The Dynamic Duo

by Ken Cornell

No, I am not writing about Batman and Robin, but rather a small active antenna working with a regenerative preamplifier that will provide amazing results for reception from the VLF to HF frequency range.

The unit consists of a short whip antenna mounted in a weathertight enclosure along with a broadband amplifier. Coax cable is used to allow the antenna to be placed at a remote location. A simple resistor/capacitor network is used at the receiving end to provide power supply isolation and receiver coupling for the antenna.

This antenna provides excellent reception from the VLF (10kHz) range through the amateur radio 2 meter band (148 MHz). The circuit is shown in figure one. Construction suggestions will be covered later in this article.

Most of us are familiar with an RF preamplifier (also called preselectors). They can be a valuable asset to receivers that lack sensitivity, particularly in the LF and HF range.

If we add feedback between the RF amplifier's output and input circuit, the amplifier can be placed in an oscillating condition. By carefully controlling the amount of feedback between RF amplification and oscillation, we form a regenerative RF amplifier.

When the feedback control is set at the threshold of oscillation, the tuned circuit "Q" is increased a thousandfold and will peak-up a received signal and improve selectivity tremendously! A circuit for a regenerative RF amplifier is shown in figure two.

Construction of a practical antenna is shown in figure three. The housing is a thirty inch length of inch and a half diameter PVC pipe with pipe caps at both ends. Insert a four and one half inch wide by twenty-eight inch long sheet of aluminum flashing (copper is okay, too) rolled to fit the inside diameter of the pipe. This is the actual antenna.

An alternative would be to insert (STUFF) heavy duty aluminum foil inside the pipe and at the bottom, make a double fold and punch a hole for a 6/32 machine screw with a solder lug and nut. Solder a short length of flexible stranded wire to connect to the perf board. A one quarter inch screw eye in the top cap will allow the antenna to be hung from any convenient structure.

Install the "F" connector by filing a flat on the outside center of the bottom pipe cap. Drill a 23/64 inch diameter hole and screw the connector in; it will cut its own

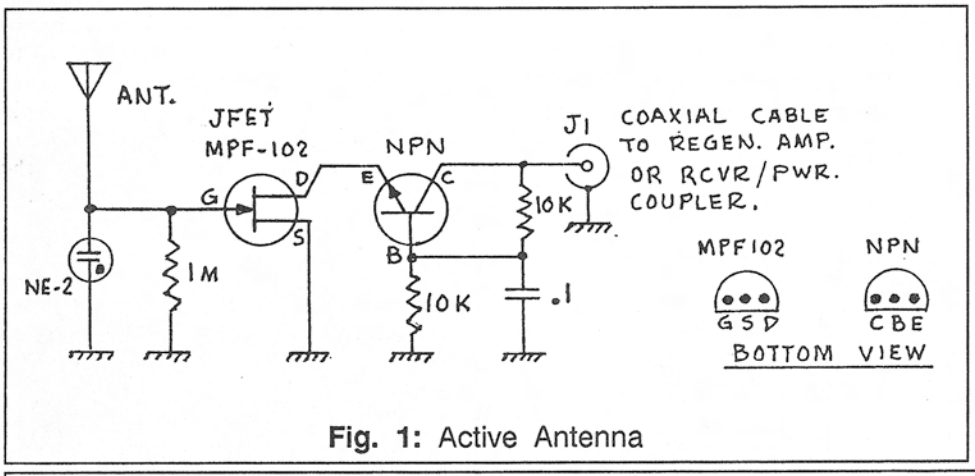

Fig. 1: Active Antenna

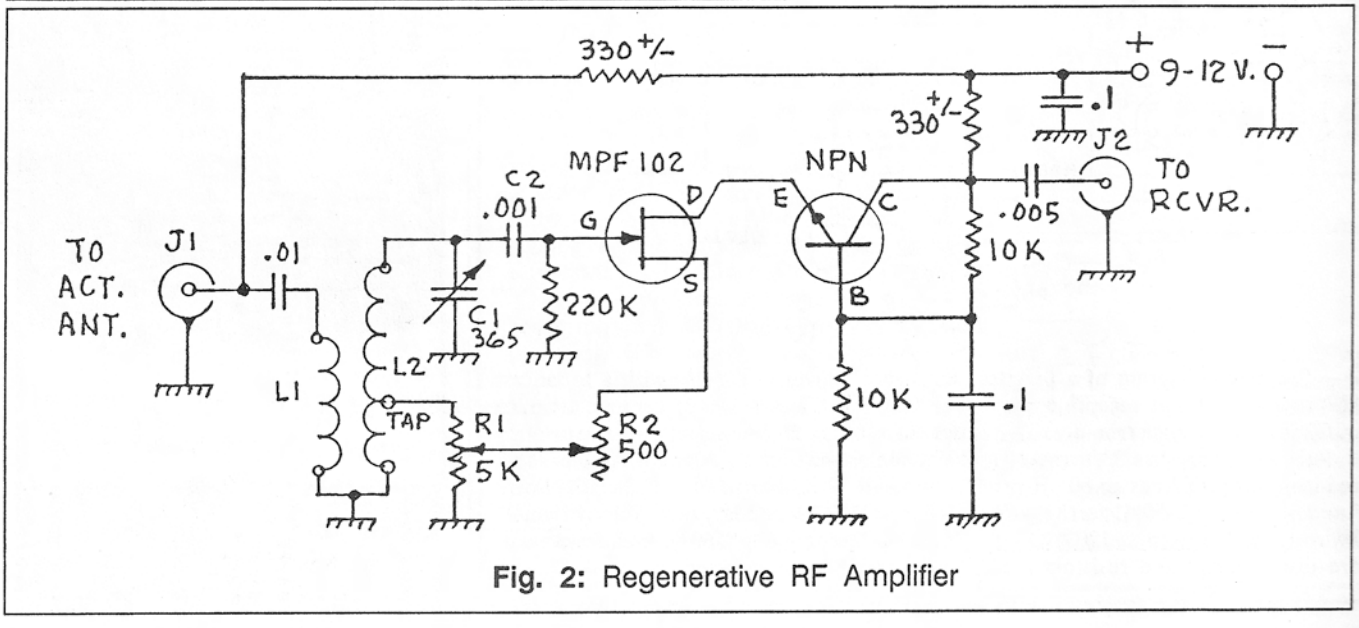

Fig. 2: Regenerative RF Amplifier

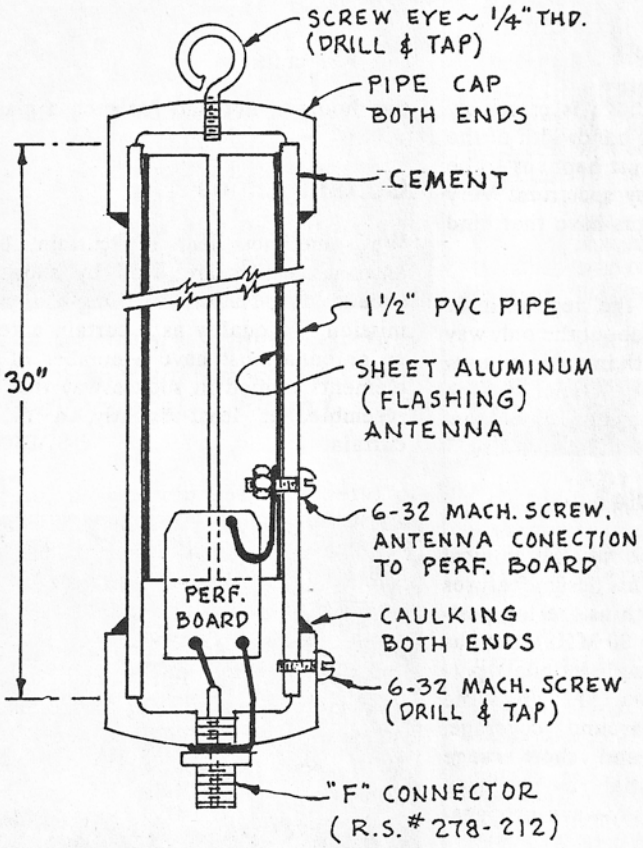

Fig. 3:
Suggested Construction for an Active Antenna

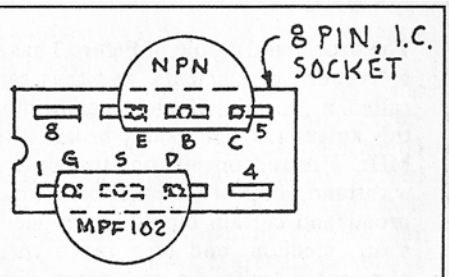

Fig. 4

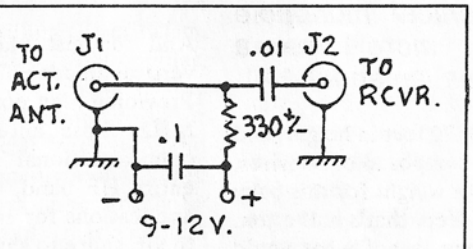

Fig. 5

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threads, hence assuring a weather-proof fit.

Use a piece of perf board 1-1/4 by 2-1/4 inches to mount the parts for the active antenna. Transistor sockets or an 8 pin IC socket as shown in figure four should be used to make removal of the transistors easy; this will allow you to experiment to find the most sensitive devices for your amplifier.

The coils (L2) are commercial units, Miller 9011 thru 9019, (inductance ranges from 40uH through 750mH). L1 is magnet wire of about the same size and consists of about 25% of the total turns of L2 wound on the cold end of L2. Exact wire size and number of turns is not extremely critical. If you wish, experiment with L1 to obtain the results you desire; more turns increase gain but lower selectivity. You can mount the coils on a socket such as a five pin automotive speaker plug or octal plug to provide plug in coil band changing. Or use a switching system to change coils for the respective bands.

All of the coax connectors can be your favorite type. An F connector is suggested for the active antenna if it is to be mounted outside. The NE-2 neon lamp provides a small measure of lighting protection; however, any outside antenna should be fitted with an approved lightning arrestor.

Use a vernier dial for C1 because tuning is extremely sharp on the HF bands. Resistors should be 1/4 or 1/2 watt and capacitors should have a minimum rating of 35 volts. The NPN transistor is any general purpose RF amplifier; the 2N2222A is a good choice.

Test your active antenna board in the enclosure before installing it at the final location.

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