Kenwood TS-2000 Un-Lock Repair Notes

There are 5 PLL IC's on the TX-RX 2 Unit (X57-606X-XX) (B/11). Any of the 5 can cause a PLL un-lock condition. The failure mode is internal to the IC and because the part is buried under the VCO assembly, it's very difficult to trouble shoot.

Repair #1

The LMX2306 by National Semiconductor can exhibit a failure where pin 8 (OSCin) DC voltage drifts towards VCC. When this happens, the TS-2000 will indicate an Unlock condition and the frequency display will turn off. In this case IC-409 failed.

According the NS's data sheet, the voltage on pin 8 is internally referenced to VCC/2. After warm-up on a TS-2000 before I repaired it, pin 8 measured about 4.5 volts. It should measure approximately 2.5 volts.

Another indication that the PLL chip, pin 8 is drifting is when the radio is first powered, after a few minutes, you might hear static during receive even when the antenna is disconnected. Then the receiver will go dead and the CW "UL" will be sent.

One last note: National Semiconductor could have had a bad batch in a production run. The original PLL chips had a date code of MH06AD. My replacements were marked MH06AF.

Repair #2

The Second TS 2000 exhibits a different PLL un-lock condition. The customer complained that his TS-2000 would un lock on the HF band when he first turned it on but 10 or 20 minutes later, it worked. The 2 meter band was always un-locked. IC410, the 2 meter PLL IC (LMX2306) was creating a bus conflict on the CLK and DATA leads. With the PLL board removed I measured 160 ohms between the PDA and PCK leads (Pins 2 and 3 on connector CN501). The measurement was made on the opposite side R400 and R401. To determine which IC was causing the short, I used a heat gun to warm the bottom side of the PLL board at each VCO module. At the same time, I measured the resistance between the CLK and DATA. The resistance changed from 160 ohms to 5k ohms. After replacing IC410 the resistance measured 10 meg-ohms. The LMX2306 date code was MH07AF

Jack WA9FVP

Willco Electronics. 3/21/2015