RADIO CONTROL
MODELER
THE LEADING MAGAZINE FOR RADIO CONTROL • JULY 1966 50¢

CDC

WIN A NEW PROPORTIONAL SYSTEM!
Name RCM's Plane On The Cover

6 METER DIGITRIO CONVERSION
Plus Dual Digitrio Charger

Build Your Own Foam Wing Cutter

KEN WILLARD'S 'TOP DAWG': FOR MULTI OR SINGLE

A few words about me.

I am Electronic Engineer and this is my day job.

From tender age two things attracted my interest and I managed to have them in my life.

The first was electricity and the second the bluesky.

I´ve found the model airplanes hobby in October 1973.

I love the wooden structures from scratch airplanes and boats also.

I started collecting plans, articles, books and anything else that could help the hobby of many years ago and have created a very large personal collection of them.

Since 2004 I became involved with the digitization and restoration of them and started to share the plans from public domain with my fellow modelers.

Now after all this experience I have decided to digitize, to clean and to re publish in digital edition and free of all issues RC Modeler magazine from 1963 to 2005 and others books and magazines.

Certainly this will be a very long, difficult and tedious task but I believe with the help of all of you I will finish it in a short time.

I apologize in advance because my English is poor.
It is not my mother language because I am Greek.
I wish all of you who choose to collect and read this my work good enjoyment and enjoy your buildings.

My name is Elijah Efthimiopoulos. (H.E)
My nickname Hlsat.

My country is Greece, and the my city is Xanthi.

Λίγα λόγια για μένα.

Είμαι Μηχανικός Ηλεκτρονικός και αυτό είναι το αληθινό μου επάγγελμα εργασίας.
Από μικρός δυο πράγματα μου κέντρισαν το ενδιαφέρον και ασχολήθηκα με αυτά.
Πρώτον ο ηλεκτρισμός και δεύτερον το απέραντο γαλάζιο του ουρανού και ο αέρας αυτού.
Το χόμπι του αερομοντελισμού το πρωτογνώρισα τον Οκτώβριο του 1973.
Μου αρέσουν οι ξύλινες κατασκευές αεροπλάνων και σκαφών από το μηδέν.
Ξεκίνησα να συλλέγω σχέδια, άρθρα, βιβλία και ότι άλλο μπορούσε να με βοηθήσει στο χόμπι από τα πολύ παλιά χρόνια.
Έχω δημιουργήσει μια πολύ μεγάλη προσωπική συλλογή από αυτά.
Από το 2004 άρχισα να ασχολούμαι με την ψηφιοποίησης τους, τον καθαρισμό τους αλλά και να τα μοιράζομαι μαζί σας αφού τα δημοσιοποιώ στο διαδίκτυο (όσα από αυτά επιτρέπεται λόγο των πνευματικών δικαιωμάτων τους).
Σήμερα μετά από όλη αυτήν την εμπειρία που έχω αποκτήσει, αποφάσισα να ψηφιοποιήσω, να καθαρίσω και να ξαναδημοσιεύσω σε ψηφιακή έκδοση και ελεύθερα όλα τα τεύχη του περιοδικού RC Modeler από το 1963 μέχρι το 2005 και κάποια άλλα βιβλία και περιοδικά.
Σίγουρα είναι μια πολύ μεγάλη, δύσκολη και επίπονη εργασία αλλά πιστεύω με την βοήθεια όλων σας να την τελειώσω σε ένα καλό αλλά μεγάλο χρονικό διάστημα.
Ζητώ συγγνώμη εκ των προτέρων γιατί τα Αγγλικά μου είναι φτωχά.
Δεν είναι η μητρική μου γλώσσα γιατί είμαι Έλληνας.
Εύχομαι σε όλους εσάς που θα επιλέξετε να τα συλλέξετε και να τα διαβάσετε αυτήν την εργασία μου καλή απόλαυση και καλές κατασκευές.
Το όνομα μου είναι Ηλίας Ευθυμιόπουλος.(Η.Ε)
Το ψευδώνυμο μου Hlsat.
Η χώρα μου η Ελλάδα και η πολη μου η Ξάνθη.

Aeroporia Greek Magazine Editing and Resampling.

Work Done:

1)Advertisements removed.

2) The building plans of airplanes in full size can be found on websites listed in the table.

3) Articles building planes exist within and on the websites listed in the table.

4) Pages reordered.

5) Topics list added.

Now you can read these great issues and find the plans and building articles on multiple sites on the internet.

All Plans can be found here:

Hlsat Blog Free Plans and Articles.

http://www.rcgroups.com/forums/member.php?u=107085

AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

http://www.hippocketaeronautics.com/hpa_plans/index.php

Contributors:

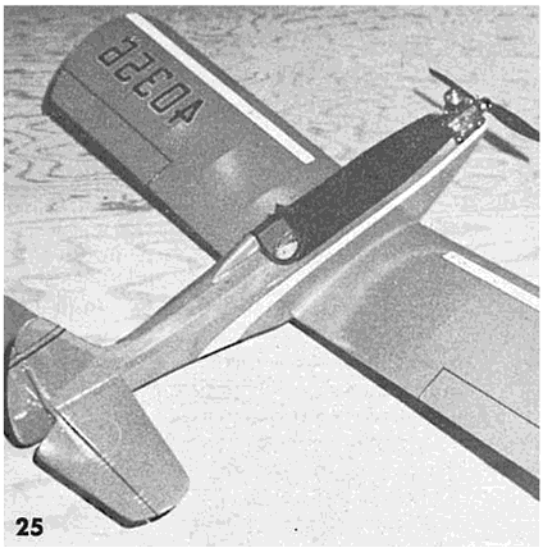
Scanning by Hlsat.

Editing by Hlsat.

Thanks Elijah from Greece.

RADIO CONTROL
MODELER

JULY 1966 VOL. 3 NO. 7



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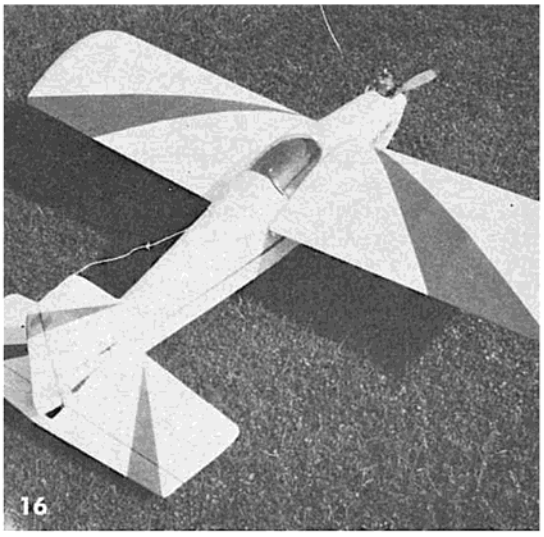
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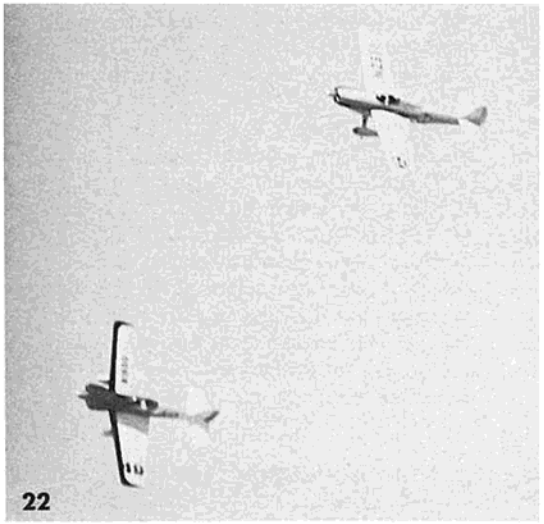
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FEATURES

DEPARTMENTS

COVER

The subject of RCM's Name-The-Plane contest — two prototypes of Herb Abrams outstanding low winger for Gallopless Ghost and .09 mills. Cover by Jim Northmore.

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EDITOR'S MEMO

BY DON DEWEY

GREETINGS, sports fans . . .
We've got so much material for you this month that we'll keep this column to a minimum. First off, though, we'd like to apologize to Joe D'Amico who was the first place winner in Class II Expert at the recent King Orange Internats. We mistakenly labeled the picture of Bill Welker who took third place in that event as the first place winner. Sorry, Joe . . .

●

Chuck "Swamp" Cunningham (earned that nickname due to the fact that every time he takes pen in hand the bull rushes), sent us up a copy of an article about rechargeable power supplies that appeared in a recent copy of 'Purchasing Week,' April 4th edition. It seems that current research and development at General Electric labs include putting a third electrode in nickel cadmium cells which opens and closes the charging circuit, thus permitting recharging in 2 to 4 hours instead of the usual 16 hours. At least for a while, however, the price for inserting a complex component into a battery, will make these units prohibitive from a cost standpoint for R/C usage. But it's just one of many new developments to come.

●

Speaking of new developments, Peter Berg of Holland stopped by our office during a visit to the U. S. this month. While we were sitting and talking about R/C in our respective companies, he pulled a complete radio system from his shirt pocket — a completely encapsulated superregen receiver that is exactly the same size of a lump of sugar plus a magnetic actuator for proportional rudder control that was the same size! Designed for .010-.020 ships, the unit is demonstrated on a 12" all-balsa hand launched glider that turns in five to fifteen minute flights from the nearest cliff site! The transmitter, complete with pulser, is exactly the same size as a pack of regular size cigarettes. Air range is approximately three-quarters of a mile. You could put this unit on an indoor rubber powered scale model and scarcely notice the weight difference!

●

June 18th and 19th are the dates for the Fourth Annual Wright Brothers Memorial Radio Control Championships to be held at Wright-Patterson AFB in Dayton, Ohio. Events will include Class III Expert and Novice, Class II Jr-Sr-Open, Class I Jr-Sr, Class I Open, Flying Scale, Open Pylon (3 airplanes at a time with no restriction on plane or engine), Goodyear Pylon, Limbo, Combat, Freestyle Class III, and a special improved pattern for Class III. Four continuous flight lines, rotating experienced judges, plus refreshments add to the special attractions of this outstanding meet. This is one that is on the 'must' list. Contact Don Laughead CD, 4789 Lamme Road, Dayton 39, Ohio.

●

While on the subject of things to do and see, there will be a large operating display of most leading brands of proportional radios during June 1st to June 20th at Root's Hobby Hut, 6036 Telegraph Avenue, Oakland 9, California. This is being arranged by Dale Root in cooperation with the manufacturers in order to enable all the many interested modelers in the Northern California area to actually see and operate the many fine proportional products of the leading manufacturers. Hours will be from noon to 5 PM and 7 to 9 PM each weekday and Saturday 10 to 5 PM. To date, the following systems will have radios presented: Kraft, Orbit, Ace, Controlaire, Bonner, Micro-Avionics, Logictrol, Sterling, C&S, and Min-X. Catch this one if you're in the area.

●

Last week we had the privilege and pleasure of receiving a beautiful plaque that read as follows:

An Honorary Membership in the Port Arthur Radio Control Club, otherwise known as The Oily Birds, is hereby presented to Don Dewey and the entire staff, both editorial and production, of the Radio Control Modeler Magazine. All rights and privileges as lifetime members are extended to you all as a token of our appreciation of the fine coverage you have given to our club activities. Henceforth, you may call yourselves, and be known as Oily Birds, by the unanimous consent of the members in meeting, assembled on this day, April 5, 1966.

(Continued on Page 9)

Congratulations to Bud Atkinson who was recently appointed Associate Editor of Grid Leaks and a consultant to Ace R/C.

The plaque was signed by Robert A. Follette, President; Lonnie Betts, VP; Dick Dickson, Secretary, and Buddy Tomlinson, Treasurer.

We would like to extend our deep appreciation to all of the members of the Oily Birds for this honor that they have bestowed upon us. The club, itself, has earned an enviable reputation as a leading R/C organization, and one that is, indeed, a tribute to model aviation.

●

Speaking of clubs, 'Cymdeithas Reoli Diwifr Deheudir Cymru' is pronounced: Kum-dye-thass ree-ole-eye dee-wiv-rr dee-hi-deerr kum-ree. Just in case you didn't already know. In Welsh, it means South Wales R/C Society, according to Pete Waters, the Honorable Secretary of the group. Or, at least they think it does, since nobody in the group speaks Welsh! Maurice Franklin, our former editor in Great Britain, and now an employee of Kraft Radio, and I were discussing this one night last week. Both Maurice and I were sporting the South Wales R/C Society decals on our newest birds. We decided that it was too far to go to attend the meeting this month. . . .

●

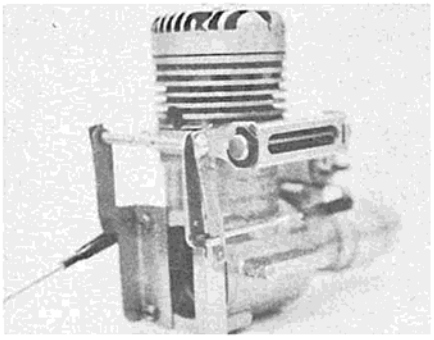
Next month's cover will be a picture of a modeler holding a 10 channel Sterling Spitfire in front of a full-size version of the famous WW II fighter, taken outside the Royal Australian Air Force Memorial Building near Perth, Australia. Our photographer for this shot, Ray Irvin, passes on this somewhat unusual R/C story:

Ten years ago, before the modeling bug got to Ray, he as a professional photographer, attempted to fire electronic flash guns by radio control. For this purpose, he purchased a single channel transmitter and two receivers. The first big trial came at a large hotel ballroom where he set up a bank of flashes and one receiver on each side of the room. The transmitter was carried on his shoulder hooked up to the camera. The formal event was a wedding scheduled for that evening. During the afternoon trials, all went well. That night, with all wedding guests seated, Ray switched on and flashes started to go at all sorts of intervals! In fact, every time the elevator went past the floor they were on!

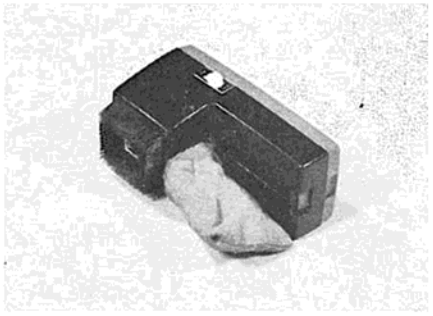
Showcase 66

Cletus Brow announces that he is now taking orders for his pneumatic retracting gear. Three years of development work and testing have gone into this product, making it one of the most reliable and thoroughly tested retractable gear offered for sale. The gear is comprised of two wing units, one nose unit, actuating switch, fittings, instructions, and all tubing needed for installation. A pressure tap fitting (not supplied) on your motor provides the operating power. Most motors will supply the required pressure for operation. Cletus is presently compiling a list of motors that have been used with his gear and will reply to your inquiry if you are in doubt. All units are complete within themselves, requiring only a single length of neoprene tubing pushed over a fitting for operation. Each unit mounts with four screws on two wooden rails spaced 1¼" apart. The two wing units require a depth of 1½" for operation. The nose unit requires 1¾" depth for operation. Each set of gear is handcrafted and checked out to work perfectly before delivery. Price is $69.50 per set and all units are guaranteed. For further information, write to Cletus Brow, 2022 N. Acoma, Hobbs, New Mexico 88240, or **Circle #1 on the Reader Service Card.**

A very convenient Motor Control Crossover has been produced by **Darin Brothers,** 5221 Allen Road, Allen Park, Michigan 48101. Designed to fit all engines from .29 up, this unit eliminates the problem associated with hooking up the throttle control linkage when the throttle arm is on the opposite side of the fuselage from the servo. The unit, itself, does not interfere with the mounting of the engine as the uprights do not extend beyond the sides of the crankcase. The uprights are of stainless steel for maximum strength and wear. All parts are formed and cut to size. All that is needed to complete the unit is to drill the necessary mounting holes and make two solder joints. Complete step-by-step instructions are included with each unit. Price is $2.75. For further information, **Circle #2 on the Reader Service Card.**



The Mini-Vac is a miniature battery power portable vacuum cleaner that is useful around the modeler's workshop and in the wife's kit of cleaning accessories. Modelers who build on the kitchen table will find it invaluable for keeping sanding dust to a minimum. In the workshop, the Mini-Vac will pick up balsa and styrofoam dust from sanding and sawing operations. It should always be used to remove the sanding dust from the surfaces of balsa and styrofoam before applying contact adhesive. The unit is powered by two "C" size flashlight batteries. Price is $3.75 plus 50c for handling from **Delta Specialties,** P.O. Box 754, Bridgeton, Missouri, 63042. **Circle #3 on the Reader Service Card.**



Fibrefoam Products, 720 E. Imperial, El Segundo, California, has come up with a "first" in R/C products, in the form of molded foam wings for currently popular RC designs such as the Candy, Senior Falcon, and Kwik Fli II. As close to being aerodynamically perfect as possible, these wings are strong beyond belief. The molding process starts with the wing covering being positioned in the mold and held in place by vacuum. Fibreglass is then bonded to the wing covering. Then a chemical foam in a liquid state, formulated by Fibrefoam Products, is introduced into the mold. The foam rises from the L.E. to the T.E. within the mold. Carbon dioxide is used to expand the liquid chemicals into a low density foam which cures until rigid and form the inner primary structure of the wing. After a heat cure, the wing is released from the mold — 100% fibreglass reinforced, stressed skin covered, and totally seamless. All of this is accomplished inside the mold! A free sample of the process can be obtained by sending 8c in stamps to Fibreglass Products.

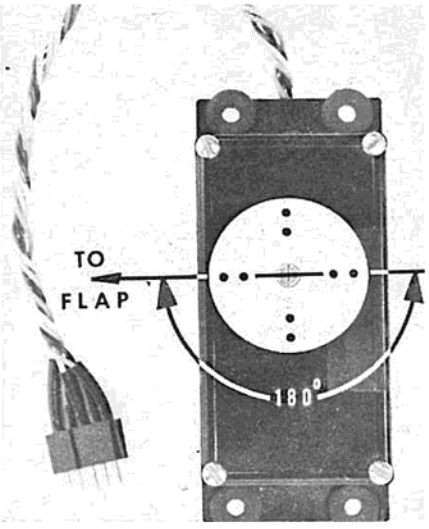
Min-X-Radio Inc., 8714 Grand River Avenue, Detroit, Michigan 48204, has released their model SH-1 superhet receiver. This is the smallest commercial production relay superhet unit on the market today, measuring 1 5/16" x 1 17/16" x 1 5/16" and weighing two ounces. Sensitivity is 5 microvolts. Voltage requirement: 3V. Optimum tone: 400 to 1500 cps. Modulation percentage required: 60 to 100%. Price is $34.95. For further information, **Circle #4 on the Reader Service Card.**

Rocket City R/C Specialties, 1901 Polk Drive N.E., Huntsville, Alabama, is offering a set of wheel brakes for $2.00. These new brakes consist of a molded hub designed to fit DuBro wheels, plus a spring that is wound around this hub. One end of the spring is secured to the landing gear strut and the other is actuated by the elevator servo, causing the spring to tighten and prevent the hub from rotating, thus providing positive braking action with a minimum of weight and moving parts. Tested and recommended by RCM. For further information, **Circle #5 on the Reader Service Card.**

(Continued on Page **9** *)*

Nashville Hobby Center, 903 Church Street, Nashville, Tennessee, has a complete line of professionally built RC scale aircraft and multi stunt models available. Built by skilled craftsmen, these models are available at prices that are hard to match. For example, a Jetco Pt-19 is $129.95; Jack Stafford's Commanche is $137.50; Sterling's P-51 with flaps $95. For further information, **Circle #6 on the Reader Service Card.**

EK Products, 14875 Dillow Street, Westminster, California 92683, has added a 180 degree Flap Servo to their line of R/C products. The advanced design of the unit effectively locks control devices in their extreme position, preventing excessive current drain. Linear output feature has been eliminated to allow 180 degree output arm travel. The unit is similar in size to their standard servo and will retail for $45. Weight is 3 ounces. **Circle #7 on the Reader Service Card.**



Johnnie Casburn Model Engineering Co., 6508 Normandy Road, Fort Worth, Texas, is currently in production on The Sweeper, a swept wing, 776 sq. inch multi RC model that features precision cut foam wing cores and many exceptional kit features. An ex-

cellent competition and sport design for .45 to .61 engines and reeds or proportional control. Kit price is $39.95. Foam wing core only is $15.95. Plans are available separately for $3.75. For further information, **Circle #8 on the Reader Service Card.**

CUNNINGHAM ON R/C

WHATEVER happened to competition?

Have you ever stopped to think what has happened to this aspect of modeling? At one time in this sport, competition was almost everything. In free flight and U-control it is still big, but beginning to die. In R/C, the lack of competition goes all of the way from the local contest to the Nationals. At least seventeen billion words have been written asking what happened to the juniors and some few thousand words have been directed toward the lack of entrants at most of today's contests. The reasons are there — they're not very good reasons, but they are valid. In the case of the juniors, I think that most of them have been frightened off by plastic models at an early age. When they are getting to an age where their co-ordination and skill level is high enough to be able to construct a pretty good ship, girls drag them away. My own youth is not buried by too many years and yet I can remember that we would rather build models and fly them than stand around gassing with the girls. Since TV, it ain't so anymore! Now girls are the big thing. (Looking at it now, who can throw stones?)

With the advent of radio control, we, the flyers, found out that you didn't need to have a contest to have fun. Just batting around the sky on a Saturday or Sunday afternoon is fun enough without trying to beat the next guy. But, can you think of another game or sport where there is no competition? I'll grant you that you can swim or water ski or snow ski or participate in many activities without actually competing, but how about golf, tennis, ping-pong, football, or any of these sports? To make them interesting it takes COMPETITION! Have you ever watched those Sunday afternoon sport programs on TV? They go to very great lengths to make everything competitive in order to hold your interest. Why then does almost ninety-five percent of the R/C fraternity back away from a contest?

One of the most often heard, and reasonable arguments is that "I can't fly with that guy; he's too good. Why should I enter and make a fool of myself?" This is really the big problem with pattern events as we know them. I don't mean to infer that pattern events are bad and should be abolished. What I mean is that more of us should try and gain the necessary proficiency to fly in a pattern event. One night while talking to Jerry Kleinburg on the phone, he told me that some days he spends his entire time just practicing one phase of a class I roll. He's right and I'm wrong, but I frankly can't spend the day on one thing. I like to Jack Bat around.

There are a number of "pros" in our ranks. These are men who have taken the necessary time to become top-notch fliers. They have a natural gift of co-ordination plus the urge to be the best, and consequently they have risen to the top. These fliers usually practice every day, just for example, like a pro golfer would practice. Most of us are too busy trying to earn a living to keep shoes on the kids' feet as well as a few extra props in the tool box to be able to spend this much time in practice.

The need, then, is for more contests which stress a certain amount of luck to go along with the skill. The past two years have seen the growth of the Rinky-Dink contest and this has attracted more entrants and has sparked more competition than anything else in recent years. Unfortunately, this type of meet is also too often won by the pro, the guy who does the best flying with the best plane, but it is a step in the right direction. My political viewpoint is strictly opposed to the idea of making everyone conform to the same level — a ward of the state — and this feeling certainly spills over into modeling. The best man should win, but by gosh, the rest of us can make it darn hard for him to do so if we get with it!

Ed Rankin and Edd Alexander, fellow members of the Fort Worth Thunderbirds, worked up a pretty good set of rules for the rinky-dink type affairs. We have held four of them in the last year and one-half, and so far the winner of one has never repeated his conquest. These ideas are presented here, not so much as the last work in R/C, but as a sample of the type of contest that has been fun for all entrants and very easy to judge.

The events are (1) Bomb drop (dropped from the very original idea of the donut stick picked up from MAN about two years ago), (2) Loops, (3) Rolls, (4) Spins and, (5) Carrier landing. All of this is done in one flight and more than one ship can be in the air at one time. Last fall, the Thunderbirds had a very successful contest with twenty entrants using those rules. We were on our fourth round of flying when the time ended and we took time out to fly an unlimited pylon race. We had nine heats in this event. Can you imagine

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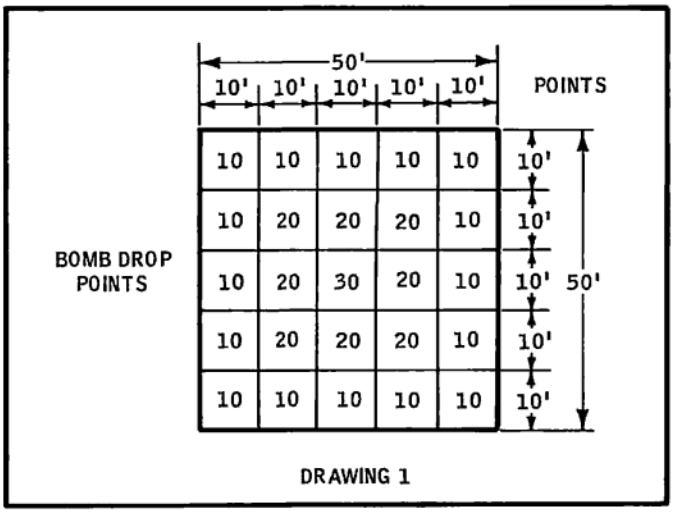
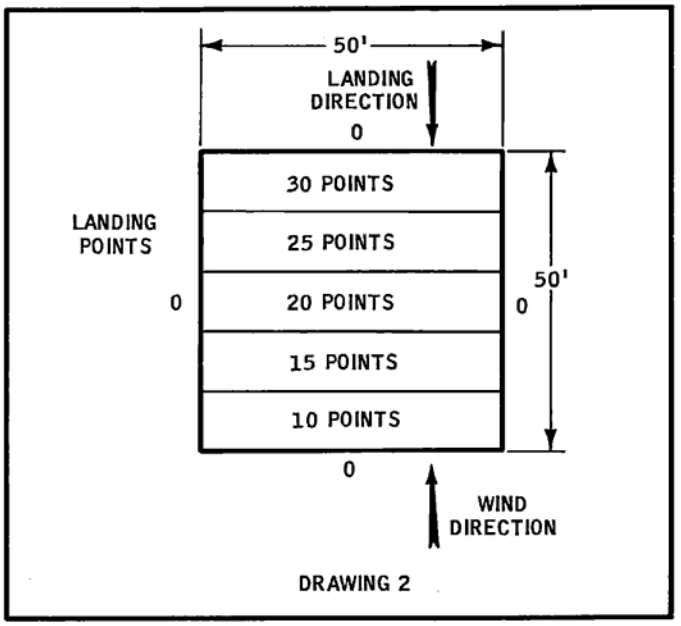
Put a little fun into competition. Here is the field layout for the bomb drop and carrier landing events.



DRAWING 1



DRAWING 2

two Fox .59 ships fighting for the air space at the same time? It's noisy to say the least. This contest started at noon and ended at five, producing a busy and fun-filled afternoon!

The first step is to divide the field into a square. We have found a fifty foot square works very well. Divide each fifty foot side into five sections of ten feet each. Mark off this grid with lime into twenty-five sections (see drawing number 1). This is the score system for the bomb drop. At the last Rinky-dink contest held by the Dallas R/C club they used mechanical bomb drops and this will probably be the rule in the future. If mechanical drops are allowed, perhaps a fifty-five gallon barrel could be used and the winner would be the flyer who could drop his egg in this basket.

Drawing number two is the scoring system for the carrier type landing. This method keeps everyone off of the field during each flight so that the judge can see just what square the plane landed in without trying to measure a touch-down point to the spot!

The sequence of events progresses like this: Take off is made with the bomb, the first maneuver being to try and drop it into the center of the fifty foot square. If you think that this is easy, try it. After the bomb pass, the plane has to make a pass by the judge at landing speed and below fifteen feet. This takes the place of a touch and go which could cause the flight to abort abruptly. When the judge signals he is satisfied with the landing pass, the flier pours on the coal and has one minute to make as many loops as he can. He is given one point for each loop. At the end of the minute, the judge writes down the score (see drawing #3) and the flier makes another landing pass. On the signal, he again gooses it then has one minute to make as many rolls as possible — one point per roll.

After the rolls, he again passes the judge, and on signal, hits high throttle and climbs out. He is allowed to climb for one minute and at the end of this time, the judge again signals and the contestant then spins down from this altitude. One point per spin is awarded. At one of our earlier contests, we allowed the contestant an unlimited climb out, but Edd Alexander stopped us all with a spin down with his Sweeper of 89 verified spins! Bob Pearce did over forty with his Falcon! Either one is a bunch! The average spin on the one minute scale is between fifteen and twenty.

At the end of the spins, the flier must touch down inside the fifty foot square to gain any additional points. The row in which he lands denotes the points he has earned.

As I said earlier, these aren't the best rules in the world, but they are an attempt to standardize this affair to allow for future contests.

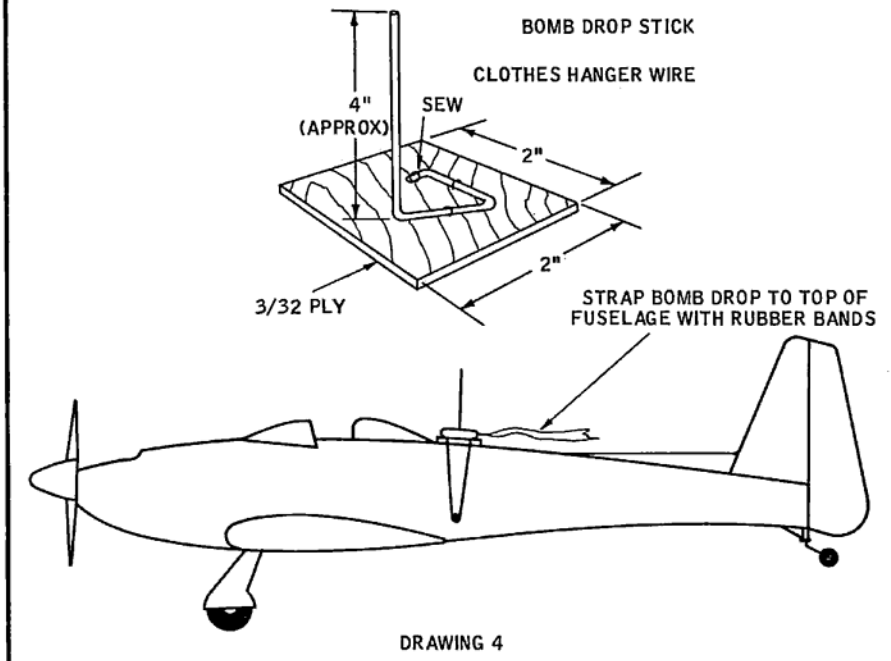
NAME _____

FREQUENCY _____

	1	2	3	4	HIGHEST SCORE
BOMB					
LOOPS					
ROLLS					
SPINS					
LANDING					
				TOTAL	

(ENTRY & SCORE CARD)
(3 x 5 CARD)

DRAWING 3



DRAWING 4

To some degree, the same old problem exists even with this type of event — that is, not everyone will enter. Some ships are not capable of spinning, simply cannot get on the ground anywhere near the fifty foot square. So they simply won't enter.

Why, then, the worry about competing? Simply this — that without some form of competition, the sport as we know it, will die. Suddenly you'll find that it begins to become boring just jack-batting around. Without a challenge, you lose interest. It does happen! If you have friendly rivalry, you not only enjoy the sport to the fullest extent, but you, yourself, become more proficient. If you have a fifty foot square to shoot for on a landing, you soon become pretty proficient at landing just where you want. If you have a goal, you try harder.

We are planning a forthcoming contest which we hope will get some of the beginners out and into competition. No doubt there are some holes in this contest program, but again it is a step in the right direction. This contest is to be a variation on the 7-11 type meet. Here's how it works:

(Continued on Page 9)

CUNNINGHAM ON R/C

(Continued from Page 8)

Each contestant is teamed up with another. The pairings are to be made so that a relative newcomer is teamed with a more experienced pilot and faster planes are paired with slower planes. The team members take turns being the pilot. The first pilot removes his prop and hands it to the judge. The judge then signals go and starts the stop watch. The pilot grabs a pair of dice (a natural for all of you WW deuce grey beards) and rolls until he has rolled a seven. As soon as a seben comes up, he grabs his prop, dashes for his ship, puts on the prop and takes off. As soon as his ship has broken ground, his partner dashes back to the table and throws the dice, throwing for an eleven. When he finally gets the eleven, he shouts to his teammate and the pilot lands, stops his engine, removes his prop and brings it to the judge. When the prop hits the judge's table, the clock stops. The next time the team is up to fly, the other member flies his ship. It should not only be fun, but it puts the luck factor into competition.

One last rule: Only one set of dice can be used, no ringers!

Another idea that was tried at the last two contests, was the brainchild of the Thunderbirds' Vice President, Helmer Johnson. During the contest (he was contest director), he set a hidden alarm clock. Each time that the alarm went off the guys that were in the air won a prize. At one time, the prize was a gallon of fuel, at other times the prize was money. This moved things right along and kept everyone anxious to get into the air.

Flying can be a lot more fun if it has a purpose and everyone should gain a benefit from any and all competition. Remember — keep the contest simple and the judging to a minimum and everyone will have fun, even the judges!

For those of you who haven't tried the donut stick idea, the bomb drop is illustrated in drawing number four. The easiest material to use for a stick is coat hanger wire with a ply base. Strap it to the ship with rubber bands and a foam pad. The best location varies from ship to ship. Some like to install the stick ahead of the cg; others just aft. At any rate, lean the stick just slightly forward so that the airflow will not suck the bomb off of the stick in level flight. For bombs, we have used old wooden hubbed sponge rubber model wheels with a short streamer attached. There are several methods for dropping the bomb. Some pull into a half loop and then give full down at the top to toss off the bomb. Some can throw it in a roll and others can get rid of the pesky thing by coming over the field at a speed just above landing, about twenty feet, hit a down and then an up to toss it off forward of the model. Practice this type of throw up HIGH! It's best to have a spotter try and guide you into the target area because it's pretty hard to watch both your ship and the ground at the same time.

Good luck! Gee, I've never seen Bernie Murphy at OUR flying field! Of course, we fly in the country — not enough guts to fly it out with old Snoopy above the house tops!

Hisat H.E Plans

EDITOR'S MEMO

(Continued from Page 5)

Needless to say, Ray's first introduction to interference was somewhat catastrophic. The radio gear was put into cold storage until one of his boys was given a model kit for his birthday. Now an avid model enthusiast, Ray makes sure he doesn't fly near buildings with elevators!

●

This month, Model Airplane News's spies infiltrated our ranks. Now, I mean this is going too far! We don't mind being referred to as R/C Playboy, and model aviation's girlie magazine, and we've always tried to keep our bugging devices well hidden in Uncle Walt's office. Like, industrial espionage is one thing, but deliberately getting yourself into the pages of a competitive magazine is another! Really! Just as big as life, sitting there in the cockpit like he owned the whole flamin' page . . .

●

Bernie keeps saying he'll see **you** at the field, except that he won't **let** anybody else fly off the street in front of his house.

The whole hobby is going to blazes. Don't call me, I'll call you . . .

SHOWCASE '66

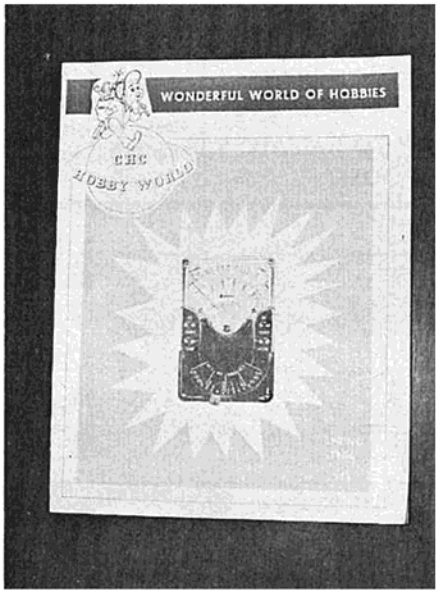
(Continued from Page 6)

The newest release from **Andrae Plan Kits**, P. O. Box 112, Elmwood Park, Illinois, 60635, is a twin-engine A-30 Baltimore Bomber, designed exclusively for multi reed and proportional control. The plan kit consists of giant size quality plans, molded nose, canopy, and gun turret sections (exact scale), fully layed-out part sheets which you laminate to standard 3″ x 36″ balsa sheets, formed landing gears, and a highly detailed 16 page construction manual. Span of the A-30 is 70″. Also available is a 41¼″ span Grumann TBF Avenger for single channel radio. Price of the A-30 is $7.75 while the TBF is $6.75. For further information, **Circle #9 on the Reader Service Card.**

Hodge Models, 9 Woodland Avenue, Coventry, Rhode Island 02816, has produced a set of plans for the Swee'pea as an R/C Goodyear racer. Scaled 2¼″ to 1′, it is designed to conform to NMPRA rules. Complete building and trim instructions are included. A kit of this model will soon be offered. For further information, **Circle #10 on the Reader Service Card.**

C.H.C. Hobby World's new catalog is available for 25c from C.H.C. Hobby World, P.O. Box 208, Covina, California 91722. This beautifully illustrated catalog lists many new and different RC tools and electronic items. Write direct to C.H.C.

The C&M line of RC accessories is now being manufactured by **Ace R/C Inc.**, Higginsville, Missouri. Included in this line are some excellent items such as three sizes of E-Z Fill Pumps, one ounce fuel primers, two sizes of heat shrink tubing, and 4 through 12 ounce fuel tanks. For further information on the Ace line of products, **Circle #11 on the Reader Service Card.**



HANDICAP SYSTEM FOR CLUB CONTESTS

by
BOB LIEN
STAN JOHN

Here is a contest tried and proven handicap system that encourages the sport flier and the newcomer to enter the challenging and fun-filled sports world of R/C competition.

DURING the past year, there has been an increasing trend towards the use of a workable handicap system in local and regional meets. Several articles and letters to the editor have been published, with a view towards initiating same type of handicap system at the national organization level. In view of the complexity of setting up a nationwide handicap system, we have for some time been using the system herein described at our regular monthly club meets. During this time we have had ample opportunity to revise and revamp our handicap system, without in any way, damaging the shining image of our national organization. The Crescent City R/C Club, Inc., of New Orleans, is composed of a representative cross-section of R/C modelers. We have all the standard types – avid competitors, thoughtful experimenters, Sunday fliers. The system has been applied to our regular monthly club meets, and has proven successful.

It is evident to the writers that some sort of workable handicap system is necessary, if the competitive side of R/C is to thrive and grow. One year ago we made a written plea for such a system, to be initiated at the national level by the AMA. Of course, no such system has evolved, and therefore we feel the method detailed here, designed for use in local club meets and smaller competitions may have value. The system represents an attempt at equalizing the major factors separating the various classes of R/C aircraft, equipment and ability, and also attempt to give newer club members an equal opportunity at winning. Under this plan it is possible for a newcomer to R/C to win a meet by showing a very moderate degree of improvement from one meet to the next. At the same time, the expert competitor must do his very best, and constantly strive for improvement in order to win his share of the meets. We have found that this method of handicapping has brought new life and interest into monthly club contests. The meets have been better attended than ever before, and individual interest in competitive flying has soared.

The meets, as we have conducted them, always make use of a portion of the AMA pattern. Scoring of the flights is on the standard AMA five point basis per maneuver, and of course scoring is done as accurately and consistently as possible. In other words, the handicap points are meant to be added to the contestant's score **after** the flight, not before or during. We limit our meets to two rounds or two hours, whichever is shorter, in order that the meet doesn't take up the entire day. By keeping the actual contest short and fast, everybody enjoys the meet, and we have no trouble getting judges from among the club members. An added benefit is the fact that during the course of a year or so, we have developed a club-full of qualified judges, by virtue of the fact that everybody gets a turn at it. The club, as a whole, has benefitted from the meets since with the handicap system in effect, many more have entered and have thus been inoculated with the competition virus. At the same time, they have been made quite familiar with the standard AMA pattern.

Pattern maneuvers used have varied from contest to contest, at the discretion of the CD, but usually only enough maneuvers to total 30 to 40 points are chosen for any one contest. The remainder of the actual flight score is a so-called bonus for landing on our rather small strip, and varies in order that a total perfect score remains at 50 from meet to meet. With a maximum of six AMA maneuvers in any one contest, flights are short, and using two flight lines, the meets have never lasted longer than two hours. Originally, in order that scores might be more in line with a full AMA pattern score, we multiplied actual earned point scores by two before adding the handicap. This was discarded as an unnecessary frill. We do not time engine starts or flights. Very little extra work is necessary on contest days, although in the future, as our members sharpen their eye, we may need the standard 100 foot circle for the bonus points, rather than the landing strip itself.

It can be said that contest results are very interesting. For fellow racetrack devotees, many a long shot has won, yet on analysis each month following the meet, it can be seen that luck has actually played less of a part than ever before in determining the winner. If a relative newcomer to competition has won, invariably a comparison with his

(Continued on Page 11)

HANDICAP SYSTEM

(Continued from Page 10)

previous scores will show definite improvement in flying ability since the last meet. If the meet has been won by an experienced competitor, he himself has felt that he had to battle for it, and had to fly at his very best to win. A change from say, reeds to propo will decrease the individual's handicap, and unfamiliarity with the new equipment will usually keep such an individual out of the winners' circle until he has mastered plane and equipment. However, with more sophisticated gear, his actual point scores invariably increase as he masters the new system. The workmanship handicap points are unusual in that the better the workmanship, the higher the handicap. Whether one's potential handicap would enter into the care with which one builds is debatable, but we have kept it in the line-up. It does serve one major purpose, in that it provides a handicap to almost everyone in the game — that is, it would be a rare expert flyer so inept at building as to garner zero points. It could conceivably be used as a club over the head of the inveterate purchaser of aircraft built by others than himself, but we have never used it in this manner.

The equipment handicap points have worked very well using the simple breakdown into single channel, reeds and propo. Within the single channel category we have included the more sophisticated systems such as galloping ghost, and pulse sets. Also included here are of course the more numerous escapement and the newer motorized escapement systems. Aircraft not included in the type of plane handicap points are handicapped at the discretion of the CD. Bipes and an occasional triplane fall into this category.

The bonus points for merely landing on the landing strip might be construed as a giveaway, and of course this is what it is. However, to a beginner, unaccustomed to landing on the strip consistently, these 20 points serve as an added inducement to accuracy and safety. The bonus points can be broken into other categories if desired. Thus, during early handicapped meets, we used instead a system whereby 5 points were given for showing up at the field with a flyable airplane, 5 points were allowed for starting the engine, five for getting in the air and five for sending a functional signal to the plane. As abilities improved during the year, these bonus points sort of settled into their present niche.

In order to get an idea how the handicap system works, let us take a couple of examples and try it out. First, suppose you are a beginner in the sport — you have made enough flights during the past three or four months to be able to control your single channel cabin job reasonably well, and your percentage of landings back on the field is improving regularly. On entering this club meet, your first meet, by the way, your handicap will be 20, plus whatever your level of workmanship might be. Let us say that the workmanship is good, giving a total handicap of 24. The pattern for today's meet consists of the first five AMA maneuvers, and landing. It is probable that the flight score would run thusly — Proto taxi — 0 points, takeoff — 0 points, since a hand launch was used. Straight flight out — 1 point, procedure turn — 2 points, straight return — 2 points. Landing was a three bounce 2 pointer, but on the landing strip for a bonus of 20 points. Total score, 29 points. Now, add the handicap of 24, and your final score for this flight will stand at 51 points.

Now, suppose that instead of being a novice at his first contest, you are an expert of the highest order. You fly a low-wing bomb, latest full house propo, of course, entered five meets last year, and have been around the hobby for plenty more than five years. As with the beginner above, you have done a good job on the bird, which gives you a total handicap of 4. Same set of maneuvers of course, since you and our novice friend are competing in the same meet. Scores here might run as follows: Proto taxi — 5 points, takeoff — 4 points, straight flight out — 4 points, procedure turn — 4 points, straight return — 5 points, and landing — 5 points — a real greaser, spang on the strip. Total score, 27 points out of a possible 30 — add the 20 point bonus to this, giving a flight total of 47 points. The handicap of 4 gives a final score of 51 — same score as our novice friend! Both have been flying to the best of their respective abilities, and both are tied for first place! We think you can now see why the handicap system really does make a horse-race out of an otherwise rather cut and dried situation.

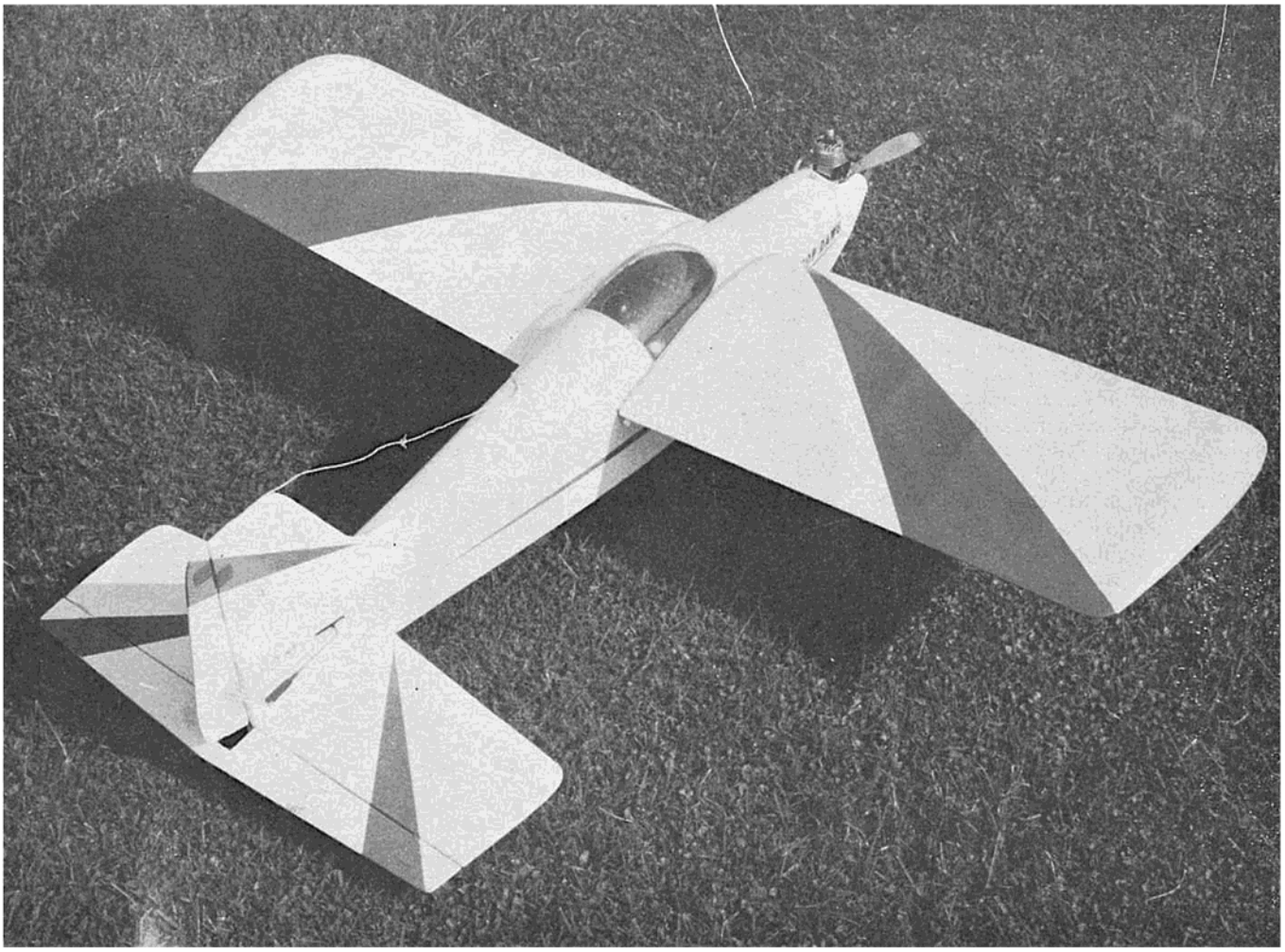
Just one more example. Let us assume that, rather than being either a rank beginner or a real pro, you fall into the great middle ground. Again, we are assuming several things in order to provide a handicap, but these examples are all taken from our contest files over the past months. Let us assume that, if you are an average RC'er, you have been around the hobby about 3 years — handicap points two. You entered only one contest last year — enjoyed it and took third in multi Novice — 4 points. You are flying reeds in a Falcon Sr., and the workmanship is fair — 3 points. Total handicap, 15 points. On the pattern, you score as follows: Proto taxi — 2 points, takeoff — 3 points, straight flight out — 3 points, procedure turn — 2 points, straight return — 3 points, and landing, 3 points on the strip, bonus 20 points. Total flight score is 36, including the bonus landing points. Add the handicap of 15 points — total score, 51 points! We hope you see by now that systems of this nature can add real zest to club meets. Any improvement, however slight, shown by any of our examples would have won the meet. Perhaps next time, the novice has learned to fly his cabin ship on a straighter path, or perhaps the expert has practised until he can squeeze out a 5 on his procedure turn — in any event, all participants must look to their own areas of possible improvement in order to win. It is entirely likely, and it has happened many times in our meets, that the Sunday flier will sharpen his pattern just a little, and come in a winner.

Next time your club has a meet, or as a first time venture, try handicapping!

HANDICAP SYSTEM

1. Contests entered in past year, exclusive of local club meets. None entered — 5 handicap points. Subtract one point for each meet entered during past year, not to exceed 5 points.
2. Years in R/C
   Beginner — 5 handicap points. Subtract one point for each year in R/C, not to exceed 5 points.
3. Type of Equipment.
   Single channel — 5 handicap points.
   Reeds — 3 handicap points.
   Proportional — 0 handicap points.
4. Type of Aircraft.
   Cabin — 5 handicap points.
   Shoulder-wing — 3 handicap points.
   Low-wing — 0 handicap points.
5. Workmanship.
   Excellent — 5 handicap points.
   Good — 4 handicap points.
   Fair — 3 handicap points.
   Poor — 0 handicap points.


TOP DAWG
TOP DAWG



By KEN WILLARD

RCM's Chief Sunday Flier presents the Top Dawg, an .049 to .15 sport Goodyear type design for single channel through multi proportional . . .

THE Top Dawg was designed in response to numerous requests from you Sunday fliers for a good, small sport job that would be suitable for several types of installations for radio gear — escapements, servos, reeds, galloping ghost, and even the more expensive proportional gear, such as the Orbit 3+1, Digitrio, PCS, Micro-Avionics, etc.

It has been an interesting challenge to meet such a broad requirement. From my own standpoint, I added another specification — that it should look hot like a racer, yet be comparatively easy to handle so the sport fliers could enjoy it. You shouldn't have to finish every flight with a severe case of nerves! Probably some of you will anyway — at least until you get used to it, because you'll want the hot version with an .09 or .10, even .15 power. But that's OK too, as long as that's the way **you** want it!

Some interesting factors were involved in this design. The compartment for the radio gear needed to be large enough for three servos, receiver, and battery pack for proportional gear. Yet the center of gravity location had to be non-critical because of all the possible variations in equipment.

It figured that the version with the proportional gear would probably be the hottest to handle because of the heavier wing loading and higher power required. So that was the first version to be built. A Max .10 was selected to power it, and Art Strahm loaned me his Orbit 3+1 (what sublime faith!) for control.

Now, I don't have a lot of stick time on full house proportional gear, but I decided to make the first test flight anyway. I had done some rudder only proportional flying, and figured I'd just use rudder until I got the feel of it.

That first flight was a real thrill! Art hand launched the Top Dawg, and away she went, climbing straight out until I gave a slight rudder command. A gentle turn, gain of altitude, then back off on the throttle, and try to get the feel.

Somebody — I forget who — came up alongside and asked, "What have you got in that job — galloping ghost?"

"Nope. Full proportional," I replied nervously, watching the model.

"Oh, yeah," he said. "Now I see. Calm down, ole' buddy. Your hand is shaking so much that you're fluttering the elevator!"

So I did — a little, anyway. This was a hot little job — hotter than I'd been flying for a long time. But as the flight progressed, and I could see there wasn't any reason to be nervous, I began to try a little elevator as well as the rudder action. Finally, getting up more nerve, I pulled a loop, and as Top Dawg came screaming out of it, I throttled back

and brought her in for a shaky, but successful landing!

On the next flight, I let Steve Corby, an old pro at proportional, fly. Man, it was beautiful! But on the next flight I took over again and with more confidence let the model go, as you occasionally have to do with single channel gear, and decided it would be necessary to modify the fin area. It was fine for proportional, but marginal for rudder only.

Next, a friend of mine, John Forrester, using my working plans, built one for single channel servo control. Since he had a Cox .09 with engine control, he installed it — even though the single channel version is designed for .049 power.

But we flew it with the .09 anyway. Wow! It climbed with the engine in idle! However, it proved the basic design was good for single channel, even with high power. So the .049 version should be very acceptable for you fliers who just want a good looking, good performing sport machine.

If you think you can handle it, put in an .09 or a Max .10 — and be ready! I don't recommend it for beginners, even though the .049 version is very good to fly. My suggestion would be to first fiy your Top Dawg with .049 power. Then install an .09 or a .10 after you've learned the reaction speed of the model. Three versions were built during the design stage. One had a 15% airfoil with 4 degrees dihedral, and this version is good for full proportional control, since you'll be controlling it all the time. The second version was similar. The difference being that it had 6 degrees dihedral. This is the best all around version, since it will free flight when properly trimmed, and return to level flight from a steep turn all by itself. This is good for single channel flying. The third version had a 10% airfoil and is too hot except for very experienced fliers.

Based on the flight tests, the version with the 15% thick airfoil and 6 degree dihedral was selected for publication. I think you'll like it. Here are a few building hints.

The Top Dawg, himself, holds aloft the .049 powered single channel version. Finish is Top Flite's Monokote.

FUSELAGE

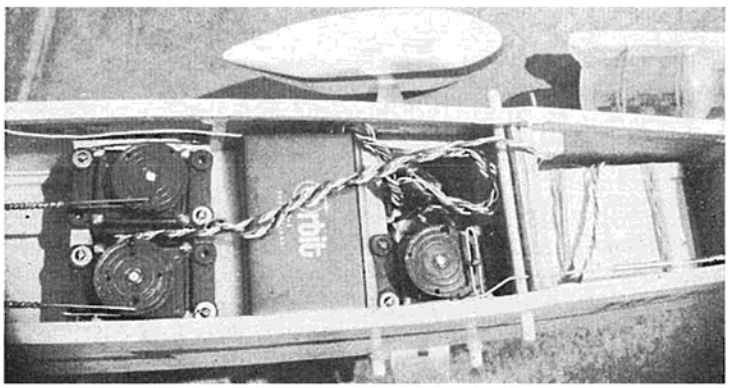
This is basically a box structure, with a turtledeck and hatch added on top. Be sure the 1/16" sheet material for the sides is of equal weight and strength so that the curvature of the sides is equal.

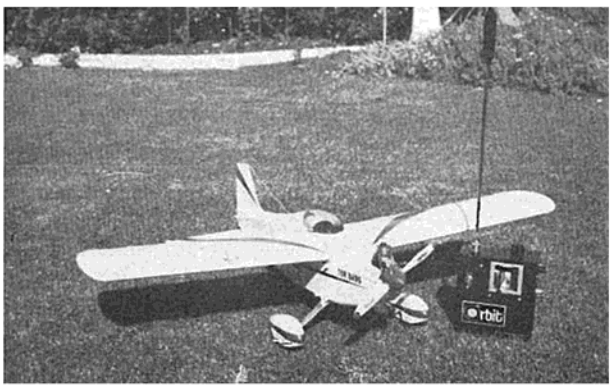
Note the sides taper in a straight line from the bulkhead at the trailing edge of the wing back to the tailpost. This is so the turtledeck is a half cone in shape — easy to cover with sheet balsa, since there's no double curvature to contend with.

There are three ways to make the turtledeck. I've shown the sheet-covered stringer and bulkhead method on the plans. An easier, but slightly more expensive way, is to make it out of block balsa, hollowed out for lightness. A third way (I used it on one prototype) is to cut a styrofoam core to shape and cover it with 1/16" sheet. This is light and strong, but shaping the styrofoam and then covering it is a bit of a chore.

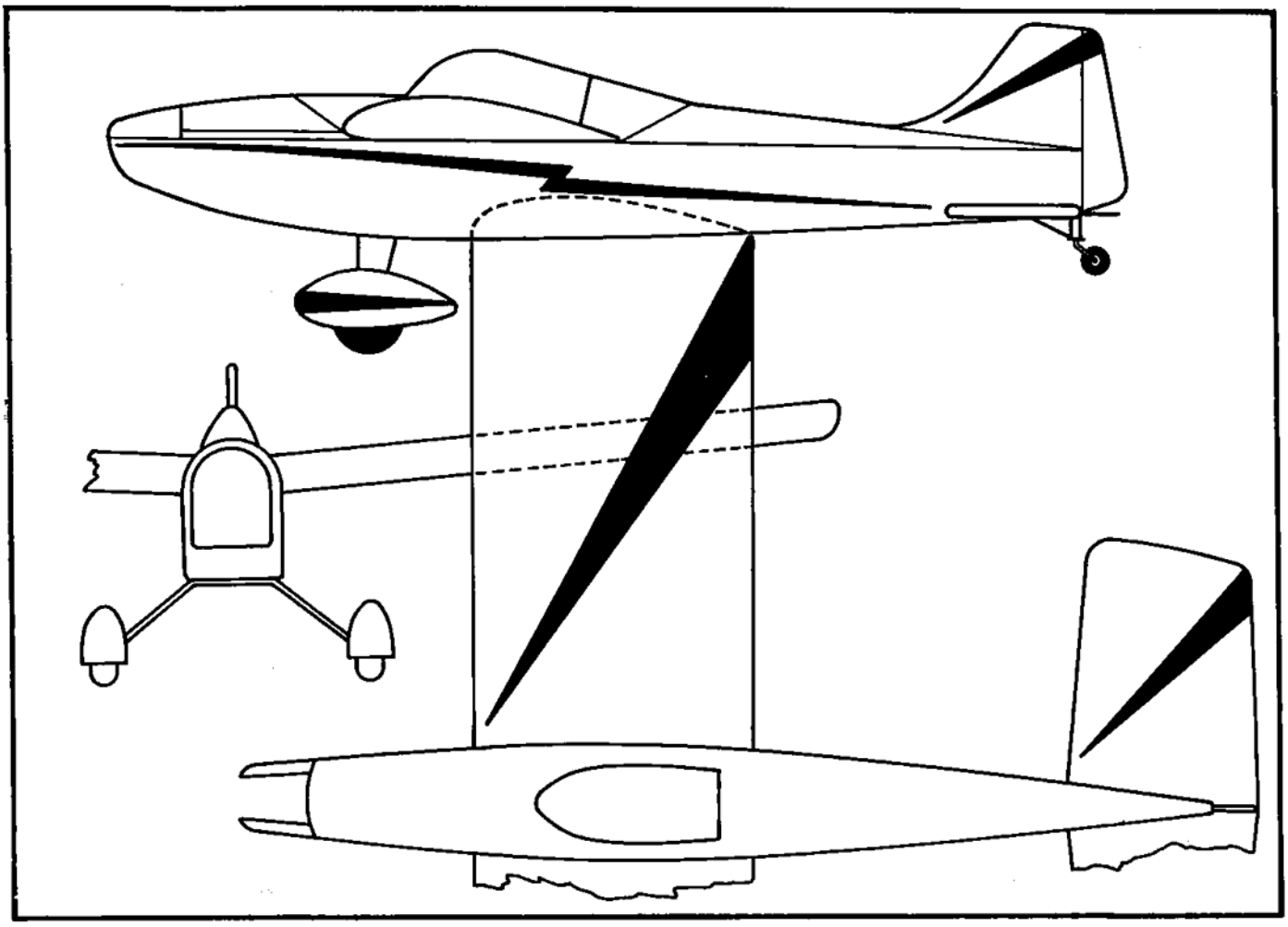
No detail structure is shown in the radio compartment. It has to be tailored to the various types of equipment, and there are too many to show them all. In general, your receiver should fit up against the bulkhead at the wing leading edge position. Then a 3/16" bulkhead can be inserted behind it so it is in a separate compartment from the servo, or servos as the case may be. If you use an escape-

Orbit 3+1 proportional version. Installation shown below, left. Motor control linkage translates angular to linear motion. Sleeve on linkage provides friction fit connections to throttle link for easy adjustment. Hobbypoxy finish.





TOP DAWG DATA SHEET



ENGINE

Single channel prototype used a Cox Medallion .049. Multi channel prototype used a Max. .10. All engines from .049 through .15 are suitable.

DIMENSIONS

Wingspan: 36" Chord: 9"
Total Wing Area: 351 square inches
Fuselage Length: 30" Max. Fuselage Width: 3½"
Incidence: Wing: +2 degrees
Stab: 0 degrees

RC EQUIPMENT

Sport design for rudder only, or rudder, elevator and motor. Any single channel escapement or servo system for the .049 version. Any six channel reed, small multi proportional system, or Galloping Ghost. Author's prototypes used both single channel and Orbit 3+1 proportional system.

FLIGHT CHARACTERISTICS

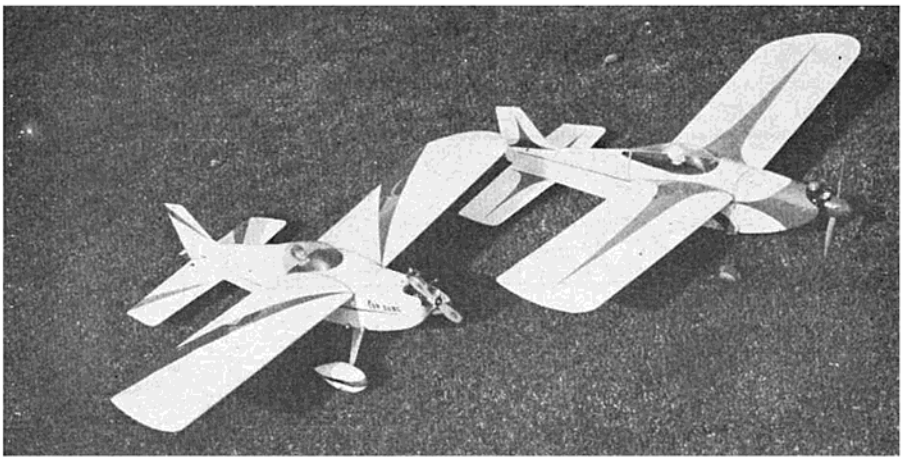
The Top Dawg is quite fast with a .10 to .15 engine. It is responsive but stable. Limit elevator movement on first flights.

MATERIAL LIST

Wings:
- (1) ½" x ¾" x 36"
- (1) 1/16" x 3" x 36"
- (1) ¼" x ¾" x 36"
- (2) 3/16" x 3/16" x 36"
- (2) 1/16" x ¾" x 36"
- (1) ¼" x 2" x 36"
- (1) ⅛" x 2" x 12" (scrap)
- (2) 1½" x 1½" x 10"

Tail Group:
- (1) 3/32" x 4" x 36"
- (1) ⅛" x 5" x 36"
- (1) ⅛" x 5" x 36"

Fuselage:
- (2) 1/16" x 3" x 36"
- (1) ⅛" x 5" x 20"
- (1) 1/16" x 4" x 36"
- (4) 3/16" x 3/16" x 36"
- (1) 1/16" x 6" x 12" plywood
- (1) ⅛" x 3" x 3" plywood scrap
- (1) 1" x 4" x 6"
- (1) 2" x 3" x 4"
- (1) 3/16" x 36" dowel



Two of the prototypes. Max .10, 3+1 version on left uses 15% wing section. .049 ship on right utilizes thinner 10% section mentioned in text.

ment, a separate mounting bulkhead can be installed about midpoint under the wing. In the case of the Orbit 3+1, I put the motor servo right behind the L.E. wing bulkhead position, then the receiver crosswise behind a separating 3/16" bulkhead. The rudder and elevator servos were placed behind the receiver and fastened to cross pieces of bass wood glued to the top of 1/4" balsa bulkheads which came up from the floor just high enough to let the servos clear the bottom.

As you can see, there are many ways to tailor the compartment to fit your own individual equipment preference.

Up front, there's the well braced 1/8" plywood firewall, and this firewall mounting for the engine is not only the simplest, but it also gives maximum room for installation for the tank behind the firewall. The 2 oz. tank gives a 4 to 5 minute flight with the Max. 10. Then again if you use an .049 Baby Bee or Golden Bee, you don't need this extra tank. If you use a Tee Dee or Medallion .049, the 2 oz. tank will run the engine for a longer time. Hollow the balsa block hatch to fit the tank used.

The 1/16" plywood bottom piece from the firewall to just slightly off of the rear lanking gear dowel gives the strength where it's needed — up front!

The Tatone engine mount simplifies the installation of the Max .10 and makes thrust line adjustments easy.

Servo rod connections have not been detailed, since they are pretty standard, with cutouts on either side of the fuselage and the DuBro Kwik Link fittings attached to Top Flite control horns.

Do not install the dowels for mounting the wing and landing gear until after you have finished the sides. It's easy to put them in then, and it makes it a lot easier to sand the sides smooth. Also, if you're going to cover the sheet balsa with Monokote, it will go on faster and you can cut holes to fit the dowels after the Monokote is in place.

There's enough information on the plans for most of you to build the fuselage without even reading these instructions.

The landing gear is a standard commercial aluminum type put out by several manufacturers. In case you can't get one locally, the old reliable 3/32" bent wire can be used. The aluminum gear looks better, and also provides a flat surface perpendicular to the axle bolt to which you can mount the wheel pants.

WING

The wing shown on the plans was the easiest to build, unless you have a friend who can make up a foam core for you. It's quite straightforward, and all information needed is right on the plans. If you prefer, the wing tips can be made of 3/16" flat sheet, cut to slope up from the bottom of the tip rib. In their case, extend the top spar out to serve as an anchoring point for the tip sheet.

TAIL SURFACES

Simple. Just cut out from sheet balsa the sizes shown. I've been asked how I keep the stab from warping, and the only answer I know is "Pick a straight sheet to begin with."

I still prefer the old reliable linen hinges for models this size. However, I'm experimenting with Monokote hinges. You cut out a piece 1/4" longer than you want the hinge to be, cut it in two, reverse one side, then overlap the center 1/8" and stick it together. Thus one side sticks to the top of the stab, the joint is at the hinge line, and the other end sticks to the bottom of the elevator. Reversing the next one gives you the hinge action.

The tail wheel bracket attaches directly to the faining on the underside of the stab, then the 1/16" wire comes up through the small opening cut out in the center of the elevator. Finally, it is bent to fit along the bottom of the rudder. Attach it to the rudder, either with linen or Monokote, and you have a steerable tail wheel. It's sensitive though, and if you prefer a fixed tail wheel, you can bend the wire to fit forward along the side of the fuselage.

For those of you who will be flying rudder only, here's a hint: mount the elevator with hinges, but then bend the tail wheel wire at the top of the tail wheel bracket so that it fits the bottom of the elevator. Then, if you need an elevator adjustment, bend the tail wheel wire up or down to move the elevator as required. Again, fasten it to the bottom of the elevator with a strip of Monokote. Later on, if you change equipment to add elevator control, you're all ready for it just by changing the tail wheel wire.

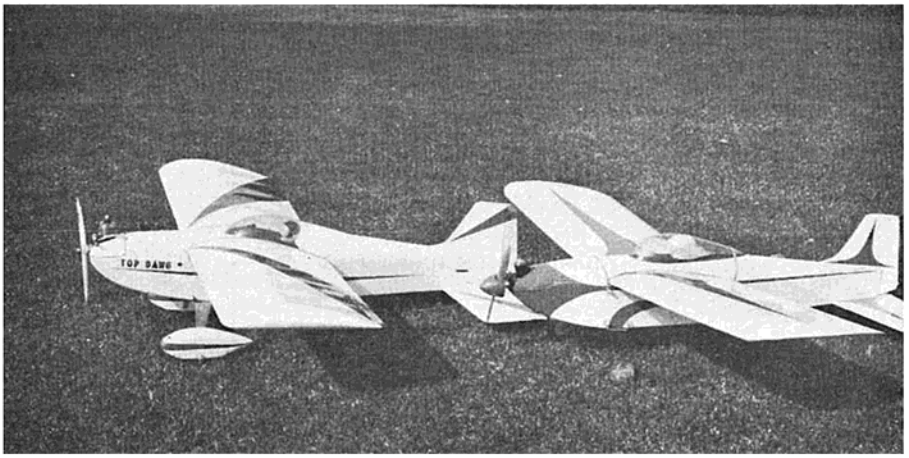
COCKPIT

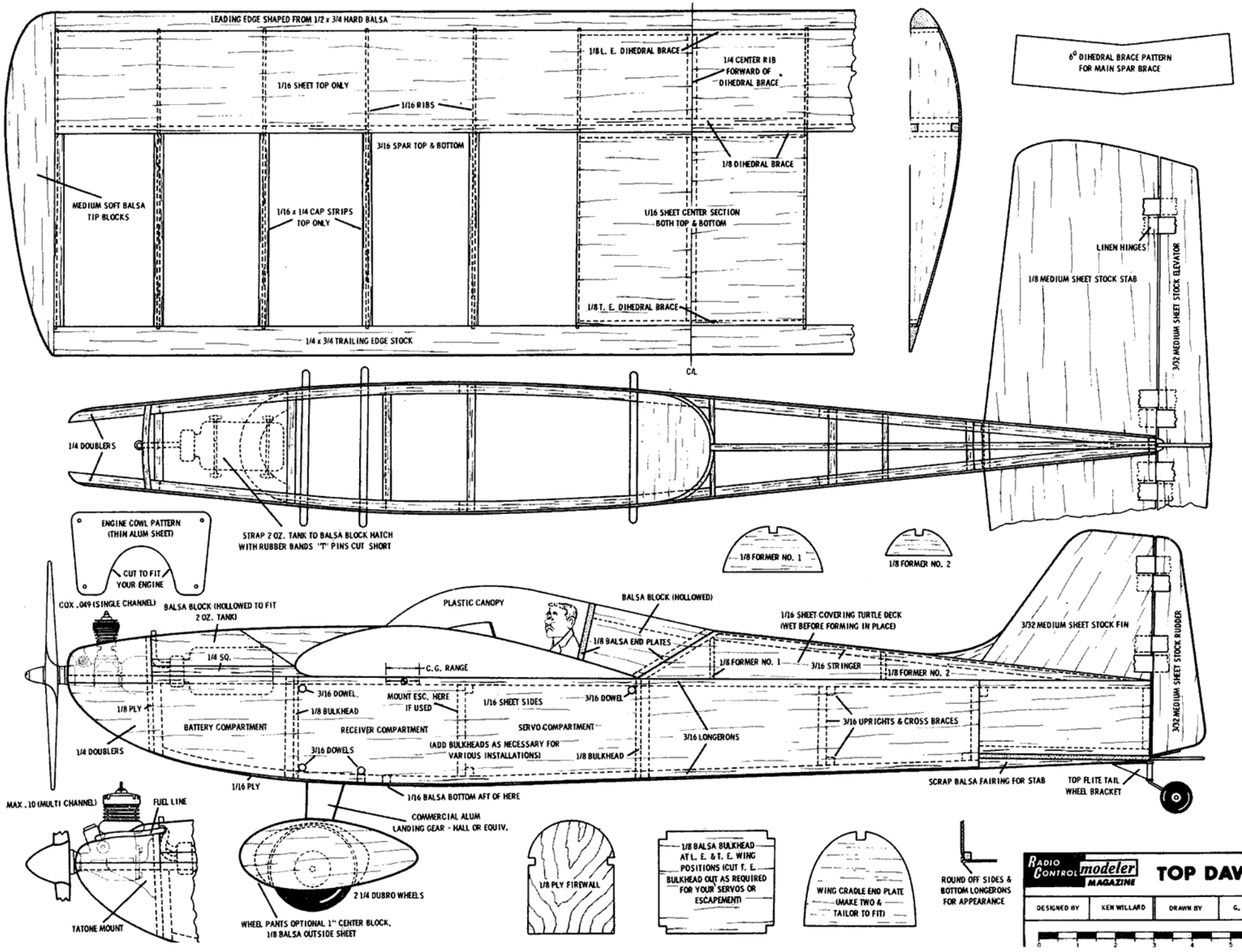
Tailoring the cockpit to fit the wing and also to fir the turtledeck is best done by temporarily holding the wing in place while you shape the balsa blocks to fit. The little block of balsa ahead of the pilot simulating instrument panel adds a nice touch, but isn't really necessary — just looks good.

Incidentally, I tried two cockpit versions. One was the well recognized "bubble canopy" type. Nice looking, but

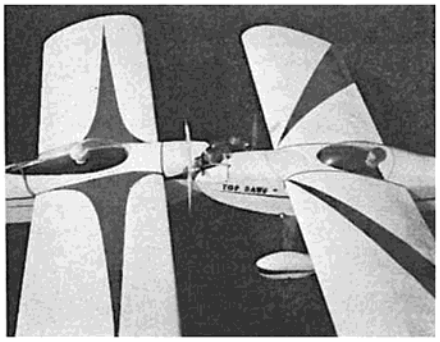
(Continued on Page 18)

Another view illustrates the two fuselage configurations used on Ken's prototypes. Author chose the turtledeck version for its similarity to many Goodyear racers.




LEADING EDGE SHAPED FROM 1/2 x 3/4 HARD BALSA
1/16 SHEET TOP ONLY
1/16 RIBS
1/8 L. E. DIHEDRAL BRACE
1/4 CENTER RIB FORWARD OF DIHEDRAL BRACE
1/8 DIHEDRAL BRACE
3/16 SPAR TOP & BOTTOM
MEDIUM SOFT BALSA TIP BLOCKS
1/16 x 1/4 CAP STRIPS TOP ONLY
1/16 SHEET CENTER SECTION BOTH TOP & BOTTOM
1/8 T. E. DIHEDRAL BRACE
1/4 x 3/4 TRAILING EDGE STOCK
C/L
6° DIHEDRAL BRACE PATTERN FOR MAIN SPAR BRACE
LINEN HINGES
1/8 MEDIUM SHEET STOCK STAB
3/32 MEDIUM SHEET STOCK ELEVATOR
1/4 DOUBLERS
STRAP 2 OZ. TANK TO BALSA BLOCK HATCH WITH RUBBER BANDS 'T' PINS CUT SHORT
ENGINE COWL PATTERN (THIN ALUM SHEET)
CUT TO FIT YOUR ENGINE
1/8 FORMER NO. 1
1/8 FORMER NO. 2
COX .049 (SINGLE CHANNEL)
BALSA BLOCK (HOLLOWED TO FIT 2 OZ. TANK)
PLASTIC CANOPY
BALSA BLOCK (HOLLOWED)
1/16 SHEET COVERING TURTLE DECK (WET BEFORE FORMING IN PLACE)
3/32 MEDIUM SHEET STOCK FIN
1/4 SQ.
C.G. RANGE
1/8 BALSA END PLATES
1/8 FORMER NO. 1
3/16 STRINGER
1/8 FORMER NO. 2
3/32 MEDIUM SHEET STOCK RUDDER
3/16 DOWEL
MOUNT ESC. HERE IF USED
1/16 SHEET SIDES
3/16 DOWEL
1/8 PLY
1/8 BULKHEAD
BATTERY COMPARTMENT
RECEIVER COMPARTMENT
SERVO COMPARTMENT
3/16 UPRIGHTS & CROSS BRACES
1/4 DOUBLERS
3/16 DOWELS
(ADD BULKHEADS AS NECESSARY FOR VARIOUS INSTALLATIONS)
1/8 BULKHEAD
3/16 LONGERONS
1/16 PLY
1/16 BALSA BOTTOM AFT OF HERE
SCRAP BALSA FAIRING FOR STAB
TOP FLITE TAIL WHEEL BRACKET
MAX. .10 (MULTI CHANNEL)
FUEL LINE
COMMERCIAL ALUM LANDING GEAR - HALL OR EQUIV.
TATONE MOUNT
2 1/4 DUBRO WHEELS
WHEEL PANTS OPTIONAL 1" CENTER BLOCK, 1/8 BALSA OUTSIDE SHEET
1/8 PLY FIREWALL
1/8 BALSA BULKHEAD AT L. E. & T. E. WING POSITIONS (CUT T. E. BULKHEAD OUT AS REQUIRED FOR YOUR SERVOS OR ESCAPEMENT)
WING CRADLE END PLATE (MAKE TWO & TAILOR TO FIT)
ROUND OFF SIDES & BOTTOM LONGERONS FOR APPEARANCE
RADIO CONTROL modeler MAGAZINE
TOP DAWG
DESIGNED BY
KEN WILLARD
DRAWN BY
G. FLORES

(Continued from Page 16)



Kissin' cousins — the Top Dawg was designed for single or multi. But most of all, it was designed for you!

the majority of modelers who saw the prototypes preferred the version shown in the plans.

FINISHING

This is always a matter of individual preference. Interestingly enough, in the three prototypes used for proving out the design, three different finishing techniques were used. The original model used Hobbypoxy—directly on the sheet balsa fuselage and tail surfaces, and over three coats of butyrate dope on the silk covered wing. The second model used the standard butyrate finish.

On the third version, Monokote had just become available, and it was applied throughout — wing, fuselage, and tail surfaces. It worked out very well, especially as a covering for the aluminum cowl because it attaches equally well to wood or metal. From the standpoint of speed, the Monokote covered version was completely covered and decorated in less than half the time it took for the others. In all fairness though, it must be recorded that after several weeks it was necessary to reshrink the fuselage and tail. No problem, though!

FLYING

This is a little difficult to explain briefly, because of the many variations that are possible.

First, the single channel, .049 versions should weigh somewhere in the 25-30 oz. range, depending on the equipment installed. The lighter versions should be lively, but reasonably gentle. The 30 oz. jobs will be a little sluggish, but very easily controlled by rudder only. Keep your rudder travel to less than 12 degrees in either direction.

The multi channel, .09 or .10 powered Top Dawg should weigh 36-42 ozs. Rudder travel should be the same as for single channel, and elevator travel will depend on your own ability. The Top Dawg is very sensitive to elevator, and I would recommend limiting the angles to 15 degrees up and down unless you are ready for violent reaction!

The sensitivity of the elevator is related to the center of gravity location, naturally. For all-around general purpose flying, the C.G. should be just about in line with the main spars. As I mentioned earlier, wide latitude in the C.G. is desirable, and it can be ½" forward of the spar (which will hold the model very steady) or even ½" behind the spar — but this is an extreme location for experts who want a really frisky performance. Make your own decision, but I'd advise the middle of the road.

So let me summarize. For the beginner, an .049 powered rudder only con-

Note flexible loop on OS Max .10 to allow for servo overtravel.

trolled version with the C.G. about ¼" ahead of the spar, should be pretty easy to handle. It should weigh about 26-28 ozs.

For the advanced modeler, the .09 or .10 powered job with galloping ghost, reeds, or proportional control, weighing 36-42 ozs., with C.G. at the spar, should do very well.

And for you "power hounds," a Max .15 in the nose will give a wild performance — but only for about three minutes, because of the 2 oz. tank limitation.

So there you have it — any way you want it. No matter which version you build, you'll find that in its class, it's the "Top Dawg."

Hisat * H.E * Plans

The maestro, Cliff Weirick, prepares to pit his Midget Mustang against Ray Downs' Shoestring. See page 23 for the sequence as Ray's #44 diminishes the Mustang's early lead at the #3 pylon.

THE R/C GOODYEAR EVENT

BY JERRY NELSON • ED SHIPE • RAY DOWNS • CLIFF WEIRICK

NARRATED BY JOE MARTIN

WHEN the National Miniature Pylon Racing Association rules were first drawn up, over a year ago, it was our intention to try them locally for about a year in order to work out the "bugs," then try to sell a set of proven rules to the A.M.A. so that we could have national competition. We were surprised at just how fast the event caught on — in fact, it may have caught on a little **too** *fast! As an example, I've heard of cases where this event was added to a regular contest but the Event Director didn't even bother to see if there would be any entries! Spectators then showed up for the races only to be disappointed. I sincerely doubt that things like this helped, but it certainly evidences the tremendous national interest in the event itself.*

In this article, I'm going to elect myself "sales representative" for the event and try to sell it with very few changes, for very few are needed. In fact, if we accepted these rules as is, they would still provide the finest event R/C has to offer.

Perhaps a logical starting place would be the reasons why we picked the 190 cubic inch class from which to scale an event. The answer is quite simple: They look like "real" airplanes, they are fairly easy to build as R/C models go, and they are excellent flying aircraft. The latter was proved before any rules were drawn up, in itself enough of an advantage for having "experts" evolve a set of rules.

Before we go too far into this article, I'm going to let Jerry Nelson take over and explain our definition of "scale" and how scale entries should be judged for a handicap.

Jerry Nelson

The majority of the interested modelers who are thinking about Goodyear pylon hav been misled by our definition of scale. Basically, and at least to our way of thinking, if the model looks like a scale racer, then it is one.

The model should be judged from a distance of 3-5 feet. No measurements should be taken to determine how close to scale the model is to the original ship. Of course, measurements will have to be taken if the model is obviously **under** the various minimum dimensions. All we are concerned with is the general outline shape. Deviations in spinner size, cheek cowl width, fuselage widths, etc., are allowed with no major reduction in points, provided that the general outline is still similar to the original. We are **not** trying to promote a scale competition — there are, already, rules for that. What we **are** after is a set of

scale racing rules.

In actual practice, the best way to judge the models in competition is to judge them all at once. In effect, the models will be judged against one another on a relative basis. The points are given out accordingly so that the best ship receives close to the maximum number of points. The next competition you may see the prior scale point winner receiving fewer points because of the entry of better models than his own.

Another advantage of the judging in a group is to allow the spectators to view the model and take photographs of the entire competition.

Reference material for scale judging is not a major problem. Ample data is available. True, you will not go down to the local magazine stand and find data on Goodyear racing, however there are several books available that can be purchased for a nominal charge. Remember – you don't need detailed 3-views – all you need are some good photographs or rough three views of the original ship.

The models should be judged quickly. Only about 3-4 minutes per airplane. Any more time spent will turn the event into an all-out scale contest, and this we **don't** want. The thing I want to stress again is that we are trying to pick out a **relative** winner – one airplane is selected to be better than another.

The individuals who feel that the rule for the Goodyear event is "anything goes" have had their chance before. Open Pylon has been a standard event for over five years on the West Coast. The last couple of years has evidenced such a lack of interest in this event that it is no longer being held. We **don't** want this event to be so easy that **everybody** can enter it. The event is intended so that the average, serious modeler who can build and fly a Class III stunt model with some degree of success can compete on a close-to-equal basis with any Expert Class III flyer. This has proven to be a fact.

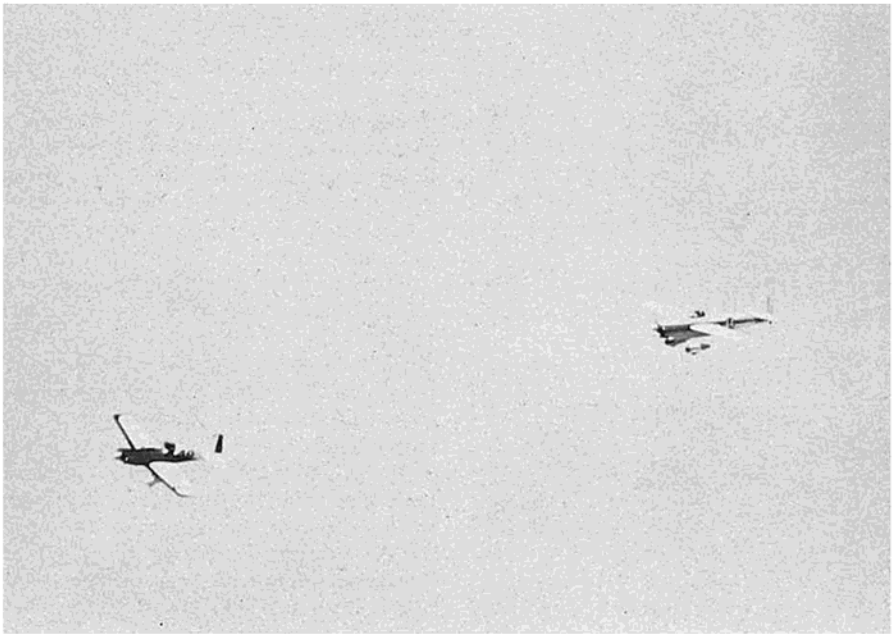
Since more people can have a potential of being a contender in Goodyear pylon flying, I feel that in the future, pylon will become the major event and Class III relegated to a second place.

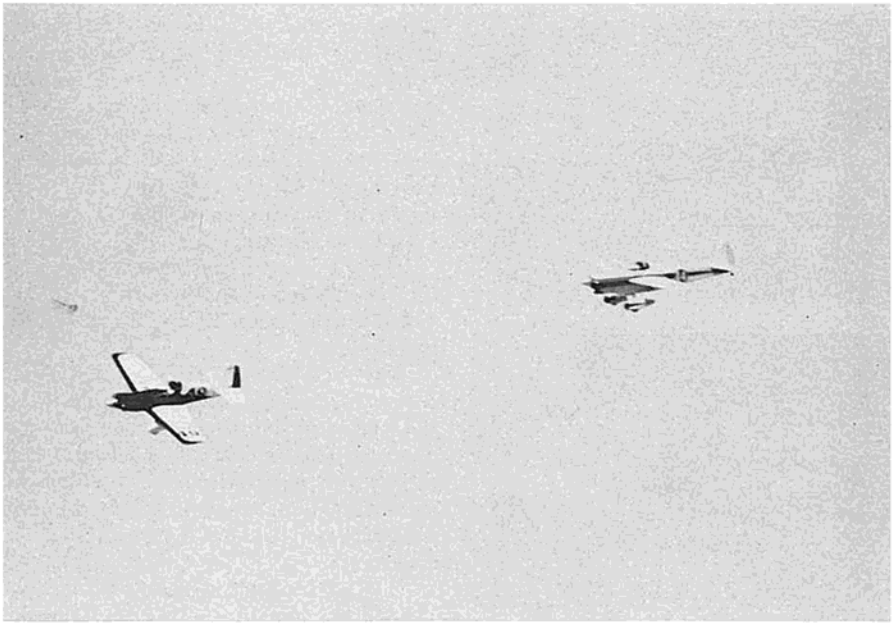
A question often asked is – "Why scale?" Let's see what Ray Downs' views are on this subject:

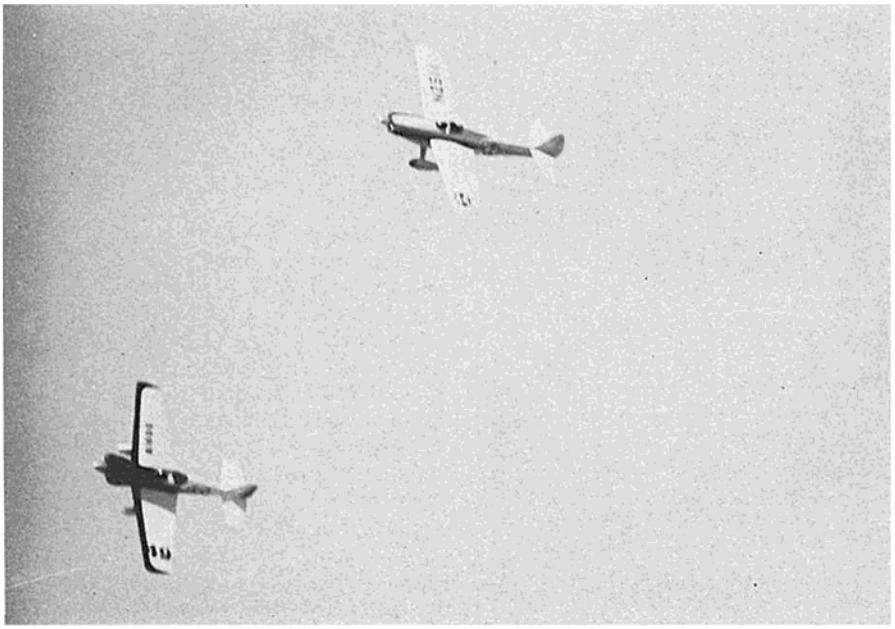
Ray Downs

One of the main reasons that Goodyear racing caught my interest was the idea that the models would look like scale airplanes.

This eliminated a fellow simply "throwing a model together" and taking to the sky just for the "jollies" involved. When a modeler works toward scale he naturally puts more time and energy into the construction, finish, and radio installation. I feel that these racers, at-







COSMIC WIND

LI'L SPOOK

PITTS SPECIAL

LA JOLLITA

BONZO

MILLER SPECIAL

taining the speeds they have already recorded, require a well-constructed and neatly installed system. It takes only a little more time to build a scale model than any other type – the only extra time and effort being put into the finishing of the model. We take a great deal more pride in a scale model than in one that is non-scale – it is a pleasure to fly and to own.

This event has great spectator appeal – which was conclusively proven when we flew the intermissions at the Palm Springs National Air Races in November of '65. The Goodyear races received a greater amount of applause than the real racers! I feel that the reason for this was, and is, that they **are** scale and **look like** their big brothers. They use pylons which are similar to the real ones, the only difference is that the event is flown immediately in front of the crowd so that they can witness all three pylon turns. It does not matter who is actually in the lead – the spectator can **feel the pulse** of the closeness of the model planes and the height at which they fly. I think that the idea that these modelers have built a scale model – a machine that really looks like the real racers – and yet when they fly in competition they fly to win, forgetting the many hours of building and finishing – this appeals to the spectator.

I like it . . . it's fun, it's exciting, and the models are scale appearing.

I'm a gentleman flyer – it's a gentleman's event.

Now let's get into running a contest. Not too much has been said on this so far, and very few people know how we come up with a winner. Ed Shipe will supply the information on this aspect. Ed has done an excellent job of running several major contests held on the West Coast.

Ed Shipe

Let's get into the actual operation of the meet. You will need the following officials:

Event Director – His duties are to make sure all other officials are on hand. He will normally be responsible for having the correct contestant at the starting line. In general – he will have to do anything he can't get somebody else to do.

Recorder – Now this is a nice simple job – if nobody drops out of the preplanned schedule of flights and he has a calculator for a mind. Basically the job entails telling the pit manager (event director?) who is due on the line, tell the flagman the lineup, and handicap and then record the results.

Flagman – This lad turns loose the screaming herd (if he is fast he won't get a spinner in the leg), warns the flyers of pylon infractions during the race, drops the white with one lap to go, and shuts things down with the checker. **He will only accept reports of cut pylons from the lap counter assigned to the contestant.** Some spectator is always yelling "He cut the pylon" when it only looked that way from where the spectator stands.

Lap Counters – Keep track of the laps. During qualification heats they also time the contestant they are responsible for. During the race they must watch the pylon judges for cut pylon signals and relays this information to the flagman. They must also inform the flagman when the contestant they are keeping track of **starts** his next to the last lap.

Pylon Judges – No. 1 pylon has the same number of judges as there are planes in the heats. Pylons No. 2 and 3 have one judge each. The Judges at No. 1 pylon will space themselves out to the right of the pylon and each will be responsible for the plane in the same relative position on the starting line: i.e., plane on right – judge on right, plane on left – judge on left. The judges will hold their flags up as the planes approach the pylon and drop them as the plane comes abreast – 90° to the course and even with the pylon. Care must be taken not to drop the flag early or late so as to avoid unfair advantage or handicap the contestant. The signal for a cut pylon is waving the flag in a circular motion over the head. Judges at Pylons No. 2 and 3 will signal all cuts on their respective pylons. If more than one plane is passing the pylon at the same time, he should call out which one cut. If a suitable intercom system is available, the flags for cut pylons can be eliminated and the plane's color and basic number can be called in to the recorder for relay to the flagman.

The qualification heats serve several purposes. They give the contestants a chance to familiarize themselves with the operation. It should be impressed on the contestants that in the event of a point tie at the end of the meet between contestants on the same frequency, the one who turned the fastest time in the qualifications wins! Flying two contestants at a time during qualifications seems to work out the best. Each contestant is allowed to go to the starting line three times to post a qualifying speed. If he posts a qualifying speed on the first round, he may, at his own discretion, drop out of rounds two and three or he can fly and try to improve his time. When a contestant is called to the line he must fly or pass the round. The event director may waive this rule under extenuating circumstances but it should be followed wherever possible.

I believe the handicap system is self-explanatory but I will go over its use in practice. Say a plane receives appearance points of 25 – this is subtracted from 30 (which is maximum) – giving

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R/C GOODYEAR

(Continued from Page 24)

him a handicap of 5 seconds. When the contestants come to the starting line the lowest handicap is on the right and will be first off. The rest line up on his left in handicap order. When all engines are started or at the end of three minutes, whichever is sooner, the flagman will point the flag at each contestant and timer. As soon as he has the OK from all concerned, he will raise the green flag. At this point the timers and flagman's watches will be started. The flag will be dropped for each contestant as the handicap is reached on the flagman's stopwatch. When two contestants have the same handicap, a coin will be flipped to see which will take an extra second delay. An insurance lap should be taken by the contestants in case he might have cut a pylon on the last lap. When the flagman has confirmed the completion of the race by all participants, he will give the word to land aircraft which will be done without delay.

I use a factor of four to determine the minimum number to be in the main series of heats. If you plan to fly two plane heats, you should have at least eight planes for the main – to fly three plane heats you would need 12 qualifiers. Using the above as a basis for setting up the finals with three plane heats, up to 15 qualifiers and you would have a main series only – with 16 qualifiers you would have 12 in the main and 4 in consolation bracket. I feel there should be at least four contestants for each award place. As soon as we start getting larger entries (80 entries could be easily handled) the consolation race will be standard and this will give an automatic novice-expert class.

Now let's set up a main series of heats with 12 contestants and three planes to the heat. You will need three groups so divide your citizens frequencies as near as possible and then use your six meter boys as fill. The following is typical on the West Coast:

Brown 1	Yellow 1	Green 1
Brown 2	Yellow 2	Green 2
Brown 3	Orange 1	White 2
Red 1	White 1	White 3

This will give you your first round of heats. To set up the second round, let column one stand as is. In column two move the top to the bottom and the others up one notch. In column three move the bottom to the top and the others down one notch. The same procedure can be used for a total of four rounds or sixteen races with no contestant flying against the same man twice. (That is, assuming motors keep running, signals stay strong and nobody tries to fly below ground zero.) Somebody always goofs, so be prepared to juggle the schedule. It will be a help if you make a list under each contestant's name of those he can fly against and scratching off names as he flys against them or they eliminate themselves, you patch up your prepared schedule.

Scoring is the easiest part of the whole bit and the usual complaints of bad judges in stunt and bum timers in speed won't be heard. The handicap being taken care of at the start of the race means whoever crosses the finish line first is the winner. When running three plane heats in the finals, the winner always gets three points – regardless of how many finish. Second place gets two and third gets one. A plane that does not finish gets no points. Normally at the end of four rounds you will have a winner. If not there are three ways of coming up with winners. One, if time allows use your check off list and patch together another round. Two, if ties are on different frequencies, fly them against each other. Last, use qualification speeds, the fastest is the winner.

The original idea for this event and the spreading of the word across the country belong to Jerry Nelson. Four of us, Jerry Nelson, Bud Crane, Joe Martin and myself worked out the original rules. These rules were modified through necessity and with discussion by contestants into the workable state they are now. The rules as they stand, are not perfect, but, if the planes in this event are to be kept from degenerating in appearance to the Deltas of AMA pylon – the slab sided control line rat racers or the not so realistic control line protos, any rule changes should be carefully considered. I feel the attraction this event holds for both contestant and spectator are direct competition and realism. True, it will attract a different breed of cat than the average stunt flyer, but it will attract contestants. They will be stunt flyers, disenchanted stunt flyers and possibly a few new members to the RC ranks. They might even be control line speed flyers like myself.

Please note how little skilled help is needed. The major advantage to this is that almost any club organization could conduct and run a meet. To give you some idea of what it is like to compete in this event, I'll turn it over to Cliff Weirick. I'm sure we couldn't get anybody with more experience in RC competition.

Cliff Weirick

Let's talk about flying these little bears. Hot dog! I've never had so much fun in all my years in RC! Class III competition won't even come close. Granted, the competition is stiff in Class III, but most of the time you sit and wait. Not so with the Goodyear event – things move fast! In two hours I get more flights than I do in two days of Class III competition. Try to picture, if you will, two or more racers flying wingtip to wingtip for ten laps. Boy, the pressure is on, . . . tighten those turns . . . easy on the elevator . . . don't climb now . . . watch that pylon and don't cut it . . . now you've got him – oops! he got me on that turn. And here we go again. Oh well, you can't win 'em all!

I've heard it mentioned that this event is only for the experts. Bah! And humbug! Not so. Granted, experience helps. But we also have handicaps so that those proto speed jobs get off last. Ever try to make up two laps? Boy, what a chore! As for flying the little jobs, it's really great. Most of them fly better than the big stunt ships, with the major problems confronting most Goodyear pilots being that the control surfaces move too far. Now we have a real touchy toy and here comes the big job.

Reliability is probably the biggest requirement in this event, with special emphasis on the engine and fuel system. It must start easily and be capable of running at reduced RPM in case your competitors don't get theirs started immediately. Ever try to re-start a hot engine? I can't stress reliability strongly enough, and I speak from experience. I've lost more races due to my own troubles than I've ever lost in the air.

Another thing I've heard mentioned is the possibility of mid-air collisions. Sure, it's possible, however I've never seen one in a race even with six airplanes on the course. I have sure had my share of mid-air crashes with stunt ships, though! Remember, that during a race, at least the traffic all goes in the same direction.

So, let's get together on this Goodyear racing program. It's the greatest thing that ever hit RC. At least don't knock it until you have tried it!

I'm going to finish this off by trying to explain where a novice fits into the Goodyear program as well as giving an answer to a recent article by Hal deBolt on this program. A lot of letters have been received expecting a rebuttal to the deBolt piece from Jerry Nelson, but after reading it several times, we didn't feel that it warranted an answer. I wonder what kind of article he might have written if, at last year's Nat's, he had finished in 50th place instead of second because he was handicapped for being good! Should we say any more? This is basically what he has proposed for Goodyear.

Just where the novice fits in is a rough one to answer, but first let's determine just what a novice is. According to the dictionary, a novice is a beginner. Please note, I said **beginner,** *not a lousy flyer with many years of experience. There isn't any room in this*

(Continued on Page 25)

TOP OUT

JERRY KLEINBURG

Jim Scheffler and his good looking Waco cabin scaler — ship flies well on rudder only, escapement, and an F & M Pioneer super-regen receiver. Veco 35 pulls the 4 year old sport plane.

TOP OUT?

From time to time we're asked about the name of the column — folks seem to feel the term is familiar but aren't just real sure they've got our meaning. A note from Martha Alexander of Bossier City, La., brings up the question again and provides an opportunity to clear up the matter. Martha puts it this way:

"Say, been wondering — where did you pick up the name "TOP OUT" for the column? Not meaning, of course, that anyone who flies these little R/C 'dears' has the top out of his head? Ah, ha! — 20 lashes with a wet noodle for that one!"

Obviously, R/C wives are a great gang so in deference to their charm and wit (— and intelligence in selecting fine husbands) we'll sincerely dedicate the following to each of them — and to JD's wife in particular.

In pilot and weatherman lingo the term "top out" designates the altitude of the **top** of a cloud deck (yes, they come in "decks") as opposed to "ceiling" which indicates the height above the ground of the *base* of the clouds. See? The ceiling is really the bottom—simple! Anyway, it's important for pilots to know where the top of the top (?) is so that he may plan his instrument flying—it's nice to look ahead, especially when you can't see where you're going! In this way he can establish his 'on top' flight altitude for a standard "500 foot on top" IFR flight plan. (Girls, IFR means Instrument Flight Rules — any other questions?) As we said in our first column 'way back in December 1964, "TOP OUT . . . will attempt to raise Class I matters above the clouds of confusion and sectional blind-flying, and keep to bright, clear air. . . ." Sorta poetic, but that's how it is flying above the clouds — calm, bright, clear, and you can see a long, long way. . . .

(Continued on Page **24***)*

Bob MacDonald, Enjay Chemical Co. executive, appreciates the rain guard employed by Stan John of Custom R/C Products. That's an Ace Phelps Pulser with a built-in transmitter to control Bob's fun ship, a Top Flite Cessna which he flies at Baton Rouge's pretty RC field. What, no Happy Wing?

Tangled tales — Sims Alexander and Hank (Lt. Col.) Walker of the Austin R/C Club get their stories straight at recent Fly-Together at the San Antonio ARCS stronghold. Alexander's Sr. Falcon with Orbit reeds while Walker's responds to Digimite promptings and an original wing. Note Hank's sax lanyard — new status symbol of propo pro's!

TOP OUT

(Continued from Page 23)

CAVALIERS FOR '66

Reception to the 1965 list of Class I Cavaliers was encouraging, so it's a pleasure to present the 1966 group with the addition this year of several juniors who qualify for inclusion. As we said last year, Cavaliers are the top Class I fliers, who, through contest performance or development efforts and service have conspicuously advanced the art of Class I flying.

*Bob Angus, Tucson, Arizona
Buddy Brammer, Nederland, Texas
Rogers Barton, Corpus Christi, Tex.
Armond Cote, Laconia, New Hampshire
*Jackie Gardner, Jackson, Mississippi
*George Gorden, Toledo, Ohio
*Harrison Morgan, Pembrook, New Hampshire
M. C. Reed, Canton, Ohio
Norman Rhodes, Groves, Texas
Walter Staff, Salt Lake City, Utah

Juniors:

Steve Morgan, Pembrook, New Hampshire
Mike Ritter, Gobles, Michigan
Bobby Woods, Oklahoma City, Oklahoma

Now having reached the distinction of a Cavalier each is advised that all other fliers are to give deference to their title by trying to "beat the socks off them at any and all contests!" And seriously, nominations for next year's cast are solicited from all readers, so send them on!

AMERICAN R/C ANNUAL

More details of the forthcoming Oklahome City meet set for May 28, 29 & 30 have arrived and show the TORKS are once again aiming to please everyone and also gain added National stature. They are definitely in the running along with Phoenix, Detroit, and Dayton as well as others to develop a contest capability and reputation to someday take on a National R/C-only contest. With R/C being curtailed more and more at the Nats due to the need to stay within Navy limits, it is almost certain sentiment for a separate national competition, tailored solely to the requirements of RC'ers. And the list of events scheduled for the AMERICAN R/C ANNUAL the TORKS is promoting is an excellent cross section of what RC'ers would like to see more of. Give a look at these:

Rat Race
Class I — 5 laps
Class II — 15 laps
Class III — 30 laps
Pattern Saturday, 1 PM until it's too dark to fly
Class I, II, IIIE Sunday, 7 AM to 12:30 PM or at least 4 rounds
Class III Nov. Monday, 7 AM to 12:00 noon
Scale — same schedule as Pattern
Open Pylon — Sunday PM
Goodyear — Sunday PM
Speed & Seed — Sunday PM
also: Best Finish
Worst Dork
Rube Goldberg Award
Original Design Contest ($50 cash award)
Sportmanship Award
Jr. Class I Trophy
Special Demonstration Flights

Ever since the first AMERICAN R/C ANNUAL (82 contestants, separate sets of judges for each class and one of the first multiple flight lines) the TORKS have shown unusual contest management leadership. This year, with a 10 point system for the judges' use (over 100 years combined judging experience, they say), a small warehouse of merchandise prizes to augment the trophies, and a Saturday night combination auction, exhibit, gabfest, swim and movie party — with refreshments — it appears the TORKS are going to chalk up another mark for the rest of the country to measure to.

TECHNICAL TIDBITS

● Celastic—the coloidal cloth—has become a "standard" in a quiet way and is finding ever-widening use among modelers. Latest established use is as fillets on stabs and rudders in addition to wing center section as stressed skin. Builders find by keeping it moistened with thinned dope while applying and rubbing the Celastic's edges, they may be feathered to give a smooth finish. Does away with ungainly looking rudder base blocks. . . .

● Need to drill extra long holes? Or perhaps drill a hole where the drill chuck doesn't fit? In the first case, try regular brass tubing as a bit — it's surprising how it'll cut through plywood as well as balsa, and straight, too! Just chuck an undressed piece in your drill — stuffing the chucked end with a drill or wire that fits is OK but isn't necessary — and drill away. As for drilling inaccessible spots, soldering a drill bit in a length of tubing will often give the extra reach needed to get a tough job done easily. A piece of flexible shaft like a speedometer cable and a hunk of tubing to hold the drill bit combine neatly to drill around corners and obstacles.

● Sanding convex shapes like fillets and hollowed blocks sometimes is a problem. Next time use the flask shaped plastic bottle white glue comes in. The oval shape is real handy on round inside corners and the soft give of the bottle helps sand better and the sandpaper doesn't slip. . . .

● Sig — a leading name in balsa — is distributing a series of free builders' manuals that modelers will find valuable to save time as well as in finding new building methods explained fully. The latest deals with fiberglass and polyester resin technique. The manuals are simple and factual and available at your hobby shop or by dropping a line to the Sig Mfg. Co., Montezuma, Iowa — they'll be glad to see you get one, and you'll like it, too.

● Now that the contest rules allow two planes, class I fliers may equip each ship with its own receiver and use the same transmitter to fly either aircraft — that is, if you use the Petri process to set it up. Pete Petri of San Antonio found he could lick the tone trim pot bugaboo that made driving two receivers with the same transmitter a mean retuning task, by using the top set of toggles of his 10 channel transmitter for one ship and the lower set for the second ship. Since most multi-rudder contest fliers use 10 channel equipment it's a simple task to trim engine and rudder pots for ship #1 and elevator and aileron pots for #2. If you wish, you may even fly both planes at once with this setup. Pete did and got away with it! Shades of Tom Williams and his Chargers. . . .

● Recognizing the potential market for a real class I plane kit, Bob Moore and Buddy Brammer are "tooling" up to market the "Oily Bird," an original hatched in the mosquito marshes of Port Arthur by Bob Moore. The pair know their way around class I flying so their Bird ought to be one to look for.

CONTEST TECHNIQUE

To the dedicated aerodynamicist, a spin is a delicate balance of complicated dynamic factors working in unison to hold the aircraft in the stall gyration. To the average RC'er it's simply a matter of enough rudder area and throw to kick the bird into a true spin for the standard 3 turn maneuver. Of course, where too much force is horsed into the act the

(Continued on Page 25)

The "Ewing Special" — a 6-foot Class I by Ed DeSha of Sinton, Texas. Fox 59 and Controlaire 10 easily fit in the plane built while Ed was in a hospital.

K&B .19 hauls Chuck Winchester's Tri-Squire at little Del Rio, Texas, flying spot known as Laughlin AFB. Chuck is a member of the AF promoted Border Eagles R/C Club.

TOP OUT

(Continued from Page 24)

modeler might find he's getting spins at embarrassing times! For class I, spins start by trimming the ship so that it'll only spin to the left and where engine torque must aid in inducing necessary force for the spin. In this way sharp right turns under full power may be made without mentally standing on tippy-toes. To the left, it's a matter of taking a small piece of the power off to be able to act with impunity similar to that for turns to the right. Full power turns to the left are still possible, but like porcupines and sex, carefully! With the advent of propo gear the problem clears a great deal and as more proportional equipment is put into use, rudder shape in class I will change a lot. Although spin technique will change somewhat due to this factor, the basics of current technique will continue as the foundation of the spin maneuver.

Completion of the Cuban 8 placed the aircraft about 100 feet upwind — a suitable place for a spin — and at an altitude of 50 feet — not so suitable! Immediately after calling "complete" on the Cuban 8 a full power climb is started to bring the ship to about 350 feet high. This is perhaps more than needed but in looking ahead to the next maneuver — the Rolling 8 — the extra height will be useful. Maneuver the climb so that a suitable altitude is reached simultaneously with the plane heading directly into the wind and in a nose high stalled position. If you have all this you're ready to call the maneuver and hit full left rudder. Keep track of the turns — quietly is best — while the ship is rotating down under full power. At the right time ("right time" depends on those practice sessions where the ship's individual reaction time under varying atmospheric conditions have been learned) let the rudder neutralize so as to stop the spin with the nose exactly into the wind for 3 full turns which includes that first quick floppy one at the beginning. Avoid opposite rudder recoveries — they can be troublesome — by trimming and balancing the plane to permit neutral rudder recoveries. After the spin stops, level the wings in case they're not that way and keep power on to regain some of the lost altitude for that next maneuver — it'll be needed!

CLOSING SHOT

Hope the folks in Kodiak, Alaska enjoyed their King Crab Festival on May 6 to 8 and that the local RC'ers attracted a good share of attention at the arts and crafts exhibit. . . .

R/C GOODYEAR

(Continued from Page 22)

event for anyone who can't control his plane fairly well – he would only create havoc for the other contestants as well as endangering the spectators.

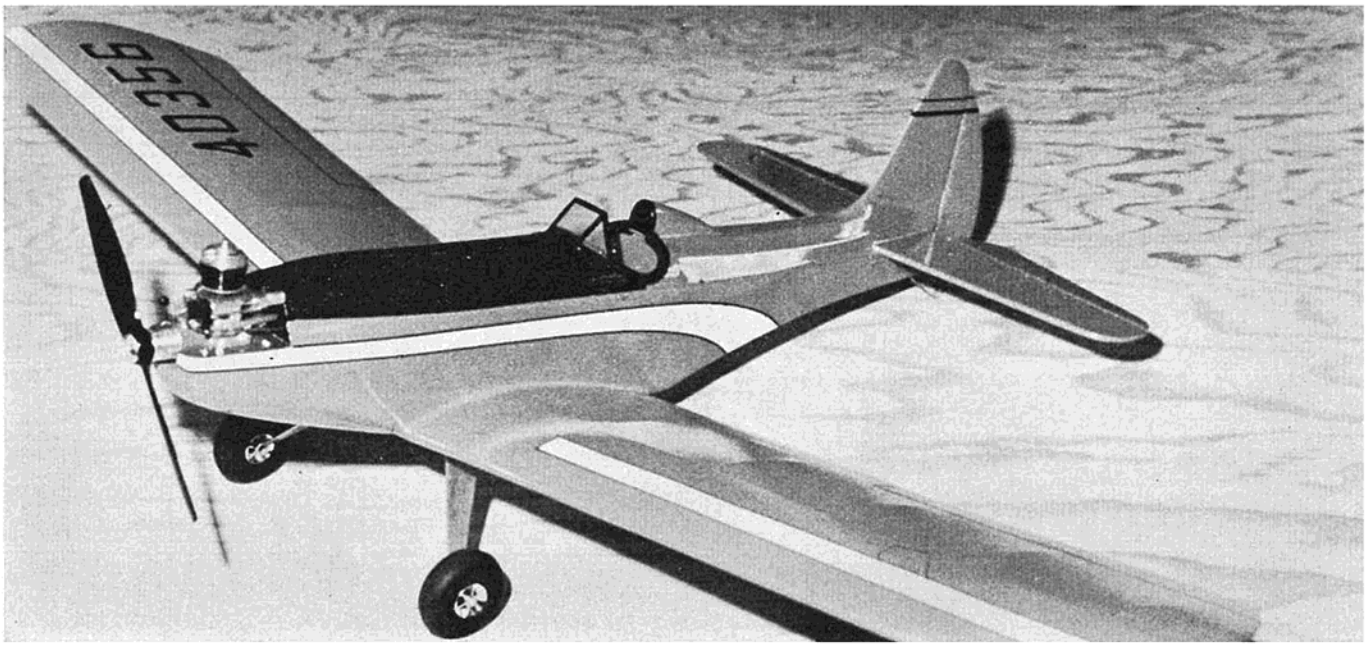
This is a point that should have been made a long time ago. This is **not** *an "everyman's" event. On the other hand, if a novice has an above-average ability, I think he would find working his way to the top a lot easier in Goodyear than in the stunt categories. A few reasons why I make this statement: (a) it's a new event with room for a lot of new faces at the top (b) the planes are easier to trim-out (all they have to do is fly straight) (c) an unknown flyer can't be held back by poor or prejudiced judging (d) you don't have to build your own plane – there is no BOM rule (e) and last but not least, a pylon course is easier to fly than a stunt pattern.*

The main reason for the semi-scale part in our rules was to give the novice a place to start. The handicap with this type of entry would delay his start so he wouldn't have to worry about other planes at takeoff. He could get a lot of experience with a slower aircraft and still have a chance of winning the consolation race.

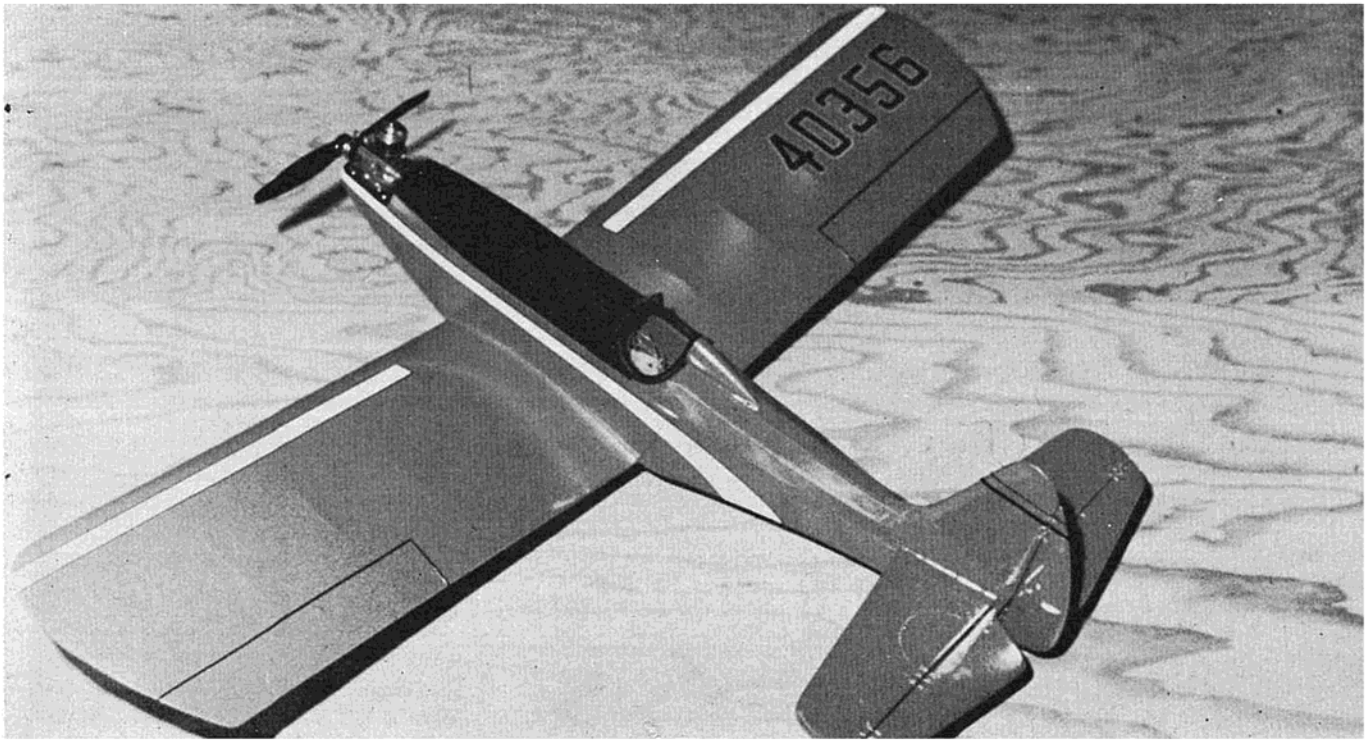
There is also room for the expert craftsman with little flying ability in this event. He may get himself an expert pilot for his plane and compete in this fashion. This would be a tough combination to beat, and I'm sure the owner would get as much satisfaction out of competing as would his pilot.

In closing, I hope the people who are concerned with this event will always stop and consider the purpose of our rules – to duplicate Goodyear pylon racing while having a competitive event – before making any adverse comments.

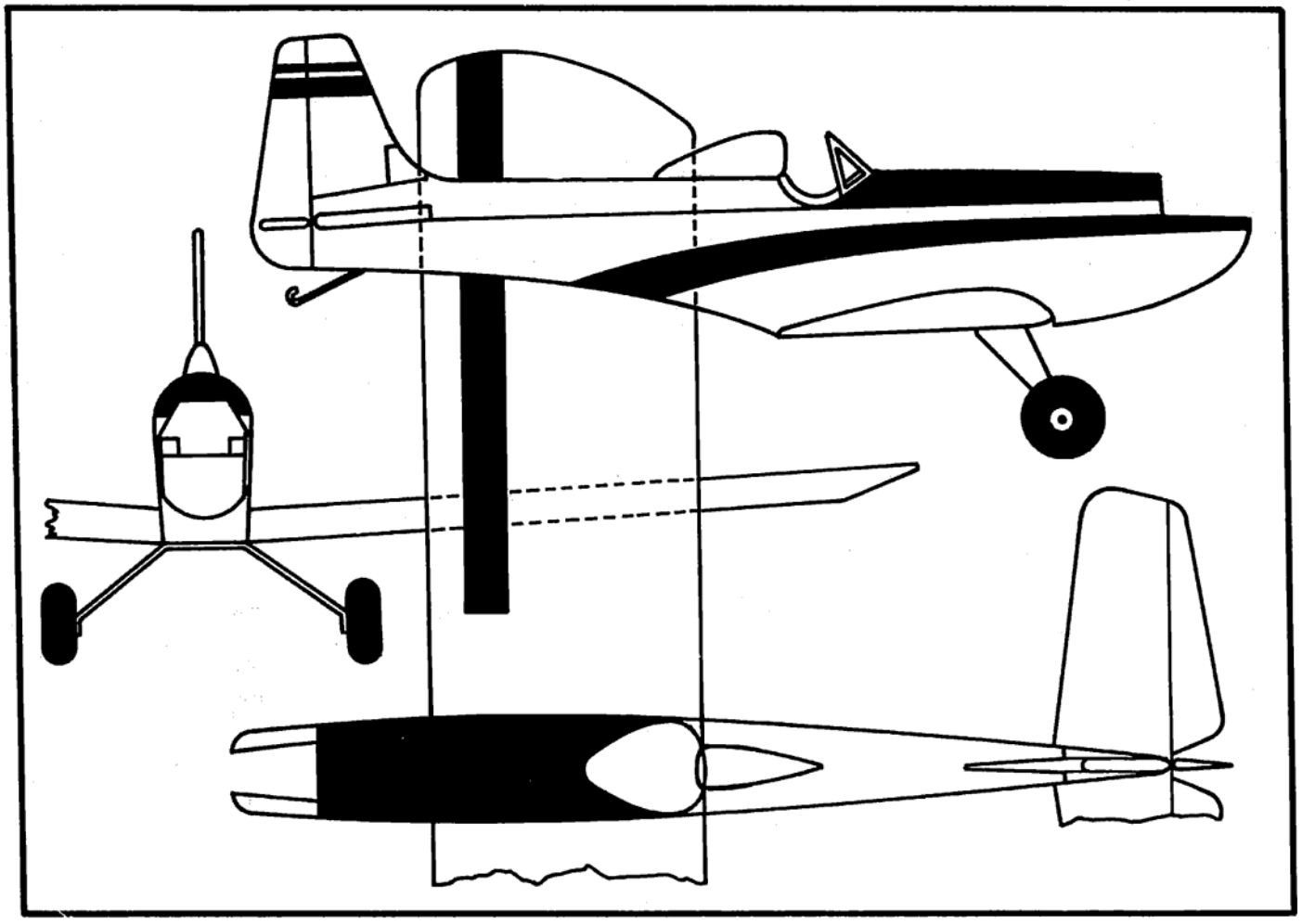

CAN YOU NAME . . . .
26.995
3704
. . RCM'S 'PLANE ON THE COVER'?



A sensation wherever it's been shown or flown, Herb Abrams' .09 powered low-winger for proportional control lacks only a name. If yours is selected by RCM, you'll win a new proportional system, actuator, and a two-year subscription. Interested? Read on . . . . .



DATA SHEET



ENGINE

.049 to .10. Cox .09 Medallion with throttle recommended.

DIMENSIONS

Wingspan: 36" Chord: 7"
Total Wing Area: 252 square inches
Fuselage Length: 25" Max. Fuselage Width: 2½"
Engine Thrust Offset: 3 degrees down
3 degrees right

FLIGHT CHARACTERISTICS

Sport design for single channel proportional control of rudder, elevator, and throttle. Very short ROG's, fast, stable, and responsive. Limit elevator movement to minimum on first flights.

RC EQUIPMENT

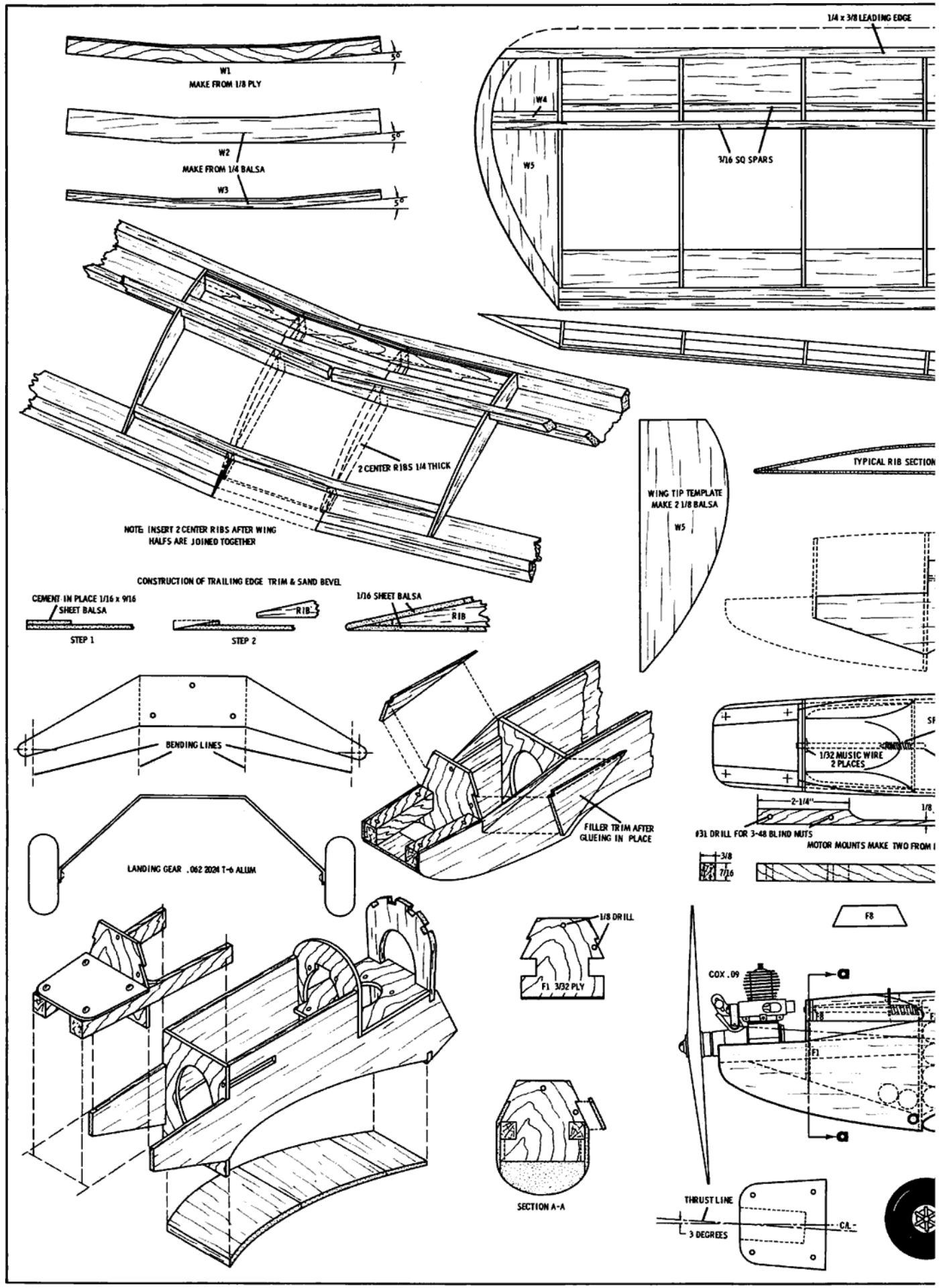
Prototypes used Min-X 1200S superhet single channel proportional system with Rand LR-3 Galloping Ghost actuator.

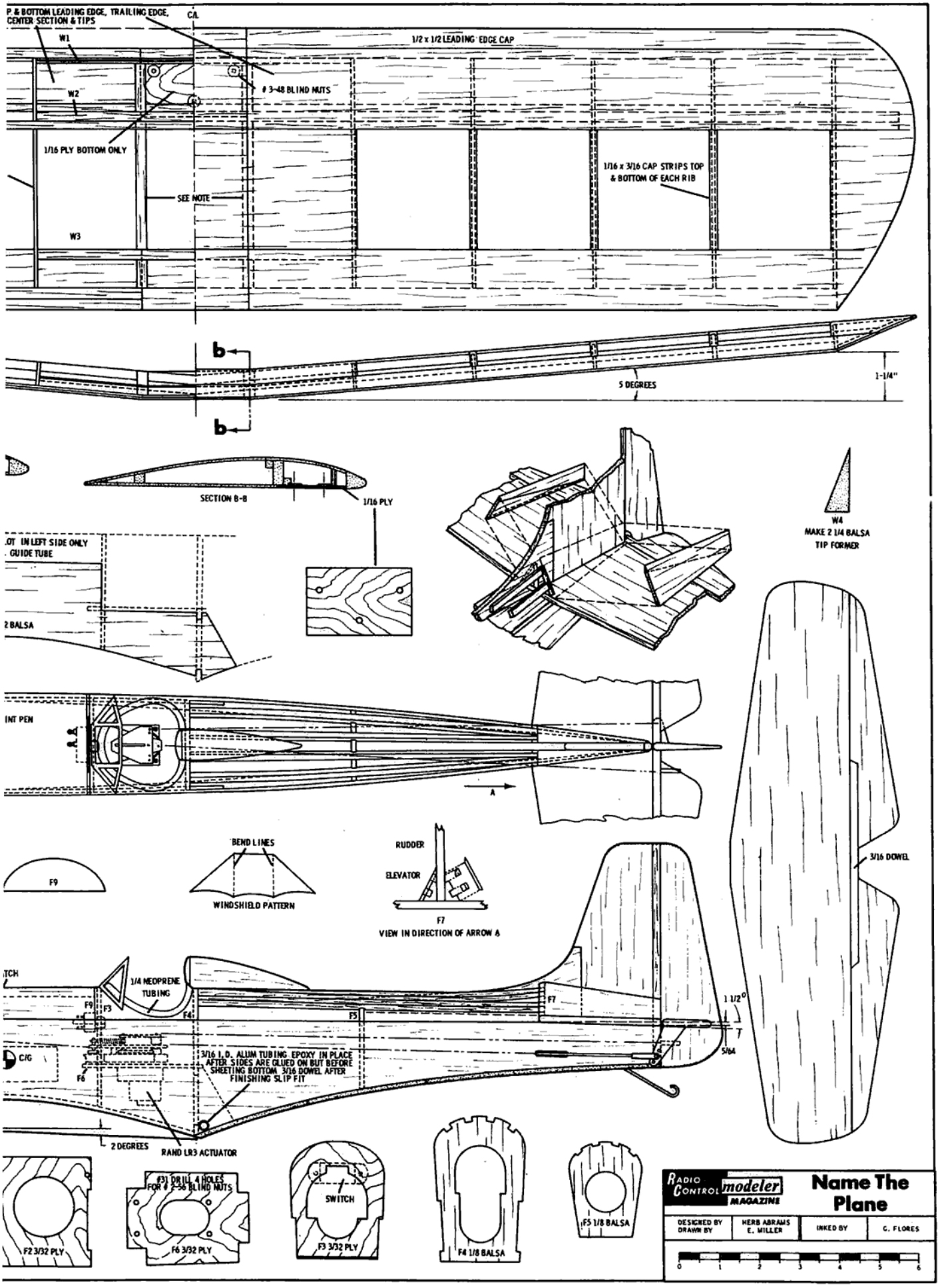
MATERIAL LIST

Wings:
(1) ½" x ½" x 36"
(1) 1/16" x 1" x 36"
(1) 1/16" x 2" x 36"
(1) 1/16" x 3" x 36"
(2) 3/16" x 3/16" x 36"
(1) ¼" x 1" x 36"
(1) 3/32" x 3" x 36"
(2) 1/16" x 3/16" x 36"
(1) ⅛" x 3" x 36"

Tail Group:
(1) ⅛" x 3" x 36"

Fuselage:
(2) 3/32" x 3" x 36"
(1) 3/32" x 3" x 36"
(2) ⅛" x ⅛" x 36"
(1) ⅛" x 3" x 8" (scrap)
(1) 3/32" x 6" x 12" plywood
(1) 1" x 3" x 6"
(1) 1" x 3" x 8"
(1) ⅜" x 7/16" x 12" motor mount stock


W1
MAKE FROM 1/8 PLY
W2
MAKE FROM 1/4 BALSA
W3
1/4 x 3/8 LEADING EDGE
W4
W5
3/16 SQ SPARS
2 CENTER RIBS 1/4 THICK
NOTE: INSERT 2 CENTER RIBS AFTER WING HALFS ARE JOINED TOGETHER
WING TIP TEMPLATE
MAKE 2 1/8 BALSA
W5
TYPICAL RIB SECTION
CONSTRUCTION OF TRAILING EDGE TRIM & SAND BEVEL
CEMENT IN PLACE 1/16 x 9/16 SHEET BALSA
STEP 1
RIB
STEP 2
1/16 SHEET BALSA
RIB
BENDING LINES
FILLER TRIM AFTER GLUEING IN PLACE
1/32 MUSIC WIRE 2 PLACES
2-1/4"
1/8
#31 DRILL FOR 3-48 BLIND NUTS
MOTOR MOUNTS MAKE TWO FROM
3/8
7/16
LANDING GEAR .062 2024 T-6 ALUM
1/8 DRILL
F1 3/32 PLY
F8
COX .09
F8
F1
SECTION A-A
THRUST LINE
3 DEGREES
C.A.


P & BOTTOM LEADING EDGE, TRAILING EDGE, CENTER SECTION & TIPS
W1
W2
W3
C/L
1/2 x 1/2 LEADING EDGE CAP
3-48 BLIND NUTS
1/16 PLY BOTTOM ONLY
SEE NOTE
1/16 x 3/16 CAP STRIPS TOP & BOTTOM OF EACH RIB
b
5 DEGREES
1-1/4"
SECTION B-B
1/16 PLY
W4
MAKE 2 1/4 BALSA
TIP FORMER
OT IN LEFT SIDE ONLY
GUIDE TUBE
2 BALSA
INT PEN
A
BEND LINES
WINDSHIELD PATTERN
F9
RUDDER
ELEVATOR
F7
VIEW IN DIRECTION OF ARROW A
3/16 DOWEL
ITCH
1/4 NEOPRENE TUBING
F3
F4
F5
F6
C/G
3/16 I.D. ALUM TUBING EPOXY IN PLACE AFTER SIDES ARE GLUED ON BUT BEFORE SHEETING BOTTOM. 3/16 DOWEL AFTER FINISHING SLIP FIT
1 1/2°
5/64
2 DEGREES
RAND LR3 ACTUATOR
F2 3/32 PLY
#31 DRILL 4 HOLES FOR # 2-56 BLIND NUTS
F6 3/32 PLY
SWITCH
F3 3/32 PLY
F4 1/8 BALSA
F5 1/8 BALSA
RADIO CONTROL modeler MAGAZINE
Name The Plane
DESIGNED BY
DRAWN BY
HERB ABRAMS
E. MILLER
INKED BY
G. FLORES
0 1 2 3 4 5 6

THIS outstanding little low-wing design was originally conceived by Jack Lemon and Ellsworth Miller in 1957, and in its original configuration, was flown with escapements and pulse proportional for rudder only sport and contest work. My first encounter with this spritely looking machine occurred one Sunday morning when I stopped by Jack's house on the way to the flying field. It didn't take much arm-twisting to get Jack to agree to take it out to the field. The ensuing flights were beautiful — the plane was fast enough to provide a challenge, yet slow enough to make me want to try it!

After flying it on rudder-only, I could hardly wait to try it out on Galloping Ghost. The addition of elevator would add a new dimension to its flying and utility. Learning that Ellsworth Miller had built four of these models on almost a production basis, I purchased two of the existing models for my experiments. Even though they were, by now, eight years old, I found them to be in perfect condition.

Elevators were quickly added and a Rand LR-3 actuator installed. Radio equipment consisted of a Min-X Pulsemite 1200 transmitter and receiver combination. Back at the field, once again, we learned our first lessons about this airplane — the first flights were quite short, consisting of take-offs and snap rolls into the ground. The vicious stalls and subsequent snap rolls were caused by our failure to block the wing to the proper incidence angle. Several repeated attempts to fly the model ended in the same manner, yet the model sustained no damage whatsoever. Ellsworth had designed the airplane as strong as possible in order to withstand this type of activity — the design emphasis having been to build it simply, yet strong, the slight additional weight penalty being of less severity than the damage a less well-constructed model would sustain. He had proved to be an able designer!

After determining the proper incidence, plus making a few additional changes, the model performed beyond all expectations. With proportional rudder and elevator plus throttle control on the Cox Medallion .09, the plane is one of the most outstanding sport fliers we have ever encountered. It is a fairly fast model, responsive to command, and capable of some pretty fancy maneuvers! Although the size would dictate an .049 engine, and if built quite lightly this size engine would probably suffice, we used a Cox Medallion .09 with throttle on all prototypes. Don't let the power to size ratio frighten you, since the continually moving surfaces on pulse-proportional control induces drag that must be offset by additional engine power. **You** can fly this plane — and you'll enjoy every minute of it!

You can also win a new Min-X 1200 proportional transmitter and receiver and Rand LR-3 actuator, complete with wiring harness, if you submit the best name for this design. Originally called the Penetrator because of its ability to fly in high winds, we discovered that this was the name for a leading Class I contest design. From this dilemma came the idea of the Name-The-Plane Contest. As an added incentive, RCM is adding a two-year subscription for the winner. Let's get on with construction.

Wing

The wing is simplicity itself, with only a few additional hints needed to help the constructor. The panels are built using the lower sheeting as a base. The trailing edge filler strip should be finished to final shape prior to the installation of the ribs. If the latter are left a little thick at the trailing edge, they can easily be blended to match the filler strip after installation. Do not sheet the top of the wing until the panels have been joined to the center section, and until the spars, gussets, and wing tips have been added.

Sheet the center section to the middle of the ¼" thick center ribs and then add the top sheeting and capstrips. I would suggest that the plywood landing gear plate be epoxied in place and that 1" wide reinforcing strip be applied at the dihedral joints. When the wing is completed, sand lightly, then spray the entire structure with two coats of thin dope before covering.

Fuselage

The actuator mounting plate is used to key the fuselage square. The two side doublers, along with formers F2, F3, and F4, form a box which is held square by the mounting plate F6. If all of these members are glued with HobbyPoxy, the box can be made at one time and held in place with rubber bands and masking tape. The box should be turned over on a flat surface while drying in order to prevent any possible twisting.

The wing-nest sheeting is applied and finished flush. This is accomplished in order to provide an inner lock joint with the sides. The motor mount assembly can be positioned in this inner structure at this time, gluing firewall F1 in position at the same time. The ends of the motor mounts will have to sprung-in to bear against F2. Again, HobbyPoxy glue should be used at this point. A soft balsa nose block glued in place and finished flush completes this structure. The sides can now be glued in place and the addition of former F5 and the 3/16" square hard balsa used for the vertical stabilizer added to complete the basic fuselage.

The pictorial drawing illustrates the manner in which the fuselage sides are trimmed to match Former F1. Filler pieces have been added to form the contour. A notch is shown which provides excess stock for trimming. Provision has been made for the motor control push rod housing, the latter being ⅛" nylon tubing which is glued in place. Plastic balsa can be used to fill and blend the area above the motor mounts.

(Continued on Page 32)

A very practical feature of this plane is the use of a full-length hatch which exposes all of the gear for checking and inspection. This hatch is cut from soft balsa with 1/16" plywood formers on the ends and at position F2 to hold the hatch pin.

The stringers adjacent to the vertical stabilizer must be trimmed to be fit into position. These stringers are notched on the ends so that the cockpit cover and tail fillet will blend properly. Note the angle of incidence of the wing is 2½ degrees positive and that the angle of the horizontal stabilizer is 2 degrees. The fuselage sides must be trimmed prior to final assembly so that the final incidence angle between wing and stab is ½ degree. The object is to have the model fly in a tail-high position.

A note about using the Cox throttle in this installation — the position of the motor control pushrod will not match the Cox throttle linkage at the rear of the exhaust restrictor, so the linkage is simply moved to the front of the exhaust restrictor, using the same screw that holds the linkage from the carburetor.

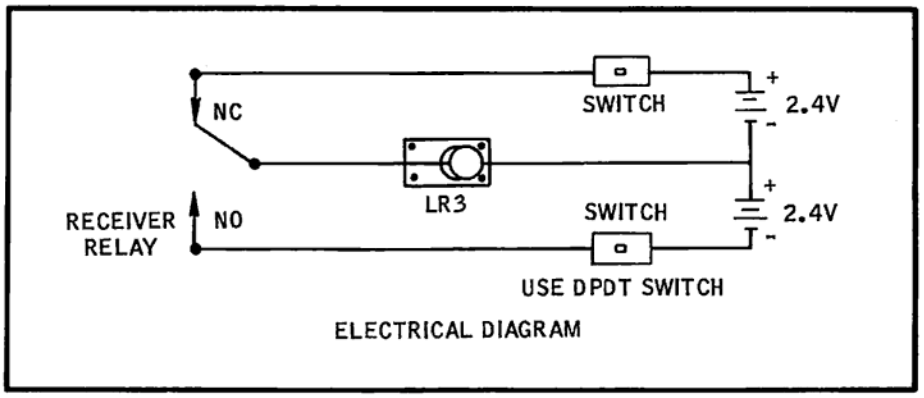
Elevators

The elevators are made from 3/16" soft sheet balsa with 3/16" dowel epoxied in place to join the two halves. A long control horn is used to limit the control motion.

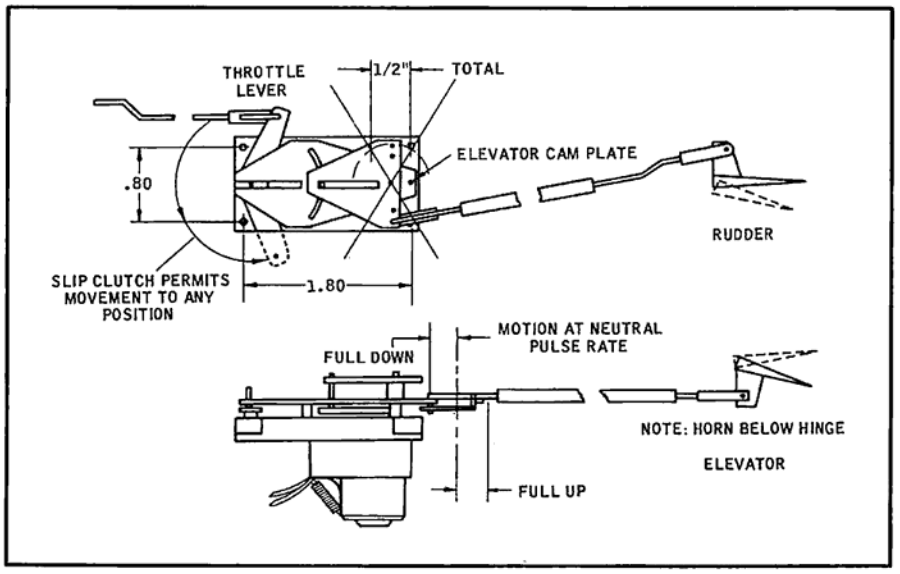
Radio Installation

Before going into the actual radio installation, let's clear up some confusion about Galloping Ghost for the benefit of the newcomer to radio control. Quite simply speaking, GG is "getting the most with the least." That is, proportional control of the rudder and elevator, along with throttle control, from a single channel system and only one actuator. There are three variables transmitted from the Galloping Ghost transmitter — pulse rate, pulse width, and tone-on or tone-off. These are transmitted via the pulse coder and received by the superhet receiver. They are, in turn, mechanically decoded by the actuator. The latter moves the control surfaces to give the desired proportional control. Now, let's apply these commands to the Rand LR-3 actuator and see what happens:

The **rate** information controls the position of the elevator cam plate in relation to how fast the actuator motor oscillates. At high pulse rates, the crank does not have time to move very far. Therefore, the effect is for full down elevator. At low pulse rates the crank



ELECTRICAL DIAGRAM



has time to move about 270 degrees with the effect of up elevator. At neutral pulse rates the crank swings back and forth approximately 100 degrees (5/16"), which motion causes the elevator to move up and down equally for effective neutral elevator.

The pulse **width** variable causes the actuator motor to turn more in one direction than the other, which means that the rudder assumes an average position to the right or left.

A steady tone-on or steady tone-off causes the actuator to turn 360 degrees five times for full throttle control, provided by the adjustable arm on the actuator. Signal-off is used for low motor in order to provide a fail-safe operation in case of any system malfunction. The controls are moved rapidly through their extreme positions during throttle changes giving effective neutral control action at the rudder and elevator.

During all periods of operation, the control surfaces are moving, or cycling, through their positions, giving a neutral position 1 until the transmitter stick is moved, at which time the surfaces move toward the given signal. Due to the high rate of the pulses, the wiggle of the control surfaces is barely perceptible in flight.

The trim lever setting on the transmitter selects the neutral pulse rate, and therefore, the amount of control surface motion. As in ordinary multi aircraft, the pushrod adjustment is used for flight trim. The transmitter trim levers are used for in-flight trim.

The receiver used in the prototypes is the new Min-X SH-1 superhet receiver, the smallest production relay superhet on the market today, measuring 15/16" x 1 7/16" x 1 15/16" and weighing only two ounces. Two alkaline energizers or three 225 ma nicad button cells can be used for the receiver power supply. A separate power supply is used for the actuator, consisting of four 500 ma nicad pencells or 450 ma button cells. Many tests were conducted with several different receivers and various switcher circuits for eliminating the two separate sets of batteries. It was found that, regardless of whose receiver was used, that a 50% loss in range could be expected when using a common battery supply to the actuator and receiver. In addition, we tried operating the actuator on 3.6 volts using the switcher. It turned out to be a disadvantage, since the actuator is set up on 2.4 volts to move proportionally with a 70-30 width change. Many factors effect this relationship, such as the actuator itself, motor, torque and speed characteristics, and the spring rate of the centering spring. On 2.4 volts, measured at the actuator, motor control will be normal. If 2.4 volts is used through a switcher, a voltage drop occurs, so that the actuator will have less than two volts and motor control will not be reliable. The diagram shows the proper method of wiring. Connect the leads to the actuator so that the throttle control moves to low throttle on low motor signal — signal OFF. Simply reverse the leads if it moves in the wrong direction. With the transmitter signaling left turn, note the position of the actuator rudder plate. Connect the rudder pushrod to the appropriate side to give left rudder. Adjust the pushrod length for neutral. Connect the elevator pushrod as illustrated. Observe the motion of the elevator with the stick and trim in the neutral position, which is 6 pulses per second. Adjust the length of the pushrod so that the elevator moves approximately the same amount above and below the center line. Connect the pushrod on the furthest "out" position on the elevator horn for initial flights. Be sure all of your control linkages are free. Watch for binding of your Kwik Links at the control horns, caused by too much tension, or keepers that are too tight, or misalignment of pushrod to control horn.

Flight Trim

Balance the airplane as shown. The airplane will take off in 10 or 15 feet and be quite sensitive to the controls. If there is any tendency to gallop, increase the pulse rate and lengthen the elevator pushrod to compensate. Good flying — and don't forget to send in your selection for a name for this plane!

THE 3 R'S

READING FOR RELIABILITY IN R/C CAN GO A LONG WAY TOWARDS BOOSTING THE SUCCESS FACTOR OF THAT NEXT R/C SHIP

BY CDR. LOU GUERRIERI

Author of the three part article 'R/C Flying Safety' recently presented in R/C Modeler Magazine

NOWADAYS we all try to extend the life of our models as much as possible. No one would deliberately destroy one of his creations, or would he?

How about that character you met last month? You know the guy. The one who built those super-detailed Fokker D-VII's and SE-5's when he was a kid, took them up to the roof one day (it was always the roof), set them afire one by one, and watched them burn as they gracefully soared earthward. What a thrill! Remember that guy!

Pure economics prohibits that sort of thing today. It's like trading in your brand-new Cadillac because the ashtrays are full. It's too expensive.

When the average Class III machine climbs into the blue, an investment of about 350 of the long green is at stake. It is just good common sense to keep it from impacting with Mother Earth as long as possible. Some are more successful than others in this regard, while some couldn't get down in one piece if their lives, much less their pocketbooks, depended upon it.

Of course, many factors contribute to success in R/C.

Experience is one. Only the most dense among us fails to learn something from each goof or prang.

It has also been said that experience is the best teacher. But doesn't the tuition run a bit too high for the average RC'er? If you and I had to learn all our lessons from crackups, we should have been named J. Paul Getty. Of course, a tanker or an oil well or two never hurt anybody.

Learning all we can about R/C operations also helps the success factor. In this day of quality model aviation publications, there are many well-written articles on all phases of the hobby. These articles enable us to gain more and more knowledge and, in the long run, help to extend the useful life of each plane. You learn something new every day, whether it is out at the local flight line or home in an easy-chair perusing the latest issue of that old favorite, "American Radio Control Flying News."

All articles are valuable to a degree, however, some make a more positive contribution to R/C success than others. These generally focus on the reliability aspects of engine, airframe, and equipment, the applications of the laws of aerodynamics, design principles, and "how to fly."

The listing that follows is an attempt to catalogue the best of the written word appearing during the years 1961 to 1965. Superhet receivers and low-wing Class III aircraft came into their own early in this period. In most cases, back issues of the magazines cited are still available.

Since this is but one man's list, it is bound to be arbitrary and subjective. Bear with me if I neglected your favorite author. It is not a complete bibliography of everything that has appeared in print. The scope of the listing is rather narrow — extending the useful life of a model.

So on to one method of assuring more flights per model. It is the three **R**'s for R/C — **R**eading for **R**eliability in **R**/C. It will produce some degree of longevity for you — less ulcers; and some for your latest wind machine — fewer crackups.

Happy Landings — into the wind, most of the time!

READING FOR RELIABILITY IN R/C

Abbreviations:

AM — American Modeler
AMAN — American Modeler Annual
AeroModAn — Aero Modeller Annual
DCRC — DCRC Technical Symposium on Radio Control
FM — Flying Models
GL — Grid Leaks
MAN — Model Airplane News
RCM — Radio Control Modeler

General

How to Build Radio Control Models by W. Winter. A goldmine of reliable information concerning all aspects of R/C. If you read nothing else, read this. Kalmbach Publishing Company, 1964.

How to Get Started in R/C . . . Without Really Crying by R. Lopshire. A broad treatment of common sense, aerodynamics, design, technique, and construction. Must reading for the novice. MAN Jan 65, pg 20.

R/C Primer by H. McEntee. Worthwhile information concerning field and installation tests, maintenance of the aircraft and systems. Kalmbach Publishing Company, 1961, and second edition, 1965.

Half a R/C by K. Willard. The pros and cons of ½A R/C, with emphasis on the pros. MAN May 61, pg 26.

Aerodynamics and Aircraft Design

M/M of R/C by H. deBolt. The airfoil and other factors affecting R/C design and performance. AMAN 64, pg 67.

R/C Model Design by H. deBolt. General discussion of aerodynamics and design principles. Part I, MAN May 61, pg 29; Part II, MAN Jun 61, pg 31; Part III, MAN Sep 61, pg 36.

Ritz on Airfoils by G. Ritz. Choosing the proper airfoil. General discussion and application to R/C. AM Sep/Oct 63, pg 20.

(Continued on Page 34)

CG. Proper positioning of the Center of Gravity as it affects the Free Flight aircraft. Applicable for the RC'er. AMAN 61, pg 36.

Taurus by E. Kazmirski. Theory of design behind a most successful aircraft. Includes extensive comments on trimming. A must. MAN Jan 63, pg 11.

The Interceptor by H. deBolt. General notes concerning an advanced R/C design. MAN Jan 64, pg 11.

Citron by J. Kirkland. Aerodynamic considerations in the design of a Class III multi. AM July/Aug 65, pg 34.

Watch Yer Yaw by E. Engelhardt. Rudder and dihedral effects for the R/C aircraft. FM Apr/May 62, pg 28.

Rudder Effect by D. Miller. Vertical fin design and comments pertinent to R/C. MAN Apr 62, pg 14.

A Question of Balance. Complete treatment of Center of Gravity and surface rigging angles. AeroModAn 64-65, pg 121.

Aristo-Cat by B. Atkinson. Getting the most out of the rudder in a Class II design. MAN May 64, pg 11.

Flying Deltas by Smith and Baldwin. Stability and design considerations for R/C deltas. MAN Aug 62, pg 14.

Batteries

Nickel-Cadmium Rechargeable Batteries. Characteristics of nickel-cadmium cells. A comprehensive treatment. RCM Sep 64, pg 27, and RCM Nov 64, pg 27.

Nickel-Cad Facts. Effects of low temperature and partial charging/discharging. AM Jul/Aug 65, pg 82.

Construction

Build 'Em Right. Accuracy in construction using the Magna Jig. RCM Oct 63, pg 15.

Simple building technique for assuring warp-free stabilizers. RCM Feb 65, pg 43.

Drawings of a universal wing jig for warp-proof construction. MAN Dec 62, pg 29.

Engines

How to Idle and Still Be Successful by C. Lee. Comprehensive notes on engines, their care, and how to get good idling characteristics. A must. MAN May 64, pg 26.

Taking Care of Your Engine. Another approach to getting the best out of the engine over a long period of time. AeroModAn 63-64, pg 124.

Engine Idling Secrets by H. Thomasian. An extensive treatment of engines including the popular R/C makes. Part I, AM Nov 62, pg 18; Part II, AM Dec 62, pg 27.

Tired Engine? by H. deBolt. Understanding the engine and its requirements as to fuel, glow plugs, and the effects of temperature and humidity. AMAN 62, pg 78.

Equipment (single channel)

Secrets of Relayless Operation by R. Parfitt. Reliable relayless escapement operations. A must. GL Jul/Aug 63, pg 12.

Rx for Escapements by H. Cooper. Description of escapement operation and techniques for ensuring reliability. RCM Oct 63, pg 16.

Bench Bits by H. Giunta. Trouble-shooting single channel equipment, including faults most commonly caused by batteries. RCM Feb 64, pg 10.

Equipment (multi)

The Transmite Servo, a Complete Service Reference by Giunta, Campbell, Nash, and Hatfield. A complete analysis of the Bonner Transmite servo including circuitry, operation, and trouble-shooting. A must. RCM Feb 65, pg 21.

Comprehensive notes about reed bank characteristics and tuning by G. Wilson. A must. MAN Oct 64, pg 29.

Reed Bank Adjustment. How to tune and adust reeds for optimum performance. RCM Sep 64, pg 23.

Flying Techniques

A Trim Schedule for Class I Contest by A. Welgemoed. How to make the Class I machine fly as it should. A must. MAN May 65, pg 30.

Multi — and How to Trim by A. Weglemoed. How to make the multi machine fly as it should. A must. MAN Jan 65, pg 30.

An Approach to Flying Proportional by C. Weirick. Words of wisdom by a winner. Covers basics of the aircraft and equipment and how to get the most out of the proportional aircraft. Part I, RCM Apr 65, pg 12; Part II, RCM May 65, pg 14; Part III, RCM Jun 65, pg 8.

Installations

A Question of Reliability by W. Winter. The philosophy of reliability and how to achieve it by pin-pointing areas likely to cause problems. A must. GL Jan/Feb 63, pg 14.

Shock and Vibration in R/C Models by E. Lorenz. Reliability through elimination of shock and vibration in aircraft installations. A must. DCRC 63, pg 26.

Multi Installations. Methods of wiring and installing 6 and 10 channel rigs. Covers ground from equipment selection through aircraft hookup. Includes reliability tips. A must. RCM Sep 64, pg 30.

Wiring Reed Installations by G. Wilson. General wiring requirements and diagrams covering multi reed installations. MAN Sep 65, pg 32.

Noise and Interference by J. Ridley. Symptoms, sources, and remedies for electrical noise in the R/C system. GL Jan/Feb 65, pg 10.

Noise by G. Wilson. Noise and its effects on receivers. A must. MAN Aug 63, pg 16.

Bench Bits by H. Giunta. Noise and the single channel superhet rig. Techniques for increasing reliability. RCM Mar/Apr 64, pg 12.

Brief notes on receiver vibration isolation and linkages. RCM Apr 65, pg 40.

Hints on checking reeds and wiring on a periodic basis. MAN Dec 63, pg 65.

Receiver antenna installation; the case for the vertical whip. MAN Oct 65, pg 29.

Contacts and Interconnections by R. Allen. Reliability in switches and connectors. A complete treatment. DCRC 65, pg 27.

Propellers

Applications of Propellers to Model Aircraft by S. Axelrod. Wood versus nylon props. Vibration and strength tests of nylon propellers. DCRC 64, pg 17.

Members of the Monmouth (New Jersey) M.A.C. pose with their RCM Digitrios. Group has monthly "Digitrio Builders Meetings" in addition to regular club dates. Photo by Dick Sarpolus.

RCM DIGITRIO

CONVERSION TO SIX METERS

By ED THOMPSON
RCM TECHNICAL EDITOR

THIS last month we've been busy working the four channel conversion into shape for publication. There are several prototypes being flown around the states and all reports to date have been gratifying. I've been flying the heck out of mine — so far about 250 flights. By the time the conversion appears, there should be at least 2,000 flights on the prototypes. Although the conversion will be to only four channels, the basic decoder can be expanded very simply. There are currently several five and one eight channel versions flying.

I am presently working at top speed on the Digitrio 4 and will try to kick it off next month. The modification is designed to be as painless as possible. It consists of the addition of a small P.C. board in the transmitter, a three-control stick assembly (or if you wish, your own arrangement) and a new decoder board to replace the existing one. Most of the parts on the old decoder board can be reused in the transmitter modification, keeping the necessary additional parts to a minimum. If some of you want to get a head start, you can build a new transmitter case with provisions for four channels around the existing Digitrio transmitter P.C. board. The small transmitter modification board will not interfere with your mechanical layout. Those of you who have wanted to build a Digitrio but desired to wait until the four channel version was presented can build the Digitrio, less the decoder board (save the parts) for a head start. It will not be necessary to modify the motor servo on the four channel system.

I have built a transmitter using 2N3640's in place of the 2N3638's and 2N3646's in place of the 2N706's. I recommend the 2N3640's as substitutes for the 2N3638's and the 2N3646's for the 2N706's in the untuned power amplifier circuit. I haven't found any heat sinks that fit the 2N3646's but they can be made by cutting down the TO-5 type. I have also found a good substitute for the timing capacitors used in the one shots. These are made by Erie and are type Z5E.

We received a letter from Buddy Tomlinson of Groves, Texas about his four channel Digitrio and was surprised to see that Buddy's circuit was almost identical to the one I had been flying, except for his method of sync. Buddy was kind enough to incorporate my sync circuit and forward his P.C. board layout, overlay, and a brief writeup. This circuit is recommended only for those technicians who like to experiment. I have abandoned this particular circuit in favor of SCS's and recommend that only technicians use it. At the time of this writing Buddy has a dozen or so flights on it and says the only problem he encountered so far is one of sync when the equipment is first turned on. According to Buddy, if you turn the receiver on before the transmitter, or swamp the receiver, one of the servos may run to an extreme position. Turning the switch off and then on again will restore it to its proper sync condition and Buddy claims he has never had it lose sync while flying. I didn't have this problem when I was flying this circuit and don't know what might be causing it. In any case, it should be thoroughly checked out before use. Buddy gave us permission to print his address and stated he would like to correspond with any technicians interested in the circuit, or for that matter just to swap ideas on any electronics circuitry. His address is:

B. G. Tomlinson
2310 Owen Ave.
Groves, Texas

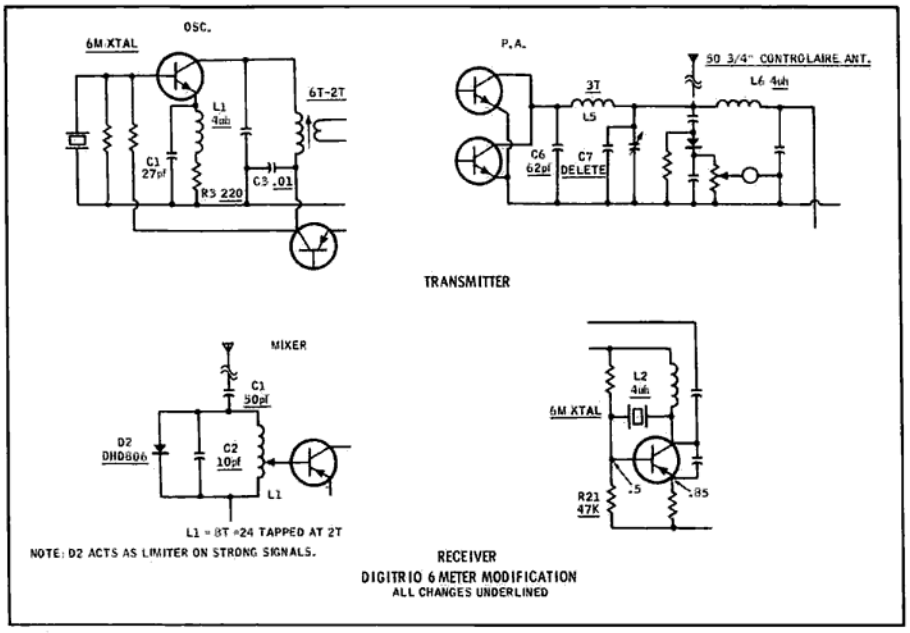
Here is a note on the servos passed on to me by Tomlinson. A couple of fellows he knows have bent the finger assembly on the output arm to prevent it hitting the .001 capacitor. This may cause the fingers to run off the end of the resistance element when the output arm is at the extreme position. To prevent this, the .001 should be moved to the left to obtain clearance rather than bending the wiper assembly.

I have been flying the retractable gear that I mentioned last month with excellent results. Cletus Brow put a lot of thought and ingenuity into these devices. The installation is simple since each gear has its own actuator, eliminating cables, etc. Operation is practically foolproof and they require almost no maintenance.

Each unit has an air actuating cylinder and motor crankcase pressure is used for power. A unique and practically foolproof pressure switch using surgical tubing is actuated by the motor or extra channel servo for operation.

A reed valve, from a Cox .020 is used between the motor and the actuators. Once the gear is retracted no further pressure is needed. This also allows the gear to stay retracted if the motor stops. Ted White uses this feature to best advantage by dropping his gear at the last moment on dead stick landings. At the Southwest Regionals this year he had

Buddy Tomlinson shown with his 4-channel Digitrio. Tomlinson's modifications detailed in this issue.



everyone, even the spectators, yelling "drop the gear" thinking he had forgotten them. With a smile on his face, and hardly able to contain himself, he waited until the last minute, dropped the gear and dead sticked his El Gringo almost dead center on the spot. This ended one of the best flights I have seen and one that had the spectators and even some of the contestants applauding each maneuver. Ted sure knows how to milk the points out of the judges!

Here are some features of this gear:

1. Easy installation.
2. Positive down lock.
3. Nose wheel steering has built in yoke assembly allowing push/pull operation.
4. Light weight, approximately 14 ozs. total.
5. Maintenance free.
6. No electrical noise.
7. Foolproof operation when properly installed.
8. All units shock absorbing (coil springs).
9. Machined wheel mounting hardware supplied allows adjustment of gear height.
10. Thoroughly flight tested and proven reliable.

RCM approves and recommends this gear.

In the May 1966 issue of RCM, I presented a home crafted stick, designed by Mr. Gerald Dale. The construction writeup for this unit on page 88 appears to have been written by myself. Actually, Mr. Dale wrote the assembly instructions and should receive full credit.

Apparently those who have built the Digitrio are not having many problems. I base this on the fact that I have received very few letters of complaint, and those that I have received concern minor difficulties or problems that could easily be cured with the modifications I have printed. I am very interested in knowing how the Digitrio is performing throughout this country as well as overseas and have made up a form which I hope you readers will fill out and mail to me. I will compile the information I receive and publish it. Please take a few minutes of your time to do this for me as it will give the readers a chance to evaluate the Digitrio and provide me with valuable information for future projects.

I am currently editing several other articles for publication and as soon as they are ready, they will be printed in an effort to expand the technical coverage of the magazine. You readers can help here by letting me know what you want to see in print, and also by submitting technical material for evaluation. Unlike dealing with the "big time" editors, you don't have to knock yourselves out for nothing — just drop me a line if you think you have a "goodie" and describe it. I'll let you know if I feel it is worth general publication and assist you in the preparation of an article. You will receive full credit for the article and a check for your contribution. Remember that I am a technician who flies R/C every chance I get and I have the facilities to evaluate almost anything you can come up with, so I am not going to reject any articles because I am twenty years behind the "times" and afraid of laying an egg. Also I am not a "know-it-all" who thinks that only a chosen few are worthy contributors. If you have a "goodie," your project will receive a fair evaluation and I may learn a few things in the process. Don't expect overnight acceptance however, because anything printed in RCM must be evaluated completely and be of top quality. I'll work with a prospective author until we are both satisfied that it is "top quality."

Here are some guidelines for prospective authors that will help speed up acceptance and save both of us time:

1. Jot down a description of your device or circuit and send it to me along with a photo.
2. Be prepared to send me a sample, if requested, for evaluation.
3. Insure that the item can be duplicated with the same performance as the original.
4. Be prepared to work as hard and as long as necessary to see the "project" through.

SIX METER CONVERSION FOR DIGITRIO

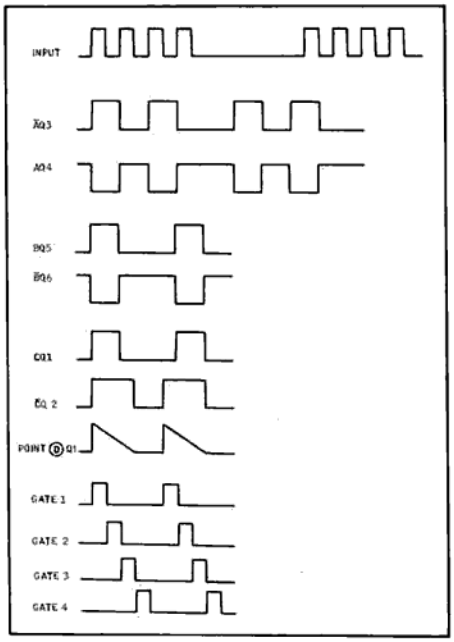
The changes necessary for six meter operation of the Digitrio are shown in the attached drawings. All schematic changes are underlined. Since any person operating equipment on six meters must be a licensed amateur operator, I won't go into a lengthy discussion of the changes. I used a 50¾" antenna from World Engines which is, theoretically, a little short of resonance. To provide for true resonance, I installed a four-turn slug-tuned coil, the form being the same as used at L2. Due to ground loss resistance a significant improvement in output power, but if you are a purist you can install one. Use the shield and one shot modifications described earlier.

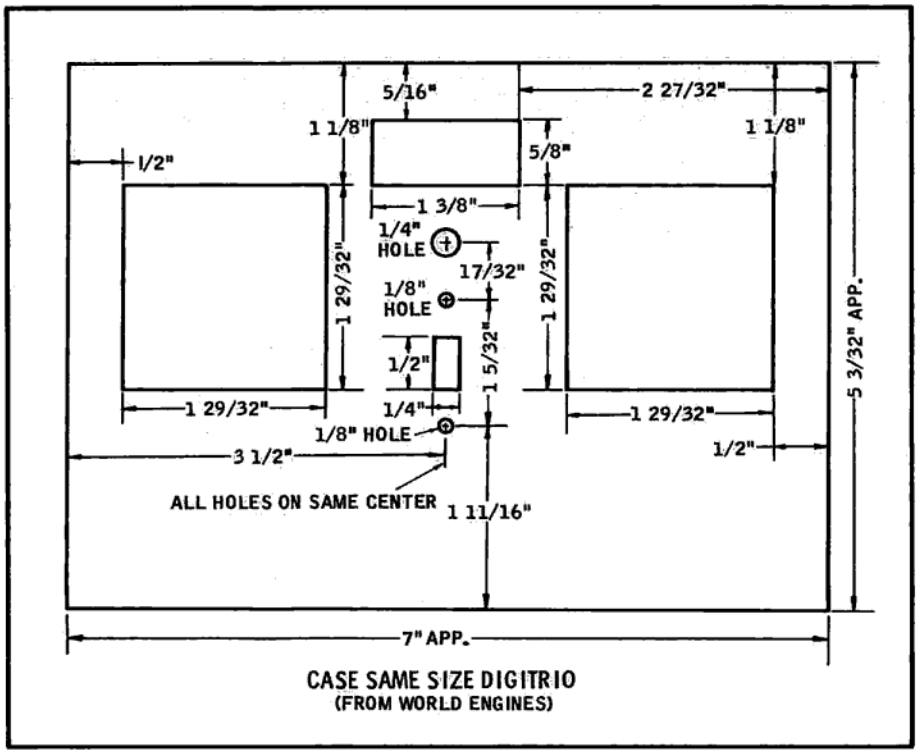
Range of the six meter version is as good, and may exceed, the eleven meter version. I have more than two hundred flights on mine and have experienced no system problems. We don't have many six meter problems where I fly, but in some of the more congested areas "RF wise" it would be a good idea to spend a little time finding a "clear spot" to operate the system.

The equipment is tuned just like the 27 MC version and operates just as well. Dave Holmes of Grafton, Va., replaced the oscillator transistor with a 2N3646

(Continued on Page 37)

Waveforms from B. G. Tomlinson's 4-channel Digitrio conversion. See text for theory and construction.





CASE SAME SIZE DIGITRIO
(FROM WORLD ENGINES)

when he found that slow pulse recovery time was causing wide output pulses. I haven't experienced this problem, but am passing it on in case it may help someone. Dave has been flying his six meter version for about seven months and says he has never had a range problem or glitches due to insufficient signal strength.

FOUR CHANNEL DIGITRIO BY B. G. TOMLINSON

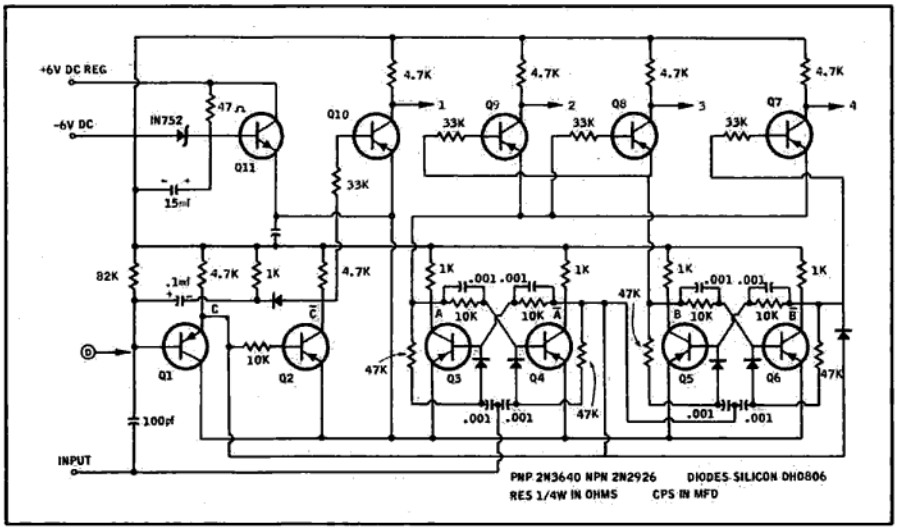
THEORY OF DECODER

Most of the circuits in the decoder were covered briefly in the first article and in the Trio decoder. Two flip-flops, one one-shot, and three gates (Q10 is merely an amplifier) are used to count/sort the pulse trains into separate channels. Constant reference to the decoder waveforms will be necessary to grasp its operation.

The input to the decoder is a replica of the transmitted signal. Q3 and Q4 (flip flop) are triggered by the leading edge of each pulse. This produces square waves at both collectors (Point A and A). The width of these pulses are determined by the width between the leading edges of the pulses in the incoming pulse train. Since Q3 and Q4 cannot be in the same state at the same time, A and A will be inverted replicas of each other.

Q5 and Q6 (B and B) form another flip-flop which is triggered by Q4. This flip-flop changes state each time Q4 produces a pulse, which will be every other time Q3 and Q4 receive a pulse from the incoming pulse train. They are inverted replicas of each other.

Q1 and Q2 (C and C) form the one shot that is used to measure the time between the #1 pulse in the pulse train. The time between #1 pulse is compared with the timing of this one shot to produce the motor control pulse. It is also used to reset the two flip flops during the sync pause.



Q7, Q8, and Q9 are the output gates for pulses 2, 3, and 4 respectively. Q10 is the motor control output transistor. Q11 in conjunction with Z1 provide regulated voltage for all timing circuits including the reference generators in the servo. It also provides regulated voltage for the receiver.

Let's start with the action of the one shot Q1 and Q2 and the two flip-flops Q3 and Q4, Q5 and Q6. During the sync pause, Q1 and Q2 will return to the quiescent state, Q1 conducting and Q2 cut off. Q1 will produce a positive pulse at this time and cause the two flip-flops to sync Q3 off, Q4 on, Q5 off, and Q6 on. Q2 being off will place a negative voltage on the base of Q10, forward-biasing it on. Gates Q7, Q8, and Q9 are cut off at this time. There will be a positive voltage on the base and negative voltage on the emitter of Q7, this will not allow it to conduct. Q8 has a negative voltage on its emitter and base and cannot conduct. Q9 has a negative voltage on its emitter and base and it cannot conduct. As can be seen these gates must have positive emitter and negative base in order to conduct.

When the first pulse arrives it changes the state of the one-shot and the flip-flops. When Q1 cuts off and Q2 goes on, the base of Q10 goes to ground potential, cutting it off. At the same time Q3 goes to ground and Q4 goes negative, Q5 and Q6 remain as they were, Q5 negative and Q6 ground Q3 and Q5 forward-biases Q9 causing it to conduct. Under this condition neither Q7, Q8, or Q10 is forward-biased so they are not conducting.

The second pulse will change both flip-flops. Q3 goes to negative, Q4 to ground and Q4 at this time triggers the second flip flop causing Q5 to go to ground and Q6 to go negative. Q8 at this time will be forward-biased by Q3 and Q5 turning on giving us another control pulse. At the same time Q9 is turned off Q7 and Q10 still have the wrong potential and cannot conduct.

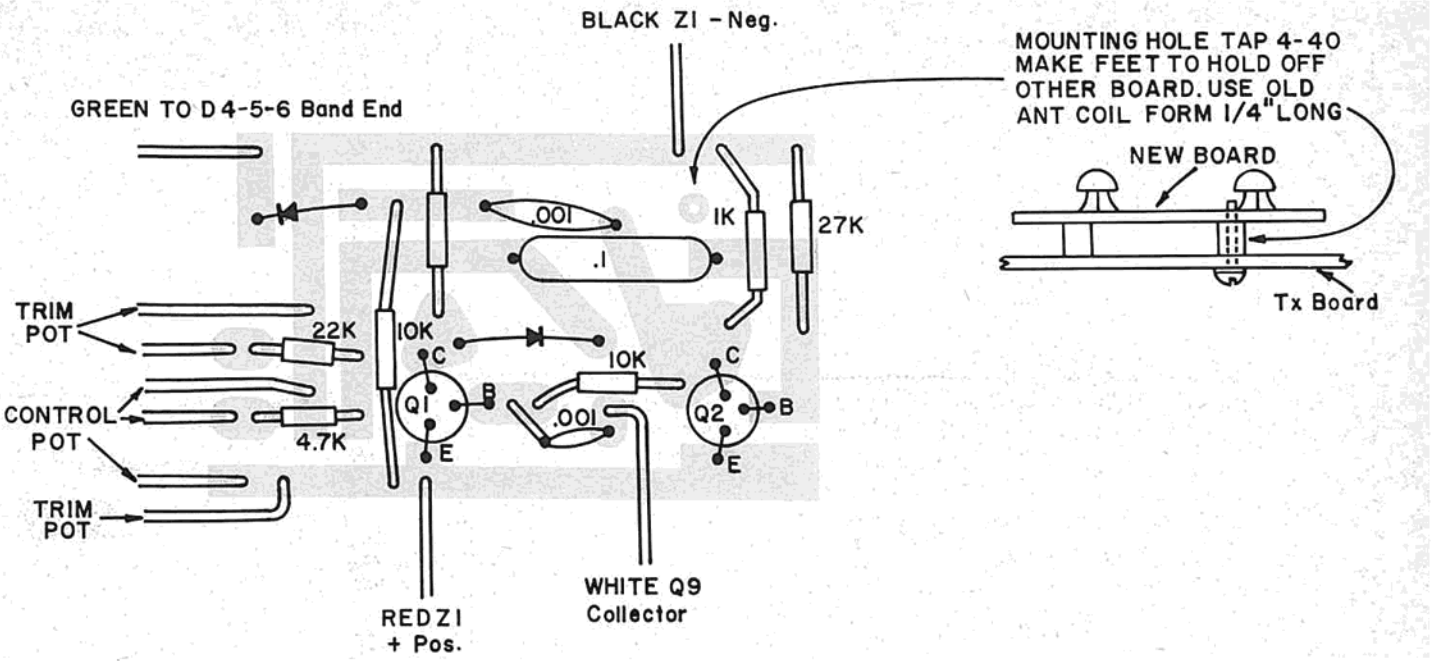
The third pulse will change the first flip-flop again causing Q3 to go to ground and Q4 to go negative, Q5 and Q6 remain the same. This turns off Q8. Q7 will be forward-biased by Q3 and Q6 giving us our last control pulse.

The fourth pulse changes both flip-flops. Again Q3 goes negative, Q4 to ground, but Q5 goes to negative and Q6 goes to ground. This turns Q7 off; at this point all gates have the wrong potential and cannot conduct. The sync pause starts over again and after approximately 6.5 MS the one shot will return to its quiescent state. This brings us back to where we started.

SYSTEM IN GENERAL

In building the decoder, care should be taken when installing the diode that lays down.

I have made all the latest changes to



MOUNT IN TOP LEFT HAND CORNER OF DIGITRIO Tx BOARD

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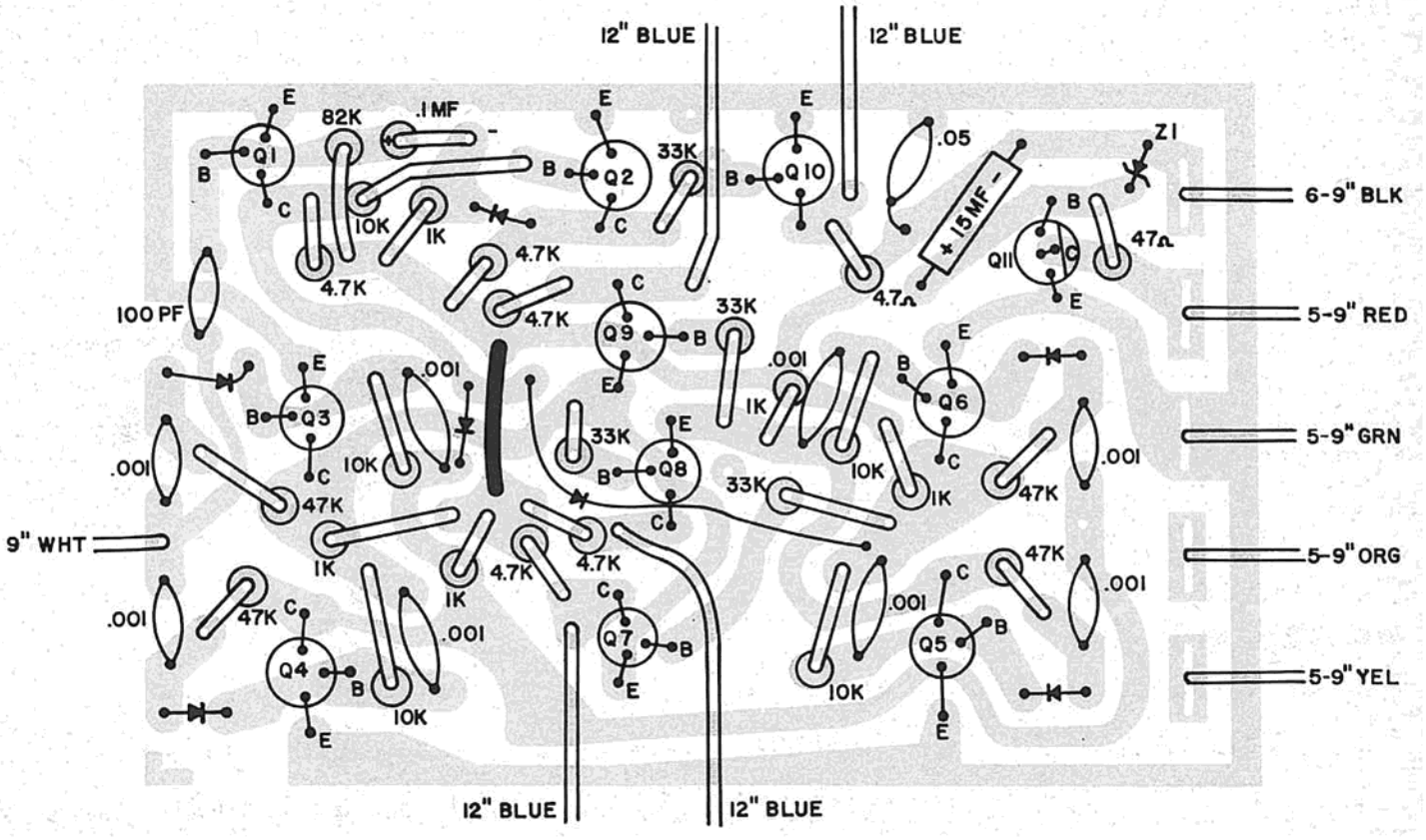
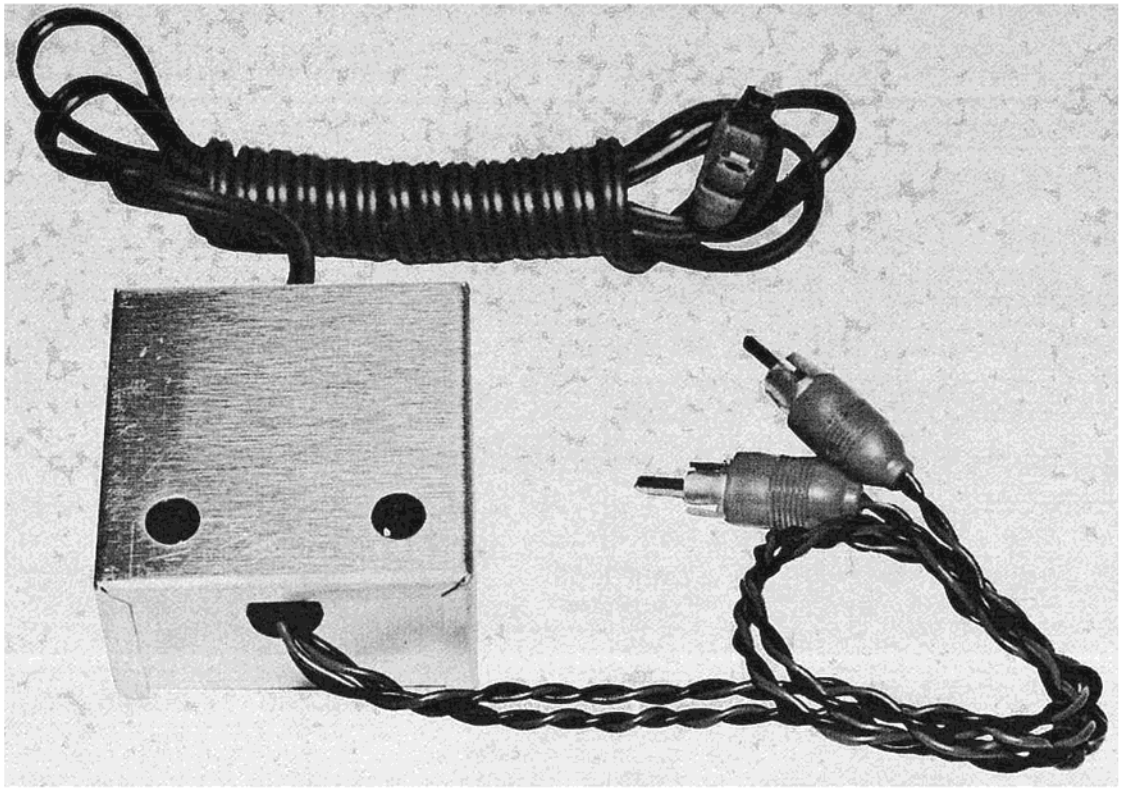
the system (servos and Tx). They all help to some degree.

The system is rock solid; no servo chatter or buzzes with or without signal. I find that it is as reliable both on the ground and in the air as the Digitrio. I have noted that you can cause it to go out of sync (servo or servos will run to one end or the other) by swamping the receiver. Back off turns Tx off then on and it will sync again.





DUAL DIGITRIO CHARGER

BY BOB MC KNIGHT

THIS charger was designed for use with the Digitrio system, and has the following features: The use of an isolation transformer to eliminate shock hazard, a series connected charge indicator light for each output that tells when batteries are charging; duel output that allows you to charge both the transmitter and receiver batteries simultaneously.

The aluminum case for the charger measures 2¼" x 2¼" x 1⅜". These dimensions are not critical, and a larger box may be used if desired. The PC board is shown full size and may be made by the standard photo process, or due to the simplicity of the board, may be mechanically constructed by scribing the outline of the rectangular lands with an X-Acto knife and then carefully peeling away all excess copper. Before starting, check fit of the circuit board in the case bottom. Trim to fit if necessary.

( ) 1. Cut 12V transformer leads to ½" length. Strip ¼" insulation from each lead. Insert black leads into holes 21 and 22. Insert Green leads into holes 19 and 20. Temporarily mount the transformer to the PC board with 4-40 x ⅜ bolts and locknuts. Solder the Green and Black leads to their corresponding lands.

( ) 2. Insert line cord through one of the 3/16" grommets. Split the line cord back 2" and tie a knot for strain relief. Strip ¼" insulation from both leads and pre-tin. Insert leads into holes 23 and 24 and solder.

( ) 3. Insert one diode into hole 12 with red end up and solder. Insert other lead (red end) into hole 13 and solder.

( ) 4. Insert other diode into hole 11 with red end up and solder. Insert other lead (red end) into hole 10 and solder.

( ) 5. Insert 100 ohm resistor into holes 14 and 15 and solder. Resistor should stand up over hole 14.

( ) 6. Insert 47 ohm resistor into holes 5 and 6 and solder. Resistor should stand up over hole 6.

( ) 7. Mount one #49 pilot lamp as follows:
Solder a ½" piece of scrap diode lead to copper side of PC board crossing over the center of hole 16. See Fig. 1 and picture for correct location. Center #49 pilot lamp over hole 16. Pilot bulb should stand in a vertical position. While pressing bulb firmly against board quickly solder the center terminal of bulb to the wire lead previously installed. Avoid heating the bulb too much as heat can damage the filament. Insert a small piece of scrap resistor lead in hole 2 and solder. Bend this lead over against the base of the bulb and solder. See picture.

( ) 8. Mount the other #49 pilot lamp in the same manner. Solder a ½" piece of scrap diode lead on the copper side

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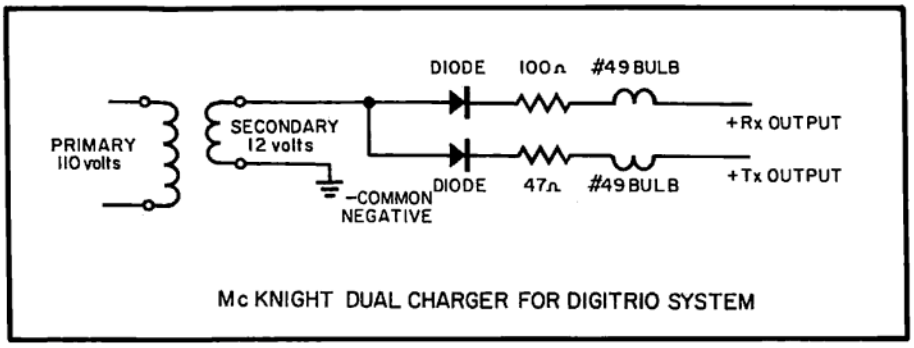
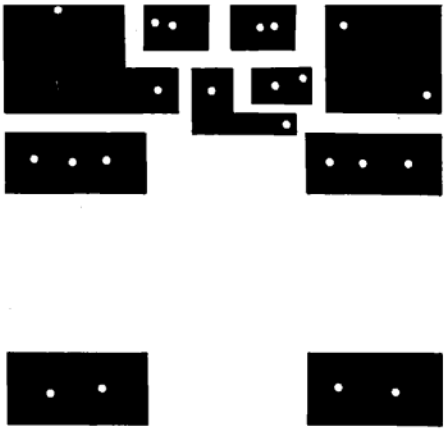
RCM Technical Editor's Note: *The charge rates for the McKnight charger were measured at 20-25 mah. This is adequate for extended charging, but a higher rate is recommended for the standard practice of overnight charging. I recommend 30-35 mah as the minimum charging rate. This can be obtained by reducing the 100 ohm receiver battery series limiting resistor to 47 ohms, and replacing the 47 ohm transmitter battery series limiting resistor with a length of resistor lead. This change will cost you nothing if you're building from the Controlaire kit since the necessary material is supplied.*



Mc KNIGHT DUAL CHARGER FOR DIGITRIO SYSTEM



Charger schematic shown above. Full size printed circuit board at left.

of the PC board crossing over hole 9. Center the #49 pilot lamp over the hole and while pressing the bulb firmly against the board quickly solder the center terminal of the bulb to the wire lead. Insert a piece of scrap resistor lead in hole 7 and solder. Bend this lead over against the base of the bulb and solder. See picture.

( ) 9. Cut two 18" lengths of black insulated wire. Strip ¼" insulation from one end of each wire. Insert these two black leads into holes 17 and 18 and solder.

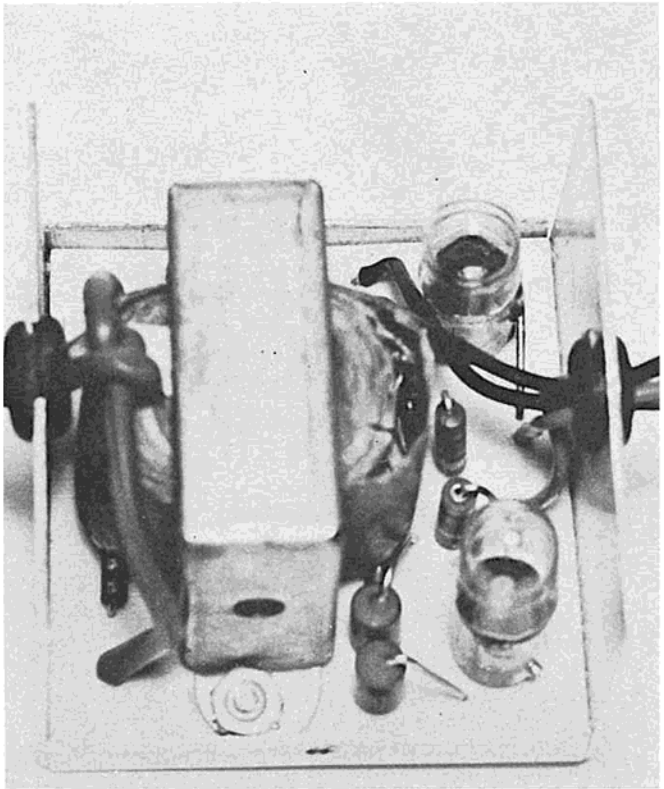
( ) 10. Cut two 18" lengths of red insulated wire. Strip ¼" insulation from one end of each wire. Insert these two red leads into holes 3 and 4 and solder.

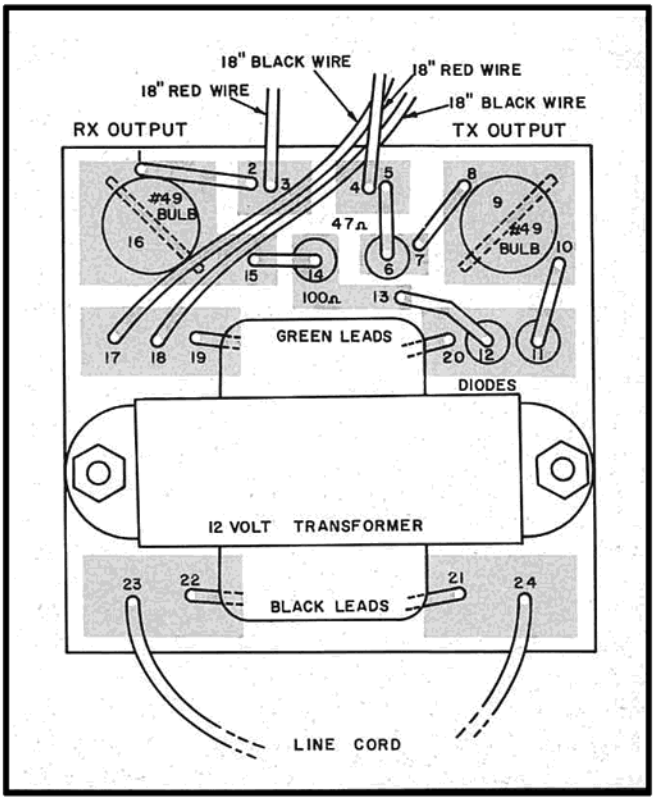
( ) 11. MOUNTING CHARGER INTO CASE: Insert ¼" grommet into hole in end of case bottom. Lay the insulator sheet in bottom of case. Remove the 4-40 x ⅜" bolts and nuts holding the transformer to the PC board. Insert charger into case with the red and black leads threaded through the ¼" grommet. The line cord and grommet should slide over the notch in the end of the case. Insert the 4-40 x ⅜" bolts through the bottom of the case, through the insulator sheet, PC board and transformer mounting tabs. Bolt firmly together with 4-40 lock nuts.

( ) 12. RECEIVER OUTPUT: Take the black lead from hole 17 and the red lead from hole 3. Twist these two leads together to form a cable. Cut the leads so that the red lead is ¾" longer than the black lead. Strip the Black lead back 3/16" and the Red lead should be stripped back ⅝". Pre-tin these leads. Insert the Red lead through the center pin of the phone plug and solder. Solder the Black lead to the outside terminal of the phone plug. Push rubber cap down over the phone plug. The phone jack should be connected to the battery pack. The center terminal (red lead) should be connected to the plus end of the battery pack. The side terminal (black lead) should be connected to the minus end of the battery pack.

( ) 13. Transmitter output: Take the black lead from hole 18 and the red lead from hole 4. Twist these two leads together to form the other output cable. Cut the leads so that the red lead is ¾" longer than the

(Continued on Page 45)





MICRO-AVIONICS PROPORTIONAL SYSTEM

BY ED THOMPSON
RCM Technical Editor

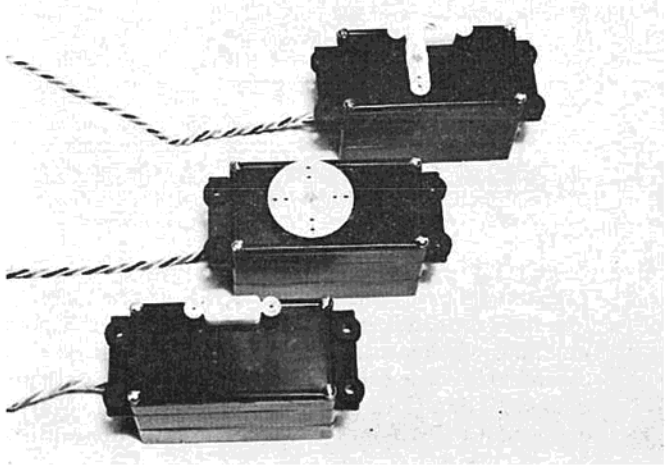
WHAT makes one proportional system different from another? How about personality? How can a bunch of electronic parts have personality? Easy! Have you ever seen two Senior Falcons built by different people that looked identical? Have you ever seen two models painted or flight trimmed exactly the same?

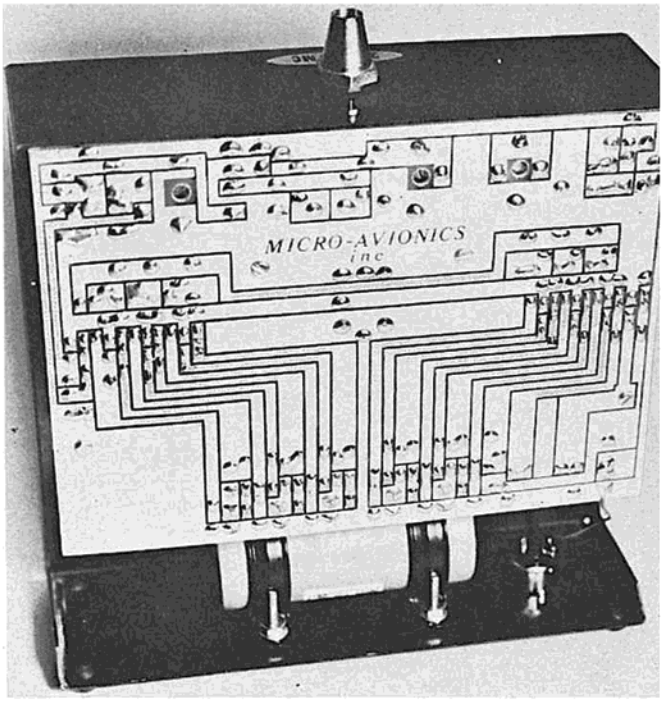
This also holds true with proportional systems. They all basically work in the same manner but some are smoother than others; some have a different feel on the control sticks; while still others give the owner more confidence while flying. Does this sound like a crazy approach to a product report? Not at all! The Micro-Avionics system does indeed have its own personality. This personality starts with the control stick assemblies and ends in the servos. Throughout this entire system, there are some personal touches and unique circuitry. Top quality is there also but it is not a design feature; it is simply a by-product of two of the leading and most experienced proportional designers in the field, Don Mathes and Doug Spreng. Reliability does not come easy to any designer — it must be sought after diligently, with countless hours of application and testing before the final selection is made. Mathes and Spreng have, apparently, utilized some of the best circuits available today.

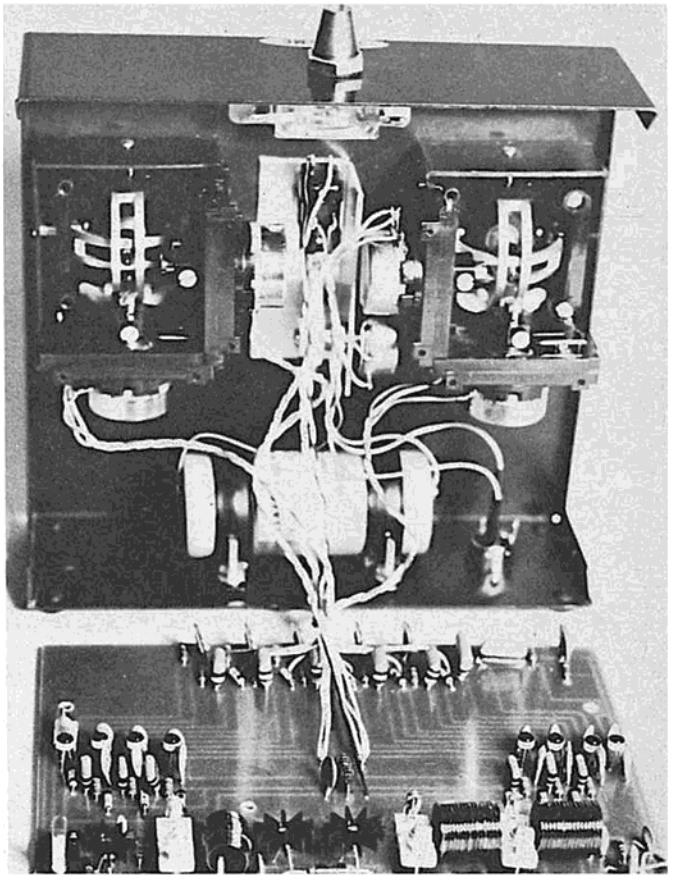
I visited Micro-Avionics in connection with this product report in order to get better understanding of how this system is constructed. One portion of the shop that I was especially interested in was the assembly section which is supervised by Dorothy Mathes. Dorothy

The Micro-Avionics receiver-decoder viewed from base of PC board.

The Micro-Avionics servo allows a choice of outputs as illustrated below.







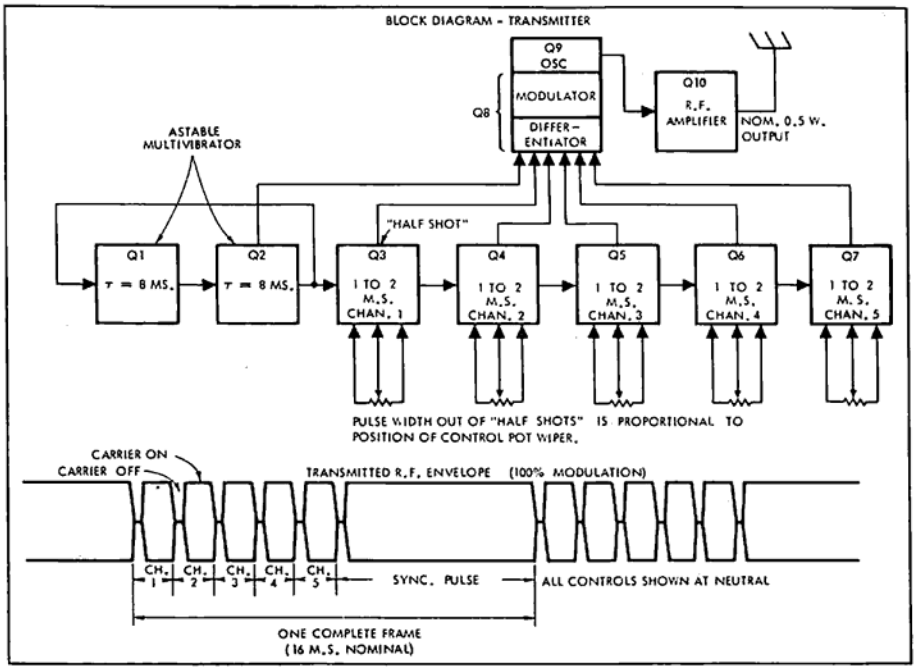
Above: back cover removed from the Micro-Avionics transmitter. Nickel cadmium power supply mounted on base beneath printed circuit board. Right: PC board dropped to reveal the digital coder and RF section. A minimum number of components on PC board. Photo shows rear view of unique stick assemblies.

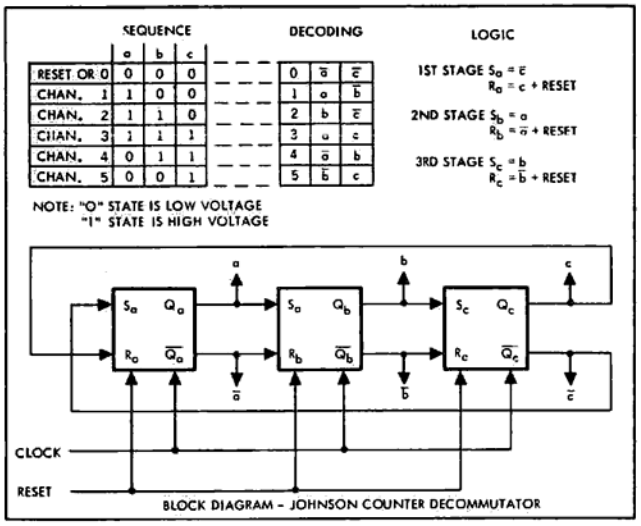
was busily engaged in final assembly checkout, destined for worldwide export. Her inspection techniques reminded me of the way that my wife checks my bank statement each month — she didn't miss a thing! From the assembly section, all equipment goes directly to Don Mathes for a personal checkout. After he is completely satisfied with a system, it is given full charge before packaging for shipment. If Don is not completely satisfied with a system he sends it to the service department where it is checked and necessary adjustments are made. It is then placed at the tail end of the assembly line where it is completely rechecked before arriving in front of Don again for his final approval. I might add here that Don's service department is complete, with some of the finest test equipment and supervised by Mr. Darrel Yonkers, who is also one of the top technicians in the field.

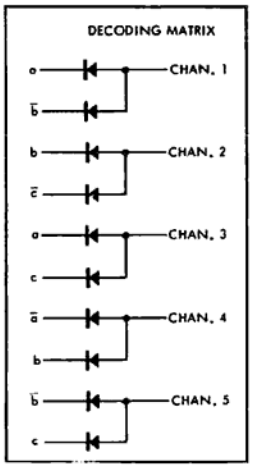
GENERAL DESCRIPTION

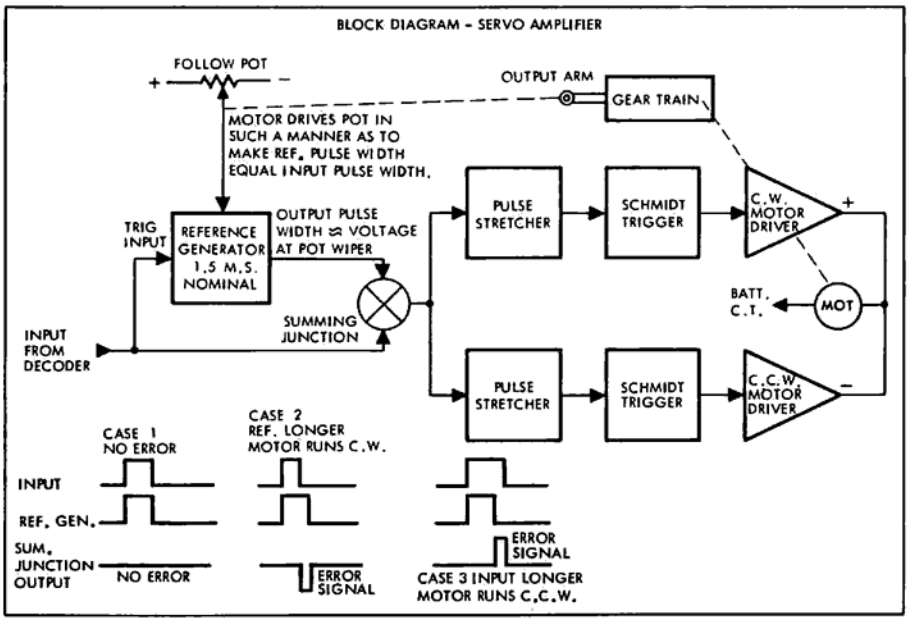
The Micro-Avionics system uses digital technique for control of five independent, fully proportional channels. The transmitter continuously sends six pulses followed by a sync pause at a nominal 16 MS frame rate. The transmitted signal is processed through a superhet receiver using a double tuned input for increased selectivity and better image rejection. The decoder separates the six transmitted pulses into five control pulses of discreet, controllable width. The servos measure their respective incoming pulse, compare it with their own reference generators and run to the position to which they are commanded. The first impression that I got from looking at the transmitter was the exceptional quality of the control stick assemblies. The second impression was the functional grouping of the trim levers, off/on switch and meter.

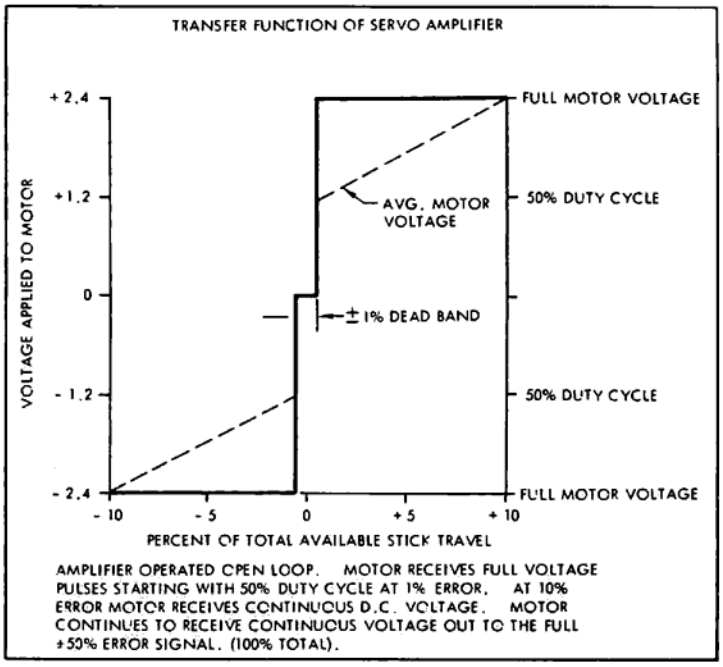
The overall appearance of this transmitter that gave me a peculiar feeling for quite a while — I couldn't describe it, but I knew there was something wrong! After staring at it intently for about an hour, it finally dawned on me. There were no exposed screwheads on the face of the transmitter except the stick assembly! This brought a question to my mind as to how many hours Don spent eliminating them and how many methods he tried to hold the back cover on before conceding that screws were the best method. This is one of the few transmitters I have seen that looks almost as good inside as it does outside. In order to see the internal construction of the transmitter, it is necessary to drop the P.C. board and I would not advise this, so I have included a picture show-











ing the internal construction details. Here is the first indication of the personality I referred to earlier.

The control sticks were designed by Don Mathes and as you can see, support the P.C. board in sort of a sub-chassis configuration. The aluminum sheet, running across the transmitter at the top of the stick assemblies, is used to shield the RF portion of the transmitter from the remaining circuitry. Don now uses a round nicad battery pack built by General Electric instead of the rectangular packs previously employed, feeling that they offer improved reliability. All components in the transmitter were selected for their long-term stability and trouble-free operation. The antenna connector is an improvement over the single contact microphone type. The antenna is screwed down into this connector, giving rigid antenna support and a large surface area contact providing excellent electrical bonding.

The transmitter encoder uses a multivibrator clock and a single transistor per stage for the controllable outputs. Each information channel is variable from 1 to 2 MS with a 1.5 MS nominal width with control stick centered. The output of each of the encoder stages is fed to a differentiating circuit which causes the modulator to turn the oscillator off for approximately 200 MS. The RF section is straight-forward using a two stage oscillator/power amplifier configuration of proven design. The transmitter feeds a base-loaded whip antenna and the panel meter indicates relative rectified RF voltage.

RECEIVER

There is not much to say about the receiver except that it is a straight-forward superhet type employing AGC. The receiver is electrically decoupled throughout for maximum stability and is fully temperature compensated. As mentioned before it uses a double-tuned RF input which is now becoming stand-

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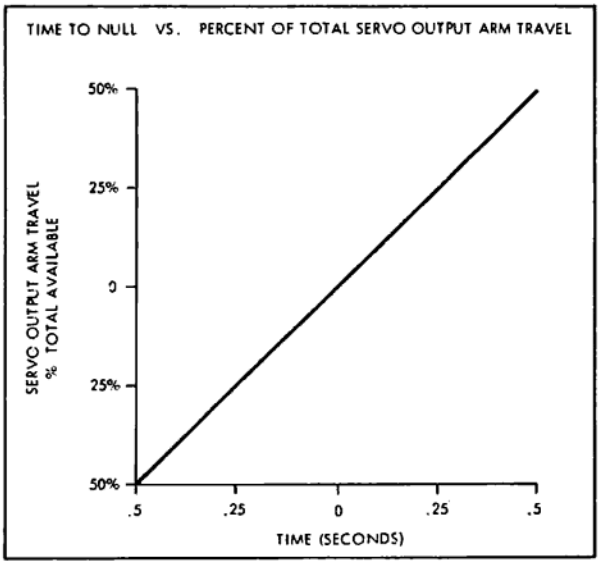
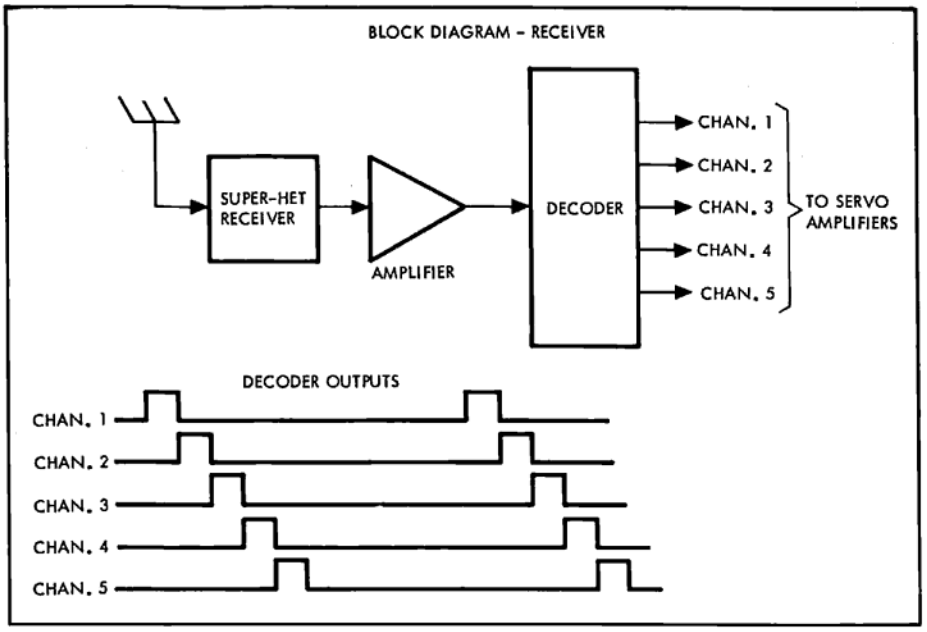




PRODUCT REPORT

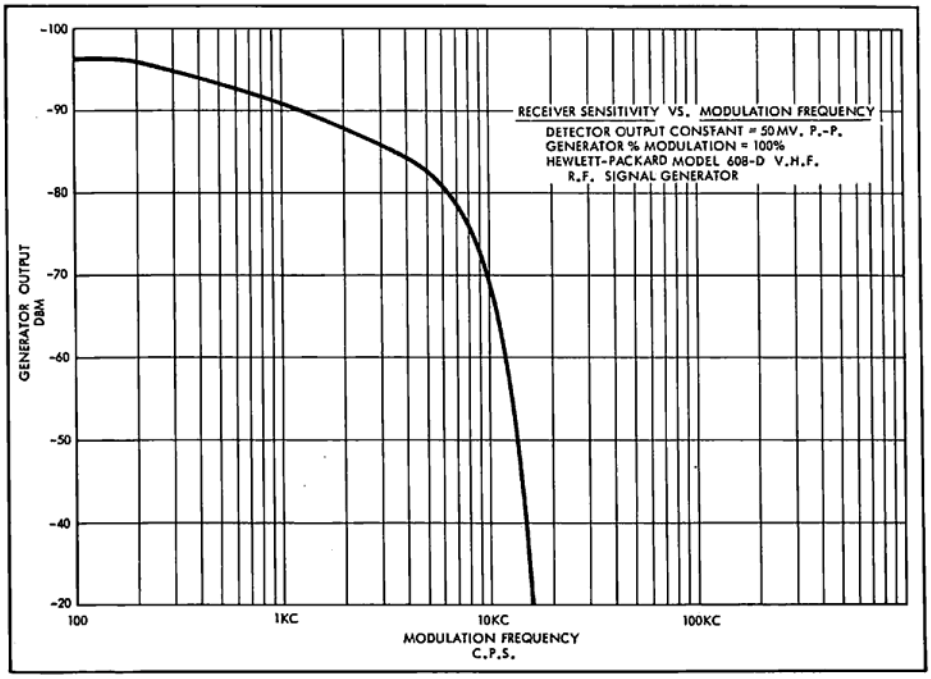
(Continued from Page 43)

ard on most of the digital systems which do not use an RF amplifier stage. The received information, after detection, is processed through a two-stage amplifier system and applied to the decoder. The decoder uses one transistor as a sync separator and logic driver. The logic portion of the decoder is a Johnson counter decommutator using six transistors. The decoder sorts out the six incoming pulses and separates them into five separate outputs. During the sync pause the syncronizing circuit checks the condition of the decoder and syncs it, if necessary, to accept the next incoming pulse train in its proper order. Here Don has chosen a circuit requiring a minimum of parts for increased reliability. This arrangement uses only two matrix diodes per stage as opposed to three diodes per stage in a more conventional modulo-type circuit configuration. The receiver is of the single-deck type construction and the case is a conventional heavy chassis, thin cover type. The method of mounting the P.C. board is unique as it uses no screws. It is a notch and slot type mounting arrangement which allows easy access and Don feels it offers superior crash damage resistance.

SERVOS

The servo circuitry is of the single-deck construction, using the Orbit servo mechanism. The servo uses the standard reference generator, input amplifier, Schmidt trigger and motor driver stages. Here, again, Don has applied some unique circuitry. The incoming pulse comparison takes place in a passive resistor summing setwork, the output of which drives a positive or negative amplifier of a center-tapped configuration. The reference generator is electrically decoupled from the rest of the servo amplifier for maximum stability, and a unique diode-protection circuit affords adequate insurance against both halves of the servo amplifier conducting simultaneously. The result is a stable, reliable, silky-smooth, quiet, powerful servo.

The servos have a molded nylon case and gears. It employs a rotary-type mechanism using a standard potentiometer element. This pot is of the hot, molded type and is not subject to the normal scraping deterioration found in the cheaper deposited-type pot elements. This arrangement also allows the servo to be electrically centered during manufacture simply by rotating the pot mechanically to the desired position. In addition to the normal rotary output a rack-type gear is used to provide linear output as well. There is also a lever-type output available simply by substituting a lever for the rotary disc. The servo is delivered with necessary parts to allow any of the three outputs desired.



FLYING EVALUATION

Upon receiving the Micro-Avionics gear, I unpacked all the equipment, read the instruction book, plugged everything together and played with it for about two hours. I decided not to take anything apart for a "look-see" until I had flown it. Not having an aircraft available at the time, I took it to the flying site the following Sunday to perform a ground-range check and to see how the system reacted in the presence of transmitters on the other R/C frequencies. Everything checked out well and George Sing offered to install it in a Cherokee which was donated by Bill Rosebury. The following two weekends, I put approximately thirty flawless flights on the system and then experienced some trouble with the transmitter battery pack. I shipped the equipment back to Don and he installed a new transmitter battery pack made by General Electric which he feels is more reliable. The equipment is very smooth in operation and the stick assemblies afford a positive feel. To make a long story short, the equipment works well, and in my opinion is one of the best systems on the market.

CONCLUSION

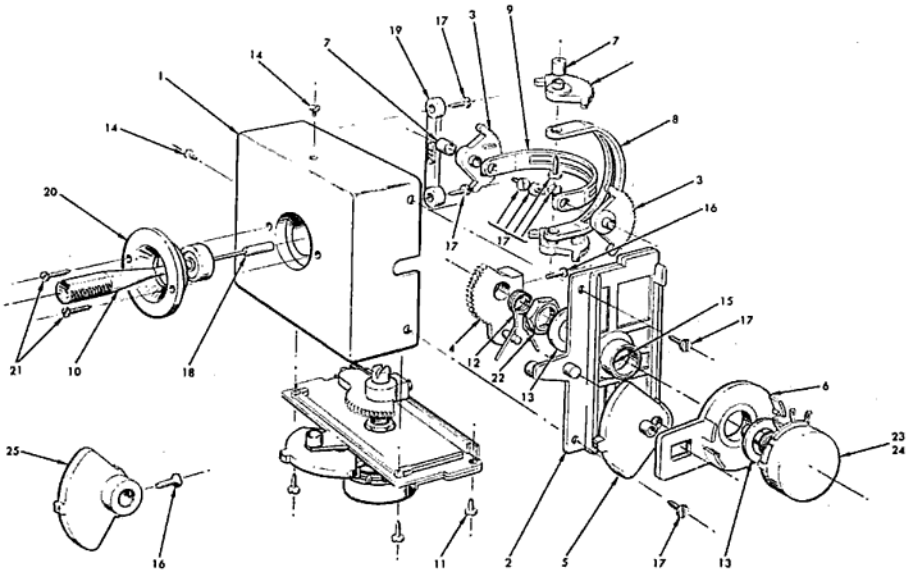
Don is offering his stick assembly for sale separately and as I have stated before, it is exceptionally well designed and manufactured. I have enclosed an exploded view of the stick.

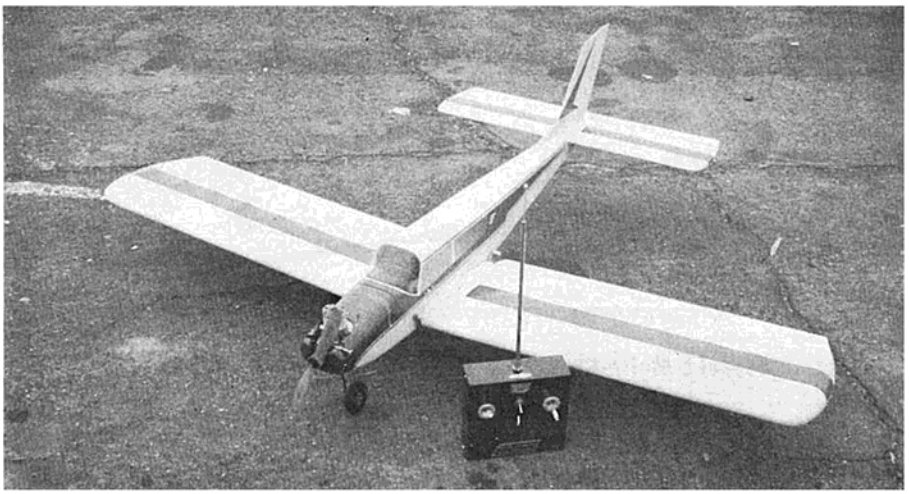
The servo output direction can be reversed very simply by the average modeler and instructions are given to do this in the manual supplied with the equipment. The instruction book itself is undoubtedly one of the finest that I have seen for a person who wants to know what goes on inside the little boxes which he has just purchased.

I have checked the equipment specifications and find them to equal, and in some cases, exceed those claimed. The

PARTS LIST
FOR
MICRO-AVIONICS STICK ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION OF PART	NO. REQD.
	9000	STICK ASSEMBLY COMPLETE	
1	9001	MAIN HOUSING	1
2	9002	SIDE PLATE	2
3	9003	GIMBLE GEAR	2
4	9004	POT GEAR	2
5	9005	TRIM LEVER	2
6	9006	TRANSFER FUNCTION LEVER	2
7	9007	GIMBAL BEARING	2
8	9008	GIMBAL - OUTSIDE	1
9	9009	GIMBAL - INSIDE	1
10	90010	CONTROL STICK WITH BEARING	1
11	90011	#2 x 1/4" PK SCREW	1
12	90012	CENTERING SPRING	2
13	90013	POT WASHER	4
14	90014	2-56 x 1/4" SCREW	2
15	90015	POT BEARING	2
16	90016	4-40 x 5/16" SCREW	3
17	90017	#4 x 1/4" PK SCREW	10
18	90018	STICK BUSHING, NYLON	1
19	90019	ENGINE CONTROL RATCHET	1
20	90020	FACE PLATE	1
21	90021	MOUNTING SCREW	2
22	90022	NUT, POT	2
23	90023	POT 4K	2
24	90024	POT 10K	
25	90025	AUXILIARY LEVER	





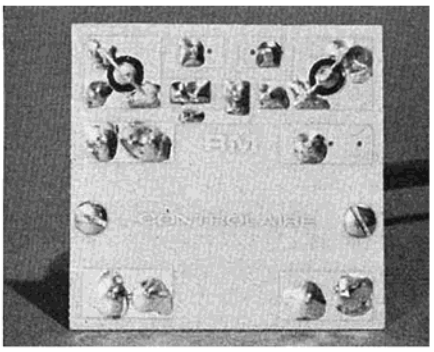
RCM's test ship, a VK Cherokee built from the kit, used during flight test evaluations of the Micro-Avionics proportional system.

battery chargers provided, are of the transformer-less type and care should be exercised while using them to prevent electrical "shock." Their use is covered in the manual and should be followed. Basically battery connectors should not be handled while the chargers are connected to an AC outlet. In other words, connect the chargers to the equipment before plugging the charger into the AC outlet and disconnect the charger from the AC outlet before unplugging the equipment.

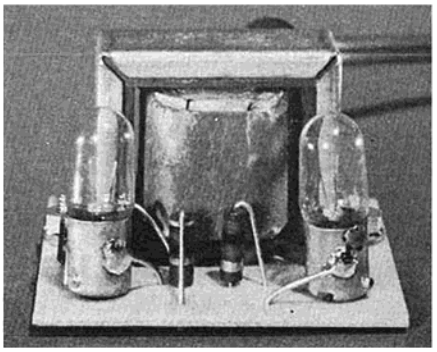
This equipment has been tested, approved, and recommended by R/C Modeler magazine.

DIGITRIO CHARGER

(Continued from Page 40)



Bottom view of PC board showing center terminals of pilot lamps soldered to diagonal wires.



Top view of PC board showing installation of wires soldered to base of pilot lamps.

Black lead. Strip the black lead back 3/16" and the red lead should be stripped back 5/8". Pre-tin these leads. Insert the end of the cable through the remaining rubber cap. Insert the red lead through the center pin of the phone plug and solder. Solder the black lead to the outside terminal of the phone plug and push the rubber cap down over the phone plug. Wire the phone jack in your transmitter so that the center terminal is plus and the outside terminal, or case, is negative.

( ) 14. Install top lid and secure with two #6 x 1/4" sheetmetal screws. Charger is now ready for use. NOTE: The receiver and transmitter charging plugs should be marked so that you will be able to identify them.

Operation

Connect charger plugs to both transmitter and receiver batteries before 110 volt AC plug is installed into wall socket. 500 MAH cells should be charged 24 to 30 hours when new. After this and before each day's use, a recharge of 20 hours will keep them in top condition. Recharge time depends upon previous use. If you are in doubt, charge for 24 hours.

RCM salutes the SHARKS — RC'ers of Shreveport, La.

THE CLUB . . .
24 members fly all types, all categories — propo gear predominates.

THE LADIES . . .
take an active interest — make flying and club activities a family affair.

THEY WORK . . .
despite chilled air and 35 mph wind mowing detail gets helpful advic and direction in preparing new fly ing site.

THEY FLY . . .
J. D. Alexander and wife, Martha, typify club's family flying teams. Ship is "Snoopy" — John's original and club's pride and joy. It flies with surprising grace and ease — proves beginners can still create their own.

and THEY FLY . . .

Below, Keith McCoy, club president, winds new Falcon. Most members like kits. Right, Martha Beason, newsletter gal, puts in a share of flying with Royal Coachman and Orbit 3+1.

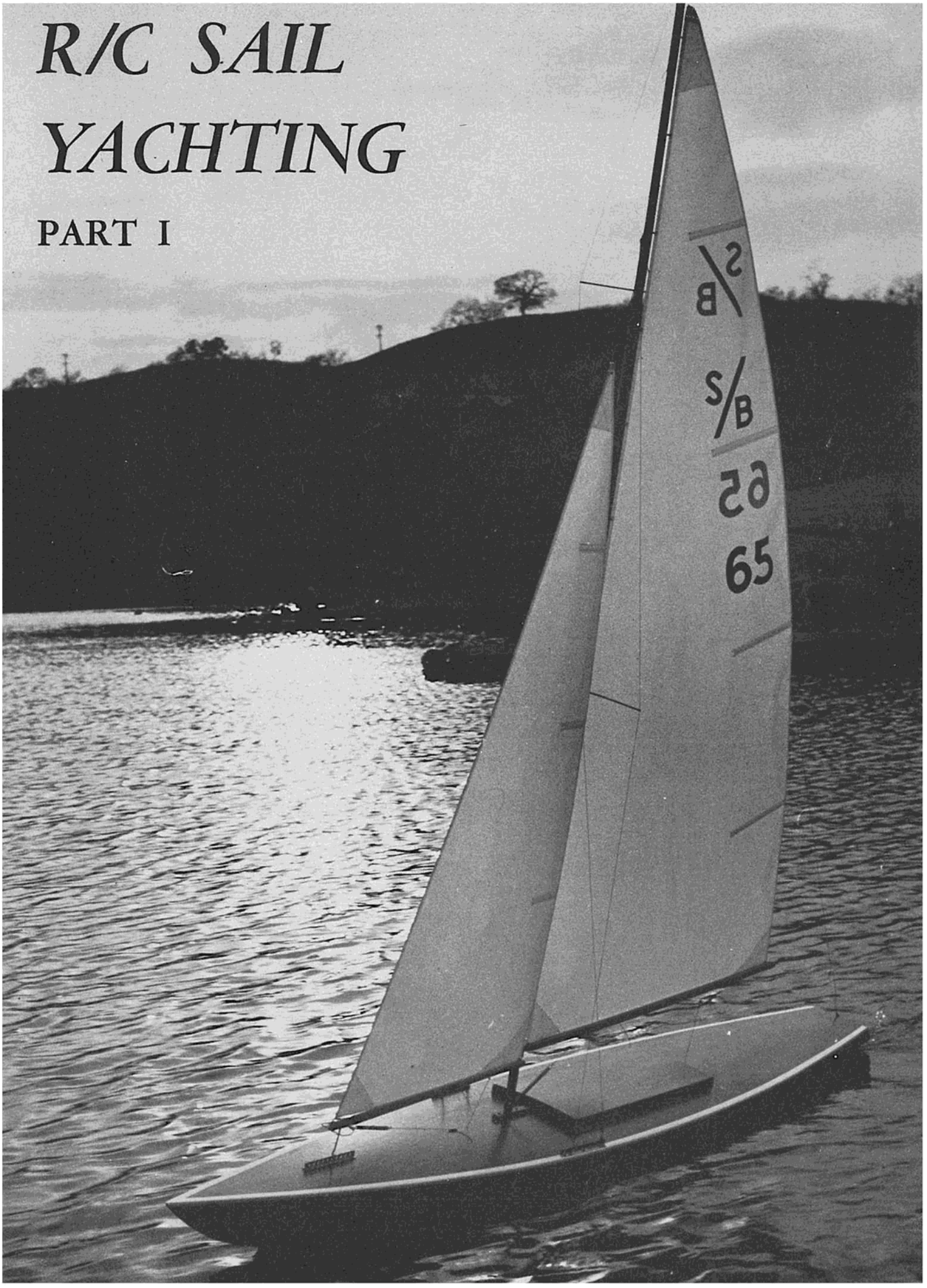
-and, THEY COLLECT TROPHIES . . .

"RC WIFE of the YEAR"
1966
MARTHA BEASON

Recognizing that wives fill an essential role in R/C — a predominantly male hobby/sport — RCM happily presents its first annual *R/C WIFE of the YEAR* award to Martha Beason of the Shreveport, La. SHARKS. Martha's entertaining and original newsletter, as well as active participation in flying activities, reflect the outstanding feminine charm and leadership that inspires and sustains the SHARKS and helped bring awareness of the club's record. Wife to expert multi flier, Larry Beason—an Air Force major—and mother of three boys (Doug, Chuck, and Jim-bo), Martha is also an enthusiastic model builder who often advises and encourages wives to actively help their husbands. "Only don't stir paint dope with their best files!" Martha cautions.

R/C SAIL YACHTING

PART I



Roger Grigsby, left, and Tom Protheroe, pose beside Grigsby's SB2, the Halycon. Both are top yachtsmen as well as proficient multi fliers. Roger manufactures the Halycon 5-channel servo, while Tom is the designer of the Santa Barbara One Design chosen for this series of articles. Size of boat is indicated by the fact that both men are about six feet tall.

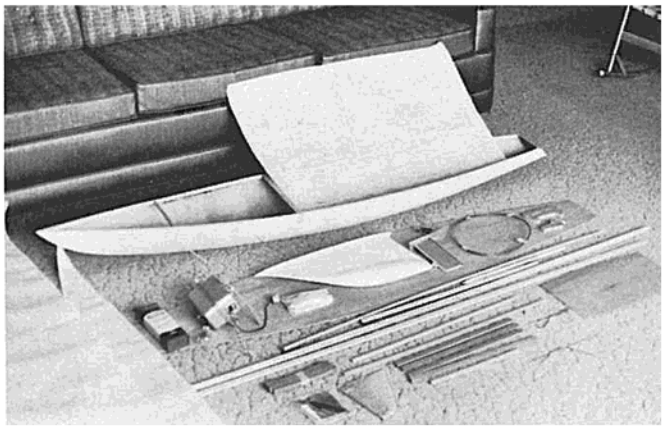
First of a three-part series on one of the most challenging and rewarding phases of radio control — building and racing an R/C sail yacht.

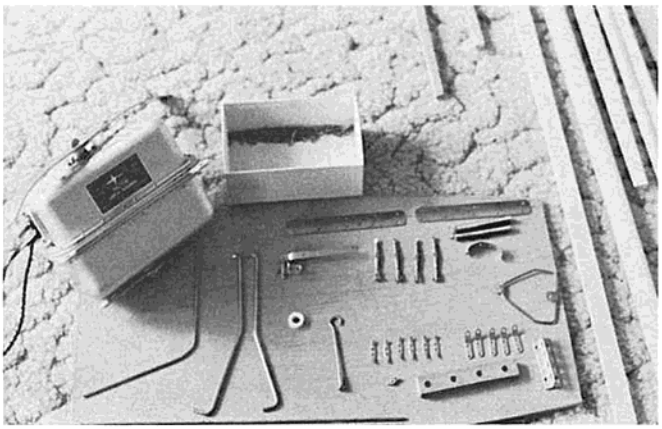
DUE to the somewhat phenomenal number of requests that we have received at RCM for additional information on building and racing RC model sail yachts, we are commencing, this month, a two part series on this exciting and challenging phase of radio control. In preparation for this two-part article, the editors of RCM have built and sailed all three of the commercially available RC sail yachts. Since there is a wide latitude between the amount of work necessary to complete these various boats and a corresponding difference in the price of the completed yacht, we have tried to effect a compromise between the three, and have selected for this series, the Santa Barbara One Design manufactured by Tom Protheroe, P.O. Box 3772, Santa Barbara, California.

Introduced in the summer of 1964 as a complete kit with molded fiber-glass hull and keel, mahogany plywood deck, spruce spars, dacron sails, and all necessary brass fittings and hardware, the S/B One Design fleet has grown to number over 65 yachts, represented in every corner of the United States, including Hawaii, and in South America as well. Inquiries continue to come in from distant points in the Hemisphere, such as Bermuda, Mexico City, Ecuador, and the Philippines. Colonel C. F. Bowden, patron saint of model yachting in Great Britain, has expressed an intention to feature the design in his latest book on the subject, believing as does Tom Protheroe, in the virtues of a light displacement hull design.

No stranger to one-design yachting, Tom has owned and raced full-scale boats such as the Star and Geary 18 classes, rising to the championship in the vane-steered, free-running "V" class of model sail yachts as a protege of the late Gus Lassel, one of the most influential, energetic proponents of model yachting this country has known. Lessons learned from the "V" class led to the development of the larger, more controllable, S/B One Design.

An interesting sidelight is that Tom, as well as the majority of the yacht skippers in the Santa Barbara area, are all active multi, Class III fliers. Why the interest, then, in R/C sail yachting? All we can say is that you'll have to try it for yourself in order to find out. No one can aptly describe the grace . . . the





RCM's Santa Barbara One-Design, SB65, as received includes fibreglass hull, keel, mahogany decking, masts and booms, hardware, fittings, and finished sails. Closeup photo shows Halycon servo, brass fittings.

thrills, and the challenge of this aspect of our hobby. You can learn to successfully control your boat in less than ten minutes. You can "solo" the first time out. But to learn the intracacies of competition racing with these 7½ foot tall boats, maneuvering for position in the choppy water with but a scant few inches between their hulls, is an art that is just as challenging as becoming a competition flier in the flying classes. As we mentioned, it's something you won't believe until you try it for yourself. As "dyed-in-the-wool" fliers, ourselves, we had to be shown!

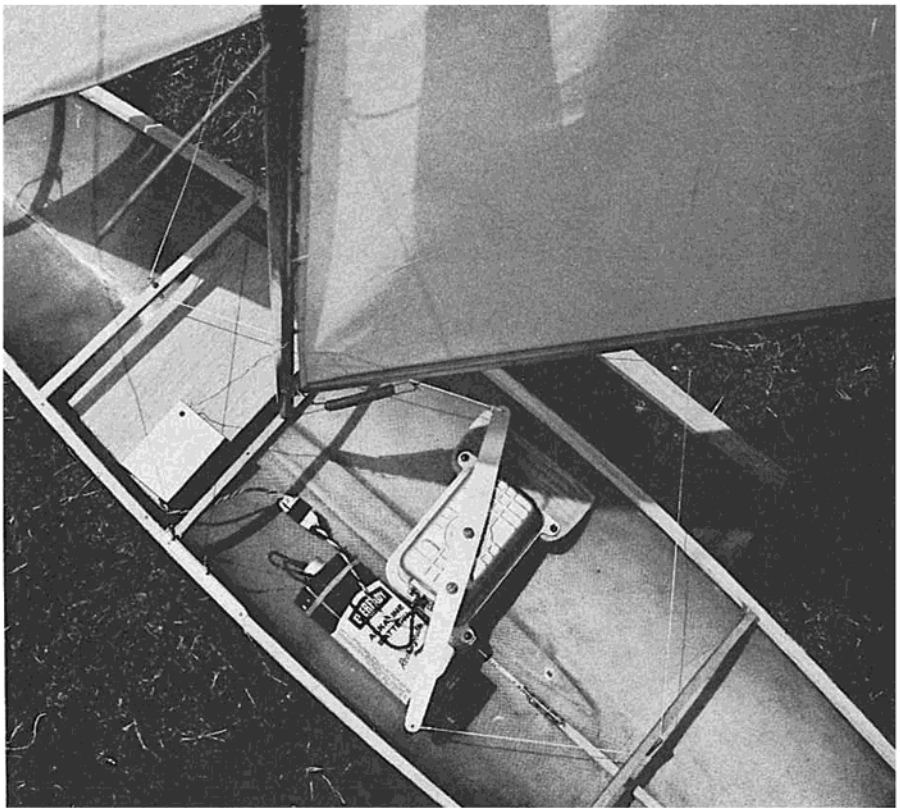
The S/B One Design is available in several kit configurations. The complete kit with ready-made sails lists for just under $70. From this point, it can be obtained complete with a sail kit, or without sails, without sails and fittings, or simply with just the fiberglass hull, keel, plans, and building instructions. The price of the latter is $32.50, with the other choices falling in between insofar as price is concerned. For our prototype, we selected the complete kit, consisting of a beautiful fibreglass hull, hand laid up, and with wood sheerstrips and mahogany transom installed. The keel is a separate, hollow fibreglass unit with keel bolts installed, and ready for installation in a recess in the bottom of the hull for proper alignment. The deck and hatch framing is of mahogany. The sails are of top grade dacron, complete with top quality brass fittings including the mast head fitting, stainless steel rigging wire, model maker nails, spreader bars, pulley block, jib sheet tensioner, mast tangs, chain plates, screw eyes, spring, turnbuckles, mast step, jib rack, screws, gooseneck, cleats, and bowser. Included with the sails are the S/B emblems and your S/B One Design registration number (in our case, S/B 65).

There are various methods of controlling the mainsail, jib, and rudder on model sail yachts. Before getting into the actual construction of the boat, here are the control units used in our prototype:

The radio system consisted of a Controlaire six channel receiver and transmitter. A Halycon servo, manufactured by Halycon of Santa Barbara, P. O. Box 64, Goleta, California, was used for control of the sails and rudder. This is 5-channel, simultaneous, dual output, relayless device which was developed in

(Continued on Page **51***)*

Fibreglass hull with framing, servo mount, and servo in place. Right: photo of SB2 illustrates simple installation of servo with sail arm attached, receiver, and alkaline battery.



RCM's completed SB65 on its shakedown cruise. Fibreglass hull is finished with orange Poly-Aqua epoxy paint. Deck is natural mahogany sprayed with several coats of Rez. Mast and booms also natural finished with clear Rez.

R/C SAIL YACHTS

(Continued from Page **50** *)*

conjunction with the S/B One Design model sailing yacht to provide an efficient means of trimming rudder and sails in racing competition. Tapped batteries or separate voltage sources are not required with this unit, and the entire voltage supply of 7-10 volts is used to drive the motors. A transistorized voltage regulator has been incorporated which supplies filtered, regulated 6V DC power to operate the receiver. In order to provide the highest reliability and efficiency, silicon semiconductors are used extensively. Two permanent magnet motors with 1950:1 ratio gear reductions, plus all of the electronic circuitry are enclosed within the watertight, anodized aluminum case. An on-off toggle switch is also built in. A 12" sail arm and a 2" rudder arm with teflon bushings are included. The sail arm is positionable through 170 degrees of travel, and rudder is positionable through 75 degrees with selective neutral. The simple rigging arrangement avoids backlash and fouling which are usually encountered with winches, reels, chains, etc. Travel time for sail is approximately 7 seconds with a 7.5 volt supply, and for rudder, 3 seconds stop to stop.

A 7.5 volt, rechargeable alkaline battery of 2 amp/hours capacity is also available from Halycon, and was used in RCM's prototype. Operating current drain of the servo, per motor, is 100 ma minimum (unloaded) and 1 ampere maximum (stalled) on a 7.5 volt supply. Motors will drive with input signal levels as low as .5 milliamp. Basic unit weight is 32 ounces, and with battery, totals 57 ounces. Servo price complete with mounting hardware is $49.95 with an additional $8 for the battery.

While on the subject of batteries, the Eveready alkaline secondary batteries are a unique new rechargeable power source. They use a new electrochemical system and are maintenance free, hermetically sealed, and will operate in any position. These batteries have discharge characteristics similar to primary batteries. The voltage slowly decreases as power is withdrawn from the battery. The total voltage drop for a given power withdrawal increases as the number of charge and discharge cycles increases.

When one of these new alkaline secondary batteries is discharged for 4 hrs. at the max. recommended discharge current and then recharged for 10 hrs. at the recommended charging current, the complete discharge and charge cycle can be repeated approximately 50 times before the battery will fall below .9 volts per cell in any 4 hr. discharge period. Decreasing either the discharge current or the total ampere hour withdrawal will increase the cycle life of the battery more than proportionately.

Proper charging must be based on ampere-hour control or time methods. Maximum recommended discharge current is 500 milliamperes. Recommended charge rate is 250 milliamperes for 10 hours. Overcharging is not critical, but should be held to a minimum.

New batteries are shipped fully charged and **must be used before charging.** Battery must not be discharged completely. During deep discharges, a secondary electro-chemical reaction takes place which will make it impossible to recharge. The voltage regulator in the Halcyon servo will preclude this because the battery will still be safe when its voltage drops below the regulator setting, causing erratic receiver operation. The skipper should heed this warning and recover his boat immediately, recharging the battery before any

further operations are attempted.

Constructing the S/B One Design

Fiberglass cloth, cut into fine pieces and mixed with resin (known as "goop"), is used to fasten the following items:

Deck beams and risers
Deck stringer
Keel and skeg
Rudder shaft log and thwart
Servo, battery and receiver mounts

Weldwood glue is used for the deck and hatch construction.

Begin construction by cutting deck beams to correct length to acquire the specified beam measurement. Beam tolerance is + ¼ in. Install the beams with catalyzed goop and allow to cure.

Secure the rudder blade to its shaft with the two 1/16 in. dia. brass rods and resin or epoxy glue. Finish sand the rudder and coat with resin or paint.

As received, the exterior surfaces of the hull and keel are coated with mold release which must be removed with soap and water. To achieve a better bond, sand the keel recess, plus a ¾ inch area around it, the keel fillet, and the skeg mounting area, with rough sandpaper. Drill ¼ in. dia. holes for the keel studs, ½ in. dia. ballast pour hole and ⅛ dia. vent hole in the keel recess of the hull. Attach keel with #10 nuts and goop, tightening the nuts just enough to pull the keel up snug. Check the keel for being plumb by measuring from the side of the hull to the center line of the keel. Before the goop cures, place a 1 in. wide strip of fiberglass cloth over the seams and smooth out the excess goop to help finish out the fillets.

Place the skeg in its slot, positioning the back edge even with the rudder shaft log hole. Coat both sides with goop, place a ¾ in. wide strip of cloth over the goop and work it out to a small fillet. Hold the skeg in precise alignment with the keel with a strip of masking tape stretched over the skeg to either side of the hull. When the resin has gelled to the consistency of wood, the excess should be trimmed off with a sharp knife.

With the hull inverted, slip the rudder shaft through the shaft log hole. Drill a 1/16 in. dia. hole in the skeg for the bottom bearing (1/16 in. dia. monel rod), and fasten the bearing to the skeg with epoxy glue or resin. Turn the hull right-side-up and slip the ¼ in. O.D. brass tube over the rudder shaft, and the thwart in turn, over the tube. Mount the rudder control horn with the 2 nuts and solder securely. Apply goop at ends of thwart, and around the shaft log at hull and thwart.

To obtain a constant deck crown, the deck crown template is used to provide the correct elevation for the deck stringer. It will be necessary to notch beams 1 & 4, and block up the stringer about ⅛ in. at beams 2 & 3. Secure stringer with goop, clamping in place until cured.

While holding the deck in place at bow and stern with a wood screw, mark the deck accurately around the hull. Remove the deck and trim to about 1/16 in. outside the marks with a small block plane. Mark the nail locations on the top side of the deck.

Spacing should be approximately 1½ in. Locate the nails in from the edge to where they will be driven down the center line of the sheer strip. It is advisable to predrill the deck with a small drill. Coat the sheer strips, deck stringer, and top edge of transom with Weldwood glue. Position the deck with the same 2 screws, hold it down with masking tape and secure with ⅜ in. long model maker nails.

The front edge of the hatch is positioned about 31 in. from the bow. Recommended size is 6½ in. wide by 14 in. long. Scribe the desired hatch outline on the deck. Trim the 2 end pieces so coaming sides will fit properly. Fasten the 2 crowned end pieces with two ½ in. long wood screws, (countersunk) and Weldwood glue. Screw the side pieces to the ends of the after coaming and add the 4 screws on each side in succession as the sides are bent around to meet the forward coaming.

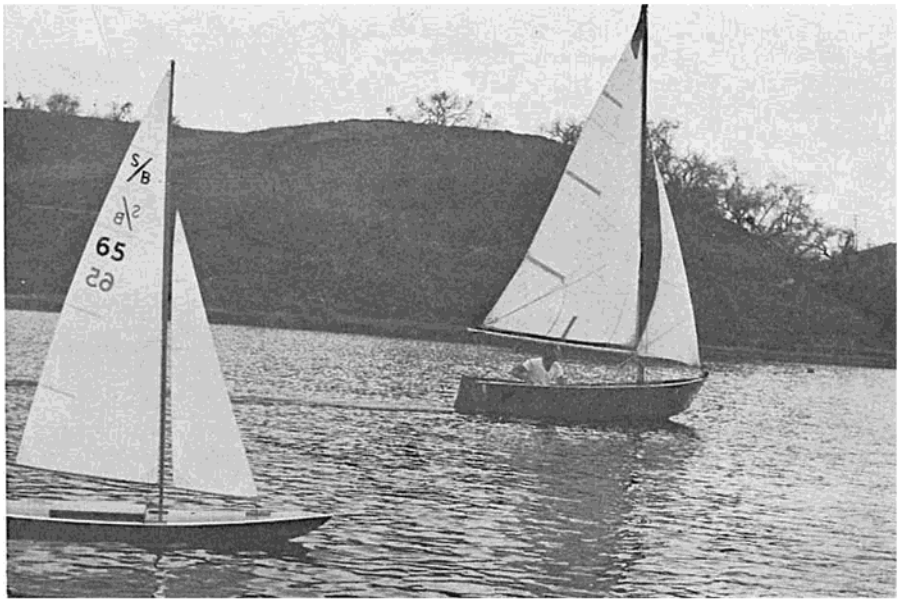
Clamp the end pieces of the hatch cover frame to the coaming ends. Screw the side pieces to the ends and fair off the top surface. Nail and glue the ⅛ in. plywood hatch cover cap in place in the same manner as the deck. Lift the cover and cut out the opening.

Sand and varnish the deck and hatch cover. It is recommended that 4 coats of varnish be applied, sanding well between coats. One coat of resin, well sanded and over-coated with 1 or 2 coats of varnish may also be used.

There are numerous finishes that may be used to paint the boat, and every builder has his preference. The majority of yachts have been finished with normal marine paints, consisting of 1 or 2 coats of undercoat, and 1 or 2 of enamel, applied with brush or spray. It is necessary to "rough-up" the slick plastic surface with sandpaper to insure a proper bond with any finish you apply. We used orange poly-aqua marine epoxy on the hull and clear varnish on the mahogany deck.

(Continued on Page **53***)*

RCM's Bill O'Brien sails alongside the SB65 during maiden cruise. On the shore, Chuck Waas controls the graceful craft via a Controlaire 6 transmitter. Left: The SB65 shows its style on a buoy turn in preparation for a forthcoming regatta in Santa Barbara, California.



RCM's completed SB65 on its shakedown cruise. Fibreglass hull is finished with orange Poly-Aqua epoxy paint. Deck is natural mahogany sprayed with several coats of Rez. Mast and booms also natural finished with clear Rez.

(Continued from Page **52***)*

After the undercoat has dried, the waterline may be marked. Invert the boat on a smooth surface and level with blocks. Measure 6 in. back from the point of the bow and 2 in. from the stern and mark these points on the boat center-line. Using a height gage, block the boat up fore and aft so that the marks are at the same elevation. With a soft pencil mounted on your height gage, mark the hull all the way around, mask and paint.

Shape and varnish mast and booms with at least 2 coats of spar varnish.

Drill 3/32 in. dia. holes in mast for the 2 spreaders. Slip the main spreader in place and solder on the tangs. The upper spreader is bent 90 degrees after soldering the tangs. Add the masthead fitting, cleats, screw eyes, goose-neck fitting and sail track wire. Starting 11 in. from the bottom of the mast, install 1/4 in. lg. round head wood screws spaced 6 in. apart to mount the sail track wire. Stretch the wire tight so that it will lay in the slots of the screw heads, and secure with a drop of solder.

Rig the top diamond with enough tension to throw a slight forward curve into the mast. When the jib and back stay are "set up" tight, the mast will be straight. Use a drop of solder at the ends of the spreaders to secure the wire as it passes through the saw slots.

Mount the deck fittings and finish rigging the mast on the boat. A ring bowser is used at the back stay to acquire a large scope of mast adjustment.

The jib stay runs through the hem on the leading edge of the jib and can be secured to the jib boom with a 1/2 in. lg. wood screw.

A nylon string is tied to the eye at the top of the wire, passed through the screw eye at the upper spreader, and secured to the lower cleat. A string is tied to the grommet at the top of the jib and fastened in the same manner. Secure the lower corners of the jib with nylon string tied through holes drilled in the ends of the boom. Drill a 1/8 in. dia. hole for the jib boom swivel and hook. The jib sheet tensioner is mounted as near the front end of the boom as possible. It must be able to pivot freely.

The traveler wire on the main boom must have just enough slack so that the block will not jam when the sail is all the way out. The main sail is lashed at the goose-neck fitting. A nylon string is tied to the back corner of the sail, passed through a small hole in the end of the boom, and secured to a cleat on the **side** of the boom. This will allow you to adjust the draught of the main.

Tie a nylon string to the head board and pass it through the hole in the masthead fitting next to the back stay, over the top and down through the forward hole and secure to the upper cleat.

Pour 12 to 14 lbs. of #8 or #9 bird shot into the keel and solidify with 4 oz. of resin. Use a cold mixture (small amount of catalyst), and pour no more than 2 oz. at a time. If too much "hot" resin is used, the heat generated in curing will distort the smooth sides of the keel. This will not hinder the sailing ability of the boat, but it will not enhance the looks either. The first pour should be allowed to cure over night before more resin is added.

Position the batteries and control actuator to affect static balance at the 37 inch measurement, keeping the weight as low as possible.

The mast is stepped in the aft position in light winds, and forward in strong winds. The jib boom should be out about 2 in. when the main boom is amidships.

To check sail balance for a particular wind velocity, sheet the sails in tight, rudder amidships. The yacht should sail into the wind at about 45 degrees or less, with the sails shaking slightly. If it heads up into the wind too sharply, move the mast forward, and if it bears off the wind (broadside), move the mast aft.

(Next month, Tuning the R/C Sail Yacht for Competition Racing.)

R/C

PRODUCTS BY

deBOLT

This second in a series of interviews with R/C manufacturers is with the man with the corncob pipe — a pioneer RC'er and top competitor who needs little introduction to the R/C sports world.

HAROLD deBolt, one of the most well-known personages in the R/C sports world, is also one of those rare individuals who has been able to successfully combine a hobby and business without one destroying the other. Many modelers who enter the industry on a full-time basis find that, even though they are still "modelers at heart," they no longer have time to actively participate in the hobby without sacrifice on the part of their business. "Pappy," a leading manufacturer as well as a top contender in competition circles, is living proof that this isn't necessarily a rule of the game!

A native New Yorker, deBolt began his modeling career in 1929 by attending a hobby class at a local YMCA. This led to an increased interest in model aviation and the formation of a high-school sponsored model club and then a larger group under the auspices of the American Legion. The latter group conducted a rubber powered contest with deBolt and another winner being sent to the 1933 Nationals at Akron, Ohio. Besides winning the event with an OOS flight with a single pusher, Hal had his first opportunity to watch the early masters of the gas powered model — Kovel, Grant, Zaic, and Bassett. Determined to follow in their footsteps, deBolt installed the club's first gas engine, a Brown Junior, in a scale model of a homebuilt aircraft of the period, and with $3.50 in his pocket, hitchhiked to a meet in Lakehurst, New Jersey to enter his first gas contest. The model stalled and crashed due to a tail-heavy C.G., and deBolt hitchhiked back the 300 miles to Geneva, N. Y.

Discouraged by this event, Hal began to enter rubber powered indoor and outdoor events, winning the regional indoor Junior Birdman eliminations in 1936 and attending the Birdman finals with seventeen other regional winners at San Antonio. At the latter event he finally stuck both of his models in the rafters after fourteen minutes duration! At the same Texas meet, deBolt learned to fly indoor hand launched gliders from the master, Wally Zimmers.

Several more gas models were built by deBolt without much success until a seven foot design, completely planked with 1/8" x 3/8" strip balsa, flew seven miles during a one hour duration flight. During a period of unemployment in 1938 he designed several "quicky" types which flew quite well. These "quickies" turned into the Blitzkrieg design which deBolt developed in Buffalo while working at Curtiss Aircraft. The design had a tremendous climb rate which made it a winner over the slower models of the time. In their final season, Hal lost seven of them to the thermals!

The next design was the first real attempt to reduce drag in a free flight model. The Thunderbolt series featured retractable gear and spoilers — in 1938! One was built for every class of free flight event and not one was ever lost! deBolt's contest strategy consisted of waiting for the first OOS flight of the meet, at which point he would check the time recorded. The spoilers on his Thunderbolt were then set for just a bit longer than the recorded time. The system worked well with the models averaging over four minutes in dead air.

After helping to organize the Buffalo Aeronuts in 1939, now known as the Flying Bisons, and the Curtis Flying Club in 1940, deBolt entered the Navy shortly after the outbreak of WW II.

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It was inevitable that he should organize the Navy's first hobby club, the Patuxent Model Engineers, which was personally inspected by Secretary of the Navy Forrestal. During this war time period, and the advent of control line models, deBolt built many of the circle burners, and decided, while waiting for his discharge in 1945, to become a model manufacturer.

In December, 1945, dmeco was formed. With no money, no machinery, plenty of determination and 16-hour days, their first control line kit, the Bipe, was shipped on January 15th, 1946. Hal's father joined the company within six months, and for the next year and a half they tried to meet the demand for the Bipe. The Airfoiler free-flight and a Super Bipe were the next two kits to be produced. During this time, and despite the pressures of his new and growing business, deBolt established many new records in free-flight as well as being a top contender in control line stunt and speed. Personal competition in the latter event led to the production of the famous Speedwagon design, introducing Weather Vane stability which made control line speed models groove for the first time. The Speedwagon series also introduced Circular Flight which reduced line pull and added power to flight. Other developments in the series included pressurized fuel tanks and a pressure cowl which reduced drag. With its many innovations, the Speedwagon set the first record over 160 mph.

After promoting the use of the Buffalo Armory for indoor control line flying, where many top notch control line men learned to fly, Hal went on to design and develop the famous Stuntwagon and All American series of CL models.

deBolt's interest in radio control came about as a result of the first successful R/C flight by a local modeler. Borrowing a Rudder Bug model with Aerotrol RK-61 receiver, Hal managed several successful crashes before obtaining consistent flights. It was at this point that he decided that the few available R/C designs were too frail and flew too much like free flight designs.

The inevitable happened and deBolt collaborated with Bill Winter to set the design criteria for the first model designed expressly for radio control. With a list of 14 points which an R/C ship should meet, they designed the Live Wire, later called the Live Wire Senior. Using a MacNabb 465 radio, they test glided the ship from a railroad trestle, with the first powered flights proving out the feasibility of the design. The Live Wire wing had a thick airfoil which proved to be the secret to smooth R/C flight. George Swank built the second Live Wire Senior and the two ships won first and second at the Canadian Nationals (the first R/C meet), and first and second at the Tangerine Internationals (now known as the King Orange Internats) — both meets occurring within two months of the first test flight from that railroad trestle!

Dmeco's first R/C kit was announced at the Hobby Industry show. The model industry could not believe that a radio control kit would sell and was shocked at the price of the kit. This was the Live Wire Trainer which, despite industry predictions, **did** sell and led dmeco down the R/C trail with their next kit, the Live Wire Cruiser. A modified Live Wire Senior, the Cruiser won more Nationals events than any other design, yet was never flown at the big meet by deBolt.

The first commercial reed system, developed by Frank Schmidt, was tested during its experimental stage by deBolt. Five channels gave the first multi control and led to the organization of the Down Elevator Club — many models meeting their untimely end before discovering that the servos would jam under high air loads. This led to the development of the dmeco line of multi channel servos.

In 1953, Hal organized and directed the 1953 Nationals at Philadelphia, the first "big-time" R/C event, with over 200 entries attending. One of the greatest highlights of the event was deBolt's demonstration of inverted flight and outside loops as well as flying in comparatively high wind conditions. This was the first symmetrical wing for R/C, and despite this new advance and the new multi radio gear, the meet was won by the late Jack Port who flew his rudder only ship to first place against the five channel equipment!

Following the development of the Live Wire Custom Bipe and a second place at the 1957 Nationals, having been beaten by ½ point by Bob Dunham at the latter event, deBolt obtained the first Bramco reed system by traveling to Detroit and living at the plant for three days while it was built! Dmeco built the stick box for the Bramco rig and Hal did a great deal of Bramco's development flying in the coming year.

On December 7th, 1957, tragedy struck in the form of a fire that completely destroyed the dmeco plant. In addition to the financial setback, Harold deBolt's father died from burns sustained in the plant fire. Although this would be enough to make most people call it quits, deBolt reorganized the plant, dropping the manufacture of the servos and all control line kits. Dmeco would now concentrate on R/C kits and accessories exclusively.

In 1959 Hal flew in the first FAI team elimination series of meets, winning out over Maynard Hill by 3 points in the final meet for the Eastern region. This victory was followed by flying in the first R/C World Championships at Zurich in 1960. A broken wire, however, caused deBolt to crash during the first flight. His spare model scored the second highest score of the meet on the second flight, with an overall placing of seventh. Following the Internats, Hal toured Europe with Bob Dunham and Ed Kazmirski, demonstrating the American style of R/C flying to the European modelers.

In 1961, Pappy attended the Pacific Area Air Force Contest in Japan, winning the Japanese-American National meet flying a Space Control proportional system in his Pursuit design. The Space Control system used was the first commercial unit which he had helped to develop.

The Viscount design was the first attempt to remove the work from the complex multi design. This new Live Wire kit managed to cut the building time in half, and the design is still popular today. The next dmeco development was a collaboration with Jack Roth to develop the first Retract-Gears. The first nose wheel unit collapsed on take off, teaching a hard lesson about the amount of strength needed in these units. The retractable gear system was first used successfully on the Viscount III, and during the eliminations where Ralph Brooke beat deBolt by one-half point for the FAI team.

Searching for the best multi competition design with no holds barred, Hal went all out on the Interceptor. This model pioneered the progressive symmetrical airfoil, and featured low drag, a fully cowled engine, retractable gear, smooth high speed flight and excellent wind performance.

Having tried fibreglass and foam as a method of reducing building time, but finding it more expensive, heavier, and with little headway accomplished toward this goal, deBolt figured that wood models could be assembled more quickly, and developed the Jenny as a top performance "quicky" type. In order to produce the kit so that these results could be duplicated by the average RC'er, it was necessary for dmeco to develop means of prefabricating wood to close tolerances and within a reasonable cost figure. The result was the first wood kit that could be assembled from finished parts much like a plastic model.

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ALUMINUM SKINS FOR FOAM WINGS

By ROBERT L. PEARCE, M.D.

SINCE the advent of foam wing cores, there has been a constant search for a satisfactory covering material. Material such as balsa sheet, bristol board, kraft paper, plastic, etc., have all been used and to varying degrees of success. Each of these have their drawbacks in the areas of weight, expense, strength, etc. I decided to go one step further and try sheet aluminum. This material has the advantages of lightness and strength and requires no finishing other than trim.

For the prototype experiments, I used a design called the 'Texas Sweeper,' designed by Bernie Haire of Dallas, Texas, and presently being kitted by Johnny Cashburn of Fort Worth, Texas. The wing cores were cut by Custom R/C Products. The skin on wing #1 was .005 O.S. aluminum. The technique was as follows:

Trailing edges of ½" x ¼" balsa were white glued to each wing half and planed to shape, leaving the aft edges square. The entire core was then lightly sanded. A template of poster board was cut out using an X-Acto knife against a straight edge. The material cuts easily in this manner. The latter had been previously roughened with fine steel wool. Work on a soft surface, such as an old quilt over the work bench. The trailing edge of the core half was carefully stuck to the trailing edge of the sheeting, allowing ⅛" of the aluminum sheet to overlap. The core was then rolled onto the sheet, maintaining constant pressure to insure adequate adhesion. Special care is needed as the leading edge is rolled around. The edges were then trimmed with a knife, again allowing ⅛" overlap at the trailing edge. The overlaps were then turned over the squared balsa trailing edge, starting the crease in the aluminum overhangs with the fingers, then finishing the crease with an X-Acto knife handle. This fold, top and bottom, prevents the sheeting from peeling. The space between the sheets at the trailing edge allows room for the aileron hinges without having to cut through the aluminum. The other wing panel is then completed in a similar manner.

The two wing halves were then joined in the usual manner using plywood joiners and a liberal amount of epoxy glue. I doubled the center section area, top and bottom, with a 4" wide strip of .012 aluminum and epoxy cement. The contacting sufaces were first roughened with emery cloth, providing a high shear strength. Tips were then glued in place and sanded, masking off the adjacent aluminum to prevent scratching. The servo compartment was then cut out and completed. The wing can then be masked and trimmed to suit, using any material suitable for metal. Hobby Poxy works quite well for this application. Ailerons are then hinged and "horned" in the usual manner.

Wing #2 was constructed of .004 S.T. #18 aluminum which proved to be much more satisfactory. Since it is tempered, it resists denting and creasby myself and several other RC'ers. This included 180 degree pullouts from full power, terminal velocity vertical dives. Wing #1 had an untimely accident on a misjudged final approach, hitting the top of a tall tree and proceeding to fall all the way through — not missing a branch on the way down! It landed on its back within two feet of an empty beer can. This prompted a companion to say that the accident had obviously caused the "Tin Goose" to give birth prematurely! Since its owner is an obstetrician between flying sessions, the situation was well in hand!

The actual damage consisted of several dents in the leading edge and a broken aileron. Repairs to aluminum foam wings are easily made as follows: Cut out a piece of aluminum large enough to cover the damaged area with about an extra inch all the way around. Using this as a guide, cut out the area. Apply fresh contact cement to the exposed foam and patch. Then stick the latter in place. Seal the edges with a fine bead of epoxy

In conclusion: The aluminum covered foam wing is the fastest wing I've built to date. It also equals other types of construction in nearly all departments. The metal suface produced no effect on an Orbit reed system. A letter from Bonner Specialties indicated that, although they had no experience with this problem, that the metal would have no effect on the Bonner Digimite system either.

R/C PROFILE

(Continued from Page 55)

The response to the Jenny was so overwhelming that it was quickly followed by the low-wing P-Shooter, a design that proved its competitive ability by placing second to the best in many of the nation's top contests.

The most recent design from dmeco is the Acrobat biplane, a development from a design criterion much like the original fourteen points laid out for the first Live Wire kit. It had to be a biplane without any of the traditional drawbacks of a bipe. All told, the Acrobat was two years in the development stage. The present kit produces a competitive design, having won against the very best, and capable of more exotic maneuvers at a lower flying speed.

So what's new at dmeco? We're afraid to ask! Rumors have it that the old pro is working on a new Goodyear prototype racer for the NMPRA event plus another Class III design in yet another attempt to reduce building time and improve performance. Whatever the project back at Buffalo, we are quite sure the end result will evidence the careful consideration and workmanship of Hal deBolt — a radio control pioneer and exemplary modeler who is a credit to his profession and a tribute to model aviation.

The Roostertail

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General Office:
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MAKE a big circle around your calendar dates of August 21, and 22; also September 3 and 4. These are the dates of the BIG contests of 1966. August 21 and 22 have been chosen for the 17th Annual IMPBA Invitational Regatta to be held at Potawatame Park in Wheeling, Ill., hosted by the DeVry Dolphins boat club. The competition program will be made up after a complete survey which is intended to poll the membership asking each member which events he intends to enter. Rest assured that there will be multiple boat racing as it appears that type of racing is the greatest thing to come to model power boating since the radio.

September 3 and 4 have been set aside for the West Coast District Regatta for 1966, hosted by the San Francisco Model Yacht Club, and held at Lake Merced in Golden Gate Park.

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To date, the IMPBA has been unable to obtain any form of Liability insurance to offer to the membership. Many clubs have obtained policies through local park districts, or local agents of insurance companies, in order to protect themselves and their guests at regattas. The International Model Power Boat Association, its officers, and its sponsors, assumes no responsibility or liabilities due to, or caused by any of its members while operating model power boats at any time during sanctioned competition, or at any other time.

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On Saturday afternoon, Feb. 26, Mr. L. A. "Steve" Stevens completely demolished the World Speed Record for R/C model boats with two consecutive, near-identical runs over 49 mph! His performance completely overshadowed some excellent speeds posted by other model boats, including six other speed records.

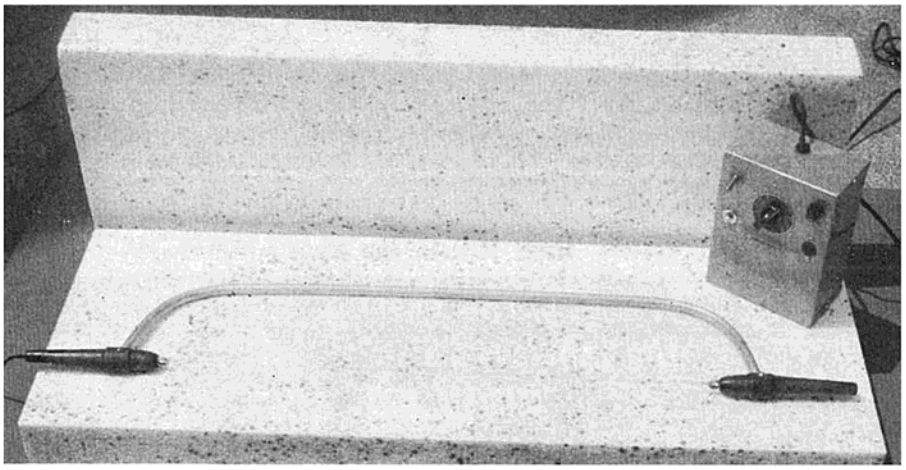
First, the somewhat meager technical details: The hull is a three-point, prop-riding hydro built by Del Park of Los Angeles. It is, in fact, the same hull that set the old record at 35.21 mph last year. The rig was formerly powered by a modified McCoy .60. It now has a Rossi .60 with a carburetor designed and built by "Steve" Stevens. The prop has large cupped blades brazed onto the hub at a very steep pitch angle. We understand that Steve fabricated the prop as well as the carburetor. The props have been patterned after either full size hydro props or tether boat props. The blades on this look somewhat like teaspoons! The shaft is 3/16" music wire (!) and the prop is located about 2" behind the transom and alongside the rudder which is offset to the left. The record received both local and newspaper coverage.

There were several reasons why the California group was totally unprepared for such a performance at this contest. First, the pond is only 600-700 feet long and does not afford much room for acceleration and deceleration before and after the timed 330 foot course. Second, the San Francisco Model Yacht Club group did not attend this meet and they have the reputation for having the fastest boats. (Rumors were circulating in the pits that Del Silva of the SFMYC recently posted a speed of 44 mph at an unsanctioned Sacramento event. Dick Pretel of the SFMYC held the WAM record at 39.47 mph.) Third, they were not aware that Steve had experienced any success with the boat since he acquired it. We hear that the Los Angeles group expected a 45+ mph speed.

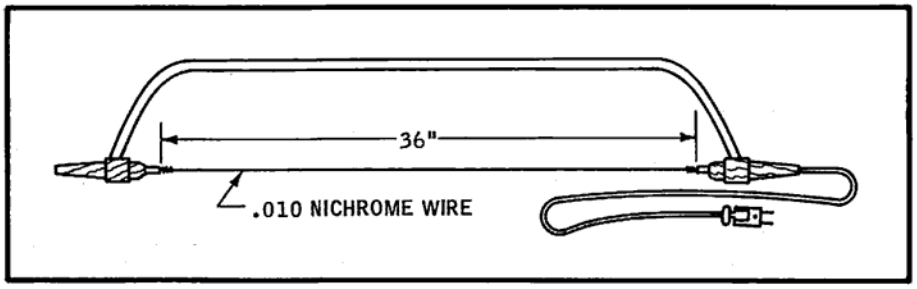
It was windy Saturday morning and Steve mentioned something about wanting to "try the boat" if the water calmed down. The wind did drop, finally, and Steve entered. When his turn came up, the water was only lightly rippled. Someone suggested that the boat might be very fast, so the spectators were asked to stay away from the water's edge and keep their eyes on the boat. When the Rossi came to life the sound indicated potential, but no one knew what was in store. Steve's pit crew (Jim Whitlatch) tinkered with the needle valves for a while, checked out the controls, and then Jim launched it with a vigorous shove. The boat got up on the pond very rapidly and Steve made a perfect 180 degree turn, using the whole pond and lining up for a straight-arrow charge. Then he punched the throttle! The boat just seemed to accelerate like a rocket! The time down through the lights was 4.55 seconds. Another fast wide turn and then, throttle wide open, back up the far side of the pond. 4.57 seconds! The average is 4.56 seconds or 49.3421 mph. Bob Foley was stationed alongside Wes Hunt's electronic timer and when he saw that 4.55 time, he yelled into the P.A., "That is the fastest boat in the world!" The cheers nearly drowned the shriek of the Rossi going upwind on the second run. When it was all over, "Steve" Stevens turned from the water, his face white as a sheet. He didn't run another boat all weekend, although he had come prepared to race his 1.22 cu. in. twin ski boat on Sunday!

About all that Steve had to say afterward was that he was glad that Wes Hunt had clocked the boat as he felt that this would add credibility to the record. Wes now has the legend "49.3421 mph, 26 Feb. 1966" pencilled on the front of the timer. Wes' equipment uses coherent light beams aimed across the pond at photocells at the water's edge. A boat breaking the narrow beam of light causes the photocell-amplifier goodies to send a signal that changes the state of the clock (running or not running). For timing oval events, such signals are blocked until the boat is nearing the finish line, since the lights are broken twice per lap. The clock itself is an A. W. Haydan 1/100 second D.C. stop-clock, running off a regulated D.C. power supply. This clock is periodically checked and calibrated (at the Naval Electronics Lab in San Diego). The detailed design of the systems is Wes Hunt's proprietary information as he is engaged in timing various speed events in Southern California with this equipment.

The record run took about 20 seconds and all the camera types were paralyzed! Not a picture was taken until after the boat was safely back on its cradle. MANY pictures were taken of the boat on display afterward, and no doubt some of these will be published.



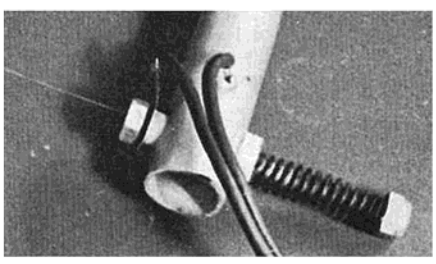
BUILD YOUR OWN FOAM CUTTER



WITH the ever increasing trend toward foam wings and stabs for R/C application, we have received numerous requests for instructions on a do-it-yourself project for a nichrome-wire, foam wing cutter.

The basic items necessary for a unit suitable for cutting foam wings is a power transformer and a cutting bow fitted with a length of nichrome resistance wire. For the transformer, a simple 18 volt, 1½ amp electric train or Revell Power Pak slot car transformer will suffice. The cutting bow should be slightly longer than the length of one wing panel of the size ship you customarily build. Normally, a three foot bow will be more than adequate. The transformer is wired to the three foot length of .010 diameter nichrome wire (3 ohms per foot) through a wood or plastic insulated bow handle. The wire should be tightened in the bow to a tension of approximately 10 pounds.

The unit shown in the photographs was provided to us by Model Trends of Inglewood, California, and is built primarily of surplus parts, and incorporates a few extra features such as a rheostat, fuse, and pilot light. The case used is a 5" x 7" x 3" commercial Bud box, available at most electronic supply houses. The rheostat is a surplus DeJur unit, #N16-R-89698-1340. A 6 amp, 250V Littelfuse is used in the circuit. The face panel of the box is equipped with a two connector plug receptacle for the male plug and 6 foot length of insulated wire from the bow. The power supply used in the prototype is a step down 120 volt, 60 cycle unit manufactured by Freed Transformer Co., Inc., Brooklyn, N.Y., Manufacturers #26528, MIL-T-27, Grade I, CL.C.



The bow is constructed from 7/16" O.D. aluminum tubing, which can be easily bent to the two radii by filling the tubing with sand, then bending over your knee or a rounded form. The two handles can be made from any insulating material, and each contain a screw-eye to hold the nichrome wire. The "hot line" from the transformer is attached to the screw eye at one handle.

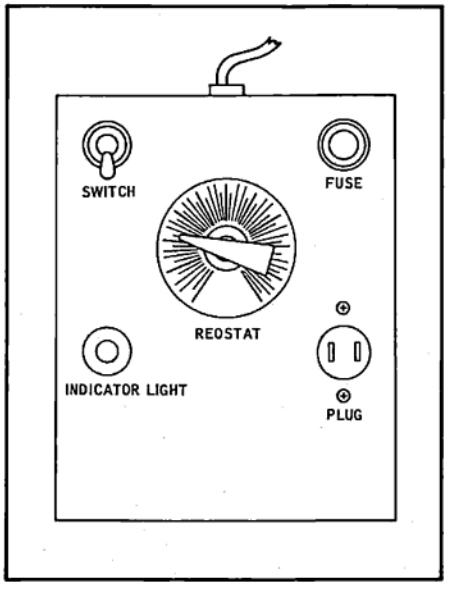
When installing the transformer in the metal case, be sure to provide an insulating sheet between the transformer connecting posts and the metal frame of the case. Drill a hole in the case and insert a grommet to protect the 110V. A.C. line.

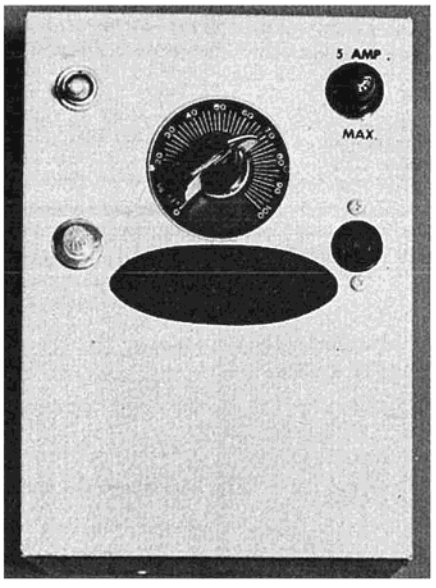
The cutter is used by securing a plywood rib template to each end of the foam blank. The cutter is passed over these templates, chordwise, cutting the wing panel to the shape of the ply templates. Foam blanks are available from several sources. The ones shown in the accompanying photographs are 3" x 12" x 35" blanks from Custom R/C Products, 1205 Green Acres Rd., Metairie, Louisiana. The most commonly used type of foam is the 1 pound density, with .8 lb. stock gradually being made available.

As recently pointed out by John Stehno, foam can be used for more than just wing and stab cores. As an example, extremely strong bulkheads can be made by sandwiching 3/8" foam sheet between two faces of 1/32" plywood sheet. The resulting bulkhead is equivalent in strength of 3/16" plywood with only half the overall weight. Foam can also be easily shaped and sanded for male molds, then covered with fibreglass cloth and filled with HobbyPoxy Formula II for excellent wing tips, fuselage turtle decks, etc.

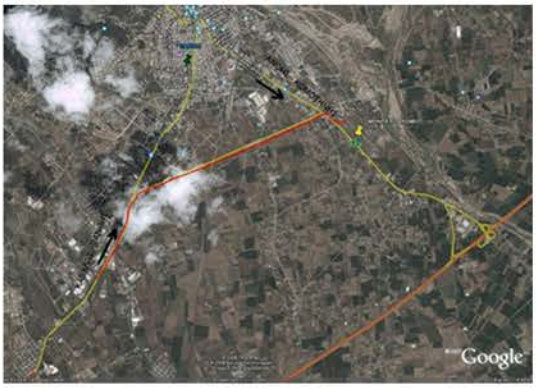
Build a hot wire cutter and form your own foam wings – it's fun and it's easy!

Transformer can be as simple or as elaborate as you desire. A slot car or model train power pack will give satisfactory results. RCM's unit shown below.





Airport Xanthi 1



Airport Xanthi 2

Airport Xanthi 3

Airport Xanthi 4

Airport Xanthi 5

Airport Xanthi 6

Airport Xanthi 7

Pilots (Hlsat,Savvas,Kostas)