



ELECTRONICS

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## Antenna Mounting ATV Downconverters

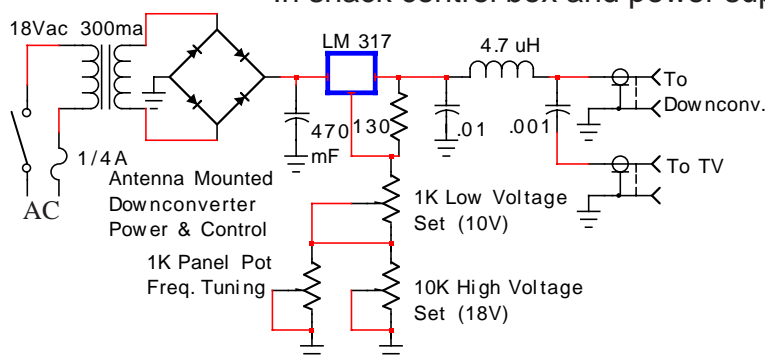
For optimum sensitivity, the first preamp stage in a receiving system should be placed directly at the antenna to avoid the coax loss. The first stage should be the lowest noise device in the system and can either be part of the downconverter or a stand alone preamp. There are some pluses and minuses to antenna mounting downconverters vs just a preamp vs low loss coax..

**The Pluses:** It is more important to minimize coax loss with FM ATV systems than AM ATV since the picture to noise ratio changes more rapidly. With AM the picture to noise ratio is dB for dB with 6 dB being one P unit or half the distance for the same picture to noise level. An acceptable rule of thumb has been 3 dB or less coax loss or greater than 100 ft of Belden 9913 or LMR-400 on the 70cm band for instance, before considering expending time and money on an improvement. With FM it depends on the modulation index and how good the limiter is - given the 4 MHz deviation standard we use on the 902 through 2400 MHz bands and poor limiting found in today's IC PLL or quadrature detectors it is about 2-3 dB for each dB of coax loss. The higher bands have much more coax loss so having the first stage as close to the antenna as possible is much more significant. Many may try ATV by first getting a down converter and antenna to receive the local repeater output. If everything practical has been done with antenna gain and positioning and the picture still has some snow in it, then eliminating the feed line loss is the next step. If the repeater is crossband, and you don't have to transmit on the repeater output band, then just adding an antenna mounted preamp might be the best way to go. If you don't mind a little solder slinging, then you can repackage the downconverter board in a weather proof box for antenna mounting and build a DC coupler/control box. The coax to the shack can be hundreds of feet of RG6 which has little loss at ch3 and which the converter gain has overcome. To transmit on the same band, you must add the complexity of T/R switching.

**The Minuses:** Primarily it is cost, complexity and reliability. As mentioned, if you want to transmit on the same band, you need to build in a RF T/R relay system. RF coax relays for UHF and above are not cheap and you need to sequence the DC and RF so that you don't transmit into an open coax for too long and that there is enough isolation between the two relay ports such that the transmitter does not blow the preamp. Max RF at the preamp should not exceed a few milliwatt's.

Effective weather proofing is important so that moisture does not get in and ruin the circuit. The box generally needs to be constructed to have seams and connectors only on the side pointing to the ground. Temperature is also significant especially in areas with weather extremes. Most ham gear is not designed or even tested to see how it does below freezing - a proportional resistive heater is some times used in this case. With tunable downconverters the LO frequency will probably drift and require slight frequency dial adjustment every 10 degrees of outside temperature change or so - this may or may not be a source of annoyance. The TVC-2G only drifted 340 kHz from 75 down to 5 degrees F which is in the range of most TV AFC's if tuned in the center. Higher bands will shift more.

In shack control box and power supply



The downconverter board from the TVC-4G, 9G or 12G can be removed and the control box built using the old chassis box and many of its parts - it uses a CAB234 box.

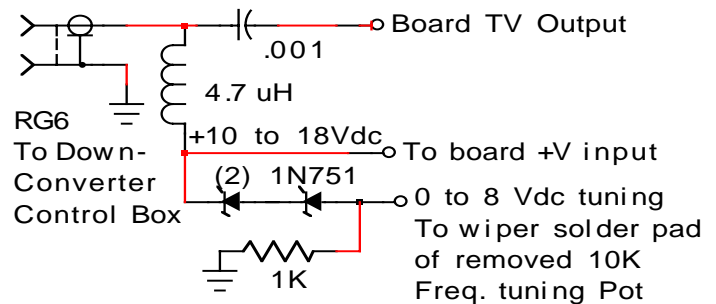
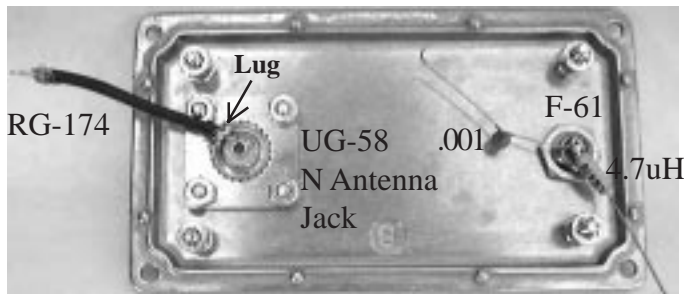


## Antenna Mounting ATV Downconverters, Continued

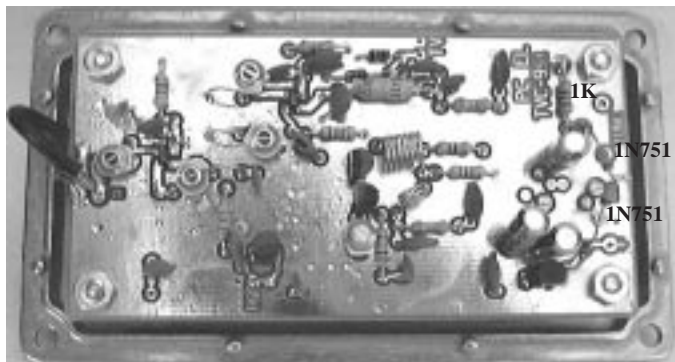
### Repackaging:

Shown below is a TVC-9 902-928 MHz tunable downconverter built into an Eagle 4591 die cast aluminum box. All holes are in the cover so no moisture can get in when mounted facing the ground. The board is first placed and centered on the inside of the top cover. This way the 4 1/8" dia mounting screw holes can be marked and then drilled accurately. Then drill a 1/8" pilot hole directly between the two board mounting holes at one end for the F-61 jack. On the other end drill the pilot hole in-between but about a 1/2" in from the line between the two board mounting holes. Finish drilling the F jack to 3/8" and on the other end the UG-58 N jack to 5/8". Place the UG-58 jack in the hole and mark and then drill the 1/8" diameter holes for the four 4-40x5/16", lock washer and nut.

Wrap one end of a .001 mF disc cap and a 4.7 uH inductor around the center pin terminal of the F-61 jack as close to the insulation as possible and then solder. The cap lead must be long enough to reach the TV output of the board and the inductor to the + voltage input. Cut off the excess terminal as close as possible to the wires. This is necessary to clear the bottom of the board. Mount the UG58 jack and use a solder lug under one of the outer mounting nuts and pointed toward the center pin terminal. Cut a piece of RG174 50 Ohm coax to about 2". Strip the outer insulation back 1/4 inch and fold back the braid. Strip the center conductor 1/8". Place one end through the solder lug hole and solder to the center terminal. Flair the braid around the solder lug and solder them together. Check for shorts.



On the downconverter board, remove the old tuning pot wires and the bandsread 10K trim pot. Twist and solder the two 1N751 Zener diode leads together then solder the cathode end of one to the extra hole on the + DC input trace and the other end to the wiper solder pad of the old tuning pot wire. At the extra solder pad next to the wiper solder pad add the 1K with the other end soldered to the ground plane.



Put in the four 4-40x5/8" board mounting screws and secure with a lock washer and nut. Then put a nut on each one and thread down about 1/4" from the end along with a lock washer. Place the board on the screws and put a nut on each down to where the screw top is flush with the nut, then tighten the respective nut on the bottom of the board. Check to make sure none of the connectors are touching the bottom of the board, then solder the cap, inductor and coax ends to their respective locations on the board. Check that there are no shorts on the F61 jack center to ground.

Preset the tunable downconverter control box by first turning the 1K frequency tuning pot to full CCW which is the lowest frequency and DC VCO voltage. Set the Low Voltage pot for 10Vdc out which will give zero volts to the varicap on the downconverter board. Then turn the frequency pot to full CW and set for the highest frequency which is 18Vdc. Connect the downconverter and reset the lowest frequency and highest frequency while receiving an ATV signal for the about 2 and 8 respectively on a 0-10 dial.