ORDER NO. KM40303045C1
F12

Service Manual

Telephone Equipment

Caller ID Compatible

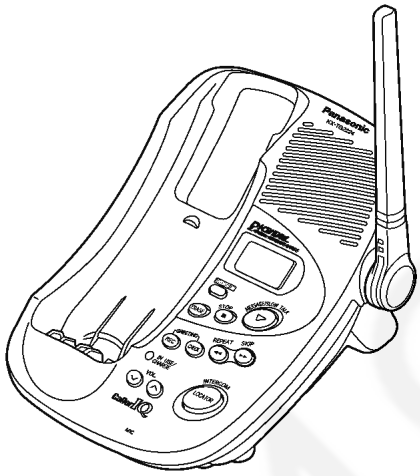
KX-TG2224F
KX-TG2224P
KX-TG2224W

2.4GHz Digital Cordless Answering System

Blue Version
Taupe Version
White Version

(for U.S.A.)

(Handset)



(Base Unit)

SPECIFICATIONS

	Base Unit	Handset
Power Source:	AC Adaptor (120 V AC, 60 Hz)	Ni-MH battery (2.4 V, 1,500 mAh)
Power Consumption:	Stanby: Approx. 2.6 W Maximum: Approx. 3.9 W	11 days at Standby, 5 hours at Talk
Frequency:	39 channels within 2.402 GHz ~ 2.480 GHz	39 channels within 2.402 GHz ~ 2.480 GHz
Receiving Method:	Single super heterodyne	Single super heterodyne
Oscillation Method:	PLL synthesizer	PLL synthesizer
Tolerance of OSC Frequency:	8.192 MHz	8.192 MHz
Modulation Method:	TDD-FSK	TDD-FSK
ID Code	28-bit	28-bit
Dialing Mode:	Tone (DTMF)/Pulse	Tone (DTMF)/Pulse
Security Code:	———	1,000,000
Operating Enviroment:	5 °C ~ 40 °C (41°F ~ 104 °F)	5 °C ~ 40 °C (41°F ~ 104 °F)
Redial:	———	5 (Up to 32 digits)
Speed Dialer:	———	50 (Up to 22 digits)
Dimension (H × W × D):	4 3/32" × 5 27/32" × 6 13/16" 104 mm × 148 mm × 173 mm)	9 11/16" × 2 1/16" × 1 5/8" (246 mm × 52 mm × 41 mm)
Weight	0.79 lbs. (360 g)	0.46 lbs. (210g) with battery

Specifications are subject to change without notice.

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

⚠ WARNING

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

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

CONTENTS

1 ABOUT LEAD FREE SOLDER (PbF: Pb free)

Note:

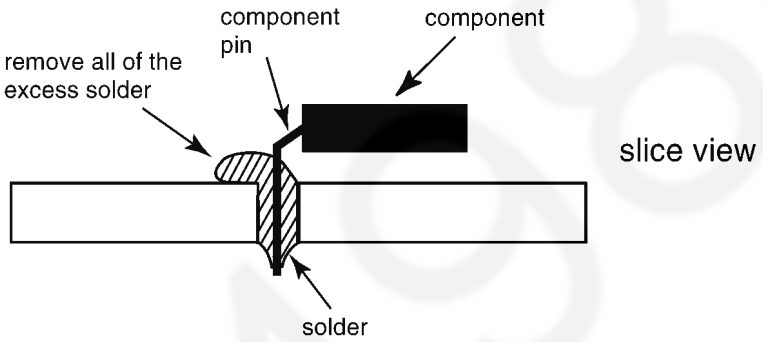
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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

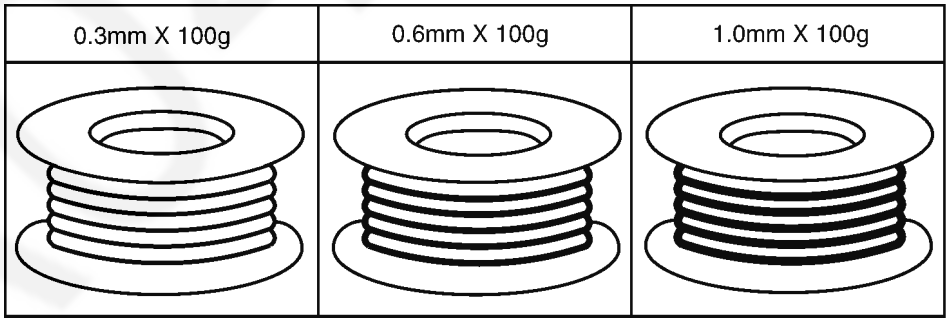
- PbF solder has a melting point that is 50°F ~ 70°F (30°C ~ 40°C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700°F ± 20°F (370°C ± 10°C). In case of using high temperature soldering iron, please be careful not to heat too long.
- PbF solder will tend 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 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 manufac turer's specific instructions for the melting points of their products and any precautions for using their product with other materials.

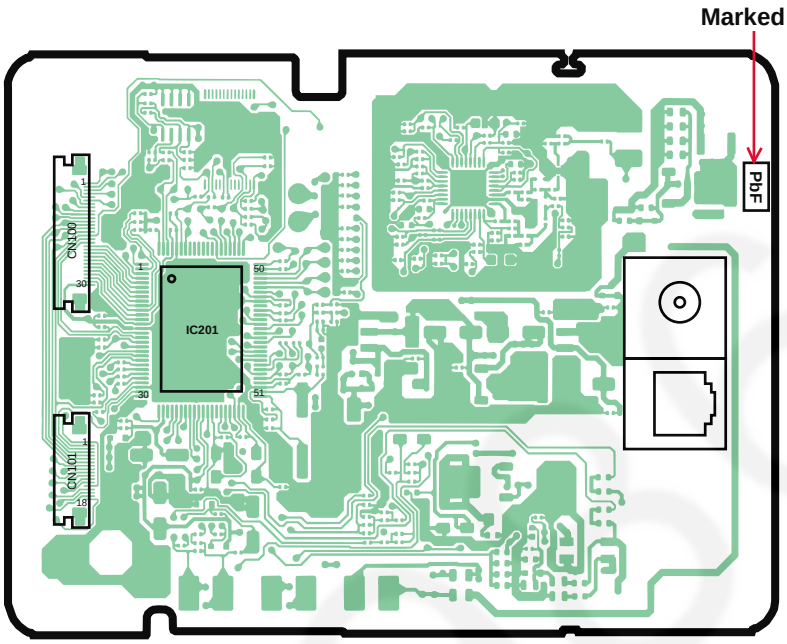
The following lead free (PbF) solder wire sizes are recommended for service of this product: 0.3mm, 0.6mm and 1.0mm.



1.2. How to recognize that Pb Free solder is used (at KX-TG2224F/P/W)

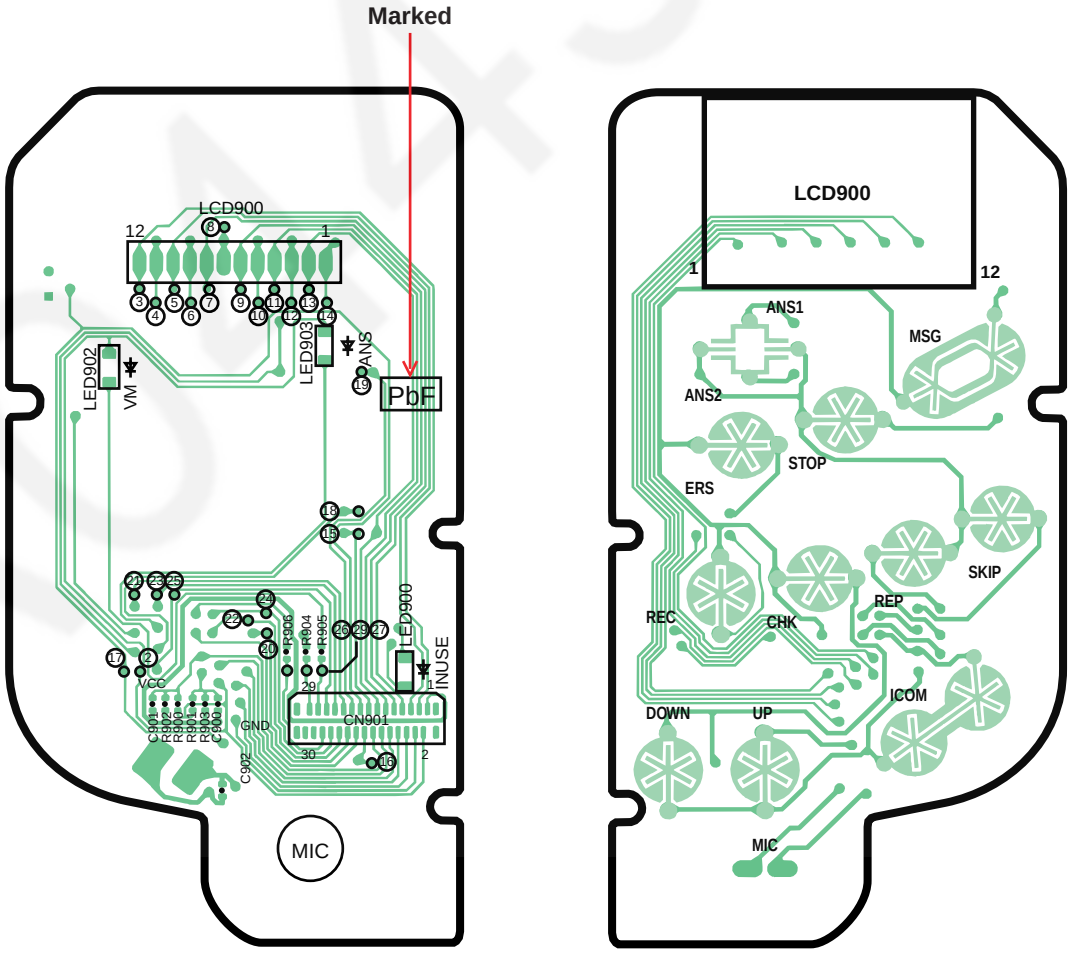
1.2.1. Base Unit

1.2.1.1. Main



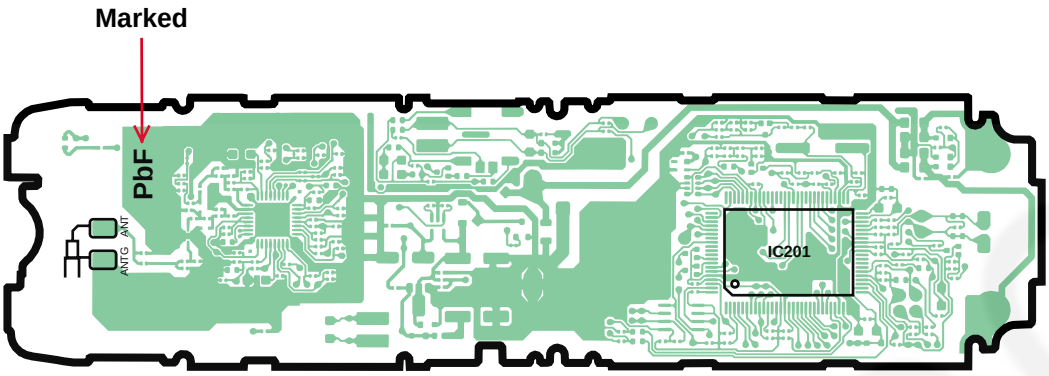
(Component View)

1.2.1.2. Operation



(Component View) (Flow Solder Side View)

1.2.2. Handset



(Component View)

2 FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.

When repairing, the following precautions will help prevent recurring malfunctions.

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

3 CAUTION

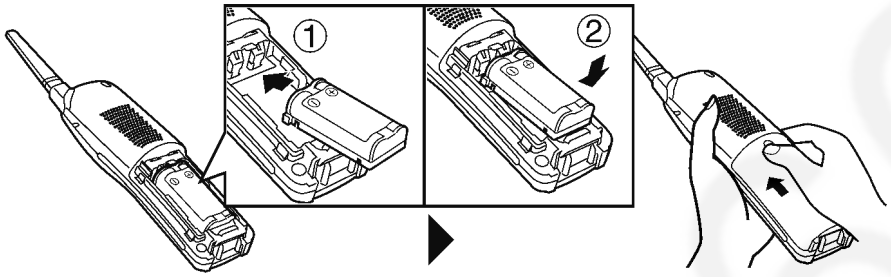
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommendenced by the manufacturer.

Dispose of used batteries according to the manufacture's Instructions.

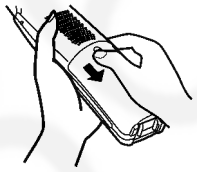
4 BATTERY

4.1. Installing the Battery in the Handset

Insert the battery (①), and press it down until it snaps into the compartment (②).
Close the cover.



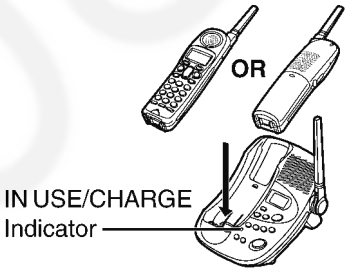
To replace the battery:
Press the notch on the cover firmly and slide it as indicated by the arrow. Replace the old battery with a new one.
Close the cover and charge the battery for about 6 hours.



4.2. Battery Charge

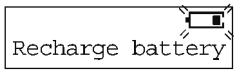
Place the handset on the base unit and charge for about **6 hours** before initial use.

- The IN USE/CHARGE indicator lights and the unit beeps once.
- It is normal for the back on the handset to feel warm during battery charge.



4.3. Battery Recharge

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



- If you DO NOT recharge the handset battery for more than 15 minutes, the display will continually indicate "Recharge battery" and/or " " will flash when the handset is lifted off the base unit.

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.

4.4. Battery Strength

You can check the battery strength on the handset display. The battery strength is as shown in the chart on the right.

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

4.5. 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, the battery needs to be replaced. Please order a new Panasonic HHR-P513 battery.

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

4.6. Battery information

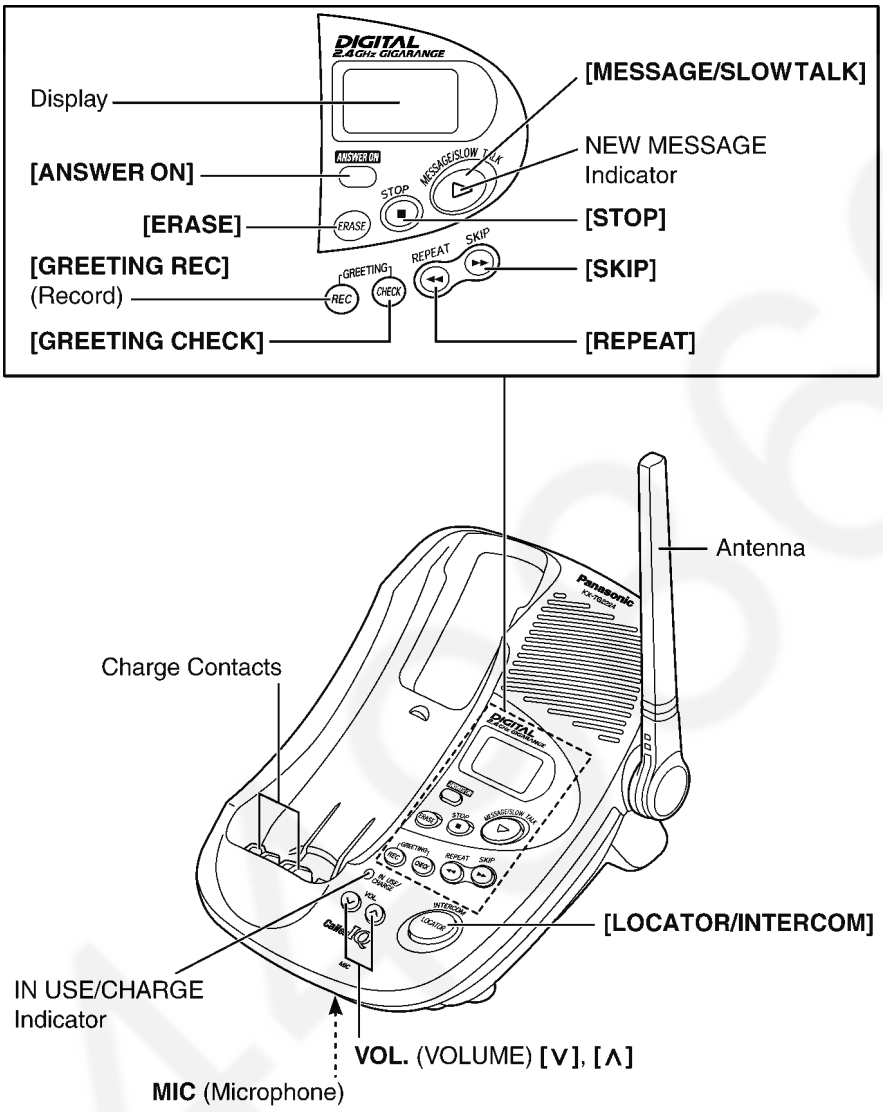
After your Panasonic battery is fully charged:

Operation	Operating time
While in use (TALK)	Up to 5 hours
While not in use (Standby)	Up to 11 days

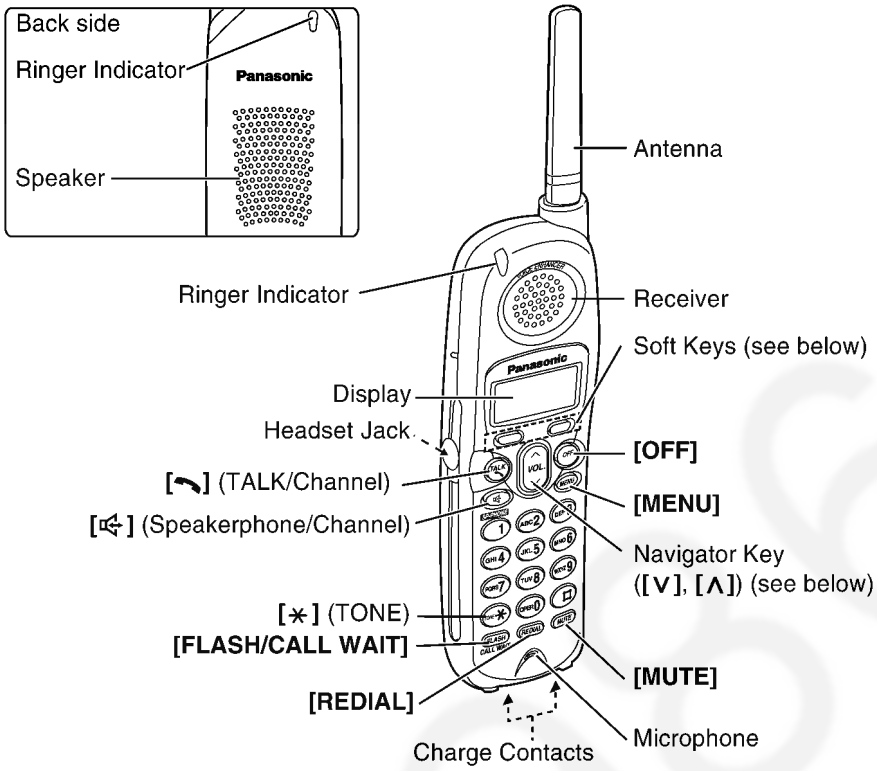
- The battery operating time may be shortened depending on usage conditions and ambient temperature.
- **Clean the charge contacts of the handset and the base unit with a soft, dry cloth. Clean if the unit is subject to grease, dust or high humidity.** Otherwise the battery may not charge properly.
- 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.
- The battery cannot be overcharged.

5 LOCATION OF CONTROLS

5.1. Base Unit

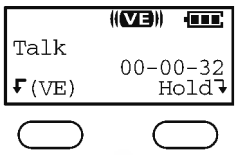


5.2. Handset



How to use the soft keys/navigator key

① **Soft keys:**



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

For example, to operate "Hold", press the right soft key.

- When a function does not appear above a soft key, the soft key will not work.

② **Navigator key:**

Scrolls through the function menu, the Caller List and the phone book (works as a scroll key).
Adjusts the handset ringer and receiver/speaker volumes (works as a volume key).

Throughout this Service Manual:

- The soft keys are indicated with the display above the keys.
  Ex. "Press **Hold**." indicates "Press the soft key below Hold".
- The navigator key is indicated by the arrows [V] or [Λ].

6 DISPLAY

6.1. Troubleshooting

Cordless Telephone

Problem	Cause & Remedy
"No link to base. Place on cradle and try again." is displayed and an alarm tone sounds.	• You are too far from the base unit. Walk closer and try again. • Place the handset on the base unit and try again. • Plug in the AC adaptor. • Raise the base unit antenna.
Static, sound cuts in/out, fades. Interference from other electrical units.	• Move the handset and the base unit away from other electrical appliances. • Walk closer to the base unit. • Raise the base unit antenna. • Select a clearer channel.
The handset and/or base unit does not ring.	• The ringer volume is set to OFF. Set to HIGH, MEDIUM or LOW. • When the handset is on the base unit, the handset does not ring. Only the base unit rings when receiving a call.
The handset display is blank.	• Charge the battery fully.
You cannot program function items.	• Programming is not possible while the unit is being used. • Do not pause for over 60 seconds while programming. • Walk closer to the base unit.
While programming or searching, the unit starts to ring and stops the program/ search.	• A call is coming in. To answer the call, press **[ ]** or **[ ]**. Start again from the beginning after hanging up.
You cannot make a call with the handset.	• Your handset is in remote operation mode. Exit by pressing **[OFF]**.
You cannot redial.	• If the last number dialed was more than 32 digits long, the number will not be redialed correctly.

Problem	Cause & Remedy
The unit does not display the caller's name and/or phone number.	• You need to subscribe to a Caller ID service. • 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 Caller ID box is connected between the unit and the telephone wall jack, disconnect the Caller ID box or plug the unit directly into the wall jack.
The handset display exits the Caller List or phone book.	• Do not pause for over 60 seconds while searching.
You cannot page the handset or base unit.	• The handset is too far from the base unit. • The handset user is making an outside call, viewing the Caller List/phone book or listening to messages. Wait until the IN USE/ CHARGE indicator light goes out. • The handset or base unit is in use. Try again later.
You cannot have a conversation using the headset.	• Make sure the optional headset is connected properly. • If "SP-phone" is displayed on the handset, press [ ] to switch to the headset.

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” • Memory is full. Erase unnecessary messages.
You cannot listen to recorded messages.	• Make sure the unit is not being used.
“FULL” is displayed and **[ANSWER ON]** flashes rapidly. No new messages are recorded.	• Memory is full. Erase unnecessary messages.
You cannot operate the Answering System with the base unit.	• The handset user is operating the Answering System, or is on the phone. Wait until the IN USE/CHARGE indicator light goes out.
You cannot operate the Answering System from a touch tone phone.	• Make sure you enter the correct remote code. • 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.
You cannot operate the Answering System with the handset.	• Someone is operating the Answering System. • You are too far from the base unit. Walk closer to the base unit. • The unit is recording a message. To answer the call, press **[ ]** or **[ ]**.
While recording a greeting message, the unit starts to ring and stops recording.	• To answer the call, press **[ ]** or **[ ]**. Start again from the beginning after hanging up.
During playback, the unit starts to ring and stops playback.	• To answer the call, press **[ ]** or **[ ]**. To resume playback, press **[MESSAGE/SLOW TALK]** after hanging up.
Caller ID information is not displayed during message playback.	• Caller ID information will not be displayed if the Caller List is renewed and the caller ID information is erased.

General

Problem	Cause & Remedy
The unit does not work.	• Check the settings. • Check whether the dialing mode setting is correct. • Charge the battery fully. • Clean the charge contacts and charge again. • Install the battery properly. • Place the handset on the base unit and unplug the AC adaptor to reset it. Plug in, and try again. • Re-install the battery and charge it fully.
Previously programmed information is erased.	• If a power failure occurs, programmed information may be erased. Reprogram if necessary.
"Recharge battery" is displayed, " " flashes or the unit beeps intermittently.	• Charge the battery fully.
You charged the battery fully, but "Recharge battery" is still displayed and/or " " continues to flash.	• Clean the charge contacts and charge again. • Install a new battery.
The IN USE/CHARGE indicator light does not go out after the battery has been charged.	• This is normal.
If you cannot solve your problem	• Call our customer call center at 1-800-211-PANA(7262). • Panasonic's e-mail address for customer inquiries: consumerproducts@panasonic.com for customers in the USA or Puerto Rico ONLY
When you try to download phone book data or information from openLCR, the voice prompt is not announced from the handset while "Listen & follow phone guidance." is being displayed.	• Check the settings. • If you cannot solve a problem, consult openLCR (see below).
For more information about Caller IQ	• Call openLCR's customer service department at 1-866-openLCR (1-866-673-6527). • openLCR's web site: www.openLCR.com

7 openLCR Service for Caller IQ Feature

The Caller IQ feature is compatible with service provided by openLCR.

Important:

- **If you have any questions regarding the openLCR service, call openLCR´s customer service department at 1-866-openLCR (1-866-673-6527).**
- NEITHER PANASONIC COMMUNICATIONS CO., LTD. (PCC) NOR MATSUSHITA ELECTRIC CORPORATION OF AMERICA (MECA) IS IN ANY WAY AFFILIATED WITH, OR RESPONSIBLE FOR THE ACTS OR OMISSIONS OF, OPENLCR.COM, INC. (OPENLCR). NEITHER PCC NOR MECA NOR ANY OF THEIR EMPLOYEES OR AFFILIATES OR CUSTOMERS MAKE ANY WARRANTIES OR REPRESENTATIONS, EITHER EXPRESS OR IMPLIED, TO ANY CUSTOMER OR ANY OTHER THIRD PARTY WITH RESPECT TO ANY OF THE SERVICES PROVIDED BY OPENLCR, NOR ASSUME NOR CREATE ANY OTHER OBLIGATION OF ANY KIND ON BEHALF OF OPENLCR.

7.1. Setting Caller IQ to OFF and ON (Handset)

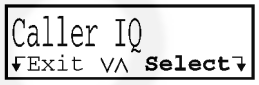
After the first download to your phone, Caller IQ features are automatically turned on. If you wish, you can turn off Caller IQ.

- When Caller IQ is ON, "[CIQ]" is displayed while talking.

To set Caller IQ to OFF (When Caller IQ is ON.)

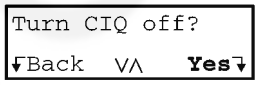
1 Press **[MENU]**.

2 Scroll to "Caller IQ" by pressing **[∨]** or **[∧]**, then press **Select**.



3 Scroll to "Turn CIQ off?" by pressing **[∨]** or **[∧]**, then press **Yes**.

- "Caller IQ off" is displayed.
- If the handset beeps 3 times, Caller IQ is not set to OFF. Start again from step 1.



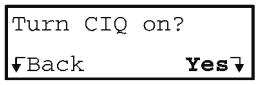
4 Press **[OFF]**.

To set Caller IQ from OFF to ON

1 Follow steps 1 to 2 of "To set Caller IQ to OFF" above.

2 Press **Yes** at "Turn CIQ on?".

- "Caller IQ on" is displayed.
- If the handset beeps 3 times, Caller IQ is not set to ON. Start again from step 1.



3 Press **[OFF]**.

7.2. Downloading Phone Book Data

To create your phone book, go to the openLCR web site to update your phone book, then download the data to your unit. Accessing the openLCR web site can be done from any computer with Internet access.

- While downloading from openLCR, "dL" flashes on the base unit display.

To create phone book data

If you have already stored items into the phone book of the unit, you need to enter all of those stored items on the openLCR web site. Then, add all new items through the openLCR web site.

1 Go to openLCR's web site at **www.openLCR.com** and click on "Manage Account" tab.

2 Follow the web screen to create the phone book data.

- Make sure to enter a name up to 15 characters, and a phone number up to 32 digits.

- In the case that you stored or created the items in the phone book of the unit, you also need to store or create the items on the web site.
- The description on the openLCR web screen is subject to change without notice.

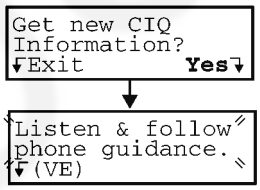
To download the phone book data from openLCR (Handset)

1 Press **[ ]** or **[ ]**, then press **[MENU]**.

2 Press **Yes** within 10 seconds at "Get new CIQ Information?".

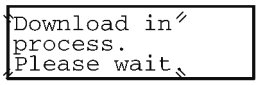
- The unit will dial to openLCR automatically.
- A voice prompt will be heard.

If you live in or move from another area to Fort Collins, Colorado, press **[#]** before pressing **Yes**.



3 Follow the voice prompt to start downloading.

- When downloading starts, the display will show the message on the right.
- After downloading starts, the handset must be off-hook. DO NOT PLACE the handset on the base unit (placing the handset on the base unit will terminate the download process). DO NOT PRESS **[OFF]** (pressing **[OFF]** will terminate the download process).



4 When downloading is complete, a beep sounds.

- If the handset beeps 3 times and "Download incomplete. Phone book full." is displayed, some items cannot be stored in the phone book. Store items by following the steps below.
  1. Erase items which do not exist on the web from the phone book of the unit.
  2. Access the openLCR web site.
  3. Go to the web screen to create the phone book data.
  4. Click Download All.
  5. Start again from step 1 ("To download the phone book data from openLCR").
- If the handset beeps 3 times and "Download incomplete. Try again." is displayed, the unit has lost communication with openLCR. Store items by following the steps below.
  1. Access the openLCR web site.
  2. Go to the web screen to create the phone book data.
  3. Click Download All.
  4. Start again from step 1 ("To download the phone book data from openLCR").
- You cannot access the openLCR server if a telephone or fax machine on the same phone line is in use.
- While the unit is downloading the data from openLCR, the Call Waiting Service cannot be used.

7.3. Information Download (Handset)

This enables you to view information such as weather forecast, stock quotes, lottery results, sports scores and horoscopes from the LCD display on your openLCR-ready unit. Each time you download the data from openLCR, the information will be updated. To view up-to-date information, you will need to download it to your unit.

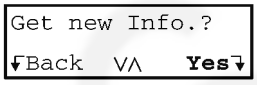
- You can select the items of information on the web site which you want to view.
- Horoscopes are for entertainment purposes only.

To update information

1 Press **[MENU]**.

2 Scroll to "`Caller IQ`" by pressing **[∨]** or **[∧]**, then press **Select**.

3 Scroll to "`Get new Info.?`" by pressing **[∨]** or **[∧]**, then press **Yes**.



- The unit will dial to openLCR automatically and start downloading information.

  If you live in or move from another area to Fort Collins, Colorado, press **[#]** before pressing **Yes**.

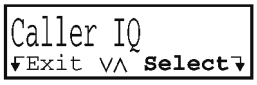
4 When downloading is complete, a beep sounds.

- To update information after pressing **[ ]** or **[ ]**, press **[MENU]**. "`Get new CIQ Information?`" is displayed. Press **Yes** within 10 seconds, then follow the voice prompt to start downloading.

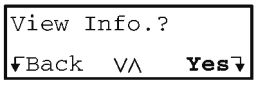
To view information

1 Press **[MENU]**.

2 Scroll to "`Caller IQ`" by pressing **[∨]** or **[∧]**, then press **Select**.



3 Press **Yes** at "`View Info.?`".



- The items of information which you selected on the web are displayed.

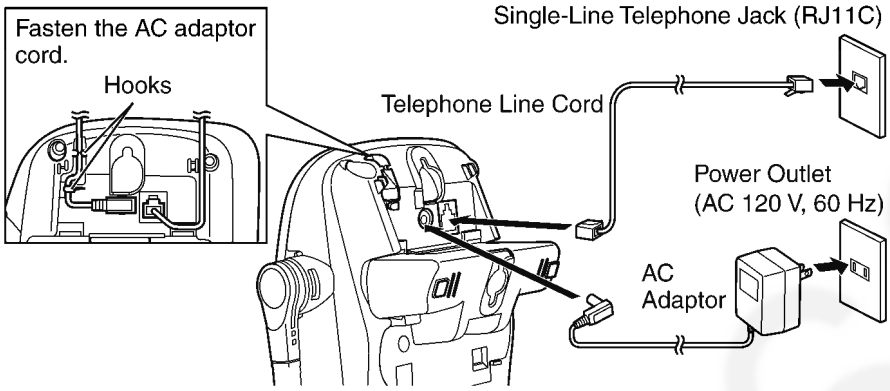
4 Scroll to the desired information by pressing **[∨]** or **[∧]**.

- You can also select the desired information by pressing dialing buttons.

5 When finished, press **[OFF]** or place the handset on the base unit.

8 SETTINGS

8.1. Connections



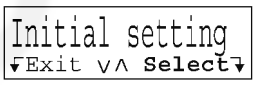
- USE ONLY WITH Panasonic AC ADAPTOR PQLV19Z.
- The AC adaptor must remain connected at all times. (It is normal for the adaptor to feel warm during use.)
- If your unit is connected to a PBX which does not support Caller ID, you cannot access Caller ID services.
- The unit will not work during a power failure. To connect a standard telephone on the same line, use the Panasonic T-adaptor KX-J66.

8.2. Display Language (Handset)

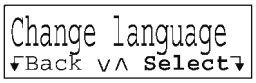
You can select either ENGLISH or SPANISH as the display language. The factory preset is ENGLISH.

1 Press **[MENU]**.

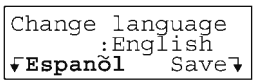
2 Scroll to "`Initial setting`" by pressing **[∨]** or **[∧]**, then press **`Select`**.



3 Scroll to "`Change language`" by pressing **[∨]** or **[∧]**, then press **`Select`**.



4 Select the language by pressing **`Español`** or **`English`**.



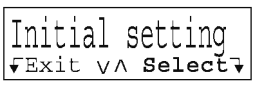
5 Press **`Guard.`** or **`Save`**, then press **[OFF]**.

8.3. Dialing Mode (Handset)

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

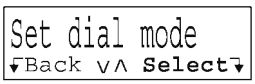
1 Press **[MENU]**.

2 Scroll to "`Initial setting`" by pressing **[∨]** or **[∧]**, then press **`Select`**.

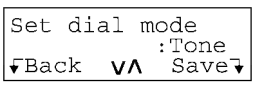


3 Scroll to "`Set tel line`" by pressing **[∨]** or **[∧]**, then press **`Select`**.

4 Press **`Select`** at "`Set dial mode`".



5 Select "`Pulse`" or "`Tone`" by pressing **[∨]** or **[∧]**.



6 Press **`Save`**, then press **[OFF]**.

8.4. Direct Commands

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

- **[1]** Ringer setting
  - **[1]** Ringer volume
    - **[0]**: Off
    - **[1]**: Low
    - **[2]**: Medium
    - **[3]**: High
  - **[2]** Ringer tone
    - **[1]** – **[6]**: tone pattern 1 – 6
- **[2]** Message play
- **[4]** Date and time
- **[5]** Voice enhancer
  - **[1]** : On
  - **[0]** : Off
- **[7]** Caller IQ
  - **[1]** : Activate CIQ*1
  - **[2]** : View Info.*2
  - **[3]** : Get new Info.*2
  - **[4]** : Turn CIQ off *2
  - **[5]** : Turn CIQ on*2
- **[8]** Intercom

- **[0]** Initial setting
  - **[1]** LCD contrast
    - **[1]** – **[5]** : level 1 – 5
  - **[3]** Auto talk
    - **[1]** : On
    - **[0]** : Off
  - **[4]** Caller ID edit
    - **[1]** : On
    - **[0]** : Off
  - **[5]** Set tel line
    - **[1]** Set dial mode
      - **[1]** : Pulse
      - **[2]** : Tone
    - **[2]** Set flash time
      - **[1]** :700ms **[2]** :600ms
      - **[3]** :400ms **[4]** :300ms
      - **[5]** :250ms **[6]** :110ms
      - **[7]** :100ms **[8]** :90ms
    - **[3]** Set line mode
      - **[1]** : A
      - **[2]** : B
  - **[6]** Set answering
    - **[1]** Number of rings
      - **[2]** – **[7]** : 2 – 7 rings
      - **[0]** : Toll saver
    - **[2]** Recording time
      - **[1]** - **[3]** : 1-3 minutes
      - **[0]** : Greeting only
    - **[3]** Remote code
      - **[0]** – **[9]** : 00 – 99
  - **[8]** Change language
    - **[1]** : English
    - **[2]** : Spanish

During programming:
To save the setting, press the right soft key (**Save**).
To exit the programming, press **[OFF]**.

- If you press the direct command incorrectly, exit the programming. Then re-enter the programming by pressing **[MENU]**.

*1 Can be used to activate Caller IQ. See the leaflet included in the unit for more information.
*2 For openLCR subscribers only.

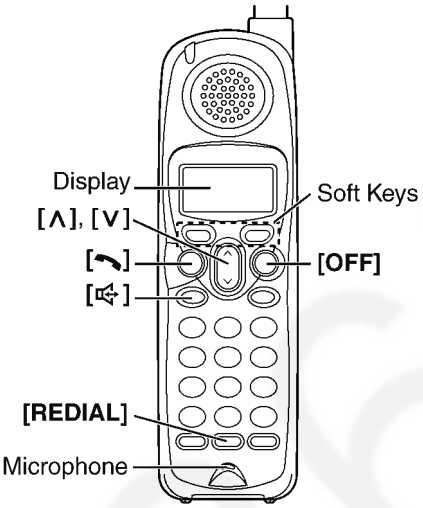
9 OPERATIONS

9.1. Making Calls (Handset)

1 Press [ ].
- "Talk" is displayed.

2 Dial a phone number.
- The dialed number is displayed.
- After a few seconds, the display will show the length of the call.

3 To hang up, press **[OFF]** or place the handset on the base unit.



To have a hands-free phone conversation

1 Press [ ].
- "SP-phone" is displayed.

2 Dial a phone number.
- The dialed number is displayed.
- After a few seconds, the display will show the length of the call.

3 When the other party answers, talk into the microphone.

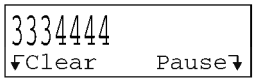
4 To hang up, press **[OFF]** or place the handset on the base unit.

Hands-free Digital Duplex Speakerphone
For best performance, please note the following:
- Talk alternately with the other party in a quiet room.
- If you or the other party has hearing difficulty, press **[V]** to decrease the speaker volume.
- While talking using [ ], you can switch to the hands-free phone conversation by pressing [ ]. To switch back to the receiver, press [ ].

- If the handset has lost communication with the base unit, the handset beeps 3 times and "No link to base. Place on cradle and try again." is displayed.
- If [ ], [ ] or any other buttons except **[MUTE]** and **[OFF]** is pressed while the handset is on the base unit, the handset beeps 3 times and "Please lift up and try again." is displayed. Lift the handset and press the button again.

To dial after confirming the entered number

1 Enter a phone number.



- If you misdial, press **Clear**. Enter the correct number.
- If a pause is required for dialing, press **Pause** where needed
- To cancel, press **[OFF]**.

2 Press [ ] or [ ].

3 To hang up, press **[OFF]** or place the handset on the base unit.

If noise interferes with the conversation

Have the unit select a clearer channel by doing one of the following:
Press [ ] (Channel) if talking using [ ],
press [ ] (Channel) if talking using [ ], or
press **CH**, which is displayed when you adjust receiver or speaker volume
OR
Walk closer to the base unit.

To redial the last number dialed

Press [ ] or [ ], then press **[REDIAL]**.

To redial using the redial list (Memory Redial)

The last 5 phone numbers dialed with the handset are stored in the redial list.

1 Press **[REDIAL]**.

- The last number dialed is displayed.

2 Scroll to the desired number by pressing **[V]** or **[^]**.

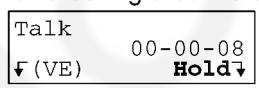
- You can also scroll through the list by pressing **[REDIAL]**.
- To exit the list, press **[OFF]** or **Exit**.

3 Press [ ] or [ ].

- **To erase an item,** scroll to the desired item then press **Erase**.
- If "No items stored" is displayed, the list is empty.

To put a call on hold

Press **Hold** during a conversation.



- "Hold" is displayed.
- To page the base unit while holding, press **Intercom** (Intercom hold).

To return to the call, press [ ] or [ ].

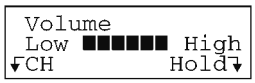
- If another phone is connected on the same line, you can also return to the call by lifting its handset.
- If a call is kept holding for 6 minutes, an alarm tone will start to sound. After 4 additional minutes on hold, the call will be disconnected.
- The alarm volume corresponds to the ringer volume level. If the ringer is OFF, the alarm will sound at the LOW level.

To adjust the receiver/speaker volume while talking

3 levels (HIGH, MEDIUM and LOW) are available for the receiver and 6 levels for the speaker.

To increase volume, press **[^]**.
To decrease volume, press **[V]**.

Ex. Receiver volume:HIGH
Speaker volume:level 6



- The display shows the current volume setting.
- If you try to increase/decrease volume when it is at the maximum/minimum level, the handset will beep 3 times.

Backlit LCD display

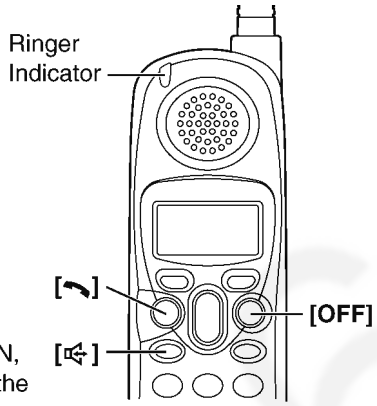
The lighted display of the handset will stay on for a few seconds after pressing a button or lifting the handset off the base unit.

Lighted handset keypad

The handset dialing buttons will light when you press a button or lift the handset off the base unit. The light will go out after a few seconds.

9.2. Answering Calls (Handset)

When a call is received, the unit rings and "Incoming call" is displayed, and the Ringer indicator on the handset and the IN USE/CHARGE indicator on the base unit flash rapidly.



1 Press [ ] or [ ].
- You can also answer a call by pressing any button except [∨], [∧] and **[OFF]**.

2 To hang up, press **[OFF]** or place the handset on the base unit.

Auto Talk: If you set the Auto Talk feature to ON, you can answer a call by lifting the handset off the base unit.

- When the ringer volume is set to OFF, the unit will not ring

9.3. FLASH Button (Handset)

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

- Pressing **[FLASH/CALL WAIT]** cancels the following operations:
  - temporary tone dialing, or
  - muting your conversation.

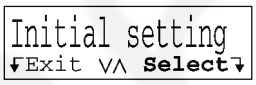
Selecting the flash time

The flash time required 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)". The factory preset is "700 ms".

- If PBX functions do not work correctly, consult your PBX supplier for the correct settings.

1 Press **[MENU]**.

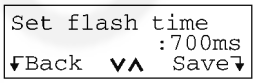
2 Scroll to "`Initial setting`" by pressing **[∨]** or **[∧]**, then press **Select**.



3 Scroll to "`Set tel line`" by pressing **[∨]** or **[∧]**, then press **Select**.

4 Scroll to "`Set flash time`" by pressing **[∨]** or **[∧]**, then press **Select**.

5 Select the desired time by pressing **[∨]** or **[∧]**.



6 Press **Save**, then press **[OFF]**.

9.4. Erasing Messages

The unit will announce the remaining recording time after playback, if it is less than 3 minutes. New messages cannot be recorded when:

- "Memory full" is heard.
- "FULL" is displayed on the base unit.
- **[ANSWER ON]** 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.

(Handset)

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

• The unit beeps, then plays back the next message.

Erasing all messages

All recorded messages, except the greeting message, can be erased at one time.

(Base Unit)

1 Press **[ERASE]**.

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

2 Within 10 seconds, press **[ERASE]** again.

• The unit beeps, then announces "No messages".
• The base unit display shows "0".

(Handset)

1 Press **[MENU]**.

2 Scroll to "Message play" by pressing **[∨]** or **[∧]**, then press **Select**.

3 Press **[✳]** **[5]**.

• The unit beeps, then announces "No messages".

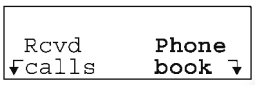
• To cancel playback on the handset, press **[OFF]**.
• Information in the Caller List will not be erased.

9.5. Phone Book

You can store up to 50 names and phone numbers in the handset phone book. All phone book items are sorted alphabetically. You can make a call by selecting a name on the handset display.

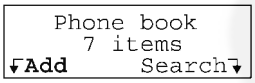
9.5.1. Storing Names and Numbers (Handset)

1 Press **Phone book**.



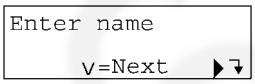
2 Press **Add**.

- When 50 items are stored in the phone book, "Add" is not displayed.

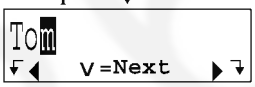


3 Enter a name, up to 15 characters with the dialing buttons (**[0]** to **[9]**), then press **[V]**.

- If a name is not required, press **[V]** then go to step 4.

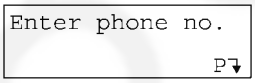


Example

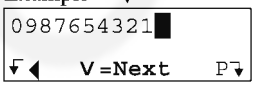


4 Enter a phone number, up to 32 digits.

- Each time you press ◀, a digit is erased. To erase all of the digits, press and hold ◀.
- If a pause is required for dialing, press **P**. A pause is stored in a phone number as one digit .

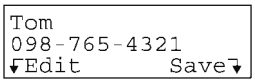


Example



5 Press **[V]**.

- If you want to change the name, press **Edit** then change it.
- If you want to change the number, press **[^]** then change it.



6 Press **Save**.

- To continue storing other items, repeat from step 2.
- When you store the 50th item, "Phone book full" is displayed.

7 Press **[OFF]**.

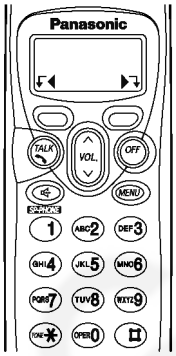
- If the handset beeps 3 times when you press **Save**, the item cannot be stored in the phone book. Place the handset on the base unit and try again from step 1.

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
◀	Erases the character 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.)		

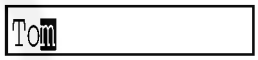


For example, to enter "Tom":

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

2 Press **[6]** three times, then press ▶ to move the cursor.

3 Press **[6]**.



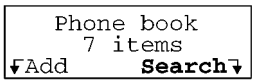
If you make a mistake when entering a name or number

Use ◀ to erase the incorrect character. Each time you press ◀, a character is erased. Then re-enter the correct character.
To erase all characters, press and hold ◀.

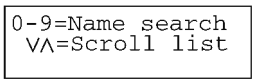
9.5.2. Dialing from the Phone Book (Handset)

1 Press **Phone book** to enter the phone book.

2 Press **Search**.



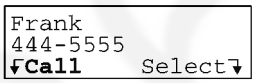
3 Scroll to the desired item. To scroll down, press **[V]**. To scroll up, press **[Λ]**.



Phone book 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)

4 Press **Call**, **[ ]** or **[ ]**.

- The displayed phone number is dialed.



5 To hang up, press **[OFF]** or place the handset on the base unit.

- To exit the phone book list, press **[OFF]**.
- If "No items stored" is displayed in step 2, the phone book is empty.
- To view a phone number over 16 digits, repeat steps 1 to 3, then press **Select**, **Edit** and then **[V]**. When finished, press **[OFF]**.

To search for a name by initial

1. Repeat the steps 1 and 2 above.
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 in the index you selected, the first entry in the next alphabetical index will be displayed.
3. Press **[V]** repeatedly until the desired name is displayed.

Index table

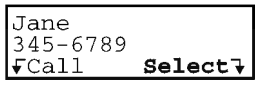
Keys	Index	Keys	Index
[1]	Other symbols, 1	[6]	M, N, O, 6
[2]	A, B, C, 2	[7]	P, Q, R, S, 7
[3]	D, E, F, 3	[8]	T, U, V, 8
[4]	G, H, I, 4	[9]	W, X, Y, Z, 9
[5]	J, K, L, 5	[0]	0, Space

9.5.3. Editing an Item in the Phone Book (Handset)

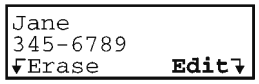
1 Press **Phone book** to enter the phone book.

2 Press **Search**.

3 Scroll to the desired item by pressing **[V]** or **[∧]**, then press **Select**.



4 Press **Edit**.



5 Edit the name, then press **[V]**.

- If you do not need to change the name, press **[V]** then go to step 6.

6 Edit the phone number, then press **[V]**.

- If you do not need to change the number, press **[V]** then go to step 7.
- If a pause is required for dialing, press **P**. A pause is stored in a phone number as one digit.

7 Press **Save**.

- To continue editing other items, repeat from step 2.

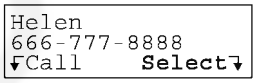
8 Press **[OFF]**.

9.5.4. Erasing an Item in the Phone Book (Handset)

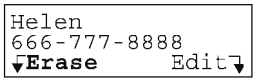
1 Press **Phone book** to enter the phone book.

2 Press **Search**.

3 Scroll to the desired item by pressing **[V]** or **[∧]**, then press **Select**.

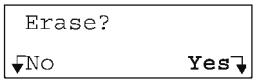


4 Press **Erase**.



5 Press **Yes**.

- A beep sounds and the item is erased.
- To erase other items, repeat from step 3.



6 Press **[OFF]**.

- To cancel erasing, press **No** after step 4.

10 DISASSEMBLY INSTRUCTIONS

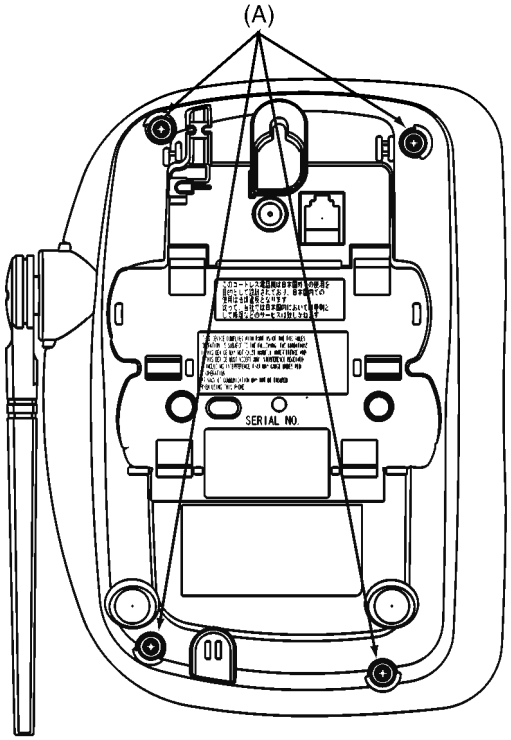


Fig. 1

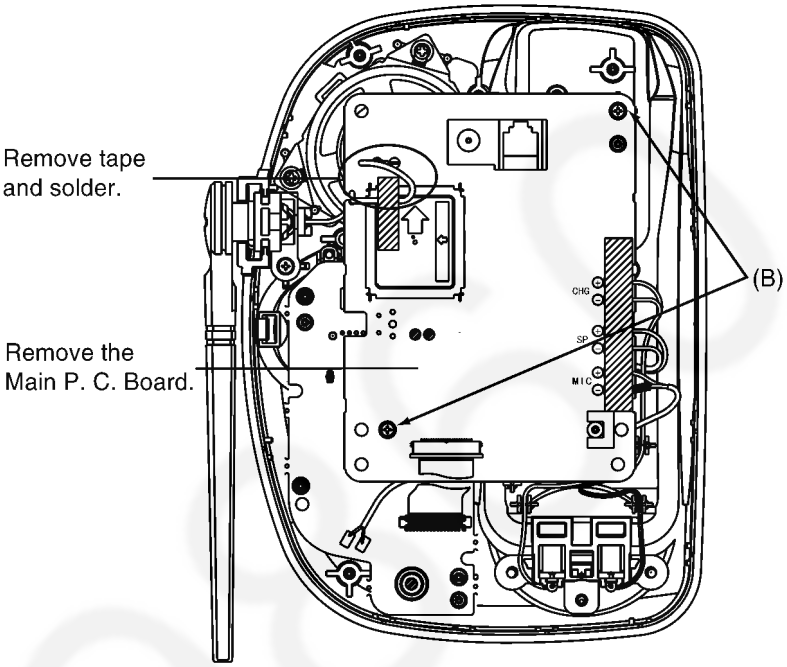


Fig. 2

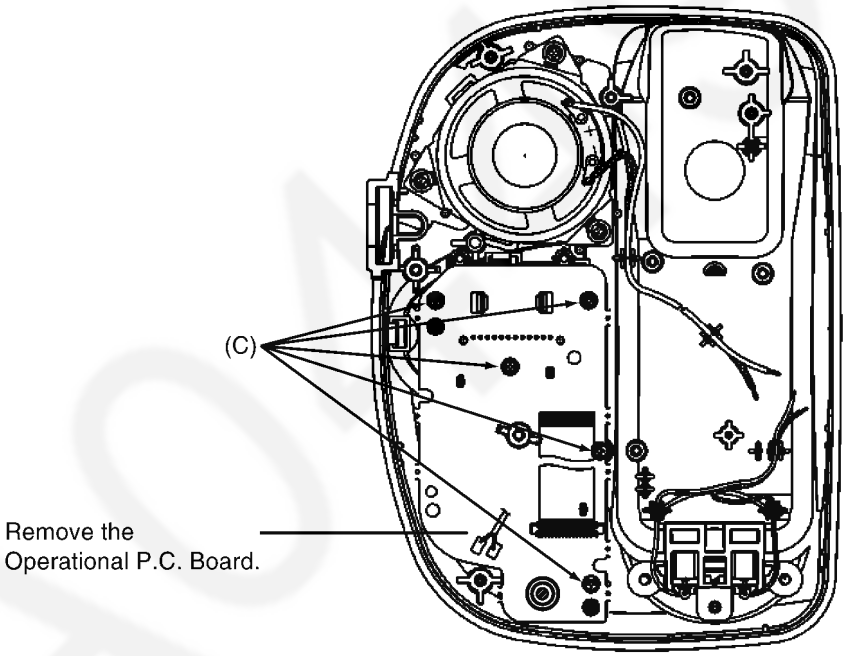


Fig. 3

Shown in Fig.-	To Remove -	Remove -
1	Lower Cabinet	Screws (2.6 × 12).....(A) × 4
2	Main P.C. Board	Screws (2.6 × 8).....(B) × 2
		Tape and Solder
		The Main P.C. Board
3	Operational P.C. Board	Screws (2.6 × 8).....(C) × 5
		The Operational P.C. Board

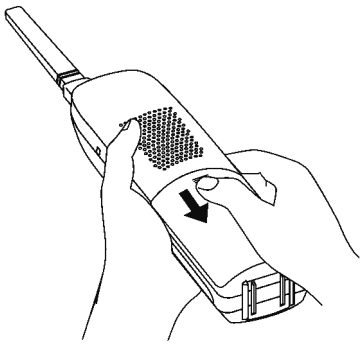


Fig. 4

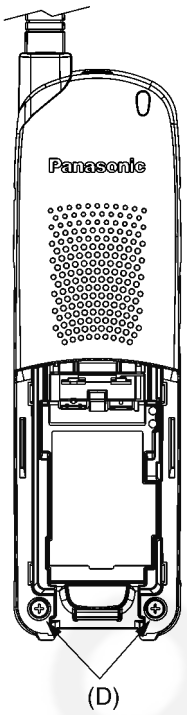


Fig. 5

Note: When opening the rear cabinet,
be careful of the speaker lead wire.

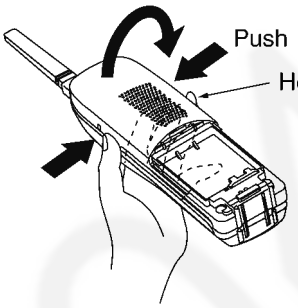


Fig. 6

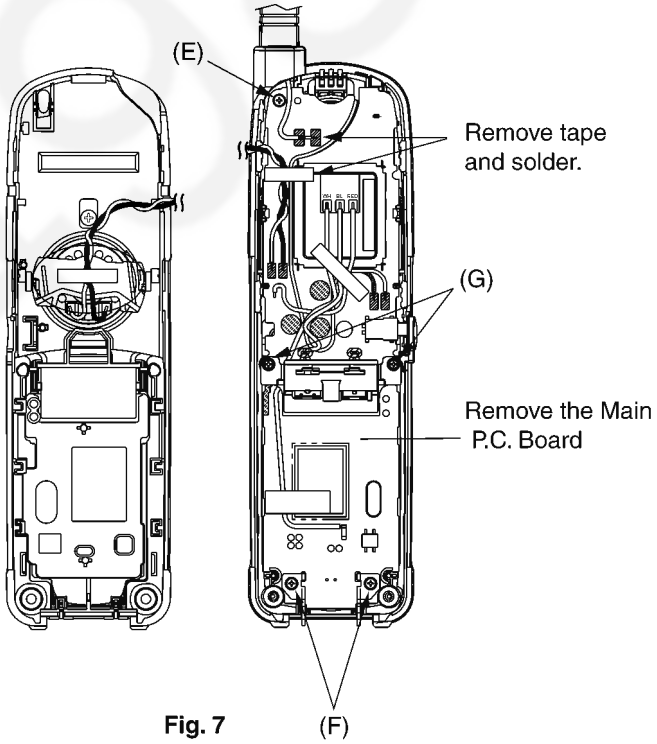
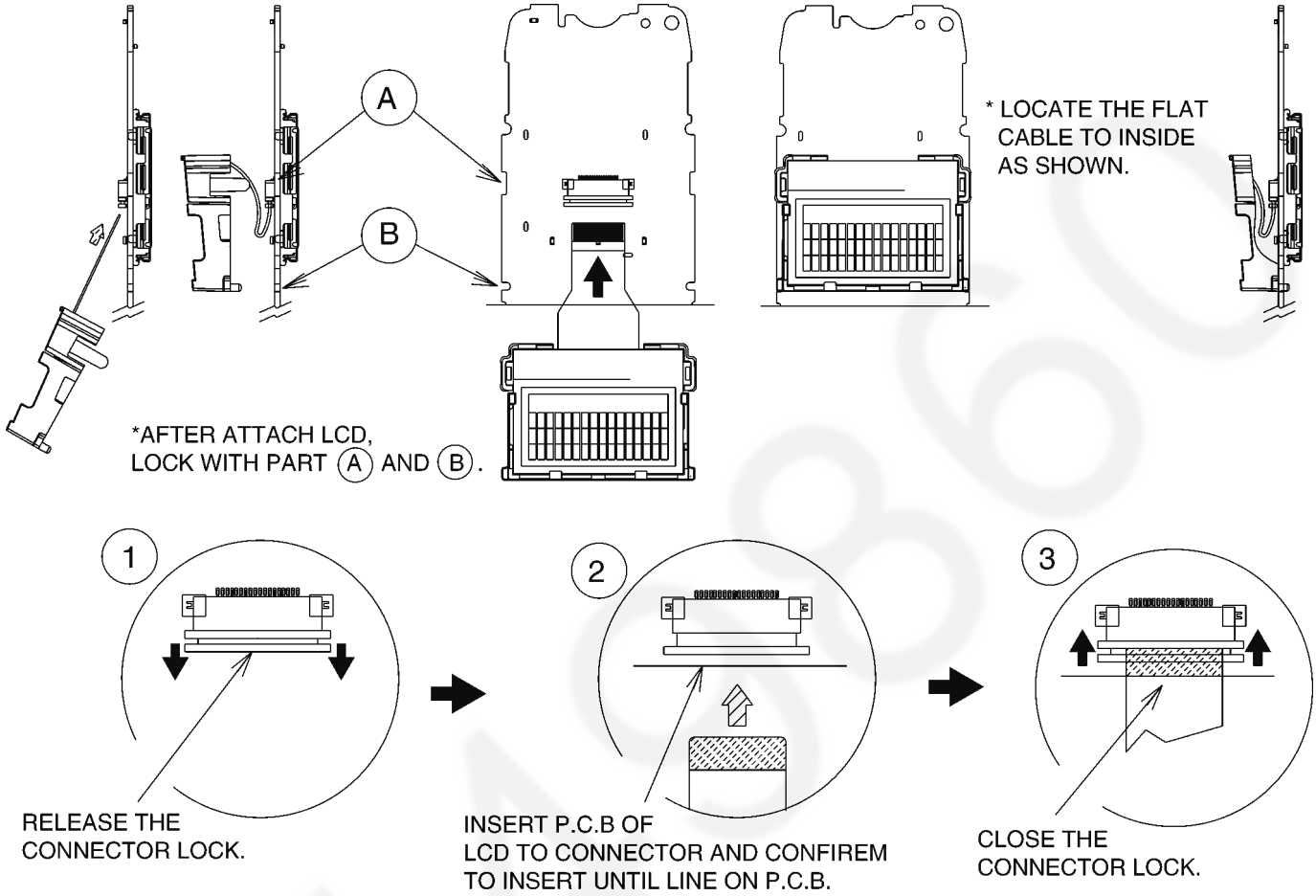


Fig. 7

Shown in Fig.-	To Remove -	Remove -
4	Battery Cover	Battery Cover
5	Rear Cabinet	Screws (2.6 × 12).....(D) × 2
6	Rear Cabinet	Rear Cabinet
7	Main P.C. Board	Screw (2.6 × 12).....(E) × 1
		Screws (2.6 × 9).....(F) × 2
		Screws (2 × 10).....(G) × 2
		Tape and Solder
		The Main P.C. Board

11 ASSEMBLY INSTRUCTIONS

11.1. Fix the LCD to P.C. Board (Handset)



11.2. Connect the Small P.C. Board to Main P.C. Board (Handset)

1. WIPE THE SURFACE OF RF UNIT USING ALCOHOL (IPA). PEEL THE SEPARATOR OFF SMALL P.C.B. AND STICK THE P.C.B. TO THE RF UNIT (Fig. 1).
2. SOLDER LEAD WIRES (BLUE, RED, WHITE) FROM THE SMALL P.C.B. TO MAIN P.C.B. (Fig. 2).
3. FIX THE LEAD WIRES WITH HIMERON TAPE AND ACETATE TAPE AFTER WIRING AS SHOWN (Fig. 1).

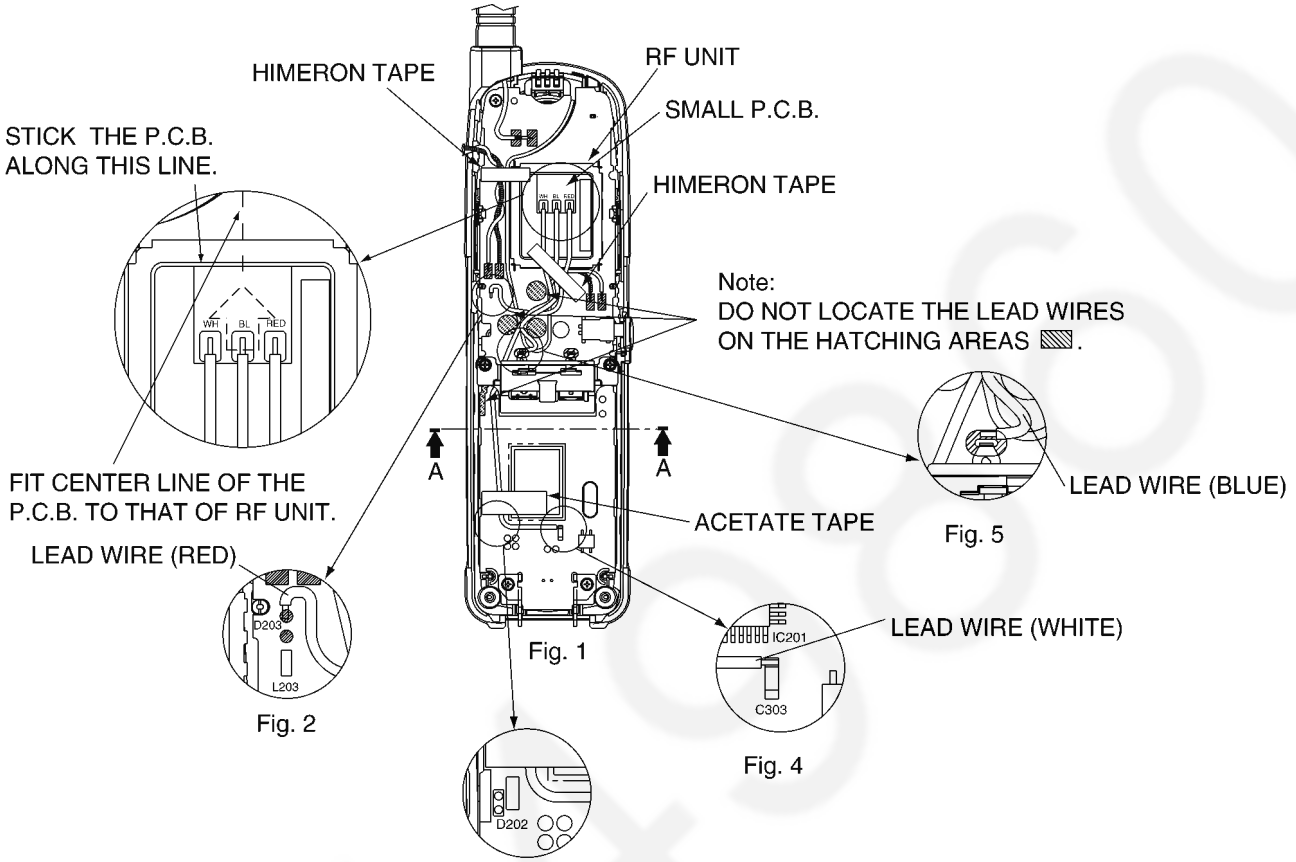


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

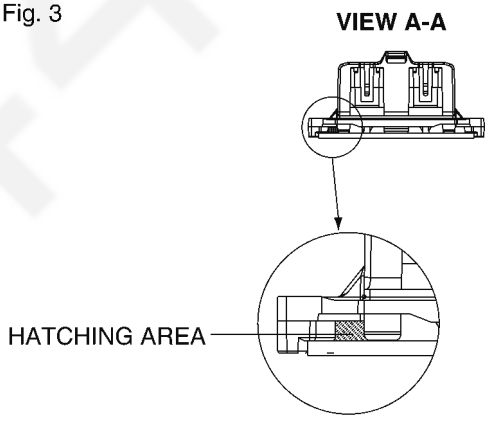
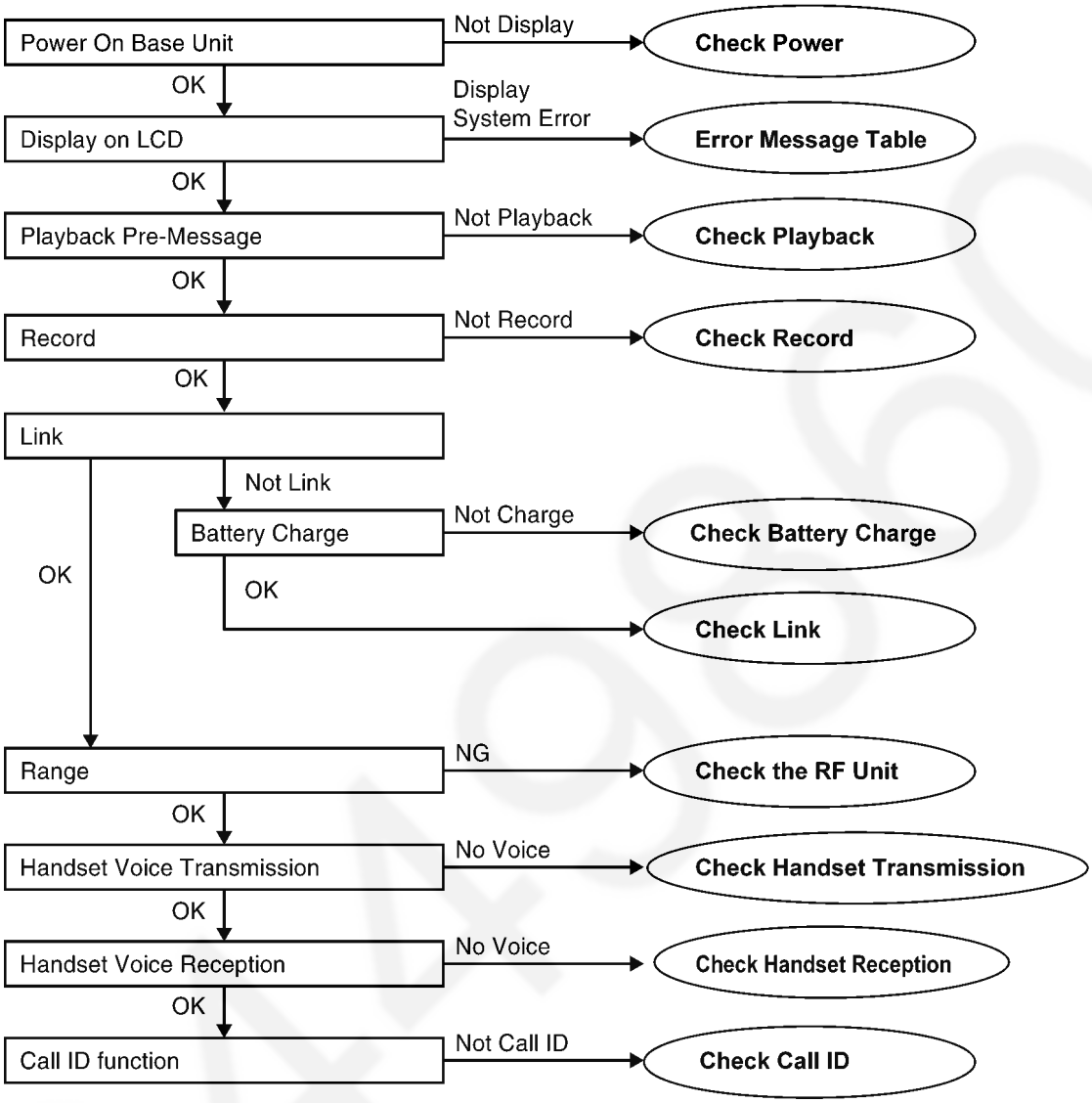


Fig. 6

12 TROUBLESHOOTING GUIDE

FLOW CHART



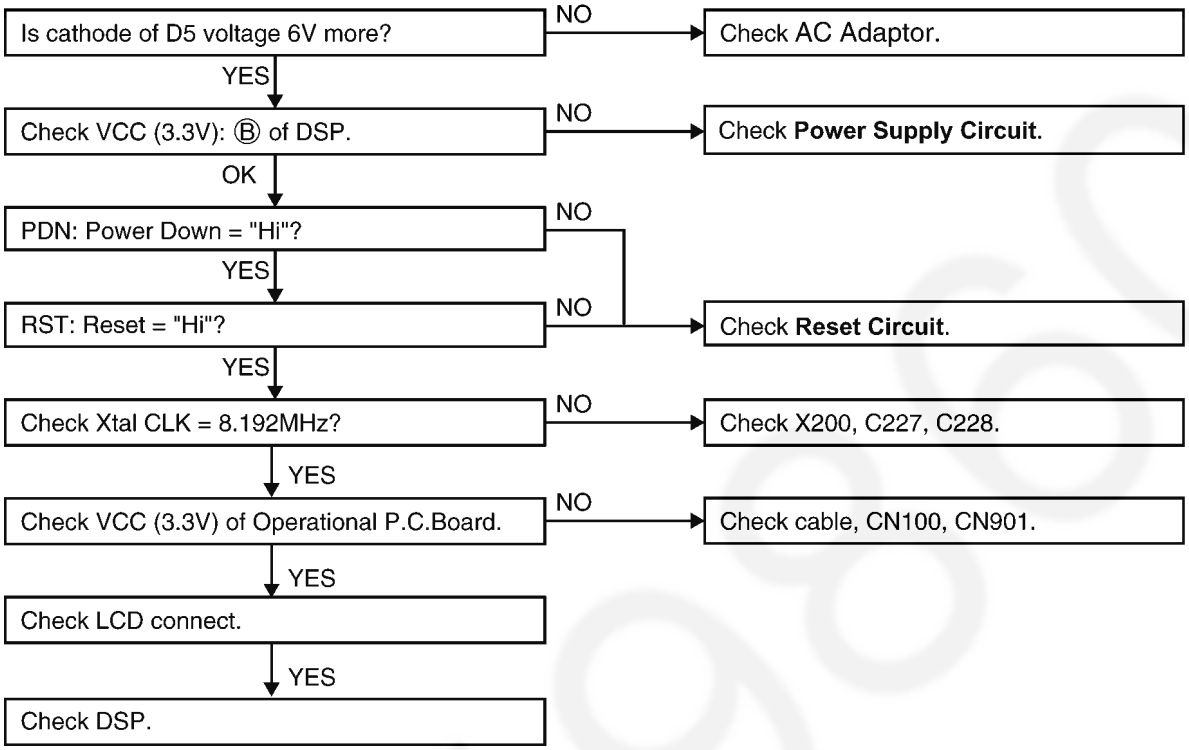
Cross Reference:

Check Power (P.34)
Error Message Table (P.34)
Check Playback (P.36)
Check Record (P.35)
Check Battery Charge (P.37)
Check Link (P.37)
Check the RF Unit (P.38)
Check Handset Transmission (P.43)
Check Handset Reception (P.43)
Check Caller ID (P.43)

12.1. Check Power

BASE UNIT

Is the AC Adaptor inserted into 120V outlet? (AC Adaptor PQLV19Z)



Cross Reference:

Power Supply Circuit (P.56)

Reset Circuit (P.57)

Note:

Flash Memory is IC300.

DSP is IC201.

12.2. Error Message Table

Display	Symptom	Remedy
E 1	The initialization was tried, but it could not be done.	1. Check the peripheral circuit of Flash Memory visually. 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.
E 3 E 9	When the adjustment data was checked, an error was detected. (The adjustment data may not be written.)	
E 7	The defect of synthesized voice was detected. (The synthesized voice may not be written.)	
E 2 E 8 E A E E	The defect of Flash Memory was detected.	When Flash Memory has the fatal detect, replace Flash Memory. This error hardly occurs.
E 4	The defect of DSP was detected. (The chip in DSP may have a defect.)	1. Confirm Pins of DSP or resoldering. 2. Confirm the oscillation frequency of DSP. If no frequency is found, replace DSP because it might be defect.
E 5 E 6 E L E	The defect of DSP was detected.	Replace DSP.

Note:

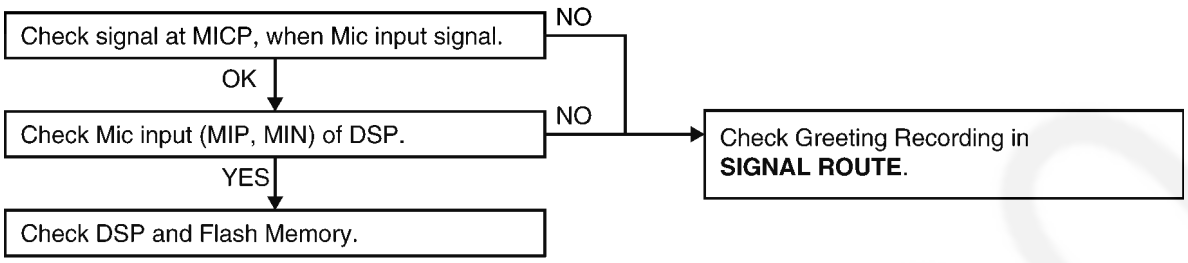
Flash Memory is IC300.

DSP is IC201.

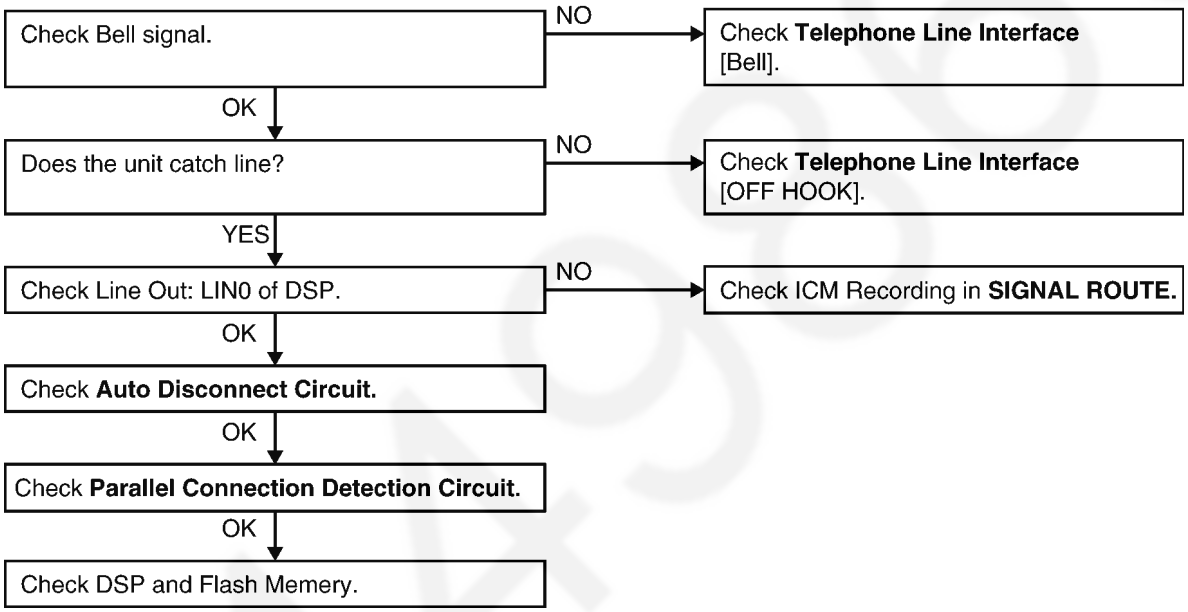
12.3. Check Record

BASE UNIT

Not record Greeting Message



Not record Incoming Message



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”→”REPEAT”+”SP-PHONE”simultaneously	Stand-by
	4 sec	”STOP”→”REPEAT”+”UP” simultaneously	
Disable*		”STOP”→”REPEAT”+”DOWN” simultaneously	

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

Cross Reference:

Telephone Line Interface (P.58)

Auto Disconnect Circuit (P.59)

Parallel Connection Detect Circuit (P.59)

SIGNAL ROUTE (P.66)

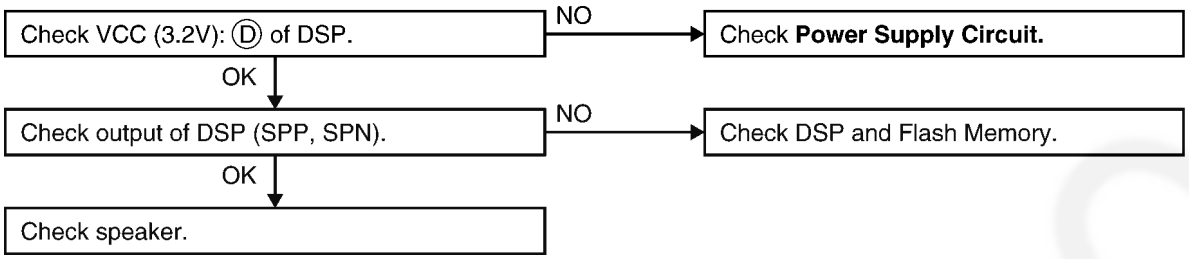
Note:

Flash Memory is IC300.

DSP is IC201.

12.4. Check Playback

BASE UNIT



Cross Reference:

Power Supply Circuit (P.56)

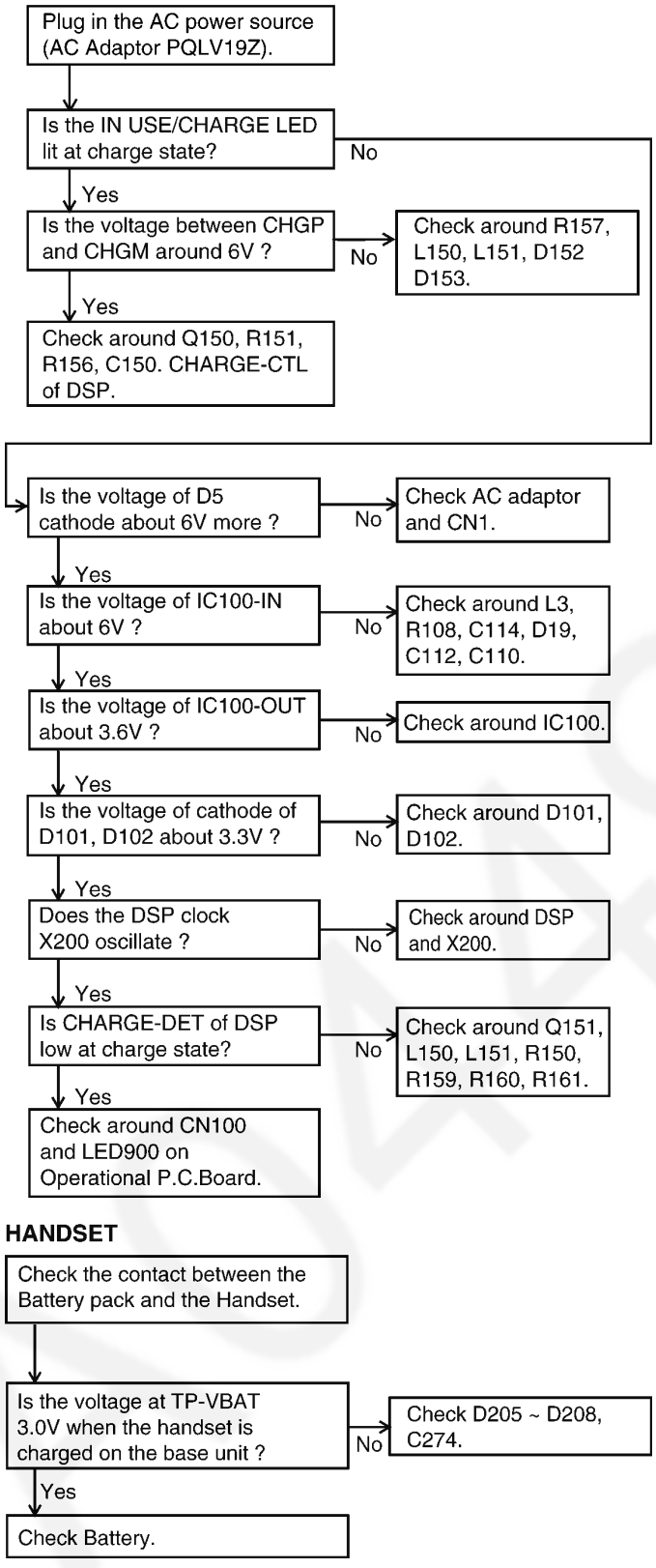
Note:

Flash Memory is IC300.

DSP is IC201.

12.5. Check Battery Charge

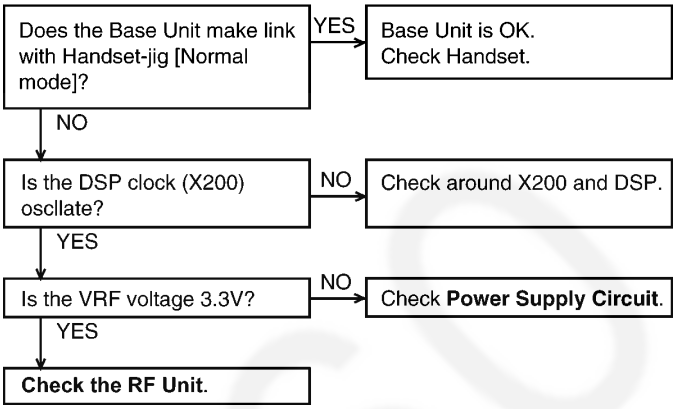
BASE UNIT



HANDSET

12.6. Check Link

BASE UNIT



Cross Reference:

Check the RF Unit (P.38)

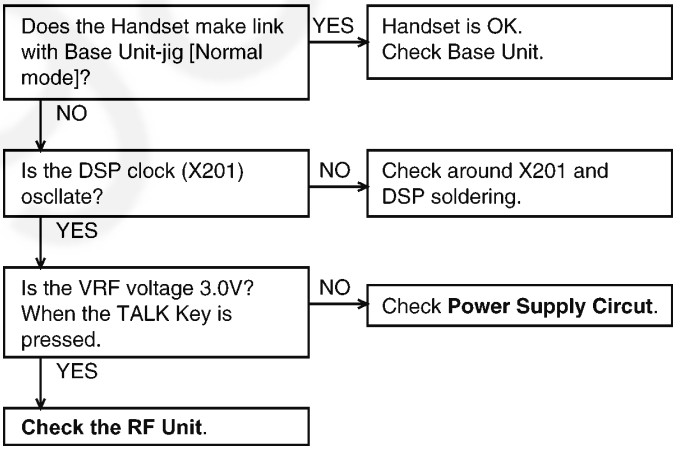
Power Supply Circuit (P.56)

Note:

Flash Memory is IC300.

DSP is IC201.

HANDSET



Cross Reference:

Check the RF Unit (P.38)

Power Supply Circuit (P.63)

Note:

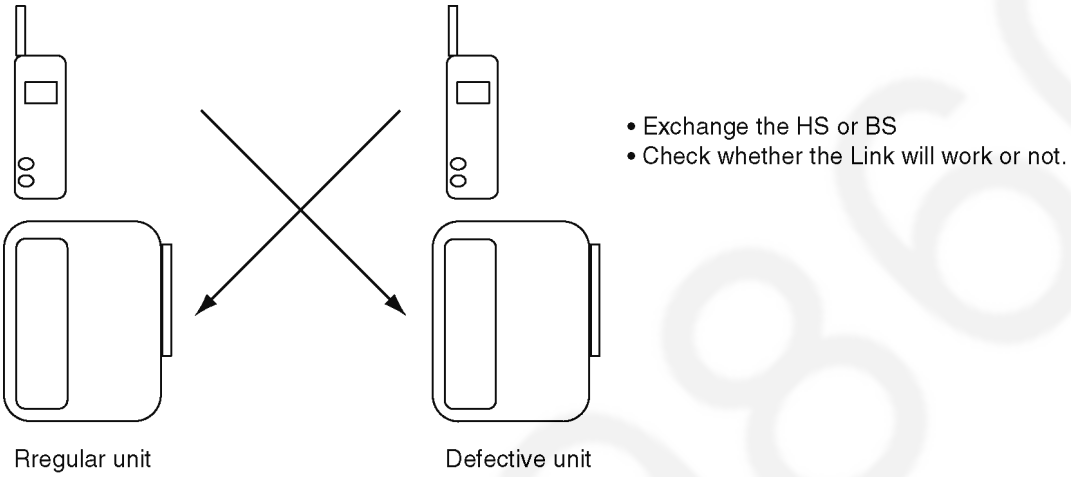
EEPROM is IC202.

DSP is IC201.

12.7. Check the RF Unit

12.7.1. Defective Unit Check

The defective unit should be checked using the HS of Regular unit (working) and BS of Regular unit (working). Both* of Regular unit (working) are required as the defect may be either in the handset or the base of the defective unit. For a defective BASE UNIT, place HS of Regular unit (working) on the cradle of the unit and check to see that the handset links with the base. To confirm that they do link, lift handset off the cradle and press TALK button. A beep is heard and in use/charge LED's of the base unit should turn on. For a defective HANDSET UNIT, place HS on the cradle of the BS of Regular unit (working) and check to see that the HS links with the base. Again, press TALK button. A beep is heard and in use/charge LED's of the BS of Regular unit (working) should turn on.



See **RF Check Flowchart** (P.40).

See **Check Table for RF Block** (P.41).

Note:

*KX-TG2258 with marks HS JIG/BS JIG can be used only for troubleshooting. However, regular production set also can be used as a JIG.

12.7.2. Converting a Regular Production Unit to a JIG

Both base unit and handset unit have two modes: TEST POWER LOW mode and NORMAL POWER mode even a Regular production unit.

Each unit can be used as a JIG by changing the original NORMAL POWER mode to TEST POWER LOW mode.

- NORMAL POWER mode.

  In this mode both base unit and handset unit can be used as a regular set.

- **TEST POWER** LOW mode, when production unit has been changed into a jig and will be used to check RF link.

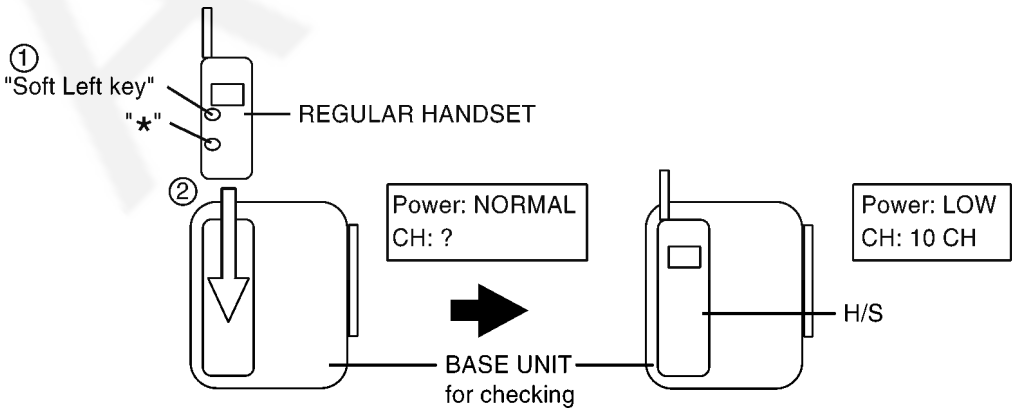
  In this mode it is for checking if the sensitivity of RF block for both base unit and handset unit are good or not. Procedure as follows to enter this mode.

  (1) Press "Soft Left key" and "⊠" of the handset simultaneously, and keep it (10CH is taken for example).

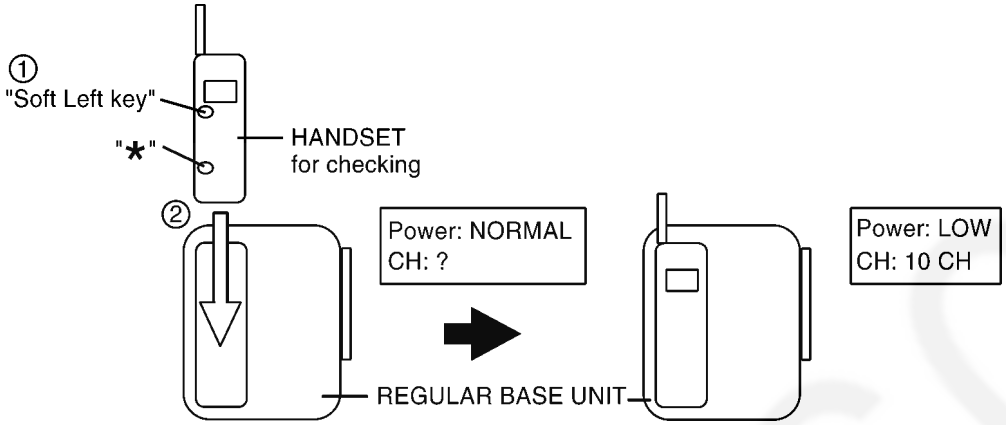
  (2) Place the handset unit on the cradle of the base unit. (A long beep sounds, and the display is not changed.)

  As shown in below a) HANDSET, b) BASE UNIT

a) HANDSET



b) BASE UNIT



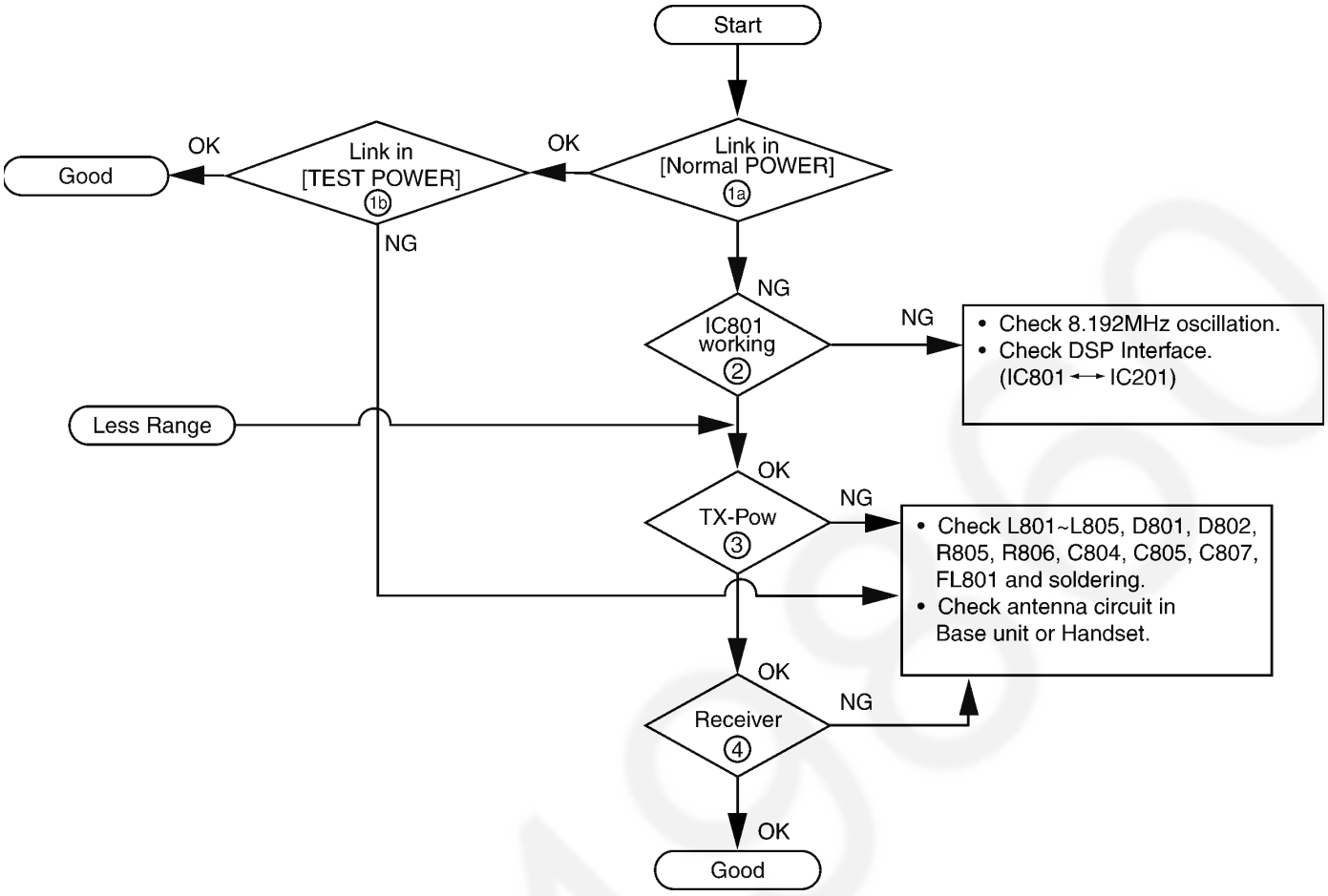
A short beep followed by a long beep is heard. This indicates the unit is in TEST POWER LOW mode. Once in TEST POWER LOW mode, to return the unit to the original NORMAL POWER mode, press 2, 5, 8, 0 simultaneously while the handset unit is in stand-by (not in use, not charging). A long beep is heard. Then disconnect the battery from the handset. Reconnect the battery and place the handset on the cradle to exchange security codes. A single beep is heard.

Note:

You can check the other channels as follows, if need.

Fixation CH	**Figure 1**	
CH	POWER	making key
1CH	“LOW“	"Soft Left key" + "1"
2CH	“LOW“	"Soft Left key" + "2"
3CH	“LOW“	"Soft Left key" + "3"
4CH	“LOW“	"Soft Left key" + "4"
5CH	“LOW“	"Soft Left key" + "5"
6CH	“LOW“	"Soft Left key" + "6"
7CH	“LOW“	"Soft Left key" + "7"
8CH	“LOW“	"Soft Left key" + "8"
9CH	“LOW“	"Soft Left key" + "9"
10CH	**“LOW”**	**"Soft Left key" + "⊠" ←** the above case
11CH	“LOW“	"Soft Left key" + "0"
12CH	“LOW“	"Soft Left key" + "#"
13CH	“LOW“	"Down key" + "1"
14CH	“LOW“	"Down key" + "2"
15CH	“LOW“	"Down key" + "3"
16CH	“LOW“	"Down key" + "4"
17CH	“LOW“	"Down key" + "5"
18CH	“LOW“	"Down key" + "6"
19CH	“LOW“	"Down key" + "7"
20CH	“LOW“	"Down key" + "8"
21CH	“LOW“	"Down key" + "9"
22CH	“LOW“	"Down key" + "⊠"
23CH	“LOW“	"Down key" + "0"
24CH	“LOW“	"Down key" + "#"
25CH	“LOW“	"OFF" + "⊠"
26CH	“LOW“	"OFF" + "#"
1CH	“NORMAL“	"OFF" + "1"
4CH	“NORMAL“	"OFF" + "2"
7CH	“NORMAL“	"OFF" + "3"
10CH	“NORMAL“	"OFF" + "4"
13CH	“NORMAL“	"OFF" + "5"
14CH	“NORMAL“	"OFF" + "6"
17CH	“NORMAL“	"OFF" + "7"
20CH	“NORMAL“	"OFF" + "8"
23CH	“NORMAL“	"OFF" + "9"
26CH	“NORMAL“	"OFF" + "0"

12.7.3. RF Check Flowchart



1a ~ ④ : Details of confirmation items are following in "**Check Table for RF Block** (P.41)".

Note:

DSP is IC201. (for Base Unit)

DSP is IC201. (for Handset)

Both of RF Blocks for Handset and Base Unit are same.

12.7.4. Check Table for RF Block

No	Item		BS (Base unit) (*1)	HS (Handset) (*1)
1a.	Link confirmation [NORMAL POWER]	Procedure	1. Put “HS (working)” on BS. 2. Set MODE to [NORMAL POWER] of “HS (working)“. 3. Press [TALK] key of “HS (working)” to establish link.	1. Put HS on “BS (working)”. 2. Set MODE to [NORMAL POWER] of “BS (working)“. 3. Press [TALK] key of “HS” to establish link.
1b.	Link confirmation [TEST POWER] for confirmation the sensitivity of RF Block	Procedure	1. Change MODE to [**TEST POWER**] of “HS (working)”. 2. Press [TALK] key of “HS (working)” to establish link. 3. Confirm the suspicious BS links to HS (working) with approximately the same distance from BS (working).	1. Change MODE to [**TEST POWER**] of “BS (working)”. 2. Press [TALK] key of “HS“ to establish link. 3. Confirm the suspicious HS links to BS (working) with approximately the same distance from HS (working).
2	IC801 working confirmation	Procedure	1. Set Test-mode Just entering to test mode.(*3) 2. Confirm oscillate signal of RF UNIT (8.192 MHz at OSC). (*5)	1. Set Test-mode Just entering to test mode.(*3) 2. Confirm oscillate signal of RF UNIT (8.192 MHz at OSC). (*6)
		Check point	1. Check Xtal oscillator at Q260 - C of the base unit. 2. Check DSP interface(IC801←→DSP/BS) (*4).	1. Check Xtal oscillator at Q204 - C of the handset. 2. Check DSP interface(IC801←→DSP/HS) (*4).
3	TX Power confirmation	Procedure	1. Put RF wire to ANT and ANT_GND (See **Base Unit Reference Drawing**). Connect this wire to the Spectrum Analyzer. 2. Set Test-mode. (*7) 3. Confirm TX power level within +11±5dBm (*2)	1. Put RF wire to ANT and ANT_GND (See **Handset Reference Drawing**). Connect this wire to the Spectrum Analyzer. 2. Set Test-mode. (*8) 3. Confirm TX power level within +11±5dBm (*2)
		Check point	1. Check L801 ~ L805, D801, D802, R805, R806, C804, C805, C807, FL801 and soldering. 2. Check Antenna in BS.	1. Check L801 ~ L805, D801, D802, R805, R806, C804, C805, C807, FL801 and soldering. 2. Check Antenna in HS.
4	Receiver confirmation	Procedure	1. Put “HS (working)” on BS. 2. Set MODE to [NORMAL POWER] of “HS (working)”. 3. Press [TALK] key of “HS (working)“ to establish link. 4. Change MODE to [TEST POWER] of “HS (working)“. 5. Press [TALK] key of “HS (working)” to establish link. Confirm the suspicious BS links to HS (working) with approximately the same distance from BS (working).	1. Put HS on “BS (working)”. 2. Set MODE to [NORMAL POWER] of “BS (working)”. 3. Press [TALK] key of “HS” to establish link. 4. Change MODE to [TEST POWER] of “BS (working)”. 5. Press [TALK] key of “HS” to establish link. Confirm the suspicious HS links to BS (working) with approximately the same distance from HS (working).
		Check point	1. Check C115, C114, L111, C118 soldering. 2. Check Antenna in BS.	1. Check C115, C114, L111, C118 soldering. 2. Check Antenna in HS.

(1*) BS : Base unit which is checked.

HS : Handset unit which is checked.

BS (working) : Base unit which is working.

HS (working) : Handset unit which is working.

(*2)<Spectrum analyzer setting>

SPAN: 10MHz

VBW, RBW: 1MHz

SWEEP: 1sec.

(*3)See **TEST MODE (** P.44).

(*4)See **RF-DSP interface signal wave form** (P.42).

See **CIRCUIT BOARD (BASE UNIT)** (P.89).

See **CIRCUIT BOARD (Handset)** (P.93).

(*5)See **Base Unit Reference Drawing** (P.48).

(*6) see **Handset Reference Drawing** (P.49)

(*7) see **Test mode flow chart for Base Unit** (P.44)

(*8) see **Test mode flow chart for Handset** (P.46)

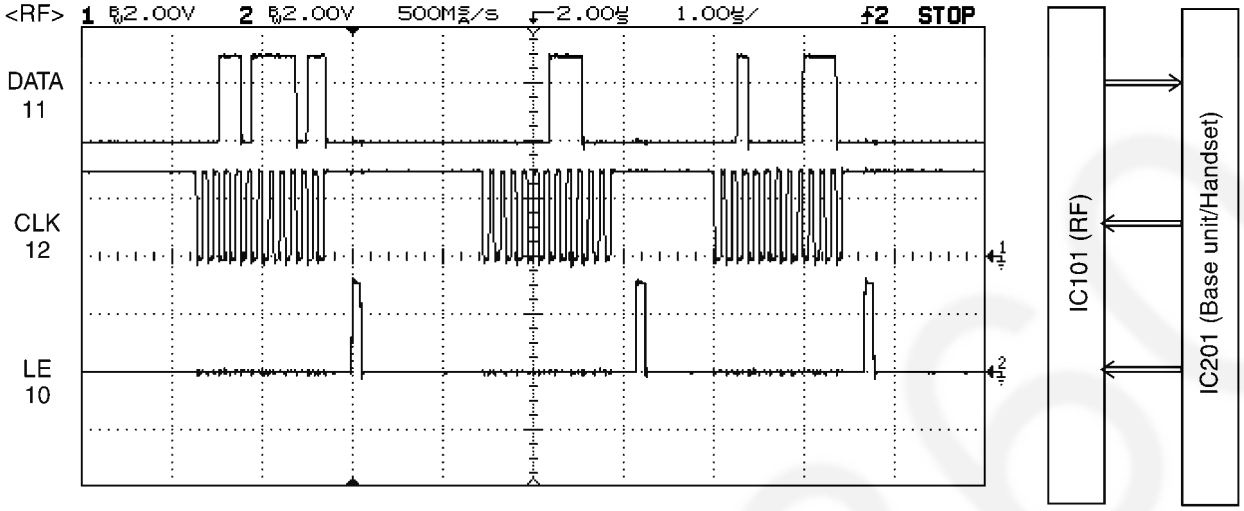
Note:

DSP is IC201. (for Base Unit)

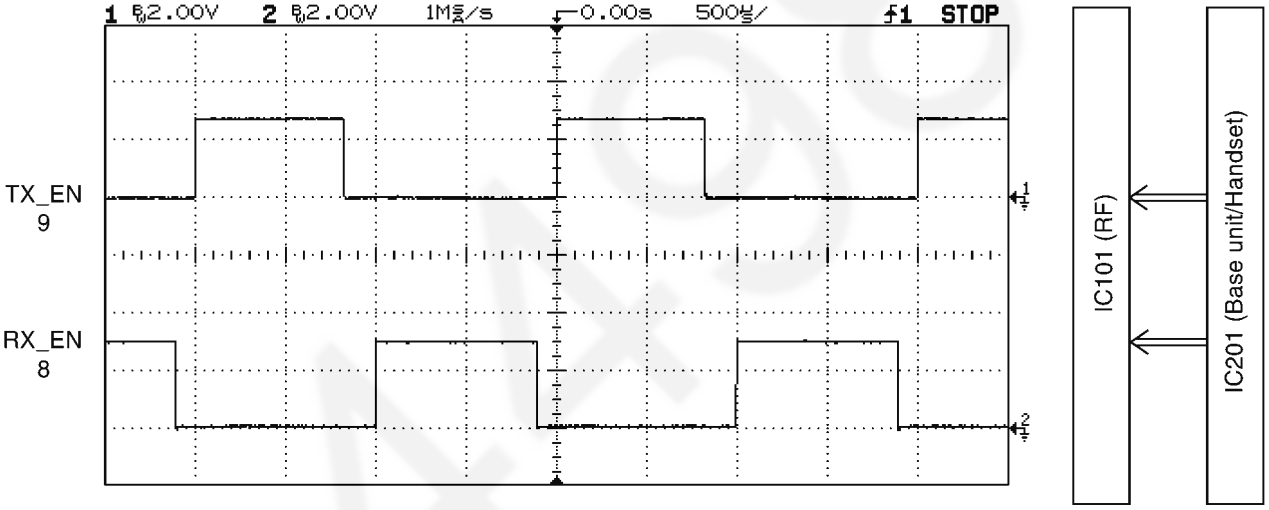
DSP is IC201. (for Handset)

12.7.5. RF-DSP interface signal wave form

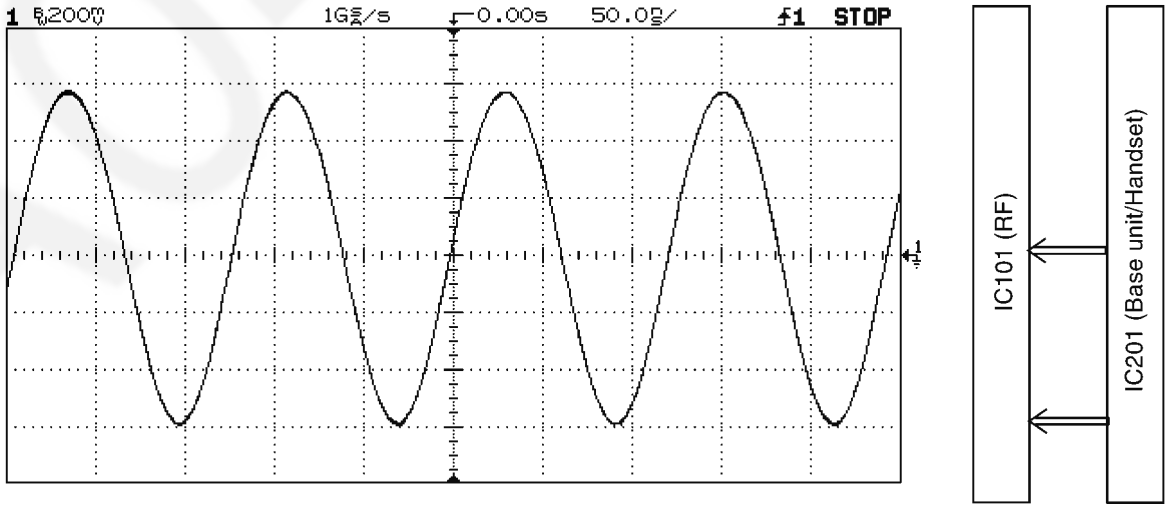
(1) Serial control line
<Standby mode>



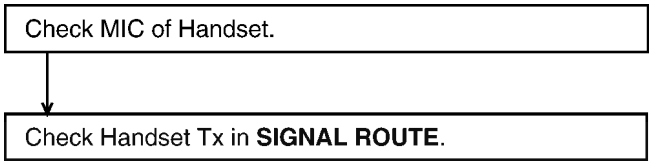
(2) Control line <Talk mode>
<Tx & Rx Power SW>



<Reference clock 8.192MHz>



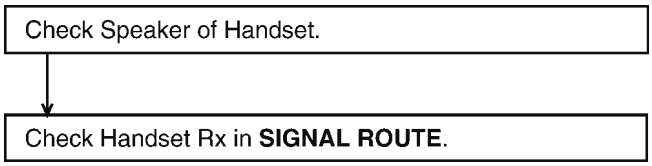
12.8. Check Handset Transmission



Cross Reference:

SIGNAL ROUTE (P.66).

12.9. Check Handset Reception



Cross Reference:

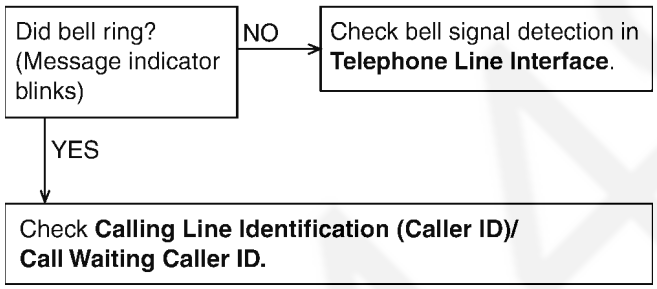
SIGNAL ROUTE (P.66).

Note:

When checking the RF UNIT, Refer to **Check the RF Unit** (P.38)

12.10. Check Caller ID

BASE UNIT



Cross Reference:

Telephone Line Interface (P.58).

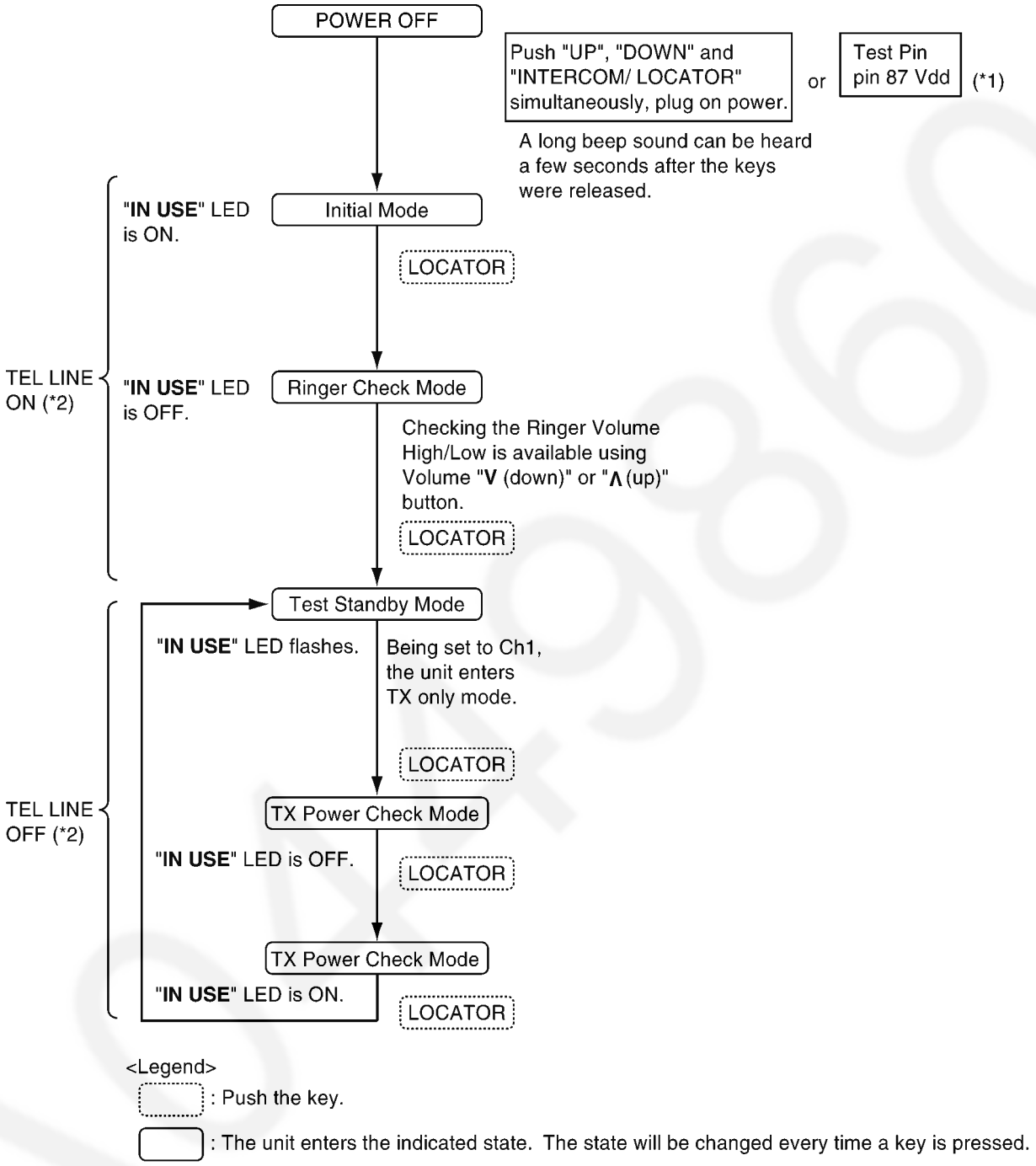
Calling Line Identification (Caller ID)/Call Waiting Caller ID (P.60).

Note:

- Make sure the format of the Caller ID or Call Waiting Caller ID service of the Telephone company that the customer subscribed to.
- Also we recommend to confirm that the customer is really a subscriber of the service.

13 TEST MODE

13.1. Test mode flow chart for Base Unit

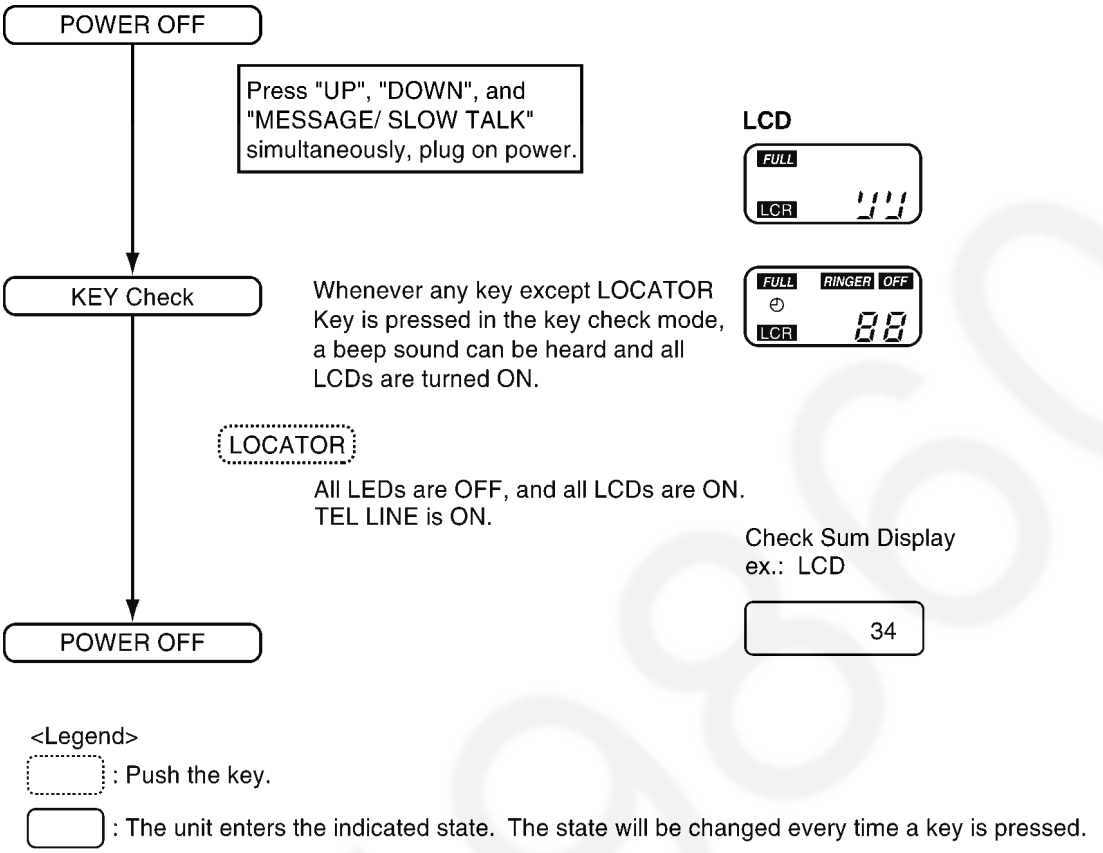


(*1) It shows whether the telephone line is connected or not.

-ON: OFF HOOK.

-OFF: ON HOOK

13.2. TAM Test mode flow chart

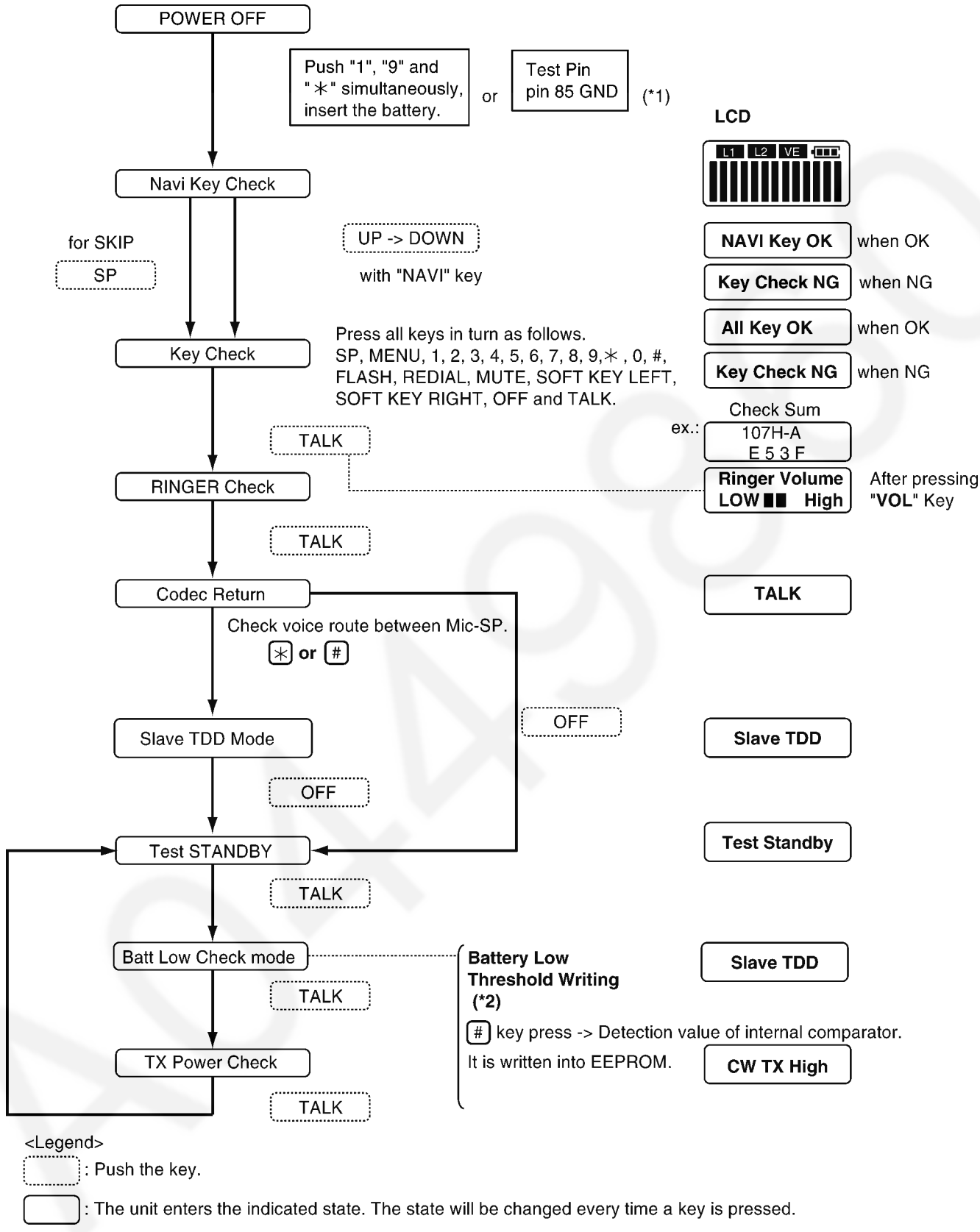


<Legend>

: Push the key.

: The unit enters the indicated state. The state will be changed every time a key is pressed.

13.3. Test mode flow chart for Handset



<Legend>

: Push the key.

: The unit enters the indicated state. The state will be changed every time a key is pressed.

(*1) See **Handset Reference Drawing** (P.49).---Should return to OPEN after entering the Test mode.

(*2) See **Adjustment Battery Low Detector Voltage** (P.47).

13.4. X201 Check

The confirmation is made under the “TX Power Check” mode of TEST MODE.

Equipment: Frequency counter

TP for measurement: TP_ANT

Measure range: 2472.64550 MHz ± 5 kHz (1ch) at Test Standby mode in **TEST MODE** (P.44).

13.5. Adjustment Battery Low Detector Voltage

After replacing handset’s DSP (IC201), Re-writing Battery Low voltage to EEPROM is required.

<How to re-write>

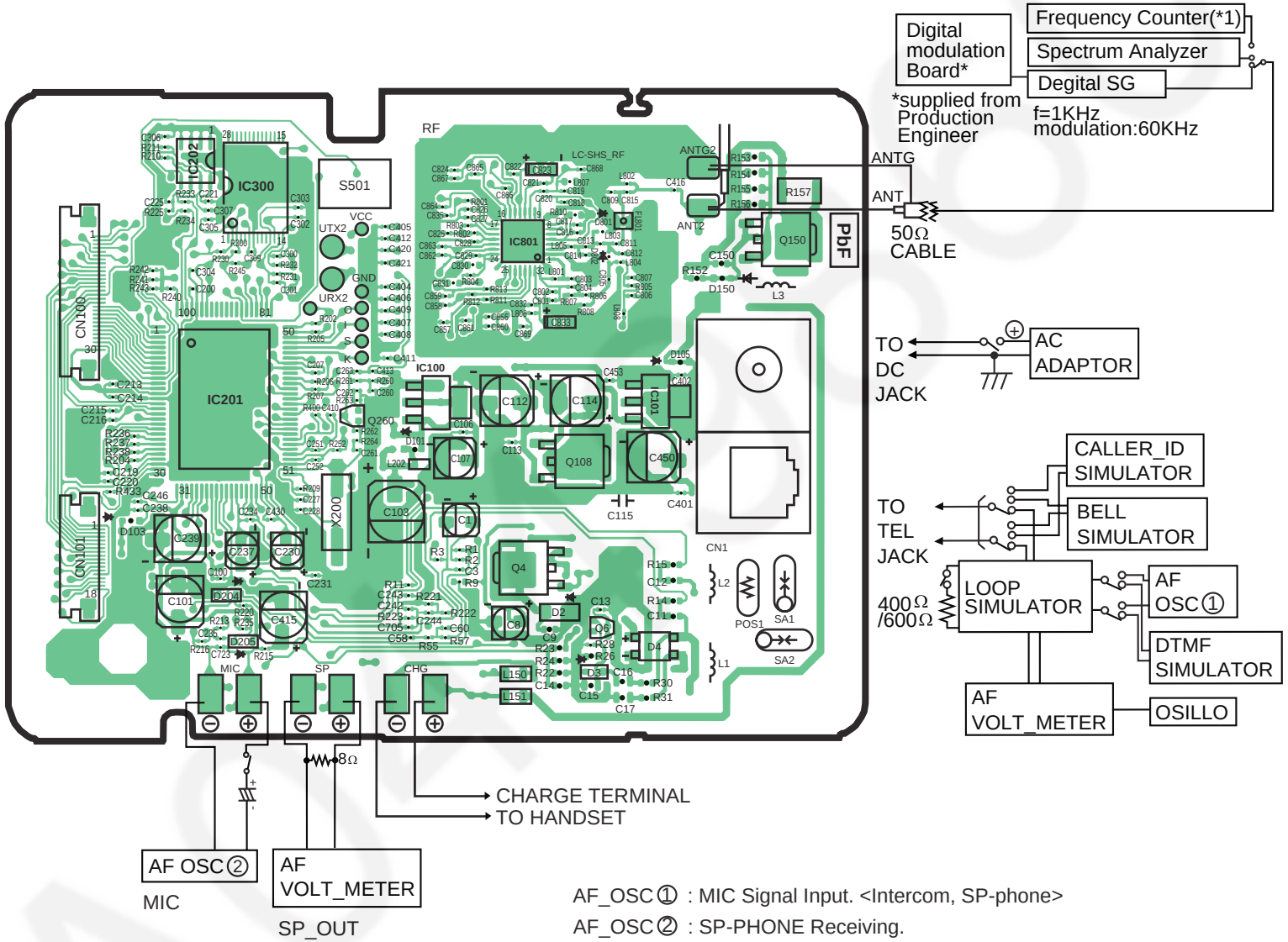
1. Set 2.7V for DC power supply.
2. Enter the test mode (Refer to **Test mode flow chart for Handset** (P.46))
3. Follow to “Batt Low Check” mode..... (Slave TDD is displayed on LCD)
4. Set 2.37V for DC power supply.

Note: Check voltage at battery connector, because some voltage drop is happened, using long or thin cable.

5. Press “#“ key to write voltage value in EEPROM.
6. Turn power off. Then this value is available.

13.6. Base Unit Reference Drawing

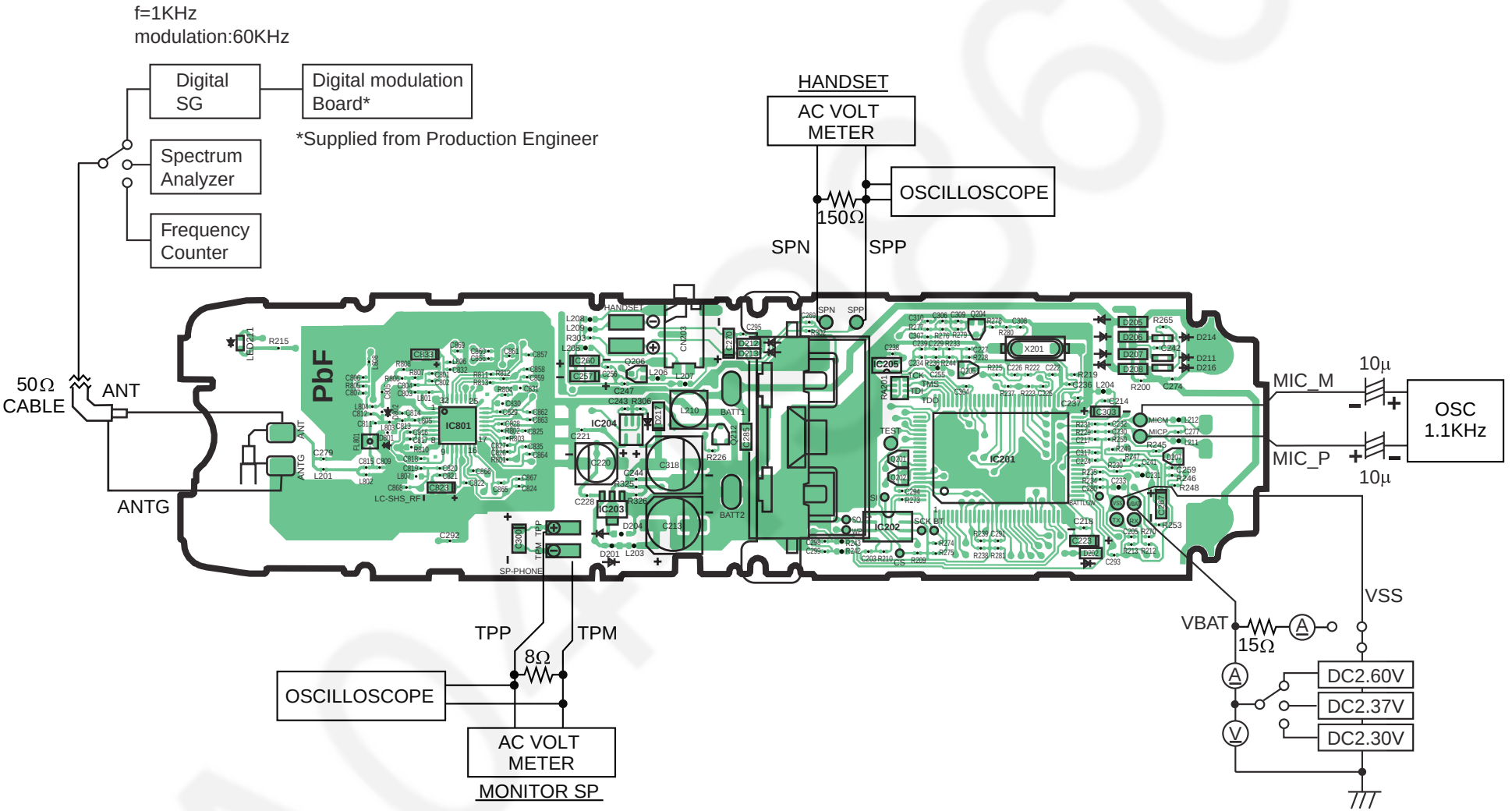
When connecting the Simulator and Equipments for checking, please refer to below.



Note: (*2) is refered to No.2 of **Check Table for RF Block** (P.41)

13.7. Handset Reference Drawing

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



Note: (*2) is refered to No.2 of **Check Table for RF Block** (P.41)

13.8. Frequency Table

Channel	TX/RX Frequency (MHz)	Channel	TX/RX Frequency (MHz)
1	2472.70400	21	2405.63050
2	2473.21425	22	2406.14400
3	2474.75150	23	2406.65425
4	2475.26175	24	2407.16775
5	2475.77525	25	2407.67800
6	2476.28550	26	2409.21525
7	2476.80225	27	2429.18325
8	2477.31250	28	2429.69675
9	2477.82600	29	2430.20700
10	2478.33625	30	2430.72050
11	2478.84975	31	2431.23075
12	2479.36000	32	2431.74425
13	2479.87350	33	2432.25450
14	2402.04900	34	2433.79175
15	2402.55925	35	2434.30200
16	2403.07275	36	2434.81550
17	2403.58300	37	2435.32575
18	2404.09650	38	2435.83925
19	2404.60675	39	2436.34950
20	2405.12025		

14 DESCRIPTION

14.1. Frequency

The frequency range of 2402.04900 MHz ~ 2479.87350 MHz is used. Transmitting and receiving channel between base unit and handset is same frequency. Refer to the Frequency Table.

14.2. Time Division Duplex (TDD) operation

Transmission/reception between the base unit and handset is performed by time-sharing as shown in Fig. 7. 1 slot time of transmission and reception is 1mS. Same frequency is used in transmitting and receiving. The figure shows an example; the frequency of 3ch is used in transmitting between the base unit and handset.

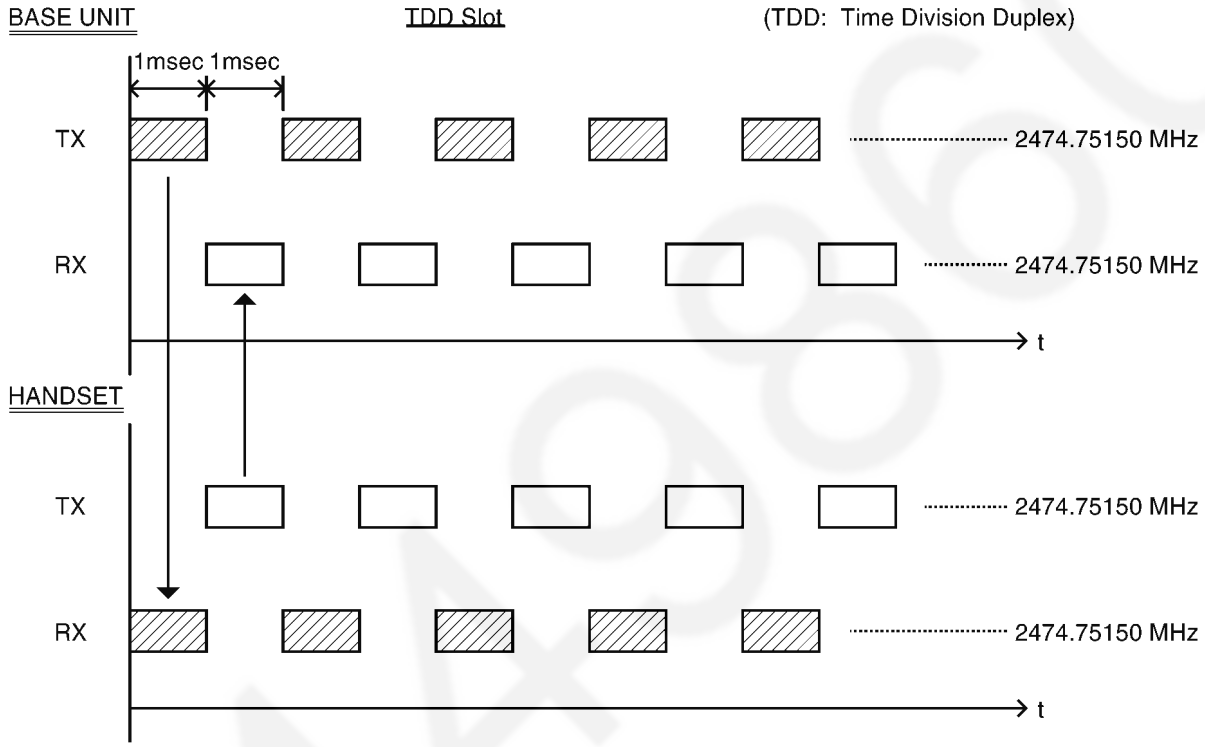


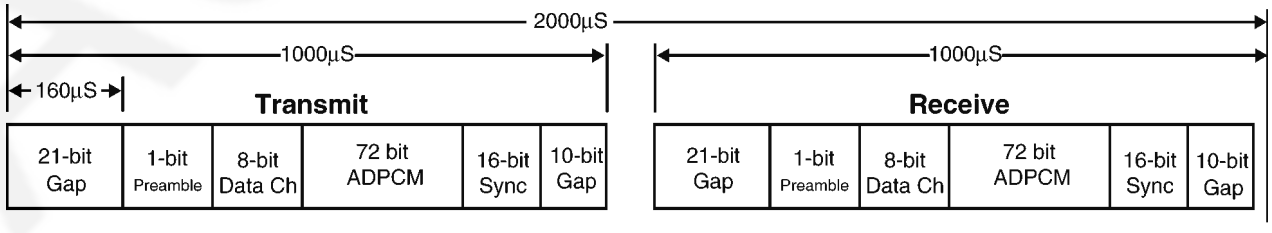
Fig. 7

14.2.1. TDD Frame Format

The TDD frame is 2mS in length. Each subframe contains 128 bits of 7.8µS duration.

Each subframe consists of the following four fields:

- A 1-bit Preamble field
- An 8-bit Data Channel field
- An 16-bit Sync Word
- A 72-bit ADPCM Payload (Parity 8-bit)



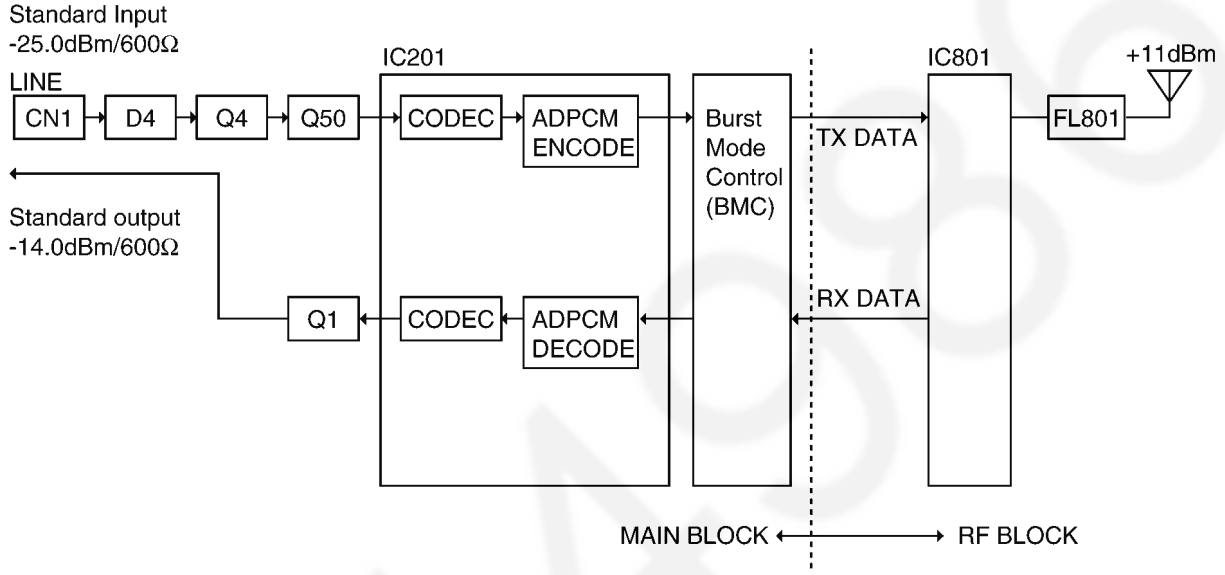
14.3. Signal Flowchart in the Whole System

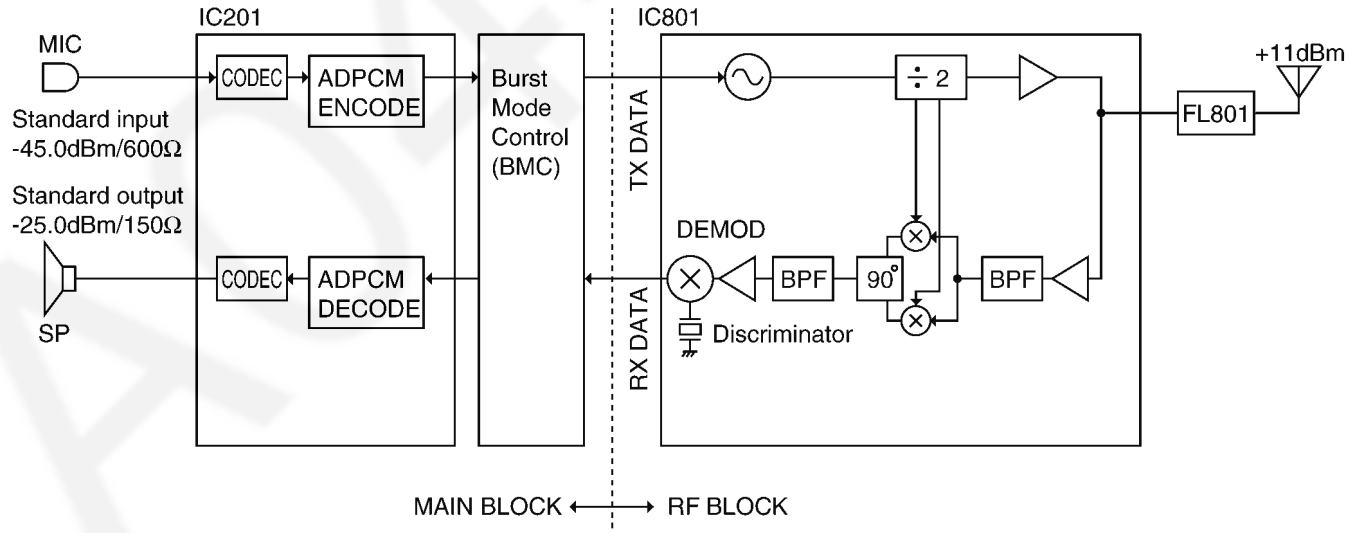
Reception

CN1 of the base unit is connected to the TEL line, and the signal is input through the bridge diode D4. While talking the relay (Q4) is turned ON and amplified at the amplifiers Q50, then led to DSP (IC201). DSP generates ADPCM signal. The ADPCM signal is input to RFIC (IC801) of RF UNIT. RFIC outputs FSK modulated RF signal. The RF signal is passed through filter (IC801) to be transmitted from the antenna. As for the handset, RF signal from the antenna is input to RFIC passing through filter (IC801) then input to DSP (IC201). DSP performs ADPCM decoding to convert the signal into the voice signal, then it is output to the speaker.

Transmission

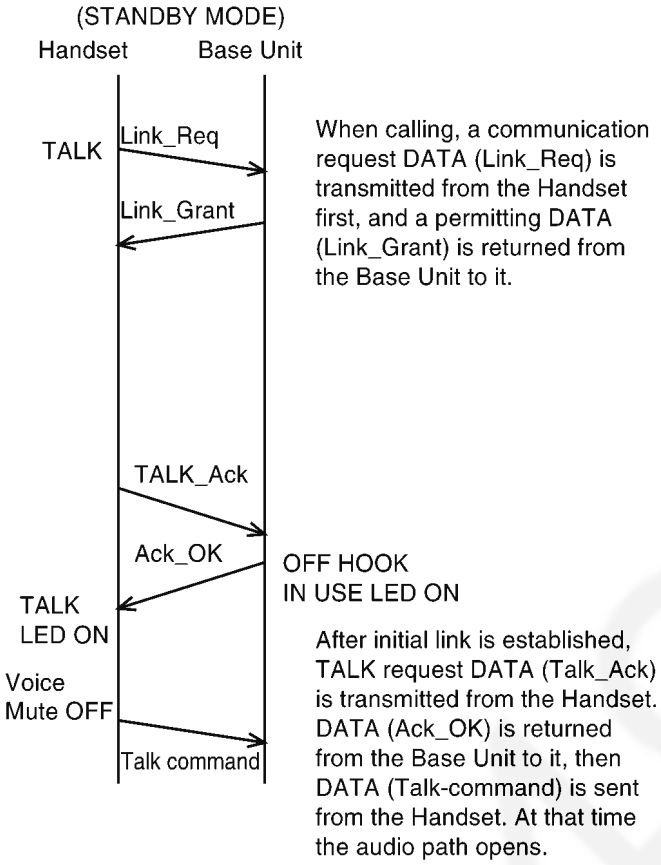
The voice signal input from the microphone is led to DSP (IC201). The DSP generates ADPCM signal. As well as the reception, it is converted into the RF signal by RFIC (IC801). Passing through filter (FL801), it is transmitted from the antenna. As for the base unit, RF signal from the antenna is input to RFIC (IC801) passing through filter (FL801) then input to DSP (IC201). DSP performs ADPCM decoding to convert the signal into the voice signal. The voice signal is amplified at the TX amplifier (Q1), then output to the TEL line (CN1) through the relay (Q4) and bridge (D4).



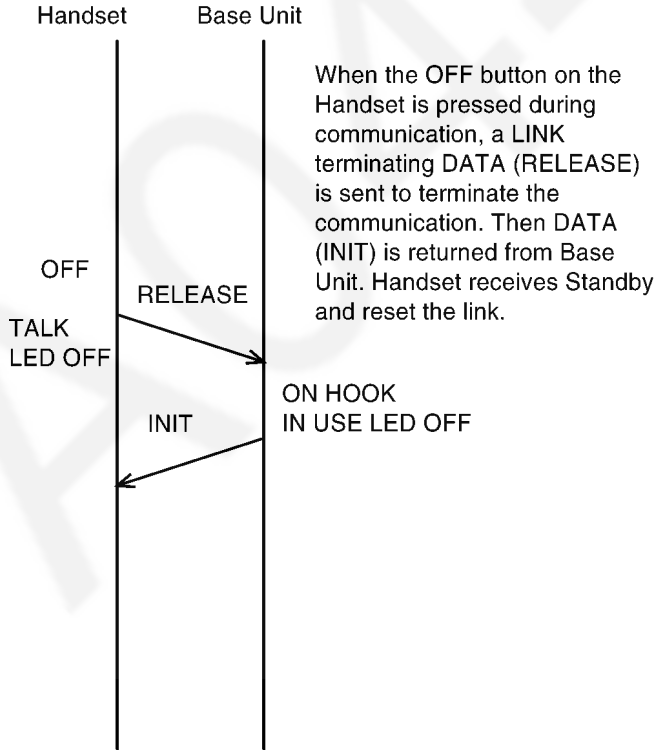


15 EXPLANATION OF BBIC (Base Band IC) DATA COMMUNICATION

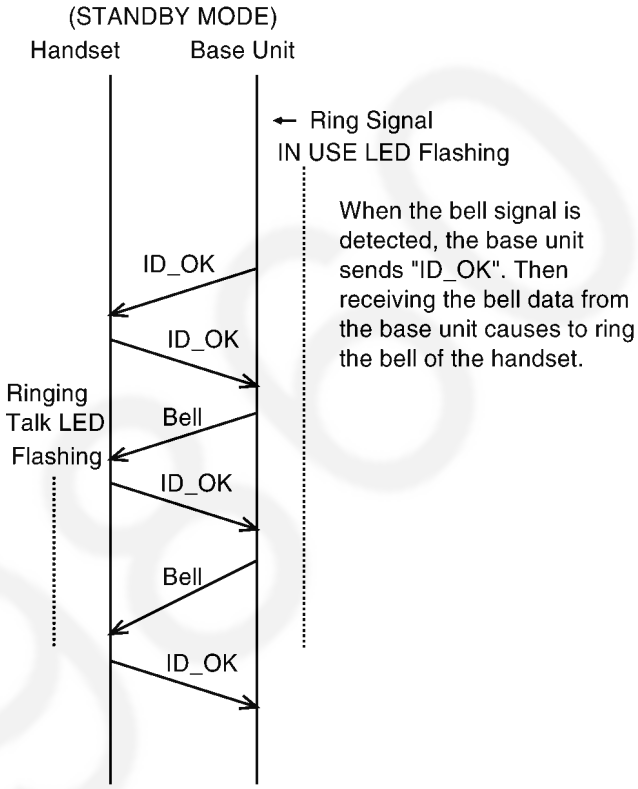
15.1. Calling



15.2. To Terminate Communication



15.3. Ringing

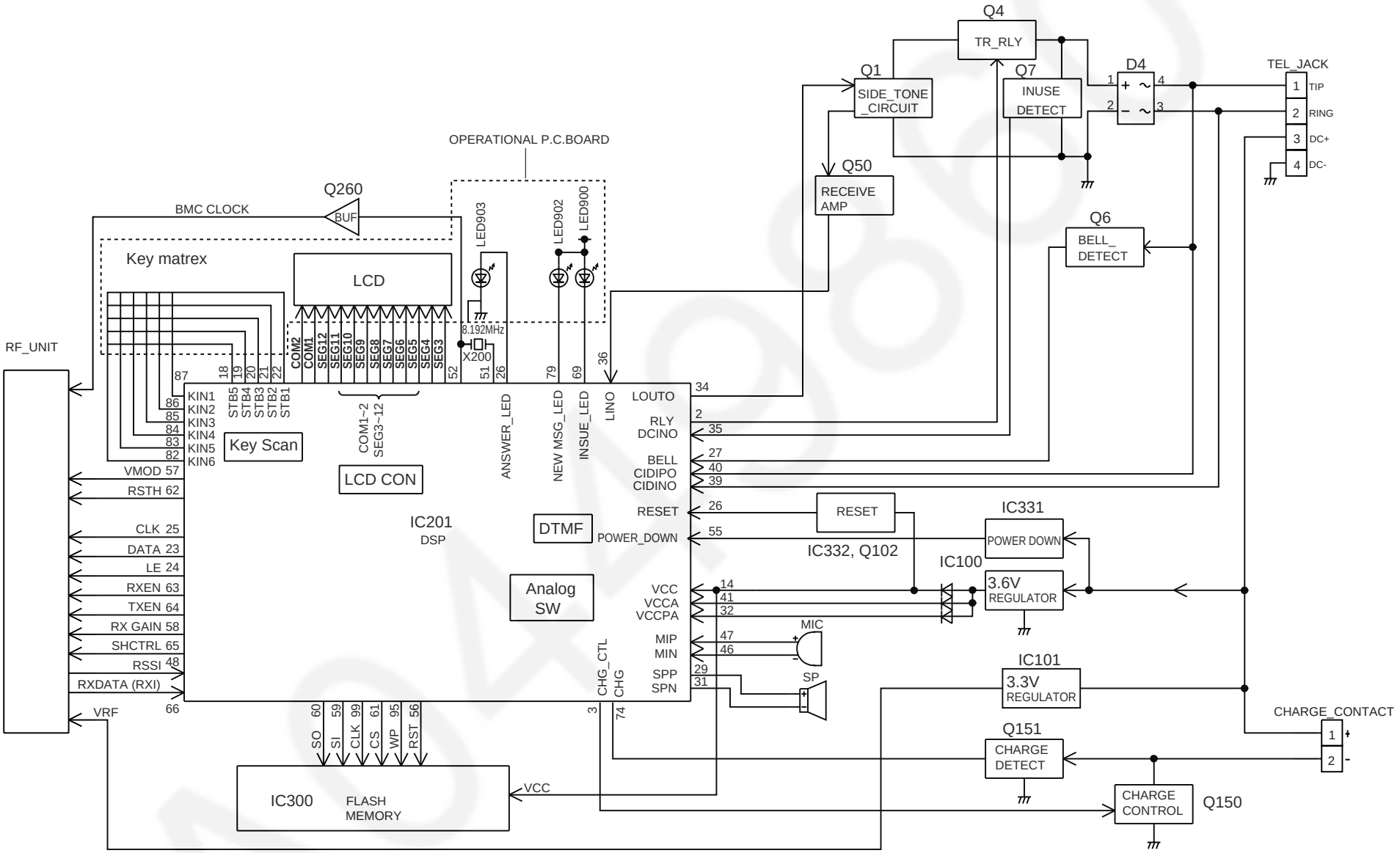


15.4. Ports for Transmitting and Receiving of Data

Handset: (IC201)
Transmitting ..... Pin 57 (TXO), Pin 64 (TXEN)
Receiving ..... Pin 66 (RXI), Pin 63 (RXEN)

Base Unit: (IC201)
Transmitting ..... Pin 57 (TXO), Pin 64 (TXEN)
Receiving ..... Pin 66 (RXI), Pin 63 (RXEN)

16 BLOCK DIAGRAM (Base Unit)



KX-TG2224F/P/W BLOCK DIAGRAM (BASE UNIT)

17 CIRCUIT OPERATION (Base Unit)

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.

17.1. DSP (Digital Speech/Signal Processing: IC201)

- **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, Playback, 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 an FLASH MEMORY, which stored the vocabulary.

- **Caller ID and Call Waiting CID 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 unit, LED, Key scan, Speaker, Microphone, Telephone line, LCD

17.2. Flash Memory (IC300)

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

17.3. Power Supply Circuit

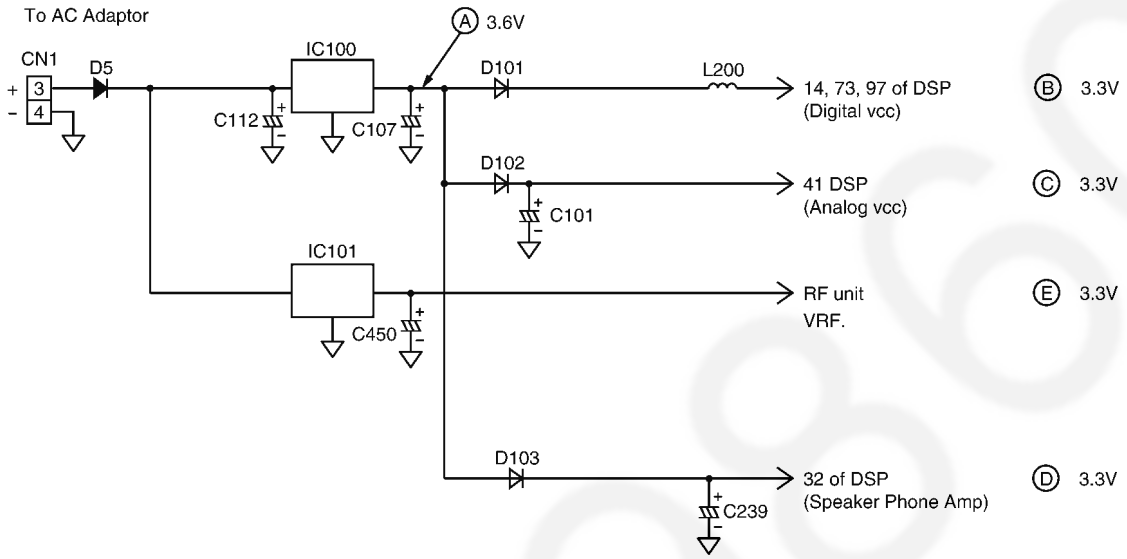
Function:

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

Circuit Operation:

This unit supplies the voltage to each block as shown below.

Circuit Diagram



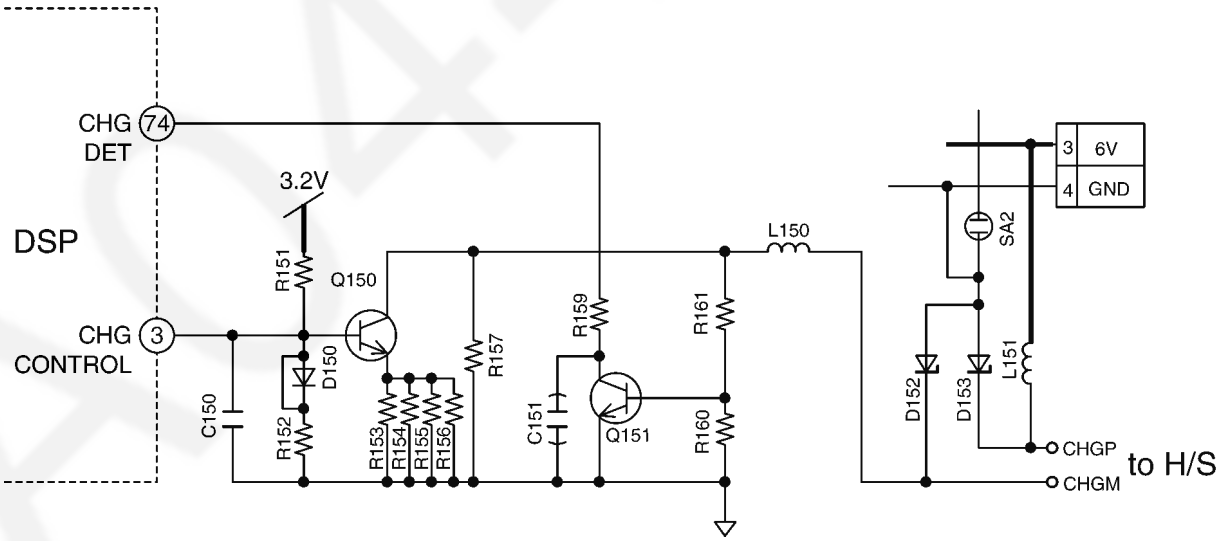
17.3.1. Charge Circuit

The voltage from the AC is supplied to the main charge circuits. Normal charge (290 mA) of maximum 6-hours is started soon after the Handset is placed on the base unit. Then it changes to trickle charge (15 mA on the average) to prevent from overcharging.

Normal charge : Q150 is ON

Trickle charge : Q150 is OFF

Circuit Diagram



17.4. Reset Circuit

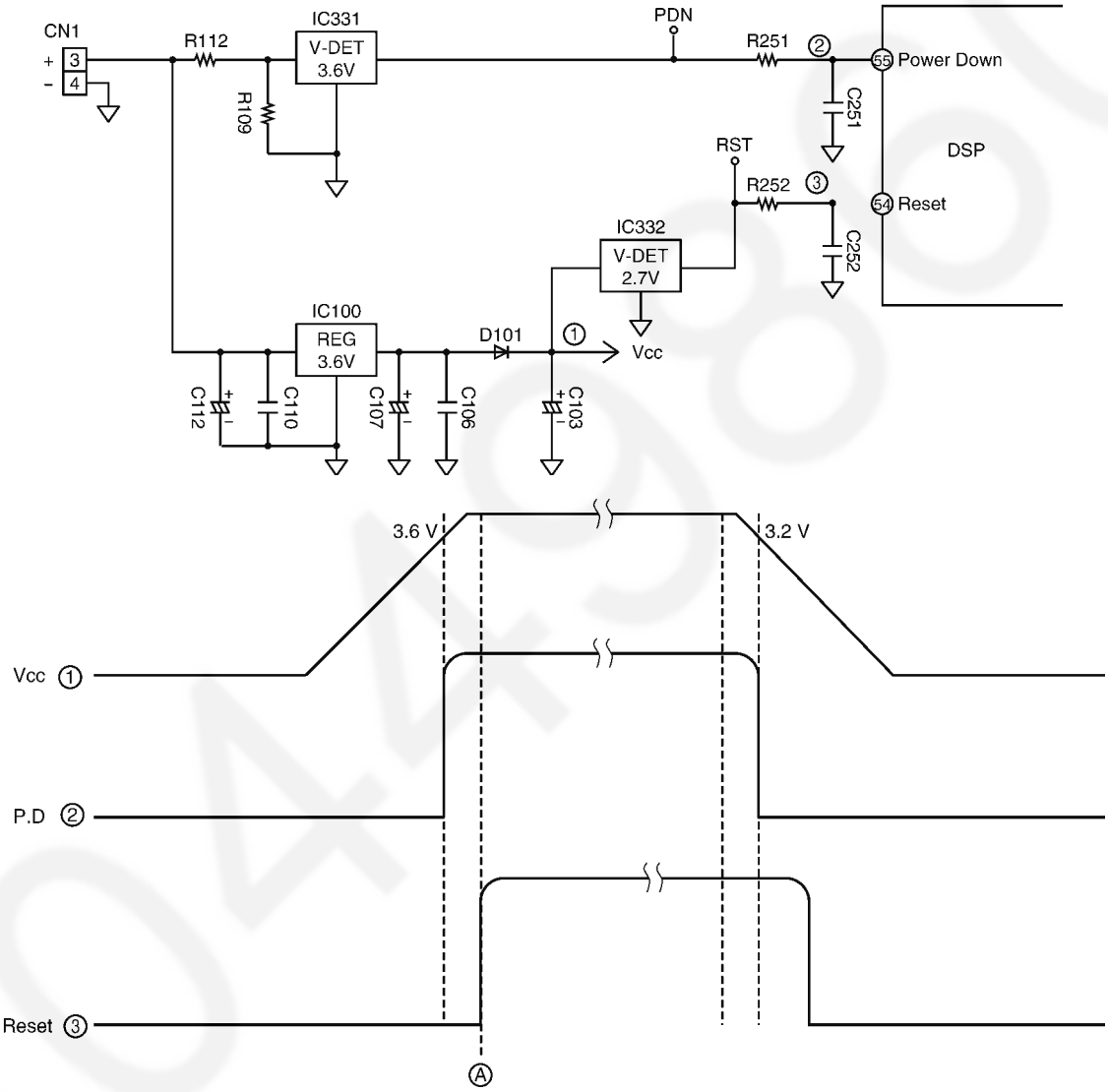
Function:

This circuit is used for 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 IC100, D101 and power is supplied to the DSP. The set can operate beyond point Ⓐ in the circuit voltage diagram.

Circuit Diagram



17.5. Locator/Intercom Mode

1. When the base unit LOCATOR/INTERCOM button is pressed, a call monitor signal (intercom sound) is output from DSP (SPP, SPN). Thus a monitor tone is heard from the speaker.
2. At the same time, flashing of the IN USE/CHARGE (LED900) is obtained from DSP (INUSE-LED). This status is called "Intercom stand-by".
3. The receiving signal flows:

   RF → DSP (SPP, SPN) → SP
4. The transmission signal flows:

   MIC → C235, C236 → R213, R214 → DSP (MIN, MIP) → RF

17.6. Telephone Line Interface

Telephone Line Interface Circuit:

Function

- Bell signal detection
- ON/OFF hook and pulse dial circuit
- Side tone circuit
- Auto-disconnect circuit/Parallel connection detection circuit

Bell signal detection and OFF HOOK circuit:

In the idle mode, Q4 is open to cut the DC loop current and decrease the ring load. When ring voltage appears at the Tip (T) and Ring (R) leads (When the telephone rings), the AC ring voltage is transferred as follows:

T, R → L1, L2 → R30, R31 → C16, C17 → Q6 → DSP (BELL) **[BELL]**

When the CPU (DSP) detects a ring signal, Q4 turns on, thus providing an off-hook condition (active DC current flow through the circuit) and the following signal flow is for the DC line current.

T → D4 → Q4 → Q1 → R5 → D1 → D4 → L2 → POS1 → R **[OFF HOOK]**

ON HOOK Circuit:

Q4 is open, Q4 is connected as to cut the DC loop current and to cut the voice signal. The unit is consequently in an on-hook condition.

Pulse Dial Circuit:

DSP (RYL) turns Q4 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 Q1 is canceled by the echo canceller of DSP.

Note: DSP is IC201.

See **CPU DATA (Base Unit)** (P.67)

17.7. 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 a receiving status or OGM transmitting status.

Circuit Operation:

The voltage DSP (DCIN1) is monitored. If a parallel-connected telephone is put into an OFF HOOK status, the presence/absence of a parallel connection is determined when the voltage changes by 0.2V or more.

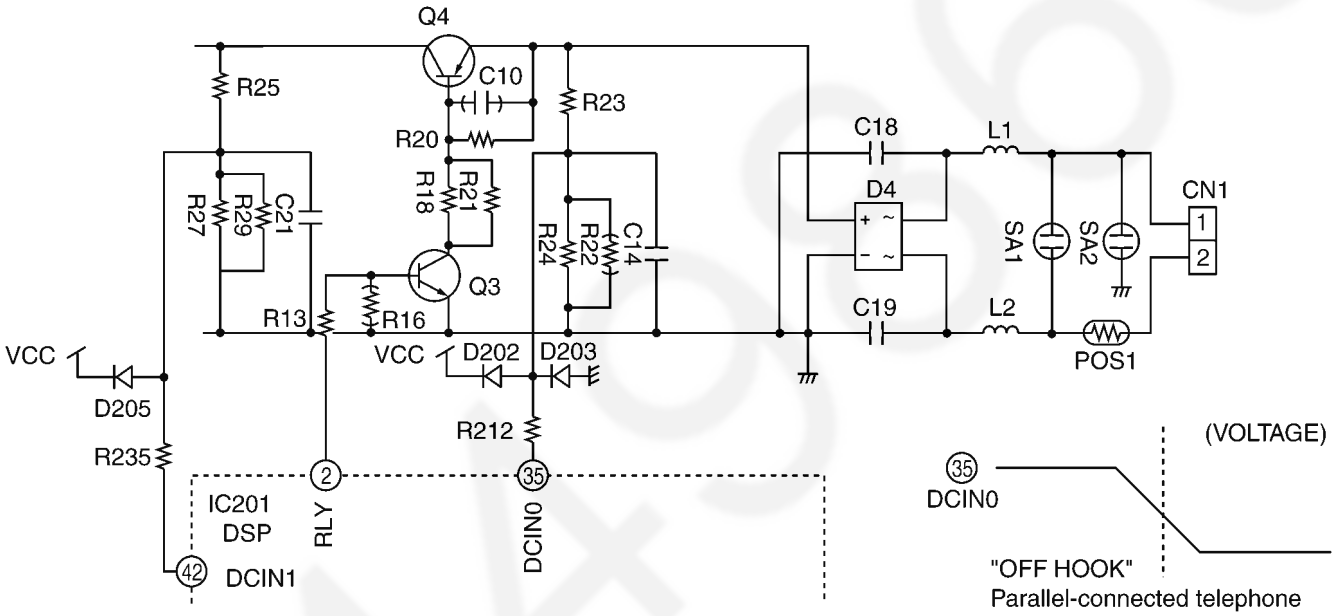
When the set detects the parallel-connected telephone is OFF HOOK status, the line is disconnected.

Note:

DSP is IC201.

See **CPU DATA (Base Unit)** (P.67)

Circuit Diagram



You can enable or disable the Auto Disconnect function.

See **Check Record** (P.35).

17.8. Parallel Connection Detect Circuit

Function:

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

It is like an “Auto Disconnect Circuit”.

Circuit Operation:

Parallel connection detection when on hook:

When the set is on hook, the voltage is monitored at DSP (DCIN0). There is no parallel connection if the voltage is 2.50 V or higher, while a parallel connection is deemed to exist if the voltage is lower.

Parallel connection detection when off hook:

When the set is off hook, the voltage is monitored at DSP (DCIN1); the presence/absence of a parallel connection is determined when the voltage changes by 0.2 V or more.

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

Function:

Caller ID

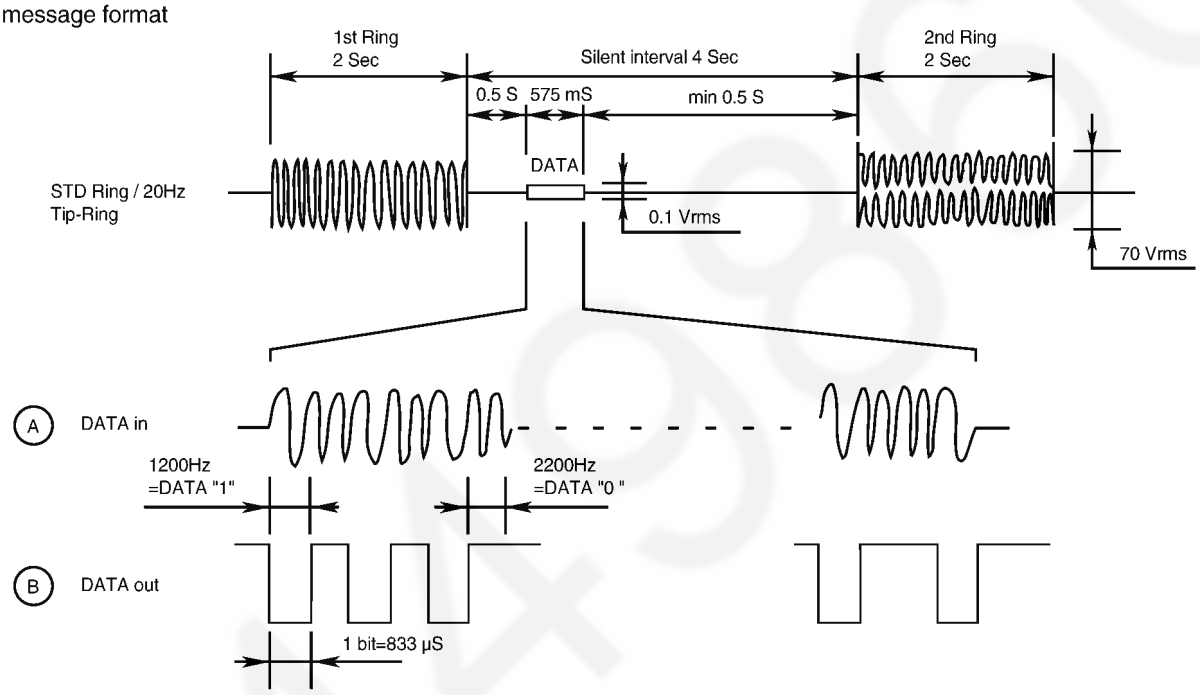
The caller ID is a chargeable ID which the user of a telephone circuit obtains by entering a contract with the telephone company to utilize a caller ID service. For this reason, the operation of this circuit assumes that a caller ID service contract has been entered for the circuit being used.

The data for the caller ID from the telephone exchange is sent during the interval between the first and second rings of the bell signal. The data from the telephone exchange is a modem signal which is modulated in an FSK (Frequency Shift Keying) * format. Data "1" is a 1200 Hz sine wave, and data “0” a 2200 Hz sine wave.

There are two type of the message format which can be received: i.e. the single message format and plural message format. The plural message format allows to transmit the name and data code information in addition to the time and telephone number data.

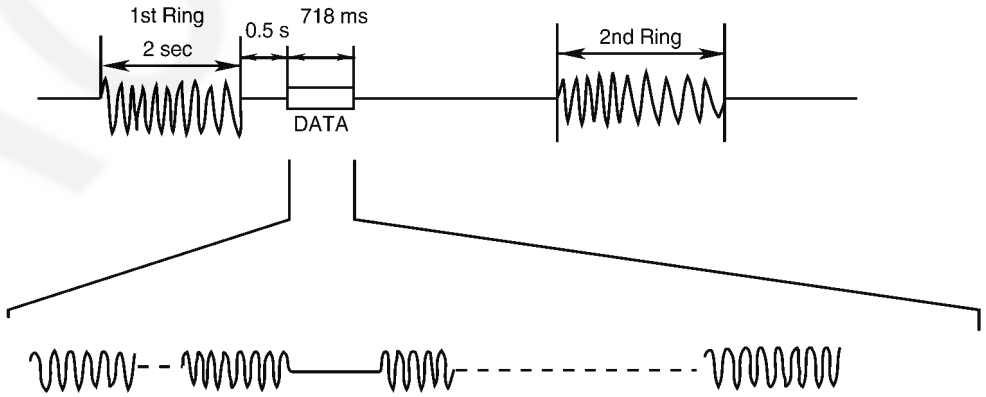
*: Also the telephone exchange service provides other formats.

- Single message format



month		day		hour		minute		number
04	–	15	–	16	–	35	–	2013487000

- Plural message format



DATA CODE	NAME
201	John Smith

month		day		hour		minute		number
04	–	16	–	16	–	35	–	2013487000

Call Waiting Caller ID

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

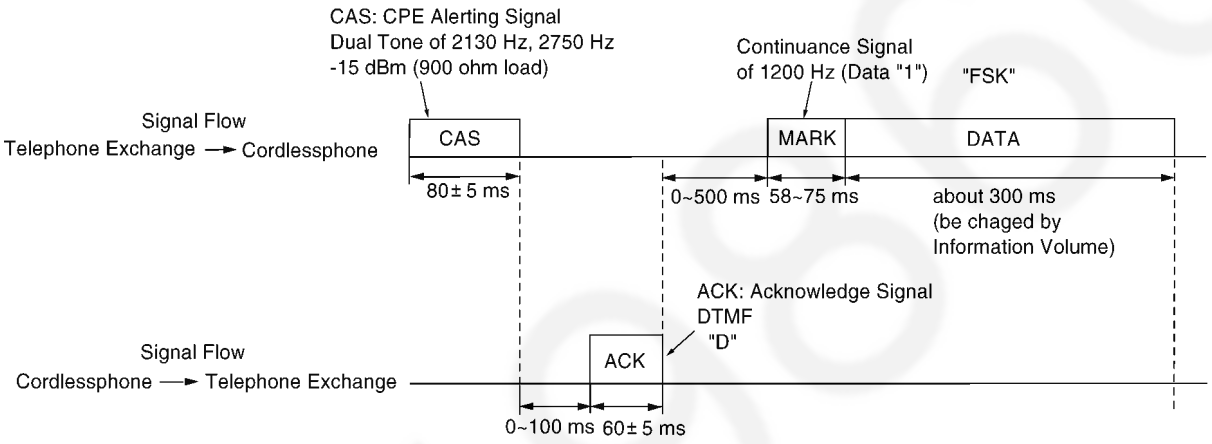
Function:

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

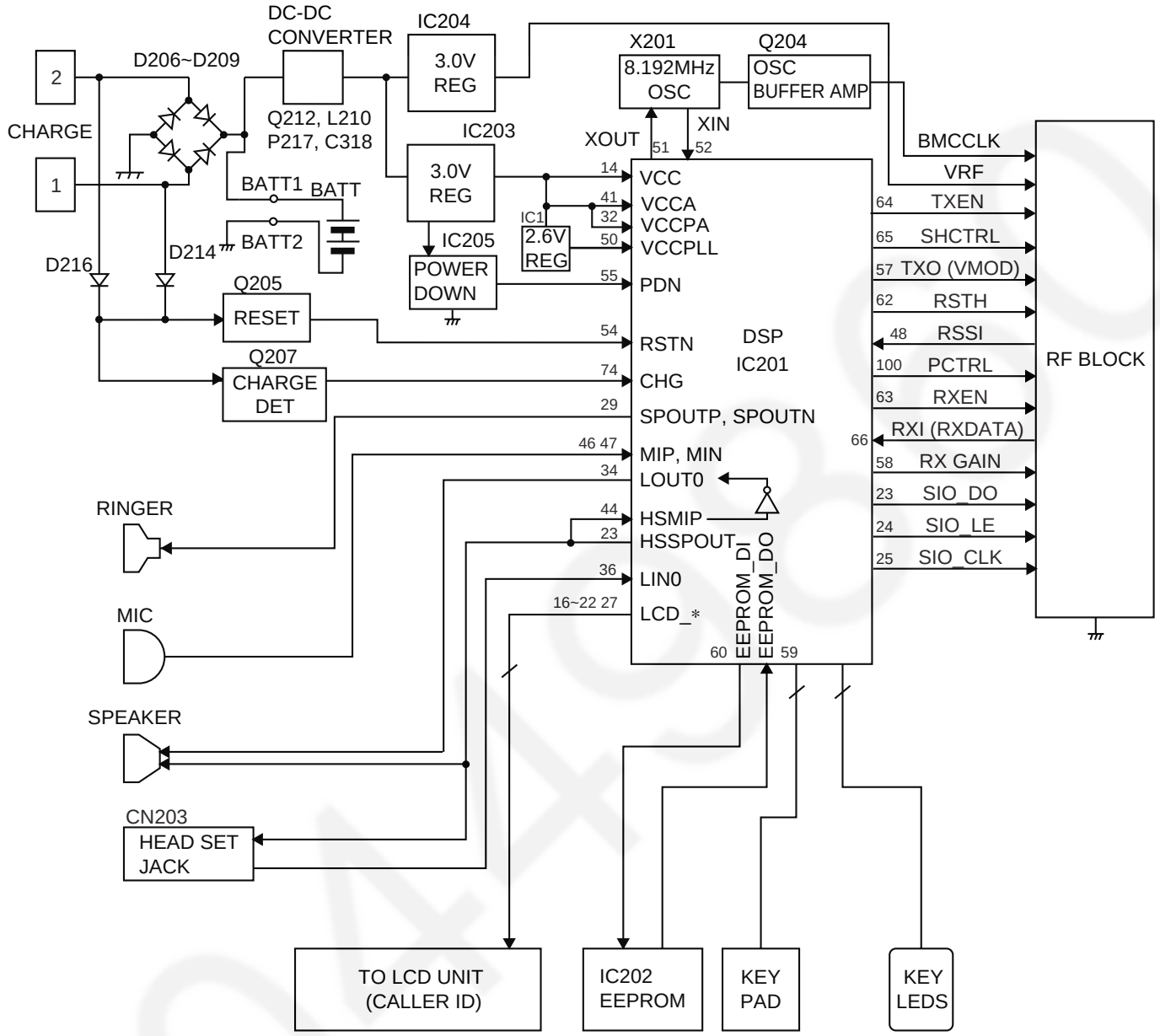
Telephone Line → CN1(A, B) → C11, C12 → R14, R15 → DSP (39~40).

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

Call Waiting Format



18 BLOCK DIAGRAM (Handset)



KX-TG2224F/P/W BLOCK DIAGRAM (HANDSET)

19 CIRCUIT OPERATION (Handset)

19.1. Construction

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

19.1.1. DSP:IC201

Function

- Battery Low, Power down detect circuit
- Ringer Generation
- Interface circuit

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

19.1.2. RF unit

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

19.1.3. EEPROM: IC202

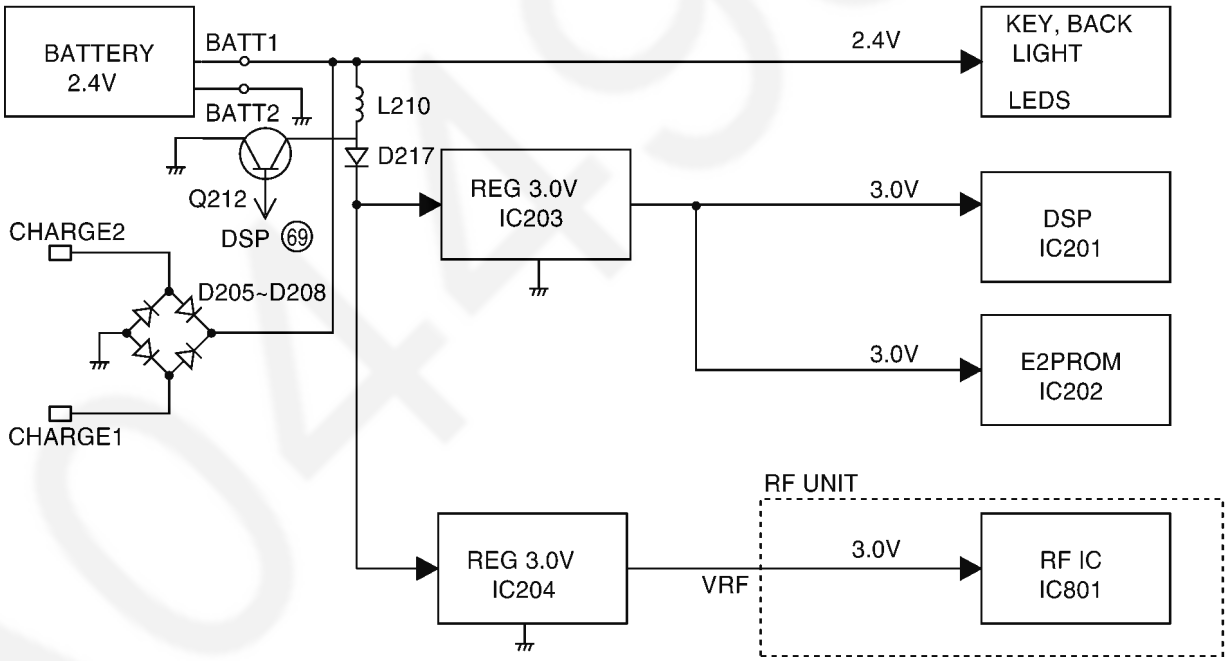
All setting data is stored.

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

19.2. Power Supply Circuit

Voltage is supplied separately to each block.

Circuit Diagram (Handset Power)



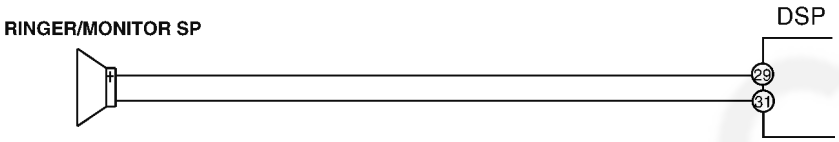
19.3. Charge Circuit

Ni-Cd battery is connected to (BATT+, BATT-). When the handset is put on the cradle of the base unit, the power is supplied from CHARGE1 and CHARGE2 terminals to charge the battery. Q207 detects the voltage of CHARGE1 and CHARGE2 terminals, then the handset makes ID code setting (*) with the base unit.

19.4. Ringer and Handset SP-Phone

DSP (29-31) → SP/RINGER

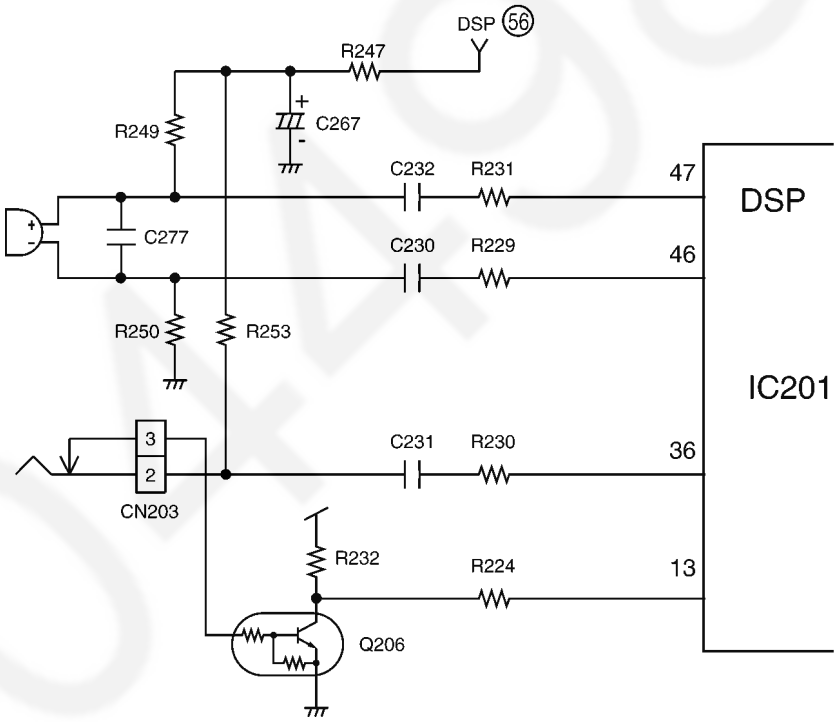
Circuit Diagram



19.5. Sending Signal

The voice signal from the microphone input to DSP (46-47). CN203 is the headphone 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 headphone is input to DSP (36). Also the power for the microphone is supplied from Q211, and the power is turned OFF on standby.

Circuit Diagram



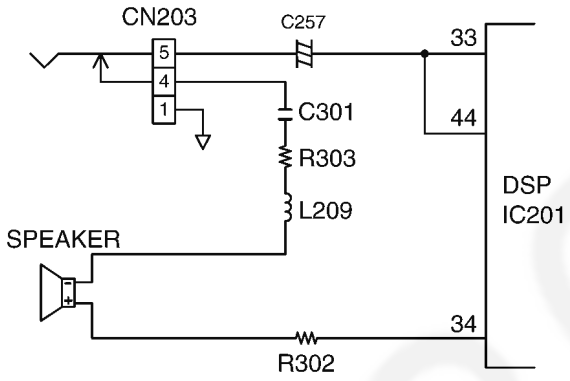
Note: DSP is IC201.

See **CPU DATA (Handset)** (P.68).

19.6. Reception Signal

The voice signal from the base unit is output to DSP (33) (HSSOUT). This signal is led to the headset jack (CN203) and DSP (44) (HSMIP). The signal input to DSP (44) is inverted and output to DSP (34) (LOUTO).The signal through the headset jack is inverted, then 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.

Circuit Diagram



19.7. Small P.C.B.

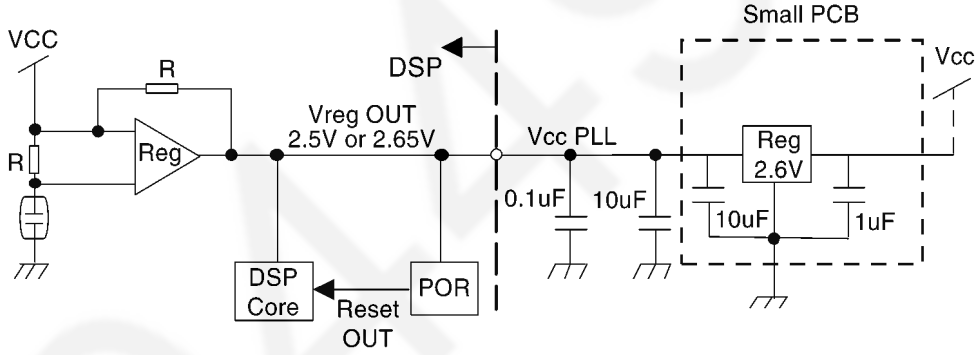
1. **Symptom**

   Doesn´t work when install the battery in the handset in low temperature condition.

   This problem was found during low temperature test (-10deg C).

   This is not lock up problem, symptom is doesn´t work when install the battery.

2. **Cause**



<Process of this problem>

(1) Due to tolerance of DSP-IC, "Vreg OUT" voltage of some DSPs are lower than specification.

(2) If the "Vreg OUT" voltage is lower than 1.8V, internal POR (power on reset) doesn´t work.

(3) DSP can´t wake up because of no power on reset.

3. **Countermeasure**

   Add external Regulator circuit on small PCB (with 2 cap, 3 wires) on handset to input 2.6V from outside.

20 SIGNAL ROUTE

Each signal route is as follows.

SIGNAL ROUTE	IN → signal → ROUTE → OUT
HANDSET Tx	HANDSET MIC → C232 - R231 / C230 - R229 → IC201 (46 - 47, 57) - RF unit (15) - - - - RF unit (4) - IC201 (66, 34) - R223 - C244 - R222 - Q1 - Q4 - D4 - TEL LINE
HANDSET Rx	TEL LINE - L1 - D4 - Q4 - C3 - C61 - R57 - R55 - C58 - Q50 - R227 - C250 - IC201 (36, 57) - RF unit (15) - - - - RF unit (4) - IC201 (66, 33 - 44) → R302 / C257 - L205 - Headset - R303 - L209 → HANDSET SPEAKER
GREETING PLAY TO TEL LINE	IC201 (34) - R223 - C244 - R222 - Q1 - TEL LINE
ICM PLAY TO SPEAKER	IC201 (29 - 31) - Speaker
ICM RECORDING	TEL LINE - C1 - R57 - R55 - C58 - Q50 - R227 - C250 - IC201 (36)
GREETING RECORDING	MIC - C235, C236, R213, R214 - IC201 (46 - 47)
DTMF DETECTION	TEL LINE - L1 - D4 - Q4 - C1 - R57 - R55 - C58 - Q50 - R227 - C250 - IC201 (36)
DTMF SIGNAL TO TEL- LINE	IC201 (34) - R223 - C244 - R222 - Q1 - Q4 - D4 - L1 - TEL LINE

21 CPU DATA (Base Unit)

21.1. IC201

Pin	Description	I/O	High	High_Z	Low
1	LINE_SZ	D.O	On	--	Off
2	RLY	D.O	On	--	Off
3	CHAGEG_CTL	D.O	--	Charge	Non Charge
4	SEG3	D.O	--	--	Normal
5	SEG4	D.O	--	--	Normal
6	SEG5	D.O	--	--	Normal
7	SEG6	D.O	--	--	Normal
8	SEG7	D.O	--	--	Normal
9	SEG8	D.O	--	--	Normal
10	SEG9	D.O	--	--	Normal
11	SEG10	D.O	--	--	Normal
12	SEG11	D.O	--	--	Normal
13	SEG12	D.O	--	--	Normal
14	VCC	VCC	Vcc	--	--
15	GND	GND	--	--	GND
16	COM2	D.O	--	--	Normal
17	COM1	D.O	--	--	Normal
18	STB5	D.O	Active	Not	--
19	STB4	D.O	Active	Not	--
20	STB3	D.O	Active	Not	--
21	STB2	D.O	Active	Not	--
22	STB1	D.O	Active	Not	--
23	SIOD0	D.O			
24	SIOALE	D.O			
25	SIOCLK	D.O			
26	RESET	D.O	--	--	Normal
27	BELL	D.I	Off	--	On
28	GND	GND	--	--	GND
29	SPP	A.O	--	--	--
30	GNDPA	GND	--	--	GND
31	SPN	A.O	--	--	--
32	VCCPA	VCC	VCC	--	--
33	HSSPOUT	A.O	--	--	--
34	LOUT0	A.O	--	--	--
35	DCIN0	A.I	--	--	--
36	LIN0	A.I	--	--	--
37	LGS0	A.I	--	--	--
38	CIDO0	A.I	--	--	--
39	CIDIN0	A.I	--	--	--
40	CIDIP0	A.I	--	--	--
41	VCCA	VCC	VCC	--	--
42	DCIN1	A.I	--	--	--
43	GNDA	GND	--	--	GND
44	HSMIP	A.I	--	--	--
45	VREF	A.O	--	--	--
46	MIN	A.I	--	--	--
47	MIP	A.I	--	--	--
48	DCIN2	A.I	--	--	--
49	GNDPLL	GND	--	--	GND
50	VCCPLL	VCC	VCC	--	--

Pin	Description	I/O	High	High_Z	Low
51	XOUT	A.O	--	--	--
52	XIN	A.I	--	--	--
53	GND	GND	--	--	GND
54	RSTN	D.I	Normal	--	Reset
55	PDN	D.I	Power On	--	Power Down
56	CE	D.O	Not	--	Active
57	TXOUT	D.O	High	--	Low
58	RXGAIN	D.I	HIGH_GAIN	--	LOW_GAIN
59	ALE	D.O	High	--	Low
60	CLE	D.O	High	--	Low
61	NC	D.O	--	--	Normal
62	RSTH	D.O	Normal	--	Wakeup
63	RXEN	D.O	Enable	--	Disable
64	TXEN	D.O	Enable	--	Disable
65	SHCTRL	D.O	High	--	Low
66	RXI	D.I	High	--	Low
67	UART_RX	D.I	High	--	Low
68	UART_TX	D.O	High	--	Low
69	INUSE_LED	D.O	--	Off	On
70	SP_LED	D.O	--	Off	On
71	Tr_Ctrl	D.O	STOP	--	Normal
72	GND	GND	--	--	GND
73	VCC	VCC	VCC	--	--
74	CHARGE_DET	D.I	Off Charge	--	On Charge
75	TCK	D.O			
76	TMS	D.O			
77	TDI	D.I			
78	TDO	D.O			
79	MSG_LED	D.O	--	Off	On
80	OPENLCR_LED	D.O	--	Off	On
81	WP	D.O	Not	--	Active
82	KIN6	D.I	Key In	--	Non
83	KIN5	D.I	Key In	--	Non
84	KIN4	D.I	Key In	--	Non
85	KIN3	D.I	Key In	--	Non
86	KIN2	D.I	Key In	--	Non
87	KIN1	D.I	Key In	--	Non
88	IO7	D.O	High	--	Low
89	IO6	D.O	High	--	Low
90	IO5	D.O	High	--	Low
91	IO4	D.O	High	--	Low
92	IO3	D.O	High	--	Low
93	IO2	D.O	High	--	Low
94	IO1	D.O	High	--	Low
95	IO0	D.O	High	--	Low
96	GND	GND	--	--	GND
97	VCC	VCC	VCC	--	--
98	RE	D.O	--	Not	Active
99	WE	D.O	--	Not	Active
100	PCTRL	D.O	High Power	--	Low Power

22 CPU DATA (Handset)

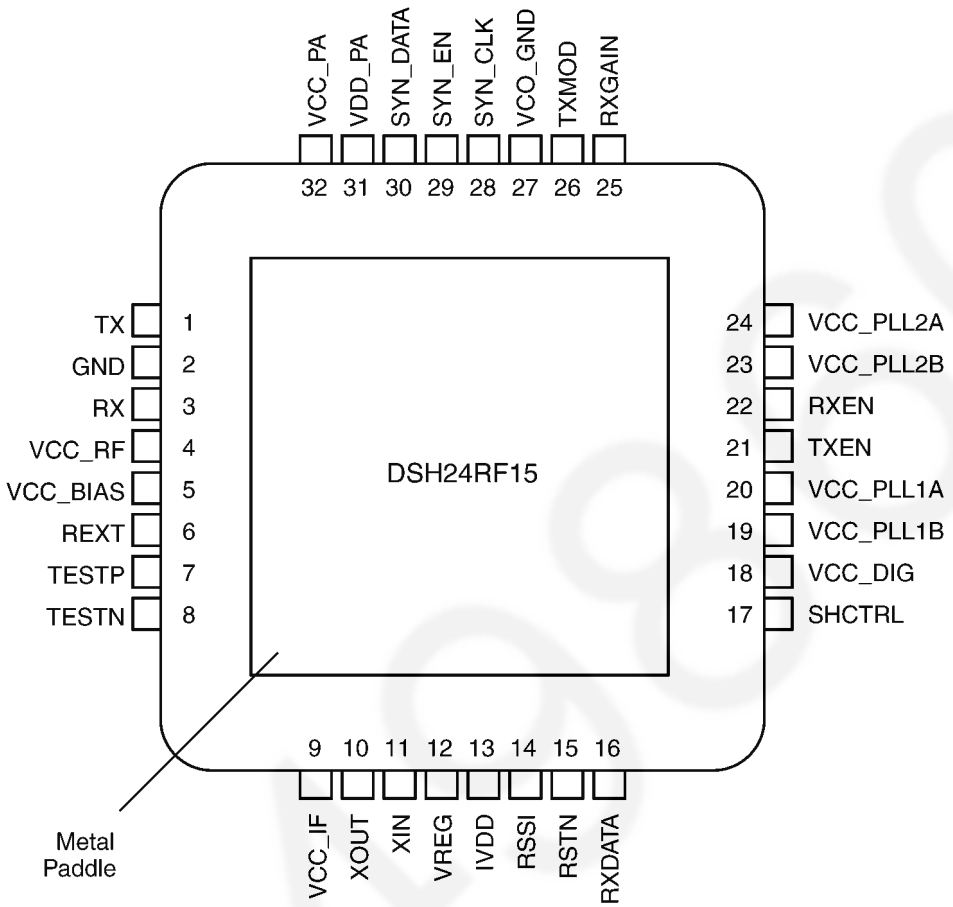
22.1. IC201

Pin	Description	I/O	High	High_Z	Low
1	NC	D.O	--	--	Normal
2	NC	D.O	--	--	Normal
3	UART_RX	D.I	High	--	Low
4	UART_TX	D.O	High	--	Low
5	LCD POWER_SW	D.O	Off	--	On
6	KEY STROBE_F	D.O	--	Not	Active
7	KEY STROBE_E	D.O	--	Not	Active
8	KEY STROBE_D	D.O	--	Not	Active
9	KEY STROBE_C	D.O	--	Not	Active
10	KEY STROBE_B	D.O	--	Not	Active
11	KEY STROBE_A	D.O	--	Not	Active
12	NC	D.O	--	--	Normal
13	HEADSET_DET	D.I	Headset In	--	Non
14	VCC	VCC	Vcc	--	--
15	GND	GND	--	--	GND
16	DOT_DB4	D.O	High	--	Low
17	DOT_DB5	D.O	High	--	Low
18	DOT_DB6	D.O	High	--	Low
19	DOT_DB7	D.O	High	--	Low
20	DOT_E/RD	D.O	Active	--	Not
21	DOT_RW/WR	D.O	Read	--	Write
22	DOT_RS	D.O	Data	--	Instruction
23	SIODO_RF	D.O	High	--	Low
24	SIOLE_RF	D.O	Latch	--	Latch
25	SIOCLK_RF	D.O	High	--	Low
26	NC	D.O	--	--	Normal
27	DOT_RESET	D.O	Not	--	Reset
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	LGS0	A.I	--	--	--
38	CIDO0	A.I	--	--	--
39	CIDIN0	A.I	--	--	--
40	CIDIP0	A.I	--	--	--
41	VCCA	VCC	VCC	--	--
42	DCIN1	A.I	--	--	--
43	GNDA	GND	--	--	GND
44	HSMIP	A.I	--	--	--
45	VRFF	A.O	--	--	--
46	MIN	A.I	--	--	--
47	MIP	A.I	--	--	--
48	RSSI	A.I	--	--	--
49	GNDPLL	GND	--	--	GND
50	VCCPLL	VCC	VCC	--	--

Pin	Description	I/O	High	High_Z	Low
51	XOUT	A.O	--	--	--
52	XIN	A.I	--	--	--
53	GND	GND	--	--	GND
54	RSTN	D.I	Normal	--	Reset
55	PDN	D.I	Power On	--	Power Down
56	MIC_POWSW	D.O	Bias Off	--	Bias On
57	TX0	D.O	High	--	Low
58	RXGAIN	D.I	HIGH_GAIN	--	LOW_GAIN
59	EEPROM_DO	D.I	High	--	Low
60	EEPROM_DI	D.O	High	--	Low
61	NC	D.O	--	--	Normal
62	RSTH	D.O	Normal	--	Wakeup
63	RXEN	D.O	High	--	Low
64	TXEN	D.O	High	--	Low
65	SHCTRL	D.O	High	--	Low
66	RXI	D.I	High	--	Low
67	EEPROM_CS	D.O	Active	--	Not
68	NC	D.O	--	--	Normal
69	LITED LED	D.O	On	--	Off
70	TALK LED	D.0	Off	--	On
71	RADIOEN	D.0	On	--	Off
72	GND	GND	--	--	GND
73	VCC	VCC	VCC	--	--
74	CHAGE DET	D.I	Off Charge	--	On Charge
75	TCK	D.O			
76	TMS	D.O			
77	TDI	D.I			
78	TDO	D.O			
79	RECHAGE LED	D.O	Off	--	On
80	INTLED	D.O	Off	--	On
81	NC	D.O	Normal	--	--
82	KEYIN_5	D.I	Non	--	Key In
83	KEYIN_4	D.I	Non	--	Key In
84	KEYIN_3	D.I	Non	--	Key In
85	KEYIN_2	D.I	Non	--	Key In
86	KEYIN_1	D.I	Non	--	Key In
87	NC	D.O	Normal	--	--
88	LCD_BL	D.O	On	--	Off
89	NC	D.O	--	--	Normal
90	NC	D.O	--	--	Normal
91	NC	D.O	--	--	Normal
92	NC	D.O	--	--	Normal
93	NC	D.O	--	--	Normal
94	NC	D.O	--	--	Normal
95	NC	D.O	--	--	Normal
96	GND	GND	--	--	GND
97	VCC	VCC	VCC	--	--
98	NC	D.O	Normal	--	--
99	EPP_CLK	D.O	High	--	Low
100	POWCTRL	D.O	--	--	Normal

23 EXPLANATION OF RF UNIT TERMINALS

23.1. IC801



Pin	Description	I/O
1	TX	O&VCC
2	GND_RF	GND
3	RX	I
4	VCC_RF	VCC
5	VCC_BIAS	VCC
6	REXT	I
7	TESTP	O
8	TESTN	O
9	VCC_IF	VCC
10	XOUT	XI/XO
11	XIN	XI/XO
12	VREG	O
13	VDD	I
14	RSSI	O
15	RSTN	I
16	RXDATA	O

Pin	Description	I/O
17	SHCTRL	I
18	VCC_DIG	VCC
19	VCC_PLL1B	VCC
20	VCC_PLL1A	VCC
21	TXEN	I
22	RXEN	I
23	VCC_PLL2B	VCC
24	VCC_PLL2A	VCC
25	RXGAIN	O
26	BCLK	O
27	TXMOD	I
28	SYN_CLK	I
29	SYN_EN	I
30	SYN_DATA	I
31	VDD_PA	I
32	VCC_PA	VCC
PKG	PADDLE_GND	GND

24 HOW TO REPLACE A FLAT PACKAGE IC

24.1. 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

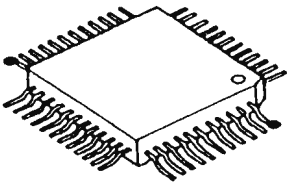
  Recommended Flux: Specific Gravity → 0.82.

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

  Note: See **ABOUT LEAD FREE SOLDER (PbF: Pb free)** (P.4).

24.2. Procedure

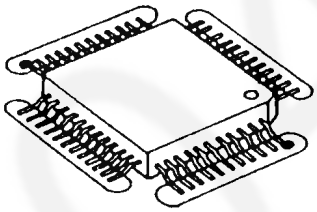
1. Tack the flat pack IC to the PCB by temporarily soldering two diagonally opposite pins in the correct positions on the PCB.



● – – – – – – Temporary soldering point.

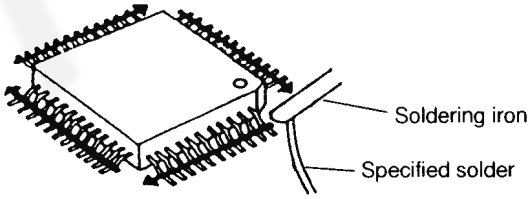
Be certain each pin is located over the correct pad on the PCB.

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



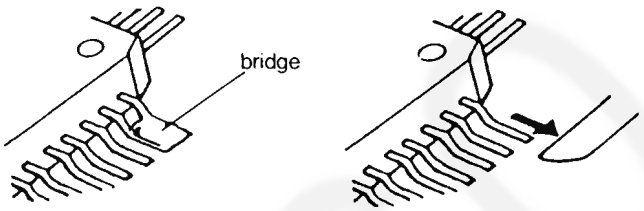
– – – – – – Flux

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.

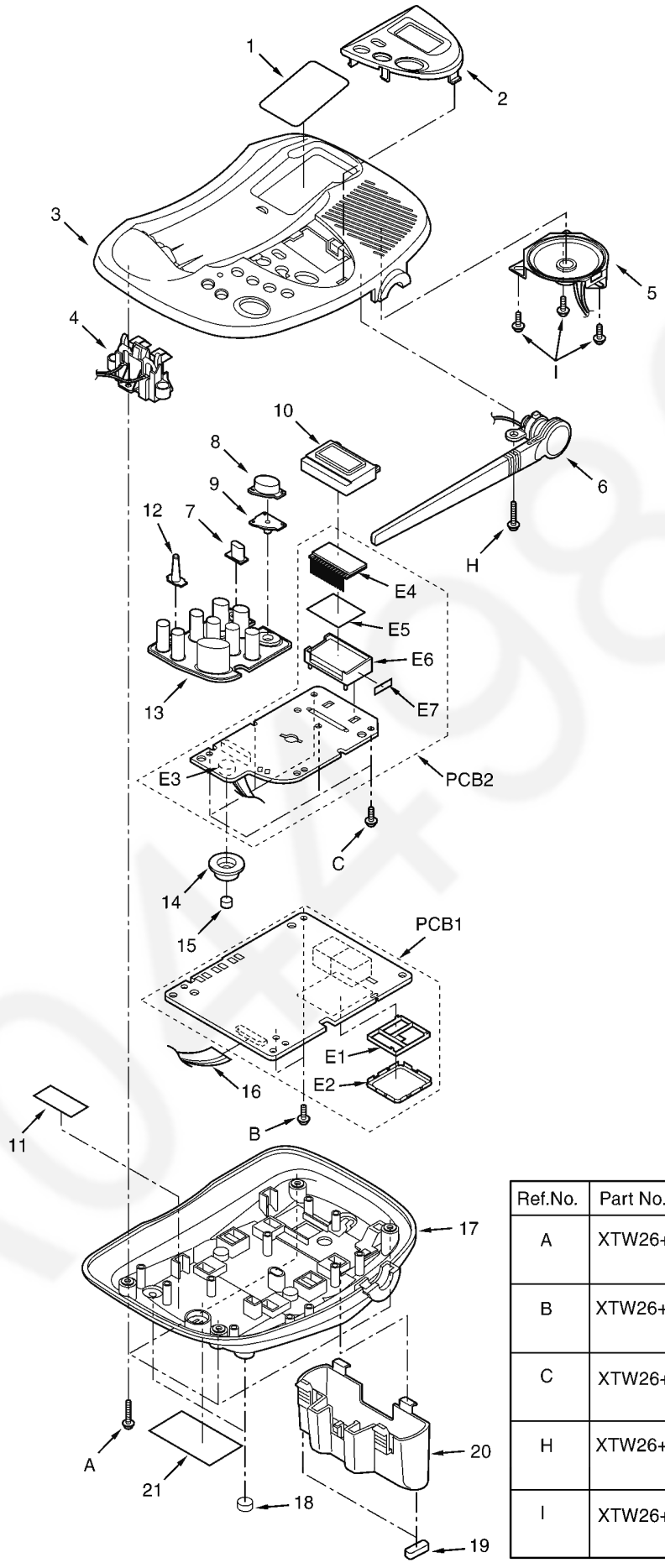


24.3. Removing Solder from Between Pins

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.

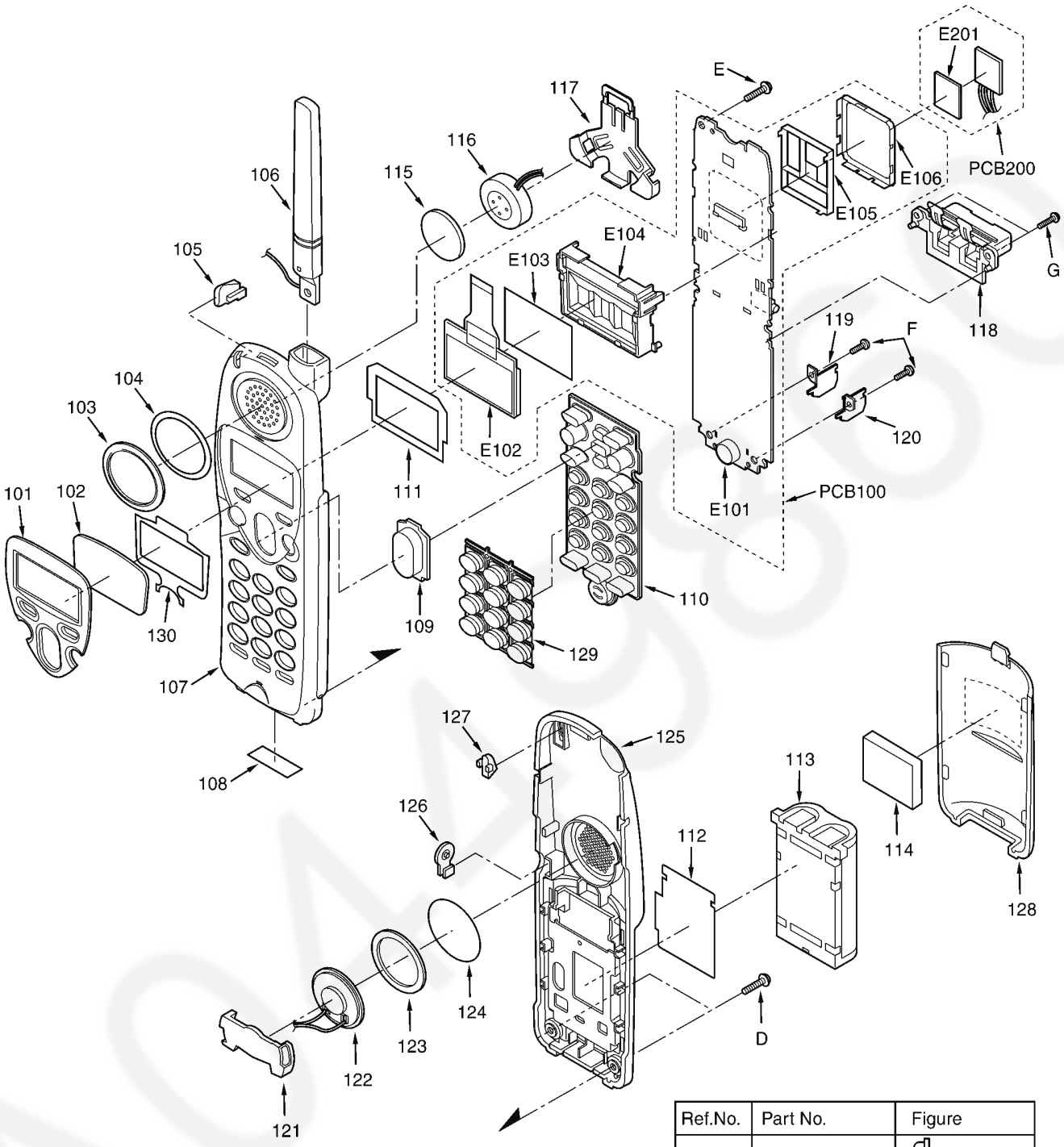


25 CABINET AND ELECTRICAL PARTS (Base Unit)



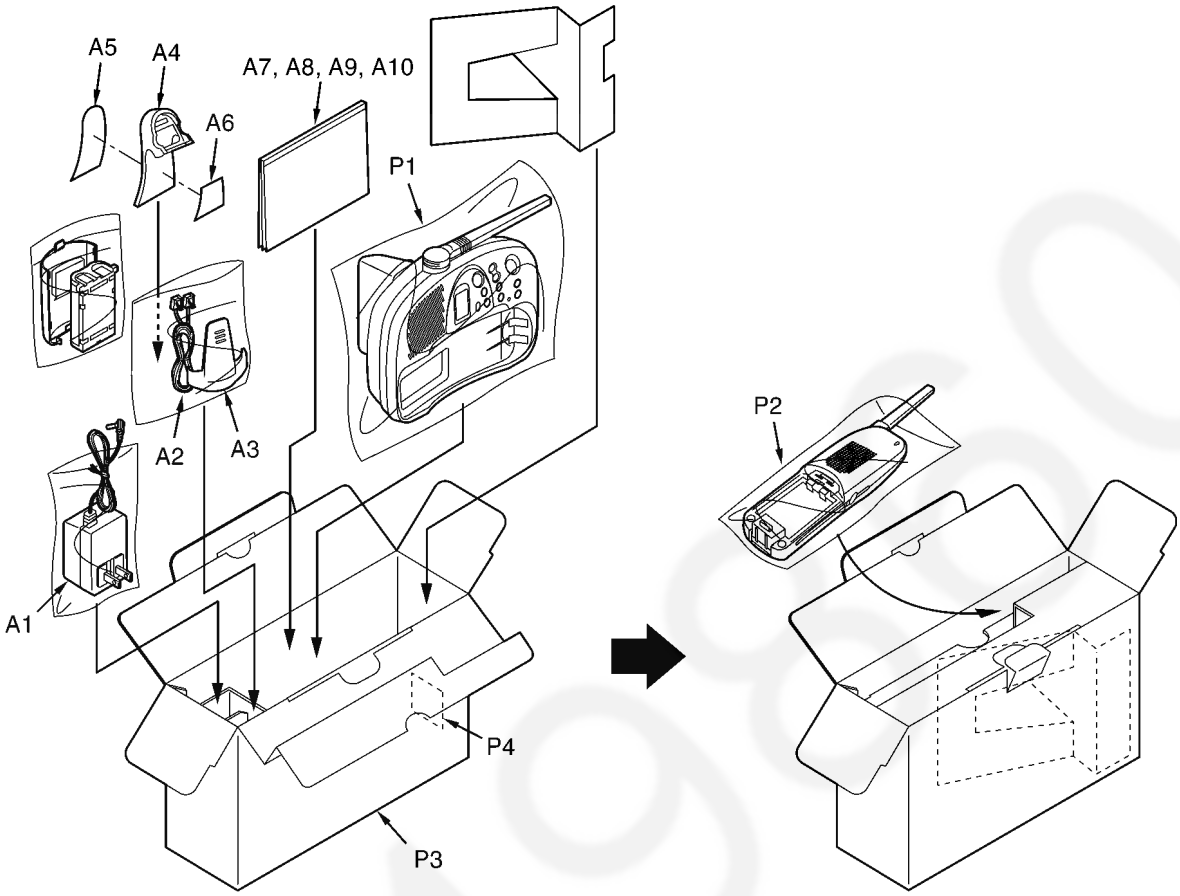
Ref.No.	Part No.	Figure
A	XTW26+12P	2.6ϕ × 12mm
B	XTW26+8P	2.6ϕ × 8mm
C	XTW26+8P	2.6ϕ × 8mm
H	XTW26+12P	2.6ϕ × 12mm
I	XTW26+8P	2.6ϕ × 8mm

26 CABINET AND ELECTRICAL PARTS (Handset)



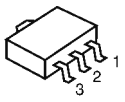
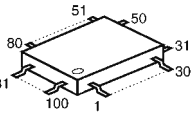
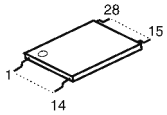
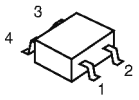
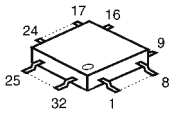
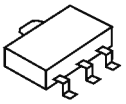
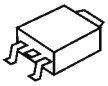
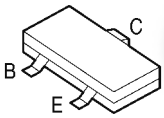
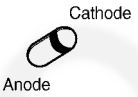
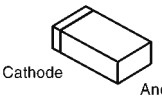
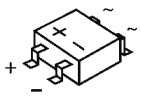
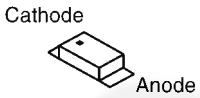
Ref.No.	Part No.	Figure
D	XTW26+12P	2.6ϕ × 12mm
E	XTW26+12P	2.6ϕ × 12mm
F	XTB26+9J	2.6ϕ × 9mm
G	XTW2+R10P	2ϕ × 10mm

27 ACCESSORIES AND PACKING MATERIALS

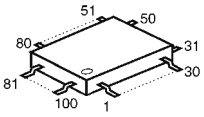
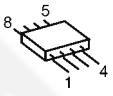
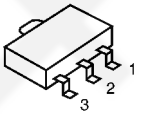
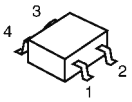
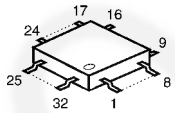
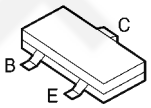
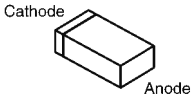
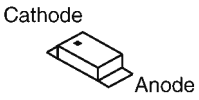


28 TERMINAL GUIDE OF THE ICs, TRANSISTORS AND DIODES

28.1. Base Unit

 C0CBABD00036 C0CBABD00017	 C2HBBJ000026	 PQWITG2224WH	 PQVIPS3436UT	 C0EBE0000283
 C1CB00001486	 2SD874A B1BBAP000011	 2SD1758Q B1BDBP000002	 2SD1819A 2SC3930C	 PQVDRLZ2R0 PQVDRLZ20A
 MA111, MA8220 MA27P0700L B0JCME000035 PQVDHRU0302A	 PQVDMD5S	 LNJ311G8TRU LNJ211R8ARU		

28.2. Handset

 C2HBBJ000027	 PQWITG2224WR	 C0CBABD00019	 C0CBAAC00119 PQVIMM1385HN	 C0EBE0000292
 C1CB00001486	 PQVTDTC143E, 2SC3930C 2SD1819A, PQVTXP151A13		 MA111 PQVDEP10LA03 MA27P0700L B0JCMD000017	 PQVDSML310MT PQVDEL1921SR

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

Wattage

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

*Type & Voltage Of Capacitor

Type

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

Voltage

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

29.1. Base Unit

29.1.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
1	PQQT22572Z	LABEL, TAM	
2	PQGG10157Z1	GRILLE	
3	PQKM10593Y2	CABINET BODY (for KX-TG2224F)	PS-HB
3	PQKM10593Y3	CABINET BODY (for KX-TG2224P)	PS-HB
3	PQKM10593Z1	CABINET BODY (for KX-TG2224W)	PS-HB
4	PQWE10027Z	BATTERY TERMINAL, CHARGE	
5	PQAS5P13Y	SPEAKER	
6	PQSA10098Y	ANTENNA (for KX-TG2224F)	
6	PQSA10098Y	ANTENNA (for KX-TG2224P)	
6	PQSA10098W	ANTENNA (for KX-TG2224W)	
7	PQBC10379Z1	BUTTON, ANSWER ON	AS-HB
8	PQBC10377Z1	BUTTON, NEW MESSAGE	AS-HB
9	PQHR10975Z	GUIDE, LED	ABS-HB
10	PQGP10229Z1	PANEL, LCD	AS-HB
11	PQXDZLDRS1	LABEL, SECURITY TAG (for KX-TG2224W only)	
12	PQHR11007Z	OPTIC CONDUCTIVE PARTS, LED LENS	
13	PQSX10231Y	KEYBOARD SWITCH, TAM (for KX-TG2224F)	
13	PQSX10231Y	KEYBOARD SWITCH, TAM (for KX-TG2224P)	
13	PQSX10231Z	KEYBOARD SWITCH, TAM (for KX-TG2224W)	
14	PQMG10023Z	RUBBER PARTS, MIC COVER	
15	PQHE10146Z	SPACER, MIC	
16	PQJE10126Z	LEAD WIRE, FFC	
17	PQKF10589Z2	CABINET COVER (for KX-TG2224F)	PS-HB
17	PQKF10589Z2	CABINET COVER (for KX-TG2224P)	PS-HB
17	PQKF10589Z1	CABINET COVER (for KX-TG2224W)	PS-HB
18	PQHA10011Z	RUBBER PARTS, FOOT	
19	PQHA10024Z	RUBBER PARTS, FOOT	
20	PQKL10052Z2	STAND, WALL MOUNT ADAPTOR (for KX-TG2224F)	ABS-HB
20	PQKL10052Z2	STAND, WALL MOUNT ADAPTOR (for KX-TG2224P)	ABS-HB
20	PQKL10052Z1	STAND, WALL MOUNT ADAPTOR (for KX-TG2224W)	ABS-HB
21	PQGT16056Z	NAME PLATE (for KX-TG2224F)	
21	PQGT16058Z	NAME PLATE (for KX-TG2224P)	
21	PQGT15673Z	NAME PLATE (for KX-TG2224W)	

29.1.2. Main P.C. Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB1	PQWP1TG2224H	MAIN P.C.BOARD ASS´Y (RTL)	
		(ICs)	
IC100	C0CBABD00036	IC	
IC101	C0CBABD00017	IC	
IC201	C2HBBJ000026	IC	
IC300	PQWITG2224WH	IC	
IC331	PQVIPS3436UT	IC	
IC332	C0EBE0000283	IC	
IC801	C1CB00001486	IC	
		(TRANSISTORS)	
Q1	2SD874A	TRANSISTOR(SI)	
Q3	B1BBAP000011	TRANSISTOR(SI)	
Q4	B1BDBP000002	TRANSISTOR(SI)	
Q6	2SD1819A	TRANSISTOR(SI)	
Q50	2SD1819A	TRANSISTOR(SI)	
Q150	2SD1758Q	TRANSISTOR(SI)	S
Q151	2SD1819A	TRANSISTOR(SI)	
Q260	2SC3930C	TRANSISTOR(SI)	
		(DIODES)	
D1	PQVDRLZ2R0	DIODE(SI)	S
D2	PQVDRLZ20A	DIODE(SI)	S
D3	MA111	DIODE(SI)	
D4	PQVDMD5S	DIODE(SI)	
D5	B0JCME000035	DIODE(SI)	
D101	PQVDHRU0302A	DIODE(SI)	S
D102	PQVDHRU0302A	DIODE(SI)	S
D103	PQVDHRU0302A	DIODE(SI)	S
D152	MA8220	DIODE(SI)	
D153	MA8220	DIODE(SI)	
D202	MA111	DIODE(SI)	
D205	MA111	DIODE(SI)	
D801	MA27P0700L	DIODE(SI)	
D802	MA27P0700L	DIODE(SI)	
		(COILS)	
L1	PQLQXF330K	COIL	S
L2	PQLQXF330K	COIL	S
L3	PQLQXF3R3K	COIL	S

Ref. No.	Part No.	Part Name & Description	Remarks
L150	G1C6R8MA0072	COIL	
L151	G1C6R8MA0072	COIL	
L200	PQLQR2KA213	COIL	S
L801	MQLRF10NJF	COIL	
L802	MQLRF3N9DF	COIL	
L803	MQLRF2N7DF	COIL	
L804	MQLRF10NJF	COIL	
L805	MQLRF2N2DF2	COIL	
L806	MQLRF10NJF	COIL	
L807	PQLQR4D1R0K	COIL	S
		(JACK AND CONNECTOR)	
CN1	PQJJ2H003Z	JACK	S
CN100	PQJS30A12Z	CONNECTOR	S
		(VARISTORS)	
SA1	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S
SA2	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S
		(RESISTORS)	
R1	ERJ2GEJ122	1.2K	
R2	ERJ2GEJ681	680	
R3	ERJ2GEJ470	47	
R5	ERJ12YJ330	33	
R7	ERJ3GEYJ393	39K	
R8	ERJ3GEY0R00	0	
R10	ERJ3GEYJ102	1K	
R13	ERJ3GEYJ473	47K	
R14	ERJ3GEYJ394	390K	
R15	ERJ3GEYJ394	390K	
R17	ERJ3GEYJ473	47K	
R18	ERJ3GEYJ103	10K	
R19	PQ4R10XJ000	0	S
R20	ERJ3GEYJ104	100K	
R21	ERJ3GEYJ103	10K	
R23	ERJ3GEYJ106	10M	
R24	ERJ3GEYJ105	1M	
R25	ERJ3GEYJ106	10M	
R26	ERJ3GEYJ472	4.7K	
R29	ERJ3GEYJ335	3.3M	
R30	ERJ3GEYJ104	100K	
R31	ERJ3GEYJ104	100K	
R51	ERJ3GEYJ470	47	
R52	ERJ3GEYJ394	390K	
R55	ERJ2GEJ102	1K	
R57	ERJ2GE0R00	0	
R70	ERJ3GEYJ392	3.9K	
R105	ERJ3GEYJ104	100K	
R108	PQ4R10XJ000	0	S
R109	ERJ3GEYJ334	330K	
R112	ERJ3GEYJ273	27K	
R150	ERJ3GEYJ104	100K	
R151	ERJ3GEYJ331	330	
R152	ERJ3GEYJ391	390	
R153	PQ4R10XJ150	15	S
R154	PQ4R10XJ120	12	S
R155	PQ4R10XJ120	12	S
R156	PQ4R10XJ120	12	S
R157	ERJ12YJ221	220	
R159	ERJ3GEYJ103	10K	
R160	ERJ3GEYJ563	56K	
R161	ERJ3GEYJ273	27K	
R200	ERJ3GEYJ101	100	
R201	ERJ3GEYJ101	100	
R202	ERJ2GEJ472X	4.7K	
R203	ERJ3GEYJ472	4.7K	
R204	ERJ2GEJ101	100	
R205	ERJ2GEJ101	100	
R207	ERJ2GEJ101	100	
R212	ERJ3GEYJ102	1K	
R213	ERJ2GEJ102	1K	
R214	ERJ3GEYJ102	1K	
R215	ERJ2GEJ681	680	
R216	ERJ2GEJ681	680	
R217	ERJ3GEYJ394	390K	
R218	ERJ3GEYJ123	12K	

Ref. No.	Part No.	Part Name & Description	Remarks
R219	ERJ3GEYJ103	10K	
R220	ERJ2GEJ101	100	
R222	ERJ2GEJ333	33K	
R223	ERJ2GEJ222	2.2K	
R224	ERJ3GEYJ394	390K	
R227	ERJ3GEYJ222	2.2K	
R230	ERJ2GE0R00	0	
R231	ERJ2GE0R00	0	
R232	ERJ2GE0R00	0	
R234	ERJ2GE0R00	0	
R235	ERJ2GEJ102	1K	
R236	ERJ2GEJ181	180	
R237	ERJ2GEJ181	180	
R238	ERJ2GEJ181	180	
R245	ERJ2GE0R00	0	
R251	ERJ3GEYJ102	1K	
R252	ERJ2GEJ102	1K	
R260	ERJ2GEJ471	470	
R261	ERJ2GEJ471	470	
R262	ERJ2GEJ104	100K	
R263	ERJ2GEJ101	100	
R264	ERJ2GEJ182	1.8K	
R300	ERJ2GE0R00	0	
R400	ERJ2GEJ332	3.3K	
R433	ERJ2GEJ102	1K	
R801	ERJ2GEJ100	10	
R802	ERJ2GEJ100	10	
R803	ERJ2GEJ100	10	
R804	ERJ2GEJ4R7	4.7	
R805	ERJ2GEJ331	330	
R810	ERJ3GEYF103	10K	
L203	PQ4R10XJ000	0	S
L204	PQ4R10XJ000	0	S
		(CAPACITORS)	
C1	EEE1CA100SR	10	
C3	ECUE1A473KBQ	0.047	
C4	ECUV1H101JCV	100P	
C6	ECUV1H103KBV	0.01	
C8	EEE1HA010SR	1	
C9	ECUV1H103KBV	0.01	S
C11	ECUV1H681JCV	680P	S
C12	ECUV1H681JCV	680P	S
C13	ECUE1H102KBQ	0.001	S
C14	ECUV1H103KBV	0.01	
C15	PQCUV1A684KB	0.68	
C16	PQCUV1H154KR	0.15	
C17	PQCUV1H154KR	0.15	
C18	F1K2J681A006	680P	
C19	F1K2J681A006	680P	
C21	ECUV1H103KBV	0.01	
C55	ECUV1H102KBV	0.001	S
C58	ECUE1A104KBQ	0.1	
C100	ECUE1C104ZFQ	0.1	
C101	EEE0JA101SP	100P	
C103	EEE0JA331P	330P	
C106	ECUE1C104ZFQ	0.1	
C110	ECUV1C104ZFV	0.1	
C111	PQCUV1H104ZF	0.1	S
C112	EEE1CA101WP	100P	
C114	EEE1CA101WP	100P	
C150	ECUV1C104ZFV	0.1	
C200	ECUE1C104ZFQ	0.1	
C201	ECUV1H681JCV	680P	S
C207	ECUE1C104ZFQ	0.1	
C213	ECUE1C104ZFQ	0.1	
C214	ECUE1H101JCQ	100P	
C215	ECUE1H101JCQ	100P	
C216	ECUE1H101JCQ	100P	
C217	ECUV1H101JCV	100P	
C218	ECUV1H101JCV	100P	
C219	ECUE1H101JCQ	100P	
C220	ECUE1H101JCQ	100P	
C227	ECUE1H5R0CCQ	5	

Ref. No.	Part No.	Part Name & Description	Remarks
C228	ECUE1H5R0CCQ	5	
C230	ECUV1A106ZF	10	S
C231	ECUE1C104ZFQ	0.1	
C232	ECUV1H101JCV	100P	
C233	ECUV1H101JCV	100P	
C234	ECUE1E103ZFQ	0.01	
C235	ECUE1C103KBQ	0.01	
C236	ECUV1H103KBV	0.01	
C237	EEE1CA100SR	1	
C238	ECUE1E103ZFQ	0.01	
C239	EEE0JA221WP	220P	
C241	ECUV1C104ZFV	0.1	
C242	ECUE1H272KBQ	0.0027	
C244	ECUE1A104KBQ	0.1	
C245	ECUV1H121JCV	120P	
C250	ECUV1C473KBV	0.047	
C251	ECUE1C104ZFQ	0.1	
C252	ECUE1C104ZFQ	0.1	
C260	ECUE1C104ZFQ	0.1	
C261	ECUE1H3R0CCQ	3	
C262	ECUE1A104KBQ	0.1	
C263	ECUE1A104KBQ	0.1	
C300	ECUE1H101JCQ	100P	
C301	ECUE1H101JCQ	100P	
C302	ECUE1H101JCQ	100P	
C303	ECUE1H101JCQ	100P	
C304	ECUE1H101JCQ	100P	
C305	ECUE1H101JCQ	100P	
C309	ECUE1C104ZFQ	0.1	
C401	ECUE1E103ZFQ	0.01	
C402	ECUE1C104ZFQ	0.1	
C404	ECUE1H101JCQ	100P	
C405	ECUE1H330JCQ	33P	
C406	ECUE1H101JCQ	100P	
C410	ECUE1H101JCQ	100P	
C411	ECUE1H101JCQ	100P	
C412	ECUE1H101JCQ	100P	
C415	EEE0JA221WP	100P	
C416	ECUE1H100DCQ	10P	S
C420	ECUE1H101JCQ	100P	
C421	ECUE1H101JCQ	100P	
C430	ECUE1H471KBQ	470P	
C450	EEE0JA101SP	100P	
C453	ECUE1H030CCQ	3P	
C723	ECUE1A823KBQ	0.082	
C801	ECUE1H102KBQ	0.001	S
C802	ECUE1H1R0CCQ	1	
C803	ECUE1H100DCQ	10P	S
C804	ECUE1H1R0CCQ	1	
C805	ECUE1H100DCQ	10P	S
C807	ECUE1H100DCQ	10P	S
C811	ECUE1H100DCQ	10P	S
C813	ECUE1H100DCQ	10P	S
C814	ECUE1H1R5CCQ	1.5	S
C815	ECUE1H100DCQ	10P	S
C816	ECUE1H100DCQ	10P	S
C817	ECUE1C104ZFQ	0.1	
C818	ECUE1C104ZFQ	0.1	
C819	ECUE1H391KBQ	390P	
C820	ECUE1C104ZFQ	0.1	
C821	ECUE1H102KBQ	0.001	S
C822	ECUE1H1R0CCQ	1	
C823	ECSTAJ0JA106	10	S
C824	ECUE1H102KBQ	0.001	S
C825	ECUE1H681KBQ	680P	
C827	ECUE1H102KBQ	0.001	S
C828	ECUE1H102KBQ	0.001	S
C829	ECUE1H102KBQ	0.001	S
C830	ECUV1A105ZFV	1	
C831	ECUV1A105ZFV	1	
C833	ECSTAJ0JA106	10	S
C856	ECUE1H2R0CCQ	2	
C857	ECUE1H2R0CCQ	2	
C858	ECUE1H2R0CCQ	2	
C859	ECUE1H2R0CCQ	2	
C860	ECUE1H100DCQ	10P	S
C861	ECUE1H2R0CCQ	2	
C862	ECUE1H100DCQ	10P	S
C863	ECUE1H100DCQ	10P	S
C865	ECUE1H221JCQ	220P	
C866	ECUE1C103KBQ	0.01	
C867	ECUE1H2R0CCQ	2	
C869	ECUE1H2R0CCQ	2	
R806	ECUE1H100DCQ	10P	S
		(OTHERS)	
X200	H0J819400004	CRYSTAL OSCILLATOR	
FL801	J0E2457B0008	LCR FILTER	
E1	PQMC10471Z	MAGNETIC SHIELD, FRAME	
E2	PQMC10472Z	MAGNETIC SHIELD, COVER	
POS1	PQRPAR390N	THERMISTOR, POSISTOR	S
RA201	EXRV8V472JV	RESISTOR ARRAY	S

29.1.3. Operational P.C.Board Part

Ref. No.	Part No.	Part Name & Description	Remarks
PCB2	PQWP2TG2224H	OPERATIONAL P.C.BOARD ASS´Y (RTL)	
		(DIODES)	
LED900	LNJ311G8TRU	LED	
LED902	LNJ211R8ARU	LED	
LED903	LNJ211R8ARU	LED	
		(RESISTORS)	
R900	ERJ3GEYJ104	100K	
R901	ERJ3GEYJ104	100K	
R902	ERJ3GEYJ104	100K	
R903	ERJ3GEYJ104	100K	
R904	ERJ3GEY0R00	0	
R905	ERJ3GEYJ820	82	
R906	ERJ3GEYJ820	82	
		(CAPACITORS)	
C900	ECUV1H101JCV	100P	
C901	ECUV1H101JCV	100P	
		(OTHERS)	
CN901	K1MN30A00008	CONNECTOR	
E3	L0CBAB000044	MICROPHONE	
E4	L5DCBCB00013	LIQUID CRYSTAL DISPLAY	
E5	PQHS10327Z	TAPE, LCD	
E6	PQHR10974Z	GUIDE, LCD	PS-HB
E7	PQHS10599Z	TAPE, DOUBLE SIDE	

29.2. Handset

29.2.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
101	PQGG10161Z1	GRILLE	
102	PQGP10234Z1	PANEL, LCD	AS-HB
103	PQKE10360Z1	SPACER, SP RING	AS-HB
104	PQHS10572Z	TAPE, DOUBLE SIDE (SP RING)	
105	PQHR10985Z	OPTIC CONDUCTIVE PARTS, LED LENS (UPPER)	PS-HB
106	PQSA10125X	ANTENNA (for KX-TG2224F)	
106	PQSA10125X	ANTENNA (for KX-TG2224P)	
106	PQSA10125Y	ANTENNA (for KX-TG2224W)	
107	PQKM10599Z2	CABINET BODY (for KX-TG2224F)	ABS-HB
107	PQKM10599Z3	CABINET BODY (for KX-TG2224P)	ABS-HB
107	PQKM10599Z1	CABINET BODY (for KX-TG2224W)	ABS-HB
108	PQGT16057Z	NAME PLATE (for KX-TG2224F)	
108	PQGT16059Z	NAME PLATE (for KX-TG2224P)	
108	PQGT16041Z	NAME PLATE (for KX-TG2224W)	
109	PQBC10383Z1	BUTTON, VOLUME KEY	AS-HB
110	PQSX10235Y	KEYBOARD SWITCH (for KX-TG2224F)	

Ref. No.	Part No.	Part Name & Description	Remarks
110	PQSX10235Y	KEYBOARD SWITCH (for KX-TG2224P)	
110	PQSX10235Z	KEYBOARD SWITCH (for KX-TG2224W)	
111	PQHS10573Z	SPACER, CUSHION LCD	
112	PQQT22570Y	LABEL, BATTERY	
113	HHR-P513	BATTERY, NI-MH	
114	PQHE10143Z	SPACER, BATTERY	
115	PQHS10592Z	SPACER, SPEAKER	
116	L0AD02A00014	SPEAKER	
117	PQHR10984Z	GUIDE, SPEAKER	ABS-HB
118	PQWE10028Z	BATTERY TERMINAL, CHARGE	
119	PQJT10207Z	TERMINAL, CHARGE (L)	
120	PQJT10208Z	TERMINAL, CHARGE (R)	
121	PQHR10778Z	GUIDE, SPEAKER	ABS-HB
122	PQAS3P07Y	SPEAKER	
123	PQHG10666Z	SPACER, SP RUBBER SHEET	
124	PQHS10457Z	COVER, SPEAKER	
125	PQKF10593Z3	CABINET COVER (for KX-TG2224F)	ABS-HB
125	PQKF10593Z4	CABINET COVER (for KX-TG2224P)	ABS-HB
125	PQKF10593Z1	CABINET COVER (for KX-TG2224W)	ABS-HB
126	PQKE10359Z3	COVER, HEADSET(for KX-TG2224F)	
126	PQKE10359Z3	COVER, HEADSET(for KX-TG2224P)	
126	PQKE10359Z2	COVER, HEADSET(for KX-TG2224W)	
127	PQHR10986Z	OPTIC CONDUCTIVE PARTS, LED LENS (LOWER)	PS-HB
128	PQKK10136Z3	LID, BATTERY (for KX-TG2224F)	ABS-HB
128	PQKK10136Z4	LID, BATTERY (for KX-TG2224P)	ABS-HB
128	PQKK10136Z1	LID, BATTERY (for KX-TG2224W)	ABS-HB
129	PQBX10371Z1	BUTTON, 12KEY	
130	PQHS10570Z	TAPE, DOUBLE SIDE (GRILLE)	

29.2.2. Main P.C. Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB100	PQWPTG2258SR	MAIN P.C.BOARD ASS´Y (RTL)	
		(ICs)	
IC201	C2HBBJ000027	IC	
IC202	PQWITG2224WR	IC	
IC203	C0CBABD00019	IC	
IC204	PQVIMM1385HN	IC	
IC205	C0EBE0000292	IC	
IC801	C1CB00001486	IC	
		(TRANSISTORS)	
Q201	PQVTDTC143E	TRANSISTOR(SI)	S
Q202	PQVTDTC143E	TRANSISTOR(SI)	S
Q204	2SC3930C	TRANSISTOR(SI)	
Q205	2SD1819A	TRANSISTOR(SI)	
Q206	PQVTDTC143E	TRANSISTOR(SI)	S
Q207	2SD1819A	TRANSISTOR(SI)	
Q212	PQVTXP151A13	TRANSISTOR(SI)	S
		(DIODES)	
D205	B0JCMD000017	DIODE(SI)	
D206	B0JCMD000017	DIODE(SI)	
D207	B0JCMD000017	DIODE(SI)	
D208	B0JCMD000017	DIODE(SI)	
D214	MA111	DIODE(SI)	
D216	MA111	DIODE(SI)	
D217	PQVDEP10LA03	DIODE(SI)	S
D801	MA27P0700L	DIODE(SI)	
D802	MA27P0700L	DIODE(SI)	
LED201	PQVDSML310MT	LED	S
LED202	PQVDSML310MT	LED	S
LED203	PQVDSML310MT	LED	S
LED204	PQVDSML310MT	LED	S
LED205	PQVDSML310MT	LED	S
LED206	PQVDSML310MT	LED	S
LED207	PQVDSML310MT	LED	S
LED210	PQVDEL1921SR	LED	
LED211	PQVDEL1921SR	LED	
		(COILS)	
L203	J0JCC0000186	COIL	
L205	PQLQR4RB601D	COIL	
L206	PQLQR4RB601D	COIL	
L207	PQLQR4RB601D	COIL	
L208	PQLQR4RB601D	COIL	
L209	PQLQR4RB601D	COIL	
L210	PQLE1G5K3220	COIL	S
L801	MQLRF10NJF	COIL	
L802	MQLRF3N9DF	COIL	
L803	MQLRF2N7DF	COIL	
L804	MQLRF10NJF	COIL	
L805	MQLRF2N2DF2	COIL	
L806	MQLRF10NJF	COIL	
L807	PQLQR4D1R0K	COIL	S
R242	PQLQR4RB601D	COIL	
R243	PQLQR4RB601D	COIL	
		(CONNECTOR AND JACK)	
CN201	PQJS22A12Z	CONNECTOR	S
CN203	K2HD103D0001	JACK	
		(RESISTORS)	
R201	ERJ3GEYJ101	100	
R202	ERJ3GEYJ101	100	
R203	ERJ3GEYJ101	100	
R204	ERJ3GEYJ101	100	
R205	ERJ3GEYJ820	82	
R206	ERJ3GEYJ820	82	
R207	ERJ3GEYJ820	82	
R209	ERJ2GEJ102	1K	
R210	ERJ2GEJ103	10K	
R212	ERJ2GEJ101	100	
R213	ERJ2GEJ101	100	
R215	ERJ2GEJ151	150	
R216	ERJ3GEYJ561	560	
R217	ERJ3GEYF434	430K	S
R218	ERJ3GEYF824	820K	S
R222	ERJ2GEJ101	100	
R223	ERJ2GEJ102	1K	
R224	ERJ3GEYJ103	10K	
R228	ERJ2GEJ224	220K	
R229	ERJ2GEJ102	1K	
R230	ERJ2GEJ102	1K	
R231	ERJ2GEJ102	1K	
R232	ERJ3GEYJ103	10K	
R233	ERJ2GE0R00	0	
R234	ERJ2GEYF225	2.2M	
R235	ERJ2GEYF225	2.2M	
R237	ERJ2GEJ104	100K	
R240	ERJ3GEY0R00	0	
R244	ERJ2GEJ473	47K	
R245	ERJ2GEJ103	10K	
R246	ERJ2GEJ393X	39K	
R247	ERJ2GEJ182	1.8K	
R248	ERJ2GEJ393X	39K	
R249	ERJ2GEJ122	1.2K	
R250	ERJ2GEJ122	1.2K	
R253	ERJ2GEJ222	2.2K	
R265	ERJ2GEJ103	10K	
R270	ERJ2GEJ104	100K	
R276	ERJ2GEJ471	470	
R277	ERJ2GEJ471	470	
R278	ERJ2GEJ104	100K	
R279	ERJ2GEJ101	100	
R280	ERJ2GEJ182	1.8K	
R281	ERJ2GEJ104	100K	
R302	ERJ2GEJ470	47	
R303	ERJ2GEJ470	47	
R306	ERJ2GEJ104	100K	
R325	ERJ2GEYF185	1.8M	
R326	ERJ2GEYF105	1M	
R801	ERJ2GEJ100	10	

Ref. No.	Part No.	Part Name & Description	Remarks
R802	ERJ2GEJ100	10	
R803	ERJ2GEJ100	10	
R804	ERJ2GEJ4R7	4.7	
R805	ERJ2GEJ331	330	
R810	ERJ3GEYF103	10K	S
		(CAPACITORS)	
C203	ECUE1C104ZFQ	0.1	
C205	ECUE1H101JCQ	100P	
C206	ECUV1C104KBV	0.1	
C207	ECUV1C104KBV	0.1	
C208	ECUV1C104KBV	0.1	
C209	ECUV1C104KBV	0.1	
C210	ECUV1C104KBV	0.1	
C211	ECUV1A474KBV	0.47	
C212	ECUV1A474KBV	0.47	
C213	EEE0JA331P	330P	
C214	ECUE1C104ZFQ	0.1	
C215	ECUV1A474KBV	0.47	
C217	ECUE0J105ZFQ	1	
C218	ECUE1C104ZFQ	0.1	
C220	EEE0JA101SP	100P	
C221	ECUE1C104ZFQ	0.1	
C223	ECST0JY106	10	
C224	ECUE1C104ZFQ	0.1	
C226	ECUE1C104ZFQ	0.1	
C228	ECUE1C104ZFQ	0.1	
C229	ECUE1C104ZFQ	0.1	
C230	ECUE1A333KBQ	0.033	
C231	ECUV1A224KBV	0.22	
C232	ECUE1A333KBQ	0.033	
C233	ECUV1A105ZFV	1	
C236	ECUE1H4R0CCQ	4	
C237	ECUE1H4R0CCQ	4	
C243	ECUE1C103KBQ	0.01	
C244	ECUE1C104ZFQ	0.1	
C255	ECUV1A224KBV	0.22	
C257	ECST0JY226	22	
C267	ECST0JY226	22	
C274	ECUE1C104ZFQ	0.1	
C277	ECUE1A823KBQ	0.082	
C291	ECUE1C104ZFQ	0.1	
C293	ECUE1H221JCQ	220P	
C294	ECUE1C104ZFQ	0.1	
C298	ECUE1H101JCQ	100P	
C299	ECUE1H101JCQ	100P	
C303	ECUV1A106ZF	10	S
C304	ECUE1C104ZFQ	0.1	
C306	ECUE1C104ZFQ	0.1	
C307	ECUE1A104KBQ	0.1	
C308	ECUE1H3R0CCQ	3	
C309	ECUE1A104KBQ	0.1	
C318	EEEFK0J331P	330P	
C801	ECUE1H102KBQ	0.001	S
C802	ECUE1H1R0CCQ	1	
C803	ECUE1H100DCQ	10P	S
C804	ECUE1H1R0CCQ	1	
C805	ECUE1H100DCQ	10P	S
C807	ECUE1H100DCQ	10P	S
C811	ECUE1H100DCQ	10P	S
C813	ECUE1H100DCQ	10P	S
C814	ECUE1H1R5CCQ	1.5	S
C815	ECUE1H100DCQ	10P	S
C816	ECUE1H100DCQ	10P	S
C817	ECUE1C104ZFQ	0.1	
C818	ECUE1C104ZFQ	0.1	
C819	ECUE1H391KBQ	390P	
C820	ECUE1C104ZFQ	0.1	
C821	ECUE1H102KBQ	0.001	S
C822	ECUE1H1R0CCQ	1	
C823	ECST0JY106	10	
C824	ECUE1H102KBQ	0.001	S
C825	ECUE1H681KBQ	680P	
C827	ECUE1H102KBQ	0.001	S
C828	ECUE1H102KBQ	0.001	S
C829	ECUE1H102KBQ	0.001	S
C830	ECUV1A105ZFV	1	
C831	ECUV1A105ZFV	1	
C833	ECST0JY106	10	
C856	ECUE1H2R0CCQ	2	
C857	ECUE1H2R0CCQ	2	
C858	ECUE1H2R0CCQ	2	
C859	ECUE1H2R0CCQ	2	
C860	ECUE1H100DCQ	10P	S
C861	ECUE1H2R0CCQ	2	
C862	ECUE1H100DCQ	10P	S
C863	ECUE1H100DCQ	10P	S
C865	ECUE1H221JCQ	220P	
C866	ECUE1C103KBQ	0.01	
C867	ECUE1H2R0CCQ	2	
C869	ECUE1H2R0CCQ	2	
L201	ECUE1H100DCQ	10P	S
R806	ECUE1H100DCQ	10P	S
		(OTHERS)	
X201	H0J819400004	CRYSTAL OSCILLATOR	
FL801	J0E2457B0008	LCR FILTER	
E101	L0CBAB000044	MICROPHONE	
E102	L5DCBDC00009	LIQUID CRYSTAL DISPLAY	
E103	PQHX11186Z	SPACER, LCD	
E104	PQHR10983Z	GUIDE, LCD	PC+ABS-HB
E105	PQMC10471Z	MAGNETIC SHIELD, FRAME	
E106	PQMC10472Z	MAGNETIC SHIELD, COVER	
RA201	EXRV8V104JV	RESISTOR ARRAY	S

29.2.3. Small P.C. Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB200	PQLP10262Z	SMALL P.C.BOARD ASS´Y (RTL)	
		(IC)	
IC1	C0CBAAC00119	IC	
		(CAPACITORS)	
C1	ECUV1A105ZFV	1	
C2	ECST0JY106	10	
		(OTHER)	
E201	PQHE10148Z	SPACER, SHEET	

29.2.4. Accessories and Packing Materials

Ref. No.	Part No.	Part Name & Description	Remarks
A1	PQLV19Z	AC ADAPTOR	⚠
A2	PQJA10075Z	CORD, TELEPHONE	
A3	PQKE10361Z2	HANGER, BELT CLIP (for KX-TG2224F)	PC+ABS-HB
A3	PQKE10361Z2	HANGER, BELT CLIP (for KX-TG2224P)	PC+ABS-HB
A3	PQKE10361Z1	HANGER, BELT CLIP (for KX-TG2224W)	PC+ABS-HB
A4	PQKE10364Z1	PLASTIC PARTS, SHOULER REST	
A5	PQHG10680Z	RUBBER PARTS, SHEET	
A6	PQQT22597Z	LABEL, CAUTION	
A7	PQQX13576X	INSTRUCTION BOOK	
A8	PQQW12828Z	QUICK GUIDE (for English)	
A9	PQQW12829Y	QUICK GUIDE (for Spanish)	
A10	PQQW12842Z	LEAFLET	
P1	XZB21X35A03	PROTECTION COVER (for Base Unit)	
P2	XZB10X35A02	PROTECTION COVER (for Handset)	
P3	PQPK14022Z	GIFT BOX (for KX-TG2224F)	
P3	PQPK14023Z	GIFT BOX (for KX-TG2224P)	
P3	PQPK13909Z	GIFT BOX (for KX-TG2224W)	
P4	PQXDDS400-8	LABEL, SECURITY TAG	

30 FOR SCHEMATIC DIAGRAM

30.1. Base Unit (SCHEMATIC DIAGRAM (BASE UNIT))

Note:

1. DC voltage measurements are taken with voltmeter from the negative voltage line.
2. This schematic diagram may be modified at any time with the development of new technology.

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

30.2. Handset (SCHEMATIC DIAGRAM (HANDSET))

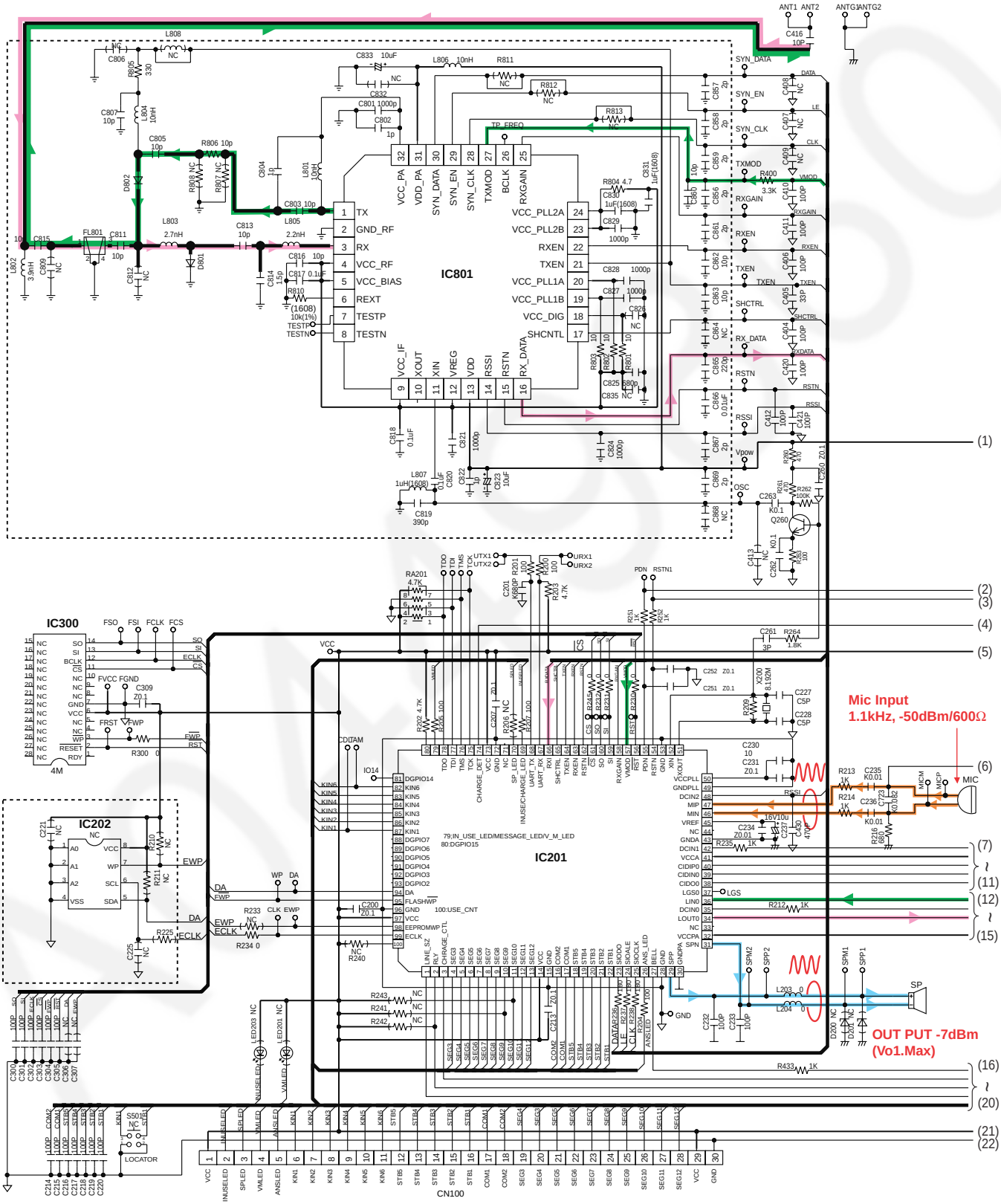
Note:

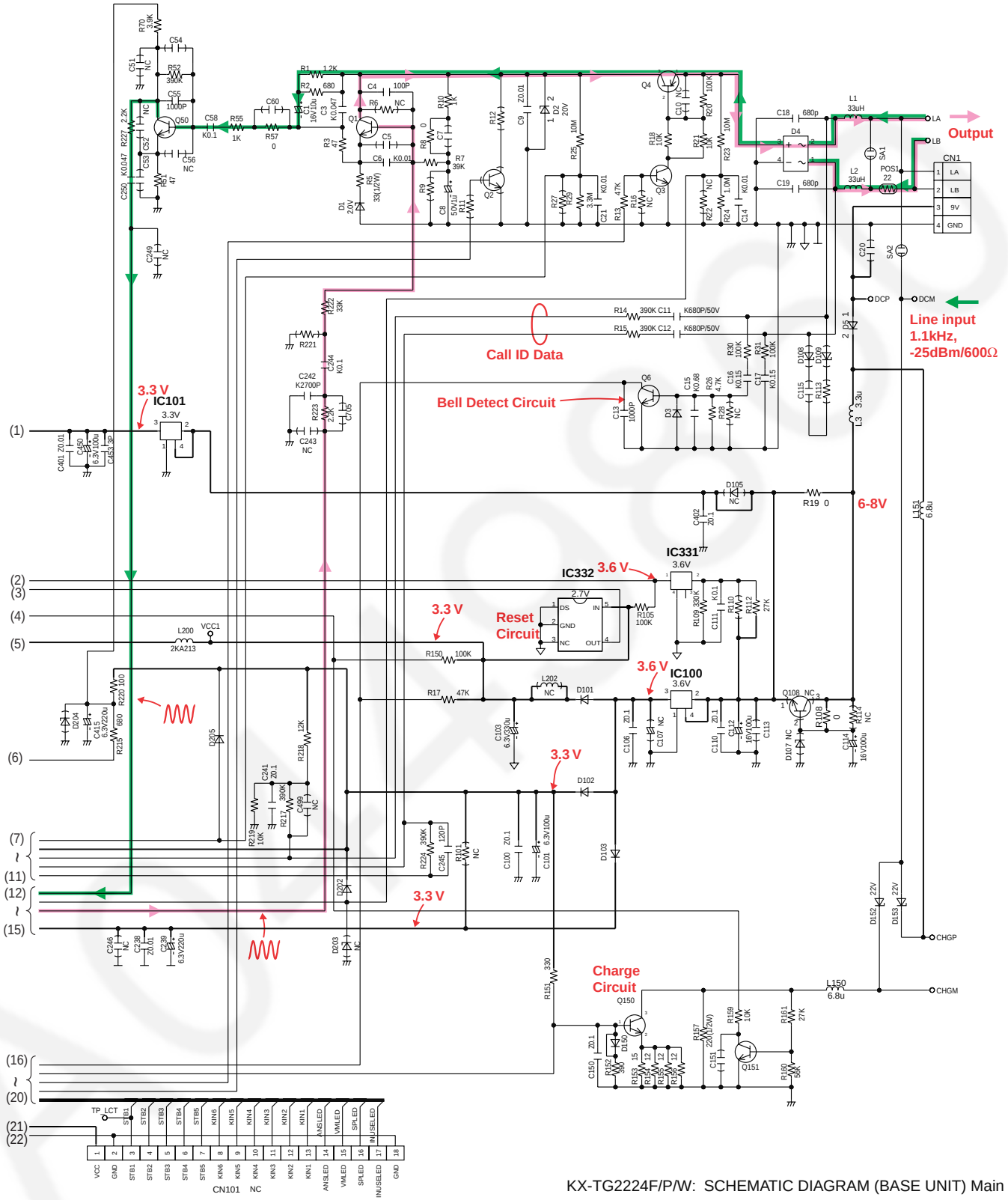
1. DC voltage measurements are taken with an oscilloscope or a tester with a ground.
2. The schematic diagrams and circuit board may be modified at any time with the development of new technology.

30.3. Memo

31 SCHEMATIC DIAGRAM (BASE UNIT)

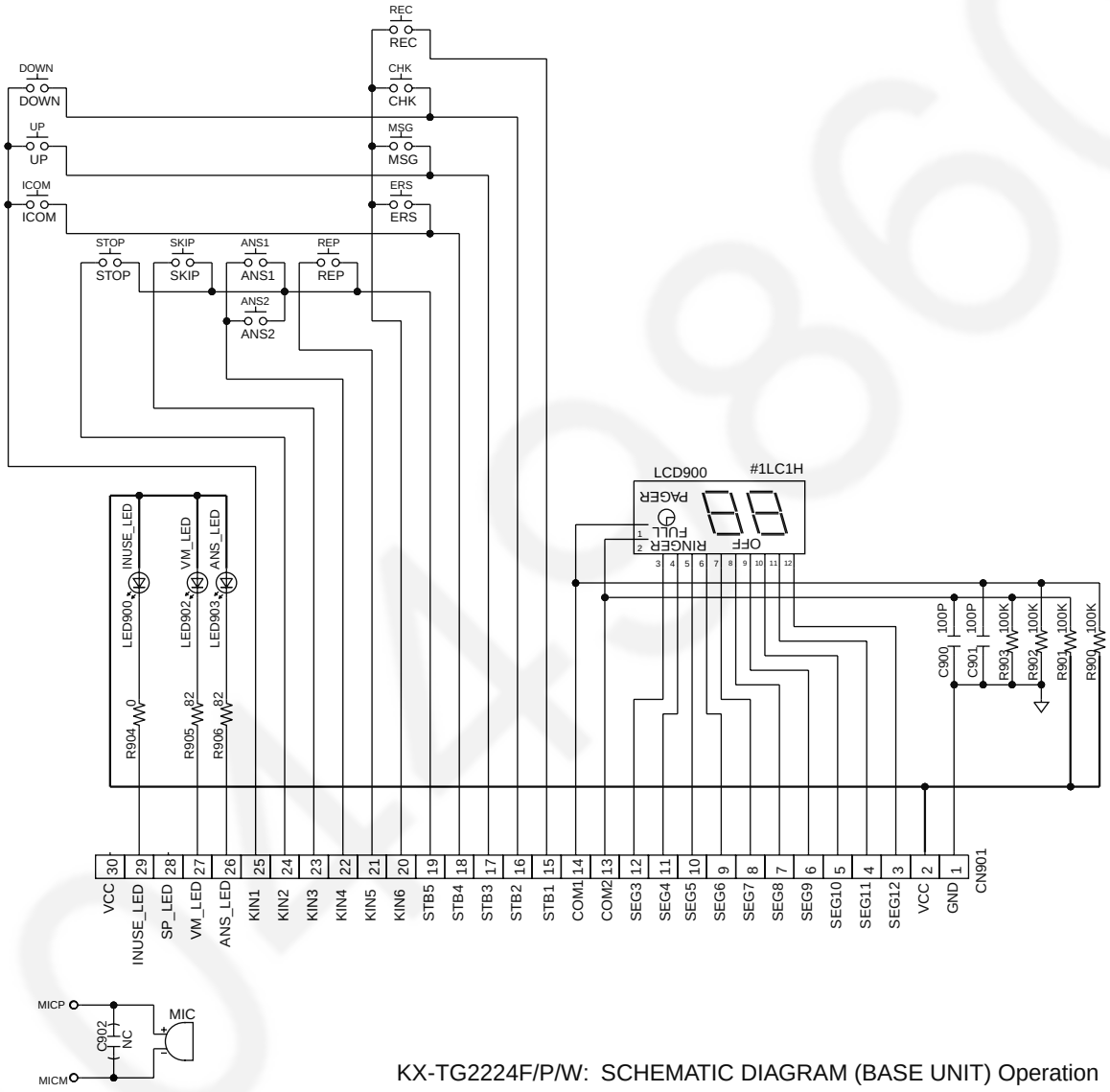
31.1. Main





KX-TG2224F/P/W: SCHEMATIC DIAGRAM (BASE UNIT) Main

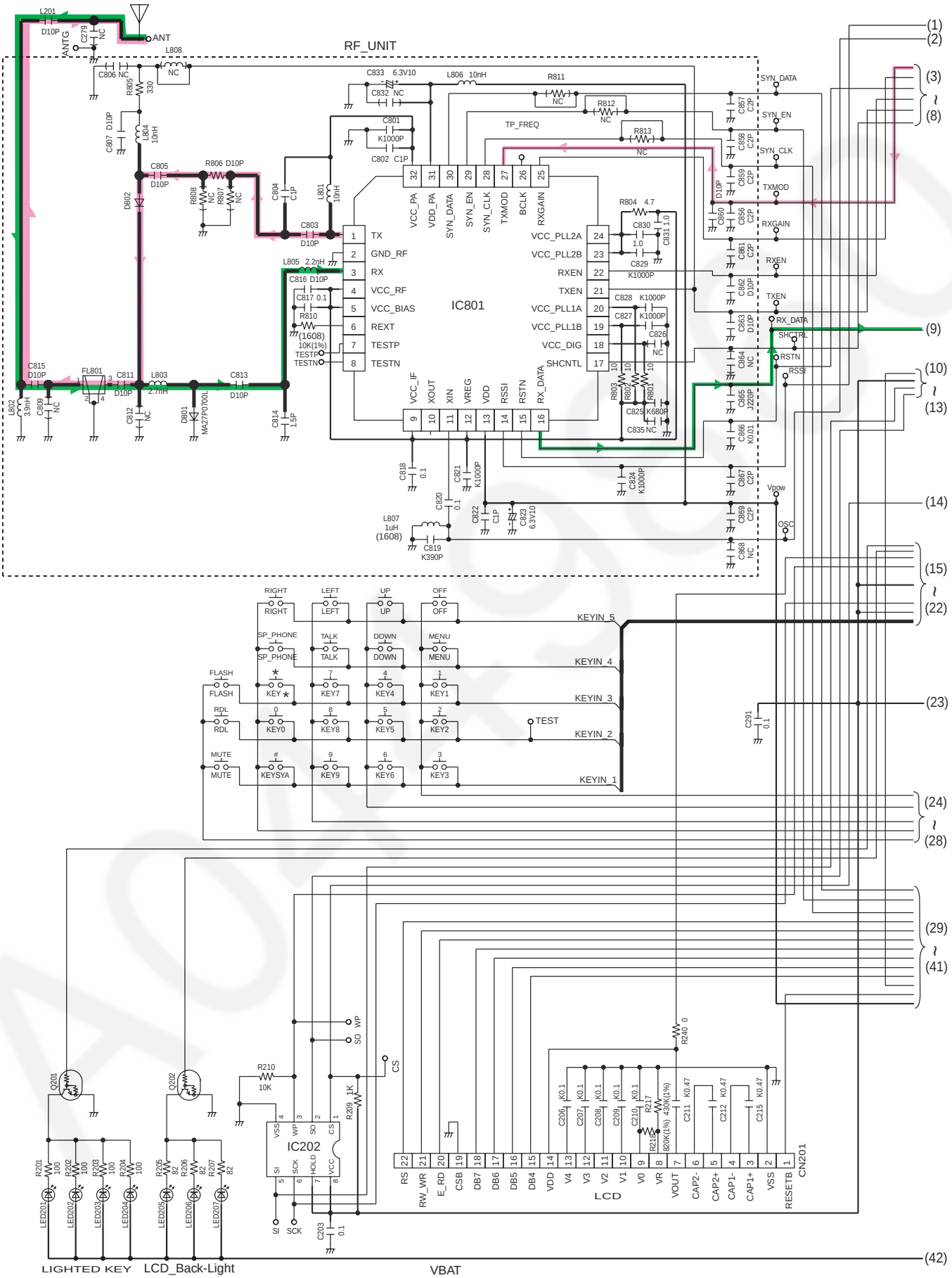
31.2. Operation

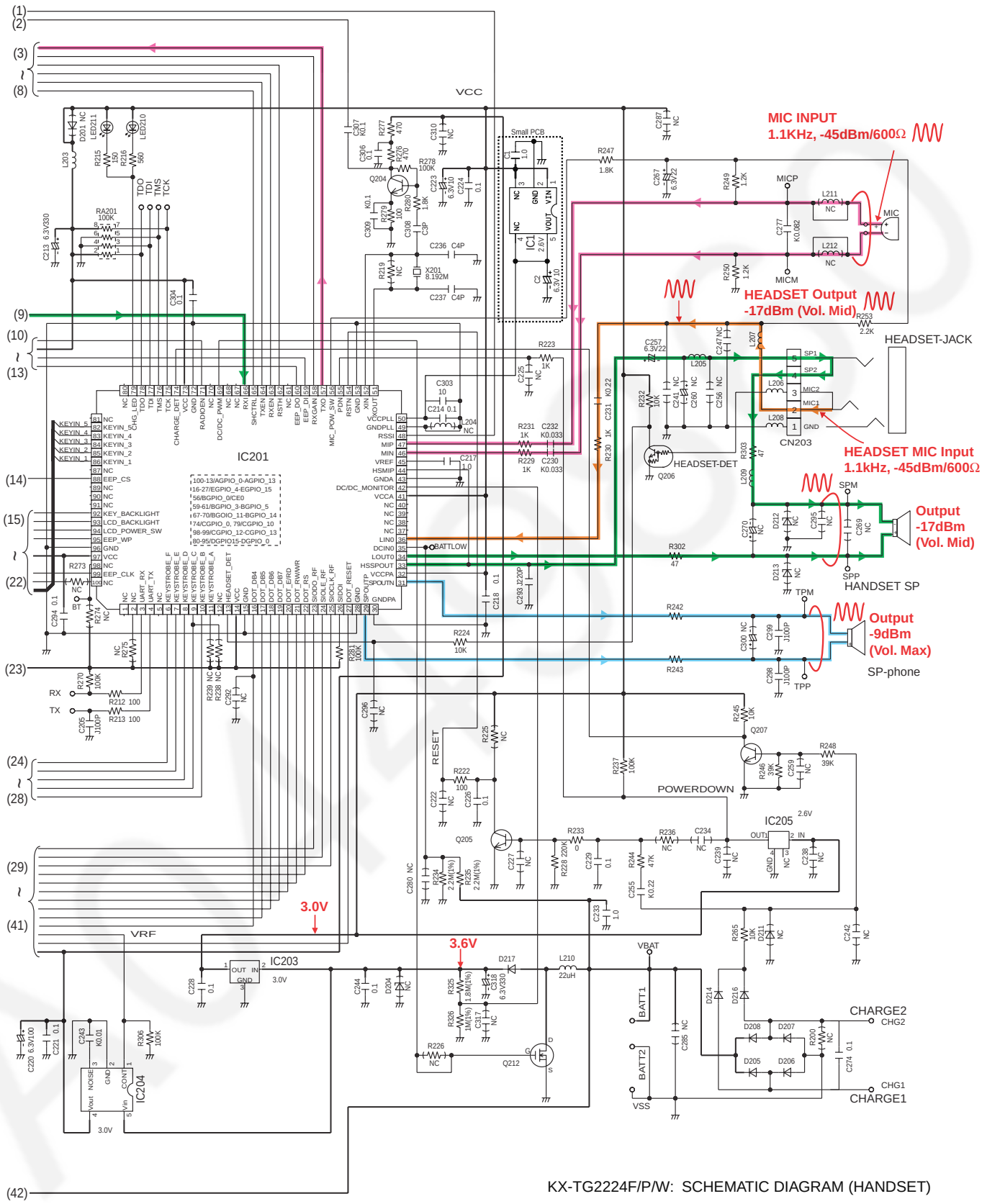


KX-TG2224F/P/W: SCHEMATIC DIAGRAM (BASE UNIT) Operation

31.3. Memo

32 SCHEMATIC DIAGRAM (HANDSET)





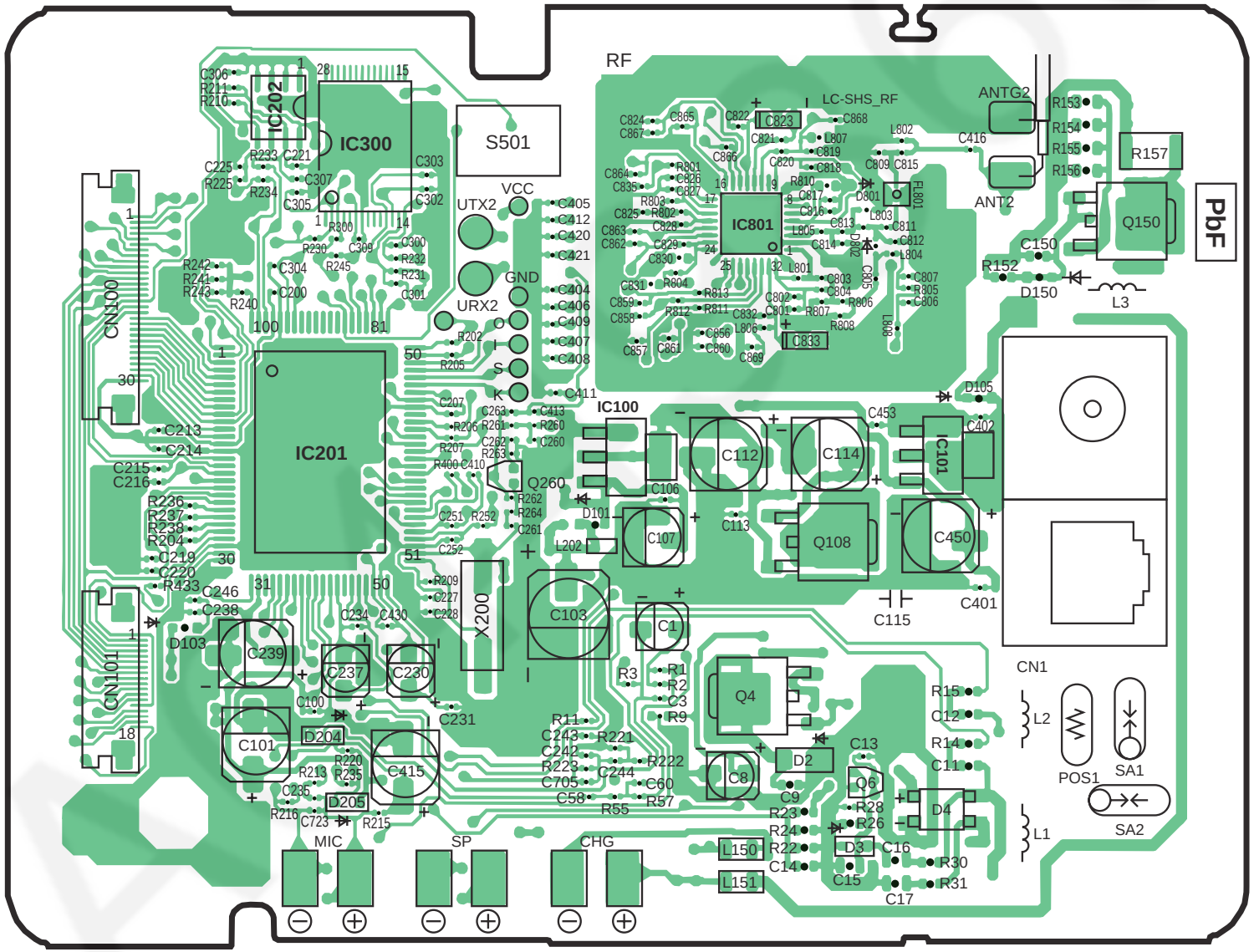
KX-TG2224F/P/W: SCHEMATIC DIAGRAM (HANDSET)

32.1. Memo

33 CIRCUIT BOARD (BASE UNIT)

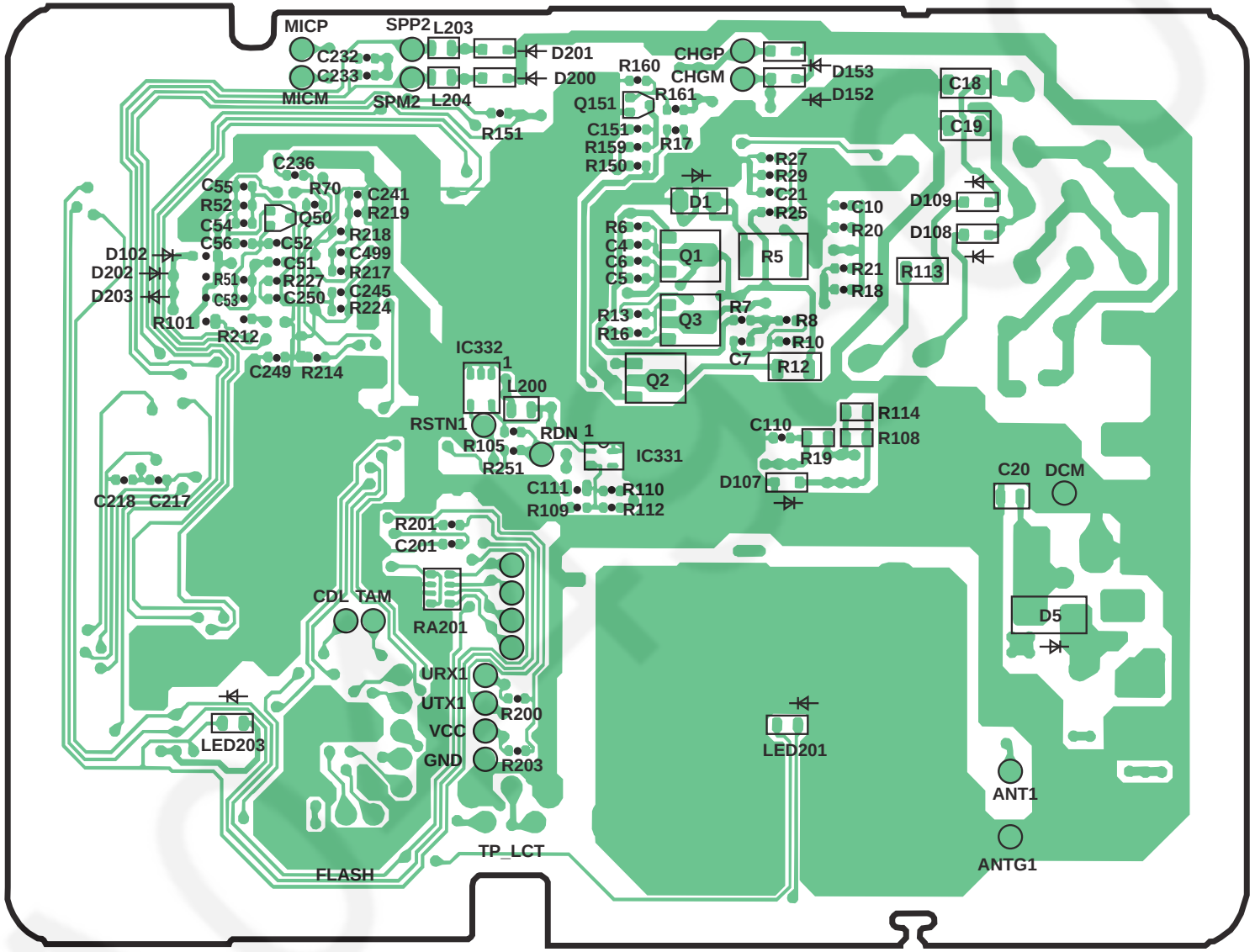
33.1. Main

33.1.1. Component View



KX-TG2224F/P/W CIRCUIT BOARD (BASE UNIT) Main (Component View)

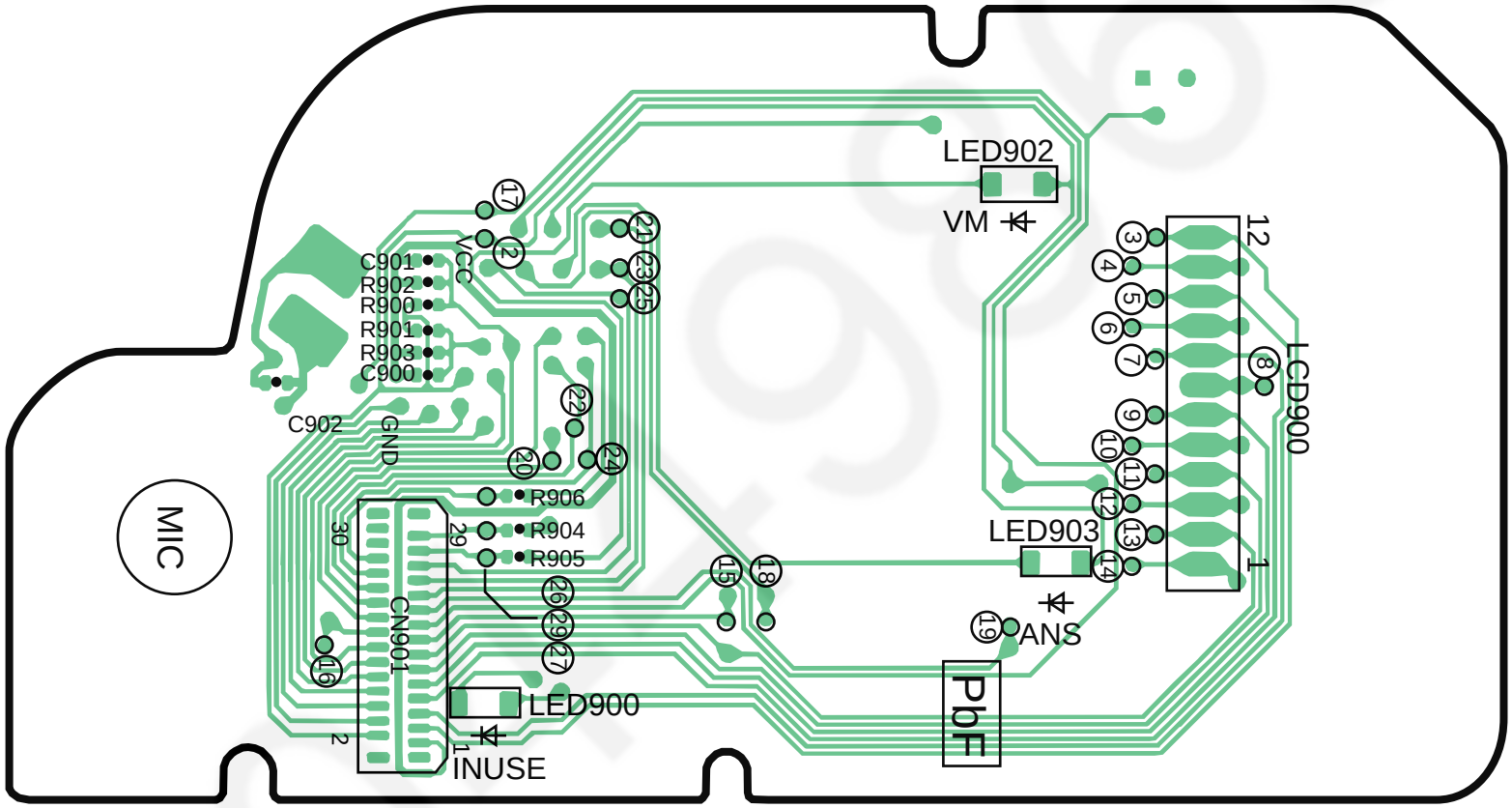
33.1.2. Flow Solder Side View



KX-TG2224F/P/W CIRCUIT BOARD (BASE UNIT) Main (Flow Solder Side View)

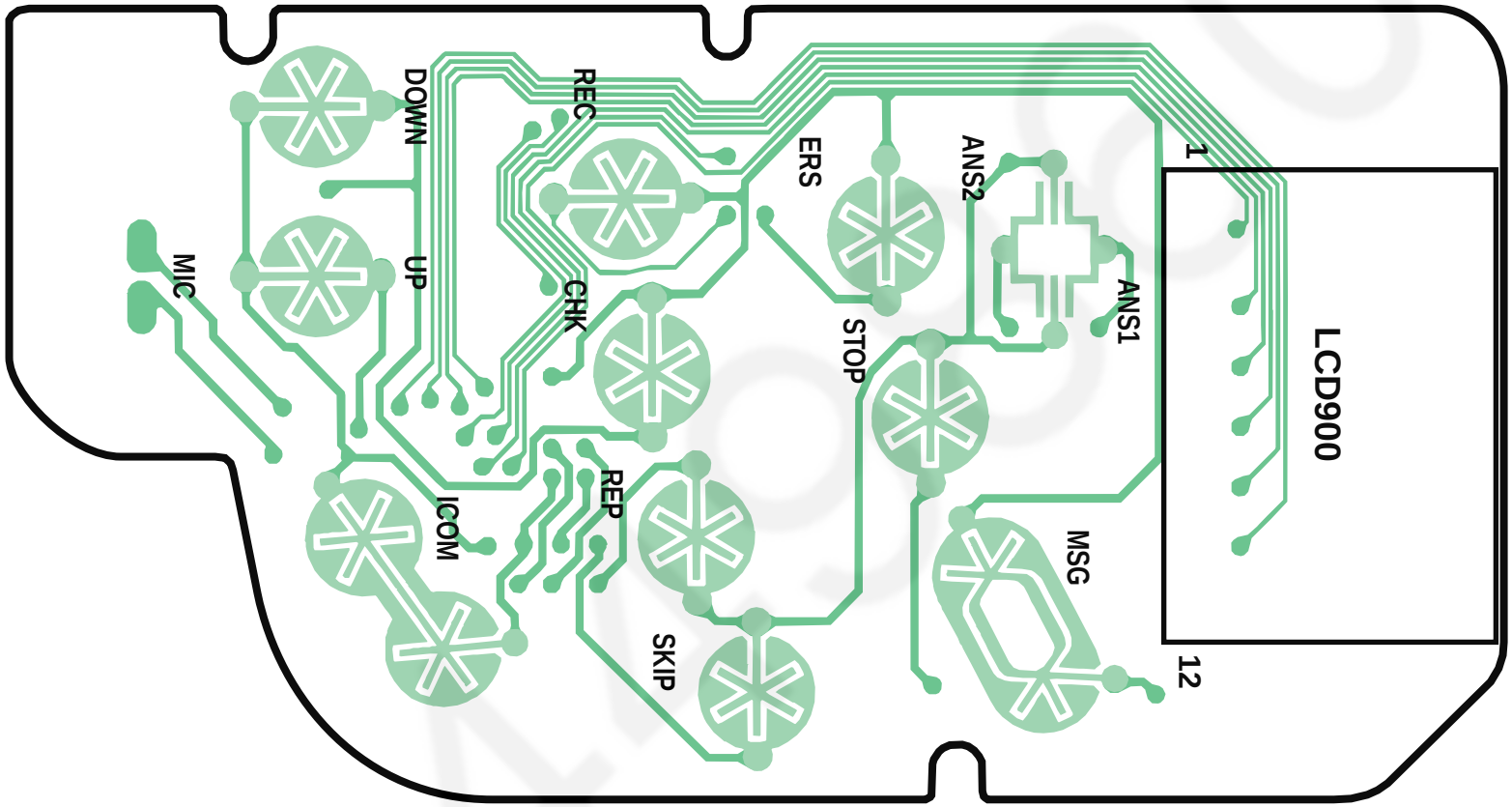
33.2. Operation

33.2.1. Component View



KX-TG2224F/P/W CIRCUIT BOARD (BASE UNIT) Operation (Component View)

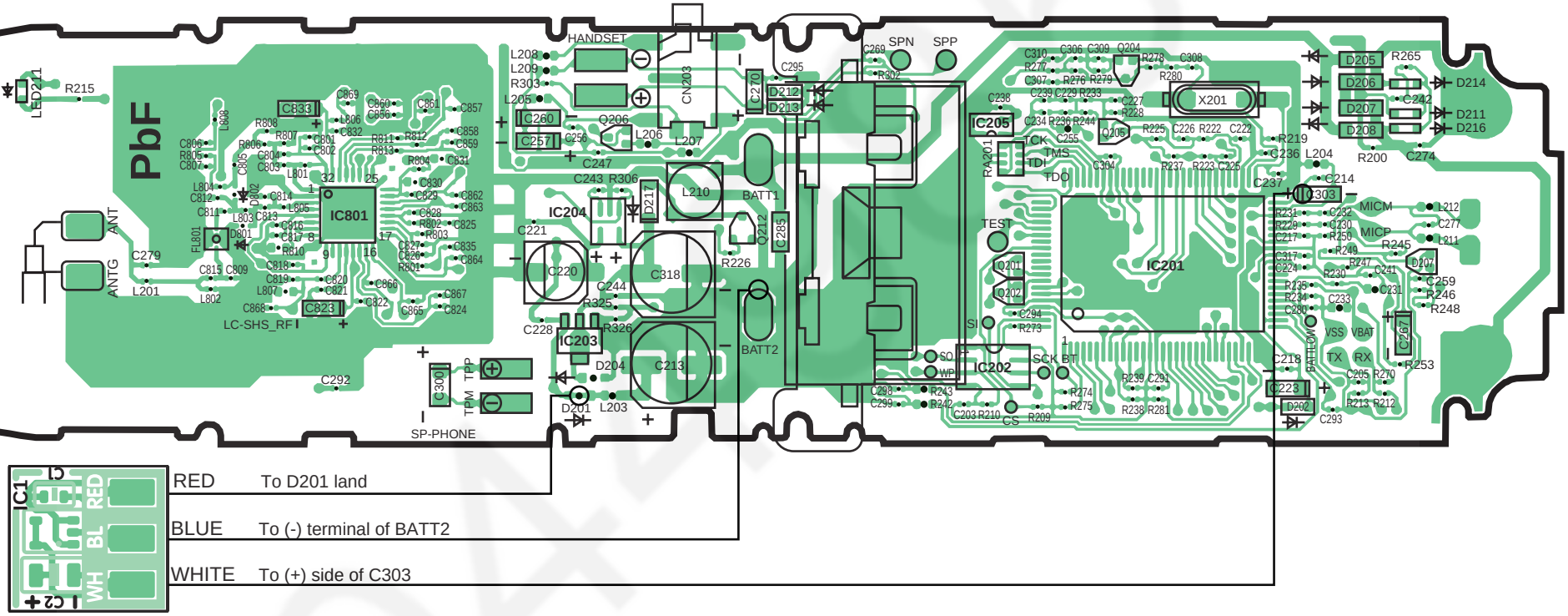
33.2.2. Flow Solder Side View



KX-TG2224F/P/W CIRCUIT BOARD (BASE UNIT) Operation (Flow Solder Side View)

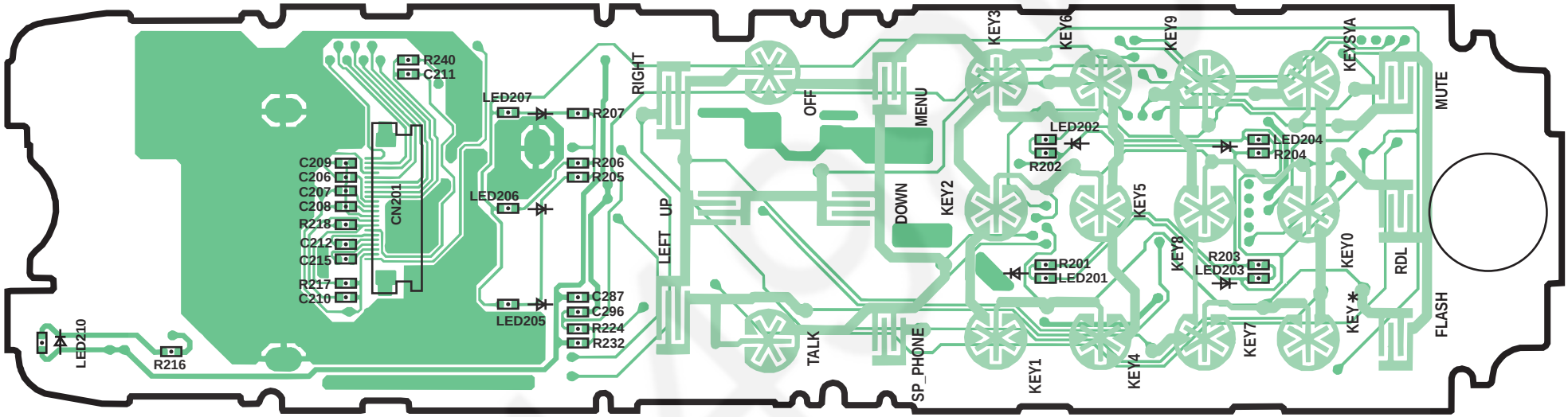
34 CIRCUIT BOARD (Handset)

34.1. Component View



KX-TG2224F/P/W CIRCUIT BOARD (HANDSET) Main (Component View)

34.2. Flow Solder Side View



KX-TG2224F/P/W CIRCUIT BOARD (HANDSET) Main (Flow Solder Side View)