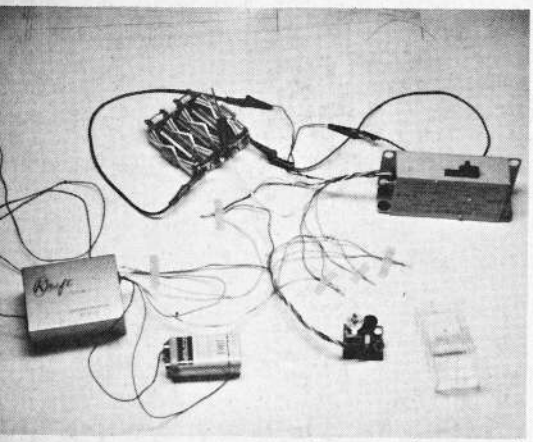
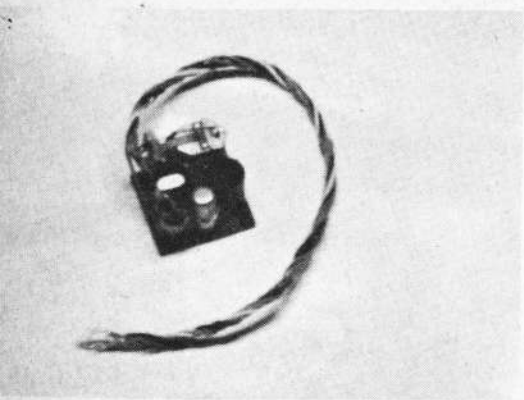
R/C news



R/C Editor's breadboard using Selectron with Duramite servo and Kraft 9V superhet receiver.



The Selectron unit fits in a 1" x 1" x ¾" plastic box and weighs only ¾ oz. ready to go.

FIGURE "A"
Selectron schematic basic

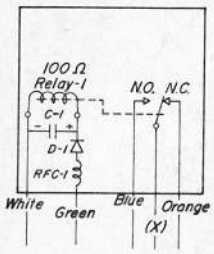
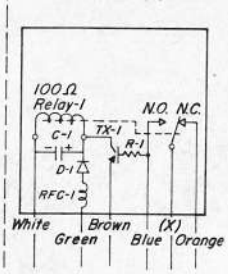


FIGURE "B"
Selectron schematic Trimmable



R-1 7500 Ω
C-1 10 MFD
D-1 IN93 (See fig. E)
TX-1 2N223 (any PNP-30 M.A.)
RFC-1 10-70 Uh.
Relay-1 100 Ω
(X)-Color of this wire should be different than any other wires on servo to prevent error in hookup.

FIGURE "D"

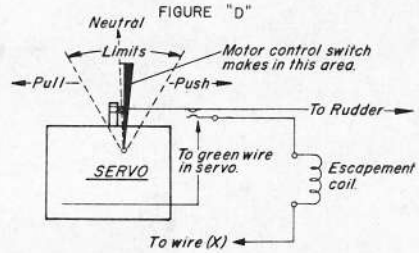
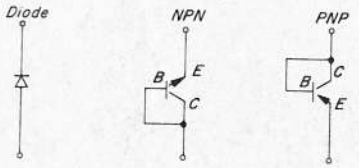


FIGURE "E"
Diode Substitution



RELIABLE SYSTEM SUBSTITUTING STANDARD MULTI SERVOS FOR ESCAPEMENT IN SINGLE-CHANNELS.

FIGURE "C"
Wiring Schematatic/Selectron-Duramite

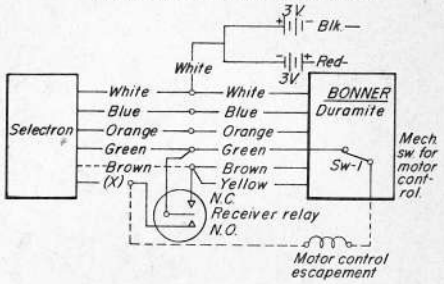
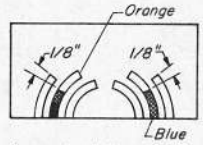
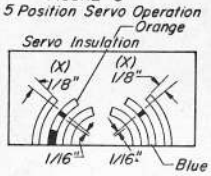


FIGURE "F"
Printed Circuit Insulation



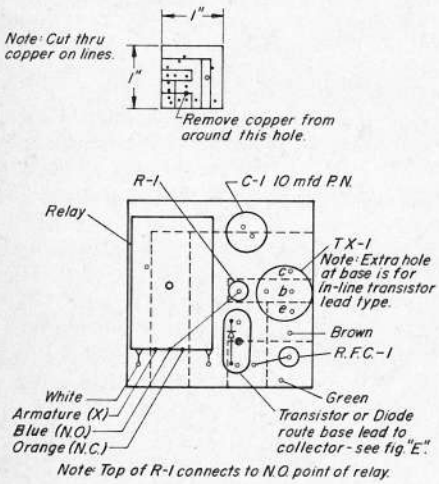
Note: 1- Dark area insulation should insulate when servo is at push limit.
2-Insulate the shaded area for basic airplane system.
3-Insulate dark and light shaded for semi proportional boat servo.

FIGURE "G"
5 Position Servo Operation



Note: Increase distance (X) to obtain more control throw in partial position.

FIGURE "H"
Printed Circuit Board



Note: Top of R-1 connects to N.O. point of relay.

'SELECTRON' SINGLE-CHANNEL SERVO

By OWEN S. BLACK

Introduction by R/C Editor

► *The skill and moxie that it takes to translate push-button signals into flying a R/C plane have almost been forgotten in the mad rush to proportional control. Many modelers across the country still enjoy escapement rudder-only flying, and it is with this in mind that we bring you a system which provides the power of a multi servo along with the simple keying and relatively inexpensive components of single-channel radio.*

This system has been checked out by your R/C Editor and has been found to be as reliable, almost as fast, and more powerful, when compared to the average rubber-powered escapement.

This system is designed to use multi servos with single-channel relay type receivers. It is capable of giving right or left action to a control surface, going directly in the required direction without cycling through unwanted controls, and returning to neutral when no signal is being sent to the receiver. An escapement type motor control may be added by the addition of a switch operated by the control linkage. The coding of the signal is the same as used for compound escapements. On and hold gives one direction (called primary direction) and pulse and hold gives the opposite (secondary direction). With the wiring shown for the Bonner Duramite, the primary direction will be in the pull direction. If after a control direction has been selected, a reversal of control is required, the signal is momentarily broken and reapplied. The servo will reverse direction and run toward the opposite limit. This system has been used in planes and boats with success. The motor control system is actuated with two pulses. The key is actuated as would be done to drive the servo in the secondary direction, but is released before the servo drives more than 3/32" from neutral. This puts a sharp pulse of current through the motor control escapement, causing it to change to the next position. Using it to drive an electric motor type of motor control would require some type of storage circuit, possibly a capacitor and transistor would do the job.

A variation of this basic system has been used in several boats, both gas and electric. By adding a transistor to the Selectron and changing the printed circuit insulation we can have a servo that will neutralize on absence of signal, go left or right on command and stop and hold any (*Continued on page* 50)

SELECTRON

(*Continued from page* 32)

amount of control in either direction. This is about as close to proportional control that can be obtained and still control with a button or micro switch at the transmitter. Keying for the direction of turn is the same as with the basic system. When a desired amount of turn is obtained. the signal is broken momentarily and then reapplied. The

servo will stop at the position and hold as long as signal is held on. This allows turns of any radius to be held. Short releases of the signal allows the servo to trim in short steps back toward neutral. Complete release of the signal allows the servo to return to neutral. Slower speed servos or lower voltage is better for this system as it allows the operator to select the amount of turn more easily. Fast servo operation is an advantage with the basic system and is more adaptable to airplane control.

Much interest has been shown lately in the "five position" servo as used in the multi-ships. We can do the same thing and with single-channel too. The same Selectron system as just described with the transistor is used, the only change required is in the insulation of the servo wipers. This is shown in sketch G. Selection of control direction is again as previously described. If the signal is held on, the servo will drive to the limit. A quick release and reapplication of the signal will cause the servo to drive back in to the half-control position and stay as long as signal is held. If this quick release is done when the servo is driving toward the limit, the servo will go to the half-control position without driving to its full limit. This allows small corrections in control without the usual abrupt changes in course; making much smoother controlling.

Construction:

Construction of the Selectron unit is very simple and not at all critical. The most practical seems to be to mount the relay and components in a small plastic box. Some units have been built into the servo itself for use in electric boats. This is not felt to be practical where vibration may be encountered such as in gas boats or airplanes. A printed circuit board layout is shown for use with the 100 ohm Deans relay. This fits in the 1" sq. boxes that are usually available in hobby shops or dime stores. You will note that the printed circuit board is made without the use of resist paint, acid etching, and without the usual work involved. Just cut through the copper on the lines using a knife, small file or a Hand Electric tool. All holes should be drilled with #60 drill except relay mount holes. If a transistor is used as a diode, the base lead may be routed in either direction to allow use of either PNP or NPN types of transistor at this point. The transistor used for the trimmable system must be of the PNP type.

Mounting:

Since the unit *does* contain a relay, shock mounting is recommended although not necessary in the electric boats. Most of the wires from the unit go directly to the servo, I find it neater to mount the Selectron close to he servo and bring all wires through a 7 pin plug.

Adjusting:

The relay used may be anywhere from 50 to 200 ohms. I have used the 100 Gem and the 100 ohm Deans. The relays should be set to pull in at 10-12 milliamps and drop out at 8-10 M.A. The Deans relay is set in this range from the factory while the Gem usually needs only a bit more tension on the spring. Current through the relay will be in excess of 20 M.A. so it makes a good solid "click" in both directions. This current is only drawn during short periods of servo operation and there is no current drawn when the control is neutral or in either limit position.

To adjust the motor control switch, it should make for a distance of 3/32" of servo travel as the servo leaves neutral going to the secondary direction. Adjust just far enough from neutral so the motor control does not work when the servo neutralizes from the primary direction.

Two pulses will cause the motor control to change and the control surface will be displaced a very small amount, not noticeable in even the faster planes or boats. If the motor control does not work every time, increase the 10 mfd capacitor to 20 or 30 mfd. This allows a longer pulse time through the escapement.

Batteries:

The Selectron system uses the normal servo battery complement and will work well on the 4 nicads so popular in servo installations. Higher voltages may be used if diodes and transistors are capable of extra current.

Diodes and Transistors:

The diode D-1 should be of a low forward resistance. The best I have checked is the 1N93. These are quite expensive so further checks show that transistors hooked with base to collector work well. They are lower in cost and all I have checked have a forward resistance of 3 ohms or less. See Figure E for connection. The transistor should be rated for 40 M.A. or more. I have used both the 2N229 (NPN) and 2N223 (PNP) in this spot.

The transistor Tx-1 is a PNP, rated at 40 M.A. or more. The 2N223 works fine here but is not critical. The 7500 ohm resistor should work with any transistor used.

Insulation of Servo printed Circuit:

See sketch F-Insulate dark shaded area for use with basic system. Insulate dark and light shaded areas for use with the trimmable system. See Fig. G for insulation for 5-position operation. Insulation may be accomplished by painting on glass resin. A temporary check may be made using Scotch or Mylar tape. This is recommended to check the operation of the servo prior to changing it permanently. Any rough edges on the servo wipers should be filed smooth before using.

Keying:

Keying to obtain the desired direction is the same as used on the compound escapements. Signal on and hold gives primary direction. Pulse and hold gives the opposite or secondary direction. In keying for the secondary direction or for the motor control, the off time between signal should be short. The two pulses for motor control uses the same timing as for going in the secondary direction except the signal is released before the servo can drive more than 3/32" from neutral. This is the time that the motor control switch is made. This causes a sharp pulse of current through the escapement. This pulse is the total voltage used on the servo, 4.8—6 volts, so gives a good healthy kick to the escapement.

Many single channel receivers normally used with escapement systems will be found to be quite sensitive to noise generated by the servo motor. If your Selectron system works when the relay on the receiver is operated manually but does not work or chatters in limit positions when operated by radio signal the receiver is probably the culprit. A .1 capacitor across the green and white wire from the servo will usually cure the problem.

The foregoing covers operation of the Selectron unit for single-channel operation. There are many more possibilities for the unit, however. At present, two planes are being fitted with four-channel equipment. Two channels will be used on a normal rudder circuit. A third channel will be used with the Selectron system for elevator and the fourth channel will be used for a 3-position motor control. Many more variations may be imagined by the modeler with a desire for more control on a limited number of channels. Cascading the Selectron units may be possible and an automatic keyer is a logical step if more than one unit is to be used in a plane or boat. There is plenty of experimentation to be done and I would appreciate hearing from anyone who has some variation on the theme. Anyone desiring more information or wishing to purchase completed units, please contact Pacific Hobby Associates, 4920 Cypress Avenue, Carmichael California.

Round and Round

(*Continued from page* 25)

and doesn't have scads of more or less similar jobs on the ready line, he'll tell you what to do. Meanwhile, don't spend time and money on a completely finished manuscript and plans unless you have good reason to be confident. If you are new to the business of submitting material, these suggestions probably are as good as any. Of course, there must always be reasons why other people would want to build your model.

Provided it got by the editorial mine field, there could be a pic with this column, showing some smiling Californians—two of them happy juniors—who are members of the Flying Fools. The occasion was the winning of the Bakersfield Perpetual Trophy which is given to the club which symbolizes outstanding club participation in control-line activities in Southern Cal. We agree with Roy Smith who sent the exclusive shot, that this is a real achievement—especially in California—for such a small club. The good times these Hawthorne modelers have flying together is a potent argument for anyone's joining a club. (If you want to join a club, R&R will help—mention the nearest city.)

The Flying Fools in turn belong to the Southern California Control-Line Association who have a very nice newsletter made possible by the most active interest of its member clubs. Bob Hayford, we note, reported the combat meet at Delano last fall. Evidently, the boys had the usual wild time with spectators straying through the handle-line layout area—he suggests that these areas ought to be roped off and policed. Wires are fairly expensive equipment and usually are short-life items, he points out, which is a nice way of saying that kinks from careless feet do no one any good.

"Most spectators who would like to feel welcome get shouted at mercilessly as they unwittingly stroll through the contestant's lines," states Bob. "If a roped off area is provided and the contestant doesn't use it, that's his lookout."

Having sided with the girl modelers, we are more than sympathetic to the hapless public. Have you guys ever tried spectating? At too many meets these areas are not defined. Even to modelers who know their way around, the confounded lines are a booby trap. Contestants put the lines down and go away, or fuss with a crate while they ignore folks who step on and fall over the lines. Many times we've told some modeler that his lines were being stepped on. The too typical response is a shrug of the shoulders.

Judging by a documented story from Bill Rushbrook, of Lockport, Ill., the where-are-the-juniors question is a problem that won't yield to paper plans. It is easier, he found, to get the Juniors to fly, and join a club, then it is to keep them active. Before getting into Bill's intriguing account of the rise and fall of Junior doings in the Flying Cyclops, it would be well if we all considered that the high school years take a heavy, if temporary toll, of modelers, especially in the Junior and Senior years when various distractions, studies included, push the crates into the background. So the 14-year-old Junior is,

(*Continued on page* 55)