

RADIO CONTROL and Model Aircraft WORLD



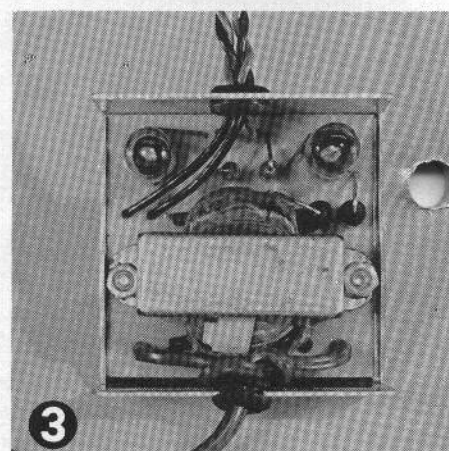
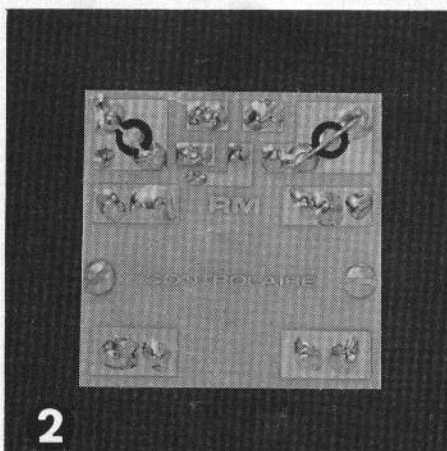
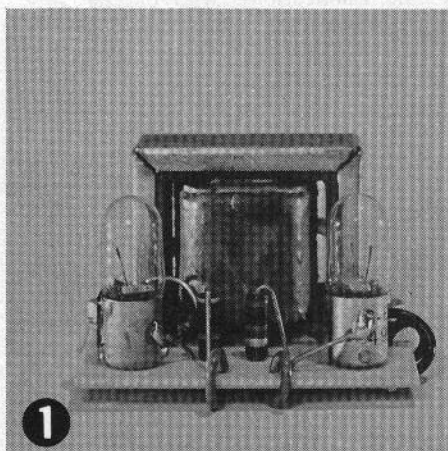
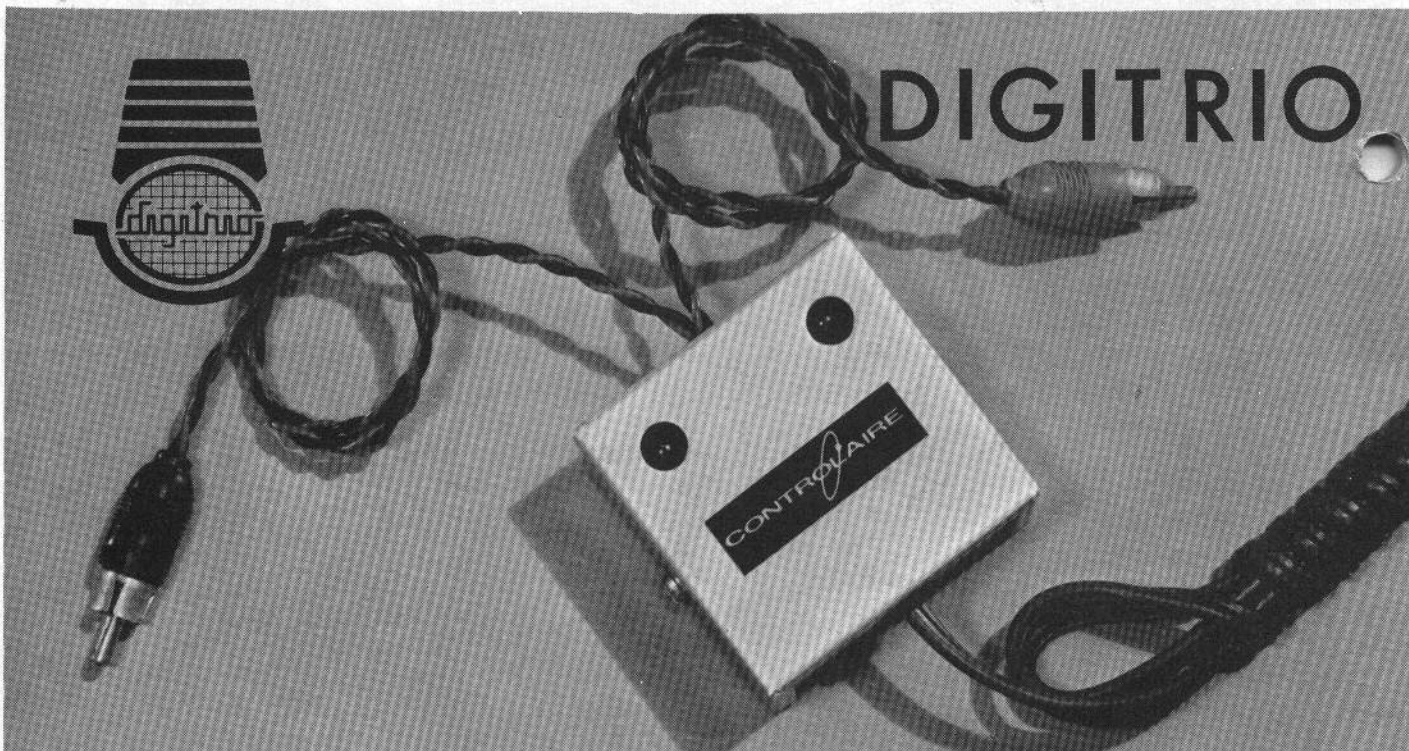
VOL. 7, NO. 4 JULY-AUGUST 1966 35 CENTS

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- The Stits Skycoupe—A Real Beauty
- R/C Makes Slotless Racing Possible
- More Muscle for the Adams Actuator



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Dual Charger For The Digitrio System

The Controlaire Dual Charger Kit for the Digitrio System has several features that have appeal for the R/Cer. First is the convenience of needing only one charger unit to charge the Rx and Tx batteries simultaneously. A charge rate between 25 and 30 MA was chosen to allow a longer cell life. Five hundred MAH cells should be charged 24 to 30 hours when new. After this initial charge and before each day's use a recharge of from 12 to 20 hours will keep them at their peak. This time period, however, does depend upon the previous usage — if in doubt charge for 24 hours. Dual indicator lights let you know when the unit is in operation. An isolation transformer is used in the circuitry to eliminate any shock hazard. The very complete charger kit contains all components, a punched aluminum case and printed circuit board. Price \$7.98.

PHOTO 1 — This side view of the Dual Charger Printed Circuit Board shows all of the components mounted and the wire leads soldered. Note the method used to connect the Pilot Lamp base into the circuit.

PHOTO 2 — Bottom view of the Printed Circuit Board illustrates the straight-forward circuitry. Short diagonal wires bridge across the two punched holes and are soldered to the base terminal of each Pilot lamp.

PHOTO 3 — Here the P. C. Board with the mounted components is installed in the aluminum case bottom. Two diodes are visible at the right, between the bulb and the transformer. Resistors are located between the two bulbs.

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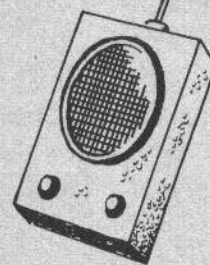
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The Editor's OPEN CHANNEL



RADIO CONTROL and Model Aircraft **GRID LEAKS** WORLD

VOL. 7
NO. 4

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BILL WINTER bid his adieus in the last issue of GRID LEAKS—RADIO CONTROL WORLD. He has now officially become Editor-Publisher of the revised AMERICAN MODELER, published by Potomac Publications, who purchased it from Conde Nast.

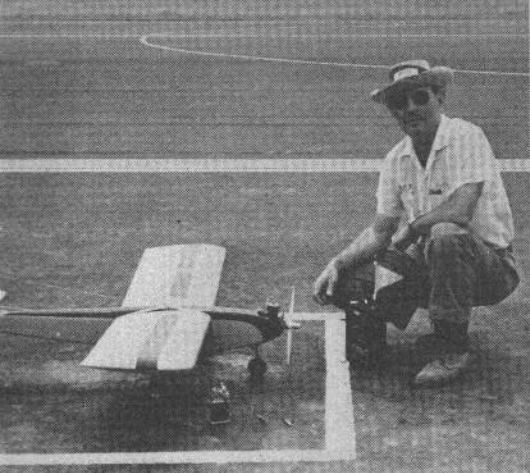
We wish for Bill the very best in his new chores and know he will do a good job with them. As a matter of fact we are looking forward to the new AMERICAN MODELER, since Bill will be inaugurating some new concepts. We will miss him.

With this issue, I assume full editorship of GRID LEAKS again, a task I had a number of years ago, when I nursed a house organ into a magazine. Many of you readers of the new GRID LEAKS may not know me, but I'll try to take care of that as time goes on. You'll find that I have a nature which is peculiarly my own, that I am not averse to speaking my mind, and that some people have even classed me as having character or being one, depending on which way you look at it.

The question has been raised as to whether GL will go back to an earlier format editorially. There was a time in its almost nine year history when it was strictly a piddler's periodical; one reader even labeled it a Tinkerer's Tabloid. Frankly, I am not quite sure. There have been a lot of changes in RC during those years, and here is where I need your help.

This point and others were raised by the new editor of a major electronics magazine recently, when he took over the job that had been done many years by Hugo Gernsback. As a matter of fact his first editorial covers much of the territory I want to cover, I am going to
(Continued on next page)

THE COVER: This photo shows Curtiss Krieser holding his dad's Stits Skycoupe. Extra large fin and rudder area give this model maneuverability that permits spins and rolls with the best of them. Design is semi-scale, but modifications are minor. See pages 14 to 17 for story and plans.



Bud Atkinson.

The Open Channel

(Continued from page 1)

be guided largely by some of the comments he makes.

He states that any editor's job is made easier if he gets to know his readers better, and they him. So how do I become better acquainted with you? There are too many of you for me to become acquainted with you individually (GL, incidentally took on quite a good boost in circulation with this issue, so there are many more of you). Many of you I have met at various meets, MATS, Toledo, NATS. GL can and will run questionnaires; but in those you can only answer questions—there really is not much in the way of getting to know you.

The best answer is for you to introduce yourself to me through your letters. Many have. You might be surprised how well this works. You'll get to know me through the editorials and through answers we will print in Readers Write department, and also from many letters that I will answer. I can get to know quite a lot about you from your letters. One typewritten page can hold a lot of information!

So please write! Write when you need information. Write when you have a problem. Write and tell me when you see something you like. Write with article ideas. Tell me what you think of GL now, which authors you like, of new features you'd like to see and give me specific suggestions on how to make your GRID LEAKS what you want it to be. It is YOUR magazine. I only hope to edit it. (Continued on page 31)



Carl Lindsey.

AMA WINS FIVE NEW R/C FREQUENCIES

A Special Editorial by PAUL F. RUNGE

JUNE 20, 1966 will go down as a memorable date for that is the day the Federal Communications Commission set as the beginning of the five new spots for radio control that had been petitioned for by the Academy of Model Aeronautics.

The new frequencies are: 72.08 MHz., 72.24 MHz., 72.40 MHz, 72.96 MHz, and 75.64 MHz. That last frequency is far enough away from the first four to allow for the use of super-regen equipment, since the first four spots will not bother this one lone spot, and vice versa.

The frequencies are incorporated into the Class C Citizens Band, but are exclusively for modeler use. This is the same service under which radio controllers are now licensed. Therefore, no new license will be required. Current frequencies in the 26-28 MHz. band are not affected by the action and may continue to be used by the modeler.

Equipment on the new frequencies is limited to one watt power input, $\frac{3}{4}$ watts output, and .005% frequency tolerance. Transmitters must be type-accepted by the FCC, meaning that both commercial and home-built equipment must be approved before they can be used. The associated receiver must also

be certificated for compliance with FCC part 15 radiation rules.

AMA's communications attorney, Jeremiah Courtney, has provided type-acceptance information to manufacturers of commercial equipment and we know of several who will be announcing new units soon.

The FCC does not guarantee interference-free reception on these frequencies, which are shared with some "flea power" industrial users and a very few fixed circuit links. The 72 to 76 MHz. area was considered by the AMA-Frequency Committee as by far the least crowded of all the bands available for additional R/C frequencies.

This in effect is the creation of a new radio service specifically for modeler use! Which means the AMA has pulled off quite an accomplishment.

Since it is quite easy to accept an accomplished fact, we believe it would be quite interesting to dig back and detail the long and arduous and, sometimes, the seemingly hopeless task the AMA undertook on behalf of the radio control model fan.

Early in 1963 John Worth, then president of the AMA, appointed Ed Loren to head up and elect a committee

(Continued on page 24)

Readers Write

BATTERY CONSIDERATIONS

In your November-December issue, there is a GL report on the Citizenship AP proportional. In the battery requirements 450 MAH nicads were recommended. Would it hurt the servos and receiver if 500 MAH batteries were used? Can you parallel 225 MAH batteries to get 450 MAH capacity?

DAVE SEARS, Blacksburg, Virginia
• Dear Dave: The requirement of the 450 MAH size cells for use with the Citizenship is the suggested minimum capacity. Capacity does not have anything to do with the voltage, and therefore this suggestion is to use 450 MAH as the smallest size. There would be no objection in using 500 MAH, 600 MAH, 750 MAH or even larger provided the plane had the weight carrying ability. It is not a good idea to parallel nickel cadmium batteries to achieve greater capacity, and we believe most nickel cadmium manufacturers strongly discourage it.

COMMENT

Grid Leaks is Grid Leaks is Grid Leaks, and it ain't whatever you call it.
VASCO WHATLEY, JR.
Allendale, S.C.

WANTS SIMPLE PROPORTIONAL CIRCUITRY

This year I subscribed to your GRID LEAKS. This is about the best RC magazine I get, and I get a number of British, American, Polish and Czech publications. For its low price it has quality articles.

I am very interested in proportional equipment that is not too high. It should be simple, light weight equipment, and can be for rudder only. I may want to add elevator and motor, but later. I use both RC boats and small airplanes.

BURKELJC, PETER
Ljubljana, Yugoslavia

• Dear Peter: Some small bits on your request in this issue, and more coming up. Also know that many of our readers will probably be sending us their circuits to share with you and other readers. We believe there is quite a bit of interest in this area, and well there should be judging from son Tom's and my own experience recently (See Editor's Open Channel this issue).—Editor

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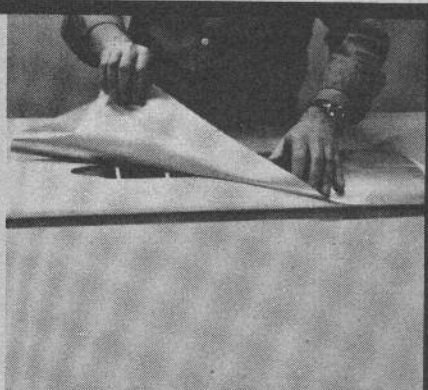
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(Continued on page 29)

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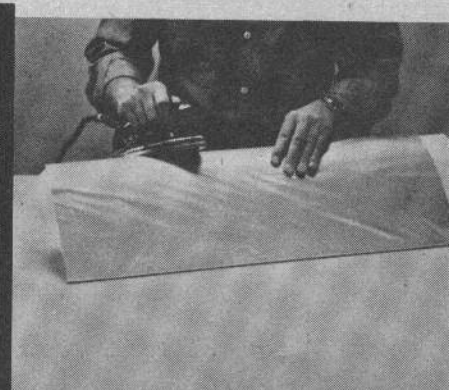
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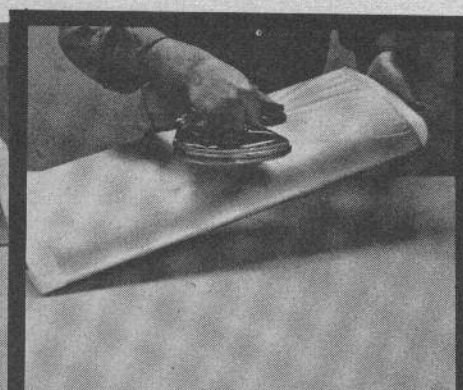
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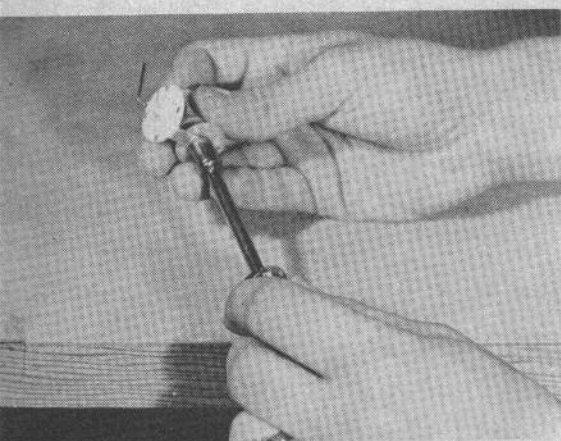
This is Frank Adams, the father of the simple proportional control device.

More Muscle for . . .

THE ADAMS ACTUATOR

The designer of this popular control device provides easy-to-follow know-how on more power.

By FRANK R. ADAMS



Using an end wrench or a nut driver, take the wound coil out of the Adams Actuator. Lay magnet and assembly aside.

HAVE YOU BEEN WANTING to use your Adams Actuator, either single or twin models in a larger ship, and haven't been too concerned about the drain on your batteries? Believe we have the answer. We have received several letters requesting information as to how the torque of the actuator could be improved, and all of these letters have advised us "forget about the increase in drain." Since the original Adams Actuator was designed primarily with low drain in mind, considerable research has been done, and we are happy to pass on a procedure whereby you can take a present Adams Actuator and wind on a new coil that will give you two coils of $8\frac{1}{2}$ ohms resistance for 2.4 volts of operation, either the single or twin model. These $8\frac{1}{2}$ ohm coils will provide the same amount of

torque on 2.4 volts as did the standard models of the actuators on 4.8 volts. Total stalled drain is 285 milliamperes, with the average drain, at pulsing, approximately 200 milliamperes. Life of a 2.4 nickel cadmium battery of the 500 milliampere hour size per charge is approximately 2 hours and 5 minutes to cut off. While the coil will be available commercially later, we felt that a number of experimenters would prefer to have the information so that they could make this change easily themselves now.

To do this, take your actuator apart. Using a nut drive, remove the $6/32$ and slide the coil out.

Remove the windings from the standard coil and clean out the holes in the solder lugs carefully. Do not use excessive heat, or the nylon will melt. You

may use a #56 or #57 drill to open the holes.

Now, with some #30 Belden 8041 Solder Ease wire, you will want to wind on two coils of approximately 8.5 ohms each. You will do this by winding on two strands at a time on the form until you have 700 turns. Actually, what this amounts to is you will have one 1400 turn coil which you will hook up so that it will begin at one outer lug, and end at the outer lug, with the center of the coil connected to the center lug.

For ease in winding you may use a 6/32 x 2" bolt and nut, and fasten the coil form securely in this, and chuck the remaining end into a hand drill press, which is secured in a small bench vice. Determine the number of turns at the chuck for each turn of the handle. Use two spools of wire for ease of winding. Leave the beginning ends of both strands stick up near the lugs for future hookup. After you have completed 700 turns of the two pieces of wire, back tie the last turn of the two strand wiring to secure, until you have completed phasing and soldering. Clean the beginning ends of both strands of wire. Feed one of these beginning ends through the lower hole of the center lug, and wind two or three turns around the lug body. The other beginning end is connected to one of the outer lugs, using the same procedure.

Now clean both ends of the strand on the last wound turns. Use an ohmmeter to check for continuity from a center lug to find out which of the two remaining wires is the outer end of the wire attached to the center lug. You should get an approximate 8.5 ohm reading. This wire is then connected to the remaining outer lug, using the above method. The remaining wire is connected to the solder lug.

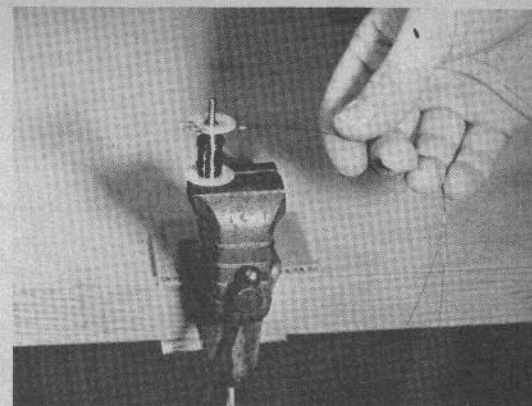
Solder connections with fine Ersin solder and a small iron with coil lying header and lugs down on the bench. Apply heat carefully to the free end of the lug. When hot enough, touch solder to the inner hole of lug also. Do not disturb until cool, as lugs may pull out of nylon header while the lugs are hot. Resistance check from center lug to either outer lug should be 8.5 ohms for the final check. Leave a little slack in the wire at all connections to prevent strain or fatigue. Be careful that no bare wires touch each other, except for the two tied to the center lug. After your checks show that you have two 8.5 ohm coils, tape the coil to finish it.

If your receiver will work on 2.4 volts, use a normal hookup. If 3.6 volts is required by the receiver, tap your battery pack down to run minus 2.4 to the center lug of the actuator coil. This is the same as overexcitation circuit, which is furnished with the Adams Actuator, except you tap the pack down instead of up.

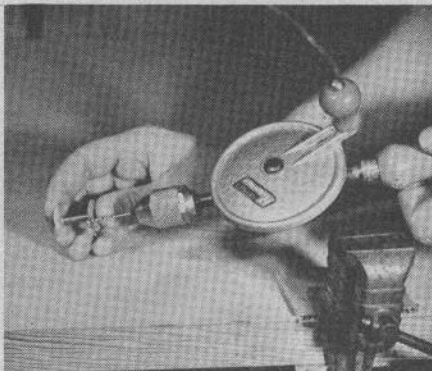
A 2N1303 transistor will be found to be OK in the output for drain at 2.4 volts, while a GC743 or a 2N38, and 1.2 ampere hour C cells for approximately 25% to 30% more torque at 3.6 volts will be required, since this has a stalled drain (Continued on page 30)



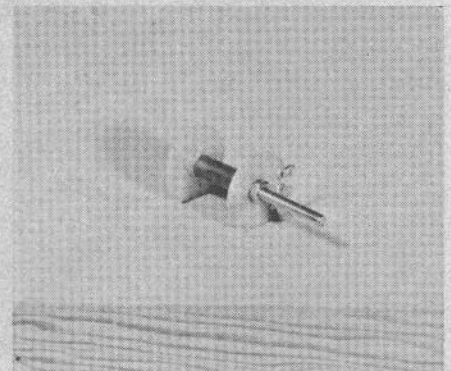
Carefully remove the tape, and save so that when you have rewound the coil, you can then replace it.



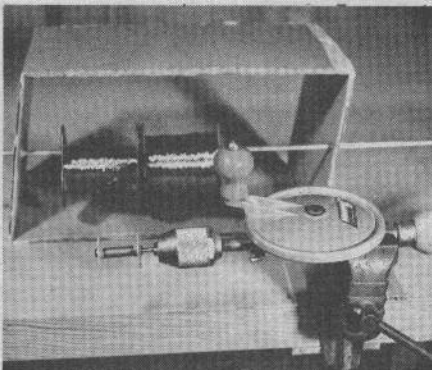
Cut the wires on the solder lug, and unwind the coils. Use of a 6/32 bolt in your vise will help. Unwind both coils at once.



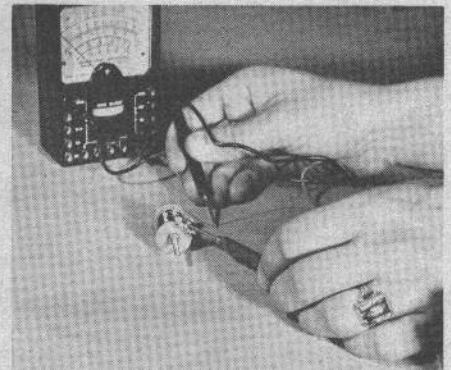
Drill out the solder in the bottom portion of the lugs, using a #56 drill or one small enough to do the job adequately.



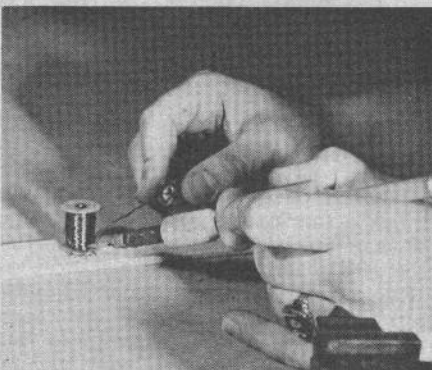
Mount the bobbin on a 6/32 x 2 inch bolt using a nut to hold it firmly in place so it cannot turn.



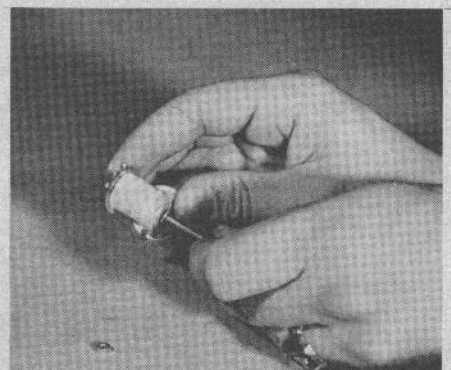
Mount the remaining end of the bolt in hand drill and fasten drill in vise. Put the two spools #30 wire on a cardboard jig.



After you have wound on two coils 750 turns, check for phasing of the coils. An inexpensive meter will give continuity.



Carefully solder wires on the lugs, make sure lugs are down on a piece of wood, and do not apply too much heat.



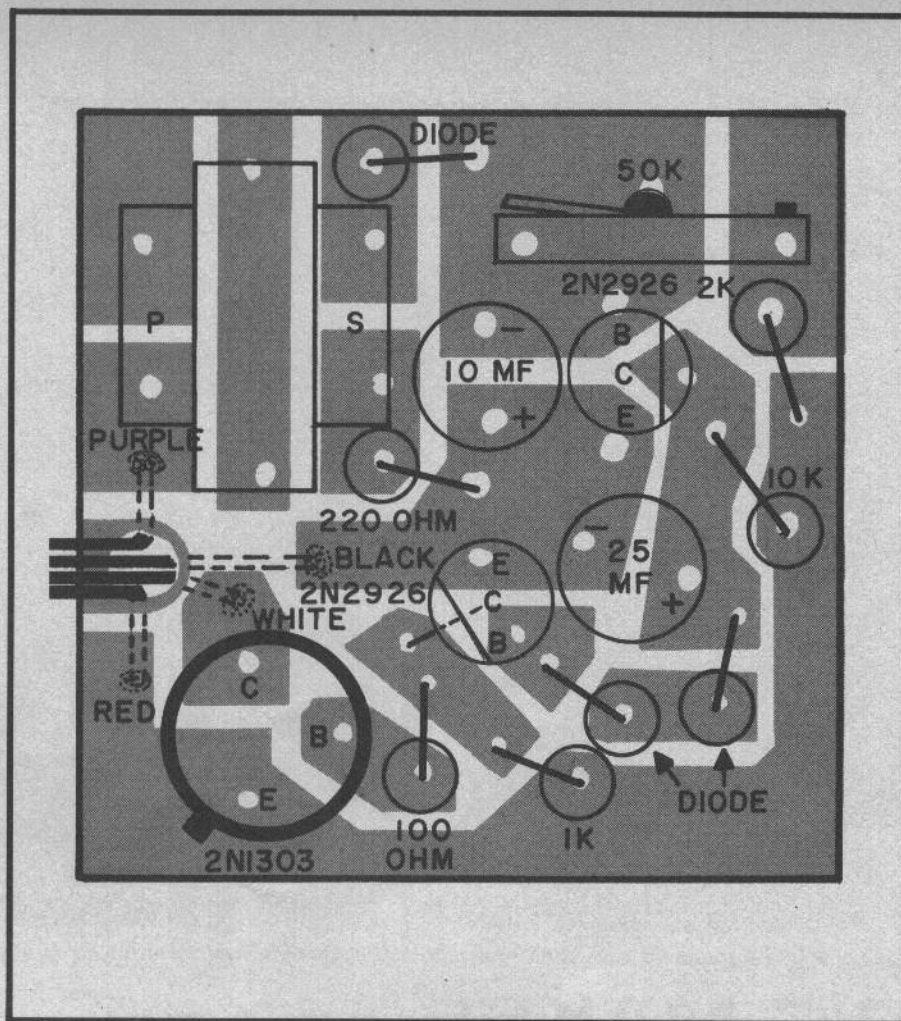
Rewrap the tape. Put your new coil back into the assembly, and you are ready to test fly your more powerful actuator.

mal flying pulse rate, motor change can be achieved as fast as is possible with Quick Blip on escapements.

The desired high pulse rate for motor control can be obtained in two ways in the transmitter pulser. The first is with switch in the rate circuit of the pulser, used to short out some value of resistance. This is done in the Sterling Transmitters and some success has been achieved by E. M. Black, Jr., March-April 1964 issue of Grid Leaks in a Shows pulser. Secondly, the large electrolytic capacitor in the pulser can be paralleled by a smaller valued one (eg. In the Phelps the 15 mfd capacitor is paralleled with a 2-4 mfd.) and a switch used to remove the larger capacitor when motor control is desired. Normally, when a small capacitor of 2-4 mfd is placed in parallel with the present 15 mfd the pulse rate does not change a great deal. If it does, rotate the rate pot so a higher rate is obtained. I converted my Phelps pulser with this method for high rate signals. Reed switch or relayless operation is a must.

One unusual characteristic of the circuit is that when the batteries decrease in voltage, the motor control circuit will turn off and on without high pulse signal. This is due to the bias method of Q-1. It is an advantage, in that it gives the RC'er warning of failing batteries. As far as batteries are concerned nickel cadmiums are musts for RC work. If you have been flying with pencils, you are lucky and are gambling with your equipment and plane.

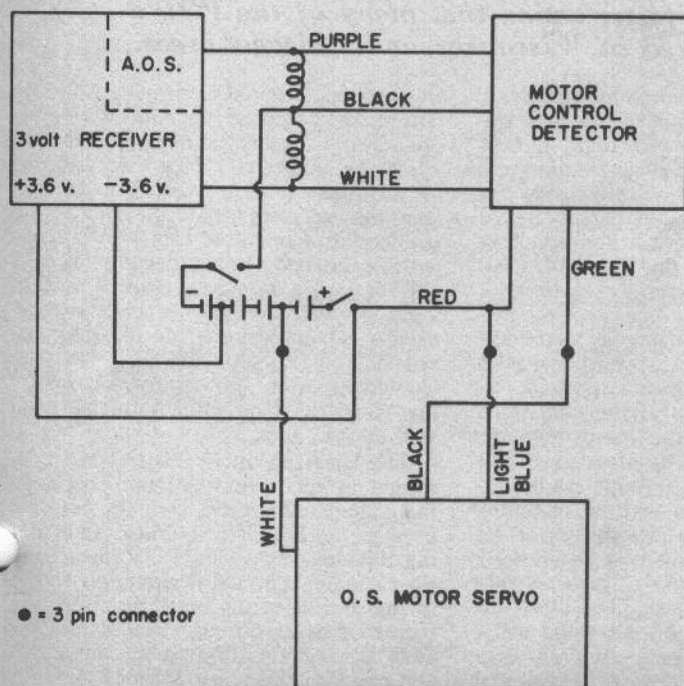
Build the circuit as per schematic
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TYPICAL INSTALLATION
USING MOTORIZED SERVO

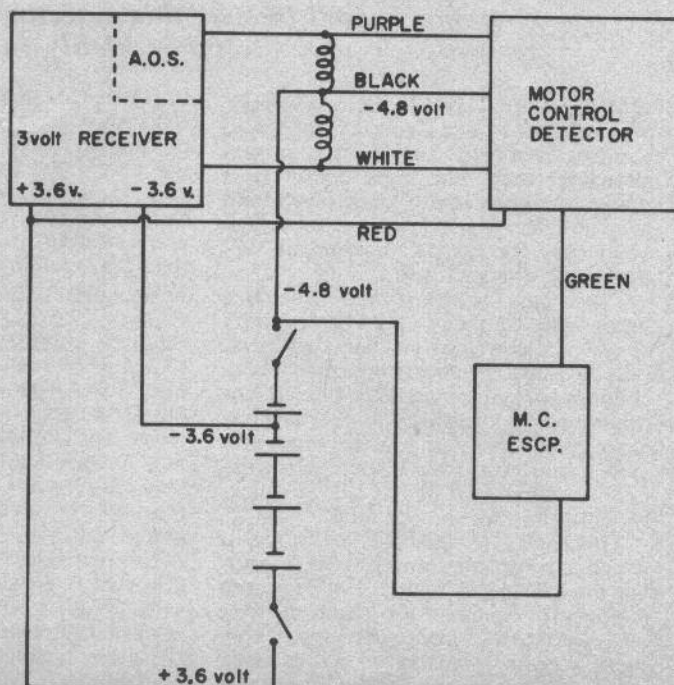
TYPICAL INSTALLATION
USING AN ESCAPEMENT

RUDDER ACTUATOR COIL



● = 3 pin connector

RUDDER ACTUATOR COIL





Fleet of R/C controlled toy cars. With superhets, and lightweight equipment, racing is a good possibility—and slotless!

R/C MAKES *Slotless Racing Possible*

Here is a painless way to get some important basic training in pulse proportional system.

By NEIL S. DEYE

SOME OF THE MORE HARDY modelers of our Central Ohio Radio Kontrol Society (CORKS) fly planes all winter long, but I get cold feet. I prefer to tinker at my work bench and keep my feet warm. As a result I find other uses for my RC equipment, RC cars being one such use.

These cars as shown will provide a lot of basic training in pulse proportional systems as well as an item that never fails to cause an attraction among both children or grownups. Now with the superhet type operation more than one car can be operated together and provide a start for model sport car competition, whereby a course can be quickly set-up on any smooth floor.

The cars I selected are 69¢ toys of which a large selection of scale appearing models are available, ranging from antique to modern and about the size of 1/24 size slot cars. (They are very light weight, constructed of a thin metal chassis and body, and are made

in Japan. These are worth looking for.)

From past experience I found it important to keep RC cars light, due to the weight the batteries and equipment add. Most American-made toys are too heavy and the scale slot cars required more effort in their finish and adapting than I was willing to do. I was attracted to the antique Ice Cream Truck because of all its fine detail. The steering mechanism I designed using a Micro-Mo motor TO-5 and 141:1 gear box with a friction drive. This arrangement allows the drive to slip at the end of its travel and protects the motor damage due to stall loads. The steering motor was pulsed via C & S Relayless Super-regenerative receiver with a switching circuit of my own design. A TO-3 Micro-Mo motor with an internal 15.1 gear box and external 4:1 gear set was used to drive the car. This little car worked quite well and attracted some attention.

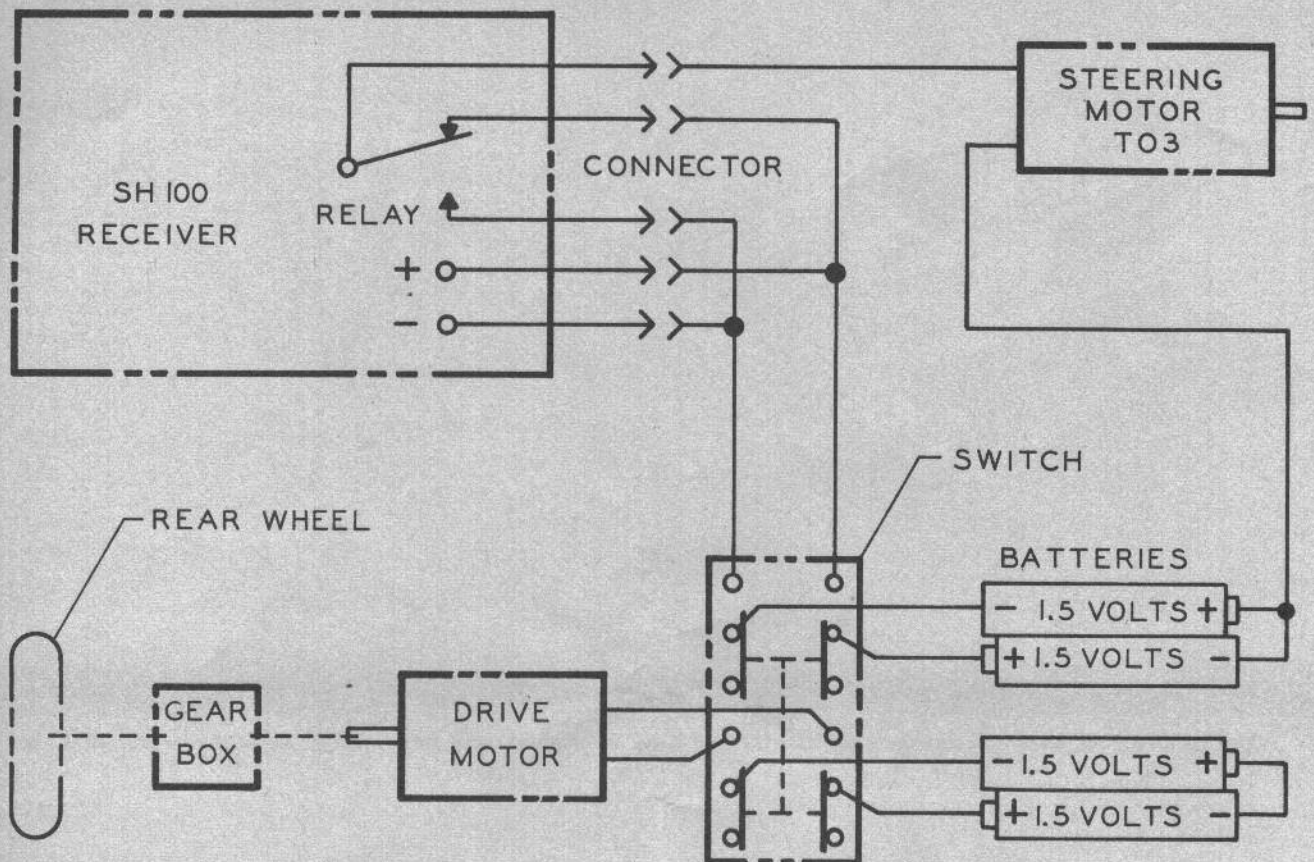
My next model was a Fire Truck and

this was constructed to provide a simple design that could be reproduced by anyone. Jerry Joseph joined me in this effort; he built the Police Car and did all the photographic work. We decided superhet receivers would be used so the cars could be operated together. If competitive interest should develop, then I will design a relayless control system with a speed control. A high performance car could be made using standard slot car components. We used the Controlaire SH 100 receivers because they work well on pulse, and we each already had one.

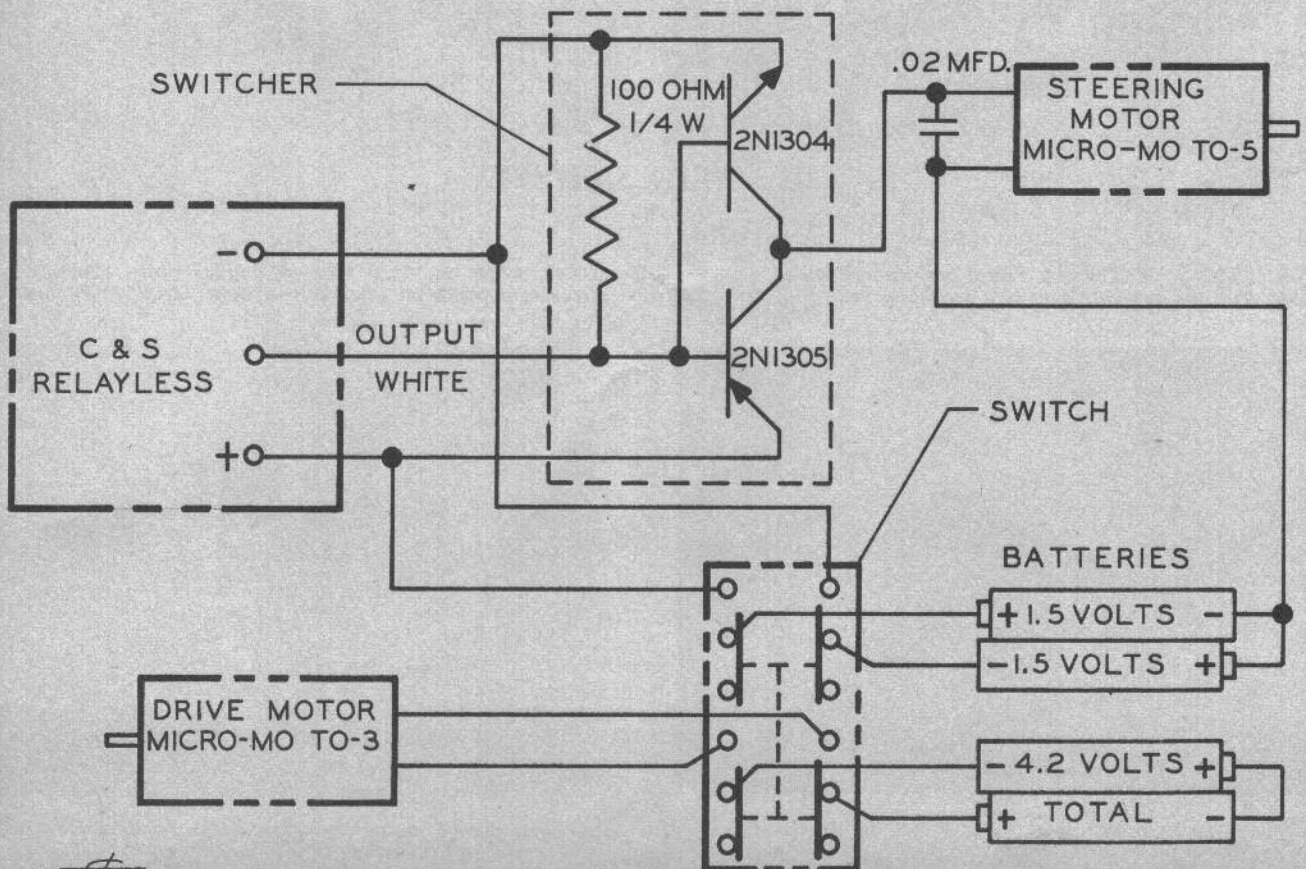
The steering mechanism was redesigned to incorporate certain improvements and refinements over the first one used in the Ice Cream Truck. In building this steering assembly, a little extra time spent in deburring the edges of the metal, and assuring the accuracy of the formed parts and their assembly is time well spent. (A difference has been

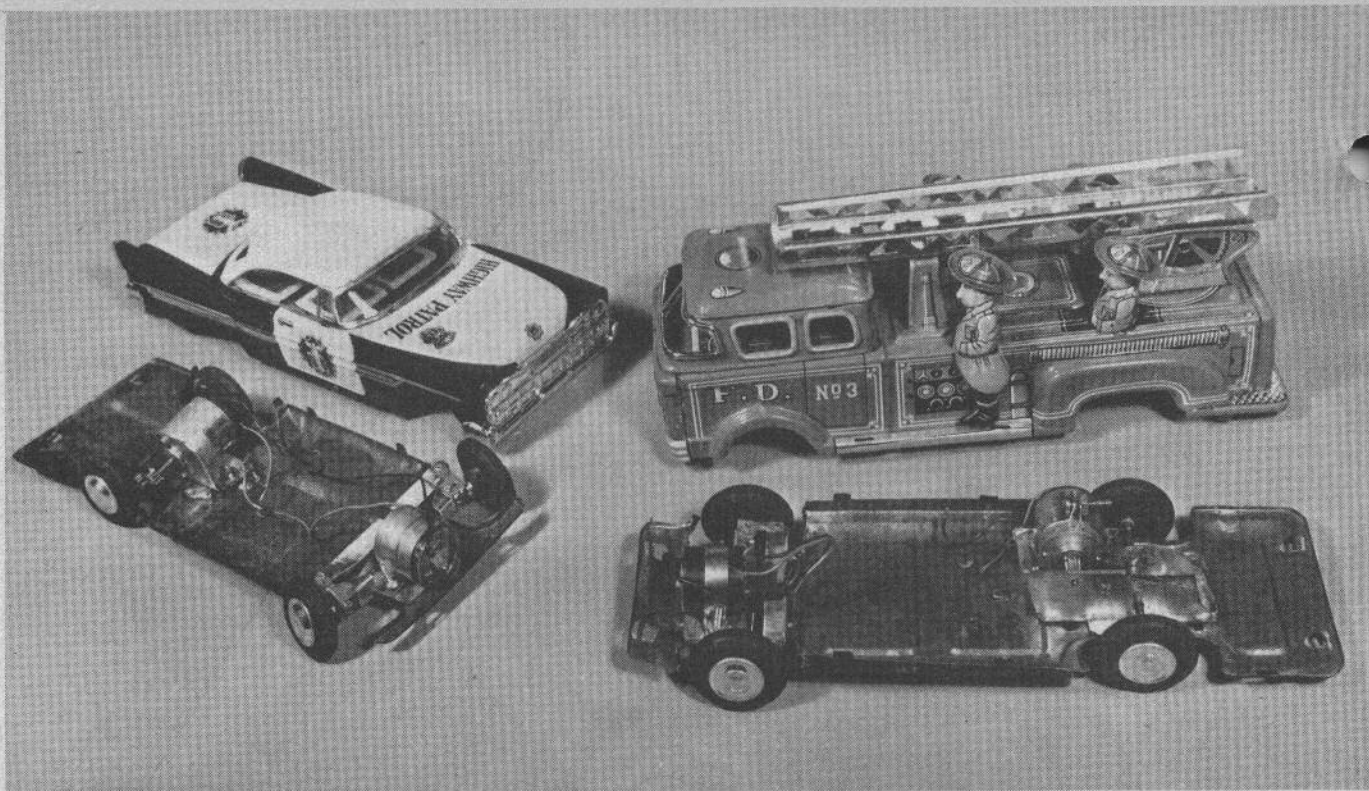
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FIRE TRUCK WIRING



ICE CREAM TRUCK WIRING

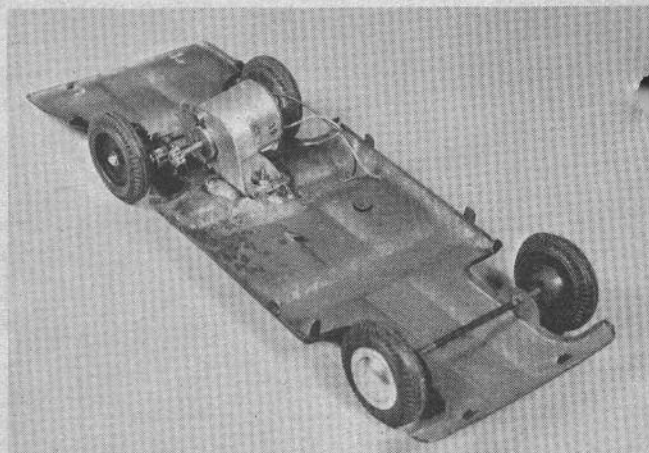




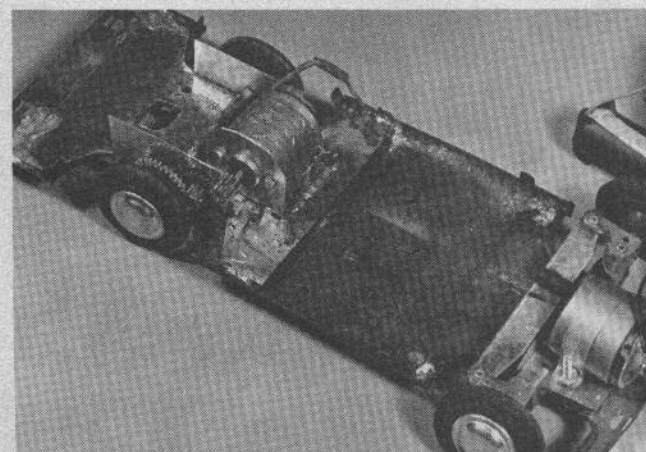
Tops removed, the picture shows the basic steering and drive mechanism used. Both must be adapted for your car's size.



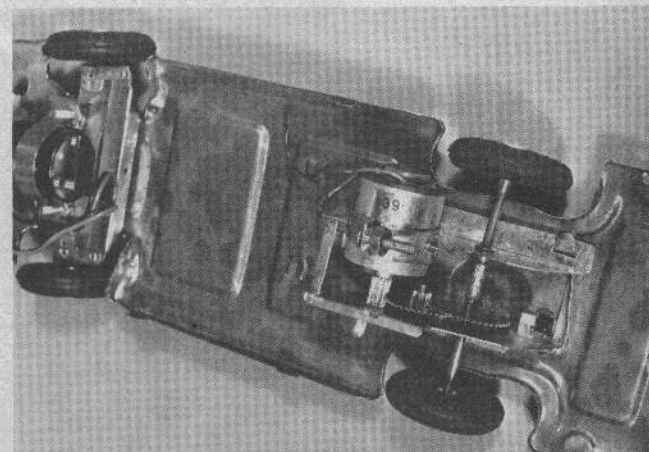
This 1/24th scale Highway Patrol car can zip along quite well and presents a unique modeling project.



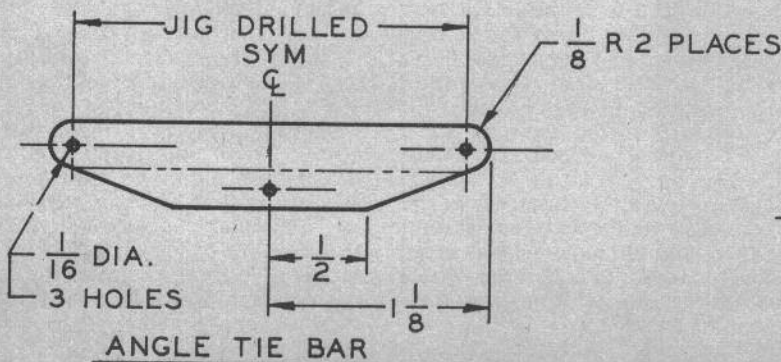
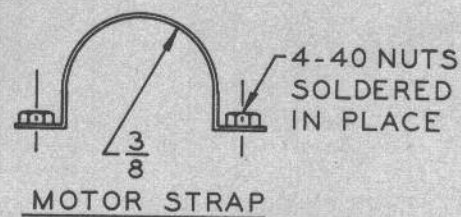
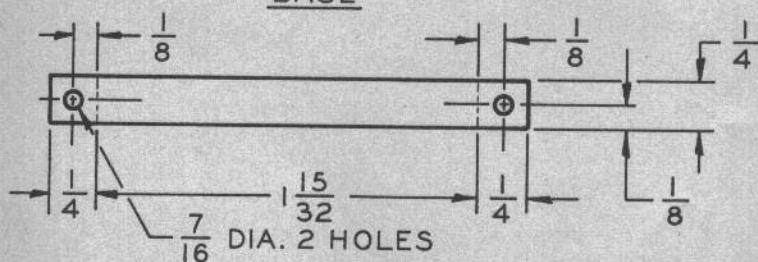
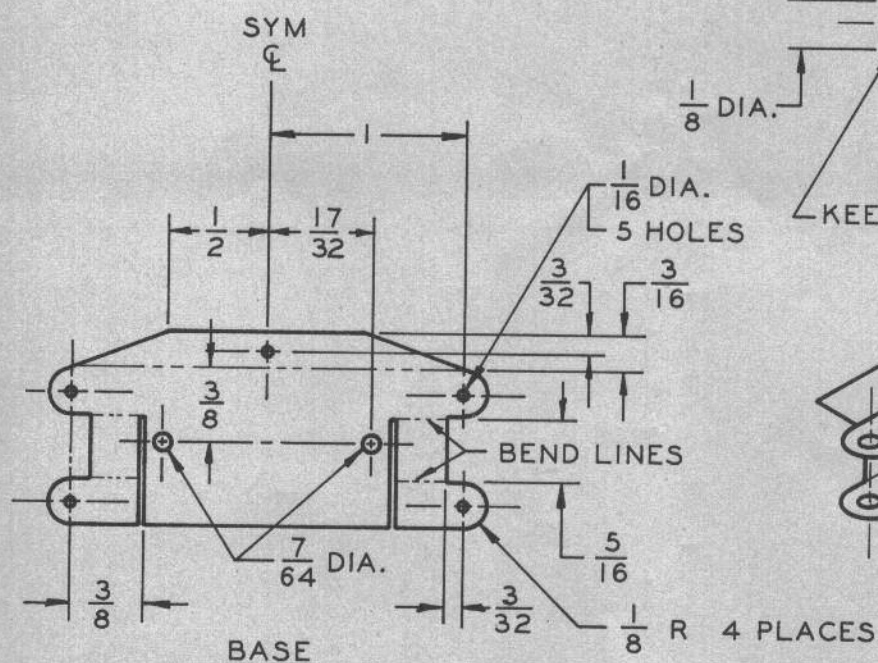
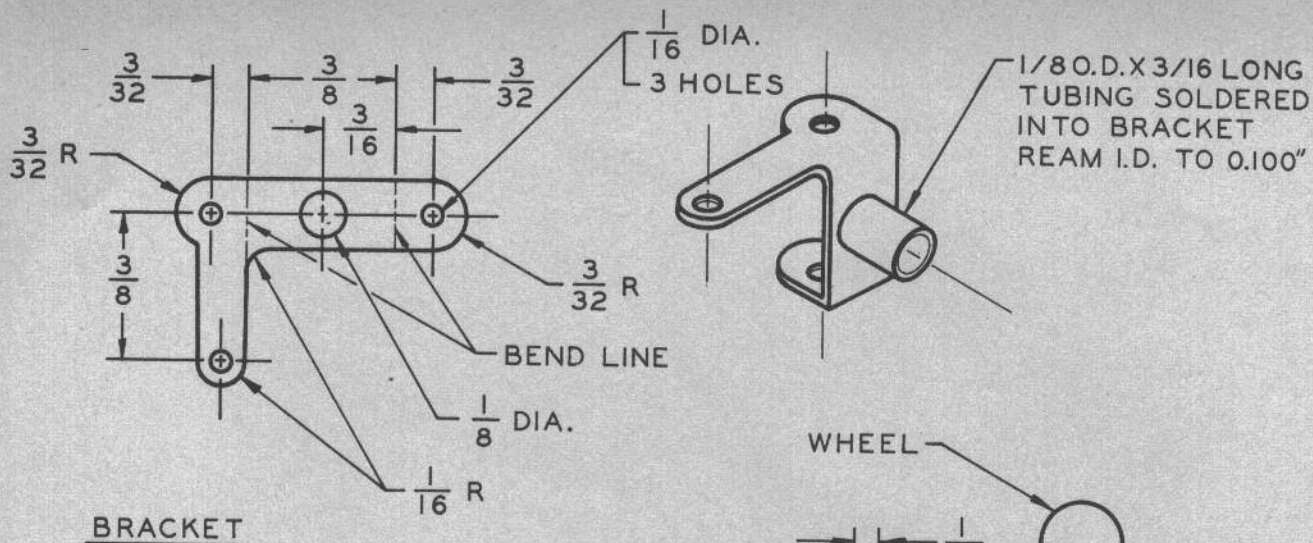
Drive motor mounted with additional gear reduction. Gearing depends on whether you want "drag" or endurance.

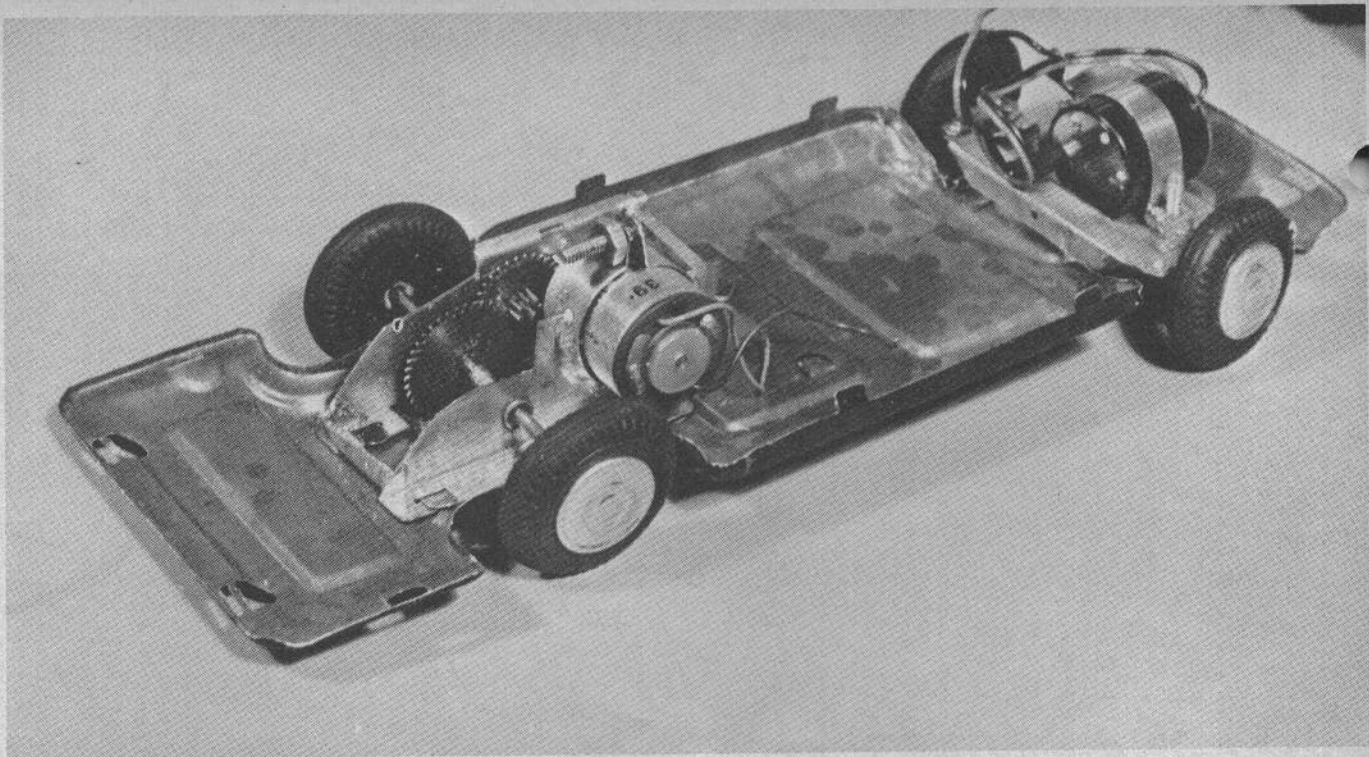


Simple steering motor assembly uses fuel or neoprene tubing for friction drive which simplifies the job.

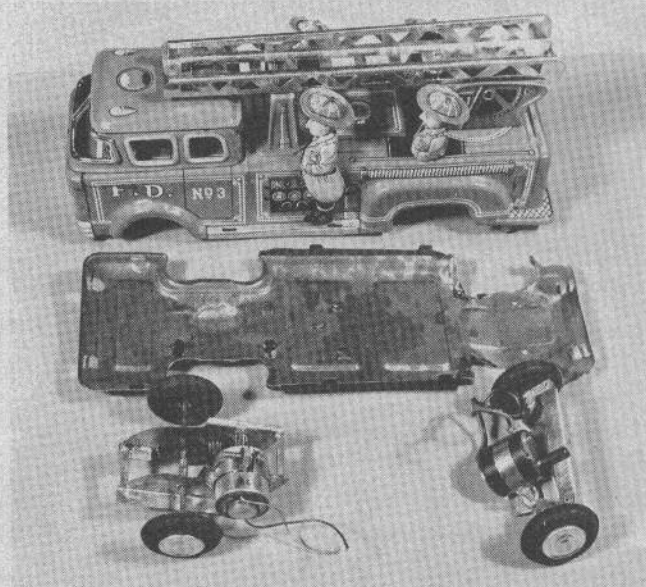


Another view to detail mounting of the drive motor and gear train reduction. Study pictures, plans, carefully.



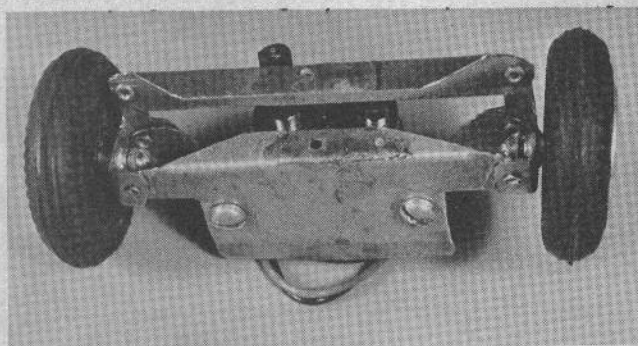


Fire truck shows slightly different drive and gearing assembly. Available space and parts used will dictate requirements.



Fire truck modules left, chassis, body, drive and steering gear are all separate for ease of assembly.

Frame for base and angle tie bar, as well as wheel portions, are easily formed from .015 brass.



(Continued from page 8)

noted in wheel spacing and axle diameter in different models and as a result some dimensions may need to be altered for some models.) Printed circuit type 1/16" brass eyelets were used as tubular rivets in the assembly of this unit. Care must be used in setting them so the riveted joint will turn freely, but not sloppily. The angle rod is made last and jig drilled to compensate for all the collective tolerances of this unit. With the assembly together, less the motor and tie rod, the wheels are aligned parallel to each other on both a horizontal and vertical axis. Both hinge lines should be perpendicular to the base plate. With this alignment maintained, the holes for the tie rod ends are

marked and drilled. The top surface of the angle tie rod is roughened at right angles to its direction of travel with fine sandpaper. A short piece of neoprene fuel line is forced over the motor output shaft and serves to drive the tie rod. The motor is rotated in its mount to adjust the drive tension. The tension must be checked throughout the full range of travel of the tie rod. Some slight bending may be required to assure uniform tension.

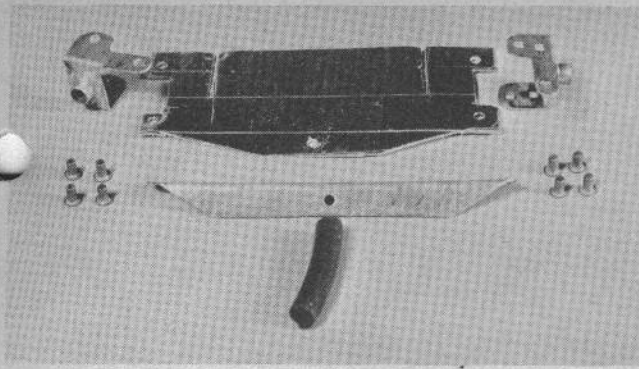
The steering unit is fastened to the auto chassis with the two screws that are used to hold the motor clamp strap. Care must be taken to assure the wheels do not rub the chassis throughout their full range of travel.

Centering should be incorporated in

the steering mechanism, but was not shown. I used a rubber band attached to a hook soldered to the center of the tie bar and one on each side of the chassis. While this is satisfactory, I feel certain better methods could be devised.

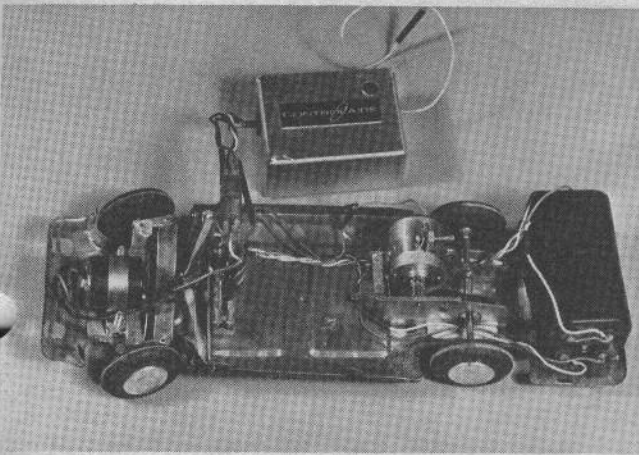
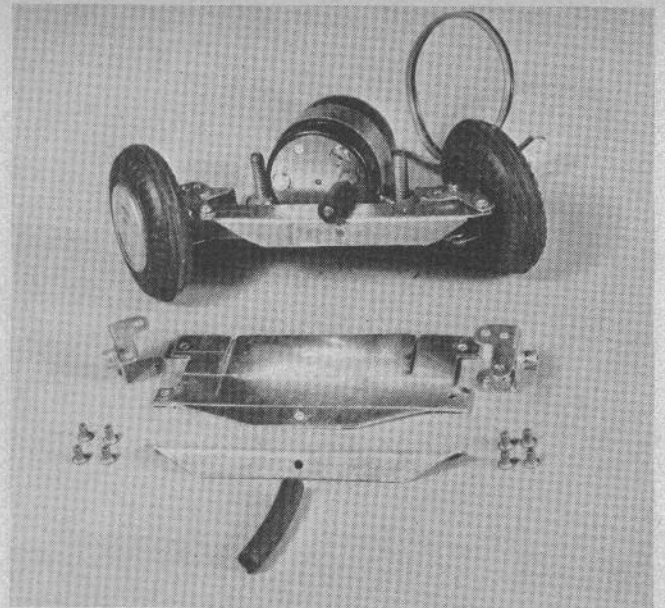
The drive system on the Fire Truck was made from the existing "friction drive" gear box on the toy. The fly wheel was removed, and its pinion gear center bored and press fitted to the motor shaft. Using its shaft hole in the side of the gear box as a reference center, a circular cut out was made equal to the radius of the drive motor plus its mounting clamp. The motor clamp was positioned in this cut out with the motor tightly clamped and its shaft extending

(Continued on page 30)

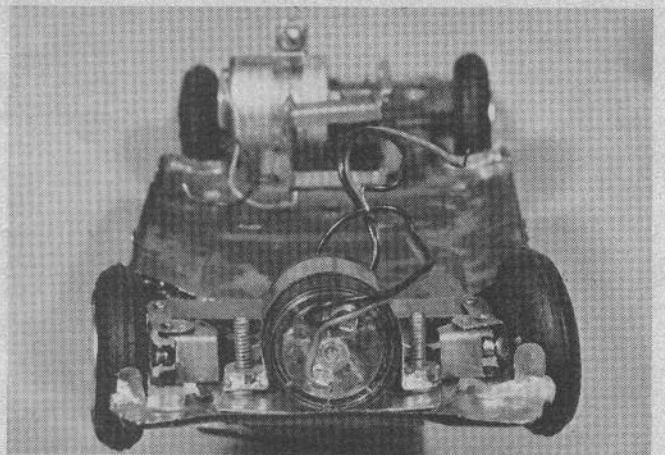


Here all the basic parts are tied together and motor mounted. Check picture with drawings for assembly.

View at right shows the basic steering components and the completely assembled steering unit.

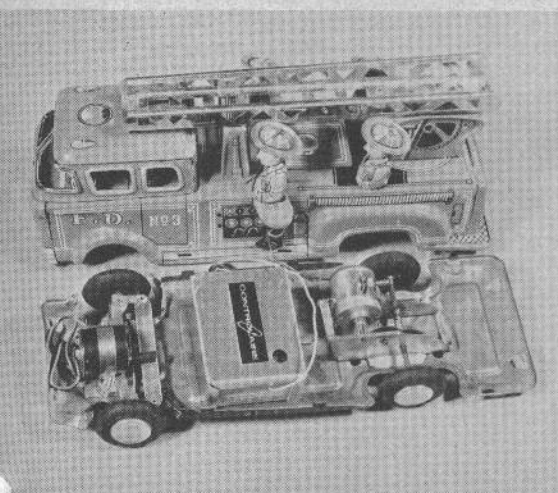


Basic frame with steering and drive assemblies mounted, receiver and battery pack. Almost ready to go!



This view from the steering end shows how the steering section fits on the frame. Pretty neat, no?

Fire truck ready to go. Sound the alarm and start practicing proportional steering, or keep your reflexes in.



This view shows placement of receiver in the fire truck. In 1/24th scale you must utilize your space effectively.





See how closely this semi-scale model resembles the big one shown at the right.

The Stits Skycoupe

This semi-scale features a fin and rudder area that will really give you maneuverability.

By R. JESS KRIESER

YOU CLASS II R/C PILOTS who've been complaining about not having enough fin and rudder area to do smooth, axial rudder rolls—gather 'round and feast your eyes on the vertical tail assembly of this Stits Skycoupe! If this doesn't give you enough fin and rudder area to satisfy your appetite for tight rolls, then there's no hope for you in Class II. On to Class III—and ailerons!

The first time I saw a picture of the Skycoupe, the huge fin and rudder fascinated me, and started me speculating on the directional stability and rudder response I ought to get from a flying scale model of this unusual design. My expectations were not in vain, for on the very first flight of the ship, we found that it had unusual wind penetration and directional stability, and did some of the tightest, most beautiful Immelmans we've seen. A few blips of up elevator puts the Skycoupe over in its back, and a single touch of the rudder switch rolls the ship level as though it were rotating about a rod extending through its longitudinal

axis. A real hot Class II pilot ought to have a ball with this ship! One word of caution, though—start with a very small amount of rudder throw on your first flight, and work up to the amount you find comfortable, for if you give it too much throw on its first flights you're liable to find yourself giving it a pulse or two of rudder to turn it, and suddenly find yourself looking at it coming straight at you, like it was going to buzz you!

The prototype Stits SA-9A Skycoupe is the ninth of a series of aircraft designed by Ray Stits, whose name has become virtually a universal word in the world of home-built aircraft. Go to any home-built rally, particularly the annual EAA fly-in at Rockford, Illinois, and chances are that you'll find more Stits-designed home-builts in evidence than any other single design.

When I decided to develop an R/C model of the SA-9A Skycoupe, a letter to Ray Stits brought a prompt response, filling me in on the missing details, together with a brochure and several photos of the prototype, N8467H.

While the name Stits is most readily associated with home-built designs, the SA-9A Skycoupe was not intended for the amateur builder, but was designed to be produced commercially, as a small, high-performance, two-place private aircraft. The prototype complied with all F.A.A. requirements for production aircraft, and was awarded F.A.A. Type Certificate No. 4A31, in December 1961. Plans were to have the design produced under license by firms in both North and South America, and was expected to sell in the U. S. for around \$6,000. To date, however, plans for commercial production have not been finalized.

The prototype has a fuselage of welded 4130 chromoly steel tubing with .016 24ST3 aluminum skin covering. Wings and empennage assembly are of aircraft Sitka spruce, covered with .07 birch plywood skin, topped with fabric to environment-seal the entire structure. Control surfaces are all metal, with beaded stiffening built into them. The wingspan is 28 feet 7 inches, with a length of 19 feet 2 inches. Height at the



This is a view of the real thing—Ray Stitt's Skycoupe. Plans were to market it.

tail is 8 feet 11 inches, and empty weight is 1,000 lbs., with a useful load of 525 lbs.

The prototype was powered with a 100 h.p. Continental O-200-A, with a metal, fixed-pitch, Sensenich propeller. The cabin is very roomy, with a width of 39 inches, a height of 46 inches, and a length of 55 inches from seat back to firewall. Nine cubic feet of space behind the seat provides room for a maximum of 60 lbs. of baggage.

As a private aircraft, the Skycoupe would make an excellent cross-country ship for the private pilot who wants a good balance between performance and economical purchase price and operating costs. With a 24-gallon fuel capacity, it has a range of 425 miles at a cruising speed of 117 miles per hour at 7,500 feet. Cruising speed at sea level, at 75% power, is 102 miles per hour, while tops is 116. Stalling speed is 57, and rate of climb at sea level, fully loaded, is 600 feet per minute. Take-off distance to clear a 50-foot obstacle, at gross weight, sea level, is 1,190 feet, while landing distance over a 50-foot obstacle to a dead stop is 1,160 feet. Service ceiling is 12,500 feet. A little more horsepower in it would produce even higher performance, and the design would undoubtedly handle more powerful engines with ease, as the red line (maximum permissible) speed is 166 miles per hour.

The big fin and rudder pays off handsomely in the stability department, as the Skycoupe can be put through aileron-only turns with no yawing swing of the nose away from the turn. With feet solidly on the floor, off the rudder pedals, stick movement puts the ship into steady, smooth turns, with no oscillation or wandering of the nose. Rudder movement is limited to 10 degrees either side of center, so that when you do use rudder, you run out of it before you have a chance to over-control. With full rudder, and enough aileron to put the wings down about 15

(Continued on page 26)



While you probably will never see your job from this vantage point, here is the real thing.

This shows generous fin and rudder area which allow some violent maneuverability.



SEEN THESE



Testor R/C Mustang



Min-X small superhet receiver

THE TESTOR CORPORATION announces their long awaited ready-to-run radio controlled Ford Mustang, and will be on the market sometime in July or August. It will retail for \$79.95.

The transmitter is all transistor, single tone, AM modulated, relayless pulse. Unijunction and silicon transistors are used. A 12 volt battery is required. Has 800 cycles per second audio tone frequency, and has a center loaded $\frac{1}{2}$ wave 54" antenna. Size is $7\frac{1}{8}$ by $4\frac{7}{8}$ and $2\frac{1}{4}$. The receiver is six transistor, and is superhet, allowing 5 cars to be raced.

MIN-X RADIO, INC., 8714 Grand River Avenue, Detroit, Michigan, announce a very small relay type superhet receiver. This was designed for the modeller who wants to fly small models. Its tiny size and micro weight allow the hobbyist to fly models smaller than ever before. Fully arc suppressed relay superheterodyne receiver with anodized aluminum case, and prewired plugs. Glass epoxy printed circuit board is tin plated over 2 ounce copper. Size is $15/16$ " by $1\frac{7}{16}$ " by $1\frac{15}{16}$ ", and it is claimed to be the smallest production relay superhet receiver available. Weight is 2 ounces.

Power supply is 2 pen cells or 3 225 ma nickel cadmium cells.

Optimum tone 400 to 1500 CPS, and percentage of modulation required is 60% to 100%. Operates over a broad temperature range of 0 to 150 degrees. Has a five micro Volt sensitivity, with a selectivity of 8 KC.

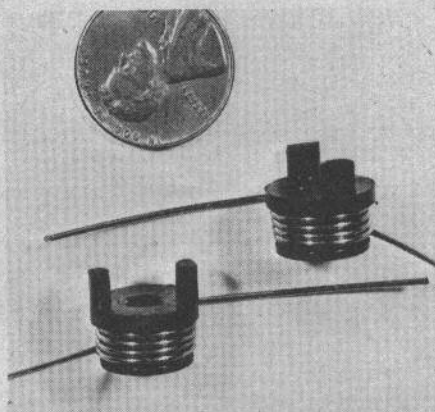
ACE R/C announces the rights to manufacture the Glass City Mini-Max Servo, in both kit and assembled form.

The Mini-Max is a revolution in small design. Minimum size is $15/16$ " wide by $1\frac{3}{4}$ " long by $1\frac{1}{2}$ " high.

Minimum weight $1\frac{1}{4}$ ounces. Minimum current drain approximately 80 mils RMS at 2.4 volts. Minimum complexity—damaged servos can be field repaired by anyone with standard replacement parts. Minimum price.

The Mini-Max Servo Kit at \$7.95, and the Mini-Max Servo Assembled at \$9.95, available soon from Ace R/C.

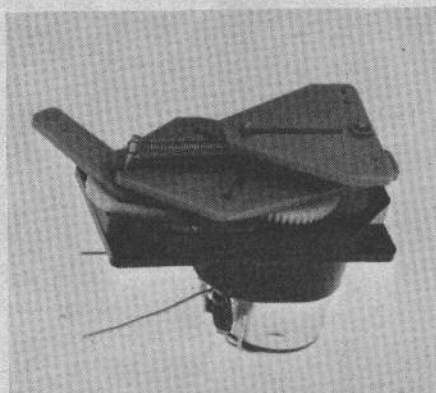
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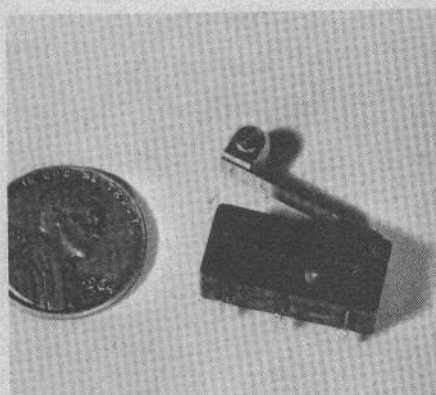
Rocket City brakes



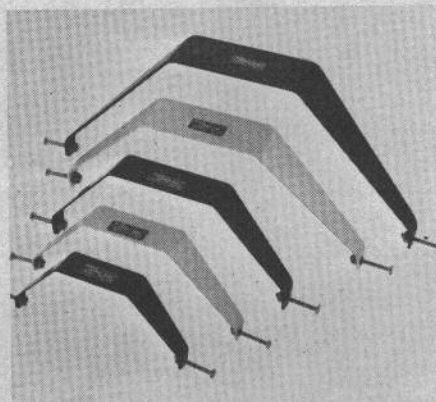
Remcon's versatile 12 transmitter



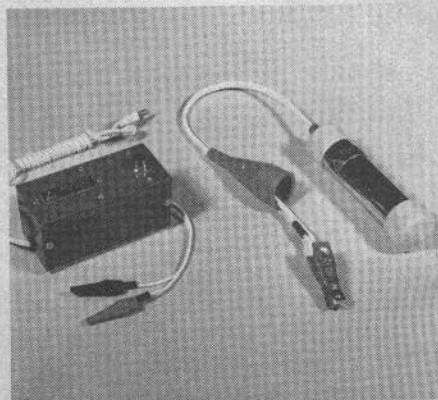
Rand LR3 Take-off Actuator



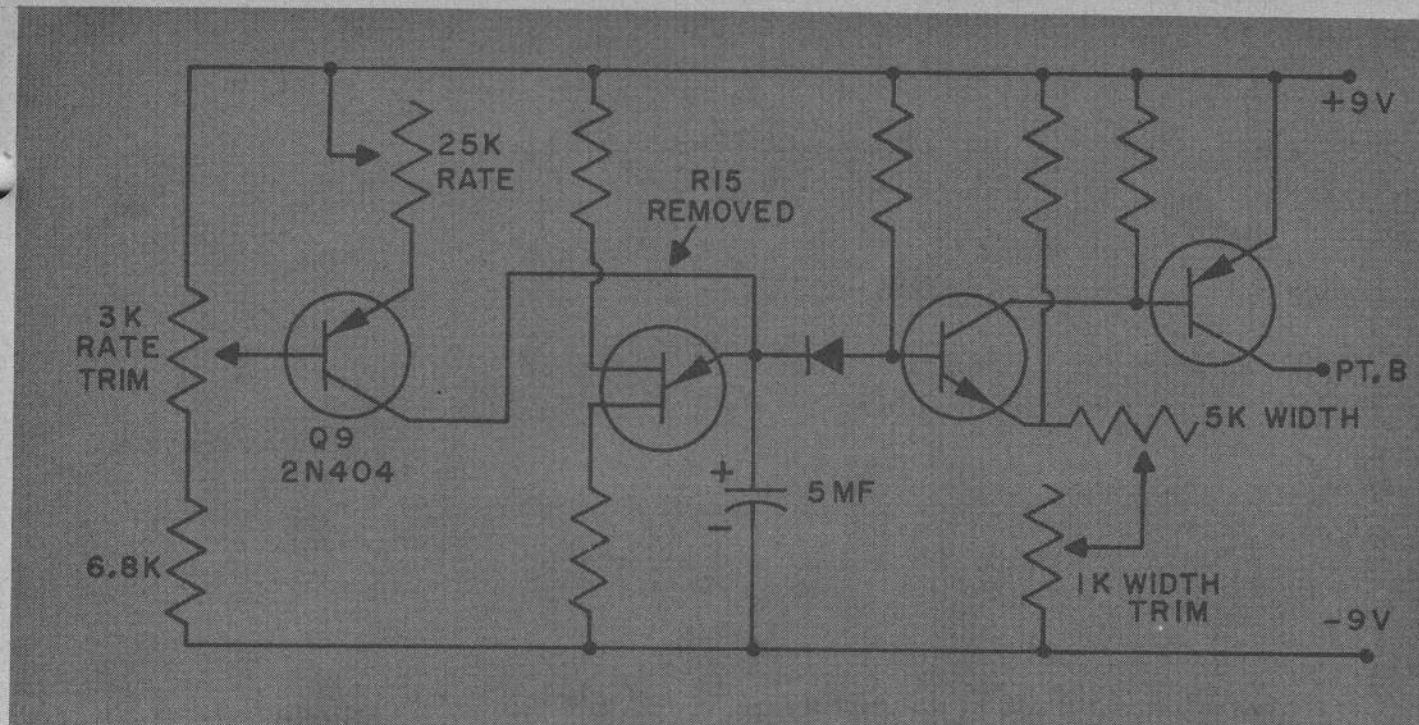
Unimac switch



Hallco landing gears



Delta starting battery and charger



Values are given only to components added to pulser section.

Electronic Trim for JANSSEN'S TRANSMITTER

If you fly several systems, this simple circuit will broaden the scope of your transmitter.

By ED GERHARDT

WHEN DICK JANSSON presented the construction details on his expandable pulse transmitter, it looked like the ideal replacement for my well-used 22½ volt pulser. This had worked with a variety of tube and transistor transmitters for a number of years.

Dick had everything in one package with only one battery. The only difficulty lay in Jansson's use of the Digimite stick assembly with its rather limited range of trim obtained mechanically.

Not only did I wish to use my own stick assembly, but I needed a wide range of rate-trim since I use the same pulser for a number of systems, including pulsed rudder, galloping ghost, kicking duck, and some bench work on feedback systems.

The modification is very simple, requiring the addition of one 2N404 transistor in addition to the pots. I am using a 25K rate pot in place of the 100K originally specified. By changing the pot setting with reference to neutral stick, the range of pulse change can be adjusted. Starting with the pot in the center of its range, a rate change of about 3-1 may be expected.

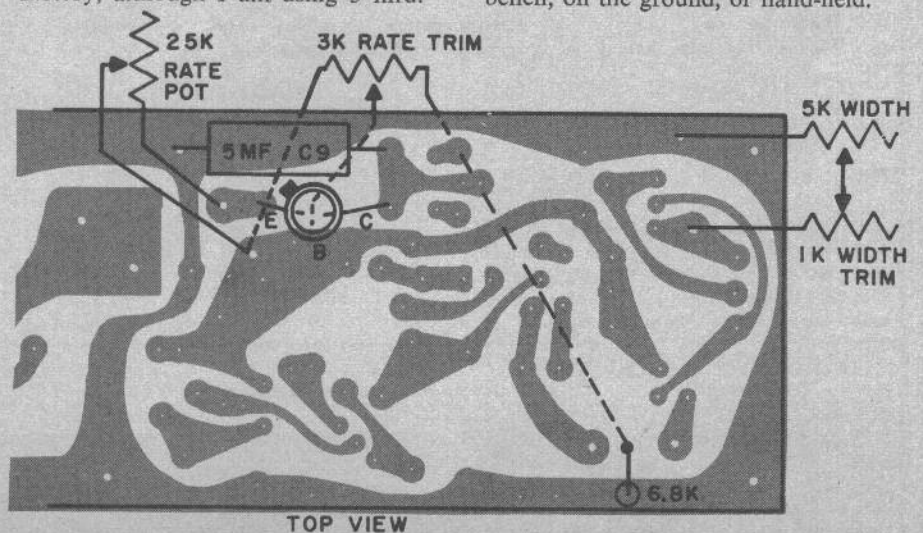
Start with the 3K trim pot adjusted with minimum resistance to the 9 volt

positive end (slow pulse) and adjust for desired pulse rate. If the rate trim is fully advanced to the high-rate end of its travel, it may distort the pulse shape generated by the unijunction transistor, and this will cause rate-width interaction.

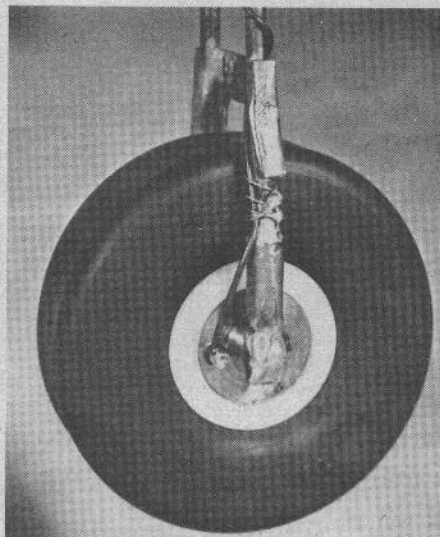
Probably, any one of the values Jansson offered for C9 will be satisfactory, although I am using 5 mfd.

This circuit was originally offered in Grid Leaks by John Phelps and subsequently by Neil S. Deye. The theory and adjustments are quite well covered in these two previous articles.

My Jansson transmitter continues to perform well. I particularly like the R.F. stability. It puts out a good healthy wallop, regardless of whether it is on the bench, on the ground, or hand-held.



Bits and PIECES



Bud's Slick WAG brake.

SLICK WAG BRAKE

The new DuBro Slicks and shock absorbing wheels can be slipped on to the WAG delrin brake hubs, according to Bud Atkinson. But it will take soap and water and quite a bit of effort. Shot here shows Bud's on his test bed plane.

Bud also has been experimenting using some of the 9 volt transistor type batteries on the WAG brakes to achieve extra nose wheel braking. Use of the 9 volt battery would suggest using the size of the C cell size or possibly even larger if your plane can take it.

RELAYLESS SERVO TIPS

I finally got around to building the relayless driver circuit for Bellamatic II servos. (Ref: Grid Leaks of March-April 1965)

I'm not sure what Mr. Colver means by "standard reed bank" in his opening sentence. He says that most multi receivers have the reed common line tied to the "most negative" voltage—Its been my experience that any reedbank that feeds Bonner transmits (a very popular servo) must be supplying a positive going signal. I have, therefore, tied the reedback common on my Orbit 12 to the receiver B+ line. This works nicely with Bonner servos and with my home brew bank of relays. To get Mr. Colver's circuit to work in conjunction with this other gear, I had to reverse its polarity.

This was done by substituting PNP

transistors for NPN (and vice versa) and reversing the diode and both capacitors. I used Motorola HEP-51 and HEP-53 transistors with good results. As Frank says, the #43 Lamp was not necessary when using these 500 m silicons. The "high" power GE transistors he called out are no longer in production.

MARVIN C. SUMNER
Mountain View, California

OPEN STICK ASSEMBLY CURE

Thought I'd pass on a neat modification to any transmitter with an open stick assembly, such as Orbit 3 = 1, 4-8 Digital, Kraft KP6 or similar with an open stick assembly. This was developed by John Schell of the Toledo Weak Signals.

Cut a piece of 1/2 inch foam rubber 1/4 to 3/8 inch oversize on all edges the size of the stick opening. Punch a hole in the center the size of the stick shaft. Remove knob and push this under the line of the stick opening. Then cut a piece of 1/4 foam 3/8 to 1/2 inch large than the previous piece of foam. Center punch it and slide over the shaft and push the foam in neatly under the stick opening edge. The 1/2 inch foam will bear pressure against the 1/4 inch foam, thus sealing the opening against dust, etc. An added asset is that it also helps center the stick.

LARRY SNEDEKER
Toledo, Ohio

Lanier Ready-to-Fly R/C NEW — BRONCO — IN STOCK —

Ready-to-Fly Span 65"

Flies complete pattern

Fly with rudder
elevator, trim
ailerons & motor

\$39.95

BRONCO also available with sweptwing **\$44.95**

send 10c for catalog

send 50c for construction manual

interchangeable

spare parts available separately

Empty wt.
2 1/2 lbs.

R/C TRAINER

TRANSIT \$37.95

Span 63" Empty wt. 2 1/2 lbs.

Flies on 6 channels or
proportional. Rudder, elevator & motor

**READY-TO-FLY
GO-GO
\$39.95**

**READY-TO-FLY
MUSTANG
\$34.95**

Fly complete
AMA pattern

Both above models Span 65"
Empty wt. 2 1/2 lbs.

Flies on rudder, ailerons, elevator, trim and motor

**AFTER 8 YEARS OF TESTING ALL LANIER
READY-TO-FLY MODELS FEATURE**

Finished rugged fuselage
Preformed landing gear
Kits contain glue

Air-O-Sheet exteriors are smooth and
nonporous and fuel proof
Models accept all R/C gear

All models are made of Air-O-Sheet® which is a custom
made thermoplastic material engineered to meet the needs
of modeling. Air-O-Sheet is a tough pliable material that
will not shatter like fiberglass and other plastics.

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SHIPPING CHARGES ARE C.O.D.
DEALER INQUIRIES INVITED

Seen These?

(Continued from page 18)

TWO NEW ITEMS have come across our desk from Rocket City Specialties of 1901 Polk Drive N.E., Huntsville, Alabama.

The first is a Control Horn with a self tapping nut plate, selling for 59 cents a pair. The special self tapping nut plate will give the modeller easier and neater installation. This nut plate eliminates nuts, washers and the usual piece of plywood re-enforcement.

The next item is an extended nose gear Bell Crank designed for direct coupling to the rudder servo. Due to the extended arm it will automatically reduce the nosewheel movement. The hole in the bell crank will fit 5/32 gears, and is a brass insert. Price: 59¢.

Rocket City also announce their new Positive Action Wheel Brakes at \$2.00 a pair. These are simple mechanical brakes with a drum which rides against the strut, and has a spring which is wrapped in solder to the vertical strut and then simply tightens up. Guaranteed to give you positive stops with no overloading of your servo.

RAND MANUFACTURING COMPANY, makers of the Take-Off Actuators in three models, announce parts availability for all of the models. For the LR3 they are as follows: 6001 Frame \$5.00; 6002 Idler Gear .25; 6003 Crank Gear .70; 6004 Motor Control Gear .35; 6005 Sector & Lever Gear .75; 6006 Elevator Plate 1.85; 6007 Rudder Plate 1.50; 6008 Spring .20; 6009 Snap rings, six .40; 6010 Motor w/suppression 7.50.

For the HR 1 they are as follows: 6021 Frame \$4.50; 6002 Idler Gear .25; 6003 Crank Gear .70; 6022 Spring .20; 6023 Rudder Plate 1.50; 6009 Snap rings, six .40.

For the HR 2 they are as follows: 6031 Frame \$5.00; 6002 Idler Gear .25; 6003 Crank Gear .70; 6004 Motor Control Gear .35; 6005 Sector & Lever Gear .75; 6032 Spring .20; 6007 Rudder plate 1.50; 6009 Snap rings, six .40; 6010 Motor w/suppression 7.50. Available from Rand or better dealers everywhere.

THE UNIMAC SWITCH, similar to the Micro SMI, may be used in any servo switching application, such as switching on the WAG brakes on over-travel of the elevator down.

New switches are hard to locate and tend also to be expensive. Ace R/C has them in an unused surplus at a real saving. Dimensions are similar to the SMI— $3/4 \times 1/4 \times 1/2$ ", exclusive of the cam. Switching action is SPDT. No. 30K24—Unimac switch at \$1.19 each. From Ace R/C.

FROM HALLCO comes their new Temper-Lock Landing Gear, available in a great variety of sizes, from medium duty models to heavy duty models. There are unique in that they feature two spline, self-locking nuts, which are factory press-fitted and clinched into the heat treated aluminum gear. They are supplied with tough, stainless steel

axles, which are locked into position by the nylon insert in the nut.

Landing gears are smoothly finished, and are then anodized, and are available in either black or in natural color. They will not cut into rubber bands. They will deflect and spring back without taking a set, since they are made of the heat treated aluminum alloy.

Priced from \$2.95 to \$4.75, they range from a 6" tread to a 13.6" tread, and for models under 1.7 pounds up to 6 to 8 pound models.

If your dealers can not get them, write directly to Hall Company, 420 East Water Street, Urbana, Ohio, 43078.

The Hall Company also make a wide variety of Nerve Centers which are available in a number of models. They certainly go a long way to eliminate the ugly wiring rats nests that can be had in most multi models. Models are also available for the Digitrio.

DELTA SPECIALTIES announces their new SB-4 Starting Battery and BC-4 Battery Charger System.

The heavy duty SB-4 Starting Battery is reliability engineered to provide years of service use to the active miniature model aircraft flyer. Its high capacity nickel cadmium cell provides over 90 minutes of glo plug heating from each full charge. Has low lost power cord so that it delivers maximum voltage for quick sure start. Has a sealed nickel cadmium battery. This quality item is housed in a chromed metal case with protective plastic end caps for durability and good looks.

A very useful feature of the SB-4 Starting Battery is the insulator which slides along the power cord to cover the glo plug clip and thus prevent shorting while being carried in your tool box. The business end of the glo plug clip is inserted into the large end of the insulator and an easy tug on the power cord locks the glo plug clip in place. The Delta SB-4 Battery is \$14.95.

The BC-4 Battery Charger is a high quality full wave rectification charger that is designed to put out 400 milliamperes hours.

May even be shorted temporarily, since the charger will safely handle over-loading incurred for a few minutes without harm. Transformer isolated to prevent shock hazards. Has a charger indicator light that glows softly to indicate proper hookup and charging rate. If the light glares brightly, either the charger leads are shorted together or the battery is hooked up backwards. The charger is \$14.95. Since these are designed to be used for years of continuous heavy duty service, the cost spreads out quite easily, since the battery pack will last and last and last.

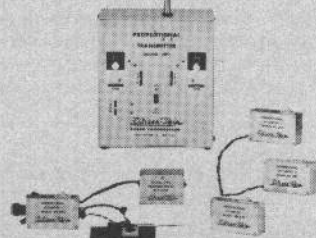
Delta Specialties also have a miniature vacuum cleaner called Mini Vac. It is battery powered, using two D cell size batteries. It is very useful around your workbench area, and your wife's kit of cleaning accessories.

At \$3.75 you will like it.

Available from Ace R/C, as are all Delta Specialty products.

(Continued on page 22)

Citizen-Ship R/C EQUIPMENT for BEGINNERS TO EXPERTS TOPS OUT the line with FULL HOUSE DIGITAL PROPORTIONAL



Five Completely Independent Proportional Simultaneous Channels. Completely wired and ready to use. Field-proven reliability.

Suggested List Price— **\$349.95**

DP SYSTEM INCLUDES:

DPT TRANSMITTER:

Type AER (aileron and elevator on right stick)

Type AMR (aileron and motor on right stick)

PLEASE SPECIFY WHICH TYPE
WHEN ORDERING

Purchased separately \$124.95
including batteries

DPR RECEIVER:

Uses ceramic transfilter for improved selectivity and rejection of undesirable signals. Purchased separately \$74.95

4 DPC SERVOS:

NEW LINE of powerful servos. Thrust 4 pounds plus.

Purchased separately \$39.95 ea.

RECEIVER AND SERVOS WIRED
READY TO OPERATE.

WIRING BOARD:

Complete with switch and 7 connectors.

Does ALL interconnecting.

Purchased separately \$14.95

BATTERIES:

Rechargeable nicads supplied for ALL UNITS.

CHARGER:

Built into transmitter. Includes plugs and harness to charge BOTH Transmitter and Receiver Batteries. Light indicates when charging.

AIRBORNE WEIGHT OF SYSTEM
LESS THAN 22 OUNCES.

SEND FOR FREE CATALOG describing the above system and other equipment for ALL CLASSES OF FLYING.

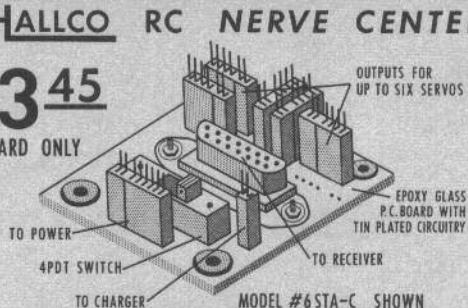
Citizen-Ship
RADIO CORPORATION
810 E. 64th St. Indianapolis, Indiana

LOOK MA! NO WIRES

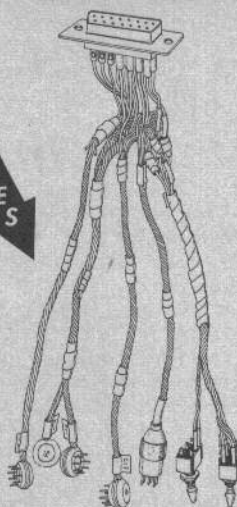
A **HALLCO** RC NERVE CENTER

\$3.45

BOARD ONLY



REPLACES



1. #6STA Nerve Center only, with all holes drilled and with mounting grommets \$ 3.45
2. #6STA-W Nerve Center assembled and soldered, with:
 - 1—15 pin receiver connector (Amphenol/Cannon Type)
 - 1—4 PDT power switch (World Engines #9F)
 - 1—2-8 Deans power connector..... \$13.80
3. #6STA-C As #2, with 5 additional Deans connectors for five servos, assembled and soldered \$24.50
4. #17-20150 Mating male 15 pin receiver connector \$ 1.80

FOR SPACE PINCHERS---NERVE CENTERS COMBINED WITH SERVO MOUNTING BOARDS

Model No.	Servo Arrangement	Size	(May be trimmed for Annco to:)	Price
2MSA	Two servos side by side	1/16x2.1x5	or 2.1x4.7	\$4.25
3MSA-L	Two side by side, one on left	1/16x2.1x7.3	or 2.1x6.9	5.50
3MSA-R	Two side by side, one on right	1/16x2.1x7.3	or 2.1x6.9	5.50
4MSA	Four servos	1/16x2.3x8.1	or 2.3x7.8	6.50
2MSB	Two Bonner servos	1/16x2.5x5.9		5.50
4MSB	Four Bonner servos	3/32x2.5x9.6	or 2.5x9.2 Minimum	7.95
3MSD	Special for the Digitrio system, for three servos with printed circuitry.	1/16x2.1x7.3		5.50

See your dealer. If not available, write direct; prices postpaid. Ohio residents add 3%. No C.O.D., please.

THE HALL COMPANY

Dept. G3, 420 E. Water St., Urbana, Ohio 43078

Seen These?
(Continued from page 21)

FROM DARIN BROTHERS comes a much sought after device—a Motor Control Crossover. This features a fit on any engine .35 and up. Eliminates problem of hooking up motor control when servo is on the opposite side of the hookup arm on throttle. Hookup may be on either side of the engine. The Crossover is made of stainless steel, and is available from Ace R/C and other suppliers at \$2.75.

Darin Brothers also announce a tool that will find many uses in a workshop. The 4 to 1 Pocket Socket replaces four popular sizes of nut drivers in one quality chromed tool. Bright chrome finished tool steel with maroon butarate plastic handle. Pocket Socket is a 4 in 1 telescoping nut and bolt driver. No more looking for the right tool for a job. Just pick up your Pocket Socket and you've got it. No larger than any one nut driver.

Will be available in two models. Size 401 has sockets for 1/4", 5/16", 3/8" and 7/16". Size 402 has sockets for 3/16", 7/32", 9/32" and 11/32".

Price for either model has been announced at \$4.98.

CRESCENT INDUSTRIES, New Freedom, Pa., announces their Exit Guide for push rod. Made of delrin, the guide will prevent nicked up slots in the fuselage which causes poor servo tracking. May be used for either rudder or elevator or both. Smooth and self-lubricating.

The slot is 3/4" long and 5/64" wide. Can be held in place with contact cement. Comes 1/4" deep which may be cut to suit if required. Tentative price for package of 2 has been set at 60¢.

MRC-ENYA has several goodies that seem not to be too well known in the field. First is an AMA Safety Prop Nut for the Enya .60 engine. Meets AMA safety requirement at a very low cost. The Enya .60 AMA Safety Nut sells for 60 cents.

Also they have conversion nuts which convert metric thread to American Standard thread. Available in three different sizes: A for .09, B for .15, .19, .29, .35 and .45, and C for the .60. Price is 60 cents for any size.

REMCON DO-IT-YOURSELF REED RECEIVER AND TRANSMITTER. Remcon Electronics, Ltd, 4a Broadway, Bexleyheath, Kent, England, have a very interesting set of packages to make up an all transistor 12 volt transmitter, and a superhet receiver that may be used either as a relayless, or with a relay or a reed bank of 60 to 90 ohms for up to 12 channel operation.

The design is by Eric Hook, and development work was by Geoff Chapman. Remcon offers both transmitter and receiver packages in separate packs of certain components so you can add on, and you can choose in the receiver whether you are going single, 4 or 6, or 10 or 12. The constructional details on this appeared in the April 1966 Radio Control Models and Electronics.

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To insure delivery at your new address PLEASE NOTIFY US NOW OR SURELY 6 WEEKS IN ADVANCE OF YOUR MOVING. Write in old and new address below, if possible include the address label from your last issue. Thank you.

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STARTING BATTERY & CHARGER

ENGINEERED FOR RELIABILITY & CONVENIENCE

- ▲ HEAVY DUTY NICKLE CADMIUM CELL PROVIDES OVER 90 MINUTES OF GLOW PLUG HEATING.
- ▲ INSULATOR SLIDES OVER GLOW CLIP TO PREVENT TOOL BOX SHORTING.
- ▲ HEAVY DUTY STRAIN RELIEVED POWER CORD.
- ▲ TRANSFORMER TYPE BURN OUT PROOF CHARGER.
- ▲ CHARGE SBI BATTERY WITH BCI CHARGER OR USE YOUR EXISTING CHARGER AT 400 MA.

SBI BATTERY 14.95
BCI CHARGER 14.95

SEND CHECK OR MONEY ORDER
ADD .50 FOR POSTAGE
MO. ORDERS ADD 3% SALES TAX
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RADIO CONTROL CENTER
P.O. BOX 754

BRIDGETON, MO. 63042

**BEE
LINE**

Proudly Announces a Most Complete Line of Foam Wings

EXCLUSIVELY FROM ACE R/C DROP SHIPPED FROM BEE LINE

TYPES:

Regular Taurus, Swept Taurus, Sr. Falcon, Cherokee, Aristo Cat, Zeus Mk III, Jenny, P-Shooter, Candy, Patriot, Beach Comber, Windjammer, Citron, Kwik Fli, Stormer, Tauri, Falcon 56, Propo-Cat, Go-Go Cat.

BL-19 SERIES \$8.95

Class II configuration

* Precut airfoil. Strictly a do-it-yourself kit.

BL-20 SERIES \$10.95

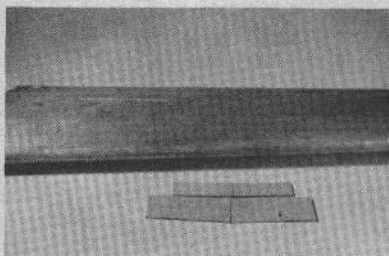
Class II configuration

* Precut airfoil * Precut dihedral * Precut gusset slots * Preglued balsa trailing edge stiffener * Precut Ply gussets

BL-21 SERIES \$11.95

Class III configuration

* Precut airfoil * Precut dihedral * Precut gusset slots * Precut gussets * Servo cutout * Preglued balsa trailing edge stiffener * Gear slots and hardwood gear mounts where applicable



BL-22 SERIES \$28.95

Class II configuration

* Precut airfoil * Precut dihedral * Precut gusset slots * Preglued balsa trailing edge stiffener * Precut gussets * Covered airfoil (1/84" birch veneer) * Tips covered * Gear slots and hardwood gear mounts where applicable.

BL-23 SERIES \$29.95

Class III configuration

(All have Built-in Strip ailerons)
* Precut airfoil * Precut dihedral * Precut gusset slots * Precut gussets * Servo cutout * Covered airfoil (1/84" birch veneer) * Tips covered * Covered strip ailerons as integral part of wing * Differential hinged ailerons with nylon * Aileron hardware installed * Hardwood gear mounts installed where applicable

During the first production run of foam wings, BEE LINE had been catering to the individual modeler's specifications regarding types, stages of construction, and configuration. In the interest of better service BEE LINE has revised and expanded their series of foam wings. Thus, a wide range of types, stages of construction and configurations are offered to meet the most exacting needs of the individual modeler. Send plans through Ace R/C and BEE LINE will make your favorite wing in any series.

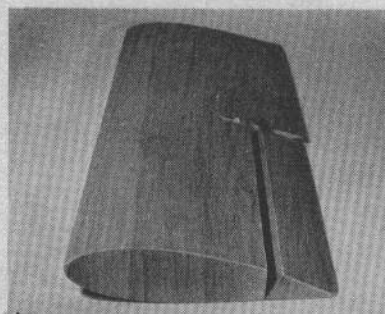
Each series represents a stage of constructions and configuration. Any type airfoil can be produced in any series. To order, merely indicate series and type. Examples: BL-24 Kwik Fli, BL-19 Aristo Cat, BL-23 Stormer, etc.

BL-24 SERIES \$33.95

Class III configuration

(All have regular ailerons)

* Precut airfoil * Precut dihedral * Precut gusset slots * Precut gussets * Servo cutout * Covered airfoil (1/84" birch veneer) * Tips covered * Regular ailerons differential hinged with nylon * Aileron torque rods and cranks installed * Hardwood gear mounts installed where applicable.



BL-25 SERIES \$35.95

Class III configuration

(All have regular ailerons)

* Precut airfoil * Precut dihedral * Precut gusset slots * Precut gussets * Servo cutout * Covered airfoil (1/84" birch veneer) * Tips covered * Regular ailerons differential hinged with nylon * Aileron torque rods and cranks installed * Hardwood gear mounts installed where applicable

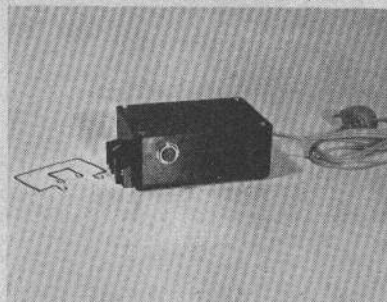
BIRCH VENEER 1/84"

Dealers direct from BEE LINE

24" x 9 ft.	\$10.80
30" x 9 ft.	\$13.50
24" x 10 ft.	\$12.00
30" x 10 ft.	\$15.00

FOAM CUTTING TOOLS

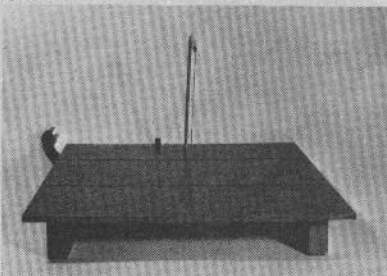
Stocked and shipped from Ace R/C



This revolutionary foam cutting tool will cut gear mount slots, make the servo cut outs, cut slots for spars, trim trailing edges, cut gussets and a variety of other needs.

Completely self contained in a bakelite case it measures 4" long, 2 55/64" wide and 1 and 9/16" high. A c line cord and pushbutton on-off switch. Use with a guide, turn switch on, place on foam and make a neat and true cut out. Comes with 2 nichrome wires which can be formed for gear mounts, or servo cut outs.

BL101 is completely self-contained \$9.95
BL102 is for use with your transformer for \$4.95.



HOT WIRE JIG SAW

Has no moving parts, just a hot wire to cut styrofoam easily and quickly. Table is 12 x 12" and has a throat of 6 inches. Transformer with on-off switch and is completely safe. Your wife and kids will find many uses for it when not in use in your shop. Many uses for anyone working with styrofoam. Priced at only \$7.95.

**BEE
LINE**

MODEL AIRCRAFT PARK
Box 353
Grandview, Missouri 64030



AMA Wins Frequencies

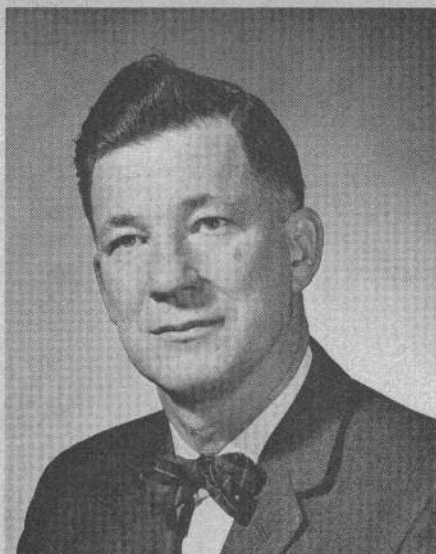
NOTE: At right are photos of members of the AMA Frequency Committee which were available at press time.

(Continued from page 2)

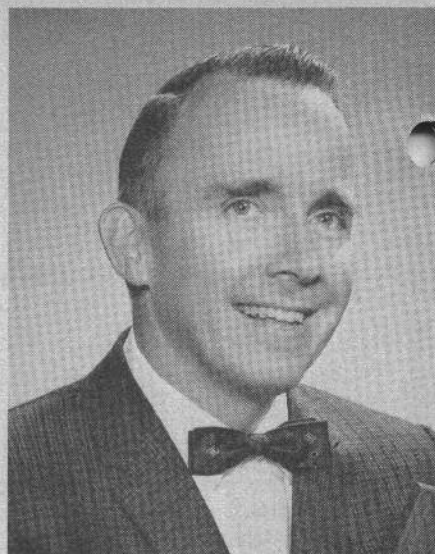
work on the increasing interference problems that were beginning to plague modelers in almost every section of the country. Appointments were made quickly. The committee consisted of John Phelps, the late Jack Port, Howard McEntee, Walt Good and myself. The first meeting of the committee was set for the DC/RC Symposium in May of that year, but phone calls and letters started flowing at a fairly fast rate as the committee tried to determine how best to proceed.

In the May meeting it was quite easily determined that we would need the help of legal counsel who specialized in such matters. Several firms were suggested but the overwhelming thing that hit the committee was the fact that money—quite a sum of it—would have to be gotten and fast because competency in this area does cost money.

Industry members would need to be contacted, clubs, and possibly individuals, depending how long the proceedings would take. It fell to my lot to start raising some of the initial money from industry members. Personal visits to the West Coast during the Nationals resulted in a handsome beginning; mailings went out to the industry members



E. J. Lorenz, Chairman AMA Committee



Dr. Walter A. Good

and industries in allied field—not once, but repeatedly the story was told.

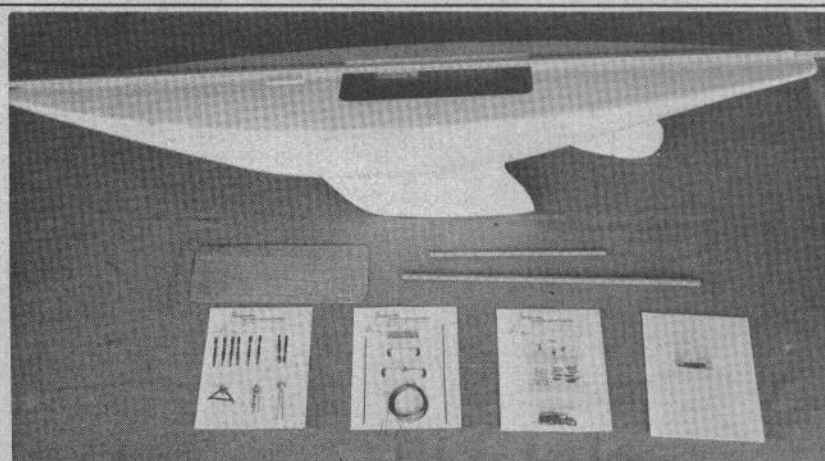
By September of 1963 the kitty held enough money so that we could approach Courtney and Associates to represent the Academy. This was done by the members of the committee residing in the east. The push was under way.

While in Washington in May, Grid Leaks received an excellently prepared article written by George Wells on "Can We Get More Frequencies?" Well documented, this was a major start on an on-

going published campaign which was mounted by all of the modelling mags.

As soon as clubs and the modeler became aware of the fact that the AMA was taking a positive course of action, money started coming in. One of the first clubs to donate a large chunk was the BIRDS on the West Coast. Their covering letter was written up in Grid Leaks and R/C Modeler.

Most heartwarming about the whole thing, was that the modeler himself wanted in on the act and headquarter

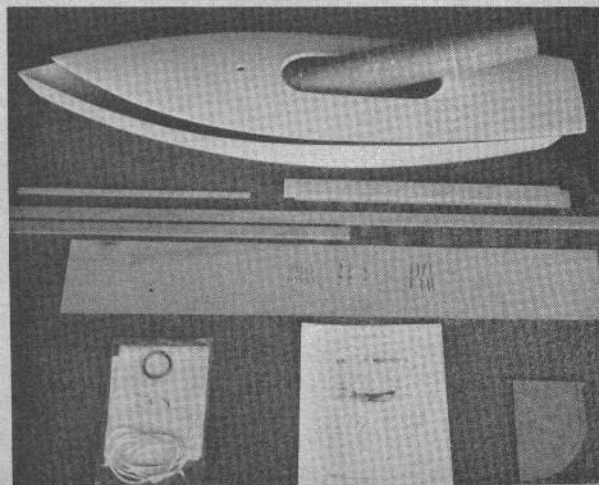


R/C SAIL BOAT KITS FROM \$29.95 UP
MODEL SAIL BOAT FITTINGS
MODELS FROM 36" TO 65"
R/C EQUIPMENT

Reynolds
MANUFACTURING COMPANY

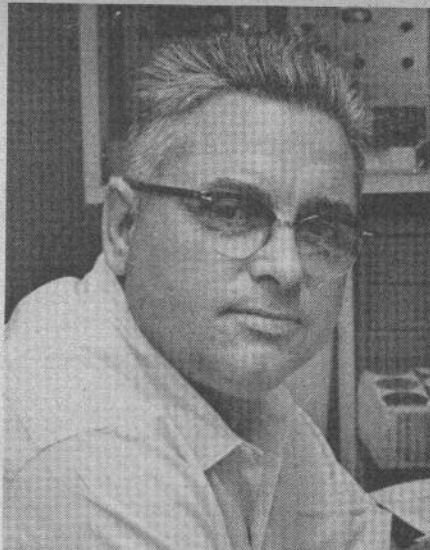
3010 Chris Lane

Orlando, Florida





Howard G. McEntee



The late Jack Port



Paul Runge

began receiving contributions ranging from \$1.00 to almost any sum. As far as possible, every manufacturer-contributor and every individual contributor received a letter thanking him for his donation.

Courtney and Associates began preparing a Docket for presentation before the FCC. There were three areas in which there conceivably could be some spots parceled out. The AMA Committee, after contacting the radio manufacturers through Howard McEntee,

finally settled on the 72-76 MHz spots as the most desirable, but the doors were not closed on the other spots in the event the FCC should not be inclined to agree with our choice.

Meantime more requests for funds were sent to industry members, and most of them responded well. Walt Schroder presented the pitch to the 1964 Model Aviation Section of the HIAA. Model Aviation continued the policy of publishing the names of club, individual and industry contributors.

The time seemed to drag to some of the contributors and since I had been the one to hit industry hard, some of them seemed to feel that action should have been had by then. But the mills of the gods and the FCC grind slowly.

The Docket was presented in July 1965, and then the waiting period during which anyone could file counter complaints and show just cause why they felt that the AMA should not get the frequencies. And there were objec-

(Continued on page 31)

LOOK TO MIDWEST FOR LEADERSHIP



The ARISTO-CAT

SPAN 45" - LENGTH 47" - WEIGHT 6.00 LBS. - 400 MG. SERVO

CLASS 22 WINNER at the 1965 NATIONALS

Now at last! Midwest proudly presents Bud Atkinson's famous design. The "Cat" has piled up an amazing number of trophies in Class 2 and 3. Championship performances by both novice and expert have been chalked up coast to coast. Optional silencers have proven to produce top performance in both multi and proportional! This Aristo-Cat kit includes everything you would expect from Midwest. Select Micro cut balsa, clean "Super Sharp" die cuts, excellent detail. Simple plans, nylon hardware and accessories. **\$24.95**

COMING JULY 15

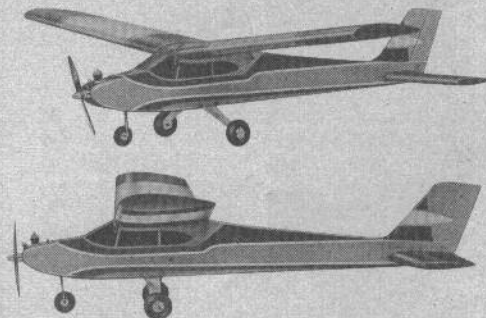


SKY SQUIRE

SPAN - 57" AREA - 584 SQ. IN.
LENGTH - 45"

10 Channel Trainer. Designed to let the beginner fly without the added worry of speed. The Sky Squire has been landed, once it has been set up on the final approach, with the transmitter off. This is built in stability. **KIT NO. 114 \$22.95**

NEW!



ASTRO-MITE FOAM WING & STAB

Midwest is proud to introduce the first combination foam wing and stab kit. We have made a marriage between balsa wood and foam. The Astro-Mite was designed to build and fly in a hurry. Top quality material and pre-fabrication. Light enough for escapement flying with .049 and roomy enough for servos with .10. Ideal trainer for pulse rudder or galloping ghost systems.

SPAN - 44" AREA - 264 SQ. INCHES CLASS 1 OR 2
KIT NO. 112 **\$8.95**

If your dealer does not stock MIDWEST,
write to factory for prompt delivery.



TRI-SQUIRE \$12.95

Tri-Squire Kit No. TS 108 R.C. Intermediate for .09 to .19 engines. This stable flyer is an ideal multi trainer - 4, 6 or 8 channels... the perfect step up from rudder only models... wing span 51 1/2", length 38"... Prefab construction... the Midwest way... "drop-out" die-cut balsa, complete, full size plans and construction tips.



LIL TRI SQUIRE

Clean, functional lines, simplicity of construction. Top quality material and pre-fabrication. Light enough for escapement flying with .049. Roomy enough for servos with .099. Don't miss this one. It will perform. Vincent Micchia's latest design.

Span 40" Area 320 sq. in.
Class 1 or 2 Engine .049 to .099
KIT NO. 109 \$7.95

MIDWEST PRODUCTS Co., Inc.

400 So. Indiana, Hobart, Ind.

**See these
 new SIG
 model
 products**
 — all now
 available
 at your
 own local
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► We distribute
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SIG-MENT
 OUR GREAT NEW "ONE-TUBE A
 AND B SUPER-CEMENT" — THE
 PERFECT ADHESIVE FOR MODEL
 BUILDING AND FIELD REPAIRS
 2 oz. Tube 25¢ 4 oz. Tube 39¢

N/AMERICAN AT-6
 SUPERSCALE C/L MODEL, DESIGNED
 BY CAL SMITH. SUITABLE FOR .19
 -35 ENGINES / 32" SPAN. \$8.95

PIPER SUPER CRUISER
 SUPERSCALE 1/2A F/F (1,020 - 1,049),
 C/L (1,049 - 1,099) OR R/C DESIGN.
 FEATURES DIE-CUT SIG BALES AND
 PLYWOOD / AUTHENTIC DECALS /
 RUBBER WHEELS / "FORMED" WIRE
 LANDING GEAR / HARDWARE AND
 FULL SIZE PLANS — WITH "FLOAT
 CONVERSION" FULLY DETAILED /
 1" : 1" SCALE / 36" SPAN. \$2.95

SINBAD 40 GLIDER
 LATEST KIT VERSION OF FAMOUS
 SINBAD DESIGN. FEATURES FULL-
 SIZE DETAILED PLANS / INTEGRAL
 BALLAST BOX / SIMPLE RUGGED
 CONSTRUCTION / 40" SPAN. \$1.49

**SIG CLEAR PLASTIC
 BUBBLE CANOPIES**
 FORMED FROM CLEAR, TOUGH .020
 CELLULOSE ACETATE PLASTIC SHEET
 — CAN EASILY BE TRIMMED TO FIT
 ANY MODEL (13 SIZES IN RANGE)
 LENGTHS (D) 7" 40¢ 12" 90¢
 4" 15¢ 8" 50¢ 13" 11.00
 5" 20¢ 10" 70¢ 15" 12.20
 6" 30¢ 11" 80¢ 16" 12.25
 (HEIGHTS EQUAL 29% OF LENGTHS)

SIG SUPERFOAM
 AMAZING POLYURETHANE 2-PART
 CHEMICAL — WHICH EXPANDS 25
 TIMES WHEN COMBINED. DRIES IN
 10 MINUTES INTO LIGHT, DURABLE
 FOAM THAT CAN BE SAWN, CAST
 IN MOLDS, CARVED, SANDED AND
 DOPED. COMES IN PARTS "A" AND
 "B", IN TWO 8 oz. CANS. \$3.25

SIG METAL PRIMER
 NEW ITEM REQUESTED BY BUILDERS
 4 oz. 60¢ 8 oz. \$1.00 Pint \$1.69

SIG SUPERSOLV
 NEW CEMENT SOLVENT, REMOVES
 CEMENT FROM HANDS & CLOTHES
 4 oz. 35¢ 8 oz. 49¢ Pint 89¢

SIG CONTEST RUBBER
 NEW "HIGH POWER" RUBBER STRIP:
 1 LB. of 1/8" \$5 1 LB. of 1/4" \$5

SIG POWERSTRIP
 NEW 1/24" 50. RUBBER STRIP WITH
 AMAZING POWER/WEIGHT RATIO:
 50 ft. 45¢ 100 ft. 85¢ 1 LB. \$4.95

SIG SUPERWELD
 NEW LIQUID RESIN MODEL PLANE
 AND AIRCRAFT ADHESIVE. FLEX-
 IBLE, PLASTIC DISPENSER BOTTLES
 4 Ounces 49¢ 8 Ounces 79¢
 (REPLACES OLD "SIG WHITE GLUE")

World's finest model dope...

SIG SUPERCOAT FUEL PROOF DOPE

BRIGHT WHITE • DIANA CREAM
 POLAR GRAY • BROWN • JET BLACK
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 LIGHT RED • SILVER • OLIVE DRAB
 FOREST GREEN • BRIGHT GREEN
 DK. GREEN • DK. BLUE • LIGHT BLUE
 MIAMI BLUE • CLEAR • THINNER
 PLUS 5 NEW SUPERCOAT COLORS —
 GOLD, COPPER, METALLIC GREEN,
 METALLIC BLUE, METALLIC MAROON

COLOR	CLEAR	THINNER
4 oz. 55¢	4 oz. 45¢	4 oz. 30¢
8 oz. 90¢	8 oz. 79¢	8 oz. 49¢
Pint 1.40	Pint 1.29	Pint 89¢
Qrt. 2.65	Qrt. 1.98	Qrt. 1.30
Gal. 7.50	Gal. 5.95	Gal. 3.75



CHECK TABLE BELOW — & SEE
 HOW YOU SAVE AS MUCH AS
 \$4 A GALLON ON SIG DOPE!

★ PRICE COMPARISONS — 3 LEADING BRANDS ★

Dope	4 oz.	8 oz.	Pint	Qrt.	Gal.	Thinner	Qrt.	Gal.
SIG	45¢	79¢	1.29	1.98	5.95	SIG	1.50	
"T"	60¢	*	1.50	2.25	7.50	"T"	1.98	
"P"	69¢	1.10	1.89	2.98	9.95	"P"	2.45	

★ * 8 oz. size not available in Brand "T" ★

Four great new SIG fuels...



SIG PETER CHINN
 MODEL ENGINE FUEL
REGULAR

FUEL TYPE	PINT	QRT.	1 GAL.
REGULAR	85¢	\$1.50	\$4.95
CONTEST	90¢	\$1.59	\$5.95
GRAND PRIX	\$1.00	\$1.75	—
R/C SPECIAL	—	\$1.39	\$4.50

REGULAR HIGHEST QUALITY
 AND ECONOMICAL
 GENERAL PURPOSE FUEL FOR .15 -
 .45 ENGINES. IDEAL FOR .35 - .45
 STUNT, .35 COMBAT, .15 - .45 R/C
 THROTTLE-ENGINES, BREAKING-IN.

CONTEST TOP PERFORMANCE,
 ALL-PURPOSE FUEL
 FOR .01 - .15 ENGINES. EXCELLENT
 FOR ALL MEDIUM AND LARGE-SIZE
 ENGINES (AFTER BREAKING-IN) &
 WHERE EXTRA POWER IS REQUIRED.

GRAND PRIX ULTRA-HIGH
 PERFORMANCE
 (GIVES UP TO 40% MORE POWER)
 "HIGH NITROMETHANE CONTENT"
 FUEL FOR ALL COMPETITION AND
 RACING ENGINES. FOR F/F GAS,
 C/L RAT-RACING, PROTO-SPEED &
 SPEED. NOT SUITABLE FOR STUNT,
 R/C ENGINES OR BREAKING-IN.

R/C SPECIAL ECONOMICAL,
 "WIDE R.F.M."
 RANGE" FUEL FOR ALL THROTTLE-
 EQUIPPED .15 - .60 R/C ENGINES.
 GIVES ULTRA-SMOOTH RUNNING
 AT FULL POWER AND LOWEST IDLE
 — IN ALL CLIMATIC CONDITIONS.
 ALSO IDEAL FUEL FOR C/L NAVY
 CARRIER AND C/L STUNT FLYING.

R/C FUEL N720C THIS IS IT — THE VERY
 FINEST COMPETITION
 BREW OBTAINABLE — FOR ALL THROTTLE CONTROL
 ENGINES / GIVES PEAK POWER PLUS WIDE RPM
 RANGE AND LOWEST IDLE WITHOUT ENGINE CUT.
 GALLON CAN: \$4.95

The Stits Skycoupe

(Continued from page 15)

depress, it slips smoothly and cleanly,
 permitting rock-steady approaches to
 short fields with a descent of about
 1200 feet per minute at 80 miles per
 hour. When down low enough on the
 final, a light touch on the controls
 straightens the ship out for a full-stall
 landing with a very short roll-out. With
 power off, and stick all the way back,
 it settles into a full-stall touch-down
 with no tendency to tuck a wing tip
 down, and without the tail bumper
 touching the ground.

In the development of the Skycoupe
 Ray Stits had the collaboration of
 Harold E. Dale, an aeronautical en-
 gineer with more than 20 years of ex-
 perience at North American Aviation,
 Inc., and who contributed much to the
 Sabreliner, F-107 and F-108 projects.
 Harold Dale did all of the basic en-
 gineering on the SA-9A and handled
 the F.A.A. certification.

Our Skycoupe model is not fully
 scale, but is very close to it. It has been
 designed as a semi-scale design, to pro-
 vide construction and good flying
 characteristics in combination with a
 realistic appearance. The profile of the
 ship is very accurately to scale, as is the
 huge fin and rudder. Horizontal tail is
 also to scale. However, the fuselage has
 been narrowed somewhat, as full scale
 here would have produced a width of
 more than six inches. I also eliminated
 the two degree sweepback in the wing
 of the prototype, in the interests of
 simple construction. This sweepback
 was inserted into the prototype after
 initial test flights to increase directional
 stability and adjust the center of gravi-
 ty. I also departed from scale in the
 choice of an airfoil section, as the
 prototype had a flat-bottomed section
 that appears to be the NACA 4412. I
 chose the NACA 2415 section, to pro-
 vide smoother inside and outside loops,
 and to provide more stable inverted
 flight characteristics.

The prototype featured full span
 ailerons, and these would scale out to
 approximately 1-1/8 inches wide on the
 model, for the builder who wants to
 go full-house and add them. However,
 I believe that the excellent rudder re-
 sponse makes ailerons totally unneces-
 sary on this model.

Wings. You may build the wing in
 two pieces, joining it at final assembly
 and adding dihedral braces and gus-
 sets, or you can build it in one piece,
 building the dihedral in as you go. I
 use a Magna-Jig, which makes one-
 piece construction an easy matter. If
 you don't have one, you can join two
 wide pieces of white pine, or other soft
 wood, at the proper angle to form the
 dihedral. To build it in one piece, start
 by laying down the lower main spars
 of 3/16 x 3/8 medium balsa, then glue
 all ribs in place over them, except for
 the center rib parts. Tabs on the ribs
 help keep the semi-symmetrical wing
 in alignment as you go.

Next, cut and glue the center dihed-
 ral brace of 1/4 hard sheet in place at
 the center section. Cut the proper

dihedral angle on the inboard ends of
 the leading edge pieces, and glue them
 in place, adding the 1/8 plywood dihed-
 ral brace at the center section. Add the
 top main spars and the 1/16 plywood
 dihedral brace at the center section.
 Now you can install the center rib parts.
 When all has set up solidly, add the
 1/16 sheet piece to form the upper half
 of the trailing edge, and cut and glue
 all cap strips in place.

When the wing assembly has dried
 thoroughly, remove it from the build-
 ing board and turn it upside down. Cut
 and fit the 1/4 x 3/4 trailing edge filler
 piece and glue it in place at the center
 section, adding the 1/8 plywood dihedral
 brace. Trim all tabs off the ribs and add
 the leading and trailing edge sheeting
 to the bottom surface. Capstrip all ribs,
 cut and glue tip blocks in place, and
 your wing is ready for carving.

Tail Assembly. Stabilizer ribs are cut
 from sheet balsa as shown, with tabs to
 aid alignment during assembly. Start
 by putting down the bottom spar of
 1/8 x 1/4 stock, then glue all ribs in
 proper position. Carefully align and
 space the two center ribs to form a
 slot that will receive the fin. Glue the
 leading edge piece in position, then cut
 the trailing edge of the stab to proper
 length, and glue the 1/4 sheet center
 reinforcement to it. Glue the entire
 rear spar assembly in place. Add the
 top spar and leading edge sheeting, then
 capstrip all ribs.

When dry, remove from the building
 board and trim the tabs off the bottom
 of each rib. Add the leading edge sheet-
 ing and capstrips on the bottom sur-
 face, then cut and glue tip blocks in
 place. When dry, carve and sand to
 final shape. Elevators are shaped from
 1/2 sheet balsa as shown, and are joined
 by the 3/32 wire yoke rotating
 through a piece of 1/8 brass or alumi-
 num tubing, as shown. Fin and rudder
 are made from 1/4 sheet balsa. Use
 light, quarter-grained stock if possible,
 to keep down weight and to prevent
 warping. When all tail assembly parts
 are sanded to final shape, glue the fin
 into the slot in the stabilizer.

Fuselage. Cut fuselage sides from
 matched sheets of 1/8 balsa. You won't
 find stock wide enough, but working
 with 6-inch sheets, you will need to add
 only a small piece to form the upper
 part of the cabin, which puts the glue
 joint in a position where it will be as
 short as possible. Careful sanding with
 very fine sandpaper after joining the
 pieces will produce a neat joint that
 can't be seen. The sides are reinforced
 with 1/16 sheet doublers from former
 3 forward, and with 1/2 sheet triplers
 from former 2 forward. Before cement-
 ing the doublers in place, carefully
 trim the bottom part to allow for the
 1/4 square bottom longerons. After
 doublers and triplers are glued in place,
 add the bottom and top longerons to
 each side assembly, and the 1/16 sheet
 doubler at the tail end. Cut and glue
 the 1/8 x 1/4 vertical in place on each
 side assembly, midway between former
 3 and former 4, as shown.

While side assemblies are drying, cut

all formers to proper shape. Former 1 is 3/16-thick, 5-ply plywood; former 2 is 1/8 plywood; and the remainder are 1/8 sheet balsa. Drill all holes required in former 1 for landing gear mount, fuel lines, throttle push rod and nose wheel push rod, and drill the push rod holes in former 2. Build the combination tail post and tail cone before assembly of the side units to it. Cut the unit from 3/8 sheet balsa, then cut and bevel the two 1/8 sheet side fairing pieces to proper shape (as shown in top view), and glue them in position on each side of the tail post. Next, add scrap wedges on each side (see top view). The completed assembly acts as a keying unit, for proper location and alignment of the sides during assembly.

Before assembling the fuselage sides, glue the 7/16 x 9/16 hardwood motor bearers in place, beveling them at the front end for the proper downthrust angle, as shown. To assemble the sides, spread your plan on your building board so that you can assemble the fuselage over the top view, pinning it directly to the building board to hold it in alignment during assembly. Work from the rear forward, glueing former 4 in place and pinning the sides down to the board. Add the cross pieces between former 3 and 4, pinning this part down. Then add former 3, pinning the sides in proper alignment while it dries. Now, add all of the top sheeting from former 3 to the rear, which locks the fuselage assembly into alignment. Then work forward, adding former 2 and former 1, pinning them in place, and blocking up the lower part of the fuselage at these points, to keep everything pinned in alignment to the building board while it dries. The 1/8 sheet wing saddle pieces can be added to the cabin top at this time.

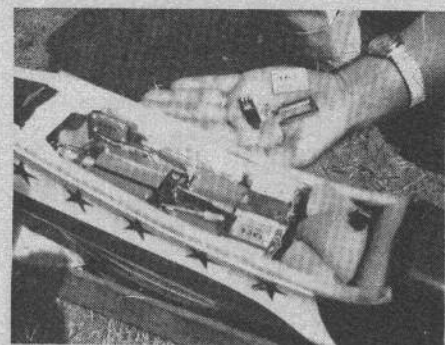
When the fuselage assembly is dry, remove it from your board, and install the main landing gear parts, cutting them to proper shape from 1/8 plywood. Use white glue for this assembly, to insure proper strength. Add the bottom landing gear parts from 1/8 plywood, then sheet the bottom of the fuselage from former 3 to former 2. Cut and glue in place the 1/8 sheet floor to the fuel tank compartment, then box off the battery compartment as shown, adding the firewall reinforcements of 1/4 x 1 trailing edge stock. Install your steerable nose gear assembly, and nylon tubing for the control rod, before sheeting the rest of the fuselage bottom.

To construct the cabin area, start by carefully cutting and fitting the 1-5/16 x 1-11/32 blocks, glueing them in position when you have them fitted snugly. Install the throttle push rod tube before glueing these blocks permanently in position. Cut two pieces of 1/2 x 45 degree stock and glue them to the top-inside edges of these blocks, as shown by the dashed lines in the cross-section through the fuselage at station 1. At this point, before you go any farther, add two coats of fibreglass resin to the entire fuel tank compartment, to fuel-proof it. When the resin

(Continued on page 28)

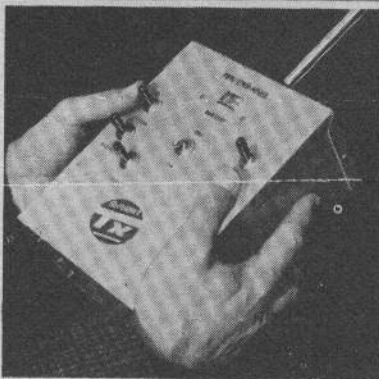


S. A. C. S. is the name for a neat little switch developed by well known modeller Jim Kirkland. S. A. C. S. means Slaved Auxiliary Circuit Switch. These are ultra light and have low drag operation; they are vibration proof and may be mounted in any position. Measure 13/16 x 1-5/8 overall. Jim uses one SACS to provide two levels of braking power to his WAG brakes. Can also be used to allow selective braking to either wheel, at either level of braking power. Jim uses one on his throttle control to switch in a nickel cadmium battery to the glow plug when throttle is in low speed to keep his engine going. Will be available soon in kit form from Ace R/C under license from Jim.



Photos by Bud Atkinson

RADIO MODELLER
JANUARY 1966



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gines with jerry rigged carburetors were all that was available. It just isn't so for modern R/C engines with well engineered carburetors, exhaust dampers, and idle bar plugs. You must use nitro in moderation to approach the performance built into your engine. Many modelers spend \$500-\$1000 on a model and then endanger the whole project by "saving" five or ten dollars a year on inferior fuel.

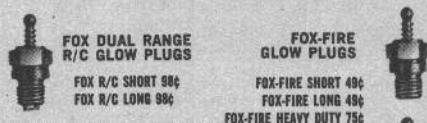
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Only \$6.95. Available through your Ace R/C dealer.

Adams Manufacturing Co.
Janesville, Wisconsin



The Stits Skycoupe

(Continued from page 27)

has hardened, add the 1/4 sheet top to the tank compartment, and cut and glue the windshield block in place. Turn the fuselage upside down, and apply two coats of resin to the inside surface of the 1/4 sheet tank compartment top, working through the opening in former 2. Install blind mounting nuts in the motor bearers, then add the remaining blocks to the nose assembly, and the fuselage is ready to carve to shape. Do all rough shaping with a very sharp knife, referring to the various fuselage cross-sections for proper contour. Finish the shaping with sandpaper, using progressively finer grades as you complete your work.

Covering and Finishing. I finished my Skycoupe in the colors of the prototype, using Glidden Daytona White ('59 and earlier) for the overall color, with Glidden Santa Fe Red for trim. These are approximately the colors of the original built by Ray Stits. Windows and license numbers were done in black. My finishing started with a fine sanding of the entire structure with 400 wet or dry paper. Two coats of full strength clear dope were applied to the entire structure, sanding between coats. Before this doping, I coated the entire nose with two coats of fibreglass resin, inside the engine compartment, and around the outside of the nose back to former 1, sanding down each coat with fine sandpaper. This not only adds fuel proofing, but greatly increases nose strength. After the entire ship has been clear doped and sanded, I applied the silk.

Three thinned out coats of clear were applied to the entire structure, lightly sanding to remove the fuzz from the silk between each coat. For filler, I mixed talcum powder into some thinned out clear dope to give a creamy mixture. Three coats of this were brushed on the entire structure, and everything allowed to dry for three or four days. This allows the dope to evaporate thoroughly and cure well before sanding again. At this point I started sanding with 400 paper, used wet. When finished, I checked the entire structure to make sure it was glassy and smooth. If I found any doubtful areas, I brushed some more talcum-dope on them, and wet sanded some more. After being satisfied with a good, slick surface, I sprayed on three coats of white. A couple of days drying time and this was wet sanded thoroughly. Two more coats of white and I was ready for masking off the entire ship for trim colors.

After applying the red trim and the

black windows and license numbers, I installed the rudder and elevator hangers, using 3/8 x 3/4 pieces of .010 nylon keyed in place with cut-off pins. At this point I installed and painted the wing and tail hold-down dowels. The tail hold-down dowels are not essential as you can glue the tail assembly permanently if you wish. I merely used a detachable arrangement to facilitate adjusting stabilizer incidence, if necessary. However, no adjustment was needed, so it could have been fastened permanently if you wish. I merely used ed I gave the ship two coats of thinned out clear Aero Gloss, sprayed on. These final coats help level off the ridges from the masking tape, and give the entire ship an even gloss overall. Now all that remains is to bend the landing gear parts, install them, add wheels, push rods, servos, tank, and engine, and you're ready for test flying.

Test Flying. Since this ship is quite tame and easy to fly, not much needs to be said about test flying other than to observe the normal precautions. Make sure the C. G. is properly positioned, and that wing and tail angles of attack are as specified on the plans. Check to see that all surfaces are true — no warps. If any warps are present, steam them out before flying. Because of the great amount of side area and the huge fin sticking up to get hit by the prop wash, this ship needs considerable side thrust to offset torque effects. Start with 3 to 4 degrees of right thrust, and adjust further if necessary after flight testing. On your first flight, start with a small amount of rudder throw to avoid violent rudder reaction on your first flight. You can increase the throw as you get the ship trimmed out if you wish, or as you get used to the big fin and rudder on the Skycoupe.

If your ship checks out with all settings as specified on the plans, you should need to make adjustments only to the rudder and side thrust on your first flights. If the ship turns to the left under power, but glides straight, or to the right, adjust side thrust until you get it going straight under power. Adjust rudder to give you straight glide with no power. If the ship tends to hang on the prop during climb, or wants to lift its nose up under power when flying into the wind, increase down thrust. If it stalls in the glide, adjust your C. G., or trim the stab angle of attack to make it more positive. If it glides too steeply, decrease the angle of attack of the stab. However, if you've built the ship true to the plans, you will need little adjustment. The original needed only side thrust adjustment, and slight rudder trim to get it flying properly.

When you've got the ship trimmed out, start trying some rolling maneuvers, such as Immelmans, Cuban Eights, Rolling Eights, and horizontal rolls. You're in for a surprise when you see what this ship will do in these maneuvers. Rudder-Only pilots could probably make a real hot ship out of the Skycoupe by trimming the C. G. and increasing decalage for rudder only flying.

Readers Write

(Continued from page 2)

subscription for 2 years of Grid Leaks. I can't afford the subscription to lag as the entire club that I am a member of reads it from page to page and it would be worth my life to turn up at a meeting minus the next issue.

R. BRENNAN
Riverwood, N.S.W., Australia

TAKE A BOW, BILL

Don't know when my subscription expires but hope I'll be notified in advance. Your latest issue is (March-April) beyond any doubt the finest ever published anywhere as every article was written for me. The article by Bill Campbell is what I've been (and every other reed flyer) looking for. Even my manufacturer couldn't (or wouldn't) supply such instructions on tuning. That one article is worth at least 5 years subscription to your magazine, and I would have paid more to get such information. Thanks again.

W. G. MacSWAIN
Ottawa 8, Ontario, Canada

WARPS

I just finished reading Sylvan Wolverton's letter in Grid Leaks pertaining to the problems of warp in the wings.

The answers given in Grid Leaks are very much to the point, however when one spends \$24.00 and up, one hesitates to replace half the wood in the box. I very seldom replace any wood. Bear in mind one thing, the drying of glue puts tremendous pressure on the balsa parts sometimes even pulling the pins out of the bench. A wing can be no truer than the surface you build it on. An inexpensive flush-type door makes a good bench top. I seem to have trouble building a work bench with an absolutely flat top so I bought an Adjust-o-jig, made in Frankfort, Indiana. It is very simple to use and if you can spare \$29.95, I highly recommend it. You can build wings and stabs on it. Not so good for extreme swept backs, though a jig of course is the easy way out. Now to the possible causes of your particular problem of building on a bench.

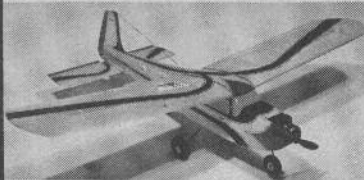
If possible you should get the bottom leading and trailing edge sheeting secured to the spars in the same operation as you do the top sheeting, or lay the bottom sheeting on the bench, glue the bottom spars along the rear edge of L E sheeting place ribs, add top spar, secure top sheeting to spar, then reach in with a Q-tip to spread glue on edges of ribs, then secure sheeting over the curve with masking tape. Now this is very hard to explain on paper and it may take a few more letters to whip this problem but it can be whipped. You are 100% right on one point, I have never yet been able to get a warp or twist out of a panel, once it is in there, no amount of steaming or bending gets the warps out for me. Also sometimes on a 4 way taper wing, some heavy T E stock, the largest you can find, can be scooted under the panel, from the rear to support the assembly.

MAC SMITH
Greenfield, Ohio

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FOR FLYABILITY YOU CAN'T BEAT A MAMBO!

Mighty Mambo



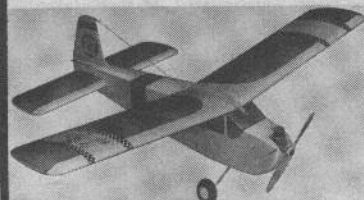
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BOX 301

Motor Control Detector

(Continued from page 7)

and watch capacitor and diode polarities. I like to build the circuit from the input and continue right down the schematic. A 37½ to 40 watt iron and Ersin Multicore solder is recommended for construction. When all finished soldering, clean the PC board with isopropyl alcohol and an old tooth brush. Inspect the board and touch up any bad solder joints.

The following adjustment procedure is recommended for the motor control circuit:

1. Check batteries—they should read 1.2 volts per cell or a total of 4.8 volts.
2. Viewing the trim pot, adjust to the maximum resistance by moving pot arm to the extreme right (clockwise).
3. Turn on the transmitter and receiver power supply. Check to see that the rudder actuator is functioning properly.
4. The motor control detector will be operating (turned on), motorized servo systems will continue to cycle, escapements will pull in and hold.
5. Move trim pot slowly to the left (counter-clockwise) until the motor control detector turns off, ie., motorized servos stop cycling and escapements drop out.
6. Move trim pot 1/64 inch further to the left (counter-clockwise) for stable operation of the motor control system.
7. Press and release the motor control button on the transmitter. Motor

control device should cycle to the next position in its sequence of operation.

8. The adjustment of the trim pot is very important for proper operation and should be done with great care as outlined above.

9. If unwanted motor control changes occur, this is an indication of decreasing battery voltage. Check batteries and they should still read about 1.2 volts per cell. If they are OK readjust the trim pot.

This method allows step by step check of proper circuit operation. Some of the step checks may be eliminated after the user becomes more familiar with the circuit's operation.

R/C Slotless Racing

(Continued from page 12)

through the bearing hole on the opposite side of the gear box. With this alignment, the clamp was tack soldered in three points. The motor was removed and the soldering of the clamp was completed. To provide more chassis space the gear box length was cut down to a minimum and reassembled with spacers soldered at its ends.

Now, in turning a car, the wheel on the outside of the turn must rotate faster because it has further to travel. If both rear wheels are secured to the axle, then in a turn, one must slide the difference each wheel travels during this turn. This is undesirable because it reduces the turning radius, causing slip-

page in the front wheels. This in turn causes a great amount of drag which loads the drive motor and reduces the speed. This is overcome by driving only one of the rear wheels and allowing the other to turn freely on the axle. This is best done by pulling one wheel from the axle and drilling it larger so as to turn freely on the axle. Retaining washers or eyelets are then soldered to the axle on both sides of the wheel. This is how I should have done mine, but due to a lack of foresight, plus a few goofs I achieved the same results with a lot more work.

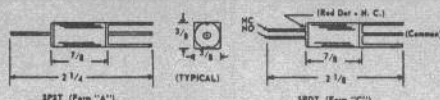
For all soldering, I strongly recommend "Stay-Brite Silver Solder" by J.W. Harris Company, 433 West Ninth Street, Cincinnati 3, Ohio. This sells for one dollar and works as easily as regular solder with your normal soldering iron, but is five times stronger.

Next the radio, switch, batteries, and motors are wired up and the car tested and adjusted before adding the body.

With the transmitter pulsing at a 50/50 output, the receiver relay armature tension should be adjusted for a 50/50 output. This is indicated by the steering motor shaft pulsing slightly, but not rotating in either direction. Movement of the transmitter control stick should cause the drive motor to drive one direction or the other at a rate proportional to the stick displacement. The direction can be reversed by reversing the connections of the motor leads. The assistance of someone experienced in pulse work would be helpful for adjustments.

These model cars are very helpful in aiding a modeler in learning to understand pulse systems without first wrecking several airplanes. Pulse systems, particularly with relays, require a bit of tinkering and experience to achieve a reliable proportional system. On your mark, get set, go!

OMEGA REED SWITCHES



MODELS	SPECIFICATIONS				
	AR-300	AR-500	HR-1	300-DT	HR-DT
Resistance Ohms:	300	500	3600	300	3600
Turns:	4K	5.5K	15K	4K	15.5K
Type:	#40	#41	#44	#40	#44
Weight Grams (Nominal)	(- - - SPST Form "A" - - -) (- - - SPDT Form "C" - - -)				
Switch:	4.5	4.5	5.0	4.5	5.0
Leads:	Hamlin, Inc., Hermetically Sealed All Types				
SENSITIVITIES	All Types & Models, Solder Tinned or Gold #24 Gage				
Pull-In-Current (Max. Value)	10ma	7ma	2.6ma	10ma	2.5ma
Pull-In-Voltage	(1.6 to 2.8V)	(1.8 to 3.8V)	(4.5 to 8.0V)	(1.6 to 2.8V)	(5.0 to 8.0V)
CONTACT RATINGS	(RESISTIVE LOADS -- INDUCTIVE LOADS MUST BE PROTECTED)				
Max. Voltage:	250v	250v	250v	28vdc	28vdc
Max. Current (Steady State)	.5a	.5a	.5a	.25adc	.25adc
Max. AC Power	12va	12va	12va	NA	NA
Max. DC Power	10w	10w	10w	3 Watts	3 Watts
Life Expectancy:	10 x 10 ⁶ Operations at full rating @ 12 operations/second.				
Packaging:	Each Model packed in a 3/8" x 2" x 2 7/8" plastic box.				
LIST PRICE:					
(Within Above Spec Pull-In)	\$3.50 p.p.	\$3.75 p.p.	\$4.00 p.p.	\$5.95 p.p.	\$6.95 p.p.

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OMEGA DIVISION, SILICONE SEALS, INC.
 3694 MILWAUKEE AVENUE, CHICAGO, ILL. 60641

Adams Actuator

(Continued from page 5)

of 425 milliamps. The average drain at 3.6 volts pulsing is approximately 290 mls.

Battery life will be improved if the transmitter is kept pulsing until the receiver and actuator switch are turned off, since this will prevent it from having full stalled drain.

One important thing to remember is that when reassembling a twin actuator, the coil through the screw must be thoroughly tightened down before re-soldering the overlap of the two frames where they meet at the coil. If left loose while soldering, soldering may fill a small gap between the members, and act as a magnetic barrier, causing a reduction in efficiency and torque. We hope you will like the extra power at the slight increase of battery life that this gives you. As most any pulsing fan will tell you, however, nickel cadmiums are a must for good pulsing anyhow, and with nickel cadmiums the extra drain can quite easily be tolerated.

Completely wound coils ready for your assembly may be had at a later time when announced. The price will be in the neighborhood of \$3.00.

The Open Channel

(Continued from page 2)

R/C is a big field running all the way from simple single channel equipment, which is still selling like hot cakes most manufacturers report, to the exotic ump-ten channel propo units which cost more than a color TV set. And if you feel R/C is big now, as Al Jolson used to say, "You ain't seen nothin' yet!" Where it goes will depend on people like you. Whether you are a Sunday flier or an ardent contest competer, whether you home brew your own radio gear, or buy only the finished box and couldn't care less as to why it works—whatever your connection with R/C, the future of the industry depends on how well informed and knowledgeable you stay. That's what we hope to help you do in coming issues of GL.

Speaking from personal experience—on the local cowpasture flying field east of our house only about a quarter of a mile—there is much to be said for simple, single channel, proportional flying. Son Tom and I resurrected a four or five year old Nomad we had down in the workshop, took the escapement out and put in an Adams single actuator. We had gotten one of the new SSH Citizenship relayless receivers and wanted to test it out. This with an Ace Add On Switcher kit and three 225 ma. nickel cadmium batteries fixed up the ship. I had better stop right here and mention that the Nomad is a 48" sail-plane type powered with either an .010 or .020 engine to take her upstairs. Design was by Ted Strader and the plans appeared in FLYING MODELS.

The last two weekends, Tom and I have had a ball. We used a Jansson GG Transmitter—using only the rudder portion of the stick—or a transmitter left here by Dick Adams on his visit last year. After the first flight, Tom yelled, "You can throw away my control lines, Pop, this is the only way I'm gonna fly from now on!"

The Nomad, which had not been too successful as an escapement ship, because Pop was heavy thumbed and left the button down too long, was a sweet flyer on proportional rudder. With the .010 screaming, as only an .010 can, the ship would seek altitude. Then came minute and minute of soaring, after the engine cut and we brought the bird back to earth. It's no wonder that R/C continues to thrill the old-timer, and look so intriguing to those outside. A Nomad type of experience could make the bug bite anyone.

Tom and I will have to retire the Nomad, the glue joints are quite brittle and she's soaked up a lot of fuel. But coming to a rapid finish in our basement work area are two projects—they are one of Len Purdy's Lanier Transits, and Ted Strader's Gypsy. The Gypsy, Tom says, will be so he can hand over the stick any time after launch and get the bug to bite some of his buddies. Bet it does, too. More on our projects later—there are several others cooking.

(Continued on page 32)

AMA Wins Frequencies

(Continued from page 25)

tions by some of the manufacturers who make the devices that operate cranes for the industrial plants which share this spectrum of frequencies.

The Frequency Committee members then really rolled up their sleeves and went to work and documentation was procured from the Space Program, from the RCIA and from many sources to show just cause as to why R/C was a sport and not just a toy, and with the country requiring and needing more and more skilled technicians, model aviation of the R/C variety could help semi-train people.

This was presented by Courtney and Associates to the FCC in November, 1965. Mr. Courtney was quietly optimistic, and continued to be so. And then came May 12, 1966 and AMA Director John Worth made public the pronouncement that our new frequencies were an accomplished fact!

I know I speak for the committee when I say we are proud to have made the grade. I also know that if it had not been for the Academy of Model Aeronautics which launched this effort, we wouldn't have this extra. So let's use the new spots legally; let's make an effort to see that we get every one licensed; and let's give the AMA a whole heap of credit. By the way, do you belong to the AMA? If you don't, don't you think this is one big reason why you should?

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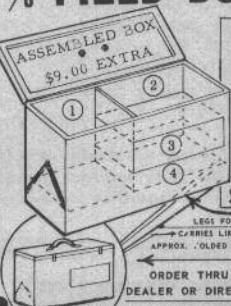
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The Wild One, a really hot and aerobatic ship, built by Norman Rosenstock, President of the L. I. D. S., will be a featured plan in the September-October issue of GL-RCW. Watch for it.

The Open Channel

(Continued from page 31)

Associated with the new GRID LEAKS—RADIO CONTROL WORLD, is Bud Atkinson (photo on page 2) on an editorial consultant basis. Bud has also joined the staff of Ace R/C on a consultant basis, so we'll have the pleasure of working very closely with him. I know many of you know Bud, but for the benefit of those who do not here is a brief run-down: Bud has been in R/C 15 years or more. He is a well known contestant, having made the National many years. Bud is quite noted in Scale. His design of the Aristocat was published by AMERICAN MODELER and is kitted by Midwest. His Propocat was published by MODEL AIRPLANE NEWS this year. Bud is working on a scale of the Corben Super Ace, a prominent home built of the 1930's. It will appear in an early issue. Bud is also at work on several other projects some of which are a bit hush-hush. He will be flying one of the proto-types of a new proportional design by Phil Kraft

before too much longer. More on this later, too.

Besides Bud Atkinson, we have also added another KC RC member—Carl Lindsey (photo on page 2). Carl is another well known modeller, and will be remembered as the CD for the two Heart of America contests held recently. Carl has been added in an art capacity—and will be doing many of the full size plans GL will be having in the future. He will also serve in a consultant capacity editorially and is on the trail of some hot features for GL.

Model airplanes get quite a good boost in the motion picture "Flight of the Phoenix." If you haven't seen it, it's well worth seeing for other things beside the pitch on the dignity of model airplanes.

Briefly, the plot concerns itself with the rebuilding of a crashed C119 Fairchild Packet. In the desert sand storm this is forced down in Arabia and the international crew from all over the

world on leave from the oil fields decide to rebuild it into a single engine aircraft. The German engineer, Heinrich Dorfman, with his slide rule makes the necessary calculations to achieve a flight-worthy design. Only as they are about to try it, does Captain Frank Towns, played by James Stewart, reach the startling conclusion that Dorfman is an engineer with a German MODEL firm. There are serious doubts and it is Dorfman who delivers the rather passionate lines which will give every modeler a thrill. Should change a lot of laymen's ideas about our "toys". Believe you'll like it.

Write!

Paul F. Bunge

Editor

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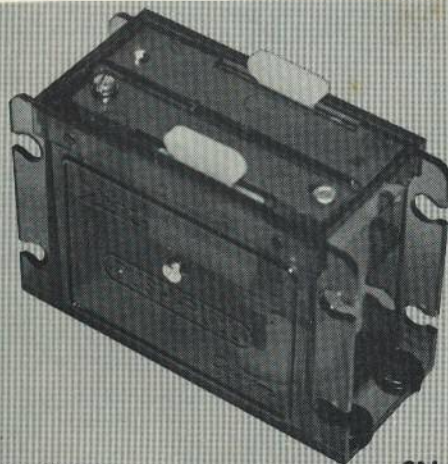
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