

BUILD A FET STICK

R.F. AMPLIFIER EXPERIMENT

BY ART TRAUFFER

IN EXPERIMENTER CIRCLES, any time a new electronic device is introduced it stimulates a wave of creativity. The field effect transistor is no exception and has, in fact, received more than its share of attention. But in this article, concentration is on the use of the FET in an r.f. amplifier in a specific project.

The "FET Stick" is a novel yet practical and extremely simple broadcast band radio receiver project. It has been specifically designed to use and demonstrate the FET as an r.f. amplifier. The project gets its name from the major device used and the fact that the entire circuit is built on a piece of pine lumber—literally a stick.

Construction. Prior to building the FET stick, select an 11" length of 1" × 2" clear pine (actual dimensions $3\frac{1}{8}$ " × $1\frac{5}{8}$ "). After making sure that the pine is perfectly dry, sand it smooth on all sides, and apply two coats of shellac. Nail on 1" × 1" pine legs.

Starting 1" from the left end of the pine board (viewed as shown in the photo), close-wind L_1 (see Fig. 1) with 25 turns of #28 enameled wire. Anchor the first and last turns with plastic cement to prevent unravelling. Now, spaced $\frac{1}{8}$ " from the right end of L_1 , close-wind another 102 turns of the wire to make L_2 .

Measure $6\frac{1}{2}$ " from the left end of the

board, and close-wind another 25 turns to make L_3 . Finally, spacing it $\frac{1}{8}$ " from the right end of L_3 , wind L_4 with 102 turns of wire; twist three taps, evenly spaced and about 1" long, across this winding. Then to hold the taps rigid, bead them with plastic cement, starting $\frac{1}{4}$ " from the top and working down to the windings.

Screw fasten the Fahnestock clips close to the two ends of the board (1-4 in the schematic diagram and photo). Then cement C_1 and C_2 to the board as shown. Screw-fasten a solder lug to the frame of C_1 and connect one end of R_1 and the far lead of L_2 to this lug. Cut the other lead of R_1 to a $\frac{1}{2}$ " length and form an almost closed hook.

Connect and carefully solder the source lead of Q_1 to the free end of R_1 . Then scrape away the insulating enamel from the near end of L_3 and solder this wire to the drain lead of Q_1 . Solder the gate lead of Q_1 and the near lead of L_2 to the insulated solder lug on the side of C_1 . Make sure when soldering to Q_1 that the leads of the FET are properly heat sunk to prevent heat damage.

At the center rear of the board, mount another solder lug and to it, solder one end of R_2 . Bend R_2 so that it parallels the top of the board and points toward L_3 . Solder the free end of L_3 to the free end of R_2 .

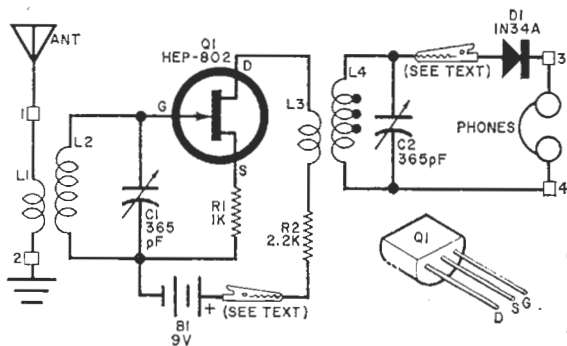


Fig. 1. Alligator clips connected to D1 anode and B1+ leads allow individual adjustment of selectivity and sensitivity. Blocks numbered 1 to 4 indicate the Fahnestock clips.

PARTS LIST

- B1—9-volt battery
 C1, C2—365-pF tuning capacitor (Radio Shack No. 272-1343, or similar)
 D1—IN34A germanium diode
 L1, L2, L3, L4—See text
 Q1—Motorola HEP-802 field effect transistor
 R1—1000-ohm, 1/2-watt resistor
 R2—2200-ohm, 1/2-watt resistor
 †—Medium size Fahnestock clips
 ‡—11" long piece of 1" x 2" pine (see text)
 Misc.—Control knobs (2); battery connector; #6 solder lugs (3); 6-32 x 1/4" machine screws (2); 1/2" wood screws (7); 1 3/8" x 1" square pine for legs (2); sandpaper; shellac; plastic cement; misc.

Next, solder the cathode end of *D1* to the right rear Fahnestock clip (3 in Fig. 1). Solder a small alligator clip to one end of a 4" length of stranded hookup wire; the other end goes to the anode end of *D1*. Again, use proper heat-sinking to prevent heat damage.

Scrape away the enamel from the unconnected leads of *L1-L4*. Solder the near and far leads of *L1* to the left front and left rear, respectively, Fahnestock clips. Screw-mount the remaining solder lug to the frame of *C2* and solder the far lead of *L4* to it. Then solder both the near lead of *L4* and the right front Fahnestock clip (4) to the insulated solder lug on the side of *C2*.

Finally, mount *B1* on the underside of the board. Snap on its connector, and solder the negative, black, lead to the solder lug at the junction of *L2*, *C1*, and *R1*. Then solder a small alligator clip to the positive lead of the battery.

Operation. In using the FET Stick, best results are obtained when an outdoor an-

tenna, at least 50'-long, and a cold water pipe ground are used. However, good results can also be obtained with even a coiled bed spring antenna.

To operate the FET Stick, first apply power by clipping the alligator clip that is soldered to the positive lead of *B1* to the solder lug connected to *R2*. (Note: for increased sensitivity, especially on weak stations, you can connect the alligator clip to the other side of *R2*.) Then connect your antenna, ground, and headphones to the appropriate Fahnestock clips and the alligator clip on *D1* to one of the taps on *L4*. (Experiment with the proper tap to use for any given station, since tap selection determines selectivity.)

Now, while listening through the headphones, adjust *C1* and *C2* until you have the station you wish to hear. Capacitor *C1* has the greatest effect on tuning, while *C2* is used for selectivity. With a little practice, you will soon be tuning in stations with the same ease as you would with any other AM broadcast radio. —30—

Circuit components mount on length of pine lumber, which doubles as coil form for *L1-L4*. Clips 1 and 2 go to antenna and ground; 3 and 4 are for phones.

