PAMS Technical Documentation
NPM–9 Series Transceivers

Troubleshooting Instructions

Issue 1 02/2002

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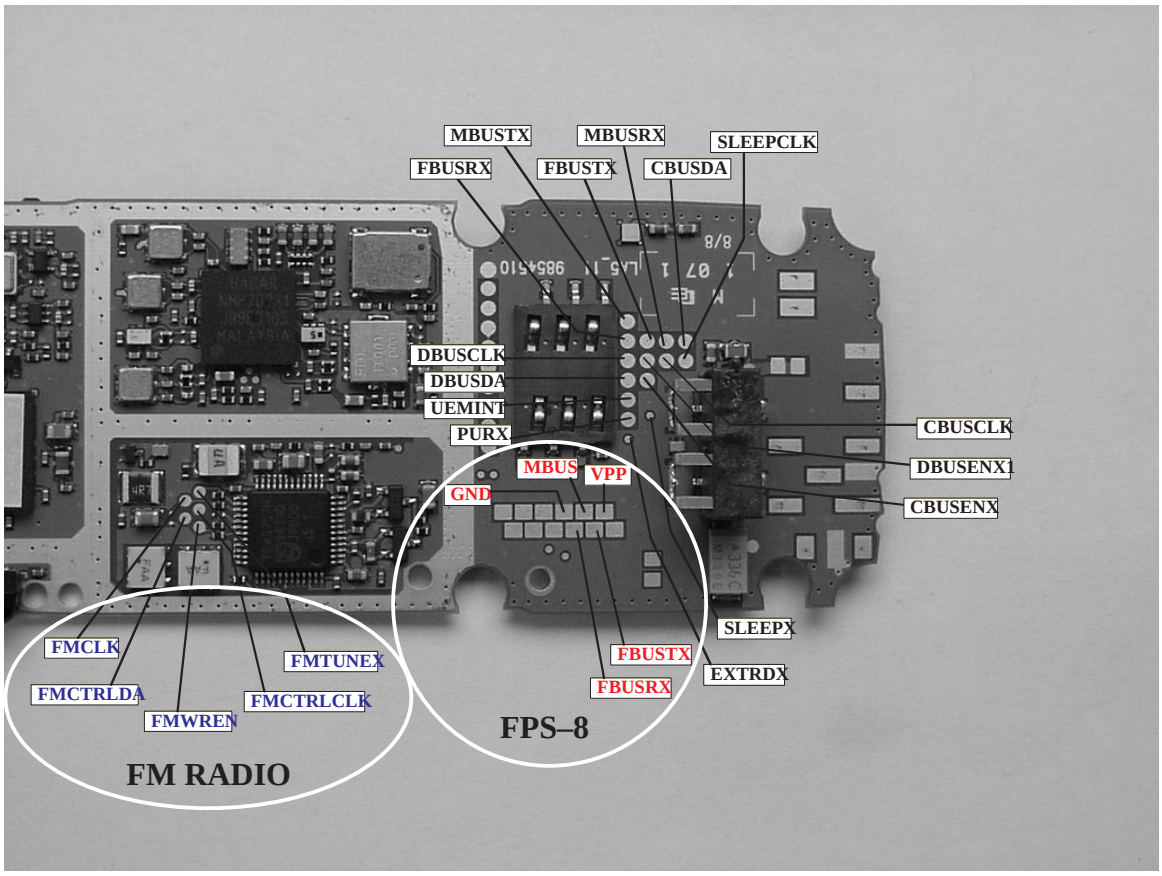
Baseband Troubleshooting

PWB Test Points

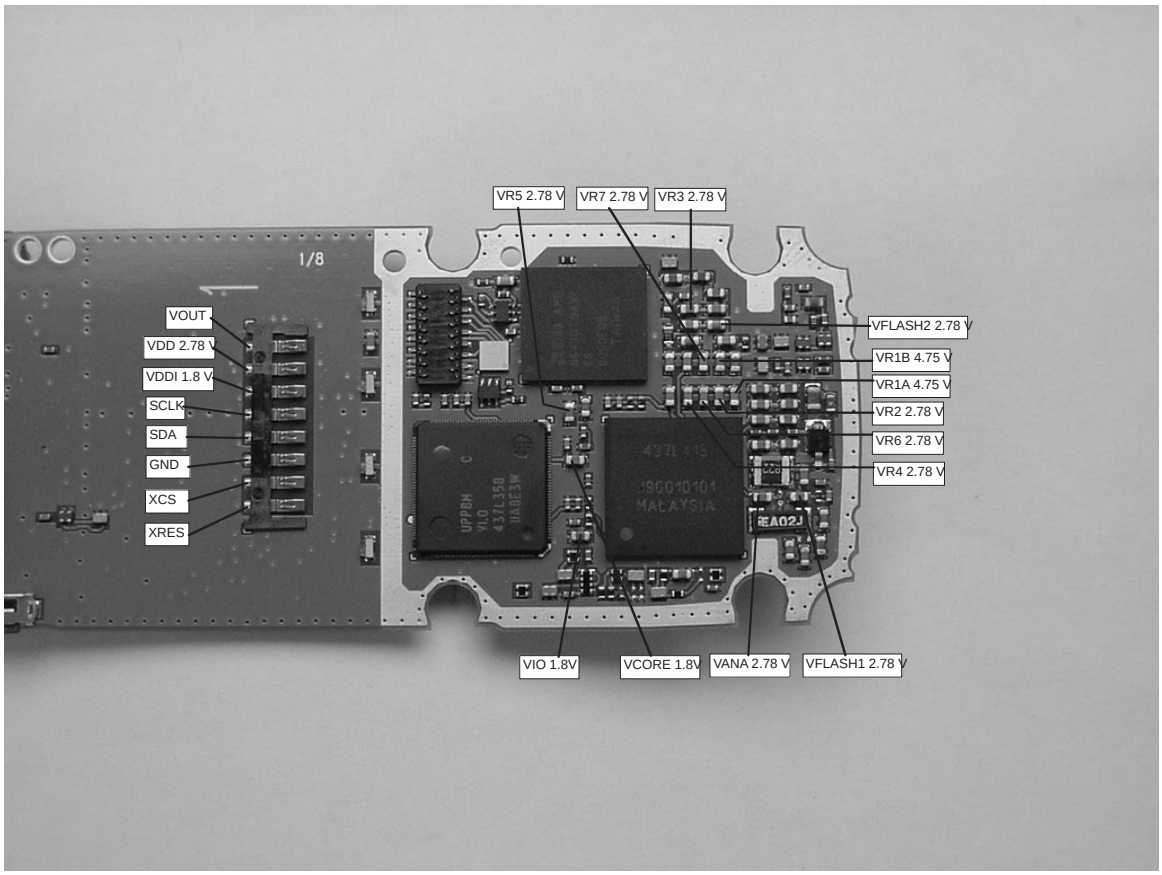


BLACK colored test points are connected to the lines between UEM and UPP where the logic level is 1.8 V.

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

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

Measurement Points



Troubleshooting steps

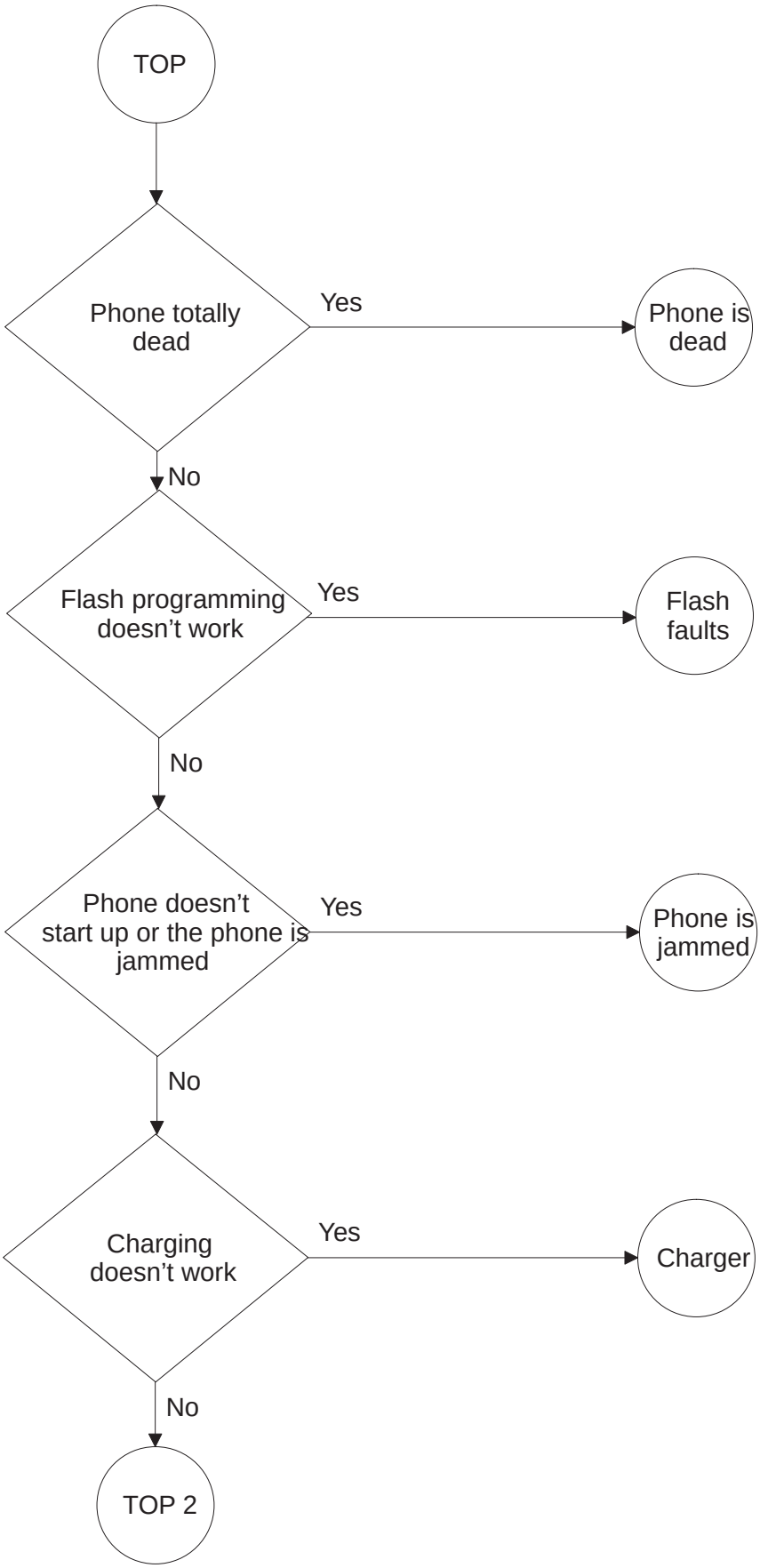
The following hints help to find the problem if the circuitry seems to be faulty. The instructions are divided into following sections:

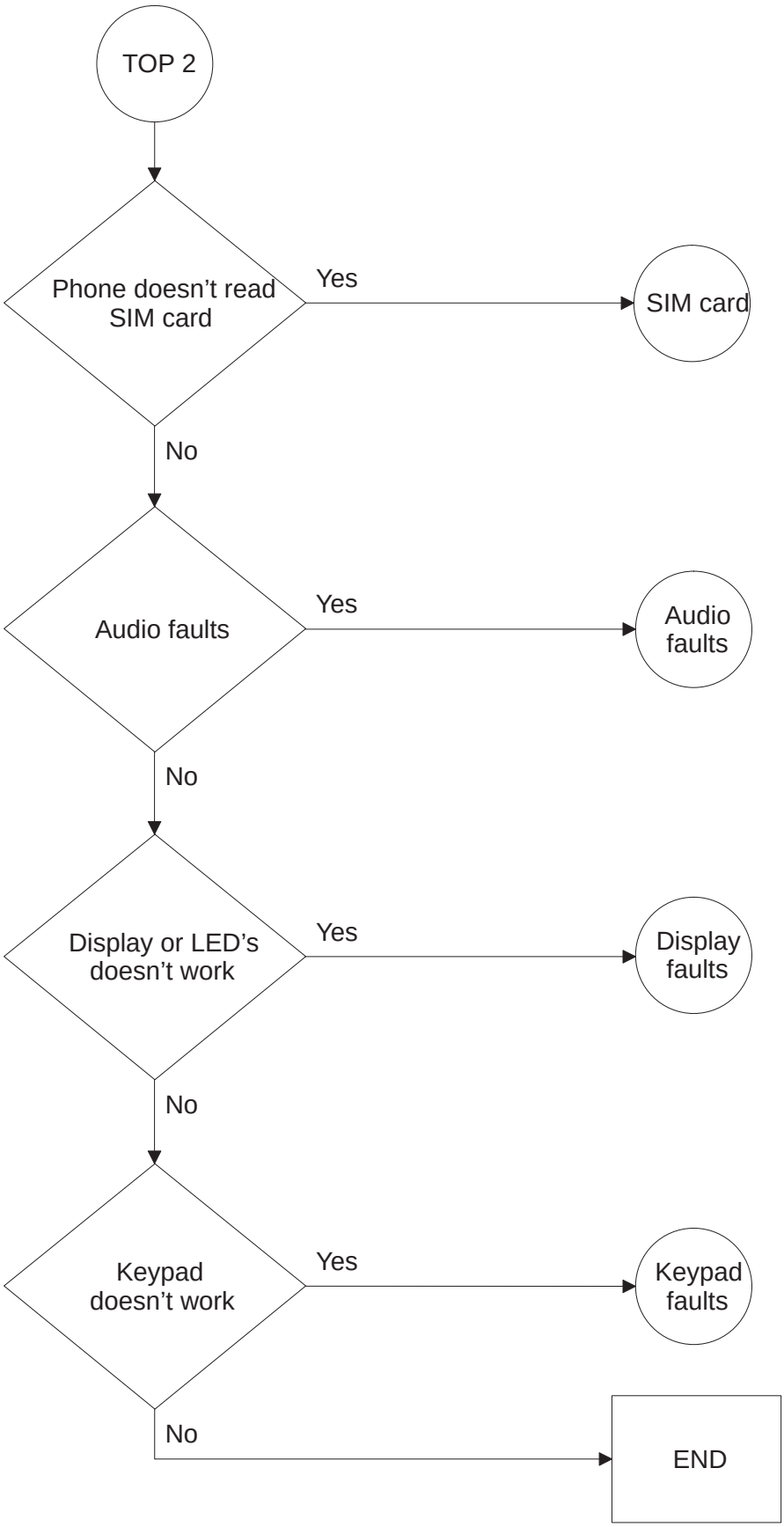
1. Phone is totally dead
2. Flash programming doesn’t work
3. Power doesn‘t stay on or the phone is jammed
4. Charging fault
5. Plug in SIM card is out of order (insert SIM card).
6. Audio fault
7. Display is not working
8. Keypad fault

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

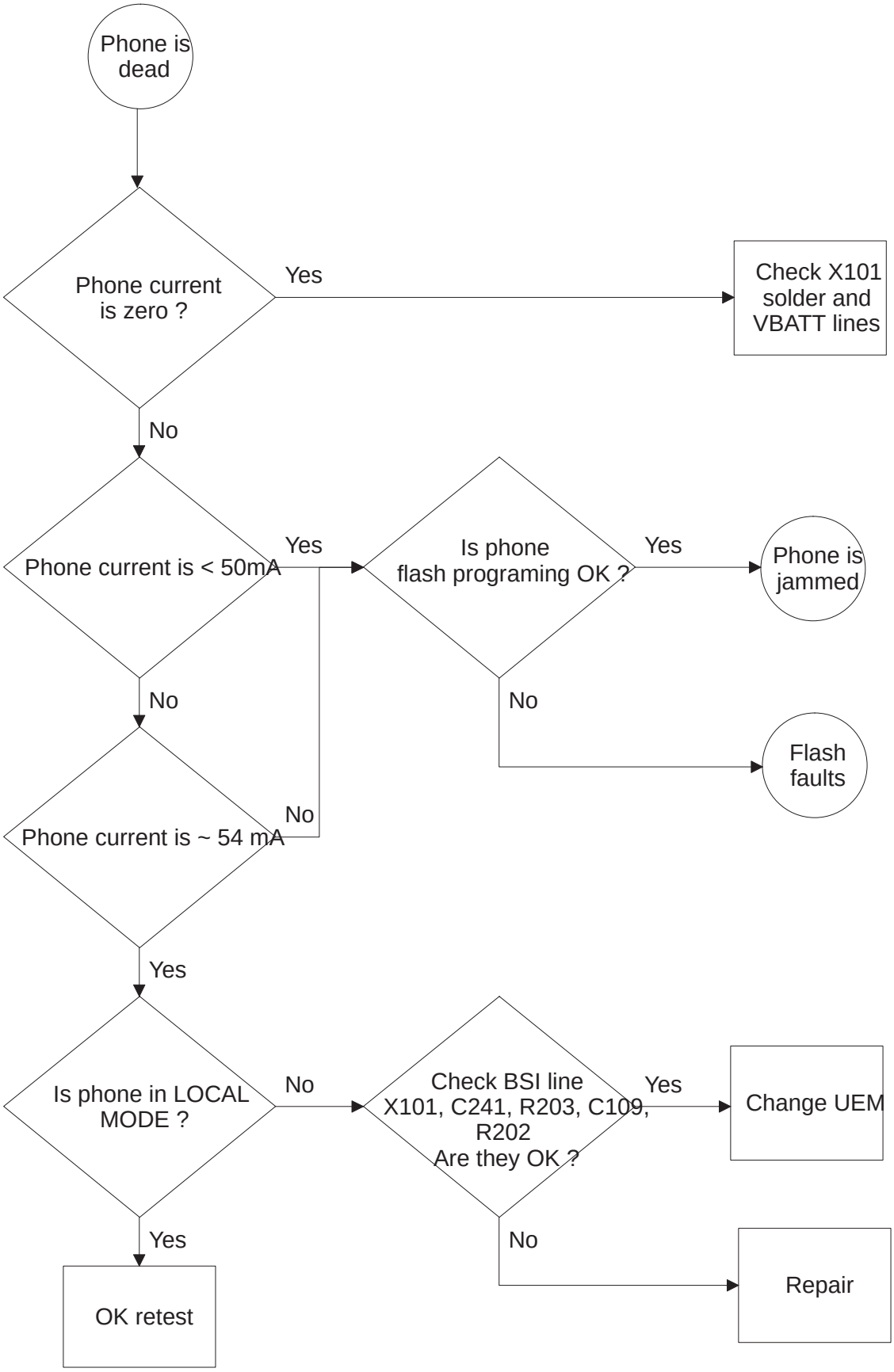
a) there are not any mechanical damages
b) soldered joints are OK

Main troubleshooting tree

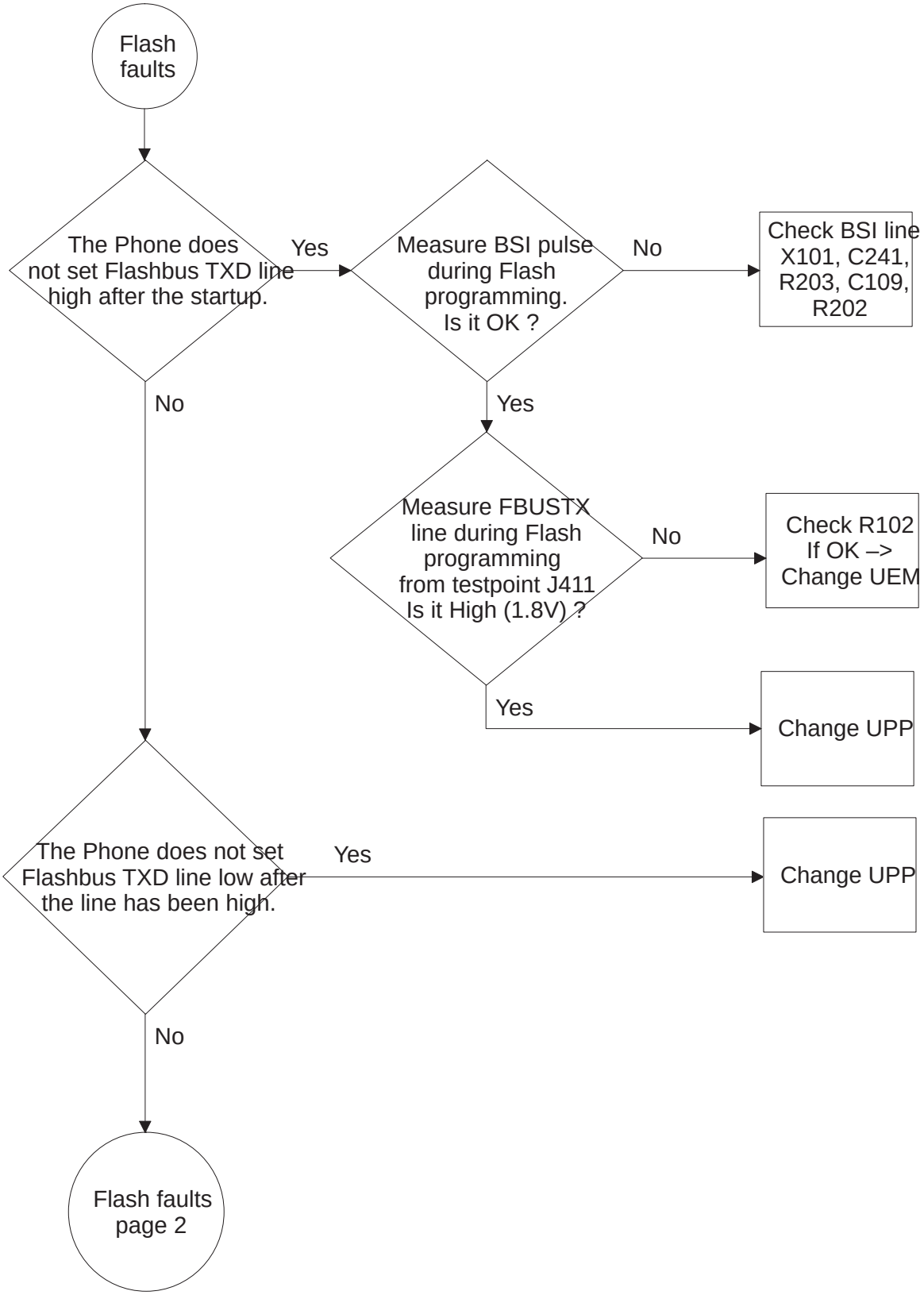


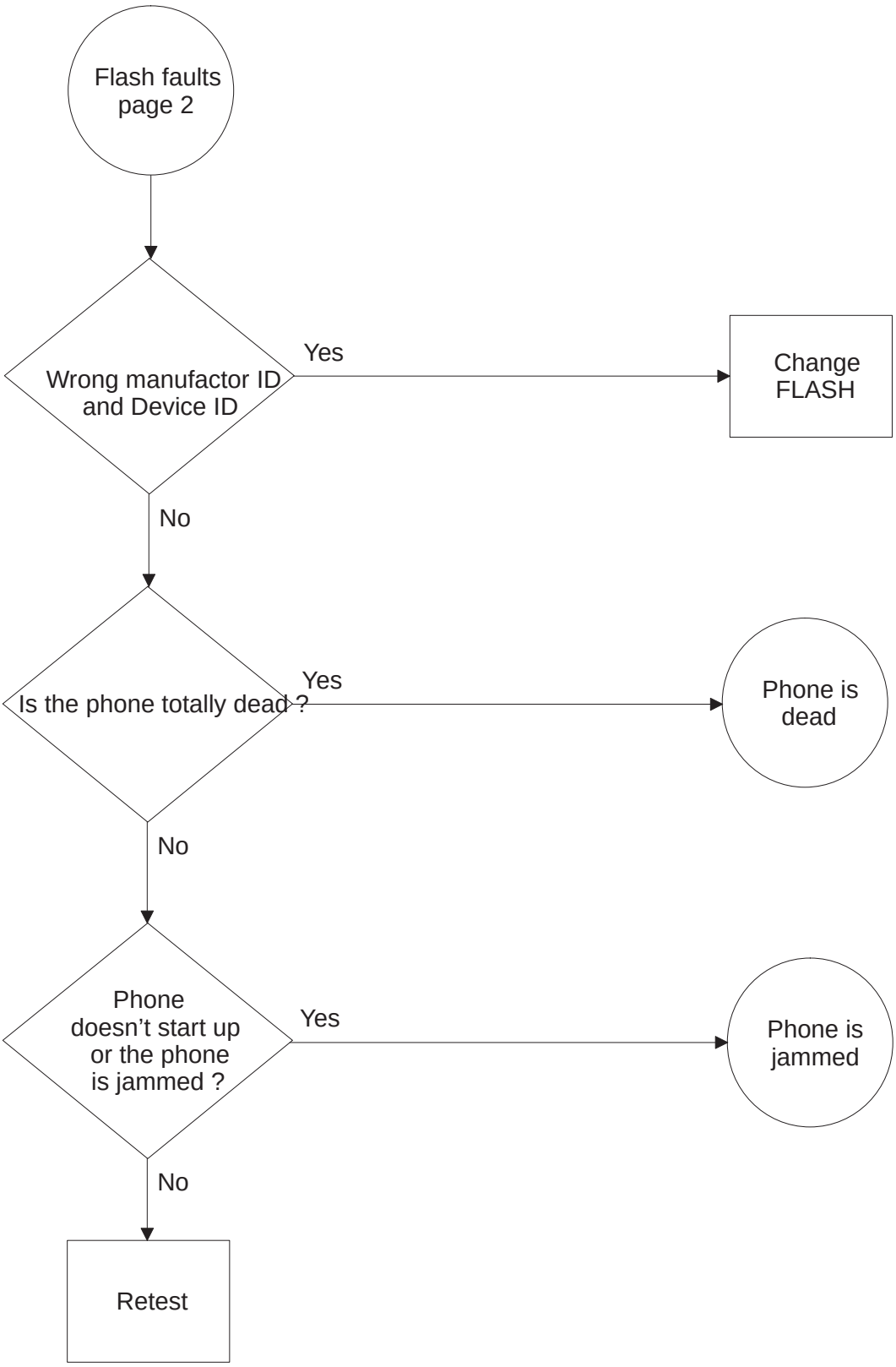


Phone is dead

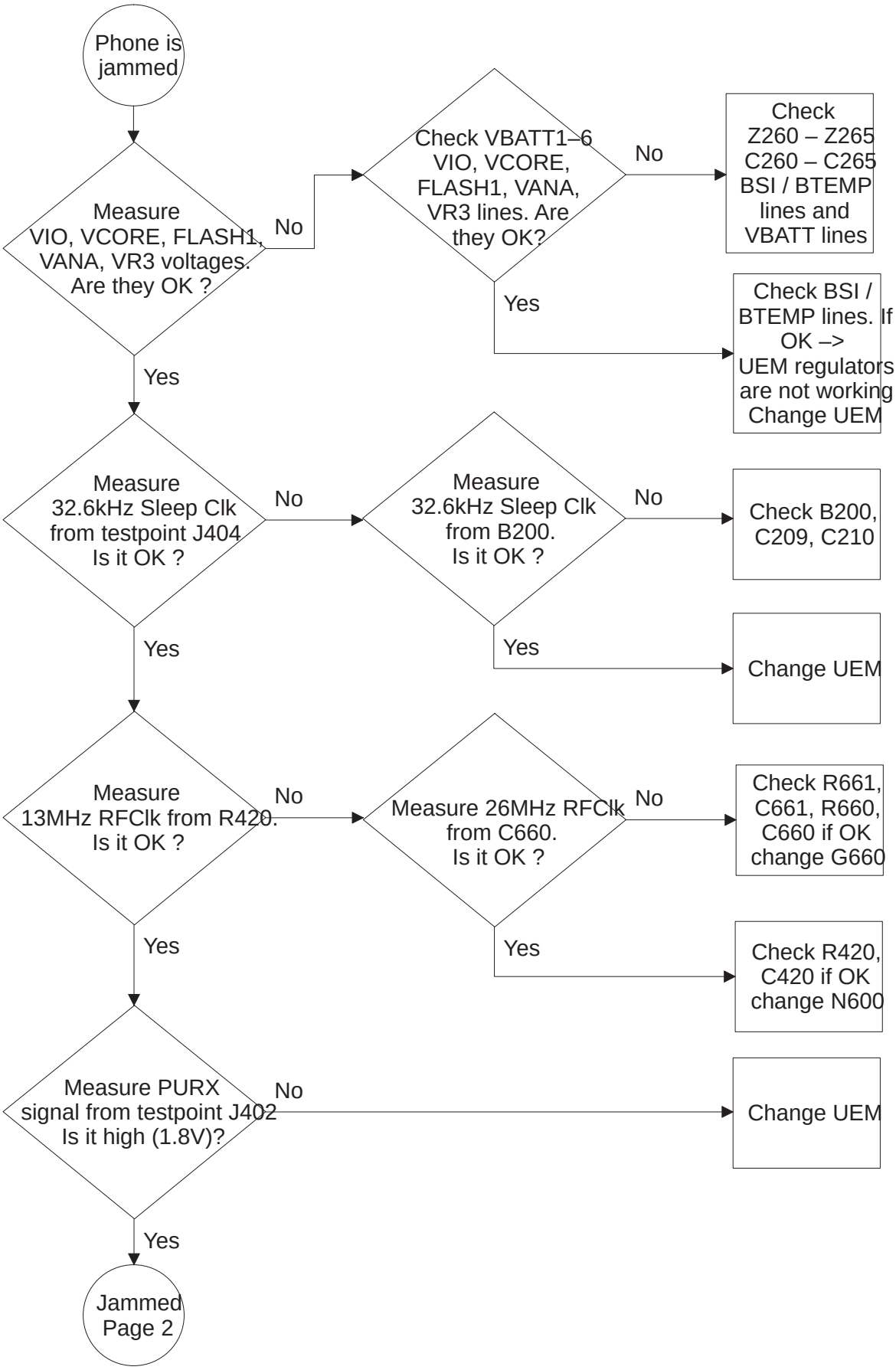


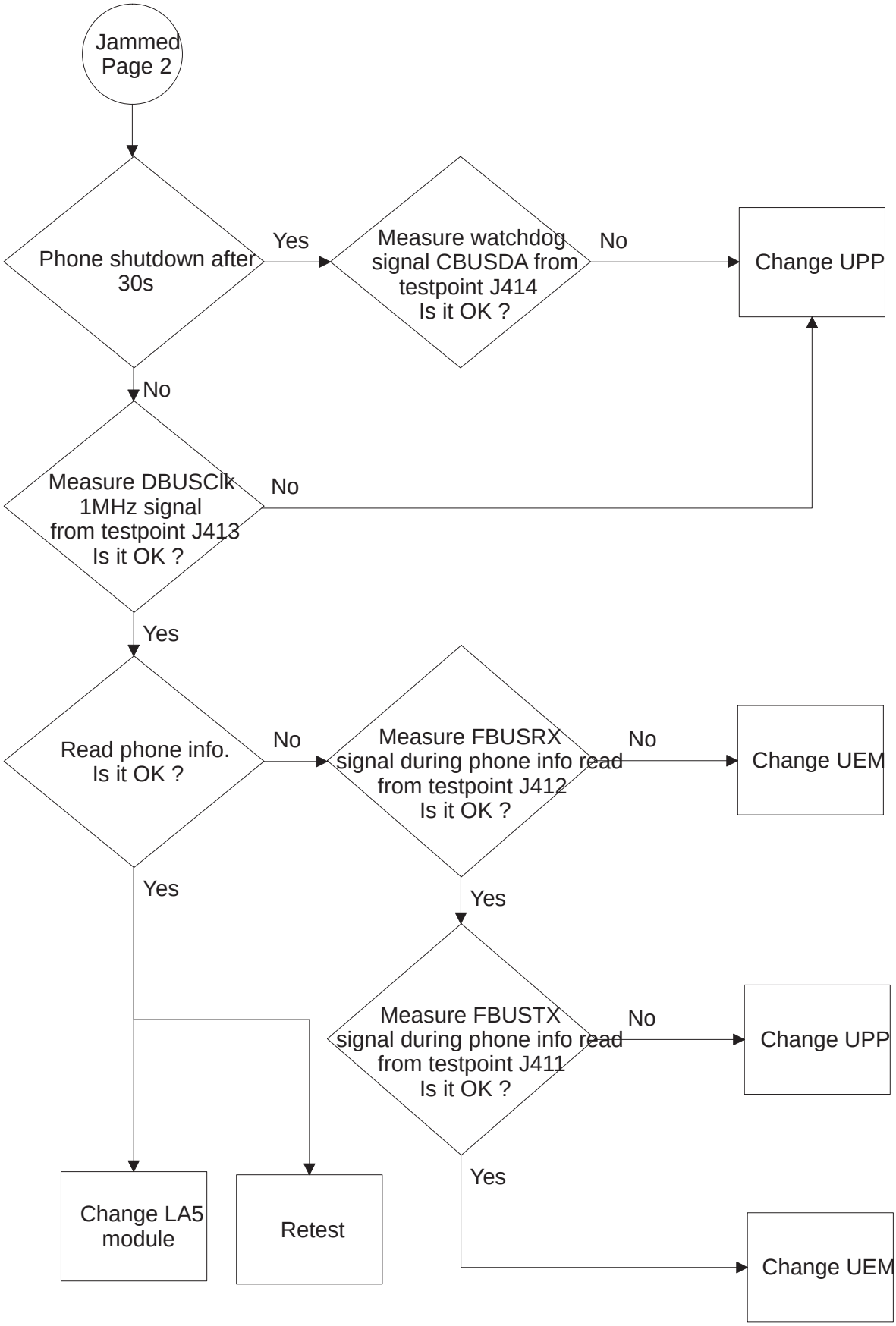
Flash programming doesn’t work



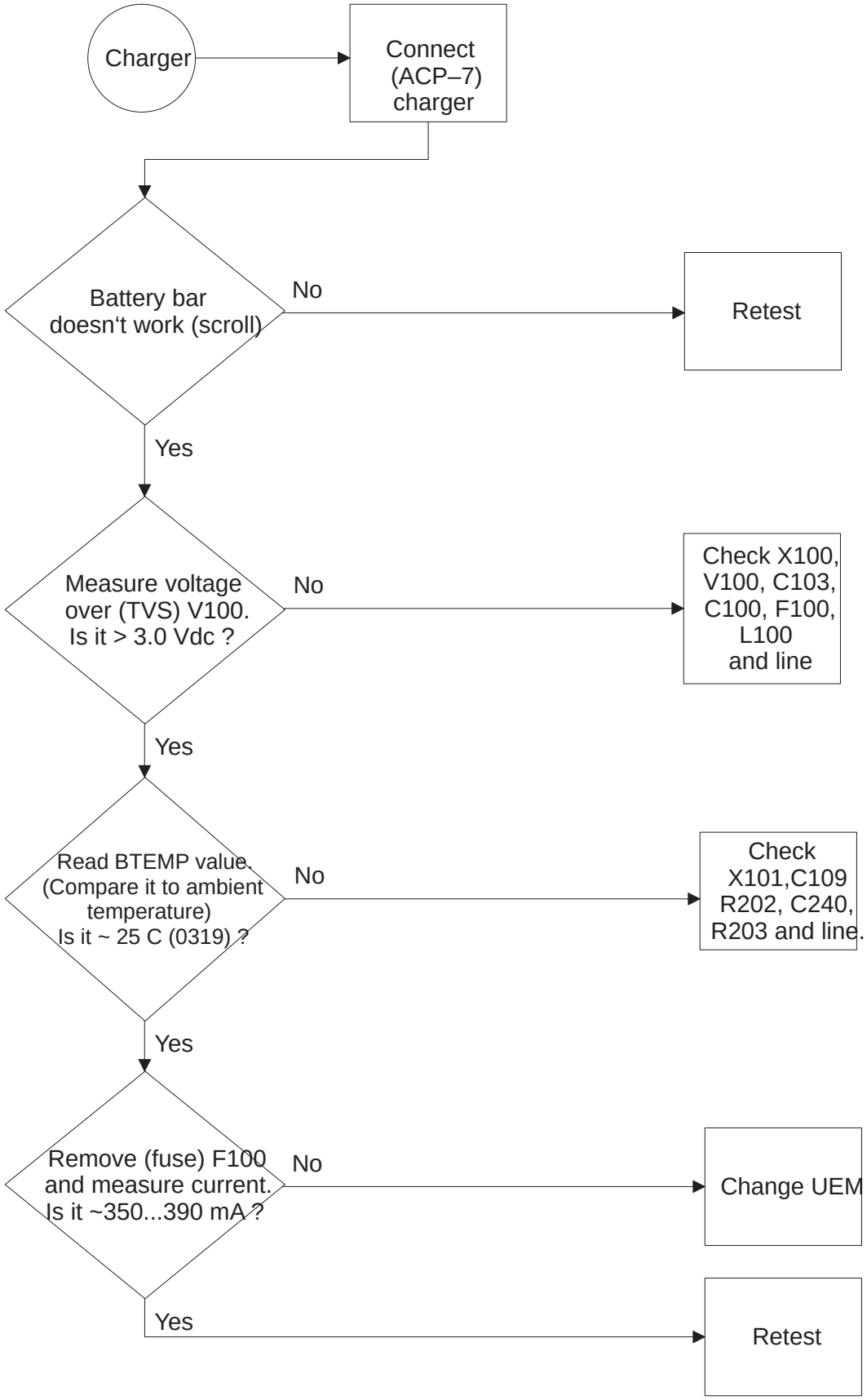


Phone is jammed

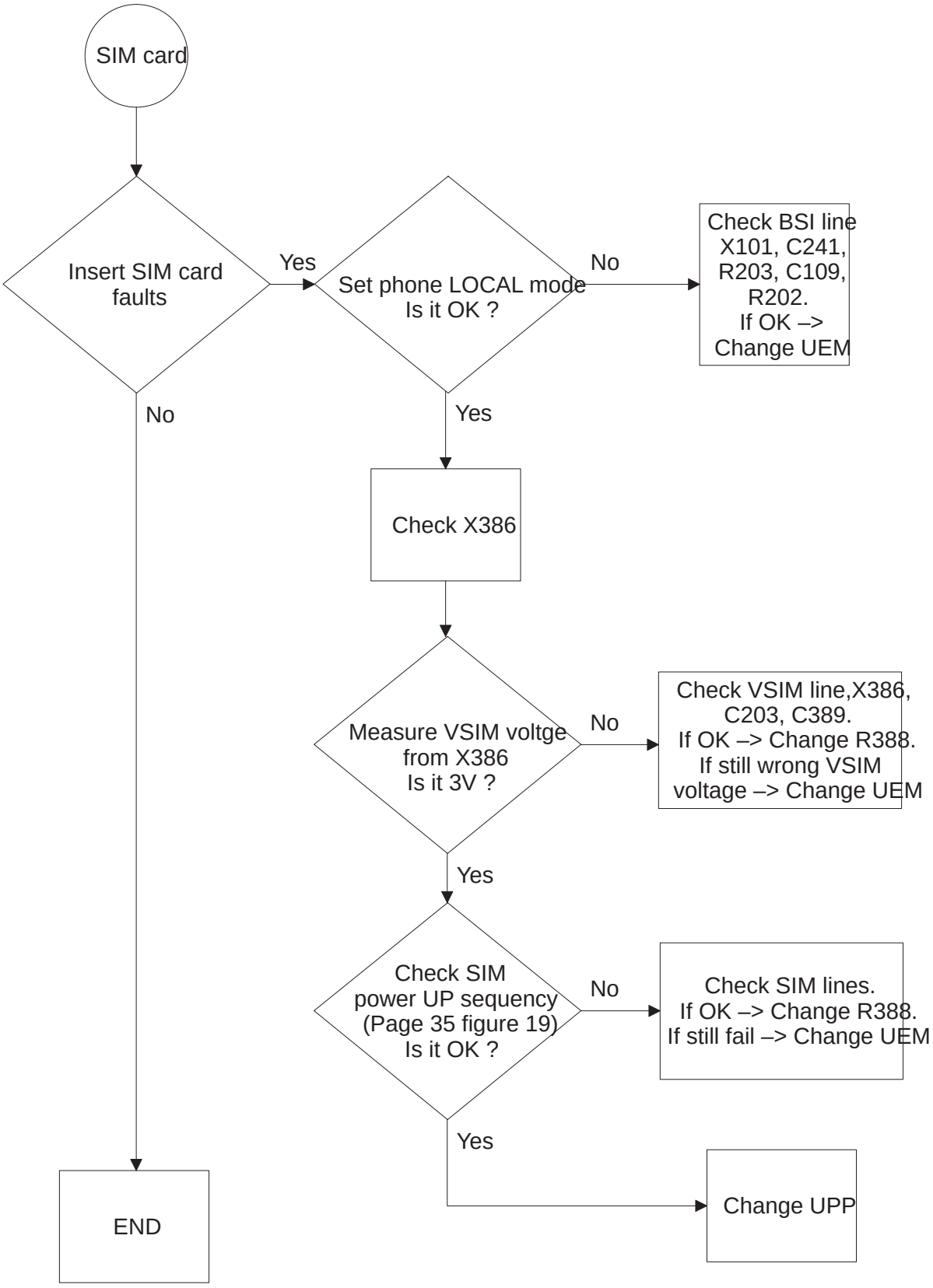




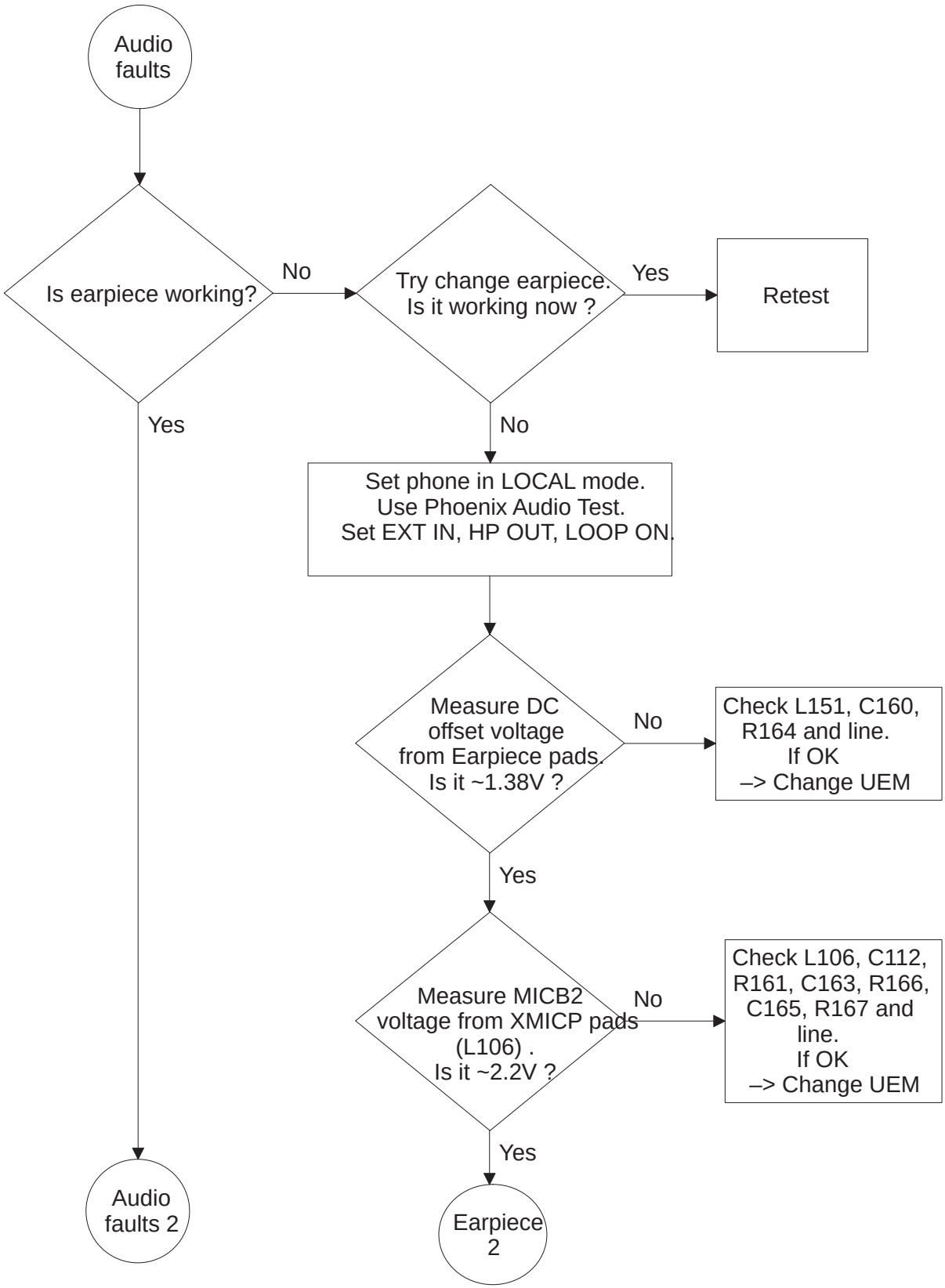
Charging fault

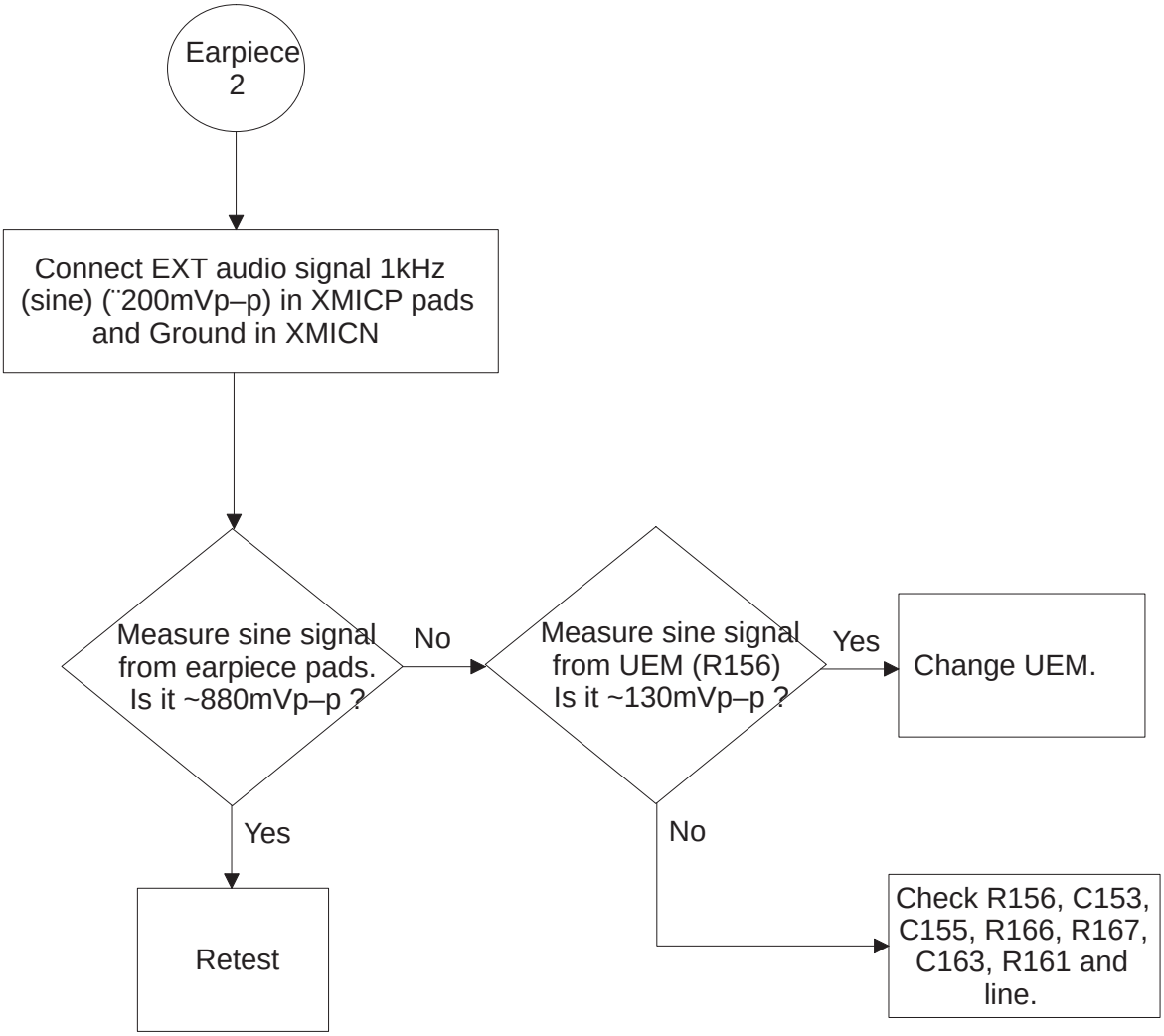


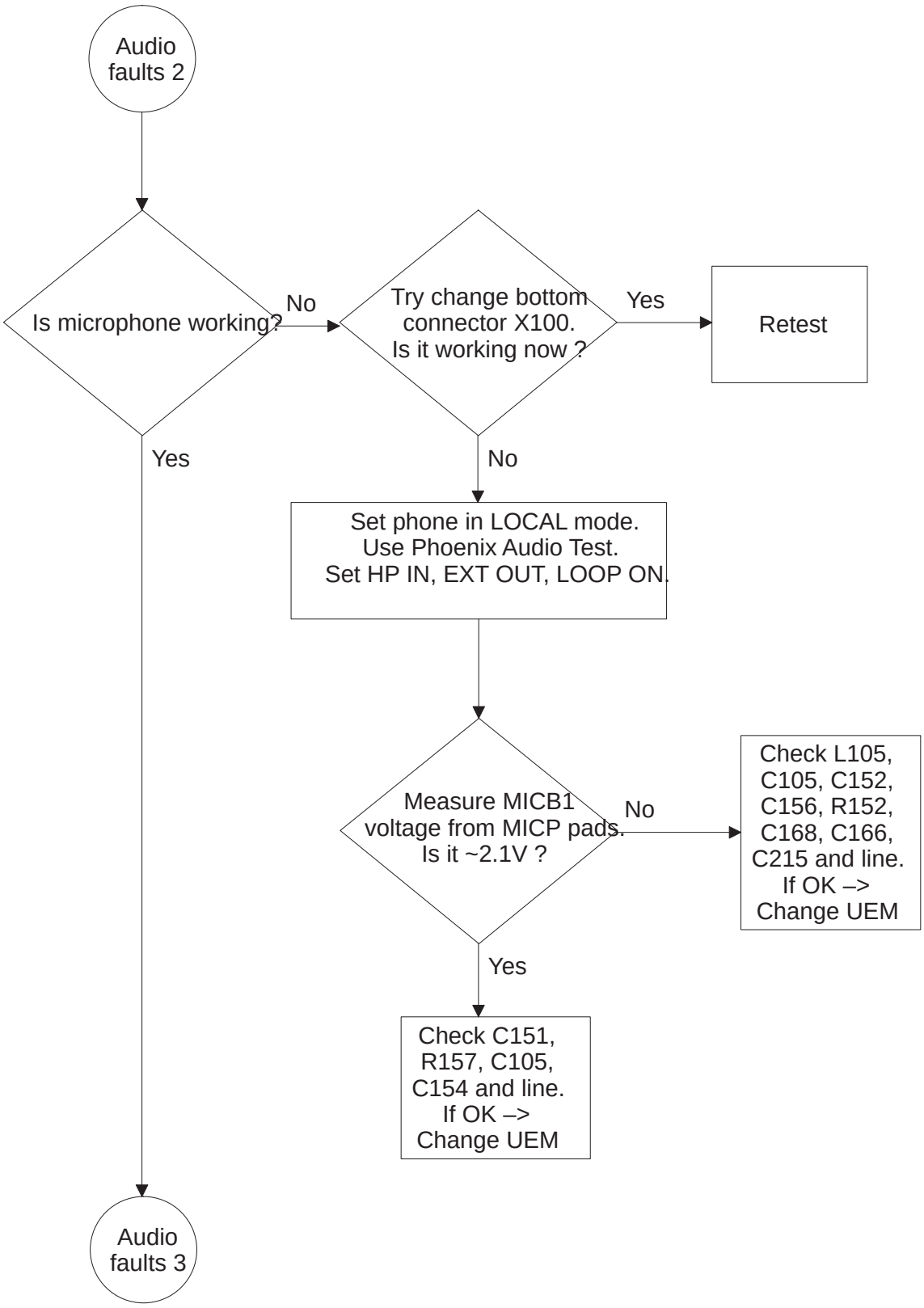
SIM card is out of order (insert SIM card)

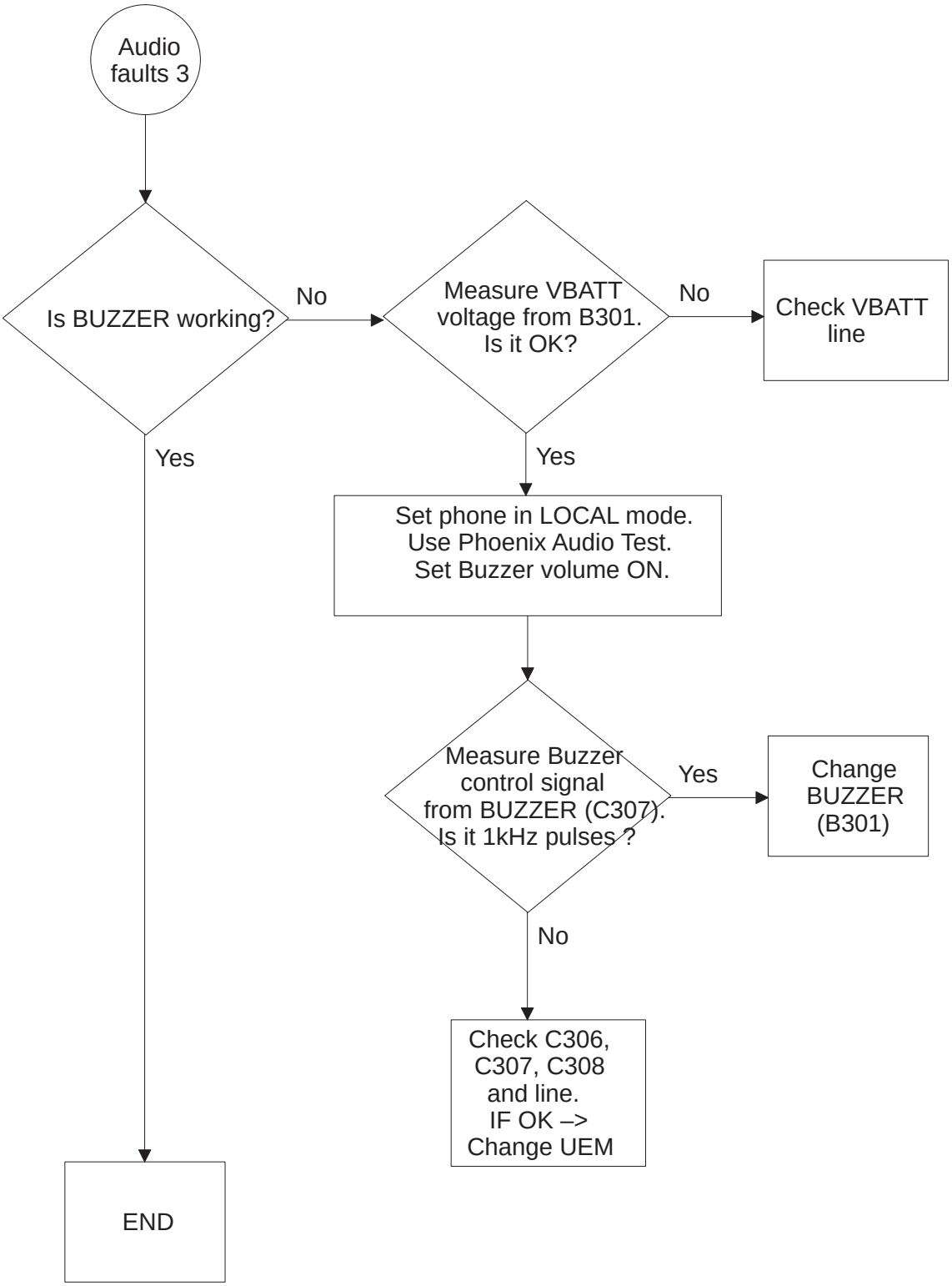


Audio fault

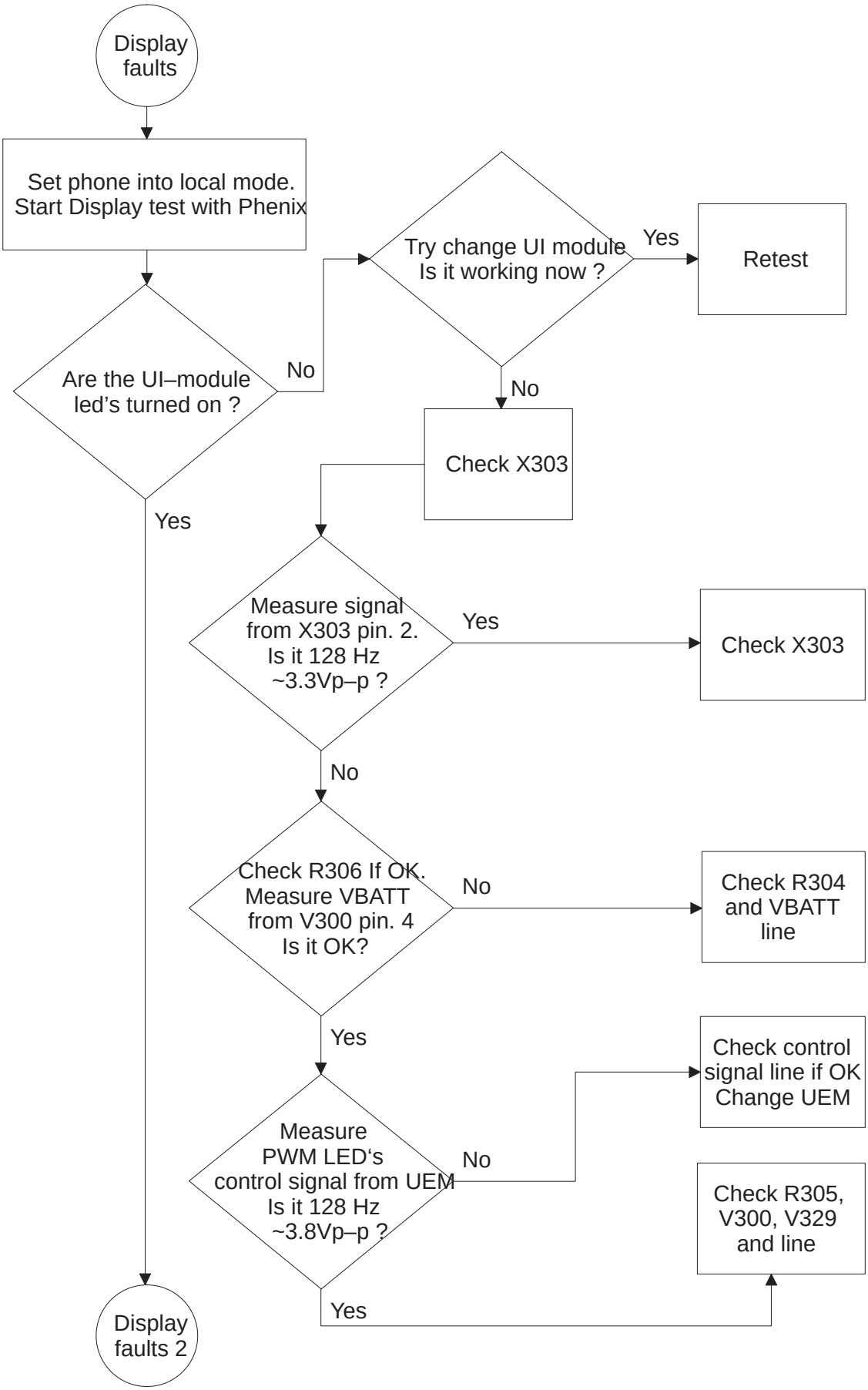


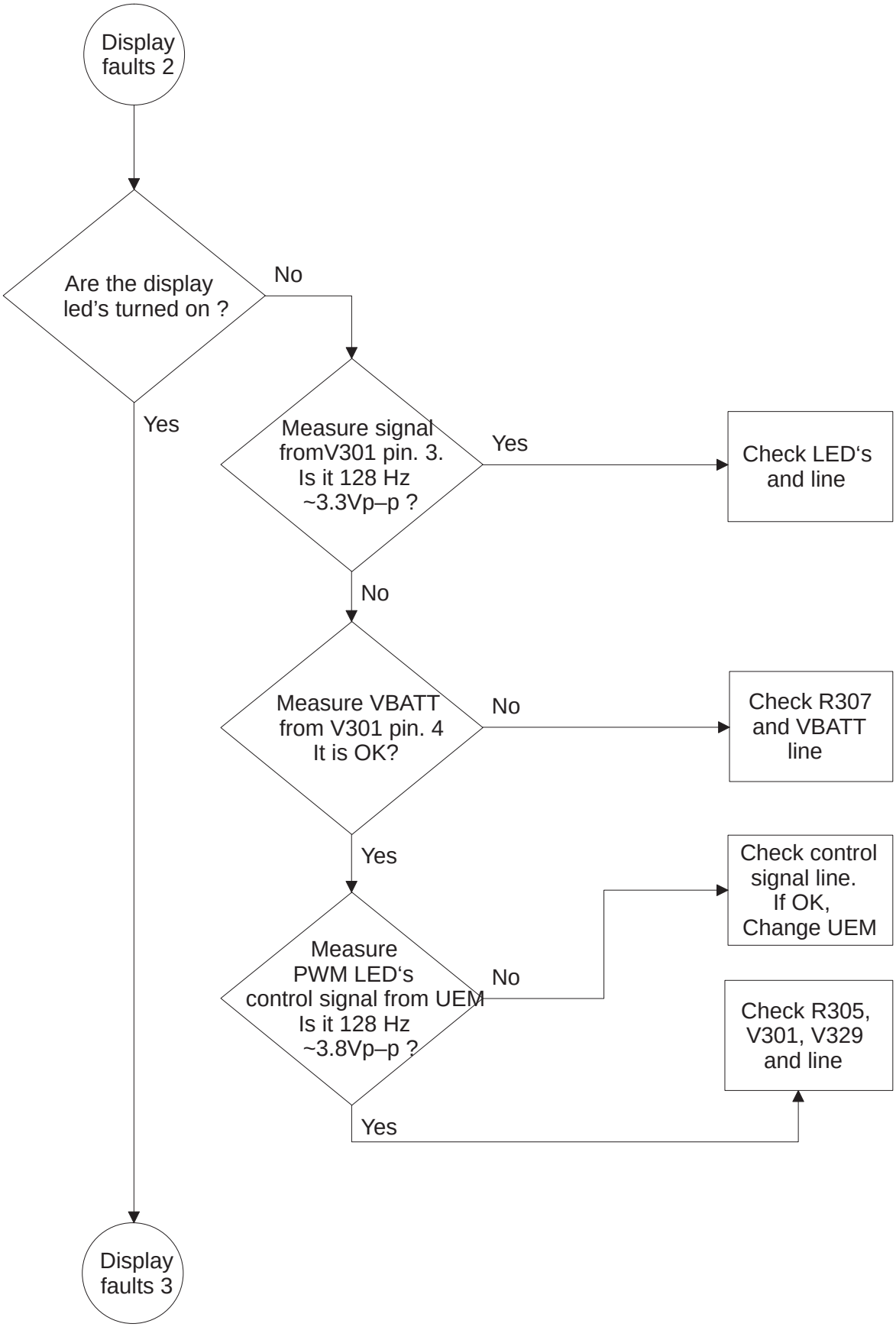


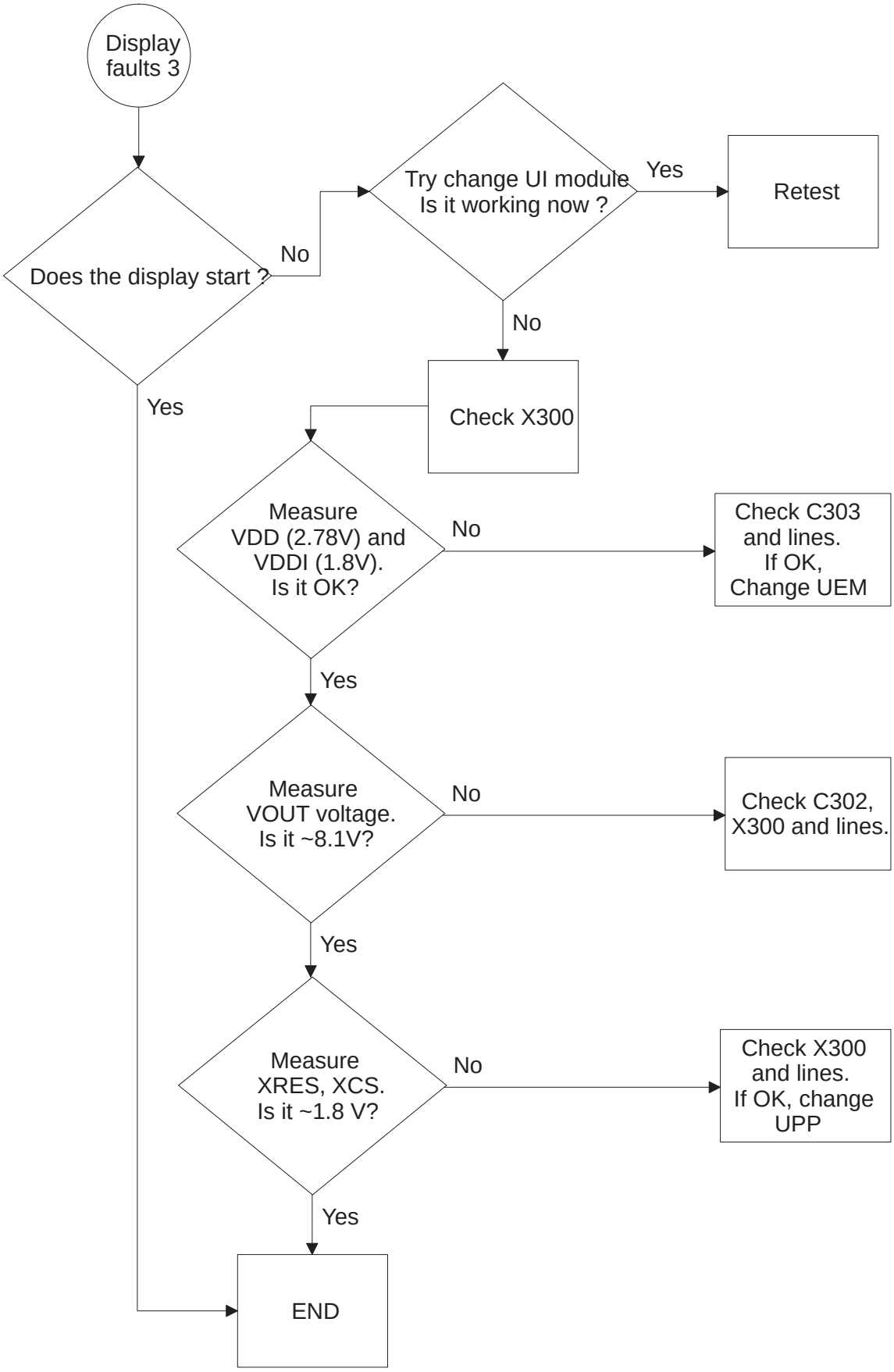




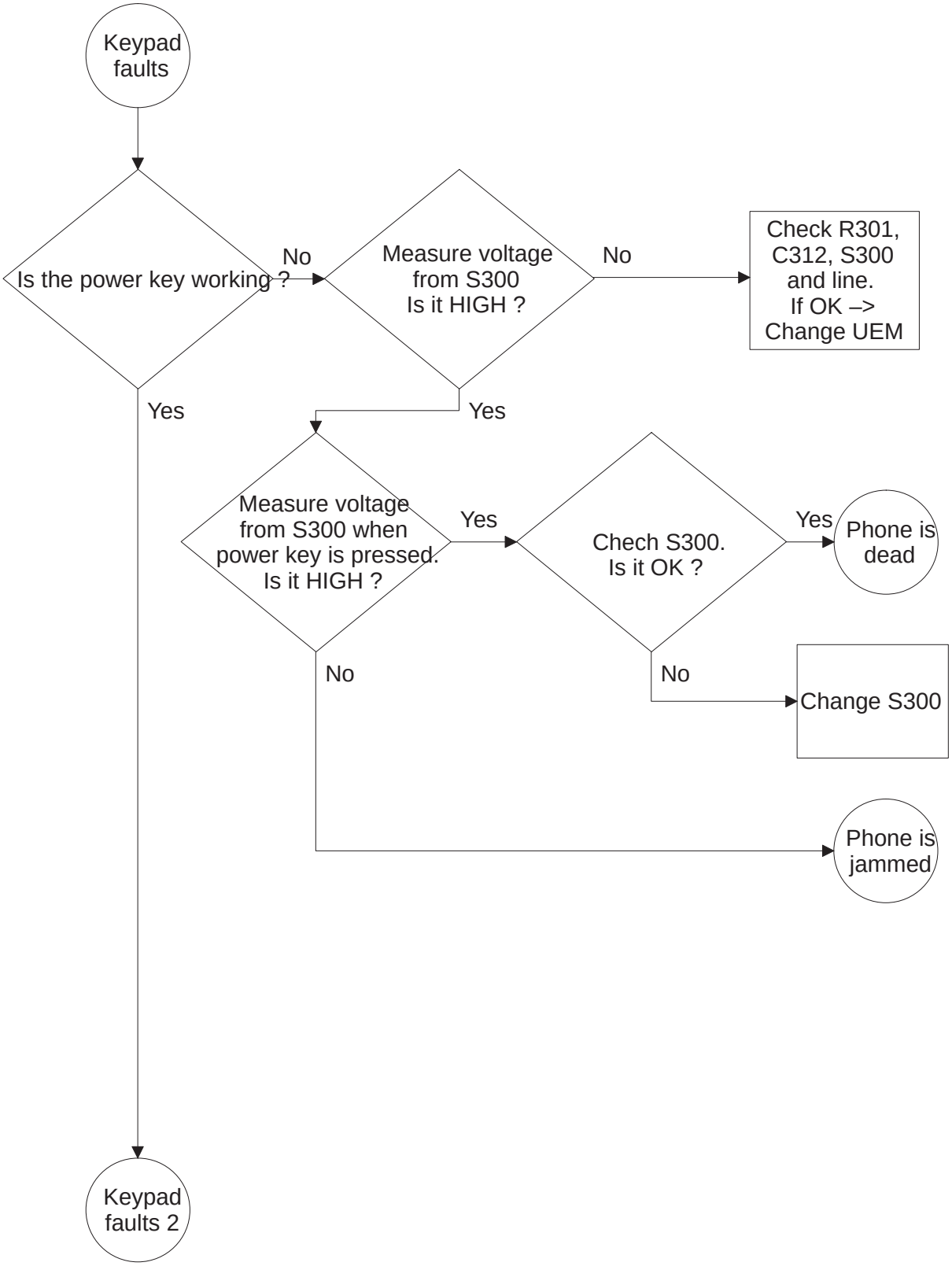
Display fault

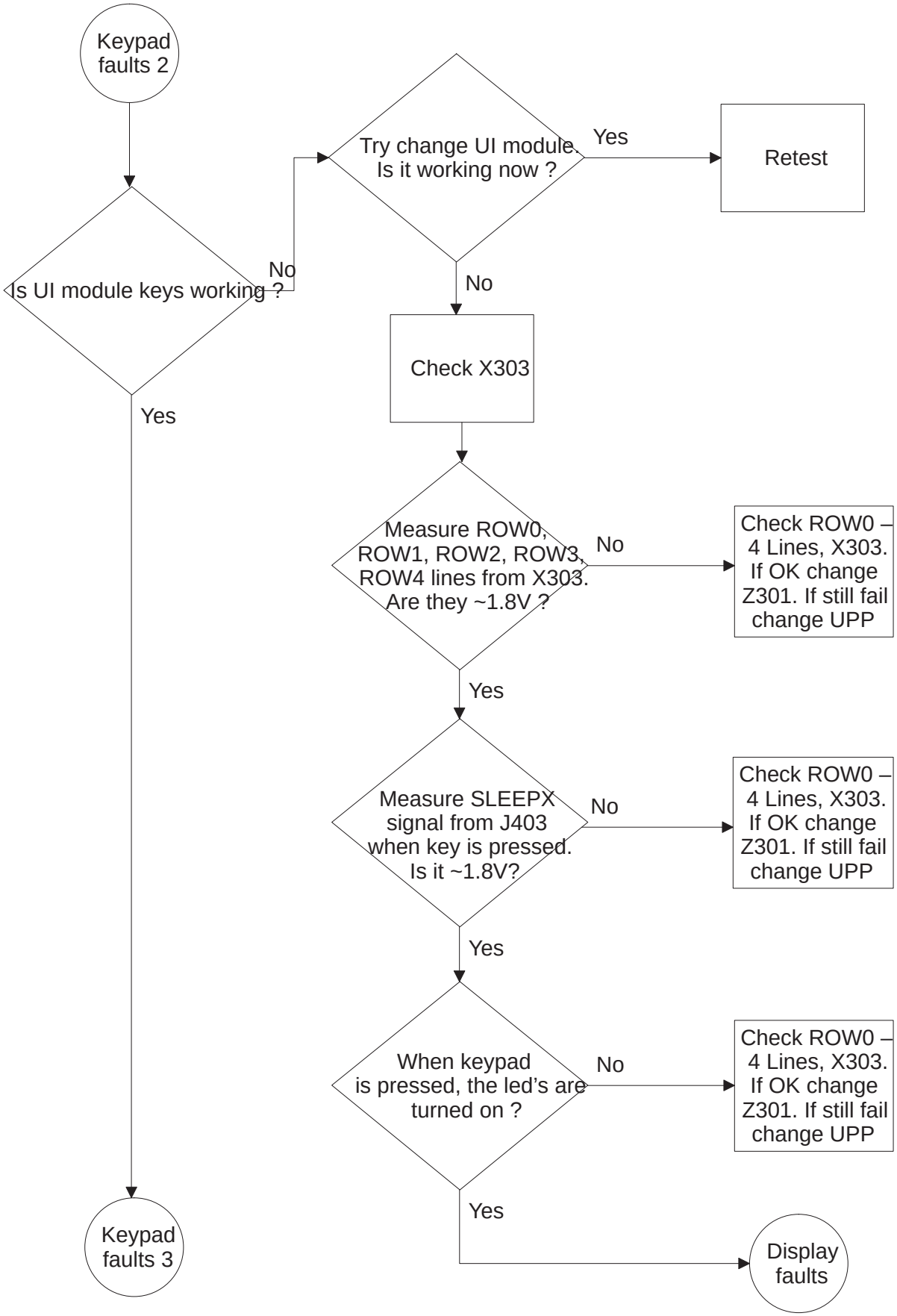


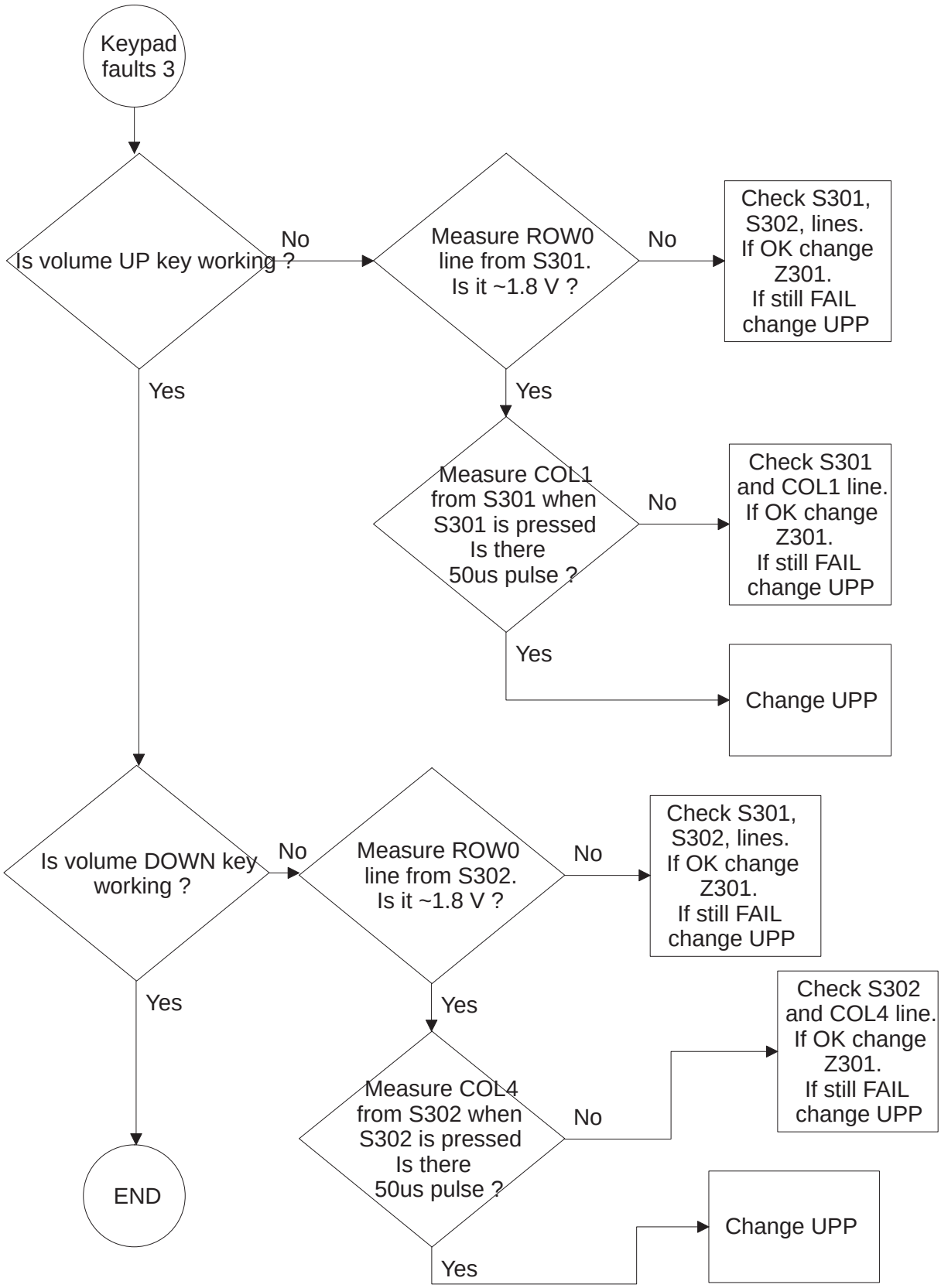




Keypad fault







RF Troubleshooting

Introduction

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).

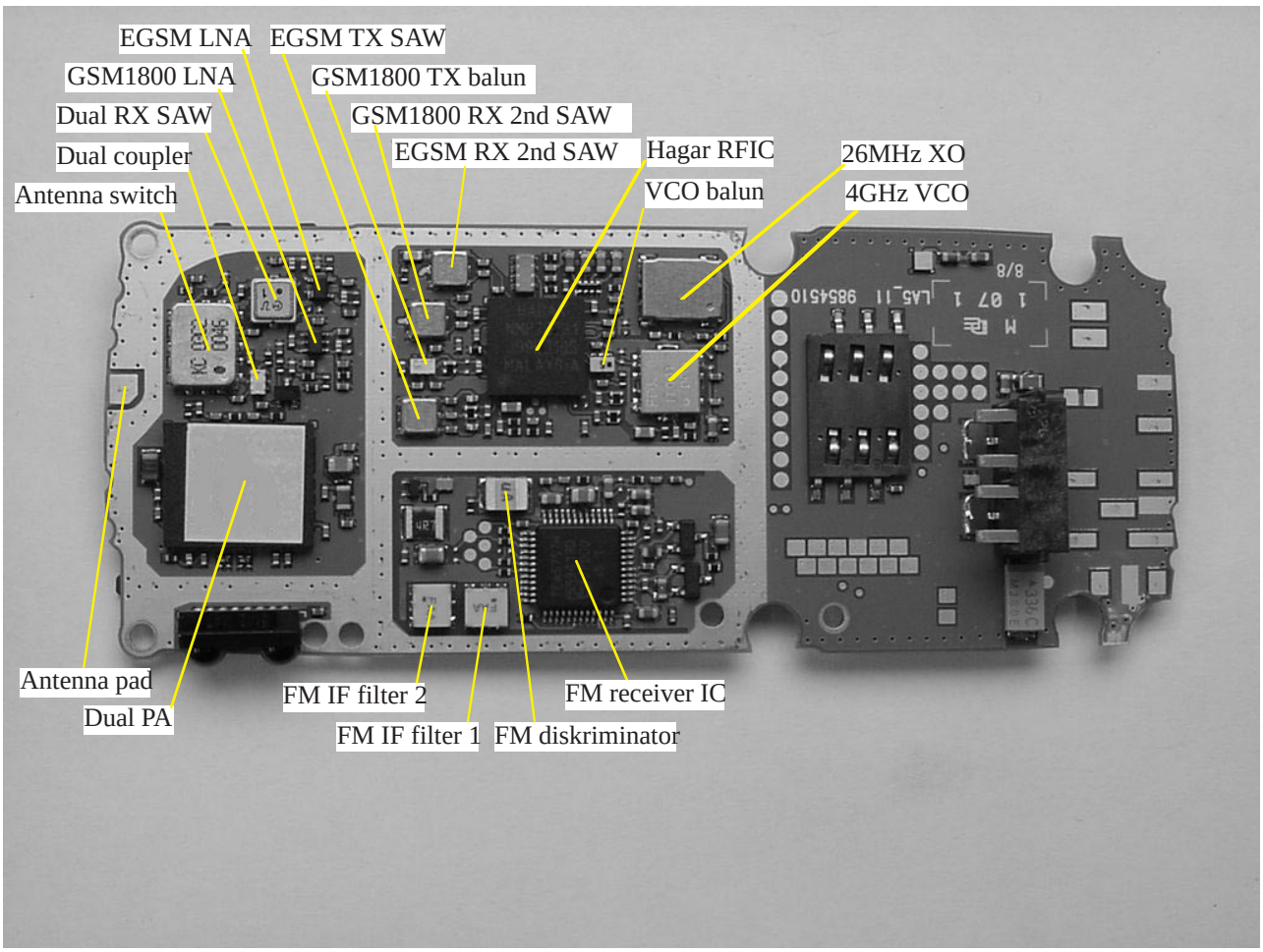
The RF–section is build around one RF–ASIC (HAGAR N600). Before changing HAGAR, please check following things: Supply voltages are OK and serial communication coming from baseband to HAGAR.

Please 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.

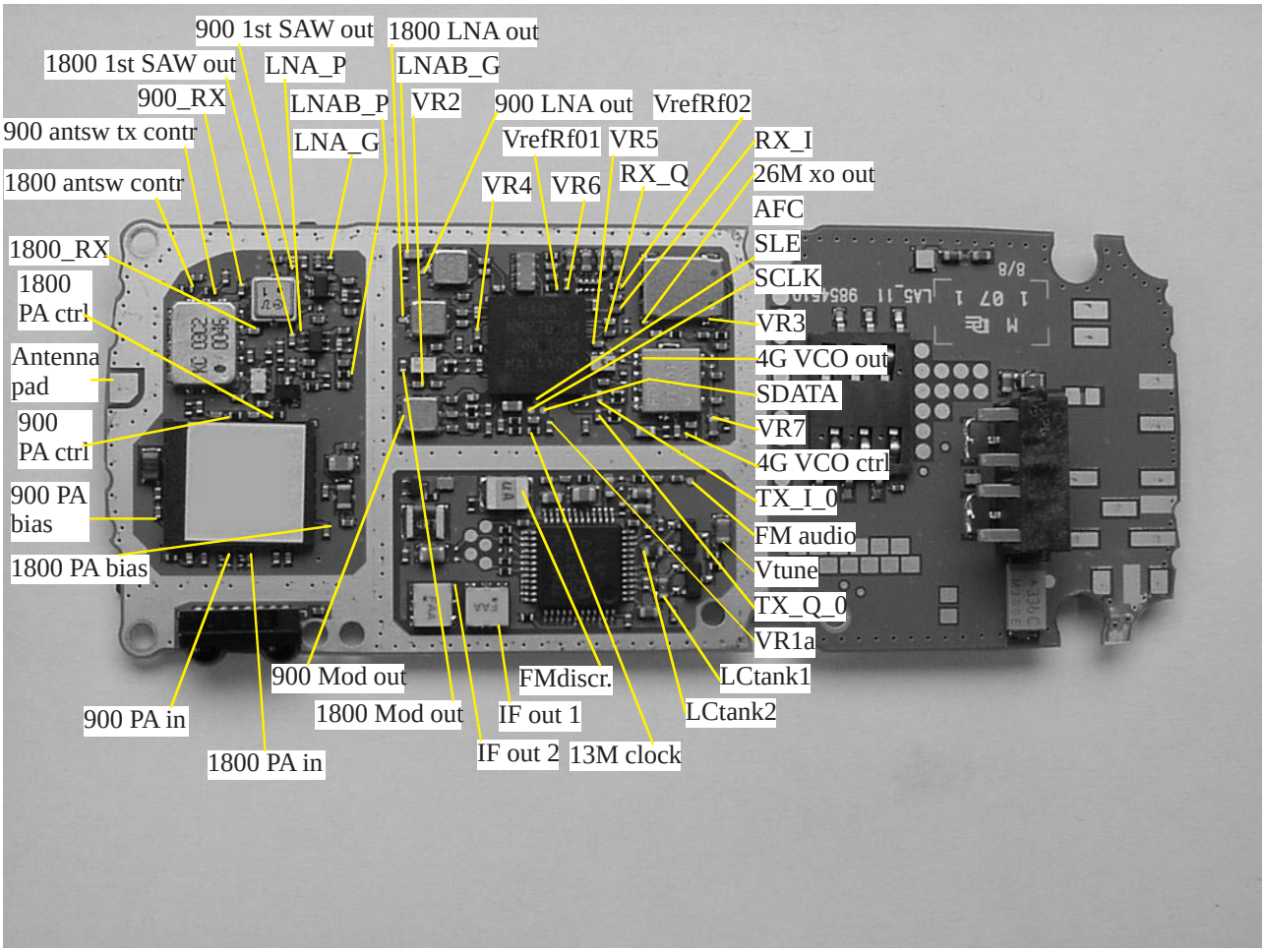
Troubleshooting discrete components (resistors, inductors and capacitors) is done by checking component soldering. Capacitors can be checked for shortening and resistor values using an ohmmeter, but remember in–circuit measurements are evaluated with caution.

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 metallic tweezers to connect probe ground to PWB ground as close to measurement point as possible.

RF Key Components



PWB Test Points



Transmitter

General instructions

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 sofware.

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

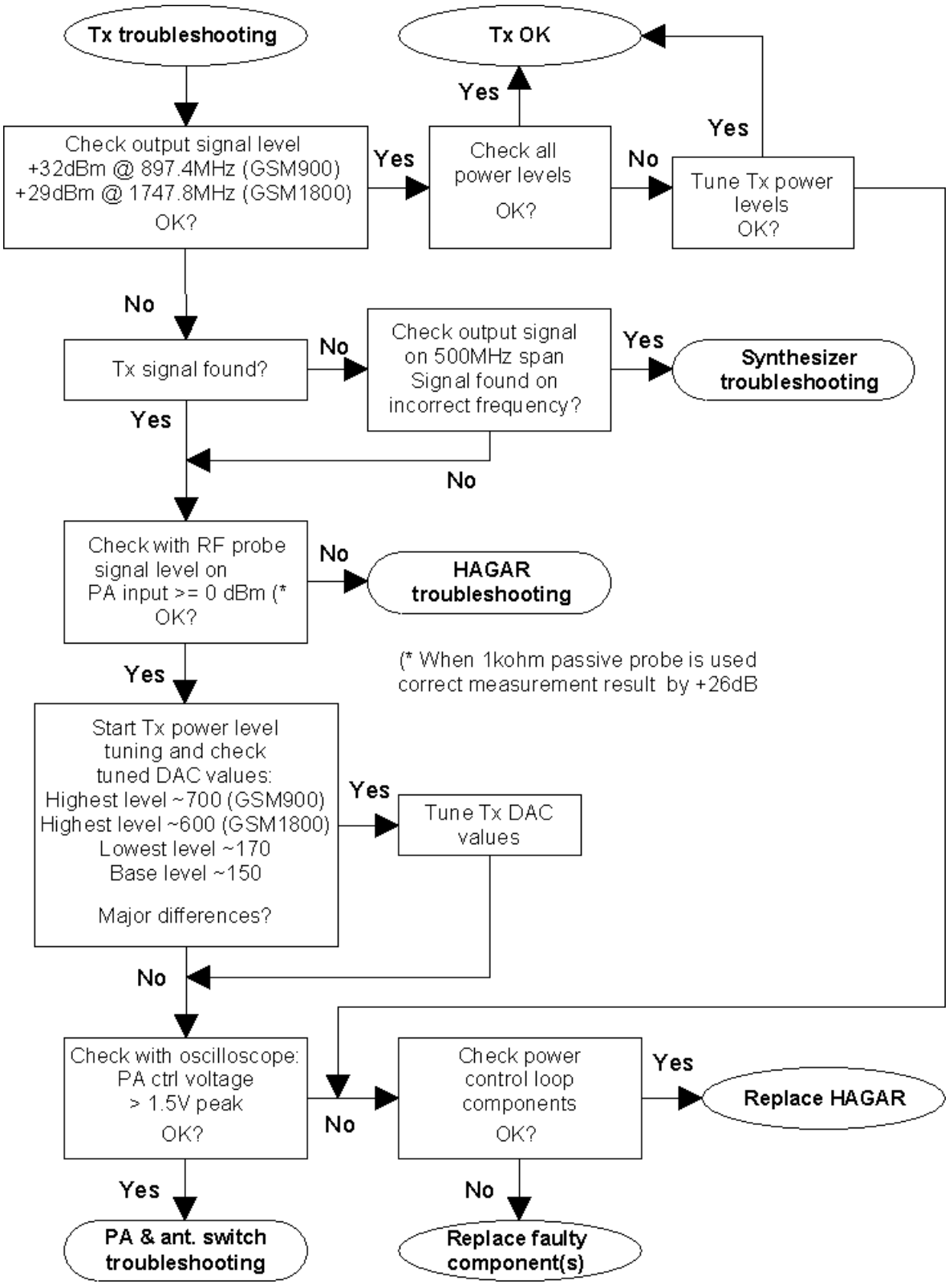
Select product from the menu: File –> Choose product –> NPM–9

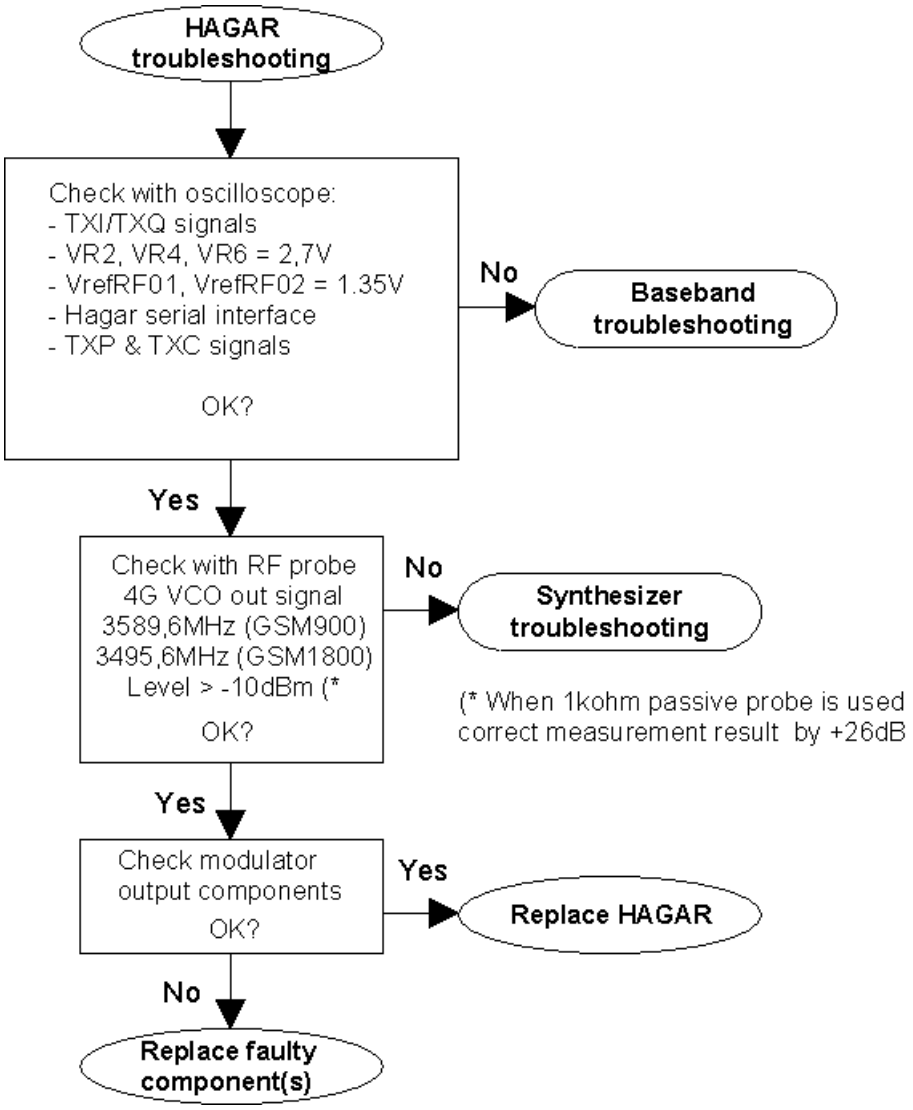
From toolbar set operating mode to ”Local”.

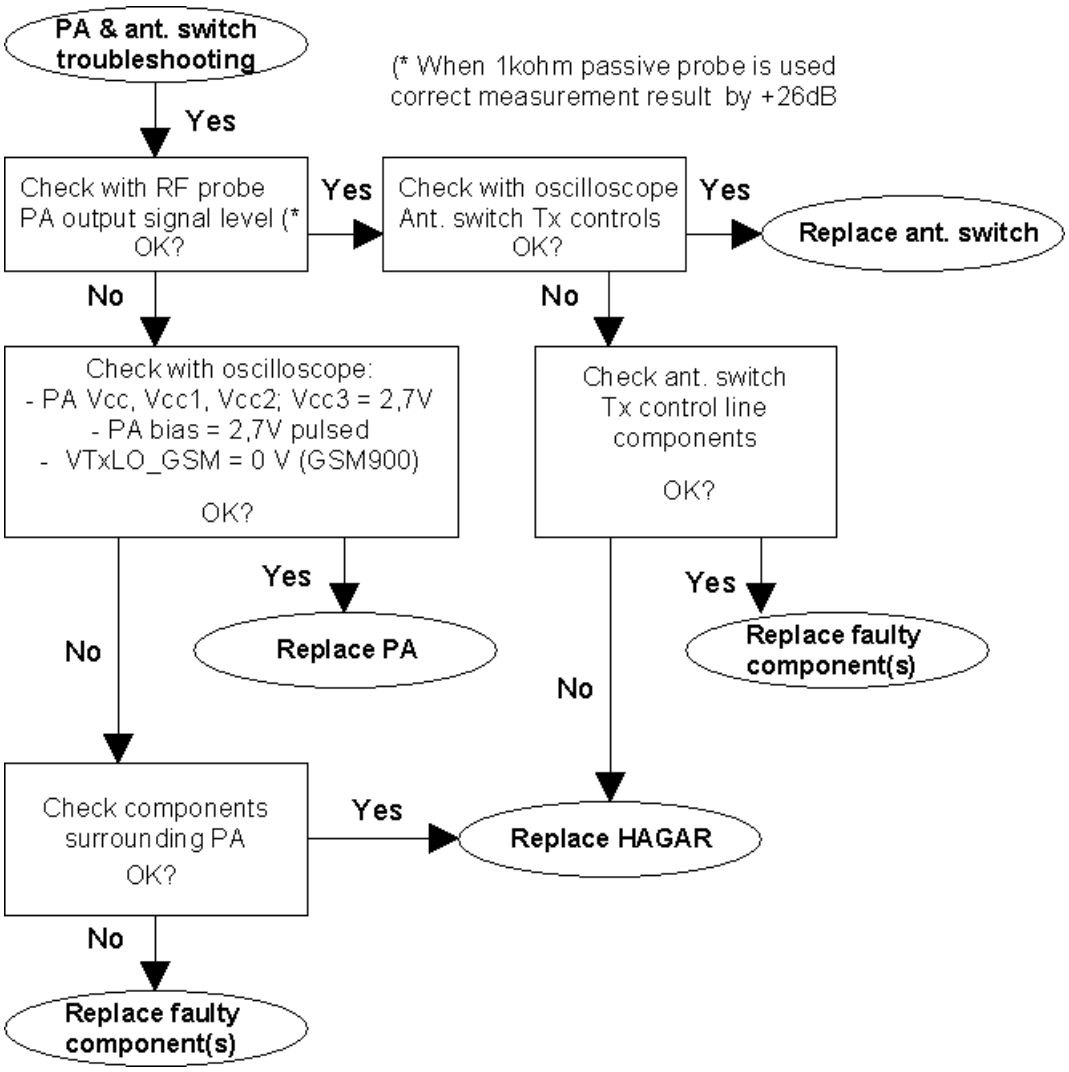
Activate RF controls window from the menu:
Maintenance –> Tuning –> RF Controls

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

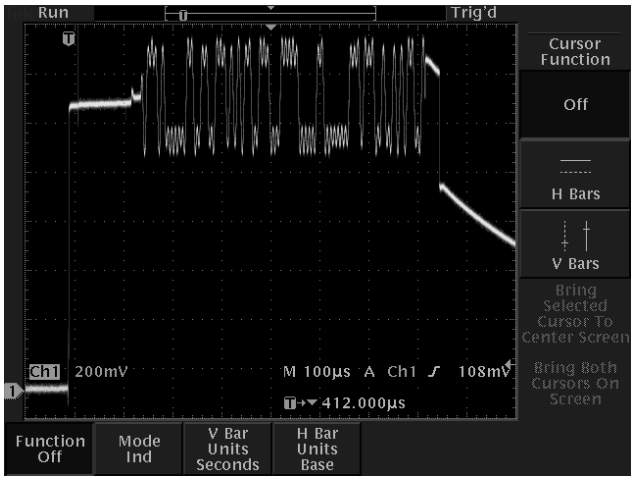
Transmitter troubleshooting diagram



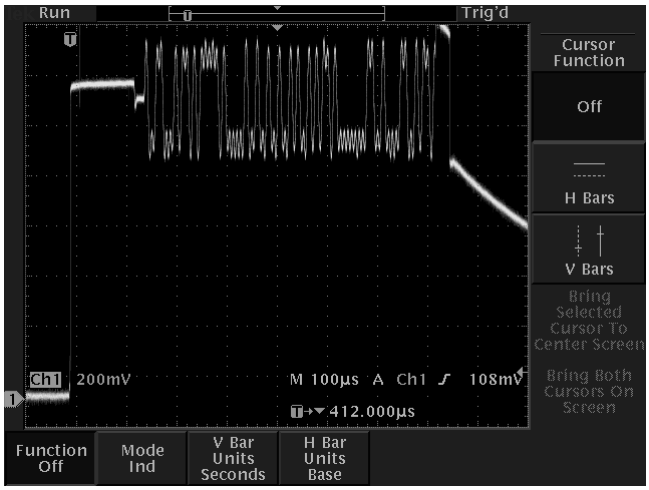




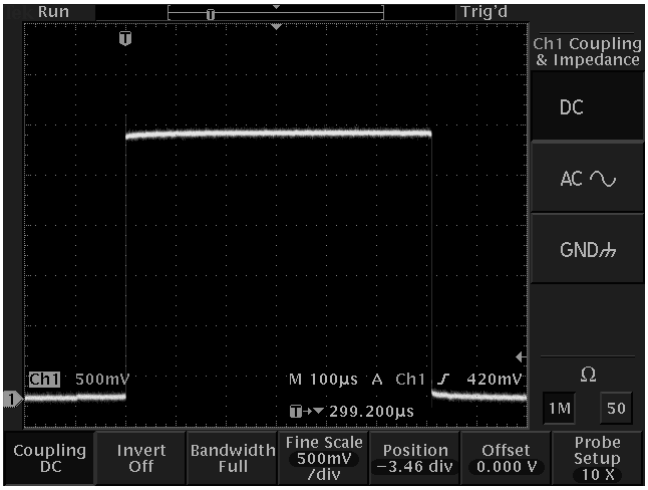
Transmitter signals



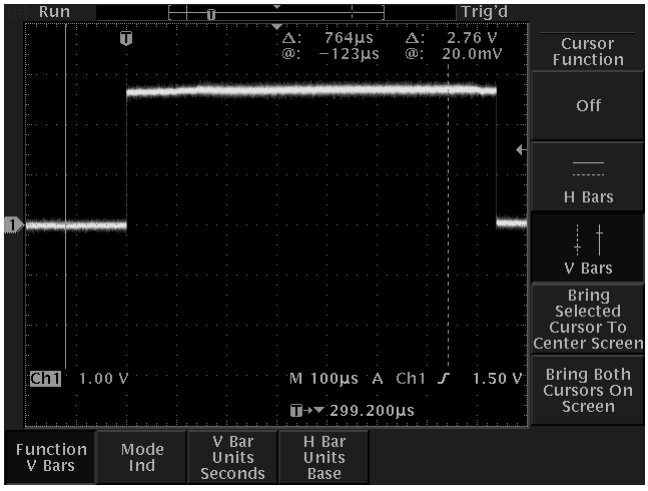
TX_I_0, Tx on, Random data, Burst mode



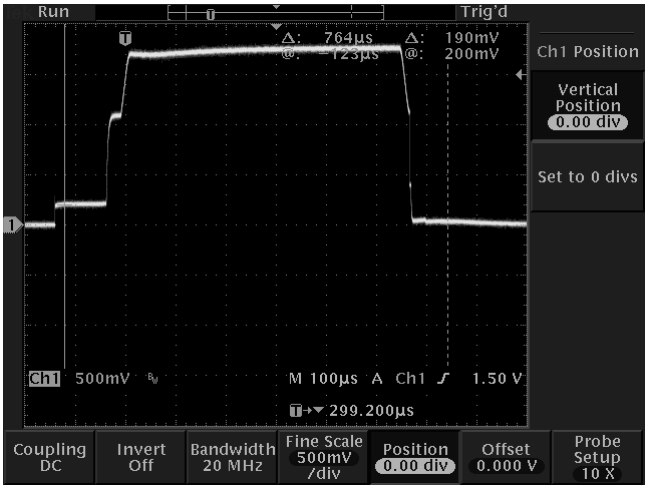
TX_Q_0, Tx on, Random data, Burst mode



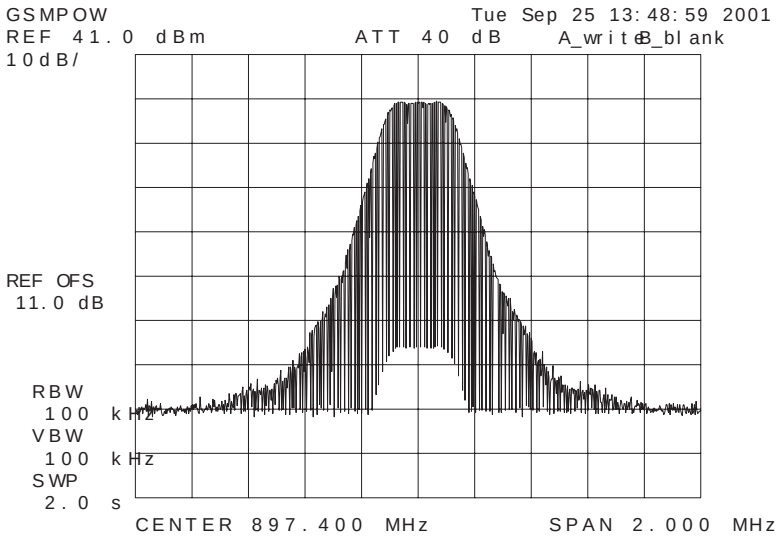
900/1800 antsw tx contr, Tx on, Burst mode



900/1800 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

General instructions

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. 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 sofware.

Initialize connection to phone. Use FBUS driver when using DAU9S and COMBOX driver when using FPS–8.

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

From toolbar set operating mode to ”Local”.

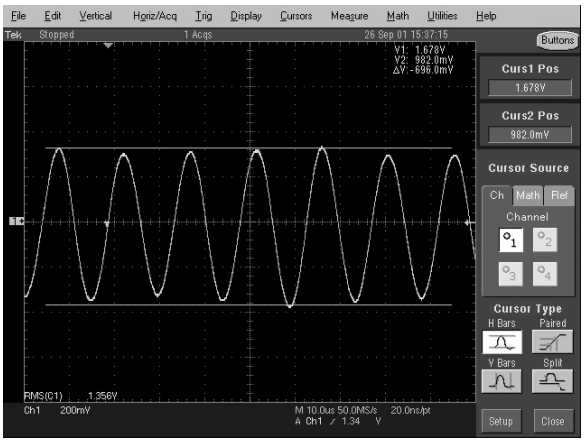
Activate RF controls window from the menu: Maintenance –> Testing –> RF Controls.

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)

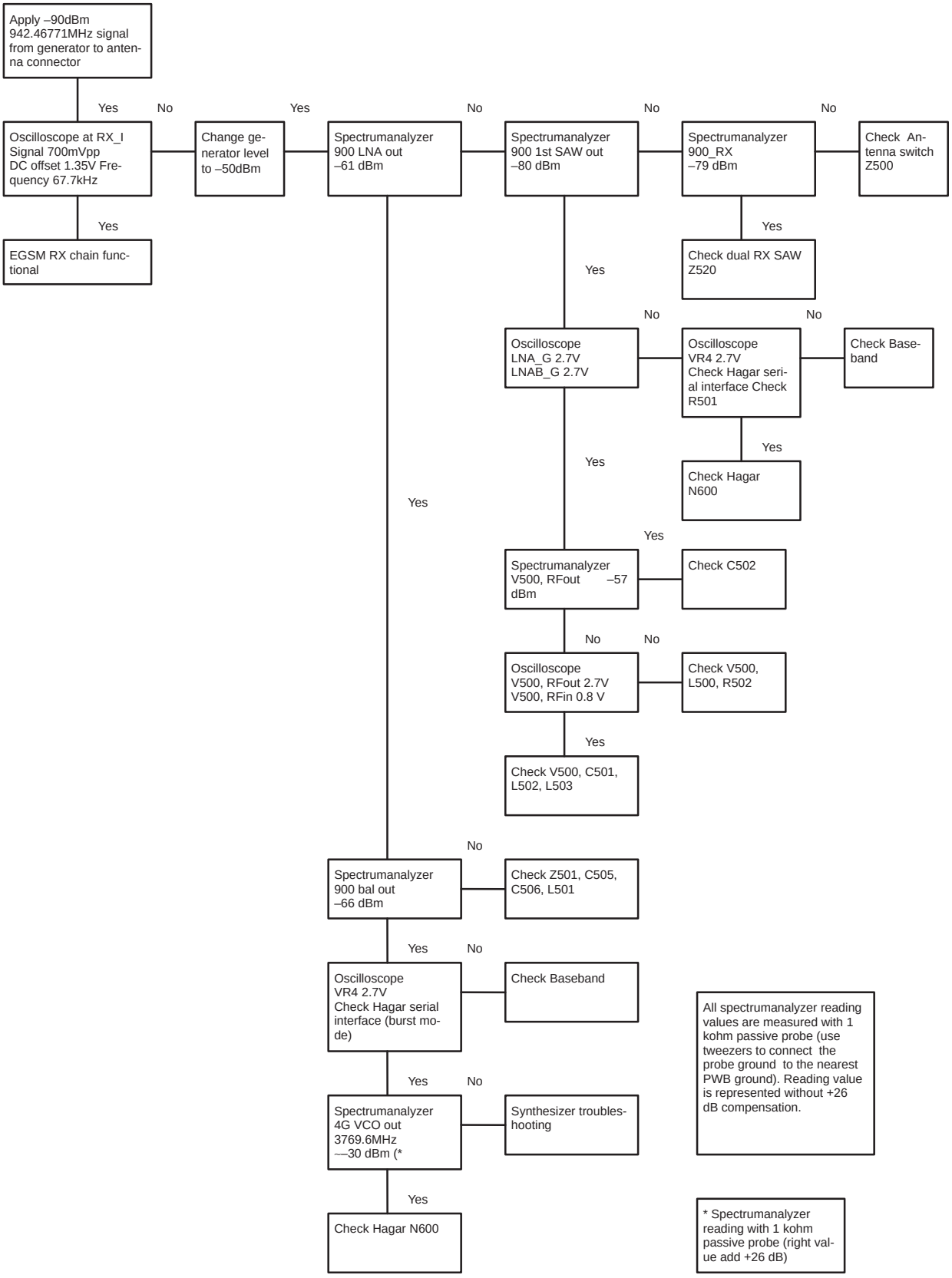
Apply 942.46771 MHz (channel 37 + 67.710 kHz offset) or 1842.86771 MHz (channel 700 + 67.710 kHz offset) –90 dBm signal to the RF–connector (remember to compensate for cable attenuation).

Measuring with an oscilloscope on ”RX_I” or ”RX_Q” this picture should be seen on a working GSM900 or GSM1800 receiver:

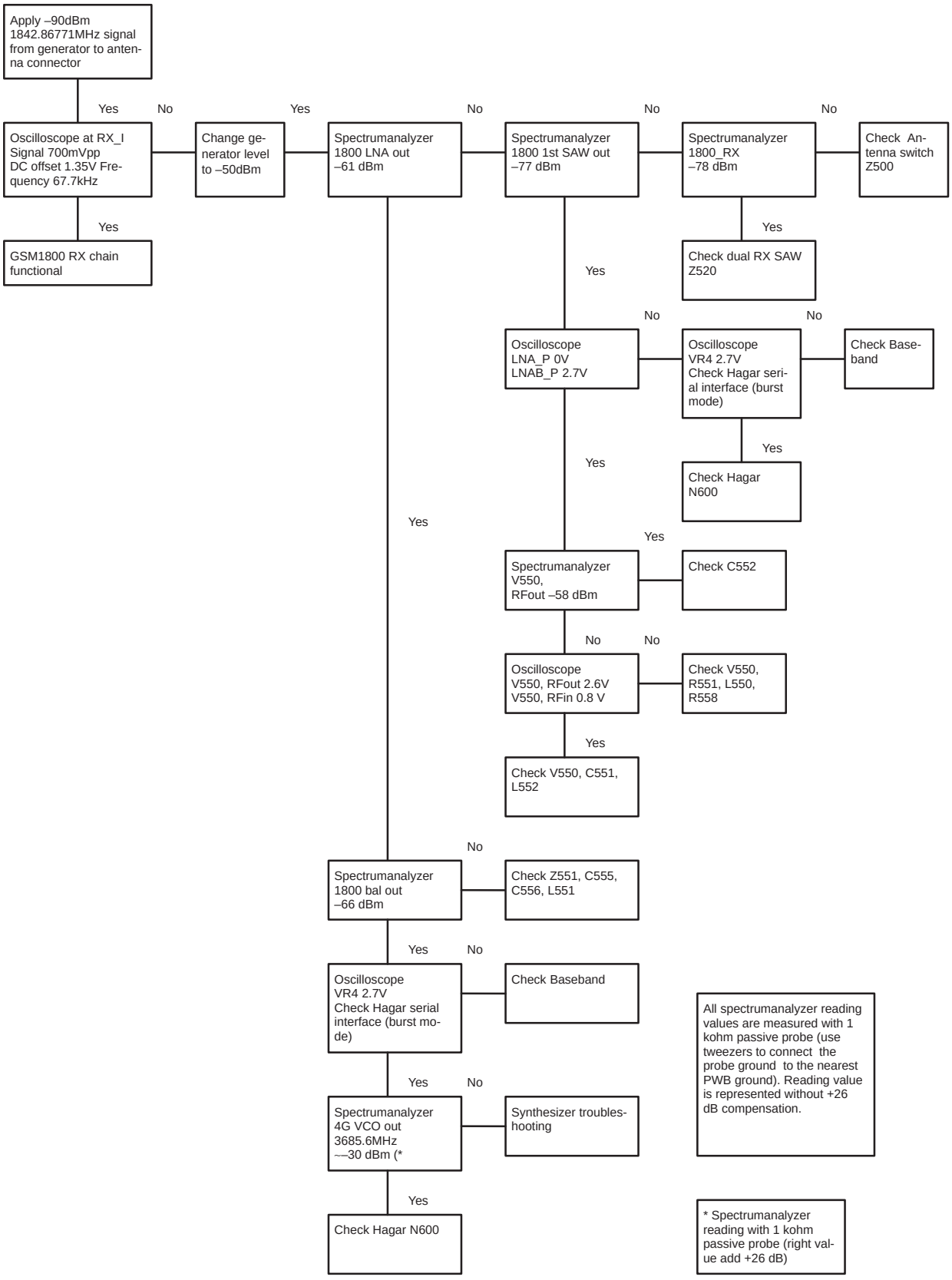


Signal amplitude is 700 mVpp, DC offset 1.35 V and frequency 67 kHz. If this picture is not seen, continue to the next page.

Receiver troubleshooting diagram for GSM900



Receiver troubleshooting diagram for GSM1800



LNA gainstep checking GSM900 & GSM1800

900 LNA out	1800 LNA out
– RF–level at antenna port eg. –50 dBm – RX continuous mode (local mode) – difference between AGC –settings ”FEG on” and ”FEG off” roughly 25 dB (using 250 ohm passive RF–probe)	– RF–level at antenna port eg. –50 dBm – RX continuous mode (local mode) – difference between AGC –settings ”FEG on” and ”FEG off” roughly 30 dB (using 250 ohm passive RF–probe)

LNAB_G	LNAB_P
– RX continuous mode (local mode) – 2,6 V DC voltage ”FEG ON” – 0 V DC voltage ”FEG OFF”	– RX continuous mode (local mode) – 2,7 V DC voltage ”FEG ON” – 0 V DC voltage ”FEG OFF”

LNA_G	1800 LNA_P
– RX continuous mode (local mode) – 2,7 V DC voltage ”FEG ON” and ”FEG OFF”	– RX continuous mode (local mode) – 0 V DC voltage ”FEG ON” – 1.9 V DC voltage ”FEG OFF”

Synthesizer

General instructions

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 parallel port.

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 sofware.

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 –>NPM–9

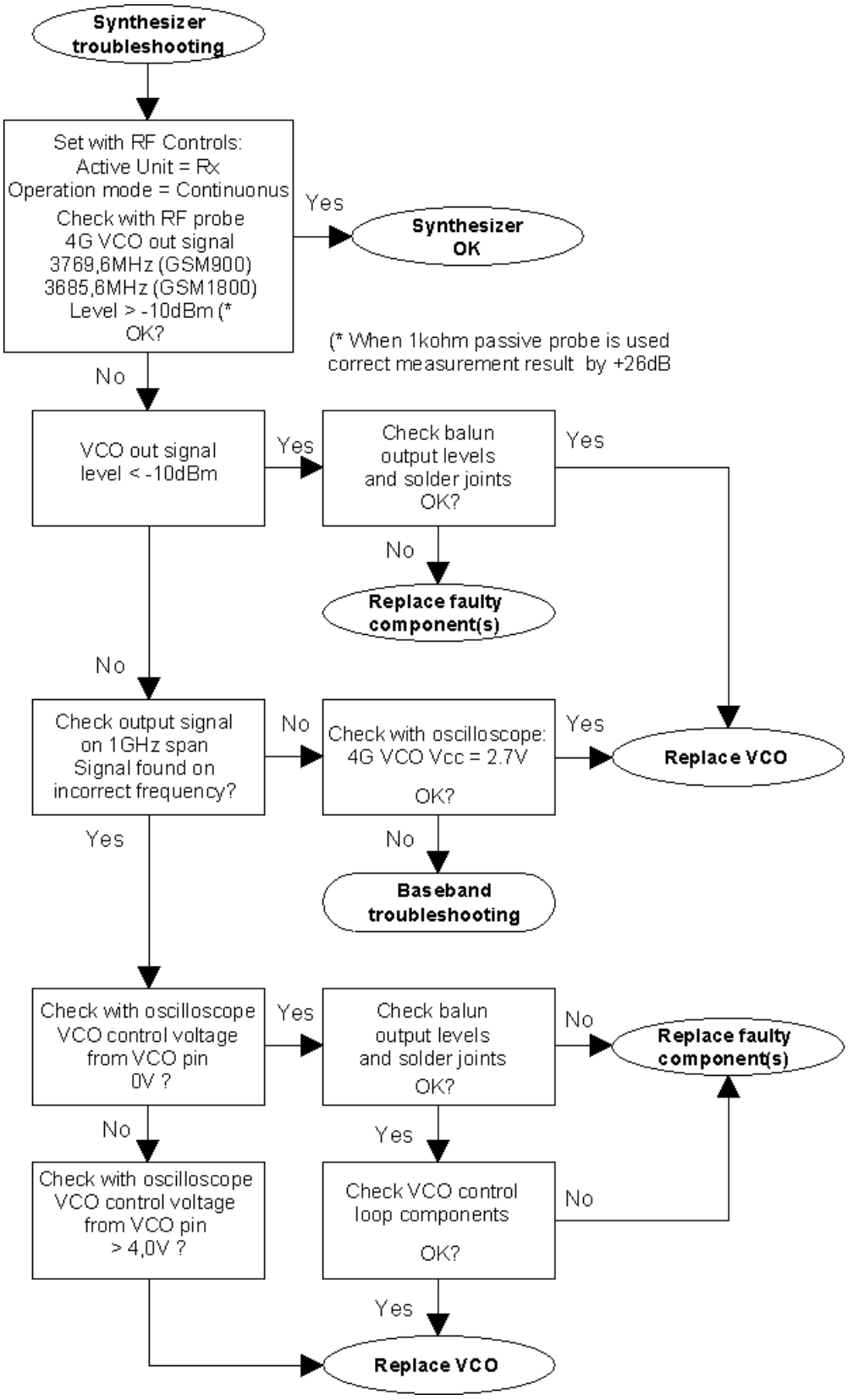
From toolbar set operating mode to ”Local”.

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

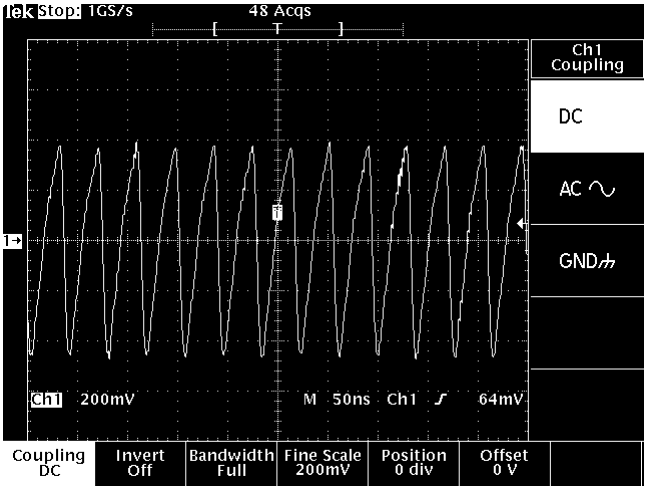
From the RF controls window:

– 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)

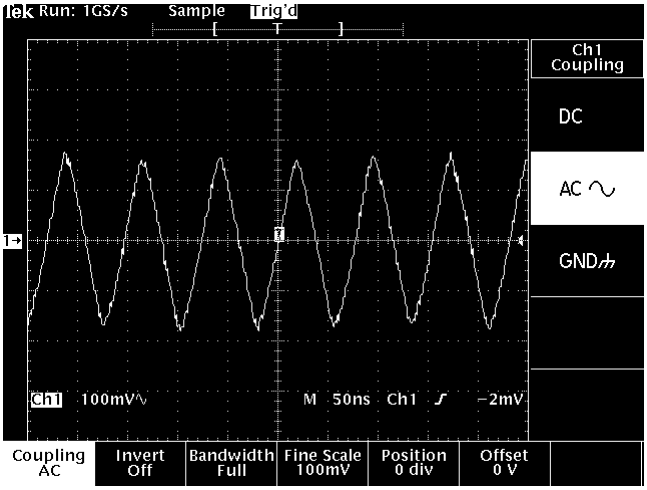
Synthesizer troubleshooting diagram



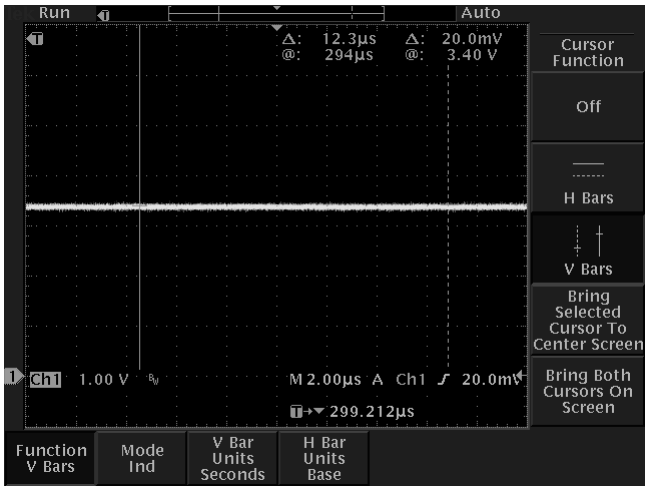
Synthesizer signals



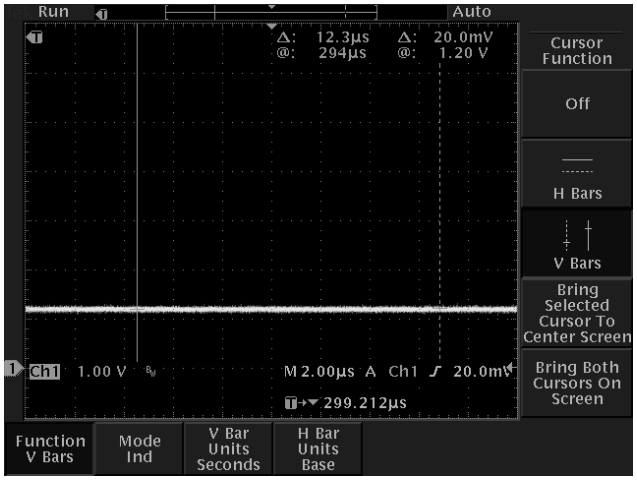
26MHz XO out



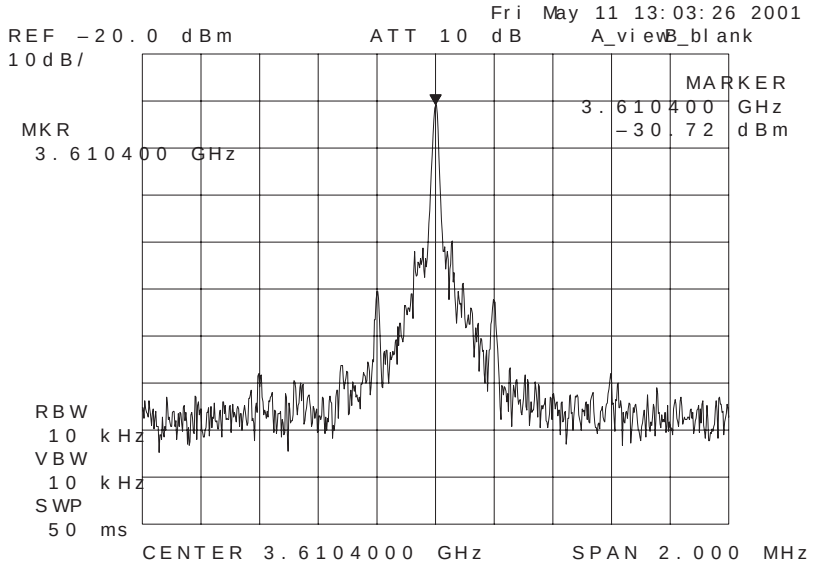
13MHz clock



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

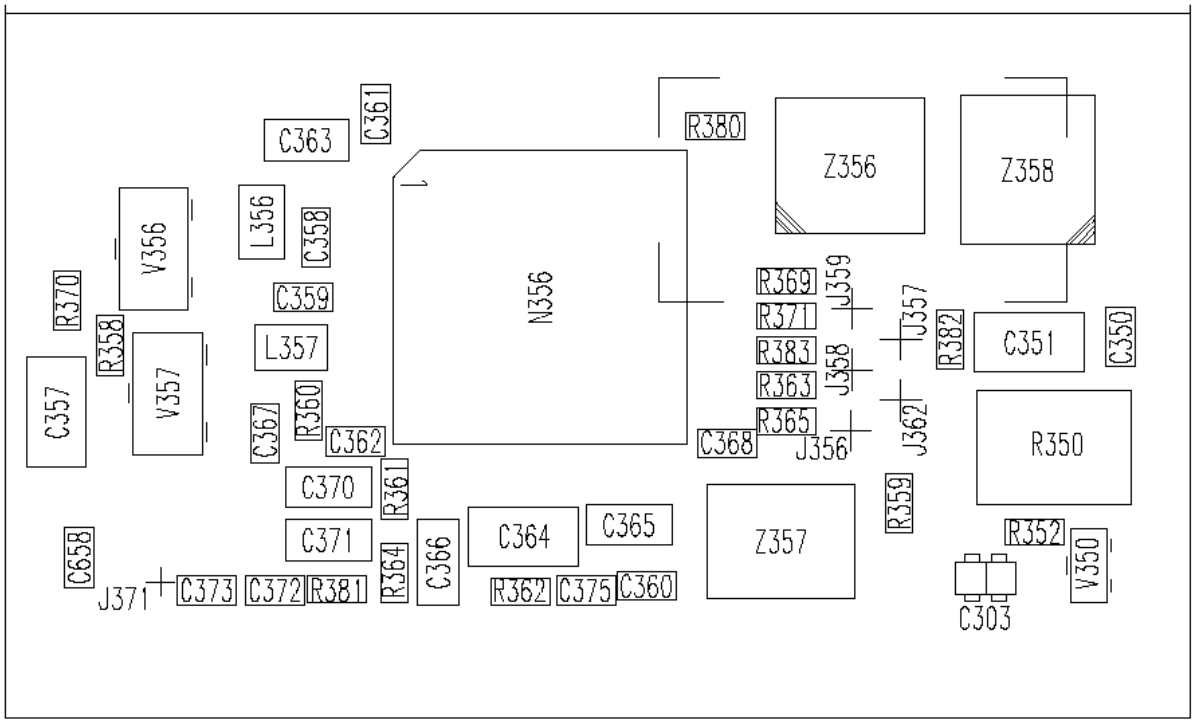


4GHz VCO ctrl
1800 TX, channel 512, continuous mode



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

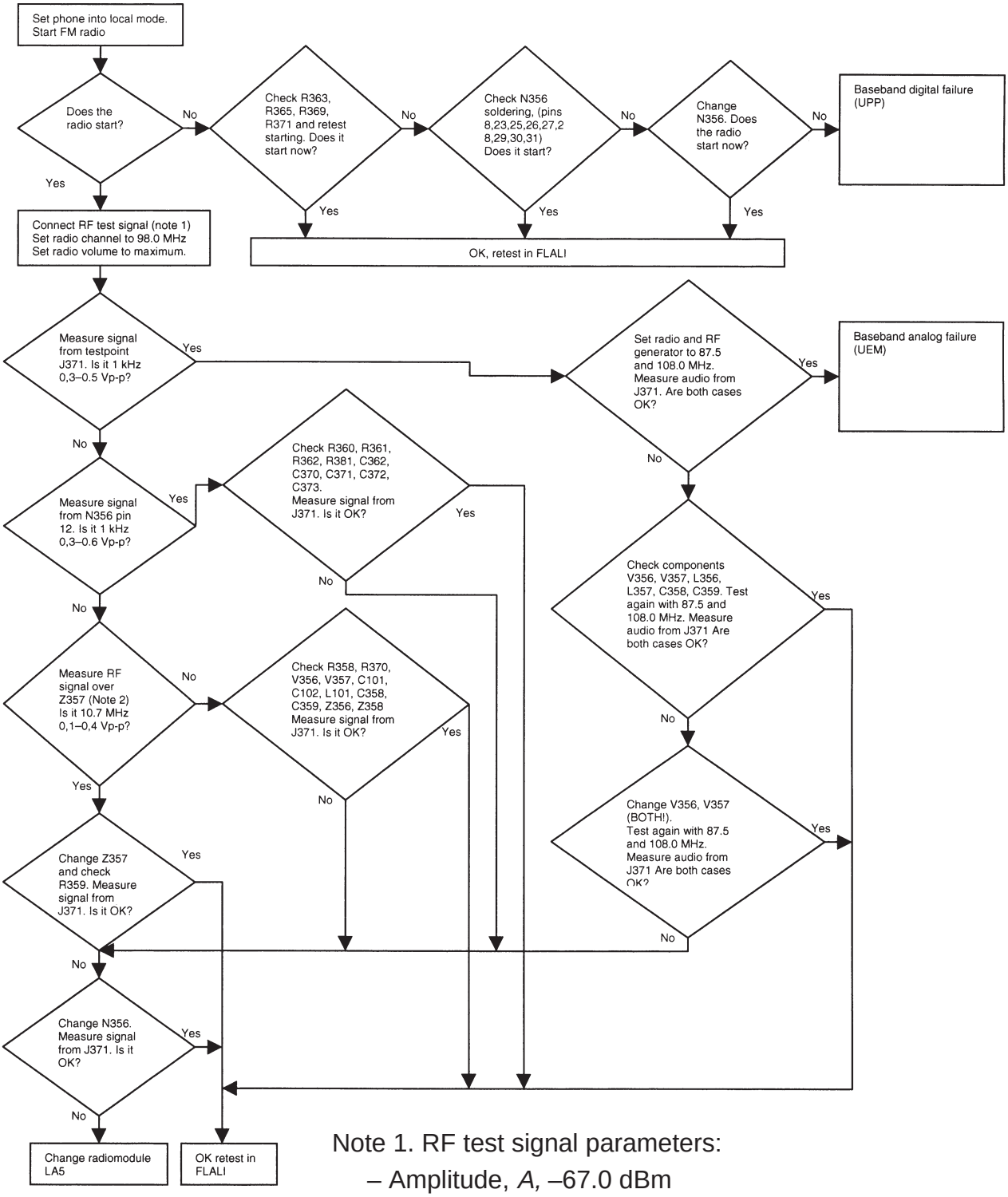
FM Radio troubleshooting



FM Radio component layout

Components L101, C101 and C102 are not shown in picture. Components are placed in baseband section.

FM Radio troubleshooting diagram

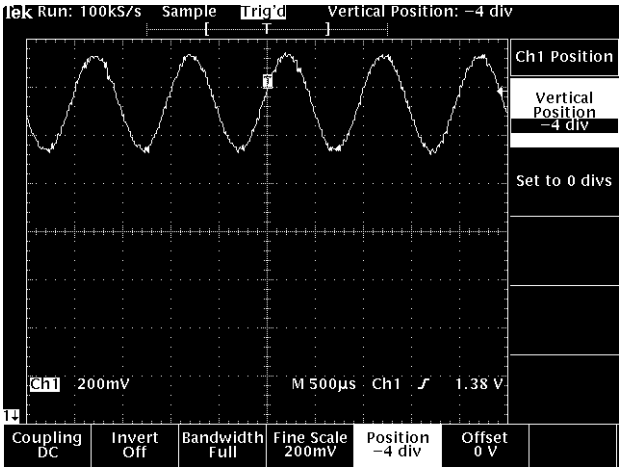


Note 1. RF test signal parameters:

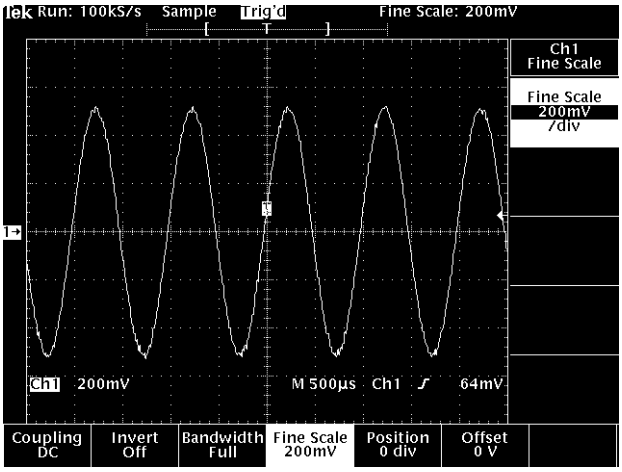
– Amplitude, *A,* –67.0 dBm
– Carrier ferquency, f_c, 98,000 MHz
– Deviation, Δf, 75 kHz
– Modulating frequency f_m, 1,000 kHz
(RF generator internal)

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

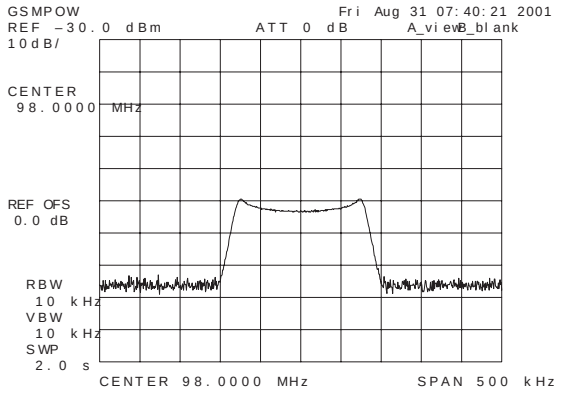
FM Radio signals



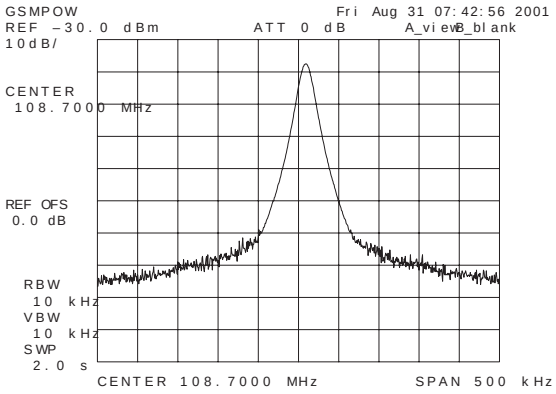
Audio out from PWB test point – with FM test signal.



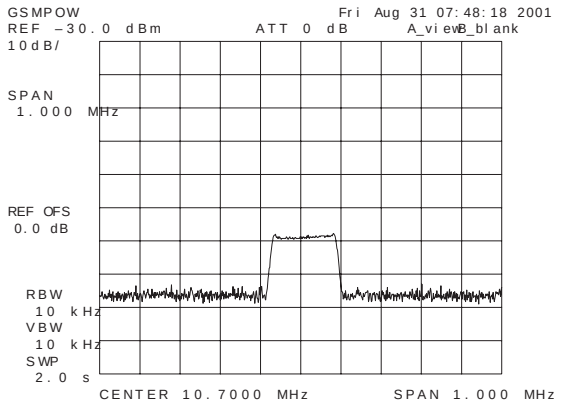
Audio out from test jig connector – with FM test signal, volume 100%.



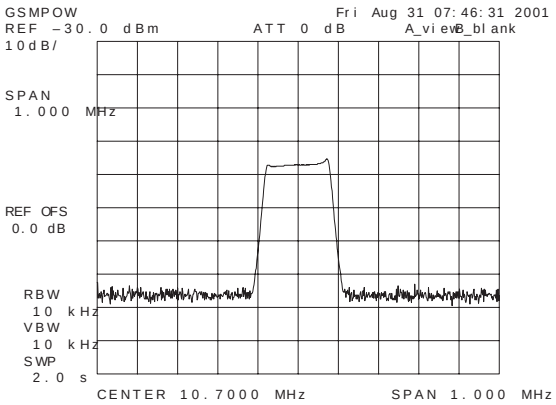
LC tank 1 – with FM test signal.



LC tank 2 – with FM test signal.



IF out 1 – with FM test signal.



IF out 2 – with FM test signal.

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