Troubleshooting

Ok, you've completed assembly and are now ready for checkout.

If you have soldered all components correctly (and the parts are in the correct location), and you have the correct supply voltage, the VIA should power up and operate correctly from the "get go". If, however, you are like most of us, you may encounter some difficulties.

To start, load the latest version of the firmware.

The following is an attempt to provide a step by step procedure to get you up and running in the shortest amount of time.

Before proceeding, check all solder connections to each IC, resistor, capacitor, and board connector. Retouch as needed. Check also for solder splashes that might short adjacent connection. It is also recommended that you use the schematic to check for proper continuity of all signal and power traces.

Display blank and no back light. You probably have a solder connection problem on the 40 pin connector for the LCD display. Check all connections, and touch up each solder connection as needed. The LCD Checklist Spreadsheet identifies the LCD connections that need to be verified. This should get the display working.

If the display shows the splash screen within about 2 or 3 seconds, you are well on your way. If it takes about 20 seconds, there is a problem with communications between the Si5351 and the Discovery board. Check continuity of each of the SDA and SCL lines between U1, U5, and U6. Retouch solder connections if needed

Restart the unit and select SETUP. Set the Start Frequency to 3MHz, Stop Frequency to 30MHz, Frequency Step to 10kHz, and Dwell time to 20mSec. Save these values by tapping STORE. Now select either AUTO or MANUAL Mode. Check the display for the readings for V1, V2 and IF-Sig. The users manual provides typical values for these variables.

If V1 and IF-Sig are very low (and V2 is close to normal) you likely have a problem in the signal path from U3 pin 4, through C16, to U1 pin 16. .

If V2 is very low (and V1 and IF-Sig are close to normal), you likely have a problem in the signal path from U2 pin 4, through C15, to U1 pin 15.

If either of these is your problem, you are lucky. There can't be too much wrong. Most likely a solder problem.

If both V1 and V2 (and IF-Sig) are low, the problem will be more difficult to sort out. However, a step by step approach should help resolve the problem in the shortest time. It may be necessary to trace the signals from the RF source, through attenuator networks, to the bridge, to the mixers, and on to the codec input.

Measure the resistance from the center pin of the BNC connector to the ground of the connector. You should measure about 107 ohms. If you measure something outside of the range of 102 to 112 ohms, you likely have a problem in a solder connection of one or more of the resistors R1 to R6.

Here are some examples of resistance values that you may observe under various fault conditions:

R14 and/or R16 open--infinite

R1 and/or R2 open--115 ohms

R3 open--146 ohms

R12 and/or R13 open--123 ohms

Please note that these values are based on the assumption that all resistors are nominal and that your meter is accurately calibrated. You my find your measured values differ from these by a few ohms. The values given above are intended to provide guidance only.

Retouch the solder connections as needed. If you found a problem with one of these connections, you might want to reassemble the VIA and check its operation again.

Alternatively, you should probably recheck the solder connections to U1, U2, U3, and U4. Also check the solder connections to C2, C3, and C21-C24.

If you still haven't found a problem, it is probably time to start some signal tracing. For this, you will need an oscilloscope that is capable of viewing a signal with a frequency of at least 3 MHz, or whatever start frequency you have entered. Ideally, a 30 MHz bandwidth oscilloscope would be used.

Start at the signal source, U6. This chip has two outputs that can be monitored by connecting your scope across R1 and R4. The signals should be very close in frequency (2 kHz apart) and have an amplitude of about 1.6 volts peak to peak. If the bandwidth of your scope is sufficient, the waveform should approximate a square wave. If one of the two signals is missing, check the solder connections to U6 again, and also the connections to C2 and C3. Once you have signals across both R1 and R4, check the signals across R3 and R6. You should still have signals that look like those across R1 and R4, but somewhat smaller in amplitude. The voltage across R3 should be near 200 mV peak to peak. The voltage across R6 should be near 150mV peak to peak. If either signal is missing, check the series resistors R2 and R5 for solder issues.

If you have no signals across R1 and R4, it is possible that the crystal X1 is not properly soldered, or there is another solder problem at the pins of U6.

Once you have RF signals across R3 and R6, proceed to trace the signal to the junction of C19 and C20 and also to the junction of R11,12,14 and 15. If you find levels approximately the same as across R2 and R5, you are good to proceed.

If the solder connections on C19 and C20 are good, you should also have a “local oscillator” signal into the mixers, U2 pin 6 and U3 pin 6.

If the solder connections to C21 to C24 are good, there should be bridge RF signals getting to the two mixers.

If both the RF and LO signals are present at each Mixer, there should be 2 kHz outputs at U2 pin 4 and

U3 pin 4. These two signals are coupled via C15 and C16 into the codec. Place a 50 ohm load on the BNC connector and check for a low level 2 kHz signal at the junction of C13 and C15, and at the junction of C14 and C16. If you can see the 2 kHz signal (several millivolts peak to peak) at each codec input, you should see sizeable V1 and V2 signals on the display.

Assuming that you now have signals going into the codec, if you still have very low signals displayed for V1 and V2, there is probably a connection problem with the Codec U1. Because this is a leadless chip and the connections are slightly recessed, this is not uncommon. Reheat all of the solder connections, being careful not to create any solder bridges and recheck the V1 and V2 readings on the display.