[2] Adjustment procedures after replacement of the parts

Be sure to make adjustments to the parts as shown in the table below.

	1.Adjustment to camera temperature	2. Adjustment to battery temperature	3. Flicker adjustment	4. White defect correction	5. Optical axis adjustment
IC105	O	×	×	×	×
IC307	×	O	×	×	×
Camera FPC A'ssy	×	×	×	O	O
Main-screen Display	×	×	O	×	×

1. Adjustment procedures of camera temperature

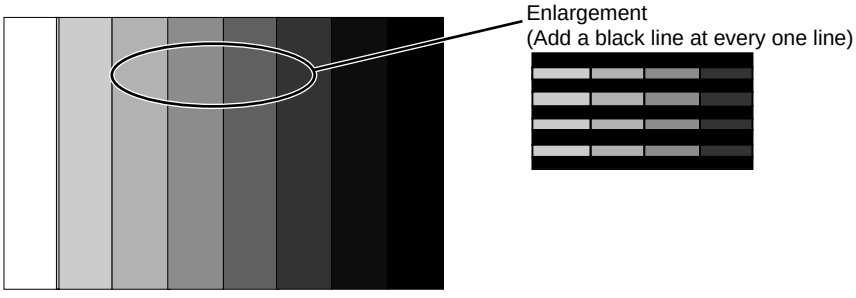
1. Place a thermometer near the unit to be adjusted. Make sure the room temperature is over 0°C.
2. Attach the battery pack.
3. Access the normal mode by holding down the power key.
4. Transmit the [AT+XDIAG] command.
5. Make sure the screen for the function test mode is displayed.
6. Access the TEMP ADJ mode by pressing the "⁎" key, and push the "1" (1. CAM TEMP) key.
7. Temperature detected by the sensor is displayed after "Temp:". Compare the displayed value to the room temperature. Enter the difference as a corrected value with the "▼" key if the displayed value is higher, and use the "▲" key if it is lower. The corrected value is displayed after "Correct:".
8. Press the "#" key. [Param Save OK.] will be displayed to notify the corrected value is registed.
9. Press the "0" key to access the initial screen of the function test mode.
10. Press the "POWER" key to exit this mode.

2. Adjustment procedures of battery temperature

1. Perform steps 1 – 5 of "Camera temperature adjustment procedure".
2. Access the TEMP ADJ mode by pressing the "⁎" key, and push the "2" (2.BAT TEMP) key.
3. Perform steps 7 – 10 of "Camera temperature adjustment procedure".

3. Flicker adjustment procedure

1. Attach the battery pack.
2. Access the manual testmode
3. Access the manual testmodeF81 (LCD Setting) by pressing the "8", "1" and "Right Soft" keys in this order.
4. Press the "2" (2. VCOM Adjust) key.
5. Adjust the flickers on the screen to the minimum by pressing the "▲" and the "▼" keys. Make sure visually they are minimized at a distance of about 20 cm from the inverter fluorescent lamp. (Fine adjustments to the DC voltage between LCD electrodes)



8 gradation patterns with a black line between each line of the patterns (monochrome pattern)

6. Press the "M" key twice. [Diag Param Saving] will be displayed to notify the corrected value is registered.
7. Press the "POWER" key to exit this mode.

4. Procedures of white defect correction

1. Attach the battery pack.
2. Access the normal mode by holding down the power key.
3. Connect the unit to the PC and send the [AT+XDIAG] command.
4. Make sure the screen for the function test mode is displayed.
5. Send the [LDDEVPRM] command.
6. Block off light completely from the light sensor after receiving the [LDDEVPRMOK]. If the [LDDEVPRMNG] is received, start from step 5.
7. Transmit the [WHC01540160] command.
8. 6 digits will be received if the transmission is completed after 20 to 30 seconds. Be sure to continue to block off light during this process.

<6 digits to be received>

- In case of [LDDEVPRMOK]: aaabbb will be received.
  aaa: the number of white defects
  bbb: the maximum level of dark current)
- In case of [LDDEVPRMNG]: 000000 will be received.
  This indicates light was not blocked completely. Go back to step 7.

9. Send the [WH] command.
10. If [OK] is received, send the AT [SVDEVPRM] command.
11. After receiving the [SVDEVPRMOK], block off light completely from the light sensor. If the [SVDEVPRME1] is received, go back to step 10.
12. Remove the Data cable from the unit. Press the “POWER” key to exit.

* White defect correction
White defects indicate pixel defects in the image detected by the light sensor. These appear as white spots even when light is completely blocked off (even on a black background). White defect correction solves this problem.

5. Optical axis adjustment

1. Attach the battery pack.
2. Access the normal mode by holding down the “POWER” key.
3. Connect the unit to the PC and send the [AT+XDIAG] command.
4. Make sure the screen for the function test mode is displayed.
5. Press the “6” key. The camera image will appear on the display.
6. Set your face in the center of the camera mirror and press the “M” key (for shooting). Correct the image with the “◄” key if it is on the center right, and use the “►” key if it is on the center left. Press the “Right Soft” key. [Param Save OK.] will be displayed to notify the corrected value is registered. The screen is returned to the shooting screen. The image is moved by 2 dots each time the “◄” or “►” key is pressed.
7. Make sure the image is set in the center after performing step 6 several times.
8. Press the “0” key to access the initial screen of the function test mode.
9. Press the “POWER” key to exit this mode.

[3] Test poins

KEY PWB-B (FRONT SIDE)

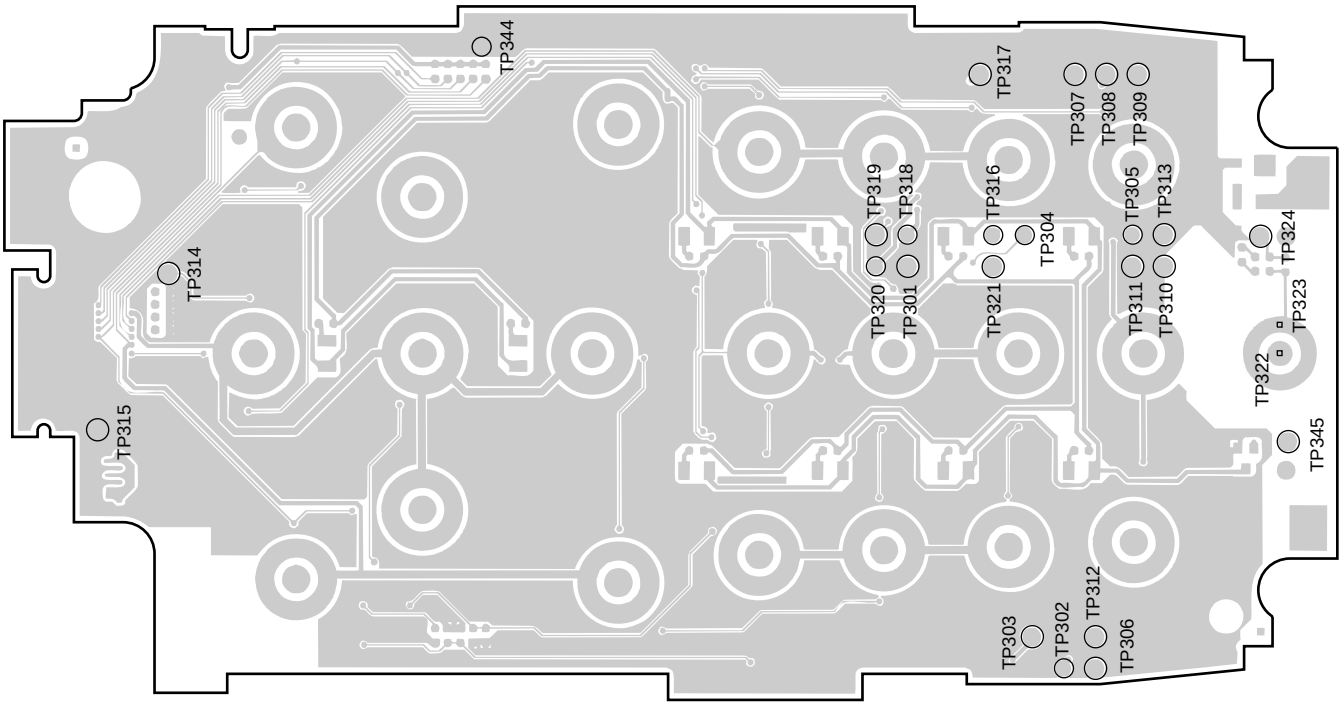


Figure 63 TEST POINT

TP No.	Signal name	TP No.	Signal name
TP301	VSIM (2.85 V)	TP313	ADP
TP302	SIMCLK	TP314	BATT_SENSE
TP303	SIMRST	TP315	DGND
TP304	SIMIO	TP316	3 V
TP305	TDI	TP317	VTCXO (2.9 V)
TP306	RXD	TP318	VSYNTH (2.9 V)
TP307	ADPDET	TP319	VRF (2.9 V)
TP308	CONT2	TP320	VTXVCO (2.9 V)
TP309	CONT1	TP321	VBACK (3 V)
TP310	RTS	TP324	MIC
TP311	CTS	TP344	D GND
TP312	TXD	TP345	KEY_BL_ON

KEY PWB-B (REAR SIDE)

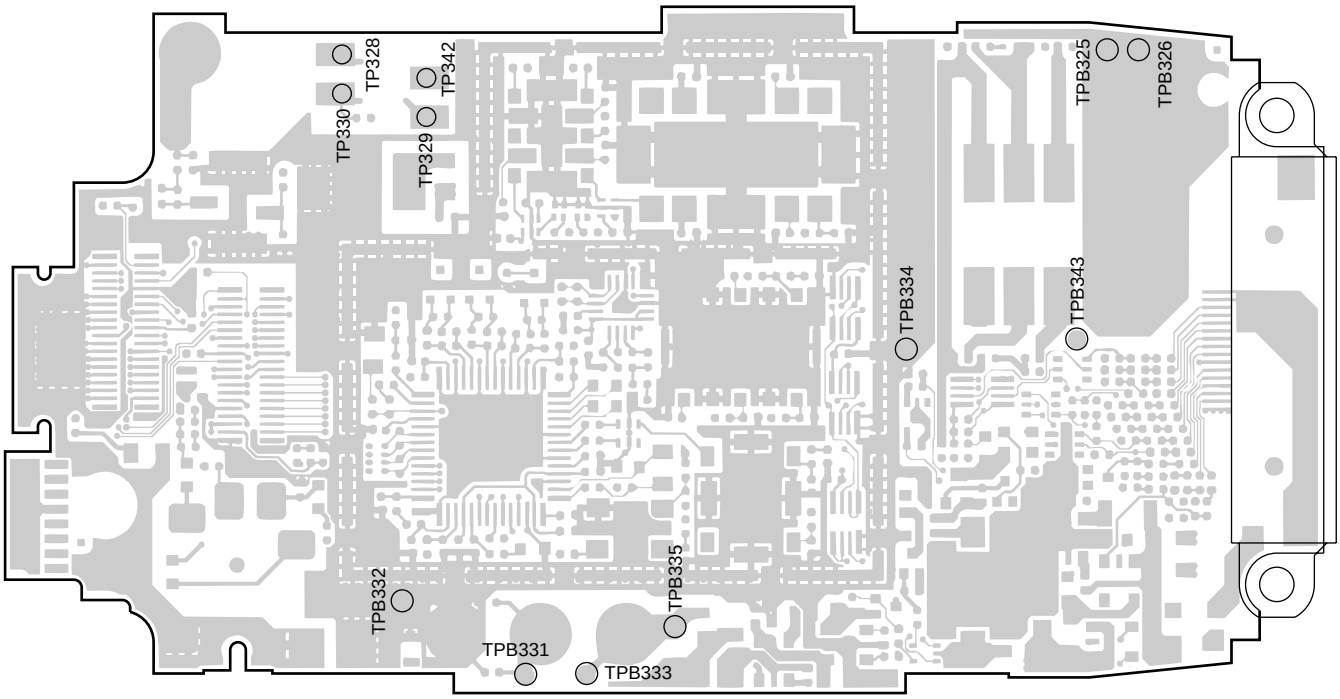


Figure 64 TEST POINT

TP No.	Signal name
TPB325	TXD
TPB326	RXD
TPB331	BATT_SENSE
TPB332	DGND
TPB333	BATT
TPB334	DGND
TPB335	BATT
TPB343	ADPDET

MAIN PWB-A (FRONT SIDE)

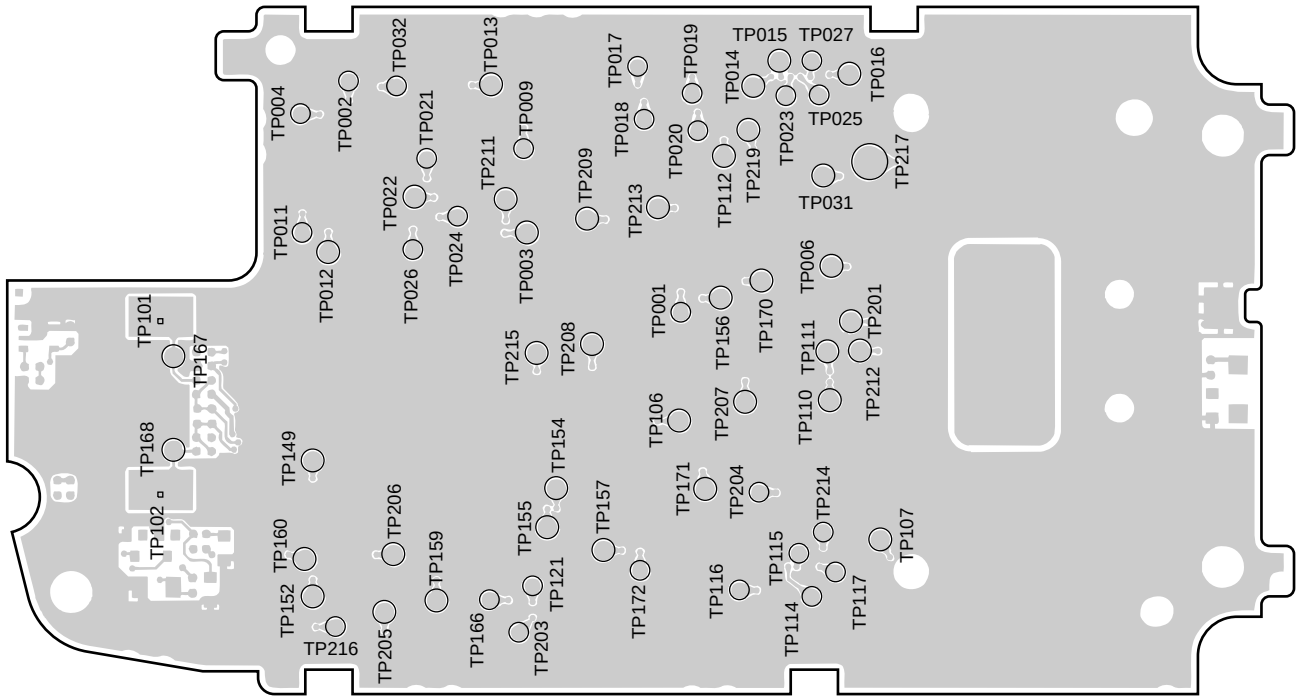


Figure 65 TEST POINT

TP No.	Signal name	TP No.	Signal name	TP No.	Signal name
TP001	/RD	TP026	GCS2	TP160	Flash-Vpp
TP002	/WR	TP027	GCS1	TP166	CINT
TP003	/LCD_RST	TP031	Back light (LED–)	TP167	RECIVER_OUTP
TP004	CS_TFTLCD	TP032	PWM	TP168	RECIVER_OUTN
TP006	Back light (LED+)	TP106	JAKMIC	TP170	AUXADC2 (ADIN)
TP009	VDDCORE	TP107	JAKEAR	TP171	AUXADC6
TP011	13 MHzCLK	TP110	SP1	TP172	CLKOUTGATE
TP012	Terminal for LCDC adhesion check 1	TP111	SP2	TP201	CHGIN
		TP112	VVIB	TP203	VBACK (3 V)
TP013	Terminal for LCDC adhesion check 2	TP114	TCK	TP204	BATT_SENSE
		TP115	TMS	TP205	VRTC (1.8 V)
TP014	LCD 5 V	TP116	TDI	TP206	VCAM (3.1 V)
TP015	LCD 15 V	TP117	TDO	TP207	VCORE (1.8 V)
TP016	LCD –10 V	TP121	H_AMP	TP208	VANA (2.45 V)
TP017	LS	TP149	Terminal for STACK MEMORY adhesion check 1	TP209	VMEM (2.8 V)
TP018	DCLK			TP211	VLCD (2.5 V)
TP019	PS2	TP152	Terminal for STACK MEMORY adhesion check 2	TP212	VEXT_CN (2.5 V)
TP020	PS1			TP213	VINT (3 V)
TP021	SPL	TP154	TMS/CHECKER_1	TP214	VINT_SW (3 V)
TP022	GSP	TP155	TCK_/LED_ON	TP215	VT (2.715 V)
TP023	GCK	TP156	EXT1	TP216	VIR (2.8 V)
TP024	ALW	TP157	CLKOUT	TP217	POWONKEY
TP025	GMODE	TP159	GP023	TP219	BATT

MAIN PWB-A (REAR SIDE)

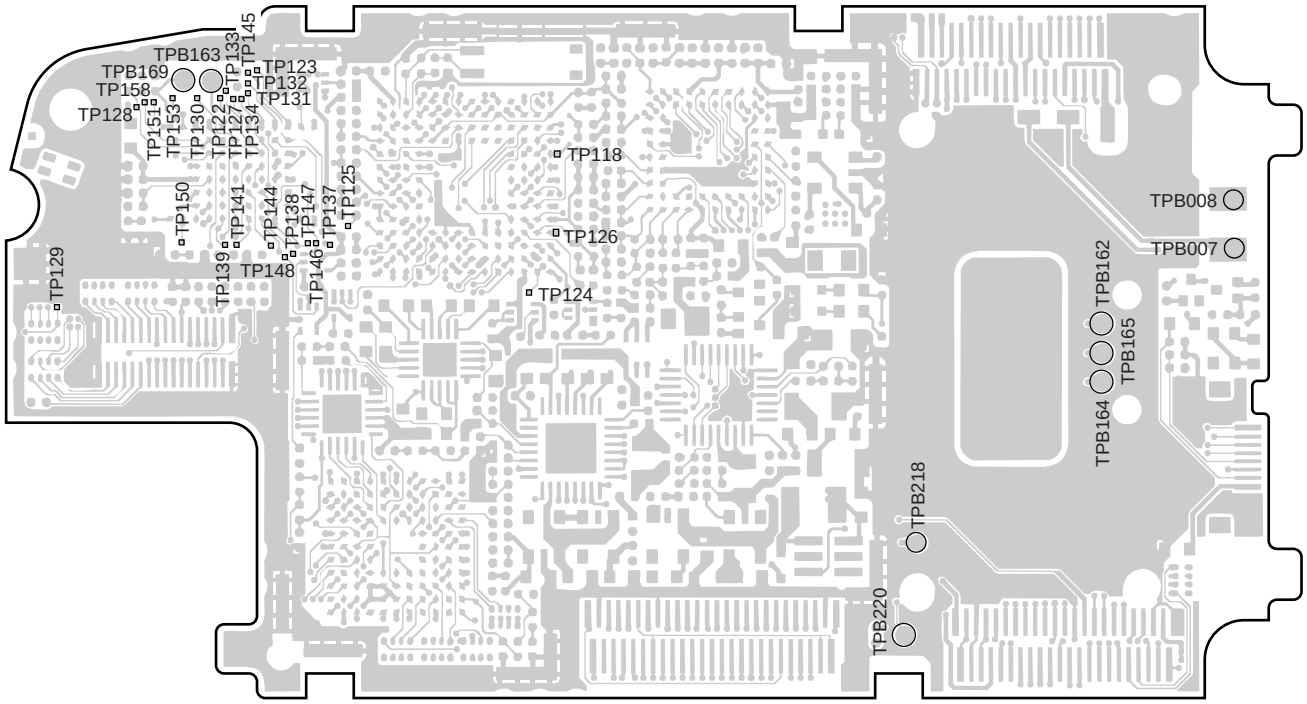


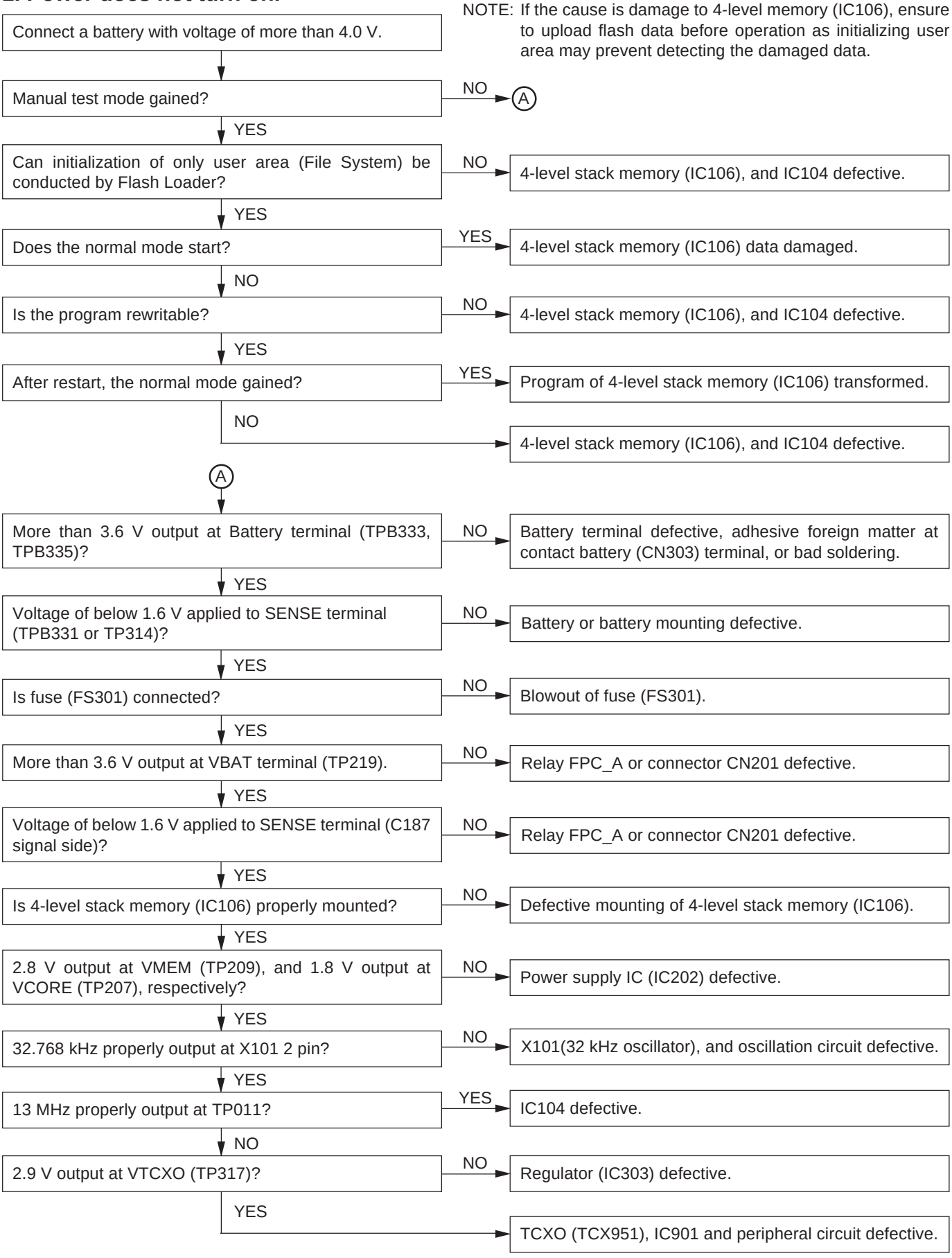
Figure 66 TEST POINT

TP No.	Signal name
TPB162	TCK/LED_ON
TPB163	TDI
TPB164	TDO
TPB165	TMS_CHECKER
TPB169	JTAG (3VINPUT)
TPB218	POWONKEY
TPB220	POWONKEY

[4] Troubleshooting

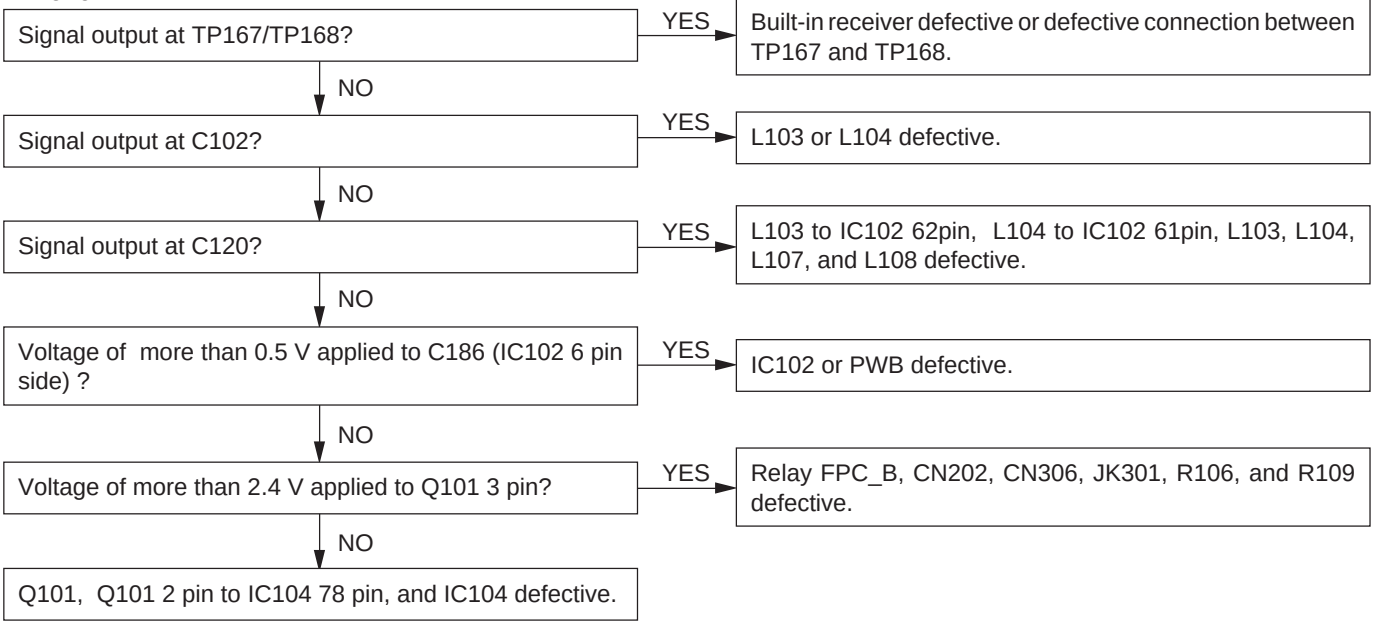
1. Power does not turn on.

NOTE: If the cause is damage to 4-level memory (IC106), ensure to upload flash data before operation as initializing user area may prevent detecting the damaged data.

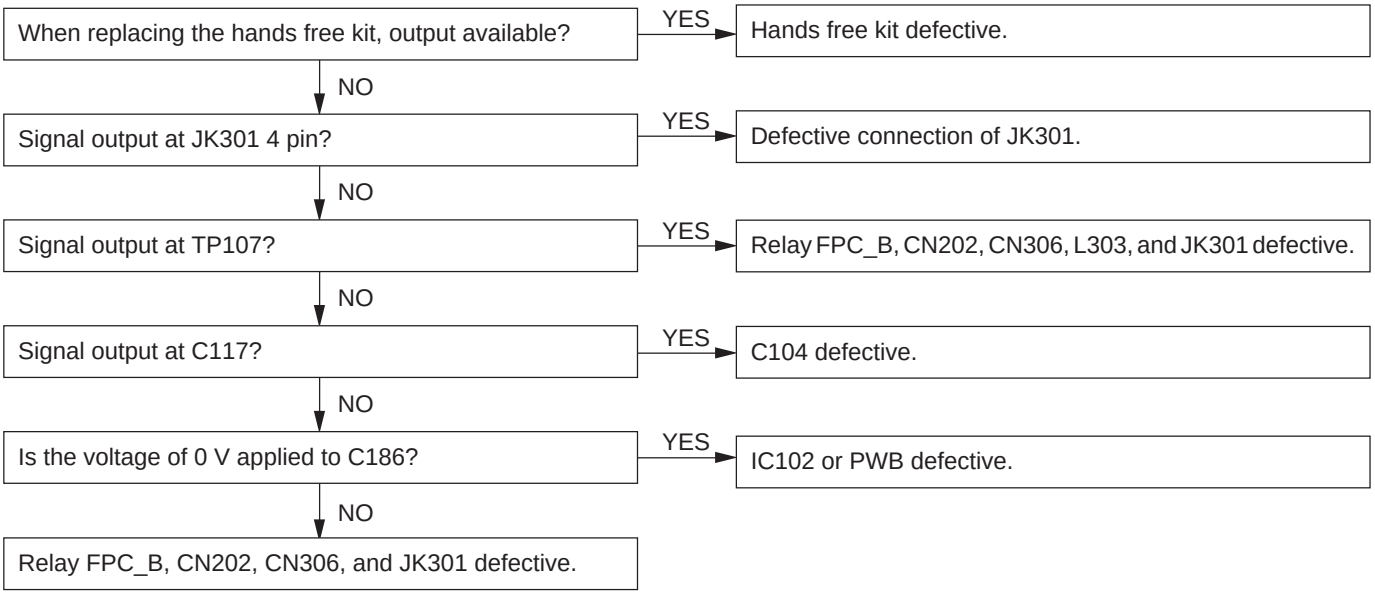


2. Incoming audio cannot be heard.

Phone

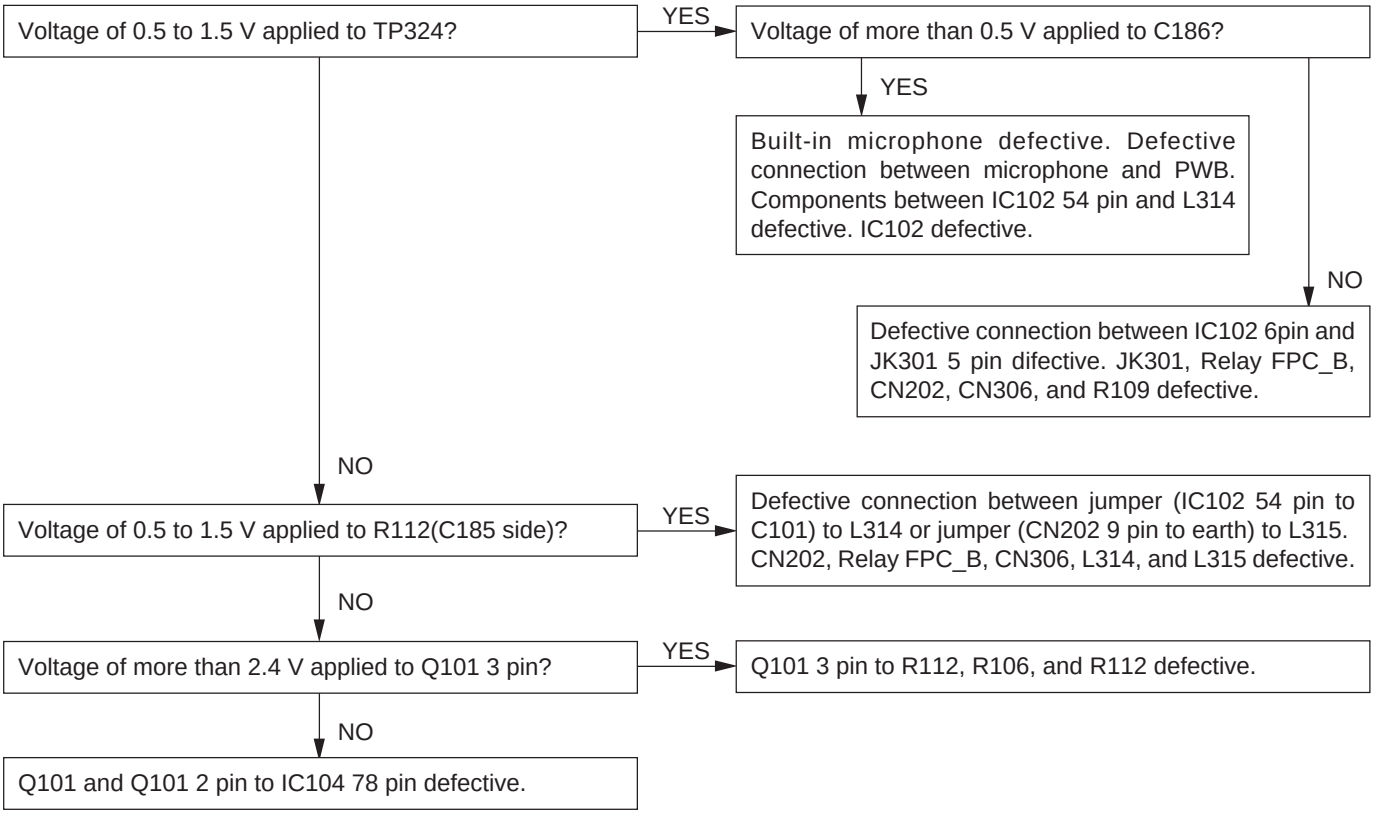


Hands free kit

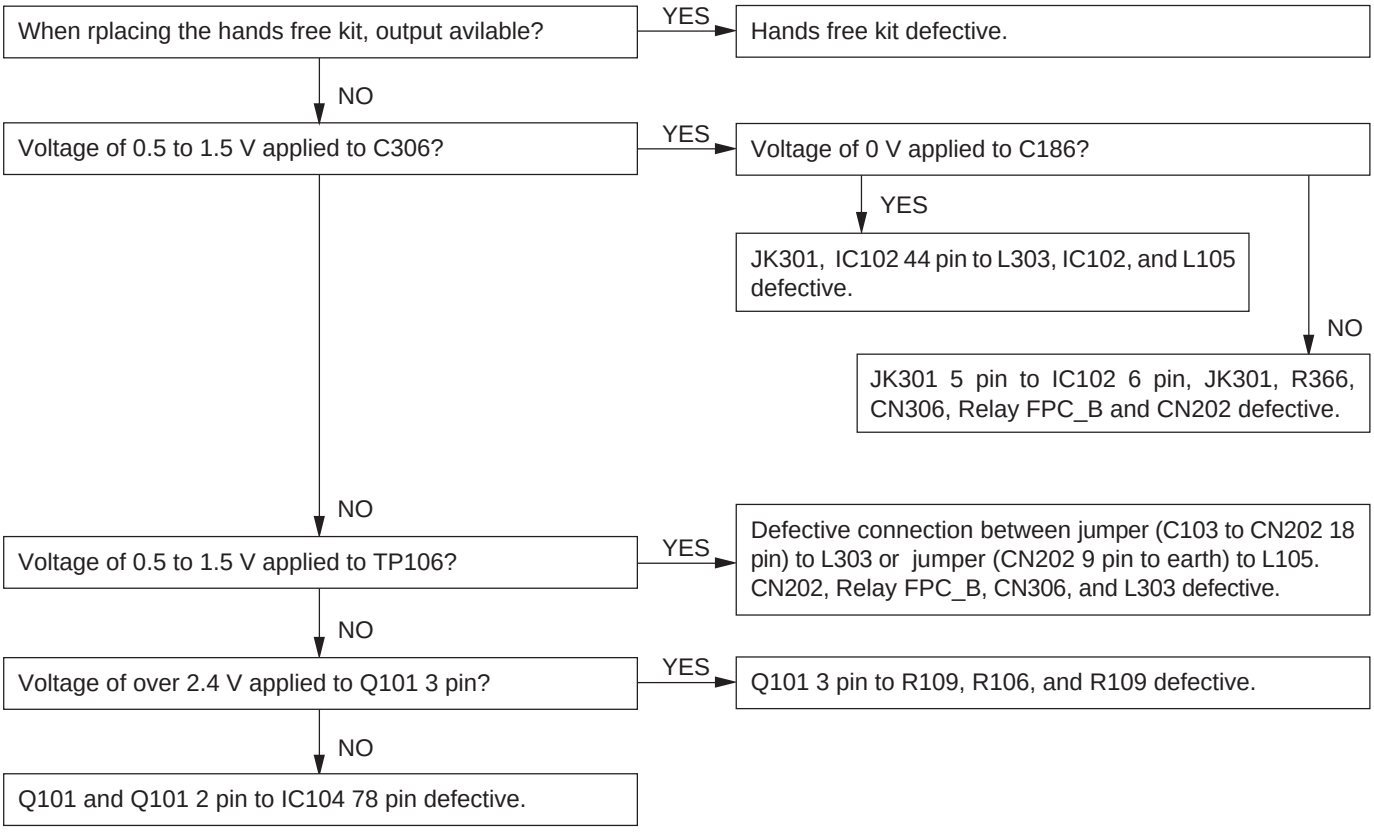


3. Audio cannot be sent/recorded.

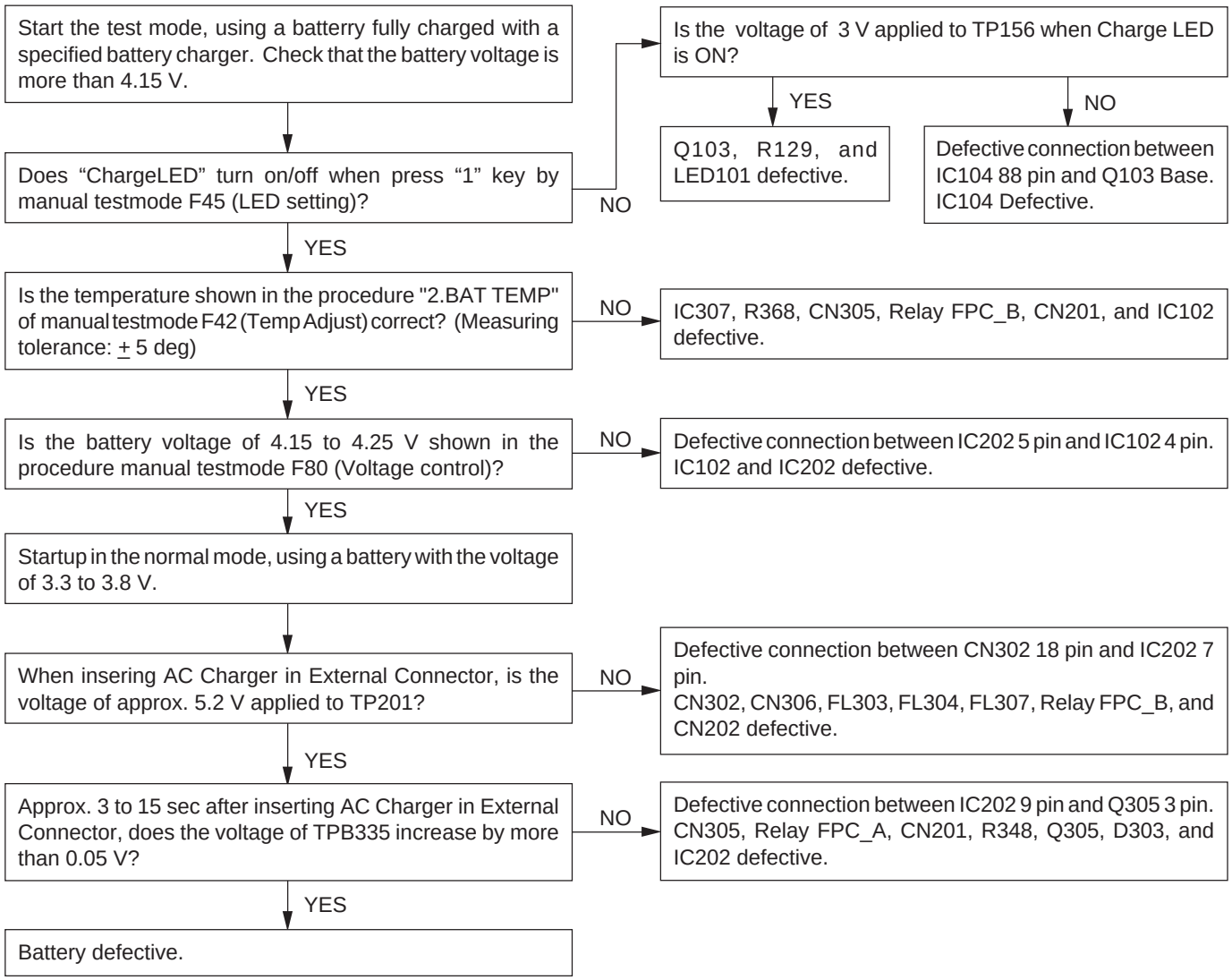
Phone



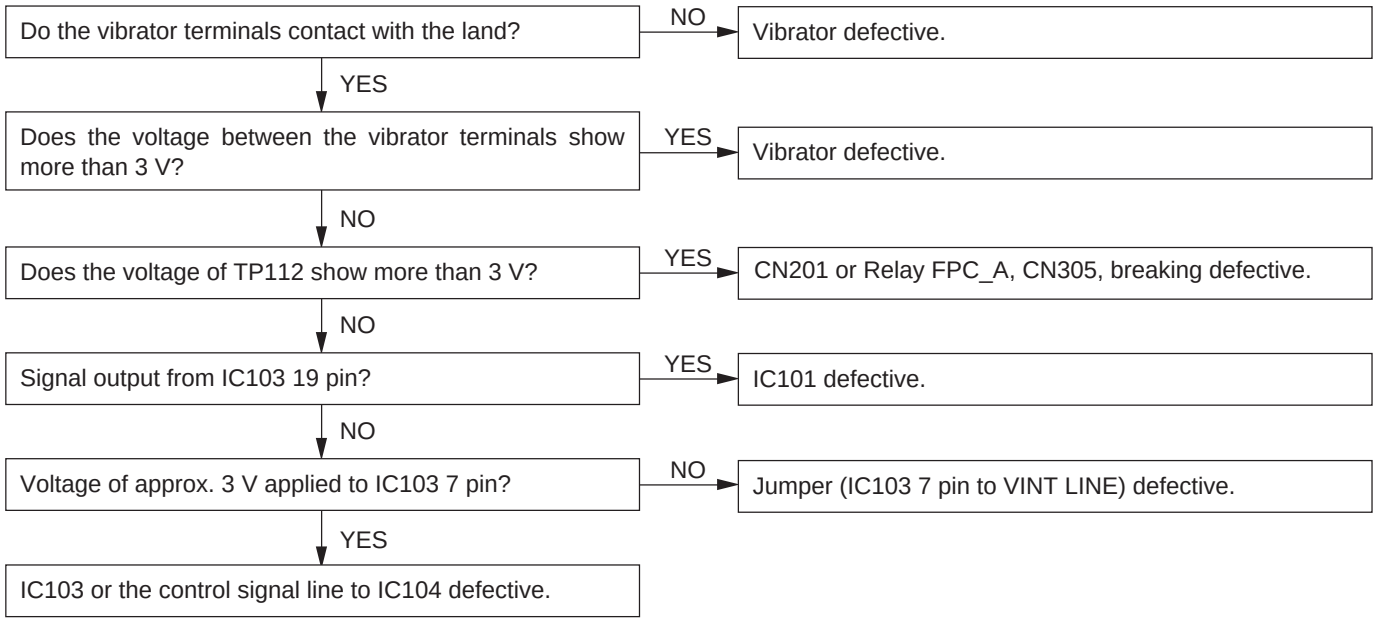
Hands free kit



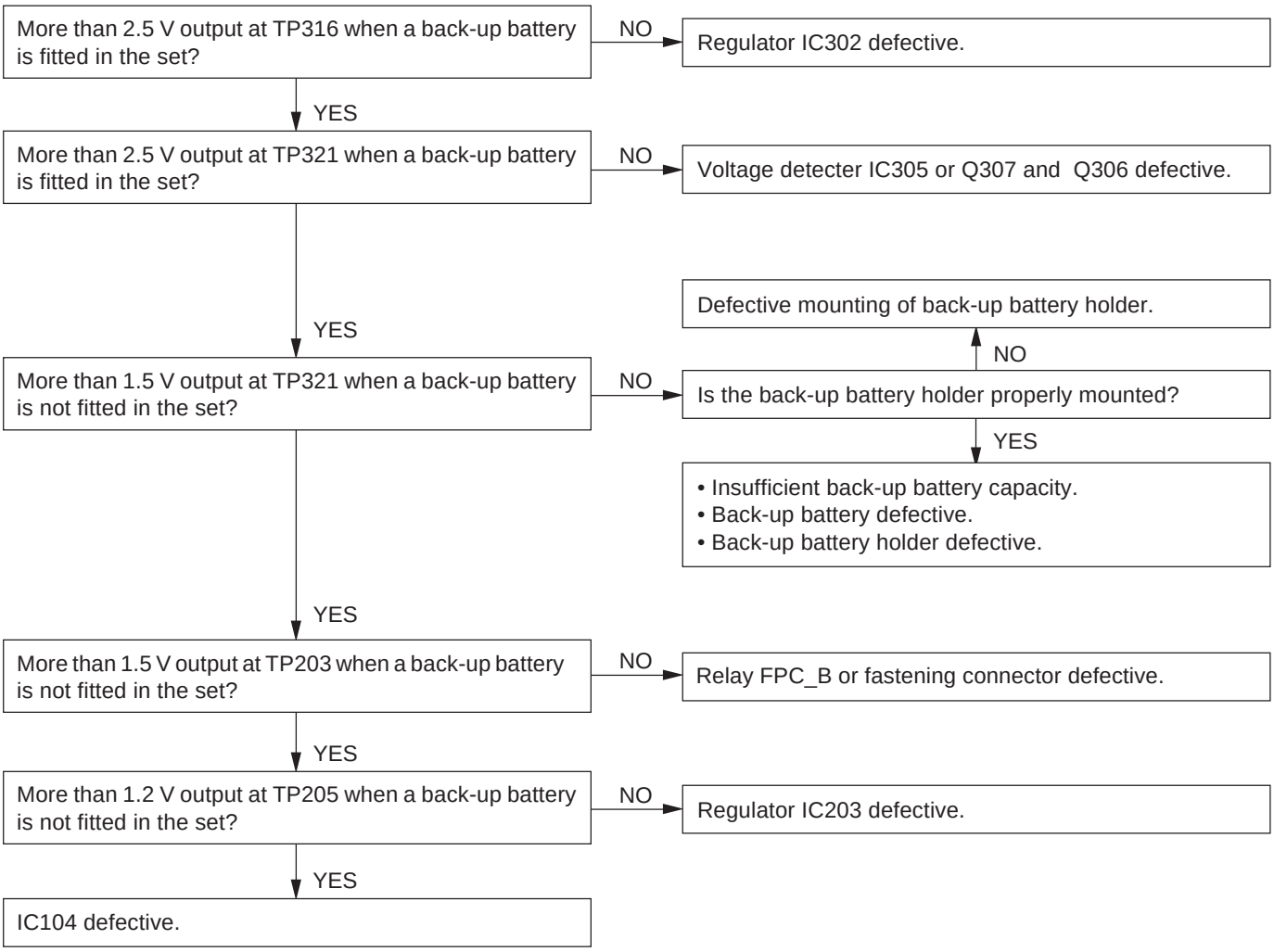
4. Charging impossible.



5. Vibrator does not operate.

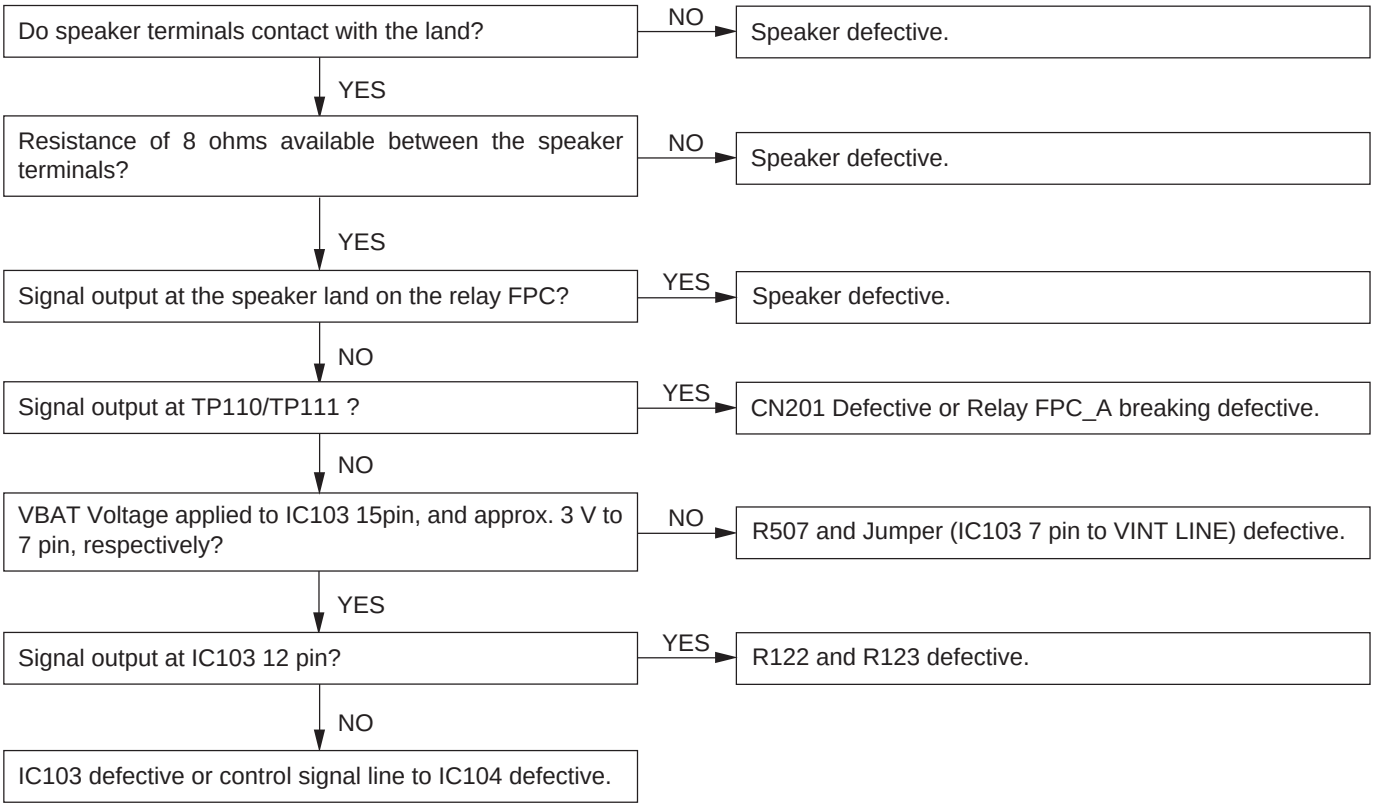


6. Clock is reset.

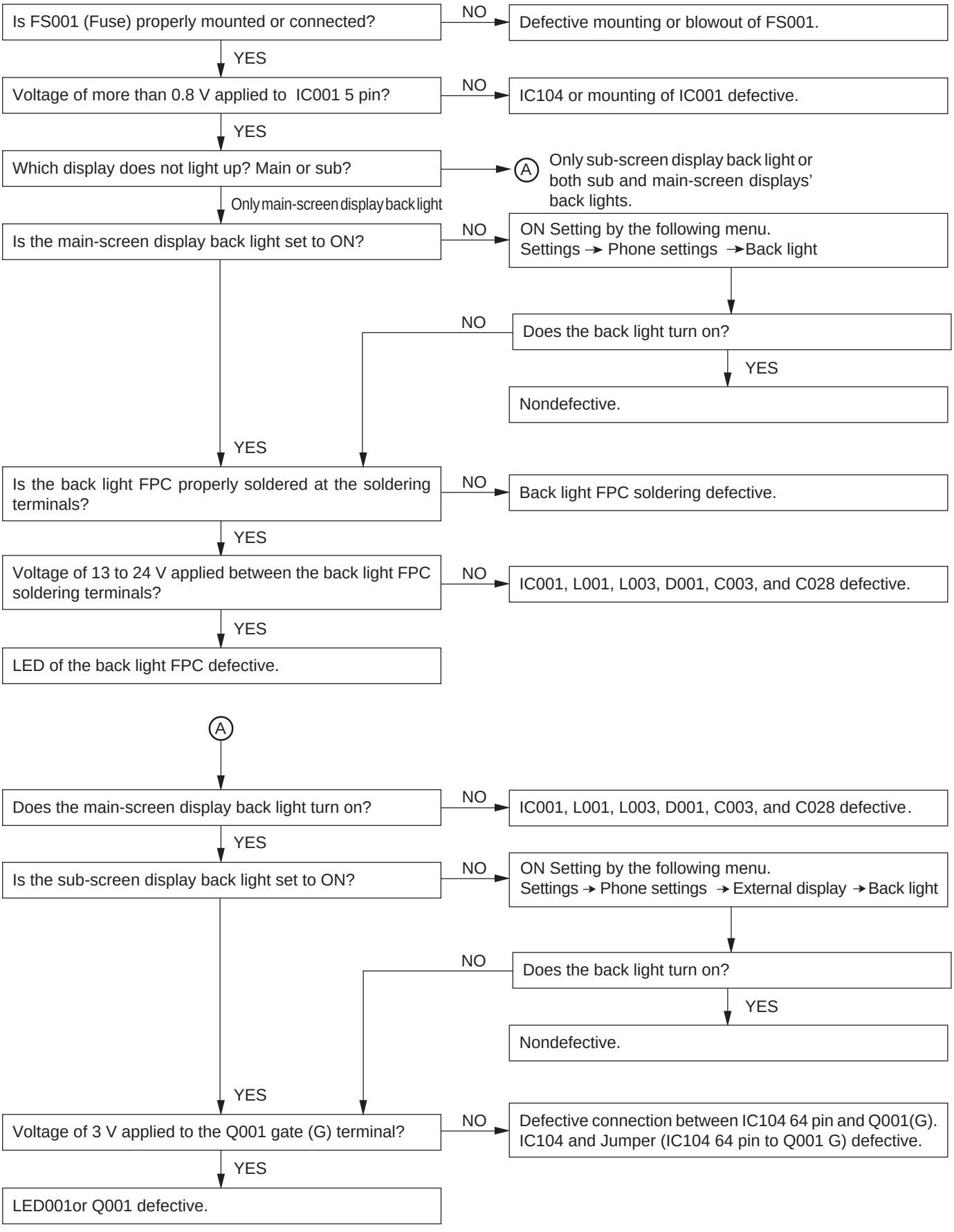


7. Speaker does not operate.

*When ring tones sound but only key touch tones do not, "Keypad Tones" are set to OFF.



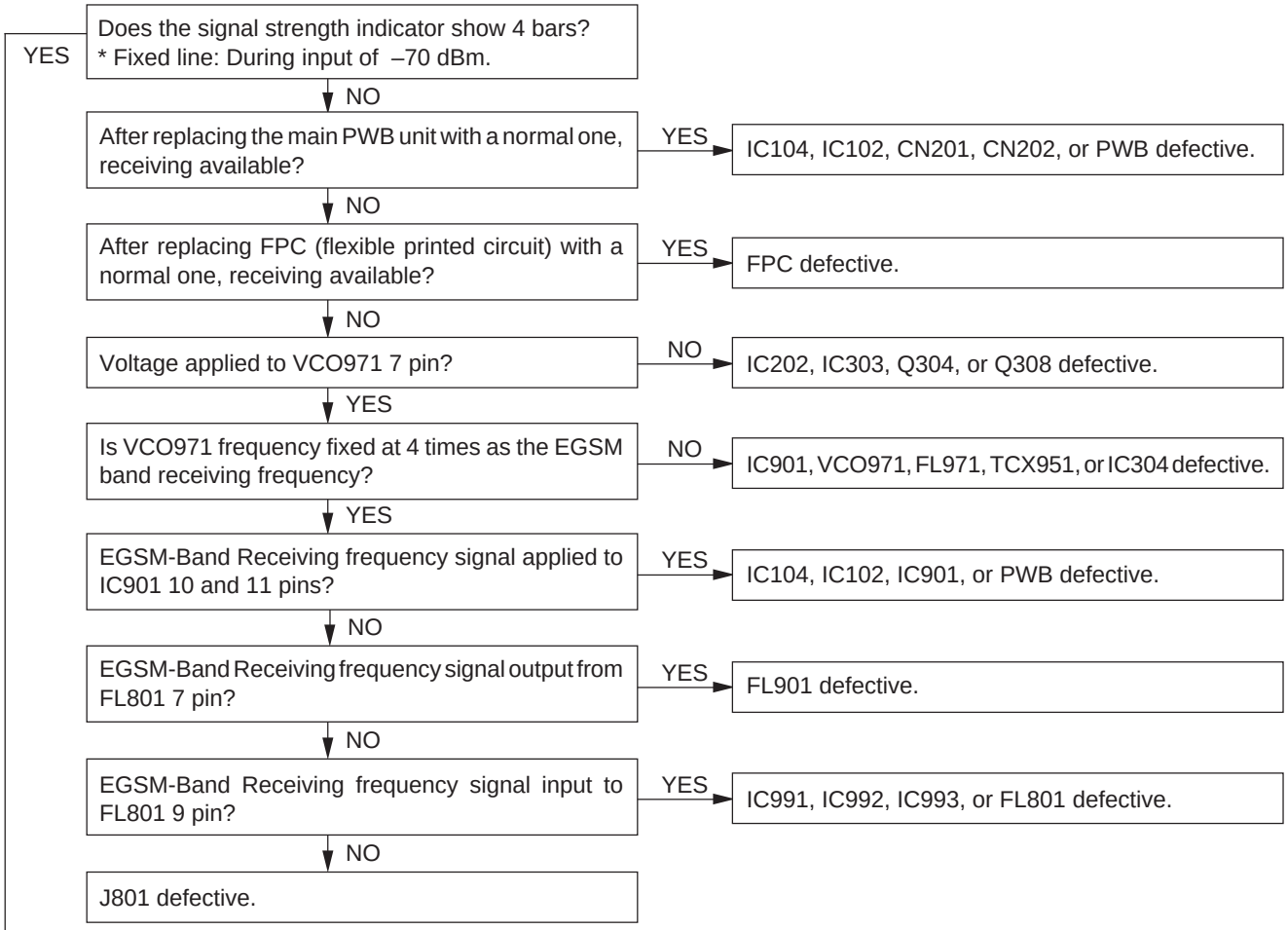
8. Back light does not turn on.



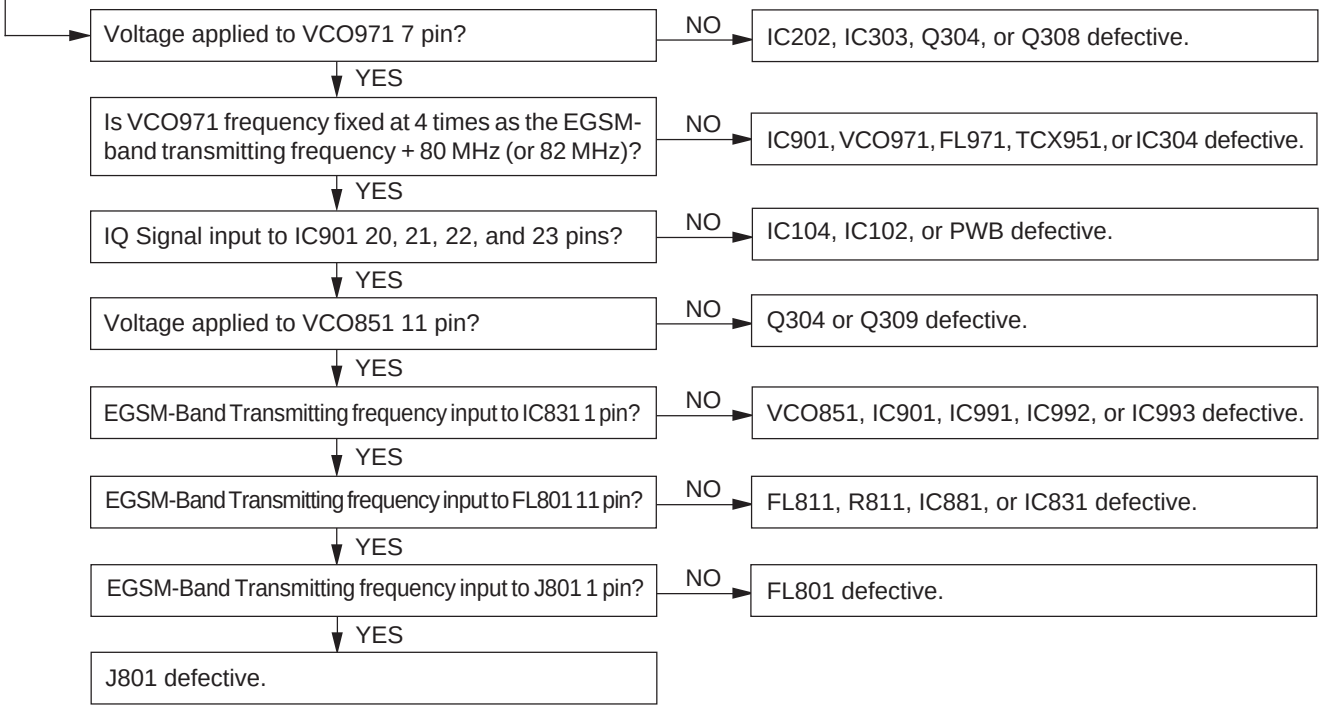
9. "No Service" display and receiving/transmitting do not function.

9. 1 "No Service" display and receiving/transmitting do not function in the EGSM band.

[Receiving System]

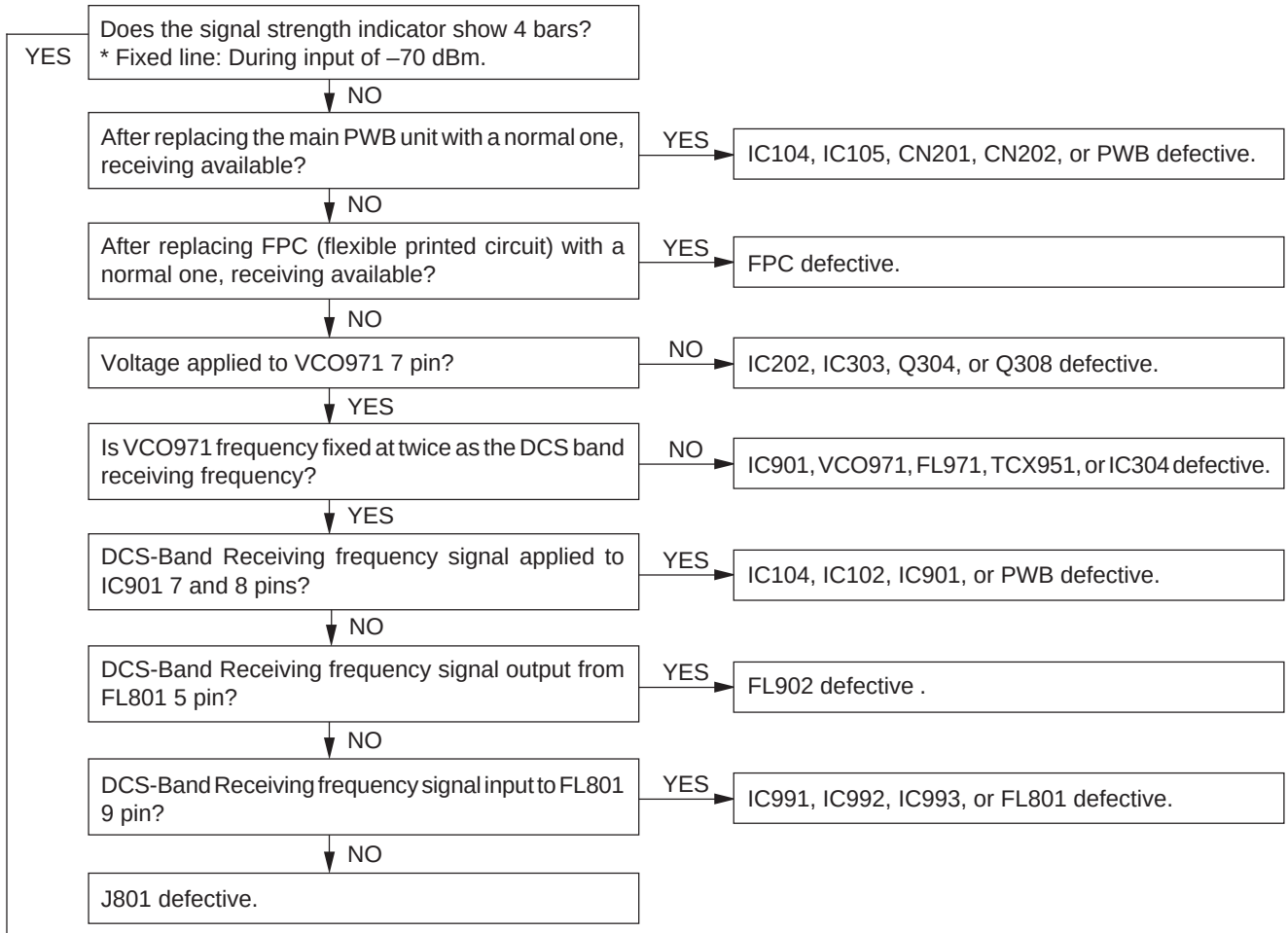


[Transmitting System]

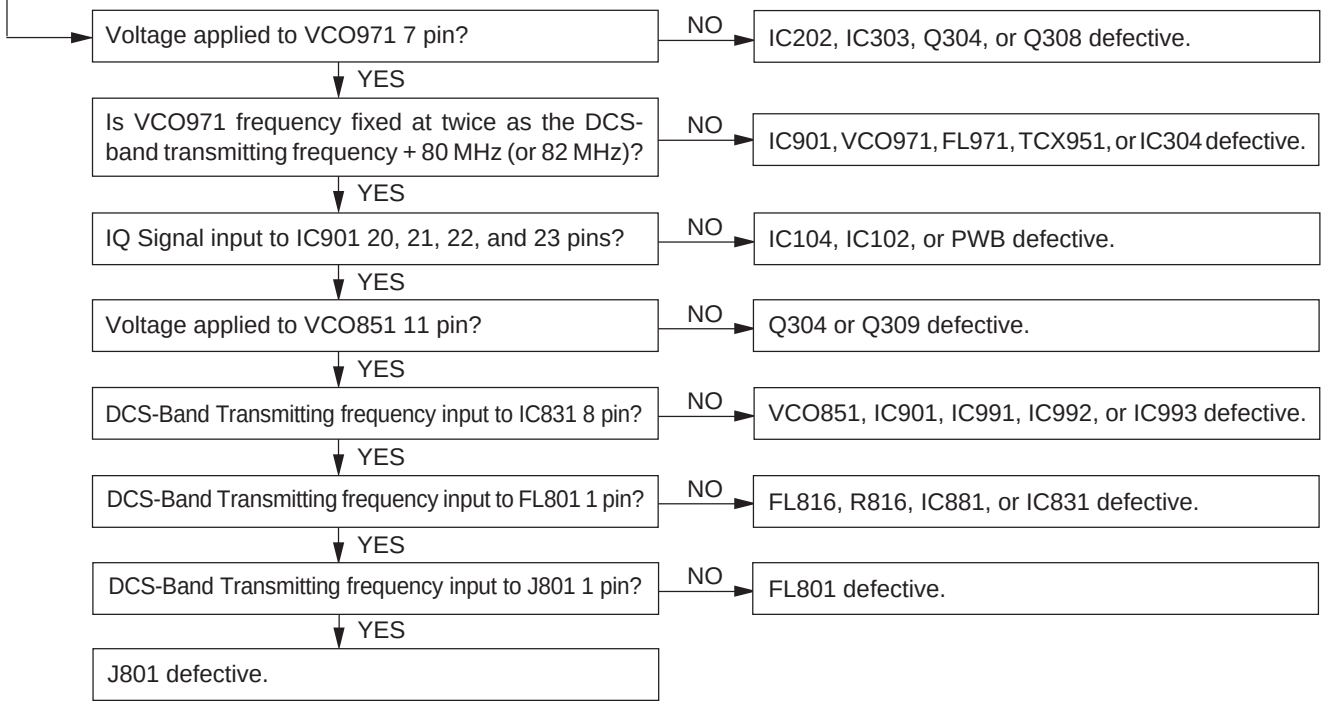


9. 2 "No Service" display and receiving/transmitting do not function in the DCS band.

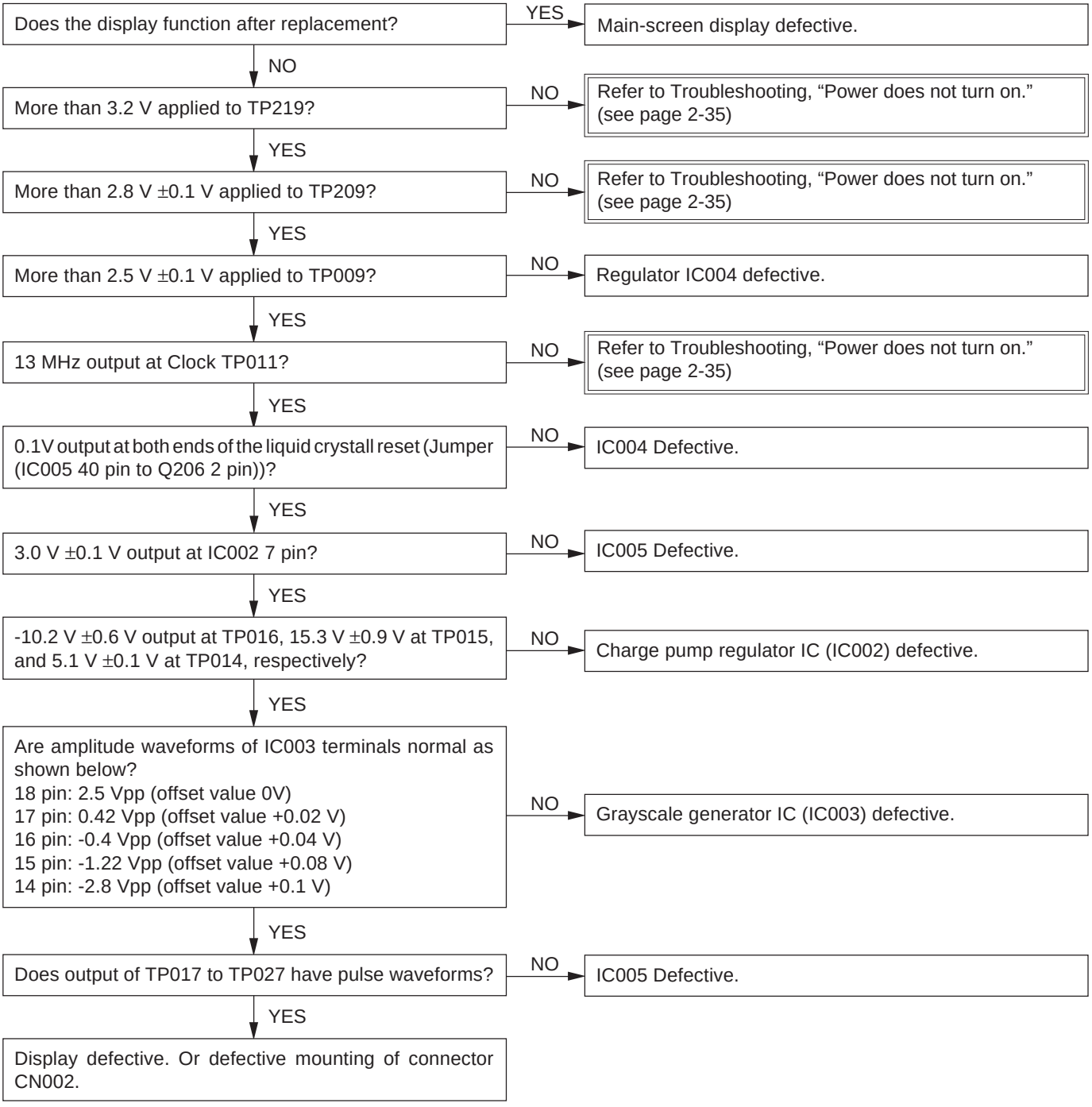
[Receiving System]



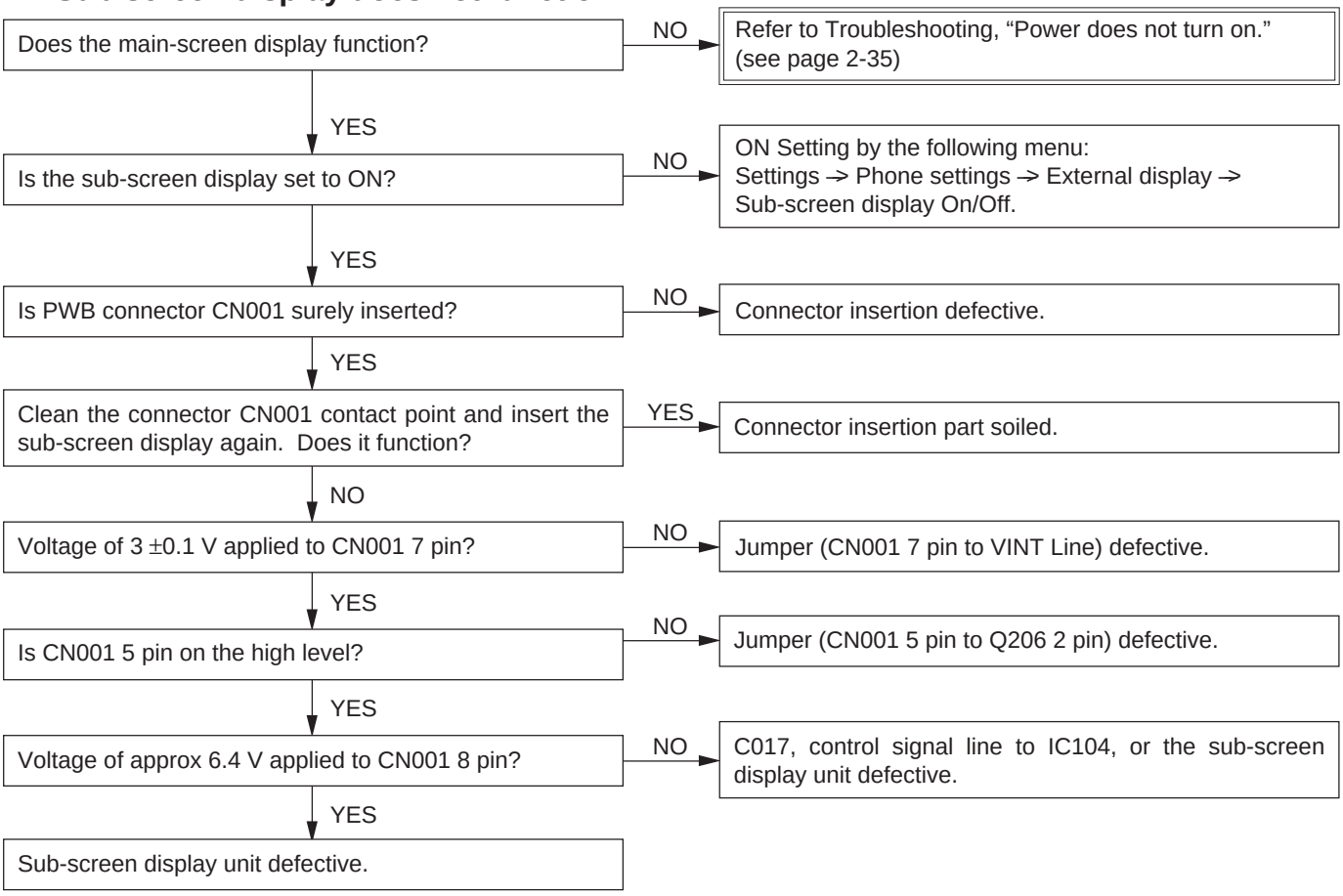
[Transmitting System]



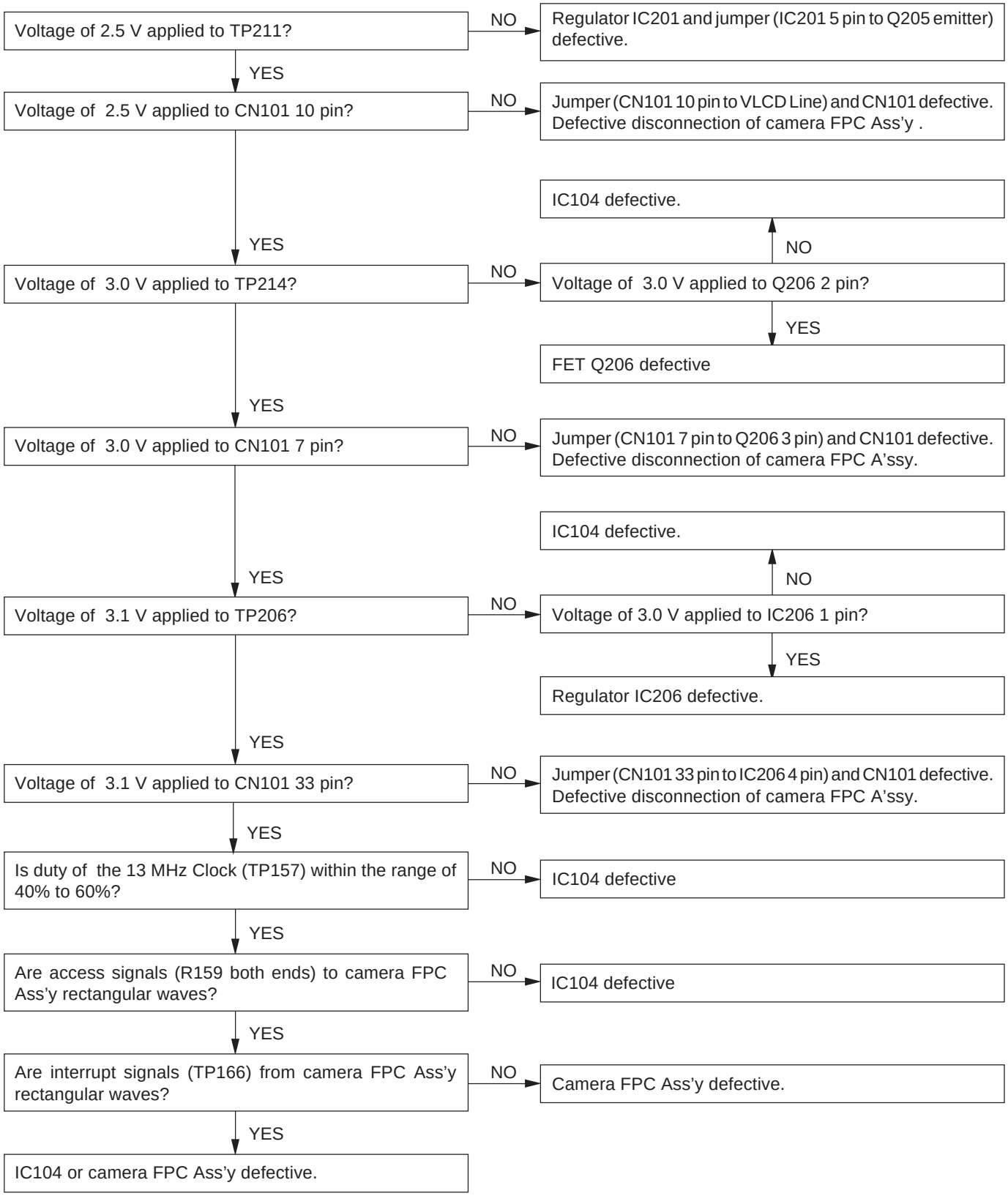
10. Main-screen display does not function.



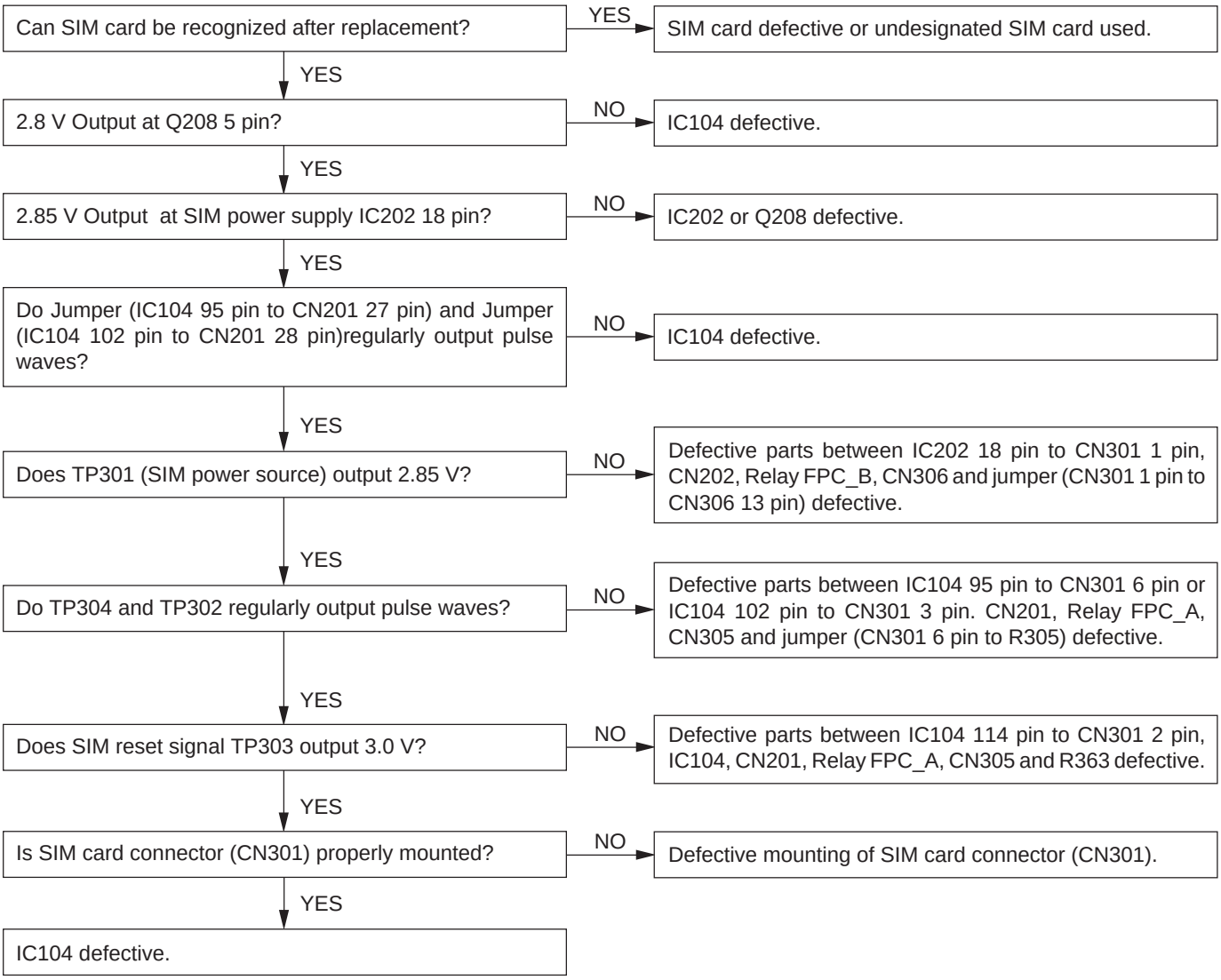
11. Sub-screen display does not function.



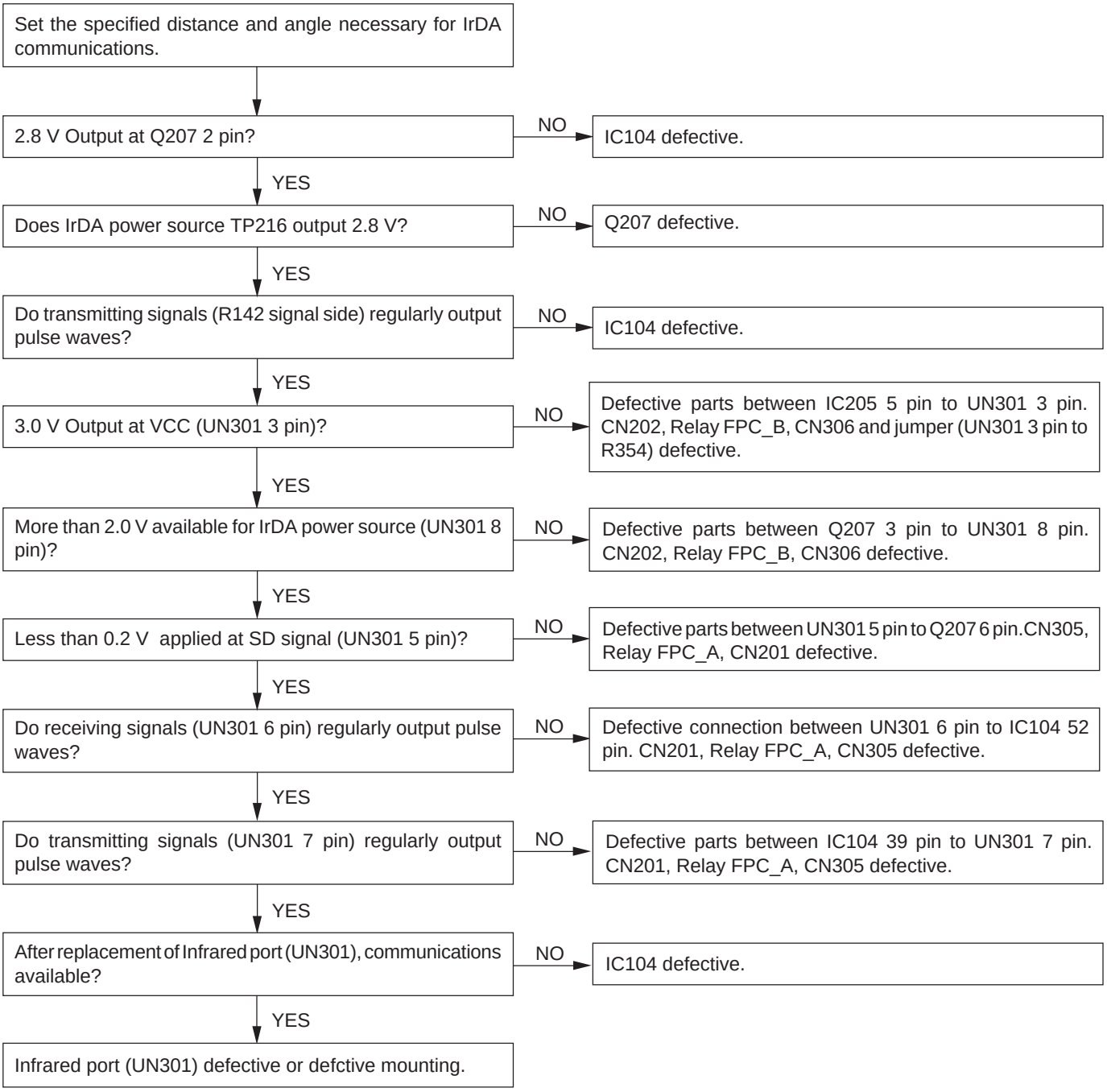
12. Camera does not function.



13. SIM Card is not recognized.



14. IrDA Communications unavailable



[5] Specification for function test

■ Outline

AT commands are used for the function test mode.
To enter the general mode, send the command “AT+XDIAG”.
Then the machine can accept all key test functions (see “All Key Test and Others” on page 2-63) and further commands from the computer.

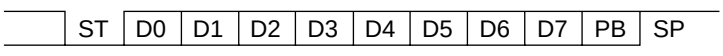
KEY Layout

Side Up	Left Soft	▲	Right Soft
	◄	M (Menu)	►
Side Down	Send	▼	End/Power
	1 ○○	2 ABC	3 DEF
	4 GHI	5 JKL	6 MNO
	7 PQRS	8 TUV	9 WXYZ
	* + ⇧	0 ␣	#

■ Logic of signals

1) Setting function (AT Command: AT+XDIAG)
Asynchronous (Consisting of 115200bps, data length 8, start 1, stop 1, and Parity None).

2) After shifting to Function Test
Incoming/Outgoing serial signals should be as follows.



ST: Start bit
D0-D7: Data bit
PB: Parity bit
SP: Stop bit

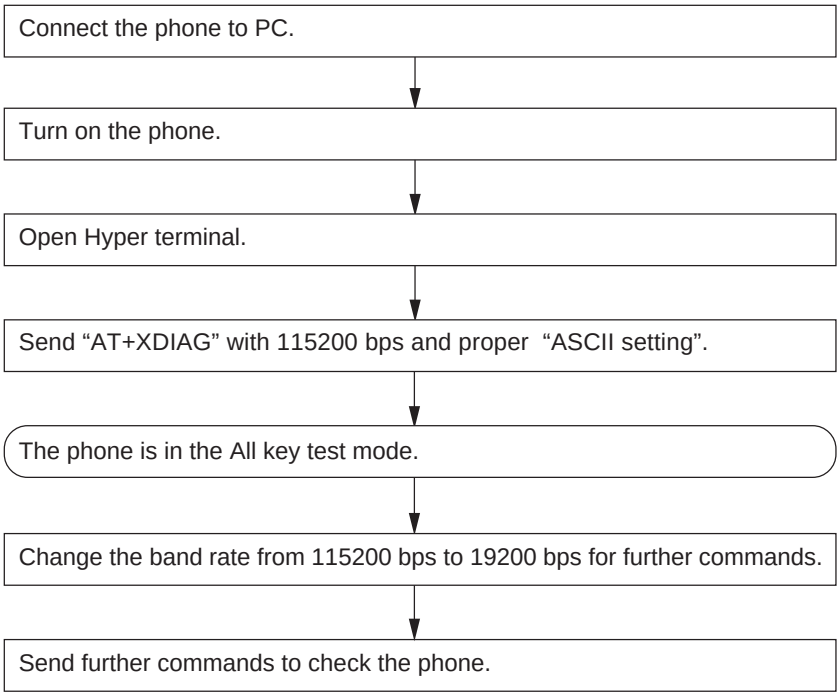
○ After AT+XDIAG
1. Transmission rate: 19,200bps
2. Synchro system Asynchronous (Consisting of data length 8, start 1, stop 1, and Parity None)

■ Signal protocol

1. The personal computer requests a response from a mobile machine to establish communications.
2. When keys are pressed, appropriate key codes are transmitted serially.
3. ASCII Characters (only capitals in the case of alphabet) are used for incoming/outgoing serial signals. At the end, return codes (0Dh, 0Ah) are added.
4. Once making a request, the personal computer cannot make another request until the mobile machine returns a certain response. Time-out does not occur.

■ Basic procedure (when using Hyper terminal)

Flow chart



(Details)

1. Connect the phone to the computer via a data cable.
2. Turn on the phone.
3. Open Hyper terminal. (Start→ Program→ Accessory→ Communication→ Hyper terminal)
4. Enter the name and choose the desired icon. Then click “OK”.

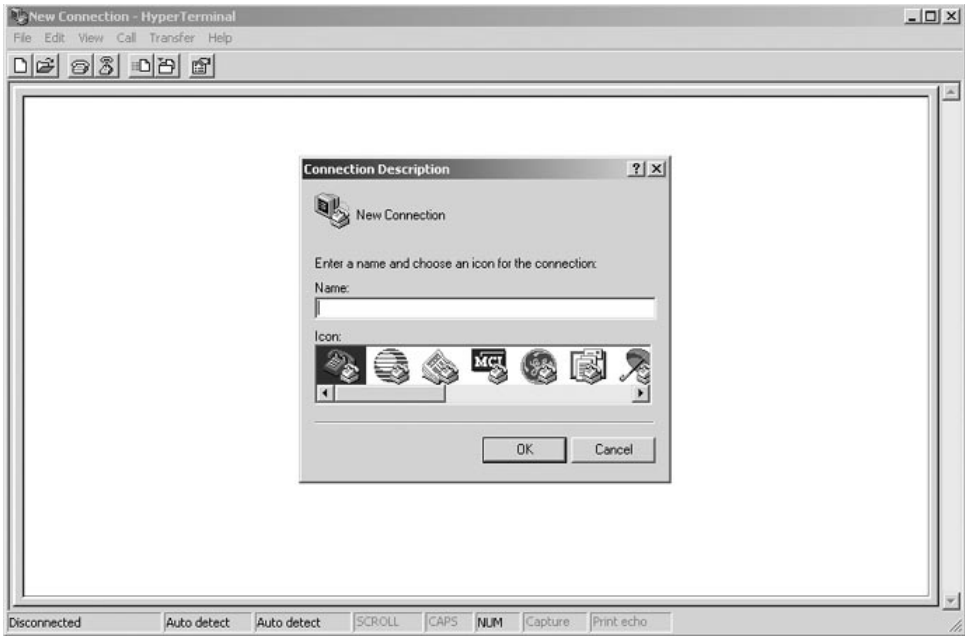


Figure 67

5. Choose the appropriate COM port for network and click “OK”.

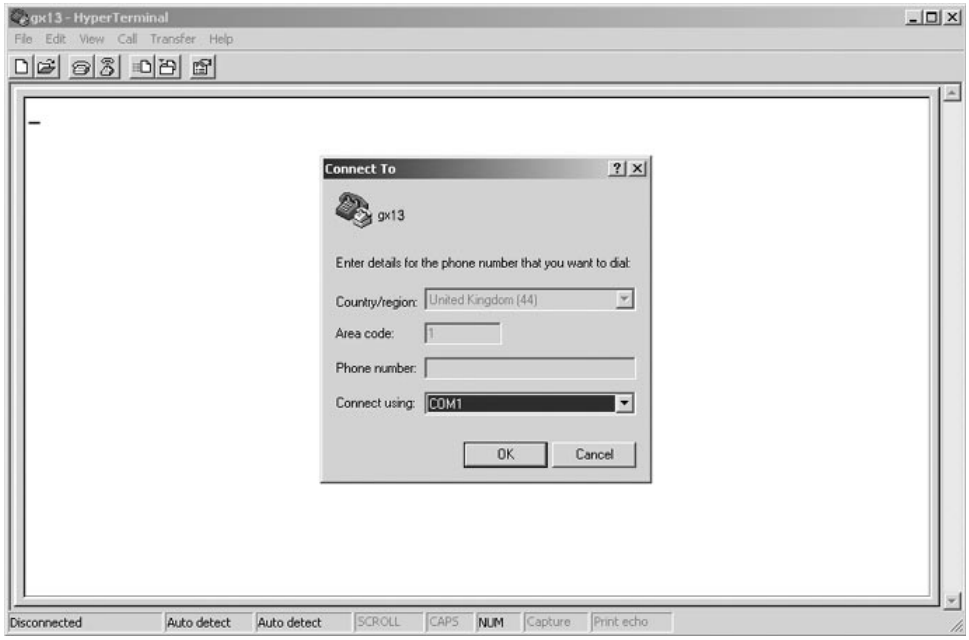


Figure 68

6. Adjust the port settings and click “OK”.

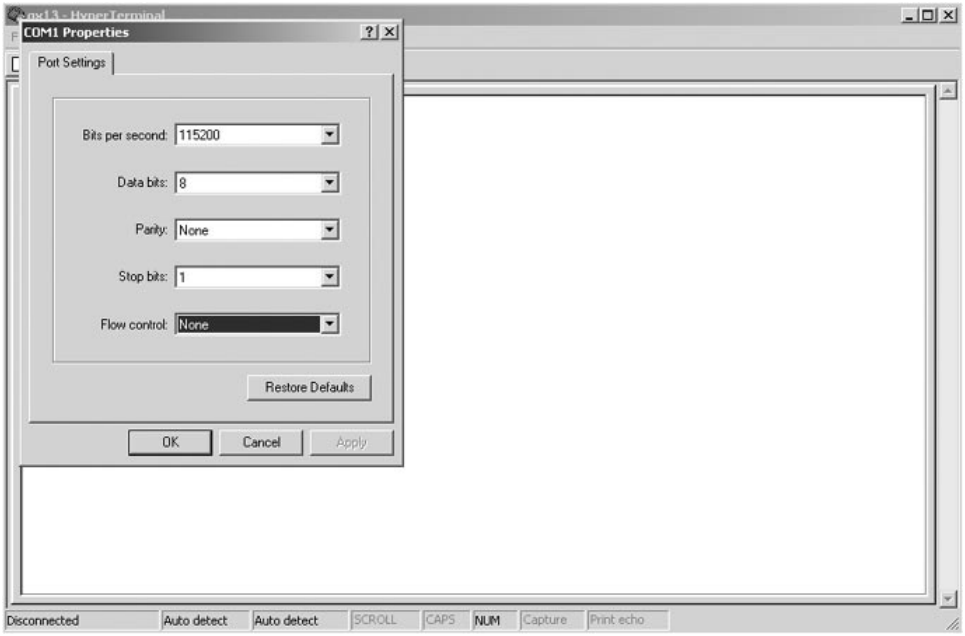


Figure 69

7. From the file menu, select “Properties” and click the Settings tab.

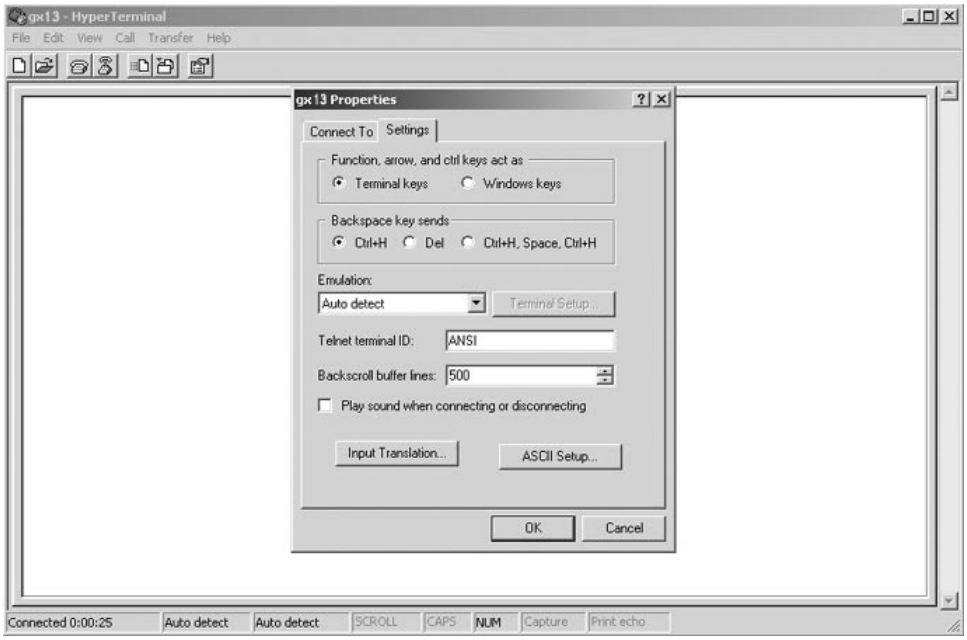


Figure 70

8. Click “ASCII setting” and check “Send line ends with line feeds” and “Echo typed characters locally”.

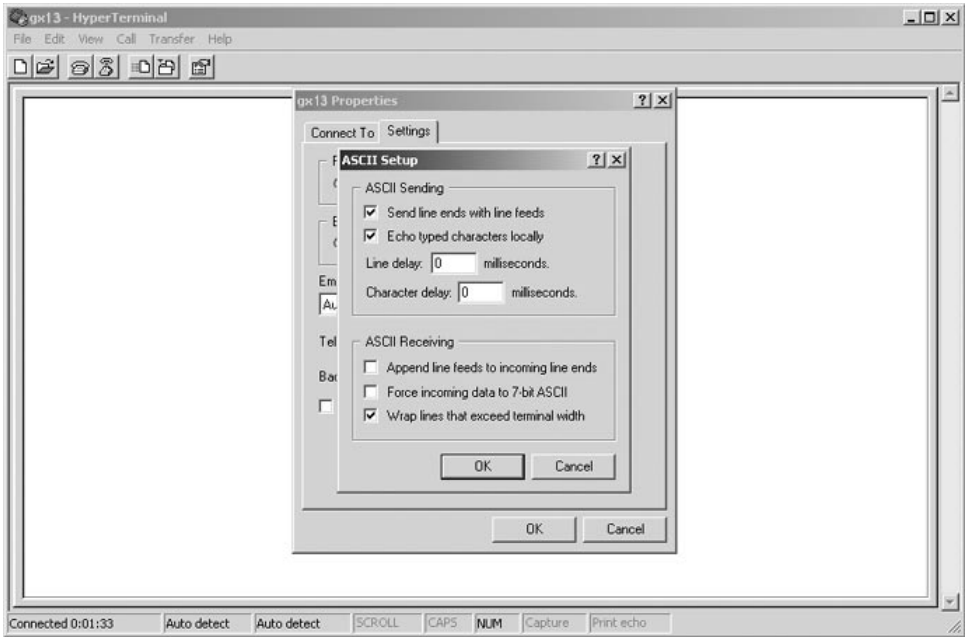


Figure 71

9. Click “OK” for “ASCII setting” and “Properties” to exit.

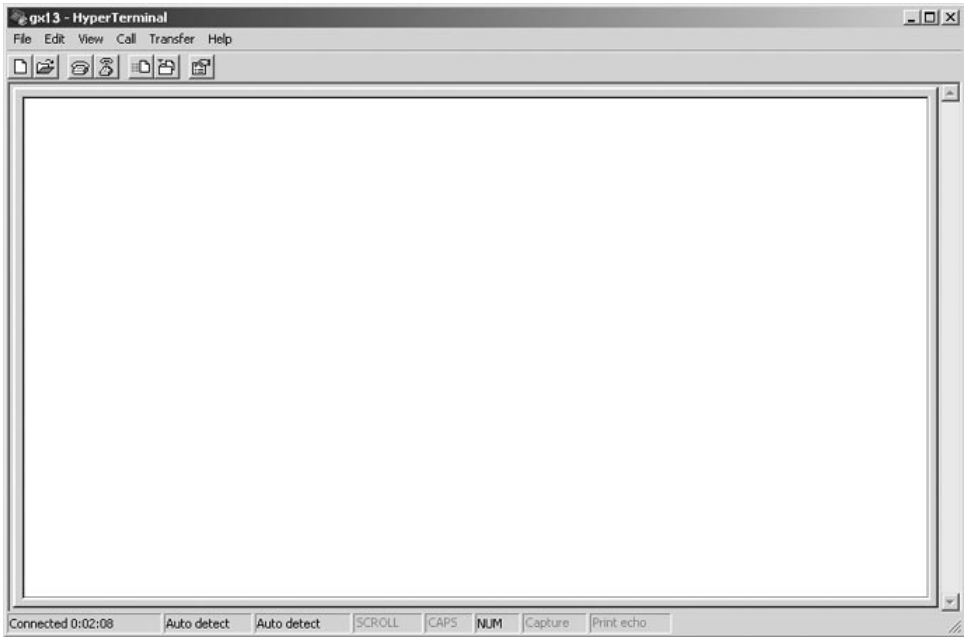


Figure 72

10. Send “AT+XDIAG”
    - You will see AATT++XXDDIIAAGG instead of AT+XDIAG as shown below by the Local echo mode, although you input AT+XDIAG.
    - After sending you will receive “OK”, and the machine should enter the All key test mode (see “All Key Test and Others” on page 2-63).

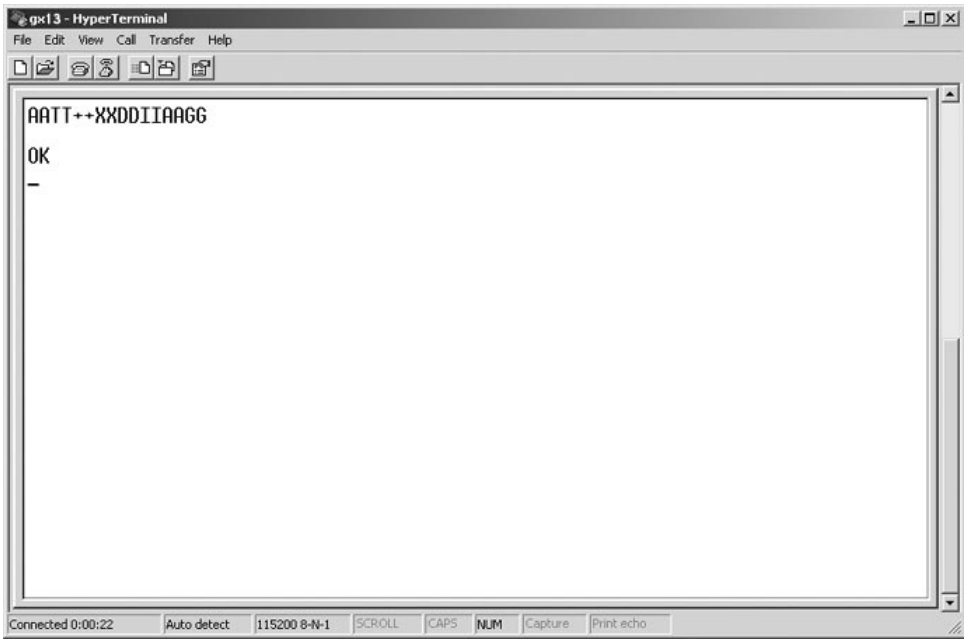


Figure 73

11. If you send further commands, you must change the baud rate from 115200 to 19200 as follows;
    11-1. Disconnect communications.

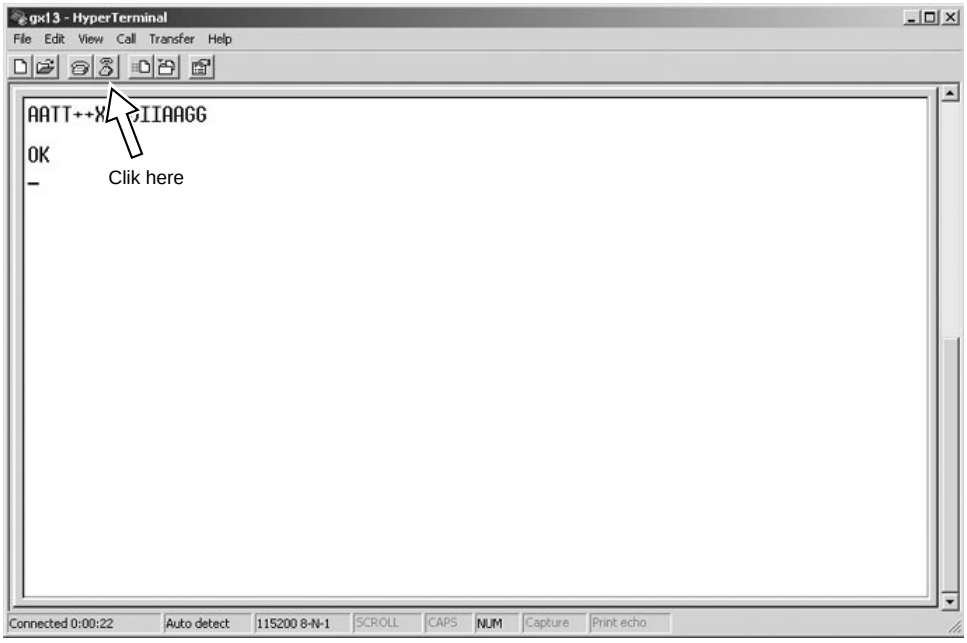


Figure 74

11-2. From the file menu, select “Properties” and click “Configure...”.
Then change the baut rate to 19200 as follows;

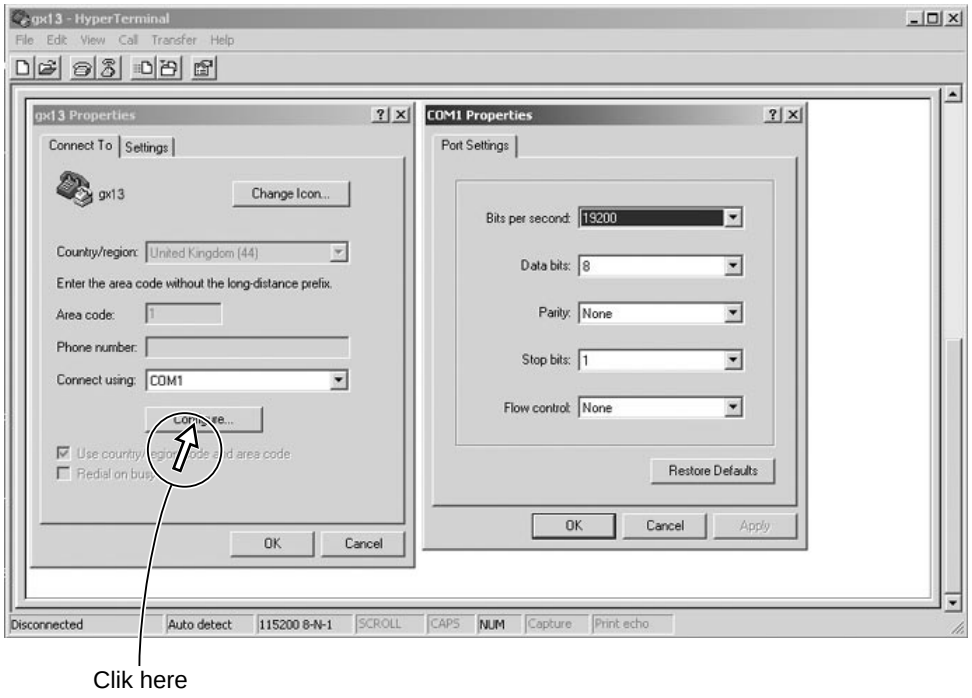


Figure 75

11-3. Click “OK” for “Port setting” and “Properties” to exit.
You can now send commands. (See example below for the “BATVAL” command.)

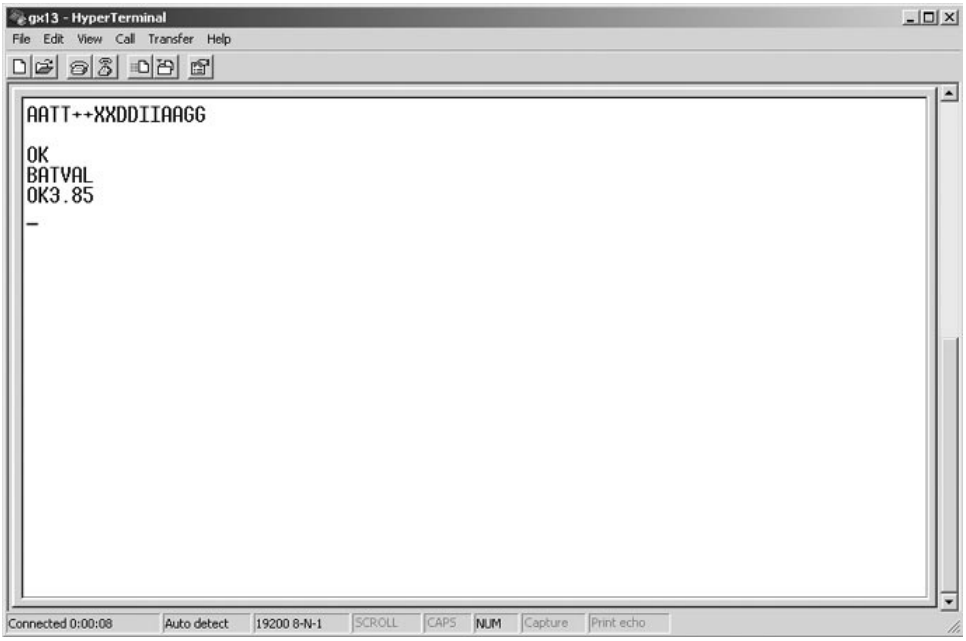


Figure 76

1) Basic Operation Test

<Startup and initial condition>

Fit a battery or a dummy battery in the set. Hold down the "End/Power" key to start up in the general mode. Then enter AT+XDIAG without pressing any key.→ Start up in the general function test mode. (3 sec. until startup)

- ○ Back light OFF
- ○ After startup, "H/W CHECK ∗ GX-13 ∗" is displayed.
- ○ When adjusting by the AT command, be sure to perform the LDDEVPRM command before adjustment and the SVDEVPRM command after adjustment.

Incoming/Outgoing Serial Signal Format for Basic Operation Test

Item	Incoming Serial Signal		Outgoing Serial Signal	Contents	Test Method
	Command	n	Response		
FROM to SRAM	LDDEVPRM	None	LDDEVPRM OK LDDEVPRM NG	FROM to SRAM extension. The contents of FROM are damaged.	Before adjustment perform this command to output the adjustment value stored in FROM to SRAM.
Checking LCD back light voltage	LED	5 4 3 2 1 0	LEDn (n=0, 1, 2, 3, 4)	Sub-screen display back light. Key back light LED. Red LED lights up. Green LED lights up. Main-screen display back light lights up. All LEDs light off. *1	Checking that LEDs light up. LED1: Main-screen display back light lights up. LED2: Green LED lights up. LED3: Red LED lights up. LED4: Key back light lights up. LED0: All LEDs light off.
Measuring RTC clock	OUT32K	1 0	OUT32Kn	32 kHz Output (MON Output) 32 kHz Stop (Returned to ALT1)	Checking frequency of the real time clock. Normal: When OUT32K1 is transmitted, TP205 frequency is 32.768 kHz ±1.11 kHz.
Battery voltage check	BATVAL	None	Okn.nn	Reading down to the last two digits of voltage.	Reading the voltage of the battery power line. BATVAL is transmitted, "OK" and the voltage value are returned.
RTC Test (Writing)	RTCWR	yymmddhhmmss	OK	Writing time of day "yymmddhhmmss" to RTC. *2	Writing time to the clock. When RTCWR yymmddhhmmss is transmitted, yy (year), mm (month), mm (hour), and ss (minute) are written.
RTC Test (Reading)	RTCRD	None	RTC yymmddhhmmss	Reading time of day "yymmddhhmmss" from RTC. *2	Reading time of the clock. When RTCRD is transmitted, time of day is read out.
Temperature A/D Adjustment	TMPAD	4 3 2 1	ADSETOK TMPADH <Readout AD value> TMPADL <Readout AD value> TMPADRDY	Adjustment mode ended. *3 2.2 V Measurement started. 0.4 V Measurement started. Adjustment mode started.	Refer to the "Adjustment procedures after replacement of parts" on pages 2 – 29 and 2 – 30.
Temperature check	TMP	n	TMPnxx: Temperature NG: Except 0 – 50 ˚C	Temperature readout. (0 ˚C min.) n=1: Camera n=2: Battery	Reading temperature measured by the temperature sensor. When TMP is transmitted, TM and temperature are returned. In case of other than 0 – 50 ˚C, "NG" is returned.

Item	Incoming Serial Signal		Outgoing Serial Signal	Contents	Test Method
	Command	n	Response		
Temperature correction	TMPADJ	4nn 3nn 2nn 1nn	TMPADJ4nn TMPADJ3nn TMPADJ2nn TMPADJ1nn	Battery side -nn ºC. (Not cumulative subtraction) Battery side +nn ºC. (Not cumulative addition) Camera side -nn ºC. (Not cumulative subtraction) Camera side +nn ºC. (Not cumulative addition) "nn": To input difference from the present temperature. Cumulative addition is unavailable for more than one transmission.	Correcting difference between the ambient temperature and the temperature read by the sensor. Comparing the ambient temperature and the temperature read by the sensor to transmit the corrected value. TMPADJ15: To raise temperature by 5 °C. TMPADJ25: To reduce temperature by 5 °C. * When the same commands are transmitted several times, corrected vales are not added.
IrDA Test	IRDA	1 2 3 4 5 6	OK NG aa NG NODATA	1: 2.4 kbps 2: 9.6 kbps 3: 19.2 kbps 4: 38.4 kbps 5: 57.6 kbps 6: 115.2 kbps "OK" if "5A" is detected. If values other than "5A" are detected, they are returned. Data cannot be received.	Provide the set in the IrDA jig mode to the other end of the line to perform the transmitting/receiving test. When IRDA is transmitted, the set in the IrDA jig mode receives signals and returns "5A". Detecting "5A", the tested set returns "OK" to the personal computer. When values are other than "5A", Ngaa is returned. If data cannot be received, NG NODATA is returned. *4
IrDA Jig Mode	IRDACH	1 2 3 4 5 6	OK	1: 2.4 kbps 2: 9.6 kbps 3: 19.2 kbps 4: 38.4 kbps 5: 57.6 kbps 6: 115.2 kbps IrDA Jig mode entered. After that commands are rejected.	When IRDACH5 is transmitted, using the command to set the IrDA jig mode, the jig mode starts. Reset, or disconnect the power from the set, to release the jig mode. *4
(Vibrator) MA2 Test (Sound)	VIB	1 0	VIBn	Asynchronous drive. (Always ON) Stop.	Checking vibrator operation. When VIB1 is transmitted, the vibrator operates continuously; when VIB2 is transmitted, it stops operation.
	MELO	1 0	MELOn	Melody playback. Stop. *5	Checking melody playback. When MELO1 is transmitted, melody is played back from the speaker; when MELO2 is transmitted, playback stops.
Memory test (SRAM)	MEMCHK1	00000 00000 07FF FE5	MEMCHK1 OK MEMCHK1 NG 0000 0000dddd	Addresses (00000000 to 0007FFFE) are checked. For NG, the address "00000000" and the readout data "dddd" are returned. (dddd: Production Process No)	Checking read/write of 4Mbit SRAM.
Memory test (PSRAM)	MEMCHK2	00300 00000 3FFF FE5	MEMCHK2 OK MEMCHK2 NG 0030 0000dddd	Addresses (00300000 to 003 FFFFE) are checked. For NG, the address "00300000" and the readout data "dddd" are returned. (dddd: Production Process No)	Checking read/write of 16 Mbit. Smartcombo RAM.

Item	Incoming Serial Signal		Outgoing Serial Signal	Contents	Test Method
	Command	n	Response		
SRAM to FROM saving	SVDEVPRM	None	SVDEVPRM OK SVDEVPRM E1	SRAM to FROM saving. Garbled SRAM (No saving).*6	After adjustment, adjusted values in SRAM are saved to FROM.
POWER OFF	PWRDOWN	None	None	POWER OFF	POWER OFF when PWRDOWN is transmitted.

*1: The LED test is also available in the manual test mode F45.

<Startup>

1. Fit a battery in the set to start the manual test mode.
2. Press the keys “4” → “5” → “Right Soft” to start the manual test mode F45 (LED Setting).
3. Press the following keys for ON/OFF operation.

Key	Description	Contents
“0”	OFF	All switches OFF
“1”	Charge LED ON/OFF	Charge LED (LED101: RED)
“2”	Incoming call LED ON/OFF	MA2 LED (LED101: GREEN)
“3”	Key LED ON/OFF	Key LED (LED301 to LED310: GREEN)
“4”	Back light ON/OFF	LCD Back light (Back light FPC: WHITE)
“5”	Test LED ON/OFF	Test LED (Not mount)
“6”	Sub back light ON/OFF	Sub Back light (LED001: WHITE)
“M”	End	Shifting from this mode to the initial screen

Every time a key is pressed, the operation,“Brightness 1 → 2 → 3 → 4 → OFF”, is repeated.

4. Press the key “M” to return to the initial screen with the display, “Diag Param Saving”.
5. Press the “End/Power” key to finish operation.

*2: YY=00: Year of 2000

RTC writing is also available in the manual test mode F40.

<Startup>

1. Fit a battery in the set to start the manual test mode.
2. Press the keys, “4” → “0” → “Right Soft”, to start the manual test mode F40 (Rtc Setting).
3. Press the following keys to set time of day. (For determination, press the key “Right Soft”.)
   1: Year 2: Month 3: Day 4: Hours 5: Minutes 6: Seconds
4. Every time the key “Left Soft” is pressed, time of day is displayed in a moment.
5. Press the key “M” to return to the initial screen with the display, “Diag Param Saving”.
6. Press the “End/Power” key to finish operation.

*3: Only when performing the TMPAD4 command or turning power OFF/ON, A/D adjusted values are reflected in temperature.

*4: The IrDA test is also available in the manual test mode F13.

<Startup in the jig mode>

Provide a set other than the tested set, which has been confirmed to operate normally. Use this set as the IrDA receiver.

1. Fit a battery in the set to start the manual test mode.
2. Press the keys, “1” → “3” → “Right Soft” to start the manual test mode F13 (IrDA Test).
3. Press the key “Left Soft” (S1: Test Device Mode).

   * The infinite loop mode for the IrDA data stand-by is started. After finishing the test, remove the battery.

<Startup in the test mode>

Data are transmitted/received by using the tested set.

1. Fit a battery in the set to start the manual test mode.
2. Press the keys, “1” → “3” → “Right Soft”, to start the manual test mode F13 (IrDA Test).
3. Direct the IrDA window of the tested set to that of the jig set.
4. Press the key “0” (0: Check IrDA) to transmit “A5” data automatically.
5. When “OK Data: 5A” is displayed, transmitting/receiving is normally completed. When “NG Data: **” is displayed, transmitting/receiving is abnormally ended.
6. Press the key “M” to return to the initial screen with the display, “Diag Param Saving”.
7. Press the “End/Power” key to finish operation.

*5: The melody playback test is also available in the manual test mode F51.

<Startup>

1. Fit a battery in the set to start the manual test mode.
2. Press the keys, “5” → “1” → “Right Soft”, to start the manual test mode F51 (Melody Test).
3. Press the following keys to switch operations.

Key	Description	Contents
“◀”	Selecting melody tone.	Select the next melody by toggling. If the final melody is selected, further selection is unavailable.
“▶”	Selecting melody tone. is unavailable.	Select the preceding melody by toggling. If the default melody is selected, further selection
“0”	Ring tone playback. Playback/Stop.	Toggle the selected ring tone between playback and stop. Default: –16 dB 0: Stop 1: Playback
“Right Soft”	Key touch tone output.	Toggle the key touch tone between ON and OFF. 0: Stop 1: Output (DTMF: –16dB)
“▲”	Volume control.	Turn up the volume by 1 level. During playback of ring tone: Ring tone is changed. During key touch tone output: Incoming audio volume is changed.
“▼”	Volume control.	Turn down the volume by 1 level. During playback of ring tone: Ring tone is changed. During key touch tone output: Incoming audio volume is changed.
“M”	End	Shifting from this mode to the initial screen

4. Press the key “M” to return to the initial screen with the display, “Diag Param Saving”.
5. Press the “End/Power” key to finish operation.

*6: Handling diag calibration data.

Contents of diag calibration data:

1. 4 Kinds of A/D Adjustment values.
2. Camera adjustment data (Dark current, white flaw).

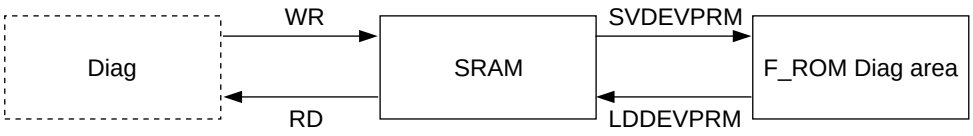


Figure 77 Handling Diag Calibration Data

2) Camera Adjustment/Test

When adjusting by the AT command, be sure to perform the LDDEVPRM command before adjustment and the SVDEVPRM command after adjustment.

Incoming/Outgoing Serial Signal Format for Camera Adjustment

Item	Incoming Serial Signal		Outgoing Serial Signal	Contents	Test Method
	Command	n	Response		
Dark current correction and white flaw check.	WHC (Including initialization)	0154 0160	In the case of OK. AAA, BBB AAA: Number of white flaws BBB: Max. level In the case of NG. COUNT NG (More than 1000 white flaws) 000000: Insufficient light shielding	S: Mode (0 to 3) ww: Dividing ratio (00 to 16) x: Average number (0 to 4) yyy: Thresholddetection frequency (000 to 255) z: G Data mode (0 to 3) *1	Refer to the "Adjustment procedures after replacement of parts" on pages 2 – 29 and 2 – 30.
White flaw correction *1	WH (Including initialization)	None	OK	White flaw correction.	Refer to the "Adjustment procedures after replacement of parts" on pages 2 – 29 and 2 – 30.
Camera operation	CAM	1 0	CAMn	ON OFF (Camera display)	Checking photography. When CAM 1 is transmitted, the camera operates; when CAM 2 is transmitted, operation stops.
Optical axis adjustment	CPH	1 2	CPH aa: Value of COFSH *2	Image shifted by 2 dots to the right. Image shifted by 2 dots to the left.	Adjusting deviation of the right and left optical axes.
Shutter ON/OFF	SHT	1 0	SHT n	Shutter ON Shutter OFF	Shutter ON/OFF operation. When SHT 1 is transmitted, the shutter turns ON; when SHT0 (to fix the screen) is transmitted, the shutter is released.
Zoom ON/OFF	ZOOM	1 0	ZOOM n	ZOOM ON (Only double size) ZOOM OFF	Changing zoom. When ZOOM 1 is transmitted, the double size image is displayed; when ZOOM 2 is transmitted, the original state is returned.

*1: Be sure to check white flaw (WHC command) before performing white flaw correction (WH command).
*2: Center value (Initial value): 12 Adjustment range: 04 to 20.

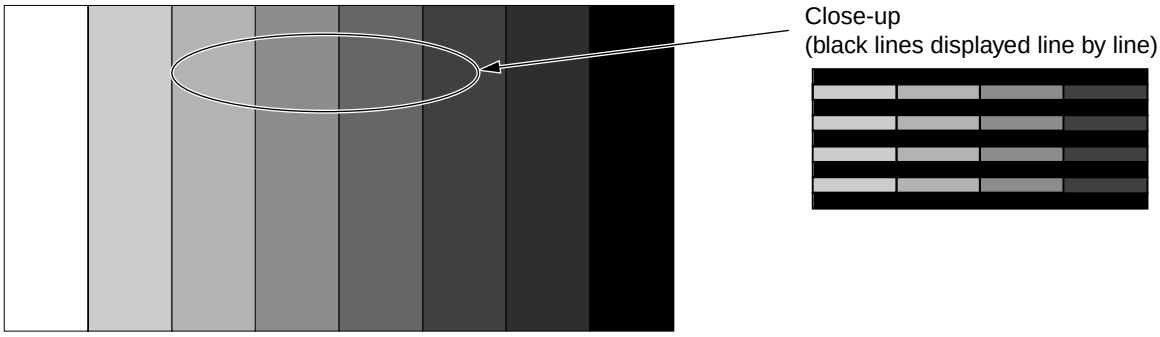
3) LCD Test

When adjusting by the AT command, be sure to perform the LDDEVPRM command before adjustment and the SVDEVPRM command after adjustment.

Main-Screen Display Test

Item	Incoming Serial Signal		Outgoing Serial Signal	Contents	Test Method
	Command	n	Response		
Checking LCD display	LCDDISP	3 2 1 0	LCDDISPn	VCOM adjustment pattern. Color bar (65 k colors). Black display (65 k colors). White display (65 k colors).	LCDDISP3 is the command for flicker adjustment pattern.
Flicker adjustment	VCOM	=nn	nn (nn: 0 to D6)	Changing DL [7 : 0] bit value of SIF1 register (No redrawing).	Flicker adjustment by performing the AT command.
Flicker adjustment	VCOMRD	None	VCOMRD=nn	Read the current data.	Flicker adjustment by performing the AT command.

VCOM Adjustment (Flicker adjustment)
Display the 8-gradation pattern. Seeing from the position within 20 cm from the inverted fluorescent light, adjust the VCOM voltage, performing the VCOM command.
Voltage for the lowest flicker is optimal for VCOMDC.
Flicker can be adjusted manually without using the AT command. (Refer to the, “Adjustment procedures after replacement of parts” on pages 2 – 29 and 2 – 30.)



Black lines are displayed line by line of the 8-gradation pattern (Black-and-white pattern)

Sub-Screen Display Test

Item	Incoming Serial Signal		Outgoing Serial Signal	Contents	Test Method
	Command	n	Response		
Checking the rear liquid crystal display	SUBLCD	2 1 0	OK	Inverted display of hound’s tooth check S. Hound’s tooth check. Initial display.	Checking the sub liquid crystal display.

4) Audio Test

Incoming/Outgoing Serial Signal Format for Audio Test

Item	Incoming Serial Signal		Outgoing Serial Signal	Contents	Test Method
	Command	n	Response		
Audio system power source and codec loop-back test.	PCMLP	4xx 3xx 2xx 1xx 0	PCMLPnxx (xx: Volume level)	Mic to JackEar path check. JackMic to Earpiece check. Jack to Jack path check. Mic to Earpiece path check. Path release (Finished)	Loop-back test for codec IC. PCMLP120: Checking that signals from the main unit microphone (TP324) are transmitted to the main unit earpiece (between TP167 and TP168). (In case that the volume level is 20) (Other cases.) PCMLP220: Between the headset microphone and the main unit ear piece. PCMLP320: Between the headset microphone and the main unit ear piece. PCMLP420: Between the main unit microphone and the headset earpiece. PCMLP0: Exiting from the loop-back.
H/S Detection	EAR	None	EARON•EAROFF	Detection of hads free insertion.	Detecting that the hads free is connected to the hands free connector. When "EAR" is transmitted: "EARON" is returned if the hads free is connected, and "EAROFF" returned if not connected.

Gain Table during "Mic to Earpiece" and "JackMic to Earpiece" Path Check.

xx	Table of Audio Volume	DAC Output Gain (dB)	Equivalent to Volume Position for User Setting
00	0x1F	Mute	MUTE
03	0x13	–19.5 dB	VOLUME 1
07	0x11	–16.5 dB	VOLUME 2
11	0x0E	–12.0 dB	VOLUME 3
15	0x09	–4.5 dB	VOLUME 4
20	0x04	+3.0 dB	VOLUME 5

Gain Table during "Jack to Jack" and "Mic to JackEar" Path Check.

xx	Table of Audio Volume	DAC Output Gain (dB)	Equivalent to Volume Position for User Setting
00	0x1F	Mute	MUTE
03	0x12	–18.0 dB	VOLUME 1
07	0x0E	–12.0 dB	VOLUME 2
11	0x0A	–6.0 dB	VOLUME 3
15	0x06	0 dB	VOLUME 4
20	0x02	+6.0 dB	VOLUME 5

5) All Key Test and Others

<Startup and initial condition>
Fit a battery or a dummy battery in the set. Hold down the "End/Power" key to start up in the general mode. Then enter AT + XDIAG.
→ Start up in the function test mode. (3 sec. until startup)
After any key is pressed, the AT command is rejected.
After the start of the test mode, the Data cable can be removed.

Key	Contents	
"Send"	Vibrator operation. "VIBRATOR" Displayed. Stop the vibrator with the key "0" to return to the all key test mode initial screen.	
"▶"	Playback melody at max. volume (MERODY1 in the normal condition). "MELODY" displayed. Press the key "⁎" to set the volume to the minimum, and the key "#", to the maximum, respectively. Stop melody with the key "0" to return to the all key test mode initial screen.	
"◀"	Playback the ringer at max. volume (Ringer1 in the normal condition). "RINGER" displayed. Press the key "⁎" to set the volume to the minimum, and the key "#", to the maximum, respectively. Stop melody with the key "0" to return to the all key test mode initial screen.	
"M"	Full-rate codec loop-back. "CODEC INT" displayed. Stop loop-back with the key "0" to return to the all key test mode initial screen.	
"1"	Display check mode.Display is as shown below. Green LED lights up. Back light is switched to the main light to turn on. LED CHECK ⁎ GX-13 ⁎ ROM VERSION: ⁎⁎⁎ BLCD:48 GX13 diag version. 2002.**.** v ** T_*** 2002/**/** **: **: **	
	"1" White → Red → Green → Blue → Black → Color bar → (Returning to white.)	
	"6" LED: Orange; Remained as it is until the key "0" is pressed.	
	Press the key "0" to turn off the green LED and return to the all key test mode initial screen.	
	"Side Up": Rear back light ON with no display. Thereafter toggling between test display and no display.	
	"Side Down": Rear back light ON with test display. Thereafter toggling between no display and test display.	
"2"	IrDA Check (115 kbps). Press the key "0" to return to the initial screen.	
"3"	Display changed to CHG CHECK. Press the key "0" to return to the initial screen. AC Charger is inserted to turn on the red LED.	
"8"	Rear liquid crystal contrast check. Press the key "0" to return to the initial screen.	
	"Side Up"	Writing to SRAM by increasing contrast by one level.
	"Side Down"	Writing to SRAM by decreasing contrast by one level.
	"0"	Returning to the all key test initial screen without contrast memory.
"6"	Camera turns ON to display camera image. (Optical axis at the left end) Press the key "Left Soft" to repeat ZOOM ON/OFF operation. Press the key "M" to repeat shutter ON/OFF operation. Press the key "◀" to shift the image by 2 dots to the left, and the key "▶" , by 2 dots to the right, respectively. Press the key "Right Soft" to write optical axis adjustment value. Press the key "0" to return to the all key test initial screen.	

Key	Contents
“9”	Red LED ON. LCDdisplay is shown below. Back light remains ON. RTC contents are displayed at the time the key “9” is pressed. Clock does not tick. KEY CHECK ＊GX-13＊ ROM VERSION : ＊＊＊ BLCD:48 2001/**/** **: **: ** GX13 diag version. 2002.**.** v ** T_*** 2002/**/** **: **: ** Press all keys except the key “0” in random order. The first pressing of the key brings white display and red LED OFF. Every pressing makes a bleep. Opening/closing flip also makes a bleep. With flip closed, green LED ON. Press the key “▶” to sound melody. (When pressing the next key, melody stops.) Press the key “◀” so sound ringer at max volume. (When pressing the next key, ringer stops.) Press the key “0” before pressing all keys to return to the all key test initial screen. When pressing all keys except the key “0”, ringer sounds at max. volume. Green LED for incoming call blinks and the screen display becomes black. When closing the flip, the ringer stops sounding. (Thereafter the ringer does not sound.) After that open/close the flip to make a bleep. Close it to turn on green LED. Press the key “0” to stop ringer, to turn off green LED for incoming call, and to return to the all key test initial screen.
“#”	Sum check. SUM CHECK ＊GX-13＊ ROM VERSION : ＊＊＊ BLCD:48 SUM:＊＊＊ GX13 diag version. 2002.**.** v ** T_*** 2002/**/** **: **: ** Press the key “0” to return to the all key test initial screen.

Key	Contents
"*"	Shifting to the mode for temperature correction. TEMP ADJ 1. CAM TEMP 2. BAT TEMP 0. EXIT "1" (Selecting the camera side) or "2" (Selecting the battery side) "0" Exit TEMP ADJ (BAT) Temp. 25 Deg. Correct : +00 Deg "▲" KEY: +1 Deg. "▼" KEY: - 1 Deg. "▲": +1 ºC Correction in the correction mode. "▼": -1 ºC Correction in the correction mode. "#": Determination of corrected value. TEMP is not updated automatically. Press the key "0" to return to the all key test initial screen.

Note) LCD Display: No temperature correction during the all key test; Display in the user contrast setting default condition.

Test Display:

6) Initializing Flash User Domain (Manual Test Mode F99)

Only use the troubleshooting procedure, "Power does not turn on" (page 2 - 35).
Take care that the user setting data will be lost in this operation.
Before starting this mode, be sure to backup the user data, referring to "SOFTWARE DOWNLOAD."

<Startup>
1. Fit a battery in the set to start the manual test mode.
2. Press the keys, "9" → "9" → "Right Soft", to start the manual test mode F99 (User Function).
3. When "Input Mode No: " is displayed on the screen, enter "1" and press the key "Right Soft".
4. "EE_FORMAT START" is displayed on the screen.
5. "FINISHED PLEASE ANY KEY" is displayed on the lower part of the screen.
6. Press the any key to return to the initial screen of the manual test mode.
7. Press the "M" key.
8. Press the "End/Power" key to finish operation.

After initialization, start up in the general mode.

CHAPTER 3. DISASSEMBLY AND REASSEMBLY

[1] Servicing Concerns

General

1. Before servicing, you must warn the user that the repair may clear the information stored in the memory.
2. Before storing or transporting the circuit board, put it into the conductive bag or wrap it in aluminium foil. (C-MOS IC may be damaged by electrostatic charges.)
3. In order not to stain cosmetic parts such as a cabinet, especially clear window parts for main and sub-screen display panels by finger print or whatever, please cover your finger by finger sack. Also, please take care about surface of main and sub-screen display panels not to stamp finger print.
4. To prevent oxidation which cause connection problem, please do not touch any terminal on electric board, microphone, vibrator, earpiece and speaker. If you have to touch there, please cover your finger by finger sack. If you touch those parts, please clean by soft dry cloth. Also, please do not touch shield case on electric board directly without finger sack, otherwise performance of the phone may decline because of oxidation.
5. Since FPC is sensitive, please handle FPC carefull so that you will not make any damage.
6. Please do not wet the moisture sensor. Once the sheet is wet, red ink is supposed to run. In this case, please replace the sheet with new one. Please take care about your sweat.
7. Be sure to remove the Li-Ion battery from mobilephone.
8. Take sufficient care on static electricity of integrated circuits and other circuits by using static electricity prevention bands when servicing.

For disassembling

1. Please do not remove the board of base band section by pulling external interface connector, otherwise you will make damage to the board.
2. Shield case is attached on shield case holder without clearance. When you remove it, please take care not to remove together with shield case holder. If you remove shield case holder together, you can not attach it again because it is attached by solder and in such a case, you shoud have taken electric pattern on the board as well.

For reassembling

1. Please make sure that all cosmetic parts have no scratch and clean.
2. Please make sure that you can open and close handset smoothly and hear tick sound of hinges.
3. Please make sure that sub-screen display cushion can not be seen from the window.
4. Please make sure that main LCD panel is placed in proper position without inclination.
5. Please make sure that all three battery terminals protrude evenly.
6. Please make sure that the pawl of aerial is upside.

● **FASTENING TORQUE (Referential Value)**

PWB/ Front Cabinet, Display	15.7 ± 2.0 N•cm (1.6 ± 0.2 Kgf•cm)
Back Cabinet, Key/ Display	17.7 ± 2.0 N•cm (1.8 ± 0.2 Kgf•cm)

The value is for reference when an electric screwdriver is used.

● **SOLDERING SPECIFICATION**

Soldering iron must be set to 350° C for 3 seconds.

● **STANDARD POSITION OF ATTACHMENT**

When replacing the Spacer, FPC,A, Spacer, FPC,C, Main -Screen Display, Tape and Sub -Screen Display Cushion shown below (▭), be sure to attach it to the designated position.

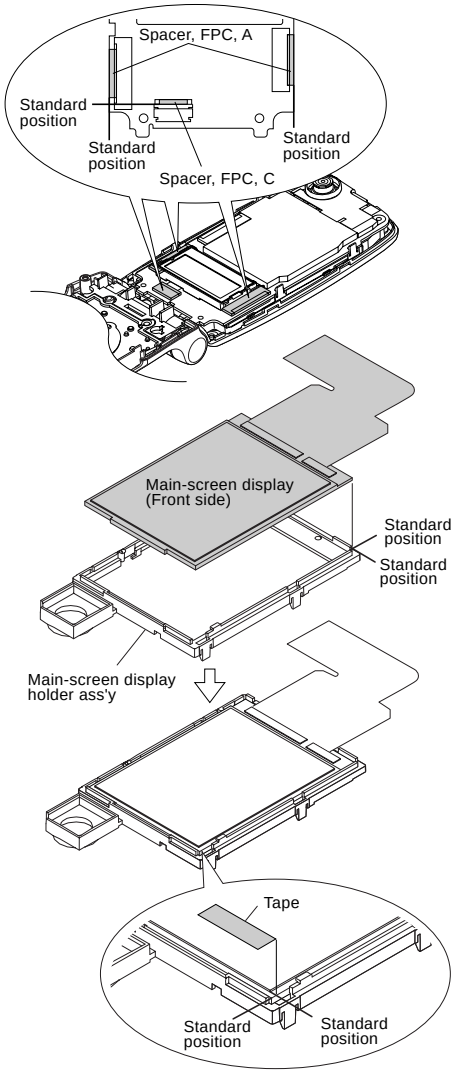


Figure 1

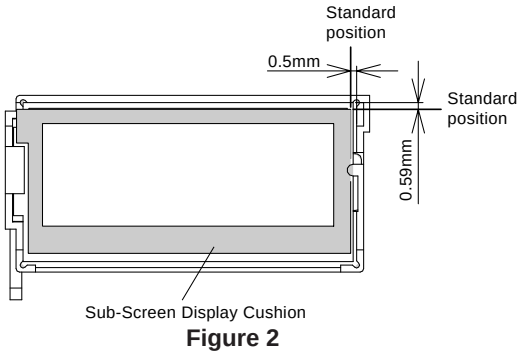


Figure 2

[2] Disassembly and reassembly

- To reassemble, follow the reverse procedure.

STEP	REMOVAL	PROCEDURE	FIGURE
1	Back Cabinet Assembly, Key	1.Battery Cover ..... (A1)x1 2.Li-Ion Battery ..... (A2)x1 3.Screw Cover ..... (A3)x2 4.Screw ..... (A4)x4 5.Hook ..... (A5)x4	3
2	Key PWB-B	1.Socket ..... (B1)x2 2.Solder ..... (B2)x5 3.Hook ..... (B3)x4	4

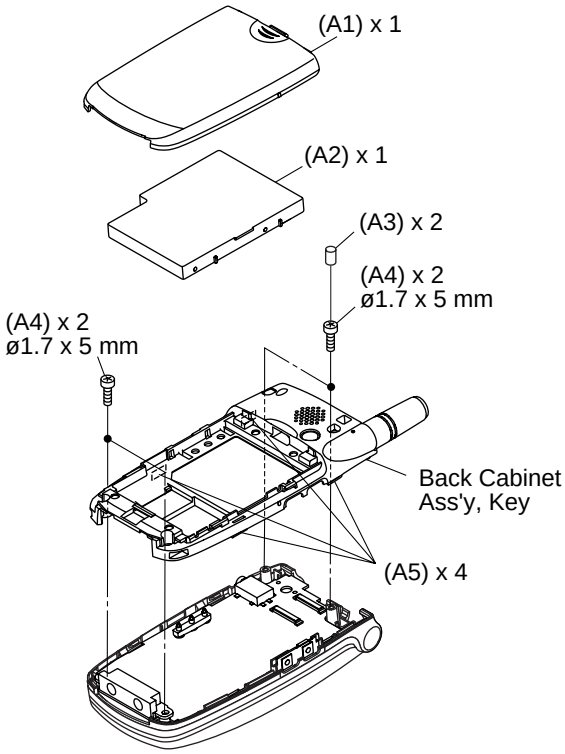


Figure 3

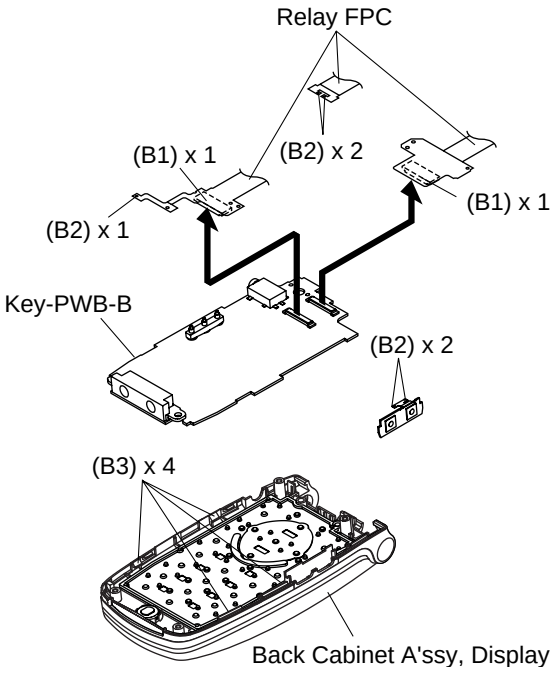


Figure 4

STEP	REMOVAL	PROCEDURE	FIGURE
3	Back Cabinet Assembly, Display	1.Screw Cover ..... (C1)x3 2.Screw ..... (C2)x7 3.Hook ..... (C3)x4	5
4	Main PWB-A	1.Solder ..... (D1)x5 2.Socket ..... (D2)x5 3.Hook ..... (D3)x4	6

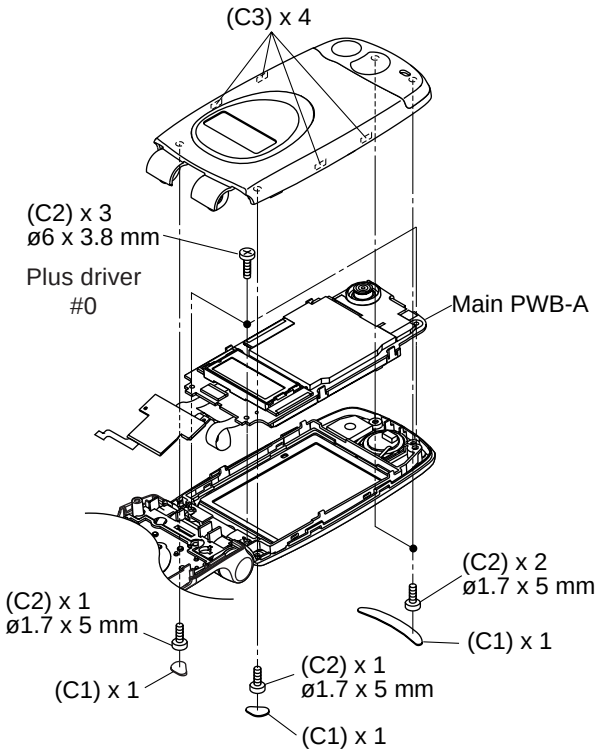


Figure 5

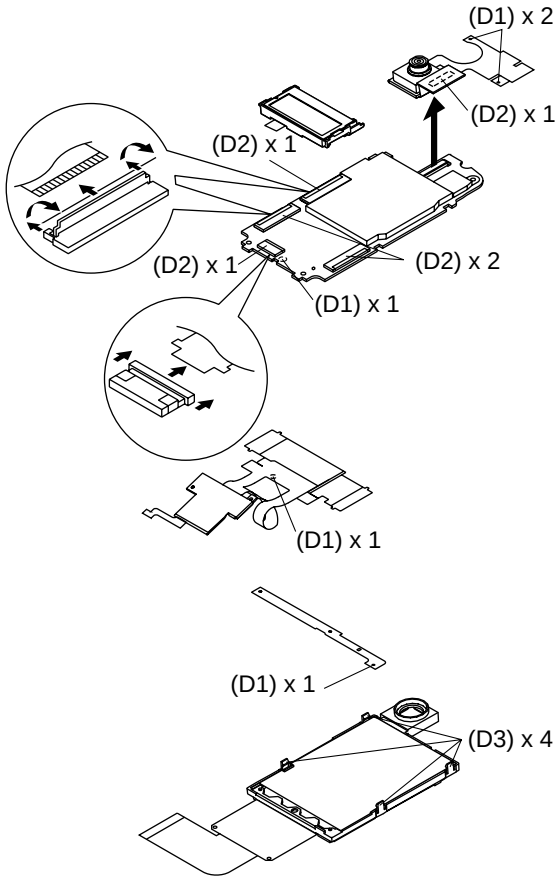


Figure 6

— MEMO —

CHAPTER 4. DIAGRAMS

[1] Block diagram

[Main]

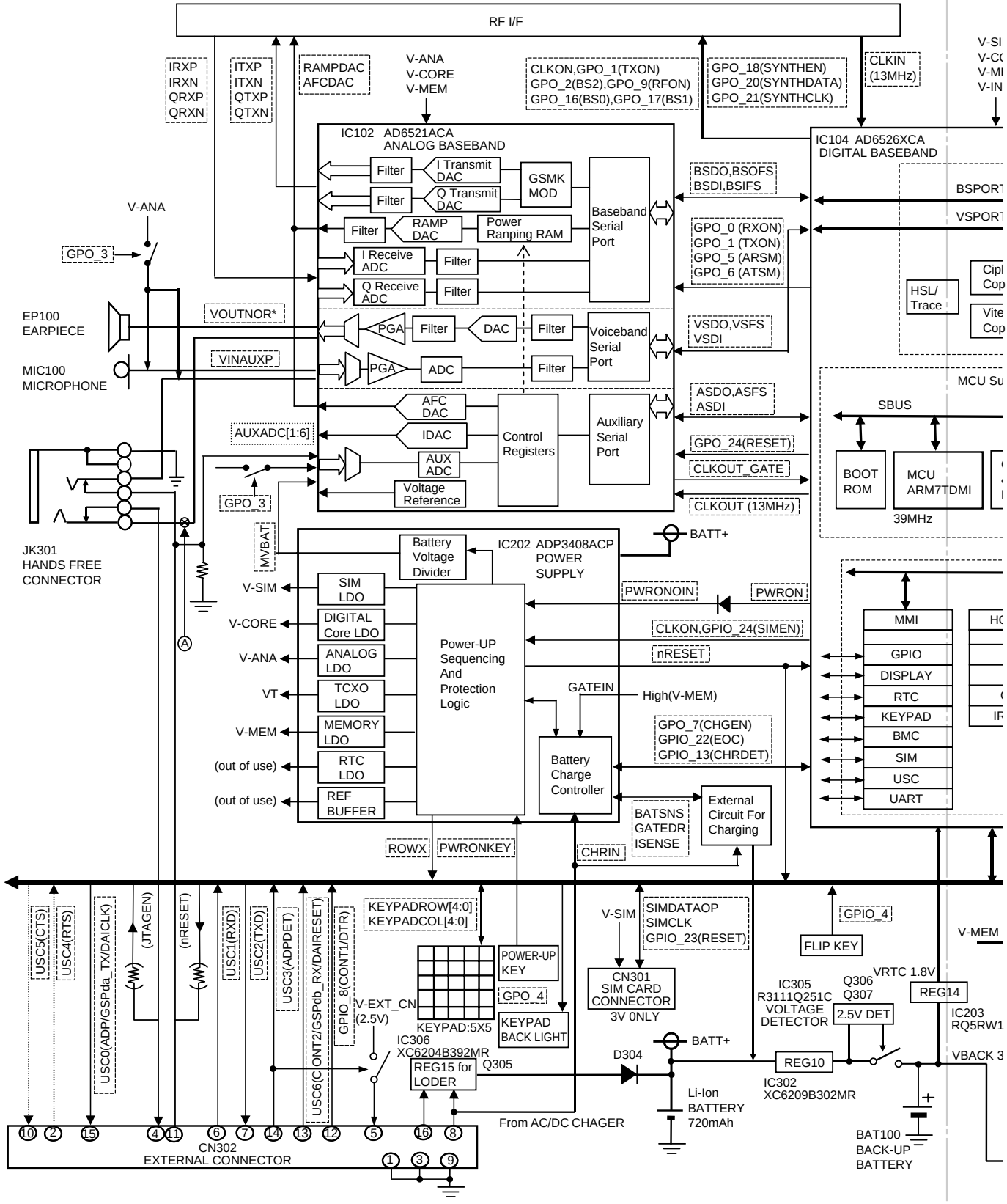


Figure 1 MAIN BLOCK DIAGRAM (1/2)

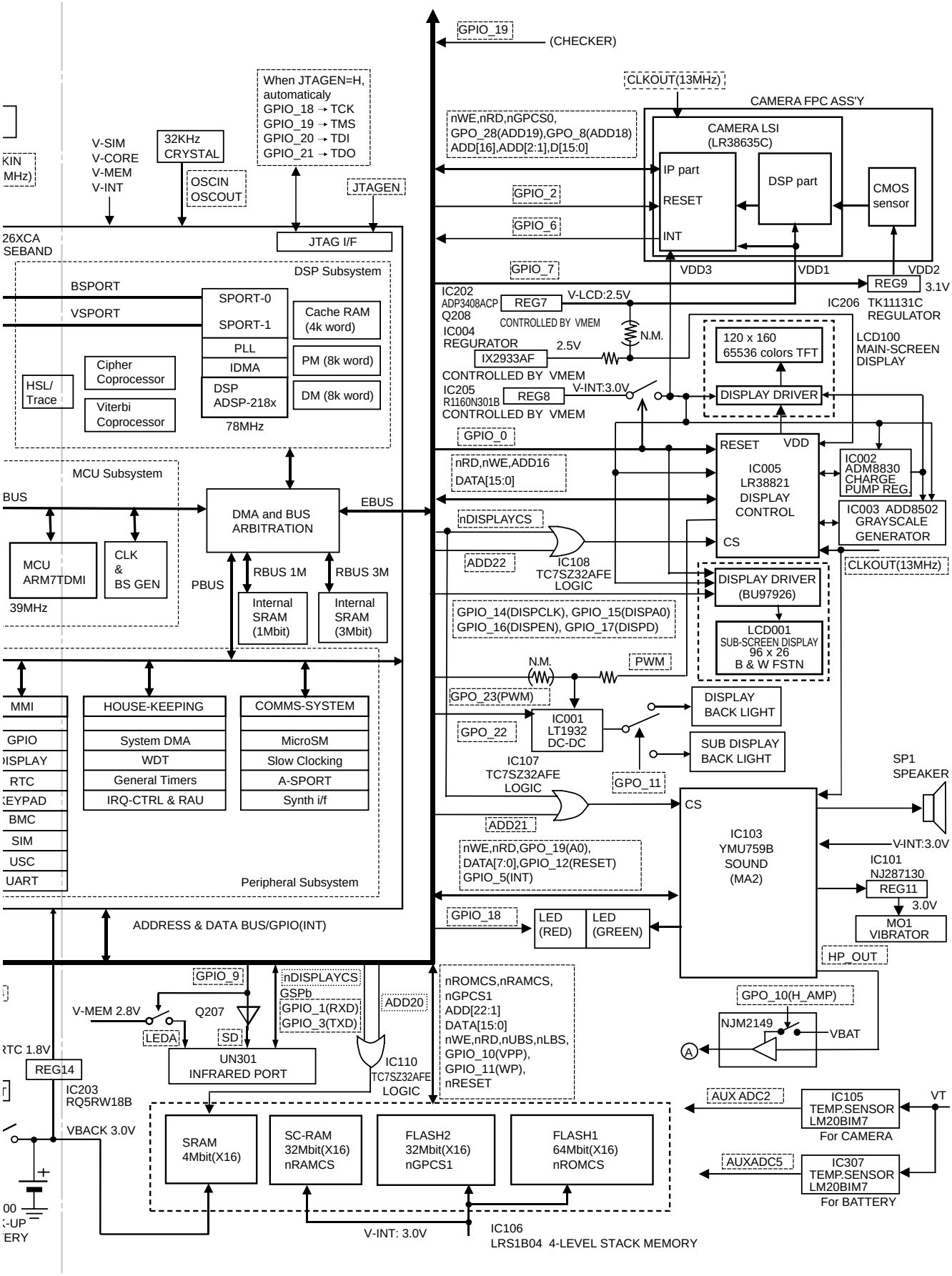


Figure 2 MAIN BLOCK DIAGRAM (2/2)

[RF]

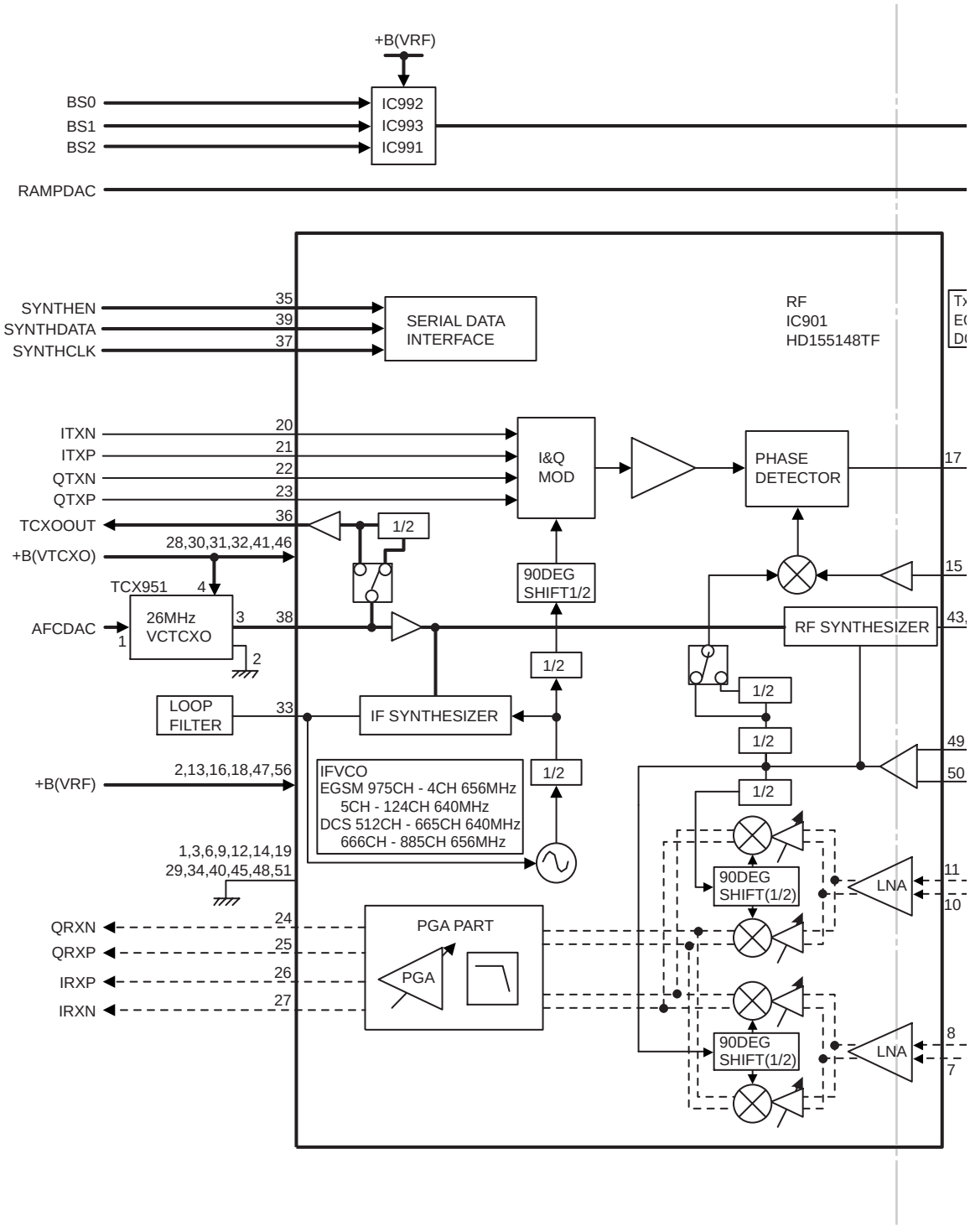


Figure 3 RF BLOCK DIAGRAM (1/2)

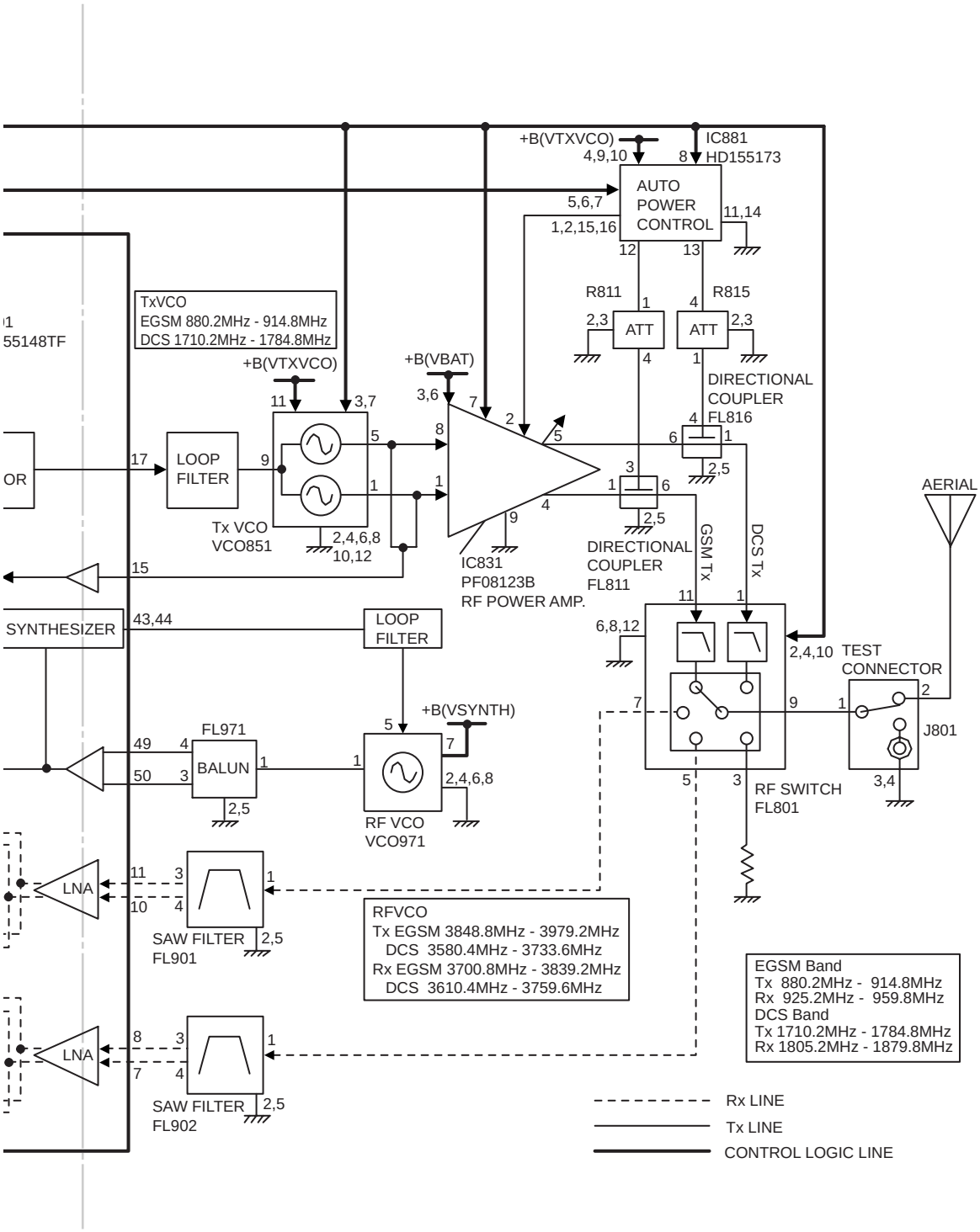


Figure 4 RF BLOCK DIAGRAM (2/2)

— MEMO —