5 T835 Fault Finding

The following test procedures and fault finding flow charts may be used to help locate a hardware problem, however they are by no means a complete fault finding procedure. If the fault still exists after having progressed through them in a logical manner, contact your nearest authorised Tait Dealer or Service Centre. Further assistance may be obtained from the Customer Support Group, Radio Infrastructure Division, Tait Electronics Ltd, Christchurch, New Zealand.

The following topics are covered in this section.

5.1 Visual Checks

Remove the covers from the T835 and inspect the PCB for damaged or broken components, paying particular attention to the surface mounted devices (SMDs).

Check for defective solder joints. If repair or replacement is considered necessary, refer to Section 3 of Part A.

5.2 Component Checks

If a transistor is suspected of faulty operation, an indication of its performance can be assessed by measuring the forward and reverse resistance of the junctions. First make sure that the transistor is not shunted by some circuit resistance (unless the device is completely desoldered). A 20k ohm/V or better multimeter should be used for taking the measurements, using only the medium or low resistance ranges.

The collector current drawn by multi-junction transistors is a further guide to their performance.

If an IC is suspect, the most reliable check is to measure the DC operating voltages. Due to the catastrophic nature of most IC failures, the pin voltages will usually be markedly different from the recommended values in the presence of a fault. The recommended values can be obtained from either the circuit diagram or the component data catalogue.

5.3 DC Checks

5.3.1 Power Rails

Refer to the test points & options diagrams for test point locations, and to the regulator fault finding chart (Section 5.5.1) for fault diagnosis.

Check the 9V (TP2) and 13.8V (TP1) power supply test points in the audio compartment with a DMM.

Check the 20V regulator output at the test point (TP3) in the regulator compartment.

Check the 5V regulator output at the test point (TP4) in the regulator compartment and on pin 4 of IC303.

5.3.2 VCO Locking

Using a DMM, monitor the VCO control voltage at PL4-1 or the junction of L1 & R1 (located adjacent to the electrolytic capacitor on the VCO PCB).

If the synthesiser is locked and the VCO aligned, the voltage at this point should be between 5 and 13V.

If the VCO is not locked, refer to the synthesiser fault finding chart (Section 5.5.2).

5.3.3 Mute Operation

The front panel LED will show the status of the mute circuitry. It will be lit when a signal is received above the threshold level. It should always be possible to open the mute gate by rotating the mute potentiometer fully clockwise, or by enabling the monitor with the front panel switch.

If the mute fails to operate correctly, refer to the mute fault finding chart (Section 5.5.3).

5.4 RF Checks

5.4.1 VCO Frequency

Check that the VCO is phase locked (refer to Section 5.3.2).

Connect a frequency counter (level +19dBm) to the VCO input to the mixer (IC301).

Monitor the local oscillator frequency and check that it is 21.4MHz ***above*** the required receive frequency.

Refer to the synthesiser fault finding chart (Section 5.5.2) for further information.

5.4.2 RF Sensitivity

Ensure that the VCO is on the correct frequency and the receiver correctly aligned.

Check that the sensitivity into the front end is -117dBm (typical).

If the sensitivity is poor, the fault can be traced by measuring the sensitivity into successive circuit blocks. Prepare a test cable by connecting a 1nF capacitor to the end of a length of coax cable as shown in Figure 5.1.

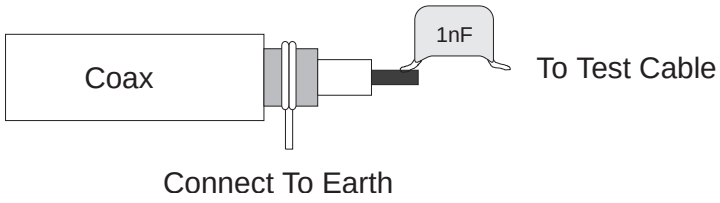


Figure 5.1 RF Test Cable

Note: Before using the test cable, ensure the coax braid is connected to an earth point on the PCB.

Using the RF test cable, apply a modulated 21.4MHz signal to the test breaks in the IF section, or an on-channel RF signal to the front end test breaks.

Check that the sensitivity at each test break is within 2dB of the levels shown on the circuit diagram.

Poor sensitivity indicates a fault in one of the circuit blocks following the test break.

Note: Poor sensitivity into the mixer can be caused by lack of drive level from the VCO (the drive level should be >+17dBm).

Refer to the receiver fault finding charts (Section 5.5.5) for further information.

5.4.3 Oscillator Stability

5.4.3.1 TCXO

While maintaining a low level unmodulated RF input to the receiver, loosely couple into the first IF an additional high level signal at 21.4MHz - a constant low frequency beat note should be heard.

Tap the TCXO with a finger and replace it if the beat note permanently changes.

5.4.3.2 Second IF

While maintaining a low level unmodulated RF input to the receiver, loosely couple into the second IF an additional high level signal at 455kHz - a constant low frequency beat note should be heard.

Adjust the frequency of the 455kHz signal for zero beat.

If the second IF is more than 300Hz off frequency, check IC302, X301, C361 and C362 and replace if necessary.

5.4.4 Demodulator Output

Apply an on-channel RF signal modulated by 1kHz with 3kHz [1.5kHz] deviation at an amplitude of -65dBm.

Connect an oscilloscope probe (DC coupled) to IC303 pin 7 (audio output).

Check that an audio signal of approximately 380mV peak to peak is present.

Optimum tuning of the quad coil (L319) for minimum audio distortion (with a "flat" audio response) should coincide with maximum audio amplitude and a DC level of approximately 1.3V.

5.4.5 IF Distortion

If after careful IF alignment (Section 3.6) the audio distortion is still high, the IF should be swept to investigate the bandpass response.

Apply an on channel RF signal modulated at 10Hz with 12kHz [6kHz] deviation at an amplitude of -80dBm.

Connect the modulating 10Hz audio signal to the "X" input of an oscilloscope and observe the 455kHz IF input to IC303 pin 16 via a suitable RF probe on the "Y" input.

Note: The X input should be DC coupled.

Check that the swept response has a rounded top and no sharp non-linearities (refer to Figure 5.2).

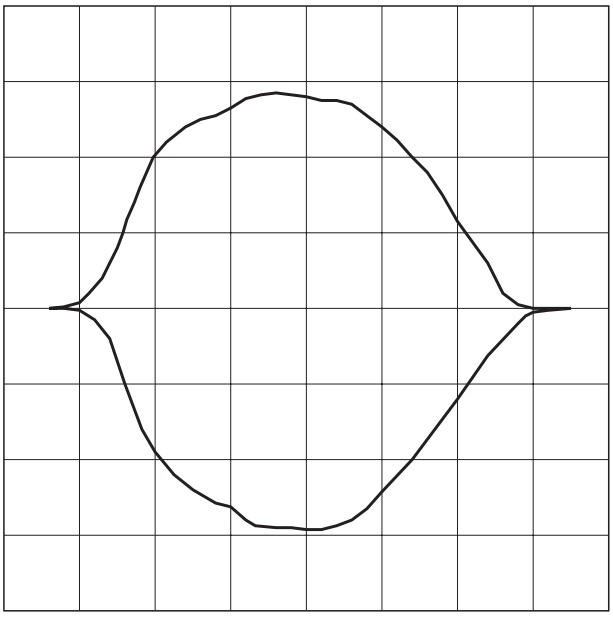


Figure 5.2 IF Swept Response

Increase the RF level to -50dBm; the trace will now show the shape of the 455kHz ceramic filter (&XF303).

Check that the response has no sharp non-linearities.

If sharp non-linearities do occur, replace the filter and sweep to confirm a satisfactory solution (refer to Figure 5.3).

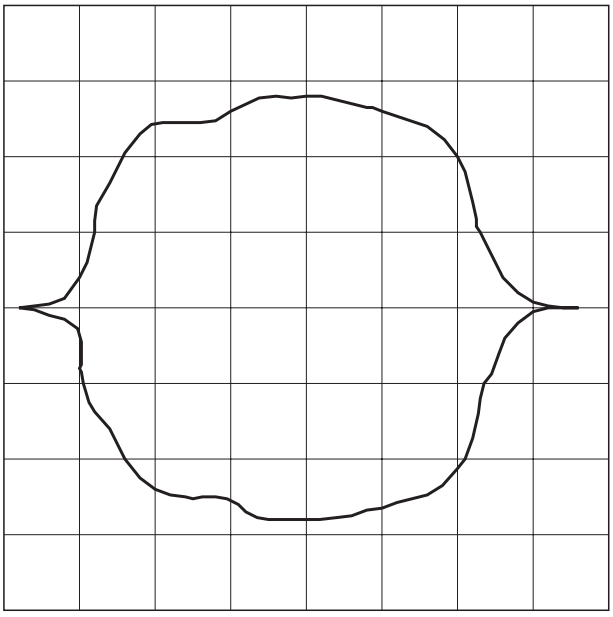


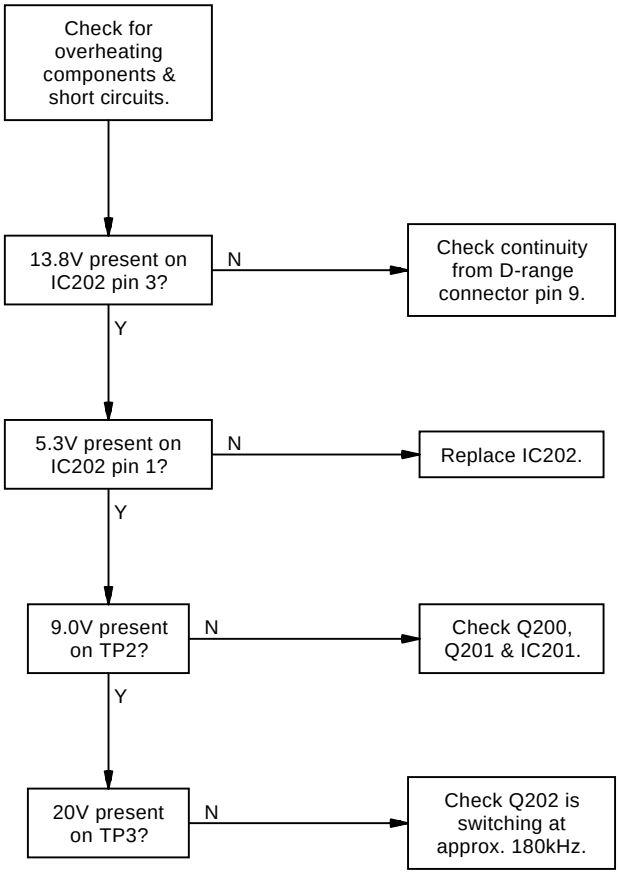
Figure 5.3 Ceramic Filter Swept Response

5.5 Fault Finding Charts

Note: The standard test point designations as used in this section are as follows:

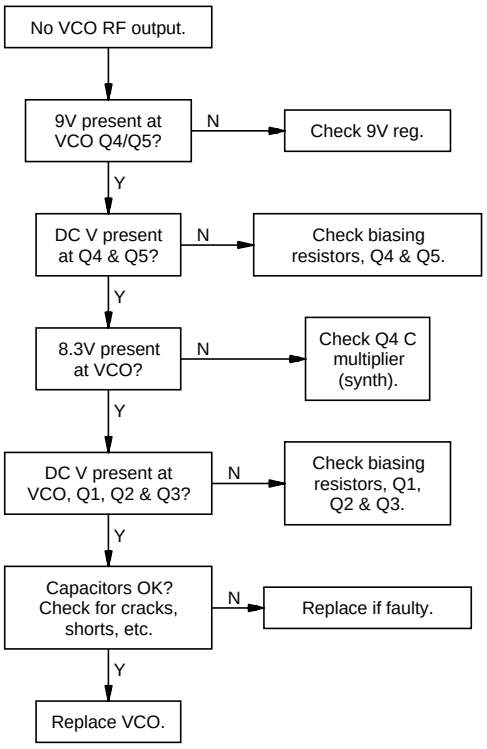
TP1	13.8V
TP2	9V
TP3	20V
TP4	5V

5.5.1 Regulator



5.5.2 Synthesiser

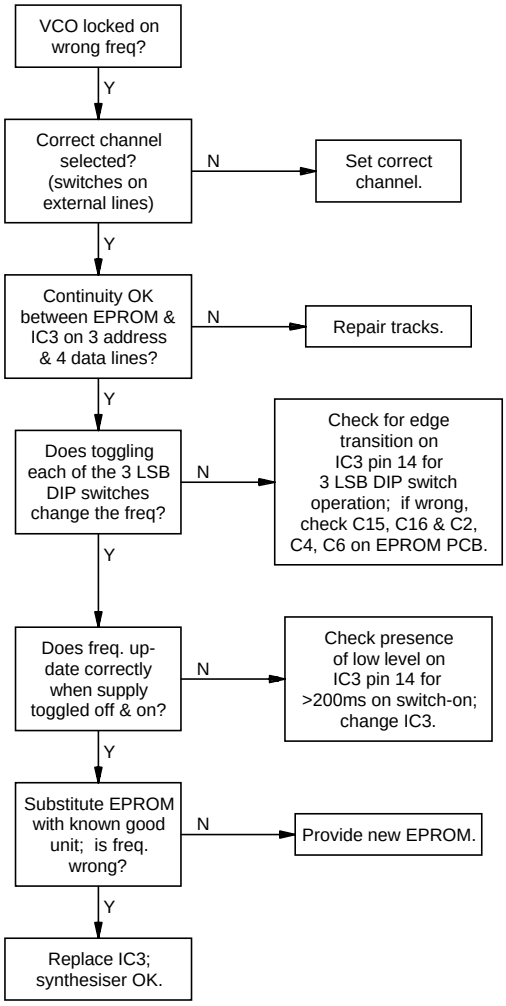
A (Refer to VCO circuit diagram)



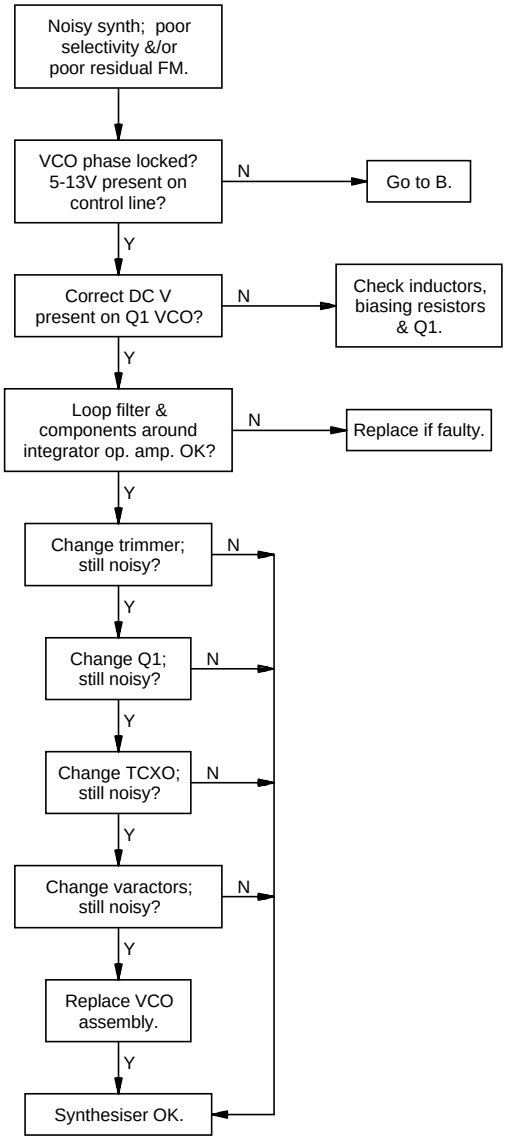
B (Refer to synth. circuit diagram)

Continued on next page.

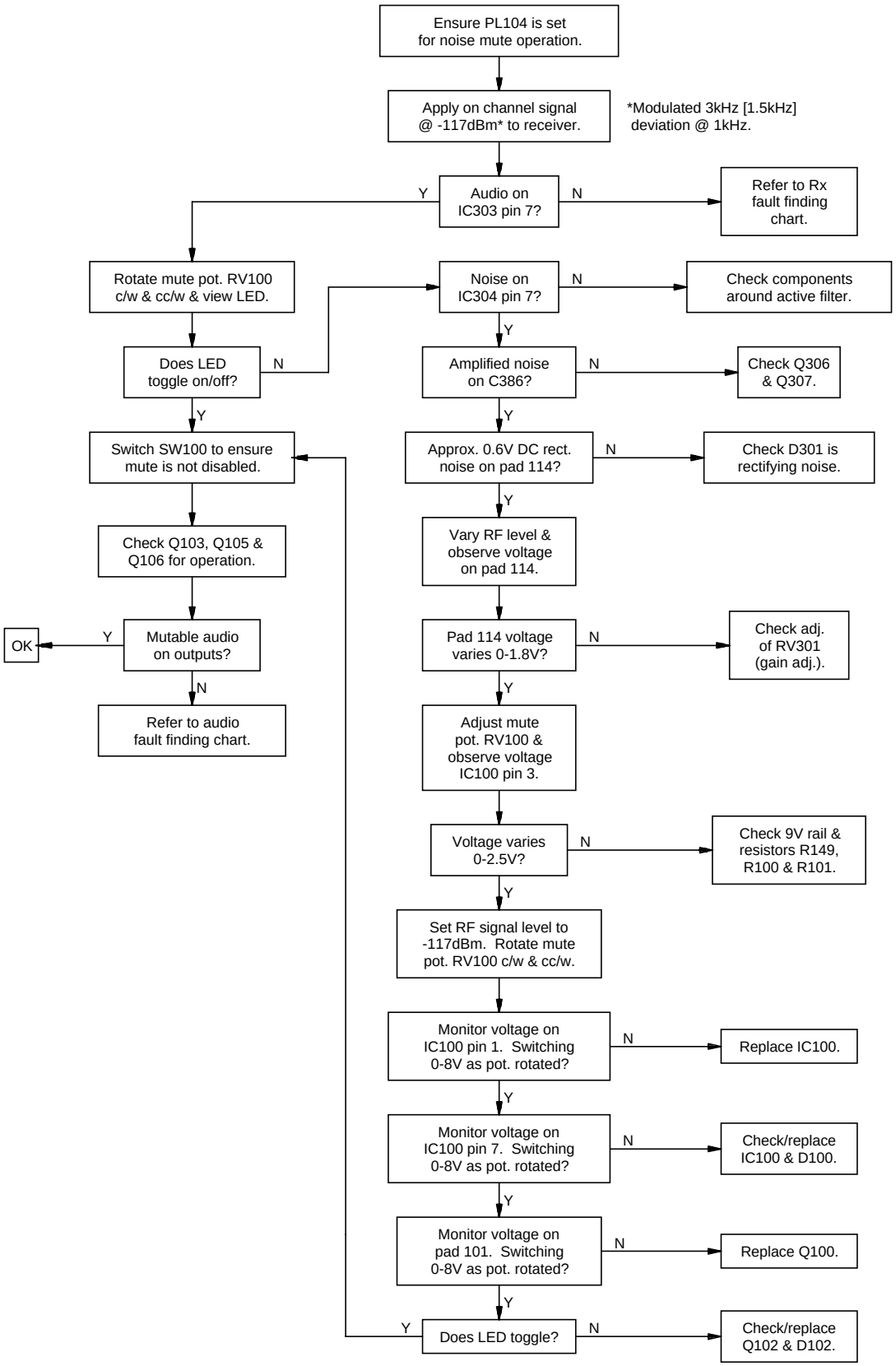
C (Refer to synth. circuit diagram)



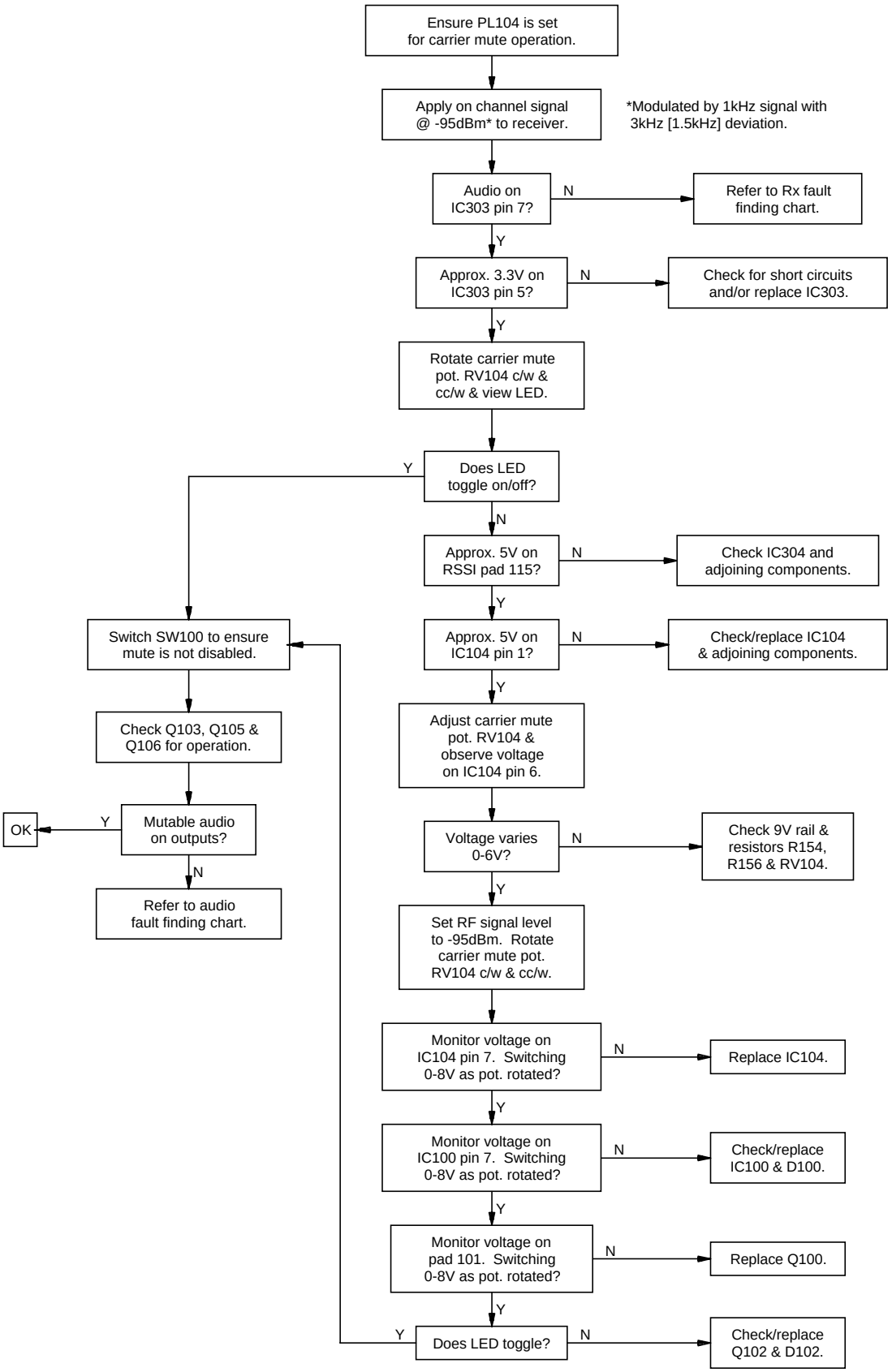
D (Refer to synth. & VCO circuit diagrams)



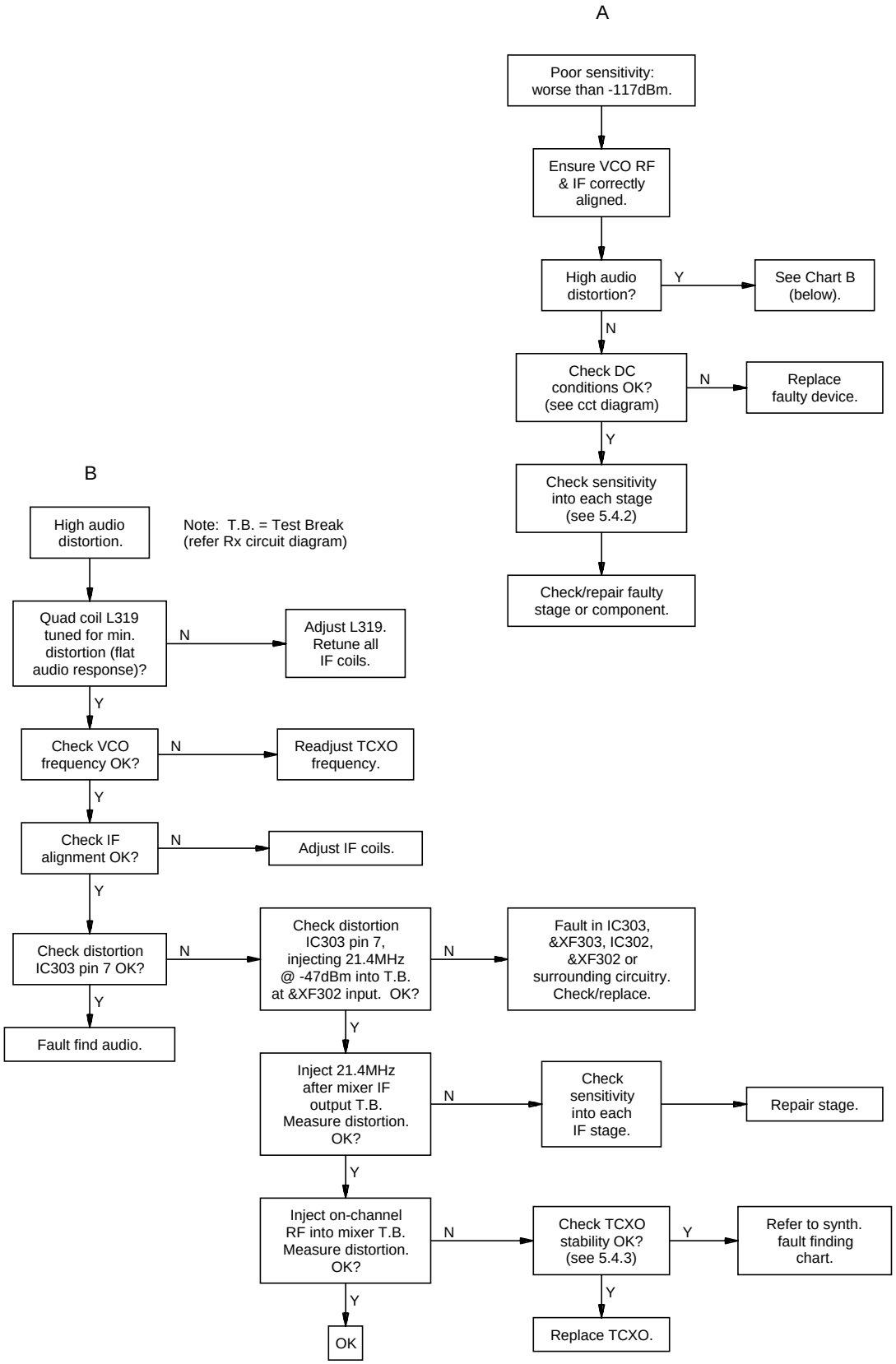
5.5.3 Noise Mute



5.5.4 Carrier Mute



5.5.5 Receiver



5.5.6 Audio