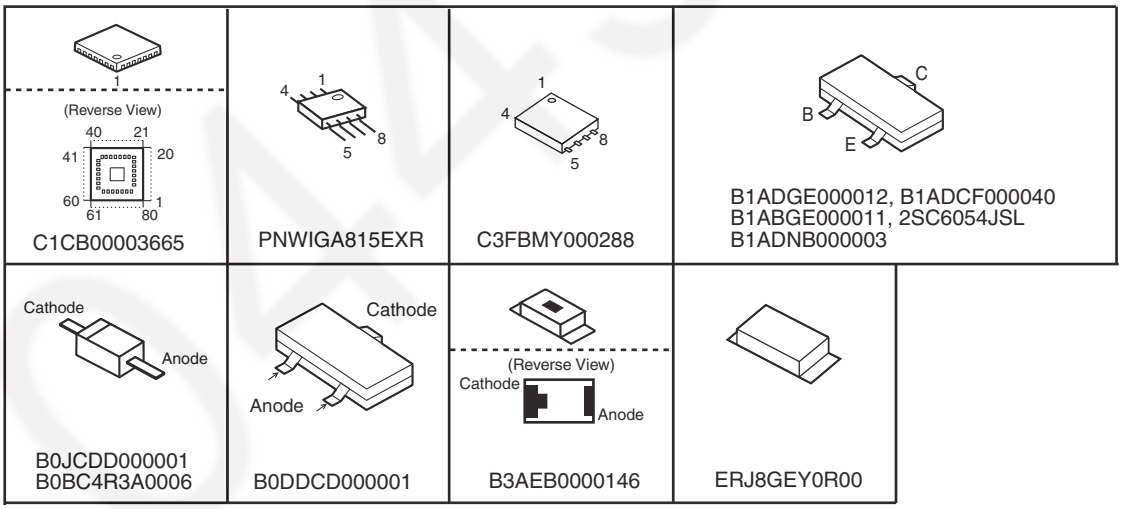


12.3. Terminal Guide of the ICs, Transistors, Diodes and Electrolytic Capacitors

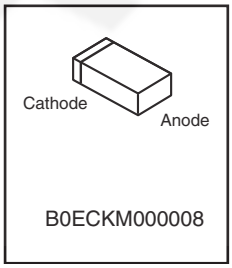
12.3.1. Base Unit



12.3.2. Handset



12.3.3. Charger Unit



13 Schematic Diagram

13.1. For Schematic Diagram

13.1.1. Base Unit (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 manufacturer's specified parts.

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

13.1.2. Handset (Handset)

Notes:

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

13.1.3. Charger Unit (Charger Unit)

Notes:

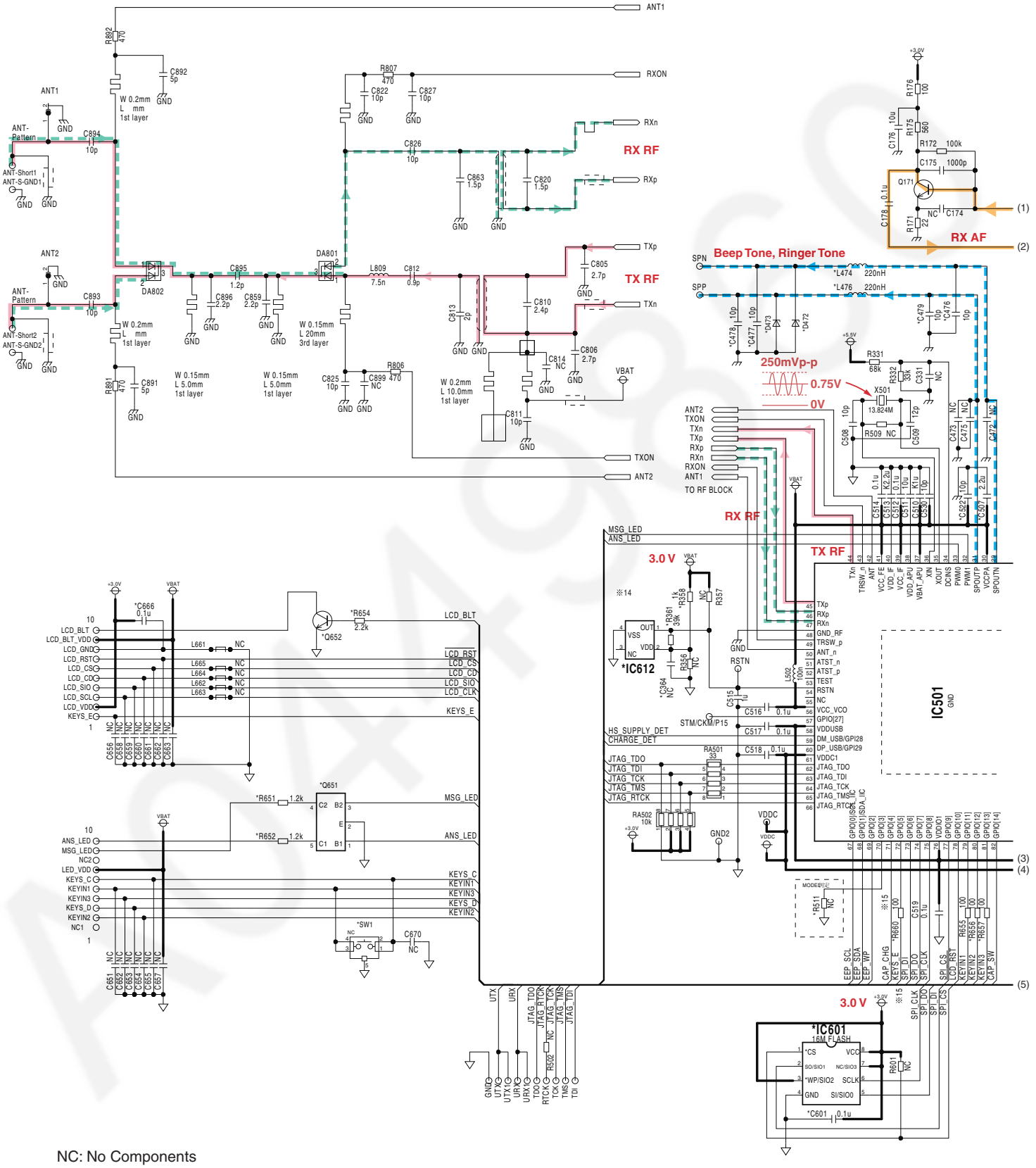
1. DC voltage measurements are taken with voltmeter from the negative voltage line.

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

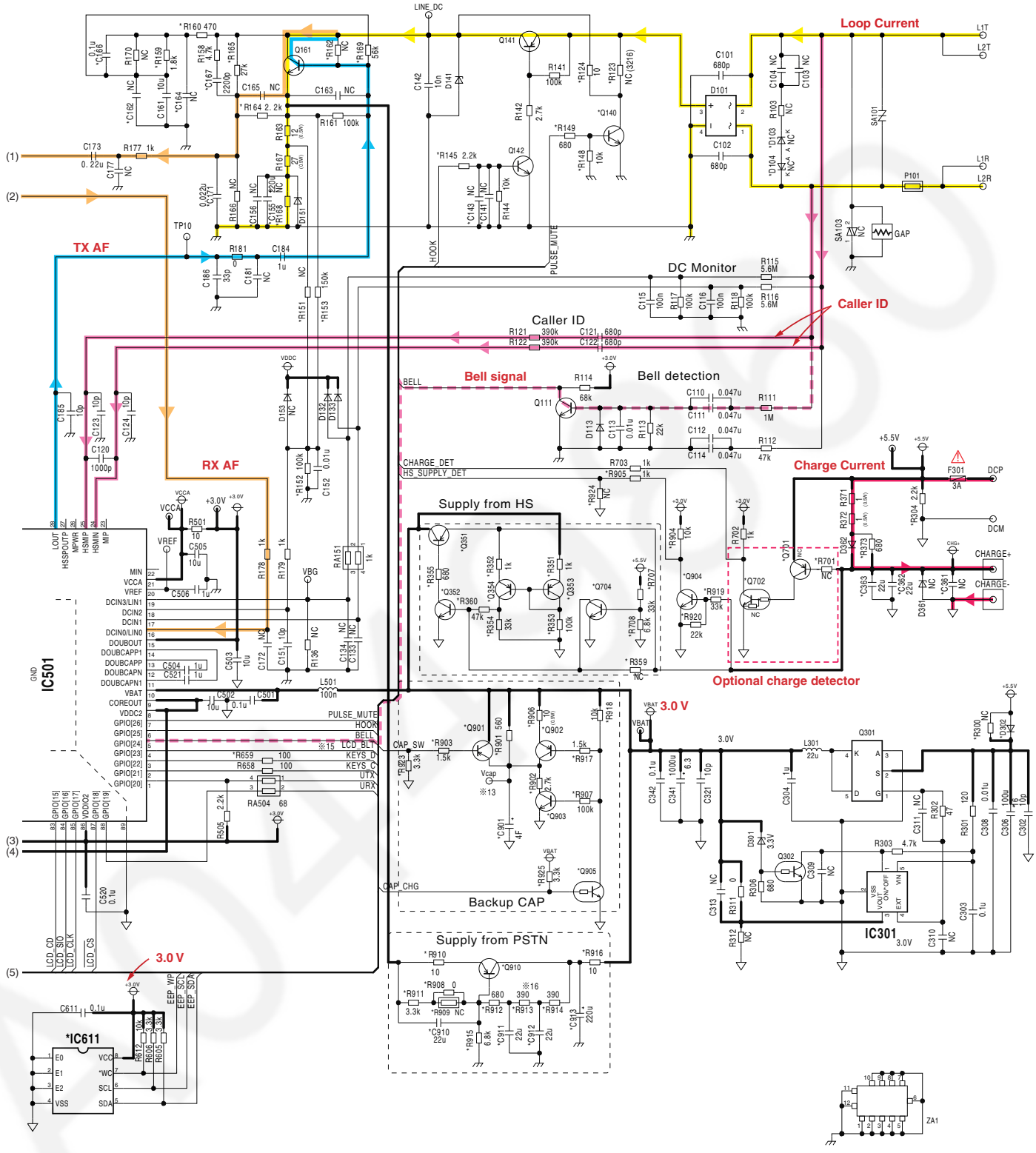
2. The schematic diagram may be modified at any time with the development of new technology.

Memo

13.2. Base Unit (Main)



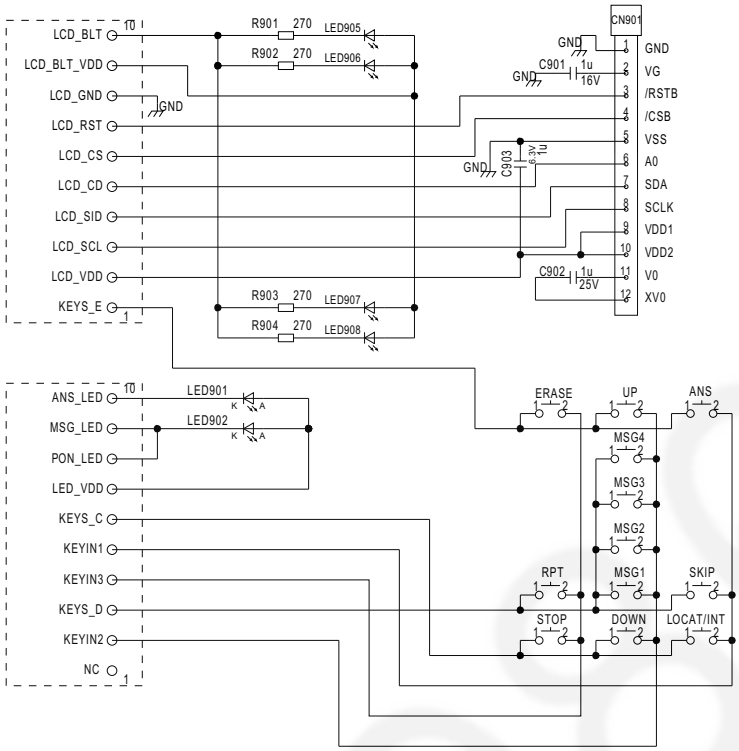
NC: No Components



NC: No Components

KX-TG8161AL SCHEMATIC DIAGRAM (Base Unit (Main))

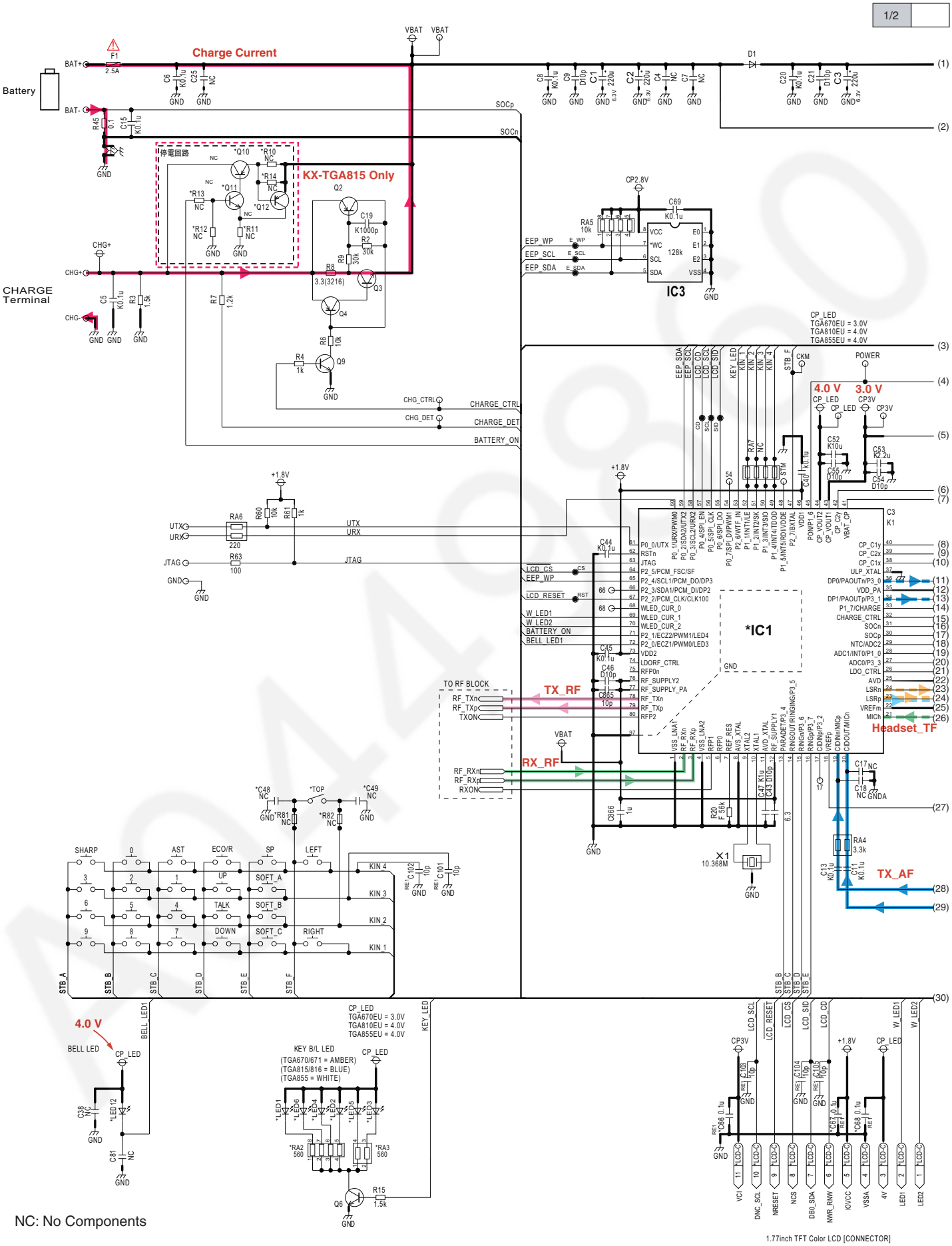
13.3. Base Unit (Operation)



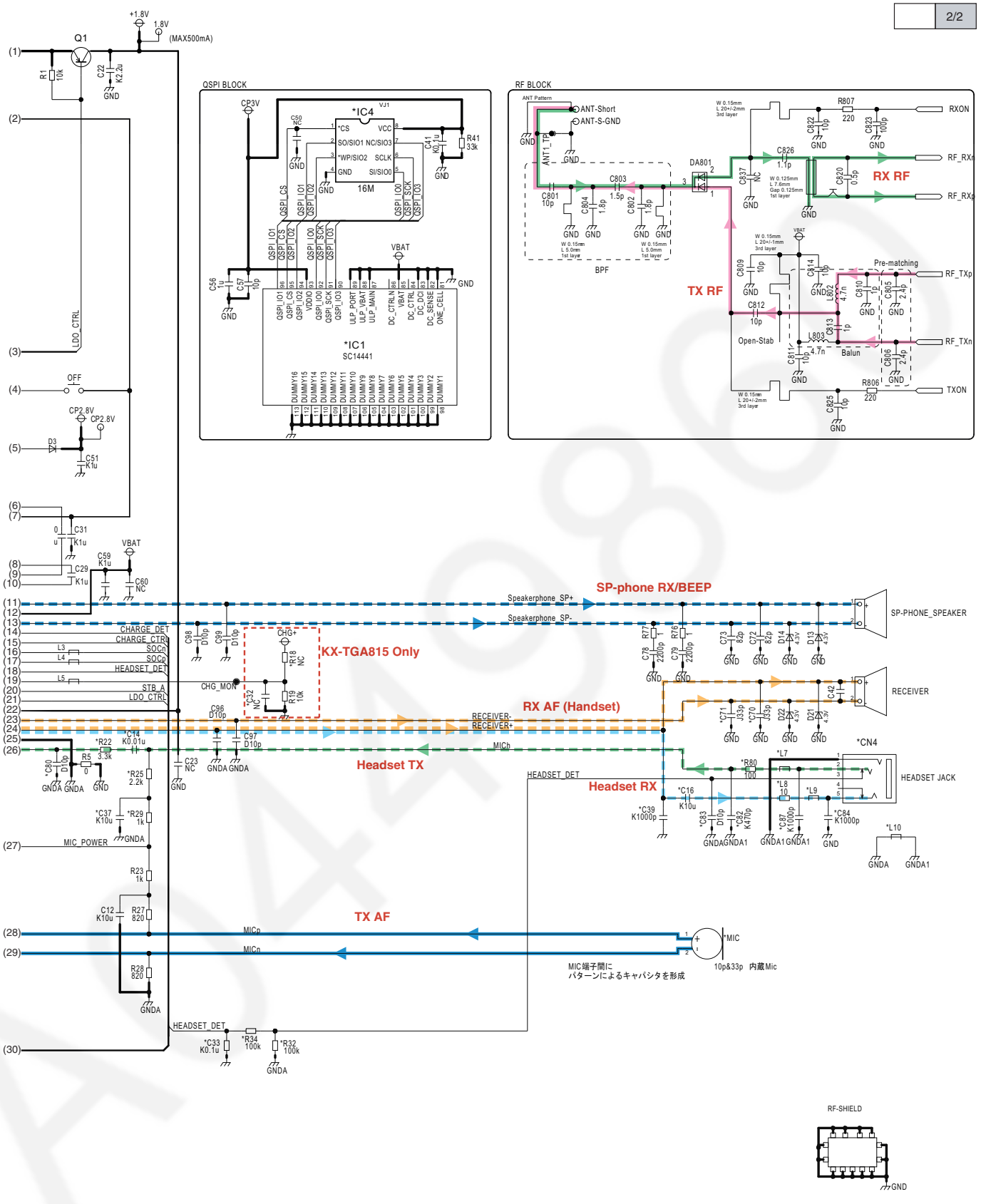
KX-TG8161 SCHEMATIC DIAGRAM (Base Unit (Operation))

Memo

13.4. Handset



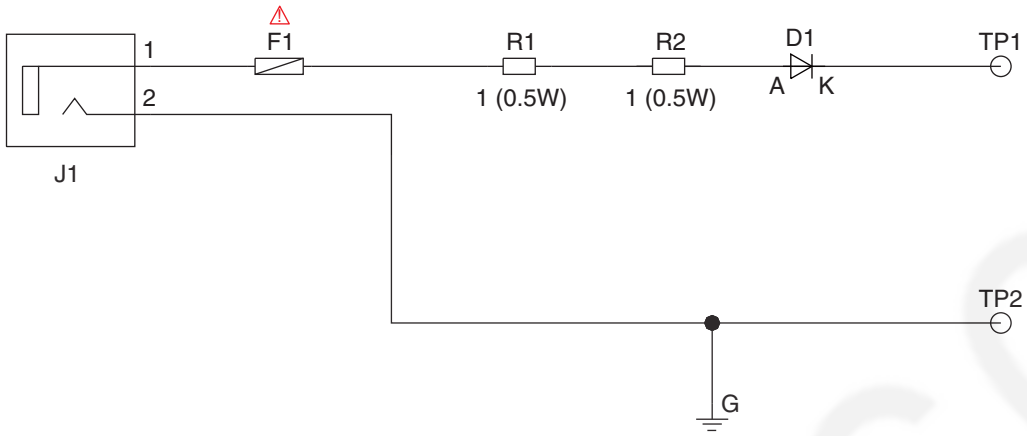
NC: No Components



NC: No Components

KX-TGA815EX SCHEMATIC DIAGRAM (Handset)

13.5. Charger Unit

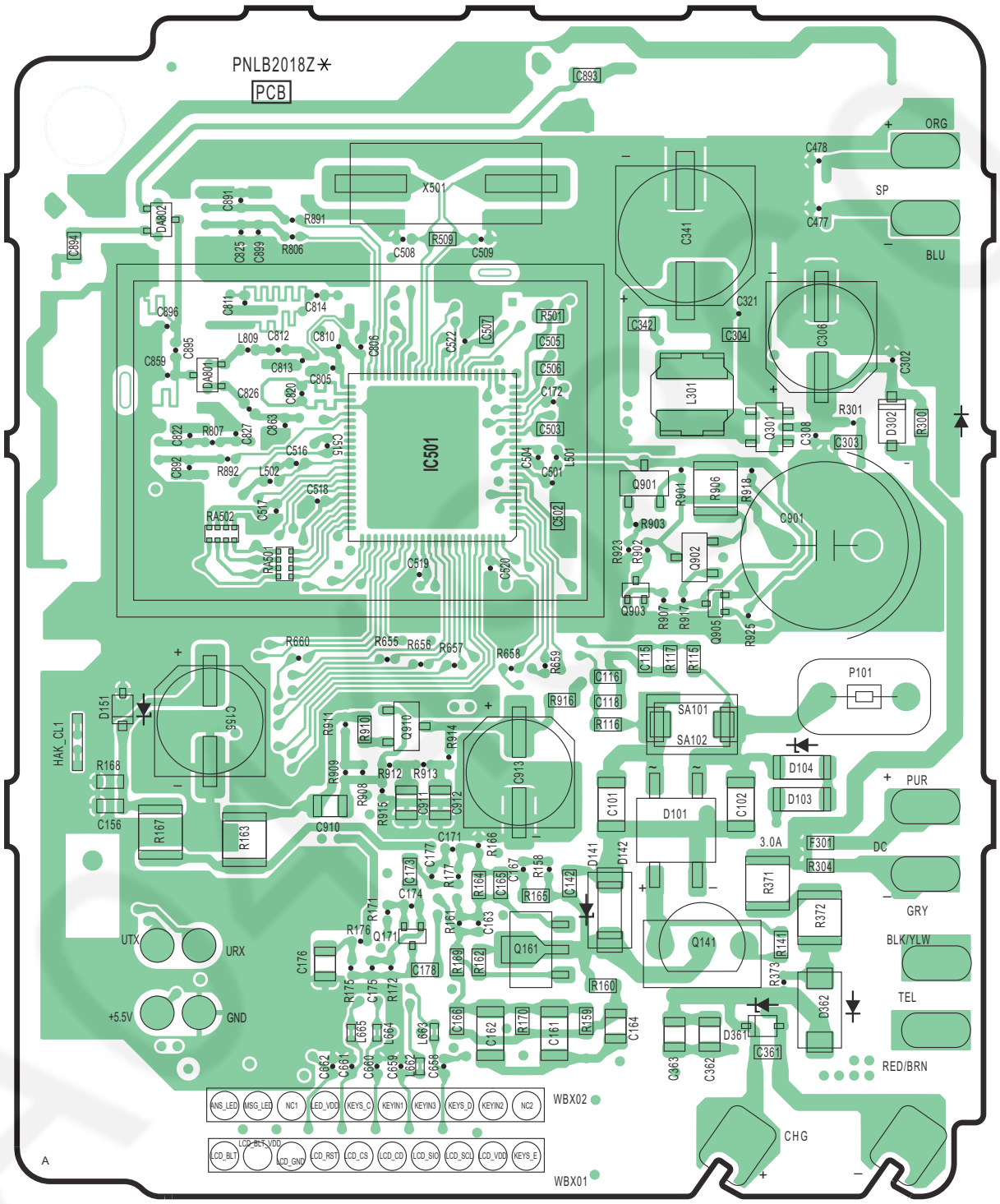


SCHEMATIC DIAGRAM (Charger Unit)

14 Printed Circuit Board

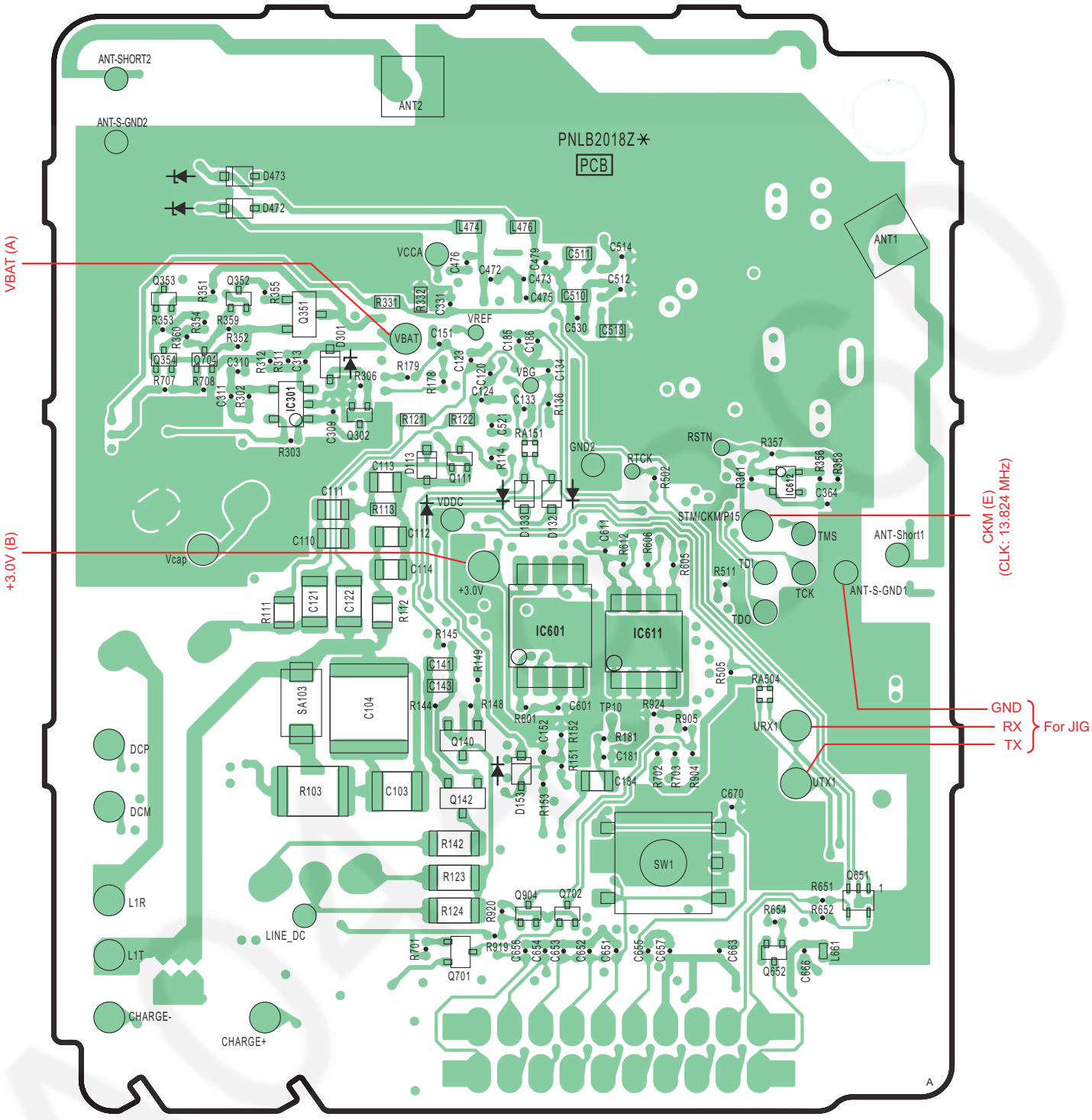
14.1. Base Unit (Main)

14.1.1. Component View



KX-TG8161 MAIN BOARD (Base Unit (Component View))

14.1.2. Bottom View



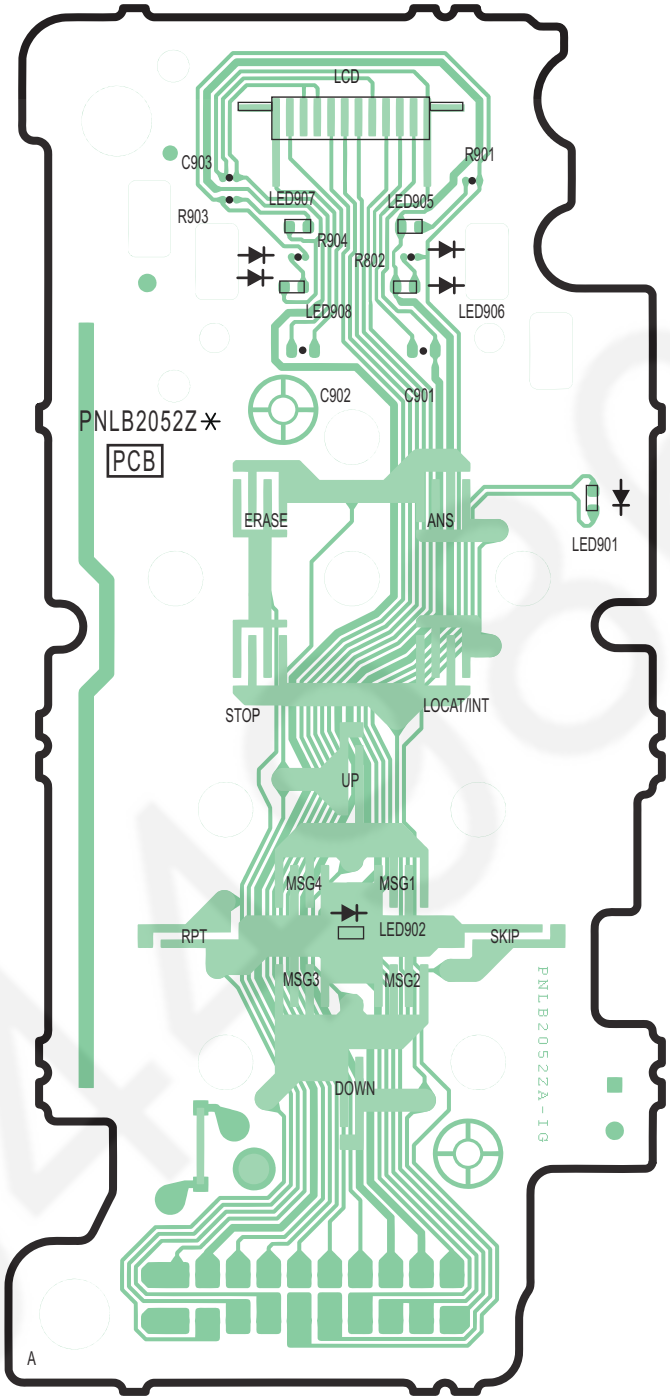
KX-TG8161 MAIN BOARD (Base Unit (Bottom View)

Note:

(A) - (E) is referred to **Check Point (Base Unit)** (P.41)

14.2. Base Unit (Operation)

14.2.1. Component View

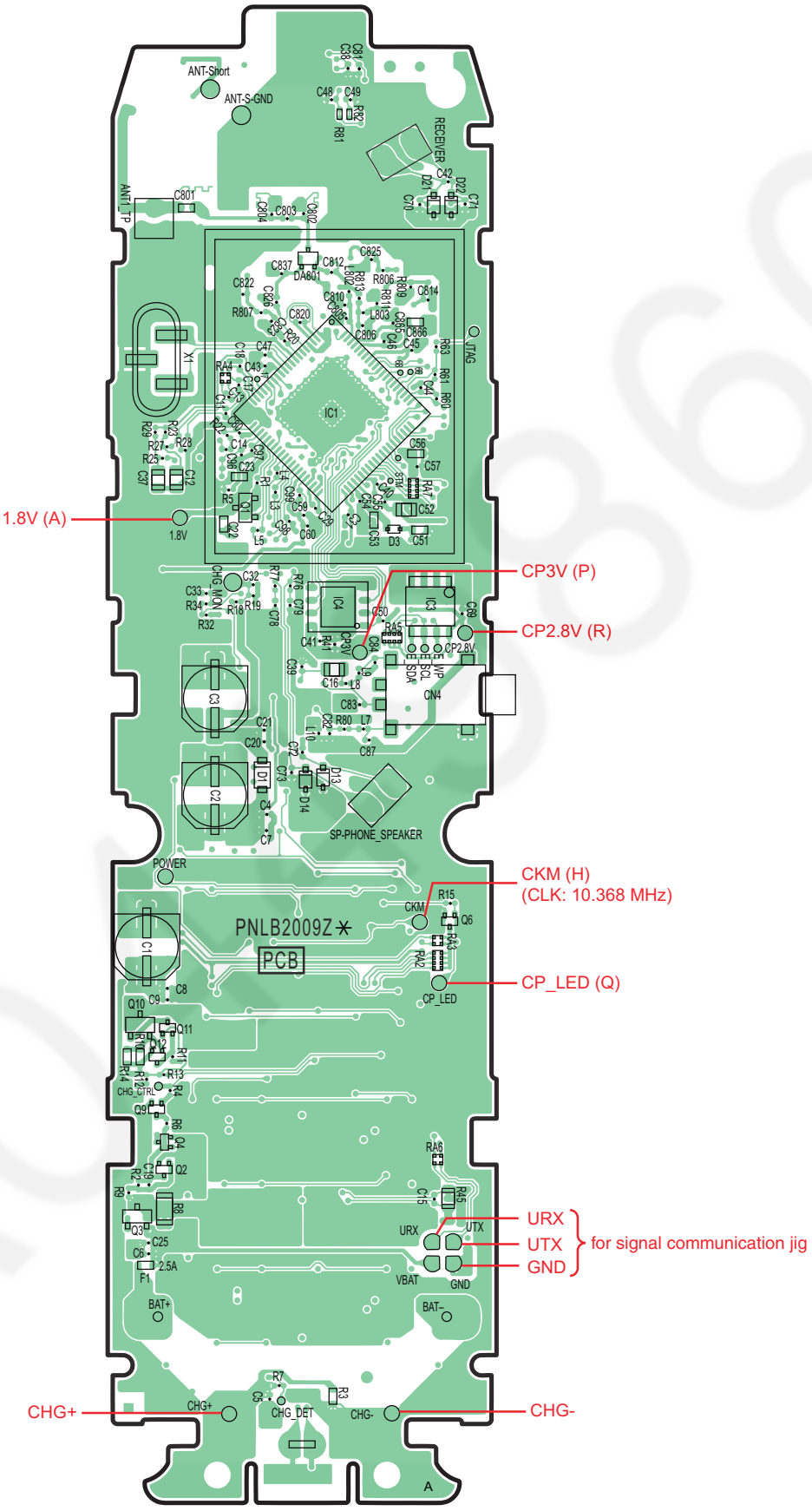


KX-TG8161 OPERATION BOARD (Base Unit (Component View))

Memo

14.3. Handset

14.3.1. Component View

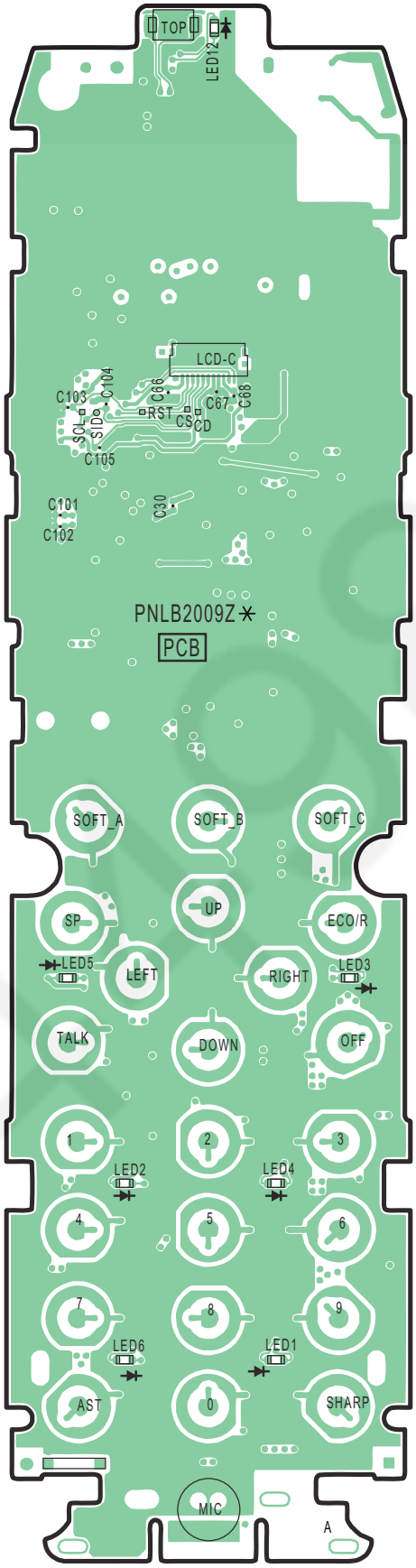


KX-TGA815 HANDSET BOARD (Component View)

Note:

(A) - (R) is referred to **Check Point (Handset)** (P.43)

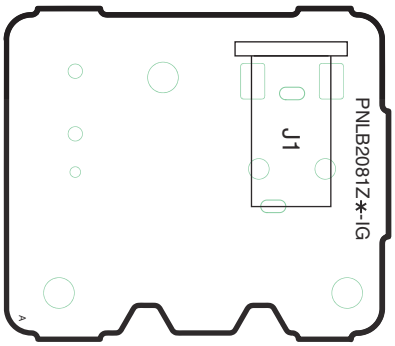
14.3.2. Bottom View



KX-TGA815 HANDSET BOARD (Bottom View)

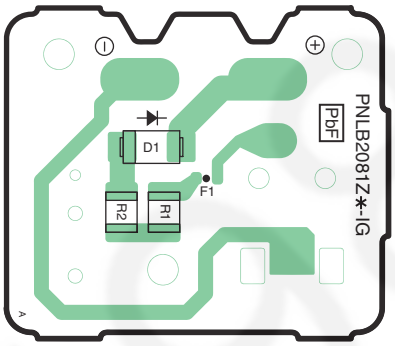
14.4. Charger Unit

14.4.1. Component View



CHARGER BOARD (Component View)

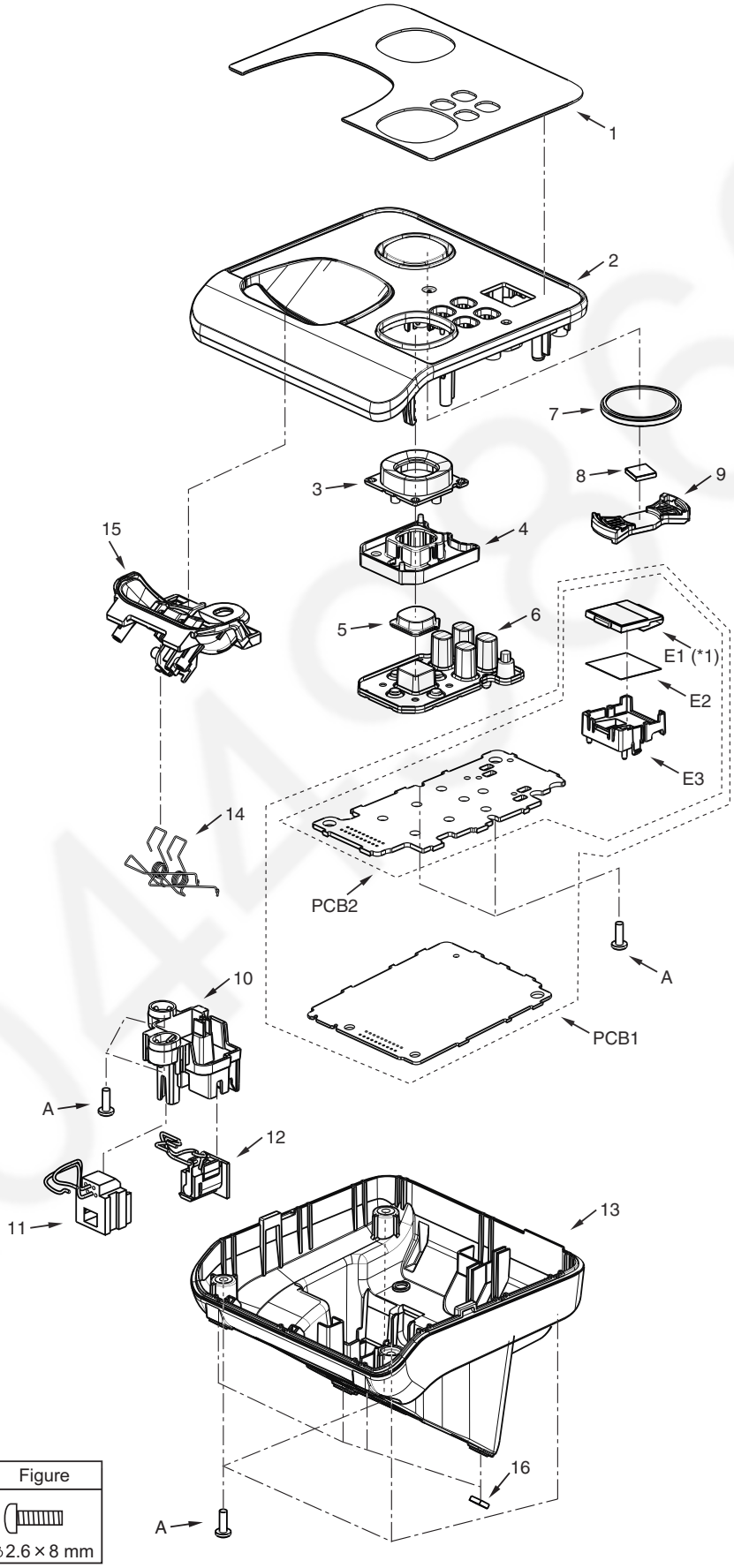
14.4.2. Bottom View



CHARGER BOARD (Bottom View)

15 Exploded View and Replacement Parts List

15.1. Cabinet and Electrical Parts (Base Unit)

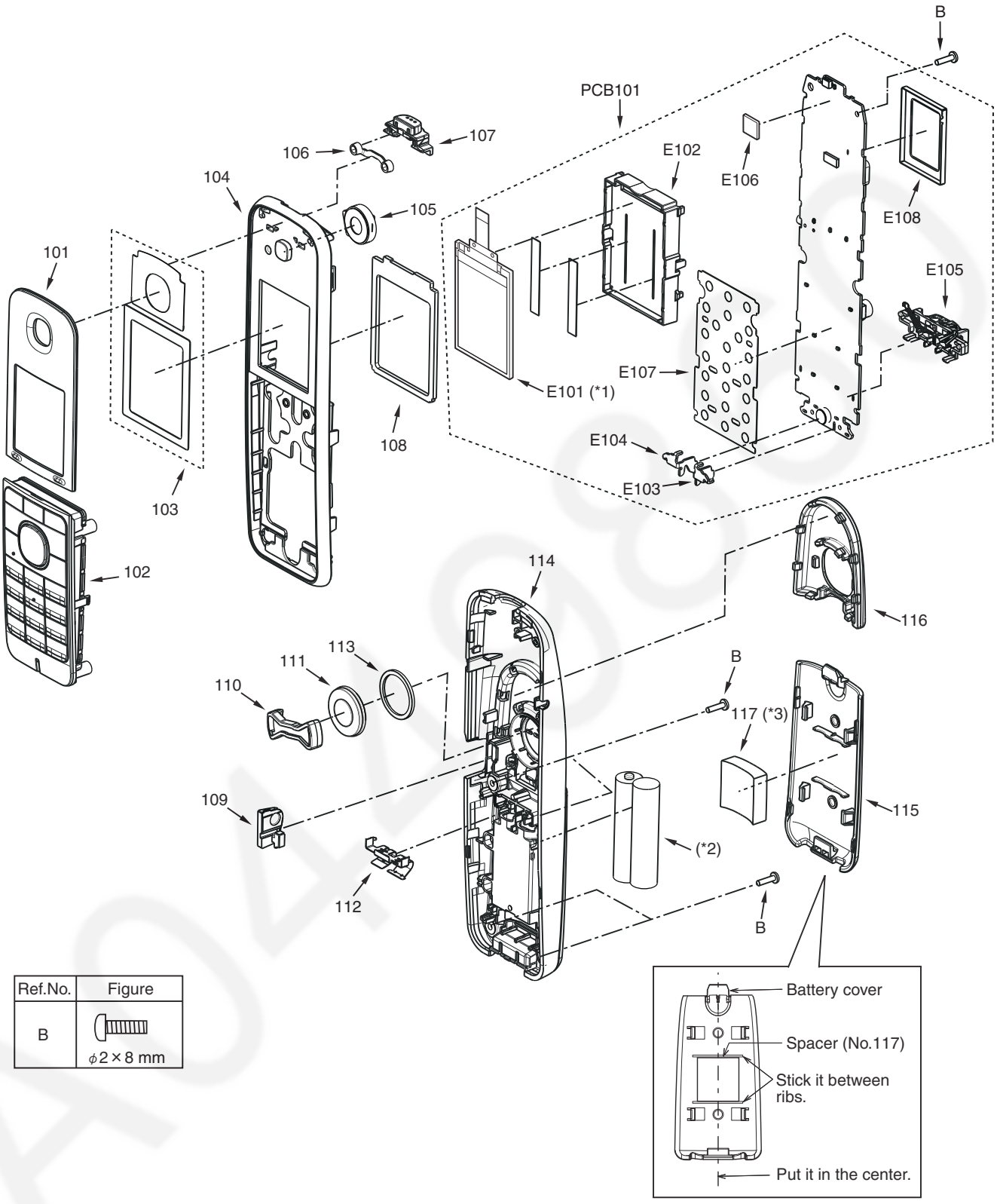


Ref.No.	Figure
A	ϕ2.6 × 8 mm

Note:

(*1) This cable is fixed by welding. Refer to **How to Replace the Base Unit LCD** (P.51)

15.2. Cabinet and Electrical Parts (Handset)



Ref.No.	Figure
B	ϕ2 × 8 mm

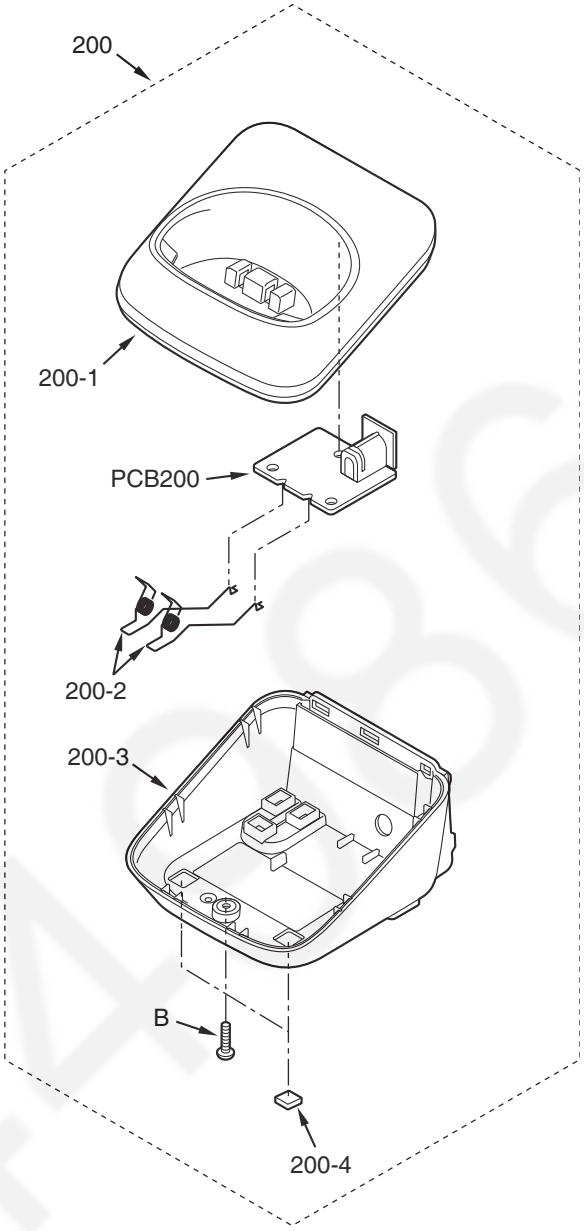
Note:

(*1) This cable is fixed by attaching. Refer to **How to Replace the Handset LCD** (P.53).

(*2) The rechargeable Ni-MH battery HHR-4MVT or HHR-4MRT is available through sales route of Panasonic.

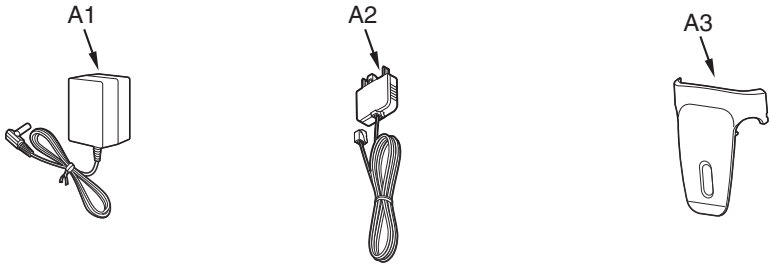
(*3) Attach the spacer (No. 117) to the exact location described above.

15.3. Cabinet and Electrical Parts (Charger Unit)



Ref.No.	Figure
B	 ϕ2 × 8 mm

15.4. Accessories



15.5. Replacement Part List

1. RTL (Retention Time Limited)

Note:

The “RTL” marking indicates that its Retention Time is Limited.

When production is discontinued, this item will continue to be available only for a specific period of time. This period of time depends on the type of item, and the local laws governing parts and product retention.

At the end of this period, the item will no longer be available.

2. Important safety notice

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

3. The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.
4. ISO code (Example: ABS-94HB) of the remarks column shows quality of the material and a flame resisting grade about plastics.
5. RESISTORS & CAPACITORS

Unless otherwise specified;

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

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

*Type & Wattage of Resistor

Type

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

Wattage

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

*Type & Voltage Of Capacitor

Type

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

Voltage

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

15.5.1. Base Unit

15.5.1.1. Cabinet and Electrical Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	1	PNGP1232Z1	PANEL, UPPER	PC-HB
	2	PNKM1261Y1	CABINET BODY	ABS-HB
	3	PNBC1435Z1	BUTTON, NAVIGATOR KEY	ABS-HB
	4	PNHR1593Z	GUIDE, BUTTON	PS-HB
	5	PNBC1345Y2	BUTTON, MESSAGE	PMMA-HB
	6	PNJK1151Z	KEYBOARD SWITCH	
	7	L0AD02A00026	SPEAKER	
	8	PQHG10729Z	RUBBER PARTS, SPEAKER	
	9	PQHR11313Z	GUIDE, SPEAKER	ASB-HB
	10	PNHR1592Z	HOLDER, JACK	PS-HB
	11	PQJJ1T039M	JACK, MODULAR	
	12	K2ECYZ000001	JACK, DC	
	13	PNKF1231Z1	CABINET COVER	PS-HB
	14	PNJT1108Z	TERMINAL, CHARGE	
	15	PNKE1133Z1	CASE, CHARGE TERMINAL	PS-HB
	16	PNHA1013Z	RUBBER PARTS, FOOT CUSHION	

15.5.1.2. Main P.C.Board Parts

Note:

(*1) When replacing IC611 or X501, make the adjustment using PNZZTG8161AL. Refer to **How to download the data** (P.61) of **Things to Do after Replacing IC or X'tal.**

(*2) When removing ZA1, use special tools (ex. Hot air disordering tool).

(*3) Backside of this IC has a ground plate. Refer to **How to Replace the Flat Package IC** (P.65).

(*4) Supplied IC is Flat Package Type.

(*5) When replacing the base unit LCD, See **How to Replace the Base Unit LCD** (P.51).

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB1	PNWP18161ALH	MAIN P.C.BOARD ASS'Y (RTL)	
			(ICs)	
	IC301	C0DBAGZ00026	IC	
	IC501	C2HBCY000108	IC (*3)(*4)	
	IC601	PNWI2G6721EH	IC (FLASH)	
	IC611	PNWITG6721GH	IC (EEPROM)(*1)	
	IC612	C0EBC0000091	IC	
			(TRANSISTORS)	
	Q111	2SC6054JSL	TRANSISTOR(SI)	S
	Q140	B1ABCE000009	TRANSISTOR(SI)	
	Q141	B1ACGP000008	TRANSISTOR(SI)	
	Q142	B1ABDM000001	TRANSISTOR(SI)	
	Q161	DSC7003S0L	TRANSISTOR(SI)	
	Q171	2SC6054JSL	TRANSISTOR(SI)	S
	Q301	B1ZBZ0000074	TRANSISTOR(SI)	
	Q302	B1GBCFGA0021	TRANSISTOR(SI)	
	Q351	B1ADNB000003	TRANSISTOR(SI)	
	Q352	2SC6054JSL	TRANSISTOR(SI)	S
	Q353	B1ADCF000040	TRANSISTOR(SI)	
	Q354	B1ADCF000040	TRANSISTOR(SI)	
	Q651	PSVTUMG11NTR	TRANSISTOR(SI)	S
	Q652	2SC6054JSL	TRANSISTOR(SI)	S
	Q704	2SC6054JSL	TRANSISTOR(SI)	S
	Q901	B1ADNB000003	TRANSISTOR(SI)	
	Q902	B1ADNB000003	TRANSISTOR(SI)	
	Q903	2SC6054JSL	TRANSISTOR(SI)	S
	Q904	2SC6054JSL	TRANSISTOR(SI)	S
	Q905	B1GBCFGA0021	TRANSISTOR(SI)	
	Q910	2SB1197KQ	TRANSISTOR(SI)	S
			(DIODES)	
	D101	PQVDMD5S	DIODE(SI)	
	D113	DA2J10100L	DIODE(SI)	
	D132	DA2J10100L	DIODE(SI)	
	D133	DA2J10100L	DIODE(SI)	
	D141	PQVDRLZ20A	DIODE(SI)	S
	D151	B0BC3R4A0006	DIODE(SI)	
	D301	B0BC3R4A0006	DIODE(SI)	
	D302	DB2X20700L	DIODE(SI)	
	D362	B0ECKM000008	DIODE(SI)	
	D472	B0BC4R3A0006	DIODE(SI)	
	D473	B0BC4R3A0006	DIODE(SI)	
	DA801	B0DDCD000001	DIODE(SI)	
	DA802	B0DDCD000001	DIODE(SI)	
			(COILS)	
	L301	G1C220MA0426	COIL	
	L474	G1CR22J00006	COIL	
	L476	G1CR22J00006	COIL	
	L501	G1CR10J00010	COIL	
	L502	G1CR10J00010	COIL	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	L809	G1C7N5JA0044	COIL	
			(RESISTOR ARRAYS)	
	RA151	D1H410220001	RESISTOR ARRAY	
	RA501	D1H83304A024	RESISTOR ARRAY	
	RA502	D1H81034A024	RESISTOR ARRAY	
	RA504	D1H468020001	RESISTOR ARRAY	
			(VARISTOR)	
	SA101	J0LY00000193	VARISTOR	
			(RESISTORS)	
	R111	PQ4R10XJ105	1M	S
	R112	PQ4R10XJ473	47k	S
	R113	ERJ3GEYJ223	22k	S
	R114	ERJ2GEYJ683	68k	S
	R115	ERJ3GEYJ565	5.6M	
	R116	ERJ3GEYJ565	5.6M	
	R117	D0GB104JA057	100k	
	R118	D0GB104JA057	100k	
	R121	ERJ3GEYJ394	390k	S
	R122	ERJ3GEYJ394	390k	S
	R124	PQ4R18XJ100	10	S
	R141	D0GB104JA057	100k	
	R142	PQ4R18XJ272	2.7k	S
	R144	D0GA103JA021	10k	
	R145	D0GA222JA021	2.2k	
	R148	D0GA103JA021	10k	
	R149	D0GA681JA021	680	
	R152	D0GA104JA021	100k	
	R153	ERJ2GEJ154	150k	S
	R158	D0GA472JA021	4.7k	
	R159	ERJ3GEYJ182	1.8k	S
	R160	D0GB471JA057	470	
	R161	D0GA104JA021	100k	
	R163	ERJ14YJ120U	12	
	R164	ERJ3GEYJ222	2.2k	S
	R165	ERJ3GEYJ273	27k	S
	R167	D0GG270JA007	27	
	R169	ERJ3GEYJ563	56k	S
	R171	D0GA220JA021	22	
	R172	D0GA104JA021	100k	
	R175	D0GA561JA021	560	
	R176	D0GA101JA021	100	
	R177	D0GA102JA021	1k	
	R178	D0GA102JA021	1k	
	R179	D0GA102JA021	1k	
	R181	ERJ2GE0R00	0	S
	R301	D0GA121JA015	120	
	R302	D0GA470JA021	47	
	R303	D0GA472JA021	4.7k	
	R304	ERJ3GEYJ222	2.2k	S
	R306	D0GA681JA021	680	
	R311	ERJ2GE0R00	0	S
	R331	ERJ3EKF6802	68k	
	R332	ERJ3EKF3302	33k	
	R351	D0GA102JA021	1k	
	R352	D0GA102JA021	1k	
	R353	D0GA104JA021	100k	
	R354	D0GA333JA015	33k	
	R355	D0GA681JA021	680	
	R358	D0GA102JA021	1k	
	R360	D0GA473JA021	47k	
	R361	D0GA393JA021	39k	
	R371	ERJ14YJ1R0U	1	
	R372	ERJ14YJ1R0U	1	
	R373	D0GA681JA021	680	
	R501	D0GB100JA057	10	
	R505	D0GA222JA021	2.2k	
	R605	D0GA332JA015	3.3k	
	R606	D0GA332JA015	3.3k	
	R612	D0GA103JA021	10k	
	R651	D0GA122JA015	1.2k	
	R652	D0GA122JA015	1.2k	
	R654	D0GA222JA021	2.2k	
	R655	D0GA101JA021	100	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	R656	D0GA101JA021	100	
	R657	D0GA101JA021	100	
	R658	D0GA101JA021	100	
	R659	D0GA101JA021	100	
	R660	D0GA101JA021	100	
	R702	D0GA102JA021	1k	
	R703	D0GA102JA021	1k	
	R707	D0GA333JA015	33k	
	R708	D0GA682JA021	6.8k	
	R806	ERJ2GEJ471	470	S
	R807	ERJ2GEJ471	470	S
	R891	ERJ2GEJ471	470	S
	R892	ERJ2GEJ471	470	S
	R901	D0GA561JA021	560	
	R902	D0GA272JA021	2.7k	
	R903	D0GA152JA021	1.5k	
	R904	D0GA103JA021	10k	
	R905	D0GA102JA021	1k	
	R906	ERJ14YJ100	10	
	R907	D0GA104JA021	100k	
	R908	ERJ2GE0R00	0	S
	R910	D0GB100JA057	10	
	R911	D0GA332JA015	3.3k	
	R912	D0GA681JA021	680	
	R913	ERJ2GEYJ391	390	S
	R914	ERJ2GEYJ391	390	S
	R915	D0GA682JA021	6.8k	
	R916	D0GB100JA057	10	
	R917	D0GA152JA021	1.5k	
	R918	D0GA103JA021	10k	
	R919	D0GA333JA015	33k	
	R920	ERJ2GEJ223	22k	S
	R923	D0GA332JA015	3.3k	
	R925	D0GA332JA015	3.3k	
			(CAPACITORS)	
	C101	F1K2H681A008	680p	
	C102	F1K2H681A008	680p	
	C110	F1J2A473A024	0.047	
	C111	F1J2A473A024	0.047	
	C112	F1J2A473A024	0.047	
	C113	PQCUV1H103KB	0.01	
	C114	F1J2A473A024	0.047	
	C115	ECUV1C104KBV	0.1	
	C116	ECUV1C104KBV	0.1	
	C120	ECUE1H102KBQ	0.001	S
	C121	F1K2H681A008	680p	
	C122	F1K2H681A008	680p	
	C123	ECUE1H100DCQ	10p	S
	C124	ECUE1H100DCQ	10p	S
	C142	ECUV1H103KBV	0.01	
	C151	ECUE1H100DCQ	10p	S
	C152	ECUE1C103KBQ	0.01	S
	C155	EEE0JA221WP	220	
	C161	F1K1E1060001	10	
	C166	ECUV1H104KBV	0.1	
	C167	ECUE1H222KBQ	0.0022	S
	C171	ECUE1C223KBQ	0.022	S
	C173	ECUV1A224KBV	0.22	
	C175	ECUE1H102KBQ	0.001	S
	C176	PQCUV0J106KB	10	S
	C178	ECUV1C104KBV	0.1	
	C184	PQCUV1A105KB	1	
	C185	ECUE1H100DCQ	10p	S
	C186	ECUE1H330JCQ	33p	
	C302	ECUE1H100DCQ	10p	S
	C303	ECUV1C104KBV	0.1	
	C304	ECUV1A105KBV	1	
	C306	F2G1C1010034	100	
	C308	ECUE1C103KBQ	0.01	S
	C321	ECUE1H100DCQ	10p	S
	C341	F2G0J1020022	1000	
	C342	ECUV1C104KBV	0.1	
	C362	F1J0J2260002	22	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C363	F1J0J2260002	22	
	C476	ECUE1H100DCQ	10p	S
	C477	ECUE1H100DCQ	10p	S
	C478	ECUE1H100DCQ	10p	S
	C479	ECUE1H100DCQ	10p	S
	C501	ECUE1A104KBQ	0.1	
	C502	ECJ1VB0G106M	10	S
	C503	ECJ1VB0G106M	10	S
	C504	ECUE0J105KBQ	1	
	C505	ECJ1VB0G106M	10	S
	C506	ECUV1A105KBV	1	
	C507	ECUV1A225KBV	2.2	S
	C508	ECUE1H100DCQ	10p	S
	C509	ECUE1H120JCQ	12p	S
	C510	ECUV1A105KBV	1	
	C511	ECJ1VB0G106M	10	S
	C512	ECUE1A104KBQ	0.1	
	C513	ECUV1A225KBV	2.2	S
	C514	ECUE1A104KBQ	0.1	
	C515	ECUE0J105KBQ	1	
	C516	ECUE1A104KBQ	0.1	
	C517	ECUE1A104KBQ	0.1	
	C518	ECUE1A104KBQ	0.1	
	C519	ECUE1A104KBQ	0.1	
	C520	ECUE1A104KBQ	0.1	
	C521	ECUE0J105KBQ	1	
	C522	ECUE1H100DCQ	10p	S
	C530	ECUE1H100DCQ	10p	S
	C601	ECUE1A104KBQ	0.1	
	C611	ECUE1A104KBQ	0.1	
	C666	ECUE1A104KBQ	0.1	
	C805	F1G1H2R7A765	2.7p	
	C806	F1G1H2R7A765	2.7p	
	C810	F1G1H2R4A765	2.4p	
	C811	ECUE1H100DCQ	10p	S
	C812	F1G1HR90A765	0.9p	
	C813	F1G1H2R0A765	2p	
	C820	F1G1H1R5A765	1.5p	
	C822	ECUE1H100DCQ	10p	S
	C825	ECUE1H100DCQ	10p	S
	C826	ECUE1H100DCQ	10p	S
	C827	ECUE1H100DCQ	10p	S
	C859	F1G1H2R2A765	2.2p	
	C863	F1G1H1R5A765	1.5p	
	C891	F1G1H5R0A765	5p	
	C892	F1G1H5R0A765	5p	
	C893	ECUV1H100DCV	10p	
	C894	ECUV1H100DCV	10p	
	C895	F1G1H1R2A765	1.2p	
	C896	F1G1H2R2A765	2.2p	
	C901	F4D304050001	0.004k	
	C910	F1J0J2260002	22	
	C911	F1J0J2260002	22	
	C912	F1J0J2260002	22	
	C913	EEE0JA221WP	220	
			(FUSES)	
⚠	F301	K5H302Y00003	FUSE	
	P101	D4FAR1830001	FUSE	
			(OTHERS)	
	X501	H0J138500011	CRYSTAL OSCILLATOR (*1)	
	ZA1	PNMC1018Z	CASE, MAGNETIC SHIELD (*2)	

15.5.1.3. Operational P.C.Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB2	PNWP2G8161GH	OPERATIONAL P.C.BOARD ASS'Y (RTL)	
			(LEDS)	
	LED901	LNJ237W82RA	DIODE(SI)	
	LED902	LNJ237W82RA	DIODE(SI)	
	LED905	LNJ237W82RA	DIODE(SI)	
	LED906	LNJ237W82RA	DIODE(SI)	
	LED907	LNJ237W82RA	DIODE(SI)	
	LED908	LNJ237W82RA	DIODE(SI)	
			(RESISTORS)	
	R901	D0GA271JA015	270	
	R902	D0GA271JA015	270	
	R903	D0GA271JA015	270	
	R904	D0GA271JA015	270	
			(CAPACITORS)	
	C901	ECUV1C105KBV	1	
	C902	F1H1E1050001	1	
	C903	ECUE0J105KBQ	1	
			(OTHERS)	
	E1	L5DYBYY00021	LIQUID CRYSTAL DISPLAY (*5)	
	E2	PNHX1406Z	COVER, LCD	
	E3	PNHR1386Z	GUIDE, LCD	ABS-HB

15.5.2. Handset

15.5.2.1. Cabinet and Electrical Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	101	PNGP1235Z1	PANEL, LCD	PMMA-HB
	102	PNYT1026Z1	KEYBOARD SWITCH	
	103	PNYE1073Z	TAPE, DOUBLE SIDED	
	104	PNKM1264Z1	CABINET BODY	ABS-HB
	105	L0AD01A00024	RECEIVER	
	106	PNHG1149Z	RUBBER PARTS, KEY DAMPER	
	107	PNBC1439Z1	BUTTON, TOP KEY	PS-HB
	108	PNYE1074Z	SPACER, LCD CUSHION	
	109	PNKE1136Z1	COVER, EP CAP	
	110	PNHR1447Y	GUIDE, SPEAKER	ABS-HB
	111	L0AA02A00096	SPEAKER	
	112	PNJC1018Z	BATTERY TERMINAL	
	113	PQHS10784Y	SPACER, SPEAKER NET	
	114	PNKF1233Z1	CABINET COVER	ABS-HB
	115	PNKK1067Z1	LID, BATTERY	ABS-HB
	116	PNKE1134Z1	COVER, RUBBER GRIP	
	117	PNHS1079Z	SPACER, BATTERY	

15.5.2.2. Main P.C.Board Parts

Note:

(*1) Reconfirm the model No. written on the handset's name plate when replacing PCB100. Because the model No. of the optional handset may differ from the included handset.

(*2) When replacing IC4, IC3 or X1, make the adjustment using PNZZTG8161AL. Refer to **Handset** (P.62) of **Things to Do after Replacing IC or X'tal.**

(*3) When removing E108, use special tools (ex. Hot air disordering tool).

(*4) When replacing the handset LCD, See **How to Replace the Handset LCD** (P.53).

(*5) Backside of this IC has a ground plate. Refer to **How to Replace the Flat Package IC** (P.65).

(*6) Supplied IC is Flat Package Type.

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB100	PNWPGA815AZR	MAIN P.C.BOARD ASS'Y (RTL)(*1)	
			(ICs)	
	IC1	C1CB00003665	IC (*5)(*6)	
	IC3	PNWIGA815EXR	IC (EEPROM)(*2)	
	IC4	C3FBMY000288	IC (*2)	
			(TRANSISTORS)	
	Q1	B1ADGE000012	TRANSISTOR(SI)	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	Q2	B1ADCF000040	TRANSISTOR(SI)	
	Q3	B1ABGE000011	TRANSISTOR(SI)	
	Q4	B1ADCF000040	TRANSISTOR(SI)	
	Q6	2SC6054JSL	TRANSISTOR(SI)	S
	Q9	2SC6054JSL	TRANSISTOR(SI)	S
	Q10	B1ADNB000003	TRANSISTOR(SI)	
	Q11	2SC6054JSL	TRANSISTOR(SI)	S
	Q12	B1ADCF000040	TRANSISTOR(SI)	
			(DIODES)	
	D1	ERJ8GEY0R00	DIODE(SI)	
	D3	B0JCDD000001	DIODE(SI)	
	D13	B0BC4R3A0006	DIODE(SI)	
	D14	B0BC4R3A0006	DIODE(SI)	
	D21	B0BC4R3A0006	DIODE(SI)	
	D22	B0BC4R3A0006	DIODE(SI)	
	DA801	B0DDCD000001	DIODE(SI)	
			(LEDS)	
	LED1	B3AEB0000146	LED	
	LED2	B3AEB0000146	LED	
	LED3	B3AEB0000146	LED	
	LED4	B3AEB0000146	LED	
	LED5	B3AEB0000146	LED	
	LED6	B3AEB0000146	LED	
	LED12	B3AEB0000146	LED	
			(COILS)	
	L802	G1C4N7Z00006	COIL	
	L803	G1C4N7Z00006	COIL	
			(RESISTOR ARRAYS)	
	RA2	EXB28V561JX	RESISTOR ARRAY	
	RA3	D1H456120001	RESISTOR ARRAY	
	RA4	D1H433220001	RESISTOR ARRAY	
	RA5	EXB28V103	RESISTOR ARRAY	
	RA6	D1H422120001	RESISTOR ARRAY	
			(IC FILTERS)	
	L3	J0JDC0000045	IC FILTER	
	L4	J0JDC0000045	IC FILTER	
	L5	J0JDC0000045	IC FILTER	
	L7	J0JCC0000276	IC FILTER	
	L9	J0JCC0000287	IC FILTER	
	L10	J0JCC0000286	IC FILTER	
			(RESISTORS)	
	R1	D0GA103JA021	10k	
	R2	D0GA303JA021	30k	
	R3	ERJ3GEYJ152	1.5k	S
	R4	D0GA102JA021	1k	
	R5	ERJ2GE0R00	0	S
	R6	D0GA103JA021	10k	
	R7	D0GA122JA015	1.2k	
	R8	PQ4R18XJ3R3	3.3	S
	R9	D0GA303JA021	30k	
	R10	ERJ3GEYJ1R0	1	S
	R11	D0GA681JA021	680	
	R12	D0GA224JA015	220k	
	R13	D0GA102JA021	1k	
	R15	D0GA152JA021	1.5k	
	R18	D0GA303JA021	30k	
	R19	D0GA103JA021	10k	
	R20	D0GA563ZA006	56k	
	R22	D0GA332JA015	3.3k	
	R23	D0GA102JA021	1k	
	R25	D0GA222JA021	2.2k	
	R27	D0GA821JA021	820	
	R28	D0GA821JA021	820	
	R29	D0GA102JA021	1k	
	R32	D0GA104JA021	100k	
	R34	D0GA104JA021	100k	
	R41	D0GA333JA015	33k	
	R45	ERJ6RSJR10V	0.1	
	R60	D0GA103JA021	10k	
	R61	D0GA102JA021	1k	
	R76	D0GA1R0JA014	1	
	R77	D0GA1R0JA014	1	
	R80	D0GA101JA021	100	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	R806	D0GA221JA021	220	
	R807	D0GA221JA021	220	
	L8	ERJ2GEJ100	10	S
			(CAPACITORS)	
	C2	EEE0JA221WP	220	
	C5	ECUE1A104KBQ	0.1	
	C6	ECUE1A104KBQ	0.1	
	C8	ECUE1A104KBQ	0.1	
	C9	ECUE1H100DCQ	10p	S
	C11	ECUE1A104KBQ	0.1	
	C12	PQCUV0J106KB	10	S
	C13	ECUE1A104KBQ	0.1	
	C14	ECUE1C103KBQ	0.01	S
	C15	ECUE1A104KBQ	0.1	
	C16	PQCUV0J106KB	10	S
	C19	ECUE1H102KBQ	0.001	S
	C20	ECUE1A104KBQ	0.1	
	C21	ECUE1H100DCQ	10p	S
	C22	ECUV1A225KBV	2.2	S
	C29	ECUE0J105KBQ	1	
	C30	ECUE0J105KBQ	1	
	C31	ECUE0J105KBQ	1	
	C32	ECUE1A104KBQ	0.1	
	C33	ECUE1A104KBQ	0.1	
	C37	PQCUV0J106KB	10	S
	C39	ECUE1H102KBQ	0.001	S
	C40	ECUE1A104KBQ	0.1	
	C41	ECUE1A104KBQ	0.1	
	C42	ECUE1H102KBQ	0.001	S
	C43	ECUE1H100DCQ	10p	S
	C44	ECUE1A104KBQ	0.1	
	C45	ECUE1A104KBQ	0.1	
	C46	ECUE1H100DCQ	10p	S
	C47	ECUE0J105KBQ	1	
	C51	ECUV1A105KBV	1	
	C52	PQCUV0J106KB	10	S
	C53	ECUV1A225KBV	2.2	S
	C54	ECUE1H100DCQ	10p	S
	C55	ECUE1H100DCQ	10p	S
	C56	ECUV1A105KBV	1	
	C57	ECUE1H100DCQ	10p	S
	C59	ECUE0J105KBQ	1	
	C66	ECUE1A104KBQ	0.1	
	C67	ECUE1A104KBQ	0.1	
	C68	ECUE1A104KBQ	0.1	
	C69	ECUE1A104KBQ	0.1	
	C70	ECUE1H330JCQ	33p	
	C71	ECUE1H330JCQ	33p	
	C72	ECUE1H820JCQ	82p	S
	C73	ECUE1H820JCQ	82p	S
	C78	ECUE1H222KBQ	0.0022	S
	C79	ECUE1H222KBQ	0.0022	S
	C80	ECUE1H100DCQ	10p	S
	C82	ECUE1H471KBQ	470p	S
	C83	ECUE1H100DCQ	10p	S
	C84	ECUE1H102KBQ	0.001	S
	C87	ECUE1H102KBQ	0.001	S
	C96	ECUE1H100DCQ	10p	S
	C97	ECUE1H100DCQ	10p	S
	C98	ECUE1H100DCQ	10p	S
	C99	ECUE1H100DCQ	10p	S
	C101	ECUE1H100DCQ	10p	S
	C102	ECUE1H100DCQ	10p	S
	C103	ECUE1H100DCQ	10p	S
	C104	ECUE1H100DCQ	10p	S
	C105	ECUE1H100DCQ	10p	S
	C801	ECUV1H100DCV	10p	
	C802	F1G1H1R8A765	1.8p	
	C803	F1G1H1R5A765	1.5p	
	C804	F1G1H1R8A765	1.8p	
	C805	F1G1H2R4A765	2.4p	
	C806	F1G1H2R4A765	2.4p	
	C809	ECUE1H100DCQ	10p	S

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C810	F1G1H1R0A765	1p	
	C811	ECUE1H100DCQ	10p	S
	C812	ECUE1H100DCQ	10p	S
	C813	F1G1H1R0A765	1p	
	C814	ECUE1H100DCQ	10p	S
	C820	F1G1HR50A765	0.5p	
	C822	ECUE1H100DCQ	10p	S
	C823	ECUE1H101JCQ	100p	
	C825	ECUE1H100DCQ	10p	S
	C826	F1G1H1R1A765	1.1p	
	C865	ECUE1H100DCQ	10p	S
	C866	ECUV1A105KBV	1	
			(OTHERS)	
	CN4	K2HD103D0001	JACK/SOCKET	
	E101	L5EDDYY00211	LIQUID CRYSTAL DISPLAY (*4)	
	E102	PNHR1594Z	GUIDE, LCD	ABS-HB
	E103	PNJT1113Z	CHARGE TERMINAL (R)	
	E104	PNJT1114Z	CHARGE TERMINAL (L)	
	E105	PNVE1011Z	BATTERY TERMINAL	
	E106	PQHG10729Z	RUBBER PARTS, RECEIVER	
	E107	PNJE1123Z	SPECIAL SWITCH	
	E108	PNMC1032Z	CASE, MAGNETIC SHIELD (*3)	
⚠	F1	K5H252Y00002	FUSE	
	LCD-C	K1MY11BA0277	CONNECTOR	
	MIC100	L0CBAY000053	BUILTIN-MICROPHONE	
	TOP	K0H1BB000094	PUSH SWITCH, TOP	
	X1	H0J103500039	CRYSTAL OSCILLATOR (*2)	

15.5.3. Charger Unit

15.5.3.1. Cabinet and Electrical Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	200	PNLC1034ZB	CHARGER UNIT ASS'Y without NAME PLATE (RTL)	ABS-HB
	200-1	PNKM1270Z1	CABINET BODY	ABS-HB
	200-2	PNJT1111Z	CHARGE TERMINAL	
	200-3	PNKF1236Z1	CABINET COVER	PS-HB
	200-4	PQHA10023Z	RUBBER PARTS, FOOT CUSHION	

15.5.3.2. Main P.C.Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB200	PNWPTGA671CH	MAIN P.C.BOARD ASS'Y (RTL)	
			(DIODE)	
	D1	B0ECKM000008	DIODE(SI)	
			(RESISTORS)	
	R1	ERJ14YJ1R0U	1	
	R2	ERJ14YJ1R0U	1	
			(OTHERS)	
⚠	F1	K5H302Y00003	FUSE	
	J1	K2ECYB000001	JACK, DC	

15.5.4. Accessories

Note:

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

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
⚠	A1	PNLV226AL0Z	AC ADAPTOR	
	A2	PQJA10168Z	CORD, TELEPHONE	
	A3	PNKE1135Z1	HANGER, BELT CLIP	ABS-HB

15.5.5. Screws

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

15.5.6. Fixtures and Tools

Note:

(*1) See **Equipment Required** (P.54), and **The Setting Method of JIG (Handset)** (P.58).

(*2) When replacing the Handset LCD, See **How to Replace the Handset LCD** (P.53).

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
		PQZZ1CD300E	JIG CABLE (*1)	
		PNZZTG8161AL	BATCH FILE CD-ROM (*1)	
		PQZZ430PIR	TIP OF SOLDERING IRON (*2)	
		PQZZ430PRB	RUBBER OF SOLDERING IRON (*2)	

RAD
KXTG8162ALB
KXTG8163ALB
KXTGA815AZB