

ASSEMBLY INSTRUCTIONS
For The

ACE ALBIN

SUPERREGEN RELAYLESS

RECEIVER

KIT

DESIGNER APPROVED

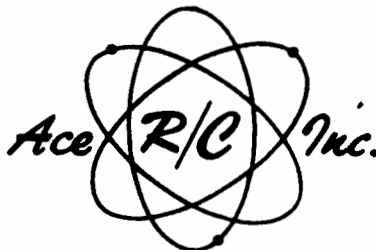
By

Bill Albin

This kit is recommended for those who have had building experience. It will require a small soldering iron 25 to 37 watt with a tip of 1/8" or less, use of solder supplied, and patience. The use of a magnifying glass is to be highly recommended.

While it is super-regen and subject to interference, because of its small weight of approximately .2 oz., it will be used extensively where interference is not a problem.

Dozens of prototypes have been built and tested in all sections of the country with excellent reports from all.



HIGGINSVILLE, MO. 64037

8/69

BUILDING YOUR ALBIN .2 OZ. SUPERREGEN RECEIVER KIT

Some two years ago midwestern modeler Bill Albin saw notes we had in American Modeler on an extremely small German receiver that looked ideal for the tiny R/C planes Bill was anxious to try. Only problem was that the receiver required a tone around 3500 cycles; Bill had just completed a brand new transmitter that would produce only about 700 cycles. The receiver maker told him its tone response couldn't be dropped to match Bill's new transmitter, due to tone filter size limitations. Bill had only one choice--make a micro-minature set of his own. He had a head start on most R/Cers--he is a circuit designer for a hearing aid manufacturer! Thus he had all the tiny parts available that he needed, and the capability of using them.

Many super-regen circuits were tried before he found one that would afford good sensitivity and stability, would not swamp close to the transmitter, and would eliminate the transformers used in very small commercial R/C receivers (such as the Otation 0-21 and a later Jap copy of same). His final model measured about $7/8 \times 5/8 \times 7/16$ "- it could have been made half this size with the parts Bill had, but would have been much harder to build and weighed .1 oz. It worked fine, was flown in several small planes with a .02 Cox engine power. Some 13 of these receivers were constructed by Bill and a friend; several other local modelers started copies but their PC boards ended up pretty much solid blobs of solder! There was also another problem; the parts were available only to electronics manufacturers in large quantities--and total parts cost was \$35-40.

Since quite a few R/Cers seemed interested in the receiver, but some couldn't manage the delicate soldering--and others couldn't manage the cost (even if the parts had been easily available) Bill undertook a redesign. His aim was to use only parts listed in catalogs of the large mail order electronics houses, and at a fairly reasonable total cost. Since parts would be a little larger, so would the PC board, and most R/C tinkerers should be able to handle the construction. The result is what you see here--a set weighing about .2 oz., measuring $1 \frac{1}{16} \times \frac{13}{16} \times \frac{1}{2}$ " over-all. Best part is cost; it comes out a bit over \$10. Unfortunately no very small coil form could be found in the mail order catalogs. And of course there was no source of PC boards. We have arranged with Ace Radio Control to supply these special components. In fact, Ace has a complete kit of parts at a price little over what you would have to pay the electronics houses; you'll save time too, since the parts that Bill specifies have to come from several different sources, and the PC base is etched and drilled.

Assuming that you get the Ace kit, let's assemble a receiver. The PC board comes all drilled (the two hole sizes are #68 and #72 with the larger holes for capacitors C5-C10 and for RFC). A $3/16$ " hole is used for the coil L1, which comes already wound in the kit. The PC board copper side has a bright finish that does not require cleaning with steel wool. You'll note that some of the holes in the board are at the edge of the lands, rather than in the center. To make reliable connections at these points it's best to bend the lead across the land, before you clip and solder it. And that brings to mind another point--make sure all components leads are clean and bright before you install any parts. Excess heat can ruin many of the parts and there just isn't room to apply a heat sink on most of the leads. You don't need to shine up the transistor leads; they are gold plated and accept solder beautifully.

PARTS LIST
ACE ALBIN SUPER REGEN RECEIVER

1/8W RESISTORS

- 1 (✓) 3.3K (orange, orange, red)
- 2 (✓) 10K (brown, black, orange)
- 1 (✓) 15K (brown, green, orange)
- 1 (✓) 33K (orange, orange, orange)
- 1 (✓) 470K (yellow, violet, yellow)
- 1 (✓) 560K (green, blue, yellow)
- 1 () 680K (blue, grey, yellow)
- 1 (✓) 220 ohm (red, red, brown)

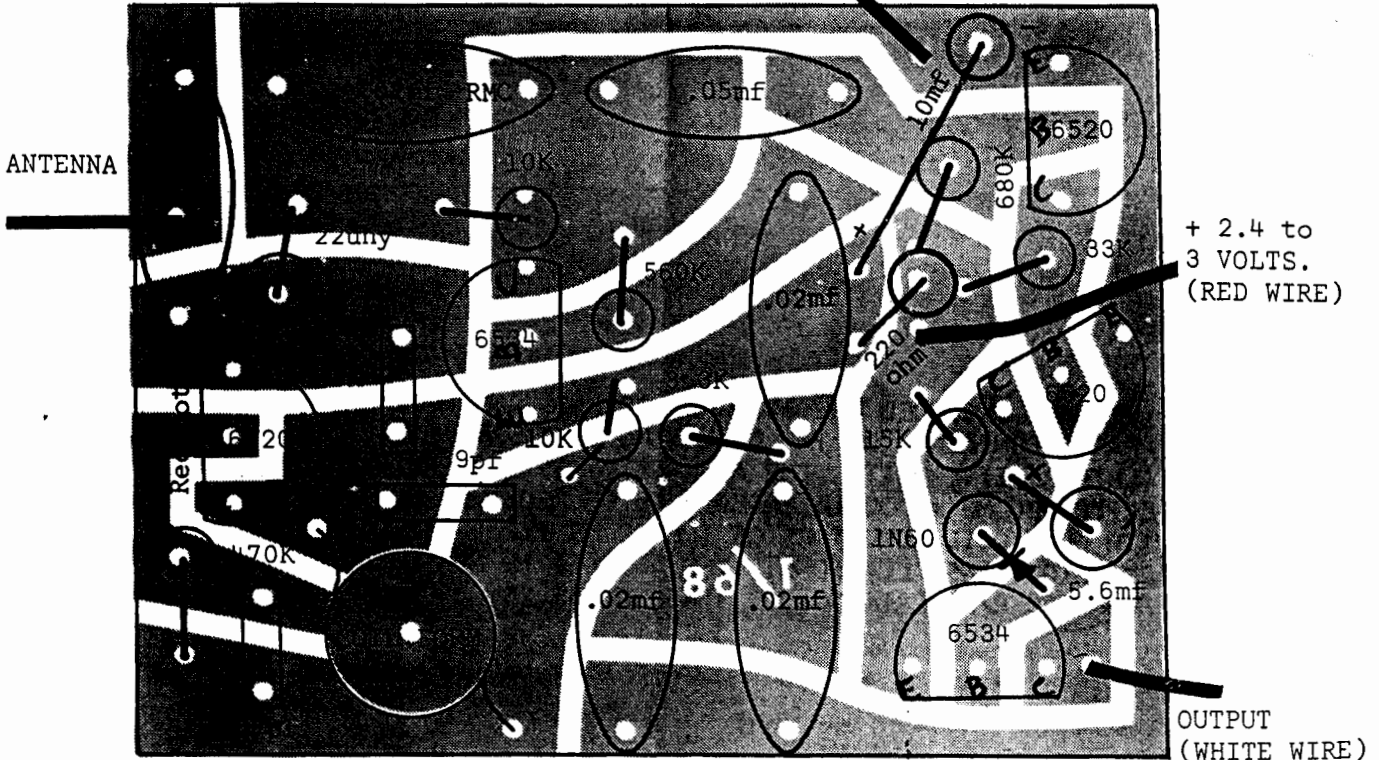
CAPACITORS

- 3 (✓) .02 mfd disc Erie
- 1 (✓) .02 " RMC
- 1 (✓) .05 "
- 1 (✓) 5.6 mfd electrolytic
- 1 (✓) 10 pf disc Gulton NPO
- 1 () 15 "
- 2 (✓) 27 "
- 1 (✓) 39 "
- 1 (✓) 10 Mf A.L. electrolytic

MISCELLANEOUS

- 3 (✓) MPS 6520 transistor
- 2 (✓) MPS 6534 transistor
- 1 (✓) 1N60 diode
- 1 () 22 uhy choke
- 1 (✓) 9 1/2 turn #30 tuning coil
- 1 (✓) PC base
- 6" (✓) Red, black, white
- 18" (✓) Antenna wire
- 1 (✓) Set of instructions

- 2.4 TO 3 VOLTS (BLACK WIRE)



If the receiver doesn't work with the 15pf, use the extra 27pf.

CATHODE (BLACK BAND) OF 1N60 NEXT TO PC BASE

First part to install is the coil L1. This is 7/16" long, and has 10 turns of #30 wire. To put the kit coil into use you must carefully peel off each wire and until you have exactly 9 1/2 turns, then bend the wire downward to go through the board holes. We found Hobby Poxy (either #1 or #2) ideal to fasten the coil form to the base. The wire on the Ace coil has a coating that is removed by solder--but you can scrape the ends if you want to hurry the process.

With L1 attached, you can start in that corner of the board to install parts. Insert a few at a time, check your work carefully (it's much easier to solder parts in place than to remove them, so heed that 'check your work carefully' bit!) solder and clip off surplus wire. We prefer to leave the transistors till last--less chance of ruining them with excess heat. Needless to say, you can't tackle this assembly with a 50 or 100 watt iron! We suggest nothing higher than a 25 watter--and 15 W would be preferable (and safer). Special low melting-point small diameter solder is mandatory--the Ace kit includes plenty of the correct kind.

Be SURE the flat sides of the transistors face as indicated on the parts placement drawing, that the black ring on the diode is nearest the board surface, and that the round end of C9 (which is the positive end) is away--from the board surface. It doesn't make much difference how you install the other parts, but checking is easier if you position the capacitors so you can most easily read their capacity markings. The leads of the disc capacitors should be spaced exactly to fit their holes; however, we found some of the tiny square caps. had wider lead spacing, and their leads should be carefully bent inward as required.

Solder on the four flexible leads last. The antenna lead should be 12-18" long; the red lead is for the positive battery connection, and black is for negative. Check the solder side of the board most carefully, preferably with a magnifying glass, to make sure that you haven't "bridged" solder across adjacent lands. Needless to say you should use the very minimum of solder for all connections that will do the job. Too much makes checking harder, is likely to bridge across lands--and it just plain adds weight! It is smart to carefully scrape all rosin off the bottom of the board, then clean it up with alcohol; the latter may be delicately applied with a pipe cleaner or very small brush (don't just dunk the whole works in alky!).

This receiver was intended to operate a tiny proportional actuator in single-ended fashion. Albin has utilized the German Bentert "large" actuator (this one and the much smaller one by the same maker are stocked by Polks in NYC) which has a 40 ohm coil. He prefers to make preliminary tests with a #49 pilot lamp connected to the set in place of the actuator; current drain is about the same. (The smaller Bentert unit has an 80 ohm coil, so will draw much less current; with it you must take more care to see that linkages and rudder hinges are absolutely free in operation--which is the reason Bill prefers the bigger unit). About all there is to do in testing is to turn on a 27 mhz transmitter that has modulation around 800 cycles (this value is optimum, but the set will work on modulation from perhaps 500-1200 Hz) and tune L1 to maximum brilliance. If you wish to test the set with a meter, it's preferable to put it only in the lead from the collector of Q5 to battery minus;

it is possible for a meter in the battery lead from the entire receiver to produce erratic action--as is the case with quite a few super-regens.

If you get good operation near the transmitter, try a distance check.

With modulation, you will get full out put, of course. The bulb can't show you much about low current in the actuator circuit, of course, and we personally prefer a meter in the Q5 collector lead, for this reason. With a 3V battery, the meter should indicate close to 60 ma with the bulb or large Bentert actuator, and about 32 ma for the small Bentert. With a CW signal coming in these receivers show only about 1-2 ma total current, but with tone, you will have some 10-12 ma battery drain in addition to whatever drain you have through Q5.

It is just possible that your receiver might be too insensitive, in which case C10 should be lowered in value. However, none of the test models have shown this fault. We did have one receiver that showed just about zero actuator current without an incoming CW signal, but still had quite reasonable sensitivity. So don't jump to conclusions until you have made distance tests. If the no-signal current shows erratic jumps (and it might even average up to 20 ma or so) you know the set is "hot" enough, and ready to go.

While Bill Albin intended the receiver for pulse propo operation, it could certainly be used with an escapement. It would be wise to choose an escapement with enough coil resistance to keep the current through Q5 to 300 ma or less.

The Bentert actuators for which this receiver was intended have a single coil, and the rotor is magnetically biased to one side; when current is applied to the actuator coil, the rotor pulls to the other side (provided coil polarity is correct--if it isn't, the rotor would try to turn even further to the biased side). Other single-ended actuators with a reasonably high coil resistance can also be utilized, of course. Or you can spring-load the rotor of such units as the Baby Adams to one side, when full current will pull it the other way. On this actuator, and any other that has a center-tapped winding, use the entire winding and disregard the center tap. If there are two separate windings as on the Septalette actuators connect the two in series--again, they must be polarized correctly.

Minimum installation weight with the Albin receiver, the small Bentert actuator and the smallest practical cells we have been able to find (the Eveready S76 silver oxide cells are the lightest for their operating capabilities) is about .65 oz. If your model can carry a bit more weight, you could go to size N flashlight cells, very smaller button nickel-cads etc. The small Bentert actuator weighs .25 oz., the large one twice this--but the latter has considerably more than twice the power (it takes twice the battery current, too). When figuring battery drain, don't forget that with a "single-ended" pulse propo system such as this receiver provides, the actuator current is only high for half the time; the other half the receiver drain is only a couple of ma. Also, don't forget this receiver draws an added 10 ma or so on tone, that does not show up in the actuator circuit.

The .65 oz. noted above brings possibilities of converting small rubber scale jobs to R/C, of applying R/C to rocket "boost-gliders", of controlling tiny cars and boats. The possibilities for indoor R/C models are very good. We would like to hear what readers fly or operate with this micro-miniature equipment; drop us a line and send a few photos!