Troubleshooting — BB

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Troubleshooting - Baseband

Overview

The Baseband module of RH-17 transceiver is a CDMA single band engine. The Baseband architecture is based on the DCT4 Apollo engine.

RH-17 Baseband consists of three ASICs: Universal Energy Management (UEM), Universal Phone Processor (UPP), and a 64-megabit Flash.

The Baseband architecture supports a power-saving function called “sleep mode”. This sleep mode shuts off the VCTCXO, which is used as system clock source for both RF and Baseband. During the sleep mode, the system runs from a 32kHz crystal. The phone awakes by a timer running from this 32kHz clock. The sleep is determined by network parameters. Sleep mode is entered when both the MC and the DSP are in standby mode and the normal VCTCXO clock is switched off.

RH-17 supports both 2- and 3-wire DCT3-type wire chargers. However, the 3-wire chargers are treated as 2-type wire chargers. Charging is controlled by UEM ASIC and EM SW.

BL-5C Li-ion battery is used as main power source for RH-17. BL-5C has nominal capacity of 850 mAh.

BB and RF Architecture

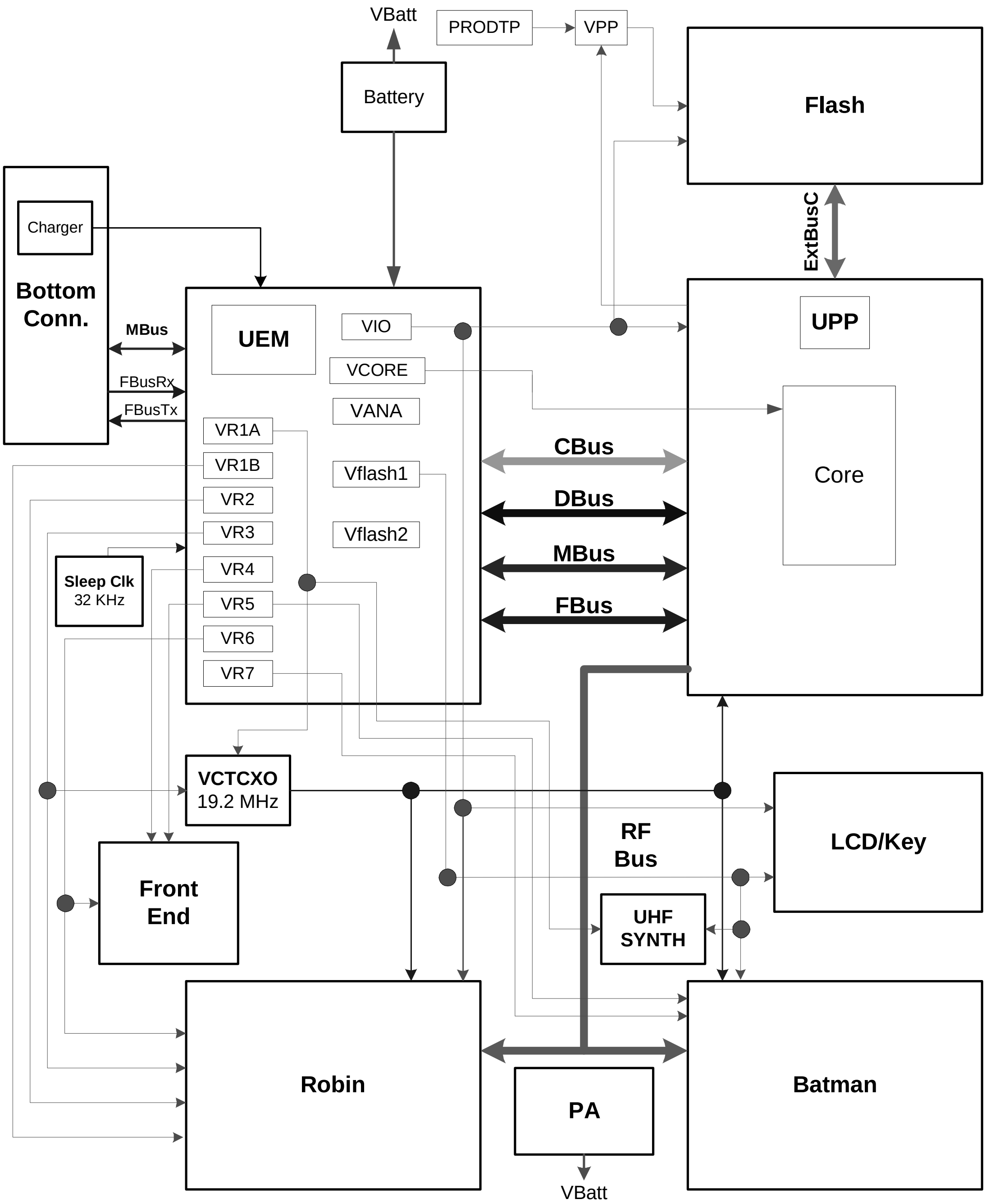


Figure 1: RH-17 Power Distribution

Power Up and Reset

Power up and reset is controlled by the UEM ASIC. RH-17 baseband can be powered up in the following ways:

1. By the Power button, which means grounding the PWRONX pin of the UEM
2. By connecting the charger to the charger input

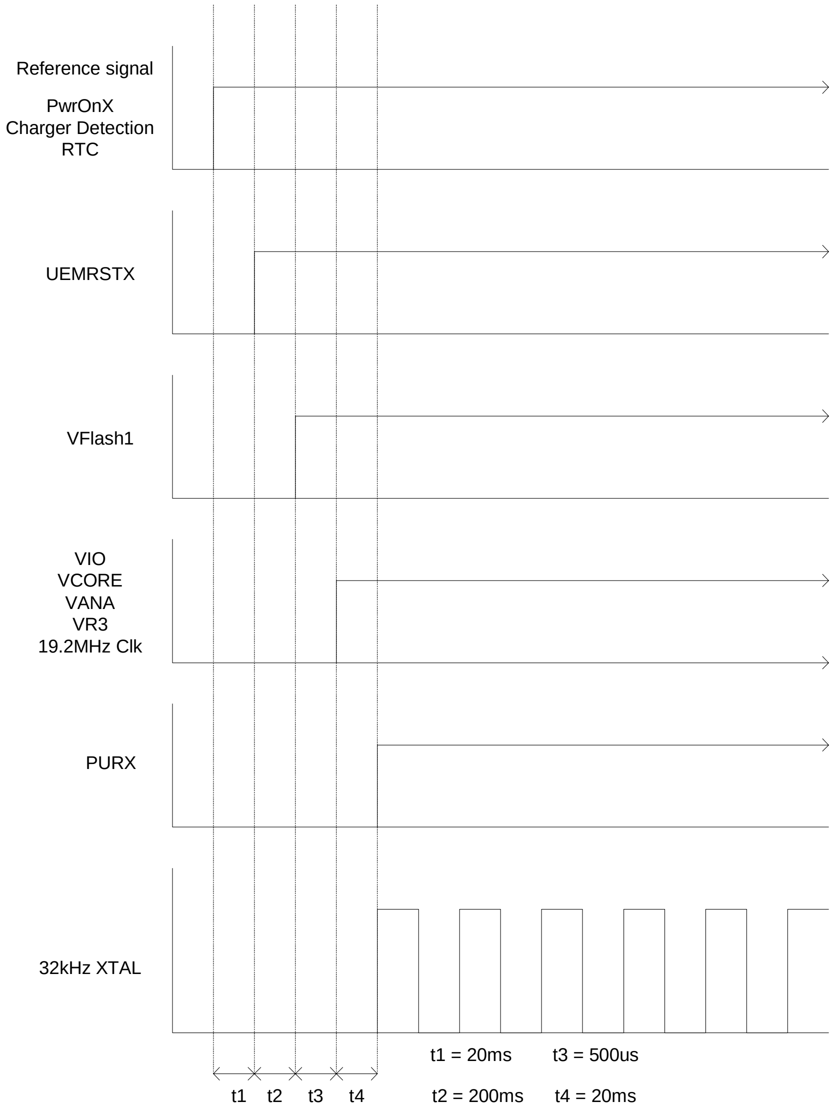
3 By the RTC Alarm, when the RTC logic has been programmed to give an alarm

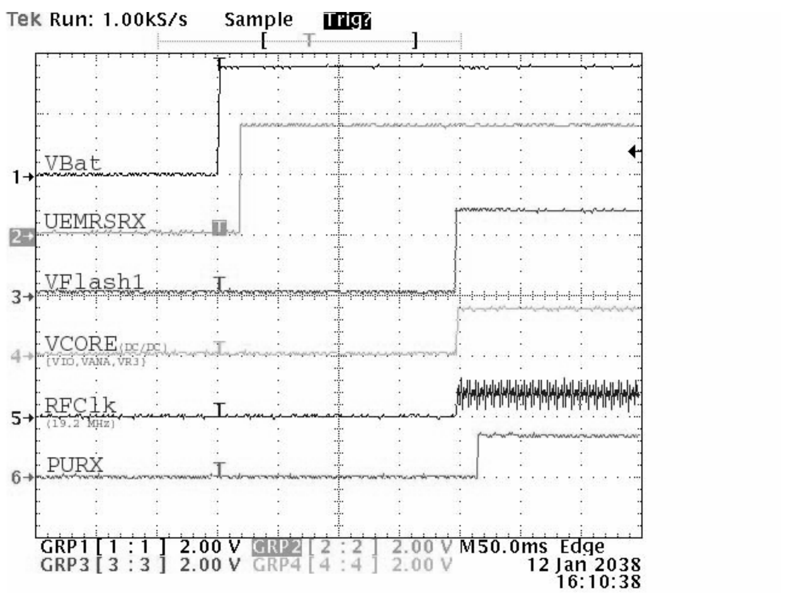
After receiving one of the above signals, the UEM counts a 20ms delay and then enters in reset mode. The watchdog starts up, and if the battery voltage is greater than Vcoff+, a 200ms delay is started to allow references etc. to settle. After this delay elapses the VFLASH1 regulator is enabled. Then, 500us later VR3, VANA, VIO and VCORE are enabled.

Finally the PURX (Power Up Reset) line is held low for 20 ms. This reset, PURX, is fed to the baseband ASIC UPP, resets are generated for the MCU and the DSP. During this reset phase, the UEM forces the VCTCXO regulator on — regardless of the status of the sleep control input signal to the UEM. The FLSRSTx from the ASIC is used to reset the flash during power-up and to put the flash in power-down during sleep.

All baseband regulators are switched on when the UEM powers on. The UEM internal watchdogs are running during the UEM reset state, with the longest watchdog time selected. If the watchdog expires, the UEM returns to power-off state. The UEM watchdogs are internally acknowledged at the rising edge of the PURX signal in order to always give the same watchdog response time to the MCU.

The following timing diagram represents UEM start-up sequence from reset to power-on mode.





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Power up with PWR key

When the Power on key is pressed, the UEM enters the power-up sequence. Pressing the power key causes the PWRONX pin on the UEM to be grounded. The UEM PWRONX signal is not part of the keypad matrix. The power key is only connected to the UEM. This means that when pressing the Power key, an interrupt is generated to the UPP that starts the MCU. The MCU then reads the UEM interrupt register and notices that it is a PWRONX interrupt. The MCU now reads the status of the PWRONX signal using the UEM control bus, CBUS. If the PWRONX signal stays low for a certain time, the MCU accepts this as a valid power-on state and continues with the SW initialization of the baseband. If the Power on key does not indicate a valid power on situation, the MCU powers off the baseband.

Power up when charger is connected

In order to be able to detect and start charging in the case where the main battery is fully discharged (empty) and hence UEM has no supply (NO_SUPPLY or BACKUP mode of UEM), charging is controlled by *START-UP CHARGING* circuitry.

Whenever VBAT level is detected to be below master reset threshold (V_{MSTR-}), charging starts and is controlled by START_UP charge circuitry. Connecting a charger forces VCHAR input to rise above the charger detection threshold, VCH_{DET+}, and by detection charging is started. UEM generates 100mA constant output current from the connected charger's output voltage. As battery charges, its voltage rises and when VBAT voltage level is detected to be higher than the master reset threshold limit (V_{MSTR+}), START_UP charge is terminated.

Monitoring the VBAT voltage level is done by charge control block (CHACON). MSTRX='1' output reset signal (internal to UEM) is given to UEM's *RESET* block when VBAT>V_{MSTR+} and UEM enters into reset sequence.

If VBAT is detected to fall below V_{MSTR-} during start-up charging, charging is cancelled. It will restart if new rising edge on VCHAR input is detected (VCHAR rising above VCH_{DET+}).

RTC alarm power up

If phone is in POWER_OFF mode when RTC alarm occurs, a wake-up procedure occurs. After baseband is powered ON, an interrupt is given to MCU. When RTC alarm occurs during ACTIVE mode, an interrupt to MCU is generated.

Power off

The Baseband switches into power off mode if any of following statements is true

- Power key is pressed
- Battery voltage is too low (VBATT < 3.2 V)
- Or if Watchdog timer register expires

The Power-down procedure is controlled by the UEM.

Power Consumption and Operation modes

During power off mode, power (VBAT) is supplied to UEM, BUZZER, VIBRA, LED, PA and PA drivers (Tomcat and Hornet). During this mode, the current consumption on this mode is approximately 35uA.

In sleep mode, both processors, MCU and DSP, are in stand-by mode. Phone will go to sleep mode only when both processors made this request. When SLEEPX signal is detected low by the UEM, the phone enters SLEEP mode. VIO and VFLASH1 regulators are put into low quiescent current mode, VCORE enters LDO mode and VANA and VFLASH2 regulators are disabled. All RF regulators are disabled during SLEEP mode. When SLEEPX signal is detected high by the UEM, the phone enters ACTIVE mode and all functions are activated.

The sleep mode is exited either by the expiration of a sleep clock counter in the UEM or by some external interrupt, generated by a charger connection, key press, headset connection, etc.

In sleep mode, the VCTCXO is shut down and the 32 kHz sleep clock oscillator is used as reference clock for the baseband.

The average current consumption of the phone can vary depending mainly on SW state like slot cycle 0, 1, or 2 and if the phone is working on IS95 or IS2000 for CDMA; however, on average is about 6 mA in slot cycle 0 on IS95.

In the ACTIVE mode, the phone is in normal operation, scanning for channels, listening to a base station, transmitting and processing information. There are several sub-states in the active mode depending on the phone present state such as: burst reception, burst transmission, if DSP is working, etc.

In active mode, SW controls the UEM RF regulators: VR1A and VR1B can be enabled or disabled. VSIM can be enabled or disabled and its output voltage can be programmed to be 1.8V or 3.3V. VR2 and VR4 -VR7 can be enabled or disabled or forced into low quiescent current mode. VR3 is always enabled in active mode and disabled during Sleep mode and cannot be control by SW in the same way as the other regulators. VR3 will only turn off if both processors request to be in sleep mode.

CHARGING mode can be performed in parallel with any other operating mode. A BSI resistor inside the battery indicates the battery type/size. The resistor value corresponds to a specific battery type and capacity. This capacity value is related to the battery technology.

The battery voltage, temperature, size and charging current are measured by the UEM, and the EM charging algorithm controls it.

The charging control circuitry (CHACON) inside the UEM controls the charging current delivered from the charger to the battery. The battery voltage rise is limited by turning the UEM switch off, when the battery voltage has reached 4.2 V. Charging current is monitored by measuring the voltage drop across a 220 mOhm resistor.

Power Distribution

In normal operation the baseband is powered from the phone's battery. The battery consists of one Lithium-Ion cell. In the case of RH-17, the battery capacity is 850 mAh.

The UEM ASIC controls the power distribution to whole phone through the BB and RF regulators excluding the power amplifier (PA), which has a continuous power rail directly from the battery. The battery feeds power directly to following parts of the system: UEM, PA, buzzer, Vibra, display- and keyboard lights.

The heart of the power distribution to the phone is the power control ASIC, called UEM. It includes all the voltage regulators and feeds power to the whole system. UEM handles hardware functions of power up so that regulators are not powered and power up reset (PURX) is not released if the battery voltage is less than 3 V.

RH-17 Baseband is powered from five different UEM regulators: VANA, VIO, VFLASH1, VFLASH2, and VCORE. See Table 1.

UEM voltage regulators: VR1A, VR1B, VR2, VR3, VR4, VR5, VR6 and VR7 are used by RF. See Table 2.

Table 1: RH-17 Baseband Regulators

Regulator	Maximum current	Vout [V]	Notes
VCORE	300	1.5	Output voltage selectable 1.0V/ 1.3V/1.5V/1.8V Default power at power-up is 1.5V
VIO	150	1.8	Enabled always except during power-off mode
VFLASH1	70	2.78	Enabled always except during power-off mode
VFLASH2	40	2.78	Enabled only when data cable is connected
VANA	80	2.78	Enabled only when the system is awake (Off during sleep and power-off modes)
VSIM	25	3.0	Not used

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Table 2: RH-17 RF Regulators

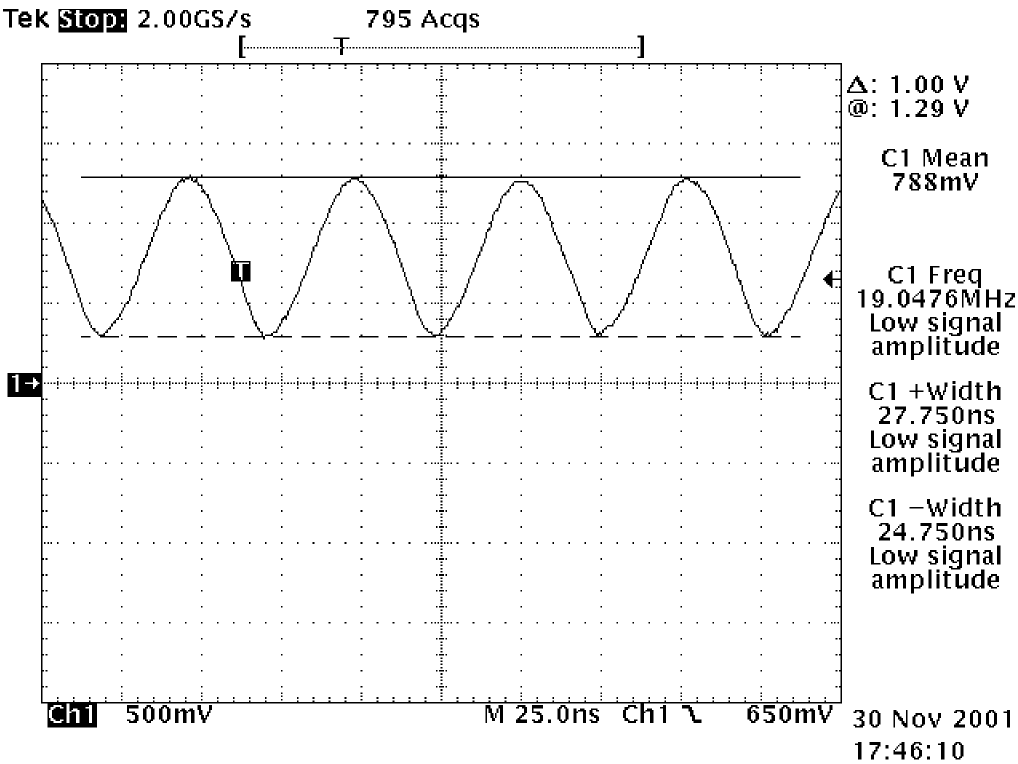
Regulator	Maximum current [mA]	Vout [V]	Notes
VR1A	10	4.75	Enabled when the receiver is on
VR1B	10	4.75	Enabled when the transmitter is on
VR2	100	2.78	Enabled when the transmitter is on
VR3	20	2.78	Enabled when SleepX is high
VR4	50	2.78	Enabled when the receiver is on
VR5	50	2.78	Enabled when the receiver is on
VR6	50	2.78	Enabled when the transmitter is on
VR7	45	2.78	Enabled when the receiver is on

A charge pump used by VR1A is constructed around UEM. The charge pump works with Cbus (1.2 MHz Clk) and gives a 4.75 V regulated output voltage to RF.

Clock Distribution

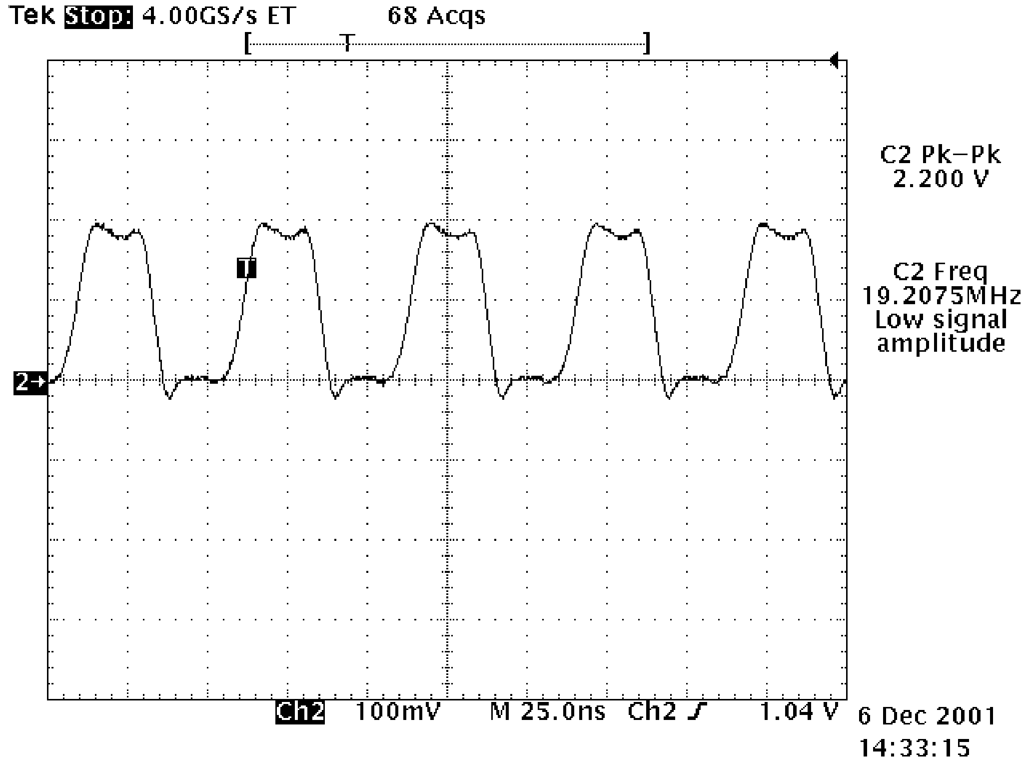
RFClk (19.2 MHz Analog)

The main clock signal for the baseband is generated from the voltage and temperature controlled crystal oscillator VCTCXO (G501). This 19.2 MHz clock signal is generated at the RF and fed to RFCLK pin of UPP.



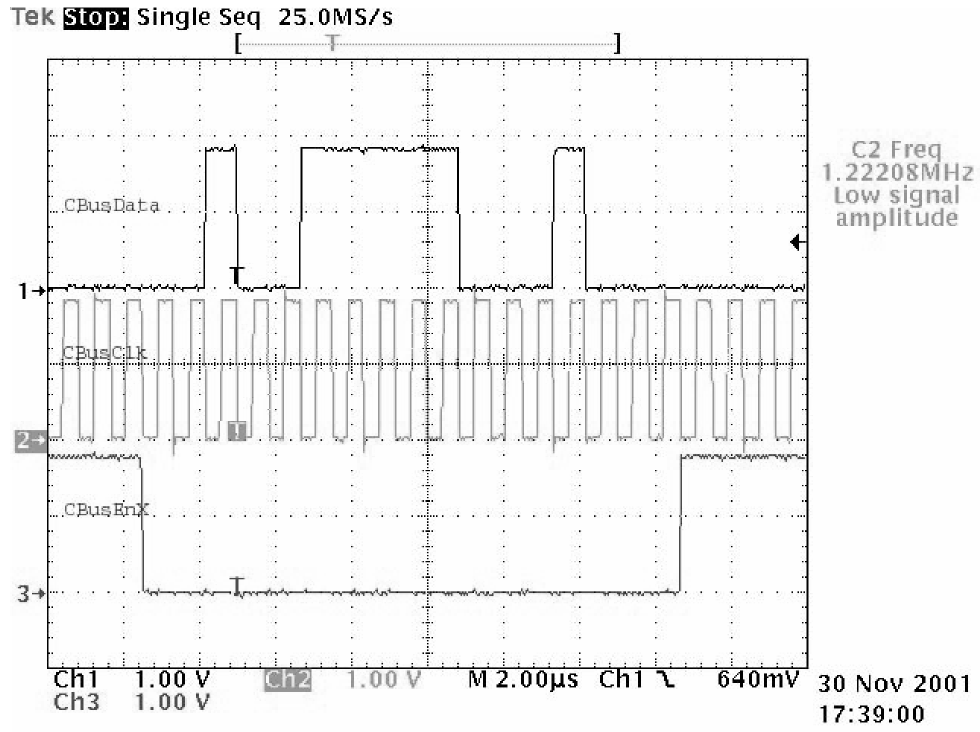
RFConvClk (19.2 MHz digital)

The UPP distributes the 19.2MHz Clk to the internal processors, the DSP and MCU, where SW multiplies this clock by seven for the DSP and by two for the MCU.



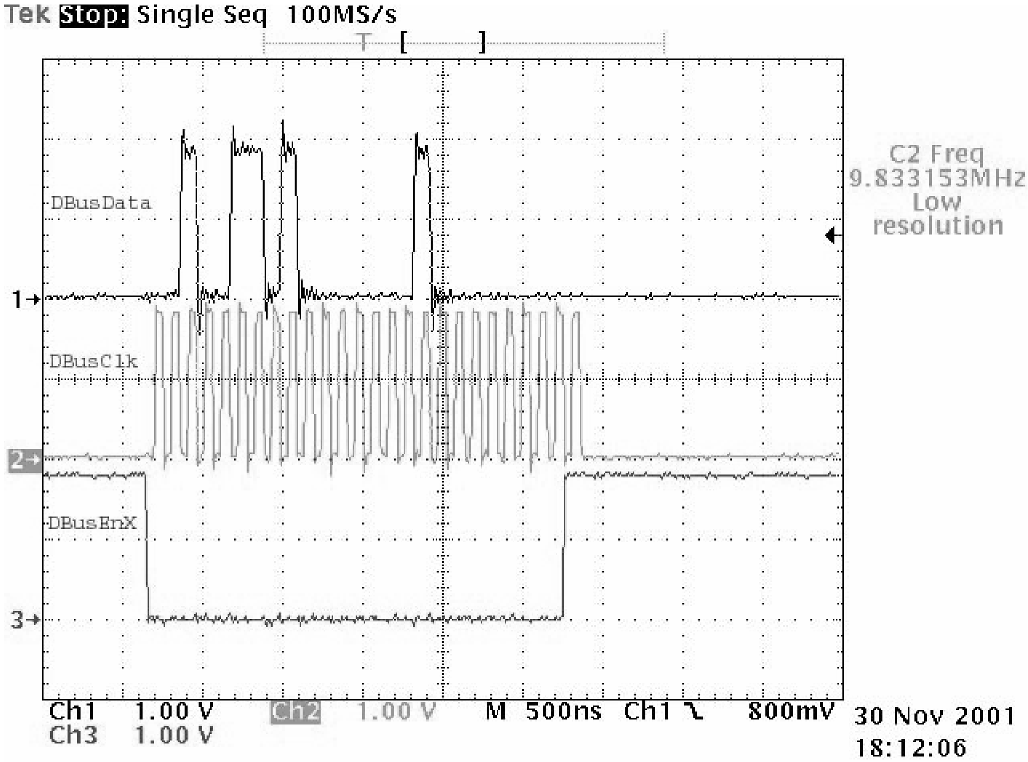
CBUSClk Interface

A 1.2 MHz clock signal is use for CBUS, which is used by the MCU to transfer data between UEM and UPP.



DBUSClk Interface

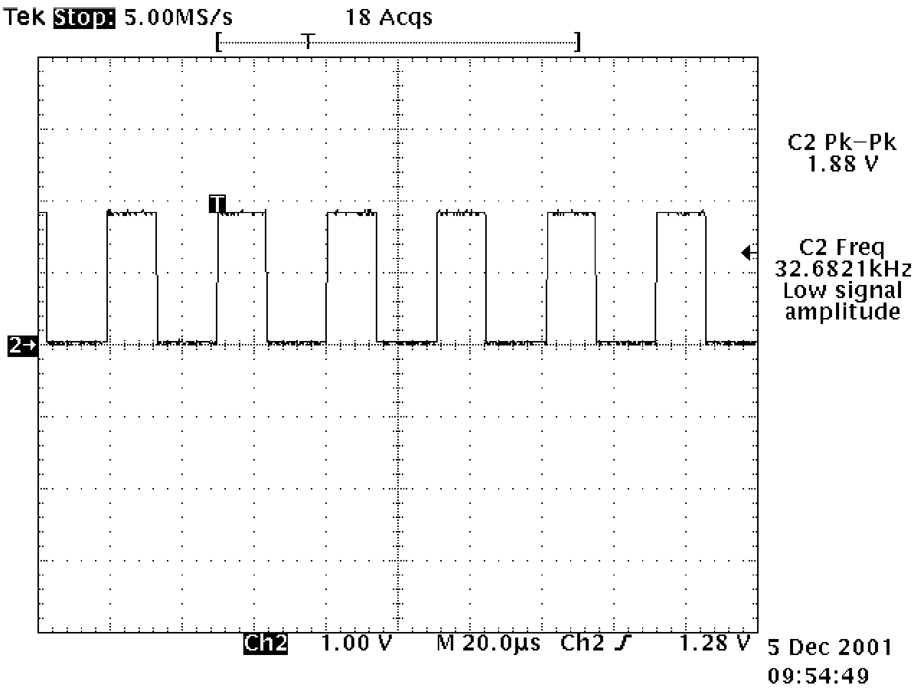
A 9.6 MHz clock signal is use for DBUS, which is used by the DSP to transfer data between UEM and UPP.



The system clock can stopped during sleep mode by disabling the VCTCXO power supply from the UEM regulator output (VR3) by turning off the controlled output signal SleepX from UPP.

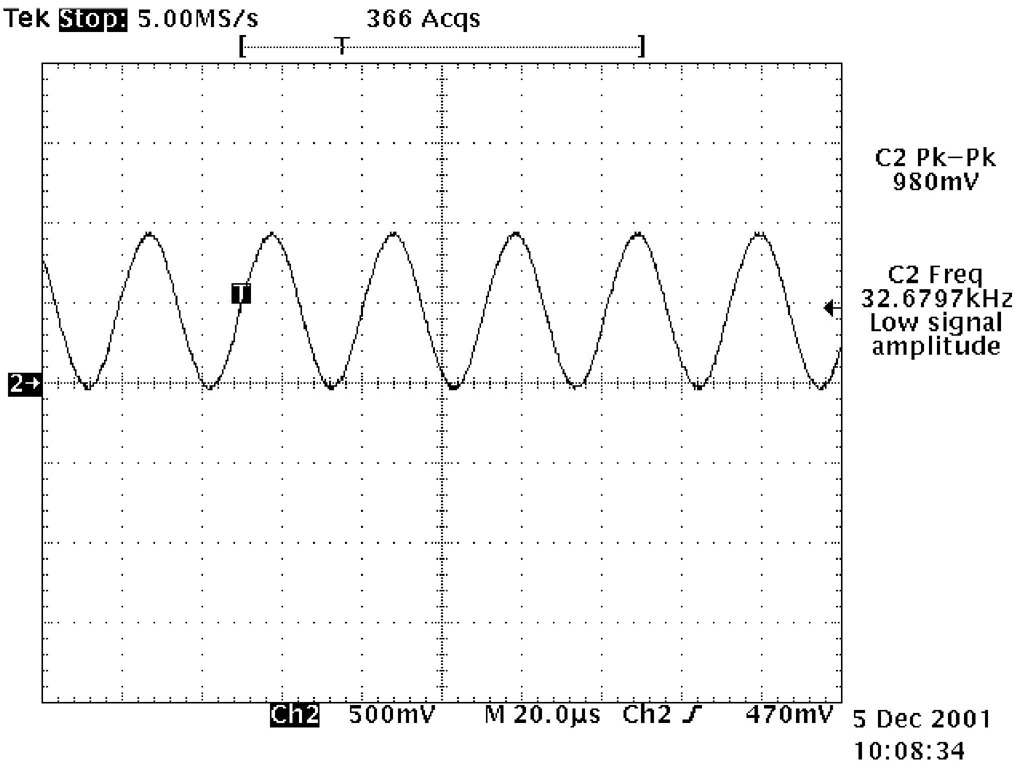
SLEEPClk (Digital)

The UEM provides a 32kHz sleep clock for internal use and to UPP, where it is used for the sleep mode timing.



SLEEPClk (Analog)

However, when the system enters sleep mode or power-off mode, the external 32KHz crystal provides a reference to the UEM RTC circuit to turn on the phone during power-off or sleep mode.



Flash programming

Connections to Baseband

The Flash programming equipment is connected to the baseband using test pads for galvanic connection. The test pads are allocated in such a way that they can be accessed when the phone is assembled. The flash programming interface consist of the VPP, FBUSTX, FBUSRX, MBUS, and BSI signals and use by the FPS8 to flash. The connection is through the UEM which means that the logic voltage levels are corresponding to 2.78V. Power is supplied to the phone using the battery contacts.

Baseband Power Up

The Baseband power is controller by the flash prommer in production and in reprogramming situations. Applying supply voltage to the battery terminals will cause the Baseband to power-up. Once the baseband is powered, flash-programming indication is done as described in the following section.

Flash Programming Indication

Flash programming is indicated to the UPP using MBUSRX signal between UPP and UEM. The MBUS signal from the baseband to the flash prommer is used as clock for the synchronous communication. The flash prommer keeps the MBUS line low during UPP boot to indicate that the flash prommer is connected. If the UPP MBUSRX signal is low on UPP the MCU enters flash programming mode. In order to avoid accidental entry to the flash-programming mode the MCU only waits for a specified time to get input data from the flash prommer. If the timer expires without any data being received the MCU will continue the boot sequence. The MBUS signal from UEM to the external connection is used as clock during flash programming. This means that flash-programming clock is supplied to UPP on the MBUSRX signal.

The flash prommer indicates the UEM that flash programming/reprogramming by writing an 8-bit password to the UEM. The data is transmitted on the FBUSRX line and the UEM clocks the data on the FBUSRX line into a shift register. When the 8 bits have been shifted in the register, the flash prommer generates a falling edge on the BSI line. This loads the shift register content in the UEM into a compare register. If the 8-bits in the compare registers matches with the default value preset in the UEM, programming starts. At this point the flash prommer shall pull the MBUS signal to UEM low in order to indicate to the MCU that the flash prommer is connected. The UEM reset state machine performs a reset to the system, PURX low for 20 ms. The UEM flash programming mode is valid until MCU sets a bit in the UEM register that indicates the end of flash programming. Setting this bit also clears the compare register in the UEM previously loaded at the falling edge of the BSI signal. During the flash programming mode the UEM watchdogs are disabled. Setting the bit indicating end of flash programming enables and resets the UEM watchdog timer to its default value. Clearing the flash programming bit also causes the UEM to generate a reset to the UPP.

The BSI signal is used to load the value into the compare register. In order to avoid spurious loading of the register the BSI signal will be gated during UEM master reset and during power on when PURX is active. The BSI signal should not change state during normal operation unless the battery is extracted, in this case the BSI signal will be pulled high,

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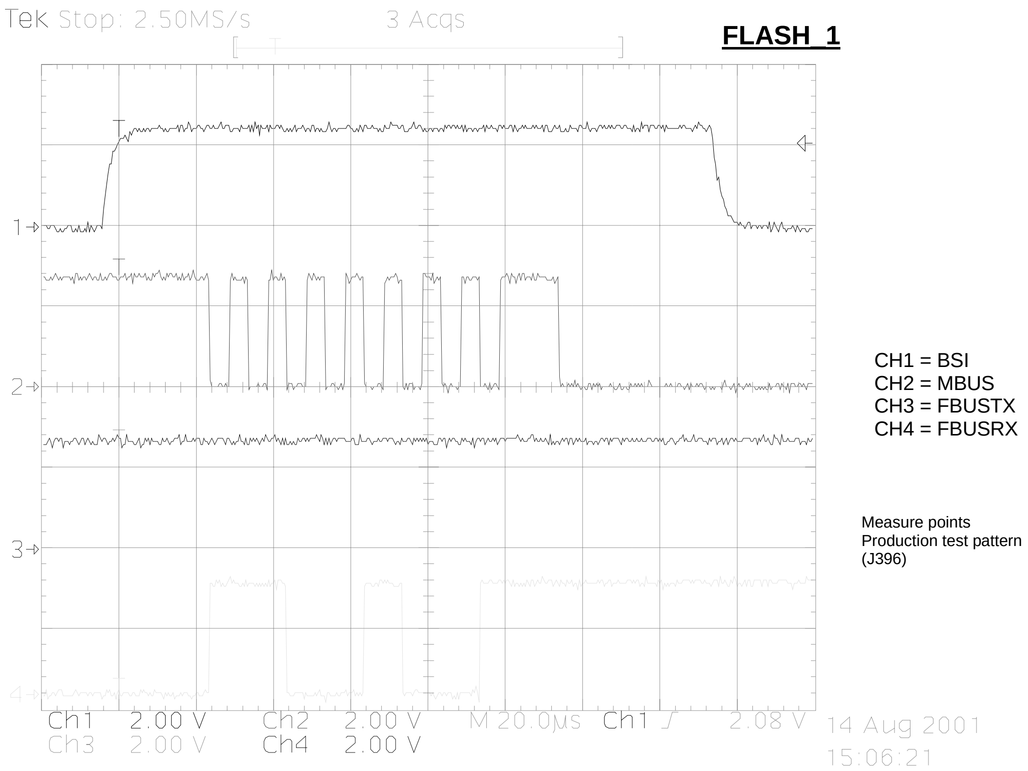
note a falling edge is required to load the compare register.

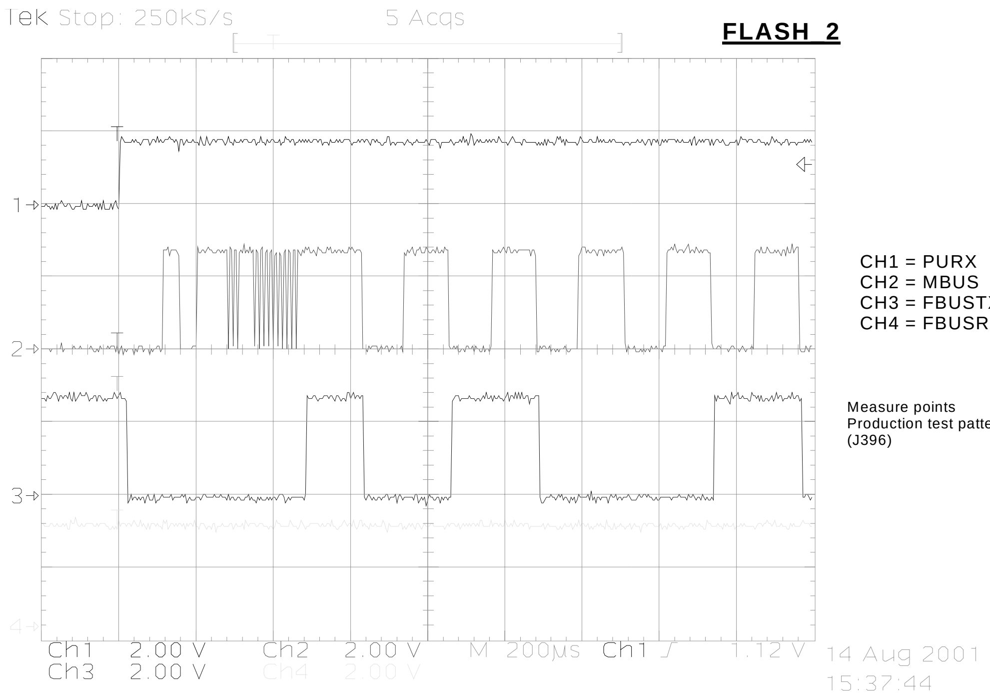
Flashing

- Flash programming is done through VPP, FBUSTX, FBUSRX, MBUS and BSI signals.
- When phone has entered to flash programming mode, prommer will indicate to UEM that flash programming will take place by writing 8-bit password to UEM. Prommer will first set BSI to "1" and then uses FBUSRX for writing and MBUS for clocking. After that BSI is set back to "0”.
- -MCU will indicate to prommer that it has been noticed, by using FBUSTX signal. After this it reports UPP type ID and is ready to receive secondary boot code to it's internal SRAM.



- This boot code asks MCU to report prommer phone’s configuration information, including flash device type. Now prommer can select and send algorithm code to MCU SRAM (and SRAM/Flash self-tests can be executed).

FLASH 2



CH1 = PURX
CH2 = MBUS
CH3 = FBUSTX
CH4 = FBUSRX

Measure points
Production test pattern
(J396)

FLASH 3

CH1 = PURX
CH2 = MBUS
CH3 = FBUSTX
CH4 = FBUSRX

Measure points
Production test pattern
(J396)

Data transfer has started (Fbus_Rx)

Charging operation

Battery

In RH-17, a Lithium-Ion cell battery with a capacity of 850 mAh is used. Reading a resistor inside the battery pack on the BSI line indicates the battery size. With an NTC-resistor on PWB, the phone measures the approximate temperature of the battery on the

BTEMP line.

Temperature and capacity information are needed for charge control. These resistors are connected to BSI pin of the battery connectore and BTEMP of the phone. Phone has 100 kΩ pull-up resistors for these lines so that they can be read by A/D inputs in the phone.

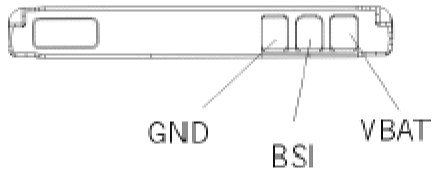


Figure 2: BL-5C battery pack pin order

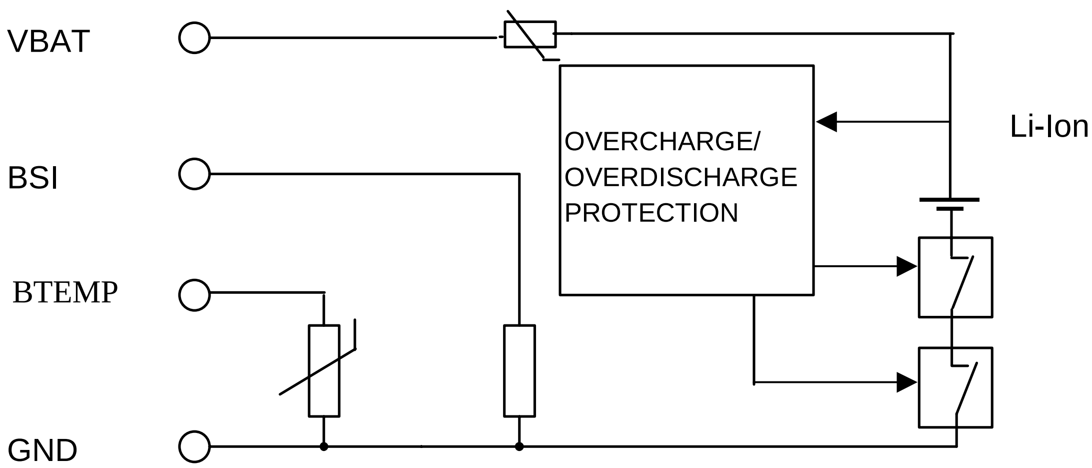


Figure 3: Interconnection diagram inside the battery pack

Charging circuitry

The UEM ASIC controls charging depending on the charger being used and the battery size. External components are needed for EMC, reverse polarity and transient protection of the input to the baseband module. The charger connection is through the system connector interface. The HDb81 baseband is designed to support DCT3 chargers from an electrical point of view. Both 2- and 3-wire type chargers are supported. However, as mention, 3-wire chargers are treated as two.

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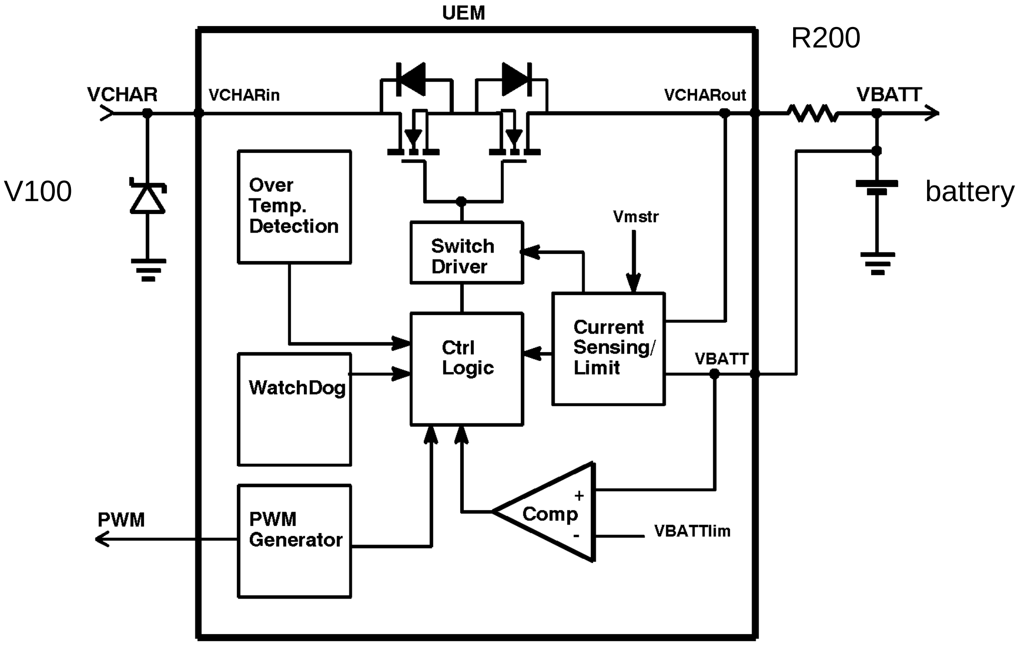

Figure 4: Charging circuitry

Charger Detection

Connecting a charger creates voltage on VCHAR input of the UEM. When VCHAR input voltage level is detected to rise above 2 V (VCHdet+ threshold) by UEM charging starts. VCHARDET signal is generated to indicate the presence of the charger for the SW. The charger identification/acceptance is controlled by EM SW.

The charger recognition is initiated when the EM SW receives a "charger connected" interrupt. The algorithm basically consists of the following three steps:

1. Check that the charger output (voltage and current) is within safety limits.

2. Identify the charger as a two-wire or three-wire charger.

3. Check that the charger is within the charger window (voltage and current).

If the charger is accepted and identified, the appropriate charging algorithm is initiated.

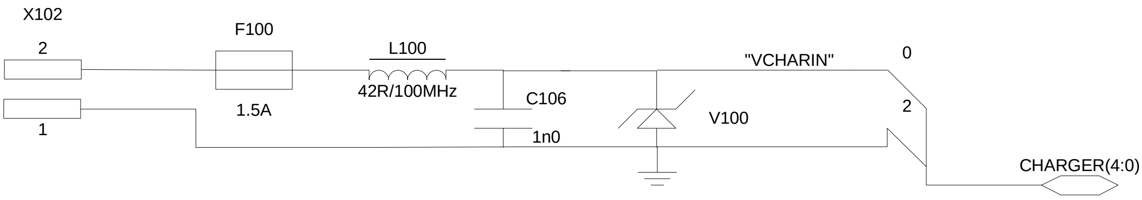

Figure 5: Charging circuit

Charge Control

In active mode, charging is controlled by UEM's digital part. Charging voltage and current monitoring is used to limit charging into safe area. For that reason UEM has programmable charging cut-off limits:

VBATLim1=3.6 V (Default)

VBATLim2L=5.0 V and

VBATLim2H=5.25 V.

VBATLim1, 2L, 2H are designed with hystereses. When the voltage rises above VBATLim1, 2L, 2H+ charging is stopped by turning charging switch OFF. No change in operational mode is done. After voltage has decreased below VBATLim- charging re-starts.

There are two PWM frequencies in use depending on the type of the charger: 2-wire charger uses a 1Hz and a 3-wire charger uses a 32Hz. Duty cycle range is 0% to 100%. Maximum charging current is limited to 1.2 A.

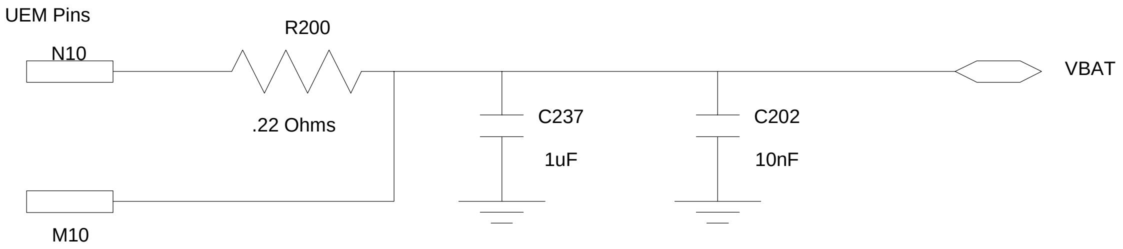

Figure 6: Charging circuit at battery

Audio

The audio control and processing in RH-17 is taken care by UEM, which contains the audio codec, and UPP, which contains the MCU and DSP blocks, handling and processing the audio data signals.

The baseband supports three microphone inputs and two earpiece outputs. The microphone inputs are MIC1, MIC2 and MIC3. MIC1 input is used for the phone's internal microphone; MIC2 input is used for headsets (HDB-4). MIC3 input is used for the Universal Headset. Every microphone input can have either a differential or single ended ac connection to UEM circuit. In RH-17, the internal microphone MIC1 and external microphone MIC2 for Tomahawk accessory detection are both differential. However, the Universal Headset interface is single ended. The microphone signals from different sources are connected to separate inputs at UEM. Inputs for the microphone signals are differential type. Also, MICBIAS1 is used for MIC1 and MICBIAS2 is used for MIC2 and MIC3 (Universal Headset).

Display and Keyboard

LEDs are used for LCD and keypad illumination in RH-17. There are three LEDs for the

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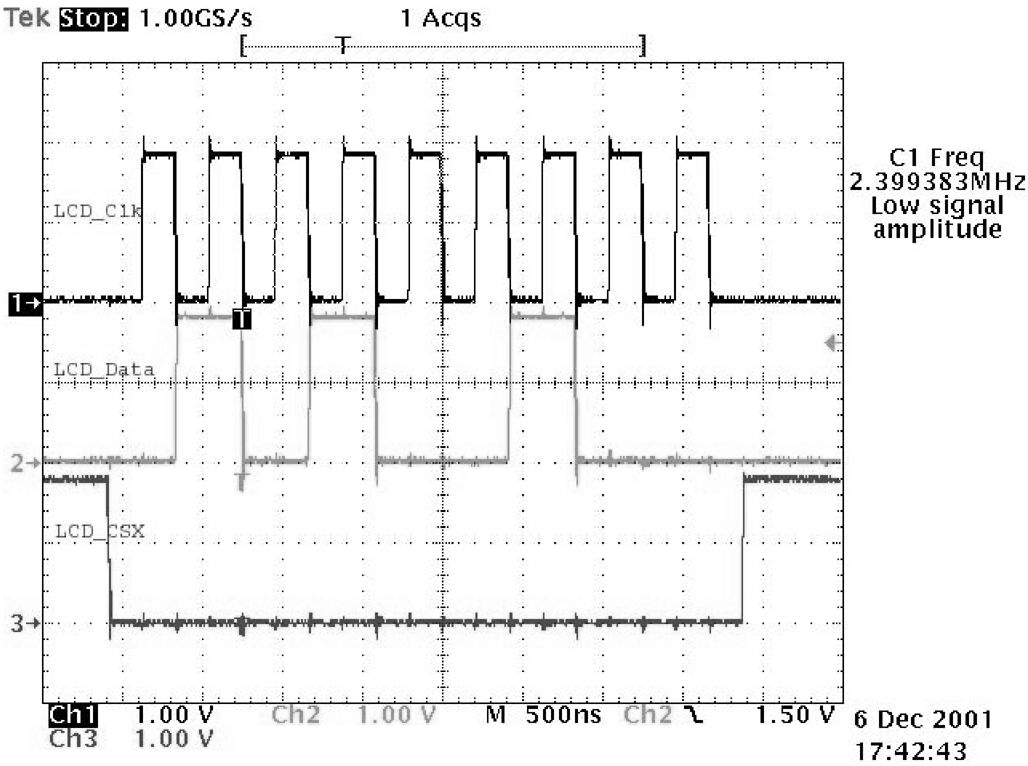
LCD and four LEDs for the keypad. The signal use to drive the LED driver for the LCD and keyboard is KLIGHT.

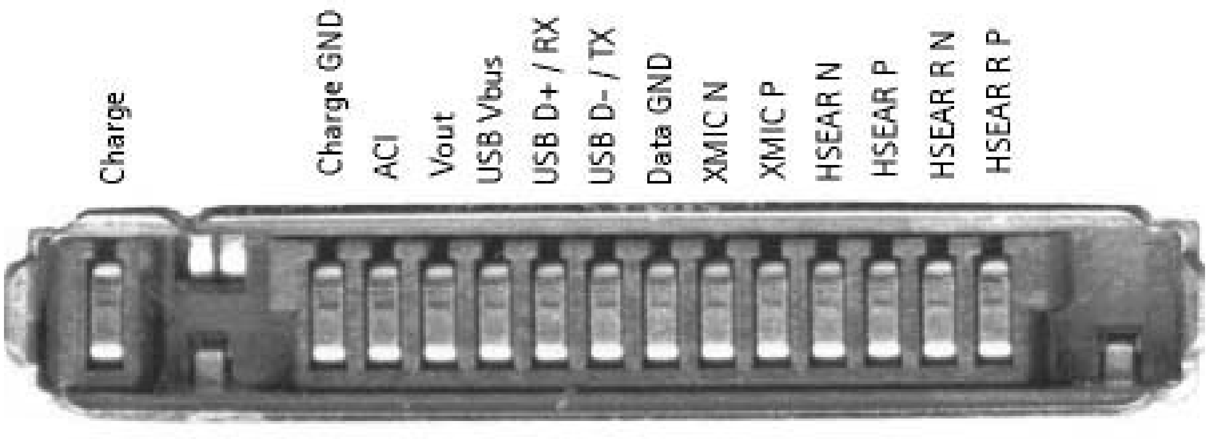
Black/White LCD is used in RH-17. Interface is using 9-bit data transfer. The interface is quite similar to DCT3 type interface except Command/Data information is transferred together with the data. D/C bit set during each transmitted byte.



Accessory

RH-17 is designed to support Tomahawk and Universal Headset accessories, differential and single ended respectively. Detection of Tomahawk accessories is done through the ACI signal were as the Univerals Headset is deteted on GenIO(12).

The following picture shows the pinout of the Tomahawk connector.



The pin out on the Tomahawk connector is as follows:

1 Charger

2 Charger GND

3 ACI

4 Vout

5 USB Vbus

6 USB D+ / Fbus Rx

7 USB D- / Fbus Tx

8 Data GND

9 XMic N

10 XMic P

11 HSear N

12 HSear P

13 HSear R N

14 HSear R P

In Tomahawk accessories, we can perform the following functions: Charging, Accessory detection, FBUS communication, USB communication, and fully differential audio interface for mono and stereo outputs. These modes will be explained on the following sections.

Charging

Charging through the Tomahawk is done same way as through the charger connector. Pin 1 of the Tomahawk is physically connected the charger connector. So when the phone is connected to the desktop charger like the DCV-15, it is charge the same way as is done on the charger connector.

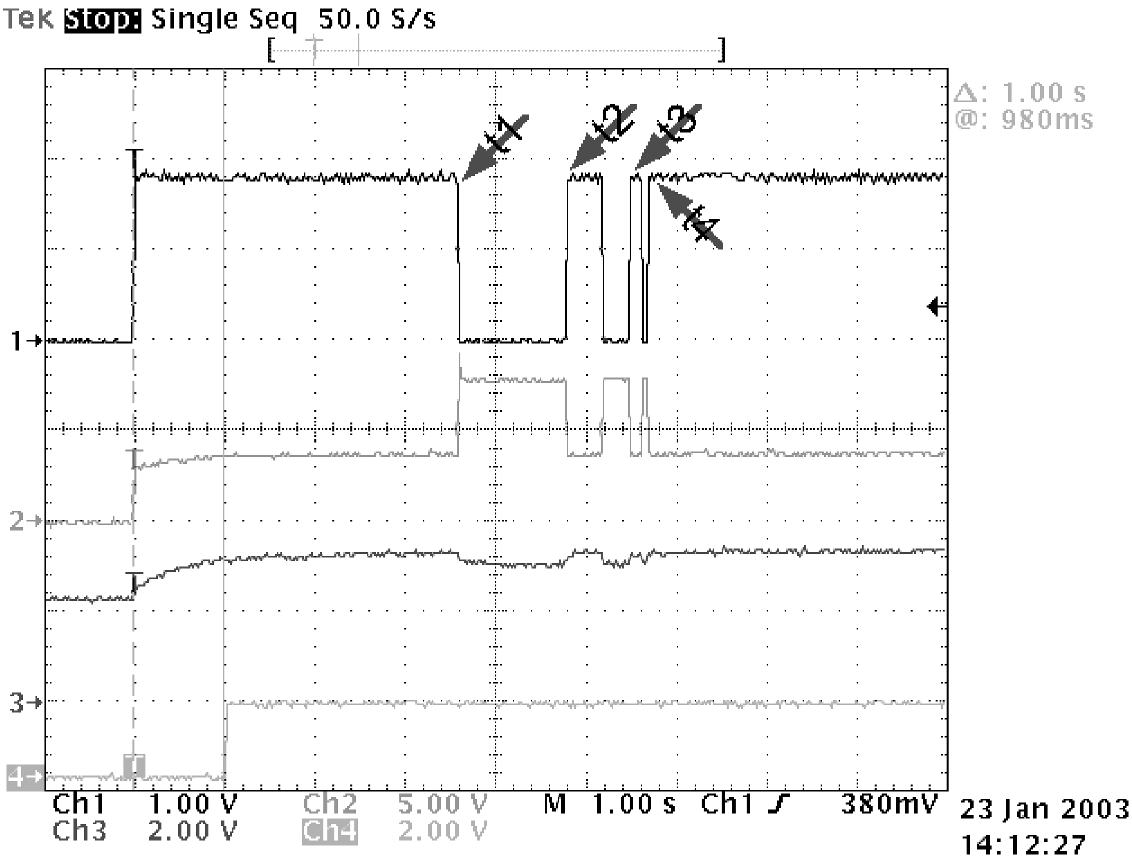
The actual charging sequence can be seen in the following figure. The channels on the figure are as follows:

CH1 = Charging current across the .22 Ohm (R200) resistor on UEMK

CH2 = Charger voltage measure at V100

CH3 = Battery voltage measure at R200

CH4 = PURX



t1: UEM opens charge switch and UPP startup.
t2: This is very very early in phone SW startup where the charge switch is being closed. Charge switch remains closed during OS and server startup to prevent HW cut-off.
t3: EM SW is started and charger recognition SW verifies charger current.
t4: Charger is accepted and Constant Current charging is started.

In Channel 4, we can see that PURX is release and this is when the phone operation goes from “RESET” mode to “POWER_ON” mode.

Tomahawk headset detection

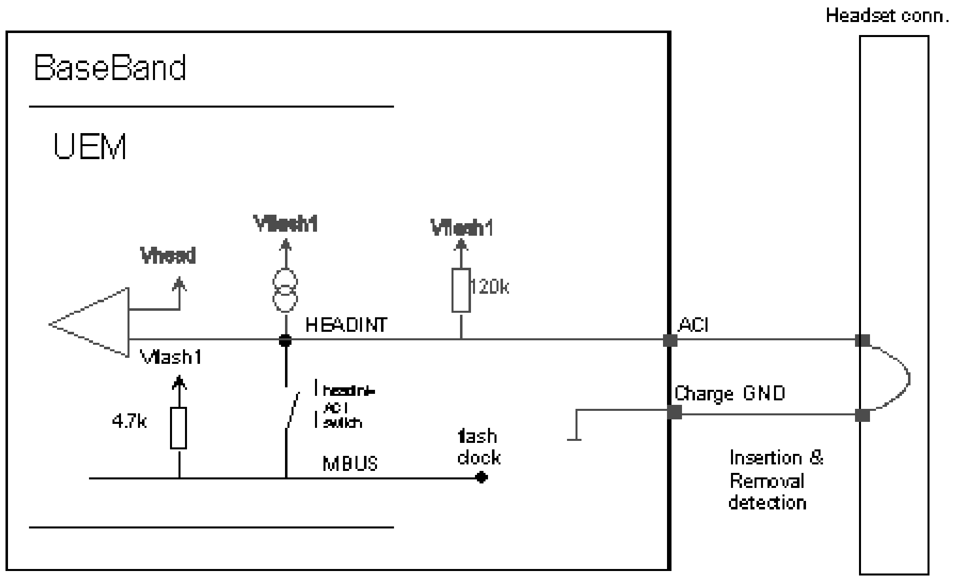
Accessory detection on Tomahawk is done digitally. The pins uses for accessory detection are:

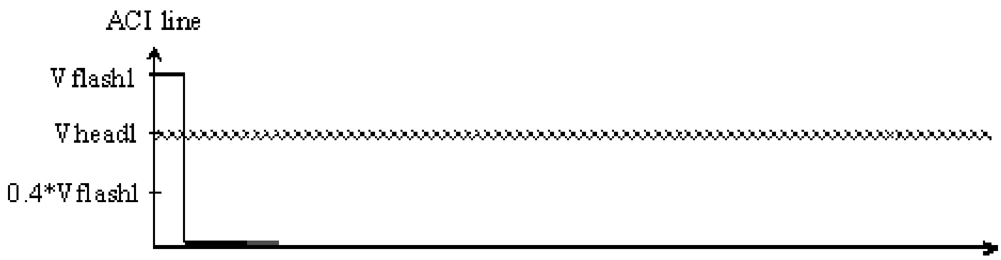
Pin 2 (Charge GND)

Pin 3 (ACI)

Pin 4 (Vout)

A waveform of such detection can be seen in the following figure:





FBus detection

FBus communication in Tomahawk is done through the following lines:

Pin 2 (Charge GND)

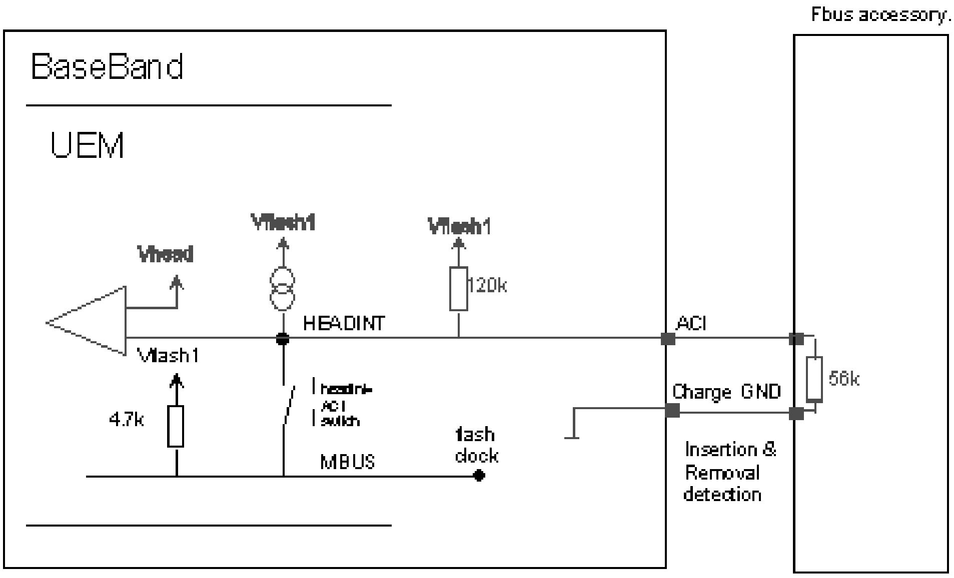
Pin 3 (ACI)

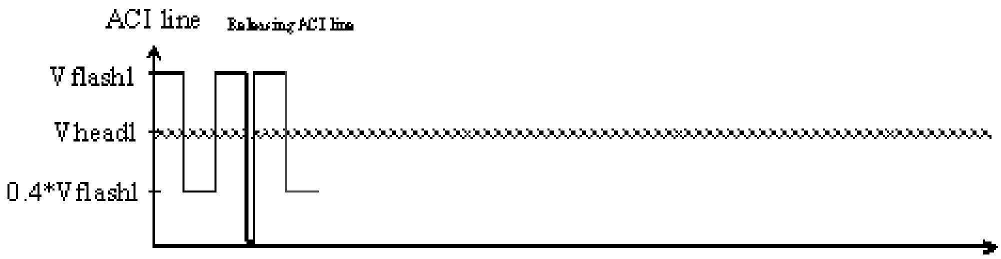
Pin 4 (Vout)

Pin 6 (FBus Rx)

Pin 7 (FBus Tx)

A waveform for such communication is shown:



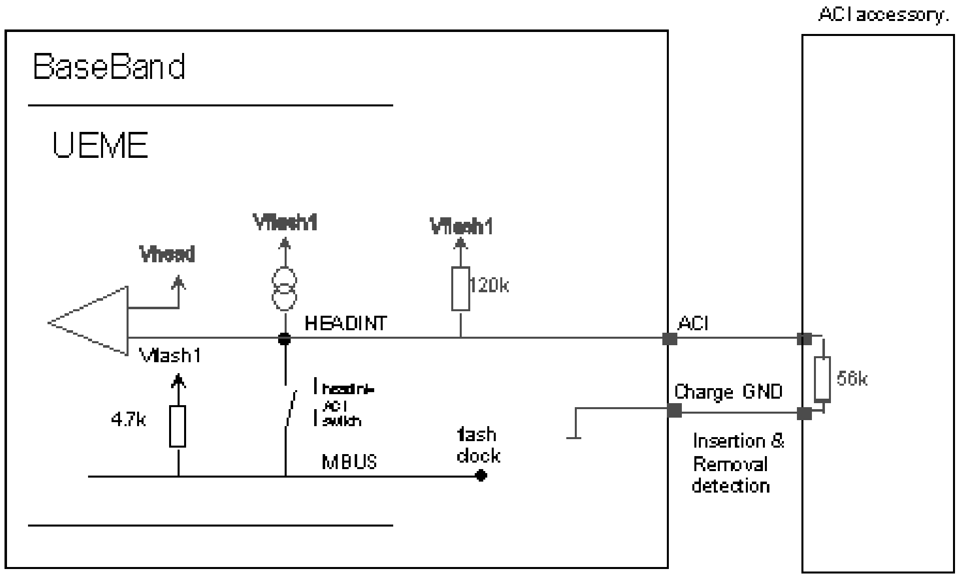


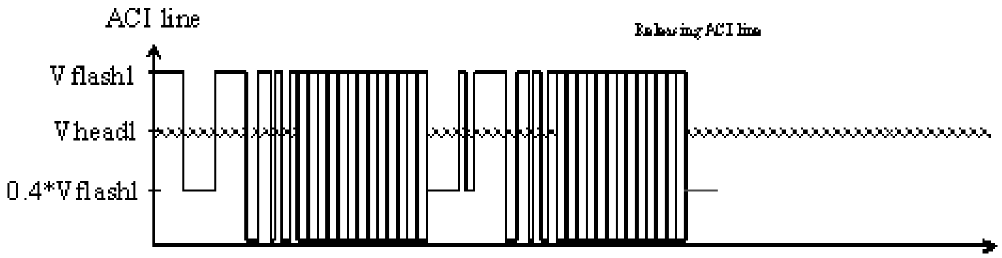
Accessory detection though ACI

USB and Audion (mono or stereo) and FM radio communication in Tomahawk is done through the following signals:

USB	Audio/FM
Pin 5 (USB Vbus)	Pin 9 (XMic N)
Pin 6 (USB +)	Pin 10 (SMIC P)
Pin 7 (USB -)	Pin 11 (HSEAR N)
Pin 8 (Data GND)	Pin 12 (HSEAR P)
	Pin 13 (HSEAR R N)
	Pin 14 (HSEAR R P)

A waveform showing such interface is shown in the following figure:





RUIM (SIM Car)

RH-17 will support RUIM for China products. The waveform below can be use to verify that sim_vcc; sim_i/o, sim_clk and sim_rst signals are activated in the correct sequence at power-up. This picture can be takan when the RUIM is install on the phone and measue the signals when the phone is turned on. The following picture shows the proper waveforms when interface is working. See “Bottom view” diagram for test point’s location.

.

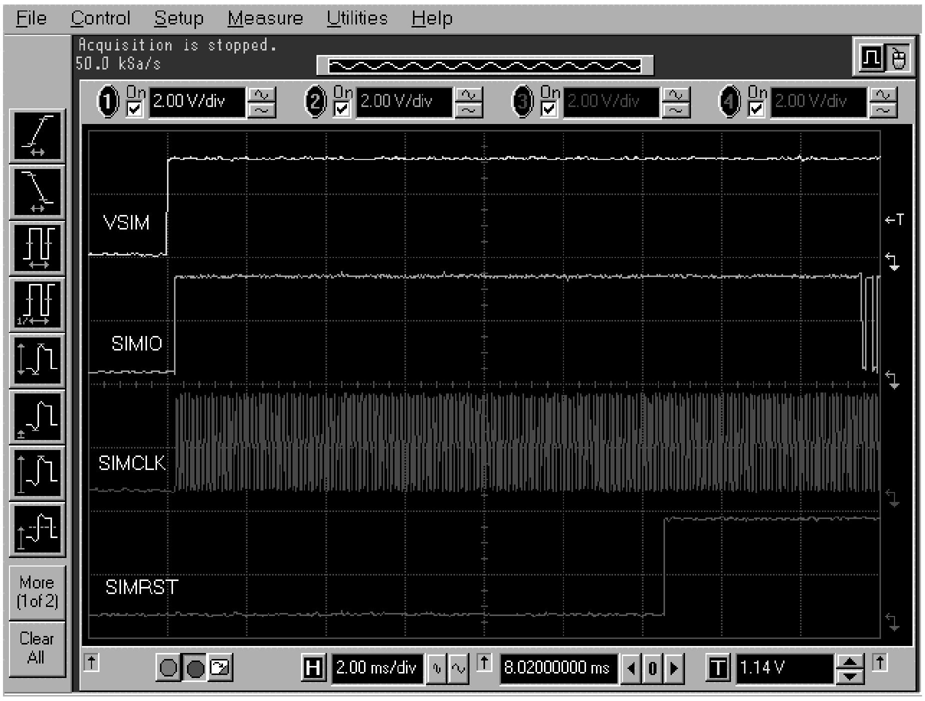
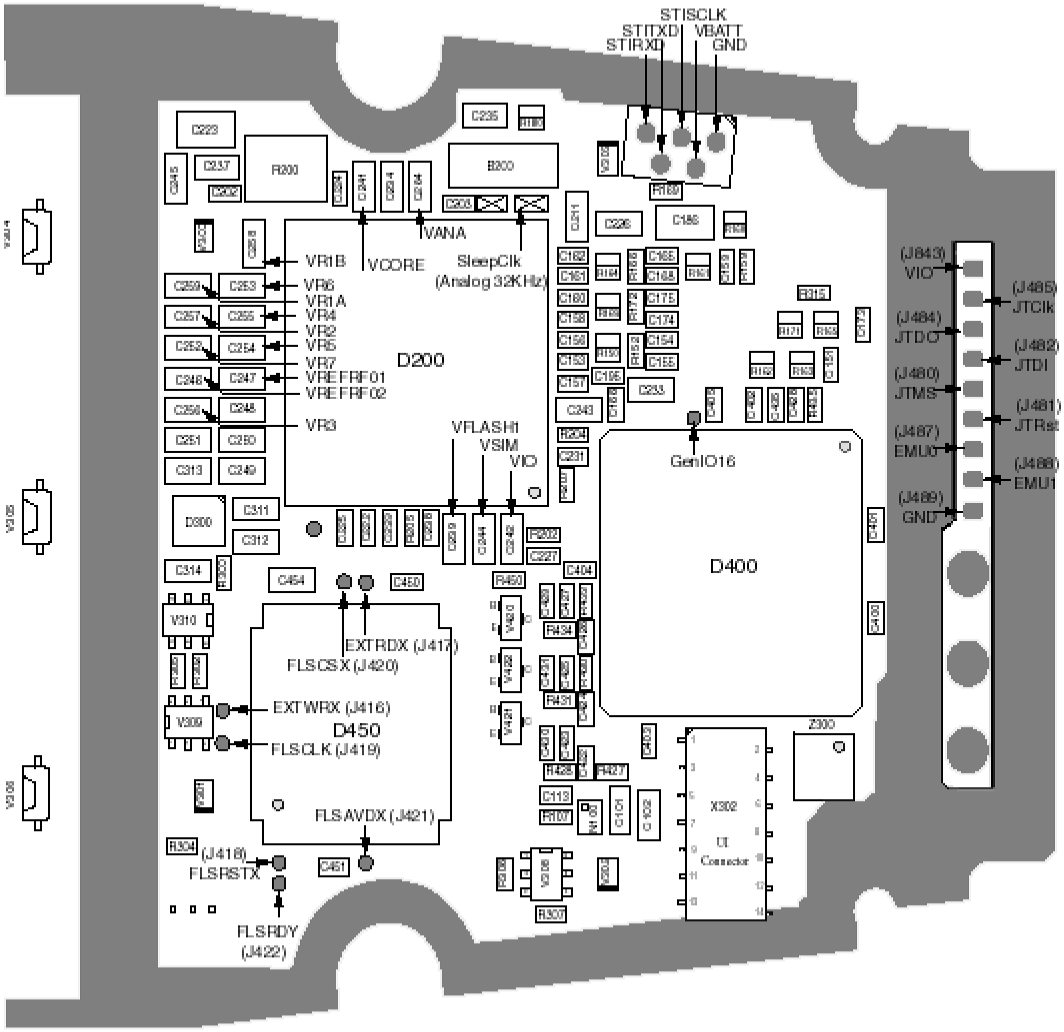


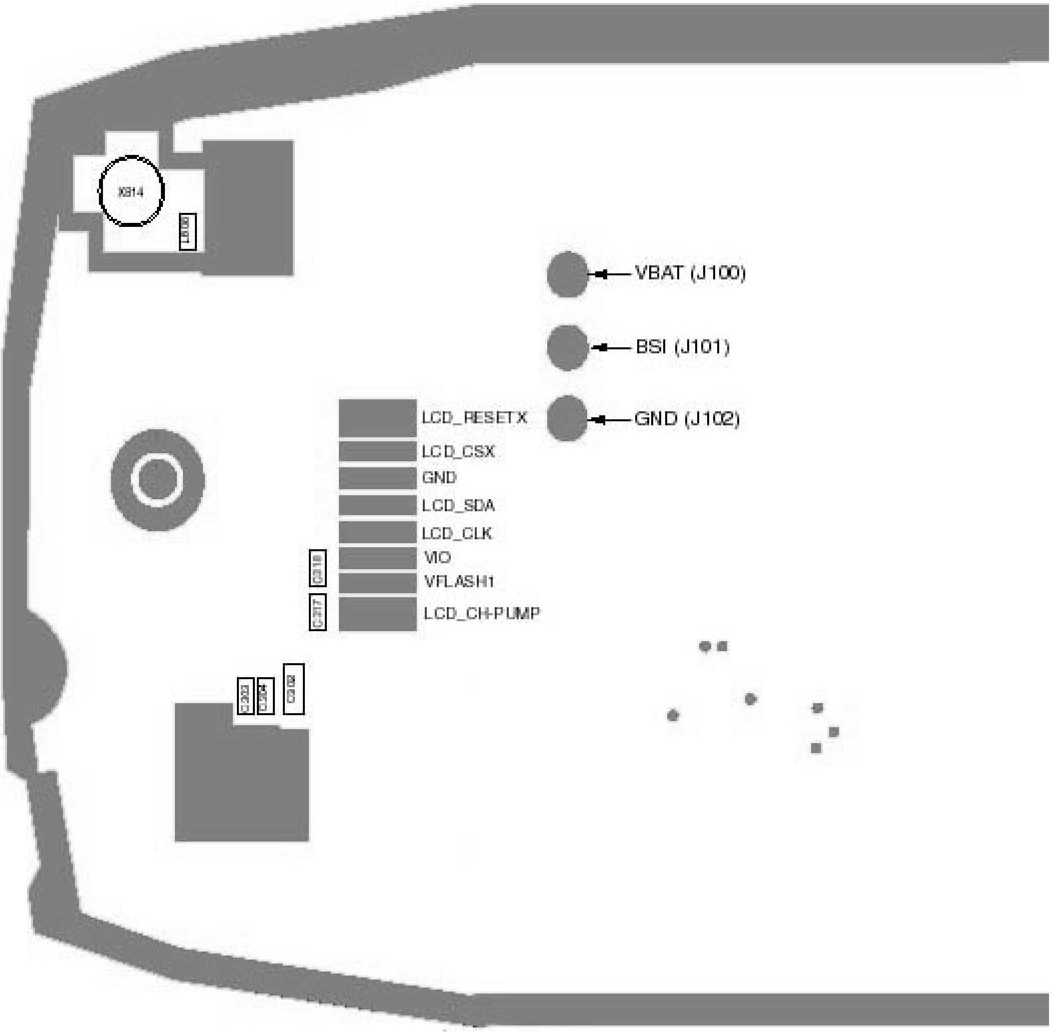
Figure 7: RUIM Signal Waveform

Test Points

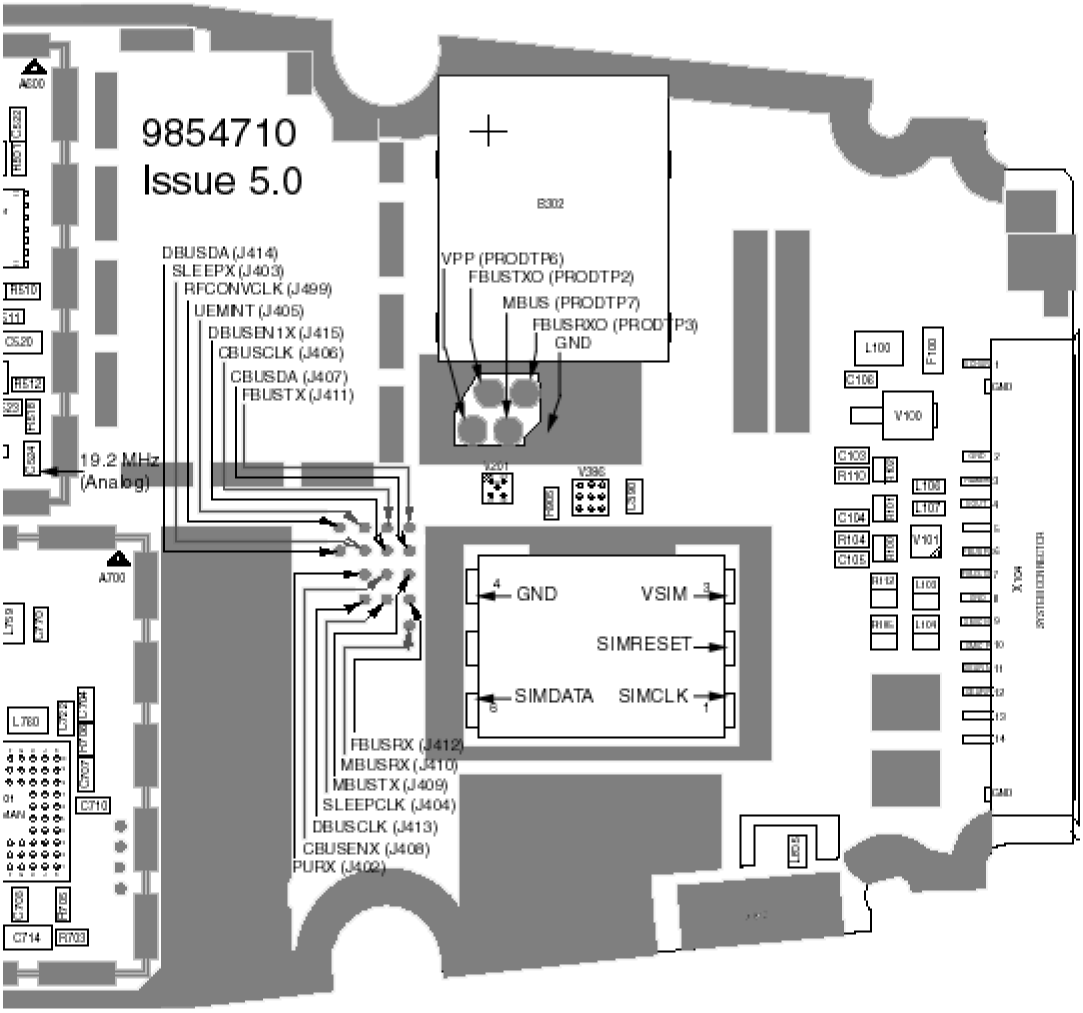
RH-17 (Haukka) BB test points, regulators, and BB ASICs.

Top View


STISCLK
STITXD
VBATT
STIRXD
GND
D200
VR1B
VCORE
VANA
SleepClk
(Analog 32KHz)
VR6
VR1A
VR4
VR2
VR5
VR7
VREFRF01
VREFRF02
VR3
VFLASH1
VSIM
VIO
GenIO16
D400
(J843)
VIO
(J485)
JTClk
(J484)
JTDO
(J482)
JTDI
(J480)
JTMS
(J481)
JTRst
(J487)
EMU0
(J488)
EMU1
(J489)
GND
EXTRDX (J417)
FLSCSX (J420)
EXTWRX (J416)
D450
FLSCLK (J419)
FLSAVDX (J421)
(J418)
FLSRSTX
FLSRDY
(J422)
X302
UI
Connector
Z300


VBAT (J100)
BSI (J101)
GND (J102)
LCD_RESETX
LCD_CSX
GND
LCD_SDA
LCD_CLK
VIO
VFLASH1
LCD_CH-PUMP

Bottom View



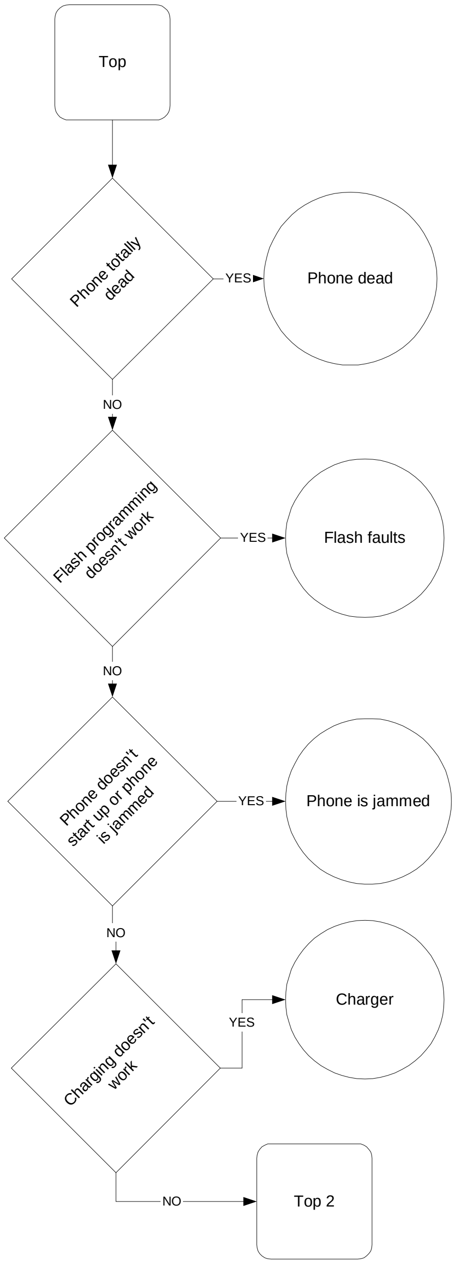
Troubleshooting

The following hints should help to find the cause of the problems when the circuitry seems to be faulty. This troubleshooting instruction is divided into the following sections.

1. Top troubleshooting map
2. Phone is totally dead
3. Power doesn't stay on or the phone is jammed
4. Flash programming doesn't work
5. Display is not working
6. Audio fault
7. Charging 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
c) ASIC orientations are OK

Top troubleshooting map



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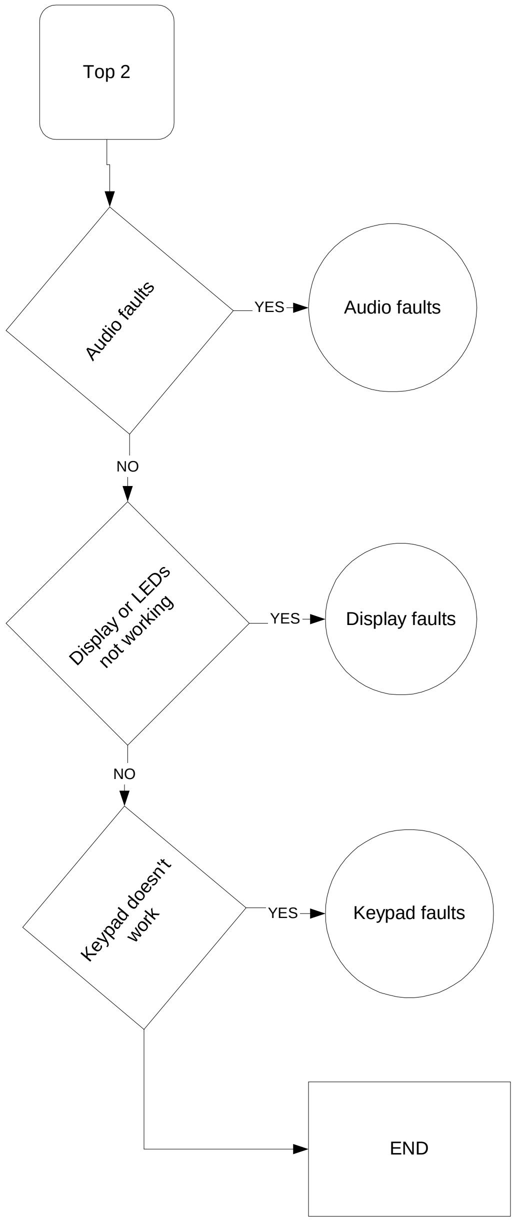
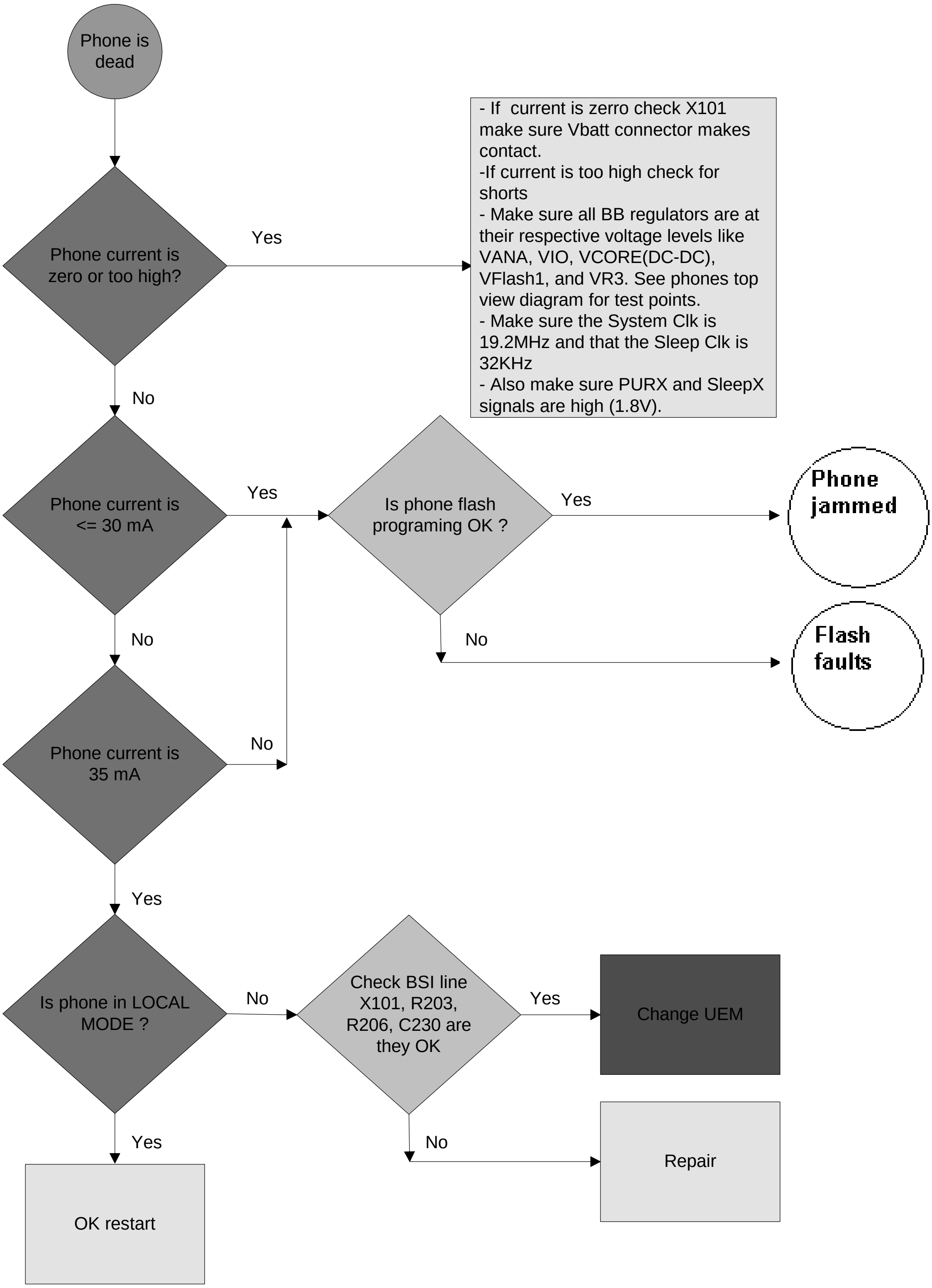

Top 2
Audio faults
YES
Audio faults
NO
Display or LEDs not working
YES
Display faults
NO
Keypad doesn't work
YES
Keypad faults
END

Phone is totally dead



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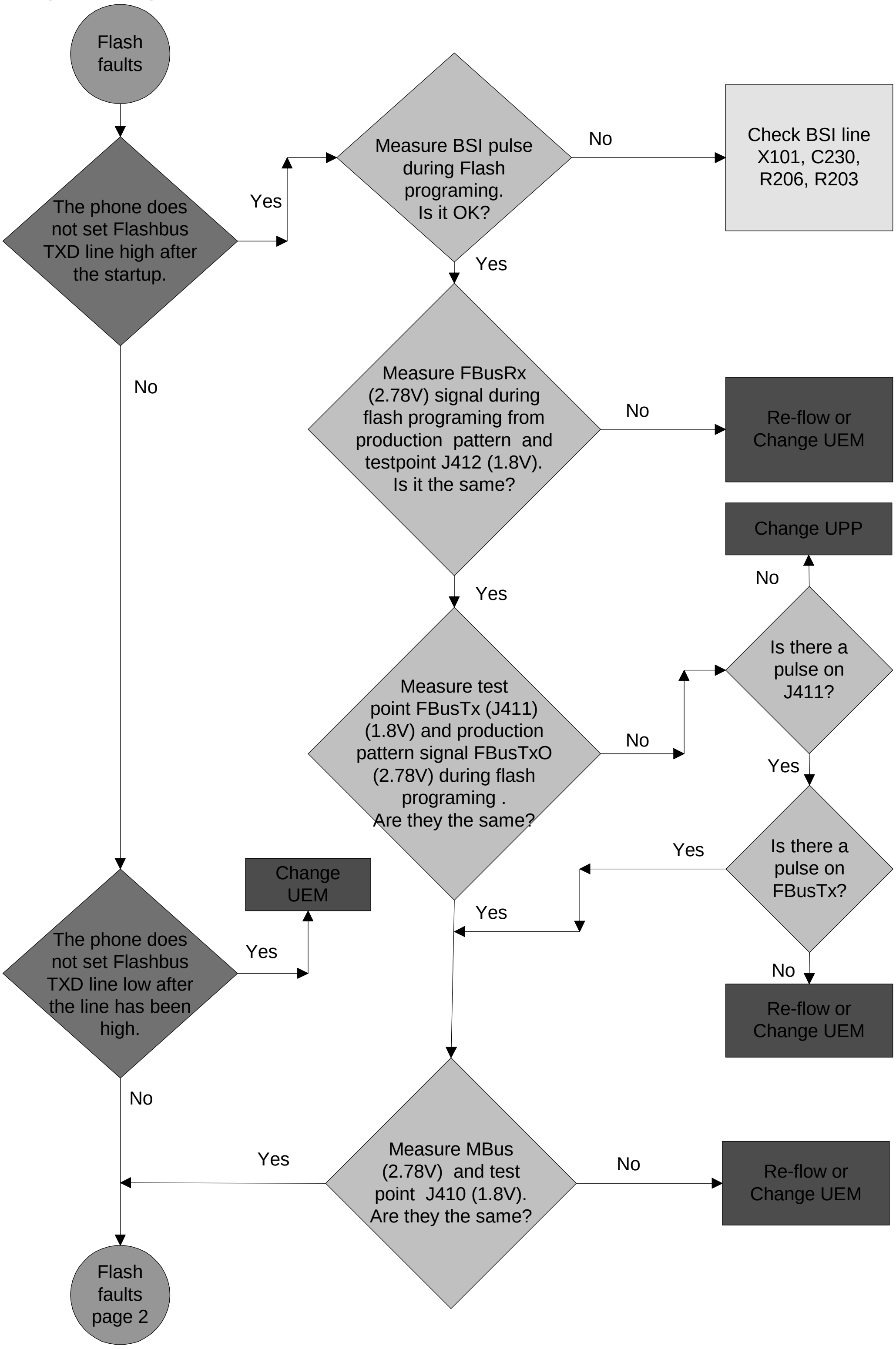
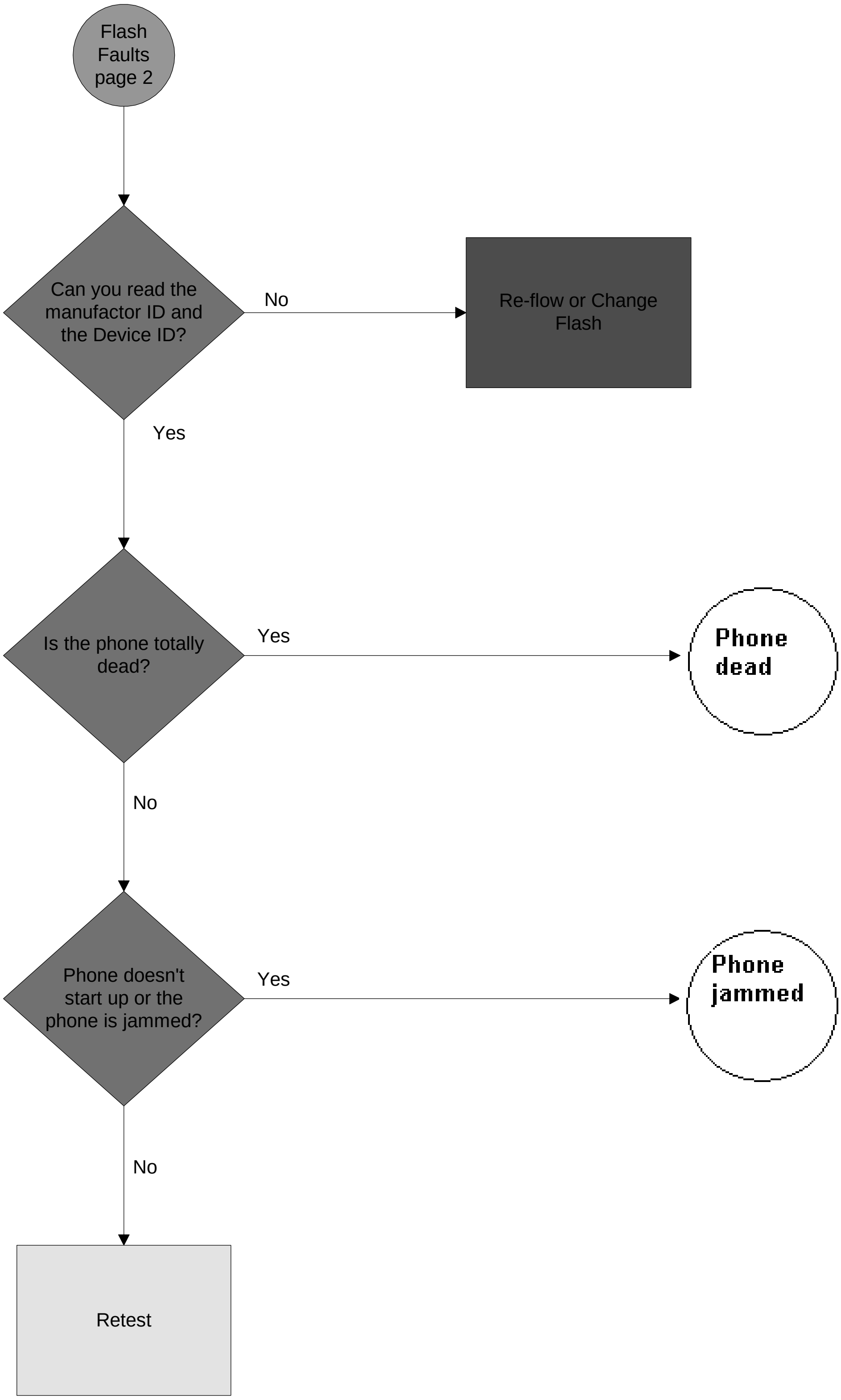
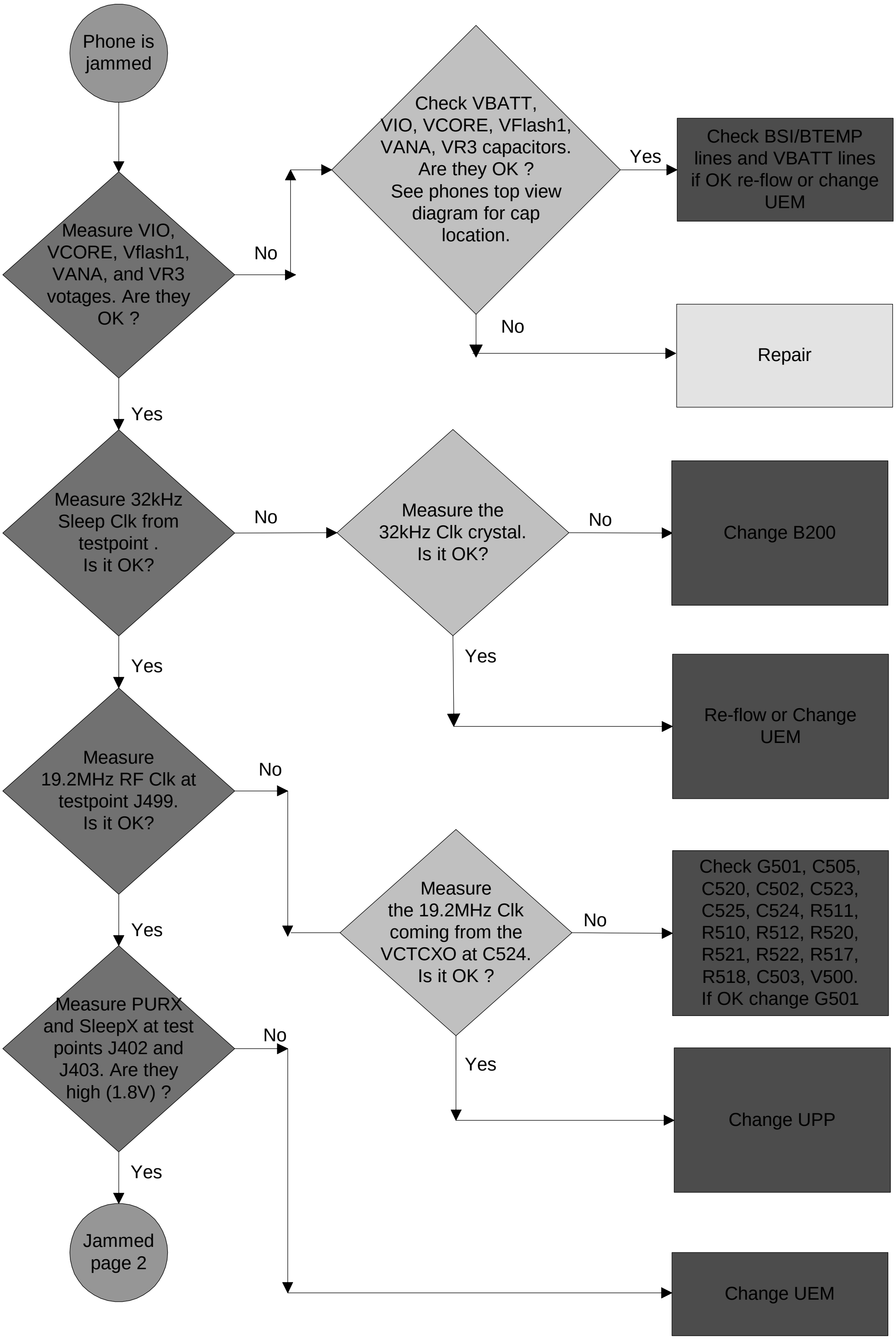
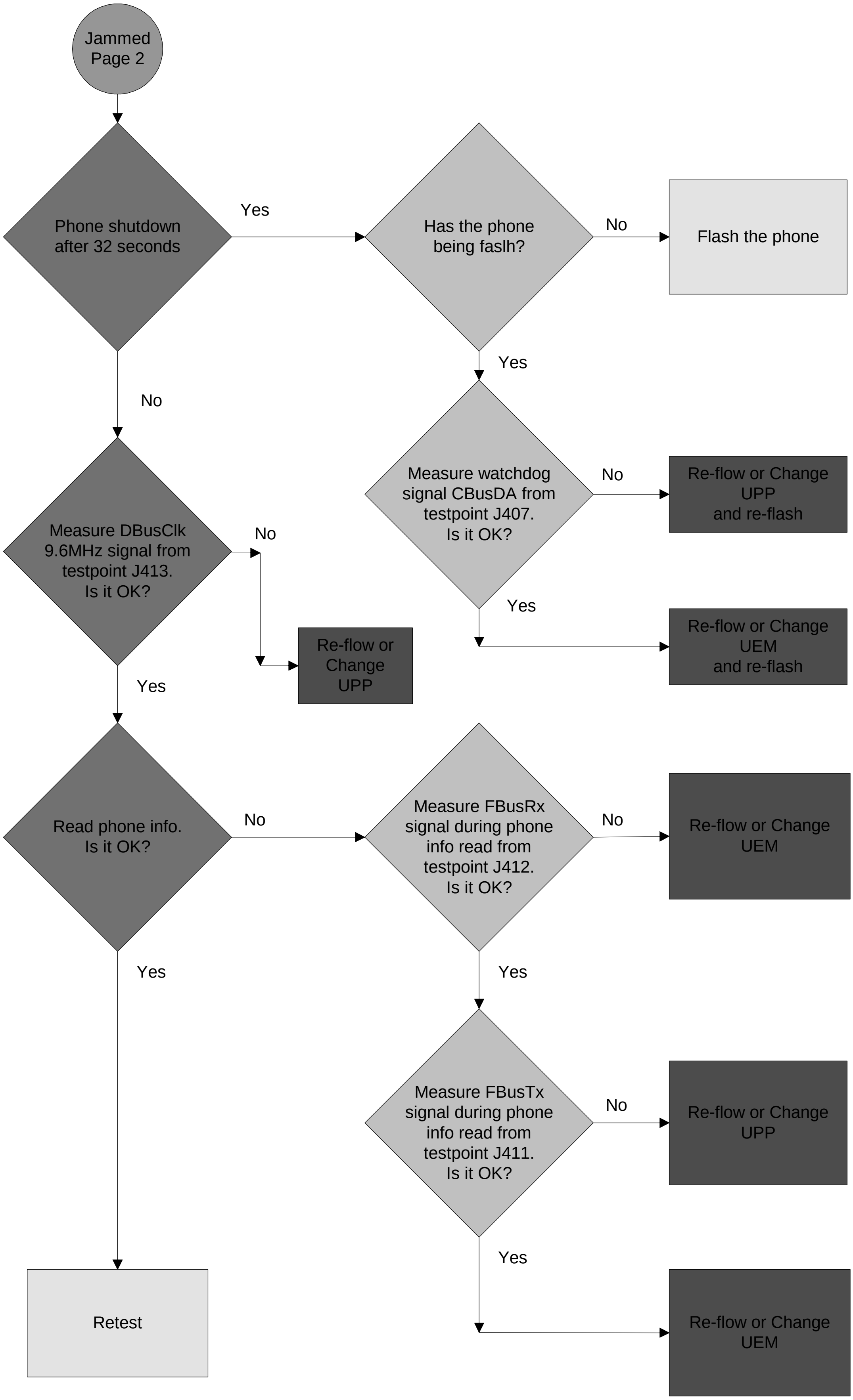
Flash programming doesn't work



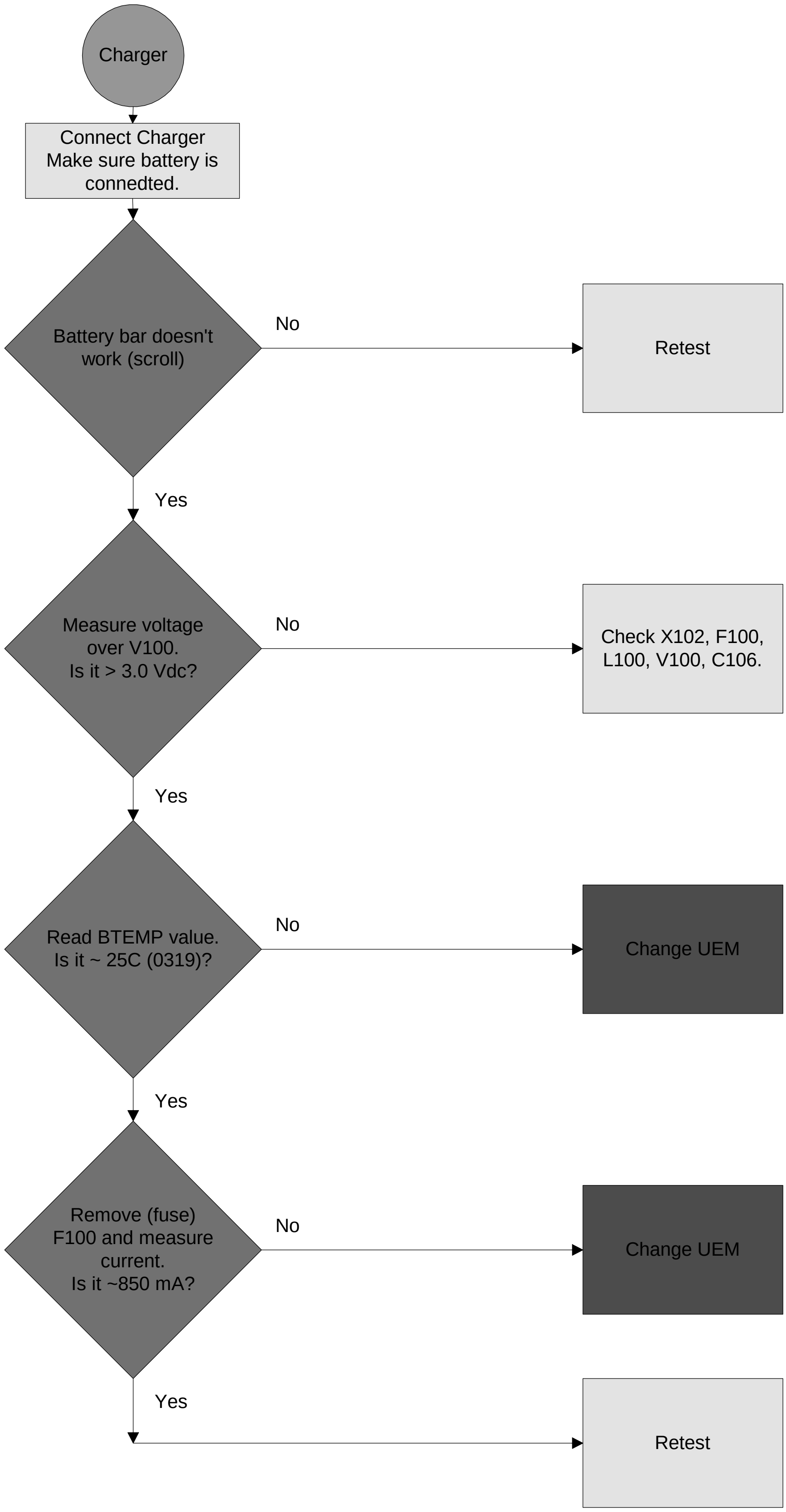

Flash Faults page 2
Can you read the manufactor ID and the Device ID?
No
Re-flow or Change Flash
Yes
Is the phone totally dead?
Yes
Phone dead
No
Phone doesn't start up or the phone is jammed?
Yes
Phone jammed
No
Retest

Power doesn't stay on or the phone is jammed

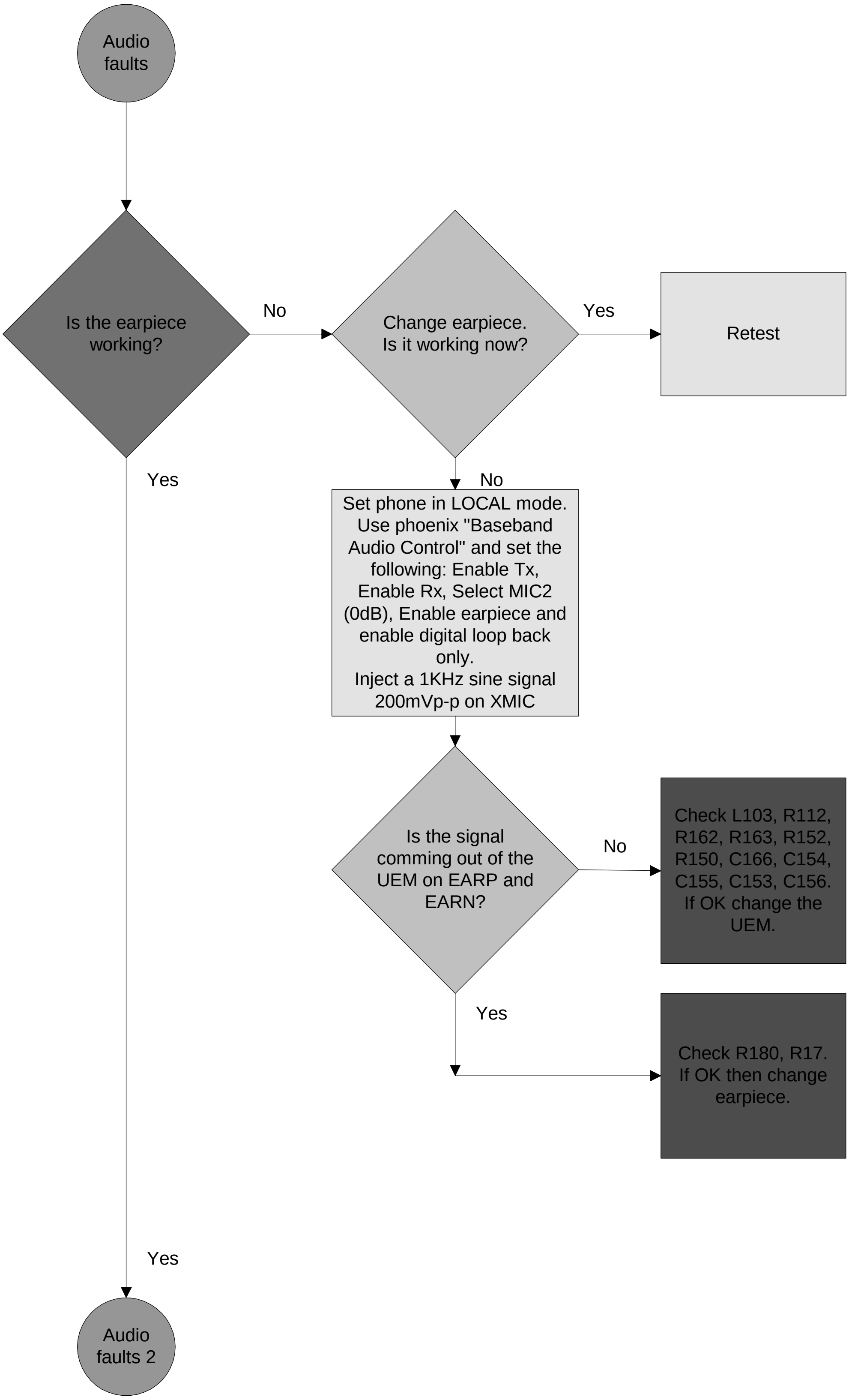


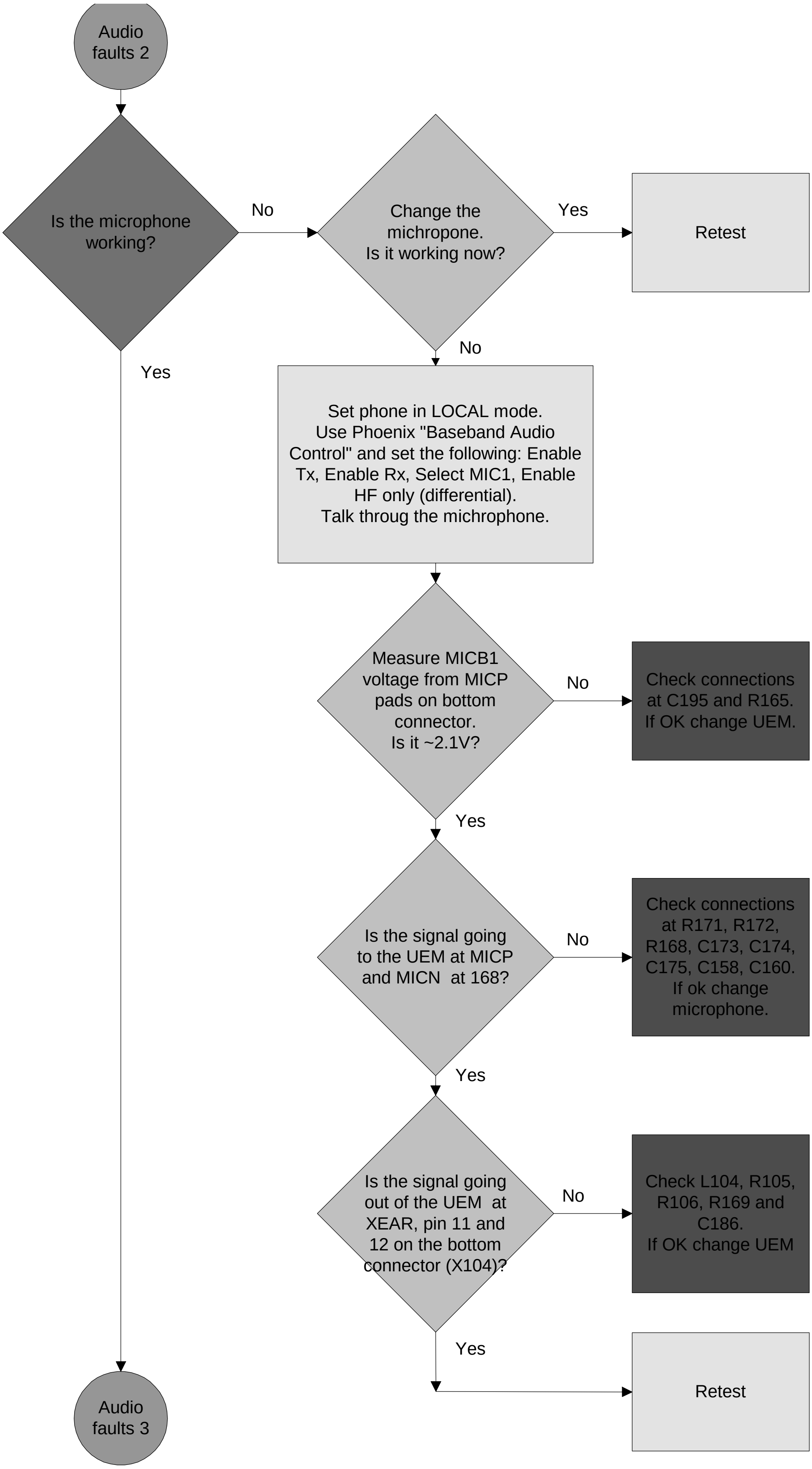

Jammed
Page 2
Phone shutdown
after 32 seconds
Yes
Has the phone
being faslh?
No
Flash the phone
Yes
No
Measure watchdog
signal CBusDA from
testpoint J407.
Is it OK?
No
Re-flow or Change
UPP
and re-flash
Measure DBusClk
9.6MHz signal from
testpoint J413.
Is it OK?
No
Yes
Re-flow or Change
UEM
and re-flash
Re-flow or
Change
UPP
Yes
Read phone info.
Is it OK?
No
Measure FBusRx
signal during phone
info read from
testpoint J412.
Is it OK?
No
Re-flow or Change
UEM
Yes
Yes
Measure FBusTx
signal during phone
info read from
testpoint J411.
Is it OK?
No
Re-flow or Change
UPP
Yes
Retest
Re-flow or Change
UEM

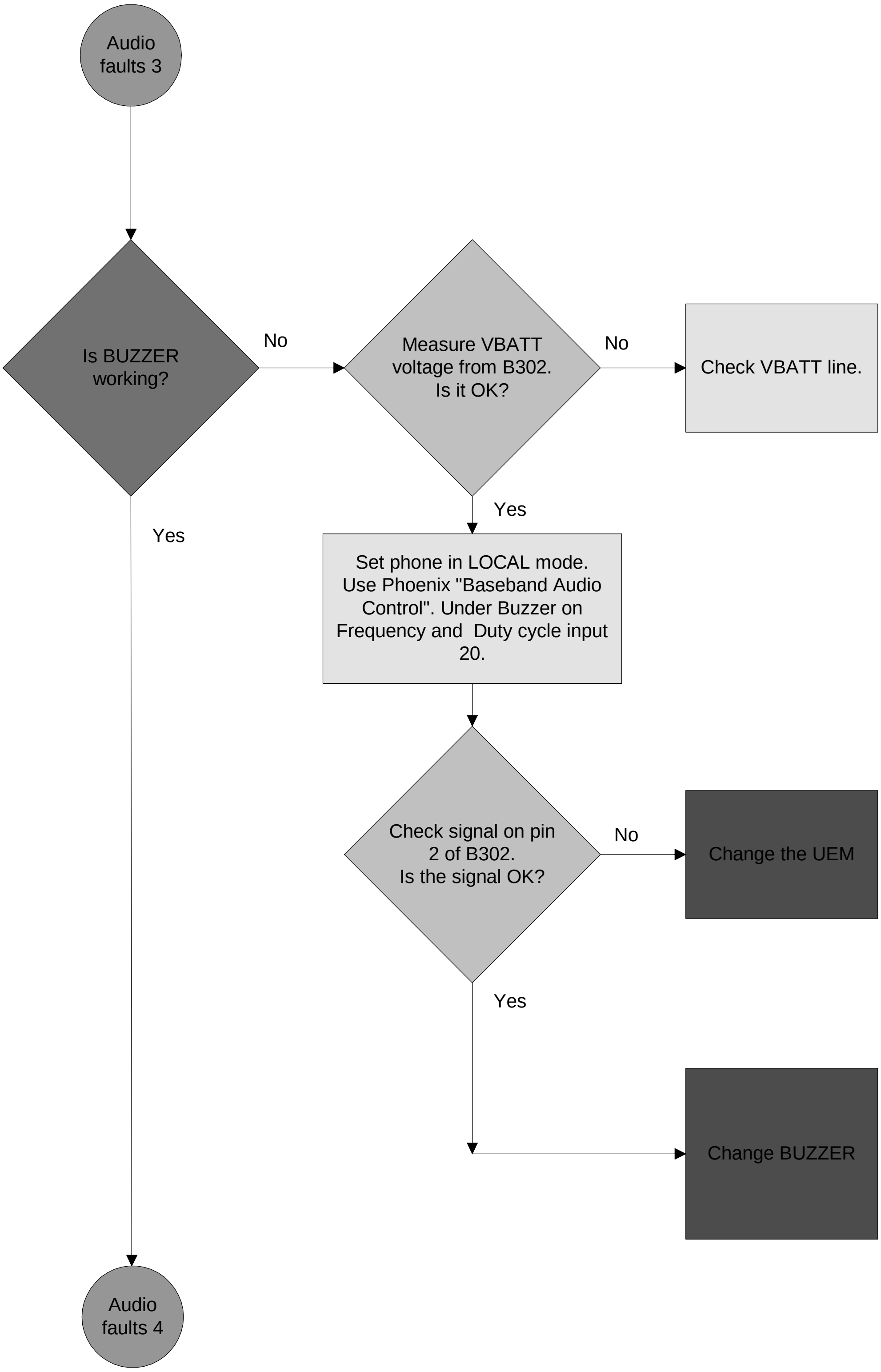
Charger


Charger
Connect Charger
Make sure battery is
connedted.
Battery bar doesn't
work (scroll)
No
Retest
Yes
Measure voltage
over V100.
Is it > 3.0 Vdc?
No
Check X102, F100,
L100, V100, C106.
Yes
Read BTEMP value.
Is it ~ 25C (0319)?
No
Change UEM
Yes
Remove (fuse)
F100 and measure
current.
Is it ~850 mA?
No
Change UEM
Yes
Retest

Audio faults




Audio faults 2
Is the microphone working?
No
Change the micropone. Is it working now?
Yes
Retest
No
Yes
Set phone in LOCAL mode. Use Phoenix "Baseband Audio Control" and set the following: Enable Tx, Enable Rx, Select MIC1, Enable HF only (differential). Talk throug the michrophone.
Measure MICB1 voltage from MICP pads on bottom connector. Is it ~2.1V?
No
Check connections at C195 and R165. If OK change UEM.
Yes
Is the signal going to the UEM at MICP and MICN at 168?
No
Check connections at R171, R172, R168, C173, C174, C175, C158, C160. If ok change microphone.
Yes
Is the signal going out of the UEM at XEAR, pin 11 and 12 on the bottom connector (X104)?
No
Check L104, R105, R106, R169 and C186. If OK change UEM
Yes
Retest
Audio faults 3



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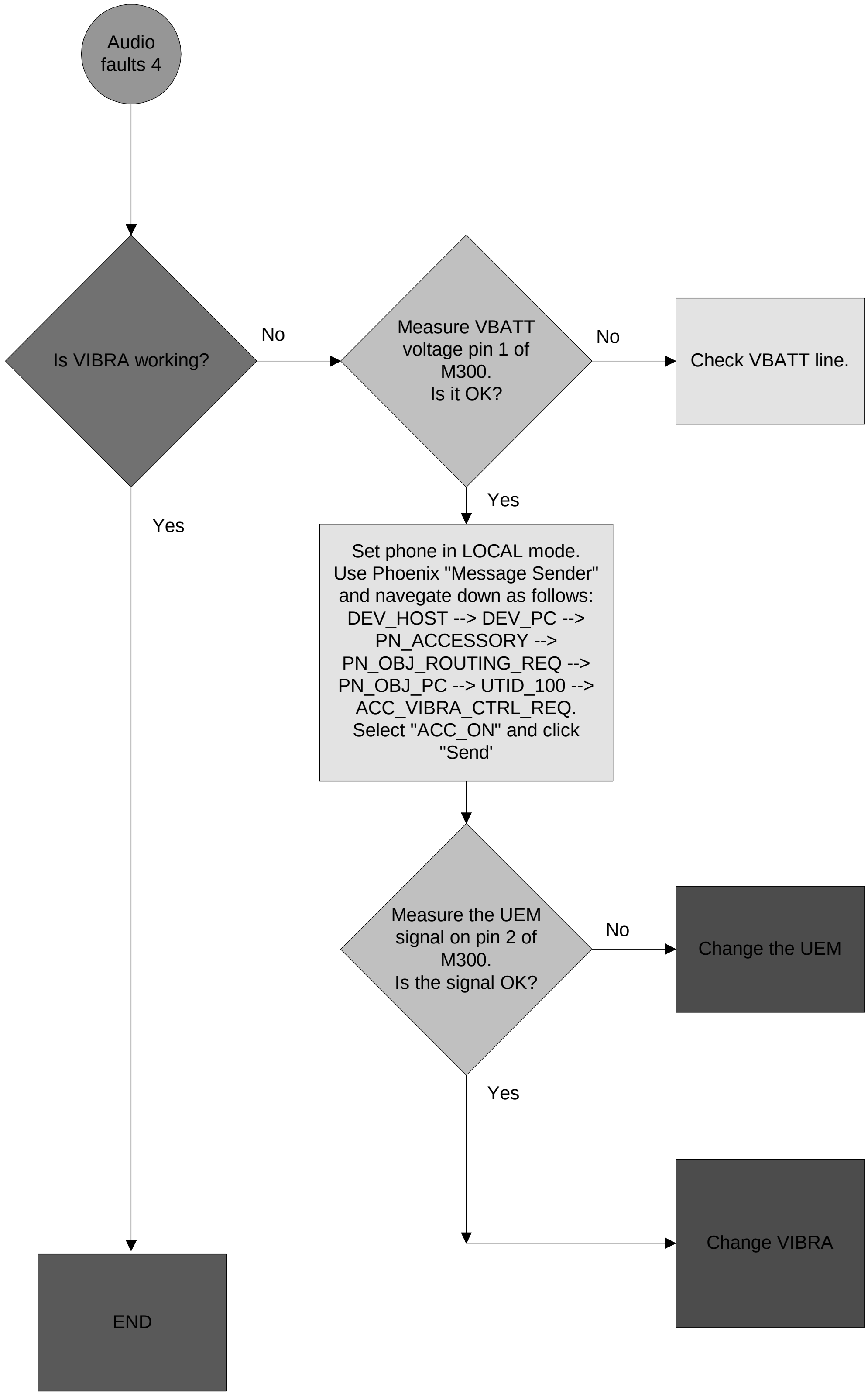
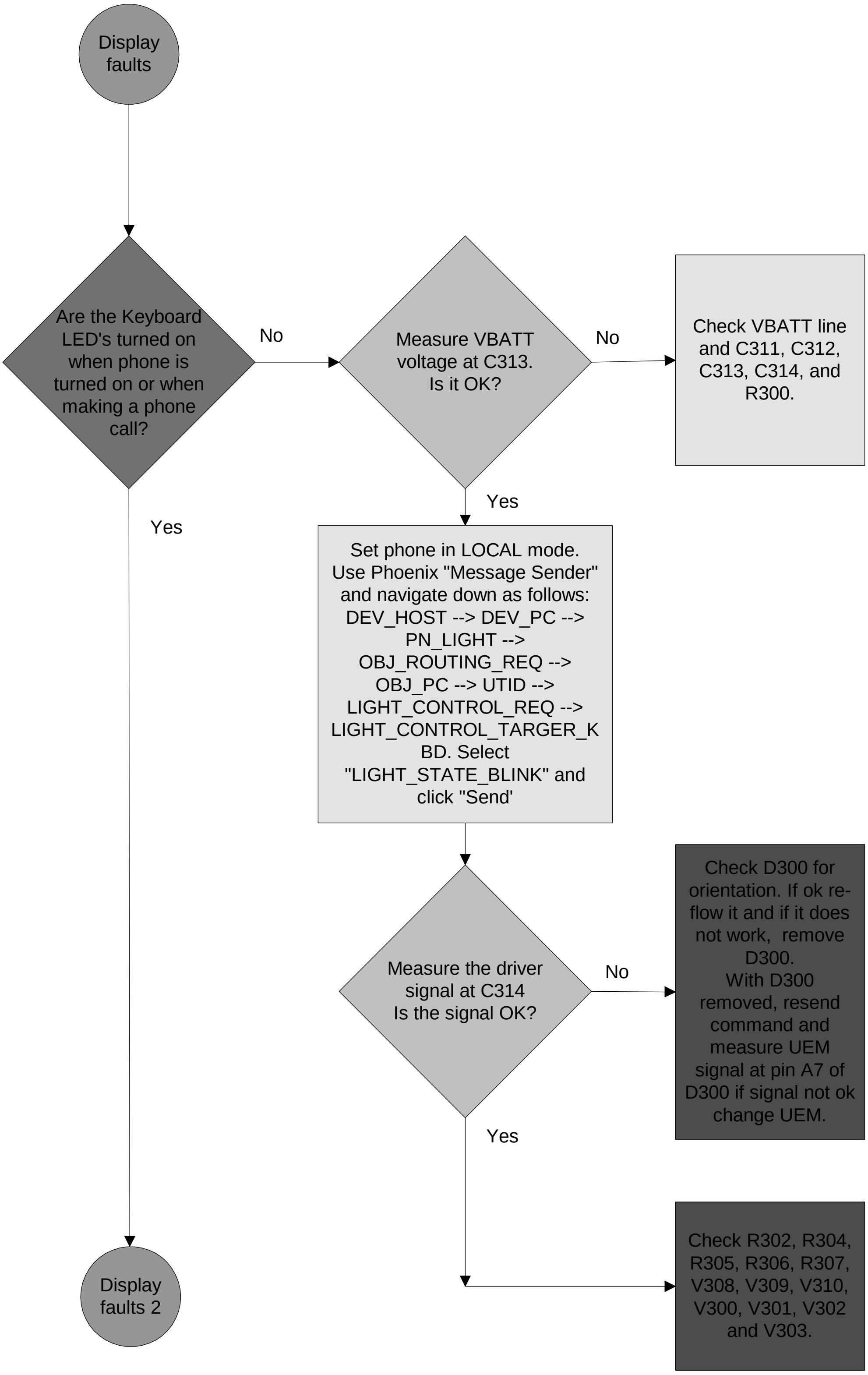
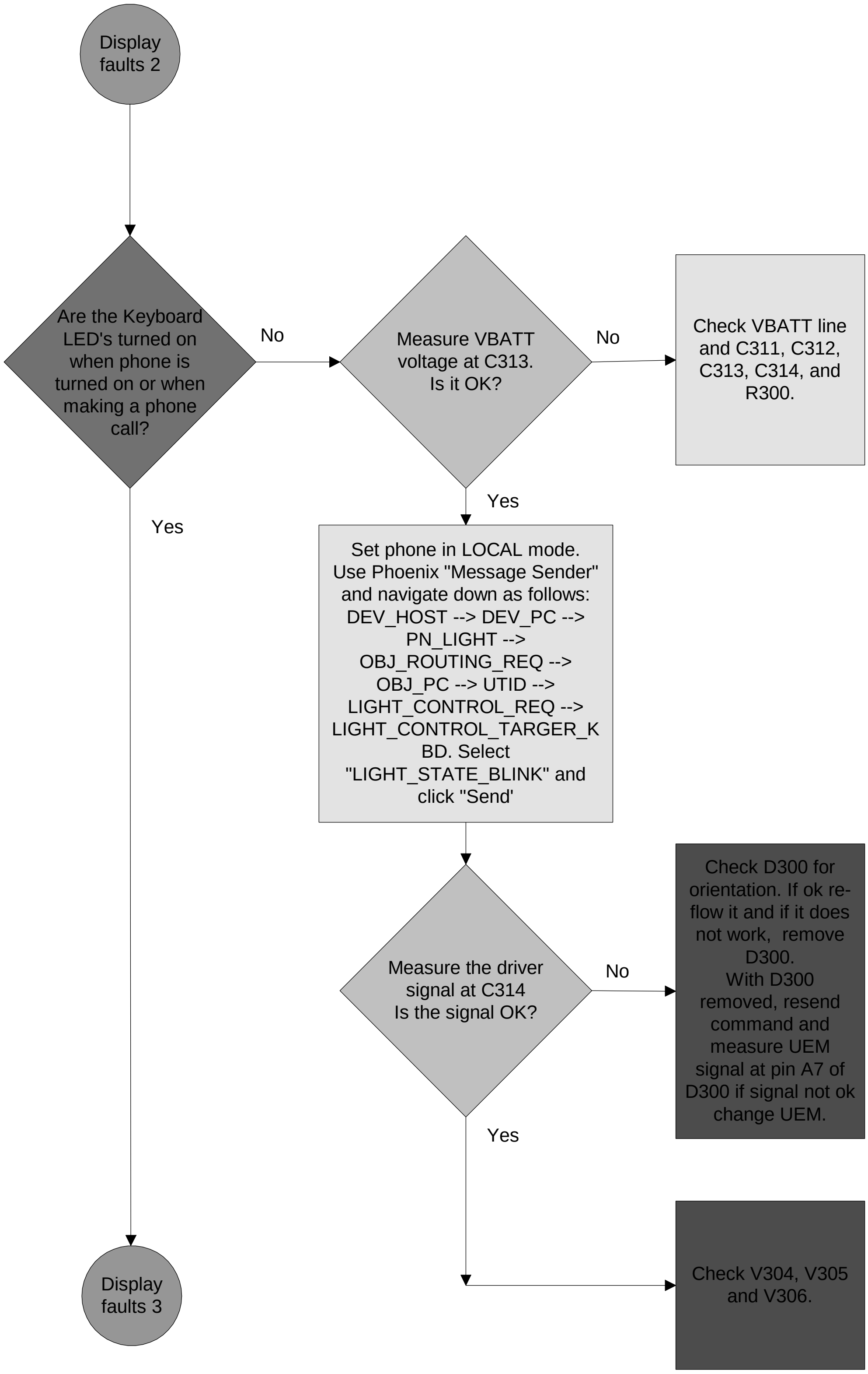
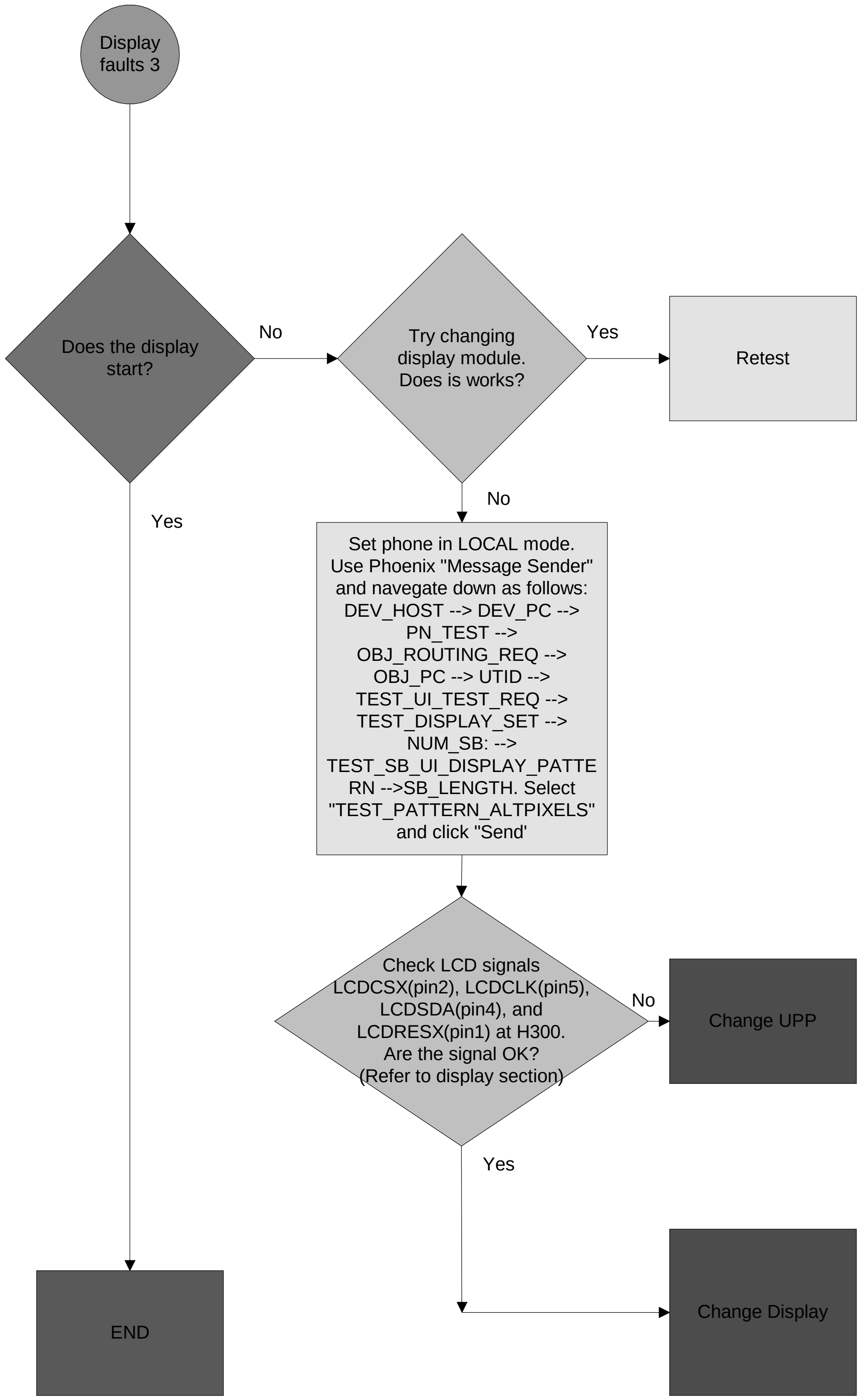

Audio faults 4
Is VIBRA working?
No
Measure VBATT voltage pin 1 of M300. Is it OK?
No
Check VBATT line.
Yes
Yes
Set phone in LOCAL mode. Use Phoenix "Message Sender" and navegate down as follows: DEV_HOST --> DEV_PC --> PN_ACCESSORY --> PN_OBJ_ROUTING_REQ --> PN_OBJ_PC --> UTID_100 --> ACC_VIBRA_CTRL_REQ. Select "ACC_ON" and click "Send'
Measure the UEM signal on pin 2 of M300. Is the signal OK?
No
Change the UEM
Yes
Change VIBRA
END

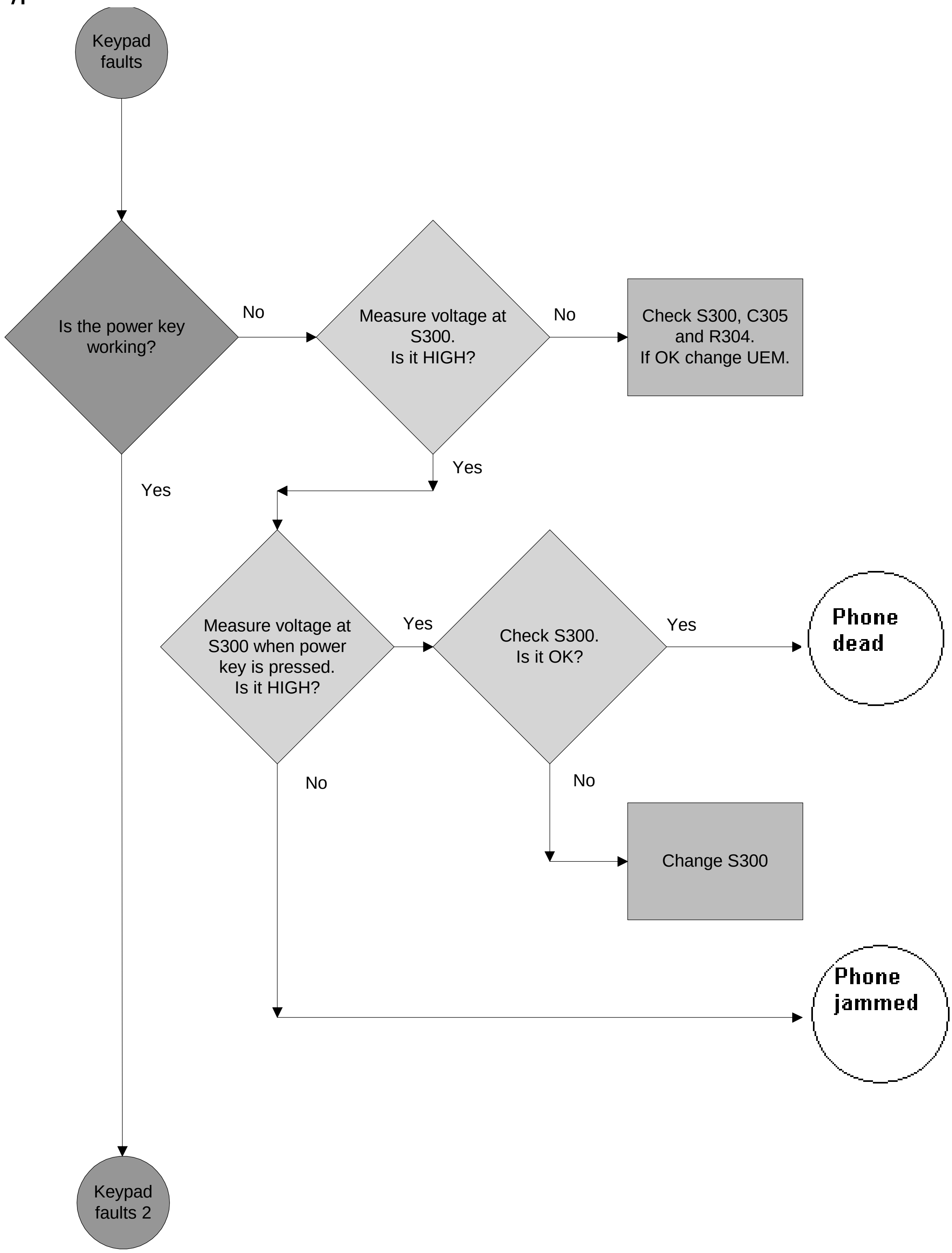
Display faults

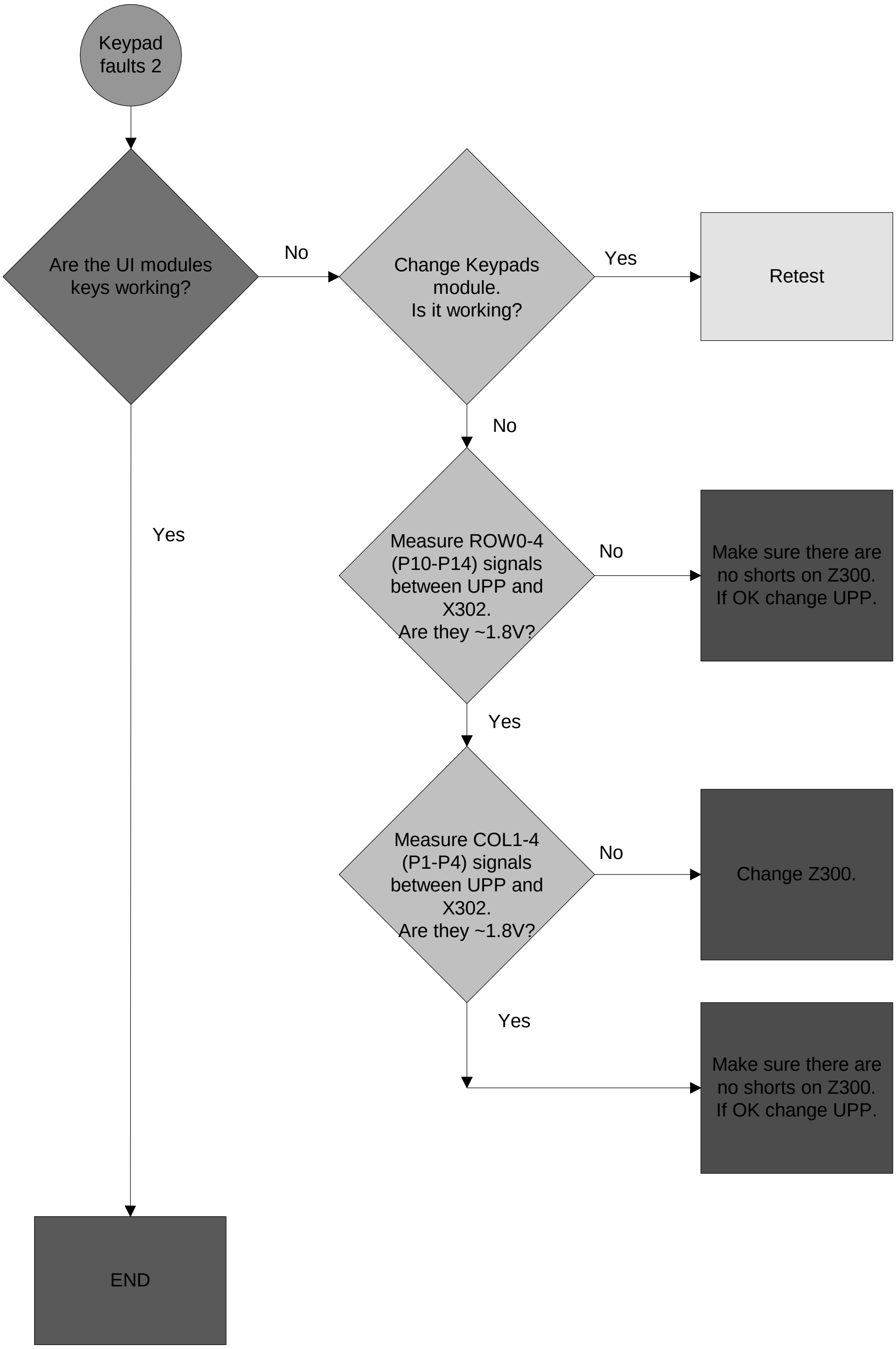



Display faults 2
Are the Keyboard LED's turned on when phone is turned on or when making a phone call?
No
Measure VBATT voltage at C313. Is it OK?
No
Check VBATT line and C311, C312, C313, C314, and R300.
Yes
Yes
Set phone in LOCAL mode. Use Phoenix "Message Sender" and navigate down as follows: DEV_HOST --> DEV_PC --> PN_LIGHT --> OBJ_ROUTING_REQ --> OBJ_PC --> UTID --> LIGHT_CONTROL_REQ --> LIGHT_CONTROL_TARGER_KBD. Select "LIGHT_STATE_BLINK" and click "Send'
Measure the driver signal at C314 Is the signal OK?
No
Check D300 for orientation. If ok re-flow it and if it does not work, remove D300. With D300 removed, resend command and measure UEM signal at pin A7 of D300 if signal not ok change UEM.
Yes
Display faults 3
Check V304, V305 and V306.


Display faults 3
Does the display start?
No
Try changing display module. Does is works?
Yes
Retest
No
Set phone in LOCAL mode. Use Phoenix "Message Sender" and navegate down as follows: DEV_HOST --> DEV_PC --> PN_TEST --> OBJ_ROUTING_REQ --> OBJ_PC --> UTID --> TEST_UI_TEST_REQ --> TEST_DISPLAY_SET --> NUM_SB: --> TEST_SB_UI_DISPLAY_PATTERN -->SB_LENGTH. Select "TEST_PATTERN_ALTPIXELS" and click "Send'
Check LCD signals LCDCSX(pin2), LCDCLK(pin5), LCDSDA(pin4), and LCDRESX(pin1) at H300. Are the signal OK? (Refer to display section)
No
Change UPP
Yes
Change Display
Yes
END

Keypad faults




Keypad faults 2
Are the UI modules keys working?
No
Change Keypads module. Is it working?
Yes
Retest
No
Yes
Measure ROW0-4 (P10-P14) signals between UPP and X302. Are they ~1.8V?
No
Make sure there are no shorts on Z300. If OK change UPP.
Yes
Measure COL1-4 (P1-P4) signals between UPP and X302. Are they ~1.8V?
No
Change Z300.
Yes
Make sure there are no shorts on Z300. If OK change UPP.
END