

# Omni V Birdie Removal an attempt!

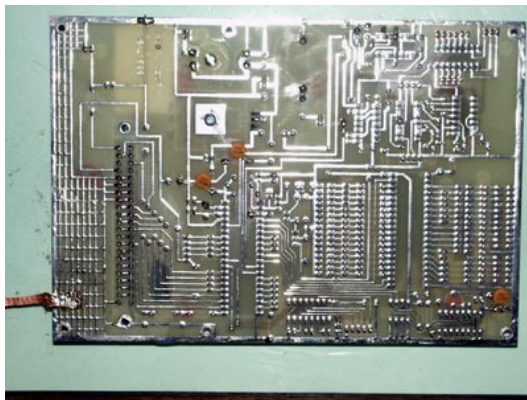
I have been very frustrated by the number of “birdies” in the Omni V. In particular the very strong birdie on 15 metres. The Omni V is a very quiet rig and with crystal mixing likely not to be birdie free. That’s the nature of the beast BUT ***my goal is to try and reduce or eliminate the stronger birdies***. What follows is a summary of my efforts - what worked & what didn’t work.

Before I begin here’s what Ten-Tec said about the birdies in a circa 1997 Omni V Supplement.

"BIRDIES. There are many weak birdies that can be heard without an antenna connected. By actual count, there are 56 than (sic) can be heard in the allocated ham bands, without an antenna. All but 13 of these birdies are S-1 or less and disappear when an antenna is connected and there is signal propagation. Nine of these, that can be heard are at S-3 or so, are spread throughout the ten meter band. The other 4 are at 3.6, 3.999, 21.332 and 21.363 MHz. Most of them are biproducts of the mixing scheme used and all cost effective methods to eliminate them, or reduce their amplitude, have been applied. The notch filter will get them out of the way, if needed. Our evaluation of competitive equipment supports the conclusion that any receiver without spurious signals is either very expensive (commercial/Military variety) or the sensitivity has been compromised, or both. Other techniques that we have observed for controlling spurs, burbles and pops include the use of a full time noise blanker and/or simply eliminate the frequency from the tuning range of the receiver, with software. Our philosophy is to optimize performance, minimize the spurious emissions where practical, and be honest with you."

## **LOGIC Board:** *(I had little success here!)*

Piotr Tomczak, LA9HFA has described his efforts to eliminate or reduce birdies on the Omni VI and I have used his efforts as a guide and starting point. The first step was to place additional bypass (decoupling) capacitors on the +5 volt lines to the CPU, the output of the 7805 regulator and the VDD of U10. I used 0.01 uF ceramic capacitors from the VCC or VDD to ground and mounted them on the bottom of the board.



On the upper surface of the board I put a ferrite choke on supply line input to connector 2. In addition various groups of cables were routed through split torroids as follows:

1. 94, D and 93
2. B, 41, 66, 82, 83, and 84
3. E, 34 and 59
4. The Omni V.9 CW spot cable was also passed through a torroid choke.

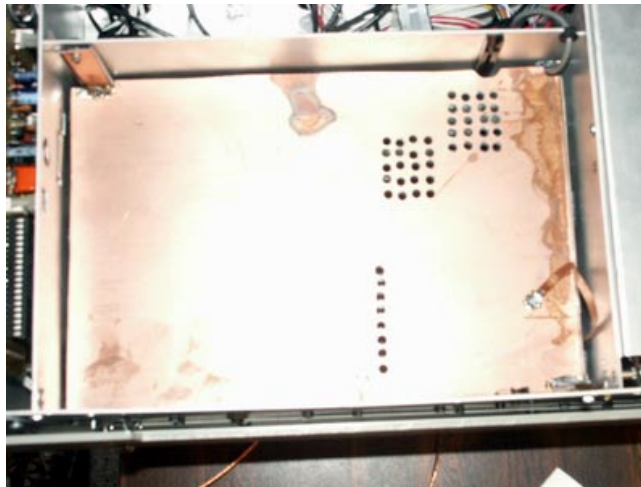


### Logic Board Results:

The results have been *modest* at best. Some of the 10 metre birdies are diminished but there are still *MANY* birdies scattered across the band.

Note:

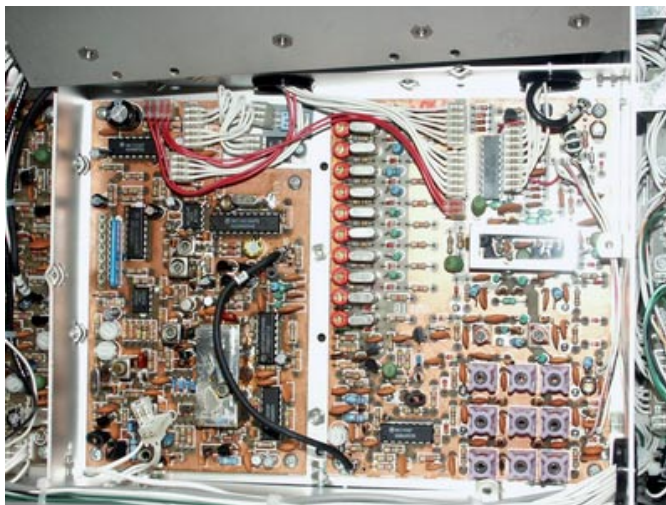
1. I added a ground from the foil of the logic board and tied it to the chassis. However, there was **no improvement** and it was removed.
2. I built a shield, using PC board material, to cover the logic board. It provided **no improvement** and resulted in a **significant heat build up** so it too was removed.



3. Finally **all split core chokes were removed** from the logic board as it was felt that they gave **no improvement** to the birdies.

### PLL & Xtal Osc-LO Mixer Boards:

John (G3JAG) pointed me to the PLL board as a possible source of birdies. The PLL board is located in a compartment below the FM board etc. It is accessed by lifting the screws of the cover (complete with the attached FM board etc.) and disconnecting a minimum of cables to allow the shelf with the FM board etc to be rotated to the center of the rig. When the shelf is removed it will expose the Xtal oscillator/mixer and PLL boards.



The PLL board is on the left in the figure. The mod is to re-solder the shielded case to the upper foil of the PC board. (For good measure, I also re-soldered the 4 posts that go to the under surface of the PC board.) **Care must be taken to not over-heat the shielded case but still heating it sufficiently to make a good solder connection.**



#### **Results of PLL & Xtal Osc-Lo Mixer Board Modification:**

The PLL board results were **far better** than those of the logic board! In many cases I was plagued with multiple birdies over a few kHz and this has eliminated many of these problems. It also seems to have reduced the magnitude of numerous other birdies. I still have *many* other birdies but we are progressing.

The data are grouped as follows:

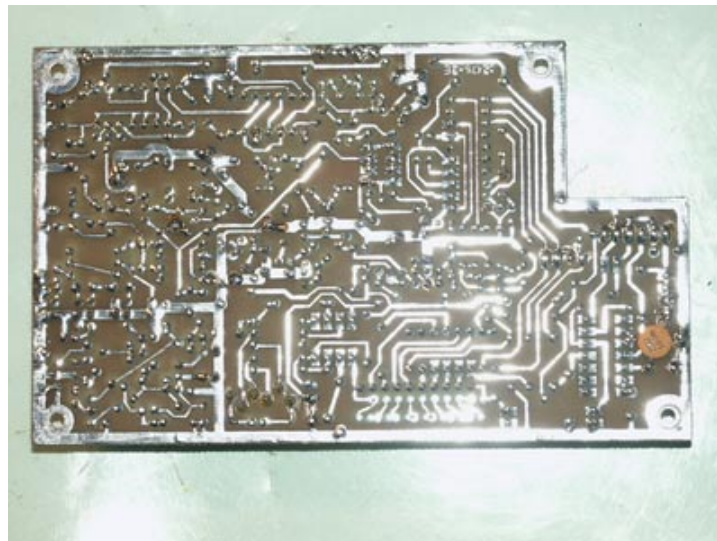
Strength S Units	Number of Occurrences	Frequency (if applicable)
6	1	21.333
5	2	29.607, 29.035
4	7	29.032, 29.612, 29.478, 29.423, 28.859, 28.689 <sup>+</sup> , and 28.281
3	24	many
2	25	many
1	36	many
Weak	23	many barely move S-meter
Very Weak	52	many heard but no S-meter movement

+ this includes 24 sub-birdies in a few kHz

The strongest birdie at 21.333 MHz is likely off of U7, the square wave generator on the PLL board. To generate the necessary 5.333 MHz signal, U7 would be running at 21.333 MHz.

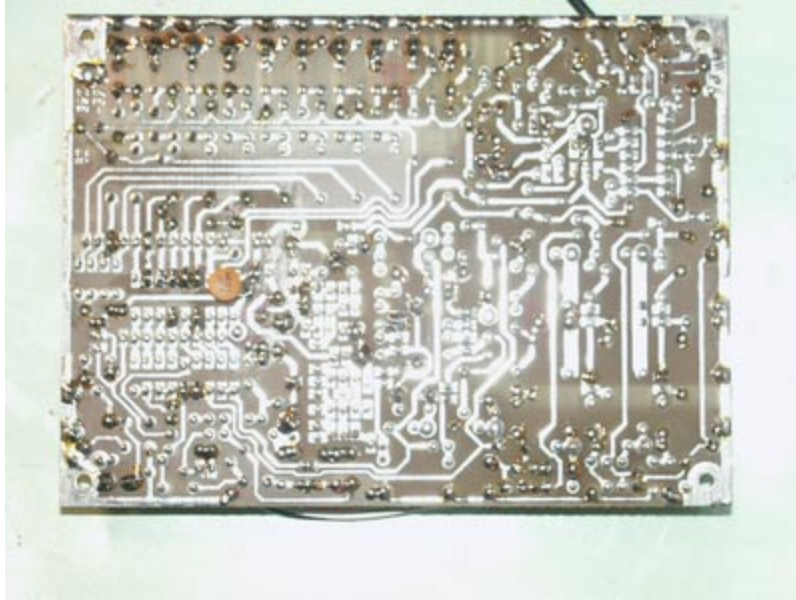
A call to Ten-Tec confirmed my suspicions. The 21.333 MHz birdie is impossible to remove. As I mentioned earlier, if you want a quiet rig with crystal mixing this is the price to pay.

I decided to give it one more try and did a little work on the DC leads coming to the **PLL** and **Xtal Osc-Lo Mixer** boards. I put decoupling capacitors (see pictures below) on the DC header connector 81 (on both boards) and placed a ferrite choke of approximately 10 uH on the DC line where it enters the shielded compartment.

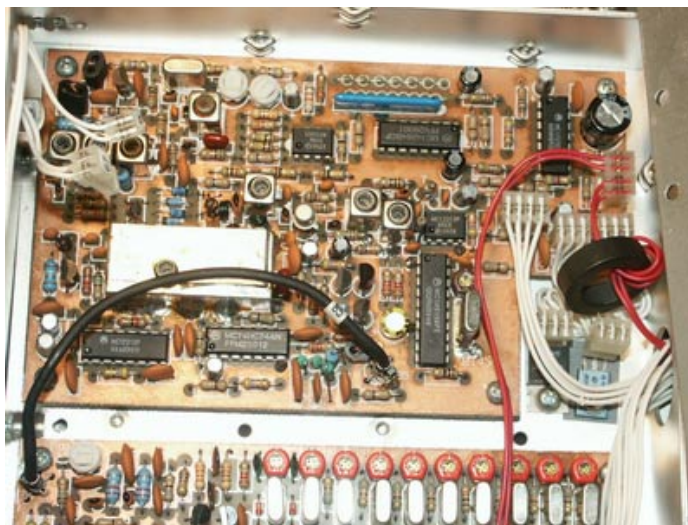


**PLL Board**





**Xtal QSC-Lo Mixer**



**10 uH Choke on DC Lead**

The results were good and the S-6 birdie on 21.333 MHz has dropped to less than S-5. Many of the other birdies are diminished, but only marginally.

All together it has been a learning experience and as always the Omni V.9 is very impressive and still fun to work on.

73,

Rick  
VE7TK