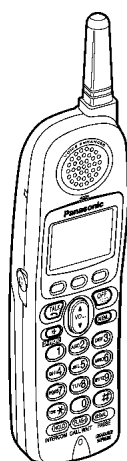# Service Manual

Caller ID Compatible

KX-TG6500BXB
KX-TGA650BXB

Expandable   Cordless   Answering
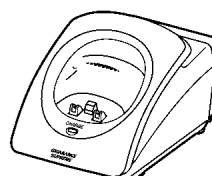System

Black Version

(for Asia, Middle Near East and other areas)

(Handset)   (Base Unit)

(Charger Unit)

Configuration for each model

Model No	Base Unit	Handset	Charger Unit
KX-TG6500	1	1(TGA650)	
KX-TGA650*		1	1

*KX-TGA650 is also an optional accessory, which
contains a handset and a charger.

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.

Panasonic

When you note the serial number, write down all 11 digits. The serial number may be found on the bottom of the unit.

Note:

Because CONTENTS 5 to 10 are the extracts from the Operating Instructions of this model, they are subject to change without notice. Please refer to the original Operating Instructions for further information.

CONTENTS

1   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 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 although, with some precautions, standard Pb solder can also be used.

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). In case of using high temperature soldering iron, please be careful not to heat too long.

· PbF solder will tend to splash if it is heated much higher than its melting point, approximately 1100°F (600°C).

· If you must use Pb solder on a PCB manufactured using PbF solder, remove as much of the original PbF solder as possible and be sure that any remaining is melted prior to applying the Pb solder.

· 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).
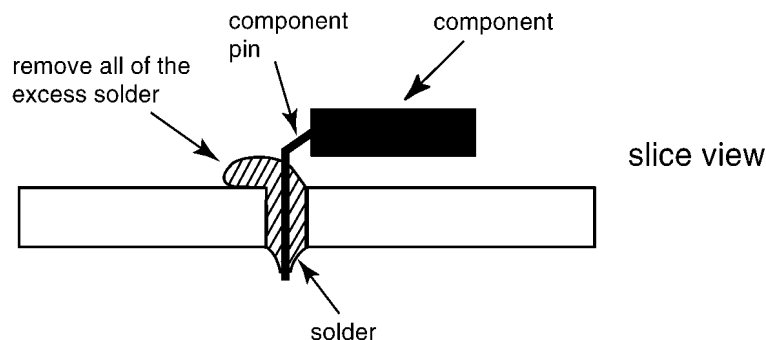
1.1.   Suggested PbF Solder

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: 0.3mm, 0.6mm and 1.0mm.

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

1.2.   How to recognize that Pb Free solder is used

1.2.1.   Base Unit

1.2.1.1.   Main P.C.B.

(Component View)

(Flow Solder Side View)
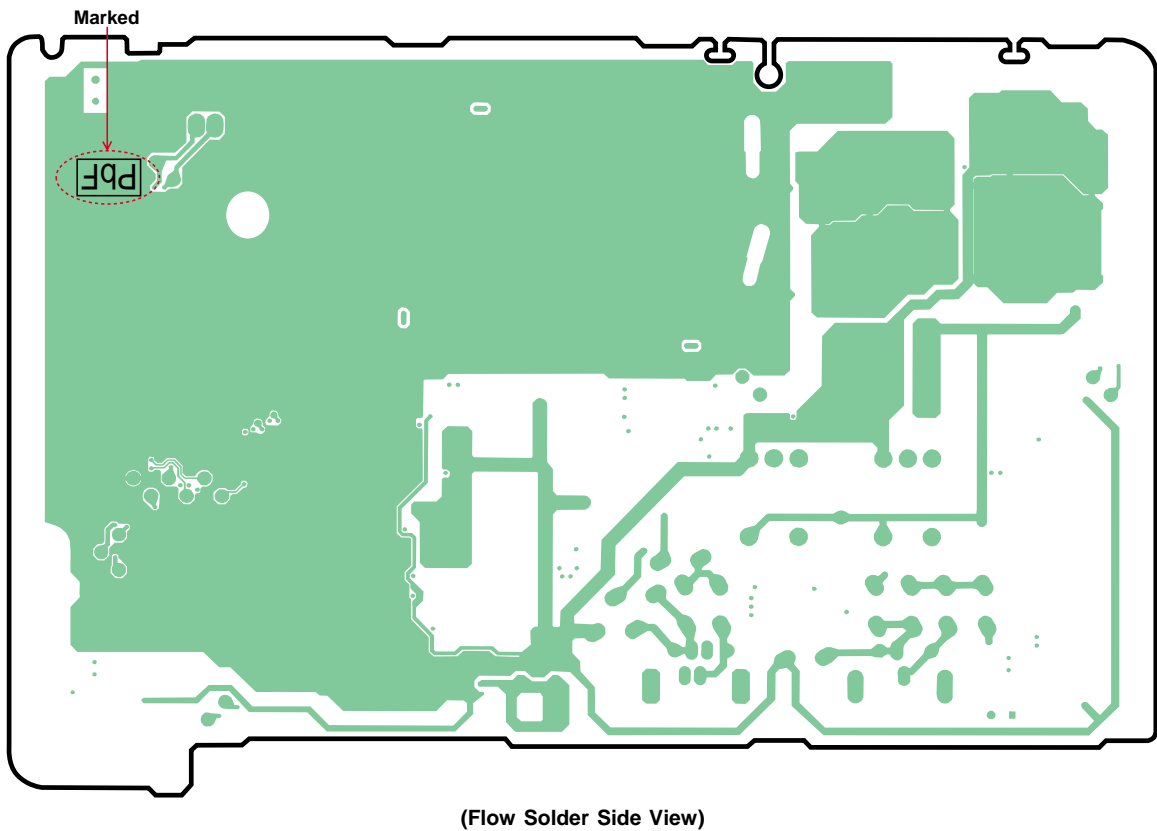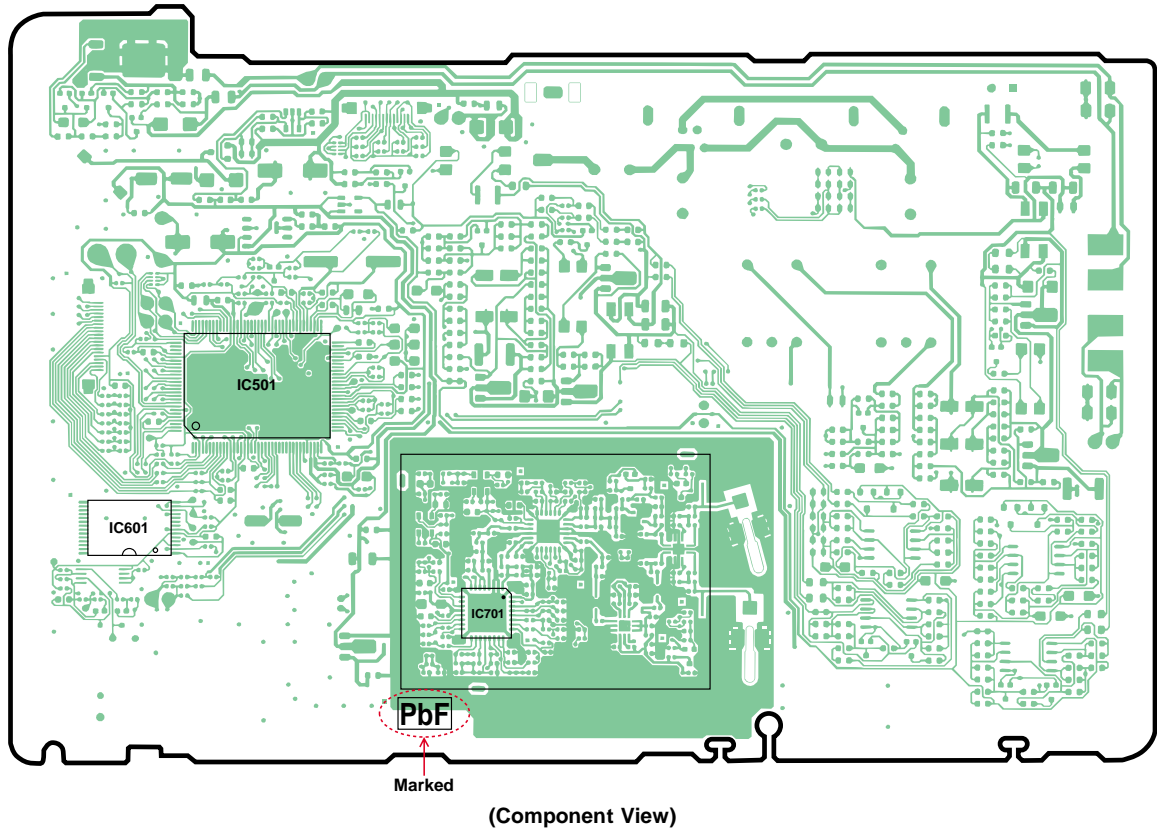
Note:

The location of the "PbF" mark is subject to change without notice.

1.2.1.2. Operational P.C.B.

CN963
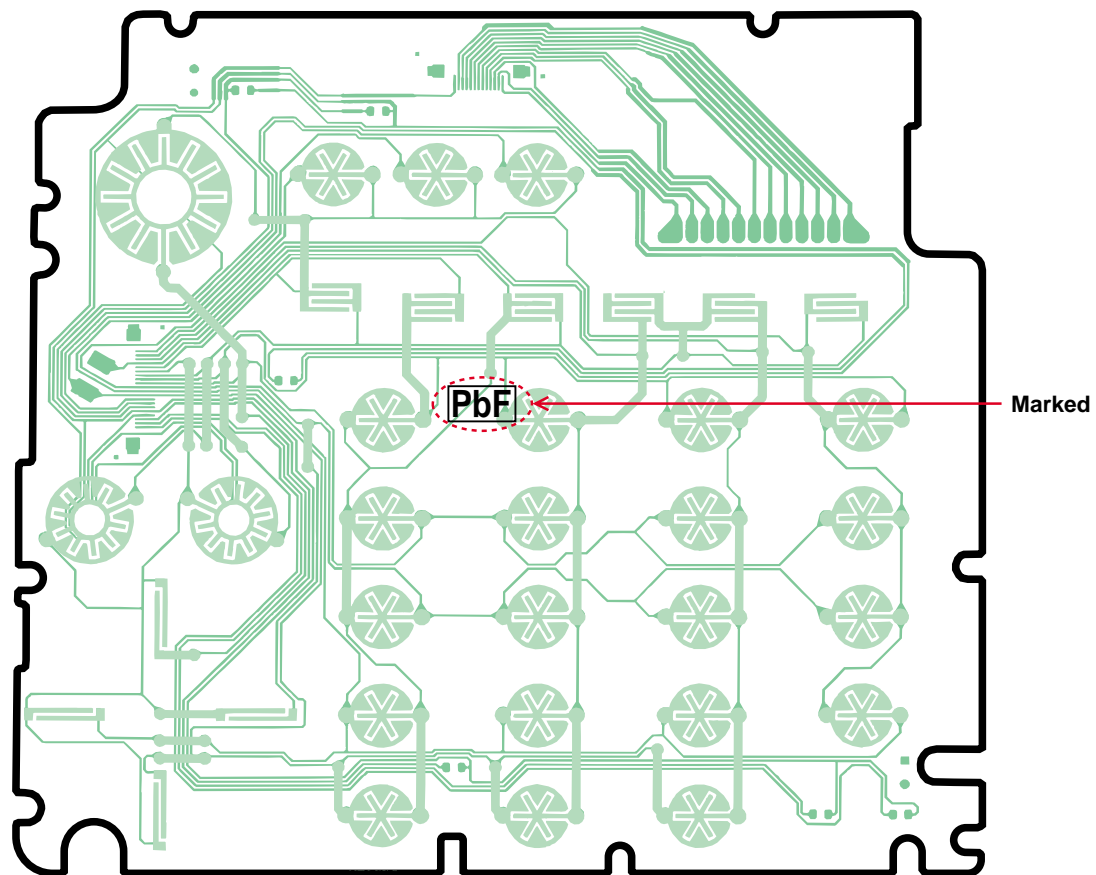
LCD900

CN960

PbF ←——— Marked

(Component View)

PbF ←——— Marked

(Flow Solder Side View)

Note:

The location of the "PbF" mark is subject to change without notice.

6

1.2.2. Handset

1.2.2.1. Main P.C.B.

Marked

(Component View)

Marked

(Flow Solder Side View)
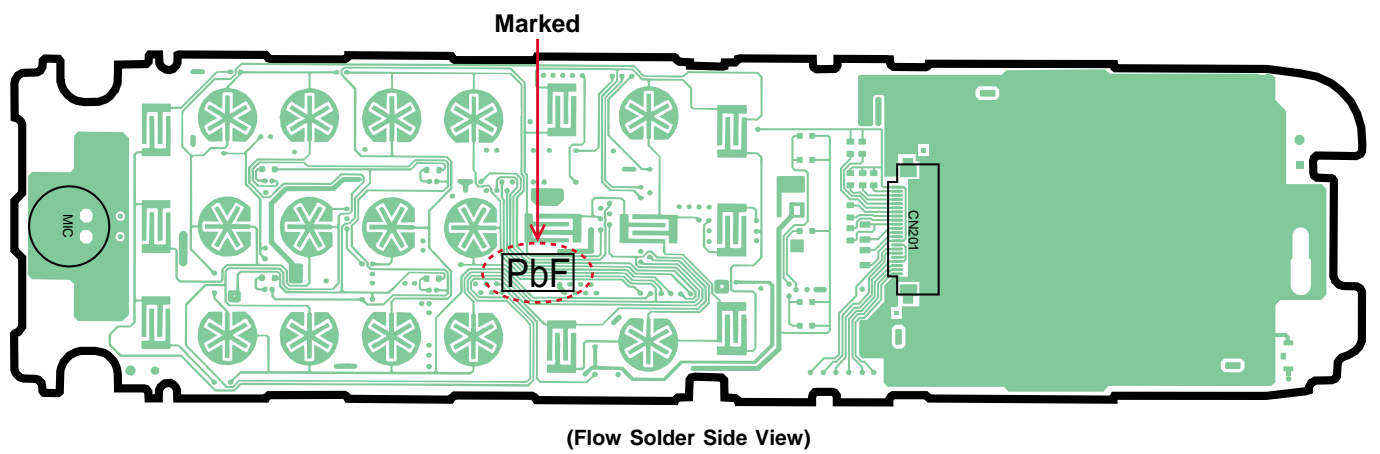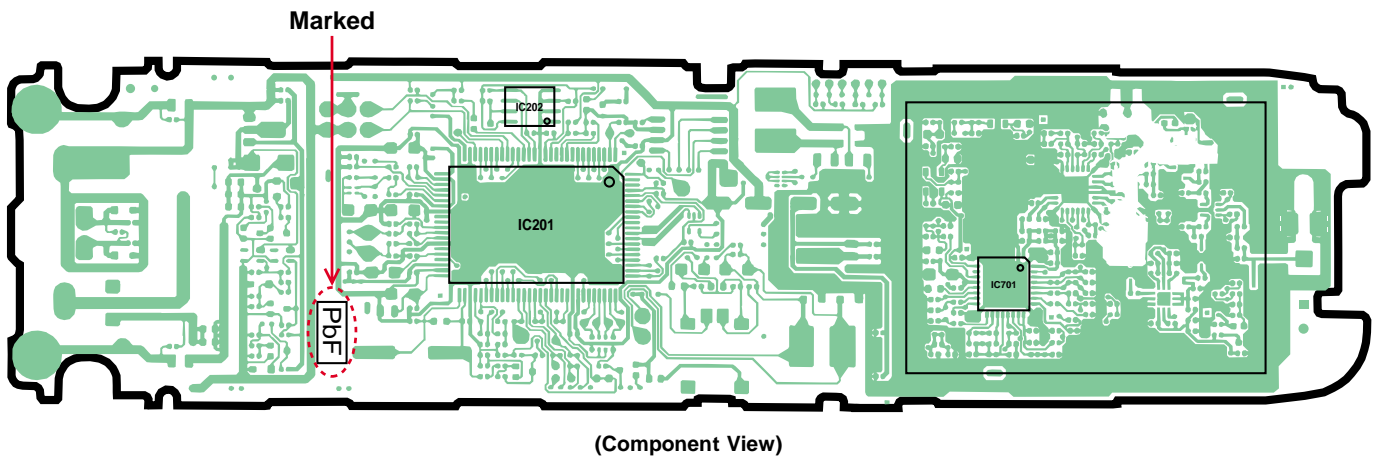
Note:

The location of the "PbF" mark is subject to change without notice.

1.2.3. Charger Unit

Marked

(Flow Solder Side View)
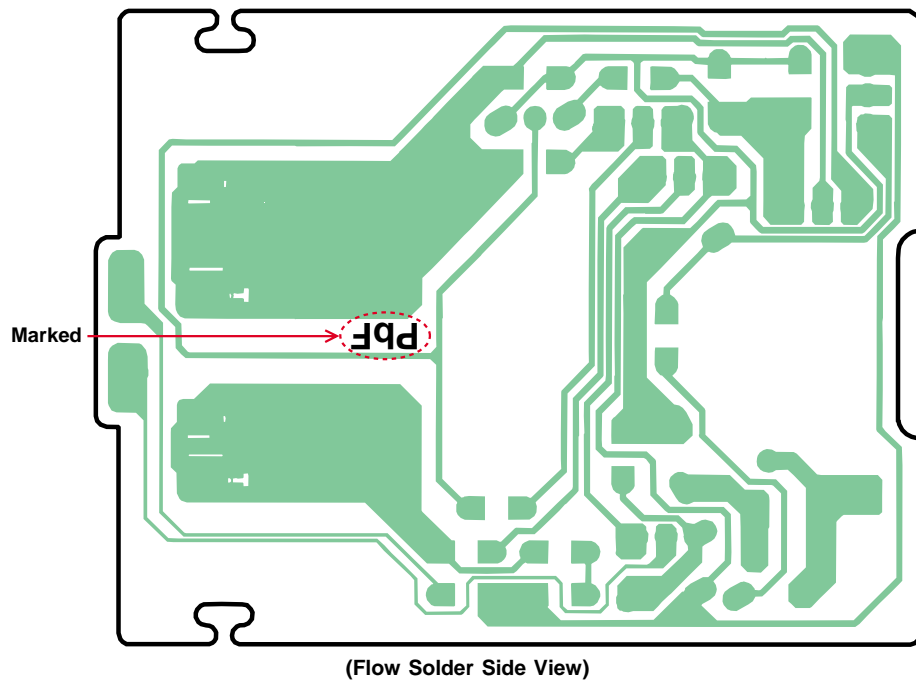
Note:

The location of the "PbF" mark is subject to change without notice.

2 FOR SERVICE TECHNICIANS

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.

3 CAUTION

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.

Dispose of used batteries according to the manufacturer´s Instructions.

4 SPECIFICATIONS

	Base Unit	Handset	Charger
Power Supply	AC Adaptor (PQLV1BXZ, 220-240 V AC, 50/60 Hz)	Rechargeable Ni-MH battery (3.6 V, 830 mAh)	AC Adaptor (KX-TCA1BX, 220-240 V AC, 50/60 Hz)
Receiving/Transmitting Frequency	89 channels within 5.76GHz-5.84GHz	89 channels within 5.76GHz-5.84GHz	——
Receiving Method	Super Heterodyne	Super Heterodyne	——
Oscillation Method	PLL synthesizer	PLL synthesizer	——
Detecting Method	Quadrature Discriminator	Quadrature Discriminator	——
Tolerance of OSC Frequency	13.824MHz±270Hz	13.824MHz±100Hz	——
Modulation Method	Frequency Modulation	Frequency Modulation	——
Spread spectrum Method	Frequency Hopping Spread spectrum	Frequency Hopping Spread spectrum	——
ID Code	20bit	20bit	——
Security Codes	——	1,000,000	——
Ringer Equivalence No. (REN)	0.2	——	——
Dialing Mode	Tone (DTMF)/Pulse	Tone (DTMF)/Pulse	——
Redial	Up to 48 digits	Up to 48 digits	——
Speed Dialer	Up to 32 digits	Up to 32 digits (Phone book)	——
Power Consumption	Standby: Approx. 2.6W, Maximum: Approx. 6.5W	11 days at Standby, 5 hours at Talk	Standby: Approx. 0.8W, Maximum: Approx. 4.0W
Operating Environment	5°C - 40 °C (41 °F - 104 °F)	5°C - 40 °C (41 °F - 104 °F)	——
Dimension (H x W x D)	Approx. 107mm × 251mm × 135mm (4 $^{7}/_{32}$" × 9 $^{7}/_{8}$" × 5 $^{5}/_{16}$")	Approx. 220mm × 53mm × 37mm (8 $^{21}/_{32}$" × 2 $^{3}/_{32}$" × 1 $^{15}/_{32}$")	Approx. 69mm × 74mm × 100mm (2 $^{23}/_{32}$" × 2 $^{29}/_{32}$" × 3 $^{15}/_{16}$")
Weight	Approx. 520 g (1.15 lb.)	Approx. 210 g (0.46 lb.)	Approx. 120 g (0.26 lb.)

Specifications are subject to change without notice.

5 BATTERY

5.1. Installing the Battery in the Handset

Insert the battery ((①)), and press it down until it snaps into the compartment ((②)).
Close the cover.
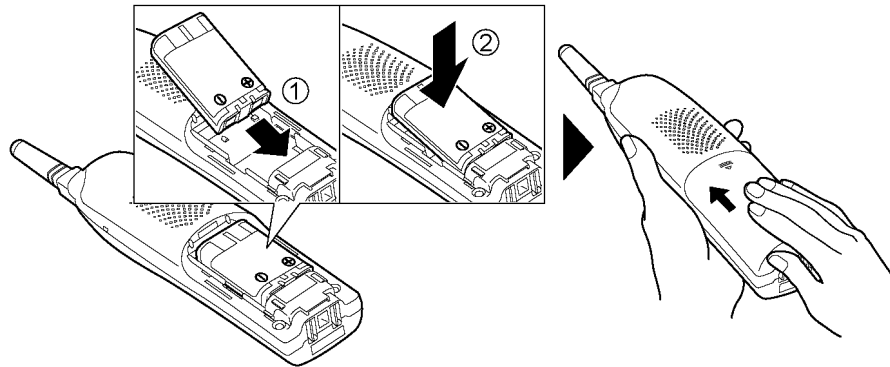
To replace the battery:
Press the notch on the cover firmly and slide it as
indicated by the arrow. Replace the old battery with a new
one. Close the cover and charge the handset for 6 hours.
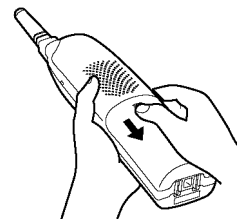
5.2. Battery Charge

Place the handsets on the base unit for **6 hours**
before initial use.

• The unit beeps once, the CHARGE indicator lights and
"`Charging`" is displayed.

• When the battery is fully charged, "`Charge completed`"
is displayed if there are no new calls in the Caller List.

CHARGE Indicator

5.3. Battery Recharge

Recharge the battery when:
— "`Recharge battery`" is displayed on the handset,
— "□■" flashes, or
— the handset beeps intermittently while it is in use.
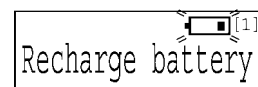
`Recharge battery`

• The display will continually indicate "`Recharge battery`" and/or "□■" will
flash when the handset battery is charged for less than 15 minutes and the
handset is lifted off the base unit.

• If the battery has been discharged, the handset will display "`Charge for 6 HRS`"
and "□" when you place the handset on the base unit. The handset will not work
unless the battery is charged. Continue charging.

Note for service:

The battery strength may not be indicated correctly if the battery is disconnected and connected again, even after it is fully
charged. In that case, by recharging the battery as mentioned above, you will get a correct indication of the battery strength.

5.4. Battery Strength

You can confirm the battery strength on the handset display.
Battery strength is indicated by the icons shown in the chart to the right.

Display prompt	Battery strength
◀▯▯▯	Fully charged
◀▯▯	Medium
◀▯	Low
◀▯ (flashing)	Needs to be recharged.
◀▭	Discharged

5.5. Battery Replacement

If you cleaned the charge contacts and fully charged the battery, but after a few telephone calls, "**Recharge battery**" is displayed and/or "◀▯" continues to flash, or "**Charge for 6 HRS**" and "◀▭" are displayed, the battery may need to be replaced. Please replace with a new Panasonic HHR-P104 battery.

5.6. Battery Information

After your Panasonic battery is fully charged, you can expect the following performance:

Operation	Operating time
While in use (TALK)	Up to 5 hours
While not in use (Standby)	Up to 11 days
While using the Clarity Booster feature	Up to 3 hours

- A fully charged battery will give you up to 5 hours of continuous talk time, or keep your handset in Standby mode to receive incoming calls for up to 11 days (if no phone calls are made). Battery power is consumed whenever the handset is off of the base unit even when the handset is not in use. The longer you leave the handset off of the base unit, the time you can actually talk on the handset will be shortened. Actual battery performance depends on a combination of how often the handset is in TALK mode and how often it is in Standby mode.
- **Clean the charge contacts of the handset, the base unit and charger with a soft, dry cloth. Clean if the unit is subject to grease, dust or high humidity.** Otherwise the battery may not charge properly.
- If the battery is fully charged, you do not have to place the handset on the base unit until "**Recharge battery**" is displayed and/or "◀▯" flashes. This will maximize the battery life.
- If you want to keep the battery fully charged at all times, place the handset on the base unit when the handset is not used. The battery cannot be overcharged.
- When the Clarity Booster feature is turned on automatically or manually, battery operating time may be shortened.

6 LOCATION OF CONTROLS

6.1. Base Unit

[MEMO] Button
[ERASE] Button
[ANSWER ON] Button and Indicator

Display
[PROGRAM] Button

NEW MESSAGE Indicator

[MESSAGE] Button

[AUTO] Button
[STOP] Button

[GREETING REC] (Record) Button
[LINE SELECT] Button

[GREETING CHECK] Button

Charge Contacts
[✱] (TONE) Button

Antenna

[REDIAL/PAUSE] Button

Antenna

Speaker

[LOCATOR/ INTERCOM/ TRANSFER] Button and Indicator

CHARGE Indicator

IN USE Indicator

LINE Buttons

[CONF] (Conference) Button

Navigator Key
([▲], [▼], [◀◀], [▶▶])

CALL WAIT] Button

[SP-PHONE] (Speakerphone) Button and Indicator

[MUTE] Button

MIC (Microphone)

6.2. Handset

Back side

Speaker

Ringer/Message Alert Indicator

Antenna

Receiver

Display

Soft Keys

Headset Jack

[OFF] Button

[✎] (TALK) Button

[MENU] Button

[⊄] (Speakerphone) Button

Navigator Key ([▲], [▼])

[✳] (TONE) Button

[REDIAL/PAUSE] Button

[HOLD/INTERCOM] Button

Microphone

[FLASH/CALL WAIT] Button

Charge Contacts

6.3. Charger Unit

Charge Contacts

CHARGE Indicator

6.4. How to Use the Soft Keys/Navigator Keys

Handset soft keys
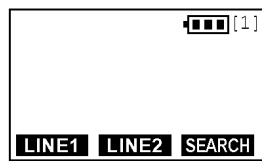
3 soft keys are used to select functions displayed directly above each key. Functions displayed above each key will change depending on the state of use.

On this sample display, "**LINE1**", "**LINE2**" and "**SEARCH**" are displayed above the soft keys.

Pressing the right soft key selects "**SEARCH**".

Pressing the middle soft key selects "**LINE2**".

Pressing the left soft key selects "**LINE1**".

• When a function name does not appear above a soft key, the soft key has no function.

Throughout this Service Manual, the soft keys are indicated by their icons, such as **LINE1**, **LINE2** and **SEARCH**.

Handset navigator key

Scrolls up [▲] and down [▼] the function menu, the Caller List and the phone book.
Increases [▲] or decreases [▼] the handset ringer and receiver/speaker volumes.

Throughout this Service Manual, the handset navigator key is indicated by the arrows [▼] and [▲].

Base unit navigator key
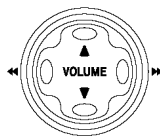
Increases [▲] or decreases [▼] the base unit speaker volumes.
Increases [▲] or decreases [▼] the base unit ringer volume for the line after pressing **[LINE SELECT]**.
[◄◄] and [►►] select the base unit ringer tone for the line after pressing **[LINE SELECT]**.
Repeats [◄◄] or skips [►►] recorded messages.

Throughout this Service Manual, the base unit navigator key is indicated by the arrows [▼], [▲], [◄◄] and [►►].

---

7 DISPLAYS

7.1. Handset Display and Base Unit Display

Handset
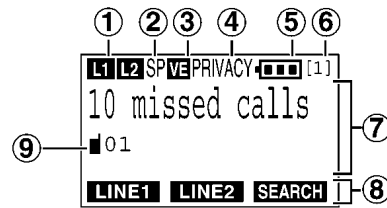
① "**L1**" and "**L2**" indicate the status of each line as follows:

Off (invisible)	The line is free.
On	The line is being used.
Flashing	A call is on hold on the handset or base unit, or the Answering System is answering a call.
Flashing rapidly	A call is being received.

② "SP" is shown when you are using the handset speakerphone.

③ "**VE**" indicates Voice Enhancer mode is on.

④ "PRIVACY" indicates Call Privacy mode is on. Other extension users cannot join your conversation.

⑤ The battery icon indicates battery strength.

⑥ The extension number of your handset is displayed if it has been registered to the base unit.

⑦ The display shows the dialed number, call status, programming options, phone book items, Caller information, etc.

⑧ The icons on the bottom line indicate the functions of the corresponding soft keys which are located directly below the display.

⑨ "▮" (extension icon) and extension numbers are displayed (ex. base unit="0", handset 1= "1")
a) during an intercom call or a conference call;
b) while monitoring a room.

Base unit

① ② ③ ④

FULL
L1
L2 LINE 1 LINE 2

⑤
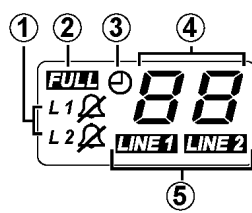
① " L1 " indicates the line 1 ringer on the base unit is off.
" L2 " indicates the line 2 ringer on the base unit is off.

② " FULL " flashes when no new messages can be recorded. Erase unnecessary messages.

③ " ⏰ " flashes until you set the date and time, and flashes after a power failure. If it is flashing, set the date and time.

④ Message counter shows:
— the number of recorded messages. If the recording time is set to "Greeting only", "go" will be displayed for a few seconds when you turn the Answering System on.
— the selected volume level while you are adjusting the speaker volume.
— "P" when [PROGRAM] is pressed to store a phone number.
— "E" when your greeting message or memo message was not recorded correctly.

⑤ " LINE 1 " and/or " LINE 2 " will be displayed when selecting the line(s)
a) to record the greeting message;
b) to turn the Answering System on;
c) to play back messages;
d) to erase messages;
e) to change the ringer volume or tone.

" LINE 1 " and/or " LINE 2 " will flash when
a) the Answering System is answering a call on the line;
b) a message on the line is played.

7.2. Troubleshooting (Handset LCD)

The following will be displayed on the handset when the unit needs your attention.

Display message	Cause & Remedy
Recharge battery	• The battery needs to be charged. Recharge the battery.
Charge for 6 HRS	• The battery has been discharged. The handset will not work. Fully charge the battery.
No link to base. Move closer to base and try again.	• The handset has lost communication with the base unit. Walk closer to the base unit, and try again. • Confirm the base unit's AC adaptor is plugged in. • Raise the base unit antennas. • The handset's registration may have been canceled. Re-register the handset.
Please lift up and try again.	• A handset button was pressed while the handset was on the base unit (or charger, for accessory handset users). Lift the handset and press the button again.
Busy	• The called base unit or handset is in use. • Other users are using the line(s). Wait until the line button light or the line status icon goes out. • Privacy mode is on for the call you tried to join. • The handset you tried to send phone book items to is in use. • The handset you are calling is too far from the base unit.
Invalid	• The called handset has not been registered to the base unit. • You selected your own extension number.
Error!!	• When you tried to register or deregister the handset, the handset and base unit could not link for some reason, such as interference from electrical appliances. Move the handset and base unit away from any electrical appliances and try again. • If more than 1 handset is in use, you may not be able to register/deregister. Try again later. • Another handset tried to send phone book items to you but copying stopped. Have the other handset user re-send the items to you.
System is busy. Please try again later.	• If more than 1 other user is using the handset and/or base unit, such as conducting outside/intercom calls or listening to messages, you may not be able to use the handset. Try again later. • The Answering System is in use (answering a call or playing back messages). Try again later. • The handset has lost communication with the base unit. Walk closer to the base unit and try again.

Display message	Cause & Remedy
Phone book full	• When you tried to store an item in the phone book, the phone book memory was full. Press **[OFF]** to exit programming mode. To erase other items from the phone book, see "**Erasing an Item in the Phone Book**".
---Incomplete--- Tom Jones 0987654321 Phone book full (The name/number is an example.)	• When the displayed item was sent to the destination handset, the phone book memory was full and copying stopped. If you tried to send all of the items, the item displayed with "Incomplete" and items after it have not been copied to the destination handset. Press **[OFF]** to exit. To erase items from the destination handset phone book, see "**Erasing an Item in the Phone Book**". You can copy all of the items again or copy the items which have not been copied one by one.
---Incomplete--- Tom Jones 5557654321 (The name/number is an example.)	• The destination handset is out of area. • The destination handset user may have pressed **[↝]** or **[↯]**.
Phone book No items stored	• Your phone book is empty. No items cannot be copied to the destination unit.
Denied	• The Room Monitor feature is turned off on the destination handset or base unit and cannot be monitored. • The called handset was on the base unit. The handset must be off the base unit to be monitored.
Invalid. Please register to the base unit	• The handset you tried to call has not been registered to the base unit. Register the handset.
Error!! 4 handsets have already been registered.	• 4 handsets have already been registered to the base unit. To cancel a handset's registration, see "**Canceling the Handset Registration**". • You may have registered one of your handsets to another base unit without deleting its registration to this base unit. Erase the handset's registration from the base unit. (1) Press and hold **[LOCATOR/INTERCOM/ TRANSFER]** for 3 seconds, and (2) Press and hold the handset number **[1]** (*⌿*) to **[4]** (*⌿*) that you do not want for 5 seconds. A long beep sounds, then the handset number is erased from the base unit memory.
Wrong handset Refer to manual	• The accessory handset for this base unit is KX-TGA650BX. Your handset is not for this base unit. Your handset is for KX-TG5210BX/KX-TG5230BX base unit.

Cross Reference:

8 SETTINGS

8.1. Connections

8.1.1. Connecting the AC Adaptor

Base unit

Raise the antennas.

Fasten the AC adaptor cord.
Hook
Bottom of the base unit

To Power Outlet
(AC 220–240 V, 50/60 Hz)
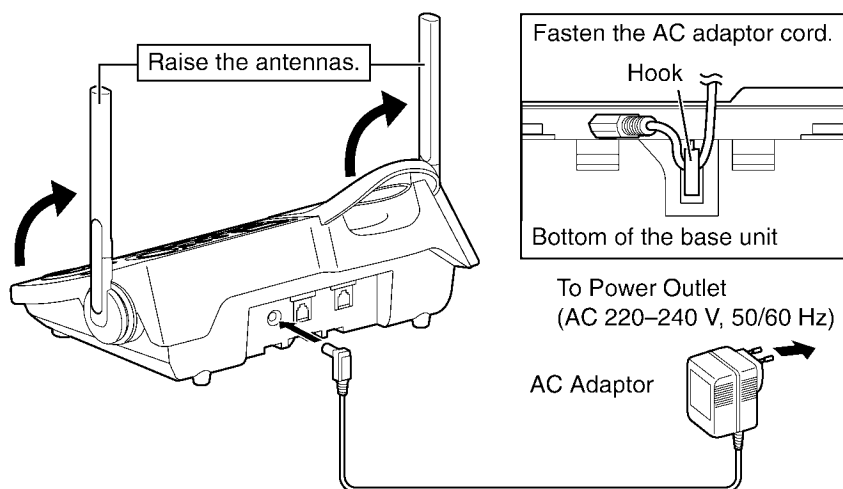
AC Adaptor

- Base unit: USE ONLY WITH Panasonic AC ADAPTOR PQLV1BXZ.
- The AC adaptor must remain connected at all times. (It is normal for the adaptor to feel warm during use.)
- The AC adaptor should be connected to a vertically oriented or floor-mounted AC outlet. Do not connect the AC adaptor to a ceiling-mounted AC outlet, as the weight of the adaptor may cause it to become disconnected.
- If your unit is connected to a PBX which does not support Caller ID, you cannot access Caller ID services.
- This unit will not function during a power failure. We recommend connecting a standard telephone to the same telephone line or to the same telephone jack using a T-adaptor.
- When more than one unit is used, the units may interfere with each other. To prevent or reduce interference, please keep ample space between the base units.

Charger unit

AC Adaptor

To Power Outlet
(AC 220–240 V, 50/60 Hz)
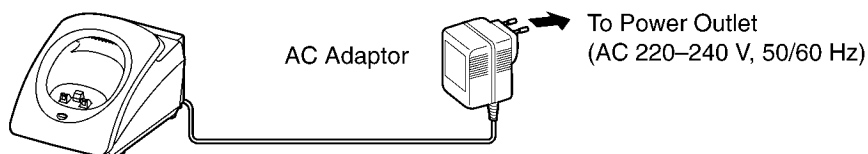
- Charger unit: USE ONLY WITH Panasonic AC ADAPTOR KX-TCA1BX.
- The AC adaptor must remain connected at all times. (It is normal for the adaptor to feel warm during use.)
- The AC adaptor should be connected to a vertically oriented or floor-mounted AC outlet. Do not connect the AC adaptor to a ceiling-mounted AC outlet, as the weight of the adaptor may cause it to become disconnected.

8.1.2.   Connecting the Telephone Line Cord

Connect the telephone line cord(s) to the base unit.

If your unit is connected to a telephone line with DSL service, see "**For DSL service users**".

To connect to a 2-line telephone jack

4-Wire Telephone Line Cord **with GREEN Plugs**

To 2-Line Telephone Jack

LINE 1/2   LINE 2

GREEN Plug

19
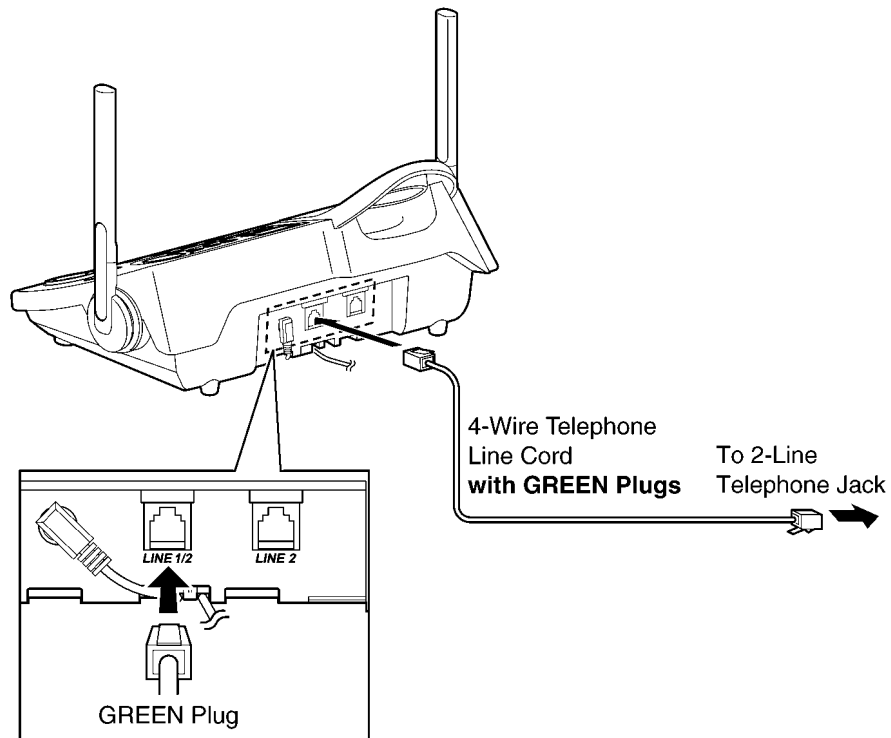
To connect to 2 single-line telephone jacks

To Single-Line
Telephone Jacks

4-Wire Telephone Line Cord
with GREEN Plugs

LINE 2

LINE 1/2   LINE 2

2-Wire Telephone Line
Cord **with**
TRANSPARENT Plugs

LINE 1

TRANSPARENT   GREEN
Plug   Plug
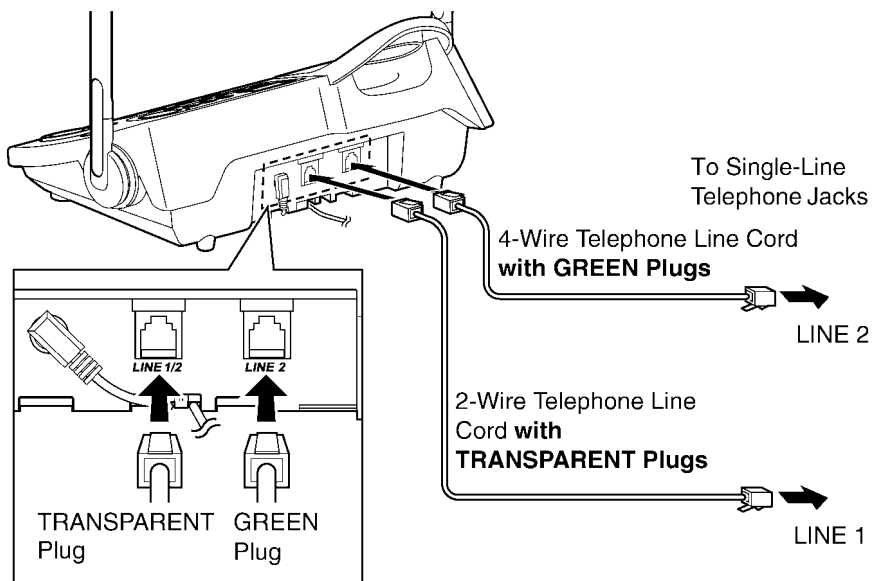
If you use the unit as a single-line telephone only

2-Wire Telephone
Line Cord **with**
TRANSPARENT
Plugs

To Single-Line
Telephone Jack

LINE 1/2   LINE 2

LINE 1

TRANSPARENT Plug
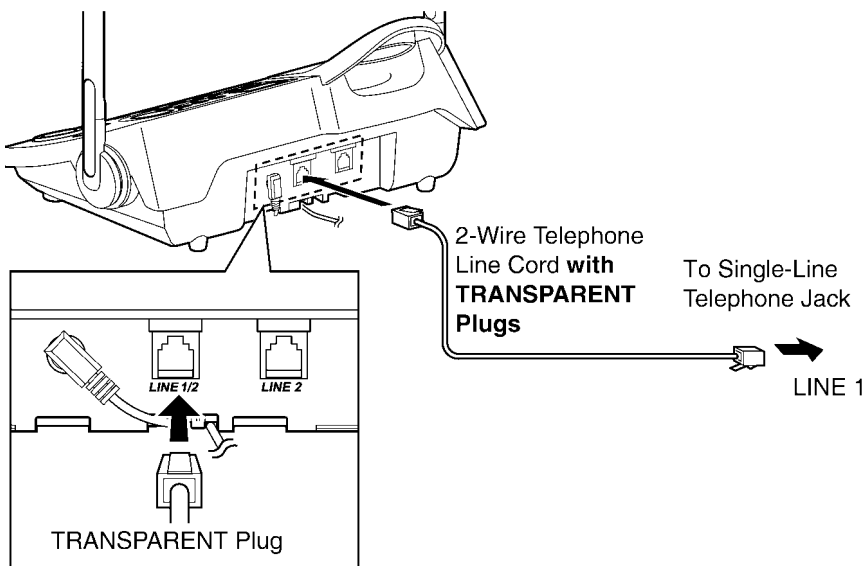
For DSL service users

If the unit is connected to a telephone line with DSL service, you may hear noise from the receiver or speaker during conversations or the unit may not display caller's phone number properly. We recommend connecting a **noise filter***
(contact your DSL service provider) to the DSL telephone line between the base unit and the telephone line jack.

■ Connecting a 2-line telephone jack

For this connection, please purchase a T-adaptor.

Ex. DSL line is LINE 2.
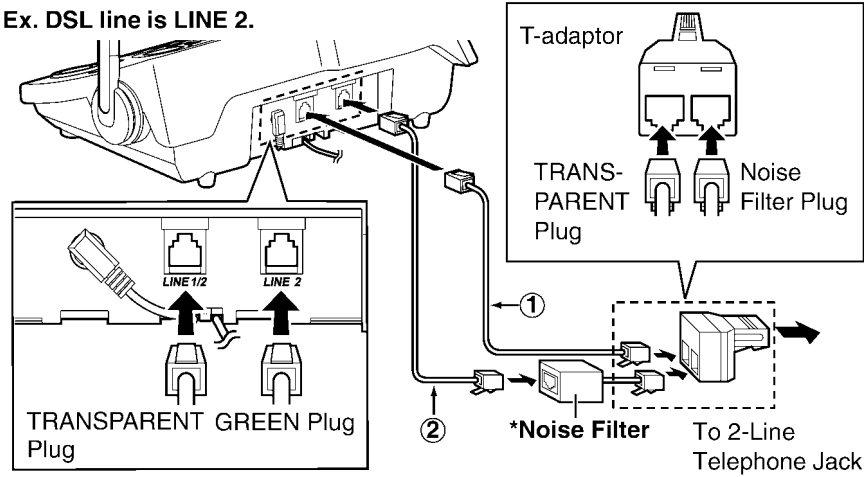
① 2-Wire Telephone Line Cord **with TRANSPARENT Plugs**
② 4-Wire Telephone Line Cord **with GREEN Plugs**

■ Connecting 2 single-line telephone jacks

Ex. DSL line is LINE 2.
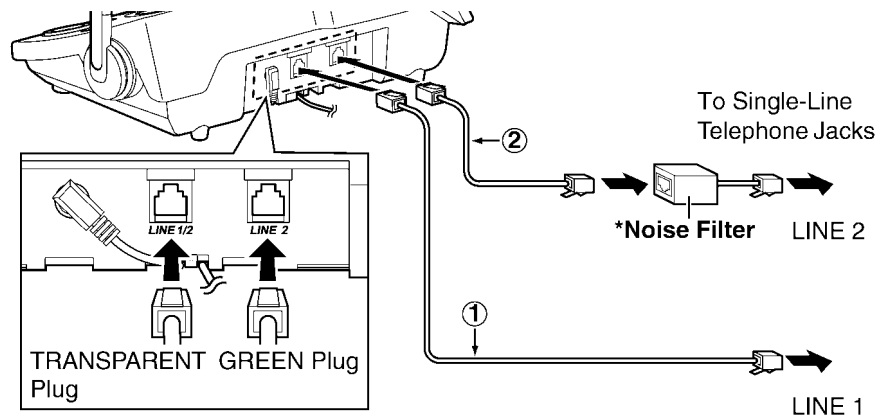
① 2-Wire Telephone Line Cord **with TRANSPARENT Plugs**
② 4-Wire Telephone Line Cord **with GREEN Plugs**

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8.1.3. Connecting an Optional Headset

Connecting an optional headset to the handset allows hands-free phone conversation. Please use only a Panasonic KX-TCA89BX headset.

Open the headset jack cover, and insert the headset plug into the headset jack as shown below.

Headset Jack
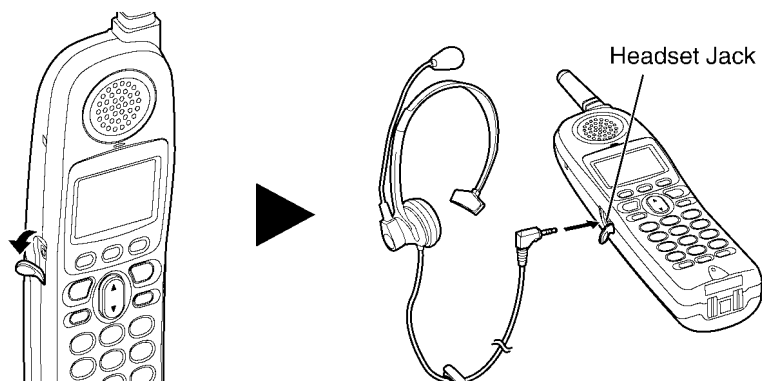
| To switch to the speakerphone while using the headset: |
| Press [✦]. To return to the headset, press [✦]. |

8.2. Function Menu Table

You can use the following functions to customize your unit.

• After pressing **[MENU]**, you can also program menu items directly by pressing (**[0]** to **[9]**, **[✳]** and **[#]**) instead of using the soft keys.

```
( Main menu )-------+---( Sub-menu I )----+----( Sub-menu II )------

  ┌→Message play
  │
  │ Phone book
  │
  │ Ringer setting ────┬── Ringer volume
  │                    ├── Ringer tone
  │ Date and time      └── Incoming call.
  │
  │ Voice enhancer
  │                       Copy 1 item
  │ Copy phone book ──┬── Copy 1 item
  │                   └── Copy all items      ┌── Number of rings
  │                                           ├── Recording time
  │ Initial setting ──┬── Set answering ──────┤── Remote code
  │                   │                       └── Recording mode
  │                   │ Message alert
  │                   ├── LCD contrast
  │                   ├── Key tone
  │                   ├── Auto talk
  │                   ├── Room monitor           ┌── Line selection
  │                   ├── Set tel line ──────────┤── Set dial mode
  │                   │                          ├── Set flash time
  │                   │                          └── Set line mode
  │                   │                          ┌── Ringer volume
  │                   │                          ├── Ringer tone
  │                   ├── Set base unit ─────────┤── Incoming call.
  │                   │                          ├── Room monitor
  │                   │                          └── Line selection
  │                   │
  │                   └── Registration ─────────┬── HS registration
  │                                             └── Deregistration
```

• If you program the date and time, dialing mode, flash time, line mode, number of rings, recording time, recording mode or the remote code using one of the handsets, you will not need to program the same item using another handset.

8.3. Date and Time

You need to set the date and time;
— to display the time and date the calls were received in the Caller List, and
— to announce the day and time when each message was recorded, during a message playback.

1 Press **[MENU]**.

2 Scroll to "`Date and time`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
          ▲
Date and time
          ▼
BACK            SELECT
```
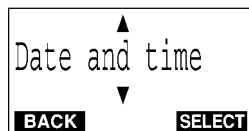
3 (1) Enter 2 digits each for the day, month and year. (Ex. To set May 15, 2004, enter "15 05 04".)
   (2) Enter 4 digits for the time (hour and minute). (Ex. To set 9:30, enter "0930".)
   • If you enter a wrong number, press the soft key (◀) or (▶), or press **[▲]** or **[▼]** to move the cursor to the incorrect number. Enter the correct number.

```
Date:31.12.2004
Time:12:00 AM
 0-9=Date&Time
 *=AM/PM
 ◀    ▶    SAVE
```

```
Date:15.05.2004
Time:09:30 AM
 0-9=Date&Time
 *=AM/PM
 ◀    ▶    SAVE
```
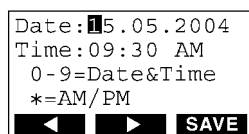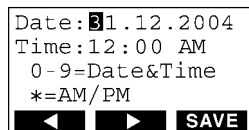
4 Select "`AM`" or "`PM`" by pressing **[*]**.

5 Press the soft key (**SAVE**).
   • The date and time are set and "🕐" disappears from the base unit display.
   • If the handset beeps 3 times, the date and time were not set correctly. Start again from step 3.

6 Press **[OFF]**.

• When entering the time, you cannot enter numbers greater than 12. **Do not use military time.** (To set 13:00 hours, enter "0100", and select "PM" in step 4.)

The date and time may be incorrect after a power failure. When "🕐" flashes on the base unit display or "🕐 `Press MENU.`" flashes on the handset display, set the date and time again.

To adjust the date and time when "🕐 `Press MENU.`" **flashes on the handset display:**
Press **[MENU]**, then go to step 3 above.

To confirm the date and time, repeat steps 1 and 2.

• The current date and time are displayed. When finished, press **[OFF]**.

8.4.   Dialing Mode

If you have touch tone service, set the dialing mode to "Tone". For rotary or pulse service, set to "Pulse". The factory preset is "Tone".

1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Initial setting
```

3 Scroll to "`Set tel line`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Set tel line
```

4 Scroll to "`Set dial mode`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Set dial mode
```

5 Select "`Pulse`" or "`Tone`" by pressing **[▼]** or **[▲]**.

```
Set dial mode
:Tone
```

6 Press the soft key (**SAVE**), then press **[OFF]**.

8.5.   Line Mode

The line mode for both lines is preset to "B" and generally should not be adjusted. If the line buttons on the base unit do not light properly, or the line status icons (**L1** and **L2**) are not displayed on the handset properly, the line mode selection is incorrect. Set line mode to "A". Each line has its own setting.

1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Initial setting
```

3 Scroll to "`Set tel line`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Set tel line
```

4 Scroll to "`Set line mode`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Set line mode
```

5 Press **[▼]** (`Line1`) or **[▲]** (`Line2`) to select the line.

```
Set line mode
▼=Line1  ▲=Line2
```

6 Select "`A`" or "`B`" by pressing **[▼]** or **[▲]**.

```
Set line mode
Line1:B
```

7 Press the soft key (**SAVE**)
• To select the other line, repeat from step 4.

8 Press **[OFF]**.

8.6. Voice Enhancer Technology

Panasonic's Voice Enhancer Technology clarifies the voice of the person you are talking to, reproducing a more natural-sounding voice that is easier to hear and understand. Voice Enhancer Technology can be turned on or off. The factory preset is OFF.

• Depending on the condition and quality of your telephone line, this feature may emphasize existing line noise. If it becomes difficult to hear, turn this feature off.

To turn Voice Enhancer on, press the soft key (**(VE)**) during a conversation.

• "**VE**" is displayed.
• **To turn this feature off**, press the soft key (**(VE)**) again. "**VE**" disappears from the display.

```
┌─────────────────────────┐
│ L1      VE        ▭▪▪▪[1]│
│ Talk         Line1      │
│ 00-00-32                │
│                         │
│ (VE)    LINE2    MUTE   │
└─────────────────────────┘
```
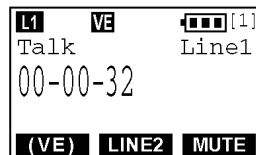
• After hanging up a call, the on/off setting will be retained.

■ "**(VE)**" will not be shown while you are using both lines simultaneously. In that event, you can turn this feature on or off during a conversation by performing the following steps:

1. Press **[MENU]** during a conversation.
2. Press **[4]** to select "4=**Voice enhancer**" or "**V.E. off**".
    • You can also select "4=**Voice enhancer**" or "4=**V.E. off**" by pressing **[▼]** or **[▲]** then pressing the soft key (**SELECT**).

```
┌─────────────────────────┐
│ 1=Phone book            │
│ 2=Privacy on            │
│ 3=Booster on            │
│ 4=Voice enhancer        │
└─────────────────────────┘
```
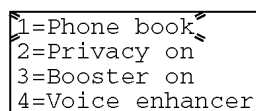
• After hanging up a call, the on/off setting will be retained.

■ When the handset is not in use, you can also turn this feature on or off by performing the following steps:

1. Press **[MENU]** while the handset is not in use.
2. Scroll to "**Voice enhancer**" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).
3. Select "**On**" or "**Off**" by pressing **[▼]** or **[▲]**.
4. Press the soft key (**SAVE**), then press **[OFF]**.

8.7. Ringer Tone

You can set the handset and base unit ringers to use one of 8 ringer patterns for each line. "Tone 1" to "Tone 4" are bell ringer patterns. "Melody 1" to "Melody 4" are melody patterns. LINE 1 is preset to "Tone 1". LINE 2 is preset to "Tone 2".
• You cannot change the ringer tone for intercom calls.
• If you select one of the melody ringer patterns, the ringer will continue to sound for several seconds if:
— the caller hangs up before you answer the call, or
— another person answers the call using another phone connected on the same line.
• If LINE 1 and LINE 2 have different ringer patterns and both lines receive calls simultaneously, both ringers will ring alternately.

8.7.1. Handset Ringer Tone

1 Press **[MENU]**.

2 Scroll to "**Ringer setting**" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

> Ringer setting

3 Scroll to "**Ringer tone**" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

> Ringer tone

4 Press **[▼]** (**Line1**) or **[▲]** (**Line2**) to select the line.

> Ringer tone
> ▼=Line1 ▲=Line2

5 Select the desired ringer tone by pressing **[▼]** or **[▲]**.

• The handset will ring and the ringer tone will change. If the ringer volume has been turned off, the handset will not ring.

> Ringer tone   L1
> 1:Tone 1
> ▼▲
> **BACK** **VOLUME** **SAVE**

• You can also select the ringer tone by pressing **[1]** to **[8]**.
[1] to **[4]**: Bell ringer patterns
[5] to **[8]**: Melody patterns

To adjust the ringer volume, press the soft key (**VOLUME**). Adjust the ringer volume by pressing **[▼]** or **[▲]**.

6 Press the soft key (**SAVE**).

• To select the other line, repeat from step 3.

7 Press **[OFF]**.

8.7.2. Base Unit Ringer Tone (Use Either the Base Unit or the Handset)

\<Using the Base Unit\>

Make sure the base unit is not being used.

1 Select either line by pressing **[LINE SELECT]** until "LINE 1" or "LINE 2" is announced.

Ex. LINE 2 selected.

LINE 2

- The selected line (**LINE 1** or **LINE 2**) is displayed.
- Do not select both lines. You cannot set the ringer for both lines at the same time.

2 Press **[◄◄]** or **[►►]** repeatedly to select the desired tone.

- Each time you press **[◄◄]** or **[►►]**, another ringer tone will be heard and selected.
- If the ringer volume has been turned off, the base unit will not ring. Press **[▼]** or **[▲]** to turn the ringer on.
- To stop ringing, press **[STOP]**.
- You can also select the ringer tone by pressing **[1]** to **[8]**.
  [1] to **[4]**: Bell ringer patterns
  [5] to **[8]**: Melody patterns
- To change the ringer volume, press **[▲]** or **[▼]**.

\<Using the Handset\>
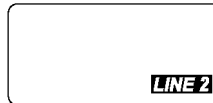
1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

3 Scroll to "`Set base unit`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

4 Scroll to "`Ringer tone`" by pressing **[▲]** or **[▼]**, then press the soft key (**SELECT**).

5 Follow steps 4 to 7 of "**Handset Ringer Tone**".

- When selecting the ringer tone, the base unit will ring. If the base unit ringer volume has been turned off, the base unit will not ring.

Cross Reference:

Handset Ringer Tone (P.27).

8.8. Direct Commands

After pressing **[MENU]**, you can also program menu items directly by pressing (**[0]** to **[9]**, **[✱]** and **[#]**) instead of using the soft keys.

Menu item		Command	Selection items
Ringer volume (Handset)	Line 1	**[1] [1] [1]**	**[1]** : Low **[2]** : Medium **[3]** : High **[0]** : Off
	Line 2	**[1] [1] [2]**	
Ringer tone (Handset)	Line 1	**[1] [2] [1]**	**[1]**–**[4]** : Tone pattern 1–4 **[5]**–**[8]** : Melody pattern 1–4
	Line 2	**[1] [2] [2]**	
Incoming call tone (Handset)		**[1] [3]**	**[1]** : On **[2]** : 2 times **[0]** : Off
Message play		**[2]**	–
Date and time		**[4]**	Go to Step 3 of "**Date and Time**".
Voice enhancer		**[5]**	**[1]** : On **[0]** : Off
Copy phone book –Copy 1 item		**[#] [1]**	Go to Step 4 of "**To Copy One Phone Book Item to Another Handset**".
Copy phone book –Copy all items		**[#] [2]**	Go to Step 4 of "**To Copy All of the Items in Your Phone Book to Another Handset**".
LCD contrast		**[0] [1]**	**[1]**–**[6]** : Level 1–6
Key tone		**[0] [2]**	**[1]** : On **[0]** : Off
Auto talk		**[0] [3]**	**[1]** : On **[0]** : Off
Set dial mode		**[0] [5] [1]**	**[1]** : Pulse **[2]** : Tone
Set flash time	Line 1	**[0] [5] [2] [1]**	**[1]** : 700 ms **[2]** : 600 ms **[3]** : 400 ms **[4]** : 300 ms
	Line 2	**[0] [5] [2] [2]**	**[5]** : 250 ms **[6]** : 110 ms **[7]** : 100 ms **[8]** : 90 ms
Set line mode	Line 1	**[0] [5] [3] [1]**	**[1]** : A **[2]** : B
	Line 2	**[0] [5] [3] [2]**	
Line selection (Handset)		**[0] [5] [5]**	**[0]** : Auto **[1]** : Line 1 **[2]** : Line 2
Number of rings	Line 1	**[0] [6] [1] [1]**	**[2]**–**[7]** : 2–7 rings **[0]** : Toll saver
	Line 2	**[0] [6] [1] [2]**	
Recording time	Line 1	**[0] [6] [2] [1]**	**[1]** : 1 minute **[2]** : 2 minute **[3]** : 3 minute **[0]** : Greeting only
	Line 2	**[0] [6] [2] [2]**	
Remote code		**[0] [6] [3]**	Go to Step 5 of "**Remote Code**".

Cross Reference:

Date and Time (P.24).

To Copy One Phone Book Item to Another Handset (P.47).

To Copy All of the Items in Your Phone Book to Another Handset (P.47).

Remote Code (P.39).

Menu item		Command	Selection items
Recording mode		[0] [6] [4]	[1] : Standard recording (60 min) [2] : Enhanced recording (30 min)
Room monitor (Handset)		[0] [9]	[1] : On [0] : Off
Message alert		[0] [#]	[1] : On [0] : Off
Ringer tone (Base unit)	Line 1	[0] [✶] [1] [1]	[1]–[4] : Tone pattern 1–4 [5]–[8] : Melody pattern 1–4
	Line 2	[0] [✶] [1] [2]	
Incoming call tone (Base unit)		[0] [✶] [2]	[1] : On [2] : 2 times [0] : Off
Room monitor (Base unit)		[0] [✶] [3]	[1] : On [0] : Off
Line selection (Base unit)		[0] [✶] [5]	[0] : Auto [1] : Line 1 [2] : Line 2
Ringer volume (Base unit)	Line 1	[0] [✶] [6] [1]	[1] : Low [2] : Medium [3] : High [0] : Off
	Line 2	[0] [✶] [6] [2]	
Handset registration		[0] [0] [1]	Go to Step 5 of "Re-registering the Handset".
Handset deregistration		[0] [0] [2]	[3] [3] [5]
Phone book		[✶]	To store an item, go to Step 2 of "Storing Names and Numbers". To search for items, go to Step 2 of "Dialing from the Phone Book".

During programming:
When "**SAVE**" or "**O K**" is displayed, press the right soft key **to save the new settings**.
To exit programming, press **[OFF]**.

• If you press the direct command incorrectly, press **[OFF]**, then re-enter programming mode by pressing **[MENU]**.

Cross Reference:

Re-registering the Handset (P.65).

Storing Names and Numbers (P.42).

Dialing from the Phone Book (P.44).

9 OPERATIONS

9.1. Answering System

9.1.1. Greeting Message

You can record a personal greeting message of **up to 2 minutes** for each line or a common greeting message for both lines. If you do not record your own message, one of 2 pre-recorded greetings will be played for callers.

> The total recording time of all messages (greeting, incoming and memo) is **about 60 minutes**. We recommend you record **a brief greeting message** in order to leave more time for recording new messages.

• You can use the enhanced recording mode for clearer sound, if necessary.

To record a greeting message

> **Greeting message samples**
>
> "Hello, this is (your name and/or number). Sorry, I cannot take your call. Please leave a message after the beep. Thank you."

1 To record a common greeting for both lines, press **[LINE SELECT]** repeatedly until "LINE 1 and LINE 2" is announced.

 • "**LINE 1** **LINE 2**" is displayed.

 To record a greeting for either line individually, press **[LINE SELECT]** repeatedly until "LINE 1" or "LINE 2" is announced.

 • "**LINE 1**" or "**LINE 2**" is displayed.

2 Press **[GREETING REC]**.

 • "To record greeting, press RECORD again" is heard.

3 Within 10 seconds, press **[GREETING REC]** again to record your greeting.

4 After the long beep, talk clearly, about 20 cm (8 inches) away from the **MIC** (microphone).

 • The elapsed recording time is displayed.
 • If you record for over 2 minutes, the unit will stop recording.

5 When finished, press **[GREETING REC]** or **[STOP]**.

 • To change the greeting, start again from step 1.

 To review the greeting, press **[GREETING CHECK]** when finished.

• If "E" is displayed, 6 beeps sound and "Your greeting was not recorded. Record your greeting again." is announced, start again from step 1.

```
[GREETING REC]
  [ERASE]
    [LINE SELECT]
      [STOP]
```

[▲], [▼]
MIC
[GREETING CHECK]
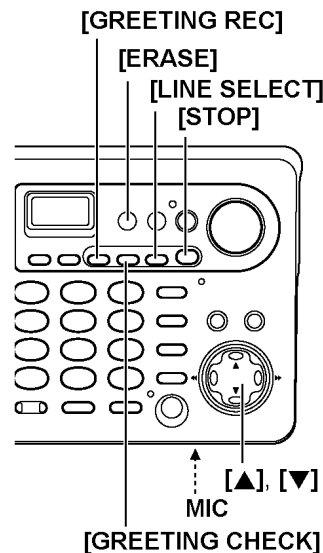
To review the greeting

1. Select the line(s) by pressing **[LINE SELECT]**.

2. Press **[GREETING CHECK]**.

   • When both lines are selected and they have separate greetings, the LINE 1 greeting will be played first.

To adjust the speaker volume, press **[▼]** or **[▲]** during playback.

• 9 levels (0–8) are available while using the Answering System. The level is displayed on the base unit.

To erase the greeting

1. Select the line(s) by pressing **[LINE SELECT]**.

2. Press **[GREETING CHECK]**, then press **[ERASE]** while the recorded message is being played.

   • The unit will answer calls for the line using a pre-recorded greeting (see below).

Pre-recorded greeting

If you do not record a greeting, one of 2 greetings will be played when a call is received, depending on the caller's recording time.

To review the pre-recorded greeting, select the line(s) by pressing **[LINE SELECT]**, then press **[GREETING CHECK]**.

• A pre-recorded greeting will be played as follows:

■ When the recording time is set to "1 minute", "2 minutes" or "3 minutes":
   "Hello, we are not available now. Please leave your name and phone number after the beep. We will return your call."

• If recording time runs out, the unit will automatically switch to the "Greeting only" mode (see below), and no new messages will be recorded.

■ When the recording time is set to "Greeting only":
   "Hello, we are not available now. Please call again. Thank you for your call."

Flash Memory Message Backup (Message storage)

Messages stored in memory will not be affected by power failures. All messages are saved until you erase them.

9.1.2. Caller's Recording Time

You can select "1 minute", "2 minutes", "3 minutes" or "Greeting only" for the caller's recording time. Each line has its own setting. The factory preset for both lines is "3 minutes".

1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (SELECT).

```
Initial setting
```

3 Press the soft key (SELECT) at "`Set answering`".

```
Set answering
```

4 Scroll to "`Recording time`" by pressing **[▼]** or **[▲]**, then press the soft key (SELECT).

```
Recording time
```

5 Press **[▼]** (`Line1`) or **[▲]** (`Line2`) to select the line.

```
Recording time
▼=Line1  ▲=Line2
```

6 Select the recording time by pressing **[▼]** or **[▲]**.
• You can also select the recording time by pressing **[1]**, **[2]**, **[3]**, or **[0]** (Greeting only).

```
Recording time
L1:3min
```

7 Press the soft key (SAVE).
• To select the other line, repeat from step 4.

8 Press **[OFF]**.

If you select "`Greeting only`" for the line(s), the unit will answer a call with the greeting message, and then hang up. The unit will not record any incoming messages for the line(s). When you turn the Answering System on, the base unit will display "g o" and the line(s) (LINE 1 and/or LINE 2) for a few seconds.

9.1.3. Message Alert

You can select whether or not the Ringer/Message Alert indicator on the handset will flash slowly when new messages have been recorded. The factory preset is OFF.

1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (SELECT).

```
Initial setting
```

3 Scroll to "`Message alert`" by pressing **[▼]** or **[▲]**, then press the soft key (SELECT).

```
Message alert
```

4 Select "`on`" or "`off`" by pressing **[▼]** or **[▲]**.

```
Message alert
:Off
```

5 Press the soft key (SAVE), then press **[OFF]**.

• The Ringer/Message Alert indicator will not flash for new messages while the handset is in use.
• The Ringer/Message Alert indicator acts as a ringer indicator and as a message alert indicator. This indicator will flash rapidly when a call is received whether this feature is on or off.
• Battery operating time may be shortened when using this feature.

9.1.4. Erasing Messages

The unit will announce the remaining recording time after playback if it is less than 10 minutes. New messages cannot be recorded when:
— "Memory full" is heard.
— " FULL " flashes on the base unit.
— ANSWER ON indicator flashes rapidly (when the Answering System is on).
Erase unnecessary messages. We recommend you erase unnecessary messages after each playback.

Erasing a specific message

<Base Unit>

Press **[ERASE]** while the message you want to erase is being played.

• A beep sounds, then the next message is played. To exit playback mode, press **[STOP]** 2 times.

<Handset>

Press **[**✱**][4]** while the message you want to erase is being played.

• A beep sounds, then the next message is played. To exit remote operation mode, press **[OFF]**.

Erasing all messages

You can erase all caller messages and all memo messages in one operation.
• The greeting message(s) will not be erased.
• If the Answering System was turned on for only one of the 2 lines, only caller messages for that line and memo messages are erased. Caller messages recorded for the other line are not erased.
If you want to erase caller messages only for the desired line(s), select the line(s).

<Base Unit>

1 Press **[ERASE]** while the base unit is not being used.

  • "To erase all messages, press ERASE again" is heard.

2 Within 10 seconds, press **[ERASE]** again. Wait until "No messages" is heard.

  • While erasing messages, alarm tones will be heard.
  • All messages for the line(s) and memo messages are erased.

To erase all messages for the desired line(s)

1. Select the line(s) by pressing **[LINE SELECT]**.

2. Press **[ERASE]**.

3. Within 10 seconds, press **[ERASE]** again. Wait until "No messages" is heard.

  • While erasing messages, alarm tones will be heard.
  • All messages for the line(s) are erased. Memo messages are not erased.

<Handset>

1 Press the soft key (**SEARCH**), then press the soft key (**PLAY**).

2 Press **[✳][5]** to erase all messages. Wait until "No messages" is heard.
  • While erasing messages, alarm tones will be heard.
  • All messages for the line(s) and memo messages are erased.
  • To end remote operation, press **[OFF]**.

• Information in the Caller List will not be erased.

To erase all messages for the desired line(s)

1. Press the soft key (**SEARCH**), then press the soft key (**PLAY**).
2. Select the line(s) by pressing **[#][1]** (LINE 1), **[#][2]** (LINE 2) or **[#][0]** (LINE 1 and LINE 2).
3. Press **[✳][5]** to erase all messages for the line(s). Wait until "No messages" is heard.
  • While erasing messages, alarm tones will be heard.
  • All messages for the line(s) are erased. Memo messages are not erased.
  • To end remote operation, press **[OFF]**.

9.2. For Call Waiting Service Users

If another call is received on the same line during a conversation, you will hear a call waiting tone. Press **[FLASH/CALL WAIT]** to answer the second call.
• The first call is put on hold.
• To return to the first caller, press **[FLASH/CALL WAIT]** again.
• Call Waiting service cannot be used when:
  — the first call on the same line is put on hold,
  — the Answering System is handling a call on the same line, or
  — you are having a conference call on both lines.
• If this function does not operate properly, consult your telephone company for details.

9.3. Using the PAUSE Button (For PBX Line/Long Distance Calls)

We recommend you press **[REDIAL/PAUSE]** if a pause is required for dialing with a PBX or to make a long distance call.
Ex. Line access number **[9]** (PBX)

[9] ➡ **[REDIAL/PAUSE]** ➡ | Phone number |

- Pressing **[REDIAL/PAUSE]** once creates a 3.5 second pause. This prevents misdialing when you dial after confirming the entered number or dial a stored number.
- Pressing **[REDIAL/PAUSE]** more than once increases the length of the pause between numbers.

9.4. FLASH Button

Pressing **[FLASH/CALL WAIT]** allows you to use special features of your host PBX such as transferring an extension call, or accessing optional telephone services such as call waiting.

- Pressing **[FLASH/CALL WAIT]** cancels the mute or the Temporary Tone Dialing mode.

Selecting the flash time

The flash time depends on your telephone exchange or host PBX.
You can select the following flash times: "700, 600, 400, 300, 250, 110, 100 or 90 ms (milliseconds)". Each line has its own setting. The factory preset for both lines is "700 ms".

- The setting should stay at 700 ms unless pressing **[FLASH/CALL WAIT]** fails to pick up the Call Waiting call.
- If PBX functions do not work correctly, consult your PBX supplier for the correct settings.

1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

| Initial setting |

3 Scroll to "`Set tel line`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

| Set tel line |

4 Scroll to "`Set flash time`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

| Set flash time |

5 Press **[▼]** (`Line1`) or **[▲]** (`Line2`) to select the line.

| Set flash time
▼=Line1 ▲=Line2 |

6 Select the flash time by pressing **[▼]** or **[▲]**.

| Set flash time
Line1:700ms |

7 Press the soft key (**SAVE**).

- To select the other line, repeat from step 4.

8 Press **[OFF]**.

9.5. Line Selection

When you make or answer a call, the handset and base unit can automatically select the line when you press [✎] or [☊] on the handset or **[SP-PHONE]** on the base unit. There are 3 types of line selection. You can change the line selection for the handset and base unit separately. The factory preset is "Auto".

Auto (factory preset):
When making a call, LINE 1 will be selected. If that line is unavailable, LINE 2 will be selected. When answering a call, the ringing line will be selected.
• When you call back from the Caller List, the indicated line will be selected.
• If the Auto Talk feature is turned on, the unit will select the ringing line when you lift the handset off the base unit (or charger, for accessory handset users), to answer the call.

Line 1: Line 1 will be selected.

Line 2: Line 2 will be selected.

You can select any line by pressing a line soft key (**LINE1**) or (**LINE2**) on the handset or a line button on the base unit, regardless of this setting.

9.5.1. Handset Line Selection

1 Press **[MENU]**.

2 Scroll to "**Initial setting**" by pressing [▼] or [▲], then press the soft key (**SELECT**).

> Initial setting

3 Scroll to "**Set tel line**" by pressing [▼] or [▲], then press the soft key (**SELECT**).

> Set tel line

4 Press the soft key (**SELECT**) at "**Line selection**".

> Line selection

5 Select "**Line1**", "**Line2**" or "**Auto**" by pressing [▼] or [▲].

> Line selection
> :Auto

6 Press the soft key (**SAVE**), then press **[OFF]**.

9.5.2. Base Unit line selection

1 Press **[MENU]**.

2 Scroll to "**Initial setting**" by pressing [▼] or [▲], then press the soft key (**SELECT**).

> Initial setting

3 Scroll to "**Set base unit**" by pressing [▼] or [▲], then press the soft key (**SELECT**).

> Set base unit

4 Scroll to "**Line selection**" by pressing [▼] or [▲], then press the soft key (**SELECT**).

> Line selection

5 Select "**Line1**", "**Line2**" or "**Auto**" by pressing [▼] or [▲].

> Line selection
> :Auto

6 Press the soft key (**SAVE**), then press **[OFF]**.

9.6. Remote Operation from a Touch Tone Phone

While outside, you can operate the Answering System from any touch tone phone. A synthesized voice menu will guide you through the Answering System.

• To skip the voice menu and operate the unit directly, see "**Direct Remote Operation**".
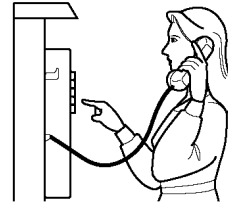
Summary of remote operation

Call your unit from a touch tone phone.

Enter the remote code during or after the greeting.	To listen to messages for the desired line(s):
• The unit will announce the number of new messages (caller messages for the line(s) for which the Answering System is turned on, plus memo messages). The new messages will be played.	Enter the remote code, then press **[#][1]** (LINE 1), **[#][2]** (LINE 2) or **[#][0]** (LINE 1 and LINE 2).* • The unit will announce the number of new messages for the line(s). The new messages will be played.

After 3 seconds, the voice menu will start. Follow the menu or enter direct commands.

To end remote operation, hang up. To listen to messages for the desired line(s), press **[#][1]** (LINE 1), **[#][2]** (LINE 2) or **[#][0]** (LINE 1 and LINE 2).*

• The unit will announce the remaining recording time after playback if it is less than 10 minutes.
• The messages are saved.
• If the unit announces "No new messages", there are only old messages. If "No messages" is announced, there are no messages.
• If 65 or more new messages have been recorded, the unit will not announce the number of new messages during playback.

*After selecting the line(s), messages for the line(s) will be played. Memo messages will not be played.

Cross Reference:

Direct Remote Operation (P.41).

9.6.1. Remote Code

The remote code prevents unauthorized people from accessing your unit and listening to your messages. Choose any **2-digit number (00–99)** for your remote code.
The factory preset remote code is "**11**". If you do not program your own remote code, you can use "11".

1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Initial setting
```

3 Press the soft key (**SELECT**) at "`Set answering`".

```
Set answering
```

4 Scroll to "`Remote code`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Remote code
```

5 Enter a **2-digit remote code (00–99)**.

Ex. Entered 35.

```
Remote code
:35
```

6 Press the soft key (**SAVE**).

7 Press **[OFF]**.

To confirm the remote code, repeat steps 1 to 4.

• The remote code is displayed. When finished, press **[OFF]**.

9.6.2. Voice Menu

The parts in bold letters are voice prompts.

Press 1 to play back all messages. **Press 2 for other functions.**	Press **[1]**. →	**All Message Playback.** All recorded messages are played back. At the end of the last message, "End of final message" is heard.

Press **[2]**. ↓

Press 1 to play back new messages. **Press 2 for other functions.**	Press **[1]**. →	**New Message Playback.** Only new messages are played back. At the end of the last message, "End of final message" is heard.

Press **[2]**. ↓

Press 1 to record your message. **Press 2 for other functions.**	Press **[1]**. →	**Please leave your message.** 1. Talk after the long beep. 2. When you finish recording a voice message, hang up.

Press **[2]**. ↓

Press 1 to erase all messages. **Press 2 for other functions.**	Press **[1]**. →	Wait until "No messages" is heard. • All recorded messages are erased.

Press **[2]**. ↓

Press 1 to record your greeting. **Press 2 for other functions.**	Press **[1]**. →	**Press 7 to record your greeting.** **Press 9 to end recording.** 1. Press **[7]**. 2. After the long beep, talk for up to 2 minutes. 3. Press **[9]** to finish. • Your greeting will be played back for confirmation.

Press **[2]**. ↓

- 3 seconds after playback, the voice menu will start again from the beginning.
- The unit will announce the remaining recording time after playback if it is less than 10 minutes.
- If you hear "Memory full" after playback, erase unnecessary messages.
- To listen to messages for the desired line(s), press **[#][1]** (LINE 1), **[#][2]** (LINE 2) or **[#][0]** (LINE 1 and LINE 2). Memo messages will not be played.
  If you erase all messages after selecting the line(s), all messages for the line(s) will be erased. Memo messages will not be erased.
- If you do not press any buttons within 10 seconds after a voice prompt, "Thank you for your call" will be heard and the call will be disconnected.

9.6.3. Direct Remote Operation

Once you have entered the remote code, you can also control your unit by direct commands instead of using the voice menu. To end the remote operation, hang up at anytime.

Direct commands

[4]:	Plays back new messages.
[5]:	Plays back all messages.
[1]:	Repeats the current message. • If pressed within the first 5 seconds of playback, the previous message will be played.
[2]:	Skips the current message.
[9]:	Stops the current operation. • To resume, enter a direct command within 15 seconds, or the voice menu will start.
[7]:	Records a greeting message. After the long beep, talk for up to 2 minutes.
[9]:	Recording is stopped. • The greeting is played.
[0]:	Turns off the Answering System.

[✻] [4]:	Erases the current message. • A beep will sound and the next message will be played.
[✻] [5]:	Erases all messages. Wait until "No messages" is heard. • To erase all messages for the desired line(s), select the line(s) (see below), then press **[✻][5]**. Memo messages will not be erased.
[#] [1]:	Selects LINE 1.
[#] [2]:	Selects LINE 2.
[#] [0]:	Selects LINE 1 and LINE 2. • Memo messages will not be played.
[#][1][8]:	Turns on the Answering System for LINE 1.
[#][2][8]:	Turn on the Answering System for LINE 2.
[#][0][8]:	Turns on the Answering System for LINE 1 and LINE 2.

• If the Answering System is turned on for one line and you also want to turn on the system for the other line, press **[#][0][8]**.
• To turn the Answering System off for one line when both lines are turned on, turn the system on for the line which you want to leave on (see above).

Turning on the Answering System

Call the line for which you turned off the system, and wait for 15 rings.
• The unit will answer and the greeting will be played.
• The Answering System will be turned on. Hang up or enter the remote code for other options.
• When turning on the Answering System using a rotary or pulse service telephone, you cannot enter the remote code for other options.

Skipping the greeting

After calling your unit, press **[✻]** during the greeting.
• The unit skips the rest of the greeting and you can start recording your message after the long beep.

9.7. Phone Book

The handset can store up to 50 names and phone numbers in its phone book. You can make a call by selecting a name or number from the phone book, and copy phone book items from one handset to another.

9.7.1. Storing Names and Numbers

1 Press the soft key (**SEARCH**), then press the soft key (📖).

• The display will show the number of stored items.

```
Phone book
  10 items
0-9=Name search
▼▲=Scroll list
```

2 Press the soft key (**ADD**).

3 Enter a name of up to 16 characters with the dialing buttons ([0] to [9]), then press [▼].

• To move the cursor, press the soft key (◀) or (▶).
• If a name is not required, press [▼] then go to step 4.

```
Enter name
Tom
▼=Next
```

4 Enter a phone number of up to 32 digits.

• To delete a digit, press the soft key (**CLEAR**). To erase all of the digits, press and hold the soft key (**CLEAR**).

```
Enter phone no.
5557654321
▼=Next
```

5 Press [▼].

• If you want to change the name, press the soft key (**EDIT**). The display returns to step 3. Change the name.
• If you want to change the number, press [▲]. The display returns to step 4. Change the number.

```
Tom
5557654321
```

6 Press the soft key (**SAVE**).

• To continue storing other items, repeat from step 2.

7 Press [OFF].

• In step 1, you can also enter the phone book from the function menu: (1) press [MENU], (2) scroll to "Phone book" by pressing [▼] or [▲], then (3) press the soft key (**SELECT**).
• If a pause is required when dialing, press [REDIAL/PAUSE] in step 4. A pause is stored in a phone number as one digit.
• To store numbers for calling card access (see "**Chain Dial**"), we recommend you add pauses after each item. Storing pauses with numbers will prevent misdialing. The delay time necessary will depend on your telephone company.

Cross Reference:

Chain Dial (P.45).

Selecting characters to enter names

Enter names using the dialing buttons. Press each button until the desired character is displayed.

• Pressing each button selects a character in the order shown below.

Keys	Characters	Keys	Characters
[1]	# & ' ( ) * , − . / 1	[6]	m n o M N O 6
[2]	a b c A B C 2	[7]	p q r s P Q R S 7
[3]	d e f D E F 3	[8]	t u v T U V 8
[4]	g h i G H I 4	[9]	w x y z W X Y Z 9
[5]	j k l J K L 5	[0]	0 Space
◀	Moves the cursor to the left.		
▶	Moves the cursor to the right. (To enter another character using the same number key, move the cursor to the next space.)		

For example, to enter "Tom":

1. Press **[8]** 4 times.

2. Press **[6]** 3 times, then press the soft key (▶) to move the cursor.

3. Press **[6]** once.

If you make a mistake while entering a name

1. Press the soft key (◀) or (▶) to move the cursor to the incorrect character.

2. Press the soft key (CLEAR) to delete the character.
   • Each time you press the soft key (CLEAR), a character is erased.
   • To erase all characters, press and hold the soft key (CLEAR).

3. Enter the correct character.

9.7.2. Dialing from the Phone Book

1 Press the soft key (**SEARCH**), then press the soft key (📖).

- The display shows the number of stored items.
- You can press the soft key (**SEARCH**) to view the first item.

```
   Phone book
    10 items
0-9=Name search
  ▼▲=Scroll list
```

2 Scroll to the desired item. To scroll down, press [**▼**]. To scroll up, press [**▲**].

```
Frank
5554567890
```

Items are sorted in the following order:	
1	Alphabet letters (Alphabetical)
2	Space & ' ( ) , – . /
3	Numbers 0 to 9
4	# ✳
5	Telephone numbers (If no name is stored)

3 Press [📞] or [🔊].
OR
Press the soft key (**CALL**), then press a line soft key (**LINE1**) or (**LINE2**).

- The phone number is dialed.

- In step 1, you can also enter the phone book from the function menu:
  (1) press [**MENU**], (2) scroll to "Phone book" by pressing [**▼**] or [**▲**], then (3) press the soft key (**SELECT**).
- If "No items stored" is displayed in step 1, the phone book is empty.
- To exit the phone book, press [**OFF**].

To search for a name by initial

1. Press the soft key (**SEARCH**), then press the soft key (📖).

2. Press the dialing button for the first letter of the desired name until any name with the same initial is displayed (see the Index table below).

   Ex. To find "Frank", press [**3**] repeatedly until the first item under "F" is displayed.
   - If there are no items beginning with the character you selected, the first item in the next alphabetical index will be displayed.

3. Press [**▼**] repeatedly until the desired name is displayed.

Index table

Keys	Index	Keys	Index
[1]	Symbols, 1	[6]	M, N, O, 6
[2]	A, B, C, 2	[7]	P, Q, R, S, 7
[3]	D, E, F, 3	[8]	T, U, V, 8
[4]	G, H, I, 4	[9]	W, X, Y, Z, 9
[5]	J, K, L, 5	[0]	0, Space

9.7.3. Chain Dial

You can dial a combination of phone book or manual key pad entries while making a call. This feature can be used, for example, to first automatically dial a calling card access number that you have stored in the phone book, then manually or automatically dial your PIN and then automatically dial the destination number from the phone book.

Ex. Using a long distance calling card

• To prevent misdialing, we recommend you add pauses where needed when storing numbers. For example, add pauses after a calling card access number and your PIN when storing in the phone book.

1. Search and dial from the phone book: 18000123456 (Calling card access number)
   • The voice guidance may be announced.
2. Search and dial from the phone book: 1234 (Calling card PIN)
3. Search and dial from the phone book: 15550123456 (Destination Number)

1 **While you are on a call;**
Press [MENU].

```
1=Phone book
2=Privacy on
3=Booster on
```

2 Press the soft key (**SELECT**) at "**1=Phone book**", or press **[1]**.

```
   Phone book
    30 items
0-9=Name search
▼▲=Scroll list
```

3 Search for the desired item by pressing **[▼]** or **[▲]**.
   • To search for an item by initial, see "**Dialing from the Phone Book**".

```
Alan
15550123456
```

4 Press the soft key (**CALL**).
   • The phone number is dialed.
   • If required, repeat steps 1 to 4 for any remaining numbers.

• If you have rotary or pulse service, you need to press **[✶]** before pressing **[MENU]** in step 1 to change the dialing mode temporarily to tone.

Cross Reference:
   Dialing from the Phone Book (P.44).

9.7.4. Editing an Item in the Phone Book

1 Press the soft key (SEARCH), then press the soft key (📖).

2 Scroll to the desired item by pressing [▼] or [▲].
- To search for the item by initial, see "**Dialing from the Phone Book**".

3 Press the soft key (EDIT).

```
Enter name
Jane█
▼=Next
```

4 Edit the name, then press [▼].
- If you do not need to change the name, press [▼] then go to step 5.
- To move the cursor, press the soft key (◄) or (►).

```
Enter name
Jane Walker█
▼=Next
```

5 Edit the phone number, then press [▼].
- If you do not need to change the number, press [▼] then go to step 6.
- To delete a digit, press the soft key (CLEAR). To delete all of the digits, press and hold the soft key (CLEAR).

```
Enter phone no.
5554567890█
▼=Next
```

6 Press the soft key (SAVE).
- To continue editing other items, repeat from step 2.

7 Press [OFF].

Cross Reference:

Dialing from the Phone Book (P.44).

9.7.5. Erasing an Item in the Phone Book

1 Press the soft key (SEARCH), then press the soft key (📖).

2 Scroll to the desired item by pressing [▼] or [▲].
- To search for the item by initial, see "**Dialing from the Phone Book**".

3 Press the soft key (ERASE).
- To cancel erasing, press the soft key (NO).

```
Erase?
```

4 Press the soft key (YES).
- To erase other items, repeat from step 2.

```
Erased
```

5 Press [OFF].

Cross Reference:

Dialing from the Phone Book (P.44).
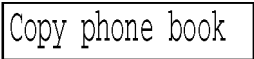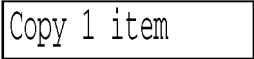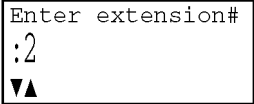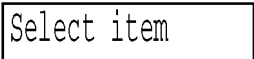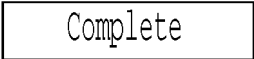
9.7.6. Copying Items in the Phone Book (When the System Has 2 or More Handsets)

You can copy 1 or all phone book items between 2 handsets. The destination handset will save the items in its phone book.

- If an outside call is received during the phone book copy, copying will stop. You will need to re-send the item(s) later.
- After the copy has started, do not place your handset on the base unit (or the charger, for accessory handset users) until copying finishes, otherwise copying will stop.

9.7.6.1. To Copy One Phone Book Item to Another Handset

Make sure the destination handset is not in use.

1 Press **[MENU]**.

2 Scroll to "`Copy phone book`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Copy phone book
```
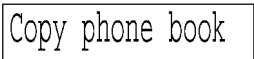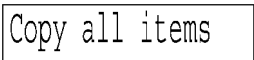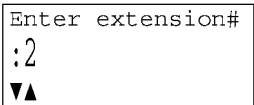
3 Press the soft key (**SELECT**) at "`Copy 1 item`".

```
Copy 1 item
```

4 Select the destination extension number (1 to 4) by pressing **[▼]** or **[▲]**.
   - You can also select the extension number by pressing **[1]** to **[4]**.

```
Enter extension#
:2
▼▲
```

5 Press the soft key (**NEXT**).

```
Select item
```

6 Scroll to the desired phone book item by pressing **[▼]** or **[▲]**.
   - To search for the item by initial, see "**Dialing from the Phone Book**".

7 Press the soft key (**SEND**).
   - When the item has been copied, a long beep sounds and "`Complete`" is displayed.
   - The destination handset displays "`Phone book Receiving`" then "`Phone book Received`".
   - To continue copying other items, repeat from step 6.

```
Complete
```

8 Press **[OFF]**.
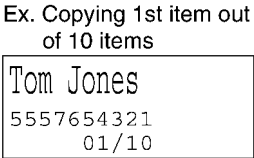
Cross Reference:
   Dialing from the Phone Book (P.44).

9.7.6.2. To Copy All of the Items in Your Phone Book to Another Handset

Make sure the destination handset is not in use.

1 Press **[MENU]**.

2 Scroll to "`Copy phone book`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Copy phone book
```

3 Scroll to "`Copy all items`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Copy all items
```

4 Select the destination extension number (1 to 4) by pressing **[▼]** or **[▲]**.
   - You can also select the extension number by pressing **[1]** to **[4]**.

```
Enter extension#
:2
▼▲
```

5 Press the soft key (**SEND**).
   - When all items have been copied, a long beep sounds and "`Complete`" is displayed.
   - The destination handset displays "`Phone book Receiving`" then "`Phone book Received`".
   - To continue copying items to another extension, repeat from step 3.

Ex. Copying 1st item out of 10 items

```
Tom Jones
5557654321
      01/10
```

6 Press **[OFF]**.

   - You can exit phone book copying mode by pressing **[OFF]**.

10 TROUBLESHOOTING

If the handset display shows error messages, see "Troubleshooting (Handset LCD)"(*1) of "DISPLAYS" for the Cause & Remedy.

Telephone System

Problem	Cause & Remedy
"No link to base. Move closer to base and try again." is displayed and an alarm tone sounds.	• The handset has lost communication with the base unit. Walk closer to the base unit, and try again. • Confirm the base unit's AC adaptor is plugged in. • Raise the base unit antennas. • The handset's registration may have been canceled. Re-register the handset (*2).
Static, sound cuts in/out, fades. Interference from other electrical units.	• Move the handset and base unit away from other electrical appliances. • Walk closer to the base unit. • Raise the base unit antennas. • Turn on the Clarity Booster feature. • If the unit is connected to a telephone line with DSL service, you may hear noise from the receiver or speaker during conversations. We recommend connecting a noise filter (contact your DSL service provider) to the telephone line between the base unit and the telephone line jack.
The base unit/handset does not ring.	• The ringer volume is turned off. Set to high, medium, or low. • If more than 1 other user is using the handset and/or base unit, the handset/base unit may not ring. Users will hear incoming call tones during a call or in room monitor mode.
The handset display is blank.	• If the handset display is blank, fully charge the battery (*3).
You cannot program any function items.	• Programming is not possible while the handset or base unit is being used. • Do not pause for over 60 seconds while programming. • Walk closer to the base unit. • While another user is listening to messages or the Answering System is handling a call, you cannot program. Try again later.
While programming or searching, the handset or base unit starts to ring and the program/search stops.	• A call is coming in. To answer the call, press [↴], [◁], or the called line soft key (**LINE1**) or (**LINE2**) on the handset, or press **[SP-PHONE]** or the called line button on the base unit. Start again from the beginning after hanging up.
You cannot make an intercom/ outside call.	• If more than 1 other user is using the handset and/or base unit, you may not be able to make a call. Try again later. • Your handset is in remote operation mode. Exit by pressing **[OFF]**. • The handset you called is too far from the base unit.

Cross Reference:

Problem	Cause & Remedy
You cannot redial.	• If the last number dialed was more than 48 digits long, the number will not be redialed correctly. • The **[REDIAL/PAUSE]** button functions as either redial or pause. It will redial the last number dialed if pressed before dialing any digits. If another number has been dialed first, it will operate as a pause button (*4).
The handset does not display the caller's phone number.	• You need to subscribe to Caller ID. • Other telephone equipment may be interfering with your phone. Disconnect it and try again. • Other electrical appliances connected to the same outlet may be interfering with Caller ID. • Telephone line noise may be affecting Caller ID. • The caller requested not to send his/her Caller ID information. • If a call is being transferred to you, the Caller ID information will not be displayed. • If a (separate) Caller ID box is connected between the base unit and the telephone wall jack, disconnect the Caller ID box or plug the unit directly into the wall jack. • If the unit is connected to a telephone line with DSL service, the unit may not display caller's phone number properly. We recommend connecting a noise filter (contact your DSL service provider) to the telephone line between the base unit and the telephone line jack.
The handset display exits the Caller List or phone book.	• Do not pause for over 60 seconds while searching.
The Ringer/Message Alert indicator flashes slowly when the handset is not ringing and in use.	• The Message Alert is turned on and new messages have been recorded. Turn the Message Alert off (*5) or listen to the new messages.
You cannot have a conversation using the headset.	• Make sure the optional headset is connected properly (*6). • If "SP-phone" is displayed on the handset, press [➘] to switch to the headset.

Cross Reference:

(*4) **Using the PAUSE Button (For PBX Line/Long Distance Calls)** (P.36).

(*5) **Message Alert** (P.33).

(*6) **Connecting an Optional Headset** (P.22).

Answering System

Problem	Cause & Remedy
The Answering System is on, but incoming messages are not recorded.	• The recording time is set to "Greeting only". Select "1 minute", "2 minutes" or "3 minutes" (*7). • Memory is full. Erase unnecessary messages (*8). • The Answering System is not turned on for the line you wish to record messages from. Select the desired line or both lines by pressing **[LINE SELECT]** repeatedly, then turn the Answering System on again.
" FULL " flashes and the ANSWER ON indicator flashes rapidly. No new messages are recorded.	• Memory is full. Erase unnecessary messages (*8).
You cannot operate the Answering System from the base unit or the handset.	• If more than 1 other user is using the handset and/or base unit, you may not be able to operate the Answering System. Try again later. • If another user is listening to messages or the Answering System is handling a call, you cannot operate the Answering System. Try again later.
You cannot operate the Answering System from a touch tone phone.	• Make sure you entered the correct remote code (*9). • The Answering System may not respond if the tones are too short to activate the unit. Press each button firmly. • The Answering System is off. Turn it on.
When you play back messages or turn on the Answering System, the base unit and handset announce the wrong day and time.	• The date and time may be set incorrectly. Set the date and time again (*10).
Caller ID information is not displayed during message playback.	• Caller ID information will not be displayed — if a message is recorded by using **[MEMO]**, or — if a call is transferred to the Answering System and the caller leaves a message.
Although you tried to erase all messages, all messages are not erased.	• If you pressed a button to start another operation before you hear "No messages", erasing is stopped. Erase messages again (*8).
The NEW MESSAGE indicator still flashes even if you have listened to all new messages.	• The other line has new messages. Select that line by pressing **[LINE SELECT]**, then play back the new messages. • If you selected lines to play back messages, memo messages will not be played. Play back messages without selecting lines first.
An incoming message recorded for a line is not played after pressing **[MESSAGE]**.	• Select the line for that message by pressing **[LINE SELECT]**, then press **[MESSAGE]**.
Memo messages are not played after pressing **[MESSAGE]**.	• You may have pressed **[LINE SELECT]** before pressing **[MESSAGE]**. Press **[MESSAGE]** again without pressing **[LINE SELECT]**.

Cross Reference:

(*7) **Caller's Recording Time** (P.33).

(*8) **Erasing Messages** (P.34).

(*9) **Remote Code** (P.39).

(*10) **Date and Time** (P.24).

General

Problem	Cause & Remedy
The handset/base unit does not work.	• Check the settings (*11)(*12). • Check whether the dialing mode setting is correct (*13). • Fully charge the battery (*3). • Clean the charge contacts and charge again (*14). • Check battery installation (*15). • Unplug the base unit's AC adaptor to reset it. Plug in, and try again. • The handset has not been registered to the base unit. Register the handset (*2). • Re-install the battery and fully charge it.
Time setting is erased, and "🕐" flashes on the base unit display or "🕐 Press MENU." flashes on the handset display.	• If a power failure occurs, the time setting may be erased. Set the date and time again(*16).
"Recharge battery" is displayed, "⊏■" flashes, or the handset beeps intermittently.	• Fully charge the battery (*3).
"Charge for 6 HRS" and "⊏□" are displayed and the handset does not work.	• The battery has been discharged. Fully charge the battery (*3).
You charged the battery fully, but "Recharge battery" is still displayed and/or "⊏■" continues to flash, or "Charge for 6 HRS" and "⊏□" are displayed.	• Clean the charge contacts and charge again (*14). • The battery may need to be replaced. If you install a new battery, fully charge it (*14).
The CHARGE indicator does not go out after the battery has been charged.	• This is normal.

Cross Reference:

(*11) **BATTERY** (P.9).

(*12) **Connections** (P.18).

(*13) **Dialing Mode** (P.25).

(*14) **Battery Recharge** (P.9).

(*15) **Installing the Battery in the Handset** (P.9).

(*16) **Date and Time** (P.24).

11 DISASSEMBLY INSTRUCTIONS

11.1. Base Unit

(A)

Fig. 1

Remove Cables.   Remove the Main P.C. Board.

Remove Tape and Solder.

Fig. 2

(B)

Remove Tape.

Remove the Operational P.C.Board.
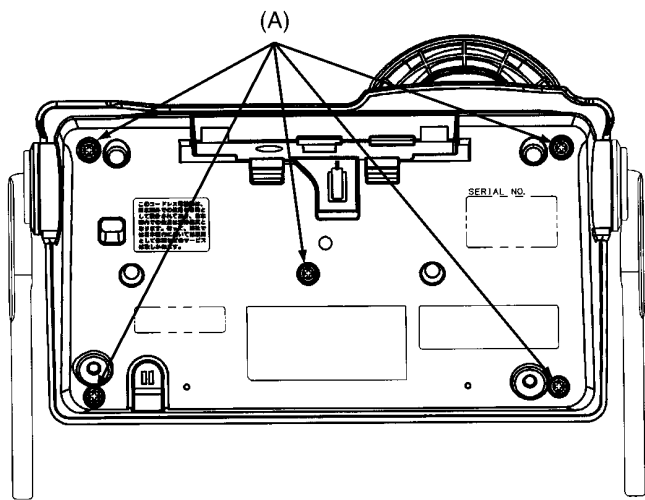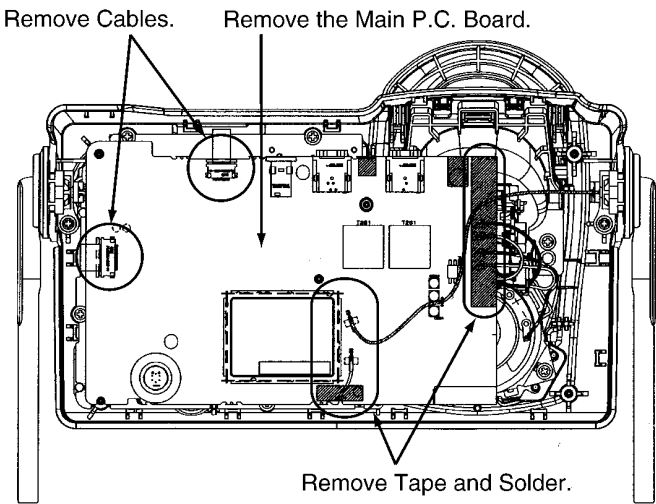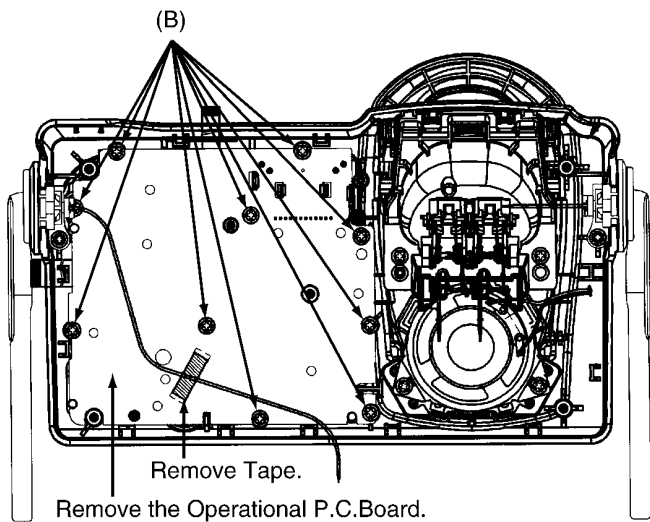
Fig. 3

Shown in Fig.-	To Remove -	Remove -
1	Cabinet Cover	Screws (2.6 × 12).....(A) × 5
2	Main P.C. Board	Tape and Solder
		Cables
		Main P.C. Board
3	Operational P.C. Board	Tape
		Screws (2.6 × 8)...........(B) × 10
		Operational P.C. Board

11.2. Handset

Remove Tape.

Remove Solder.

Remove Charge Terminals.

(D)

Remove the Main P.C.Board.

(C)

Fig. 4

Fig. 6

(E)
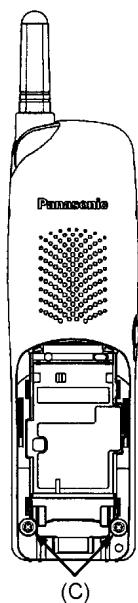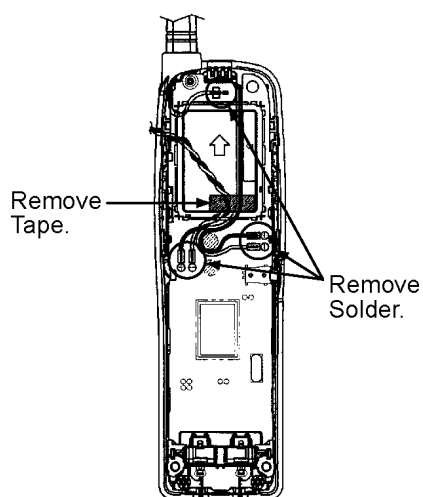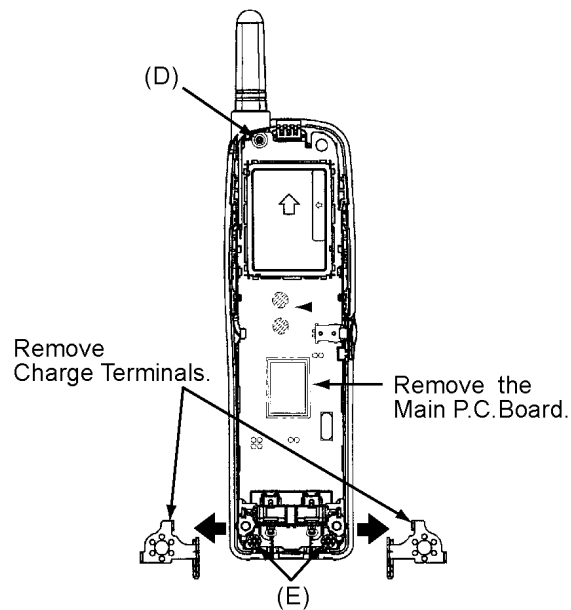
Fig. 7
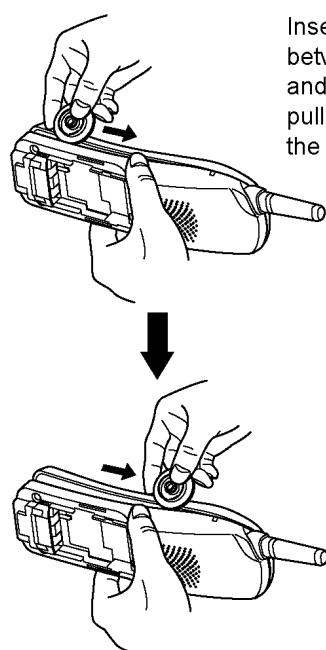
Insert a JIG (PQDJ10006Y) between the Cabinet Body and the Cabinet Cover, then pull it along the gap to open the Cabinet.
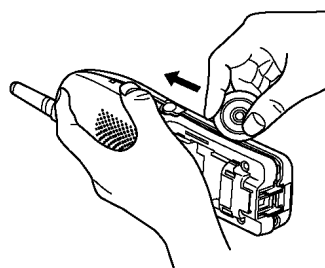
Likewise, open the other side of the Cabinet.
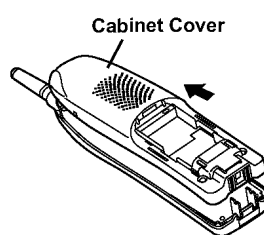
Cabinet Cover

Remove the Cabinet Cover by pushing it upward.

Fig. 5

Shown in Fig.-	To Remove -	Remove -
4	Cabinet Cover	Screws (2.6 × 12)........(C) × 2
5		Follow the procedure.
6	Main P.C. Board	Tape and Solder
7		Screw (2.6 × 12)..........(D) × 1
		Screws (2.6 × 8)..........(E) × 2
		Charge Terminals
		Main P.C. Board

11.3. Charger Unit

(F)

Remove the Main P. C. Board.
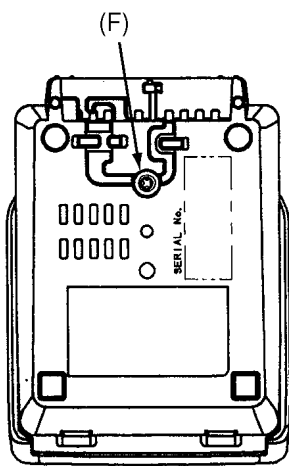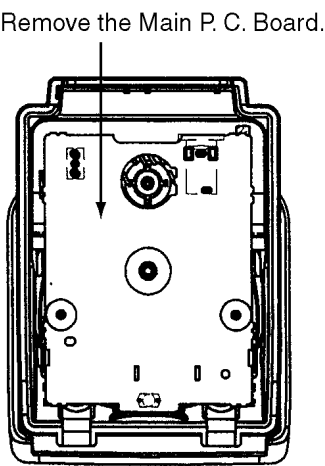
Fig. 8   Fig. 9

Shown in Fig.-	To Remove -	Remove -
8	Cabinet Cover	Screws (2.6 × 12)......(F) × 1
9	Main P.C.Board	Main P.C.Board

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12 ASSEMBLY INSTRUCTIONS

12.1. Fix the LCD to the Main P.C. Board (Handset)

* LOCATE THE FLAT
CABLE TO INSIDE
AS SHOWN.

* AFTER ATTACHING
LCD, LOCK IT WITH
PART Ⓐ AND Ⓑ .

Ⓐ

Ⓑ
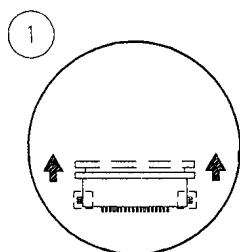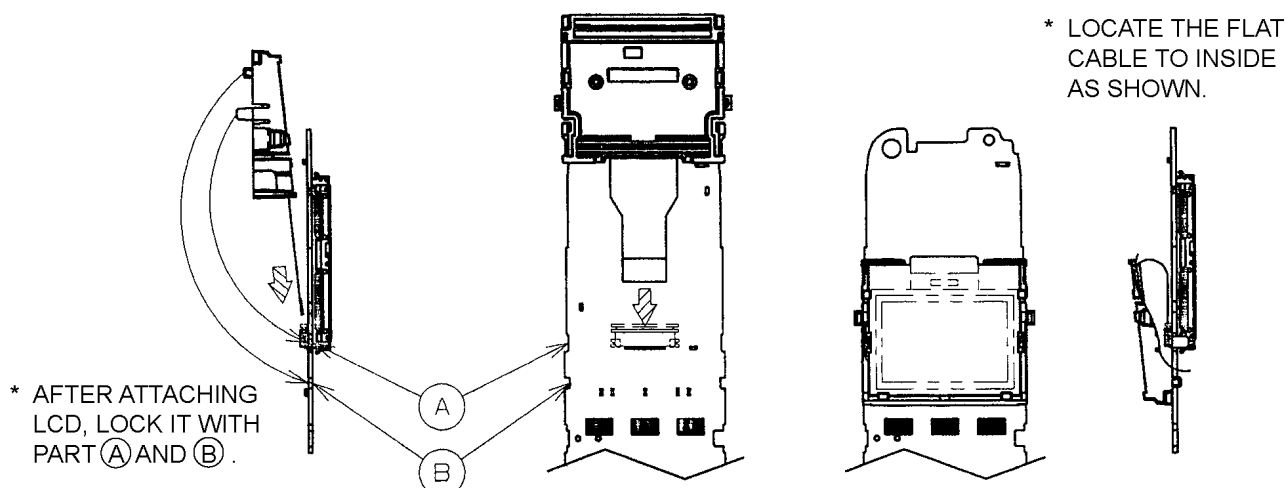
① RELEASE THE
CONNECTOR LOCK.
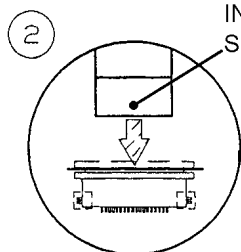
② INSERT FFC
CERTAINLY.

INSULATION
SIDE (WHITE).
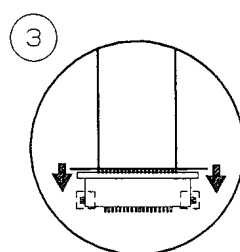
③ CLOSE THE
CONNECTOR LOCK.

CONNECTOR IS
IMPERFECTLY
LOCKED.
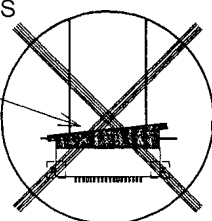
FFC IS
IMPERFECTLY
INSERTED.

FFC IS
INCLINED.

NG

NG
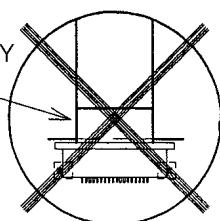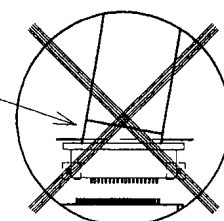
NG

13 TROUBLESHOOTING GUIDE

FLOW CHART

Power ON Base Unit	NO →	Check Power
OK ↓		
Display ON LCD (Base Unit)	NO →	Error Message Table
OK ↓		
Sp-phone Voice Transmission	NO →	Check Sp-phone Transmission
OK ↓		
Sp-phone Voice Reception	NO →	Check Sp-phone Reception
OK ↓		
Recording	NO →	Check Recording
OK ↓		
Playback	NO →	Check Playback
OK ↓		
Battery Charge	NO →	Check Battery Charge
OK ↓		
Link	NO →	Check Link
OK ↓		
Range	NO →	Check the RF part
OK ↓		
Handset Voice Transmission	NO →	Check Handset Transmission
OK ↓		
Handset Voice Reception	NO →	Check Handset Reception
OK ↓		
Caller ID Function	NO →	Check Caller ID

Cross Reference:

Check Power (P.57)

Error Message Table (P.57)

Check Sp-phone Transmission (P.58)

Check Sp-phone Reception (P.58)

Check Recording (P.59)

Check Playback (P.60)

Check Battery Charge (P.61)

Check Link (P.62)

Check the RF part (P.63)

Check Handset Voice Transmission (P.71)

Check Handset Voice Reception (P.71)

Check Caller ID (P.71)

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 be reappeared with TEL simulator in the service center. In this case, try **Check Recording** (P.59) item (C).

13.1. Check Power

BASE UNIT

Is the AC Adaptor inserted into 220-240V outlet?
(AC Adaptor PQLV1BXZ)

Is anode of D301 voltage 9V more ?	**NO** → Check AC Adaptor.
↓ OK	
Is DCDC Convertor voltage 4.5V ?	**NO**
↓ OK	
Check VCC (3.3V): F of DSP.	**NO** → Check **Power Supply Circuit**.
↓ OK	
RST: Reset = "High"?	**NO** → Check **Reset Circuit**.
↓ OK	
Check X'tal CLK = 13.824MHz ?	**NO** → Check X501.
↓ OK	
Check LCD and Key connection.	
↓ OK	
Check DSP.	
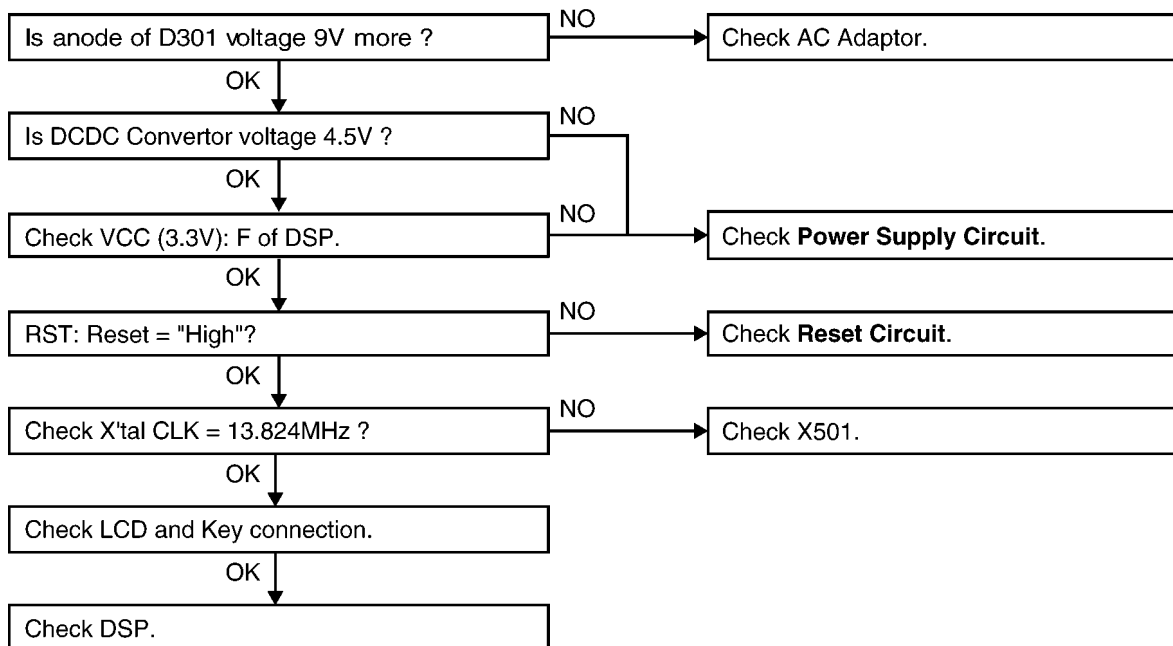
Cross Reference:

Power Supply Circuit (P.93)

Reset Circuit (P.95)

Note:

Flash Memory is IC601.

DSP is IC501.

13.2. Error Message Table

Display	Symptom	Remedy
E1	The initialization was tried, but it could not be done.	1. Check the peripheral circuit of Flash Memory visually.
E9	The abnormality of Flash Memory was detected, when Flash Memory was accessed.	2. Confirm that the voltage is added to the power supply pin. If no voltage is detected, replace the Flash Memory because it might be defect. 3. Solder the Flash Memory again.

Note:

Flash Memory is IC601.

DSP is IC501.

13.3. Check Sp-phone Transmission

BASE UNIT

Press "Line" Button. Does the Base unit catch the line ? — NO → Check **Telephone Line Interface**.

↓ OK

Check signal at MIP, when the signal input to the microphone.

↓ OK

Check Mic input (Pin 60, 61) of DSP. — NO → Check around the microphone.

↓ OK

Check output signal (Line1: Pin 41, Line2: Pin 39). — NO → Check DSP.

↓ OK

Check input signal at base (Line1: Q161, Line2: Q261). — NO → Check SP Phone TX **SIGNAL ROUTE**.

↓ OK

Check the output signal at T/R. — NO → Check **Telephone Line Interface**.

Cross Reference:
    SIGNAL ROUTE (P.116)
    Telephone Line Interface (P.96)

Note:
    Flash Memory is IC601.
    DSP is IC501.

13.4. Check Sp-phone Reception

BASE UNIT

Press "Line" Button. Does the Base unit catch the line ? — NO → Check **Telephone Line Interface**.

↓ OK

Check the signal Pin of DSP (Line1: Pin 52, Line2: Pin 45). — NO → Check SP-Phone RX **SIGNAL ROUTE**.

↓ OK

Check output of DSP (Pin 35 and Pin 37). — NO → Check DSP.

↓ OK

Check Speaker.
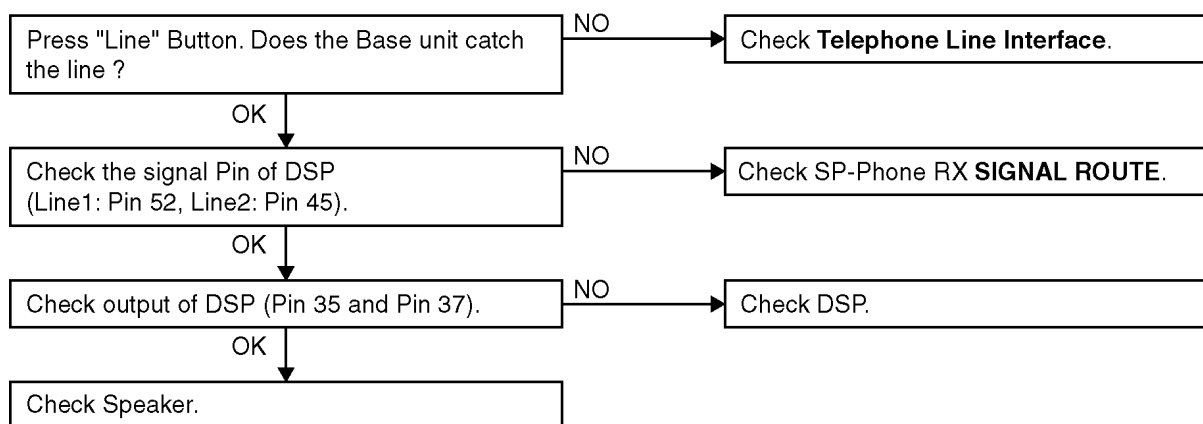
Cross Reference:
    Telephone Line Interface (P.96)
    SIGNAL ROUTE (P.116)

Note:
    Flash Memory is IC601.
    DSP is IC501.

13.5. Check Recording

BASE UNIT

a) Not record Greeting Message

Check signal at MIP, when Mic input signal. → NO

OK ↓

Check Mic input (Pin 60, 61) of DSP. → NO

OK ↓

Check DSP and Flash Memory.

Check Greeting Recording in **SIGNAL ROUTE**.
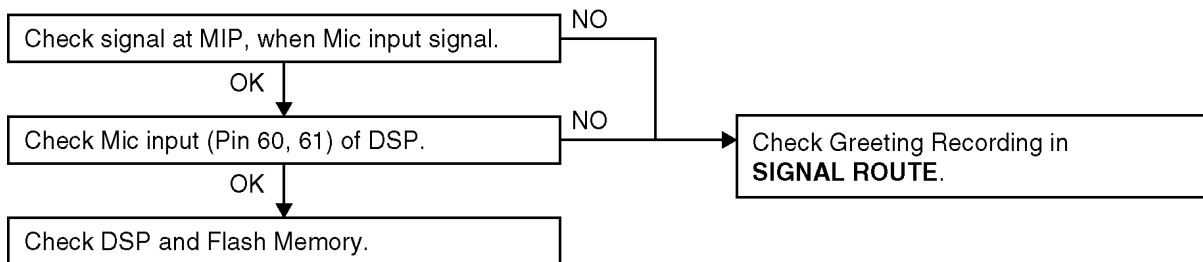
b) Not record Incoming Message

Input Bell signal, Ring sounds ? → NO → Check Telephone Line Interface [Bell].

OK ↓   OK ↓

Check **Parallel Connection Detection Circuit**. (*1) → OK

Is the unit able to catch the line ? → NO → Check **Telephone Line Interface**.

OK ↓

Check the signal of DSP.
(Line1: Pin 52, Line2: Pin 45) → NO → Check ICM Recording **SIGNAL ROUTE**.

OK ↓

Check **Auto Disconnect Circuit**.

OK ↓

Check DSP.
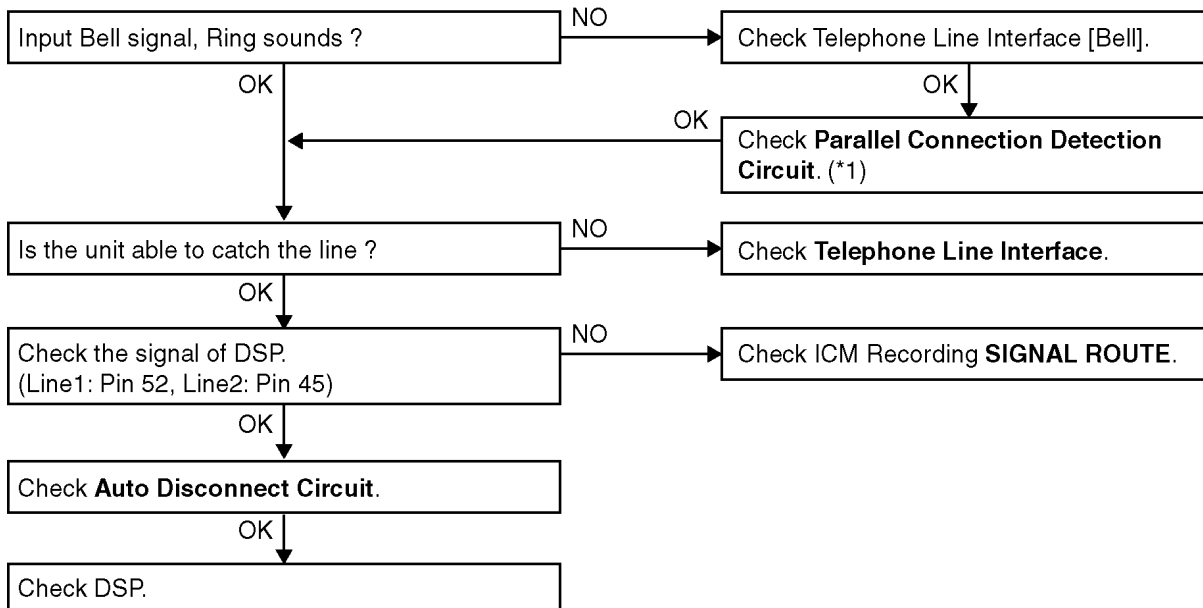
c) How to change the Auto Disconnect activation (time)

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 (time) through the procedures below.

Auto Disconnect activation (time)		PROCEDURE	Status
Enable	2 sec [default]	"STOP"+"LOCATOR"+"ERASE" simultaneously	
	4 sec.	"STOP"+"LOCATOR"+"MEMO" simultaneously	Stand-by
Disable*		"STOP"+"LOCATOR"+"ANSWER ON" simultaneously	

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

d) How to change the VOX level

VOX Level	PROCEDURE
Normal	"STOP"+"VOLUME ▼"+"MEMO" simultaneously
-10 dB Down	"STOP"+"VOLUME ▼"+"ANSWER ON" simultaneously

Cross Reference:

   SIGNAL ROUTE (P.116)

   Parallel Connection Detect Circuit (P.100)

   Telephone Line Interface (P.96)

   Auto Disconnect Circuit (P.98)

Note:

   Flash Memory is IC601.

   DSP is IC501.

   (*1) Multi-Line unit does not ring when the unit detects the line disconnection even if the unit detects the bell signal.

13.6. Check Playback

BASE UNIT

Check VCC (3.3V): Ⓓ of DSP.	NO →	Check **Power Supply Circuit.**
↓ OK		
Check output of DSP (Pin 35, 37).	NO →	Check DSP and Flash Memory.
↓ OK		
Check Speaker.		

Cross Reference:

 Power Supply Circuit (P.93)

Note:

 Flash Memory is IC601.

 DSP is IC501.

13.7. Check Battery Charge

BASE UNIT

```
Plug in the AC power source
(AC Adaptor PQLV1BXZ).
        │
        ▼
Is the CHARGE LED
lit at charge state?          No ──────────────────┐
        │ Yes                                      │
        ▼                                          │
Is the voltage between CHG+     Check around D301,  │
and CHG- around 9V ?      No ─▶ D362, L361, D361,   │
        │ Yes                   D371, L371, Q371.   │
        ▼                                          │
Check around Q371~Q373                             │
of DSP (Pin 12).                                   │
                                                   │
        ┌──────────────────────────────────────────┘
        ▼
Is the voltage of D301          Check AC adaptor
anode about 9V more ?    No ─▶  and CN301.
        │
        ▼
Is the voltage of               Check around IC300,
IC331 (Pin 4) about 4.0V ? No ─▶ Q300, D300, L300.
        │ Yes
        ▼
Is the voltage of               Check around IC331.
IC331 (Pin 5) about 3.3V ? No ─▶
        │ Yes
        ▼
Does the DSP clock              Check around DSP
X501 oscillate ?          No ─▶ and X501.
        │ Yes
        ▼
Is DSP (Pin 13) low at          Check around D362,
charge state?             No ─▶ Q361, Q362,
        │ Yes                   R361~R364.
        ▼
Check around LED901.
```

Note:

Flash Memory is IC601.

DSP is IC501.

HANDSET

```
Check the contact between the
Battery pack and the Handset.
        │
        ▼
Is the voltage at TP-VBAT       Check around  Q209,
4.0V when the handset is   No ─▶ Q210, Q212, D214.
charged on the base unit ?
        │ Yes
        ▼
Check Battery.
```

CHARGER UNIT

Is the AC Adaptor inserted into AC outlet?
(AC Adaptor KX-TCA1BX)

```
        ▼
Is the voltage between          Check AC Adaptor.
DCP and DCM 9V more?      No ─▶
        │ Yes
        ▼
Is the voltage of IC1-out       Check around L1, L2,
above 9V?                 No ─▶ R11, C2, R10 and C1.
        │ Yes
        ▼
Is the voltage between CP        Check around Q1 - Q3,
and CM around 9V ?        No ─▶ R7, D2 and R5.
        │ Yes
        ▼
Is the CHARGE LED lit at         Check around Q4 - Q5
charge state?             No ─▶ and LED1.
```

13.8. Check Link

BASE UNIT

Does the Base Unit make link with Handset Regular Unit? (*1) — YES → Base Unit is OK. Check Handset.

NO ↓

Does the IC501 clock (X501) oscillate? (Test mode) — NO → Check around X501 and IC501.

YES ↓

Is the IC801 (Pin 7) and IC701 (Pin 11) oscillation (RF part) 13.824MHz ± 270Hz? — NO → Check around Q521 and 13.824MHz_OSC line.

YES ↓

Is the IC761 (Pin 1), IC841 (Pin 1) voltage (RF part) 4.0V? — NO → Check around VRF (4.0V) line.

YES ↓

Check the RF part.

Note:

Flash Memory is IC601.

DSP is IC501.

HANDSET

Does the Handset make link with Base Unit Regular Unit? (*1) — YES → Handset is OK. Check Base Unit.

NO ↓

Does the IC201 clock (X201) oscillate? (Test mode) — NO → Check around X201 and IC201.

YES ↓

Is the IC801 (Pin 7) and IC701 (Pin 11) Oscillation (RFpart) 13.824MHz ± 100Hz? — NO → Check around Q204 and 13.824Hz_OSC line

YES ↓

Is the IC761(Pin 1), IC841 (Pin 1) voltage (RF part) 3.6V? — NO → Check around VBAT line.

YES ↓

Is the L861, L851 (IC851 side) voltage (RF part) 3.3V? — NO → Check around IC204.

YES ↓

Check the RF part.

Cross Reference:

Check the RF part (P.63)

(*1) Refer to **Finding out the Defective part** (P.63).

13.9. Check the RF part

13.9.1. Finding out the Defective part

1. Prepare Regular HS(*1) and Regular BU(*2).
2. Cancel the Registration of the regular HS to the regular BU to confirm that neither of them is defective.
3. Cancel the Registration of Handset (to be checked) to Base Unit (to be checked).
   If this operation fails in some ways, either the Handset or the Base Unit is defective, then skip this procedure.
4. 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. After all the checkings or repairing, cancel the Registration of Regular HS to checked Base Unit, and checked Handset to Regular BU.

2. Re-register the checked Handset to the checked Base Unit, and Regular HS to Regular BU.
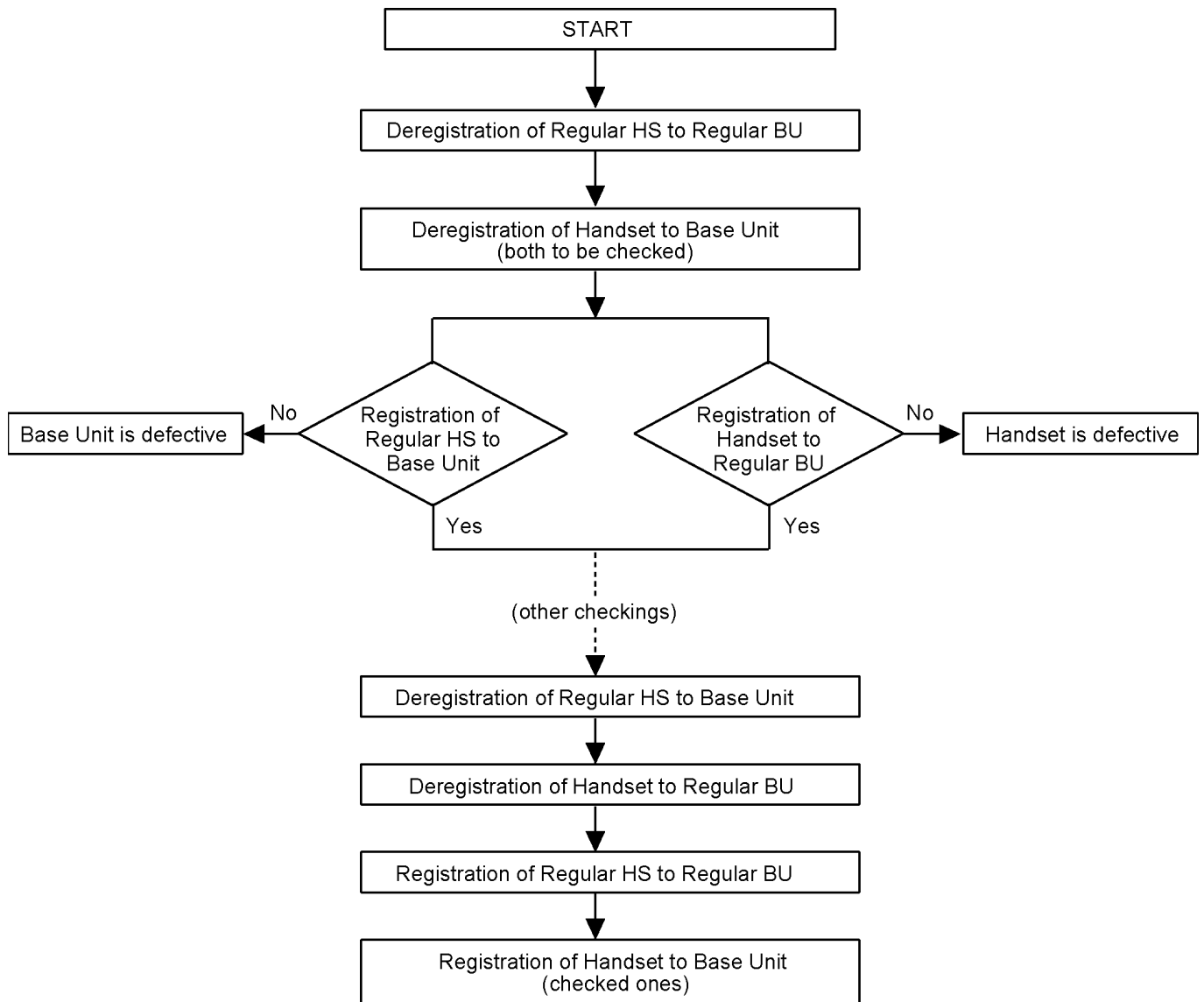
Note:

(*1) HS: Handset

(*2) BU: Base Unit

13.9.1.1. Canceling the Handset Registration

Only one handset can be canceled at a time.
Make sure the handset and the base unit near each other and are not being used.

1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Initial setting
```

3 Scroll to "`Registration`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Registration
```

4 Scroll to "`Deregistration`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Deregistration
```

5 Press **[3][3][5]** to delete the registration memory.

• If you enter a wrong code, re-enter **[3][3][5]**.

```
Deregistration
Enter code:335
            :335
```

6 Press the soft key (**OK**).

• The registration memory will be erased on both the handset and the base unit.
• If the handset beeps 3 times, you entered a wrong code. Enter "335", then press the soft key (**OK**).
• To register the handset to another base unit of the same model, start from step 5 in **Re-registering the Handset**.

Ex. Extension number 2

```
Handset [2]
  Deregistered
```

• "`[-]`" is shown on the top right of the display.
• After canceling registration, the handset cannot be used. If you want to use it again, register the handset to the base unit by performing steps 5 and 6 in **Re-registering the Handset**.

Cross Reference:

Re-registering the Handset (P.65)

13.9.1.2. Re-registering the Handset

Only one handset can be registered at a time near the base unit.

Make sure the base unit and the other handsets are not being used. Have both the handset and base unit nearby during registration.

> If you have canceled handset registration at a previous base unit, start from step 5.

1 *Handset:* Press **[MENU]**.

2 *Handset:* Scroll to "`Initial setting`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Initial setting
```

3 *Handset:* Scroll to "`Registration`" by pressing **[▼]** or **[▲]**, then press the soft key (**SELECT**).

```
Registration
```

4 *Handset:* Press the soft key (**SELECT**) at "`HS registration`".

```
HS registration
```

5 *Base unit:*
Press and hold **[LOCATOR/INTERCOM/TRANSFER]** for 3 seconds.

• The CHARGE indicator flashes. After the CHARGE indicator starts flashing, the rest of the procedure must be completed within 1 minute.

6 *Handset:*
(1) Press the soft key (**OK**).
(2) Wait until a long beep sounds and the display shows the new extension number (ex. extension number 2).

• Registration is complete.

```
Press LOCATOR
on base unit
for 3 sec.
Then press OK↓
          OK
```

```
                    ▮▮▮[2]
Handset [2]
   Registered
```

• You can stop registration by pressing **[OFF]** on the handset and pressing **[LOCATOR/INTERCOM/TRANSFER]** on the base unit.
• If "`Wrong handset Refer to manual`" is displayed, the handset you tried to register is not for this base unit. This handset is for KX-TG5210BX/KX-TG5230BX base unit. The accessory handset for this base unit is KX-TGA650BX.

> If you have not canceled the handset's registration at the previous base unit, the handset number remains in that base unit's memory. To erase the handset number from the previous base unit, perform the following steps:
> (1) Press and hold **[LOCATOR/INTERCOM/TRANSFER]** for 3 seconds, and (2) Press and hold the handset number **[1]** (*♯*) to **[4]** (*♯*) that you do not want for 5 seconds. A long beep sounds, then the handset number is erased from the base unit memory.

13.9.2. RF Check Flowchart

Each item (1 ~ 6) of RF Check Flowchart corresponds to **Check Table for RF part** (P.67).

Please refer to the each item.

```
                Start
                  |
        1         |
     Link         NG      2                      NG
  confirmation ------->  Control          -----------> Check DSP interface parts.
    Normal              signal                         (RF Block <->DSP on BU/HS P.C.B)
                      confirmation
        OK                  OK
                         |
                  3   X'tal            NG
                   Frequency       ----------> Adjust X'tal Frequency.
                  confirmation
                         OK
                  4
                   TX Power         NG
                  confirmation  ----------> Check  TX Block and 5.8GHz Convertor Circuit.
                         OK
                  5   RX             NG
                   Sensitivity   ----------> Check  RX Block.
                  confirmation
                         OK

        6
     Range              NG
  confirmation  -----------------------------> TEST RANGE Check.
    Normal
        OK
      GOOD
```
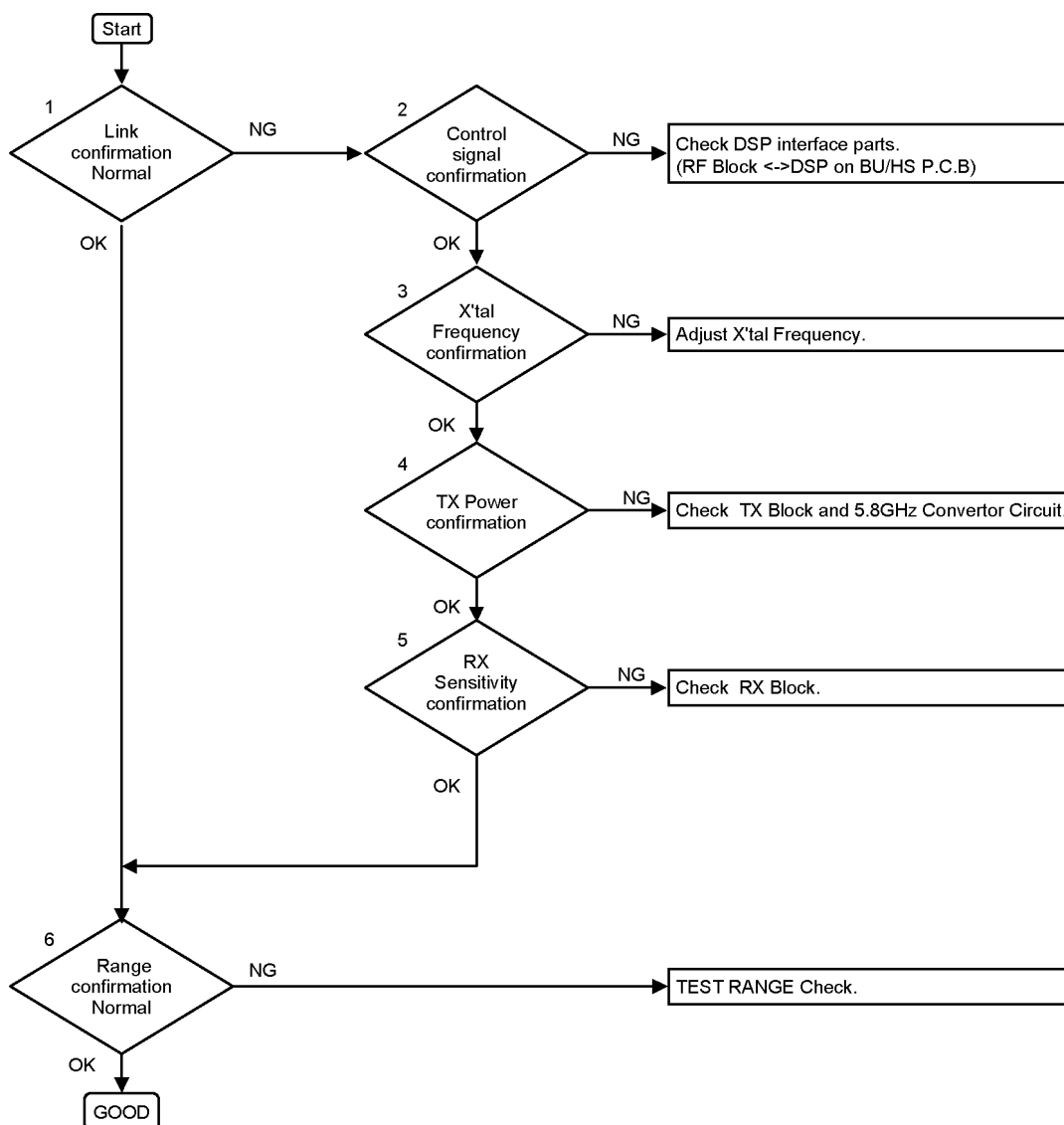
13.9.3. Check Table for RF part

No.	Item	BU (Base Unit) Check	HS (HandSet) Check
1	Link Confirmation Normal HS, BU Mode [Normal Mode]	1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link.	1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link.
2	Control signal confirmation HS, BU Mode: [Test Burst Mode] (*1)	Check DSP interface. (*2)	Check DSP interface. (*2)
3	X´tal Frequency confirmation (*7) HS, BU Mode: [Adjustment] (*3)	Check X´tal Frequency. (13.824000MHz ±270Hz)	Check X´tal Frequency. (13.824000MHz ±100Hz)
4	TX Power confirmation Regular HS, BU Mode: [RX-CW Mode.] (*4) HS, BU (to be checked) Mode: [Test Burst Mode.] (*1)	1. Place the Regular HS about 15cm away from the BU. 2. Confirm that RSSI of the Regular HS is approximately 2V by Oscilloscope. (*5)	1. Place the HS about 15cm away from the Regular BU. 2. Confirm that RSSI of the Regular BU is approximately 2V by Oscilloscope. (*6)
5	RX Sensitivity confirmation Regular HS, BU Mode: [Test Burst Mode.] (*1) HS, BU (to be checked) Mode: [RX-CW Mode.] (*4)	1. Place the Regular HS about 15cm away from the BU. 2. Confirm that RSSI of the BU is approximately 2V by Oscilloscope. (*5)	1. Place the HS about 15cm away from the Regular BU. 2. Confirm that RSSI of the HS is approximately 2V by Oscilloscope. (*6)
6	Range Confirmation Normal HS, BU Mode: [Normal Mode]	1. Register Regular HS to BU (to be checked). 2. Press [Talk] key of the Regular HS to establish link. 3. Compare the range of the BU (being checked) with that of the Regular BU.	1. Register HS (to be checked) to Regular BU. 2. Press [Talk] key of the HS to establish link. 3. Compare the range of the HS (being checked) with that of the Regular HS.

Note:

(*1)(*3)(*4) **ADJUSTMENT AND TEST MODE** (P.72)

(*2) **RF-DSP Interface Signal Wave Form** (P.69)

(*5) **Base Unit Reference Drawing** (P.81)

(*6) **Handset Reference Drawing** (P.82)

(*7) **X501 (Base Unit), X201 (Handset) Check** (P.80)

13.9.4. 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 Mode: [Test Link Mode] (*1)	1. Register Regular HS to BU (to be checked). 2. Set BU to "Test Link mode". 3. Set Regular HS to "Test Link mode". *Set TX Power and RX Sensitivity of the BU and the Regular HS by CHART1. * 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 Regular BU to "Test Link mode". 3. Set HS to "Test Link mode". *Set TX Power and RX Sensitivity of the HS and the Regular BU by CHART1. * 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 Mode: [Test Link Mode] (*1)	1. Register Regular HS to BU (to be checked). 2. Set BU to "Test Link mode". 3. Set Regular HS to "Test Link mode". *Set TX Power and RX Sensitivity of the BU and Regular HS by CHART1. * 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 Regular BU to "Test Link mode". 3. Set HS to "Test Link mode". * Set TX Power and RX Sensitivity of Checking_HS and Regular_BU by CHART1. * 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	RX Sens.	TX Power	RX Sens.
BU (Base Unit) TX Power Check	High	High	High	**Low**
BU (Base Unit) RX Sensitivity Check	High	High	**Low**	High

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

Note:

(*1) **ADJUSTMENT AND TEST MODE** (P.72)

13.9.5. RF-DSP Interface Signal Wave Form

<Test Burst Mode>

SYN_CLK & SYN_DATA

SYN_CLK   3V / 0V

SYN_DATA   3V / 0V

SYN_LE2   3V / 0V

1μs:Handset, 2μs:Base Unit
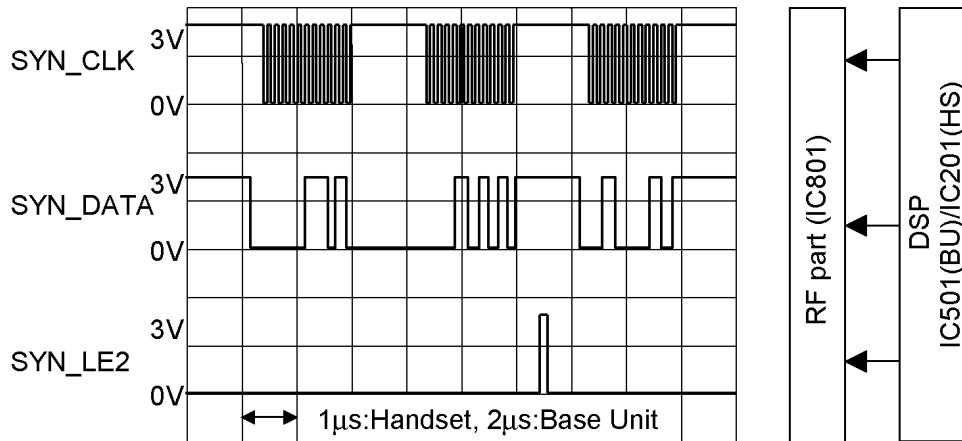
(Length variable)

This wave form can be seen only at the Handset, because DSP of the BU, IC501, writes these signals just once. Therefore, check the DC Voltage of IC801(pin11) is 0.4-2.3V at the BU.
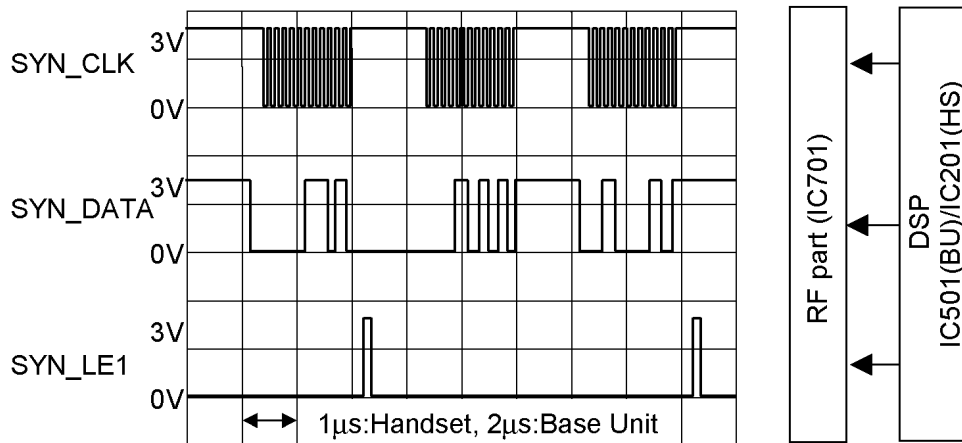
RF part (IC801)

DSP IC501(BU)/IC201(HS)

SYN_CLK   3V / 0V

SYN_DATA   3V / 0V

SYN_LE1   3V / 0V

1μs:Handset, 2μs:Base Unit

(Length variable)

RF part (IC701)

DSP IC501(BU)/IC201(HS)

<Test Burst Mode>

13.10. Check Handset Voice Transmission

```
Check MIC of Handset.
```

```
Check Handset Tx in SIGNAL ROUTE.
```
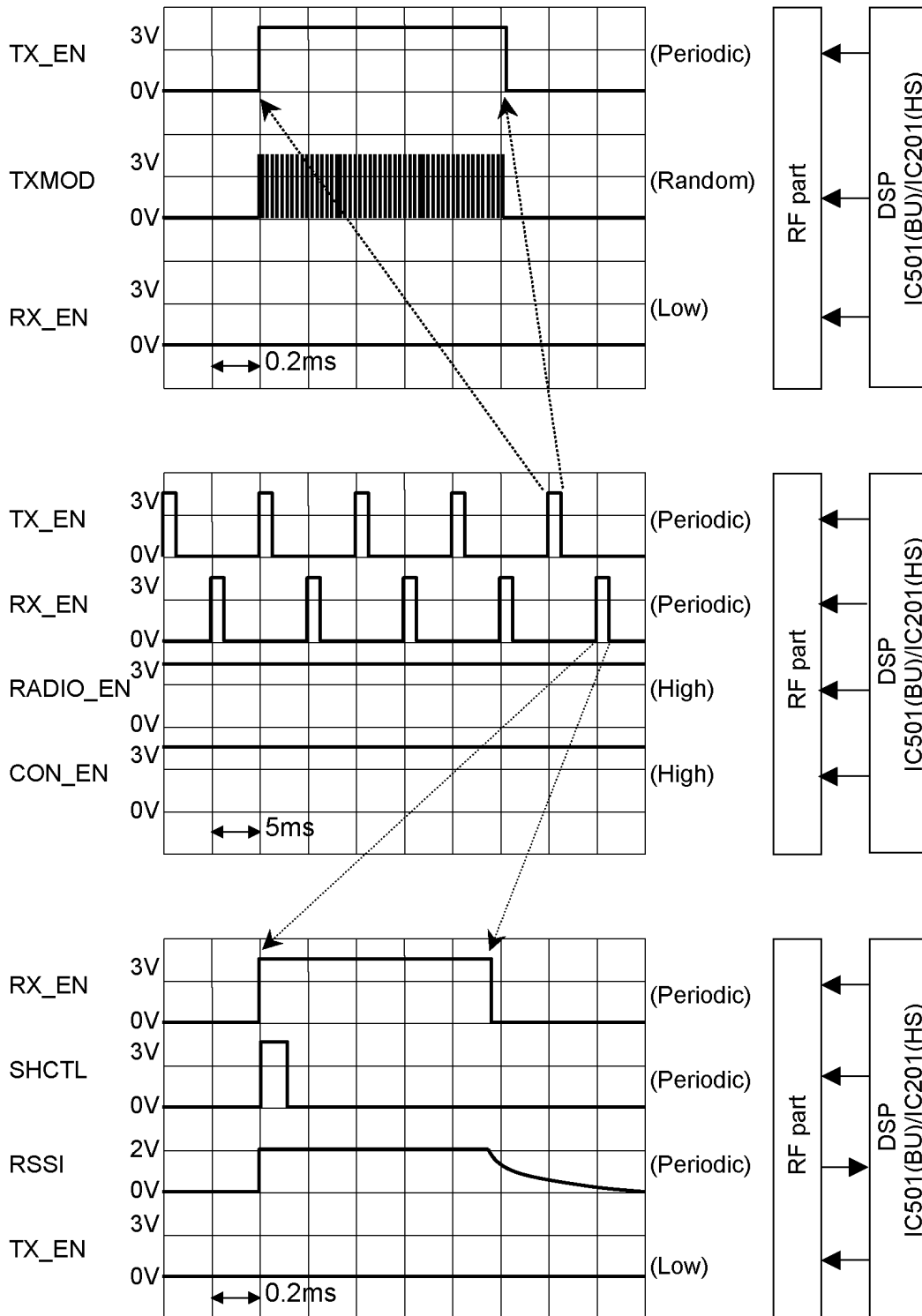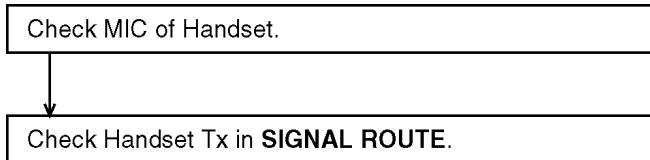
Cross Reference:

SIGNAL ROUTE (P.116)

13.11. Check Handset Voice Reception

```
Check Speaker of Handset.
```

```
Check Handset Rx in SIGNAL ROUTE.
```
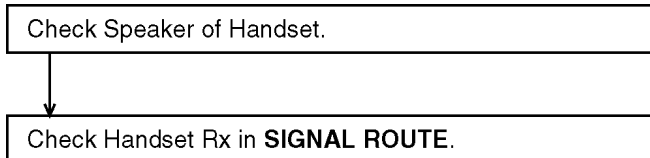
Cross Reference:

SIGNAL ROUTE (P.116)

Note:

When checking the RF part, Refer to **Check the RF part** (P.63)

13.12. Check Caller ID

BASE UINT

```
Does the bell ring ? (LINE indicator blinks)    NO →    Check bell signal detection in Telephone Line Interface

                        OK

Does LINE LED turn on under the idle state ?    NO →    Check Parallel Connection Detect Circuit.

                        OK

Check Calling Line Identification (Caller ID).
```
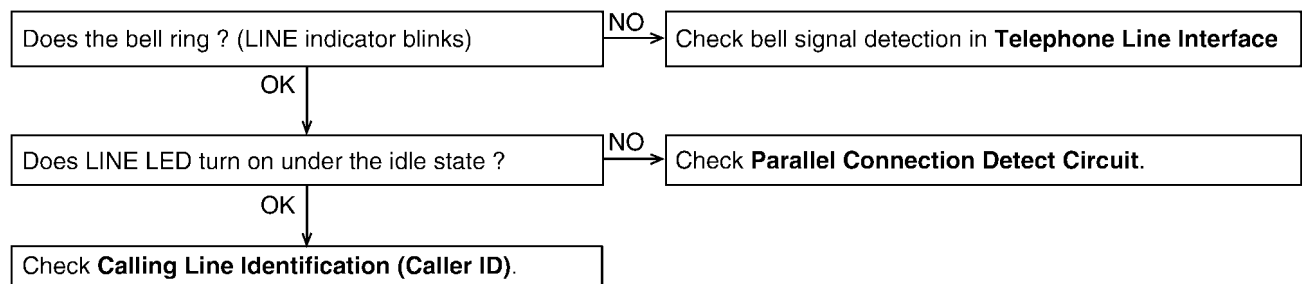
Cross Reference:

Telephone Line Interface (P.96)

Parallel Connection Detect Circuit (P.100)

Calling Line Identification (Caller ID) (P.101)

Note:

· Make sure the format of the Caller ID of the Telephone company that the customer subscribed to.

· Also we recommend to confirm that the customer is really a subscriber of the service.

14 ADJUSTMENT AND TEST MODE

14.1. Test Mode Flow Chart for Base Unit

14.1.1. Test Burst Mode

POWER OFF

Press [1], [6], [HOLD] keys simultaneously, then POWER ON.

LED display
- CHARGE LED
- IN USE LED
  - O: OFF
  - ●: ON
  - ◎: Flashing

LCD

Select Line mode | ● | O | $\boxed{00}$

Press (LOCATOR)

Select Antenna mode | O | O | $\boxed{00}$

Press (LOCATOR)

Select Channel mode | ◎ | O | (default: 1ch.) $\boxed{01}$ (*1)

To use another channel, enter two-digit numbers with dial keys before pressing (LOCATOR). (ex.) (4), (7) = 47CH

Press (LOCATOR)

Select TX power mode | O | ● | $\boxed{00}$

Press (1)

Press Dial key to select power.
- (1): **High TX power**
- (2): Low TX power

Select Menu mode | ● | ● | $\boxed{01}$

Press (2)

Press Dial key to select mode.
- (1): Link mode
- (2): **TX Only mode**
- (3): RX Only mode
- (4): Clock Adjust Mode

Select TX method mode | O | ● | $\boxed{02}$

Press (1)

Press Dial key to select method.
- (1): **Test burst mode (Transmit periodically)**
- (2): Transmit continuously

TEST Burst mode | ● | ● | $\boxed{0b}$

Press (LOCATOR)

RF-DSP interface signal waveform can be checked. TX Power of Base Unit or RX Sensitivity of Handset can be confirmed.

<<POWER OFF.>>

POWER OFF

Note:

(*1) LCD displays the Channel number.

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14.1.2. RX-CW TEST Mode

POWER OFF

Press [1], [6], [HOLD] keys
simultaneously, then POWER ON.

LED display
- - - - CHARGE LED
- - - - IN USE LED
○: OFF
●: ON
◎: Flashing

LCD

Select Line mode | ● | ○ |

Press (LOCATOR)

Select Antenna mode | ○ | ○ |

Press (LOCATOR)

Select Channel mode | ◎ | ○ |(default: 1ch.) (*1)
To use another channel,
enter two-digit numbers
with dial keys before
pressing (LOCATOR).
(ex.) (4), (7) = 47CH

Press (LOCATOR)

Select TX power mode | ○ | ● |
Press Dial key to select power.
(1) : **High TX power**
(2) : Low TX power

Press (1)

Select Menu mode | ● | ● |
Press Dial key to select mode.
(1) : Link mode
(2) : TX Only mode
(3) : **RX Only mode**
(4) : Clock Adjust Mode

Press (3)

RX-CW TEST mode | ● | ● |
**RX Sensitivity of Base Unit
or TX Power of Handset
can be confirmed.**

Press (LOCATOR)

<<POWER OFF.>>

POWER OFF

Note:

(*1) LCD displays the Channel number.

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14.1.3. Test Link Mode

POWER OFF

Press [1], [6], [HOLD] keys simultaneously, then POWER ON.

LED display
CHARGE LED
IN USE LED
○: OFF
●: ON
◎: Flashing

LCD

Select Line mode

● | ○
Connect to Line 1.

Press (LOCATOR)

Select Antenna mode

○ | ○

Press (LOCATOR)

Select Channel mode

◎ | ○ (default: 1ch.)
To use another channel, enter two-digit numbers with dial keys before pressing (LOCATOR).
(ex.) (4), (7) = 47CH

(*1)

Press (LOCATOR)

Select TX power mode

○ | ●
Press Dial key to select power.
(1): **High TX power**
(2): **Low TX power**

Press (1) or (2)

Select Menu mode

● | ●
Press Dial key to select mode.
(1): **Link mode**
(2): TX Only mode
(3): RX Only mode
(4): Clock Adjust Mode

(*2)

Press (1)

Link Standby mode

● | ○
Set Handset 'TEST LINK mode' close by the Base Unit, then Base Unit turns to 'TEST LINK mode'.

Press (LOCATOR)

TEST LINK mode

● | ●
Press Dial key to select sensitivity.
(1): **RX Gain High**
(2): **RX Gain Low**

Press (#)   Press (1) or (2)

RSSI check mode

● | ○
RSSI voltage of Base Unit or RSSI voltage of Handset can be confirmed.

<<POWER OFF.>>

POWER OFF

Note:

(*1) LCD displays the Channel number.

(*2) LCD displays the number of selected power.

14.1.4. Adjustment Mode

POWER OFF

Press [1], [6], [HOLD] keys simultaneously, then POWER ON.

LED display
---- CHARGE LED
---- IN USE LED
O: OFF
●: ON
◎: Flashing

LCD

Select Line mode   ● O

Press (LOCATOR)

Select Antenna mode   O O

Press (LOCATOR)

Select Channel mode   ◎ O (default:1ch)
No need to select a channel.

Press (LOCATOR)

Select TX power mode   O ●

Press (1)

Select Menu mode   ● ●

Press (4)

Adjust Crystal mode   O ◎

(Cancel)

Press (▲) or (▼)

Q521 collector = 13.824MHz   no

Press (LOCATOR)   yes

<<POWER OFF.>>

POWER OFF

<<POWER OFF.>>

Cross Reference

Check and Adjust X501 (Base Unit) Frequency (P.80)

Note:

(*1) This is an adjustment value (hex.).

14.2. Test Mode Flow Chart for Handset

14.2.1. Test Burst Mode

```
                    ┌─────────────────┐
                    │    Power OFF    │
                    └─────────────────┘
  ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
  │ Press dial keys [ 1 ], [ 6 ] and [✱] │
  │ simultaneously, and then Power ON.   │
  └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

LCD

Step	Description	LCD
Select Channel — Press (TALK)	(default: 1ch.) To use another channel, enter two-digit numbers with dial keys before pressing (TALK). (ex.) (4), (7) = 47CH	`CH 00` (*1)
Select TX power — Press (1)	Press Dial key to select mode. (1): **High TX power** (2): Low TX power	`1: High` `2: Low`

Select Talk mode — Press (2)	Press Dial key to select mode. (1): Link mode (2): **TX Only mode** (3): RX Only mode	`1: Link`
		`2: TX`
		`3: RX`

Select TX method — Press (1)	Press Dial key to select method. (1): **Test burst mode (Transmit periodically)** (2): Transmit continuously	`1: Burst` `2: CW`
TEST Burst Mode	**RF-DSP interface signal waveform can be checked. TX Power of Handset or RX Sensitivity of Base Unit can be confirmed.**	`TX`

Press (OFF)

<<Remove Battery>>

```
                    ┌─────────────────┐
                    │    Power OFF    │
                    └─────────────────┘
```

Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

14.2.2. RX-CW TEST Mode

Power OFF

Press dial keys [1], [6] and [✳] simultaneously, and then Power ON.

LCD

Select Channel

(default: 1ch.)
To use another channel, enter two-digit numbers with dial keys before pressing (TALK).
(ex.) (4), (7) = 47CH

```
CH 00              (*1)
```

Press (TALK)

Select TX power

Press Dial key to select mode.
(1) : **High TX power**
(2) : Low TX power

```
1:High
2:Low
```

Press (OFF)

Press (1)

Select Talk mode

Press Dial key to select mode.
(1) : Link mode
(2) : TX Only mode
(3) : **RX Only mode**

```
1:Link
2:TX
3:RX
```

Press (3)

RX-CW Mode

TX Power of Base Unit or RX Sensitivity of Handset can be confirmed.

```
RX
```

<<Remove Battery>>

Power OFF

Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

14.2.3. Test Link Mode

```
                                    ┌─────────────────┐
                                    │    Power OFF    │
                                    └─────────────────┘
  ┌─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐          │                                              LCD
  │ Press dial keys [ 1 ], [ 6 ] and [ ✱ ]│          │                                         ┌──────────────────┐
  │ simultaneously, and then Power ON.   │          ▼                                         │ CH 00         (*1)│
  └─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘  ┌─────────────────┐   (default: 1ch.)                 │                  │
         ┌──────────────────────────▶│  Select Channel │   To use another channel,          │                  │
         │                            └─────────────────┘   enter two-digit numbers with     └──────────────────┘
         │          Press (TALK)               │            dial keys before pressing
         │                                     │            (TALK)
         │                                     ▼            (ex.) (4), (7) = 47CH
         │                            ┌─────────────────┐   Press Dial key to select mode.    ┌──────────────────┐
         │                            │  Select TX power│   (1) : High TX power               │ 1:High           │
         │          Press (1) or (2)           │            (2) : Low TX power                │ 2:Low            │
         │                                     │                                              └──────────────────┘
   Press (OFF)                                 ▼
         │                            ┌─────────────────┐   Press Dial key to select mode.    ┌──────────────────┐
         │                            │  Select Talk mode│  (1) : Link mode                    │ 1:Link           │
         │          Press (1)                  │            (2) : TX Only mode                 │ 2:TX             │
         │                                     │            (3) : RX Only mode                 │ 3:RX             │
         │                                     ▼                                              └──────────────────┘
         │                            ┌─────────────────┐   Press Dial key to select mode      ┌──────────────────┐
         │                            │   Link Standby  │   close by the Base unit.           │ 1:Handset        │
         │          Press (1)                  │            (1) : Handset                      │ 2:SP-phone       │
         │                                     │            (2) : SP-phone (*2)                └──────────────────┘
         │                                     ▼
  ┌─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─▶┌─────────────────┐   Press Dial key to select mode.    ┌──────────────────┐
  │      │                            │ TEST LINK mode  │   (1) : RSSI A                      │ 1:RSSI A xx      │
  │      │                            └─────────────────┘   (2) : RSSI B (*2)                  │ 2:RSSI B xx      │
  │      │          Press (1)                  │            (3) : Frame error (*2)             │ 3:FRAME ERROR    │
  │ Press (✱)                                  ▼                                              └──────────────────┘
  │      │                            ┌─────────────────┐   Press Dial key to select sensitivity.┌────────────────┐
  │      │                            │ Select sensitivity│ (1) : RX Gain High                 │ RSSI xx          │
  │      │          Press (1) or (2)           │            (2) : RX Gain Low                  │ RxGain           │
  │      │                                     │                                              │ 1:High 2:Low     │
  │      │                                     ▼                                              └──────────────────┘
  │      └────────────────────────────┌─────────────────┐   RSSI voltage of Handset or        ┌──────────────────┐
  │                                   │   RSSI check    │   RSSI voltage of Base Unit          │ RSSI xx          │
  │                                   │      mode       │   can be confirmed.                 │ RxGain           │
  │                                   └─────────────────┘                                     │ 1:High 2:Low     │
  │  <<Remove Battery>>                                                                       └──────────────────┘
  ▼
┌─────────────┐
│  Power OFF  │
└─────────────┘
```

Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

(*2) for factory use only

14.2.4. Adjustment Mode

LCD

```
POWER OFF
```

Press dial keys [3], [7] and [#]
simultaneously, then POWER ON.

Select Menu

(1) : Adjust
(2) : Initial

```
1:Adjust
2:Initial
```

Press (1)

(cancel) → Adjust Crystal mode

Press (▲) or (▼)

Volume (▲) : X'tal +1
Volume (▼) : X'tal -1

```
Clock Adj
37 (*2)
```

Press (OFF)

Press (OFF)

BCK=13.824MHz — no

yes

Press (TALK)

Adjust Batt Low

```
Bat Adj
Thresh :A1    (*2)
Current:A0    (*3)
```

<<POWER OFF.>>

Power supply
voltage = 3.50V — no

**Adjust Power supply
voltage (=3.50V), then
press [TALK] key. (*1)**

```
POWER OFF
```

yes

Press (TALK)

```
Bat Adj
Thresh :A1    (*2)
Current:A0    (*3)
```

Cross Reference

(*1) **Adjust Battery Low Detector Voltage (Handset)** (P.80)

Note:

(*2) These are the default values.

(*3) These values may not be fixed depending on the battery strength.

14.3. X501 (Base Unit), X201 (Handset) Check

Equipment: Frequency counter

Check Point for measurement: Q521 collector (Base Unit)/BCK (Handset)

Checking tolerance: 13.824MHz ± 270Hz (Base Unit)/13.824MHz ± 100Hz (Handset)

14.3.1. Check and Adjust X501 (Base Unit) Frequency

1. Set up Base Unit in TEST mode.
2. Press following keys in order to Adjust Crystal mode. [LOCATOR], [LOCATOR], [LOCATOR], [1], [4]

    * Check frequency at Q521 collector.
3. If the frequency is out of the checking tolerance (± 270Hz), adjust to Adjustment tolelance (± 30Hz) by pressing [▲] or [▼] key.

    Adjustment Tolerance: 13.824MHz ± 30Hz
4. Press [LOCATOR] key to write the new frequency factor in Memory.
5. Turn the power off. Then this value is available.

> When you have replaced IC501 or IC601, adjust X501 by the procedure above.

Cross Reference:

Adjustment Mode (P.75)

14.3.2. Check and Adjust X201 (Handset) Frequency

1. Set DC power supply to 3.9V.
2. Set up Handset in TEST mode (Adjustment flow).
3. Press [1] key to Adjust Crystal mode. ("Clock Adj." is displayed on LCD)

    * Check BCK frequency.
4. If the BCK frequency is out of the checking tolerance (± 100Hz), adjust to Adjustment tolelance (± 30Hz) by pressing [▲] or [▼] key.

    Adjustment Tolerance: 13.824MHz ± 30Hz
5. Press [TALK] key to write the new frequency factor in EEPROM.
6. Turn the power off. Then this value is available.

> When you have replaced IC201 or IC202, adjust X201 by the procedure above.

Cross Reference:

Adjustment Mode (P.79)

14.4. Adjust Battery Low Detector Voltage (Handset)

After Handset´s DSP (IC201) or EEPROM (IC202) replacement, Re-writing Battery Low voltage to EEPROM is required.

With following Handset Adjustment Flow, adjust DC power supply and DC voltmeter by the procedure below.

1. Set DC power supply to 3.9V.
2. Set up Handset in TEST mode (Adjustment flow).
3. Press [1] key and [OFF] key to Adjust Batt Low mode. ("Bat Adj." is displayed on LCD)
4. Change the voltage of the DC power supply to 3.50V accurately.

    * Check the voltage at P.C. board pads because some voltage drops occur due to the usage of long or thin cables.
5. Press [TALK] key to write voltage value in EEPROM.
6. Turn the power off. Then this value is available.

Note:

Refer to **Handset Reference Drawing** (P.82) for connection of DC power supply and voltmeter.

Cross Reference:

Adjustment Mode (P.79)

14.5. Base Unit Reference Drawing

When connecting the Simulator Equipment for checking, please refer to below.

Note:

(***1**) is referred to No.3 of **Check Table for RF part** (P.67)

14.6. Handset Reference Drawing
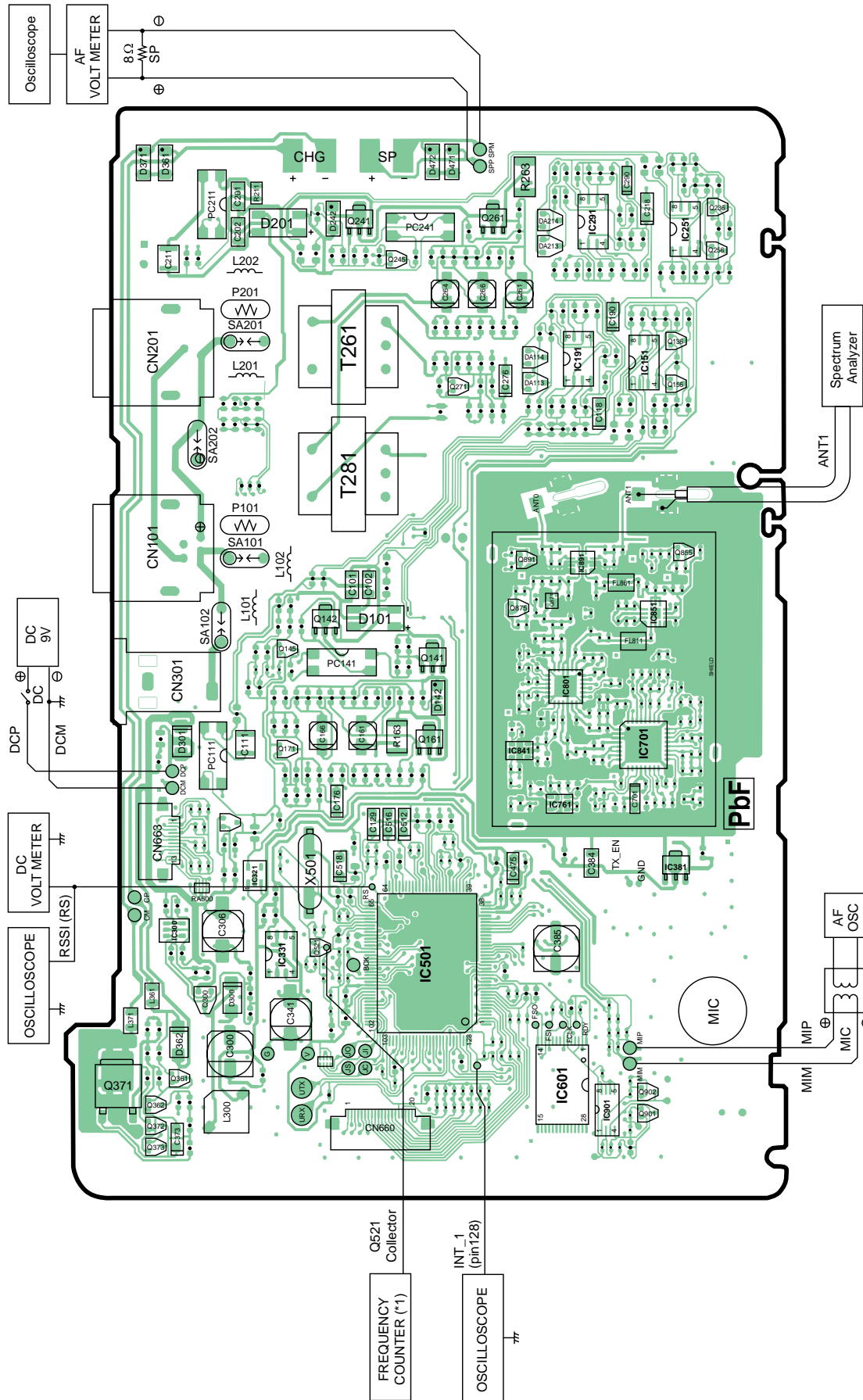
When connecting the Simulator and Equipment for checking, please refer to below.

Note: (*1) is referred to No.3 of **Check Table for RF part** (P.67)

14.7. Frequency Table

14.7.1. Base Unit

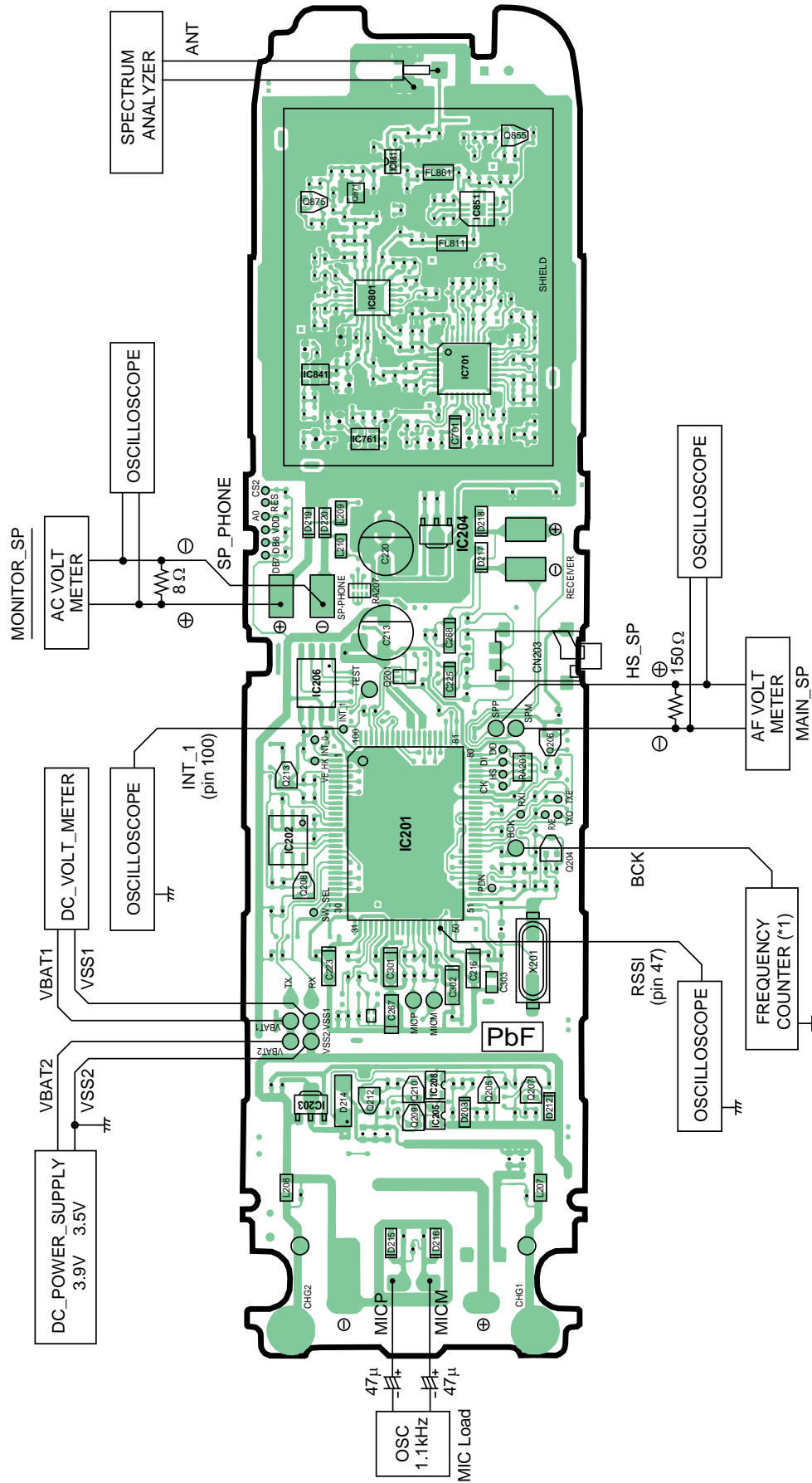| Channel	TX/RX Frequency (MHz)	Channel	TX/RX Frequency (MHz)	Channel	TX/RX Frequency (MHz)
1	5759.702398	33	5788.242242	65	5816.782086
2	5760.592291	34	5789.132135	66	5817.671978
3	5761.486139	35	5790.025982	67	5818.565826
4	5762.376031	36	5790.915875	68	5819.455719
5	5763.269879	37	5791.809723	69	5820.349566
6	5764.159771	38	5792.699615	70	5821.239459
7	5765.053619	39	5793.593463	71	5822.133307
8	5765.943512	40	5794.483355	72	5823.023199
9	5766.837359	41	5795.377203	73	5823.917047
10	5767.727252	42	5796.267096	74	5824.806939
11	5768.621100	43	5797.160943	75	5825.700787
12	5769.510992	44	5798.050836	76	5826.590680
13	5770.404840	45	5798.944684	77	5827.484527
14	5771.294732	46	5799.834576	78	5828.374420
15	5772.188580	47	5800.728424	79	5829.268268
16	5773.078473	48	5801.618316	80	5830.158160
17	5773.972320	49	5802.512164	81	5831.052008
18	5774.862213	50	5803.402057	82	5831.941900
19	5775.756060	51	5804.295904	83	5832.835748
20	5776.645953	52	5805.185797	84	5833.725641
21	5777.539801	53	5806.079644	85	5834.619488
22	5778.429693	54	5806.969537	86	5835.509381
23	5779.323541	55	5807.863385	87	5836.403228
24	5780.213434	56	5808.753277	88	5837.293121
25	5781.107281	57	5809.647125	89	5838.186969
26	5781.997174	58	5810.537018		
27	5782.891021	59	5811.430865		
28	5783.780914	60	5812.320758		
29	5784.674762	61	5813.214605		
30	5785.564654	62	5814.104498		
31	5786.458502	63	5814.998346		
32	5787.348394	64	5815.888238		

14.7.2. Handset

Channel	TX/RX Frequency (MHz)	Channel	TX/RX Frequency (MHz)	Channel	TX/RX Frequency (MHz)
1	5759.700425	33	5788.240269	65	5816.780113
2	5760.594273	34	5789.134117	66	5817.673960
3	5761.484165	35	5790.024009	67	5818.563853
4	5762.378013	36	5790.917857	68	5819.457701
5	5763.267906	37	5791.807749	69	5820.347593
6	5764.161753	38	5792.701597	70	5821.241441
7	5765.051646	39	5793.591490	71	5822.131333
8	5765.945494	40	5794.485337	72	5823.025181
9	5766.835386	41	5795.375230	73	5823.915074
10	5767.729234	42	5796.269078	74	5824.808921
11	5768.619126	43	5797.158970	75	5825.698814
12	5769.512974	44	5798.052818	76	5826.592662
13	5770.402867	45	5798.942710	77	5827.482554
14	5771.296714	46	5799.836558	78	5828.376402
15	5772.186607	47	5800.726451	79	5829.266294
16	5773.080455	48	5801.620298	80	5830.160142
17	5773.970347	49	5802.510191	81	5831.050035
18	5774.864195	50	5803.404039	82	5831.943882
19	5775.754087	51	5804.293931	83	5832.833775
20	5776.647935	52	5805.187779	84	5833.727623
21	5777.537828	53	5806.077671	85	5834.617515
22	5778.431675	54	5806.971519	86	5835.511363
23	5779.321568	55	5807.861412	87	5836.401255
24	5780.215415	56	5808.755259	88	5837.295103
25	5781.105308	57	5809.645152	89	5838.184996
26	5781.999156	58	5810.538999		
27	5782.889048	59	5811.428892		
28	5783.782896	60	5812.322740		
29	5784.672789	61	5813.212632		
30	5785.566636	62	5814.106480		
31	5786.456529	63	5814.996373		
32	5787.350376	64	5815.890220		

14.8. How to Clear User Setting

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

This operation should not be performed for a usual repair.
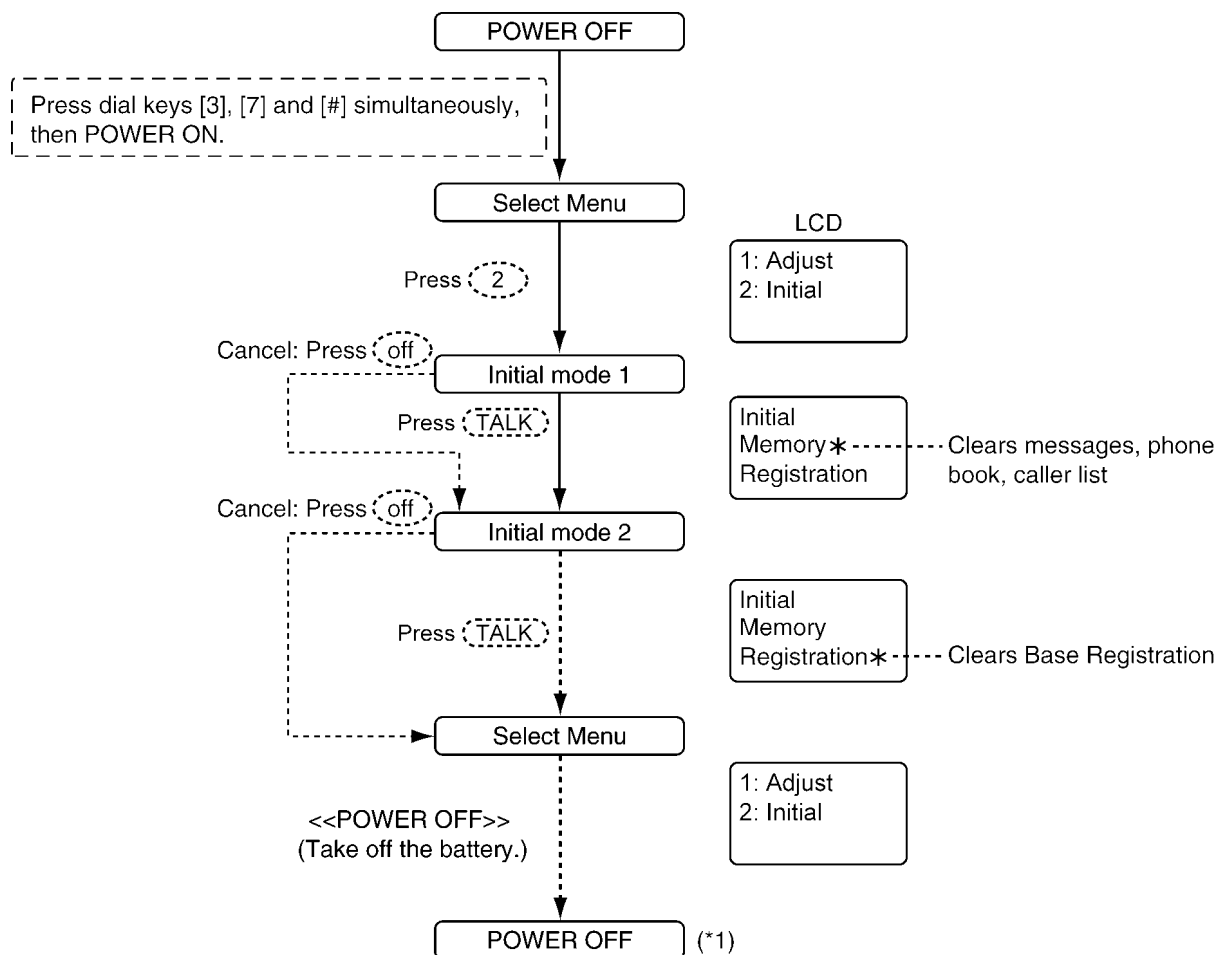
14.8.1. Base unit
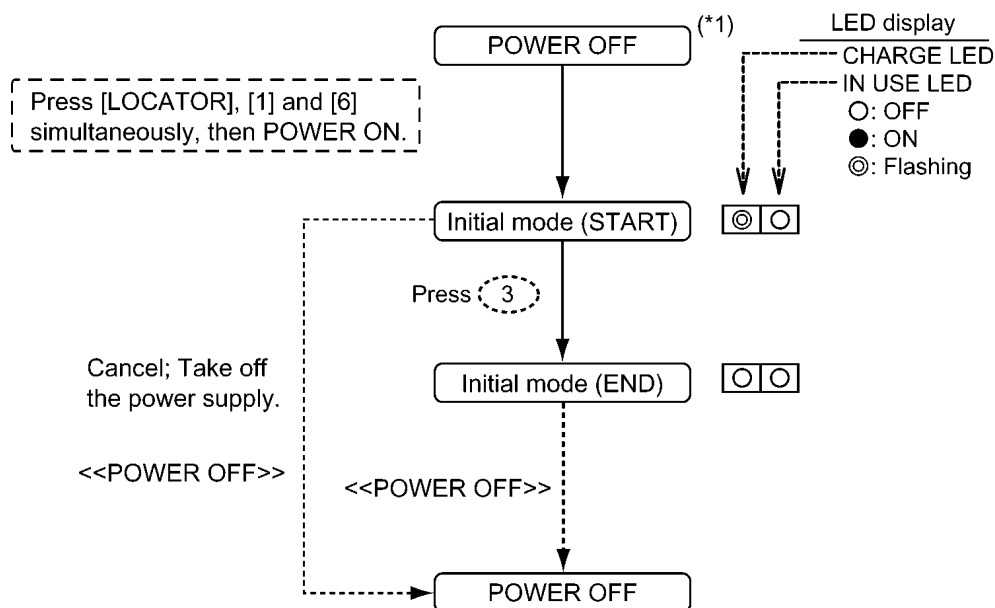
Note:

(*1) Telephone line must be connected.

14.8.2. Handset

Note:

(*1) Be sure to short the battery terminals of the Handset with a lead wire, etc. for 2 seconds for discharge after removing the battery.

15 DESCRIPTION

15.1. Frequency

The frequency range of 5.76GHz~5.84GHz is used. Transmitting and receiving channel between Base Unit and Handset is same frequency. Refer to **Frequency Table**.

Cross Reference:

Frequency Table (P.83)

15.2. FHSS (Frequency Hopping Spread Spectrum)

This telephone is using an IC chip which has similar specification to WDCT (World Digital Cordless Telephone) and is the cordless telephone system that can use multiple portable unit simultaneously.

The explanation of this system is mentioned below.

This system uses a Time Division Multiple Access/Time Division Duplex (**TDMA/TDD**) scheme: transmitting and receiving frequencies of the Base Unit and cordless Handset are shared in the same frequency. The construction of RX/TX frequency data is shown below. It consists of 4 slots from the Base Unit to the cordless Handset, and 4 slots from the cordless Handset to the Base Unit, total 8 slots in 10ms. By this slot system, simultaneous air link and communication between 4 cordless Handsets and the Base Unit can be realized. One communication between cordless Handset and the Base Unit is done by one slot from the Base Unit to cordless Handset, and another slot from cordless Handset to the Base Unit.

DSS makes spectrum spread by multiplying carrier signal by PN code.

The purpose to make spectrum spread is to reduce power density per time and per band.

On the other hand, **FHSS** makes spectrum spread by changing channel every 10ms according to Hopping table. Also the purpose to make spectrum spread is to reduce power density per time and per band.
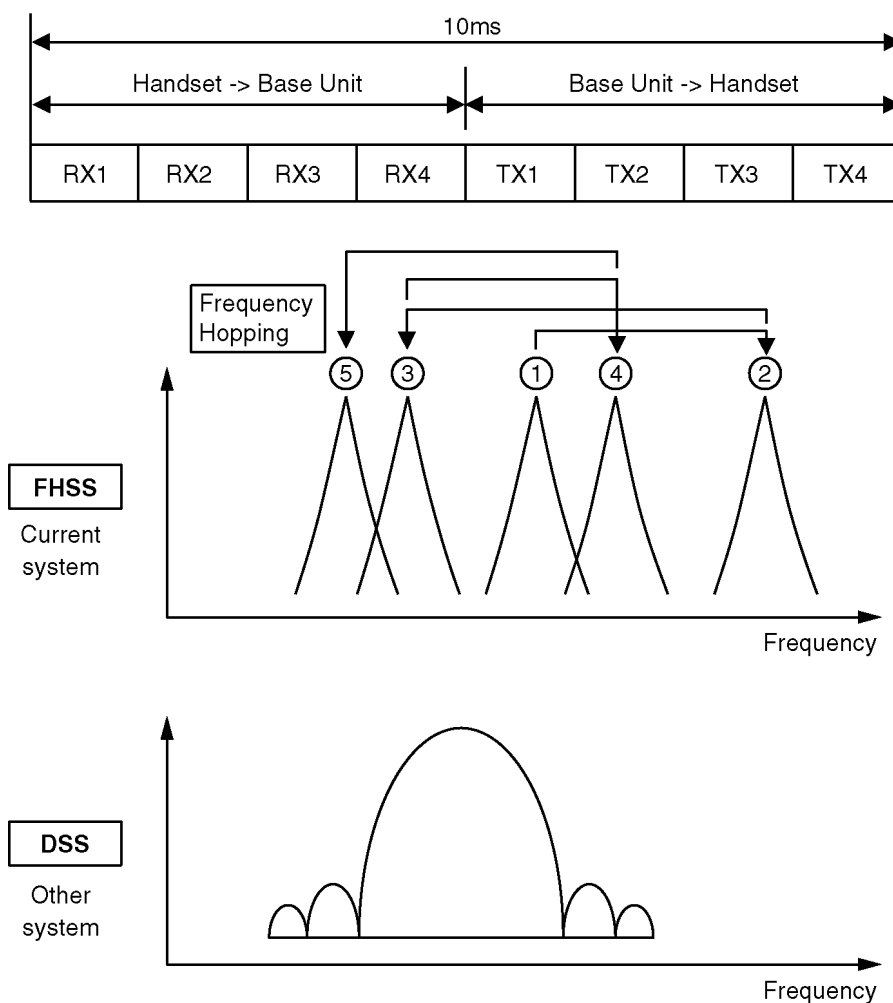
15.2.1. TDD Frame Format
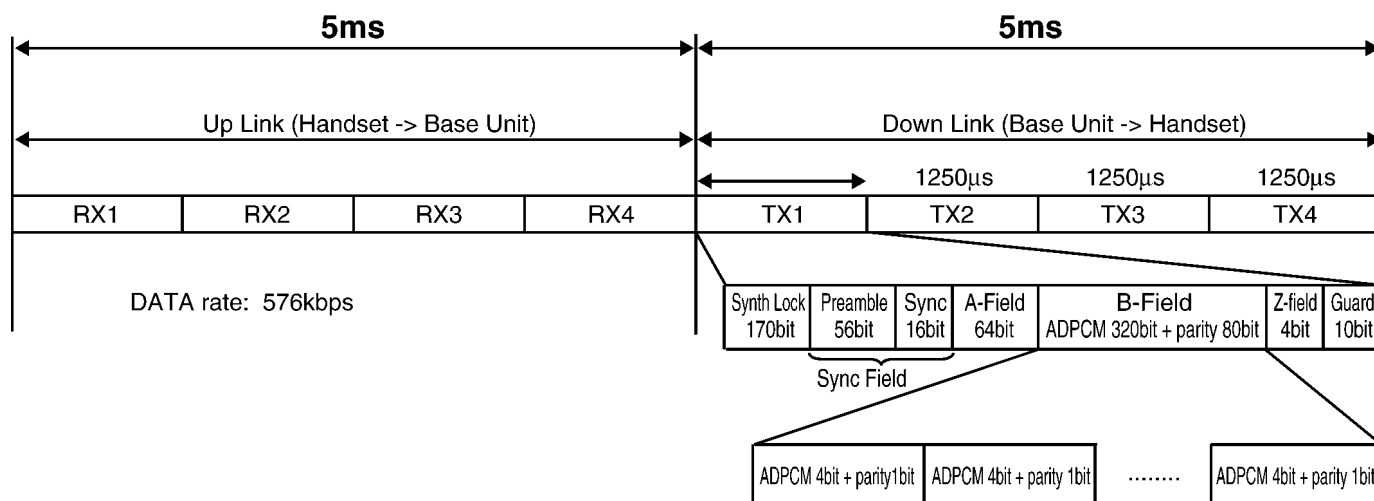
Sync Field (72bit): Preamble56bit + SyncWord16bit

Base Unit (Handset) adjusts the timing of reception so that reception of Base Unit (Handset) can correspond to transmission of Handset (Base Unit).

It is necessary for sync-field that Handset gets synchronization.

A - field (64bit): Each kinds of DATA: ch data, line condition, etc.

B - field (320bit + 80bit): Sound data + parity

Z - field (4bit): Parity Check

15.2.2. TDMA system

This system is the cycles of 10ms, and has four duplex paths,

so it is possible to perform four duplex communications simultaneously.

(Up to four Handsets can be registered.)

In 1 slot 1.25ms, the 10ms of voice data is transmitted.

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

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

· 2 - Handsets Link
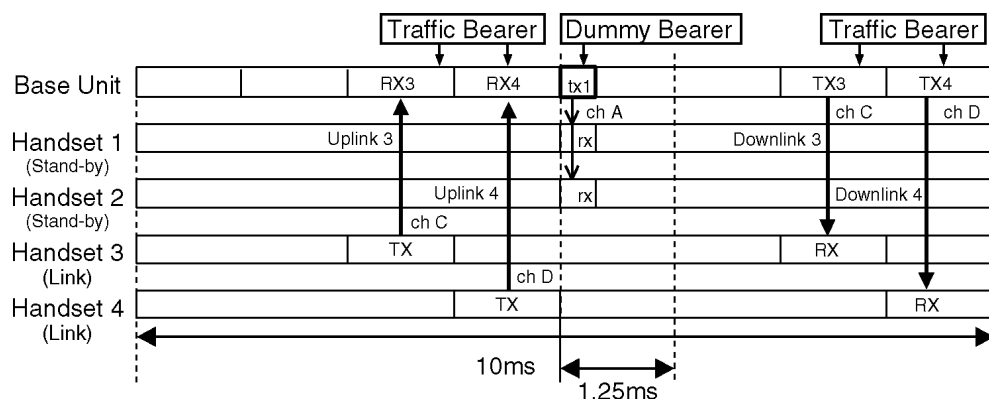
Traffic Bearer

A link is established between Base Unit and Handset.

The state where duplex communication is performed.

The hopping pattern of a 3000hops (30 seconds) cycle.

Dummy Bearer

The Base Unit sends Dummy-data to the all stand-by state Handsets.

The Handsets receive that data for keeping synchronization and monitoring request from the Base Unit.

Dummy Bearer doesn't contain B-field (sound) data.

15.3. Signal Flowchart in the Whole System

Reception

CN101 of the Base Unit is connected to the TEL line, and signal is enter through the bridge diode D101. While talking, the relay (Q141) is turned ON and amplified at the Q171, then led to DSP (IC501). The DSP encodes ADPCM and TDD/TDMA with FHSS to TXMOD. The TXMOD signal is enter to IC701 of RF PART, and modulated to 2.4GHz. The 2.4GHz signal is up-converted to 5.8GHz RF signal by IC801. The RF signal is amplified by the power amplifier (IC851) and fed passed through filter (FL861). The RF signal is fed to Antennas.
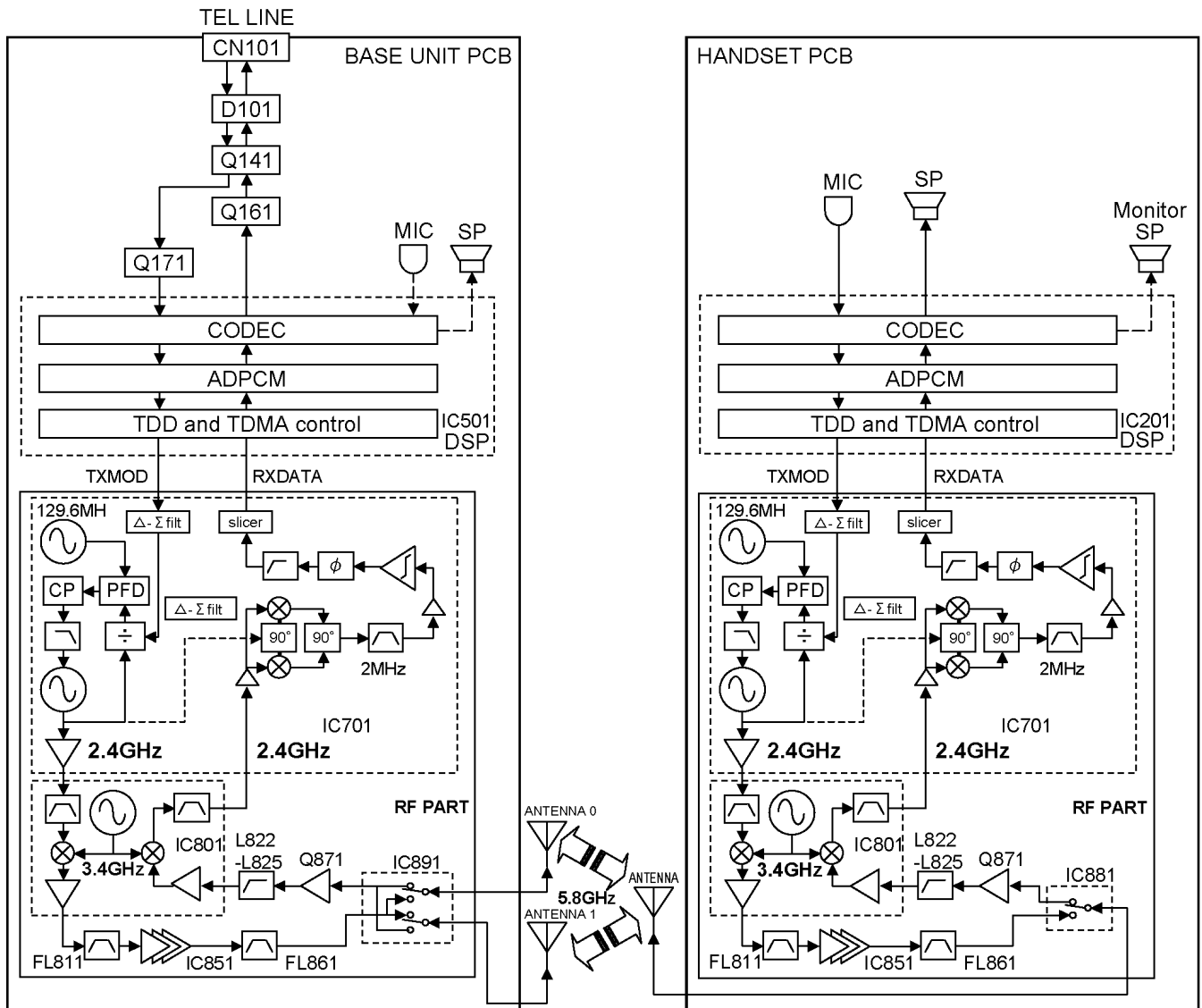
As for the Handset, RF signal from the RX antenna is amplified by LNA (Q871). The amplified signal is down-converted to 2.4GHz signal by IC801 and led to IC701. The 2.4GHz is down-converted to IF signal in IC701. The IF signal passing through internal filter is demodulated into RXDATA, then enter to DSP (IC201). The DSP performs TDD/TDMA and ADPCM decoding to convert the RXDATA into the voice signal, then it is output to the speaker.

Transmission

The voice signal entering from the Handset microphone is led to DSP (IC201). The DSP encodes ADPCM and TDD/TDMA with FHSS to TXMOD. The TXMOD signal is enter to IC701 of RF PART, and modulated to 2.4GHz. The 2.4GHz signal is up-converted to 5.8GHz RF signal by IC801. The RF signal is amplified by the power amplifier (IC851) and fed passed through filter (FL861). The RF signal is fed to Antenna.

As for the Base Unit, RF signal from the Antennas is amplified by LNA (Q871). The amplified signal is down-converted to 2.4GHz signal by IC801 and led to IC701. The 2.4GHz is down-converted to IF signal in IC701. The IF signal passing through internal filter is demodulated into RXDATA, then enter to DSP (IC501). The DSP performs TDD/TDMA and ADPCM decoding to convert the RXDATA into the voice signal. The voice signal is amplified at the TX amplifier (Q161), then output to the TEL line CN101 through the relay (Q141) and bridge (D101).

16 EXPLANATION OF LINK DATA COMMUNICATION

16.1. Calling

(STANDBY MODE)

Handset   Base Unit

TALK   CC-SETUP

OFF HOOK

CC-CONNECT

Display "Talk"
Voice mute OFF
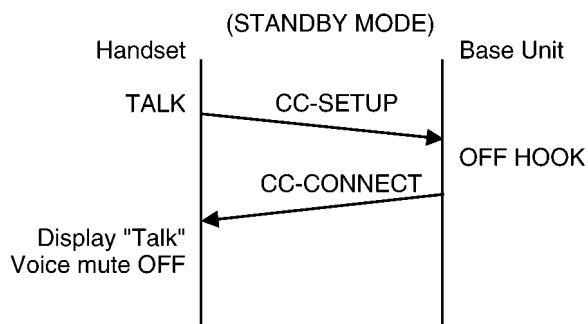
When calling, a communication
request DATA (CC-SETUP) is
transmitted from the Handset,
and a permitting DATA (CC-CONNECT)
is returned from the Base Unit to it.
At that time the audio path opens.

16.2. To Terminate Communication

Handset   Base Unit

OFF   CC-RELEASE

ON HOOK

CC-RELEASE-COM

"Talk" off
Voice mute ON
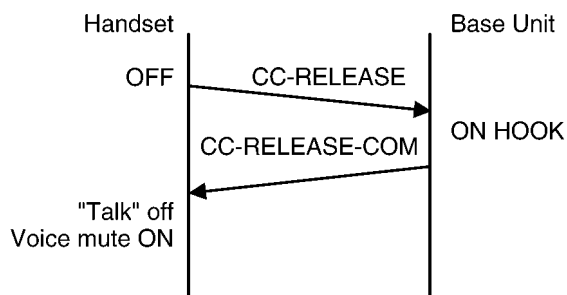
When the OFF button on the
Handset is pressed during
communication, a LINK
terminating DATA (CC-RELEASE)
is sent to terminate the
communication. Then DATA
(CC-RELEASE-COM) is returned
from Base Unit.
Handset receives it and reset the link.

16.3. Ringing

(STANDBY MODE)

Handset   Base Unit

GR-PAGE-REQ
(Bell start)

Start IN USE LED or LINE LED Flashing

Ringing   GR-PAGE-REQ   Ring Signal
           (Bell stop)

non Signal
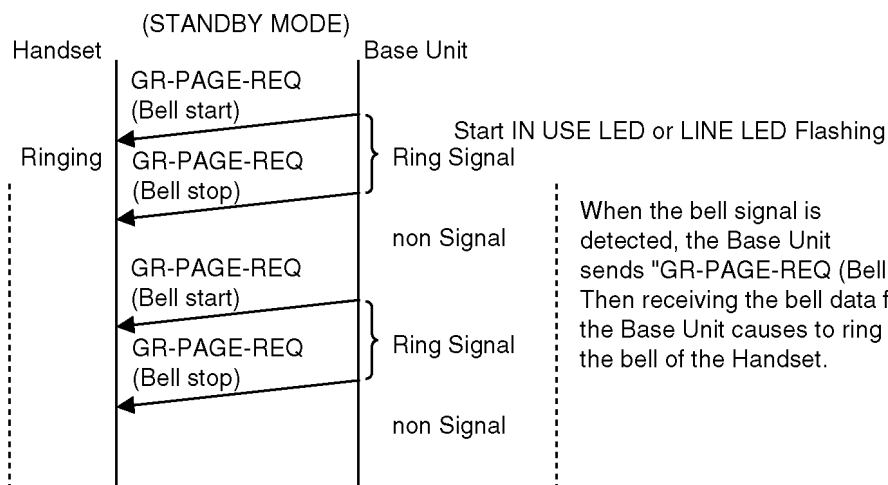
When the bell signal is
detected, the Base Unit
sends "GR-PAGE-REQ (Bell start)".
Then receiving the bell data from
the Base Unit causes to ring
the bell of the Handset.

GR-PAGE-REQ
(Bell start)

GR-PAGE-REQ   Ring Signal
(Bell stop)

non Signal

17 BLOCK DIAGRAM (BASE UNIT_MAIN)

KX-TG6500BXB BLOCK DIAGRAM (Base Unit_Main)

18 CIRCUIT OPERATION (BASE UNIT_MAIN)

General Description:

(DSP, Flash Memory) is a digital speakerphone/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 DSP system is fully controlled by a host processor DSP. The host processor provides activation and control of all that functions as follows.

18.1. DSP (Digital Speech/Signal Processing: IC501)

· **Voice Message Recording/Play back**

The DSP system use 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.

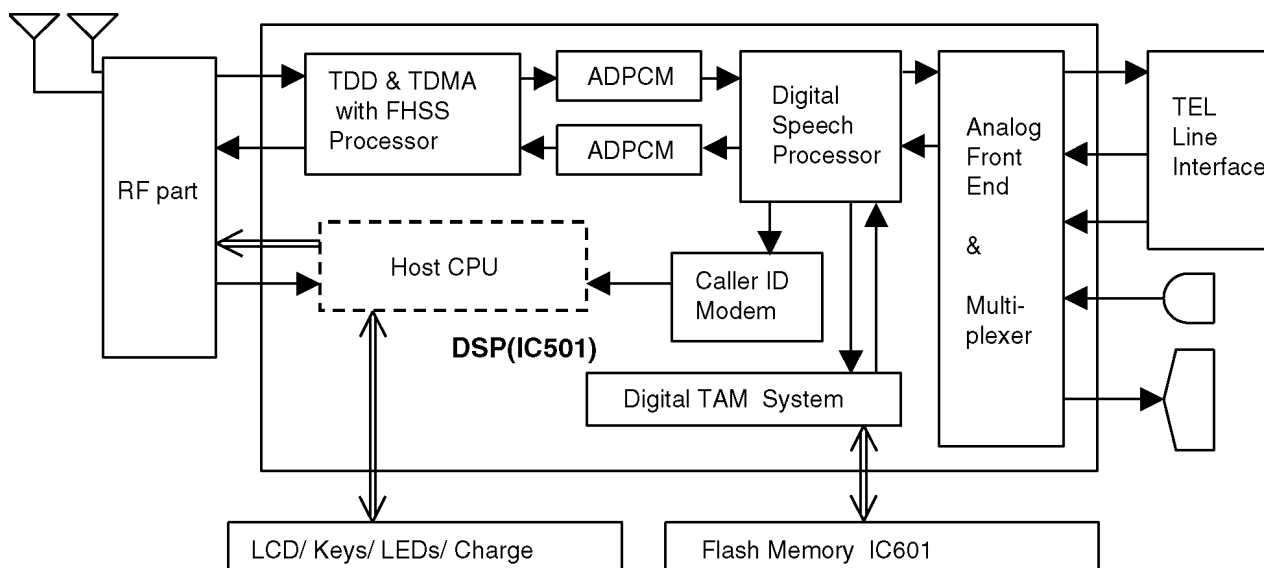· **DTMF Detection/Generator**

The DTMF detection is implemented by the DSP system in software. The DTMF detection is performed during Record, Play back, and Line Monitoring modes of operation.

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

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

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

· **Caller ID demodulation**

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

· **Analog Switching**

The voice signal from telephone line is transmitted to the speaker or the voice signal from speakerphone microphone 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, Microphone, Telephone line, LCD.

18.2. Flash Memory (IC601)

Following information data is stored.

· **Voice signal**

ex: Pre-recorded Greeting message, Incoming message

· **Telephone number, etc.**

ex: Telephone Directory number, Caller ID data, ID code

· **Settings**

ex: message numbers, caller ID numbers, pulse tone dial

18.3. Power Supply Circuit

Function:

The power supply voltage from AC adaptor is converted to the desired voltage of each block.

Circuit Operation:

· Q300 and IC300: 4.5V DCDC Converter

· IC331: 3.3V Regulator
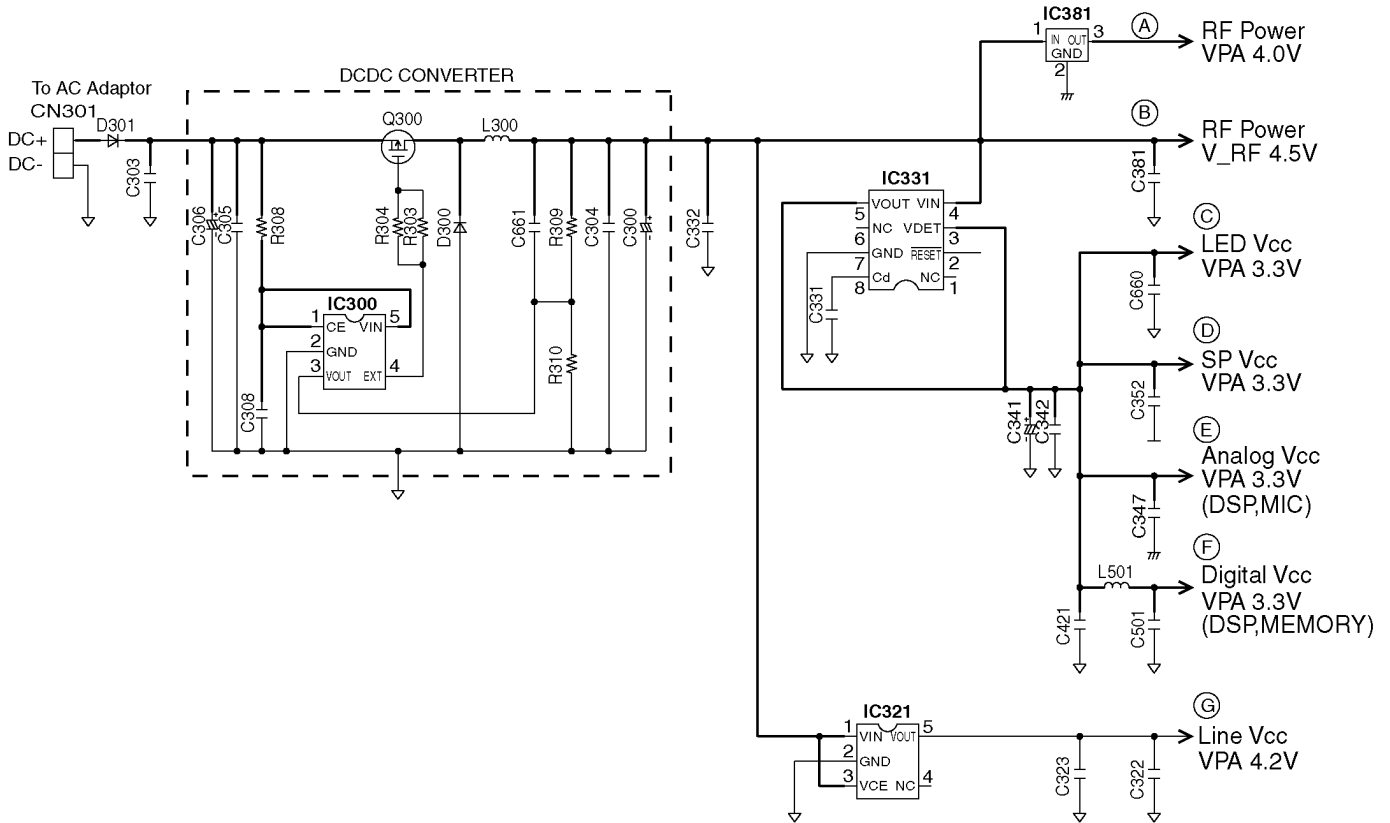
18.3.1. Charge Circuit

The voltage from the AC is supplied to the charge circuits. Main charge (180mA at the Battery) of maximum 6-hours is started soon after the Handset is placed on the Base Unit. Then it changes to Trickle charge to prevent from overcharging.

Charging-form

• Main charge

>> Trickle charge

Handset controls Charging-form pattern

• Trickle charge
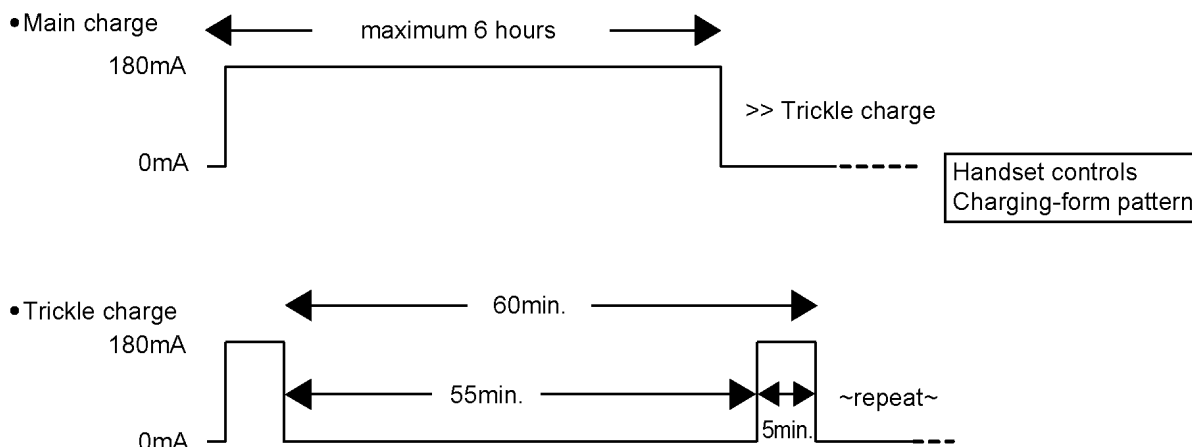
Q361 and Q362 detect the ON-HOOK state (Handset is placed on Base Unit).
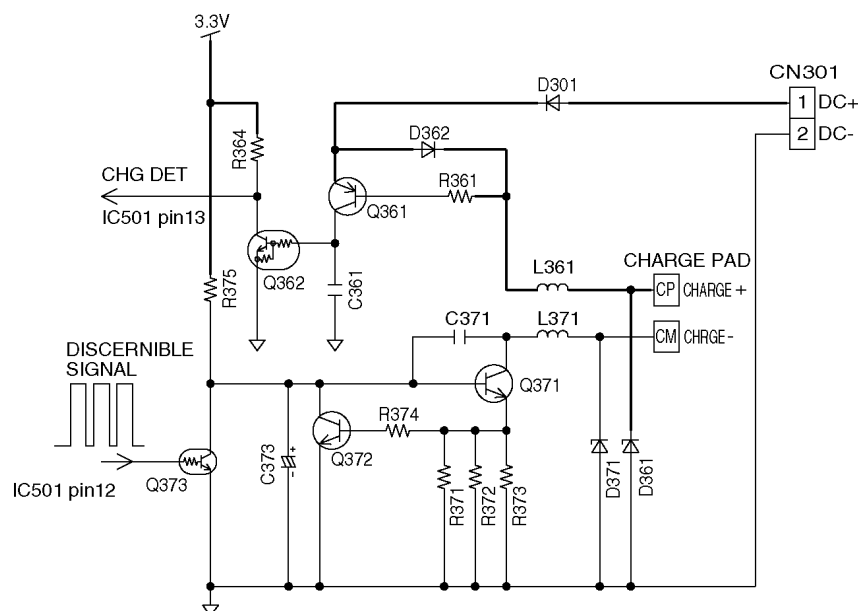
Q371 and Q372 control the charge current.

Q373 sends a signal to the Handset for about 5 seconds soon after the Handset is placed on the Base Unit.

This signal tells that the Handset is been charging on the Base Unit or the optional charger.

When the signal is received: charging on the Base Unit

No signal: charging on the optional charger.

18.4. Reset Circuit

Function:

This circuit is used to initialize the microcomputer when it incorporates an AC adaptor.

Circuit Operation:

When the AC Adaptor is inserted into the unit, then the voltage is shifted by IC331 and power is supplied to the DSP.

The set starts to operate when VCC goes up to 3.0V or more in the circuit voltage diagram.
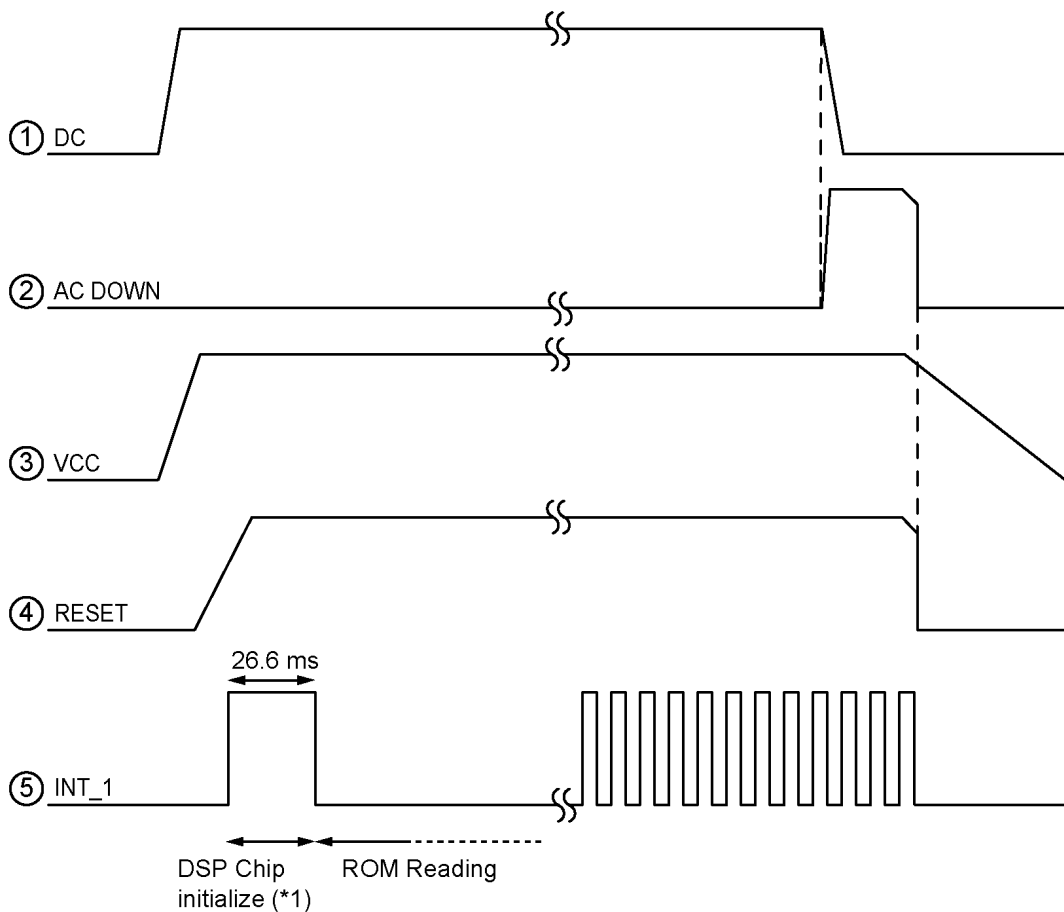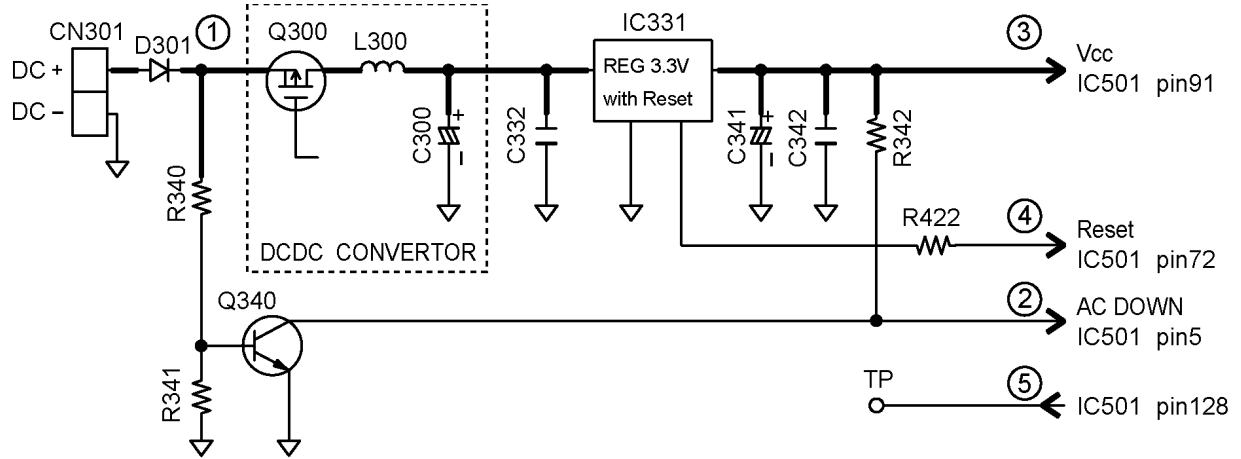
Note:

(*1) The initializing time of the DSP chip is 26.6ms under normal conditions.

18.5. Locator/Intercom Mode

1. Press the Base Unit dialing button (= Handset extension number) after INTERCOM/TRANSFER button, then a call monitor signal (intercom sound) is output from pins 35 and 37 of IC501. Thus a monitor tone is heard from the speaker.

2. At the same time, the Handset ring. This status is called "Intercom stand-by".

3. Then press TALK button of the Handset, the status is changed to "Intercom mode".

4. The receiving signal flows:

   RF → pins 35 and 37 of IC501 → SP

   The transmission signal flows:

   MIC → R455, R456 → C457, C458 → R459, R460 → pins 61 and 60 of IC501 → RF

18.6. Telephone Line Interface

Telephone Line Interface Circuit:

Function

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

18.6.1. Line 1

Bell signal detection and OFF HOOK circuit:

In the idle mode, Q141 and Q142 are open to cut the DC loop current and 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:

T → L101 → R111 → PC111 → DSP pin 3 [BELL]

To provide an off-hook condition (active DC current flow through the circuit), CPU turns Q145 on.

Thus Q141 and Q142 turn on. Following signal flow is the DC current flow.

T → L101 → D101 → Q141 → Q161 → R163 → Q142 → D101 → L102 → P101 → R

ON HOOK Circuit:

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

Pulse Dial Circuit:

Pin 4 of DSP turns Q145 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 DSP.
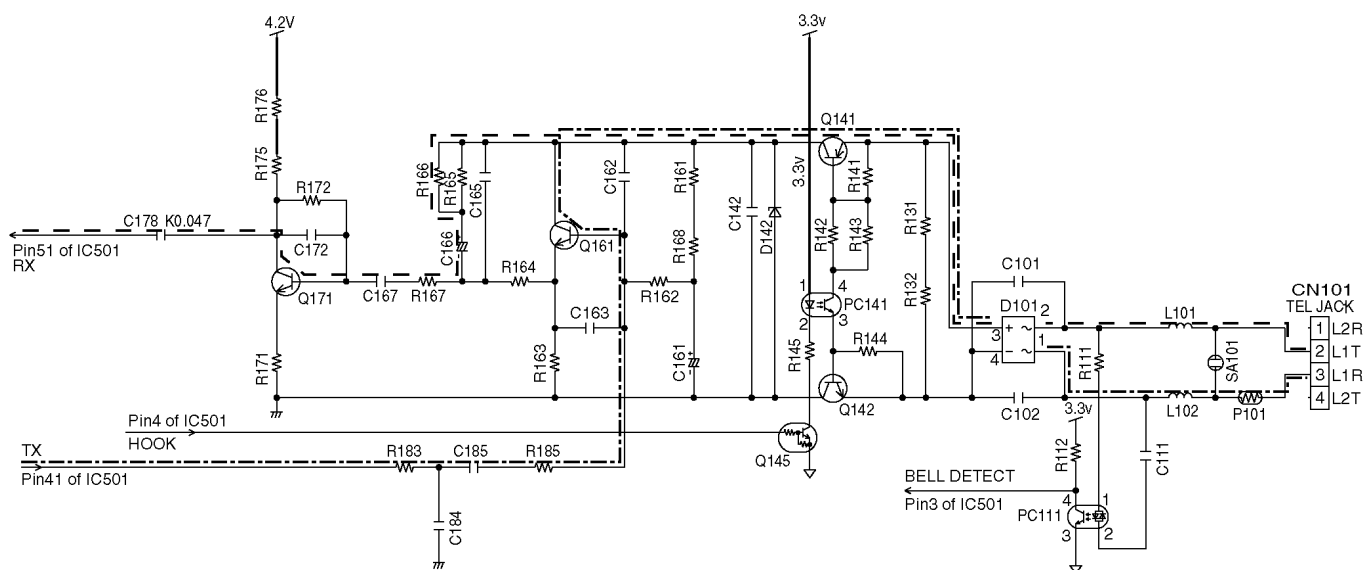
18.6.2. Line 2

Bell signal detection and OFF HOOK circuit:

In the idle mode, Q241 is open to cut the DC loop current and 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:

T → L201 → R211 → PC211 → DSP Pin 93 [L2_BELL]

To provide an off-hook condition (active DC current flow through the circuit), CPU turns Q245 on.

Thus Q241 turns on. Following signal flow is the DC current flow.

T → L201 → D201 → Q241 → Q261 → R263 → D201 → L202 → P201 → R

ON HOOK Circuit:

Q241 is open, Q241 is connected as to cut DC loop current and to cut the voice signal. The unit is consequently in on-hook condition.

Pulse Dial Circuit:

Pin4 of DSP turns Q245 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 DSP.
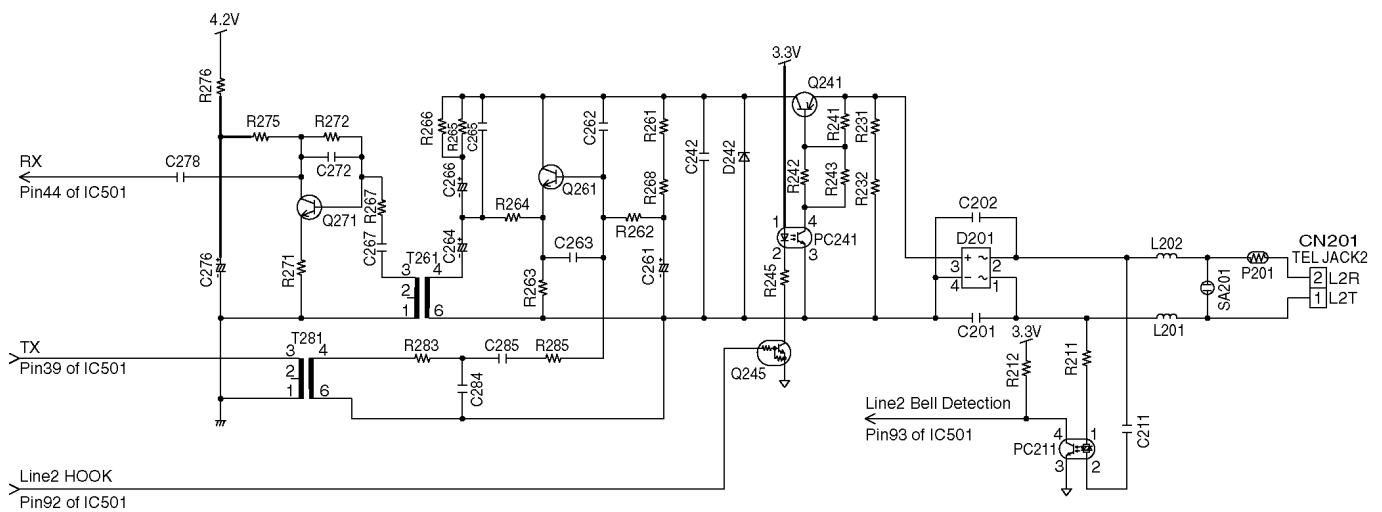
18.7. Auto Disconnect Circuit

Function:

This circuit is used to detect the fact that another telephone connected to the same line is OFF-HOOK while the unit is in message receiving, OGM transmitting and Hold status.

Circuit Operation:

Operational amplifier with high value resisters is used in order to isolate both lines.

This circuit gain is controlled by the signal (inverse RLY). When the base unit is in off-hook condition, the control signal logic is zero.

This circuit transforms the voltage of the line and DSP monitors the result of the transformation.

When the DSP detects the voltage drop 0.2V or more by parallel-connected telephone off-hook, the unit will disconnect the line.

Pin 50 is for Line 1.

Pin 43 is for Line 2.

Line 1
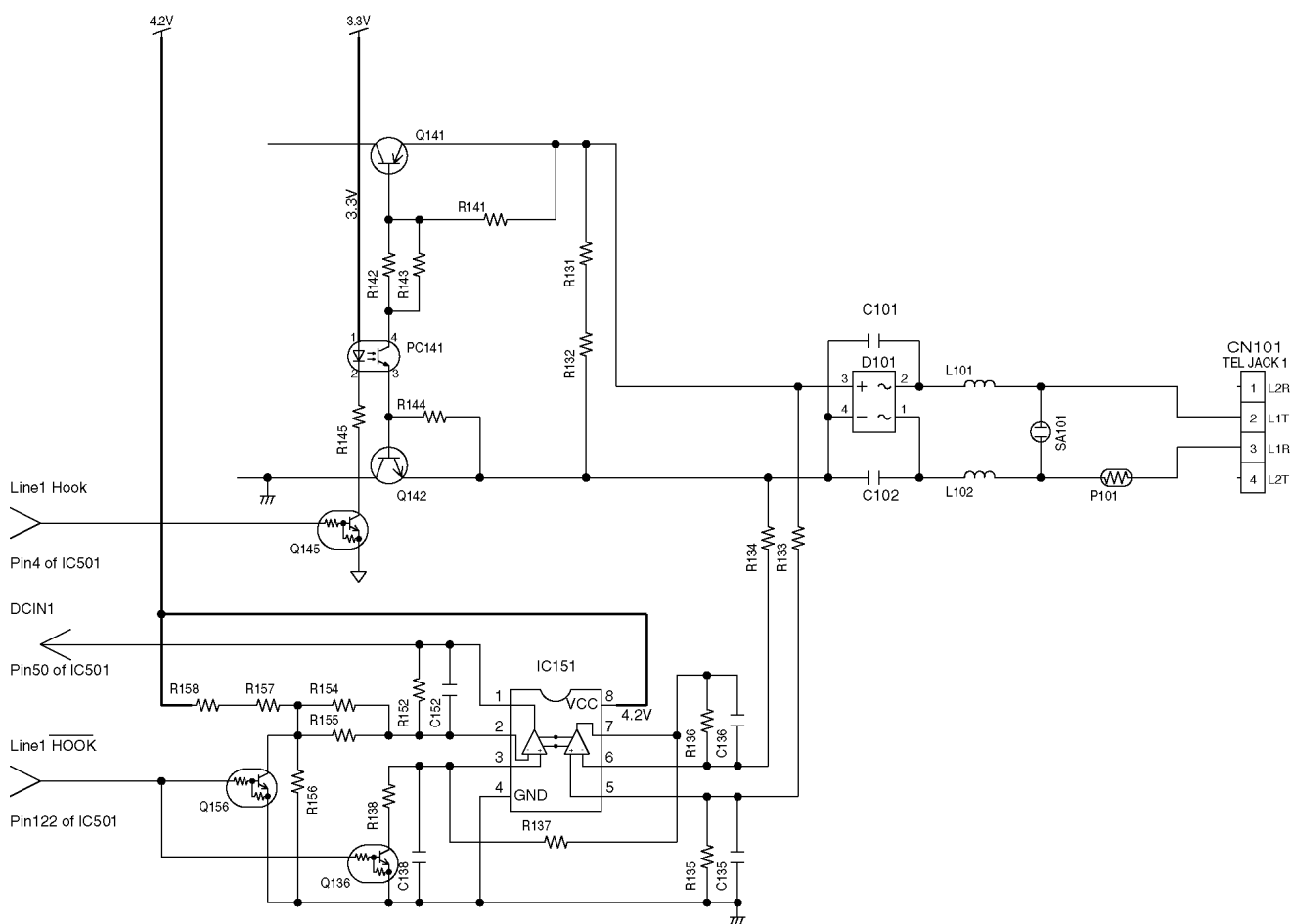
Line 2
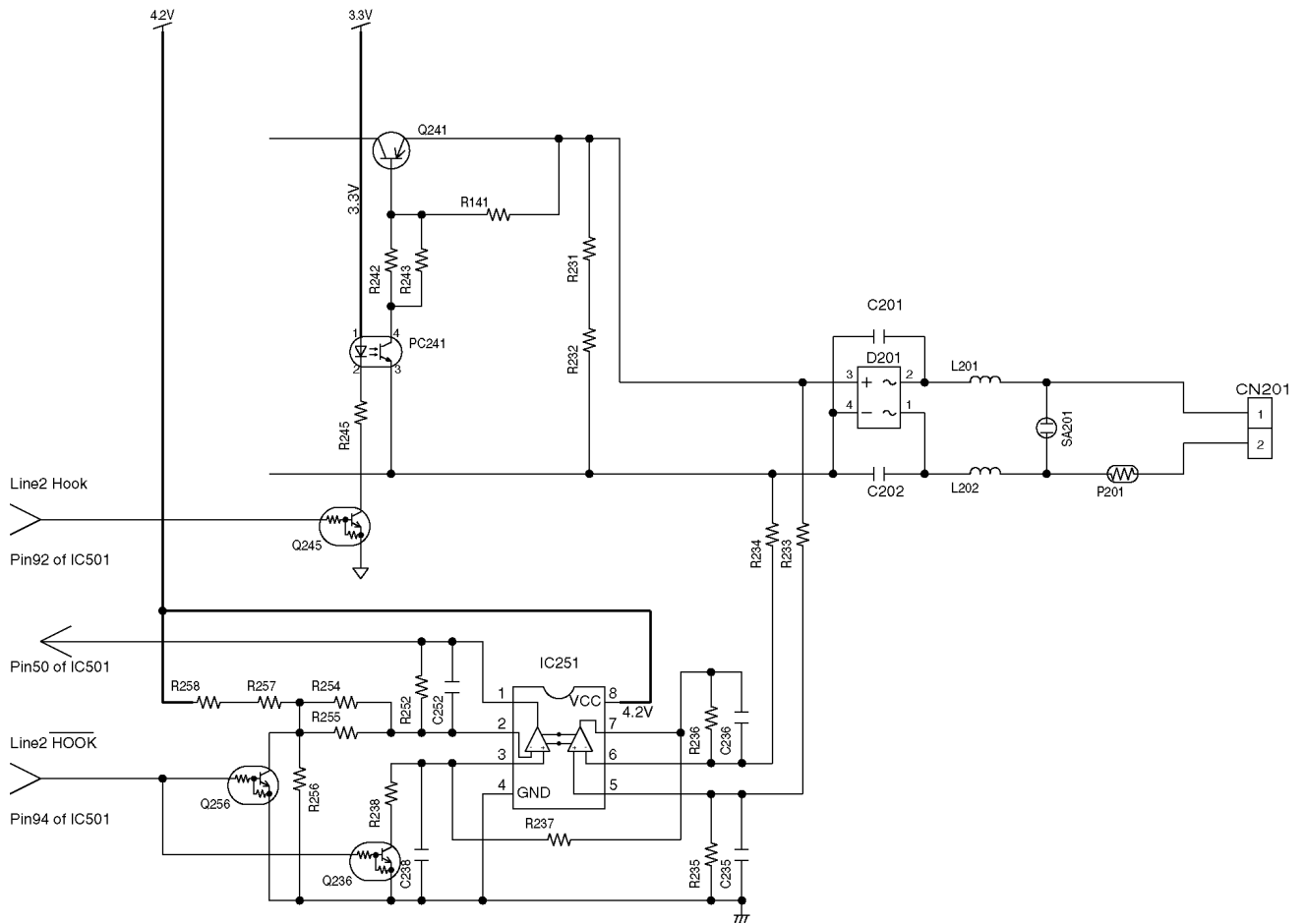
You can enable or disable the Auto Disconnect function.

See **Check Recording** (P.59)

18.8. Parallel Connection Detect Circuit

Function:

This circuit is used to detect the fact that another telephone connected to the same line is OFF-HOOK while the unit is in idle state; to catch the empty line automatically.

Circuit Operation:

The circuit is same as Auto Disconnect circuit.

But this circuit is controlled by inverse RLY signal. In on-hook state, the input signal logic is "high", then the transistors (Line 1: Q156   Q136, Line 2: Q256   Q236) turn on.

As a result, the circuit gain is different from off-hook state.

If the input signal to DSP is 1.65V or higher, DSP will judge there is no use of the telephones connected in parallel.
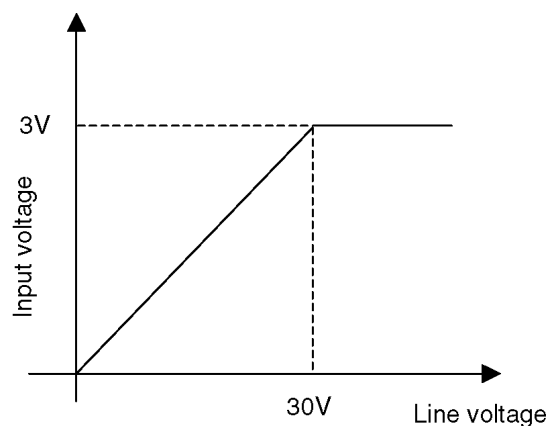
Transformation Characteristics

18.9. Calling Line Identification (Caller ID)

Function:

The caller ID is a chargeable ID which the user of a telephone circuit obtains by entering a contract with the telephone company to utilize a caller ID service. For this reason, the operation of this circuit assumes that a caller ID service contract has been entered for the circuit being used.

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

· **FSK (Frequency Shift Keying) format**
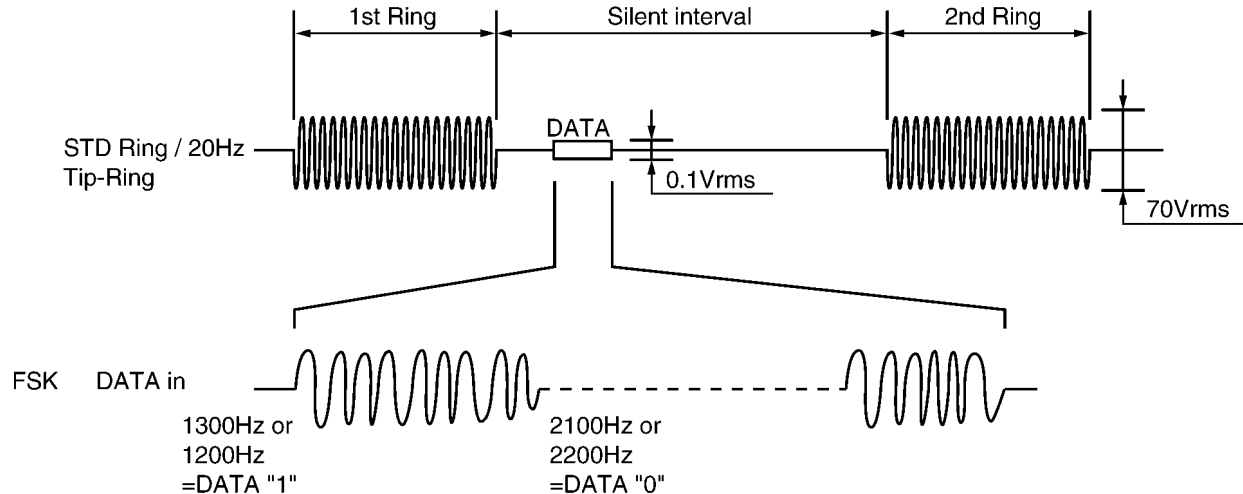
· **DTMF format**

It is the method to send the telephone number of calling party with DTMF to the telephone. DTMF is sent before the first bell signal.

The data is sent in turn; first the start code, secondly the telephone number of calling party, lastly end code.

The DTMF is chosen from A (1633Hz and 697Hz), B (1633Hz and 770Hz), C (1633Hz and 852Hz) and D (1633Hz and 941Hz) as the start code and end code according to the exchange.
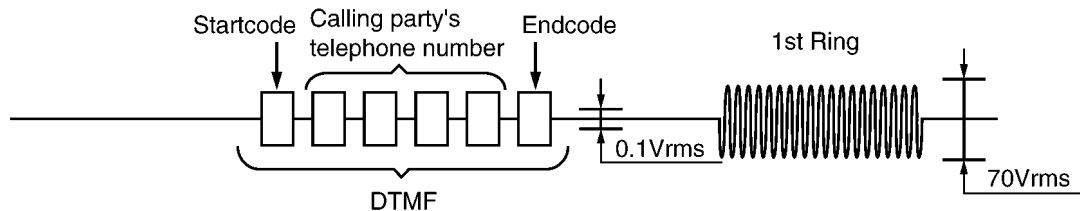
19 BLOCK DIAGRAM (BASE UNIT_RF PART)

KX-TG6500BXB BLOCK DIAGRAM (Base Unit_RF Part)

DSP

V_PA
V_RF
RADIO_EN
PA_CONT
SYN_LE2
SYN_DATA
SYN_CLK
SYN_LE1
SYN_OUT
OSC_IN
TX_EN
TX_DATA
RSSI
RX_DATA
SHCTRL
RF_RESET
RX_EN
RX_GAIN
ANT1
ANT0

Power Supply Circuit

IC841
3.0V REGULATOR

IC761
2.5V REGULATOR

TXEN
VCC
XIN

Serial Interface

Δ - Σ
Frac-N PLL

IC701

Slicer
TC_CTRL
RSTN
RXEN

FM det.

2MHz

2.4GHz Mod/Demod Circuit

REFIN
2.4GHz
2.4GHz

PLL

3.4GHz

Serial Interface

TXEN
VCC

IC801

RXGAIN
RXEN

5.8GHz Converter Circuit

5.8GHz

FL811
Q855
Bias SW

IC851

FL861

5.8GHz PA Circuit

Q875
DC SW
Q871

L822
-L825

5.8GHz LNA Circuit

5.8GHz

Antenna SWitch Circuit

IC891

ANT_0
ANT_1

102

20 BLOCK DIAGRAM (HANDSET_RF PART)

KX-TGA650BXB BLOCK DIAGRAM (Handset_RF Part)

21 CIRCUIT OPERATION (RF PART)

General Description:

RF part includes Transmitter and Receiver functions. Digital signals (Mainly voice data) that come from DSP, are modulated and are transmitted. On the other hand, received signals are demodulated and go out to DSP.

```
                                    RF PART
              ┌──────────────┐
              │ 5.8GHz PA Circuit │              ┌──────────────┐
              └──────────────┘              │   2.4GHz      │  TX_DATA    ┌──────┐
  Antenna     ┌──────────┐   ┌──────────┐   │  Mod/Demod    │◄─────────── │      │
      ▽       │ Antenna  │   │  5.8GHz  │◄──│   Circuit     │             │ DSP  │
      │       │ Switch   │   │ Converter│   │               │  RX_DATA    │      │
      └──────►│ Circuit  │   │  Circuit │──►│               │───────────► │      │
              └──────────┘   └──────────┘   └──────────────┘             └──────┘
              ┌──────────────┐        ┌────────────────────┐
              │ 5.8GHz LNA Circuit │  │ Power Supply Circuit │
              └──────────────┘        └────────────────────┘
```
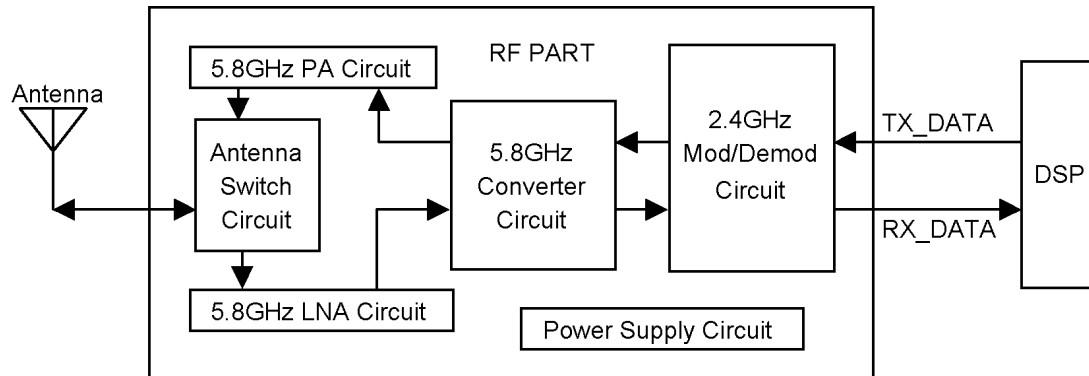
21.1. Power Supply Circuit

As indicated below, the various voltages are supplied to each block.

V_PA, about 4.0V at Base Unit or 3.3V at Handset, is supplied to the Power amplifier in 5.8GHz PA circuit.

IC841 is 3.0V Regulators, and IC761 is a 2.5V Regulator. They output Vcc_5.8GHz, and Vcc_2.4GHz respectively by order of RADIO_EN signal or CON_EN signal. V_RF is approximately 4.0V (Base Unit) or 3.6V (Handset).
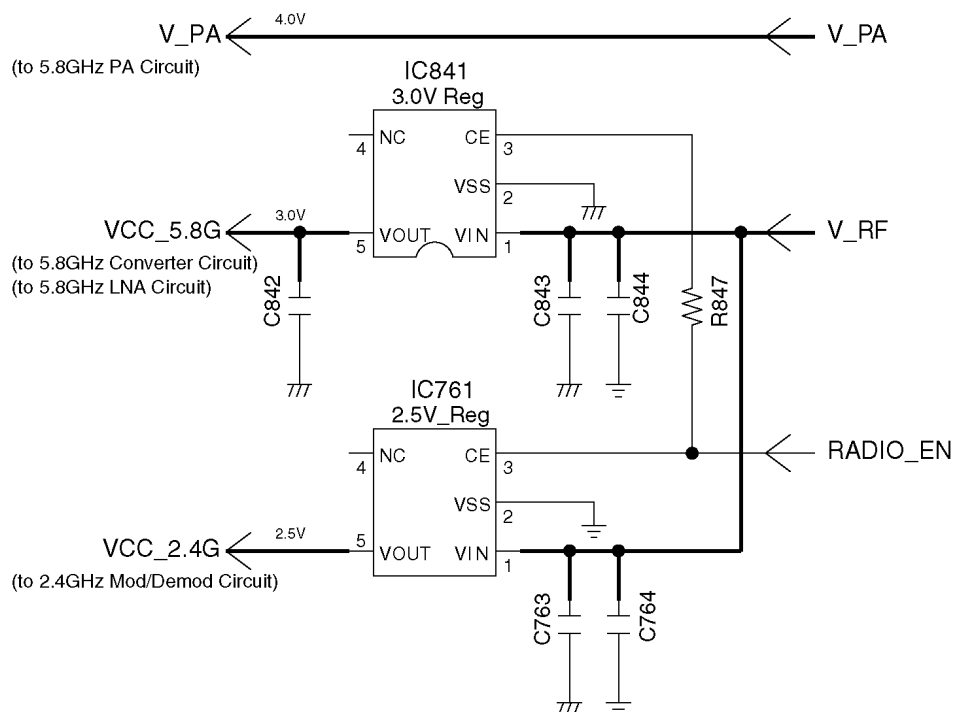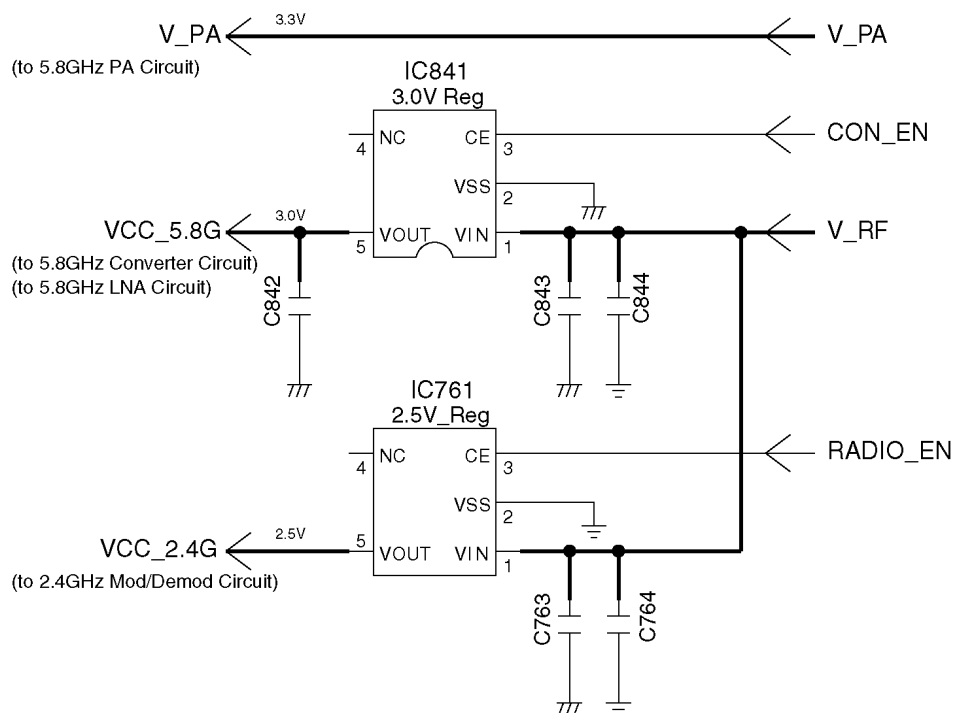
21.2. 2.4GHz Mod/Demod Circuit

IC701 incorporates all of the modulation and demodulation functions. TX Digital data (TX_DATA) from DSP is supplied to pin 27 of IC701, and then 2.4GHz TX modulated signal is output from pin1. This TX signal goes into the 5.8GHz Converter circuit. 2.4GHz RX signal from 5.8GHz Converter circuit is passed through matching circuit and supplied to pin4 of IC701, then demodulated signal (RX_DATA) comes out from pin 16. At the same time, RSSI (Received Signal Strength Indicator) outputs from the pin 14. Reference clock (13.824MHz) from DSP block is supplied to pin 11 of IC701. VCC_2.4G supplies 2.5V regulated voltage.
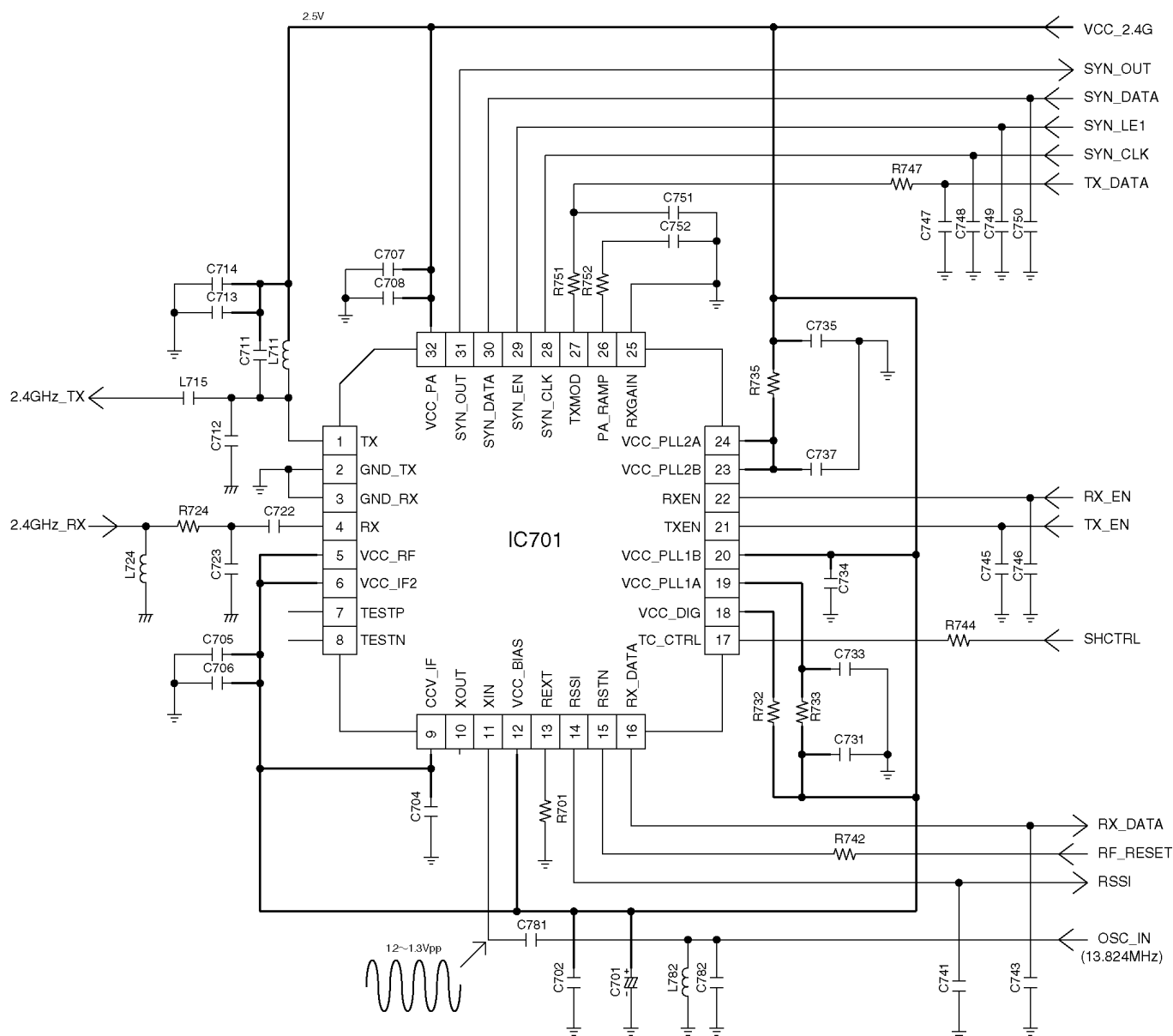
21.3. 5.8GHz Converter Circuit

This block converts frequency of TX signal and RX signal.

IC801 includes TX-MIXER, RX-MIXER, PLL and VCO modules internally.

The VCO module is tuned by PLL synthesizer module, and generates 3.4GHz Local signal. Reference clock (13.824MHz) from DSP block is supplied to pin7 of IC701.

2.4GHz TX signal from 2.4GHz Mod/Demod circuit is supplied to pin 17 of IC801, and internal TX-MIXER multiplies it by 3.4GHz Local signal from internal VCO module, and up-converts into 5.8GHz TX signal. This 5.8GHz TX signal is output from pin 2, and goes into the 5.8GHz PA circuit.

5.8GHz RX signal from 5.8GHz LNA circuit supplied to pin 5 of IC801, and internal RX-MIXER multiplies it by 3.4GHz Local signal from internal VCO module, and down-converts into 2.4GHz RX signal. This 2.4GHz RX signal is output from pin 15, and goes into the 2.4GHz Mod/Demod circuits.
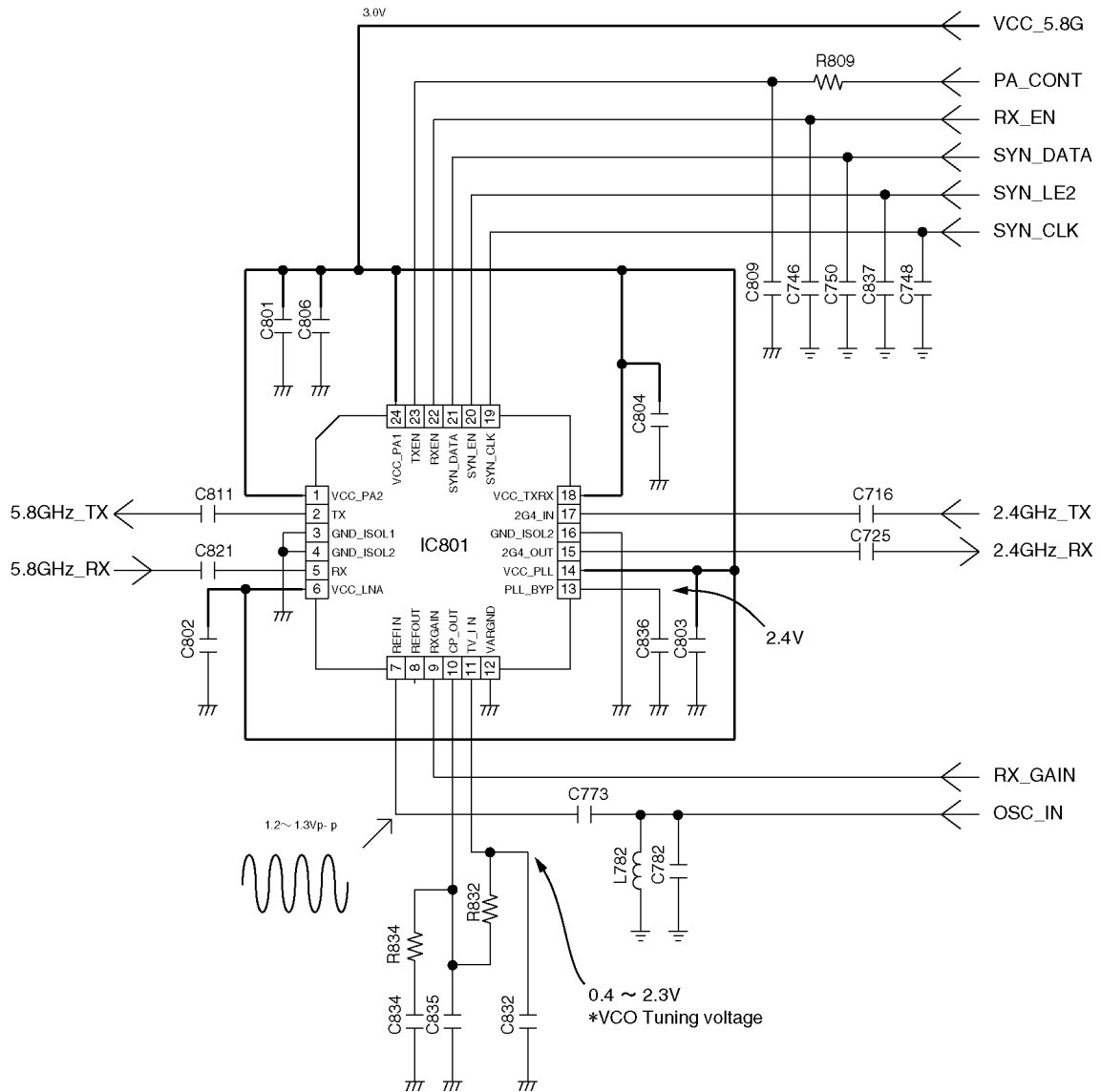
21.4. 5.8GHz PA (Power Amplifier) Circuit

This block amplifies power of 5.8GHz TX signal.

5.8GHz TX signal from 5.8GHz Converter circuit is filtered by 5.8GHz-BPF FL811, and amplified by Power amplifier IC851, and then passes through 5.8GHz-BPF FL861. After that, it is supplied to Antenna Switch circuit.

V_PA is approximately 4.0V at Base Unit, and 3.3V at Handset.

Q855 is switched by PA_CONT signal, and supplies Gates voltage of Power Amplifier IC851.
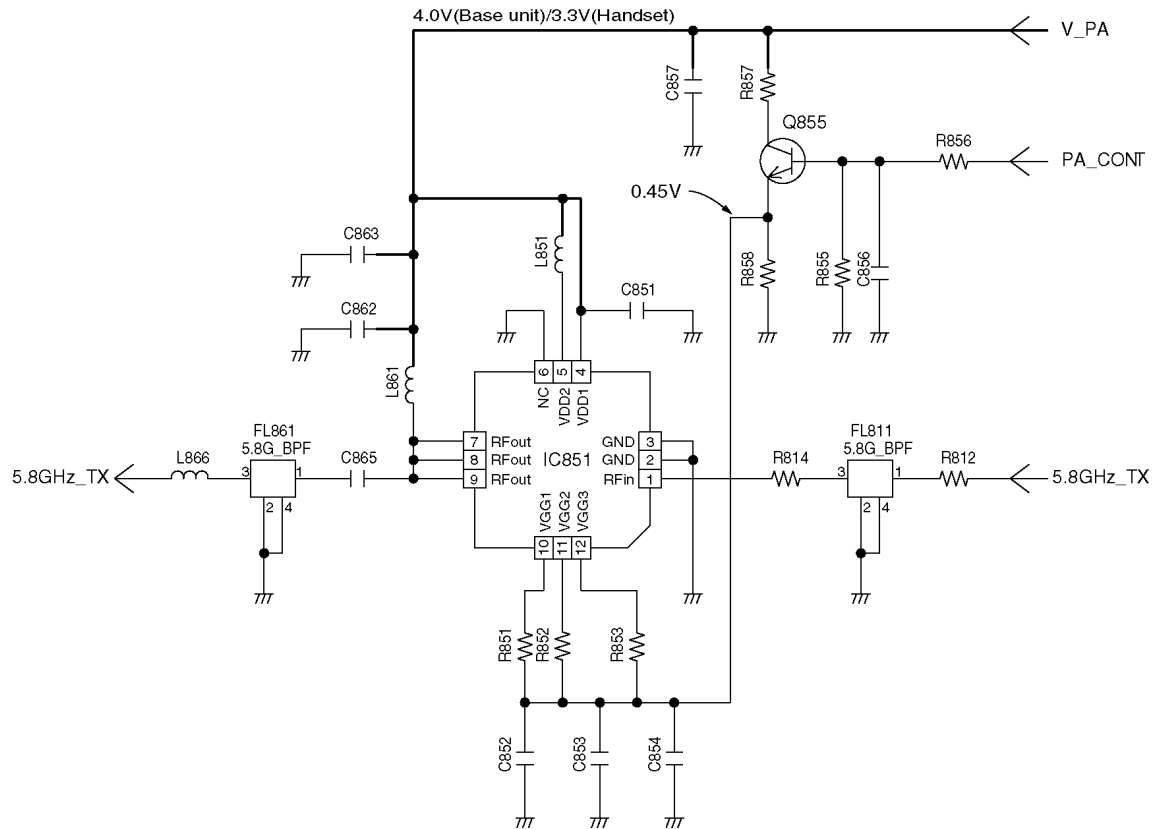
21.5. 5.8GHz LNA (Low Noise Amplifier) Circuit

This block amplifies receiving 5.8GHz signal.

5.8GHz RX signal from Antenna Switch circuit amplified by LNA (Low Noise Amplifier) Q871 and filtered by HPF (L822-L825), and then supplied to 5.8GHz Converter circuit.

Q875 is switched by RX_EN signal, and supplies VCC_5.8G (regulated 3.0V) to LNA Q871.
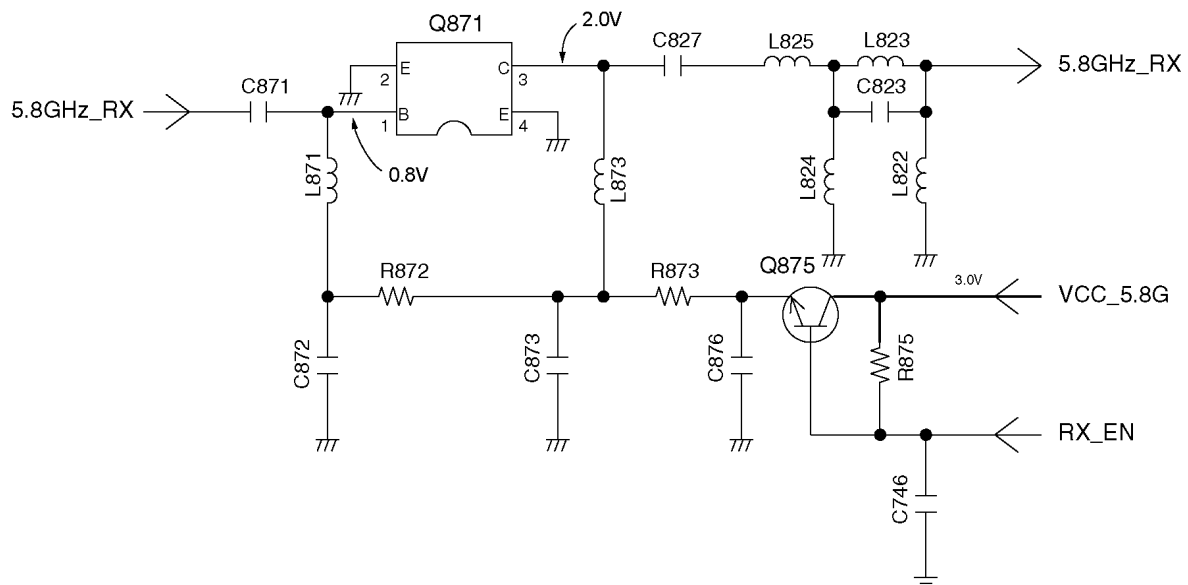
21.6. Antenna Switch Circuit

This block selects the TX 5.8GHz signal or RX 5.8GHz signal, and connects to Antenna terminal.

<Handset>

IC881 includes Switch for High frequency signals, and controlled by PA_CONT signal and RX_EN signal from DSP. At the TX mode 5.8GHz TX signal from 5.8GHz PA circuit leads to Antenna terminal, at the RX mode 5.8GHz RX signal from Antenna terminal leads to 5.8GHz LNA circuit.

<Base Unit>
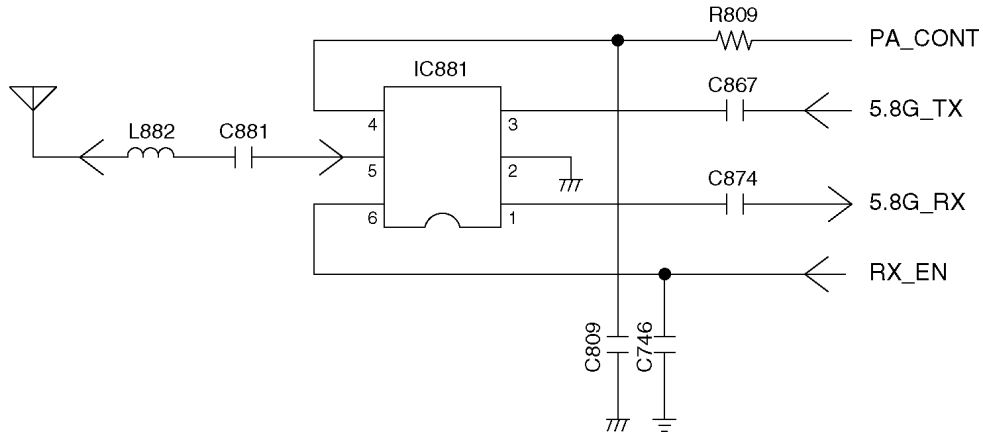
IC891 includes Switches for High frequency signals, and controlled by ANT0 signal and ANT1 signal from DSP.

DSP is checking RSSI (Received Signal Strength Indicator) signal, and selects better condition Antenna from two antennas.

At the TX mode 5.8GHz TX signal from 5.8GHz PA circuit leads to selected Antenna terminal, at the RX mode 5.8GHz RX signal from selected Antenna terminal leads to 5.8GHz LNA circuit.

22 BLOCK DIAGRAM (HANDSET_MAIN)

IC202
EEPROM

X201
13.824MHz

Q204
OSC AMP

ANT

Q207
CHARGE DETECT

CHG_DET

WP, CLK, DATA

OSC-IN

RF part

Q209, Q210
CHARGE CONTROL

CHG_CTL

TX_DATA
RX_DATA
PA_CONT
RADIO_EN
CON_EN
SYN_LE2
SYN_OUT
SYN_DATA
SYN_CLK
SYN_LE1
RX_GAIN
RX_EN
TX_EN
SHCTRL
RF_RESET
RSSI

Q205
RESET

RESET

CHARGE

Q212

IC205
POWER DOWN

PDN

V_PA

V_RF

IC203
3.0V REGULATOR

VCC
VCCR
VCCA
VCCPA

BATTERY

IC201
DSP

MIC

MIP
MIN

SP

LOUTO (SP)

Headst Jack

HSSPOUT

LINO (HS_MIC)

CN203

Q206
HEADSET DETECT

HEADSET_DET

Monitor SP

SPOUTP
SPOUTN

INT 1

INT_1

LCD_LIGHT

KEY_LIGHT

KEYSTOROBE_A~F

KEYIN_1~5

LCD

KEYS

IC204
3.3V REGULATOR

KX-TGA650BXB BLOCK DIAGRAM (Handset_Main)

23 CIRCUIT OPERATION (HANDSET_MAIN)

23.1. Construction

The circuit mainly consists of DSP and RF part as shown in the block diagram.

23.1.1. DSP: IC201

Function

- ・Battery Low, Power down defect circuit
- ・Ringer Generation
- ・Interface circuit

  RF part, speaker, mic, LED, Key scan, LCD, Headset

Initialize
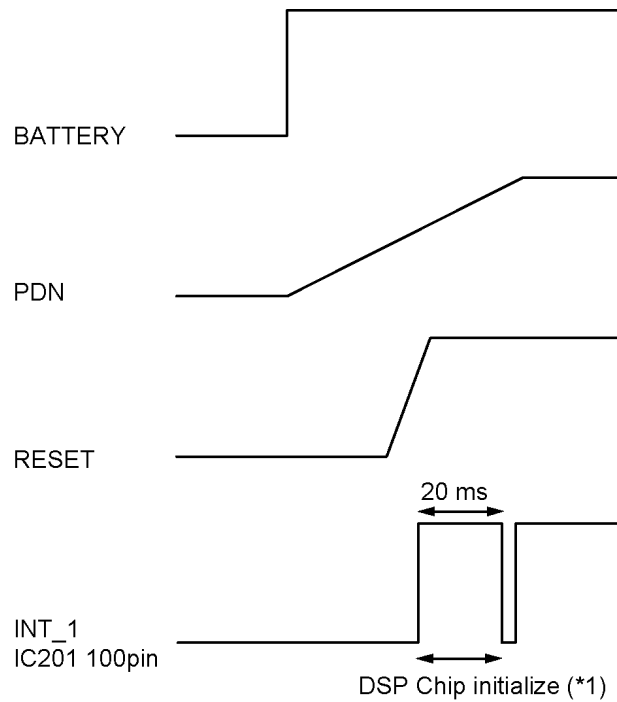
Note:

(*1) The initializing time of the DSP chip is 20ms under normal conditions.

23.1.2. RF part

Mainly voice signal is modulated to RF, or it goes the other way.

23.1.3. EEPROM: IC202

All setting data is stored.

ex: ID code, user setting (Flash Time, Tone/Pulse)

23.2. Power Supply Circuit

Voltage is supplied separately to each block.

Block Diagram (Handset Power)
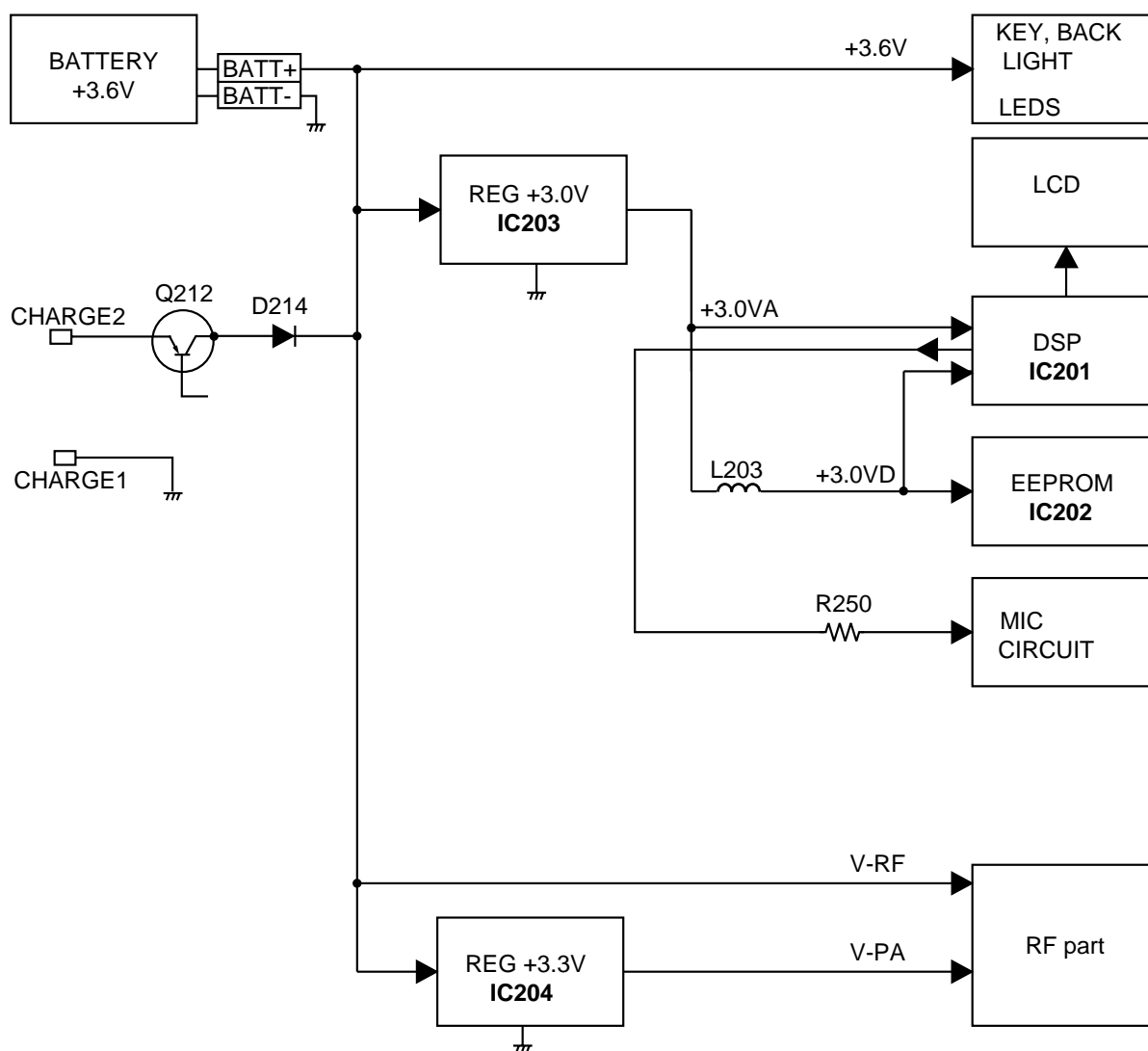
23.3. Charge Circuit

When the Handset is put on the cradle of the Base unit or the optional charger, the power is supplied from CHARGE+ and CHARGE- terminals to charge the battery via R268, R269, R270 or Q212 and D214. The voltage between CHARGE+ and CHARGE- flows R248 → Q207 → pin80 of IC201, where the charge is detected. Then IC201 calculates the battery consumption amount from the previous charge, and it controls Q212/Q210/Q209 by pin82 of IC201 until charging is complete. When charging is complete, the control pattern is switched to Trickle charging form from Operational charging form.

Charging-form
• Main charge

maximum 6 hours

180mA

0mA

>> Trickle charge

• Trickle charge

60min.

180mA

55min.

0mA

5min.

~repeat~

Vcc

R245

Q207

CHG_DET

80

R248

D212

C242

IC201

R270

R268

VBAT

R235

BATT_LOW

35

R269

D214

CHARGE+

R263

Q212

BATTP

R234

C280

C273

C285

R264

BATTM

CHARGE-

R266

Q210

Q209

CHG_CTL

82
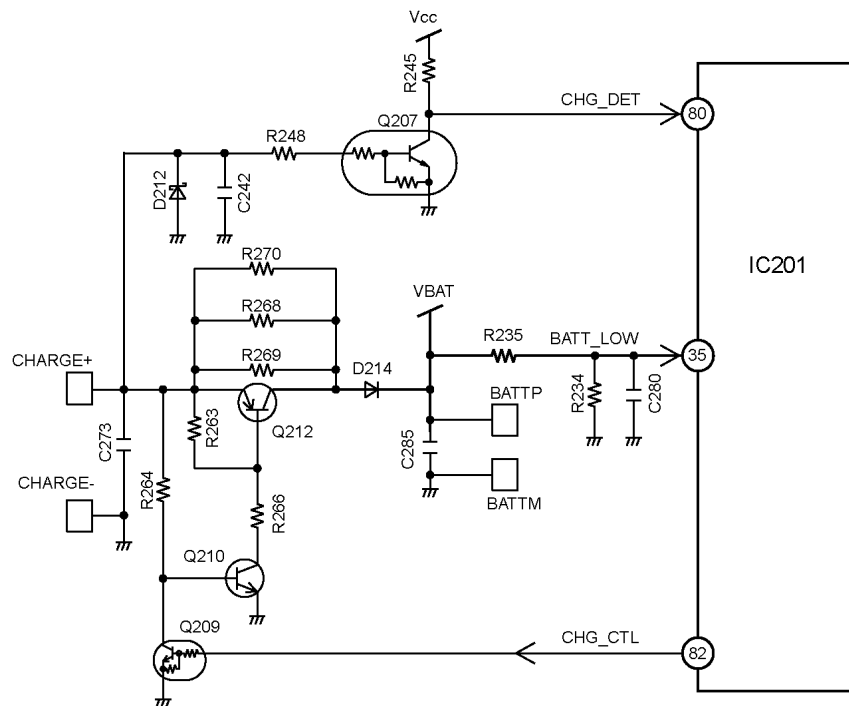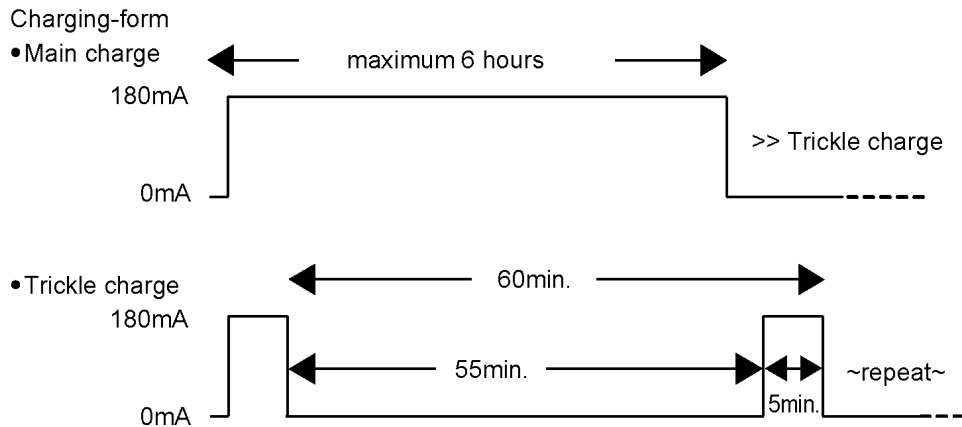
Pin 35 of IC201 monitors the battery voltage and detect BATT LOW at 3.50V.

23.4. Ringer and Handset SP-Phone

DSP

RINGER/MONITOR SP

29

IC201

31

113
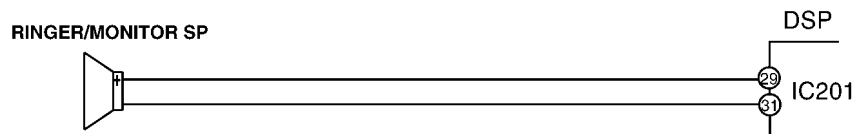
23.5. Sending Signal

The voice signal from the microphone input to DSP (42, 43). CN203 is the headset jack. When the headphone is connected, the Q206 detect it. The input from the microphone of the Handset (MIN, MIP) is cut and the microphone signal from the headset is input to DSP (36). Also the power for the microphone is supplied from DSP (20) and the power is turned OFF on standby.
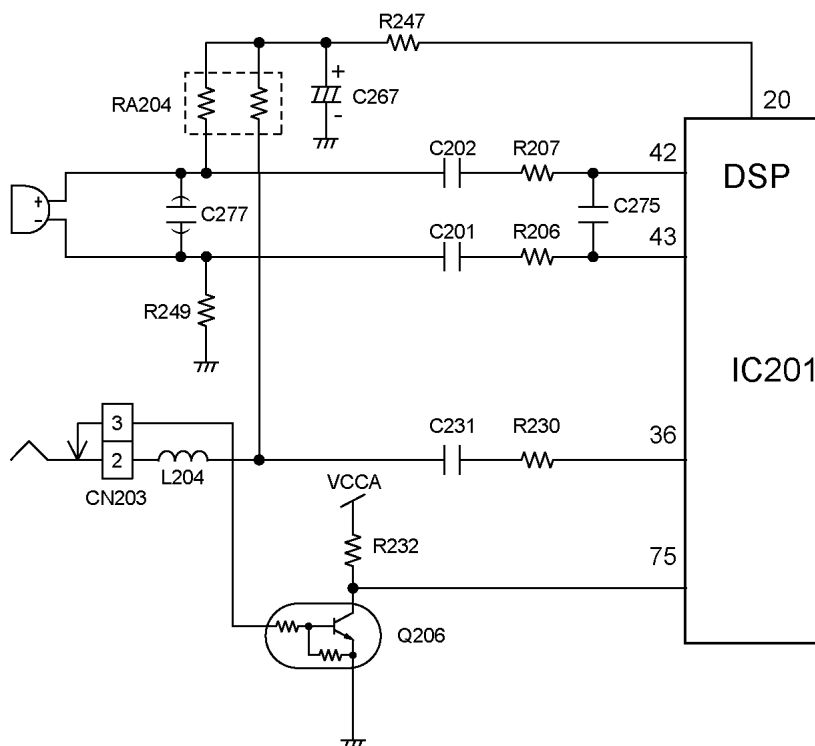
23.6. Reception Signal

The voice signal from the Base Unit is output to DSP (33) (HSSPOUT). This signal is led to the headset jack (CN203). The signal through the headset jack and the other signal output from DSP (34) to drive the speaker. When the headset is inserted to the jack, the voice signal is cut at the jack, so the sound does not come out from the speaker, but from the headset only.
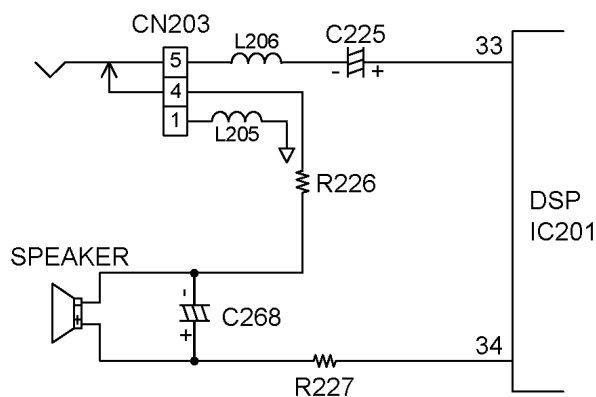
24 CIRCUIT OPERATION (CHARGER UNIT)

The voltage from the AC is supplied to the charge circuits. Main charge (180mA at the Battery) of maximum 9-hours is started soon after the Handset is placed on the Base Unit. Then it changes to Trickle charge to prevent from overcharging.

Charging form

Charging-form
• Main charge

180mA

maximum 6 hours

>> Trickle charge

0mA

Handset controls
Charging-form pattern.

• Trickle charge

60min.

180mA

55min.

5min.

~repeat~

0mA
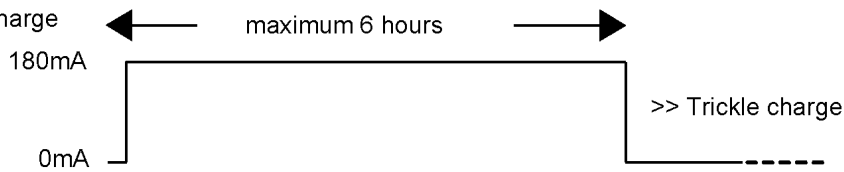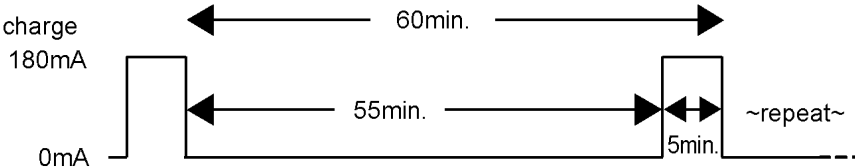
Q4 detects the ON-HOOK state (Handset is placed on Base Unit), then Q5 turns ON and LED1 lights up.
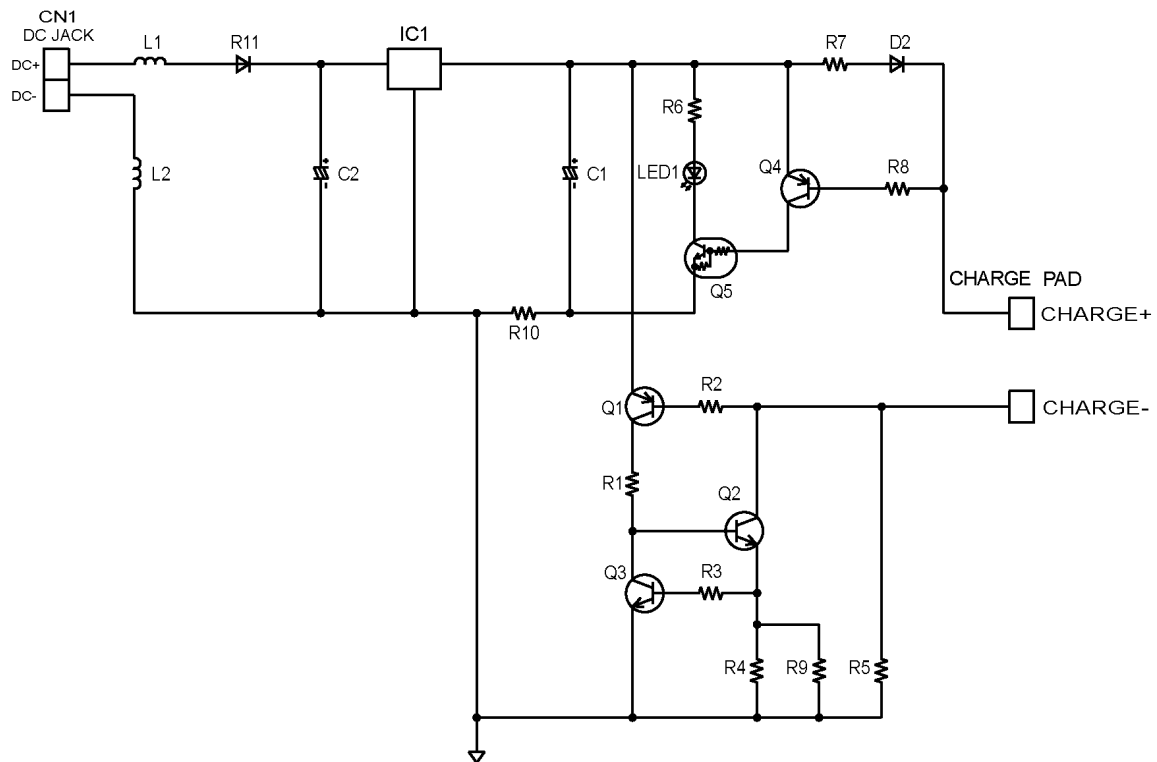
Q1, Q2 and Q3 regulate the charge current.

The route for this is as follows: DC+pin of CN1→R11→IC1→R7→D2→CHARGE+pad→Cordless Handset→CHARGE pad→Q2→R4 and R9→DC pin of CN1.

25 SIGNAL ROUTE

SIGNAL ROUTE between Handset and Base Unit (or through the Base Unit)

SIGNAL ROUTE	IN → ROUTE → OUT
HANDSET TX **[LINE 1]**	HANDSET MIC - C201/C202 - R206/R207 - IC201(43/42 - 57) - <HANDSET_RF_TX_ROUTE> - ANT.-- -- ANT. - <BASE_UNIT_RF_RX_ROUTE> - IC501(84 - 41) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(LINE1 TEL LINE)
HANDSET TX **[LINE 2]**	HANDSET MIC - C201/C202 - R206/R207 - IC201(43/42 - 57) - <HANDSET_RF_TX_ROUTE> - ANT.-- -- ANT. - <BASE_UNIT_RF_RX_ROUTE> - IC501(84 - 39) - T281 - R283 - C285 - R285 - Q261 - Q241 - D201 - L201/L202 - CN201(LINE2 TEL LINE)
Headset TX **[LINE 1]**	HEADSET_JACK(2) - L204 - C231 - R30 - IC201(36 - 57) - <HANDSET_RF_TX_ROUTE> - ANT.-- --ANT. -<BASE_UNIT_RF_RX_ROUTE> - IC501(84 - 41) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(LINE1 TEL LINE)
Headset TX **[LINE 2]**	HEADSET_JACK(2) - L204 - C231 - R30 - IC201(36 - 57) - <HANDSET_RF_TX_ROUTE> - ANT.-- --ANT. - <BASE_UNIT_RF_RX_ROUTE> - IC501(84 - 39) - T281 - R283 - C285 - R285 - Q261 - Q241 - D201 - L201/L202 - CN201(LINE2 TEL LINE)
HANDSET Sp-phone TX **[LINE 1]**	HANDSET MIC - C201/C202 - R206/R207 - IC201(43/42 - 57) - <HANDSET_RF_TX_ROUTE> - ANT.-- --ANT. - <BASE_UNIT_RF_RX_ROUTE> - IC501(84 - 41) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102- CN101(LINE1 TEL LINE)
HANDSET Sp-phone TX **[LINE 2]**	HANDSET MIC - C201/C202 - R206/R207 - IC201(43/42 - 57) - <HANDSET_RF_TX_ROUTE> - ANT.-- --ANT. - <BASE_UNIT_RF_RX_ROUTE> - IC501(84 - 39) - T281 - R283 - C285 - R285 - Q261 - Q241 - D201 - L201/L202 - CN201(LINE2 TEL LINE)
HANDSET RX **[LINE 1]**	CN101(Line1 TEL LINE) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 - IC501(51 - 75) - <BASE_UNIT_RF_TX_ROUTE> -ANT.-- --ANT.- <HANDSET_RF_TX_ROUTE> - IC201(66 - 33/34) - [C225 - L206 - HEADSET_JACK(5 - 4) - R226]/R227 - HANDSET SPEAKER
HANDSET RX **[LINE 2]**	CN201(Line2 TEL LINE) - L201/L202 - D201 - Q241 - C265 - C264 - T261 - C267 - R267 - Q271 - C278 - IC501(43 - 75) --ANT. -<HANDSET_RF_TX_ROUTE> - IC201(66 - 33/34) - [C225 - L206 - HEADSET_JACK(5 - 4) - R226]/R227 - HANDSET SPEAKER
Headset RX **[LINE 1]**	CN101(Line1 TEL LINE) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 - IC501(51 - 75) - <BASE_UNIT_RF_TX_ROUTE> -ANT.-- --ANT. - <HANDSET_RF_RX_ROUTE> - IC201(66 - 33) - C225 - L206 - HEADSET_JACK(5)
Headset RX **[LINE 2]**	CN201(Line2 TEL LINE) - L201/L202 - D201 - Q241 - C265 - C264 - T261 - C267 - R267 - Q271 - C278 - IC501(43 - 75) --ANT. - <HANDSET_RF_RX_ROUTE> - IC201(66 - 33) - C225 - L206 - HEADSET_JACK(5)
HANDSET Sp-phone RX **[LINE 1]**	CN101(Line1 TEL LINE) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 - IC501(51 - 75) - <BASE_UNIT_RF_TX_ROUTE> -ANT.-- --ANT. - <HANDSET_RF_RXS_ROUTE> - IC201(66 - 29/31) - L209/L210 - MONITOR SP
HANDSET Sp-phone RX **[LINE 2]**	CN201(Line2 TEL LINE) - L201/L202 - D201 - Q241 - C265 - C264 - T261 - C267 - R267 - Q271 - C278 - IC501(43 - 75) --ANT. - <HANDSET_RF_RXS_ROUTE> - IC201(66 - 29/31) - L209/L210 - MONITOR SP
INTERCOM HS to BU	HANDSET MIC - C201/C202 - R206/R207 - IC201(43/42 - 57) - <HANDSET_RF_TX_ROUTE> - ANT.-- --ANT. - <BASE_UNIT_RF_RX_ROUTE> - IC501(84 - 35/37) - R473/R474 - SPEAKER

Note:

☐ ; inside of Handset

SIGNAL ROUTE	IN	→	ROUTE	→	OUT
INTERCOM BS to HS	MIC - C457/C458 - R459/R460 - IC501(61/60 - 75) - <BASE_UNIT_RF_TX_ROUTE>-ANT.-- --ANT. - <HANDSET_RF_RXS_ROUTE> - IC201(66 - 29/31)- L209/L210 - MONITOR SP				
BASE UNIT Sp-phone TX **[LINE 1]**	MIC - C457/C458 - R459/R460 - IC501(61/60 - 41) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(LINE1 TEL LINE)				
BASE UNIT Sp-phone TX **[LINE 2]**	MIC - C457/C458 - R459/R460 - IC501(84-39) - T281 - R283 - C285 - R285 - Q261 - Q241 - D201 - L201/L202 - CN201(LINE2 TEL LINE)				
BASE UNIT Sp-phone RX **[LINE 1]**	CN101(Line1_TEL_Line) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 - R178 - IC501(51 - 35/37) - R473/R474 - SPEAKER				
BASE UNIT Sp-phone RX **[LINE 2]**	CN201(Line2 TEL LINE) - L201/L202 - D201 - Q241 - C265 - C264 - T261 - C267 - R267 - Q271 - C278 - IC501(51 - 35/37) - R473/R474 - SPEAKER				
GREETING RECORDING	MIC - C457/C458 - R459/R460 - IC501(61/60 - 78/79) - IC601				
GREETING PLAY TO **Line1**	IC601 - IC501(78/79 - 41) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(LINE1 TEL LINE)				
GREETING PLAY TO **Line2**	IC601 - IC501(78/79 - 39) - T281 - R283 - C285 - R285 - Q261 - Q241 - D201 - L201/L202 - CN201(LINE2 TEL LINE)				
ICM RECORDING **[Line1]**	CN101(Line1 TEL LINE) - L101/L102 - D101 - Q141 - C165-R167 - C167 - Q171 - C178 - IC501(51 - 78/79) - IC601				
ICM RECORDING **[Line2]**	CN201(Line2 TEL LINE) - L201/L202 - D201 - Q241 - C265 - C264-T261 - C267 - R267 - Q271 - C278 - IC501(43 - 78/79) - IC601				
ICM PLAY TO SPEAKER	IC601 - IC501(78/79 - 35/37) - R473/R474 - SPEAKER				
DTMF SIGNAL TO **Line1**	IC501(41) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(LINE1 TEL LINE)				
DTMF SIGNAL TO **Line2**	IC501(39) - T281 - R283 - C285 - R285 - Q261 - Q241 - D201 - L201/L202 - CN201(LINE2 TEL LINE)				
CALLER ID **[Line1]**	CN101(Line1 TEL LINE) - L101/L102 - C121/C122 - R121/R122 - C123/C124 - C125/C126				
CALLER ID **[Line2]**	CN201(T/R) - L201/L202 - C213/C214 - R214/R214 - R215/R216 - IC291(5/6 - 7) - R291 - R292 - C292 - IC291(2 - 1) -C297 - C298 - R299 - IC501(47 - 46)				

Note:

☐ ; inside of Handset

RF part signal route

SIGNAL ROUTE	IN	→	ROUTE	→	OUT
HANDSET RF [TX_ROUTE]	< R747 - R751 - IC701(27 - 1) - L751 - C716 - IC801(17 - 2) - C811 - R812 - FL811 - R814 - IC851(1 - 7/9) - C865 - FL861 - L866 - C867 - IC881(3 - 5) - C881 - L882 >				
HANDSET RF [RX_ROUTE]	< L882 - C881 - IC881(5 - 1) - C874 - C871 - Q871(B - C)- C827 - L825 - L823 - C821 - IC801(5 - 15) - C725 - R724 - C722 - IC701(4 - 16) >				
BASE UNIT RF [TX_ROUTE]	< R747 - R751 - IC701(27 - 1) - L751 - C716 - IC801(17 - 2) - C811 - R812 - FL811 - R814 - IC851(1 - 7/9) - C865 - FL861 - L866 - C867 - IC891(12 - 4/6) - C891/C896 - C893/C898 >				
HANDSET RF [RX_ROUTE]	< C893/C898 - C891/C896 - IC891(4/6 - 10) - C874 - C871 - Q871(B - C) - C827 - L825 - L823 - C821 - IC801(5 - 15) - C725 - R724 - C722 - IC701(4 - 16) >				

Note:

☐ ; inside of Handset

26 CPU DATA (BASE UNIT)

26.1. IC501

PIN	Description	I/O	High	High_Z	Low
1	NC	D.O	--	--	--
2	NC	D.O	--	--	--
3	BELL_L1	D.I	OFF	--	ON
4	RLY_L1	D.O	Off Hook	--	On Hook
5	AC_DOWN_ DET	D.I	High	--	Low
6	KEY_STB_F	D.O	Active	Not	--
7	KEY_STB_E	D.O	Active	Not	--
8	KEY_STB_D	D.O	Active	Not	--
9	KEY_STB_C	D.O	Active	Not	--
10	KEY_STB_B	D.O	Active	Not	--
11	KEY_STB_A	D.O	Active	Not	--
12	CHG_CTRL	D.O	No Charge	--	Charge
13	CHG_DET	D.I	Off Charge	--	On Charge
14	INUSE_LED	D.I.O	--	Off	On
15	ANS_LED	D.I.O	--	Off	On
16	VCC	VCC	VCC	--	--
17	GND	GND	--	--	GND
18	LINE2_LED	D.I.O	--	Off	On
19	MSG_LED	D.I.O	--	Off	On
20	KEY_IN6	D.O	Non	--	Key In
21	KEY_IN5	D.I	Non	--	Key In
22	KEY_IN4	D.I	Non	--	Key In
23	KEY_IN3	D.I	Non	--	Key In
24	KEY_IN2	D.I	Non	--	Key In
25	KEY_IN1	D.I	Non	--	Key In
26	NC	D.O	--	--	--
27	NC	D.O	--	--	--
28	NC	D.O	--	--	--
29	SYN_DATA	D.O	High	--	Low
30	SYN_LE1	D.O	Not	--	Active
31	SYN_CLK	D.O	High	--	Low
32	SYN_DI	D.I	High	--	Low
33	SYN_LE2	D.O	Not	--	Active
34	GND	GND			
35	SPOUTP	A.O			
36	GNDPA	GND			
37	SPOUTN	A.O			
38	VCCPA	VCC			
39	HSSPOUT	A.O			
40	LOUT0	A.O			
41	LOUT1	A.O			
42	VREFO	A.O			
43	DCIN0	A.I			
44	LIN0	A.I			
45	LGS0	A.I			
46	CIDO0	A.I			
47	CIDIN0	A.I			
48	CIDIP0	A.I			
49	VCCA	VCC			
50	DCIN1	A.I			
51	LIN1	A.I			
52	LGS1	A.I			
53	CIDO1	A.I			
54	CIDIN1	A.I			
55	CIDIP1	A.I			
56	GNDA	GND			
57	HSMIP	A.I			
58	HSMIN	A.I			
59	VREF	A.O			
60	MIN	A.I			
61	MIP	A.I			
62	GNDR	GND			

PIN	Description	I/O	High	High_Z	Low
63	TXMOD	A.O			
64	VREFR	A.O			
65	RSSI	A.I			
66	VCCR	VCC			
67	GNDPLL	GND			
68	VCCPLL	VCC			
69	XOUT	A.O			
70	XIN	A.I			
71	GND	GND			
72	Reset	D.I	Normal	--	Reset
73	Power Down	D.I	Normal	--	Power Down
74	FLASH_RST	*	High	Middle	Low
75	TX_OUT	D.O	High	--	Low
76	PA_CONT	D.O	Low Power	--	High Power
77	FLASH_SO	*	High	Middle	Low
78	FLASH_SI	*	High	Middle	Low
79	FLASH_CS	*	High	Middle	Low
80	BMCCLK	D.O	High	--	Low
81	RXEN	D.O	Active	--	Off
82	TXEN	D.O	Active	--	Off
83	RXGAIN	D.O	High	--	Low
84	RXI	D.I	High	--	Low
85	GHG_LED	D.I.O	--	Off	On
86	SP_LED	D.I.O	--	Off	On
87	INT_LED	D.I.O	--	Off	On
88	RF_RST	D.O	Normal	--	WakeUp
89	RADIO_EN	D.O	Active	--	Not
90	GND	GND	--	--	GND
91	VCC	VCC	VCC	--	--
92	RLY_L2	D.O	Off Hook	--	On Hook
93	BELL_L2	D.I	OFF	--	ON
94	LINE_INV_L2	D.O	On Hook	--	Off Hook
95	SHCTRL	D.O	Active	--	Not
96	ANT0	D.O	On	--	Off
97	ANT1	D.O	On	--	Off
98	TCK	D.O	--	--	--
99	TMS	D.O	--	--	--
100	TDI	D.I	--	--	--
101	TDO	D.O	--	--	--
102	NC	D.O	--	--	--
103	LINE1_LED	D.I.O	--	Off	On
104	NC	D.O	--	--	--
105	NC	D.O	--	--	--
106	GND	GND	--	--	GND
107	VCC	VCC	VCC	--	--
108	SEG12	D.O	High	--	Low
109	SEG11	D.O	High	--	Low
110	SEG10	D.O	High	--	Low
111	SEG9	D.O	High	--	Low
112	SEG8	D.O	High	--	Low
113	SEG7	D.O	High	--	Low
114	SEG6	D.O	High	--	Low
115	SEG5	D.O	High	--	Low
116	SEG4	D.O	High	--	Low
117	SEG3	D.O	High	--	Low
118	COM2	D.O	High	Middle	Low
119	COM1	D.O	High	Middle	Low
120	UART_TX	D.O	High	--	Low
121	UART_RX	D.I	High	--	Low
122	LINE_INV_L1	D.O	On Hook	--	Off Hook
123	WDT CTL	D.O	--	Normal	Low

PIN	Description	I/O	High	High_Z	Low
124	GND	GND	--	--	GND
125	VCC	VCC	VCC	--	--
126	NC	D.O	--	--	--
127	FLASH_CLK	*	High	Middle	Low
128	WDT CLK	D.O	--	--	Low

Note:

- The mark "*" in the I/O column means the port is controlled by the firmware.
- Data in the blank columns are omitted because of the Analog I/O.

27 CPU DATA (HANDSET)

27.1. IC201

PIN	Description	I/O	High	High_Z	Low
1	NC(INT0)	D.O	--	--	Normal
2	NC(CV-hook)	D.O	--	--	Normal
3	DOT_LCD_CS2	D.O	High	--	Low
4	DOT_LCD_RESET	D.O	High	--	Low
5	DOT_LCD_A0	D.O	High	--	Low
6	LCDPOWER_ SW	D.O	High	--	Low
7	DOT_LCD_SCL	D.O	High	--	Low
8	DOT_LCD_SI	D.O	High	--	Low
9	NC	D.O	--	--	--
10	NC	D.O	--	--	--
11	NC	D.O	--	--	--
12	NC	D.O	--	--	--
13	NC	D.I	--	--	--
14	VCC	VCC	VCC	--	--
15	GND	GND	--	--	GND
16	EEPROM_ DATA	D.I.O	High	--	Low
17	EEPROM_CLK	D.O	High	--	Low
18	EEPROM_WP	D.O	WP	--	Write
19	ANT_LED	D.O	OFF	--	On
20	MIC POWER SW	D.O	Bias on	--	Bias off
21	UART_TX	D.O	High	--	Low
22	UART_RX	D.I	High	--	Low
23	SERIAL_DATA	D.O	High	--	Low
24	SERIAL_LE	D.O	High	--	Low
25	SERIAL_CLK	D.O	High	--	Low
26	SERIAL DI	D.I	High	--	Low
27	NC	D.O	--	--	--
28	GND	GND	--	--	GND
29	SPOUTP	A.O	--	--	--
30	GNDPA	GND	--	--	GND
31	SPOUTN	A.O	--	--	--
32	VCCPA	VCC	VCC	--	--
33	HSSPOUT	A.O	--	--	--
34	LOUT0	A.O	--	--	--
35	DCIN0	A.I	--	--	--
36	LIN0	A.I	--	--	--
37	VCCA	VCC	VCC	--	--
38	GNDA	GND	--	--	GND
39	HSMIP	A.I	--	--	--
40	HSMIN	A.I	--	--	--
41	VREF	A.O	--	--	--
42	MIN	A.I	--	--	--
43	MIP	A.I	--	--	--
44	GNDR	GND	--	--	GND
45	TXMOD	A.O	--	--	--
46	VREFR	A.O	--	--	--
47	RSSI	A.I	--	--	--
48	VCCR	VCC	VCC	--	--
49	GNDPLL	GND	--	--	GND
50	VCCPLL	VCC	VCC	--	--
51	XOUT	A.O	--	--	--
52	XIN	A.I	--	--	--
53	GND	GND	--	--	GND
54	RESET	D.I	Normal	--	Reset

PIN	Description	I/O	High	High_Z	Low
55	PDN	D.I	Power On	--	Power Down
56	(FLASH_ RESET)	D.O	--	--	Normal
57	TX OUT	D.O	High	--	Low
58	SYN_LE2	D.O	On	--	Off
59	(FLASH_SO)	D.O	--	--	Normal
60	(FLASH_SI)	D.O	High	--	Low
61	(FLASH_CS)	D.O	--	--	Normal
62	BMCCLK	D.O	--	--	--
63	RXEN	D.O	Active	--	Off
64	TXEN	D.O	Active	--	Off
65	RXGAIN	D.O	High	--	Low
66	RXI	D.I	High	--	Low
67	OSC_BUF	D.O	--	--	On
68	CON_EN	D.O	High	--	Low
69	PA_CONT	D.O	High	--	Low
70	LO_EN	D.O	High	--	Low
71	RADIOEN	D.O	On	--	Off
72	GND	GND	--	--	GND
73	VCC	VCC	VCC	--	--
74	SHCTRL	D.O	On	--	Off
75	HEADSET_DET	D.I	Headset In	--	Non
76	TEST_CLK	D.I	--	--	--
77	TEST_MODE_ SELECT	D.I	--	--	--
78	TEST_DATA_ IN	D.I	--	--	--
79	TEST_DATA_ OUT	D.O	--	--	--
80	CHARGE_DET	D.I	Off Charge	--	On Charge
81	RF_RESET	D.O	Normal	--	Reset
82	CHARGE_CNT	D.O	Trickle	--	Normal
83	KEYIN5	D.I	Non	--	Key In
84	KEYIN4	D.I	Non	--	Key In
85	KEYIN3	D.I	Non	--	Key In
86	KEYIN2	D.I	Non	--	Key In
87	KEYIN1	D.I	Non	--	Key In
88	LIGHTED	D.O	On	--	Off
89	LCD_BACK_ LIGHT	D.O	On	--	Off
90	KEYSTROBE_ F	D.O	--	Not	Active
91	KEYSTROBE_ E	D.O	--	Not	Active
92	KEYSTROBE_ D	D.O	--	Not	Active
93	KEYSTROBE_ C	D.O	--	Not	Active
94	KEYSTROBE_ B	D.O	--	Not	Active
95	KEYSTROBE_ A	D.O	--	Not	Active
96	GND	GND	--	--	GND
97	VCC	VCC	VCC	--	--
98	NC	D.I.O	High	--	Low
99	FLASH_SCK	D.O	High	--	Low
100	NC(INT1)	D.O	--	--	Normal

28 EXPLANATION OF IC TERMINALS (RF PART)

28.1. IC701

Pinout diagram: DH24RF17

Top pins (left to right): 32 31 30 29 28 27 26 25
- 32 VCC_PA
- 31 SYN_OUT
- 30 SYN_DATA
- 29 SYN_EN
- 28 SYN_CLK
- 27 TXMOD
- 26 PA_RAMP
- 25 RXGAIN

Left pins (top to bottom):
- 1 TX
- 2 GND_TX
- 3 GND_RX
- 4 RX
- 5 VCC_RF
- 6 VCC_IF2
- 7 TESTP
- 8 TESTN

Right pins (top to bottom):
- 24 VCC_PLL2A
- 23 VCC_PLL2B
- 22 RXEN
- 21 TXEN
- 20 VCC_PLL1B
- 19 VCC_PLL1A
- 18 VCC_DIG
- 17 TC_CTRL

Bottom pins (left to right): 9 10 11 12 13 14 15 16
- 9 VCC_IF
- 10 XOUT
- 11 XIN
- 12 VCC_BIAS
- 13 REXT
- 14 RSSI
- 15 RSTN
- 16 RXDATA

Metal Paddle

Pin	Description	I/O	Pin	Description	I/O
1	TX	O & VCC	18	VCC_DIG	VCC
2	GND_TX	GND	19	VCC_PLL1A	VCC
3	GND_RX	GND	20	VCC_PLL1B	VCC
4	RX	I	21	TXEN	I
5	VCC_RF	VCC	22	RXEN	I
6	VCC_IF2	VCC	23	VCC_PLL2B	VCC
7	TESTP	O	24	VCC_PLL2A	VCC
8	TESTN	O	25	RXGAIN	I
9	VCC_IF	VCC	26	PA_RAMP	I
10	XOUT	XI/XO	27	TXMOD	I
11	XIN	XI/XO	28	SYN_CLK	I
12	VCC_BIAS	VCC	29	SYN_EN	I
13	REXT	I	30	SYN_DATA	I
14	RSSI	O	31	SYN_OUT	O
15	RSTN	I	32	VCC_PA	VCC
16	RXDATA	O	PKG	PADDLE_GND	GND
17	TC_CTRL	I			

28.2. IC801

DH58RFC05
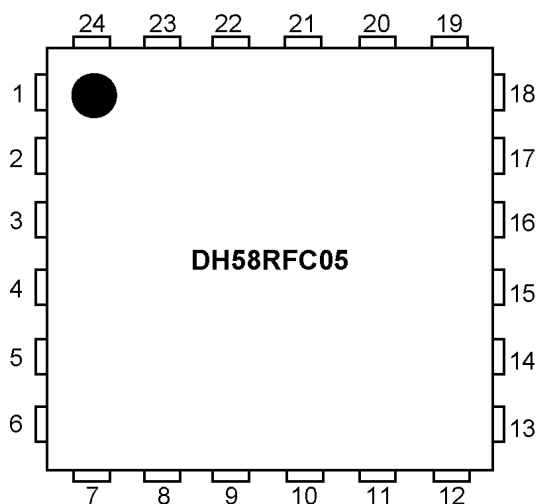
Pin	Description	I/O
1	VCC_PA2	VCC
2	TX	O
3	GND_ISOL1	GND
4	GND_ISOL2	GND
5	RX	I
6	VCC_LNA	VCC
7	REFIN	I
8	REFOUT	O
9	RXGAIN	I
10	CP_OUT	O
11	TV_IN	I
12	VARGND	GND

Pin	Description	I/O
13	PLL_BYP	O
14	VCC_PLL	VCC
15	2G4_OUT	O
16	GND_ISOL3	GND
17	2G4_IN	I
18	VCCTXRX	VCC
19	SYN_CLK	I
20	SYN_EN	I
21	SYN_DATA	I
22	RXEN	I
23	TXEN	I
24	VCC_PA1	VCC

Backside Terminal: GND

28.3. IC851

XM5800PD
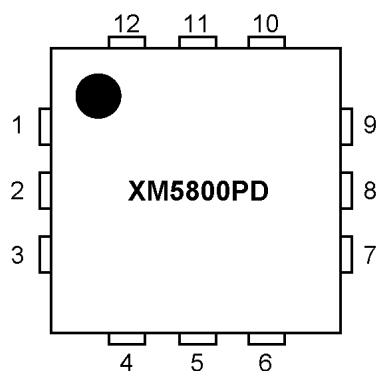
Pin	Description	I/O
1	RFIN	I
2	GND	GND
3	GND	GND
4	VDD1	VCC
5	VDD2	VCC
6	NC	– –

Pin	Description	I/O
7	RFOUT/VDD3	O/VCC
8	RFOUT/VDD3	O/VCC
9	RFOUT/VDD3	O/VCC
10	VGG3	I
11	VGG2	I
12	VGG1	I

Backside Terminal: GND

28.4. IC881
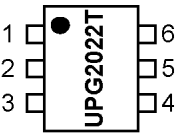
Pin	Description	I/O		Pin	Description	I/O
1	OUT2	I/O		4	VCONT1	I
2	GND	GND		5	IN	I/O
3	OUT1	I/O		6	VCONT2	I

28.5. IC891
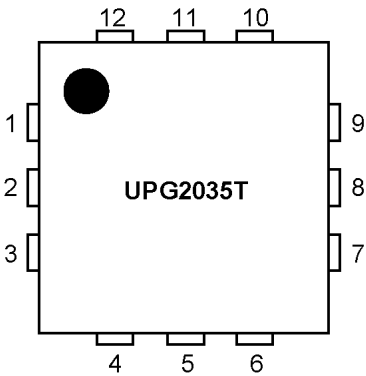
Pin	Description	I/O		Pin	Description	I/O
1	GND	GND		7	VCONT2	I
2	GND	GND		8	GND	GND
3	VCONT1	I		9	GND	GND
4	ANT1	I/O		10	RX	O
5	GND	GND		11	GND	GND
6	ANT2	I/O		12	TX	I

Backside Terminal: GND

29 HOW TO REPLACE A FLAT PACKAGE IC

29.1. Preparation

· PbF (: Pb free) Solder

· Soldering Iron

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

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

· Flux

Recommended Flux: Specific Gravity → 0.82.

Type → RMA (lower residue, non-cleaning type)
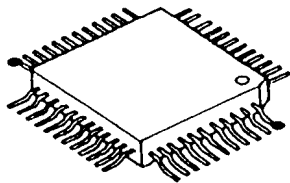
Note: See **ABOUT LEAD FREE SOLDER (PbF: Pb free)** (P.4).

29.2. Procedure

1. Tack the flat pack IC to the PCB by temporarily soldering two diagonally opposite pins in the correct positions on the PCB.

● – – – – – – Temporary soldering point.

Be certain each pin is located over the correct pad on the PCB.

2. Apply flux to all of the pins on the IC.
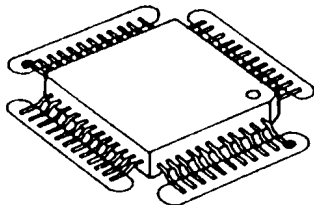
– – – – – Flux

3. Being careful to not unsolder the tack points, slide the soldering iron along the tips of the pins while feeding enough solder to the tip so that it flows under the pins as they are heated.

Soldering iron

Specified solder
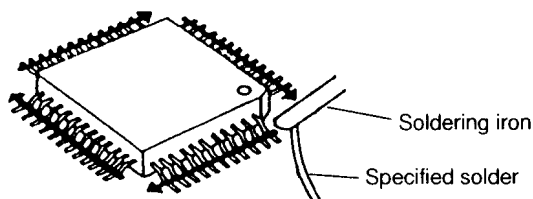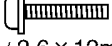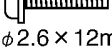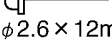
29.3. Removing Solder from Between Pins

1. Add a small amount of solder to the bridged pins.

2. With a hot iron, use a sweeping motion along the flat part of the pin to draw the solder from between the adjacent pads.

bridge
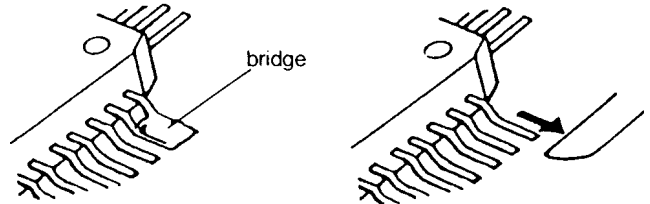
30 CABINET AND ELECTRICAL PARTS (BASE UNIT)
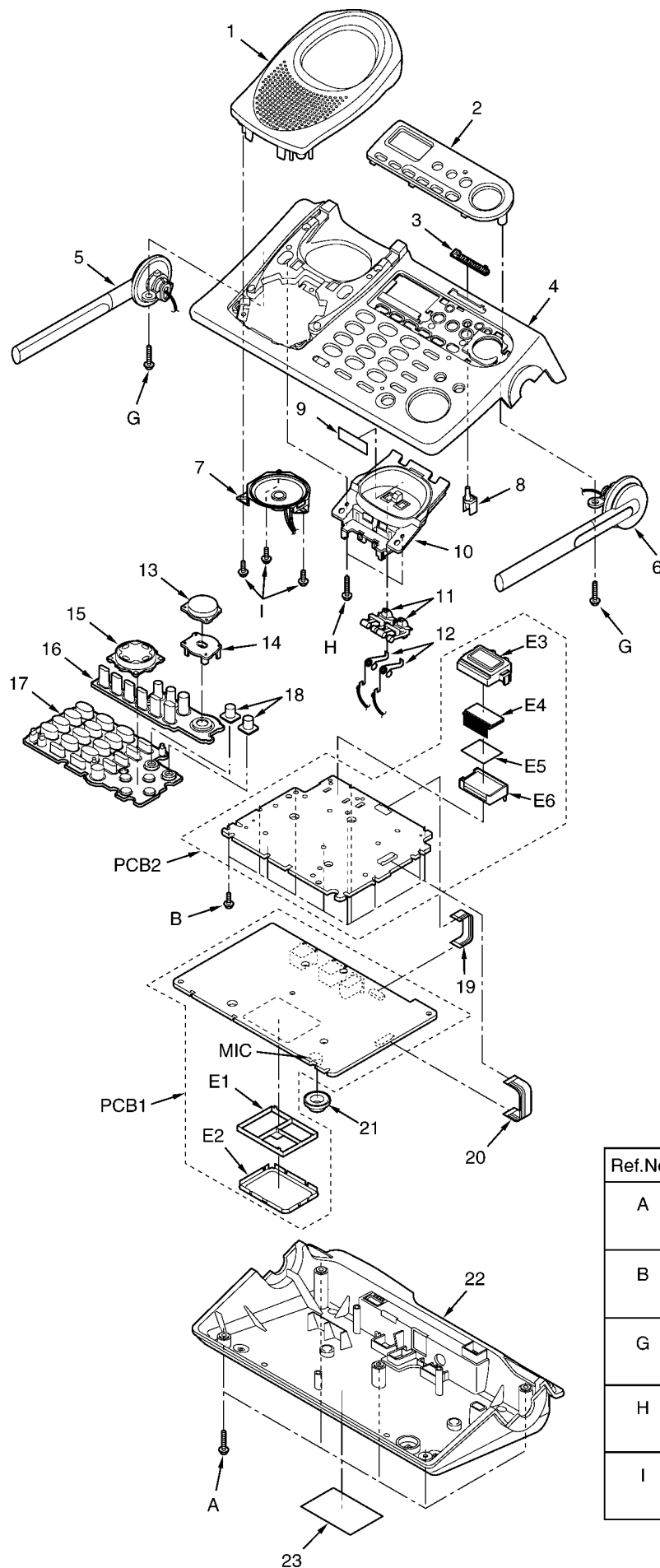
Ref.No.	Part No.	Figure
A	XTW26+12P	φ2.6 × 12mm
B	XTW26+8P	φ2.6 × 8mm
G	XTW26+12P	φ2.6 × 12mm
H	XTW26+12P	φ2.6 × 12mm
I	XTW26+12P	φ2.6 × 12mm

31 CABINET AND ELECTRICAL PARTS (HANDSET)

* Attach the spacer (No. 132) to the exact location described below.

PUT IT IN THE CENTER.

PUSH AND STICK THE WHOLE SPACER ALONG BY THIS LINE.

SPACER (No.132)

Ref.No.	Part No.	Figure
C	XTW26+12P	φ2.6 × 12mm
D	XTW26+12P	φ2.6 × 12mm
E	XTB26+8J	φ2.6 × 8mm

32 CABINET AND ELECTRICAL PARTS (CHARGER UNIT)

Ref.No.	Part No.	Figure
F	XTW26+12P	$\phi 2.6 \times 12mm$
J	XTW26+12P	$\phi 2.6 \times 12mm$
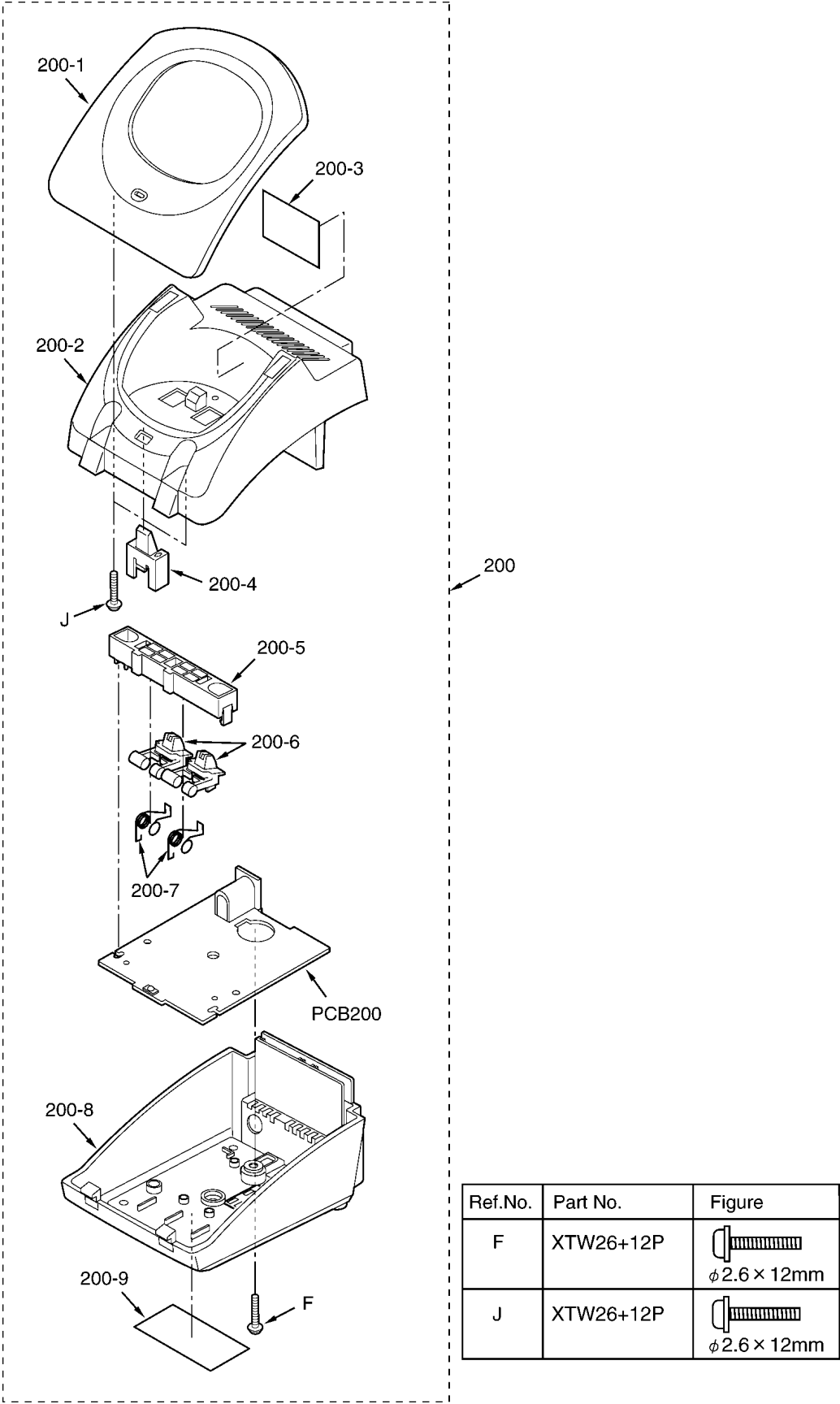
33 ACCESSORIES AND PACKING MATERIALS

33.1. KX-TG6500BXB
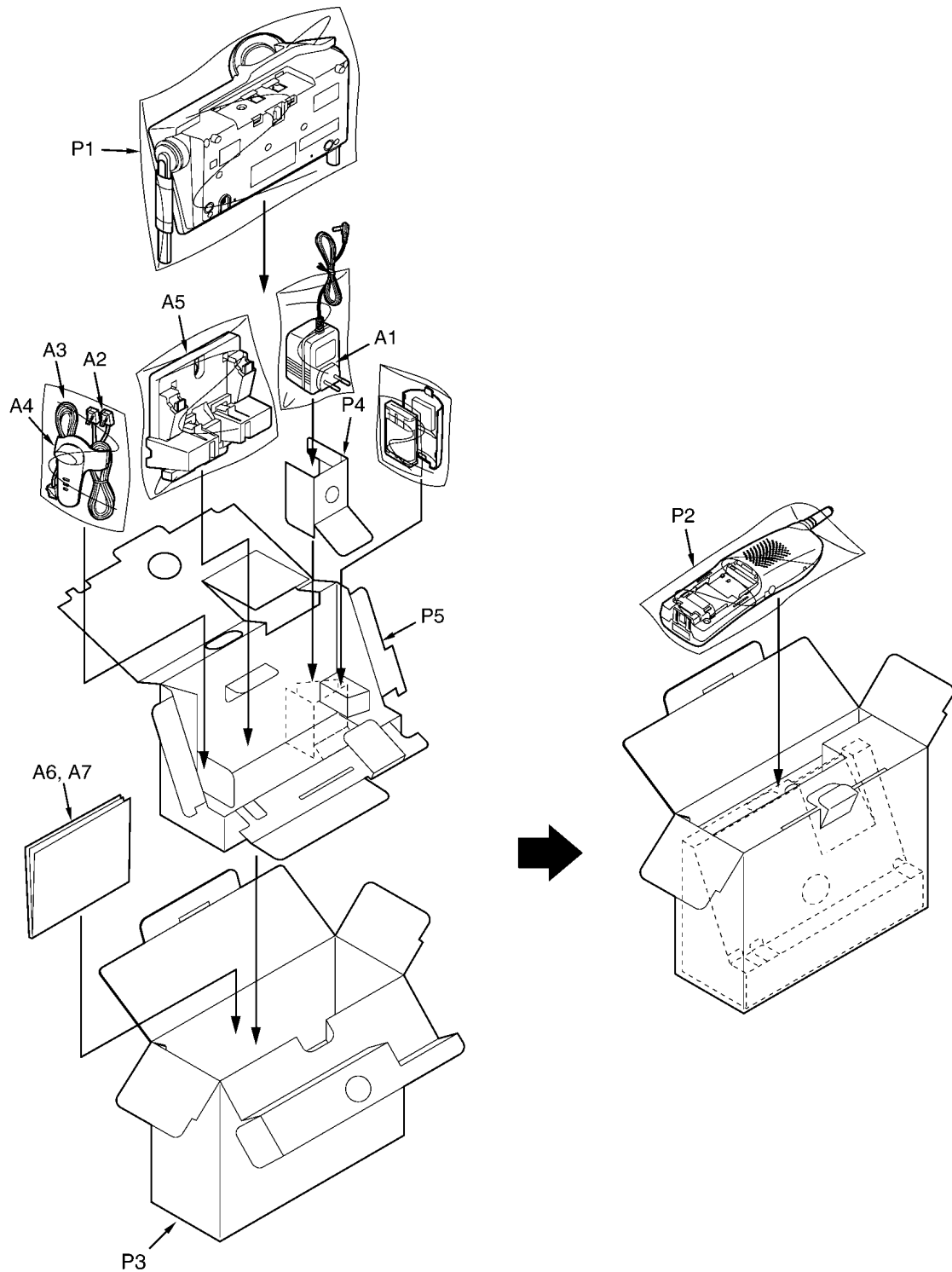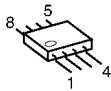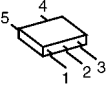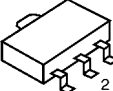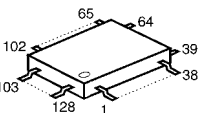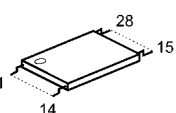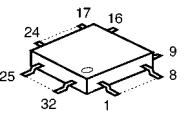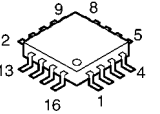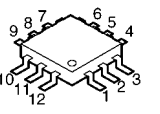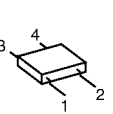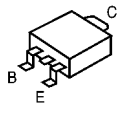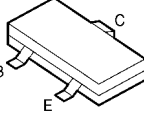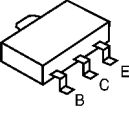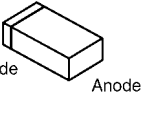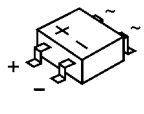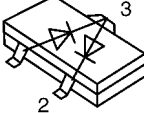
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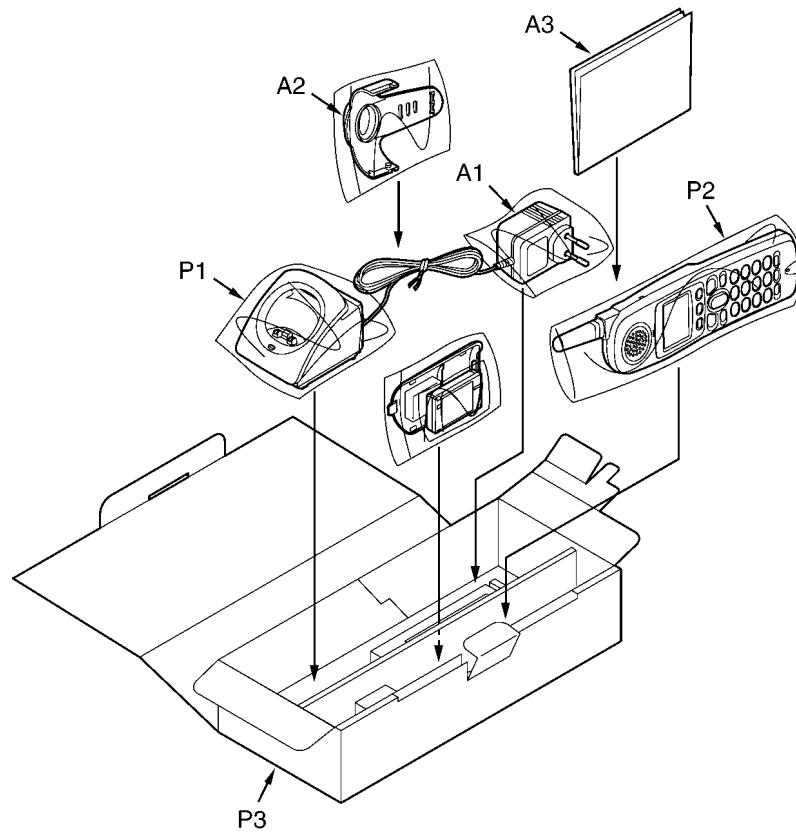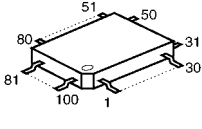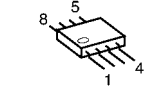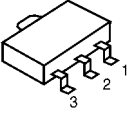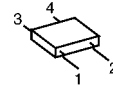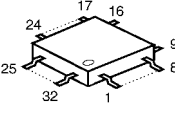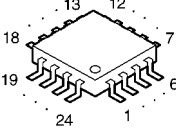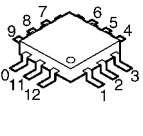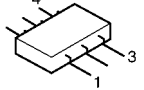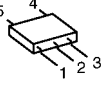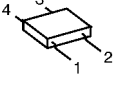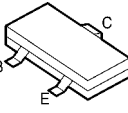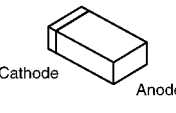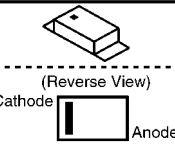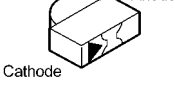
34 TERMINAL GUIDE OF THE ICs, TRANSISTORS AND DIODES
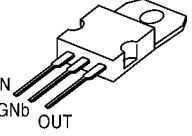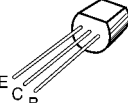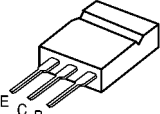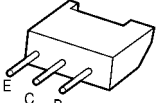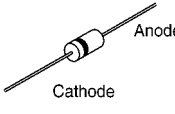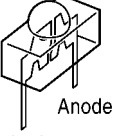
34.1. Base Unit

PQVINJM2904V PQVINJM2904F C0DBFGD00017	C0CBCCC00035 C0DBAGZ00023 C0CBAAC00083 C0CBABE00029	C0CBABD00028	C2HBBL000009	PQWIG6500BXH
C1CB00001657	C1CB00001682	C1CB00001676 C1CB00001687	B1ABAA000022	2SD1758Q
B1DHCD000016, 2SD1819A, 2SB1218A PQVTDTC143E, UN5213, 2SC39300CL PQVTDTC114TU	B1ADGP000001 2SD0874AS B1BBAP000011	B0JCME000035 B0ECKM000008	PQVDS1ZB60F1	
PQVDRLZ20A PQVDRLZ5R1A	MA153	PQVDSML210L PQVDPY1112H		

34.2. Handset

C2HBBK000025	PQWIG6500BXR	C0CBABD00019 C0CBABD00011	PQVIC61CN32N	C1CB00001657
C0CBAAC00083 C0CBABE00029	C1CB00001682	C1CB00001687	C1CB00001675	PSVTUMG11NTR
B1ABAA000022	UN521, PQVTDTC143E, 2SC39300CL, 2SD1819A, PQVTDTC123JU, 2SB1197KQ	MA111 B0ECKM000008 MA8047	B3ACB0000115	
B3ACB0000125				

34.3. Charger Unit

C0CAAHG00013	2SA933 DTC143EA	2SD2136	2SD1991A	PQVDS5688G	LNJ201LPQJA

35 REPLACEMENT PARTS LIST

Note:

1. RTL (Retention Time Limited)

   The marking (RTL) indicates that the Retention Time is limited for this item.

   After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability depends on the type of assembly and the laws governing parts and product retention.

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

2. Important safety notice

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

3. The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.

4. ISO code (Example: ABS-94HB) of the remarks column shows quality of the material and a flame resisting grade about plastics.

5. RESISTORS & CAPACITORS

   Unless otherwise specified;

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

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

   *Type & Wattage of Resistor

   Type

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

   Wattage

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

   *Type & Voltage Of Capacitor

   Type

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

   Voltage

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

35.1. Base Unit

35.1.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
1	PQGG10258Z2	GRILLE, CRADLE	ABS-HB
2	PQGG10264Z1	GRILLE, MESSAGE BUTTON	ABS-HB
3	PQGB10023Z1	BADGE, PANASONIC	PS-HB
4	PQKM10639Q2	CABINET BODY	PS-HB
5	PQSA10148X	ANTENNA (L)	
6	PQSA10149Z	ANTENNA (R)	
7	L0AA05A00050	SPEAKER	

Ref. No.	Part No.	Part Name & Description	Remarks
8	PQHR11036Z	OPTIC CONDUCTIVE PARTS, LED LENS	PS-HB
9	PQQT22734Z	LABEL, CHARGE	
10	PQKE10379Z5	CASE, CHARGE	PS-HB
11	PQKE10350Z1	HOLDER, CHARGE TEMINAL	POM-HB
12	PQJT10213Z	TERMINAL, CHARGE	
13	PQBC10411Z1	BUTTON, MESSAGE	AS-HB
14	PQHR11044Z	GUIDE, LED	ABS-HB
15	PQBC10408Z1	BUTTON, NAVI KEY	ABS-HB
16	PQSX10271Z	KEYBOARD SWITCH, TAM	
17	PQSX10272Y	KEYBOARD SWITCH, DIAL	
18	PQBC10412Z1	BUTTON, LINE	ABS-HB
19	PQJE10137Z	LEAD WIRE, FFC (13 PIN)	
20	PQJE10136Z	LEAD WIRE, FFC (20 PIN)	
21	PQMG10025Z	RUBBER PARTS, MIC COVER	
22	PQYF10586W2	CABINET COVER	PS-HB
23	PQGT17293Z	NAME PLATE	

35.1.2. Main P.C. Board Parts

Note:

(*1) When you have replaced IC501 or IC601, adjust X501.

Refer to **Check and Adjust X501 (Base Unit) Frequency** (P.80).

Ref. No.	Part No.	Part Name & Description	Remarks
PCB1	PQWP16500BXH	MAIN P.C.BOARD ASS´Y (RTL)	
		(ICs)	
IC151	PQVINJM2904F	IC	S
IC251	PQVINJM2904F	IC	S
IC291	PQVINJM2904F	IC	S
IC300	C0DBAGZ00023	IC	S
IC321	C0CBCCC00035	IC	
IC331	C0DBFGD00017	IC	
IC381	C0CBABD00028	IC	
IC501	C2HBBL000009	IC (*1)	
IC601	PQWIG6500BXH	IC (*1)	
IC701	C1CB00001657	IC	
IC761	C0CBAAC00083	IC	
IC801	C1CB00001682	IC	
IC841	C0CBABE00029	IC	
IC851	C1CB00001687	IC	
IC891	C1CB00001676	IC	
IC901	PQVINJM2904V	IC	S
		(TRANSISTORS)	
Q136	UN5213	TRANSISTOR(SI)	S
Q141	B1ADGP000001	TRANSISTOR(SI)	S
Q142	B1BBAP000011	TRANSISTER(SI)	
Q145	UN5213	TRANSISTOR(SI)	S
Q156	UN5213	TRANSISTOR(SI)	S
Q161	2SD0874AS	TRANSISTOR(SI)	
Q171	2SD1819A	TRANSISTOR(SI)	
Q236	UN5213	TRANSISTOR(SI)	S
Q241	B1ADGP000001	TRANSISTOR(SI)	S
Q245	UN5213	TRANSISTOR(SI)	S
Q256	UN5213	TRANSISTOR(SI)	S
Q261	2SD0874AS	TRANSISTOR(SI)	
Q271	2SD1819A	TRANSISTOR(SI)	
Q300	B1DHCD000016	TRANSISTOR(SI)	S
Q340	2SD1819A	TRANSISTOR(SI)	
Q361	2SB1218A	TRANSISTOR(SI)	
Q362	PQVTDTC143E	TRANSISTOR(SI)	S
Q371	2SD1758Q	TRANSISTOR(SI)	S
Q372	2SD1819A	TRANSISTOR(SI)	
Q373	PQVTDTC114TU	TRANSISTOR(SI)	
Q521	2SC39300CL	TRANSISTOR(SI)	
Q855	2SD1819A	TRANSISTOR(SI)	
Q871	B1ABAA000022	TRANSISTOR(SI)	
Q875	2SD1819A	TRANSISTOR(SI)	
Q901	2SD1819A	TRANSISTOR(SI)	
Q902	PQVTDTC114TU	TRANSISTOR(SI)	
		(DIODES)	

Ref. No.	Part No.	Part Name & Description	Remarks	Ref. No.	Part No.	Part Name & Description	Remarks
D101	PQVDS1ZB60F1	DIODE(SI)	S	R131	PQ4R10XJ106	10M	S
D142	PQVDRLZ20A	DIODE(SI)	S	R132	PQ4R10XJ106	10M	S
D201	PQVDS1ZB60F1	DIODE(SI)	S	R133	PQ4R10XJ825	8.2M	S
D242	PQVDRLZ20A	DIODE(SI)	S	R134	PQ4R10XJ825	8.2M	S
D300	B0JCME000035	DIODE(SI)		R135	ERJ3GEYJ824	820K	
D301	B0JCME000035	DIODE(SI)		R136	ERJ3GEYJ824	820K	
D361	PQVDRLZ20A	DIODE(SI)	S	R137	ERJ3GEYJ103	10K	
D362	B0ECKM000008	DIODE(SI)		R138	ERJ3GEYJ272	2.7K	
D371	PQVDRLZ20A	DIODE(SI)	S	R141	ERJ3GEYJ104	100K	
D471	PQVDRLZ5R1A	DIODE(SI)	S	R142	ERJ3GEYJ472	4.7K	
D472	PQVDRLZ5R1A	DIODE(SI)	S	R143	ERJ3GEYJ472	4.7K	
DA213	MA153	DIODE(SI)	S	R144	ERJ3GEYJ104	100K	
DA214	MA153	DIODE(SI)	S	R145	ERJ3GEYJ222	2.2K	
		(JACKS AND CONNECTORS)		R152	ERJ3GEYJ683	68K	
CN101	PQJJ1TB26Z	JACK	S	R154	ERJ3GEYJ473	47K	
CN201	PQJJ1TA15Z	JACK	S	R155	ERJ3GEYJ273	27K	
CN301	PQJJ1B4Y	JACK	S	R156	ERJ3GEYJ103	10K	
CN660	K1MN20B00109	CONNECTOR		R157	ERJ3GEYJ392	3.9K	
CN663	K1MN13B00079	CONNECTOR		R158	ERJ3GEYJ104	100K	
		(LCR FILTERS)		R161	ERJ3GEYJ152	1.5K	
FL811	J0E5797B0001	LCR FILTER		R162	ERJ3GEYJ393	39K	
FL861	J0E5797B0001	LCR FILTER		R163	ERJ12YJ680	68	
		(COILS)		R164	ERJ3GEYJ470	47	
L101	PQLQXF330K	COIL	S	R165	ERJ3GEYJ821	820	
L102	PQLQXF330K	COIL	S	R166	ERJ3GEYJ471	470	
L201	PQLQXF330K	COIL	S	R167	ERJ3GEYJ102	1K	
L202	PQLQXF330K	COIL	S	R168	ERJ3GEY0R00	0	
L300	G1C220M00037	COIL	S	R171	ERJ3GEYJ680	68	
L361	G1C6R8MA0072	COIL		R172	ERJ3GEYJ104	100K	
L371	G1C6R8MA0072	COIL		R175	ERJ3GEYJ561	560	
L501	PQLQR2KA213	COIL	S	R176	ERJ3GEYJ101	100	
L711	MQLRF18NJF2	COIL		R178	ERJ3GEYJ102	1K	
L782	PQLQR4D1R0K	COIL	S	R183	ERJ3GEYJ222	2.2K	
L822	MQLRF3N3DF2	COIL		R185	ERJ3GEYJ333	33K	
L823	MQLRF3N3DF2	COIL		R211	PQ4R10XJ473	47K	S
L824	MQLRF1N0DF	COIL		R212	ERJ2GEJ183	18K	
L825	MQLRF1N0DF	COIL		R213	ERJ3GEYJ225	2.2M	
L851	MQLRF2N2DF2	COIL		R214	ERJ3GEYJ225	2.2M	
L861	MQLRF3N3DF2	COIL		R215	ERJ3GEYJ564	560K	
L871	MQLRF6N8JF	COIL		R216	ERJ3GEYJ564	560K	
L873	MQLRF2N2DF2	COIL		R217	ERJ3GEYJ684	680K	
L899	MQLRF1N5DF2	COIL		R218	ERJ3GEYJ104	100K	
C723	MQLRF2N7DF	COIL		R219	ERJ3GEYJ103	10K	
		(THERMISTORS)		R227	ERJ2GEJ104	100K	
P101	PFRT002	THERMISTOR (POSISTOR)	S	R228	ERJ2GEJ124	120K	
P201	PFRT002	THERMISTOR (POSISTOR)	S	R231	PQ4R10XJ106	10M	S
		(PHOTO ELECTRIC TRANSDUCERS)		R232	PQ4R10XJ106	10M	S
PC111	0N3181R	PHOTO COUPLER	S	R233	PQ4R10XJ825	8.2M	S
PC141	PQVITLP627	PHOTO COUPLER		R234	PQ4R10XJ825	8.2M	S
PC211	0N3181R	PHOTO COUPLER	S	R235	ERJ3GEYJ824	820K	
PC241	PQVITLP627	PHOTO COUPLER		R236	ERJ3GEYJ824	820K	
		(COMPONENTS PARTS)		R237	ERJ3GEYJ103	10K	
RA500	D1H810440003	RESISTOR ARRAY		R238	ERJ3GEYJ272	2.7K	
RA501	D1H84724A013	RESISTOR ARRAY		R240	ERJ3GEYJ102	1K	
		(VARISTORS)		R241	ERJ3GEYJ104	100K	
SA101	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S	R242	ERJ3GEYJ103	10K	
SA102	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S	R243	ERJ3GEYJ103	10K	
SA201	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S	R245	ERJ3GEYJ332	3.3K	
SA202	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S	R252	ERJ3GEYJ683	68K	
		(I.F. TRANSFORMERS)		R254	ERJ3GEYJ473	47K	
T261	PQLT3E3A	I.F. TRANSFORMER	S	R255	ERJ3GEYJ273	27K	
T281	PQLT3E3A	I.F. TRANSFORMER	S	R256	ERJ3GEYJ103	10K	
		(RESISTORS)		R257	ERJ3GEYJ392	3.9K	
R111	PQ4R10XJ473	47K	S	R258	ERJ3GEYJ104	100K	
R112	ERJ2GEJ183	18K		R261	ERJ3GEYJ152	1.5K	
R120	ERJ2GEJ123	12K		R262	ERJ3GEYJ393	39K	
R121	ERJ3GEYJ225	2.2M		R263	ERJ12YJ680	68	
R122	ERJ3GEYJ225	2.2M		R264	ERJ3GEYJ470	47	
R123	ERJ3GEYJ274	270K		R265	ERJ3GEYJ821	820	
R124	ERJ3GEYJ274	270K		R266	ERJ3GEYJ471	470	
R127	ERJ2GEJ105X	1M		R267	ERJ3GEYJ102	1K	
R128	ERJ2GEJ105X	1M		R268	ERJ3GEY0R00	0	
R129	ERJ2GEJ103	10K		R271	ERJ3GEYJ151	150	

Ref. No.	Part No.	Part Name & Description	Remarks	Ref. No.	Part No.	Part Name & Description	Remarks
R272	ERJ3GEYJ154	150K		R812	ERJ2GE0R00	0	
R275	ERJ3GEYJ561	560		R814	ERJ2GE0R00	0	
R276	ERJ3GEYJ101	100		R832	ERJ2GEJ562X	5.6K	
R278	ERJ3GEYJ102	1K		R834	ERJ2GEJ332	3.3K	
R283	ERJ3GEYJ272	2.7K		R847	ERJ2GE0R00	0	
R285	ERJ3GEYJ682	6.8K		R851	ERJ2GEJ100	10	
R289	ERJ3GEYJ683	68K		R852	ERJ2GEJ180	18	
R290	ERJ3GEYJ473	47K		R853	ERJ2GEJ100	10	
R291	ERJ3GEYJ683	68K		R855	ERJ2GEJ152	1.5K	
R292	ERJ3GEYJ473	47K		R856	ERJ2GEJ272	2.7K	
R293	ERJ3GEYJ473	47K		R857	ERJ2GE0R00	0	
R294	ERJ3GEYJ104	100K		R858	ERJ2GEJ221	220	
R295	ERJ3GEYJ684	680K		R872	ERJ2GEJ473	47K	
R296	ERJ3GEYJ274	270K		R873	ERJ2GEJ121	120	
R297	ERJ3GEYJ103	10K		R875	ERJ2GEJ104	100K	
R298	ERJ3GEYJ473	47K		R901	ERJ2GEJ105X	1M	
R299	ERJ2GEJ333	33K		R902	ERJ2GEJ224	220K	
R300	ERJ3EKF5101	5.1K		R903	ERJ2GEJ104	100K	
R301	ERJ3GEYF393	39K	S	R904	ERJ2GEJ103	10K	
R303	ERJ3GEYJ221	220		R905	ERJ2GEJ103	10K	
R304	ERJ3GEYJ221	220		R906	ERJ2GEJ104	100K	
R308	ERJ3GEYJ121	120		R907	ERJ2GE0R00	0	
R340	ERJ3GEYJ123	12K		L866	ERJ2GE0R00	0	
R341	ERJ3GEYJ102	1K				(CAPACITORS)	
R342	ERJ3GEYJ473	47K		C101	ECUV2H681KB	680P	S
R361	ERJ3GEYJ332	3.3K		C102	ECUV2H681KB	680P	S
R364	ERJ3GEYJ103	10K		C111	F1L2E2240004	0.22	
R365	ERJ3GEYJ102	1K		C121	ECUV1H121JCV	120P	
R371	ERJ3GEYJ100	10		C122	ECUV1H121JCV	120P	
R372	ERJ3GEYJ100	10		C123	ECUV1H152KBV	0.0015	
R373	ERJ3GEYJ100	10		C124	ECUV1H152KBV	0.0015	
R374	ERJ3GEYJ101	100		C125	ECUE1H272KBQ	0.0027	
R375	ERJ3GEYJ561	560		C126	ECUE1H272KBQ	0.0027	
R421	ERJ2GEJ473	47K		C127	ECUE1H151JCQ	150P	S
R422	ERJ2GEJ102	1K		C128	ECUE1H151JCQ	150P	S
R453	ERJ2GEJ222	2.2K		C129	ECSTAJ0JA106	10	S
R454	ERJ2GEJ222	2.2K		C135	ECUV1C104KBV	0.1	
R459	ERJ2GEJ222	2.2K		C136	ECUV1C104KBV	0.1	
R460	ERJ2GEJ222	2.2K		C138	ECUV1C104KBV	0.1	
R473	ERJ2GEJ1R0	1		C142	ECUV1H103KBV	0.01	
R474	ERJ2GEJ1R0	1		C152	ECUV1H220JCV	22P	
R501	ERJ2GEJ102	1K		C161	EEE1EA100WR	10	
R506	ERJ2GEJ121	120		C162	ECUV1H101JCV	100P	
R521	ERJ2GEJ182	1.8K		C163	ECUV1H472KBV	0.0047	S
R522	ERJ2GEJ151	150		C165	ECUV1C473KBV	0.047	
R523	ERJ2GEJ393X	39K		C166	EEE1CA100SR	10	
R524	ERJ2GEJ561	560		C167	ECUV1A224KBV	0.22	
R525	ERJ2GEJ681	680		C172	ECUV1H272KBV	0.0027	
R533	ERJ2GEJ472X	4.7K		C176	ECST0JY226	22	
R670	ERJ2GE0R00	0		C178	ECUV1C473KBV	0.047	
R671	ERJ2GE0R00	0		C179	ECUV1H153KBV	0.015	
R672	ERJ2GE0R00	0		C184	ECUV1C473KBV	0.047	
R673	ERJ2GE0R00	0		C185	ECUV1H183KBV	0.018	
R674	ERJ2GE0R00	0		C201	ECUV2H681KB	680P	S
R675	ERJ2GEJ221	220		C202	ECUV2H681KB	680P	S
R676	ERJ2GEJ821	820		C211	F1L2E2240004	0.22	
R677	ERJ2GEJ681	680		C213	ECUV1H101JCV	100P	
R678	ERJ2GEJ221	220		C214	ECUV1H101JCV	100P	
R679	ERJ2GEJ681	680		C218	ECSTAJ0JA106	10	S
R680	ERJ2GEJ221	220		C227	ECUE1H471KBQ	470P	S
R681	ERJ2GEJ681	680		C228	ECUE1H152KBQ	0.0015	S
R682	ERJ2GEJ221	220		C235	ECUV1C104KBV	0.1	
R701	ERJ3GEYF103	10K		C236	ECUV1C104KBV	0.1	
R724	ERJ2GE0R00	0		C238	ECUV1C104KBV	0.1	
R732	ERJ2GEJ100	10		C242	ECUV1H103KBV	0.01	
R733	ERJ2GEJ100	10		C252	ECUV1H220JCV	22P	
R735	ERJ2GEJ4R7	4.7		C261	EEE1EA100WR	10	
R742	ERJ2GEJ331	330		C262	ECUV1H101JCV	100P	
R744	ERJ2GEJ102	1K		C263	ECUV1H472KBV	0.0047	S
R747	ERJ2GEJ102	1K		C264	EEE1CA100SR	10	
R751	ERJ2GEJ102	1K		C265	ECUV1C473KBV	0.047	
R752	ERJ2GEJ102	1K		C266	EEE1CA100SR	10	
R809	ERJ2GEJ223	22K		C267	ECUV1A224KBV	0.22	

Ref. No.	Part No.	Part Name & Description	Remarks	Ref. No.	Part No.	Part Name & Description	Remarks
C272	ECUV1H272KBV	0.0027		C678	ECUE1C103KBQ	0.01	S
C276	ECST0JY226	22		C679	ECUE1C103KBQ	0.01	S
C278	ECUV1C104KBV	0.1		C680	ECUE1C103KBQ	0.01	S
C279	ECUV1H153KBV	0.015		C681	ECUE1C103KBQ	0.01	S
C280	ECUV1C104KBV	0.1		C682	ECUE1C103KBQ	0.01	S
C284	ECUV1C473KBV	0.047		C701	ECSTAJ0JA106	10	S
C285	ECUV1C473KBV	0.047		C702	ECUE1A104KBQ	0.1	
C290	ECSTAJ0JA106	10	S	C704	ECUE1H102KBQ	0.001	S
C292	ECUV1H682KBV	0.0068	S	C705	ECUE1H100DCQ	10P	S
C296	ECUV1H681JCV	680P	S	C706	ECUE1C103KBQ	0.01	S
C297	ECUV1H682KBV	0.0068	S	C707	ECUE1H102KBQ	0.001	S
C298	ECUV1H272KBV	0.0027		C708	ECUE1H1R5CCQ	1.5P	S
C300	EEEFK1C470P	47		C711	ECUE1H010CCQ	1P	S
C303	ECUV1H103KBV	0.01		C712	ECUE1H2R0CCQ	2P	
C304	ECUV1A105KBV	1		C713	ECUE1H100DCQ	10P	S
C305	ECUV1H103KBV	0.01		C714	ECUE1H102KBQ	0.001	S
C306	F2G1E1010011	100	S	C716	ECUE1H2R0CCQ	2P	
C307	ECUV1H102KBV	0.001		C722	ECUE1H2R0CCQ	2P	
C308	ECUV1E104KBV	0.1		C725	ECUE1H050CCQ	5P	S
C322	PQCUV1A225KB	2.2		C731	ECUE1C103KBQ	0.01	S
C323	ECUV1C104KBV	0.1		C732	ECUE1H102KBQ	0.001	S
C331	ECUV1C474KBV	0.47		C733	ECUE1H102KBQ	0.001	S
C332	ECUV1C104KBV	0.1		C734	ECUE1H102KBQ	0.001	S
C341	EEE0JA331P	330		C735	ECUE1A104KBQ	0.1	
C342	ECUV1C104KBV	0.1		C737	ECUE1H102KBQ	0.001	S
C347	ECUV1C104KBV	0.1		C741	ECUE1H222KBQ	0.0022	S
C352	ECUV1C104KBV	0.1		C743	ECUE1H221JCQ	220P	
C361	ECUV1H102KBV	0.001		C745	ECUE1H101JCQ	100P	S
C365	ECUE1C103KBQ	0.01	S	C746	ECUE1H101JCQ	100P	S
C371	ECUV1C104KBV	0.1		C747	ECUE1H100DCQ	10P	S
C373	ECSTAJ0JA106	10	S	C748	ECUE1H101JCQ	100P	S
C381	ECUV1A105KBV	1		C749	ECUE1H101JCQ	100P	S
C384	ECUV0J106KB	10		C750	ECUE1H101JCQ	100P	S
C385	EEE0JA101SP	100P		C751	ECUE1H100DCQ	10P	S
C387	ECUV1A105KBV	1		C752	ECUE1H471KBQ	470P	S
C421	ECUV1C104KBV	0.1		C763	ECUV1A474KBV	0.47	
C422	ECUV1C104KBV	0.1		C764	ECUE1H2R0CCQ	2P	
C457	ECUE1C223KBQ	0.022	S	C773	ECUE1H101JCQ	100P	S
C458	ECUE1C223KBQ	0.022	S	C781	ECUE1A104KBQ	0.1	
C459	ECUE1C153KBQ	0.015	S	C782	ECUE1H121JCQ	120P	
C475	ECST0JY226	22		C801	ECUE1H030CCQ	3P	S
C501	ECUV1C104KBV	0.1		C802	ECJ0EC1H220J	22P	
C502	ECUV1C104KBV	0.1		C803	ECUE1C103KBQ	0.01	S
C503	ECUV1C104KBV	0.1		C804	ECUE1H150JCQ	15P	S
C504	ECUV1C104KBV	0.1		C806	ECUE1H100DCQ	10P	S
C508	ECUE1H2R0CCQ	2P		C809	ECUE1H102KBQ	0.001	S
C509	ECUE1H2R0CCQ	2P		C811	ECUE1H2R0CCQ	2P	
C513	ECUV1C104KBV	0.1		C821	ECUE1H100DCQ	10P	S
C514	F1J0J1060006	10		C823	ECUE1H010CCQ	1P	S
C515	ECUV1A105KBV	1		C827	ECUE1H050CCQ	5P	S
C516	ECSTAJ0JA106	10	S	C832	ECUE1H221JCQ	220P	
C517	ECUV1C104KBV	0.1		C834	ECUE1C103KBQ	0.01	S
C518	ECST0JY226	22		C835	ECUE1H471KBQ	470P	S
C521	ECUE1H030CCQ	3P	S	C836	ECUV1A105KBV	1	
C522	ECUE1A104KBQ	0.1		C837	ECUE1H101JCQ	100P	S
C524	ECUE1A104KBQ	0.1		C842	ECUV1A105KBV	1	
C525	ECUE1A104KBQ	0.1		C843	ECUV1A474KBV	0.47	
C551	ECUE1C103KBQ	0.01	S	C844	ECUE1H2R0CCQ	2P	
C601	ECUE1A104KBQ	0.1		C851	ECUE1H101JCQ	100P	S
C660	ECUV1C104KBV	0.1		C852	ECUE1H101JCQ	100P	S
C663	ECUE1H331KBQ	330P		C853	ECUE1H101JCQ	100P	S
C664	ECUE1H331KBQ	330P		C854	ECUE1H102KBQ	0.001	S
C665	ECUE1H331KBQ	330P		C856	ECUE1C103KBQ	0.01	S
C666	ECUE1H331KBQ	330P		C857	ECUE1H0R5CCQ	0.5P	S
C667	ECUE1H331KBQ	330P		C862	ECUE1H101JCQ	100P	S
C668	ECUE1H331KBQ	330P		C863	ECUE1C103KBQ	0.01	S
C669	ECUE1H331KBQ	330P		C865	ECUE1H010CCQ	1P	S
C670	ECUE1H331KBQ	330P		C867	ECUE1H100DCQ	10P	S
C671	ECUE1H331KBQ	330P		C871	ECUE1H010CCQ	1P	S
C672	ECUE1H331KBQ	330P		C872	ECUE1H010CCQ	1P	S
C675	ECUE1C103KBQ	0.01	S	C873	ECUE1H010CCQ	1P	S
C676	ECUE1C103KBQ	0.01	S	C874	ECUE1H010CCQ	1P	S
C677	ECUE1C103KBQ	0.01	S	C876	ECUE1H100DCQ	10P	S

Ref. No.	Part No.	Part Name & Description	Remarks
C890	ECUE1H101JCQ	100P	S
C891	ECUE1H100DCQ	10P	S
C893	ECUE1H100DCQ	10P	S
C895	ECUE1H101JCQ	100P	S
C896	ECUE1H100DCQ	10P	S
C898	ECUE1H100DCQ	10P	S
C901	ECUE1C103KBQ	0.01	S
C902	ECUV1A224KBV	0.22	
C904	ECUE1A104KBQ	0.1	
L715	ECUE1H050CCQ	5P	S
		(OTHERS)	
MIC	L0CBAB000052	MICROPHONE	
E1	PQMC10486Z	MAGNETIC SHIELD, FRAME	
E2	PQMC10485Z	MAGNETIC SHIELD, COVER	
X501	H0J138500003	CRYSTAL OSCILLATOR	

35.1.3. Operational P.C. Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB2	PQWP2TG6502H	OPERATIONAL P.C.BOARD ASS´Y (RTL)	
		(DIODES)	
LED901	PQVDSML210L	LED	S
LED902	PQVDPY1112H	LED	S
LED903	PQVDSML210L	LED	S
LED904	PQVDSML210L	LED	S
LED905	PQVDSML210L	LED	S
LED907	PQVDSML210L	LED	S
LED908	PQVDSML210L	LED	S
LED909	PQVDPY1112H	LED	S
		(CONNECTORS)	
CN960	K1MN20B00109	CONNECTOR	
CN963	K1MN13B00079	CONNECTOR	
		(OTHERS)	
E3	PQGP10256Z1	PANEL, LCD	AS-HB
E4	L5ACBCB00001	LIQUID CRYSTAL DISPLAY	
E5	PQHS10327Z	TAPE, LCD	
E6	PQHR11022Z	GUIDE, LCD	ABS-HB

35.2. Handset

35.2.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
101	PQGG10262Z1	GRILLE, LCD	ABS-HB
102	PQGP10257Z1	PANEL, LCD	PC-HB
103	PQHS10628Z	TAPE, DOUBLE SIDED (GRILLE)	
104	PQKE10373Z1	SPACER, SPEAKER RING	AS-HB
105	PQHS10623Z	TAPE, DOUBLE SIDED	
106	PQKM10642U8	CABINET BODY	ABS-HB
107	PQGT17294Z	NAME PLATE	
108	PQSA10150W	ANTENNA	
109	PQHS10592Z	SPACER, SPEAKER SHEET	
110	L0AD02A00020	SPEAKER	
111	PQHS10634Z	SPACER, SPEAKER SHEET	
112	PQHR10984Z	GUIDE, SPEAKER	ABS-HB
113	PQHS10629Z	SPACER, LCD CUSHION	
114	L5DCBDC00011	LIQUID CRYSTAL DISPLAY	
115	PQHX11249Z	COVER, LCD COVER SHEET	
116	PQHR11038Z	TRANSPARENT PLATE, LCD PLATE	PMMA-HB
117	PQHR11040Z	GUIDE, LCD	ABS-HB
118	PQBC10410Z1	BUTTON, VOLUME KEY	AS-HB
119	PQBX10376Y1	BUTTON, 12 KEY	PMMA-HB
120	PQSX10268X	KEYBOARD SWITCH	
121	PQWE10032Z	BATTERY TERMINAL	
122	PQJT10214Z	TERMINAL, CHARGE (L)	
123	PQJT10215Z	TERMINAL, CHARGE (R)	
124	PQHR10778Z	GUIDE, SPEAKER	ABS-HB
125	PQHG10689Z	SPACER, SP RUBBER SHEET	
126	L0AD02A00010	SPEAKER	
127	PQHS10622Z	SPACER, SPEAKER NET	

Ref. No.	Part No.	Part Name & Description	Remarks
128	PQKE10378X4	COVER, EARPHONE	
129	PQKF10624Z5	CABINET COVER	ABS-HB
130	PQHX11248X	PLASTIC PARTS, BATTERY COVER SHEET	
131	HHR-P104	BATTERY	
132	PQHE10151Z	CUSHION, BATTERY	
133	PQKK10142Z5	LID, BATTERY COVER	ABS-HB

35.2.2. Main P.C.Board Parts

Note:

(*2) When you have replaced IC201 or IC202, adjust X201.

Refer to **Check and Adjust X201 (Handset) Frequency** (P.80) and **Adjust Battery Low Detector Voltage (Handset)** (P.80).

Ref. No.	Part No.	Part Name & Description	Remarks
PCB100	PQWP6500BXR	MAIN P.C.BOARD ASS´Y (RTL)	
		(ICs)	
IC201	C2HBBK000025	IC (*2)	
IC202	PQWIG6500BXR	IC (*2)	
IC203	C0CBABD00019	IC	
IC204	C0CBABD00011	IC	
IC205	PQVIC61CN32N	IC	S
IC701	C1CB00001657	IC	
IC761	C0CBAAC00083	IC	
IC801	C1CB00001682	IC	
IC841	C0CBABE00029	IC	
IC851	C1CB00001687	IC	
IC881	C1CB00001675	IC	
		(TRANSISTORS)	
Q201	PSVTUMG11NTR	TRANSISTOR(SI)	S
Q204	2SC39300CL	TRANSISTOR(SI)	
Q205	2SD1819A	TRANSISTOR(SI)	
Q206	PQVTDTC143E	TRANSISTOR(SI)	S
Q207	UN521	TRANSISTOR(SI)	S
Q208	2SD1819A	TRANSISTOR(SI)	
Q209	PQVTDTC143E	TRANSISTOR(SI)	S
Q210	2SD1819A	TRANSISTOR(SI)	
Q212	2SB1197KQ	TRANSISTOR(SI)	S
Q213	PQVTDTC123JU	TRANSISTOR(SI)	S
Q855	2SD1819A	TRANSISTOR(SI)	
Q871	B1ABAA000022	TRANSISTOR(SI)	
Q875	2SD1819A	TRANSISTOR(SI)	
		(DIODES)	
D203	MA111	DIODE(SI)	S
D214	B0ECKM000008	DIODE(SI)	
D215	MA8047	DIODE(SI)	S
D216	MA8047	DIODE(SI)	S
D217	MA8047	DIODE(SI)	S
D218	MA8047	DIODE(SI)	S
D219	MA8047	DIODE(SI)	S
D220	MA8047	DIODE(SI)	S
LED201	B3ACB0000115	LED	
LED202	B3ACB0000115	LED	
LED203	B3ACB0000115	LED	
LED204	B3ACB0000115	LED	
LED205	B3ACB0000115	LED	
LED206	B3ACB0000115	LED	
LED207	B3ACB0000115	LED	
LED208	B3ACB0000125	LED	
		(CONNECTOR & JACK)	
CN201	K1MN22B00098	CONNECTOR	
CN203	K2HD103D0001	JACK	
		(LCR FILTERS)	
FL811	J0E5797B0001	LCR FILTER	
FL861	J0E5797B0001	LCR FILTER	
		(COILS)	
L204	PQLQR2KB113T	COIL	S
L205	PQLQR2KB113T	COIL	S
L206	PQLQR2KB113T	COIL	S

Ref. No.	Part No.	Part Name & Description	Remarks		Ref. No.	Part No.	Part Name & Description	Remarks
L207	G1C6R8MA0072	COIL			R851	ERJ2GEJ100	10	
L208	G1CR47J00005	COIL			R852	ERJ2GEJ180	18	
L209	G1CR47J00005	COIL			R853	ERJ2GEJ100	10	
L210	G1CR47J00005	COIL			R855	ERJ2GEJ182	1.8K	
L711	MQLRF18NJF2	COIL			R856	ERJ2GEJ272	2.7K	
L782	PQLQR4D1R0K	COIL	S		R857	ERJ2GE0R00	0	
L822	MQLRF3N3DF2	COIL			R858	ERJ2GEJ221	220	
L823	MQLRF3N3DF2	COIL			R872	ERJ2GEJ473	47K	
L824	MQLRF1N0DF	COIL			R873	ERJ2GEJ560X	56	
L825	MQLRF1N0DF	COIL			R875	ERJ2GEJ104	100K	
L851	MQLRF2N2DF2	COIL			L866	ERJ2GE0R00	0	
L861	MQLRF3N3DF2	COIL			L882	ERJ2GE0R00	0	
L871	MQLRF6N8JF	COIL					(CAPACITORS)	
L873	MQLRF2N2DF2	COIL			C201	ECUE1C183KBQ	0.018	
C723	MQLRF2N7DF	COIL			C202	ECUE1C183KBQ	0.018	
		(COMPONENTS PARTS)			C203	ECUE1A104KBQ	0.1	
RA201	EXRV8V472JV	RESISTOR ARRAY			C206	ECUV1C474KBV	0.47	
RA204	D1H42222A006	RESISTOR ARRAY			C207	ECUV1A474KBV	0.47	
RA207	D1H83314A013	RESISTOR ARRAY			C208	ECUV1A474KBV	0.47	
		(RESISTORS)			C209	ECUV1A474KBV	0.47	
R201	ERJ2GEJ152	1.5K			C210	ECUV1A474KBV	0.47	
R202	ERJ2GEJ152	1.5K			C211	ECUV1A105KBV	1	
R203	ERJ2GEJ152	1.5K			C212	ECUV1A105KBV	1	
R204	ERJ2GEJ152	1.5K			C213	EEE0GA331WP	330	
R206	ERJ2GEJ222	2.2K			C214	ECUE1A104KBQ	0.1	
R207	ERJ2GEJ222	2.2K			C215	PQCUV1C105KB	1	S
R208	ERJ2GEJ101	100			C216	ECST0JY226	22	
R220	ERJ2GEJ274	270K			C217	F1G0J1050007	1	S
R222	ERJ2GEJ102	1K			C218	PQCUV1C105KB	1	S
R223	ERJ2GEJ102	1K			C220	EEE0JA101SP	100P	
R224	ERJ2GEJ103	10K			C221	ECUE1A104KBQ	0.1	
R226	ERJ2GEJ180	18			C222	ECUE1A104KBQ	0.1	
R227	ERJ2GEJ180	18			C224	ECUE1A104KBQ	0.1	
R228	ERJ2GEJ224	220K			C225	ECST0JY226	22	
R230	ERJ2GEJ102	1K			C226	ECUE1H101JCQ	100P	S
R232	ERJ2GEJ103	10K			C228	ECUE1A104KBQ	0.1	
R234	ERJ2GEJ225	2.2M			C231	ECUE1C103KBQ	0.01	S
R235	ERJ2GEJ225	2.2M			C234	ECUE1A104KBQ	0.1	
R236	ERJ2GEJ223	22K			C236	ECUE1H040CCQ	4P	S
R241	ERJ2GEJ183	18K			C237	ECUE1H040CCQ	4P	S
R242	ERJ2GEJ223	22K			C239	ECUE1C103KBQ	0.01	S
R245	ERJ2GEJ103	10K			C240	ECUE1A104KBQ	0.1	
R247	ERJ2GEJ391	390			C242	ECUE1A104KBQ	0.1	
R248	ERJ2GEJ223	22K			C251	ECUE1H121JCQ	120P	
R249	ERJ2GEJ222	2.2K			C252	ECUE1H121JCQ	120P	
R260	ERJ2GEJ104	100K			C253	ECUE1H121JCQ	120P	
R263	ERJ2GEJ473	47K			C254	ECUE1H121JCQ	120P	
R264	ERJ2GEJ473	47K			C260	ECUE1C103KBQ	0.01	S
R266	ERJ2GEJ102	1K			C261	ECUE1C103KBQ	0.01	S
R268	ERJ3GEYJ102	1K			C262	ECUE1C103KBQ	0.01	S
R269	ERJ3GEYJ102	1K			C263	ECUE1C103KBQ	0.01	S
R270	ERJ3GEYJ102	1K			C264	ECUE1C103KBQ	0.01	S
R276	ERJ2GEJ561	560			C267	ECST0JY226	22	
R277	ERJ2GEJ104	100K			C268	ECST0JY225	2.2	
R279	ERJ2GEJ104	100K			C273	ECUV1H103KBV	0.01	
R284	ERJ2GEJ182	1.8K			C275	ECUE1C153KBQ	0.015	S
R285	ERJ2GEJ151	150			C280	ECUE1A104KBQ	0.1	
R286	ERJ2GEJ393X	39K			C291	ECUE1A104KBQ	0.1	
R701	ERJ3GEYF103	10K			C294	ECUE1A104KBQ	0.1	
R724	ERJ2GE0R00	0			C296	ECUE1A104KBQ	0.1	
R732	ERJ2GEJ100	10			C298	ECUE1A104KBQ	0.1	
R733	ERJ2GEJ100	10			C303	F1J0J1060006	10	
R735	ERJ2GEJ4R7	4.7			C306	ECUE1H471KBQ	470P	S
R742	ERJ2GEJ331	330			C308	F1G0J1050007	0.1	S
R744	ERJ2GEJ102	1K			C309	ECUE1A104KBQ	0.1	
R747	ERJ2GEJ102	1K			C311	ECUE1H030CCQ	3P	S
R751	ERJ2GEJ102	1K			C312	ECUE1A104KBQ	0.1	
R752	ERJ2GEJ102	1K			C701	ECSTAJ0JA106	10	S
R809	ERJ2GEJ223	22K			C702	ECUE1A104KBQ	0.1	
R812	ERJ2GE0R00	0			C704	ECUE1H102KBQ	0.001	S
R814	ERJ2GE0R00	0			C705	ECUE1H100DCQ	10P	S
R832	ERJ2GEJ562X	5.6K			C706	ECUE1C103KBQ	0.01	S
R834	ERJ2GEJ332	3.3K			C707	ECUE1H102KBQ	0.001	S

Ref. No.	Part No.	Part Name & Description	Remarks
C708	ECUE1H1R5CCQ	1.5P	S
C711	ECUE1H010CCQ	1P	S
C712	ECUE1H2R0CCQ	2P	
C713	ECUE1H100DCQ	10P	S
C714	ECUE1H102KBQ	0.001	S
C716	ECUE1H2R0CCQ	2P	
C722	ECUE1H2R0CCQ	2P	
C725	ECUE1H050CCQ	5P	S
C731	ECUE1C103KBQ	0.01	S
C732	ECUE1H102KBQ	0.001	S
C733	ECUE1H102KBQ	0.001	S
C734	ECUE1H102KBQ	0.001	S
C735	ECUE1A104KBQ	0.1	
C737	ECUE1H102KBQ	0.001	S
C741	ECUE1H222KBQ	0.0022	S
C743	ECUE1H221JCQ	220P	
C745	ECUE1H101JCQ	100P	S
C746	ECUE1H101JCQ	100P	S
C747	ECUE1H100DCQ	10P	S
C748	ECUE1H101JCQ	100P	S
C749	ECUE1H101JCQ	100P	S
C750	ECUE1H101JCQ	100P	S
C751	ECUE1H100DCQ	10P	S
C752	ECUE1H471KBQ	470P	S
C763	ECUV1A474KBV	0.47	
C764	ECUE1H2R0CCQ	2P	
C773	ECUE1H101JCQ	100P	S
C781	ECUE1A104KBQ	0.1	
C782	ECUE1H121JCQ	120P	
C801	ECUE1H030CCQ	3P	S
C802	ECJ0EC1H220J	22P	
C803	ECUE1C103KBQ	0.01	S
C804	ECUE1H150JCQ	15P	S
C806	ECUE1H100DCQ	10P	S
C809	ECUE1H102KBQ	0.001	S
C811	ECUE1H2R0CCQ	2P	
C821	ECUE1H100DCQ	10P	S
C823	ECUE1H010CCQ	1P	S
C827	ECUE1H050CCQ	5P	S
C832	ECUE1H221JCQ	220P	
C834	ECUE1C103KBQ	0.01	S
C835	ECUE1H471KBQ	470P	S
C836	ECUV1A105KBV	1	
C837	ECUE1H101JCQ	100P	S
C842	ECUV1A105KBV	1	
C843	ECUV1A474KBV	0.47	
C844	ECUE1H2R0CCQ	2P	
C851	ECUE1H101JCQ	100P	S
C852	ECUE1H101JCQ	100P	S
C853	ECUE1H101JCQ	100P	S
C854	ECUE1H102KBQ	0.001	S
C856	ECUE1C103KBQ	0.01	S
C857	ECUE1H0R5CCQ	0.5P	S
C862	ECUE1H101JCQ	100P	S
C863	ECUE1C103KBQ	0.01	S
C865	ECUE1H010CCQ	1P	S
C867	ECUE1H100DCQ	10P	S
C871	ECUE1H010CCQ	1P	S
C872	ECUE1H010CCQ	1P	S
C873	ECUE1H010CCQ	1P	S
C874	ECUE1H010CCQ	1P	S
C876	ECUE1H100DCQ	10P	S
C881	ECUE1H050CCQ	5P	S
L715	ECUE1H050CCQ	5P	S
		(OTHERS)	
MIC	L0CBAB000052	MICROPHONE	
E101	PQMC10486Z	MAGNETIC SHIELD, FRAME	
E102	PQMC10485Z	MAGNETIC SHIELD, COVER	
X201	H0J138500003	CRYSTAL OSCILLATOR	

35.3. Charger Unit

35.3.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
200	PQLV30024XB	CHARGER UNIT	
200-1	PQGG10263Y4	GRILLE	ABS-HB
200-2	PQKM10643Z2	CABINET BODY	PS-HB
200-3	PQQT22615Z	LABEL, CHARGE	
200-4	PQHR11041Z	OPTIC CONDUCTIVE PARTS, LED LENS	PS-HB
200-5	PQHR10917Z	GUIDE, CHARGE TERMINAL	PS-HB
200-6	PQKE10338Z1	HOLDER, CHARGE TEMINAL CASE	POM-HB
200-7	PQJT10192Z	TERMINAL, CHARGE	
200-8	PQYF10589Z2	CABINET COVER	PS-HB
200-9	PQGT17295Z	NAME PLATE	

35.3.2. Main P.C.Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB200	PQWPTGA520MH	MAIN P.C.BOARD ASS´Y (RTL)	
		(IC)	
IC1	C0CAAHG00013	IC	
		(TRANSISTORS)	
Q1	2SA933	TRANSISTOR(SI)	S
Q2	2SD2136	TRANSISTOR(SI)	
Q3	2SD1991A	TRANSISTOR(SI)	
Q4	2SA933	TRANSISTOR(SI)	S
Q5	DTC143EA	TRANSISTOR(SI)	S
		(DIODES)	
D2	PQVDS5688G	DIODE(SI)	S
R11	PQVDS5688G	DIODE(SI)	S
LED1	LNJ201LPQJA	LED	
		(COILS)	
L1	PQLQXF4R7K	COIL	
L2	PQLQXF4R7K	COIL	
		(JACK)	
CN1	PQJJ1B4Y	JACK	S
		(RESISTORS)	
R1	ERDS2TJ222	2.2K	
R2	ERDS2TJ223	22K	
R3	ERDS2TJ101	100	
R4	ERDS2TJ6R8	6.8	
R5	ERDS2TJ103	10K	
R6	ERDS2TJ821	820	
R7	ERDS2TJ000	0	
R8	ERDS2TJ182	1.8K	
R9	ERDS2TJ6R8	6.8	
R10	ERDS2TJ000	0	
		(CAPACITORS)	
C1	ECEA1HKS010	1	
C2	ECEA1HKS010	1	

35.4. Accessories and Packing Materials

35.4.1. KX-TG6500BXB

Ref. No.	Part No.	Part Name & Description	Remarks
A1	PQLV1BXZ	AC ADAPTOR	⚠
A2	PQJA10075Z	CORD, TELEPHONE (6FT/2WIRE)	
A3	PQJA10088Z	CORD, TELEPHONE (6FT/4WIRE)	
A4	PQKE10377Z5	HANGER, BELT CLIP	PC+ABS-HB
A5	PQKL10063Z3	STAND, WALL MOUNT	ABS-HB
A6	PQQX14347Z	INSTRUCTION BOOK	
A7	PQQW13500Z	QUICK GUIDE (for Arabic)	
P1	PQPP170Y	PROTECTION COVER (for Base Unit)	
P2	XZB10X35A02	PROTECTION COVER (for Handset)	

Ref. No.	Part No.	Part Name & Description	Remarks
P3	PQPK14525Z	GIFT BOX	
P4	PQPD10619Z	CUSHION	
P5	PQPN11714Z	ACCESSORY BOX	

35.4.2. KX-TGA650BXB (Optional Set)

Ref. No.	Part No.	Part Name & Description	Remarks
A1	KX-TCA1BX	AC ADAPTOR	⚠
A2	PQKE10377Z5	HANGER, BELT CLIP	PC+ABS-HB
A3	PQQX14348Z	INSTRUCTION BOOK	
P1	XZB15X25A04	PROTECTION COVER (for Charger Unit)	
P2	XZB10X35A02	PROTECTION COVER (for Handset)	
P3	PQPK14526Z	GIFT BOX	

35.5. Memo

36 FOR SCHEMATIC DIAGRAM

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

36.1.1. Microphone Input Level (Base Unit)

Adjust the signal level to -40dBm(11mVp-p) with no load.

Then input the signal to MIP and MIN of the base unit through PQLT3E3A-M.
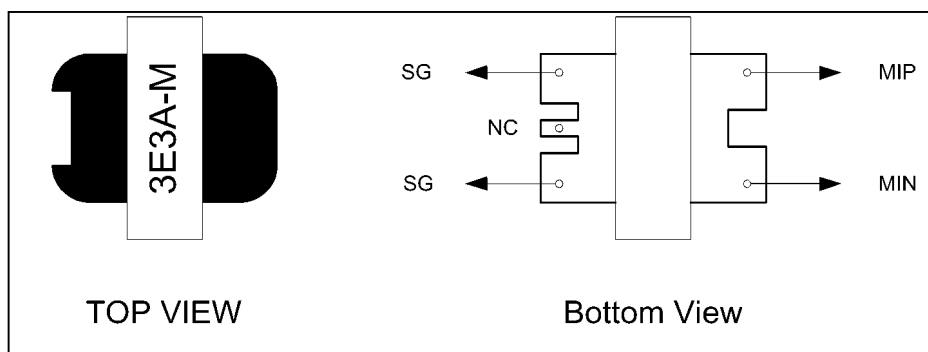
36.1.2. Acoustic Testing Mode

Press "1", "6" and "flash" simultaneously, and insert the plug of AC adaptor.

*No beep sound

It is difficult to measure the transmit level without acoustic testing mode.

36.2. 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 and circuit board may be modified at any time with the development of new technology.

36.2.1. Microphone Input Level (Handset)

Handset Mode

Adjust the signal level to -40dBm with 600 ohm load.

Then input the signal to MICP and MICN of the handset through the 47uF capacitors.

Headset Mode

Adjust the signal level to -45dBm with 600 ohm load.

Then input the signal to MICP and MICN of the handset through the 47uF capacitor.

36.3. Charger Unit (SCHEMATIC DIAGRAM (CHARGER UNIT))

Notes:

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

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

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

36.4. Level Relationship

	Line Input Level	Output Level	Remarks
Base SP RX	-25 dBm	-9 dBm	8 ohm terminal, volume max
Handset RX	-25 dBm	-10 dBm	150 ohm terminal, volume max
Handset SP RX	-33 dBm	-1.5 dBm	8 ohm terminal, volume max
Headset RX	-25 dBm	-20.5dBm	150 ohm terminal, volume max

	Line Input Level	Output Level	Remarks
Base SP TX	-40 dBm	-15.5 dBm	Refer to **Microphone Input Level (Base Unit)**.
Handset TX	-40 dBm	-15.5 dBm	Refer to **Microphone Input Level (Handset)**.
Headset TX	-45 dBm	-15.5 dBm	Refer to **Microphone Input Level (Handset)**.

Cross Reference:

Microphone Input Level (Base Unit) (P.140)

Microphone Input Level (Handset) (P.140)

37 SCHEMATIC DIAGRAM (BASE UNIT_MAIN)

NC: No Components

NC: No Components

KX-TG6500BXB SCHEMATIC DIAGRAM (Base Unit_Main)
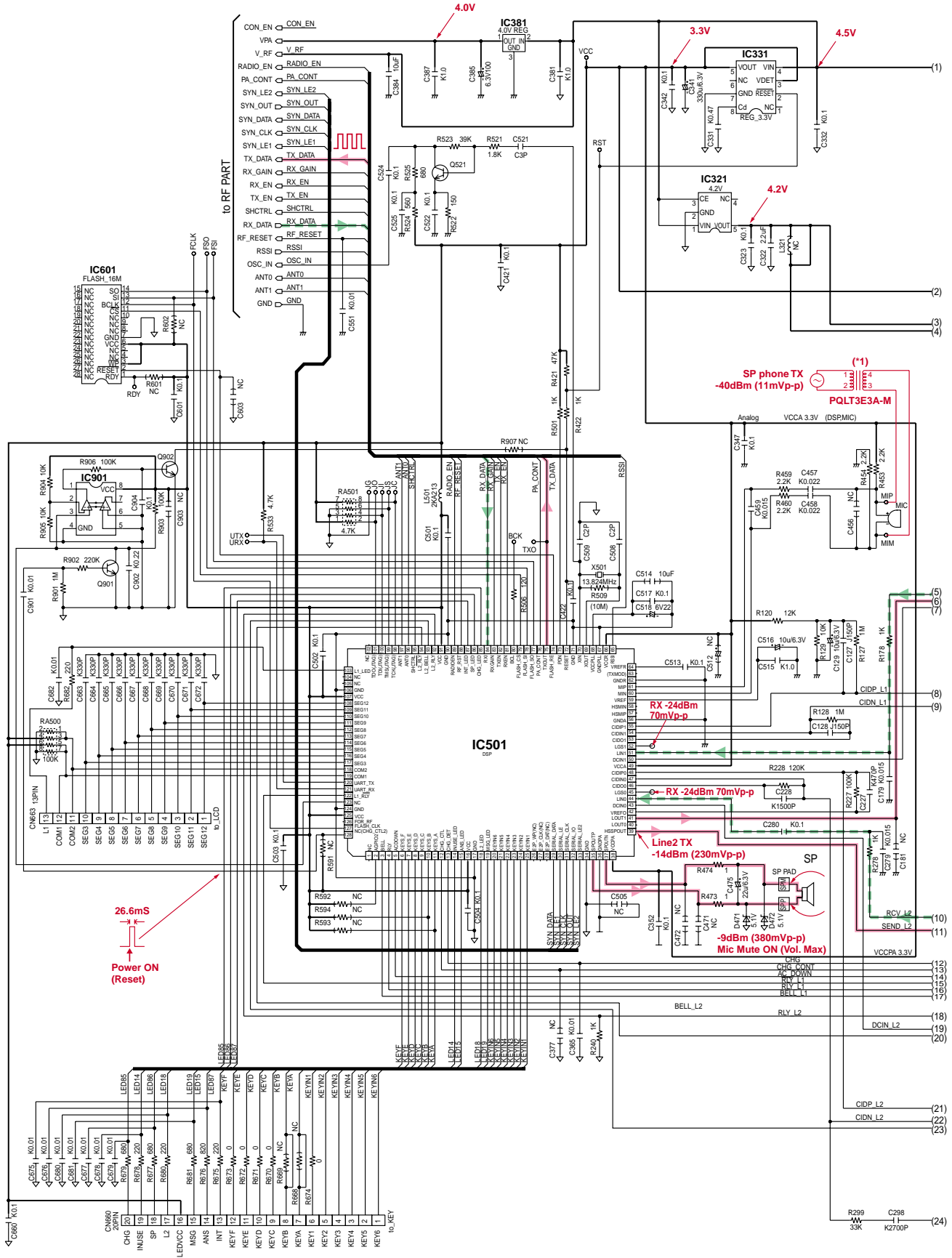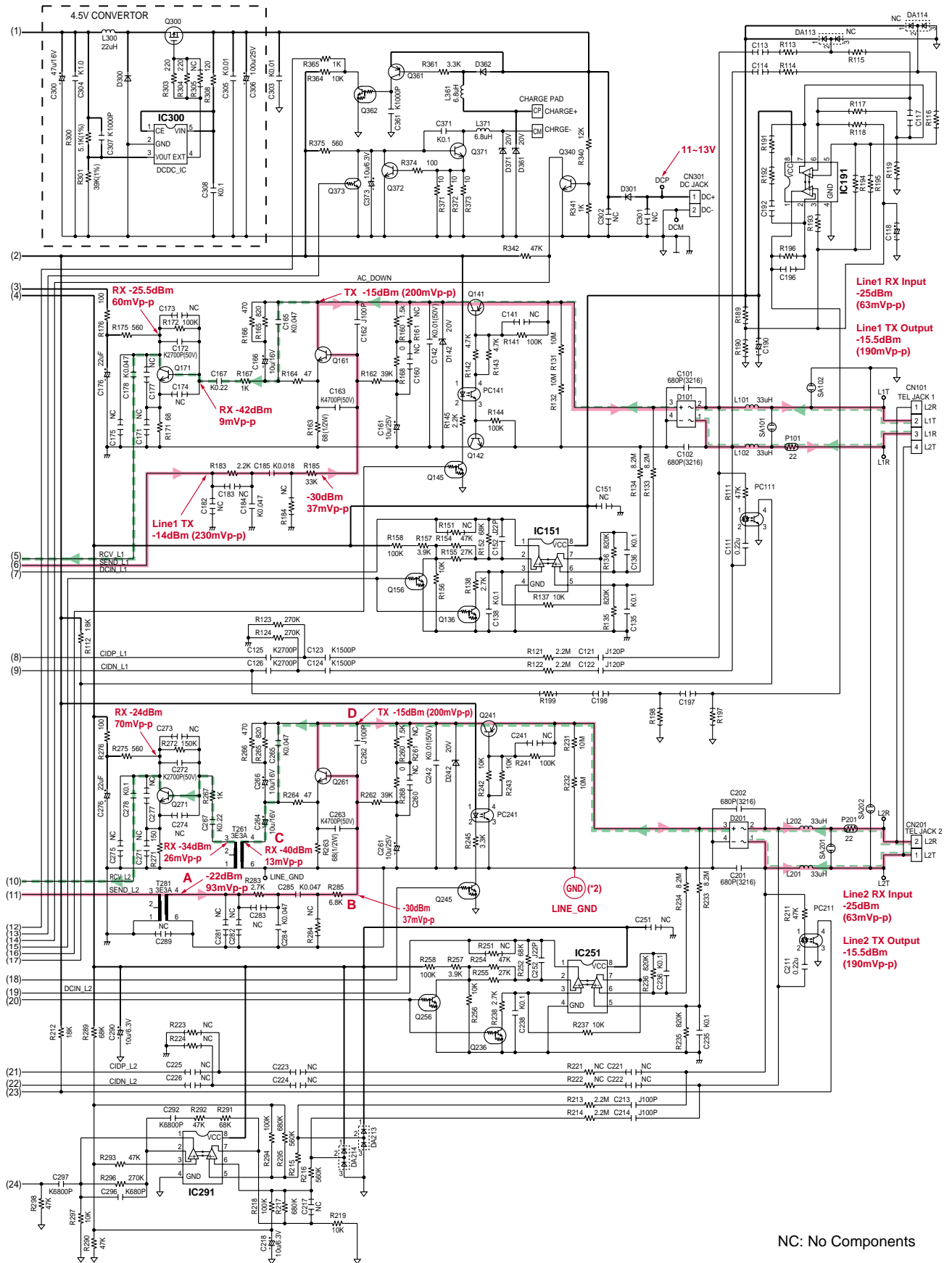
Note:

(*1) Refer to **Microphone Input Level (Base Unit)** (P.140).

(*2) Use the point LINE_GND as ground, when you measure the signal level at A, B, C and D points.

38 SCHEMATIC DIAGRAM (BASE UNIT_RF PART)

NC: No Components

SHIELD

(1)

L860 NC
C860 NC
C858 NC   C859 NC

V_RF(VPA)

(2)

PA_CONT

CON_EN

RF-Reg.
IC841

R845 NC

IF-Reg.
IC761

R765 NC

4.0V

R847 0

RADIO_EN

C846 NC
NC CE 3
VSS 2
VOUT VIN 1
3.0V Reg

Vcc_TX

C766 NC
NC CE 3
VSS 2
VOUT VIN 1
2.5V_REG

L768 NC

V_RF

C841 NC
C842 K1uF(1608)
C843 K0.47(1608)
C844 C2P
C845 NC

C761 NC
C762 NC(1608)
C763 K0.47(1608)
C764 C2P
C765 NC

C768 NC
C769 NC

(3)
(4)
(5)
(6)
(7)

2.4GHz IF

GND

R837 NC
J100P
C837

SYN_LE2

2.5V

SYN_OUT

C751 D10P
C752 K470P
R753 NC

R754 NC

R750 NC
R749 NC
R748 NC

SYN_DATA
SYN_LE1
SYN_CLK

R751 1K
R752 1K

J100P J100P J100P
C748 C749 C750

(8)

C714 K1000P
C713 D10P

C707 K1000P
C708 C1.5P

R747 1K

TX_DATA

C1P

C711 L711 18nH

32 31 30 29 28 27 26 25

C735 K0.1
R735 4.7
C736 NC
C737 K1000P

C747 D10P

2.4GHz TX

C716 C2P L715 C5P
C717 NC
C712 C2P

VCC_PA SYN_OUT SYN_DATA SYN_EN SYN_CLK TXMOD PA_RAMP RXGAIN

R746 NC

RX_EN

(9)

1 TX
2 GND_TX
3 GND_RX
4 RX
5 VCC_RF
6 VCC_IF2
7 TESTP
8 TESTN

VCC_PLL2A 24
VCC_PLL2B 23
RXEN 22
TXEN 21
VCC_PLL1B 20
VCC_PLL1A 19
VCC_DIG 18
TC_CTRL 17

R745 NC
J100P J100P
C745 C746

TX_EN

(10)

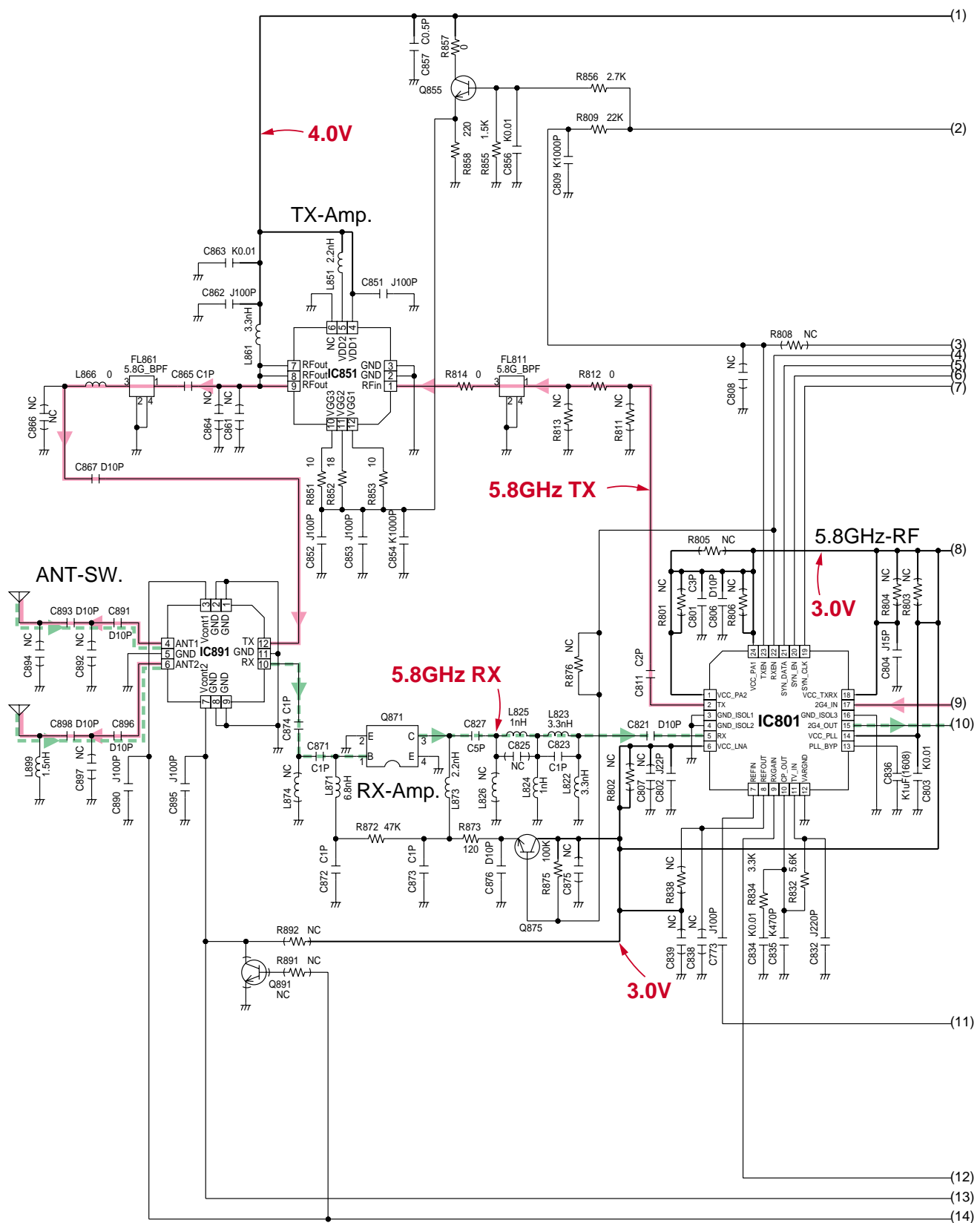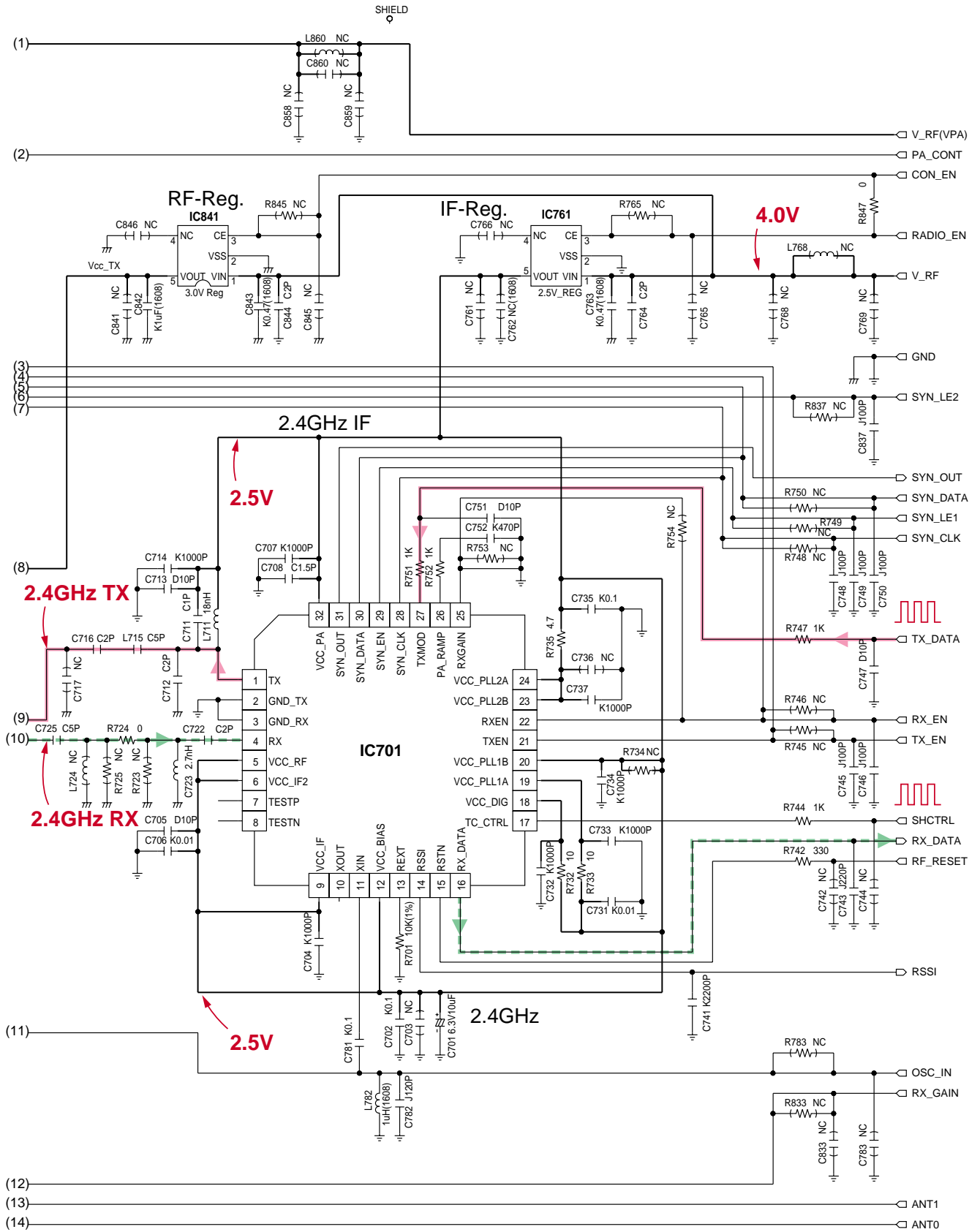C725 C5P R724 0   C722 C2P
L724 NC R725 NC R723 NC
C723 2.7nH

IC701

R734 NC
C734 K1000P

R744 1K

SHCTRL

2.4GHz RX

C705 D10P
C706 K0.01

C733 K1000P

RX_DATA

R742 330

RF_RESET

VCC_IF XOUT XIN VCC_BIAS REXT RSSI RSTN RX_DATA

9 10 11 12 13 14 15 16

C732 K1000P
R732 10
R733 10
C731 K0.01

C742 NC
C743 J220P
C744 NC

C704 K1000P

R701 10K(1%)

RSSI

C741 K2200P

(11)

2.5V

2.4GHz

C781 K0.1
C702 K0.1
C703 NC
C701 6.3V/10uF

R783 NC

OSC_IN

R833 NC

RX_GAIN

L782 1uH(1608)
C782 J120P

C833 NC
C783 NC

(12)
(13)
(14)

ANT1
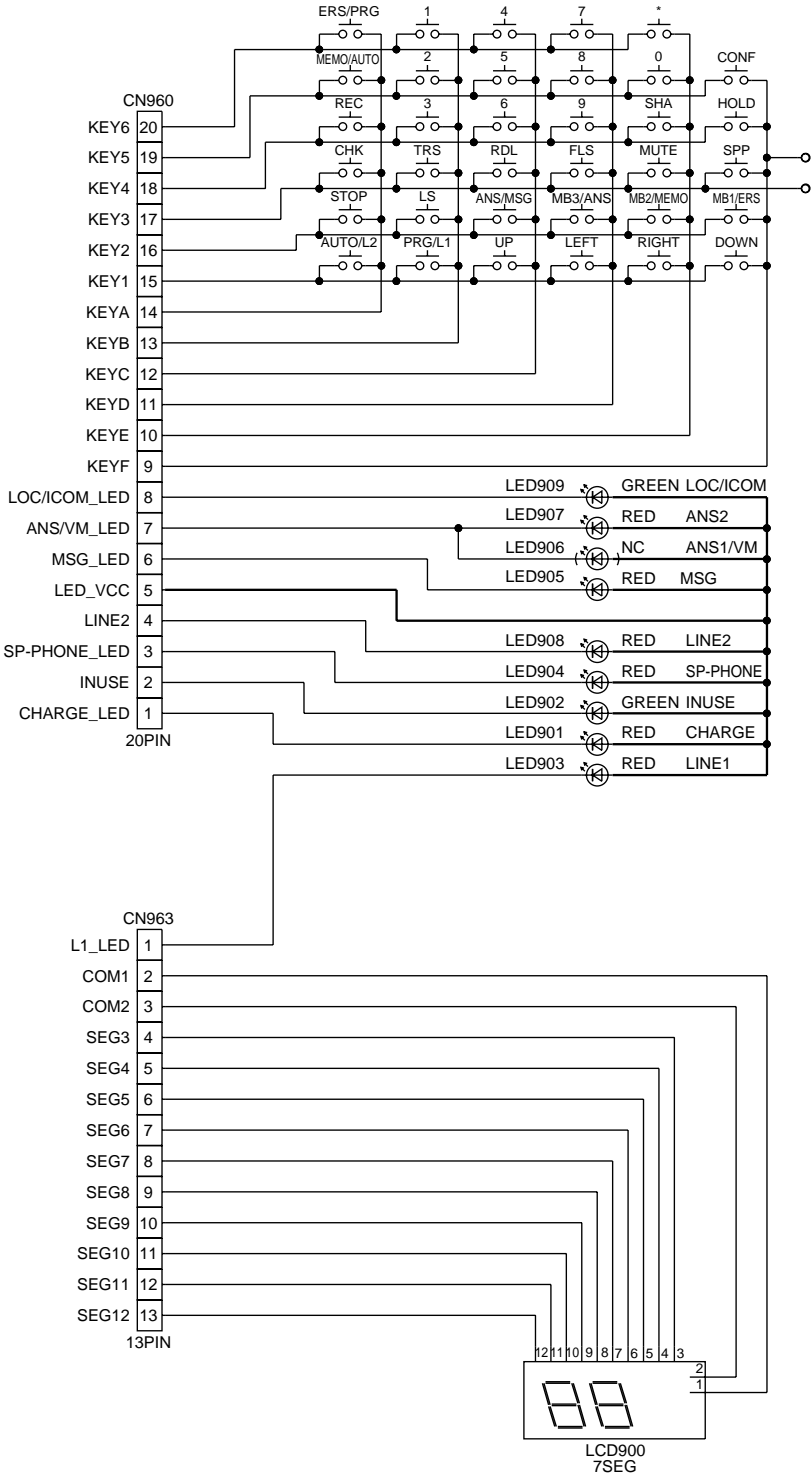ANT0

NC: No Components

KX-TG6500BXB SCHEMATIC DIAGRAM (Base Unit_RF Part)

39 SCHEMATIC DIAGRAM (BASE UNIT_OPERATION)

NC: No Components

KX-TG6500BXB SCHEMATIC DIAGRAM (Base Unit_Operation)

Memo

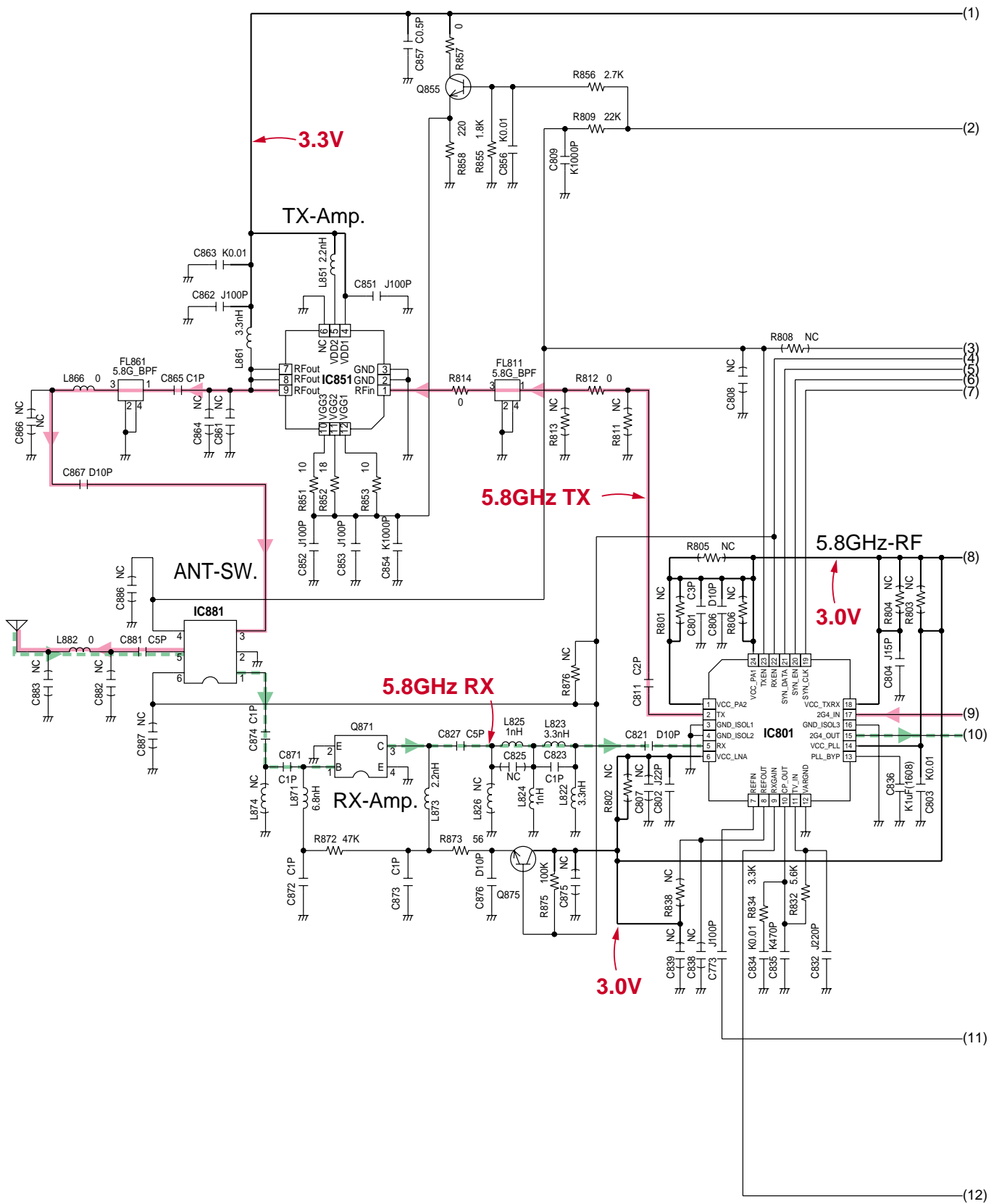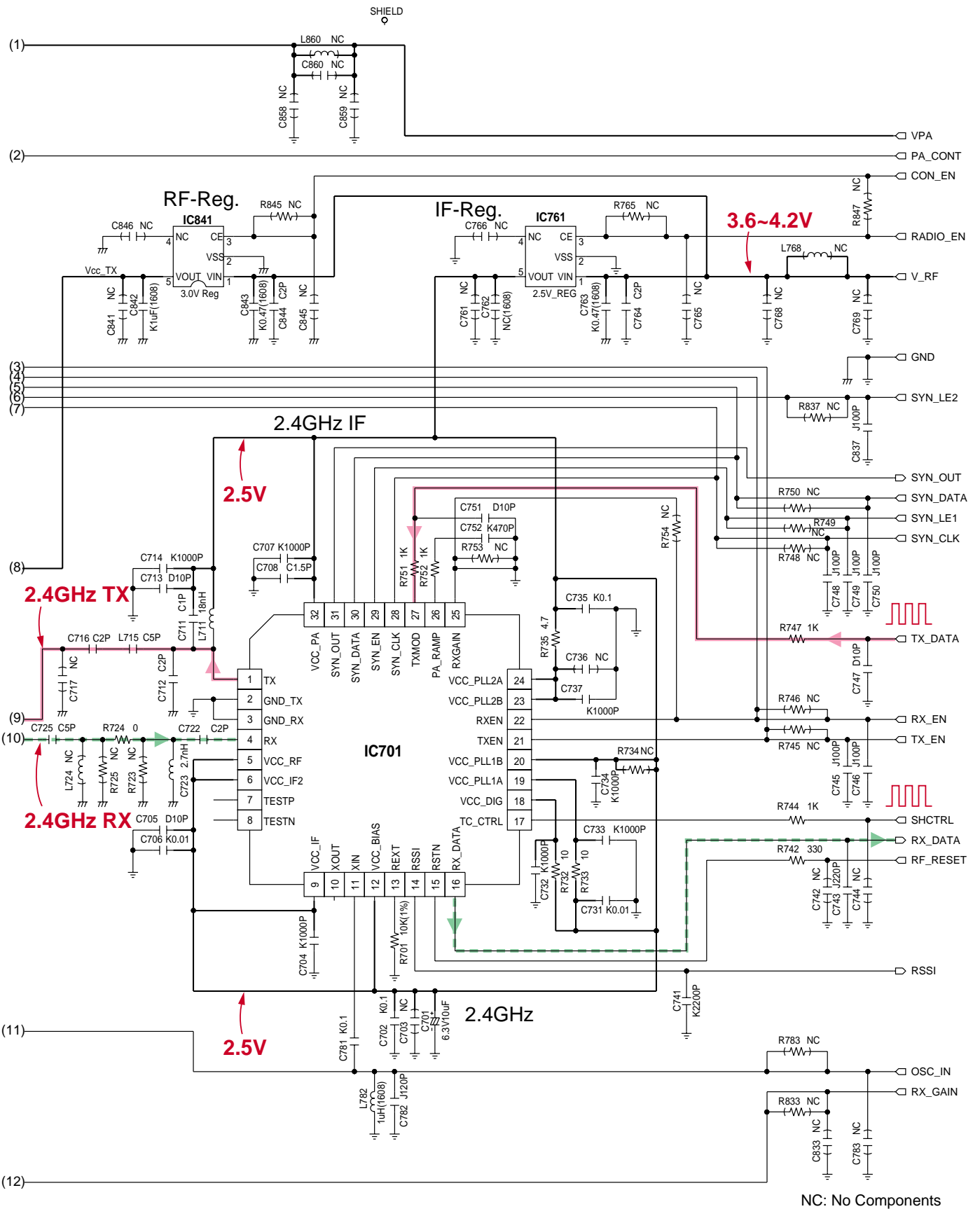# 40 SCHEMATIC DIAGRAM (HANDSET_MAIN)

NC: No Components

KX-TGA650BXB SCHEMATIC DIAGRAM (Handset_Main)

NC: No Components

Note:

(*1) Refer to **Microphone Input Level (Handset)** (P.140).

41 SCHEMATIC DIAGRAM (HANDSET_RF PART)

NC: No Components

SHIELD

(1)

L860 NC

C860 NC

C858 NC   C859 NC

VPA

(2)   PA_CONT

CON_EN

RF-Reg.   R845 NC   IF-Reg.   R765 NC   **3.6~4.2V**   R847 NC

RADIO_EN

C846 NC   IC841   C766 NC   IC761

4 NC   CE 3   4 NC   CE 3

VSS 2   VSS 2

Vcc_TX   5 VOUT VIN 1   5 VOUT VIN 1   L768 NC   V_RF

3.0V Reg   2.5V_REG

C841 NC   C842   K1uF(1608)   C843 K0.47(1608)   C844 C2P   C845 NC   C761 NC   C762   NC(1608)   C763 K0.47(1608)   C764 C2P   C765 NC   C768 NC   C769 NC

(3)   GND

(4)

(5)   SYN_LE2

(6)   R837 NC   J100P

(7)

C837

2.4GHz IF   SYN_OUT

R750 NC   SYN_DATA

2.5V   C751 D10P   R749   SYN_LE1

C752 K470P   NC   SYN_CLK

R753 NC   R754 NC

(8)   R751 1K   R752 1K   R748 NC   J100P J100P J100P

C714   K1000P   C707 K1000P   C748 C749 C750

2.4GHz TX   C713 D10P   C708 C1.5P   C735 K0.1   R747 1K   TX_DATA

C711 C1P   32 31 30 29 28 27 26 25   R735 4.7   C747 D10P

L711 18nH   C736 NC

C716 C2P   L715 C5P   VCC_PA SYN_OUT SYN_DATA SYN_EN SYN_CLK TXMOD PA_RAMP RXGAIN   C737   R746 NC   RX_EN

C717 NC   C712 C2P   VCC_PLL2A 24   K1000P   R745 NC   TX_EN

(9)   1 TX   VCC_PLL2B 23

C725 C5P   R724 0   C722 C2P   2 GND_TX   RXEN 22   J100P J100P

(10)   RX   3 GND_RX   TXEN 21   R734 NC   C745 C746

L724 NC   R725 NC   R723 NC   C723 2.7nH   4 RX   VCC_PLL1B 20   C734 K1000P   R744 1K   SHCTRL

5 VCC_RF   VCC_PLL1A 19

2.4GHz RX   C705 D10P   IC701   6 VCC_IF2   VCC_DIG 18   RX_DATA

C706 K0.01   7 TESTP   TC_CTRL 17   C733 K1000P   R742 330   RF_RESET

8 TESTN   C732 K1000P   R732 10   R733 10   C742 NC   C743 J220P   C744 NC

9 10 11 12 13 14 15 16   C731 K0.01

VCC_IF XOUT XIN VCC_BIAS REXT RSSI RSTN RX_DATA   RSSI

C704 K1000P   C741 K2200P

R701 10K(1%)

(11)   OSC_IN

2.5V   C781 K0.1   C702 K0.1   C703 NC   C701 6.3V10uF   **2.4GHz**   R783 NC

R833 NC   RX_GAIN
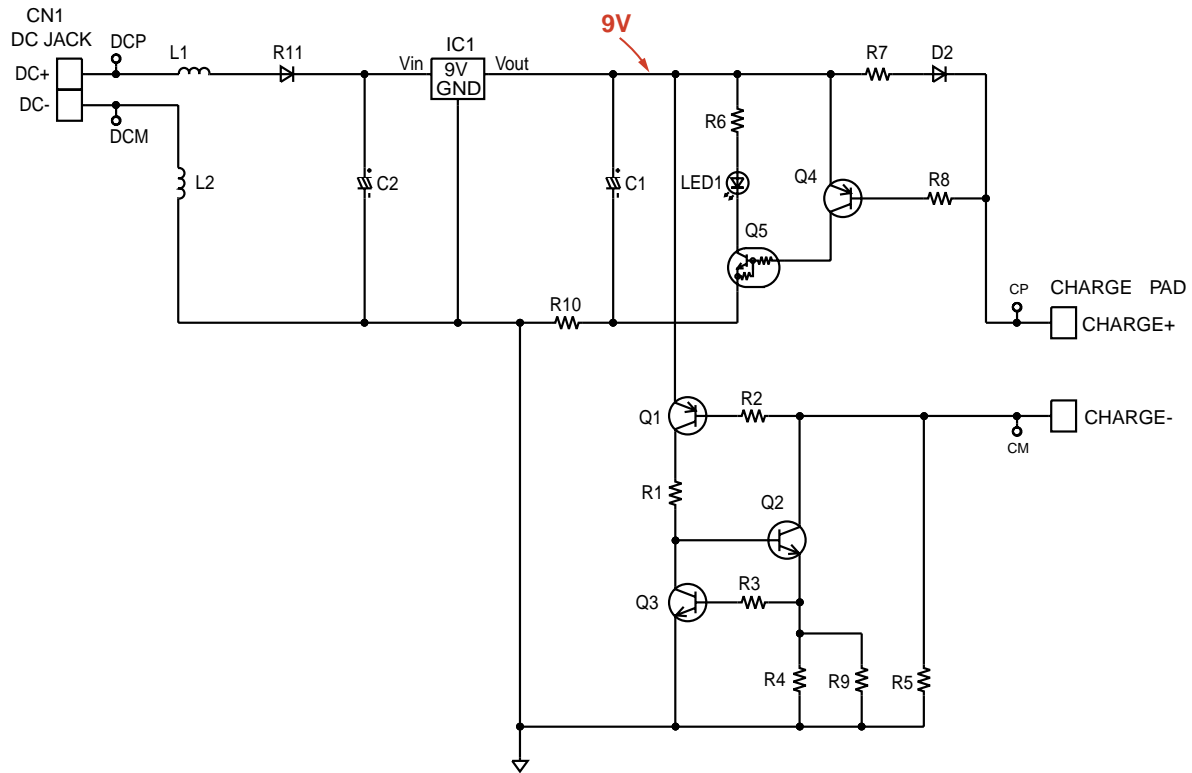
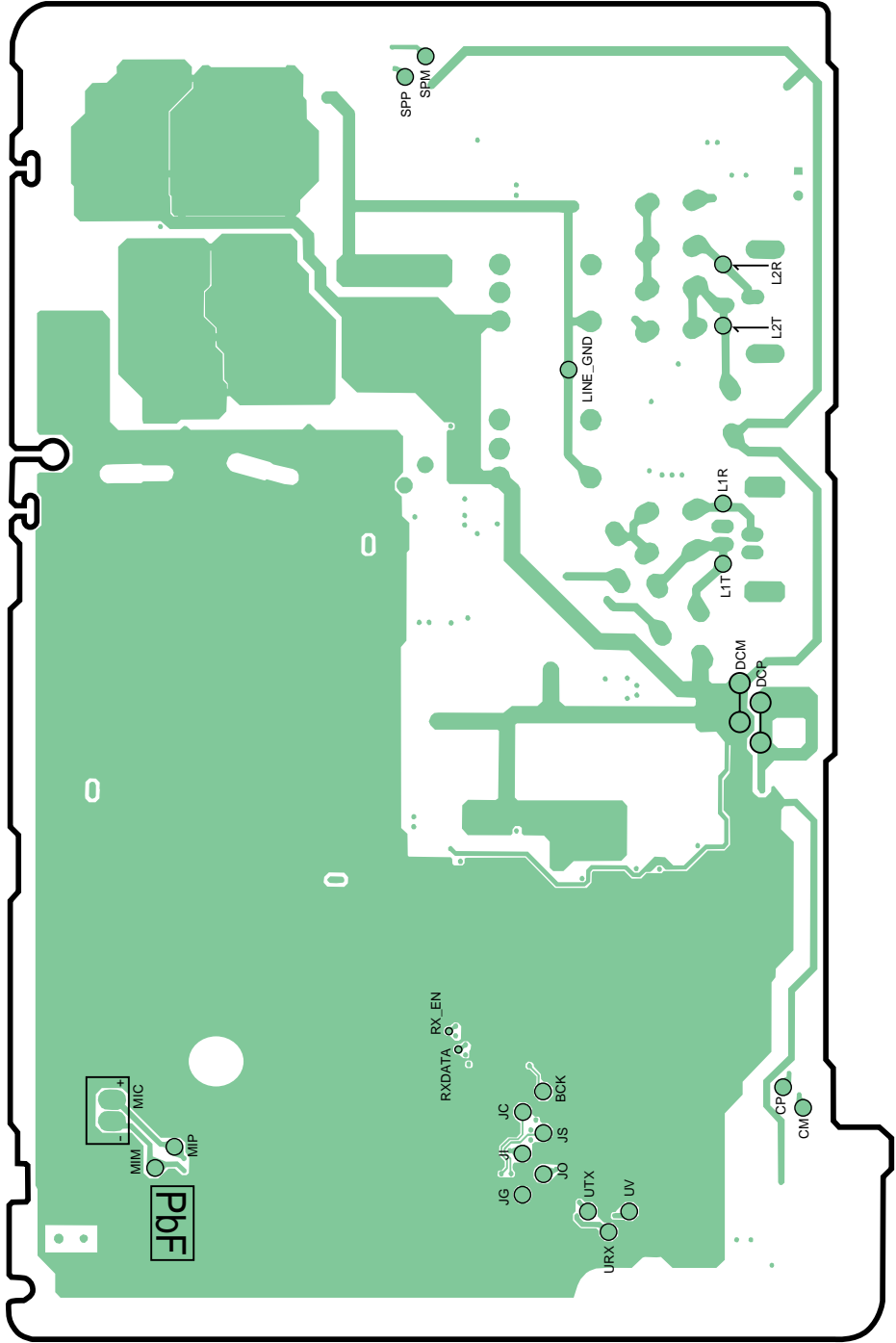L782 1uH(1608)   C782 J120P   C833 NC   C783 NC

(12)

NC: No Components

KX-TGA650BXB SCHEMATIC DIAGRAM (Handset_RF Part)

42 SCHEMATIC DIAGRAM (CHARGER UNIT)

SCHEMATIC DIAGRAM (Charger Unit)

43 CIRCUIT BOARD (BASE UNIT_MAIN)

43.1. Component View

KX-TG6500BXB CIRCUIT BOARD (Base Unit_Main ((Component View))
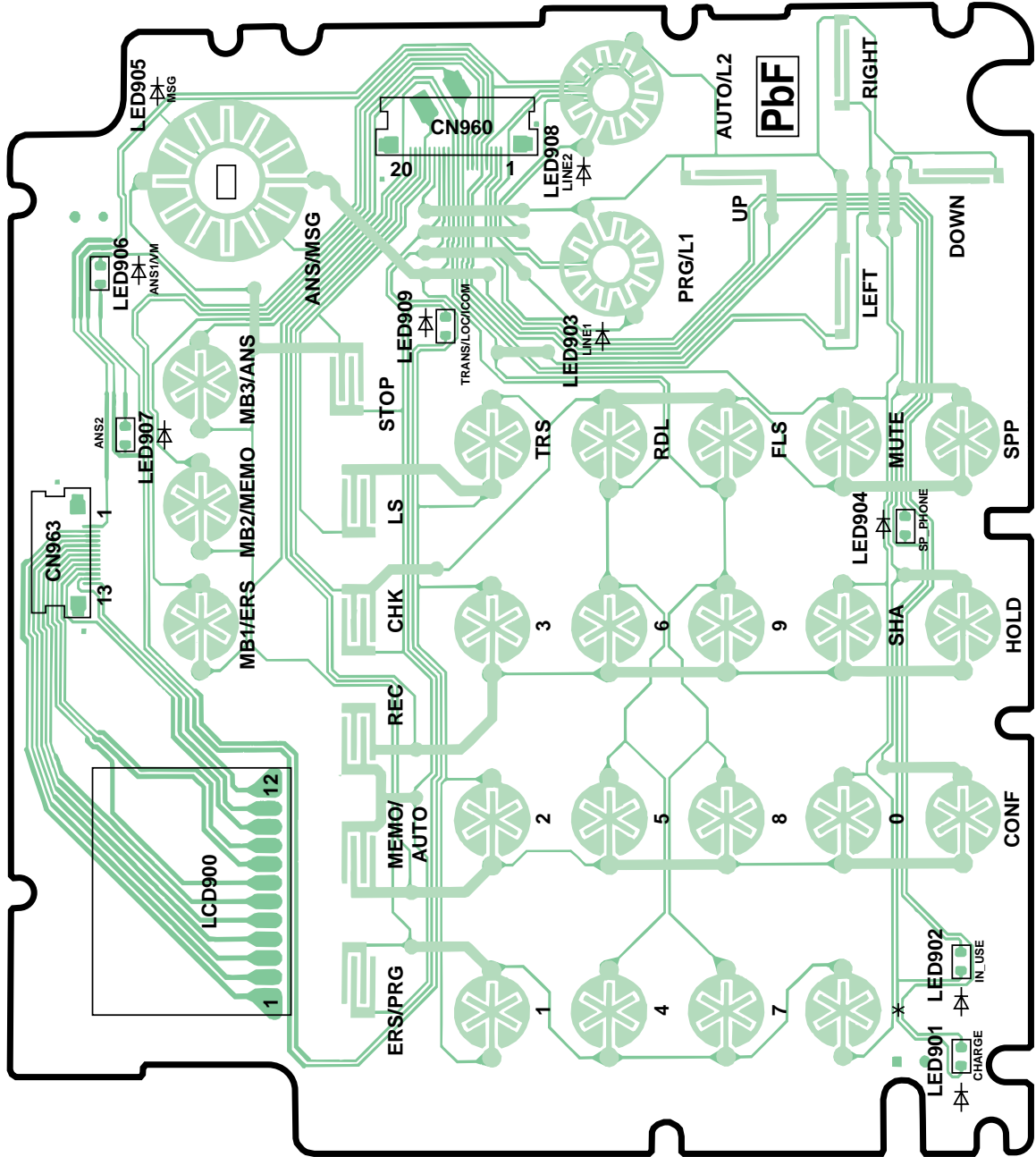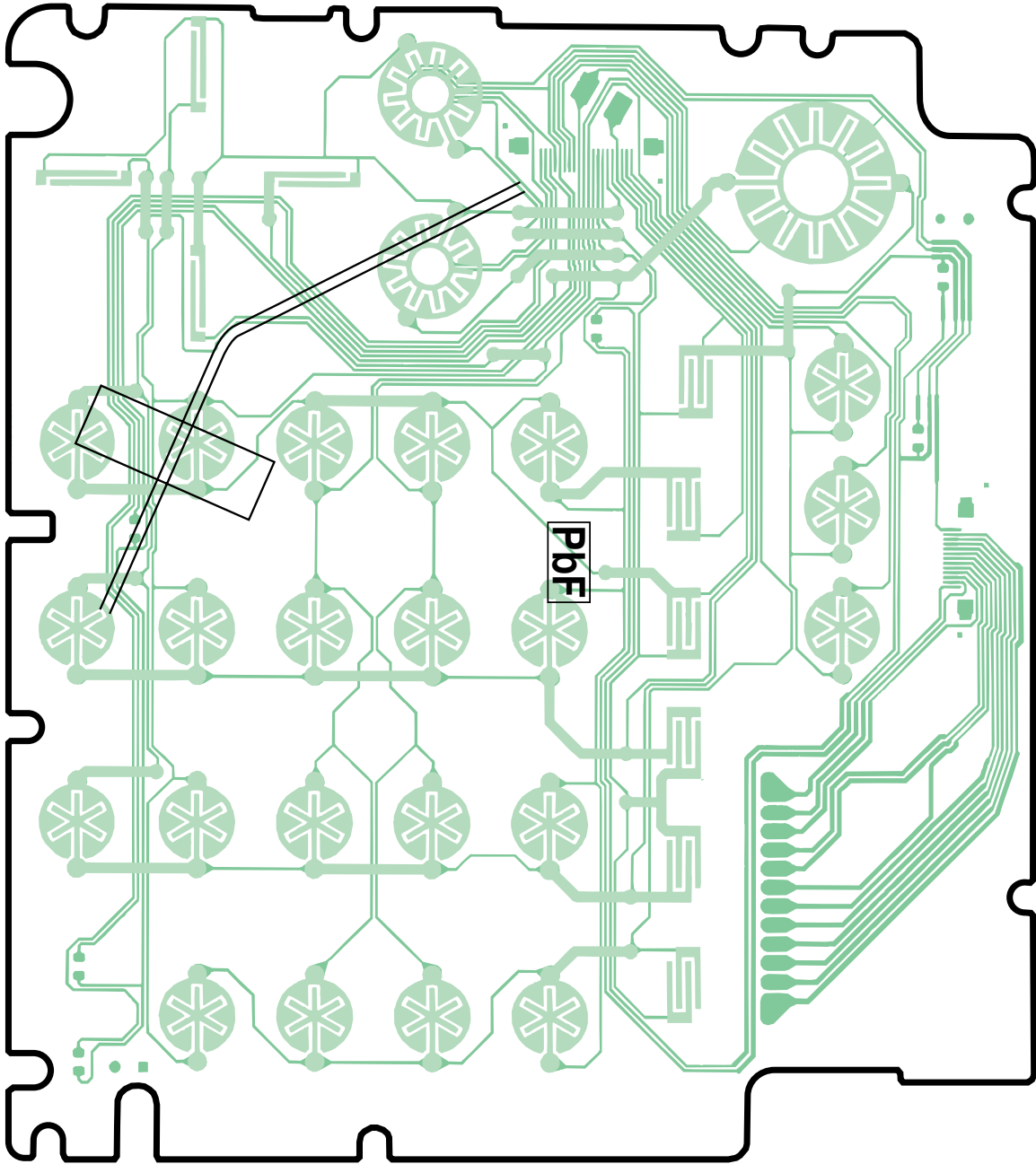
43.2. Flow Solder Side View

KX-TG6500BXB CIRCUIT BOARD (Base Unit_Main ((Flow Solder Side View))

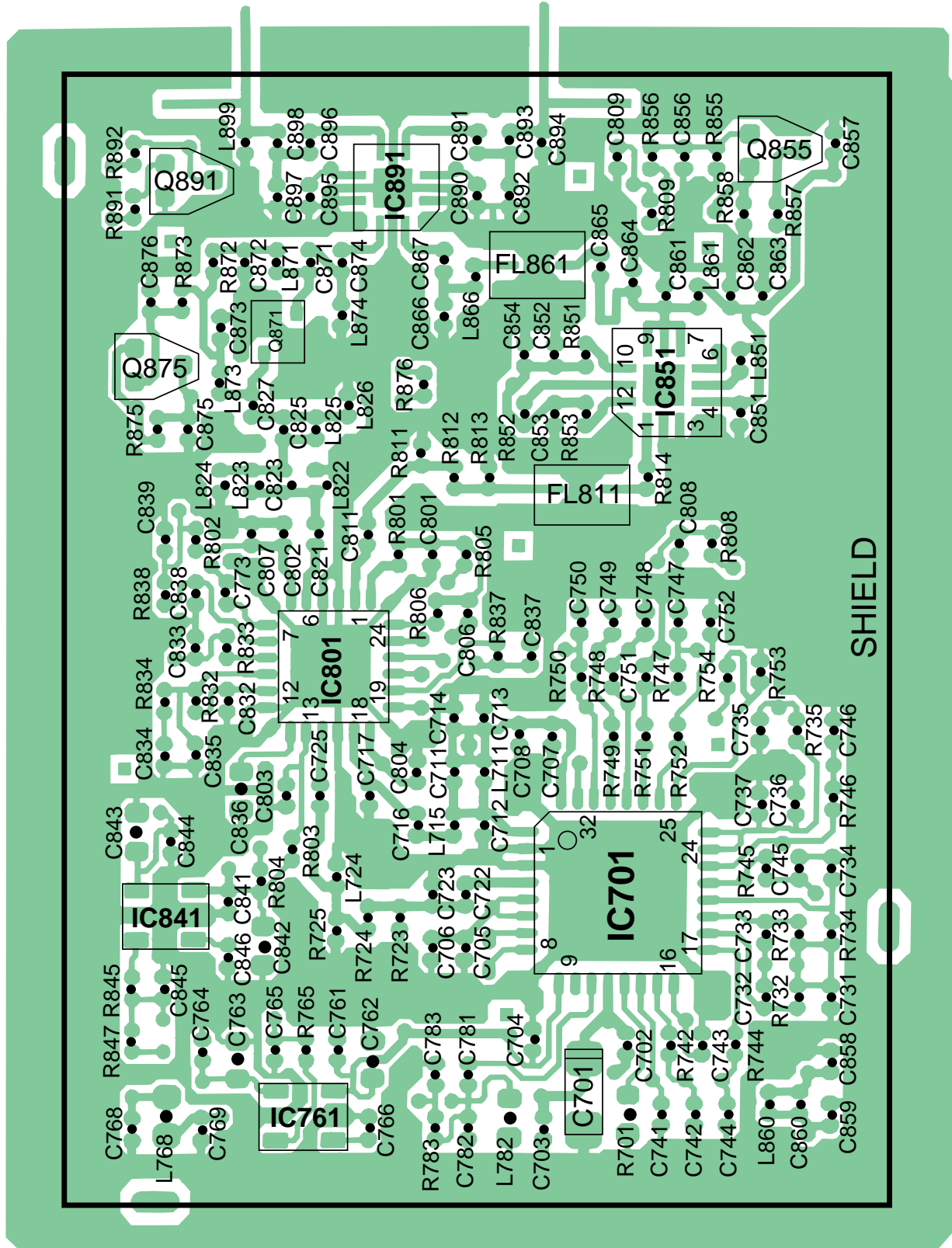# 44 CIRCUIT BOARD (BASE UNIT_OPERATION)

44.1. Component View

KX-TG6500BXB CIRCUIT BOARD (Base Unit_Operation (Component View))
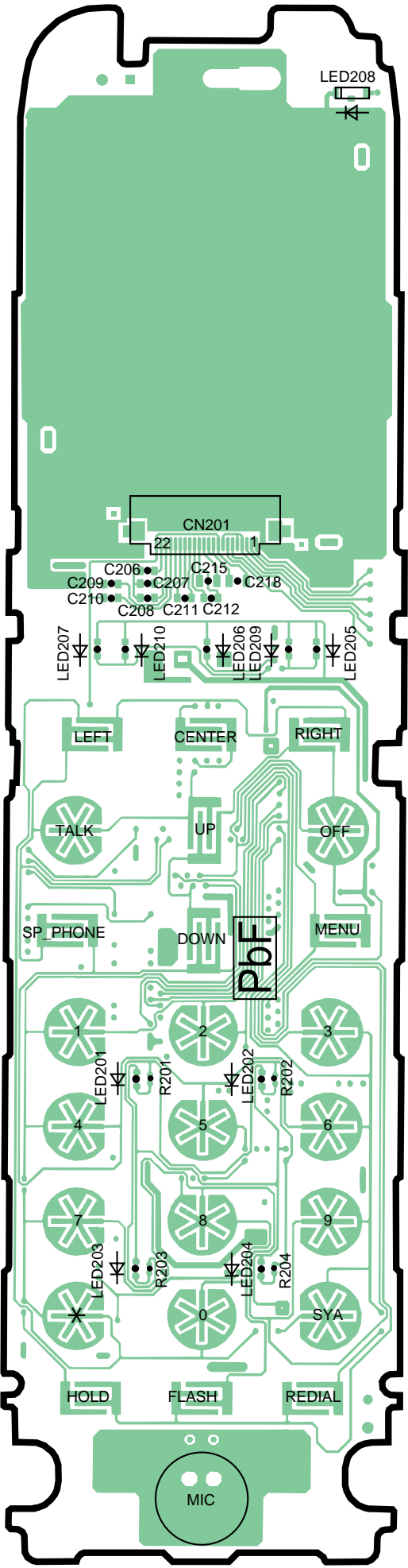
44.2. Flow Solder Side View

PbF

KX-TG6500BXB CIRCUIT BOARD (Base Unit_Operation (Flow Solder Side View))

45 CIRCUIT BOARD (BASE UNIT_RF PART)

KX-TG6500BXB CIRCUIT BOARD (Base Unit_RF Part (Component View))

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Memo

46 CIRCUIT BOARD (HANDSET_MAIN)

46.1. Component View

KX-TGA650BXB CIRCUIT BOARD (Handset_Main (Component View))

3.0V Vcc_5.8G

2.5V Vcc_2.4G

3.3V V_PA

3.0V Vcc_DSP

INT_1

3.5~4.2V (Battery)

BCK

RST Reset

PDN Power-Down

RSSI

PbF

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46.2. Flow Solder Side View

KX-TGA650BXB CIRCUIT BOARD (Handset_Main (Flow Solder Side View))
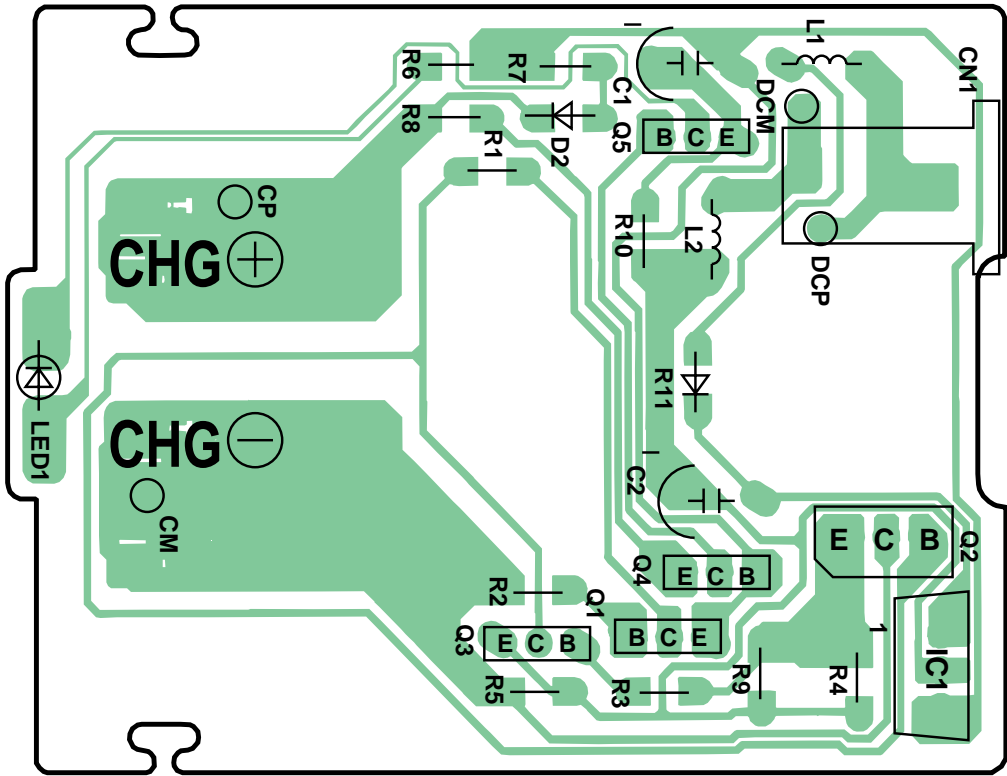
47 CIRCUIT BOARD (HANDSET_RF PART)
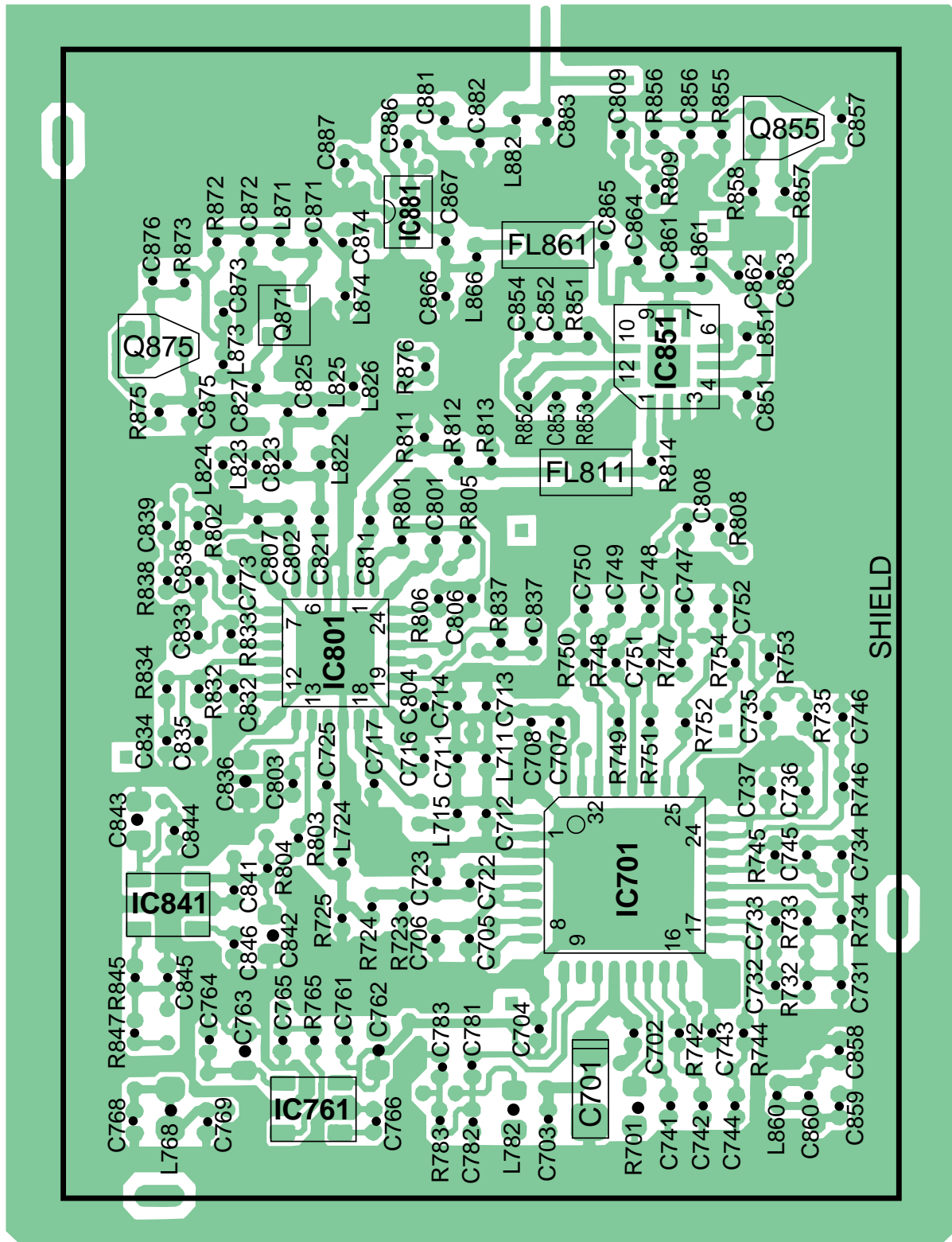
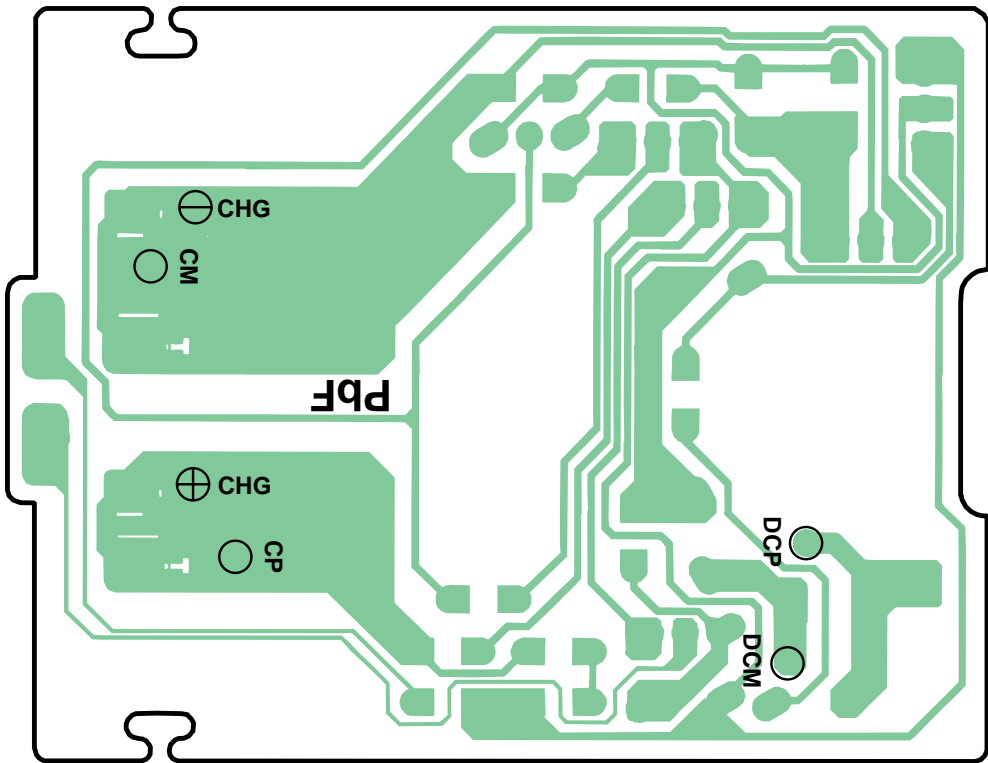KX-TGA650BXB CIRCUIT BOARD (Handset_RF Part (Component View))

48 CIRCUIT BOARD (CHARGER UNIT)

48.1. Component View

CIRCUIT BOARD (Component View (Charger Unit))

48.2. Flow Solder Side View

CIRCUIT BOARD (Flow Solder Side View (Charger Unit))