

Technical Update on G3WDG 10GHz modules - August 1992

Judging from the number of phone calls and discussions at Round Tables etc, most constructors seem to be able to get the units working with little or no trouble. Just occasionally people do have troubles, and the purpose of this note is to share a few experiences since the last update in January.

One change we have made which affects most of the modules is to have the shoulder removed from the top of the filter cavities. This has cured the problem of the silver plated tuning screws supplied being occasionally too short to resonate the filters properly. On the subject of filter tuning, one or two people have been able to resonate the cavities at the third harmonic of 2556 ie around 7.5GHz, leading to later problems in tuning up! If this is suspected, check the length of the tuning screw protruding below the locknut by carefully unscrewing both together from the cavity. The correct length of protruding screw is around 7.5mm. If the length is considerably more than this, then the cavity is probably tuned to the wrong frequency.

Another general point concerns the G4DDK004 local oscillator. A few constructors have managed to tune the output filter to 1278 instead of 2556MHz and then had trouble getting the 10GHz modules to work. This is easily done if you do not have access to a wavemeter or spectrum analyser. The correct tuning point for the trimmers is with the vanes almost fully unmeshed. The 1278MHz tuning point is with the vanes more than half meshed, so it is quite easy to check this visually.

Some recent work on a non-functional G3WDG002 receive converter revealed an unexpected consequence of using an incorrect component. The constructor had used different type of gate bias pot from that recommended in the instructions (a fully moulded item, black in colour and possibly from Maplins). This type also has much longer leads than the recommended miniature skeleton types, and this seemed to cause instability possibly as a result of coupling between the pots at RF. Although the pots are connected to nominally decoupled points on the pcb, there must still be some RF radiated from the leads. Replacing the pots with the normal type made the unit much more stable. A further recommendation is to cut the leads off the pot where they are welded to the thicker metal tabs which connect to the working parts of the component. The pot is then located a few mm from the pcb with minimum lead lengths.

The revised tuning up instructions for the G3WDG002 (November 1991 Microwave Newsletter) have been used by a number of constructors and are now the recommended method. The tuning up instructions in the booklet will be modified when the current stock runs out. One minor change which may help if any oscillations are encountered during the tune-up process, is to modify the new step 3 (in the November update) to read "Set RV2 to give full -ve gate bias to F2 and RV3 to 0V gate bias". This biases off the first LNA stage and causes the second stage only to be biased up as the test noise generator. This should guarantee that the LNA does not oscillate even if no antenna or load is connected to the first stage.

More experience with the G3WDG003 transmit converter has shown that in some cases the mixer stage can be made to oscillate with VR3 set near the fully clockwise position. This should be looked out for during tuning up. The correct position for optimum operation of this stage is with the pot somewhere between fully anticlockwise and the halfway position, where oscillation does not occur. While on the subject of mixer bias, it is worth re-emphasising that the settings of VR2 and VR3 are quite critical for best output power. Some experimentation is required and it will be found that the two adjustments interact to some extent. It is also possible to find false optimums so it is worth trying the controls over wide ranges to check that the best settings really have been found. The new tuneup procedure (Jan 92 Microwave Newsletter) helps in this respect, as some output power can be seen even when the mixer bias adjustments are not optimum.

The final point concerns mounting lossy rubber. This material is designed to operate next to a groundplane and should be well bonded for best results. I have found Evostick to be a very effective glue. It works best when both the rubber and the lid are coated with a thin smear of adhesive and left to dry for 10-15 minutes or until dry to the touch. A very strong bond is formed when the two pieces are brought together.

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