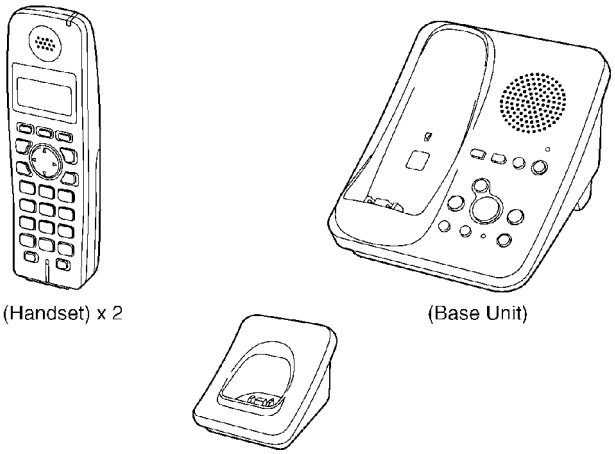
ORDER NO. KM40611246CE

Service Manual

Telephone Equipment

KX-TG3531BXS
KX-TG3531BXB
KX-TG3532BXS
KX-TG3532BXB
KX-TGA351BXS
KX-TGA351BXB

Caller ID Compatible



(Handset) x 2

(Base Unit)

(Charger Unit)

Model shown is KX-TG3532.

2.4 GHz Expandable Digital Cordless Answering System

Silver Version

Black Version

(for Asia, Middle Near East and Other areas)

Configuration for each model

Model No	Base Unit	Handset	Charger Unit	Expandable
KX-TG3531	1 (TG3531)	1 (TGA351)		Up to 4
KX-TG3532	1 (TG3531)	2 (TGA351)	1	Up to 4
KX-TGA351*		1 (TGA351)	1	

* KX-TGA351 is also an optional accessory, which contains a handset and a charger.

Panasonic

⚠ WARNING

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

IMPORTANT SAFETY NOTICE

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

IMPORTANT INFORMATION ABOUT LEAD FREE, (PbF), SOLDERING

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

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

Note for TABLE OF CONTENTS:
Because sections 5, 6 and 7 of this manual are extracts from the operating instructions for this model, they are subject to change without notice. You can download and refer to the original operating instructions on TSN Server for further information.

TABLE OF CONTENTS

1 Safety Precaution

1.1. For Service Technicians

ICs and LSIs are vulnerable to static electricity.

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

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

2 Warning

2.1. Battery Caution

1. Danger of explosion if battery is incorrectly replaced.
2. Replace only with the same or equivalent type recommended by the manufacturer.
3. Dispose of used batteries according to the manufacture's Instructions.

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

Note:

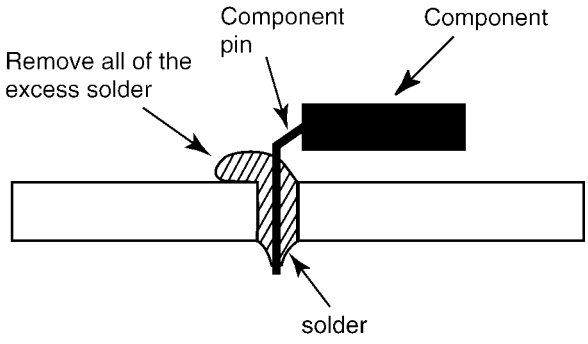
In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

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

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

Caution

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

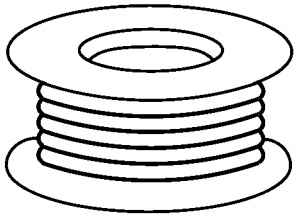
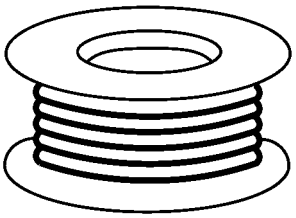
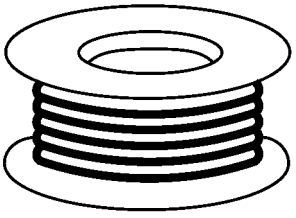


(Slice View)

2.2.1. Suggested PbF Solder

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

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

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

3 Specifications

	Base Unit	Handset	Charger
Power Supply	AC Adaptor (PQLV203BXZ, 220-240 V AC, 50/60 Hz)	Rechargeable Ni-MH battery (3.6 V, 650 mAh) HHR-P107	AC Adaptor (PQLV208BXZ, 220-240 V AC, 50/60 Hz)
Receiving/Transmitting Frequency	90 channels within 2.4 GHz-2.48 GHz	90 channels within 2.4 GHz-2.48 GHz	—
Receiving Method	Super Heterodyne	Super Heterodyne	—
Oscillation Method	PLL synthesizer	PLL synthesizer	—
Detecting Method	Quadrature Discriminator	Quadrature Discriminator	—
Tolerance of OSC Frequency	13.824 MHz±100 Hz	13.824 MHz±100 Hz	—
Modulation Method	Frequency Modulation	Frequency Modulation	—
Spread spectrum Method	Frequency Hopping Spread spectrum	Frequency Hopping Spread spectrum	—
ID Code	19 bit	22 bit	—
Security Codes	—	1,000,000	—
Ringer Equivalence No. (REN)	0.1	—	—
Dialing Mode	—	Tone (DTMF)/Pulse	—
Redial	—	Up to 48 digits	—
Power Consumption	Standby: Approx. 2.1 W Maximum: Approx. 5.2 W	11 days at Standby, 5 hours at Talk	Standby: Approx. 1.4 W, Maximum: Approx. 4.0 W
Power Output	125 mW (max.)	125 mW (max.)	—
Operating Environment	5°C - 40 °C	5°C - 40 °C	5°C - 40 °C
Dimensions (H x W x D)	Approx. 95 mm × 116 mm × 143 mm	Approx. 156 mm × 48 mm × 33 mm	Approx. 68 mm × 82 mm × 87 mm
Mass (Weight)	Approx. 250 g	Approx. 150 g	Approx. 80 g

- Optional Headset: KX-TCA89BX
- Design and specifications are subject to change without notice.

4 Technical Descriptions

4.1. FHSS Description

4.1.1. Frequency

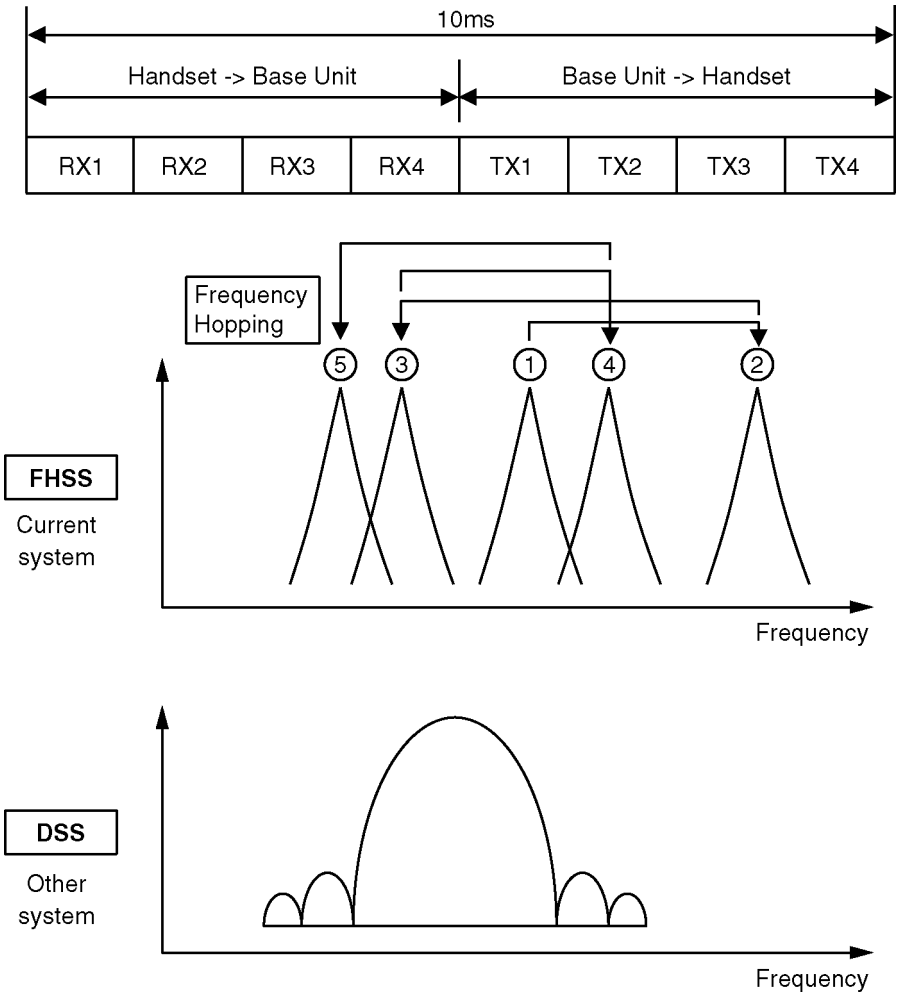
The frequency range of 2.4 GHz - 2.48 GHz is used. Transmitting and receiving channel between Base Unit and Handset is same frequency. Refer to **Frequency Table** (P.81).

4.1.2. FHSS (Frequency Hopping Spread Spectrum)

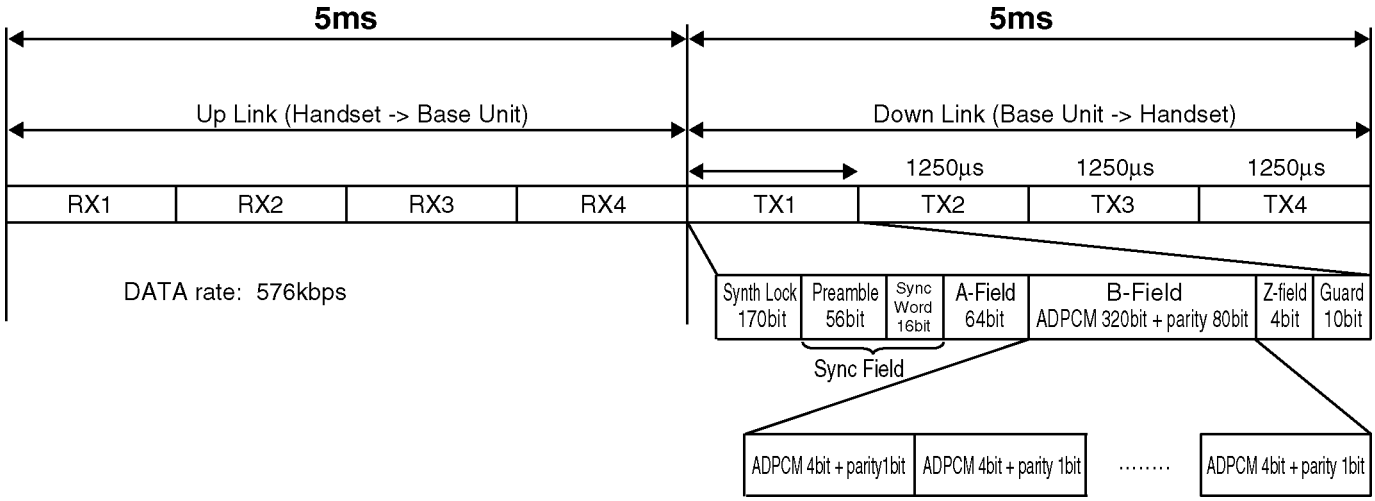
This telephone is using an IC chip which has similar specification to WDCT (World Digital Cordless Telephone) and is the telephone system that can use multiple portable unit simultaneously. The explanation of this system is mentioned below. This system uses a Time Division Multiple Access/Time Division Duplex (**TDMA**/**TDD**) scheme:

transmitting and receiving frequencies of the Base Unit and Handset are shared in the same frequency. The construction of RX/TX frequency data is shown below. It consists of 4 slots from the Base Unit to the Handset, and 4 slots from the Handset to the Base Unit, total 8 slots in 10ms. By this slot system, simultaneous air link and communication between 4 Handsets and the Base Unit can be realized. One communication between Handset and the Base Unit is done by one slot from the Base Unit to Handset, and another slot from Handset to the Base Unit.

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



4.1.2.1. TDD Frame Format

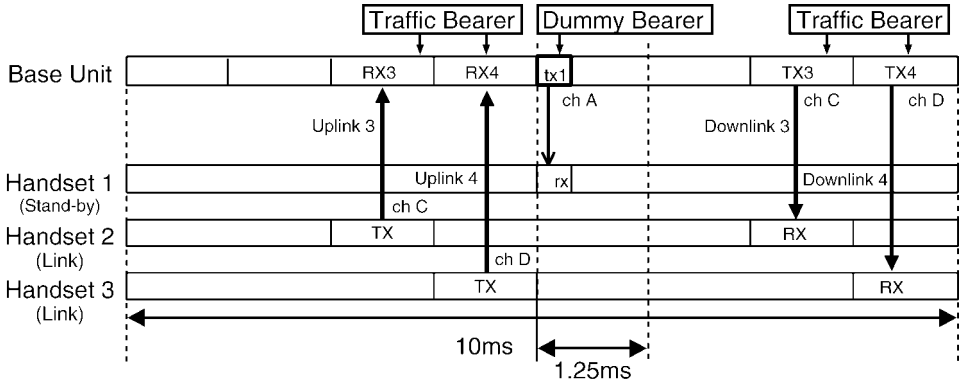


Sync Field (72bit): Preamble 56bit + SyncWord 16bit
Base Unit (Handset) adjusts the timing of reception so that reception of Base Unit (Handset) can correspond to transmission of Handset (Base Unit).
It is necessary for sync-field that Handset gets synchronization.
A - field (64bit): Each kinds of DATA: ch data, line condition, etc.
B - field (320bit + 80bit): Sound data + parity
Z - field (4bit): Parity Check

4.1.2.2. TDMA system

This system is the cycles of 10ms, and has four duplex paths,
so it is possible to perform four duplex communications simultaneously.
In 1 slot 1.25ms, the 10ms of voice data is transmitted.
Each slot makes every frame frequency hop. (100hops/sec.)
Although each slot (UpLink3 and UpLink4) uses different frequency, UpLink3 and DownLink3 use the same frequency.

• **2 - Handsets Link**



Traffic Bearer

A link is established between Base Unit and Handset.
The state where duplex communication is performed.
The hopping pattern of a 1800hops (18 seconds) cycle.

Dummy Bearer

The Base Unit sends Dummy-data to the all stand-by state Handsets.
The Handsets receive that data for keeping synchronization and monitoring request from the Base Unit.
Dummy Bearer doesn't contain B-field (sound) data.

4.1.3. Signal Flowchart in the Whole System

Reception

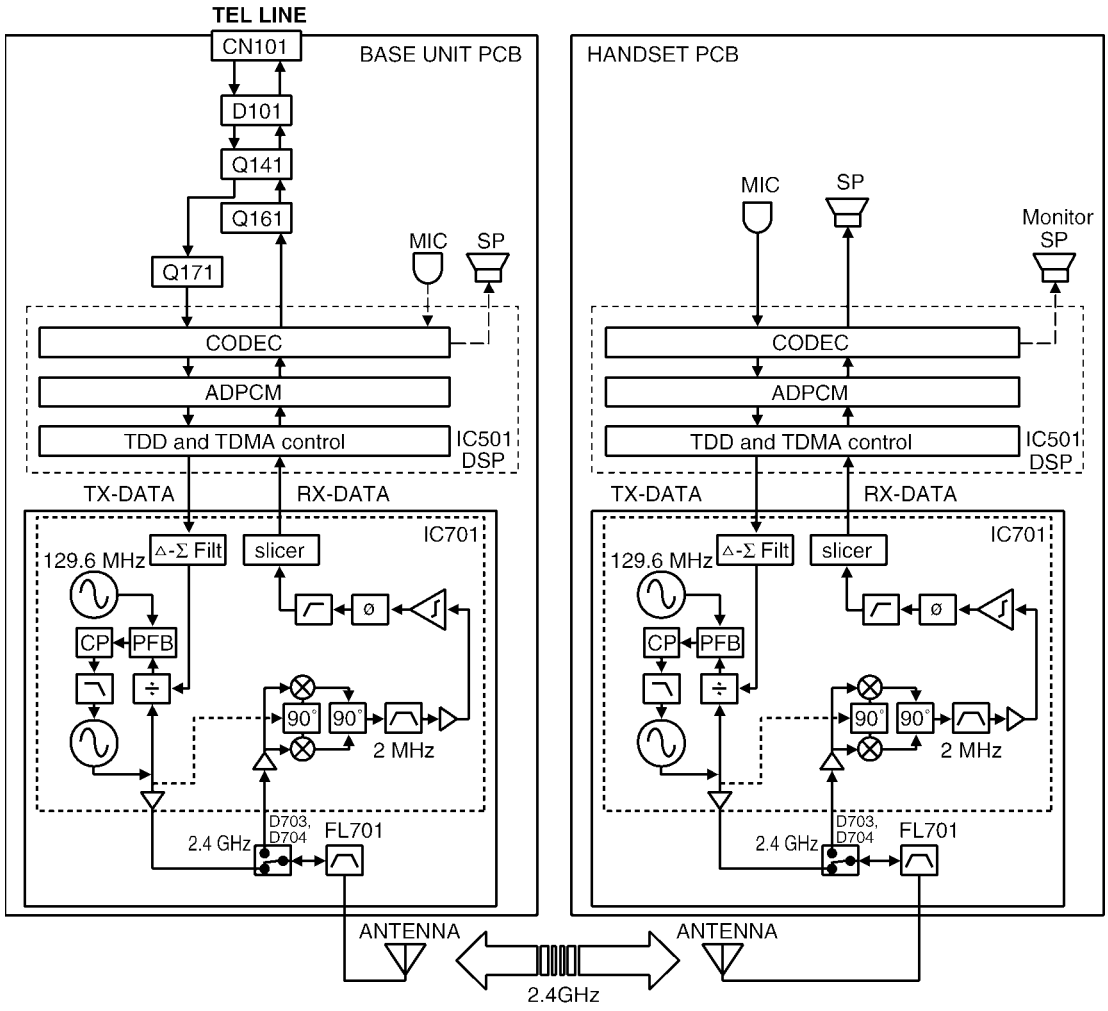
CN101 of the Base Unit is connected to the TEL line, and signal is entered through the bridge diode D101. While talking, the relay (Q141) is turned ON and amplified at the Q171, then led to DSP (IC501). The DSP encodes ADPCM and TDD/TDMA with FHSS to TX-DATA. The TX-DATA signal is entered to IC701 of RF UNIT, and modulated to 2.4 GHz. The RF signal is fed into Tx/Rx switch (D704). The RF signal is passed through filter (FL701) and fed to ANTENNA.

As for the Handset, RF signal from the antenna passes through filter (FL701), then is routed by Tx/Rx switch (D704) and led to IC701. The RF signal is amplified by LNA and down-converted to IF signal in IC701. The IF signal passing through internal filter is demodulated into RX-DATA, then enters DSP (IC501). The DSP performs TDD/TDMA and ADPCM decoding to convert the RX-DATA into the voice signal, then it is output to the speaker.

Transmission

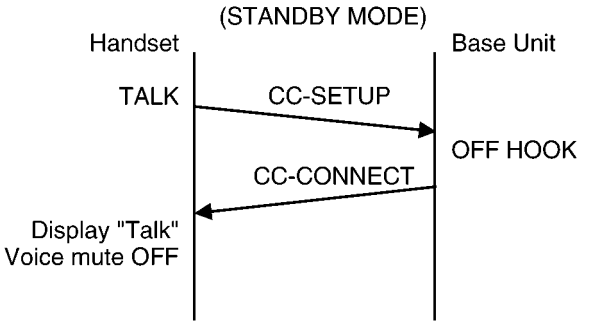
The voice signal entering from the microphone is led to DSP (IC501). The DSP encodes ADPCM and TDD/TDMA with FHSS to TX-DATA. The TX-DATA signal enters IC101 of RF UNIT, and is modulated to 2.4 GHz. The RF signal is fed into Tx/Rx switch (D704). The RF signal is passed through filter (FL701) and fed to ANTENNA.

As for the Base Unit, RF signal from the antenna passes through filter (FL701), then is routed by Tx/Rx switch (D704) and led to IC701. The RF signal is amplified by LNA and down-converted to IF signal in IC701. The IF signal passing through internal filter is demodulated, then enters DSP (IC501). The DSP performs TDD/TDMA and ADPCM decoding to convert the RX-DATA into the voice signal. The voice signal is amplified at the TX amplifier (Q161), then output to the TEL line CN101 through the relay (Q141) and bridge (D101).



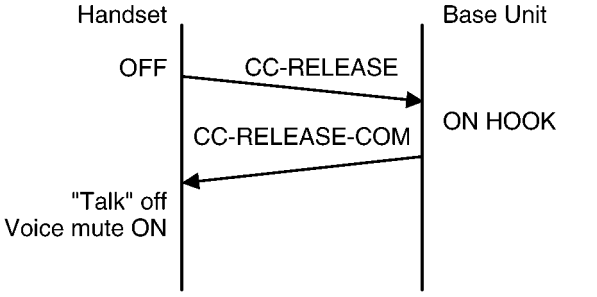
4.2. Explanation of Link Data Communication

4.2.1. Calling



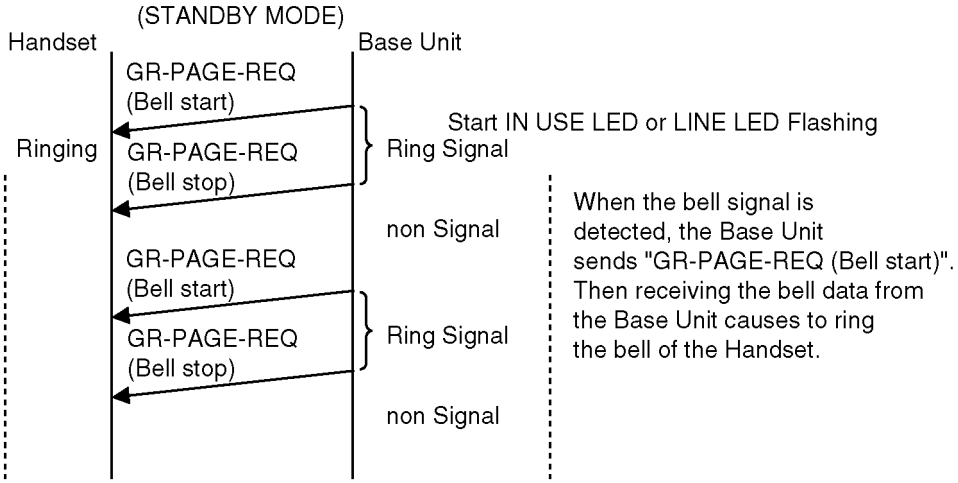
When calling, a communication request DATA (CC-SETUP) is transmitted from the Handset, and a permitting DATA (CC-CONNECT) is returned from the Base Unit to it. At that time the audio path opens.

4.2.2. To Terminate Communication



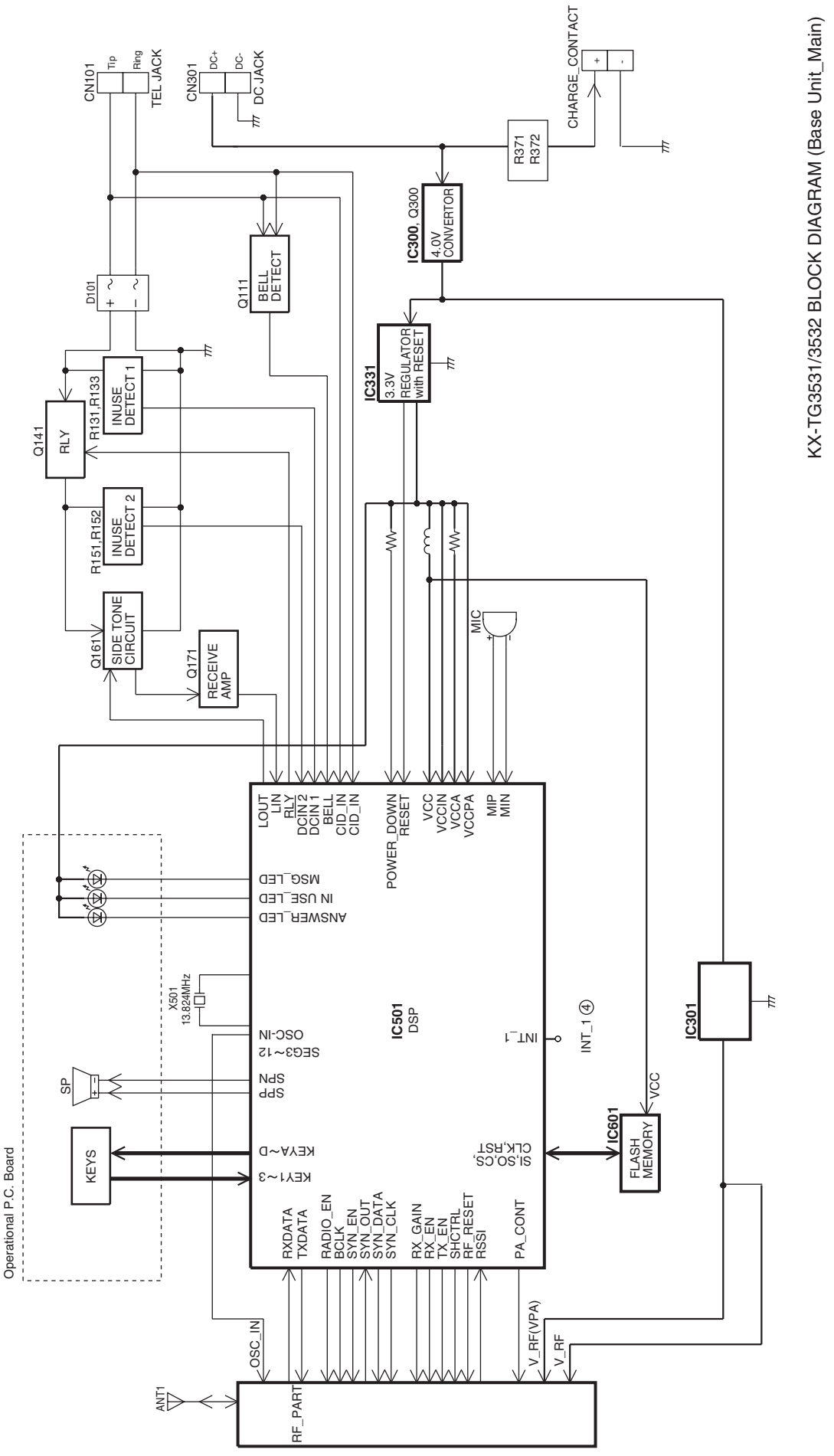
When the OFF button on the Handset is pressed during communication, a LINK terminating DATA (CC-RELEASE) is sent to terminate the communication. Then DATA (CC-RELEASE-COM) is returned from Base Unit.
Handset receives it and reset the link.

4.2.3. Ringing

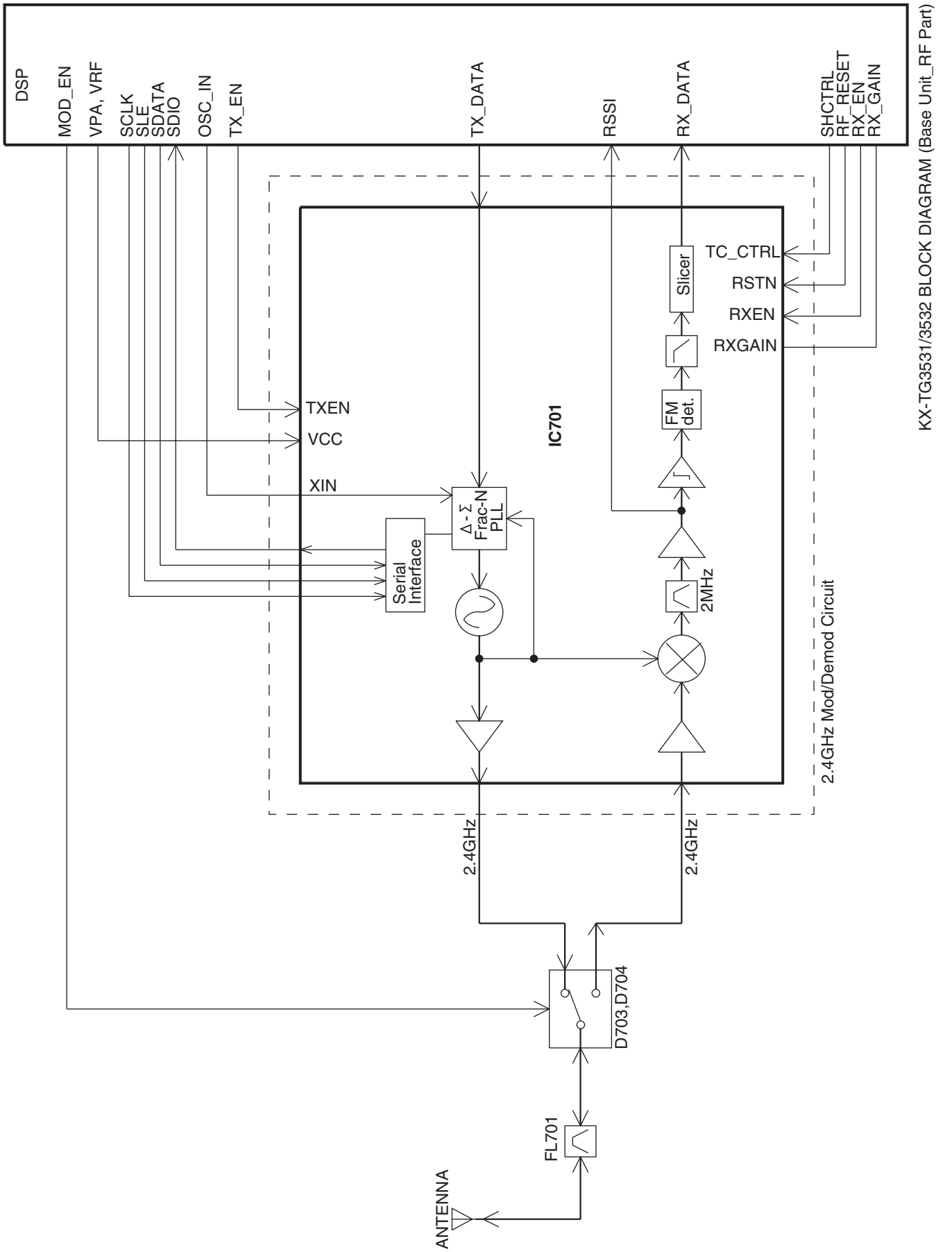


When the bell signal is detected, the Base Unit sends "GR-PAGE-REQ (Bell start)". Then receiving the bell data from the Base Unit causes to ring the bell of the Handset.

4.3. Block Diagram (Base Unit_Main)



4.4. Block Diagram (Base Unit_RF Part)

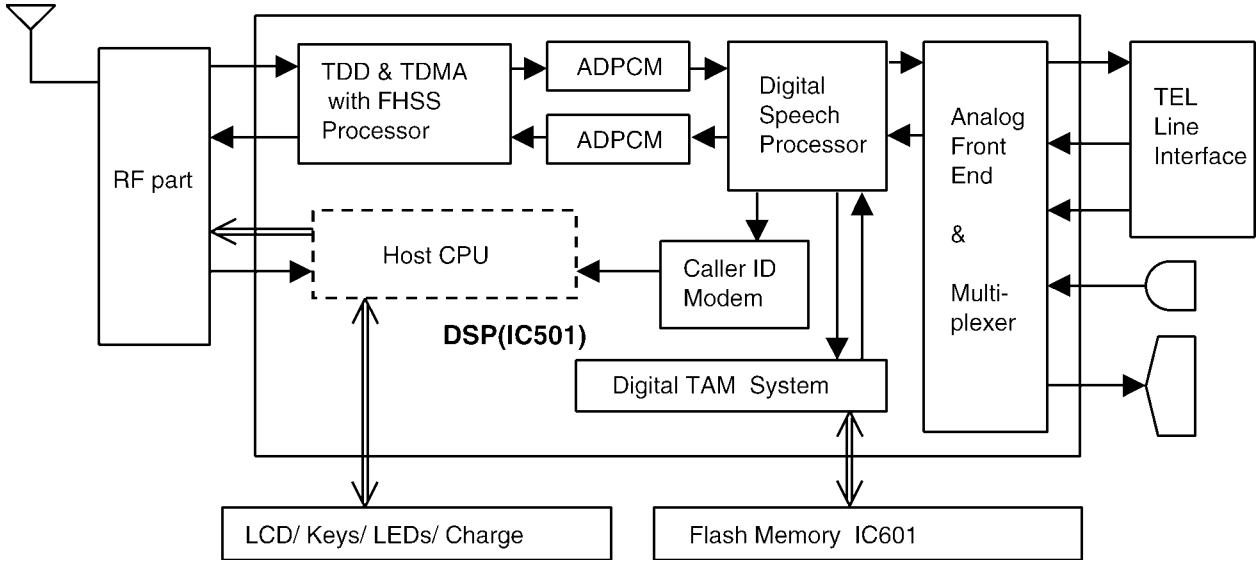


4.5. Circuit Operation (Base Unit)

General Description:

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

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



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

- **Voice Message Recording/Play back**
  The DSP system use a proprietary speech compression technique to record and store voice message in Flash Memory.
  An error correction algorithm is used to enable playback of these messages from the Flash Memory.
- **DTMF Generator**
  When the DTMF data from the Handset is received, the DTMF signal is output.
- **Synthesized Voice (Pre-recorded message)**
  The DSP implements synthesized Voice, utilizing the built in speech detector and a Flash Memory, which stored the vocabulary.
- **Caller ID demodulation**
  The DSP implements monitor and demodulate the FSK signals that provide CID information from the Central Office.
- **Digital Switching**
  The voice signal from telephone line is transmitted to the handset or the voice signal from handset is transmitted to the Telephone line, etc. They are determined by the signal path route operation of voice signal.
- **Block Interface Circuit**
  RF part, LED, Key scan, Speaker, Microphone, Telephone line, LCD.

4.5.2. Flash Memory (IC601)

Following information data is stored.

- **Voice signal**
  ex: Pre-recorded Greeting message, Incoming message
- **Settings**
  ex: message numbers, ID code, Flash Time, Tone/Pulse

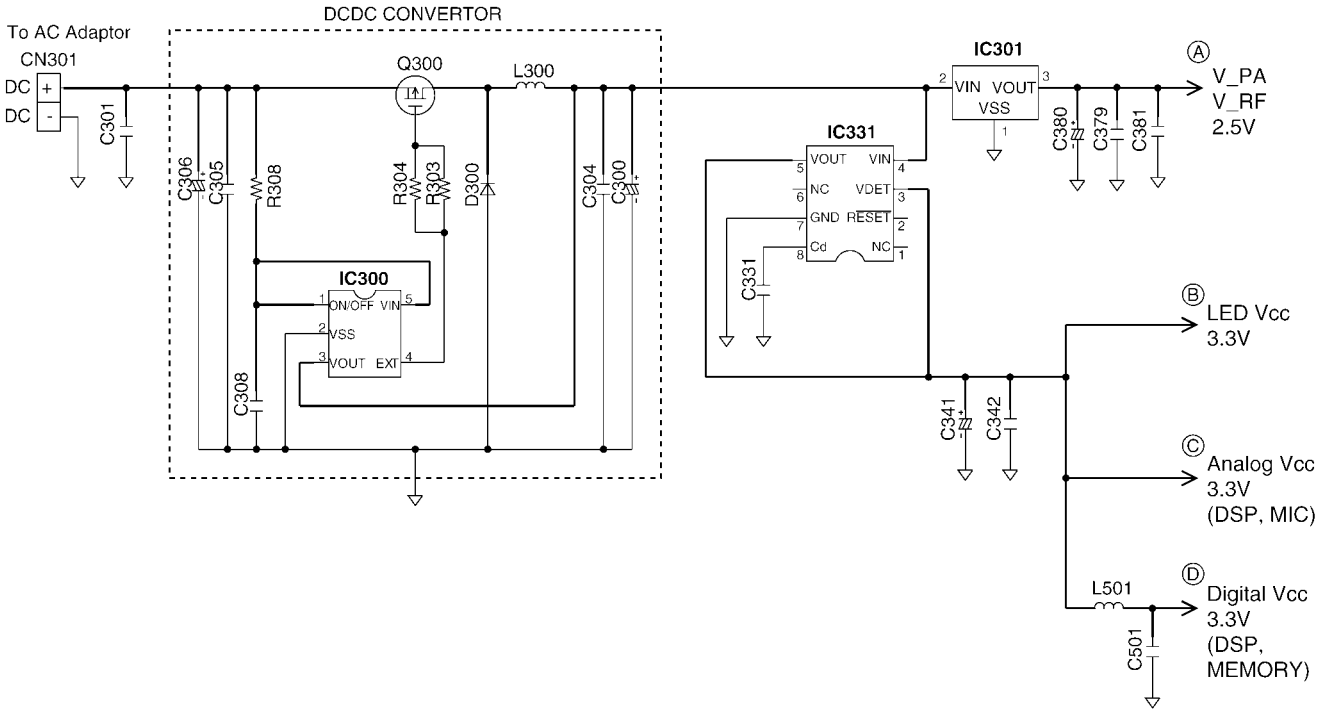
4.5.3. Power Supply Circuit

Function:

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

Circuit Operation:

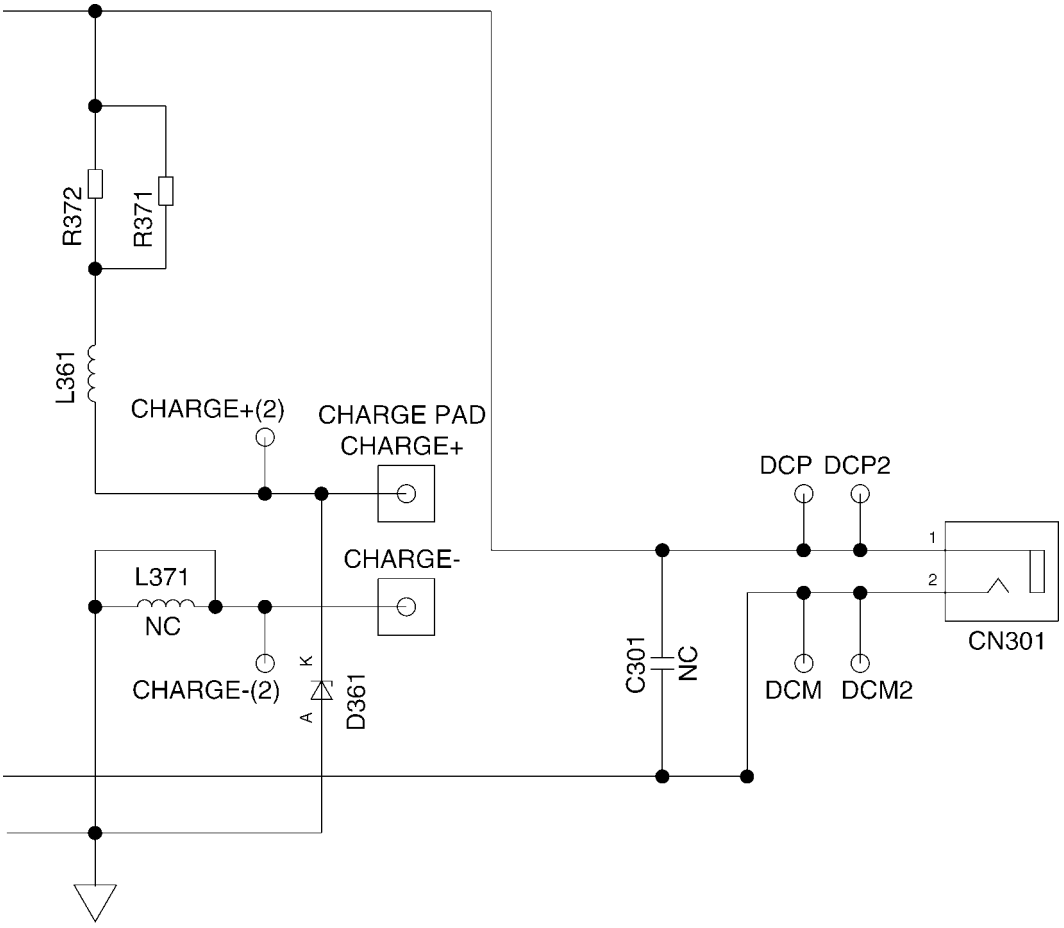
- Q300 and IC300: 4.0V DCDC Converter
- IC331: 3.3V Regulator



4.5.3.1. Charge Circuit

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

The charge is controlled by the handset.



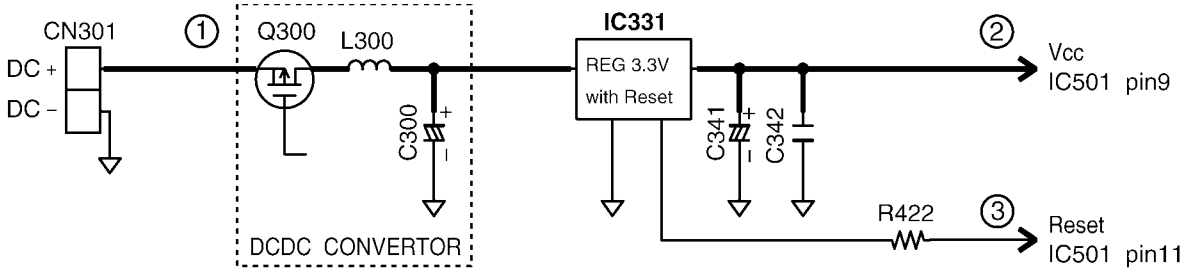
4.5.4. Reset Circuit

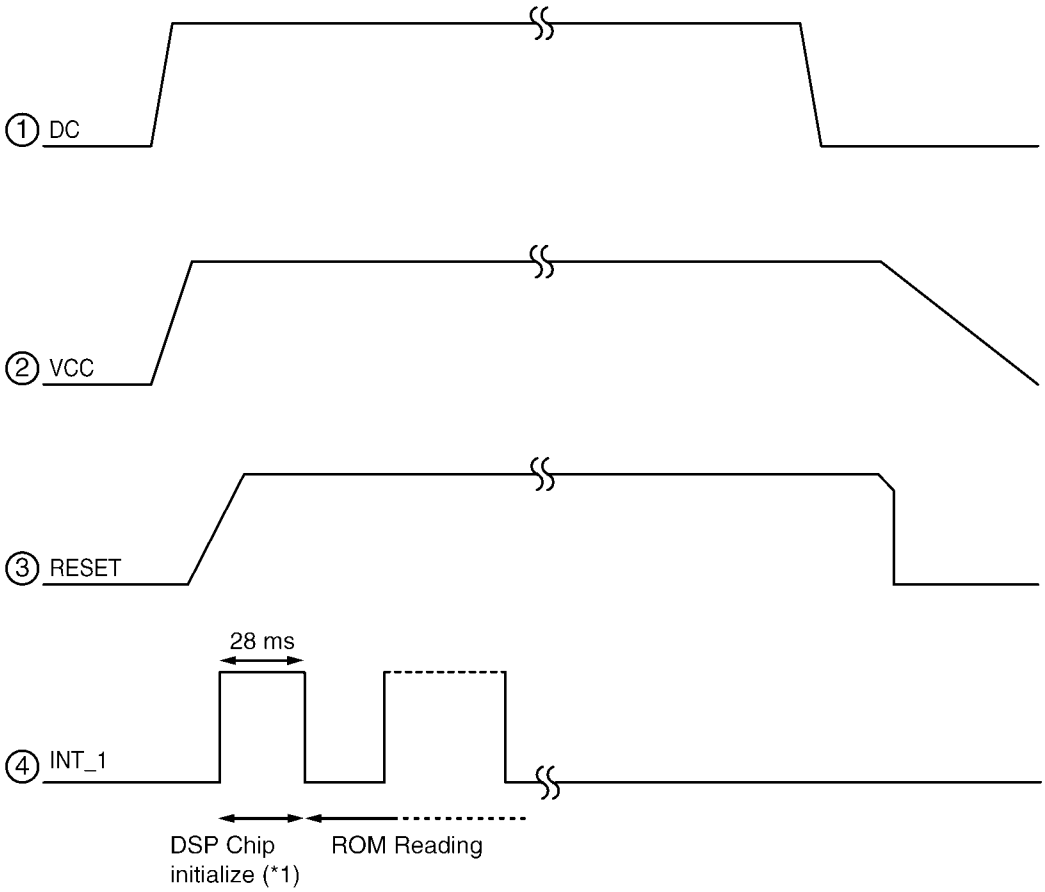
Function:

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

Circuit Operation:

When the AC Adaptor is inserted into the unit, then the voltage is shifted by IC331 and power is supplied to the DSP. The set starts to operate when VCC goes up to 3.0V or more in the circuit voltage diagram.





Note:

(*1) The initializing time of the DSP chip is 28ms under normal conditions.

4.5.5. Telephone Line Interface

Telephone Line Interface Circuit:

Function

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

Bell signal detection and OFF HOOK circuit:

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

T → L101 → R111 → C111 → Q111 → DSP pin 58 [BELL]

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

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

ON HOOK Circuit:

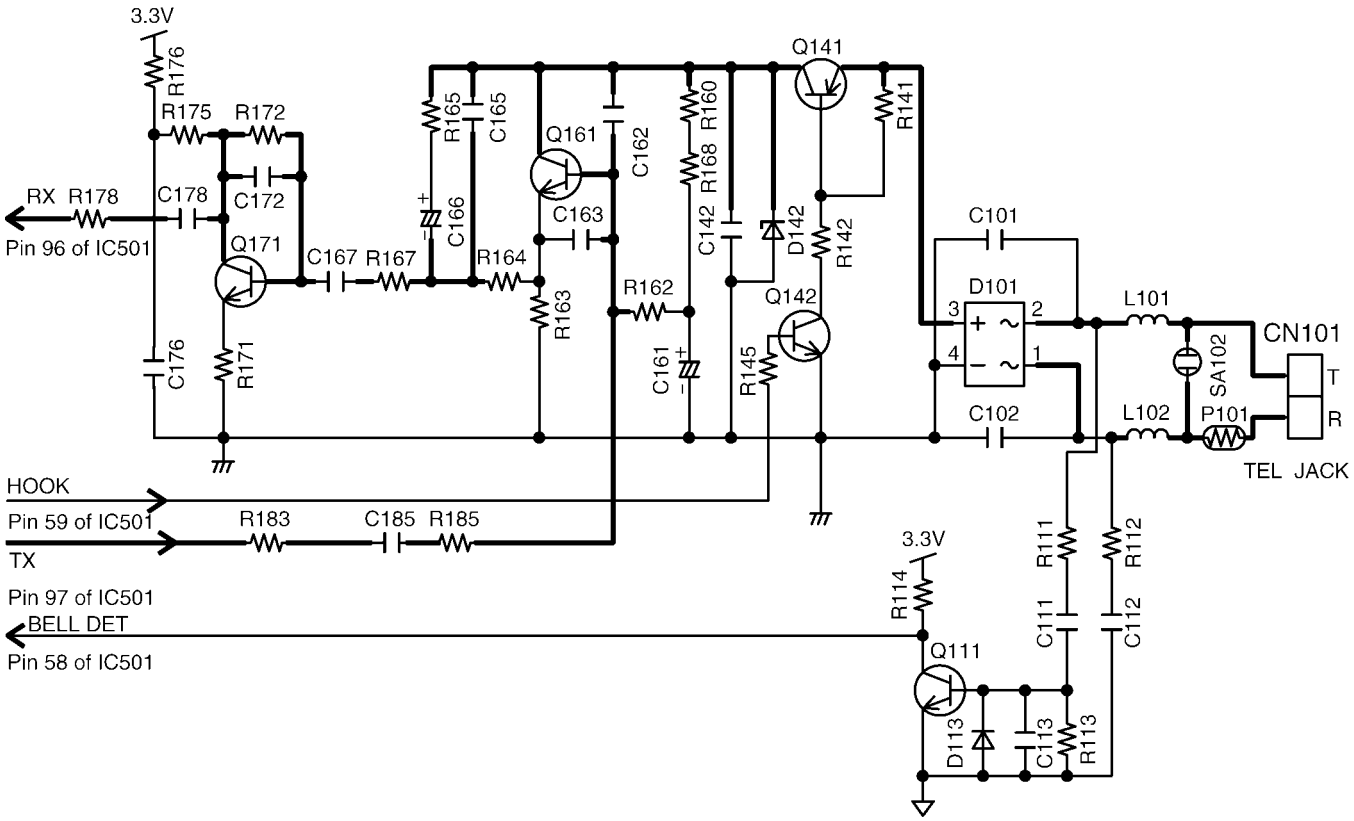
Q141 is open, Q141 is connected as to cut the DC loop current and to cut the voice signal. The unit is consequently in an on-hook condition.

Pulse Dial Circuit:

Pin 59 of DSP turns Q141 ON/OFF to make the pulse dialing.

Side Tone Circuit:

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



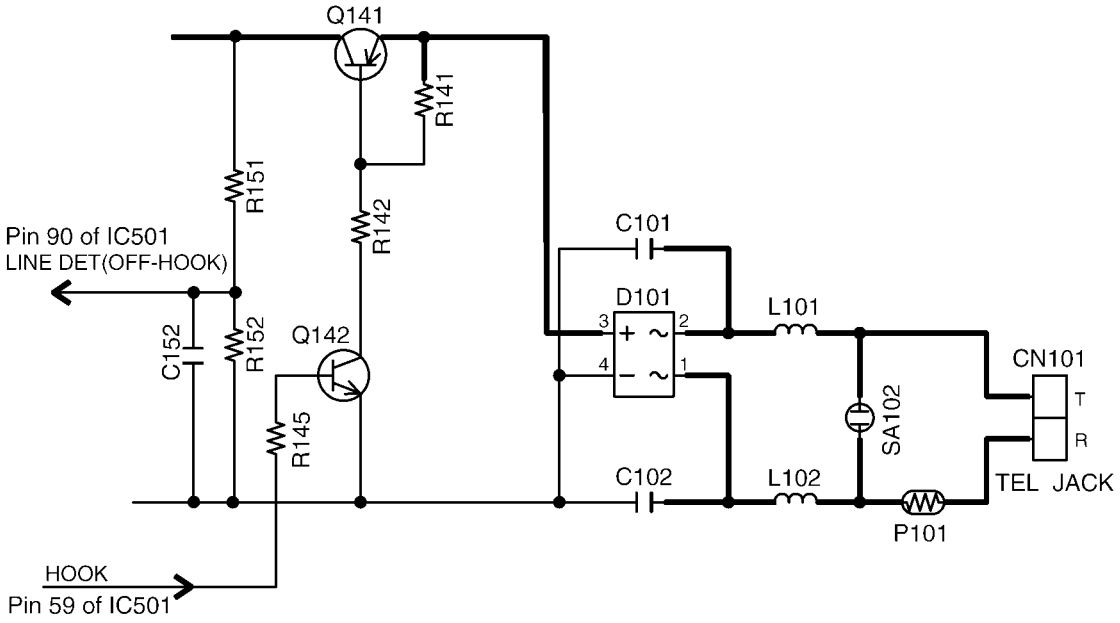
4.5.6. Auto Disconnect Circuit

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 of pin 90 of IC501 is monitored. If a parallel-connected telephone is put into 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.



You can enable or disable the Auto Disconnect function.

See **Check Record** (P.57)

4.5.7. 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.

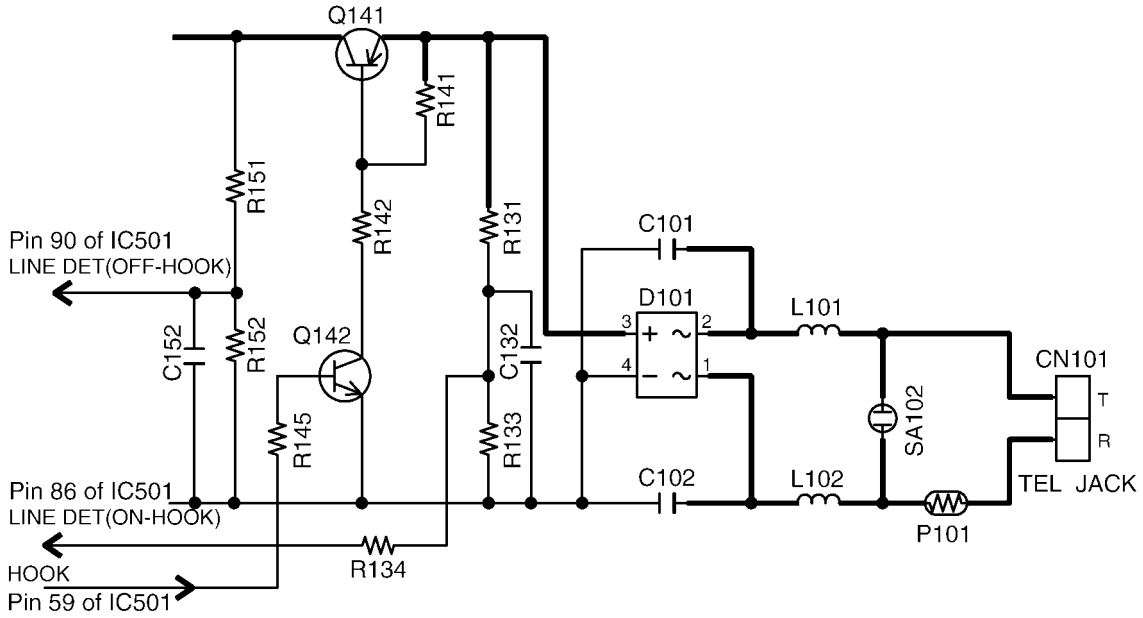
Circuit Operation:

Parallel connection detection when on hook:

When on hook Q136 is ON, the voltage is monitored at pin 86 of IC501. There is no parallel connection if the voltage is 1.65 V or higher, while a parallel connection is deemed to exist if the voltage is lower.

Parallel connection detection when off hook:

When off hook Q136 is OFF, the voltage is monitored at pin 90 of IC501; the presence/absence of a parallel connection is determined when the voltage changes by 0.2 V or more.



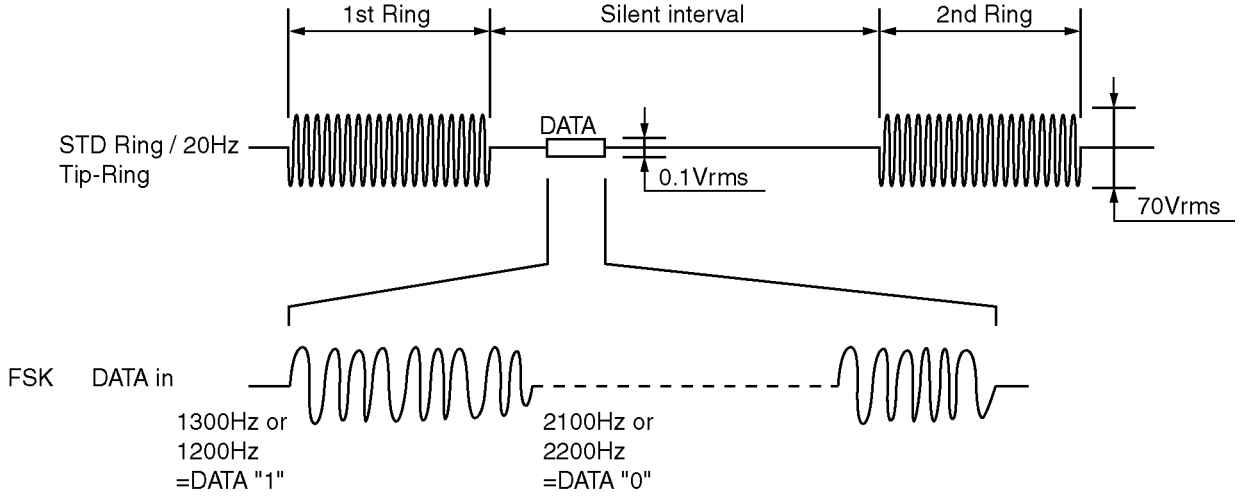
4.5.8. Calling Line Identification (Caller ID)

Function:

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

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

FSK (Frequency Shift Keying) format

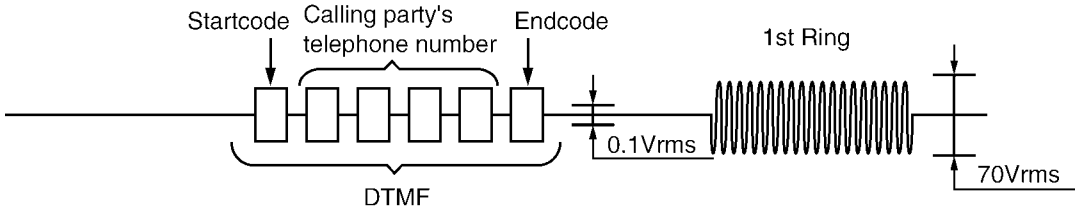


DTMF format

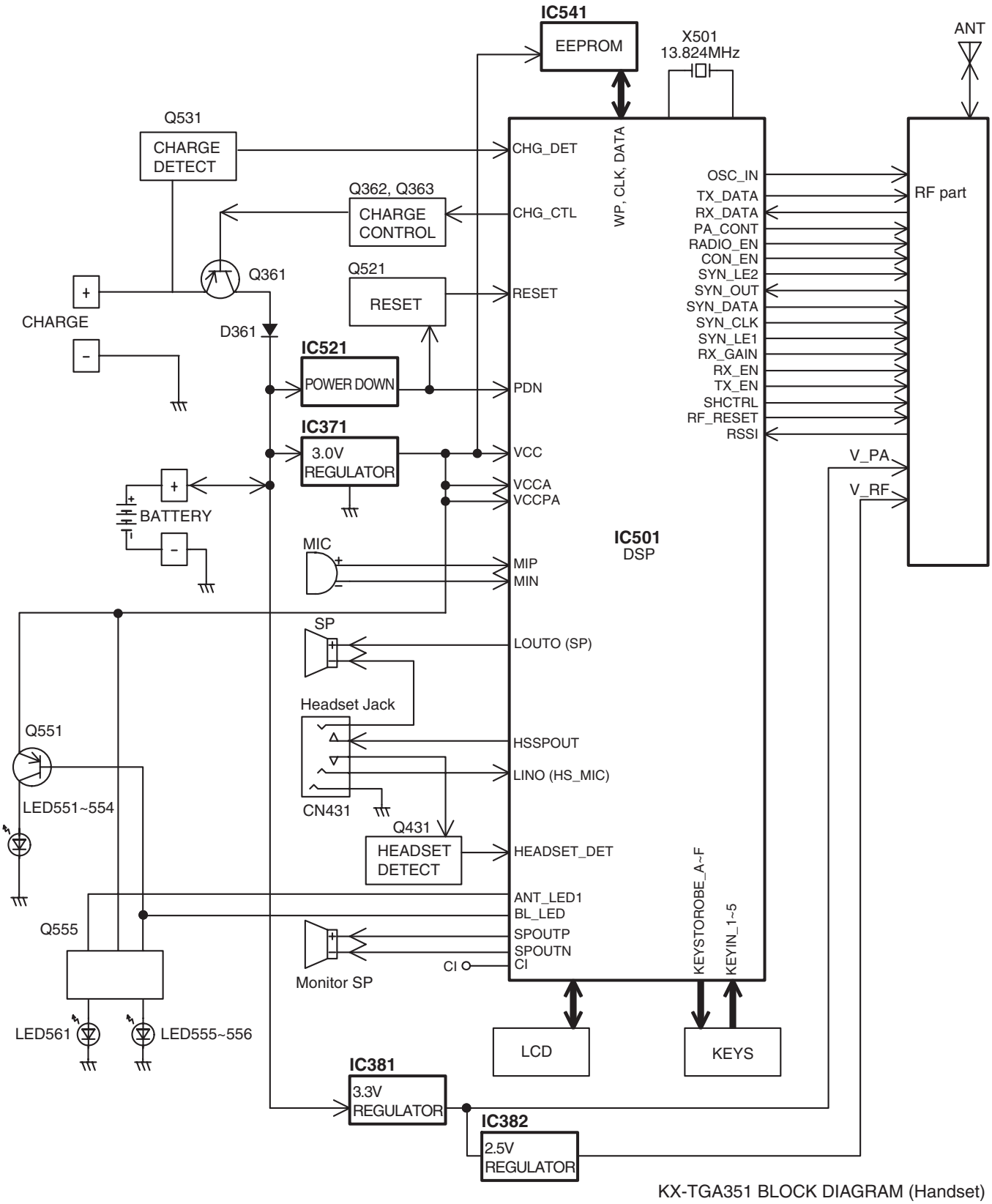
It is the method to send the telephone number of calling party with DTMF to the telephone. DTMF is sent before the first bell signal.

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

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

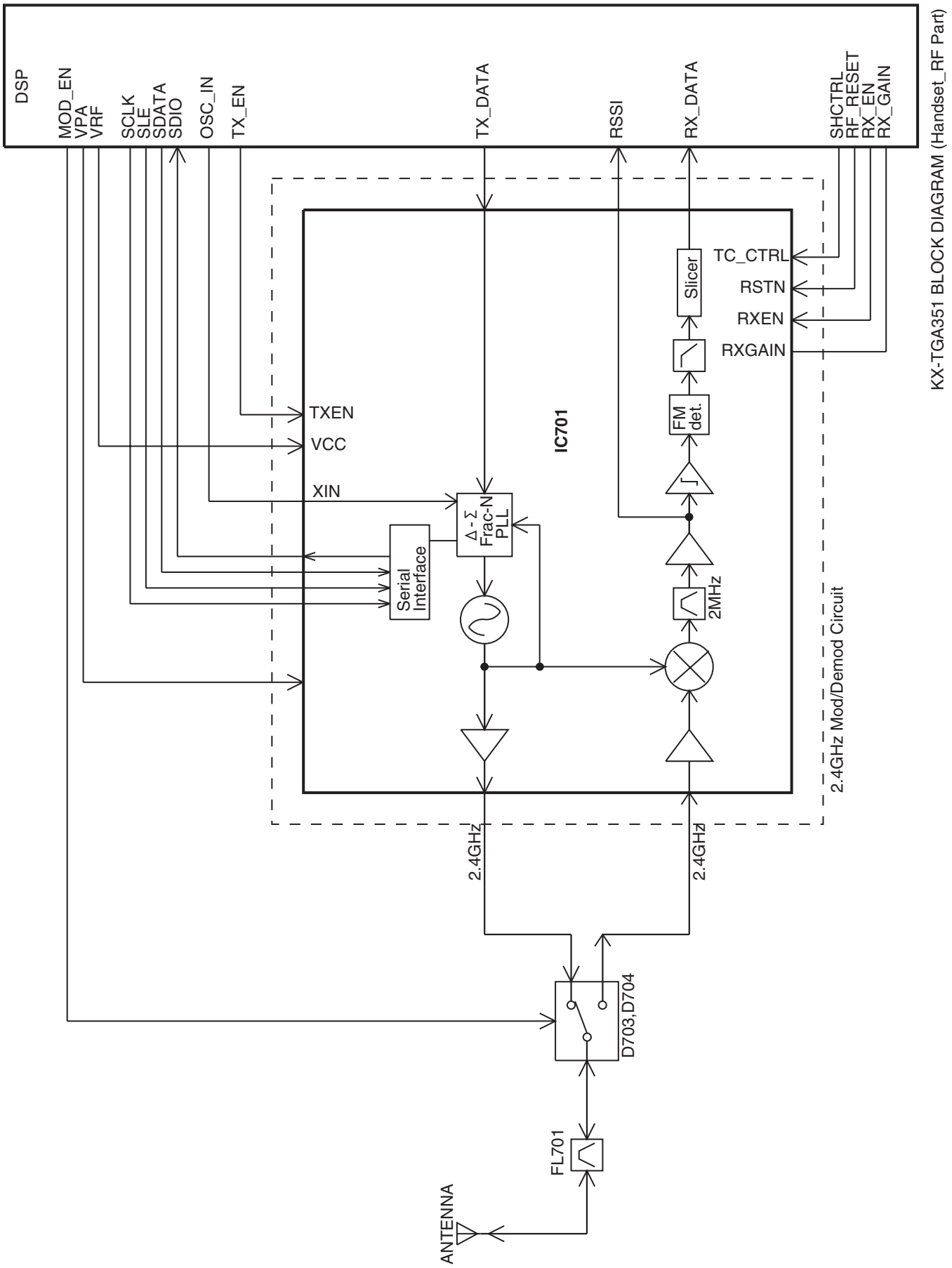


4.6. Block Diagram (Handset)



KX-TGA351 BLOCK DIAGRAM (Handset)

4.7. Block Diagram (Handset_RF Part)



4.8. Circuit Operation (Handset)

4.8.1. Construction

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

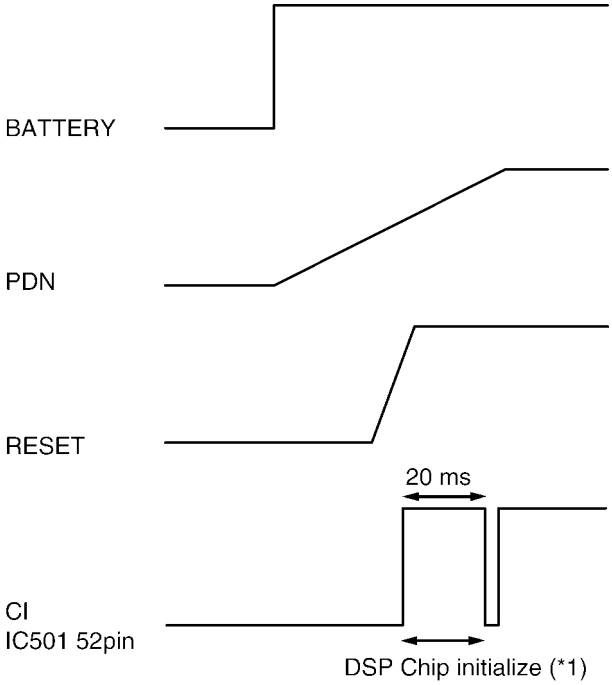
4.8.1.1. DSP: IC501

Function

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

  RF part, Speaker, Mic, LED, Key scan, LCD, Headset

Initial waves



Note:

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

4.8.1.2. RF part

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

4.8.1.3. EEPROM: IC541

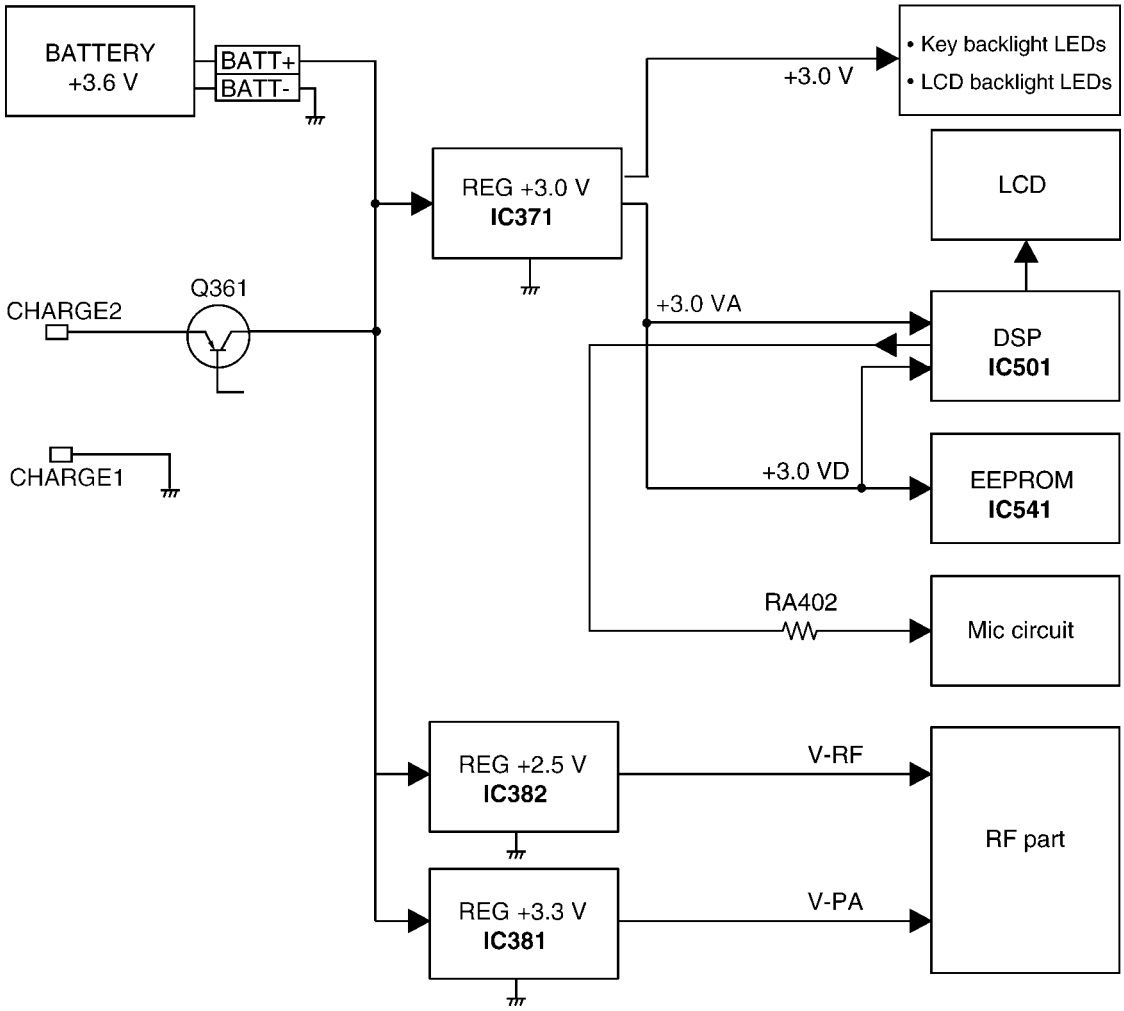
All setting data is stored.

ex: ID code, user setting (Phonebook, Caller ID data)

4.8.2. Power Supply Circuit

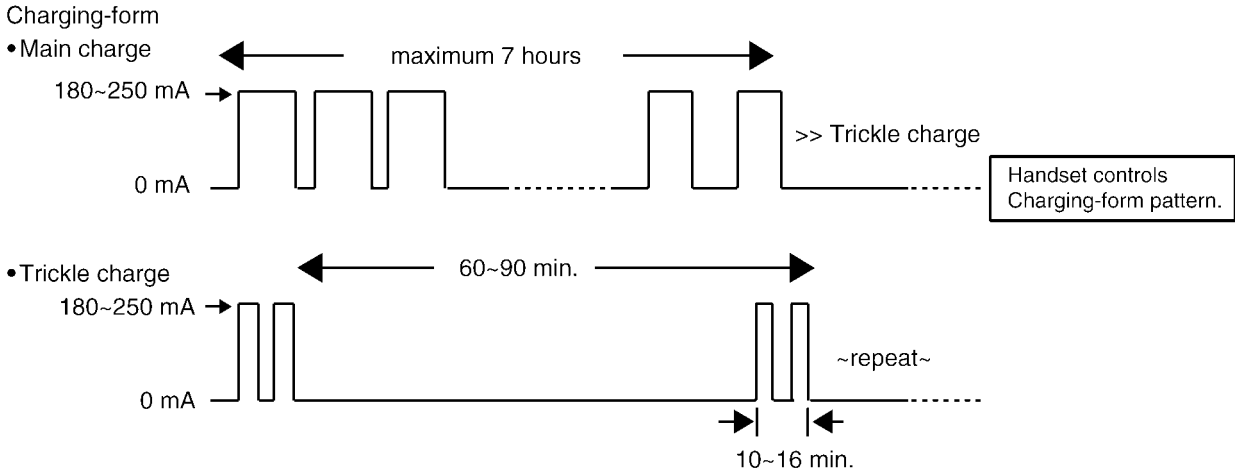
Voltage is supplied separately to each block.

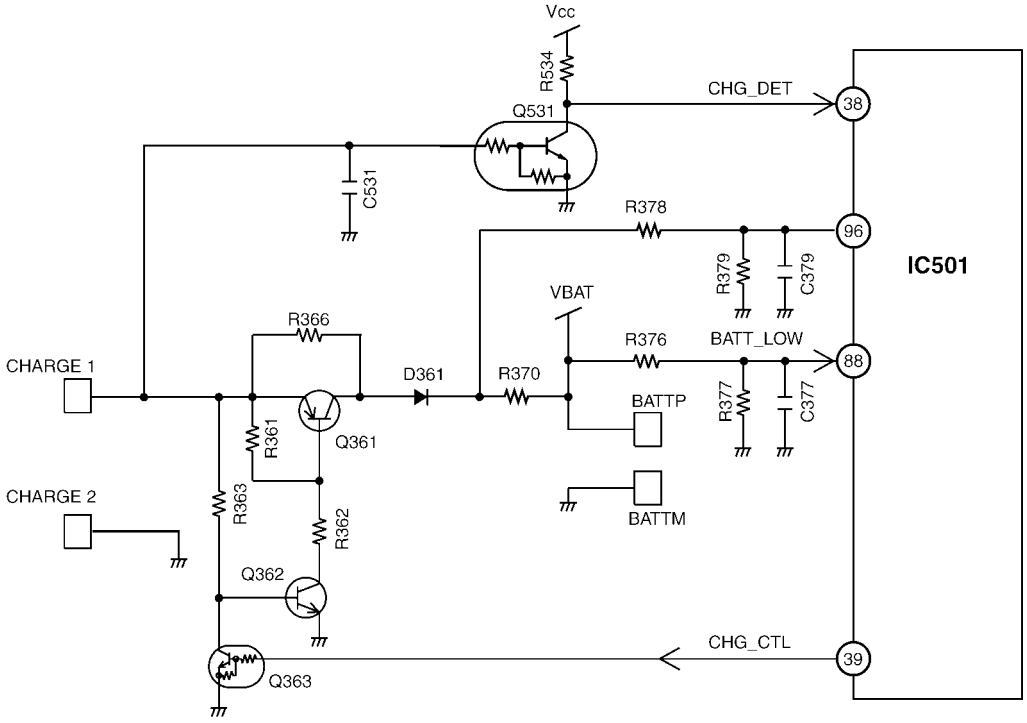
Block Diagram (Handset Power)



4.8.3. Charge Circuit

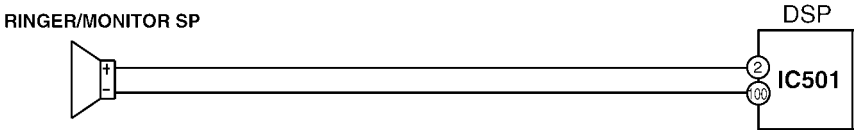
When the Handset is put on the cradle of the Base unit or the charger, the power is supplied from CHARGE+ and CHARGE- terminals to charge the battery via D361 and R366 or Q361. The voltage between CHARGE+ and CHARGE- flows R531 → Q531 → pin38 of IC501, where the charge is detected. Then IC501 calculates the battery consumption amount from the previous charge, and it controls Q361/Q362/Q363 by pin80 of IC501 until charging is complete. When charging is complete, the control pattern is switched to Trickle charging form from Operational charging form.





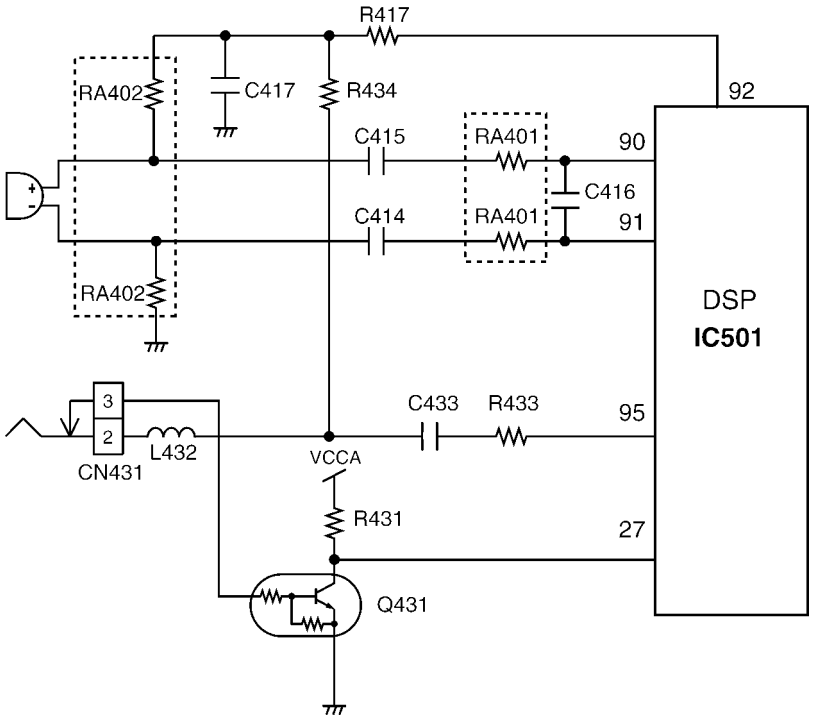
Pin 88 of IC501 monitors the battery voltage and detect BATT LOW at 3.50 V.

4.8.4. Ringer and Handset SP-Phone



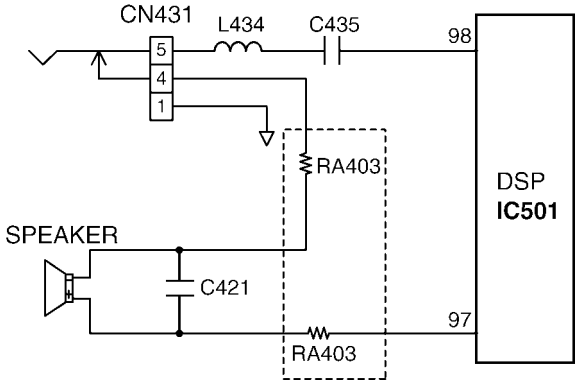
4.8.5. Sending Signal

The voice signal from the microphone is input to DSP (90, 91). CN431 is the headset jack. When the headphone is connected, the Q431 detect it. The input from the microphone of the Handset (MIM, MIP) is cut and the microphone signal from the headset is input to DSP (95). Also the power for the microphone is supplied from DSP (92) and the power is turned OFF on standby.



4.8.6. Reception Signal

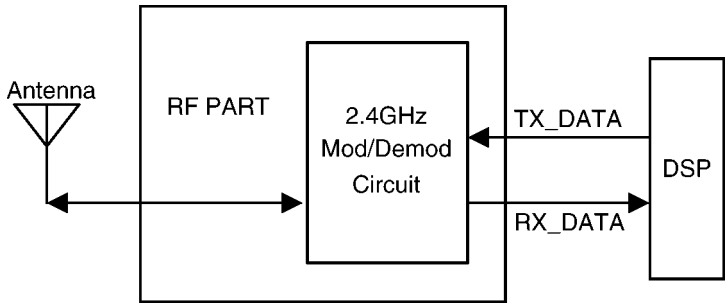
The voice signal from the Base Unit is output to DSP (98). This signal is led to the headset jack (CN431). The signal through the headset jack and the other signal output from DSP (97) drives the speaker. When the headset is inserted to the jack, the voice signal is cut at the jack, so the sound does not come out from the speaker, but from the headset only.



4.9. Circuit Operation (RF Part)

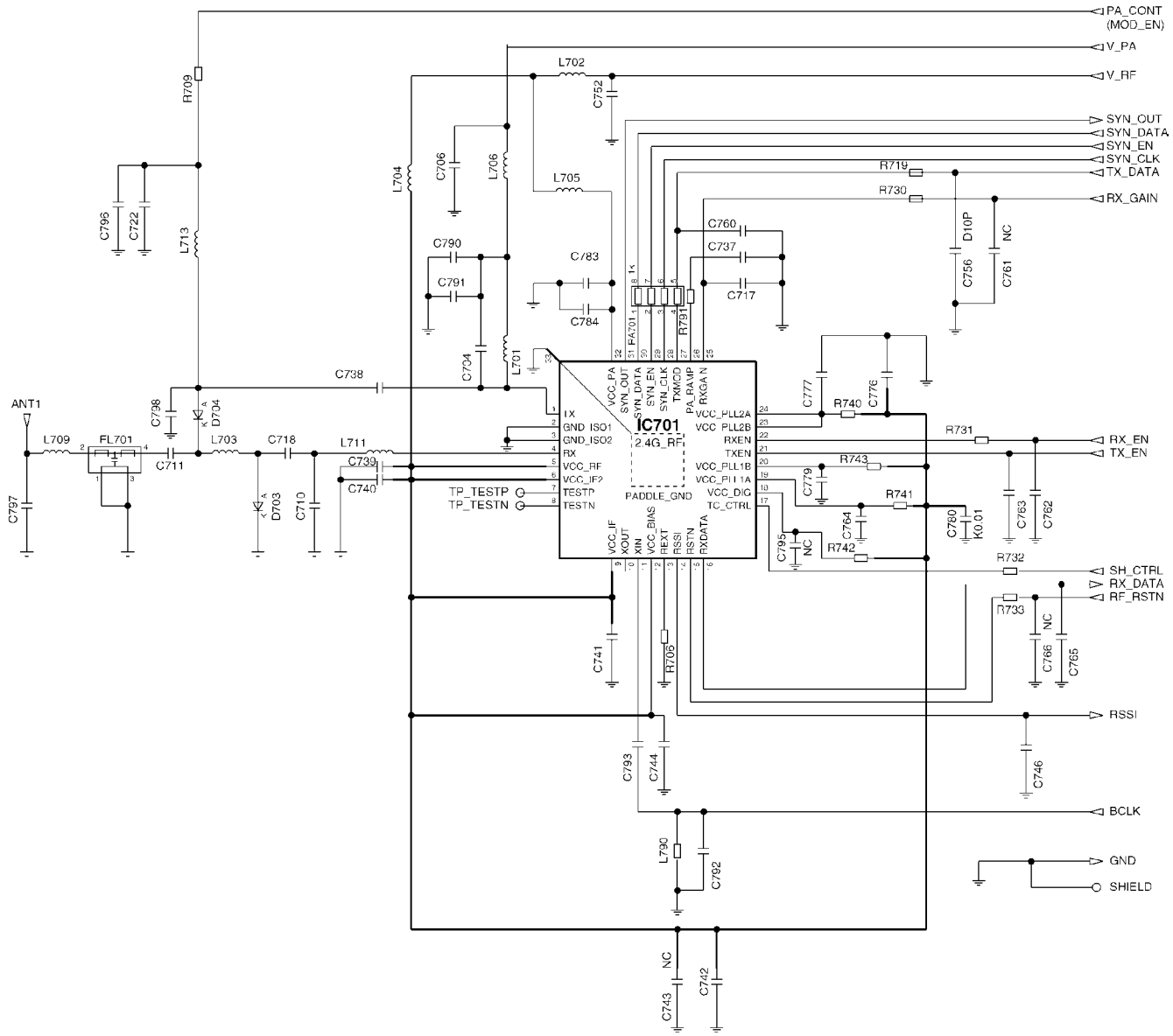
General Description:

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



4.9.1. 2.4GHz Mod/Demod Circuit (Base Unit RF Part)

IC701 incorporates all of the modulation and demodulation functions. TX Digital data (TX_DATA) from DSP is supplied to pin 27 of IC701, and then 2.4 GHz TX modulated signal is output from pin1. This TX signal is filtered by BPF (FL701) and supplied to Antenna. 2.4 GHz RX signal from the Antenna is filtered by BPF (FL701) and supplied to pin4 of IC701, then demodulated signal (RX_DATA) comes out from pin 16. At the same time, RSSI (Received Signal Strength Indicator) outputs from pin 14. Reference clock (13.824 MHz) from DSP block is supplied to pin 11 of IC701. V_PA and V_RF supply 2.5V regulated voltage.

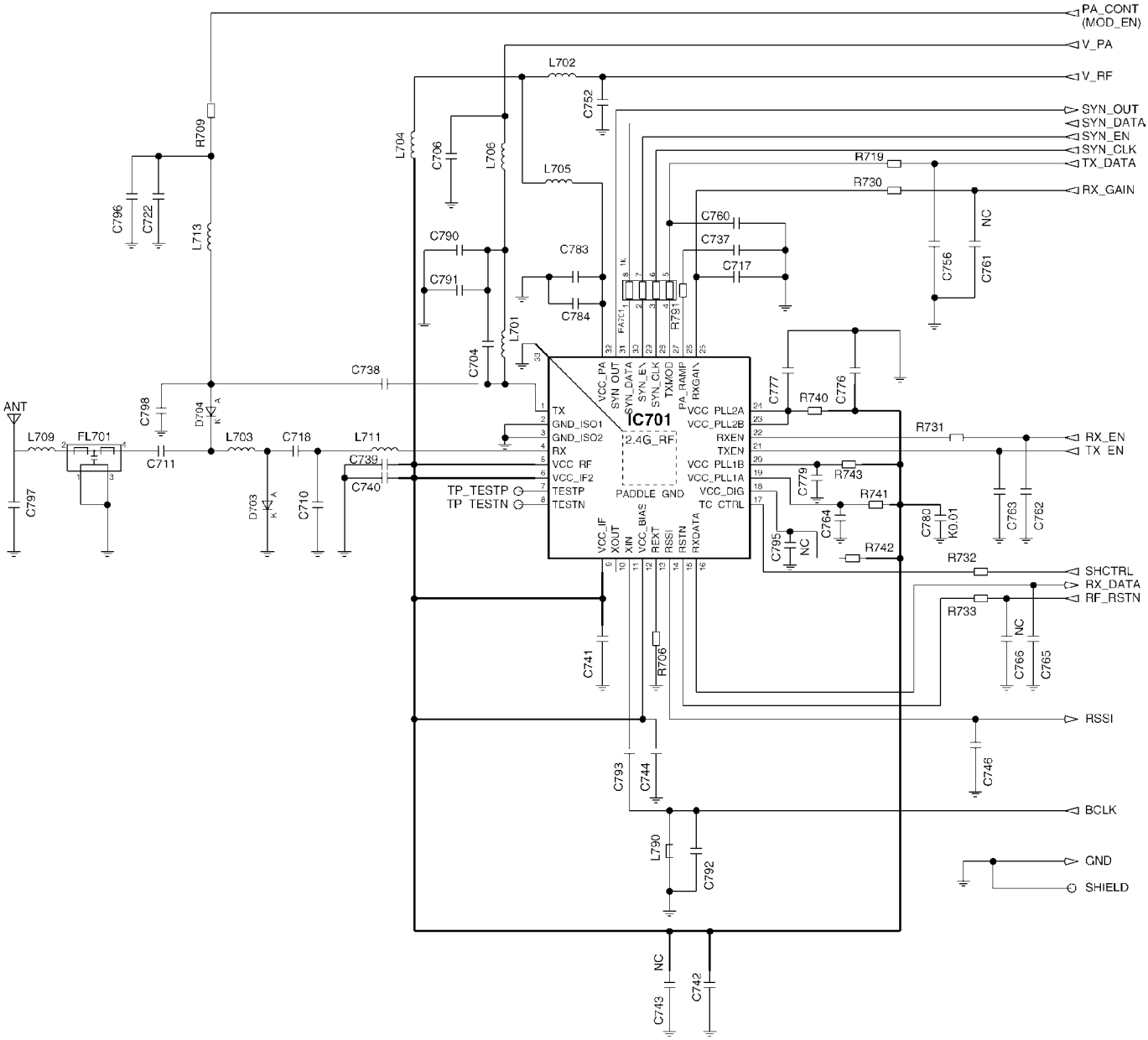


Note:

The exposed GND_PLATE on the bottom of the IC701 supplies the circuit ground(s) for the entire chip. It is very important that a good solder connection is made between this GND_PLATE and the ground plane of the PCB underlying the IC701.

4.9.2. 2.4GHz Mod/Demod Circuit (Handset RF Part)

IC701 incorporates all of the modulation and demodulation functions. TX Digital data (TX_DATA) from DSP is supplied to pin 27 of IC701, and then 2.4 GHz TX modulated signal is output from pin1. This TX signal is filtered by BPF (FL701) and supplied to Antenna. 2.4 GHz RX signal from the Antenna is filtered by BPF (FL701) and supplied to pin4 of IC701, then demodulated signal (RX_DATA) comes out from pin 16. At the same time, RSSI (Received Signal Strength Indicator) outputs from pin 14. Reference clock (13.824 MHz) from DSP block is supplied to pin 11 of IC701. V_RF supplies 2.5 V regulated voltage. V_PA supplies 3.3 V regulated voltage.

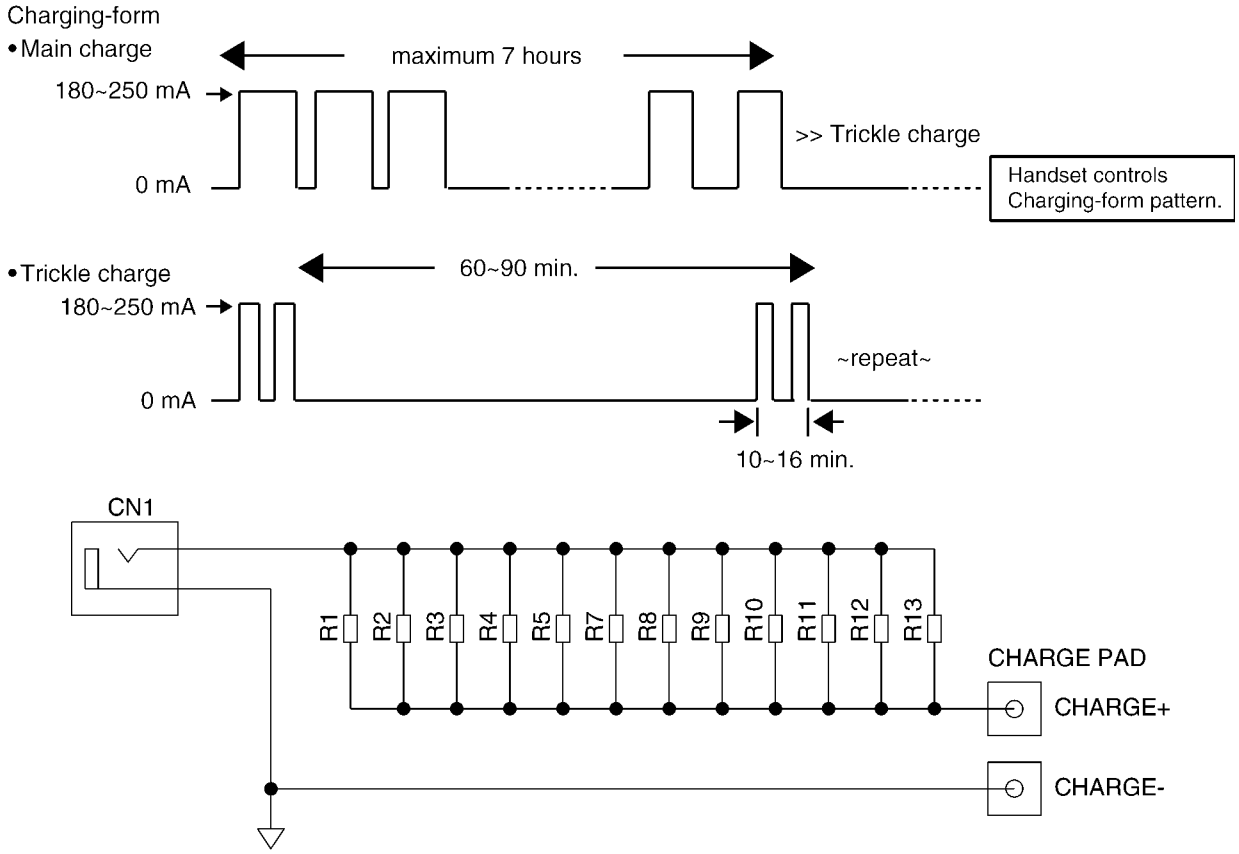


Note:

The exposed GND_PLATE on the bottom of the IC701 supplies the circuit ground(s) for the entire chip. It is very important that a good solder connection is made between this GND_PLATE and the ground plane of the PCB underlying the IC701.

4.10. Circuit Operation (Charger Unit)

The voltage from the AC adaptor is supplied to the charge circuits. Main charge (180~250mA at the Battery) of maximum 7-hours is started soon after the Handset is placed on the Charger Unit. Then it changes to Trickle charge to prevent from over-charging.



The route for this is as follows: DC + pin of CN1 → R1 ~ R5, R7 ~ R13 → CHARGE + pad → Handset → CHARGE-pad → DC- pin of CN1.

4.11. Signal Route

SIGNAL ROUTE	IN → ROUTE → OUT
HANDSET TX	HANDSET MIC - C414/C415 - RA401 - IC501(91/90 - 20) - **<HANDSET_RF_TX_ROUTE>** - ANT. --- ---ANT. - **<BASE_UNIT_RF_RX_ROUTE>** - IC501(34 - 97) - R183- C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(TEL LINE)
HANDSET RX	CN101(TEL LINE) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 - R178 - IC501(96 - 18) - **<BASE_UNIT_RF_TX_ROUTE>** - ANT. --- --- ANT. - **<HANDSET_RF_RX_ROUTE>** - IC501(36 - 98/97) - [C435 - L434 - HEADSET_JACK(5 - 4) - RA403]/RA403- HANDSET SPEAKER
HEADSET TX	HEADSET_JACK(2) - L432 - C433 - R433 - IC501(95 - 20) - **<HANDSET_RF_TX_ROUTE>** - ANT. --- ---ANT. - **<BASE_UNIT_RF_RX_ROUTE>** - IC501(34 - 97) - R183 - C185 - R185 - Q161- Q141 - D101 -L101/L102 - CN101(TEL LINE)
HEADSET RX	CN101(TEL LINE) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 - R178 - IC501(96 - 18) - **<BASE_UNIT_RF_TX_ROUTE>** - ANT. --- --- ANT. - **<HANDSET_RF_RX_ROUTE>** - IC501(36 - 98) - C435 - L434 - HEADSET_JACK(5)
HANDSET SP-Phone TX	HANDSET MIC - C414/C415 - RA401 - IC501(91/90 - 20) - **<HANDSET_RF_TX_ROUTE>** - ANT. --- ---ANT. - **<BASE_UNIT_RF_RX_ROUTE>** - IC501(34 - 97) -R183 - C185 -R185 -Q161 -Q141 - D101 - L101/L102 -CN101(TEL LINE)
HANDSET SP-Phone RX	CN101(TEL LINE) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 -R178 - IC501(96 - 18) - **<BASE_UNIT_RF_TX_ROUTE>** - ANT. --- --- ANT. -**<HANDSET_RF_RX_ROUTE>** - IC501(36 - 2/100) - MONITOR SP
INTERCOM HANDSET TO BASE UNIT	HANDSET MIC - C414/C415 - RA401 - IC501(91/90 - 20) - **<HANDSET_RF_TX_ROUTE>** - ANT. --- --- ANT. - **<BASE_UNIT_RF_RX_ROUTE>** - IC501(34 - 2/100) - L473/L472 - SPEAKER
INTERCOM BASE UNIT TO HANDSET	MIC - C457/C458 - R459/R460 - IC501(88/89 - 18) - **<BASE_UNIT_RF_TX_ROUTE>** - ANT. --- --- ANT. - **<HANDSET_RF_RX_ROUTE>** - IC501(36 - 98/97) - [C435 - L434 - HEADSET_JACK(5 - 4) - RA403]/RA403- HANDSET SPEAKER
GREETING RECORDING	MIC - C457/C458 - R459/R460 - IC501(88/89 - 13/14) - IC601
GREETING PLAY TO TEL LINE	IC601 - IC501(13/14 - 97) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(TEL LINE)
ICM RECORDING	CN101(TEL LINE) - L101/L102 - D101 - Q141 - C165 - R167 - C167 - Q171 - C178 - R178 - IC501(96 - 13/14) - IC601
ICM PLAY TO SPEAKER	IC601 - IC501(13/14 - 2/100) - L473/L472 - SPEAKER

Note:

□: inside of Handset

SIGNAL ROUTE	IN → ROUTE → OUT
DTMF SIGNAL TO TEL LINE	IC501(97) - R183 - C185 - R185 - Q161 - Q141 - D101 - L101/L102 - CN101(TEL LINE)
CALLER ID	CN101(TEL LINE) - L101/L102 - C121/122 - R121/122 - IC501(93/94)
BELL DETECTION	CN101(TEL LINE) - L101/L102 - R111/R112 - C111/C112 - Q111 - IC501(58)

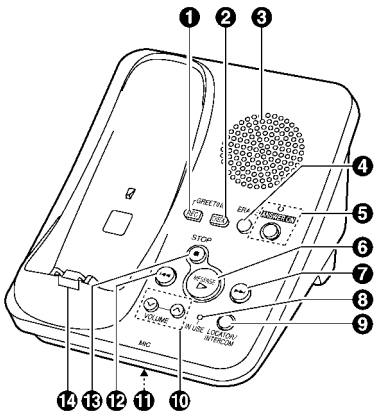
RF part signal route

SIGNAL ROUTE	IN → ROUTE → OUT
BASE UNIT/ HANDSET RF [TX_ROUTE]	R719 → RA701 → IC701(27 - 1) → C738 → D704 → C711 → FL701 → L709
BASE UNIT/ HANDSET RF [RX_ROUTE]	L709 → FL701 → C711 → L703 → C718 → L711 → IC701(4 - 16)

5 Location of Controls and Components

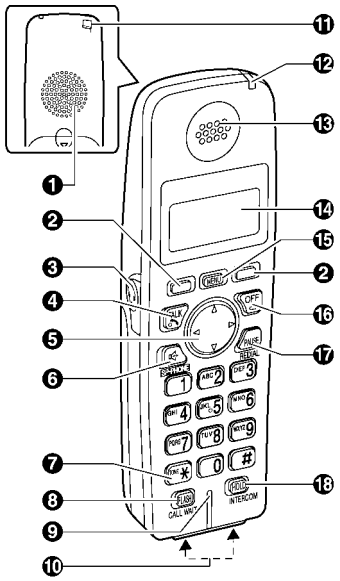
5.1. Controls

5.1.1. Base Unit



❶ 【GREETING REC】(Recording)
❷ 【GREETING CHECK】
❸ Speaker
❹ 【ERASE】
❺ 【ANSWER ON】ANSWER ON indicator
❻ 【MESSAGE】MESSAGE indicator
❼ 【▶▶|】(SKIP)
❽ IN USE indicator
❾ 【LOCATOR】【INTERCOM】
❿ VOLUME【∨】【∧】
⓫ MIC (Microphone)
⓬ 【|◀◀】(REPEAT)
⓭ 【STOP】
⓮ Charge contacts

5.1.2. Handset



❶ Speaker
❷ Soft keys
❸ Headset jack
❹ 【 】(TALK)
❺ Navigator key ([▲] [▼] [◄] [►])
❻ 【 】(SP-PHONE)
❼ 【✳】(TONE)
❽ 【FLASH】【CALL WAIT】
❾ Microphone
❿ Charge contacts
⓫ Lanyard/strap eyelet
⓬ Charge indicator
Ringer indicator
Message indicator
⓭ Receiver
⓮ Display
⓯ 【MENU】
⓰ 【OFF】
⓱ 【PAUSE】【REDIAL】
⓲ 【HOLD】【INTERCOM】

5.2. Displays

5.2.1. Handset Display Items

Displayed item	Meaning
VE	Voice enhancer is on.
	Battery level
Example: [1]	The handset's extension number (example shown here: handset1)

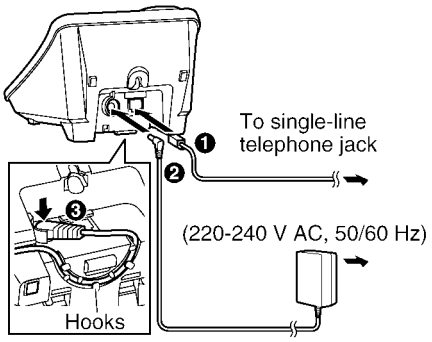
6 Installation Instructions

6.1. Setting Up the Base Unit

6.1.1. Connecting the AC Adaptor and Telephone Line Cord

Connect the telephone line cord until it clicks into the base unit and telephone line jack (❶). Connect the AC adaptor cord (❷) by pressing the plug firmly (❸).

- Use only the included Panasonic AC adaptor PQLV203BXZ.



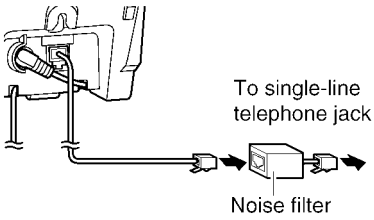
Note:

- The AC adaptor must remain connected at all times. (It is normal for the adaptor to feel warm during use.)
- The AC adaptor should be connected to a vertically oriented or floor-mounted AC outlet. Do not connect the AC adaptor to a ceiling-mounted AC outlet, as the weight of the adaptor may cause it to become disconnected.
- When more than one unit is used, the units may interfere with each other. To prevent or reduce interference, please keep ample space between the base units.
- The unit will not work during a power failure. We recommend connecting a corded telephone to the same telephone line or to the same telephone line jack using a Panasonic T-adaptor.

If you subscribe to a DSL service

Please attach a noise filter (contact your DSL provider) to the telephone line between the base unit and the telephone line jack in the event of the following:

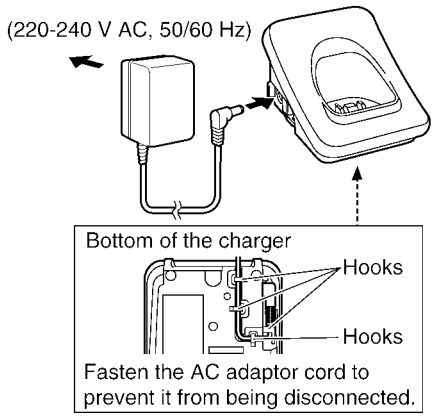
– Noise is heard during conversations.
– Caller ID features do not function properly.



6.2. Setting Up the Handset

6.2.1. Connecting the AC Adaptor

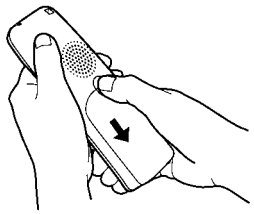
- Use only the included Panasonic AC adaptor PQLV208BXZ.



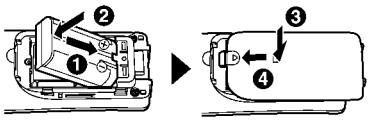
6.3. Battery Installation/ Replacement

1 Press the notch of the handset cover firmly, and slide it in the direction of the arrow.

- If necessary, remove the old battery.



2 Insert the battery (❶), and press it down until it snaps into position (❷). Then close the handset cover (❸, ❹).



Important:

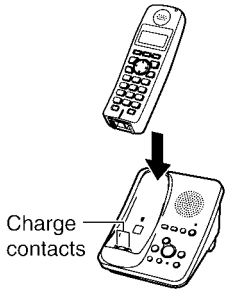
- Use only the rechargeable Panasonic battery HHR-P107.

6.4. Battery Charge

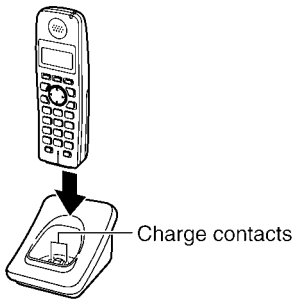
Place the handset on the base unit or charger for **7 hours** before initial use.

- While charging, "`Charging`" is displayed and the charge indicator on the handset lights. When the battery is fully charged, "`Charge completed`" is displayed.

Base unit:



Charger:



Note:

- If you want to use the handset immediately, charge the battery for at least 15 minutes.
- To ensure that the battery charges properly, clean the charge contacts of the handset, base unit, and charger with a soft, dry cloth. Clean if the unit is subject to the exposure of grease, dust, or high humidity.
- When the battery is empty, "`Charge for 7h`" is displayed and the charge indicator does not light for about 5 minutes to concentrate on charging.

Note for service:

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

6.4.1. Battery Level

Battery icon	Battery level
	Fully charged
	Medium
	Low Flashing: needs to be recharged.
	Empty

Note:

- When the battery needs to be charged, the handset beeps intermittently during use.

6.4.2. Panasonic Battery Performance

Operation	Operating time
While in use (talking)	Up to 5 hours
While not in use (standby)	Up to 11 days
While using the clarity booster feature	Up to 3 hours

Note:

- Battery operating time may be shortened over time depending on usage conditions and surrounding temperature.
- Battery power is consumed whenever the handset is off the base unit or charger, even when the handset is not in use.
- After the handset is fully charged, displaying "`Charge completed`", it may be left on the base unit or charger without any ill effect on the battery.
- The battery level may not be displayed correctly after you replace the battery. In this case, place the handset on the base unit or charger and let it charge for 7 hours.

7 Operation Instructions

7.1. Programmable Settings

You can customize the unit by programming the following features using the handset.
To access the features, there are 2 methods:
- scrolling through the display menus
- using the direct commands

• Mainly the direct command method is used in these operating instructions.

7.1.1. Programming by Scrolling through the Display Menus

1 **【MENU】**
2 Press **【▼】** or **【▲】** to select the desired menu. → **【Select】**
●If there is a sub-menu(s), press **【▼】** or **【▲】** to select the desired item. → **【Select】**
3 Press **【▼】** or **【▲】** to select the desired setting. → **【Save】**
●This step may vary depending on the feature being programmed.
4 **【OFF】**

Main menu	Sub-menu 1	Sub-menu 2
Message play	–	–
Alarm	–	–
Ringer setting	Ringer volume	–
	Ringer tone	–
Set date & time	Date and time*1	–
	Time adjustment*1	–
Voice enhancer	–	–
Dial lock*1	–	–
Copy phonebook	Copy 1 item	–
	Copy all items	–
Initial setting	Set answering	Ring count*1
		Recording time*1
		Remote code*1
	Message alert	–
	LCD contrast	–
	Key tone	–
	Auto talk	–
	Set area code	–
	Set tel line	Set dial mode*1
		Set flash time*1
		Set line mode*1
	Set base unit	Ringer tone*1
	Registration	HS registration
		Deregistration

*1 If you program these settings using one of the handsets, you do not need to program the same item using another handset.

7.1.2. Programming using the Direct Commands

1 **[MENU]**
2 Enter the desired feature code.
3 Enter the desired setting code. → **[Save]**
- This step may vary depending on the feature being programmed.

4 **[OFF]**

Note:
- In the following table, < > indicates the default setting.
- If you make a mistake or enter the wrong code, press **[OFF]**, then start again from step 1.

Feature	Feature code	Setting code	System setting*1
Alarm	[8]	[1]: Once [0]: <Off>	–
Auto talk*2	[0][3]	[1]: On [0]: <Off>	–
Copy phonebook (1 item)	[#][1]	–	–
Copy phonebook (all items)	[#][2]	–	–
Date and time	[4][1]	–	●
Deregistration	[0][0][2]	–	–
Dial lock	[6]	–	●
HS registration	[0][0][1]	–	–
Key tone*3	[0][2]	[1]: <On> [0]: Off	–
LCD contrast (Display contrast)	[0][1]	[1]–[6]: Level 1–6 <3>	–
Ringer tone (Handset)	[1][2]	[1]–[3]: Tone <1>–3 [4]–[7]: Melody 1–4	–
Ringer volume (Handset)	[1][1]	[1]: Low [2]: Medium [3]: <High> [0]: Off	–
Set area code	[0][4]	–	–
Set dial mode	[0][5][1]	[1]: Pulse [2]: <Tone>	●
Set flash time*4	[0][5][2]	[1]: <700ms> [2]: 600ms [3]: 400ms [4]: 300ms [5]: 250ms [6]: 110ms [7]: 100ms [8]: 90ms	●
Set line mode*5	[0][5][3]	[1]: A [2]: <B>	●
Time adjustment*6 (Caller ID subscribers only)	[4][2]	[1]: Caller ID [auto] [0]: <Manual>	●
Voice enhancer	[5]	[1]: On [0]: <Off>	–
Message play	[2]	–	–
Message alert	[0][#]	[1]: On [0]: <Off>	–
Recording time	[0][6][2]	[1]: 1min [2]: 2min [3]: <3min>	●
Remote code	[0][6][3]	Default: 11	●
Ring count	[0][6][1]	[2]–[7]: 2–7 rings <4> [0]: Toll saver	●
Ringer tone (Base unit)	[0][*][1]	[1]–[3]: Tone <1>–3	●

*1 If "System setting" column is checked, you do not need to program the same item using another handset.
*2 If you subscribe to Caller ID service and want to view the caller's information after lifting up the handset to answer a call, turn off this feature.
*3 Turn this feature off if you prefer not to hear key tones while you are dialing or pressing any keys, including confirmation tones and error tones.
*4 The flash time depends on your telephone exchange or host PBX. Consult your PBX supplier if necessary.
*5 Generally, the line mode setting should not be adjusted. If "Line in use" is not displayed when another phone connected to the same line is in use, you need to change the line mode to "A".
*6 This feature allows the unit to automatically adjust the date and time setting when caller information is received. To use this feature, set the date and time first.

7.2. Copying Handset Phonebook Items

You can copy one or all of the phonebook items from one handset to another.

7.2.1. Copying all items

1 [MENU] → [#][2]
2 [▼]/[▲]: Select the handset to copy to. → [Send]
3 Press [OFF] after the long beep.

7.3. Dial Lock

This feature prohibits making outside calls. The default setting is OFF.

Important:

- **When dial lock is turned on, only phone numbers stored in the phonebook as emergency numbers (numbers stored with a # at the beginning of the name) can be dialed using the phonebook. We recommend storing emergency numbers in the phonebook before using this feature.**
- When dial lock is turned on, you cannot store, edit, or erase items in the phonebook.

To turn dial lock on

1 [MENU] → [6]
2 Enter a 4-digit password*.
  - This password is required when turning dial lock off. We recommend writing the password down.
3 [Save] → [Yes] → [OFF]

Note:

- If dial lock is turned on, the handset displays "`Dial lock`". While there are new messages, "`Dial lock`" is not displayed when the handset is off the base unit or charger.

To turn dial lock off

1 [MENU] → [6]
2 Enter the same password* that was entered when dial lock was turned on.
3 [Save] → [Yes] → [OFF]

For Service Hint:

*: If the current password is forgetten, enter "726276642" and you will be able to go to step 3.

7.4. Error Messages

If the unit detects a problem, one of the following messages is shown on the display.

Display message	Cause/solution
`All handsets are registered.`	• 4 handsets have already been registered to the base unit. A previously deregistered handset number may still be retained in the base unit. To register an additional handset, erase the unnecessary handset number.
`Busy`	• The called unit is in use. • The handset you tried to copy phonebook items to is in use. Try again later. • The handset you are calling is too far from the base unit.
`Dial locked`	• Dial lock is turned on. To turn it off, see "**Dial Lock**".
`Error!!`	• The handset's registration has failed. Move the handset and base unit away from all electrical appliances and try again. • Another handset user tried to send phonebook items to you but there was an error. Have the other handset user re-send the items to you. • The entered password was wrong in programming dial lock. Enter the correct password.
`---Incomplete---` `Phonebook full`	• The destination handset's phonebook memory is full. Erase unnecessary items from the destination handset's phonebook.
`Invalid`	• There is no handset registered to the base unit matching the extension number you entered.
`No items stored`	• Your phonebook or redial list is empty.

`No link to base.`
`Move closer to base,`
`try again.`
	• The handset has lost communication with the base unit. Move closer to the base unit, and try again.
	• Confirm that the base unit's AC adaptor is plugged in.
	• The handset's registration may have been canceled. Re-register the handset.

`Phonebook full`	• There is no space to store new items in the phonebook. Erase unnecessary items.
`Please lift up and try again.`	• A handset button was pressed while the handset was on the base unit or charger. Lift the handset and press the button again.
`System is busy.` `Please try again later.`	• Other units are in use and the system is busy. Try again later. • Another user is listening to messages. Try again later. • The handset's registration may have been canceled. Re-register the handset.

7.5. Troubleshooting

General use

Problem	Cause/solution
The unit does not work.	● Make sure the battery is installed correctly and fully charged. ● Check the connections. ● Unplug the base unit's AC adaptor to reset the unit. Reconnect the adaptor and try again. ● The handset has not been registered to the base unit. Register the handset.
I cannot hear a dial tone.	● Confirm the telephone line cord is properly connected. ● Disconnect the unit from the telephone line and connect a known working telephone. If the working telephone operates properly, contact our service personnel to have the unit repaired. If the working telephone does not operate properly, contact your telephone service provider.
The indicator on the top right of the handset flashes slowly.	● New messages have been recorded. Listen to the new messages.

Programmable settings

Problem	Cause/solution
I cannot program items.	● Programming is not possible while either the base unit or another handset is being used. Try again later.
I cannot set the alarm.	● In order to set the alarm, you must first set the date and time. ● The handset has lost the communication with the base unit. Move closer to the base unit, and try again.
While programming, the handset starts to ring.	● A call is being received. Answer the call and start again after hanging up.

Battery recharge

Problem	Cause/solution
I fully charged the battery, but  continues to flash, or  is displayed.	● Clean the charge contacts and charge again. ● The battery may need to be replaced with a new one.
The handset display is blank.	● Confirm that the battery is properly installed. ● Fully charge the battery.
While charging, the charge indicator does not light and "`Charge for 7h`" is displayed.	● The battery is empty. The charge indicator does not light in order to concentrate on charging. After about 5 minutes, the charge indicator lights and "`Charging`" is displayed.

Making/answering calls, intercom

Problem	Cause/solution
Static is heard, sound cuts in and out. Interference from other electrical units.	• Move the handset and base unit away from other electrical appliances. • Move closer to the base unit. • Turn on the clarity booster feature. • If your unit is connected to a telephone line with DSL service, we recommend connecting a noise filter between the base unit and the telephone line jack. Contact your DSL provider for details.
The handset does not ring.	• The ringer volume is turned off. Adjust it.
The base unit does not ring.	• The ringer volume is turned off. Adjust it.
I cannot make a call.	• The dialing mode may be set incorrectly. Change the setting. • Another handset is in use. Try again later. • Dial lock is turned on. To turn it off, see "Dial Lock".
I cannot have a conversation using the headset.	• Make sure that an optional headset is connected properly. • If "SP-phone" is displayed on the handset, press [ ] to switch to the headset.
I cannot page the handset.	• The called handset is too far from the base unit. • The called handset is in use. Try again later.
I cannot page the base unit.	• The base unit is in use. Try again later.

Caller ID

Problem	Cause/solution
The handset does not display the caller's phone number.	• You have not subscribed to Caller ID service. Contact your telephone service provider to subscribe. • If your unit is connected to any additional telephone equipment such as a Caller ID box or cordless telephone line jack, disconnect the unit from the equipment and plug the unit directly into the wall jack. • If your unit is connected to a telephone line with DSL service, we recommend connecting a noise filter between the base unit and the telephone line jack. Contact your DSL provider for details. • Other telephone equipment may be interfering with this unit. Disconnect the other equipment and try again. • The caller requested not to send caller information.

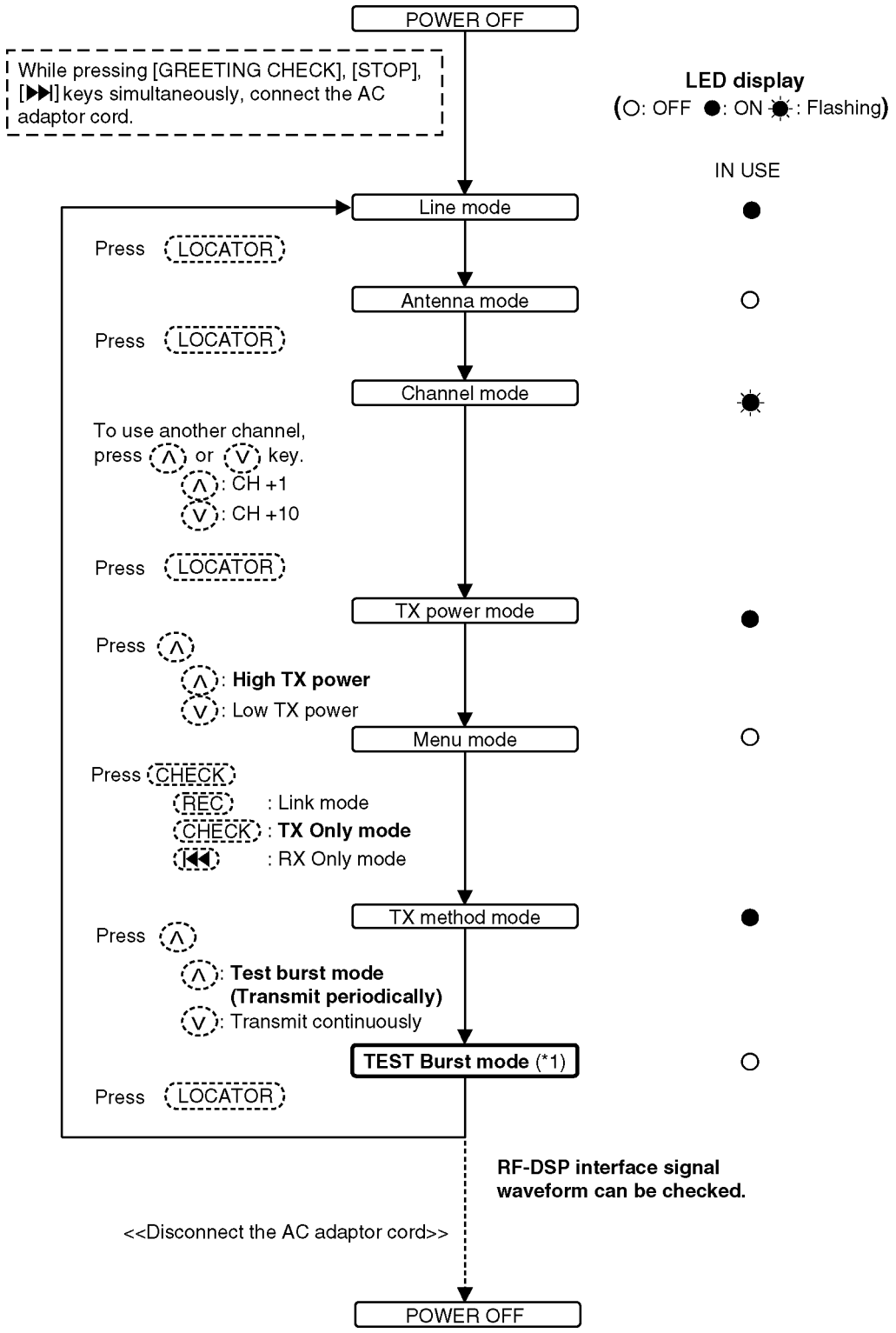
Answering system

Problem	Cause/solution
I cannot listen to messages from a remote location.	• A touch tone phone is required for remote operation. • Enter the remote code correctly. • The answering system is off. Turn it on.
The unit does not record new messages.	• The answering system is off. Turn it on. • The message memory is full. Erase unnecessary messages.
I cannot operate the answering system.	• Someone is operating the answering system. • If someone is talking on a conference call, you cannot operate the answering system. Try again later.

8 Test Mode

8.1. Adjustment and Test Mode Flow Chart

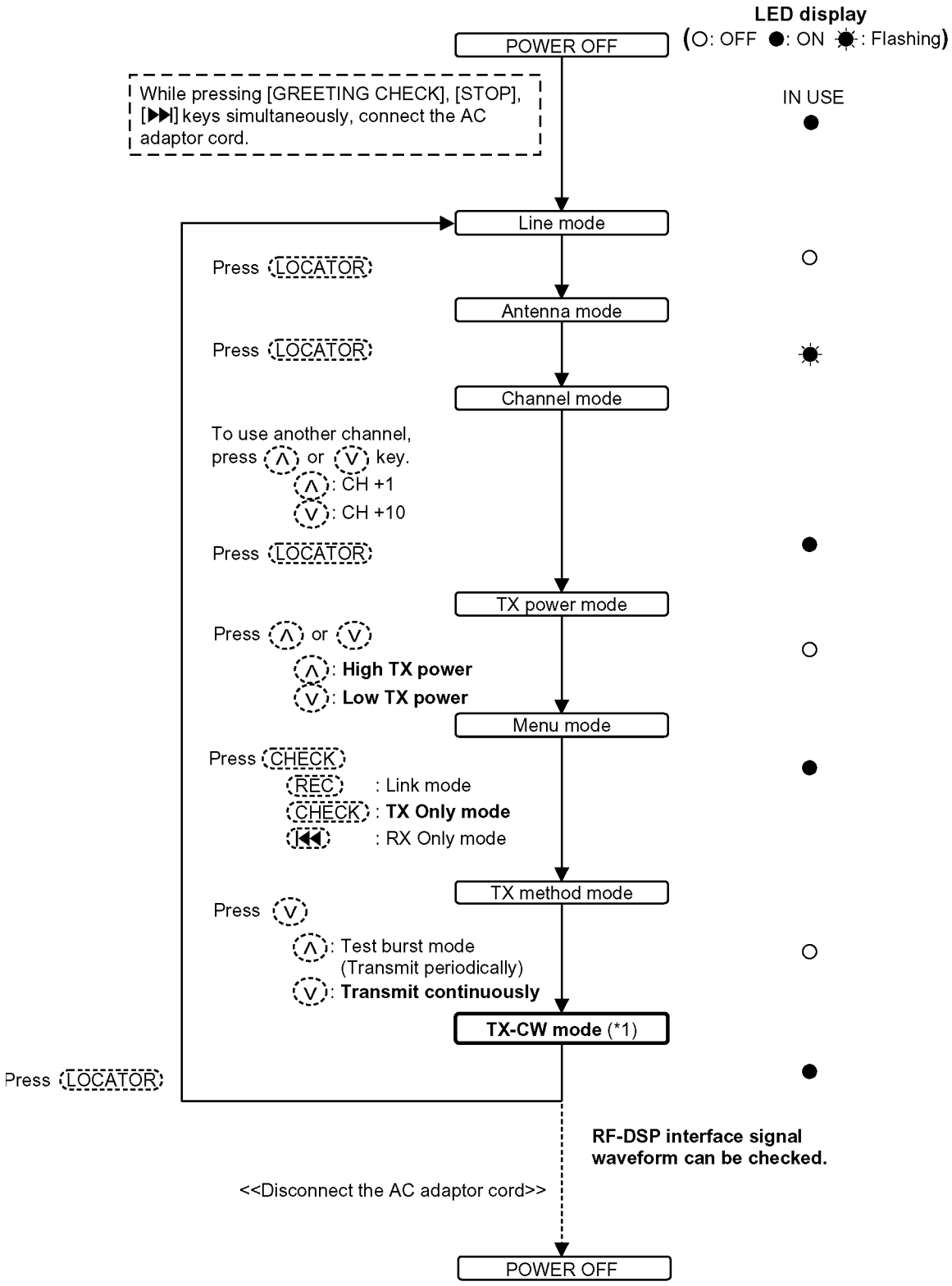
8.1.1. Test Burst Mode for Base Unit



Note:

(*1) Refer to **Check Table for RF part** (P.63).

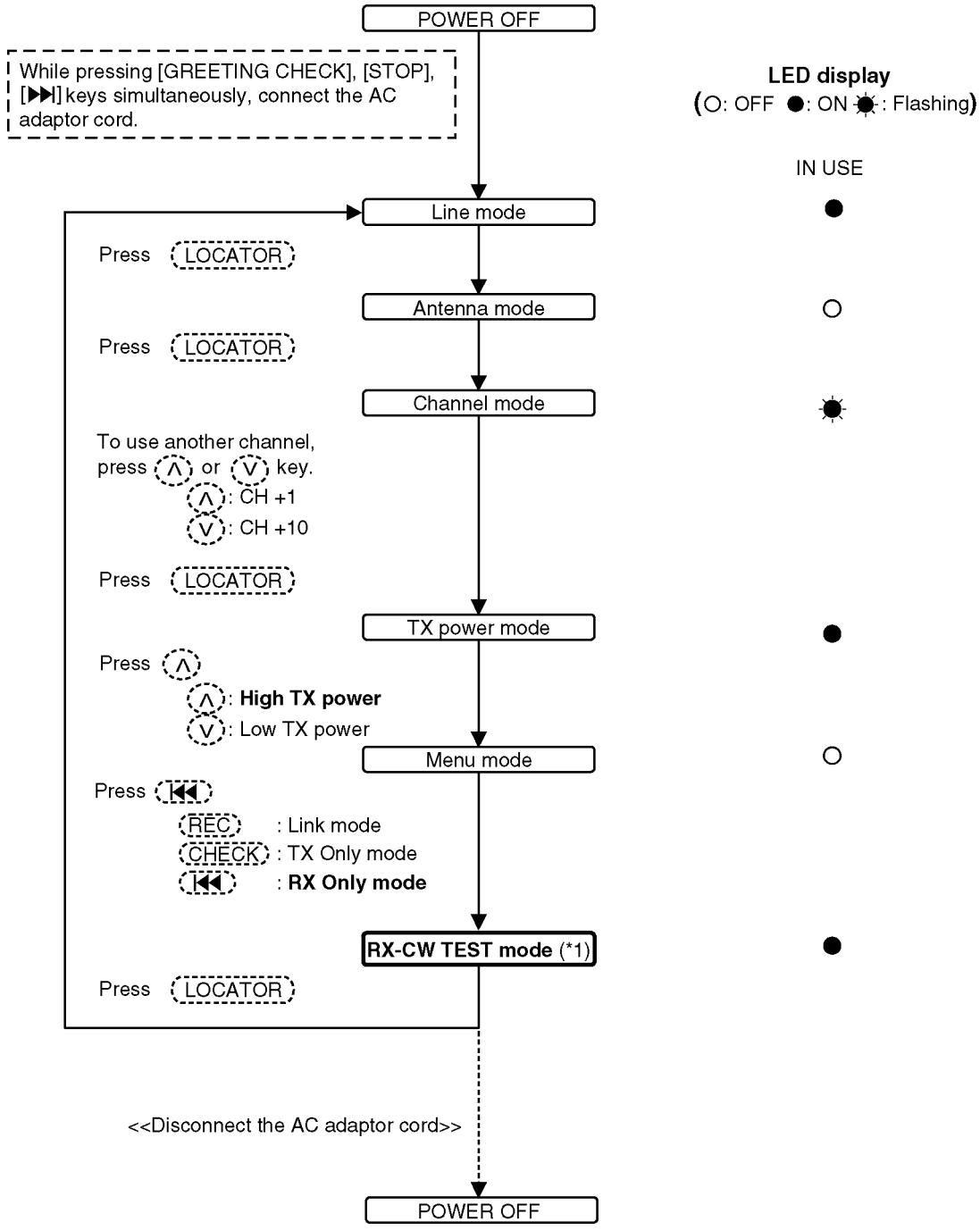
8.1.2. TX-CW Mode for Base Unit



Note:

(*1) Refer to **Check Table for RF part** (P.63).

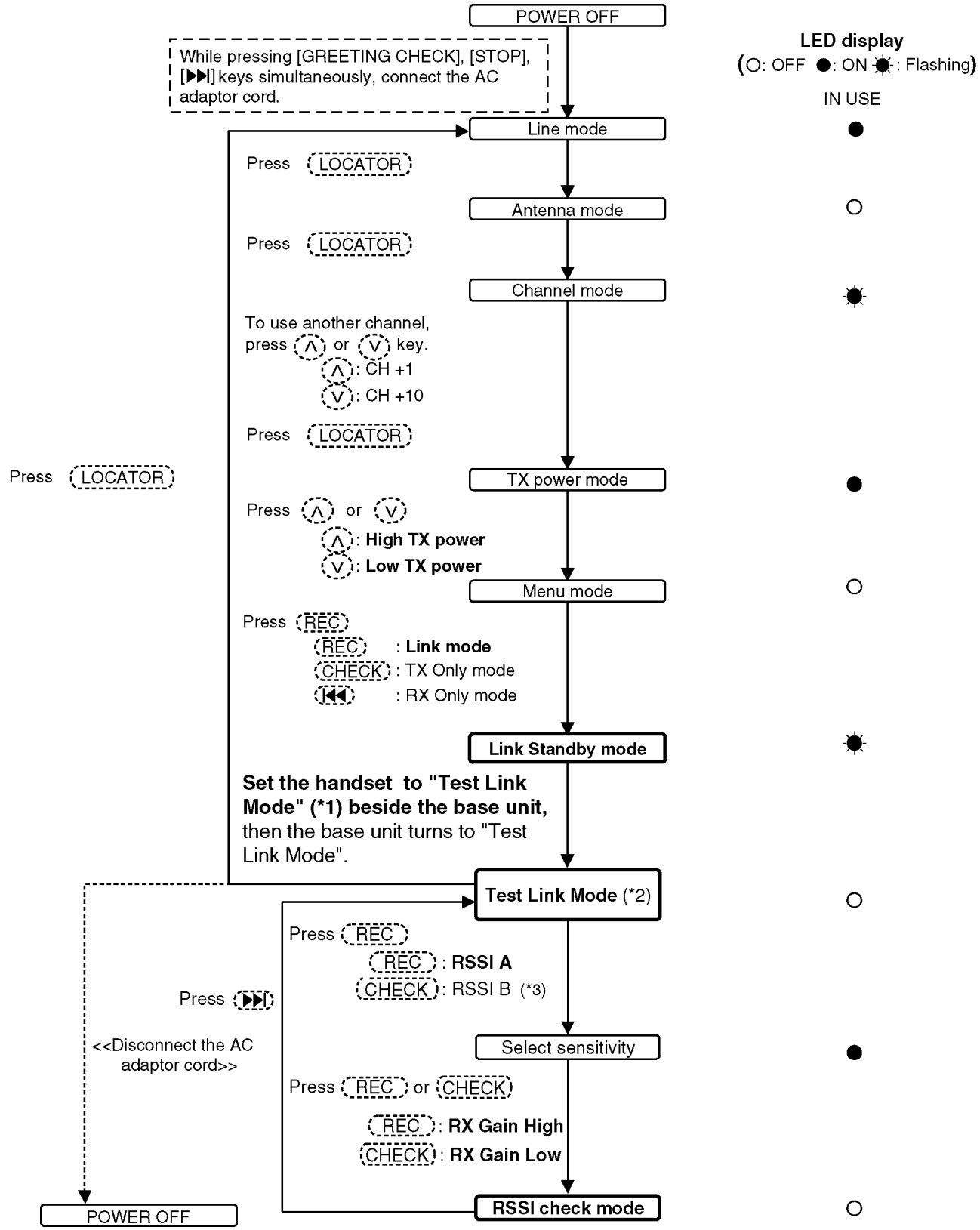
8.1.3. RX-CW Test Mode for Base Unit



Note:

(*1) Refer to **Check Table for RF part** (P.63).

8.1.4. Test Link Mode for Base Unit



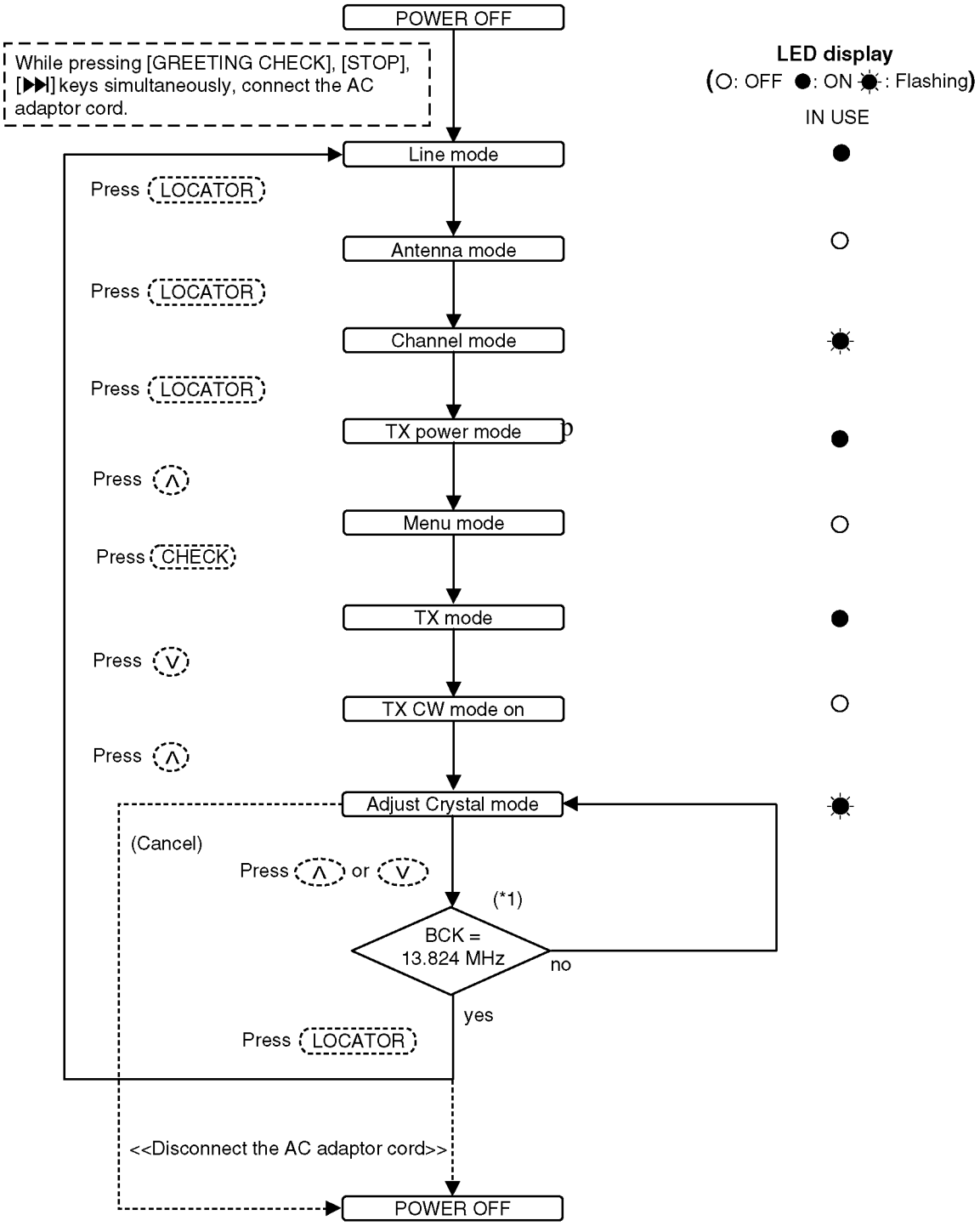
Note:

(*1) Refer to **TX-CW Mode for Handset** (P.47). If you can not proceed to the next step, refer to **Registering a Handset** (P.61).

(*2) Refer to **Check Table for RF part** (P.63).

(*3) for factory use only

8.1.5. Adjustment Mode for Base Unit



<<Disconnect the AC adaptor cord>>

Cross Reference

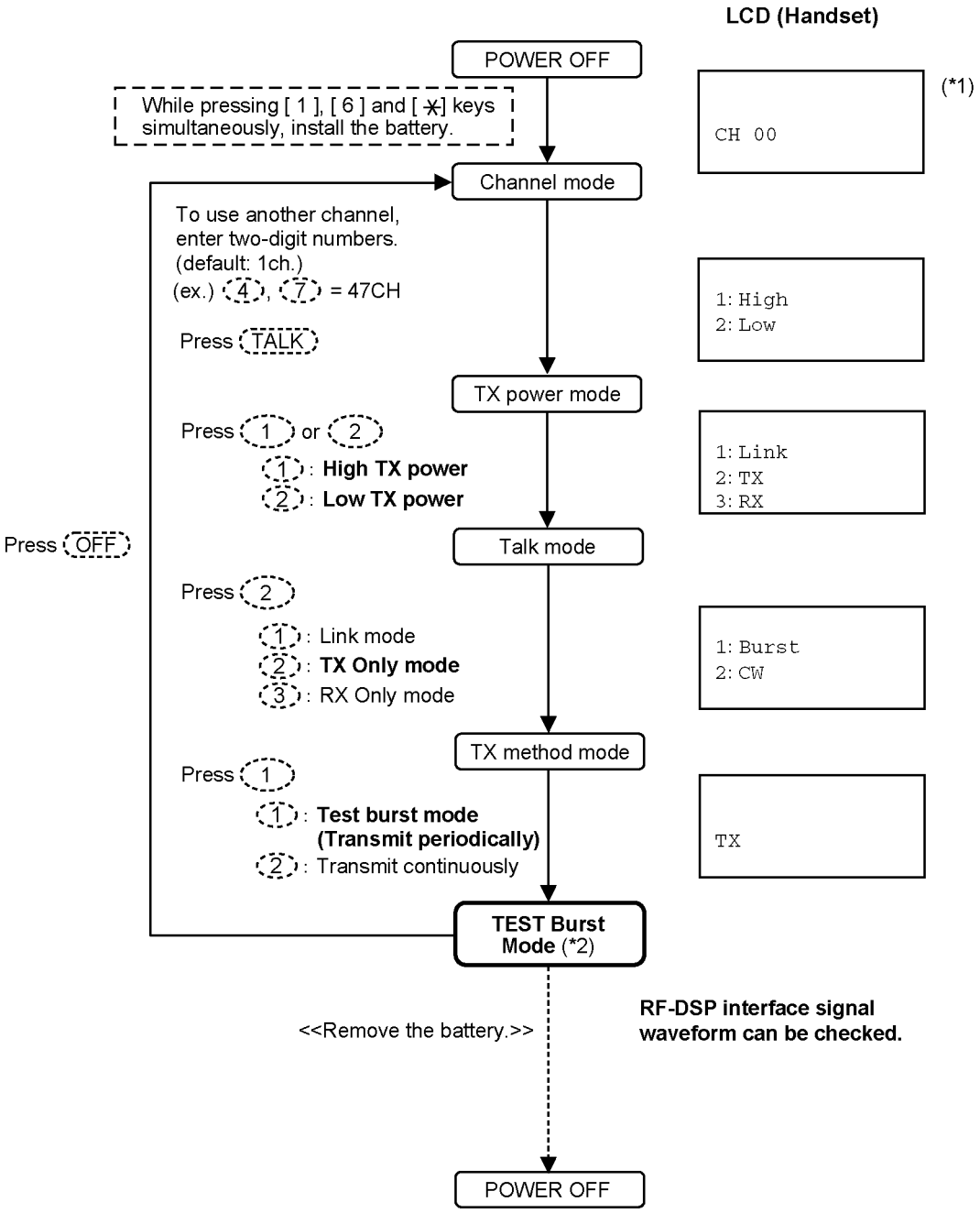
Check and Adjust Frequency (Base Unit) (P.78)

Note:

(*1) Refer to the table below, if using Frequency Counter for checking.

BCK		TEST MODE Frequency (1 Channel)
13.824 MHz	→	2400.724512 MHz
±30 Hz	→	±5.20 kHz
±100 Hz	→	±17.36 kHz

8.1.6. Test Burst Mode for Handset

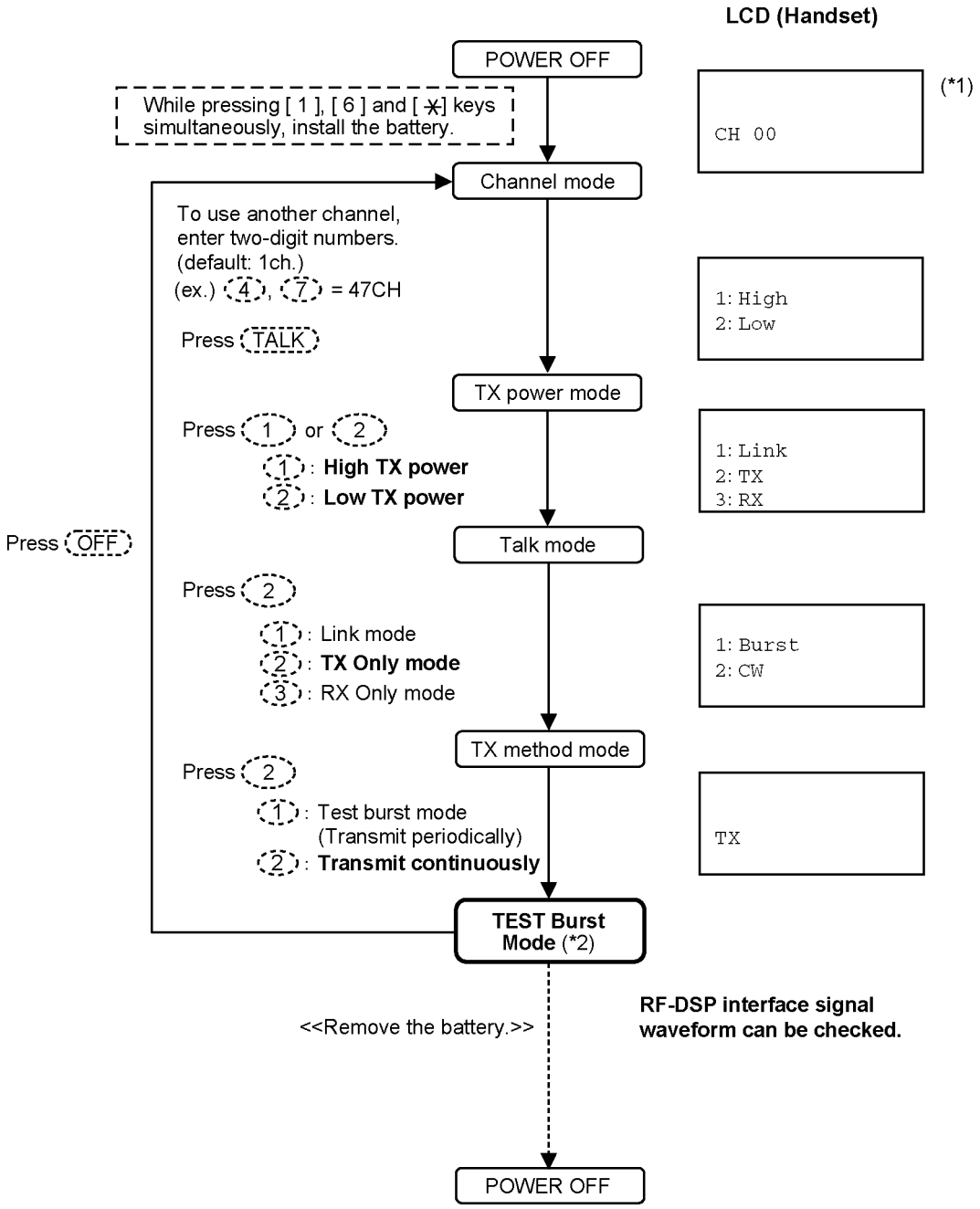


Note:

(*1) LCD displays the Channel number.
(exception: default/ CH00 = 1ch.)

(*2) Refer to **Check Table for RF part** (P.63).

8.1.7. TX-CW Mode for Handset

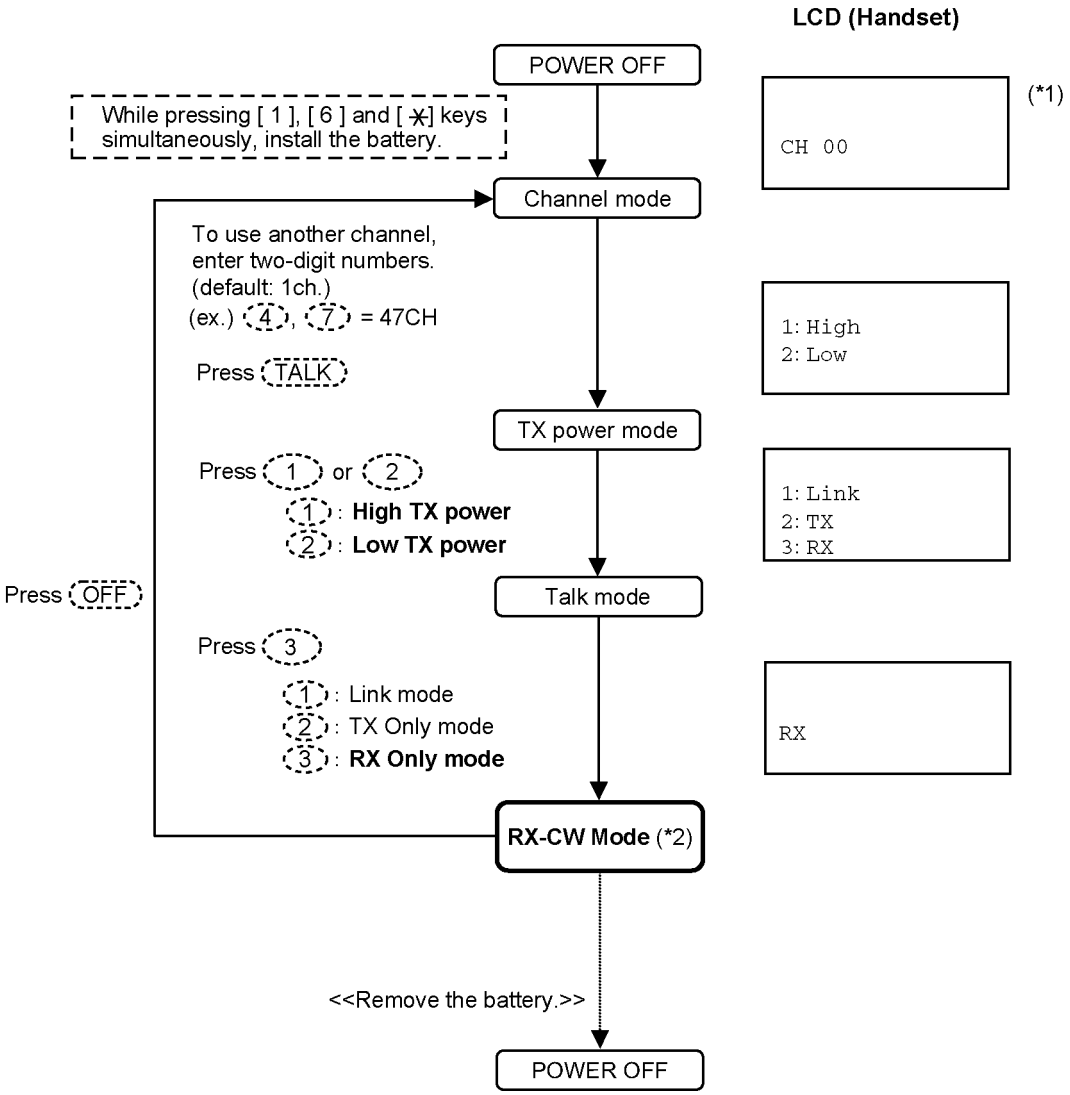


Note:

(*1) LCD displays the Channel number.
(exception: default/ CH00 = 1ch.)

(*2) Refer to **Check Table for RF part** (P.63).

8.1.8. RX-CW Test Mode for Handset

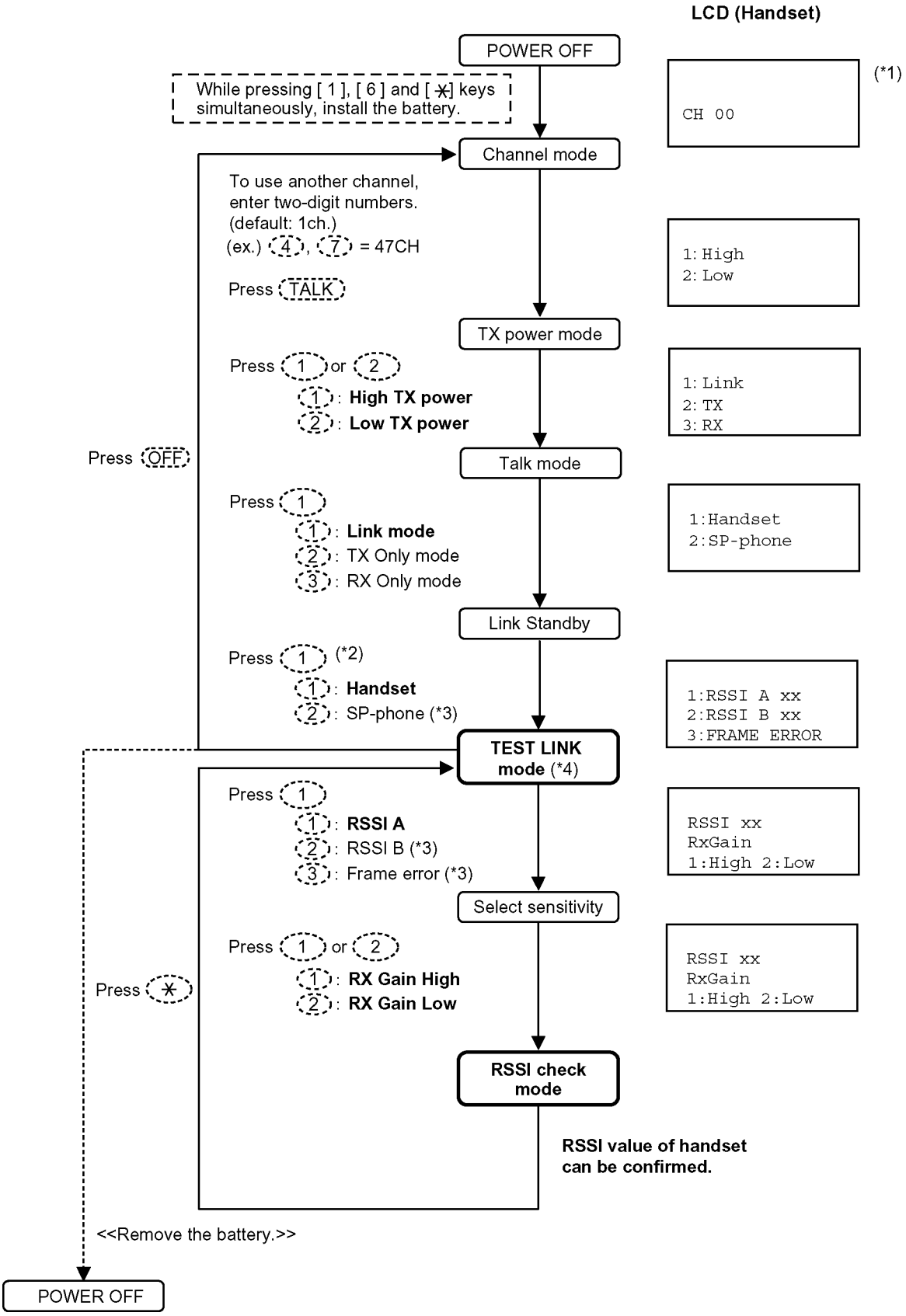


Note:

(*1) LCD displays the Channel number.
(exception: default/ CH00 = 1ch.)

(*2) Refer to **Check Table for RF part** (P.63).

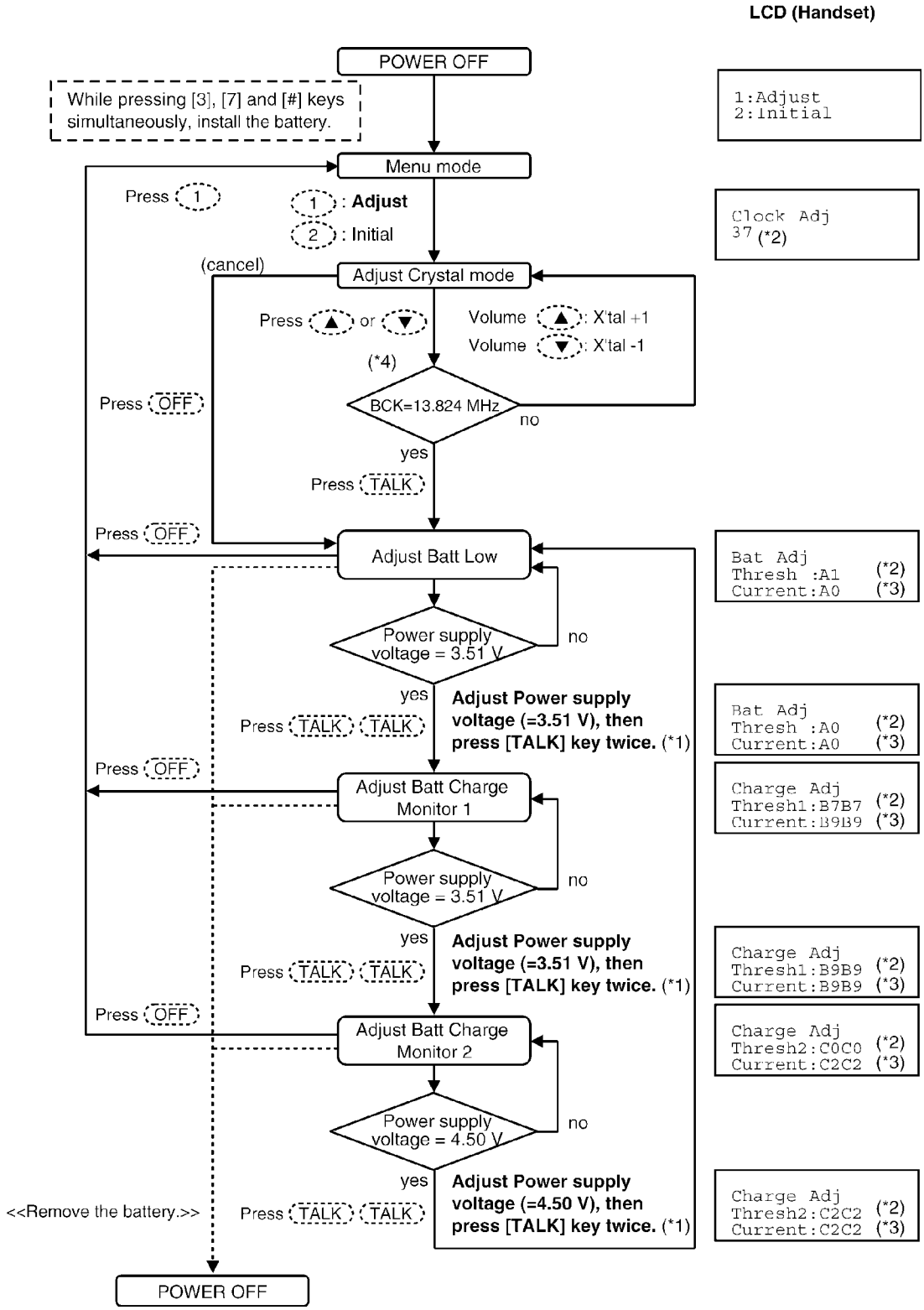
8.1.9. Test Link Mode for Handset



Note:

(*1) LCD displays the Channel number.
(exception: default/ CH00 = 1ch.)
(*2) If can not proceed to the next step, refer to **Registering a Handset** (P.61).
(*3) for factory use only.
(*4) Refer to **Check Table for RF part** (P.63).

8.1.10. Adjustment Mode for Handset



Cross Reference

(*1) **Adjust Battery Low Detector Voltage (Handset)** (P.78)

Note:

(*2) These are the default values.

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

(*4) Refer to the table below, if using Frequency Counter for checking.

BCK		TEST MODE Frequency (1 Channel)
13.824 MHz	→	2400.724512 MHz
±30 Hz	→	±5.20 kHz
±100 Hz	→	±17.36 kHz

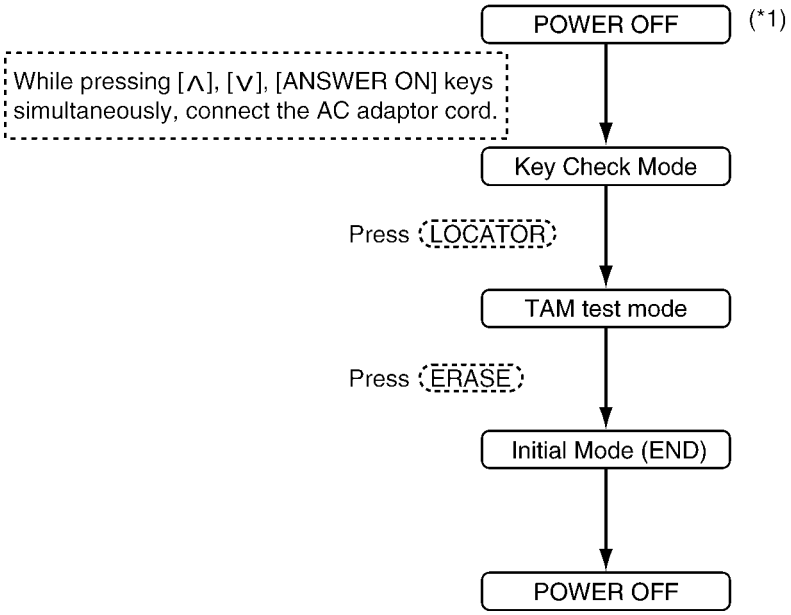
9 Service Mode

9.1. How to Clear User Setting

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

This operation should not be performed for a usual repair.

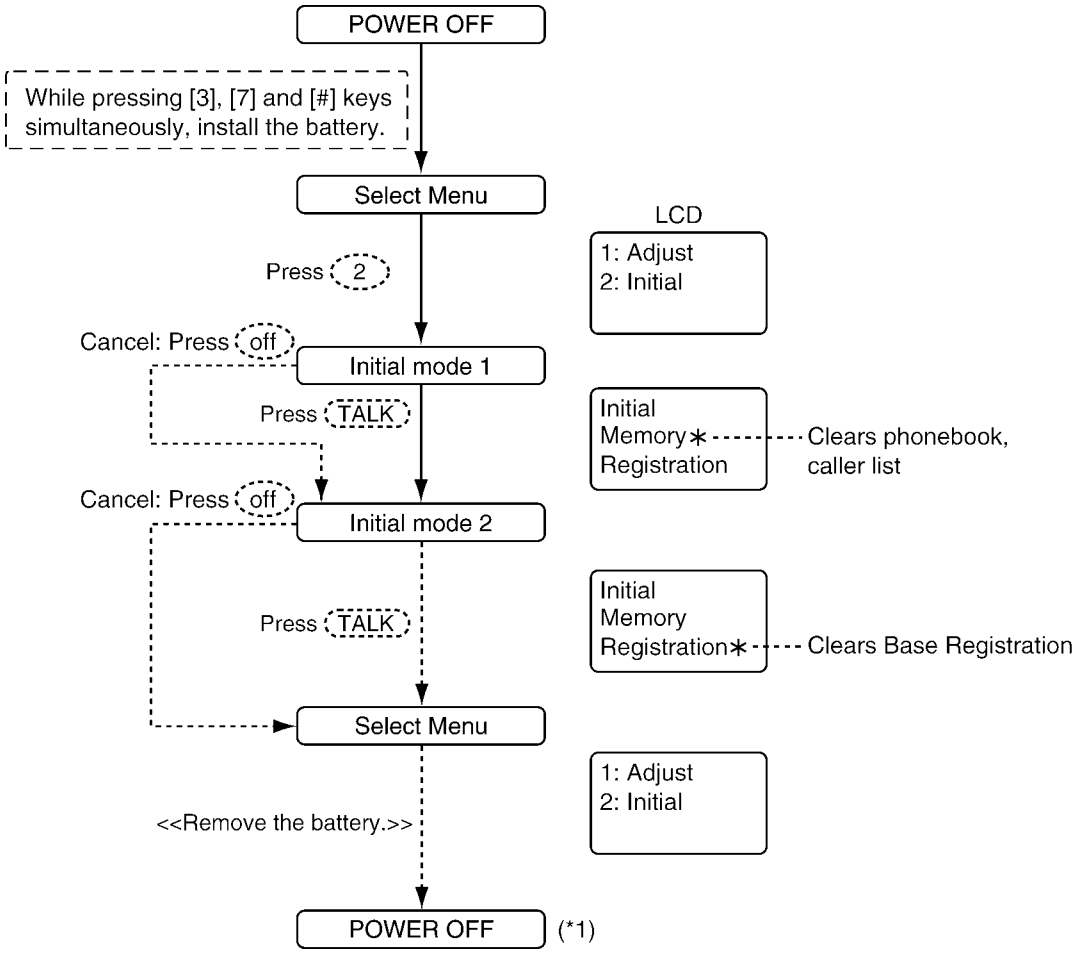
9.1.1. Base Unit



Note:

(*1) Telephone line must be connected.

9.1.2. Handset

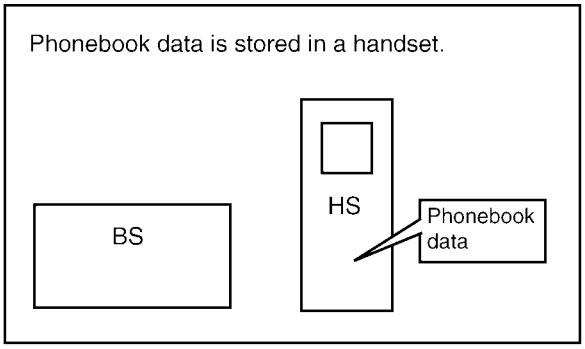


Note:

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

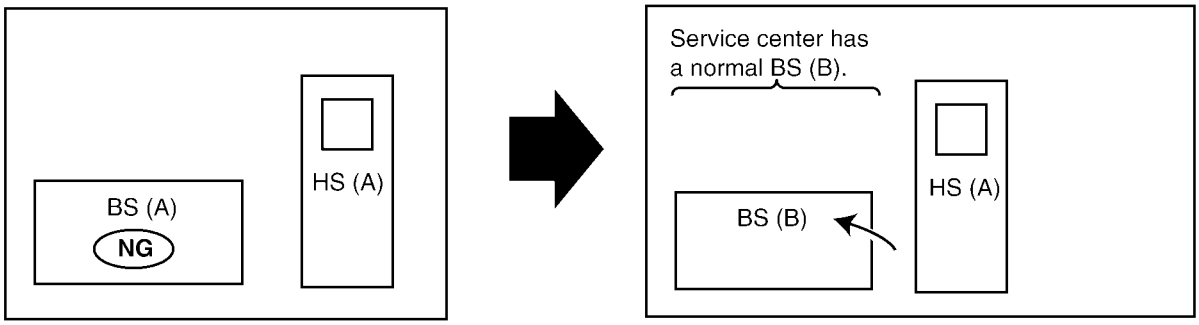
9.2. Copying Phonebook Items when Repairing

You can copy the handset phonebook to another (compatible Panasonic) handset. This will help to save the original phonebook data which the customer has registered.
Refer to the following procedures.



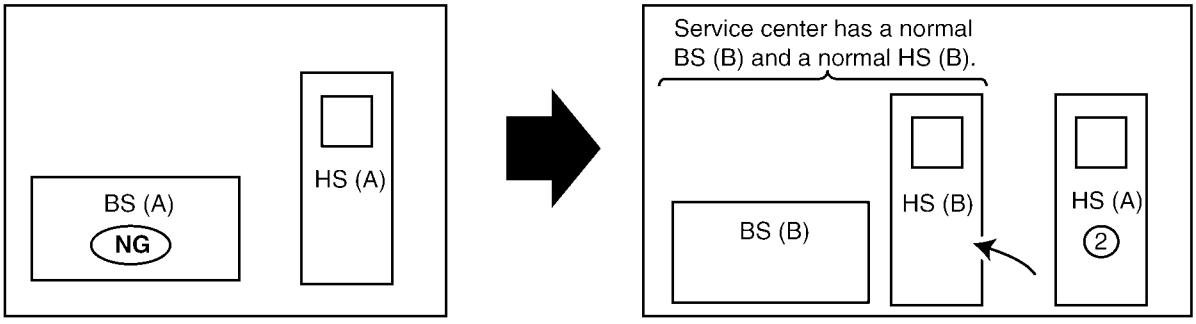
Note:
BS=Base unit
HS=Handset

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



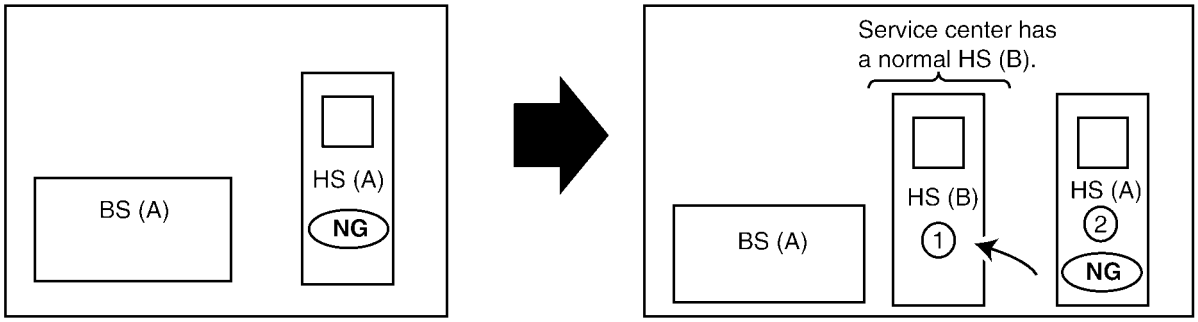
1. Register HS (A) to BS (B).
   HS (A) is normal, therefore no need to copy the phonebook data.

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



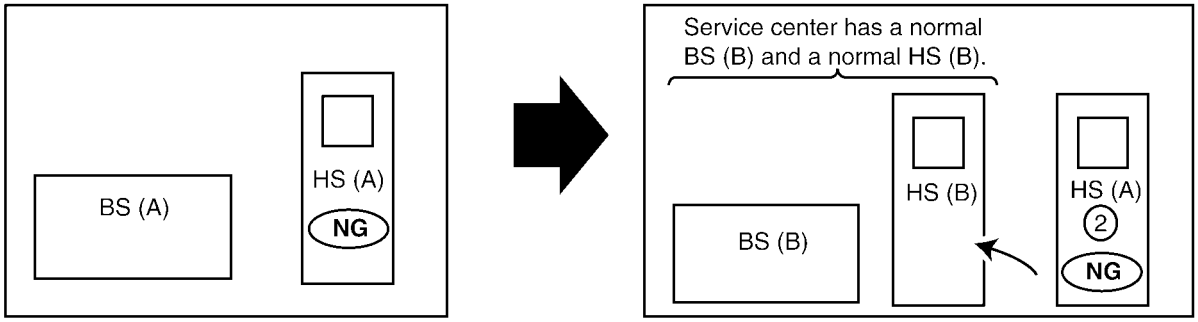
1. Register HS (A) to BS (B) as a handset no. 2.
2. Copy the phonebook data from HS (A) to HS (B).
3. Canceling the HS 2 (HS (A)).

Case 3: A handset has a defect.
(Radio transmission is functioning.)



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

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



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

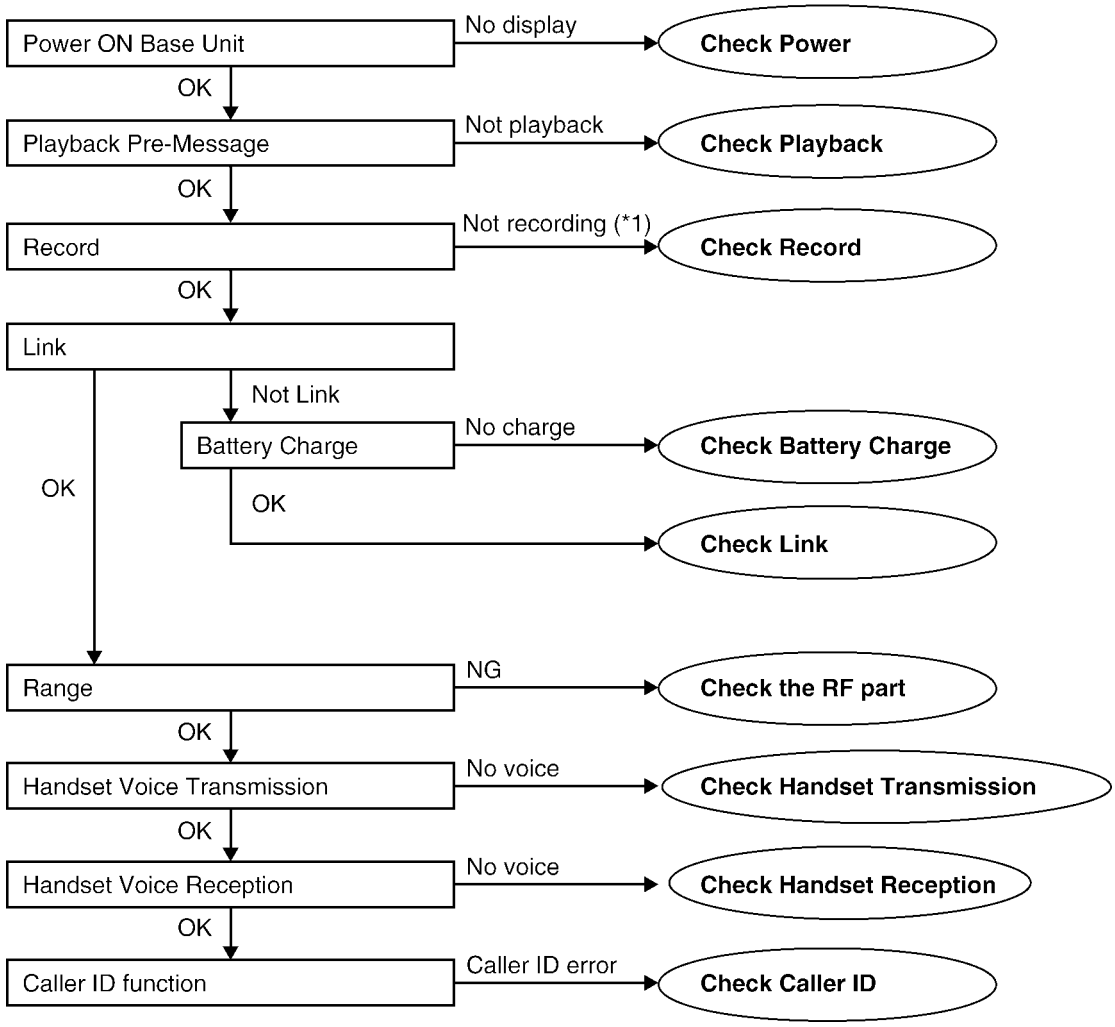
Note:

- If the max number of handsets are already registered to the base unit, a new handset cannot be registered.
- To register the handset, refer to **Registering a Handset** (P.61).
- To cancel the handset, refer to **Deregistering a Handset** (P.61).
- To copy the handset phonebook, refer to **Copying Handset Phonebook Items** (P.37)

10 Troubleshooting Guide

10.1. Troubleshooting Flowchart

FLOW CHART



Cross Reference:

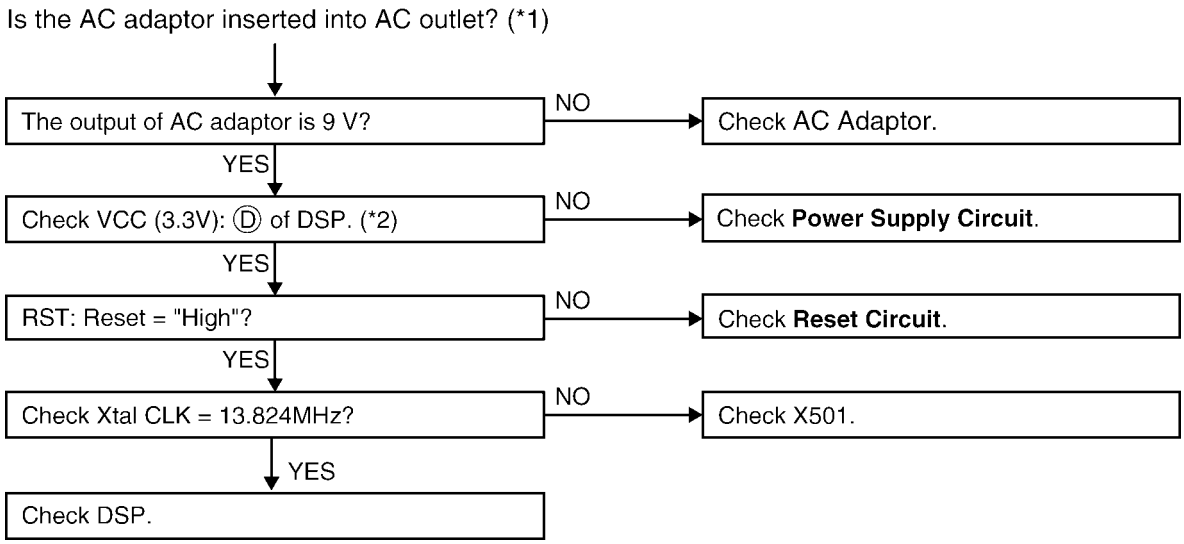
- **Check Power** (P.56)
- **Check Playback** (P.58)
- **Check Record** (P.57)
- **Check Battery Charge** (P.58)
- **Check Link** (P.59)
- **Check the RF part** (P.60)
- **Check Handset Transmission** (P.67)
- **Check Handset Reception** (P.67)
- **Check Caller ID** (P.67)

Note:

(*1) When a user claims that the unit disconnects a call right after the greeting message and no incoming messages can be recorded, this symptom can not be reappeared with TEL simulator in the service center. In this case, try **Check Record** (P.57) item (C), (D).

10.1.1. Check Power

BASE UNIT



Cross Reference:

Power Supply Circuit (P.13)

Reset Circuit (P.15)

Note:

DSP is IC501.

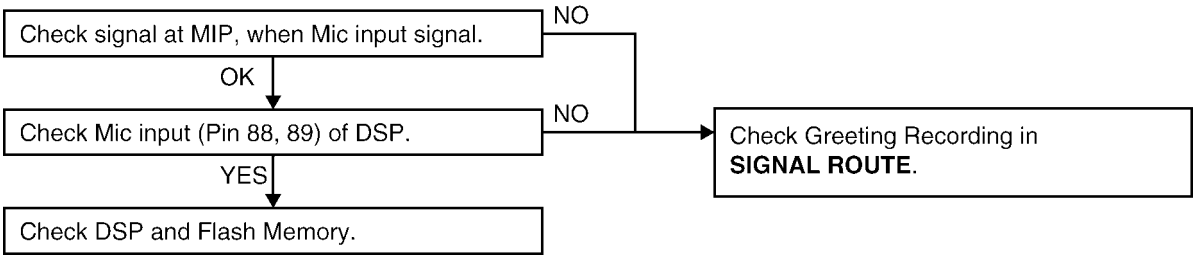
(*1) Refer to **Specifications** (P.5) for part number and supply voltage of AC adaptor.

(*2) Refer to **Circuit Board (Base Unit_Main)** (P.93).

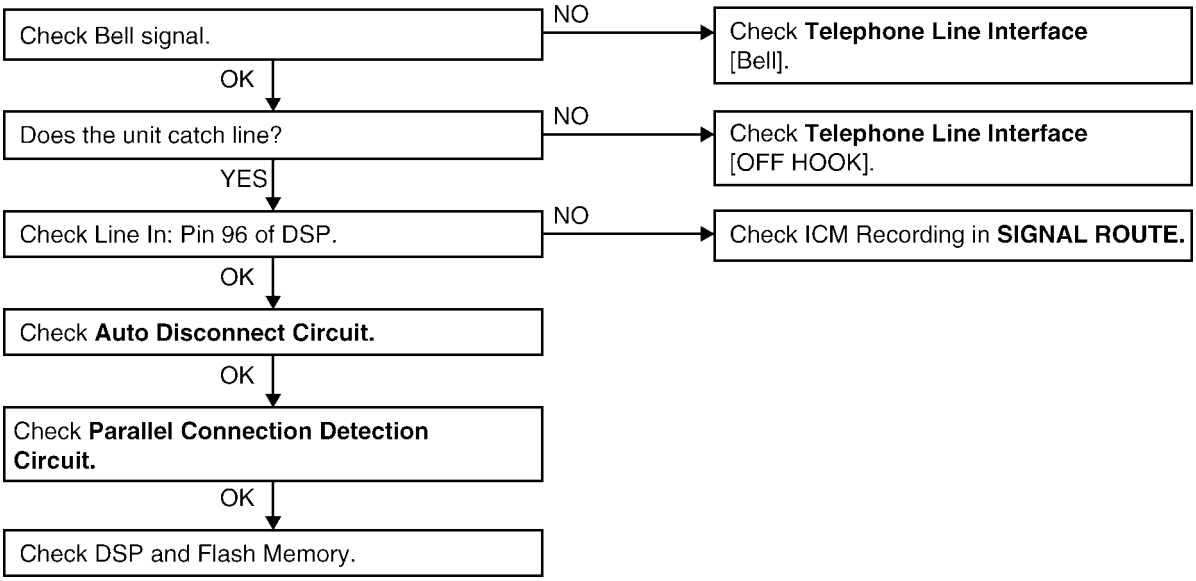
10.1.2. Check Record

BASE UNIT

A) Not record Greeting Message



B) Not record Incoming Message



C) How to change the Auto Disconnect activation (time)

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

Auto Disconnect detect	CPC detect	PROCEDURE at Stand-by mode
Enable*1		"STOP"+"GREETING CHECK"+"INTERCOM" simultaneously
Enable*1 [default]	Disable	"STOP"+"GREETING CHECK"+"VOL. [∧]" simultaneously
Disable*2		"STOP"+"GREETING CHECK"+"VOL. [∨]" simultaneously

Note:

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

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

D) How to change the VOX level

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

VOX Level sensitivity	PROCEDURE
Normal [default]	"STOP"+"LOCATOR"+"VOL. [∧]" simultaneously
6 dB Up	"STOP"+"LOCATOR"+"VOL. [∨]" simultaneously

Cross Reference:

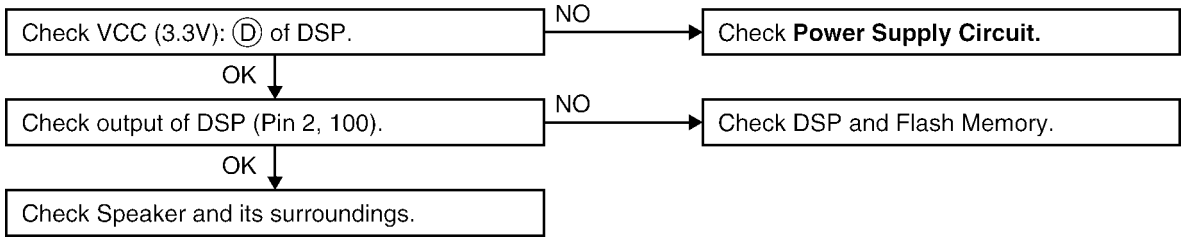
Signal Route (P.30)
Telephone Line Interface (P.16)
Auto Disconnect Circuit (P.17)
Parallel Connection Detect Circuit (P.18)

Note:

Flash Memory is IC601.
DSP is IC501.

10.1.3. Check Playback

BASE UNIT

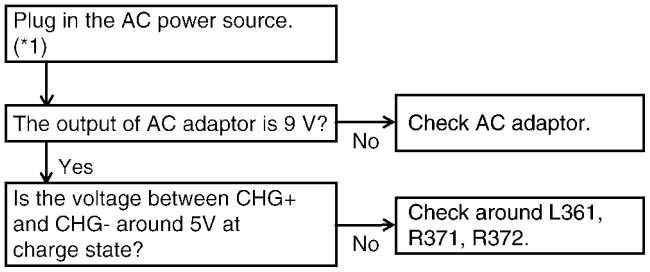


Cross Reference:
Power Supply Circuit (P.13)

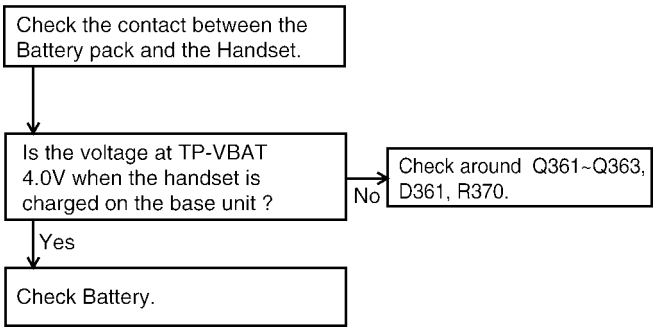
Note:
Flash Memory is IC601.
DSP is IC501.

10.1.4. Check Battery Charge

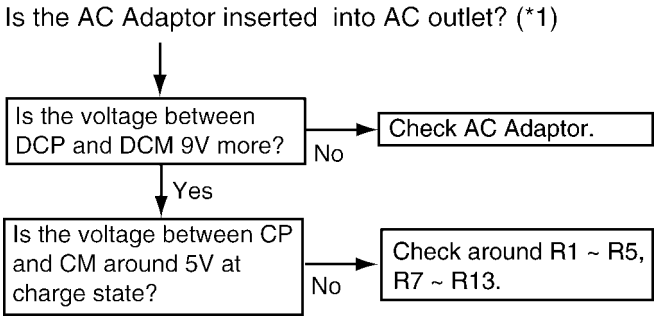
BASE UNIT



HANDSET



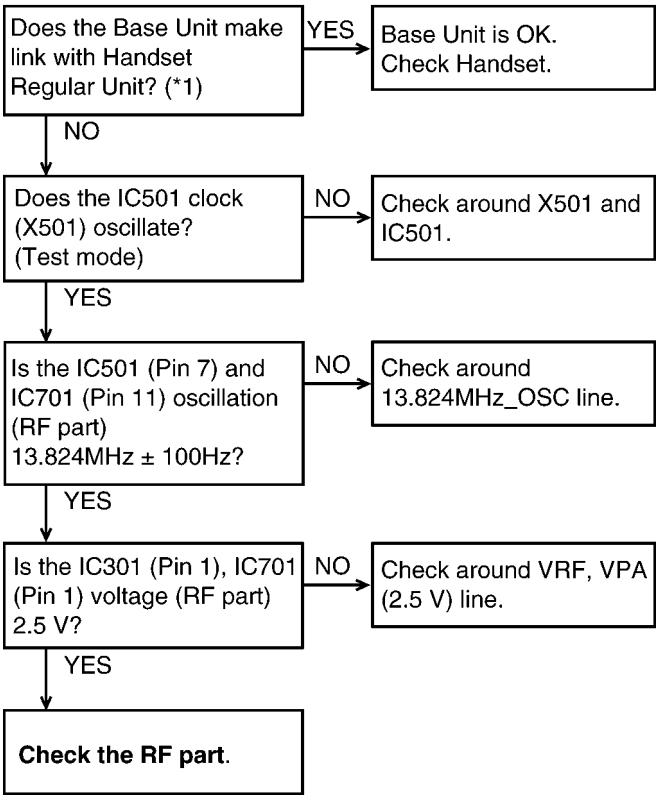
CHARGER UNIT



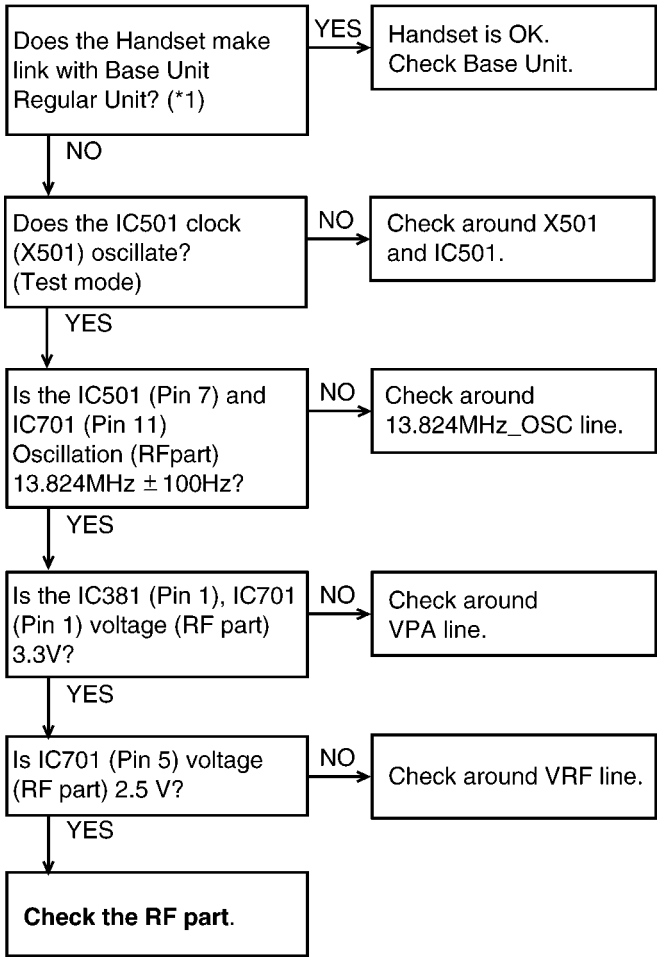
Note:
(*1) Refer to **Specifications** (P.5) for part number and supply voltage of AC adaptor.

10.1.5. Check Link

BASE UNIT



HANDSET



Note:

DSP is IC501.

(*1) Refer to **Check the RF part** (P.60).

Cross Reference:

Check the RF part (P.60)

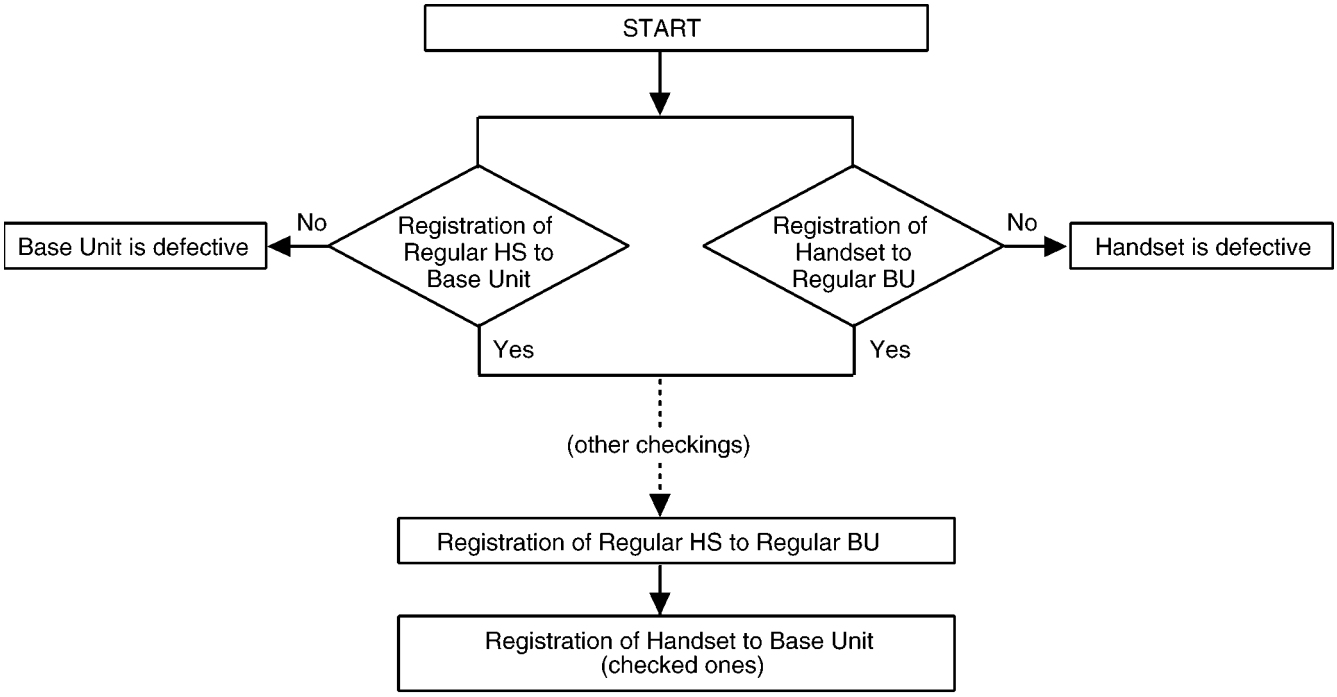
10.1.6. Check the RF part

10.1.6.1. Finding out the Defective part

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

After All the Checkings or Repairing

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



Note:

(*1) HS: Handset

(*2) BU: Base Unit

10.1.6.1.1. Registering a Handset

The included handset and base unit are preregistered. If for some reason the handset is not registered to the base unit, register the handset.

1 **Handset:**
[MENU] → [0][0][1]

2 **Base unit:**
Press and hold **[LOCATOR/INTERCOM]** until the IN USE indicator flashes.
- After the IN USE indicator starts flashing, the rest of the procedure must be completed within 1 minute.

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

4 **[OFF]**

Registering an additional handset

Start from step 2.

10.1.6.1.2. Deregistering a Handset

1 **[MENU] → [0][0][2]**
2 **[3][3][5] → [OK]**
3 Select the handset you want to cancel by pressing the desired handset number (**[1]** – **[4]**).

10.1.6.1.3. Deregistering all handsets by the base unit

Base unit:

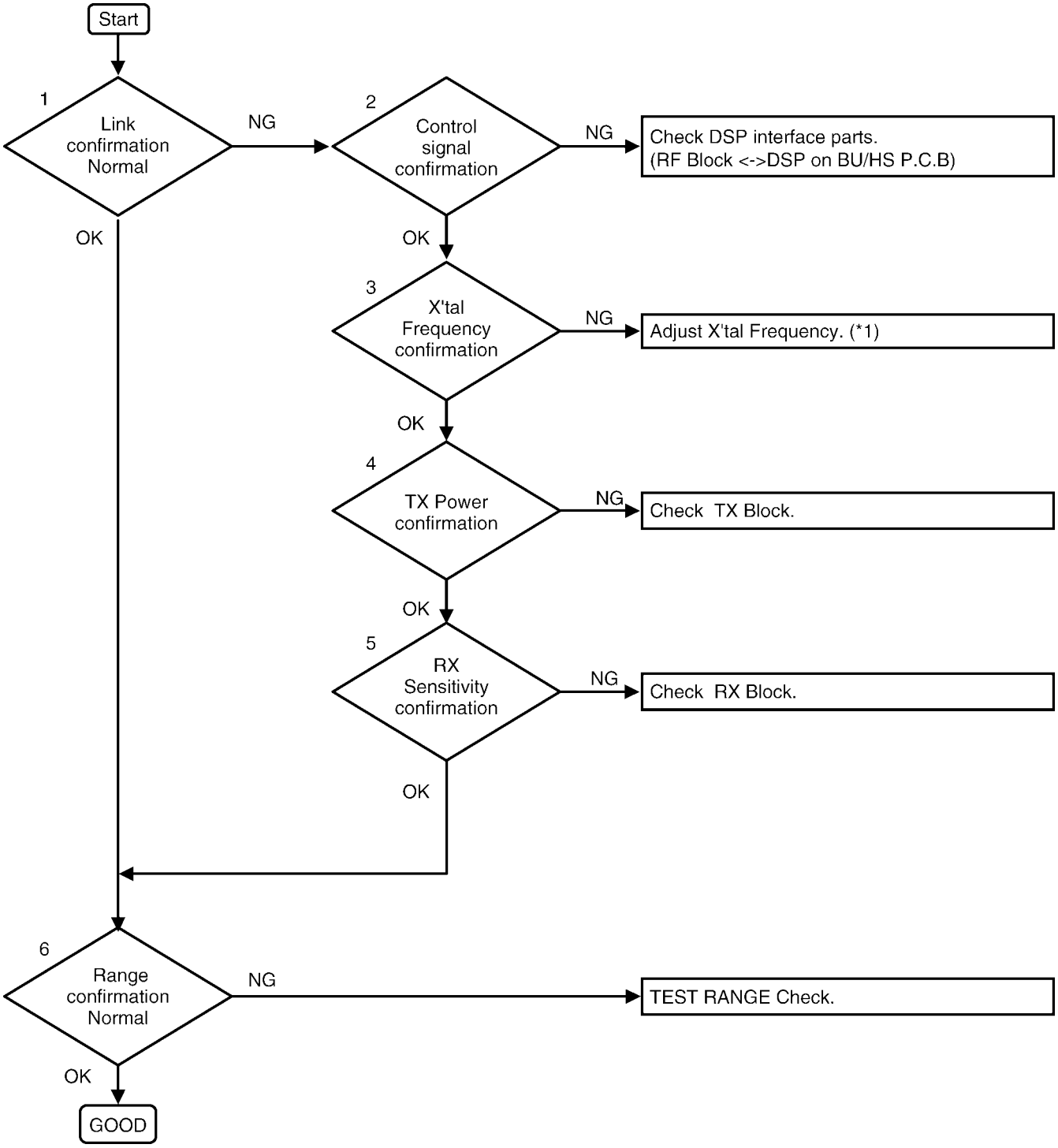
1 Connect the AC adaptor cord while pressing **[LOCATOR/INTERCOM]**, then IN USE indicator flashes.

2 Press and hold **[LOCATOR/INTERCOM]** again till IN USE indicator stops flashing.

Important:
When deregistering all handsets by the base unit, the registration information of all handsets in the base unit is erased.
However the registration information in each handset will still remain.

10.1.6.2. RF Check Flowchart

Each item (1 ~ 6) of RF Check Flowchart corresponds to **Check Table for RF part** (P.63).
Please refer to the each item.



Note:
(*1) Refer to **Things to Do after Replacing IC or X'tal** (P.78)

10.1.6.3. Check Table for RF part

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

Note:

(*1)(*3)(*4) **Test Mode** (P.41)

(*2) **RF-DSP Interface Signal Wave Form** (P.65)

(*5) **Base Unit Reference Drawing** (P.79)

(*6) **Handset Reference Drawing** (P.80)

(*7) **Things to Do after Replacing IC or X'tal** (P.78)

10.1.6.4. TEST RANGE Check

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

Item	BU (Base Unit) Check	HS (HandSet) Check
Range Confirmation TX TEST (TX Power check) HS, BU Mode: [Test Link Mode] (*1)	1. Register Regular HS to BU (to be checked). 2. Set BU to “Test Link mode”. 3. Set Regular HS to “Test Link mode”. *Set TX Power and RX Sensitivity of the BU and the Regular HS by CHART1. * At distance of about 20m between HS and BU, Link OK = TX Power of the BU is OK. No Link = TX Power of the BU is NG.	1. Register HS (to be checked) to Regular BU. 2. Set Regular BU to “Test Link mode”. 3. Set HS to “Test Link mode”. *Set TX Power and RX Sensitivity of the HS and the Regular BU by CHART1. * At distance of about 20m between HS and BU, Link OK = TX Power of the HS is OK. No Link = TX Power of the HS is NG.
Range Confirmation RX TEST (RX sensitivity check) HS, BU Mode: [Test Link Mode] (*1)	1. Register Regular HS to BU (to be checked). 2. Set BU to “Test Link mode”. 3. Set Regular HS to “Test Link mode”. *Set TX Power and RX Sensitivity of the BU and Regular HS by CHART1. * At distance of about 20m between HS and BU, Link OK= RX Sensitivity of the BU is OK. No Link = RX Sensitivity of the BU is NG.	1. Register HS (to be checked) to Regular BU. 2. Set Regular BU to “Test Link mode”. 3. Set HS to “Test Link mode”. * Set TX Power and RX Sensitivity of Checking_HS and Regular_BU by CHART1. * At distance of about 20m between HS and BU, Link OK= RX Sensitivity of the HS is OK. No Link = RX Sensitivity of the HS is NG

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

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

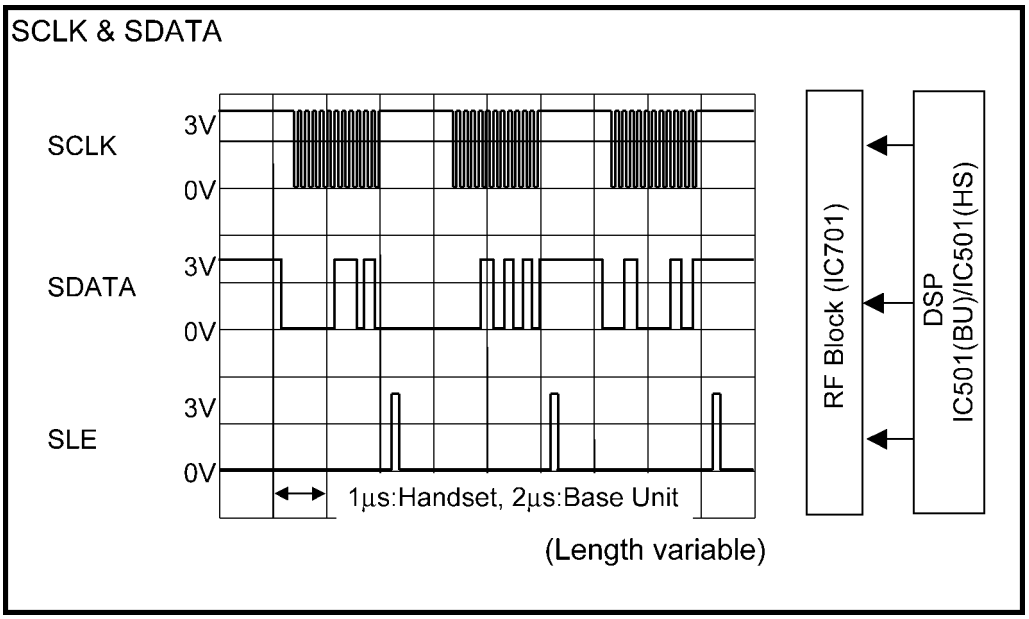
	HS (to be checked)		Regular_BU	
	TX Power	RX Sens.	TX Power	RX Sens.
HS (Handset) TX Power Check	High	High	High	**Low**
HS (Handset) RX Sensitivity Check	High	High	**Low**	High

Note:

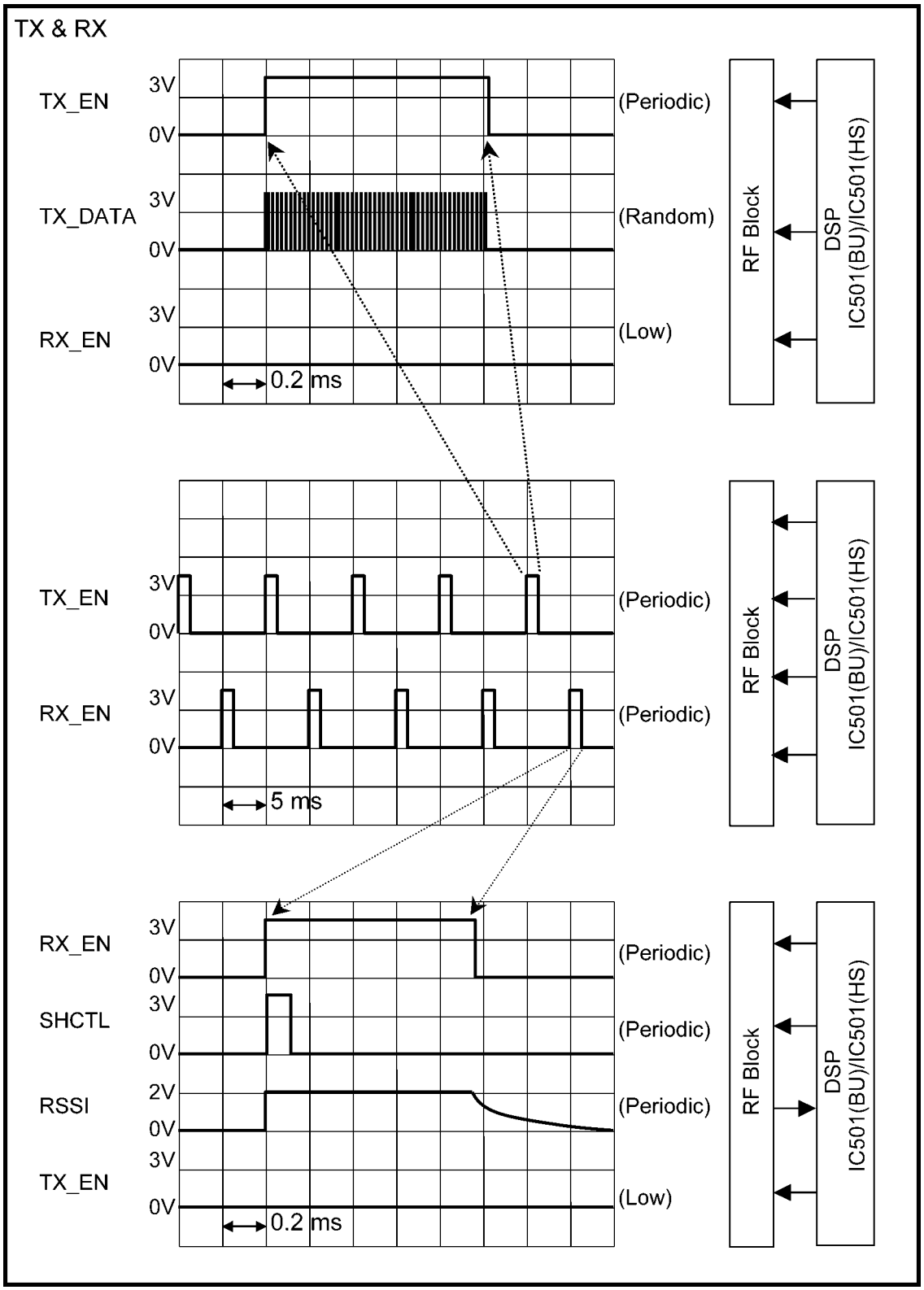
(*1) **Test Mode** (P.41)

10.1.6.5. RF-DSP Interface Signal Wave Form

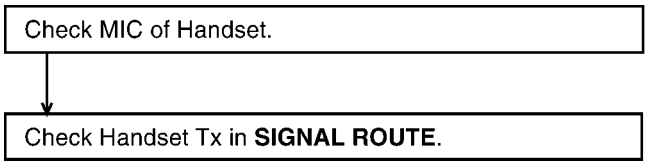
Test Burst Mode:



Test Burst Mode:

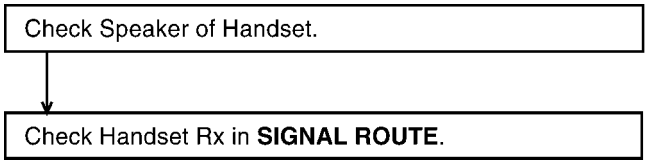


10.1.7. Check Handset Transmission



Cross Reference:
Signal Route (P.30)

10.1.8. Check Handset Reception

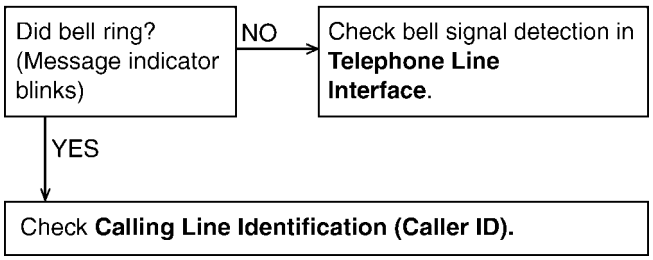


Cross Reference:
Signal Route (P.30)

Note:
When checking the RF part, Refer to **Check the RF part** (P.60).

10.1.9. Check Caller ID

BASE UNIT



Cross Reference:
Telephone Line Interface (P.16)
Calling Line Identification (Caller ID) (P.19)

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

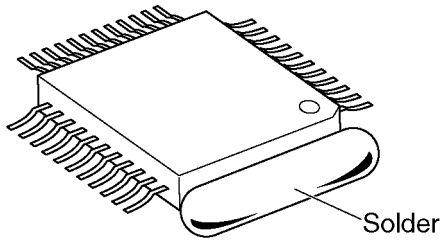
10.2. How to Replace the Flat Package IC

10.2.1. Preparation

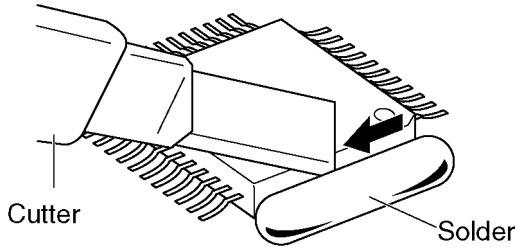
- PbF (: Pb free) Solder
- Soldering Iron
  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)
  Note: We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
- Flux
  Recommended Flux: Specific Gravity → 0.82.
  Type → RMA (lower residue, non-cleaning type)
  Note: See **About Lead Free Solder (PbF: Pb free)** (P.4).

10.2.2. How to Remove the IC

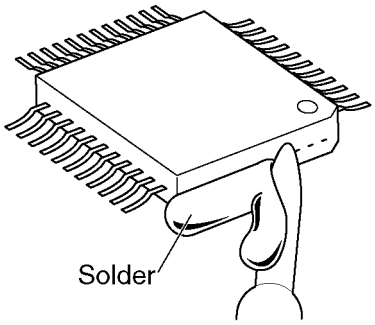
1. Put plenty of solder on the IC pins so that the pins can be completely covered.
   Note:
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



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



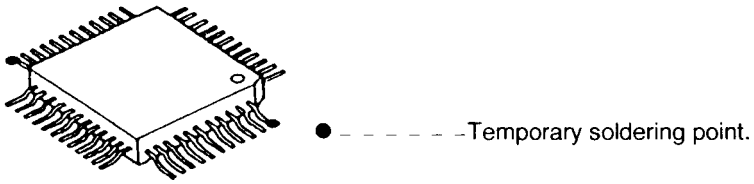
3. While the solder melts, remove it together with the IC pins.



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

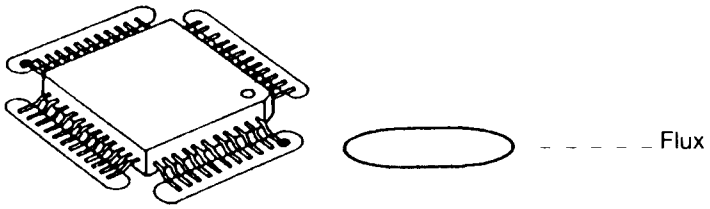
10.2.3. How to Install the IC

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

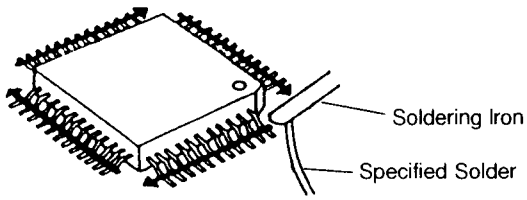


*Check the accuracy of the IC setting with the corresponding soldering foil.

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

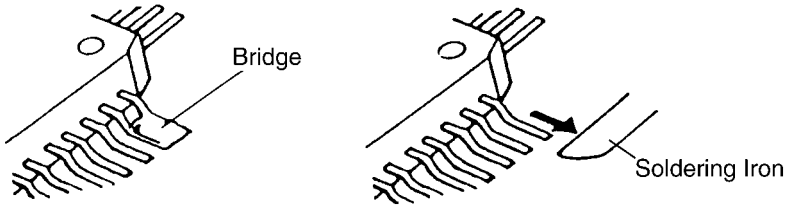


3. Solder the pins, sliding the soldering iron in the direction of the arrow.



10.2.4. How to Remove a Solder Bridge

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



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

10.3.1. Preparation

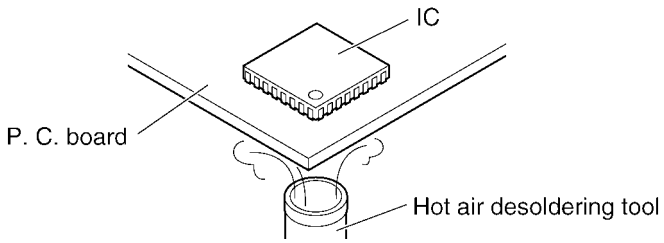
- PbF (: Pb free) Solder
- Soldering Iron
  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)
  Note:
  We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.
- Hot Air Desoldering Tool
  Temperature: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

10.3.2. Caution

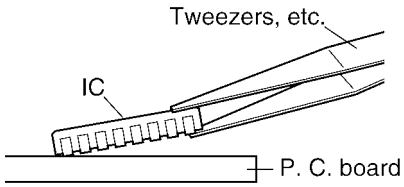
- To replace the IC efficiently, choose the right sized nozzle of the hot air desoldering tool that matches the IC package.
- Be careful about the temperature of the hot air desoldering tool not to damage the PCB and/or IC.

10.3.3. How to Remove the IC

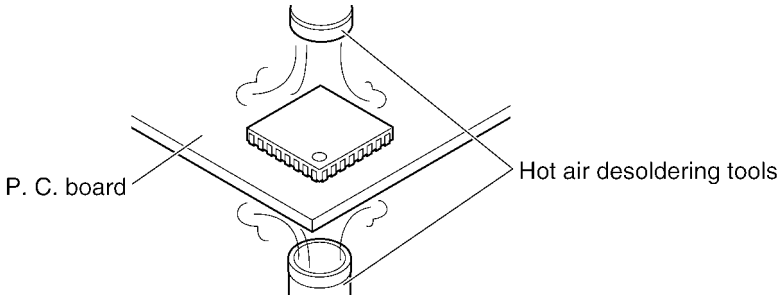
1. Heat the IC with a hot air desoldering tool through the P. C. board.



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



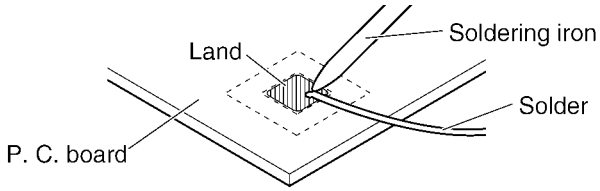
When it is hard to melt the solder completely, heat it with a hot air desoldering tool through the IC besides through the P. C. board.



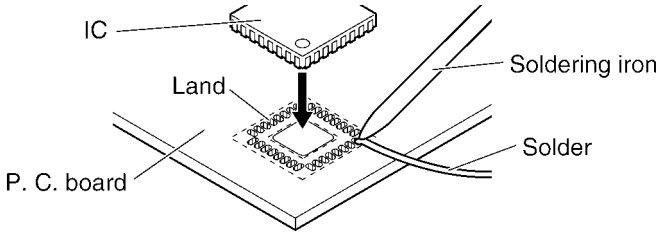
3. After removing the IC, clean the P. C. board of residual solder.

10.3.4. How to Install the IC

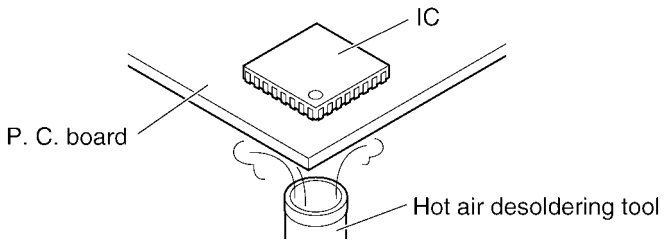
1. Place the solder a little on the land where the radiation GND pad on IC bottom is to be attached.



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



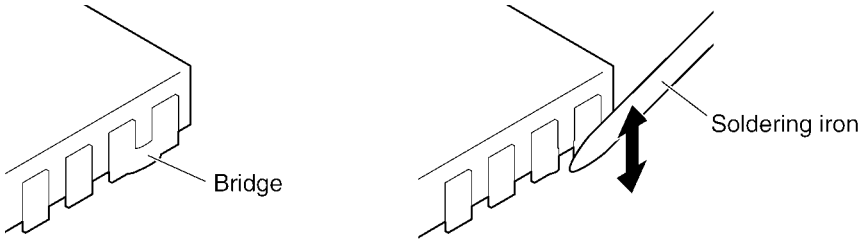
3. Heat the IC with a hot air desoldering tool through the P. C. board until the solder on IC bottom is melted.
   Note:
   • Be sure to place it precisely, controlling the air volume of the hot air desoldering tool.



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

10.3.5. How to Remove a Solder Bridge

When a solder bridge is found after soldering the bottom of the IC, remove it with a soldering iron.

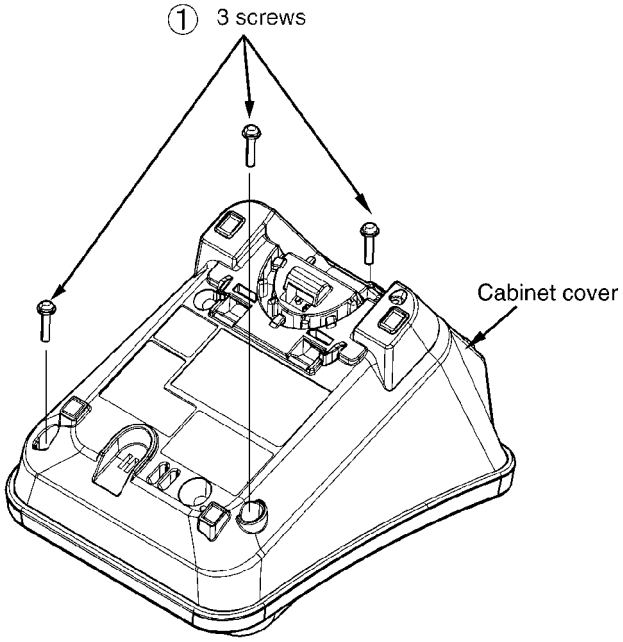


11 Disassembly and Assembly Instructions

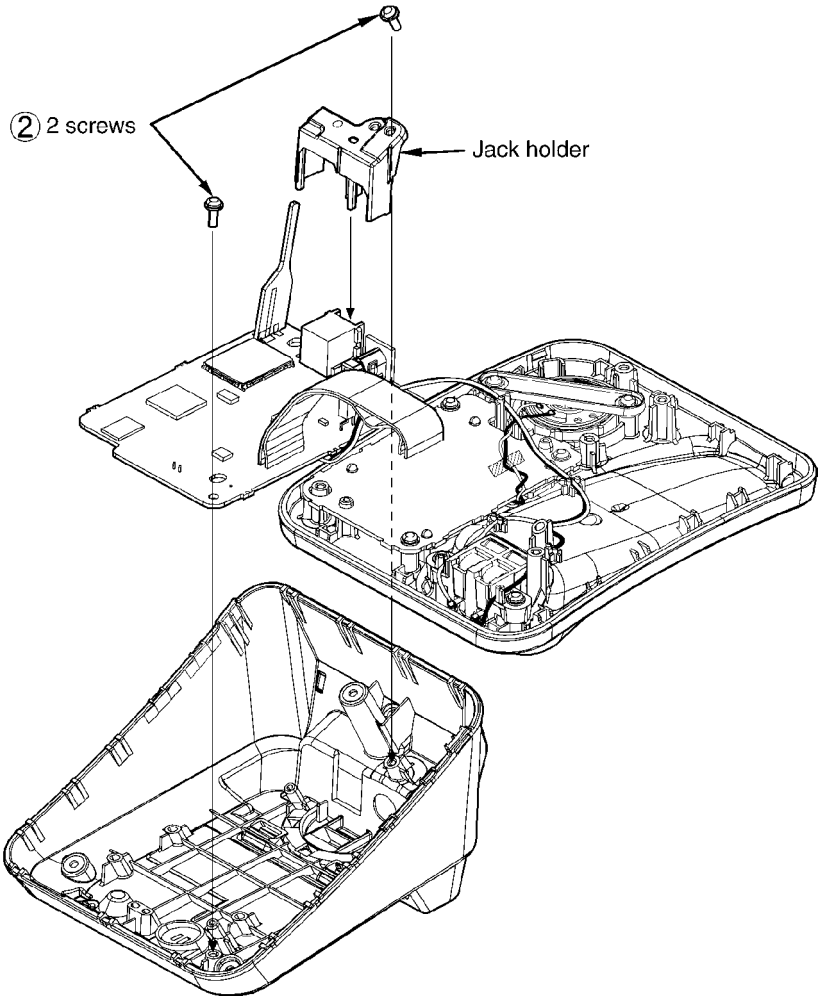
11.1. Disassembly Instructions

11.1.1. Base Unit

① Remove the 3 screws to remove the cabinet cover.

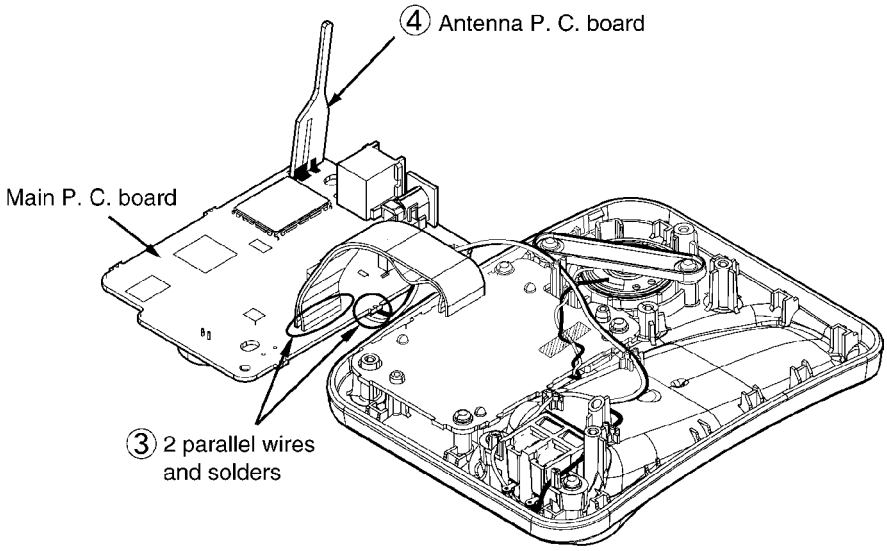


② Remove the 2 screws to remove the jack holder.

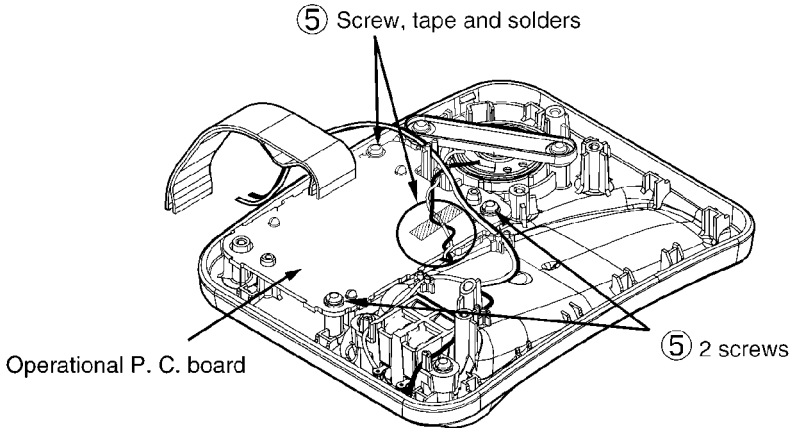


③ **Remove the 2 parallel wires and the solders to remove the main P.C. board.**

④ **Remove the antenna P. C. board.**

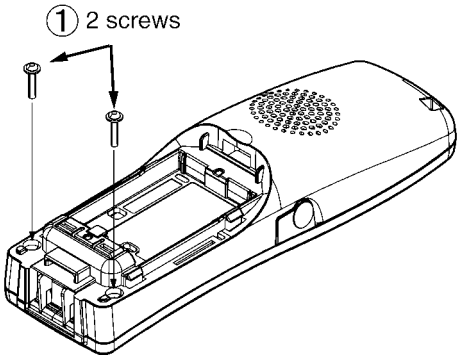


⑤ **Remove the 3 screws, the tape and the solders to remove the operational P. C. board.**

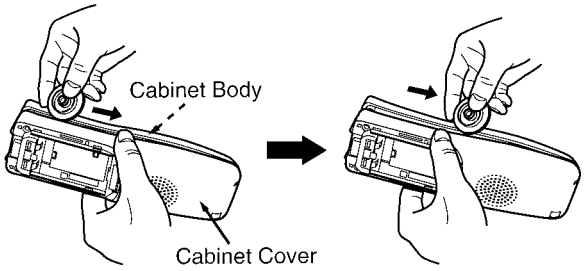


11.1.2. Handset

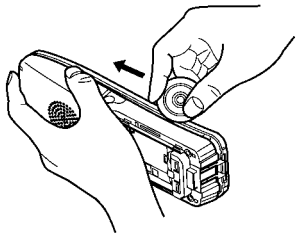
① **Remove the 2 screws.**



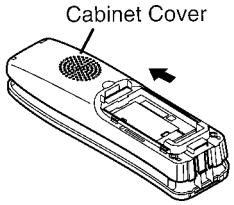
② **Insert a JIG (PQDJ10006Y) between the cabinet body and the cabinet cover, then pull it along the gap to open the cabinet.**



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

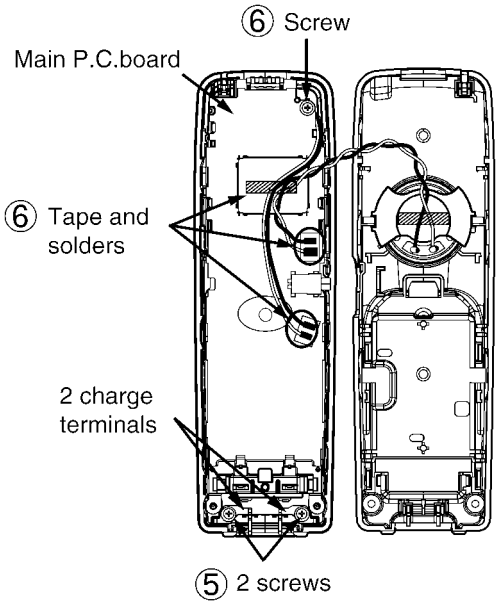


④ **Remove the cabinet cover by pushing it upward.**



⑤ **Remove the 2 screws to remove the 2 charge terminals.**

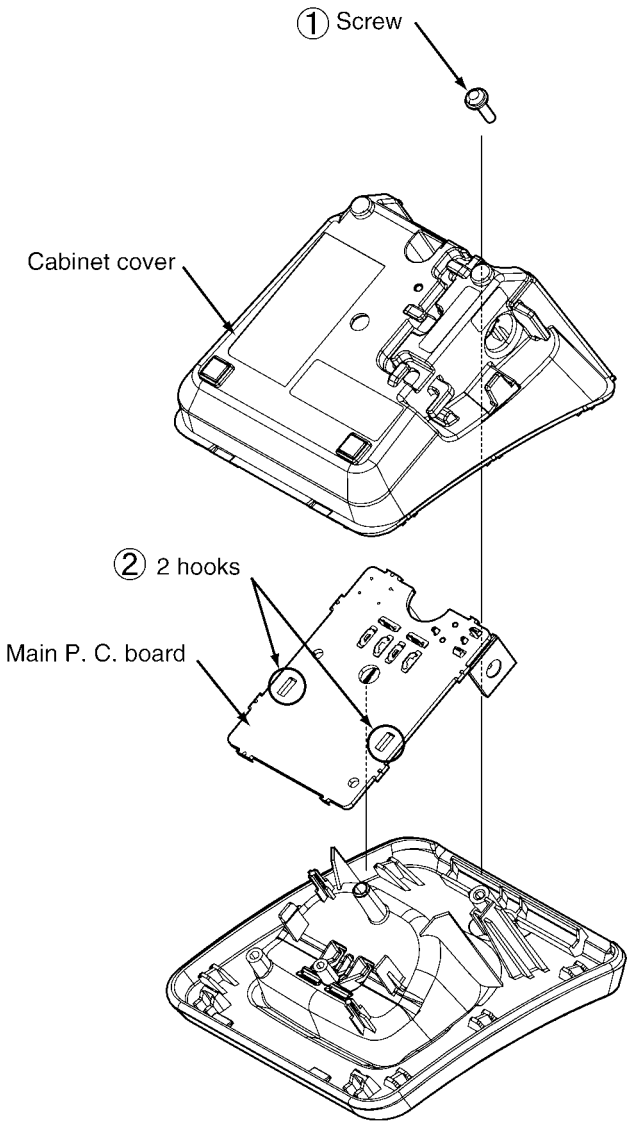
⑥ **Remove the screw, tape and solders to remove the main P. C. board.**



11.1.3. Charger Unit

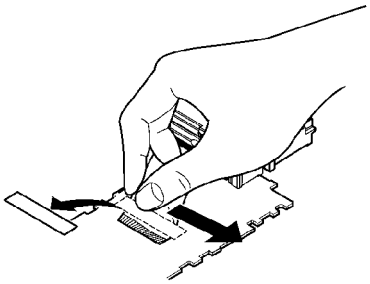
① **Remove the screw to remove the cabinet cover.**

② **Detach the 2 hooks to remove the main P.C. board.**



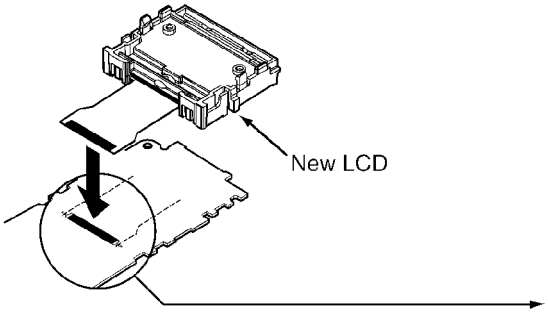
11.2. How to Replace the Handset LCD

①



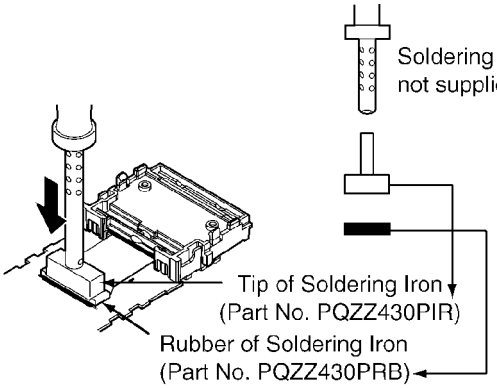
Remove the tape and peel off the FFC (Flexible Flat Cable) from the LCD, in the direction of the arrow. Take care to ensure that the foil on the P.C. board is not damaged.

②



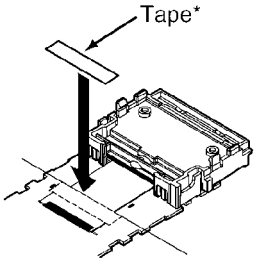
Fit the heatseal of a new LCD.

③

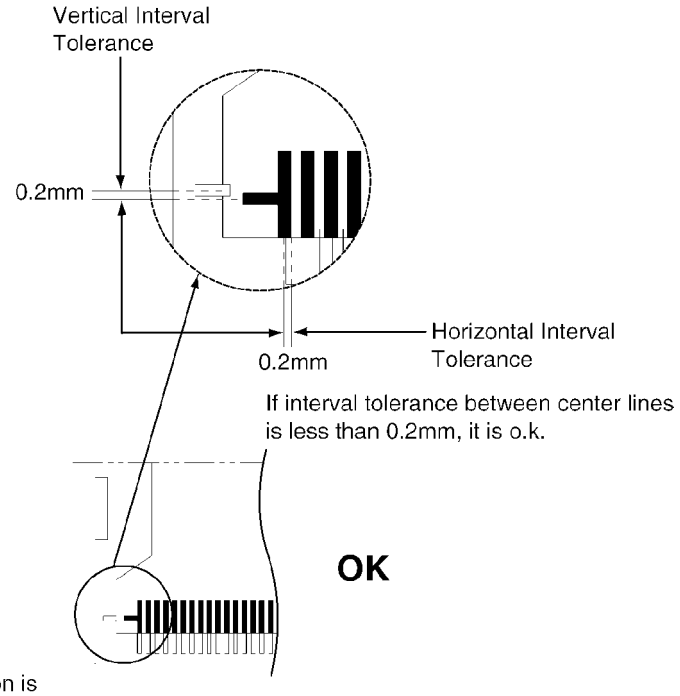


Heatweld with the tip of the soldering iron about 5 to 8 seconds (in case of 60W soldering iron).

④

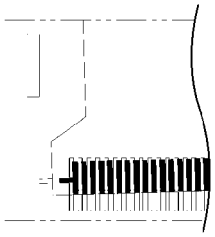


Stick the tape over the heatseal.
Use the tape removed in step 1.



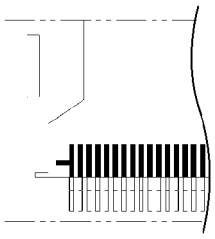
If interval tolerance between center lines is less than 0.2mm, it is o.k.

OK



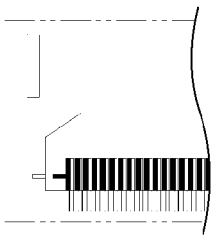
NG

(Inclined)



NG

(Vertical interval tolerance is more than 0.2mm.)



NG

(Horizontal interval tolerance is more than 0.2mm.)

11.3. Antenna soldering work

Preparation

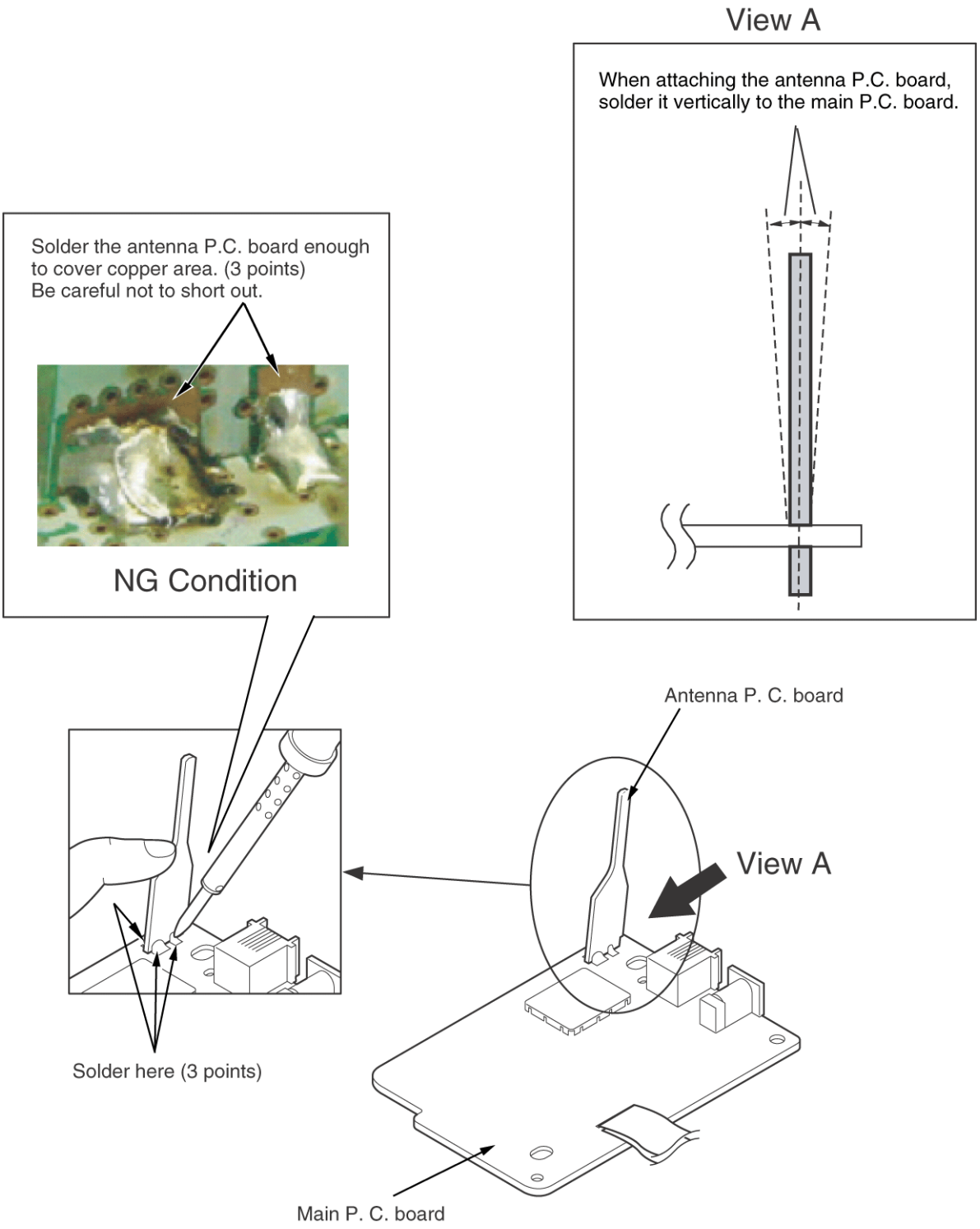
- PbF (: Pb free) Solder
- Soldering Iron

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

Note:

We recommend a 30 to 40 Watt soldering iron.

Solder the antenna P.C. board as below.



12 Measurements and Adjustments

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

12.1.1. Preparation

Equipment: Frequency counter
Check Point for measurement: BCK
Checking tolerance: 13.824MHz ± 100Hz (Base Unit)/13.824MHz ± 100Hz (Handset)

12.1.2. Check and Adjust Frequency (Base Unit)

1. Set up Base Unit in TEST mode.
2. Press following keys in order to Adjust Crystal mode. [LOCATOR], [LOCATOR], [LOCATOR], [Λ], [CHECK] [V], [Λ]. Check BCK frequency.
3. If the BCK frequency is out of the checking tolerance (± 100Hz), adjust to Adjustment tolelance (± 30Hz) by pressing [Λ] or [V] key.
   Adjustment Tolerance: 13.824MHz ± 30Hz
4. Press [LOCATOR] key to write the new frequency factor in Memory.
5. Turn the power off. Then this value is available.

Cross Reference:

Test Link Mode for Base Unit (P.44)

12.1.3. Check and Adjust Frequency (Handset)

1. Set DC power supply to 3.9V.
2. Set up Handset in TEST mode (Adjustment flow).
3. Press [1] key to Adjust Crystal mode (“Clock Adj.” is displayed on LCD). Check BCK frequency.
4. If the BCK frequency is out of the checking tolerance (± 100Hz), adjust to Adjustment tolelance (± 30Hz) by pressing [▲] or [▼] key.
   Adjustment Tolerance: 13.824MHz ± 30Hz
5. Press [TALK] key to write the new frequency factor in EEPROM.
6. Turn the power off. Then this value is available.

Cross Reference:

RX-CW Test Mode for Handset (P.48)

12.1.4. Adjust Battery Low Detector Voltage (Handset)

After Handset's DSP (IC501) or EEPROM (IC541) replacement, Re-writing Battery Low voltage to EEPROM is required.
With following Handset Adjustment Flow, adjust DC power supply and DC voltmeter by the procedure below.

1. Set DC power supply to 3.9 V.
2. Set up Handset in TEST mode (Adjustment flow).
3. Press [1] key and [OFF] key to Adjust Batt Low mode. (“Bat Adj.” is displayed on LCD)
4. Change the voltage of the DC power supply to 3.51 V accurately. Check the voltage at P.C. board pads because some voltage drops occur due to the usage of long or thin cables.
5. Press [TALK] key twice to write voltage value in EEPROM.
6. Press [TALK] key twice to write charge value 1 in EEPROM.
7. Change the voltage of the DC power supply to 4.50 V accurately.
8. Press [TALK] key twice to write charge value 2 in EEPROM.
9. Turn the power off. Then this value is available.

Note:

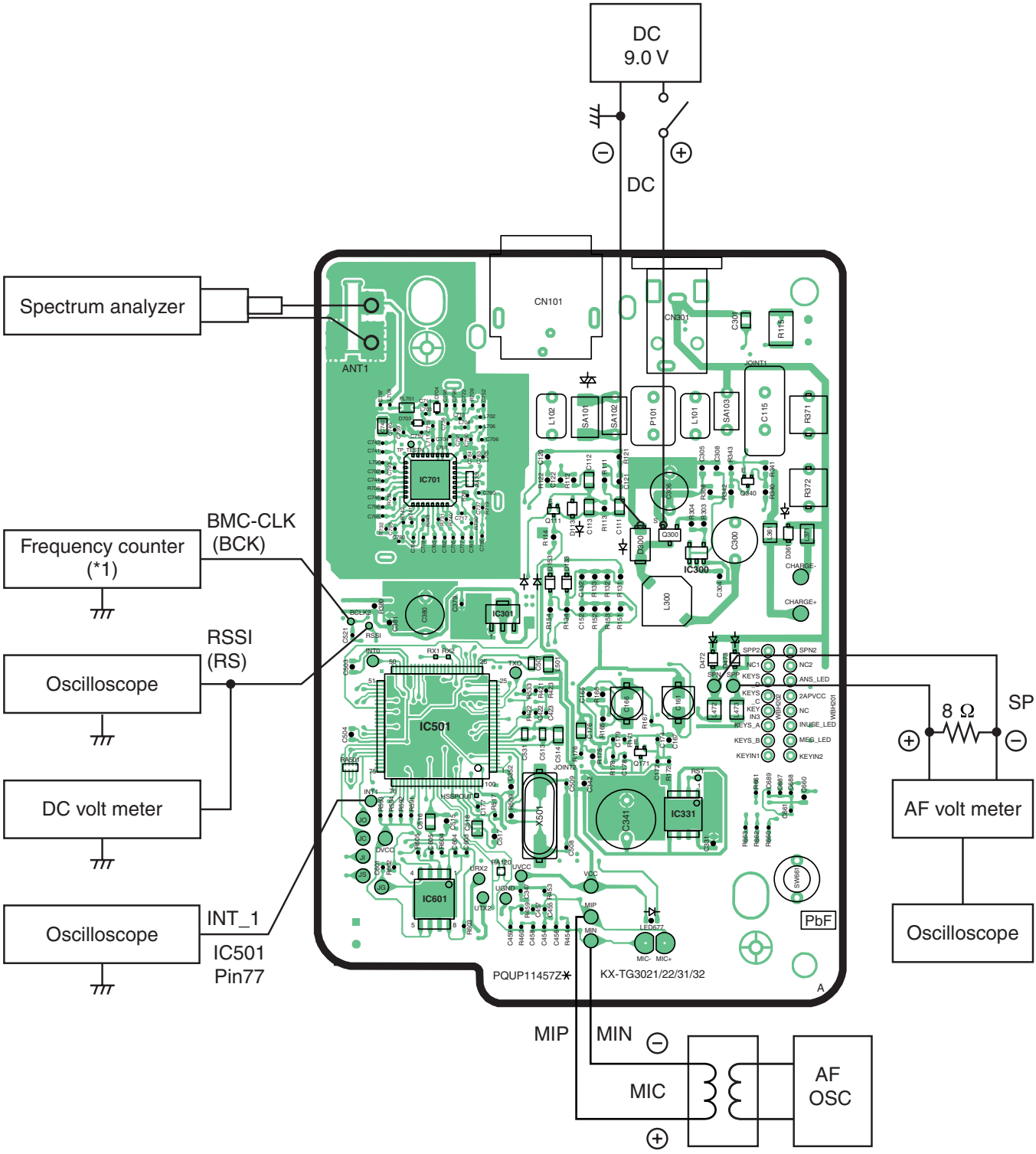
Refer to **Handset Reference Drawing** (P.80) for connection of DC power supply and voltmeter.

Cross Reference:

RX-CW Test Mode for Handset (P.48)

12.2. Base Unit Reference Drawing

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

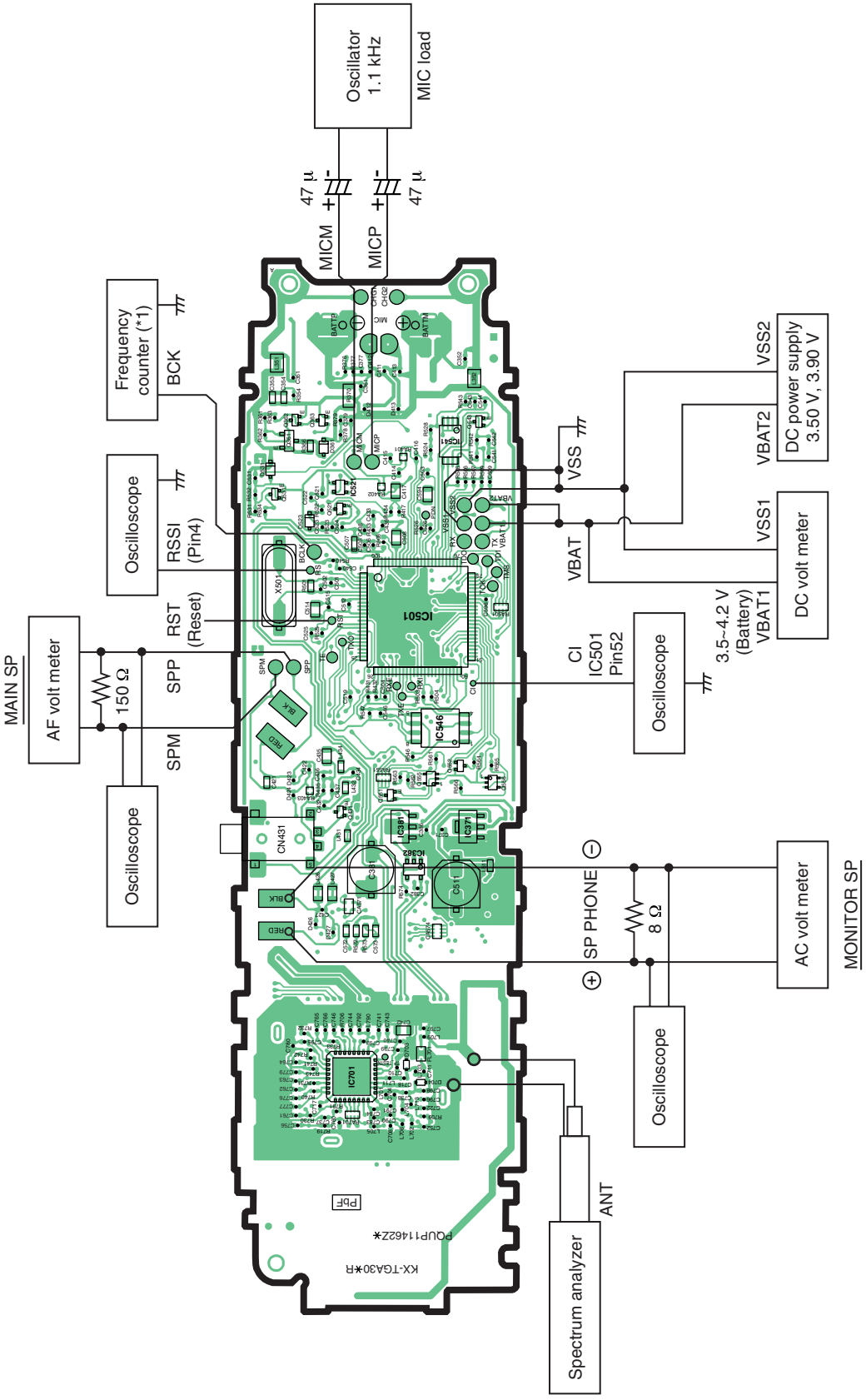


Note:

(*1) is referred to No.3 of **Check Table for RF part** (P.63).

12.3. Handset Reference Drawing

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



Note:

(*1) is referred to No.3 of **Check Table for RF part** (P.63).

12.4. Frequency Table

Channel	TX/RX Frequency (MHz)	TEST MODE Frequency (MHz)
1	2400.914355	2400.724512
2	2401.808203	2401.618359
3	2402.698096	2402.508252
4	2403.591943	2403.402100
5	2404.481836	2404.291992
6	2405.375684	2405.185840
7	2406.265576	2406.075732
8	2407.159424	2406.969580
9	2408.049316	2407.859473
10	2408.943164	2408.753320
11	2409.833057	2409.643213
12	2410.726904	2410.537061
13	2411.616797	2411.426953
14	2412.510645	2412.320801
15	2413.400537	2413.210693
16	2414.294385	2414.104541
17	2415.184277	2414.994434
18	2416.078125	2415.888281
19	2416.968018	2416.778174
20	2417.861865	2417.672021
21	2418.751758	2418.561914
22	2419.645605	2419.455762
23	2420.535498	2420.345654
24	2421.429346	2421.239502
25	2422.319238	2422.129395
26	2423.213086	2423.023242
27	2424.102979	2423.913135
28	2424.996826	2424.806982
29	2425.886719	2425.696875
30	2426.780566	2426.590723
31	2427.670459	2427.480615
32	2428.564307	2428.374463
33	2429.454199	2429.264355
34	2430.348047	2430.158203
35	2431.237939	2431.048096
36	2432.131787	2431.941943
37	2433.021680	2432.831836
38	2433.915527	2433.725684
39	2434.805420	2434.615576
40	2435.699268	2435.509424
41	2436.589160	2436.399316
42	2437.483008	2437.293164
43	2438.372900	2438.183057
44	2439.266748	2439.076904
45	2440.156641	2439.966797
46	2441.050488	2440.860645
47	2441.940381	2441.750537
48	2442.834229	2442.644385
49	2443.724121	2443.534277
50	2444.617969	2444.428125
51	2445.507861	2445.318018
52	2446.401709	2446.211865
53	2447.291602	2447.101758
54	2448.185449	2447.995605
55	2449.075342	2448.885498
56	2449.969189	2449.779346
57	2450.859082	2450.669238
58	2451.752930	2451.563086
59	2452.642822	2452.452979
60	2453.536670	2453.346826
61	2454.426563	2454.236719
62	2455.320410	2455.130566
63	2456.210303	2456.020459
64	2457.104150	2456.914307
65	2457.994043	2457.804199
66	2458.887891	2458.698047
67	2459.777783	2459.587939
68	2460.671631	2460.481787
69	2461.561523	2461.371680
70	2462.455371	2462.265527
71	2463.345264	2463.155420
72	2464.239111	2464.049268
73	2465.129004	2464.939160
74	2466.022852	2465.833008
75	2466.912744	2466.722900
76	2467.806592	2467.616748
77	2468.696484	2468.506641
78	2469.590332	2469.400488
79	2470.480225	2470.290381
80	2471.374072	2471.184229
81	2472.263965	2472.074121
82	2473.157813	2472.967969
83	2474.047705	2473.857861
84	2474.941553	2474.751709
85	2475.831445	2475.641602
86	2476.725293	2476.535449
87	2477.615186	2477.425342
88	2478.509033	2478.319189
89	2479.398926	2479.209082
90	2480.292773	2480.102930

13 Schematic Diagram

13.1. For Schematic Diagram

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

13.1.1.1. Acoustic Testing Mode

Press “STOP”, “ ▶▶ ” and “ ^ ” simultaneously, and insert the plug of AC adaptor.
- No beep sound.

It is easier to measure the transmit level with acoustic testing mode.

Notes:

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

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

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

13.1.2. Handset (Schematic Diagram (Handset_Main))

Notes:

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

13.1.3. Charger Unit (Schematic Diagram (Charger Unit))

Notes:

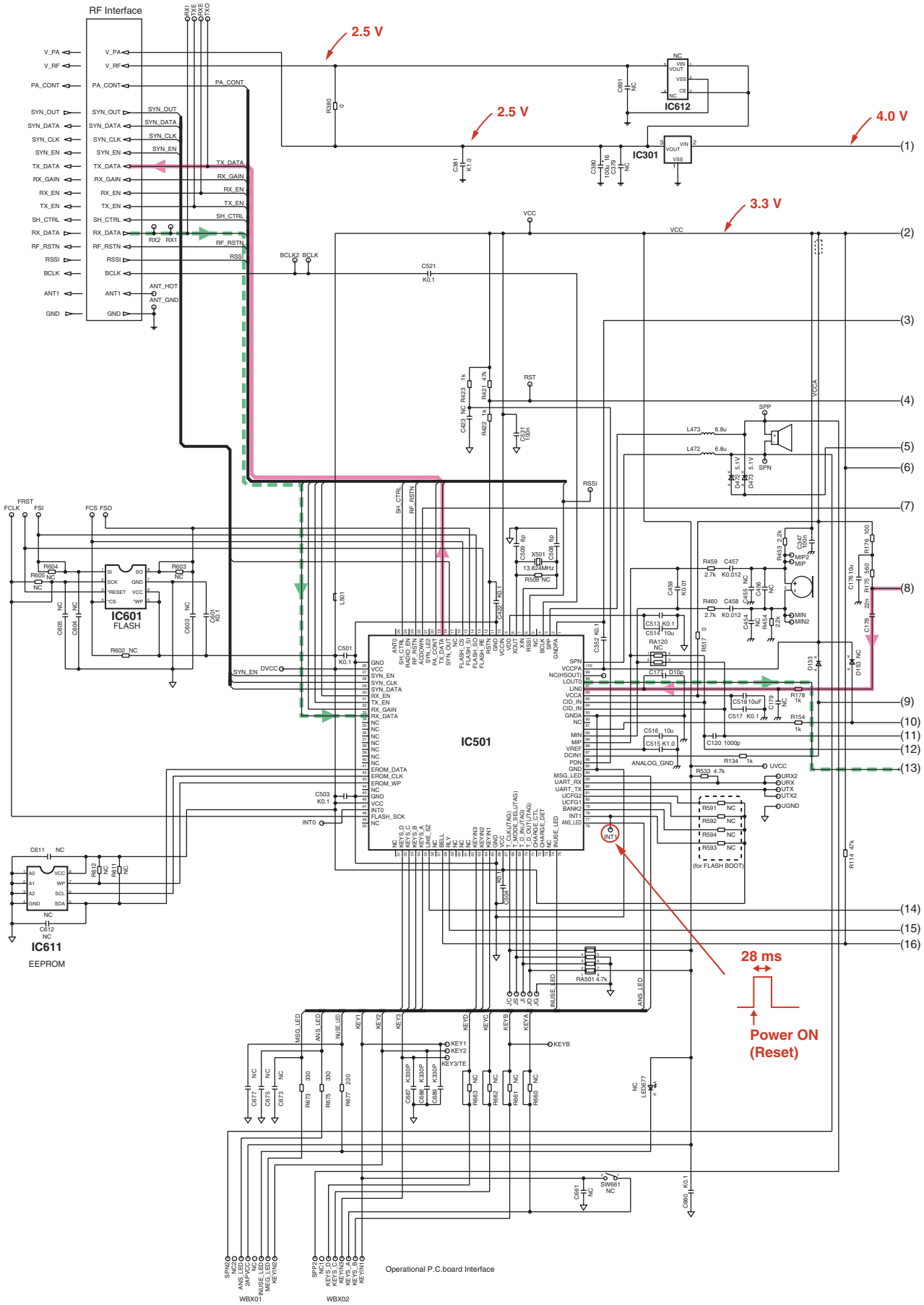
1. DC voltage measurements are taken with voltmeter from the negative voltage line.

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

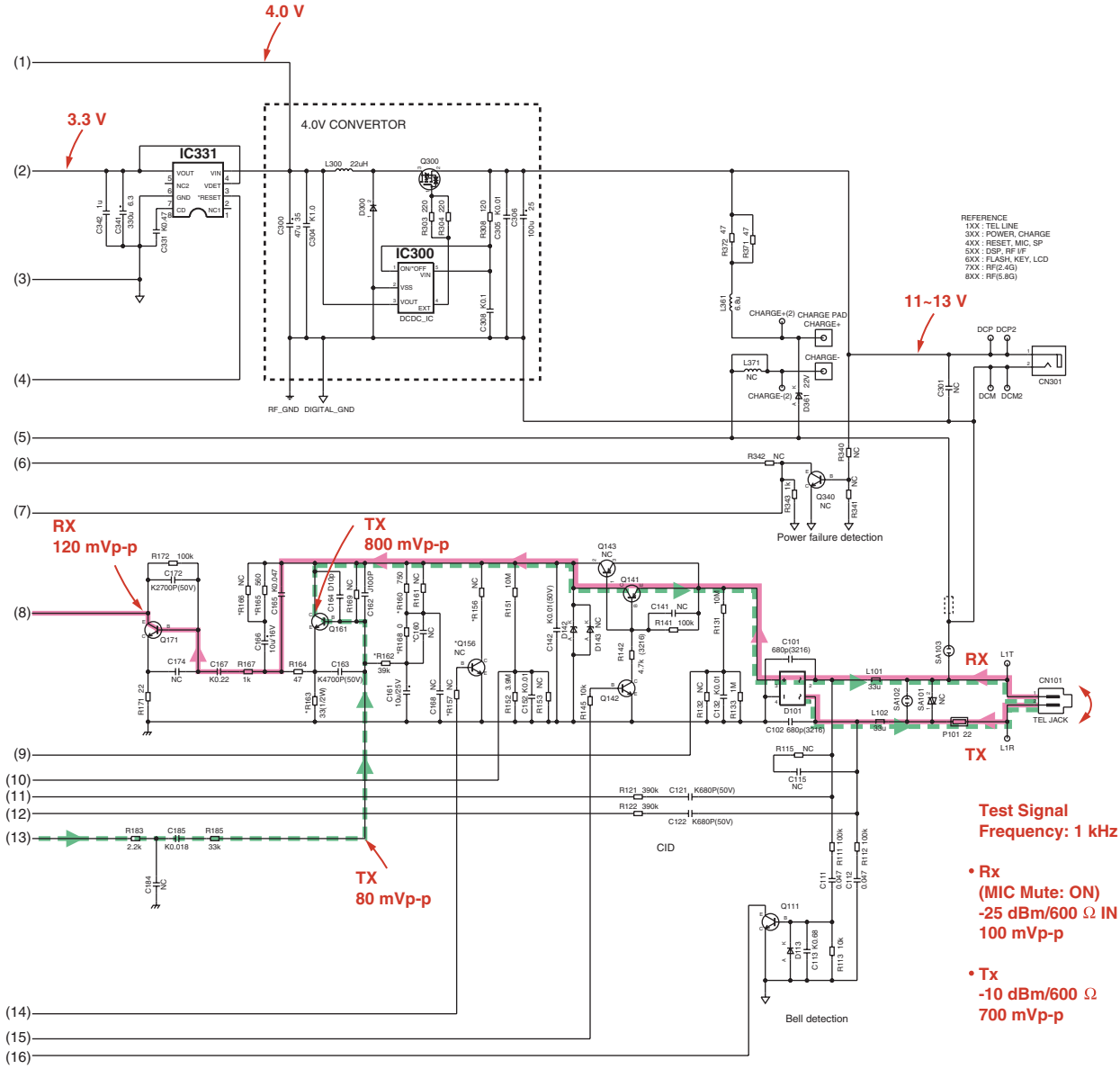
2. The schematic diagram may be modified at any time with the development of new technology.

Memo

13.2. Schematic Diagram (Base Unit_Main)



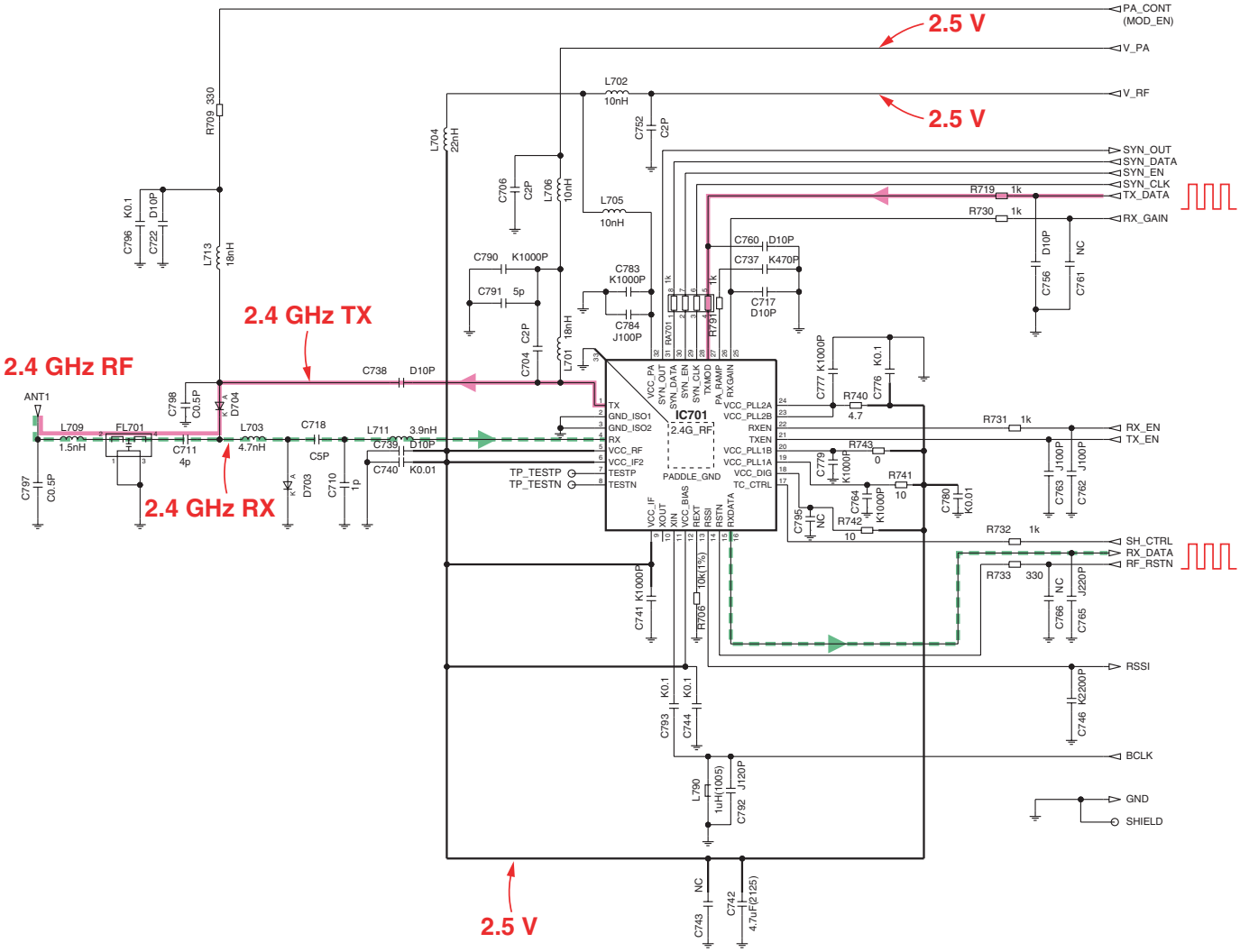
NC: No Components



NC: No Components

KX-TG3531/3532BX SCHEMATIC DIAGRAM (Base Unit_Main)

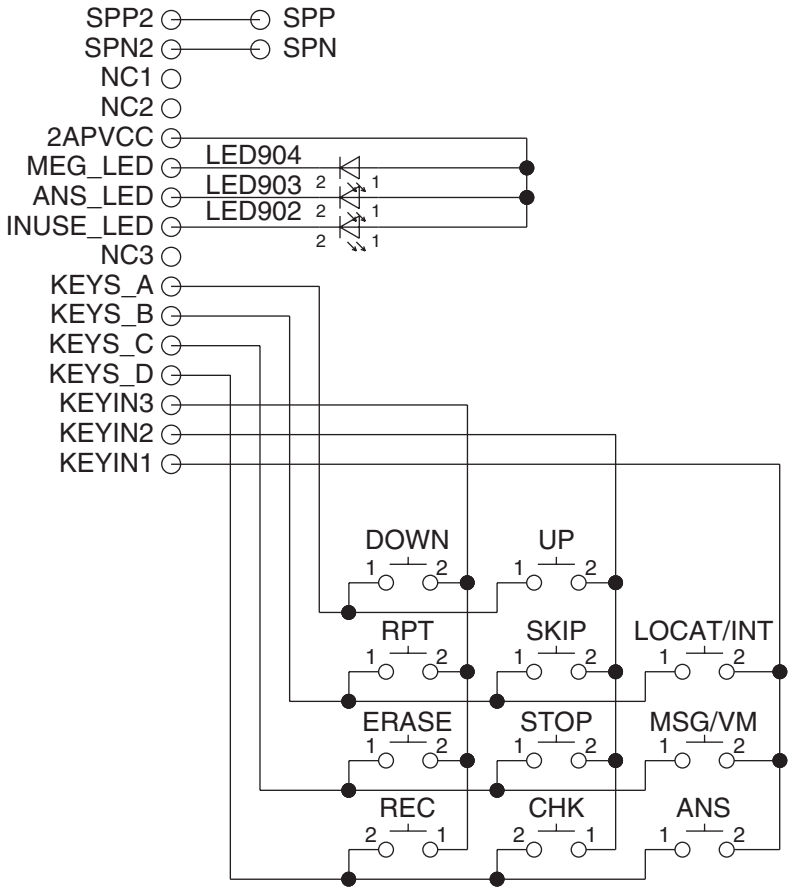
13.3. Schematic Diagram (Base Unit_RF Part)



NC: No Components

KX-TG3531/3532 SCHEMATIC DIAGRAM (Base Unit_RF Part)

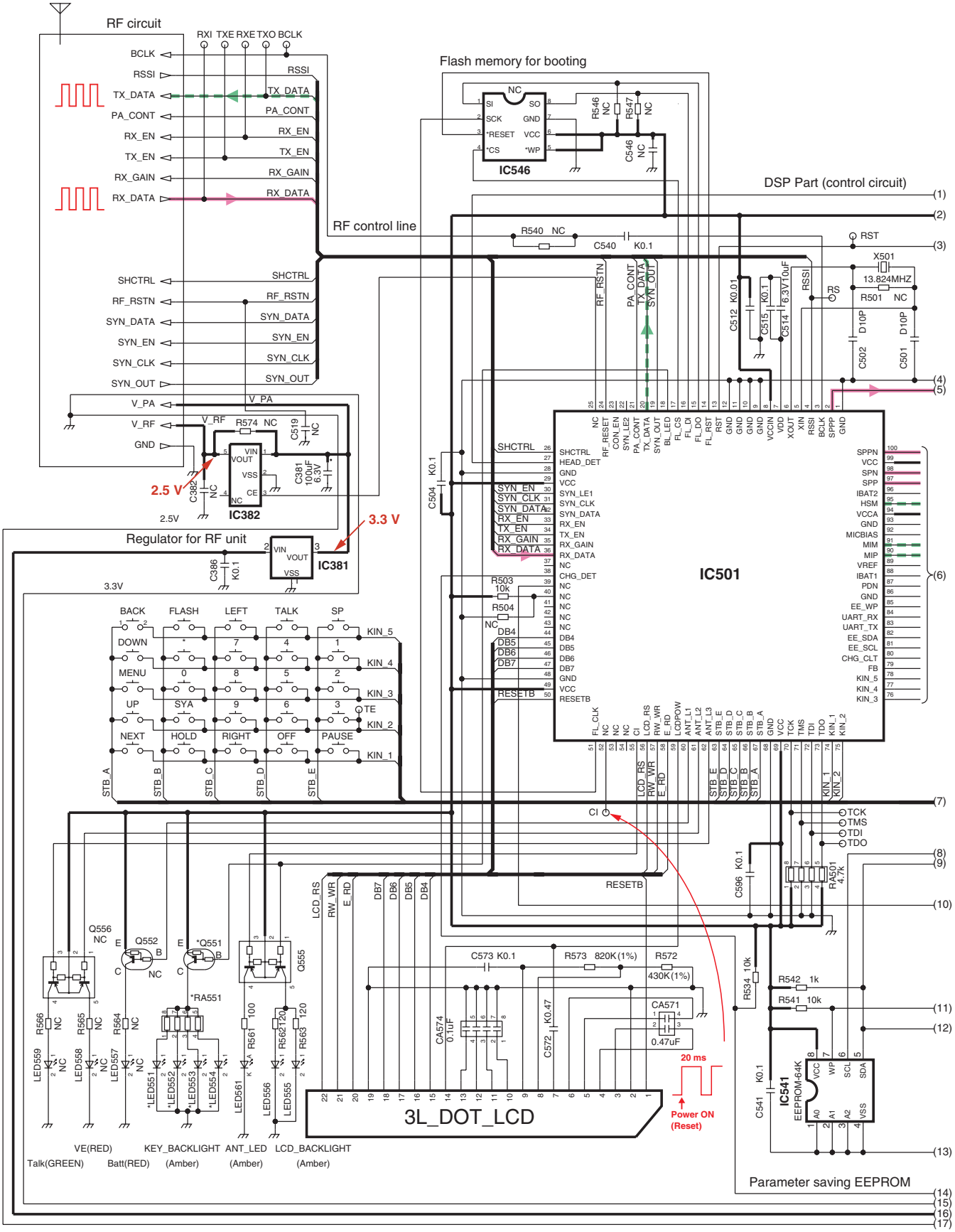
13.4. Schematic Diagram (Base Unit_Operation)



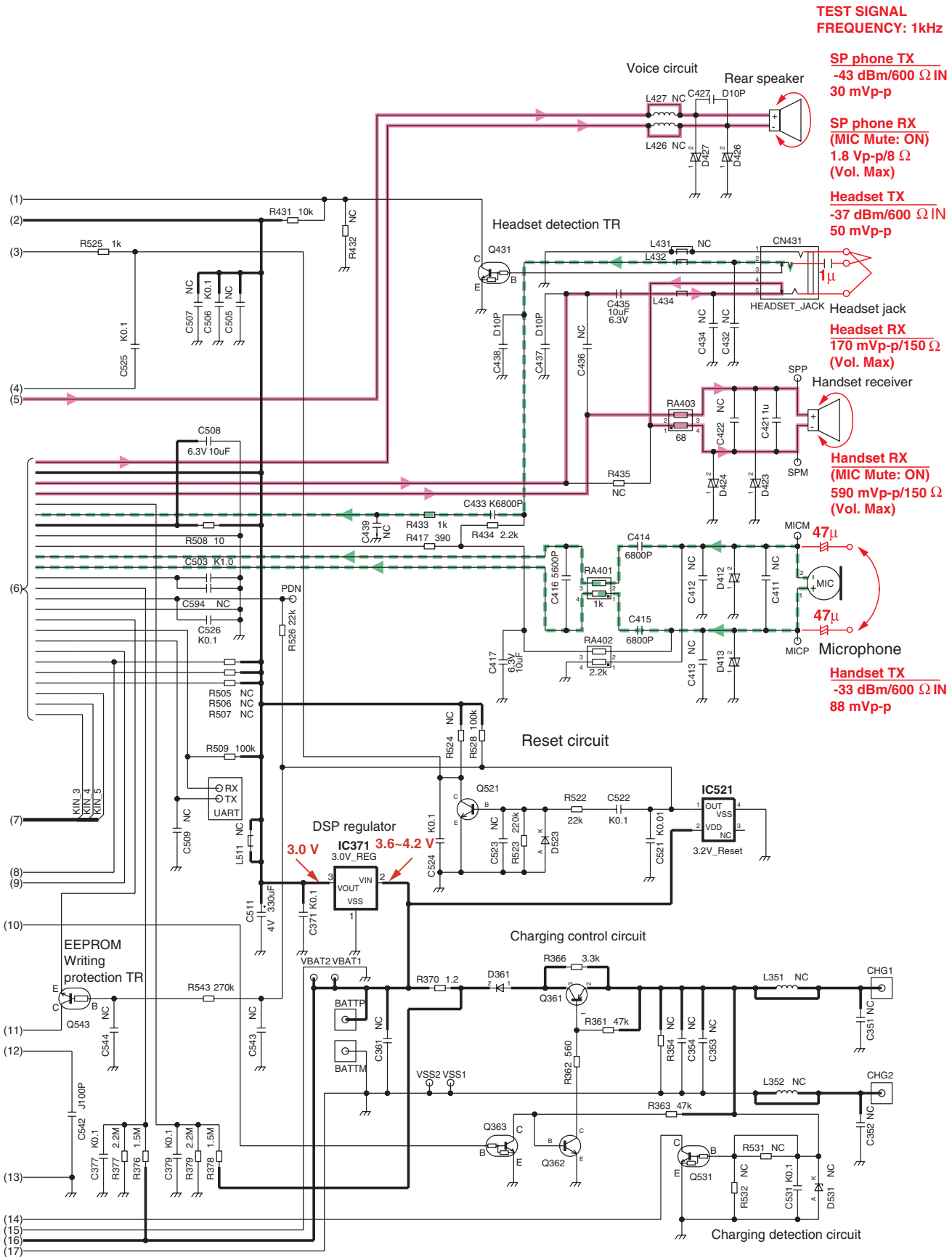
NC: No Components

KX-TG3531/3532 SCHEMATIC DIAGRAM (Base Unit_Operation)

13.5. Schematic Diagram (Handset_Main)



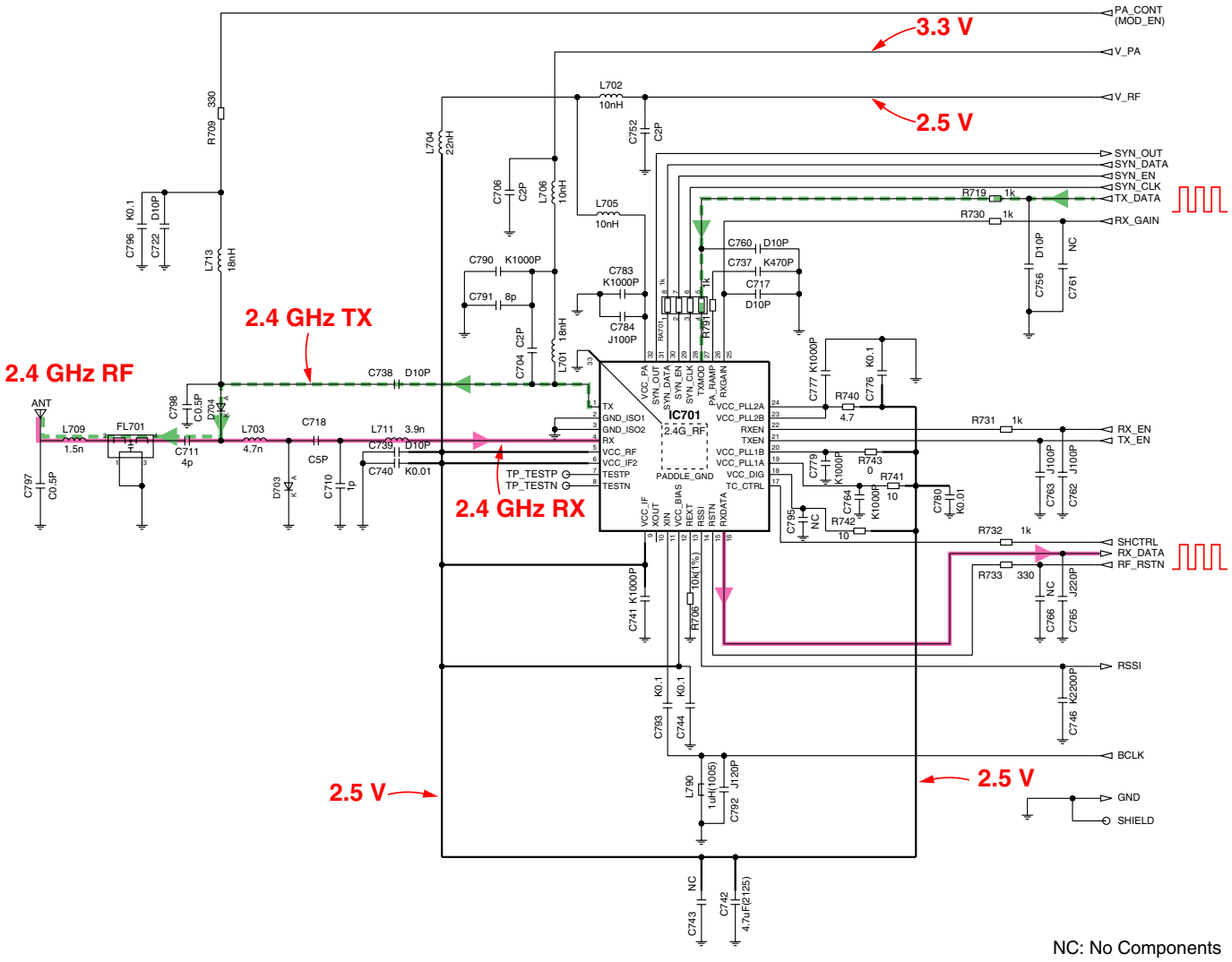
NC: No Components



NC: No Components

KX-TGA351 SCHEMATIC DIAGRAM (Handset)

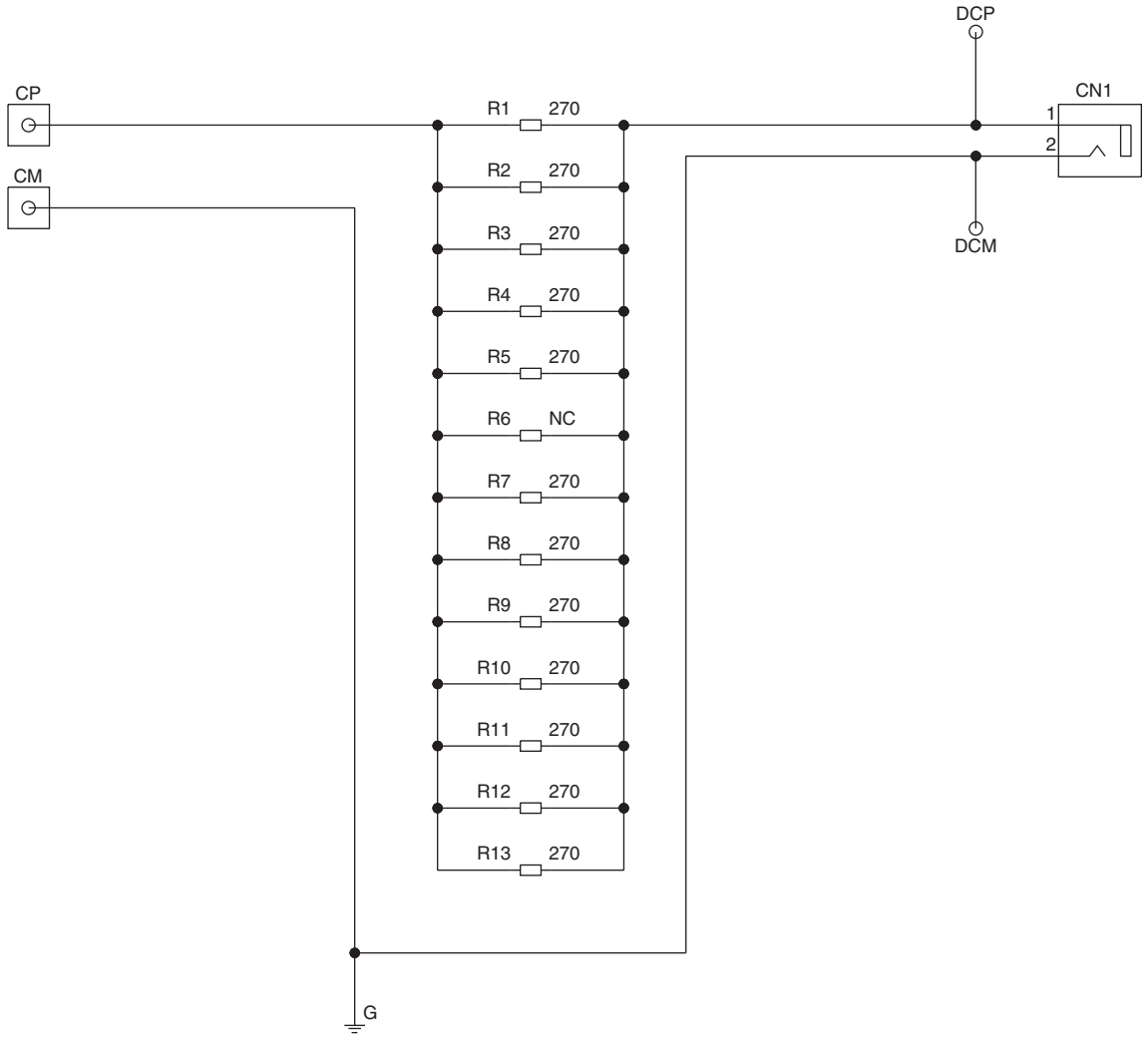
13.6. Schematic Diagram (Handset_RF Part)



NC: No Components

KX-TGA351 SCHEMATIC DIAGRAM (Handset_RF Part)

13.7. Schematic Diagram (Charger Unit)



NC: No Components

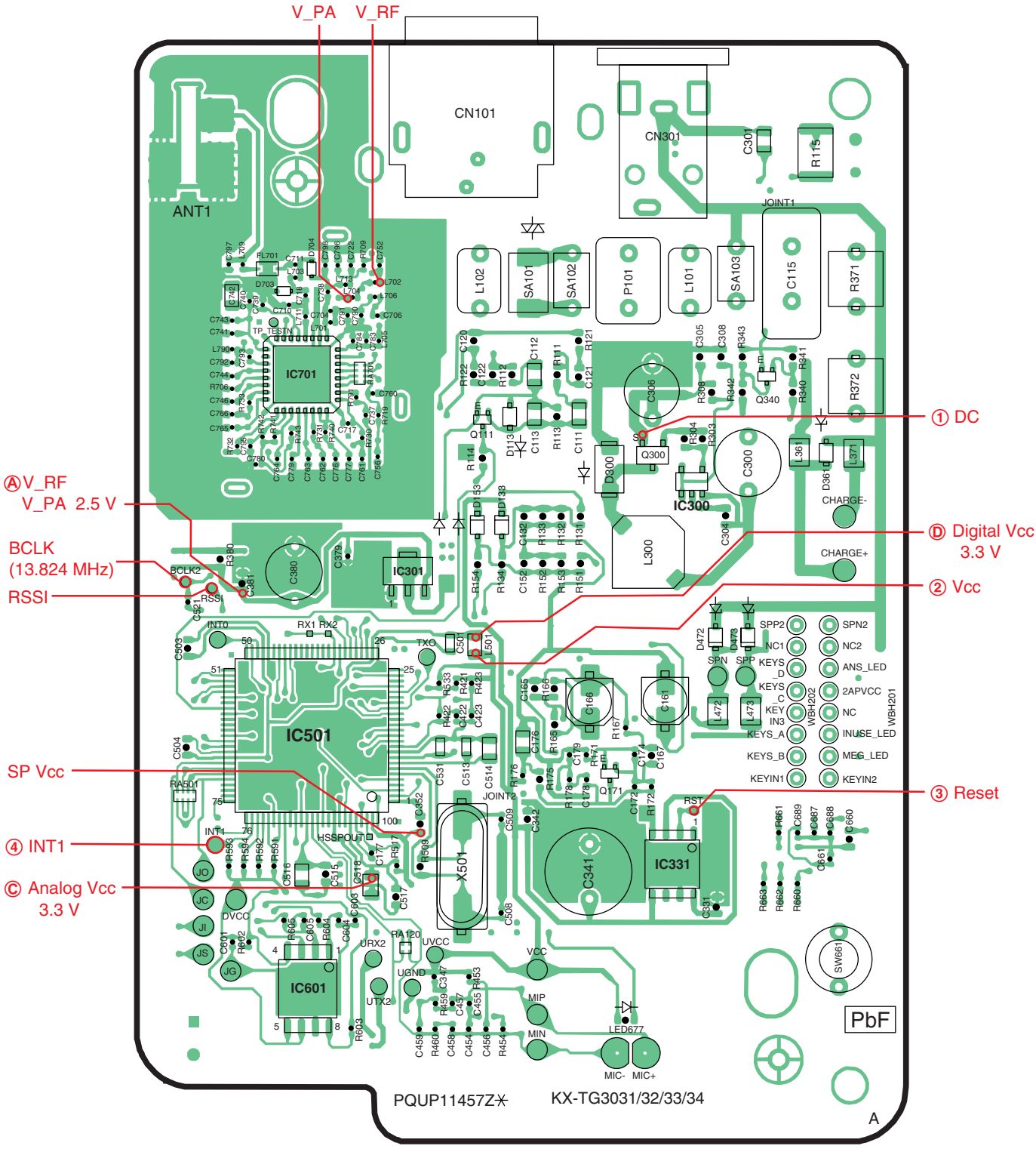
SCHEMATIC DIAGRAM (Charger Unit)

Memo

14 Printed Circuit Board

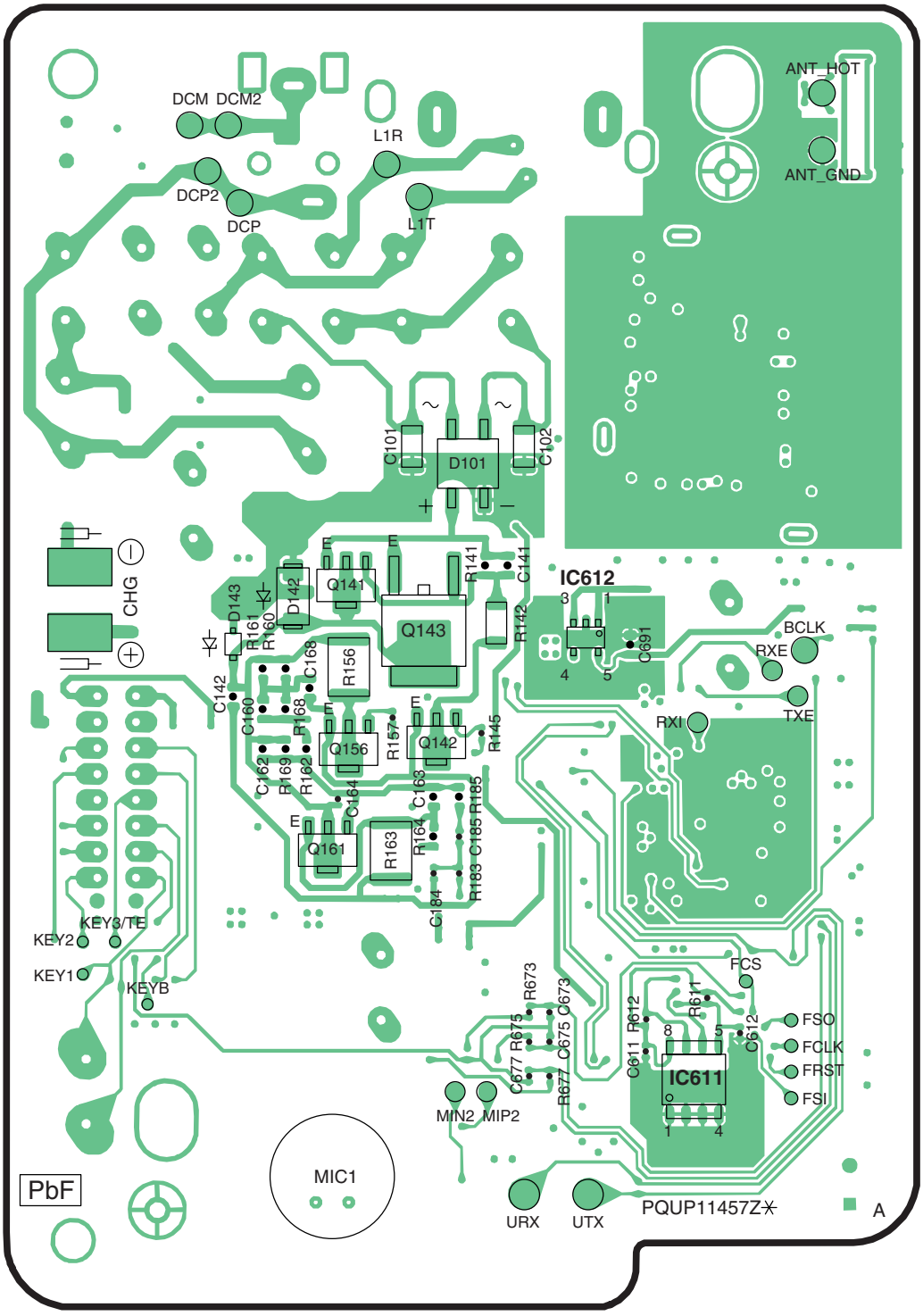
14.1. Circuit Board (Base Unit_Main)

14.1.1. Component View



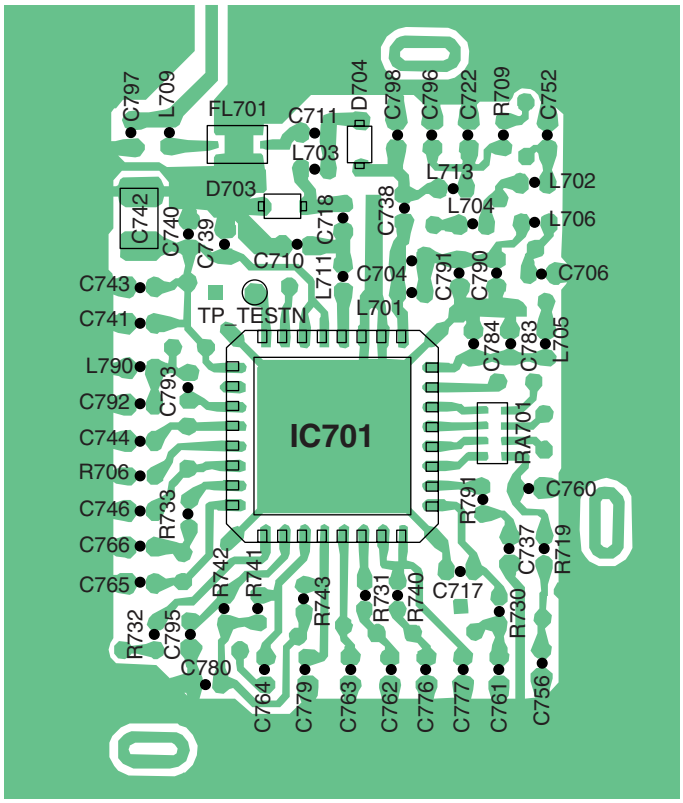
KX-TG3531/3532 CIRCUIT BOARD (Base Unit_Main (Component View))

14.1.2. Flow Solder Side View



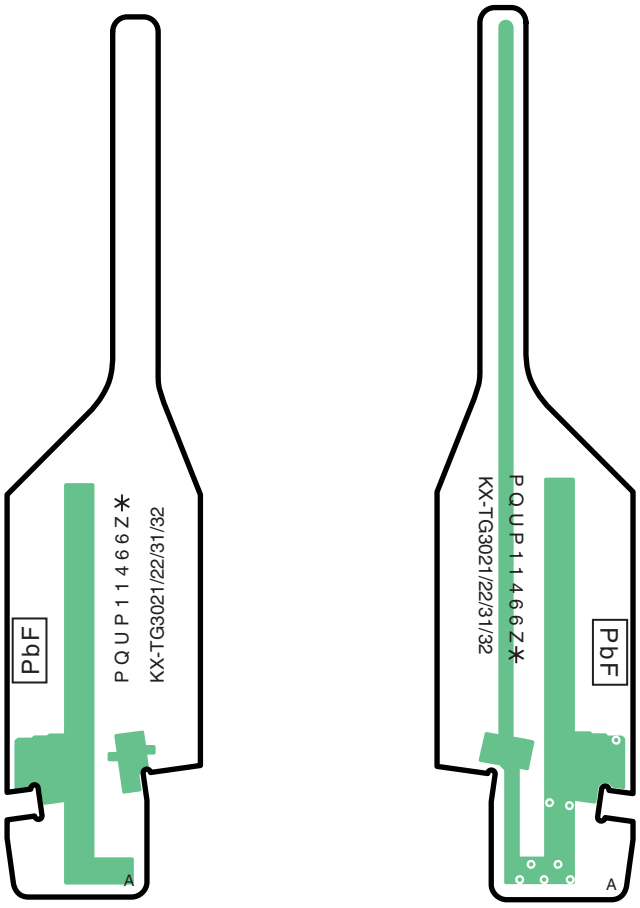
KX-TG3531/3532 CIRCUIT BOARD (Base Unit_Main (Flow Solder Side View))

14.2. Circuit Board (Base Unit_RF Part)



KX-TG3531/3532 CIRCUIT BOARD (Base Unit_RF Part (Component View))

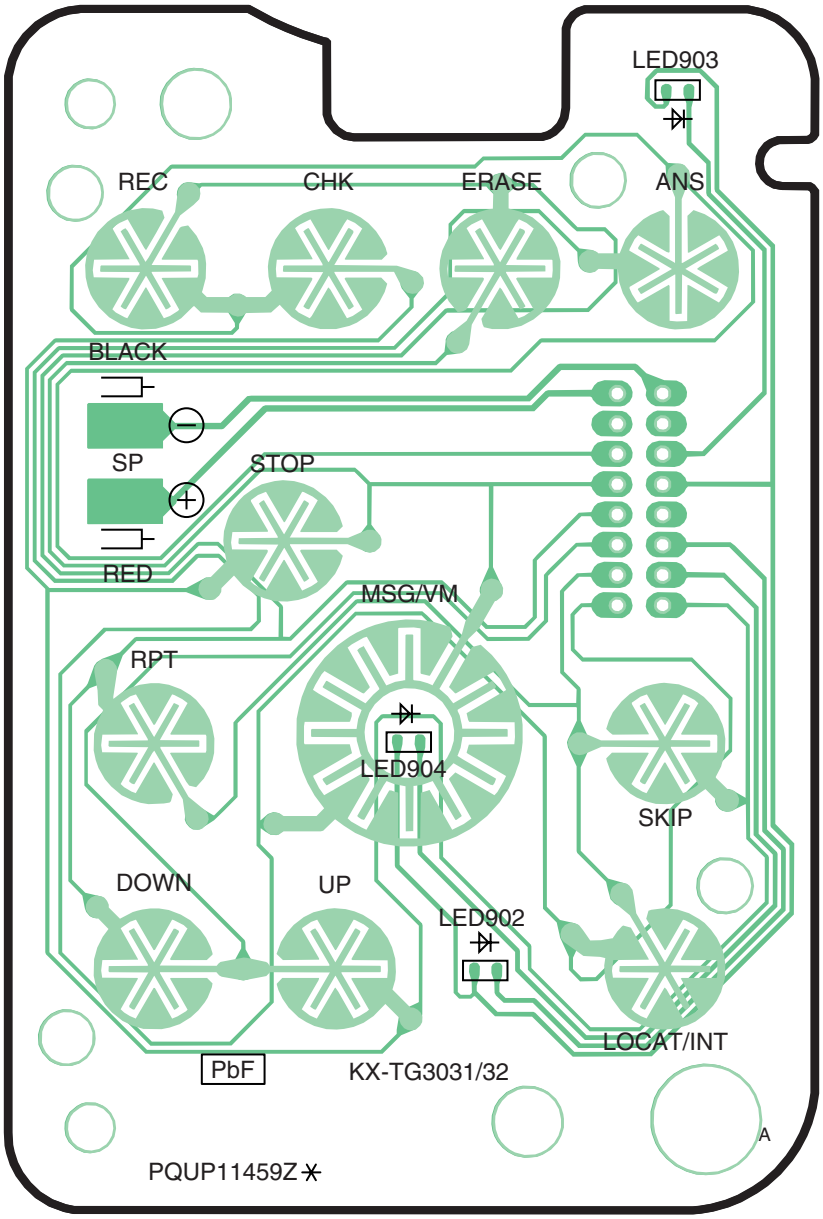
14.3. Circuit Board (Base Unit_Antenna)



KX-TG3531/3532 CIRCUIT BOARD (Base Unit_Antenna)

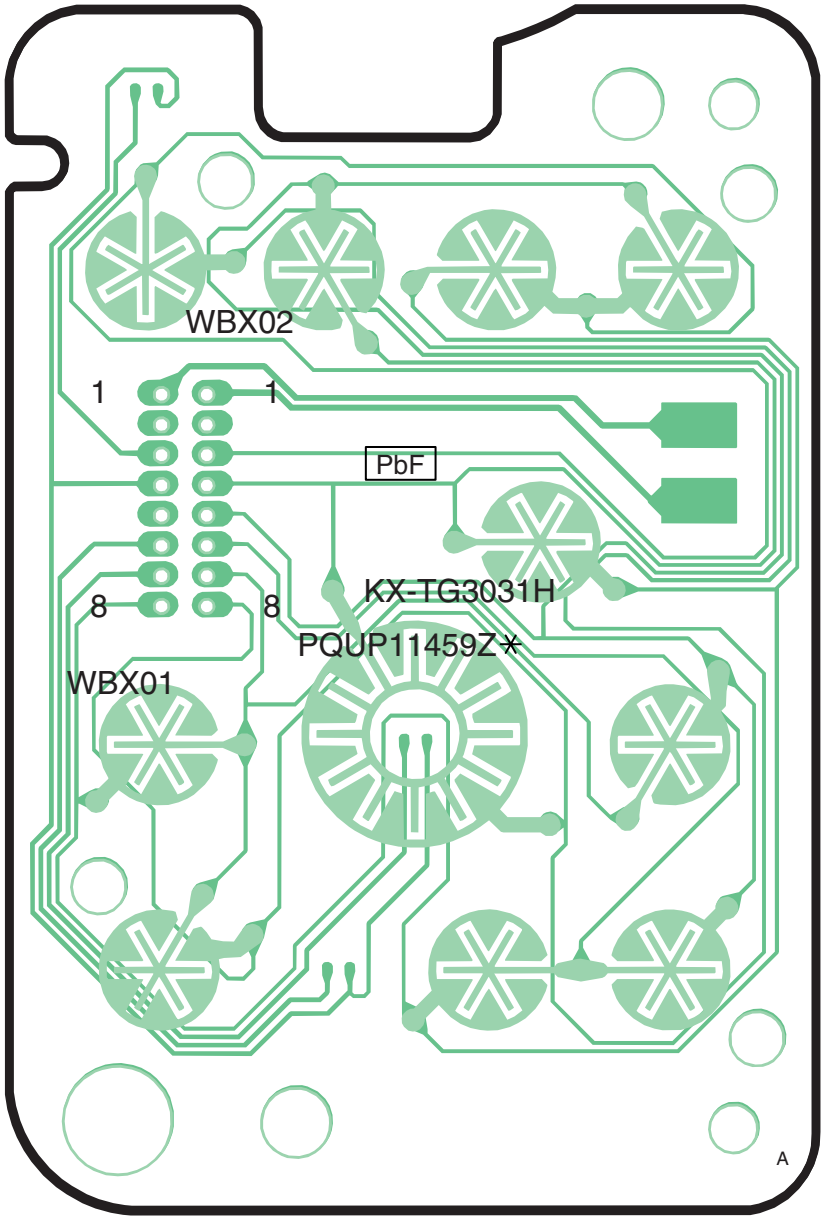
14.4. Circuit Board (Base Unit_Operation)

14.4.1. Component View



KX-TG3531/3532 CIRCUIT BOARD (Base Unit_Operation (Component View))

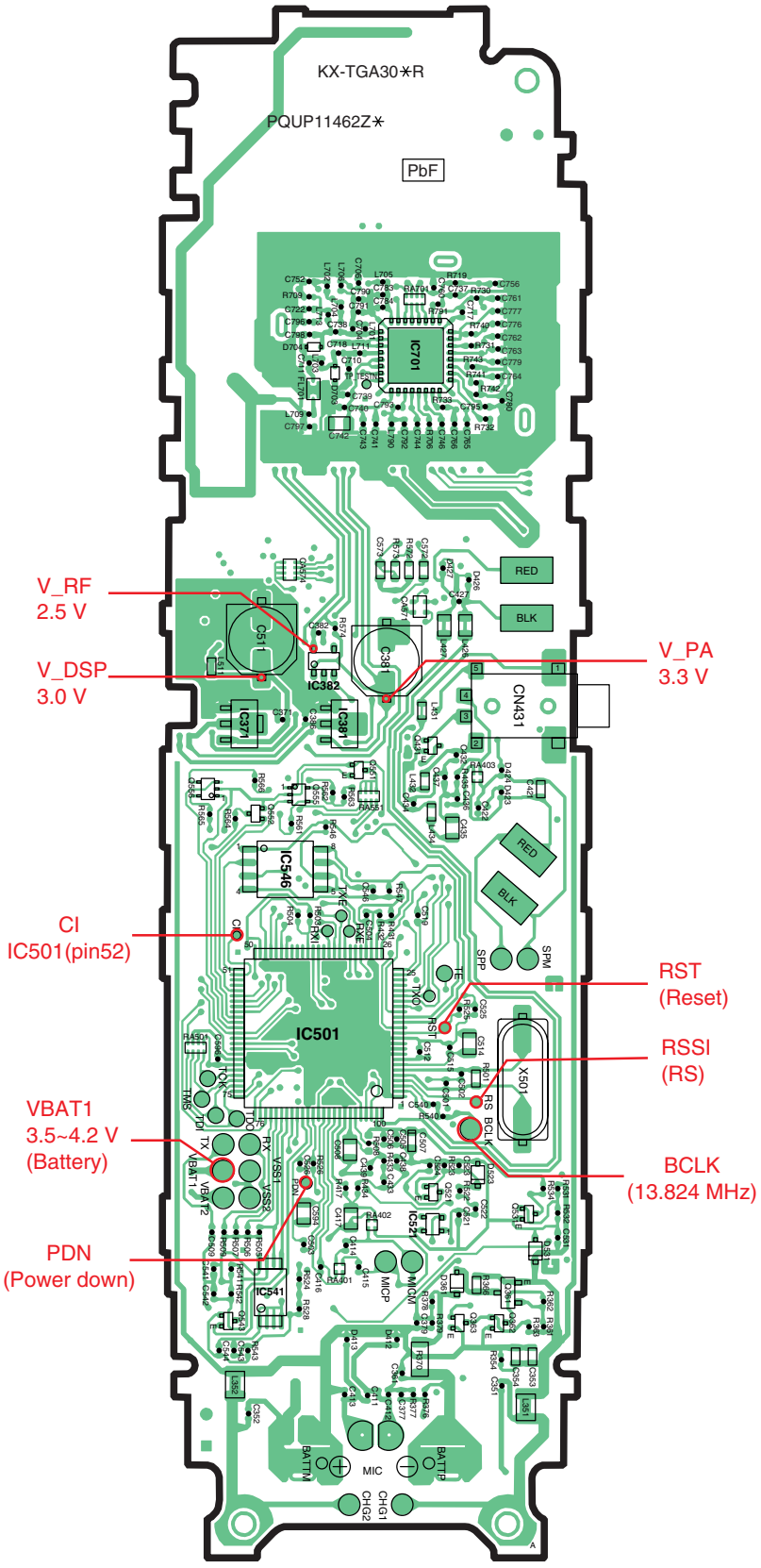
14.4.2. Flow Solder Side View



KX-TG3531/3532 CIRCUIT BOARD (Base Unit_Operation (Flow Solder Side View))

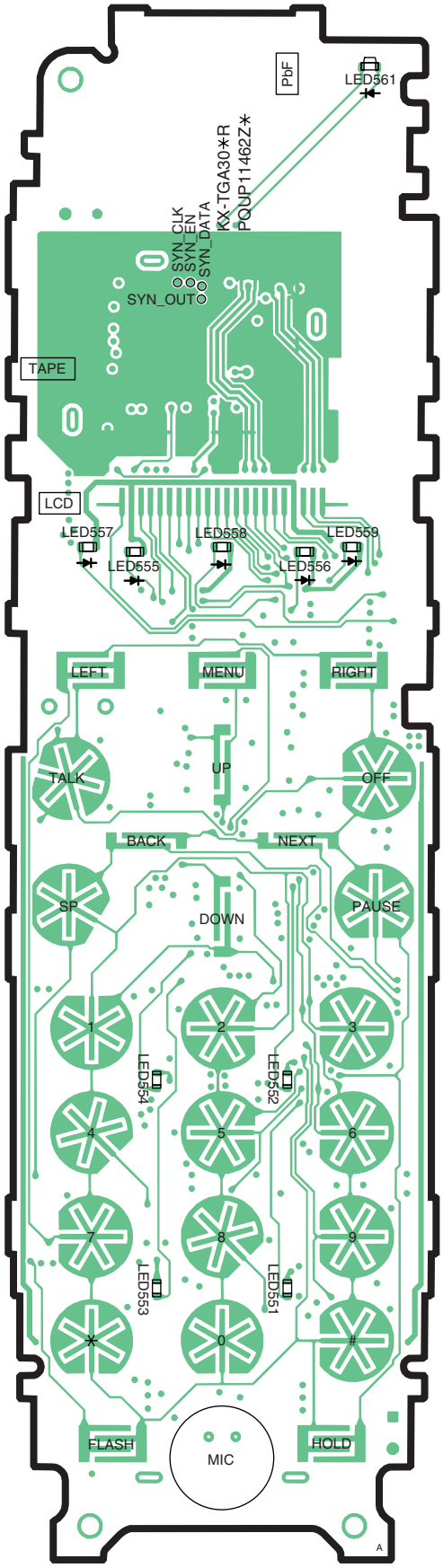
14.5. Circuit Board (Handset_Main)

14.5.1. Component View



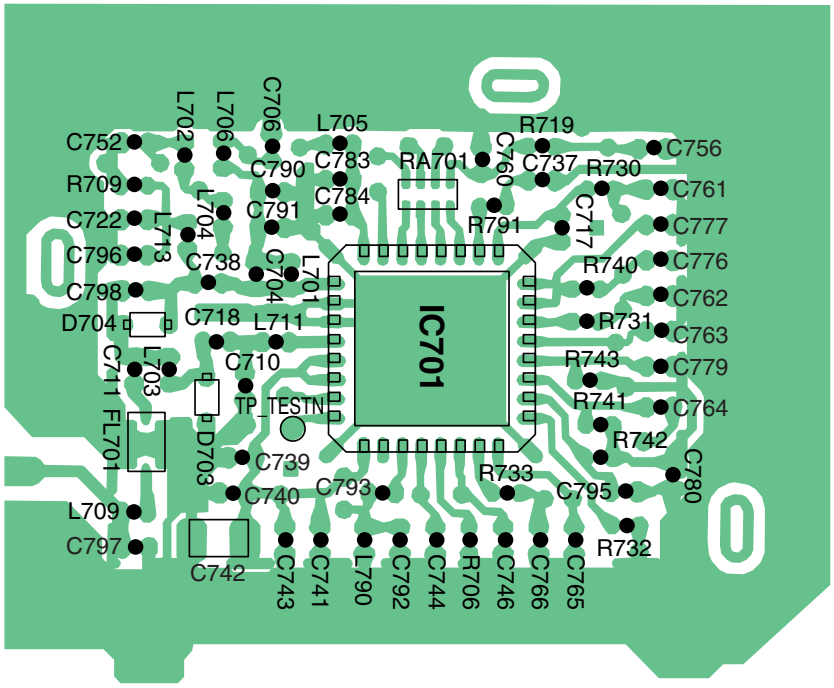
KX-TGA351 CIRCUIT BOARD (Handset (Component View))

14.5.2. Flow Solder Side View



KX-TGA351 CIRCUIT BOARD (Handset (Flow Solder Side View))

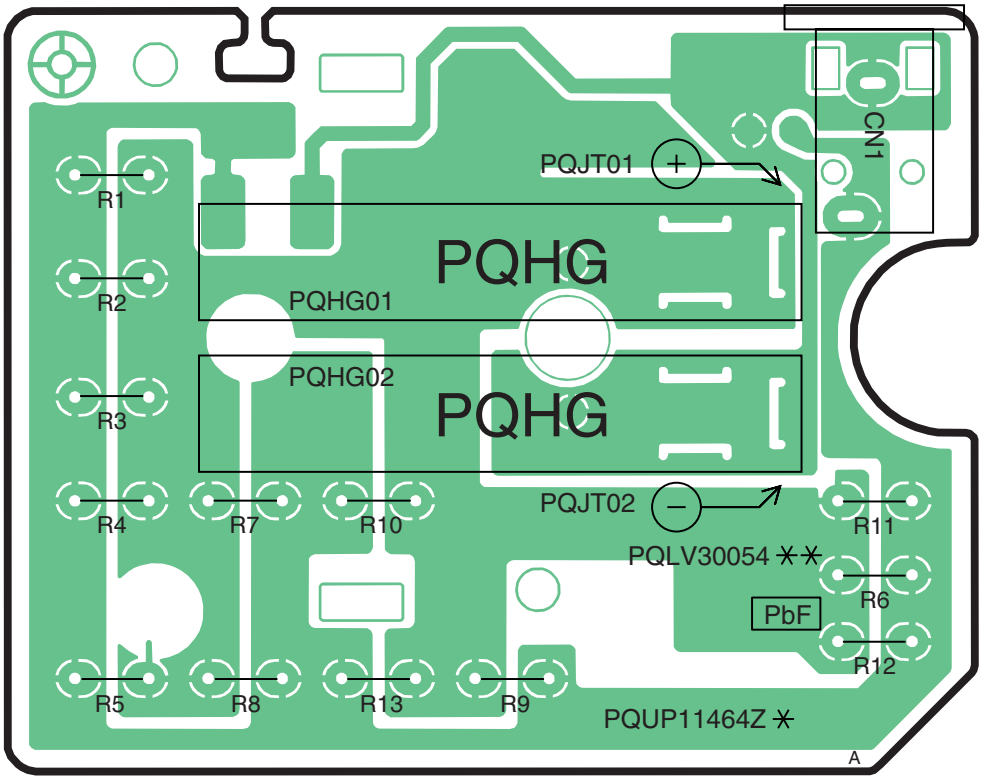
14.6. Circuit Board (Handset_RF Part)



KX-TGA351 CIRCUIT BOARD (Handset_RF Part (Component View))

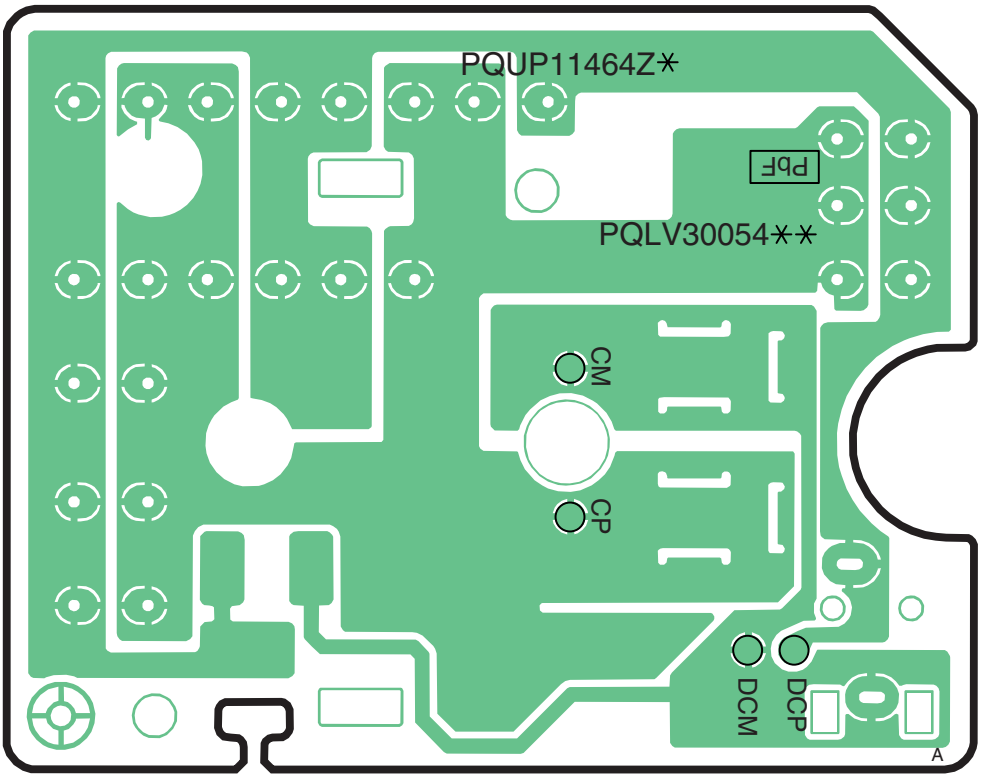
14.7. Circuit Board (Charger Unit)

14.7.1. Component View



CIRCUIT BOARD (Charger Unit (Component View))

14.7.2. Flow Solder Side View



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

15 Appendix Information of Schematic Diagram

15.1. CPU Data (Base Unit)

15.1.1. IC501

PIN	Description	I/O	High	High_Z	Low
1	GNDPA	GND	--	--	--
2	SPOUTP	A.O	--	--	--
3	BCLK	A.O	--	--	--
4	TXMOD	A.O	--	--	--
5	RSSI	A.I	--	--	--
6	XIN	A.I	--	--	--
7	XOUT	A.O	--	--	--
8	VDD	D.O	--	--	--
9	VCCIN	VCC	--	--	--
10	GND	GND	--	--	GND
11	RESET	D.I	Normal	--	Reset
12	FLASH_ RST	*	High	Middle	Low
13	FLASH_SO	*	High	Middle	Low
14	FLASH_SI	*	High	Middle	Low
15	FLASH_CS	*	High	Middle	Low
16	NC	D.O	--	--	--
17	SYN_OUT	D.I	High	--	Low
18	TX_DATA	D.O	High	--	Low
19	PA_CONT	D.O	High	--	Low
20	SYN_LE2	D.O	--	--	--
21	AC_DOWN _DET	D.I	High	--	Low
22	RF_RST	D.O	--	--	--
23	RADIO_EN	D.O	Active	--	Not
24	SHCTRL	D.O	--	--	--
25	ANT0	D.O	--	--	--
26	GND	GND	--	--	GND
27	VCC	VCC	VCC	--	--
28	SYN_LE1	D.O	Not	--	Active
29	SYN_CLK	D.O	High	--	Low
30	SYN_DATA	D.O	High	--	Low
31	RXEN	D.O	Active	--	Off
32	TXEN	D.O	Active	--	Off
33	RXGAIN	D.O	--	--	--
34	RXI	D.I	High	--	Low
35	NC	D.O	--	--	--
36	NC	D.O	--	--	--
37	NC	D.O	--	--	--
38	NC	D.O	--	--	--
39	NC	D.O	--	--	--
40	NC	D.O	--	--	--
41	NC	D.O	--	--	--
42	NC	D.O	--	--	--
43	NC	D.O	--	--	--
44	NC	D.O	--	--	--
45	NC	D.O	--	--	--
46	GND	GND	--	--	GND
47	VCC	VCC	VCC	--	--
48	INT0(NC)	D.I.O	--	--	--
49	FLASH_ SCK	*	High	Middle	Low
50	NC	D.O	--	--	--
51	KEY_STB _E	D.O	--	--	--
52	KEY_STB _D	D.O	--	--	--
53	KEY_STB _C	D.O	Active	Not	--
54	KEY_STB _B	D.O	Active	Not	--
55	KEY_STB _A	D.O	Active	Not	--
56	NC (LINE_SZ)	D.O	--	--	--
57	NC	D.O	--	--	--
58	BELL	D.I	OFF	--	ON
59	RLY	D.O	Off Hook	--	On Hook
60	KEY_IN6	D.I	Non	--	Key In
61	KEY_IN5	D.I	Non	--	Key In
62	KEY_IN4	D.I	Non	--	Key In
63	KEY_IN3	D.I	Non	--	Key In
64	KEY_IN2	D.I	Non	--	Key In
65	KEY_IN1	D.I	Non	--	Key In
66	GND	GND	--	--	GND
67	VCC	VCC	VCC	--	--
68	TCK	D.O	--	--	--
69	TMS	D.I	--	--	--
70	TDI	D.O	--	--	--
71	TD0	D.O	--	--	--
72	NC	D.O	--	--	--
73	NC	D.O	--	--	--
74	NC	D.O	--	--	--
75	INUSE_ LED	D.I.O	--	Off	On
76	ANS_LED	D.I.O	--	Off	On
77	NC(INT1)	D.O	--	--	--
78	NC	D.O	--	--	--
79	NC	D.O	--	--	--
80	NC	D.O	--	--	--
81	UART_TX	D.O	High	--	Low
82	UART_RX	D.I	High	--	Low
83	MSG_LED	D.I.O	--	Off	On
84	GND	GND	--	--	GND
85	PDN	A.I	--	--	--
86	IBAT	A.I	--	--	--
87	VREF	A.O	--	--	--
88	MIP	A.I	--	--	--
89	MIN	A.I	--	--	--
90	DCIN2	A.I	--	--	--
91	NC	A.O	--	--	--
92	GNDA	GND	--	--	--
93	CID_IN	A.I	--	--	--
94	CID_IN	A.I	--	--	--
95	VCCA	VCC	--	--	--
96	LIN0	A.I	--	--	--
97	LOUT0	A.O	--	--	--
98	NC	A.O	--	--	--
99	VCCA	VCC	--	--	--
100	SPOUTN	A.O	--	--	--

Note:

- The mark “*” in the I/O column means the port is controlled by the firmware.

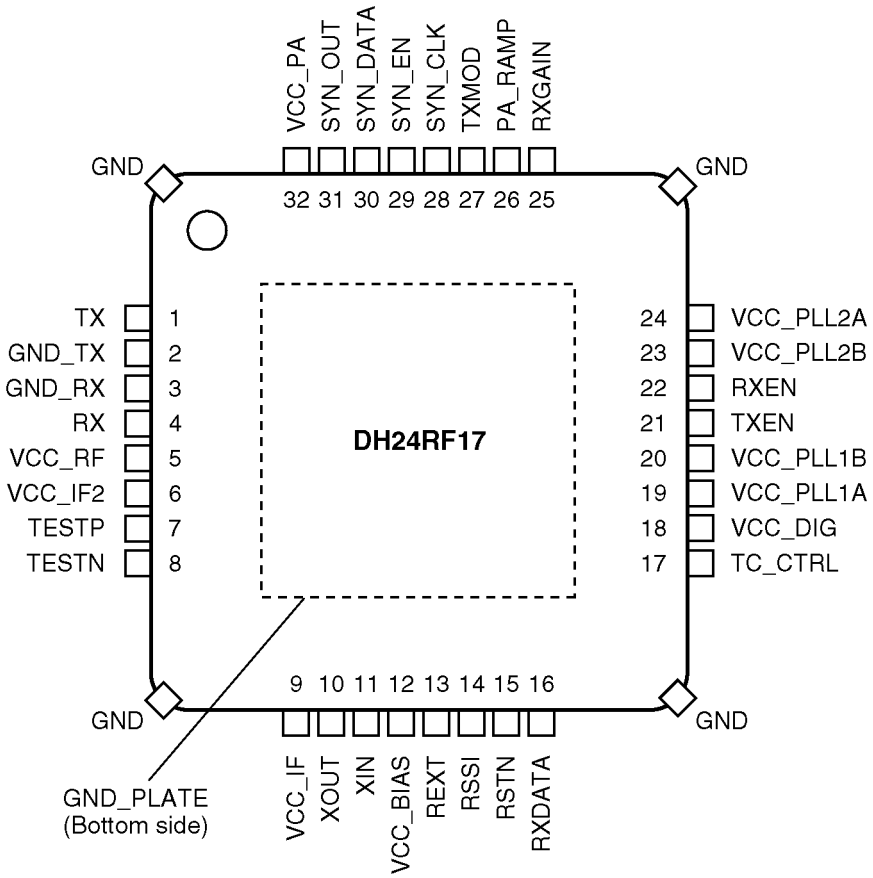
15.2. CPU Data (Handset)

15.2.1. IC501

PIN	Description	I/O	High	High_Z	Low
1	GNDPA	GND	--	--	GND
2	SPOUTP	A.O	--	--	--
3	BCLK	A.O	--	--	--
4	RSSI	A.I	--	--	--
5	XIN	A.I	--	--	--
6	XOUT	A.O	--	--	--
7	VDD	VDD	--	--	--
8	VCCIN	VCC	VCC	--	--
9	GND	GND	--	--	GND
10	GND	GND	--	--	GND
11	GND	A.I	--	--	--
12	GND	A.O	--	--	--
13	RESET	D.I	Normal	--	Reset
14	(FLASH_ RESET)	D.O	--	--	Normal
15	(FLASH_ SO)	D.O	--	--	Normal
16	(FLASH_ SI)	D.O	High	--	Low
17	(FLASH_ CS)	D.O	--	--	Normal
18	BL LED	D.O	Off	--	On
19	SYN_OUT	D.I	High	--	Low
20	TX_DATA	D.O	High	--	Low
21	MOD_EN	D.O	High	--	Low
22	(SYN_LE2)	D.O	On	--	Off
23	(CON_EN)	D.O	High	--	Low
24	RF_RESET	D.O	Normal	--	Reset
25	RF_POWER	D.O	On	--	Off
26	SHCTRL	D.O	On	--	Off
27	HEADSET_ DET	D.I	Headset In	--	Non
28	GND	GND	--	--	GND
29	VCC	VCC	VCC	--	--
30	SYN_EN	D.O	High	--	Low
31	SYN_CLK	D.O	High	--	Low
32	SYN_DATA	D.O	High	--	Low
33	RX_EN	D.O	Active	--	Off
34	TX_EN	D.O	Active	--	Off
35	RXGAIN	D.O	High	--	Low
36	RXI	D.I	--	--	--
37	NC	D.O	--	--	Normal
38	CHARGE_ DET	D.I	Off Charge	--	On Charge
39	CHARGE_ CNT	D.O	Trickle	--	Normal
40	EEPROM_ DET	D.I	64M	--	16M
41	NC	D.O	--	--	Normal
42	NC	D.O	--	--	Normal
43	NC	D.O	--	--	Normal
44	DOT_LCD_ D4	D.O	High	--	Low
45	DOT_LCD_ D5	D.O	High	--	Low
46	DOT_LCD_ D6	D.O	High	--	Low
47	DOT_LCD_ D7	D.O	High	--	Low
48	GND	GND	--	--	GND
49	VCC	VCC	VCC	--	--
50	DOT_LCD_ RESET	D.O	Normal	--	Reset
51	(FLASH_SCK)	D.O	High	--	Low
52	CI	D.O	--	--	Normal
53	NC	D.O	--	--	Normal
54	NC	D.O	--	--	Normal
55	ANT_LED1	D.O	Off	--	On
56	DOT_LCD_RS	D.O	Data	--	Instruct
57	DOT_LCD_ RW_WR	D.O	Read	--	Write
58	DOT_LCD_ E_RD	D.O	Active	--	Not
59	DOT_LCD_ POWER_SW	D.O	On	--	Off
60	NC	D.O	--	--	Normal
61	NC	D.O	--	--	Normal
62	NC	D.O	--	--	Normal
63	KEYSTROBE _E	D.O	--	Not	Active
64	KEYSTROBE _D	D.O	--	Not	Active
65	KEYSTROBE _C	D.O	--	Not	Active
66	KEYSTROBE _B	D.O	--	Not	Active
67	KEYSTROBE _A	D.O	--	Not	Active
68	GND	GND	--	--	GND
69	VCC	VCC	VCC	--	--
70	TEST_CLK	D.I	--	--	--
71	TEST_MODE _SELECT	D.I	--	--	--
72	TEST_DATA _IN	D.I	--	--	--
73	TEST_DATA _OUT	D.O	--	--	--
74	KEYIN1	D.I	Non	--	Key In
75	KEYIN2	D.I	Non	--	Key In
76	KEYIN3	D.I	Non	--	Key In
77	KEYIN4	D.I	Non	--	Key In
78	KEYIN5	D.I	Non	--	Key In
79	NC(INT1)	D.O	--	--	Normal
80	NC(INT0)	D.O	--	--	Normal
81	EEPROM_ CLK	D.O	High	--	Low
82	EEPROM_ DATA	D.I.O	High	--	Low
83	UART_TX	D.O	High	--	Low
84	UART_RX	D.I	High	--	Low
85	EEPROM_ WP	D.O	WP	--	Write
86	GND	GND	--	--	GND
87	PDN	A.I	--	--	--
88	Battlow	A.I	--	--	--
89	VREF	A.O	--	--	--
90	MIP	A.I	--	--	--
91	MIN	A.I	--	--	--
92	DCIN2	A.I	--	--	--
93	GNDA	GND	--	--	GND
94	VCCA	VCC	VCC	--	--
95	Headset_ MIC_in	A.I	--	--	--
96	DCIN0	A.I	--	--	--
97	LOUT0	A.O	--	--	--
98	HSSPOUT	A.O	--	--	--
99	VCCPA	VCC	VCC	--	--
100	SPOUTN	A.O	--	--	--

15.3. Explanation of IC Terminals (RF Part)

15.3.1. IC701

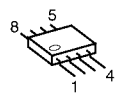


Pin	Description	I/O
1	TX	O & VCC
2	GND_TX	GND
3	GND_RX	GND
4	RX	I
5	VCC_RF	VCC
6	VCC_IF2	VCC
7	TESTP	O
8	TESTN	O
9	VCC_IF	VCC
10	XOUT	XI/XO
11	XIN	XI/XO
12	VCC_BIAS	VCC
13	REXT	I
14	RSSI	O
15	RSTN	I
16	RXDATA	O
17	TC_CTRL	I

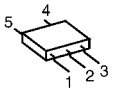
Pin	Description	I/O
18	VCC_DIG	VCC
19	VCC_PLL1A	VCC
20	VCC_PLL1B	VCC
21	TXEN	I
22	RXEN	I
23	VCC_PLL2B	VCC
24	VCC_PLL2A	VCC
25	RXGAIN	I
26	PA_RAMP	I
27	TXMOD	I
28	SYN_CLK	I
29	SYN_EN	I
30	SYN_DATA	I
31	SYN_OUT	O
32	VCC_PA	VCC
GND_PLATE		GND

15.4. Terminal Guide of the ICs, Transistors and Diodes

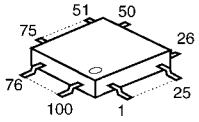
15.4.1. Base Unit



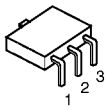
C0DBFGD00017
PQWIG3531BXH



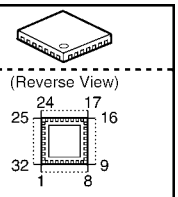
C0DBAGZ00023



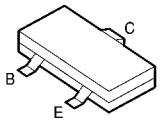
C2HBBY000069



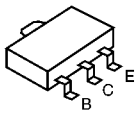
C0CBAAD00018



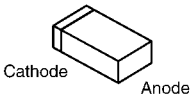
C1CB00002285



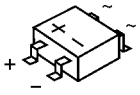
B1CHND000004
2SC6054JSL



B1ADGP000008
2SD0874AS
B1BBAP000021

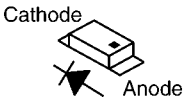


MA111, MA8220
B0JCME000035
B0DCCD000011



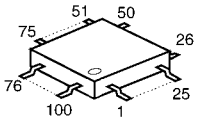
MAZ805100L
PQVDMD5S

MA1Z300

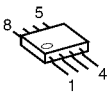


LNJ308G8JRA
PQVDBR1111C

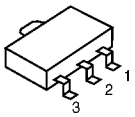
15.4.2. Handset



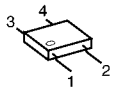
C2HBBY000067



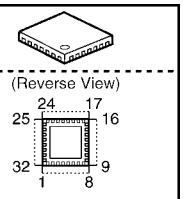
PQWIG3521BXR



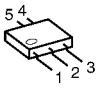
C0CBABD00019
C0CBABD00011



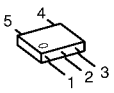
C0EBF0000179



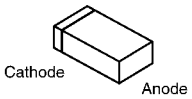
C1CB00002285



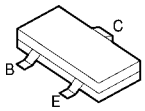
C0CBAAC00083



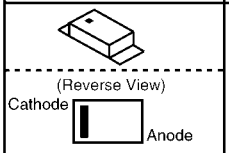
XP0111L00L



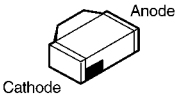
MA111
MA2ZD0200L
B0DCCD000011



UNR911LJ0L
B1ADGE000004, 2SC6054JSL
UNR921LJ0L, UNR921EJ0L, UNR9215J0L



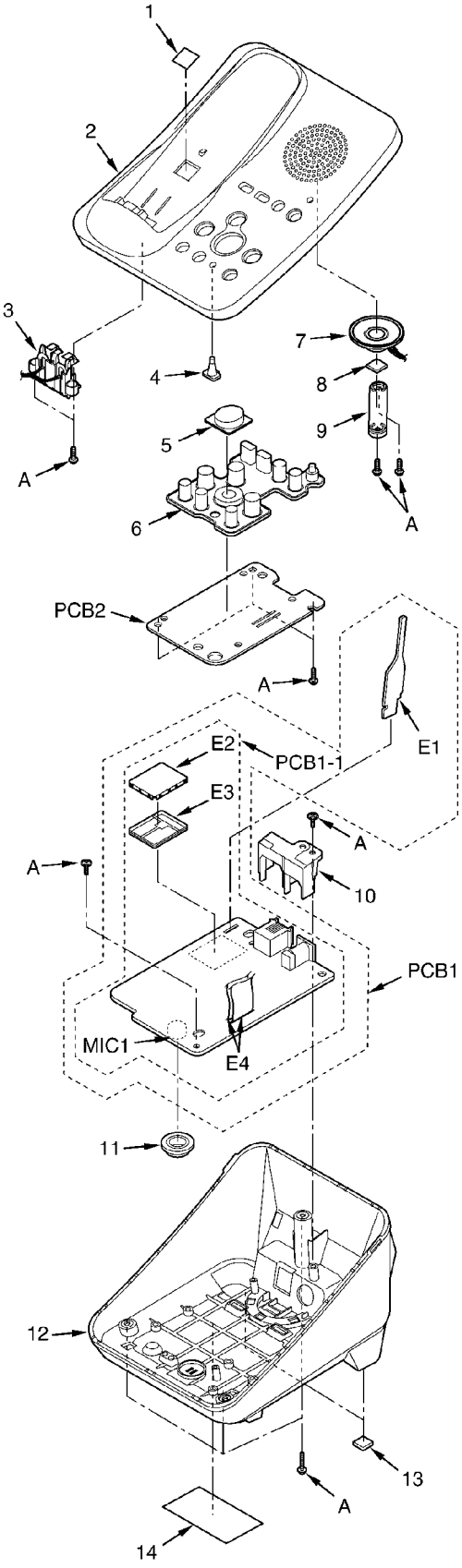
B3ACB0000115



B3ACB0000134

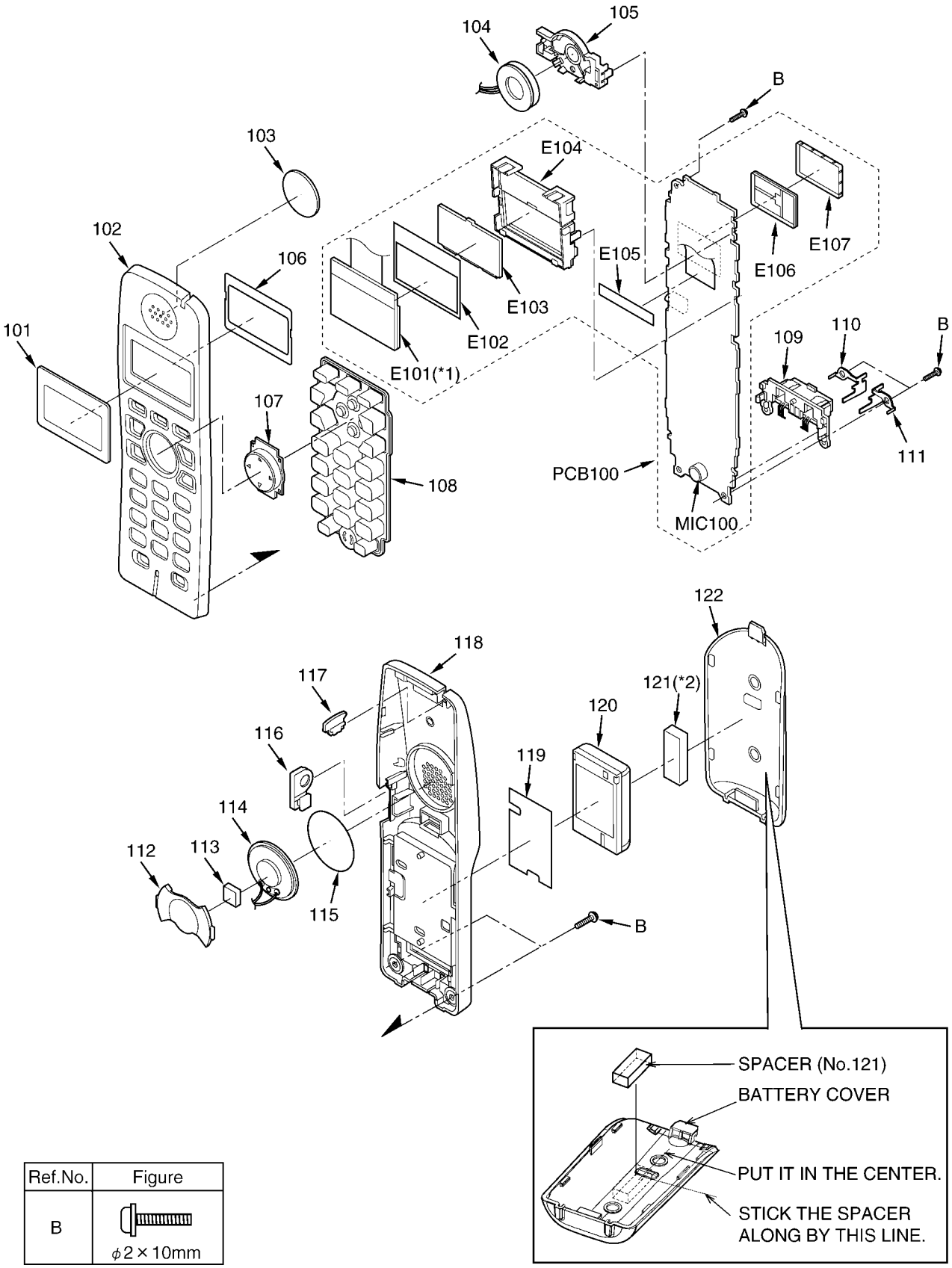
16 Exploded View and Replacement Parts List

16.1. Cabinet and Electrical Parts (Base Unit)



Ref.No.	Figure
A	ϕ2.6×8mm

16.2. Cabinet and Electrical Parts (Handset)



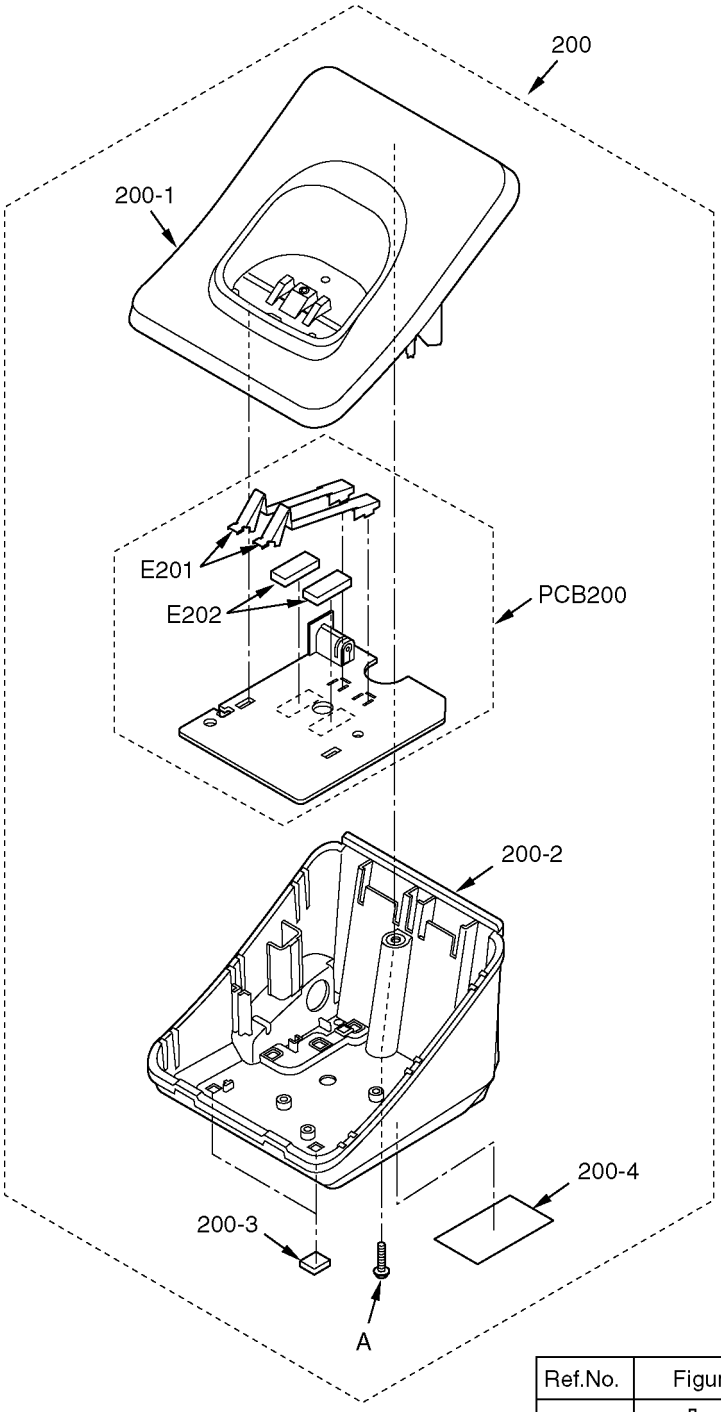
Ref.No.	Figure
B	ϕ2 × 10mm

Note:

(*1) This cable is fixed by welding. Refer to **How to Replace the Handset LCD** (P.76).

(*2) Attach the spacer (No. 121) to the exact location described above.

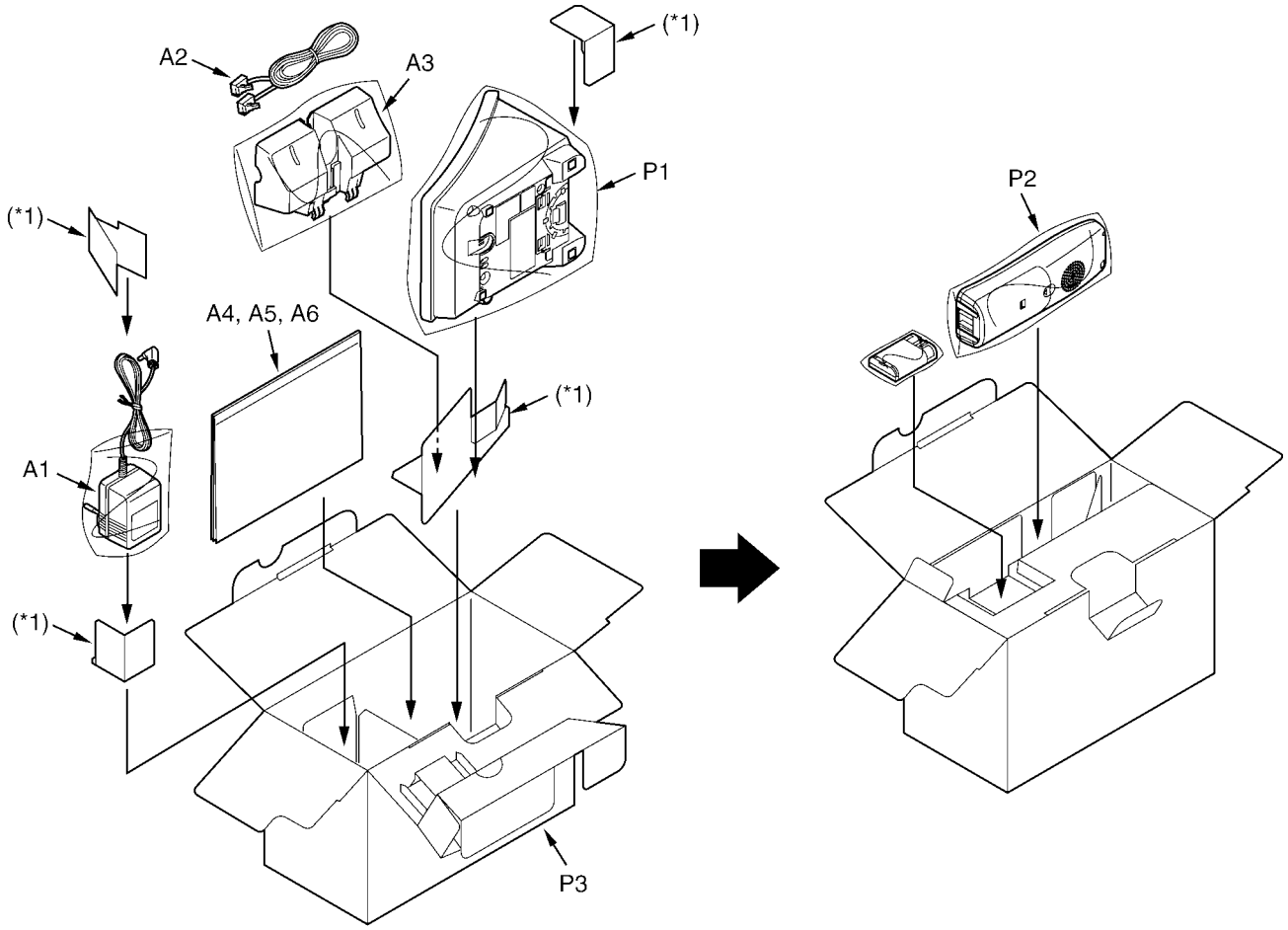
16.3. Cabinet and Electrical Parts (Charger Unit)



Ref.No.	Figure
A	 ϕ2.6 × 8mm

16.4. Accessories and Packing Materials

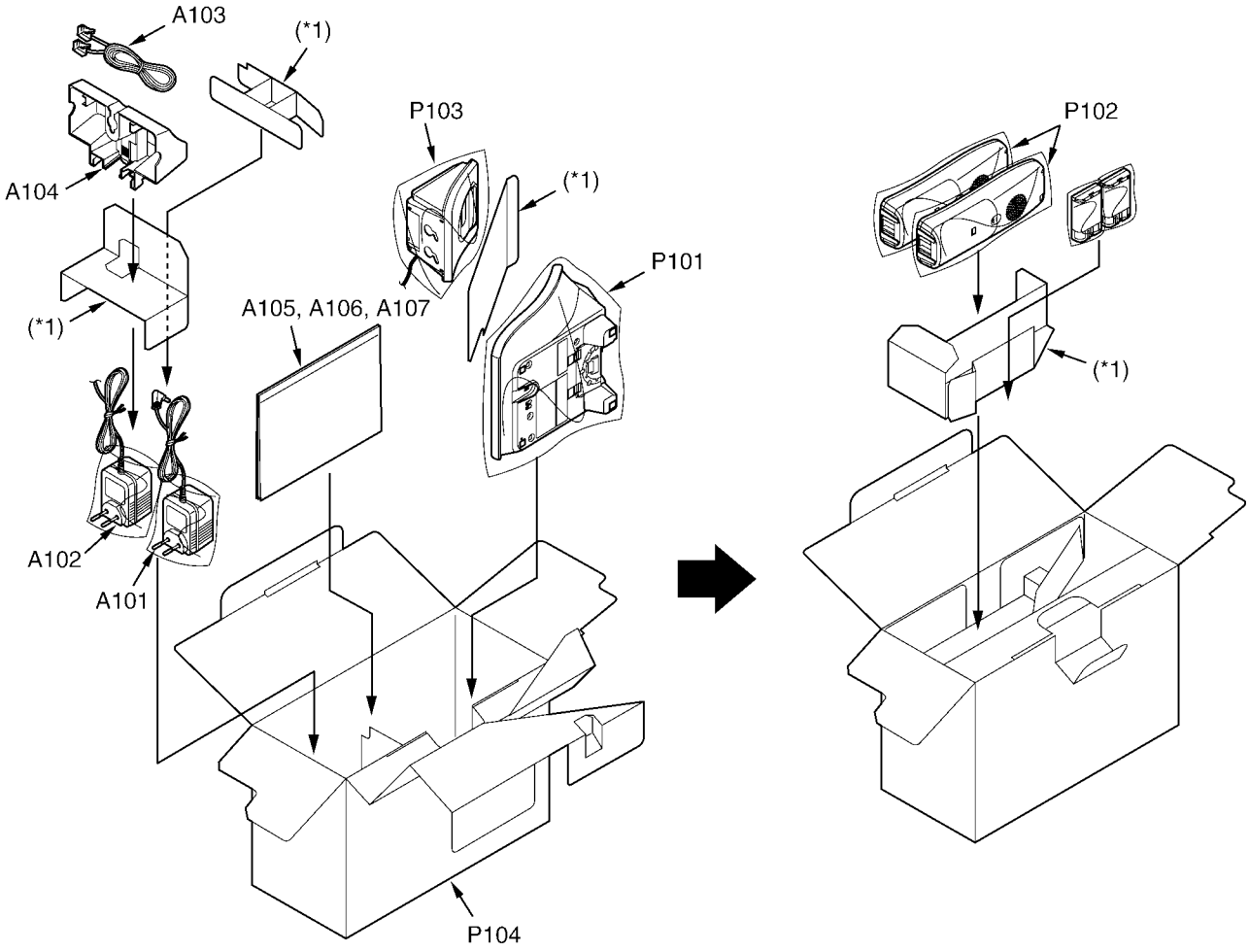
16.4.1. KX-TG3531BXS/BXB



Note:

(*1) These pads are pieces of Ref No. P3 (GIFT BOX).

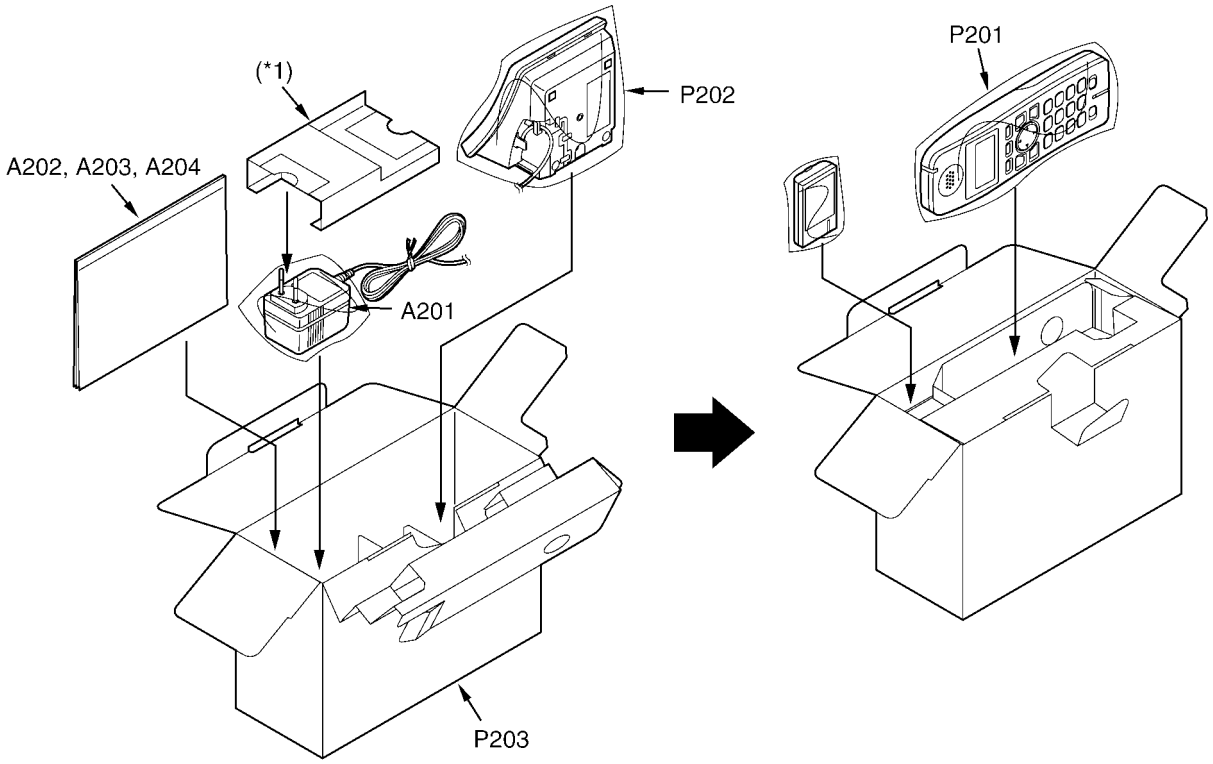
16.4.2. KX-TG3532BXS/BXB



Note:

(*1) These pads are pieces of Ref No. P104 (GIFT BOX).

16.4.3. KX-TGA351BXS/BXB



Note:

(*1) This pad is a piece of Ref No. P203 (GIFT BOX).

16.5. Replacement Parts List

Note:

1. RTL (Retention Time Limited)
   The marking (RTL) indicates that the Retention Time is limited for this item.
   After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability depends on the type of assembly and the laws governing parts and product retention.
   At the end of this period, the assembly will no longer be available.
2. Important safety notice
   Components identified by the ⚠ mark indicates special characteristics important for safety. When replacing any of these components, only use specified manufacture's parts.
3. The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.
4. ISO code (Example: ABS-94HB) of the remarks column shows quality of the material and a flame resisting grade about plastics.
5. RESISTORS & CAPACITORS
   Unless otherwise specified;
   All resistors are in ohms (Ω) K=1000Ω, M=1000kΩ
   All capacitors are in MICRO FARADS (μF) P=μμF
   *Type & Wattage of Resistor

Type

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

Wattage

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

*Type & Voltage Of Capacitor

Type

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

Voltage

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

16.5.1. Base Unit

16.5.1.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
1	PQQT23193Z	LABEL, CHARGE	
2	PQKM10746Y3	CABINET BODY (for KX-TG3531BXS) (for KX-TG3532BXS)	PS-HB
2	PQKM10746Y4	CABINET BODY (for KX-TG3531BXB) (for KX-TG3532BXB)	PS-HB
3	PQWE10037Z	BATTERYTERMINAL	PS-HB
4	PQHR11283Z	OPTIC CONDUCTIVE PARTS, LED LENS (IN USE)	PS-HB
5	PQBC10488Z3	BUTTON, MESSAGE (for KX-TG3531BXS) (for KX-TG3532BXS)	AS-HB
5	PQBC10488Z4	BUTTON, MESSAGE (for KX-TG3531BXB) (for KX-TG3532BXB)	AS-HB
6	PQSX10340X	KEYBOARD SWITCH (for KX-TG3531BXS) (for KX-TG3532BXS)	
6	PQSX10340W	KEYBOARD SWITCH (for KX-TG3531BXB) (for KX-TG3532BXB)	
7	L0AA02A00072	SPEAKER	
8	PQHG10729Z	RUBBER PARTS, SPEAKER	
9	PQHR11303Z	GUIDE, SP HOLDER	PS-HB
10	PQHR11276Z	GUIDE, JACK HOLDER	PS-HB
11	PQMG10025Z	RUBBER PARTS, MIC	
12	PQKF10731Y3	CABINET COVER (for KX-TG3531BXS) (for KX-TG3532BXS)	PS-HB
12	PQKF10731Y4	CABINET COVER (for KX-TG3531BXB) (for KX-TG3532BXB)	PS-HB
13	PQHA10023Z	RUBBER PARTS, FOOT CUSHION	
14	PQGT19647Z	NAME PLATE (for KX-TG3531BXS) (for KX-TG3532BXB)	
14	PQGT19718Z	NAME PLATE (for KX-TG3531BXB) (for KX-TG3532BXB)	

16.5.1.2. Main P.C. Board Parts

Note:

(*1) When you have replaced IC501, IC601 or X501, make the adjustment. Refer to **Check and Adjust Frequency (Base Unit)** (P.78).

(*2) When replacing IC701, refer to **How to Replace the LLP (Leadless Leadframe Package) IC** (P.70).

Ref. No.	Part No.	Part Name & Description	Remarks
PCB1	PQWP13531BXH	MAIN P.C.BOARD ASS'Y (with ANTENNA P.C.B.) (RTL)	
PCB1-1	PQWP33531BXH	MAIN P.C.BOARD ASS'Y (without ANTENNA P.C.B.) (RTL)	
		(ICs)	
IC300	C0DBAGZ00023	IC	S
IC301	C0CBAAD00018	IC	
IC331	C0DBFGD00017	IC	
IC501	C2HBBY000069	IC (*1)	
IC601	PQWIG3531BXH	IC (*1)	
IC701	C1CB00002285	IC (*2)	
		(TRANSISTORS)	
Q111	2SC6054JSL	TRANSISTOR(SI)	
Q141	B1ADGP000008	TRANSISTOR(SI)	
Q142	B1BBAP000021	TRANSISTOR(SI)	S
Q161	2SD0874AS	TRANSISTOR(SI)	
Q171	2SC6054JSL	TRANSISTOR(SI)	
Q300	B1CHND000004	TRANSISTOR(SI)	
		(DIODES)	
D101	PQVDMD5S	DIODE(SI)	
D113	MA111	DIODE(SI)	S
D133	MA111	DIODE(SI)	S
D142	MA1Z300	DIODE(SI)	S
D300	B0JCME000035	DIODE(SI)	
D361	MA8220	DIODE(SI)	S
D472	MAZ805100L	DIODE(SI)	
D473	MAZ805100L	DIODE(SI)	
D703	B0DCCD000011	DIODE(SI)	
D704	B0DCCD000011	DIODE(SI)	
		(COILS)	
L101	PQLQXF330K	COIL	S
L102	PQLQXF330K	COIL	S
L300	G1C220M00037	COIL	S
L361	G1C6R8MA0072	COIL	
L472	G1C6R8MA0072	COIL	
L473	G1C6R8MA0072	COIL	
L501	PQLQR2KA213	COIL	S
L701	MQLRF18NJFB	COIL	
L702	MQLPF10NJFB	COIL	
L703	MQLRF4N7DFB	COIL	
L704	MQLRF22NJFB	COIL	
L705	MQLRF10NJFB	COIL	
L706	MQLPF10NJFB	COIL	
L709	MQLRF1N5DFB	COIL	

Ref. No.	Part No.	Part Name & Description	Remarks
L711	MQLRF3N9DFB	COIL	
L713	MQLRF18NJFB	COIL	
L790	G1C1R0KA0096	COIL	
		(JACKS)	
CN101	K2LB102B0053	JACK, MODULAR	
CN301	K2ECYB000001	JACK, DC	
		(COMPONENTS PARTS)	
RA501	D1H84724A013	RESISTOR ARRAY	S
RA701	D1H810240004	RESISTOR ARRAY	S
		(VARISTORS)	
SA102	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S
SA103	PQVDDSS301L	VARISTOR (SURGE ABSORBER)	S
		(RESISTORS)	
R111	ERJ3GEYJ104	100K	
R112	ERJ3GEYJ104	100K	
R113	ERJ3GEYJ103	10K	
R114	ERJ3GEYJ473	47K	
R121	ERJ3GEYJ394	390K	
R122	ERJ3GEYJ394	390K	
R131	ERJ3GEYJ106	10M	
R133	ERJ3GEYJ105	1M	
R134	ERJ3GEYJ102	1K	
R141	ERJ3GEYJ104	100K	
R142	PQ4R18XJ472	4.7K	S
R145	ERJ2GEJ103	10K	
R151	ERJ3GEYJ106	10M	
R152	ERJ3GEYJ395	3.9M	
R154	ERJ3GEYJ102	1K	
R160	ERJ3GEYJ751	750	
R162	ERJ3GEYJ393	39K	
R163	ERJ12YJ330	33	
R164	ERJ3GEYJ470	47	
R165	ERJ3GEYJ561	560	
R167	ERJ2GEJ102	1K	
R168	ERJ3GEY0R00	0	
R171	ERJ2GEJ220	22	
R172	ERJ2GEJ104	100K	
R175	ERJ3GEYJ561	560	
R176	ERJ2GEJ101	100	
R178	ERJ2GEJ102	1K	
R183	ERJ2GEJ222	2.2K	
R185	ERJ3GEYJ333	33K	
R303	ERJ3GEYJ221	220	
R304	ERJ3GEYJ221	220	
R308	ERJ3GEYJ121	120	
R343	ERJ3GEYJ102	1K	
R371	ERG2SJ470	47	
R372	ERG2SJ470	47	
R380	ERJ3GEY0R00	0	
R421	ERJ2GEJ473	47K	
R422	ERJ2GEJ102	1K	
R423	ERJ2GEJ102	1K	
R453	ERJ2GEJ222	2.2K	
R454	ERJ2GEJ222	2.2K	
R459	ERJ2GEJ272	2.7K	
R460	ERJ2GEJ272	2.7K	
R517	ERJ2GE0R00	0	
R533	ERJ2GEJ472X	4.7K	
R675	ERJ2GEJ331	330	
R673	ERJ2GEJ331	330	
R677	ERJ2GEJ221	220	
R706	ERJ2RKF103X	10K	
R709	ERJ2GEJ331	330	
R719	ERJ2GEJ102	1K	
R730	ERJ2GEJ102	1K	
R731	ERJ2GEJ102	1K	
R732	ERJ2GEJ102	1K	
R733	ERJ2GEJ331	330	
R740	ERJ2GEJ4R7	4.7	
R741	ERJ2GEJ100	10	
R742	ERJ2GEJ100	10	
R743	ERJ2GE0R00	0	
R791	ERJ2GEJ102	1K	

Ref. No.	Part No.	Part Name & Description	Remarks
		(CAPACITORS)	
C101	F1K2J681A006	680P	
C102	F1K2J681A006	680P	
C111	F1J2A473A024	0.047	
C112	F1J2A473A024	0.047	
C113	PQCUV1A684KB	0.68	
C120	ECUV1H102KBV	0.001	
C121	ECUV1H681JCV	680P	S
C122	ECUV1H681JCV	680P	S
C132	ECUV1H103KBV	0.01	
C142	ECUV1H103KBV	0.01	
C152	ECUV1H103KBV	0.01	
C161	EEE1EA100WR	10	
C162	ECUV1H101JCV	100P	
C163	ECUV1H472KBV	0.0047	
C164	ECUE1H100DCQ	10P	
C165	ECUV1C473KBV	0.047	
C166	EEE1CA100SR	10	
C167	ECUV1A224KBV	0.22	
C172	ECUE1H272KBQ	0.0027	
C176	PQCUV0J106KB	10	
C177	ECUE1H100DCQ	10P	
C178	ECUE1C223KBQ	0.022	
C185	ECUE1C183KBQ	0.018	
C300	PSEA1VXF470	47	S
C304	ECUV1A105KBV	1	
C305	ECUV1H103KBV	0.01	
C306	ECEA1EU101	100	S
C308	ECUV1E104KBV	0.1	
C331	ECUV1C474KBV	0.47	
C341	ECEA0JSJ331	330	S
C342	ECUV1A105KBV	1	
C347	ECUE1A104KBQ	0.1	
C352	ECUV1C104KBV	0.1	
C380	ECA1CM101	100P	
C381	ECUV1A105KBV	1	
C422	ECUE1A104KBQ	0.1	
C457	ECUE1C123KBQ	0.012	
C458	ECUE1C123KBQ	0.012	
C459	ECUE1C103KBQ	0.01	
C501	ECUV1C104KBV	0.1	
C503	ECUV1C104KBV	0.1	
C504	ECUV1C104KBV	0.1	
C508	ECUE1H6R0CCQ	6P	
C509	ECUE1H6R0CCQ	6P	
C513	ECUV1C104KBV	0.1	
C514	PQCUV0J106KB	10	
C515	ECUV1A105KBV	1	
C516	PQCUV0J106KB	10	
C517	ECUV1C104KBV	0.1	
C518	PQCUV0J106KB	10	
C521	ECUE1A104KBQ	0.1	
C531	ECUV1C104KBV	0.1	
C601	ECUE1A104KBQ	0.1	
C660	ECUV1C104KBV	0.1	
C687	ECUE1H331KBQ	330P	
C688	ECUE1H331KBQ	330P	
C689	ECUE1H331KBQ	330P	
C704	ECUE1H2R0CCQ	2P	
C706	ECUE1H2R0CCQ	2P	
C710	ECUE1H010CCQ	1P	S
C711	ECUE1H4R0CCQ	4P	
C717	ECUE1H100DCQ	10P	
C718	ECUE1H5R0CCQ	5P	
C722	ECUE1H100DCQ	10P	
C737	ECUE1H471KBQ	470P	
C738	ECUE1H100DCQ	10P	
C739	ECUE1H100DCQ	10P	
C740	ECUE1C103KBQ	0.01	
C741	ECUE1H102KBQ	0.001	
C742	PQCUV0J475MB	4.7	
C744	ECUE1A104KBQ	0.1	
C746	ECUE1H222KBQ	0.0022	

Ref. No.	Part No.	Part Name & Description	Remarks
C752	ECUE1H2R0CCQ	2P	
C756	ECUE1H100DCQ	10P	
C760	ECUE1H100DCQ	10P	
C762	ECUE1H101JCQ	100P	
C763	ECUE1H101JCQ	100P	
C764	ECUE1H102KBQ	0.001	
C765	ECUE1H221JCQ	220P	
C776	ECUE1A104KBQ	0.1	
C777	ECUE1H102KBQ	0.001	
C779	ECUE1H102KBQ	0.001	
C780	ECUE1C103KBQ	0.01	
C783	ECUE1H102KBQ	0.001	
C784	ECUE1H101JCQ	100P	
C790	ECUE1H102KBQ	0.001	
C791	ECUE1H5R0CCQ	5P	
C792	ECUE1H121JCQ	120P	
C793	ECUE1A104KBQ	0.1	
C796	ECUE1A104KBQ	0.1	
C797	ECJ0EC1H0R5C	0.5P	S
C798	ECJ0EC1H0R5C	0.5P	S
		(OTHERS)	
MIC1	L0CBAB000052	MICROPHONE	
E1	PQUP11466Z	ANTENNA P.C.BOARD ASS'Y (RTL)	
E2	PQMC10493Z	MAGNETIC SHIELD, COVER	
E3	PQMC10494Z	MAGNETIC SHIELD, FRAME	
E4	WBX08SH-9SS	PARALLEL WIRE	
FL701	J0E2457B0008	IC FILTER	
P101	PFRT002	THERMISTOR (POSISTOR)	S
X501	H0J138500003	CRYSTAL OSCILLATOR (*1)	

16.5.1.3. Operational P.C. Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB2	PQWP2TG3031H	OPERATIONAL P.C.BOARD ASS'Y (RTL)	
		(LEDS)	
LED902	LNJ308G8JRA	LED	
LED903	PQVDBR1111C	LED	S
LED904	PQVDBR1111C	LED	S

16.5.2. Handset

16.5.2.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
101	PQGP10320Z3	PANEL,LCD(forKX-TGA351BXS)	PC
101	PQGP10320Z2	PANEL,LCD(forKX-TGA351BXB)	PC
102	PQKM10747Z2	CABINET BODY (for KX-TGA351BXS)	PS-HB
102	PQKM10747Z1	CABINET BODY (for KX-TGA351BXB)	PS-HB
103	PQHS10658Z	SPACER, RECEIVER NET	
104	L0AD02A00023	RECEIVER	
105	PQHR11282Z	GUIDE, RECEIVER HOLDER	ABS-HB
106	PQHS10762Z	SPACER, CUSHION LCD	
107	PQBC10492Z1	BUTTON, NAVIGATOR KEY	ABS-HB
108	PQSX10338N	KEYBOARD SWITCH (for KX-TGA351BXS)	
108	PQSX10338P	KEYBOARD SWITCH (for KX-TGA351BXB)	
109	PQWE10047Z	BATTERY TERMINAL	ABS-HB
110	PQJT10247Z	CHARGE TERMINAL (L)	
111	PQJT10246Z	CHARGE TERMINAL (R)	
112	PQHR11198Z	GUIDE, SP HOLDER	ABS-HB
113	PQHG10729Z	RUBBER PARTS, SPEAKER CUSHION	
114	L0AA02A00072	SPEAKER	
115	PQHS10622Z	SPACER, SPEAKER NET	
116	PQKE10471Y2	COVER, EARPHONE CAP	
117	PQHR11280Z	OPTIC CONDUCTIVE PARTS, LED LENS	PS-HB
118	PQKF10729Z3	CABINET COVER (for KX-TGA351BXS)	ABS-HB
118	PQKF10729Z4	CABINET COVER (for KX-TGA351BXB)	ABS-HB
119	PQGT19650Z	NAME PLATE (for KX-TGA351BXS)	
119	PQGT19717Z	NAME PLATE (for KX-TGA351BXB)	
120	HHR-P107	BATTERY	
121	PQHS10681Y	SPACER, BATTERY	
122	PQKK10600Z3	LID, BATTERY COVER (for KX-TGA351BXS)	ABS-HB
122	PQKK10600Z4	LID, BATTERY COVER (for KX-TGA351BXB)	ABS-HB

16.5.2.2. Main P.C.Board Parts

Note:

(*1) When you have replaced IC501, IC541 or X501, make the adjustment. Refer to **Check and Adjust Frequency (Handset)** (P.78) and **Adjust Battery Low Detector Voltage (Handset)** (P.78).

(*2) When replacing IC701, refer to **How to Replace the LLP (Leadless Leadframe Package) IC** (P.70).

(*3) When replacing the handset LCD, See **How to Replace the Handset LCD** (P.76).

Ref. No.	Part No.	Part Name & Description	Remarks
PCB100	PQWPG3521BXR	MAIN P.C.BOARD ASS'Y (RTL)	
		(ICs)	
IC371	C0CBABD00019	IC	
IC381	C0CBABD00011	IC	
IC382	C0CBAAC00083	IC	
IC501	C2HBBY000067	IC (*1)	
IC521	C0EBF0000179	IC	
IC541	PQWIG3521BXR	IC (*1)	
IC701	C1CB00002285	IC (*2)	
		(TRANSISTORS)	
Q361	B1ADGE000004	TRANSISTOR(SI)	
Q362	2SC6054JSL	TRANSISTOR(SI)	
Q363	UNR921LJ0L	TRANSISTOR(SI)	
Q431	UNR921LJ0L	TRANSISTOR(SI)	
Q521	2SC6054JSL	TRANSISTOR(SI)	
Q531	UNR921EJ0L	TRANSISTOR(SI)	
Q543	UNR9215J0L	TRANSISTOR(SI)	
Q551	UNR911LJ0L	TRANSISTOR(SI)	
Q555	XP0111L00L	TRANSISTOR(SI)	
		(DIODES)	
D361	MA2ZD0200L	DIODE(SI)	
D523	MA111	DIODE(SI)	S
D703	B0DCCD000011	DIODE(SI)	
D704	B0DCCD000011	DIODE(SI)	
LED551	B3ACB0000115	DIODE(SI)	
LED552	B3ACB0000115	DIODE(SI)	
LED553	B3ACB0000115	DIODE(SI)	
LED554	B3ACB0000115	DIODE(SI)	
LED555	B3ACB0000115	LED	
LED556	B3ACB0000115	LED	
LED561	B3ACB0000134	LED	
		(COILS)	
L432	PQLQR2KB113T	COIL	S
L434	PQLQR2KB113T	COIL	S
L701	MQLRF18NJFB	COIL	
L702	MQLPF10NJFB	COIL	
L703	MQLRF4N7DFB	COIL	
L704	MQLRF22NJFB	COIL	
L705	MQLRF10NJFB	COIL	
L706	MQLPF10NJFB	COIL	
L709	MQLRF1N5DFB	COIL	
L711	MQLRF3N9DFB	COIL	
L713	MQLRF18NJFB	COIL	
L790	G1C1R0KA0096	COIL	
		(COMPONENTS PARTS)	
CA571	F5A424740002	CAPACITOR ARRAY	

Ref. No.	Part No.	Part Name & Description	Remarks
CA574	F5A841040004	CAPACITOR ARRAY	
RA401	D1H410220001	RESISTOR ARRAY	
RA402	D1H422220001	RESISTOR ARRAY	
RA403	D1H468020001	RESISTOR ARRAY	
RA501	D1H84724A013	RESISTOR ARRAY	S
RA551	D1H83314A013	COMPONENTSPARTS	S
RA701	D1H810240004	RESISTOR ARRAY	
		(VARISTORS)	
D412	D4ED1180A013	VARISTOR	
D413	D4ED1180A013	VARISTOR	
D423	D4ED1180A013	VARISTOR	
D424	D4ED1180A013	VARISTOR	
D426	D4ED1180A013	VARISTOR	
D427	D4ED1180A013	VARISTOR	
		(RESISTORS)	
R361	ERJ2GEJ473	47K	
R362	ERJ2GEJ561	560	
R363	ERJ2GEJ473	47K	
R366	ERJ3GEYJ332	3.3K	
R370	ERJ8GEYJ1R2	1.2	
R376	ERJ2GEJ155	1.5M	
R377	ERJ2GEJ225	2.2M	
R378	ERJ2GEJ155	1.5M	
R379	ERJ2GEJ225	2.2M	
R417	ERJ2GEJ391	390	
R431	ERJ2GEJ103	10K	
R433	ERJ2GEJ102	1K	
R434	ERJ2GEJ222	2.2K	
R503	ERJ2GEJ103	10K	
R508	ERJ3GEYJ100	10	
R509	ERJ2GEJ104	100K	
R522	ERJ2GEJ223	22K	
R523	ERJ2GEJ224	220K	
R525	ERJ2GEJ102	1K	
R526	ERJ2GEJ223	22K	
R528	ERJ2GEJ104	100K	
R534	ERJ2GEJ103	10K	
R541	ERJ2GEJ103	10K	
R542	ERJ2GEJ102	1K	
R543	ERJ2GEJ274	270K	
R561	ERJ2GEJ101	100	
R562	ERJ2GEJ121	120	
R563	ERJ2GEJ121	120	
R572	D1BB4303A055	430K	
R573	D1BB8203A055	820K	
R706	ERJ2RKF103X	10K	
R709	ERJ2GEJ331	330	
R719	ERJ2GEJ102	1K	
R730	ERJ2GEJ102	1K	
R731	ERJ2GEJ102	1K	
R732	ERJ2GEJ102	1K	
R733	ERJ2GEJ331	330	
R740	ERJ2GEJ4R7	4.7	
R741	ERJ2GEJ100	10	
R742	ERJ2GEJ100	10	
R743	ERJ2GE0R00	0	
R791	ERJ2GEJ102	1K	
		(CAPACITORS)	
C371	ECUE1A104KBQ	0.1	
C377	ECUE1A104KBQ	0.1	
C379	ECUE1A104KBQ	0.1	
C381	EEE0JA101SP	100	
C386	ECUE1A104KBQ	0.1	
C414	ECUE1E682KBQ	0.0068	
C415	ECUE1E682KBQ	0.0068	
C416	ECUE1E562KBQ	0.0056	
C417	PQCUV0J106KB	10	
C421	ECUV1A105KBV	1	
C427	ECUE1H100DCQ	10P	
C433	ECUE1E682KBQ	0.0068	
C435	PQCUV0J106KB	10	
C437	ECUE1H100DCQ	10P	
C438	ECUE1H100DCQ	10P	

Ref. No.	Part No.	Part Name & Description	Remarks
C501	ECUE1H100DCQ	10P	
C502	ECUE1H100DCQ	10P	
C503	ECUE0J105KBQ	1	
C504	ECUE1A104KBQ	0.1	
C506	ECUE1A104KBQ	0.1	
C508	PQCUV0J106KB	10	
C511	EEE0GA331WP	330	
C512	ECUE1C103KBQ	0.01	
C514	PQCUV0J106KB	10	
C515	ECUE1A104KBQ	0.1	
C521	ECUE1C103KBQ	0.01	
C522	ECUE1A104KBQ	0.1	
C524	ECUE1A104KBQ	0.1	
C525	ECUE1A104KBQ	0.1	
C526	ECUE1A104KBQ	0.1	
C531	ECUE1A104KBQ	0.1	
C540	ECUE1A104KBQ	0.1	
C541	ECUE1A104KBQ	0.1	
C542	ECUE1H101JCQ	100P	
C572	ECUV1C474KBV	0.47	
C573	ECUV1C104KBV	0.1	
C596	ECUE1A104KBQ	0.1	
C704	ECUE1H2R0CCQ	2P	
C706	ECUE1H2R0CCQ	2P	
C710	ECUE1H010CCQ	1P	S
C711	ECUE1H4R0CCQ	4P	
C717	ECUE1H100DCQ	10P	
C718	ECUE1H5R0CCQ	5P	
C722	ECUE1H100DCQ	10P	
C737	ECUE1H471KBQ	470P	
C738	ECUE1H100DCQ	10P	
C739	ECUE1H100DCQ	10P	
C740	ECUE1C103KBQ	0.01	
C741	ECUE1H102KBQ	0.001	
C742	PQCUV0J475MB	4.7	
C744	ECUE1A104KBQ	0.1	
C746	ECUE1H222KBQ	0.0022	
C752	ECUE1H2R0CCQ	2P	
C756	ECUE1H100DCQ	10P	
C760	ECUE1H100DCQ	10P	
C762	ECUE1H101JCQ	100P	
C763	ECUE1H101JCQ	100P	
C764	ECUE1H102KBQ	0.001	
C765	ECUE1H221JCQ	220P	
C776	ECUE1A104KBQ	0.1	
C777	ECUE1H102KBQ	0.001	
C779	ECUE1H102KBQ	0.001	
C780	ECUE1C103KBQ	0.01	
C783	ECUE1H102KBQ	0.001	
C784	ECUE1H101JCQ	100P	
C790	ECUE1H102KBQ	0.001	
C791	ECUE1H8R0CCQ	8P	
C792	ECUE1H121JCQ	120P	
C793	ECUE1A104KBQ	0.1	
C796	ECUE1A104KBQ	0.1	
C797	ECJ0EC1H0R5C	0.5P	S
C798	ECJ0EC1H0R5C	0.5P	S
		(OTHERS)	
MIC100	L0CBAY000018	MICROPHONE	
E101	L5DCBYY00003	LIQUID CRYSTAL DISPLAY (*3)	
E102	PQHX11327Z	COVER, LCD COVER SHEET	
E103	PQHR11285Z	TRANSPARENT PLATE, LCD PLATE	PMMA
E104	PQHR11284Z	GUIDE, LCD HOLDER	ABS-HB
E105	PQHS10683Z	TAPE, ADHESIVE	
E106	PQMC10494Z	MAGNETIC SHIELD, FRAME	
E107	PQMC10493Z	MAGNETIC SHIELD, COVER	
CN431	K2HD103D0001	JACK	
FL701	J0E2457B0008	IC FILTER	
X501	H0J138500003	CRYSTAL OSCILLATOR (*1)	

16.5.3. Charger Unit

16.5.3.1. Cabinet and Electrical Parts

Ref. No.	Part No.	Part Name & Description	Remarks
200	PQLV30054SS	CHARGER UNIT ASS'Y (RTL) (for KX-TG3532BXS) (for KX-TGA351BXS)	
200	PQLV30054SB	CHARGER UNIT ASS'Y (RTL) (for KX-TG3532BXB) (for KX-TGA351BXB)	
200-1	PQKM10751Z2	CABINET BODY (for KX-TG3532BXS) (forKX-TGA351BXS)	PS-HB
200-1	PQKM10751Z1	CABINET BODY (for KX-TG3532BXB) (forKX-TGA351BXB)	PS-HB
200-2	PQKF10734Y3	CABINET COVER (for KX-TG3532BXS) (forKX-TGA351BXS)	PS-HB
200-2	PQKF10734Y4	CABINET COVER (for KX-TG3532BXB) (forKX-TGA351BXB)	PS-HB
200-3	PQHA10023Z	RUBBER PARTS	
200-4	PQGT19665Y	NAME PLATE (for KX-TG3532BXS) (for KX-TGA351BXS)	
200-4	PQGT19719Y	NAME PLATE (for KX-TG3532BXB) (for KX-TGA351BXB)	

16.5.3.2. Main P.C.Board Parts

Ref. No.	Part No.	Part Name & Description	Remarks
PCB200	PQWPTGA600CH	MAIN P.C.BOARD ASS'Y (RTL)	
		(JACK)	
CN1	K2ECYB000001	JACK, DC	S
		(RESISTORS)	
R1	ERDS2TJ271	270	
R2	ERDS2TJ271	270	
R3	ERDS2TJ271	270	
R4	ERDS2TJ271	270	
R5	ERDS2TJ271	270	
R7	ERDS2TJ271	270	
R8	ERDS2TJ271	270	
R9	ERDS2TJ271	270	
R10	ERDS2TJ271	270	
R11	ERDS2TJ271	270	
R12	ERDS2TJ271	270	
R13	ERDS2TJ271	270	
		(OTHERS)	
E201	PQJT10200Z	CHARGE TERMINAL	
E202	PQHG10584Z	SPACER, RUBBER	

16.5.4. Accessories and Packing Materials

Note:

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

16.5.4.1. KX-TG3531BXS/BXB

Ref. No.	Part No.	Part Name & Description	Remarks
A1	PQLV203BXZ	AC ADAPTOR (for Base Unit)	⚠
A2	PQJA10075Z	CORD, TELEPHONE	
A3	PQKL10084Z2	STAND, WALL MOUNT	PS-HB
A4	PQQX15835Z	INSTRUCTION BOOK (for English) (*1)	
A5	PQQW15601Z	LEAFLET, QUICK GUIDE (for Arabic)	
A6	PQQW15602Z	LEAFLET, QUICK GUIDE (for Persian)	
P1	XZB21X35A03	PROTECTION COVER (for Base Unit)	
P2	XZB08X25B02	PROTECTION COVER (for Handset)	
P3	PQPK15858Z	GIFT BOX	

16.5.4.2. KX-TG3532BXS/BXB

Ref. No.	Part No.	Part Name & Description	Remarks
A101	PQLV203BXZ	AC ADAPTOR (for Base Unit)	⚠
A102	PQLV208BXZ	AC ADAPTOR (for Charger Unit)	⚠
A103	PQJA10075Z	CORD, TELEPHONE	
A104	PQKL10084Z2	STAND, WALL MOUNT	PS-HB
A105	PQQX15835Z	INSTRUCTION BOOK (for English) (*1)	
A106	PQQW15601Z	LEAFLET, QUICK GUIDE (for Arabic)	
A107	PQQW15602Z	LEAFLET, QUICK GUIDE (for Persian)	
P101	XZB21X35A03	PROTECTION COVER (for Base Unit)	
P102	XZB08X25B02	PROTECTION COVER (for Handset)	
P103	XZB13X19C03	PROTECTION COVER (for Charger Unit)	
P104	PQPK15863Z	GIFT BOX	

16.5.4.3. KX-TGA351BXS/BXB

Ref. No.	Part No.	Part Name & Description	Remarks
A201	PQLV208BXZ	AC ADAPTOR	⚠
A202	PQQX15851Z	INSTRUCTION BOOK (for English) (*1)	
A203	PQQX15852Z	INSTRUCTION BOOK (for Arabic) (*1)	
A204	PQQX15853Z	INSTRUCTION BOOK (for Persian) (*1)	
P201	XZB08X25B02	PROTECTION COVER (for Handset)	
P202	XZB13X19C03	PROTECTION COVER (for Charger Unit)	
P203	PQPK15864Z	GIFT BOX	

16.5.5. Screws

Ref. No.	Part No.	Part Name & Description	Remarks
A	XTW26+T8PFJ	TAPPING SCREW	
B	XTW2+R10PFJ	TAPPING SCREW	

16.5.6. Fixtures and Tools

Note:

When replacing the Handset LCD, See **How to Replace the Handset LCD** (P.76).

Part No.	Part Name & Description	Remarks
PQZZ430PIR	TIP OF SOLDERING IRON	
PQZZ430PRB	RUBBER OF SOLDERING IRON	

K.I/N
KXTG3531BXS
KXTG3531BXB
KXTG3532BXS
KXTG3532BXB
KXTGA351BXS
KXTGA351BXB