



W6ORGy Notes

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NEW Downeast Microwave 225 Watt pep 70cm Linear Amp

DEMI sent me a prototype of their new 70cm 225 Watt linear amplifier to test out on ATV. Ever since Teletec lost their heatsink facility to an earthquake in Taiwan, there has been a need for a good quality, high power linear 70cm amplifier that will work with ATV. From my tests, this amplifier may fill the bill. Downeast is kicking around a few different versions with various inputs between 4 watts and 25 watts and with or without RF T/R relays. Prices will be in the \$400 to \$600 range, again depending on features. Available? Watch our website.

The great linearity is due to the use of a 28 Vdc power FET. Most 12V silicon power transistors gain curve start bending over at about 1/2 their rated output and require ATV transmitter to have both output (sync tip or pep) and blanking pedestal adjustments - commonly called sync stretchers - to process the video so that the transmitted video to sync ration is maintained. This amp was very linear up to 150 watts pep without the need for sync stretching. This means that the new Videolynx VM-70X transmitter which has no sync stretching, but does have pep (peak envelope power) drives this amp to 150 Watts pep nicely with just under 5 Watts pep drive.



Downeast Microwave 70225PA

Final version will have two cooling fans mounted on the top of the heatsink and look similar to their new 23120PA 23cm amp which you can see on their web site. Size is 10" x 7" x 4". DC power requirement is 28Vdc at up to 20A. Linear series regulator power supplies are preferred with ATV as some switching types can put noise in the video at the switching frequency.

I tested the amplifier with one of our TC70-20Sa ATV transceivers since they are adjustable from over 20 watts to actually below 1 watt pep RF output. I did not have a 28V supply, so I hooked two Astron RS-20M supplies in series and adjusted one for a total of 28.0 Vdc. A line sampler on the output and connected to a scope was used to look at the linearity of a gray scale and a frequency multiburst applied video to the TC70-20Sa plus amp combination. Insignificant video rolloff, intermod or other distortions were noted. Power measurements were taken from an IFR 1200S Communications Monitor digital readout in the peak power mode - yes, I know the load is rated at 150 watts, but I had my fingers crossed and keyed down just long enough to make the reading.

Input	Output	Current	Set up is easy if you have a RF power meter for the level and band. You can also come close by driving up to 10 Amps then setting the pedestal for 7.5 A .
1.4	53	5.5	First, with no video connected, set the pep - sync tip power to less than 5 watts.
2.8	100	7	Connect to the amp and adjust to the desired pep - we suggest 200 Watts
5.1	156	9	maximum so as to have some headroom for the sound which rides on top of the sync.
10	218	10	Set the pedestal pot to 56% of the pep value - 112W in the case of 200 pep.
All power is sync tip or pep.			There is a LED output indicator that will vary with what is in the picture.



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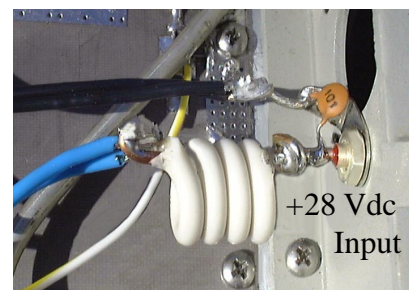
Repeaterizing the Downeast Microwave 70225PA Amp



One of the big problems with operating an inband 70cm ATV repeater is desense, especially when running high power. Shielding and filtering is all important to keep the level of transmitter intermod side-band harmonics in the receiver passband as well as the video carrier overload from getting into the receiver. Ten pole VSB filters, duplexer or antenna separation and 100% shielded coax used throughout work for the direct coax RF path to and from the antenna, but RF can feed around the filters from power supply and signal wires acting as pick up probes inside the chassis and the outsides acting as antennas.

As the new Downeast 70225PA 70cm 225 Watt amp comes, there is no RF bypassing at the power supply and key jacks or the +28Vdc wire to the fans. Sniffing with a spectrum analyzer revealed about one milliwatt (0 dBm) of RF on the power supply lead when running the amp at 100 Watts (+50 dBm) out on 434 MHz. The 5th order intermod product of the carrier and sound subcarrier in the passband of a receiver on 421.25 was at -50 dBm - quite a strong signal especially if any of the receiver leads are close or using the same power supply. Separate power supplies should always be used for transmitter and receiver, and the leads routed away from each other as well as shielded if possible.

The DC power connector was removed and the internal DC + and - leads soldered to a .001 pF feedthru cap in a hole drilled next to the connector hole. A 100 pF disc was put in parallel and a RFC in series made from 4 turns #14 solid copper house wire wound on a 1/4" drill as a form - see photo. This dropped the RF in the 421.25 MHz passband down to better than -80 dBm.



+28 Vdc Input

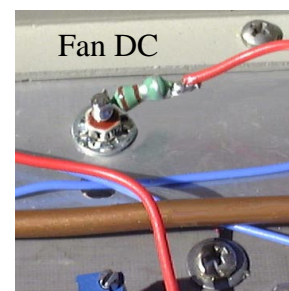
On the amp key RCA jack, a 100 pF cap was put from center to ground and a .22 uH RFC (Mouser 23LS227 or equiv.) in series to knock down the pickup, conduction and radiation of RF from this source.



Key Jack

The +28Vdc lead to the fans atop the heat sink can also radiate out some of the RF picked up from inside the chassis. The lead was cut and routed to another .001 pF feedthru cap. A #29 drill is used to come in between the fins and .7" in from the edge before tapping for the feedthru's 8-32 thread. Make sure your soldering iron can fit far enough between the fins to reach after mounting and attaching the wire. Another .22 uH is used in series with the wire inside.

The chassis and cover come with the mating surfaces painted. To make sure that the cover made metal contact, internal tooth lock washers were put under each 4-40 mounting screw to bite into the cover. Hot spots around the edge were reduced. The power supply should also be metal encased and 100 pF disc caps to ground put at each + and - terminal. Series regulator power supplies are preferred but some switching types may have low enough switching noise and proper grounding is much more critical.



Fan DC