PAMS Technical Documentation
NSE–8/9 Series Transceivers

Troubleshooting

Issue 1 07/99

CONTENTS

Abbreviations in fault finding charts

BB	Baseband
DC	Direct Current
ESD	Electro Static Dicharge
f:	Frequency of signal (measured with Spectrum Analyzer)
LO	Local Oscillator
P:	Power of signal –dB) (measured with Spectrum Analyzer)
PA	Power Amplifier
PCB	Printed Circuit Board
PLL	Phase Locked Loop
RF	Radio Frequency
RX	Receiver
T:	Time between pulses
TX	Transmitter
UHF	Ultra High Frequency
V:	Voltage of signal (measured with oscilloscope)
VCO	Voltage controlled oscillator
VHF	Very High Frequency

Baseband Trouble Shooting

The following hints should facilitate finding the cause of the problem when the circuitry seems to be faulty. This troubleshooting instruction is divided into the following section.

4.1 Phone is totally dead
4.2 Flash programming doesn't work
4.3 Power doesn't stay on or phone is jammed
4.4 Display Information: Contact Service
4.5 The phone doesn't register to the network or phone doesn't make a call
4.6 Plug in SIM card is out of order (insert SIM card or card rejected).
4.7 Audio fault.
4.8 Charging Fault

The first thing to do, is carry out a through visual check of the module.

Ensure in particular that:

a) there is not any mechanical damage (especially battery connector X101, X102)
b) solder joints are OK

NOTE: X201 is a connection that is ONLY present in the production. Therefore it is not applicable for the PAMS repair.

Service interface J100 - J105 should be used along with service tools:

– TDS–7 (Service battery)
– MJS–13 (Module repair Jig)

The diagnostics on the following pages assumes that the tranceiver bd. Is placed in the MJS–13 jig.

4.1. Phone is totally dead

This means that the phone doesn't take current at all when the power switch S416 is pressed or when the watchdog disable pin (X201 pin 11) is grounded. Used battery voltage must be higher than 1,9 V. Otherwise the hardware of the switcher V105 and CCONT (N100) will not operate reliable.

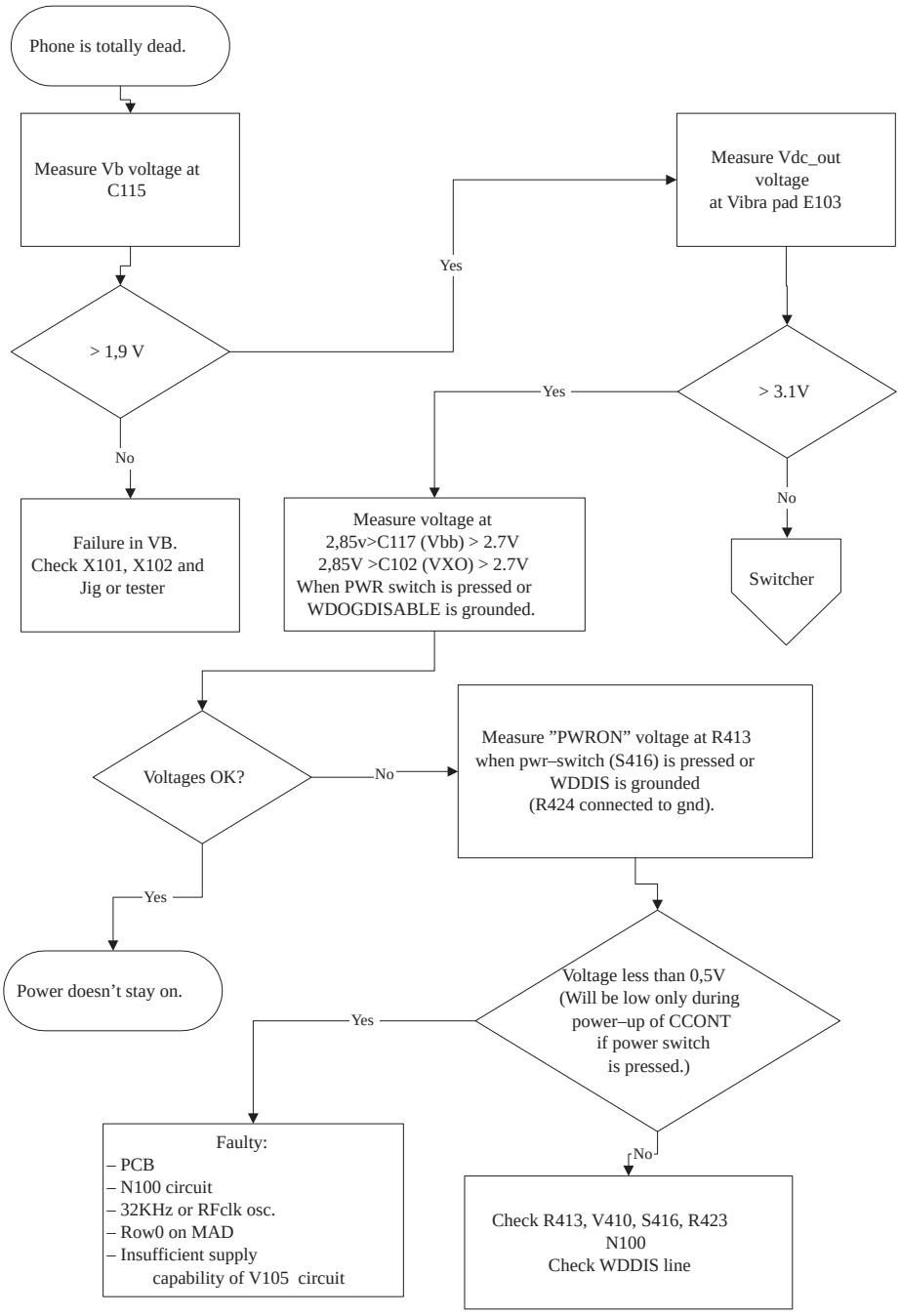


Figure 4–1

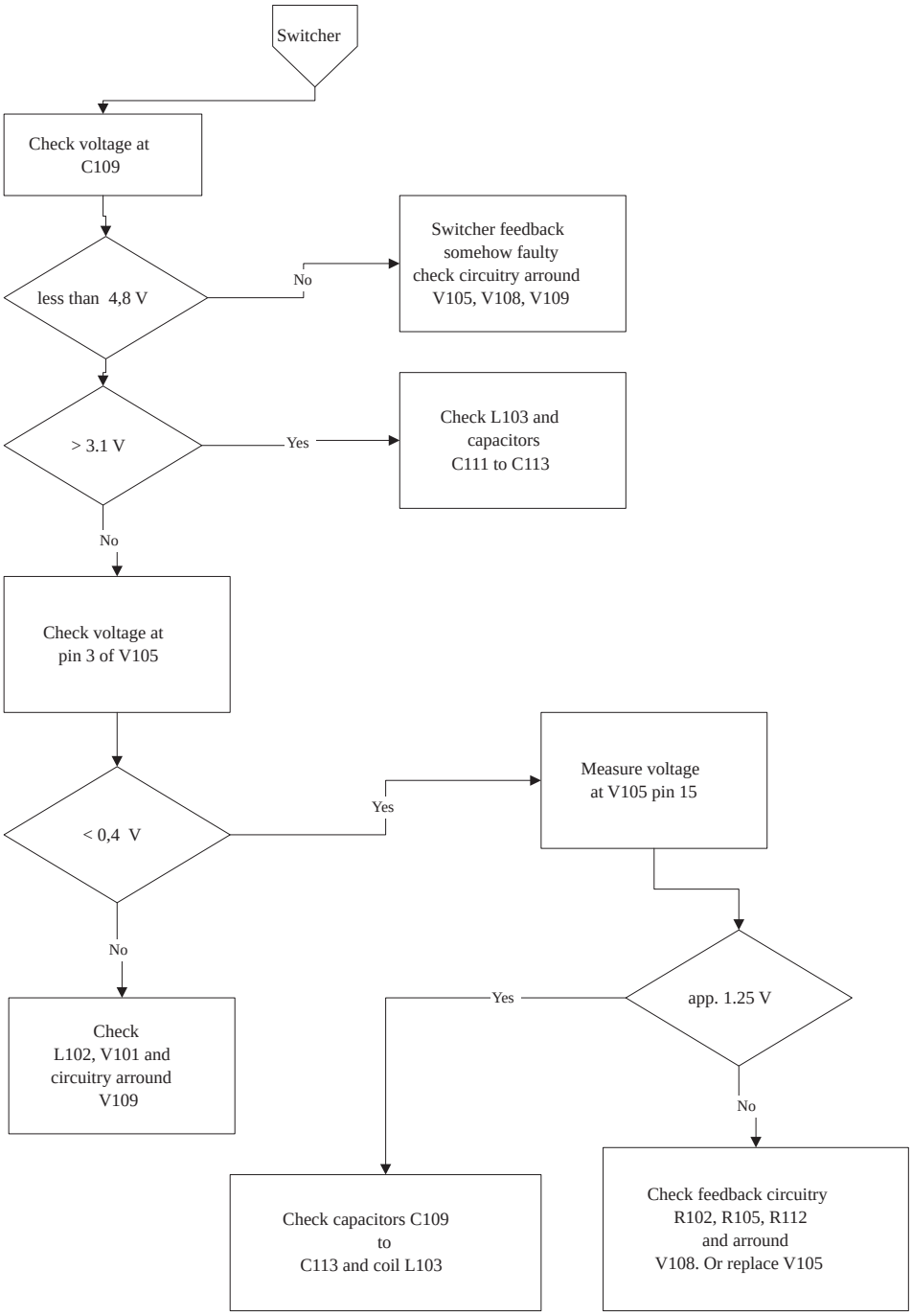


Figure 4–2

4.2. Flash programming doesn’t work

The flash programming can be done via panel connector X201 or via service interface J100 - J105.

In production, the first programming is done via panel connector X201. After this, the panel connector is cut away, thus other flash programming must be done via service interface J100 - J105.

The main differences between these are:
a) FLASH programming voltage is produced different way.
b) Signal routings are different.

The fault finding diagrams for flash programming are shown in Figure 4–3, Figure 4–4 and Figure 4–5.

In flash programming error cases the flash prommer can give some information about a fault.
The fault information messages could be:
– MCU doesn’t boot
– Serial clock line failure
– Serial data line failure
– External RAM fault
– Algorithm file or alias ID don’t find
– MCU flash Vpp error

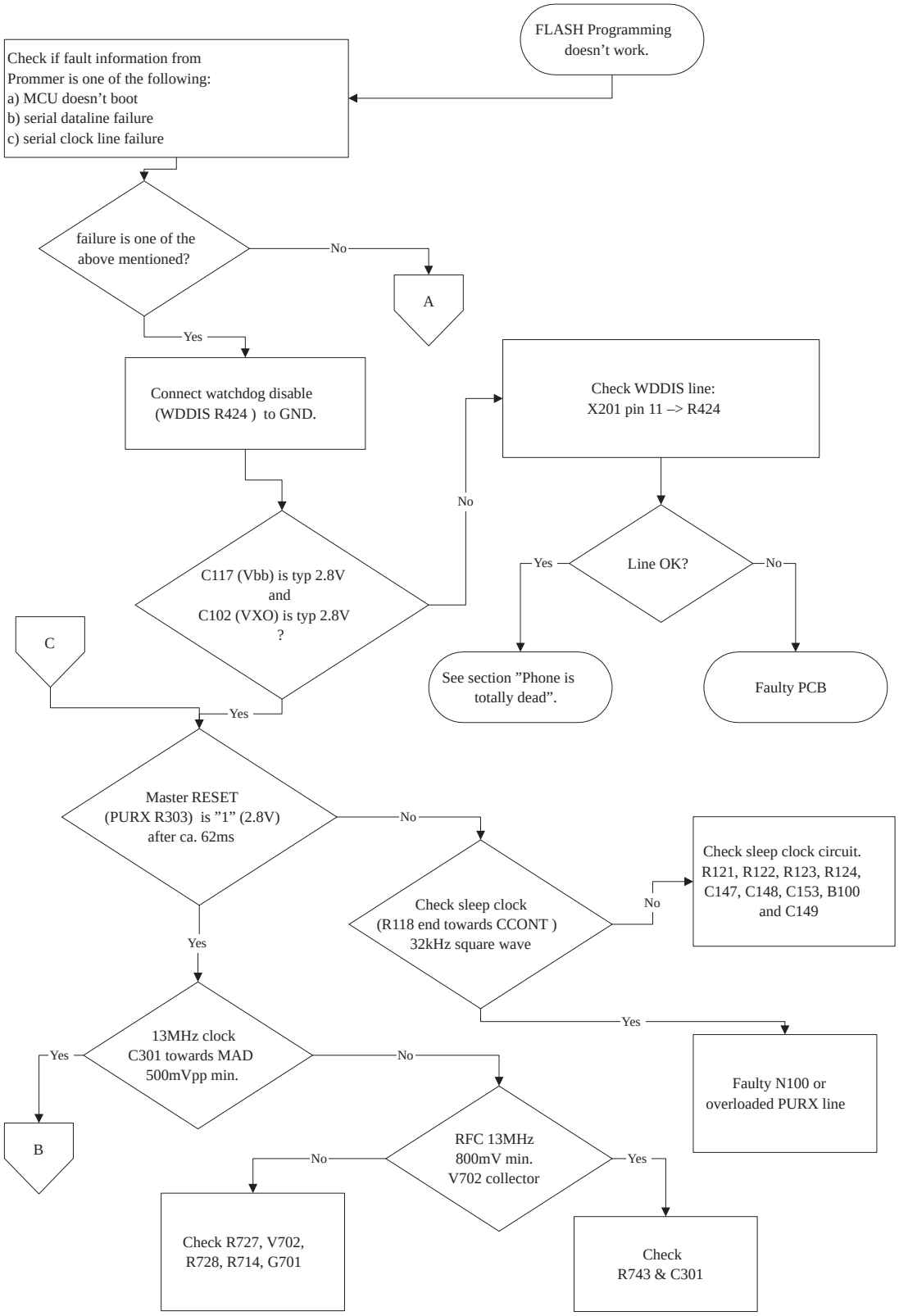

FLASH Programming doesn't work.
Check if fault information from Prommer is one of the following:
a) MCU doesn't boot
b) serial dataline failure
c) serial clock line failure
failure is one of the above mentioned?
No
A
Yes
Connect watchdog disable (WDDIS R424) to GND.
Check WDDIS line: X201 pin 11 –> R424
No
C117 (Vbb) is typ 2.8V and C102 (VXO) is typ 2.8V ?
Line OK?
Yes
No
See section "Phone is totally dead".
Faulty PCB
C
Yes
Master RESET (PURX R303) is "1" (2.8V) after ca. 62ms
No
Check sleep clock (R118 end towards CCONT) 32kHz square wave
No
Check sleep clock circuit. R121, R122, R123, R124, C147, C148, C153, B100 and C149
Yes
Yes
13MHz clock C301 towards MAD 500mVpp min.
Yes
No
Faulty N100 or overloaded PURX line
B
RFC 13MHz 800mV min. V702 collector
No
Yes
Check R727, V702, R728, R714, G701
Check R743 & C301

Figure 4–3

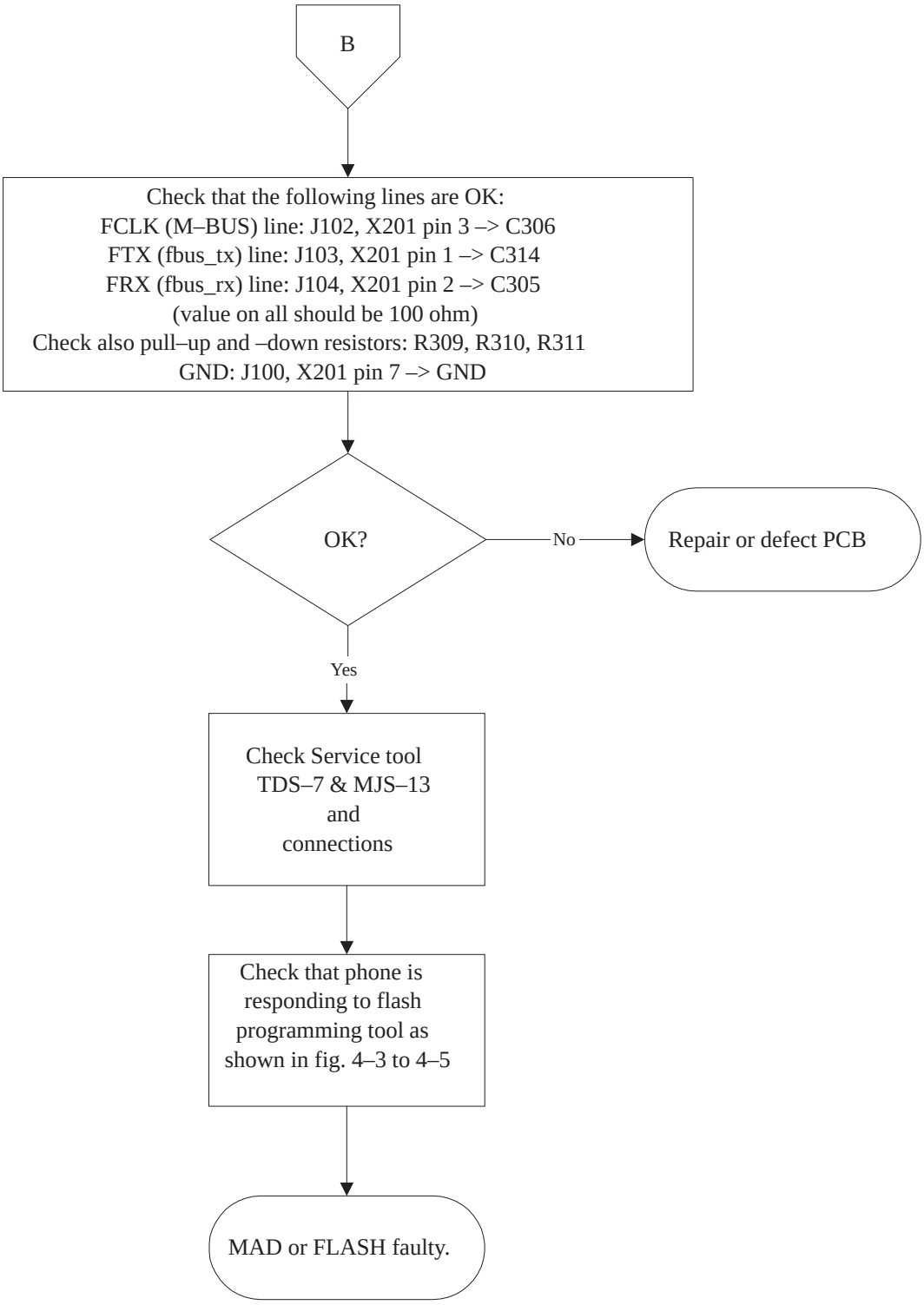

B
Check that the following lines are OK:
FCLK (M–BUS) line: J102, X201 pin 3 –> C306
FTX (fbus_tx) line: J103, X201 pin 1 –> C314
FRX (fbus_rx) line: J104, X201 pin 2 –> C305
(value on all should be 100 ohm)
Check also pull–up and –down resistors: R309, R310, R311
GND: J100, X201 pin 7 –> GND
OK?
No
Repair or defect PCB
Yes
Check Service tool
TDS–7 & MJS–13
and
connections
Check that phone is
responding to flash
programming tool as
shown in fig. 4–3 to 4–5
MAD or FLASH faulty.

Figure 4–4

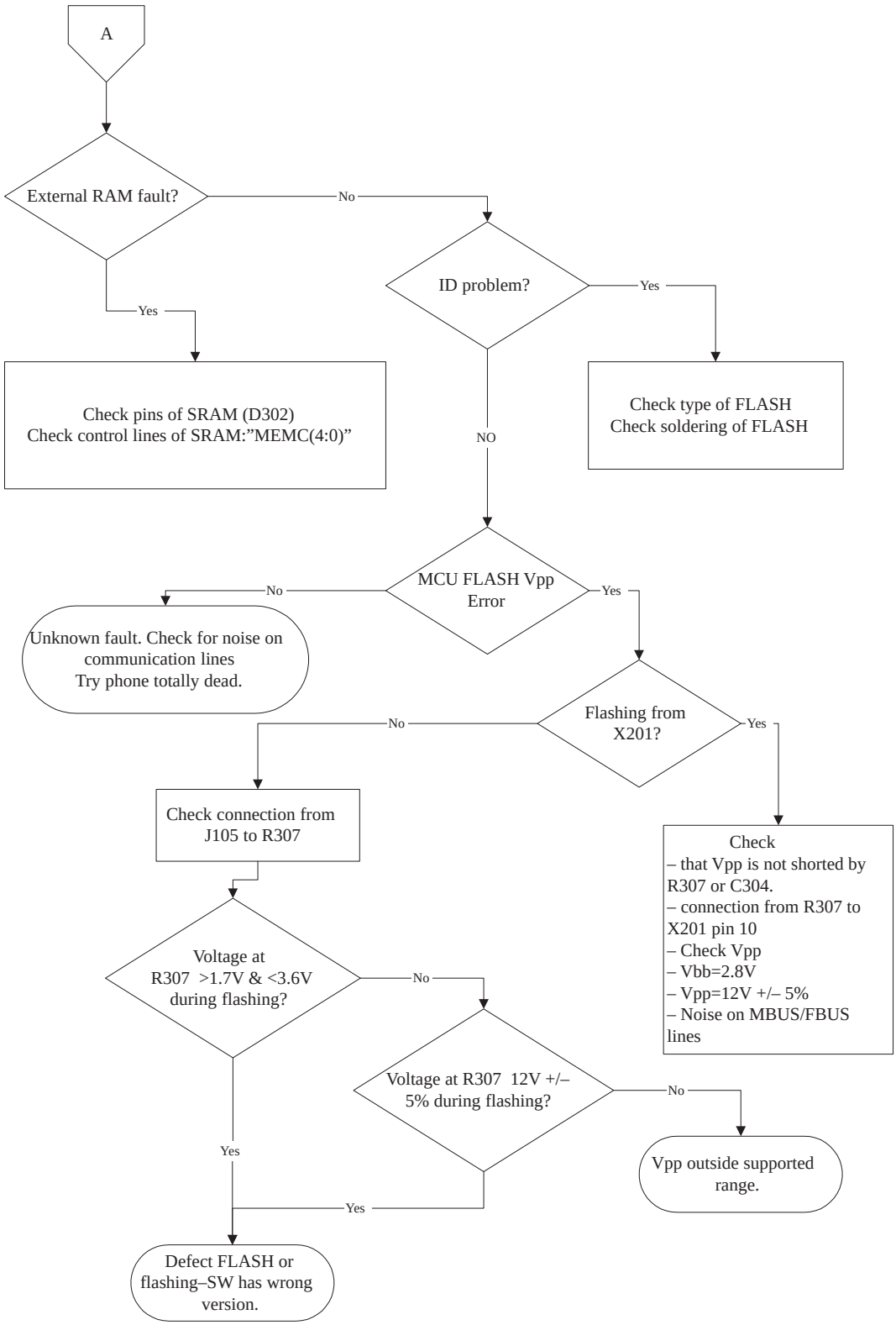

A
External RAM fault?
No
Yes
ID problem?
Yes
Check pins of SRAM (D302)
Check control lines of SRAM:"MEMC(4:0)"
Check type of FLASH
Check soldering of FLASH
NO
MCU FLASH Vpp Error
No
Yes
Unknown fault. Check for noise on communication lines
Try phone totally dead.
Flashing from X201?
No
Yes
Check connection from J105 to R307
Check
– that Vpp is not shorted by R307 or C304.
– connection from R307 to X201 pin 10
– Check Vpp
– Vbb=2.8V
– Vpp=12V +/– 5%
– Noise on MBUS/FBUS lines
Voltage at R307 >1.7V & <3.6V during flashing?
No
Voltage at R307 12V +/– 5% during flashing?
No
Yes
Vpp outside supported range.
Yes
Defect FLASH or flashing–SW has wrong version.

Figure 4–5

4.3. Power doesn’t stay on or phone is jammed

If this kind of fault has come after flash programming, there are most probably open pins in ICs. The soldered joints of ICs: D300 (MAD2Pr1), D301 (FLASH), N100 (CCONT), D302 (SRAM) are useful to check at first.

Normally the power will be switched off by CCONT (N100) after 32 seconds, if the watchdog of the CCONT can not be served by software.

Check watchdog is updated. Check that PWRON (at R413) is high and that CCONTCSX (J337) toggles. In the normal case there is a short burst of pulses every 8 seconds.

The power off function of CCONT can be prevented by connecting a short circuit wire from R424 to ground (Watchdog disabled).

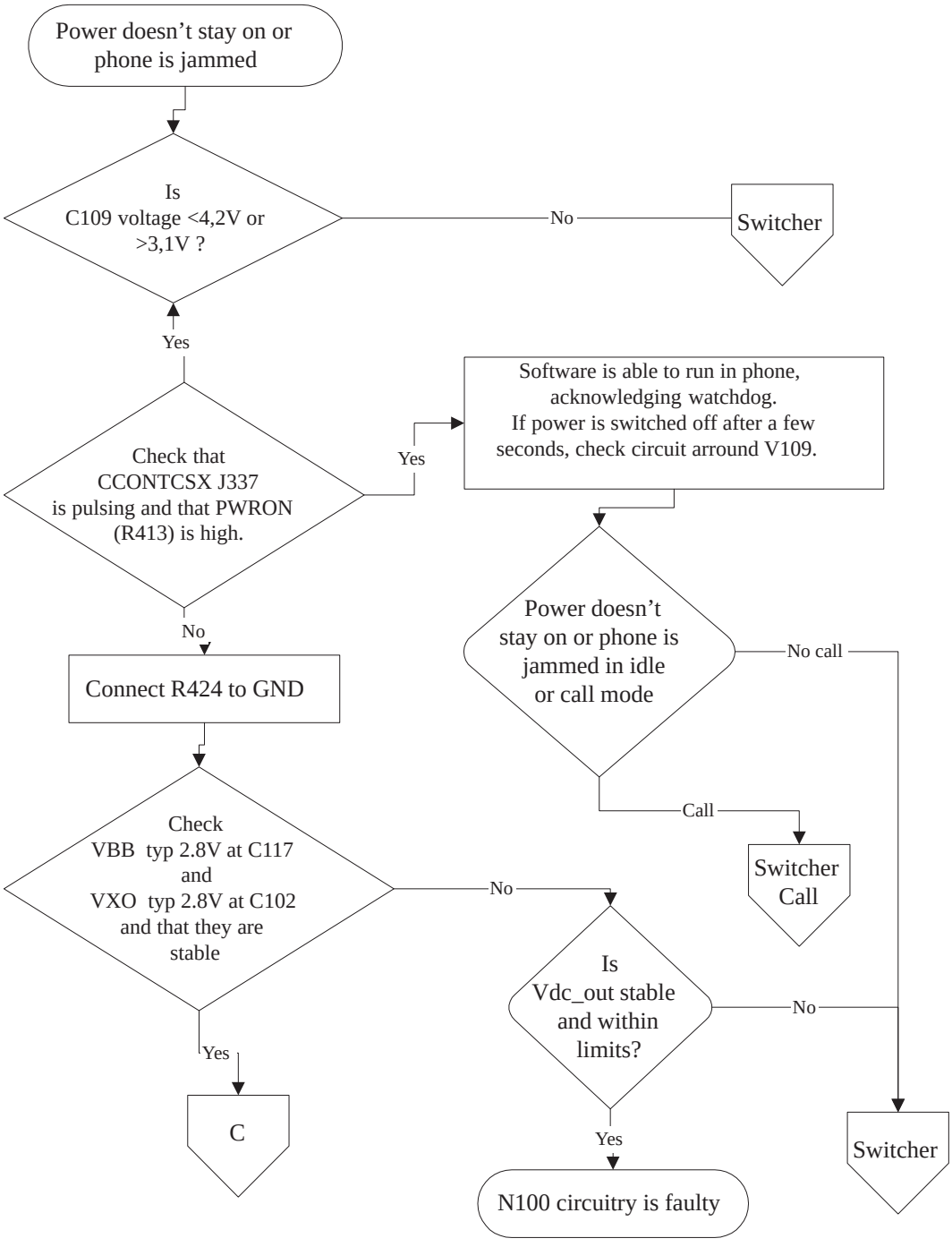


Figure 4–6

The LABEL "C" refers to Figure 4–3, The Label "Switcher" referes to Figure 4–2

4.4. Display Information: Contact Service

This fault means that software is able to run and thus the watchdog of CCONT (N100) can be served.
Selftest functions are run when power is switched on and software is started to execute from flash.
If any of selftests is failed, contact service information will be shown on display.

a) Check Selftest status in WinTesla
b) Check that content of EEProm D303 and flash D301 is correct
c)

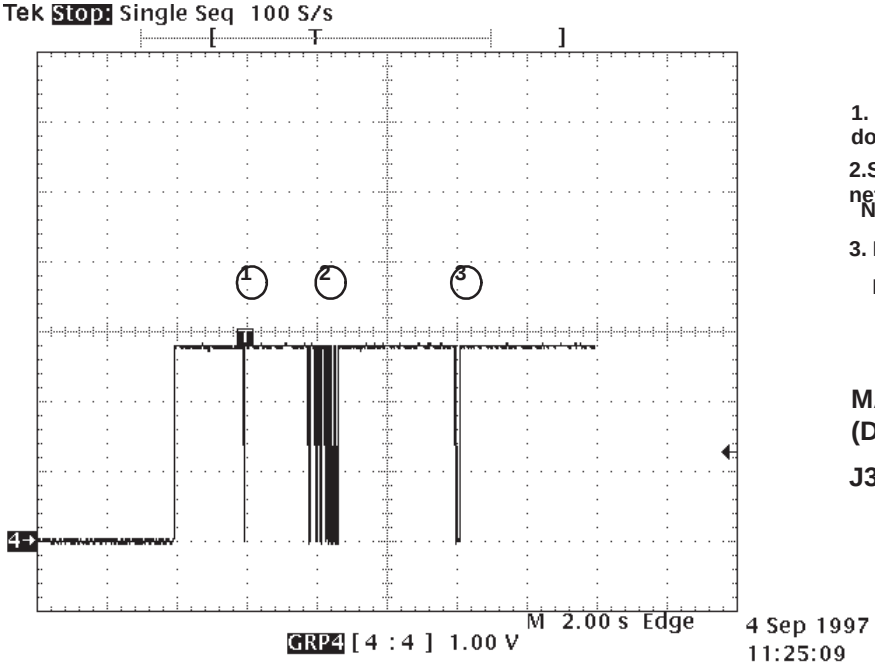
4.5. The phone doesn't register to the network or phone doesn't make a call

If the phone doesn't register to the network or the phone doesn't make a call, the reason could be either the baseband or the RF part.
The phone can be set to wanted mode by Wintesla service software and determinate if the fault is in RF or in baseband part (RF interface measurements).

The control lines for RF part are supplied both the System Asic (MAD2;D300) and the RFI (Cobba_GJP; N200). MAD2Pr1 handles digital control lines (like synthena, TxP etc.) and Cobba handles analog control lines (like AFC, TxC etc.).

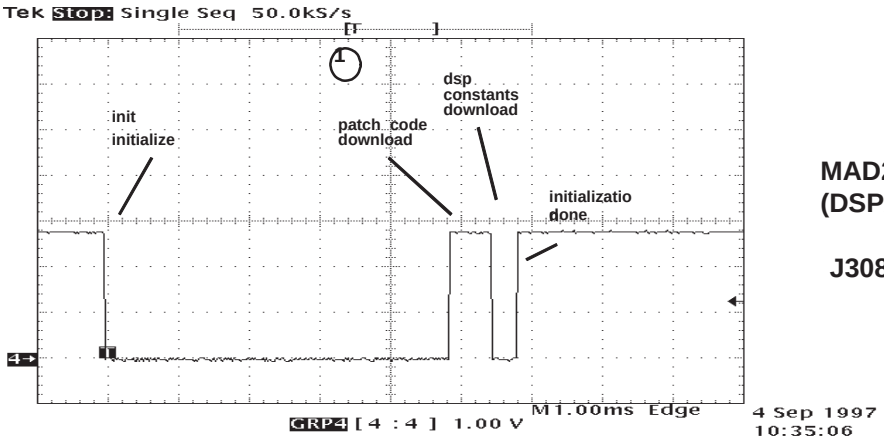
The DSP software is constructed so that operation states of DSP (MAD2Pr1) can be seen in external flag (DSPXF) output pin J308.

After power up, DSP signals all completed functions by changing the state of the XF pin (see Figure 4–7, Figure 4–8, Figure 4–9 and Figure 4–10).



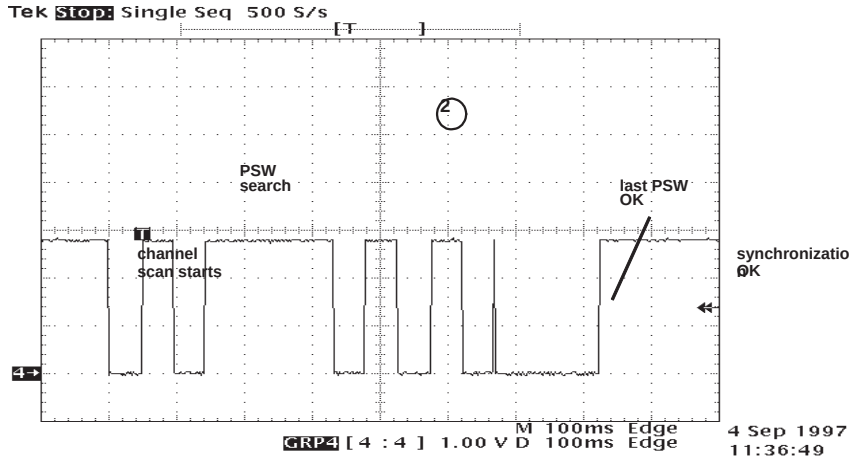
The states of DSP (MAD2) after power on

Figure 4–7



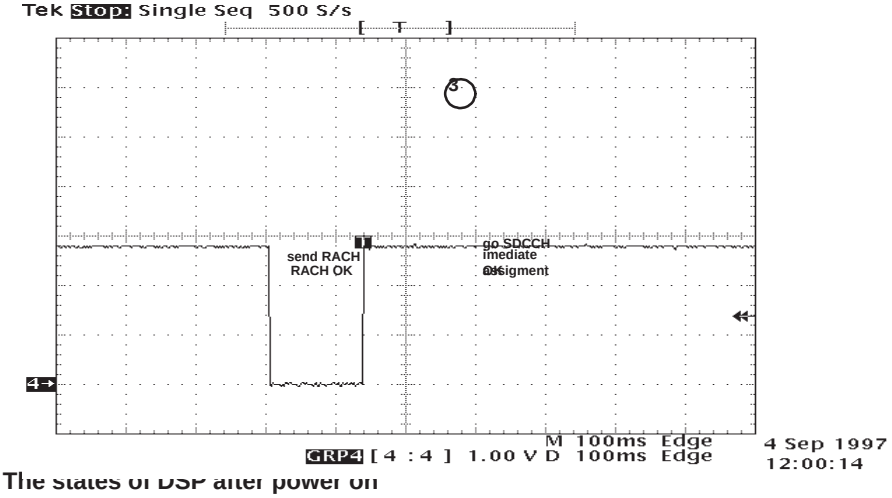
The states of DSP after power on

Figure 4–8



The states of DSP after power on

Figure 4–9



The states of DSP after power on

Figure 4–10

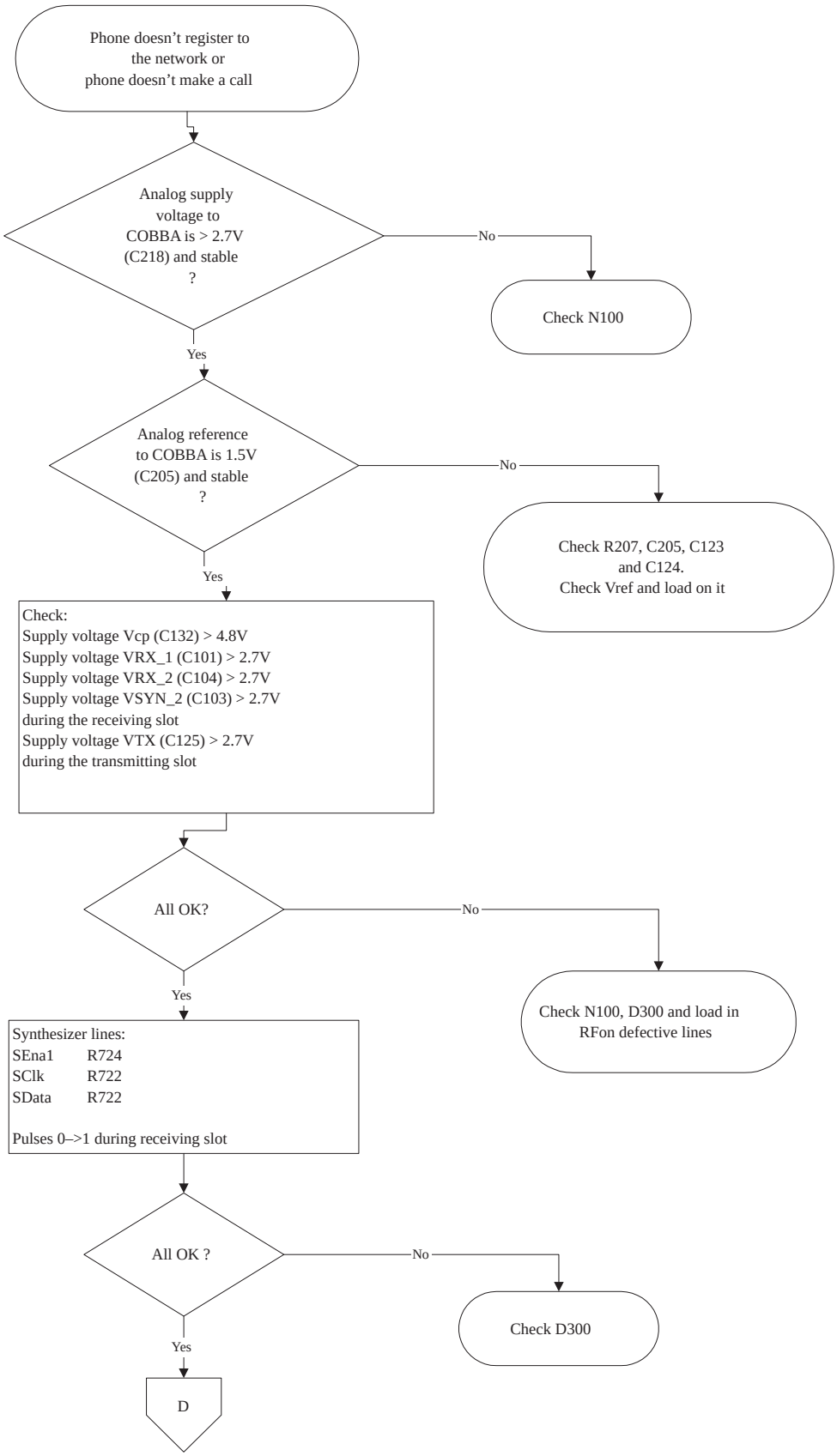

Phone doesn't register to the network or phone doesn't make a call
Analog supply voltage to COBBA is > 2.7V (C218) and stable ?
No
Check N100
Yes
Analog reference to COBBA is 1.5V (C205) and stable ?
No
Check R207, C205, C123 and C124. Check Vref and load on it
Yes
Check:
Supply voltage Vcp (C132) > 4.8V
Supply voltage VRX_1 (C101) > 2.7V
Supply voltage VRX_2 (C104) > 2.7V
Supply voltage VSYN_2 (C103) > 2.7V
during the receiving slot
Supply voltage VTX (C125) > 2.7V
during the transmitting slot
All OK?
No
Check N100, D300 and load in RFon defective lines
Yes
Synthesizer lines:
SEna1 R724
SClk R722
SData R722
Pulses 0–>1 during receiving slot
All OK ?
No
Check D300
Yes
D

Figure 4–11

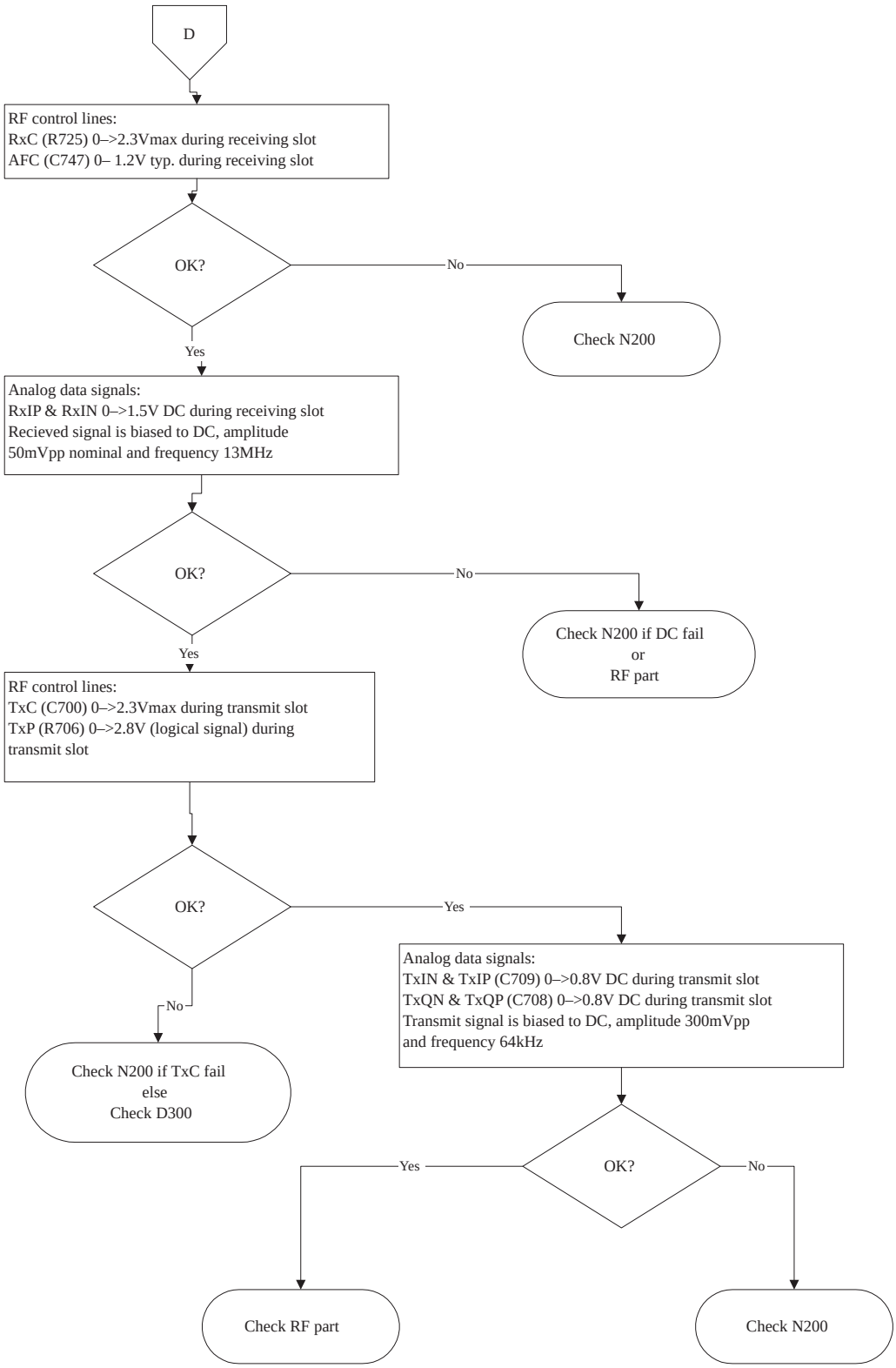
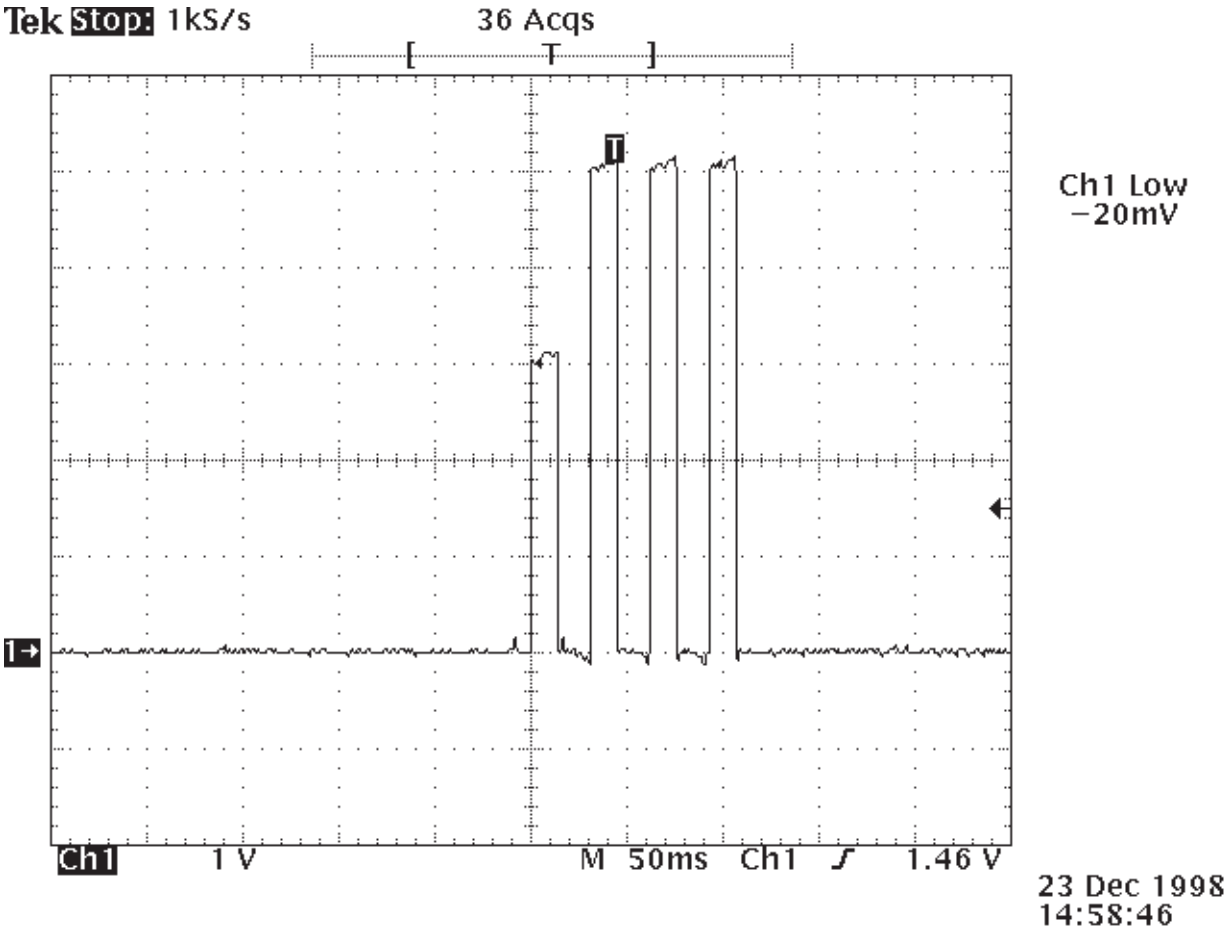

D
RF control lines:
RxC (R725) 0–>2.3Vmax during receiving slot
AFC (C747) 0– 1.2V typ. during receiving slot
OK?
No
Check N200
Yes
Analog data signals:
RxIP & RxIN 0–>1.5V DC during receiving slot
Recieved signal is biased to DC, amplitude
50mVpp nominal and frequency 13MHz
OK?
No
Check N200 if DC fail
or
RF part
Yes
RF control lines:
TxC (C700) 0–>2.3Vmax during transmit slot
TxP (R706) 0–>2.8V (logical signal) during
transmit slot
OK?
Yes
Analog data signals:
TxIN & TxIP (C709) 0–>0.8V DC during transmit slot
TxQN & TxQP (C708) 0–>0.8V DC during transmit slot
Transmit signal is biased to DC, amplitude 300mVpp
and frequency 64kHz
No
Check N200 if TxC fail
else
Check D300
OK?
Yes
No
Check RF part
Check N200

Figure 4–12

4.6. Plug in SIM card is out of order (insert SIM card or card rejected).

The hardware of the SIM interface from MAD2Pr1 (D300) to the SIM connector (X100) can be tested without SIM card.
When the power is switched on, all the used lines (VSIM, RST, CLK, DATA) rises up to 3V one time and 5V tree times (see fig 5).

Thus ”Insert SIM card” faults can be found without SIM card.
The fault information ”Card rejected” means that ATR message (the first message is always sent from card to phone) is sent from card to phone but the message is somehow corrupted, data signal levels are wrong etc. or factory set values (stored to the EEPROM) are not correct.



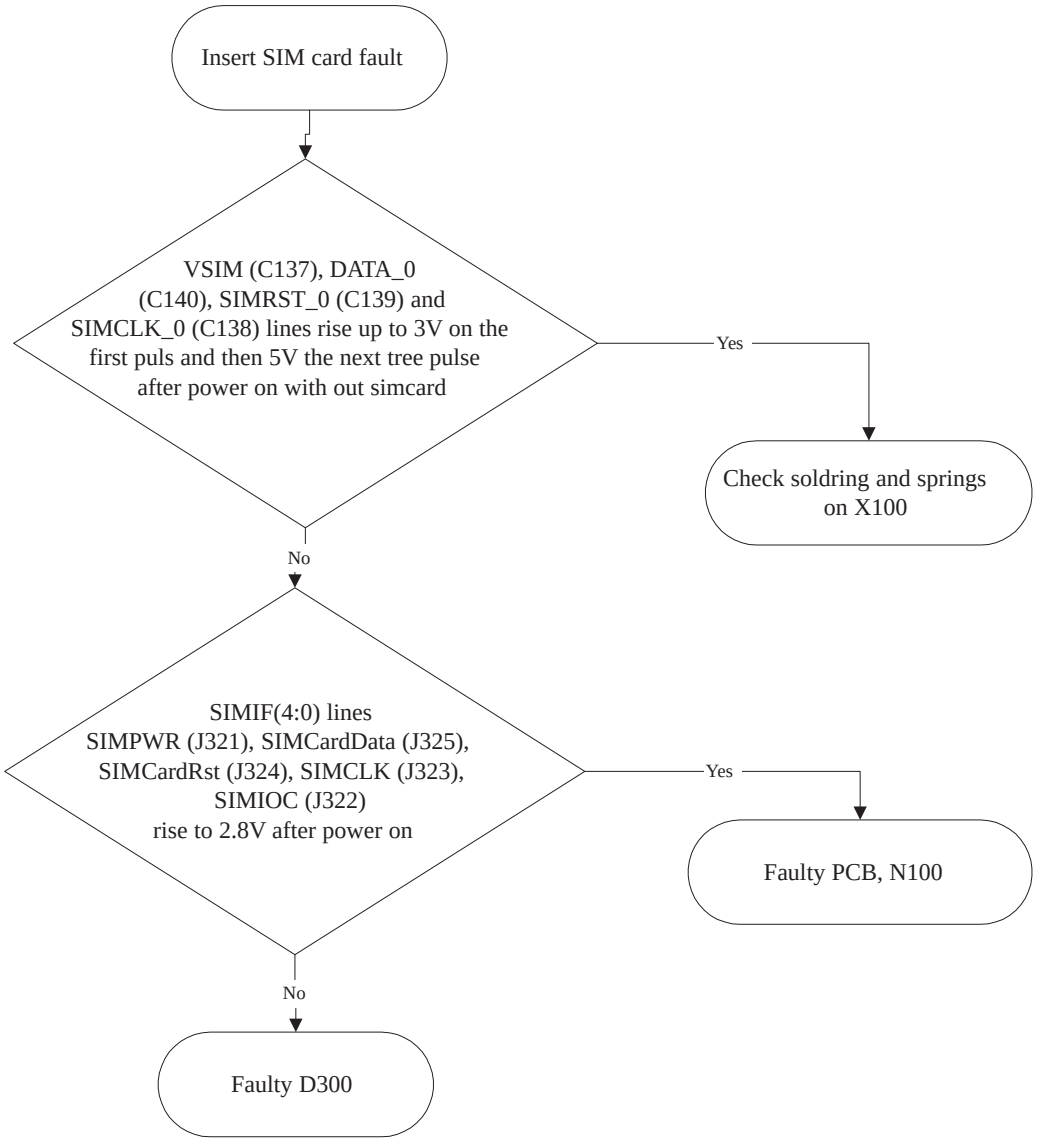

Insert SIM card fault
VSIM (C137), DATA_0 (C140), SIMRST_0 (C139) and SIMCLK_0 (C138) lines rise up to 3V on the first puls and then 5V the next tree pulse after power on with out simcard
Yes
Check soldring and springs on X100
No
SIMIF(4:0) lines SIMPWR (J321), SIMCardData (J325), SIMCardRst (J324), SIMCLK (J323), SIMIOC (J322) rise to 2.8V after power on
Yes
Faulty PCB, N100
No
Faulty D300

Figure 4–13

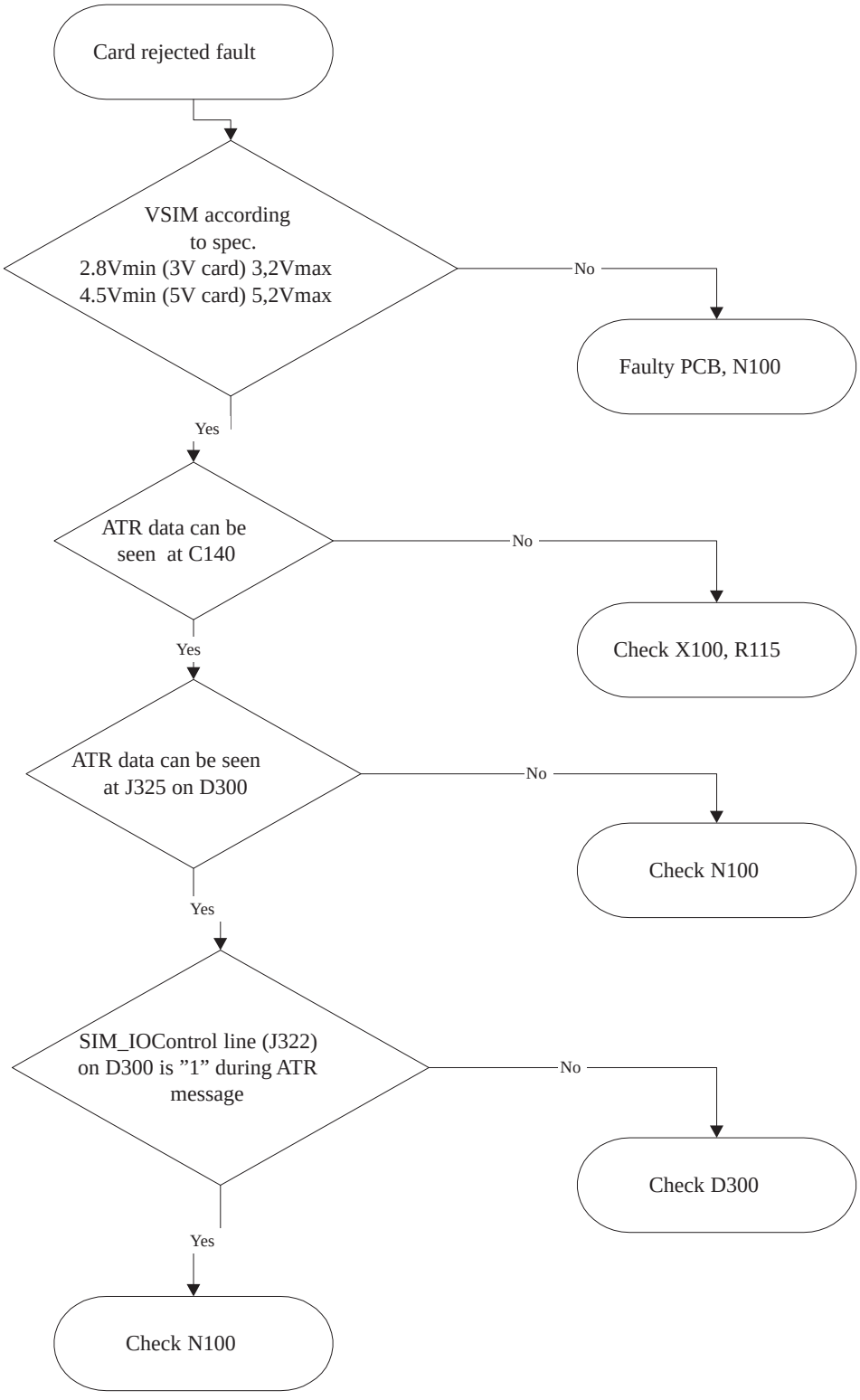

Card rejected fault
VSIM according to spec. 2.8Vmin (3V card) 3,2Vmax 4.5Vmin (5V card) 5,2Vmax
No
Faulty PCB, N100
Yes
ATR data can be seen at C140
No
Check X100, R115
Yes
ATR data can be seen at J325 on D300
No
Check N100
Yes
SIM_IOControl line (J322) on D300 is ”1” during ATR message
No
Check D300
Yes
Check N100

Figure 4–14

4.7. Audio fault.

Upon disassembly it is wise to check the spring contacts of the audio transducers and bottom connector

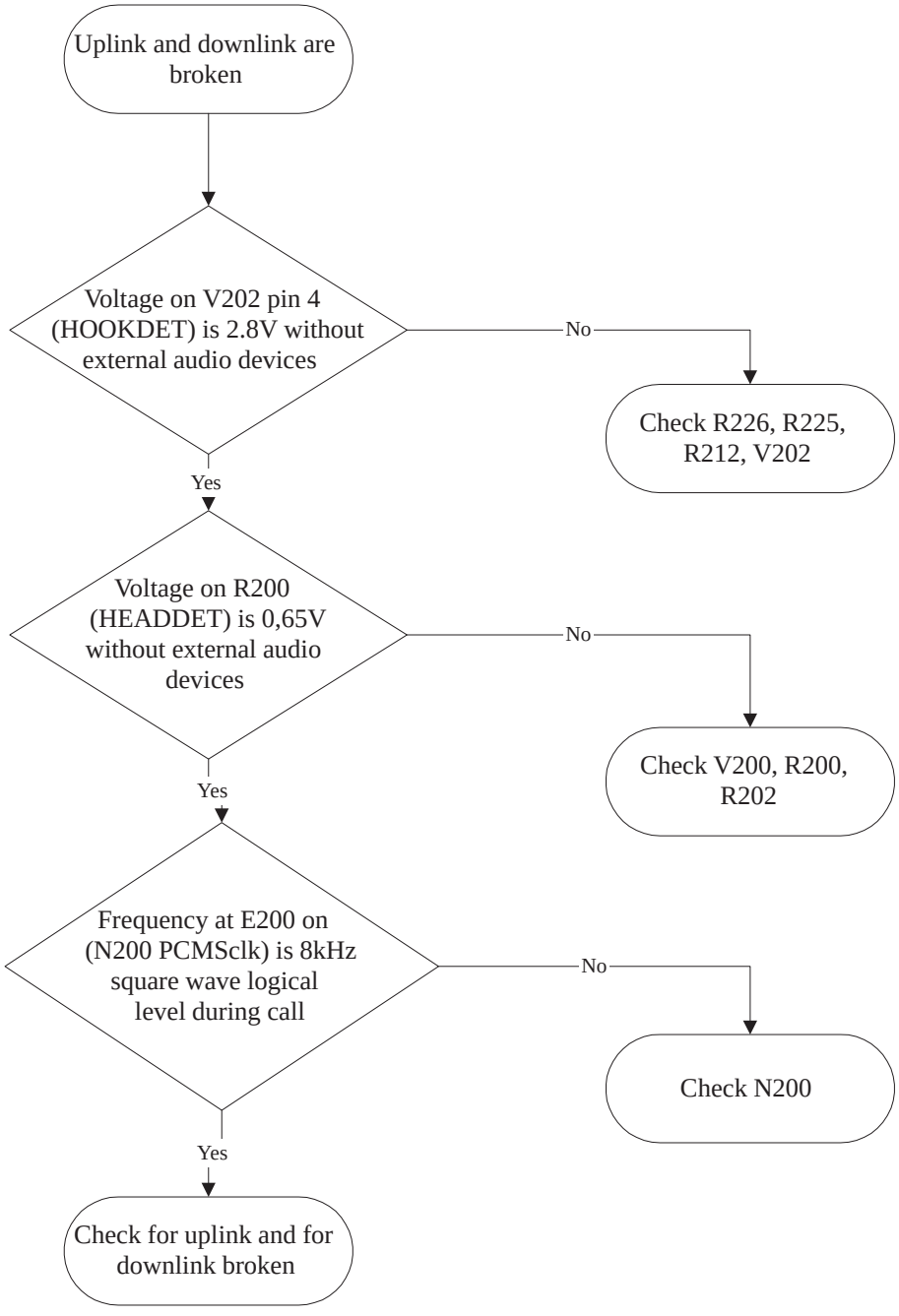


Figure 4–15

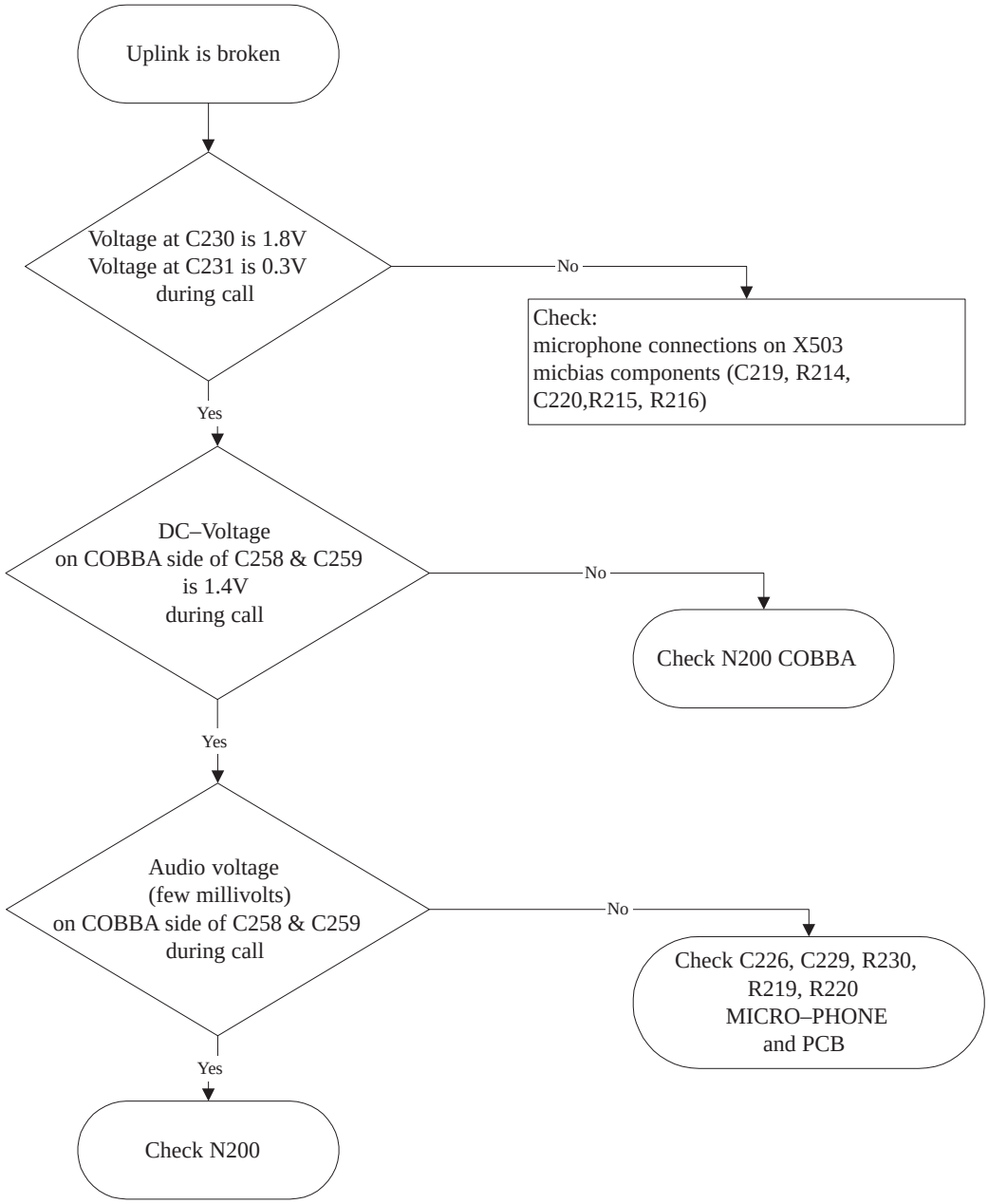

Uplink is broken
Voltage at C230 is 1.8V
Voltage at C231 is 0.3V
during call
No
Check:
microphone connections on X503
micbias components (C219, R214,
C220,R215, R216)
Yes
DC–Voltage
on COBBA side of C258 & C259
is 1.4V
during call
No
Check N200 COBBA
Yes
Audio voltage
(few millivolts)
on COBBA side of C258 & C259
during call
No
Check C226, C229, R230,
R219, R220
MICRO–PHONE
and PCB
Yes
Check N200

Figure 4–16

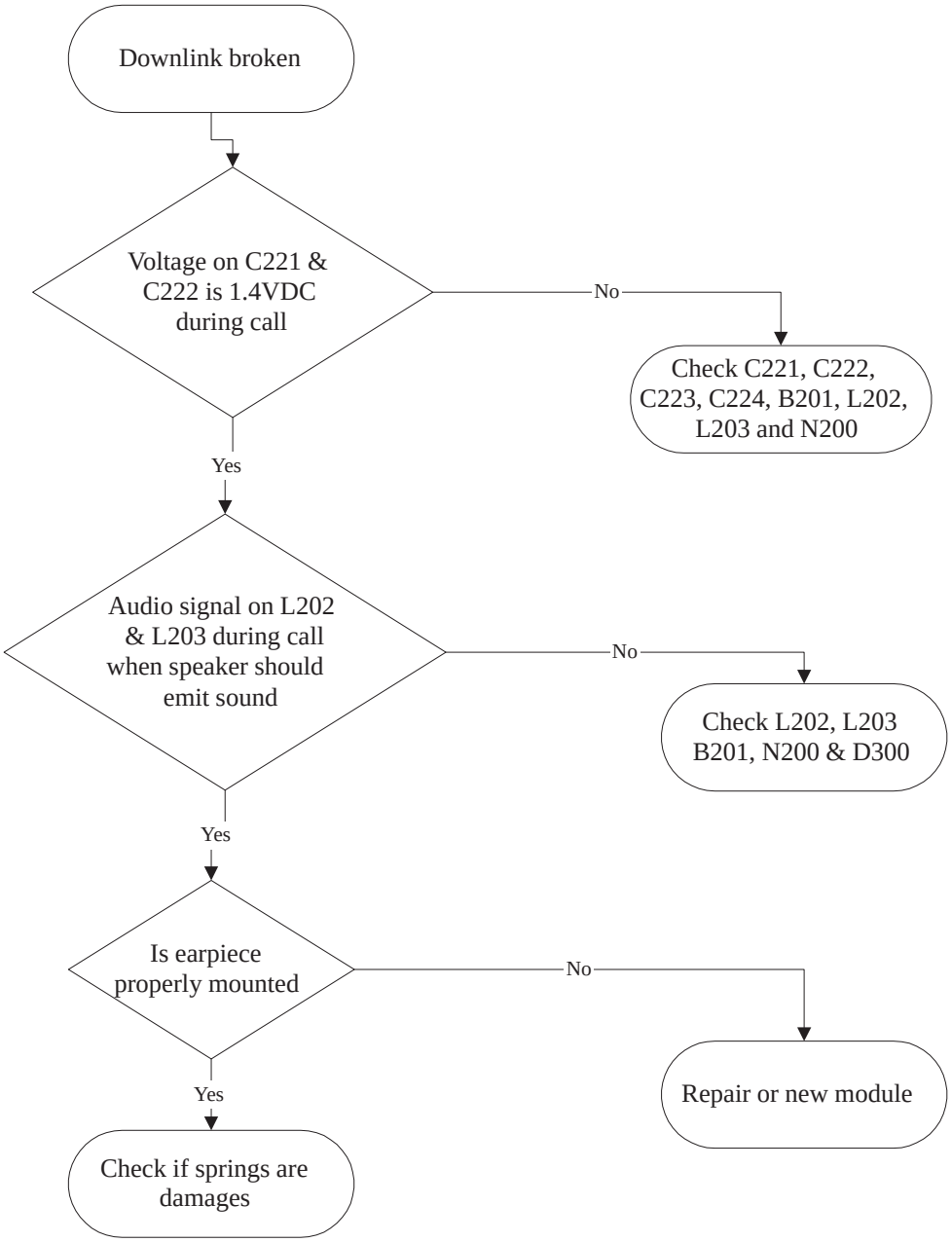

Downlink broken
Voltage on C221 & C222 is 1.4VDC during call
No
Check C221, C222, C223, C224, B201, L202, L203 and N200
Yes
Audio signal on L202 & L203 during call when speaker should emit sound
No
Check L202, L203 B201, N200 & D300
Yes
Is earpiece properly mounted
No
Repair or new module
Yes
Check if springs are damages

Figure 4–17

4.8. Charging Fault

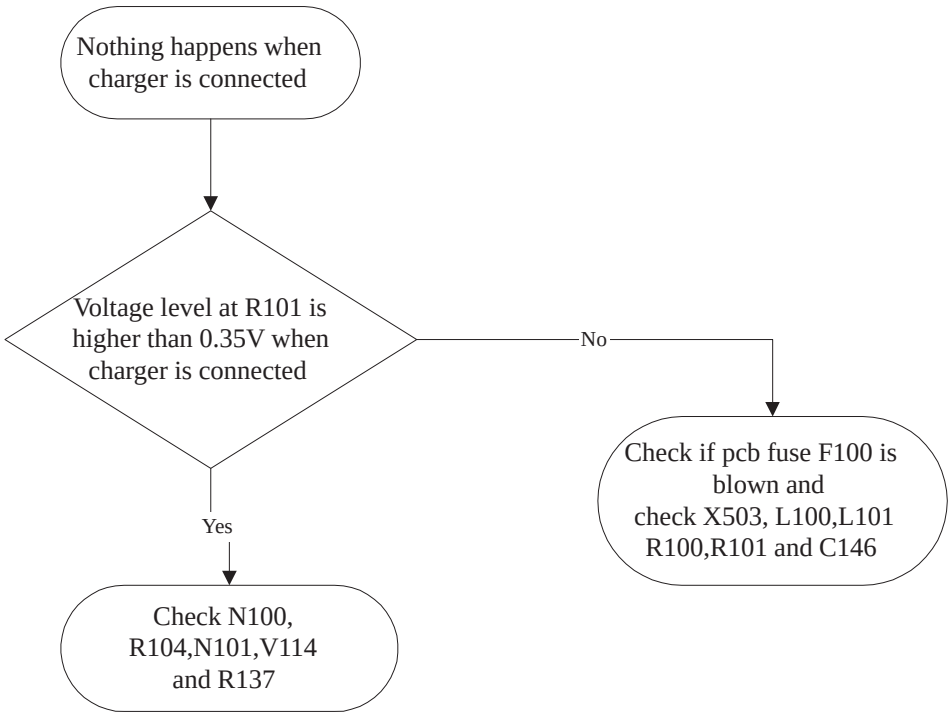


Figure 4–18

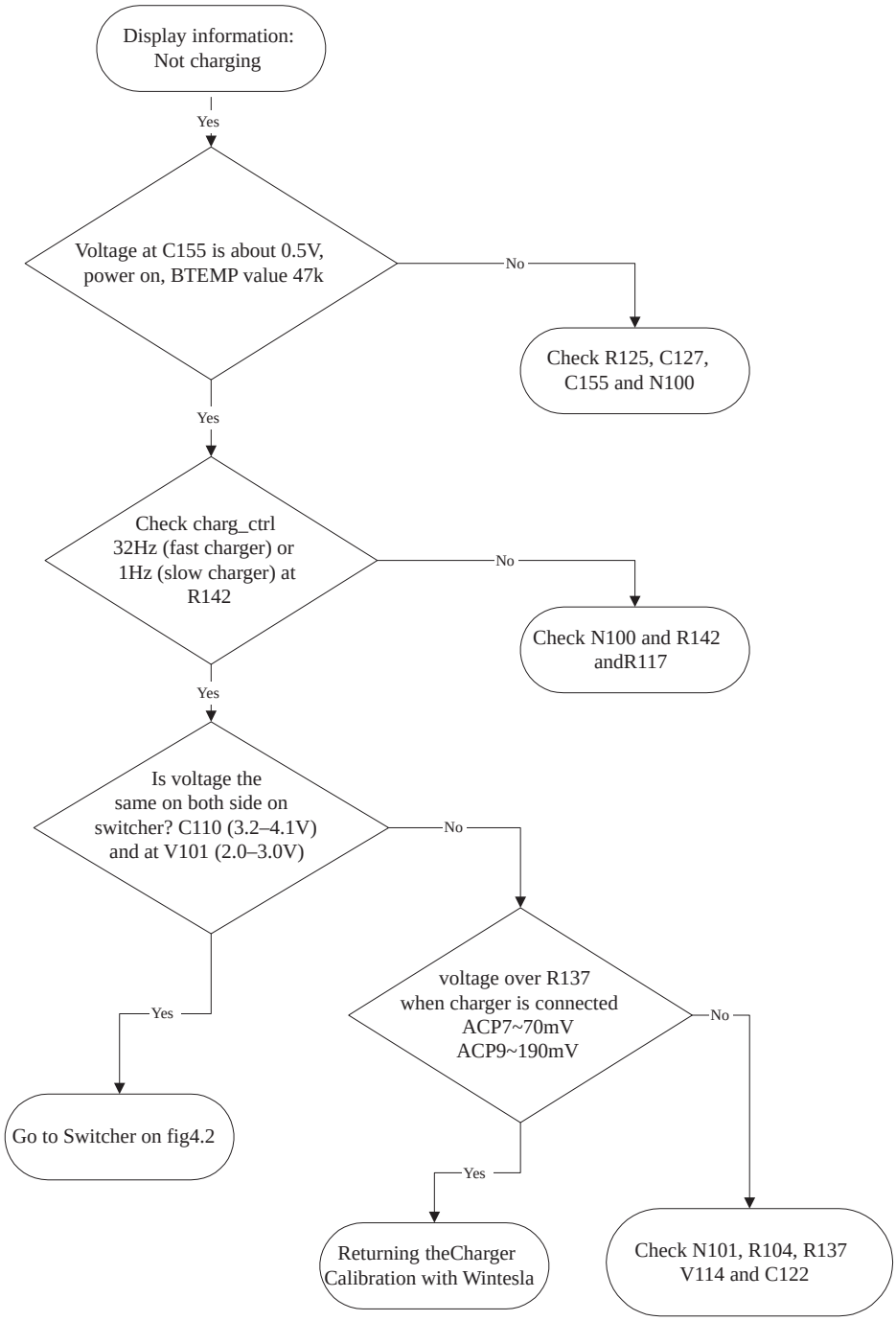

Display information:
Not charging
Yes
Voltage at C155 is about 0.5V,
power on, BTEMP value 47k
No
Check R125, C127,
C155 and N100
Yes
Check charg_ctrl
32Hz (fast charger) or
1Hz (slow charger) at
R142
No
Check N100 and R142
andR117
Yes
Is voltage the
same on both side on
switcher? C110 (3.2–4.1V)
and at V101 (2.0–3.0V)
No
Yes
Go to Switcher on fig4.2
voltage over R137
when charger is connected
ACP7~70mV
ACP9~190mV
No
Yes
Returning theCharger
Calibration with Wintesla
Check N101, R104, R137
V114 and C122

Figure 4–19

RF Troubleshooting

Measurements should be done using Spectrum Analyzer with high–frequency 500 ohm passive probe (LO–/reference frequencies and RF–power levels) and Oscilloscope with a 10:1 probe (DC–voltages and low frequency signals).

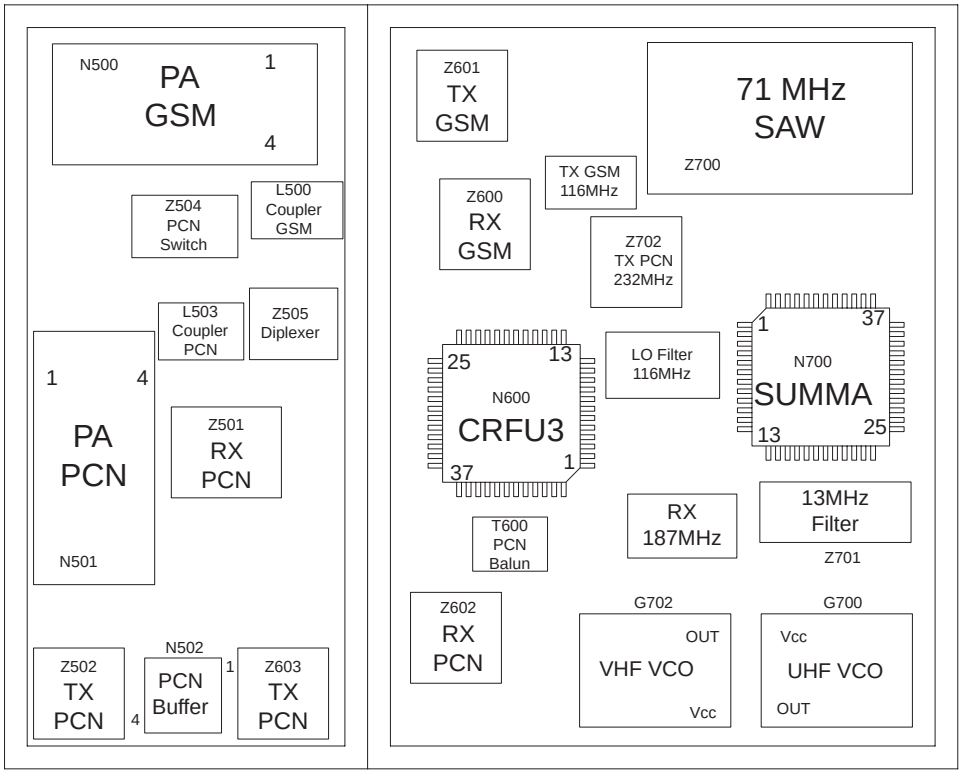
RF–section is mainly build from two ASICS CRFU3 (N600) and SUMMA (N700), external filters, MMIC PA–modules (N500, N501) and two synthesizers. For easier troubleshooting, this RF troubleshooting document is divided into five sections: GSM Receiver, GSM Transmitter, PCN Receiver, PCN Transmitter and Synthesizer parts. The tolerance is specified for critical signals/voltages.

Before changing either of the ASIC's, please check the following things: The soldering and connections of pins of the ASIC's are OK, supply voltages are OK and the signals of the synthesizers are coming to ASIC's. This will prevent the unnecessary changing of the ASIC's.

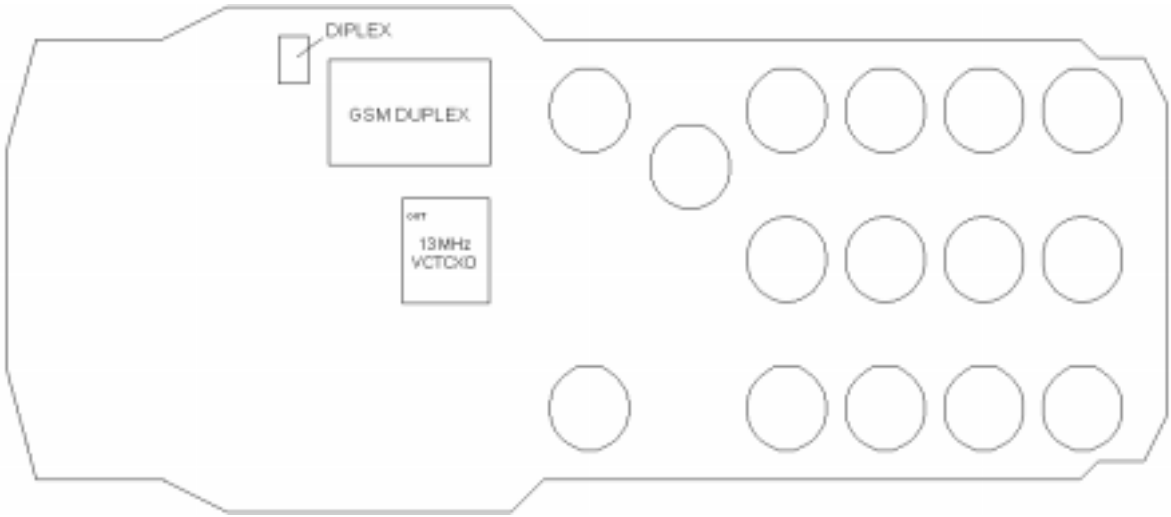
Please note that the grounding of the PA–module is directly below PA–module so it is difficult to check. **The PA–module is static discharge sensitive!** So ESD protection must be used when dealing with PA–module (ground straps and ESD soldering irons). The PA's are class 3 moisture sensitive so parts must be dry bake.

There are still a lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done just by checking that component is soldered or it is not missing from PCB.

PCB Bottom view(GF7)



PCB Top view (GF7 + GD7)



2. GSM Receiver

2.1 . General instructions for GSM RX troubleshooting

Start WinTesla–Service–Software and

Select:	Product			Alt+p
		Band		b
			GSM	g
Select:	Testing			Alt+e
		RF Controls		r
			RX Continuous	Alt+r
			Cont. Mode Ch: 60	Alt+o, 60
			Front End On	(if Front End is off, Alt+e)

Apply a 947.0 MHz (channel 60) –50 dBm signal to MJS–13 RF–connector. This signal is tracked through RX–path and will make the troubleshooting of the RX easier.

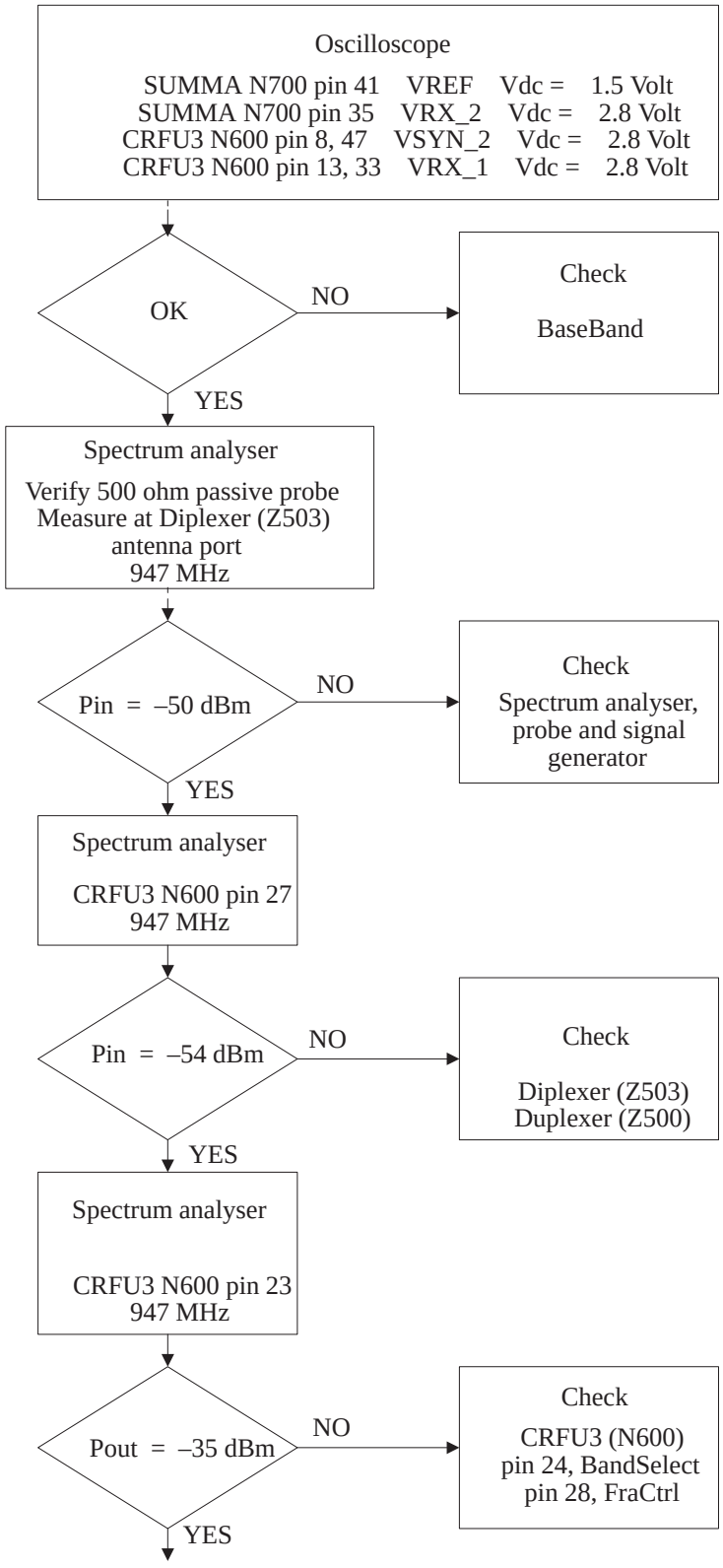
2.2 . Path of the received GSM signal

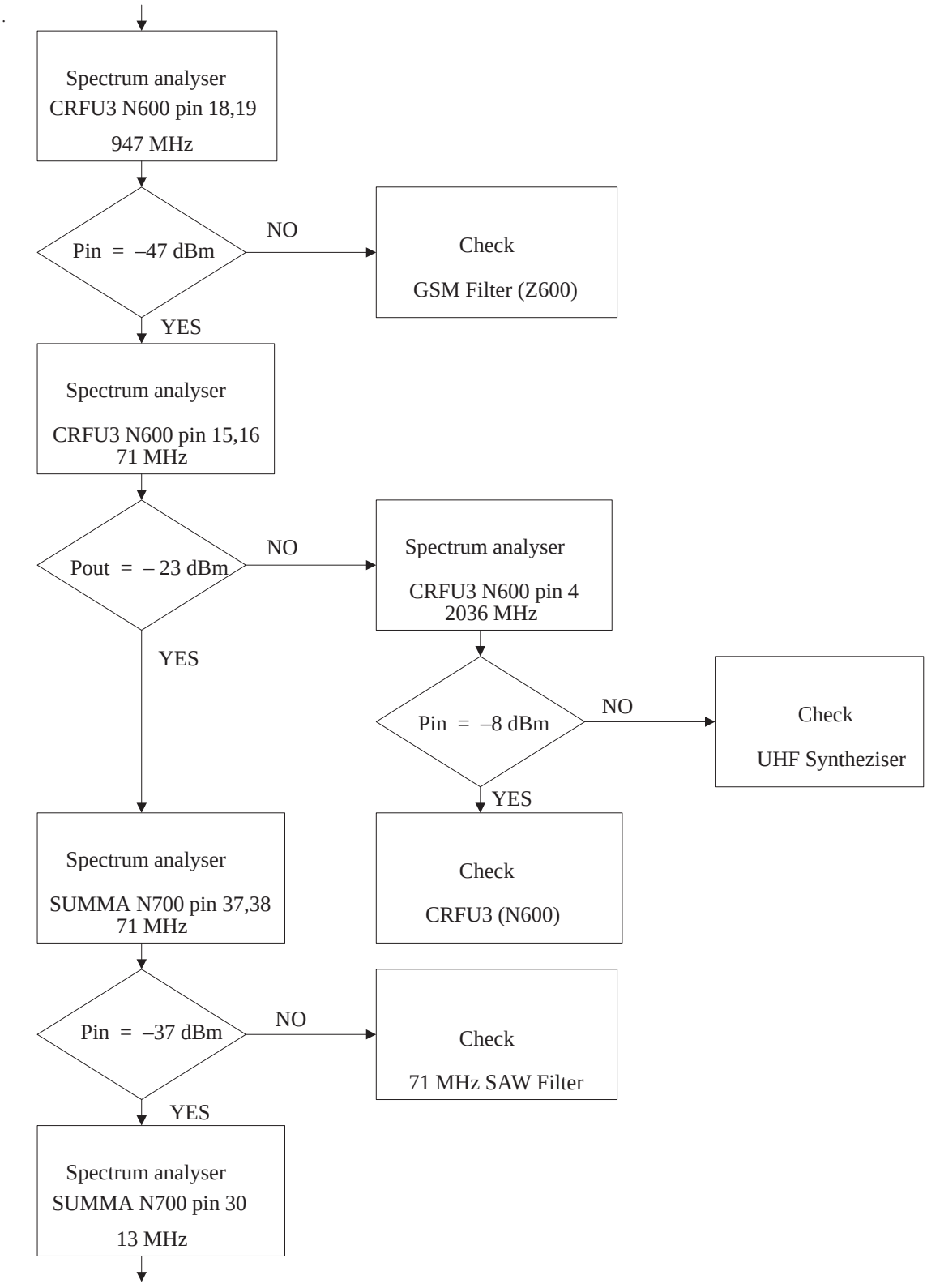
This path defines the general route of the received signal:

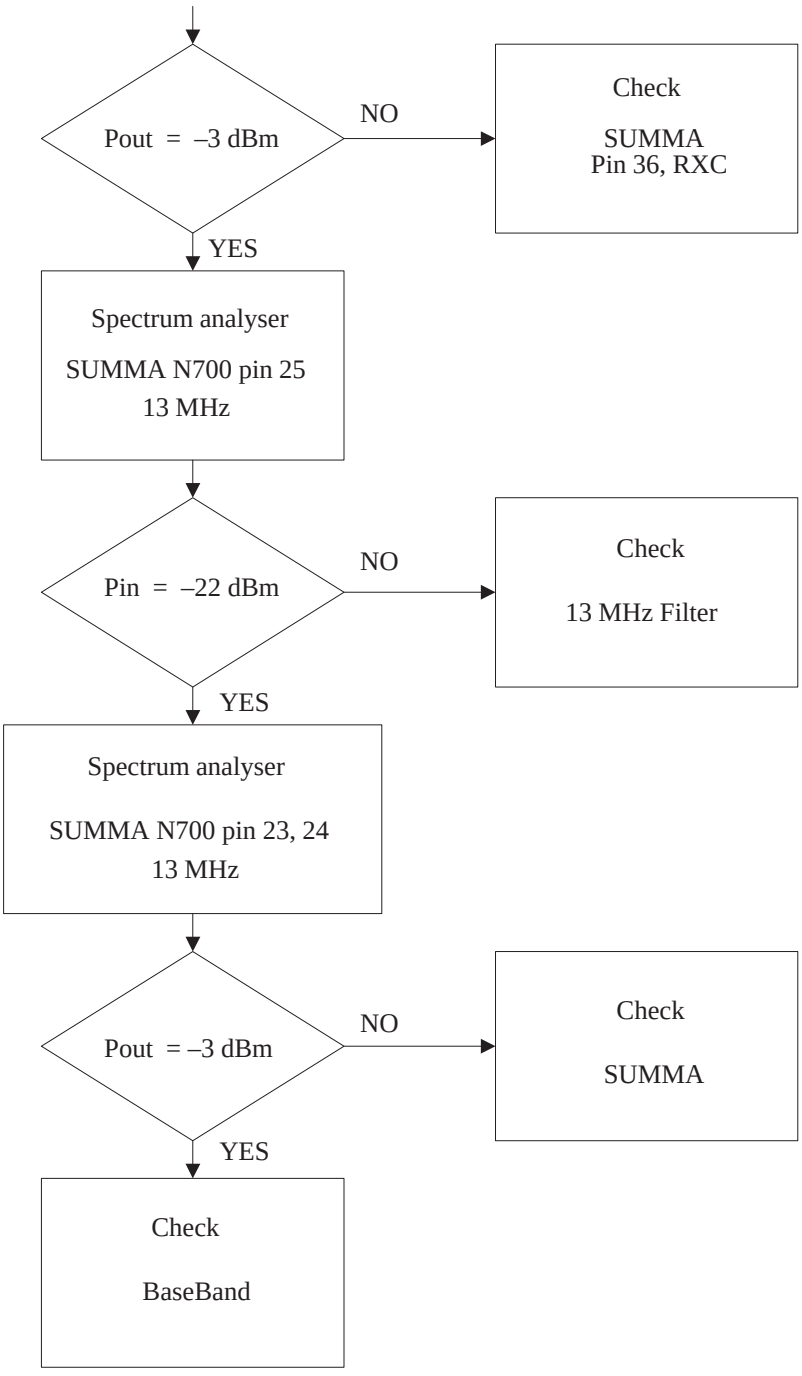
Antenna, Diplexer (Z503), Duplexer (Z500), CRFU3 (LNA N600), GSM Filter (Z600), CRFU3 (Mixer N600), SAW 71MHz Filter (Z700), SUMMA (N700), 13Mhz Filter (Z701), SUMMA, COBBA_GJP (N200).

The related component number(s) are defined inside (.).

2.3. Fault finding chart for GSM receiver




Spectrum analyser
CRFU3 N600 pin 18,19
947 MHz
Pin = –47 dBm
NO
Check
GSM Filter (Z600)
YES
Spectrum analyser
CRFU3 N600 pin 15,16
71 MHz
Pout = – 23 dBm
NO
Spectrum analyser
CRFU3 N600 pin 4
2036 MHz
YES
Pin = –8 dBm
NO
Check
UHF Syntheziser
YES
Spectrum analyser
SUMMA N700 pin 37,38
71 MHz
Check
CRFU3 (N600)
Pin = –37 dBm
NO
Check
71 MHz SAW Filter
YES
Spectrum analyser
SUMMA N700 pin 30
13 MHz


Pout = –3 dBm
NO
Check
SUMMA
Pin 36, RXC
YES
Spectrum analyser
SUMMA N700 pin 25
13 MHz
Pin = –22 dBm
NO
Check
13 MHz Filter
YES
Spectrum analyser
SUMMA N700 pin 23, 24
13 MHz
Pout = –3 dBm
NO
Check
SUMMA
YES
Check
BaseBand

3. PCN Receiver

3.1 . General instructions for PCN RX troubleshooting

Start WinTesla–Service–Software and

Select:	Product		Alt+p
		Band	b
			PCN p
Select:	Testing		Alt+e
		RF Controls	r
			RX Continuous Alt+r
			Cont. Mode Ch: 700 Alt+o, 700
			Front End On (if Front End is off, Alt+e)

Apply an 1842.8 MHz (MID channel) –50 dBm signal to MJS–13 RF–connector. This signal is tracked through RX–path and will make the troubleshooting of the RX easier.

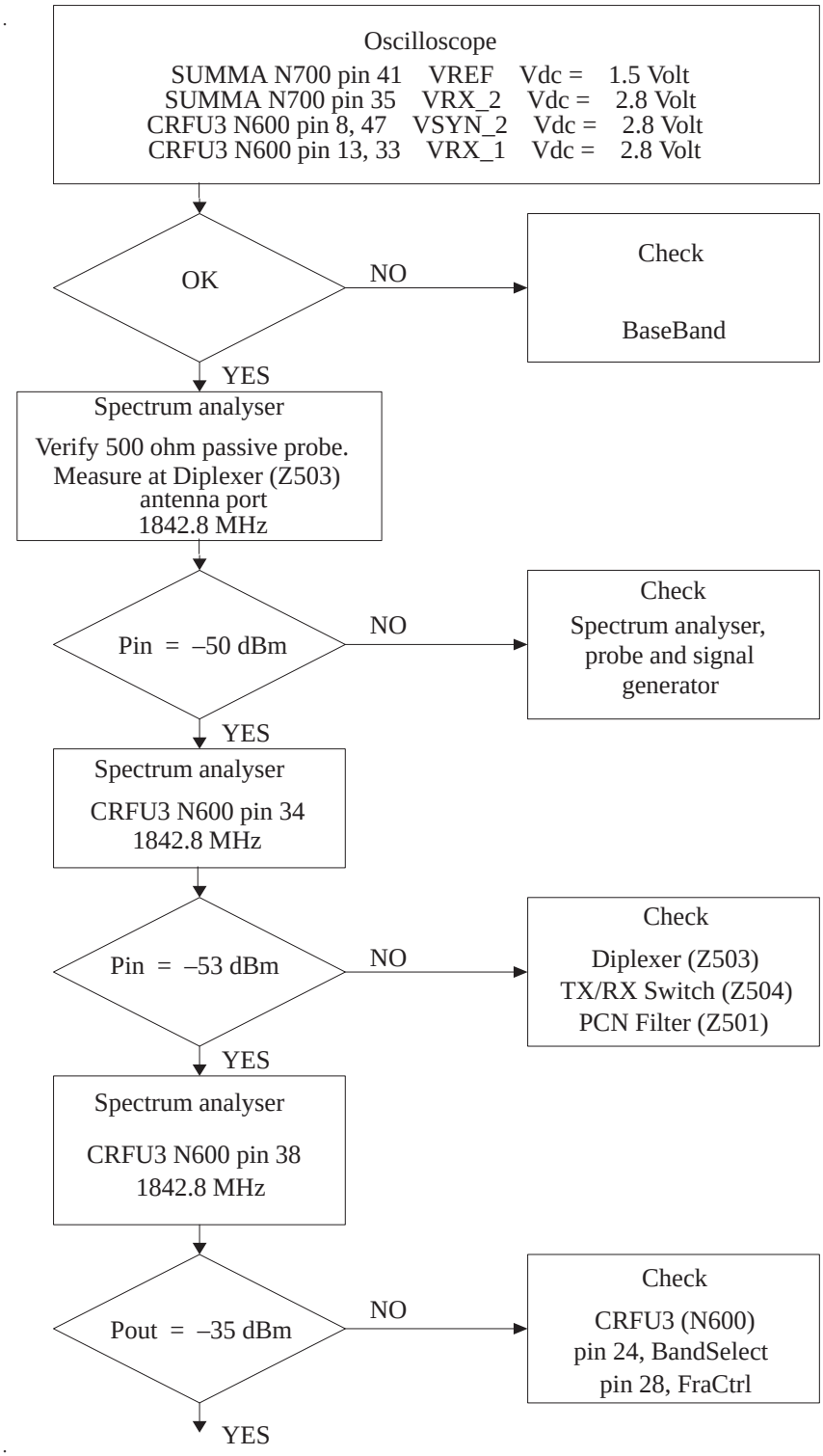
3.2 . Path of the received PCN signal

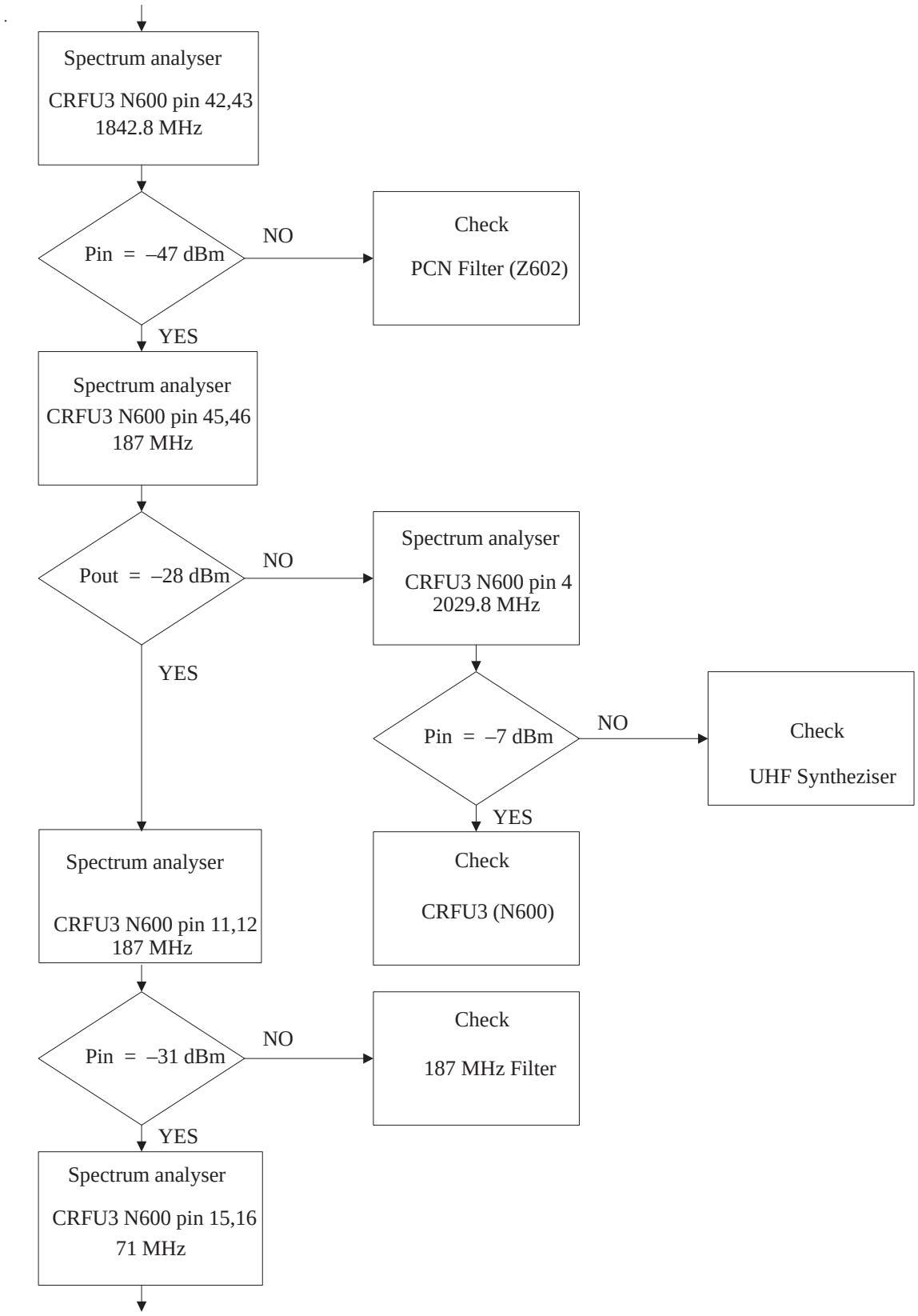
This path defines the general route of the received signal:

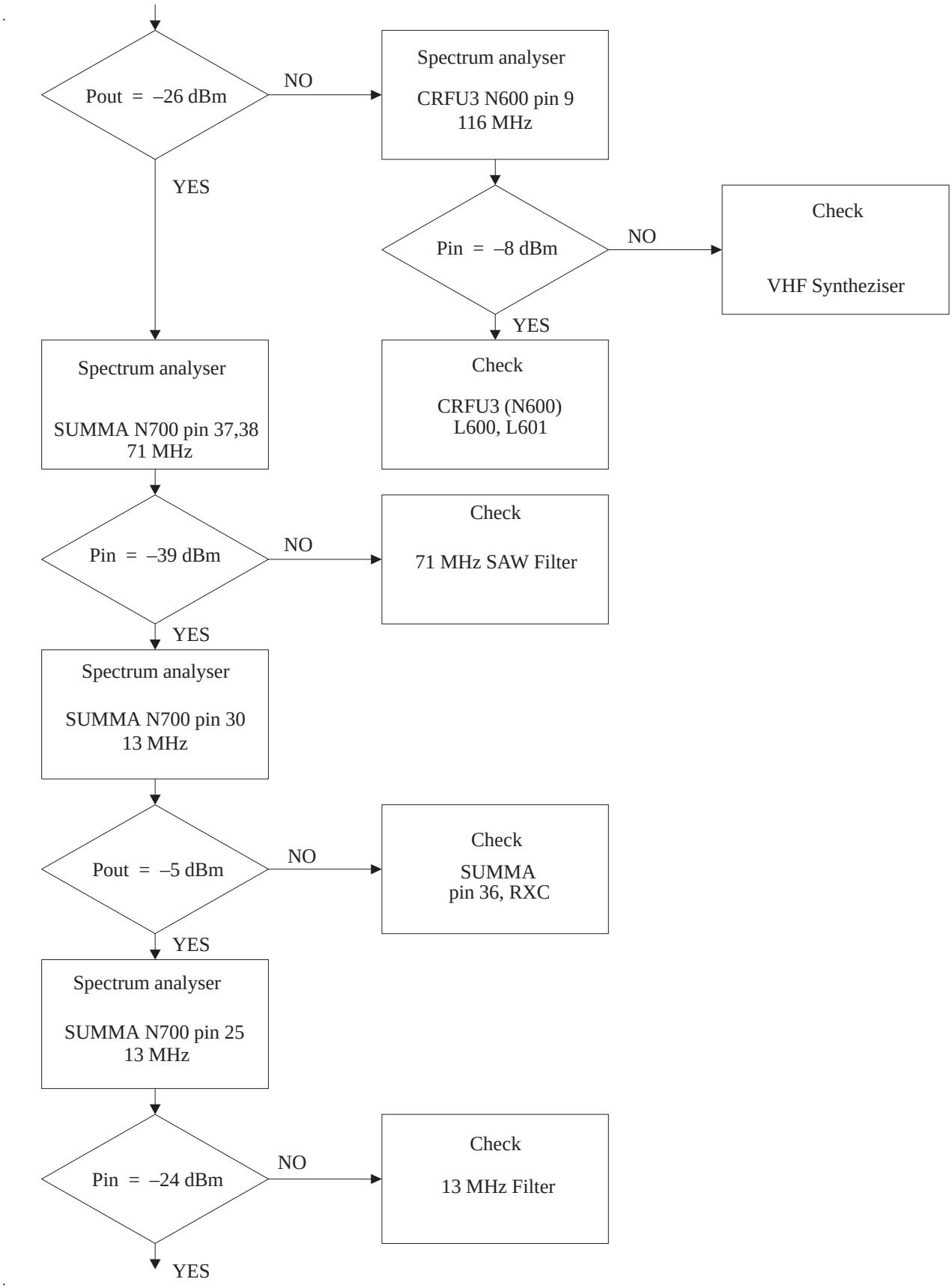
Antenna, Diplexer (Z503), TX/RX Switch (Z504), PCN Filter (Z501), CRFU3 (LNA N600), PCN Filter (Z602), CRFU3 (Mixer N600), LC 187 MHz Filter (L604), CRFU3 (Mixer N600), SAW 71MHz Filter (Z700), SUMMA (N700), 13Mhz Filter (Z701), SUMMA, COBBA_GJP (N200).

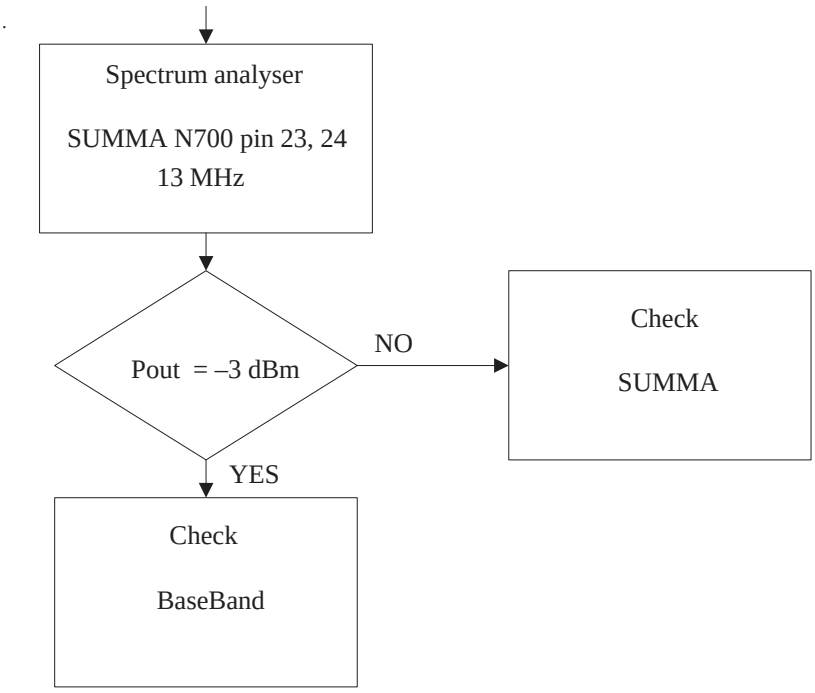
The related component number(s) are defined inside (.).

3.3 Fault finding chart for PCN receiver




Spectrum analyser
CRFU3 N600 pin 42,43
1842.8 MHz
Pin = –47 dBm
NO
Check
PCN Filter (Z602)
YES
Spectrum analyser
CRFU3 N600 pin 45,46
187 MHz
Pout = –28 dBm
NO
Spectrum analyser
CRFU3 N600 pin 4
2029.8 MHz
YES
Pin = –7 dBm
NO
Check
UHF Syntheziser
YES
Spectrum analyser
CRFU3 N600 pin 11,12
187 MHz
Check
CRFU3 (N600)
Pin = –31 dBm
NO
Check
187 MHz Filter
YES
Spectrum analyser
CRFU3 N600 pin 15,16
71 MHz


Pout = –26 dBm
NO
Spectrum analyser
CRFU3 N600 pin 9
116 MHz
YES
Pin = –8 dBm
NO
Check
VHF Syntheziser
YES
Spectrum analyser
SUMMA N700 pin 37,38
71 MHz
Check
CRFU3 (N600)
L600, L601
Pin = –39 dBm
NO
Check
71 MHz SAW Filter
YES
Spectrum analyser
SUMMA N700 pin 30
13 MHz
Pout = –5 dBm
NO
Check
SUMMA
pin 36, RXC
YES
Spectrum analyser
SUMMA N700 pin 25
13 MHz
Pin = –24 dBm
NO
Check
13 MHz Filter
YES


Spectrum analyser
SUMMA N700 pin 23, 24
13 MHz
Pout = –3 dBm
NO
Check
SUMMA
YES
Check
BaseBand

4. GSM Transmitter

4.1 General instructions for GSM TX troubleshooting

Apply a RF–cable to the MJS–13 RF–connector to allow the transmitted signal act as normal. RF–cable should be connected to measurement equipment or to at least a 10–dB attenuator, otherwise the PA may be damaged.

Start WinTesla–Service–Software and

Select:	Product		Alt+p
		Band	b
			GSM g
Select:	Testing		Alt+e
		RF Controls	r
			TX Power Level : BASE Alt+x, b
			TX Continous Alt+c
			TX Data Type: Random Alt+d, r
			Channel: 60 Alt+n, 60
			Apply Alt+a

4.2 . Path of the transmitted GSM signal

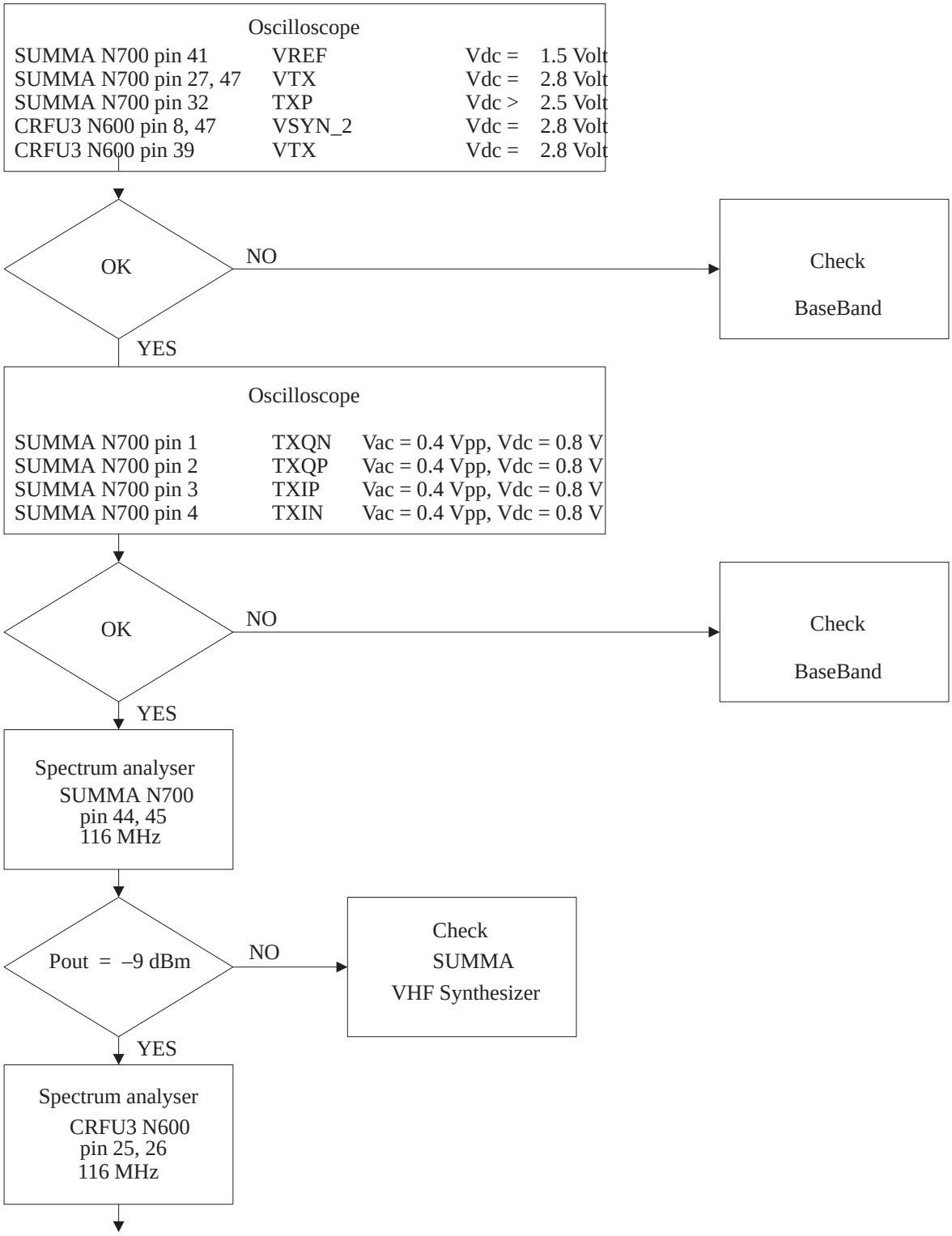
This path defines the general route of the transmitted signal:

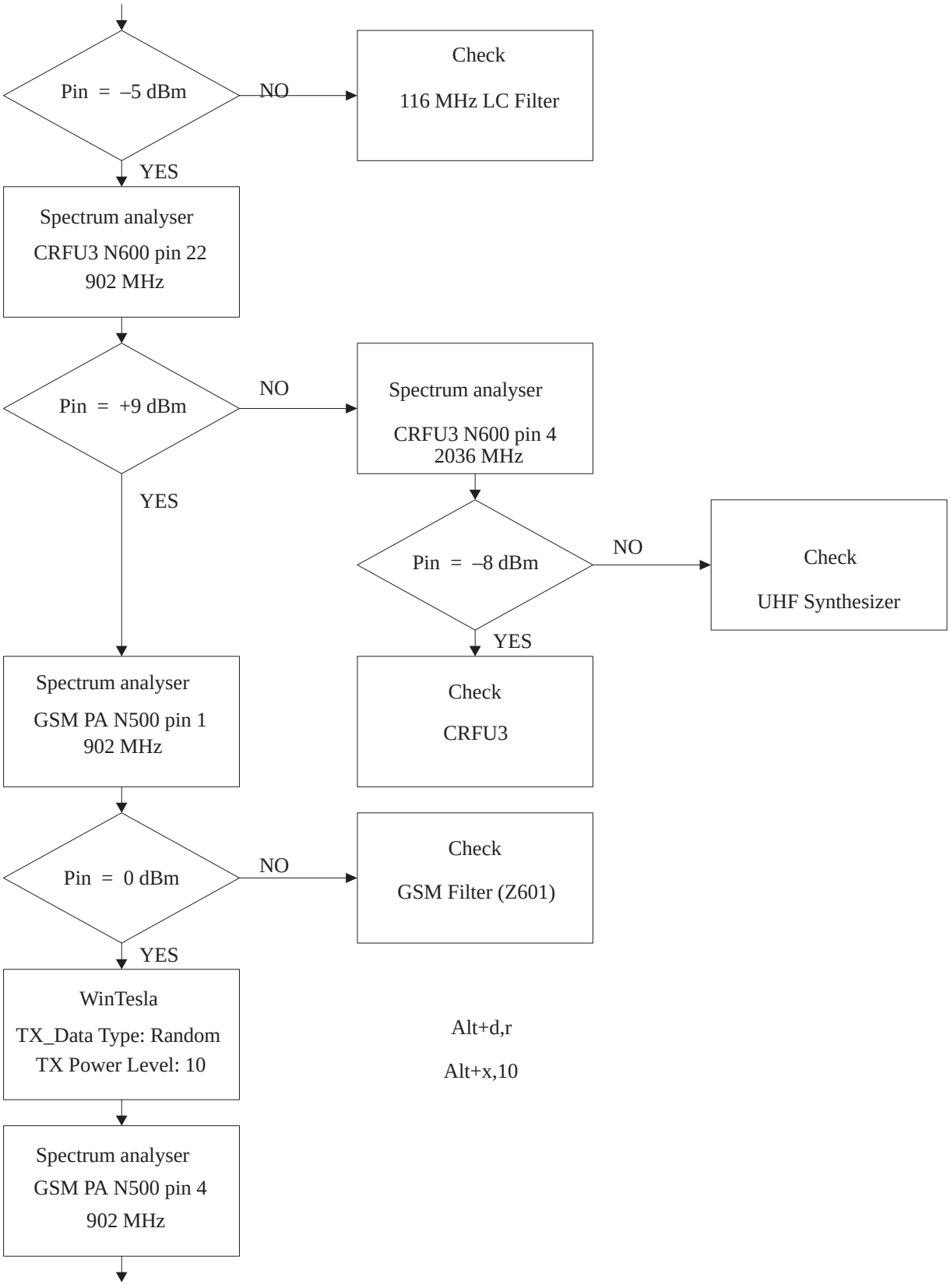
COBBA_GJP (N200), SUMMA(N700), 116 MHz Filter (L703, L704, L708), CRFU3 (Upconverter N600), GSM Filter (Z601), MMIC PA (N500), Directional Coupler (L500), Duplexer (Z500), Diplexer (Z503), Antenna.

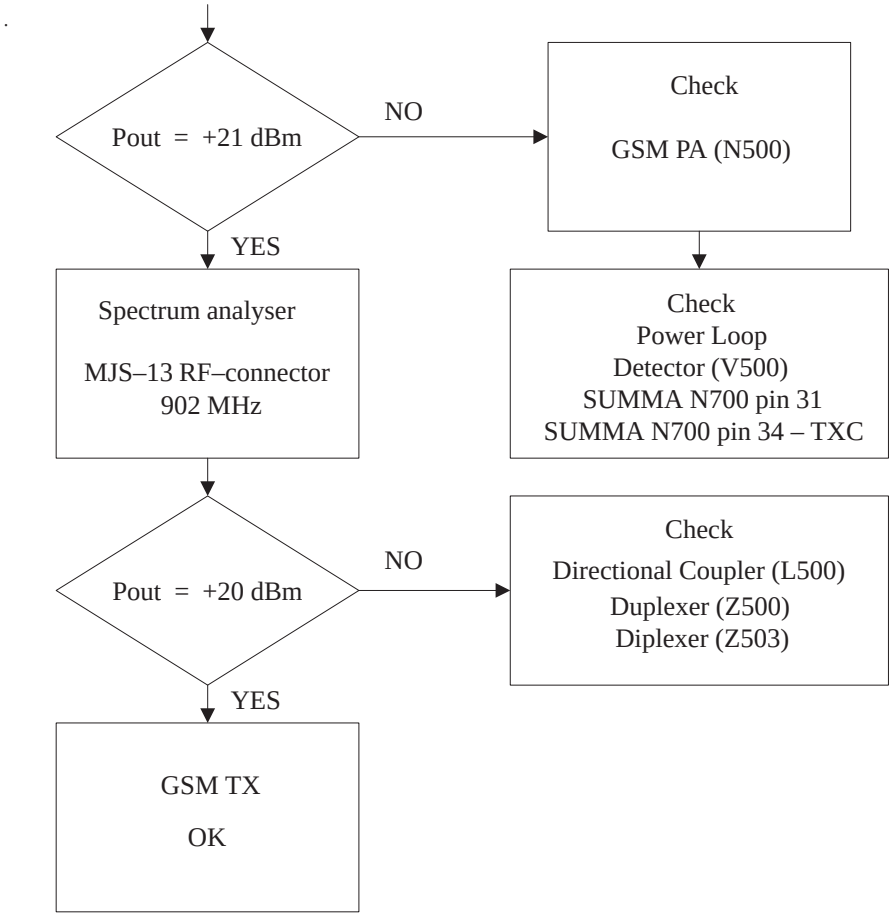
The related component number(s) are defined inside (.).

There is also power detection (V500) and power control circuits inside SUMMA for transmitter power control.

4.3 . Fault finding chart for GSM transmitter




Pin = –5 dBm
NO
Check
116 MHz LC Filter
YES
Spectrum analyser
CRFU3 N600 pin 22
902 MHz
Pin = +9 dBm
NO
Spectrum analyser
CRFU3 N600 pin 4
2036 MHz
YES
Pin = –8 dBm
NO
Check
UHF Synthesizer
YES
Spectrum analyser
GSM PA N500 pin 1
902 MHz
Check
CRFU3
Pin = 0 dBm
NO
Check
GSM Filter (Z601)
YES
WinTesla
TX_Data Type: Random
TX Power Level: 10
Alt+d,r
Alt+x,10
Spectrum analyser
GSM PA N500 pin 4
902 MHz


Pout = +21 dBm
NO
Check
GSM PA (N500)
YES
Spectrum analyser
MJS–13 RF–connector
902 MHz
Check
Power Loop
Detector (V500)
SUMMA N700 pin 31
SUMMA N700 pin 34 – TXC
Pout = +20 dBm
NO
Check
Directional Coupler (L500)
Duplexer (Z500)
Diplexer (Z503)
YES
GSM TX
OK

5. PCN Transmitter

5.1 . General instructions for PCN TX troubleshooting

Apply a RF–cable to the MJS–13 RF–connector to allow the transmitted signal act as normal. RF–cable should be connected to measurement equipment or to at least a 10–dB attenuator, otherwise the PA may be damaged.

Start WinTesla–Service–Software and

Select:	Product		Alt+p
		Band	b
			PCN p
Select:	Testing		Alt+e
		RF Controls	r
			TX Power Level: BASE Alt+x, b
			TX Continous Alt+c
			TX Data Type: Random Alt+d, r
			Channel: 700 Alt+n, 700
			Apply Alt+a

5.2 . Path of the transmitted PCN signal

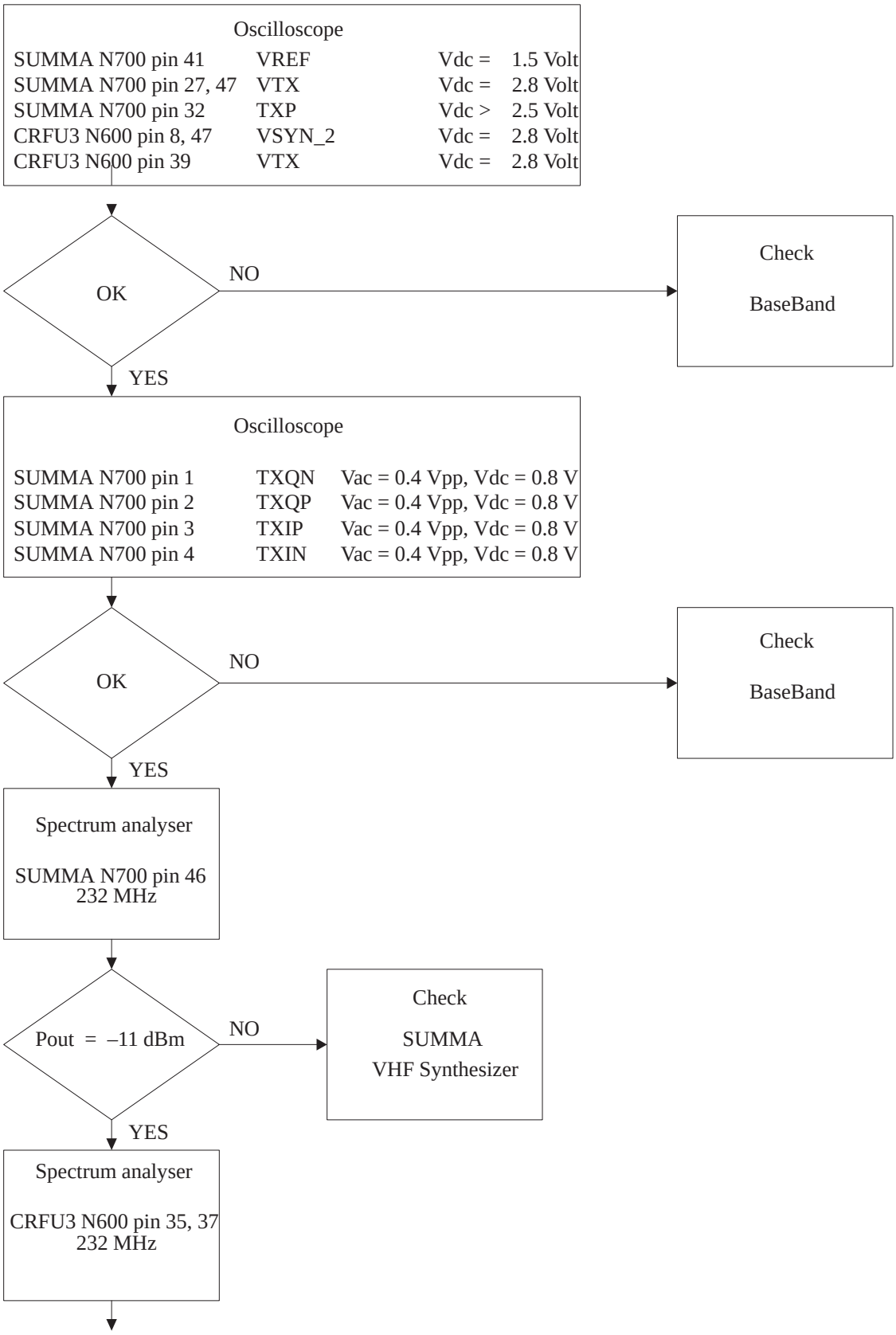
This path defines the general route of the transmitted signal:

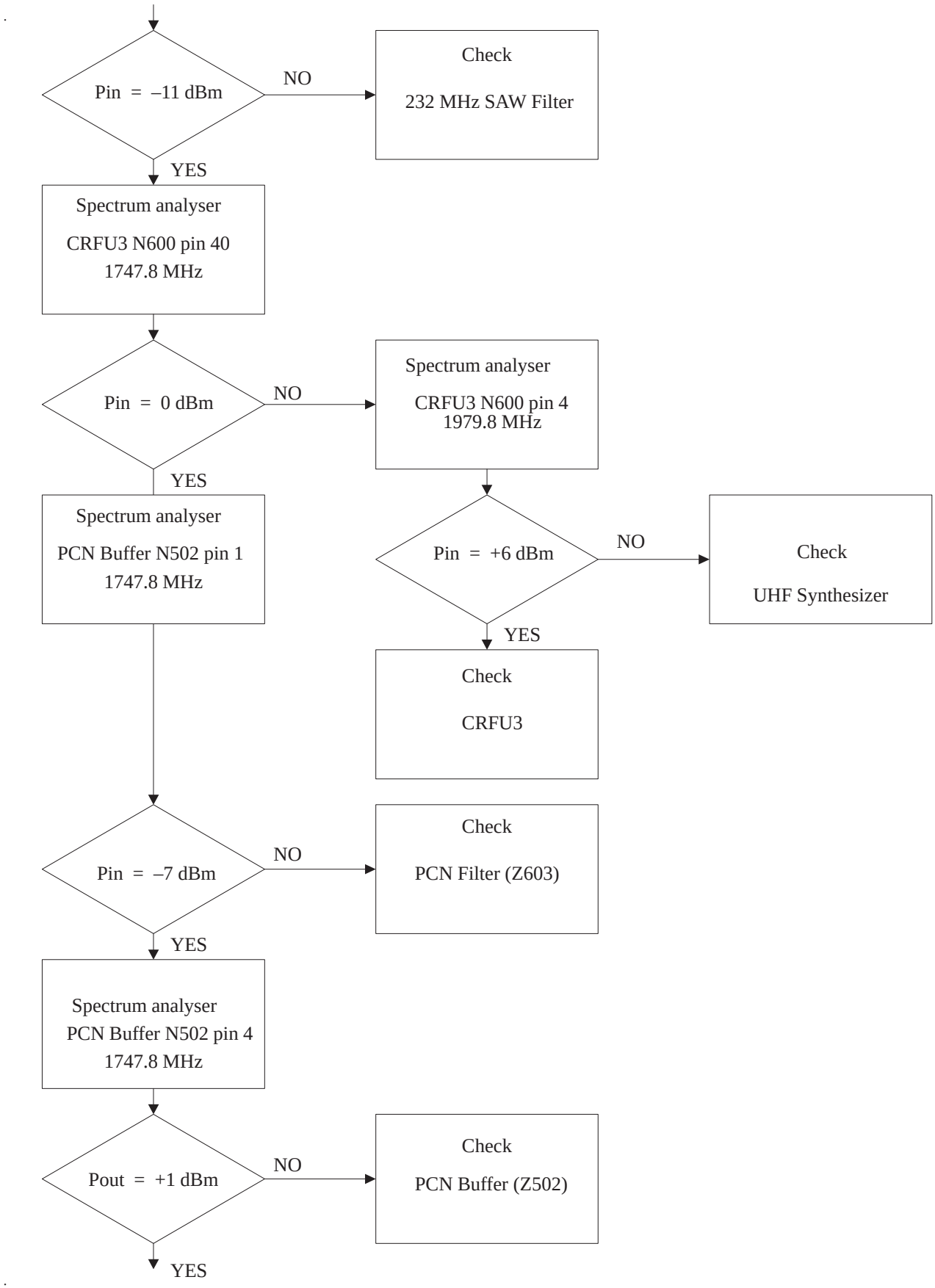
COBBA_GJP (N200), SUMMA (N700), 232 MHz SAW Filter (Z702), CRFU3 (Upconverter N600), PCN Filter (Z603), PCN Buffer (N502), PCN Filter (Z502), MMIC PA (N501), Directional Coupler (L500), TX/RX Switch (Z504), Diplexer (Z503), Antenna.

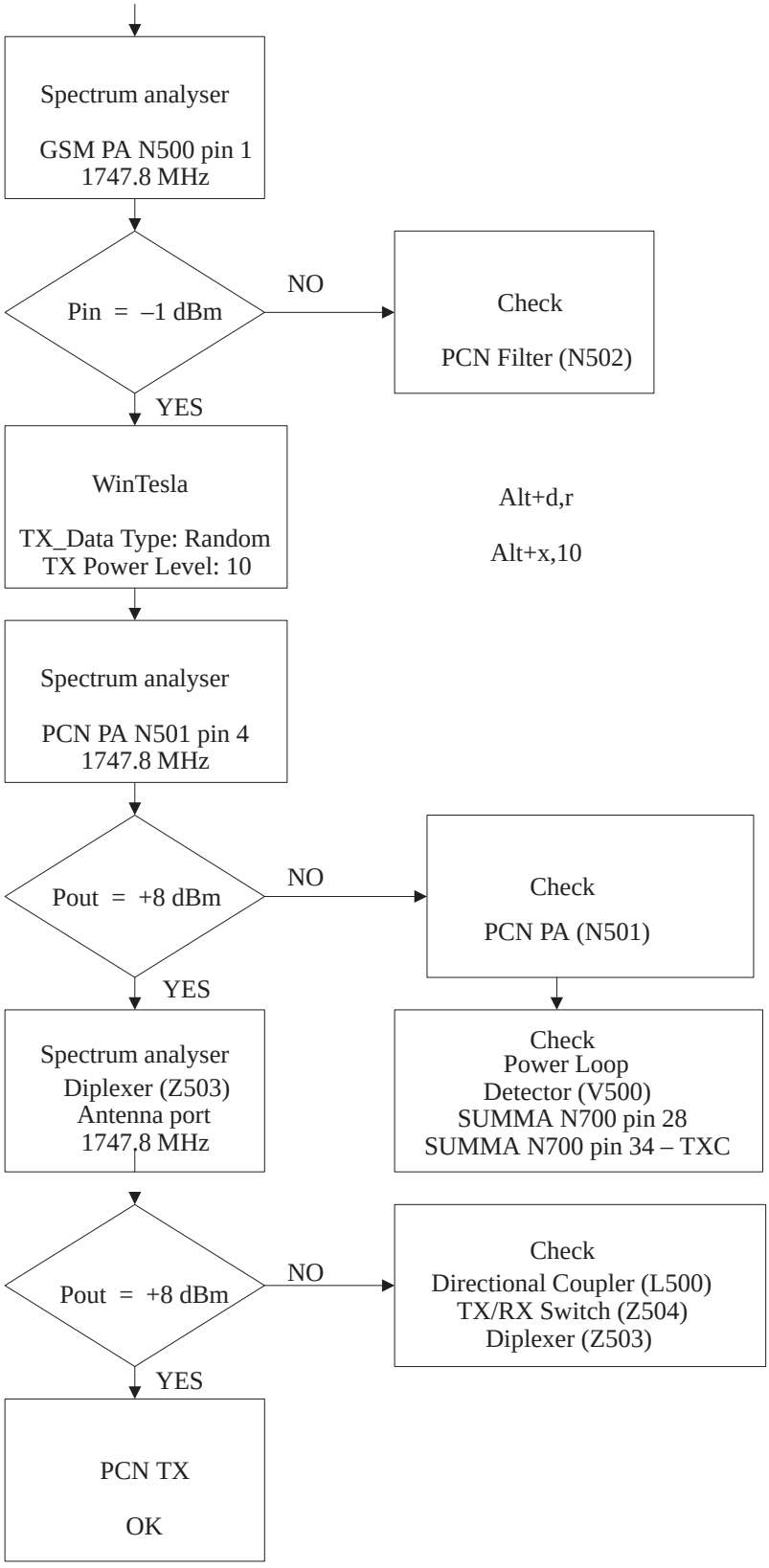
The related component number(s) are defined inside (.).

There is also power detection (V500) and power control circuits inside SUMMA for transmitter power control.

5.3. Fault finding chart for PCN transmitter




Pin = –11 dBm
NO
Check
232 MHz SAW Filter
YES
Spectrum analyser
CRFU3 N600 pin 40
1747.8 MHz
Pin = 0 dBm
NO
Spectrum analyser
CRFU3 N600 pin 4
1979.8 MHz
YES
Spectrum analyser
PCN Buffer N502 pin 1
1747.8 MHz
Pin = +6 dBm
NO
Check
UHF Synthesizer
YES
Check
CRFU3
Pin = –7 dBm
NO
Check
PCN Filter (Z603)
YES
Spectrum analyser
PCN Buffer N502 pin 4
1747.8 MHz
Pout = +1 dBm
NO
Check
PCN Buffer (Z502)
YES


Spectrum analyser
GSM PA N500 pin 1
1747.8 MHz
Pin = –1 dBm
NO
Check
PCN Filter (N502)
YES
WinTesla
TX_Data Type: Random
TX Power Level: 10
Alt+d,r
Alt+x,10
Spectrum analyser
PCN PA N501 pin 4
1747.8 MHz
Pout = +8 dBm
NO
Check
PCN PA (N501)
YES
Spectrum analyser
Diplexer (Z503)
Antenna port
1747,8 MHz
Check
Power Loop
Detector (V500)
SUMMA N700 pin 28
SUMMA N700 pin 34 – TXC
Pout = +8 dBm
NO
Check
Directional Coupler (L500)
TX/RX Switch (Z504)
Diplexer (Z503)
YES
PCN TX
OK

6. Synthesizers

There are three oscillators generating the needed frequencies for RF–section. 13 MHz reference oscillator, 464 MHz VHF VCO and UHF VCO.

The frequency range for UHF VCO is GSM TX: 2012.4 ... 2061.6 MHz,
PCN TX: 1942.2 ... 2016.8 MHz,
GSM RX: 2012.4 ... 2061.6 MHz,
PCN RX: 1992.2 ... 2066.8 MHz.

6.1 . General instructions for Synthesizer troubleshooting

Start WinTesla–Service–Software and

Select:	Product		Alt+p
	Band		b
		GSM	g
Select:	Testing		Alt+e
	RF Controls		r
		RX Continuous	Alt+r
		Cont. Mode Ch: 60	Alt+o, 60

6.2 .. 13 MHz reference oscillator

The 13 MHz oscillator (G701) is controlled by COBBA_GJP (N200). This 13 MHz signal is pulse–shaped and connected to SUMMA (N700) and it is also buffered, filtered and connected to MAD2 (D300).

6.3. VHF VCO

The 464 MHz VHF VCO (G702) signal is used to generate the 116 MHz– and 232 MHz signals inside SUMMA. The 116 MHz signal is used in GSM transmitter and in PCN receiver. The 232 MHz signal is used in PCN transmitter.

Fault finding table for VHF VCO

The fault finding is as described for UHF VCO with following exceptions:

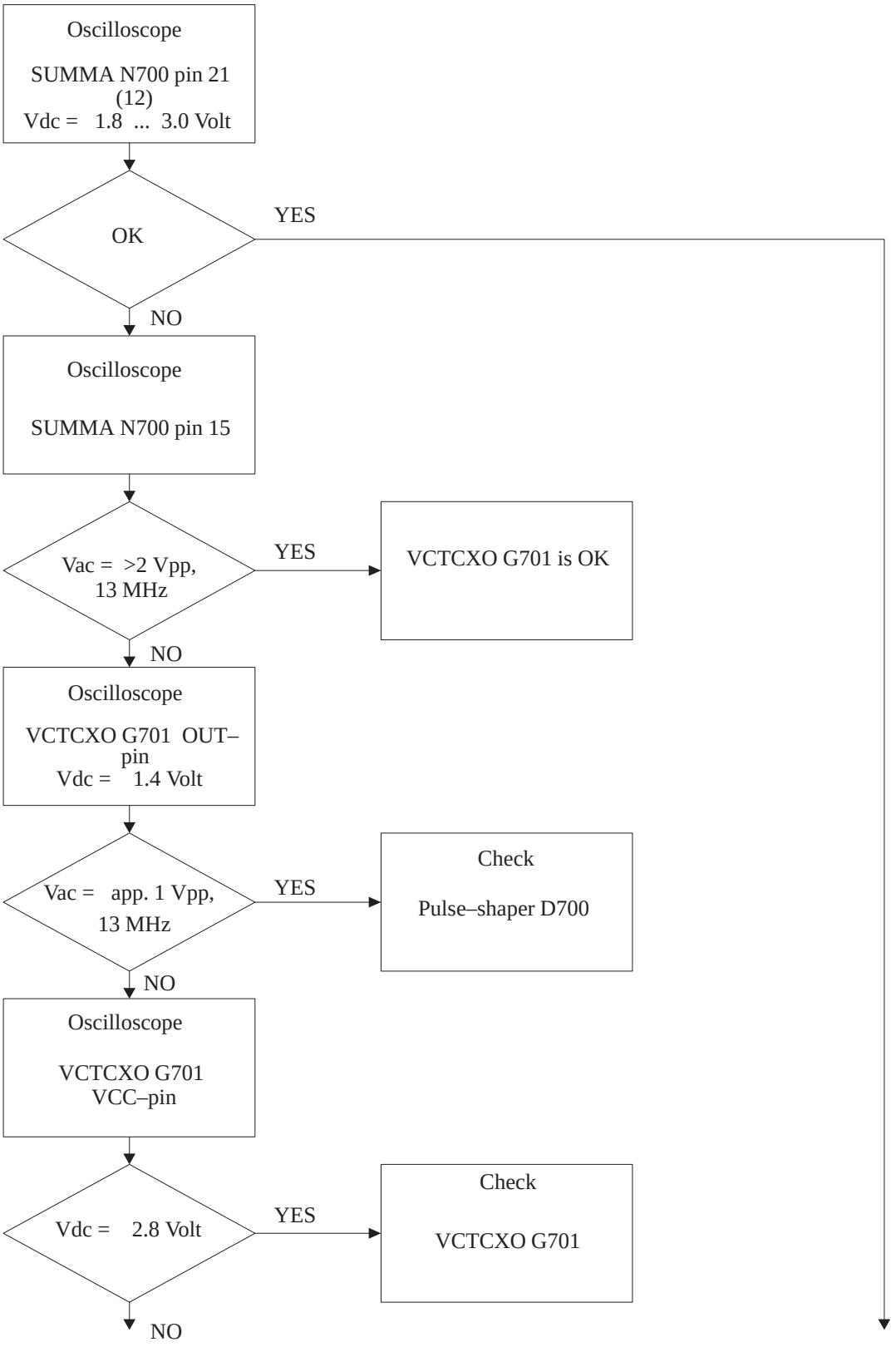
	UHF VCO		VHF VCO	
1	SUMMA N700 pin 21	changed to	SUMMA N700 pin 12	Vdc = 1.8 ... 3.0 Volt
2	UHF VCO G700	changed to	VHF VCO G702	
3	SUMMA UHF PLL	changed to	SUMMA VHF PLL	
4	UHF VCO G700 OUT–pin	changed to	VHF VCO G702 OUT–pin	Pout > –3 dBm

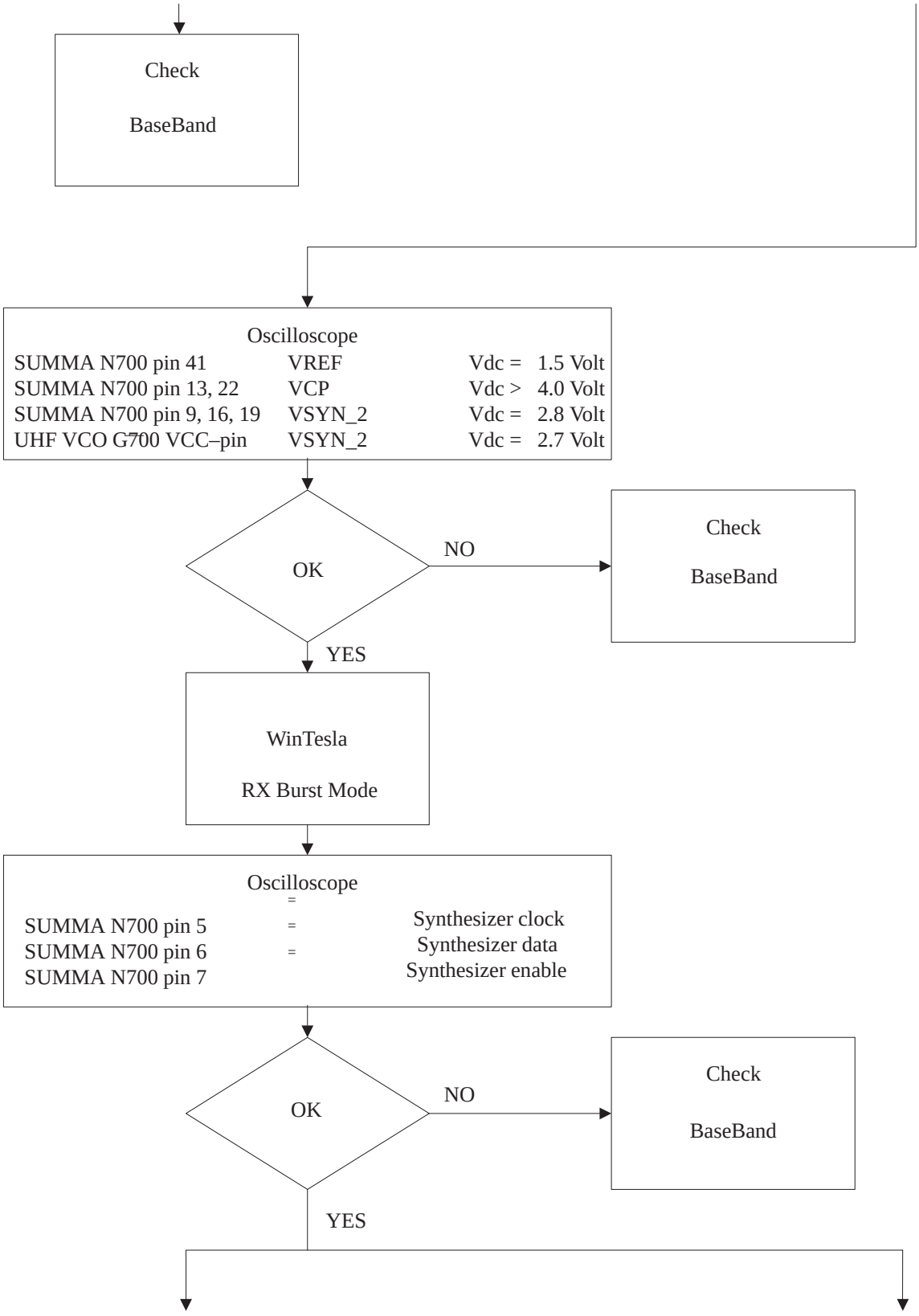
The exceptions will be inside (.) in the fault finding chart for the UHF VCO.

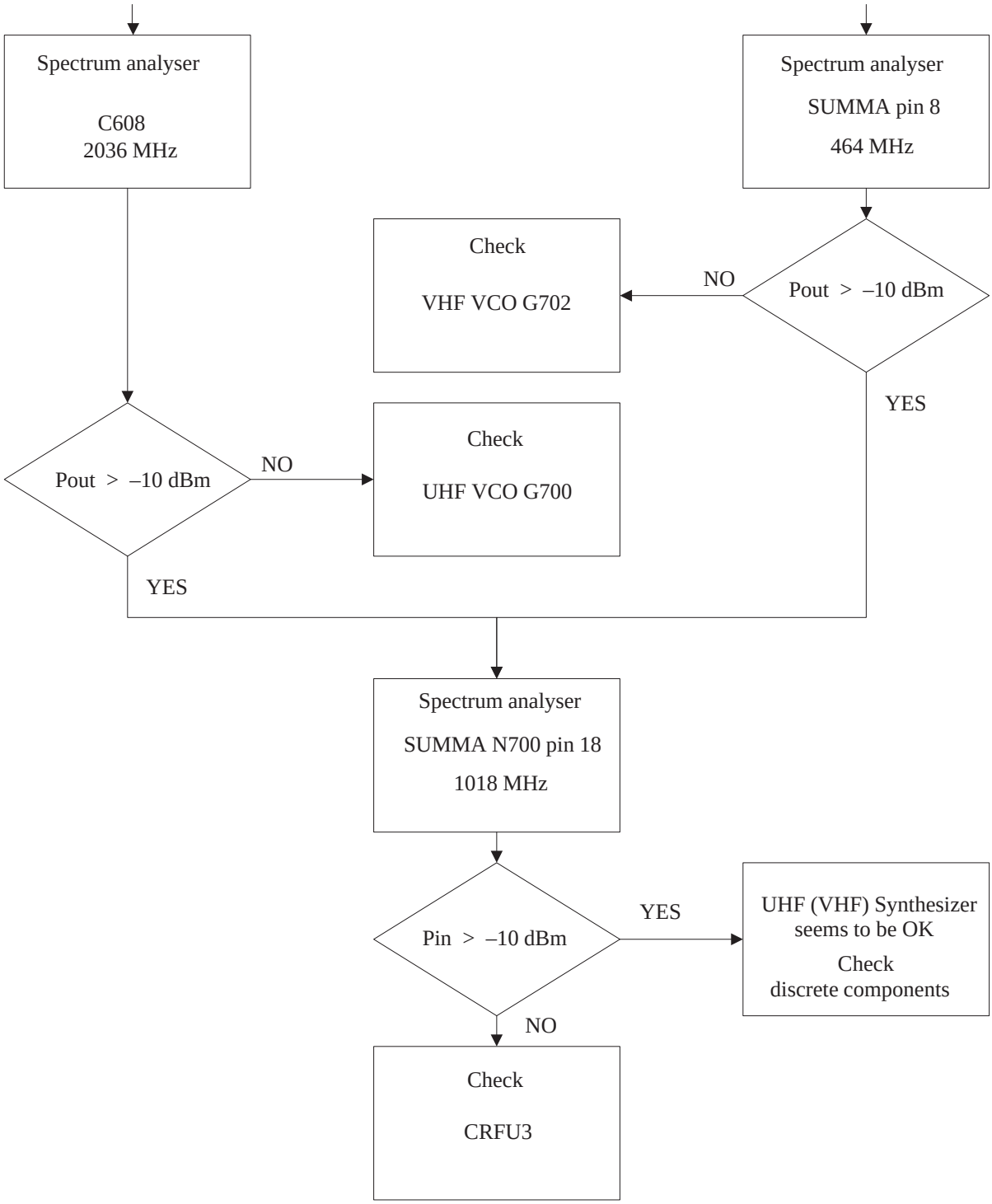
6.4. UHF VCO

UHF VCO (G700) is used to generate the first injection for RX (GSM 2012.4 ... 2061.6 MHz, PCN 1992.2 ... 2066.8 MHz) and the final injection for TX (GSM 2012.4 ... 2061.6 MHz, PCN 1942.2 ... 2016.8 MHz). The output frequency of the module depends on the DC–control voltage coming from SUMMA.

6.5. *Fault finding chart –UHF VCO and 13 MHz ref. oscillator*




Check
BaseBand
Oscilloscope
SUMMA N700 pin 41 VREF Vdc = 1.5 Volt
SUMMA N700 pin 13, 22 VCP Vdc > 4.0 Volt
SUMMA N700 pin 9, 16, 19 VSYN_2 Vdc = 2.8 Volt
UHF VCO G700 VCC–pin VSYN_2 Vdc = 2.7 Volt
OK
NO
Check
BaseBand
YES
WinTesla
RX Burst Mode
Oscilloscope
SUMMA N700 pin 5 = Synthesizer clock
SUMMA N700 pin 6 = Synthesizer data
SUMMA N700 pin 7 = Synthesizer enable
OK
NO
Check
BaseBand
YES


Spectrum analyser
C608
2036 MHz
Spectrum analyser
SUMMA pin 8
464 MHz
Check
VHF VCO G702
NO
Pout > –10 dBm
YES
Pout > –10 dBm
NO
Check
UHF VCO G700
YES
Spectrum analyser
SUMMA N700 pin 18
1018 MHz
Pin > –10 dBm
YES
UHF (VHF) Synthesizer
seems to be OK
Check
discrete components
NO
Check
CRFU3