Comtech Receiver Improvements 1.2 and 2.4 GHz

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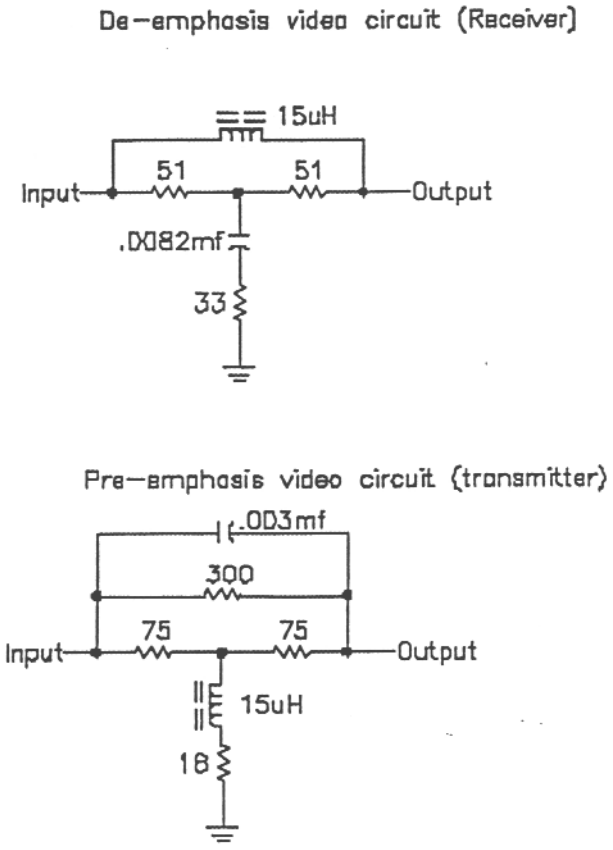
Comtech Technology LTD has demo boards for 900 MHz - 2.4 GHz bands utilizing FM modulation. Many ATVers are using the boards and several have complained about QRM and less than desired operation. The receivers were designed (900 MHz – 1.2 GHz) for use as the tuner and demodulator in DBS satellite receivers. As most know, satellite deviation is 11 MHz while terrestrial FM video for broadcast and industry is 4 MHz deviation.

The receiver evaluation boards do not include pre-emphasis on transmitter unit or de-emphasis on receiver unit. Art Towslee, WA8RMC, has a circuit to take care of the emphasis issues. This will improve the signal to noise performance of the boards by several dB.



Art Towslee's, WA8RMC, circuit for pre-emphasis and de-emphasis

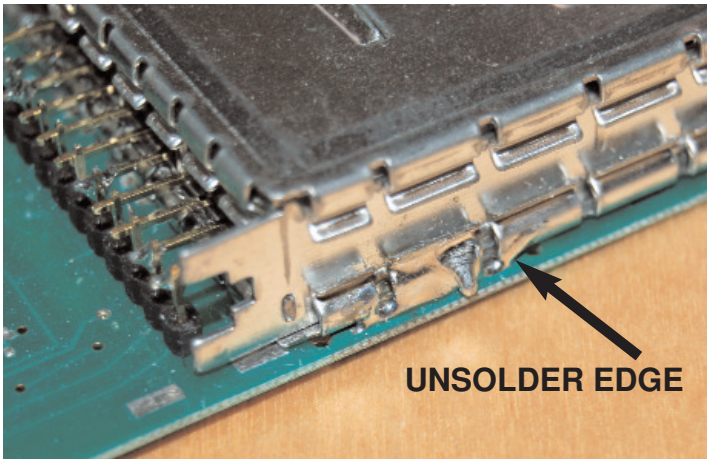
The transmitter as shipped is about 6.5 MHz and should be reduced to 4 MHz deviation utilizing the white pot on the TX board, this should be done with the pre-emphasis circuit in line. The receiver is then adjusted for 1 volt p-p with a video test signal modulation stair step sync tip to peak white utilizing the white pot on the RX board. This adjustment also needs to be done with the de-emphasis circuit in line.

I did notice that the differential phase and gain specifications improved with the reduced deviation of the system, most likely in the more linear range of the VCO.

The receiver uses a 27 MHz wide 479.5 MHz SAW IF filter. This is way too wide for terrestrial use. This lets half the band in and on the 900 MHz band lets in the entire band plus paging band just above 928 MHz. The solution is a narrow IF filter. ECS-D480A, a 17 MHz wide filter. Available through Digikey, P/N XC993-ND for $2.25 each. Mouser should also have them.

Now for the surgery on the receiver board: Unsolder the pins (note: not all the pins are soldered or need to be).

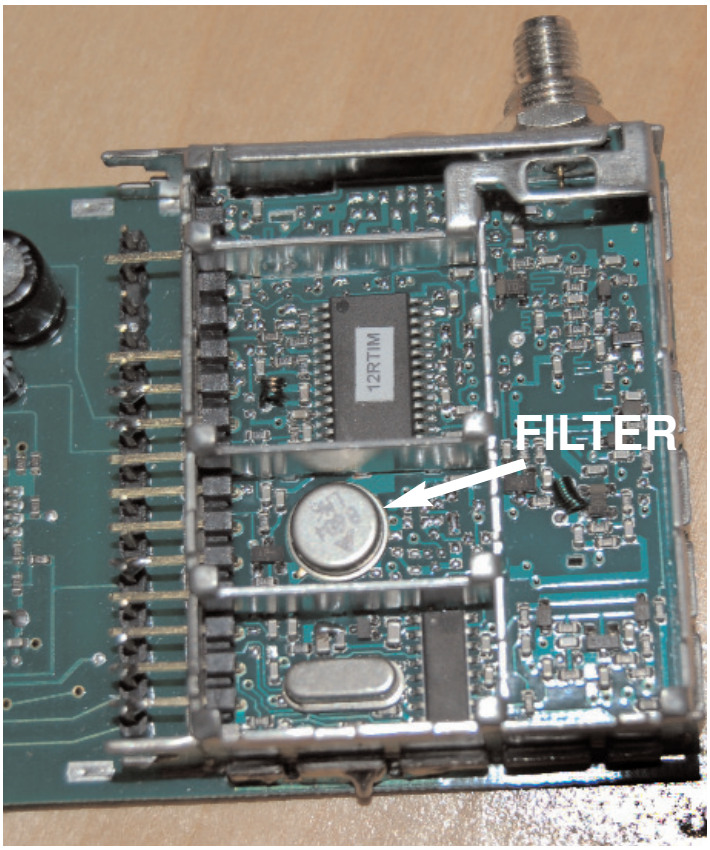
Next unsolder the two sides of the tin can where it is attached to the board, get as much solder out as you can.



Using a small blade screwdriver gently pry up the can to break free from the board. The pins should pivot then break loose where it was soldered.

Take off the top and bottom lids noting how they came off.

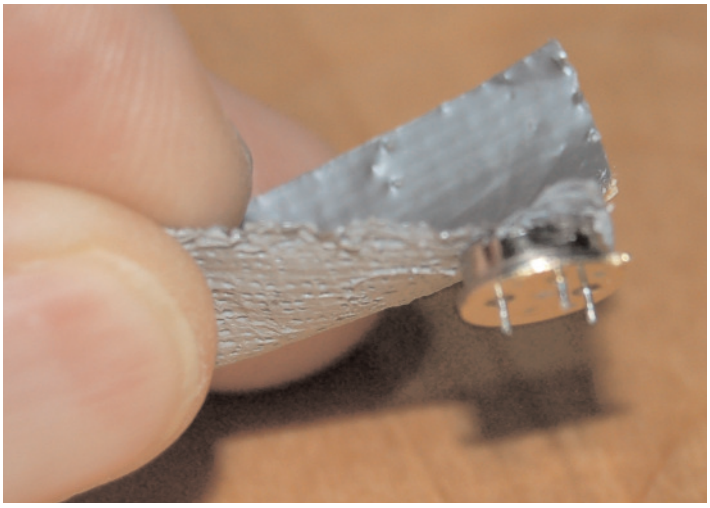
Locate the T0-5 can inside, it looks like a 2N2219 metal transistor, see the photo.



It is best to use a desoldering iron with lots of suction but wick or a manual solder sucker can do it as well. Unsolder the input and output pins (the outer ones) first. Make sure the leads are clear and no longer soldered to the board.

Filter top and bottom

The ground pin is a bit more difficult as the board has a ground plane on both sides which sucks the heat away. In my case, I was not able to get all the solder out so I put the tin can in a PCB vise and used the soldering iron to heat the lead and board and pulled the top side of the can with needle nose pliers to get the filter out.



As we know, duct tape has many uses. I used a small piece to hold the filter and guide it into position. (Ed)

I then took out the rest of the solder from the ground pin hole. Insert the filter and solder in place. Put the tin can back together and install back on the board making sure to get the pins pack in the right order and then solder the pins and the lid back to the board.

Power up the receiver and you are done. The video output level should not change with new filter and you should be ready to go. This new filter is ½ MHz off center and with 17 MHz bandwidth, should make no difference using 4 MHz deviation, in fact it may help a bit as the local oscillator is on the high and will reverse the sidebands at IF and get you an extra 500 KHz further away from the top end of the band were the NBFM voice repeaters are located.

There are some 479.5 MHz 17 MHz wide filter, but ordering from the manufacture required a 1000 lot order. Sensitivity is increased due to narrower noise floor presented to the IF and demodulator. I measured more than 2 dB. Selectivity is where you will get the best benefit from adjacent activity and radar (1.2 GHz band).

In the ideal world, I would want a 14 MHz bandwidth filter centered on 479.5 MHz but this is a vast improvement over a 27 MHz wide IF. I hope this will be helpful for you to improve on your FM ATV equipment.

ATVQ

ATVQ: I have purchased a few filters and will sell them for $5.00 each plus $1.00 shipping. This may help those that do not want to buy $25 of stuff from Digikey to meet the minimum order. If you are ordering other parts from Digikey, that would be the place to buy them as the price would be less.

If you do the mod, let us know the results!

Gene - WB9MMM