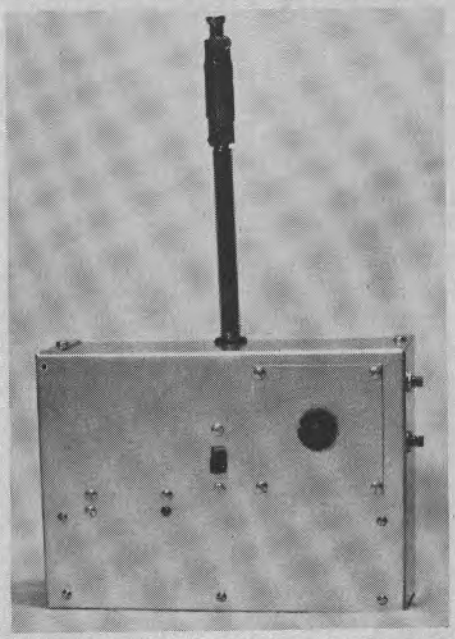
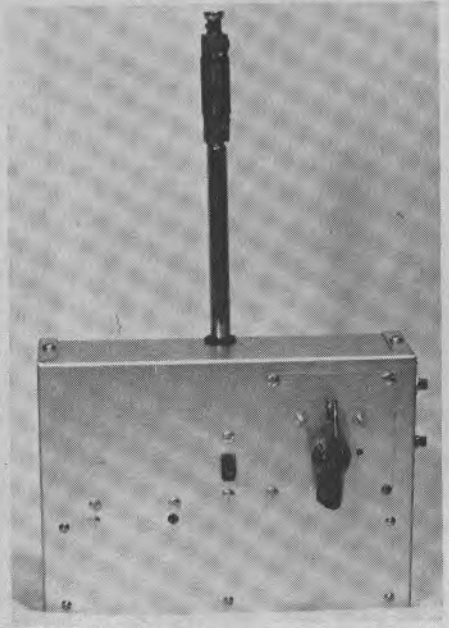
THE JANSSON TRANSMITTER

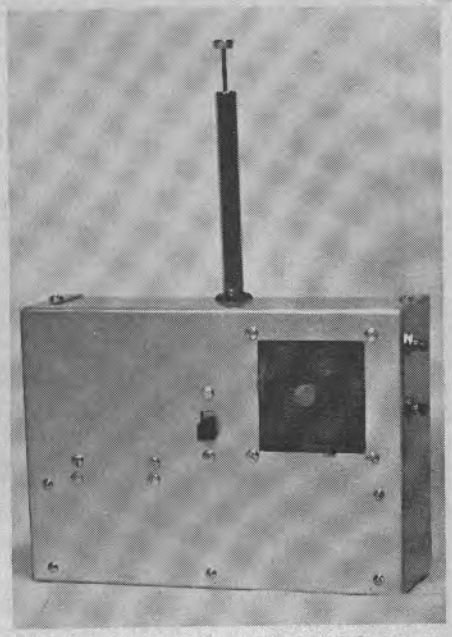
The control flexibility designed into this equipment provides new opportunities for experimentation in progressive classes of flying. Breaks cost-versus-change barrier!



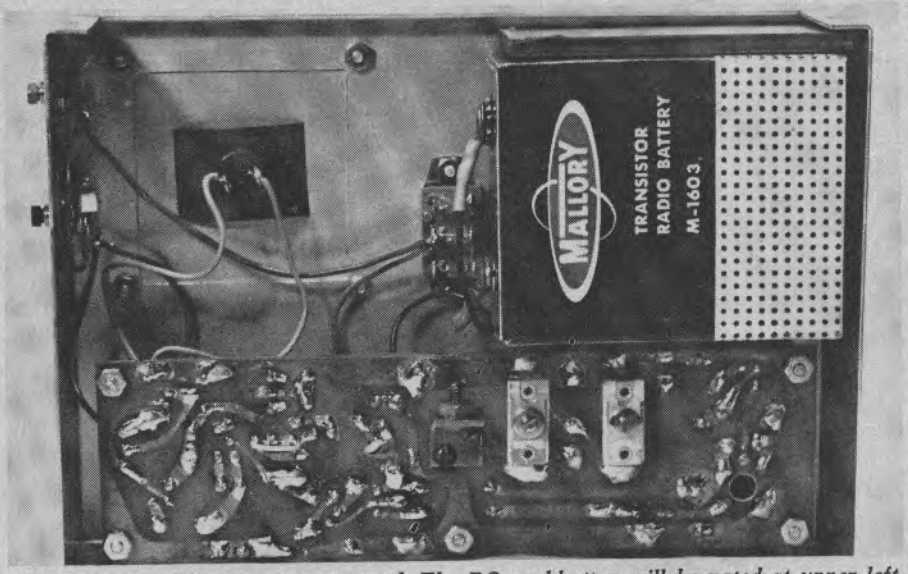
Prototype with rudder-only pushbutton.



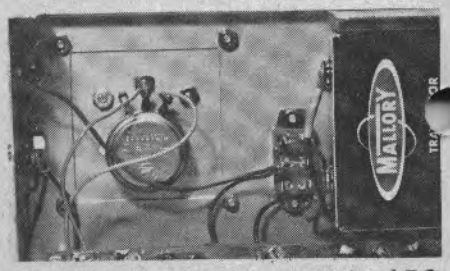
With left-right knob for pulse propo on RO.



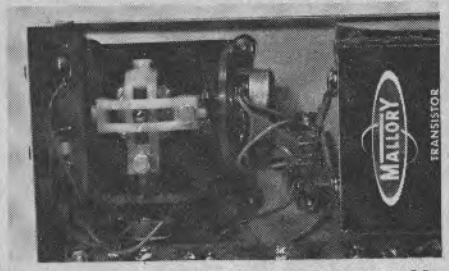
With Bonner Digimite stick for GG propo.



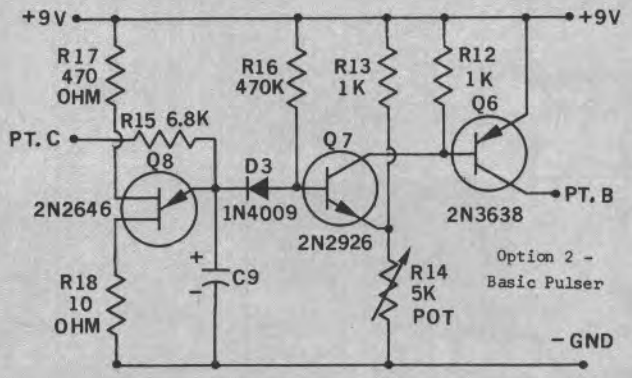
What you see with rear cover removed. The RO pushbutton will be noted at upper left.



Control knob pot, used in proportional RO.



Rear view of the Digimite stick assembly.

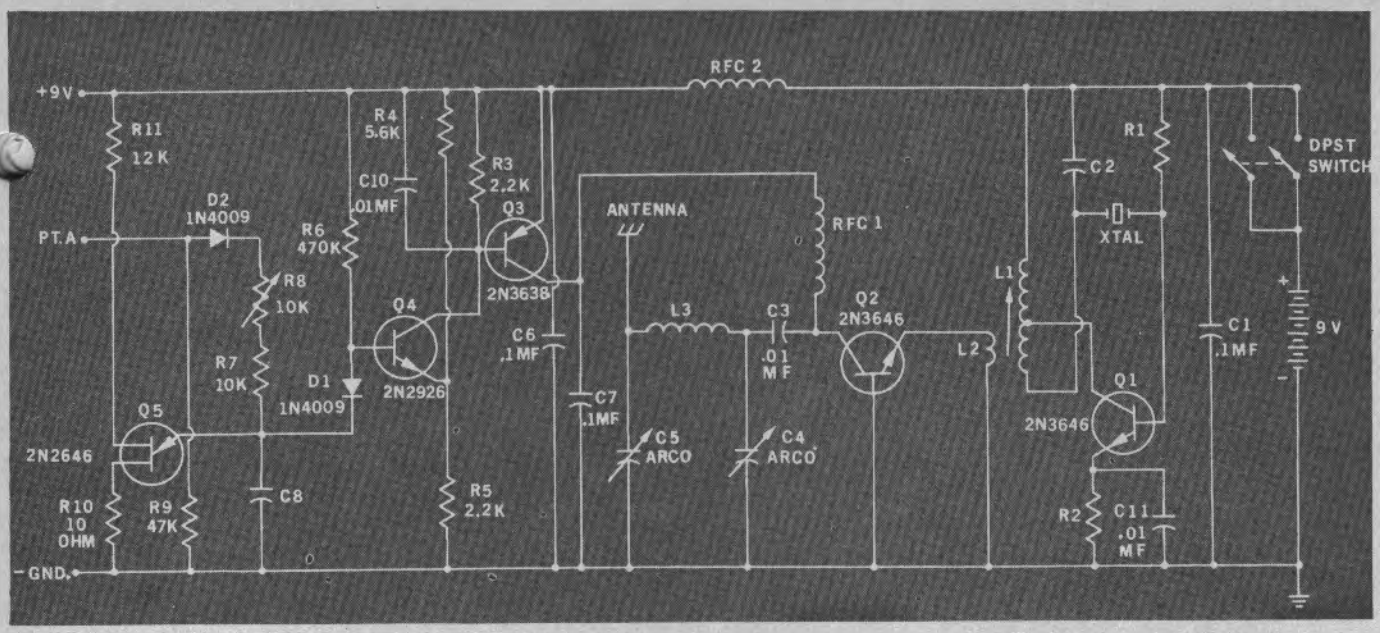


S2=30A9, S3=30A17 (low motor), S4=30A16 (High), S5=30A16. C-9=8mf 25V (=7.5 to 20 pps); 6mf 25V (=10 to 27 pps); 4mf 25V (=15 to 40 pps). Schematic is pulser.

■ Cost factors in the radio-control model hobby have grown in recent years. It is rare when a modeler has less than $100 invested in radio equipment alone. When the modeler starts with a simple system (for example, escapement control) and then desires to go to proportional pulse rudder or even rudder-elevator (Simple-Simul, G-G, etc.) he must either invest in wholly new equipment or work up an unorthodox "kludge" of attachments for his present gear.

In a like vein, many modelers may start out on the 27 MC citizens band transmissions and then (obtaining a FCC Technicians License) move to the 50 MC ham frequencies or higher —again necessitating wholesale revisions of equipment.

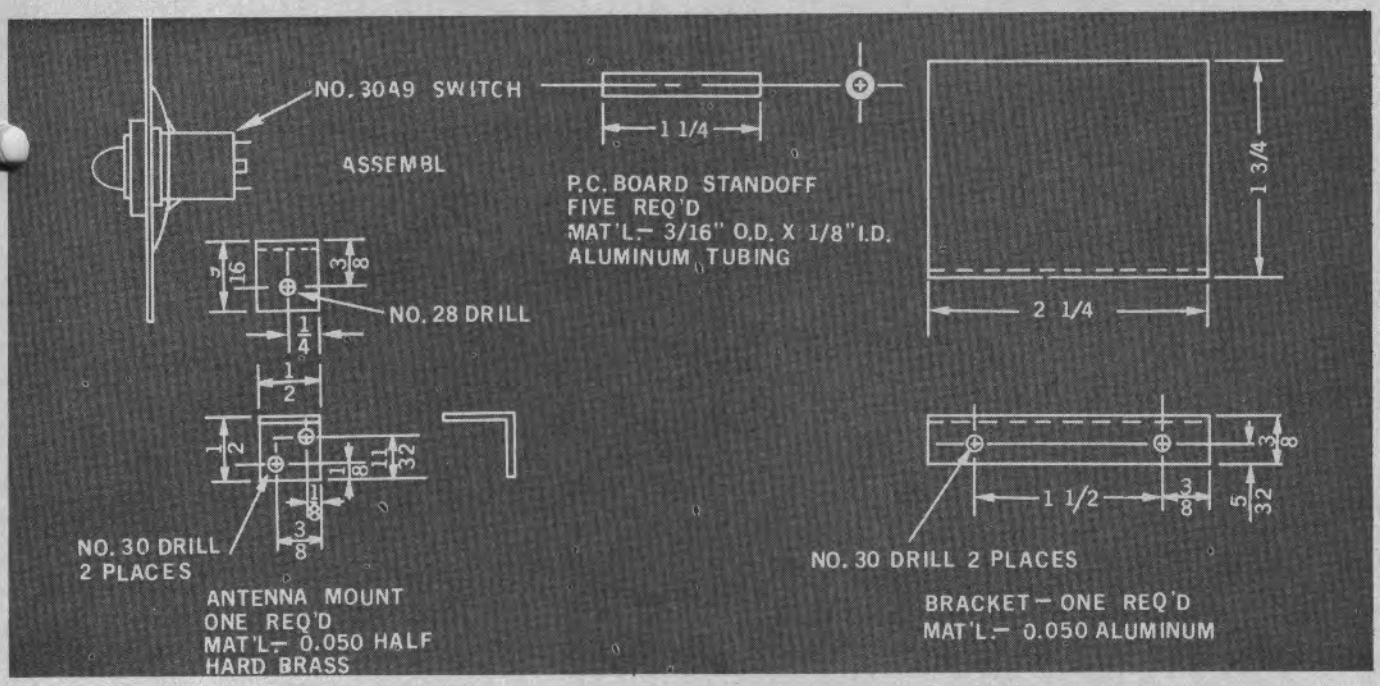
The transmitter described in this article is aimed at breaking down this cost versus-change barrier. Earlier efforts (G.L. July-August 1963) were aimed in this direction, but did not find themselves commercially acceptable. One of the large cost-reduction factors now being found in radio control equipment is the recent availability of low-cost, high-frequency silicon transistors (such as are being marketed (*Continued on page* 30)

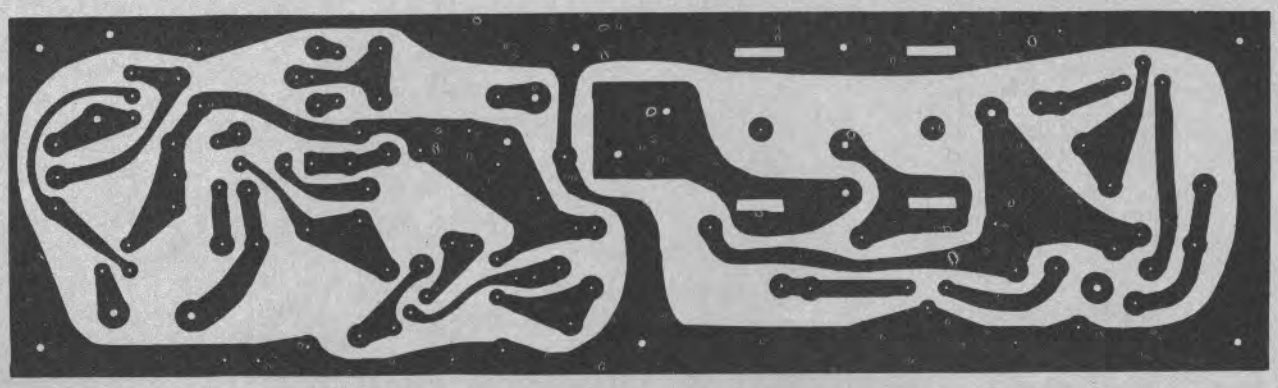


C8 = 0.082mf (= 450-900 cps); 0.047mf (= 800-1.6kc); 0.027mf (= 1.4-2.6 kc); 0.015mf (= 2.5-4.9kc). Mallory 1603 or equivalent. L1 = 7¼ turns #26AWG wire tapped 4⅛ turns from bottom (+ 9V) on CTC 2173-3-3 form. L2 = 2¼ turns #26 AWG wire over center of L1.

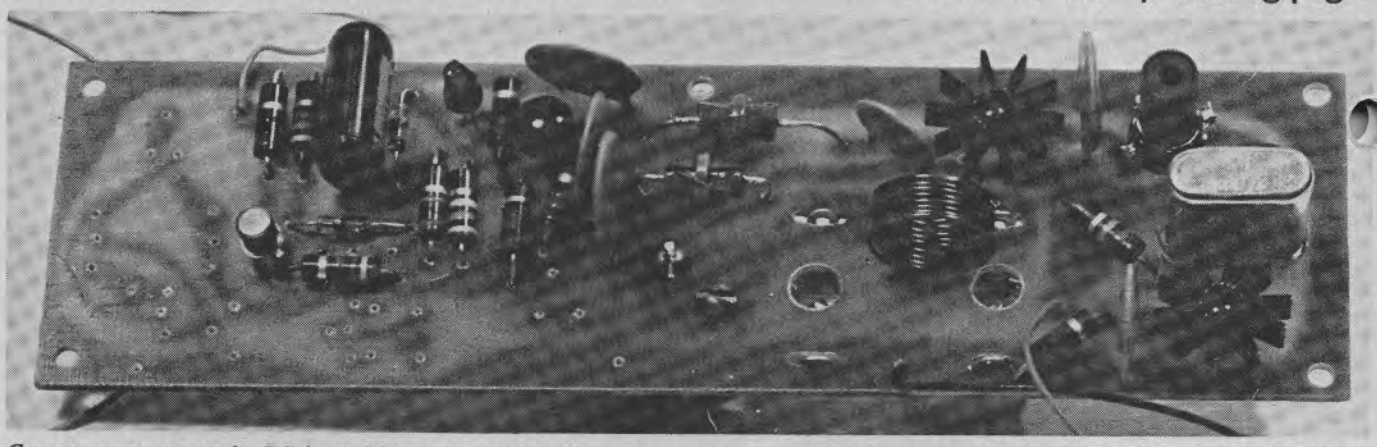
26-28 MC COMPONENTS
Crystal = 3rd Overtone 27MC
RFC-1 = Miller 20 uhy
RFC-2 = Miller 20 uhy
L-3 = 9 Turns #22 AWG ½" I.D.
C-2 = 75pf Silver mica
C-4 = Arco 426
C-5 = Arco 424
R-1 = 12K
R-2 = 100 ohm

50-54 MC COMPONENT CHANGES
Crystal = 50-54 MC 3rd Overtone
RFC-1 = CTC 10 uhy
RFC-2 = CTC 10 uhy
L-3 = 4 turns #20 AWG ½" I.D.
C-2 = 15pf Silver mica
C-4 = Arco 423
C-5 = Arco 422
R-1 = 12K
R-2 = 100 ohm



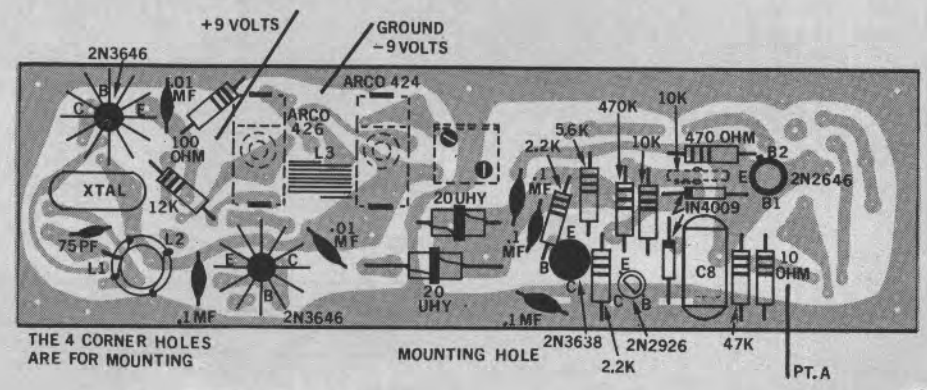


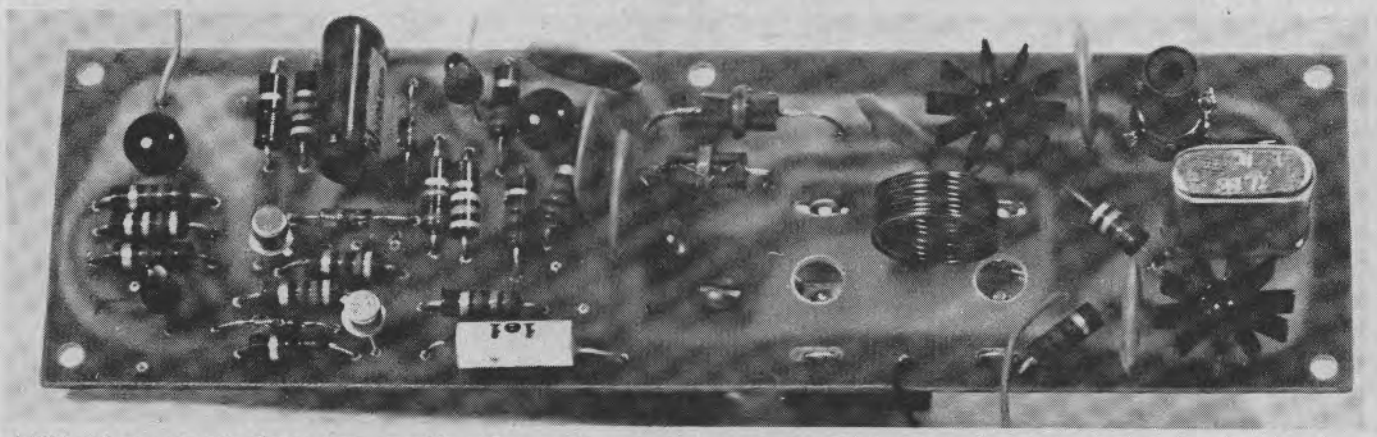
MORE PICS, DRAWINGS AND SCHEMATICS OF JANSSON X-MITTER — NEXT TWO PAGES



Component parts on the PC base. This picture shows RF section and tone generator section of pushbutton rudder-only transmitter.

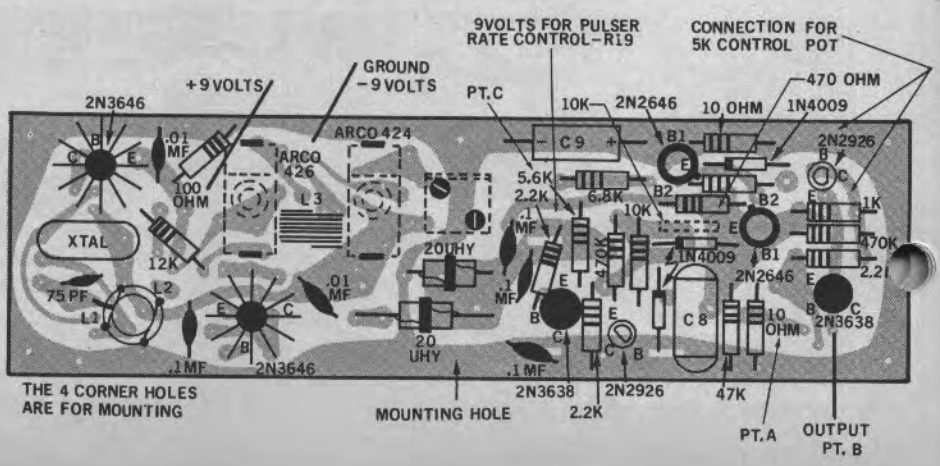
L1 = 7¼ turns #26 AWG, tapped at 4⅛ turns from bottom (+9V) on CTC 2173-3-3 form
L2 = 2¼ turns #26 AWG, over center of L1.
L3 = 9 turns #22 AWG ½" I.D.
C8 = 0.082 mf for 450 cps-900 cps
0.047 mf for 800 cps- 1.6 KC
0.027 mf for 1.4 KC - 2.6 KC
0.015 mf for 2.5 KC - 4.9 KC
NOTE: Mounting bolts 5 4/40 x 1½" nuts, and lock washers. Board spaced from case with 5 1¼" spacers.
Antenna bracket mount on copper side using 2 4/40 x ¼" bolt, nut, and lock washers. 1 6/32 x ½" bolt, nut, and lock washer.

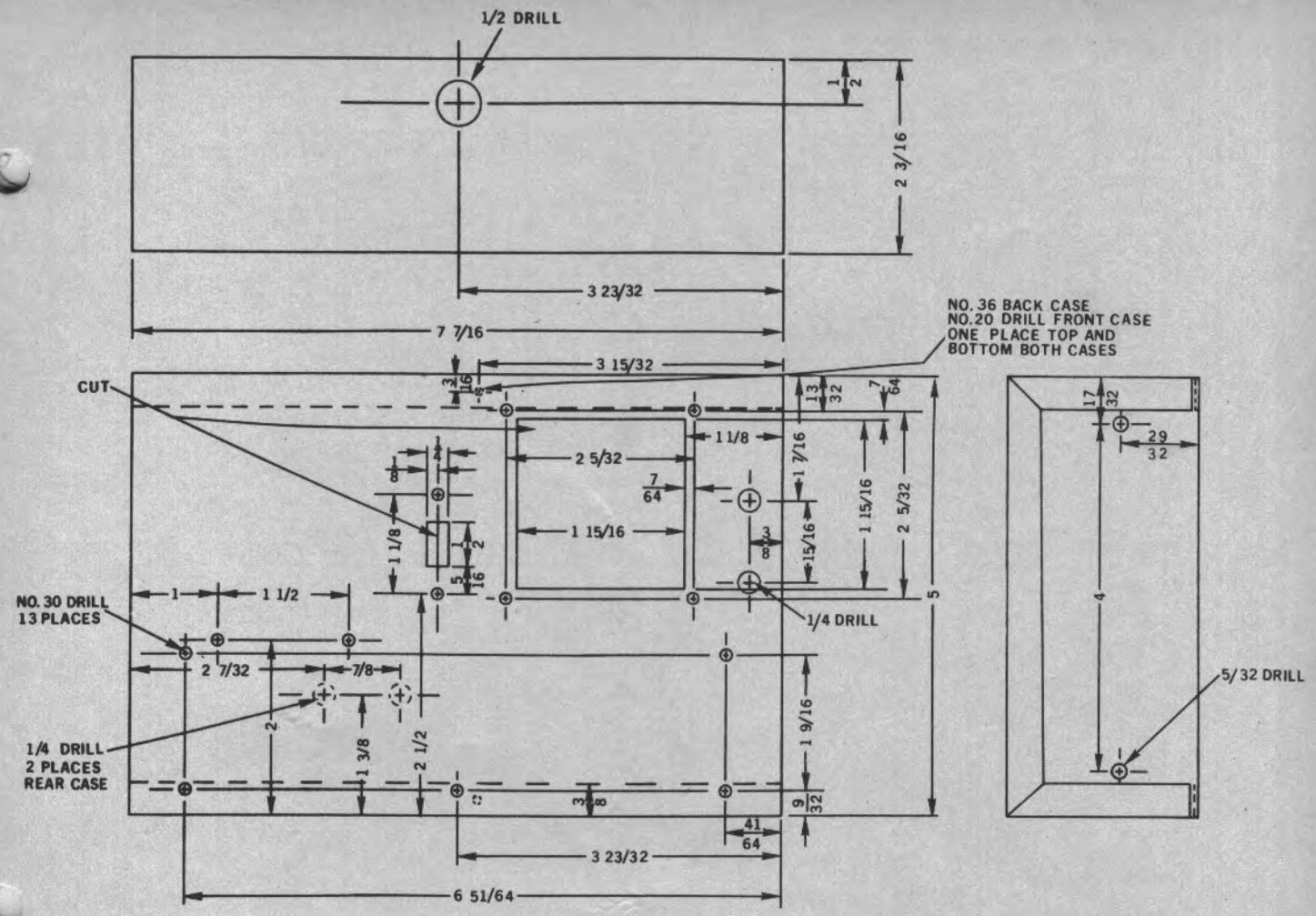


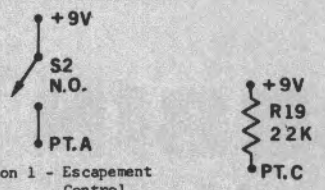


Additional components shown here provide pulser section which is required for both RO proportional and Galloping Ghost setups.

L1 = 7¼ turns #26 AWG, tapped at 4⅛ turns from bottom (+9V) on CTC 2173-3-3 form
L2 = 2¼ turns #26 AWG, over center of L1.
L3 = 9 turns #22 AWG ½" I.D.
C8 = 0.082 mf for 450 cps-900 cps
0.047 mf for 800 cps- 1.6 KC
0.027 mf for 1.4 KC - 2.6 KC
0.015 mf for 2.5 KC - 4.9 KC
C9 = 8 mf ± 10% @ 25V for 7.5 pps to 20 pps
6 mf ± 10% @ 25V for 10 pps to 27 pps
4 mf ± 10% @ 25V for 15 pps to 40 pps



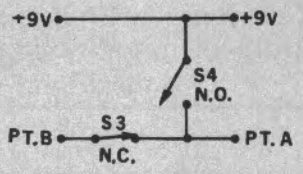




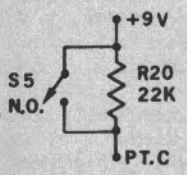
Option 1 - Escapement Control

Option 2A

Fixed Pulse Rate, connect Pts. A and B.



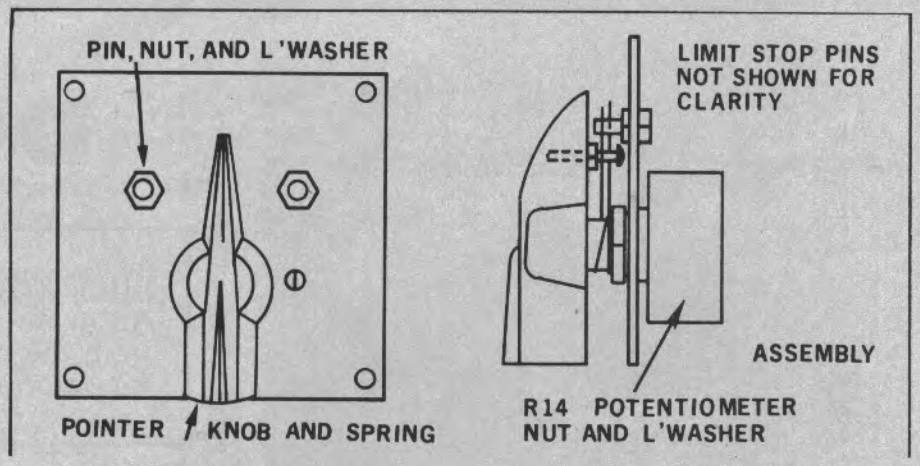
Option 2B - Tone ON-OFF Engine Control.

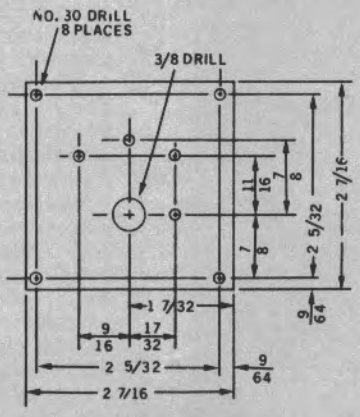


Option 2C - Fast Pulse Engine control, Connect Pts. A and B.

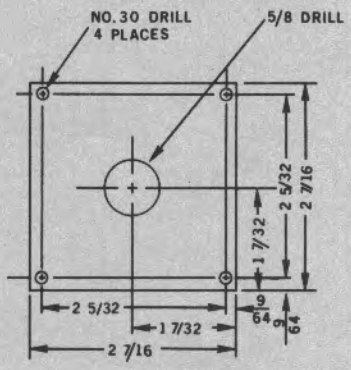
Option 2D - Elevator Control Pulse Rate Use W/Option 2B.

R21 - 100K Pot, adjusted to 8K slider to top terminal





MAT'L:- 0.050 ALUMINUM



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GL At Play

(*Continued from page* 1)

superregen circuit!

We would hesitate to say that the days of the superregen are entirely done. And this is a prediction that we think we'll probably get clobbered by some of the "experts."

* * *

• There is a new atmosphere at AMA Headquarters, and it gives a good feeling to oldtimers who sense it.

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Bits and Pieces

(*Continued from page* 20)

frequency is varied.

Here is another version which I have been successfully using with a filter setup which is similar to that in the Phelps Tone Receiver. Power is from the transmitter nicads. Most any interstage transistor transformer will work. Try both windings for best output. A set of 2000 earphones make a code practice outfit. Use any PNP transistor with gain of 50 or better. Standard resistors and disc capacitors are satisfactory for most operations. (Thanks to E. W. Gerhardt, Basking Ridge, N.J.)

Fix for Micro-Mo Deadspots: One of the best servo motors I've found is the micro-Mo; however, we have had several develop "dead spots" after some months of use. Ron Shuster of the Mentor R/C Club told me what to do about that and I tried it and it works! This was done on the TO-5 series:

1) Scratch a mark on the case where the screw on the back plate is to re-orient the back plate when reassembling; 2) Then pry off the back plate with a knife blade; 3) Inspect the winding leads where they are soldered to the commutator wires. Use a pin and check each connection for looseness—one or two will be loose (probably); 4) Dab a bit of flux on the loose connection, with a sharpened soldering iron, quickly (hot iron) re-solder the joint—don't use too much solder or imbalance will result; 5) Ron and I guess that vibration is the culprit here, so dab some Goo or cement or silicone bathtube sealer on each joint; 6) Remove the center plug from the back plate and drill it if necessary; 7) Put a piece of 3/32 tubing through the hole in the back plate and arrange the wire brushes on each side of the tube using a pin; 8) Slip the tubing over the commutator bars (careful here, don't bend the commutator and slide the back plate into position—it will snap in place but not tightly, so hold it in; 9) Remove the tube, glue around the seam between back plate and motor housing.

Replace back plate plug or just tape over it to keep out dust. I used Pactra 77 cement, but I think any model cement will do. If you don't trust the glue, cut some plastic electrical tape to 3/16 or 1/2 widths and tape right around the motor in the case of a TO-3 or a TO-5. Tape it full width around it.

(From Bob Penko, Kirtland Hardware & Hobby Shop, Willoughby, Ohio.)

Jansson Transmitter

(*Continued from page* 5)

by General Electric and Fairchild).

The drawings and pictures illustrate the basic transmitter setup for three different control system options; escapement control, pulse rudder with either fast pulse or tone OFF-ON engine control, and pulse width-pulse rate rudder-elevator control with tone OFF-ON engine control. A modeler can start with the basic transmitter and control option No. 1 (escapement), adding at a later time three transistors, six resistors, a capacitor, a control potentiometer, and one or two push switches to obtain a pulse proportional rudder control for control option No. 2. Or even still later, the modeler can add the Bonner Digimite control stick to obtain full rudder-elevator proportional control.

FAIL-SAFE FOR REED SERVOS

Circuit will not work properly with servos that use a -1.2 to -3.6 V bias on their servo amplifiers. Bias will appear on emitter and negative lead of capacitor. This bias will not allow capacitor to discharge. *July-August GRID LEAKS*

Simple solution is to reverse low motor lead and battery C.T. lead. This will isolate bias voltage from capacitor allowing it to discharge. (Slow motor operation normal for this type of circuit.) Relayless amplifiers will be damaged if two control functions are keyed at same time. Operator could call for high motor while the fail-safe is driving towards low motor, damaging amplifier. If high motor servo lead is used instead of either rudder or elevator lead, damage could not occur. Incoming pulse from high motor would cut off fail-safe avoiding damage. Murray Elchitz, Winnipeg R.C. Club, Winnipeg, Manitoba, Can.

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Other flexible features that are designed into the transmitter include an adjustable tone frequency (since this unit is tone modulated) that can be set from 450 cps to over 4,000 cps to tune to any commercially available receiver system, even those containing sharply selective tone filters (such as the Phelps unit presented in G.L.). For pulse operations, the pulse rate can be adjusted by a simple capacitor change permitting pulse rates from 4 pps to 40 pps with a 2.5:1 control range.

By changing a frequency crystal, two resistors, one coil, three capacitors, and the tuned antenna, operation on the MC to 54 MC ham band can be obtained with all of the control options as previously described. A similar frequency change option will be available for the new RC band when and if it becomes a reality.

The circuit schematics are given for the basic transmitter and for the control options. A biased grounded emitter oscillator drives the grounded base final amplifier through an impedance matching link coupling. Achieving optimum operation on 50-54 MC requires proper matching of the oscillator collector tuned circuit to get adequate crystal drive. It was found that the oscillator bias required a change between 27 MC and 50-54 MC services due to crystal activity. This is achieved by changing the emitter resistor from 100 ohms to 47 ohms, the resistor also serving the function of an oscillator current limiter—thus providing uniform results within the span of crystal variations. The base bias resistor is also changed from 12K to 10K to increase oscillator drive. In view of the 50-54 MC crystal (and higher frequency) activity, it appears desirable to use half frequency crystals in the oscillator, doubling in the final amplifier. This step retains an active oscillator and sacrifices final efficiency.

Although the circuit is optimized for the higher frequencies, the performance of the 27 MC crystals is such that adequate final amplifier drive is obtained with an oscillator that is performing at less than its maximum capability. Optimizing the oscillator on 27 MC can easily drive the final amplifier to exceed its transistor ratings. Power input to the final amplifier is in the order of 450 Mw to 750 Mw with an estimated efficiency of 60 percent.

The final RF stage operates in a CW mode and is 100 percent downward switch modulated by Q3 at the tone frequency. Output tuning is a pi network operating into a tuned half-wave antenna or 27 MC, and an approximate one-quarter wave on the higher frequencies. Tone generation is accomplished with a unijunction transistor oscillator coupled to a fixed bias switch that is in turn DC coupled to the modulator. Resistor R9 in the tone oscillator insures a sharp turn-off when connection point "A" is removed from the +9 supply (via a switch or switching transistor). Diode D_2 is inserted to provide the CW on operation of the transmitter with CW off during tone-off situations, a simple jumper of D_2 will do the job.

Pulser circuitry is very much like the tone generator, the differences appearing in the use of a variable bias NPN switch to follow the unijunction oscillator to provide pulse width control, and a variable resistor in the RC network of the oscillator to control pulse rate. Through capacitor changes in the pulser, rates up to 40 to 50 pps can be obtained to allow the advanced experimenter to use analog feedback servos in the flight equipment.

Other figures show the internal arrangement of the case and the printed circuit board. All circuitry is contained on this board, although some portions in the pulser area may not be used for control option No. 1.

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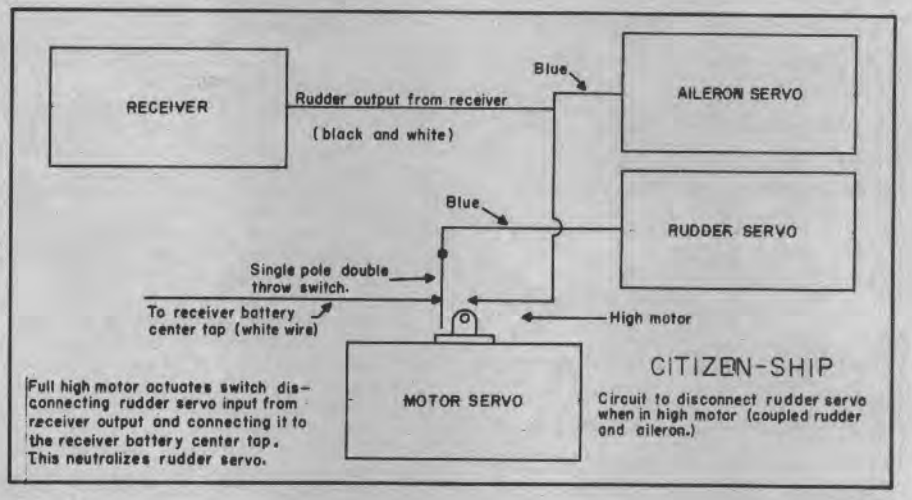
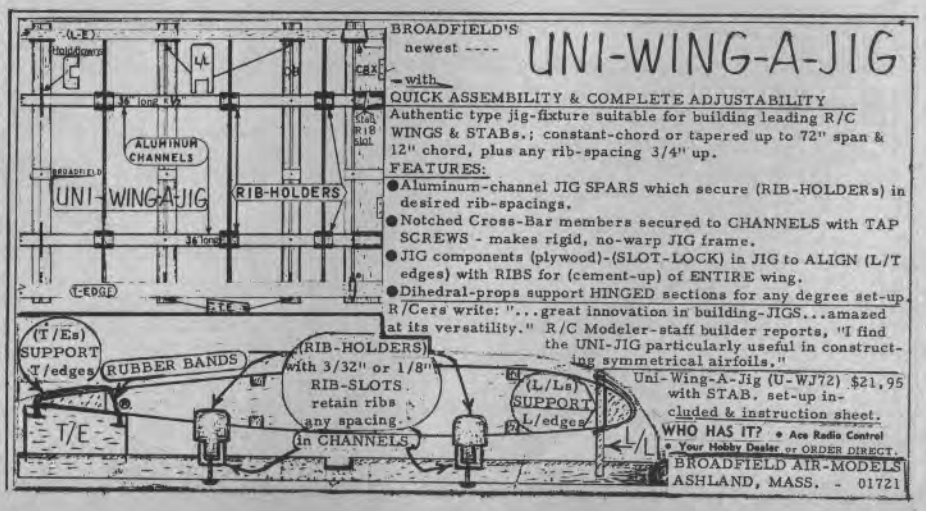
Tuning procedures are very uncomplicated as my shop is not cluttered with a lot of exotic instruments, not even a V.T.V.M. Using a field strength meter or a grid dip meter, (tuned to the proper frequency) held near the oscillator coil, adjust the coil slug for an indicated RF output, starting on the high frequency side, slug extended from coil form (maximum clock-wise position). It is best not to peak the oscillator completely until the final amplifier has been tuned. Now place the completely assembled transmitter, antenna fully extended on a wooden chair or bench along with the field strength meter nearby and individually peak C4, C5, and the oscillator coil slug. Unlike most pi network output stages, there seems to be little interdependence between C4 and C5, although a little trial can be done, offsetting one capacitor and repeaking the other to achieve a maximum reading. Most efforts in this line only resulted in coming back to the original settings. Test the oscillator setting by switching the transmitter on and off several times to insure that it will start, this step is only precautionary as no trouble has been experienced to date. If it fails to start, back the adjustment

(*Continued on page* 32)





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off peak slightly toward the less sensitive side of the response curve and recheck.

Tone adjustments are done with the receiver system complete. Collapse the transmitter antenna and back off several steps from the receiver, testing and adjusting R8 for maximum actuator response. It is presumed here that a proper value of C8 has already been selected for the receiver tone range.

If one of the pulser options has been installed in the transmitter, further adjustments will be needed. If the rudder action is not neutral with a neutral control, move the control (R14) to achieve the correct rudder action, loosen the set screw and allow the control to neutralize (without moving the pot shaft) and retighten the set screw.

The same procedures are used for adjusting R21 for pulse rate elevator controls, providing the proper value of C9 has been used. While trim pots are not provided for these pulser adjustments, the procedure is less effort to perform than it took to write about, and once set the neutral settings stay put, thus eliminating the separate trim adjustment pots. To trim the pulse rate on rudder-only models with P.O.D. or fast pulse engine decoders, value adjustments of R19 or R20 respectively should be made.

Control flexibility, such as is designed into this transmitter, can provide new opportunities for the modeler to experiment in his pursuit of this enjoyable hobby.

Readers Write

(*Continued from page* 2)

and doping the model, I painted and doped the patches in the carton. Results, I have three patches of the three colors I painted the model for future patching.

2. With the help of a local refrigeration mechanic, I obtained a roll of silver solder wire, a four ounce bottle of silver solder flux, and a small propane tank and torch for about $3.00. The hand type torch was about 8 inches long, and made some really beautiful landing gear and linkage joints, which I consider far superior to the wrap and solder type, and only a little practice was required.

3. After having trouble with masking tape and the recommended cellophane type method of masking, I tried the new band-aid air vent tape with perfect results. This tape is elastic enough to mask a 1 inch circle, and will not tear.

4. I came up with a real dandy for my field box. I used a skate case or small grip, and filled it with zonalite or expanded polystyrene. I made cut-outs to receive my transmitter, small parts kits, extra wheels, extra props, and etc. One glance at the open case and you won't forget an item, and arrive at the flying site unprepared.

GENE ABERNATHY, Lilbourn, Mo.

TRANQUILIZER

Received my first copy of your magazine and was quite impressed by the interesting format. Was particularly pleased to see that single-channel gets a fair hearing. Noted a letter from your correspondent, Mr. Robert L. Rose. He asks that a good performing, slow flying airplane be featured for the sport flyer. I can think of no better ship than the Airknocker.

The *Flying Models* magazine comments convinced me the Airknocker performance would be ideal for my initial RC work. To learn a little of the radio side I assembled the TX and RX from kits by MacGregor of England. I chose an Elmic escapement. It operates very reliably, somewhat contradicting Mr. Rose's claim that no decent working escapements are available.

Only alterations to the Airknocker design were the fitting of cabin windows, forward battery hatch, and the wonderful old Mills 1.3 cc Diesel. Excellent ground takeoffs are possible, with good air maneuverability and a fine glide which makes landing approaches easy to position. I have no hesitation in recommending this design to any beginner or general sport flier. Mine has approximately 500 flights.

ARNOLD L. CURTISS, Fielding Model Club, Fielding, New Zealand

(Editor's Note—The reader's indulgence is appreciated for tolerating this reference to one of our old magazine designs. Two reasons influence, and we hope justify, publication of Mr. Curtiss' good letter. One reason is the profound difficulty of publishing such airplanes anywhere—although people want them. When FM saw this design, not knowing what we'd produce, they gallantly published it but with the understandable remark later, "Please, no more Airknockers."

Perhaps we should have told them that an independent plan service reported sales superior to all multis, excepting scale! At least they published it! The second reason for giving undue publicity to just another little crate is the stark way in which it points up the unfortunate tendency of industry and consumer to modify any design.

For example, the strict recommendation for low power was keyed to realistic, easy flying, and permitted use of a unique profile and high fuselage and fin disposition which normally would produce undesirable rolling turns with bigger engines. Yet plan ads typically said for ".09 to .15 power." Using a Fox .09 without motor control (what for?) and a well known U.S. escapement, we had more pleasure from a season's leisurely flying with the original than we've had from any reed and prop multi.

The odd thing (?) was its unfailing appeal in flight to the spectators—and sometimes to flyers who'll never admit it. (You spot them watching or listening to the long holds on a monitor.) Put the power to it, and the friendly crate becomes a monster, like all the other "modern-day" overpowered 1945-1950 vintage designs. So don't modify those plans, (multi, too) from any magazine, and don't blame the results on the designer, publisher, or a kit manufacturer when you do.

HAPPY ENDING

People who find time to help fellows like me, make this the wonderful hobby it is. I wrote Ted Strader as suggested and although he made no specific recommendations, I used a Glass City Pulsemitter, and his Du-Ac with Saturn receiver. Later I built a Controlaire "4" receiver from a kit. The Controlaire got my preference, but the Saturn will pulse perfectly after all—and I do mean all—metal-to-metal is eliminated. (Editor—This is not a criticism; as a general rule you should eliminate metal-to-metal—regardless.)

Pulse flying is a ball and I intend to stick with it until something takes its place. It really will have to be good because pulse is the greatest way to enjoy the sport. I never intend to go beyond a 15-size engine because this is the in between and most broad.

The Pulsemitter is great. It is basic and easy for the layman to service. I did make a change in the metal wiper. Added a silver-coated carbon brush. The unit then smoothed out and produced clean, crisp signals.

JAMES KNEIDEL, Chief Application Engineer, Automation Devices, Inc., Erie, Pa.