



**ELECTRONICS**

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## TVC-12G 23cm ATV Downconverter

This ATV GaAsfet downconverter is designed to convert the 23cm amateur band (1240-1300 MHz) down to TV channels 7 or 8. The TVC-12G rev. S1 board is mounted in a shielded cabinet ready to go with 120 Vac/12 Vdc power supply to be set up in the shack or even used mobile or portable with external 12 to 14 Vdc applied.

The downconverter board consists of a low noise dual gate GaAsfet preamp and mixer. There is a triple tuned stripline filter between the preamp and mixer for extra rejection of cellular transmitters which operate on the image frequency. The output of the mixer has a tuned lowpass matching circuit which is peaked to TV channel 7 and 8. The local oscillator is varicap tuned by a front panel 10K pot to vary the tuning voltage between ground and the regulated 8 Vdc. Zero on the dial corresponds to the low end of the band (1240 MHz), and 10 to the high end (1300 MHz).

**TVC-12G SET-UP.** Connect up the 23cm antenna or the downconverter output of the TX23-1 transmitter to the type N jack. Due to the high losses in coax at this band, Belden 9913 or better coax to the antenna is suggested, & all outside connectors weatherproofed with coax seal or double wrapped vinyl tape. A short length of RG58 with an N on one end and a BNC on the other can plug to the TX23-1 Transmitter if used. Ready made coax cables, connectors and adapters are available from Nema Electronics (305) 893-3924. F connector 75 Ohm cables to your TV set are available from Radio Shack. The TVC-12G can also be powered and switched (both RF and power) from the TX23-1 ATV transmitter four pin connector (pin 3 ground & pin 4 +13V receive). If you make up your own external power cord with a 5.5 x 2.1 mm DC power plug (RS 274-1569), verify that there is positive polarity on the plug center with respect to the grounded sleeve and that it is no less than +11 nor more than +15 VDC before plugging into the TVC-12G. Current requirement is 100 ma.

**OPERATION.** Connect a piece of RG6 75Ω coax from the TV output F connector on the back of the TVC-12G to the antenna input of your TV set. Do not use 300 Ohm twin lead, use a balun if your TV does not have a F connector antenna input. With the TVC-12G off, turn on the TV and set the channel selector to channel 7 or 8, whichever is not used for broadcasting in your area. Adjust the fine tuning on the TV for minimum adjacent channel interference. Then turn on the TVC-12G and tune the knob on the front of the cabinet for a known ATV station on the 23cm band. You may have to turn off the TV's AFC. Most areas use a 2 meter FM frequency for coordination. This is a good place to give a call for an ATV station to come on and send you some video to tune on. Also see the ARRL Repeater Directory for ATV repeaters in your area. Optimize your antenna position for least snow. From day to day there may be some frequency drift due to temperature changes so that the stations may need to be slightly retuned in. Zero on the dial is the low end of the band (1240 MHz). We set them up for 1265 MHz being about 3-4 on the dial. Most repeaters use the low end of 23cm to minimize 3rd harmonic desense: 1241.25 & 1253.25 repeat, 1265.25 simplex/duplex. 1277.25 is also used for repeaters and 1289.25 for simplex per the ARRL bandplan. If you only use one part of the band, and you have some snow, you can carefully and slowly repeat C1, 2, 3 and 4 for least snow with the proper insulated tuning tool - do not touch them without first receiving a P3 or better picture. Also you may have to slightly retune frequency with the front panel knob when adjusting C4 or 5. Do not touch local oscillator cap C7 without a frequency counter. For LO readjustment use a pickup loop or high Z probe near or on the 10 Ohm resistor test point. LO frequency = F-181.25 (ch 8). Example: 1253.25 - 181.25 = 1072 MHz. If only 1 frequency or it's adjacent are of interest, the tuning can be made finer by turning the knob to 8 and resetting C7 for the highest frequency of interest with a counter. Then turn the knob to 2 and adjust the 25K bandspread pot for the lowest frequency of interest. Again, do not adjust C7 without using a frequency counter and a known on the air strong signal or signal generator.

**ANTENNA.** This is the most important part of your ATV receive system. Mount the antenna as high as practical or line of sight to the transmitter and at least 5 ft. away from any other antenna or metal structure. Make sure you have set the antenna for the polarity in use in your area. Most 23cm ATV repeaters are vertical. The Downeast 24 element 2424LYRM Loop Yagi can be mounted either way. For vertical, mount the antenna with the loops out to the side of the boom - see sketch on other side. A female N connector comes with the antenna to connect to the Belden 9913 downlead. Route the coax along the boom and mounting bracket and then down the far side of the mast. Use vinyl electrical tape to hold the coax in place. Run a large enough coax length around the rotor and fasten securely with tape and cable ties above and below the rotor such that the coax does not bind up through the full 360 degree rotation. We suggest Belden 9913 low loss coax from the antenna to the downconverter kept as short as possible. Foliage attenuation is very high on this band as well as 9 dB additional path loss compared to 70cm due to smaller antenna area. So height and placement are very important. For duplex operation with 70cm, 5' driven element end to end separation is usually enough for up to 15 watt 70cm transmitters without desense. However more may be needed depending on higher power, harmonic relationship, and cleanliness of the signal. You may have to experiment for a null point. Weather proof all outdoor connectors. Do not use adapters, they are very lossy.

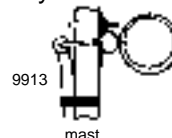
**ANTENNA MOUNTED PREAMP.** If you are using the HFT IF70 for FM ATV, or on standard AM your 9913 50 Ohm coax run is more than 60 feet (3 dB), we suggest placing a Downeast Microwave 23LNAWPQ antenna mounted preamp at the antenna (to order, call us). With AM it will make up for the coax loss and on FM add the required system gain. However the preamp does not have T/R switching provisions which means the antenna can only be used for receiving, no transmitting. The preamp can be powered thru the coax from the TVC-12G - see info on other side of this page. ©2005

**Output frequencies:**

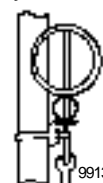
Standard is ch 7 and 8 (175.25 and 181.25 MHz).  
 Other outputs are optional with an LO readjustment and parts change.

Fout	C5	L6	C6
ch 8 - 181.25	2-9 pF	8.5T	27
ch3 - 61.25	10 + 2-9pF	.47uH	22
70 MHz	10 + 2-9pF	.47uH	22
45.75 MHz	15 + 2-9pF	.68uH	33

Directive Systems 2424LYRM loop Yagi  
 Vertically Polarized



Horizontally Polarized



Schematic supplied with product.

**TVC-12G rev S1 Board Notes**

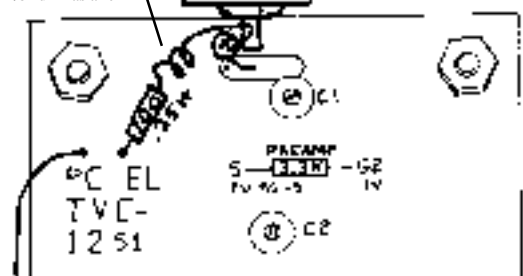
**Trouble Shooting:** check all coax and power connections. Moisture in coax? Rotor calibrated? Right antenna polarity for your area? Line of sight to repeater or transmitting station? TV on right open channel? Station actually on the air - ask on 2 meters or try receiving a different station? If the panel lamp is out, check the internal 1/2 Amp fuse. Check external power supply voltage and polarity. TVC-12G board voltage checks: 8 Vdc out of the 78L08 regulator? Preamp and mixer source leads 1 Vdc +/- .5V? Preamp Gate 2 Voltage same as source? Mixer Gate 2 40% of source voltage? TV out 1N914 protection diodes OK? See service policy on the ordering page in the catalogue.

**Bandsread** 25K pot on the board can be adjusted to reduce the bottom end tuning range for finer tuning on the front panel knob. See TVC-12G operation paragraph. Do not adjust without a strong signal.

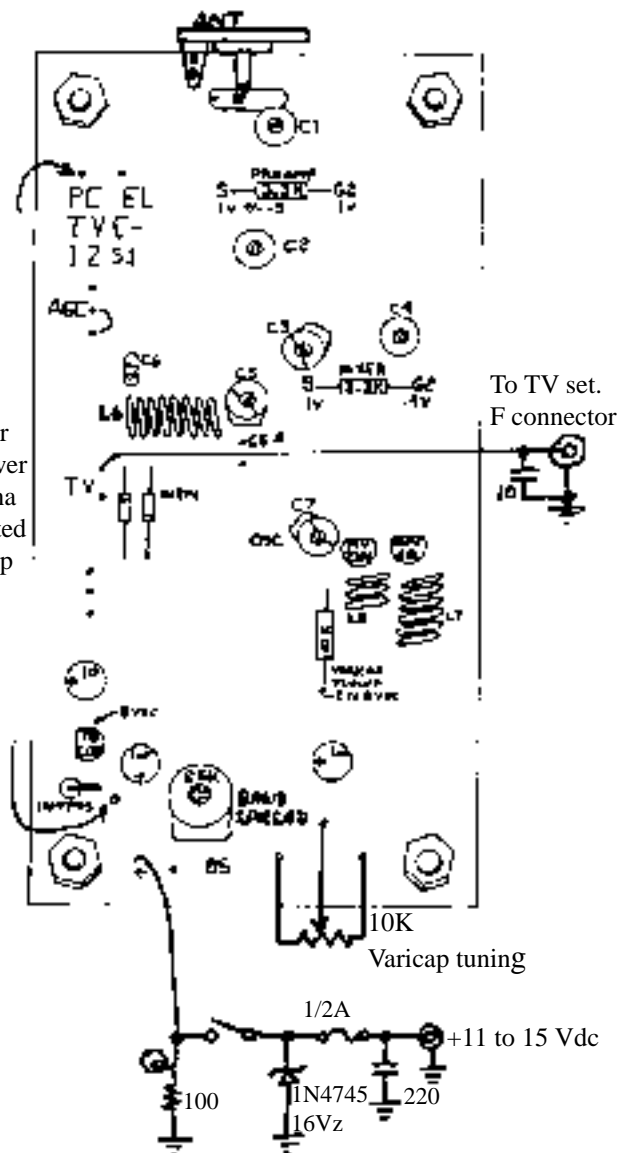
**RF AGC** (optional) the jumper can be removed for manual RF gain and 3 leads run to an external 10K pot. This will vary the preamp voltage from 0 to 8 Vdc to reduce strong signals as may be found during demos, fox hunts or public service operations. Also if used with the VRC-45b IF / receiver module, a wire is run to it's RF AGC test point for wider dynamic range.

**Antenna Preamp Power** through the coax can be done by removing the jumper from the antenna connector to the board and replacing with a 10 pF disc cap (direct short leads). Also add a 100 ohm resistor and insulated jumper wire. Check for shorts with an ohmmeter before turning on power. Normal voltage drop is 2V across the resistor. Caution: if you later use the TVC-12G with the internal power but without the antenna mounted preamp connected for portable, mobile, etc., disconnect the 12 volt jumper as the loop Yagi and other antennas are DC shorts. Preamps other than the Downeast may require more current than 20 ma and load down the TVC-12G power supply in which case an external bias T and power supply must be used.

Coil resistor lead around 1/8" drill as a form



Add jumper to power antenna mounted preamp



To TV set. F connector

10K Varicap tuning

1/2A

+11 to 15 Vdc

100 1N4745 220 16Vz