

4. SERVICE S/W AND CALIBRATION

4.1 Service S/W

4.1.1 Overview

This service S/W is used for Calibration and Standalone test.

4.1.2 Hardware and software environment

- More than 486 computer
- 16Mbyte RAM
- Remained more than 10Mbyte in Hard Disk Memory
- Under Microsoft windows 98 or more than

4.1.3 Software installation

Unzip the G7000/W7000 service software provided where folder you want there are some files extracted in that folder. Start Setup.exe in Service software setup folder. RampTable.dat, default transmit ramping table, and rf_original_L300.epm, default calibration data, are located in window system folder so that these files are loaded automatically, if you execute LaputaService.exe.

4.1.4 Common Properties of Service Software

When you execute this program, you'll see the below user interface window titled *LAPUTA_Service Tool* in figure 4-1. The *LAPUTA_Service Tool* has five main frames.

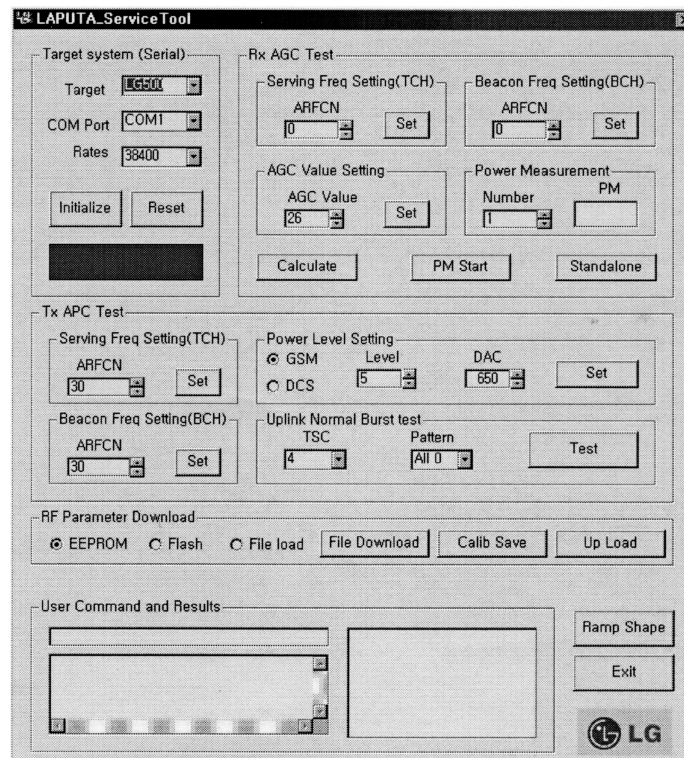


Figure 4-1. LAPUTA Service Tool

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A. Target system frame

This is for initializing the target phone. When you use this program to test G7000/W7000 phone, you have to initialize target at first. To initialize target phone, select target (G7000/W7000 is default) and COM port used at your computer and then click the Initialize button. If target initializing is ended successfully, the box in red below the initialize button will turn into green.

B. Rx AGC Test frame

At this part, you can control receiver path of target phone.

- Serving Freq. Setting (TCH)

You can set TCH of phone. The number means ARFCN of Traffic channel. You can change the value by clicking arrow button by one step or just entering the number directly.

- Beacon Freq. Setting (BCH)

You can set BCH of phone. The number means ARFCN of base station broadcasting channel.

- AGC Value Setting

You can set AGC gain of phone. The number means gain of AGC amplifier in Rx path.

- Power Measurement

The number means channel index according to pre-defined ARFCN. There are 12 pre-defined ARFCNs within Rx band. 4 ARFCNs are for GSM and others for DCS. Clicking arrow button to change number, you can see TCH and BCH ARFCN changed automatically.

PM window displays the power level measured in baseband chip. PM value is useful to calculate the received absolute power. The unit of PM is dBd.

- PM Start

You can measure Rx power that target received from test equipment. When you click this button the result of power measurement displayed at PM blank in Power Measurement frame. You can measure PM for all 12-channel indexes by changing Number and clicking PM Start.

- Calculate

You have to do this work after measuring PM for all 12-channel indexes. When you click this button, service software calculate the calibration data from measured 12 PM data.

- Standalone

This button makes target operate in Rx mode continuously. Target will be operated under the condition that you set. During continuous receiving mode, label of Standalone button is changed to Stop. If you want stop receiving mode operating, click this button one more.

C. Tx APC Test frame

At this part, you can control transmit path of target phone.

- Serving Freq. Setting (TCH)

You can set TCH of phone. The number means ARFCN of Traffic channel.

- Beacon Freq. Setting (BCH)

You can set BCH of phone. The number means ARFCN of base station broadcasting channel.

- Power Level Setting

First, you have to choose operating mode (GSM or DCS) according to TCH and BCH frequency that you selected before. Then select the Level and adjust the DAC value. Level means GSM/DCS output power level. Usable range is 5 to 19 for GSM, 0 to 15 for DCS. DAC value is a factor to determine output power. Its variable range is 0 to 1023.

- Uplink Normal Burst test

You can also control the traffic slot number by using by changing TCS value. Because GSM has 8-time slot, TCS value varies 0 to 7. Pattern is to select data format that is transmitted. You can send all data 0, or 1 or repeating of 1010. But it is good to you to using the default value because data format doesn't affect to RF characteristics.

- Test

Transmitting is started when you click this button. During Transmitting, label of Test button is changed to Stop. If you want stop transmitting, click this button one more.

D. RF Parameter Download frame

- Saving epm file into Flash

When you have a epm file, contains calibrated data, and you want to download into target Flash, check Flash and click File Download button. Then you can see RF parameters Save window. Select epm file you want to save into Flash then click Open. During saving file into Flash, The statement bar indicating download process is displayed under the RF Parameter Download frame. As successfully ending download, information box will be appeared. Click Ok.

- Saving Cal. Data to Flash

After Rx or Tx calibration, you can save the calibration results into Flash and epm file. Check Flash and click Calib Save button. Then you can see RF parameters Save window. Write the file name and click Save button.

E. User Command and Results frame

Whenever you click button or make some event in service software, every ordered event is displayed in this frame. You can also see calibration results here.

F. Ramp Shape button

This button is for burst shape table. But it is deactivated in service software.

4.2 Calibration

4.2.1 Overview

All tuning operations of the phone are carried out using the service software. The service software turns the phone into the locals mode, in which the phone can be outwardly controlled via the test Jig.

The calibration values of the phone reside on the Flash. The contents of the Flash can be read by the service software and saved as a file. This is advisable when there is need to retain that information, e.g. in view of replacement of the circuit. The program also enables writing the default parameters on the Flash, in which case all calibration steps should be carried out. The service software can't control the equipment, so only manual calibration process is possible.

4.2.2 Equipment List

Table 4-1. Calibration Equipment List.

Equipment for Calibration	Type / Model	Brand
Wireless Communication Test Set	HP8960,HP8922, CMU200, any other call equipmen	
RS-232 Cable and Test JIG		LG
RF Cable		LG
Power		
Service SW (LAPUTA)		LG
Test SIM Card		
PC(for Software Installation)	Pentium II class above 300MHz	

4.2.3 Equipment Setup

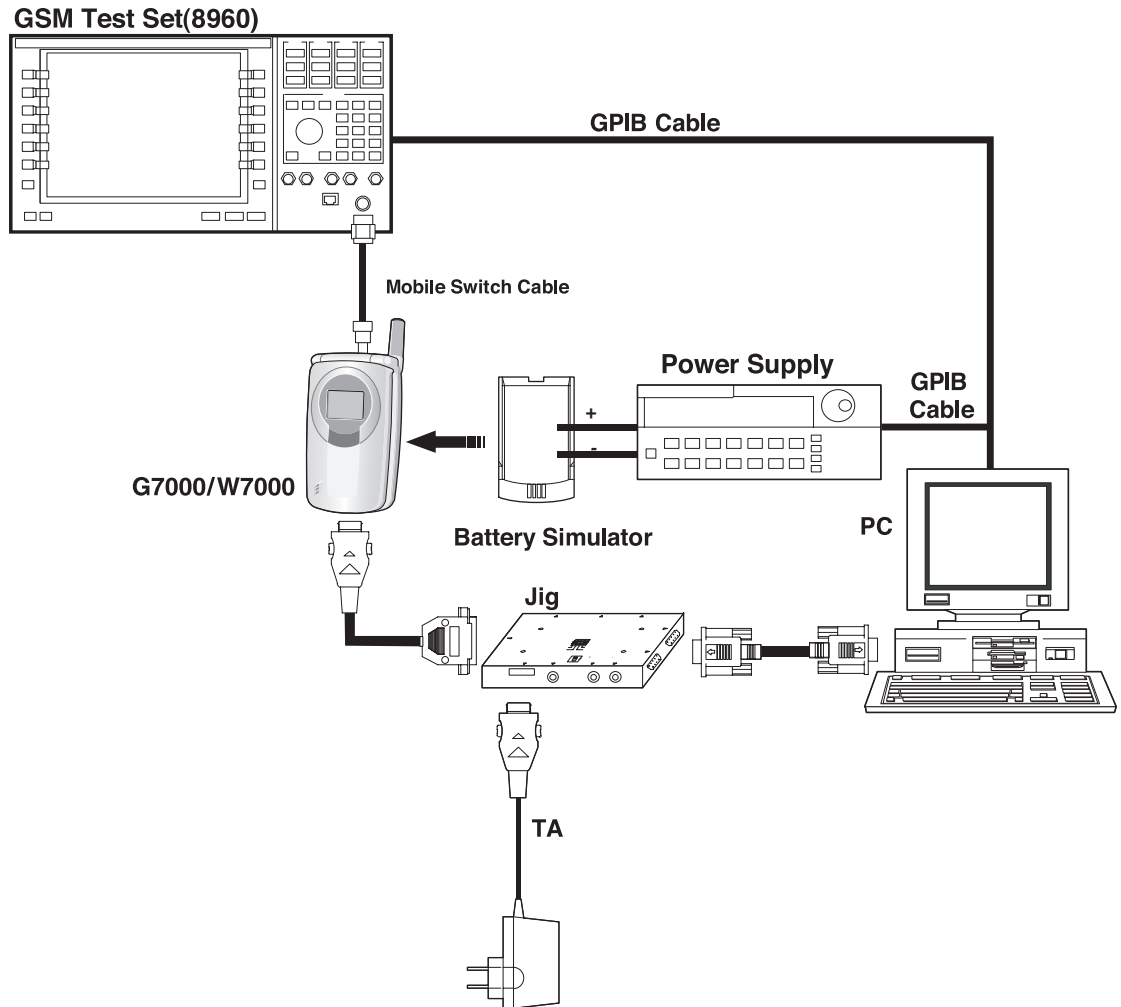


Figure 4-2. Calibration Equipment Setup

4.2.4 Calibration Steps

A. RX Calibration

In order for the RSSI measurements to be within the GSM specifications, some calibration is necessary. Also, due to AGC implementation, some AGC specific constants need calibration. In total, three calibrations are required per receive band, AGC calibration, channel compensation and temperature compensation. Of these, temperature compensation is not needed in replacement of the circuit. In AGC calibration the reference power fed into the phone via permanent antenna connector is -74dBm . In channel compensation, the channel numbers in Rx band are;

E-GSM band : 0, 40, 124, 975, and 1023.

DCS band : 512, 574, 636, 700, 760, 822 and 885.

- Procedure

- a) Initialize phone by clicking Initialize button.
- b) Set the GSM test equipment CW mode and BCH and TCH of GSM test equipment '0', same with phone.
- c) Set the power of GSM test equipment ' -74dBm '.
- d) Click the PM Start button, then the value, received power by phone, is displayed in PM measurement window at service software.
- e) Change the BCH and TCH of phone by clicking the Number button and set the channel (BCH & TCH) of equipment to be same.
- f) Click the PM Start button.
- g) Repeat above procedure until the displayed number in Power Measurement window is 12.
- h) Click the Calculate button, then the service software calculate the channel compensation parameters.
- i) Saving updated calibration data into phone by clicking Calib Saving button.

NOTE

If the calibration does not done for all channels, 5 channels for EGSM900 and 7 channels for DCS1800, the service software reports, "Please execute after measuring the PM".

B. TX Calibration

In order for the Tx power to be within the GSM specifications for each Tx level, some calibration is necessary. In total, four calibrations are required per transmit band, power calibration, channel compensation, temperature compensation and low voltage compensation. Of these, temperature compensation and low voltage compensation are not needed in replacement of the circuit and channel compensation is not needed because the transmit power is in GSM specification with enough margin. In power compensation, the channel numbers used in Tx band are;

E-GSM band : 62.

DCS band : 699.

And the target powers in dBm for each power level are;

Table 4-2. Tx target powers

Power level	GSM	DCS
0		29
1		28
2		26
3		24
4		22
5	32	20
6	31	18
7	29	16
8	27	14
9	25	12
10	23	10
11	21	8
12	19	7
13	17	6
14	15	5
15	13	4
16	11	
17	9	
18	7	
19	6	

-Procedure

- Initialize phone by clicking Initialize button.
- Set the BCH and TCH of the phone 62 for E-GSM900 and 699 for DCS1800. Of cause you have to match test equipment's BCH and TCH ARFCN with this value. For each power level, adjust the DAC value to get target power and click Test button. Then you can see the output power displayed on test equipment.
- Saving updated calibration data into phone by clicking Calib Saving button.

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4.2.5 Test JIG Operation

Table 4-3. JIG Power

	Description
Power Supply	Usually 4.0 V
DC Adaptor	9.5V, 500mA

Table 4-4. JIG DIP Switch

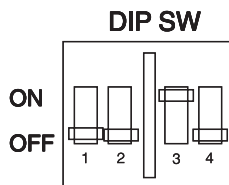
Switch Number	Name	Description
Switch 1	RPWRON	In ON state, phone is awaked.
Switch 2	HF_DETECT	Turn on for AUDIO TEST.
Switch 3	Power Supply	Power is provided for phone from Power Supply.
Switch 4	D.C power	Power is provided for phone from DC adaptor.

Table 4-5. LED Description

LED Number	Name	Description
LED 1	POWER	Power is provided for Test Jig
LED 2	CHARGER	Indicate charging state of the Phone Battery with Travel Charger.
LED 3	UART IRDA	Indicate data transfer state through the UART IRDA.
LED 4	UART MODEM	Indicate data transfer state through the UART MODEM.

- Operation

- 1) Connect the RS232 Serial Cable between COM port of notebook and MON port of test JIG in general.
- 2) Set the Power Supply 4.0V. Also DC adapter may be used.
- 3) Set the 3rd of DIP SW ON state. In case of DC adapter, set 4th ON state.



- 4) Press the Phone power key. If the Remote Power On is used, switch the 1st of Dip Switch ON.