



CDMA Portable Cellular Telephone

SCH-470

SERVICE Manual

CDMA Portable Cellular Telephone



CONTENTS

- 1. General Introduction
- 2. Specification
- 3. NAM Programming
- 4. Data Transfer
- 5. Circuit Description
- 6. Exploded View and Its Parts List
- 7. PCB Diagrams
- 8. Troubleshooting
- 9. Test Command Table
- 10. Block & Circuit Diagrams



ELECTRONICS

© Samsung Electronics Co.,Ltd. APR. 1998.
Printed in Korea
Code No. : GH68-60687A

1. General Introduction

The SCH-470 cellular phone functions as only digital cellular phone working in CDMA (Code Division Multiple Access) mode. CDMA type digital mode applies DSSS (Direct Sequential Spread spectrum) mode which first came to be used in the military.

The DSSS reduces channel cross talk and allow to use one frequency channel by multiple users in the same specific area, resulting in increase of channel capacity to about ten times compared to that of analog mode currently used.

Soft/Softer Handoff, Hard Handoff, and Dynamic RF Power Control technologies are combined into this phone to reduce the call drop while usage.

CDMA digital cellular network consists of MSO (Mobile Switching Office), BSC (Base Station Controller), BTS (Base Station Transmission System), and MS (Mobile Station). MS meets the specifications of the below:

¶TIS-95A : Mobile Station-Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System

¶TIS-96A : Speech Service Option 1 Standard for Dual-Mode Wideband Spread Spectrum Cellular Systems

¶TIS-98A : Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Station

¶TIS-126 : Mobile Station Loopback Service Options Standard

SCH-470 is composed of main handset, rapid charger, cradle, two batteries.

1.1 General

¶ Frequency Range		U
Transmitter	: 824.64 ~ 848.37 MHz	
Receiver	: 869.64 ~ 893.37 MHz	
¶ Channel Spacing	: 1.23 MHz	U
¶ Number of Channels	: 20 FA	U
¶ Duplex Spacing	: 45 MHz	U

° MSC Transmitter Frequency

FA NO.	CH. NO.	CENTER FREQUENCY	FA NO.	CH. NO.	CENTER FREQUENCY
1	1011	824.640MHz	11	404	837.120MHz
2	29	825.870MHz	12	445	838.350MHz
3	70	827.100MHz	13	486	839.580MHz
4	111	828.330MHz	14	527	840.810MHz
5	152	829.560MHz	15	568	842.040MHz
6	193	830.790MHz	16	609	843.270MHz
7	234	832.020MHz	17	650	844.270MHz
8	275	833.250MHz	18	697	845.910MHz
9	316	834.480MHz	19	738	847.140MHz
10	363	835.890MHz	20	779	848.370MHz

° MSC Receiver Frequency

FA NO.	CH. NO.	CENTER FREQUENCY	FA NO.	CH. NO.	CENTER FREQUENCY
1	1011	869.640MHz	11	404	882.120MHz
2	29	870.870MHz	12	445	883.350MHz
3	70	872.100MHz	13	486	884.580MHz
4	111	873.330MHz	14	527	885.810MHz
5	152	874.560MHz	15	568	887.040MHz
6	193	875.790MHz	16	609	888.270MHz
7	234	877.020MHz	17	650	889.270MHz
8	275	878.250MHz	18	697	890.910MHz
9	316	879.480MHz	19	738	892.140MHz
10	363	880.890MHz	20	779	893.370MHz

2. Specification

Frequency Range Transmitter	: 824.64 MHz ~ 848.37MHz
Frequency Range Receiver	: 869.64 MHz ~ 893.37 MHz
Waveform Quality	: above 0.944
Time Reference	: within $\pm 1\mu\text{s}$
RX Sensitivity	: $\pm 40\text{ dBm}$, FER = within 0.5%
Dynamic Range	: $\pm 40\text{ dBm}$ ~ $\pm 25\text{ dBm}$, FER = within 0.5%
TX Output Power	: Maximum 320 mW (25dBm)
TX Frequency Deviation	: within $\pm 300\text{ Hz}$
Occupied Band Width	: 1.32 MHz
TX Conducted Spurious Emissions	: 900 kHz below $\pm 42\text{ dBc}$ / 30 kHz : 1.98 MHz below $\pm 54\text{ dBc}$ / 30 kHz
Minimum TX Power Control	: below $\pm 50\text{ dBm}$
Open Loop Power Control	: $\pm 25\text{ dBm}$: $\pm 57.0\text{ dBm}$ ~ $\pm 38.5\text{ dBm}$: $\pm 65\text{ dBm}$: $\pm 47.5\text{ dBm}$ ~ $\pm 1.5\text{ dBm}$: $\pm 40\text{ dBm}$: $\pm 18.0\text{ dBm}$ ~ $\pm 30.0\text{ dBm}$
Standby Output Power	: below $\pm 61\text{ dBm}$
Closed Loop TX Power Control Range	: Test 1 beyond $\pm 24\text{ dB}$: Test 2 0 mS ~ 2.5 mS : Test 3 beyond $\pm 24\text{ dB}$: Test 4 beyond $\pm 24\text{ dB}$: Test 5 beyond $\pm 24\text{ dB}$
Size (mm)	: 114 ° 50 ° 22 (Standard battery) : 114 ° 50 ° 27 (Extended-life battery)
Weight (g)	: 114 (Standard battery) : 154 (Extended-life battery)

MEMO

3. NAM Programming

3.1 Switching the NAM(Numeric Assignment Module) writing mode

If you performs NAM writing mode, you have to enter the password, '4, 7, *, 8, 6, 9, #, 0, 8, #, 9'.

Keypads using in NAM writing mode are as follows :


0~9 : numeric keys

☞ # : Use to specify the variable which include several value.

VOLUME KEY : Use to switch the next item

CLR KEY : Use to retouch a wrong digit

END KEY : Use to end a NAM writing mode

 : Use to store data and switching the next function

 : Use to swich the last menu

Caution

-If you enter the NAM program mode, the last data displays on screen . When you need not change the data, press VOLUME key to go to the next item.

-You can modify the data by entering a new data. And if you enter a wrong digit, press CLR to delete the last digit.

-If you enter a wrong digit in the middle of NAM entering, continue to enter the next digits. After that check and modify the data using volume key

- While you check the data using volume, you can store the data by pressing STO key.

- When you enter the NAM, as there are necessary information enter the phone number and LOCK code and press STO key.

When you enter NAM programming, display following five items.

1. GENERAL ; Display the variable used commonly NAM.
2. Setup NAM 1 ; Display the variable of CDMA used commonly when you select NAM 1.
3. Setup NAM 2 ; Display the variable of CDMA used commonly when you select NAM 2.
4. Setup NAM 3 ; Display the variable of CDMA used commonly when you select NAM 3.
5. Setup NAM 4 ; Display the variable of CDMA used commonly when you select NAM 4.

If you don't store the data by pressing STO key after modifying as explains, the data does not change. You can check the data by pressing VOLUME key without changing the data.

3-2 Setting Up NAM1

3-2-1 General

LCD Display	Key in	Function
47*869#08#9	47*869#08#9	-selects NAM programming
NAM Program 1:General 2:Setup NAM1	1	-choose 'GENERAL.'
ESN B0000000	Volume °,	Electronic Serial Number of the phone.
CAI version 2	Volume °,	The version of the Common Air Interface supported by the mobile.
SCM 00101010	Volume °,	Station Class Mark displays the power class (bit 0~1), transmission (bit2), slotted (bit5), dual mode (bit6).
Lock Code 0000	(0000) 4-digit code STO	Four-digit number supplied by the user which enables electronic locking of the phone.
Slot Mode Yes	*S or *H STO	Enables slot mode.
Slot Index 2	0 - 7 STO	Slot mode index. Specifies the duration and frequency of times that the mobile checks the paging channel. The higher the value, the less often the mobile looks at the paging channel, and the more power is saved.
Pref NAM1... Digital only	STO	Preferred system selection for NAM1.
Pref NAM2... Digital only	STO	Preferred system selection for NAM2. Up to four NAMs are allowed for the phone. This lists one of the four NAMs.
Pref NAM3... Digital only	STO	Preferred system selection for NAM3.
Pref NAM4... Digital only	STO	Preferred system selection for NAM4.

3-2-2 Setup NAM1

LCD Display	Key in	Function
NAM Program 1:General 2:Setup NAM1	2	-choose 'NAM1.'
IMSI _MCC 454	number STO	International Mobile Station Identity Mobile Country Code.
IMSI _MNC 05	number STO	International Mobile Station Identity Mobile Network Code.
CDMA TEL NO. 8520000000	phone number STO	CDMA phone number.
CDMA pref... A pref	↑S or ↑H STO	Preferred system selection.
CDMA ACCOLC 0	class number STO	CDMA Access Overload Class. This two-digit number specifies the level of priority assigned to the mobile for accessing the system. Ranges from 0 to 15.
Pchn Sys A 283	channel number STO	Primary CDMA channel for the A carrier. Ranges from 0 to 1,023. 0 indicates no channel.
Pchn Sys B 384	channel number STO	Primary CDMA channel for the B carrier. Ranges from 0 to 1,023. 0 indicates no channel.
Pchn Sys A 691	channel number STO	Secondary CDMA channel for the A carrier. Suggested setting is 0: ranges from 0 to 1,023.
Schn Sys B 777	channel number STO	Secondary CDMA channel for the B carrier. Suggested setting is 0: ranges from 0 to 1,023.
CD Acq SID 1 0	ID number STO	CDMA Acquisition System ID. Enables you to set the phone to acquire up to six SIDs in the CDMA mode. If you enter '0' for any SID, the program assumes that you have no more numbers to store. Default setting is 0: ranges from 0 to 32,767: up to six SIDs.
CD lockSID 1 10640	ID number STO	CDMA Lock System ID. Enable you to specify up to six SIDs that the phone will be prohibited from acquiring in CDMA mode. If all six SIDs are set to zero, no lock restrictions will be in effect and the phone can acquire all SIDs. Default setting is 10640,8103,0,0,0,0 : ranges from 0 to 32,767 up to six SIDs.
CDMA HomeSID Yes	↑S or ↑H STO	CDMA Home System ID. Enables the phone to allow mobile terminated calls while in the home system. Controls the types of registration allowed for the phone.

LCD Display	Key in	Function
CDMA fSID Yes	¶S or ¶H STO	CDMA foreign System ID. Enables the phone to allow mobile terminated calls while in a foreign system. Controls the types of registration allowed for the phone.
CDMA fNID Yes	¶S or ¶H STO	CDMA foreign Network ID. Enables the phone to allow mobile terminated calls while in a foreign system and foreign network ID. Controls the types of registration allowed for the phone.
SID #1 10641	number STO	System Identification Number. Controls how the phone acquires different systems. Determines the roaming status for the mobile. All SIDs range from 0 to 32,767: a 0 setting for the SID signifies that it is not active.
NID #1 65835	number STO	Network Identification Number. Controls how the phone acquires different systems, and is set and specified in conjunction with each SID (e.g., SID #1, NID #1). Determines the roaming status for the mobile. All SIDs range from 0 to 65,535: a 0 setting for one NID signifies that it is not active.
SID #2 13	number STO	See SID #1.
NID #2 0	number STO	See NID #1.
SID #3 0	number STO	See SID #1.
NID #3 0	number STO	See NID #1.
SID #4 0	number STO	See SID #1.
NID #4 0	number STO	See NID #1.

3-3 Setting Up NAM2

LCD Display	Key in	Function
NAM Program 1:General 2:Setup NAM1	3	-choose 'NAM2'.

The NAM2 setup program is the same as \varnothing ENAM1 \varnothing See NAM1.

3-4 Setting Up NAM3

LCD Display	Key in	Function
NAM Program 3:Setup NAM2 4:Setup NAM3	4	-choose 'NAM3'.

The NAM3 setup program is the same as \varnothing ENAM1 \varnothing See NAM1.

3-5 Setting Up NAM4

LCD Display	Key in	Function
NAM Program 5:Setup NAM4	5	-choose 'NAM4'.

The NAM4 setup program is the same as \varnothing ENAM1 \varnothing See NAM1.

MEMO

4. Data Transfer

When the main board of a customer's cellular phone is required to be replaced with a new one, or the customer is needed to use a phone lent from the service center while his phone is serviced, this feature is used to transfer(copy) all the EEPROM data of the customer's phone into the new board or the lent phone to keep the information the customer had stored into his phone personally.

4-1 Equipment Required

- ¶ Data Transfer program
- ¶ IBM compatible PC
- ¶ SCH-470 Test Jig
- ¶ 3.6V Power Supply

4-2 Connection

Connect the test jig to COM1 port on the PC and connect the interface cable of the test jig to the phone.

Caution : When you use the Data Transfer program with a note book PC, you might encounter some problem. Check your serial port setup in your notebook PC (see your note book manual).

Don't worry about the serial port setup when you use a desktop PC.

4-3 Getting Started

1. Run the DTRANxx.EXE file. If you run the file for the first time, the message 'INITIAL FILE IS CREATED' appears. Do not delete the created file because the file creates DTRANxx.CFG to store environment setup data. The message does not appear once you have run the program.
2. Press any key to go to next procedure.

Function Keys

- F1 Reads EEPROM data from the customer's cellular phone.

- F3 Displays SAMSUNG logo. To reenter to program mode, press F3 key again.
- F5 Write the data of the customer's phone into the EEPROM on the new board.
- F8 Switches from Hands-free mode to Diagnostic Monitor mode to allow the data transfer. To check this mode from the cellular phone, press FCN, 9, 1 on the key board in sequence.

ALT+X Exits programming and returns to DOS mode.

U

U

4-4 Operation Procedure

1. On standby mode, 'Please check the communication link between your PC and the phone prior to beginning ...' messages appear on the screen. You are ready to transfer data.
2. Switch the phone power on after you have run the program.
3. Press <F1> key to read EEPROM data from the customer's cellular phone. On screen, 'Change the mode of the phone from HANDS-FREE mode to DM mode' message appears. On the LCD display of the phone, 'AUTO TEST' and 'WRITE EEPROM' messages appear. If the phone is already in DM(Diagnostic Monitor) mode, the message does not appear.
4. After the mode is changed to DM, EEPROM data on the cellular phone is read by PC. You can monitor the reading procedure on the screen.
5. When the data reading is completed, 'Replace the source phone with the target phone and press <F5> when ready' message appears on the screen.
6. Press any key to clear the message. The cellular phone displays 'DELETED' and '300-300-3000' instead of greeting and phone number respectively. All the features of the phone including ESN are reset to default status, and the phone can not be operated.

7. Remove the phone from the test jig and connect the new phone to the test jig.

Caution: If you try to perform reading again without writing after reading is already done once, the error message 'READING FROM THE PHONE WAS ALREADY BEEN CARRIED OUT, WRITING SHOULD BE CARRIED OUT' appears on the screen.

8. Press <F5> key to perform writing EEPROM data. You can monitor the writing procedure on the screen.

9. When the data writing is completed, the phone will reset. The program returns to standby mode and is ready to read data from another phone. 'WELL DONE, DATA TRANSFER IS COMPLETED' appears on the screen.

10. Check if the transferred EEPROM data is the same.

4-5 If Error Occurs

Symptom	Solution
Program is running, but reading is not achieved.	<ul style="list-style-type: none"> ¶ Check if the serial port setup is properly made. ¶ Check if the test jig is connected correctly. The connection is made, by '1:1 PIN TO PIN' method (not NULL modem method). Only RX, TX signal grounds are connected. ¶ If you use DOS shell in Windows and COM1 is used by another DOS shell, exit the program.
You tried to copy EEPROM data into several units.	<ul style="list-style-type: none"> ¶ No way ! The test jig clears the information after writing is done. If you force to copy it into several units, the phone might not work properly.
You tried to write EEPROM data without reading the data first.	<ul style="list-style-type: none"> ¶ You cannot perform writing procedure unless reading is completed successfully. Error message appears on the screen.
For some reasons, data transfer is not completed without writing after reading the data.	<ul style="list-style-type: none"> ¶ If the program halts or is interrupted for some reasons, and you restart the program, 'WRITING IS BEING CARRIED OUT BY USING DATA NOT FINISHED' message appears on the screen. It means that the data you have read and not wrutten is restored and ready to write. If you have finished the program by pressing ALT key and X without writing after reading, the message 'WRITING IS NOT ACHIEVED, WILL CARRY OUT WRUTING FOR NEXT TIME' appears on the screen.
Reading is interrupted in the middle of the operation due to some problem with the phone.	<ul style="list-style-type: none"> ¶ You can clear the error message by pressing any key. Reading is cancelled. The EEPROM data on the phone is not cleared. You can restart to read the data.
Writing is interrupted in the middle of the operation due to some problem with the phone.	<ul style="list-style-type: none"> ¶ You can clear the error message by pressing any key. Writing is cancelled. You can restart writing from the beginning.

5. Circuit Description

5-1 Logic Section

5-1-1 Power Supply

With the battery installed on the phone and by pressing the END/■ key, the VBATT and ON_SW signals will be connected. This will turn on U123 DC_DC convertor.

This in turn will be supplied to PIN3, PIN4 of regulators U124, PIN6 of regulators U122, thus releasing them from the shut-down state to output regulated 3.3V. (The VBATT applied to ON-SW will turn on Q103(DTC144EE) resulting in the signal ON-SW-SENSE to change start the from High to Low.)

The MSM recognizes this signal and sends out PS_HOLD (logical HIGH) to turn on Q102 even after the PWR key is released.

The power from U124 is used in the digital part of MSM and BBA. The power from U122 is used in analog part of BBA.

5-1-2 Logic Part

The logic part consists of internal CPU of MSM, RAM, ROM and EEPROM. The MSM receives TCXO and CHIPX8 clock signals from the BBA and controls the phone during the operation. The major components are as follows:

- ¶UCPU : INTEL 80186 core (inside the MSM)
- ¶FLASH ROM : U129 - 8 Mbit FLASH MEMORY
- ¶SRAM : U127 - 2 Mbit STATIC RAM
- ¶FLASH ROM : U130 - 1 Mbit FLASH MEMORY
- ¶EEPROM : U102 - 128 Kbit SERIAL EEPROM

CPU

INTEL 80186 CMOS type 16-bit microprocessor is used for the main processing. The CPU controls all the circuitry. For the CPU clock, 27MHz resonator is used.

FLASH ROM

One 8 MBIT FROM is used to store the terminal's program. Using the down-loading program, the program can be changed even after the terminal is fully assembled.

SRAM

One 2 MBIT SRAMs is used to store the internal flag information, call processing data, and timer data.

EEPROM

One 128 KBIT EEPROM is used to store ESN, NAM, power level, volume level, and telephone number.

KEYPAD

For key recognition, key matrix is setup using SCAN0-6 of STORE signals and KEY0-3 of input ports of MSM. Ten LEDs and backlight circuitry are included in the keypad for easy operation in the dark.

LCD MODULE

LCD module contains a controller which will display the information onto the LCD by 8-bit data from the MSM. It also consists a DC-DC converter to supply -3.5V for fine view angle and LCD reflector to improve the display efficiency.

5-1-3 Baseband Part

MOBILE SYSTEM MODEM (MSM)

The MSM equipped with the INTEL 80C186 CPU core is an important component of the CDMA cellular phone. The MSM comes in a 176 pins TQFP package.

MICROPROCESSOR INTERFACE

The interface circuitry consists of reset circuit, address bus (A0-A19), data bus (AD0-AD15), and memory controls (ALE, DT_R, HWR/, LWR/, RAM_CS/, ROM_CS).

INPUT CLOCK

¶UCPU clock: 27 MHz

¶UTXCO/4 (pin 34): 4.92 MHz. This clock signal from the BBA is the reference clock for the MSM except in CDMA mode.

¶UCHIPX8 : 9.8304 MHz. The reference clock used during the CDMA mode.

BBA INTERFACE

CDMA, FM Data Interface

¶UTXIQDATA0-7 (pins 24-32) : TX data bus used during both CDMA and FM mode but it is used only for CDMA mode at this phone.

Clock

¶UTC_CLK (pin 22), TX_CLK/(pin 23) : Analog to Digital Converter (ADC) reference clock used in TX mode.

¶UCHIPX8 : ADC reference clock used in CDMA RX mode.

¶UFMCLK: TXclock used in FM mode.

ADC Interface

ADC_CLK (pin 3), ADC_ENABLE (pin 1) and ADC_DATA (pin 2) are required to control the internal ADC in the BBA.

Data Port Interface

Includes the UART. Also, supports Diagnostic Monitor (DM), HP equipment interface, down loading, and data service.

CODEC Interface

The MSM outputs 2.048 MHz PCM_CLK (pin 19) and 8 KHz CODEC_SYNC (pin 16, 20) to the CODEC (U117). The voice PCM data from the MSM (U101) PCM_DIN (pin 135) is compressed into 8 KHz, by QCELP algorithm in the CDMA mode.

RF Interface

TX : TX_AGC_ADJ (pin 35) port is used to control the TX power level and PA_ON (pin 44) signal is used to control the power amplifier. This signal depends on the TX vocoder rate.

RX : AGC_REF (pin 36) port is used to control the RX gain and TRK_LO_ADJ (pin 45) is used to compensate the TCXO clock.

General Purpose I/O Register Pins

Input/output ports to control external devices.

Power Down Control

When the IDLE/ signal turns LOW, only the TX sections will be disabled. If both the IDLE/ and SLEEP/ change to LOW, all the pins except for the TCXO and 27MHz clock are disabled.

5-1-4 Audio Part

TX AUDIO PATH

The voice signal output from microphone is filtered and amplified by the internal OP-AMP and is converted to PCM data by the CODEC (U117). The signal is then applied to the MSM (U101)'s internal vocoder.

RX AUDIO PATH

The PCM data from the MSM's converted to audio signal by ADC of CODEC (U117), is then amplified by the speaker amplifier (U111) to be sent to the speaker unit.

TX WBD, ST, SAT

These signals are generated from MSM. The modulation level of TX WBD and ST is 8 kHz/dev, and SAT is ≈ 2 kHz/dev.

BUZZER DRIVING CIRCUITY

Buzzer generates alert tone when the buzzer receives the timer signal from the MSM, it generates alert tone. The buzzer level is adjusted by the alert signal's period generated from the MSM timer.

KEY TONE GENERATION

Ringer signal (pin49) out from MSM (U101) is passed through 2 serial LPF consisting of R141, C146, R145, and C142 amplified at the speaker amp (U111), and comes out to speaker.

5-2 Receiver Section

LOW NOISE AMPLIFIER (LNA, Q302)

The low noise amplifier amplifies a weak signal received from the base station to obtain the optimum scvel (Noise figure = 1.5 dB, Gain = 16 dB).

IF BAND PASS FILTER (FOR CDMA)

IF SAW BPF (F303) is used for CDMA system having 1.23 MHz wideband and ± 630 kHz bandwidth. The filter also attenuates the image product generated at the mixer.

RADIO FREQUENCY BAND PASS FILTER (RF BPF)

The RF BPF accepts only a specific frequency (881 ± 12.5 MHz) from the signal received from the base station. The band width is 25 MHz.

BUFFER AMP (Q385)

Buffer (Q385) amplifiers signal to be applied to the local input of the down converter (U301) when a phase is locked between VCO (U341) and PLL IC (U342).

DOWN CONVERTER (MIXER, U302)

First local signal is applied to this down converter. The down converter transfers the signal amplified at the LNA into 85.38 MHz IF signal. 85.38 MHz IF signal is made by subtracting 881 ± 12.5 MHz RF signal from 966 ± 12.5 MHz first local signal.

AUTOMATIC GAIN CONTROLLER (AGC) AMP U303)

85.38 MHz IF signal is applied to IF AGC amp, the IF AGC output level is applied to BBA (Baseband Analog ASIC). The IF AGC amp (U302) keeps the signal at a constant level by controlling the gain. Dynamic range is 90dB, up gain +45dB, and down gain -45dB.

VOLTAGE CONTROLLED OSCILLATOR (VCO, U341)

The VCO (U341) generates the signal having 966 MHz center frequency and ± 12.5 MHz deviation with the voltage control. PLL IC (U342) controls this signal.

ANTENNA

Antenna allows signals to send to receive from the base station.

PHASE LOCKED LOOP (PLL, U342)

Input reference frequency is generated at VC_TCXO (U343) and the divided signal is generated at VCO. PLL compares the two signals and generates the desired signal with a pre-programmed counter which controls voltage.

VOLTAGE CONTROLLED TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR (VC-TCXO, U343)

It provides 19.68 MHz reference frequency to PLL. A correct frequency tuning is made by the voltage control.

DUPLEXER (F301)

Duplexer (F301) controls to transmit through the antenna only the signals within acceptable Tx frequency range (836 ± 12.5 MHz) and to receive through the antenna only the signals within acceptable Rx frequency range (881 ± 12.5 MHz). It also matches LNA input in receiving part and PA output in transmitter part with the antenna.

POWER SUPPLY REGULATOR (U382)

The power supply regulator generates a regulated power.

THERMISTOR (R498)

The thermistor (R498) detects temperature. It is used to compensate active component characteristics due to the temperature difference.

5-3 Transmitter Section

BBA (U401)

BBA (U401) consists of ADC, DAC, LPF (FM/CDMA), divider, VCO, logic control circuit, PLL, and mixer.

BBA performs a specific function between RF part and logic part, with MSM. The IF signal out from Rx IF AGC amp is secondly converted through the down-converter. The signal passes through the CDMA or FM filter, converts to digital signal through ADC, then is sent to MSM. The digital signal out from MSM converts to analog signal through each filter and the up-converters.

POWER AMP MODULE (U467)

Power Amp module (U467) amplifies signal (24dB Gain) to be sent out to the base station through the antenna.

UP CONVERTER (MIXER, U460)

The up-converter (U460) receives the first local signal to generate 836 \pm 12.5 MHz from the BBA. 836 \pm 12.5 MHz signal comes out of the mixer output by subtracting 130 MHz IF signal from 966 \pm 12.5 MHz first local signal.

RF AUTOMATIC GAIN CONTROLLER AMP (U461, U464)

The signal out to the base station should be a constant level. The TX RF AGC amp controls power to keep the signal at a constant level.

RF BAND PASS FILTER (BPF, F451)

The RF BPF (F451) accepts only a specific frequency (836 \pm 12.5MHz) to send it out to the base station. The band width is 25 MHz.

POWER SUPPLY SWITCHING (U484)

Power supply switching (Q484) turns on TX_POWER when the phone is in traffic mode and supplies power to the circuits.

POWER SUPPLY REGULATOR (U482, U483)

The power supply regulators (U482,U483) supply a regulated power to each part of transmitter. U482 supplies 3.6V to TX AGC amp (U461) and up-converter (U460). U483 supplies 3.0V to power amp module control circuit (U487).

5-4 Desk-Top Rapid Charger

The Desk-top rapid charger(DTC21) is largely divided by two parts. One part generates secondary static voltage and current from AC power source, and the other part detects the battery pack, the battery type, and charge voltage, and controls the charging status.

5-4-1 Power Supply

AC POWER PROTECTOR AND REGULATOR

The AC power is regulated through BD1, C2 and converted to the high DC voltage.

TNR1 is used for surge protector, F1 is fuse to protect from overcurrent, and C1 and LF1 are filters to eliminate the noise of the switching circuit.

SWITCHING CONTROLLER AND TRANSFORMER

U1 as a switching controller supplies static voltage and current to the secondary through U2 (photo coupler).

Transformer PTF1 is combined with the 4 winding coils. The primary winding is linked to the primary side and the secondary winding is linked to the secondary side so that it supplies power. The fourth winding is used to supply power to U1.

This SMPS circuitry uses a flyback method, so the secondary1, 2 and fourth coils are wound reversely against the primary. When the power applies to the primary, the secondary and third will be off. When the primary is power off, the saved power will apply to the secondary and U1.

D1, D2 is a snubber circuitry, and absorbs the counter-voltage which comes out when the primary winding is off.

STATIC ELECTRICAL CURRENT CIRCUITRY

The electric current which flows on the secondary winding is detected by R25. The current will be converted into proportional voltage through U23-A and Q21.

The proportional constant is changed according to the ON/OFF status of Q22, Q23, and Q24, so that it finally change the value of the static electrical current.

The V_i is added to the U24-A pin 2, and the voltage is compared with the reference voltage (V_r) of pin 3. When the V_i is greater than the V_r , Q36 turns on and the IC2-2 is activated.

At this time, IC2-1 becomes on. It makes IC1 be off, as a result, the primary will be off and limit the electric current output.

Assumes the static current on the secondary is I_c , the V_i will be obtained by following below.

$$V = \frac{(R25 // R77)}{(R23 // R24)} I_c [R26 // (\bullet R27) // (\bullet R28) // (\bullet R29)]$$

STANDARD : $\bullet = \circ f$	EXTENDED : $\bullet = \circ f$
$\bullet = 1$	$\bullet = \circ f$
$\bullet = \circ f$	$\bullet = 1$

The V_i is maintained as the same level as V_r of the comparator U24-B, so V_i is V_r . That is:

$$I_c = \frac{(R23 // R24) \circ \S V_r}{(R25 // R77) [R26 // (\bullet R27) // (\bullet R28) // (\bullet R29)]}$$

$$V_r = \frac{R48}{R47 + R48} V_{cc}$$

R68 and C49 are used to compensate the phase difference occurred due to the time delay for the circuit.

STATIC VOLTAGE CIRCUIT (4.1V OUTPUT)

The secondary (cathod of D23) output voltage V_o is separated by R50, VR1, R55, R79 and applied to the comparator U24-B pin 6. Q41 turns off (10k~33k) or on (0~5.1k) according to the resistance value in V/F (front/rear) terminal of R50,R79.

In accordance, when Q41 turns on, the parallel linked resistance value of R50 and R79 become smaller, so that 4.1V comes out. The voltage will be compared with the reference input voltage of pin 5, and feedback to the primary by U2(OPT).

U24-B output voltage is linked to U24-A output. It turns Q36 off. Consequently, if either one of these static voltage or static current overflows, it will automatically turn U1 off. R45 and C36 are used to compensate the phase difference caused by the time delay.

$$V_d = \frac{R_{55}}{(R_{50} // R_{79} + VR_{21}) + R_{55}} V_o$$

Since, the V_d is maintained to be the same level as the reference voltage V_r is,

$$V_o = \frac{(R_{50} // R_{79} + VR_{21}) + R_{55}}{R_{55}} V_r$$

STATIC VOLTAGE CIRCUIT (4.2V OUTPUT)

The secondary (cathod of D23) output voltage V_o is separated by R50, VR21, R55, R79 and applied to the comparator U24-B pin 6. Q41 turns off (10k~33k) or on (0~5.1k) according to the resistance value in V/F (front/rear) terminal of R50, R79.

In accordance, when Q41 turns off, only the parallel linked resistance value of R50 is selected, so that 4.2V comes out. The voltage will be compared with the reference input voltage of pin 5, and feedback to the primary by U2.

U24-B output voltage is linked to U24-A output. It turns Q36 off. Consequently, if either one of these static voltage or static current overflows, it will automatically turn U2 off. R45 and C36 are used to compensate the phase difference caused by the time delay.

$$V_d = \frac{R_{55}}{(R_{50} + VR_{21}) + R_{55}} V_o$$

Since the V_d is maintained to be the same level as the reference voltage V_r is,

$$V_o = \frac{(R_{50} + VR_{21}) + R_{55}}{R_{55}} V_r$$

CHARGE SWITCHING CIRCUITRY

The rapid charger has two charge ports; front port and rear port.

When the battery is charged in the front port, Q35 turns on. It turns Q34-A (P-CHANNEL FET) on.

When the battery is charged in the rear port, Q33 turns on. It turns Q34-B (P-CHANNEL FET) on.

When the battery level becomes low, this circuitry will charge the battery until it reaches 2.7V with Q26 and Q39.

5-4-2 ControllerMICRO-CONTROLLER

U21 is a 4-bit micro-controller which controls the whole charging system. It contains I/O port, timer, and A/D converter. 4 MHz clock is used for the controller.

DETECTION OF CHARGE VOLTAGE

The battery voltage in the front port is detected by R60 and R61, and measured at the pin 13 of the MPU.

The battery voltage in the rear port is detected by R58 and R59, and measured at the pin 14 of the MPU through the analog switch U25. measured at the pin 14 of the MPU through U25.

DETECTION OF BATTERY TYPE

The battery type in the front port is detected by R54, R56, and the resistor which is connected between the battery C/F and ground terminal, and measured at the pin 15 of the MPU through U26.

The battery type in the rear port is detected by R53, R57, and the resistor which is connected between the battery C/F and ground terminal, and measured at the pin 15 of the MPU through U26.

DETECTION OF AMBIENT TEMPERATURE

TH21 is a thermistor which is used to detect the ambient temperature. It has a linear characteristic by R51 and R52, and is measured at the pin 14 of the MPU through U25.

MEASURING CHARGING CURRENT

The charging current is converted through U23-A to the voltage V_i which is proportional to the current. The noise of V_i is eliminated with R71 and C30. Finally the voltage V_i is measured at the pin 12 of the MPU.

AUTONOMOUS TIMER

If the MPU stops its operation with the charging port on due to an accidental shock (for example, drop), the battery may become overcharged. The external timer U23-B is equipped to protect the battery from being overcharged. If the timer is not reset within a specified time by MPU, MPU will be automatically reset by the timer.

MEMO

6. Exploded View and its Parts List

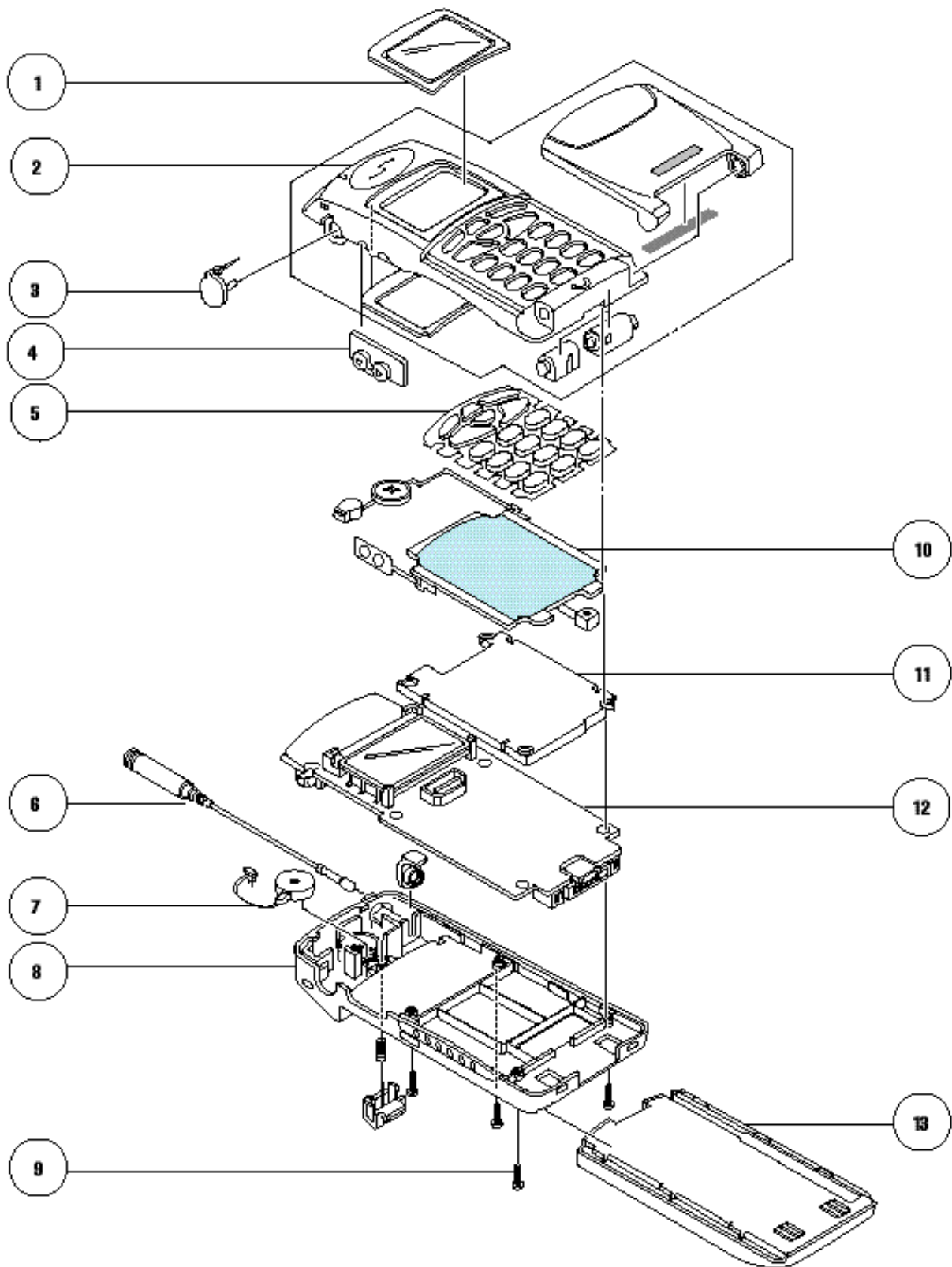
6-1 Fixed Phone Exploded View

6-2 Fixed Phone Parts List

6-3 Rapid Charger Exploded View

6-4 Cradle Dummy Ass'y & Cigar Lighter Adapter

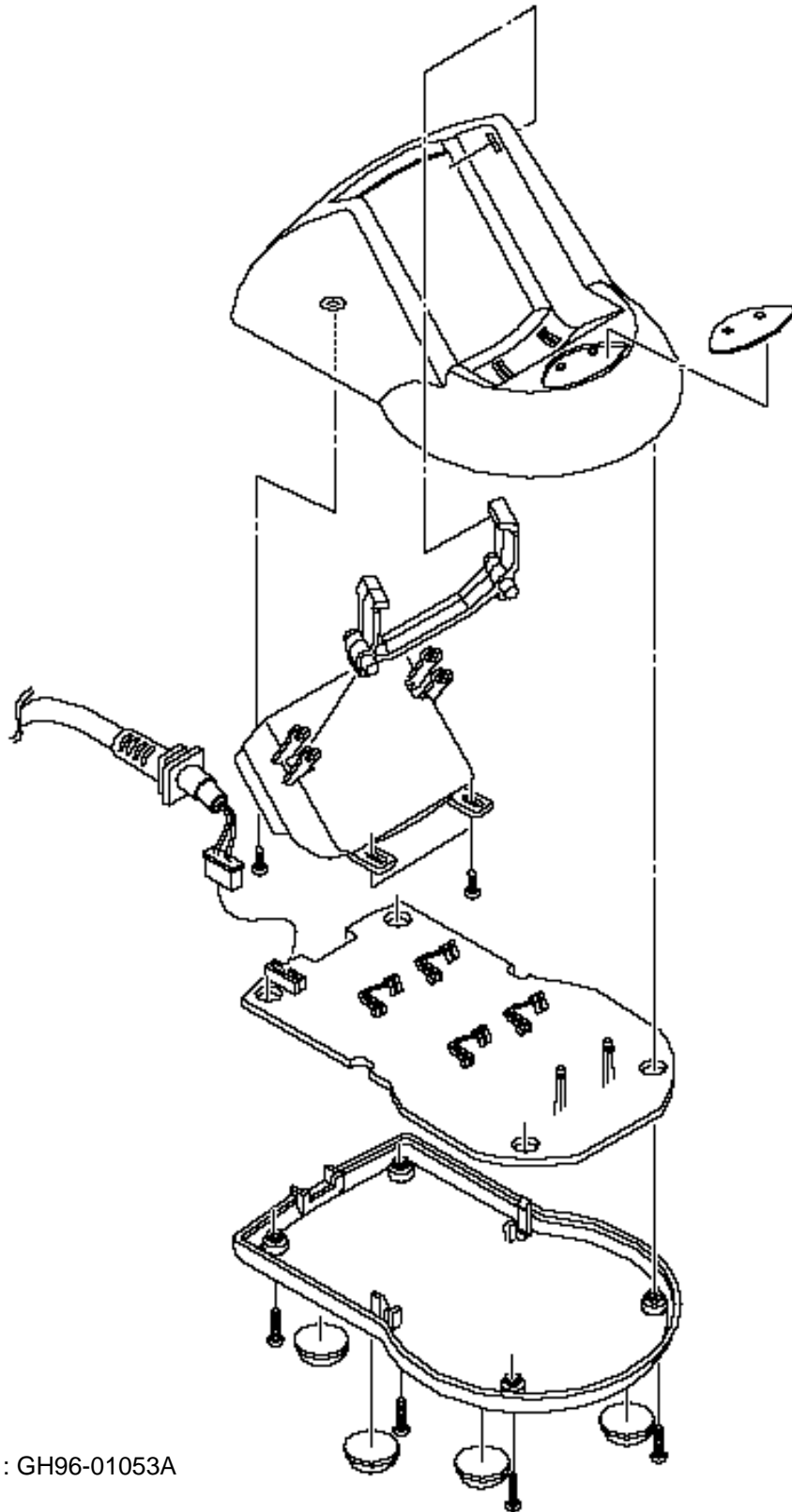
6-1 Fixed Phone Exploded View



6-2 Fixed Phone Parts List

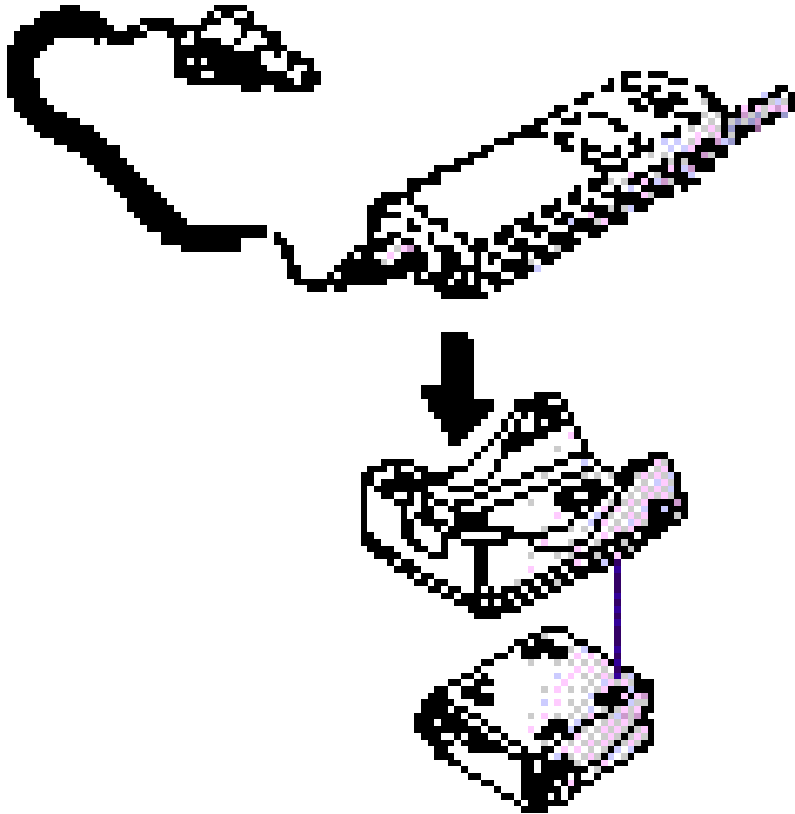
NO	DESCRIPTION	SEC. CODE				REMARK
		Black	Blue	Red	Dark Gray	
1	Front Window	GH72-41404A				
2	Front Cover Ass'y	GH75-11129A	GH75-11129B	GH75-11129C	GH75-11129D	
3	Earphone Dummy	GH73-40624A				
4	Volume Key	GH72-40626A				
5	Key Pad	GH72-41317B				
6	Antenna	GH42-10511A				
7	Motor Ass'y	GH96-01029A				
8	Rear Case	GH75-11130A				
9	Screw	6001-001046				
10	Key Pad Ass'y	GH59-10020A				
11	Shield Can	GH72-41445A				
12	Main PBA	GH72-41406A				
13	Battery	GH94-00791A			GH43-10307A GH43-10062A	Medium Extended-life

6-3 Rapid Charger Exploded View



SEC.CODE : GH96-01053A

6-4 Cradle Dummy Ass'y & Cigar Lighter Adapter



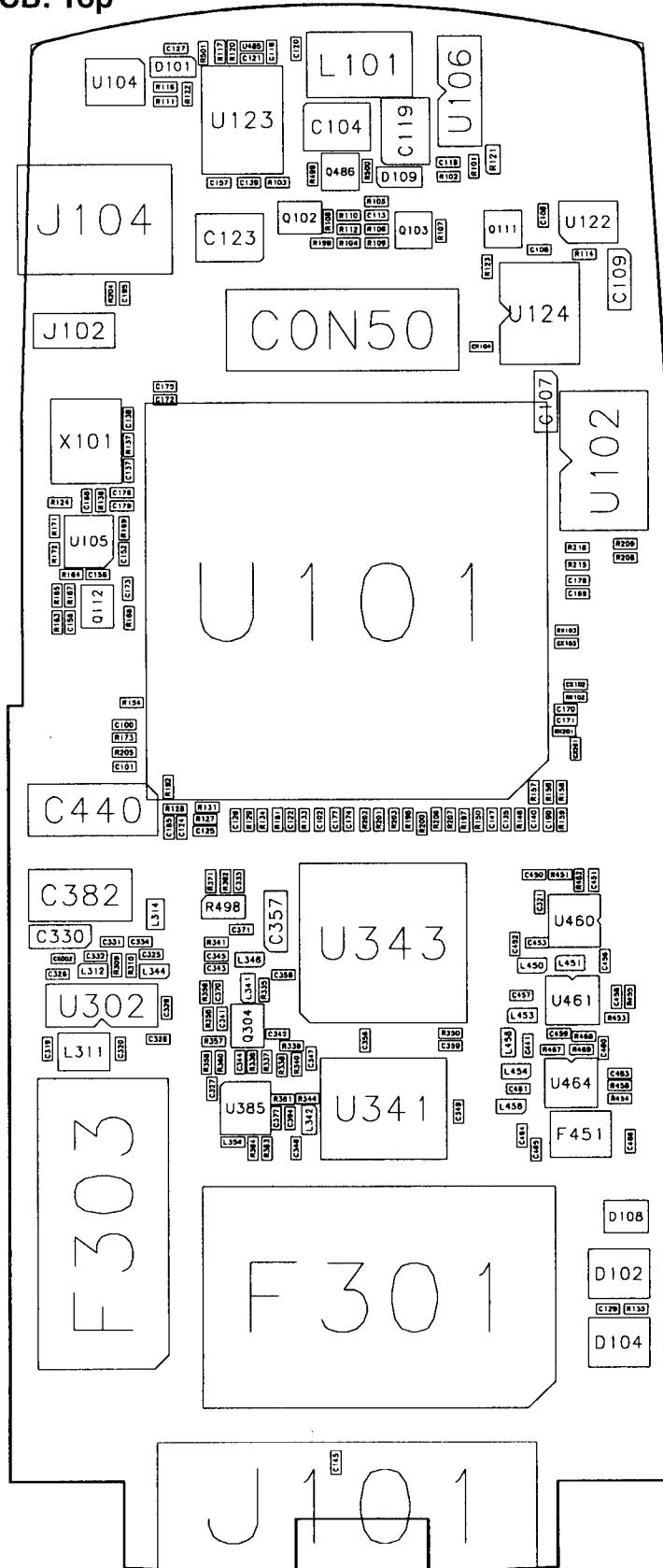
SEC.CODE : GH75-11215A

MEMO

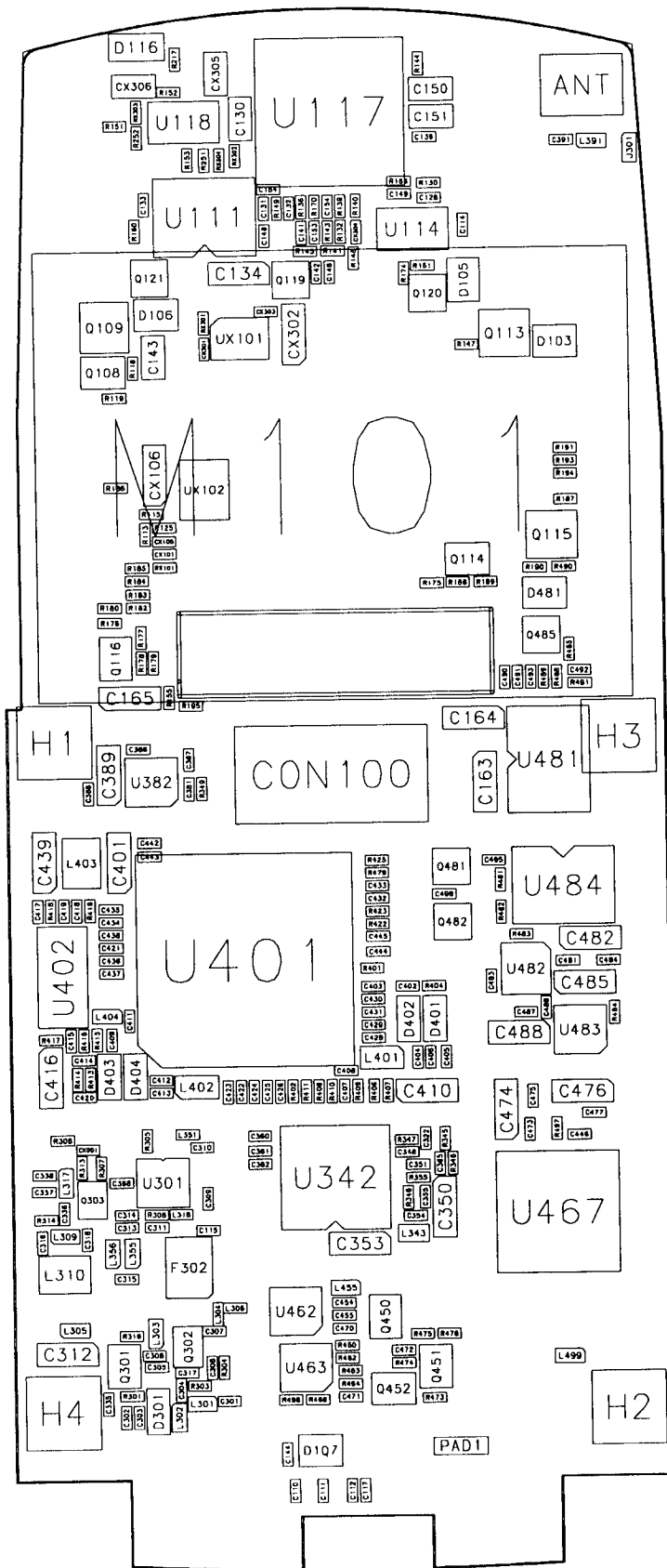
7. PCB Diagrams

7-1 Cellular Phone

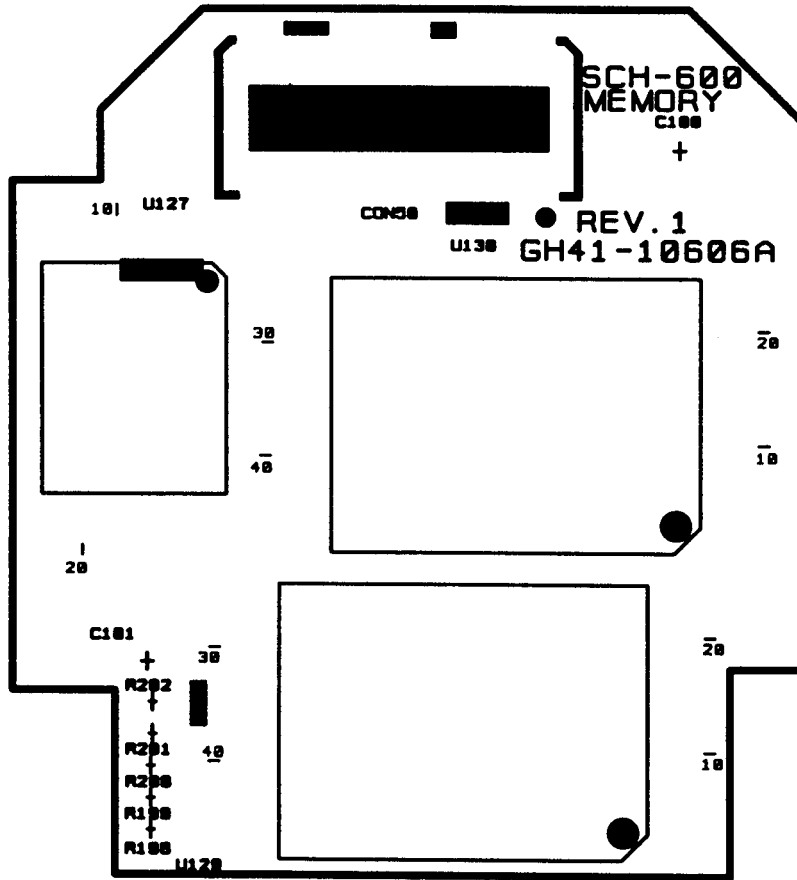
7-1-1 Main Board PCB: Top



7-1-2 Main Board PCB: Bottom



7-1-3 Memory Board PCB



7-2 Electrical Parts List

SEC. CODE	DESCRIPTION	PART NO.	POSITION
0405-000107	DIODEVARACTOR	D401,D402,D403,D404	TX
0401-001052	DIODE-SWITCHING	D101,D109	POWER
0407-000115	DIODE-ARRAY	D103,D105	AUDIO
0407-000115	DIODE-ARRAY	D106	POWER
0407-000122	DIODE-ARRAY	D102,D104	AUDIO
0407-000127	DIODE-ARRAY	D108,D107	LOGIC
0407-000127	DIODE-ARRAY	D481	TX
0409-000108	DIODE-PIN	D301	RX
0501-000162	TR-SMALL SIGNAL	Q116	POWER
0501-000162	TR-SMALL SIGNAL	Q452,Q450	TX
0501-000218	TR-SMALL SIGNAL	Q112	LOGIC
0501-000218	TR-SMALL SIGNAL	Q108,Q114,Q102	POWER
0501-000218	TR-SMALL SIGNAL	Q301	RX
0501-000218	TR-SMALL SIGNAL	Q451	TX
0501-000457	TR-SMALL SIGNAL	Q113	AUDIO
0501-000457	TR-SMALL SIGNAL	Q109,Q115	POWER
0501-000689	TR-SMALL SIGNAL	Q304	RX
0501-002063	TR-SMALL SIGNAL	Q303	RX
0504-000167	TR-DIGITAL	Q119	AUDIO
0504-000167	TR-DIGITAL	Q481,Q482	TX
0504-000168	TR-DIGITAL	Q103,Q121	POWER
0504-000172	TR-DIGITAL	Q120	AUDIO
0504-000172	TR-DIGITAL	Q111	POWER
0504-001016	TR-DIGITAL	Q485	TX
0505-001062	FET-GAAS	U301	RX
0505-001095	FET-SILICON	U106	POWER
0505-001119	FET-SILICON	Q302	RX
0505-001165	FET-SILICON	U104	POWER
0505-001170	FET-SILICON	U484	TX
0601-000355	LED,CHIP,RED	D116	POWER
0801-000885	IC-CMOS LOGIC	U105	LOGIC

SEC. CODE	DESCRIPTION	PART NO.	POSITION
0803-003010	IC-TTL	U114	AUDIO
1001-001019	IC-ANALOG MULTIPLEX	U481	TX
1103-001062	IC-EEPROM	U102	POWER
1201-000103	IC-AUDIO AMP	U111	AUDIO
1201-001006	IC-OP AMP	U463,U462	TX
1201-001090	IC-PREAMP	U385	RX
1201-001175	IC-PREAMP	U464	TX
1201-001176	IC-PREAMP	U461	TX
1201-001257	IC-AGC AMP	U302	RX
1201-001259	IC-POWER AMP	U467	TX
1202-000192	IC-CMOS,COMPARATOR	U118	AUDIO
1203-000384	IC-VOLTAGE REGULATOR	U122,UX101	POWER
1203-001107	IC-VOLTAGE REGULATOR	U482	TX
1203-001256	IC-VOLTAGE REGULATOR	U382	RX
1203-001285	IC-VOLTAGE REGULATOR	U483	TX
1203-001335	IC-VOLTAGE REGULATOR	U124	POWER
1203-001396	IC-PWM CONTROLLER	U123	POWER
1204-001106	IC-ASP	U117	AUDIO
1204-001113	IC-IF CIRCUIT	U401	TX
1205-001196	IC-LIN, MODEM	U101	LOGIC
1205-001253	IC-MIXER	U460	TX
1209-000142	IC-SYNTHESIZER	U342	RX
1209-001078	IC-PLL/SYNTHESIZER	U402	TX
1404-001040	THERMISTOR-NTC	R498	RX
2007-000070	R-CHIP 0 1/16W	L450	TX
2007-000137	R-CHIP 2K 1/16W	R417	TX
2007-000138	R-CHIP 100 1/16W	R154	LOGIC
2007-000140	R-CHIP 1K 1/16W	R147,R132,R204	AUDIO
2007-000140	R-CHIP 1K 1/16W	R192,R205,R156,R158	LOGIC
2007-000140	R-CHIP 1K 1/16W	R188,R209,R109	POWER
2007-000140	R-CHIP 1K 1/16W	R345,R346	RX

SEC. CODE	DESCRIPTION	PART NO.	POSITION
2007-000140	R-CHIP 1K 1/16W	R416,R451	TX
2007-000141	R-CHIP 2.2K 1/16W	R128,R164	LOGIC
2007-000141	R-CHIP 2.2K 1/16W	R314	RX
2007-000142	R-CHIP 2.7K 1/16W	R475,R456,R491	TX
2007-000143	R-CHIP 4.7K 1/16W	R145,R152,R140,R141	AUDIO
2007-000143	R-CHIP 4.7K 1/16W	R173,R129	LOGIC
2007-000143	R-CHIP 4.7K 1/16W	R176	POWER
2007-000143	R-CHIP 4.7K 1/16W	R466,R402	TX
2007-000146	R-CHIP 6.8K 1/16W	R455	TX
2007-000148	R-CHIP 10K 1/16W	R144,R143,R174,RX304, RX302,RX303	AUDIO
2007-000148	R-CHIP 10K 1/16W	R196,R197,R200-R203,R206, R207,R157,R159°	LOGIC
2007-000148	R-CHIP 10K 1/16W	R180,R182,R183,R185	POWER
2007-000148	R-CHIP 10K 1/16W	R178,U485	POWER
2007-000148	R-CHIP 10K 1/16W	R337,R305	RX
2007-000148	R-CHIP 10K 1/16W	R406,R407,R413,R415,R462, R464,R460,R414, R485,R473, R496	TX
2007-000149	R-CHIP 12K 1/16W	R103	POWER
2007-000151	R-CHIP 15K 1/16W	R208	POWER
2007-000151	R-CHIP 15K 1/16W	R307	RX
2007-000152	R-CHIP 20K 1/16W	R133,R134	LOGIC
2007-000153	R-CHIP 22K 1/16W	R181,R131	LOGIC
2007-000153	R-CHIP 22K 1/16W	R106,R189,R119,R199	POWER
2007-000153	R-CHIP 22K 1/16W	R474	TX
2007-000155	R-CHIP 27K 1/16W	R251,R252,R170,R136	AUDIO
2007-000155	R-CHIP 27K 1/16W	R463	TX
2007-000157	R-CHIP 47K 1/16W	R139,R166,R147	AUDIO
2007-000157	R-CHIP 47K 1/16W	R118	POWER
2007-000157	R-CHIP 47K 1/16W	R349	RX
2007-000157	R-CHIP 47K 1/16W	R481,R482,R483,R484	TX

SEC. CODE	DESCRIPTION	PART NO.	POSITION
2007-000159	R-CHIP 56K 1/16W	R148	AUDIO
2007-000159	R-CHIP 56K 1/16W	R167	LOGIC
2007-000161	R-CHIP 82K 1/16W	R146,R150	LOGIC
2007-000162	R-CHIP 100K 1/16W	R151,R153	AUDIO
2007-000162	R-CHIP 100K 1/16W	R169,R172	LOGIC
2007-000162	R-CHIP 100K 1/16W	R120,R116,R111,R108,R110	POWER
2007-000162	R-CHIP 100K 1/16W	R105,R123,R107,R113,R122	POWER
2007-000164	R-CHIP 150K 1/16W	R114,RX301	POWER
2007-000170	R-CHIP 1M 1/16W	R137	LOGIC
2007-000171	R-CHIP 0 1/16W	R138,R216,R215	LOGIC
2007-000171	R-CHIP 0 1/16W	R125,R501,R184	POWER
2007-000171	R-CHIP 0 1/16W	R364,C318,R316,R344	RX
2007-000171	R-CHIP 0 1/16W	R425,R408,R409,R418	TX
2007-000172	R-CHIP 10 1/16W	R306,R356,R350,R347,R348, R339,R341	RX
2007-000172	R-CHIP 10 1/16W	R401,R419	TX
2007-000772	R-CHIP 33K 1% 1/16W	R121	POWER
2007-000775	R-CHIP 33K 1/16W	R163	LOGIC
2007-000775	R-CHIP 33K 1/16W	R104	POWER
2007-000831	R-CHIP 39K 1/16W	R135	AUDIO
2007-000831	R-CHIP 39K 1/16W	R177	POWER
2007-000932	R-CHIP 470 1/16W	R127,R155	LOGIC
2007-000932	R-CHIP 470 1/16W	R301	RX
2007-000982	R-CHIP 5.6K 1/16W	R362	RX
2007-000982	R-CHIP 5.6K 1/16W	R453,R454,R476	TX
2007-001119	R-CHIP 680 1/16W	R355	RX
2007-001217	R-CHIP 82 1/16W	R186,R187	POWER
2007-001244	R-CHIP 91K 1/16W	R175	POWER
2007-001288	R-CHIP 18 1/16W	R360	RX
2007-001294	R-CHIP 36 1/16W	R191,R193,R194	POWER
2007-001294	R-CHIP 36 1/16W	R336	RX

SEC. CODE	DESCRIPTION	PART NO.	POSITION
2007-001298	R-CHIP 51 1/16W	R468	TX
2007-001305	R-CHIP 120 1/16W	R467,R469	TX
2007-001306	R-CHIP 150 1/16W	R361,R358	RX
2007-001307	R-CHIP 180 1/16W	R217	POWER
2007-001311	R-CHIP 270 1/16W	R308,R357	RX
2007-001313	R-CHIP 330 1/16W	RX102,RX201	LOGIC
2007-001319	R-CHIP 1.2K 1/16W	RX101,RX103	LOGIC
2007-001319	R-CHIP 1.2K 1/16W	R490	TX
2007-001320	R-CHIP 1.8K 1/16W	R303	RX
2007-001320	R-CHIP 1.8K 1/16W	R410	TX
2007-001325	R-CHIP 3.3K 1/16W	R190,R115	POWER
2007-001333	R-CHIP 18K 1/16W	R335	RX
2007-002797	R-CHIP 560 1/16W	R452	TX
2007-002965	R-CHIP 15 1/16W	R313	RX
2007-003030	R-CHIP 91 1/16W	R304	RX
2007-007001	R-CHIP 3.9K 1/16W	R160,R161	AUDIO
2007-007001	R-CHIP 3.9K 1/16W	R168	LOGIC
2007-007001	R-CHIP 3.9K 1/16W	R179	POWER
2007-007001	R-CHIP 3.9K 1/16W	R479	TX
2007-007021	R-CHIP 75K 1/16W	R112	POWER
2007-007131	R-CHIP 13K 1% 1/16W	R488	TX
2007-007132	R-CHIP 15K 1% 1/16W	R489	TX
2007-007133	R-CHIP 300 1% 1/16W	R404	TX
2007-007134	R-CHIP 39K 1% 1/16W	R411	TX
2007-007141	R-CHIP 240 1/16W	R309,R310	RX
2007-007480	R-CHIP 130K 1% 1/16W	R101	POWER
2007-007529	R-CHIP 91K 1% 1/16W	R102	POWER
2203-000234	C-CHIP 100P 1005	C145,C185,CX102,CX201	LOGIC
2203-000234	C-CHIP 100P 1005	C345,C370,C331,C334,C347, C359,C348	RX
2203-000234	C-CHIP 100P 1005	C360-C362	RX

SEC. CODE	DESCRIPTION	PART NO.	POSITION
2203-000234	C-CHIP 100P 1005	C411,C451,C417,C491,C493	TX
2203-000254	C-CHIP 10NF 1005	C110,C112,C111	AUDIO
2203-000254	C-CHIP 10NF 1005	C100,C179,C177,C169,C171, C175,C126,C152	LOGIC
2203-000254	C-CHIP 10NF 1005	C155,CX101	LOGIC
2203-000254	C-CHIP 10NF 1005	C121,CX104,CX105	POWER
2203-000254	C-CHIP 10NF 1005	C326,C308,C388,C346,C354, C355,C356,C358	RX
2203-000254	C-CHIP 10NF 1005	C381,C386,C333,C371,C394, C343,C349	RX
2203-000254	C-CHIP 10NF 1005	C461,C403,C444,C445,C429, C425,C475	TX
2203-000254	C-CHIP 10NF 1005	C423,C437,C435,C433,C431, C452,C495,C490	TX
2203-000254	C-CHIP 10NF 1005	C492,C481,C487,C486,C443, C483,C455,C470	TX
2203-000254	C-CHIP 10NF 1005	C471,C472,C473,C418,C457, C484,C441,C477	TX
2203-000278	C-CHIP 10PF 1005	C342,C313,C316	RX
2203-000359	C-CHIP 150PF 1005	C453	TX
2203-000386	C-CHIP 15PF 1005	C303	RX
2203-000438	C-CHIP 1N 1005	CX304	AUDIO
2203-000438	C-CHIP 1NF 1005	C125,C101,C140,C190	LOGIC
2203-000438	C-CHIP 1NF 1005	C113	POWER
2203-000438	C-CHIP 1NF 1005	C302,C301,C309,C311,C310, C377,C305,C306	RX
2203-000438	C-CHIP 1NF 1005	C336,C338,C307,C368,C327, C344,C315,CX001	RX
2203-000438	C-CHIP 1NF 1005	C450,C414,C428,C426,C424, C422,C436,C434	TX
2203-000438	C-CHIP 1NF 1005	C432,C430,C496,C442,C459, C460,C464,C419	TX
2203-000438	C-CHIP 1NF 1005	C454,C408	TX
2203-000466	C-CHIP 1PF 1005	C332,C325,C317	RX

SEC. CODE	DESCRIPTION	PART NO.	POSITION
2203-000466	C-CHIP 1PF 1005	C456	TX
2203-000489	C-CHIP 2.2NF 1005	C148,C131	AUDIO
2203-000489	C-CHIP 2.2NF 1005	C156	LOGIC
2203-000489	C-CHIP 2.2NF 1005	C402	TX
2203-000585	C-CHIP 220PF 1005	C124	LOGIC
2203-000585	C-CHIP 220PF 1005	C139	POWER
2203-000585	C-CHIP 220PF 1005	C387	RX
2203-000628	C-CHIP 22PF 1005	C314,C328	RX
2203-000679	C-CHIP 27PF 1005	C412,C413	TX
2203-000696	C-CHIP 2PF 1005	C420,C406,C465	TX
2203-000714	C-CHIP 3.3N 1005	C117	AUDIO
2203-000870	C-CHIP 3PF 1005	C319,C320,C341	RX
2203-000941	C-CHIP 470PF 1005	C144	LOGIC
2203-000941	C-CHIP 470PF 1005	CX103	LOGIC
2203-000941	C-CHIP 470PF 1005	C335,C329,CX002	RX
2203-000995	C-CHIP 47PF 1005	C463,C458,C404,C405	TX
2203-001033	C-CHIP 5.6NF 1005	C153	AUDIO
2203-001124	C-CHIP 680PF 1005	C133,C132	AUDIO
2203-001153	C-CHIP 68PF 1005	C135,C147	LOGIC
2203-001153	C-CHIP 68PF 1005	C337	RX
2203-001201	C-CHIP 7PF 1005	C304	RX
2203-001210	C-CHIP 8.2NF 1005	C102,C122	LOGIC
2203-001210	C-CHIP 8.2NF 1005	C438,C421	TX
2203-001259	C-CHIP 8PF 1005	C322	RX
2203-001405	C-CHIP 22NF 1005	C141,C142,C154	AUDIO
2203-001416	C-CHIP 33NF 1005	C415	TX
2203-001432	C-CHIP 47NF 1005	C365	RX
2203-001437	C-CHIP 5PF 1005	C137,C138	LOGIC
2203-001724	C-CHIP 47uF	CX302	POWER
2203-005054	C-CHIP 4.7P 1005	C466	TX
2203-005061	C-CHIP 100NF 1005	C129,C128,C146,C136	AUDIO

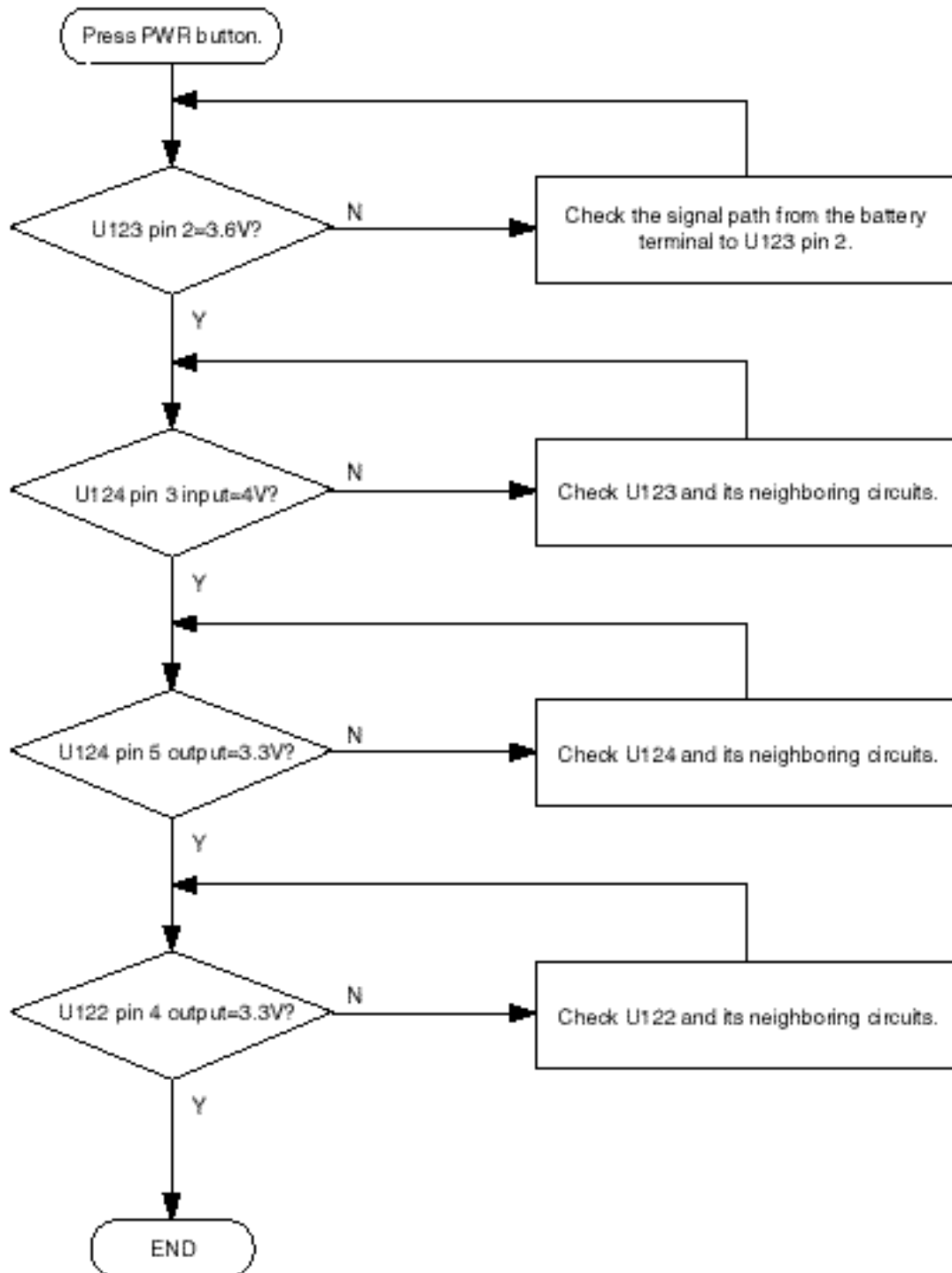
SEC. CODE	DESCRIPTION	PART NO.	POSITION
2203-005061	C-CHIP 100NF 1005	C176,C174,C178,C170,C172, C173,C168	LOGIC
2203-005061	C-CHIP 100NF 1005	C106,C108,C120,C116,C118, C157,C127,CX303, CX301	POWER
2203-005144	C-CHIP 1UF 2012	C150,C151,C130	AUDIO
2203-005144	C-CHIP 1UF 2012	C143 POWER	
2404-000139	C-TA 10UF/6.3V	C107,C109	POWER
2404-000139	C-TA 10UF/6.3V	C312,C330,C389,C353,C357	RX
2404-000139	C-TA 10UF/6.3V	C439,C401,C488,C485,C476, C474	TX
2404-000151	C-TA 1UF/16V	C410	TX
2404-000167	C-TA 2.2UF/16V	C134	AUDIO
2404-000167	C-TA 2.2UF/16V	C482	TX
2404-000222	C-TA 33UF/16V	C382	RX
2404-000232	C-TA 4.7UF/10V	C163,C165,C164	POWER
2404-000274	C-TA 1.5UF/16V	C416	TX
2404-000278	C-TA 100UF/10V	C440	TX
2404-000312	C-TA 470NF/16V	C350	RX
2404-001032	C-TA 33UF/6.3V	C123	AUDIO
2404-001032	C-TA 33UF/6.3V	C104,C119	POWER
2703-000109	INDUCTOR 100NH	L309	RX
2703-000109	INDUCTOR 100NH	L404	TX
2703-000195	INDUCTOR 330NH	L310	RX
2703-000237	INDUCTOR 750NH	L403	TX
2703-000261	INDUCTOR 390NH	L311	RX
2703-000300	INDUCTOR 1UH	L305,L314,L343,L346,L342	RX
2703-000300	INDUCTOR 1UH	L455	TX
2703-000301	INDUCTOR 2.7UH	L312,L344	RX
2703-001031	INDUCTOR 33NH	L401	TX
2703-001049	INDUCTOR 100NH	L402	TX
2703-001166	INDUCTOR 5.6NH	L391	RX
2703-001167	INDUCTOR 8.2NH	L341	RX

SEC. CODE	DESCRIPTION	PART NO.	POSITION
2703-001172	INDUCTOR 100NH	L303,L317	RX
2703-001172	INDUCTOR 100NH	L458	TX
2703-001173	INDUCTOR 12NH	L451,L499	TX
2703-001175	INDUCTOR 56NH	L355,L356	RX
2703-001179	INDUCTOR 10NH	L351,L354	RX
2703-001181	INDUCTOR 27NH	L316	RX
2703-001190	INDUCTOR 15NH	L301	RX
2703-001263	INDUCTOR 4.7NH	C446	TX
2703-001285	INDUCTOR 39NH	L302	RX
2703-001408	INDUCTOR 8.2NH	L306	RX
2703-001409	INDUCTOR 12NH	L304	RX
2703-001413	INDUCTOR 27NH	L453,L454,L456	TX
2703-001563	INDUCTOR 10UH	L101	POWER
2802-001048	RESONATOR 27MHz	X101	LOGIC
2806-001146	OSCILLATOR-VCTCXO	U341	RX
2809-001205	OSCILLATOR-VCTCXO 19.68M	U343	RX
2904-000297	FILTER-SAW 85.38MHz	F303	RX
2904-001011	FILTER-SAW 881.5MHz	F302	RX
2904-001012	FILTER-SAW 836.5MHz	F451	TX
2909-001004	FILTER-DUPLEXER 881MHz	F301	RX
3710-001105	CONNECTOR-SOCKET 2P	J102	POWER
3710-001117	CONNECTOR-SOCKET 24P	CON100	LOGIC
3710-001302	CONNECTOR-SOCKET 18P	J101	AUDIO
3711-002048	CONNECTOR-HEADER	CON50	LOGIC
3722-001172	JACK POWER	J104	AUDIO
GH07-20521A	LCD	M101	POWER
GH39-20008A	CBF-SIGNAL	J301	RX

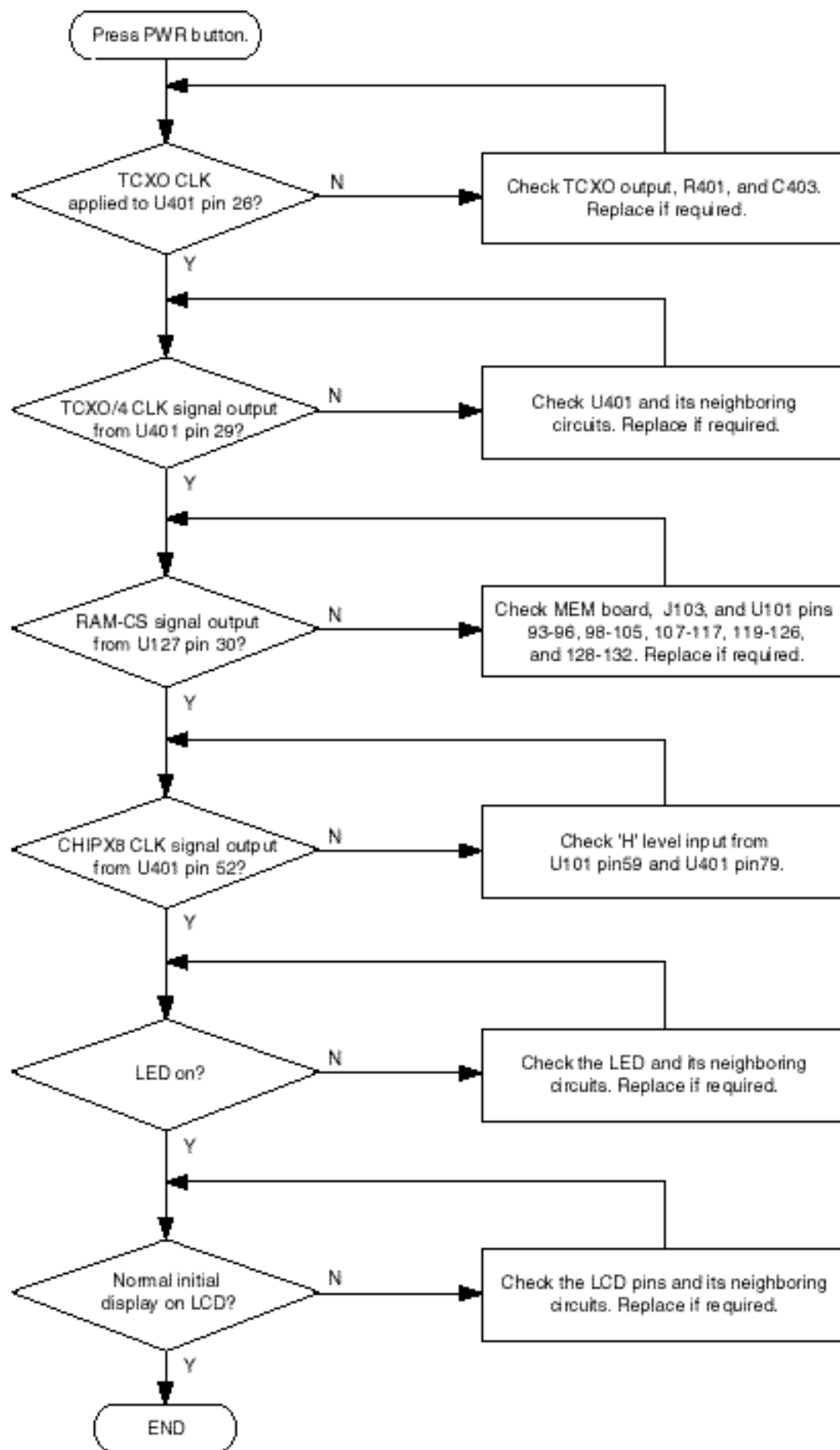
8. Troubleshooting

8-1 Logic Section

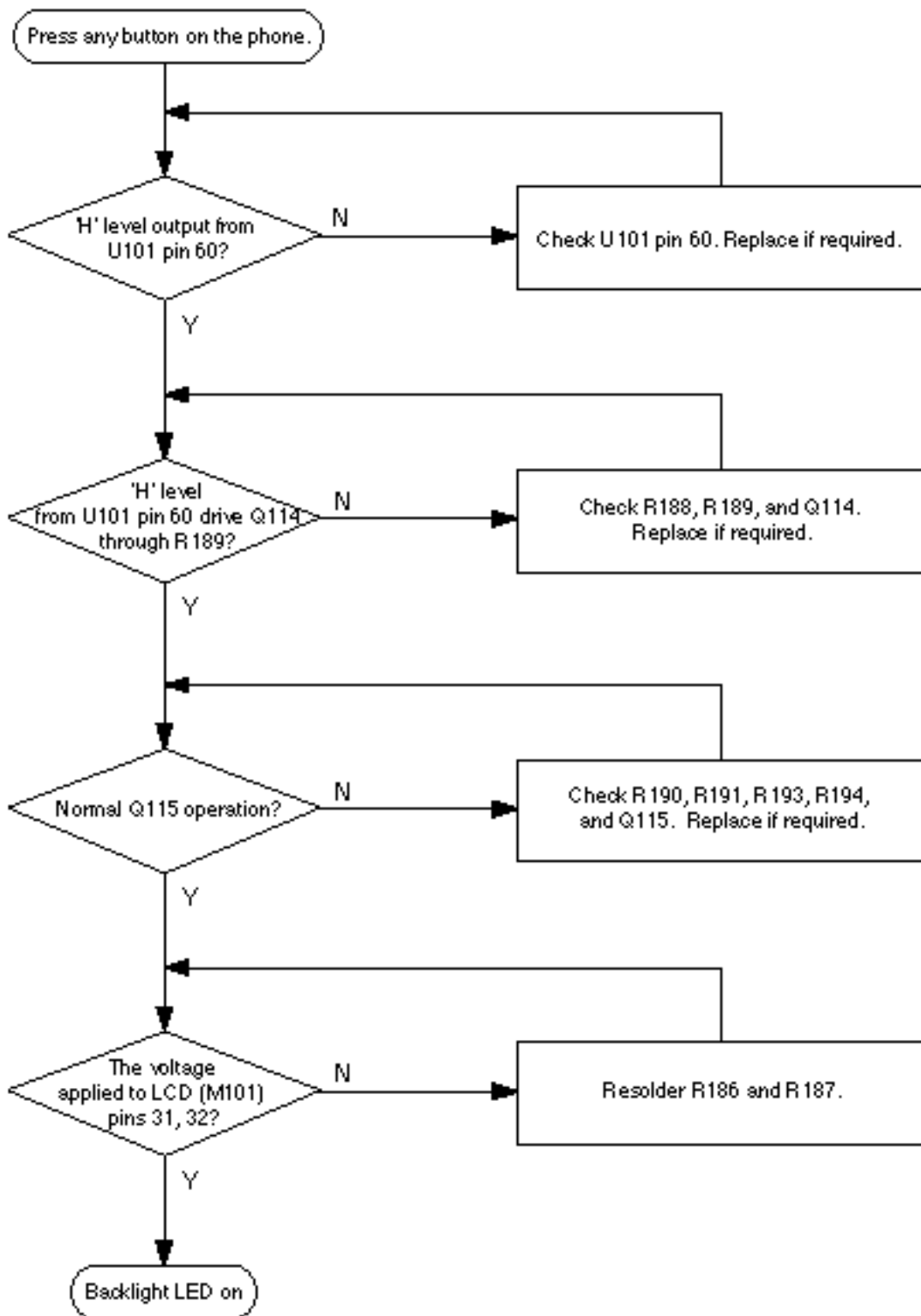
8-1-1 No Power



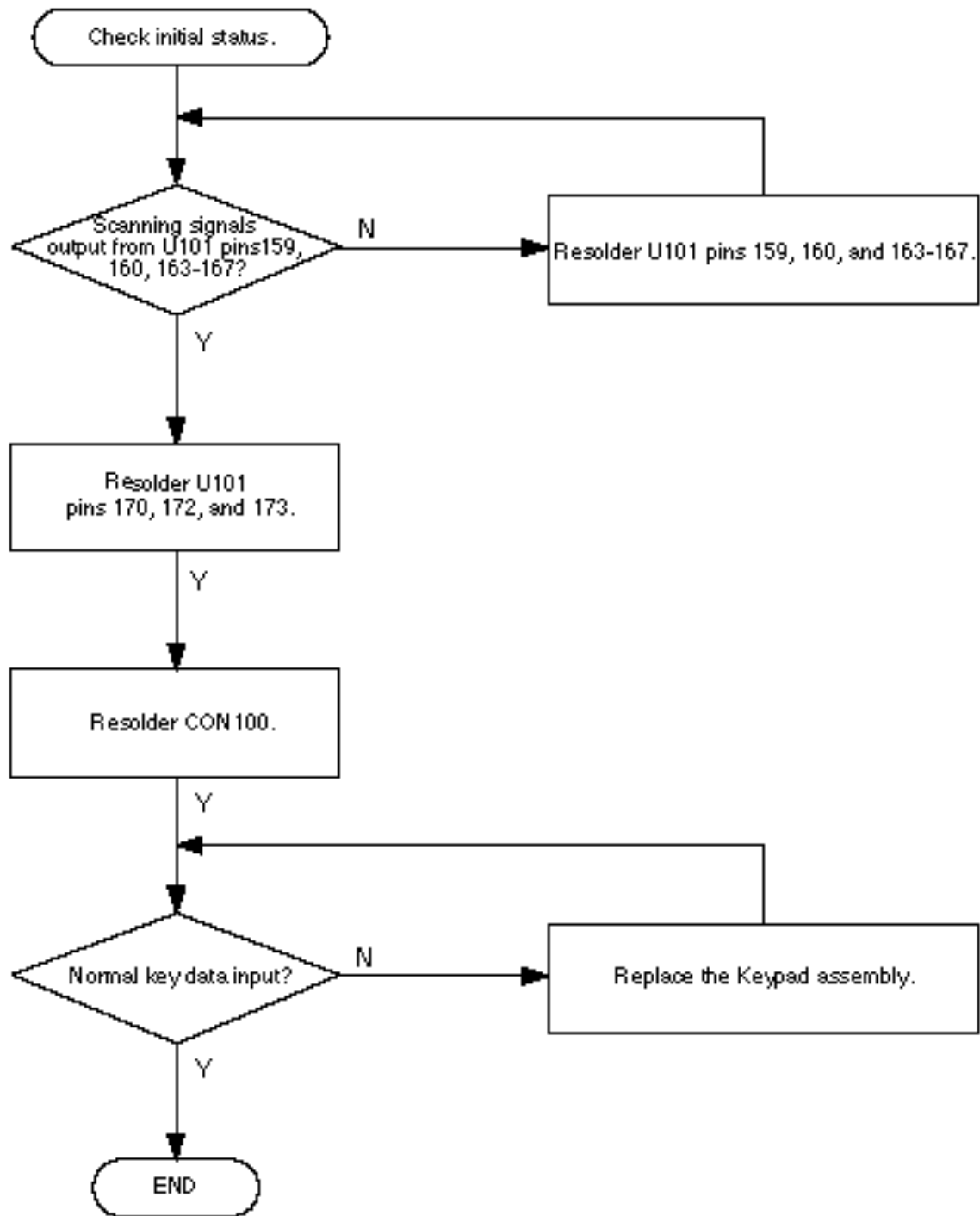
8-1-2 Abnormal Initial Operation (Normal +3.3V voltage source)



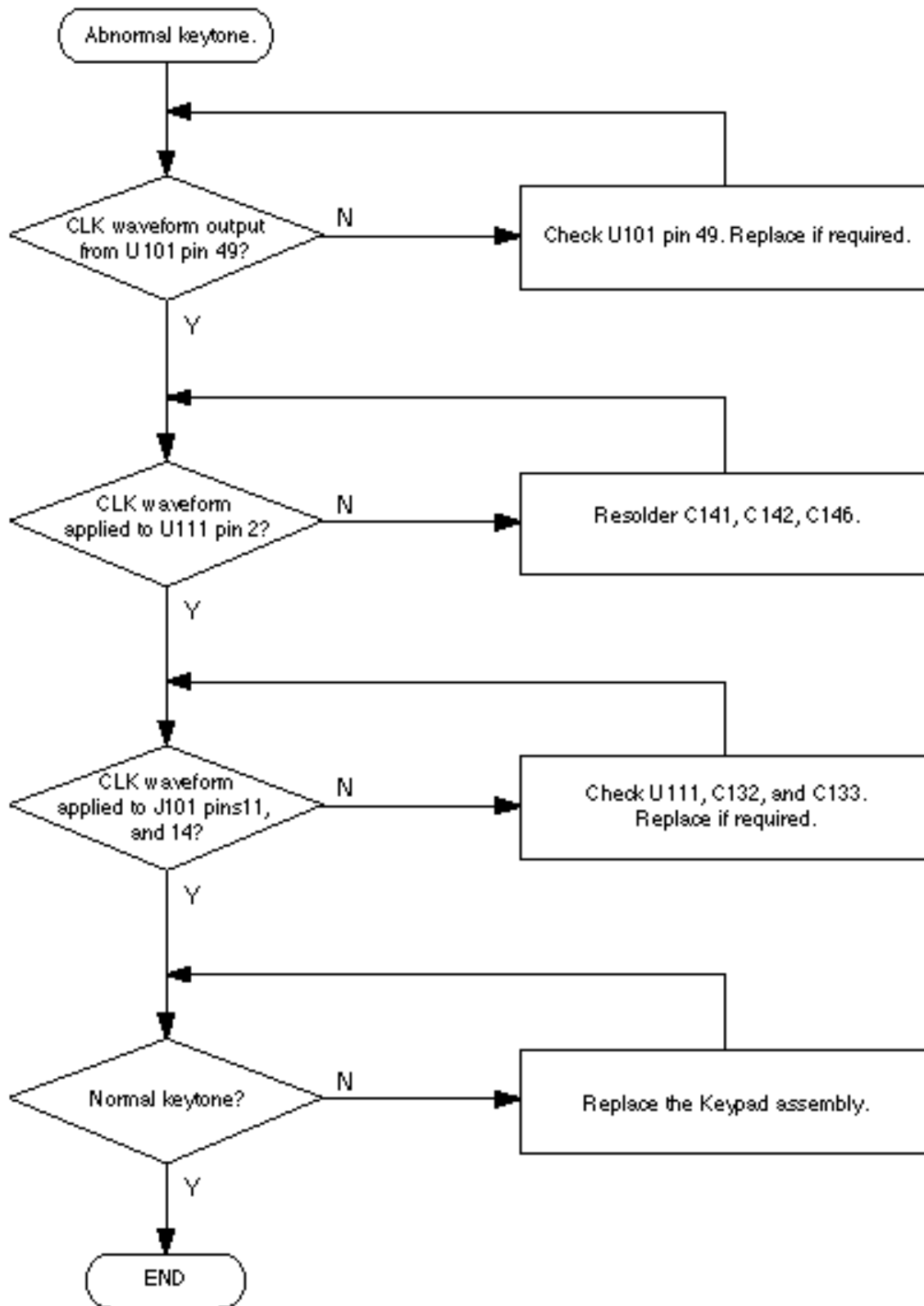
8-1-3 Abnormal Backlight Operation



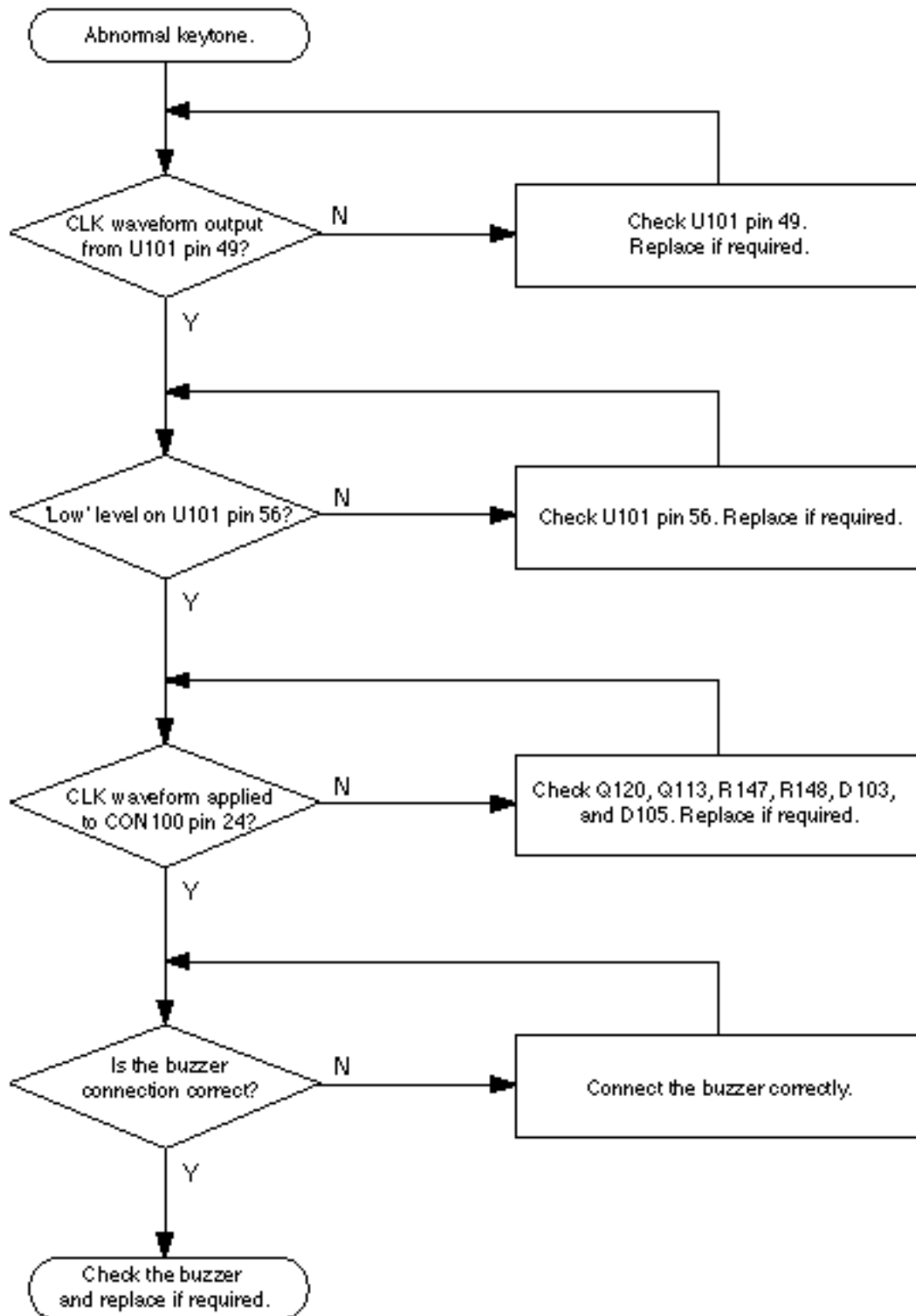
8-1-4 Abnormal Key Data Input



8-1-5 Abnormal Keytone

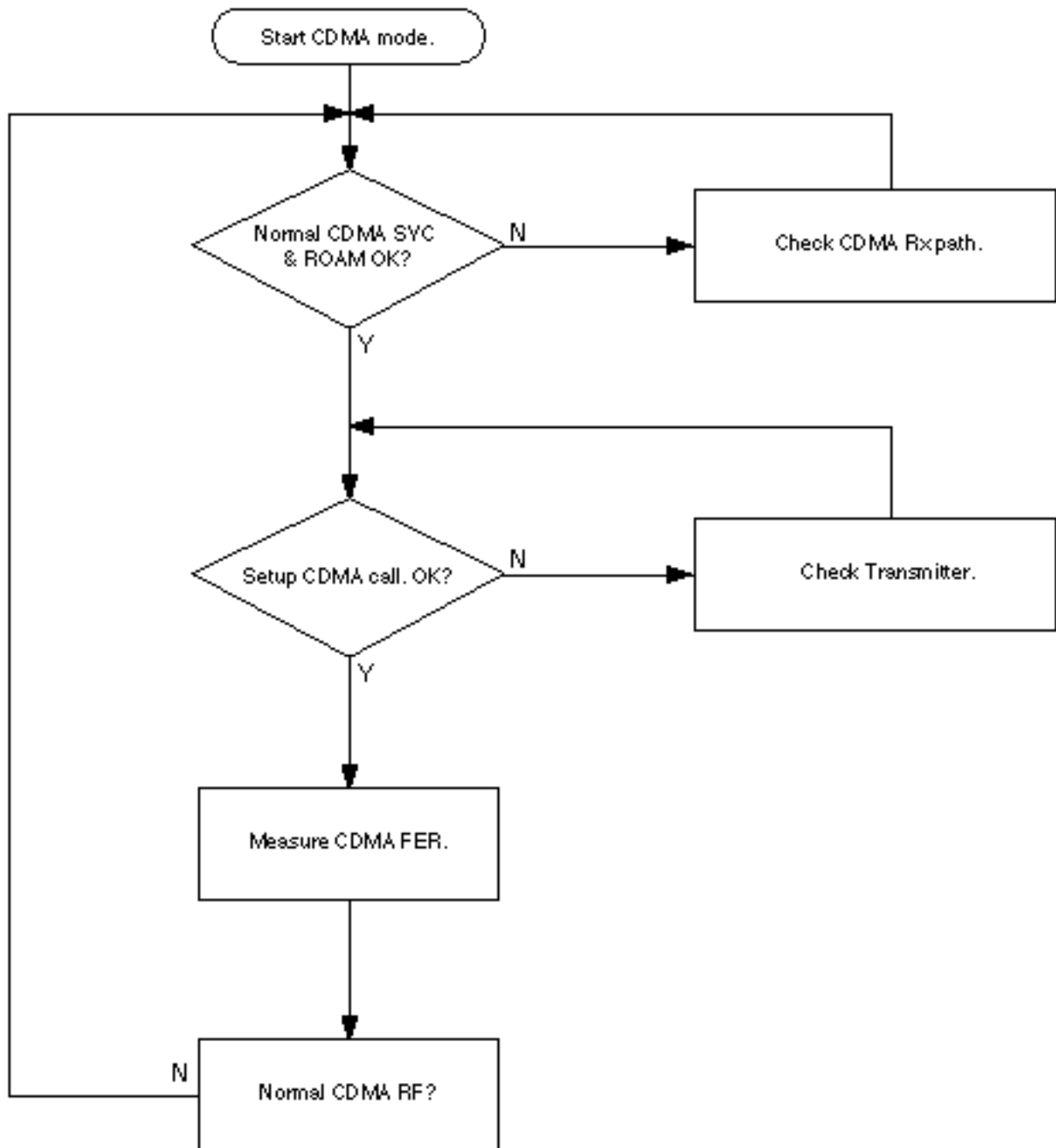


8-1-6 Abnormal Alert Tone

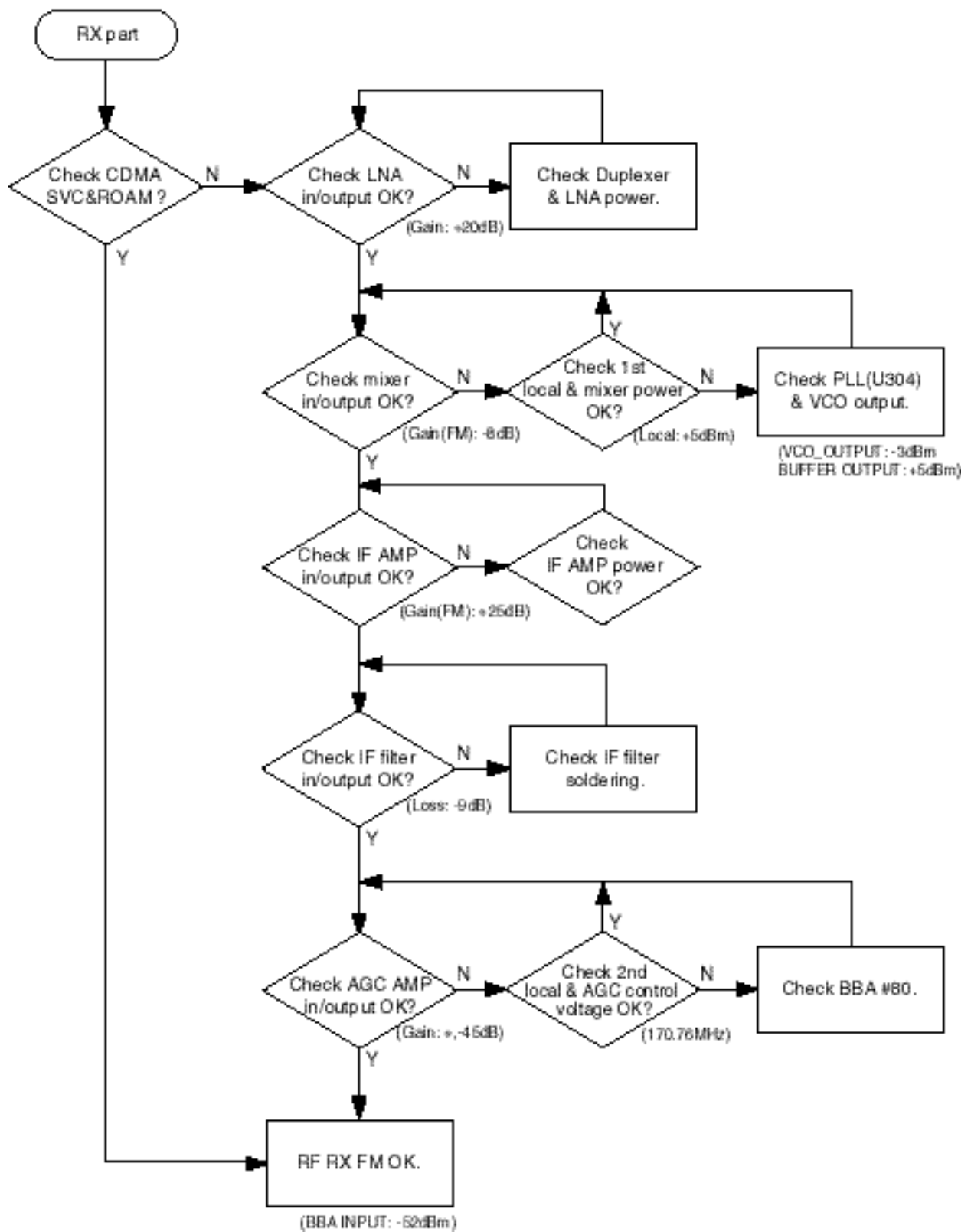


8-2 RF Section

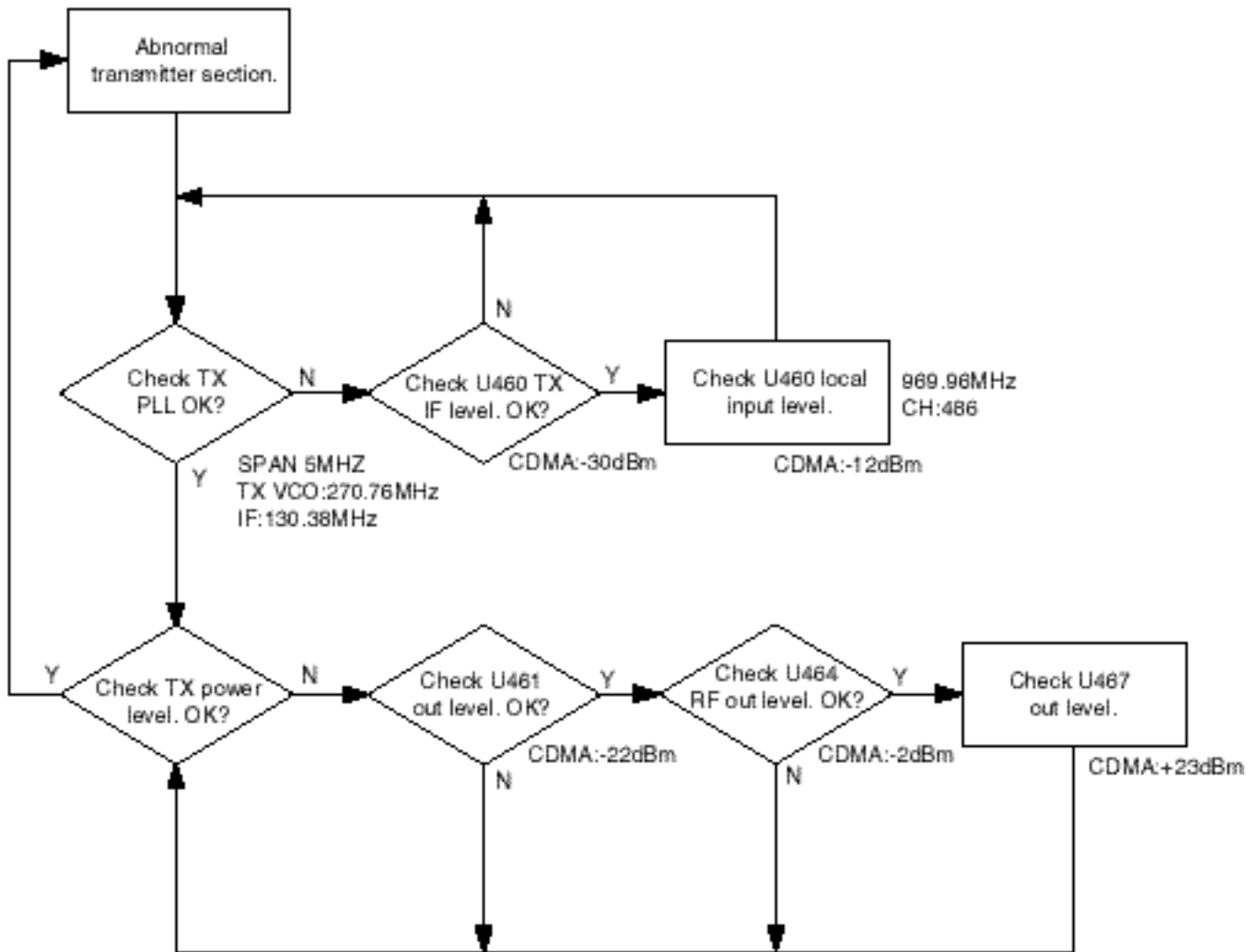
8-2-1 RF Section Troubleshooting



8-2-2 Receiver Part

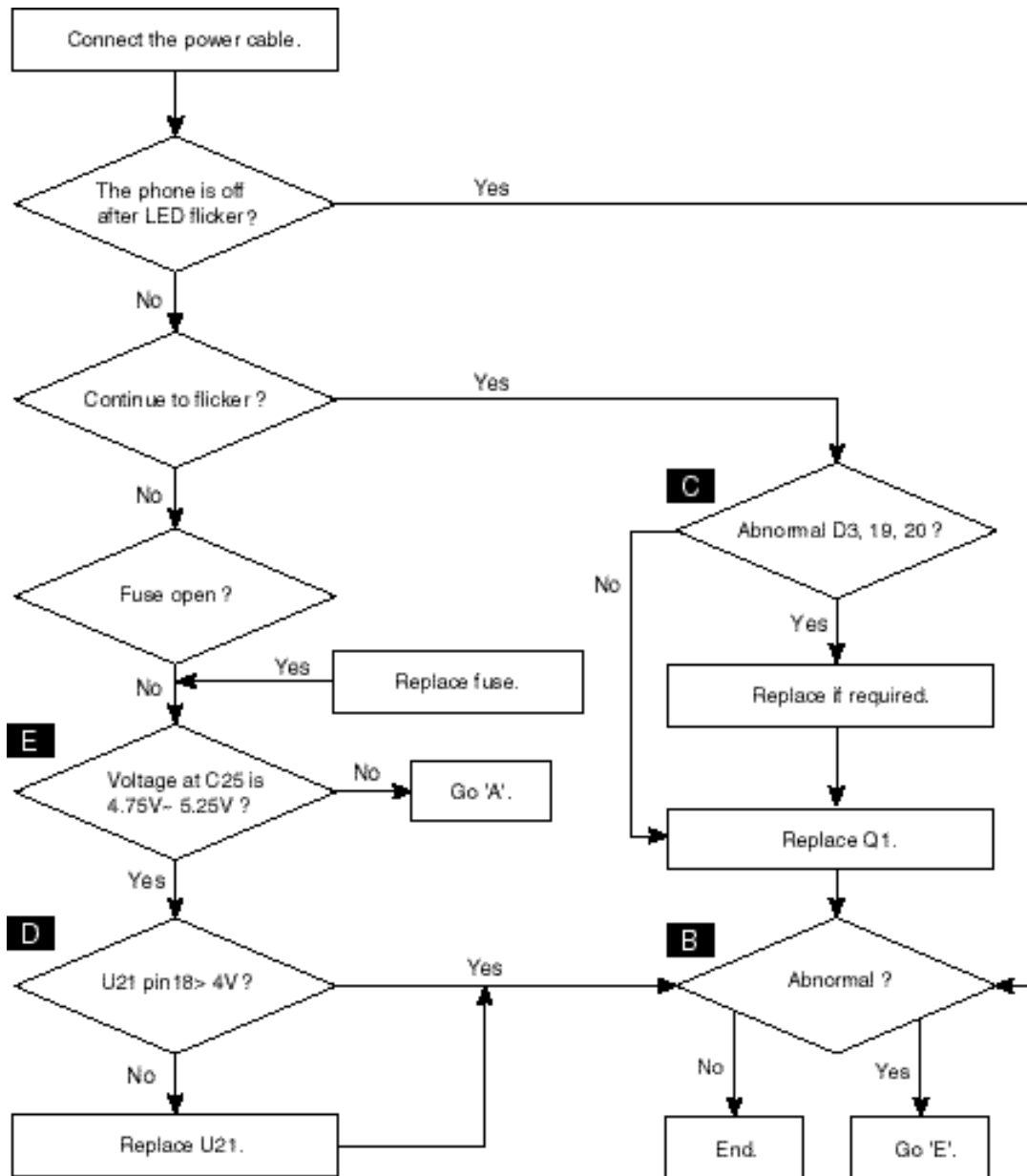


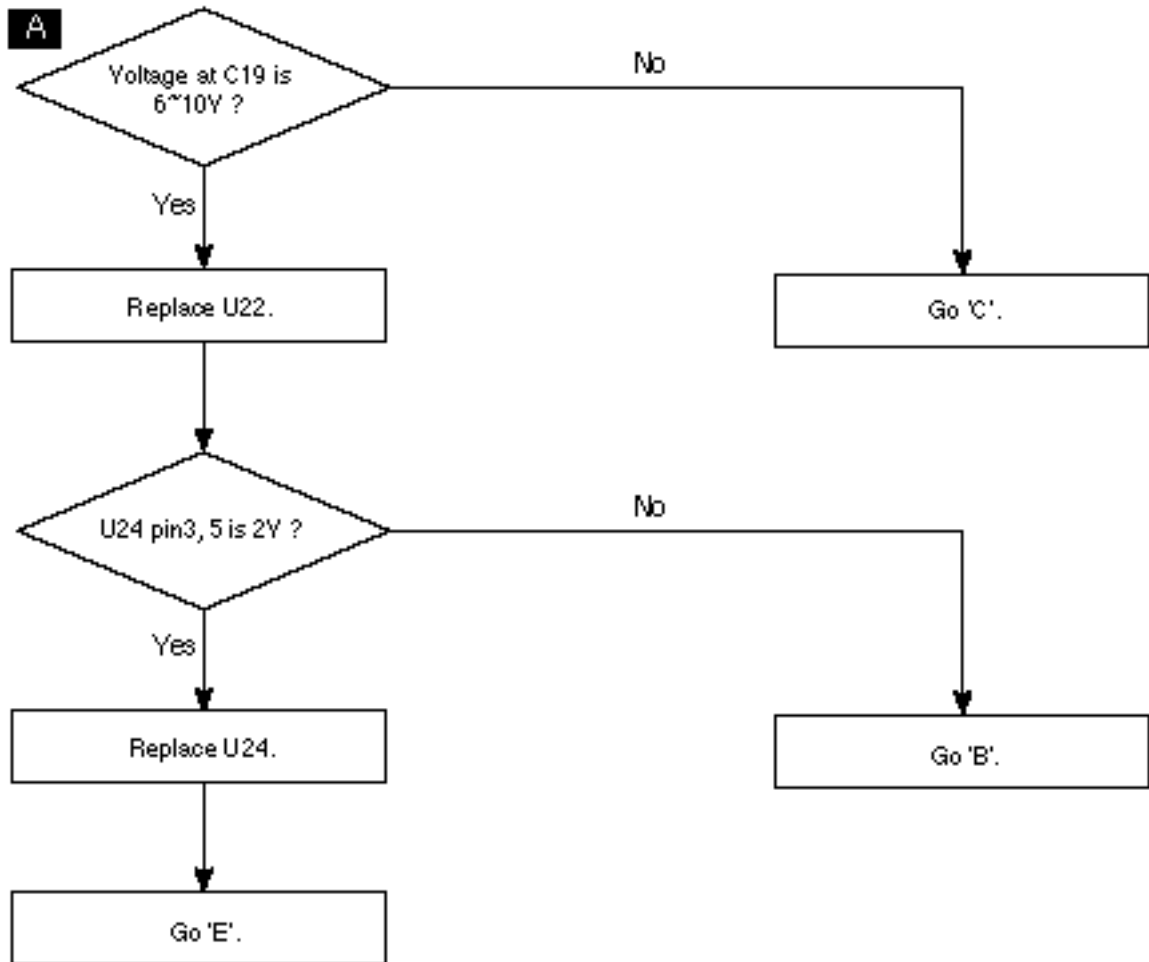
8-2-3 Transmitter Part



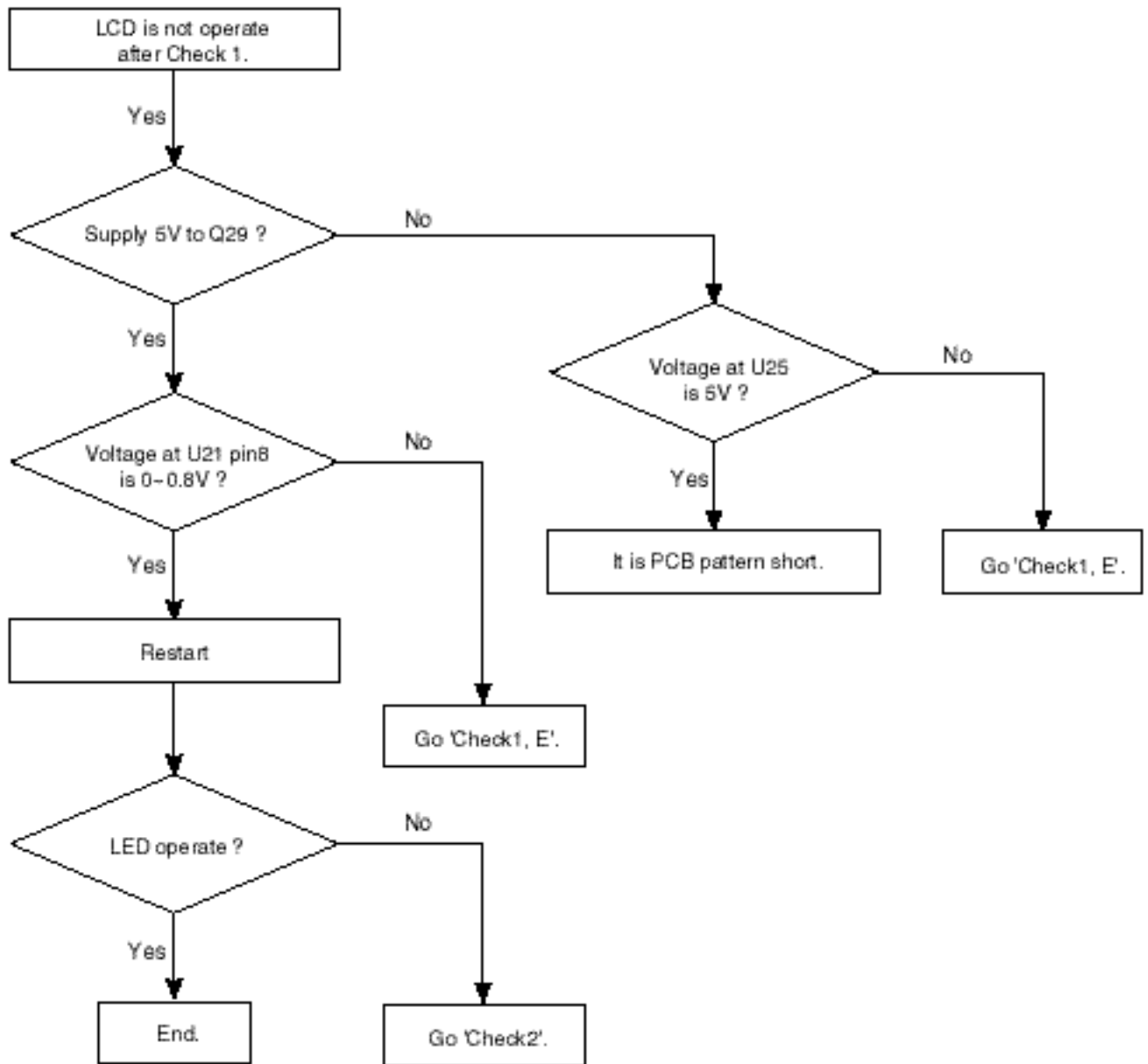
8-4 Desk-Top charger

8-4-1 Check 1

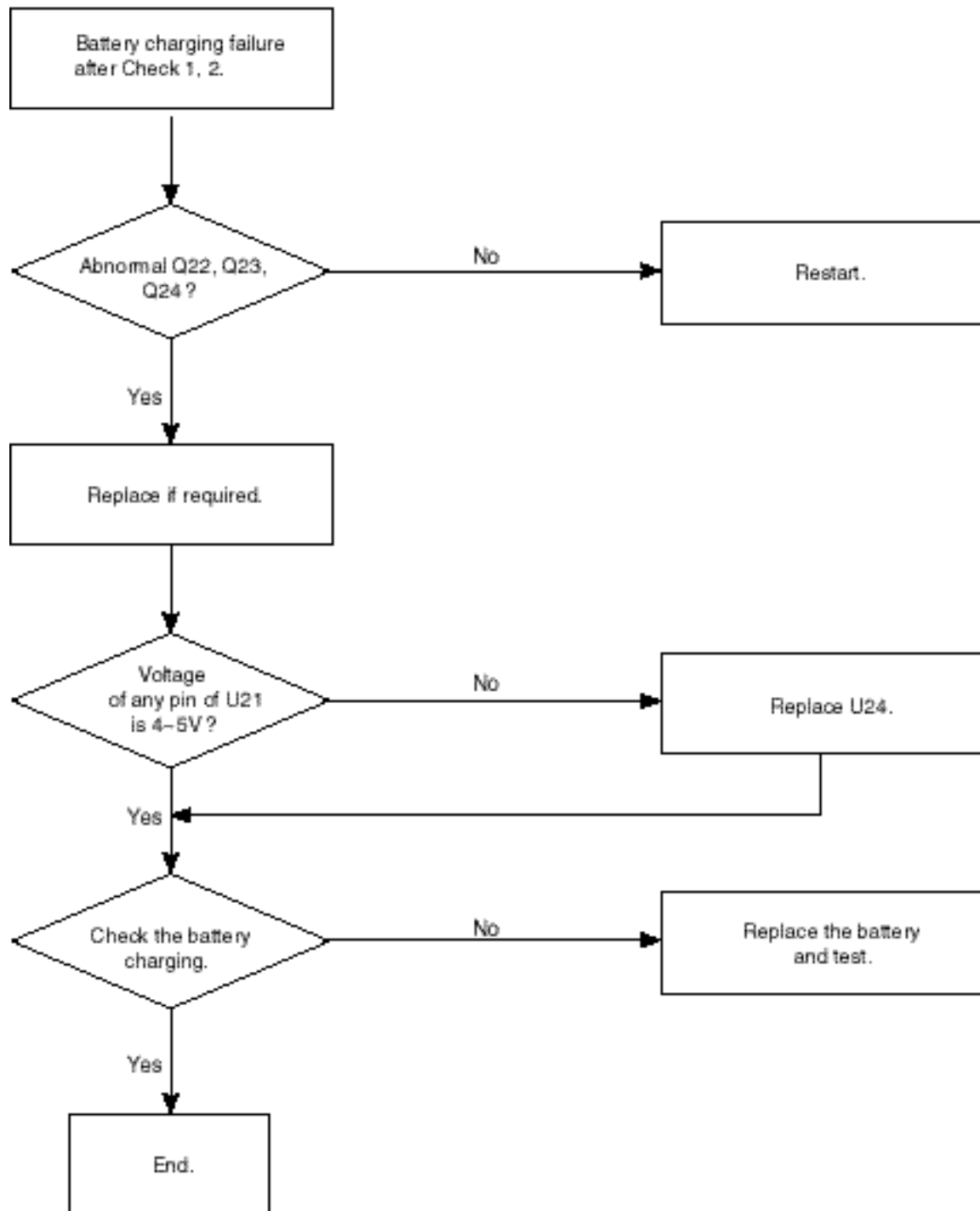




8-4-2 Check 2



8-4-3 Check 3



MEMO

9. Test Command Table

Command No. (OP, AB, RB)	Command SW Name	Description
01(1F, 0, 0)	T_SUSPEND_I	Terminate the normal mode, enter to the test mode.
02(3F, 0, 0)	T_RESTART_I	Terminate the test mode, enter to the normal mode.
03(FD, 0, 0)	T_SAVE_VAL_I	Save value in EEPROM (Only for Auto test).
06(1E, 0, 0)	T_WRITE_NV_I	Write an EEPROM item (One of the NV items).
07(81, 0, 0)	T_CARRIERON_I	Turn the carrier on.
08(82, 0, 0)	T_CARRIEROFF_I	Turn the carrier off.
09(83, 0, 0)	T_LOADSYN_I ²⁾	Set the synthesizer to the channel specified by ch_data.
22(91, 96, 96)	T_SNDNAM_I ¹⁾	Display and send NAM information.
23(95, 3, 4)	T_SNDVERSION_I ¹⁾	Display and return s/w version.
24(9F, 7, 8)	T_SNDESN_I ¹⁾	Display and return ESN.
25(92, 0, 0)	T_BACKLIGHT_ON_I	Turn on the backlight.
26(93, 0, 0)	T_BACKLIGHT_OFF_I	Turn off the backlight.
27(96, 0, 0)	T_LAMP_ON_I	Turn on the LAMP.
28(97, 0, 0)	T_LAMP_OFF_I	Turn off the LAMP.
29(9A, 0, 0)	T_REBUILD_I	Rebuild EEPROM.
30(15, 15, 0)	T_PLINE_I	Display and return Production data.
34(A2, 0, 0)	T_CDATA_I	Transmit continuous 5 [°] word Reverse CTL CH message.
35(A3, 3, 0)	T_VOLUME_UP_I	Increase value of the last command (Only for autotest).
36(A4, 3, 0)	T_VOLUME_DOWN_I	Decrease value of the last command (Only for autotest).
48(B4, 3, 0)	T_VIBRATOR_ON_I	Turn on vibrator.
49(B5, 0, 0)	T_VIBRATOR_OFF_I	Turn off vibrator.
50(B6, 0, 4)	T_BATT_TYPE_I	Get battery type.
51(B7, 1, 1)	T_BBA_I	Set BBA supplier company.
52(B9, 2, 2)	T_HW_VERSION_I	Get H/W version .
53(BA, 1, 1)	T_LOCK_CODE_I	Get Lock Code.
57(BC, 0, 0)	T_MIC_ON_I	Mic path on.
58(BD, 1, 0)	T_MIC_OFF_I	Mic path off.
59(BE, 1, 1)	T_SIO_MODE_I	SIO mode change.
67(C6, 3, 6)	T_READ_BATT_I ¹⁾	Reads Low-Battery in the standby, talk.
68(C8, 0, 3)	T_VBATT1_I ³⁾	Set the low battery position in the standby.
69(C9, 0, 3)	T_VBATT2_I ³⁾	Set the low battery position in the talking.

Command No. (OP, AB, RB)	Signal. Name	Description
70(CA, 3, 0)	T_WRITE_BATT_I ³⁾	Write battery level.
71(D1, 3, 0)	T_CDMA_TXADJ_I ²⁾	Set tx_agc_adj in CDMA mode.
74(D4, 3, 0)	T_TXADJ_OBM_I	Set tx_agc_adj for 0 dBm power.
75(D5, 0, 3)	T_READ_RSDI_I ³⁾	Read RSSI.
76(D6, 3, 0)	T_WRITE_RSSI_I ³⁾	Writes RSSI.
77(D7, 0, 3)	T_READ_REMP_I	Read a temp.
79(D9, 1, 0)	T_BUZZER_ON_I ²⁾	Buzzer on.
80(DA, 0, 0)	T_BUZZER_OFF_I	Buzzer off.
81(E3, 0, 0)	T_VOC_PCMLPON_I	Play a PCM LOOP BACK.
82(E4, 0, 0)	T_VOC_PCMLPOFF_I	Play off a PCM LOOP BACK.
85(E7, 0, 0)	T_SPEAKER_ON_I	Turn on the speaker path.
86(E8, 0, 0)	T_SPEAKER_OFF_I	Turn off the speaker path.
89(EB, 3, 0)	T_CDTRK_ADJ_I ³⁾	Set trk_lo_adj in CDMA mode.
90(F0, 4, 0)	T_HW_CHANFLAT_T	Measure the feature of the channel deviation. (before adjusting)
91(F2, 4, 0)	T_SW_CHANFLAT_T	Check the feature of the channel deviation applied channel deviation algorithm. (after adjusting)
93(F3, 4, 0)	T_CH_FLATLESS_I	Setting 22dBm channel deviation 10 Points.

¹⁾ The AB (Input Argument Byte Number) values of these commands are used only in the manual test. In automatic test mode, the AB is regarded as 0.

²⁾ You can assign the value for these commands. If the AB value is assigned without argument, the test is achieved with the value stored in EEPROM.

³⁾ After you get a desired test value by performing these commands, if you want to save the value into EEPROM, use T-SAVE-VAL-I command to store the test value into the corresponding position.

^{1S} OP: Operation Command Number
AB: Input Argument Byte Number
RB: Return Byte Number

10. Block & Circuit Diagrams

10-1 Block Diagram

10-2 Circuit Diagram

10-2-1 Power Circuit Diagram

10-2-2 Audio Circuit Diagram

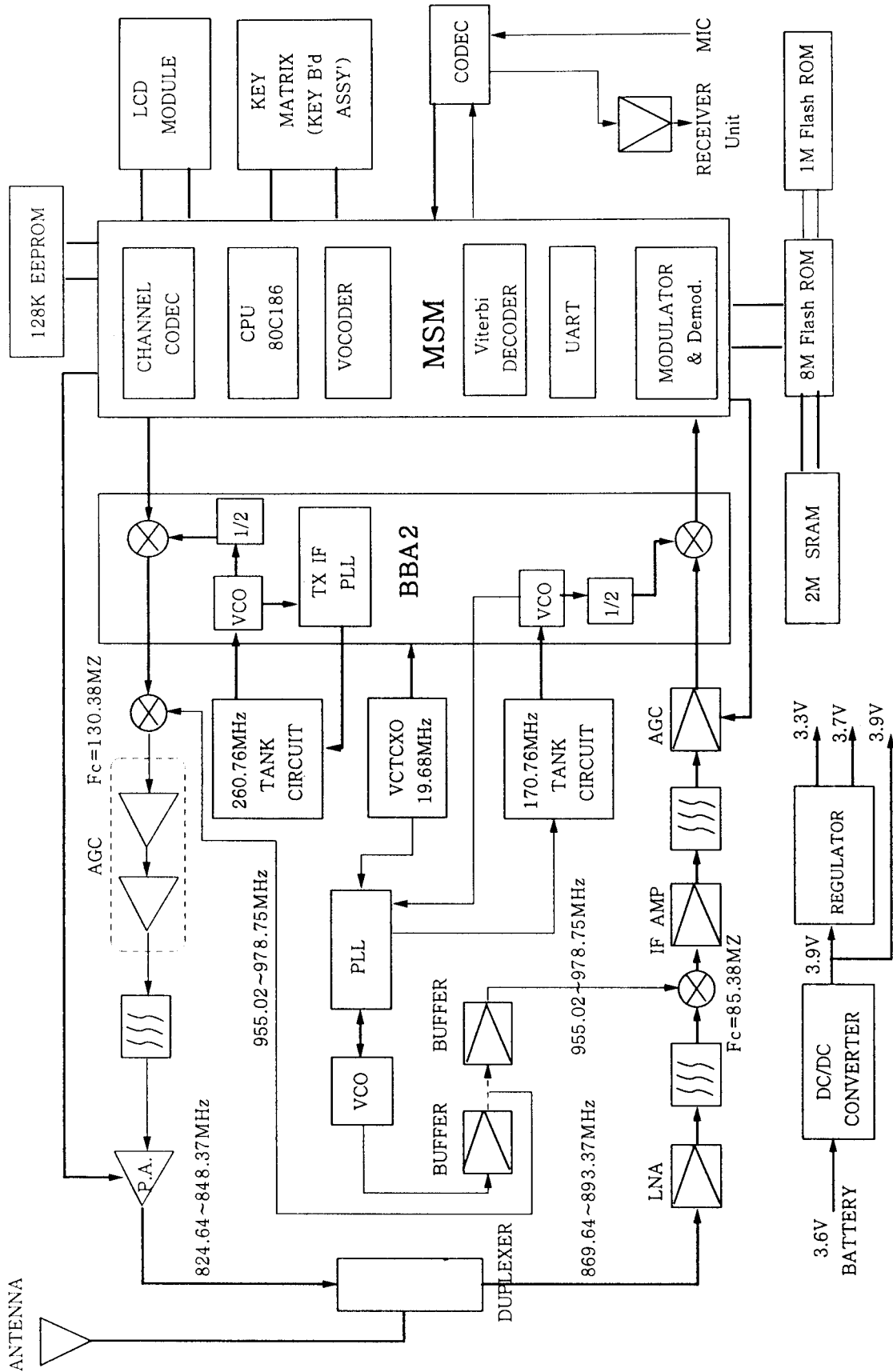
10-2-3 RX Circuit Diagram

10-2-4 TX Circuit Diagram

10-2-5 Logic Circuit Diagram

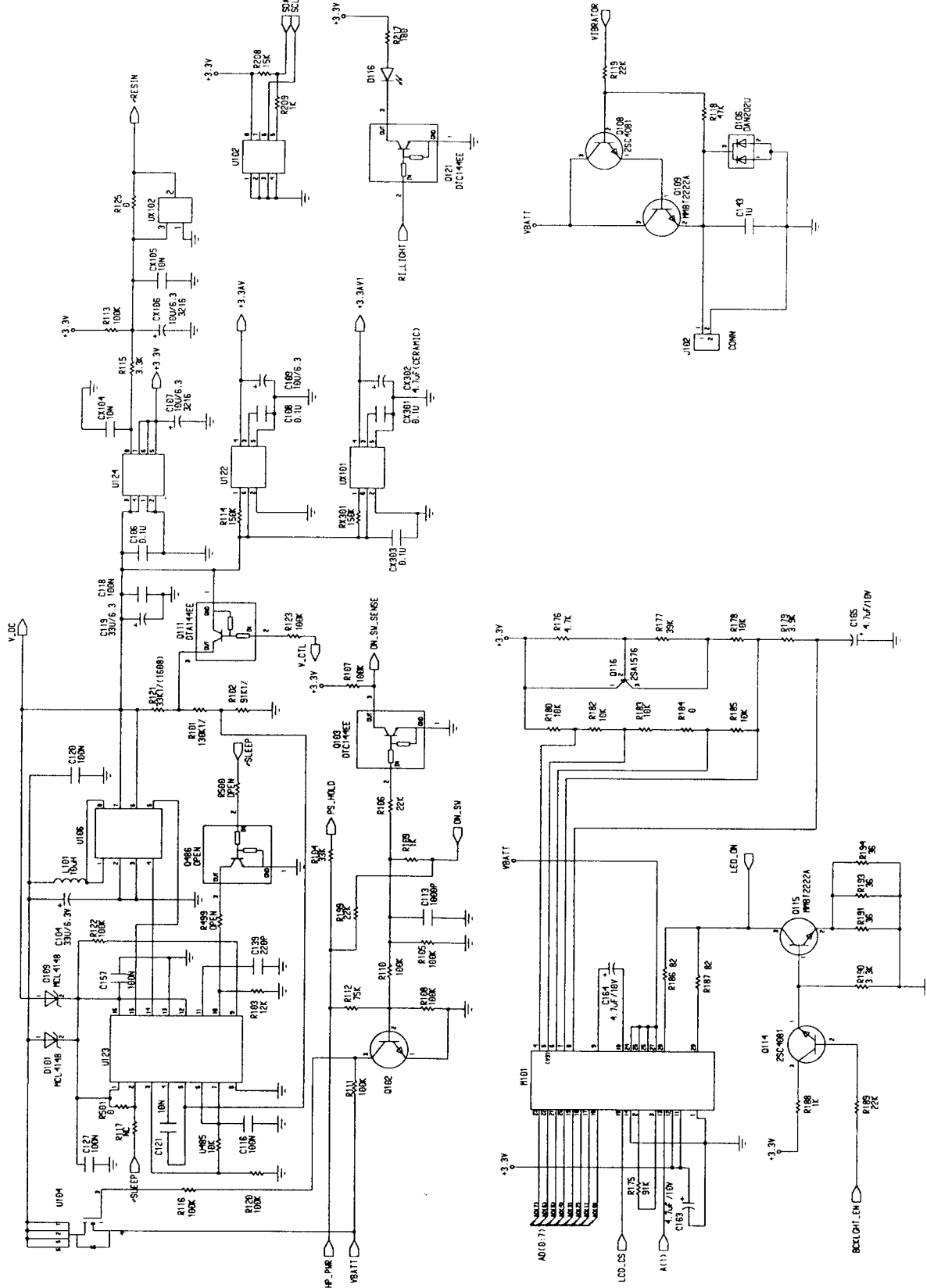
10-2-6 Memory Circuit Diagram

10-1 Block Diagram

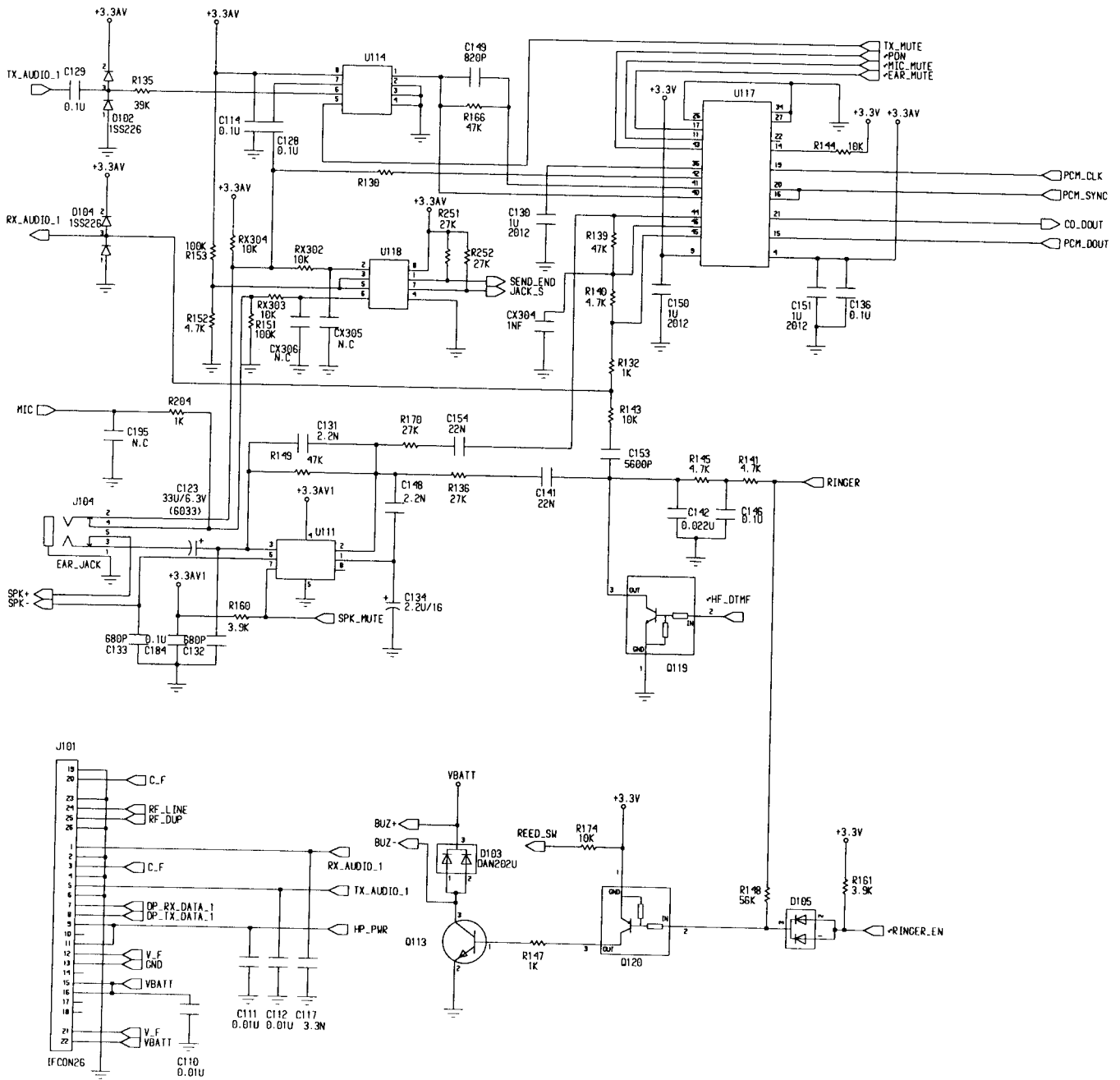


10-2 Circuit Diagram

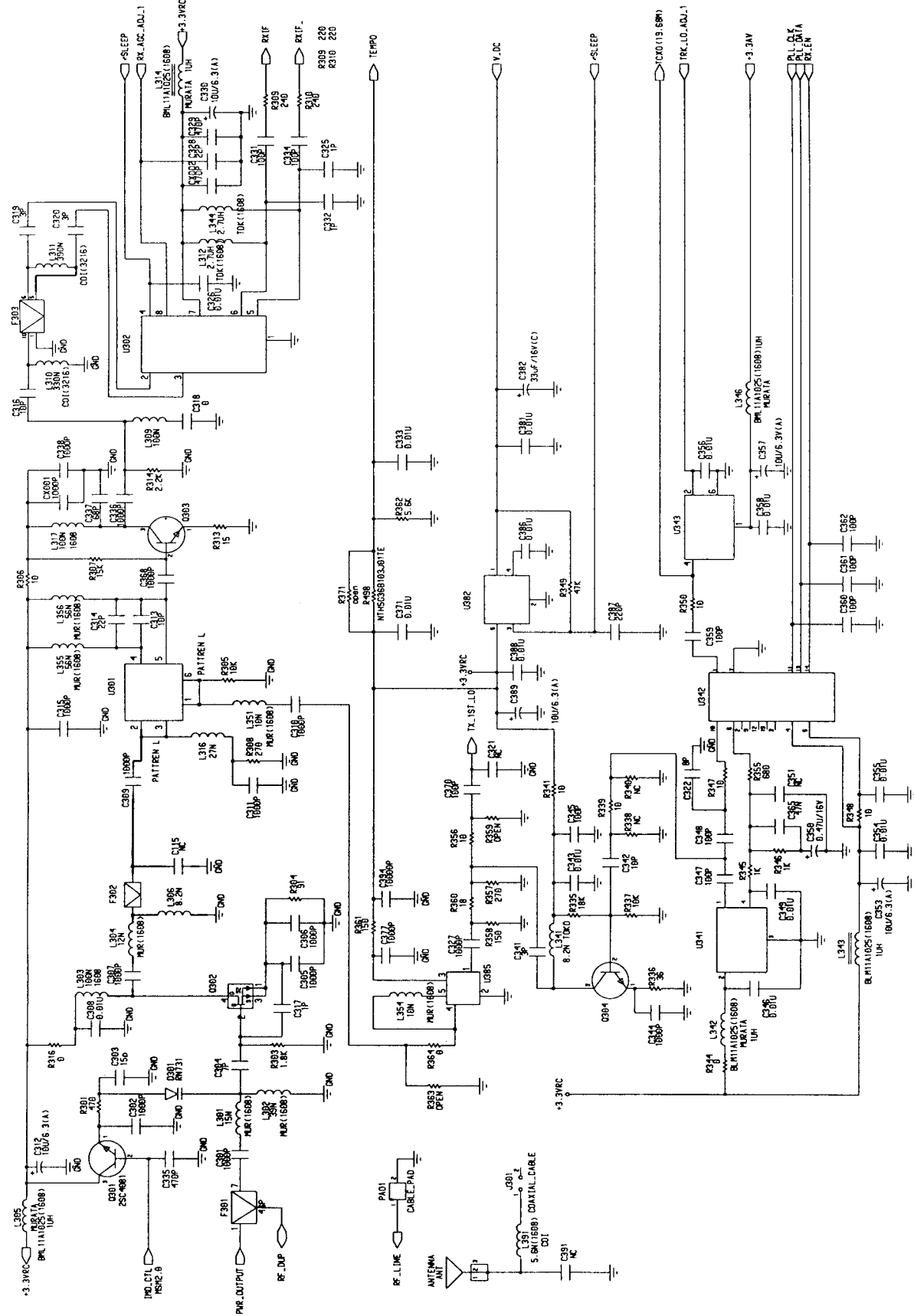
10-2-1 Power Circuit Diagram



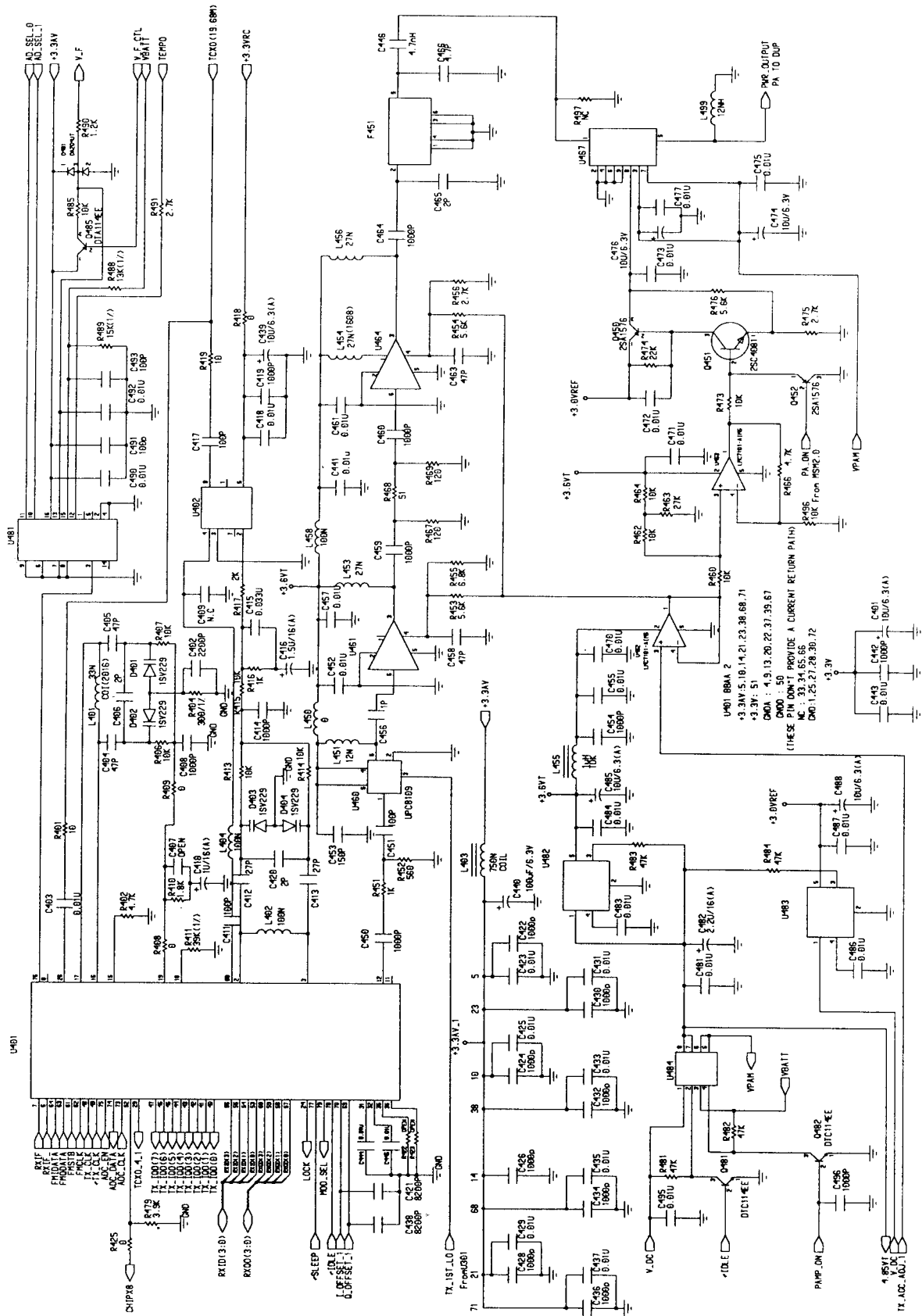
10-2-2 Audio Circuit Diagram



10-2-3 RX Circuit Diagram



10-2-4 TX Circuit Diagram



10-2-6 Memory Circuit Diagram

