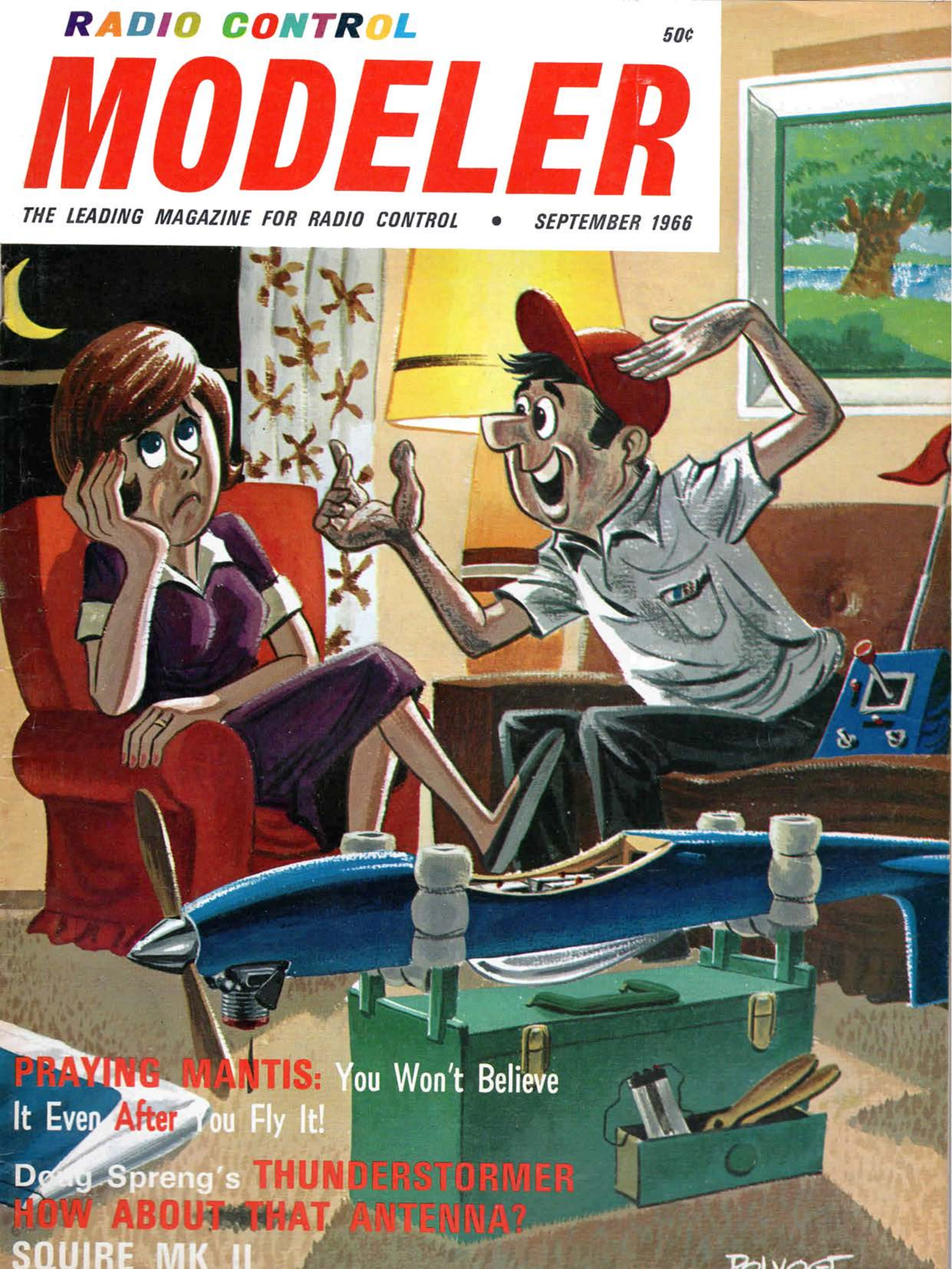
RADIO CONTROL
MODELER
50¢
THE LEADING MAGAZINE FOR RADIO CONTROL • SEPTEMBER 1966



PRAYING MANTIS: You Won't Believe It Even After You Fly It!

Doug Spreng's **THUNDERSTORMER**

HOW ABOUT THAT ANTENNA?

SQUIRE MK II

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.

RCM Magazine Editing and Resampling.

Work Done:

1)Advertisements removed.

2) Plans building plane removed and hyperlinked.

3)Articles building plane removed and hyperlinked.

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 RCModeler Free Plans and Articles.

http://www.rcgroups.com/forums/showthread.php?t=2354459

AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

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

James Hatton Blog Free Plans and Articles.

http://pulling-gz.blogspot.gr/?view=flipcard

Vintage & Old-Timer RCM Free Plans.

http://www.rcgroups.com/forums/showthread.php?t=2233857

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Thanks Elijah from Greece.

RADIO CONTROL MODELER

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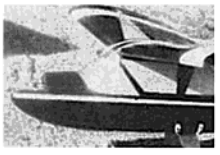
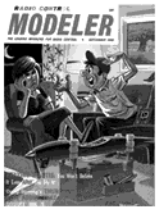
EPTEMBER VOLUME 3 NO. 9

features



R/C MODELER TECHNICAL FEATURE

departments



OVER

ill Polvogt, RCM Contributing Art Editor, pre-ents another in his series of popular cartoon overs depicting the R/C enthusiast and his nvironment. This month's presentation is ure to appeal to the myriad of R/C "wid-ws" who haven't as yet discovered that if ou can't beat 'em, join 'em — and have a ot of fun as well!

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EDITOR'S MEMO

BY DON DEWEY

THERE'S no escape.
No matter where you go — from Saigon to Reykjavik . . . from Bangkok to Hong Kong — you'll find a group of RC'ers engaged in the pursuit of their hobby. Gone is the prospect of sanctuary in some far-off place with a strange and exotic sounding name where a pretty young maiden shyly welcomes you in her native tongue. Stick around a while and you'll probably discover she's a Chamber of Commerce employee, Berlitz graduate, and the wife of the president of the local R/C club.

It's a sad commentary on our times. For example, you pick a remote island somewhere, say about a half-mile wide and about two-and-a-half miles long. Palm trees . . . the plaintive sounds of native music . . . the restful sounds of the breakers on a sloping white beach? Forget it, Clyde . . .

Take Kwajalein Island in the Marshall group, for instance. This little parcel of real estate fits our specifications exactly. It's a half mile across at the widest point, and just about two and a half miles long. Ideal, you say? A perfect spot for refuge from the smell of fuel and the sounds of screamin' 60's boring through the air? Don't count on it until after you read this letter from Roy Heybrock on Kwajalein Island:

Dear Don: —

I have been reading your great magazine since the second issue and have talked several other people into subscribing also.

We have a model club of about twenty people. We are located on Kwajalein Island in the Marshalls and would like to pass on some of our experiences to you and your readers.

Our club started with three modelers, great interest, but little activity. (There is no hobby shop here.) One day I heard someone had been flying an R/C plane and flew it right into the ocean. It turned out that George (the ocean pilot) had never flown R/C before and didn't know that the transmitter antenna extended!

After reading many magazines and going through many catalogs, we decided that multi-proportional was the way to go. Yes . . . we did read Ken Willard's "Blueprint For Beginners," and also Cliff Weirick's article on "An Approach to Flying Proportional."

After the labors of ordering, waiting for the orders to arrive, and the subsequent building, we ended up with quite a fleet. George built a Smog Hog and I a Tauri — both with full-house proportional. Hank, the third active member of our clan had flown some single channel gear back in the States and was a little more conservative. He built a Mambo Special with 3+1 analog proportional.

I must add, at this point, that along with the small size of our island, the wind blows from 15 to 30 knots almost continuously. Once in a while the wind does die down and we get a chance to fly — or try to, anyway.

But back to the story. So far with these planes, there have been eight takeoffs and eight crashes! I will try to give a short rundown on these:

Flight #1: Smog Hog — wire broke on aileron servo while in flight. Damage: wing dent and front end wiped out — repairable.

Flight #2: Tauri — Pilot error at sixty feet. Plane winged over on first turn and headed for terra firma. Damage: body broke in half — repairable.

Flight #3: Mambo Special — Left hand bank on takeoff. Correction didn't help. Damage: nose gear broken out — repairable.

Flight #4: Smog Hog — About the same as flight #2 except crash came on third leg of turn — repairable.

Flight #5: Mambo Special — Same as Flight #3.

Flight #6: Tauri — Flight started pretty good but fantasy took over. Engine flew out on crash — repairable.

Flight #7: Smog Hog — Receiver problems. Wingover almost immediately after takeoff due to loss of control. On shelf.

Flight #8: Tauri — Strong winds at seventy feet. Plane winged over and I didn't know how to get it up. Damage: body broke in half again and this time the wing broke in half — repairable?

In between this, George and I have built some .020 rudder only jobs, which is somewhat like throwing a feather at a brick wall. George was doing pretty good with the antenna all the way up, but after one minute, the model just peeled off and came right down from about 60 feet. I tried mine several weeks after that and was really having a ball, but it kept going further downwind, like near the ocean, man! I figured a crash was better than a flyaway, so at 250 feet up it was hard rudder. What a pretty spiral she made! I gave opposite rudder at about 40 feet. She came out of the spiral but peeled off in the opposite direction.

Oh, well, we have a lot of fun any way. What I am really driving at is this — if a guy doesn't have an experienced flyer around, don't fly multi. I would suggest no brakes, no steerable nose gear, no ailerons, and no motor control.

As for us, we still haven't had a successful landing. In fact, we haven't even tried to land yet. I hope you will enjoy this because we have and are not even discouraged.

Roy Heybrock
Kwajalein R/C Modelers Club.

●

You may not be discouraged, Roy, but I am. There goes my dream of an island haven. But you did have an idea that I'll have to try. It might help.

Extending the antenna, I mean.

CUNNINGHAM ON R/C

ANOTHER contest season will be almost over when this appears in print, and yet, at the beginning of the season it is very possible to predict the trend of the flying this year, as well as the trend of the aircraft, since both are following a well established path. The flying will be even better, with closer scores, and the aircraft will be the same as last year, and the year before, and the year before that. We have reached a point in competition models that was reached in U-control stunt aircraft about ten or twelve years ago. Since 99% of the readers of this column don't fly competition, or at least are not "pros" at it, what does this have to do with things in general? Simply this — most of us like to fly the ships that win the big events. There is nothing wrong with this thinking, there are certainly no flies on the Taurus, or Candy, or Kwik-Fli, or any of the other ships, but we are in danger of tripping and falling square into the rut of conformity, and this, to my way of thinking at least, ain't too good.

The prime reason for this sameness in design, flying, and so on, is directly related to the rules covering R/C flying. For some time now, RCM has tried its level best to bring a sampling of aircraft to you from all parts of the country and from all types of designers. This has been a successful campaign, and one which all of us have enjoyed. The fact still stands, however, that we are still type cast in a superb rut. The only real jogger to the rut has been the Goodyear event, and although this has had its knocks from detractors around the country, it still offers a different side of this sport, and a side that more of us should investigate.

Getting back to the rules. It is the easiest thing in the world to throw stones. Catching them is hard, but pitching is easy. Why rock the boat of rules, especially since this season is almost over? The answer is simply that this sport is made up of slightly nutty characters from the age of about ten to seventy, and is a sport that appeals to the thinking man — the man with the inquiring brain and the guts enough to back up his inquiry with some hard cash and a bunch of nerve. Why not re-tailor the rules to fit the sport?

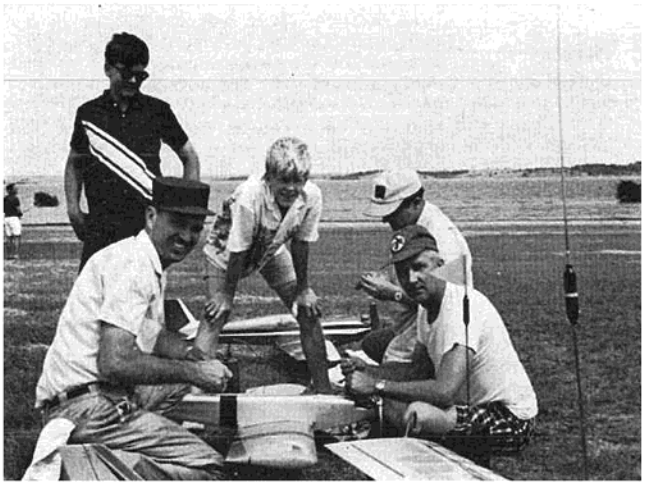
If Class III is in a class by itself, then let it be, surely the pattern is changing, and more maneuvers should be tried, but, if we are going to continue to have three classes of R/C events, why should they be the same as Class III with only a modification of the controls allowed? Take a look at the top ships in Class I, II, and III. This year has seen the advent of Class I ships that look just like the III types, with the same size engine, same wing loading, same paint jobs and same type radio gear. This to me really isn't quite kosher.

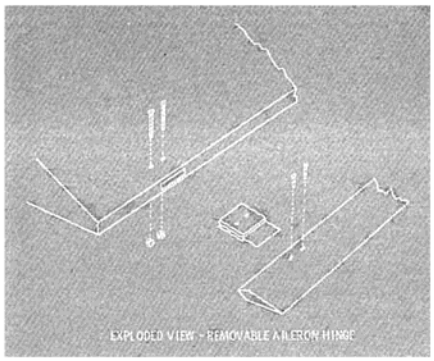
A few years back a breakthrough occurred when multi channel radio gear was first used in Class I. Since that time proportional radio has taken over all classes, and the man with four to six hundred bucks, or an "in" with a manufacturer, became top of the heap. How about the kid down the street that throws your paper, maybe he'd like to get in on a good thing too? Or yourself. Why not take a long hard look at the sport as a whole. We like it, if we didn't we wouldn't be in it, but it takes a goodly amount of cash to keep up with the big boys.

This, then, is the catcher for all of the stones. Let's give some serious thought to rewriting the rules to take out the repetition. Keep Class III as it is. Let it really be the top, the pro event. Change Class I to conform to radio gear. Not control surfaces, but radio gear. I'm not stumping for a return to escapements, far from it, but what's wrong with an event that is strictly for single channel radio with no limit to the number of controls? Don't start off talking about proportional gear as being single channel as opposed to multi channel. You know what I'm driving at. Let's set up an event for the simple, economical radio and aircraft. The new galloping ghost systems would be a natural for this event. Engine size limited to a .15 wouldn't be too bad an idea either. This would allow kids, dads, wives and girl friends (not necessarily at the same contest), to compete and would give at least a part of the sport back to the younger set, or the people that are not quite nuts enough to plunk down all of the butter and egg money on gear, kits,

(Continued on Page 7)

Below, left: Edd Alexander assists Helmer Johnson with Kwik Fli. Those plaid shorts are somethin' else, Helmer! In background is Dick Rankin, Dan Carey Jr., and Wacker Brent with Copperhead design. Below, right: Clay Price and 17 degree swept Falcon. All are members of Ft. Worth Thunderbirds.





CUNNINGHAM ON R/C

(Continued from Page 6)

". . . LET'S TRY AND GIVE A LITTLE OF IT BACK TO THE INDIANS."

props and fuel.

Class II could be used for either a class for reed fliers, or as a novice class flying the same equipment as the pros. There is no reason why this class could not become the top amateur class as opposed to the pro class for the top dawgs (sorry about that Ken). If distributed as I have been outlining, the sport would then present something for everybody; keep the high points of competition; allow the model mags to publish winning aircraft for you and me to copy; and, in general, give the sport a shot in the arm. The biggest argument to this will no doubt come from the dedicated group of rudder only fliers. They have a legitimate gripe, and one that should be heard. So, why not keep this class as a separate group, too. Once you pass the point of adding an elevator to your ship (of course, the engine in a Class I ship is now the "elevator"), the flying becomes much the same as to skill and use. So I won't argue, Jerry, keep this class as it is. It takes skill to fly this type of ship, in many cases much, much more skill than is needed for the average full house airplane.

Looking into the crystal ball of things R/C it is not too hard to visualize the future, in fact the future is almost upon us. You take out your fully-finished-five-foot-all-non-breakable-plastic-Super-Comet to the flying field. (The field is paved with heat-absorbing pavement that is also shock absorbing.) From your pocket you pull the transmitter, making sure not to mix it up with your cigarettes by lighting the antenna. That small button on the right starts the engine, so you push it. Your engine starts, and runs with a slight hum, much like a well oiled sewing machine. You look around, scan the skies, note that the air is clear, and take off. Straight up! At twenty-five feet you cut off the vertical thrusters and go into horizontal flight. After ten minutes of flying you throttle back the chemical engine, cut in the thrusters and descend vertically back to your feet. Sounds like fun? Well, it will be, but, to really be fun, you're going to have to challenge your flying partner to a contest of some type!

Back to the present, if you feel that we need a change in our thinking on the way the rule governed part of this sport is going, talk it up in club meetings and with members of the rules committee. It is just as important that Sunday Fliers take an interest in competition flying as it is for the experts.

If you watched this past contest season develop and spent a lot of time on the side lines wishing that you could get good enough to try your hand, then do something about it for next year. And, if you're serious, why not look into Class II as a good starting place. Check the number of entrants at most contests in this class. Under the present, and past rules, this has been the most under entered class of all. Why not give it a try? The ships are very much the same as Class III, the radio gear is the same, actually the top fliers are just as good as the top Class III fliers, but there are not so many of them. A good ship designed for Class II can be an excellent Sunday flier, a good Rinky-Dink craft, as well as a lot of fun. But, why stop there? With a good Class II design, why not incorporate removable ailerons so that you have a ship that can be used for almost anything? With strip ailerons this is very possible. Not easy, but possible. All that is needed is a method of removing the hinges from the wing trailing edge. The servo should be mounted so that it operates aileron bell cranks in the wings (like the Senior Falcon) and the push rods to the aileron horns can be removed. Even better would be the aileron setup used on Phil Kraft's Ugly Stick, in which all of the aileron linkage was mounted on the OUTSIDE of the wing. It ain't pretty, but it's simple.

Hinges are the problem. The new Klett hinge can be made to be removable, or if this type is not locally available, how about fastening nylon hinges to pieces of 1/16" plywood and embedding these in the trailing edge of the wing? These pieces of plywood could, in turn, be bolted to the wing with small bolts threaded into nylon lock nuts. All of this could be designed into the wing as it is being built so that by simply removing the bolts and push rods your full house ship becomes a Class II competitor.

If you're really serious about Class II by now, be sure and take a few things into account when you pick a ship to build, or to design. For best results, use a shoulder wing ship. Most low wing aircraft act much like a homing buzzard when you lean on the rudder, they just keep going straight ahead. Just for kicks, try flying your multi ship by its rudder, but quit before it winds up a bunch of sticks! Use a very generous rudder. If the ship that you want to build has a small rudder, move the hinge line forward to give you more rudder area. You need to get your ship going where you want it, in a minimum of time. As an example, several years ago I designed a ship called the Green Hornet. It had a wing aspect ratio of three to one, and a huge rudder! When this rudder was held hard over, it would roll faster than most aileron ships! Snap rolls were really something to see, either upright or inverted!

For engine, use at least a .45, better yet go to the bigger engines for more penetrating power on windy days.

Ten channel multi equipment should not be overlooked for this usage since proportional gear is not in everybody's hands yet. When you use your multi reeds hook up the rudder control a little bit differently than you normally would. Use a Dubro inline trim bar and then use two servos for rudder. Use the normal rudder servo at the trim end of the trim bar, and your unused aileron servo at the full throw end of the trim bar. Now, when you want gentle turns use the rudder lever and get small amounts of deflection. When you want to roll or snap roll, use the aileron lever and get full rudder deflection.

I am working on a design for this type ship, very simple and straight forward, fully symmetrical airfoil, small wing area, high wing loading, aerodynamically clean, and aptly named, the Warrior. Plan to use the removable aileron set up, so it will be a two-way craft.

This month we have covered a lot of ground, but if you agree in the thinking that we need to take a hard look at our sport, then make yourself heard. At least let's try and give a little of it back to the Indians.

Now, if Hugh can just tear himself away from the Bunnies a while to get this issue of the magazine in your hands I'll head back to the Bull Rushes for a nap.

Swampy, well . . . !

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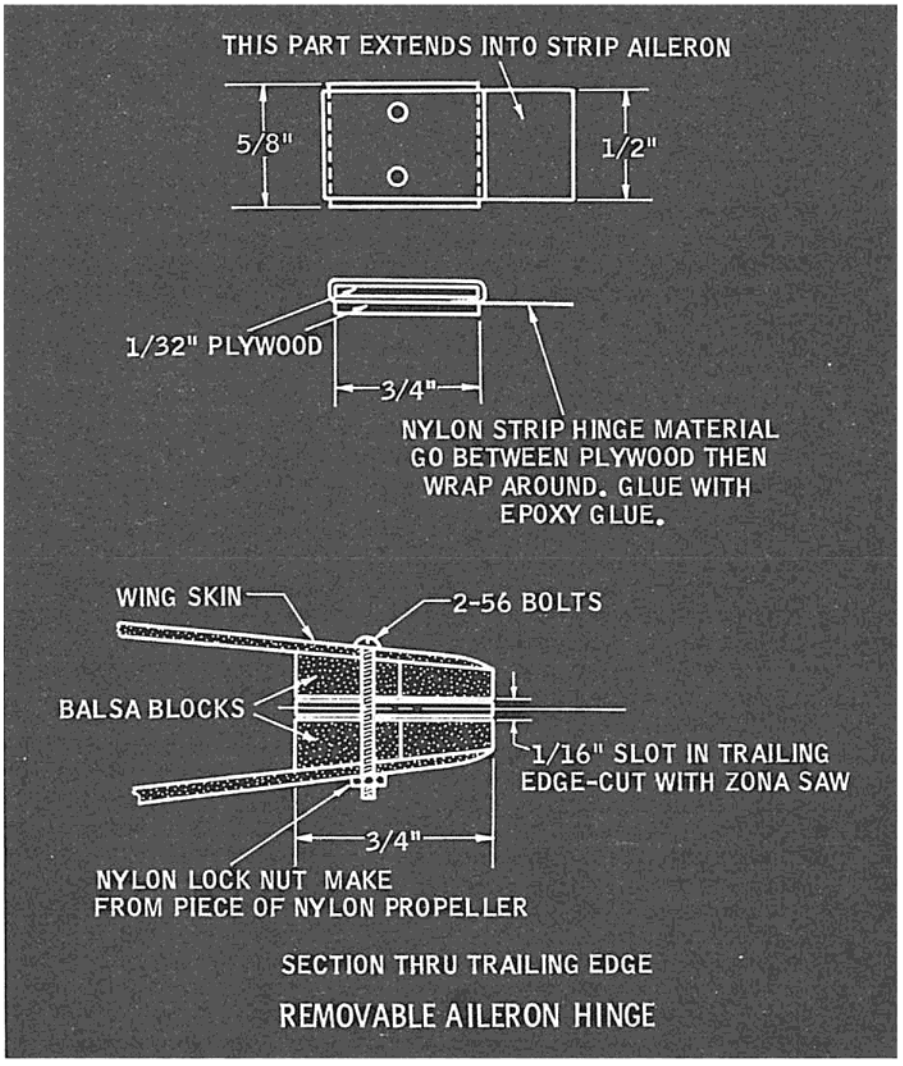
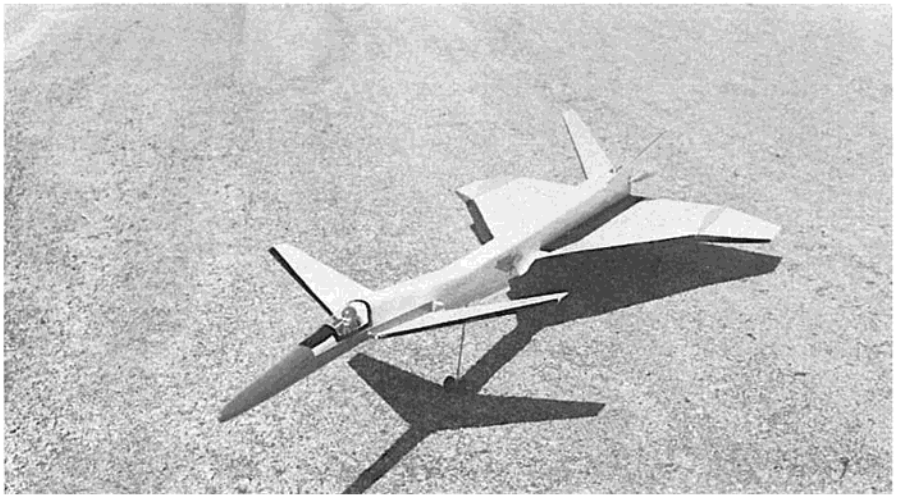


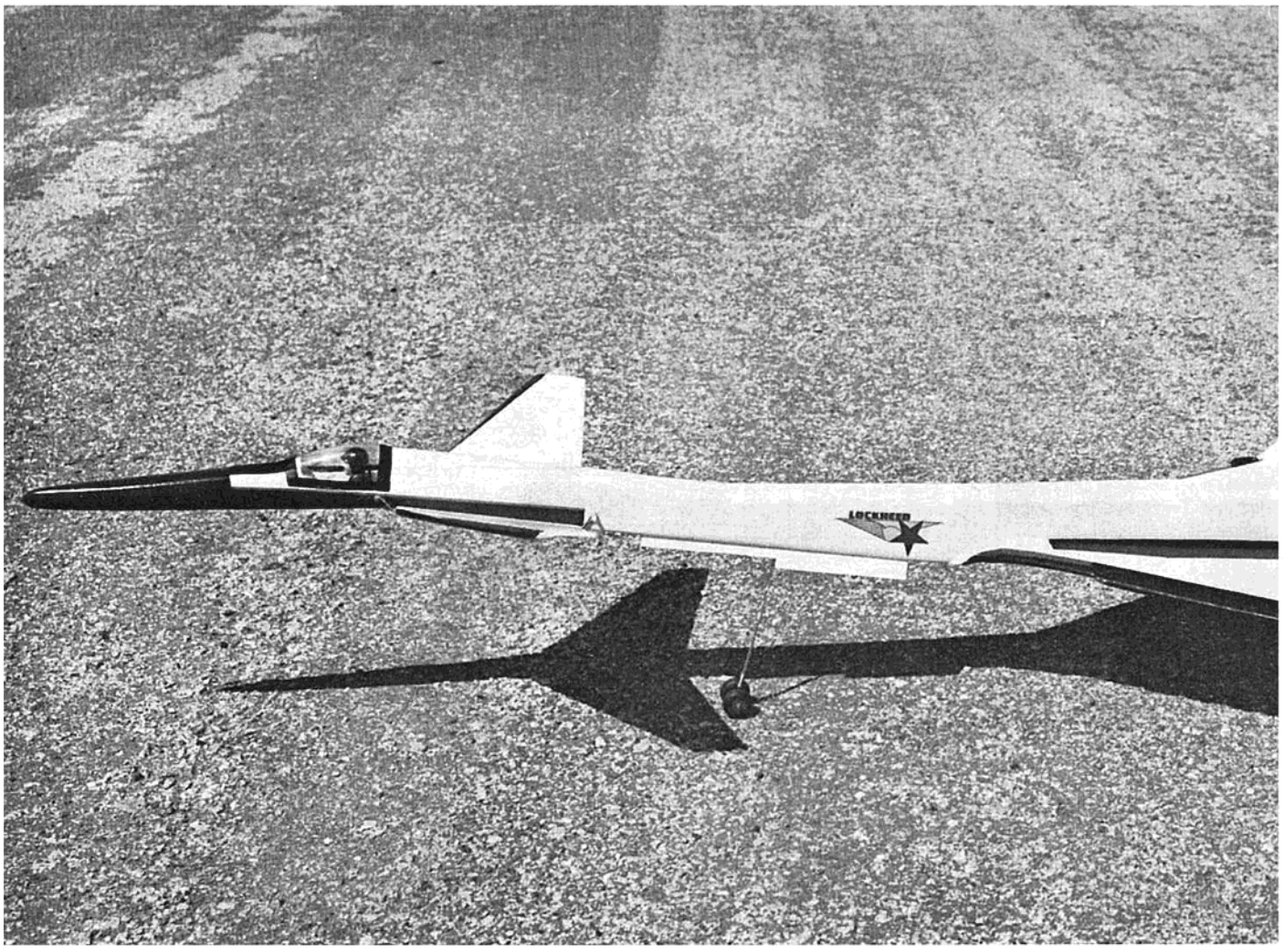
ages, although larger letters and numbers are available upon request as individually packaged items. Sizes range from ½" to 3¼" letters and are available in black on gold, white on black, fire red on white, and torch yellow on white. Each packet contains enough letters and numbers to fill most any need. They have been tested and are recommended by RCM. For further information on sizes and colors available, **Circle #5 on the Reader Service Index.**

Foamcrafts Mfg., P.O. Box 336, Campbell, California, is producing one of the finest lines of foam wing and stabilizer cores we have seen. Cut from .8# density foam, these cores are exceptionally light, accurately cut, and complete with preformed sheet leading edges. In addition to the standard line of popular RC wing and stab configurations, Foamcrafts will custom cut to your order upon receipt of wing plan and rib templates. Tested and recommended by RCM. Be sure to specify their Core-Grip Cement. For further information, **Circle #6 on the Reader Service Index.**

Flight Control Products, 1937 Simmons, Salina, Kansas 67401, has produced their Pratt-Mullen Twin Bee conversion kit, a well made unit for utilizing two Cox Babe Bee .049 or Quiet Zone engines in a twin configuration. We are currently using one of these conversions at RCM and find them to be excellent in performance and elimination of vibration. Price for the conversion kit, less engines, is $19.95. Price with two Babe Bee .049 mills is $29.95. Tested and recommended by RCM. For further information, **Circle #7 on the Reader Service Index.**

For a complete mail-order service for RC needs, **Lanes RC**, 8809 Mt. Shasta, El Paso, Texas 79904, may be just what you've been looking for. Quality and economy are the bywords for this firm whose catalog sheets lists a great majority of the common, and not-so-common items required by the RC hobbyist. For further information, **Circle #8 on the Reader Service Index.**





WHITEY PRITCHARD:

PRAYING MANTIS

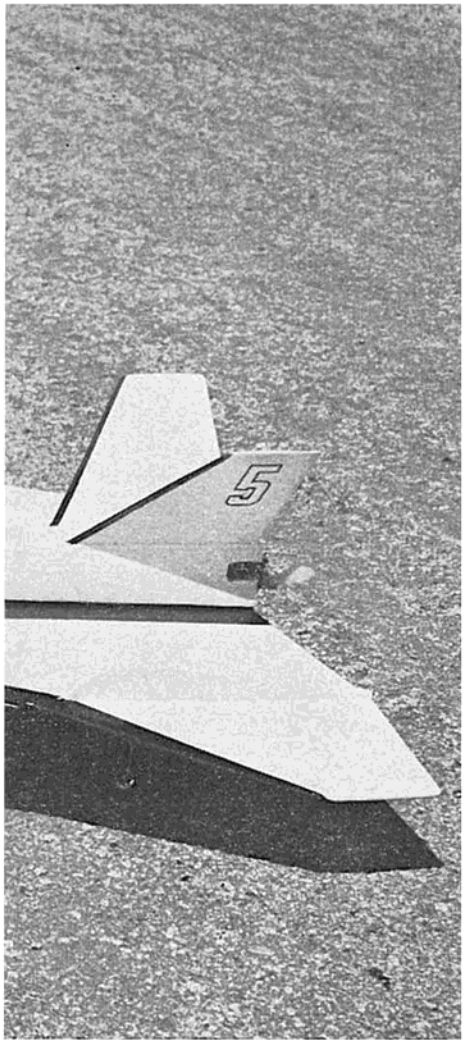
If you think today's designs are in a rut, you won't be able to resist this XB-70 type design. And you won't believe it even after you fly it!

WOULD you believe a supersonic transport? A Graf Zeppelin?

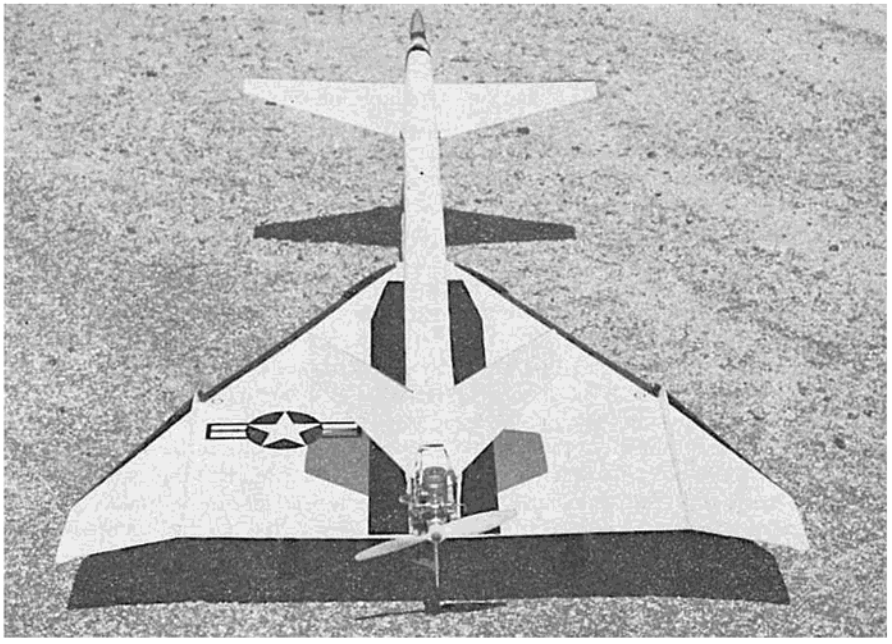
Would you believe a single-channel B-70 type canard?

The latter is what we've got. This little fellow is not so little, being six feet long, yet it performs on single channel servos just like the big boys. The stability is phenomenal and the take-offs put you in the Jet Set. The flying platforms (wing and tail) are all sheetwood with the only built-up construction utilized being in the fuselage. It is a simple straightforward design that is easily constructed and which lends itself to the Sunday Flyer.

Due to the canard configuration the Praying Mantis is very forgiving in stalls and will not slip off into a spiral dive in the turns. As a matter of fact, the first prototype might have been considered **too** stable, inasmuch as the only way to get it down was to reduce power. We have increased the rudder area on subsequent versions and it is now capable of a gentle spiral, this area change incorporated into the plans presented with this article.



"This little fellow is not so little, being six feet long, yet it performs on single channel servos just like the big boys. The stability is phenomenal, and the takeoffs put you in the Jet Set!"



The original Mantis is equipped with F&M receiver and Royal Products single channel servos driving throttle and rudder. Galloping Ghost equipment can be used, and even though it has an all-sheet wing, it has the weight carrying ability to accommodate the receiver, battery pack, and two servos of the larger proportional systems. The installation of the latter would require a wider fuselage to accommodate the receiver and servos, but other than that, the ship would remain the same with no C.G. change. If you decide on the latter course, widen the bulkheads accordingly.

The prototype made its maiden flight with a .15 engine, but once airborne, it would not sustain this design. As the nose angle increased, the mass area of the rear wing acted like an air brake and she settled back to earth. It was decided that a .23 would be a better choice. A visit to the local hobby shop didn't produce a .23, and inasmuch as Sunday was drawing near, I decided to use an OS .35 which I had on the shelf. There was also an ulterior motive in this decision, for if I could control the beast with a .35, then I could go to a reverse crank K&B .35 and forget the pusher prop, which can be a problem if your local hobby dealer doesn't stock them.

On a cold, wet, foggy Sunday morning, the OS .35 was fired up. Small children were gathered up, and with their mothers, took shelter in the cars. A few dedicated modelers remained exposed — taking faith in being behind the Mantis as the canard was aligned with the runway. The group quieted as the control functions were given the final check. Someone piped up — "You've got your ship on backwards" — and with that, the Mantis leaped down the runway. At seventy-five feet the nose broke ground and the ship arched up in one sweep to a near vertical ascent with a gentle rotation to the right. At 200 feet medium speed was programmed and the nose dropped to a more normal attitude. A couple of circuits of the field and the model was in the cloud bottoms! Full right rudder was held for a descent, but she continued to climb. Left rudder produced the same results. It was now flashing in and out of the fog. Low engine was blipped, and on the second try, the engine was heard to throttle down and it reappeared out of the fog like some demon from the deep!

Further flight tests showed that full throttle produces better than a 45 degree climb; medium speed, a normal flight attitude; and low speed, a very slow power descent. With power off, the glide is flat and fast, but the overall descent is quite mild. Contrary to what might be expected, the sheet wing does not fall out of the sky, but it does require keeping up air speed.

The main wing (rear) has two features which increase the lifting ability of the all-sheet wing. Fifteen inches of the leading edge has been turned down much like the leading edge slots on swept wing jet aircraft. The "downdroop" of the outer wing panels function similar to tip plates inasmuch as they work in conjunction with the simulated fences on top. This anhedral theoretically decreases stability, but this ship has so much inherent stability that

it doesn't miss it, and like the bumble bee which aerodynamically can't fly, doesn't know it and goes on and flies anyway! The "turned down" outer panels have an aesthetic value that gives it that B-70 type look which influenced the design. The cranked fuselage was done for the aesthetic value but is also functional as it places the forward plane out of the line of the main wing, thus producing a better airflow over the latter.

In summing up, I can never be sure I understand all I know without a wind tunnel, but I am satisfied that this bird flies well and won't look out of place on the jet taxi apron!

CONSTRUCTION

Wing:

Glue 8" wide x ¼" sheet balsa edge to edge to form an area slightly larger than the triangle shown on the plans. When this is bonded as one piece, draw the outline of the main wing and cut out. Take 1¼" trailing edge stock and glue to the bottom of all leading edges and tips **BACKWARDS**. This is to give more body to the leading edge and to produce a slight curl not unlike a bird's wing. Sand the leading edges, tips and flat surface to prepare for filler or sanding sealer. Prior to applying sanding sealer, cut half way through the wing from the top at the anhedral break points (6" from tip). Using a straight edge aligned on top and bottom, break this joint over a table edge. (Not all the way through.) Apply pressure to the straight edge on top so that the break will be even and true. Turn the wing upside down on a flat surface and block up the tips to form the 1¼" anhedral. Glue the unbroken creased joint with epoxy cement, and when dry, reverse the wing, blocking up the center and gluing the open joint. Sand, and apply sanding sealer, or filler as desired, to prepare the wing for covering. (Leave the 2" top center section clean with no filler to insure a good glue board when mating the wing to the fuselage.)

Forward Plane

Make the forward plane in the same manner as the main wing, gluing trailing edge stock to the leading edge and breaking and gluing the 2 dihedral joints. Each side should have 3¼" dihedral. Apply sanding sealer and sand. Cover with silk or silk span tissue as desired.

Fuselage

Cut the four pieces that make up the two fuselage sides from 3/16" x 3" sheet balsa. Join each of the two sides together by aligning the forward and rear section on a flat surface and gluing. Cut out the 1/16" sheet doubler that goes between station C & D and glue this in place to patch across the joint of the forward and rear section of the fuselage side. When cutting this 1/16" doubler, allow 11/16" clearance on the bottom, as it rests on top of the ½" x 3/8" rail stiffener. Another 3/16" must be allowed for the flooring. With the doubler glued in place there will be an 11/16" space from the bottom of the fuslage to the bottom of the doubler. When dry, join the two fuselage sides together by gluing in the ⅛" rear flooring that appears over the wing as well as the 3/16" forward flooring, adding bulkheads A, B, C, D & D. Glue in the nose piece by laminating ½" sheet stock into the forward area. Cut ¼" plywood to form fuel tank bulkhead (F) and fire wall bulkhead (G). Cut ¼" x ½" hardwood engine mount rails and glue bulkhead F & G together with the engine rails within the ship, forming the fuel tank engine compartment area. Hobby Poxy AB glue should be used throughout this area, coating walls and flooring.

Sand the fuselage sides and carve and sand the laminated nose (do not round off the top edge of the fuselage sides where the hatch or top planking will glue down later). Now that the fuselage is assembled, install the ½" x 3/8" rail stiffener that runs forward of the wing up to the rear cockpit bulkhead (A).

The forward part of the rail is notched out to accept the ¼" battery compartment sheet base. After installation of the rail, glue in this ¼" base and add a ⅛" sheet under that and between the two rails. This now makes a solid section from the battery compartment to the top of the forward plane.

The last construction step before mating the wing to the fuselage will be cutting the leading edge slots in the wing, cutting through at H & I, and by cutting half way through along J. Bend this slot down on either side, with a straight edge between the two bent slots at the bottom and is even by placing a straight edge between the two bent slots at the bottom and making periodic ½" measurements along this line to the bottom of the wing.

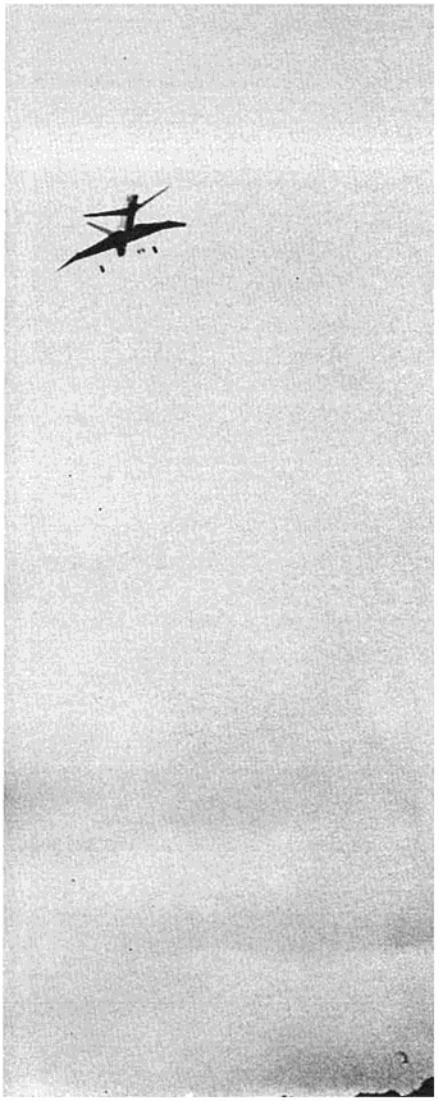
Mating

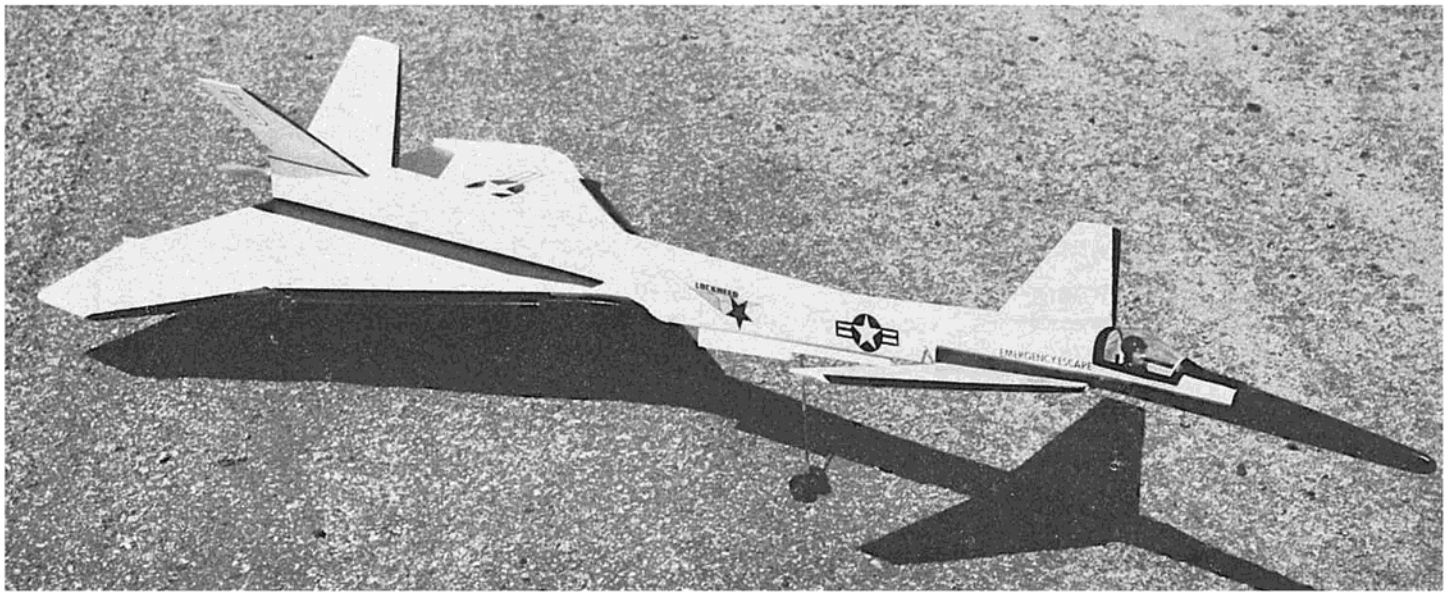
Prior to mating the wing, cut the first 3½ inches of the leading edge half way through from the top every ½ inch. This is to allow the front of the wing with the trailing edge stock to negotiate the curved area of the fuselage. To reduce cracking and brittleness, wet this 3½ inch area on top with water just prior to mating the main plane to the fuselage. Glue and join the main plane (wing).

Landing Gear

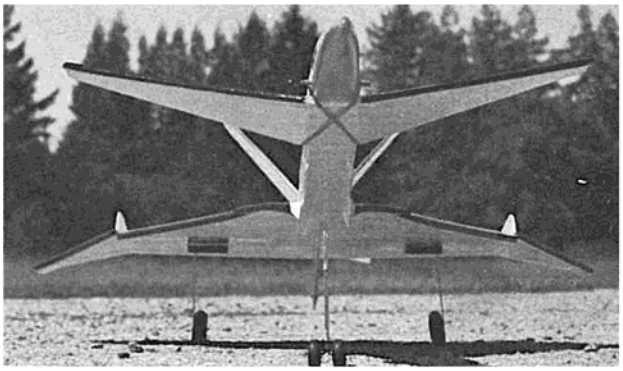
The landing gear installation is a type I have used for years on Sunday flier free flight models. As the Mantis has a sheet wing, this type of installation is simple and effective; I have never had one tear loose. The landing gear wire is bent into a box at the wing base with a 1½ square wood block recessed to accept the wire glued to the bottom of the wing with the landing gear wire sand-

(Continued on Page 15)

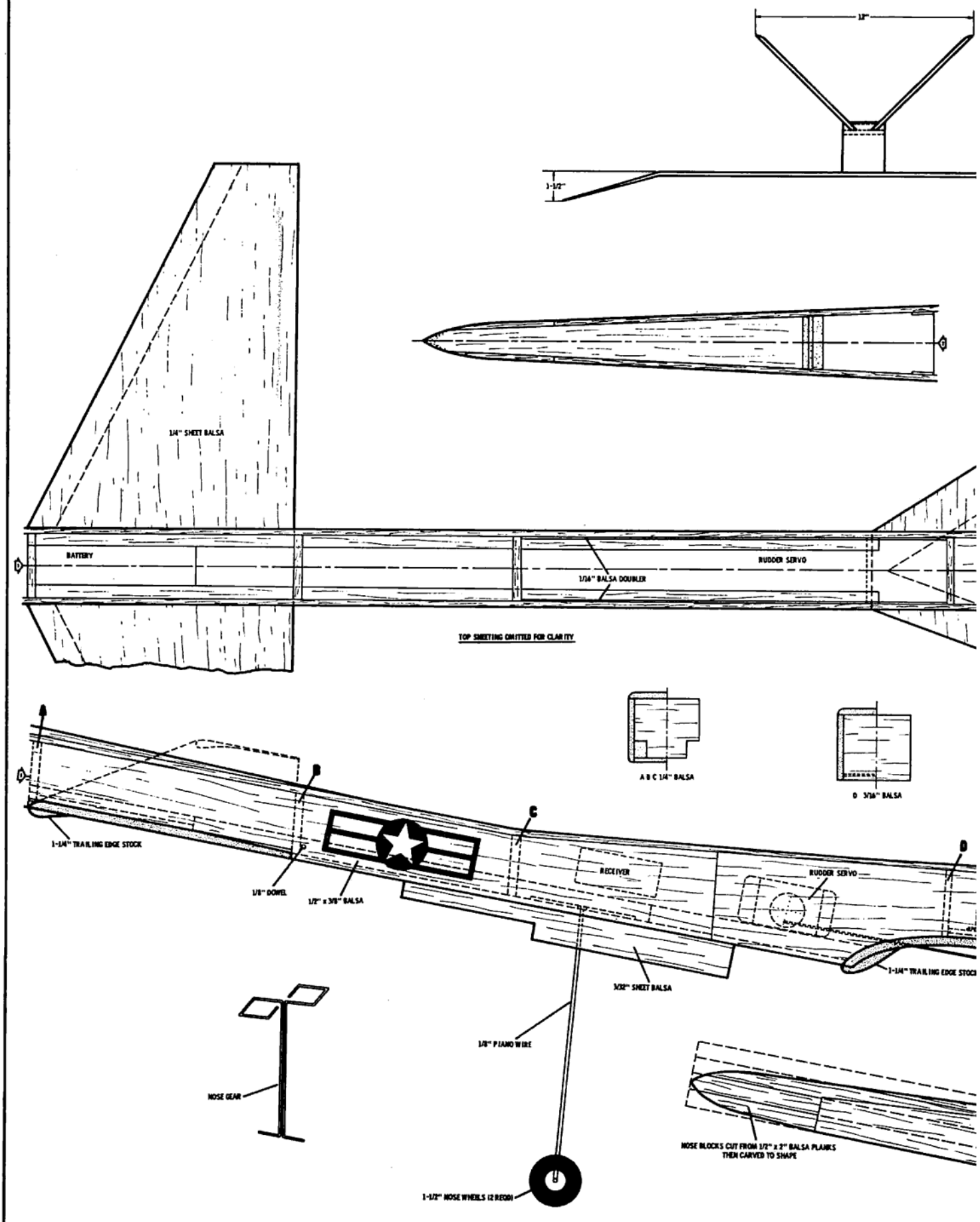


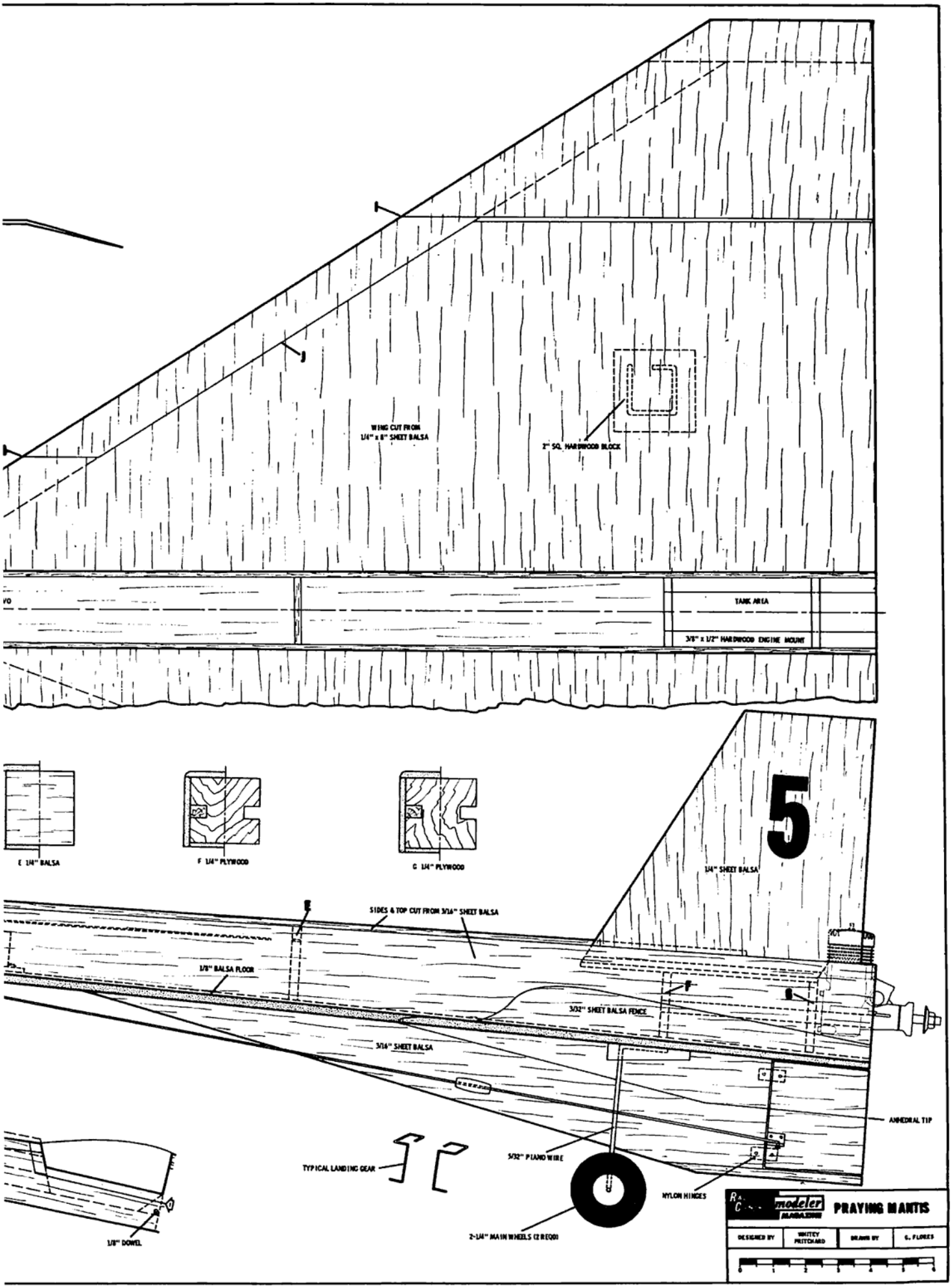


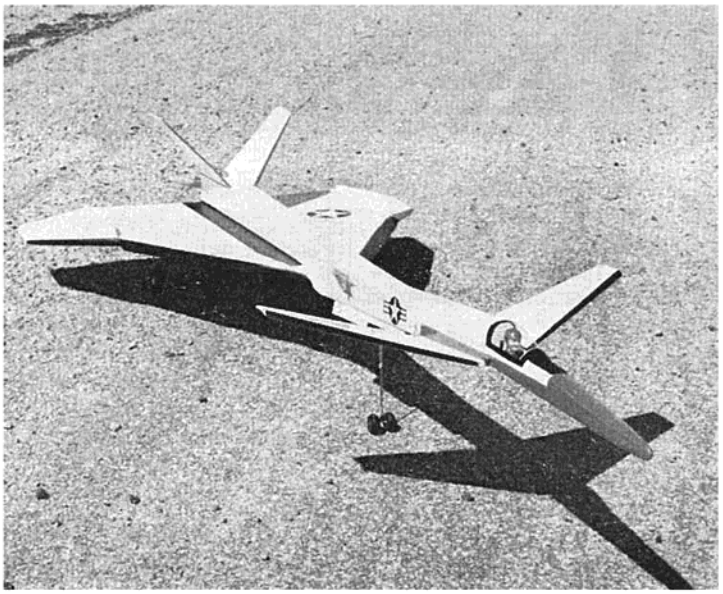
Whitey Pritchard's Praying Mantis bears a planned resemblance to the XB-70. Whitey, a member of the Lockheed photographic staff, has come up with a remarkable design that can be flown with single channel servos, as was the prototype, or with reeds or proportional control. Only throttle and rudder is utilized for flights that have to be seen and which are still hard to believe!

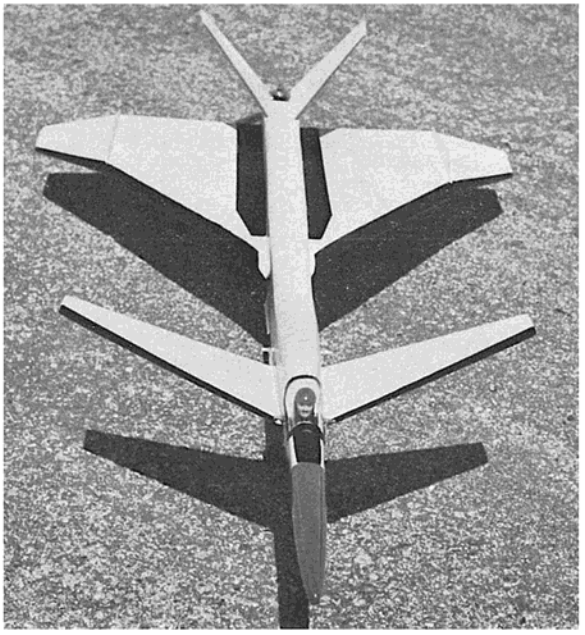


The Praying Mantis attracts attention on any strip. As easy to build as it is to fly, an inherent stability combined with its unique appearance, makes Whitey's six foot design a natural choice for anyone looking for more than just a run-of-the-mill design.


12"
1-1/2"
1/4" SHEET BALSA
BATTERY
RUDDER SERVO
1/16" BALSA DOUBLER
TOP SHEETING OMITTED FOR CLARITY
A B C 1/4" BALSA
D 3/16" BALSA
A
B
C
D
1-1/4" TRAILING EDGE STOCK
1/8" DOWEL
1/2" x 3/8" BALSA
RECEIVER
RUDDER SERVO
1-1/4" TRAILING EDGE STOCK
3/32" SHEET BALSA
1/8" PIANO WIRE
NOSE GEAR
NOSE BLOCKS CUT FROM 1/2" x 2" BALSA PLANKS
THEN CARVED TO SHAPE
1-1/2" NOSE WHEELS (2 REQD)


WING CUT FROM
1/4" x 8" SHEET BALSA
2" SQ. HARDWOOD BLOCK
TANK AREA
3/8" x 1/2" HARDWOOD ENGINE MOUNT
E 1/4" BALSA
F 1/4" PLYWOOD
G 1/4" PLYWOOD
5
1/4" SHEET BALSA
SIDES & TOP CUT FROM 3/16" SHEET BALSA
1/8" BALSA FLOOR
3/32" SHEET BALSA FENCE
3/16" SHEET BALSA
DIHEDRAL TIP
TYPICAL LANDING GEAR
5/32" PIANO WIRE
NYLON HINGES
2-1/4" MAIN WHEELS (2 REQD)
1/8" DOWEL
modeler
MAGAZINE
PRAYING MANTIS
DESIGNED BY
WHITEY PRITCHARD
DRAWN BY
G. FLORES





THE PRAYING MANTIS

(Continued from Page 11)

wiched between. The front of the landing gear retaining block is painted black in front to simulate an air scoop.

The dual nose gear is done in much the same manner with one wire strut bent in a box going forward and the mate going aft. These two wire struts are mated together, wound with wire, and soldered. The completed dual strut is lowered into the fuselage from the top with the wheel axles passing on through the fuselage through a slot that is cut in the fuselage bottom length-wise and later replaced. After the wheel axles pass through the fuselage, the landing gear is rotated back to a normal position and a wood retaining cap is glued over it that has been recessed to accept the wire, as was done on the main landing gear.

V Tail

The V Tail is cut from ¼" sheet which is sanded, seaded and covered prior to installation. The base of the twin tails rest on a ⅛ sheet platform that is glued in above the fuel tank area with the outside surface of each tail glued to the inside of the fuselage. A 3/16" sheet strip is then cemented in the center of the ⅛ platform between the two tails as an additional retainer. The angle of the V tail is established by spacing the tips 12" apart with the distance from the wing to a tip being 8¼ inches.

Sub Fin

The sub fin and rudder are cut from 3/16" sheet stock. The entire assembly is sanded and covered with the rudder mated prior to gluing in place under the wing on the center line. It is best to roughen the lower wing surface with sandpaper where the fin is attached prior to gluing in order to insure a good bond.

Equipment Installation

This has not been detailed as it will vary depending upon the type of equipment installed. The original ship had the engine servo mounted flat above the wing. The rudder servo was mounted on the right side of the fuselage to obtain a vertical axis on the servo wheel. A one piece wire push rod through the center of the curved fuselage wing section was used with a single keeper glued to the fin to restrict any flexing of the wire.

When installing the fuel tank, remember that this is a pusher and the fuel will be forced forward, rather than aft, in the tank. If you are using a clunk tank, double the fuel line back inside the tank so that the metal fuel pick-up is at the neck, or front. After the equipment has been installed and operated the top hatch can be glued in place. On the original ship no equipment access hatch was made, the entire top portion of the fuselage from the cockpit to engine compartment being glued in solid. If you desire equipment access, make a detachable hatch above your gear.

Flight Trim

The engine should be offset about 3½°. If you are using a standard engine with a reverse pitch prop, the offset would be to your left as you face the rear of the ship (the engine shaft moves from center line to the left). With a 35 engine some downthrust should be used. Start with about one washer under the rear engine bolts and progress as required. An important point to remember is that you are aft of the CG and you want to push up on the rear of the ship to achieve down.

You will find the Mantis less critical to CG location than a tractor aircraft. The ideal CG location should be about 8" back from the leading edge of the main wing (rear) but it can be shifted back as far as 12" or forward 6" and fly successfully. A more rear-ward location simply changes the trim on the forward plane, **but a word of caution:** you will find that a Canard configuration flies with a much more pronounced angle of attack on the smaller plane than a tractor aircraft. It is well to start with the forward plane well on the positive side and work down. If the angle of attack is too great, the result will be a pronounced nose high flight attitude, or a mush, rather than a full stall. On a tractor configuration, the front wing stalls first and as it holds you aloft the results are a considerable loss of altitude. On a Canard the forward wing is a trim plane, and when it stalls, the nose drops, and this reduces the angle of attack on the main wing (which is in the rear) and it does not completely stall out. On the other hand, if you start with too negative a setting the ship will tuck or zero out as speed increases.

The original ship flew well from the first without any adjustments other than a larger engine and more offset for torque. As the V-tail and sub-fin produce a strong weather vaning effect, the rudder area has been enlarged to produce a more responsive turn.

One last word of advice — if when you finish you just don't have the heart to take it off, a high speed taxi is guaranteed to clear the field of all dogs, cats and small children.

THUNDER STORMER

BY DOUG SPRENG

. . . or, Samantha, your broom i
double-parked! Doug Spreng strike
back at sanity with his not-sc
scientific explanation of how t
design a winner while keepin
your eye on a French curve

THUNDERSTORMER is the word for flying machines.

The whole thing started out as sort of a joke. Don Mathes and I decided to see how small a fuselage we could wrap around the Micro-Avionics receiver and servos. Would you believe his is skinnier? But then, so is he, so I guess it's okay.

This is another one of those "scientifically designed airplanes." You know — "Wonder what would happen if I made the fuselage ten feet long?" Or: "Think I'll take the dihedral out of the wing . . . be durned if I know how it will fly that way but it sure will make it easy to build!"

Actually, the initial design effort goes back almost a year to just prior to last year's Nationals. My usual last minute effort produced the first Thunderstormer. It was an ambitious effort. It was designed around the Rossi engine and featured a "flap" and flying stab. As it turned out, I should have named it "Blunderstormer." On the second flight the flying stab fluttered and tore the whole tail off, rudder and all! Several nasty words and a closed throttle later it dawned on me that what was left of it was still flying! It had flipped inverted after closing the throttle and was making like a big bird. As long as I didn't try to turn it too sharp it had a very shallow glide angle, so I gently guided my new "ailerons only" bird toward the nearest tall weeds where it came to roost without a scratch! It was then exactly one week before we were supposed to leave for the Nats. I replaced the empennage with a conventional tail, which took almost a week. So, the day before we Nat'sed it," I put a couple of flights on the silly thing just to make sure nothing else would fall off.

And, of course, a hell of a lot of good all this did 'cause during the second official Nat's flight somebody tilted the runway and my toy flew straight into it! After a good cry and a six months' vacation from R/C, I somewhat reservedly, but with malice of forethought, decided to spit in the "toy airplane God's" eye and try — "once more with feeling."

So here we are once again with a model designed around the same basic, down-to-earth, practical, scientific, nonsensical, black magic and witchcraft principles that made the Stormer so unsuccessful. That is, it does have a fuselage, wing, tail (non-flying type), and last but not least, a "Lee" type engine so that I don't have to throw it off a cliff to fly. (Heights make me dizzy.)

The airfoil **is** new (to me, that is). deBolt has been using it for years. So, to be "original," I used the 2% cambered version instead of the symmetrical one. It is a slightly modified NACA 65_2 — 215, A=0.5. How does **that** grab you? I eliminated the reflex at the trailing edge and, naturally, sharpened up the leading edge so it would stall quicker. It does, **too,** make sense. You see, instead of hanging on 'til the last glitch, then dropping like a rock on extended approaches, it simply mushes into the weeds. Speaking of weeds, Don Mathes claims that is why he made the Micro transmitter green — so if you crash you can throw it into the weeds, then walk away with no one the wiser!

Now, about that long tail moment. You **will** have to admit it looks racy! The great big stab is so that because the fuselage is so damn long the thing is tail heavy but it'll still fly. (Ed's Note: Whaddhesay?) Anyway, I used to build "Civvy Boys" and just couldn't kick the habit.

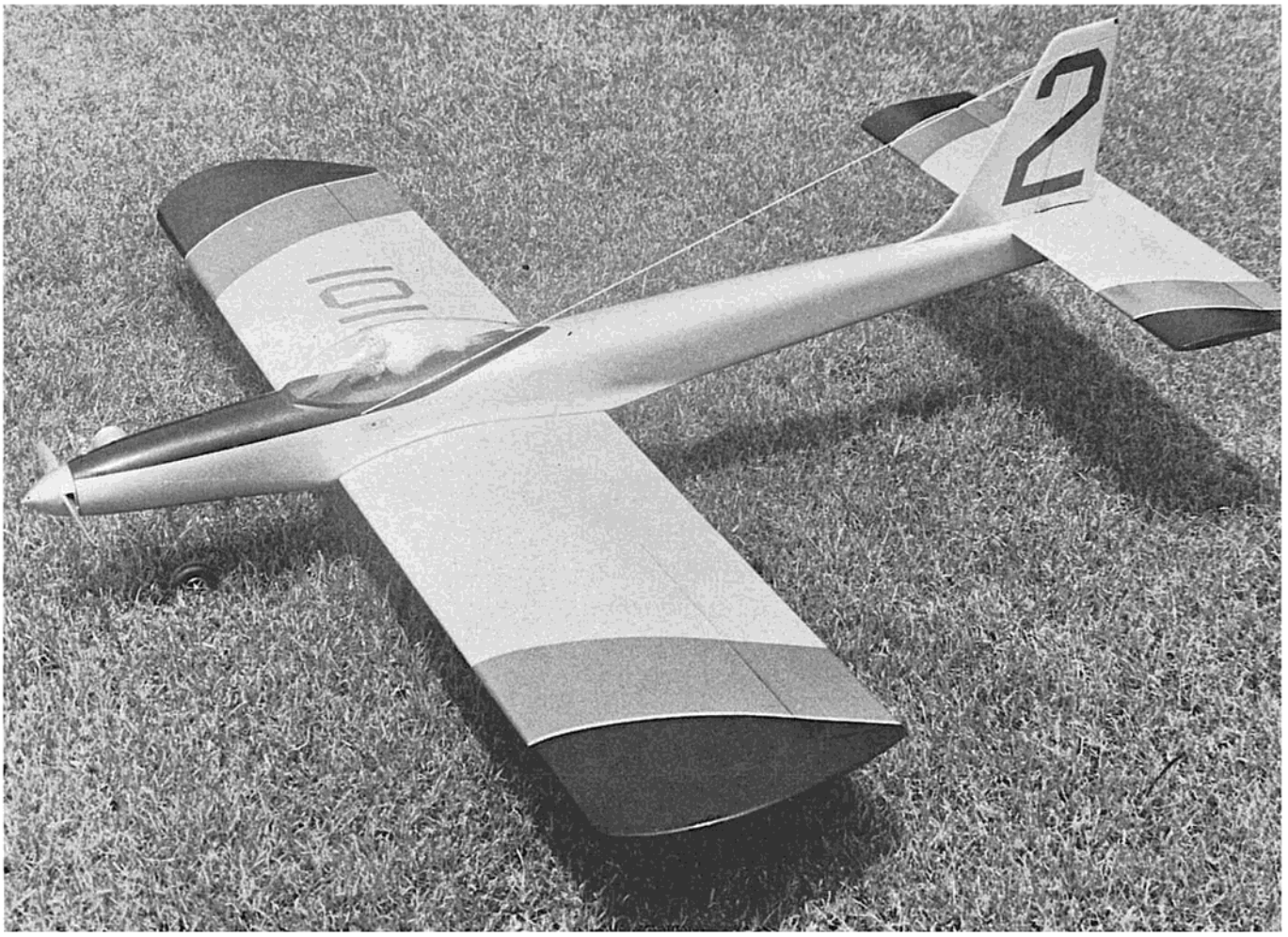
The only kind thing I can say about the whole mess is that the thing balances at about 50% of the chord, yet still is not squirrely in maneuvers. Not only that, but it is a hyper-axially rolling little grabber! Of course, the yaw-less rolls might possibly be due to the glaring absence of, pardon the expression, strip ailerons. It is my inebrious opinion that strip aileroonies have set R/C toy aviation back exactly 1.3 eons. C'mmon troops, we're not **that** lazy! As you will, or will not, see, I have gone to great lengths to make the fabrication of them real keen "barn doors" hyper-simple. Holy balsa butchers, if **I** can build it, **anybody** can! Would you believe almost anybody? Anybody with experience? How about one or two people?

You might get the impression that I'm trying to talk you out of building a Thunderstormer. You're right! I am! If I have to fly **against** one of these things in a contest, I'm sunk! How else can I maintain my pseudo-advantage? Or lack thereof . . .

Now let's tip-toe (would you believe stumble?) through the construction, starting with the modified surfboard.

Okay, you hot doggers and hodads, hang ten whilst I elucidate. Referring to the sketch that RCM is gutsy enough to call a plan, you will notice that the wing has all these funny things called ribs and spars. Arrange haphazardly as shown. Glue liberally, using glue. My next well-chosen comment is, "Sorry about that." This, of course, in answer to your question about why the photos and plans don't agree when it comes to the wingtips. Will you go for the fact that I'm inherently lazy (my mother's side of the family)? Also, being in a hurry, I used the tips off Thunderstormer #1. Do as I say, and not as I do.

Being as flat as the tires on a ten pound multi makes it possible to build the wing on a nice thick chunk of pine with 3/8" or 1/2" plywood, sawed, gang sanded, and glued on to support the top sheet under each rib, as per sketch. The 3/32" top planking is first edge-glued to a continuous 13" by 36" sheet, which is then sanded smooth enough to take



dope, or what-have-you. The object is not to sand it after the wing is lifted from the jig. This makes for a top skin that does not sag between ribs. It works. People have accused me of having a foam wing. But, of course, we know better, don't we?

Now pin the sheet down on the jig. Next, cut out the aileron sheets, pinning them down with a 1/16" gap between the main sheet and aileron sheet. Now go buy one-and-one-eighth packages of Bonner poly hinges and epoxy to the sheets, per plan. Make sure the epoxy squishes up through the holes in the hinges 'cause that's what pins them to the wing. Notch the rear spars where they meet the hinges and 'poxy in place. This also retains the hinges. It should now be casual to the most obvious observer that when we finally lift the wing out of the jig, the ailerons will be hinged and the linkage will be installed. As a side feature, the linkage is entirely buried in the wing. Nothing will protrude to snag your wife's (or girl friend's, or both) nylons. The rest of the wing is fairly standard, so I'll abstain from blithering about it.

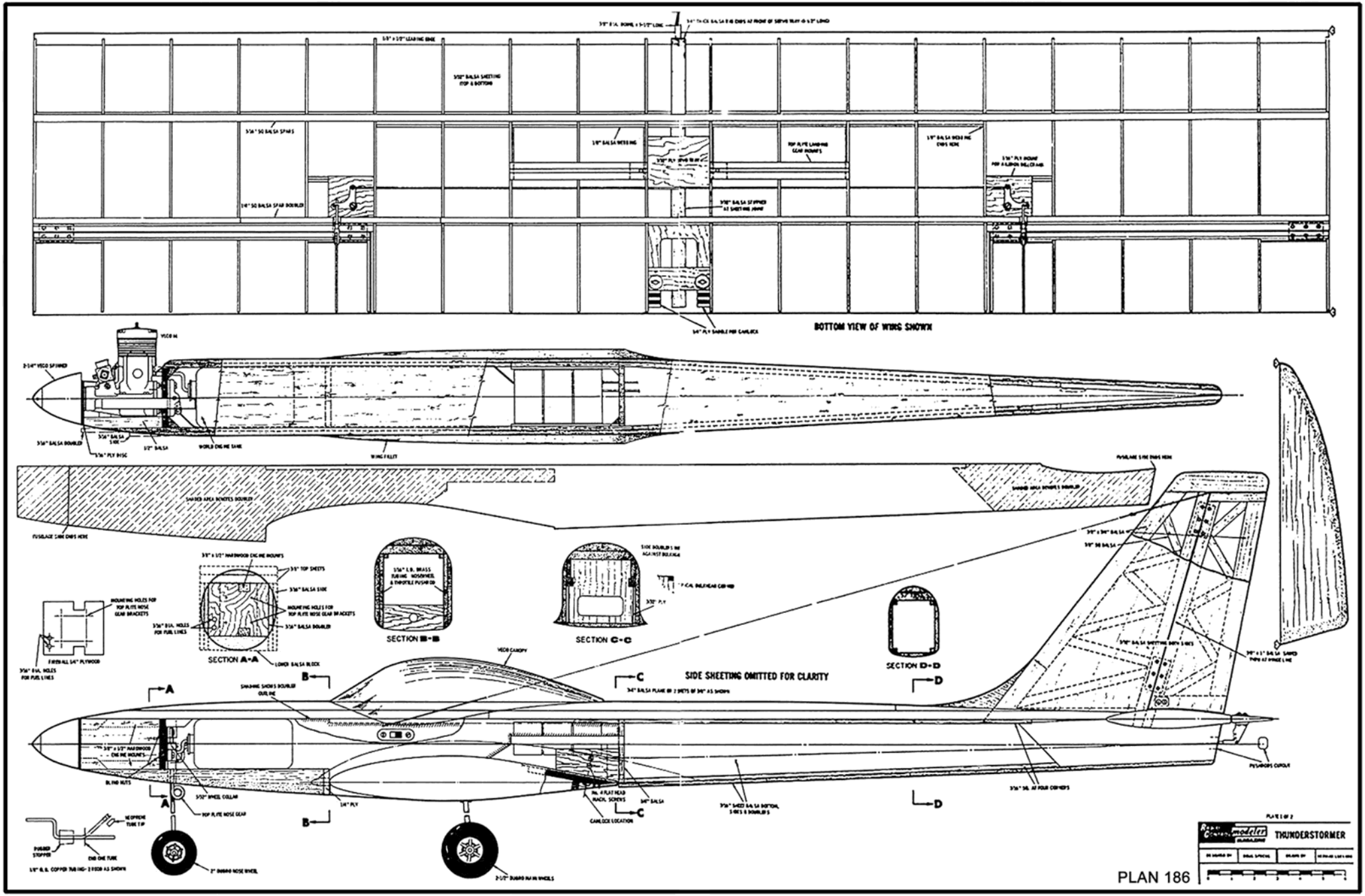
Now let's talk about the pogo stick, broomstick, bat, or whatever. Actually, kiddies, a few careless observations will lead you to believe that there is plenty of room for everything. This is not true. It's tighter than a reed radio manufacturer's advertising budget! But look at it this way — if **I** can get all that garbage in there, you humans shouldn't have any trouble. The fuselage is designed around a bevy of fantastic coincidences. Such as the tank and the spinner both measure 2¼" in the side view. The tank plus doublers is exactly as wide as a Micro Avionics servo (minus doublers) is long. (Whew!) Although the fuselage is longer than 48" you may use 48" wood because the sides don't need to go all the way to the spinner due to the shaping of the front end. The Veco 61 is exactly 2¼" wide (thank you, Clarence), and so on and on ad nauseum! Added advantages to side mounting the engine are that the needle valve centerline is coincident with tank center line, giving optimum performance, as well as allowing the exhaust to exit downwards, keeping your shiny model relatively free of the usual sticky, bug-catching mess. Also, please note that I have used Top Flite accessories wherever possible in order to save you **work,** not money. (Dear Top Flite: Payola gladly accepted.) Modify main gear per plan.

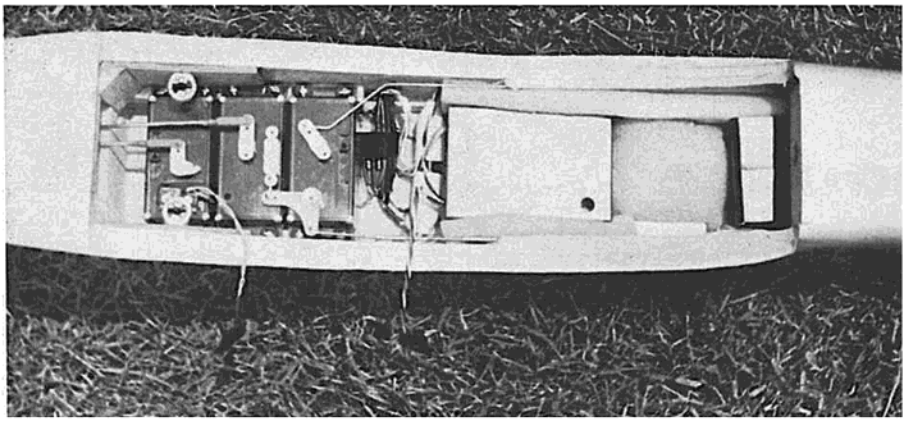
In assembly, you obviously must follow a certain sequence or you're in instant trouble like I was. Start by 'poxying the doublers to the sides. While that is hardening, cut out the firewall and bolt the Top Flite nose gear brackets on. Notice! There is a 3/32" ply shim under the brackets to allow the steering arm to swing amptly. (Wow!=What grammatical nonsense.) Now, it's top time. So you don't have to try and find some decent ¾" x 48" x 3" balsa for the top (I never did), I made mine by laminating ⅜" x 36" x 3" balsa. Obviously, since the top is longer than 36", it takes three pieces of wood. Cut one 36" piece into two 18" pieces, which, when joined to the end of the 36" pieces (with the joints staggered), makes your top block. 'Poxy the mess together and pin to a flat surface.

While the top is hardening, use an X-Acto gouge to make the grooves in which the nose wheel steering and engine control linkage tubing will be epoxied. Cut out the short motor mounts. Don't worry, when the front end is assembled and painted with epoxy, they are more than strong enough. If they aren't strong enough, sue RCM because I'm not responsible for my actions and RCM is screwy enough to print this tripe!

Want to be really petrified? I use sheet metal screws to mount my Veco 61. Clarence Lee had apoplexy when I told him, and he now refuses to come to the field while I'm there because he's afraid he will get beaned with his own

(Continued on Page **19** *)*


BOTTOM VIEW OF WING SHOWN
SIDE SHEETING OMITTED FOR CLARITY
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
THUNDERSTORMER
PLAN 186



THUNDERSTORMER

(Continued from Page 17)

handiwork when those lousy screws give up. But I've got news for you: just drill a #6 tap hole through ½" of motor mount stock and tap the hole with a #6 sheet metal screw ¾" long. When your arm muscles recover, it will suddenly dawn on you why I have confidence in that method! Anyway, when I built the front end, I forgot to put in blind nuts and so I'm stuck with the method. Besides, with no useless motor mounts cluttering up the tank compartment that real snazzy blue World Engines square tank (more payola) slips in like the 8-ball in the corner pocket. Needless to say, you had oughta' coat the inside of the tank 'partment with 'poxie. You will also come to the contusion that the steering arm must be hooked to its linkage **before** the bottom block is glued on. No need to install the Top Flite nose gear 'til after the bottom block is on, and for that matter, mine didn't get installed 'til after the model was painted. Just make damn sure you have some nice **long** Allen wrenches the right size, 'cause when you do install the nose gear, the only way you can tighten it up is through the tank compartment. You'll wish you had eyeballs in your fingernails, but like I said, all you humans out there in Model Land should fare much better than I.

By the way, I wanted to install the engine via a nice radial mount, but Clarence said **nyet**. He babbled incoherently about vibration tearing up the carburetor or something. I didn't understand it, but when it comes to engines, Clarence Lee is a combination of boss, god, allah, and he looks a little like buddah. (Or is it Jack Henry at Veco that looks like buddah?) Well, whatever he says is **the** word because he oughta know. Oh, by the way, Clarence says you all oughta' buy Veco 61's for your TS'ers (Or maybe that was what Jack Henry said . . .)

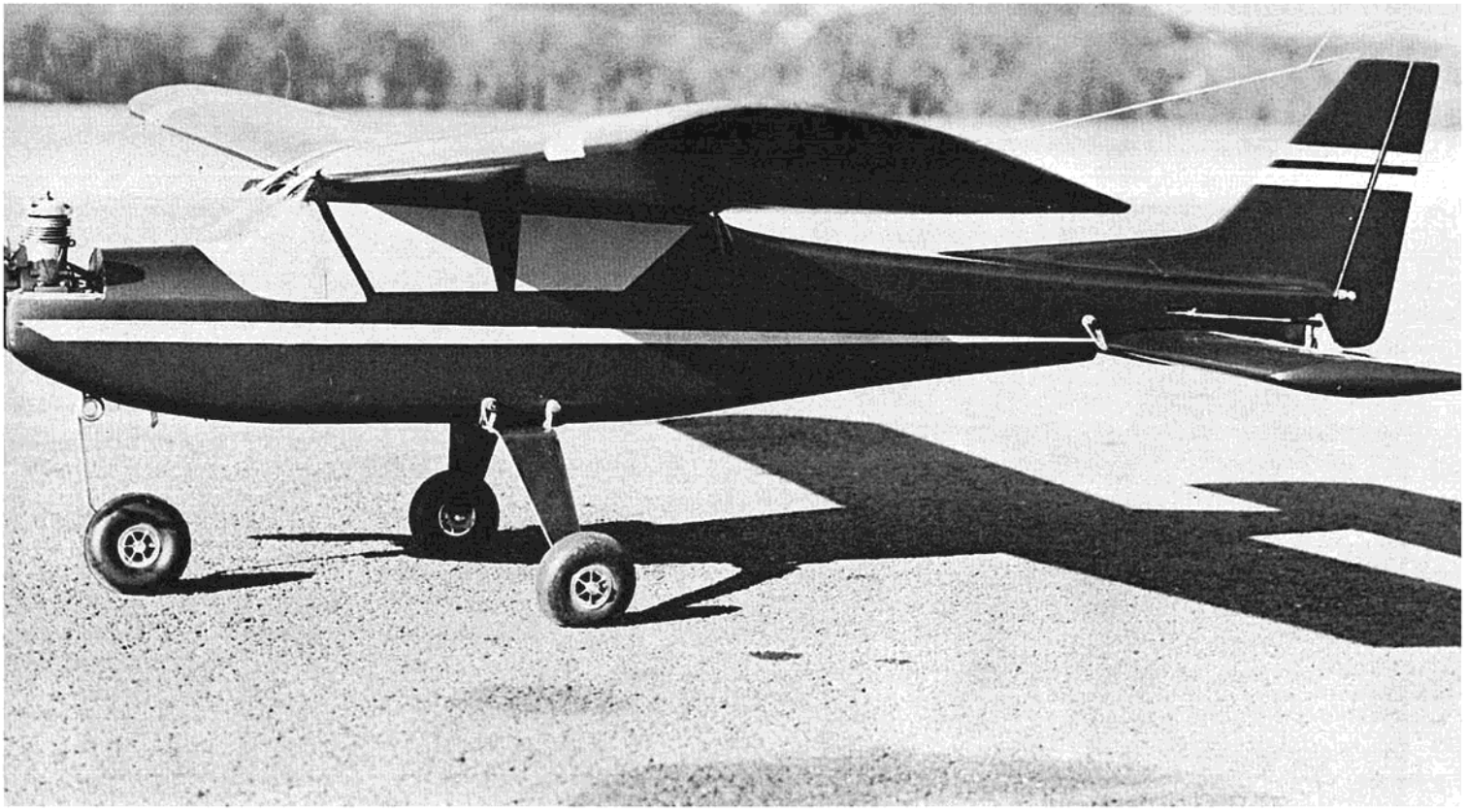
Anyway (and if there was any way I could get out of this I would), the fuselage is assembled upside down on its top block, ala Kwik Fri. If you've gotten this far you're in better shape than I am, so I'll not take the challenge out of it by giving away any more trade secrets.

So let us assume you're a real brave soul and you've just completed your bright shiny modified rocket ship and are ready to fly. Now this is where the long moments and large tail areas show the reason why. Assuming your Veco 61 is purring like a kitten and your Micro rig has been checked out and the switches are on, just slam the throttle home and watch the TS'er come out of the shoot like an angry bull! Don't fret, man, haul it off any time you want. It won't snap on takeoff, this I guarantee. Fly it around a while to get it trimmed out, then get the little grabber all lined up with the wing level and flying straight ahead. Then take your hand off the stick. If you've done your trimming well, it should fly horizon to horizon without correction. Now pull it up into a giant Immelman turn so it almost stops on top, then slam full aileron on and lock up on the keen axial roll out on top! That's those barn doors doin' what ailerons **should** do. Not a yaw in a bucketful!

The landing characteristics leave nothing to be desired except maybe it should land itself automatically already — but that would take the icing off the cake. As previously mentioned, the sharp leading edge causes a sooner, gentler stall. In fact, the model just sort of mushes and settles **instead** of stalling. I am sure the large stab and long moment arm has something to do with it, but I'll be durned if I can prove it. Condensing all that trivia down, I'm saying that you don't have to worry about losing control if you slow way up. The silly thing just doesn't have any bad traits. In fact, it is so tame that it's hell to make it spin. In fact, it's so tame it almost won't fly (oops!).

Well, enough of this bull. This makes eighteen pages of handwritten copy and I have to get my ball point gassed up. (Editor's Note: To match its owner, Doug?)

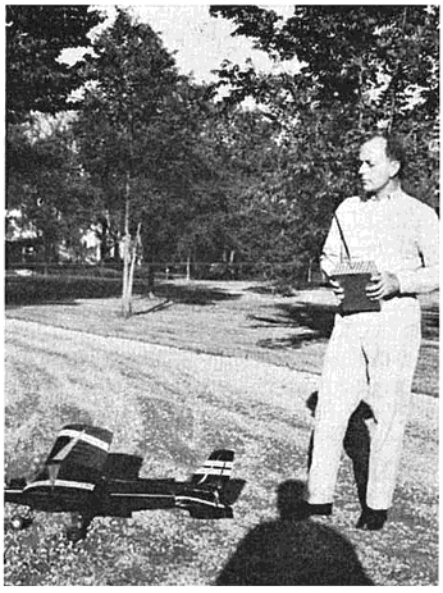
So, like Confucius say — "Rotsa' Ruck."



SQUIRE MK II

By DICK THOMAS

For the Newcomer to R/C, the Multi Novice, the Sport Flier . . . in fact, for YOU if you really want to FLY . . .



WANT to taxi? Want to brake? Want to take off unassisted? Want to make a thousand effortless touch-and-go's? Want to really fly?

This, then, is an article for you — the newcomer to R/C, or the RC'er who is about to go into multi, or is already there and floundering. The Midwest Tri-Squire, with a few simple modifications and six channel, or proportional equipment, can really give you your wings!

The Squire was originally designed for escapements and a .15 engine, rudder-only (possibly kick-up elevator), no brakes or steering. But our Squire has steerable nose gear, a Super Tigre .23 for power, and three servos inside for rudder, elevator, and engine control. Steering is attached to the rudder servo and the brakes work off down elevator. We will also have larger moving surfaces for more sensitive response and some reinforcements here and there. And last, since we are not bound by the limitations of escapements, a few changes in configuration to produce a plane with some real eye appeal! And the latter, to me, is a MUST in R/C. A model plane doesn't have to be ugly to fly, any more than the real ones.

When I started in R/C, I decided after much deliberation, to buy a 10 channel outfit and start out on a six channel plane. I made this decision in the face of well-meant advice to cut my teeth on single channel, rudder only. I have never regretted the determination to go multi from the start, that is, from the standpoint of investment, since I only had to make one equipment purchase, and it has substantial resale value. But, from the standpoint of being able to fly my first plane, the whole thing was

a nightmare! I built a Falcon and stalled it on takeoff — a sensational crash and some "I told you so" comments from my contemporaries at the field. But it came to pass that I could get the Falcon off the ground, and though every second was comparable to torture and pain, I could get it around the sky in big circles.

But land? My landings were all accidents to one degree or another, and took place in the general vicinity of where the plane wanted to go . . . never where I was standing! And, although I made fifty flights with the Falcon, I never really **flew** it. I dreamed of a plane I could control and command . . . one that would do my bidding gently. I next built a Tauri and found myself with the same trouble. Let me say here, and emphatically, that I have the highest regard for both the above designs and kits. But, from my experience, they are projects for the RC'er with substantial air time. I was very discouraged. The vision of that plane I could take off and land, touch-and-go, and maneuver in the air short of constant crisis seemed more remote than ever.

I conferred with Frank Schwartz who is the equivalent of my Patrol Leader and/or Faculty Advisor in R/C, and he again urged me to build a Midwest Tri-Squire modified for six channel, reminding me of the beautiful performance of one at the 1964 Mid-South R/C Championships. This, by the way, was flown by none other than Nickie Neville, now Class II Nats Champ! This contest is held in my home town of Nashville and sponsored by the Middle Tennessee R/C Society during the first weekend in June.

My secret hesitancy about building the Squire was my conviction that it was about the homeliest plane I had ever seen! It embarrasses me to come right out and say so, but it's the truth! When I bought the first kit I couldn't bear to look at the picture on the front. But, needless to say, I took Frank's advice, and besides the suggested flying alterations, found myself adding some face-lifting to the Squire.

That decision to build the Tri-Squire has resulted in more genuine flying pleasure, to say nothing of thrills, than I would have dreamed could be mine in R/C! It also resulted in a sound foundation on which to move into hotter multi ships.

I could easily take ten pages to describe the sheer ecstacy of setting the Squire up on a long approach, engine idling, feeding in minor corrections, and have the plane seemingly slide down a wire to the runway, flare out, touch down, brake and turn, or full throttle and up again. Man . . . that's livin'!

On my first two Tri-Squires (the one pictured in this article is my fifth), I conservatively estimate that I put in 500 flights and made four times as many touch-and-go's. The truth is I'm nuts about touch-and-go's . . . I dream about 'em! But think about it . . . it is the one maneuver requiring absolute control on the part of the pilot and precision performance on the part of the plane and equipment. Practice your T&G's diligently and the in-air maneuvers will be perfected a lot easier. And another word of advice — let some qualified RC'er get the plane off the ground . . . you take over in-air and give it back to the expert for landing. And don't fly the plane ragged when you get a little air-time! I see guys who know only one way to fly — wide open! And on each flight they "wring out" the ship through their own little set of maneuvers like every flight would be their last. And, all too frequently, it is! Get in the air, throttle back, and enjoy the thrill of relaxed flying and the systematic improvement of your proficiency. This way, believe me, you'll get more stick-time and far less bench-time!

For you proportional enthusiasts, the Squire is an excellent trainer. There are a couple of them in the area using the RCM Digitrio and are racking up excellent performance. But enough of this hangar flying — let's get on with construction!

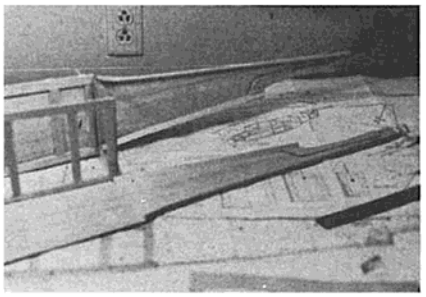
Fuselage

Construct the frames as directed in the kit. Using bulkhead 5 as a pattern, cut a new bulkhead from 3/32" plywood, measuring 3¾" in width. Remove the center so that the sides, top, and bottom are ½" in width. This gives the additional width necessary to permit placing three servos abreast. Other dimensions on the bulkhead are the same. This extra width is necessary for Bonner servos but might not be so for Annco or other smaller units. In any case, Bulkhead #5 is of plywood. Bulkhead #4 is omitted. Attach Bulkheads 3 and 5 to frames.

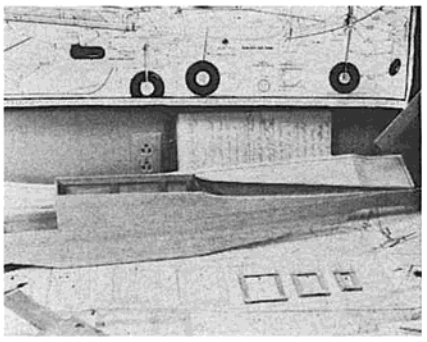
We are now ready to cut and modify the 3/32" sheet sides. Cut them to plan outline first. The shaded areas are to be cut off the plan sides. The strip on the bottom of the fuselage comes off for appearance and gets rid of that bulky look in this area.

Next, carefully, and accurately, modify the stab incidence as indicated. This is done after the fuselage sides have been cut for the original stab and after the rear doublers are in place. This increase in stab incidence is desirable since we are increasing power and speed, and thus will reduce the tendency to balloon.

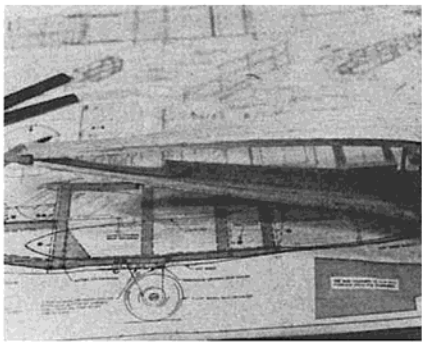
Now glue ¼" triangular strips along the top and bottom of the fuselage sides from bulkhead 5 back. Make several knife or saw cuts in these strips immediately behind Bulkhead 5 to facilitate . . . curving the top strips at this point. These strips increase the strength factor as well as allowing the rounding off of fuselage corners.



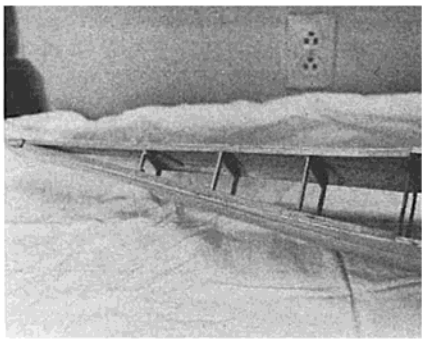
Joining fuselage sides to pre-assembled framework.



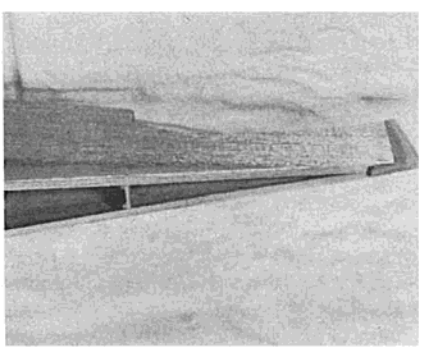
Basic fuselage structure with balance of formers in place on plans.



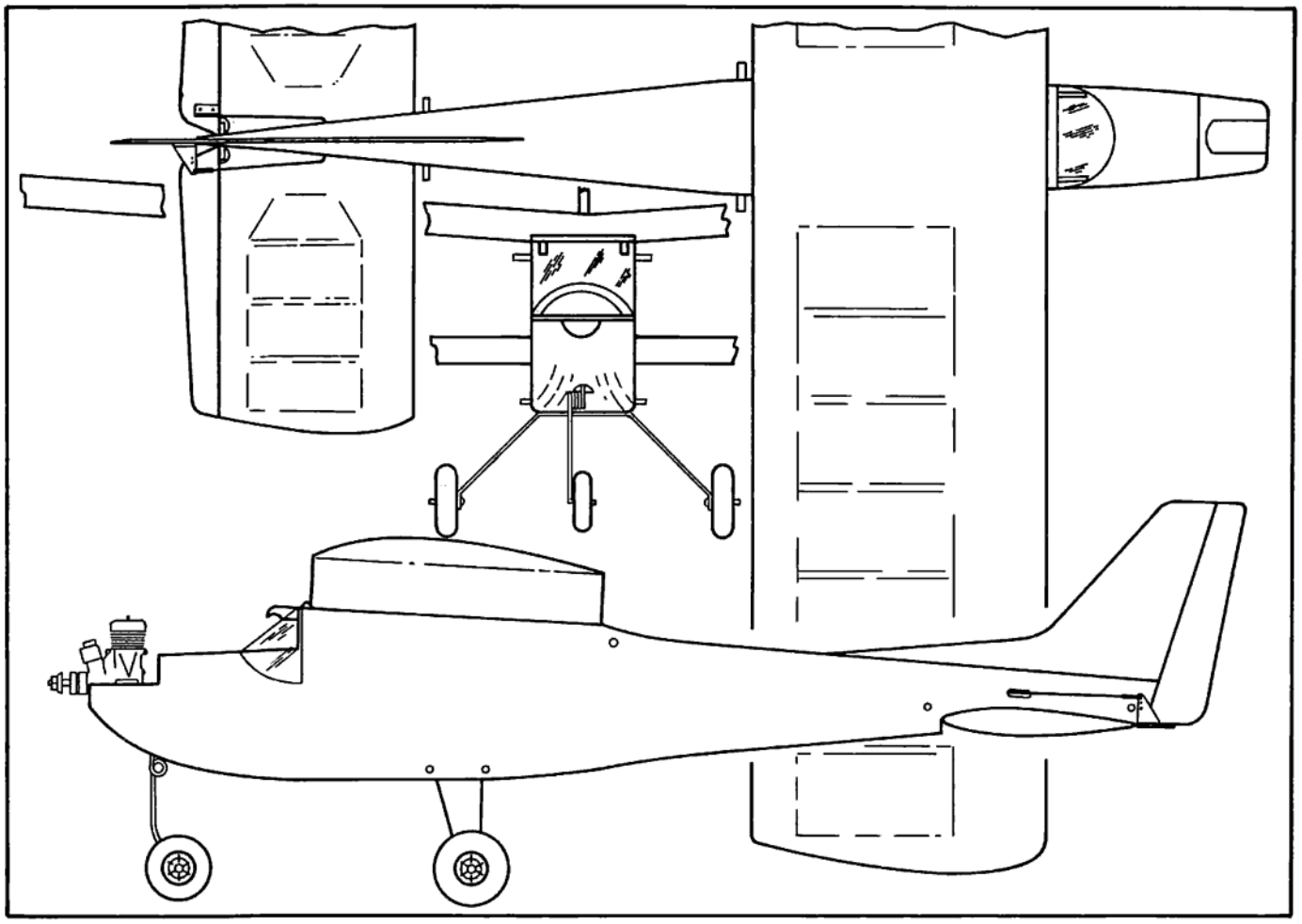
Close-up of modified tail assembly.



All fuselage aft formers in place.



Close-up of modified tail block.



Glue the fuselage sides to the frames. Build formers 6, 7, and 8 on plans but do not glue on the cross pieces at the bottom. Cut off ¼" triangles at top corners to allow for triangular strips. Now join the fuselage sides at rear with the ⅜" tail block cut to shape as shown in the outline. Note how the servo area widens out in a gentle curve when the sides are joined. This extra width is desirable and is certainly not unpleasing in appearance, so plank the bottom, when the time comes, without regard to plan width in this area.

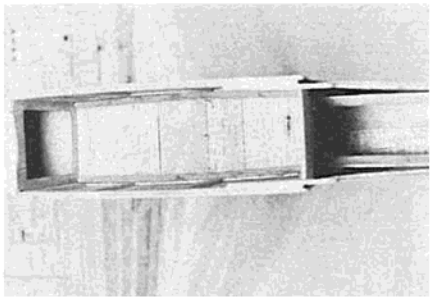
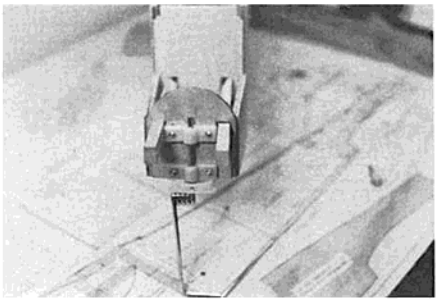
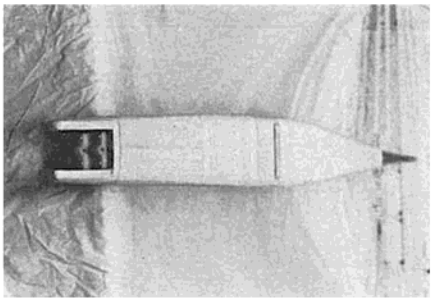
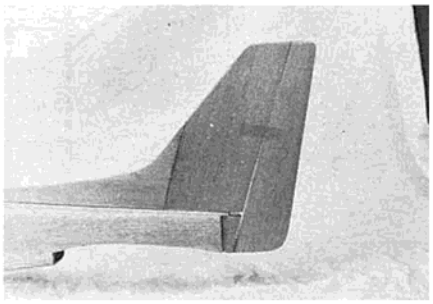
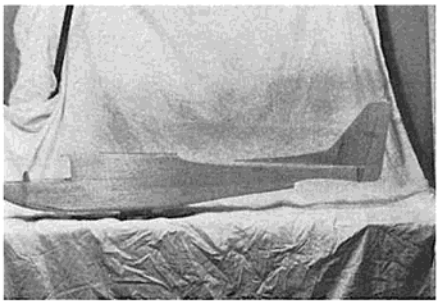
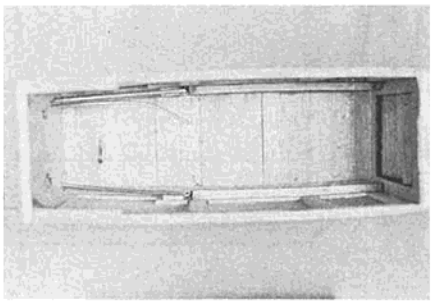
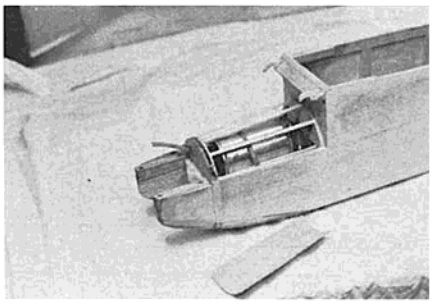
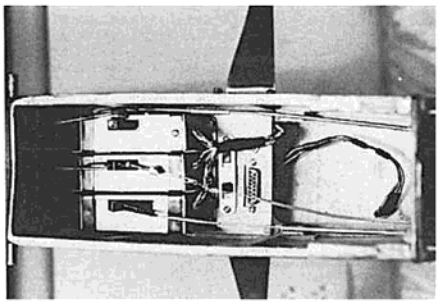
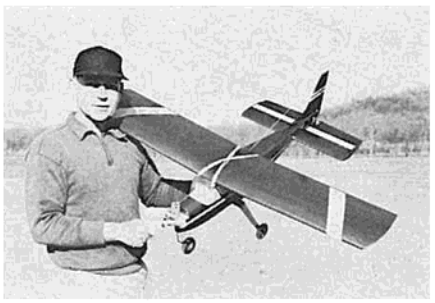
Now, back to those incomplete bulkheads. Since we reduced the height of the fuselage sides aft of bulkhead 5, we will have to custom fit #6, 7, and 8. Slip each into place, mark and cut, then glue in position. At the same time, glue in the bottom cross pieces.

Let's go back, now, and assemble the nose gear on Bulkhead #1. Using the kit bulkhead as a pattern, cut another from ⅛" plywood. We need a total of ¼" on this bulkhead for extra strength. It could be cut from ¼" stock, but the ⅛" is easier to work. Glue the two together and assemble the Top Flite nose gear so the top bearing is flush with, or slightly below, the top of the engine mounts, and the lower mount is positioned flush with the bottom of the bulkhead. Put a touch of solder on each nut to lock. This is a good time to bevel off the sections of the motor mount that the tank will be seated on. Since we are increasing power, we will use a Dmeco 4 ounce tank. I have used a six, but you'll get all the flying you want with a 4 and the Super Tigre 23. Now position the nose gear bulkhead and the motor mounts and glue in place.

Now, let's talk about the tank for a moment. Beveling the motor mounts permits seating the tank below bulkhead height. Bulkhead #2 is omitted and the ⅛" stringer extends from bulkhead 1 to 3A. Due to the longer spanning, put in two extra stringers at the 11 and 1 o'clock positions on bulkheads 1 and 3A. I prefer to cut off the filler tube on the top of the tank and seal it with solder, using the fuel line at the engine to fill through. I have found the amber surgical tubing preferable for fuel tubing because of its flexibility in all kinds of weather and for its extreme resiliency and toughness. Ultimately, the tank should be secured with a ½" strip of thin sheet metal (tin can stock) across the top and held in place by wood screws in the motor mounts. Preparations for tank installation should be made as above, but do not place in position at this point since we first need to install the tubing for the motor and steering pushrods and brake cable. This can be a bugaboo and quite messy, but not so if we make and use a 10" piece of 5/32" landing gear rod, sharpened on one end to 4 flat sides (like a nail). Locate where you want the throttle and landing gear tubing to exit and drill away through both bulkheads. The hole for the brake cable can be drilled in bulkhead #3 by dropping down while the bit is still in the hole for engine tubing in bulkhead #1. I prefer aluminum tubing for lightness and ease of bending. Glue all tubing in place. Now seal the tank area and all the engine area with a coat of Hobbypoxy II. Install the tank with fuel and overflow tubing attached. Sheeting of the top of the tank area can be facilitated by cutting one half of the sheeting to shape and then lightly coating the outside with water and bending to desired curve. Each half can then be glued in with a minimum of assistance from the pin box.

I have found nothing more satisfactory for brake cable than nylon-encased, braided fishing leader, 15 pound test. It can be secured neatly by folding back and securing the double strand with a wrapping of fine copper wire. My experience has been that brakes need frequent adjustment and the turnbuckle depicted on the plans works very well for this. Pick up some small swivels to install as shown when purchasing the brake cable.

Plank the top of the fuselage, increasing thickness to 3/32" sheet from beginning of the fin aft. Install the same triangular stringers on each side of

fuselage bottom from bulkhead #3 to #5. The main gear is set back one inch from plan position. Install it first when planking the bottom. Cut the landing gear mount from ¼" plywood, increasing the width (fore and aft) to 2". The main gear is a Dmeco, preformed and precut, 1½" wide where it is seated on the mount. On the rear edge of the plywood mount, epoxy a 3/32" strip of plywood ½" wide that has been tapered on the rear edge. This will back up the main gear which could otherwise gouge the fuselage bottom on one of those embarrassing slam-in landings. DO NOT KEY GEAR IN PLACE WITH SCREWS.

Plank the fuselage bottom and build up the cowl. I do not fill the center section below the engine since minor streamlining problems can be tackled on some later project and good access to the nose gear is desirable. If you prefer, remember to leave access for the lock collar so the nose gear can be removed.

Next, trim the top and bottom sheeting and sand to shape. A word on sanding: starting from the position that it can get tiresome and/or wavy, I recommend two corrections. A sanding block, 9" x 3", on which a half sheet of sandpaper is used is a must. And for rough sanding of corners and thick balsa sheeting, try D weight (50) open coat aluminum oxide production paper by 3M. This is the only way I know to get clean continuous shaping. Shape carefully and round out all corners to such a degree that we expose approximately ⅛" of the triangular stringers in these areas. On the inside corners of bulkhead #3, glue a ½" triangular reinforcing strip from the fuselage top to the motor mounts, notching to allow for the plywood wing mounts. Using HobbyPoxy Formula 2 glue and a piece of Sig glass cloth, secure in place over these mounts, allowing the cloth to generously overlap. In the event of a major pile-in with the Squire, this will show up as the weakest point, and the above reinforcement will allow us to continue our day's flying after attempting to execute some portion of a maneuver below ground.

The servo tray is mounted on ¼" square rails of spruce which extend from bulkhead #5 forward 6¾" and are positioned 1" above the floor of the fuselage. The servo tray may be held in place by small wood screws or by the bracket shown in the drawing. The latter require a little more work but make for trouble-free securing of tray plus easy removal. Fill between frame uprights with ⅛" x ½" balsa and glue rails in place.

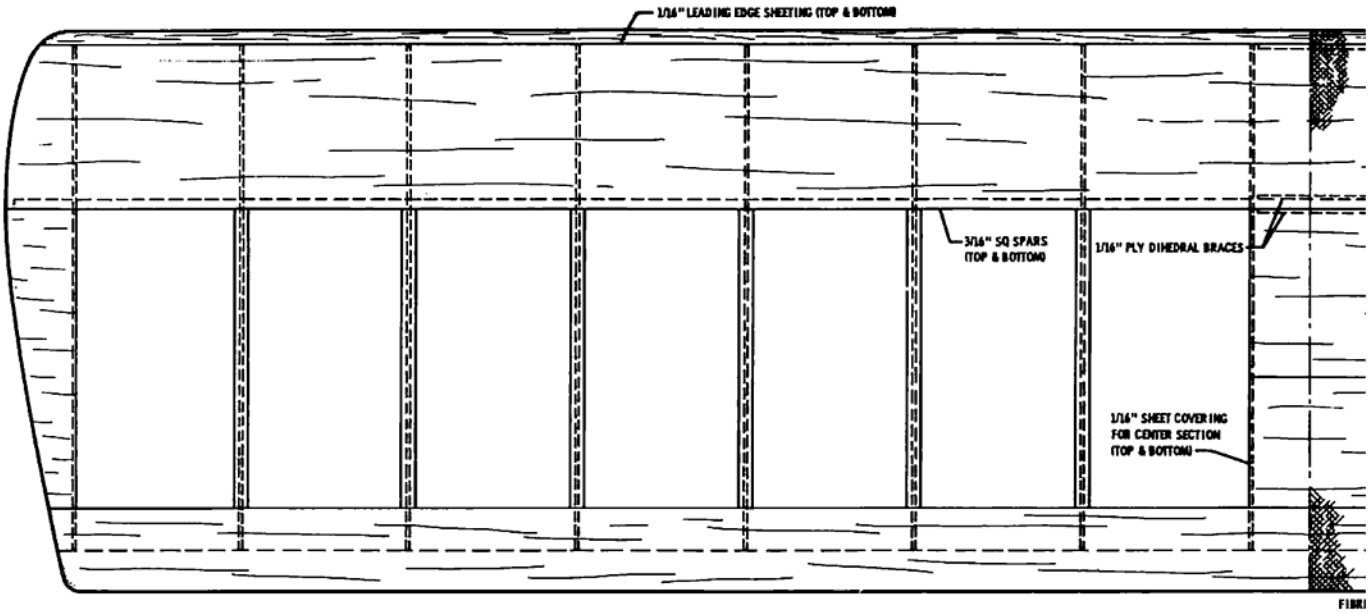
I like a completely self-contained tray unit, down to charging jack, and have shown an installation that includes switch, receiver plug, and jack, all on the same tray. The use of a World Engines slide switch permits soldering of all four groups of "common" wires in the harness to the switch poles. Insulate each at the solder joint with a piece of transparent fuel tubing. This goes a long way toward eliminating the "bird nest" problem. I, personally, "turn on" when I assemble the plane at the field, the idle drain on the receiver batteries being no problem. But, if your frequency is too popular, make a small hole in the fuselage side through which a small wire, right-angled on the end, can be inserted to turn on and off. Thus can end the era of exterior electrical components and the accompanying hazards and inconvenience.

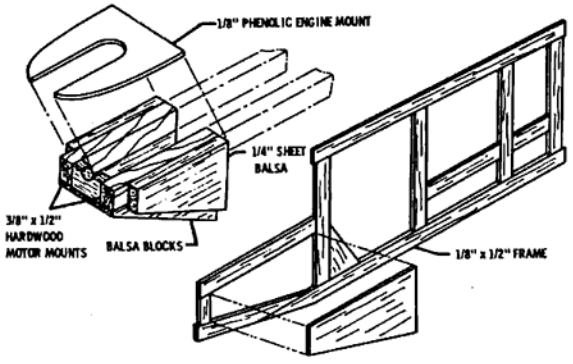
Use DuBro Kwik Links with threaded adjustments at the rudder and elevator horns and at the engine servo. A small hole can be drilled through the threaded back end of the elevator servo eye and the turnbuckle and swivel, previously mentioned, attached by wiring on. Obtain a heavier gauge windshield material and use the kit shield to cut a new one. Secure on the finished fuselage with a careful application of HobbyPoxy 2.

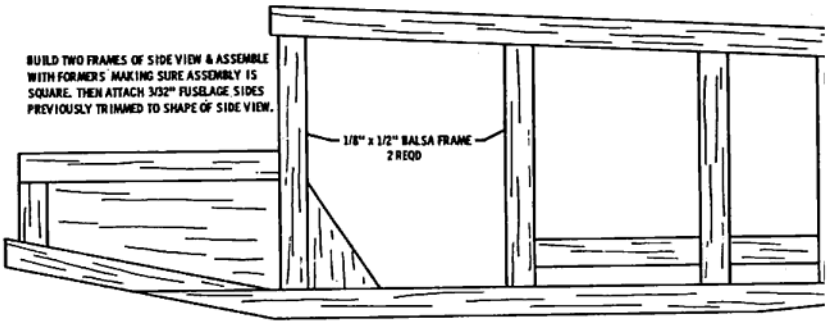
Wing

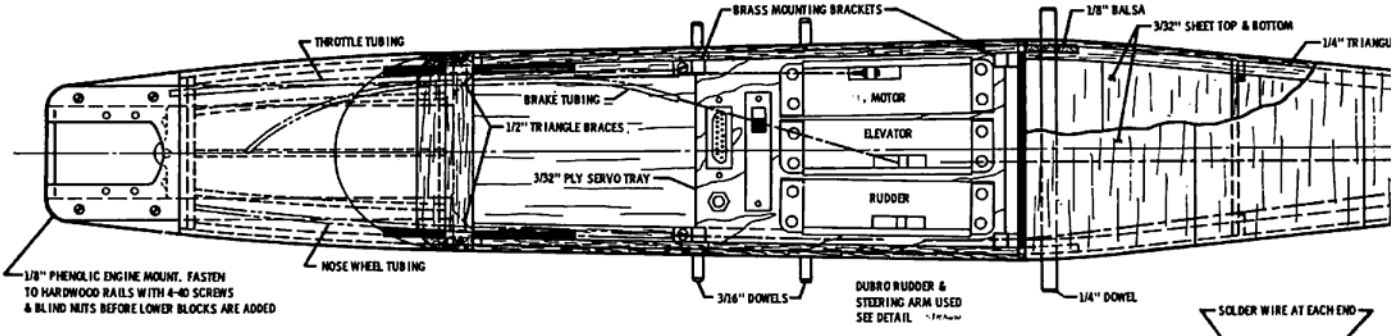
Construction of the wing is the same as on the Midwest kit plans with the following exceptions. The dihedral is

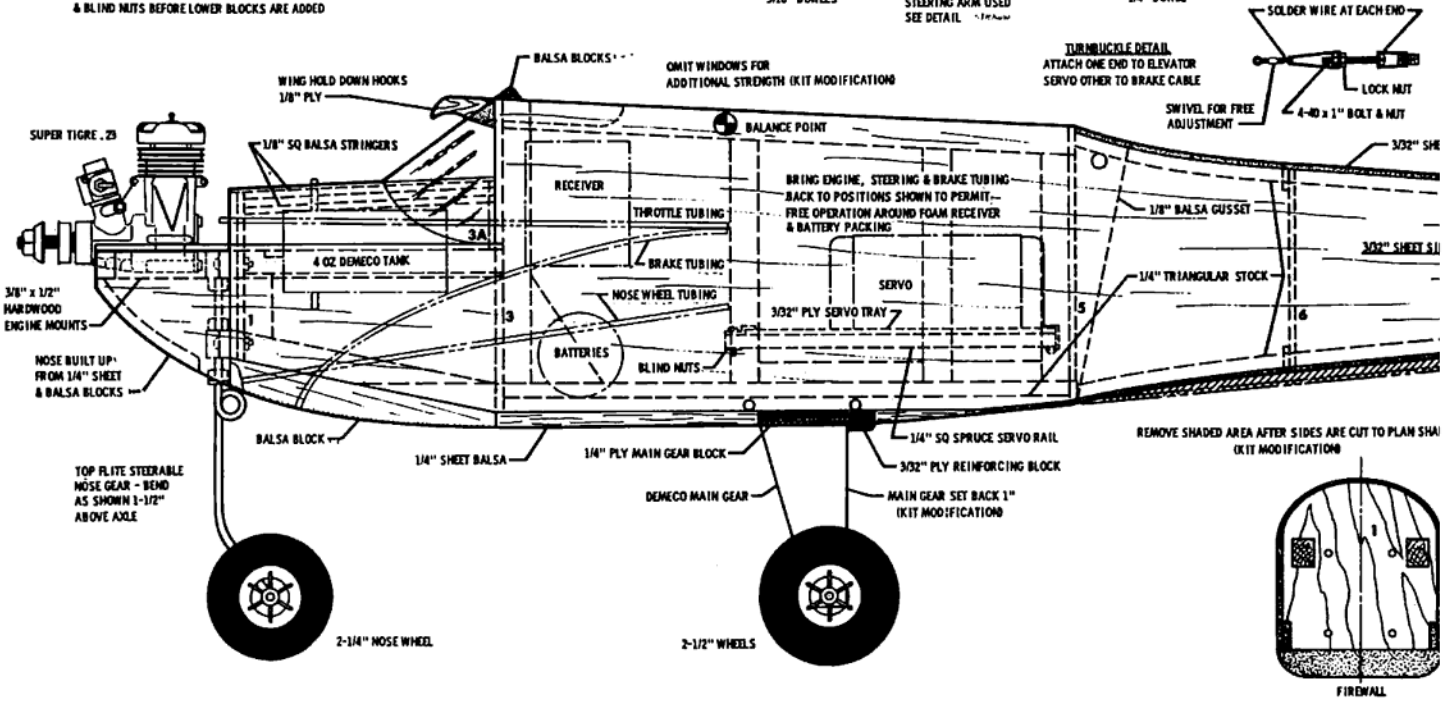
(Continued on Page 26)

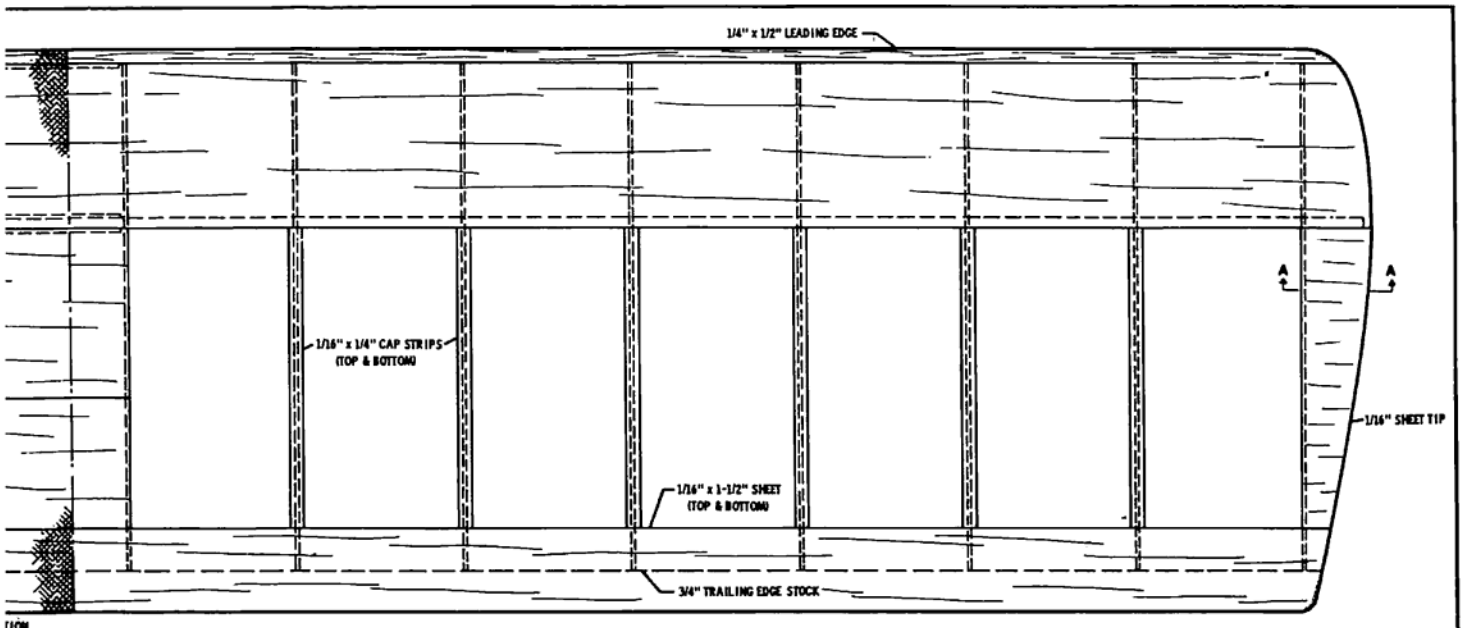

1/16" LEADING EDGE SHEETING (TOP & BOTTOM)
3/16" SQ SPARS (TOP & BOTTOM)
1/16" PLY DIHEDRAL BRACES
1/16" SHEET COVERING FOR CENTER SECTION (TOP & BOTTOM)


1/8" PHENOLIC ENGINE MOUNT
1/4" SHEET BALSA
3/8" x 1/2" HARDWOOD MOTOR MOUNTS
BALSA BLOCKS
1/8" x 1/2" FRAME


BUILD TWO FRAMES OF SIDE VIEW & ASSEMBLE WITH FORMERS MAKING SURE ASSEMBLY IS SQUARE. THEN ATTACH 3/32" FUSELAGE SIDES PREVIOUSLY TRIMMED TO SHAPE OF SIDE VIEW.
1/8" x 1/2" BALSA FRAME 2 REQD


BRASS MOUNTING BRACKETS
1/8" BALSA
3/32" SHEET TOP & BOTTOM
THROTTLE TUBING
BRAKE TUBING
1/2" TRIANGLE BRACES
3/32" PLY SERVO TRAY
MOTOR
ELEVATOR
RUDDER
NOSE WHEEL TUBING
1/8" PHENOLIC ENGINE MOUNT. FASTEN TO HARDWOOD RAILS WITH 4-40 SCREWS & BLIND NUTS BEFORE LOWER BLOCKS ARE ADDED
3/16" DOWELS
DUBRO RUDDER & STEERING ARM USED SEE DETAIL
1/4" DOWEL


SOLDER WIRE AT EACH END
TURNBUCKLE DETAIL
ATTACH ONE END TO ELEVATOR SERVO OTHER TO BRAKE CABLE
LOCK NUT
SWIVEL FOR FREE ADJUSTMENT
4-40 x 1" BOLT & NUT
BALSA BLOCKS
OMIT WINDOWS FOR ADDITIONAL STRENGTH (KIT MODIFICATION)
WING HOLD DOWN HOOKS 1/8" PLY
SUPER TIGRE .23
1/8" SQ BALSA STRINGERS
BALANCE POINT
RECEIVER
THROTTLE TUBING
BRING ENGINE, STEERING & BRAKE TUBING BACK TO POSITIONS SHOWN TO PERMIT FREE OPERATION AROUND FOAM RECEIVER & BATTERY PACKING
1/8" BALSA GUSSET
4 OZ DEMECO TANK
BRAKE TUBING
NOSE WHEEL TUBING
SERVO
3/32" PLY SERVO TRAY
1/4" TRIANGULAR STOCK
3/8" x 1/2" HARDWOOD ENGINE MOUNTS
BATTERIES
BLIND NUTS
NOSE BUILT UP FROM 1/4" SHEET & BALSA BLOCKS
BALSA BLOCK
1/4" SHEET BALSA
1/4" PLY MAIN GEAR BLOCK
1/4" SQ SPRUCE SERVO RAIL
3/32" PLY REINFORCING BLOCK
DEMECO MAIN GEAR
MAIN GEAR SET BACK 1" (KIT MODIFICATION)
TOP FLITE STEERABLE NOSE GEAR - BEND AS SHOWN 1-1/2" ABOVE AXLE
2-1/4" NOSE WHEEL
2-1/2" WHEELS
REMOVE SHADED AREA AFTER SIDES ARE CUT TO PLAN SHA (KIT MODIFICATION)
FIREWALL (2 1/8" PLY OR 1/4" PLY

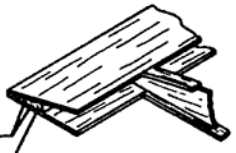


DIHEDRAL DIMENSIONS

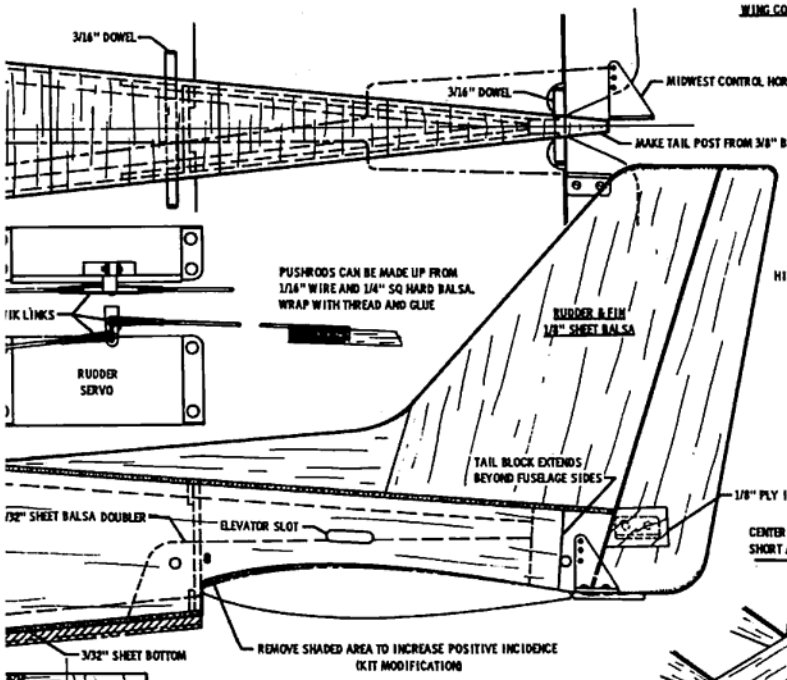

RIB TEMPLATE
18 REQD 1/16" BALSA

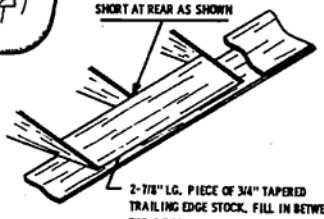
SECTION AT CENTER OF WING

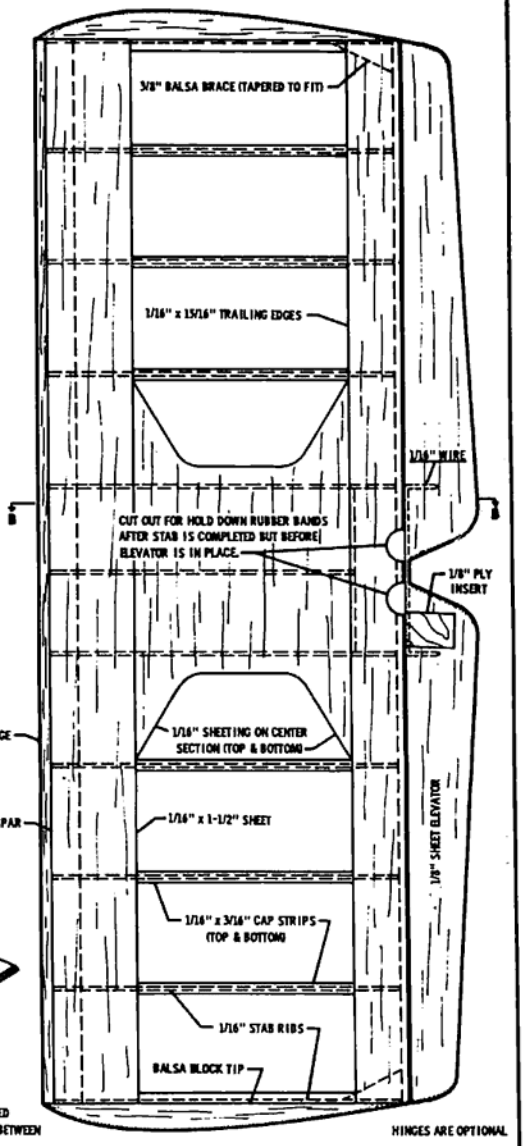
SECTION A-A



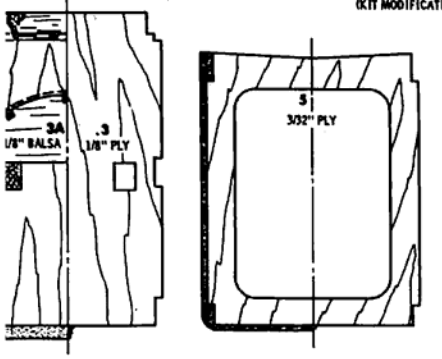
WING CONSTRUCTION








SECTION B-B
ELEVATOR RIB TEMPLATE 11 REQD 1/16" BALSA



BUILD FORMERS 6, 7, & 8 ON PLANS OUT OF 3/32" x 3/8" BALSA

Radio Control modeler MAGAZINE

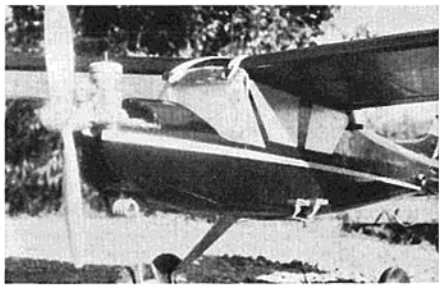
SQUIRE MK.II

DESIGNED BY	DICK THOMAS	DRAWN BY	DICK KIDD

0 1 2 3 4 5 6

SQUIRE MK II

(Continued from Page 23)



reduced to a total of 3½" measured from the top of the end of the wing. Make the top trailing edge sheeting from a 1/16" x 1¾" strip. Let this match up with the rear of tapered ¾" trailing edge and extend forward over the ribs, rather than using the kit 1/16" x ¾" strip. A slight amount of sanding may be necessary, but the single sheet affords additional strength in this area. Make **all** trailing edges square. Do not round or taper to a point. The reasoning behind this is set out in an article by Hal deBolt in a recent article in another publication, in which tests have shown this to be preferable. So, no more necessity for tediously shaping trailing edges — simply square up with a sanding block. Reinforce the wing center section by epoxying a double thickness of glass cloth (4" wide) completely around the wing.

Stabilizer

Construct the rib frame as shown on the plans. Next, sheet the leading edge, top and bottom, with a piece of 1/16" x 1½". Reinforce the rear corners with a piece of 1" x ½" triangular block of ⅜" stock fitted down into the "V" formed by trailing edge sheeting. The elevators are joined by 1/16" wire and attached with nylon hinges.

Fin

Cut the fin from 3/32" stock to pattern shown on plans. I have found nothing more satisfactory for attaching the fin to the fuselage than HobbyPoxy 2, after covering. Use your index finger to make a fillet type joint. Use sparingly. If a larger fillet is desired, add HobbyPoxy Stuff over cured HobbyPoxy 2.

Covering and Finishing

There are so many ways to finish a plane, now, that I hesitate to give details, but for a good dope finish, seal all bare wood with two coats, sanding after each. Apply silk. I prefer to lay on, then wet with a spray and apply a coat of dope to all wood areas. Do not dope open areas or rib cap strips at this time. Let dry. Now apply clear dope all over. Continue to apply clear dope until the silk is sealed . . . this may take three or four coats. Let dry thoroughly. Sand with 320 or 400 wet or dry automative finishing paper. Use it wet, dipping repeatedly into a container of water to "unload" sanded buildup. The wet or dry is the only way I know to achieve a desirable finish. Lay on successive coats of dope, wet sanding between each until a desirable finish is achieved. Last, apply final color by spraying. All contrasting trim colors should be applied with the use of masking tape over which a coat of clear has been applied to prevent "run-under." Trim colors can be brushed on to taped areas.

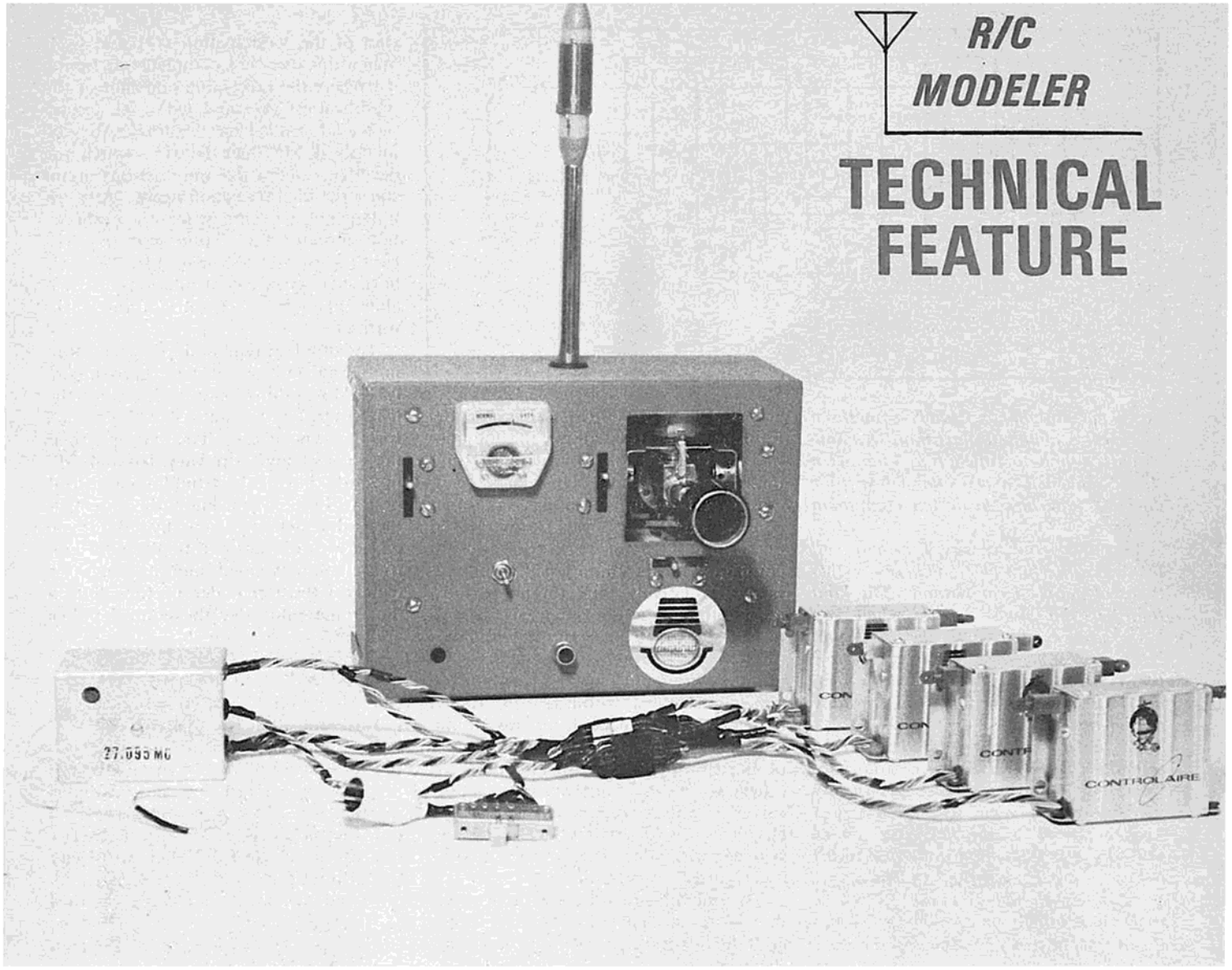
Flying

It will probably be found that one washer under each rear engine mounting bolt (Top Flite brass) is desirable for additional down thrust, and these can be installed prior to first flights. Check the CG carefully, using two pencils (erasers up) under wings to locate. Do **not** fly until it is correct. Using a Controlaire receiver, Bonner Transmite servos, and a 500 mah nicad pack with a Super Tigre .23, I have never had to add any weight to achieve proper balance. I do recommend extensive preflighting at home so that field time can be flying time. Run in a new engine until it starts quickly, sounds good, and idles well. On the first flights, run slightly rich. Vibration check the plane by having your co-pilot lift the plane by two rubber bands positioned outboard around each wing tip. Run up the engine, work all surfaces, and observe closely to make sure that no surface is being moved by unwanted reed activity. If vibration is observed, repack the receiver. Somewhere along about this time, range check the radio and don't compromise on the manufacturers standards. Be certain of simultaneous operation of rudder and elevator and rudder and engine. Adjust brakes.

Now we can take our "pride and joy" to a paved surface and get in a little taxiing. This should be harmless, but I recall my first flight with a Perigee occurred, quite unscheduled, while taxiing in front of my house and the engine stuck in high! Did I get it back? More or less . . . it went through my dining room window! Note: select open areas for flying. Anyway, taxiing around helps get the feel of the ship while building confidence. Try it! On the first trip to the field take along a well supplied field box. Before flying be certain that all surfaces are trimmed to zero. A slight touch of up will raise the Squire on takeoff. Remain in a gentle climb and gain some altitude. If all is well, throttle back a little and start getting in that long awaited Flying Time!

I know the Squire can do for you what it did for me. I would like to hear any comments or questions that arise. Write to me, Dick Thomas, 4414 Forsythe Place, Nashville, Tennessee, 37205.

Happy Touch-and-Go's!



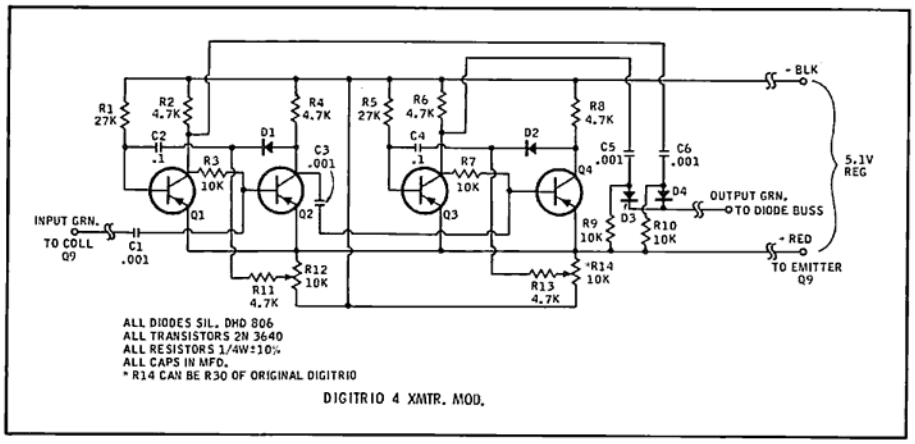
DIGITRIO DASH-FOUR

Part II of modifying the RCM DIGITRIO To Four Channel Operation

By ED THOMPSON, RCM TECHNICAL EDITOR

WELL it's time to get out the soldering iron, hand tools and aspirin again. This month, details for modifying the transmitter to four channels are presented.

I've been asked many times why I am not changing the name of the gear to 'Digiquad'. The reason is simple. This modification is to add an additional channel to the Digitrio. Therefore the name of the equipment remains Digitrio with a -4 added. Thus, 'Digitrio -4'. Also, I am working on a six channel system and would like to reserve the name! 'Digiquad.' That statement always brings the question, "Why call a six channel system Digiquad?" Another simple answer — it will be a four-channel system expandable to six; only, this time the P.C. boards will include the necessary lands. The answer to the next question is, "It would then be called Digiquad -6." I always end this type conversation by saying, "if you don't like it . . . buy Brand X!" The opposi-



DIGITRIO 4 XMTR. MOD.

tion's parting shot is usually something like, "I'll probably do just that! Anyone stupid enough to call a four channel a three, and call a six channel a four doesn't know how to design equipment anyhow!"

This leads me to why I brought all this up in the first place. There are two types of people I can't stand. The kind that tell you you're wrong when you know you're right, and, the kind that think they're right when you know they're wrong. If everyone had an open mind like me there wouldn't be so many arguments!

By the time this is printed I will be settled (hopefully) in Denver, Colorado. This move has really messed up my schedule but I have assured Fearless Leader that I would have the entire Digitrio -4 modification done and in his hands before I leave the "Valley of the Sun." This should give the RC clubs in Denver ample time to enact legislation to prevent my joining. If the club is a "closed shop type" (AMA) they won't need to bother.

I received a call from the Baltimore area yesterday from a friend who passed on to me why no one sees Bernie Murphy at the flying field. According to my friend — Bernie only flies control line at the ball diamond. When last seen, he was flying a Super V Shark with a Dennymite 60!

Well I've stretched this about as far as I can without taking a stand on one of my sore points so let's get to the modification. So long Phoenix! (I still think it should be spelled Pheonix*) So long ARCS! So long friends! And, always remember, in our society each man is entitled to only one wife but the ice man always has his pick!!*

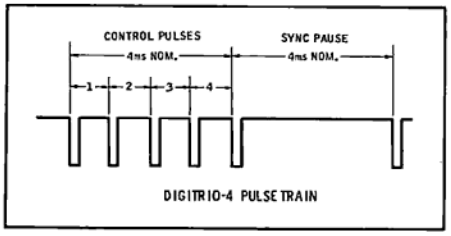
THEORY OF OPERATION (TRANSMITTER-4 MODIFICATION)

The transmitter modification for four channel operation is simply the addition of two more one-shots. The theory of operation of the one-shot circuit was covered previously so I'll just explain their use as applied to the modification.

To start with, two more one-shots are used to obtain five pulses for the four channels. This allows the unijunction to be used solely as a pulse train initiating circuit and sync pause generator. The unijunction has no direct control function. Rather than depend on a timing circuit in the decoder to compare with the timing of the unijunction, at relatively long timing periods, an additional one-shot is used to complete the pulse train action. This takes the demand for precise timing from the unijunction circuit and its operation becomes noncritical, within reason. It also relieves the decoder of precise timing and places it under the direct command of the transmitter for all channels. In other words, it becomes a passive receiver of pulses with noncritical timing circuits used throughout. During the sync pause the decoder resets itself without regard to precise timing.

The only electrical difference between the two additional one-shots is the use of 4.7K resistors as collector loads instead of 1K's used in the original Digitrio. These were used to keep current consumption down so the voltage regulator circuit would not have to be changed. The only significant component type change is the use of disc type .1's for the timing capacitors. These are discs with a good dielectric characteristic for this type circuit and should not be confused with inferior transistor general purpose discs. Also, you will note that no trim pot circuits are shown. Since these two one-shots are assigned duty as motor and rudder control circuits I didn't feel the extra expense and complication is warranted. However, if you wish trim on one or both of these controls, trim pots can be added the same as on the original Digitrio.

When the last one-shot of the original Digitrio (Q8 and Q9) completes its timing cycle, it triggers the first one-shot of the modification (Q1 and Q2). When this one shot completes its timing it triggers the remaining one shot of the modification (Q3 and Q4). This completes all control information. Approximately 4 MS later (during which the decoder resets) the unijunction circuit starts the chain reaction again. A transmitter pulse occurs when the unijunction initiates the action and one occurs for each of the one-shots. We now have five pulses controlling four variable channels. (See pulse train waveforms.)



DIGITRIO-4 PULSE TRAIN

The total unijunction recurrent timing period (frame rate) is approximately 8 MS — 4 MS nominal during the five control pulses plus 4 MS nominal for the sync pause. The sync pause is not critical and can vary from 4 MS upwards, but it's best to stay close to 4 or 5 MS unless you know the extent of the total action. Actually, the sync pause width varies constantly with control stick movement and its length is equal to the remainder of time left in the frame rate after the control pulses are sent.

WIRING TRANSMITTER AUXILIARY P.C. BOARD

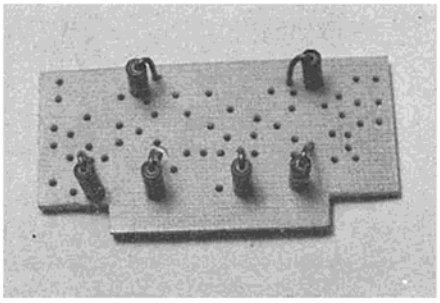
( ) Mount all 4.7K's. (6 ea)
( ) Mount all 10K's. (4 ea)
( ) Mount all 27K's. (2 ea)
( ) Mount all diodes (4 ea.). Observe overlay for proper polarity. Bar is up on all diodes.
( ) Mount all .1 MFD caps. (2 ea)
( ) Mount all .001 MFD caps. (4 ea)
( ) Mount the 2N3640's. (4 ea)
( ) Add 10" white-blue-white control pot wires.
( ) Add 2" green input and 1¼" green output wires.
( ) Add 1½" length of red wire (positive).
( ) Clean and inspect board for "solder-bridged" lands.

PRELIMINARY CHECKOUT

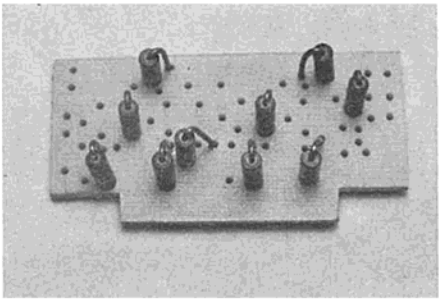
( ) Check component installation for improperly installed parts.
( ) Check clearance between all component leads for "shorts."
( ) Flat the solder mounds with a fine file and clean with acetone or dope thinner.
( ) Measure the resistance between the positive (red) wire and the negative land (running across bottom of board). You should read approximately 2,000 ohms. Observe meter polarity.

PREPARING TRANSMITTER MAIN P.C. BOARD

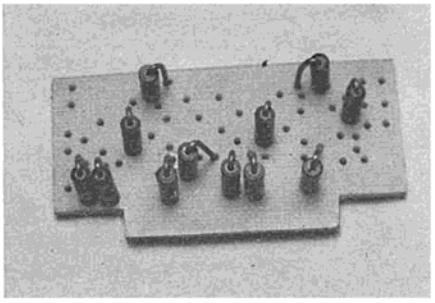
( ) Cut slot in board as shown in drawing and photo (Don, take photo of slot). You should have split the land approximately in center and remove the inside half. This allows part of the land to be used to solder the two boards together. After you have made the measurements to cut this slot "eyeball" the



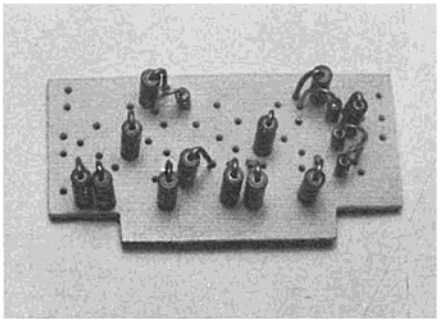
Six 4.7K resistors in place.



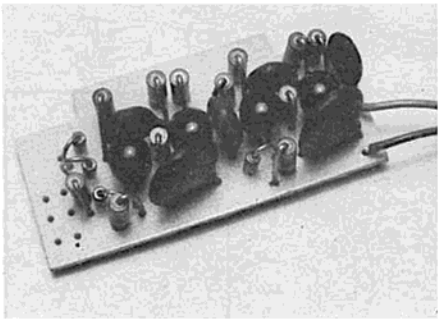
Four 10K resistors added.



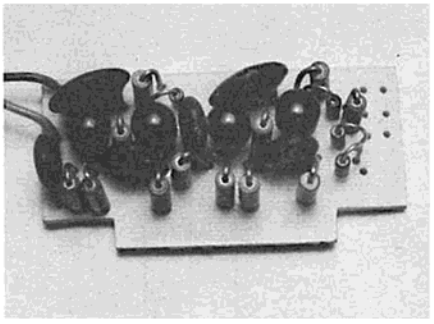
Two 27K's added to board.



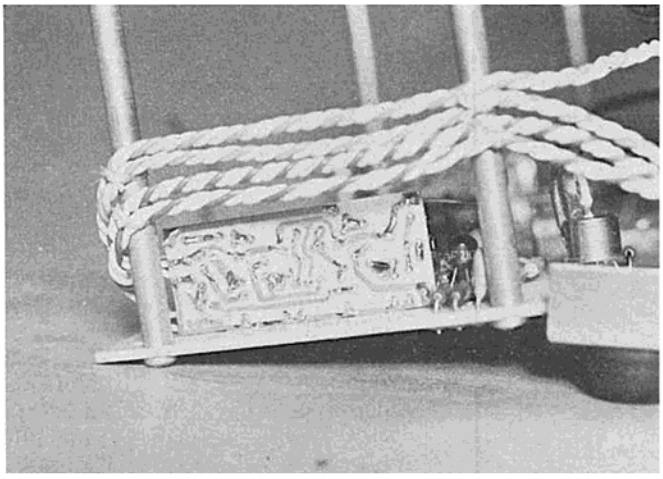
Diodes soldered in place.



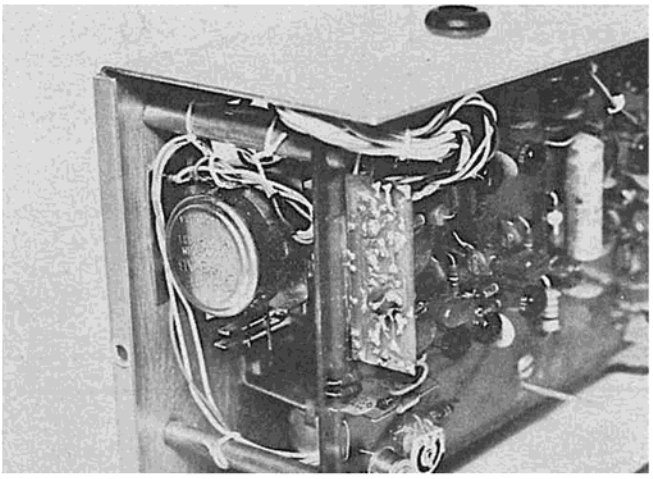
.1 and .001 mfd caps added.



Completed board, less control pot wires.

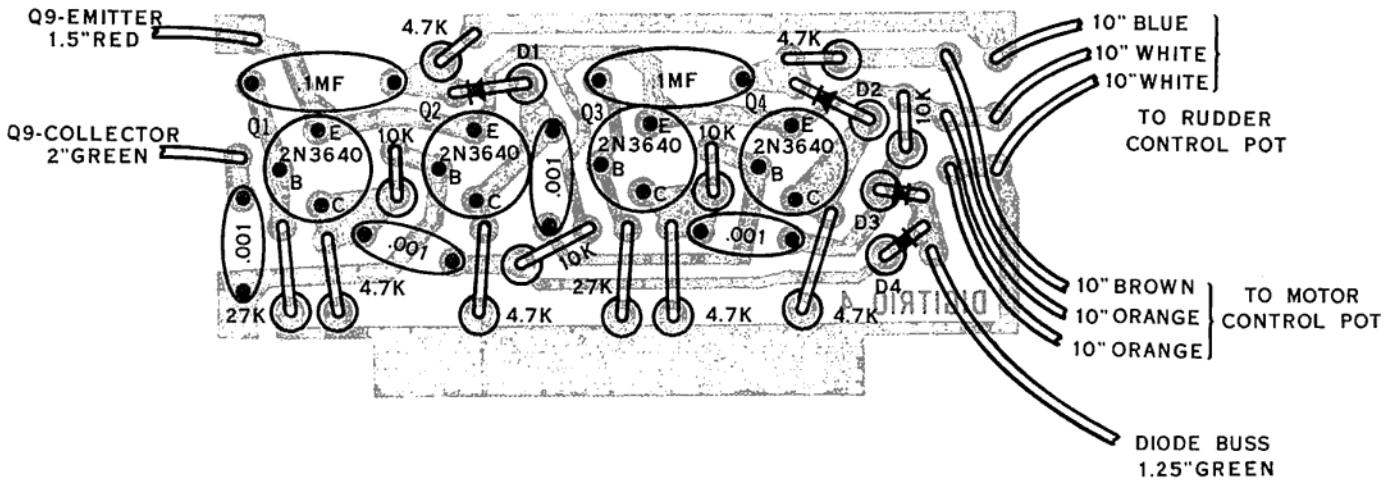


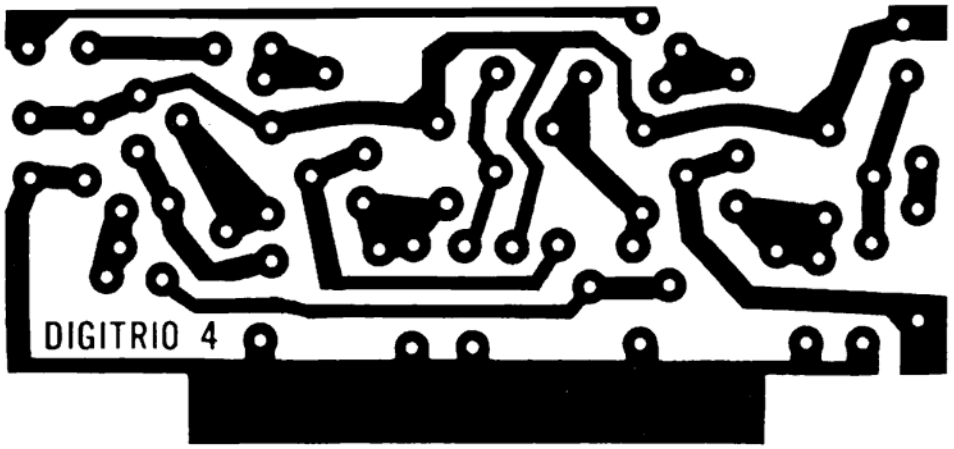
Auxiliary PC board installed on main transmitter board. Note neat, cabled control wire installation.

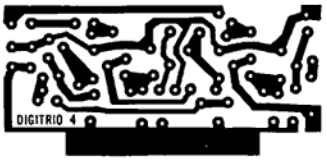


Main transmitter board in place and showing location of fourth channel auxiliary board.

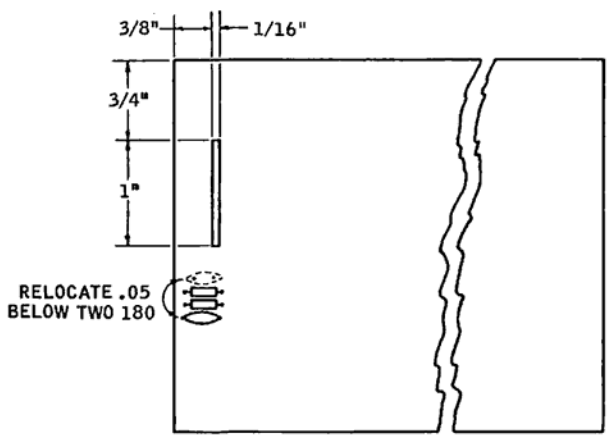
DIGITRIO 4 COMPONENT LAYOUT







Three times full size printed circuit board for auxiliary transmitter shown at left. Above: Actual size auxiliary board.



1. SLOT IN MAIN P.C. BOARD TO ACCEPT AUX. P.C. BOARD
2. AUX. BOARD IS MOUNTED WITH COMPONENT SIDE FACING CENTER OF MAIN P.C. BOARD
3. NEG. BUSS OF AUX. BOARD IS SOLDERED TO NEG. 5.1V BUSS OF XMTR.
4. SLOT SHOULD BI-SECT 5.1V BUSS OF XMTR.

DIGITRIO-4 XMTR MOD.

PARTS LIST

REFERENCE NUMBER	DESCRIPTION	MANUFACTURER OR SOURCE	MANUFACTURER'S NUMBER
C1	.001	Erie	831-000-Z5U-102P
C2	.1	Erie	5655-000-Z5EO-1042
C3	.001	Erie	831-000-Z5U-102P
C4	.1	Erie	5655-000-Z5EO-1042
C5	.001	Erie	831-000-Z5U-102P
C6	.001	Erie	831-000-Z5U-102P
D1	Silicon Diode	G.E.	DHD 806
D2	Silicon Diode	G.E.	DHD 806
D3	Silicon Diode	G.E.	DHD 806
D4	Silicon Diode	G.E.	DHD 806
Q1	2N3640	Fairchild	2N3640
Q2	2N3640	Fairchild	2N3640
Q3	2N3640	Fairchild	2N3640
Q4	2N3640	Fairchild	2N3640
R1	27K ¼W 10% Res.	Ohmite	LIDSM
R2	4.7K ¼W 10% Res.	Ohmite	LIDSM
R3	10K " " "	"	"
R4	4.7K " " "	"	"
R5	27K " " "	"	"
R6	4.7K " " "	"	"
R7	10K " " "	"	"
R8	4.7K " " "	"	"
R9	10K " " "	"	"
R10	10K " " "	"	"
R11	4.7K " " "	"	"
R12	10K Pot	"	CU 1031
R13	4.7K ¼W 10% Res.	"	LIDSM
R14*	10K Pot	"	CU 1031

*R14 can be R30 of original Digitrio.

MISCELLANEOUS

P.C. Board		World Engines
Hookup Wire	(2 10" white) (1 10" blue) (3 ¼" green) (1 ½" red)	Controlaire, Bonner, etc.

task as you go to make up for slight differences between the two boards. This can be done by drilling a series of small holes and cutting them into a slot with an Xacto knife. If you accidently cut through this land, repair the break with a resistor lead.

( ) Drill three #60 holes as follows for connecting wires:
(See original overlay)
1. Between top ends of D4 and D5 for the green output wire.
2. At the junction of Q9's emitter and the bar end of Z1 for red positive lead.
3. At the junction of the 1K, D2 and Q9's collector for the green input wire.

( ) Drill two new holes and relocate the .05 cap from above the two 180 ohm resistors to below it.

WIRING THE TWO BOARDS TOGETHER

( ) Insert the auxiliary board and solder it in place. Check for clearance between components of both boards.

( ) Solder the green output wire between the top ends of D4 and D5.

( ) Solder the red positive wire at the junction of Q9's emitter and bar end of Z1. The negative connection was made when you soldered the auxiliary board in place.

( ) Solder the green input wire in the hole you drilled at junction of 1K, D2 and Q9's collector.

FINAL TRANSMITTER WIRING

( ) Remove the orange-brown-orange wires at the P.C. board previously used for motor control.

( ) Remove and relocate R29 (10K) down to where the two orange wires used to be.

( ) Shorten orange-brown-orange wires by approximately 2½" and solder them to the auxiliary board as shown on the overlay.

( ) Wire the control pots as follows:
1. Select the left-hand set of stick and trim-pot wires from the main board and wire them to the elevator controls. White-

(Continued on Page 37)

R/C MODELER

TECHNICAL FEATURE

HOW ABOUT THAT ANTENNA?

By L. JACK WEIRSHAUSER

A comprehensive look at R/C antennas — plus an effective method of increasing your range and reliability.

(Technical Editor's Preface: RCM is proud to present this article on antennas by Mr. Weirshauser, an electronics analyst engineer by profession. It will give the beginner an insight to some of the problems facing equipment designers and provide them with information to construct an efficient antenna system that could reap benefits of increased range and reliability. Alternately, the advanced technician will find valuable reference material he can use in his own design efforts. This article is also presented in the hope that, through increased emphasis on "solid" technical articles, rather than the mediocre "idiot treatment" that has been passed off as "breakthroughs" in the past by the model press, a new awakening of experimenters and technicians will result.)

ORIGINALLY this started out to be a relatively short construction article on how to build an antenna system for R/C airplane, but at the request of RCM's technical editor I have enlarged it considerably so that it now contains much more theory than I had originally intended. It would be very easy to fill page after page with equations and formulas, but I look at it this way; if that's what you want (and can understand) you should be writing this instead of reading it. I am writing this for the 98% who don't want a lot of theory and numbers; the other 2% can go solve a simultaneous equation.

Like most articles of this type I am including a glossary of terms and definitions. Unlike most articles of this type I am including it at the beginning of the article rather than at the end. I do this in hopes that you will read it several times prior to reading the text, and at least become familiar with what it contains so that you will refer to it when necessary. Not everything in the glossary will be used in the article, but they are all common terms and are handy to know.

GLOSSARY OF TERMS (GENERAL)

1. **Period**
   The rate (in seconds, milliseconds, microseconds) which something occurs. Pulses, pulse groups, sine waves, etc. Must be known before you can determine the frequency

$$\text{frequency in CPS} = \frac{1}{\text{Period (seconds)}}$$

2. **Wavelength** (in meters)

$$\text{wavelength} = \frac{300}{\text{Frequency M.C.}}$$

3. **Wavelength** (in feet)

$$\text{wavelength} = \frac{984}{\text{Frequency M.C.}}$$

   Example: Find the wavelength of 27.0 M.C. in meters and feet.

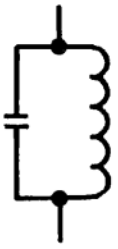
$$\frac{300}{27 \text{ M.C.}} = 11.1 \text{ meters}$$

$$\frac{984}{27 \text{ M.C.}} = 36.4 \text{ feet.}$$

   Conversion factor = 3.28.
   Convert meters to feet by multiplying 11.1 by 3.28 = 36.4 feet.
4. **D.B.** (decibels)
   Measurement of the ratio, input to output, front to back, up to down, signal to noise.
   DB (Power) = 10 log ratio
   DB (Voltage) = 20 log ratio.
5. **Gain**
   To get more out than you put in.
   Example: 1 watt in for 2 watts out = gain (ratio) of 2
   10 log 2 = 10 x .3 = 3 DB gain.
6. **Loss**
   To get less out than you put in.
   Example: 10 watts in for 1 watt out = loss (ratio) of 10
   10 log 10 = 10 x 1 = 10 DB loss.
7. **Matching** (Matched)
   To make one part of a circuit be compatible with the circuit preceding or following it for maximum transfer of energy.
8. **Impedance** (symbol Z)
   This is what you try and match when connecting circuits together. Commonly applied to coils, transformers, tank circuits, transistors, antennas. Deals with the total of **all** the resistances in the circuit. It is measured in ohms and ohms law applies.

$$Z = \frac{E}{1} \qquad \text{etc.}$$

9. **Reactance** (symbol X)
   Similar to impedance but deals only with the A.C. resistance of the circuit. Ohms law still holds good.
10. **Tank circuit.**
    A tuned circuit usually consisting of a coil (inductance) and a capacitor. They can be connected in parallel



or in series.

When connected in parallel the circuit exhibits maximum impedance (resistance) at resonance and a proportionately lower impedance to all other frequencies. The series tuned circuit, however, presents a low impedance at resonance and high impedance to all other frequencies.

11. **Link Coupling**
    This is a device used to transfer

energy into, or out of an inductive stage. The link is normally used to transfer energy from a low impedance source to one of a much higher impedance, or vice versa. See Figure 1.

12. **Gimmick** (no joke!)
This is a seldom seen device used to couple stages together. It consists of two wires, one from each stage, twisted together to form a very small capacitor. The number of twists will determine the amount of capacity.

13. **Q** — a figure of merit
A much used but seldom defined term. Normally the higher the Q the better the circuit, especially in tuned circuits.

$$Q = \frac{X}{R}$$

X = reactance of either the coil or the capacitor.
R = resistance in the circuit.

14. **Bandwidth** (frequency response)
Literally means the frequency range over which a circuit will operate. Usually measured at the half-power (3 DB) points.

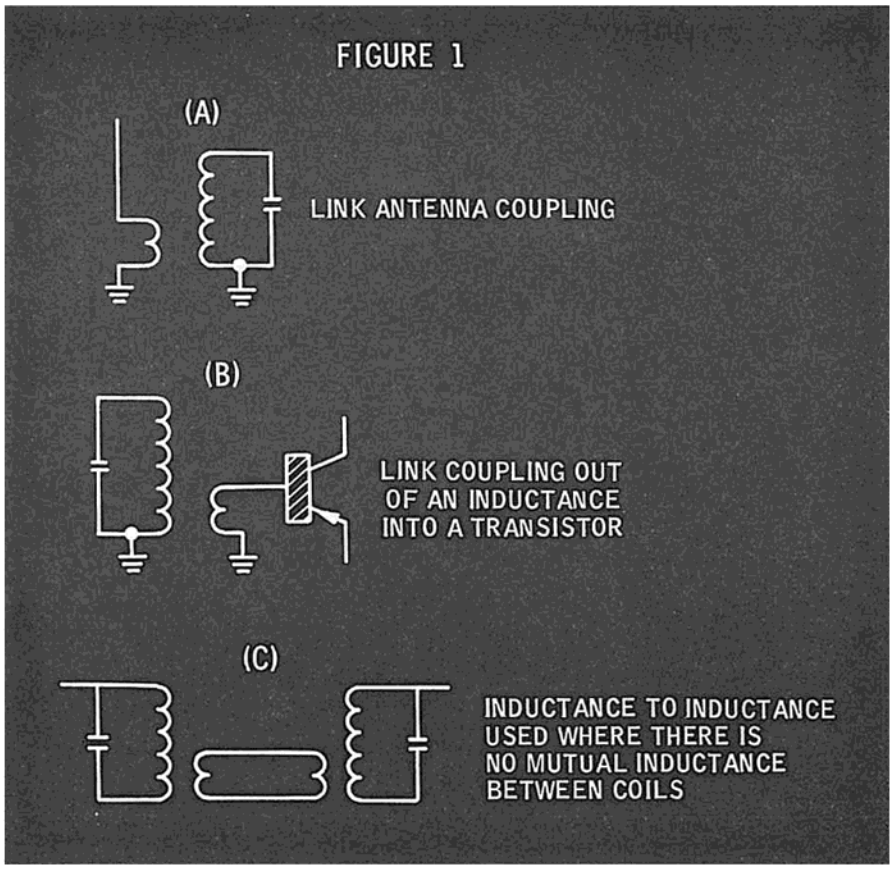
15. **Selectivity**
This goes hand-in-hand with bandwidth. The more selective a tuned circuit is the narrower its bandwidth will be and vice versa. Also the more gain a circuit has (or the least insertion loss) the more selective it will be.

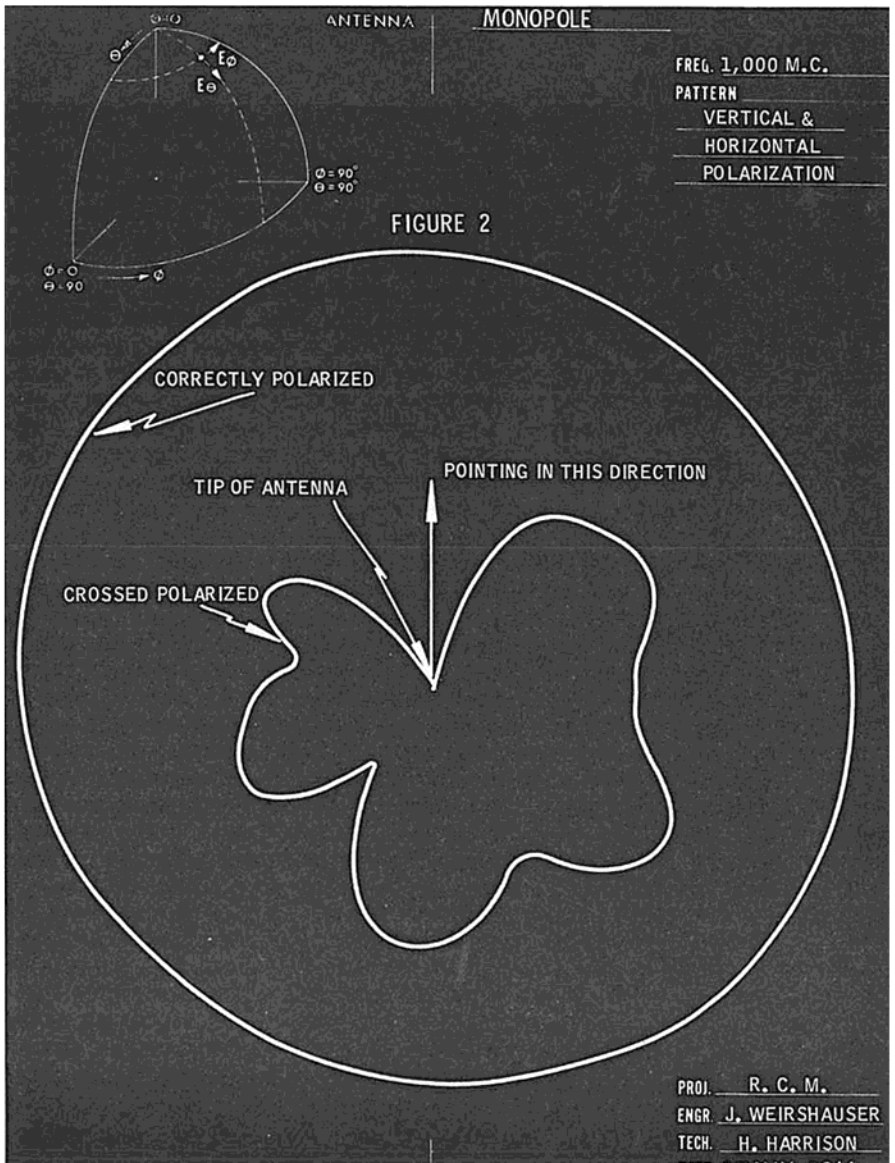
16. **Loaded** (load)
This term is used to define a good or a bad situation. When a circuit is properly loaded (matched impedances) you have a good situation. When you say you are heavily loaded you usually mean the driving circuit is being dragged down by too low a resistance, i.e., driving a 10 ohm circuit with a 10,000 ohm circuit. Conversely a lightly loaded circuit would mean trying to drive a 10,000 ohm circuit with a 10 ohm circuit. In either case there would be minimum energy transfer.

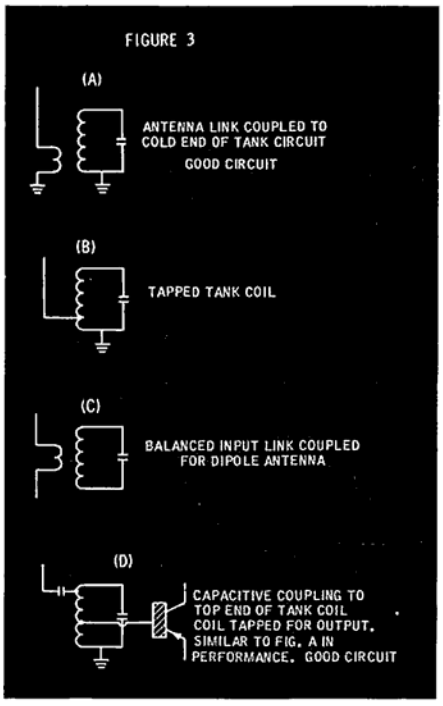
GLOSSARY OF TERMS (ANTENNA)

Beamwidth (degrees)
Directivity
Reflector
Director
Active (driven element)
Polarization.

It will perhaps be easier to understand some of these terms if you can equate an antenna to two flashlights. One flashlight (light A) should have a very concentrated beam with an intense light. The other (light B) will have a very diffused, poorly defined beam with a rather weak light. Light "A" will have a very narrow **beamwidth** and be very **directive** because of a very efficient **reflector** and lense **(director).** Light "B,"







however, will have a very ill-defined beam and will throw light all over the place because you have a poor reflector and no director or lens. Now, unscrew the lens and reflector from light "A" and leave just the bulb sticking up all by itself (you can do this with some flashlights). Now turn it on and stand it on end on a table. **Vertically Polarized.** You have now changed a highly efficient, highly directional antenna into an omnidirectional, inefficient **vertical** whip antenna. It's just that simple. It just so happens that the laws of optics and light are identical to the electrical laws of an antenna. In fact, most of the terms are even identical.

What it amounts to is this; you can take the vertical (unloaded) whip antenna from your transmitter and by putting a reflector behind it, make it a directional antenna (light B). By putting several directors (lens) in front of it you can now make it equivalent to light "A." As you can see, however, this would not be practical for R/C work. The antenna would be too large to handle and would be very directive, which means you would have to point the antenna at the airplane at all times. A T.V. yagi antenna would be a good example.

Just for fun, let's assume that the antenna we just described had 10 DB gain. Let's also assume we were putting 1 watt into the antenna. Now with the old antenna we know we were losing a great deal of power so we actually radiated around 200 — 300 milliwatts. However, with our new antenna we now were radiating effectively about 10 watts! Remember:

10 log ratio = 10 x 1 = 10 watts.

So it wouldn't be too long before we could expect a knock on the door or the hand on the shoulder routine from some nice man with a badge.

Actually we can go even further with this analogy and call the flashlight bulb the **driven** or **active element** equivalent to the whip from our transmitter. This leaves us with the term polarization. For some reason this is one of the hardest terms for the layman to understand. Let's start with a string of telephone poles. They stand up straight so they are vertically polarized. Also, there is a railroad track that runs under the telephone wires. This track uses ties to tie the track down. They lay flat so they are horizontally polarized. Okay? Now when we talk about the relationship between the ties and the poles we say they are cross-polarized or polarized at 90° to each other. Still with me? Now if it was possible to tilt either the poles or the ties, we could change this polarization to any angle we chose, until the poles were laying flat or the ties were on end, at which time we could say we were correctly polarized or just polarized for short.

Now what does this all mean in terms of antenna efficiency and signal strength? If you will look at Figure 2 you will see the relative difference in signal strength between the polarized and cross-polarized conditions. This is an antenna pattern taken in an antenna darkroom. It was taken at 1,000 M.C. so that the antennas would be a convenient size to handle, 3" instead of 18 feet.

Two whips or monopoles were set up about 20 feet apart; one was fixed in the vertical plane, and was connected to a transmitter. The other one was mounted on a turntable (vertically polarized) and was connected to a receiver. The table was then rotated slowly 360 degrees and the receiver output was recorded. This is the outer pattern. The antenna was then laid on its side (cross-polarized) and the process repeated. This is the inner pattern. The 30 DB loss occurred when the receiving antenna was pointing directly at the transmitting antenna. Theoretically this pattern should have had a smooth contour, but the connectors and connecting cables were radiating slightly and caused the pattern to be ragged.

The outer circle shows a smooth, even pattern with no holes and a relatively constant signal strength. The inner pattern shows the effect when the antennas are cross-polarized. You will notice first that the signal strength is down a minimum of 12 DB and a maximum of 30 DB or greater. You will notice this occurs because the tip of the antenna shows absolutely no radiation. This is the exact situation you have when you are standing at the tail of your airplane at the end of the runway during takeoff. The airplane just gets airborne, 300 feet out and bang! Glitches, gremlins, interference, etc., or was it really loss of signal?

I think I'll drop the subject for now and let you think about it for a while. I'll have a little more to say about polarization later in the article.

Receiving Antennas

Like everything else in this world you seldom get something for nothing, and designing an antenna is no exception. If you want gain from an antenna you must sacrifice bandwidth. If you need beamwidth you must sacrifice gain. If you need directivity you need a larger, more complex system with directors and reflectors. If you want all three you must compromise all three, one against the other, until the end results will suit the requirements.

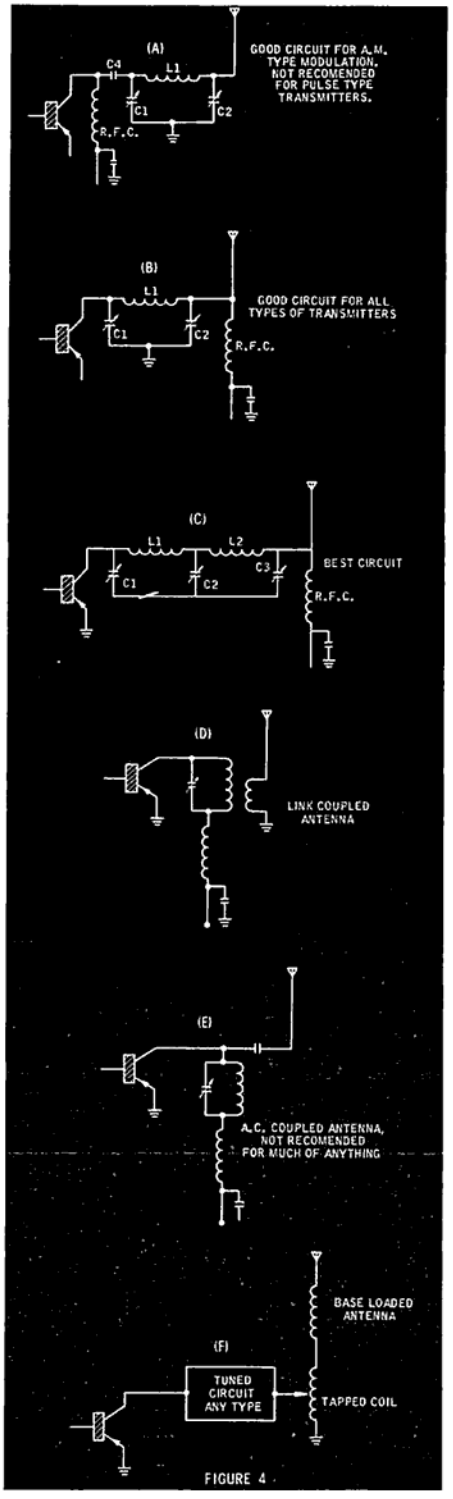
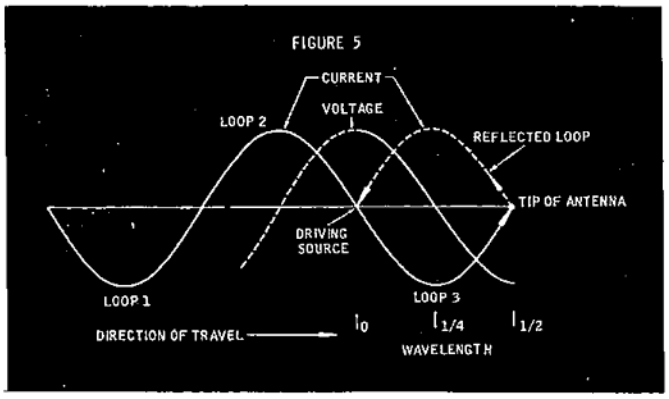
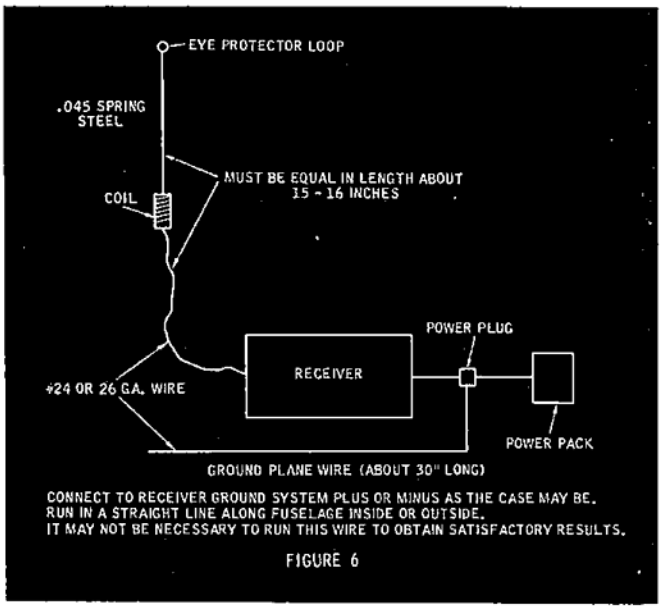


FIGURE 4





The antenna is one of the most important aspects of any communications system, yet in the RC field, is one of the least understood and most mistreated aspects of any installation. You wouldn't find an amateur radio operator with expensive radio gear simply dropping a wire out the window!

Now, since this article is slanted toward the R/C field we will not discuss tracking antenna, helix, yagis, etc., but only the antennas now used and those that have been used in the past. Obviously a model airplane, **any** airplane, large or small, cannot carry an antenna capable of 15 DB gain at 27 M.C. with a beamwidth of even 40°. It would be about 25 feet long and about 18 feet wide, so we must resign ourselves to the fact that the antennas carried by our little six-foot jobs will have no gain whatsoever and will, in fact, be quite lossy. What we can do, however, is to make sure that the antenna, whatever kind it is, is very carefully matched to the input circuitry of the receiver, thereby assuring maximum transfer of RF energy.

Now assuming we are using a piece of hookup wire or the antenna to be described later in this article, we will be dealing with a **low** impedance antenna trying to drive a high impedance input tank circuit. Various schemes for antenna coupling are shown in Figure 3.

It can be seen that not all receiver front ends are alike and hence will not have the same impedance. Therefore, you must select the input circuitry so that it matches the characteristic impedance of the antenna. In R/C, the antenna type is fairly well fixed so most receiver front ends are designed to match them.

Of all the techniques used, the link coupling method is, I think, the best. It is the easiest to adjust and more tolerant of antenna configuration than the others. It also gives you a slight step up in voltage because of a transformer action. I hasten to add that I feel this is true only with receiving antennas; transmitting antennas are a horse of a different color.

Transmitting Antennas

We have now arrived at an area where we have a little more freedom in our antenna designs. Those of you old timers who remember Ed Rockwell and his first multi-channel reed units will certainly remember the weird antennas he used for his ground-based transmitters. Some of his rigs radiated so much power you could receive an RF burn if you touched the antenna. Now, in those days there were no restrictions on radiated power like there is today, so these old pioneers took the attitude that it's better to be safe than sorry, and just blasted away. Also the receivers in those days were all super-regen types and consequently were pretty wide band, so the extra power gave some degree of protection from interference.

In this day and age, however, we are limited in the amount of power we can use for R/C and that's as it should be. We don't need exotic high-gain antennas as long as we have the **exclusive** use of a certain band of RF frequencies, a certain degree of protection from illegal and incompetent operators, and as long as the equipment manufacturers continue to build state of the art equipment. What we should have, however, is a better understanding of how the ones we do have work, so we can use them to their fullest advantage. I guess the logical place to start would be the final RF stage of the transmitter and follow the signal right out the antenna. On Figure No. 4 I show several types of output stages. Figure 4A is a typical circuit found on several low power transistors now in use. It should only be used on tone or AM type transmitters if final collector modulation is used however, because the voltage feed point is connected directly to the collector by an RF choke. This choke serves to keep the RF from getting into the rest of the circuit by means of the common power supply; the capacitor serves as an RF bypass to ground.

Capacitor C4 is a blocking capacitor to keep the voltage from the antennas, not important for our low voltage transmitters, but you had better use it for the 135-volt tube versions if you ever build one.

L_1, C_1, and C_2 form a PI output stage which is tuned to the frequency of interest. C_1 is normally about ⅓ of the value of C_2 because C_2 is used not only to help resonate the PI circuit but to help tune the antenna, especially when it is bottom- or center-loaded.

Figure 4B is the same circuit except that the voltage feed point is now at the output of the PI stage. This will keep the RFC from deforming the signal when used in a pulse type transmitter.

Figure 4C is probably the best final stage configuration that you can use. It is only slightly more complicated to construct and tune than Figure 4B, but if it is designed correctly it is capable of matching any type of antenna you might possibly use, from a bird cage to a barbed wire fence.

Figure 4D is a link-coupled output stage. It's exactly the same as a receiver input stage, but where it works great for a receiver, it's not so hot for a transmitter (boy! will I hear about that). It will work fine, however, if you want to play with it.

Figure 4E is called the Brute Force Method. It will work great for a phono oscillator or a power line transmitter, but don't use it for RF.

Figure 4F is basically the same as Figure 4D except a variable tap is used instead of a link. I like this circuit if you are using a base-loaded antenna. That brings us to the antenna portion of this little discussion.

I'll make a statement now that may lose me half of my readers, but stay with me if you will, and I'll try and justify it. A center-loaded antenna is far and away better than a base-loaded antenna. Both antennas are used extensively in R/C and Mobile Radio Communications but the radiation resistance (impedance) of a center-loaded antenna can be almost double that of a base-loaded antenna. *(Technical Editor's*

Note: This is an important factor when considering overall radiation efficiency between base and center-loaded antennas. This factor is probably the most overlooked, or disregarded, feature of center-loaded antennas by base-loaded proponents. Assume that the ground loss resistance of a hand-held transmitter antenna system is equal to the radiation resistance of the antenna. The latter will only radiate the power dissipated across the radiation resistance. The power dissipated across the ground loss resistance is in the form of heat, and is wasted. This means that only half of our power is being radiated, the other half being lost due to ground loss resistance. If we can raise the radiation resistance to double its previous value without affecting the ground loss resistance, we can effectively raise our radiated power by a factor of two if we maintain the same power input. Of course, we could also reduce the ground loss resistance with similar results. This is harder to control and difficult to do electrically short of a ground rod. One way is to provide as much body contact with the transmitter as possible, i.e., grasping the case firmly with both hands and holding it against your chest. This makes your body part of the antenna system and the better the electrical path between you and ground, the lower the ground loss resistance. An extreme comparison would be flying barefooted out of a dirt field as opposed to flying off concrete with thick soled rubber shoes!)

Now remember, we are trying to make the antenna look purely resistive with this resistance being as high as possible, and when you consider that a quarter-wave center-loaded antenna is only about 40 ohms at best, you see why a base-loaded antenna at 20 ohms would be much harder to match. There is one disadvantage however, since we now have the coil halfway up the antenna we have lost half of the capacitive reactance we had when the coil was at the bottom; that means that the coil must have twice the inductance it had when it was at the bottom.

This presents no real problem, however, especially at our operating frequency. A rule of thumb for loading coils:

> The coil should have the highest "Q" possible, i.e., the ratio of reactance to resistance:

$$Q = \frac{X}{R}$$

In order to obtain this high Q you must use the largest diameter wire possible, with spaced turns, usually by a wire diameter with the length of the coil being about twice its diameter; either air wound or wound over a very low loss coil form.

Since almost all of these requirements aren't practical for our little hand held boxes, we must compromise (I hate that word), anyway — the ones in use are adequate.

Now that we know all about loading coils, let's look at the antenna itself. In order to understand the whys and wherefores about the antenna length, coil inductance, etc., we must talk a little bit about wavelength.

I am about to make several statements about the voltage and current distribution along a resonant antenna. Commit them to memory, along with the formula for determining the wavelength of a given frequency, and you can design simple antennas yourself, and understand the majority of all the antennas you see around you.

1. The current is zero at the tip of a half-wavelength antenna and the voltage is maximum.
2. The largest current amplitude is at one-quarter-wavelength.
3. The voltage along a half-wavelength antenna is maximum when the current is minimum.

(Continued on Page 36)

An excellent method of increasing your range and effective signal strength in the smaller RC model where antenna length is often a problem.

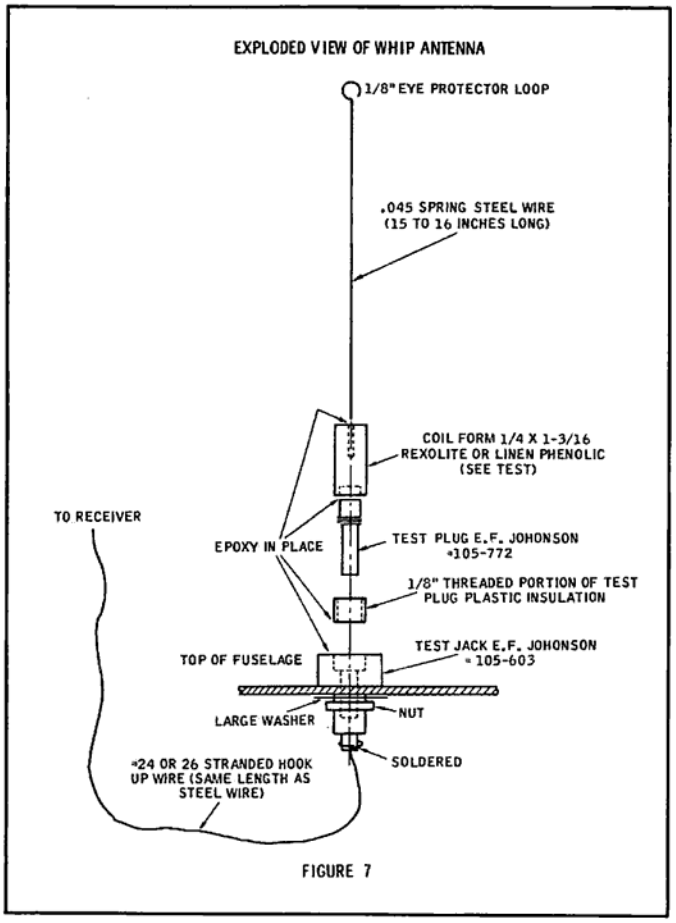


FIGURE 7

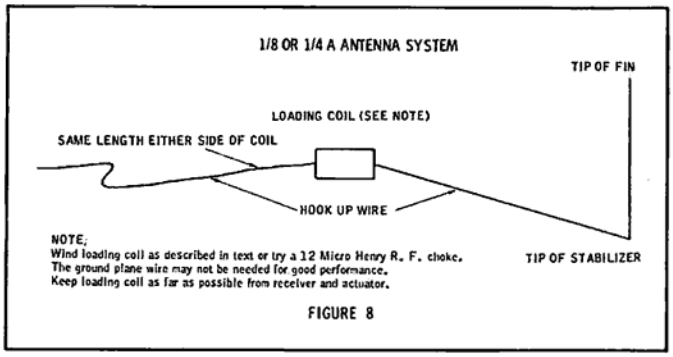


FIGURE 8

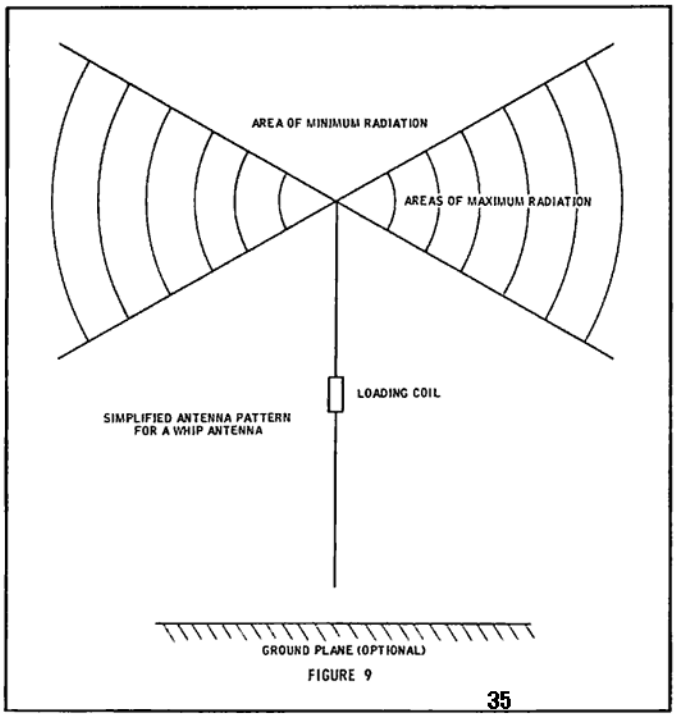


FIGURE 9

HOW ABOUT THAT ANTENNA?

(Continued from Page 35)

4. The current is reflected from the tip of the antenna and its direction reverses. See Figure 5.

It can be seen from this figure that if the antenna were half-wavelength long, it would be considered resonant. That is because the current (loop 3) would reach the tip of the antenna and be reflected back toward the driving source (transmitter) and reach there just in time to be in phase with and add to loop 1 as it moved along the antenna. When this addition of current occurs we are getting maximum efficiency from the antenna.

Now if the antenna was a little short of half-wavelength the reflected wave would get there before the next transmitted wave and be slightly out of phase. This is called capacitive reactance. If

the antenna was slightly longer than a half-wavelength, the reflected wave would reach there slightly after the transmitted wave and again be out of phase. This is called inductive reactance. So remember, a short antenna (shorter than half-wavelength) has capacitive reactance; a long antenna has inductive reactance.

We have already calculated that a wavelength at 27 M.C. is equal to 36.4 feet. One half of that is about 18 feet — Wow! After all this work we find that we need an 18-foot antenna on our little box — impractical! What do we do now? Okay, let's make it shorter and tune out the capacitive reactance with an equal amount of inductive reactance. Remember way back when we found that a series-tuned circuit gave minimum impedance at resonance? Well, that's what we will strive for in our antenna, because a loaded antenna is a series-tuned circuit.

Let's arbitrarily pick an antenna length suitable for our little box. In the beginning, everybody used automobile antennas because they were convenient, cheap, and nice and shiny. It just so happened that they were about an eighth-wavelength long, although nobody cared. That dimension is still the one being used, so why change now. Unless you have a great deal of sophisticated test equipment, you can't measure how much capacity you have in the whip, so you won't know how much inductance you will need. One way is to experiment. There is a formula however.

The capacitance of a vertical antenna shorter than a quarter-wavelength can be determined by

$$CA = \frac{17L}{\left[\left(\log_e \frac{24L}{D}\right) - 1\right]\left[1 - \left(\frac{FL}{246}\right)^2\right]}$$

Where:

CA = — Capacity in P.F.
L = Antenna length in feet.
D = Average diameter of antenna material in inches.
F = Frequency in M.C.

Now that I look at it, I suggest you go measure a buddy's and forget the whole thing; or buy one from World Engines. *(Technical Editor's Note: The approximate capacitance for a ¼ diameter antenna, 4-5 feet long, is 15pf. This value should be halved for a center loaded antenna.)*

Since there's not too much we can do with our transmitting antennas to see how they are really performing, what do you say we build one for our receivers. I think you will be very surprised at the results.

Much has been said about improving the ERP (effective radiated power) of R/C transmitters, and with the advent of low powered transistorized units it became necessary to do this, and it was done by the simple addition of a center-loaded antenna. Now, if a center-loaded antenna will so greatly improve the efficiency of a transmitter, why won't the same idea work for receiving system? Well it will, and the improvement to be realized is so great it is hard to imagine how we got along without it for lo these many years. Just to keep your interest up, let me give you an example. When I remove the antenna from my MinX 12 transmitter and use a 36-inch wire antenna on the airplane, I have between 40 and 45 feet of ground range. Under the same conditions with the antenna system that I am about to describe installed, I had over 250 feet. Are you still interested? As an added bonus, the selectivity of the receiving system was increased by some undetermined amount because we now had a tuned antenna system. Proportional flyers please take note, this system may help the glitch problem. Just so the R/C manufacturers won't start screaming about voiding guarantees, etc., let me say that the installation can be completed without removing the receiver from the airplane. Feel better boys!

Remember the rule in antenna theory that says a whip antenna shorter than a half-wavelength looks like a capacitor and resistor, and how we would like the whip to be a pure resistance? (The wire antenna on your airplane is really a whip antenna.) Well, there are two ways we can bring this about; we can make the antenna a half-wavelength long (I can just see Don Dewey flying a ⅛A off his roof with 18 feet of antenna trailing behind) or, we can tune out the capacitive effects with an inductance and thereby resonate (tune) the antenna to the transmitter frequency. Now I know that there are some that will say why bother. The systems we have available today are more than adequate for the job that they were designed to do, and they certainly would be correct. But, unfortunately, the systems don't maintain their factory condition after extensive use and can be detuned by use or abuse as the case may be. I had never taken the lid off my MinX super-het receiver in two years of dashing and crashing until I tuned it just prior to testing this system, and while I think MinX is the finest R/C reed equipment available (I wished I could afford their proportional), it still could have become detuned enough on the next flight to make me eligible for another Burrowing Owl Certificate.

What I am trying to say is that this antenna system will compensate for and to some extent nullify the effects of a slightly detuned receiving system.

Here are the more words on polarization I promised.

I am sure that you have all seen flyers change their body position with the position of their airplanes. Well, if they were old pros they were probably trying to maintain antenna polarization between the transmitter and receiver. (Both antennas in the same plane.) If they were beginners, they were trying to keep their bodies facing the same direction that the airplane was flying because they became confused as to which was right or left. Actually they were trying to maintain a form of body-airplane polarization.

Example: If you have your receiver antenna running to the tip of your rudder, you have a horizontally polarized antenna when your airplane is in level flight, which changes to a vertically polarized antenna when your airplane is in a vertical climb. However, on the ground the flyer is holding the transmitter so that the antenna sticks out at a 45-degree angle. Hence, he will always be 45 degrees cross-polarized with the airplane receiving antenna. What it all boils down to is this. The vertical antenna on the airplane is the best antenna to use and one that will be correctly polarized with the transmitter a majority of the time unless you point the transmitter antenna at the airplane, which you

(Continued on Page 37)

HOW ABOUT THAT ANTENNA?

(Continued from Page 36)

should never do. See Figures 2 and 9. Only the top portion of the antenna and the loading coil have to be vertical. So this need not present much of a problem when installing it in a multi-sized airplane.

I realize that it certainly wouldn't be practical to have 15 inches of wire and a loading coil sticking out the top of a little tiny airplane. So with a small compromise in performance the antenna can be run in the normal manner with the loading coil in the center. See Figure 8. The drawings are more than sufficient to enable the RC'er to build up this system with no test equipment. However, like anything else, "the more you got, the more you get" in the way of results. In any event, you can tell the results by the range check method without the transmitter antenna connected. Even if you never got it to work, which is unlikely, I'm sure you can afford to waste the 50 cents the parts cost.

Antenna Building Instructions

Solder a 16-inch piece of hookup wire to the jack and install on top of fuselage so that the hookup wire is reasonably straight to the receiver. Leave a little slack so a rough landing won't break the wire. Now drill a #56 hole ½-inch deep in one end of the coil form. Drill a 3/32-inch hole in the other end about 7/16 of an inch deep. Leave about 1/16 inch between threaded portion of plug and end of coil form for soldering coil wire. Cut a 16-inch piece of .045 steel wire and bend a ⅛-inch loop in one end. Cut off an eighth of an inch piece from the threaded portion of the insulating sleeve from the test plug and screw part way on the plug. Two turns is enough. Now insert the plug in the jack and epoxy the plastic sleeve to the jack body. Don't get any epoxy on the plug or you will never be able to remove it. Now epoxy the coil form onto the plug and the antenna wire into the coil form. When the epoxy has cured, unscrew and remove the antenna. Clamp the antenna wire in a vise with about ½ inch between the vise jaws and the coil form. Scrape the plug and the wire next to the coil form free of epoxy and wind coil as follows. Take a piece of #30 enameled wire about five feet long and scrape one end. Wrap this end around the antenna wire one or two turns close to the coil form and solder. Come in about 1/16 of an inch and close wind on 90 turns. Cut and scrape wire and solder to plug between the coil form and the threaded portion of the plug. Install on the airplane and you are ready to test.

If you have access to a grid dip you can dip out the coil with it installed on the airplane. And if you are within one megacycle above or below your transmitter frequency everything should be okay. If it is more than that, you had better correct it unless you give it a range check and find you have at least double the range you had before. Remember to lower the frequency of the antenna, you must add turns to the coil. To raise the frequency, you must remove turns.

The coil I describe is exactly right for my MinX receiver on 27.195 megacycles. To tune to 27.095 for instance, you may have to wind on about 95 to 100 turns total. If everything checks out satisfactorily give the coil and the solder connections a **thin** coat of epoxy and there you are.

For an in-line type of antenna, for the smaller airplanes or the larger ones too, for that matter, if you don't want to use a vertical whip, obtain a miniature 12 microhenry RF choke and install it in the center of your 30 inch wire. The results will still amaze you. See Figure 8.

There is a slight possibility that, because of the more efficient antenna, your receiver may show a tendency to oscillate, or overload, when the transmitter is held close to the receiver. If this should occur, check your receiver front end and make sure the antenna is coupled in similar to Figures 3A or 3D. I have never had this happen, but if you have an extra hot, or unstable, receiver, it might occur.

Regarding the ground plane wire shown in Figure 6, I am not using it on my present installation simply because I was too lazy to solder it in and run it inside my airplane. However, past experience tells me it will improve the operation even more.

(Technical Editor's Note: Since the antenna system, if built properly, will exhibit a low impedance at the feed point, it would be best to convert your receiver to Figure 3A if is now like Figure 3D. This can be done simply by adding a 2-3 turn link of hookup wire at the "cold" end of the receiver input tuning coil. Also, since most commercial systems AVC characteristics are tailored for a specific signal level range, your system will probably overload with greater transmitter/receiver antenna separation. This will present no flying problem as long as it doesn't occur within normal flying distance from the transmitter. It will also indicate that the antenna is providing more signal to the receiver.

This antenna may not work with superregen receivers since some of them depend on loose, inefficient coupling to the antenna. Also, in some cases, reduced sensitivity has a definite advantage with this type circuit.

As the author says, it only costs 50c to find out!)

RCM DIGITRIO

(Continued on Page 30)

blue-white to stick pot and yellow-green-yellow to the trim pot wire.

2. Wire the other set of stick and trim-pot wires from the main board to the aileron controls.
3. Wire the white-blue-white wires from the auxiliary board to the rudder control pot.
4. Wire the orange-brown-orange wires to the motor control pot (if not already wired).

NOTE: When connecting the wires to the two moveable control stick pots — it is important to provide some sort of strain relief to prevent wire breakage. Tie the wiring off and take as much time as necessary.

( ) Adjust R13 to midrange. Adjacent to Q5. (This sets frame rate to approximately 8 MS).

( ) Center all control pots electrically using the ohmmeter method.

R/C MODELER

TECHNICAL FEATURE

DIGITRIO DASH-FOUR

DELUXE TRANSMITTER MODIFICATIONS

By ED THOMPSON, RCM TECHNICAL EDITOR

YOU CAN GIVE YOUR DIGITRIO THAT 'CUSTOM COMMERCIAL' LOOK . . .

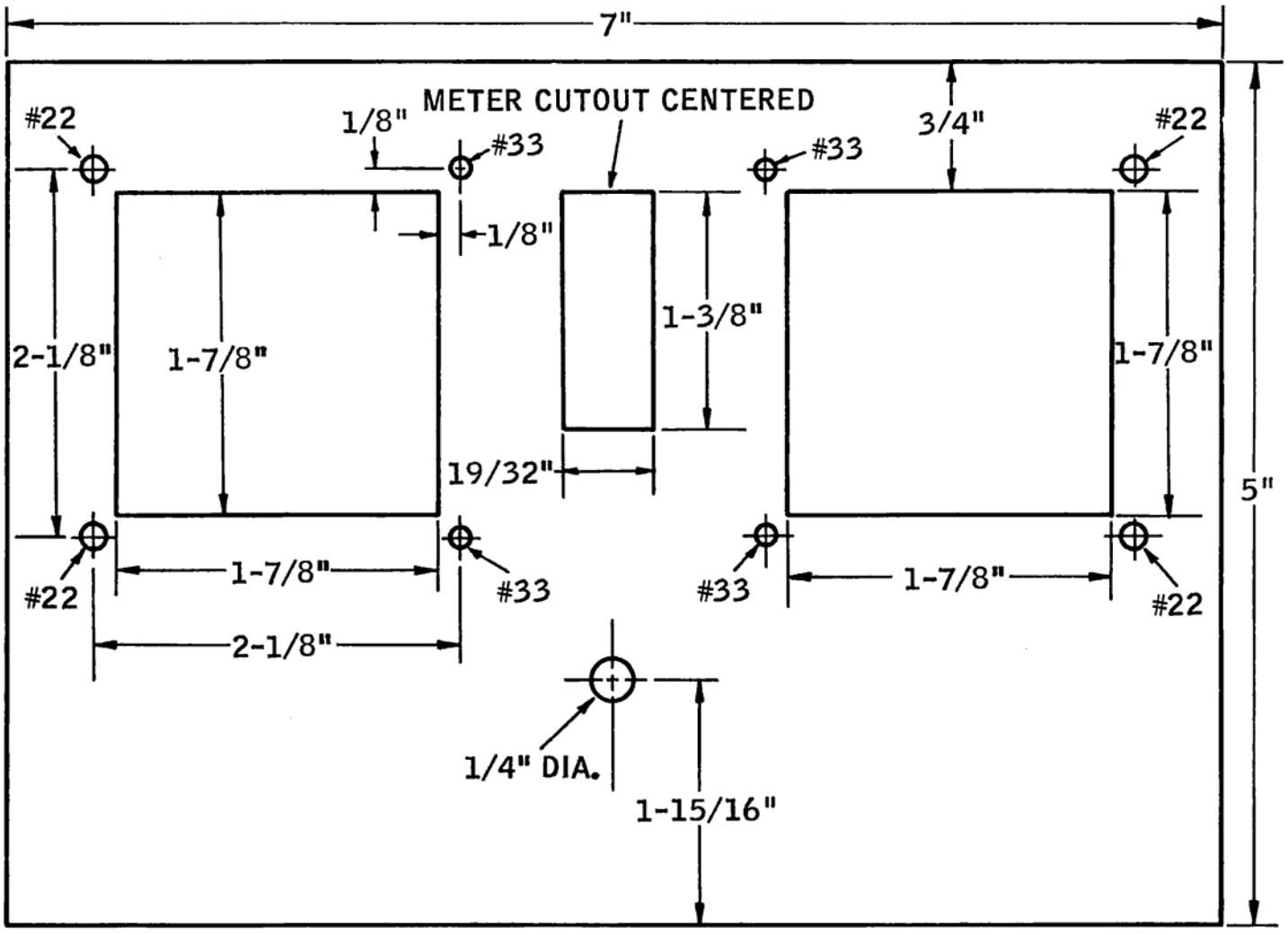
DELUXE TRANSMITTER

For those of you who want a more professional look to your radio gear — here is a deluxe version of the Digitrio-4. The only difference between this version and the three control stick version is the mechanical differences to provide the "face lifting." Most of the construction details are shown in the pictures. A little more care should be taken during case preparation as minor "goofs" will appear exaggerated due to the overall effect of the commercial sticks.

My unit was built around the World Engine's kit using an unpunched transmitter case. The LMB #145 case can also be used. By inverting the P.C. board the standoffs delivered with the Bonner sticks can be used as is without shortening them. When you invert the P.C. board you will have to move the antenna mount support to the component side of the board. Also, it will be necessary to cut the top of the oscillator tuning coil form off slightly to clear one of the pot shaft locking screws on the Bonner stick beneath it. Drill a ⅛" hole beneath the coil form (L2) for tuning access. 4-40 blind nuts epoxied to the inside mounting holes of the Bonner sticks allow easy removal or installation of the P.C. board and stick assemblies as a unit. The P.C. board mounting posts are not "peened" at the stick assembly so that the sticks can be lifted off the posts for P.C. board access. This requires that the four outside mounting holes on the case front be large enough for the posts to be inserted into them. The meter was mounted with "Silastic," a silicon rubber adhesive. This was done strictly for appearance sake and mounting screws can be used. Silastic is a product of the Dow Corning Corp. and is one of the most useful adhesives I've found for the type of work I do. It has a myriad uses in RC modeling and must be used to be appreciated. A meter face print is shown for those of you who want the meter to read vertically. This can be exchanged for the present meter scale by removing the tape holding the two halves of the meter together.

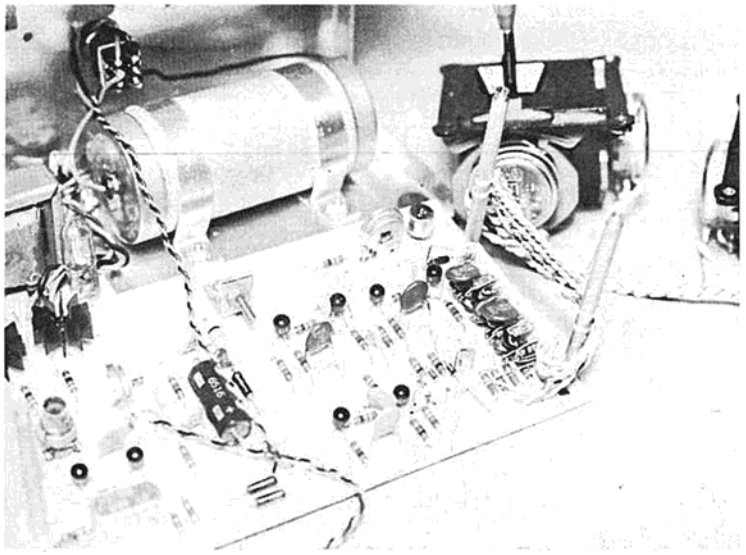
I installed a "McKnight" charger, which appeared in an earlier issue of RCM, using a "TV" type AC connector and a chassis mount socket for the

(Continued on Page 41)

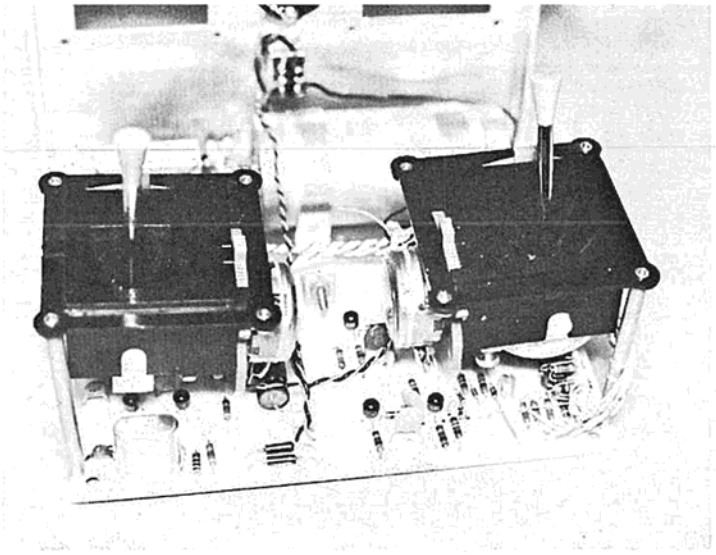


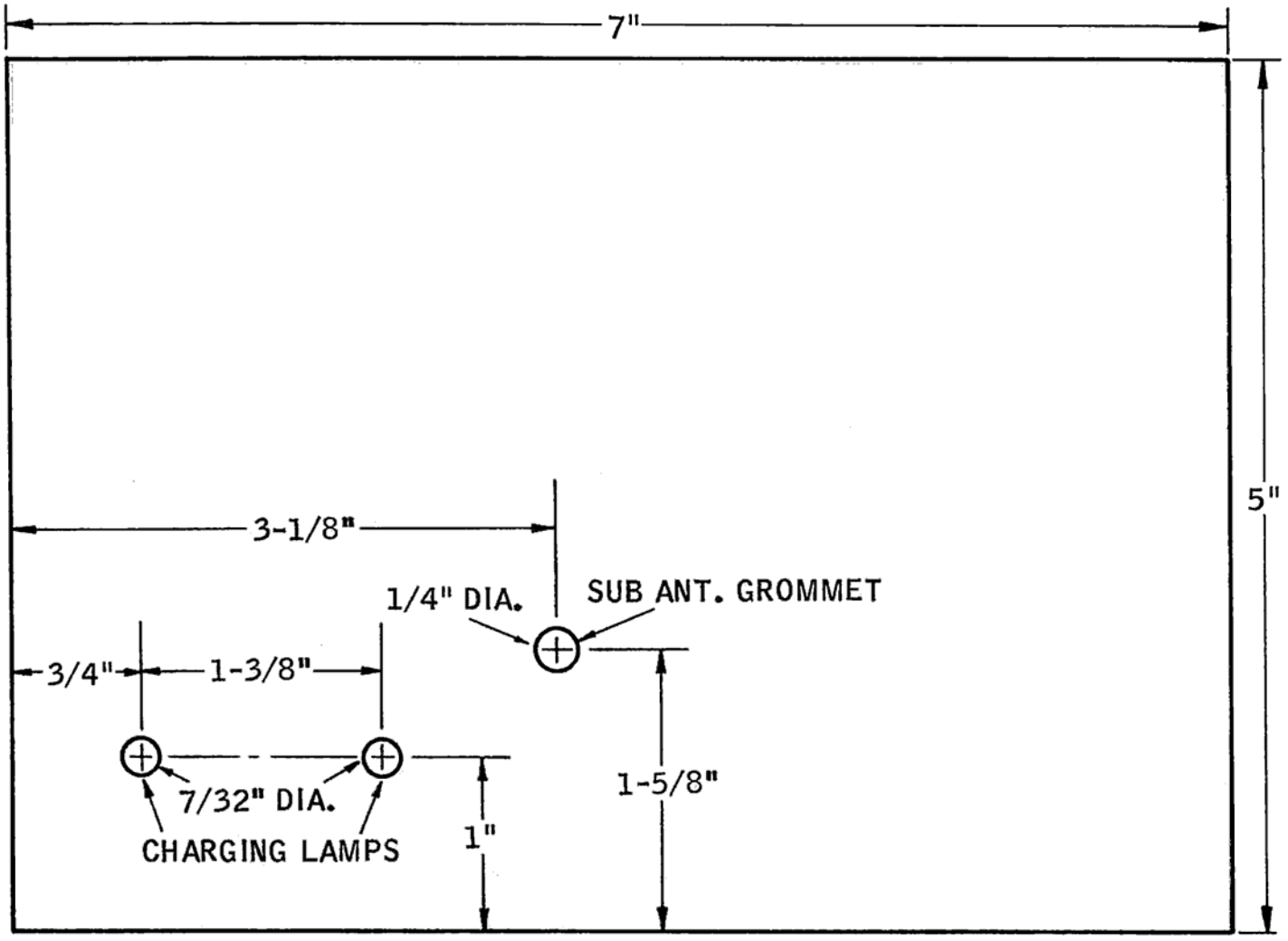
DELUXE DIGITRIO-4 CASE FRONT (FULL SIZE)

PC board removed from mounting posts shows McKnight dual charger in center left of photo and Controlaire nickel cadmium pack in upper center. Note neat cabling and tie-down of wires. Bonner sticks in background.



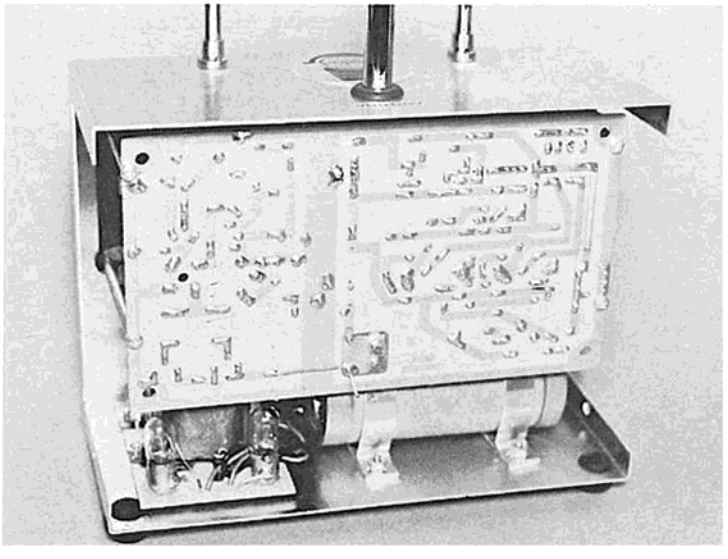
Bonner sticks mounted in place and entire assembly ready for mounting to case front. Note antenna mount support relocated on component side of board.

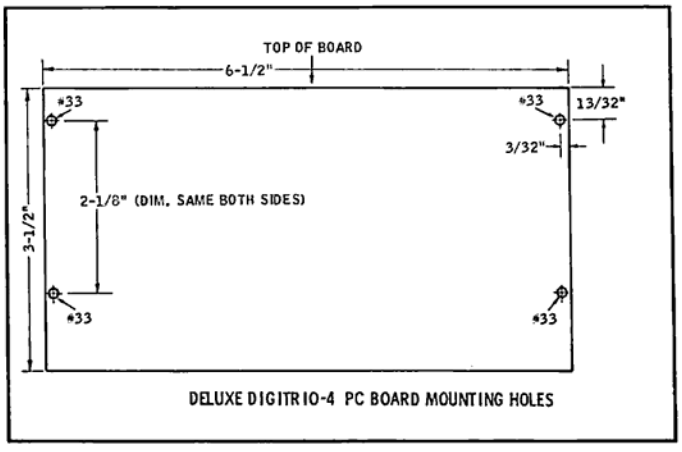




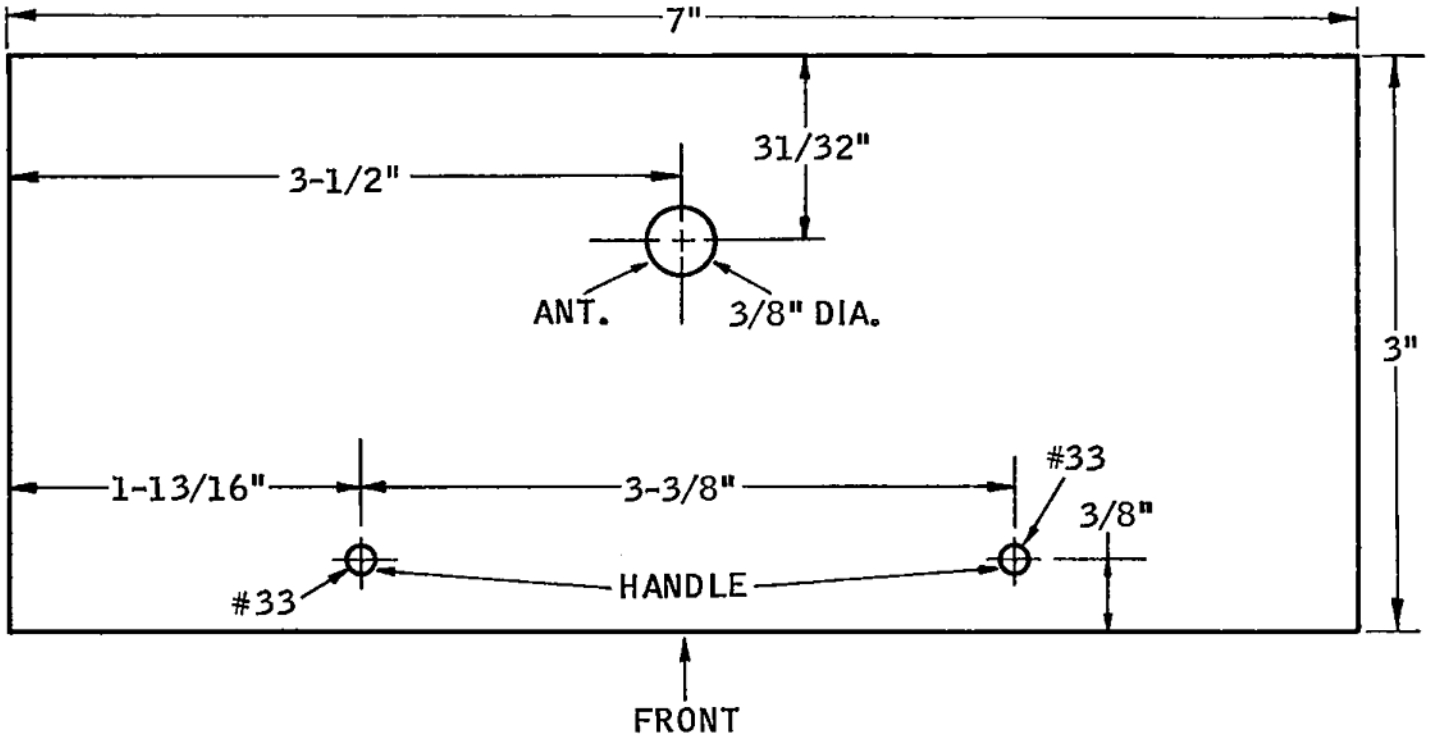
DELUXE DIGITRIO-4 CASE BACK (FULL SIZE)

Charger, power pack, Bonner stick assemblies, and printed circuit board mounted in place. Note antenna location. Chrome carrying handle shows partially on top front of case.



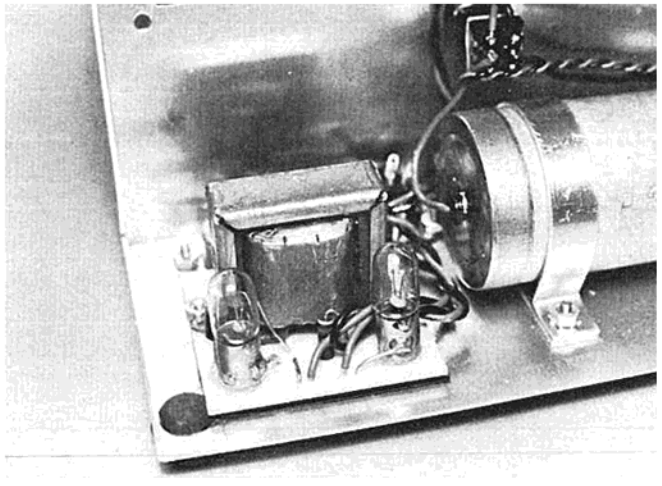


DELUXE DIGITRIO-4 PC BOARD MOUNTING HOLES



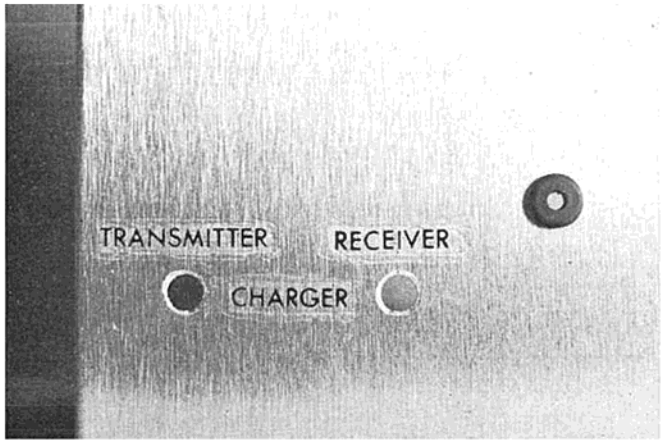
NOTE: CHECK ANT. ALIGNMENT BEFORE DRILLING HOLE.

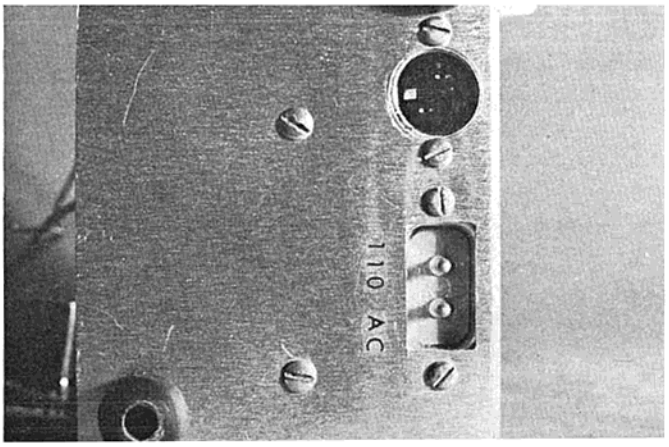
DELUXE DIGITRIO-4 CASE TOP (FULL SIZE)

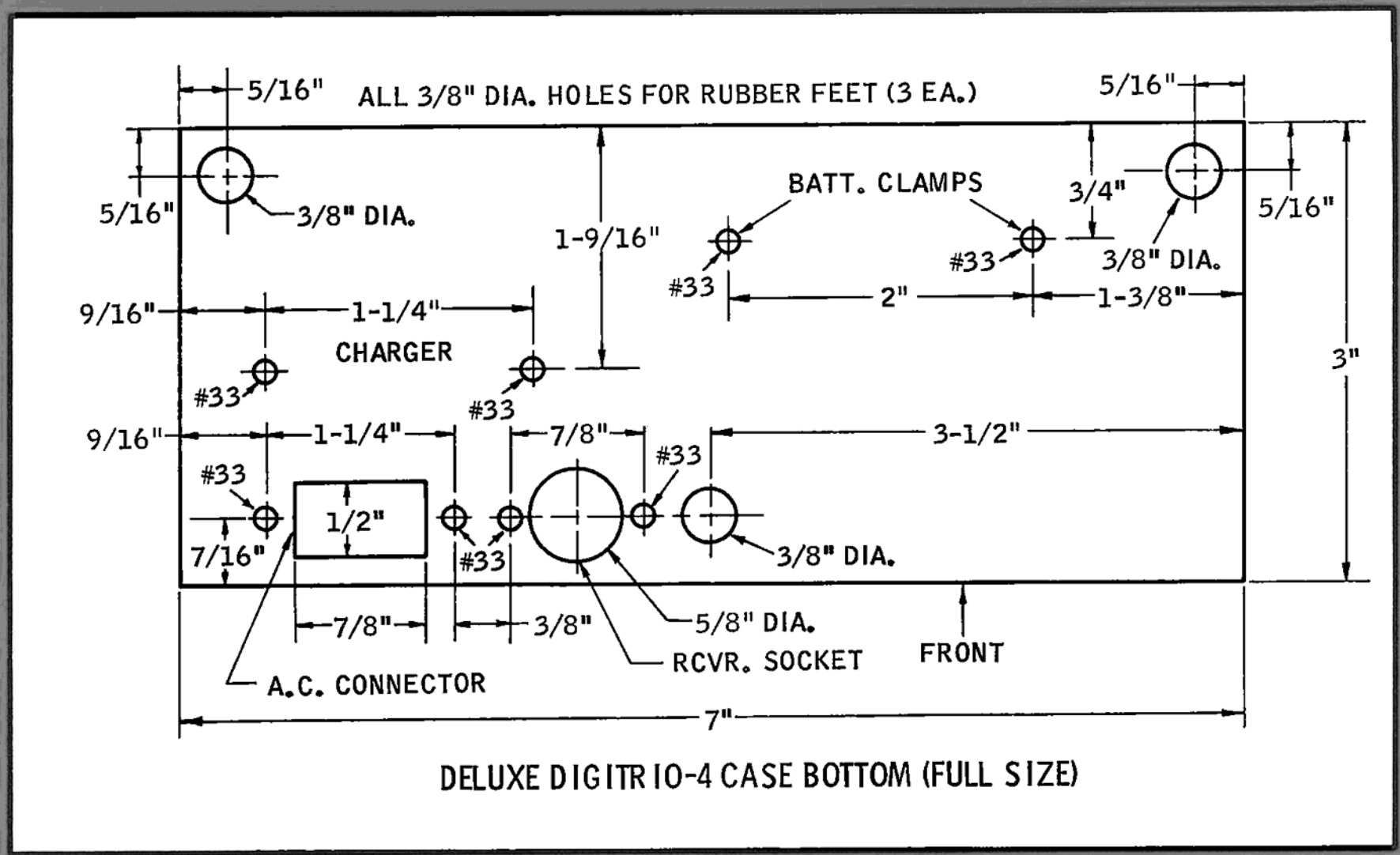


receiver. Two holes in the back of the transmitter allow you to monitor the charger in operation. The handle and battery pack came from World Engines.

As you can also see in the pictures I used 2N3640's in place of the 2N3638's and 2N3646's in place of the 2N706's. I recommended these changes a couple of issues back but no longer recommend the 2N3646's be used in the final amplifier due to a "burn out" believed to have been caused by base emitter junction failure due to transient voltage when the switch is turned on. I have also tested some Motorola transistors which I recommend as substitutes for the 2N3638's and 2N3640's — they are types MMPS3638 and MMPS3640.





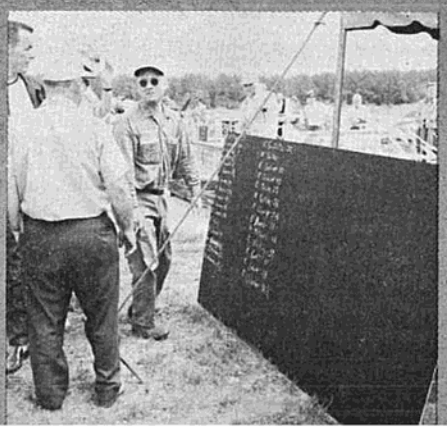


DELUXE DIGITRIO-4 CASE BOTTOM (FULL SIZE)

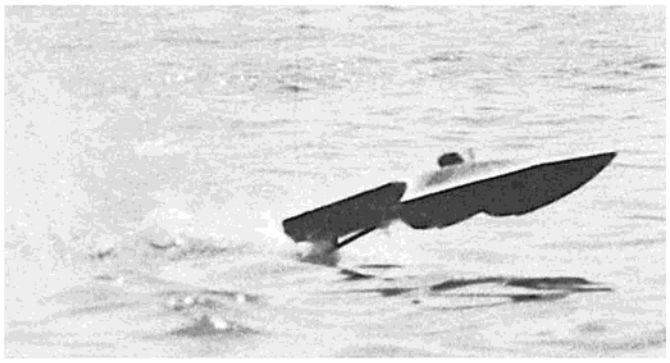
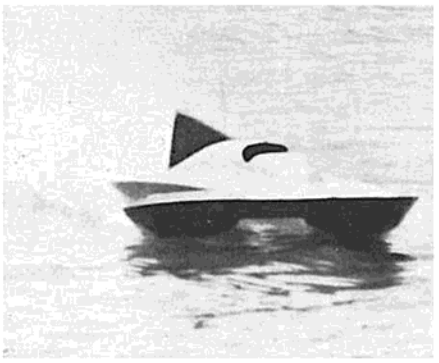
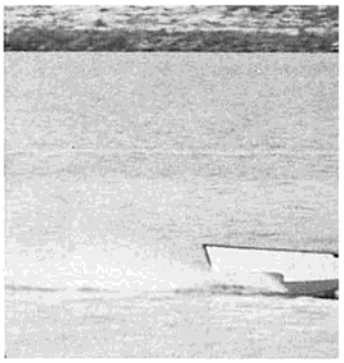
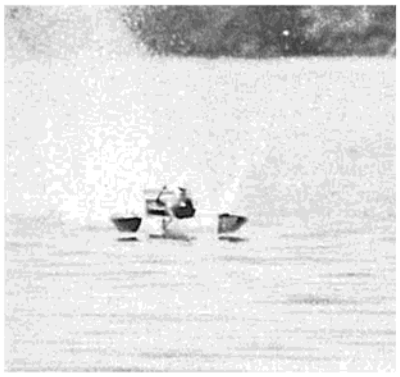
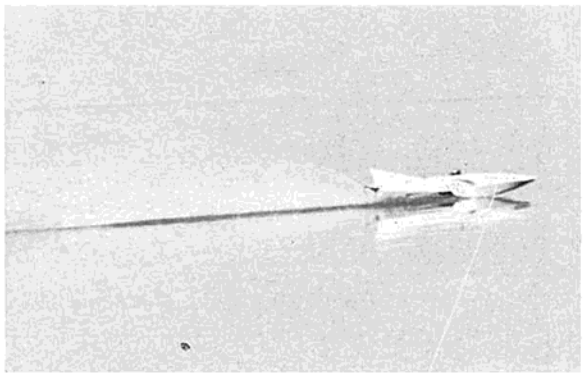
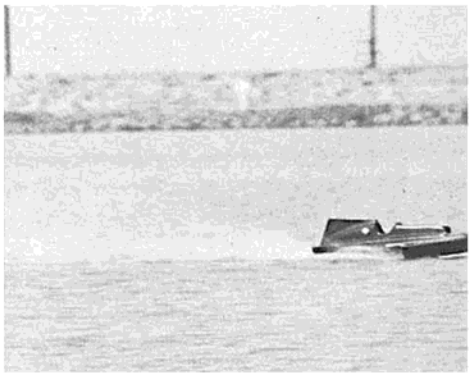
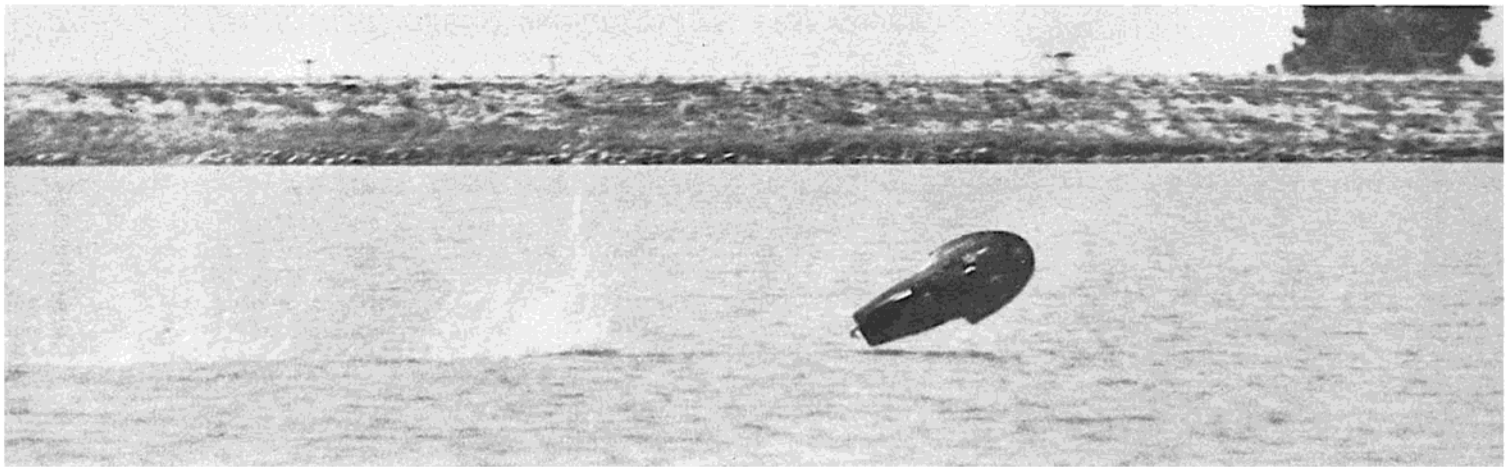
(L to R) Phil Kraft, 3rd; Harold Coleson, 2nd; Jim Kirkland, 4th; and Dick Gillette, 1st.

2ND ANNUAL GREATER ATLANTA R/C CONTEST

3000 SPECTATORS SEE DICK GILLETTE, HAROLD COLESON, AND PHIL KRAFT VIE FOR TOP TRIO IN ATLANTA R/C CLUB CLASS III SPECTACULAR.

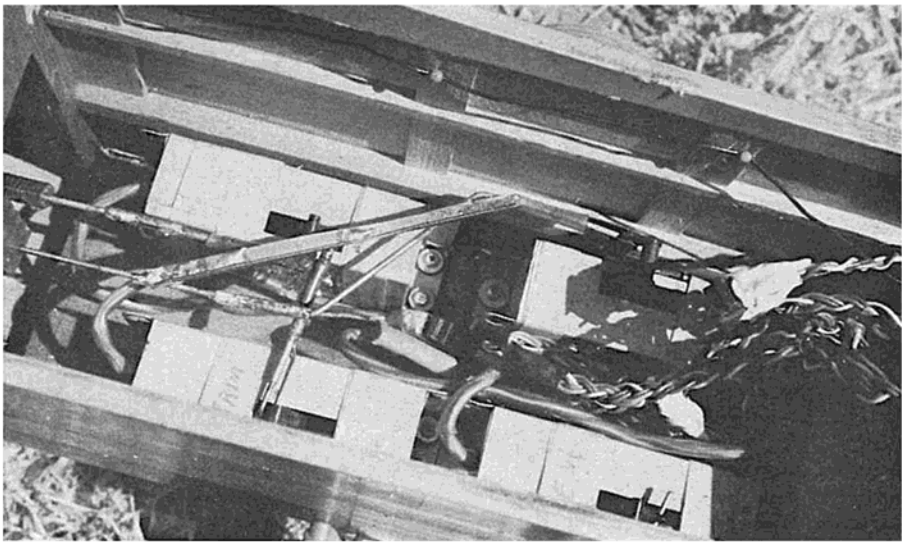


Top row, L to R: Phil Kraft and Kwik Fli II on flight line. Jim Kirkland assists. Bill Sattler (Man from Marlite) checks his plane out before moving to flight line. Ken Schneider (Nashville) with one of many Kwik Fli II's, his a beautiful yellow and black, heads for flight line. 2nd Row: Jim Kirkland and Citron on flight line. Harold Coleson looks over the "awards" during lull in Saturday's activities. 3rd Row: Chief score tabulator, Charley Evans, marks up the very low 1st round scores. Saturday was windy, and scores reflected this adverse condition. View of tent area and some of the estimated 3,000 that watched the two day meet. Big engines were much in evidence, Enya 60's, the new Veco 61's, and the larger Super Tigres. There was also a very high level of finish work to see. The flying was top quality, judging was at least of Nat's caliber, the spectators were impressed, and all agree that the Second Annual Greater Atlanta R/C Contest was a success. The South has risen again, and Atlanta IS what's hap-

DELANO TIME TRIALS

Rough water and high wind marred the 1966 Delano Time Trials, April 30th and May 1st. R. J. Foley of the San Diego Argonauts took these photos with a Honeywell Pentax 35mm SLR, Pentax 300mm lens, Tri-X film, F-11 at 1/1000 sec. Bob also ran his original three-point hydro to a new D-2 record of 34.09 mph. Top row left: Former D-2 record holder Bill Hutcheson did not find rough water to his liking. B&H Hornet hydro, Super Tigre .35. Los Angeles Pirates. Top center: Del Park's Rossi .60 powered hydro suffered hull damage when it slammed into shore line. Did about 36 mph. Same hull design as 'Sidewinder.' Top right: Del Silva's big fiberglass three-point hydro topped 40 mph at Delano, but had to settle for a new F-2 record of 38.99 mph. Original hull design, original twin cylinder 1.22 cu. in. engine based on McCoy .60. The exhaust note of this alternate firing twin is fantastic. Outfit probably would be faster if high-speed porpoising were cured. Concord Puddle Jumpers. Second row left: Like a water bug gone berserk, Ernie Jaboneta's 'Stingray' (Rossi .60 powered aluminum three pointer) skates across the water. Boat was clocked at a consistent 39-40 mph. Concord Puddle Jumpers. Second Row center: Karl Offerman's B-2 record holder (32.63 mph) ran early Saturday before the wind came up. Karl failed to improve on the record he set in San Diego in February. Light weight version of Hornet design, Super Tigre G.15, lots of nitro. San Diego Argonauts. Second row right: The 'Sidewinder,' world's fastest RC boat, leaves the traps at 48.65 mph, fastest time of the meet, but not up to its own E-2 record. The big Rossi .60 powered hull 'broke loose' and went end-over end a split second after this photo was taken. Venice Modeleers. Bottom row: A spectacular split-second shot of the Sidewinder flipping over at 40 mph. The following day, Steve Stevens dumped the big craft twice more. Del Park hull, Rossi .60 engine, F&M radio.



A classic example of **how not** to install your RC equipment!

SERVO INSTALLATIONS AND INTEGRATED FUNCTIONS

By RALPH SAWYER

HOW many beautiful and exotic R/C planes have you seen only to find a rat's nest inside once the wing is removed? More often than not, the picture is one of a maze of calibrated 1/16" wire doglegs, corkscrews, and semi-pretzels, to say nothing of the electrical wiring that is probably balled up in a corner with the leads spreading in, around, and through the servos and their associated "linkages." Usually, the owner-builder seems to be very proud of this type of plane, particularly if it has twenty coats of hand-rubbed lacquer and an upholstered cockpit with all the required elements of a scale appearance. The only items that are not scale is that rat's nest inside and the intermittent, sloppy operation that usually accompanies this type of installation!

The R/C equipment and kit manufacturers have expended a tremendous amount of effort to improve reliability, operation, and appearance, but for reasons unknown, some modelers can whip this stuff into a first class, high-priced ball of junk with a minimum of effort. The term "model" usually means a small duplicate of the real thing, but you

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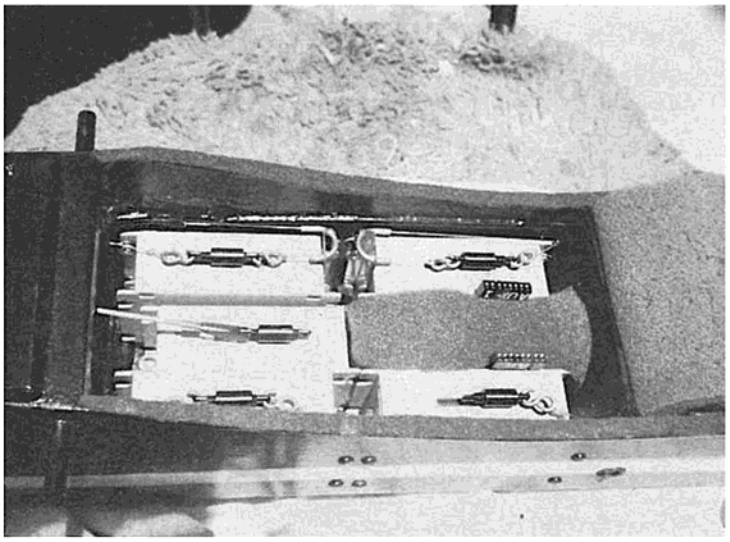
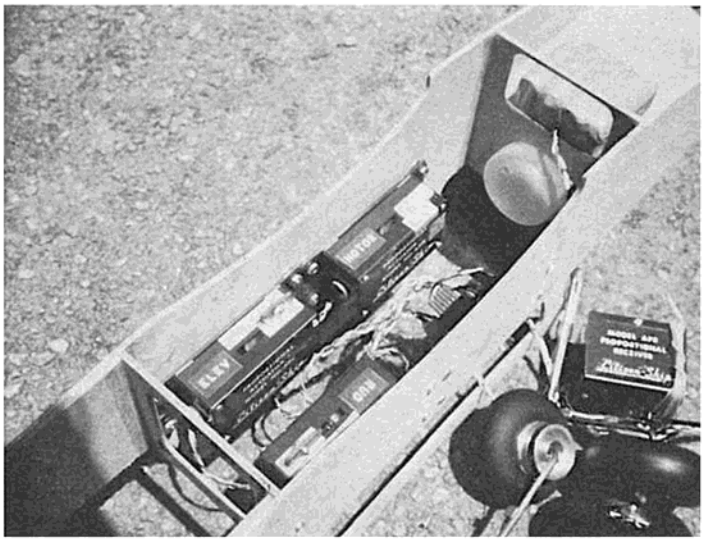
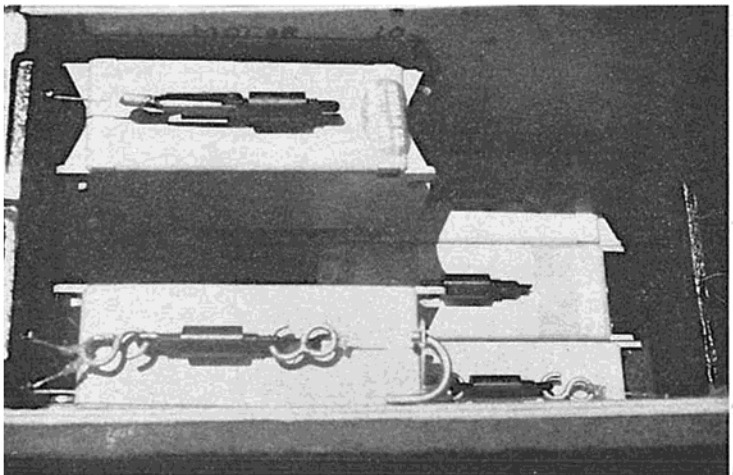
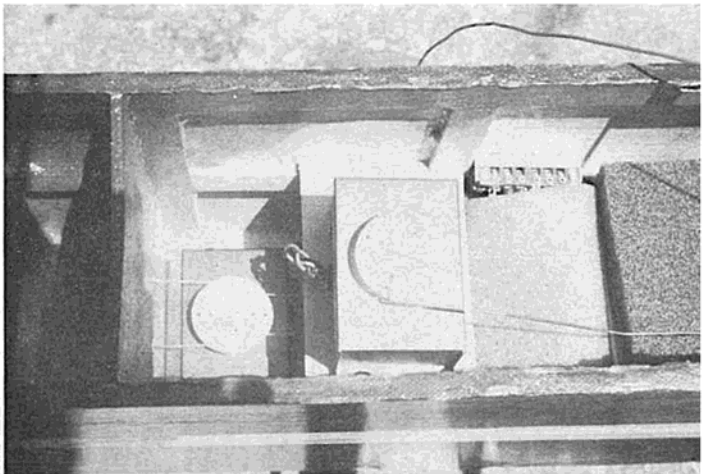




Above: Compact, neat installation netted more room for receiver. Cables helped shrink servo installation. Below: Early installation mockup is the key to installation reliability. Mixture and fuel cutoff on dual hookup in lower left corner.

Above: Proper installation determined in mockup stage. Servo directions labeled. Note nosewheel cable brake system at lower right. Below: Simple, neat, and well planned single channel installation. Note nose wheel steering.





SERVO INSTALLATIONS

(Continued from Page 45)

won't find these calibrated rodent havens in their grown-up counterparts. In full scale aircraft wiring and control installations are usually neat, simple, and planned with a definite pattern toward maximum reliability and an ease of maintenance. Why, then, shouldn't the inside of a radio controlled model be a reasonable facsimile of these planned installations?

Anyone who can plan the superb contours and mirror finishes exemplified by many of our contemporary models, to say nothing of many of the delicate and intricate scale details, can certainly find a few minutes to plan a neat, simple, and functional R/C installation without overtaxing his thought processes and natural energy. The love of model aviation should be more than enough motivation to at least create a radio compartment and control system that doesn't require a public apology when the wing is removed.

The prime requirements for the R/C installation of which we can be justly proud is one of planning and mockup, commencing as the first balsa board comes out of the kit box. After the fuselage sides are joined and station bulkheads are installed, the R/C components should be located and mounted in their respective ideal locations in order to operate the desired functions. The engine, tank, and nose gear should then be located and mounted. If nose wheel, or main landing gear brakes are to be used, they should be mounted at this time. With all of the radio equipment mounted and end functions in place except for the elevator and rudder, it is an easy task to decide what type of linkage will work most efficiently. This is the most ideal time to establish routing of all pushrods (if you must use them), flex-wires, and cables. Mock-up the entire installation for proper lengths, shapes, adjustments, and dimensions. Proper control surface throws for the available servo power can be determined at this time. Then, with the entire system, minus the wing, mocked-up, you can remove the gear and continue building the plane with the satisfaction of knowing where everything will go and that it will fit properly.

The wing doesn't present many installation problems since, normally, everything is installed prior to covering. However, if it is a low wing design and main gear brakes are planned, the cable routing should be established prior to closing out the center section.

At all times during the mock-up phase of your bird, keep in mind that a straight line motion, pull or push, is ideal since you won't lose any servo travel underload. If this isn't practical for your particular application, consider a flex-wire if the load is light, or a cable if the function requires a pull instead of a push on the part of the servo. Be sure to use hardware that will eliminate noise throughout the entire installation, regardless of cost, since a little RF noise can go a long way toward costing you an entire airplane! The use of nylon, teflon, rubber, and micarta can usually eliminate this problem if used in the right places.

Another factor to keep in mind is to never give a servo more of a job than it can handle. A stalled servo draws a lot of current and can discharge a portion of the airborne pack, possibly causing all of the servos to remain in a "command" position rather than returning to neutral.

When it comes to the wiring, braid or twist all component wires into cables and route them neatly out of any area where they might possibly become pinched, hooked, tangled, or cut. A pulled wire can be broken under the insulation and be difficult to locate even after the crash. If you wire your own airborne battery packs, always run the wires through the pack to prevent a direct pull on any connection in the event strain is placed on the pack. A few broken strands in the power pack wires can cause trouble due to voltage drop under a heavy servo load.

The conclusion to this first part of the article almost goes without saying — in R/C it's what doesn't show that counts!

While on the subject of installations, let's examine integrated servo functions. Most multi fliers usually utilize five servos if they are using reeds, or four in the case of proportional. This holds true even if they have more available channels, such as a twelve channel reed rig, or the five, six, and eight channel proportional systems. This common usage provides adequate control for all flight requirements, but what about engine reliability through mixture control plus additional functions for good, positive, and safe ground handling capabilities? Some of these features can be obtained through intergrated servo functions and, perhaps, one additional servo.

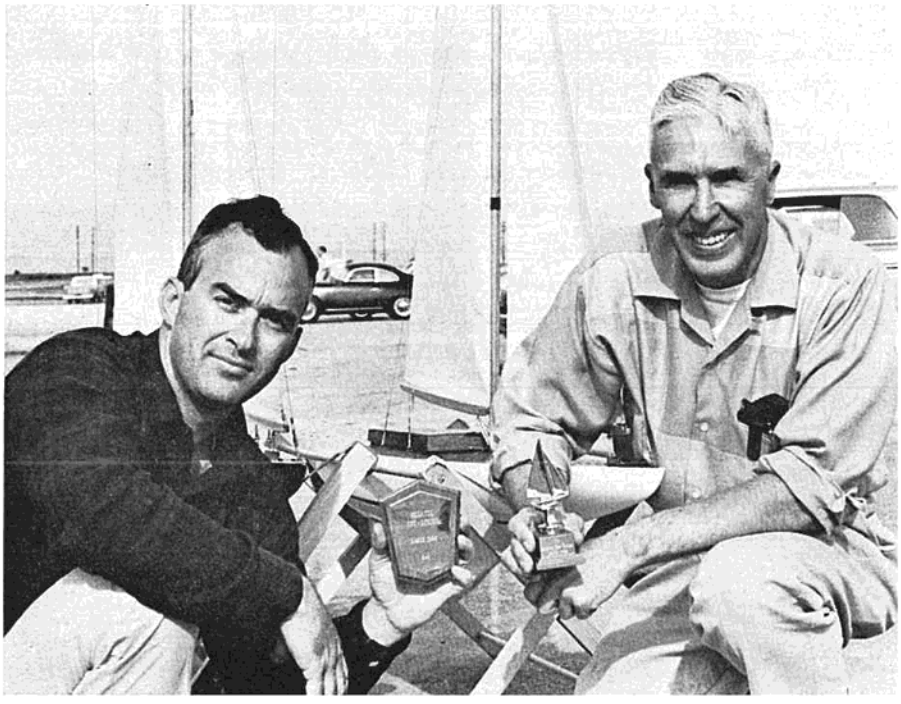
A most desirable function is braking since the safety of both pilot and spectators is involved. In the case of reed systems, the accepted method is to tie on to the elevator trim servo, or the pushrod from the elevator in the case of proportional. The accepted practice is to hook on to the down side of the elevator servo. These methods are fine, but outside of the contest fliers, you won't find one RC'er in ten who installs such a simple function. Why? I honestly don't know. One reason might be simply because the pull required to operate the brakes is too great to be effective after running the brake cable around several corners. One solution to this problem is to install longer arms on the brake assembly. Another is to install a reduction lever in the ship in order to give the servo more mechanical advantage. The best solution is a cable brake on the nose gear as was featured in the May 1966 issue of RCM.

The next additional function is a fuel cutoff and mixture control. These two operations will require one additional servo, but are well worth it. The standard procedure required to shut down a model airplane engine after the flight is completed is to pinch the fuel line, or throw a rag into the prop. These methods are effective, to be sure, but they certainly don't impress anyone in the spectator area! On the other hand, consider the airplane that taxiis up to the pit and its waiting owner, brakes to a stop, and the engine is shut off via the radio system. This same fuel cutoff also serves as a backup for the throttle in the event of throttle malfunction. It is accomplished quite simply by fabricating two pieces of ⅛" micarta, ½" wide, and set up like a scissor with a hole through both pieces the size of the fuel line. When actuated by a length of fishing leader attached to the servo, the fuel supply to the engine will be cut off. The same servo can be rigged to operate the needle valve on the throttle via a length of cable from the servo to the needle valve, where it is wrapped around a few turns, then back to the interior of the fuselage, terminating in a spring. By using all of the servo travel for mixture control, with the exception of the last 20%, on one end for the cutoff, the same servo can provide both throttle functions. My own flying experience has proved that a rich mixture is ideal for takeoff, with a leaner mix for flying and landing. As the temperature increases, the richer side of the scale is favored.

Some of today's proportional systems have throttle trim which can be used for engine cutoff. This is excellent! Now the fuel cutoff cable can be used on the wheel brakes, rigged to pull on the rich end of the servo. On some engines, such as the Veco, the mixture can be controlled automatically without the use of a servo. This is accomplished quite simply by utilizing a length of fishline attached to a fixed point, then routed to the needle valve, where it is wrapped around it six times, then back to a spring which is attached to the same fixed point from whence the fishline started. The spring needle valve clip is

(Continued on Page 57)

POWER & SAIL: THE SUMMER SCENE



Regatta One-Design RC model yachtsmen are (left) Charles Donnelly, second place; and Gordon Wallace, winning skipper, shown after receiving awards presented at first Regatta One-Design RC Model Yacht Association races.

THE recently-formed REGATTA One-design R/C Model Yacht Association launched its first radio-controlled model sail yacht regatta March 19, 1966 at Marina Del Rey.

Unfinished yachts, illnesses, etc., had previously postponed earlier dates and again thinned the entries to five yachts. The enthusiasm and sharp sailing were not affected, however. Racing was conducted in moderate conditions of wind and water. The triangular 225 yard course was the scene of a number of exciting actions at the marks and fast closing beats to the finish.

A number of yachtsmen, guests of REGATTA skippers and a large number of other persons attracted to the racing appeared to thoroughly enjoy the events and the speed and agility of the radio yachts. The fact that the models offer something of an opportunity for drawing non-sailing spectator interest and imparting some understanding of the sport impressed the model skippers and full-size boat fans alike.

Although every skipper and his yacht gave solid performances, the day's hon-

(Continued on Page 48)

The winners of the DeVry Dolphins multiple boat contest held on May 22. Gene Milasius, Randy Vitek, Marianne Preusse, Ron Buck, Dick Young, and Lee Pender.

Power & Sail: The Summer Scene (continued)

ors went to the consistent R/C-ing of Gordon Wallace (REGATTA #9) of Burbank. His few-inches-of-victory finish with second place scorer Charles Donnelly of Los Angeles (REGATTA #16) had the onlookers literally rooting the boats to the line. Trophies were awarded both skippers.

Hardworking and efficient O.O.D. was John Fletcher of Costa Mesa. His start countdowns and race scheduling procedures kept events moving. Only one penalty was incurred during the entire run of 2 boat heats.

Skipper	REGATTA Yacht	Score
Charles Donnelly	#16	5
Matt Jacobson	# 1	8
Robert Matthiessen	# 5	7
James Scott	#32	10
Gordon Wallace	# 9	4

For further information, interested persons may write to REGATTA One-design R/C Model Yacht Association, c/o Charles Donnelly, Secretary, 125 N. Van Ness, Los Angeles, California 90004.

●

Dwight F. Brooks (385 S. Los Robles, Pasadena, Calif.) had always wanted to construct a fully scale "PT" but had difficulty finding any kits large enough for his intended project. The problem was solved by purchasing a Revell plastic PT and cutting the completed model in sections to obtain the proper hull outline configurations. These were, in turn, enlarged and traced on ¼" birch plywood and cut out. Once completed, this gave Dwight the basic hull he wanted. The model was then planked with ¼" mahogany plywood and steamed to permit the radical bow contour. The finished model is hardwood throughout

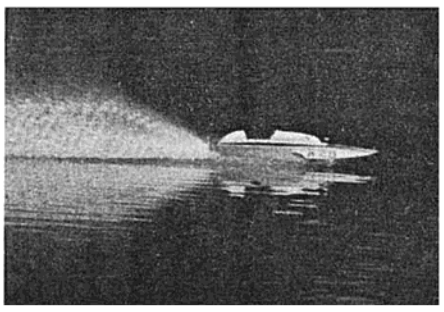
and was given two coats of clear resin prior to final painting.

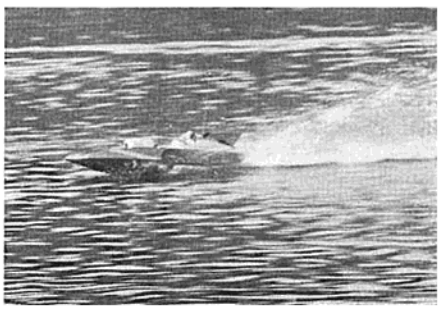
A Ganet water cooled marine engine was used for power and produced excellent results! Brooks used an Orbit 10 channel system with SN rudder operation. Other channels were used for engine speed and smoke system. Specifications are as follows: Length, 5 feet; Weight, 20 lbs.; Engine, Ganet; Prop, 2¼" brass 3-blade; Speed, 10 MPH; Paint, Duco enamel over resin then an overcoat of clear resin; Beam, 16"; Freeboard fwd., 8"; Freebroard aft, 5"; Radio equipment, Orbit 10; Torpedoes, hand carved balsa; Turrets, plastic; Guns, brass tubing; Fittings, Norco; Servos, Bonner Transmites; Adhesive used, Ambroid.

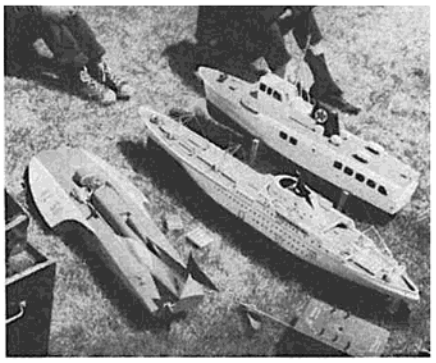
The outstanding photos of Dwight's PT were taken last summer in Northern Minnesota. Since then, the designer-builder has run it about at Newport Harbor, torpedoing Sunday traffic returning from offshore!

The purpose for the rather large size of the model was for an ease in permitting more extensive detail as well as having an operating scale boat that would run well in choppy water. The results permitted Dwight to run in virtually any kind of weather, with the hull performing particularly well in its turns. Once planing, the PT appears quite realistic in all respects — occasionally confusing a few local fishermen who have never heard of radio control!

Dick Hanson's .29 powered original which recently set a straightaway speed record of over 29 mph in Class C-2. As you can tell from the picture, it is a surface rider powered by a Super Tigre .29 and controlled by Citizen-Ship Analog Propo. The modified Hornet is a Super Tigre 60 powered design by Jack Peterson.



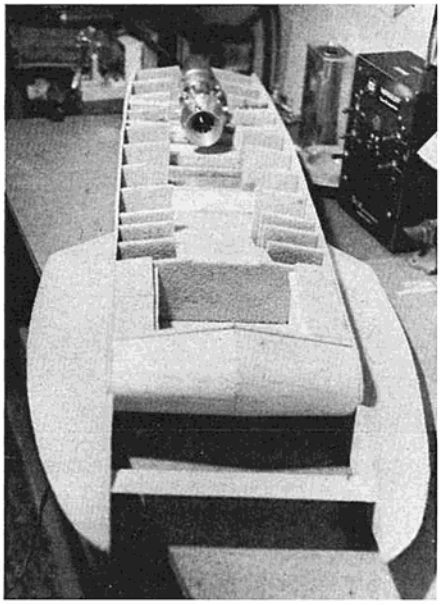




Upper left: Councilman Houston Gibson with boatmen and Miss Unlimited. Above: Miss Unlimited, N.S.S. Savannah, and Sterling's Lumba-Lumba, all belong to Commodore Howard Bowers. Below: Jerry Armbruster's Corvette moves by the larger retriever craft.

The Roostertail

The Official Publication of the International Model Power Boat Association
General Office:
2405 19th Avenue Broadview, Ill.



Here is a new wrinkle in hull construction, P.V.C. foam! The stuff has 3000 psi shear strength. Turbo Craft engine. Too bad reaction engines are not permitted in IMPBA competition!

SIXTEEN NEW RECORDS!

THE following list of new records are current to June 1, 1966. Get out your record book and bring it up to the minute. In cases where a record has been broken more than once since the last list came out, all names are listed to give credit to all the men who deserve it.

Engine classes shown between limits, .0A .1B .2C .3D .45E .67F3 .05. For instance, Class "C" is between .2, and .3, cu. in.

Straight 1/16 Mile

B-1	S. Muck	0:12.10	18.60 mph.
B-2	K. Offerman	0:06.89	32.63 mph.
D-2	B. Hutchenson	0:08.03	28.04 mph.
D-2	R. Foley	0:06.60	34.09 mph.
D-3	J. Whitlatch	0:07.98	28.21 mph.
E-2	D. Silva	0:05.81	38.73 mph.
E-2	L. Stevens	0:04.56	49.34 mph.
F-3	D. Silva	0:08.91	25.25 mph.

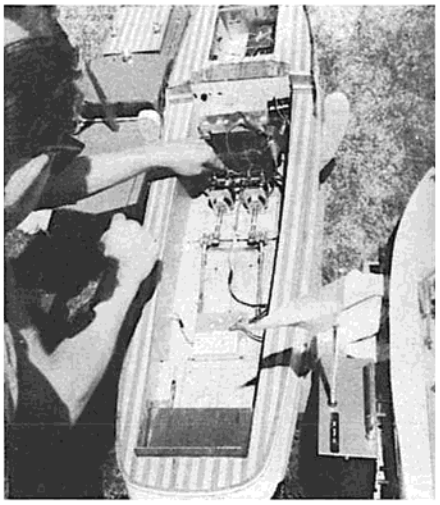
¼ mile Oval

B-1	S. Muck	0:59.22	15.20 mph.
B-2	G. Preusse	0:49.30	18.30 mph.
C-2	L. Pender	0:39.90	22.50 mph.
E-3	S. Muck	0:44.06	20.40 mph.
F-3	B. McCallister	0:54.88	16.40 mph.
K-3	W. McCallister	0:55.07	16.36 mph.

In the above list, 2 men qualified for the *Octura* trophies. L. Stevens broke not only the 40 mph, but the 45 mph as well, and only a hairs breath away from the 50 mph mark! Lee Pender broke the 40 second barrier for a .29 powered boat to qualify for his *Octura* trophy.

In preparation for the Annual Regatta of the IMPBA, the DeVry Dolphins ran the "Season Opener" regatta in the Midwest. They tired out new timing and counting equipment, as well as the new scoring system for multi-boat racing. The whole thing worked out better than expected. The individual boat-lap counter for keeping track of the lap count of each boat in a race made it easy for spectators and contestants alike to know the exact position of each boat at any time during the race. In order to give each boat some identifying mark, a colored flag was affixed to the antenna, which corresponded to the radio frequency of the boat's receiver. Since there can never be more than one receiver on the water for any given frequency, the basic color coding works fine. The counter on the display board is color coded with the same basic colors. This insures that there is never a mix-up due to boats which may have the same, or similar paint jobs. This lap counter, and a whole new set of timing devices will be put to use at the 17th Annual IMPBA Regatta, on August 20, and 21, at Potawatamie park in Wheeling, Ill. If you don't have your reservations in yet, get them in right now! Contact: Mr. R. Ruffner Sec'y, DeVry Dolphins, 4141 W. Belmont Ave., Chicago 41, Ill.

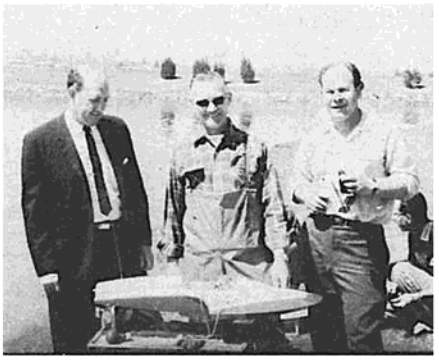
Are you looking for a place for your club to run model power boats? Try the simple, direct approach, as did the Mile High Model Boat Club, of Denver, Colorado. Back in February, long before the ice was broken, Howard Bowers, President of the Mile High MPBC, contacted the City and Park Commission regarding a site which was selected by the club. To his consternation, he found that several city officials, as well as a local T.V. station were opposed to the idea, fearing that the noise would annoy the neighbors in the vicinity. In addition, they had the usual erroneous opinion that model boats were for children, not for teen agers and adults. One T.V. commentator told him that they didn't want HELP, they wanted a positive solution



Jim Oliver's boat was built from English plans by Jerry Armbruster. Deck is hand-laid yellow pine and mahogany. Powered by two Pittman industrial motors.

for the problem of Juvenile Delinquency!

Undeterred by these skeptics and antagonists, Howard contacted the office of the Mayor, where he found a man who was willing to see what the club had to offer, and see for himself whether or not model power boating had any value as a deterrent to Juvenile Delinquency, and as recreation for



adults. A councilman attended a club meeting and gave the views of the City to the members, and conversely, the members voiced their opinions and arguments in favor of the selected pond. As a result of the meeting, a date of May 1 was set for the club to put on a demonstration for the Mayor, and all of the councilmen who wished to attend. 12 members had 15 boats to run for the demonstration, and the success of the venture is evidence by the fact that on the following Thursday, Howard signed a permit from the city to enable the Mile High Model Boat Club to run on their chosen pond. All this only proves that a picture may be worth a thousand words, but a demonstration is worth a thousand pictures.

Three Santa Barbara One-Design sail yachts practice rounding a mark. Standing is designer Tom Protheroe. Seated on the bank are Tom and Lori Protheroe and friend, Janice.

R/C SAIL YACHTING

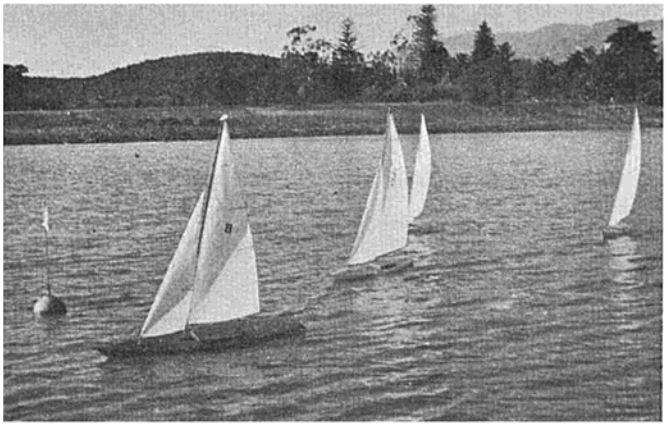
PART III

Editor's Preface: This is the third and final installment on tuning the R/C sail yacht. Before delving into the intricacies of the competition racing yacht, we would like to correct an error that occurred in Part I. In that first segment of the series, we mentioned that sheeting systems that utilized chains usually produced problems of fouling and backlash. We were referring to various "home-design" systems we have seen, most of which produced the results mentioned. The commercially available Dynafoil Sheeting System marketed by Tech-Aero Products Co., is a notable exception to the rule. This is a chain drive system for sail sheeting whose design makes it actually impossible to backlash or foul. Used in the popular Regatta One-Design sail yachts, it is an excellent system with an enviable competition record that can also be used in other competition sail yachts, such as the SB One Design used as an illustration for this series of articles.

PART III

THE final phase of tuning the R/C sail yacht begins with establishing a balance between the sails and underbody of the yacht. (Total "wetted" surface of the hull, whether heeled or upright.) The Center Of Effort (C.E.) is the centralized driving force of the sails. The approximate location of the C.E. is near, or just forward, of the center of lateral area of the sail plan, and located about one third of the way up and aft of the mast. This is a constantly changing force, both in location and intensity, as opposed to a power boat whose C.E. would be at the propeller hub, or below the hull and at the stern, producing a straight forward thrust. The R/C yacht skipper should have some idea as to the forces acting on, and affecting, his yacht in order for him to fully understand the reasoning behind tuning for various wind conditions.

Simply stated, if the C.E. is too far forward, the yacht will tend to head off, or downwind. This will require con-



Left: In a practice race, Judie Grigsby's 'Ariel' leads the pack across the starting line. Right: The saltiest dogs display their swag after racing in the Santa Barbara yacht harbor. L to R: Jim Holmes, Ernie Allenbaugh, Dave McClure, Tom Protheroe, Dan Protheroe, and Austin Munger.

stant rudder deflection (lee helm) to maintain a course to windward. The effect will slow the yacht because of rudder drag, making it difficult to tack or bring the boat about in heavy winds.

Alternately, if the C.E. is too far aft, the yacht will tend to head up, and will require a large amount of weather helm to hold it off the wind. In strong wind gusts, it would be nearly impossible. In actual practice, it would be very difficult, if not impossible, to sail a course to windward with any success against even a mediocre skipper. Rudder drag and poor control are the main reasons for losing out.

Simply stated, if the yacht heads up into the wind, move the sail area forward. If the yacht falls off the wind, move the sail area aft. Always keep these two rules in mind.

To delve further along this line of thought, a sailboat hull will pivot in the water at a certain point. If the sail area is ahead of this point, it will tend to "blow" the bow downwind. If the sail area is aft of this point, it will tend to "push" the stern around, causing the yacht to "round up" into the wind.

Insofar as these C.E. changes are concerned, the designer of the yacht has determined the C.E. and hence the mast position. This can be considered the "average" position for the design. But when it comes to racing, an "average" position is not good enough if you expect to enjoy better than average success. As an example, in heavy wind velocities, a yacht will normally tend to "head up" because the C.E. moves out to the lee of the hull as it heels over. (Remember that the C.E. is the center of the driving force of the sails, and is well above the deck level.) The amount of heading up tendencies depends on the force of the wind and the design of the yacht, itself. To compensate for these factors, you should move the sail area forward. In sailing downwind, the yacht will try to sail off in a direction opposite to the side on which the main boom is then carried. Mast position has little effect on this condition. The Santa Barbara One-Design incorporates a system to enable the skipper to sail downwind with the jib held out on the opposite side from the main, referred to as "sailing wing and wing." This balances the yacht on a downwind run and enables you to maintain a nearly neutral rudder position, thus decreasing rudder drag to a minimum.

On the other side of the scale, light winds will have the effect of moving the C.E. forward, requiring a mast position that is also further forward. Sails of different cuts, or draft will also have an effect on the C.E. If a yacht is heavy in the bow, for example, the C.E. will be forward. If it is heavy in the stern, it will tend to throw the C.E. aft. These are just a few of the factors that enter into understanding, and therefore, successfully racing, a competition yacht.

There are many methods for changing the Center of Effort. For example, you can move the mast and/or the jib, fore or aft, as required. The rake of the mast can be changed fore or aft. In excessively heavy wind conditions, the jib is sometimes sheeted-in tight to hold the bow off the wind, backwinding the main to decrease its pulling power and heeling force. As a result of the latter, you will be sailing mostly on the jib and will have adequate control over the yacht. An easier way out of this condition is to decrease the size of the main sail. The only problem here is that you will suffer on the down wind runs and reaches if you are racing. This is one of those compromise decisions you will have to make for yourself. If you are sailing a full displacement yacht, it may be advisable to decrease sail in heavy wind conditions. If, conversely, you are sailing a light displacement, semi-planing type hull, it may be to your advantage to maintain full sail. You will profit from the high speed capabilities of this type on reaches and down wind runs.

In good sailing weather, the jib should never be sheeted-in to backwind the main. Inexperienced yacht skippers have used this as a "crutch" to control the yacht from rounding-up into the wind. This will, of course, steer the yacht off the wind, but will be detrimental to its forward speed.

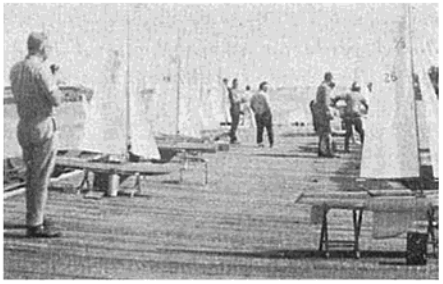
The simultaneous sail control has proved to be the most efficient system to use, the sails maintaining proper relationship at all times. This allows the skipper to pay more attention to racing tactics, etc. A well tuned yacht will, when sailing to the windward, and with the rudder amidships, slowly round up into the wind and luff its sails slightly, still maintaining headway. You must carry a slight amount of weather helm for maximum efficiency when sailing to the windward. (Weather helm is the amount of rudder offset required to prevent rounding up.)

In summarizing, it must be stated that these instructions are far from being complete. In the final analysis the fine touches of tuning are up to you. Each yacht has its own characteristics that must be learned and considered by the skipper. There are no set, ironclad rules to follow to guarantee that you will have the fastest racing yacht at the next Regatta.

You must acquire a "feel" for sailing, rather than considering it a mechanical thing. This series of articles have been a mere introduction to the graceful, challenging, and demanding art of competition yacht racing.

If you think it's easy, you're in for a surprise. If you think it's for someone else, we ask that you try it.

Just once!



KITS & PIECES

BERNIE MURPHY

THOSE of you who read last month's coverage of the DC/RC Symposium may have noticed the photo of my somewhat bent VK Cherokee and "ground plane" antenna on the Quadruplex CL-5. The photo was sent along with the column as proof to Fearless Leader that I am as prone to prang as the next guy. (A fact that he decided to share with the entire world.) Thanks a lot, FL!

I did learn a bit about RC'ers as a result. How many of you would buy a used RC system — one which you knew was "for sale" only because the owner was unhappy with it, and immediately after a bad crash? For two weeks my phone rang! Calls from hundreds of miles away, yet! The conversations were pretty much the same — "I understand you're dissatisfied with your CL-5 and want to sell it. I would like to have it. How much?" Could be they know something that I don't!

While on the subject, it might be worthwhile to explain what happened. The Cherokee had been flown earlier in the day without incident, and I had made numerous flights throughout the day on another ship without so much as a glitch. Prior to the fateful flight, four ships had experienced trouble in one specific area. My takeoff path was directly into the trouble zone, and as I broke ground, the ship flipped over and in. Someone said, "I heard it on the monitor — CB'ers talking about the airplanes just as you went in." All of the trouble had occurred on 27.045 MC! It is rare that I will buy "interference" as a crash cause, as many years of flying have indicated that it usually isn't the cause. However, five rigs of three different types, all on the same frequency, experiencing the same difficulty certainly doesn't leave much room for an alternate conclusion.

It wasn't until three weeks later, at a neighboring club meeting, that several members remembered seeing two young boys in the parking area, checking out four inexpensive Part 15 walkie-talkies! And if you don't think that this may be a problem, we suggest you obtain a copy of the July 1966 issue of S9 Magazine, a publication devoted to CB operation. Their lead article, entitled 'The Micro-Ham Special,' and sub-titled "Get On The Air With This Legal 'Hobby CB' Rig, And Learn Code Too!" is a construction article for building a Part 15 transmitter complete with "ham key." Readers are urged to work skip, set up Micro-Ham networks, swap QSL cards, and even write into the magazine for a Micro-Ham call sign! According to this article, the author has found "Channel B," 27.045 Mc to be exact, to be "usually free of interference" and seemingly "a good place for Micro-Hams to congregate." And although the limitations of Part 15 restrict the input and antenna length, the author of this article claims transmission of several miles on ground wave!

The preceding is certainly not meant as a criticism of another part of the Citizens Service, simply a warning to RC'ers that monitors are in indispensable item and may save your $500 bird. This one problem, at least, will be eliminated on the new 72 Mc spots.

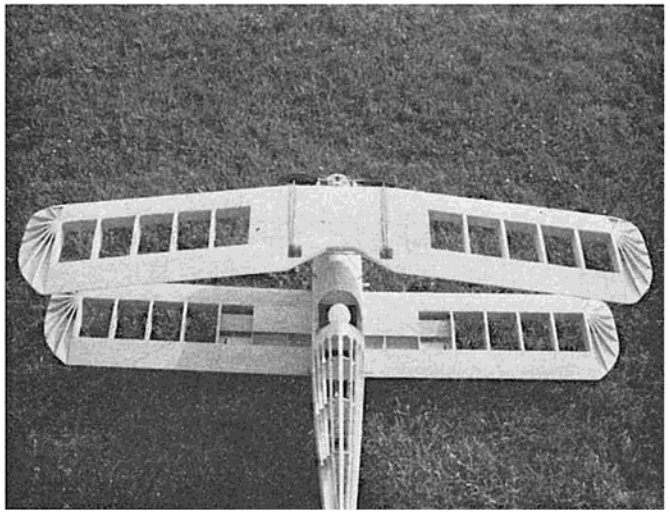
●

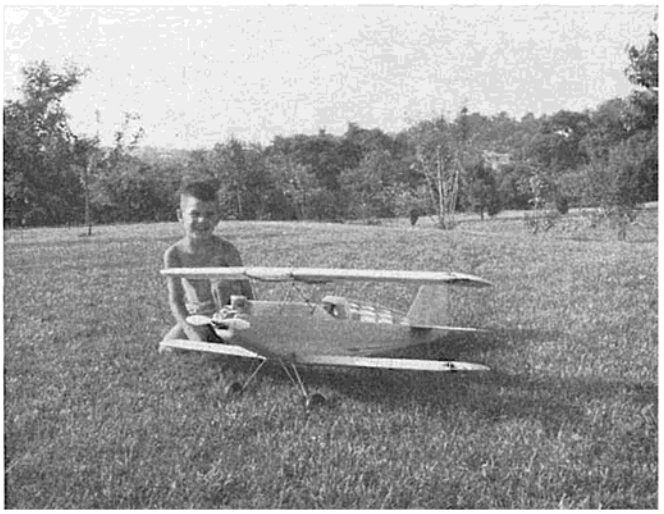
Building time has been pretty scarce lately. Ed Thompson has managed to keep us tied up with prototypes, modifications, and packaging of the Digitrio-4. I have hesitated, in the past, to comment on the Digitrio in any way which might be considered a review, since I feel it would be a little presumptuous for RCM to review RCM's Digitrio. My feelings are still the same, but after living with Digitrio for many months, plus having built and checked ours more than I care to count, I must say that I believe it to be a solid, sound, practical, and reliable system that anyone can build. This last factor is borne out by the fact that Our Leader has built two complete systems which immediately qualifies the system as one that "can be built by an idiot."

I might also add that the entire system is 100% repeatable if built in strict accordance with the instructions. If you

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

Two shots of Aamco's 'Aeromaster' bipe. #1 son Donnie in lower left photo. Built-up sunburst wingtips are added touch that enhances transparent covering.





KITS & PIECES

(Continued from Page 52)

have built, or are building, a Digitrio, and one or more units do not operate properly, either you have made an error, or some component is faulty. Properly wired with good parts, the system works — every time!

I have noticed that many RC'ers seem to feel that the Digitrio is primarily a "small plane" system. Although its light weight and compact size does make the Digitrio ideal for a small ship, it should certainly not be limited to this use. My Digitrio-4 is being installed in the AeroMaster Bipe with a Veco .61!

●

I had intended to write volumes this month on the construction of the AeroMaster, but as building progressed, it became evident that volumes would not be needed. The entire assembly can be described with three adjectives—Quick, Accurate, and Simple! The wood is excellent and selected throughout, and the die cutting is sharp and clean. The plans are among the best I have seen, and AAMCO's Foto-Aid sheet eliminates countless questions by showing each step during assembly.

The fuselage utilizes "Box Lok" construction, an AAMCO exclusive, allowing for quick, true fuselage assembly. The entire forward section is built as a box using machined grooves in ⅜" doublers for alignment. The "Box Lok" also keys the cabane structure into the fuselage, in perfect alignment. All of the wire parts for the cabane structure and landing gear are pre-formed. I think the photos will tell the story. The AeroMaster is at your dealer now. $34.95, if he isn't already sold out!

●

If you haven't seen or flown one of Lou Proctor's "Antic's," you are missing a real treat. This ship flies at one constant speed — SLOOOOW! And, in answer to all the inquiries, yet — it will fly upside down, although a good bit of down elevator is needed.

Snoopy has been replaced with an 8 mm movie camera looking out through the prop, and if all goes well, we should get a few unusual aerial films.

Speaking of movies and vintage aircraft, don't miss "Blue Max" from 20th Century Fox! The film is all WW I aircraft, even a Fokker Triplane! All flyable! This show is a must for every scale and WW I buff! (Yes, Don, even you!)

●

In response to the many inquiries about the spoked wheels used on the Antic, they are available from E. B. Wire Wheels, 3809 S. Sherman, Englewood, Colorado. Our particular set is 5" in diameter and sells for $12 per pair. I have received several letters, including one from Monte Malherbe in Pretoria, South Africa (those Antics do get around), concerning the strength of these wheels. The spokes on some of the ealier units appear to have a tendency to pull out during a hard landing. This condition no longer exists. The newer models are strong enough to withstand an impact sufficient to fold a 5/32" double wire gear! (Yes, I tried it!) During a controlled crash (Ed's Note: Bernie's normal landing procedure!), I buckled the wire gear on the Antic with no damage, whatsoever, to the wheels!

●

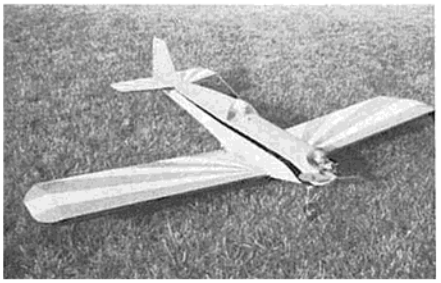
Beginning with next month's 'Kits and Pieces,' we will be including a "Tried This!?" section. Note that the title is both an exclamation and a question, indicating that we have, have you? We hope to present a few ideas, both from RCM's staff, and also its readers, to help make your hobby more enjoyable. If you have any kinks that you would like to share with your fellow RC'ers, send them along to me. A postcard will do.

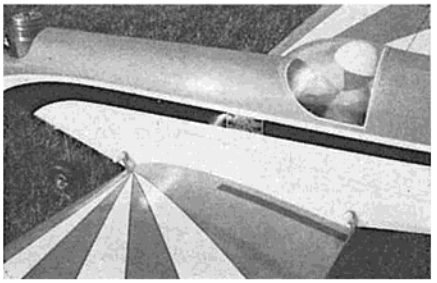
●

I recently saw what appeared to be a real gasser of a fuel pump, belonging to some fellow from another magazine. (Ed's Note: THERE IS NO OTHER MAGAZINE!) A gallon draft beer can and CO_2 dispenser had been modified to deliver fuel instead of beer. The only apparent hazard would be the possibility of arriving at the field to find that your fuel was on ice and your beer was in the tank! Several of the local flyers built the CO_2 fuelers — all worked fine. Three weeks after assembling mine, I arrived on the field only to find that the can would not deliver the mill juice.

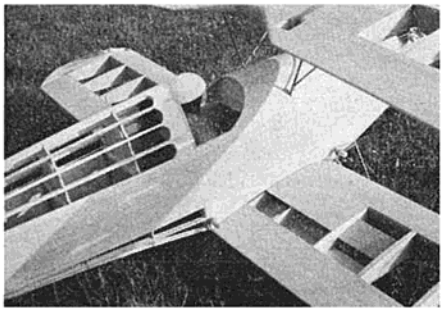
(Continued on Page 57)

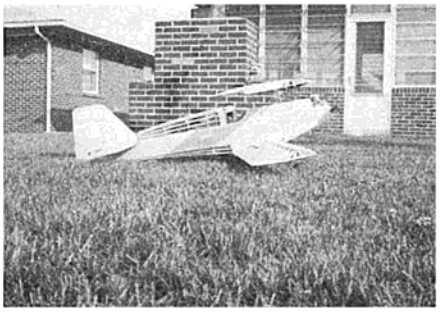
Donnie and Stevie show off with dad's prototype of Aamco's Sportmaster design. This future release from Lou Andrews is similar in design and construction to bipe.





The AeroMaster, ready for covering. Note stringer fillets and scalloped ribs for smoother lines when covered. Overall, the ship presents a sleek profile.





TOP OUT

JERRY KLEINBURG

"STUCK, Son?"

The Old Timer's question broke the quiet of a short evening. Over the smoking tip of his soldering iron he cast a quizzical eye at the motionless pencil cradled in my relaxed hand.

"Guess so," was the hesitating reply. "Besides," I quickly added, "I thought you were busy rewiring that Rag-Tag Special of yours — you've a couple nights work, and with the fly-in this Sunday — "

"Don't worry 'bout that, Son," he broke in, "I could see ya wurn't makin' headway and I wunder'd since yer a mite late, ain't ya?"

"Yes, but — "

" — And since y've been flittin' aroun' to all them big contests, as ya said there's lotsa things to tell the folks about."

The workshop quieted, then after a moment or two I started to explain.

"I'm not sure just where the trouble is but I think maybe I've got too much, a surfeit which is difficult to capsulate, to condense into a concise envelope, a definite — "

"I think I unnerstand," he interrupted, "altho if ya go on usin' sich words there won't be many who would. If ya wanna know, I don't think it's that a-tall — "

The roll of his jaw as he said this combined with an uplilt tone in his voice as he drew in an extra bit of breath told me something was coming, so with the pencil laid aside I waited the old man out. Using the smoking soldering iron as a baton to his mental orchestration he went on —

"What yur trouble is, y've got flying field fever! Ever'time ya start ta write ya get to thinkin' about the pattern points ya coulda made — or ya look at them pitchers of yours and then y'r back out there sum'rs in the sun 'n dust 'n crowd, with y'r hands fulla oil — 'n y'r head's full of the sound of these racketty engin's 'n all. Then, ya prob'ly tell y'rself folks ain't gonna read it anyway since they're mainly int'restid in flying now that it's the season."

"Well, none a this is gonna hack it," he continued, "Jes' get to doin' what y've done before an' even if they don't read it right away it'll be saved for the bad weather readin' time anyhow, Jes' try to make it's somethin' that'll keep!"

"Now, look — ," I started.

"Come on, now!" he broad-grinned back, "after all, doncha wanna fly next weekend?"

You know, the old man's got a point — so what can you do?

FLYERS DELIGHT

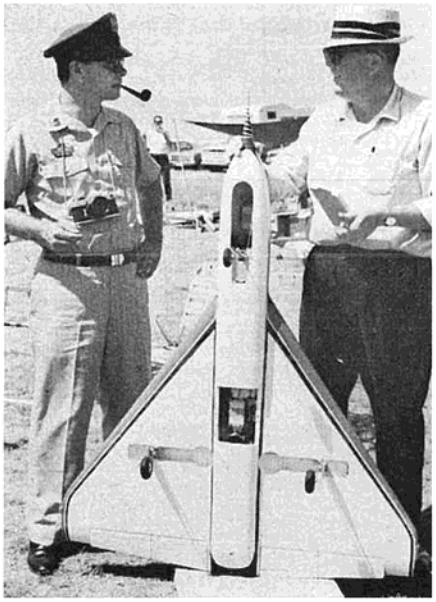
Each year the TORKS of Oklahoma City reach out to surpass previous RC wing-dings and this year's three day Memorial Weekend affair was no exception as the TORKS unrolled the 6th American RC Annual RC contest. Randy McGee, ably abetted by Curt Brownlee and a dedicated group of TORKS proved that previous meets were used as building blocks to their 1966 RC extravaganza staged at the TORKS flying field and the party room of the N.E. Expressway Holiday Inn.

Principal flying field attraction was the battle of the giants — a pattern duel between Jim Kirkland of Valpariso, Fla. and Ted White of Albuquerque, N. M. The desire to be first to qualify for the upcoming FAI finals slated for late September, spurred both and provided assembled flyers with an outstanding demonstration of radio controlled artwork. After three days — interspersed with relaxing change-of-pace events — scores tilted toward Jim Kirkland and his slick Citron due to a single factor; consistent engine performance.

Ted's Veco 61, still too new for his well-known orange and white retractable gear'd "Fletcha," was replaced by the Fox 59 Ted uses extensively, as he gamely fought to sustain the hot pace. Jim's Merco 61 never faltered for 8 rounds and gave him enough flying edge so he could concentrate for the 'extra' of perfection and 'show' that brought first place. This matched the Jackson, Miss. win taken the weekend before where the Floridian's performance was also noted to have the benefit of equipment consistency of his Kraft propo equipped star spangled ship.

A surprising third in the class III expert battle was Rob Kelly, the junior from Denver, Colo.! Rob had his own competition going with John Jennings, the young RC whiz from Dallas, and it helped as the Denverite swept his Orbit propo'd Quik-Fli past many contest veterans into trophy lane.

Ted White continued to battle in other events but it was to be almost an exclusive Kirkland show as Jim also took Open Pylon in 1:00.2 over Ted and Maurice Woods of Oklahoma City. However, the Florida Flash had to



Masthead photo is Loren Tregellas's epic Delt-Air 250 — 10¼ pounds of triangular beauty with 45" span, 60" length. Dulux enamel finish and a pusher ST 61 along with retracting gear are features. Bonner propo guided. Note wingtip upcurves — they're vortex generators to control airflow. At left, Loren readies the Delt-Air 250 for flight. Capt. Fred Degler, Tinker CAP Squadron Commander, gets operating details. CAP Cadets help manage parking, throngs who crowded to 3-day TORKS meet. Plane flys well — won Original Design Award.

drop out of Goodyear pylon after besting Ted by almost 4 seconds at a cool 1:57.4 in a hair-raising pylon scraper when he cracked an elevator on a long landing as his original K & B 40 powered Shoestring flipped in the weeds after the first heat. Ted went on with his K & B 40'd Long. Midget to top Loren Tregellas of Wichita, Kan. and Dale Nutter, well-known pylonner from Tulsa, Okla. in the suspenseful Goodyear event. Gorden Gabbert of Dallas, Tex., Maxey Hester of Des Moines, Iowa, and Wally Staat of Muskogee, Ill. were other Goodyear entrants giving the race at least an 8 state flavor. Incidently, Wally's plane, a brand new 5 colored Hobby-Poxy beauty was co-built by Jay Dee Wingo and piloted by Bud Atkinson of Springfield, Mo., who among many other RC distinctions is the new associate editor of Grid Leaks magazine.

Despite attention given class III, class II flyers took no backseat as Bill Thomas showed outstanding touch and form with his original flyer to head off big Bill Knost, Bud Atkinson, and J. B. Cox in a tight race that gave a respectable boost to pitch-yaw enthusiasts. Bill is bound to be in the top 5 in Chicago in July — but not without stiff competition from Atkinson and Knost at least!

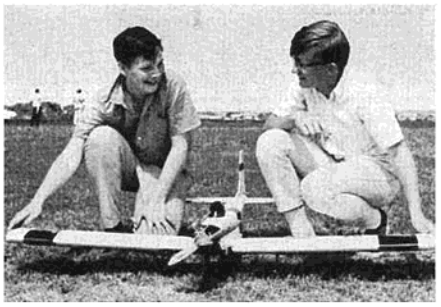
Class I readers will be disappointed to learn that although rudder-only is encouraged and sponsored each year by the TORKS, this is the second year in a row the trophies went begging for substantial Open competition. Nevertheless junior rudderites Phil Morris and Bobbie Woods continued their local war with Woods bringing the score even this time. Phil, however, received the Rube Goldberg Award (Phil's own RC 'masterpieces' show he's really trying) and the Sportsmanship Award for his good-natured spirit and cooperative desire as the club's unofficial 'bat' boy.

The "Speed and Seed" event again brought good natured humor and downright comedy to the flight line by requiring flyers to concentrate on flying after rolling dice for a 7 while eating watermelon, retaining a seed (this year there was a seed 'caddy' since many swallowed theirs last year), and then negotiating an engine start and a lap around a pylon to a hangar landing. After this the flyers raced to a spitting line to propel their watermelon seed for maximum distance! Although in the excitement it's not known who won, after all, we suspect the event is really run as an excuse for a watermelon feast on a warm afternoon. . . .

A class III novice event was also included and was well attended with K. W. Rollman winning and continuing toward expert classification. He was followed by Forest "Sleepy" Hines and L. Kinnison in the multi beginner pattern contest.

Besides pylon and class II pattern, Bud Atkinson also led in the competition for scale with his replica of the Stits home-built. Loren Tregellas, who won a $50 cash prize Original Design Award with his Delt-Air 250, couldn't gain enough flying points to sustain the static judging lead given the ship, but did nose out Gorden Gabbert's Shoestring. Dick Weathers, last year's winner, flew his seasoned Ercoupe 415D to a game 4th among the spit and polish crowd.

Loren's plane — a scaler's treat anywhere — rivaled the flying for attention from flyers and spectators alike. A masterful creation which took the better part of 2 years of design and building to produce, the Delt-Air thrilled everyone when it took to the air for a stable, well controlled flight and then a dead stick landing when the engine overheated! The unique creation — almost a perfect reproduction of the rare experimental midget delta (see Sport Aviation, Feb. '62), even to the Dupont Dulux enamel finish — weighs 10¼ pounds and has a 45" wingspan and a 60" fuselage length. A Super Tiger 60 with a left hand crankshaft provides counter-rotating pusher power to haul the maroon and white craft on 6% section delta wings while carrying a 33 ounce wingloading. Elevons alone provide air control since the rudder is not actuated. The rather high wing loading and minimal air control is readily handled by outstanding stability of the unusual wing with tip vortex generators which act as air dams or wing fences to make the 760 square inch wing — with

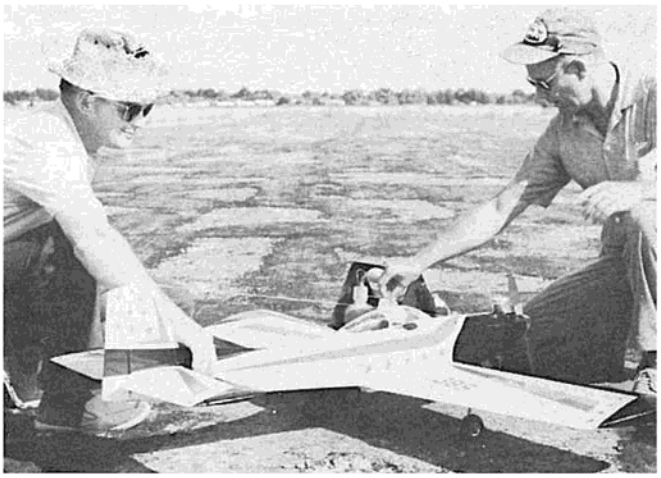


A pair to watch! John Jennings of Dallas and Rob Kelly of Denver take measure of Rob's Kwik Fli with Orbit 7-14 propo. Denver youngster won 3rd at TORKS Memorial Weekend Meet.

Maxey Hester hefts his 5¾ lb. M600, a modified Long Midget with symmetrical sectioned 600 square inch wing. Monokote finish the Hester way! K&B 40, Orbit analog full-house.

Another scale entry. Bud Atkinson, Ace associate, readies replica of Stits homebuilt. Ship handled well on propo radio, won scale event at 6th American RC Annual.

Ron Chidgey holds Jim Kirkland's Citron while the Florida Flash readied Class III winner. Jim took back-to-back victories at Jackson, Mississippi and Oklahoma City. Jim was first U. S. flyer to quality for 1966 FAI finals.



Phil (Go to your room!) Morris, shocked speechless by TORKS 1966 Sportsmanship Award. Randy McGee, prexy, makes affectionate presentation.

its scale dynamic airflow section and reflex trailing edge—a stabilizing surface.

Special features of interest include an aileron servo that tracks fore and aft with the elevator action to give elevon control, and the balsa covered foam wing and fuselage construction with a balsa nose and engine cowl. Regular 5/32 inch piano wire provides the main flex of the tricycle retracting gear that is specially engineered from De Bolt retracting mechanisms with new lo-drain motors and added reduction gearing to render a slow realistic retraction and extraction characteristic. A bonus resulting from use of the new motors and added gearing is that each motor only draws a maximum of 35 ma when the gear is lowered and 80 ma in bringing the gear up. Total operating current is usually about 150 ma which makes possible use of the Digimite receiver power pack of 7 500 ma DEAC button cells for gear operation. This pack also provides power for electric brakes and wing tip lights the needle-nose ship sports. Loren, an electronics engineer of the Boeing Aircraft Company, has some advanced prototype circuitry in the Bonner Digimite receiver which proves he likes challenge in his modeling work. Loren, you recall, recommends freezing radio equipment as a test to check for weak solder connections through thermal shrink which will show them up!

DuBro Lo-bounce 2¾ inch wheels are employed as mains while a 2 incher is on the pivotable nosegear. The nosegear incidently, may be retracted in any pivoted position reflecting the thoroughness of design work evident throughout this magnificent model. The finish, as noted, utilizes Dupont Dulux enamel on outer coats and is built up as follows: two coats of clear dope over the balsa, then silkspan followed by two more coats of clear. After thorough curing, a coat of white undercoat (appliance primer) is sprayed on and allowed to dry. This is followed by a coat of Dulux enamel which is allowed to dry at least 24 hours after which trim, also enamel, may be applied. Loren points out the passive stability of the enamel is demonstrated by it becoming immune to enamel reducer after the 24 hour setting time. This means trim may be removed if it's not satisfactory without effecting the base enamel once it is set. Resistance to glo fuel is equal to butyrate dope, Loren — who lives at 3003 S. Everett St. in Wichita, Kansas — assures.

Besides flying the Delt-Air 250, Loren brought 16 mm color movies of previous flight trials. The movies had been shot by a Wichita TV station and were shown at the Saturday night party at the Holiday Inn together with some of **this** year's doings as well as those of the 5th American RC Annual. Loren's craft — he's working on a duplicate also — promises to be a major contender at Glenview in July.

No account of a TORKS meet can reflect the depth of preparation without touching on some of the 'neater' details that undergird their effort and assure 'professional' results. Note these:

"JUDGE SAVERS" — a two-way intercom system that connects judges to the flyers yet allow the judges to remain in shade in the operations center located about 300 feet from the center of the flying field. The flyers helper announces upcoming maneuvers into a hand set wired to the appropriate judges table in the double flight line system. Required maneuvers — some were deleted for safety and to expedite flying — were easily performed in front of the judges and the maneuver list was attached right to the hand set for easy convenience and reference by the performing team.

WATER, ELECTRICITY — since the last contest at TORKS-ville, the club income had been invested to provide these utilities for the leased property. Substantial amounts have been realized from club projects which place TORKS developed and tested products on the RC market through established distributors at comparable price structures. Items currently marketed include the Hillcrest servo with a specially designed amplifier, a new type of fuel tubing, and the popular "Gasser," the accordian-shaped ½ gallon fueler. Not to rest on past accomplishments in this area, a TORKS fuel pump that fits quart **or** gallon fuel cans is being developed for the RC trade.

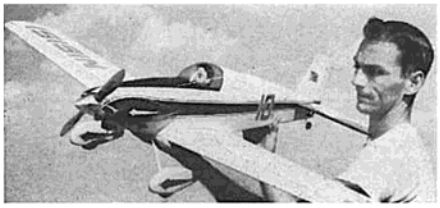
PUBLIC ADDRESS SYSTEM — this item, often neglected elsewhere, was very effective at TORKS-ville in keeping contestants, officials, and spectators informed and aided significantly in keeping events moving on with efficient dispatch and maximum understanding of what was going on. Spectators were "treated" to flight line seats, so to speak by being able to hear the helper announce the coming maneuver via the "Judge Savers," or be intrigued by the sing-song of propo audio modulation when monitor output was piped into the PA system.

PRODUCTS EXHIBITION AND AUCTION — a part of Saturday night's activity was the opportunity to see all the merchandise and trophies along with some manufacturers displays at the Holiday Inn. A well organized soliciting survey produced such exceptional results that the TORKS set up an exhibition room so all visitors could appreciate the generosity and the products of contributors. Some items, such as a Lanier ready-built, were contributed specificially for the auction which was held to help off-set contest expenses. The auction itself was an entertaining interlude presided over by Curt Brownlee and followed showing of John Thompson's traditional movies.

PEOPLE — the cast of energetic TORKS, along with McGee and Brownlee, who made the meet so complete included Roger Evans, Red Maier, Homer Darnell, Dick Richards, Jim Sweitzer, Marcy Martin, Larry Rowell, and Bill Mcbee — all of whom manned the judging or officiating chores as well as helping with innummerable tasks that characterize major contests. Dot Nelson deserved her bouquet for keeping statistics and Gary Spencer teamed with Mrs. Duke Reynolds to provide a moderately priced commissary that adequately sustained the inner man during the three enjoyable days. And as we wended our way home we wondered what the TORKS would dream up for the next meet.

One thing for sure, we'll be there to find out!

RCM Annual Long Midget by Wally Staat — Jay Dee Wingo, Muskogee, Oklahoma team, was Goodyear entry in Oklahoma City. Five color HobbyPoxy finish was perfect. Ship flew very well, fast. Next stop, Chicago!



SUNDAY FLIER

KEN WILLARD

THERE has been quite a bit of activity I'd like to share with you this month, but except to summarize, I'm going to delay the details for a month. You already know the reason if you've seen the photographs of the Praying Mantis in this issue. Before I go into that, though, here's a summary flight report on some items of interest:

(1) I flew Airtrol's RE-1 unit in a Junior Falcon and also in my ½A pylon racer, "The Scorcher." Smoo-o-oth! There were a couple of glitches, but for proportional rudder and elevator at 6 ounces airborne weight, this is the best yet for ¼A and ½A proportional single channel. It is, however, not suited for anything larger.

(2) When I flew the Scorcher, I used Cox's Quiet Zone .049. The power was more than sufficient with no noise. I recommend it wherever noise is likely to cause complaints about the flying activity.

(3) The Rand LR-3 actuator sure is a busy machine when it's gyrating, but you'd never know it when your model is airborne. A friend of mine, Johnny "Bee" (his last name is mispronounced more than it's misspelled, thus the nickname) has an original design bipe with the Rand actuator installed. He uses a Phelps pulser and the combination works exceptionally well.

I'll have more about the new single channel gear in coming issues, but this month I thought you'd enjoy one of the most exotic single channel designs I've ever seen.

Whitey Pritchard is a quiet, unassuming chap who specializes in photo work for Lockheed at our Santa Cruz Test Base. He called one day and told me about an airplane he had designed. It sounded good, so we got together and I looked at the photos. They were terrific! Then he described the construction. When I found out it was single channel with rudder and motor control via servos, I literally flipped!

"Whitey," I said, "write us a note on the construction, will you?" He did — and what a note. As a matter of fact, the note became one of this month's feature construction articles, complete with plans, photos, and text for the "Praying Mantis," so named because of its appearance. Whitey even thought of calling it the Pied Piper simply because whenever he flies it, all the citizenry within sight and sound come running.

So, this month, the Sunday Flier has a guest writer — Whitey Pritchard. Build his "Praying Mantis" and see what happens for yourself!

SERVO INSTALLATIONS

(Continued from Page 46)

removed for this setup. Now, when the throttle is advanced, the stationary needle valve will richen the mixture, alternately leaning it out at idle, which makes for reliable operation.

A speed brake function works nicely when integrated with the throttle. Simply hook it into the opposite side of the servo, giving speed brake closed with maximum power application, and speed brake open at idle. This is an ideal setup since most flying is done at maximum power with a speed reduction desired when the throttle is retarded. This installation should be set up to give about 80% down brake for 20% engine power. This is an ideal approach condition, especially when you chop the power and drop maximum brake just prior to flare-out.

Another function that has been used by a few fliers is coupled rudder and aileron with a throttle servo cut out switch for the rudder. Instead of this 3+1 type operation, how about the same cut out switch mounted to operate retractable gear as the plane takes off and lands? I am installing this system on a deBolt Acrobat at present.

Coupled aileron and nose wheel steering is another integrated function, but one which is not too practical for good positive nose wheel steering. With the aileron servo mounted in the wing, the linkage hookup to the nose wheel steering is usually sloppy, and more often than not, will jam if the wing slips, in turn jamming the ailerons.

If you already own your multi R/C equipment which has a definite number of functions, integrated servo operations are a good compromise, but if you are considering purchasing new equipment, keep in mind that separate servo functions are definitely to be preferred due to their selectivity and simplicity of installation. The additional weight may make your plane a little slower on maneuvers and faster on landings, but they will add considerable enjoyment to the operation and flying end of your R/C activities.

Absolute reliability is very important to us in this R/C sport, and is also difficult to obtain. A clean, simple, well-designed R/C installation is a big step in this direction. And while you're at it, why not a little paint inside the R/C compartment to seal the wood and dress up the area so it will have the same finished look as the rest of the plane when the wing is removed?

Let's make the next installation simple, functional, clean, and reliable — and above all, one of which we can be justly proud.

KITS & PIECES

(Continued from Page 53)

Figuring that the cartridge had given out, a new one was inserted — still no fuel. Twist, wiggle, and POOF! Suddenly — FUEL — on me, on the plane, on the ground, just about everywhere within a radius of ten feet, but not a damn drop in the tank! It would appear that the plastic used in the dispenser is not fuel proof! After several weeks of soaking in fuel, it attains a consistency about like loose chewing gum. Don't try it unless you can find an all-metal dispenser, or you just happen to like alcohol showers!

●

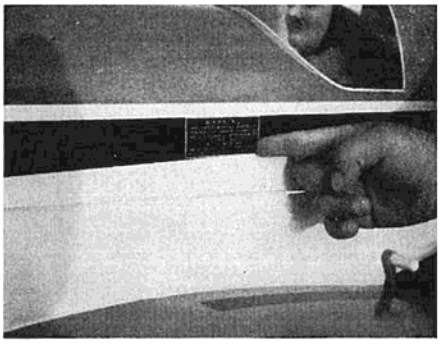
Confidential to C.C. and D.D. — my front street is open to anyone, even the chickens. We're in the country, too!

In closing, I would like to say that, based on information just received, I retract all of my comments concerning Ed Thompson's Digitrio. I recently discovered a well-kept secret that he is a free-flight advocate and his system is merely a refinement of his old autorudder timer device! The only hot landing that intrepid pilot ever made was when the wings folded on his Sandy Hogan . . .

●

See *you* at the field—or on the street!

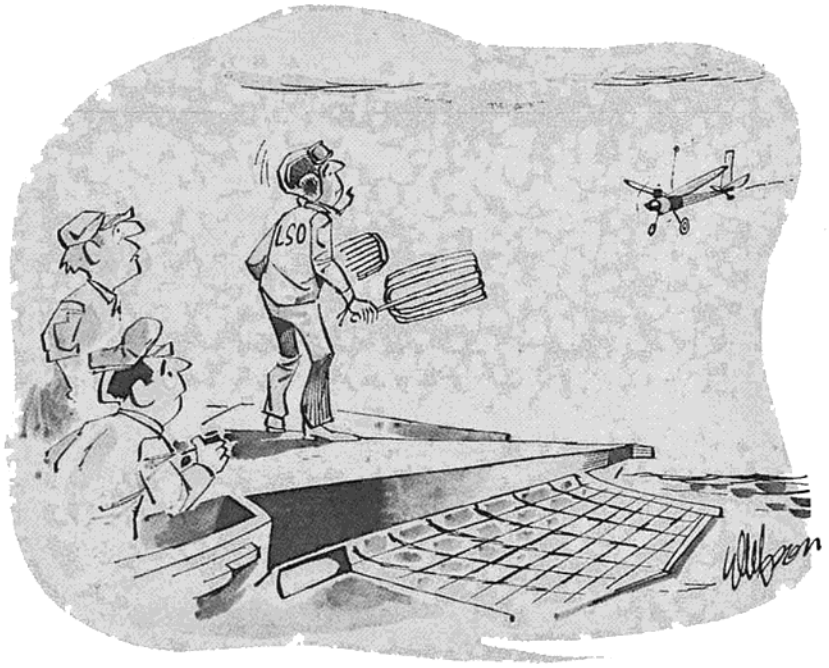
Stevie admires warning-I.D. label on Sportmaster. We will cover the making of these and similar plates in a future issue. Note clean wing-fuselage joint. (G.E. Silastic rubber).

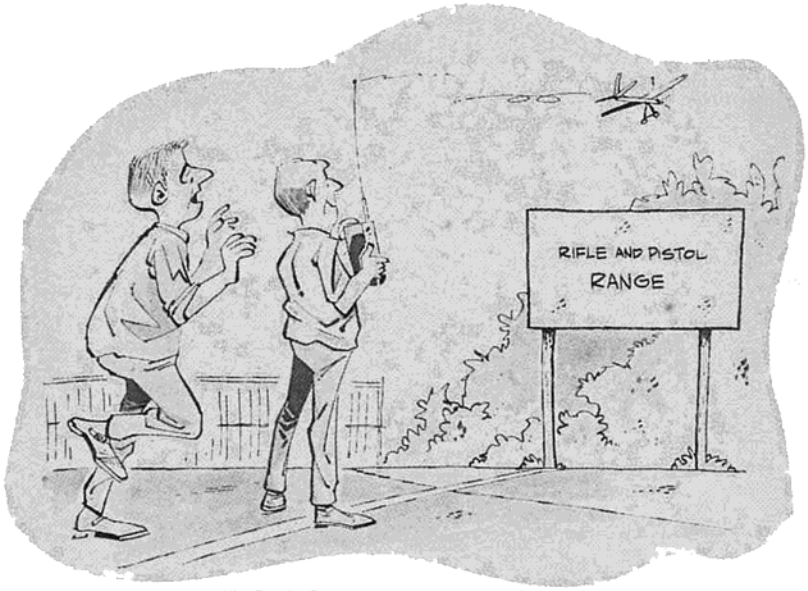


A. C., D. C., R/C

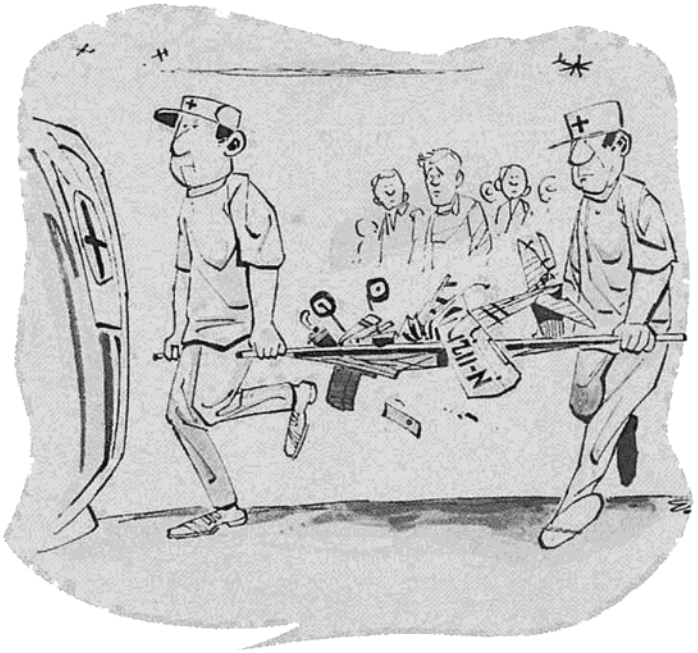
By

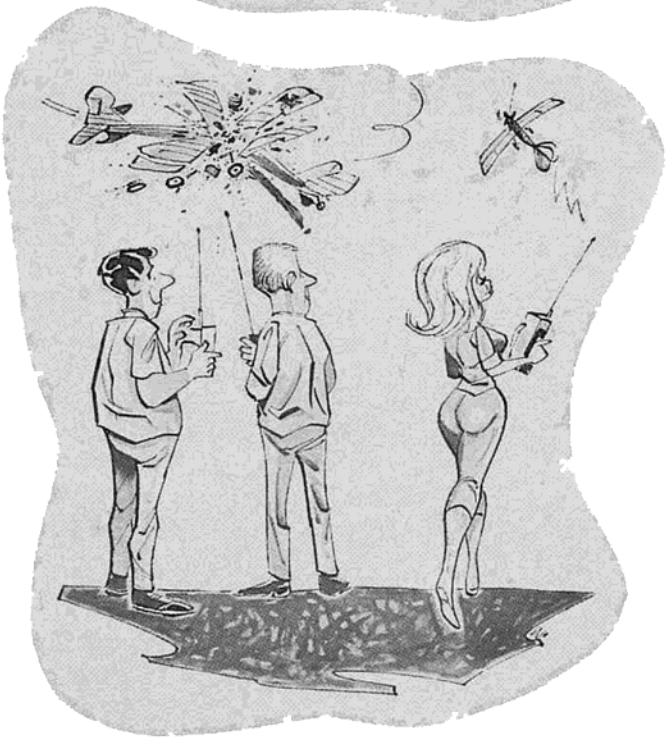
DENNIS ELLEFSON



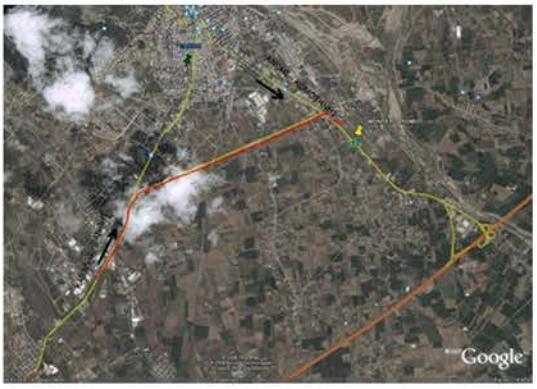


. . . "NO, NO . . . GET IT BACK **HERE**!"





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)