FT290/690/790 mk1 PLL fault

By G8MNY (New Nov 09)
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

```
 ____________________________________________
|                                            |
|  _                                   /~\   |
|  (_)  ====   4.5000     ""   ""     \./   |
|                        |__| |__|          |
|                ./"~"\.  |__| |__|  /~~\   |
|  /~\   /~\    |     |  |__| |__| |    |   |
|  \./   \./    `\._./'  |__| [__]  \../    |
|____________________________________________|
```

The fault symptoms on one of my FT290 are impulsive noise on FM that kills Rx packets & it is not so noticeable on SSB until the fault is really bad. Turning the rig off & on fixes it for a while (usually days). I have a similar fault before years ago, but I don't know what was done to fix it.

FAULTING SAGA
Tuning in to a beacon & testing in SSB, it look like the 1uF (|▒|) C34 in the PLL filter was breaking down, warming or cooling that area changes the fault (OK cold & hot, bad at room temp!), but changing the capacitor (connections buried under soldered in PCB underside screen cover) has no effect. :-(

```
       PLL Box
 ____________________________________
|  [·]        D  [·] | [·]          |
|               D  c | (+)          | inter-
|          *:  |~|:  | (+)  D       | polation
|  o(-)  |▒|:  | |:  |              |
|          D :  | |:  |              | X 10.7
|  0     D   :  |_|:  |  [·]         |   MHz
|____________________|_____________|

    VCO            X    Fo
                 5.76MHz
```

```
                 +5V
 ____          ____
|VCO|---|>---|PLL IC|---Xtal
 ----          ----
DC ---|<|--- CR      DATA
```

Further investigating found the PLL IC MN6145(uPD21819C) itself seemed to be the culprit as heating/cooling caused the fault to change. re-soldering up all 18 pins had no effect.

Connecting a 10:1 scope probe to local Xtal Pin 2 & 3, or the buffered osc drive Pin 11 had no effect, so it was not RF levels that were low.

But putting the probe on the IC Pin 1 (+5V), I found caused the PLL noise to increase, as this is decoupled with 2 caps I was surprised. So I concluded the 10uF (c) C55 may be low in value, & as the it was difficult to remove I put in a small 2u2 on the track side on pin 1 directly. This solved the probe noise effect & made the hot & cold effect on the IC less apparent, but still there!

I then tried an additional voltage drop diode (5.6V is fed via a diode post (*) to this IC for 5V) in series with the IC supply diode giving it only 4.28V, this worked OK & I can't reproduce the fault thermally now.

Result, my ageing IC does not like the supply volts, & becomes unstable at a specific temperature range. Changing the +5V to 4.2V has fixed this.

See my Tech bul on "CW/SSB Rig Frequency" & also "FT290/690/790 DC Power mod"
Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP