

**PAMS Technical Documentation  
NHM-7 Series Transceivers**

**Troubleshooting and Tuning  
Instructions**

[This page left intentionally blank]

Table of Contents

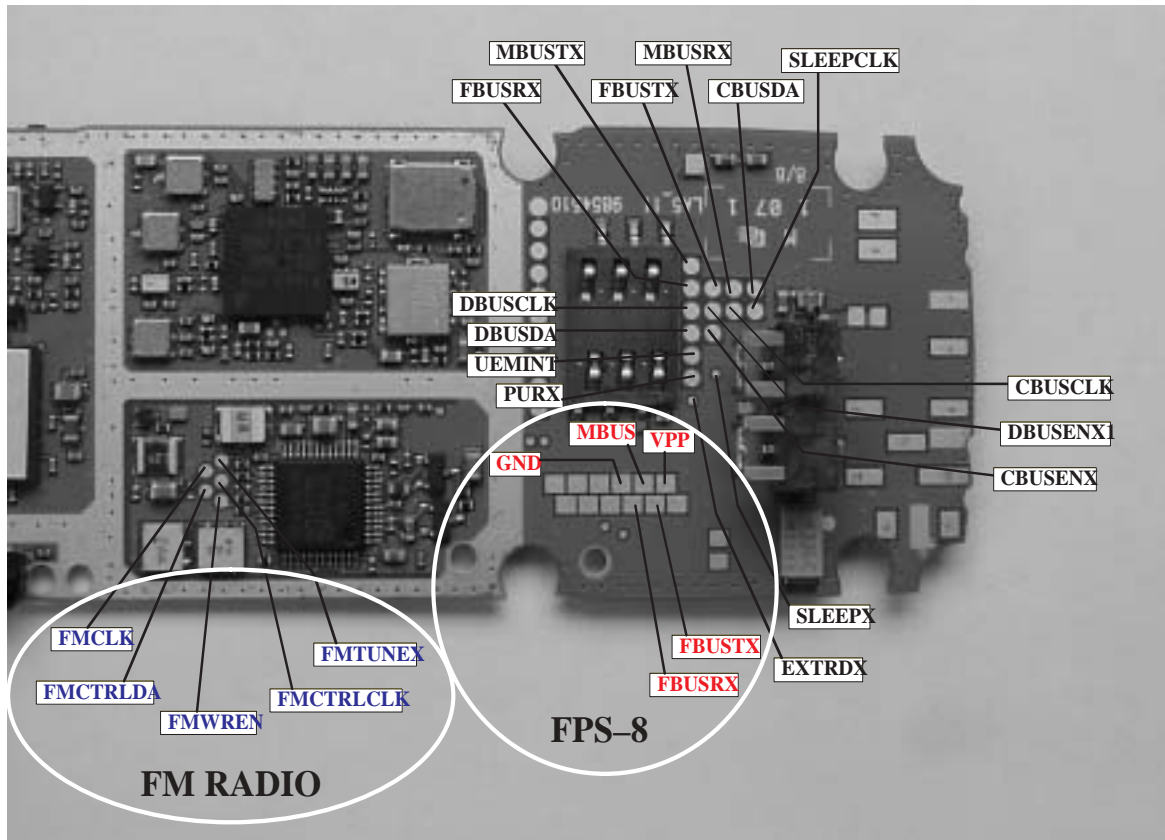
	<b>Page No</b>
Baseband Troubleshooting Instructions.....	5
PWB Test Points .....	5
Measurement Points .....	6
Troubleshooting steps .....	6
Main troubleshooting tree 1 .....	7
Main troubleshooting tree 2 .....	8
Phone dead .....	9
Flash programming fault .....	10
Flash programming fault 2 .....	11
Phone jammed 1 .....	12
Phone jammed 2 .....	13
SIM card fault (insert SIM card) .....	14
Audio fault 1 .....	15
Audio fault 1B, earpiece .....	16
Audio fault 2 .....	17
Audio fault 3 .....	18
Display fault 1 .....	19
Display fault 2 .....	20
Display fault 3 .....	21
Keypad fault 1 .....	22
Keypad fault 2 .....	23
Keypad fault 3 .....	24
RF Troubleshooting .....	25
Introduction to RF Troubleshooting .....	25
RF Key Components .....	26
PWB Test Points .....	27
Transmitter .....	28
General instructions on Troubleshooting .....	28
Transmitter troubleshooting diagram .....	30
Transmitter troubleshooting 2 - Hagar .....	31
Receiver .....	35
Receiver troubleshooting diagram for GSM900 .....	37
Receiver troubleshooting diagram for GSM1800 .....	38
ILNA gainstep checking .....	39
Synthesizer .....	40
General instructions for Synthesizer troubleshooting .....	40
Synthesizer troubleshooting diagram .....	41
Synthesizer signals .....	42
FM Radio Troubleshooting .....	44
FM Radio troubleshooting diagram .....	45
FM Radio signals .....	46
Quick Guide for Tuning the NHM-7* Phone With Phoenix .....	47
General information .....	47
Service Tool Concept for RF Tunings .....	48
Receiver tuning .....	49
RX Channel Select Filter Calibration.....	49
RX Calibration .....	51

RX Band Filter Response Compensation .....	56
RX AM Suppression .....	62
Transmitter Tuning .....	65
TX I/Q Tuning .....	65
TX Power Level Tuning .....	70
Service Tool Concept For Baseband Tunings.....	74
Baseband Tuning.....	75
Energy Management Tuning .....	75

# Troubleshooting Instructions

## Baseband Troubleshooting

### PWB Test Points

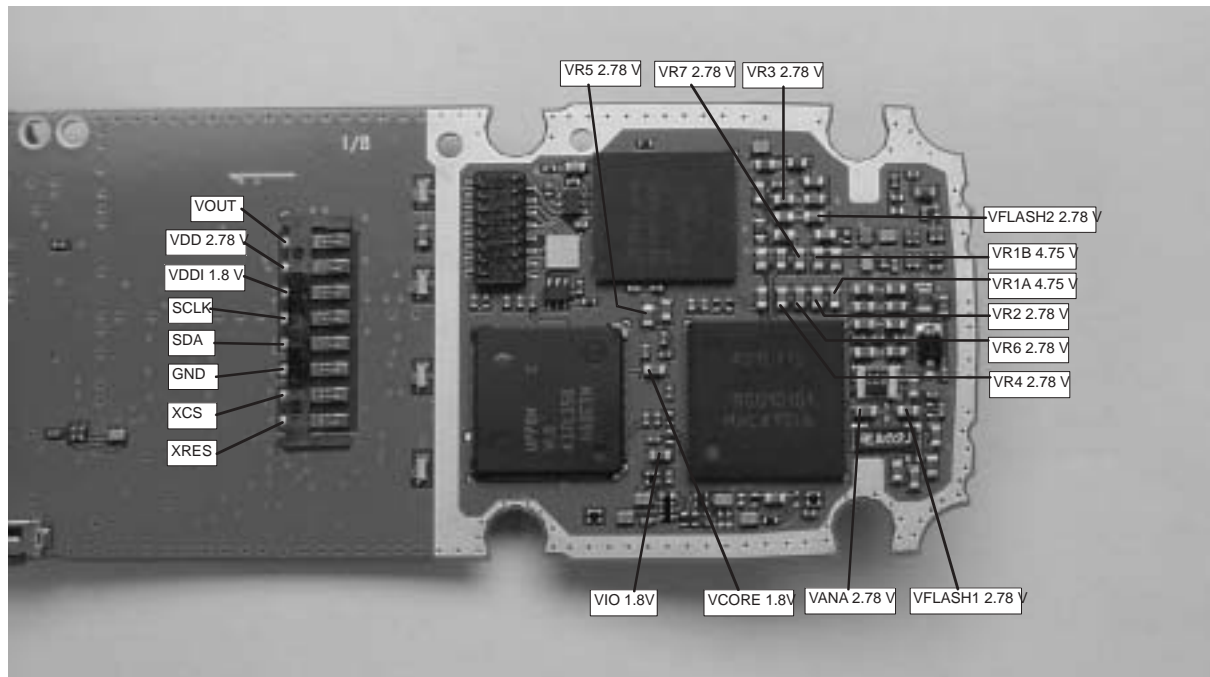


FPS-8 test points are connected to the lines from FPS-8 and have 2.7 V logic level.

FM RADIO test points are connected to FM radio lines and have 1.8 V logic level.

The rest of the test points are connected to the lines between UEM and UPP where the logic level is 1.8 V.

## Measurement Points



### Troubleshooting steps

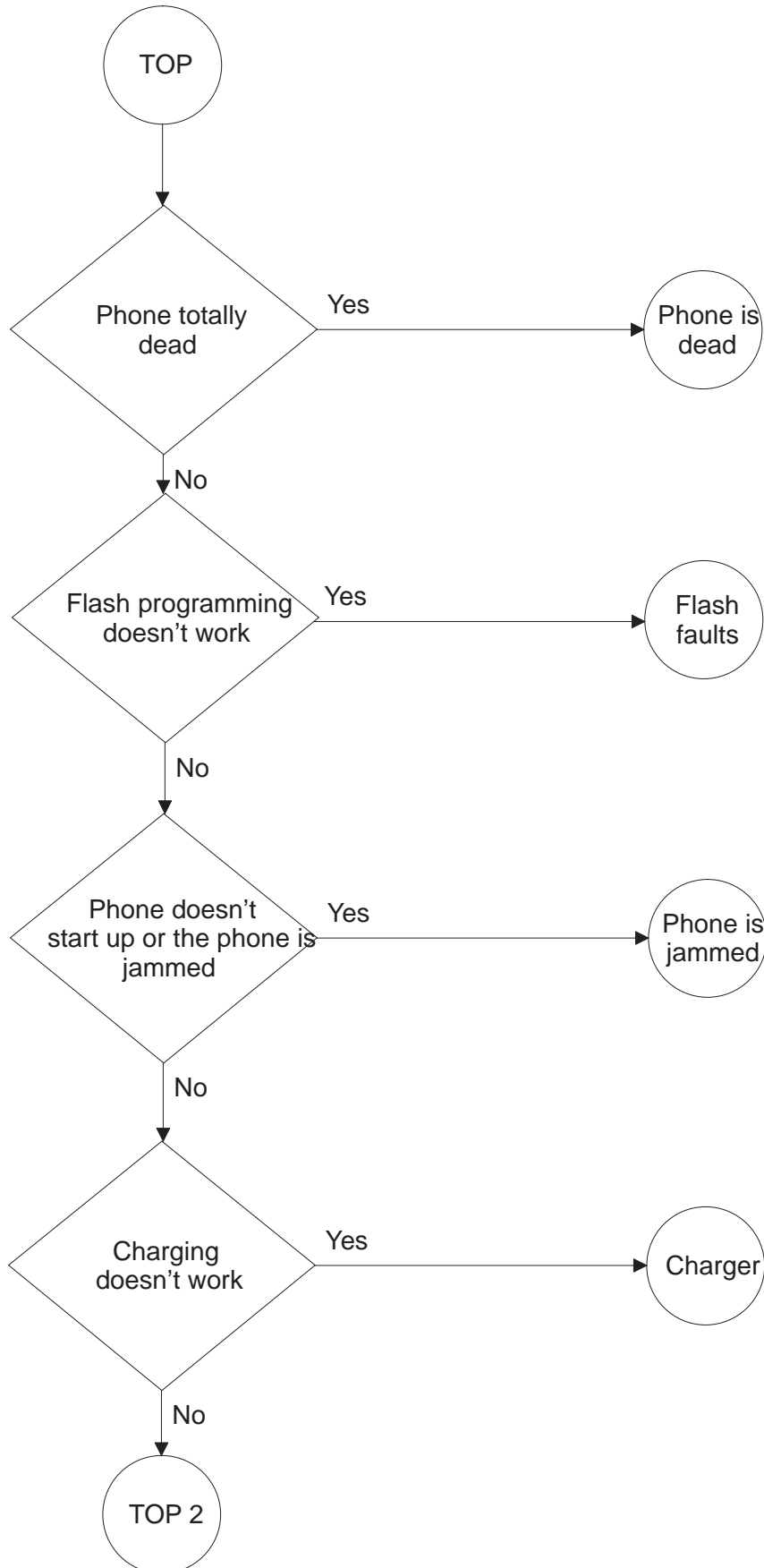
The following hints help to find the problem if the circuitry seems to be faulty. The instructions are divided into following sections:

1. Phone is totally dead
2. Flash programming doesn't work
3. Power doesn't stay on or the phone is jammed
4. Charging fault
5. Plug in SIM card is out of order (insert SIM card).
6. Audio fault
7. Display is not working
8. Keypad fault

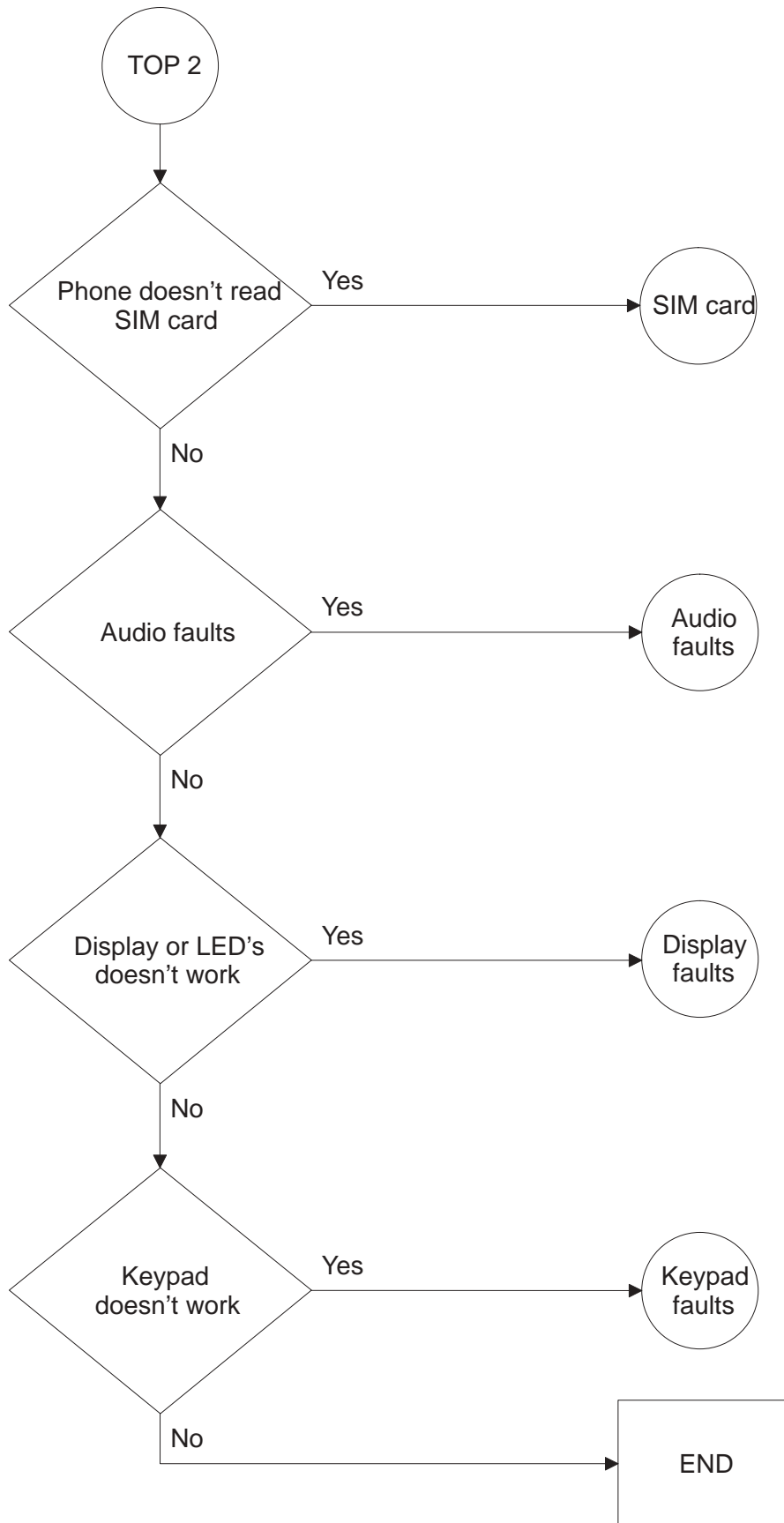
The first thing to do is carry out a through visual check of the module. Ensure in particular that:

- a) there are not any mechanical damages
- b) soldered joints are OK

### Main troubleshooting tree 1

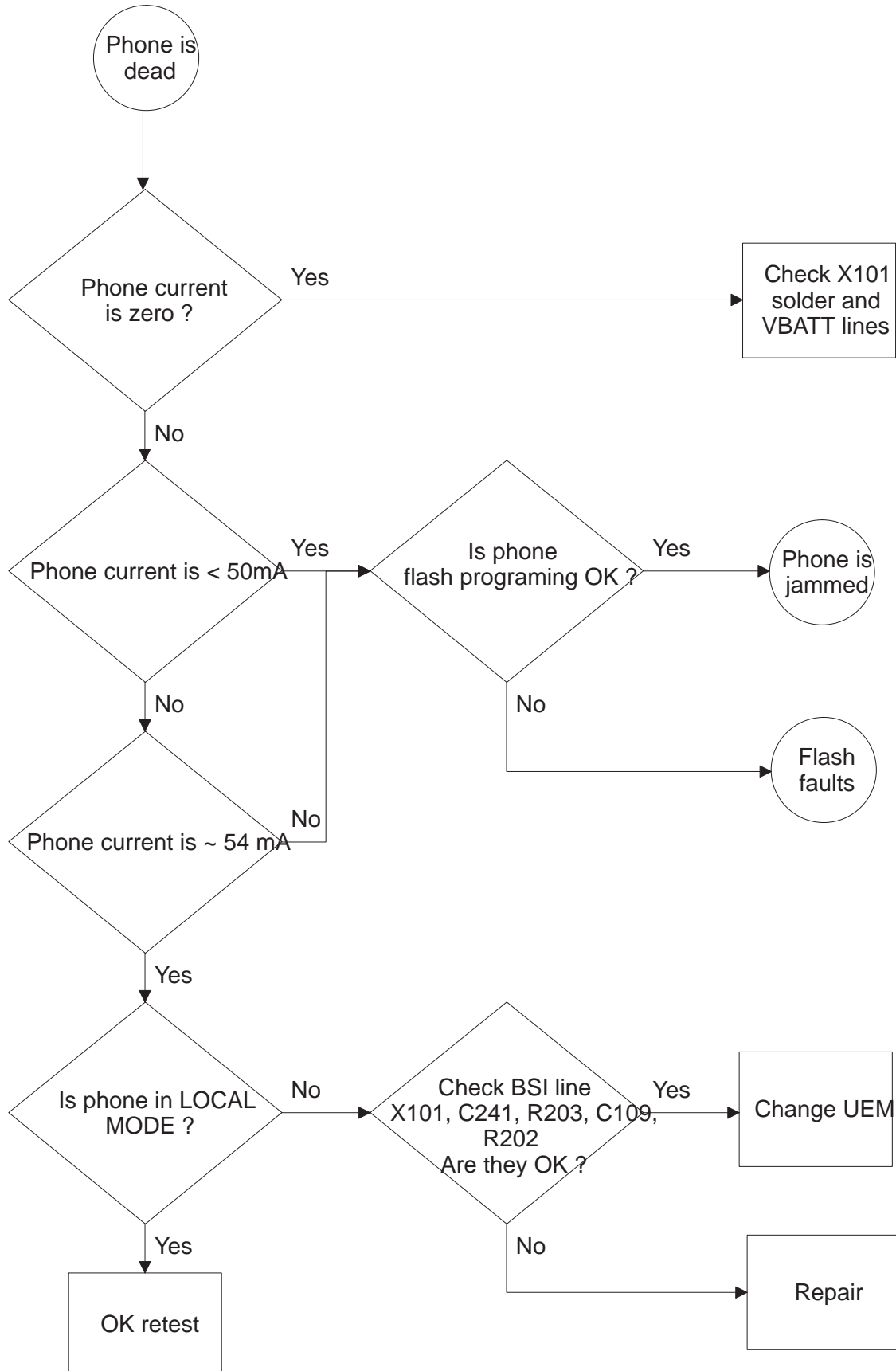


### Main troubleshooting tree 2

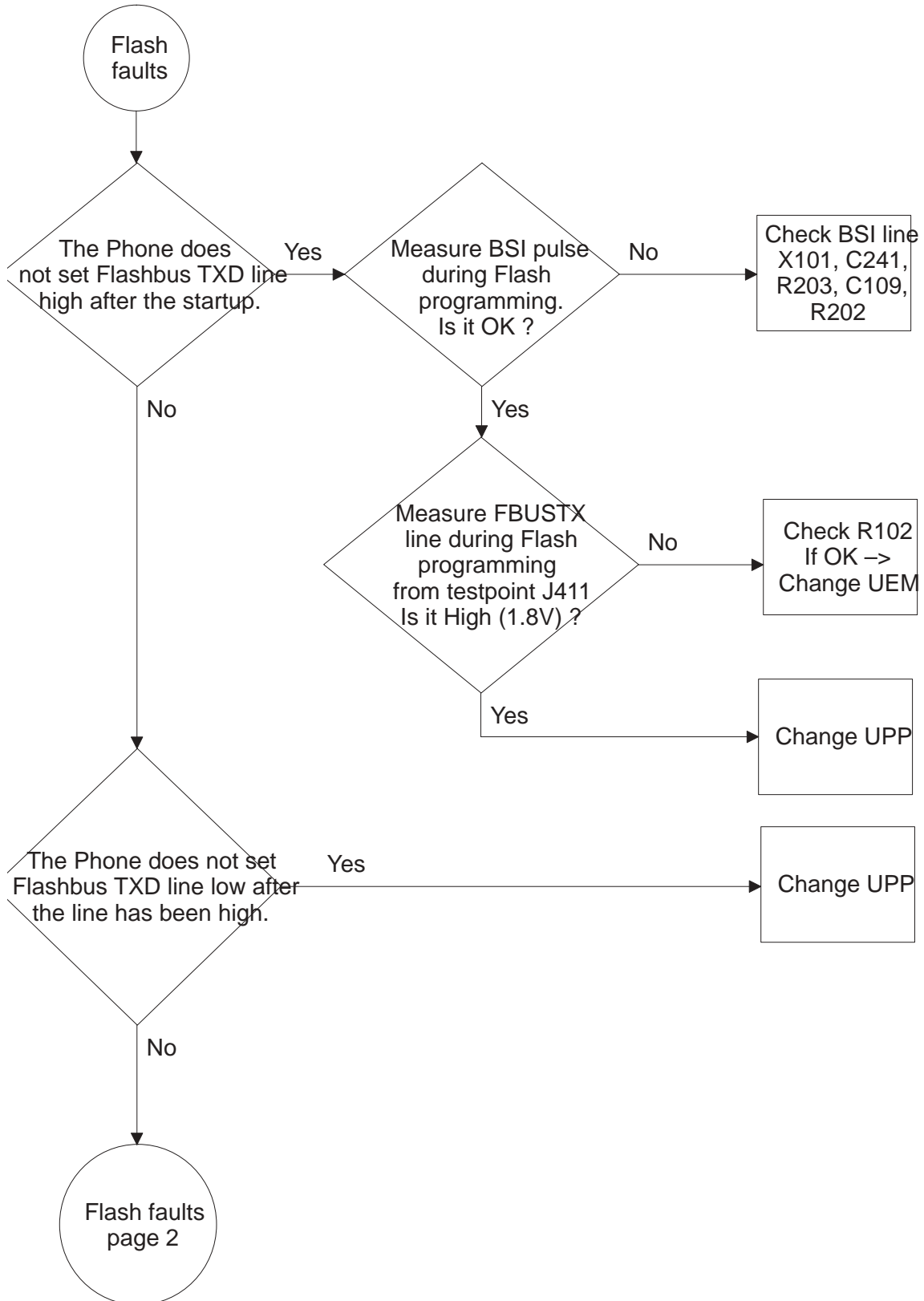




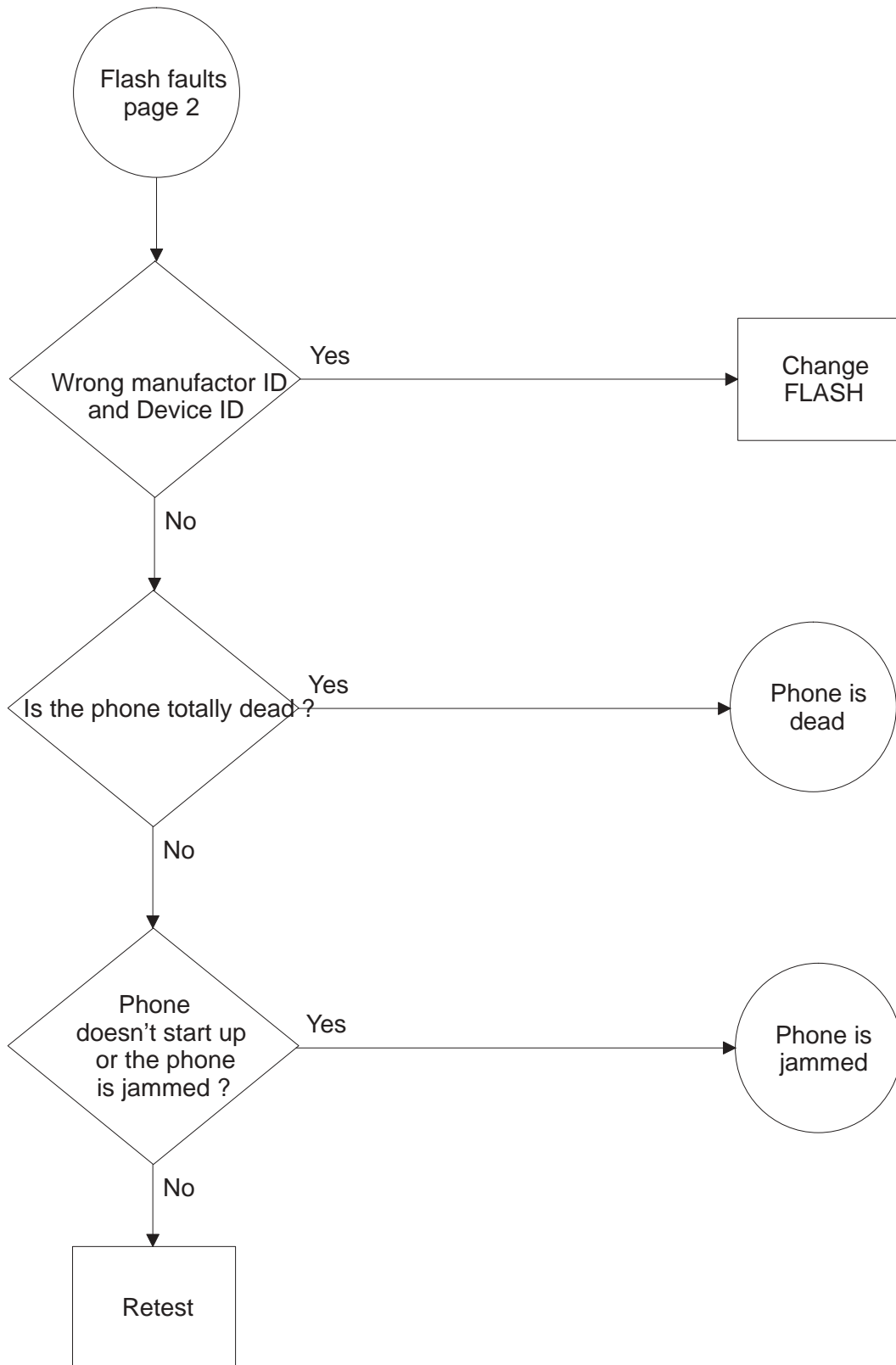
Phone dead



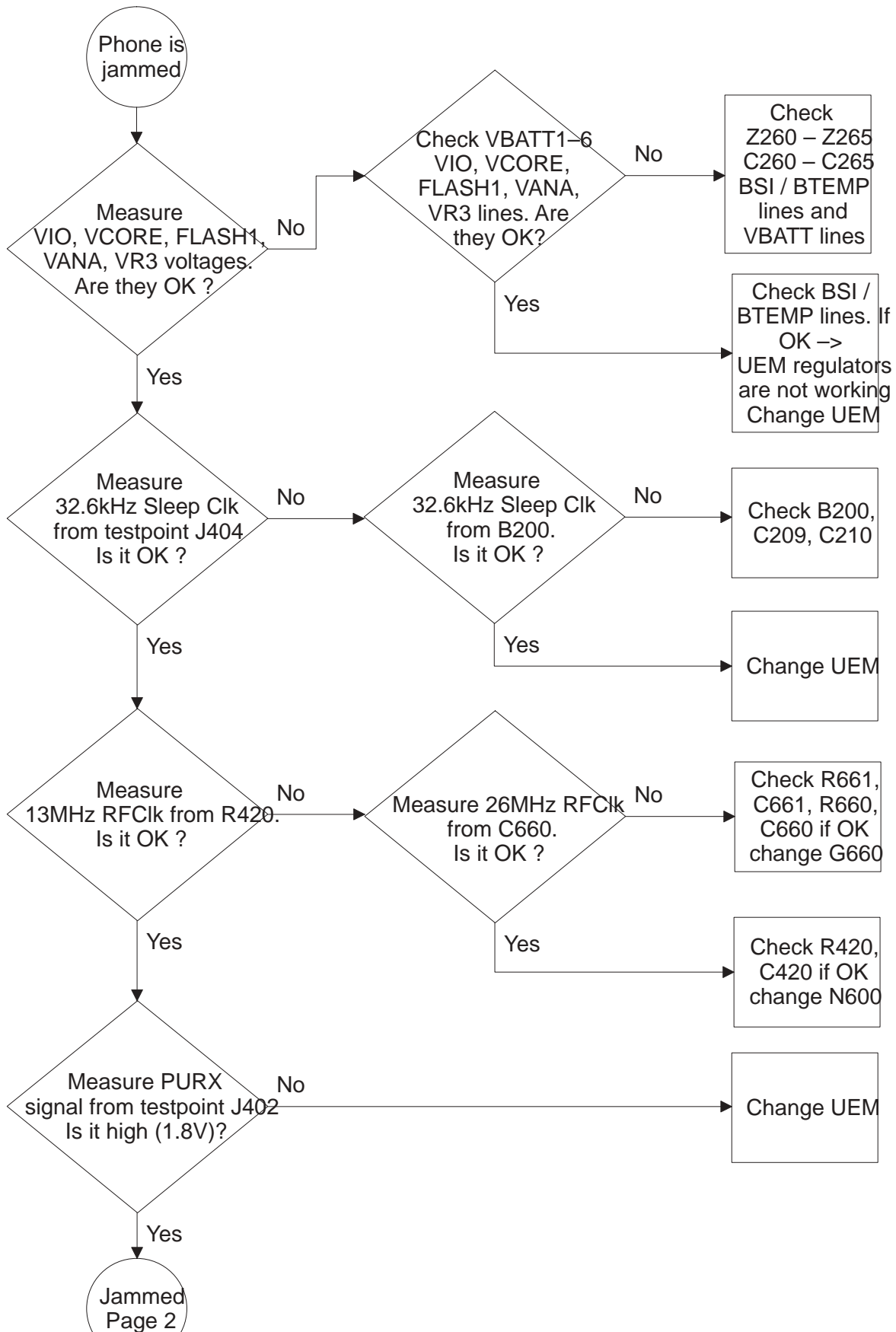
### Flash programming fault



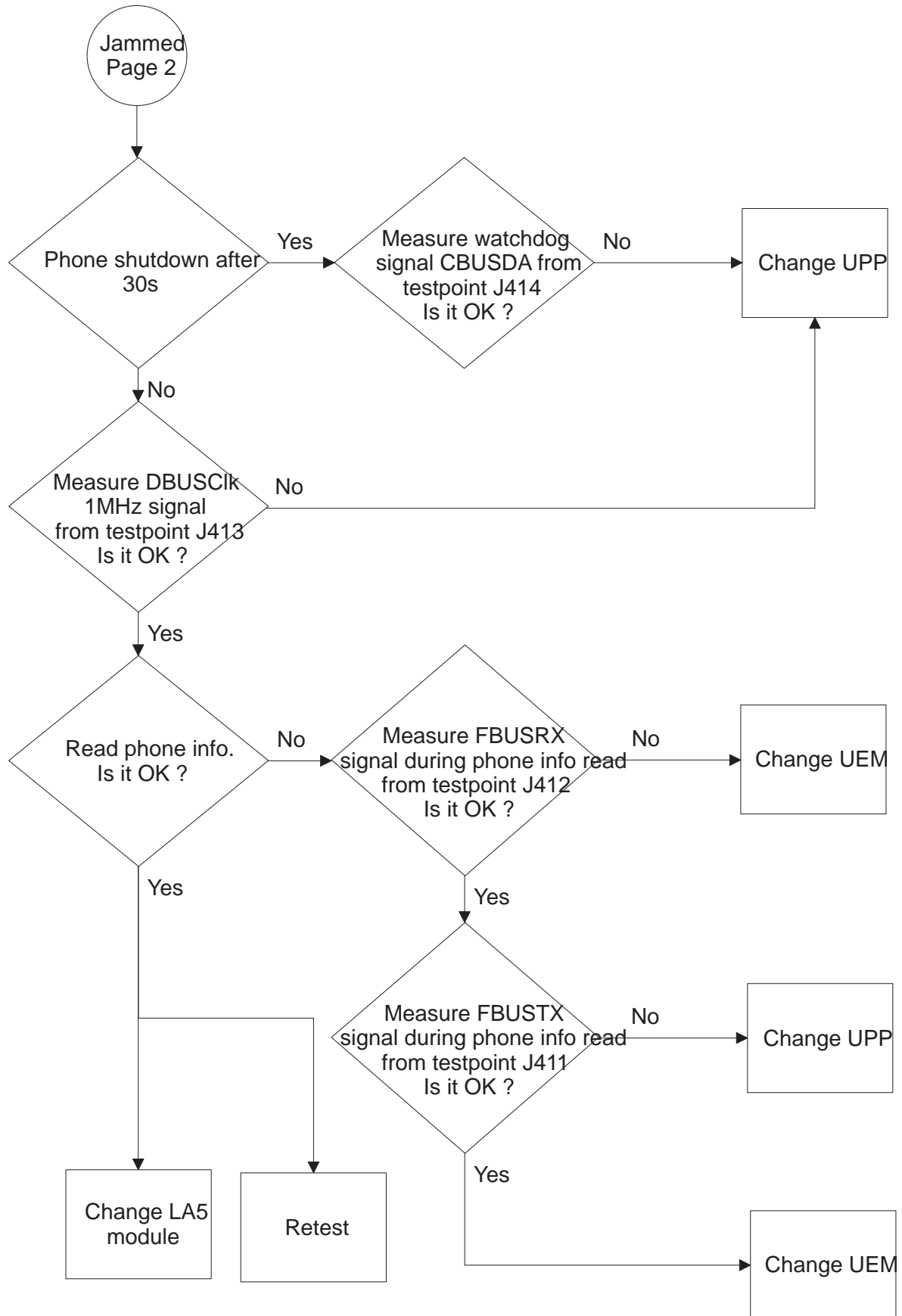
### Flash programming fault 2



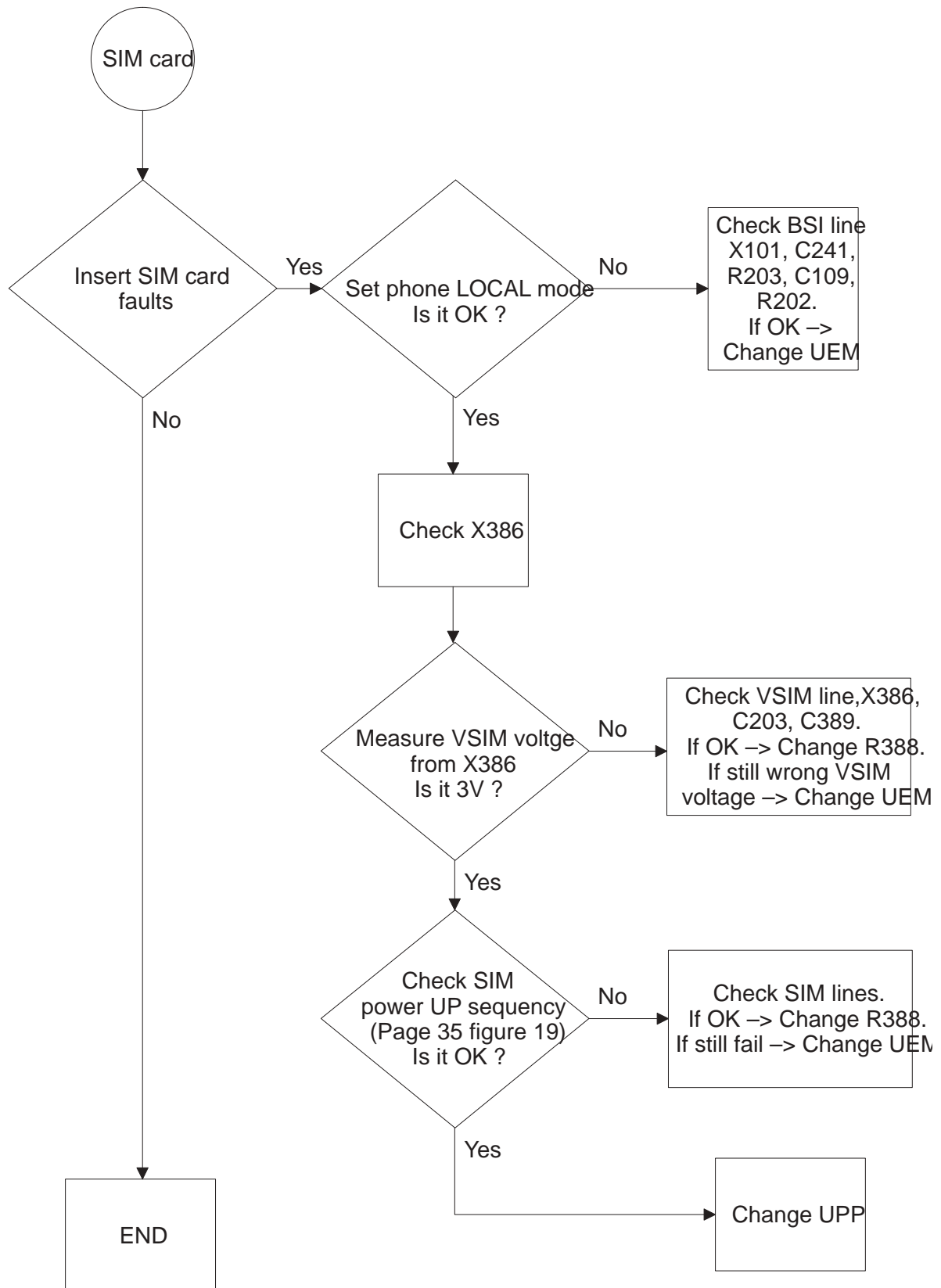
**Phone jammed 1**



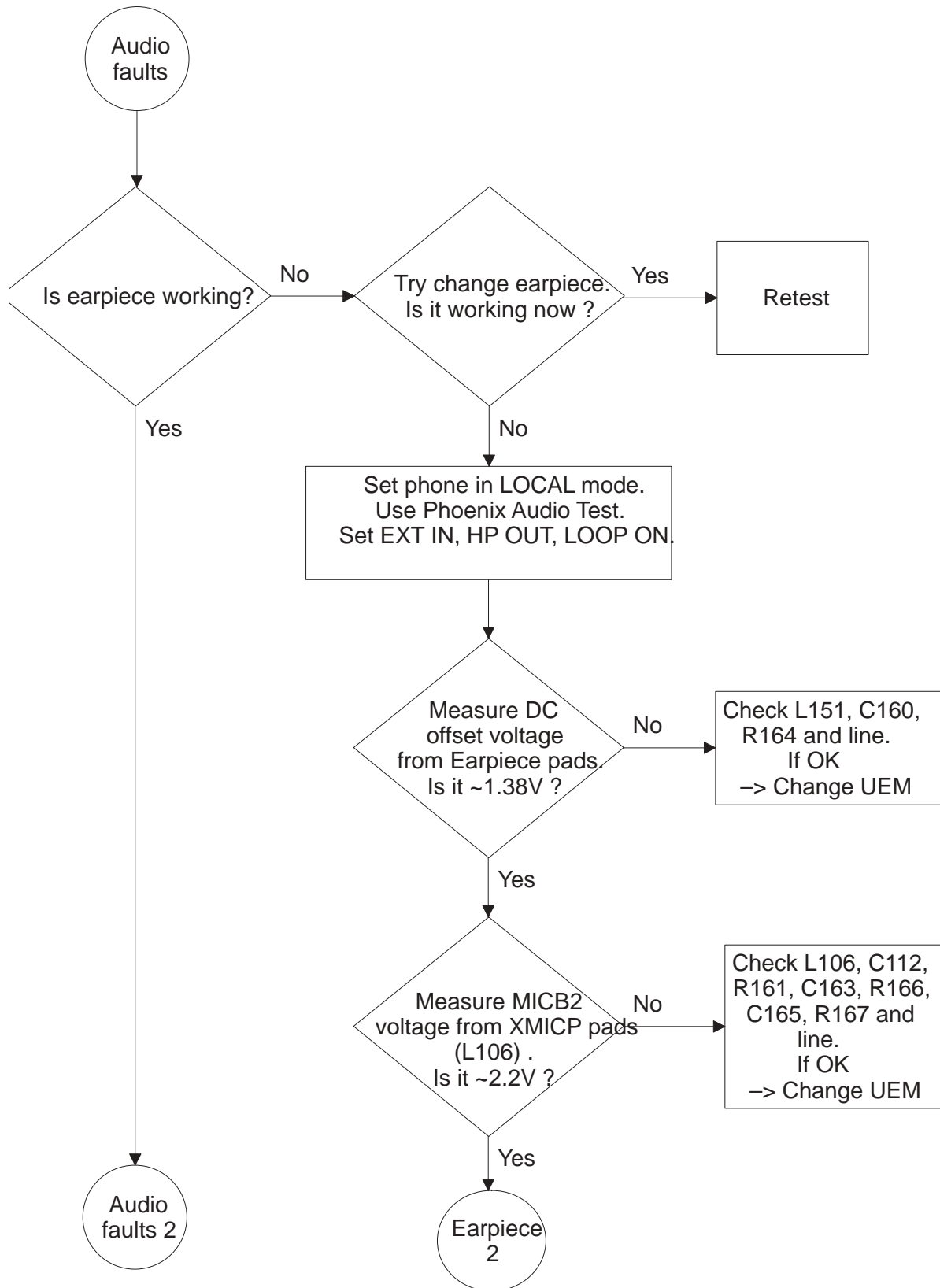
### Phone jammed 2



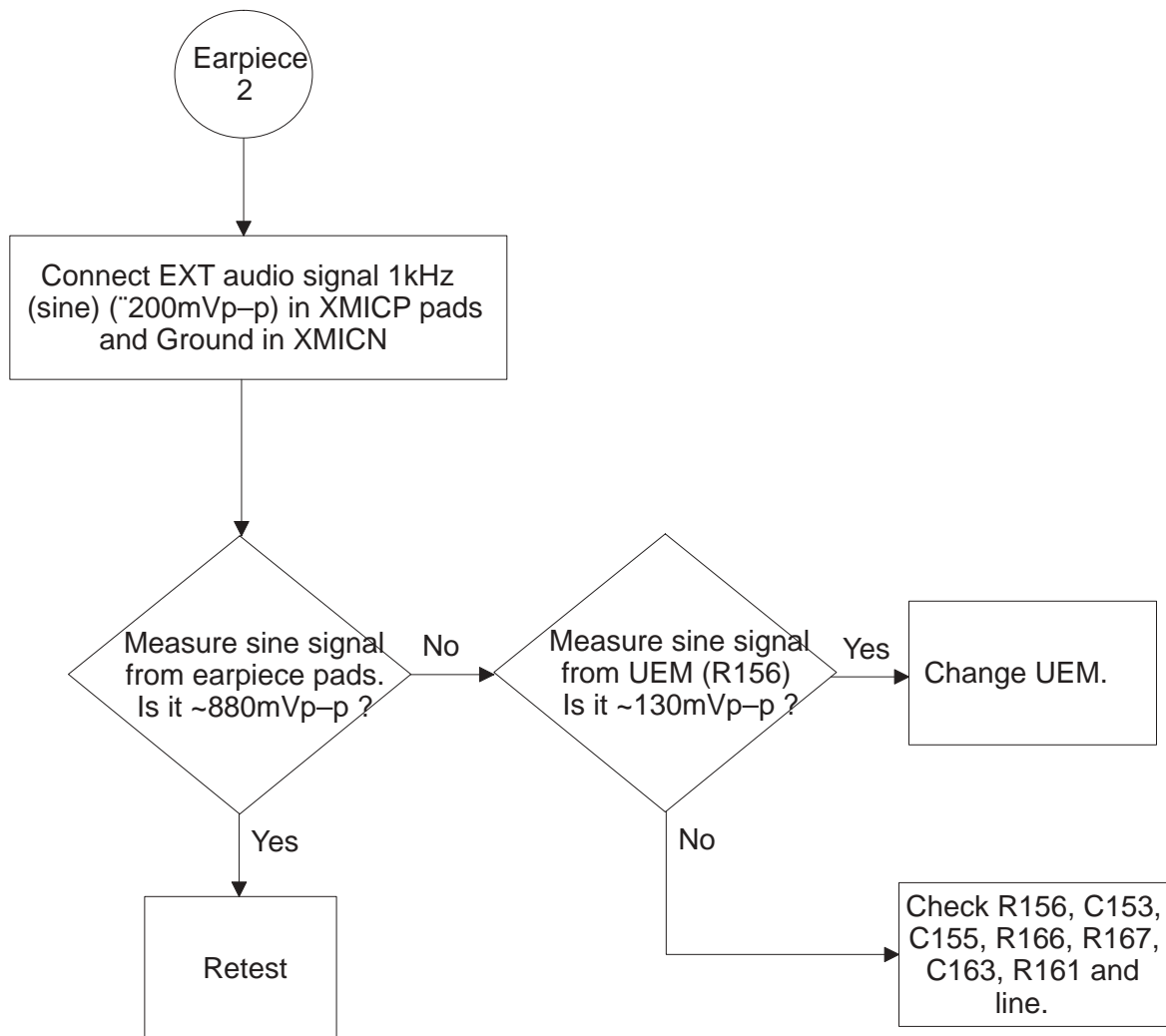
### SIM card fault (insert SIM card)



Audio fault 1

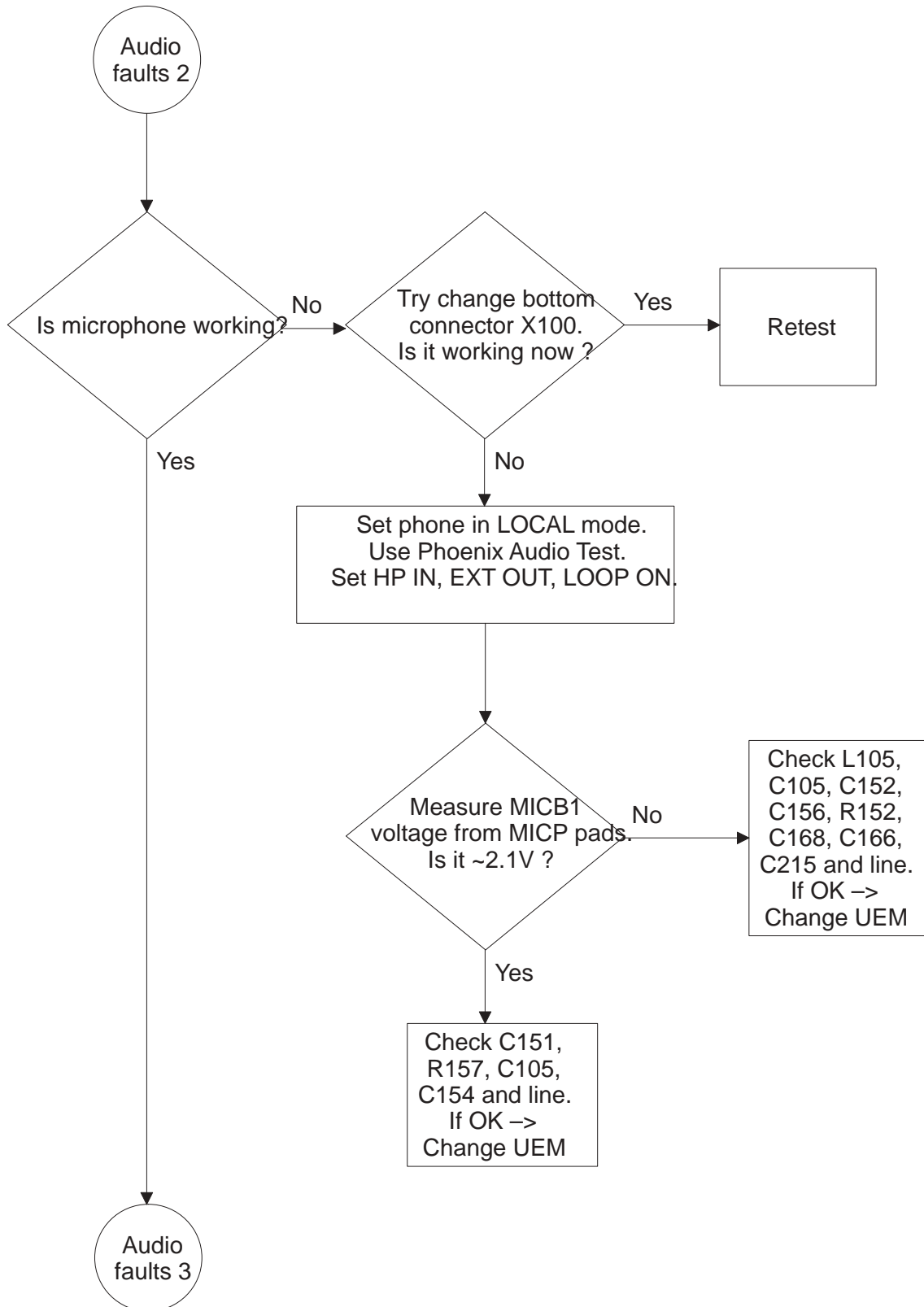


### Audio fault 1B, earpiece

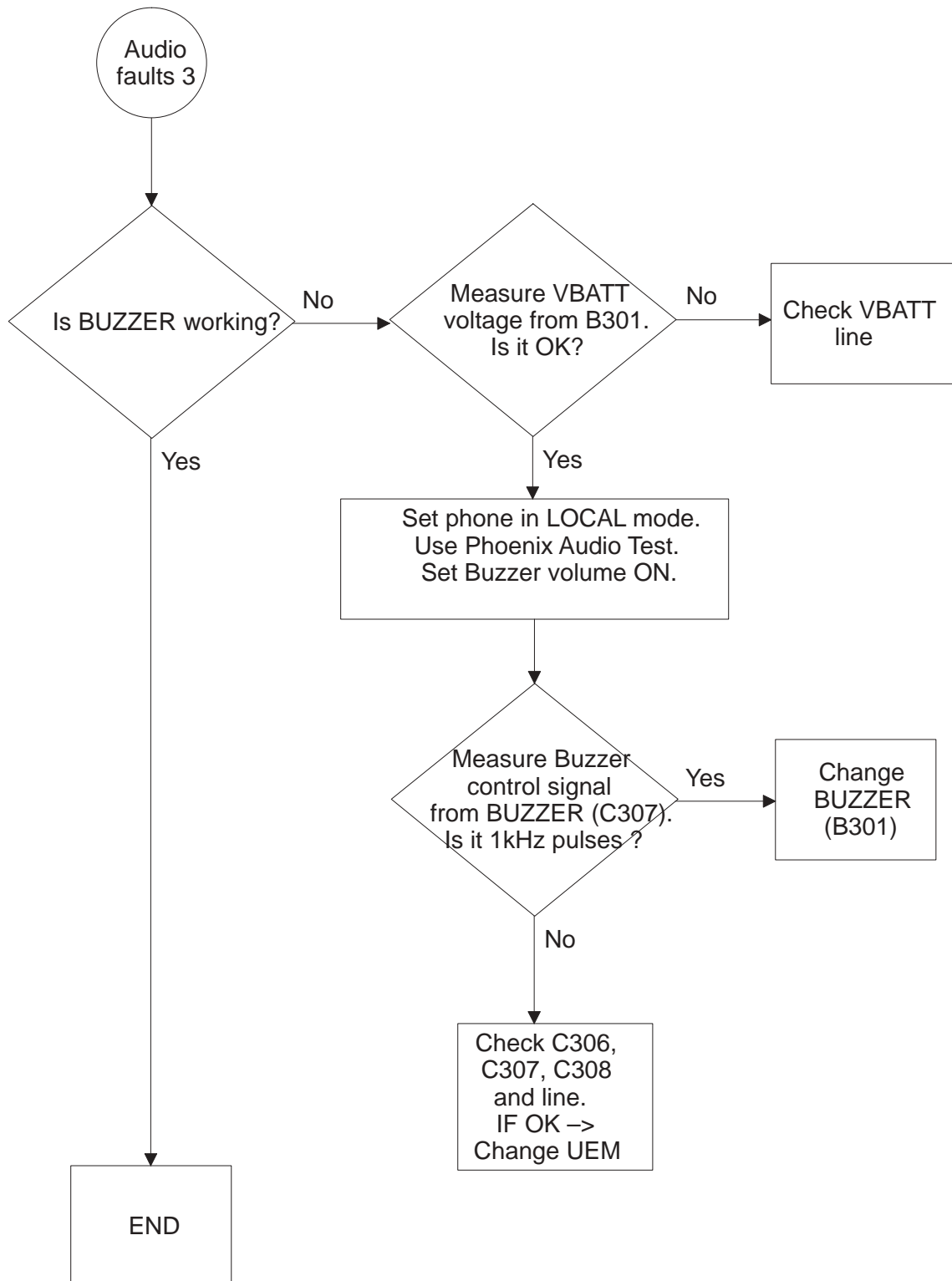




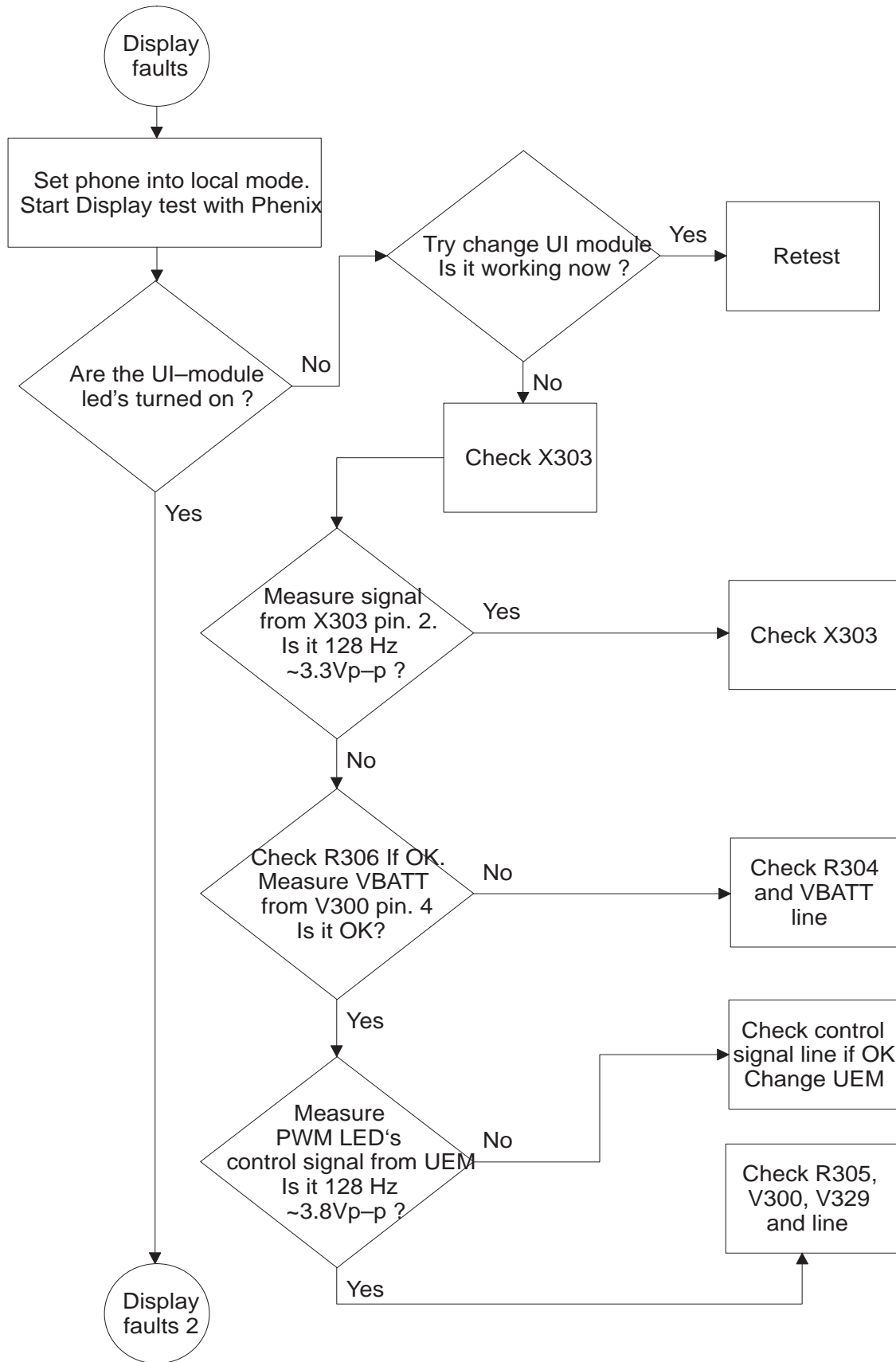
Audio fault 2



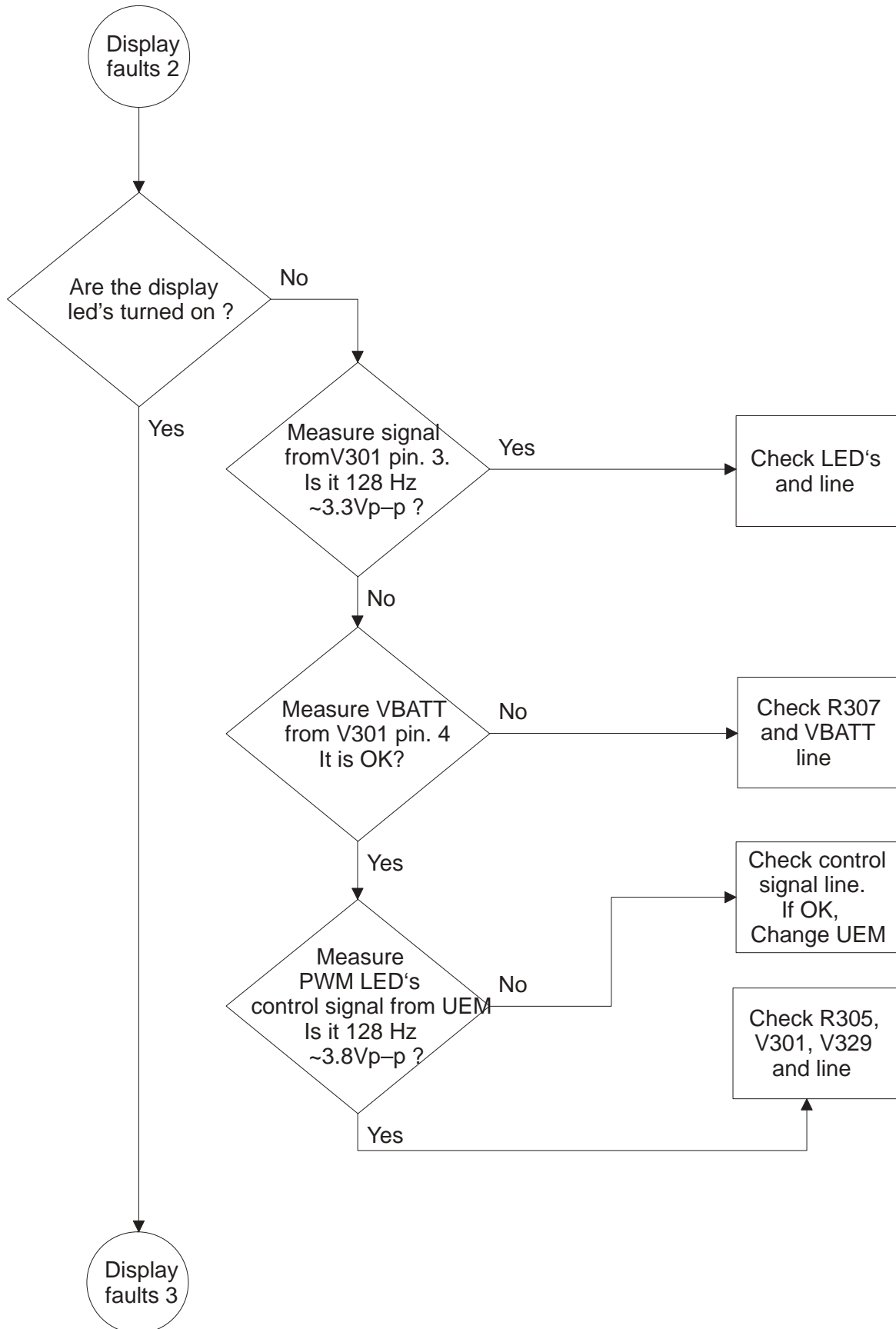
### Audio fault 3



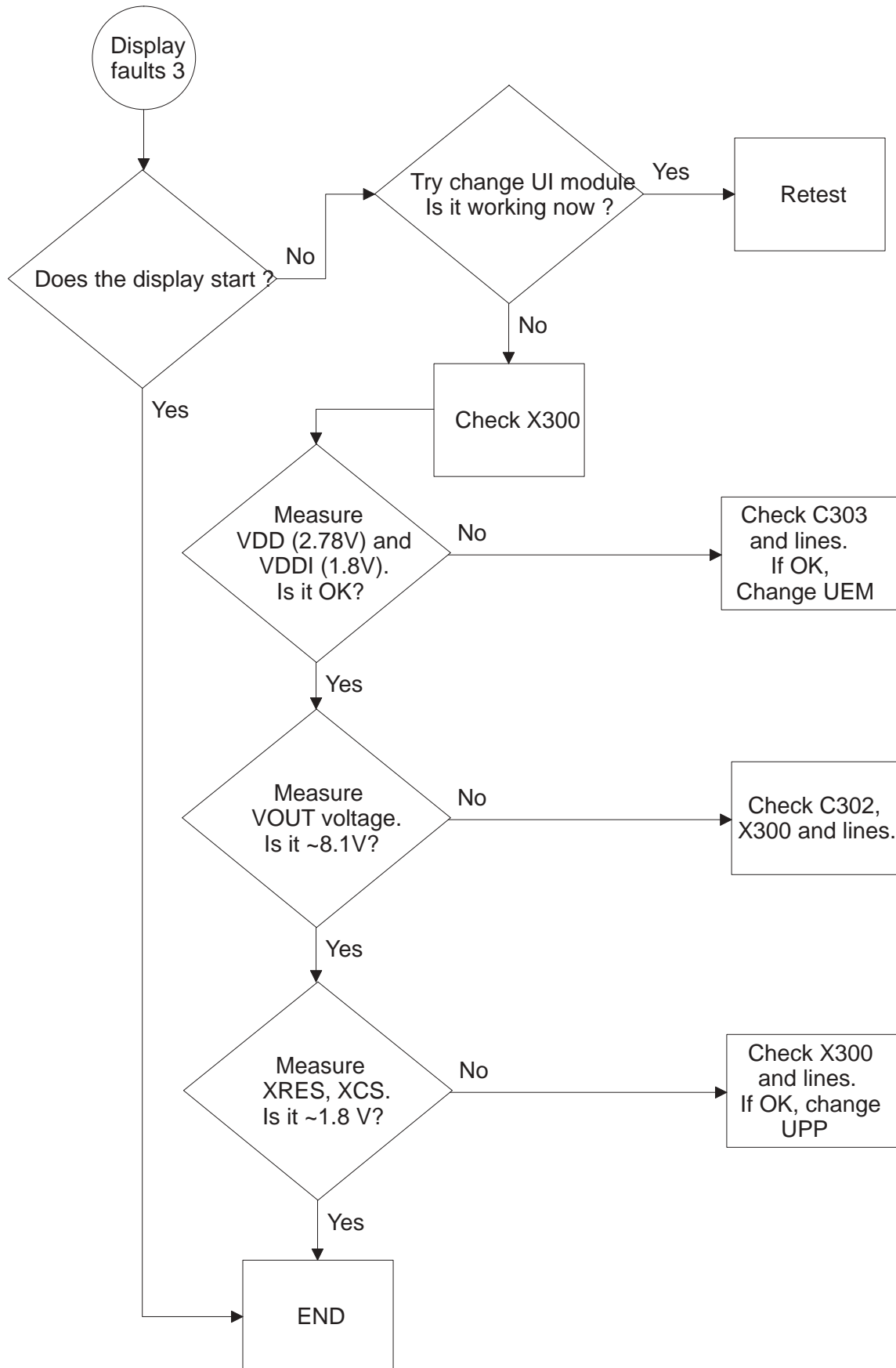
### Display fault 1



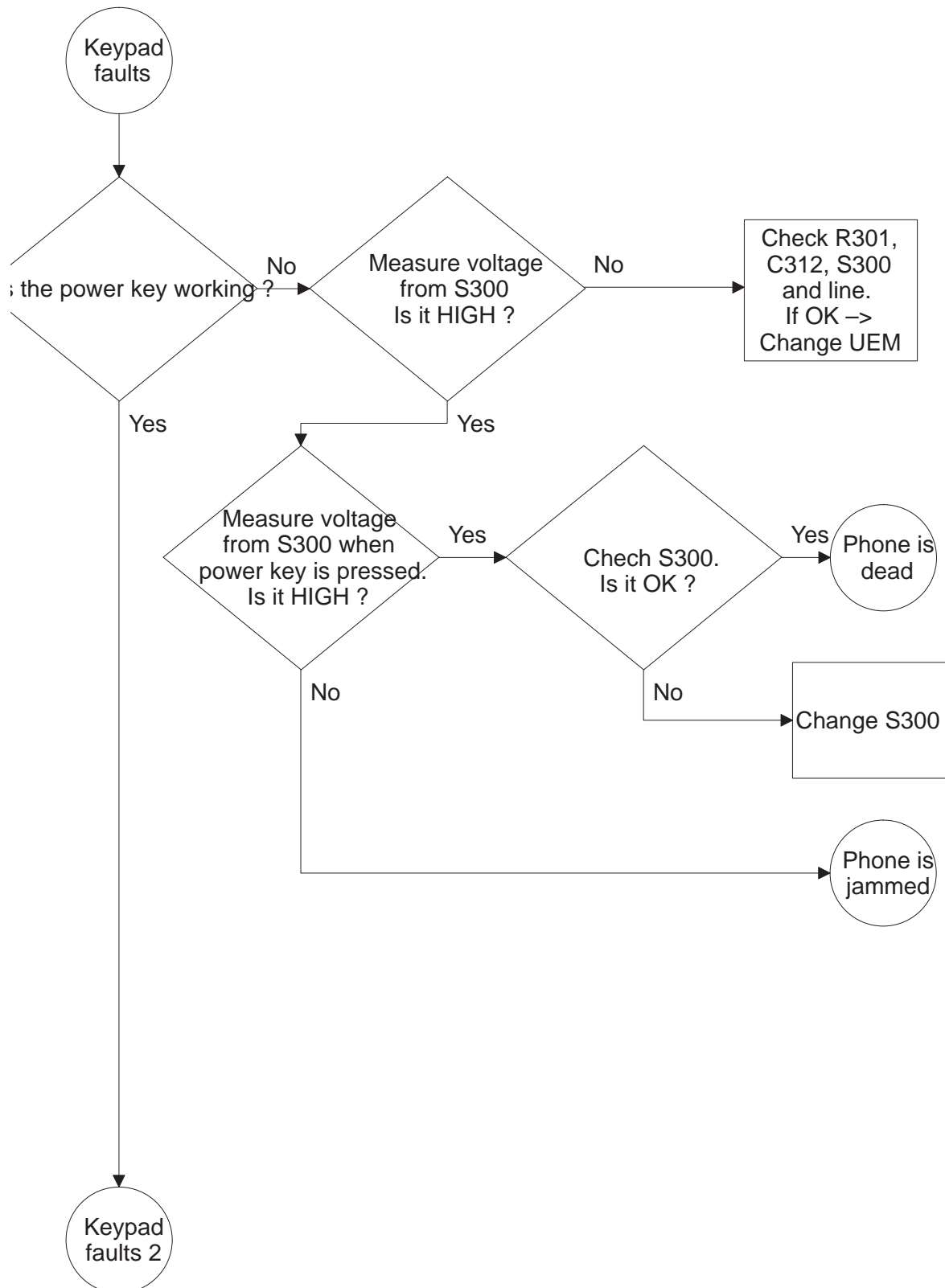
### Display fault 2



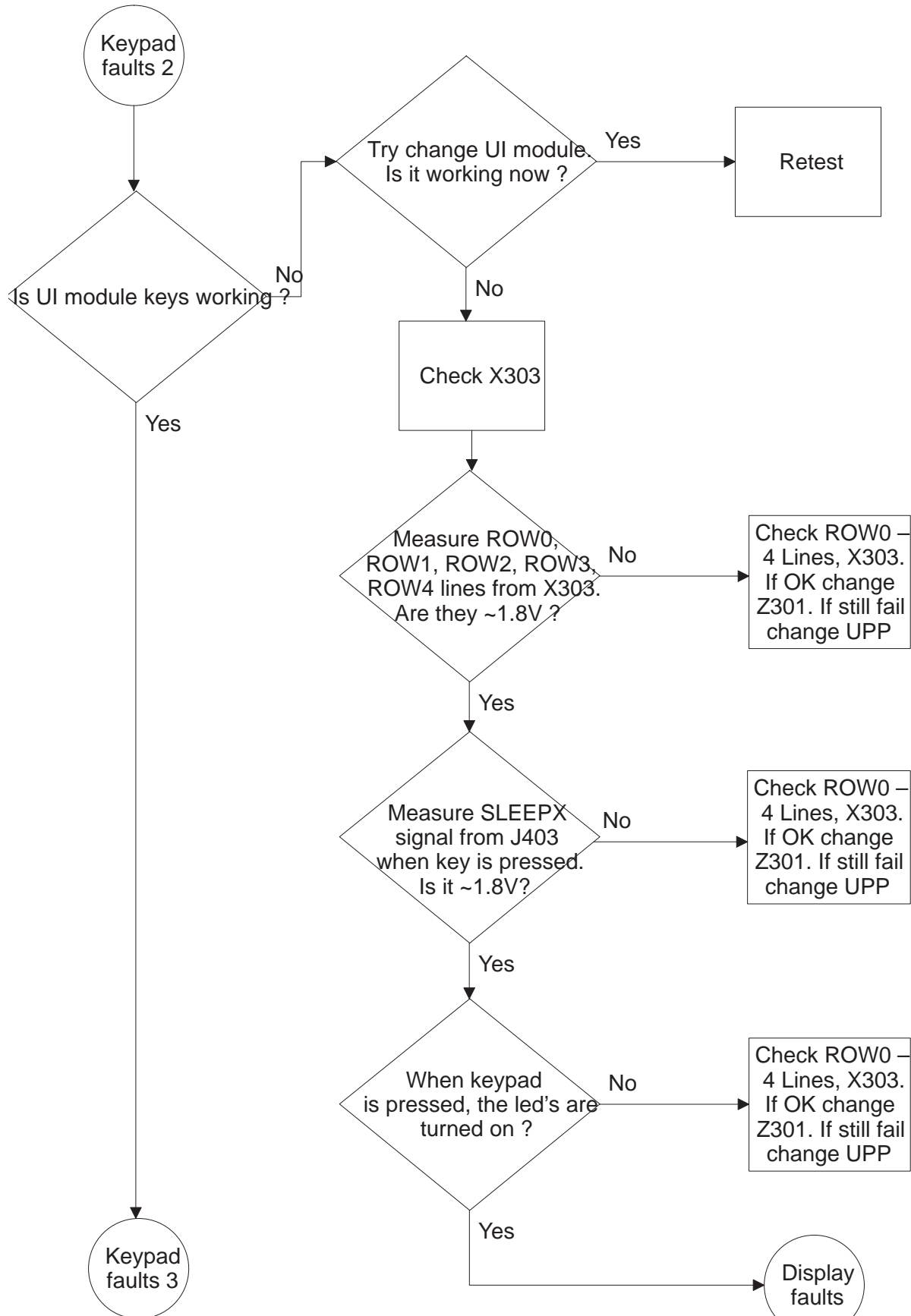
### Display fault 3



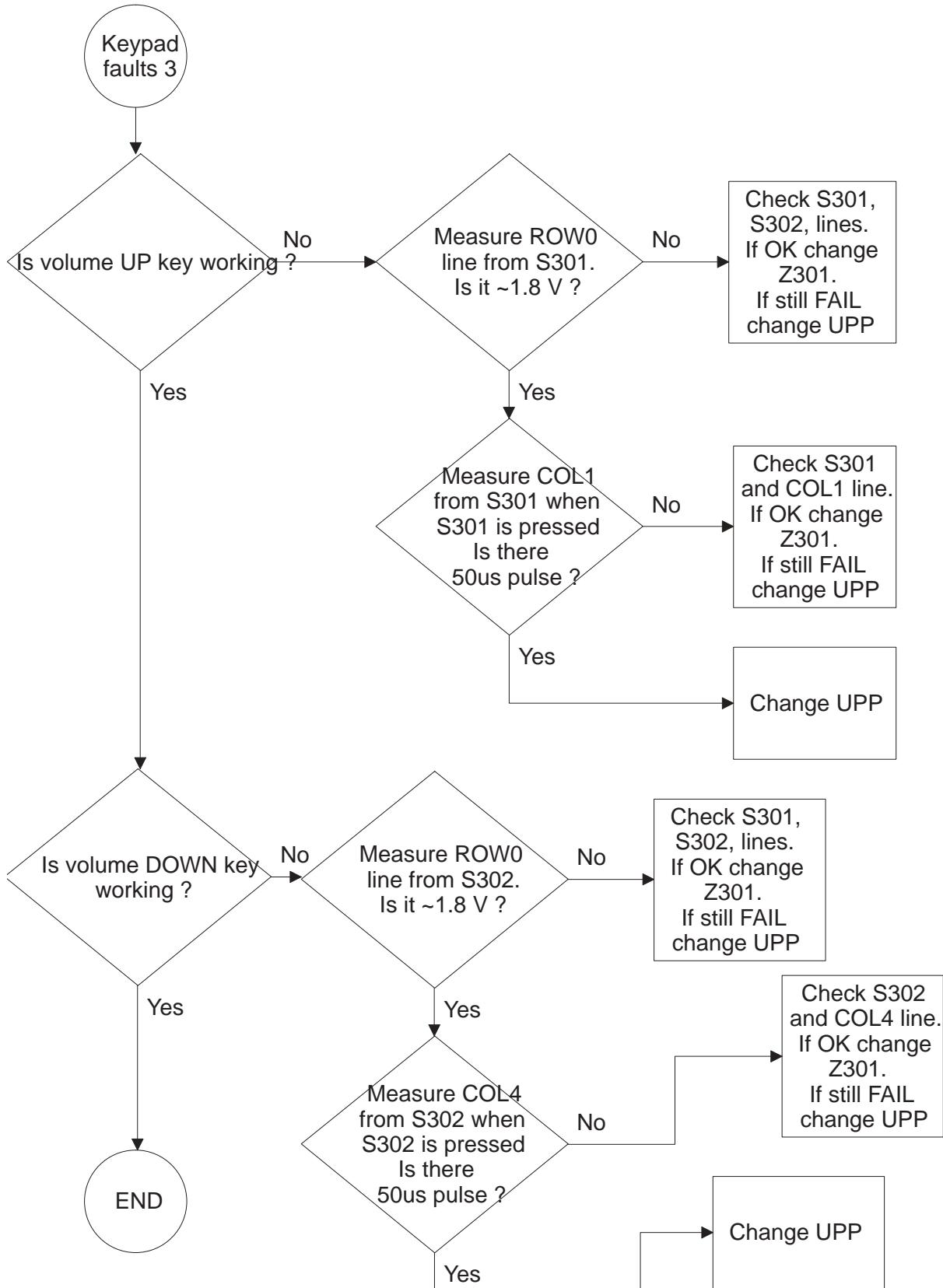
### Keypad fault 1



### Keypad fault 2



**Keypad fault 3**





## RF Troubleshooting

### Introduction to RF Troubleshooting

Measurements should be done using spectrum analyzer with high–frequency high–impedance passive probe (LO–/reference frequencies and RF power levels) and oscilloscope with a 10:1 probe (DC–voltages and low frequency signals).

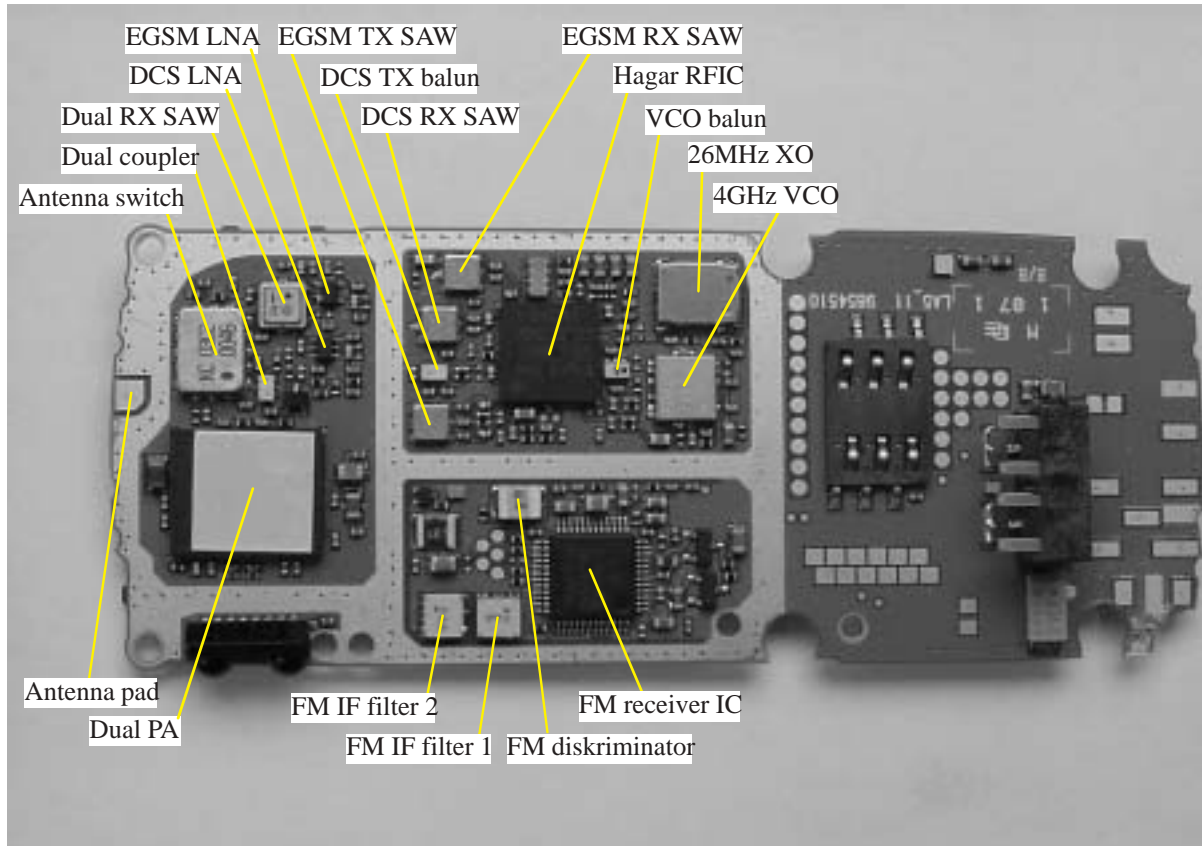
The RF–section is build around one RF–ASIC (HAGAR N600). Before changing HAGAR, please check following things: Supply voltages are OK and serial communication coming from baseband to HAGAR.

Note: Grounding of the PA module is directly below PA module making it difficult to check or change. **Most RF semiconductors are static discharge sensitive!** So ESD protection must be taken care of during repair (ground straps and ESD soldering irons). HAGAR and PA are moisture sensitive and must be pre–baked prior to soldering.

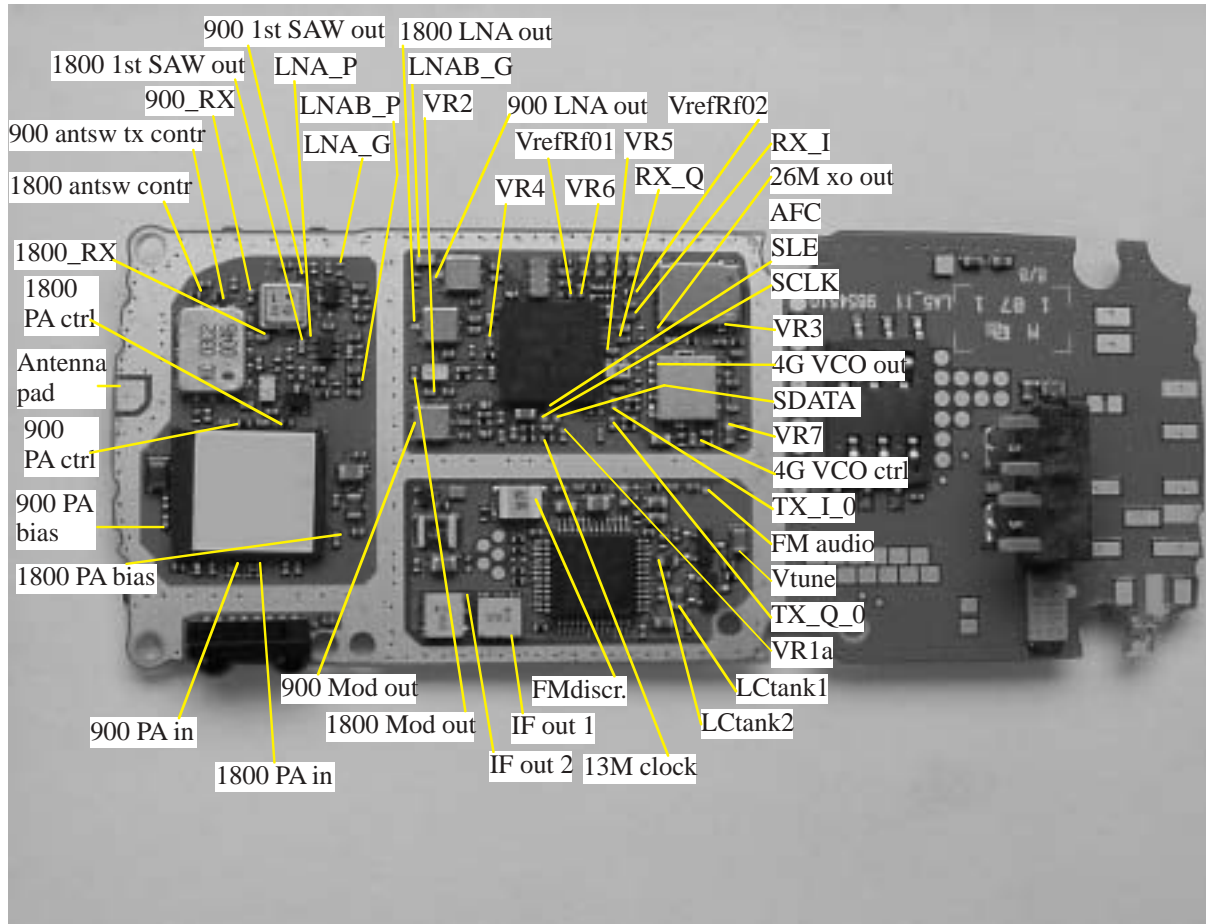
Troubleshooting discrete components (resistors, inductors and capacitors) is done by checking component soldering. Capacitors can be checked for shortening and resistor values using an ohmmeter, but remember in–circuit measurements are evaluated with caution.

Remember that all measured voltages or RF levels in this document are rough figures. Especially RF levels vary due to different measuring equipment or different probe grounding used . When using RF probe it is good to use metal tweezers to connect probe ground to PWB ground as close to measurement point as possible.

## RF Key Components



### PWB Test Points



## Transmitter

### General instructions on Troubleshooting

Connect test jig to computer with DAU9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

NOTE: When repairing or tuning transmitter use external DC supply with at least 3A current capability. Set the DC supply voltage to 3.9V and set the jumper connector on test jig to "bypass" position.

Connect RF-cable to the module test jig (MJS-46) RF connector and to measurement equipment or at least 10dB attenuator, otherwise the PA may be damaged. Normally spectrum analyzer is used as measurement equipment.

NOTE: Normally Spectrum analyzer maximum input power is +30dBm. It is recommended to use 10dB attenuator on Spectrum analyzer input to prevent damage.

Set the phone module to test jig and start Phoenix service software.

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Select product from the menu: File -> Choose product -> NHM-7

From toolbar set operating mode to "Local".

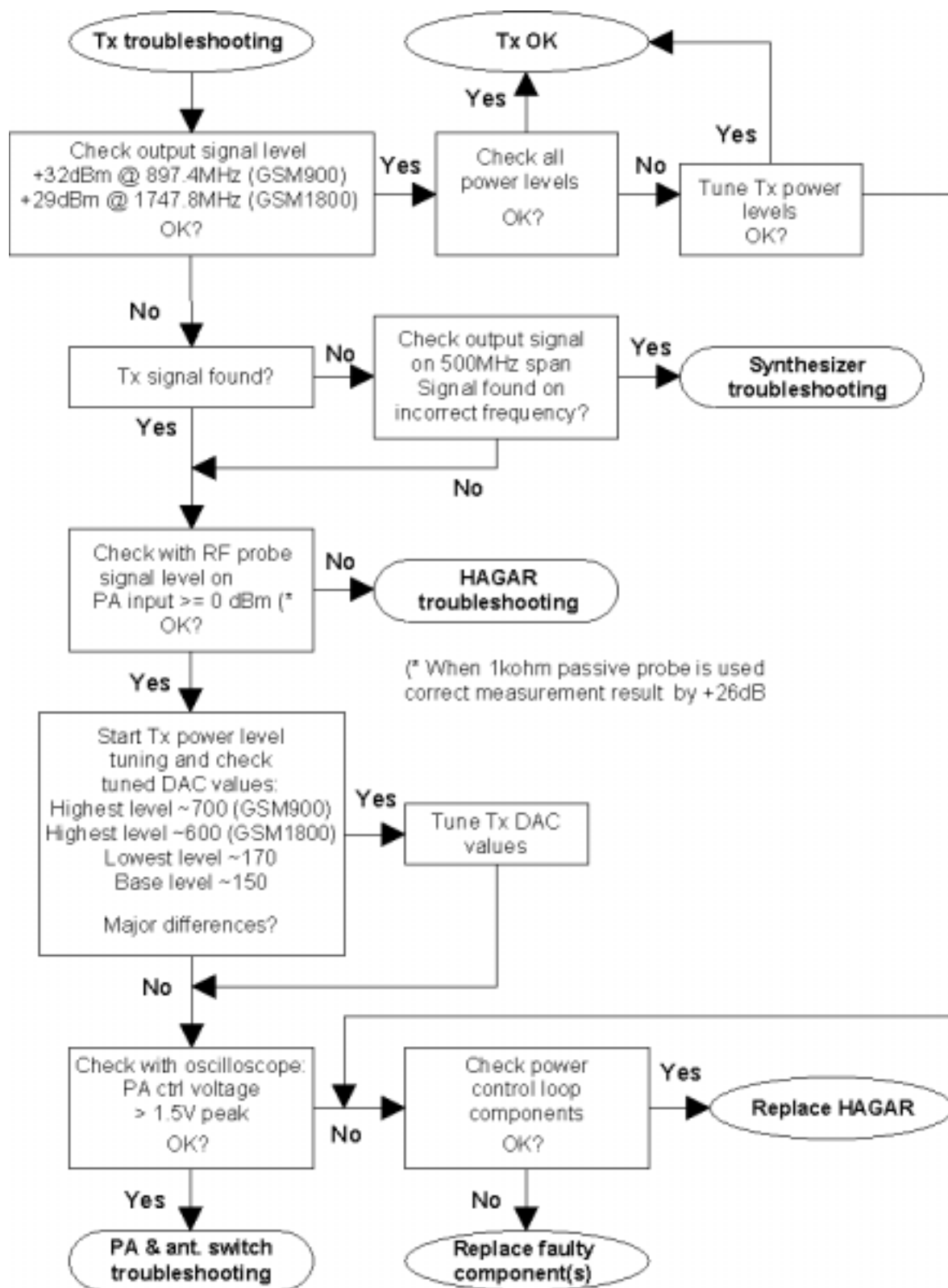
Activate RF controls window from the menu:  
Maintenance -> Tuning -> RF Controls

From the RF controls window:

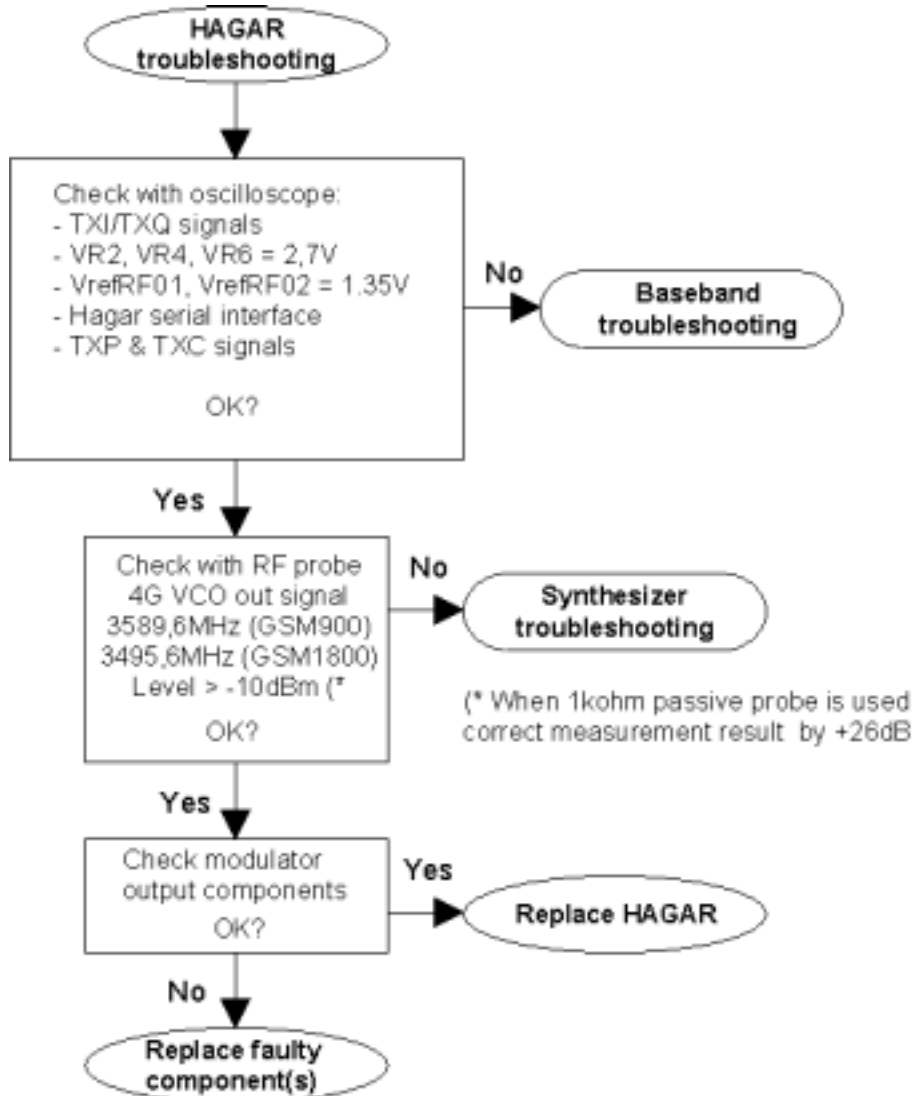
- Select band "GSM900" or "GSM 1800" (Default = "GSM900")
- Set Active unit to "Tx" (Default = "Rx")
- Set Operation mode to "Burst" (Default = "Burst")
- Set Tx data type to "Random" (Default = "All1")
- Set Rx/Tx channel to 37 on GSM900 band or 700 on GSM1800 band (Defaults)
- Set Tx PA mode to "Free" (Default)

- Set power level to 5 (Default = 19) on GSM900 or to 0 (Default = 15) on GSM1800

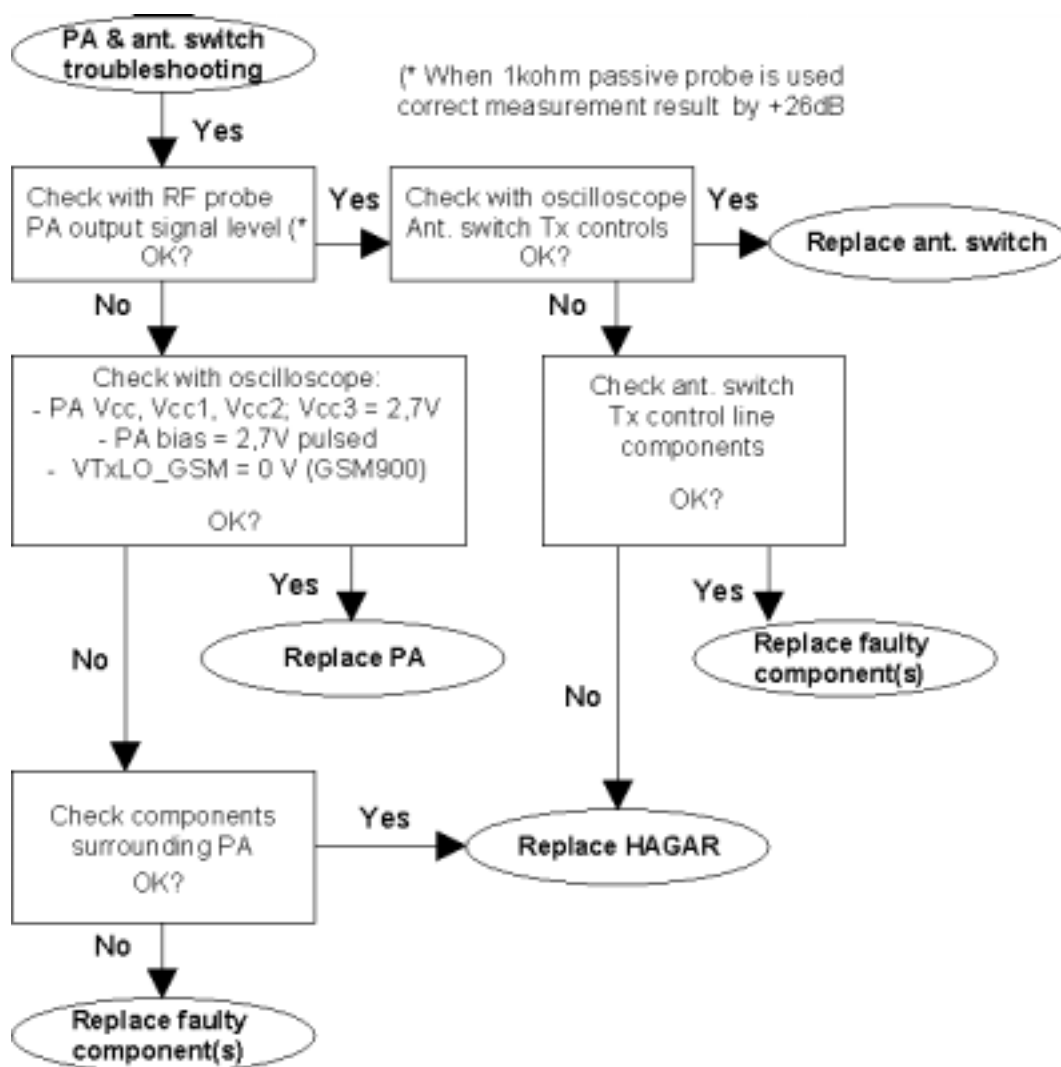
**Transmitter troubleshooting diagram**



### Transmitter troubleshooting 2 - Hagar

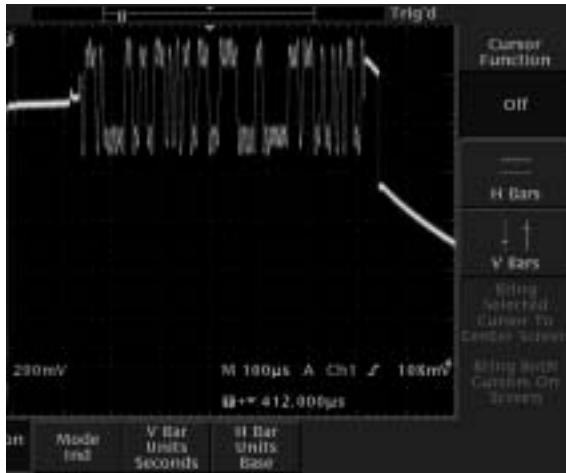


### Transmitter troubleshooting 3 - PA & Antenna

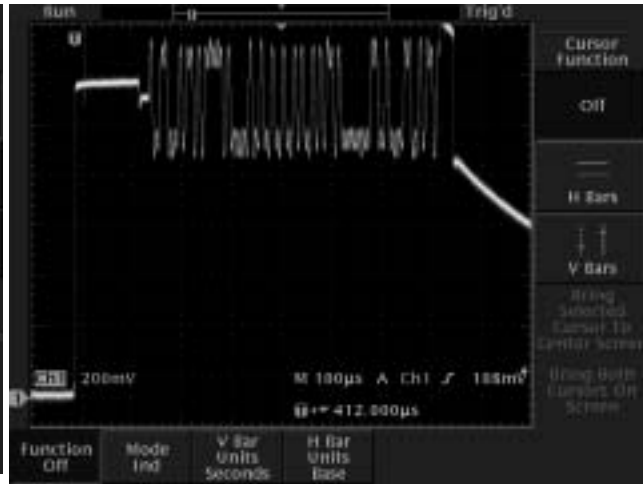




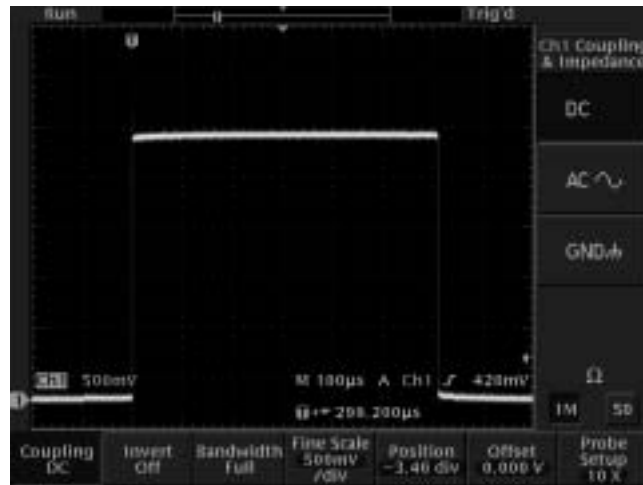
Transmitter signals



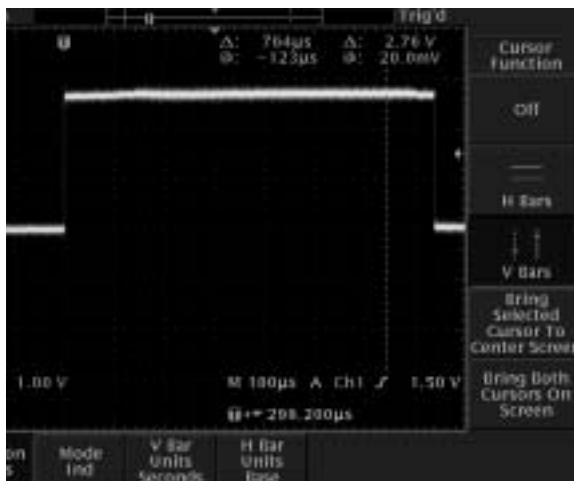
\_I\_0, Tx on, Random data, Burst mode



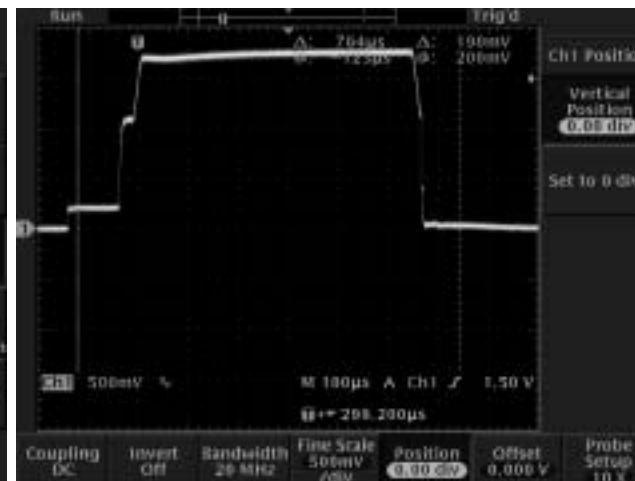
TX\_Q\_0, Tx on, Random data, Burst mode



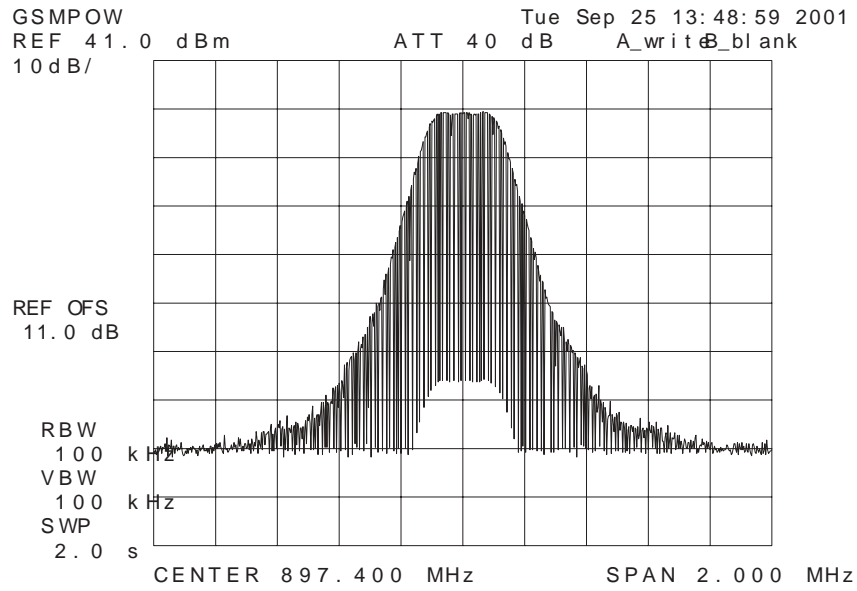
900/1800 antsw tx contr, Tx on, Burst mode



1800 PA bias, Tx on, Burst mode



900/1800 PA ctrl, Tx on, Burst mode, High power level



Tx out signal, 900 band, burst mode, channel 37

## Receiver

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prom mer with XCS-4 modular cable. Make sure that you have PKD-1 dongle connected to computer's parallel port.

Connect DC power supply to module test jig with FLC-2 cable. Set the DC supply voltage to 3.9V and set the jumper connector on test jig to "bypass" position.

Connect RF-cable to the module test jig (MJS-46) RF connector and to RF signal generator.

Set the phone module to test jig and start Phoenix service software.

Initialize connection to phone. Use FBUS driver when using DAU9S and COM-BOX driver when using FPS-8.

Choose product from the menu: File -> Choose product -> NPM-9.

From toolbar set operating mode to "Local".

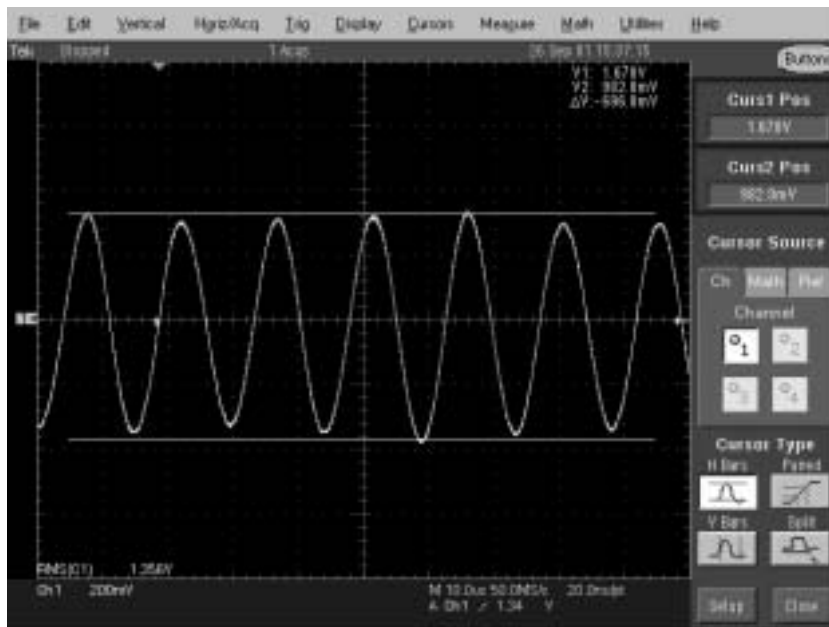
Activate RF controls window from the menu: Maintenance -> Testing -> RF Controls.

From the RF controls window:

- Select band "GSM900" or "GSM 1800" (Default = "GSM900")
- Set Active unit to "Rx" (Default = "Rx")
- Set Operation mode to "Continuous" (Default = "Burst")
- Set AGC to "8: FEG ON + 46 dB (Default = "8: FEG ON + 46 dB")
- Set Rx/Tx channel to 37 on GSM900 band or 700 on GSM1800 band (Defaults)

Apply 942.46771 MHz (channel 37 + 67.710 kHz offset) or 1842.86771 MHz (channel 700 + 67.710 kHz offset) -90 dBm signal to the RF-con nector (remember to compensate for cable attenuation).

Measuring with an oscilloscope on "RX\_I" or "RX\_Q" this picture should be seen on a working GSM900 or GSM1800 receiver:



Signal amplitude is 700 mVpp, DC offset 1.35 V and frequency 67 kHz. If this signal is not seen, continue to the next page.





### ILNA gainstep checking

900 LNA out	1800 LNA out
<ul style="list-style-type: none"> <li>- RF-level at antenna port eg. -50 dBm</li> <li>- RX continuous mode (local mode)</li> <li>- difference between AGC -settings "FEG on" and "FEG off" roughly 25 dB (using 250 ohm passive RF-probe)</li> </ul>	<ul style="list-style-type: none"> <li>- RF-level at antenna port eg. -50 dBm</li> <li>- RX continuous mode (local mode)</li> <li>- difference between AGC -settings "FEG on" and "FEG off" roughly 30 dB (using 250 ohm passive RF-probe)</li> </ul>

LNAB_G	LNAB_P
<ul style="list-style-type: none"> <li>- RX continuous mode (local mode)</li> <li>- 2,6 V DC voltage "FEG ON"</li> <li>- 0 V DC voltage "FEG OFF"</li> </ul>	<ul style="list-style-type: none"> <li>- RX continuous mode (local mode)</li> <li>- 2,7 V DC voltage "FEG ON"</li> <li>- 0 V DC voltage "FEG OFF"</li> </ul>

LNA_G	1800 LNA_P
<ul style="list-style-type: none"> <li>- RX continuous mode (local mode)</li> <li>- 2,7 V DC voltage "FEG ON" and "FEG OFF"</li> </ul>	<ul style="list-style-type: none"> <li>- RX continuous mode (local mode)</li> <li>- 0 V DC voltage "FEG ON"</li> <li>- 1.9 V DC voltage "FEG OFF"</li> </ul>

## Synthesizer

### General instructions for Synthesizer troubleshooting

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallelport.

Connect DC power supply or FPS-8 to module test jig with FLC-2 cable.

Set the DC supply voltage to 3.9V and set the jumper connector on test jig to "bypass" position.

Set the phone module to test jig and start Phoenix service software.

Initialize connection to phone. (use FBUS driver when using DAU-9S and COMBOX driver when using FPS-8)

Select product from the menu: File -> Choose product ->NHM-7

From toolbar set operating mode to "Local".

Activate RF controls window from the menu:

Maintenance -> Tuning -> RF Controls

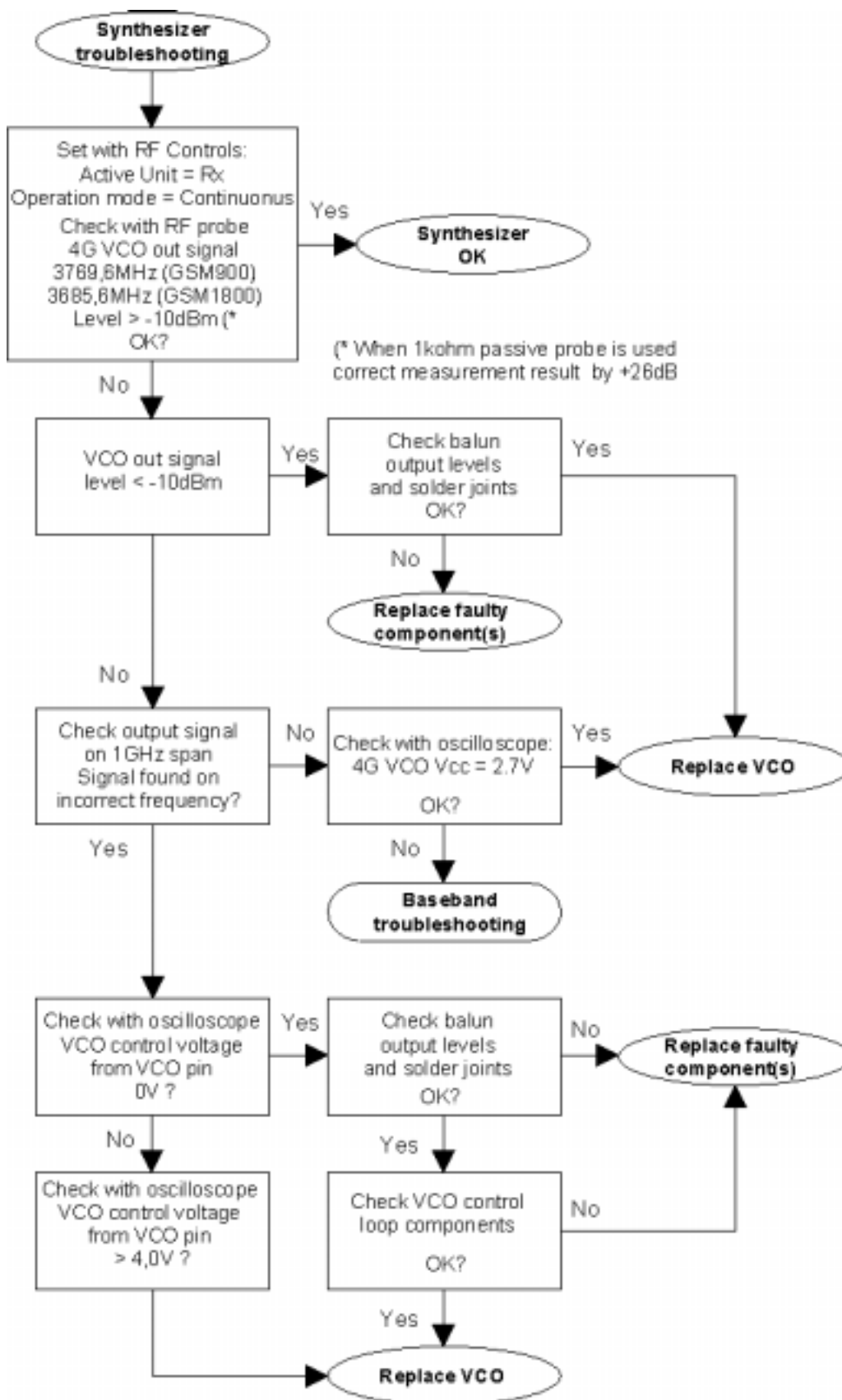
From the RF controls window:

- Select band "GSM900" or "GSM 1800" (Default = "GSM900")
- Set Active unit to "Rx" (Default = "Rx")
- Set Operation mode to "Continuous" (Default = "Burst")
- Set Rx/Tx channel to 37 on GSM900 band or 700 on GSM1800 band

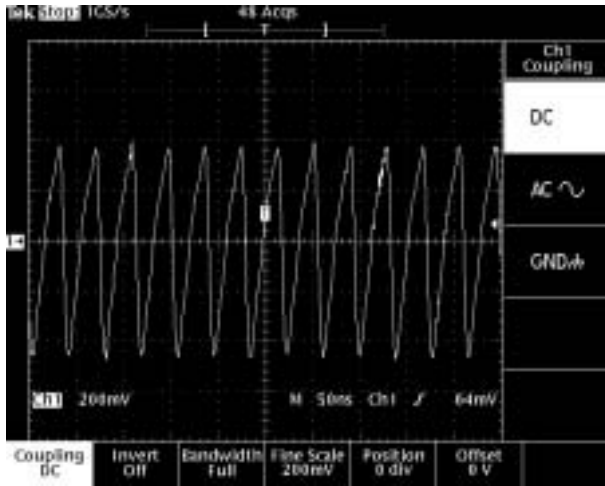
(Defaults)



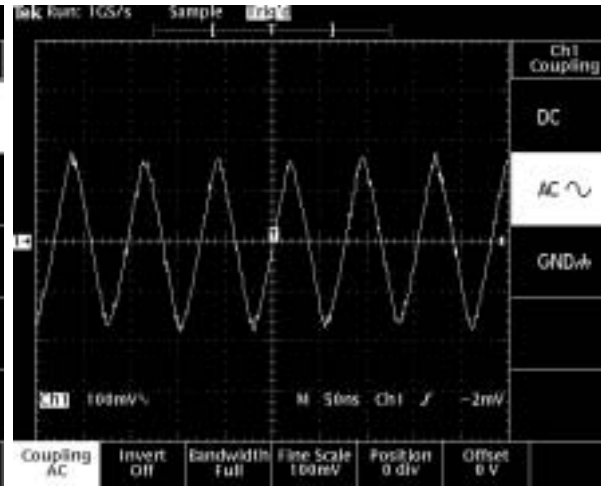
### Synthesizer troubleshooting diagram



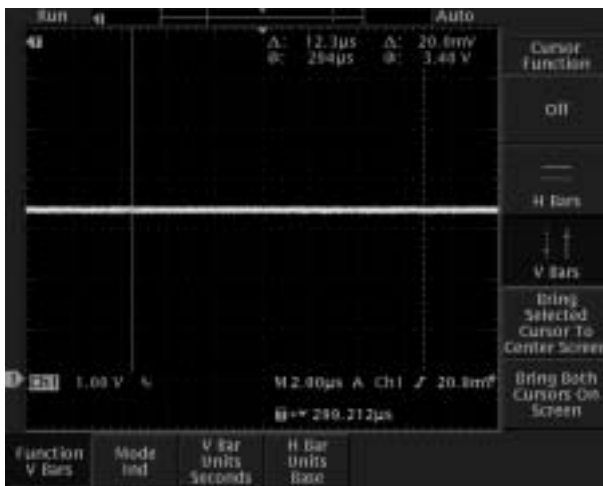
## Synthesizer signals



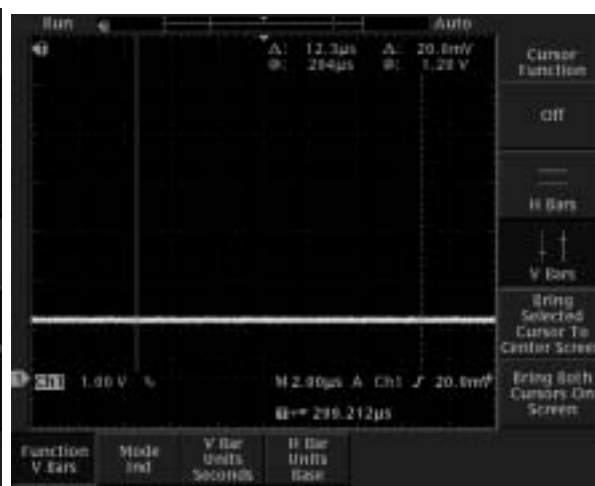
26MHz XO out



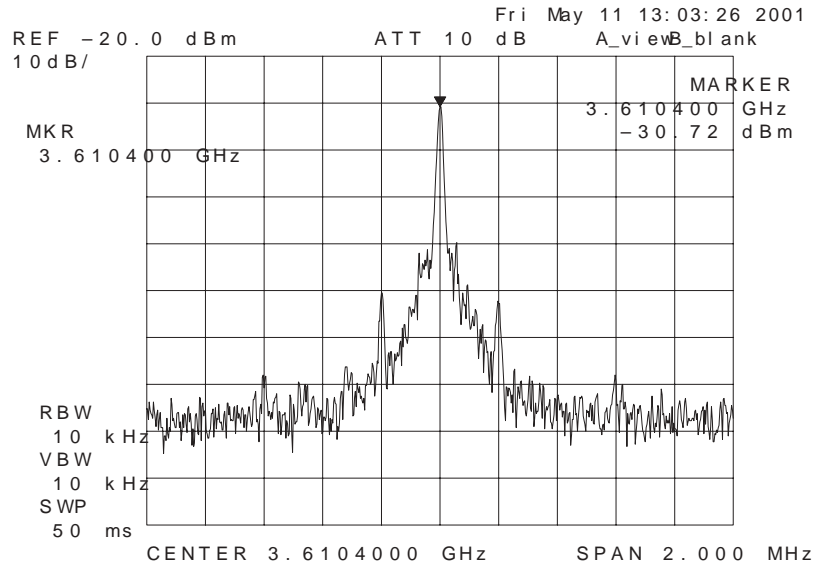
13MHz clock



4GHz VCO ctrl  
 900 RX, channel 124, continuous mode



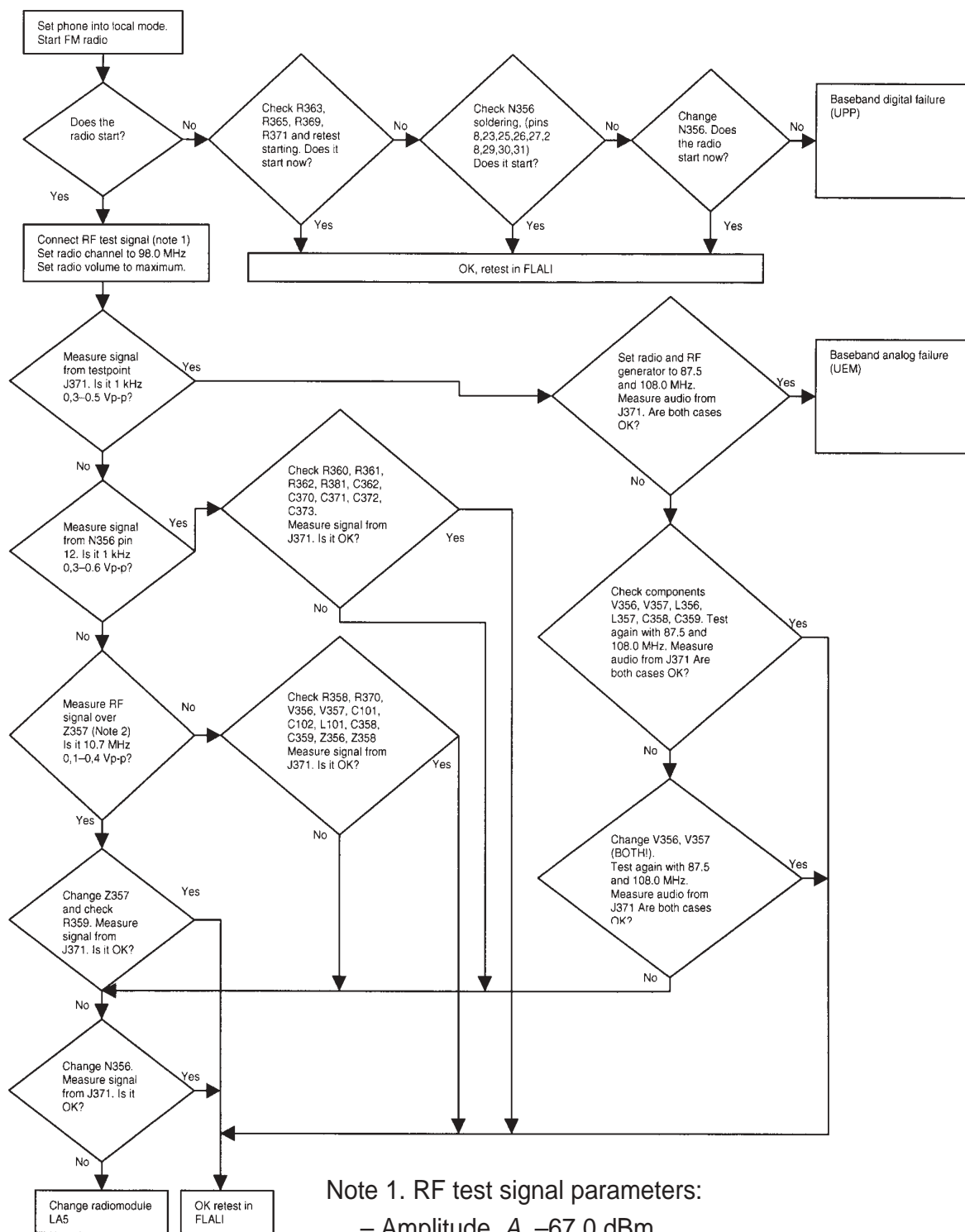
4GHz VCO ctrl  
 1800 TX, channel 512, continuous mode



**4GHz VCO output, 1800 band, RX on, continuous mode**



### FM Radio troubleshooting diagram

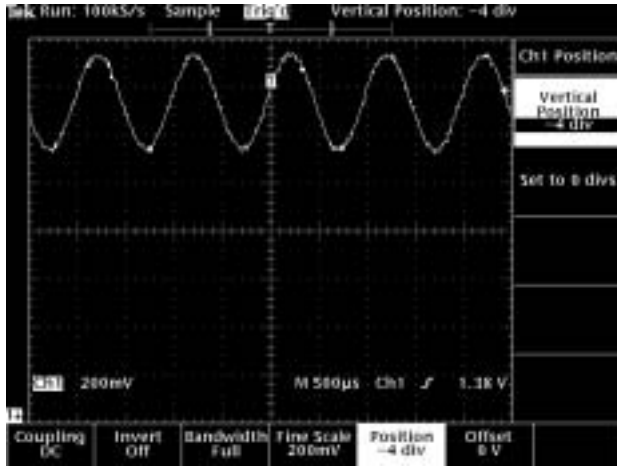


Note 1. RF test signal parameters:

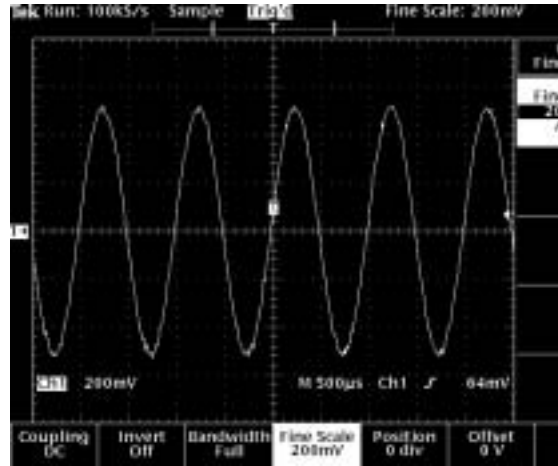
- Amplitude,  $A$ , -67.0 dBm
- Carrier frequency,  $f_c$ , 98,000 MHz
- Deviation,  $\Delta f$ , 75 kHz
- Modulating frequency  $f_m$ , 1,000 kHz (RF generator internal)

Note 2. Use 10x probe. Compare measured RF signal level to a known good product.

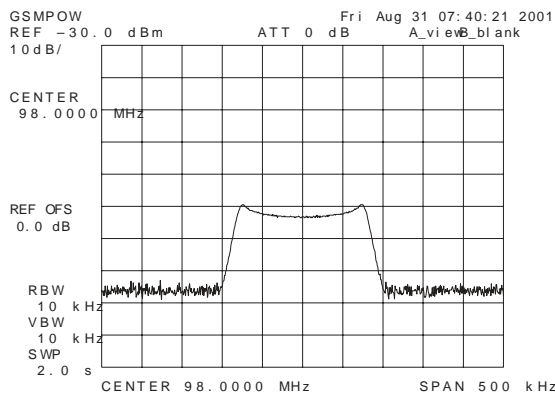
## FM Radio signals



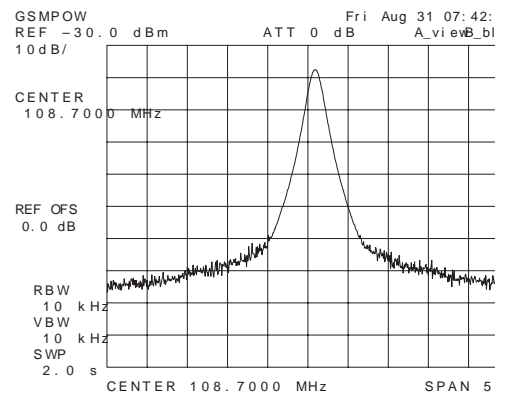
Audio out from PWB test point – with FM test signal.



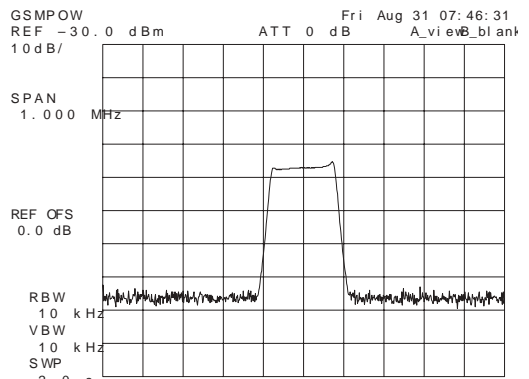
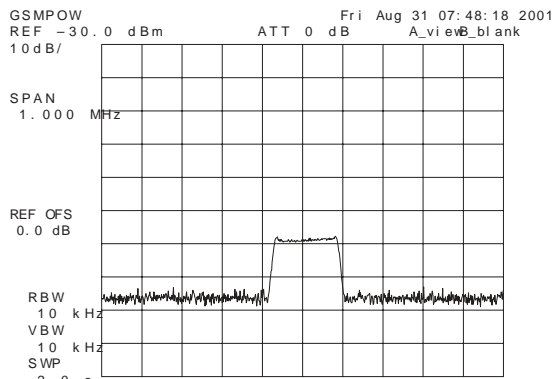
Audio out from test jig connector – with F test signal, volume 100%.



LC tank 1 – with FM test signal.



LC tank 2 – with FM test signal.



## Quick Guide for Tuning the NHM-7\* Phone With Phoenix



### General information

RF tuning should be made in the same order as shown in this document.

If baseband tuning are needed, they should be made before the RF tunings

Avoid unnecessary tuning – factory tuning values are always the most accurate ones.

Views in this document may change as the service software is developed. Please refer to the Phoenix help files, phone model specific service manual and bulletins for help.

## Service Tool Concept for RF Tunings

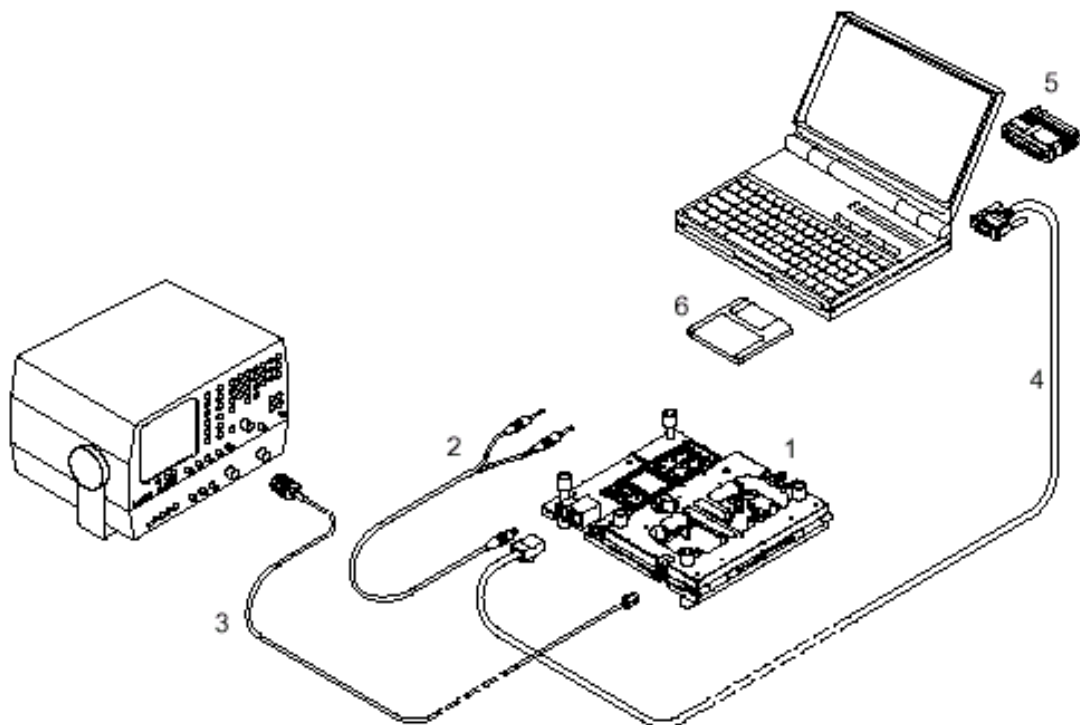
All RF tunings must be carried out in MJS-46 Module Jig

CPL-4 coupler can only be used for testing, NOT for tuning!

Power to MJS-46 should be supplied from an external DC power supply, not FPS-8 prommer

Maximum input voltage is 12 VDC, nominal input for RF tunings is +8V DC

Remember cable attenuation when setting required RF levels.



Item:	Service accessory:	Product code:
1	MJS-46, Module jig	0770316
2	PCS-1, DC power cable	0730012
3	XRF-1, RF antenna cable	0730085
4	DAU-9S, Service MBUS cable	0730108
5	PKD-1, Software protection key	0750018
6	Phoenix Service SW	8409031
	Phoenix Service SW in CD-ROM	0775311
	NHM-7 Flash SW data	8409167
	NHM-7 Flash SW data in CD-ROM	0775312



## Receiver tuning

### RX Channel Select Filter Calibration

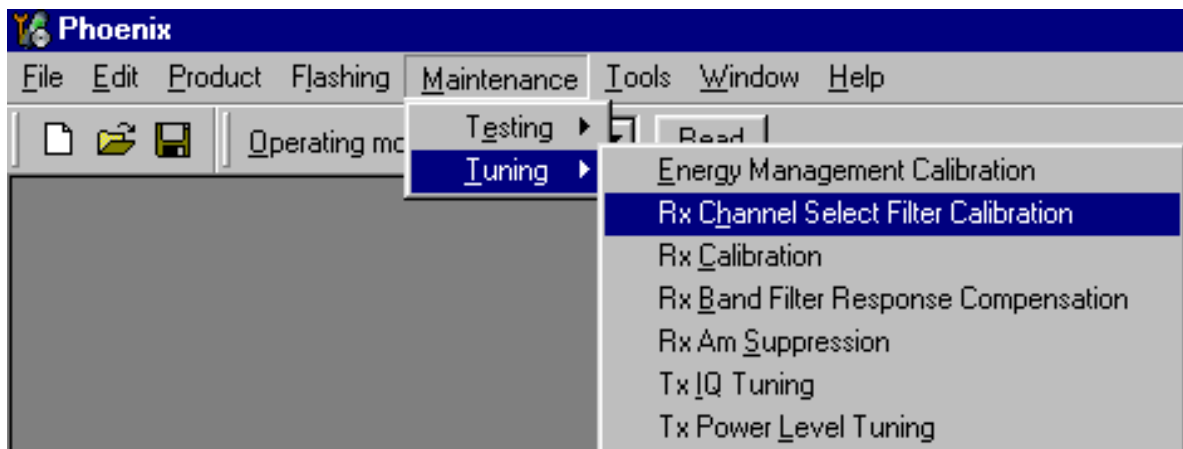
Extra equipment / external RF signal is not needed.

Must be done before other RX calibrations.

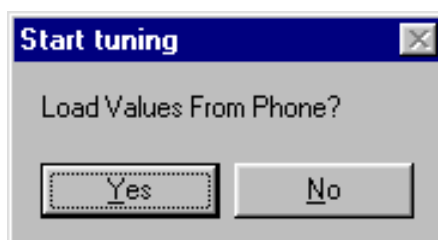
This function is used to calibrate RX channel select filter in GSM Phones.

Rx Channel select filter is tuned only in one band = Single calibration for both bands.

- Select Maintenance => Tuning => Rx Channel select filter calibratio



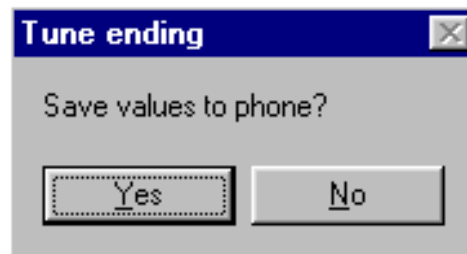
- Select "Yes" to start tuning with values already saved to the phone



- Press "AutoTune" to start the tuning.



- Tuning values should be 0...31
- Select "Stop"
- If values shown are within limits, choose "Yes" to save values to the phone save them to phone.



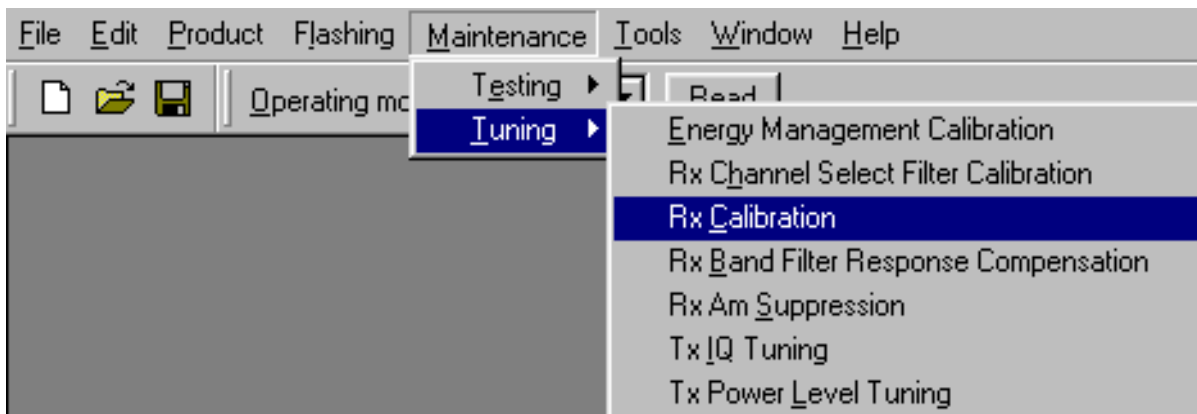
- Close the "RX Channel Select Filter Calibration" dialog to end tuning

## RX Calibration

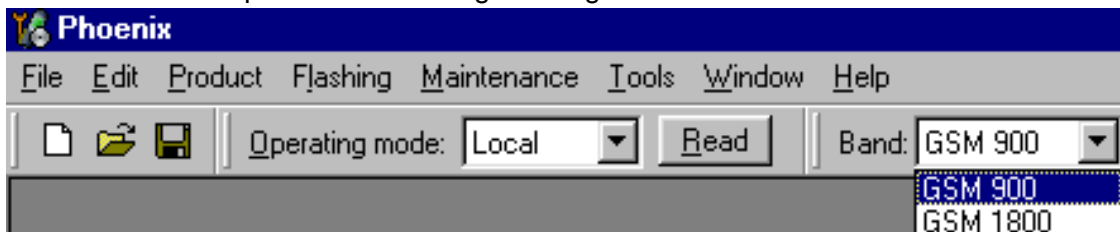
RF generator needed. This tuning performs RX Calibration

Must be done separately on both bands!

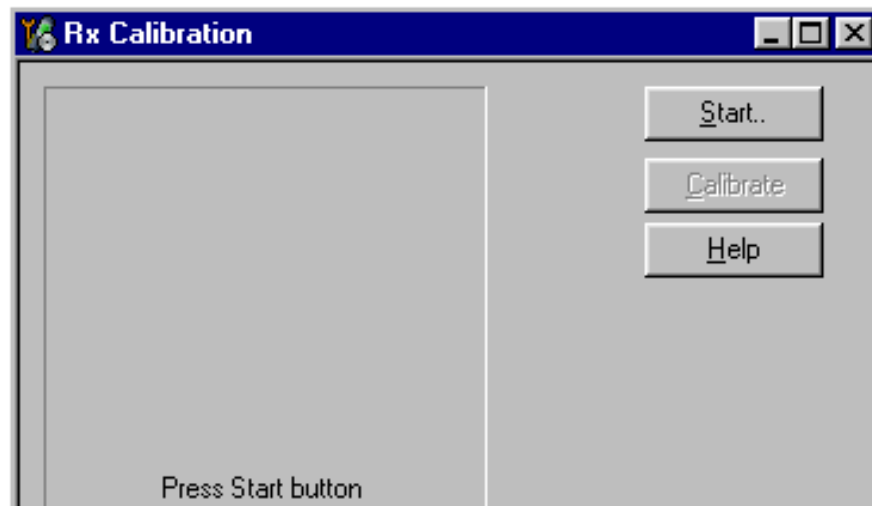
- Start RX Calibration at EGSM (GSM900), then do RX Calibration at GSM1800 band.
- AFC tuning is done while EGSM (GSM900) band RX Calibration is performed.
- Remember to take jig and cable attenuations into account!
- Select Maintenance => Tuning => Rx calibration



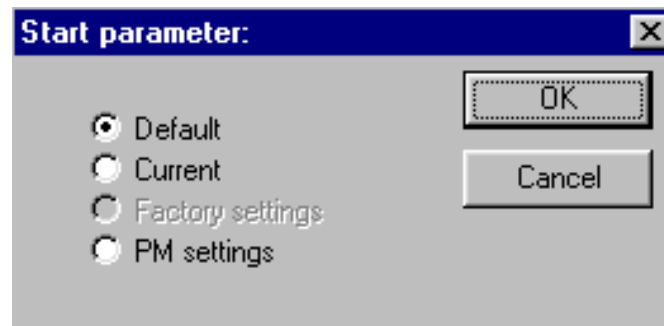
- When RX Calibration has been started, you can choose the correct band from the drop-down menu. Begin tuning from EGSM 900 band.



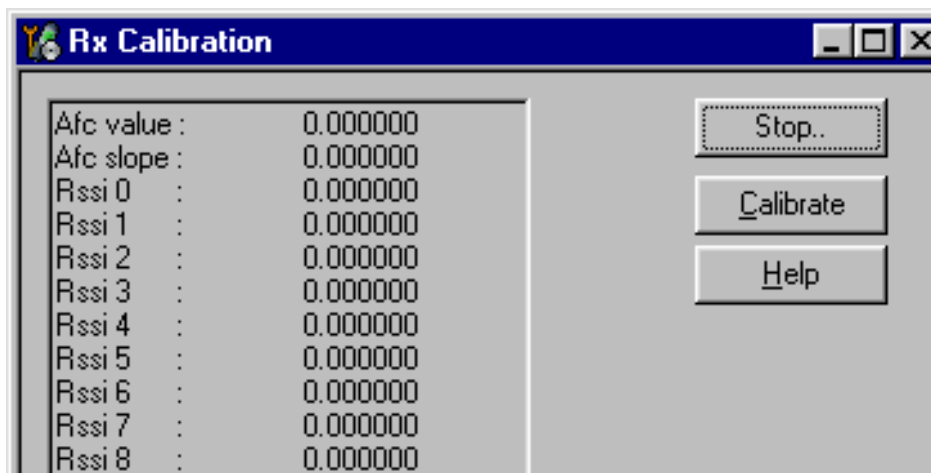
- Press "Start"



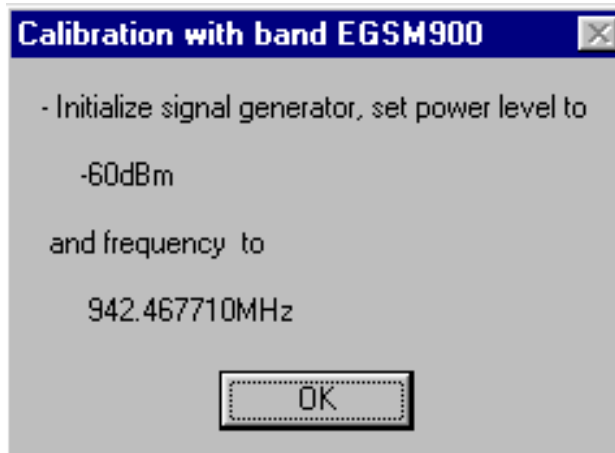
- Select "Default" to start tuning from factory default values => OK



- Press "Calibrate"



- Set RF generator to required frequency => OK

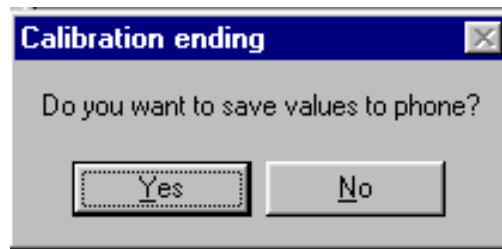


- Tuning values and ADC readings will be shown

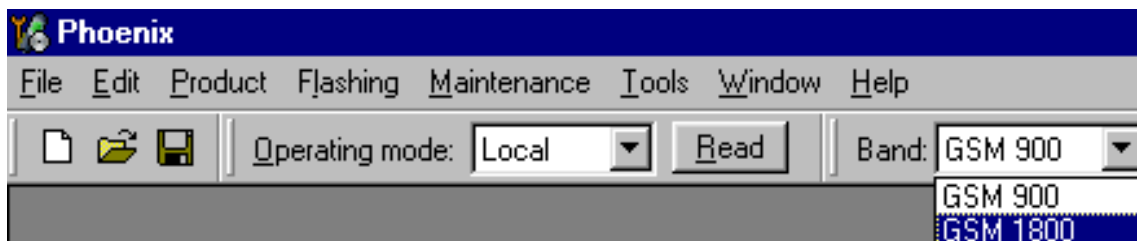
**Typical values and limits in (GSM900) RX Calibration:**

EGSM (GSM900)	Typical value	Limits
AFC value	60	-350...+350
AFC slope	260	150...350
RSSI0	72.5	67...77
RSSI1	82.5	77...87
RSSI2	92.5	87...97
RSSI3	98.5	94...104
RSSI4	108.5	104...114
RSSI5	118.5	114...124
RSSI6	128.5	124...134
RSSI7	138.5	134...144
RSSI8	148.5	144...152

- Choose "Stop" to end tuning
- If values shown are within limits, choose "Yes" to save values to the phone



- Continue tuning from GSM1800. Choose the correct band from the drop-down menu.
- Press "Start" to continue just like in the EGSM900 Band above.



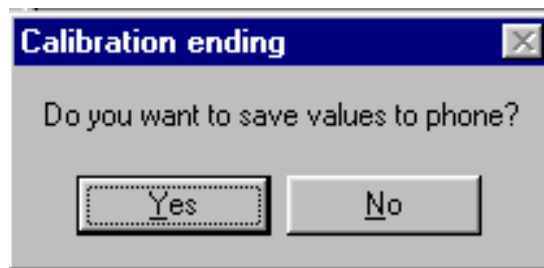
- When asked, set RF generator to required frequency => OK



**Typical values and limits in (GSM1800) RX Calibration:**

GSM1800	Typical value	Limits
RSSI0	67.5	63...73
RSSI1	77.5	73...83
RSSI2	87.5	83...93
RSSI3	99.5	94...104
RSSI4	109.5	104...114
RSSI5	119.5	114...124
RSSI6	129.5	124...134
RSSI7	139.5	134...144
RSSI8	149.5	144...152.5

- Choose "Stop" to end tuning
- If values shown are within limits, choose "Yes" to save values to the phone



- Close the "RX – Calibration – dialog to end tuning.

## RX Band Filter Response Compensation

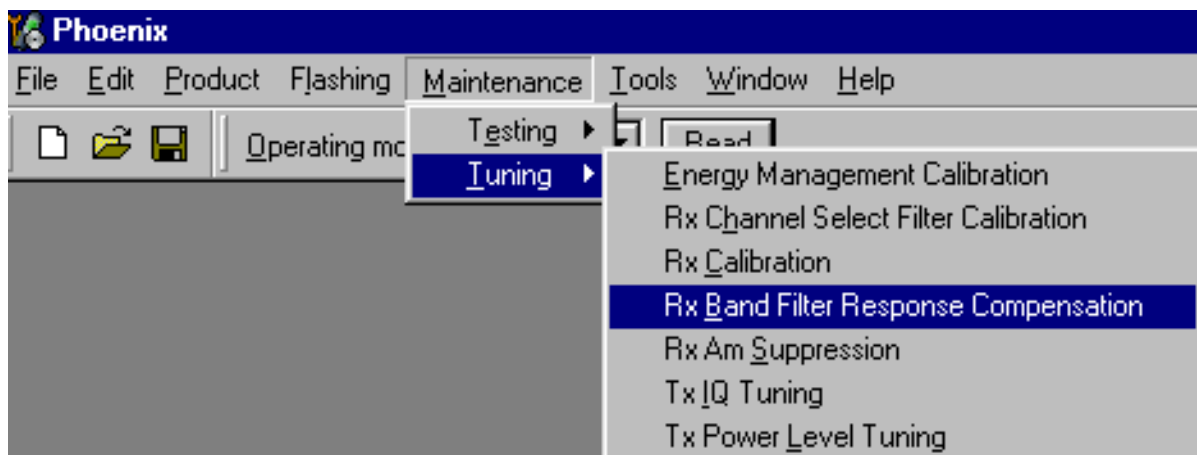
RF generator needed. Must be done separately on both bands!

Start RX Calibration at EGSM (GSM900), then do RX Calibration at GSM1800 band.

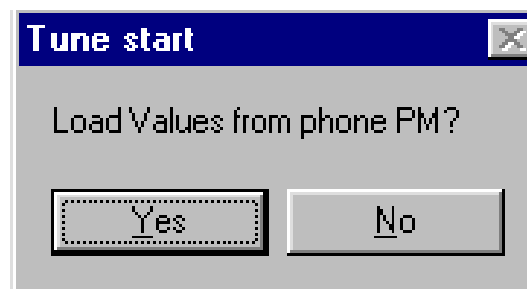
**NOTE! Remember to do RX calibration before doing Rx Band Filter Response Compensation!**

**Remember to take jig and cable attenuations into account!**

- Select Maintenance => Tuning => Rx band filter response compensation



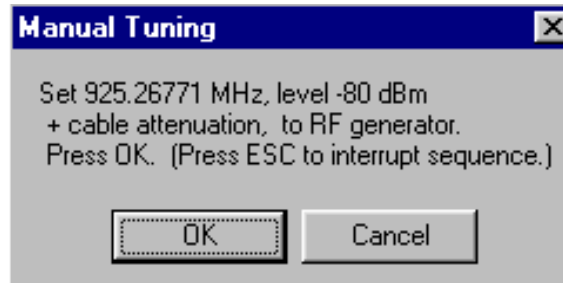
- Select "Yes" to start tuning with values already saved to the phone



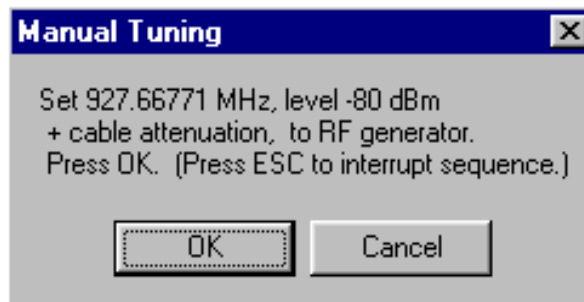




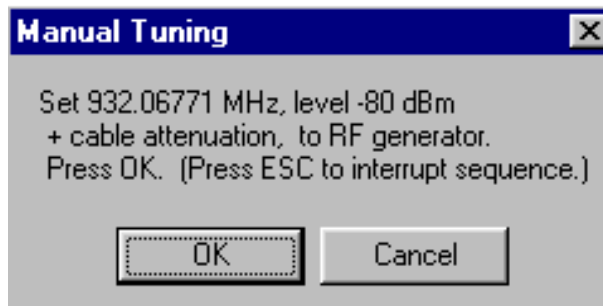
- Set 2nd required frequency and level => OK



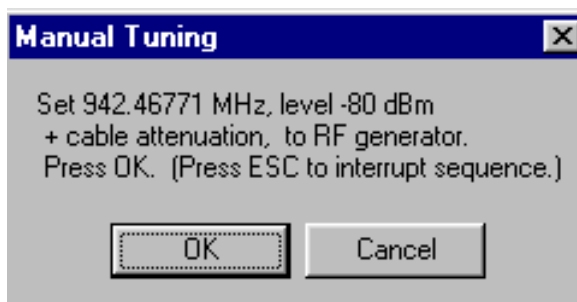
- Set 3rd required frequency and level => OK



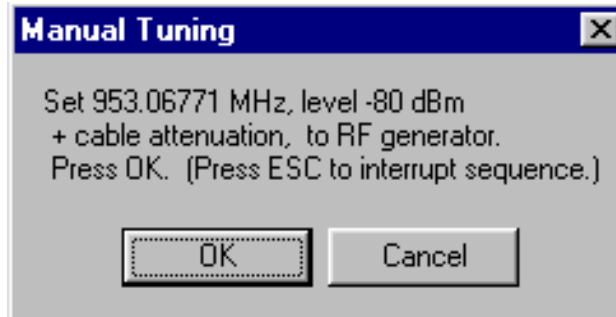
- Set 4th required frequency and level => OK



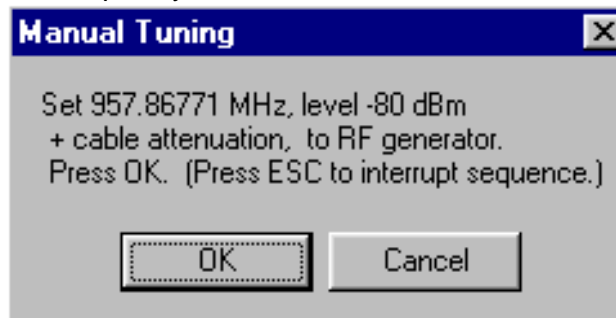
- Set 5th required frequency and level => OK



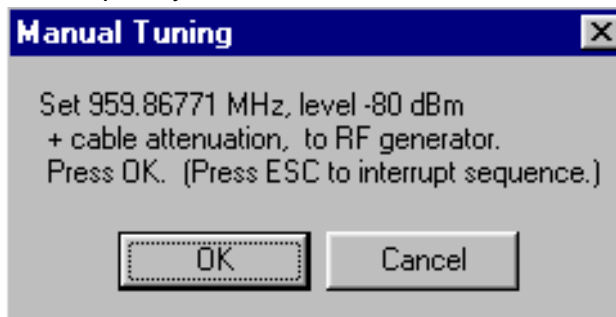
- Set 6th required frequency and level => OK



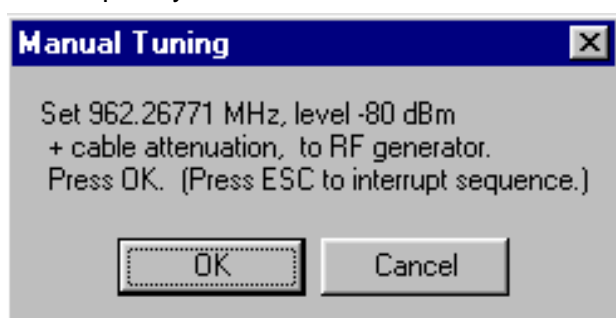
- Set 7th required frequency and level => OK



- Set 8th required frequency and level => OK



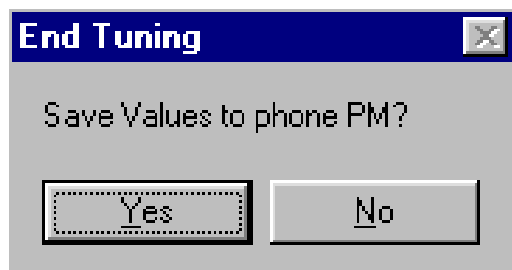
- Set 9th required frequency and level => OK



Typical values and limits in Rx Band Filter Response Compensation  
EGSM900:

Channel	Input frequency (MHz)	Measured level difference (dB)	Limits (dB)
965	923.26771	-0.516	-10...+5
975	925.26771	0.875	-5...+5
987	927.66771	1.469	-5...+5
1009	932.06771	1.656	-5...+5
37	942.46771	-0.094	-5...+5
90	953.06771	1.781	-5...+5
114	957.86771	0.719	5...+5
124	959.86771	-0.625	-5...+5
136	962.26771	-2.141	-10...+5

- Choose "Stop, write to PM area"
- If values shown are within limits, choose "Yes" to save values to the phone



- **Continue tuning from GSM1800.** Choose the correct band from the drop-down menu.



- Repeat the same steps as for the EGSM900 band above

Typical values and limits in Rx Band Filter Response Compensation  
GSM1800:

Channel	Input frequency (MHz)	Measured level difference (dB)	Limits (dB)
497	1802.26771	-0.672	-10...+5
512	1805.26771	0.109	-5...+5
535	1809.86771	0.781	-5...+5
606	1824.06771	0.781	-5...+5
700	1842.86771	-0.266	-5...+5
791	1861.06771	0.234	-5...+5
870	1876.86771	0.563	-5...+5
885	1879.86771	-0.016	-5...+5
908	1884.46771	-2.141	-10...+5

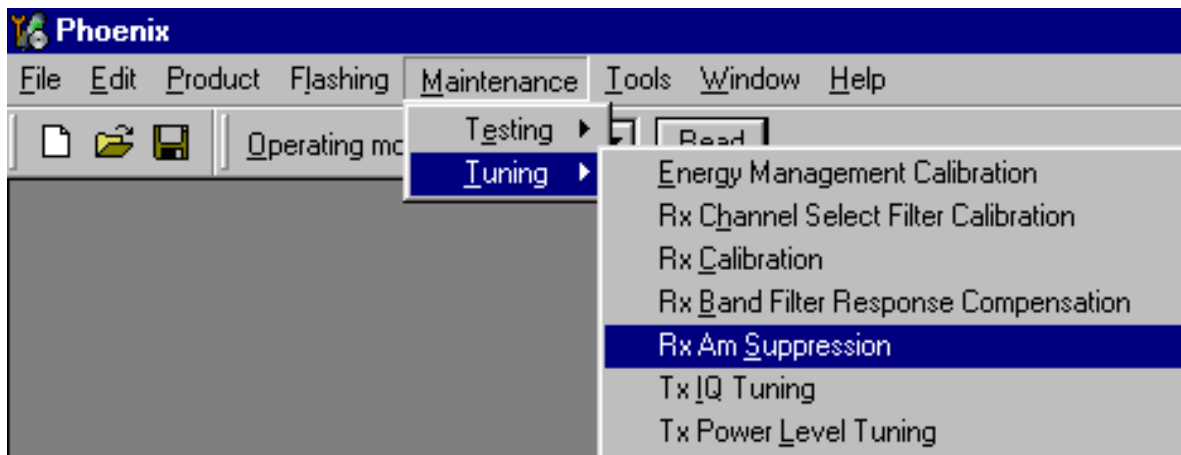
- If values shown are within limits, save values to the phone
- Close the “RX Band Filter Response Compensation” – dialog to end tuning

## RX AM Suppression

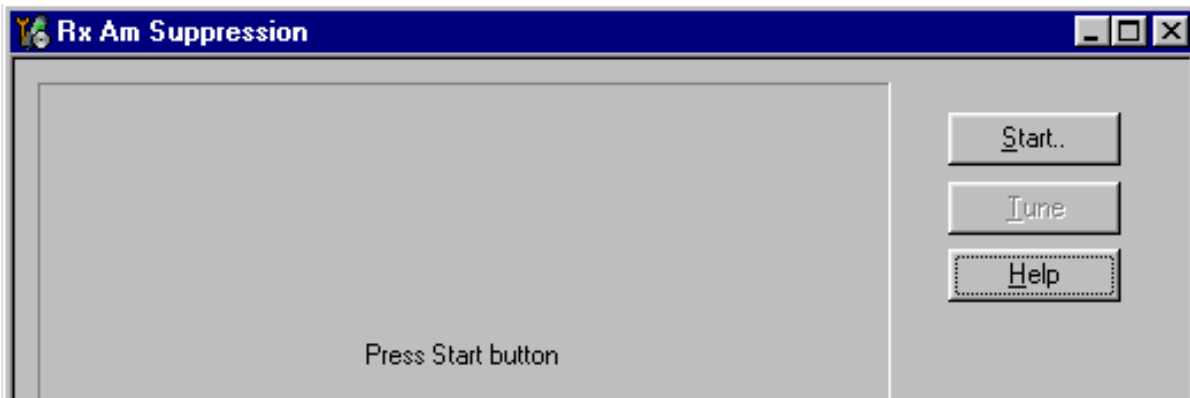
RF generator needed (AM modulation). Must be done separately on both bands!

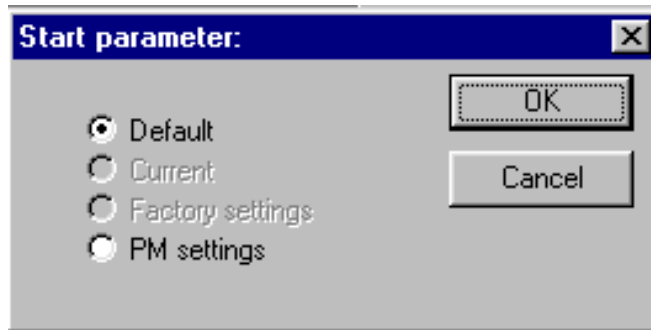
Start RX Calibration at EGSM (GSM900), then do RX Calibration at GSM1800 band.

- This dialog performs RX AM Suppression.
- Remember to take jig and cable attenuations into account!
- Select Maintenance => Tuning => Rx Am suppression

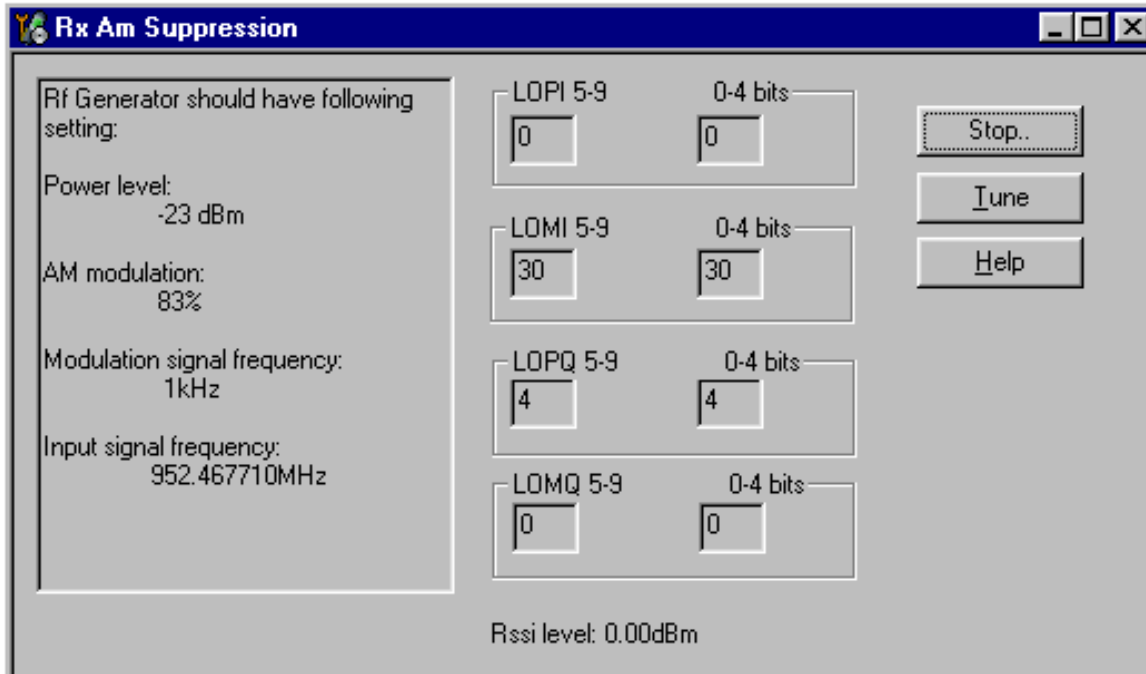


- Start => Default settings => OK,

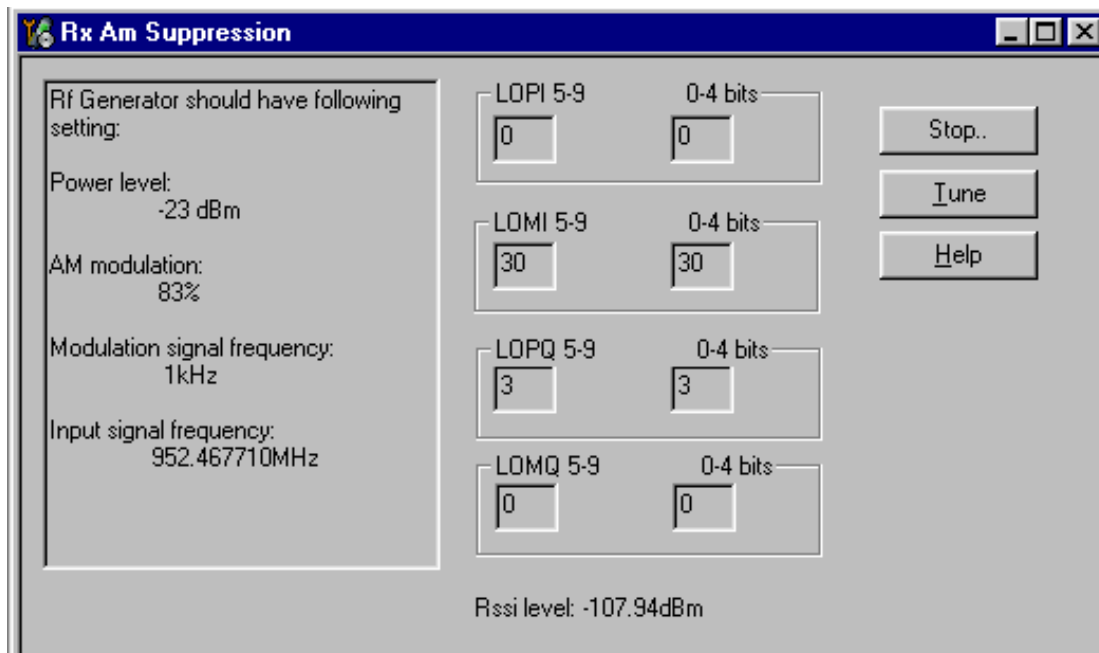




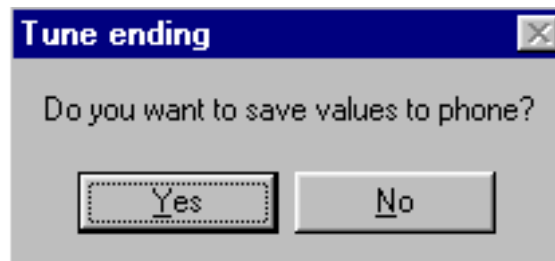
- Set RF generator to state described in left side window.
- Press the "Tune" button to perform actual tuning.
- The new tuning values and RSSI dBm value are updated.



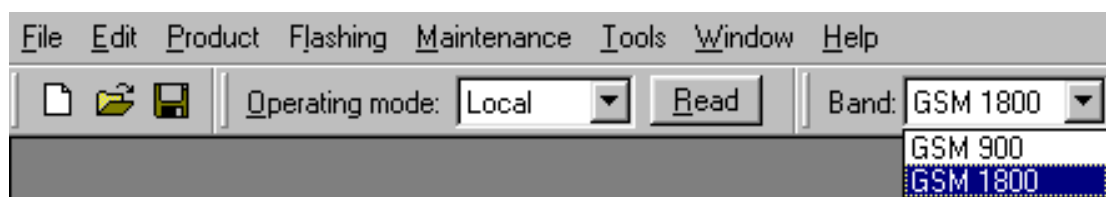
- One "I" and "Q" line values should be 0, other values 0.31
- RSSI level should be around -107 dBm



- If values shown are within limits, Select “Stop”
- Choose “Yes” to save values to the phone



- 2 Continue tuning from GSM1800.** Choose the correct band from the drop-down menu.



- Repeat the same steps as for the EGSM900 band
- If values shown are within limits, choose “Yes” to save values to the phone
- Close the “RX AM Suppression” – dialog to end tuning



# Transmitter Tuning

## TX I/Q Tuning

Spectrum analyzer needed.

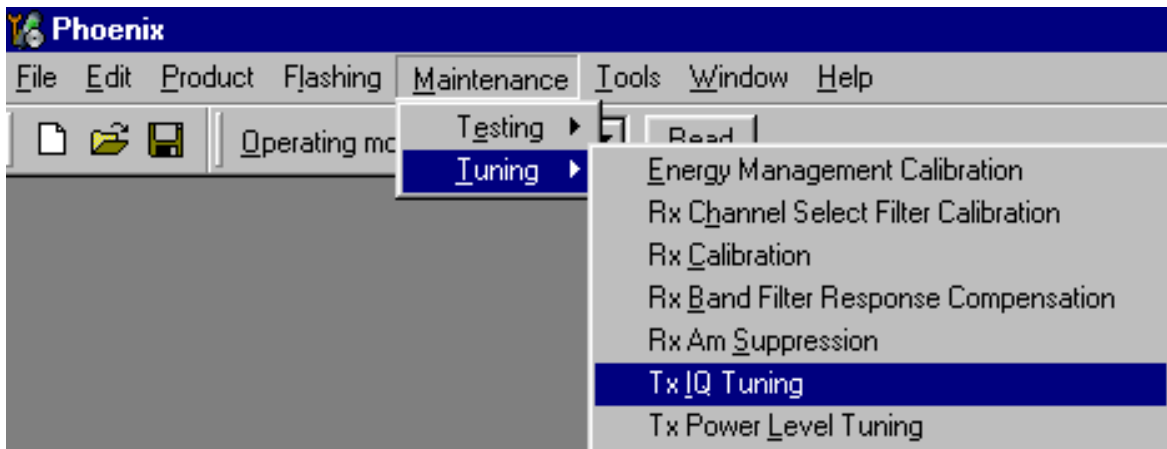
Tx IQ Tuning allows changing the Tx I DC Offset, Tx Q DC Offset, Amplitude difference and Phase difference.

Must be done separately on both bands!

Start TX I/Q Tuning at EGSM (GSM900), then continue at GSM1800 band.

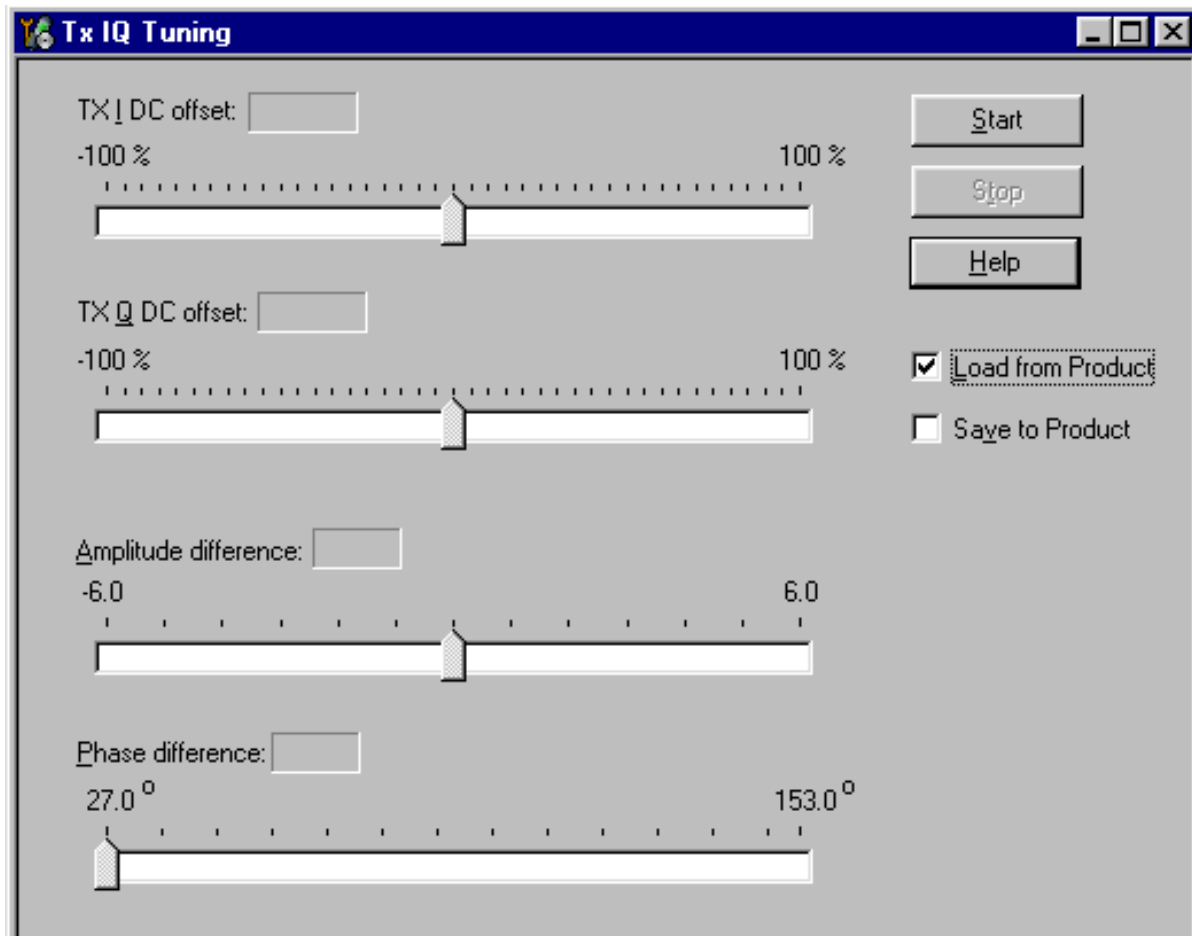
**Remember to take jig and cable attenuations into account!**

- Select Maintenance => Tuning => Tx\_IQTuning



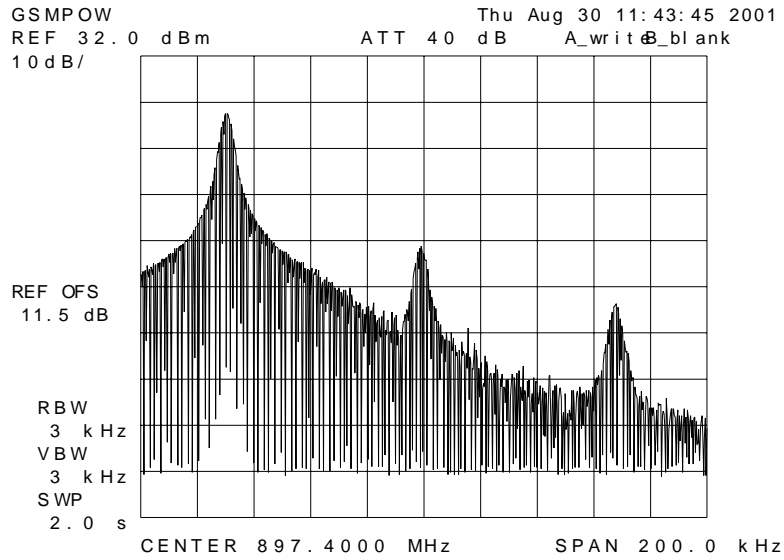
- Select "Load from product" => Start

- The tuning is done by setting each of the sliders to desired value. The sliders can be changed only when the tuning is ongoing.
- The order of tuning should be same as the order of the sliders e.g. the Tx I DC Offset is tuned first and Phase difference is tuned last.
- Use <=, =>, PgUp or PgDn keys



- Set spectrum analyzer center frequency to 897.4 MHz, span 200kHz, RBW and VWB 3kHz and sweeptime to 2 seconds
- Tune LO leak to minimum with TXI/TXQ DC offset control (**f0 on spectrum analyzer screen**)

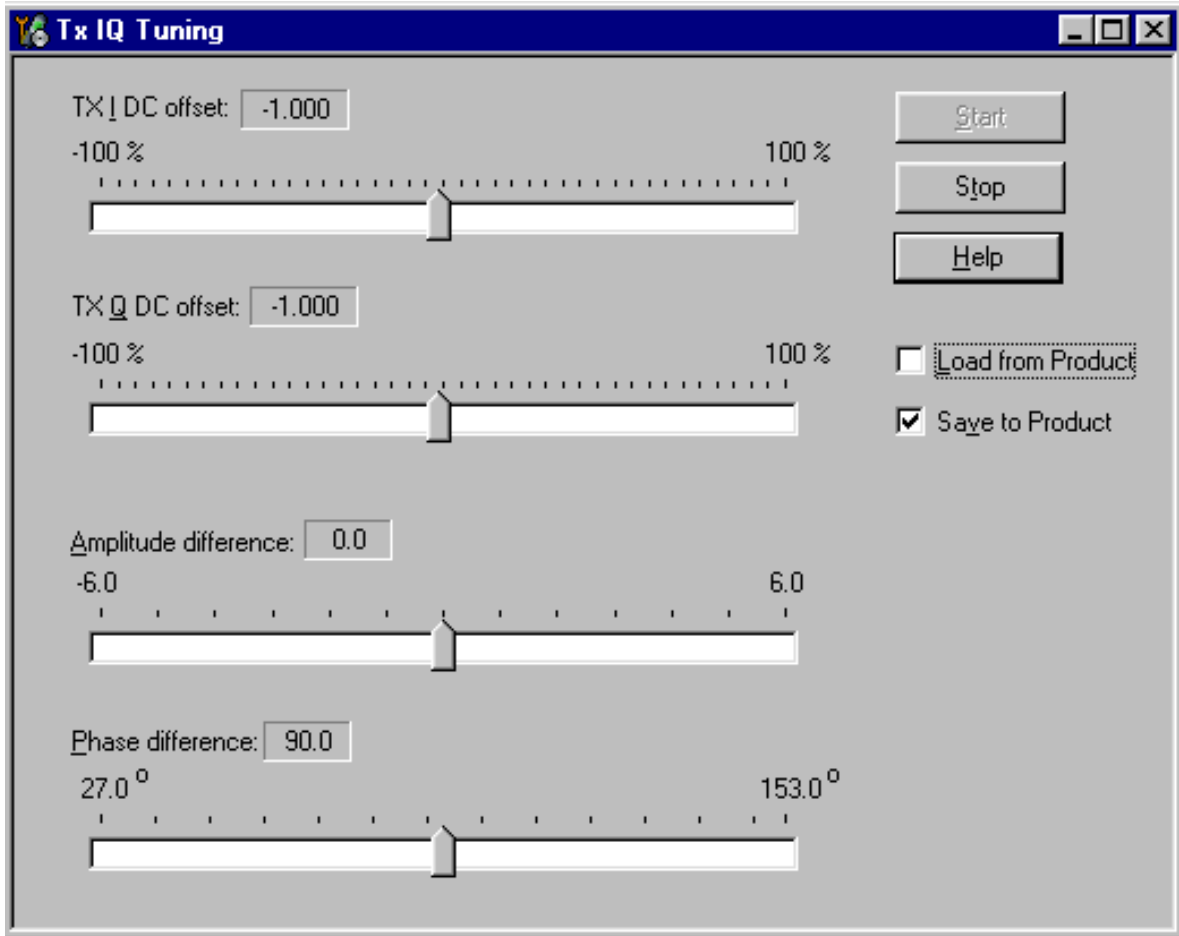
- Tune wrong sideband to minimum using Amplitude/Phase difference controls (**f0+68kHz on spectrum analyzer screen**)



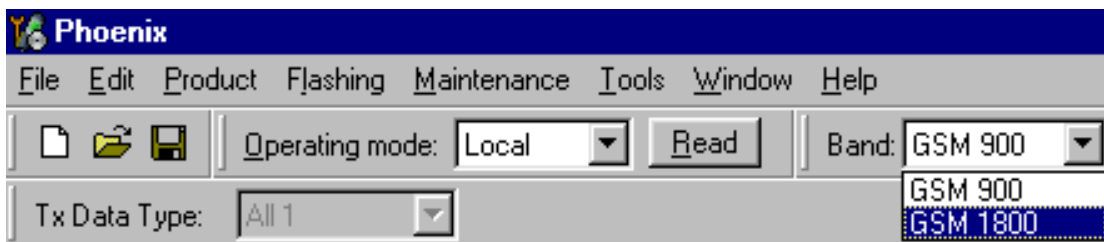
**Typical TX Iq Tuning Values and tuning limits GSM 900:**

Q DC Offset	-2.5...+0.5	-6...+6
I DC Offset	-2.5...+0.5	-6...+6
Amplitude difference	-0.2...+0.2	-1...+1
Phase difference	88.0°...92.0°	80°...100°

- If values shown are within limits, check the "Save to product" tick box and choose "Stop" save the new values to the product



- **Continue tuning from GSM1800.** Choose the correct band from the drop-down menu.



- Repeat the same steps as for the EGSM900 band
- Set spectrum analyzer center frequency to 1747.8 MHz, span 200kHz, RBW and VWB 3kHz and sweptime to 2 seconds

**Typical TX IQ Tuning Values and tuning limits GSM1800:**

I DC Offset	-3.0...0.0	-6...+6
Q DC Offset	-1.5...+1.0	-6...+6
Amplitude difference	-0.5...+0.0	-1...+1
Phase difference	90.0°...97.0°	80°...100°

- If values shown are within limits, check the "Save to product" tick box and choose "Stop" save the new values to the product
- Close the "TX I/Q Tuning" – dialog to end tuning.

## TX Power Level Tuning

Power Meter (or Spectrum analyzer) needed

With Tx Power Level Tuning, the coefficients are adjusted for each power level

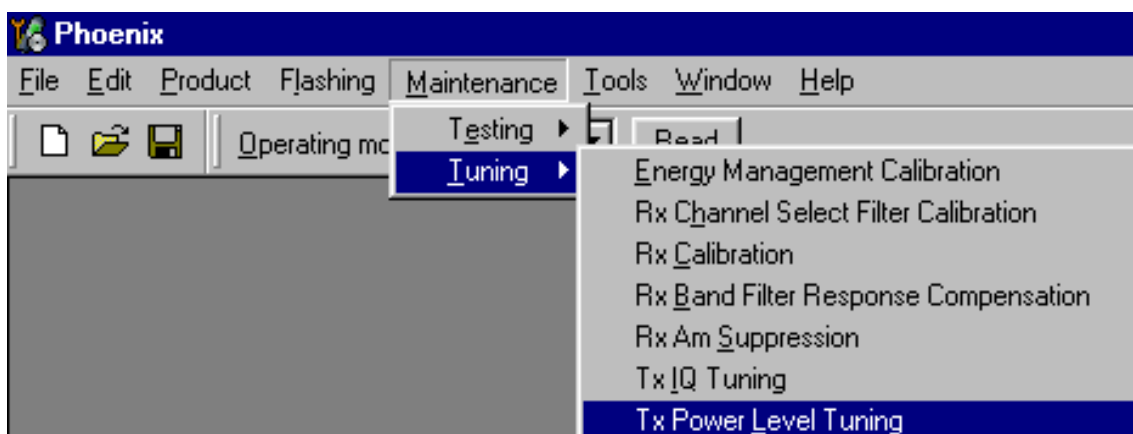
Must be done separately on both bands!

Start Power Level tuning at EGSM (GSM900), then continue at GSM1800 band.

In EGSM900 band The power level tuning is made for both high and low PA Modes

In GSM1800 band only for high PA mode.

- Maintenance => Tuning => Tx power level tuning
- Remember to take jig and cable attenuations into account!



- Select "Start" => "Load from: Permanent memory" => "OK "

- Note that TX PA mode is “High” at this point.

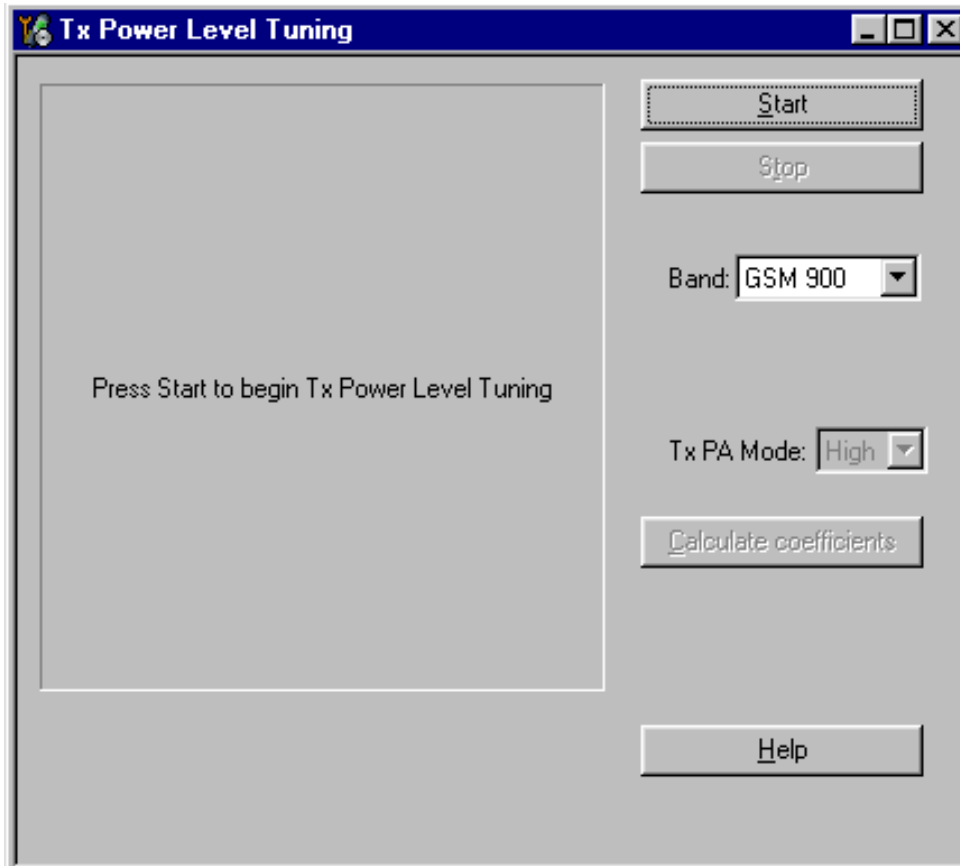
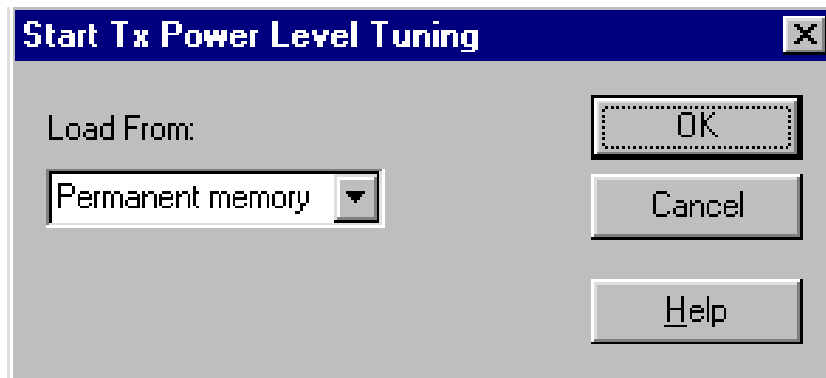
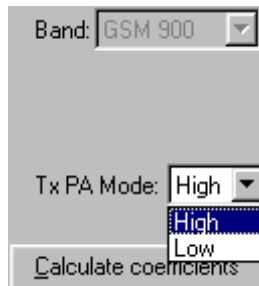


Figure 1:



- The coefficient table lists the power level, coefficient, target dBm and DAC value for each power level.
- The tuned power level can be chosen by using up and down arrows or mouse.
- The current power level is shown with inverse colors.
- The tuning value can be adjusted with “-“and “+” keys
- **Tune base level and power levels 19,15 and 5 to target level**
- Press "calculate coefficients"

- **Change TXPA mode to “low”** from the drop down menu. When the PA mode is changed, the previous values are saved in memory and the ones for new mode are shown .

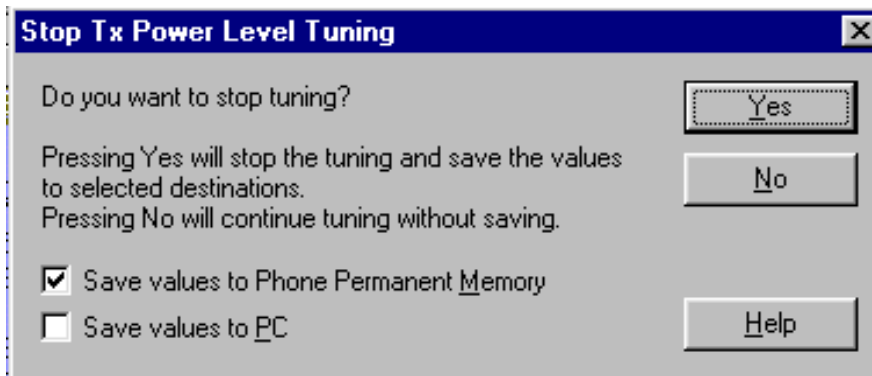


- **Tune power levels 19, 15 and 7** (Levels 5 & 6 are not used, base level tuning not needed)
- Press "Calculate coefficients"

**Typical values: EGSM900**

Power level	PA high mode	PA low mode
5	0.650...0.710	-
7	-	0.500...0.540
15	0.190...0.210	0.190...0.210
19	0.160...0.170	0.160...0.170
Base	0.140...0.150	0.140...0.150

- If values shown are within limits select “Stop” and check “Save values to phone permanent memory”
- Select “Yes” to save values to phone

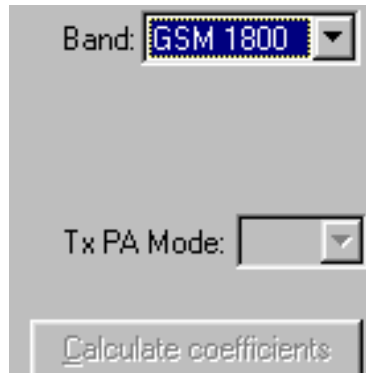




- **Continue tuning from GSM1800.** Choose the correct band from the drop-down menu.



- Repeat the same steps as for the EGSM900 band above
- Note that In GSM1800 band PA mode can not be changed because tuning is only made in “High” mode



Typical values: GSM1800

Power level	PA high mode
0	0.650...0.710
11	-
15	0.190...0.210
Base	0.140...0.150

- If values shown are within limits select “Stop” and check “Save values to phone permanent memory”
- Select “Yes” to save values to phone
- Close the “TX Power Level Tuning” – dialog to end tuning

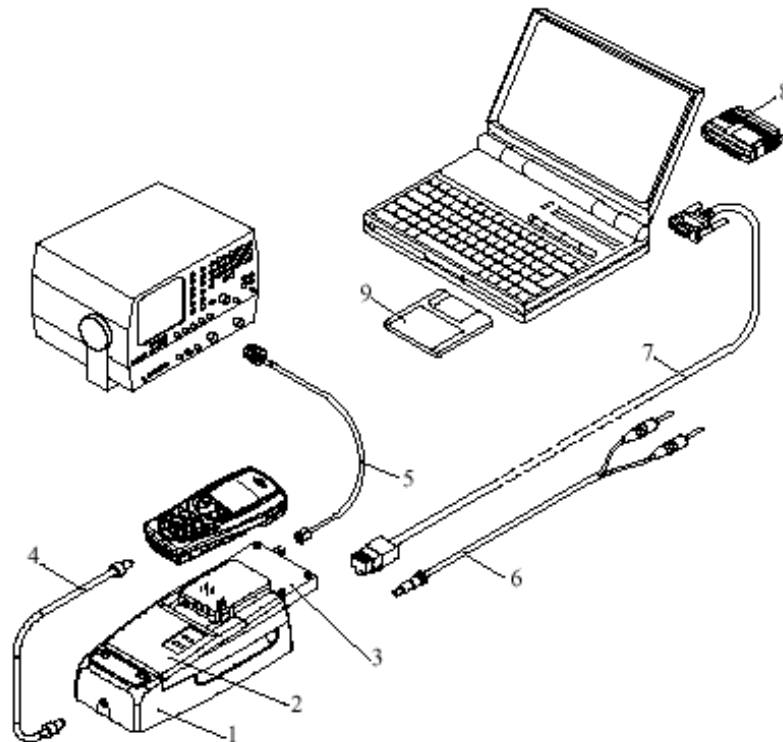
## Service Tool Concept For Baseband Tunings

EM calibrations must be carried out in JBV-1 Docking Station.

CPL-4 coupler can only be used for testing, NOT for tuning!

Power to JBV-1 should be supplied from an external DC power supply, not FPS-8 prommer.

Maximum input voltage is 16 V DC, nominal input for tunings is +12V DC.



Item:	Service accessory:	Product code:
1	JBV-1, Docking station	0770298
2	MJF-6, Docking station adapter	0770317
3	CPL-4, Coupler	0770343
4	SCB-3, DC-DC cable	0730114
5	XRF-1, RF antenna cable	0730085
6	PCS-1, DC power cable	0730012
7	DAU-9S, Service MBUS cable	0730108
8	PKD-1, Software protection key	0750018
9	Phoenix Service SW	8409031
	Phoenix Service SW in CD-ROM	0775311
	NHM-7 Flash SW data	8409167
	NHM-7 Flash SW data in CD-ROM	0775312

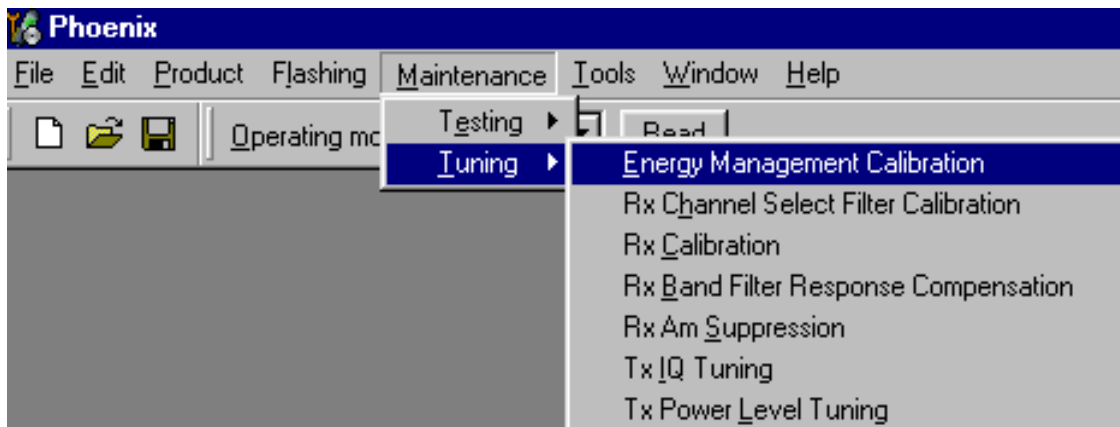
# Baseband Tuning

## Energy Management Tuning

External power supply needed. EM Calibration is used for calibrating Battery and Charger settings of the phone.

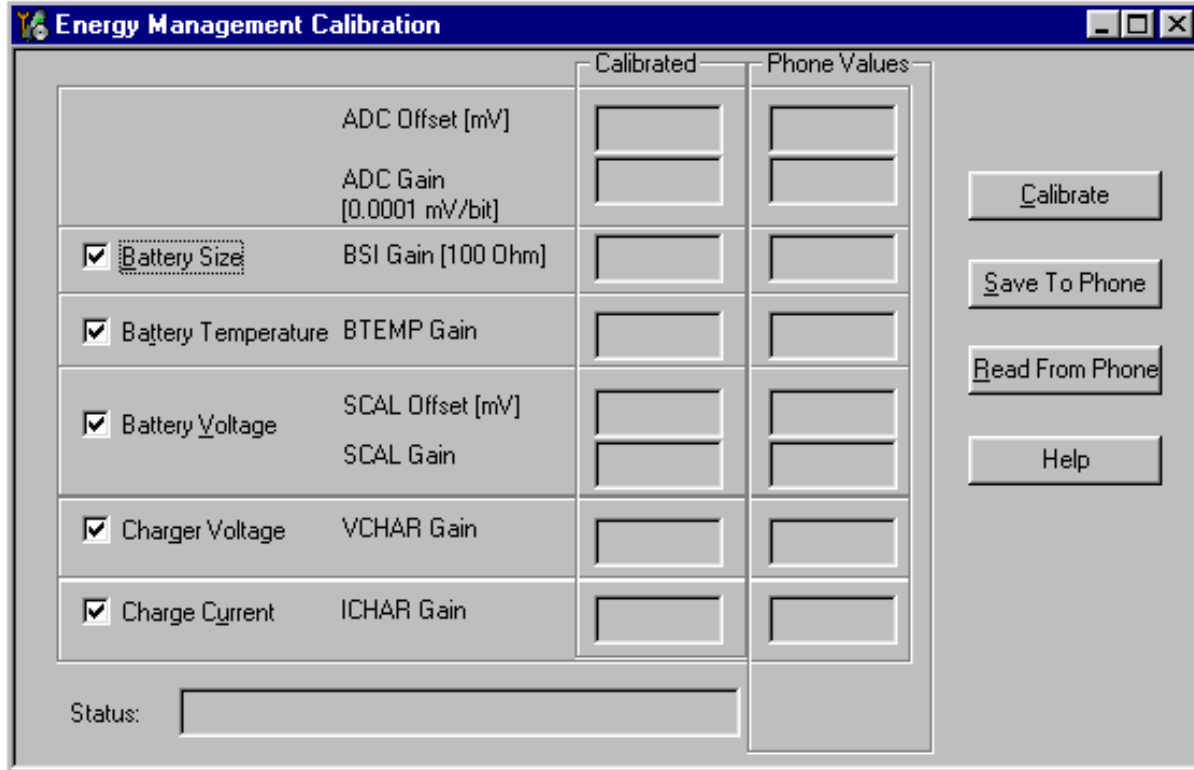
Preparation for EM Calibration:

- Connect DC Cable SCB-3 between JBV-1 and Vin of Phone for Charger calibration.
- Connect 12...15 V from Power Supply to JBV-1.
- NOTE! Check that connection is F-BUS (doesn't work with M-BUS!).
- Select Maintenance => Tuning => Energy Management Calibration



- Energy Management values to be calibrated are checked
- Select "Read from Phone" to show current values in phone memory and to check that the communication with phone works

- Select “Calibrate” to run selected calibrations



Limits for Energy Management Calibration:

If values shown are within limits select “Save To Phone” to save values to

Parameter	Min.	Max
ADC gain	25400	29000
DC offset	-100	100
BSI gain	860	1180
BTEMP gain	1980	2280
VBAT gain	10000	11000
VBAT offset	2300	2700
VCHAR	58500	62000
ICHAR	3850	4650

phone.

**NOTE!** Only values of checked tunings (Battery size, Battery Temperature etc....) will be saved.

Close the “Energy Management Calibration” – dialog to end tuning.

[This page left intentionally blank]

