

## Ham Television

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### Big Shanty ATV

The Big Shanty Repeater Group operates a wide-coverage ATV repeater on top of Sweat Mountain just north of Atlanta, Georgia. Thanks to the efforts of Ralph Fowler N4NEQ and others in the group, this repeater offers a variety of features such as NASA Select (during Space Shuttle missions), weather radar and a number of live camera views from the top of the mountain. To alleviate the problems associated with an increasingly crowded 70cm band, they elected to go with a crossband repeater with an input of 1255 MHz (FM-TV) and an output on 427.25 MHz (cable-ready channel 58). Although there are quite a few ATVers with transmit capability on 1255 MHz, a much larger

audience exists who like to watch the fun with very modest receive equipment (some using cable-ready VCRs hooked directly to a small antenna).

To improve the success of these viewers, the group embarked on a couple of projects to help stir up interest in the repeater. The first project was a small but very effective (and inexpensive) antenna designed by Kip Turner W4KIP that was made out of hog fence material. It was dubbed the "Hawg Fence" antenna and is in use by a large number of the Big Shanty group (construction details for the Hawg Fence will be given in an upcoming column).

In order to overcome inherent feedline losses and to help improve reception with cable-ready VCRs or TVs, Will Payne N4YWK developed a mast-mounted preamplifier that he dubs the "Hawg Amp." The following are Will's construction details for what has to be

one of most cost-effective mast-mounted preamps you'll likely encounter.

### The Hawg Amp

The heart of the Hawg Amp system is a Ramsey Electronics PR-40 preamp kit. Although it performs a bit below the more expensive and delicate FET types, this bipolar preamp offers a very respectable 10 dB (13 dB typical) gain, along with a noise figure of 1.2 dB (90 deg. K). It has a 3 dB bandwidth of 24 MHz (we measured 40 MHz) and operates with a supply from 8 to 16 volts with a current drain of 7 mA. The preamp's transistor is a 2SC2498 NPN and is equivalent to an ECG10 or SK9139. The real secret of the Hawg Amp system's success is to place the Ramsey preamp up at the antenna to eliminate the feedline loss. To avoid running extra wires to send power to the preamp, the preamp was modified to allow it to draw DC power from the center conductor of the coax cable. To accomplish this you will need to build a DC power injector (see Figure 1). You can think of a DC power injector (located in your shack) as a simple duplexer for two bands (DC and RF)—it allows you to put DC power into the bottom

end of your coax without interrupting the received signal path.

### Theory of Operation

In the original Ramsey preamp (refer to the schematic that comes with the Ramsey kit), the input from the antenna is applied through capacitors and inductors to the base of Q1. These input components form a UHF tuned impedance match from the input to Q1. Q1 amplifies the signal. Capacitor C4 couples the amplified signal from Q1 to the output. Resistors R1 and R2 set the bias on Q1 to draw about 7 mA of collector current, which is its best operating point. Capacitor C5 keeps the DC supply clean.

The Hawg Amp modified design takes DC power from the coax. Since the coax center conductor has 12 volts DC on it, R1 is connected right to the center conductor. Capacitor C4 lets the amplified RF bypass R1 to the output coax without being attenuated. Capacitor C5 is no longer needed here and the "DC duplexing" is built right into the collector circuit of Q1. At the indoor end of the coax (inside of the DC power injector), C5 keeps the DC clean in the power injector. Choke L2 couples

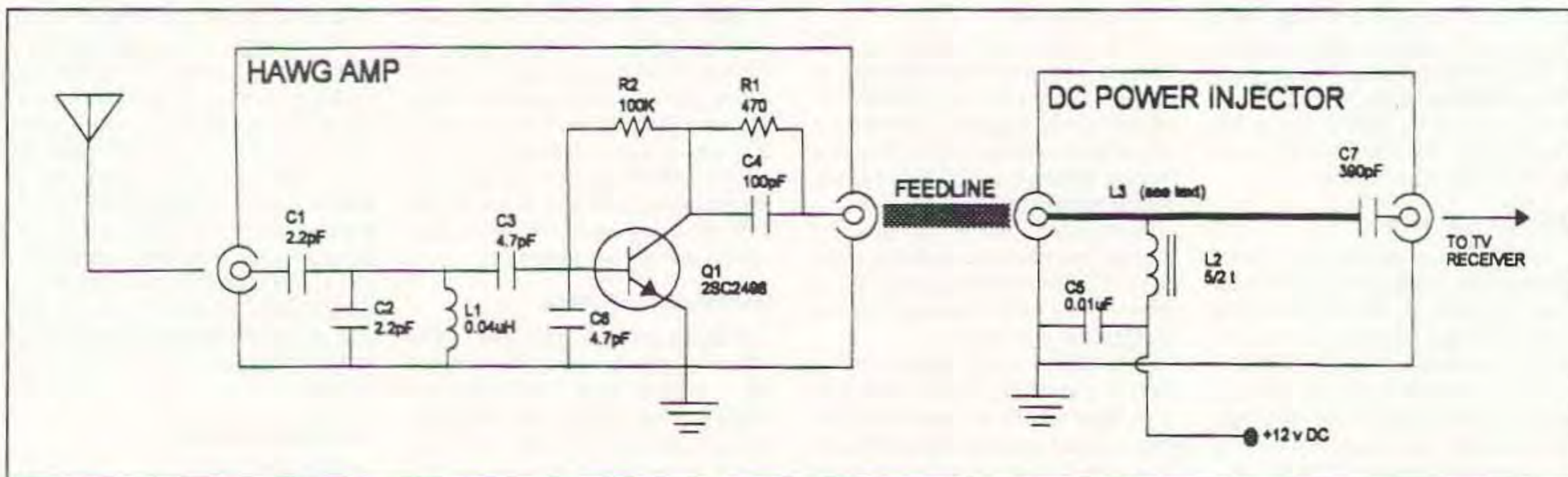


Figure 1. Schematic diagram of the modified Ramsey PR-40 preamp and the Hawg Amp DC power injector.

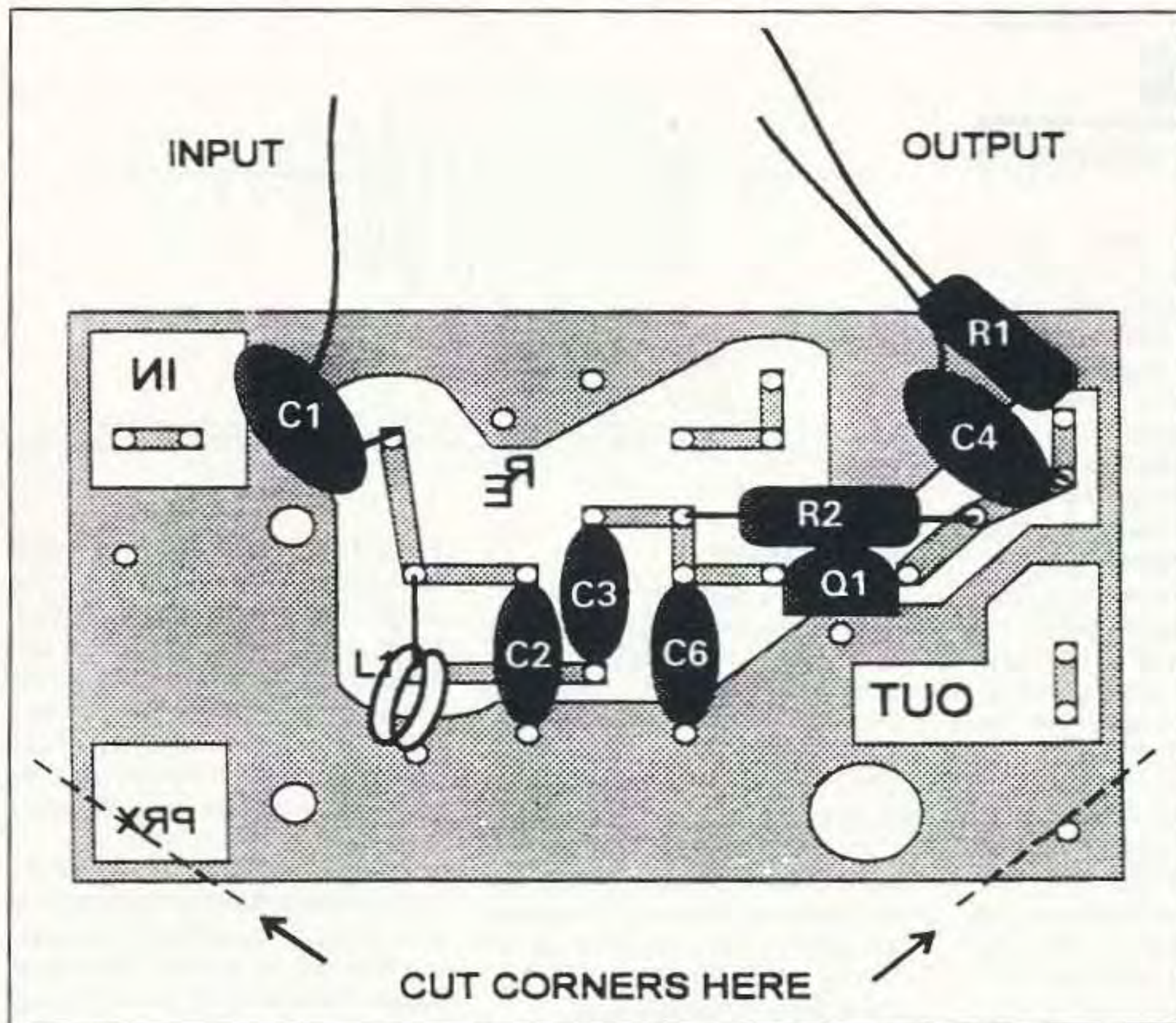


Figure 2. Parts placement of the modified preamp showing flying component leads.

the DC into the coax while blocking RF and capacitor C7 allows RF to pass through to your receiver while blocking the DC (many receivers don't like to see DC on their inputs).

#### Hawg Amp Construction

Build the Ramsey PR-40 preamp kit as shown in their instruction manual with the following exceptions: Install only one side of components R1, C1 and C4 to the circuit board. The other lead of each component will be left flying rather than using the PC board holes (refer to Figure 2 for details). These will be the leads for DC power, RF in and RF out. Do not install C5, it will be used for the power injector circuit.

Although you can use any case of your choosing for the preamp and the power injector, surplus CATV tap boxes, each having three F-type connectors were used to house the antenna-mounted preamp and the power injector. Desolder these tap boxes and remove their PC boards and at least one of the F-connectors. Save the F-connectors and one of the ferrite core

baluns for use in the DC power injector. Remove the windings from the existing balun and rewind 1-1/2 turns of magnet wire through the holes of the ferrite core as shown in Figure 3. Then assemble your DC power injector as shown in Figure 4. Solder L3, a piece of heavy bare copper wire from the center conductor of the IN connector, straight towards the center conductor of the OUT connector. Cut L3 about 1/8" short of the OUT connector. Install C7 to bridge the gap from L3 to the OUT connector. L3 and C7 should run

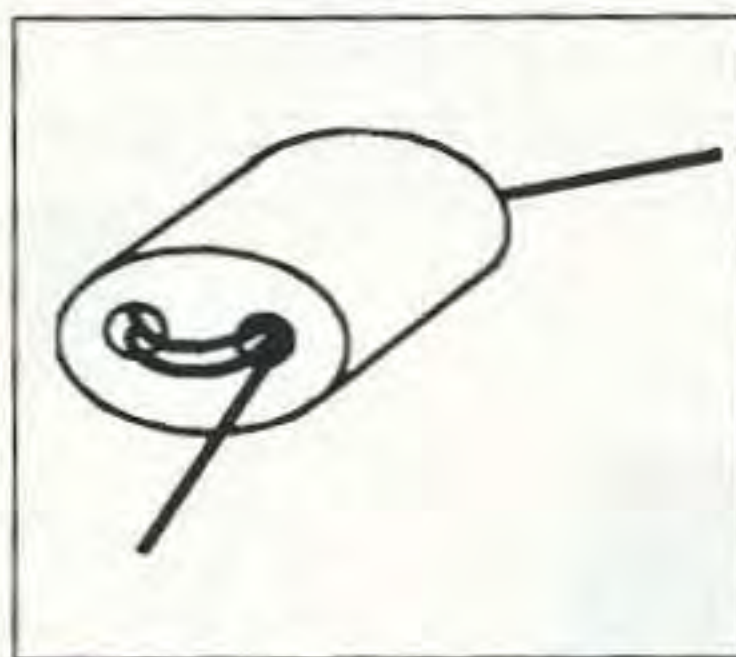


Figure 3. Balun winding details.

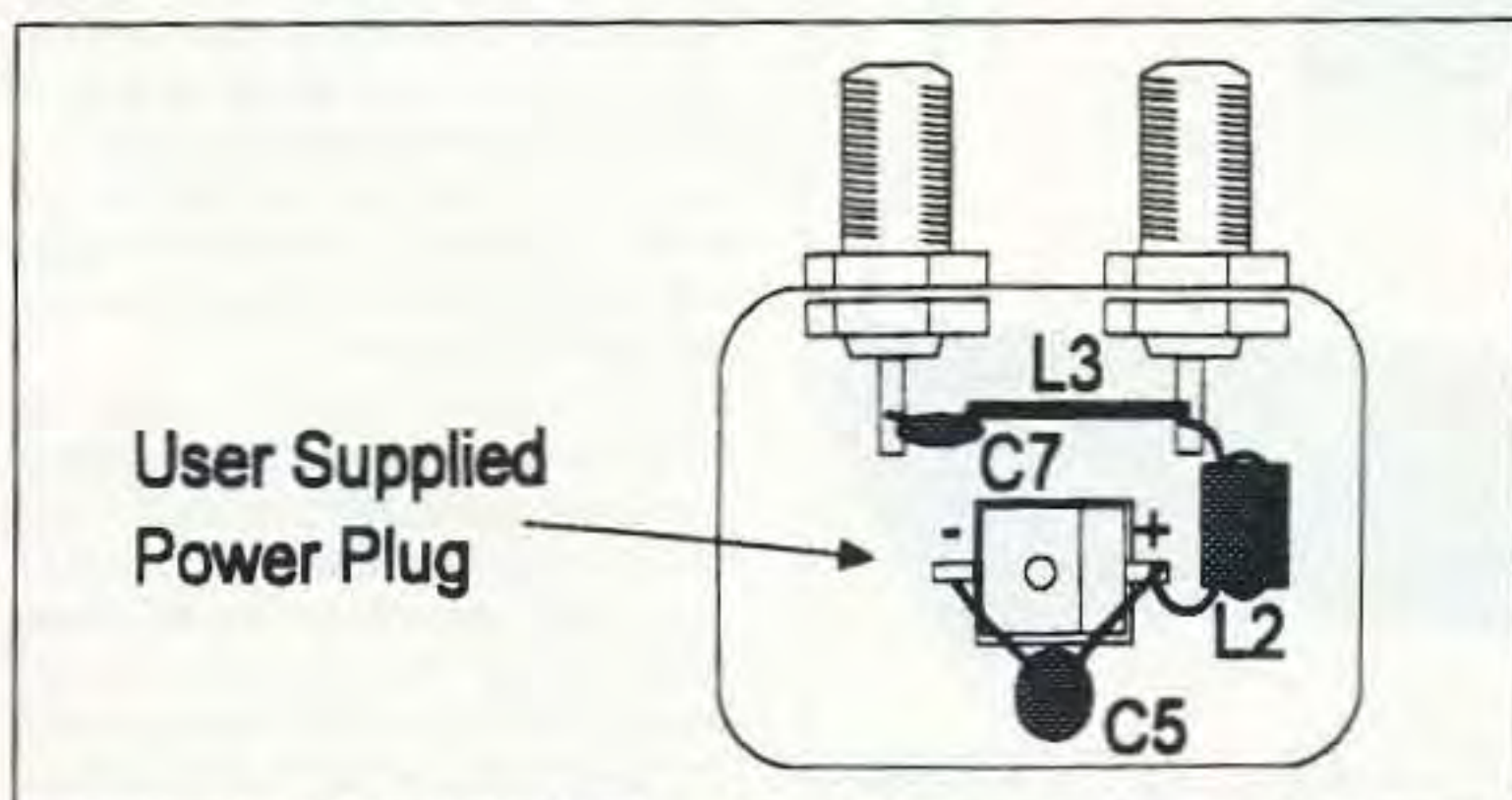


Figure 4. DC power injector final assembly.

in a straight line about 1/8" from the metal wall to form a transmission line.

Solder the ground lugs of the F-connectors to the bottom side of the Ramsey preamp and install the board and connectors into your case (you may have to cut the corners of the PC boards shown in Figure 2 if you are using a CATV tap box). Next, solder the flying leads of the preamp (C1's lead attaches to the Input connector; C4 and R1's leads attach to the Output connector).

#### Tune Up

Make sure you're getting the proper DC voltage from the DC power injector. If correct, hook it up to your preamp and attach your antenna to the preamp and

check to make sure you're drawing around 4 to 10 mA of current. While observing a weak TV signal (P2 or P3 signal level to start with to find the best peak), adjust L1 by spreading or squeezing together its turns with a plastic tool until you observe the best picture. When adjusted, install your case's lid and get ready to install the preamp at the antenna. You can weatherproof your Hawg Amp by mounting it with the connectors down with a small cup or plastic container for a rain cover. RTV silicone rubber makes a good rainproof sealant if you leave a small opening at the bottom of the box. If everything is operating correctly, you should now have a noticeably improved received signal.

If you'd like a kit of hardware components and detailed construction information for the Hawg Amp (CATV tap boxes, magnet wire, 390 pF capacitor (C7) and necessary hardware—\$10; everything including the Ramsey PR-40 preamp—\$30), send a check or money order to Will Payne N4YWK at 2823 Oak Hills Dr., Dallas GA 30132.

#### ATV Net

If you are in the greater Atlanta region, feel free to check in with the Big Shanty Repeater Group. A weekly ATV net operates every Thursday evening around 9 p.m. EDT. ATV talk-in frequencies are 144.34 MHz simplex as well as the 146.655 (-600, optional 118.8 Hz PL) repeater.

73

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