

Service Manual

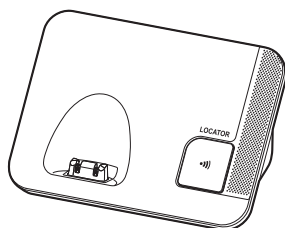
Telephone Equipment

Model No. **KX-TGE210B**
KX-TGE212B
KX-TGE232B
KX-TGE233B
KX-TGE234B
KX-TGEA20B

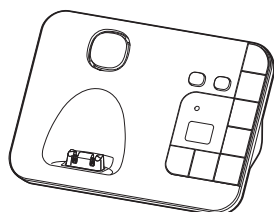
DECT
6.0



KX-TGEA20
(Handset)



KX-TGE210
(Base Unit)



KX-TGE230
(Base Unit)



(Charger Unit)

Digital Cordless Phone
 Digital Cordless Answering System
 B: Black Version
 (for U.S.A.)

Configuration for each model


Model No	Base Unit	Handset	Charger Unit	Expandable
KX-TGE210	1 (TGE210)	1 (TGEA20)		Up to 6
KX-TGE212	1 (TGE210)	2 (TGEA20)	1	Up to 6
KX-TGE232	1 (TGE230)	2 (TGEA20)	1	Up to 6
KX-TGE233	1 (TGE230)	3 (TGEA20)	2	Up to 6
KX-TGE234	1 (TGE230)	4 (TGEA20)	3	Up to 6
KX-TGEA20*		1 (TGEA20)	1	

*KX-TGEA20 is also an optional accessory, which contains a handset and a charger.

 **WARNING**

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by  in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

IMPORTANT INFORMATION ABOUT LEAD FREE, (PbF), SOLDERING

If lead free solder was used in the manufacture of this product, the printed circuit boards will be marked PbF. Standard leaded, (Pb), solder can be used as usual on boards without the PbF mark. When this mark does appear, please read and follow the special instructions described in this manual on the use of PbF and how it might be permissible to use Pb solder during service and repair work.

- When you note the serial number, write down all 11 digits. The serial number may be found on the bottom of the unit.
- The illustrations in this Service Manual may vary slightly from the actual product.

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1 Safety Precautions

1.1. For Service Technicians

- **Repair service shall be provided in accordance with repair technology information such as service manual so as to prevent fires, injury or electric shock, which can be caused by improper repair work.**
 1. When repair services are provided, neither the products nor their parts or members shall be remodeled.
 2. If a lead wire assembly is supplied as a repair part, the lead wire assembly shall be replaced.
 3. FASTON terminals shall be plugged straight in and unplugged straight out.
- **ICs and LSIs are vulnerable to static electricity.**
When repairing, the following precautions will help prevent recurring malfunctions.
 1. Cover plastic parts boxes with aluminum foil.
 2. Ground the soldering irons.
 3. Use a conductive mat on worktable.
 4. Do not grasp IC or LSI pins with bare fingers.

2 Warning

2.1. Battery Caution

Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

Attention:



A nickel metal hydride battery that is recyclable powers the product you have purchased. Please call 1-800-8-BATTERY (1-800-822-8837) for information on how to recycle this battery.

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

Note:

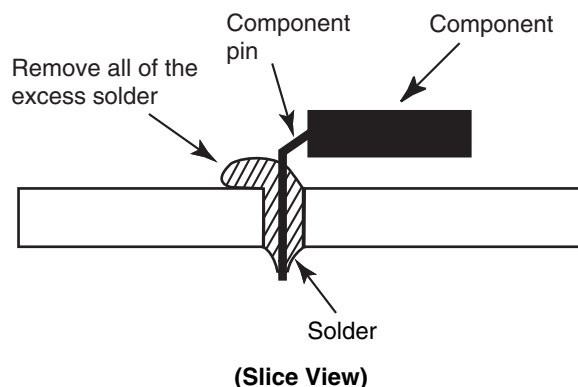
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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

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

Caution

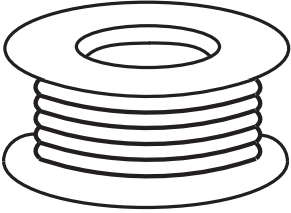
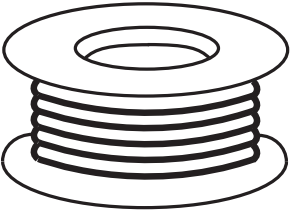
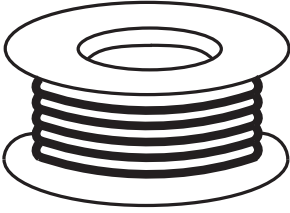
- PbF solder has a melting point that is 50 °F ~ 70 °F (30 °C ~ 40 °C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700 °F ± 20 °F (370 °C ± 10 °C).
- Exercise care while using higher temperature soldering irons.:
Do not heat the PCB for too long time in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



2.2.1. Suggested PbF Solder

There are several types of PbF solder available commercially. While this product is manufactured using Tin, Silver, and Copper (Sn+Ag+Cu), you can also use Tin and Copper (Sn+Cu), or Tin, Zinc, and Bismuth (Sn+Zn+Bi). Please check the manufacturer's specific instructions for the melting points of their products and any precautions for using their product with other materials.

The following lead free (PbF) solder wire sizes are recommended for service of this product: 0.3 mm, 0.6 mm and 1.0 mm.

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

2.3. Discarding of P. C. Board

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

3 Specifications

Standard:

DECT 6.0 (Digital Enhanced Cordless Telecommunications 6.0)

Number of channels:

60 Duplex Channels (DECT 6.0)

Frequency range:

1.92 GHz to 1.93 GHz (DECT 6.0)

Duplex procedure:

TDMA (Time Division Multiple Access)

Channel spacing:

1.728MHz (DECT 6.0)

Bit rate:

1.152Mbit/s (DECT 6.0)

Modulation:

GFSK (Gaussian Frequency Shift Keying)

RF transmission power:

115 mW (max/DECT6.0)

Voice coding:

ADPCM 32 kbit/s (DECT 6.0)

	Base Unit	Handset	Charger
Power source	AC Adaptor (PNLV226Z, 120 V AC, 60 Hz)	Rechargeable Ni-MH battery AAA (R03) size (1.2 V 400 mAh)	AC Adaptor (PNLV233AZ, 120 V AC, 60 Hz)
Receiving Method	Super Heterodyne	Super Heterodyne	—
Oscillation Method	PLL synthesizer	PLL synthesizer	—
Detecting Method	Quadrature Discriminator	Quadrature Discriminator	—
Tolerance of OSC Frequency	10.368 MHz \pm 41 Hz	13.824 MHz \pm 100 Hz	—
Modulation Method	Frequency Modulation	Frequency Modulation	—
ID Code	40 bit	40 bit	—
Ringer Equivalence No. (REN)	0.1B	—	—
Dialing Mode	Tone (DTMF)/Pulse	Tone (DTMF)/Pulse	—
Redial	Up to 48 digits	Up to 48 digits	—
Speed Dialer	Up to 24 digits (Phonebook)	Up to 24 digits (Phonebook)	—
Power Consumption	Base Unit*1 Standby: Approx. 1.0 W Maximum: Approx. 4.3 W	8 days at Standby, 10 hours at Talk	Standby: Approx 0.1 W Maximum: Approx 1.8 W
	Base Unit*2 Standby: Approx. 1.0 W Maximum: Approx. 4.3 W	8 days at Standby, 10 hours at Talk	Standby: Approx 0.1 W Maximum: Approx 1.8 W
Operating Conditions	0 °C - 40 °C (32 °F - 104 °F) 20 % - 80 % relative air humidity (dry)	0 °C - 40 °C (32 °F - 104 °F) 20 % - 80 % relative air humidity (dry)	0 °C - 40 °C (32 °F - 104 °F) 20 % - 80 % relative air humidity (dry)
Dimensions (W x D x H)	Approx. 197 mm x 88 mm x 83 mm	Approx. 54 mm x 31 mm x 171 mm	Approx. 72 mm x 72 mm x 38 mm
Mass (Weight)	Approx. 270 g	Approx. 130 g	Approx. 90 g

*1 KX-TGE210 series

*2 KX-TGE230 series

Note:

Design and specifications are subject to change without notice.

Note for Service:

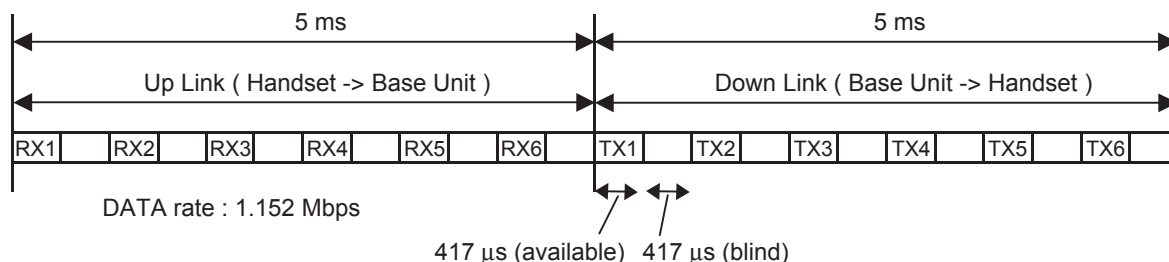
- **Operation range:** Up to 300 m outdoors, Up to 50 m indoors, depending on the condition.
- **Analog telephone connection:** Telephone Line
- **Optional headset:** KX-TCA60, KX-TCA93, KX-TCA400, KX-TCA430
- **Optional Range extender:** KX-TGA405
- **Optional Key detector:** KX-TGA20
- **T-adaptor:** KX-J66

4 Technical Descriptions

4.1. US-DECT Description

The frequency range of 1.92 GHz-1.93 GHz is used. Transmitting and receiving carrier between base unit and handset is same frequency. Refer to **Frequency Table** (P.59).

4.1.1. TDD Frame Format

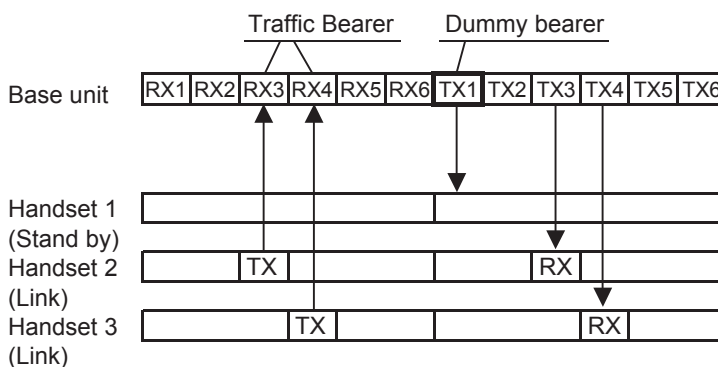


4.1.2. TDMA system

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

In 1 slot 417 μs, the 10 ms of voice data is transmitted.

• 2 - Handsets Link



Traffic Bearer

A link is established between base unit and handset.

The state where duplex communication is performed.

Handset doesn't make up duplex in no free RF channels because of interference. (*1)

Dummy Bearer

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

Handsets receive that data for synchronization and monitoring request from the base unit.

Base unit doesn't send Dummy bearer in no free RF channels because of interference. (*1)

Note:

(*1) It is a feature under FCC 15 regulation and for interference avoidance.

In the case of checking RF parts, it is better in least interference condition.

4.1.3. Signal Flowchart in the Radio Parts

Reception

Base unit:

A voice signal from TEL line is encoded to digital data and converted into a 1.9GHz modulated radio signal by BBIC(IC501). The RF signal, after which is amplified in BBIC, is fed to selected antenna.

Handset:

As for a handset RF, RF signal is received in one antenna.

BBIC down-converts to 864 kHz IF signal from RX signal and demodulates it to digital data "RXDATA".

BBIC (IC1) converts RXDATA into a voice signal and outputs it to speaker.

Transmission

Handset:

A voice signal from microphone is encoded to digital data and converted into a 1.9GHz modulated radio signal by BBIC(IC1). The RF signal, after which is amplified in BBIC, is fed to an antenna.

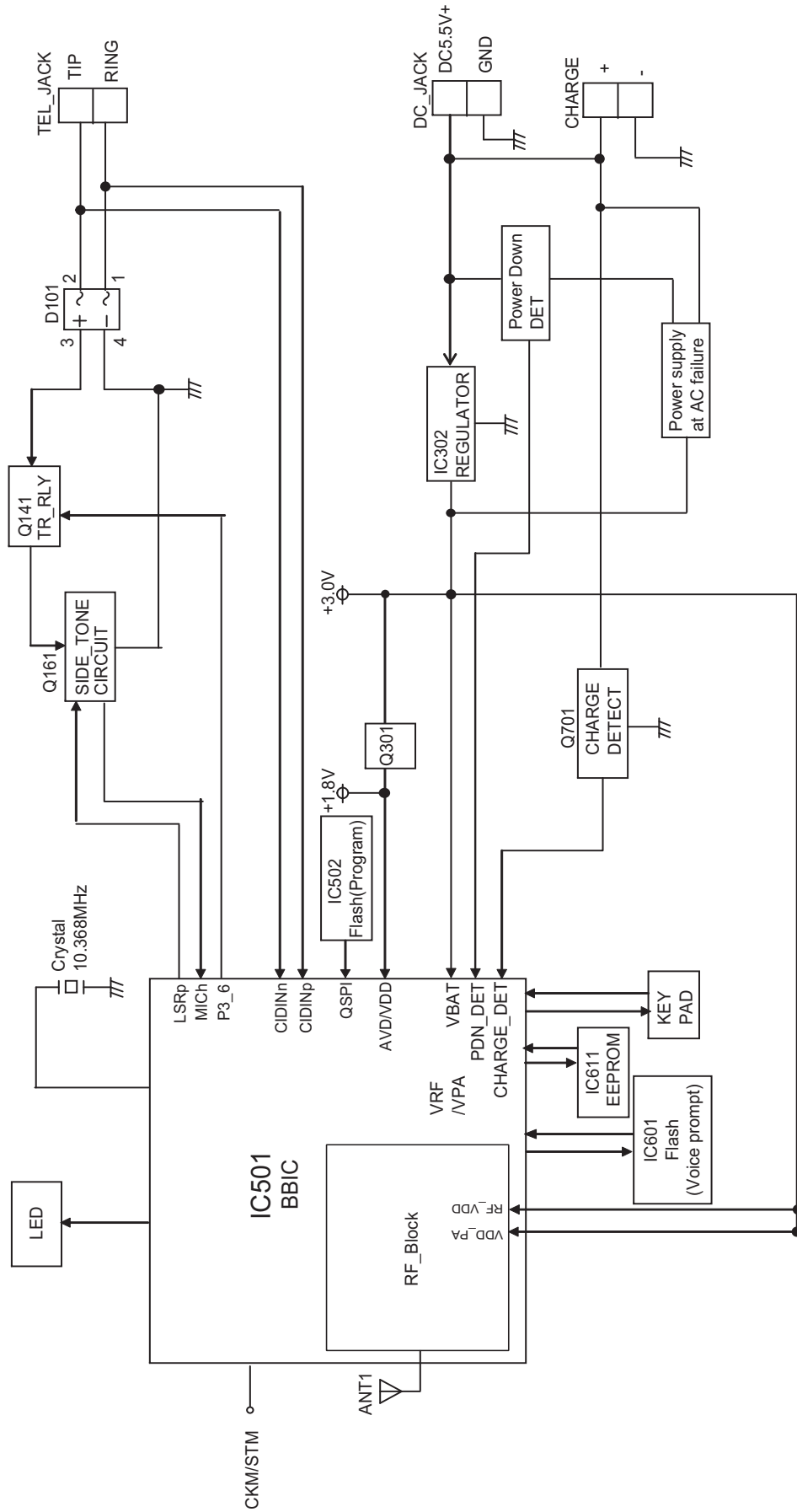
Base unit:

As for a base unit RF, RF signal is received in two antennas.

BBIC (IC501) compares RF signal levels and selects the antenna to be used. Then BBIC down-converts to 864 kHz IF signal from RX signal in the selected antenna, and demodulates it to digital data "RXDATA".

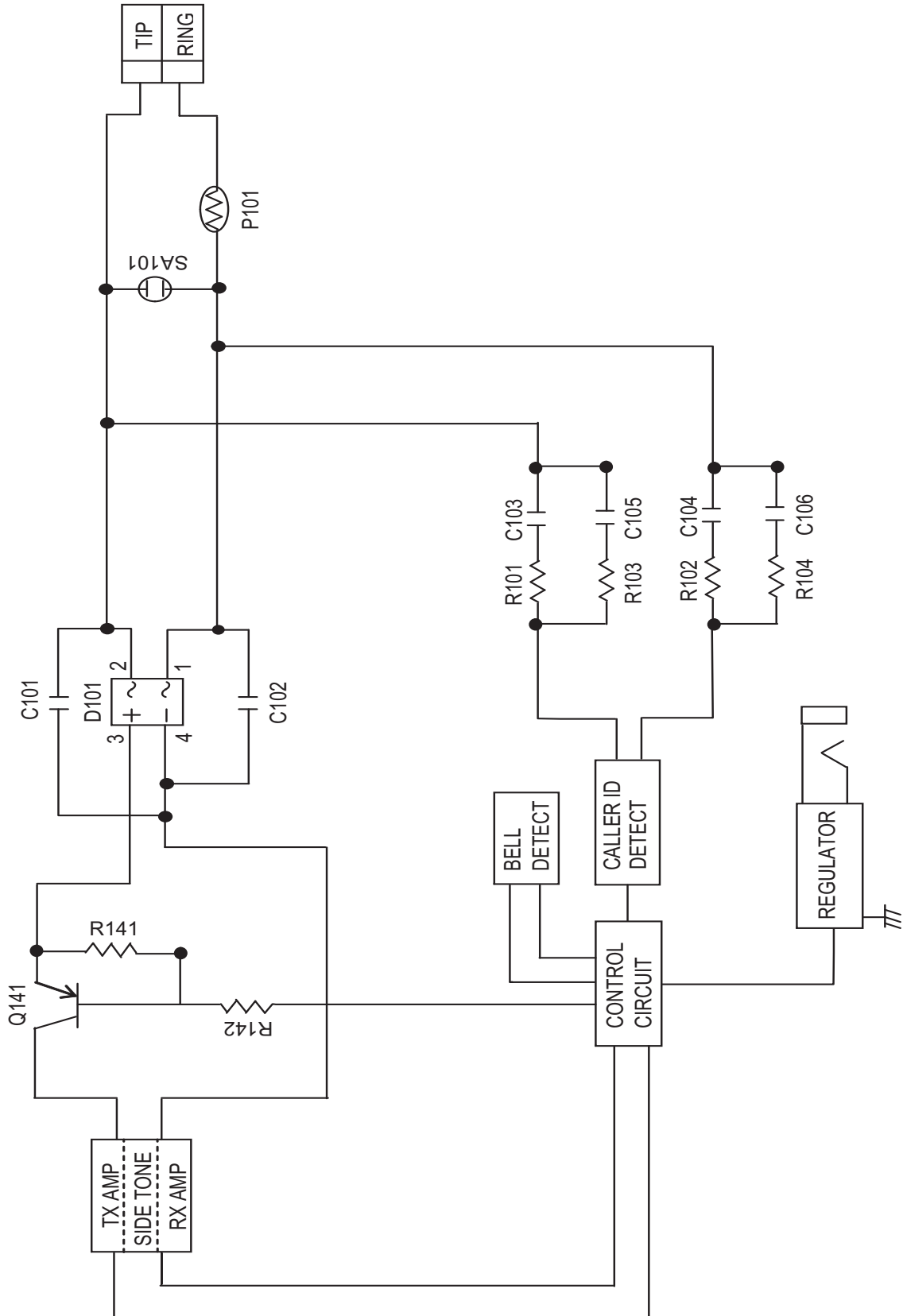
BBIC (IC501) converts RXDATA into a voice signal and outputs it to TEL line.

4.2. Block Diagram (Base Unit_Main)

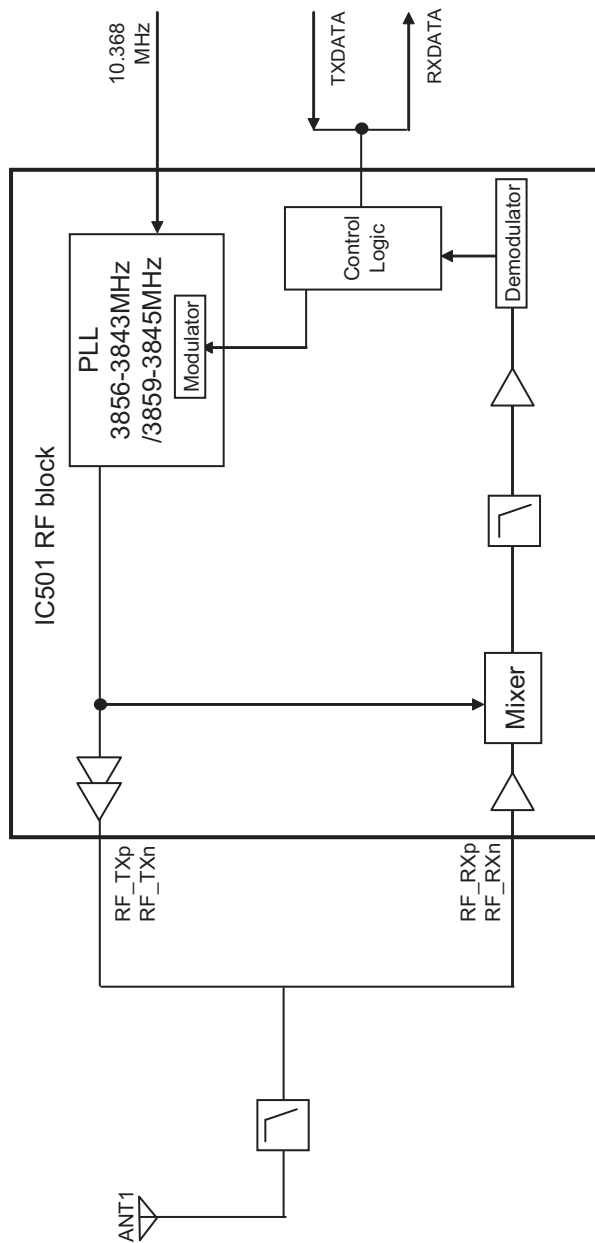


KX-TGE210/212/232/233/234 BLOCK DIAGRAM (Base Unit_Main)

4.3. Tel Interface Circuit



4.4. Block Diagram (Base Unit_RF Part)



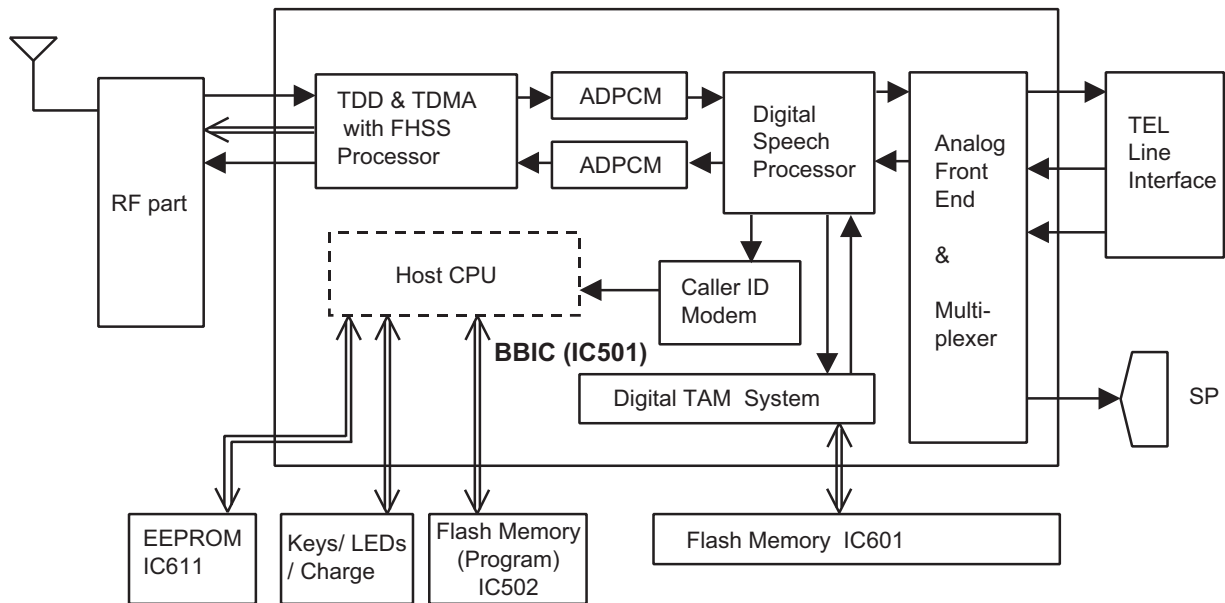
KX-TGE210/212/232/233/234 BLOCK DIAGRAM (Base Unit_RF Part)

4.5. Circuit Operation (Base Unit)

General Description:

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

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



4.5.1. BBIC (Base Band IC: IC501)

- **Voice Message Recording/Play back**

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

- **DTMF Generator**

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

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

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

- **Caller ID demodulation**

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

- **Digital Switching**

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

- **Block Interface Circuit**

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

4.5.2. Flash Memory (IC502)

Main program data is stored.

4.5.3. Flash Memory (IC601)

Following information data is stored.

- **Voice signal**

ex: Pre-recorded Greeting message, Incoming message

4.5.4. EEPROM (IC611)

Following information data is stored.

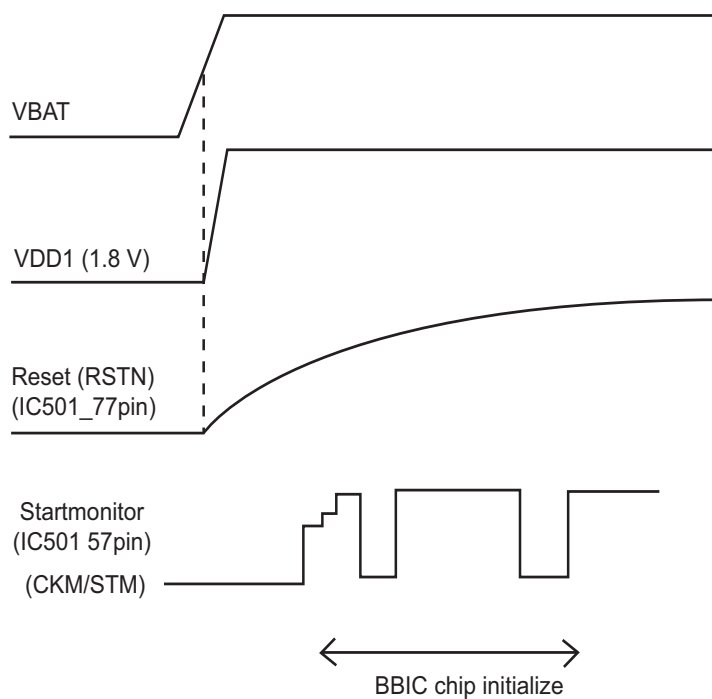
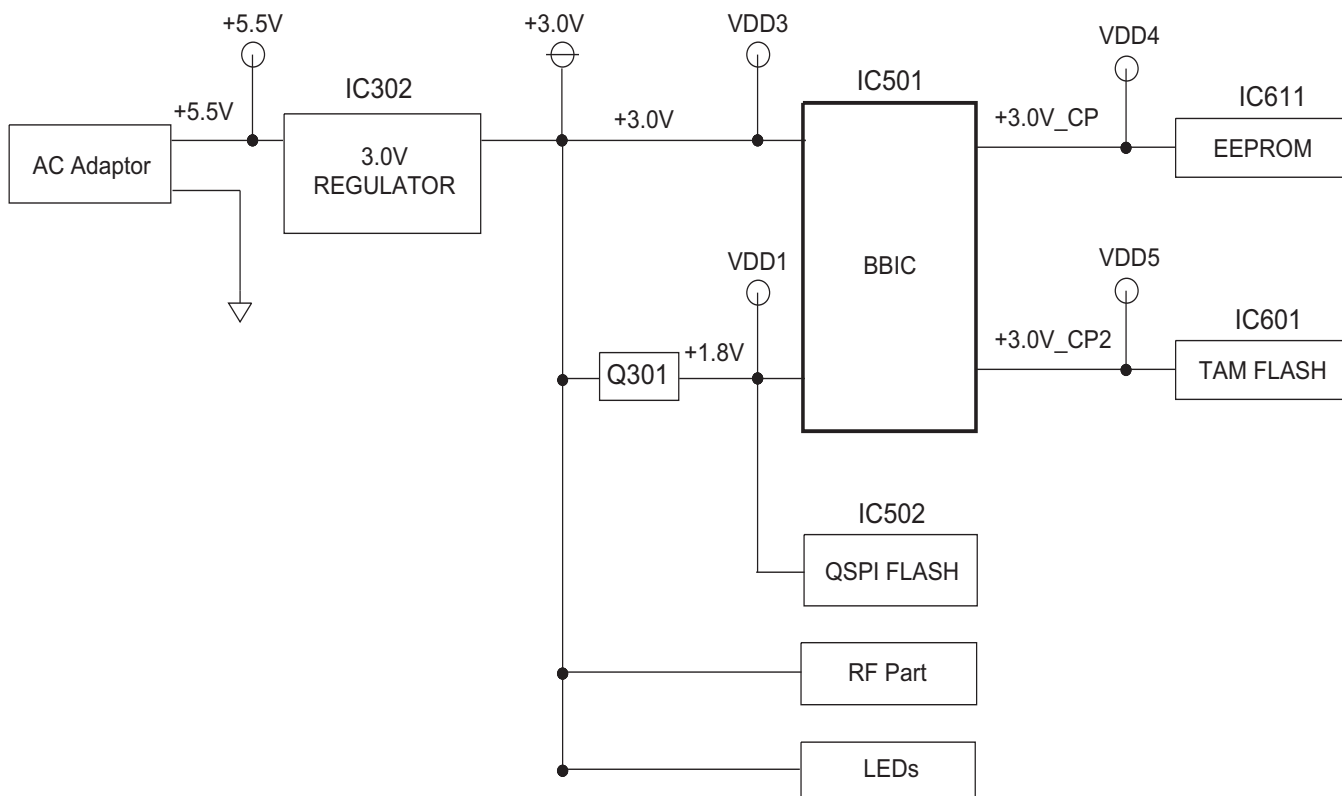
- **Settings**

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

4.5.5. Power Supply Circuit/Reset Circuit

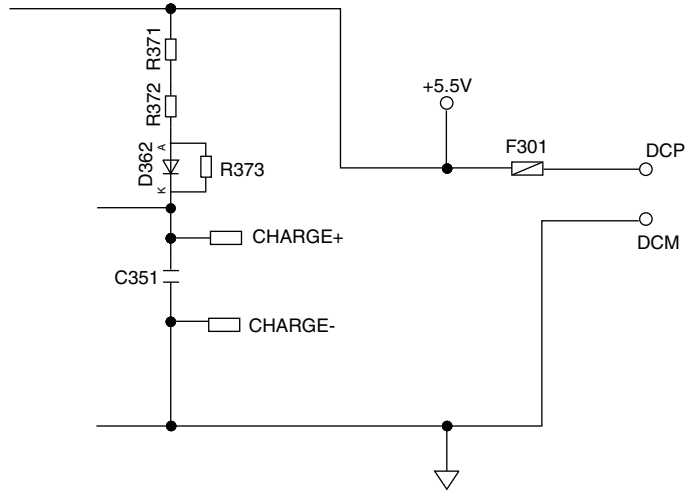
The power supply voltage from AC adaptor is converted to VBAT (3.0V) in IC302. And +3.0V for peripherals and analog part is insulated from VBAT by Doubler of BBIC.

Circuit Operation:



4.5.5.1. Charge Circuit

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



4.5.6. Telephone Line Interface

Telephone Line Interface Circuit:

Function

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

Bell (RINGING) signal detection and OFF HOOK circuit:

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

L1T → C105 → R103 → R110 → R11 1→ R112 → BBIC pin18(RINGING)

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

T → D101 → Q141 → Q161 → R163 → D101 → P101 → R

ON HOOK Circuit:

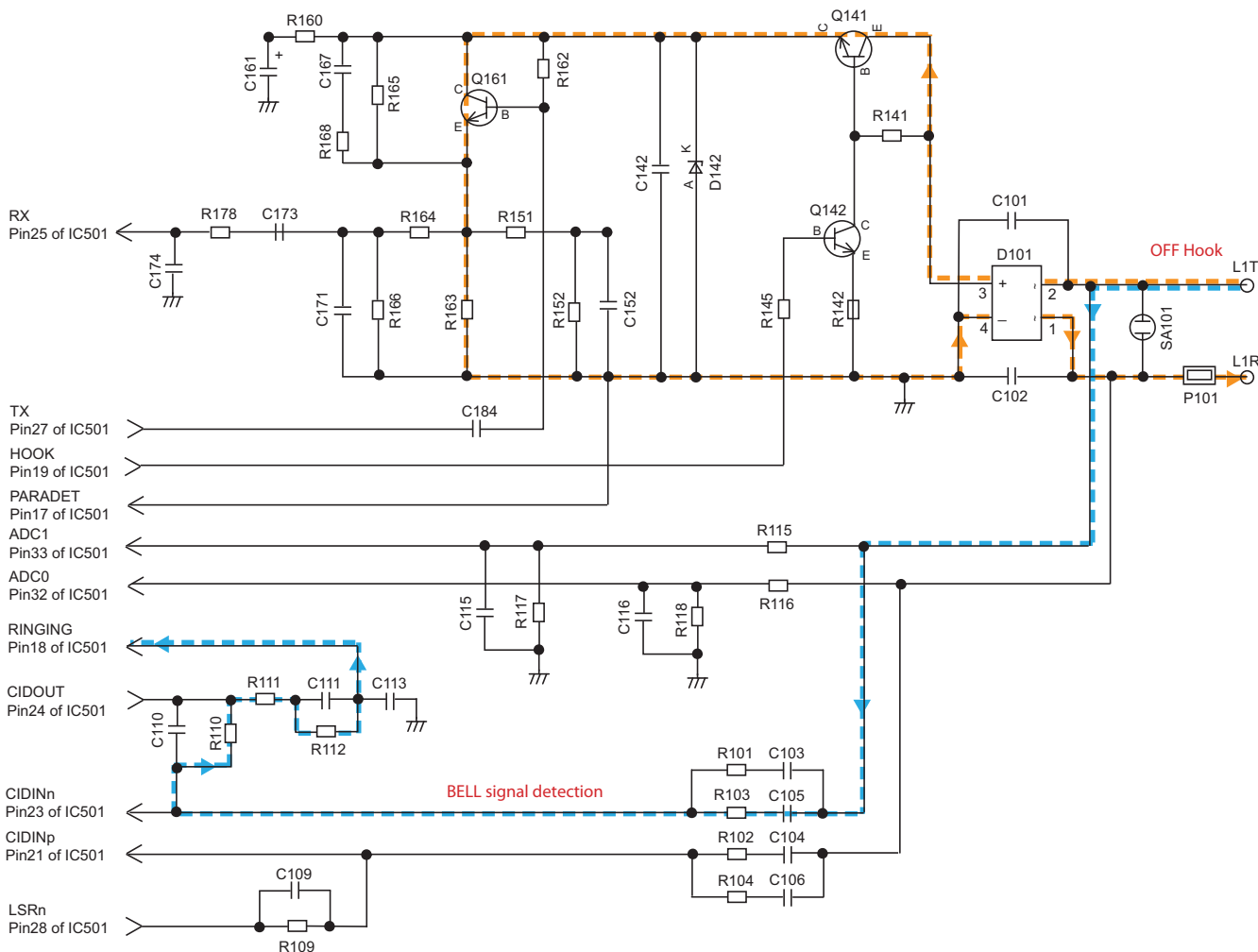
Q141 is open, Q141 is connected as to cut the DC loop current and to cut the voice signal. The unit is consequently in an on-hook condition.

Pulse Dial Circuit:

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

Side Tone Circuit:

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



4.5.7. Parallel Connection Detect Circuit/Auto Disconnect Circuit

Function:

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

Circuit Operation:

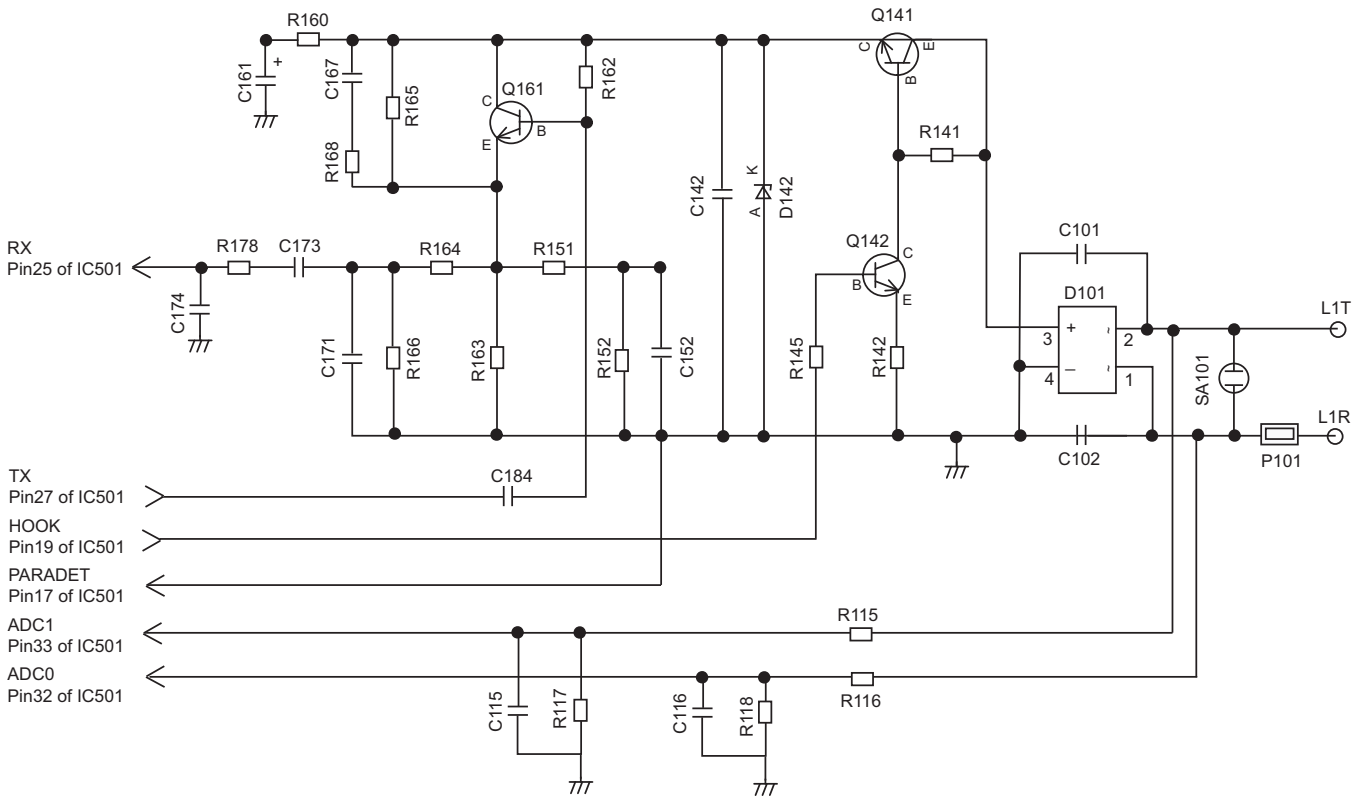
Parallel connection detection when on hook:

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

Parallel connection detection when off hook:

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

If the Auto disconnect function is ON and statuses are Hold, receiving ICM, OGM transmitting, BBIC disconnects the line after detecting parallel connection is off hook.



4.5.8. Calling Line Identification (Caller ID)/Call Waiting Caller ID

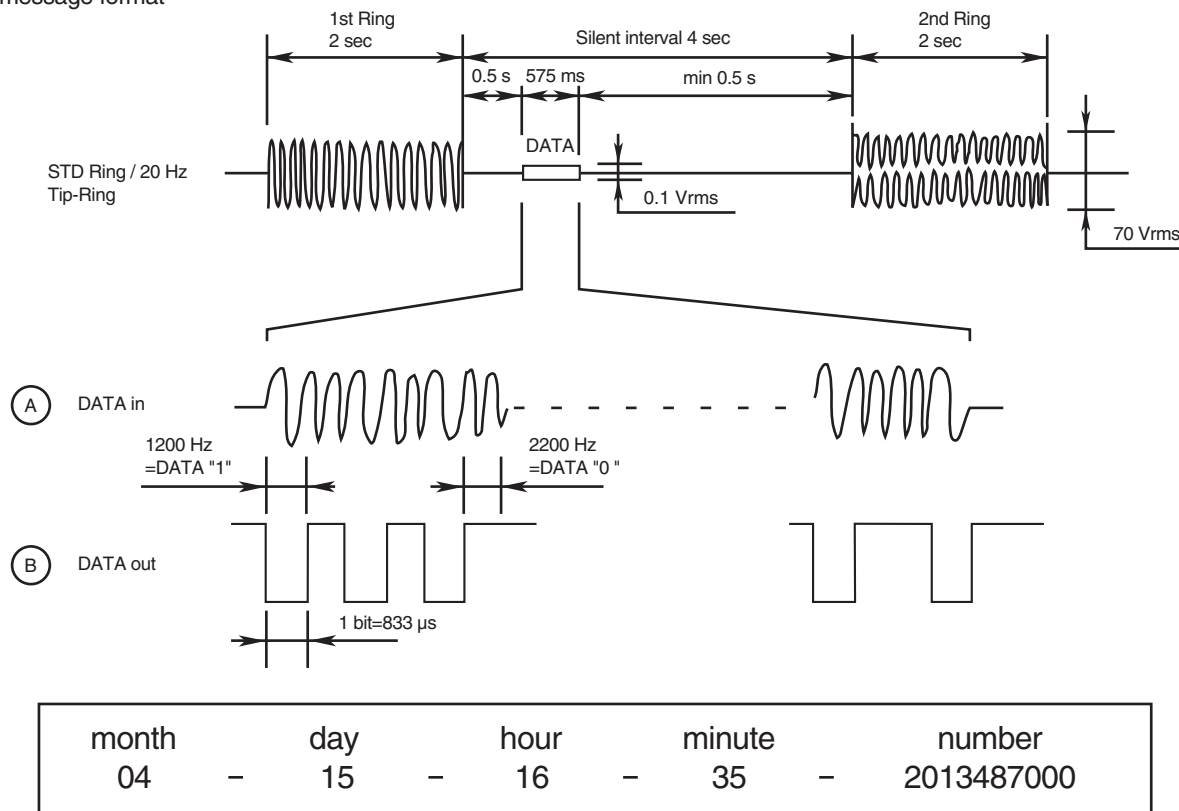
Function:

Caller ID

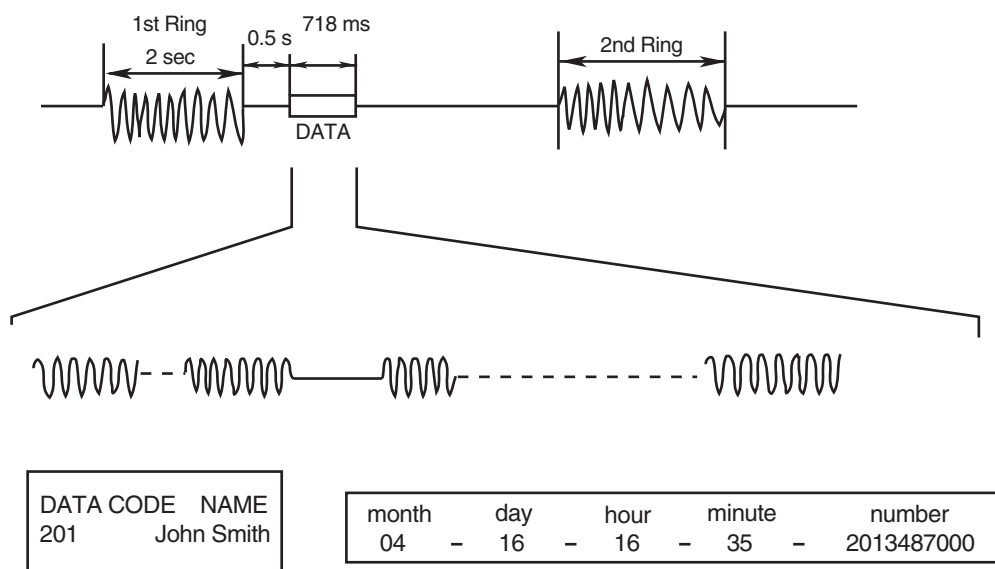
The caller ID is a chargeable ID which the user of a telephone circuit obtains by entering a contract with the telephone company to utilize a caller ID service. For this reason, the operation of this circuit assumes that a caller ID service contract has been entered for the circuit being used. The data for the caller ID from the telephone exchange is sent during the interval between the first and second rings of the bell signal. The data from the telephone exchange is a modem signal which is modulated in an FSK (Frequency Shift Keying) * format. Data "1" is a 1200 Hz sine wave, and data "0" is a 2200 Hz sine wave. There are two types of the message format which can be received: i.e. the single message format and plural message format. The plural message format allows to transmit the name and data code information in addition to the time and telephone number data.

*: Also the telephone exchange service provides other formats.

● Single message format



● Plural message format



Call Waiting Caller ID

Calling Identity Delivery on Call Waiting (CIDCW) is a CLASS service that allows a customer, while off-hook on an existing call, to receive information about a calling party on a waited call. The transmission of the calling information takes place almost immediately after the customer is alerted to the new call so he/she can use this information to decide whether to take the new call.

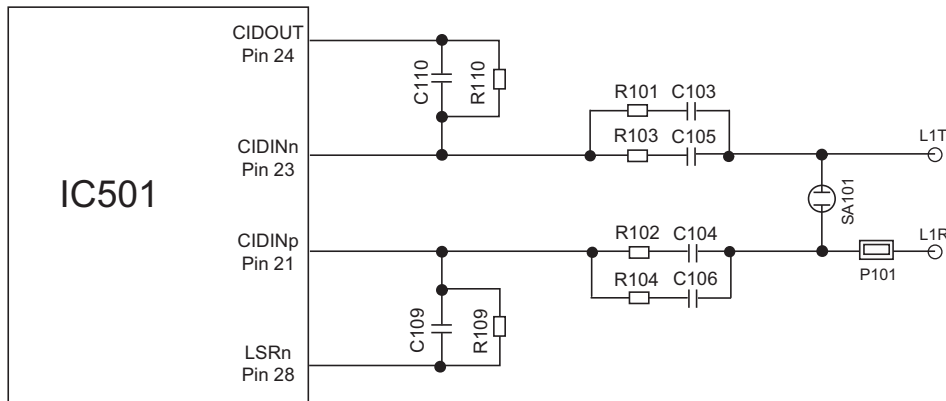
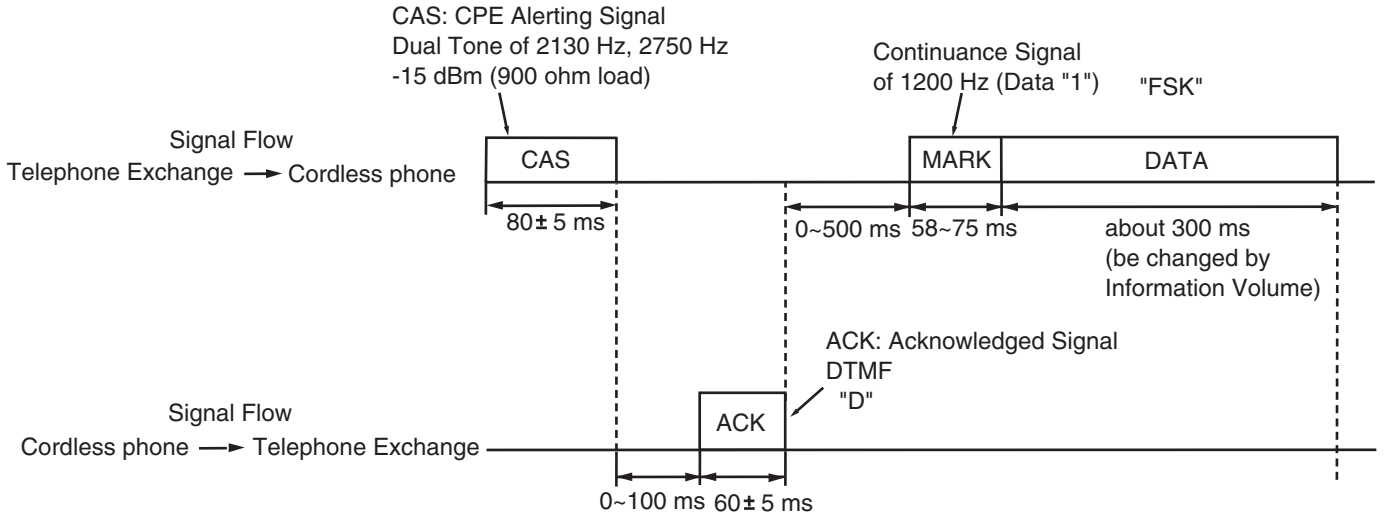
Function:

The telephone exchange transmits or receives CAS and ACK signals through each voice RX/TX route. Then FSK data and MARK data pass the following route.

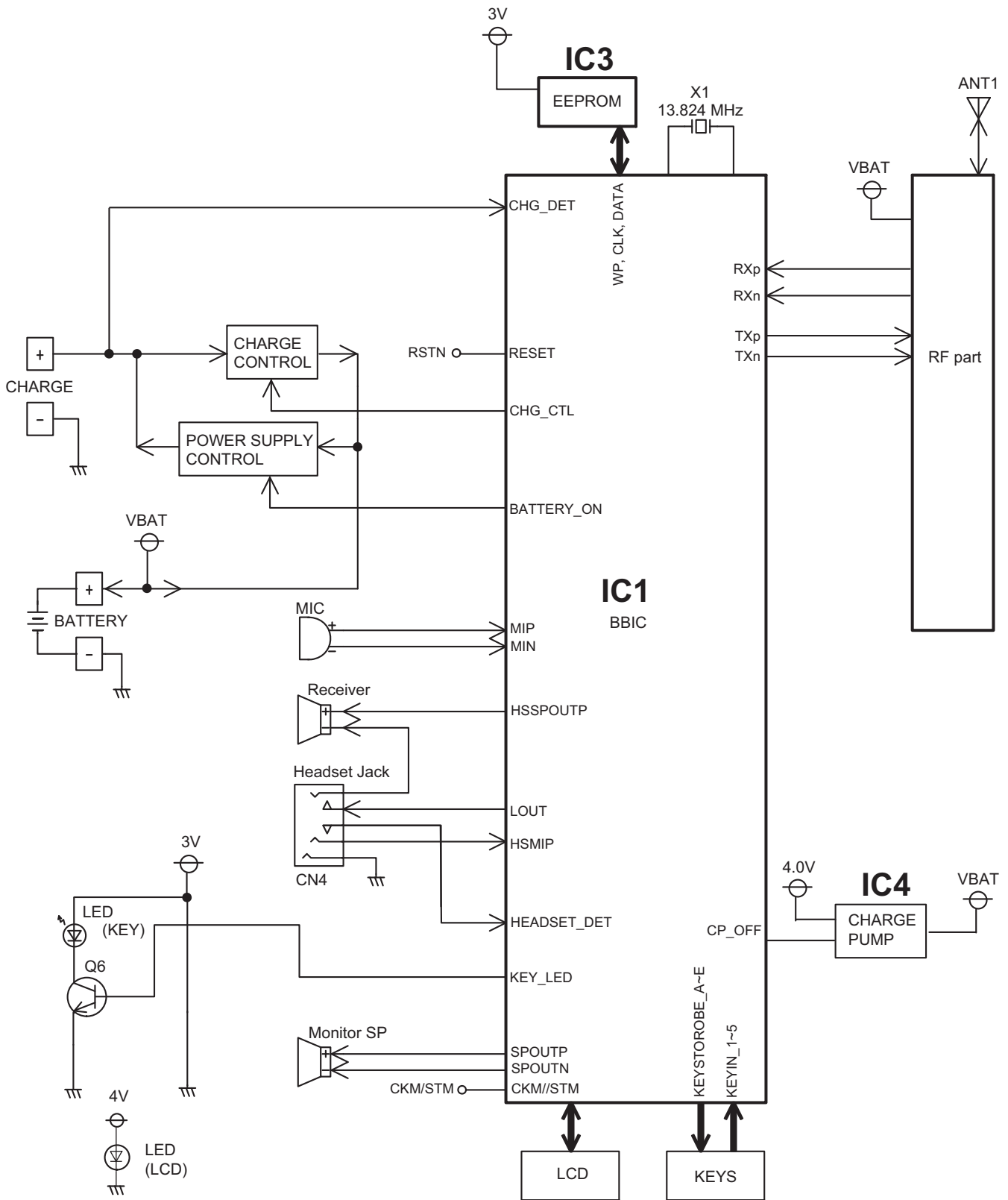
Telephone Line → P101 → C105, C104 → R103, R104 → RA101 → IC501(23, 21).

If the unit deems that a telephone connected in parallel is in use, ACK is not returned even if CAS is received, and the information for the second and subsequent callers is not displayed on the portable handset display.

Call Waiting Format

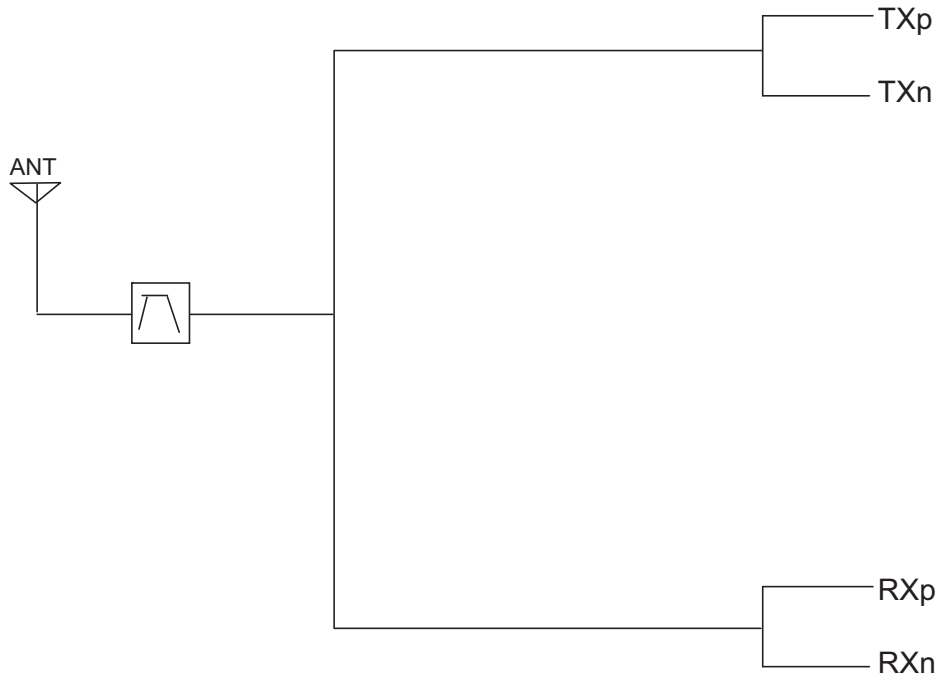


4.6. Block Diagram (Handset)



KX-TGEA20 BLOCK DIAGRAM (Handset)

4.7. Block Diagram (Handset_RF Part)



KX-TGEA20 BLOCK DIAGRAM (Handset_RF Part)

4.8. Circuit Operation (Handset)

4.8.1. Outline

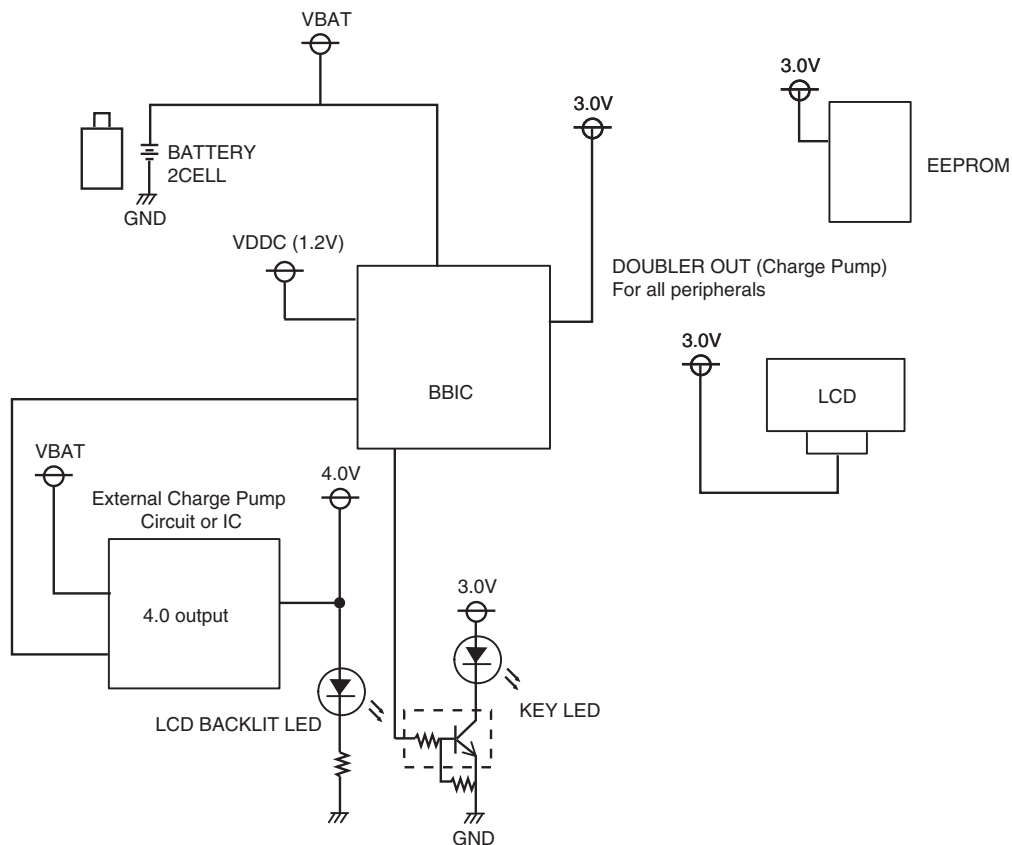
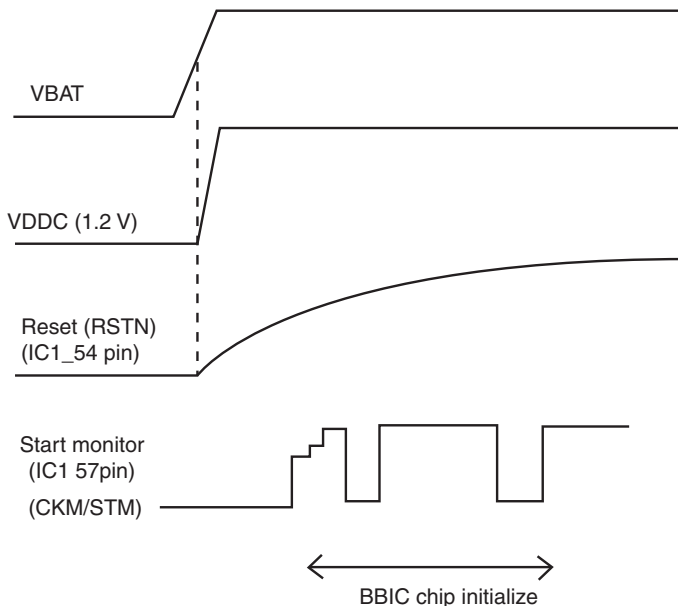
Handset consists of the following ICs as shown in **Block Diagram (Handset)** (P.20).

- DECT BBIC (**B**ase **B**and IC): IC1
 - All data signals (forming/analyzing ACK or CMD signal)
 - All interfaces (ex: Key, Detector Circuit, Charge, EEPROM, LCD)
- EEPROM: IC3
 - Setting data is stored. (e.g. ID, user setting)

4.8.2. Power Supply Circuit/Reset Circuit

Circuit Operation:

When powering on the Handset, the voltage is as follows;
 BATTERY(2.2 V ~ 2.6 V: BATT+) → F1 → BBC1 (IC1) 10 pin
 The Reset signal generates IC1 (54 pin) and 1.8 V.



4.8.3. Charge Circuit

Circuit Operation:

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

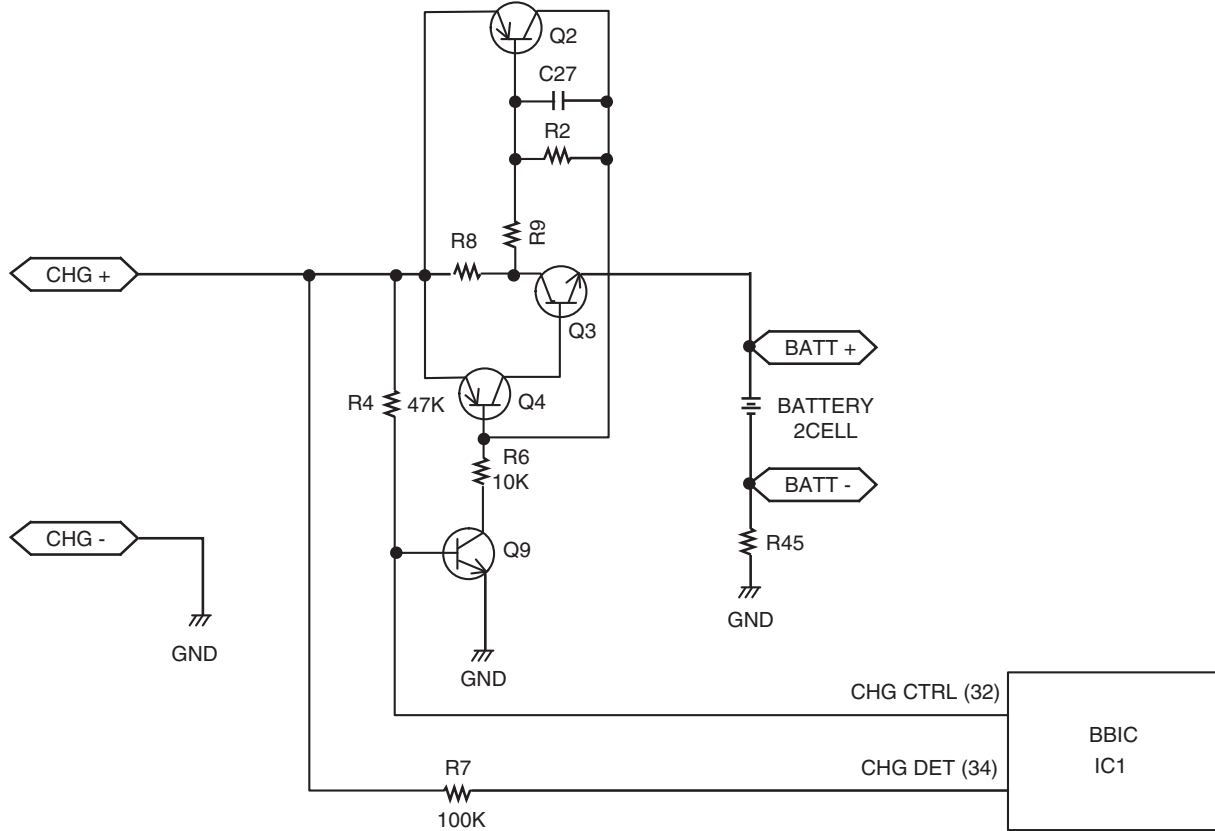
DCP(5.5V) → F301 → R371 → R372 → D362 → CHARGE+(Base) → CHARGE+(Handset) → R8 → Q3 → F1 → BATTERY+...
 Battery...

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/Reset Circuit** (P.14).



4.8.4. Battery Low/Power Down Detector

Circuit Operation:

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

The detected voltage is as follows;

- Battery Low
 Battery voltage: $V(\text{Batt}) \leq 2.35 \text{ V} \pm 50 \text{ mV}$
 The BBIC detects this level and "█" starts flashing.
- Power Down
 Battery voltage: $V(\text{Batt}) \leq 2.1 \text{ V} \pm 50 \text{ mV}$
 The BBIC detects this level and power down.

4.8.5. Speakerphone

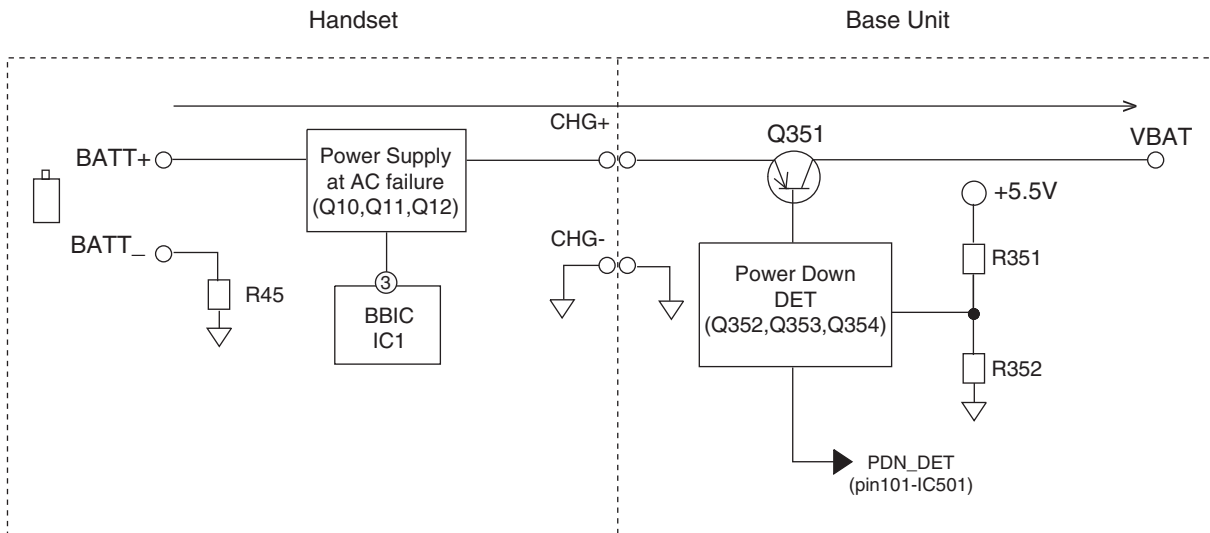
The hands-free loudspeaker at SP+ and SP- is used to generate the ring alarm.

4.9. Behavior of Electric Power Failure

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

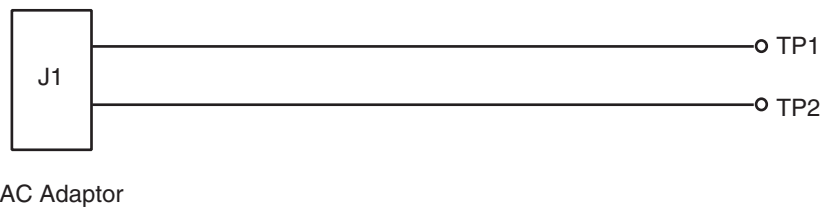
Base unit detects that power voltage of AC adaptor +5.5V is OFF, then turns Q351 ON.

It's possible to use the units during the power failure, supplying power to VBAT of base unit from battery of handset through Q10, CHG terminal and Q351.



4.10. Circuit Operation (Charger Unit)

Charge control is executed at handset side so that the operation when using charger is also controlled by handset. Refer to **Circuit Operation (Handset)** (P.22)



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

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.

8 Test Mode

8.1. Engineering Mode

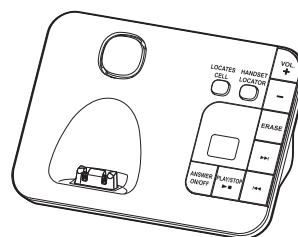
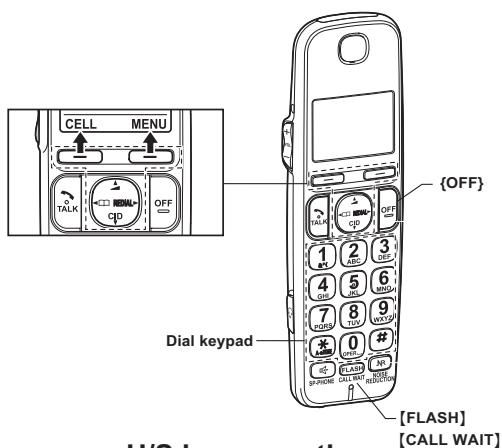
8.1.1. Base Unit

Important:

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

Make sure the link between Base and Handset before that. Then in case using not original Handset, you need to deregister Handset.

Note: Refer to Registering a Handset to a Base Unit in the Operating Instructions.

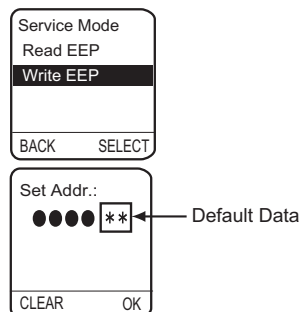


This pictured model is KX-TGE230.

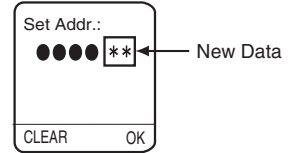
H/S LCD

- 1). Press [MENU].
- 2). Select "Settings" using [▲] or [▼] then press [SELECT] or [▶].

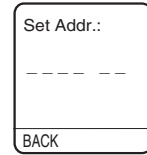
Select "Set tel line" using [▲] or [▼] then press [SELECT] or [▶].
- 3). Enter "7", "2", "6", "2", "7", "6", "6", "4".
Note: 7262 7664 = PANA SONI
(see letters printed on dial keys)
- 4). Select "Write EEP" using [▲] or [▼] then press [SELECT] or [▶].
- 5). Enter "0", "0", "0", "0" (Address). (*1)
- 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, turn the base unit power off and then power on.



Note: * "Set tel line" isn't displayed in Cell line only mode.
To return to normal mode, execute the following procedure:

- 1 [MENU] → [#][1][5][7]
- 2 [▼]/[▲]: Select "off " → [SELECT]
- 3 [OFF]

Frequently Used Items (Base Unit)
ex.)

Items	Address	Default Data	New Data		Remarks
C-ID (FSK) sensitivity	06 0B	00	01 (6dB UP)	02 (12dB UP)	When hex changes from "00" to "01" or "02" gain increases by 6dB or 12dB.
Frequency	00 07 / 00 08	70/02	-	-	Use these items in a READ-ONLY mode to confirm the contents. Careless rewriting may cause serious damage to the computer system.
ID	00 02 ~ 00 06	Given value	-	-	

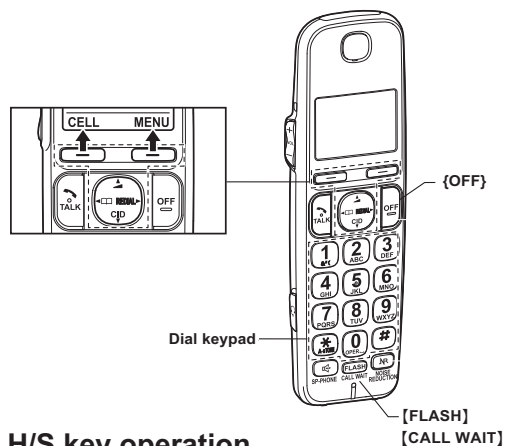
Note:
(*1) When you enter the address or New Data, please refer to the table below.

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

8.1.2. Handset

Important:

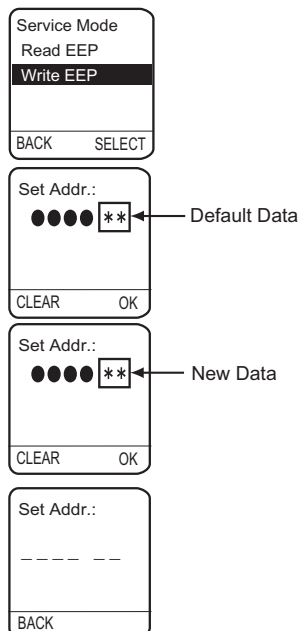
Make sure the address on LCD is correct when entering new data. Otherwise, you may ruin the unit.



H/S key operation

H/S LCD

- 1). Press [MENU].
- 2). Select "Settings" using [▲] or [▼] then press [SELECT] 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 [SELECT] or [▶].
- 5). Enter "0", "0", "0", "0" (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.

Frequently Used Items (Handset)

ex.)

Items	Address	Default Data	New Data	Possible Adjusted Value MAX (hex)	Possible Adjusted Value MIN (hex)	Remarks
Battery Low	00 12/00 13	00 / 00	-	-	-	(*2)
Frequency	00 07 / 00 08	00 / 01	-	-	-	
ID	00 02 ~ 00 06	Given value	-	-	-	

Note:

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

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

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

9 Service Mode

9.1. How to Clear User Setting (Handset Only)

Handset

Press **2**, **5**, **8**, **0** simultaneously until a beep sound is heard. Then single handset is initialized.

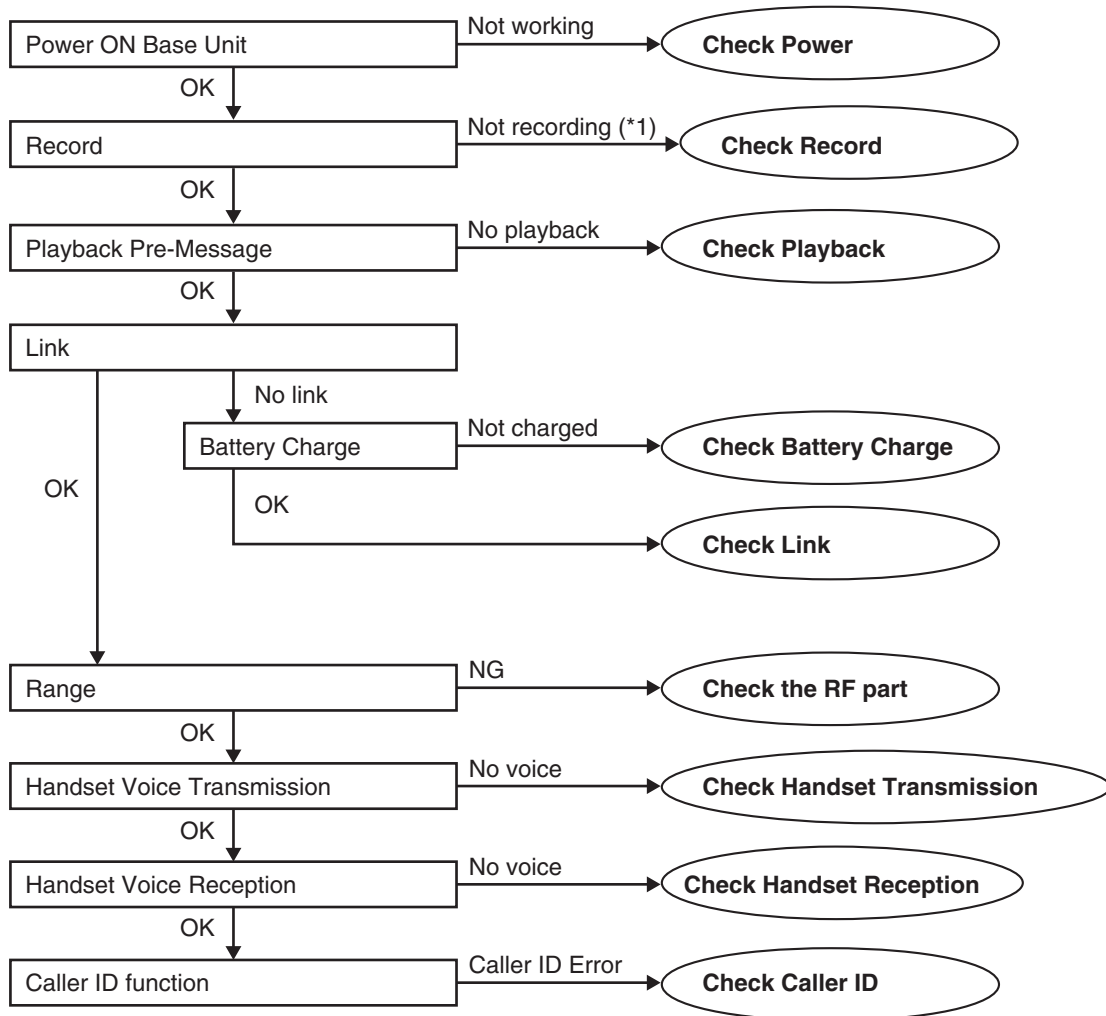
(The contents of user setting are reset to factory default)

*Usage time is not cleared.

10 Troubleshooting Guide

10.1. Troubleshooting Flowchart

FLOW CHART



Cross Reference:

Check Power (P.32)

Check Record (P.33)

Check Playback (P.36)

Check Battery Charge (P.36)

Check Link (P.37)

Check the RF part (P.39)

Check Handset Transmission (P.44)

Check Handset Reception (P.44)

Check Caller ID (P.44)

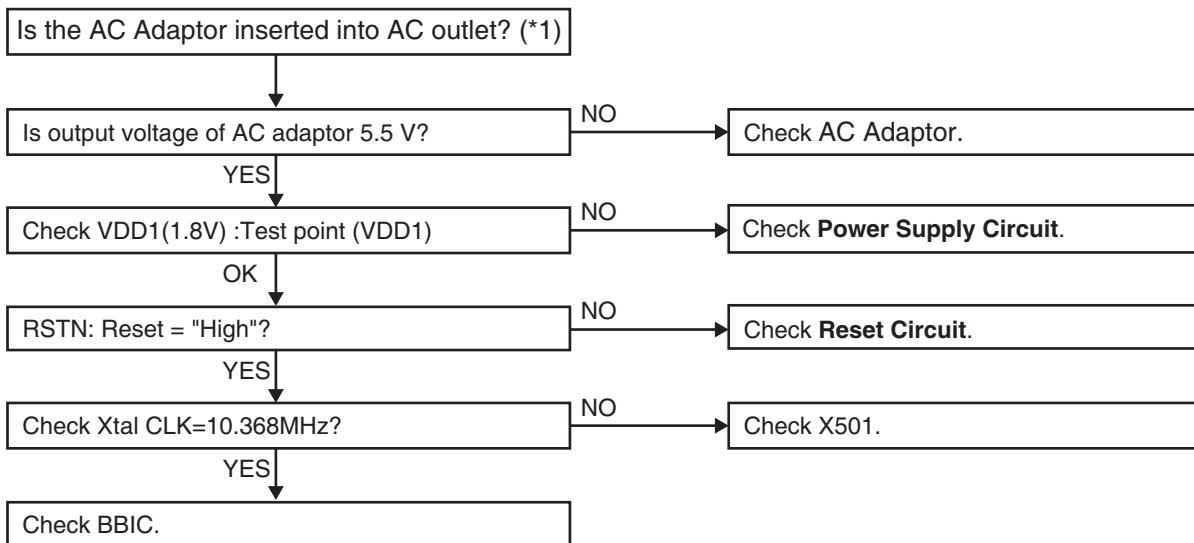
Note:

(*1) When a user claims that the unit disconnects a call right after the greeting message and no incoming messages can be recorded, this symptom can not reappear with TEL simulator in the service center. In this case, try to change the Auto disconnect activation time and Vox level.

<How to change the Auto Disconnect activation time and VOX level> (P.34) item (A) and (B).

10.1.1. Check Power

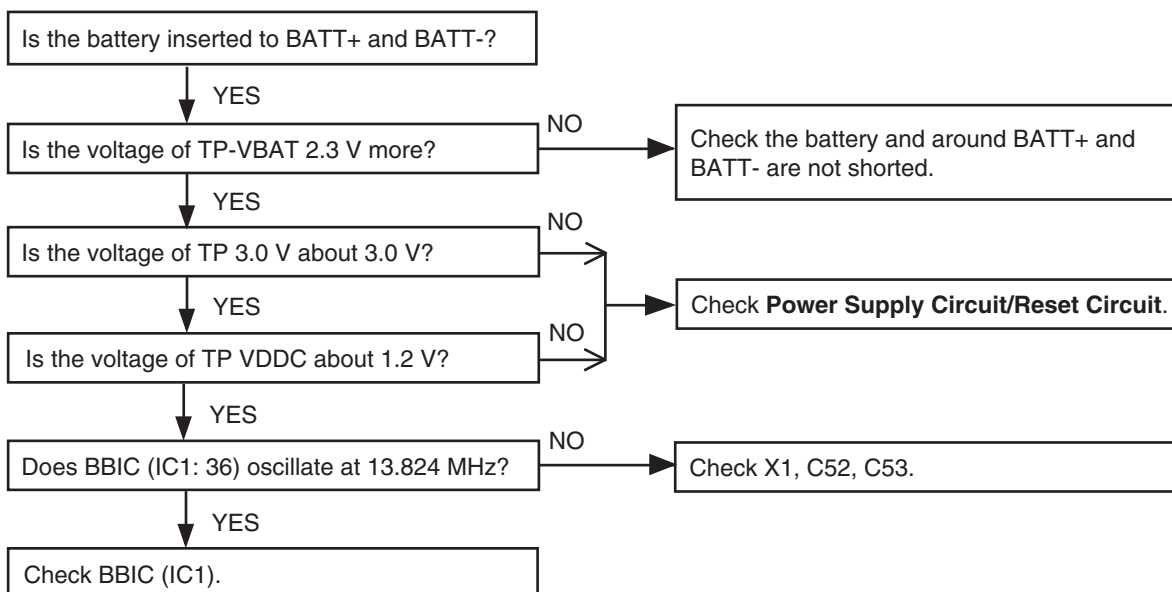
10.1.1.1. Base Unit



Cross Reference:
Power Supply Circuit/Reset Circuit (P.14)

Note:
 BBIC is IC501.
 (*1) Refer to **Specifications (P.7)** for part number and supply voltage of AC adaptor.
 (*2) Refer to **Circuit Board (Base Unit_Main) (P.76)**.

10.1.1.2. Handset

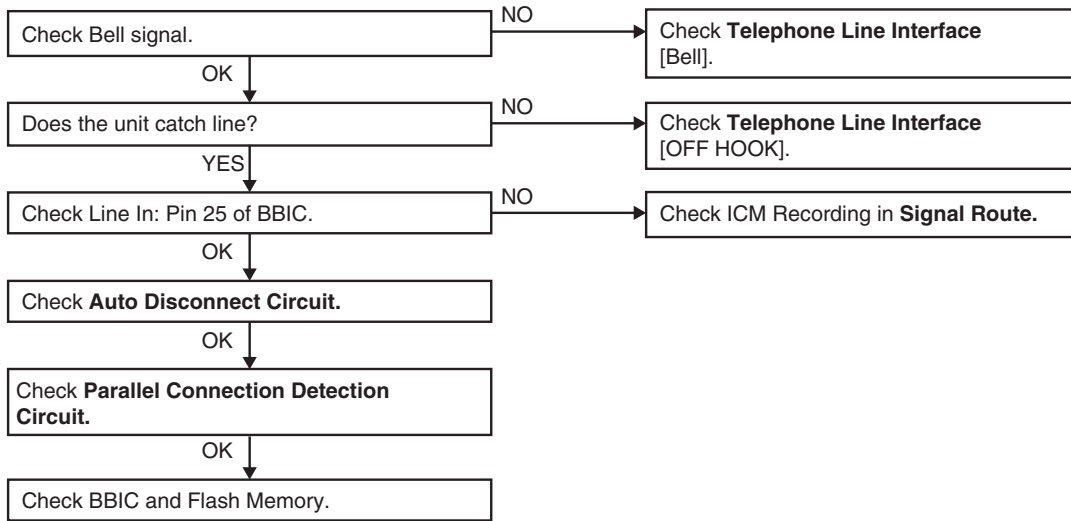


Cross Reference:
Power Supply Circuit/Reset Circuit (P.22)

10.1.2. Check Record

10.1.2.1. Base Unit

Not record Incoming Message



Cross Reference:

Telephone Line Interface (P.16)

Parallel Connection Detect Circuit/Auto Disconnect Circuit (P.17)

Note:

Flash Memory is IC601.

BBIC is IC501.

<How to change the Auto Disconnect activation time and VOX level>

A) Auto Disconnect activation time:

Some Telephone Company lines (fiber or cable) ON Hook and OFF Hook voltages are lower than conventional lines, which may cause a malfunction of Auto Disconnect detection. To solve this problem, try changing the Auto Disconnect activation through the procedures below.

- 1) Press "MENU " key at standby Mode and "#" key.

Note: The set must power on and be linked.

- 2) Press "9", "0", "0", "0", " * " .

LCD (H/S)

```

Service ready
: _____
BACK
    
```

- 3) Press "7", "3", "1".

```

Service ready
: 7 3 1 _
CLEAR
    
```

- 4) Then enter the below last digit;

last digit	"0"	Auto disconnect & CPC ^(*1) : enable . . . [default]
	"1"	Auto disconnect : enable ^(*1) CPC : disable
	"2"	Auto disconnect & CPC : disable ^(*2)

Note:

(*1) Both Auto Disconnect and CPC don't detect for the first 2 seconds.

(*2) If the "Disable" is selected, even if the parallel-connected telephone is OFF HOOK, the line isn't disconnected.

- 5) Back to "standby" mode automatically after step 4).
You can hear beep sound which is a confirmation tone.

B) Vox level:

It makes easier to detect a small voice (caller) by raising the sensitivity of VOX level. Therefore, the recording of TAM is not turned off during detection.

1) ~ 2) are same as (A).

3) Press "5", "1", "1".

Service ready :5 1 1 _ CLEAR
--

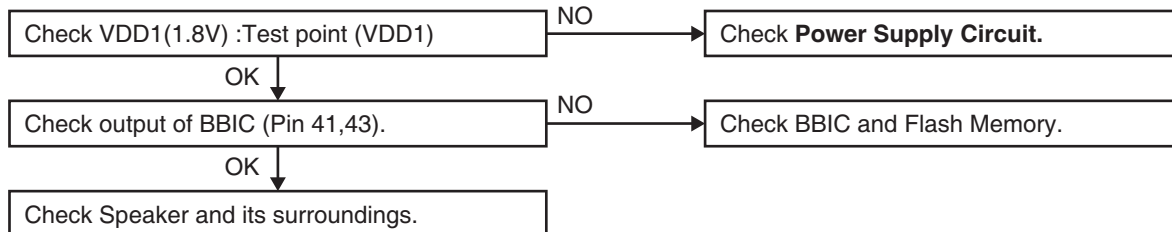
4) Then enter the below last digit;

last digit	"0"	default setting : normal
	"1"	6dB up

5) Back to "standby" mode automatically after step 4.
You can hear beep sound which is a confirmation tone.

10.1.3. Check Playback

10.1.3.1. Base Unit



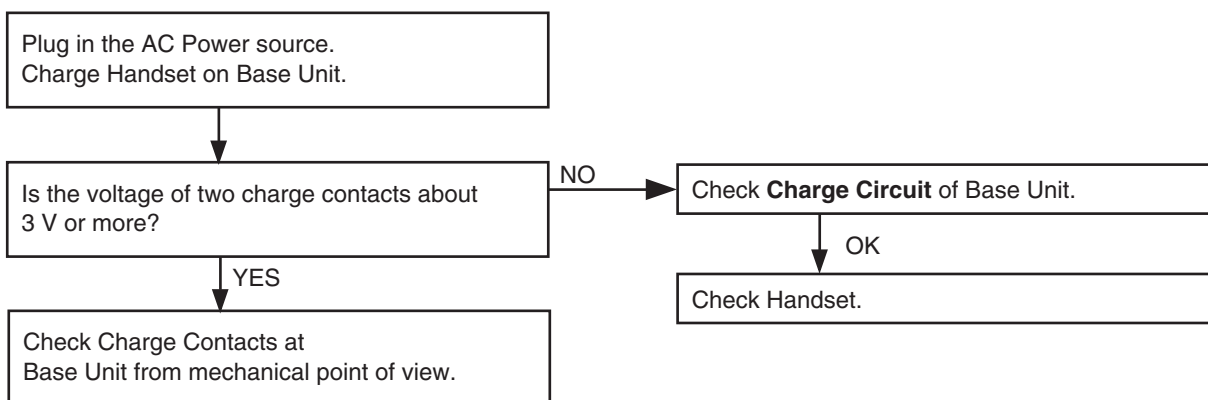
Cross Reference:
Power Supply Circuit/Reset Circuit (P.14)

BBIC is IC1.
 (*1) Refer to **Circuit Board (Base Unit_Main) (P.76)**.

Note:
 Flash Memory is IC601.

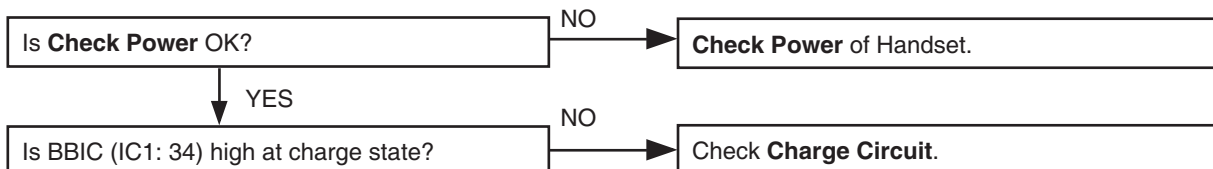
10.1.4. Check Battery Charge

10.1.4.1. Base Unit



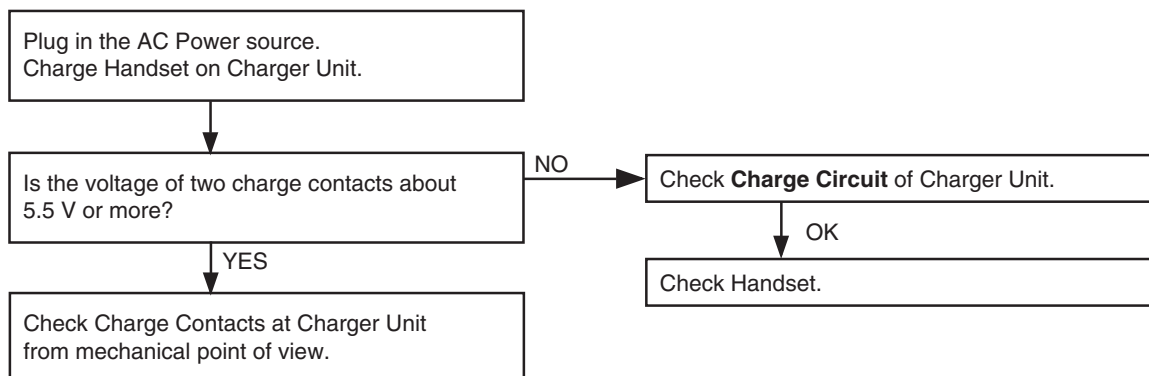
Cross Reference:
Charge Circuit (P.15)

10.1.4.2. Handset



Cross Reference:
Check Power (P.32)
Charge Circuit (P.23)

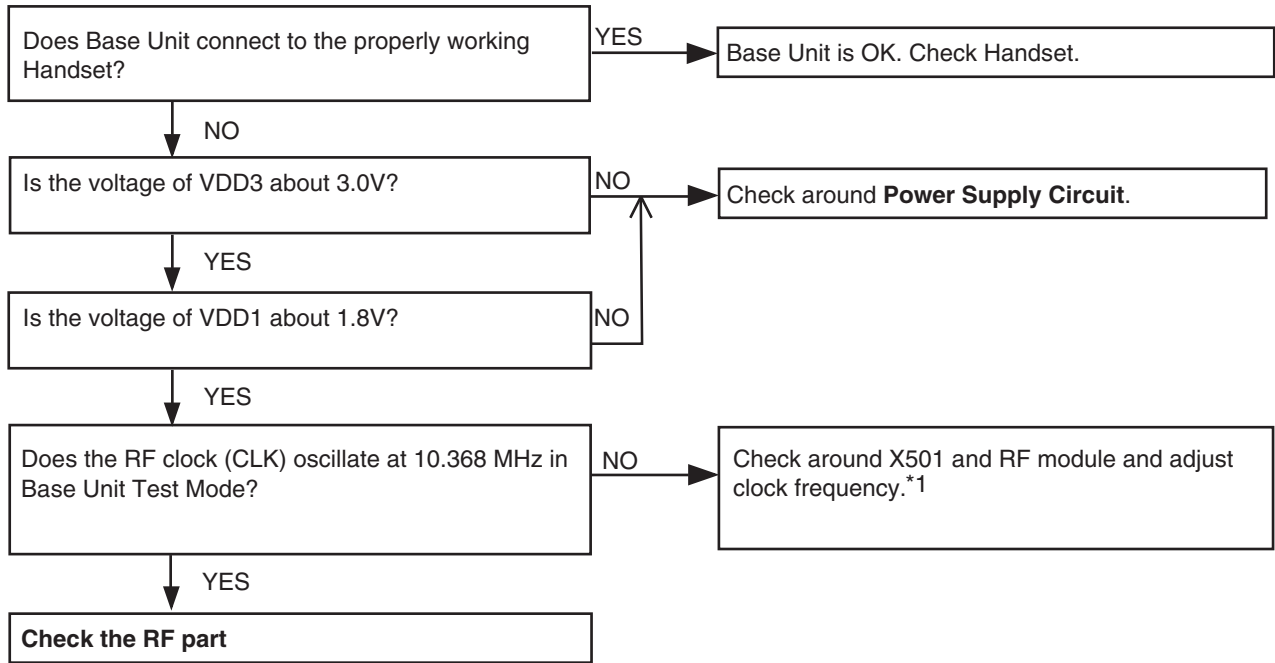
10.1.4.3. Charger Unit



Cross Reference:
Charge Circuit (P.23)

10.1.5. Check Link

10.1.5.1. Base Unit



Cross Reference:

Power Supply Circuit/Reset Circuit (P.14)

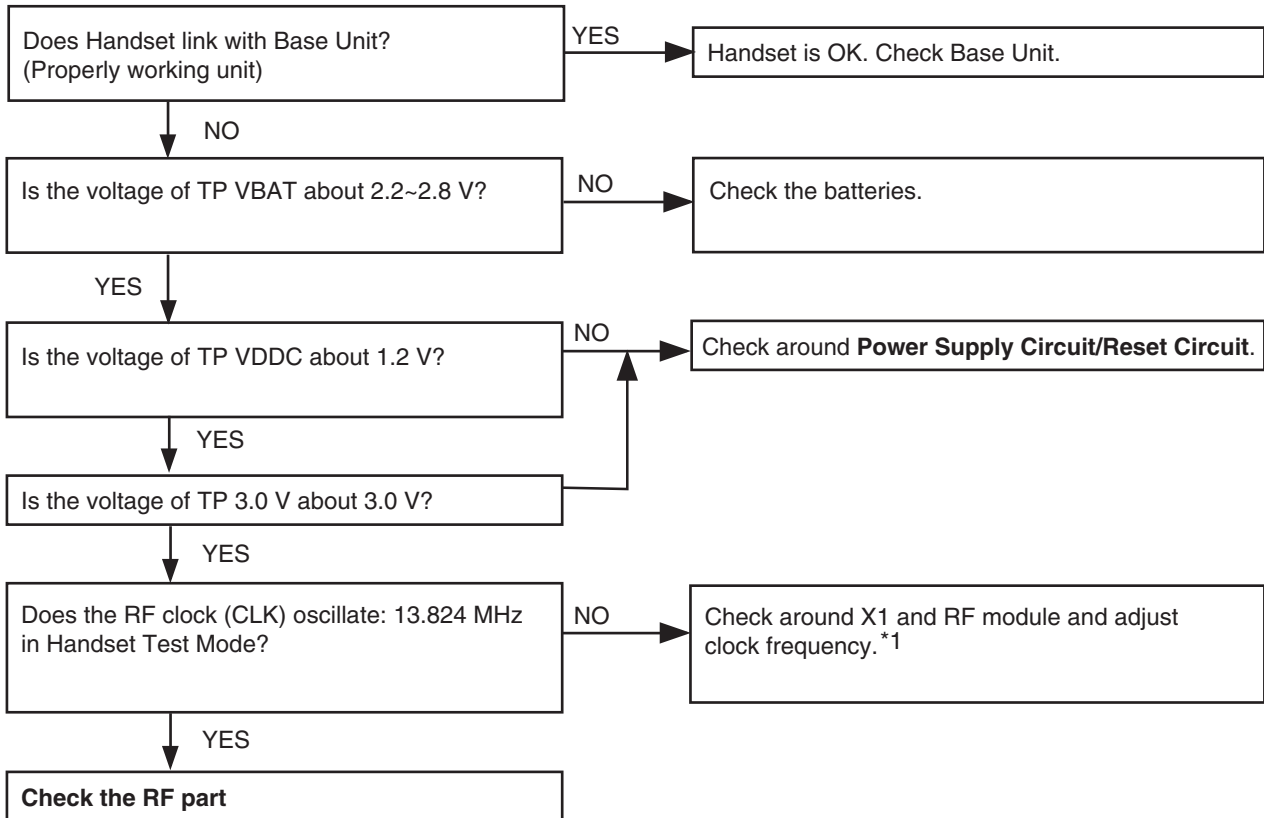
Check the RF part (P.39)

Note:

Refer to **Things to Do after Replacing IC or X'tal** (P.52)(P.58) for Base Unit.

*1 How to adjust the frequency of X501.

10.1.5.2. Handset



Cross Reference:

Power Supply Circuit/Reset Circuit (P.22)

Check the RF part (P.39)

Note:

Refer to **Things to Do after Replacing IC or X'tal (P.53)(P.58)** for Handset.

*1 How to adjust the frequency of X1.

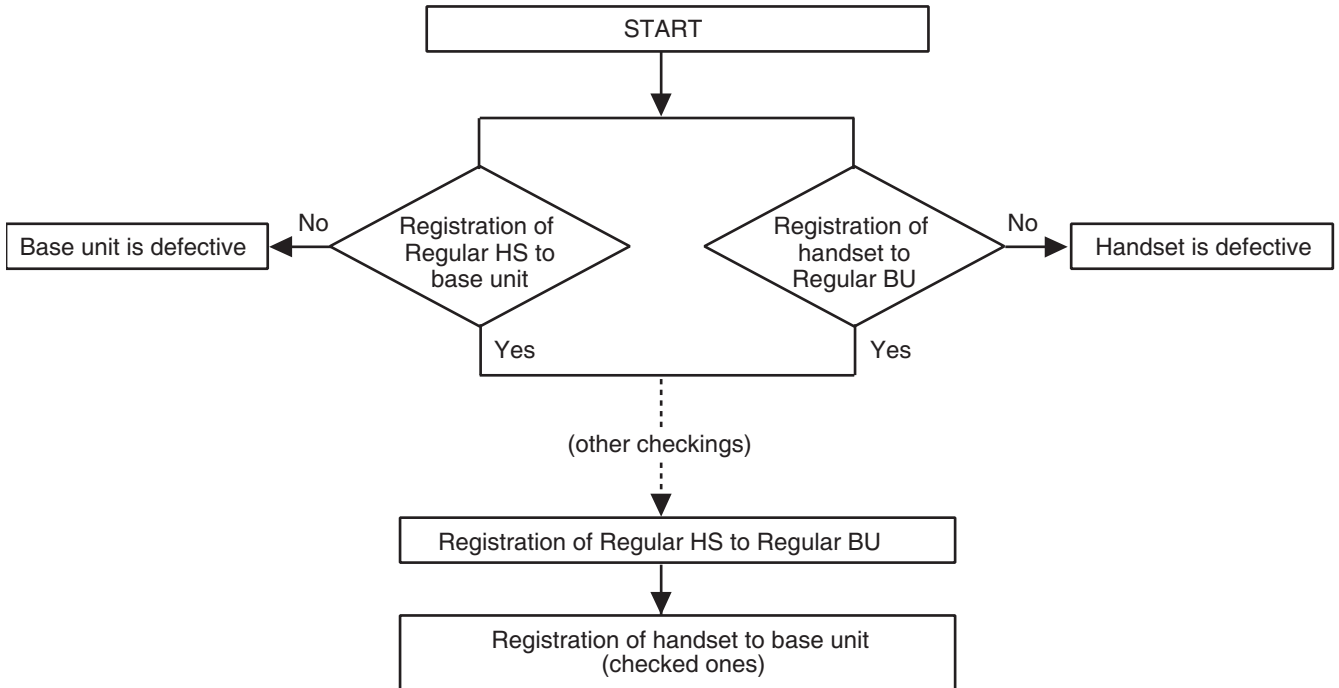
10.1.6. Check the RF part

10.1.6.1. Finding out the Defective part

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

After All the Checkings or Repairing

1. Re-register the checked handset to the checked base unit, and Regular HS to Regular BU.

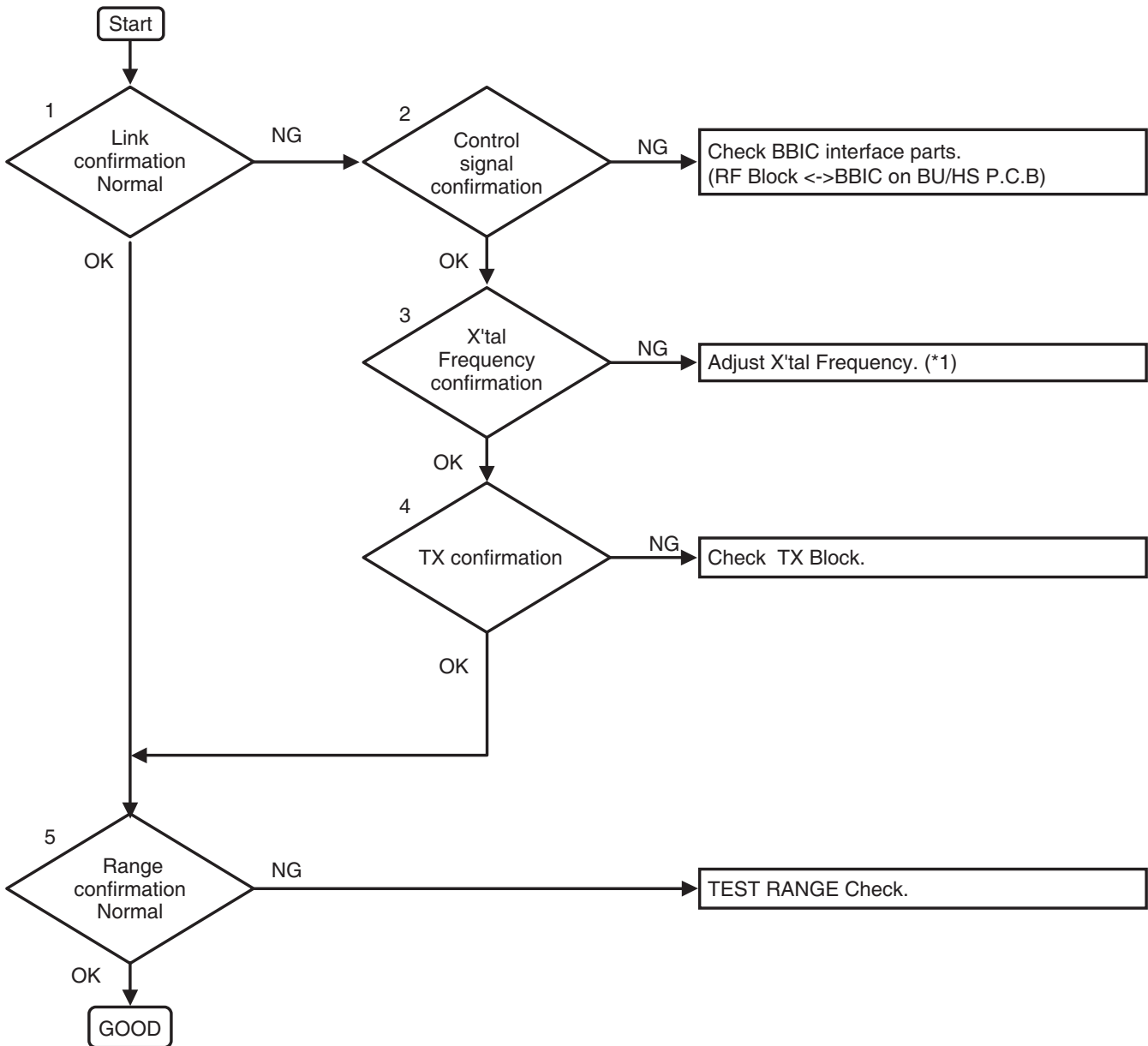


Note:

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

10.1.6.2. RF Check Flowchart

Each item (1 ~ 5) of RF Check Flowchart corresponds to **Check Table for RF part** (P.41).
Please refer to the each item.



Note:
(*1) Refer to **Check Link** (P.37).

10.1.6.3. Check Table for RF part

No.	Item	BU (Base Unit) Check	HS (Handset) Check
1	Link Confirmation Normal HS, BU Mode [Normal Mode]	<ol style="list-style-type: none"> 1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link. 	<ol style="list-style-type: none"> 1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link.
2	X'tal Frequency confirmation HS, BU Mode: [Adjustment]	Check X'tal Frequency. (10.368 MHz \pm 41Hz)	Check X'tal Frequency. (13.824 MHz \pm 100 Hz)
3	TX confirmation HS Mode: HS_Burst Mode] (*1) BS Mode: BS_Burst Mode] (*1)	<ol style="list-style-type: none"> 1. Remove wire antenna 2 and connect spectrum analyzer to TP. (*2) 2. Confirm TX power whether spec. is satisfied. Power \geq13.5dBm 	<ol style="list-style-type: none"> 1. Connect spectrum analyzer to TP. (*3) 2. Confirm TX power whether satisfied spec. Power \geq16.0dBm
4	Range Confirmation Normal HS, BU Mode: [Normal Mode]	<ol style="list-style-type: none"> 1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link. 3. Compare the range of the BU (being checked) with that of the Regular BU. 	<ol style="list-style-type: none"> 1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link. 3. Compare the range of the HS (being checked) with that of the Regular HS.

Note:

(*1) Refer to **Commands** (P.55)

(*2) **Adjustment Standard (Base Unit)** (P.56)

(*3) **Adjustment Standard (Handset)** (P.57)

10.1.6.4. TEST RANGE Check

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

Item	BU (Base Unit) Check	HS (Handset) Check
Range Confirmation TX TEST (TX Power check) HS, BU setting Checked unit: Low TX power (*1) Regular unit: High TX power (*1)	1. Register Regular HS to BU (to be checked). 2. Set TX Power of the BU and the Regular HS according to CHART1. 3. At distance of about 20m between HS and BU, Link OK = TX Power of the BU is OK. No Link = TX Power of the BU is NG.	1. Register HS (to be checked) to Regular BU. 2. Set TX Power of the HS and the Regular BU according to CHART1. 3. At distance of about 20m between HS and BU, Link OK = TX Power of the HS is OK. No Link = TX Power of the HS is NG.
Range Confirmation RX TEST (RX sensitivity check) HS, BU setting Checked unit: High TX power (*1) Regular unit: Low TX power (*1)	1. Register Regular HS to BU (to be checked). 2. Set TX Power of the BU and the Regular HS according to CHART1. 3. At distance of about 20m between HS and BU, Link OK= RX Sensitivity of the BU is OK. No Link = RX Sensitivity of the BU is NG.	1. Register HS (to be checked) to Regular BU. 2. Set TX Power of the Checking HS and the Regular BU according to CHART1. 3. At distance of about 20m between HS and BU, Link OK= RX Sensitivity of the HS is OK. No Link = RX Sensitivity of the HS is NG

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

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

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

Note:

(*1) Refer to **Commands** (P.55).

10.1.7. Registering a Handset to the Base Unit

The supplied handset and base unit are pre-registered. If for some reason the handset is not registered to the base unit, re-register the handset.

1 Handset:

[MENU] → **# 1 3 0**

2 Base unit:

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

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

3 Handset:

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

Note:

- While registering, “**Base in registering**” is displayed on all registered handsets.
- When you purchase an additional handset, refer to the additional handset’s installation manual for registration.

10.1.8. Deregistering a Handset

A handset can cancel its own registration to the base unit, or other handsets registered to the same base unit. This allows the handset to end its wireless connection with the system.

1 [MENU] → **# 1 3 1**

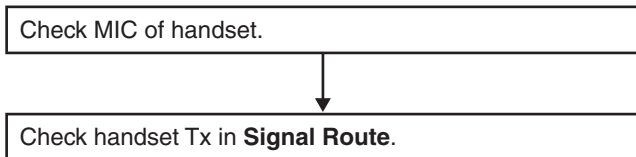
- All handsets registered to the base unit are displayed.

2 [↕]: Select the handset you want to cancel. → **[SELECT]**

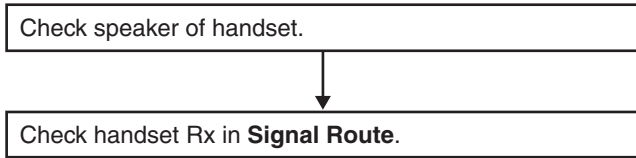
3 [↕]: “**Yes**” → **[SELECT]**

4 [OFF]

10.1.9. Check Handset Transmission



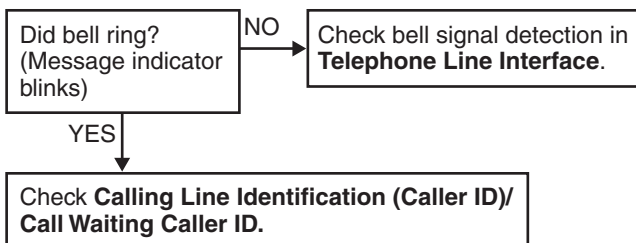
10.1.10. Check Handset Reception



Note:
When checking the RF part, Refer to **Check the RF part** (P.39).

10.1.11. Check Caller ID

BASE UNIT



Cross Reference:
Telephone Line Interface (P.16)
Calling Line Identification (Caller ID)/Call Waiting Caller ID (P.18)

Note:

- Make sure the format of the Caller ID service of the Telephone company that the customer subscribes to.
- It is also recommended to confirm that the customer is really a subscriber of the service.

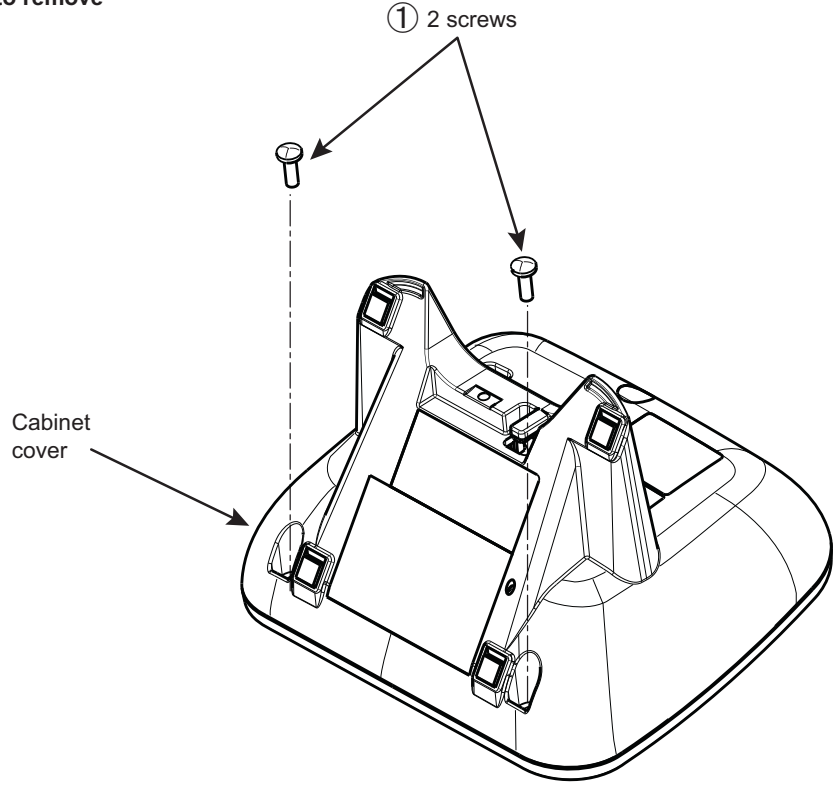
11 Disassembly and Assembly Instructions

11.1. Disassembly Instructions

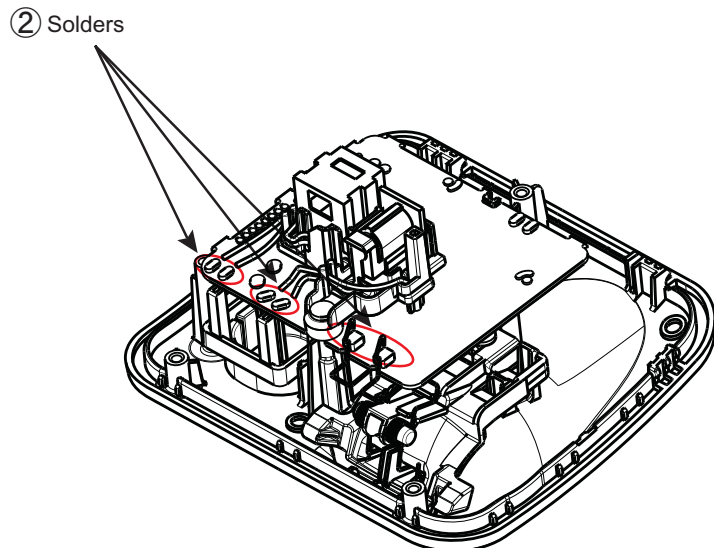
11.1.1. Base Unit

11.1.1.1. KX-TGE210

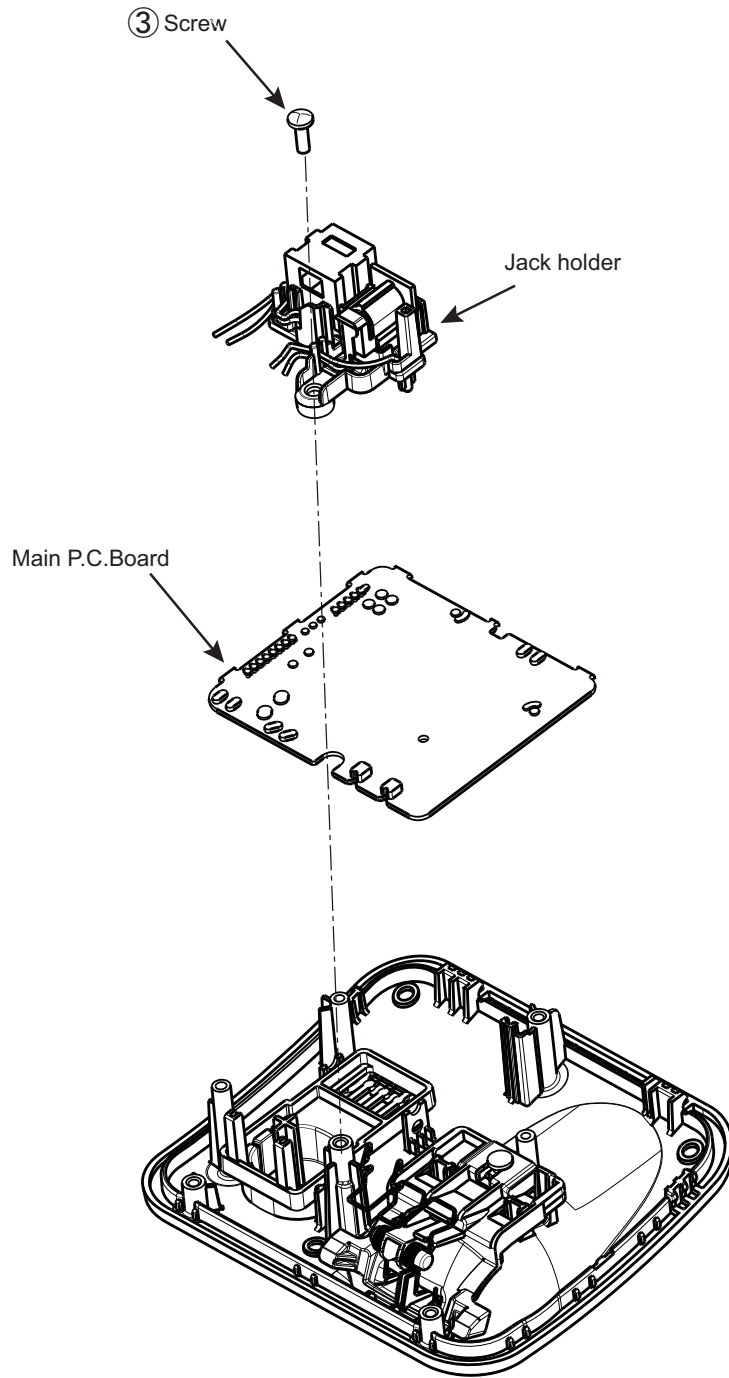
- ① Remove the 2 screws to remove the cabinet cover.



- ② Remove the solders.

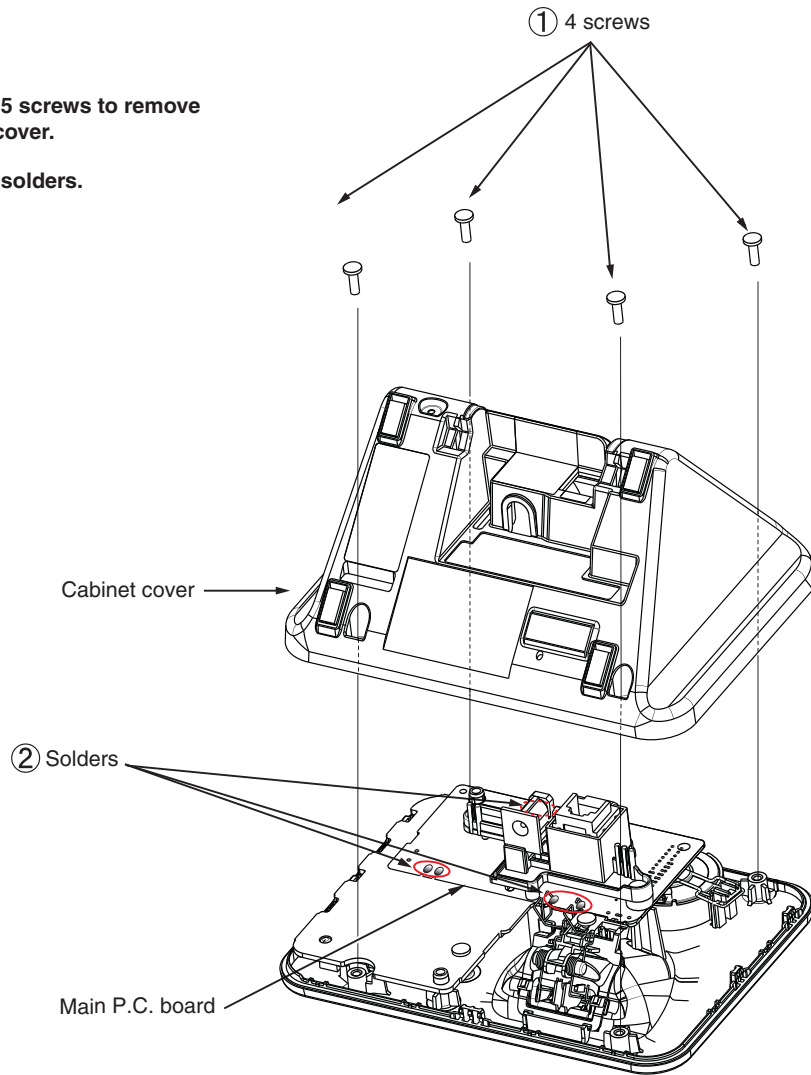


- ③ Remove the screw to remove the Jack Holder and Main P.C.Board.

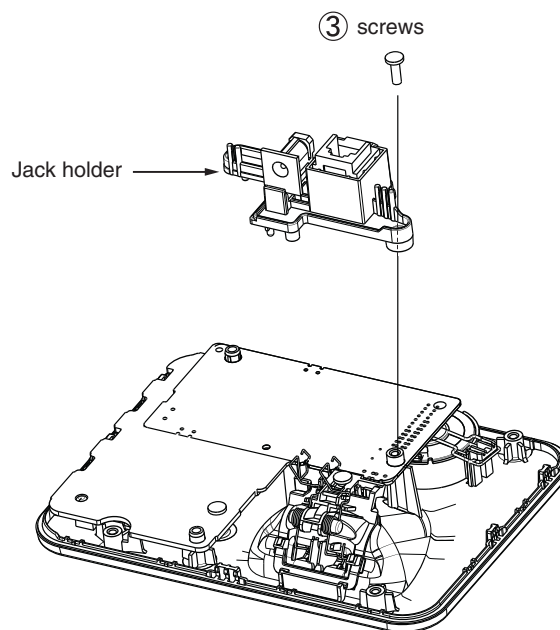


11.1.1.2. KX-TGE230

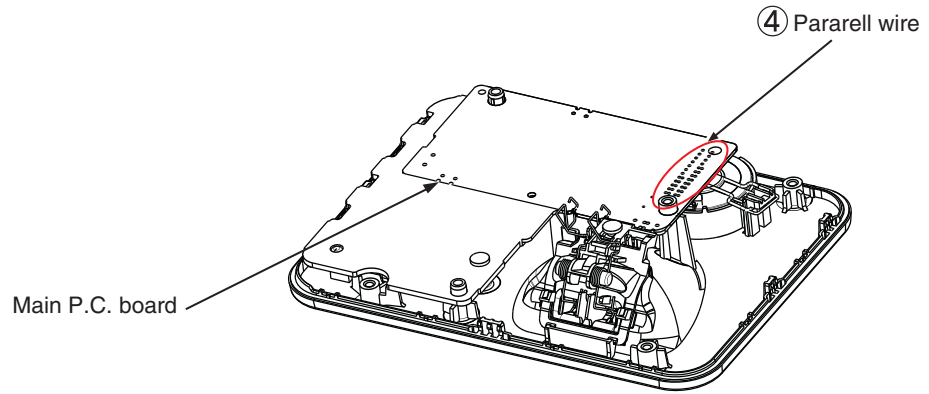
- ① Remove the 5 screws to remove the cabinet cover.
- ② Remove the solders.



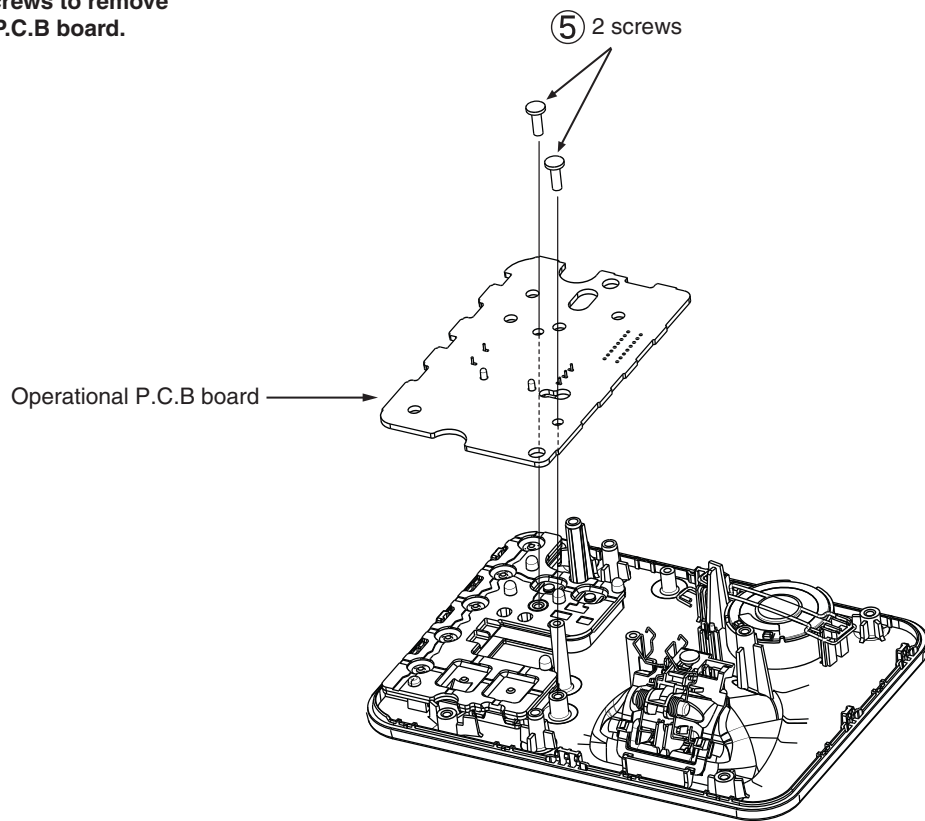
- ③ Remove the screw to remove the Jack Holder.



- ④ Remove the parallel wire to remove the main P.C. board.

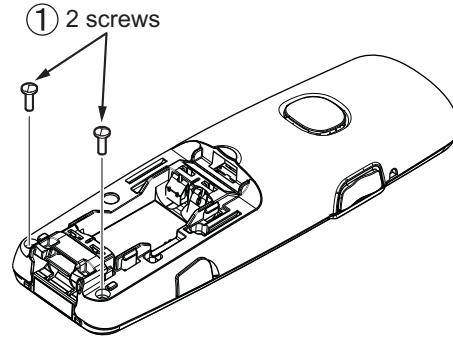


- ⑤ Remove the 5 screws to remove the operational P.C.B board.

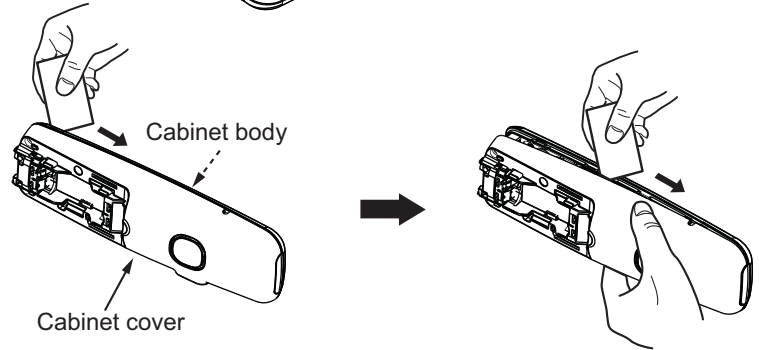


11.1.2. Handset

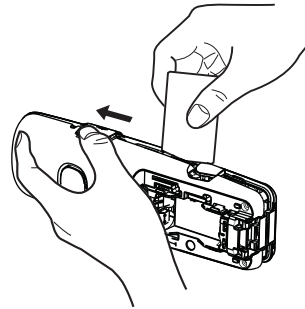
- ① Remove the 2 screws.



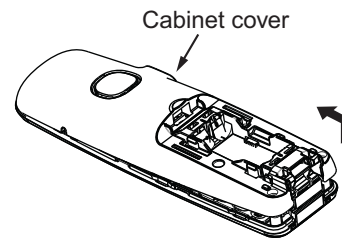
- ② Insert a plastic card. (Ex. Used SIM card etc.) between the cabinet body and the cabinet cover, then pull it along the gap to open the cabinet.



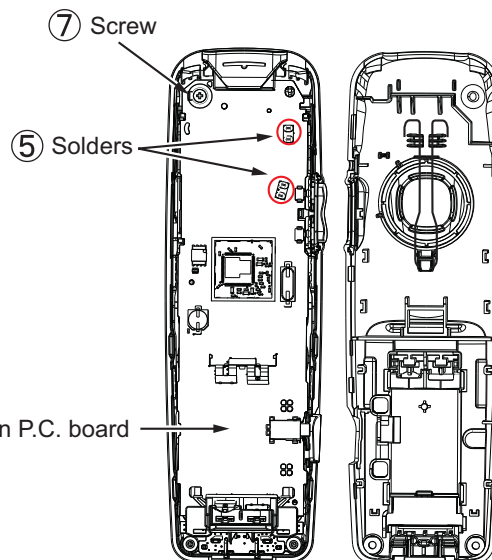
- ③ Likewise, open the other side of the cabinet.



- ④ Remove the cabinet cover by pushing it upward.



- ⑤ Remove the solders.



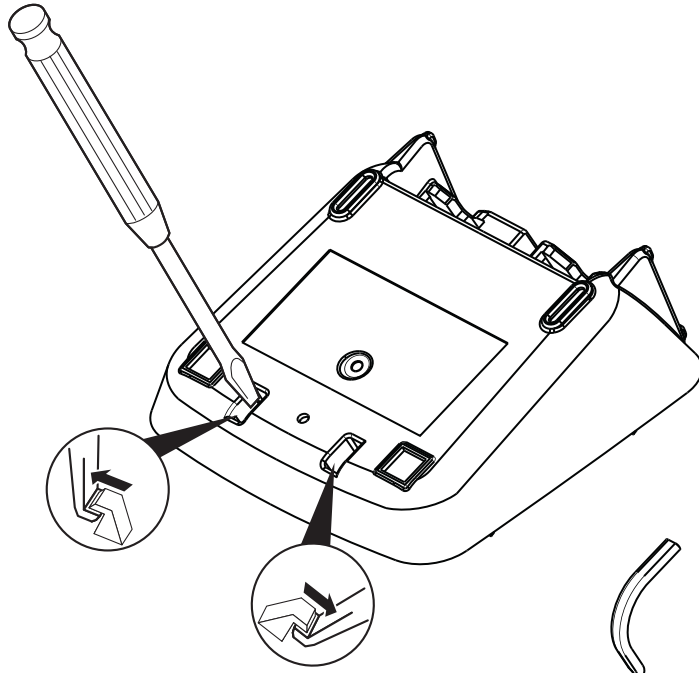
- ⑥ Remove the solders to remove the 2 charge terminals.

- ⑦ Remove the screw to remove the main P. C. board.

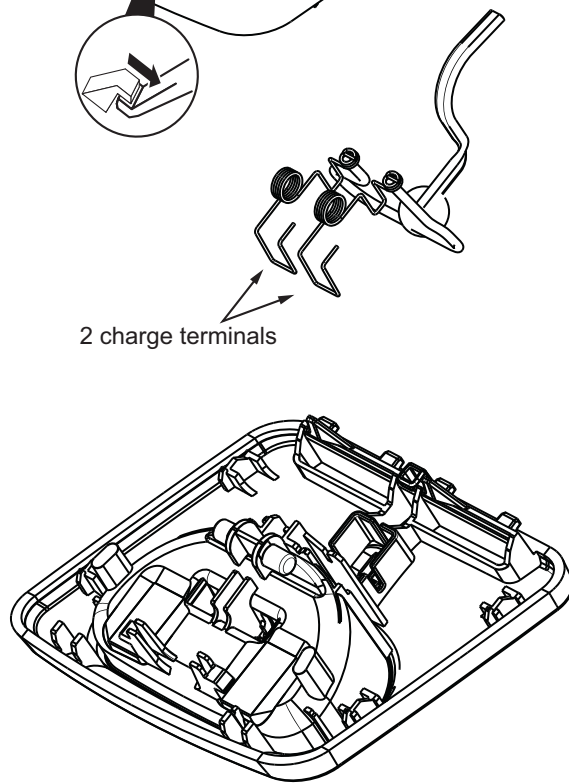
- ⑥ 2 charge terminals

11.1.3. Charger Unit

① Unhook the click of one side.



② Then unhook the other one.

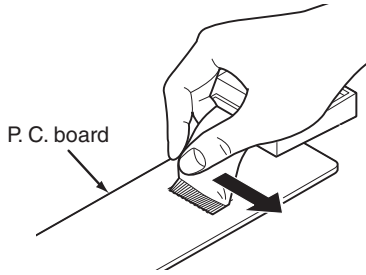


11.2. How to Replace the Handset LCD

Note:

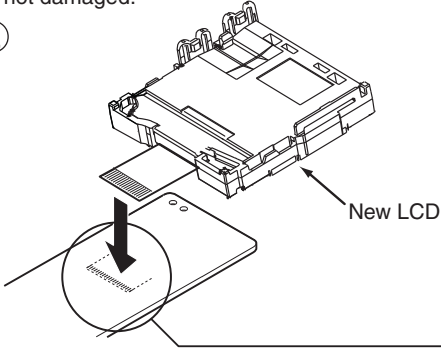
The illustrations are simplified in this page.
They may differ from the actual product.

①



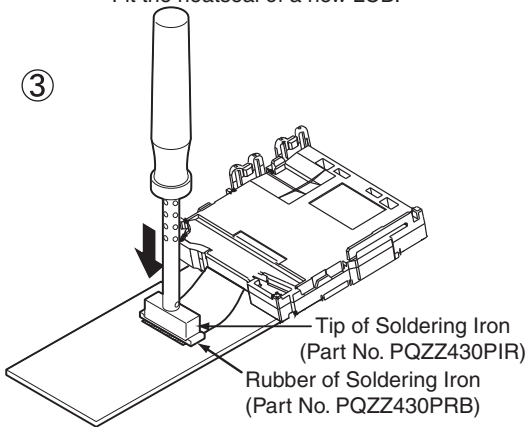
Peel off the FFC (Flexible Flat Cable) from the LCD, in the direction of the arrow. Take care to ensure that the foil on the P.C. board is not damaged.

②

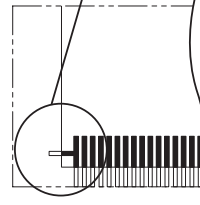
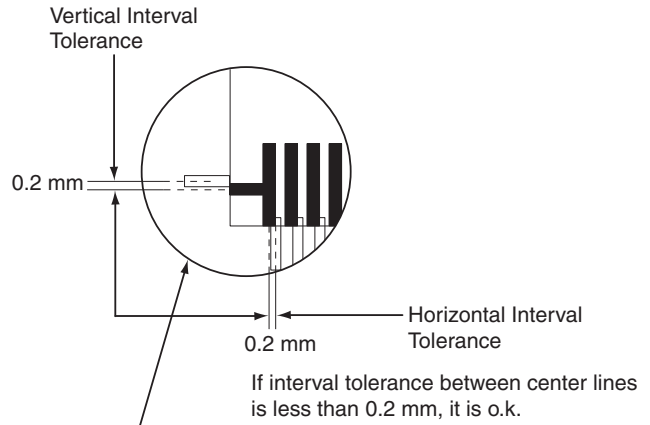


Fit the heatseal of a new LCD.

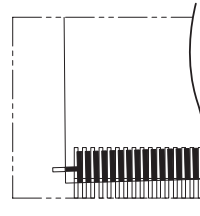
③



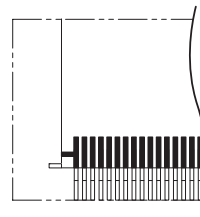
Heatweld with the tip of the soldering iron about 5 to 8 seconds (in case of 60W soldering iron).



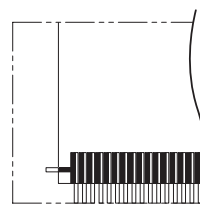
OK



NG
(Inclined)



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



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

12 Measurements and Adjustments

This chapter explains the measuring equipment, the JIG connection, and the PC setting method necessary for the measurement in **Troubleshooting Guide** (P.31)

12.1. Equipment Required

- Digital multi-meter (DMM): it must be able to measure voltage and current.
- Oscilloscope.
- Frequency counter: It must be precise enough to measure intervals of 1 Hz (precision; ±4 ppm)
Hewlett Packard, 53131A is recommended.
- DECT tester: Rohde & Schwarz, CMD 60 is recommended.
This equipment may be useful in order to precisely adjust like a mass production.

12.2. The Setting Method of JIG

<Preparation>

- Serial JIG cable: PQZZ1CD300E*
- PC which runs in DOS mode
- **Batch file CD-ROM** for setting: PNZZTGE230M

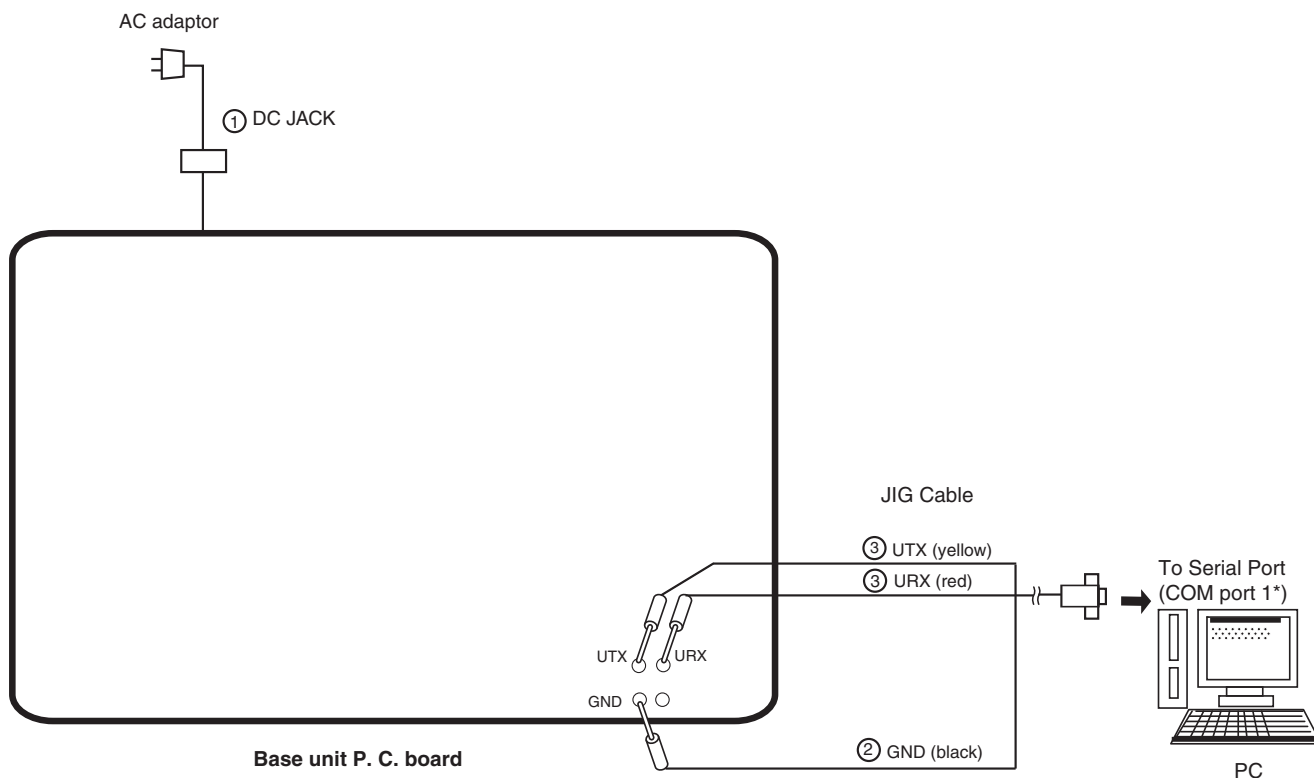
Note:

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

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

12.2.1. Connections (Base Unit)

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

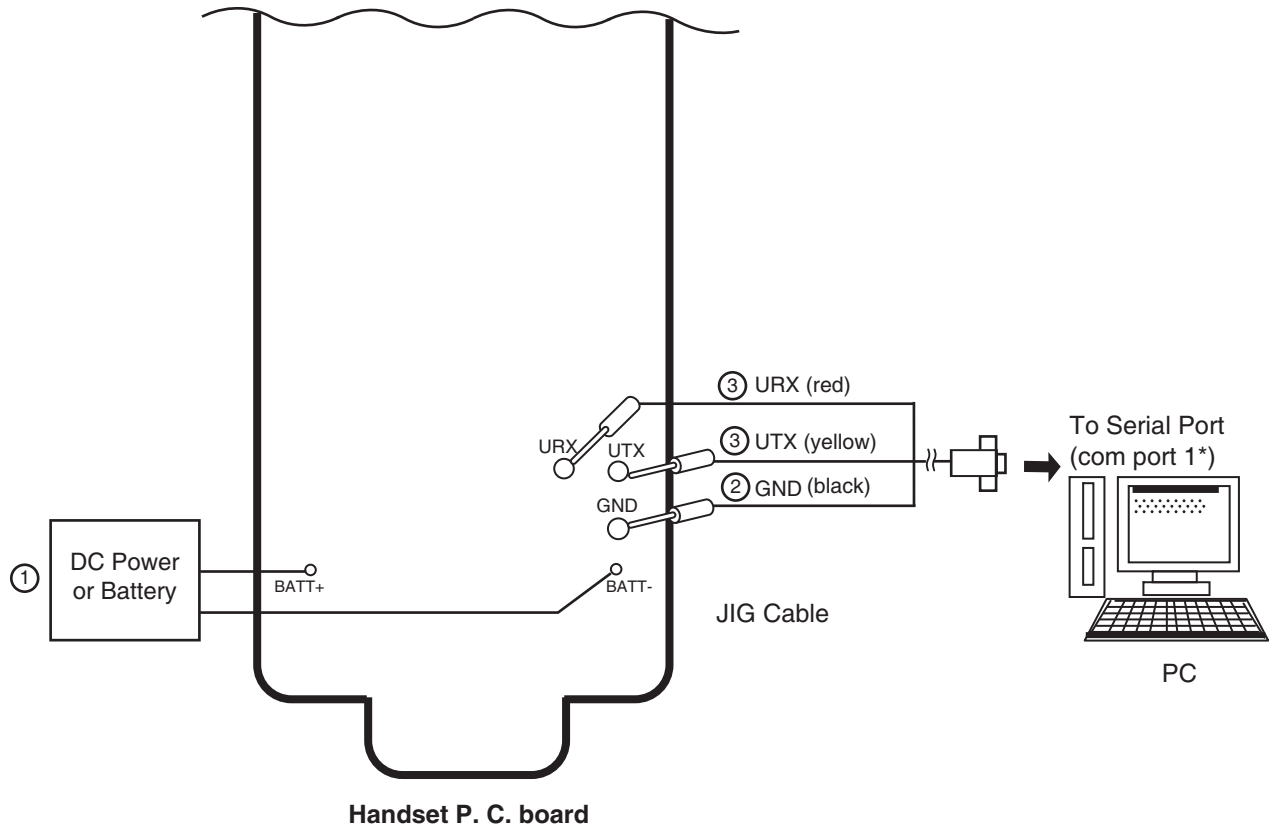


Note:

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

12.2.2. Connections (Handset)

- ① Connect the DC Power or Battery to BATT+ and BATT-.
- ② Connect the JIG cable GND (black) to GND.
- ③ Connect the JIG cable UTX (yellow) to UTX and URX (red) to URX.



Note:

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

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

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

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.

<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****>_
```

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: 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.

12.2.4. Commands

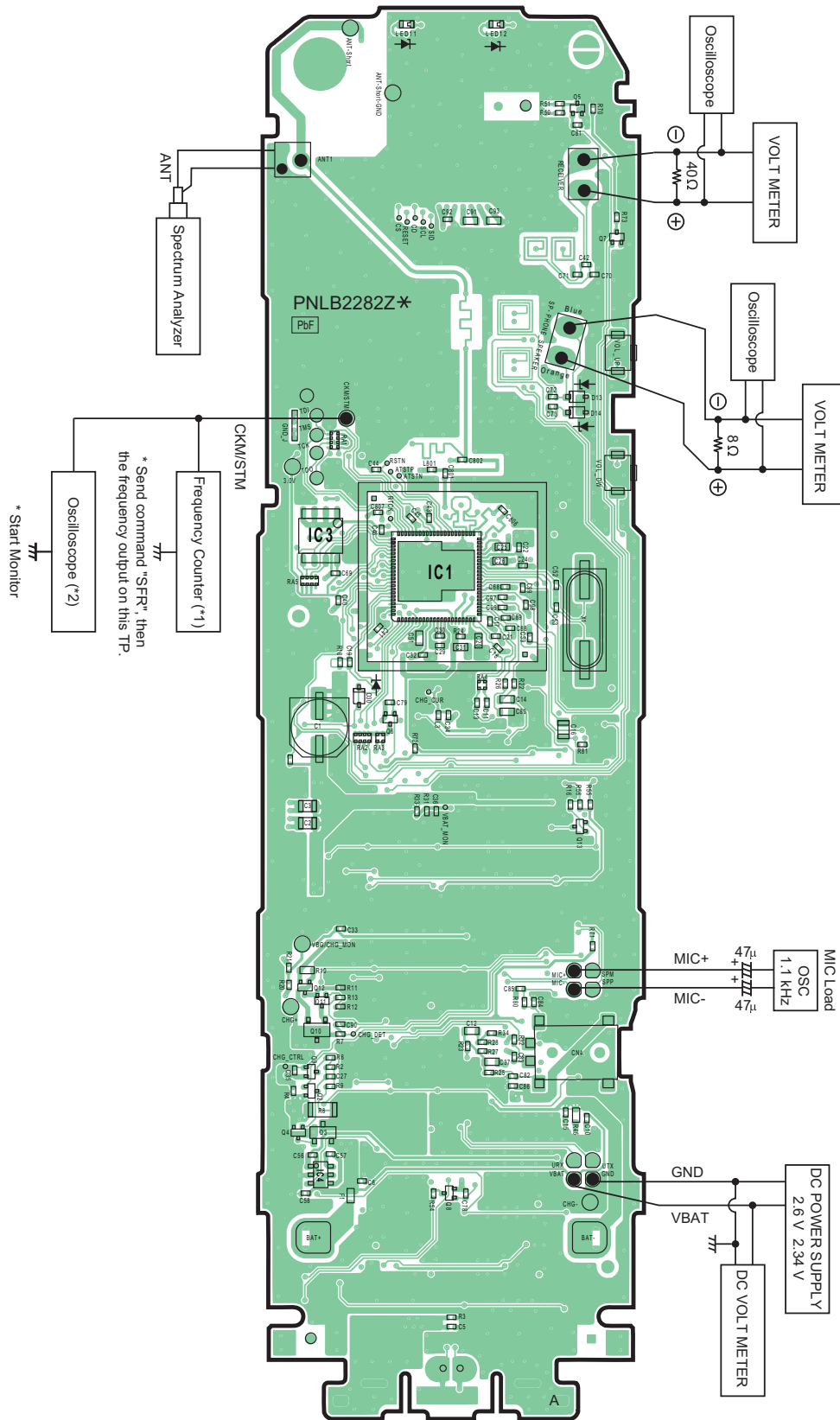
See the table below for frequently used commands.

Command name		Function	Example
rdeeprom		Read the data of EEPROM	Type "rdeeprom 00 00 FF", and the data from address "00 00" to "FF" is read out.
readid		Read ID (RFPI)	Type "readid", and the registered ID is read out.
writeid		Write ID (RFPI)	Type "writeid 00 18 E0 0E 98", and the ID "0018 E0 0E 98" is written.
hookoff		Off-hook mode on Base	Type "hookoff".
hookon		On-hook mode on Base	Type "hookon".
getchk (Base unit)		Read checksum	Type "getchk".
How to use of "getchk" in Handset	1.rdeeprom	Read EEPROM	Type "RdEeprom 03 7D 04", and the data from address "03 7D" to "03 80" is read out *This command gets 4 byte "WW", "XX", "YY", "ZZ". *Please NEVER forget these 4 byte data!
	2.sendchar epw	Write EEPROM	Type "sendchar epw 03 7D 04 FF FF FF FF"
	3.sendchar RST	Reset baseset	Type "sendchar RST"
	4.getchk	Read checksum	Type "getchk".
	5.sendchar epw	Write EEPROM	Type "sendchar epw 03 7D 04 WW XX YY ZZ" **"WW", "XX", "YY", "ZZ" is 4 byte data that already read from same address.
wreeprom		Write the data of EEPROM	Type "wreeprom 01 23 45". "01 23" is address and "45" is data to be written.
bursttx		Burst TX mode	Type "bursttx"
testrx		Burst RX mode	Type "testrx"
tph		Keep TX power high	Type "tph"
tpl		Keep TX power low	Type "tpl"

12.4. Adjustment Standard (Handset)

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

12.4.1. Component View



Note:

- (*1) refers to No.2 of Check Check Table for RF part (P.41)
- (*2) refers to Power Supply Circuit/Reset Circuit (P.22)

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

If repairing or replacing 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.

12.5.1. How to download the data

12.5.1.1. Base Unit

First, operate the PC setting according to **The Setting Method of JIG** (P.52).

Then download the appropriate data according to the following procedures.

Items		How to download/Required adjustment
BBIC(IC501)	Programming data is stored in memory.	1) System Clock 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 "AA" to download the data. 2) Default batch file: Execute the command "default.bat". 3) Country version batch file: Execute the command "TG49WW_US_US_RevXXX_YYY.bat". (*1) 4) System Clock adjustment
X'tal (X1)	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.(10.368MHz \pm 41Hz). 4) If the frequency is not 10.368MHz \pm 41Hz, adjust the frequency of CLK executing the command "sendchar sfr xx xx (where xx is the value)" so that the reading of the frequency counter is 10.368MHz \pm 5Hz.

Note:

(*1) WW: model number, XXX_YYY: revision number, ZZZ:Voice prompt, AA: Baud rate(9600/19200/57600/115200)

"XXX_YYY" and "ZZZ" vary depending on the country version. You can find them in the batch file, PNZZ- mentioned in **The Setting Method of JIG** (P.52).

12.5.1.2. Handset

First, operate the PC setting according to **The Setting Method of JIG** (P.52).

Then download the appropriate data according to the following procedures.

Items		How to download/Required adjustment
BBIC(IC1)	Programming data is stored in memory.	1) System Clock adjustment.
EEPROM (IC3)	Adjusted parameter data is stored in memory. (country version batch file, default batch file, etc.)	1) Default batch file: Execute the command "default.bat". 2) Default batch file (remaining): Execute the command "TGEA20_US_DEF_RevXXX_YYY.bat". (*2) 3) Country version batch file: Execute the command "TGEA20_US_US_RevXXX_YYY.bat". (*2) 4) System Clock adjustment 5) 2.35 V setting and battery low detection
X'tal (X1)	System clock	1) Apply 2.6V between BATT+ and BATT- with DC power. 2) Input Command " sendchar sfr", then you can confirm the current value. 3) Check X'tal Frequency.(13.824 MHz \pm 100 Hz). 4) If the frequency is not 13.824 MHz \pm 100 Hz, adjust the frequency of CLK executing the command "sendchar sfr xx xx (where xx is the value)" so that the reading of the frequency counter is 13.824000 MHz \pm 5 Hz.

Note:

(*2) XXX_YYY: revision number

"XXX_YYY" vary depending on the country version. You can find them in the batch file, PNZZ- mentioned in **The Setting Method of JIG** (P.52).

12.6. Frequency Table

	Ch. (hex)	TX/RX Frequency (MHz)
Channel 0	00	1928.448
Channel 1	01	1926.720
Channel 2	02	1924.992
Channel 3	03	1923.264
Channel 4	04	1921.536

13 Miscellaneous

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

Note:

This description only applies to the model with Shield case.

13.1.1. Preparation

- PbF (: Pb free) Solder
- Soldering Iron
Tip Temperature of 700 °F ± 20 °F (370 °C ± 10 °C)

Note:

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

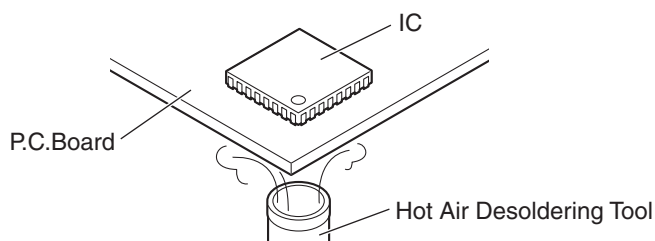
- Hot Air Desoldering Tool
Temperature: 608 °F ± 68 °F (320 °C ± 20 °C)

13.1.2. Caution

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

13.1.3. How to Remove the IC

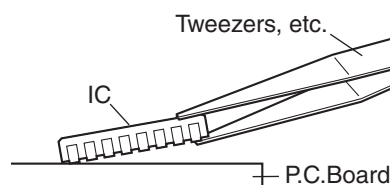
1. Heat the IC with a hot air desoldering tool through the P.C.Board.



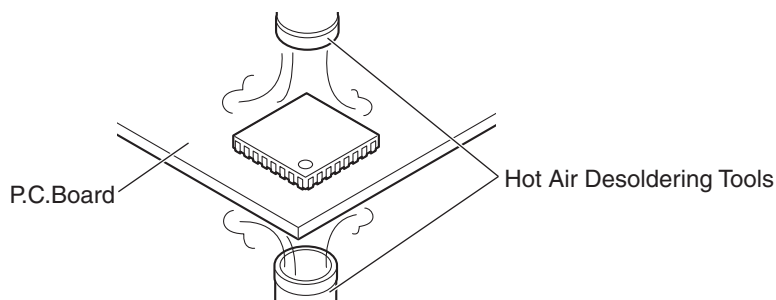
2. Pick up the IC with tweezers, etc. when the solder is melted completely.

Note:

- Be careful not to touch the peripheral parts with tweezers, etc. They are unstable.



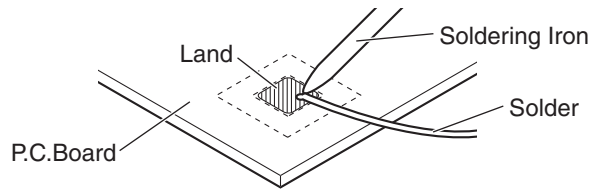
When it is hard to melt the solder completely, heat it with a hot air desoldering tool through the IC besides through the P.C.Board.



3. After removing the IC, clean the P.C.Board of residual solder.

13.1.4. How to Install the IC

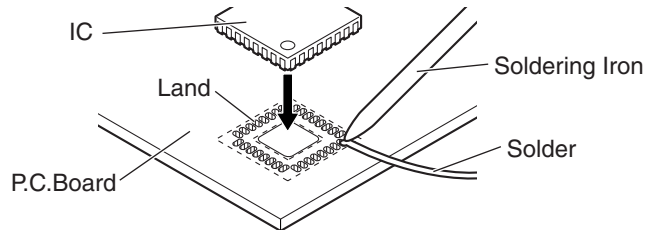
1. Place the solder a little on the land where the radiation GND pad on IC bottom is to be attached.



2. Place the solder a little on the land where IC pins are to be attached, then place the IC.

Note:

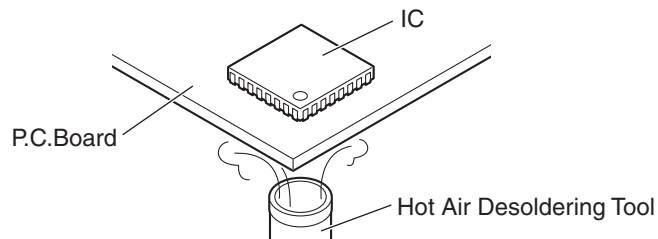
- When placing the IC, the positioning should be done very carefully.



3. Heat the IC with a hot air desoldering tool through the P.C.Board until the solder on IC bottom is melted.

Note:

- Be sure to place it precisely, controlling the air volume of the hot air desoldering tool.



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

13.2. How to Replace the Flat Package IC

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

13.2.1. Preparation

- PbF (: Pb free) Solder

- Soldering Iron

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

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

- Flux

Recommended Flux: Specific Gravity → 0.82.

Type → RMA (lower residue, non-cleaning type)

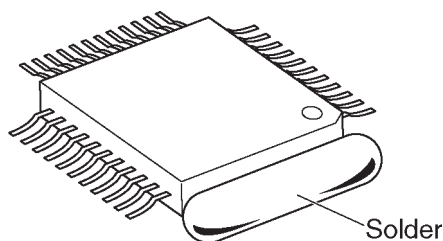
Note: See **About Lead Free Solder (PbF: Pb free) (P.5)**

13.2.2. How to Remove the IC

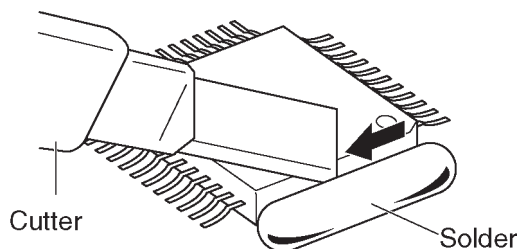
1. Put plenty of solder on the IC pins so that the pins can be completely covered.

Note:

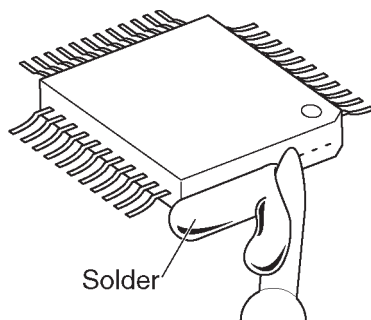
If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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



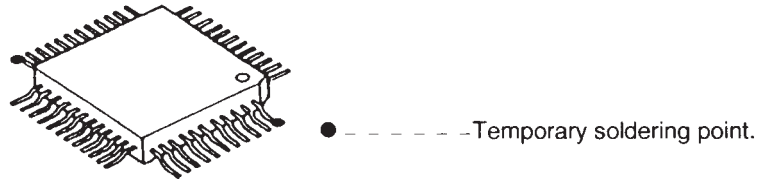
3. While the solder melts, remove it together with the IC pins.



When you attach a new IC to the board, remove all solder left on the board with some tools like a soldering wire. If some solder is left at the joint on the board, the new IC will not be attached properly.

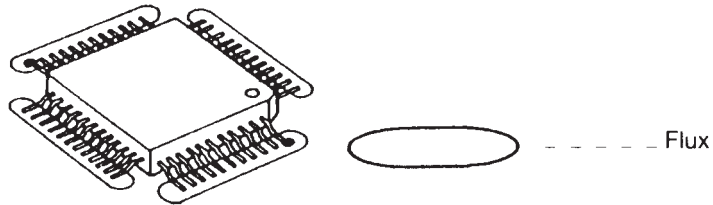
13.2.3. How to Install the IC

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

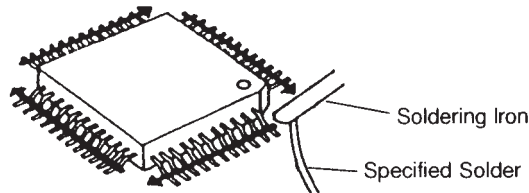


*Check the accuracy of the IC setting with the corresponding soldering foil.

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

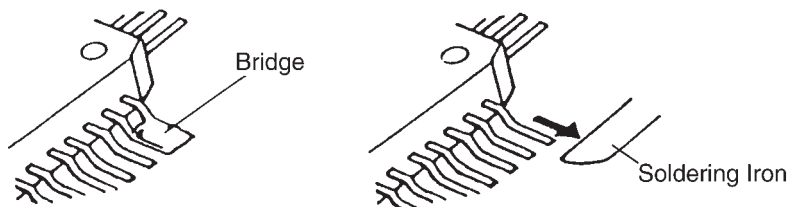


3. Solder the pins, sliding the soldering iron in the direction of the arrow.



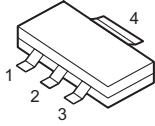
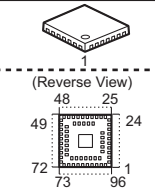
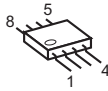

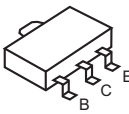
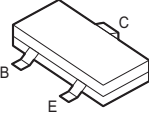

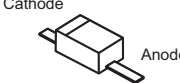

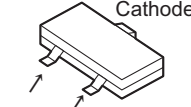
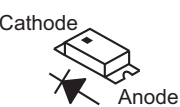
13.2.4. How to Remove a Solder Bridge

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

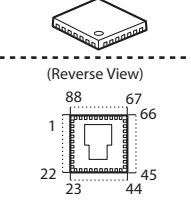
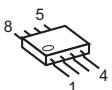
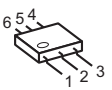
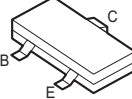

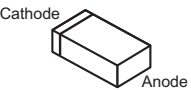
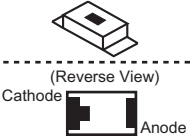


13.3. Terminal Guide of the ICs, Transistors and Diodes

13.3.1. Base Unit

 <p>C0DBEYY00102</p>	 <p>(Reverse View) C1CB00003663</p>	 <p>PNW11TGE230H PNW12TGE230H PNW13TGE230H</p>	 <p>B1ACGP000008</p>	 <p>DSC7003S0L</p>
 <p>B1ABDM000001, B1ADGE000012 B1ADNB000003, 2SC6054JSL 2SA1576S, B1GBCFYY0020</p>	 <p>B0EDER000009</p>	 <p>DY2J25000L</p>	 <p>B0ECKM000008</p>	
 <p>B0DDCD000001</p>	 <p>B3AAB0000347</p>			

13.3.2. Handset

 <p>(Reverse View) C2HBCY000142</p>	 <p>PNWITGEA20R</p>	 <p>C0DBZYY00357</p>	 <p>B1ADCF000040 DRC9113Z0L 2SC6054JSL B1ADNB000003</p>	 <p>B1ABGE000011</p>
 <p>B0BC4R3A0006</p>	 <p>(Reverse View) B3ACB0000190</p>			

Memo

14 Schematic Diagram

14.1. For Schematic Diagram

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

Notes:

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

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

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

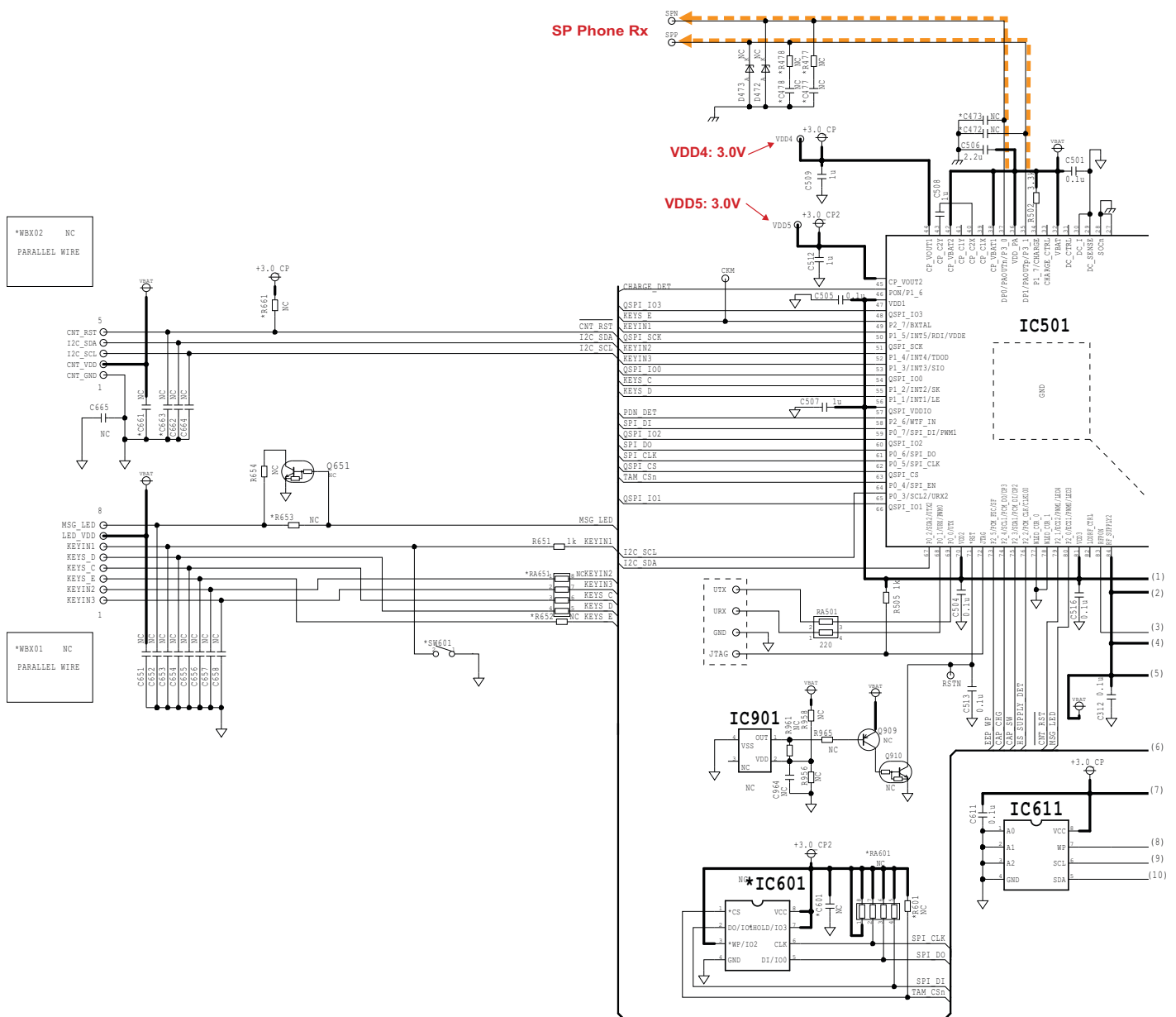
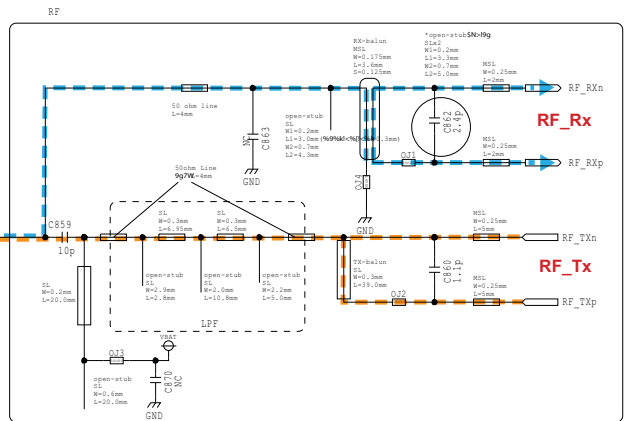
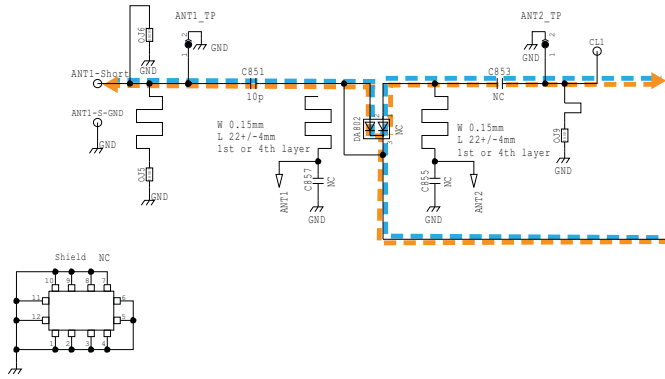
14.1.2. Handset (Schematic Diagram (Handset_Main))

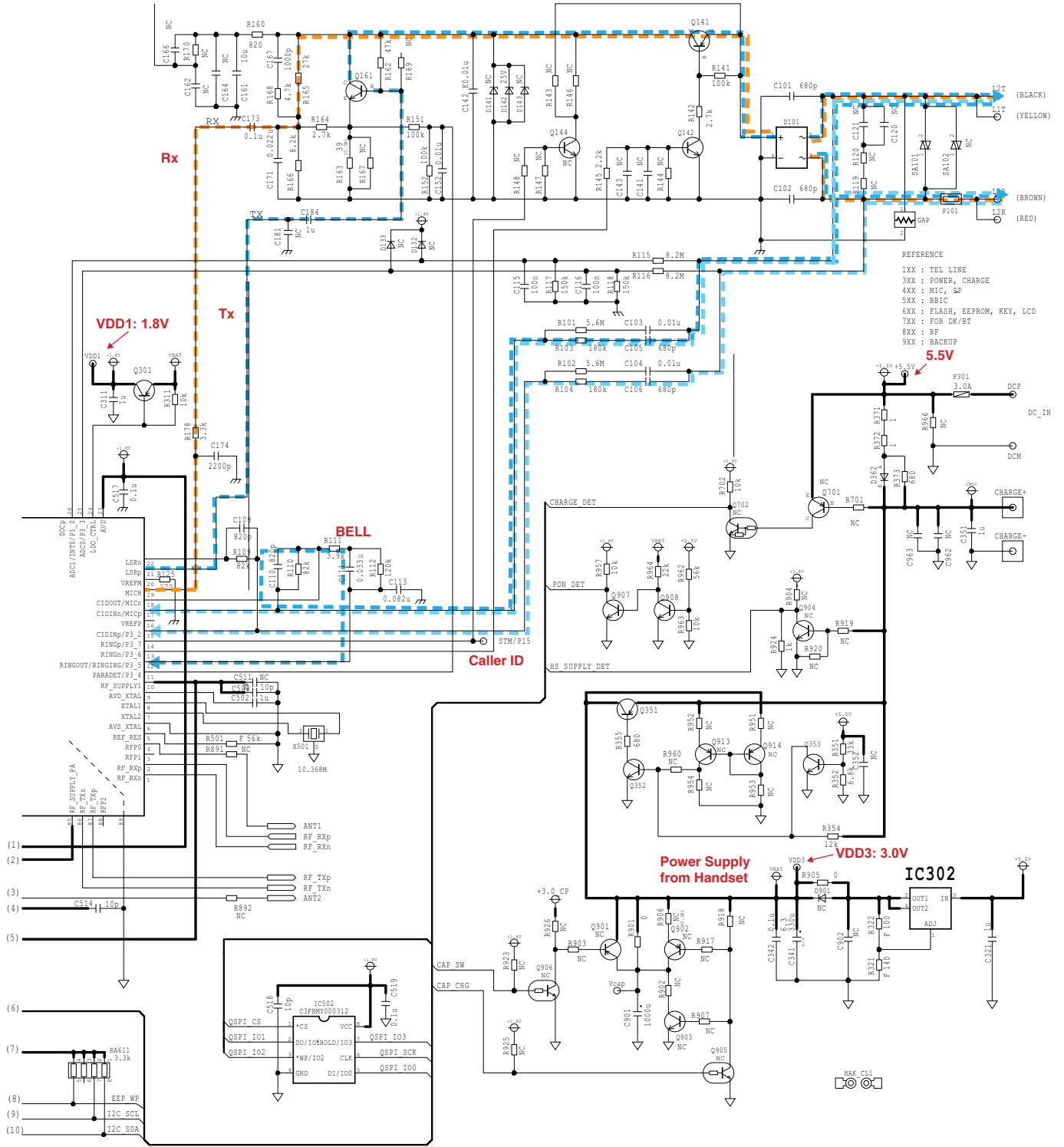
Notes:

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

14.2. Schematic Diagram (Base Unit_Main)

14.2.1. KX-TGE210

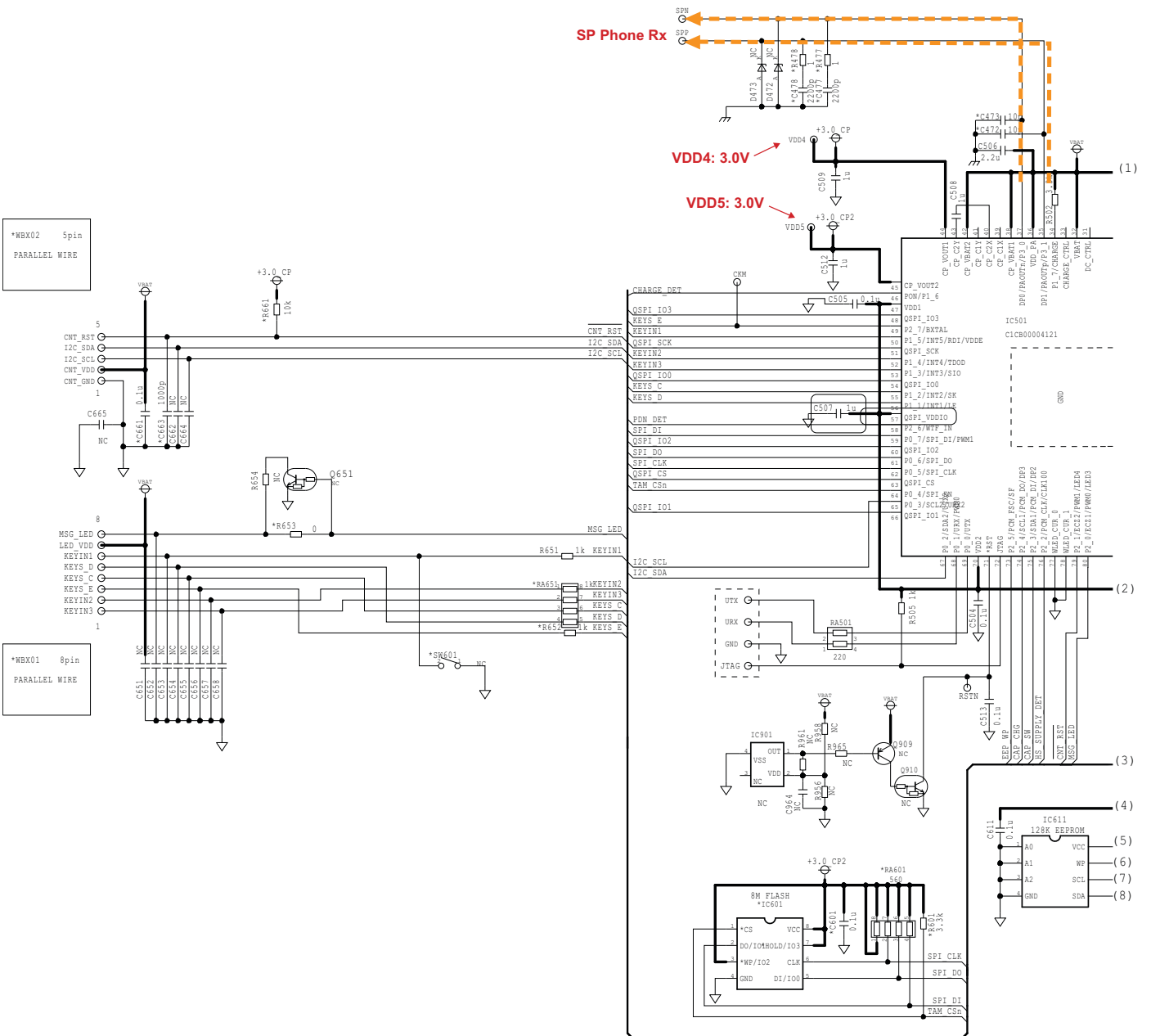
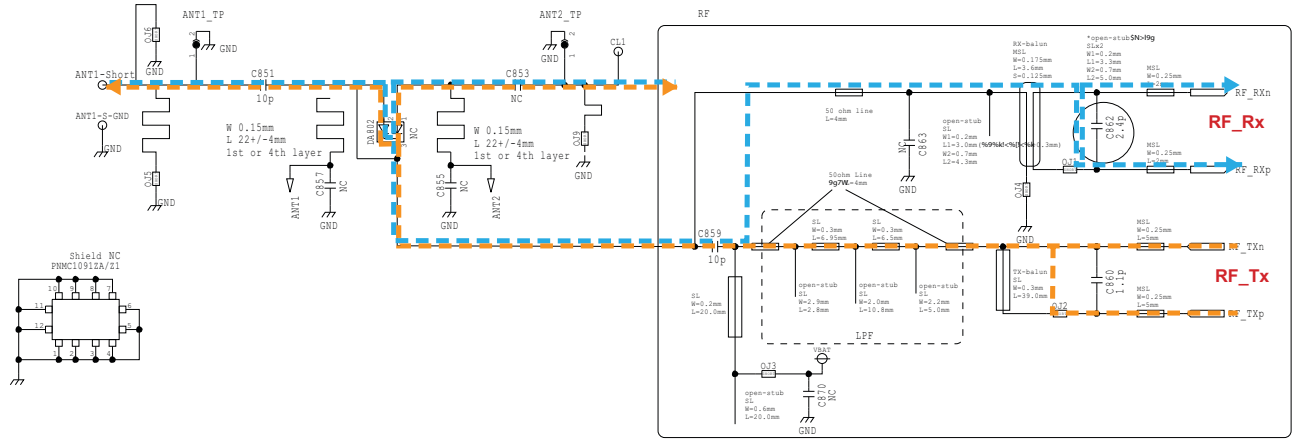


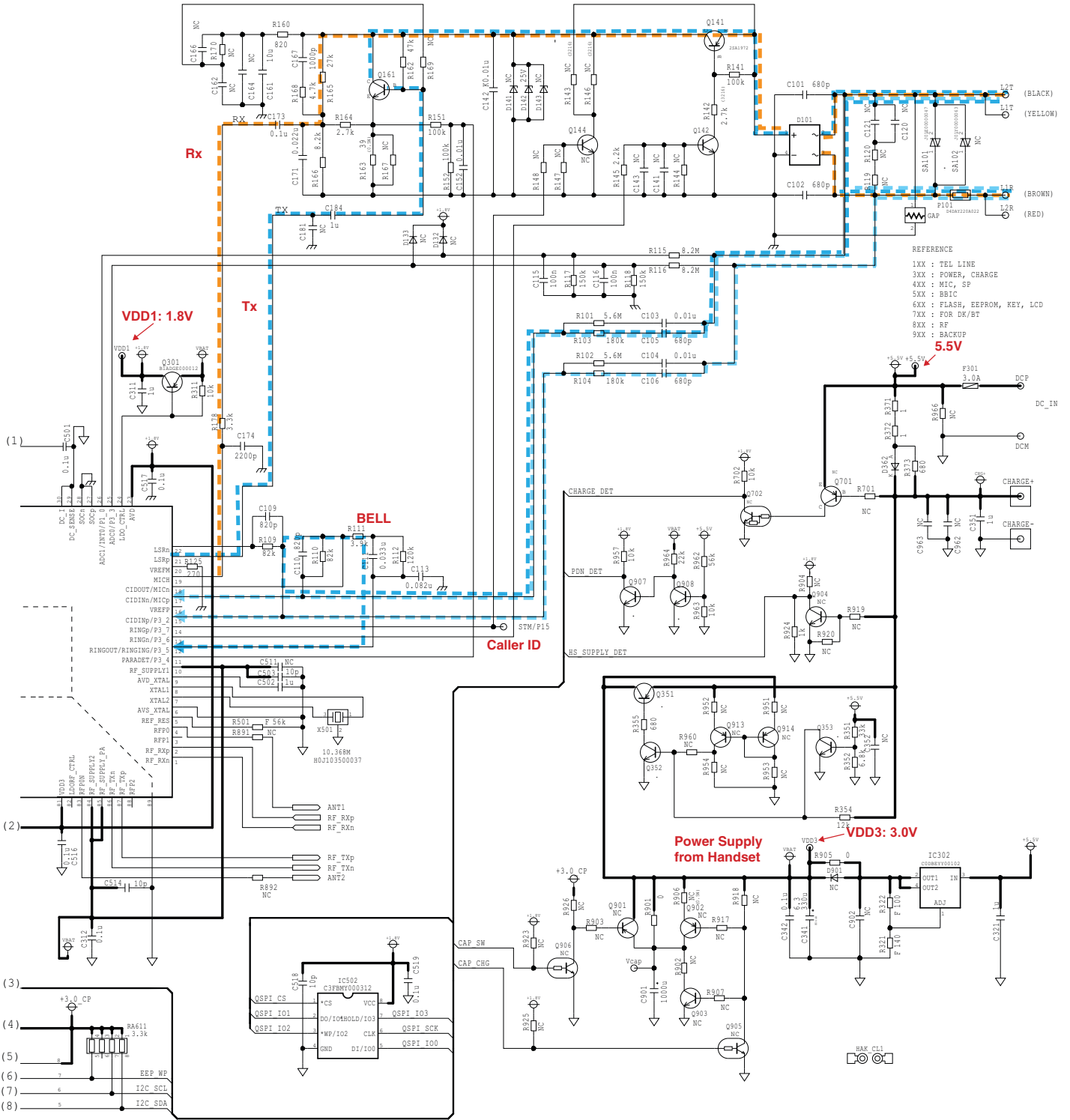


NC: No Components

KX-TGE210/212 SCHEMATIC DIAGRAM (Base Unit (Main))

14.2.2. KX-TGE230

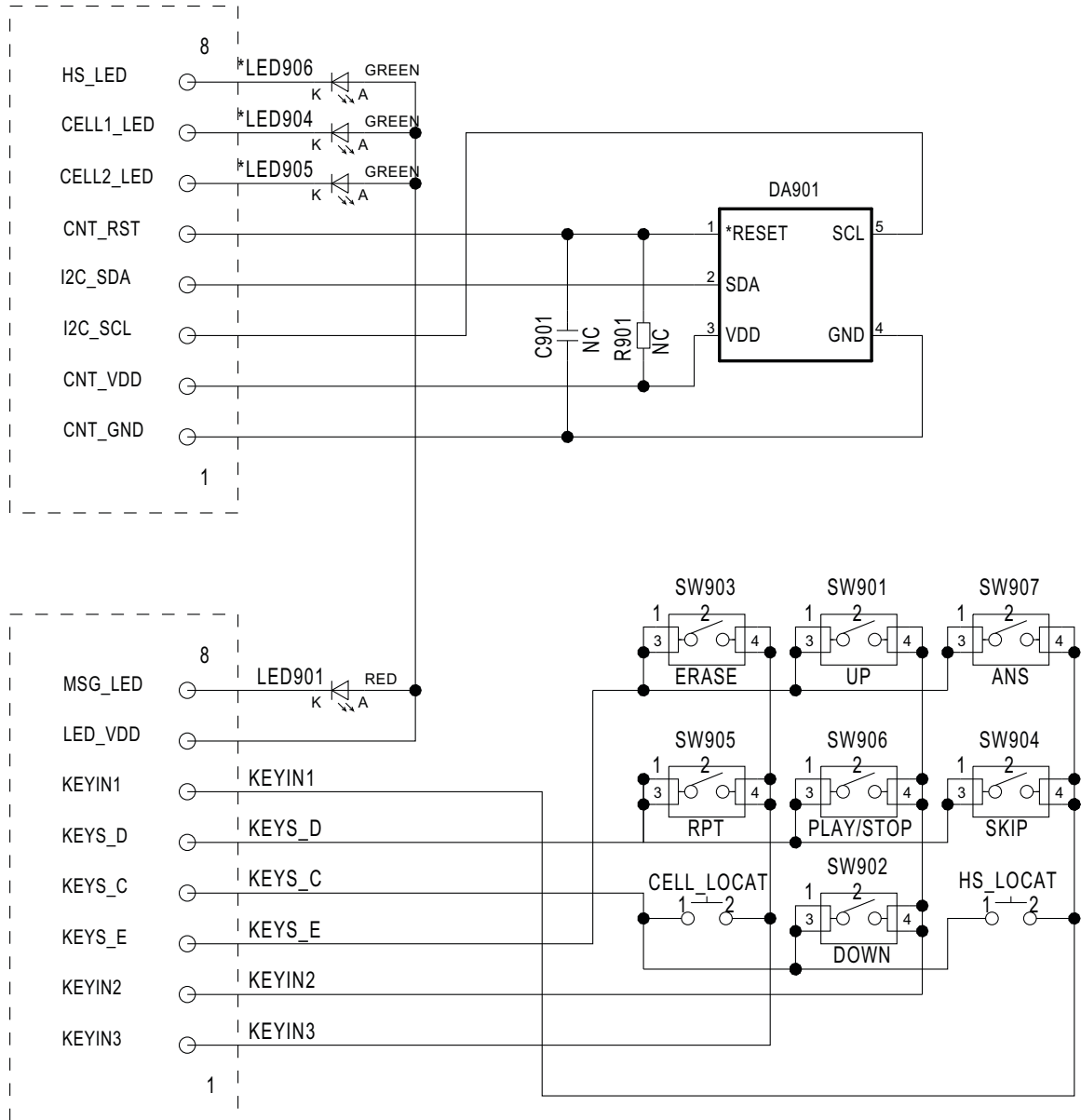




KX-TGE232/233/234 SCHEMATIC DIAGRAM (Base Unit (Main))

14.3. Schematic Diagram (Base Unit_Operation)

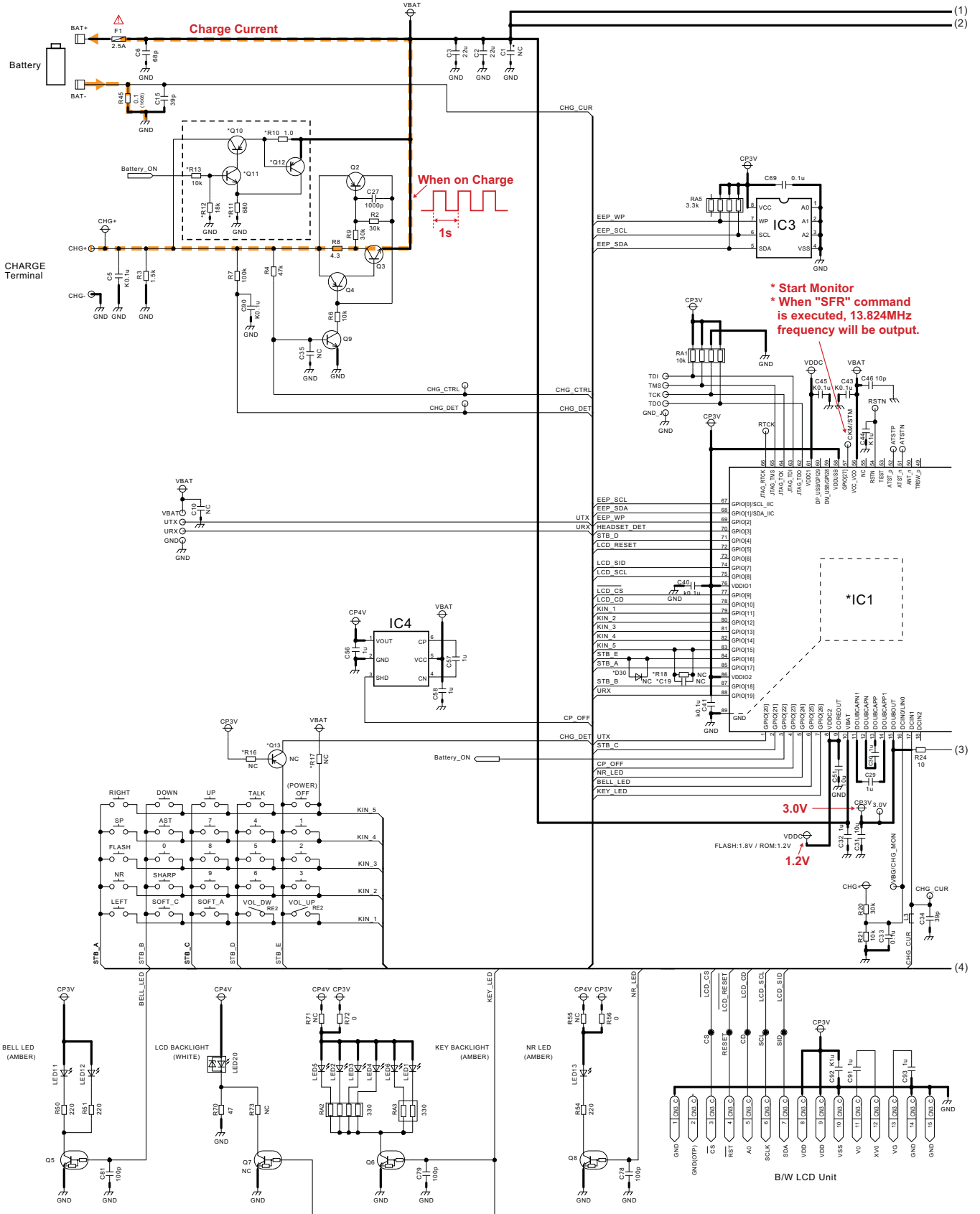
14.3.1. KX-TGE230



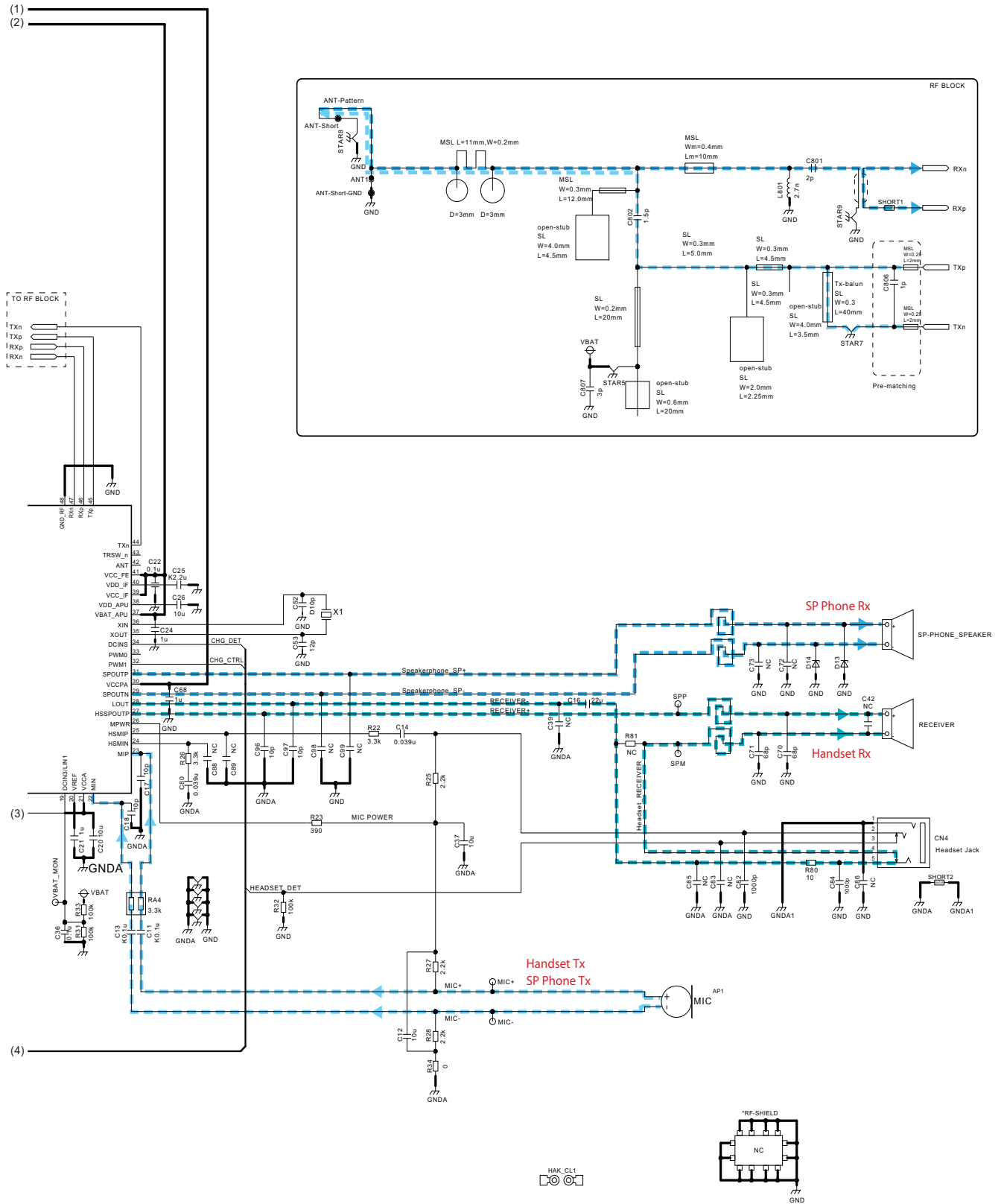
KX-TGE232/233/234 SCHEMATIC DIAGRAM (Base Unit_Operation)

Memo

14.4. Schematic Diagram (Handset_Main)



NC: No Components



NC: No Components

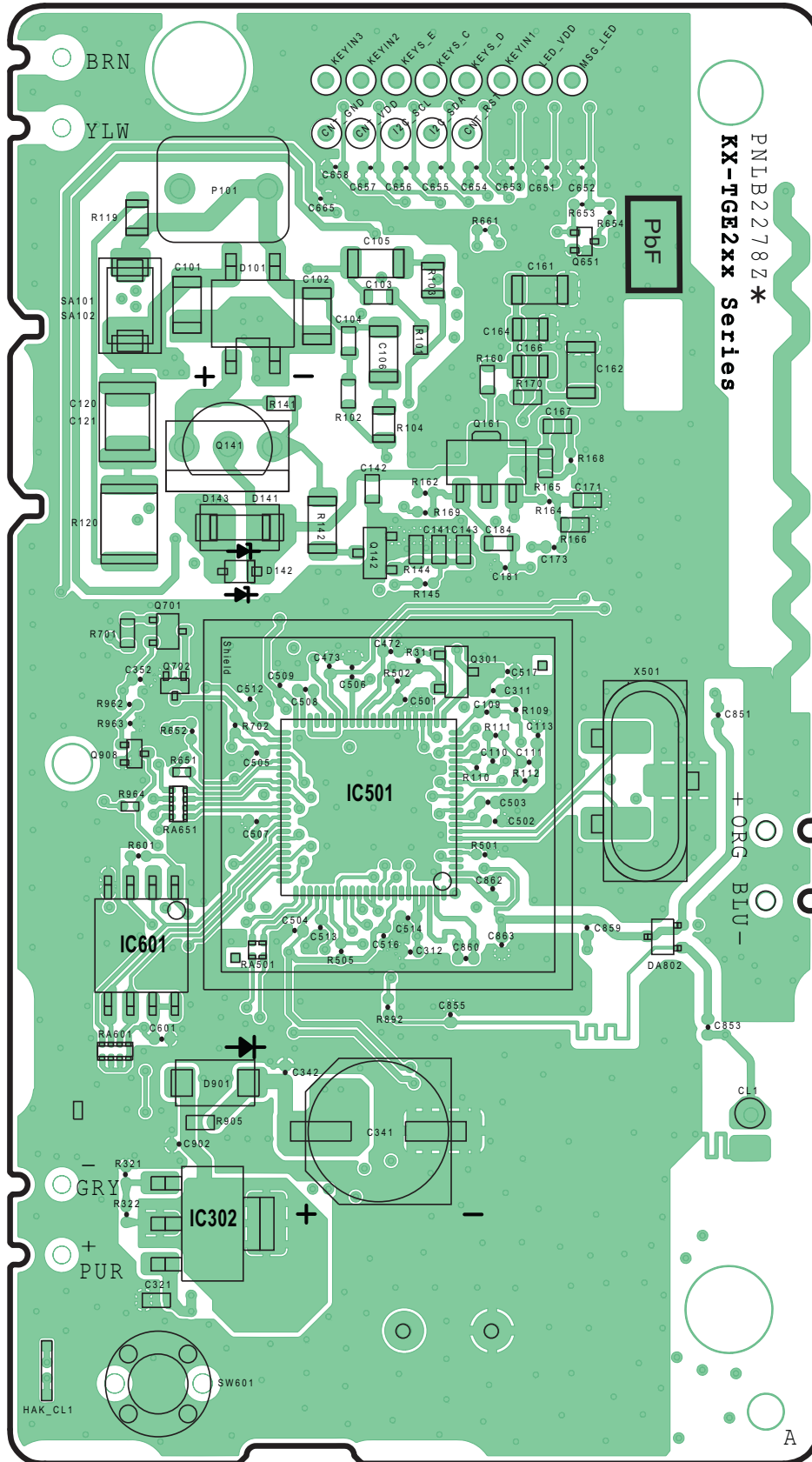
KX-TGEA20 SCHEMATIC DIAGRAM (Handset_Main)

Memo

15 Printed Circuit Board

15.1. Circuit Board (Base Unit_Main)

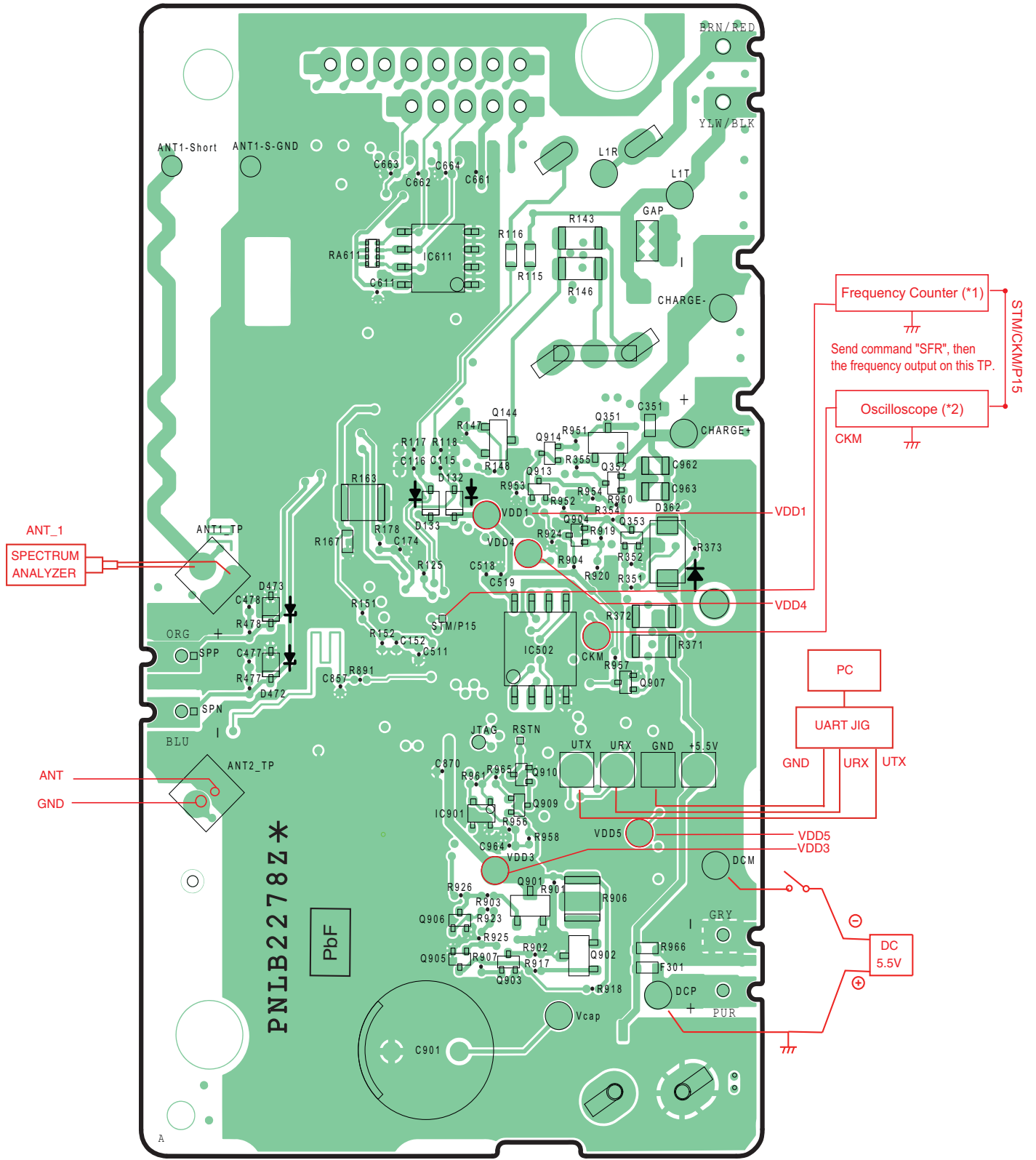
15.1.1. Component View



KX-TGE210/212/232/233/234

CIRCUIT BOARD (Base Unit_Main (Component View))

15.1.2. Bottom View

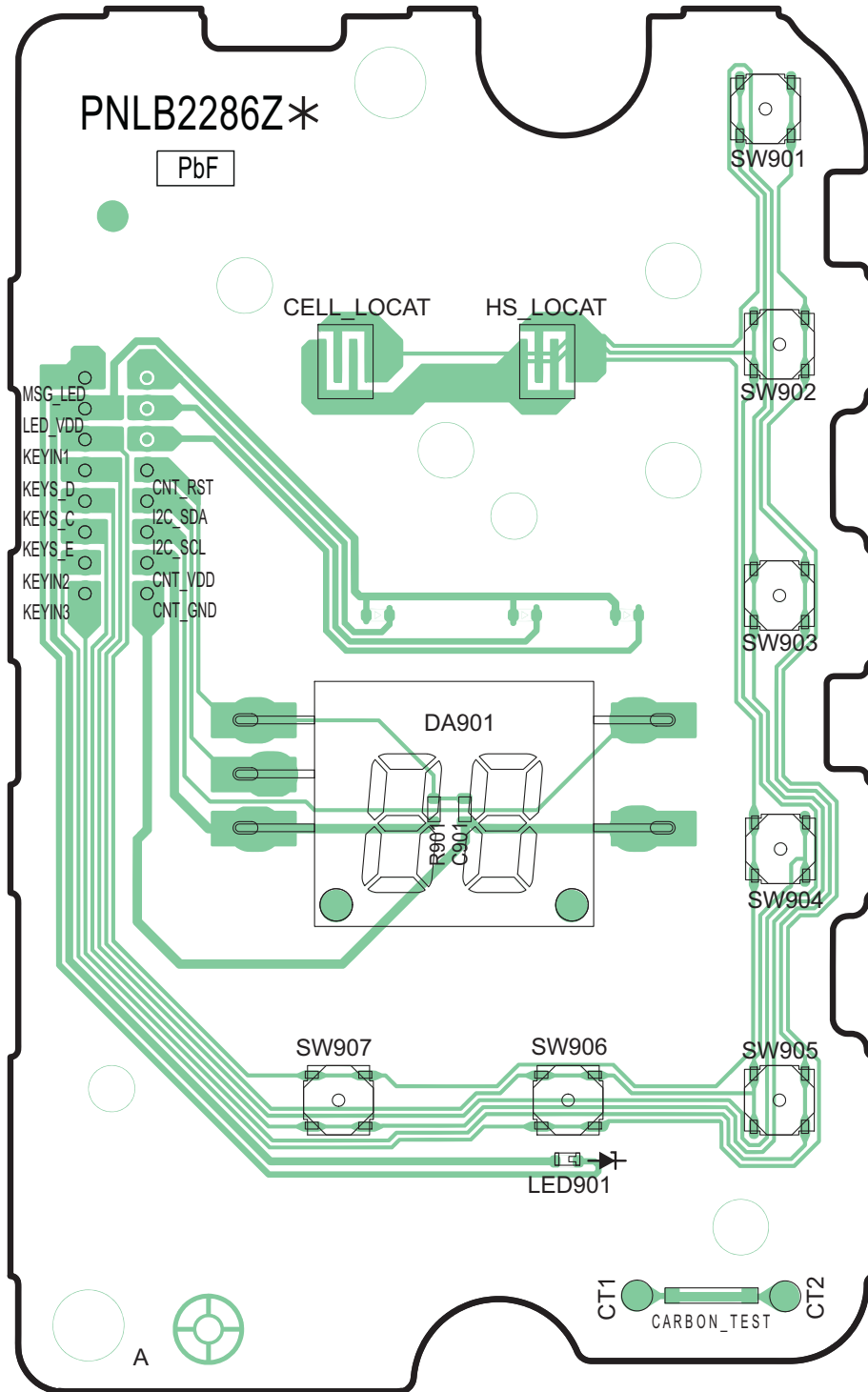


KX-TGE210/212/232/233/234

CIRCUIT BOARD (Base Unit_Main (Bottom View))

15.2. Circuit Board (Base Unit_Operation)

15.2.1. KX-TGE230

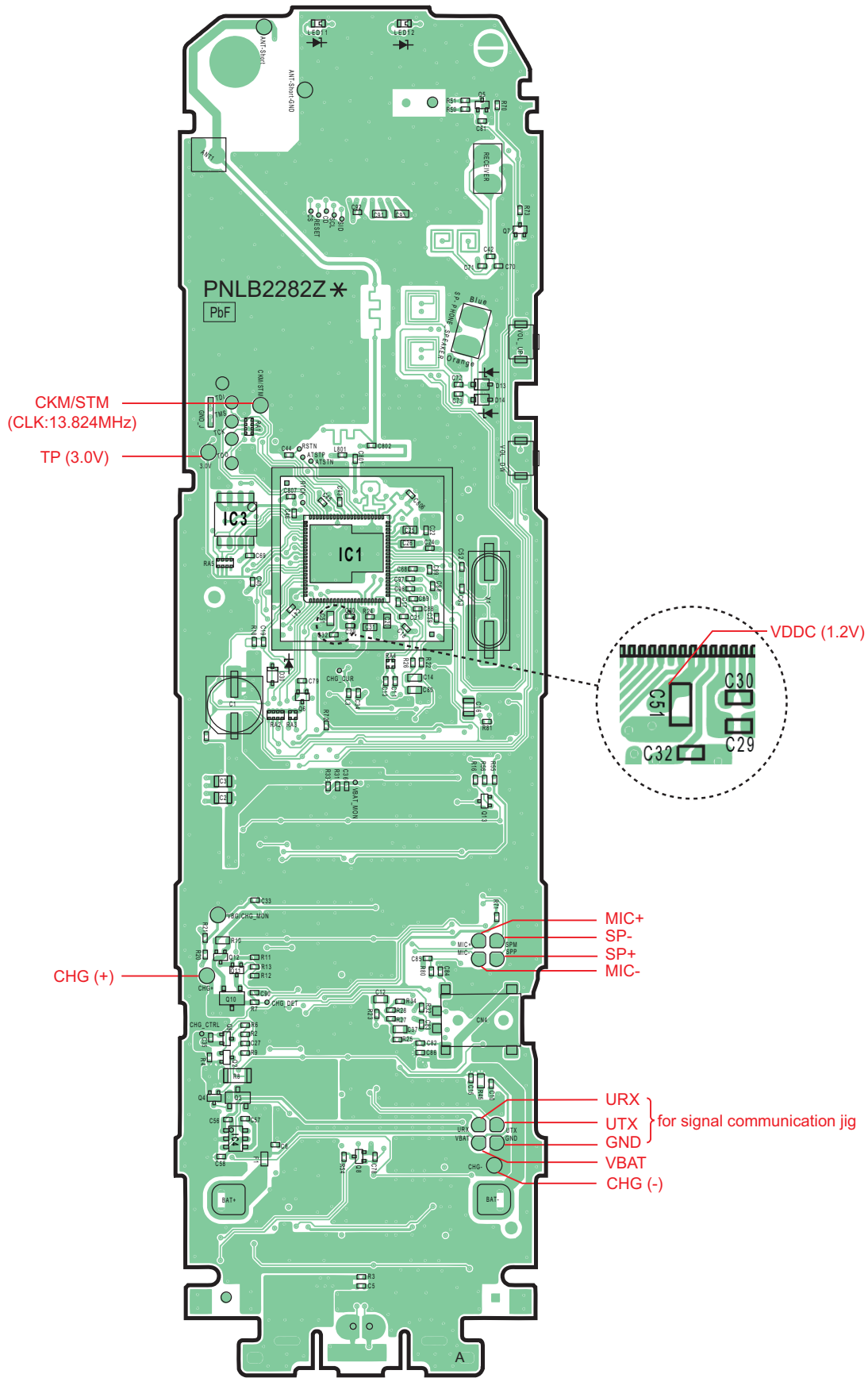


KX-TGE232/233/234
CIRCUIT BOARD (Base Unit_Operation (Component View))

Memo

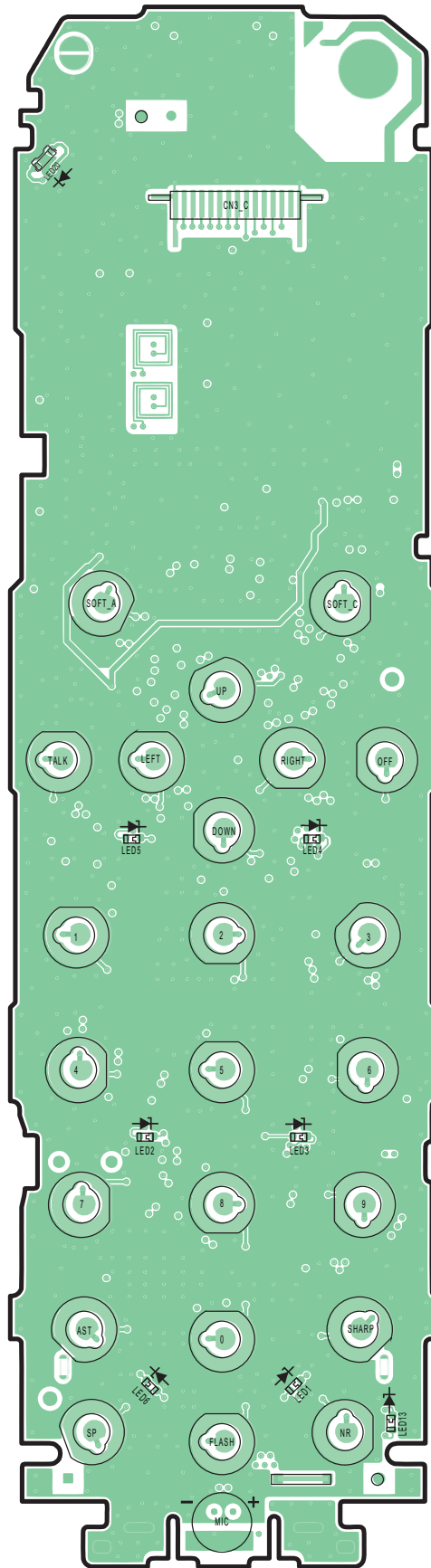
15.3. Circuit Board (Handset_Main)

15.3.1. Component View



KX-TGEA20 CIRCUIT BOARD (Handset_Main (Component View))

15.3.2. Bottom View

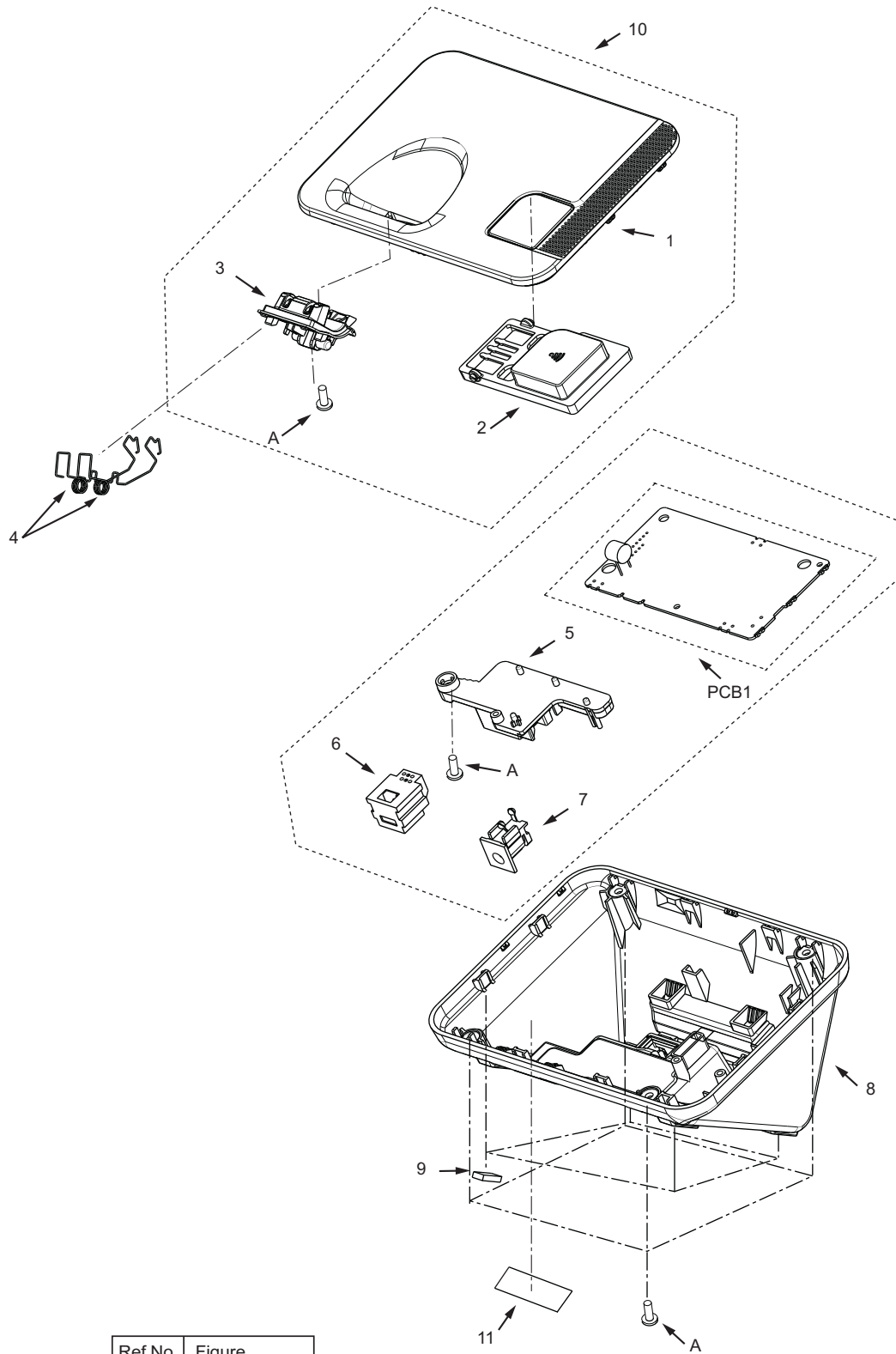



KX-TGEA20 CIRCUIT BOARD (Handset_Main (Bottom View))

16 Exploded View and Replacement Parts List

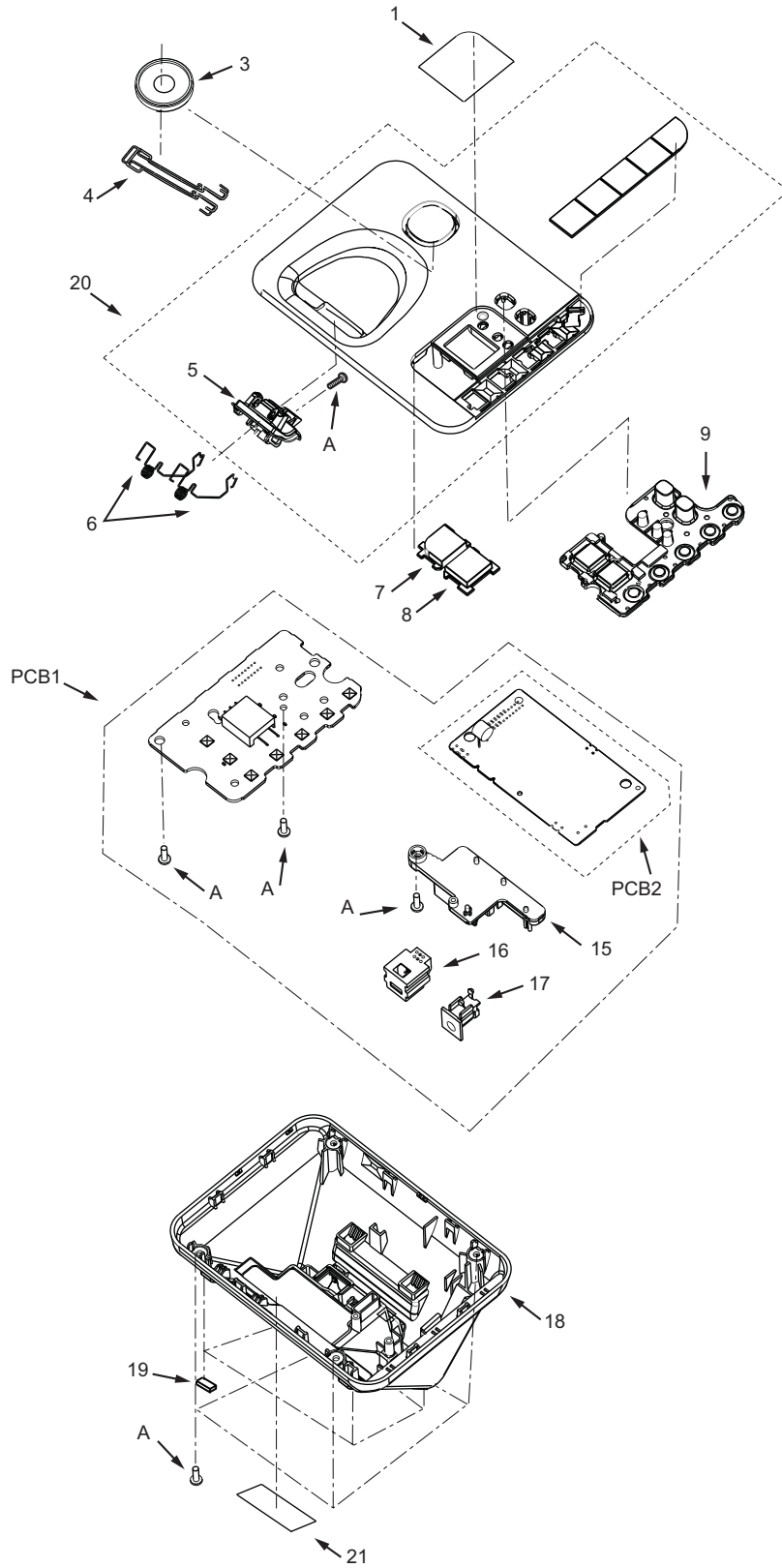
16.1. Cabinet and Electrical Parts (Base Unit)


16.1.1. KX-TGE210



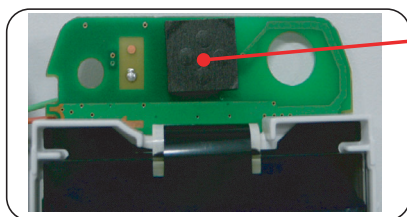
Ref.No	Figure
A	 φ 2.6 x 8mm

16.1.2. KX-TGE230

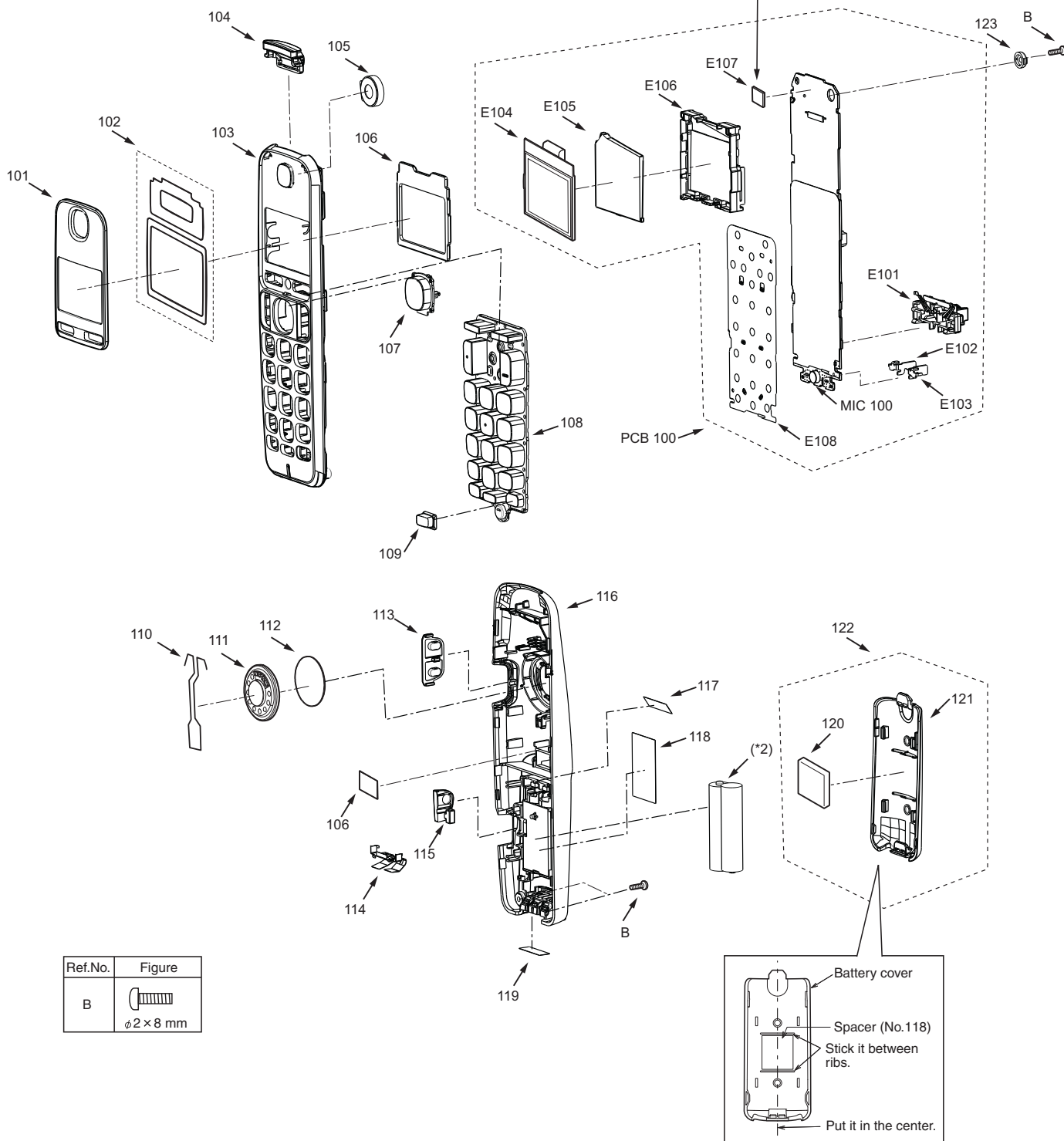


Ref.No.	Figure
A	 φ 2.6 x 8mm

16.2. Cabinet and Electrical Parts (Handset)



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



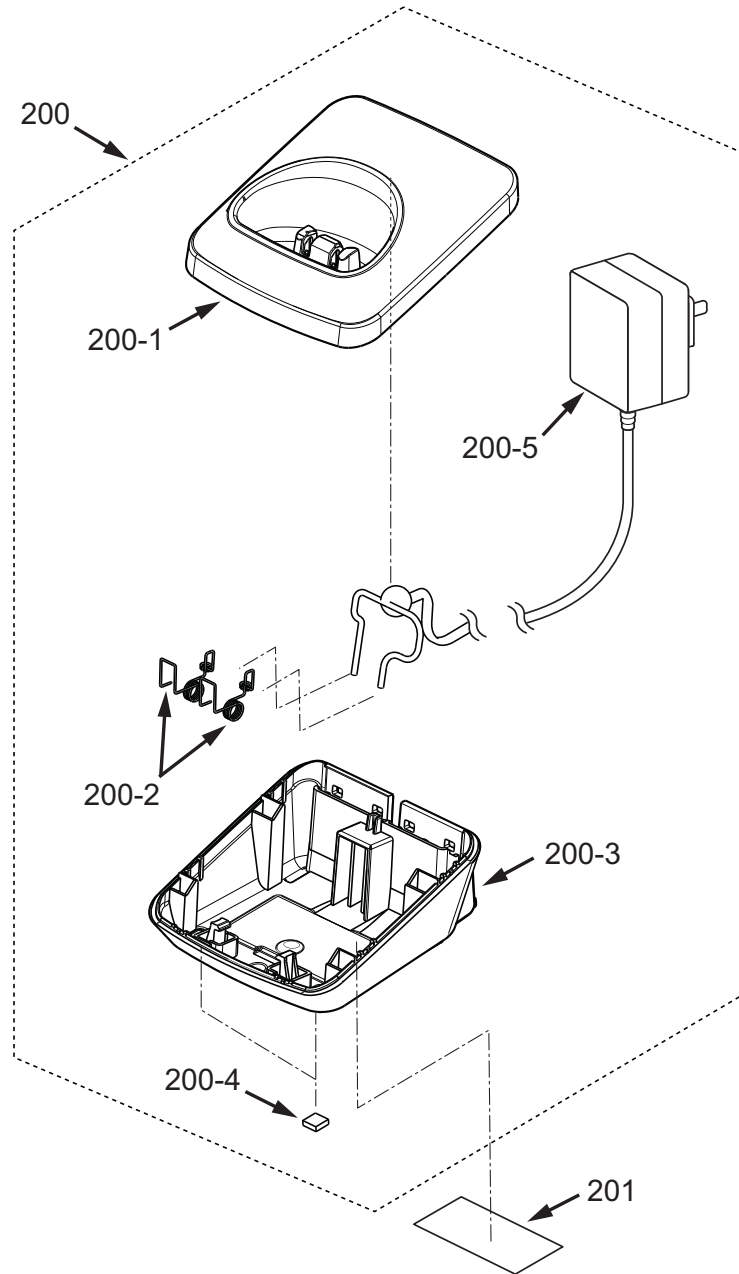
Ref.No.	Figure
B	 φ2 × 8 mm

(*1) This cable is fixed by heat-sealing. Refer to **How to Replace the Handset LCD (P.51)**.

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

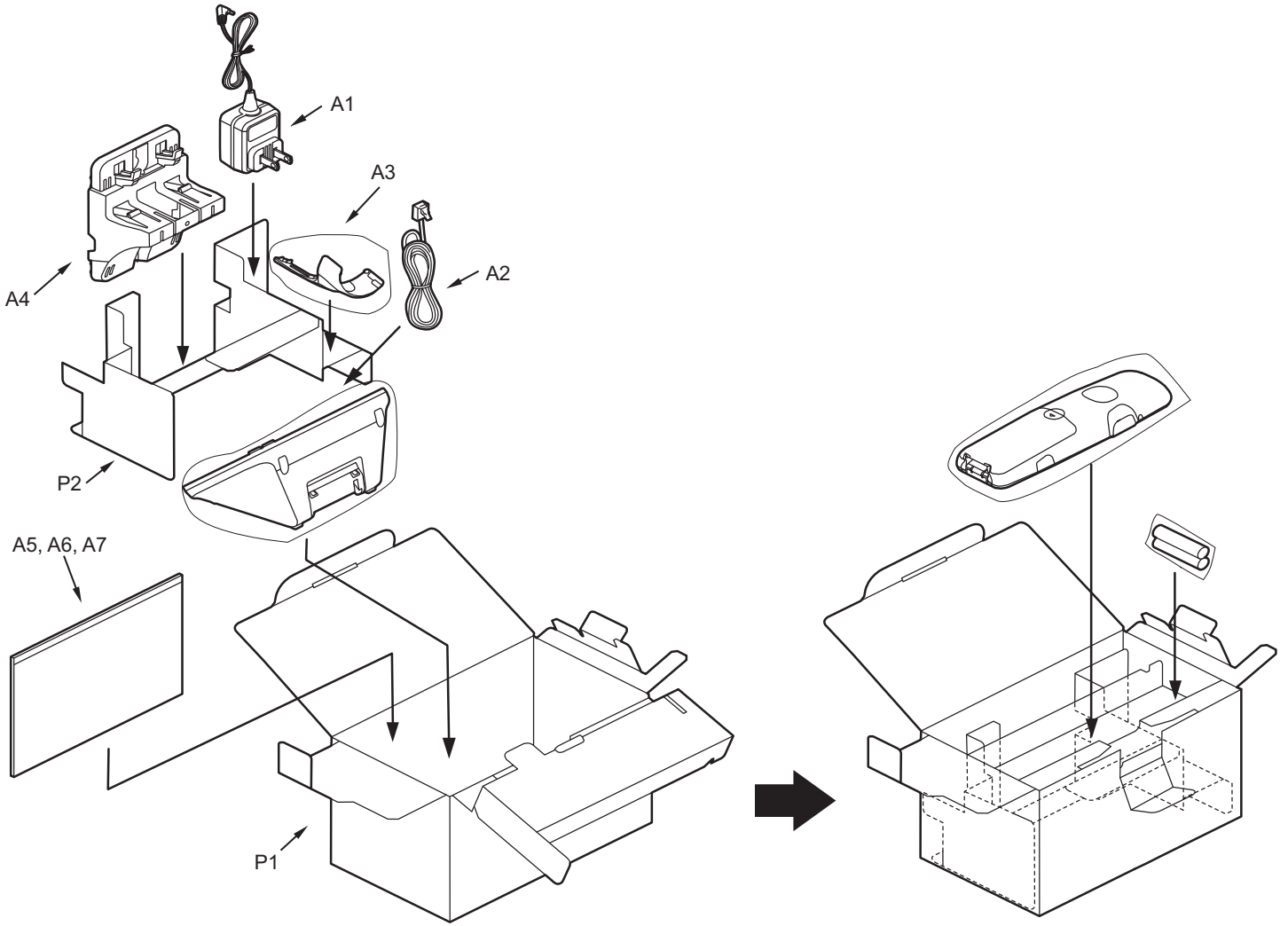
(*3) Attach the SPACER (No. 120) to the exact location described above.

16.3. Cabinet and Electrical Parts (Charger Unit)

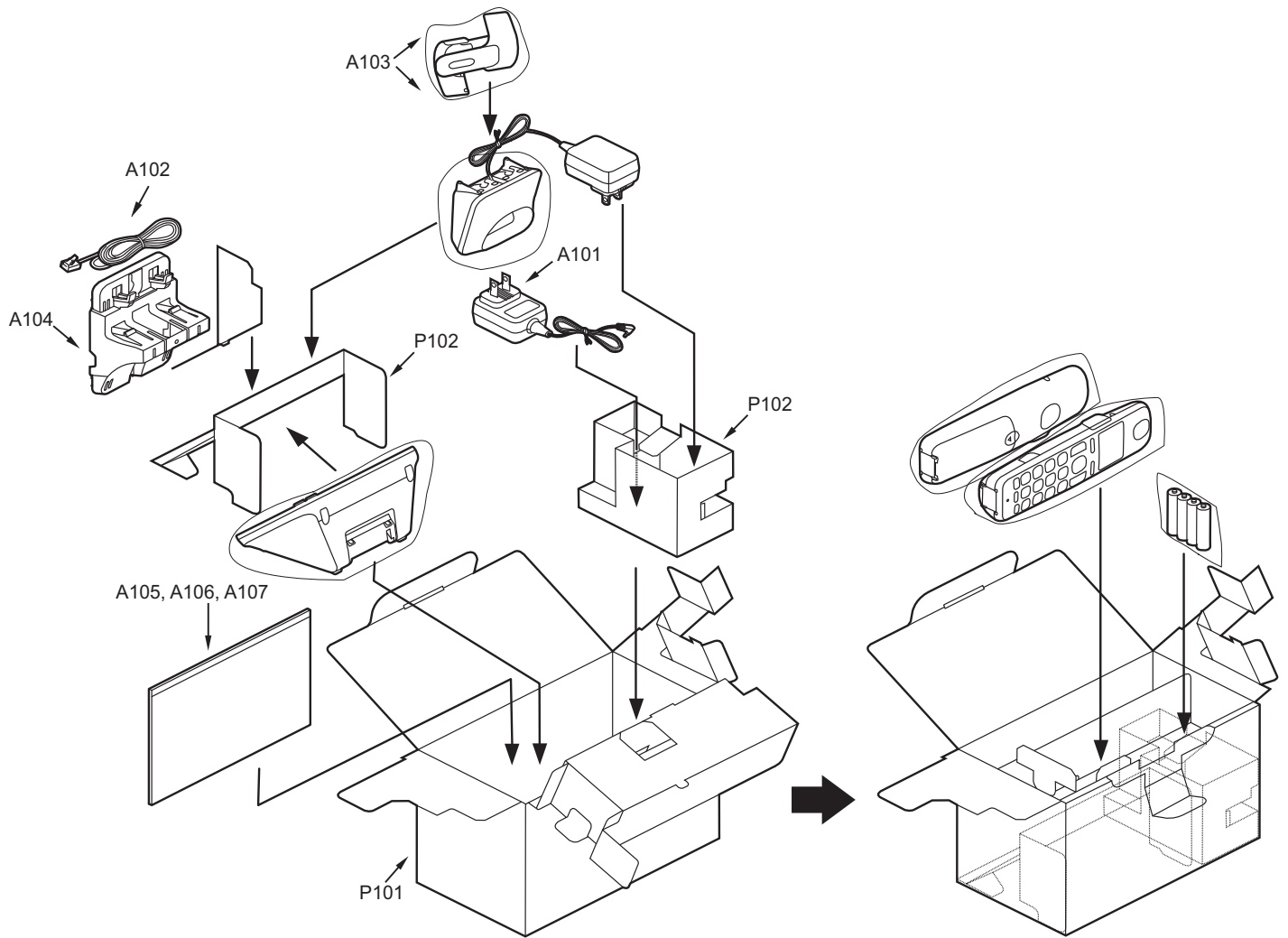


16.4. Accessories and Packing Materials

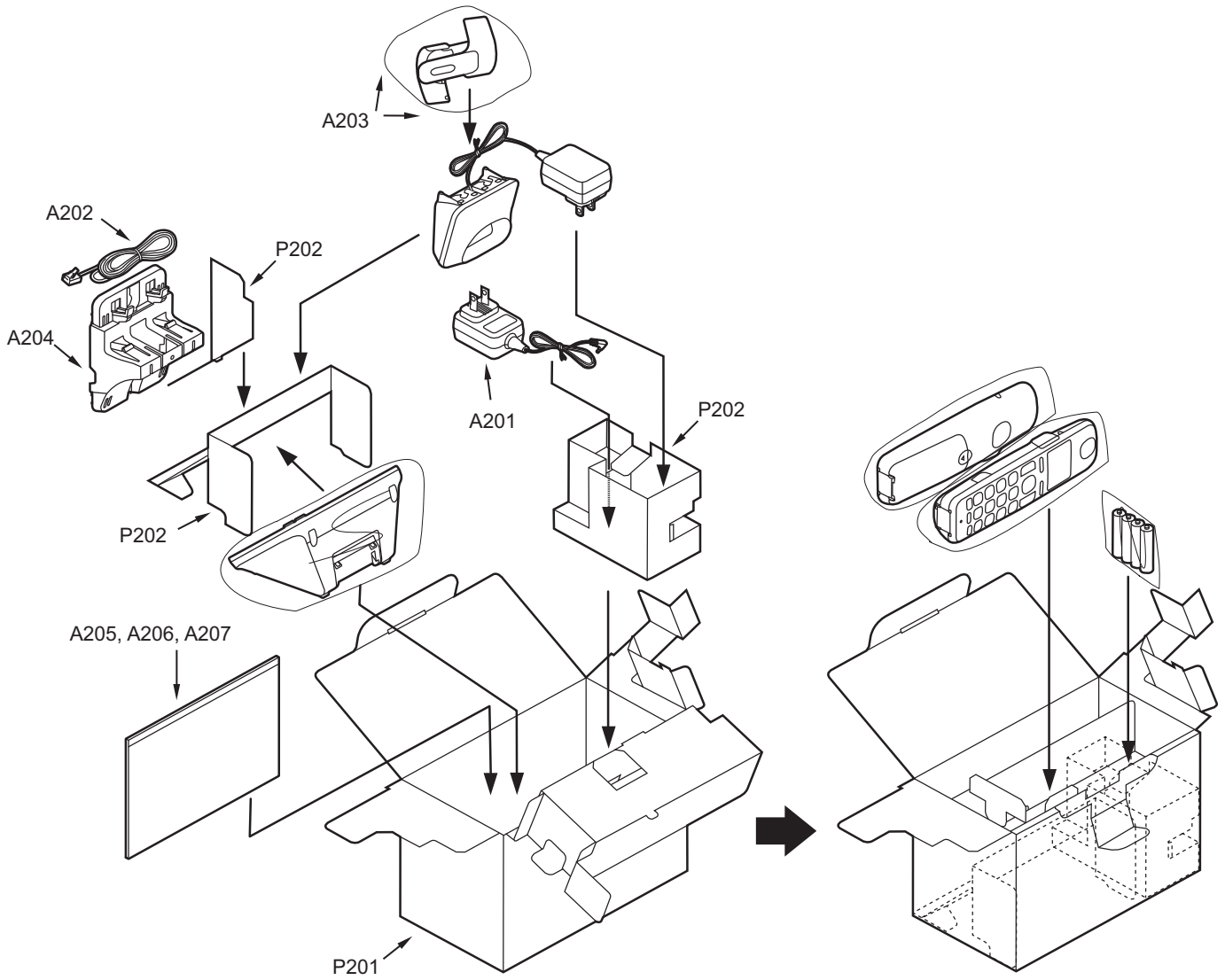
16.4.1. KX-TGE210B



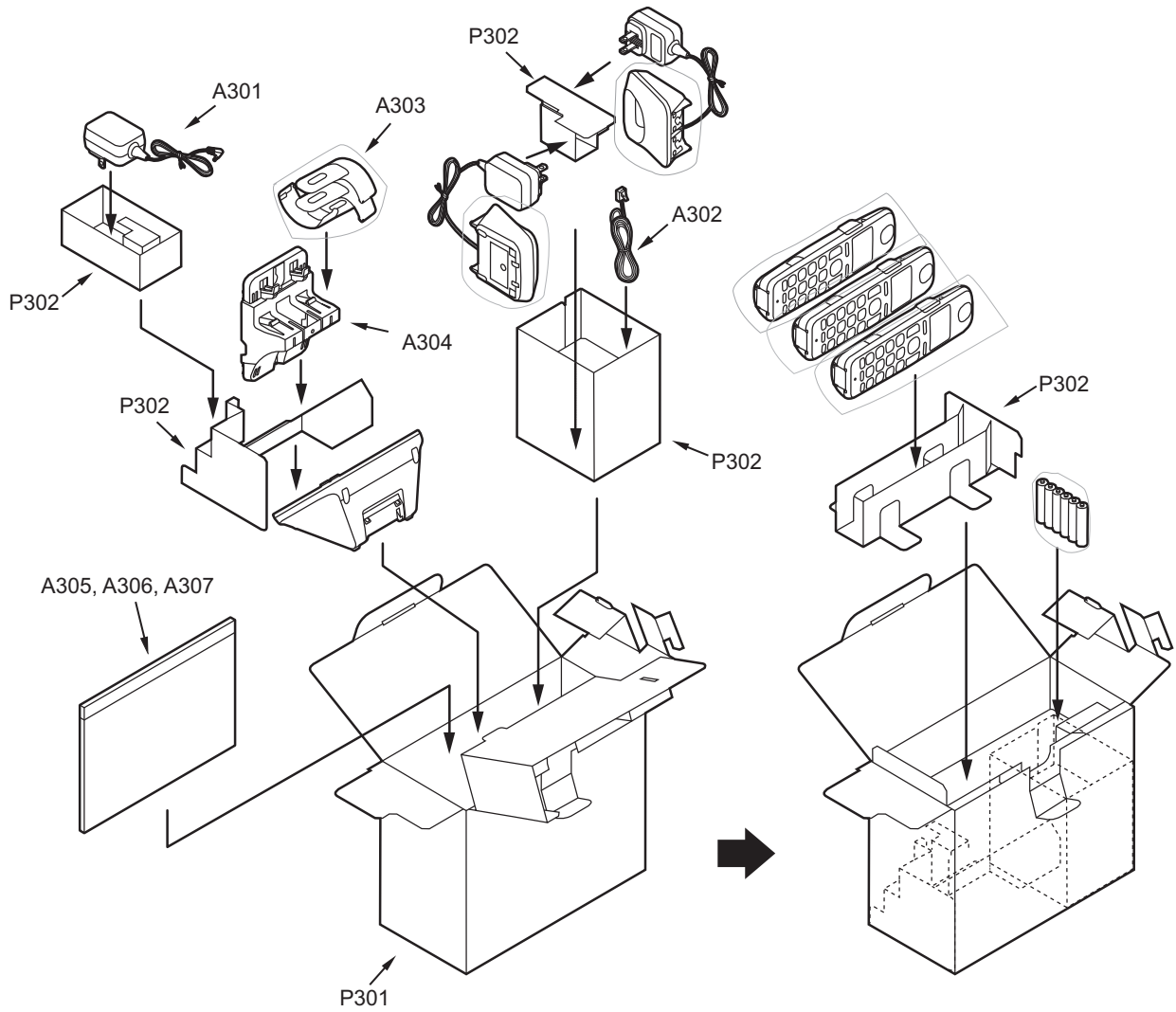
16.4.2. KX-TGE212B



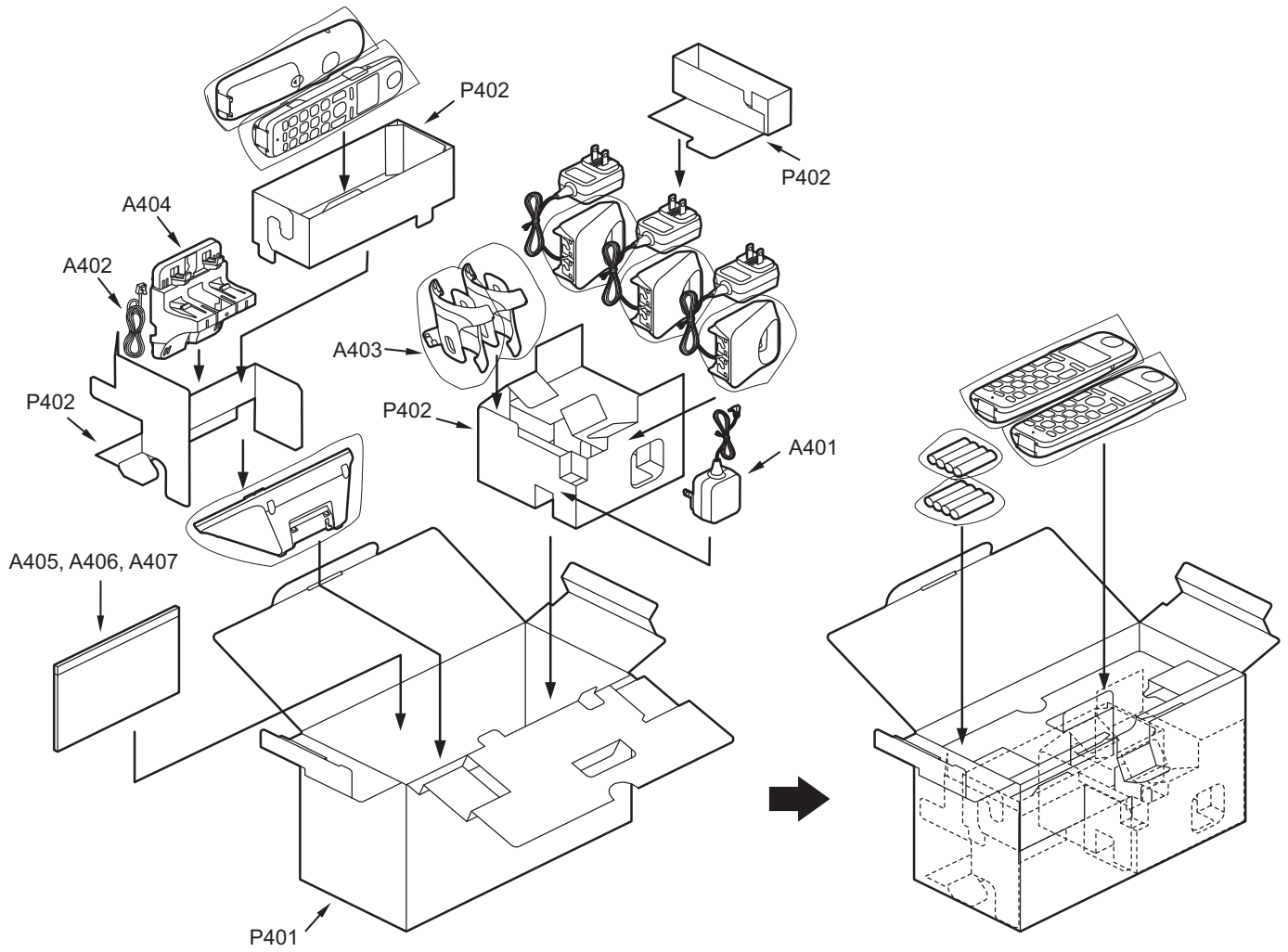
16.4.3. KX-TGE232B



16.4.4. KX-TGE233B



16.4.5. KX-TGE234B



16.5. Replacement Parts List

1. RTL (Retention Time Limited)

Note:

The "RTL" marking indicates that its Retention Time is Limited.

When production is discontinued, this item will continue to be available only for a specific period of time.

This period of time depends on the type of item, and the local laws governing parts and product retention. At the end of this period, the item will no longer be available.

2. Important safety notice

Components identified by the Δ mark indicates special characteristics important for safety. When replacing any of these components, only use specified manufacturer'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=1000k Ω

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

*Type & Wattage of Resistor

Type

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

Wattage

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

*Type & Voltage Of Capacitor

Type

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

Voltage

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

16.5.1. Base Unit

16.5.1.1. Cabinet and Electrical Parts

16.5.1.1.1. KX-TGE210B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	1	PNKM1526Z1	CABINET BODY (for KX-TGE210B) (for KX-TGE212B)	PS-HB
	2	PNBC1531Z1	BUTTON, LOCATOR (for KX-TGE210B) (for KX-TGE212B)	ABS-HB
	3	PNKE1310Z2	CASE, CHARGE TERMINAL	PS-HB
	4	PNJT1176Z	CHARGE TERMINAL	
	5	PNHR1919Z	HOLDER, JACK	
	6	PQJJ1T039L	JACK, MODULAR	
	7	K2ECYZ000002	JACK, DC	PS-HB

KX-TGE210/KX-TGE212/KX-TGE232/KX-TGE233/KX-TGE234/TGEA20

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	8	PNKF1315X2	CABINET COVER	PS-HB
	9	PNHA1032Z	RUBBER PARTS, FOOT CUSHION	
	10	PNYM1065Z2	CABINET COVER ASS'Y (for KX-TGE210B) (for KX-TGE212B)	
	11	PNGT7986Z	NAME PLATE	

16.5.1.1.2. KX-TGE230B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	1	PNGP1316Y2	PANEL, UPPER (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	PC-HB
	3	PNMH1304Z	HOLDER, SPEAKER	POM-HB
	4	LOAA02A00087	SPEAKER	
	5	PNKE1310Z2	CASE, CHARGE TERMINAL	PS-HB
	6	PNJT1176Z	CHARGE TERMINAL	
	7	PNBC1523Z1	BUTTON, ANSWER	
	8	PNBC1524Z1	BUTTON, PLAY	
	9	PNJK1209Y	KEYBOARD SWITCH, TAM	
	15	PNHR1919Z	GUIDE, JACK (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	PS-HB
	16	PQJJ1T039L	JACK, MODULAR	
	17	K2ECYZ000002	JACK, DC (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	
	18	PNKF1315X2	CABINET COVER (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	PS-HB
	19	PNHA1032Z	RUBBER PARTS, FOOT CUSHION	
	20	PNYM1060Y2	CABINET COVER ASS'Y (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	PS-HB
	21	PNGT7995Z	NAME PLATE (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	

16.5.1.2. Main P.C. Board Parts

Note:

(*1) When replacing IC501, IC611 or X501, make the adjustment using PNZZTGE230B. Refer to **How to download the data (P.58)** of Things to Do after Replacing IC or X'tal.

(*2) When replacing IC501 or IC721, refer to **How to Replace the LLP (Leadless Leadframe Package) IC (P.60)**.

16.5.1.2.1. KX-TGE210B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB1	PNWP1TGE210H	MAIN P.C.BOARD ASS'Y (RTL) (for KX-TGE210B) (for KX-TGE212B)	
			(ICs)	
		IC302	C0DBEY00102	IC
		IC501	C1CB00004121	IC (*1) (*2)
		IC502	PNWI2TGE230H	IC (FLASH) (*1)
		IC611	PNWI1TGE210H	IC (EEPROM) (*1) (for KX-TGE210B) (for KX-TGE212B)
			(TRANSISTORS)	
		Q141	2SA1776P	TRANSISTOR (SI)
		Q142	B1ABDM000001	TRANSISTOR (SI)
		Q161	DSC7003S0L	TRANSISTOR (SI)
		Q301	B1ADGE000012	TRANSISTOR (SI)
		Q351	B1ADNB000003	TRANSISTOR (SI)
		Q352	2SC6054JSL	TRANSISTOR (SI)
		Q353	2SC6054JSL	TRANSISTOR (SI)
		Q907	2SC6054JSL	TRANSISTOR (SI)

KX-TGE210/KX-TGE212/KX-TGE232/KX-TGE233/KX-TGE234/TGEA20

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	Q908	2SC6054JSL	TRANSISTOR (SI) (DIODES)	S
	D101	B0EDER000009	DIODE (SI)	S
	D142	DY2J25000L	TRANSISTOR (SI)	
	D362	B0ECKM000008	DIODE (SI)	
			(RESISTOR ARRAYS)	
	RA501	EXB24V221JX	RESISTOR ARRAY	
	RA611	EXB28V332JX	RESISTOR ARRAY	
			(VARISTOR)	
	SA101	J0LE00000047	VARISTOR (SURGE) ABSORBER	
			(RESISTORS)	
	R101	ERJ3GEYJ565	5.6M	S
	R102	ERJ3GEYJ565	5.6M	S
	R103	PQ4R10XJ184	180k	S
	R104	PQ4R10XJ184	180k	S
	R109	ERJ2GEJ823	82k	S
	R110	ERJ2GEJ823	82k	S
	R111	ERJ2GEJ392	3.9k	S
	R112	ERJ2GEJ124	120k	S
	R115	ERJ3GEYJ825	8.2M	S
	R116	ERJ3GEYJ825	8.2M	S
	R117	ERJ3GEYJ154	150k	S
	R118	ERJ3GEYJ154	150k	S
	R125	ERJ2GEJ271	270	S
	R141	ERJ3GEYJ104	100k	S
	R142	PQ4R18XJ272	2.7k	S
	R145	ERJ2GEJ222	2.2k	S
	R151	ERJ2GEJ104	100k	S
	R152	ERJ2GEJ104	100k	S
	R160	ERJ3GEYJ821	820	S
	R162	ERJ2GEJ473	47k	S
	R163	D0GG390JA007	39	
	R164	ERJ2GEJ272	2.7k	S
	R165	ERJ3GEYJ273	27k	S
	R166	ERJ3GEYJ822	8.2k	S
	R168	ERJ2GEJ472X	4.7k	S
	R178	ERJ2GEJ332	3.3k	S
	R311	ERJ2GEJ103	10k	S
	R321	ERJ2RKF1400	140	S
	R322	ERJ2RKF1000	100	S
	R351	ERJ2GEJ333	33k	S
	R352	ERJ2GEJ682	6.8k	S
	R354	ERJ2GEJ123	12k	S
	R355	ERJ2GEJ681	680	S
	R371	ERJ8GEYJ1R0	1	S
	R372	ERJ8GEYJ1R0	1	S
	R373	ERJ2GEJ681	680	S
	R501	ERJ2RKF5602	56k	
	R502	ERJ2GEJ332	3.3k	S
	R505	ERJ2GEJ102	1k	S
	R651	ERJ2GEJ102	1k	S
	R702	ERJ2GEJ103	10k	S
	R901	ERJ2GEOR00		S
	R905	ERJ3GEYOR00		S
	R924	ERJ2GEJ102		S
	R957	ERJ2GEJ103		S
	R962	ERJ2GEJ563		S
	R963	ERJ2GEJ103		S
	R964	ERJ2GEJ223		S
			(CAPACITORS)	
	C101	F1K2H681A008	680p	S
	C102	F1K2H681A008	680p	S
	C103	ECUV1H103KBV	0.01	
	C104	ECUV1H103KBV	0.01	
	C105	F1K2H681A008	680p	S
	C106	F1K2H681A008	680p	S
	C109	ECUE1H821KBQ	820p	
	C110	ECUE1H821KBQ	820p	
	C111	ECUE1A333KBQ	0.033	
	C113	ECUE1A823KBQ	0.082	
	C115	ECUV1C104KBV	0.1	
	C116	ECUV1C104KBV	0.1	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C142	ECUV1H103KBV	0.01	
	C152	ECUE1C103KBQ	0.01	
	C161	F1K1E1060001	10	
	C167	ECUV1H102KBV	0.001	
	C171	ECUV1C223KBV	0.022	
	C173	ECUE1A104KBQ	0.1	
	C174	ECUE1H222KBQ	0.0022	
	C184	ECUV1C105KBV	1	
	C311	ECUE0J105KBQ	1	
	C312	ECUE1A104KBQ	0.1	
	C321	ECUV1C105KBV	1	
	C341	F2G0J331A146	330	
	C342	ECUE1A104KBQ	0.1	
	C351	ECUV1C105KBV	1	
	C501	ECUE1A104KBQ	0.1	
	C502	ECUE0J105KBQ	1	
	C503	ECUE1H100DCQ	10p	
	C504	ECUE1A104KBQ	0.1	
	C505	ECUE1A104KBQ	0.1	
	C506	ECUV0J225KBV	2.2	
	C507	ECUE0J105KBQ	1	
	C508	ECUE0J105KBQ	1	
	C509	ECUE0J105KBQ	1	
	C512	ECUE0J105KBQ	1	
	C513	ECUE1A104KBQ	0.1	
	C514	ECUE1H100DCQ	10p	
	C516	ECUE1A104KBQ	0.1	
	C517	ECUE1A104KBQ	0.1	
	C518	ECUE1H100DCQ	10p	
	C519	ECUE1A104KBQ	0.1	
	C611	ECUE1A104KBQ	0.1	
	C851	ECUE1H100DCQ	10p	
	C859	ECUE1H100DCQ	10p	
	C860	F1G1H1R1A765	CERAMIC CAPACITOR	
	C862	F1G1H2R4A765	CERAMIC CAPACITOR	
	C901	F2A1A102B641	ELECTROLYTIC CAPACITOR (OTHERS)	
⚠	F301	K5H302Y00003	FUSE	!
	P101	D4DAY220A022	THERMISTOR	
	X501	H0J103500037	CRYSTAL OSCILLATOR (*1)	

16.5.1.2.2. KX-TGE230B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB1	PNWP1TGE230H	MAIN P.C.BOARD ASS'Y (RTL) (for KX-TGE230B) (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	
			(ICs)	
	IC302	C0DBEY00102	IC	
	IC501	C1CB00004121	IC (*1) (*2)	
	IC502	PNWI2TGE230H	IC (FLASH) (*1)	
	IC601	PNWI3TGE230H	IC (FLASH) (*1)	
	IC611	PNWI1TGE230H	IC (EEPROM) (*1) (for KX-TGE232B) (for KX-TGE233B) (for KX-TGE234B)	
			(TRANSISTORS)	
	Q141	2SA1776P	TRANSISTOR (SI)	
	Q142	1B1ABDM000001	TRANSISTOR (SI)	S
	Q161	DSC7003S0L	TRANSISTOR (SI)	
	Q301	B1ADGE000012	TRANSISTOR (SI)	
	Q351	B1ADNB000003	TRANSISTOR (SI)	
	Q352	2SC6054JSL	TRANSISTOR (SI)	S
	Q353	2SC6054JSL	TRANSISTOR (SI)	S
	Q907	2SC6054JSL	TRANSISTOR (SI)	S
	Q908	2SC6054JSL	TRANSISTOR (SI)	S
			(DIODES)	
	D101	B0EDER000009	DIODE (SI)	S
	D142	DY2J25000L	TRANSISTOR (SI)	
	D362	B0ECKM000008	DIODE (SI)	
			(RESISTOR ARRAYS)	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	RA501	EXB24V221JX	RESISTOR ARRAY	
	RA601	EXB28V561JX	RESISTOR ARRAY	
	RA611	EXB28V332JX	RESISTOR ARRAY	
	RA651	D1H810240004	RESISTOR ARRAY	S
			(VARISTOR)	
	SA101	JOLE00000047	VARISTOR (SURGE ABSORBER)	
			(RESISTORS)	
	R101	ERJ3GEYJ565	5.6M	S
	R102	ERJ3GEYJ565	5.6M	S
	R103	PQ4R10XJ184	180k	S
	R104	PQ4R10XJ184	180k	S
	R109	ERJ2GEJ823	82k	S
	R110	ERJ2GEJ823	82k	S
	R111	ERJ2GEJ392	3.9k	S
	R112	ERJ2GEJ124	120k	S
	R115	ERJ3GEYJ825	8.2M	S
	R116	ERJ3GEYJ825	8.2M	S
	R117	ERJ3GEYJ154	150k	S
	R118	ERJ3GEYJ154	150k	S
	R125	ERJ2GEJ271	270	S
	R141	ERJ3GEYJ104	100k	S
	R142	PQ4R18XJ272	2.7k	S
	R145	ERJ2GEJ222	2.2k	S
	R151	ERJ2GEJ104	100k	S
	R152	ERJ2GEJ104	100k	S
	R160	ERJ3GEYJ821	820	S
	R162	ERJ2GEJ473	47k	S
	R163	D0GG390JA007	39	
	R164	ERJ2GEJ272	2.7k	S
	R165	ERJ3GEYJ273	27k	S
	R166	ERJ3GEYJ822	8.2k	S
	R168	ERJ2GEJ472X	4.7k	S
	R178	ERJ2GEJ332	3.3k	S
	R311	ERJ2GEJ103	10k	S
	R321	ERJ2RKF1400	140	S
	R322	ERJ2RKF1000	100	S
	R351	ERJ2GEJ333	33k	S
	R352	ERJ2GEJ682	6.8k	S
	R354	ERJ2GEJ123	12k	S
	R355	ERJ2GEJ681	680	S
	R371	ERJ8GEYJ1R0	1	S
	R372	ERJ8GEYJ1R0	1	S
	R373	ERJ2GEJ681	680	S
	R477	ERJ2GEJ1R0	1	S
	R478	ERJ2GEJ1R0	1	S
	R501	ERJ2RKF5602	56k	S
	R502	ERJ2GEJ332	3.3k	S
	R505	ERJ2GEJ102	1k	S
	R601	ERJ2GEJ332	3.3k	S
	R651	ERJ2GEJ102	1k	S
	R652	ERJ2GEJ102	1k	S
	R653	ERJ2GE0R00	0	S
	R661	ERJ2GEJ103	10k	S
	R702	ERJ2GEJ103	10k	S
	R901	ERJ2GE0R00		S
	R905	ERJ3GEY0R00		S
	R924	ERJ2GEJ102		S
	R957	ERJ2GEJ103		S
	R962	ERJ2GEJ563		S
	R963	ERJ2GEJ103		S
	R964	ERJ2GEJ223		S
			(CAPACITORS)	
	C101	F1K2H681A008	680p	S
	C102	F1K2H681A008	680p	S
	C103	ECUV1H103KBV	0.01	
	C104	ECUV1H103KBV	0.01	
	C105	F1K2H681A008	680p	S
	C106	F1K2H681A008	680p	S
	C109	ECUE1H821KBQ	820p	
	C110	ECUE1H821KBQ	820p	
	C111	ECUE1A333KBQ	0.033	
	C113	ECUE1A823KBQ	0.082	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C115	ECUV1C104KBV	0.1	
	C116	ECUV1C104KBV	0.1	
	C142	ECUV1H103KBV	0.01	
	C152	ECUE1C103KBQ	0.01	
	C161	F1K1E1060001	10	
	C167	ECUV1H102KBV	0.001	
	C171	ECUV1C223KBV	0.022	
	C173	ECUE1A104KBQ	0.1	
	C174	ECUE1H222KBQ	0.0022	
	C184	ECUV1C105KBV	1	
	C311	ECUE0J105KBQ	1	
	C312	ECUE1A104KBQ	0.1	
	C321	ECUV1C105KBV	1	
	C341	F2G0J331A146	330	
	C342	ECUE1A104KBQ	0.1	
	C351	ECUV1C105KBV	1	
	C472	ECUE1H100DCQ	10p	
	C473	ECUE1H100DCQ	10p	
	C477	ECUE1H222KBQ	0.0022	
	C478	ECUE1H222KBQ	0.0022	
	C501	ECUE1A104KBQ	0.1	
	C502	ECUE0J105KBQ	1	
	C503	ECUE1H100DCQ	10p	
	C504	ECUE1A104KBQ	0.1	
	C505	ECUE1A104KBQ	0.1	
	C506	ECUV0J225KBV	2.2	
	C507	ECUE0J105KBQ	1	
	C508	ECUE0J105KBQ	1	
	C509	ECUE0J105KBQ	1	
	C512	ECUE0J105KBQ	1	
	C513	ECUE1A104KBQ	0.1	
	C514	ECUE1H100DCQ	10p	
	C516	ECUE1A104KBQ	0.1	
	C517	ECUE1A104KBQ	0.1	
	C518	ECUE1H100DCQ	10p	
	C519	ECUE1A104KBQ	0.1	
	C601	ECUE1A104KBQ	0.1	
	C611	ECUE1A104KBQ	0.1	
	C661	ECUE1A104KBQ	0.1	
	C663	ECUE1H102KBQ	0.001	
	C851	ECUE1H100DCQ	10p	
	C859	ECUE1H100DCQ	10p	
	C860	F1G1H1R1A765	CERAMIC CAPACITOR	
	C862	F1G1H2R4A765	CERAMIC CAPACITOR	
	C901	F2A1A102B641	ELECTROLYTIC CAPACITOR	
			(OTHERS)	
△	F301	K5H302Y00003	FUSE	!
	P101	D4DAY220A022	THERMISTOR	
	X501	H0J103500037	CRYSTALOSCILLATOR (*1)	

16.5.1.3. Operational P.C. Board Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB2	PNWP2TGE230H	OPERATIONAL P.C.BOARD ASS'Y (RTL)	
			(LEDS)	
	DA901	B3CAT0000004	LED	
	LED901	B3AAB0000347	LED	
			(SWITCHES)	
	SW901	K0H1BA000578	SPECIAL SWITCH	
	SW902	K0H1BA000578	SPECIAL SWITCH	
	SW903	K0H1BA000578	SPECIAL SWITCH	
	SW904	K0H1BA000578	SPECIAL SWITCH	
	SW905	K0H1BA000578	SPECIAL SWITCH	
	SW906	K0H1BA000578	SPECIAL SWITCH	
	SW907	K0H1BA000578	SPECIAL SWITCH	

16.5.2. Handset

16.5.2.1. Cabinet and Electrical Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	101	PNGP1317Y2	PANEL, LCD	PMMA-HB
	102	PNYE1124Z	TAPE, DOUBLE SIDED	
	103	PNKM1524Y2	CABINET BODY	ABS-HB
	104	PNHR1922Z	LENS, LED	
	105	L0AD01A00026	RECEIVER	
	106	PNYE1125Z	SPACER, CUSHION LCD	
	107	PNBC1491X6	BUTTON, NAVIGATOR KEY	ABS-HB
	108	PNJK1211Z	KEYBOARD SWITCH	
	109	PNBC1530Z1	BUTTON, NR KEY	
	110	PNMH1308Z	GUIDE, SPEAKER	
	111	L0AA02A00120	SPEAKER	
	112	PNHS1502Z	SPACER, SPEAKER NET	
	113	PNJK1212Y	COVER, VOLUME	
	114	PQJC10056W	BATTERY TERMINAL	
	115	PNKE1311Z2	COVER, EP CAP	
	116	PNKF1314Z2	CABINET COVER	ABS-HB
	117	PNQT2006Z	LABEL, ATTENTION	
	118	PNQT2859Z	LABEL, BATTERY	
	119	PNGT7989Z	NAME PLATE	
	120	PNHS1079Z	SPACER, BATTERY	
	121	PNKK1094Z2	LID, BATTERY	ABS-HB
	122	PNYNTGEA20BR	LID, BATTERY ASS'Y	ABS-HB
	123	PNHR1644Z	SPACER	

16.5.2.2. 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 IC1, IC3 or X1, make the adjustment using PNZZTGE230M. Refer to **Handset** (P.58) of Things to Do after Replacing IC or X'tal.
- (*3) When replacing the handset LCD, See **How to Replace the Handset LCD** (P.51).
- (*4) Backside of this IC has a ground plate. Refer to **How to Replace the Flat Package IC** (P.62).
- (*5) Supplied IC is Flat Package Type.

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	PCB100	PNWP1TGEA20R	MAIN P.C. BOARD ASS'Y (RTL) (*1)	
			(ICs)	
	IC1	C2HBCY000142	IC (*2) (*4) (*5)	
	IC3	PNWITGEA20R	IC (EPROM) (*2)	
	IC4	C0DBZYY00357	IC	
			(TRANSISTORS)	
	Q2	B1ADCF000040	TRANSISTOR (SI)	
	Q3	B1ABGE000011	TRANSISTOR (SI)	S
	Q4	B1ADCF000040	TRANSISTOR (SI)	
	Q5	DRC9113Z0L	TRANSISTOR (SI)	
	Q6	DRC9113Z0L	TRANSISTOR (SI)	
	Q8	DRC9113Z0L	TRANSISTOR (SI)	
	Q9	2SC6054JSL	TRANSISTOR (SI)	S
	Q10	B1ADNB000003	TRANSISTOR (SI)	
	Q11	2SC6054JSL	TRANSISTOR (SI)	S
	Q12	B1ADCF000040	TRANSISTOR (SI)	
			(DIODES)	
	D13	B0BC4R3A0006	DIODE (SI)	
	D14	B0BC4R3A0006	DIODE (SI)	S
			(LEDS)	
	LED1	B3ACB0000190	LED	
	LED2	B3ACB0000190	LED	
	LED3	B3ACB0000190	LED	
	LED4	B3ACB0000190	LED	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	LED5	B3ACB0000190	LED	
	LED6	B3ACB0000190	LED	
	LED11	B3ACB0000190	LED	
	LED12	B3ACB0000190	LED	
	LED13	B3ACB0000190	LED	
	LED20	B3AFB0000370	LED	
			(IC FILTER)	
	L3	J0JDC0000045	IC FILTER	
			(COIL)	
	L801	G1C2N7Z00009	COIL	
			(RESISTOR ARRAYS)	
	RA1	EXB28V103	RESISTOR ARRAY	
	RA2	D1H83314A013	RESISTOR ARRAY	S
	RA3	EXB24V331J	RESISTOR ARRAY	
	RA4	EXB24V332JX	RESISTOR ARRAY	
	RA5	EXB28V332JX	RESISTOR ARRAY	
			(RESISTORS)	
	R2	ERJ2GEJ303	30k	S
	R3	ERJ2GEJ152	1.5k	S
	R4	ERJ2GEJ473	47k	S
	R6	ERJ2GEJ103	10k	S
	R7	ERJ2GEJ104	100k	S
	R8	ERJ8GEYJ4R3V	4.3	S
	R9	ERJ2GEJ303	30k	S
	R10	ERJ3GEYJ1R0	1	S
	R11	ERJ2GEJ681	680	S
	R12	ERJ2GEJ183	18k	S
	R13	ERJ2GEJ103	10k	S
	R20	ERJ2GEJ303	30k	S
	R21	ERJ2GEJ103	10k	S
	R22	ERJ2GEJ332	3.3k	S
	R23	ERJ2GEJ391	390	S
	R24	ERJ2GEJ100	10	S
	R25	ERJ2GEJ222	2.2k	S
	R26	ERJ2GEJ332	3.3k	S
	R27	ERJ2GEJ222	2.2k	S
	R28	ERJ2GEJ222	2.2k	S
	R31	ERJ2RKF1003X	100k	S
	R32	ERJ2GEJ104	100k	S
	R33	ERJ2RKF1003X	100k	S
	R34	ERJ2GE0R00	0	S
	R45	D0GBR10JA113	0.1	
	R50	ERJ2GEJ221	220	S
	R51	ERJ2GEJ221	220	S
	R54	ERJ2GEJ221	220	S
	R56	ERJ2GE0R00	0	S
	R70	ERJ2GEJ470	47	S
	R72	ERJ2GE0R00	0	S
	R80	ERJ2GEJ100	10	S
			(CAPACITORS)	
	C11	ECUE1A104KBQ	0.1	
	C12	ECJ1VB0G106M	10	S
	C13	ECUE1A104KBQ	0.1	
	C14	ECUV1C393KBV	0.039	
	C15	ECUE1H390JCQ	39p	
	C16	F1J0J2260002	22	
	C17	ECUE1H100DCQ	10p	
	C18	ECUE1H100DCQ	10p	
	C2	F1J0J2260002	22	
	C20	ECJ1VB0G106M	10	S
	C21	ECUE0J105KBQ	1	
	C22	ECUE1A104KBQ	0.1	
	C24	ECUE0J105KBQ	1	
	C25	ECUV1A225KBV	2.2	
	C26	ECJ1VB0G106M	10	S
	C27	ECUE1H102KBQ	0.001	
	C29	ECUE0J105KBQ	1	
	C3	F1J0J2260002	22	
	C30	ECUE0J105KBQ	1	
	C31	ECJ1VB0G106M	10	S
	C32	ECUE0J105KBQ	1	
	C33	ECUE1A104KBQ	0.1	
	C34	ECUE1H390JCQ	39p	

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	C36	ECUE1A104KBQ	0.1	
	C37	ECJ1VB0G106M	10	s
	C40	ECUE1A104KBQ	0.1	
	C41	ECUE1A104KBQ	0.1	
	C43	ECUE1A104KBQ	0.1	
	C44	ECUE0J105KBQ	1	
	C45	ECUE1A104KBQ	0.1	
	C46	ECUE1H100DCQ	10p	S
	C5	ECUE1A104KBQ	0.1	
	C51	ECJ1VB0G106M	10	s
	C52	ECUE1H100DCQ	10p	
	C53	ECUE1H120JCQ	12p	
	C56	ECUE0J105KBQ	1	
	C57	ECUE0J105KBQ	1	
	C58	ECUE0J105KBQ	1	
	C6	ECUE1H680JCQ	68p	
	C68	ECUE0J105KBQ	1	
	C69	ECUE1A104KBQ	0.1	
	C70	ECUE1H680JCQ	68p	
	C71	ECUE1H680JCQ	68p	
	C78	ECUE1H101JCQ	100p	
	C79	ECUE1H101JCQ	100p	
	C80	ECUV1C393KBV	0.039	
	C801	F1G1H2R0A765	2p	
	C802	F1G1H1R5A765	1.5p	
	C806	F1G1H1R0A765	1p	
	C807	F1G1H3R0A765	3p	
	C81	ECUE1H101JCQ	100p	
	C82	ECUE1H102KBQ	0.001	
	C84	ECUE1H102KBQ	0.001	
	C90	ECUE1A104KBQ	0.1	
	C91	ECUV1C105KBV	1	
	C92	ECUE0J105KBQ	1	
	C93	ECUV1C105KBV	1	
	C96	ECUE1H100DCQ	10p	
	C97	ECUE1H100DCQ	10p	
		(OTHERS)		
	E101	PNVE1002Z	BATTERY TERMINAL	ABS-HB
	E102	PNJT1184Z	CHARGE TERMINAL (L)	
	E103	PNJT1185Z	CHARGE TERMINAL (R)	
	E104	L5DYBY00043	LIQUID CRYSTAL DISPLAY (*3)	S
	E105	PNHR1921Z	TRANSPARENT PLATE, LCD	PMMA-HB
	E106	PNHR1920Z	GUIDE, LCD	ABS-HB
	E107	PQHG10729Z	RUBBER PARTS, RECEIVER	
	E108	PNJE1194Z	SPECIAL SWITCH	
	CN4	K2HD103D0001	JACK	
△	F1	K5H252Y00002	FUSE	!
	MIC100	LOCBAY000053	MICROPHONE	
	SW1	K0H1BB000094	PUSH SWITCH	
	SW2	K0H1BB000094	PUSH SWITCH	
	SW601	K0H1BA000259	PUSH SWITCH (for KX-TGE210B) (for KX-TGE212B)	S
	X1	H0J138500003	CRYSTAL OSCILLATOR(*2)	S

16.5.3. Charger Unit

16.5.3.1. Cabinet and Electrical Parts

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
	200	PNLC1050ZB	CHARGER UNIT ASS'Y without NAME PLATE (RTL)	
	200-1	PNKM1527Z1	CABINET BODY	PS-HB
	200-2	PNJT1177Z	CHARGE TERMINAL	
	200-3	PNKF1279Z1	CABINET COVER	PS-HB
	200-4	PQHA10023Z	RUBBER PARTS, FOOT CUSHION	
△	200-5	PNLV233-AZ	AC ADAPTOR	
	201	PNGT7990Z	NAME PLATE	

16.5.4. Accessories and Packing Materials

Note:

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

16.5.4.1. KX-TGE210B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
△	A1	PNLV226Z	AC ADAPTOR	
	A2	PQJA10075Z	CORD, TELEPHONE	
	A3	PNKE1312Z2	HANGER, BELT CLIP	ABS-HB
	A4	PNKL1044Z2	WALL MOUNT ADAPTOR	ABS-HB
	A5	PNQX6358Z	INSTRUCTION BOOK (*1)	
	A6	PNQW2611Z	LEAFLET, REPEATER APPEAL	
	A7	PNQW3426Z	LEAFLET, MINI-LOCATOR APPEAL	
	P1	PNPK3779003Z	GIFT BOX	
	P2	PNPD1826Z	CUSHION	

16.5.4.2. KX-TGE212B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
△	A101	PNLV226Z	AC ADAPTOR	
	A102	PQJA10075Z	CORD, TELEPHONE	
	A103	PNKE1312Z2	HANGER, BELT CLIP	ABS-HB
	A104	PNKL1044Z2	WALL MOUNT ADAPTOR	ABS-HB
	A105	PNQX6358Z	INSTRUCTION BOOK (*1)	
	A106	PNQW2611Z	LEAFLET, REPEATER APPEAL	
	A107	PNQW3426Z	LEAFLET, MINI-LOCATOR APPEAL	
	P101	PNPK3770001Y	GIFT BOX	
	P102	PNPD1827Z	CUSHION	

16.5.4.3. KX-TGE232B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
△	A201	PNLV226Z	AC ADAPTOR	
	A202	PQJA10075Z	CORD, TELEPHONE	
	A203	PNKE1312Z2	HANGER, BELT CLIP	ABS-HB
	A204	PNKL1044Z2	WALL MOUNT ADAPTOR	ABS-HB
	A205	PNQX6358Z	INSTRUCTION BOOK (*1)	
	A206	PNQW2611Z	LEAFLET, REPEATER APPEAL	
	A207	PNQW3426Z	LEAFLET, MINI-LOCATOR APPEAL	
	P201	PNPK3770002Y	GIFT BOX	
	P202	PNPD1827Z	CUSHION	

16.5.4.4. KX-TGE233B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
△	A301	PNLV226Z	AC ADAPTOR	
	A302	PQJA10075Z	CORD, TELEPHONE	
	A303	PNKE1312Z2	HANGER, BELT CLIP	ABS-HB
	A304	PNKL1044Z2	WALL MOUNT ADAPTOR	ABS-HB
	A305	PNQX6358Z	INSTRUCTION BOOK (*1)	
	A306	PNQW2611Z	LEAFLET, REPEATER APPEAL	
	A307	PNQW3426Z	LEAFLET, MINI-LOCATOR APPEAL	
	P301	PNPK3772001Y	GIFT BOX	
	P302	PNPD1828Z	CUSHION	

16.5.4.5. KX-TGE234B

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
△	A401	PNLV226Z	AC ADAPTOR	
	A402	PQJA10075Z	CORD, TELEPHONE	
	A403	PNKE1312Z2	HANGER, BELT CLIP	ABS-HB
	A404	PNKL1044Z2	WALL MOUNT ADAPTOR	ABS-HB
	A405	PNQX6358Z	INSTRUCTION BOOK (*1)	
	A406	PNQW2611Z	LEAFLET, REPEATER APPEAL	
	A407	PNQW3426Z	LEAFLET, MINI-LOCATOR APPEAL	
	P401	PNPK3773001Y	GIFT BOX	
	P402	PNPD1829Z	CUSHION	

16.5.5. Screws

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

16.5.6. Fixtures and Tools**Note:**

(*1) See **Equipment Required** (P.52), and **The Setting Method of JIG** (P.52)

(*2) When replacing the Handset LCD, See **How to Replace the Handset LCD** (P.51)

Safety	Ref. No.	Part No.	Part Name & Description	Remarks
		PQZZ1CD300E	JIG CABLE (*1)	
		PNZZTGE230M	BATCH FILE CD-ROM (*1)	
		PQZZ430PIR	TIP OF SOLDERING IRON (*2)	
		PQZZ430PRB	RUBBER OF SOLDERING IRON (*2)	

ADDA
 KXTGE210B
 KXTGE212B
 KXTGE232B
 KXTGE233B
 KXTGE234B
 KXTGEA20B
 KXTGA20B