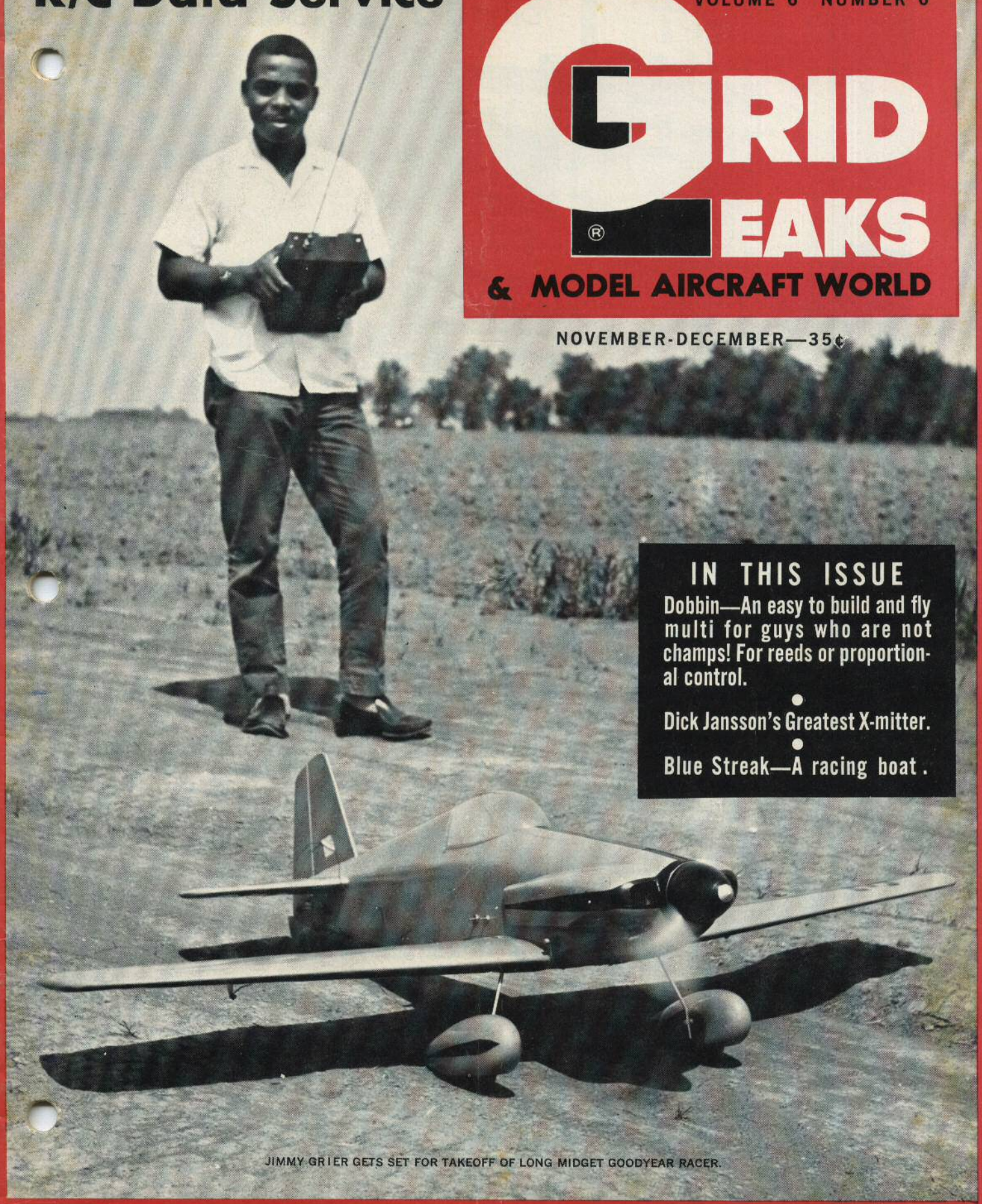
R/C Data Service

VOLUME 6 NUMBER 6

GRID GEAKS®

& MODEL AIRCRAFT WORLD

NOVEMBER-DECEMBER—35¢



IN THIS ISSUE

Dobbin—An easy to build and fly multi for guys who are not champs! For reeds or proportional control.

•

Dick Jansson's Greatest X-mitter.

•

Blue Streak—A racing boat.

JIMMY GRIER GETS SET FOR TAKEOFF OF LONG MIDGET GOODYEAR RACER.

8th YEAR OF SERVICE TO THE R/C MODELER

DIGITRIO TRANSMITTER KIT

Parts Price List

REFERENCE NO.	DESCRIPTION	QUANTITY IN KIT	LIST PRICE EACH
Ant.	C'aire. C. L. Antenna	1	6.95
C1	100PF Disc Condenser	1	.15
C2	16PF Disc Condenser	1	.15
C3	.1 MF	1	.35
C4-C5	.005 MF	2	.25
C6-C7	.50 PF	2	.15
C8	7-100 PF Trimmer	1	.60
C9	27PF Disc Condenser	1	.15
C10, 17, 19, 20, 21	.001 MF Disc	5	.15
C11, 12, 13	.05 MF Disc	3	.30
C14	1.0 MF Tantalytic cond.	1	.90
C15, 18	.1 MF Tubular cond.	2	.35
C16	.01 MF	1	.15
C22	.01 MF Tubular	1	.30
C23	100 MF Electrolytic	1	.90
C24	15 MF, 15 volt Tantalytic	1	.70
D1 thru D6	Silicon Diode DHD-806	6	.35
J1, J2	Phono Jack, one hole mt.	2	.25
L1, L3, L4, L6	47 UH RF Choke	4	.40
L5	RF Amplifier coil	1	.50
L2	Osc. coil Pre-wound	1	1.25
M1	Meter 200 UA Movement	1	4.95
Q1, 2, 3	2N706	3	1.65
Q5	2N2160	1	2.00
Q4, 6 thru 11	2N3638	7	.90

REFERENCE NO.	DESCRIPTION	QUANTITY IN KIT	LIST PRICE EACH
R1, 6, 11, 14, 16, 18, 20, 25, 26	1K ¼ Watt 10%	9	.12
R2, 8, 9, 33, 37	4.7 ¼ Watt 10%	5	.12
R3	47 Ohm ¼ Watt 10%	1	.12
R4, R5	330 Ohm ¼ Watt 10%	2	.12
R7	50K Variable Pot	1	1.00
R12, 17, 24	27K ¼ Watt 10%	3	.12
R13	10K Variable Pot	1	1.00
R15, 19, 21, 22, 23, 27, 29	10K ¼ Watt 10%	7	.12
R28	180 Ohm ¼ Watt 10%	2	.12
R30, 31, 34, 35, 38	10K Variable type J	5	2.25
R32, R36	22K ¼ Watt 10%	2	.12
S1	DPDT Toggle Switch	1	1.59
Crystal	26.995 thru 27.255	1	3.95
Z1	5.1 Volt Zener diode	1	1.70
Hardware	Ant. Grommet ⅜ x ½	1	.05
	PC Board with Ant. Bracket	1	3.75
	21 ft. asst. colors hook up wire	1	.50
	Case Assembly only, no holes	1	2.95
	Transistor Heat Sink	2	.45

The Digitrio Transmitter Kit is now available at a cost of $69.95. This includes all parts needed to construct the Tx except the control stick assembly and the power pack. The case comes without any drilled or punched holes. The printed circuit board lead holes are drilled and a bracket for the antenna is installed.

Delivery dates of the Digitrio Receiver Kit and the Servo Kit will be announced soon. Price of the Rx kit will be about $60, and the cost of each Servo kit will be approximately $25.

We, here at Controlaire and World Engines, have had an opportunity to thoroughly test and examine the Digitrio equipment. We've checked the circuitry in the test lab and the operation on our 'scopes and in the **air.** Jack Port was extremely impressed with its performance and the abilities of Mr. Ed Thompson, designer of the Digitrio. It receives our strongest endorsement.

WORLD ENGINES

INCORPORATED

8206 BLUE ASH ROAD CINCINNATI, OHIO 45236

CONTENTS

PAUL RUNGE, Publisher—WILLIAM WINTER, Editor
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GRID LEAKS AT PLAY

• It looks like things have a way of going full circle.

There is much talk about the use of polarized antennas. There is something in this issue, and it has been mentioned in other magazines, concerning the use of a music wire antenna, sticking straight up out of the aircraft, and polarized with the antenna on the ground. That is that they are in the same geometric plane.

This is really an old trick, and was used a great deal in the early days of Citizens Band R/C and even prior. It is interesting to note that many of the people who have come into R/C since the early days, apparently hail this as an entirely new innovation—and a great discovery. It does make good technical sense, and whether yours is a proportional unit or not, you can take a leaf from the oldtimer's book, and put a polarized antenna on your airplane and really be up to date.

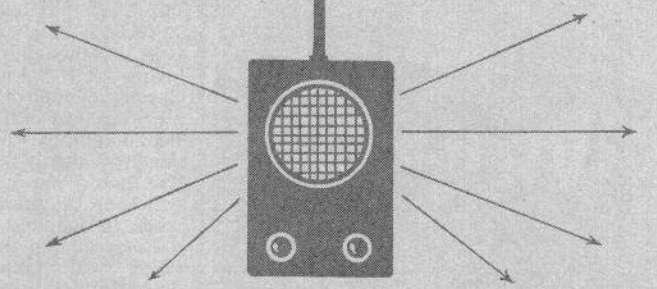
From a well known flyer in the Chicago area, comes word that they are now able (in spite of the interference that is apparent) to fly some superregen ships successfully. This is the result of several things, it is thought. Primarily, it is the fact that the FCC has clamped down on the two-way voice users quite stringently with recent regulations, and also the fact that superregen receivers have seen some considerable improvement in technology as the years have gone by. A new patent has even been issued on a *(Continued on page 30)*

TO OUR READERS

A new post office directive requires publishers to pre-sort magazine mailings by 5-digit zip codes. In order to insure the same prompt delivery of your copy of Grid Leaks, please check the address label from this issue. If it does not contain the 5-digit zip code, please write it in and mail it back to Grid Leaks, Grid Leaks, Box 301, Higginsville, Missouri 64037. Thank you.

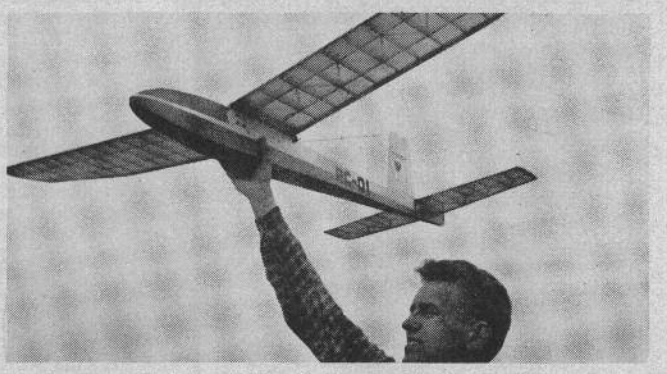
THE MONITOR

Regular round-up of new and overlooked aspects of the growing R/C field • Shop talk and just talk • A discussion corner.



■ HAPPY EDITORIALISTS keep writing about an adult RC sport and the bonanza to come when 500,000 battery-using, fuel-burning, crate-smashing addicts take to the weekend air like the carrier-pigeon clouds of yesterday. This utopia understandably sends chills down the spines of the reactionaries who just want to fly. Flyers don't stand against progress, of course, even if they indulge a "selfish" desire to get in uninterrupted (!) flights, and tour the vanishing open spaces looking for game sanctuaries to preserve the species.

City dwellers and suburbanites feel the pressure. On the Long Island side of New York City, local clubs have achieved miracles of togetherness, despite appalling handicaps. Two clubs numbering approximately 150 people have two official flying sites approved by Nassau county. One is an ex-AFB, where they are assigned a portion of one concrete runway, currently available between certain hours on weekends; the other, a clay-like spot on the edge of a marsh through which fishing boats follow channels, and where high-tides regularly

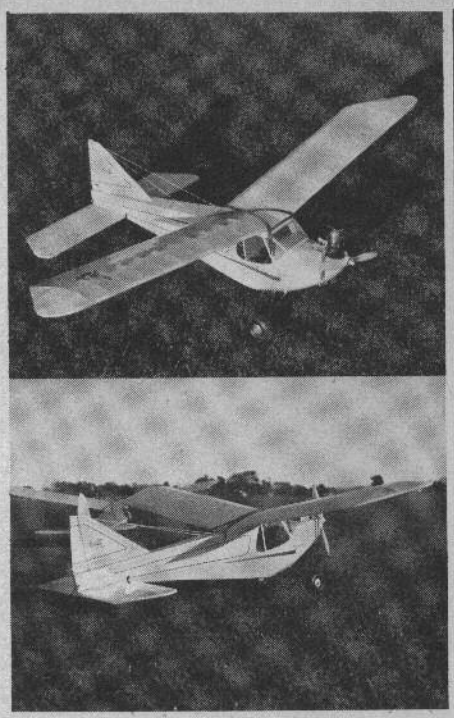


A Saturn sailplaine, Michalovic, at Czechoslovakian contest last June. Span 80½ in., 4-tube rcvr, magnetic actuator.

make most of the place too soggy for walking. In this latter area, despite warm weather stock car races which raise a tremendous din, and guys who blast shot guns in the marshes, it is the toy airplanes, natch, that draw warlike protests.

The air base is agreeably shared by go-carts, a pony trotting track, rocketry, Jim Connor racing of sport cars, U-control (hurray) and, from time to time, other mysterious activities. But when the sports cars run, the RC planes are grounded. Regulations currently ban week-day use altogether. When the sports cars take over the place on Saturday, a Sunday (violent winds please don't blow) produces a day-long jam session which commonly puts four crates into the air simultaneously, and it is not extremely uncommon to see two guys fly through each other.

Mufflers are required. Co- *(Continued on next page)*



Tranquilizer? The crate Mr. Curtiss is talking about — his letter at the right.

MONITOR . . . continued

ordination among the flyers is something to behold (a range check usually takes the form of a long sneak taxi run before take-off!), with seemingly casual but actually religiously practiced observation of all frequency flags up and down the line and out on the runway.

One must have both AMA (decal on wing) and FCC license—good thing. If you would join the fun, you must obtain from the county a beginner's flying permit which entitles you to fly provided you do so under the observances of a senior permit flyer. When you pass a simple test, showing that you can takeoff and land under good control, a flight examiner will sign your senior application. This goes to the county and then you get your ticket. Like a lot of other guys, yours truly recently went through this routine—and we are grateful!

* * *

The chap hand launched our Rebel for us. It skimmed out across this air force base runway, heading for the weeds. Inside the ancient airplane was the new Adams double-ended pulse actuator, in the nose a .15. If you've flown these old rudder jobs—notably the deBolt series which magnify this particular characteristic—you know that starting a turn, quickly reversing it, and repeating the procedure quickly as many times as necessary, will get the nose up and start a climb—even with a sick engine like this one. But when you can't pull power to maintain flight, down comes the nose, and the emergency procedure is repeated—over and over, as the ship skims the weed tops into the distance, eases around a 1000-foot radius turn, skirts the flying area perimeter, sneaks behind the parking area (ready to be dumped just in case!) and back around the takeoff point with all of 10 feet finally between the nifty looking Williams wheels and the hard concrete.

But the crowd eats it up. No spectacular multi exhibition draws such interest. They love it and show their approval when it lands wildly under power (no engine control either!). Why? (*Continued page* 27)

Readers Write

LONG LIVE THE TINKERER

Thank goodness somebody at the editorial end of radio control news publications has seen fit to devote plenty of space to the tinkerer!

Long before Mickey Mouse, Kicking Duck or Galloping Ghost made the scene there were tinkerers like Franklin and Faraday, Alex Bell, Sam Morse and Signor Marconi to take the volt-jolts and figure out why what happens.

Today's applications daily open new lines of thought, spawning new notions, giving birth to new ways of using The Button to control The Machine. We may all wind up with wide hips and muscle-bound thumbs while twiddling our RC inventions, but it seems a bit more productive than doing crosswords. Both endeavors will keep the brain tuned up, but only RC leads to tangible and worthwhile results!

Keep up the worthwhile work you are doing with GRID LEAKS, and pus us down for a six-issue subscription.

GEORGE BOURNE, Ottawa, Can.

B.O.M.–HE STARTED IT

I enjoyed the B.O.M. editorial in the July-August issue and it is a pleasure to see someone take a pro stand at any time.

I really started it all. Would like to clarify one thing, however. The letter I wrote to AMA (published in the December 1962 *Model Aviation*) was not a condemnation of ready-to-fly aircraft models (I am opposed to the use of these in competition), but the wording of the ad. Let me quote from that letter.

Paragraph #3, page 14, MA, Dec. 1962 (Views and previews): "Here is a case of a firm advertising custom-built models —R/C, scale and flying models of other types. I have no complaint with this portion of the ad. However, this company advertises that they will give reduced rates to AMA club members. If models are built for these members, they surely end up on the contest field. An advertisement of this type with AMA in the ad would appear to have AMA endorsement. I am sure this is not necessarily so, but the impression is there."

There was more, but this constituted my major objection to the ad.

Now came the rebuttal, and except for one individual, all were from the West Coast and all were Class III flyers. I have not seen any C/L or F/F men object to B.O.M. rule in print nor have I heard any flyer of any type object at any meet I've attended.

The first two to argue against my letter and the rule were Jerry Nelson and Nate Rambo, then Doug Spreng got involved. There have been some rumblings since then until we got to a certain magazine. The editor stated that he welcomed views on this subject, so I wrote to him. The only views which he publishes, however, are those which go along with his. . . . he surely is not giving all of us a voice. Printing only the biased views can cause a major portion of any voting to go his way. I do not condone this practice at all. The printed word has an awful amount of influence.

I would like to see the views of some of the top Class III men published—Izzo, Kazmirski, Kirkland, and others, on this side of the Sierra Nevadas. (GL does not know their views—Ed.) I've talked to some, and to people who've talked to others and I'll bet the majority *are for B.O.M.*

What I'll never understand about these people who are against B.O.M. is this: They state that the model is relatively unimportant, yet in every construction article and kit one sentence usually stands out. "Exercise care that all surfaces are true and aligned according to specifications," or words to this effect. I imagine that all will agree a warped airplane is difficult to fly. How can they justify the statement that the aircraft is an unimportant factor.

I have no objection to prefabrication but I cannot see custom-built models being used in competition, and I doubt very much that very many flyers feel differently.

I do not expect to see this in print, but I did wish to express my views. Needless to say, I'm boosting the B.O.M. rule on every occasion that I can. I do not wish to see our major meets evolve into sessions for those individuals that can purchase $150.00 models, be they C/L, FF, or R/C. I will never agree with Dr. Lein that the modeling fraternity is being kept from competition by this rule—or the contrary. I believe that to abandon the rule would do just this.

HOWARD CRISPIN JR., AMA 568

REED POTS–COLOR CODED

No doubt you have hated yourself when tuning a multi transmitter/receiver (with reeds) by getting on the wrong reed or pot corresponding to the control you are tuning —so you have *another* control out of tune. An easy method I use is to color code the pots or pot holes on the transmitter with small paint marks corresponding to the color of the wire on that particular reed in the reed bank—easy visual identification and also very helpful if two or more fliers share the same equipment!

BOB GAEDE, Baltimore, Md.

OTHER SIDE OF THE TRACKS

Would like to express my appreciation of GRID LEAKS as the best in its field. This makes my 35th year as a model builder and I am looking forward to the next issue.

First contact with radio was the old Good Bros. outfit put out by Beacon. Still have an old Aero-Trol put away. Did a little contest work after the war in control-line but have always been more interested in the building and flying, although I like to attend and work at all the local contests.

Be sure to keep us sport flyers in mind in GRID LEAKS. The single-channel, escapement, or servo, pulse-rudder, and G.G. flyers who would probably like a multi outfit but are not quite that well to do, but who have more fun then all the multi-millionaires put together.

C. W. HANNAH, Derby, Kan.

THOUGHT OF EVERYTHING

I have just finished a Taurus, the first model I have built in about six years. For whatever it may be worth to other modelers, I have picked up a few ideas that may or may not be new, but would like to pass them along.

1. I used a cardboard carton about [illegible] feet square, after the plane was silked, and cut three holes in the box. These holes measured approximately 5 x 8 inches. These holes were covered with the scraps of silk that were left. Then while painting

(*Continued on page* 32)

FLASH

FAMOUS Sonotone NICKEL-CADMIUM...

NEW LOW PRICES NOW EXCLUSIVE from GM HOBBIES

AN UNEXPECTED VOLUME OF SALES HAS ENABLED US TO REDUCE OUR PRICES.

NOT JUST A NICKEL-CADMIUM BATTERY BUT A *QUALITY-ENGINEERED* PRODUCT ENTIRELY MADE IN THE UNITED STATES.

■ **ALL SINTERED-PLATE CONSTRUCTION** gives maximum amperage and enormous discharge ability without damage to the cell. Sintered-plate construction prolongs the life of **your** battery and increases the number of charge/discharge cycles you can process. Can deliver up to 25 times its rated capacity without damage to cell.

■ **SONOTONE/GM DISTRIBUTED BATTERIES** are engineered for performance at all temperatures...from minus (—) 40°F to plus (+) 165°F.

■ **SAFETY VENTS ON ALL SONOTONE/GM** distributed sealed Nickel-Cadmium batteries are designed to protect your battery from excessive internal pressure due to any abuse. Tests prove hundreds of cycles are possible after venting. **ONLY SONOTONE/GM** sintered button cells are automatically supplied with safety vents.

■ **WELDED CONSTRUCTION THROUGHOUT** enables Sonotone Nickel-Cadmium to withstand extreme vibrations, shock and acceleration. This superior construction gives you reliable performance and longest life for your investment.

■ **SONOTONE/GM** distributed Nickel-Cadmium Batteries are **Guaranteed First Line, Factory Fresh!**

Only Sonotone delivers all these features in a button cell.

- **ALL SINTERED-PLATE CONSTRUCTION**
- **ALL SAFETY VENTED INCLUDING BUTTON CELLS**
- **WELDED CONSTRUCTION THROUGHOUT**
- **GUARANTEED FIRST LINE, FACTORY FRESH**

***IF YOUR PACKS ARE NOT SONOTONE, YOUR DEALER CAN OBTAIN THEM FOR YOU...OR WRITE US!* DEALER INQUIRIES INVITED.**

SPECIAL GM INTRODUCTORY PRICES for Sonotone quality Nickel-Cadmium Batteries. All batteries are Sintered-Plate construction.

225 MA BUTTON CELLS WITH LUGS

No. Cells	Output	Wt.	Lgth.	Dia.	Price
1	1.2V	.5 oz.	.34"	1"	1.61

500 MA BUTTON CELLS WITH LUGS

1	1.2V	.9 oz.	.380"	1.340"	2.30

CYLINDRICAL CELLS

Pencell-600 mA	1 oz.	1.95"	.895"	2.24
AA Pencell-500 mA	.8 oz.	1.95"	.557"	2.10
SUB "C" Size-1.2 Amp	1.8 oz.	1.650"	.875"	2.90
"C" Size-1.8 Amp	2.6 oz.	1.942"	1.027"	3.80
"D" Size-4 Amp	5.5 oz.	2.359"	1.290"	7.16

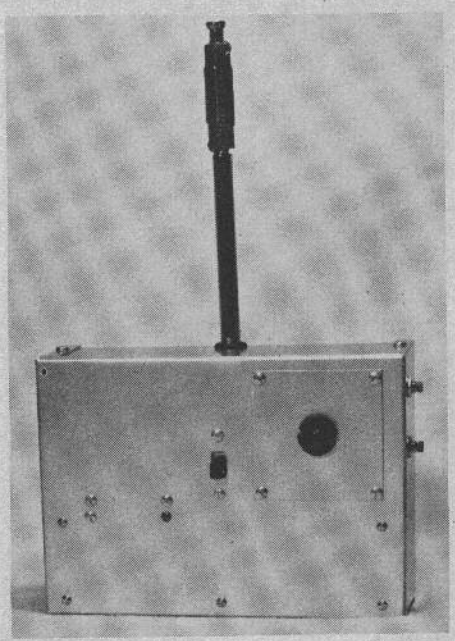
GM HOBBY SPECIALTIES INC.

2094 Fifth Street East Meadow, L.I., N.Y. 11554 **516-489-1123**

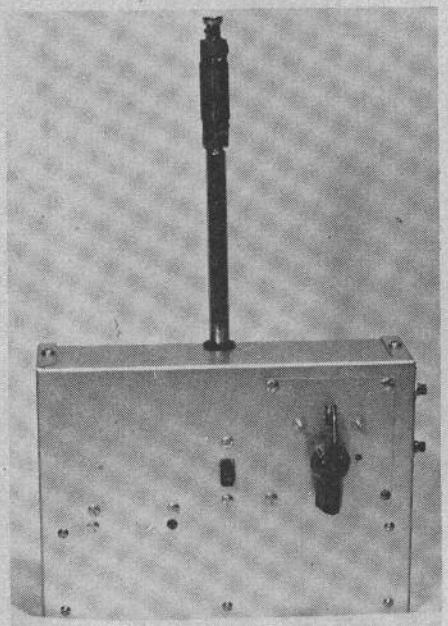
COMPLETE 1965 AIRPLANE AND R/C CATALOG—95 PAGES *JUST RELEASED*—50c

THE JANSSON TRANSMITTER

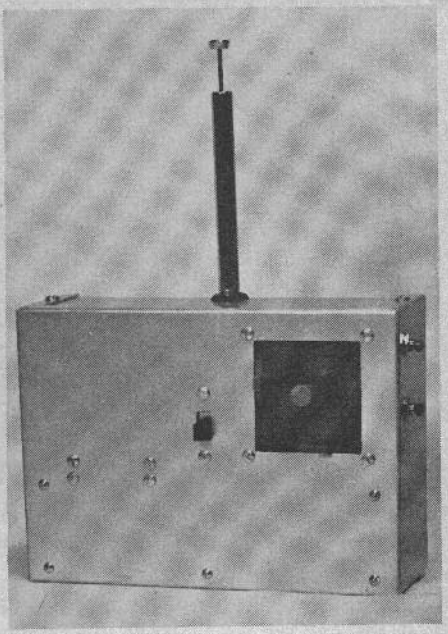
The control flexibility designed into this equipment provides new opportunities for experimentation in progressive classes of flying. Breaks cost-versus-change barrier.



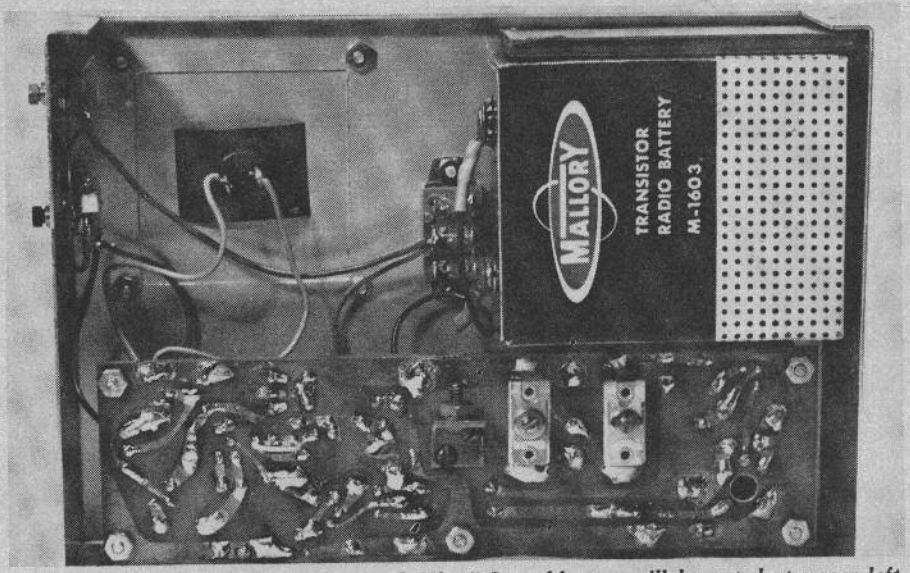
Prototype with rudder-only pushbutton.



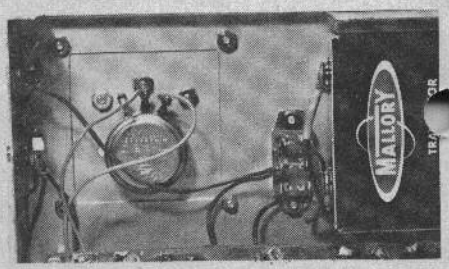
With left-right knob for pulse propo on RO.



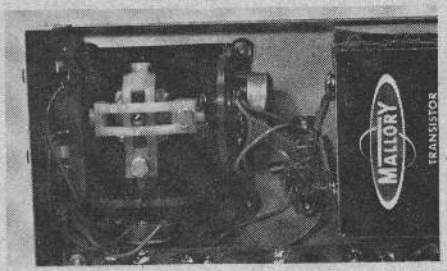
With Bonner Digimite stick for GG propo.



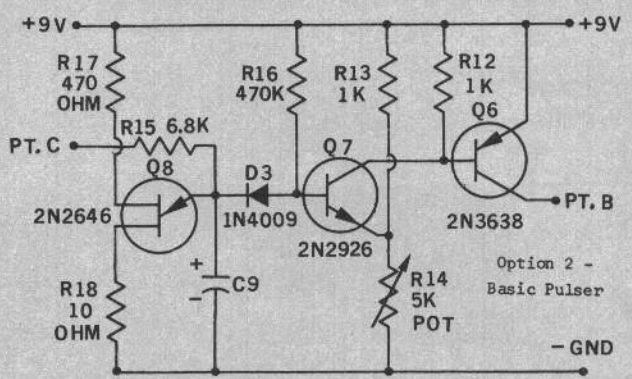
What you see with rear cover removed. The RO pushbutton will be noted at upper left.



Control knob pot, used in proportional RO.



Rear view of the Digimite stick assembly.

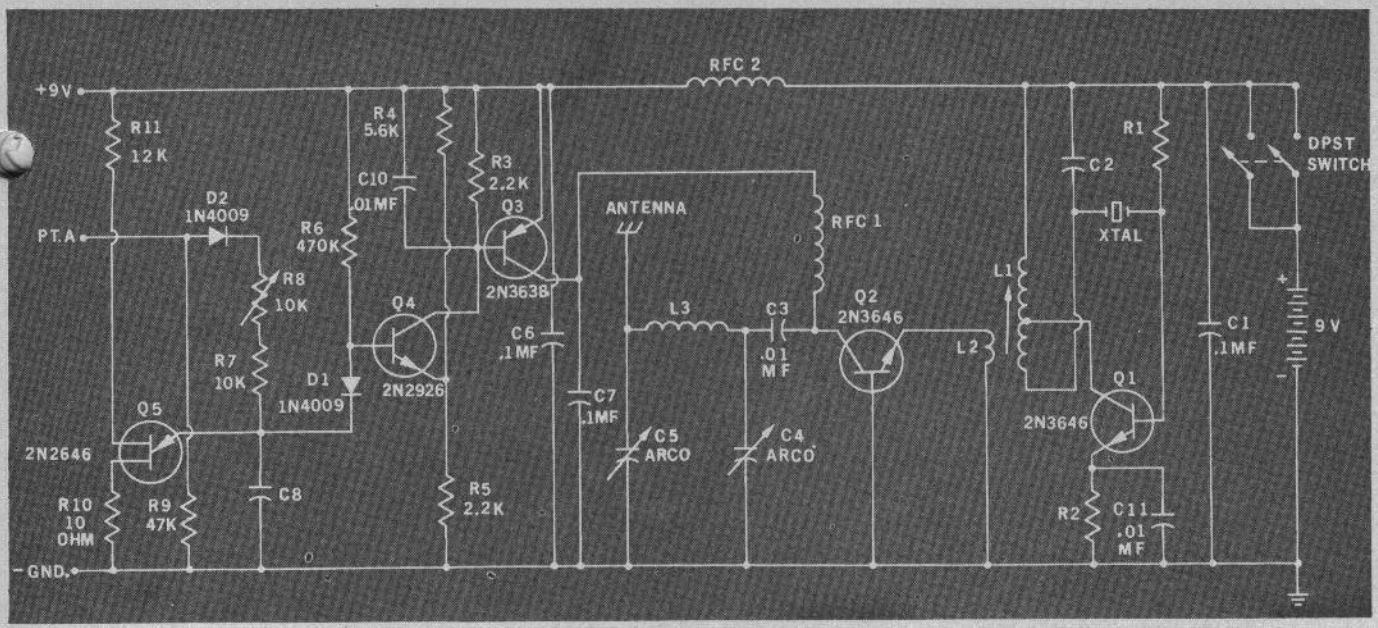


S2=30A9, S3=30A17 (low motor), S4=30A16 (High), S5=30A16. C-9=8mf 25V (=7.5 to 20 pps); 6mf 25V (=10 to 27 pps); 4mf 25V (=15 to 40 pps). Schematic is pulser.

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

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

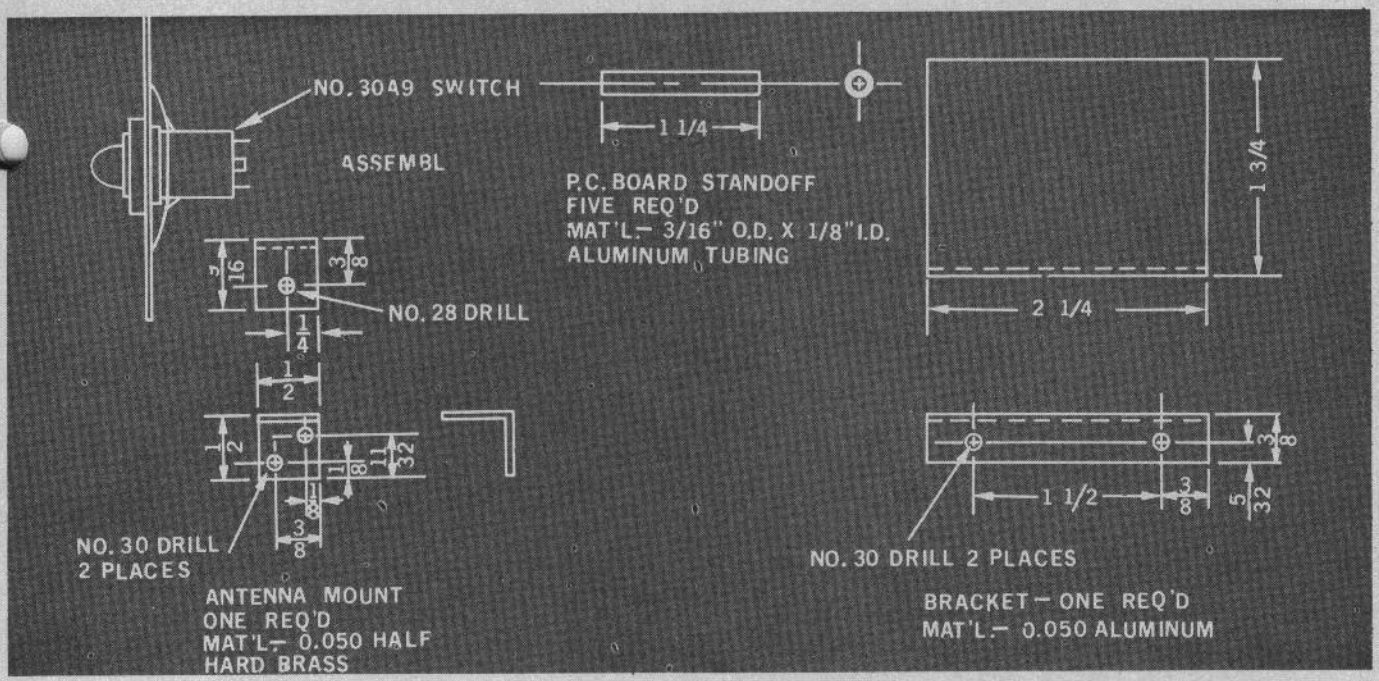
The transmitter described in this article is aimed at breaking down this cost versus-change barrier. Earlier efforts (G.L. July-August 1963) were aimed in this direction, but did not find themselves commercially acceptable. One of the large cost-reduction factors now being found in radio control equipment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

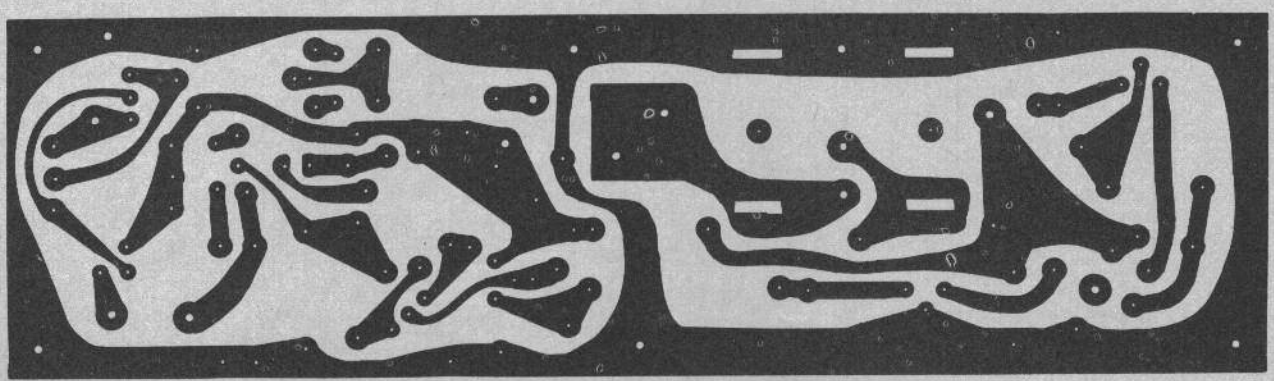


C8 = 0.082mf (= 450-900 cps); 0.047mf (= 800-1.6kc); 0.027mf (= 1.4-2.6 kc); 0.015mf (= 2.5-4.9kc). Mallory 1603 or equivalent. L1 = 7¼ turns #26AWG wire tapped 4⅛ turns from bottom (+ 9V) on CTC 2173-3-3 form. L2 = 2¼ turns #26 AWG wire over center of L1.

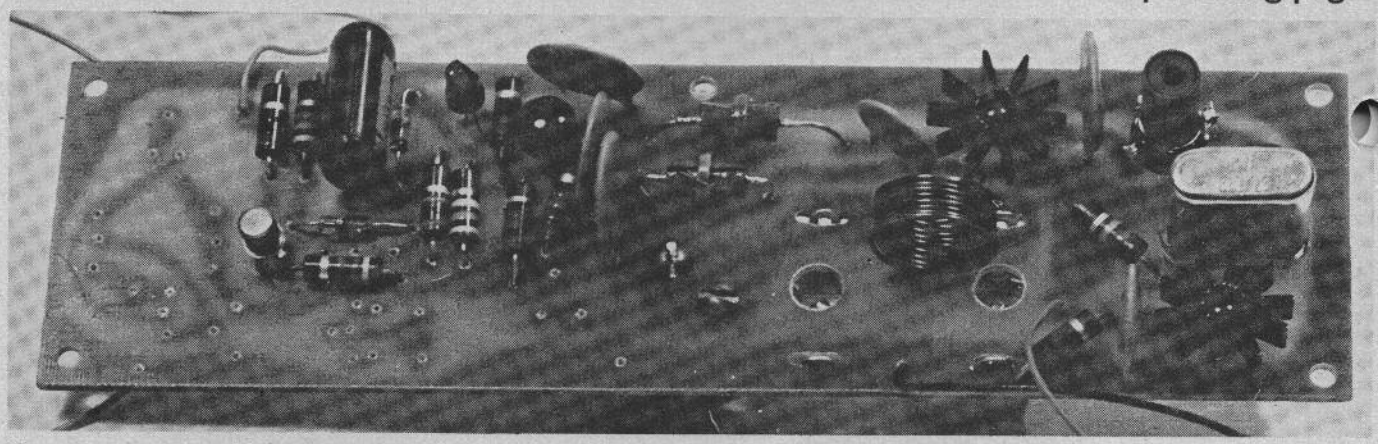
26-28 MC COMPONENTS
Crystal = 3rd Overtone 27MC
RFC-1 = Miller 20 uhy
RFC-2 = Miller 20 uhy
L-3 = 9 Turns #22 AWG ½" I.D.
C-2 = 75pf Silver mica
C-4 = Arco 426
C-5 = Arco 424
R-1 = 12K
R-2 = 100 ohm

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



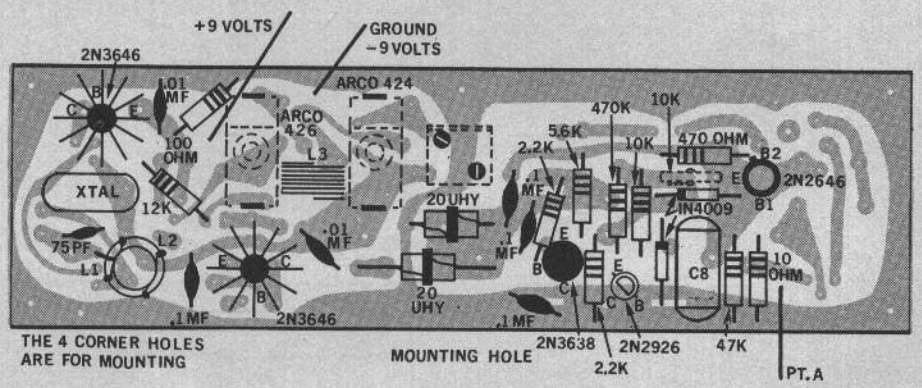


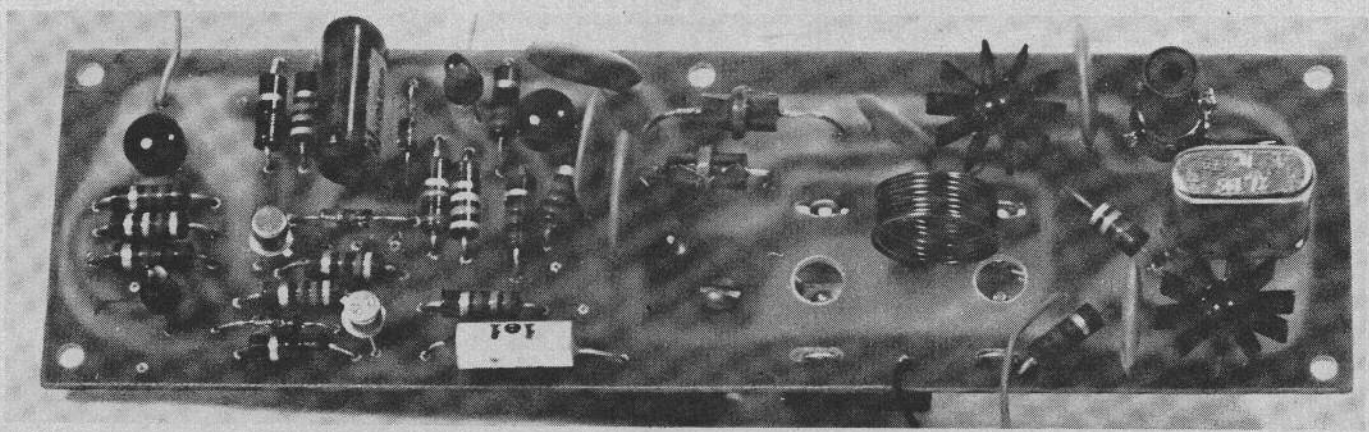
MORE PICS, DRAWINGS AND SCHEMATICS OF JANSSON X-MITTER — NEXT TWO PAGES



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

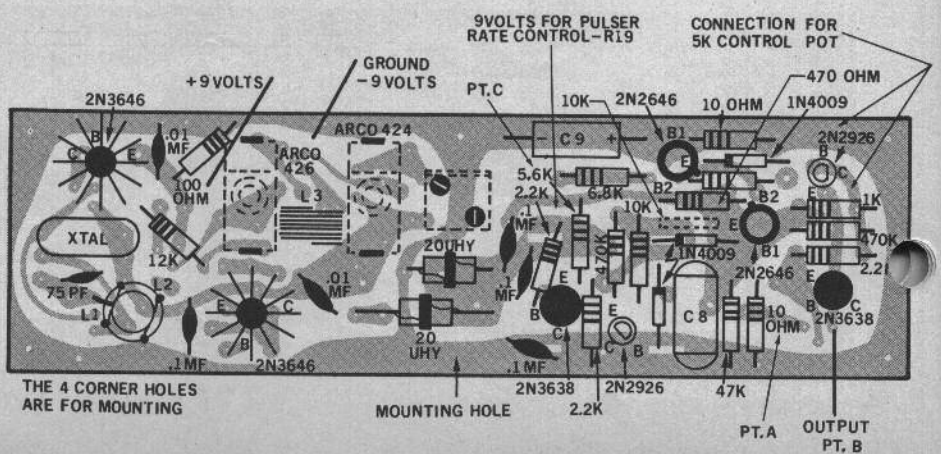
L1 = 7¼ turns #26 AWG, tapped at 4⅛ turns from bottom (+9V) on CTC 2173-3-3 form
L2 = 2¼ turns #26 AWG, over center of L1.
L3 = 9 turns #22 AWG ½" I.D.
C8 = 0.082 mf for 450 cps-900 cps
0.047 mf for 800 cps- 1.6 KC
0.027 mf for 1.4 KC - 2.6 KC
0.015 mf for 2.5 KC - 4.9 KC
NOTE: Mounting bolts 5 4/40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

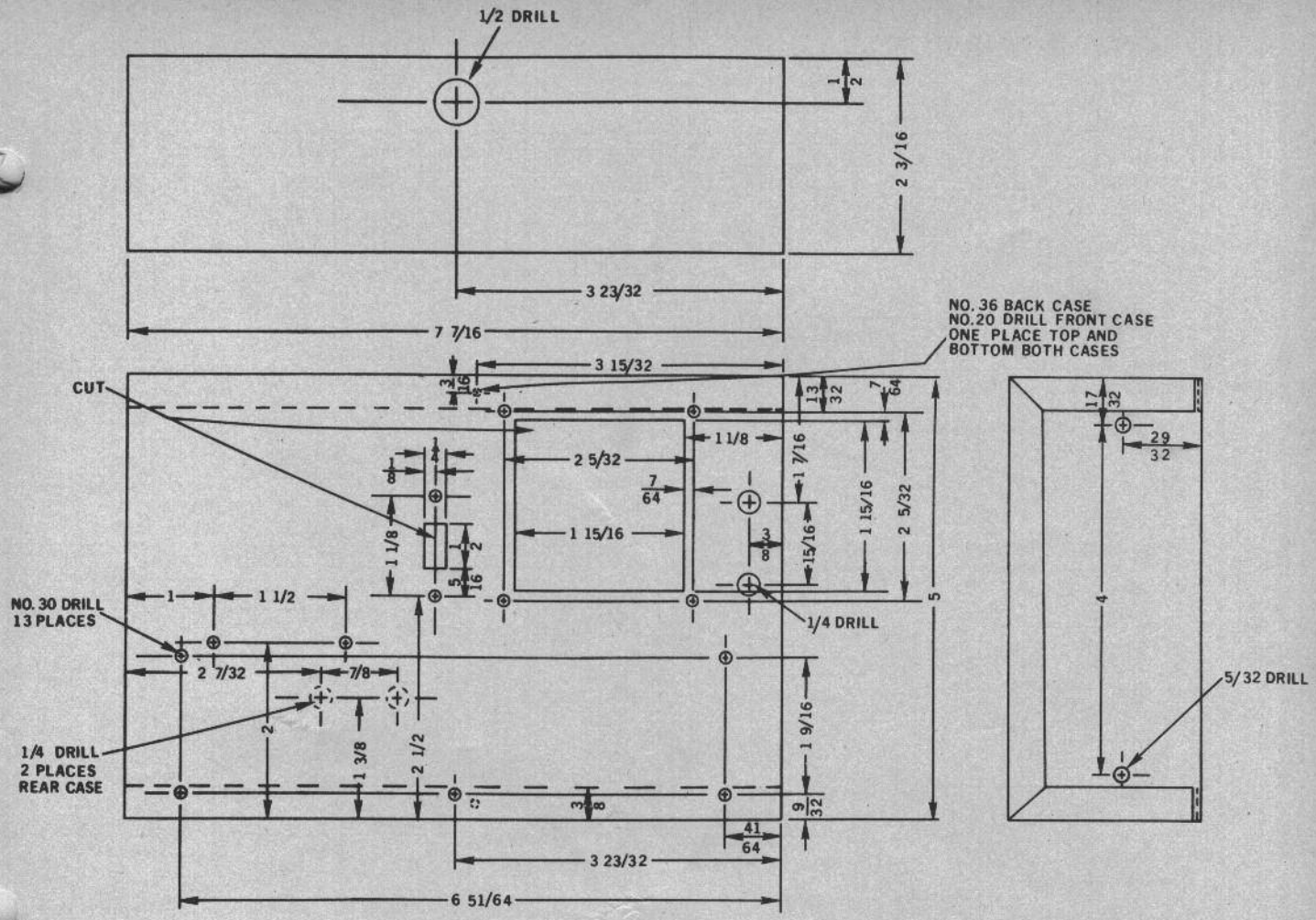


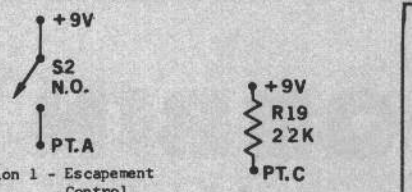


Additional components shown here provide pulser section which is required for both RO proportional and Galloping Ghost setups.

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



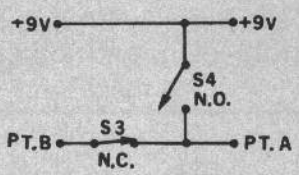




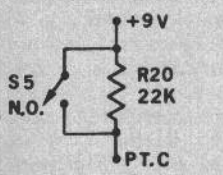
Option 1 - Escapement Control

Option 2A

Fixed Pulse Rate, connect Pts. A and B.



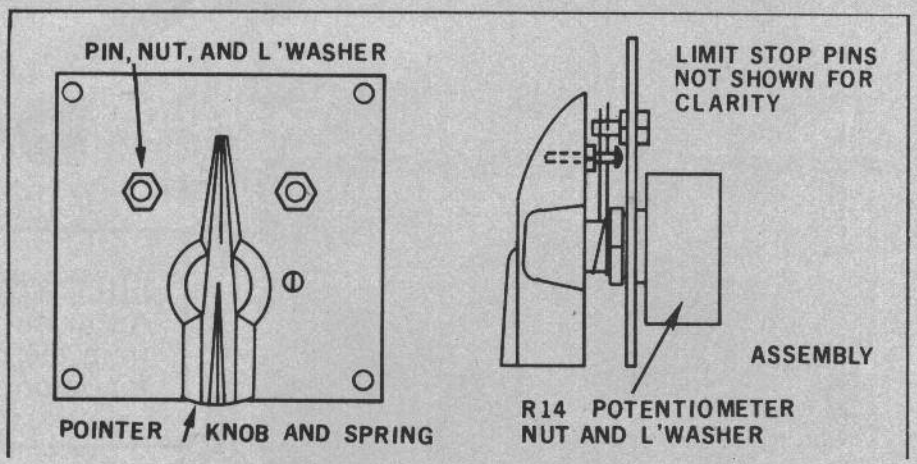
Option 2B - Tone ON-OFF Engine Control.

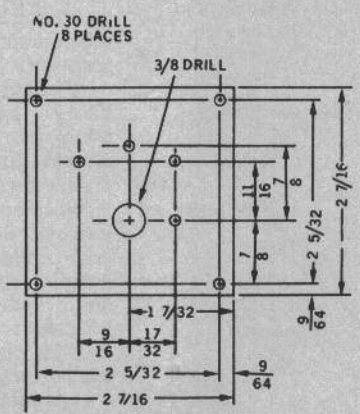


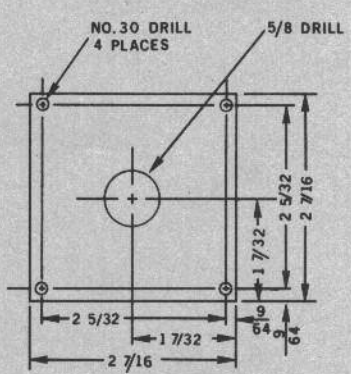
Option 2C - Fast Pulse Engine control, Connect Pts. A and B.

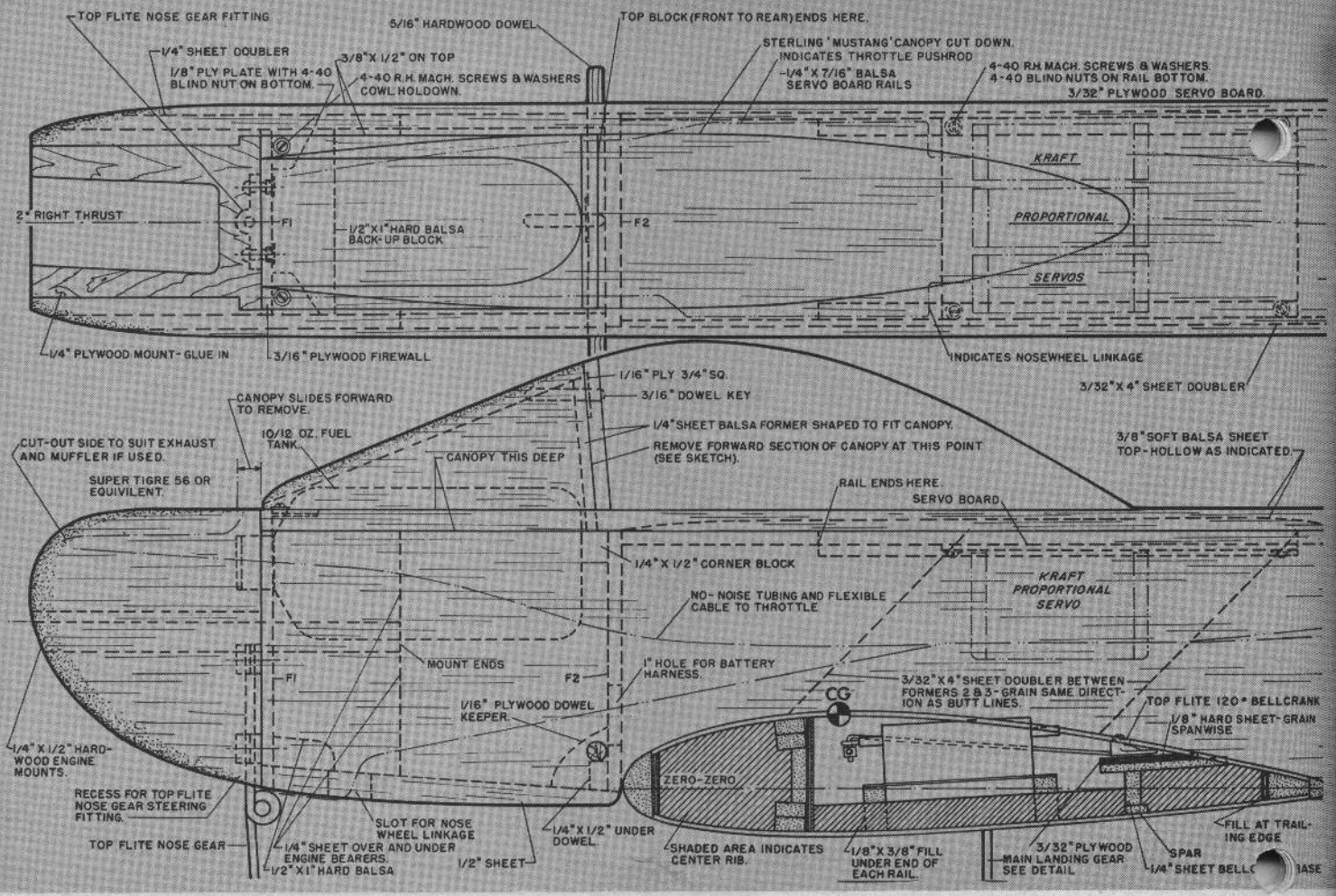
Option 2D - Elevator Control Pulse Rate Use W/Option 2B.

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

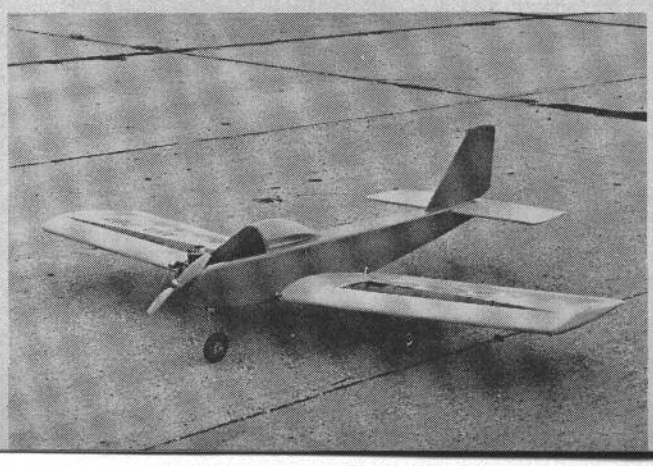








Straight functional lines mean a lot to anyone with time problem. If there is a penalty, it would be hard to measure. Below: Canopy position allows high tank for old 56, split canopy.



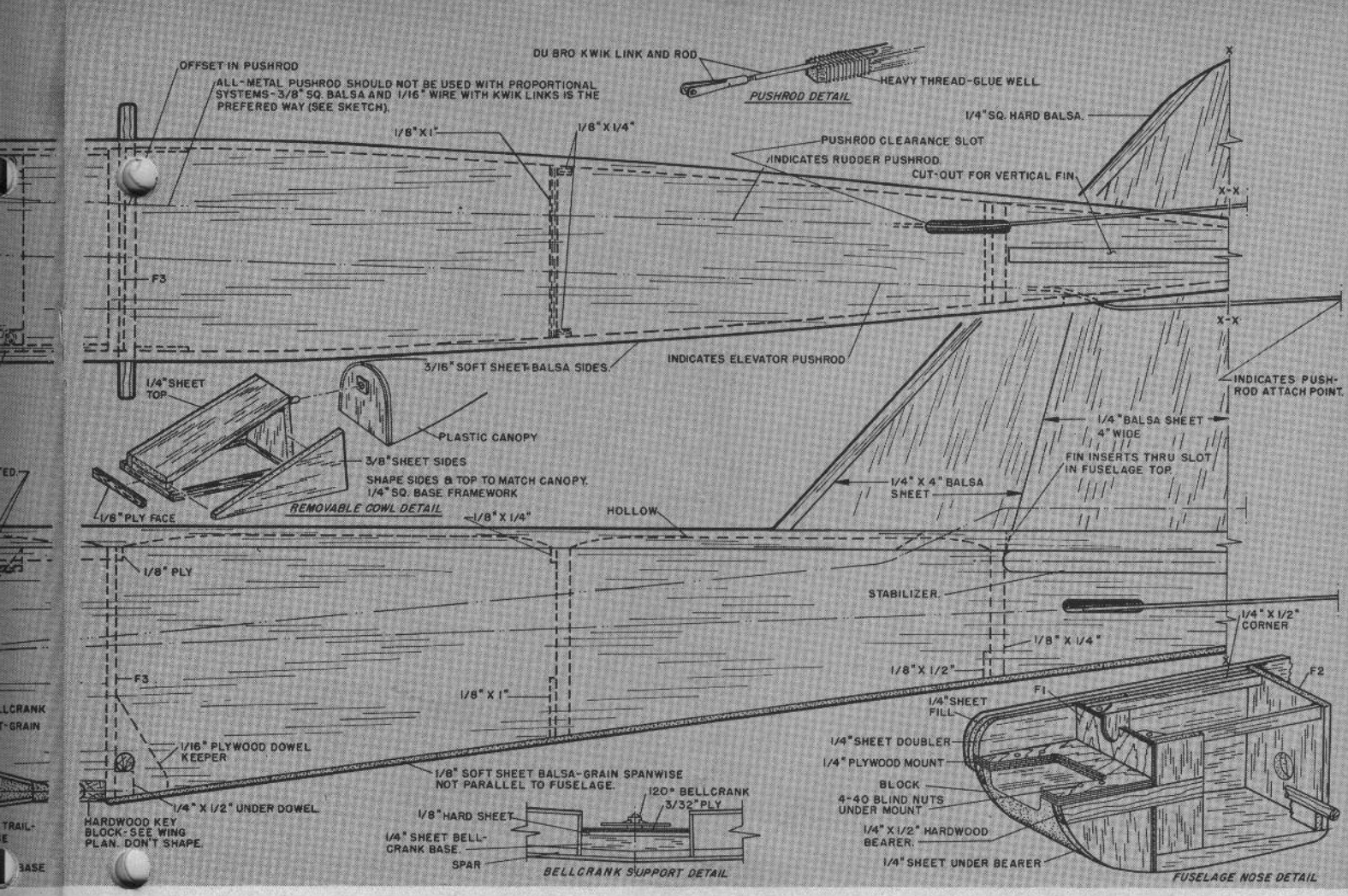
DOBBIN

FULL SIZE PLANS ARE AVAILABLE
Accurate individual contact prints — from the original drawing. See page 30 for information, this plan and others.

► Noting that only a split hair separates one design from another, and that the pilot makes the airplane, this story will tell itself.

It began with a new proportional rig. What ship to build? There is much to be said for a kit; the work is less, you get *all* the parts, a proved design, and you save time and money. However, the lure of experimenting, of flying one's own design, is overpowering.

Whether the design is your first, or a second or third, makes a world of difference. Actually, the basic dimensions, areas, and configurations of the Class III model are hardly more complex these days than those of a U-control stunter. There is no need to discover America. The would-be designer, having selected the configuration which appeals most to him, has only to check magazine back issues to establish approximate spans, lengths, moment arms, and everything else, including the installation and hardware details. We might safely assume that, *if* the Taurus completed the pioneering (Smog Hog, Astro Hog, Orion, Taurus), there may be super pilots but no obvious



G/L SPECIAL REPORT . . . A straightforward, functional Class III airplane for reeds or proportional. Easier to fly than a bomb, has required maneuverability. Engines from 45's to the 60's.

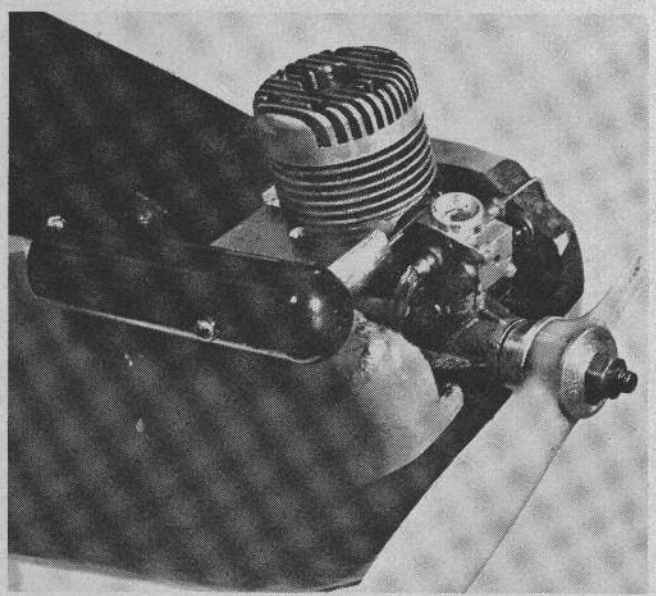
super designers. However, the fine points in design matter greatly.

If the reader has a few machines under his belt, he is ahead of the beginner (designer) in that he need not refer to back issues. Our family started multi with a Cosmic Wind, then modified into a bigger winged, straight-edged platform replacement, and finally stretched out to become the Rookie—about as much like the Cosmic Wind as a percheron is a quarter-horse. So we had a frame of reference in building a test job for propo.

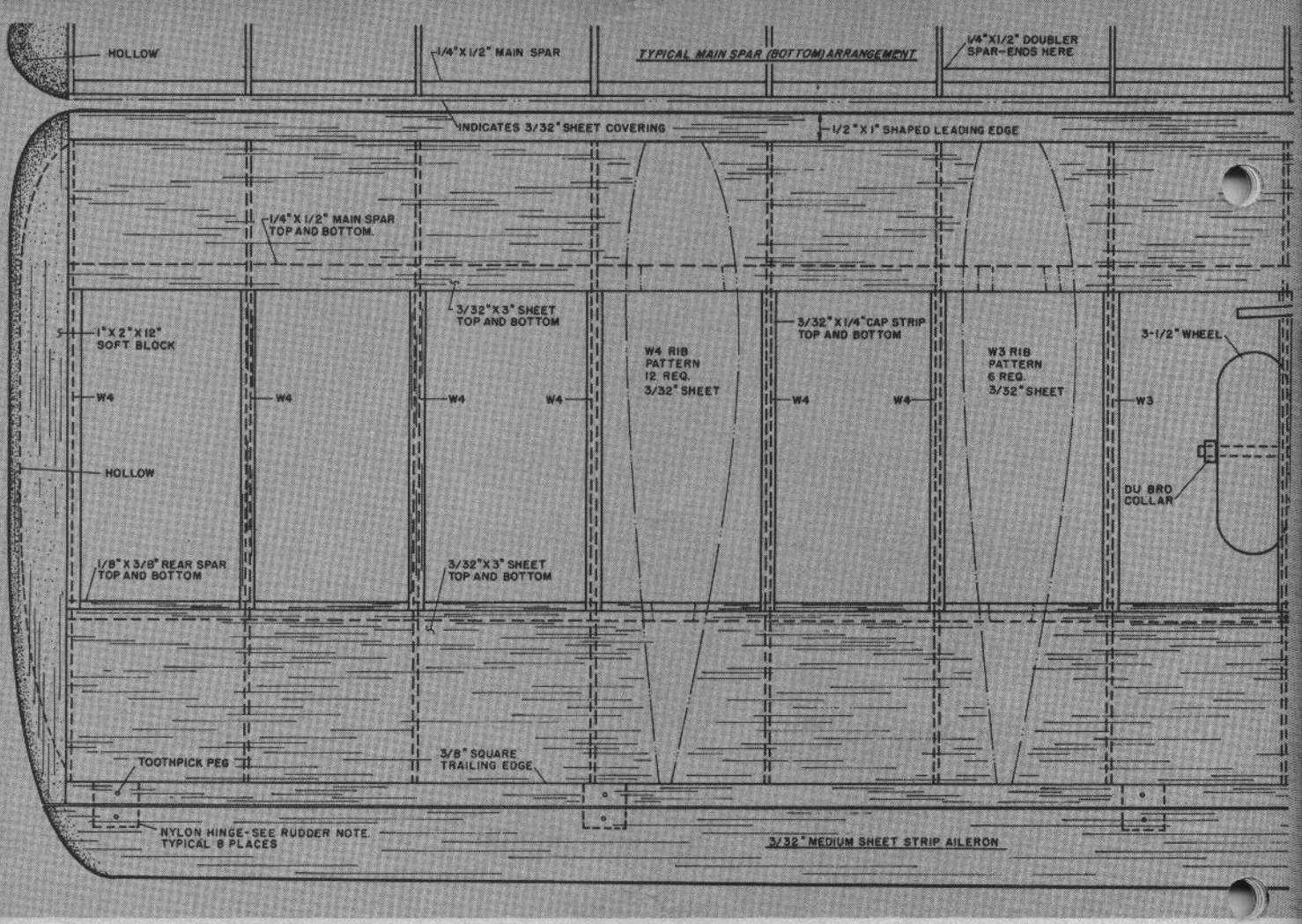
Any progression of designs involving even relatively minor modifications, may alter structure and external appearance vicariously. In this instance, the ship looks entirely new, yet involves few changes aerodynamically. These should interest the original designer.

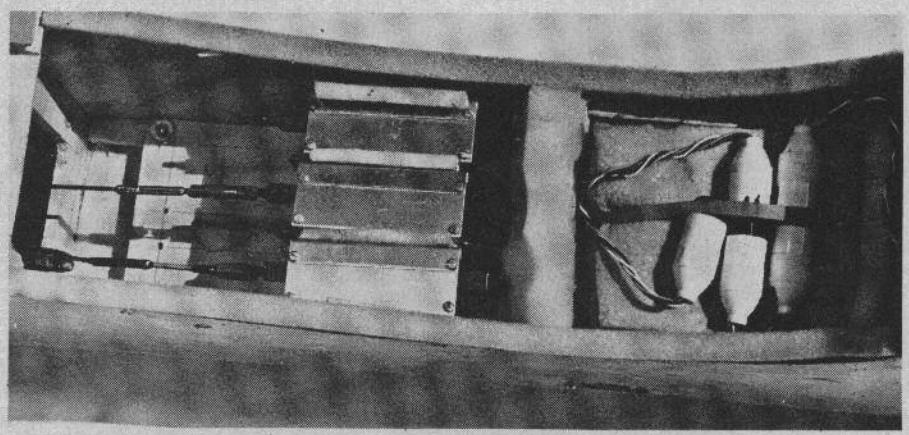
The Rookie was a big-winged job which could be slowed almost to standstill on the approach without dropping a tip—fine for slow reflexes and awkward manipulation of the many-sticked reed transmitter. Among those who had flown it was Lou Famigetti who suggested that if the span was shortened by one rib, it should be a good contest performer. So Dobbin spans a few inches less, but still has a generous 780 sq. in. area.

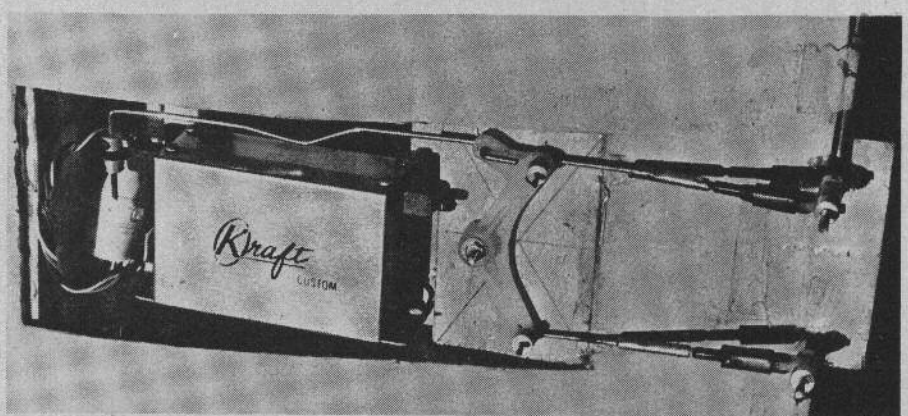
Because nose-wheels dug into the deep grass of the flying site then available, Rookie had two wheels. Its builders still report that it takes off with little controlling, with a good thrust, but on concrete in a strong wind, steering problems (wind raises the tail and there goes the braking!) call for trike gear. Moreover, the trike gear can be flown on to the ground at constant approach speed and attitude. Takeoffs usually are automatic. Holding down the tail in (*Continued on next page*)



Nose stresses cooling, accessibility. Spinflo requires a cut in wood, unless small extension made for stack. Lock cap for Williams 12-oz. not in place. World Engines nylon clevis attaches easily to flexible wire pushrod. Prop Tornado 11 x 6.







Slim proportional servos line up neatly side-by-side. Mounting is by small wood screws (through rubber grommets) into a hardwood rail. No hardware set required.

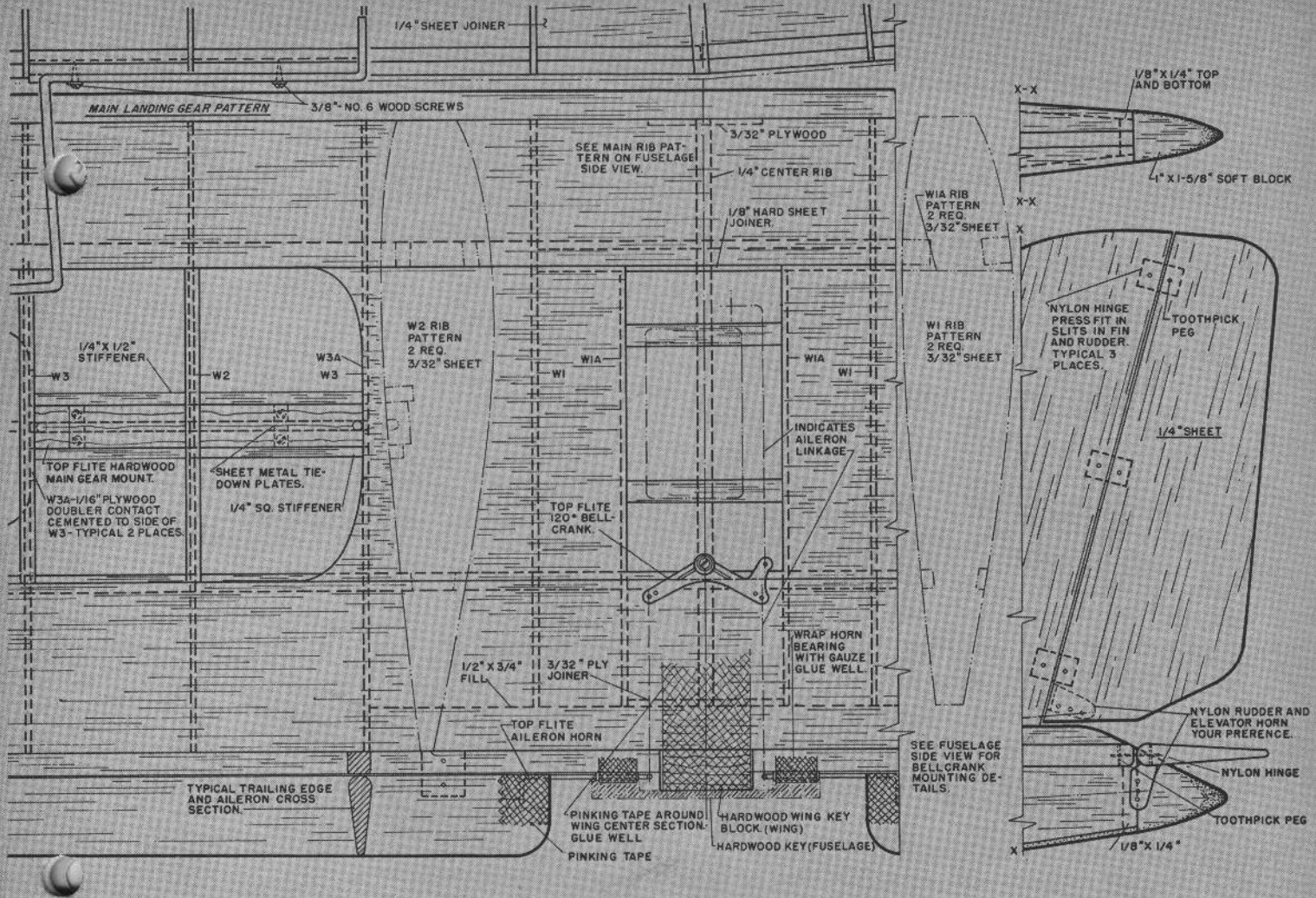
DOBBIN . . .continued

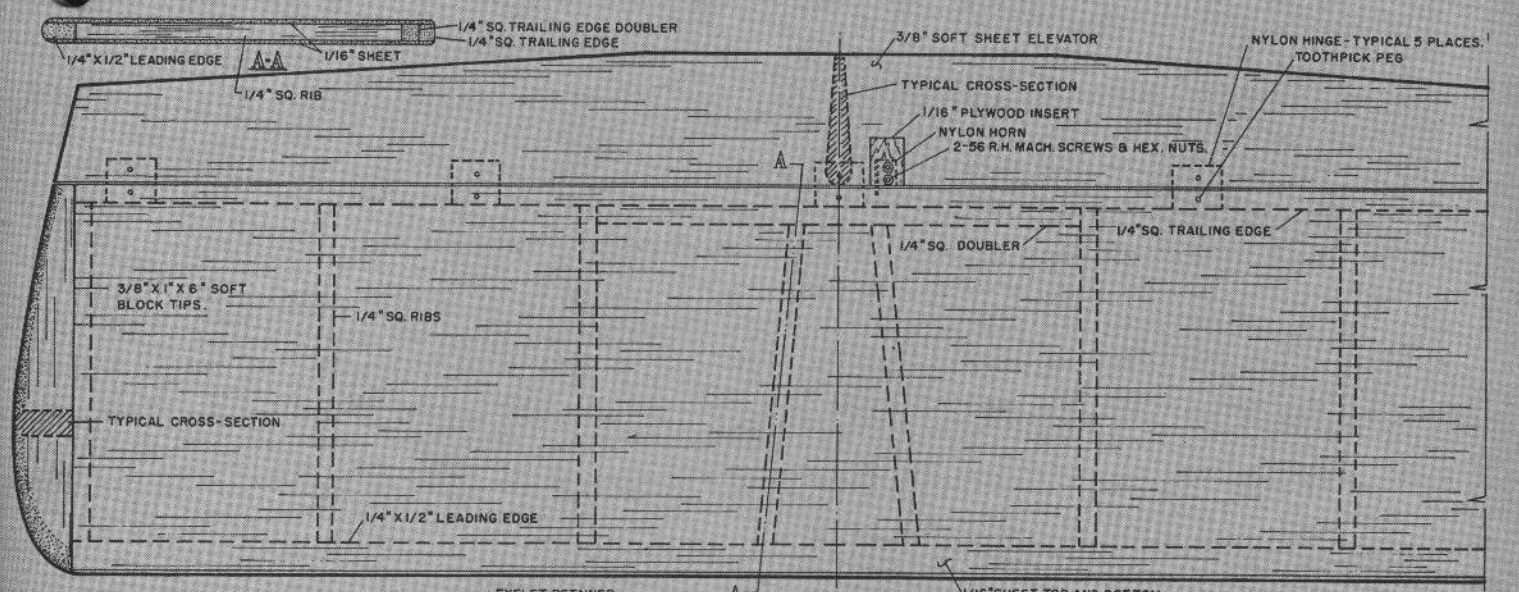
deep grass with two wheels until speed picks up, can involve the embryo pilot with some fancy stick work (reeds) in avoiding a stall or mushy flight with an early lift-off, plus a trickier switch from rudder to aileron just when he is busy with elevator. So a trike gear was essential.

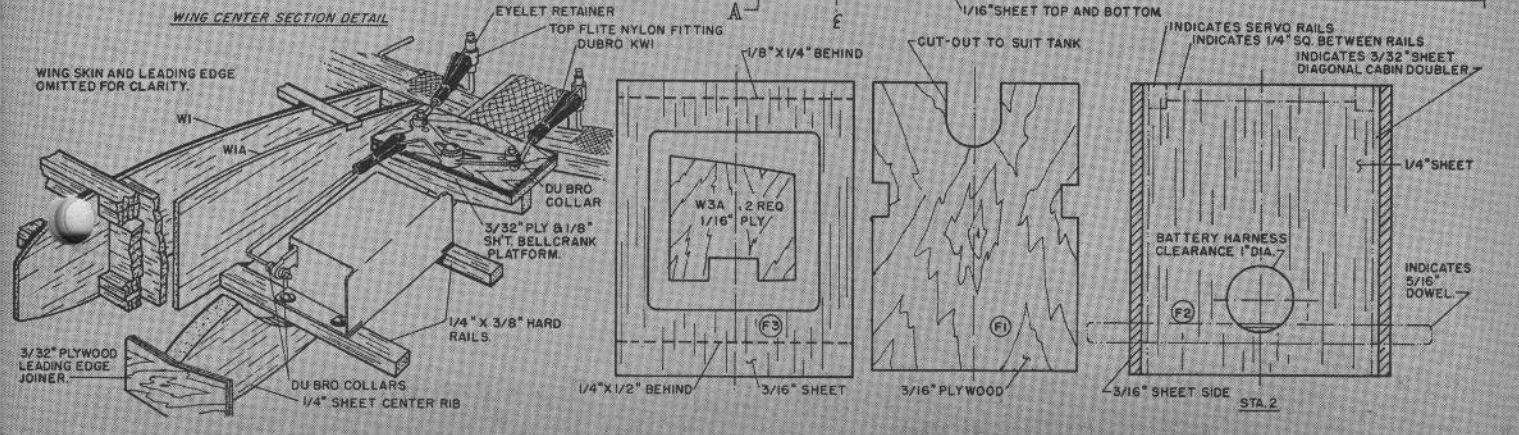
Then, a split type of elevator can be troublesome, since variations in construction or deflection under air loads confound grooved consecutive loops, especially the outsides. The one-piece elevator is easier to make, and lighter (less hardware). Unless the rudder or fuselage is holed for the one-piece elevator, the vertical and horizontal surfaces often must be staggered, or the fin and rudder located entirely above the stab—much the easier approach. (In a low wing the high stab eliminates turbulence over the tail from strip ailerons.) It is generally known that the high rudder exerts a greater roll affect, so that, unless dihedral is exceptionally flat, the machine can be turned and banked within limits by rudder as well as aileron.

Flight experience indicated that with elevator and rudder on the lefthand stick of our Kraft (motor and aileron on the right), it was feasible to have a ship that could be flown either one or two stick, including roll-out from steep fast spirals, and Immelman's, but failing of Cuban eights. But as someone said, "Why?" Having used too much this one stick capability, one

(*Continued on page* 21)


1/4" SHEET JOINER
MAIN LANDING GEAR PATTERN
3/8"- NO. 6 WOOD SCREWS
SEE MAIN RIB PATTERN ON FUSELAGE SIDE VIEW.
3/32" PLYWOOD
1/4" CENTER RIB
1/8" HARD SHEET JOINER.
W1A RIB PATTERN 2 REQ. 3/32" SHEET
W1 RIB PATTERN 2 REQ. 3/32" SHEET
W2 RIB PATTERN 2 REQ. 3/32" SHEET
1/4" X 1/2" STIFFENER
W3
W2
W3A
W1A
W1
INDICATES AILERON LINKAGE
TOP FLITE HARDWOOD MAIN GEAR MOUNT.
W3A-1/16" PLYWOOD DOUBLER CONTACT CEMENTED TO SIDE OF W3- TYPICAL 2 PLACES.
SHEET METAL TIE-DOWN PLATES.
1/4" SQ. STIFFENER
TOP FLITE 120° BELL-CRANK.
WRAP HORN BEARING WITH GAUZE GLUE WELL.
1/2" X 3/4" FILL
3/32" PLY JOINER
TOP FLITE AILERON HORN
TYPICAL TRAILING EDGE AND AILERON CROSS SECTION.
PINKING TAPE AROUND WING CENTER SECTION. GLUE WELL
PINKING TAPE
HARDWOOD WING KEY BLOCK. (WING)
HARDWOOD KEY (FUSELAGE)
SEE FUSELAGE SIDE VIEW FOR BELLCRANK MOUNTING DETAILS.
X-X
1/8" X 1/4" TOP AND BOTTOM
1" X 1-5/8" SOFT BLOCK
NYLON HINGE PRESS FIT IN SLITS IN FIN AND RUDDER. TYPICAL 3 PLACES.
TOOTHPICK PEG
1/4" SHEET
NYLON RUDDER AND ELEVATOR HORN YOUR PREFERENCE.
NYLON HINGE
TOOTHPICK PEG
1/8" X 1/4"


1/4" SQ. TRAILING EDGE DOUBLER
1/4" SQ. TRAILING EDGE
1/4" X 1/2" LEADING EDGE
A-A
1/16" SHEET
1/4" SQ. RIB
3/8" SOFT SHEET ELEVATOR
NYLON HINGE - TYPICAL 5 PLACES.
TOOTHPICK PEG
TYPICAL CROSS-SECTION
1/16" PLYWOOD INSERT
NYLON HORN
2-56 R.H. MACH. SCREWS & HEX. NUTS.
1/4" SQ. DOUBLER
1/4" SQ. TRAILING EDGE
3/8" X 1" X 6" SOFT BLOCK TIPS.
1/4" SQ. RIBS
TYPICAL CROSS-SECTION
1/4" X 1/2" LEADING EDGE
1/16" SHEET TOP AND BOTTOM


WING CENTER SECTION DETAIL
EYELET RETAINER
TOP FLITE NYLON FITTING
DUBRO KWI
WING SKIN AND LEADING EDGE OMITTED FOR CLARITY.
W1
W1A
DU BRO COLLAR
3/32" PLY & 1/8" SHT. BELLCRANK PLATFORM.
1/4" X 3/8" HARD RAILS.
3/32" PLYWOOD LEADING EDGE JOINER.
DU BRO COLLARS
1/4" SHEET CENTER RIB
1/8" X 1/4" BEHIND
W3A 1/16" PLY 2 REQ.
F3
1/4" X 1/2" BEHIND
3/16" SHEET
CUT-OUT TO SUIT TANK
F1
3/16" PLYWOOD
INDICATES SERVO RAILS
INDICATES 1/4" SQ. BETWEEN RAILS
INDICATES 3/32" SHEET DIAGONAL CABIN DOUBLER
1/4" SHEET
BATTERY HARNESS CLEARANCE 1" DIA.
F2
INDICATES 5/16" DOWEL.
3/16" SHEET SIDE
STA. 2

Tiny Hartley has his own U-2, a Jetco Imperial 100 which gets good results from an Instamatic 400 camera and Max 15 power.

BITS AND PIECES...

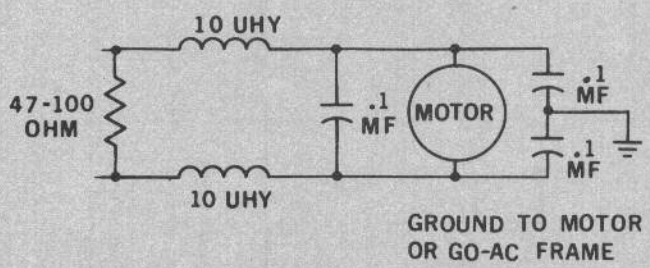
■ *Hartley's Camera Plane:* Among several photo-plane contributions received recently by GL was one from Tiny Hartley (W4YBC) who achieved acceptable results with a Jetco Imperial powered by a Max 15, carrying an Instamatic 400 camera mounted on the center of gravity. Capable of taking 20 color slides or 12 black-and-whites per flight, the camera weighs one pound loaded.

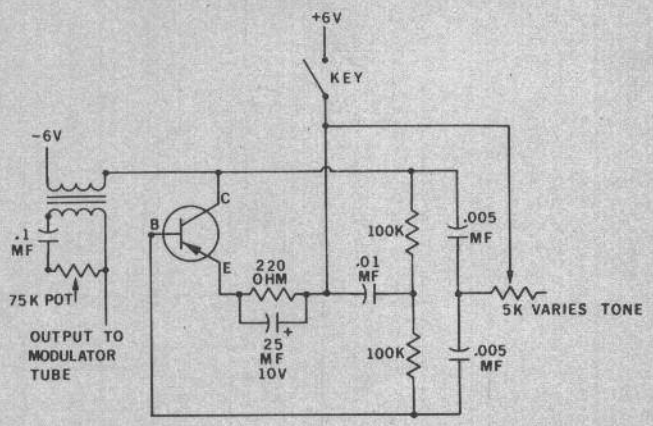
Gross, with a 6-channel (used) Controlaire 10, is four pounds. Since the plane can be launched from a fast walk, it is evident that at least another pound could be carried. Flight is slow. Landings are made in a 50-foot clearing. The pictures at the left show Tiny's eye-in-the-sky craft and a sample of its snooping.

Ted Strader Re Suppression: "I've had some time to run a few suppression tests with various superhet receivers. (Kraft, Min-X, OS, Minitron and SH 100.) Though the circuit may seem cumbersome, I also have found that it is similar to circuits which some of the ultra-multi proportional manufacturers are adding to their motors to reduce the noise level. The circuit described, plus the use of a vertical antenna, has resulted in abnormal range with the foregoing receivers. My experience with other higher priced motors shows that the motor used in the Go-Ac does not generate any more noise, and in some cases less, than a couple of motors of considerably higher cost.

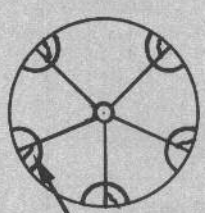
"Passing this circuit on to our superhet boys should help cure the noise problems, particularly where the superhet owners want to go Galloping Ghost."

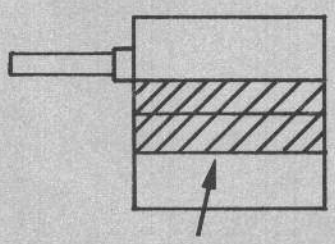
Phelps Tone-Generator: Shown on Page 21 of your July-Augus[illegible] issue this was presented far too casually. This is a *terrific* type of audio oscillator for model work. It results in a good sine wave output, is very voltage and temperature stable and the output amplitude is quite uniform as (*Continued on page* 30)

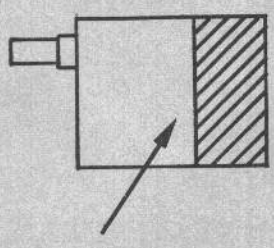




Left, above: Strader Noise Suppression; right, above: Gerhardt's version Phelps tone-generator; Below: Bob Penko on Micro-Mo.



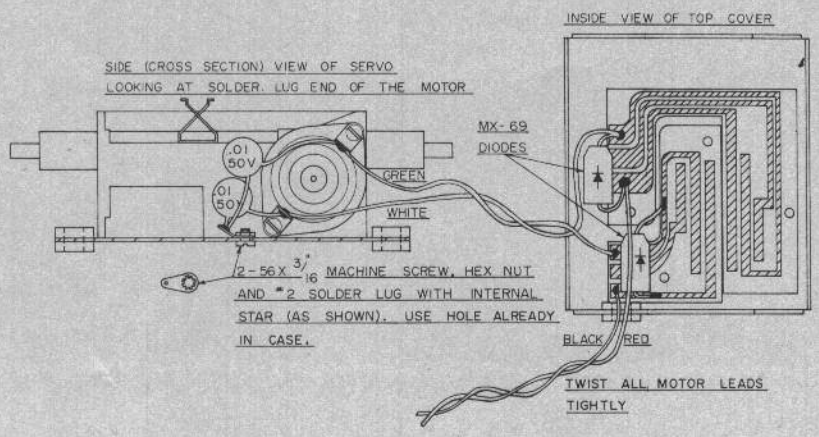




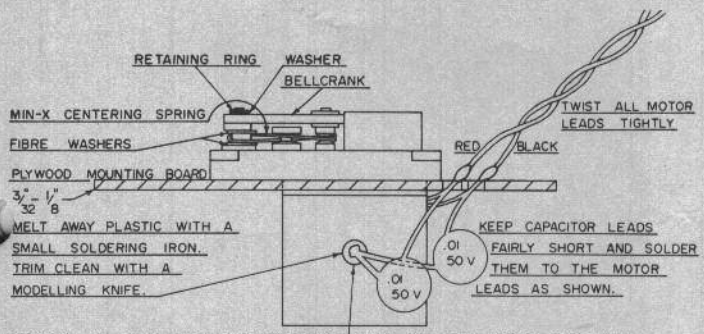
How to Suppress That "Noise."

It is widely agreed these days that a gremlin called noise does really exist; not only that, he (if it is a "he") is a sworn enemy of much of the advanced proportional stuff. The sketches on this page are not all that exists on the subject of killing noise, but they add much useful info to most notebooks. Min-X Radio, Inc. who made them, provided GL with the original drawings. (In Fig. 3 the diodes are for use with the Min-X Minicoder only.)

Clockwise these Min-X illustrations pertain to 1) Bellamatic II servo, 2) Mabuchi FM-170 motor, 3) Annco 2R servo, 4) Bonner Transmite servo (indicated as figure 5) and, 6) the popular Mighty Midget motor.

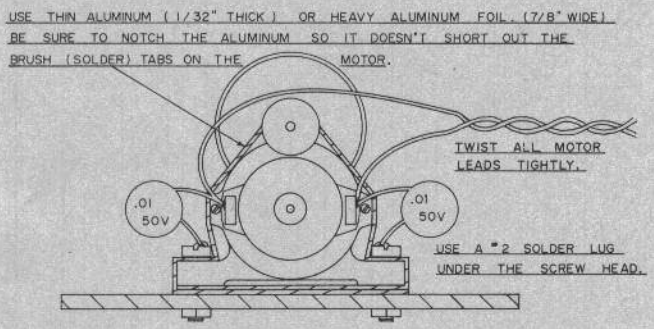


ANNCO 2R
FIGURE 3

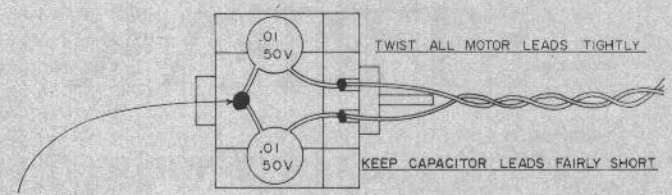


SCRATCH OR SAND THRU BLACK SURFACE FINISH ON THE MOTOR CASE WITH A SHARP OBJECT. CLEAN THOROUGHLY. USING ERSIN MULTICORE 60/40 SOLDER, TIN, THEN SOLDER MOTOR FILTER CAPACITORS SECURELY (USE A HOT 100 WATT OR LARGER SOLDERING IRON). DO A QUICK JOB TO AVOID OVERHEATING MOTOR.

BELLAMATIC II
FIGURE 1

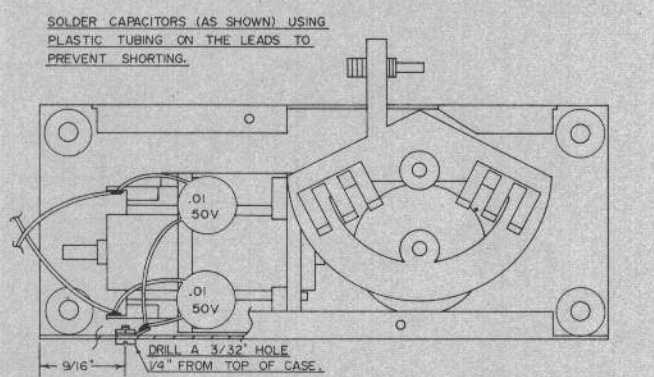


MIGHTY MIDGET
FIGURE 4



CLEAN A SMALL AREA ON THE MOTOR CASE WITH SANDPAPER OR AN AWL. CLEAN THOROUGHLY. USING ERSIN MULTICORE 60/40 SOLDER, TIN, THEN SOLDER MOTOR FILTER CAPACITORS SECURELY AS SHOWN (USE A 100 WATT OR LARGER SOLDERING IRON). DO A QUICK JOB TO AVOID OVERHEATING MOTOR.

MABUCHI FM-170
FIGURE 2



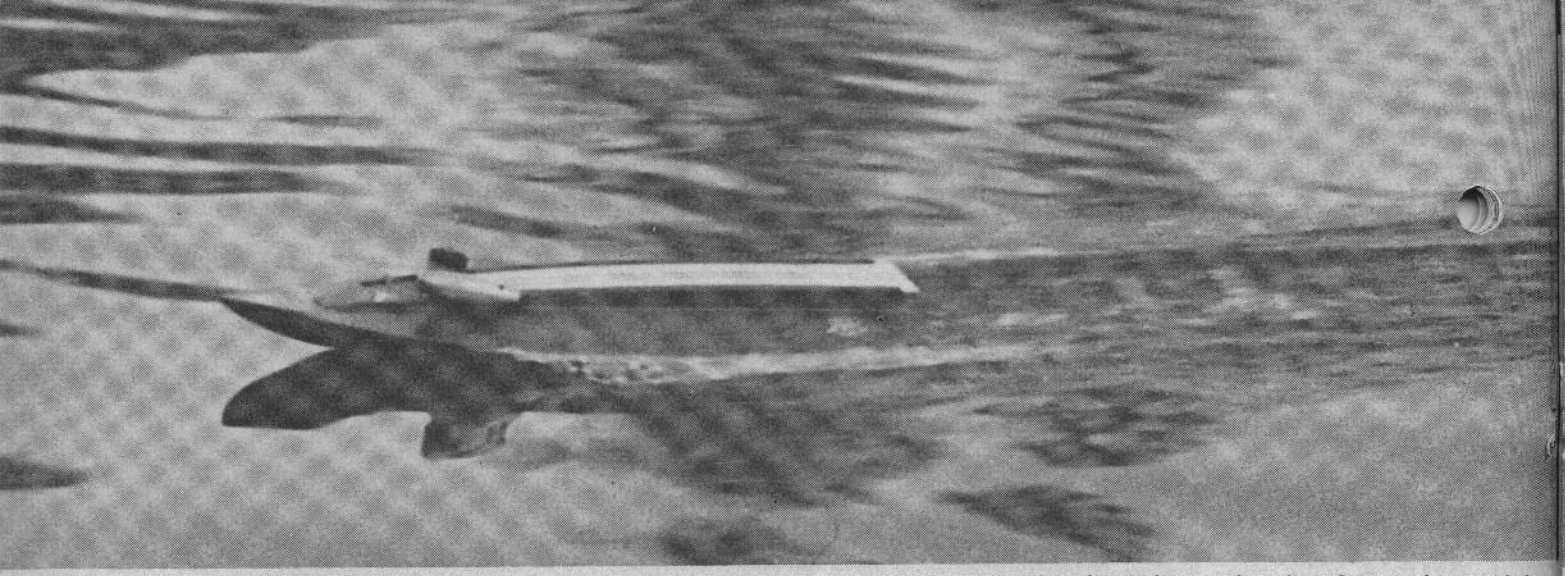
CLEAN THE ANODIZING FROM AROUND THE HOLE (7/32") AND USE A #2 INTERNAL STAR SOLDER LUG UNDER THE NUT OF A 2-56 X 3/16" MACHINE SCREW.

TOP VIEW — COVER REMOVED

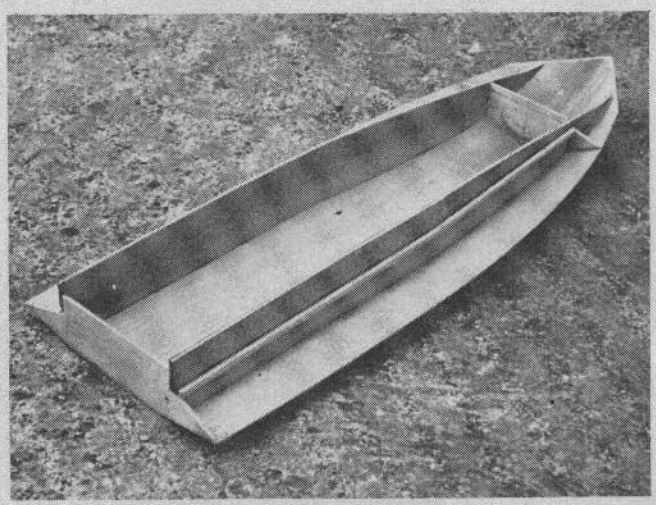
BONNER
FIGURE 5

THESE METHODS OF MOTOR NOISE SUPPRESSION HAVE BEEN TESTED AND RESULTS HAVE PROVEN THEM TO BE A NECESSITY FOR ANY TROUBLE FREE R/C INSTALLATION.

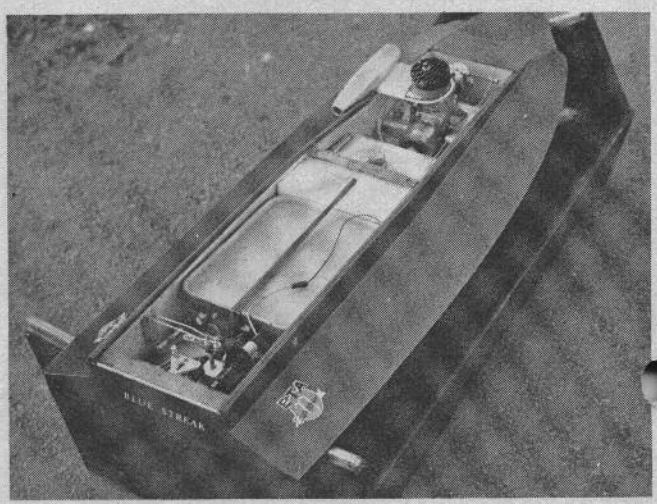
THESE METHODS OF MOTOR NOISE SUPPRESSION HAVE BEEN TESTED AND RESULTS HAVE PROVEN THEM TO BE A NECESSITY FOR ANY TROUBLE FREE R/C INSTALLATION.



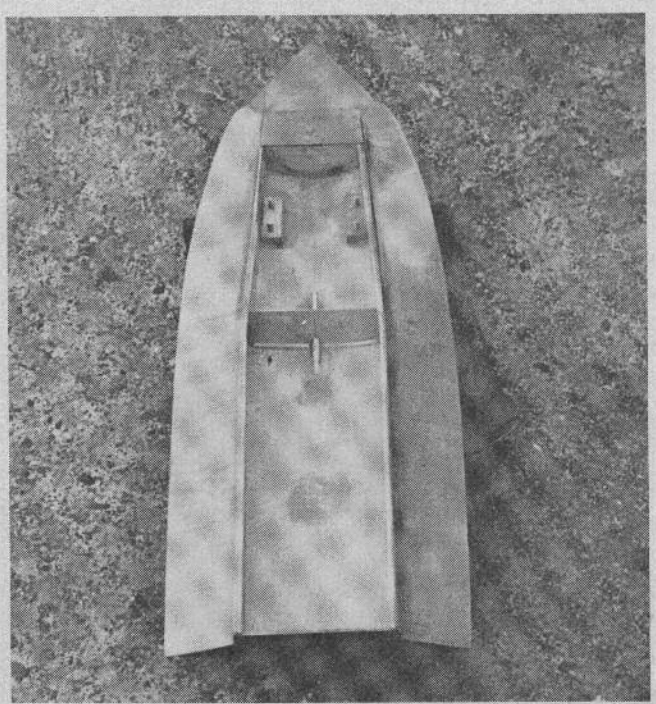
In "flat water" the craft skims over the surface causing little turbulence. High beam/length radio. lightness, directly influence characteristic.



Bulkheads and cockpit sides are added to glass fibered hull. Most of hull sides removed to reduce the height. Has low CG.



Because of the extremely low free board the radio gear should be enclosed in a protective watertight container like this one.



Decks, motor mounting blocks, propeller shaft, waterproof bulkheads, have been positioned in this helpful photograph.

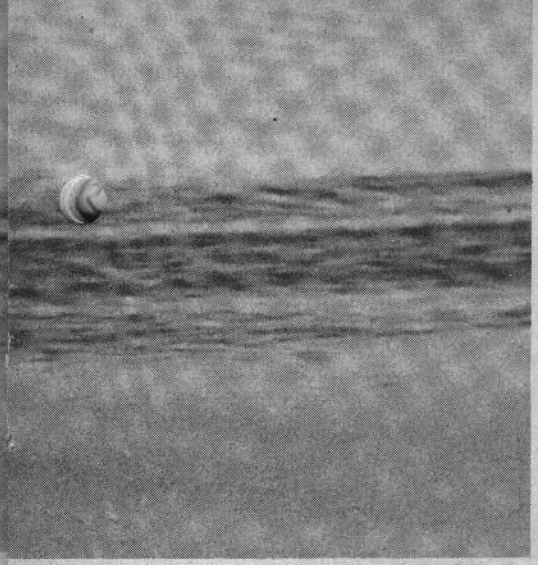
BLUE STREAK

By PHILIP CONNOLLY

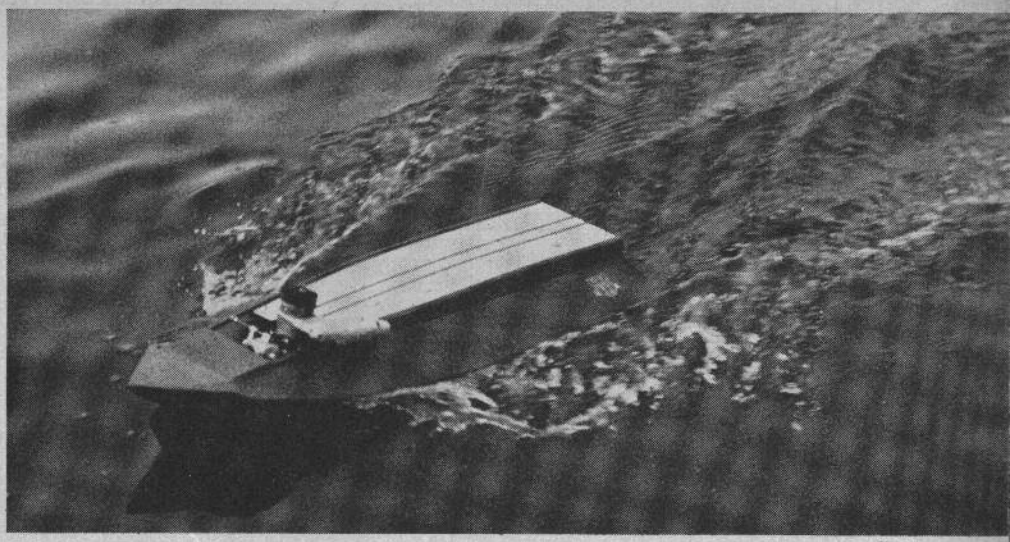
Known as the "flattie," this type of boat is highly successful in European RC racing circles. A 24½ in. x 10 in. design for engines to .29 cu. in. displacement.

► One of the most successful types of models used in Europe for speed work is the purely functional "flattie." The characteristics of such a design are: 1) very low hull with a minimum of superstructure; 2) high beam/length ratio; 3) shallow underwater form; 4) light weight.

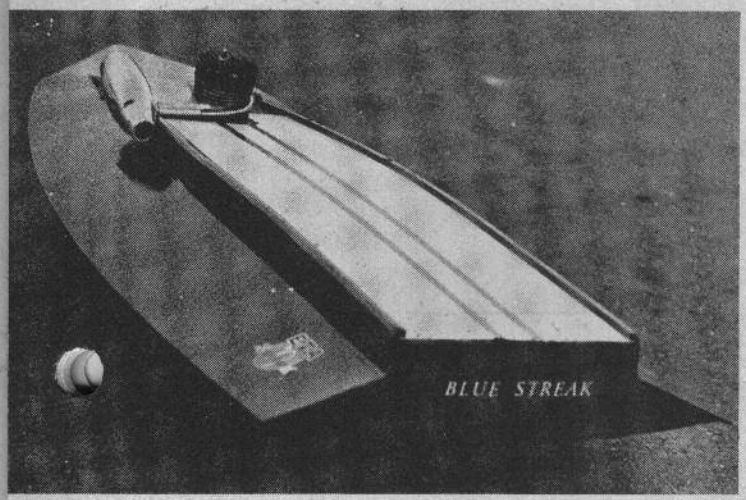
These features combine to give a model, which will perform safely and, above all, stably with a motor normally considered too large for a conventional boat of the same size.



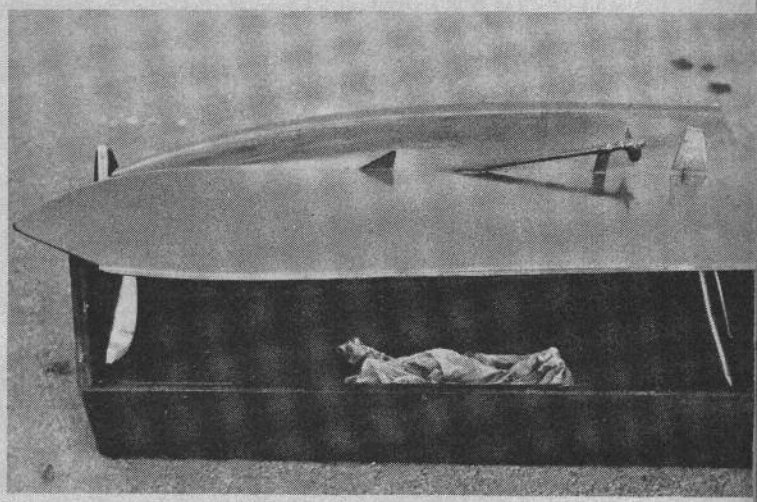
However, it is not good rough-water design.



Blue Streak here is running at tickover speed on ETA 29 air-cooled engine with muffler.



The hatch slides tightly into position. It is made from 1/16-in plywood. Hull is painted blue, hatch white, with red stripes.



Underwater form of this type of boat is important. Note details of the dagger plate, spray strips, rudder, etc.

Hence the good performance is obtained by enabling the use of a high power/weight ratio.

The stability with which a model runs depends to a great extent on the position of its center of gravity. The higher the CG, the more chance there is of the model rolling, porpoising or even flipping, and vice-versa. Thus the superstructure, which is normally the highest part of a model, should be abandoned, and the height of the deck above the waterline reduced to a safe minimum. By dropping the engine as far as the flywheel permits, and situating the radio on the hull bottom, the maximum possible stability should result.

The underwater hull form is clearly also of great importance. Generally speaking, a deep Vee hull will handle rough water well, whereas the shallow Vee or convex section used in flatties will not. This, together with the very low freeboard, makes evident the first and biggest limitation of the flattie. They are for calm water use only. In flat water, the models skim over the surface, causing little turbulence, this being attributed to the high beam/length ratio and light weight.

The Continental flatties favor the use of an English glass-fibre hull with three-fourths of the hull sides removed to reduce the height. A narrow box is built in along the length of the hull, and the powerplant and radio are fitted inside this. Decks are then fitted in the normal manner.

Blue Streak and its predecessor, a 34-in. Fox-59-powered flattie, were both based along these lines, but use all wood construction. This gives a number of advantages, e.g. the lighter weight, initial cheapness and the possibility of scaling to obtain models of different sizes for different motors.

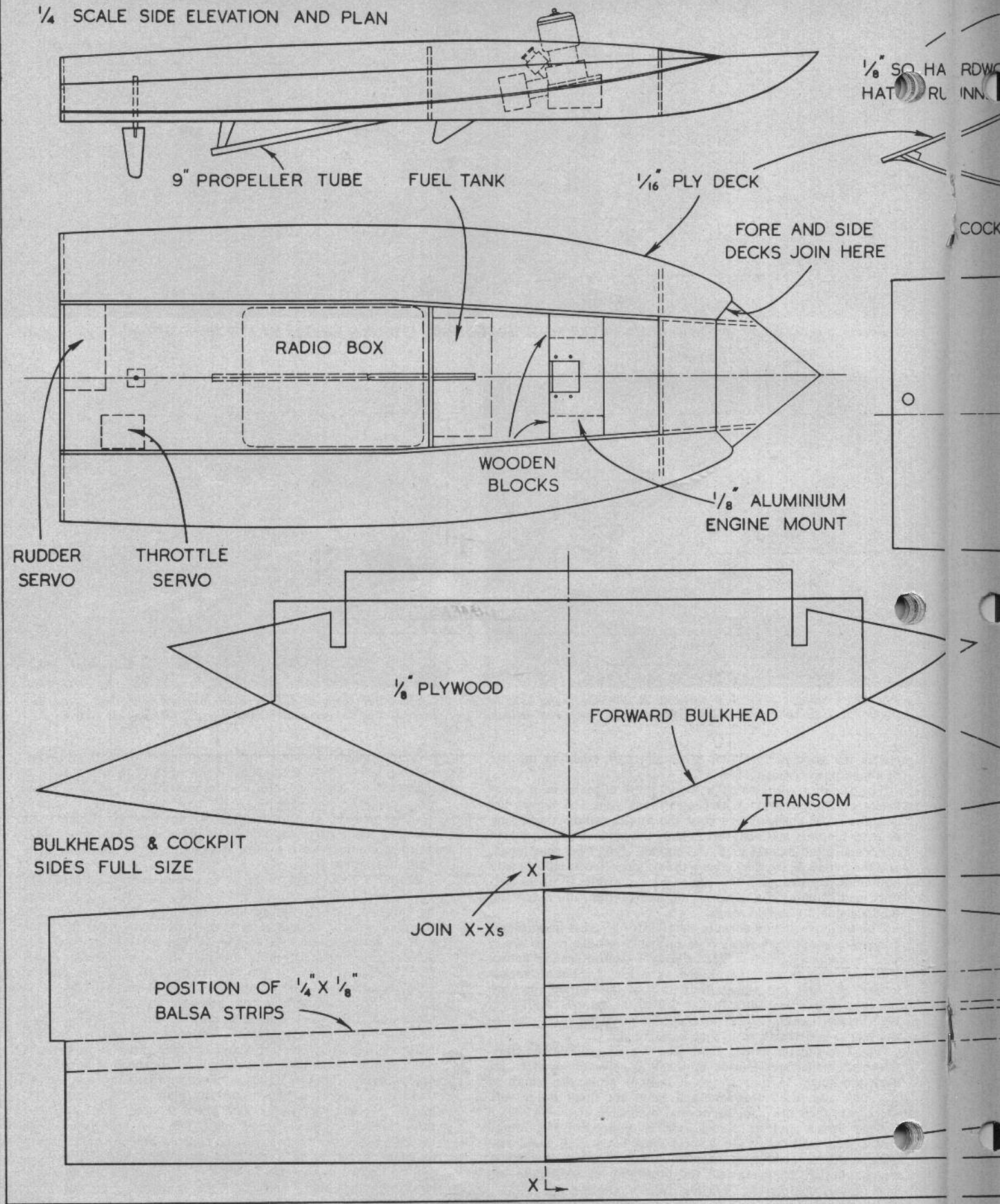
Both models are fast and exceptionally smooth running, especially in turns. Full-speed turns of less than 12 feet in diameter are easily possible, but more will be said about running later.

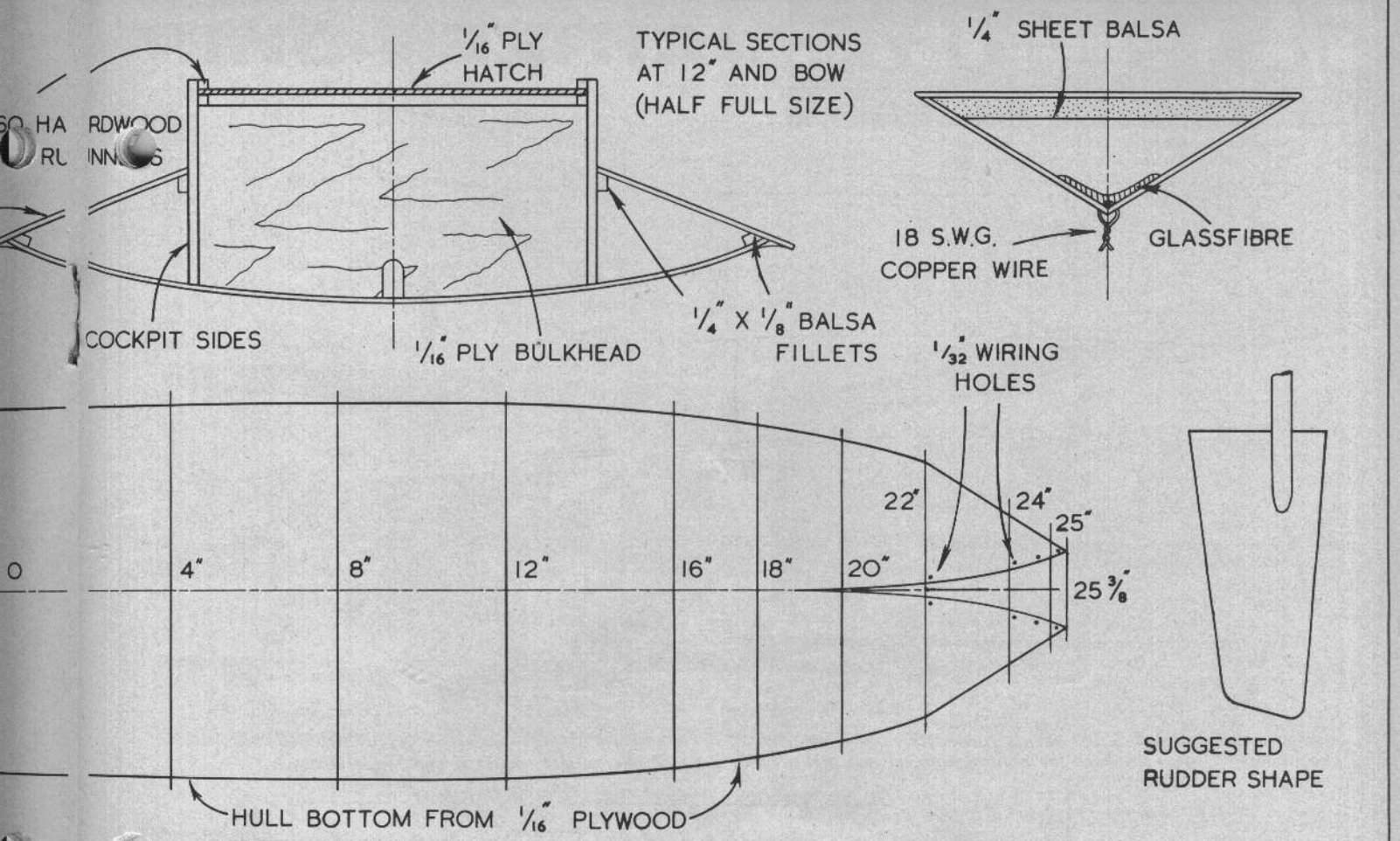
Construction: The model has no keel, saving weight and building time. Parts are added to previously constructed hull bottom, contrary to the normal practice of fitting skins to a built up framework.

Start by choosing a piece of knot and twist free plywood, 1/16" thick and measuring 9½" x 26". A center line should be drawn in the direction of the grain along the 26" length. On the plan, a table of widths at various distances from the transom is given. These can be plotted out on the plywood, together with the position of the hole for the propeller tube. Pin ⅛" square trips to the hull bottom so that the outside edge coincides with the points previously plotted out. The outline for the hull bottom can now be obtained by drawing along the strip. Once drawn, it may be cut out with a knife or saw to give the shape shown in quarter scale on the plan.

Cut out the hole for the propeller tube. Four or five small holes should be drilled in each half of the bow at a distance of ⅛" from the inside edges. The approximate position of these 1/32" holes is shown on the plan. Cut a number of lengths of 18 s.w.g. copper wire about 2" long, and push one through each adjacent pair of holes. The bow halves may now be pulled together by twisting the ends of the wire with a pair of pliers. It will be noticed that a certain amount of trimming will be needed at the bow to achieve the best fit, and this can be done with a sharp knife or sand- (*Continued on page* 28)

PLANS FOR BLUE STREAK ON FOLLOWING TWO PAGES

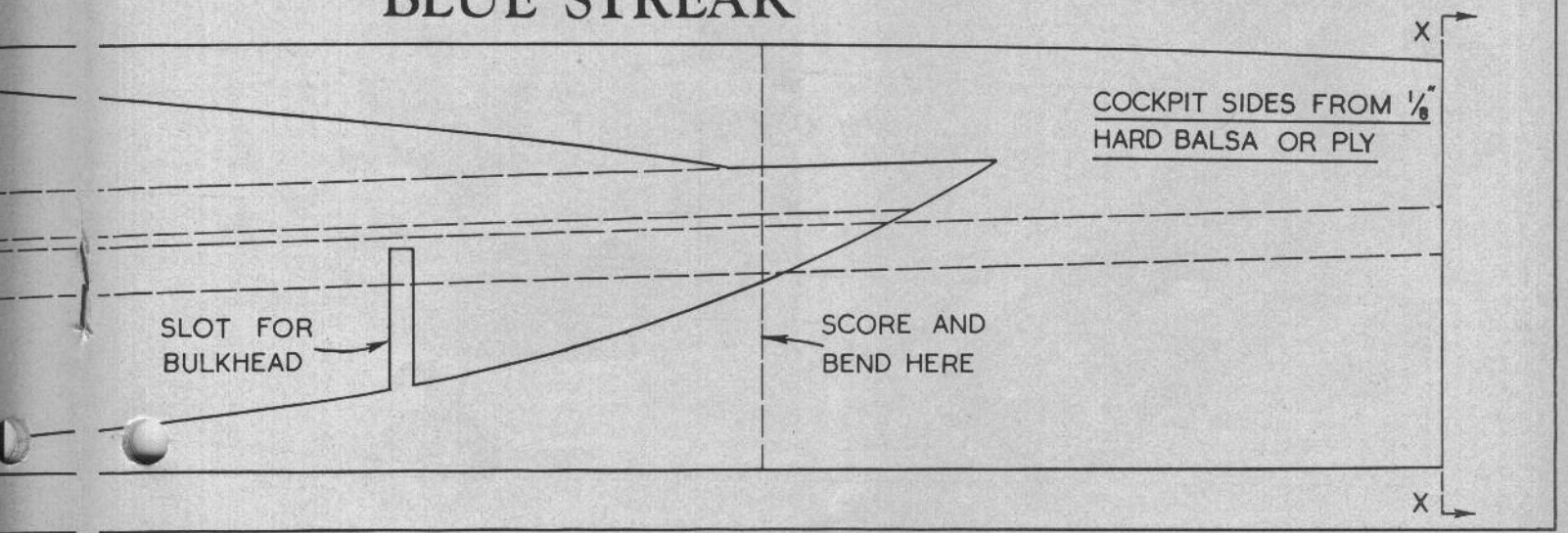

¼ SCALE SIDE ELEVATION AND PLAN
9" PROPELLER TUBE
FUEL TANK
1/16" PLY DECK
FORE AND SIDE DECKS JOIN HERE
RADIO BOX
WOODEN BLOCKS
1/8" ALUMINIUM ENGINE MOUNT
RUDDER SERVO
THROTTLE SERVO
1/8" PLYWOOD
FORWARD BULKHEAD
TRANSOM
BULKHEADS & COCKPIT SIDES FULL SIZE
X
JOIN X-Xs
POSITION OF 1/4" X 1/8" BALSA STRIPS
X



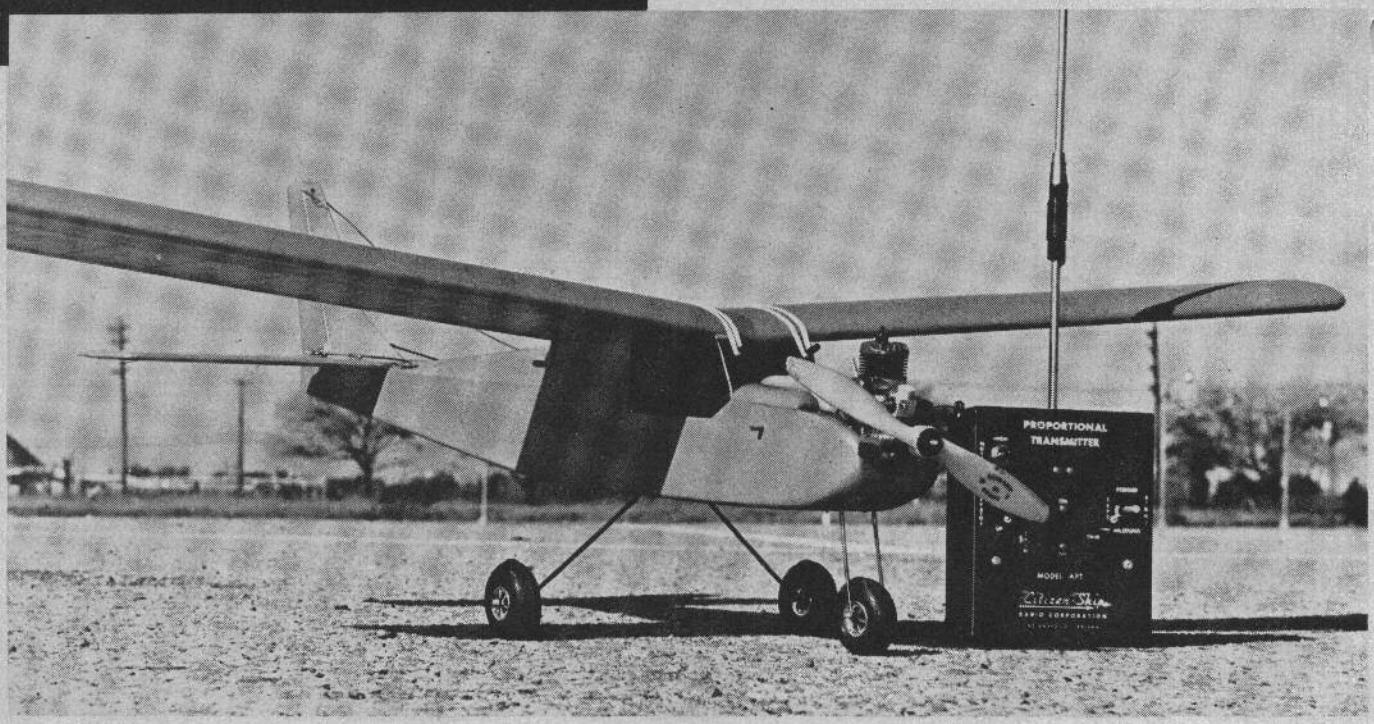
ALL DIMENSIONS IN INCHES

DISTANCE FROM TRANSOM	0	4	8	12	16	18	20	22	24	25	25 3/8
HALF WIDTH TO OUTSIDE	4 3/8	4 7/16	4 15/32	4 15/32	4 1/4	3 31/32	3 19/32	3 1/16	1 13/16	1 3/16	15/16
HALF WIDTH TO INSIDE							0	5/32	1/2	3/4	15/16

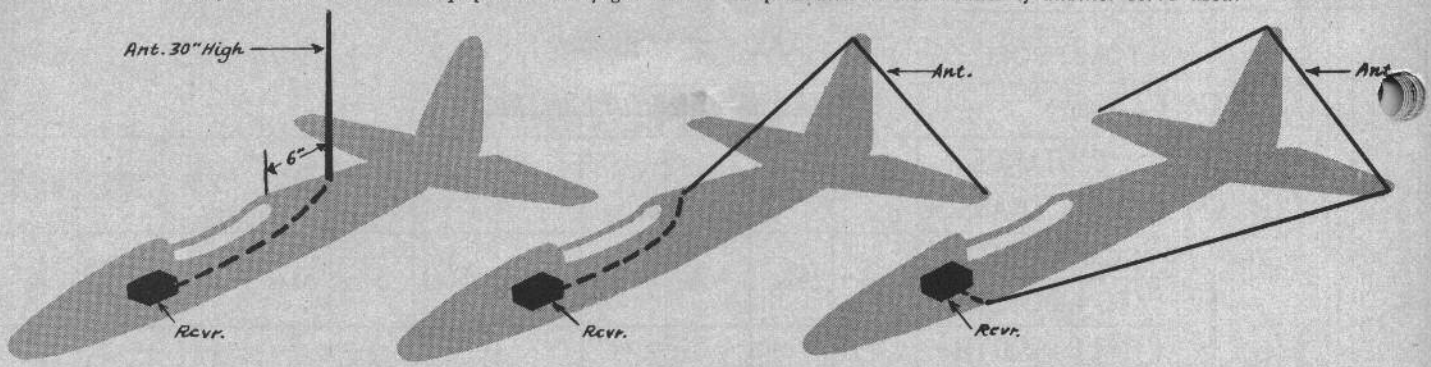
BLUE STREAK



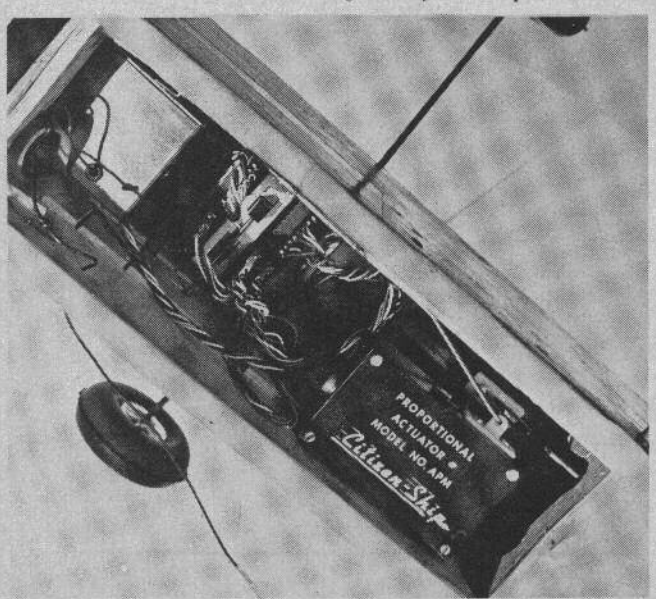
G/L reports . . . CITIZEN-SHIP



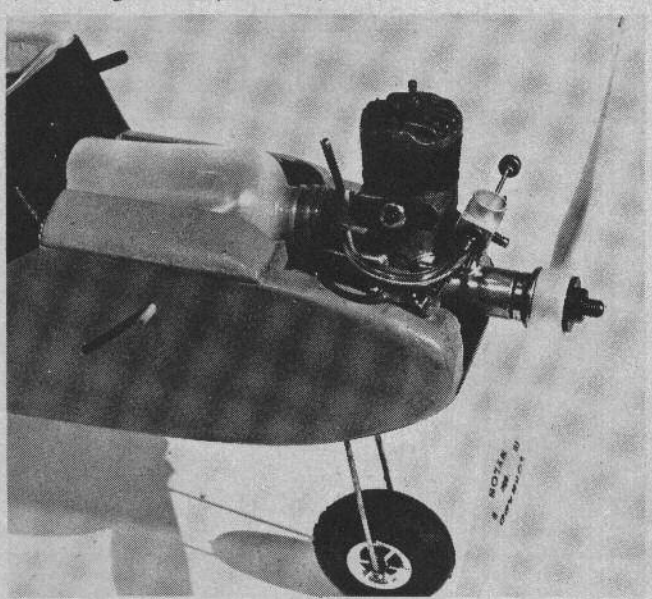
The Andrews Hi-Ray in which the radio equipment was flight tested. Coupled aileron and rudder if another servo used.



Antenna position has great influence upon reliable reception, according to manufacturer's findings, opposite page.



Although small cabin crowded servo installation, most cabins will allow grouping of all three fuselage servos on platform.



McCoy .35 RC made first flight wide open, the first time started, gave no subsequent trouble because of generally rough treatment.

PROPORTIONAL

Between the simple and the complex there is a world of pleasure with such systems.

■ At an advertised list price of $250 the Citizen-Ship proportional system, offering two proportional channels—plus a third trimmable channel—proves attractive to the consumer. Numerous "deluxe" propo systems zero in at approximately a half-grand, but more modest systems like the Citizen-Ship—and Orbit three-plus-one, etc.—will continue to draw attention.

Presumably, many potential customers wonder whether something that does not offer independent and simultaneous aileron and rudder can be both satisfactory to fly, and reliable—especially at a relatively low list. Such systems are fully acceptable for Class I and II competition and Pylon flying. Once you fly them, there's a reasonably close approximation of the most costly "complete" systems for Class III ("multi") sport flying as well. Basically, the "minus one" systems provide elevator and rudder (or aileron) plus trimmable engine control; also, by the addition of a fourth servo, a coupled action of aileron with rudder is attainable.

Many possibilities come to mind. With just three servos, you can lock rudder and fly aileron, elevator and engine in suitably appropriate aircraft, or you can mechanically couple aileron and rudder as the dual-proportional boys long have done. The AP system (and similiar), partly because of lower cost, and partly because of a broader natural application to a different spectrum of aircraft types, will be found to do well in the larger so-called rudder-only ships, as well as in modestly limited high-performance Class III type aircraft—and in all the non-pedigree variations in between.

For example, the Andrews Hi-Ray (which we had on hand) made a useful good test bed for the REM installation (no ailerons) but, perchance, this choice distracts the reader from the greater capability of such a system with ailerons in, say, a Tauri or even a Taurus. In fact, we are able to simultaneously check out the Hi-Ray, the AP, and the McCoy .35 RC engine (in a .19-limit aircraft!).

Can an economical system be dependable? Why not? Vern Macnabb, Citizen-Ship majordomo, who to our knowledge, long has been personally interested in all forms of propo (See GL, Jan.-Feb., '64) has a sharp eye for acceptable ways and means to manufacture for a target price. Typical, is the use of Tinnerman nuts on the AP system servos which eliminates all servo mounting hardware (4/40 screws provided). The system is not completely wired, but the difficult part is done, just matching plugs to be soldered to cables which connect to a special printed-circuit unit which incorporates the switch. We find no objection to the small amount of work required and CS figures that *all* connections don't have to be factory-made to insure reliability.

To be completely fair, however, the system price does not include the batteries—nickel cads for radio and servos, and an ordinary 9-volt dry battery for the transmitter—nor do you get that fourth servo as part of the package. And if you are starting out sans complete support equipment, you may have to buy a charger (an essential item regardless).

Although a great many flights had not been made at the time of writing, performance can be summed up briefly: It worked perfectly from the first time the switch (*Continued on page* 23)

NOTES ON PROPORTIONAL SYSTEMS IN GENERAL

Proportional radio control systems differ radically from all previous systems that have been available for flying model planes or controlling boats. In single channel, using escapements or servos, and with multi-channel systems using reed servos, when no command is being sent by the transmitter, the plane is flying in neutral trim, and is actually not dependent on the transmitter signal. So-called neutral trim may not be perfect, and it is almost always necessary to send correcting signals to maintain, for instance, straight level flight, but a perfectly trimmed single-channel or multi-channel reed ship should fly in a straight line *more or less* indefinitely if not affected by wind or external forces.

A plane containing a proportional system, however, is continuously dependent on received information for its attitude in the air. If it were not for so-called "fail safe" systems normally built into most proportional systems, and the transmitted signal is lost or missing, the controls (operated by servos) would go to extreme positions and crash the plane. The fail-safe returns all control surfaces to neutral and drives the motor to low speed. This low speed on the motor is probably the most important consideration because, if the motor continues at high speed, almost any contest type plane, particularly a low wing design, will spin in. (This is an advantage proportional has over reeds: If you lose control in a reed system, you can't get low motor.)

FAIL SAFE VERSUS GLICH: Probably the first thing anyone will hear when the subject of proportional systems is being discussed is the term "fail safe" or "glich." It seems that when you are flying proportional, sometimes, for no apparent reason when the plane is not very far out, it will go into "fail safe" which is an indication of the fact that the receiver lost the transmitted signal with the results *described above*. Even more strangely, this seldom occurs at extreme range, but always occurs when the plane is considerably inside its reliable range.

The answer is that it is not a function of sensitivity, or power, although increased transmitter power could help—and some of the more elaborate transmitters have gone up to one watt. It is caused by phase shift interference from signals traveling by different paths and cancelling each other when they get to the receiver. The most common example of this that we know is selective fading which we hear on distant broadcast stations at night. This is caused by a ground wave and a sky wave, which has to go a greater distance, coming in 180 degrees out of phase and cancelling out the carrier, with the net result that the signal is distorted.

How this occurs so close to a model plane is a little hard to understand, but apparently a signal going out from the transmitter and hitting a car and bouncing off, or maybe traveling a considerable distance and hitting a metal signboard or electric tower or wires and bouncing off, will arrive at the receiver 180 degrees out of phase from the transmitted signal. Obviously, this signal will be weaker than the transmitted signal, and therefore the condition is most likely to occur when the transmitter antenna is pointed at the plane and would be particularly bad if the plane also had a straight wire antenna that was parallel to the fuselage. In this case, the reflected signal and the transmitted signal might be very close to the same strength and cancel each other out giving "fail safe."

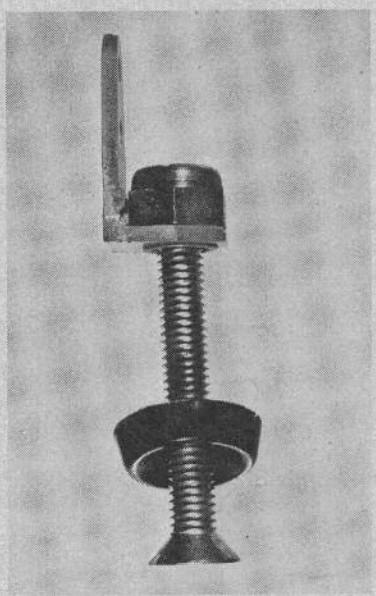
In the AP System we know that from a range angle you can fly this equipment as far as you can see it, and seldom do you get a "fail safe" at extreme range. It always seems to occur closer in, and strangely sometimes it can happen only 100 feet away. From the experiments that we run, the best solution for preventing this is the proper installation of your antenna. Apparently the best installation is a vertical antenna in which the lead from the receiver runs back through the fuselage to about 6 inches behind the trailing edge of the wing, and then a 30-inch stiff vertical wire is erected at this point. We never have had a "fail safe" with this particular installation. The next best installation is to run the antenna from the receiver directly out through the side of the fuselage to one end of the stabilizer up over the top of the fin and terminated at the other side of the stabilizer. The next best system is to run the wire back through the fuselage to the rear edge of the wing, run it up to the top of the fin, and then run it at right angles to one corner of the stabilizer. Installations in which the wire is run down the length of the fuselage or simply run up to the top of the fin are inadequate and should never be used.

(Reprinted from Citizen-Ship directions. Italicized words are editorial substitutions.)

? SEEN THESE

DeBolt Clean Flow Fuel Filter-Weight

Knobis-Kabobis: Dirt in the needle valve body has cost many a contest, including at least two world championships. Importance of filters is well known but most filters leave things to be desired. This one by deBolt is metal with stainless steel screen. Most important it serves as the fuel line pick-up weight—where a filter ought to be. Called "Clean Flow," sells for 95¢.

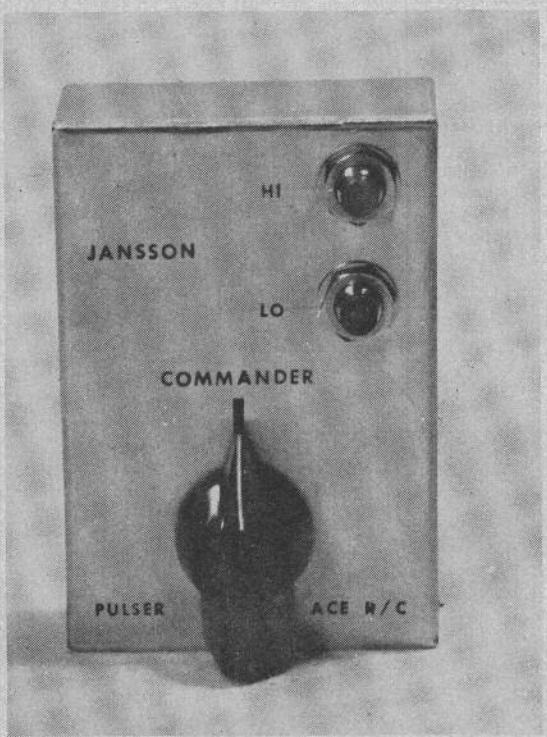


Strickland Wing Lock

Strickland Wing Locks: The modern trend is to bolt the wing—and sometimes the tail—in place. Eliminates dowels, messy bands. If anything damage is less in a cartwheel and a total is a total regardless. These have ½-in. plated steel self-locking screws, nylon finishing washers and anodized aluminum mounting brackets with self-locking nut attached. Price per pair, $1.50. (Key the leading edge, dowl peg(s) inserting into holes in ply insert.)

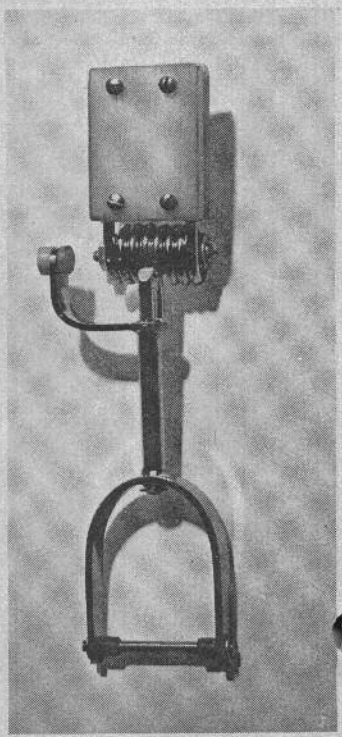
Royal Products Multitestor

Multitestor: Royal Products Company's 200H tester is distinguished by small size—convenient to pocket—of 4½ x 3½ x 1⅛, and large face for easy reading. Range selector, dial at lower right, is both easy to read and to use—as any novice will note. Probes and flexible leads are plastic, color coded. Price is $13.95.



Commander Pulser for Rudder-Only

Commander Pulser: Dick Jansson designed, this tiny relayless, solid state pulser, attaches to front of any 9-volt transmitter (using the same battery) in place of the pushbutton. Switches give full on and off for those who use on-off tone for motor command in rudder-only proportional flying. Knob is scissor-spring centering. Biggest dimension is 3 in. $17.95.



Larkin Nose Strut

Lakin Nose Gear: Features include rubber shock in spring (adjustable), nylon linkage connection (important to eliminate "noise"), no-load servo linkage, perfect alignment requiring no continuous adjustment. Fork design centers wheel under coil spring. Nylon mounting plate easily detached from firewall. $8.95.

Dobbin

(*Continued from page* 10)

steeply banked approach was almost lost in a high wind when the pilot forgot to go back to aileron for stronger response.

Following the modern trend, strip ailerons replaced the conventional type—less work and no internal linkage. Hard 1¼ in. trailing edge stock makes convenient strips, and the ⅜ in. thickness minimize warping and bowing, as well as chance of flutter if the wood is flexible.

Biggest simplication was in the fuselage which used 3/16-in. soft sides without aft corner blocks or stringers. The use of ⅜ thick soft balsa for the fuselage cap insured accurate stabilizer positioning at zero degrees. This cap, extending back over the stab, provided strength against breaking the fuselage at the stabilizer L.E. in a cartwheel—one occurred in a cross wind and the stab knocked off. The straight line afforded by the fuselage cap also makes for accurate referencing of both wing and stab when you play the incidence and decalage. Gross weight with a built-up unsheeted wing—since replaced—was 6½ pounds.

At this weight, using the built-up wing, some surprising flight characteristics resulted. With one degree incidence, the craft would take off on a fast idle, and could be held indefinitely on the ground cushion provided altitude was maintained. One could run next to the aircraft when so flown (12 x 6, but 11 x 6 is proper); easing back on the throttle put the wheels on the ground.

Kraft stick has indents for positioning throttle in definite positions unattended; level flight was maintained one indent from low motor; inverted flight and even an occasional outside could be achieved two notches from low. But an unfortunate choice of rear spar material suggested this rather flexible wing might not take fast maneuvers which reversed CP travel abruptly, and a conventional wing was substituted. Weight of the built-up wing, with gear and wheels, was 1½ pounds, the conventional wing well over two pounds. While high-end performance showed no difference with the new wing, the trick low speed capability, alas, was blunted.

The built-up wing, incidentally, was assembled flat on the work board by using horizontally split ribs, the bottom sections being added later. This method also put the solid spars in the center of the rib, with lift loads partly carried by the lower surface covering material in tension. A very high strength-to-weight ratio results—but the wing does flex, and you can't have a rip in the fabric for obvious reasons! Hobby shop sizes of ¼ x 1 and ¼ x ½ or even ¼ x ¾, for front and back spars, are shy for such a big wing. The experimenter could try built up box spars—they don't take as long as imagined for, say, ½ x 1, and ½ x ¾. Rib spacing is required to be closer—by adding one or two ribs per panel—and airfoil shape maintained at the nose by use of false or nose ribs. Timed assembly proved both wings identical.

NOTES ON PROPORTIONAL FLYING

Comparison with Reeds: Much has been said about different designs being required for propo. People will tell you planes should be a) longer and b) shorter; or they should have more dihedral, etc. With one extremely interesting exception, we found no differences. The exception is in the airfoil.

Most designers use a section, such as the 2415, which has greater curvature on top

(*Continued on page* 22)

(*Continued from page* 21)

than on bottom. This is approximately true of the "zip" section used on the Rookie and the present airplane. Both machines indicated that the leading edge must be kept down if efficient high speed maneuvers are to be done. In this ship—others could be different—a zero-zero line-up of wing and tail proved necessary; otherwise the generous area would produce a continuing gain of altitude—large trim increments had to be rolled in. At one degree, the trim wheel was full forward, and two turns of the Kwik-Link was given to the elevator as well. At zero-zero, the elevator was put in mechanical neutral and forward trim at the transmitter reduced to half. Obviously, plenty of lift is being generated by the zero airfoil because of that 2/3—1/3 camber setup. Lift would result at less than zero-zero—that is, with negative incidence.

In fact, the ship performs very well with the wing at less than zero, suggesting that, for multi proportional, the original deBolt concept of a symmetrical section may be superior. The symmetrical section should reduce, if not eliminate, steady stick corrections (or trim) for some regimes.

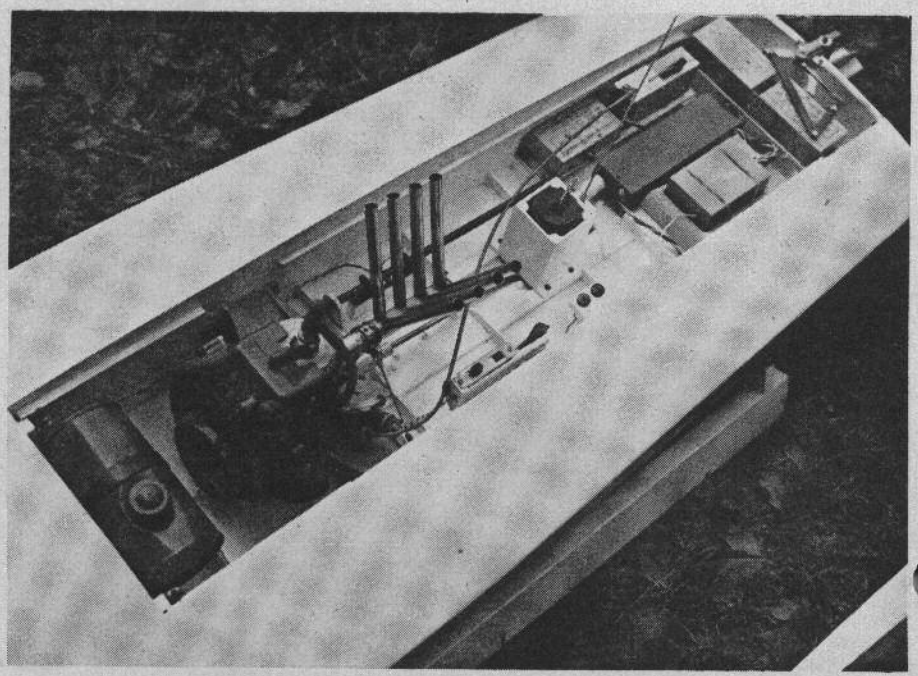
Most interesting was the tendency of the plane, when rigged with less than zero, to nose up slightly when power was taken off! An educated guess might be that the high thrust line in this case, had less of a nose-down couple—compared with lift developed (in a semi-symmetrical section)—at slightly lower speeds. Thrust line location plainly is a factor. Whereas with the reed ship, high thrust line had minimized (for us) any trim need when going inverted (the Rookie required no trim inverted and very little at high speed), it would be very easy with proportional, especially with symmetrical section, not to have the thrust produce a couple which called for stick displacement or trim alteration. For the average flyer, the less trim required, the more he can concentrate on the simplest piloting techniques.

The equipment: Most producers of proportional rigs place great stress on elimination of "noise." Kraft, for example, tells you to test the transmitter, antenna off, for distance from the plane, then to repeat the test with the engine wide open. With the top of the transmitter pointed at the tail of the ship, these distances proved to be roughly 40 feet and 12 feet respectively. The primary noise source proved to be a metal clevis to the throttle; a nylon clevis eliminated this problem. A secondary source was a too tightly packed receiver—cure obvious. These corrected the problems.

There is much talk of gliches and antenna relationship (see Citizen-Ship article, this issue). So the antenna was brought out the fuselage top above the receiver, forward of the servos, then taken to the top of the fin. This may or may not be necessary; but there has not been a glich so far.

Not being a contest flyer we are not aware of any fine faults, such as some famous pilot might identify. We do know it is easy to fly, takeoff and land, and can be slowed up. It is so easy to fly inverted off the top of a half inside, that skill required is nil. For reasons unexplained, it can be leveled off inverted with gross,

Core Grip contact cement (Advanced Model Prod., 47 Walnut St., Millis, Mass.) for use with expanded bead styrene and styrofoam structures, also for attaching balsa to doublers, etc. Light, dries in 10 mins. Pint $1.89, quart $2.95. Pint does wing up to 800 sqs.



Beautiful installation in White Heat, by Ed Soltis. Appears to have trim for rudder.

exaggerated stick movements, regardless of the pitch attitude. (Do reflect on the semi-symmetrical section, at slight negative incidence, perhaps, which is then inverted.) If you have any multi experience, an inverted pattern is a cinch the first try—you can be all over the sky, so to speak, and still maintain a wheels-on-top flight, for example.

At approximately 7 to 7¼ pounds, consecutive outsides, followed by insides off the top almost without limit, can be done merely by holding full stick, reversing it when you want, with no aileron correction in a cross wind.

It seems immeasurably easier to fly proportional than reeds. To an airplane pilot reed sticks are most unnatural. But having got this far one cannot say which system might prove easier to the guy with no prior experience to set a pattern. The two-stick box—we've flown one-stick only a bit—seems ideal and natural. There is the same feeling of flying a real airplane and, for us, better precision at an early stage of the game. Besides, there is a certain familiar relationship between the divided elevator and aileron sticks, to the similarly laid out reed transmitters. This makes for an uneventful transition from reeds to propo—in this case anyway. *(Publisher's Note—There is no intent to compare Kraft with other equipment; it so happens that the editor had for tests at this time, both Citizen-Ship and Kraft.)*

G/L Reports . . .

(*Continued from page* 19)

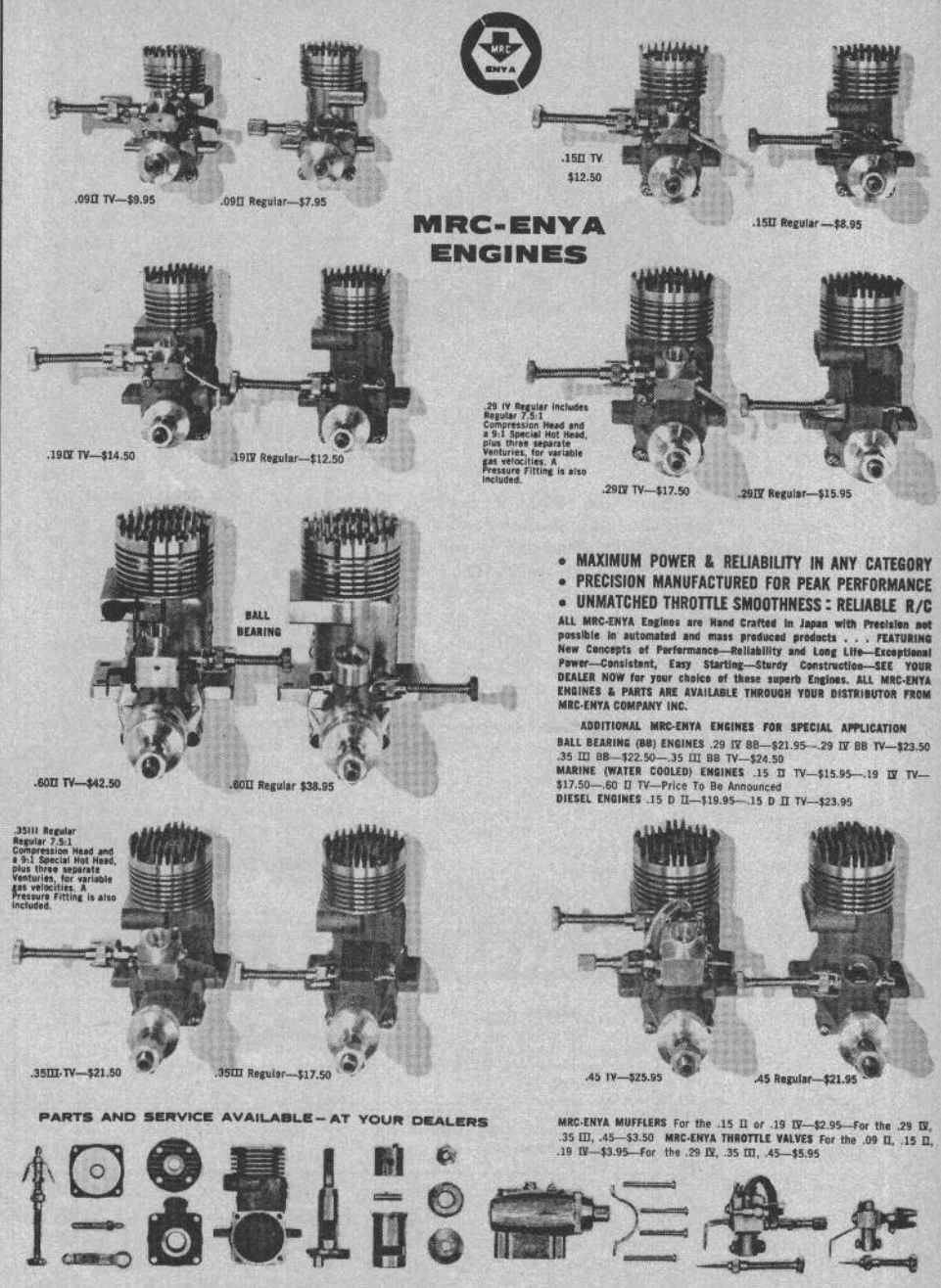
was flipped on, there were no "noise" problems, no tuning required (this may vary) and range and response has been equal to that of the excellent "exotic" system which we normally fly. So far, there have been no "glitches" or any evidence of interference—the Hi-Ray once being flown simultaneously with four other aircraft. (There is more interplane interference than you suspect.) So we say nothing further about actual performance but, instead, will talk about interesting features of this equipment (as representative of the more limited propo deals now in the public eye).

It is neither here nor there to say that the packaging of the red-colored "boxes" gives one a distinct Christmas morn feel on opening the shipping carton, but it is proper to report that the directions are interesting, lengthy, instructive, and decidedly useful beyond the mere business of voltages, charging, where the wires go, etc. Citizen-Ship deserves acclaim for the surprise article which begins the instructions. This, briefly, is a two-page rundown on propo notes, fail-safe versus glitch, and antenna locations and arrangements to minimize glitches. This is recommended reading—if you fly propo, check someone's AP instructions.

Not every propo system has a fail-safe (such as neutralizing controls, and low motor), the argument against fail-safe being that it adds a large amount of potentially troublesome and costly circuitry, and, if you price the thing as high as competition, you can put the dough into costly electronic components and tedious check out procedures. (We still don't know who is correct!) Anyway, the AP system has fail-safe. (Perhaps the argument is pointless when just two propo channels are concerned.)

The physical appearance, stick and trim locations, etc., are obvious from the advertisements. The receiver, of course, is an all-transistor superhet, with a selective audio filter tuned to 3750 CPS to reject most of the nose and electrical interference

(*Continued on page* 24)



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G/L Reports . . .

(*Continued from page* 23)

found in a plane. The transistorized transmitter uses a silicon power output transistor, is 100 percent collector-modulated at the fixed 3750 tone, using a variable rate of 20-60 CPS, and varying width of tone burst for the two proportional controls. A full motor speed change requires about one second, the control surfaces going to neutral when motor is signaled (solid tone for high, and carrier only for low).

Servos (feedback-type, linear output), designated APC for flight controls, and APM for motor, can be used with any analog system meeting the input voltage requirement. They require two 4.8 to 6-volt supplies, center tapped. The motor control servo, which does not receive continuous input signal, runs to one end with a positive voltage, the other on negative. (Obtained via a pulse omission detector.)

Ideal receiver and servo batteries would be 450-mah nickel cads, four for the receiver and four, center tapped, for servos. For smaller installations 225 mah size can be substituted, which probably is less critical on receiver (40 ma drain) than for servos. As it turned out, the Hi-Ray could have handled the weight of eight 450-mah batteries, but for lightness, had compromised on 225 mah for receiver and 450 mah for servos—this creating a dual charging requirement. Citizen-Ship estimates that the single 9-volt (Burgess D6 or equivalent) is sufficient for two or three months—anyway, it is not critical. If you substitute nickel cads (we didn't), seven 450 mah's are needed, giving a voltage range of 7.7 to 9.8.

Installation works out very well. Unique is the use of a cleverly designed wiring board, rectangular in shape to mount crosswise in the aircraft (ends can be cut down to suit cabin width); the board attaches t blocks, runners, etc. at either end by means of two small wood screws. Five Deans 2-8 pin connectors (half of each) come soldered on the board, so that cables plug in vertically, conveniently from the top. The slide switch, already in place, has a tapped plastic handle into which a brass push-pull rod screws for actuation from outside the airplane. This proved most convenient.

By mounting the servos multi-fashion aft of the PC board, and the receiver (in foam as usual) in front of it, and the battery pack in the nose, a standard multi configuration occurs. The arrangement is a happy one.

However, in the confined cabin of the Hi-Ray—really a single-channel high-performance rudder job with optional elevators—the three cabin servos won't fit side by side, nor can they be strung out in a pair plus one. Nor is their space for an easy forward motor servo mount. To maintain the required CG position, the arrangement in the photos worked very well. Rudder and elevator servos mount on a ply platform, removable from the ship by the usual four corner screws going into blind nuts under hardwood rails—in this case in the bottom side corners of the cabin.

The engine servo was mounted independently on the fuselage side, hanging out into the cabin—because of cabin space restrictions. Although rubber grommets were not specified, we elected to use them for the MC servo and to put foam blocks under the servo tray on the cabin bottom, the tray pulling down on the foam without the platform actually meeting the hardwood mounting rails.

In all propo systems noise causes should be eliminated. Just avoid metal-to-metal connections (the troublesome one invariably proves to be attachment of MC push-

(*Continued on page* 26)

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L to R, front: Jim Kirkland, Maurice Woods, Cliff Weirick, Bill Powell, Al Solnik, Maxie Hester. Back row, L to R: Phil Kraft, Harold deBolt, Randy McGee, Ralph Brooke, Larry Kelley, Ted White, Dale Nutter, Loren Tregellas. Present but not shown, Bryan Lakin and Jim Greer.

TOURNAMENT OF CHAMPIONS

► The Second International Radio-Controlled Model Airplane Tournament of Champions, sponsored by and held at the Wedgewood Amusement Park, Oklahoma City, September 24-25-26, is an invitational tournament that pulls regional, national and international champions. Put on by Maurice Woods, it attracted 500 spectators on Saturday, and 700 on Sunday at 25¢ admission. Most interesting first-day development was a washout by Doc Brooke, who finished the second and third days sharing Jimmy Greer's hard-working airplane. AMA pattern flown, excepting horizontal eights; after spin, three free-style optional maneuvers inserted.

On second day, a round of Goodyear racing was flown—after mysterious crash, Cliff Weirick shared Wood's Long Midget. (They'd teamed to win Nats Goodyear with same ship.)

Third day saw final pattern round and more Goodyear. Novel handicap system worked like this: total difference between times for 10 laps of two racers was handicapped to the faster plane. If time was less than previous low time on following flight, handicap was adjusted for next heat.

In the second round all types permitted and four pattern stunt jobs raced at the same time. Third race was strictly Goodyear. Final of the day was a 25-lapper with one required pitstop — compatibility of transmitters proving a problem, this was run against the clock.

Final Goodyear was won by Weirick, with Al Solnik second, and Harold de Bolt third. Pattern standings were Ted White first, Phil Kraft second, and Cliff Weirick third.

Success of the meet was assured by the tremendous help of the Oklahoma Radio Control Association, with a big assist from the Oklahoma Aviation Commission, who lined up judges and did some judging themselves.

Papers, radio, and TV gave the affair much publicity.

G/L Reports . . .

(*Continued from page* 24)

rod to throttle and a jammed in receiver). Use a nylon Clevis. Metal clevis can be used for the nylon control horns and to attach pushrods to servos. Wood rods with wire ends, of course.

Speaking of noise, this manufacturer thoughtfully reminds you to install all screws that hold on the removable transmitter back—a loose cover has fouled up many a propo system, and is a thing to be watched. There is one word of caution: Do not permit the receiver case to touch a servo case—former is grounded to 2.4 volts and servos are center tapped, so a short results. (Directions cover this.)

The Hi-Ray airplane: Outwardly conventional, the design incorporates some interesting assembly features (Box-Lok, Andrews calls it) in the fuselage. The manner in which the nose blocks and prebent double-strut, shock-absorbing gear (it works fine without coil spring!) fall together is noteworthy. Thick, long cabin doublers with various slots provided for convenient location of any possible desired arrangement of boards, runners and partitions, is admirable. Andrews did elect to run pushrods high through the aft fuselage, exiting above the stabilizer on either side of the fin, and a bit more care that this builder provided, should be taken to avoid rub fits between wood pushrods and bulkhead holes. Don't hesitate to modify the holes, provided remaining sheet material is strengthened with glued-on reinforcements. However, there is no reason why the elevator horn could not be dropped under the stab, with a low pushrod location. The rudder, completely, above the fuselage, will require a high exit point for the pushrod, although it could angle upward from a low hung servo. We did find that one servo required reversing to suit the horn arrangement (these servos cannot be reversed) so we mounted it backwards with no ill consequences or inconveniences.

McCoy 35. This is a surprising engine considering its cost. Turning a 10-6, a full-tank wide-open test flight was made the first time the engine was started. There was no overheat problem on a hot day. Despite being treated with complete disrespect, this .35 so far does a perfect job, and runs perfectly on both extreme high and low with admirable throttle characteristics. Bargain or not, no one should hesitate to use the Mac .35.

The Hi-Ray is more tractable, however, with a smaller engine, even with multi radio and its higher gross airplane weight. High power of the 35 requires expert pilotage with a flat bottomed airfoil, in a relatively small ship and low power on the

10-6 will almost sustain a cruise condition, making a power approach a protracted, delicate affair. A .19 is adequate.

In this entire configuration, only one thing was mildly annoying. The nose wheel could not be steered! On concrete you miss the ability to taxi about—if you've flown multi. Substituting a steerable strut is hardly a problem. For a reasonable brake substitute, squeeze a rubber grommet(s) between wheel and strut. The drag will stop rolling without hindered takeoff.

About Buying Batteries: For these tests two packaged battery packs were purchased. Assuming them OK, the radio was switched on for the first time with the not exactly uncommon experience of having the wrong controls pick up. One cell in the receiver pack was down, but accepted charge suitably for trouble-free operation thereafter.

As pointed out, the high-priced exotic systems come complete with batteries and chargers (the manufacturer does this to make sure you can't go wrong). At least one system ran into battery-source troubles anyway! In addition to checking voltage and charge before using the batteries, experience indicates you should not use any battery pack (even when plastic wrapped) which allows any flexing of the stack. Tightly tape (plastic electrical tape) the stack to make it rigid and to insure good intercell connections.

Citizen-Ship seems to have done their part in providing a good radio system in the AP, but their fate—and yours—is in your hands when it comes to buying and preparing your battery supply, and soldering a handful of cable connectors.

(Publisher's Note—The editor's report was prepared after a few weeks of flying this system. It is important to note, however, it was flown. This is more than a typical write-up of company literature.)

Monitor

(*Continued from page* 2)

Having flown full-house propo (37 hops *there* so far) without being hit once in all that crowded flying, doff a hat to these skilled flyers. But on a beautifully clear and calm Sunday morn, headed for the more peaceful boondocks and came upon this fair-sized group, flying out of a cut but tufted postage-stamp area with high tension lines frowning from about 100 feet away.

There were rudder jobs (an Aero 15, for example), no low wing multi's, one shoulder-wing (Falcon), and a couple of Mighty Mombos—one with Digimite—which were flown high, wide and handsome without a stunt except for an occasional altitude losing spiral. Pretty to watch.

Who can rationalize all the reasons why hobbyists specialize in so many different forms of flying? No one ever converted a single-channel pulse proportional man. If he gets into multi, he'll sooner or later drag out that beloved little crate.

Multi takeoffs and approaches interest the writer more than the gyrations in between—they lend themselves to watching. Stand near the approach end of an active airport runway and watch the real crates come in and you'll know this sensation. Properly flown, simple models can be just as rewarding—in a special kind of way. Perhaps character has something to do with it. What the pilot enjoys. But watching these guys—it came home that the plane must be suited to the flying area, and vice versa.

When you join a bustling group on a large field with unrestricted takeoffs, and approaches, to limitless concrete, and literally cubic miles of air space, then the big-engined, fast aircraft doesn't press you. There's less urgency to turn or loop back, or necessity to visualize a 360-degree picture of surroundings while you fly, including the inevitable stupid parker who rides across verboten territory. Here, your little simple job seems lost, a quaint novelty flown by a quaint character. You can't even hear it.

On that little field, with steep climb-out over wires, quick turns back and forth so as not to stunt over a not-too-far expressway, and a county road, and the need for sure approaches (how accurate you can become when open-space-implied permission to be sloppy is taken away) is not perfect for the full-house pursuit. This is a spot for airplane watching!

Or that pasture, alone in the evening, with swallows chasing the droning little ship in the still air—this is a job for a Mills Diesel and not Superman!—the rudder-only plane is absolute king. The multi is about as serene as the next door farmer's noisy tractor. There's poetry to flight. And machinery that shatters the peace, and the mood, is the wrong weapon, in the wrong place, at the wrong time.

Should we own types to suit any occasion—like the variety of golf sticks in a bag? A cute flying boat perhaps? Or a towliner?

* * *

Colored flags, sun glasses and interference. Sun glasses are needed on a shiny day. Reflected light, bounced off the concrete, gets under the peaked cap and to sear your eyeballs. The stunting crate is watched through squinted half blind eyes. Visibility drops off alarmingly in the sunhit haze.

Have you noticed how green that yellow "freq" flag can look? At a distance you've got to look hard to determine if it is really yellow or green. Why that greenish tint? The thing to keep in mind is that the real green one is *dark*. So squinting through sun glasses, spotted this green flag flying and, since ours was yellow, went on the air. *Presently* some easy-going chap sauntered over and said we were on the air with the guy flying. Both propo full house. He was not hit (was he being polite?), nor were we. How can you control two full-house proportional aircraft on the same frequency?

And then this chap came out with a rudder job. From several years of constant superhet flying in our busiest area, one has learned to depend on these flags and superhets. So, ready for takeoff on yellow flag, hastily warned that the other chap had superregen! He was in a wild spiral. Instantly switched off the xmitter but, by then, he was in trouble down wind.

When you fly with a small group, and with strangers, watch out for superregens. The small group can afford to ground all flying while one superregen goes up! (If the chap is daring enough to fly one regardless.)

* * *

For the first few weeks of its life, this multi (See Dobbin, inside) looked like a terrific performer on the low end of the scale. So much so we'd discounted advanced stunting capability. Oh, it probably was there, but surely many other airplanes would be so much better. But then, the Super Tigre 56—in three ships but not too much flying, really, was leaning out, or running hot, or something. Over the phone, Walt Schroder recommended Glo Life (we all had heard good things about it, of course, but you never do get around to trying everything).

They get $2 per small bottle locally. The

(*Continued on page* 28)

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Monitor

(*Continued from page* 27)

results were worth $20! Feed a capful, gradually, into the venturi while the engine is running open. Add a capful per quart to your big tin of moonshine. It is no exaggeration to say this put the ship all over the sky—the engine gained enormously in power and improved idling and response as well. The ship had to have incidence taken out—even zero-zero with a big wing is tough to handle precisely full bore. (A spectator remarked that he smelt varnish!)

"We have had our guys go wild on Glo Life," reported a correspondent. "Some swear by it and some swear at it. The ones with badly trimmed airplanes, are probably the ones who swear at it." That is close to the truth. As we had found out, the airplane can be badly trimmed with a "scraunchy" engine—you never know it.

Buy a bottle of Glo Life today. They don't advertise in GL.

* * *

GL should like to quote Bob Penko, Kirtland's Hardware and Hobby Shop, in Willoughby, O.: "We have some people flying on 27.255 and a blue flag is for both superregen and 27.255. This is very confusing, so the Mentor R/C Club adopted black as the flag for 27.255 with superhet equipment. Blue is regen."

Following are flag colors commonly used to distinguish frequencies:

26.995, brown; 27.045, red; 27.095, orange; 27.145, yellow; 27.195, green; 27.255, blue. White is used for 50-54 with frequency lettered on flag.

Blue Streak

(*Continued from page* 15)

paper block. Once wired up, leave the hull in this state and cut out the transom and forward bulkhead shown fullsize on the plan. Screw and glue these to the hull. The hull bottom may require flattening a little when inserting the forward bulkhead, depending on the wood used.

On the prototype model, the cockpit sides were laminated from 3/32" balsa and 1/32" plywood with the plywood face to the inside. However, for simplicity it is recommended that they should be cut out from hard ⅛" sheet balsa or ⅛" plywood. Do no slot the sides for the forward bulkhead until the exact position of the slot has been determined for the individual model. Fit the cockpit sides to the transom and the forward bulkhead. The lower edge of each side will need chamfering to obtain good fit on the hull bottom. It is perhaps advisable to make a dummy bulkhead from scrap ⅛" sheet balsa to space the cockpit sides at the correct distance, when gluing them in place.

The next job is to glassfibre the inside of the join of the hull bottom at the bows. Cut a couple of strips of 1" wide glassfibre tape about 8" long. Apply a generous coat of resin to the joint and lay the tape over this. A further application of resin and the second layer of tape will give a very strong joint when dry. Clip off one end of each length of wire as close to the outside of the hull as possible. The wire may now be removed completely from the hull by pulling the other end with a pair of pliers, and the small hole remaining filled with resin. An alternative to the use of glassfibre is balsa cement and 1" wide bandage. This was used on one model of similar construction and has survived several knocks so far, proving its strength.

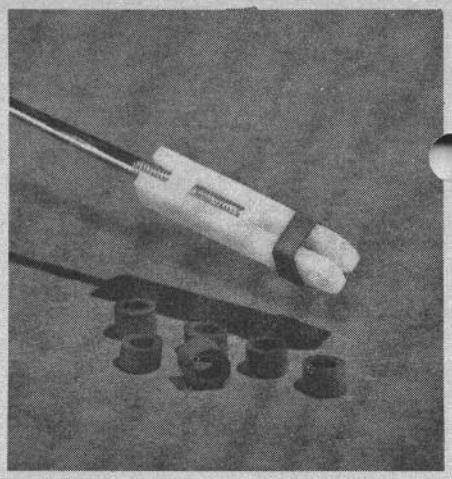
A piece of ¼" sheet balsa is shaped to fit at the bow as seen in the section. This both strengthens the model and simplifies the fiting of the 1/16" ply fore-deck at a later stage. It is most simply secured with glassfibre resin.

Now glue on the four ¼" x ⅛" fillets along the cockpit sides and the hull bottom edges. Chamfer these strips with a sanding block to take the side decks. The decks themselves are cut out from 1/16" plywood with the grain across the length of the hull. They should be trimmed to fit the cockpit sides accurately, and to overlap the edge of the hull by a half an inch. Before gluing in place paint any surfaces which cannot be reached with the decks on. On the prototype, the cavities formed by the cockpit sides, hull bottom and decks were filled with expanded polystyrene and this too must clearly be carried out before final fitting of the decks. Glassfibre was used for the latter operation and, once dry, a resin fillet was supplied to the underside of the hull to give the curve between the spray strips and the hull. (see section on plan). The spray strips, or in this model, the deck edge, should be trimmed to within ⅜" of the hull edge.

The motor mount is made from ⅛" aluminum sheet with a cut out to take the motor. This is cut to be a close fit between the cockpit sides. Two hardwood blocks are then bolted to the aluminum in the positions shown on the plan. Sink the

CORRECTION

In the September-October issue size of the R/C Primer, by Howard McEntee, was given as 6¼ x 11¼. Correct size is 8¼ wide.



World Engines R/C Craft Ny-Link with rubber tube guard—attaches easily to flex cable.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

(Act of October 23, 1962; Section 4369, Title 39, United States Code)

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(Signature of editor, publisher, business manager or owner)

I certify that the statements made by me above are correct.

Paul F. Runge, Publisher

heads of the mounting bolts well into the wooden blocks. Bolt the motor to the mount and locate the propeller assembly, coupling and motor in the hull. It will now be clear which parts of the wooden blocks require shaping, and this should be carried out until the motor crankshaft is in line with the propeller shaft. A check should be made to ensure that the flywheel is as close to the hull bottom as possible without causing the propeller to foul the hull. Glassfibre resin is again used to secure the mounting blocks to the hull and cockpit sides. Once dry, and with the motor, coupling, and propeller assembly still in position, the prop tube can be glued in with resin and tape. It was felt worthwhile to have a 1/16" ply bulkhead to separate the engine and radio compartments. This was fitted 12" from the stern and is shown on the plan.

The hatch is cut fom 1/16" plywood to fit closely inside the cockpit sides. The ⅛" square hardwood strips are glued to the inside top edges of the cockpit sides, as on the plan. The hatch runs between these.

Finishing the hull is a matter of personal taste, the colour scheme of the original being an all blue hull, white hatch with red stripes.

The rudder was made from 18 s.w.g. brass sheet, soldered to ⅛" diameter brass rod. The rudder tube was made from plain ⅛" internal brass tube, and was glued into a small block on the hull bottom. The 18 s.w.g. brass dagger plate under the forward end of the prop tume was added to improve turning. Its sizes does not seem critical, and it could well be successfully omitted.

The fuel tank was tailored from tinplate to fit around the propeller tube. As such, it is perhaps more complicated than necessary, and a polythene bottle is recommended. This could be located beside the prop tube.

Radio installation: Because of the extreme low freeboard, it is wise to enclose the radio gear in a waterproof box. My box contains an Orbit 10-channel receiver, powerpack, and servo-amplifiers. This enables the use of a standard relay type servos, a Graupner Bellamatic and a homemade throttle servo being used initially. The rudder servo has since been changed to a waterproof Taplin Navigator, showing that the larger type of servo can be accommodated. The placing of the throttle servo right aft necessitates the use of a long pushrod to the engine. However this procedure brings the servo to a dryer part of the model and lumps the radio together.

Running: The model itself has given no trouble at all, and does not seem critical to such things as weight distribution, and shape or size of the rudder or dagger plate. It was at first thought that the sloping decks right down to the water might give rise to tripping in a turn. However, there has been no such tendency, even in the tightest turns. With a model much heavier than the 3¾ lb. of the original, tripping might occur. The cure is simple. Either increase the size of the dagger plate or reduce the width of the spray strips to ¼".

The first motor tried was an aircooled Eta 29. A change of class has now occured and an Oliver Tiger Major is now in use. With the Eta not running too well, speeds of 20+ mph were reached and it is anticipated that the 3½ cc. motor will also be capable of this speed. It is suggested that a 29 motor is the upper limit for power, unless the weight can still be kept below 4 lbs. With a heavier motor the already low static freeboard at the bow will be found to be at a dangerous level, although even in the event of the motor compartment flooding, model won't sink.

GL At Play

(*Continued from page* 1)

superregen circuit!

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

* * *

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

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Bits and Pieces

(*Continued from page* 20)

frequency is varied.

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

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

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

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

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

Jansson Transmitter

(*Continued from page* 5)

by General Electric and Fairchild).

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

FAIL-SAFE FOR REED SERVOS

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

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

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

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

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

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

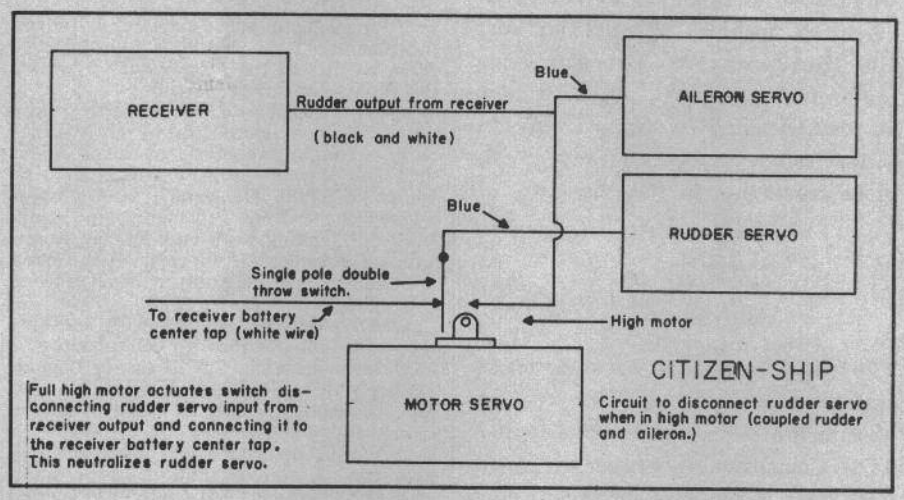
The final RF stage operates in a CW mode and is 100 percent downward switch modulated by Q3 at the tone frequency. Output tuning is a pi network operating into a tuned half-wave antenna or 27 MC, and an approximate one-quarter wave on the higher frequencies. Tone generation is accomplished with a unijunction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

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

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

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

(*Continued on page* 32)



(*Continued from page* 31)

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

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

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

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

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

Readers Write

(*Continued from page* 2)

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

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

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

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

GENE ABERNATHY, Lilbourn, Mo.

TRANQUILIZER

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

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

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

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

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

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

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

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

HAPPY ENDING

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

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

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

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

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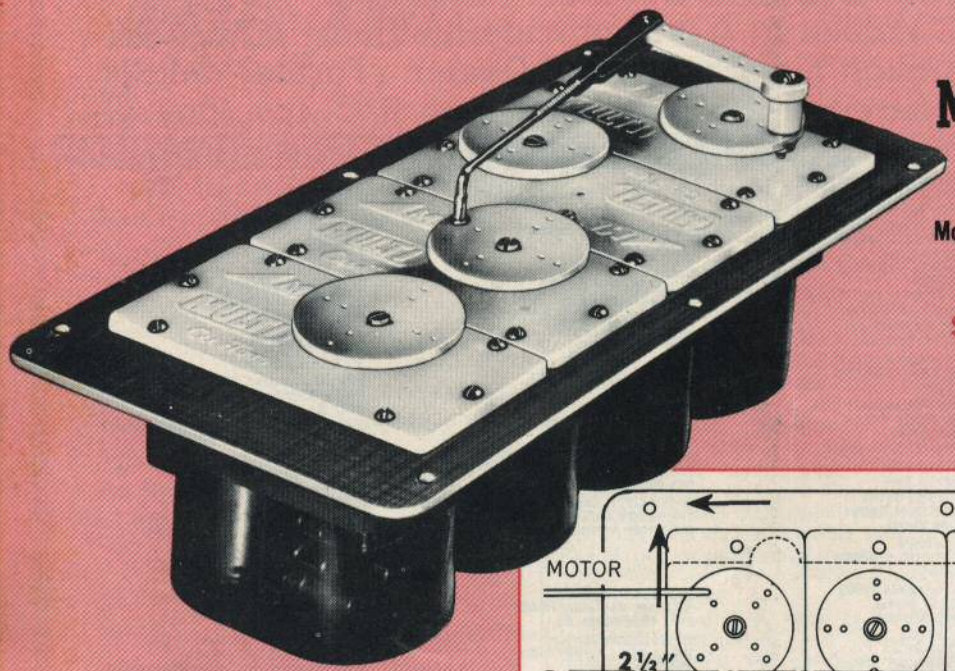
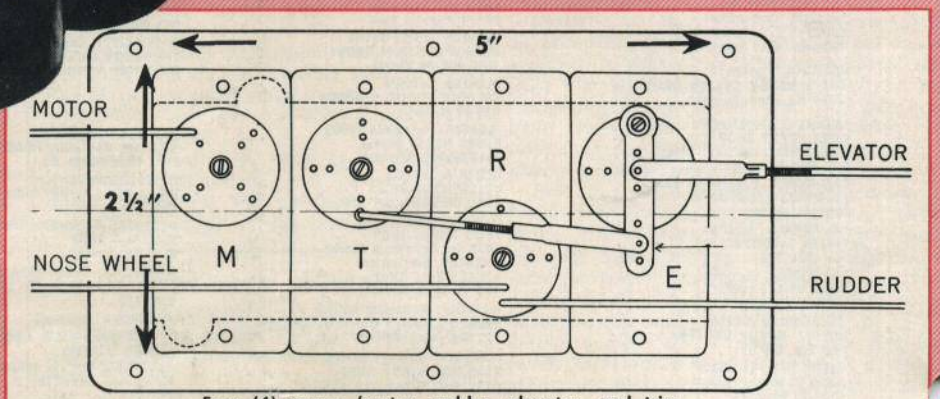


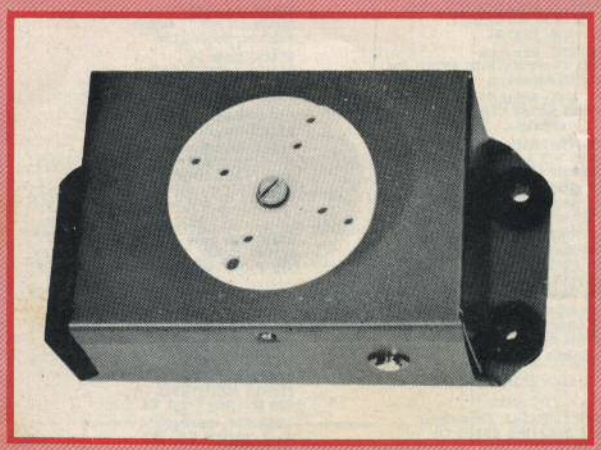
MULTI CHANNEL SERVOS

Model RMK-SN	Model RMK-T	Model RMK-R
(green)	(red)	(Blue)
SN	Trim	Relay
$24.95	$22.95	$14.95

RMK-S Servo Tray, Trim Bar and Hardware
If unavailable from your dealer, order direct for prompt delivery.



Four (4) servos (motor, rudder, elevator, and trim may be mounted in a space 2½" wide by 5" long.



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Since the introduction of the Royal Single Channel Rudder Servo and 3-Position Motor Control Servo several months ago, they have been acclaimed as the finest actuator ever designed for single channel operation. Eliminating the most common problems by replacing the troublesome escapement, Royal's Single Channel Rudder Servo features an extremely powerful compound action that is positive and will not override position. Faster than a conventional escapement, the third position triggers the Royal Motor Control Servo, a three position actuator that is powerful enough for any size engine normally used in Class I operation.

Rudder Servo	Motor Servo
$14.45	$14.45

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