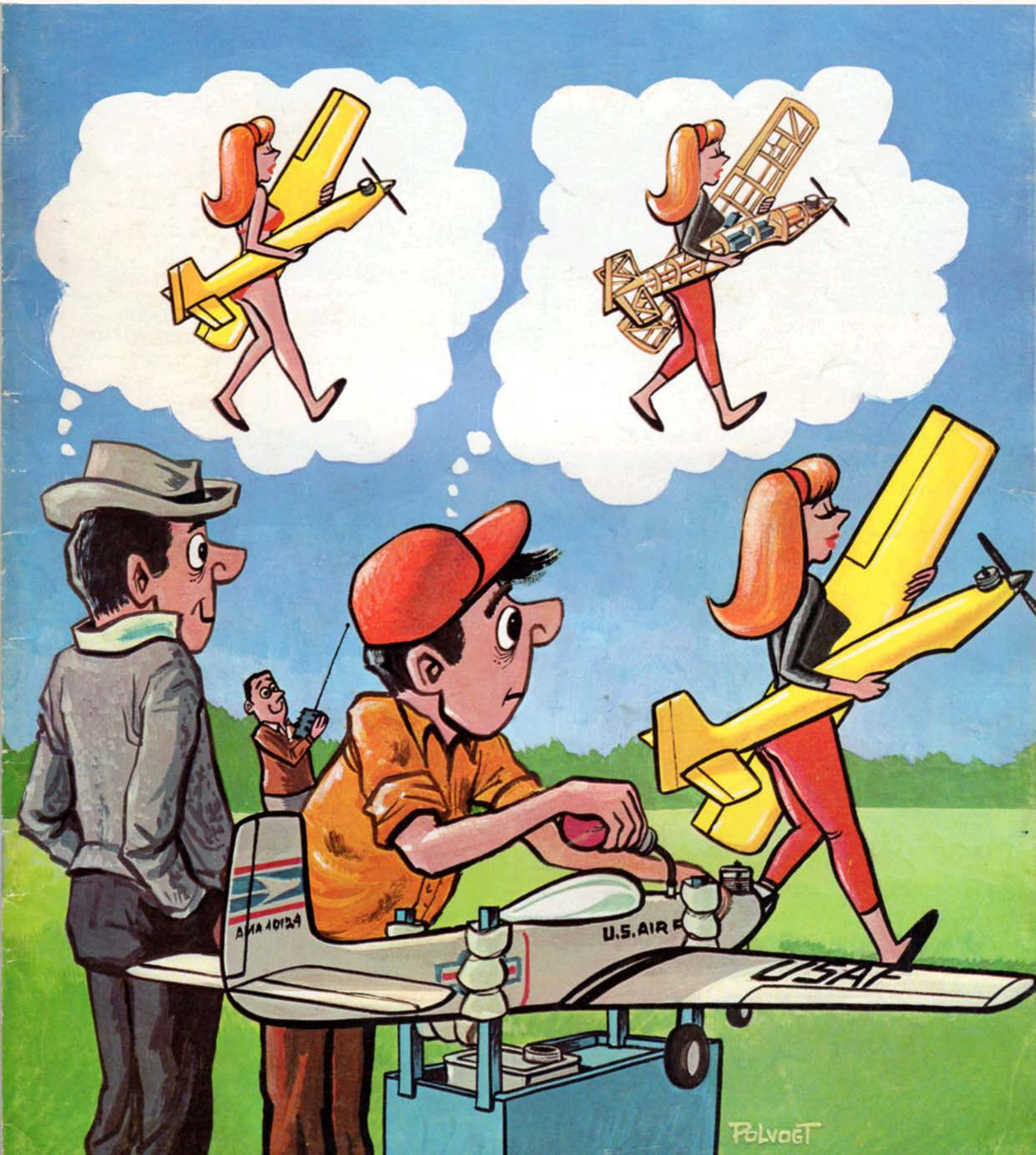
R/C MODELER

THE LEADING MAGAZINE FOR RADIO CONTROL • DECEMBER 1967 • 60¢



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.

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CEMEBR 1967 VOLUME 4 NO. 12

features

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departments

rtist Bill Polvogt takes another discriminating ok at the inside views of the R/C Modeler ersus modern man. . . .

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Subscription service: All subscription correspondence should be addressed to R/C Modeler Circulatic Office, P. O. Box 487, Sierra Madre, Calif. 91024. Please allow at least six weeks for change address. Include your old address, as well as new — enclosing an address label from a recent issu wherever possible.

Editorial contributions: must be accompanied by return postage and will be handled with all reasonabl care. Publisher assumes no responsibility for return or safety of art work, photographs, or manuscript Address editorial contributions to The Editor, R/C Modeler Magazine, P. O. Box 487, Sierra Madr California.

Subscription rate: U.S.A. & Possessions one year, $6.50. Two years $12.00. Canada & Mexico, or year $7.00. Two years $13.00. All other countries one year $7.50, two years $14.00. Payment fro all countries must be made in U. S. currency.

EDITOR'S MEMO

LABOR Day Weekend turned into an altitude record breaking onslaught, with an R/C seaplane nearly scoring an upset victory, according to the Academy of Model Aeronautics.

Maynard Hill, Silver Spring, Md., dueled Bill Northrop, Newark, Delaware, on land and sea at the Dahlgren Naval Weapons Laboratory, Virginia, September 3-4. Maynard came out on top, establishing a new world altitude record for radio models at 19,500 feet.

The action on September 4 went like this: Maynard broke Bill's record of 16,610 feet, set two years ago, with a flight of 18,900 feet. He was flying a 12 foot span, rebuilt version of his 1963 record-setting altitude ship.

Northrop came back with a flight of 19,200 feet, flying his record setting Foo Too, powered by a super Tigre .56 and equipped with Kraft KP5.

Then Hill brought out his new, lightweight altitude ship having only a six foot span and weighing 4.4 pound, empty. It is powered by a Super Tigre .60 and equipped with PCS radio gear. The flight to 19,500 feet, and return, took only forty minutes. Northrop had a crack at the new mark, but failed to surpass it. It was a sweet victory for Hill who last year while trying to break Northrop's record, lost sight of his airplane at about 20,000 feet, and did not recover it.

The new R/C record, which is also an absolute world altitude record for all types of model aircraft, will be submitted for confirmation by AMA, through the NAA, to the FAI.

While the big record belongs to the conventional aircraft, the story belongs to the seaplanes. On the preceding day, Bill Northrop amazed spectators by flying his Gee Bee float-equipped Foo Too to 16,500 feet, just 100 feet short of his existing record!

Maynard followed with the same type floats attached to his lightweight altitude ship with a flight to 18,500 feet. At this point, and until the next day, a seaplane actually held the world altitude record for radio controlled seaplanes (which it still holds) as well as the absolute record!

Seaplane takeoffs were accomplished from a pond on the Lab's golf course, and flown about a half mile to the location of the radar. The same optical tracking device used by record contenders at Dahlgren in previous years was used to follow the models at altitude this year.

Unsuccessful record attempts were made with glider speed and glider altitude models. The event was sponsored by the DC/RC, and directed by Academy CD's John Symborsky and Carlton Middlebrook.

●

Absolutely recommended for thorough reading by all AMA members is Jerry Kleinburg's description of the new rules machinery — an important change that could prove to be a historic turning point in AMA contest operation. Touching all current and future R/C events, Top Out outlines the new "Open Door" Contest Board procedure and provides an analysis and background of its development. By allowing a more direct action by contest fliers in shaping their own rules, Jerry sees the change bringing a brighter and more optimistic future for sanctioned contests and progress for all R/C activities.

Incidentally, this marks the start of the fourth year for Jerry's Top Out department. Since the December 1964 issue of RCM, Jerry's column has shown up like clockwork — and despite a full time job as an aircraft production control supervisor at Kelly AFB, he manages to fly in a dozen contests a year as well as to fill Top Out with a wide assortment of R/C news and flier's view. Jerry's column also has an "Open Door" approach and comments of individuals as well as club newsletters are welcome at Top Out's Texas hideout at 2512 W. Craig Place, San Antonio, Texas.

●

The people of Sebring and surrounding Florida communities have elected to host and officiate the King Orange Internationals. The organized group, which will be incorporated as King Orange of Sebring, Inc., unanimously selected the dates of December 29-31, 1967 for the 14th KOI; December 28-30, 1968 for the 15th KOI; and December 27-29, 1969 for the 16th KOI.

The King Orange affair will be manned by local trained officials. A complete roster of R/C judges finished their qualification training at the Hurricane RC meet on Labor Day weekend. These judges were selected from current, as well as former, air line, commercial, military, and private pilots. Their scoring and conduct was praised at the Hurricane meet by the contestants. All events will subsequently be covered by qualified officials, so that contestants at future KOI's can look forward to coming and participating as a contestant only. Virtually all AMA and FAI events will be scheduled for the KOI with all events to be flown at Sebring Air Terminal.

— ● —

In the small town of Kirby, Moorside, in Yorkshire, England, according to our correspondent, Charles Farmer, the world famous firm of Slingby, makers of high performance sailplanes and training gliders, are currently in production with a line of five piloted flying models of WWI SE5 fighters!

These aircraft are following in the current trend of making copies of vintage planes — a trend that began with the film, 'Magnificent Men and Their Flying Machines,' and continued with the production of several German WWI fighters for the film 'The Blue Max.'

Now, Paramount is about to go into production with another WWI air film, and instead of using camouflaged DH Tiger Moth's, it was decided to "build from the board" five SE5 fighters for the flying sequences. Later production calls for two or three "extra" machines for use as static models!

Amazingly enough, these aircraft will be "scale" models, since the outlines are true scale with only the internal structure slightly altered to speed production and to enable the use of modern materials. The overall scale of the aircraft will be eight-tenths full size and perfect in scale shape and external details. In the armament department, the guns mounted on top of the fuselage are operated by bottle gas, and when fired, produce realistic spurts of flame and a noise similar to a street drill. The scheduled time for production of all these machines is about eight weeks and balsa wood is being used to speed up production of items such as fairings, etc.

One radical departure from the original SE5's is that a Lycoming power plant will be hidden in the boxlike nose of the fuselage. A further addition will be the use of VHF radio for communications. To complete the scale side of the picture, "vintage type" wooden propellers will be used so that ground shots will not be spoiled by modern metal props at the front end.

The non-flying, or static versions, of these aircraft are, internally, even more like models, using solid ply ribs instead of built-up wing ribs. With their outstanding finish and overall appearance, they would certainly be the envy of any model club. As a matter of interest, among the workers at the Slingby factory are a number of leading RC modelers, some of whose grandfathers worked on the construction of the actual SE5's in 1916!

In charge of production is a well known British modeler and expert glider pilot, Derek Piggott. When visited recently in the drafting office, he was wielding a bunch of ¼" x ¼" balsa, building models of parts of the fuselage in order to help in the design of such items as wing fasteners. One problem that arose was where to obtain an 5/10ths scale WWI undercraft wheel — not quite the thing to find on the shelf of the local hobby shop, or in the modeler's "goodie box!"

Piloting these models should be very interesting, as the originals were capable of being put through the full "competition" schedule. A final ironic twist is that only weeks before the contract was signed to manufacture these wooden aircraft, Slingby had, after more than thirty years of production of wooden aircraft, test flown their first **all metal** gliders!

●

As Joe Pyne would say — straight ahead. . . .

KEN WILLARD

RECENTLY I wrote a column on the ways that a beginner could get into the sport of R/C flying, and later get into the combined sport and hobby of R/C building and flying. If you happened to read it, you will remember that I introduced several different types of beginners to Testor's ready-to-fly Skyhawk, and the majority were able to fly it the first time around — some better than others, naturally.

Since then I've had several more neophytes who've given it a try. Also, there have been a few experiences with some other ready-to-fly and almost ready-to-fly models. Such as AHM's Cessna, Lanier's Transit, and the new Solo MK 1 by Lazott Plastics.

The net result of this series of experiments is, to say the least, a little confusing. Each one comes close, but none of them can be rated fully satisfactory for the absolute beginner in R/C. By absolute beginner, I mean a guy who has **never** built a model, doesn't know **anything** about electronics, has **no** knowledge of aerodynamics, and yet **wants** to fly R/C because it fascinates him.

Testor's Skyhawk comes closest — mainly because of the excellent way in which they have presented the information necessary for the beginner. But the Skyhawk, as good as it is, still must be flown at all times — a characteristic of the great majority of low wing models. And for a beginner, the airplane should be able to right itself from almost any attitude and resume level flight.

AHM's Cessna 210 does a fine job of flying. Left to itself, it will free flight very well. However, like all small models, it reacts faster to a command than the larger ones (although this can be minimized by keeping the rudder throw very small) and the control system is by the pushbutton escapement action. The latter is not quite as natural a way of flying as the use of a stick such as that used with the Testor Skyhawk.

The Solo MK 1 is certainly the most rugged of the lot, but at the same time that makes it the heaviest. It is so heavy, by comparison, that hand launching is virtually out of the question. And, unless you put an extension skid under the fin, the model is very touchy on takeoff — much too touchy for a beginner. The airplane flies well, hands off, but due to its weight it has a pretty high sink rate in the glide.

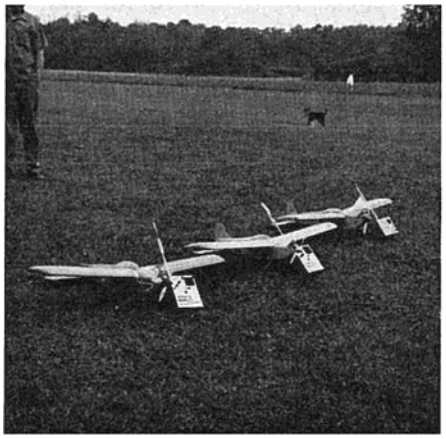
The Lanier Transit is an excellent design, flies well, and will take off unassisted if the nose wheel is adjusted so the takeoff run is straight. Once the radio gear has been installed, the Transit makes R/C flying easy for the beginner. But, before the radio can be installed, it must be bought — and now the beginner has a real problem — one that doesn't exist with the Skyhawk or the Cessna 210. He's got to have help.

Those of us who have been active in the sport for some time are used to the claims, counterclaims, and advertising gimmicks that are present in all of the model magazines. Not so with the newcomer. About every third letter that I get has a plea for advice. Some of them are pretty hard to answer. Like one I received a few days ago. Here is a "sanitized" version:

(Continued on Page **7** *)*

Ed Heiser and assistant with G.G. pylon ship ready for launch.

A trio of Flying Robots R/C Club GG pylon racers.



"Dear Ken:

Recently you reviewed ..... radio gear and recommended it as a good unit for the price. I've decided to step up from escapment flying and have saved some money for a more expensive unit. Since you seemed to like the ....., I called my hobby dealer (one of the biggest in the country) to see if they had it in stock. They said 'Not only no, but h--- no. It's junk, we've had nothing but trouble with it, and won't handle it!'

Now I am all mixed up. What do you think I should buy?"

What would you tell him? Here's what I said:

"Dear Bud:

"You have just been exposed to an occupational hazard of people in the radio control modeling field. We're all likely to be highly opinionated, no matter how hard we try not to be.

"As for the equipment you asked about, I can only tell you about my personal experiences with it. Without going into detail, I can say that if you operate it within the limits of its capability, it is a reliable guidance system. If you exceed those limits, you're almost sure to get into trouble. Obviously I don't consider the set 'junk' like your dealer does — but I do recognize that in order to meet a certain price market a manufacturer has to sacrifice some of the advantages which he could use if he charged more. Lots of people say that escapements are junk — and compared to a $400.00 proportional rig maybe they are — but used properly, an escapement can do a pretty good job for a guy on a tight budget.

"Now, since you've already decided to go for a more sophisticated control system than the escapement, it's a matter of how much money you've got to spend. I've said it before, and I'll say it again: There's only one fully satisfactory way to fly R/C, and that is with a fully proportional control system. The reason I didn't fly that way for many years was simply that I don't care to build big models to carry proportional gear. Now that single channel systems, through the medium of 'galloping ghost," can provide proportional control in small models, I'm using it more and more. Also, the new lightweight Bonner can be carried very easily in a ½A ship.

"So I guess you'll have to make up your own mind, Bud. I told you and a lot of other readers that I found ..... equipment very satisfactory. Now, if you can afford it, the full propo rigs, like PCS, Bonner, Orbit, etc., are better — and they cost twice as much. And a funny thing, Bud. When you go to buy the more expensive stuff, you'll find the opinions even more varied. I guess that's why they're all able to stay in business!"

Sometimes it's pretty hard to give advice.

* * * *

One of the problems facing all R/C clubs is that of trying to have enough variety in club contests to keep the interest up. Precision type events — spot landings, balloon busting, limbo (flying under a ribbon stretched between two poles), bomb drops — have always been popular, but after a while you start looking for something different again.

SUNDAY FLIER

(Continued from Page 6)

Racing has always been a favorite pastime in any sport, and it's true in R/C as well. But the trouble has been that it always seemed to become an event for the real experts. Look at Goodyear. It's a great event to watch, and the guys who fly it think it's the greatest thing to hit R/C in years. Yet, even now, they are trying to figure ways to slow them down!

The Flying Robots Radio Control Club have come up with their own version of a racing event — Galloping Goodyear. I heard about it from Herb Abrams, and since they were using the Top Dawg as a sort of "one design" event, naturally I wanted to know more about it. Herb sent me a note that he received from Ed Heiser of the Flying Robots, along with some photos. Let Ed tell you how it's going in their club:

"Back about a month and a half or two months ago, I was pondering the problem of how to get more club members active in club contests. Previous contests, everything was tried from carrier landings and balloon busting to pattern work, but nothing seemed to really get the club out as a club for a flying session. In searching for an event in which the 'pro' as well as the 'Sunday Flier' could compete without an elaborate handicap system and using the human judge, I came upon this idea.

"Around the first part of June, Ken Willard's 'Top Dawg' came out on the market, at least in this area, and hence an idea was born. Why not a small class racing based on the N.M.P.R.A. rules, only using 15's max. and the Top Dawg, or for those who like to build their own, a plane with the same requirements, i.e.,: wing area, fuselage height and width, etc. The advantage to this is that the Top Dawg will and does fly with anything from a G.G. rig to a large CitizenShip Analog system and anything in between. A lot of fellows have 09's, and 10's and 15's laying around doing nothing, so hence, why not a class 15 racing with the 15's being the maximum engine.

"The idea was presented to the club, with much to my surprise great enthusiasm on their part, so a date was set and a set of rules drawn up. The idea of racing against the clock seemed to perk up spirits somewhat and a time handicap was set up. To prevent 'sandbagging' a special award and trophy to be awarded the fastest qualifiers was set up. So with fingers crossed and hopes that an event had finally captured the fancy of the club, the only thing left to do was to wait until race day and see what sort of results came out of this madness.

"Race day dawned a beautiful day, temperature in the low 70's, just a few spotted clouds and a gentle breeze, out of the south, about 10 knots at most. The field was freshly cut and the fliers were in their places and everything was set for the big event.

"Come race time 4 places were ready to go; you ask how come only 4; well, a lot of people had to be convinced; seeing is believing and so, the four of us gave it a go.

"The qualification went as such:

Ed Heiser	1 min. 28 sec.
Mick Lasker	1 min. 45 sec.
Fred Case	1 min. 52 sec.
Al Harms	2 min. 00 sec.

"Handicaps were set and fortunately all planes were on different frequencies, so all were lined up ready to go, engines were started and the race began. First off was Al Harms, followed by Fred Case, Mick Lasker and Ed Heiser. Five laps around the pylons really led to some excitement, but no crashes were had and the race final results were as follows:

Al Harms, 1st	1 min. 12 sec.
Ed Heiser, 2nd	1 min. 15 sec.
Mick Lasker, 3rd	1 min. 17 sec.
Fred Case, 4th	1 min. 25 sec.

"Talking with spectators and club members after the race, enthusiasm ran very high. As one spectator put it, with all four planes flying, it resembled a bee hive, buzzing all over the place and the realism of the little racers brought much envy to those watching and promises for many now for the next race. Many took movies of the race and it will be interesting to see what it looked like from the outside spectator's view of the race.

"A little insight as to how the planes were built. All used the kit in stock form, using the thick wing and full span wing (note there is shown a shorter wing and thinner wing on the plans). Two of the four planes used the new Enya .09, the other two, one was a .15 diesel, and the other a O.S. .15. Of the four planes, three used the Min-X GGIR relayless G.G. unit with the Rand LR-3 actuators. The fourth was Orbit 10 channel reed using 3 servos for R.E.M.

"As for flying, all four flew right off the drawing board. Speed, regardless whether a .09 or .15 was used, in a straight out race, the difference was hardly noticeable.

"We have set a second date — October 22 for our next 'Galloping Goodyear' race, and all indications are that it should really be a big contest with hopefully many of these races."

Note the times they were making around two plyons that are 400 feet apart. Five laps around that course nominally would be 4000 feet, but actually the planes had to fly quite a bit more, what with rounding the turns, and with the restriction that the planes can't be flagged until they are even with the pylon. They probably flew a little more than a mile — so you can see that they must have been doing almost 60 mph on the straightaway — and this with a thick 15% wing and .09's and .15's!

The Robots have come up with a nice set of general rules very similar in some respects to the Midwest-RCM. For those of you who'd like to try a new club event, here they are:

CLASS 15 — RADIO CONTROL PYLON RACING REGULATIONS

Objective: To cover the prescribed course at the highest possible speed.

General: All AMA and FCC regulations covering the R/C flier, his plane and equipment shall be applicable to this event. There shall be no limitations as to type of equipment or number of controls. The owner must fly his own plane.

Engines: Engine size: .15 cu. in. max. No reworking or modification which increases performance is allowed. Must be equipped with a throttle or cut-off so as to be able to land the plane safely, when required, by the contest officials.

Propellers: Must be of fixed pitch type, no metal or other type allowed.

Fuel: 2 oz. minimum capacity.

Fuselage: Minimum outside width of 3.50 inches minimum. Height of 5.0 inches, when measured at the location of the pilot. Engine must be partially cowled with a minimum of one half the bottom of the crankcase hidden.

Spinner: Model will have a rounded propeller spinner of at least 1½ inches in diameter.

Landing gear: Non-retractable type. Wheel diameter minimum of 2¼ inches. At least two wheels of the specified size must be used.

Wings: Minimum area of 325 sq. in., which includes that area displaced by the fuselage.

Racing number: Located on upper left and lower right hand wing panel facing towards the left side. The number will be right side up with the model in a left bank. The number(s) will be at least 3" high on the wings. The choice of what racing number you have is up to the individual's own preference.

NOTE: Biplanes and Deltas are prohibited.

Racing Course Specifications

The course will be laid out as follows:

1. The course will consist of two (2) pylons spaced approximately 400 feet apart.
2. The race will consist of five laps, using one pylon as the start and finish point.
3. All takeoffs will be of the hand-launch system, unless a contestant so decides to R.O.G.

Operation of the Race

At the far pylon, there will be an official flagman per entrant. Each flagman will have a colored flag corresponding to the frequency the pilot is using. The flagman will stand perpendicular to the direction of the course on the right hand side of the pylon, no more than 15 feet away from the pylon.

It will be required that all models are to be flagged after they pass the pylon, and not before. There will be no flagging at the start/finish pylon.

A three (3) minutes time limit for starting the engine will be allowed.

All laps are flown counterclockwise with all turns to the left.

No minimum altitude required for racing.

All cut pylons will be unintentional cuts. Any intentional cut will be cause for disqualification for that flight. An intentional cut pylon is where the model missed the center of the pylon by more than 20 feet inside the prescribed course.

Making one insurance lap in all races is recommended.

Qualification for Racing

All contestants will be required to fly a 5-lap qualifying race against a stop watch. He will have three attempts to make two official qualifying times, the fastest time being official.

The fastest qualifier will be used as the "starting point" for handicaps to be given to the slower planes.

Handicap will be as follows:

Elapsed time of from
0 to 20 seconds slower — 80%
20 to 40 seconds slower — 70%

(Continued on Page 8)

SUNDAY FLIER

(Continued from Page 7)

40 to 60 seconds slower — 60%
60 to ? seconds slower — 50%

Example: A contestant's time is 1 min. 56 sec. = 116. The fastest qualifier's time is 1 min. 28 sec. = 88 sec. The difference is 116 — 88 = 28 sec.

The handicap he would receive would be in the 20 sec. to 40 sec. group which is 70%.

28 × 70% = 19.6 seconds = 20 seconds.

The 20 seconds would be his head start in a race with the fastest qualifier.

In heat races, all three times will be recalculated against the fastest plane in the heat.

A special trophy and/or prize will be awarded to the fastest qualifier of the day.

An elimination type of racing will start, all names will be put into a hat, names will be drawn in pairs of two. These will race, and the winners of the races will again be put into a hat, drawn again in pairs, until three winners are left. These three will fly to determine 1st, 2nd and 3rd. (In case of one or more planes on the same frequency, each will fly against the clock, his handicap subtracted from his time the lowest time is the winner.)

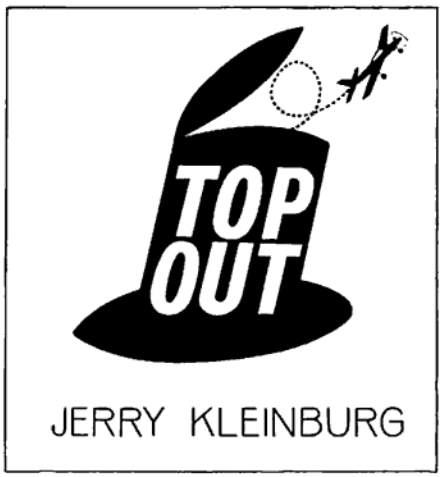
Note: When more than 6 aircraft are present, the racing will be run off to N.M.P.R.A. procedure, with all aircraft having at least (3) three flights.

Each plane regardless of position finished will receive points.

The three highest point aircraft will fly-off to determine 1st, 2nd, 3rd.

In case of ties, all ties will fly-off with the winner score elevated by 1 point, this will then give all planes different scores, and then the three highest point planes will fly-off to determine winners (this is done only after each plane has completed 3 flights and the tie is for 1st and 2nd, 2nd and 3rd or 3rd and 4th positions to fly off for 1st, 2nd, and 3rd place).

Honest, it's not as difficult as it may sound.



JERRY KLEINBURG

NEW RULES PROCEDURE — An 'open' door.

NEWS of the rules-making reforms presented at the AMA RC Contest Board meeting during the 1967 Nats has been greeted with universal enthusiasm and comments that ranged from, "It's about time!" to, "This is what's been needed all along —!" Simply stated, under the newly accepted concept each currently established event will have its own **"steering group"** composed of **active** participants in that event.

Working under the Contest Board, these groups will now review all rule change proposals involving their event and will formulate recommendations to the CB. In effect this will provide specific guidance and technical know-how to the CB based upon close and continued contact with fliers. Consequently, 'steering group' recommendations will now more clearly reflect the desires of their particular event and thus gear rules machinery a lot nearer to contest realities and its fliers.

Acting immediately under the new machinery, Jerry Nelson, the CB Chairman, made initial appointments of Group Chairmen for class I and II. Jackie Gardner and J. R. Cox, both nationally recognized leaders in class I and II respectively, were asked to form groups to undertake the task of revamping existing rules and framing up a complete set of operating standards and maneuvers for the 1968 rulebook. Since both these classes have been seriously hampered by a virtual rules 'moratorium' for the past four years, Gardner and Cox readily accepted their assignments and set out to form groups of active fliers who could represent one of the established AMA regions.

Jackie Gardner was the first under the wire and on 30 August 1967 announced the following group for Class I:

Dist. I **Harrison Morgan**
II **Ed Abram**
III **Miles Reed**
IV **Marty Meyer**
V **Jackie Gardner**
VI **Dallas Armstrong Jr.**
VII **Howard Ritter**
VIII **Jerry Kleinburg**
IX **Don Sump**
X **Willie Gardner**
XI **Walt Staff**

Since formation, the group has reviewed and revised current regulations pertaining to Class I and have drawn up a schedule of maneuvers recommended for the 1968 contest season. The group was able to move rapidly due to the work started at the 1966 Nats in Chicago where Class I unity expressed itself in favor of such changes as brakes and steering as well as separate management of Class I contest competition.

(Continued on Page 9)

Air Force trio — Winchester, Eihausen, and Stone — line up Class 1 ships at Laughlin AFB. 60 powered Windmill in center shed plastic prop blades during loops. Digitrio radios helped AF'ers garner 6 trophies in 2 AF meet this year.

TOP OUT

(Continued from Page 8)

TOP OUT

INVITES

Your Club Newsletters, Photos, and Contest Results. Send to

RCM, c/o Jerry Kleinburg,

2512 W. Craig Pl., San Antonio, Tex.

In fact, it was this early effort in Chicago that laid the ground work and conceptual pattern of the reform adopted in Los Angeles this year. Refusing to bow to what was felt to be artificial restraints, it was primarily Class I buffs who pressed for acceptance of machinery to put event 'management' into the hands of those most directly able to understand its needs and would be most concerned with its progress and welfare. Consequently, not only has Class I and II benefited under the new operating method, but rapid development is readily discernable for gliders, galloping ghost, pylon, and scale. Contest operation and interest are bound to be stimulated greatly where a wider voice and action by those most directly involved and affected is encouraged and made possible.

With regard to Class III and pylon, they also will benefit from the new move. The NMPRA may continue to guide and speak for Goodyear, and initially because of time limits, the CB will act to cover the Class III and Open Pylon events until separate groups are established. FAI activity already has separate control but additional membership is required. The so-called "Seidowski Proposal" adopted at the 1967 Nats will divide Class III into A, B, and C groups and will operate in the same manner as the Novice/Expert system where after a sanctioned meet the Class III flier mandatorily advances to the next higher class of competition, with Class IIIC being the top event where free style maneuvers as well as standard maneuvers would be required.

Other steering group leadership assignments to be made by Jerry Nelson are pending announcement. Unofficially, it's understood Dale Willoughby was being considered for the top job in gliding. Ed Shipe, newly appointed by AMA president Weirick to the Nats Executive Committee, was figured to be in line for the Goodyear group, while at last report, a qualified candidate for single channel and galloping ghost was being sought.

Under the new concept, events not having previous status but recognized by the Contest Board as having significant national activity, would be invited to form a group to establish a "provisional" set of operating rules or standards. After no more than a two year period following establishment of provisional rules, mandatory consideration by the CB would be required to make the event permanent, or extend its provisional status, or to drop it entirely depending upon recommendations of the event's steering group.

Inclusion of any event in the lineup at the Nationals would also depend upon recommendations of the steering group. This area of the group's responsibility would possibly contain the real 'heart' of proof of activity. Since actual Nats contestant participation would be a direct indicator of the effectiveness of steering group action among its fliers, as well as being more accurate measure of the real level of interest and activity, recommendations for Nats inclusion would have to be seriously weighed by the respective steering group. It is possible under the new machinery for an event, after reaching "permanent" status but not capable of sustaining sufficient contest activity, to a "provisional" level after consideration of recommendations asked for by the Contest Board in light of obvious low activity. Since the two year mandatory review would also apply in such cases, the new concept — although framed to stress positive growth aspects — provides for elimination of any deadwood events that may occur from time to time. Of course the event's group would also have the two year provisional period to rebuild their activity to again attain a permanent status.

The new management concept of "steering groups" recognizes the nearly impossible job the Contest Board has had in trying to adequately represent all facets of RC directly in a rapidly expanding situation. The limits of time and range of personnal interest hampered action and was a major underlying cause of delayed progress. Quite naturally some areas were able to receive more attention than others which produced an uneven condition and further aggravated the situation. Finally, recognizing the need for action in a broader way and to bring an essentially 'technical' solution to replace the 'political' arrangement, the Contest Board took the action noted earlier as presented by Gardner and Kleinburg in Los Angeles. In doing so the board took an important first step in developing itself into an impartially neutral group that may now begin to effectively function as a planning and coordinating agency capable of encouraging and directing greater and more meaningful contest activity as well as in promoting event development. The step brings with it the distinct belief that we've reached a period where optimism and hope for an increase in interest and solid growth for all phases of RC may be realized. As was heard after the announced adoption in L.A., "It finally got here, but it's been a long, dry season. . . .

PROPS and PUSSYFOOTIN

There's little doubt that current .56 to .61 sized engines are too powerful for the nylon props now being sold. Least surprised are the manufacturers who have never pushed their products for such use. More and more reports show outright failures of all popular brands when they're used in big engines, attesting to the simple fact that nylons have a strength limit that's marginal for such use. Most prop failures occur in the hub area, that is, within 1½" from the center. This strongly points to inherent weakness of the props themselves and not to contributing factors such as scratches, etc., that come from normal use, although these certainly don't help. But of course scratches will happen, so the point is that plastic props are needed that have a lot bigger margin of safety under these "normal" circumstances. It's theoretically possible, I guess, to wrap the current crop of nylons in cotton, to boil them, to polish them, keep them at the right temperature, etc., etc., and to get away without having one of them slice a noggin — or worse. But why continue to skate on such thin ice?

One puzzling aspect of this prop failure discussion is the slow reaction by prop producers to announce steps to remedy or directly help the situation. A clear statement as to recommended use published along with stress statistics available on nylon props is a reasonable first step. A lot stronger product could be the next. . . . Until then, it's advisable to stay clear of nylon props on the big engines and to even take care when using wooden varieties.

Before leaving the field of critical comment on products, it's been pointed out that the practice of naming brands is not cricket. This may be the ground rules in some parts of the eastern league but the slant of things here is **service to the flier** — and especially so where safety is involved, **no matter what the product is.** At times there's a tendency to pussyfoot around due to concern for what an advertiser might think or say or do. The approach here to that problem has been somewhat more direct than others in this business sometime believe best. Without getting into a theoretical dissertation on "reader vs. advertiser orientation," critical comment here is gauged upon what is estimated to be best in the long run for everyone concerned, with due consideration of the special circumstances of our hobby. Very often an editor or publisher may be influenced by generalities in the matter of where his best interest lies. Principles vs. profit has long been a dilemma and finding a formula for success is hazardous and difficult. However, looking at the "business" of model aviation it's found that the ground between reader and advertiser is small or non-existent! In our particular world a great percentage of the advertisers are also model hobbyists (readers) themselves. This circumstance alone allows greater latitude for critical comment and it is upon this assessment also that views are expressed. Nevertheless, where safety is involved theoretical niceties are secondary — the responsible path is clear and unmistakable. . . .

THE CONTEST SCENE

The turnout for the triple A Tulsa meet — held during remarkably perfect 80° weather — was outstanding and a full slate of R/C events (actually fuller than advertised) kept contest fans happy and gave the meadow-full of spectators a free show they'll remember a long time. Dale Nutter kept the flight line moving for Joe Stewart who was the R/C events director. Mattie and Wes Duncan faithfully kept records which showed that a couple of seniors, Bill Reed and Mike Laboi combined to whip their elders out of Class IIIE. Loren Tregellas did manage 3rd place. In Class IIIN it was Bob Braden, Arnold Reed and Jerry Mrazek who marched off with the hardware. Class II also had a Novice/Expert breakdown with Merl Zollers and Ken Collier leading the beginners, while Bill (he does it all the time!) Thomas outdistanced Keith (K.K.) McClure and Lenny McCoy in Class IIE ranks. Incidentally, Bill Thomas' score of 377 was top points for the meet in all pattern classes! Class I wasn't originally scheduled for this meet but when 3

contestants showed up, Tulsa hospitality responded with added trophies being dusted off as the event director made room for everyone who came with an airplane to fly. Bobby Woods and Don Sump took Class I honors subsequently.

In Scale, Pat Massey and Jack Orr couldn't get the best of Bud Atkinson and his neat Nats 5th place Mentor T-34. Bob Pearce, a Texan who shows much promise, proved he had the staying power to head off a tough field in Goodyear. Bryan Lakin was 2nd 2.6 sec. back while the team entry of Gant & Atkinson took 3rd just 3.1 seconds off the lead. For Open Pylon Bryan Lakin coursed his new original blue and white pattern ship ahead of Ken Collier and Jay Dee Wingo for the tallest hardware.

Thanks go to Bill Salnikov for his assistance during the stay in Tulsa and mention must be made of the fine chicken dinner Bill and Ess Knost served up for at least 150 hungry guests at the Knost House of Hobbies on Saturday night. It may have been commercial, but it was nice. . . . We read also that the R/C branch of the Tulsa Glue Dobbers has a new name which for some reason attracts us. TOPPERS, standing for Tulsa Oklahoma Pylon Pilots Ex-

Ponca City SKEETER quartet — Massey (2nd, Scale), Braden (1st, Cl. IIIN), Conner, and Mrazek (3rd, Cl. IIIN), make with Tulsa meet victory grins. Massey's BT-13 is scale artwork, flies very well.

perimental Racing Society, Joe Stewart tells us. Thanks, Joe, to you as well as Bob Handford and Ron Kipp — we'll see you at the next contest!

THE NATIONAL CIRCUIT

● **More About RAFF** (radio assist free flight). Last month mention was made of the thinking of Jim Robertson and other free flight modelers to use simple radio systems to prevent fly-aways of their powered endurance models and to cut down retrieving efforts. Most R/Cers understand the plight of the FFers and could help by aiding experimenters in smoothing out the bumpy trial and error path in the radio phase. FFers, themselves are warned in the National Free Flight Digest to avoid creating interference, with Dave Linstrum, FF Digest editor advising: "To those who may be prompted . . . to do some experimenting . . . let me issue a word of warning. Most sensible R/C fliers we have talked to agree RAFF is possible and may be even inevitable, **but** it must be carefully worked out. There is enough interference on R/C frequencies now without haphazard, lone wolf interference from FF experimenters. So if you plan to try, do it in the far out boondocks away from regular R/C flying sites, or else try to coordinate your flying with local R/C clubs — even at their site if you're invited."

Sounds like an interesting project, this RAFF. Do you know the FFers in your area? Why not check with them and suggest a mutual plan if they've got RAFF in mind. Some of your old 27.255 mc S/C receivers might even be useful. Besides, who knows, you may "convert" some of those good fliers — and builders — to R/C. . . .

● At the Nats Betty Stream chided us about having a wide variety in TOP OUT but leaving out — of all things — romance! Never let it be said we skip over anything so important, especially since it's often said that modeling puts the dampener on that sorta thing. Isn't true. We suspect that allegations are subtle propaganda plants by impatient wives and friends to cloud the issue and make us overlook the fact that there are hunting, fishing, golf, domino, football, baseball, etc., etc., "widows" who say the same thing about their absent **non**-R/Cing husbands and boyfriends. . . . Be that as it may, for my first "exclusive" (and perhaps the last) in the romance department, is news of the Nats honeymoon of Marlene and Alex Chisholm of WATTS NEW renown and the Fresno Radio Modelers Club. As if the Nats wasn't enough. . . . In looking over the August WATTS NEW it appears Marlene (Molica used to be the last name) not only got herself a fine modeler, but also a darn good assistant editor! Long years of connubial bliss and many happy contests to you both. . . .

● Glad to see Clark Besancon back in business at the same news stand. His PROP BUSTERS sheet of the Rapid City, S. D. R/Cers, we're happy to report, is back in circulation again. Clark advises slope soaring is a relaxing exercise and this brings to mind an item seen in the PIONEER MODULATOR that went this way: "Considering the fact that contests for R/C **slop** soaring etc. . . ." Makes me wonder just how relaxing this gliding is . . . (. . . and the printer jes' better leave that mispelled word in this time!).

● And while wondering, here's a piece of the CARRIER, newsvoice of the Frisco East Bay R/Cers, that draws attention to Soaring On the Ridge. "Action on the ridge was spectacular — would you believe **outside** loops, **inverted** flight, spins, inside loops, and **pylon racing** with gliders — **no motor** — just wind? Watching Bob Seigelkoff and Jim Stevens competing in a pylon race was exciting enough but to see Bob break off and hear him remark, "How about inverted flying?" He then flew inverted for several minutes when Jim, not to be outdone, put his glider inverted and followed Bob around the course. Jim next tried an outside loop and succeeded! He then did two consecutive outsides but Bob's batteries were getting low after 3 hours of flying (!) so he had to come in and land. Jim then did some spins before calling it a day. . . ." Now I'm not so sure about this relaxing bit. . . .

● A query has been received concerning further Class I developments in an international way. It suggests use of the funds

The McClures, an R/C family. Memphis, Tenn. mainstays, Gwen and Keith are joined at Glue Dobber field by daughter Susie and "Pedie." Ship is original Class II — 56" wing, VECO 61, glass fuselage, 11 x 7 Rev-Up prop.

collected in the recent project to demonstrate Class I and II at the Internats to promote further international competition. While interest continues for this, the matter of the funds apparently needs added clarification. Although backers of the original project were generous, with many willing to have their money kept for future uses, all donations received were returned in full. In addition the AMA FAI team fund received a windfall of $500 from proceeds of the Toledo raffle, since the original agreement with Larry Snedeker and the Toledo Weak Signals R/C Club specified any raffle profit was earmarked for the FAI fund in case the demonstrations didn't take place. Due to time limits in Corsica, the trip was shelved and John Worth, AMA Executive Director, has since acknowledged receiving the $500 which, has assured, was a welcomed help in financing the U. S team.

● While regaling a local non-R/C group with the story of "Pigtail Pete," the wayward Hawaiian gull with a fondness for west coast R/C gliders, we must have struck a chordant note somehow. Latest mail brings a newsletter from the San Antonio Audubon Society which we're pleased to receive. As I recall, the west coast R/Cers found California bird watchers an appreciative group when news of Pete brought them to the R/C flying site. Our thanks to Fabian Wimer, one of the Directors of the San Antonio group, and to Col. Wayne Jessup, their president, for the thoughtfulness in sending the information. This opportunity is also taken to invite Audubon members to the ARCS flying field to enjoy flights of mechanical birds and to watch us match maneuvers with soaring Texas vultures, as well as to exchange other ornithological notes. After all, everyone knows R/Cers are for the birds. . . .

● Out of the Arizona R/C Society newsletter two interesting classified ads were spotted and are passed along free of charge:

Labor Service — *Want to finish that new model for the Nats and the lady of the*

house wants a room painted or a shelf made? Call the "Fix-it Service" operated by Roseberry and Darr. We paint and pound wood with the best intentions while you finish your model!

Inking Service — *Dick Nichols has finished plans of the MONO-BI for RCM. It has only taken since Easter with all the leroy lettering. Now Dick has his pens sharpened and will ink your plans in a professional manner. So far he has been*

Business end of new Lakin original — Kris-Aire, is aimed at FAI competition. 7 lbs., Enya 60, Kraft, with 15% wing section. Lakin nosegear, naturally. Smaller Kris-Aire in works.

Jack Capehart, RCM's aerodynamics series author, gives 3 minutes of stick time to pretty Susan Fleener, Tulsa G/D meet visitor. Moments later — with Jack flying — experimental Kwik-Fli's wing collapsed!

working for RCM at about 13 cents an hour — which is a shade less than Roseberry/Darr charge for painting and pounding nails.

. . . . Now if anyone takes you guys seriously, you are in trouble. And with the ARCS preparing for the umteenth Southwest Regionals scheduled for 17 and 18 February 1968, Buckeye will miss these "hard" working enterprisers. Seriously, we understand the 1968 meet will have Class I, II, and III (1968 rules?) and Scale, but no Goodyear, although it had a big turnout in 1967.

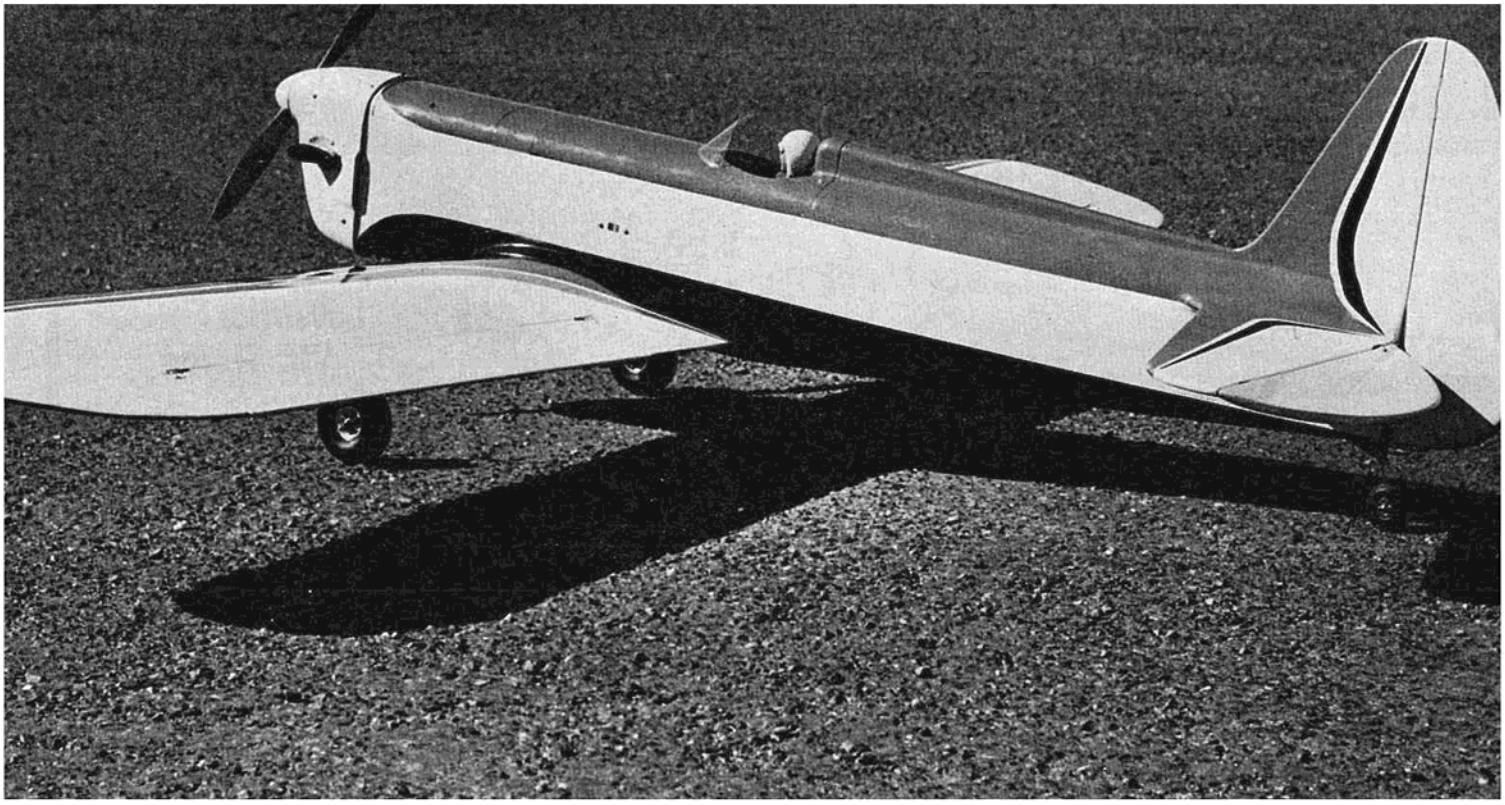
● AMA CLUB PROGRAM. How's the charter club program going? Overall, pretty well, based upon July figures released by AMA. However in analyzing the figures eastern modelers will find some cause for trying harder. This is how it shapes up.

District V, down in the S.E. corner leads with a 58% increase in clubs and a healthy 30 % influx of new members. Creation of the SARCS — an R/C club Assn. — reflects the district's vigorous growth and the direction it's taking. District VIII's small increase of only 9% in club growth is offset by a whopping 47% growth — indicating the possibility that clubs are getting bigger although it also means more "loners" too. District XI up in the N.W. corner, is the statistical champ so far with an increase of 46% in clubs over 1966 and a 58% jump in new AMA members! District I of the N.E. shows up poorest with no increase in clubs and only a 19% (smallest of all districts) gain in members. Considering all districts, there's been a 32% growth in clubs with a 28% hike in new members across the country. Judging from the figures, it appears the shift of AMA weight is increasingly in favor of the south and west. Since the midwest (Dist. III, VI, and VII) appears to be holding its own in the growth race, the east (Dist. I, II, and IV) is losing statistical ground to the rest of the country. All things being equal, this should signal a continuance of the buildup of the south and west in affairs such as elections and other nationally influenced AMA functions. Insufficient growth in the east — as compared with the pace elsewhere — deserves attention as to the causes. Is it the flying site problem that's at the root, or is it an organization bogdown? District I members may ponder on this as they vote for a new VP. There may be other causal possibilities, but whatever the factors, at stake is the balance that assures strength and durability to AMA. With this in mind, another look at the growth statistics which on the surface spells dollar solvency — an important goal — also shows other considerations deserving attention if the growth is indeed to bring long term benefit. Focusing on finances alone could be a deceiving practice.

Class II line-up at Tulsa. McClure, Wingo, Knost, Thomas, Reed and McCoy are mid-country intermediate powerhouse.

● While on this train of thought, I notice Earl Witt has been nominated for AMA's Secretary-Treasurer post — a most fortunate selection. In Earl's case, service and integrity are matched by ability which should serve AMA well. However his election will not be automatic, so it's suggested that all the candidates be looked over if you're not familiar with the records, and then it'll be evident that Earl's a good choice. And it would be nice to see more than 1500 votes this time. . . .

Bill Knost and modified Lanier for Goodyear. Despite splintered blade, it did well in Knost's Tulsa home grounds. Bill has popular hobby shop, is very active on contest trails.

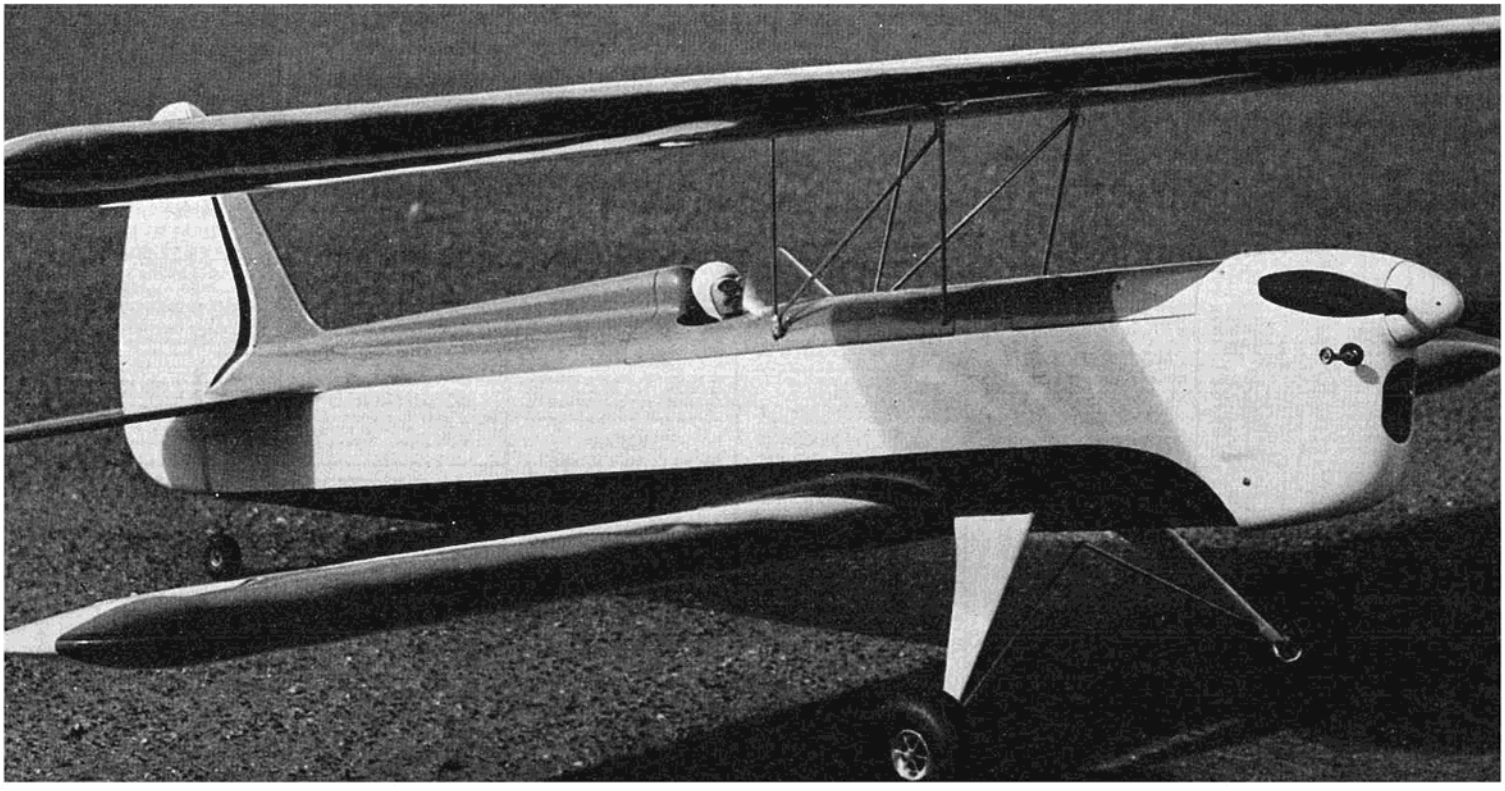


The First Convertible R/C Aircraft . . . . .

MONO—B1

By Dick Nichols

You can change from monoplane to biplane — right on the field! Your choice of several building options adds to the versatility of this remarkable design.



Design Objectives:

BY far, the costliest portion of a radio controlled model aircraft is the electronics and electro-mechanical equipment involved. Seldom is equipment used for more than one model simultaneously. If a modeler wishes to fly more than one aircraft, he is faced with the problem of transferring equipment from one plane to another or purchasing a whole new system.

In an attempt to offer the sport flyer more versatility at nominal cost, the Mono-Bi was conceived. As the name implies, the Mono-Bi is a convertible monoplane-biplane. Designed around the popular .60 engine, the monoplane is of rather conventional design in the 700 square inch class. Using the same engine, fuselage, and tail assembly, the biplane is in the 1000 square inch class. Conversion is accomplished by changing wings and attached landing gears. Aileron servos could be changed with each conversion, but in the interest of convenience, the prototype will probably have a separate servo for each configuration.

Other design objectives include:

1. Design an aircraft capable of changing configuration that will produce decidedly different flight characteristics and appearance.
2. Additional guidance (radio-servo) equipment necessary to accomplish conversion will be limited to one additional servo.
3. Conversion from one type to the other should require no more than 30 minutes in the field.
4. The aircraft in both forms should be clean and pleasing to the eye. Evidence of compromise due to conversion should be minimal in both appearance and flight characteristics.
5. In both forms, the aircraft should perform well as a sport type aircraft.
6. Construction should follow conventional trends in order to appeal to the average multi-flyer. It should not be unduly complicated.
7. Versatility in appearance, construction methods, and configuration should be available without major re-design in order to satisfy the desires of a large number of modelers.

Technical Description:

The Mono-Bi is a convertible monoplane-biplane designed to convert from one configuration to the other in the field with a minimum of effort. While the design offers many construction variables, the prototype was constructed using the more complicated choice in each case. The builder felt this was necessary in order to prove the design under the most adverse conditions. This resulted in a rather heavy monoplane, although performance is not hindered to an excessive degree by the additional weight. A simpler airplane could be built by sacrificing some appearance or versatility.

The biplane is moderately slow in flight. It feels light but has no tendency to float. It has a very gentle straight ahead stall. It cruises at about half throttle. It is very maneuverable though somewhat slow in response. Inverted flight and outside loops are particularly easy.

The monoplane is an average performer for its size and type. Despite its heavy wing loading, it is not particularly fast. It is very responsive and quick. Roll rate is average with links in outer holes. Stalls are very gentle. Landings are easy.

The ship flies well in any configuration. It could well be considered an advanced trainer or intermediate type aircraft.

Specifications:

Monoplane:

Span	66 In.
Chord	12 In.
Area	680 Sq. In.
Airfoil	18% Full Sym.
Aileron Area	114 Sq. In.
Incidence	0°
Weight	8 Lbs.
Wing Loading	1.7 Lbs/Sq. Ft.

Biplane:

Span, upper	64 In.
lower	56 In.
Chord	9 In.
Area	1000 Sq. In.
Airfoil	18% Full Sym.
Aileron Area	114 Sq. In.
Incidence	0° Both Wings
Stagger	3 In.
Gap	9 In. Clear
Weight	8.5 Lbs.
Wing Loading	1.2 Lbs/Sq. Ft.

Common:

Length	50 In.
Stabilizer Area	114 Sq. In.
Incidence	0°
Elevator Area	56 Sq. In.
Fin Area	25 Sq. In.
Rudder Area	36 Sq. In.
Engine	Enya 60 II T.V.
Equipment	Digitrio-4

Configuration Variables

(Prototype configuration boldface)

Size:
.30 to .45 engines or **.60 engine**
(510 Sq. In. mono & 750 Sq. In. bi or **680 Sq. In. mono & 1000 Sq. In. bi**

Type:
Monoplane or biplane or **convertible**
Open cockpit or enclosed or **convertible**

Landing gear:
Conventional or tricycle or **convertible**

Engine mounting:
Upright or **inverted,** or side mount

Miscellaneous:
Any configuration may be built with or without fairings and/or round fuselage bottom.

Construction Variables

(Prototype construction boldface)

Wing
Covering: **Sheeted** or silked
Spar: Twin spar or **egg crate**
Tips: **Tapered** or block or plated
Attachment: **Bolted** or banded
Other: Adapt existing wing for monoplane

Cowl: Balsa or **fiberglass**

Landing Gear: Biplane — dural or **wire** (conventional)

Control System: Push rods or **flex cable**

Biplanes have a way of stirring excitement from deep within. Yet, observing the biplane in flight gives rise to a flood of questions. Watching a bipe is one thing, owning a bipe is something else. How long before the novelty wears off? Will it satisfy my needs and desires or will I be saddled with a monster? How about windy days? Will a bipe limit flying to calm weather, particularly one with conventional landing gear?

The obvious answer to this dilemma is a second radio rig. But who can afford it? Usually the first (and only) rig places a strain on the family financial situation that makes audible sounds for months and months.

Yet, despite the negative reasoning, there comes a time in every modeler's life when he must build a bipe. Biplanes and modelers are just that way.

Mono-Bi is an attempt to satisfy the longing from deep within without sacrificing the thrill of a fast and efficient sport or contest-type airplane. As a monoplane, its performance is lively and thrilling. It appears to be a mid-thirties sport plane. One would never suspect that by removing the wing and a hatch and replacing them with another wing and a hatch, a slick biplane would result. The change in appearance is startling. Equally different are the flight characteristics of the two ships. Truly, Mono-Bi is two distinct airplanes for slightly more than the price of one.

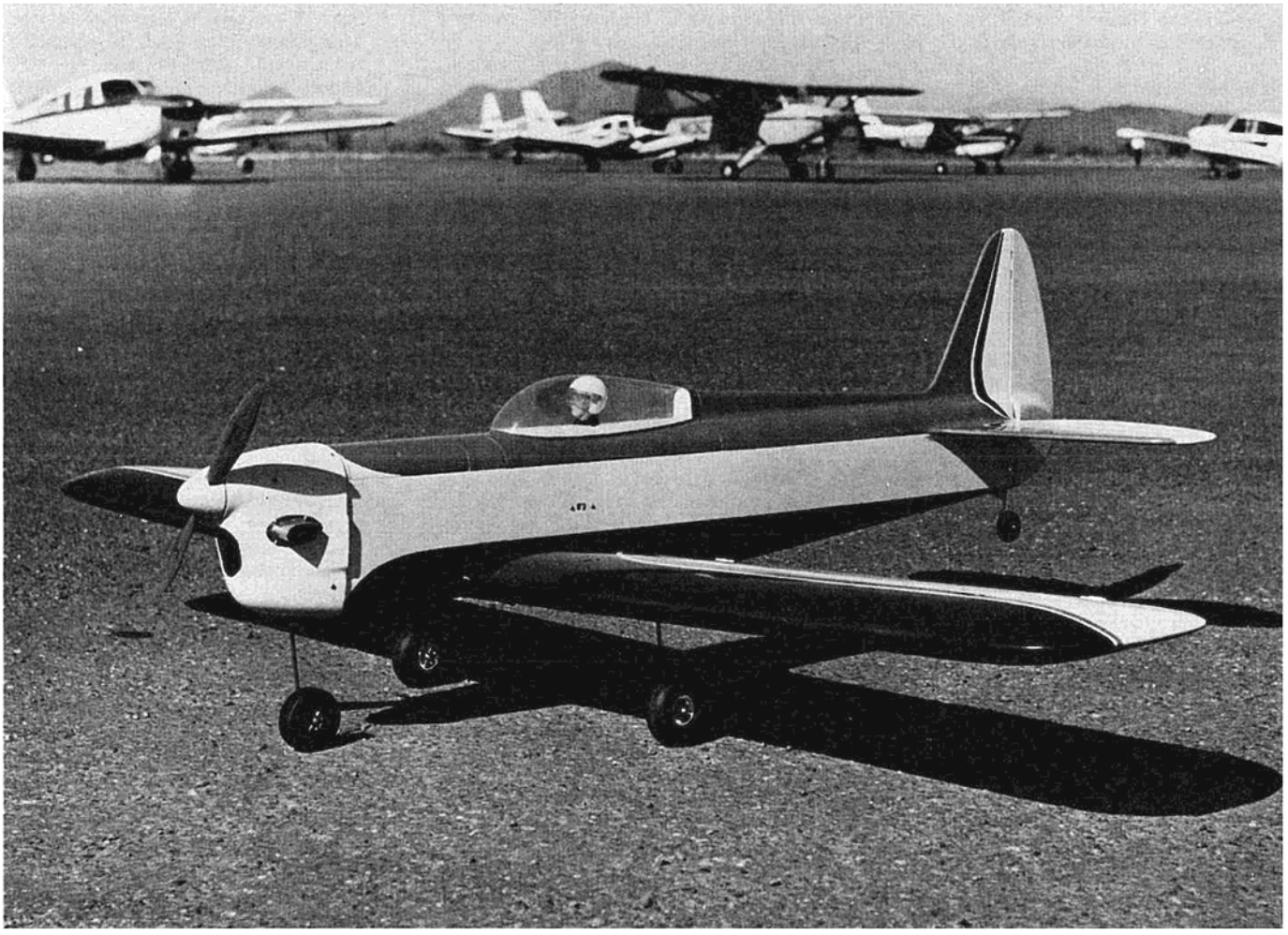
Sound versatile? Only the beginning! Versatility is Mono-Bi's long suit. The plans include details for conventional and tricycle landing gears — choose either one or both. Field change takes about ten minutes. That solves the wind problem, although both ships perform very well on conventional gear in the wind.

The prototype is a rather deluxe version; you know, fully faired wings and deep fillets. Pretty, but costly in construction time.

Provision is made for a less complicated version that will fly every bit as well. Plated or club tips may be substituted for sheeted tapered tips and other fairings may be eliminated entirely. The plans provide many other construction variables and choices. One of the most difficult aspects of Mono-Bi is the making up of your mind. You call the shots all the way through. You see, the modifications are all built-in. Just check the plans and photos if you have doubts.

Mono-Bi will accept three or four channel proportional and perhaps reeds. The original is flown with a four channel Thompson's Folly (Digitrio). The ship should perform equally as well coupled on three channels. Rudder is rather ineffective anyway, except on the ground.

How does it fly? The biplane is fairly slow, but not too slow, depending on where you set the throttle. It has no tendency to float or mush. Stalls are quite gentle and



straight ahead. Loops are very easy, particularly the outside kind. Even at moderate speed outside loops are accomplished by simply shoving the stick forward. You will swear it will never make it, but it does. And very realistically, too. Inverted flight is about as easy upright. Rolls are of the slow variety. Excessive speed isn't required (or even desired) but a definite forward pressure is needed when she rolls over followed by a tad of up as she rolls out.

Takeoffs and landings are a breeze. With a sixty full bore she lifts off in about a hundred feet. Climbs out as fast as you want. Landings are just as easy. Fast or slow, depends on you. Even at very low speeds it will not stall and fall off. Aileron control is solid right down to the ground. It has landed on conventional gear with a ground roll of less than six feet. (Without brakes.) Taxiing in the wind is another matter. It will taxi in one direction only — upwind. And that's with either type of gear.

Generally, the bipe is a sport airplane. Slow and responsive enough to make an excellent trainer, it's just plain fun to fly.

The monoplane demonstrates the same good characteristics as the bipe. It is just faster and feels different. Slow flight is responsive and solid. It tolerates a wide range of throttle settings. Landings are fast or slow, depending on your preference and the type of gear. In the monoplane form, with all the extra built-in goodies, it is somewhat heavy (eight pounds). The extra weight doesn't seem to be detrimental and certainly hasn't increased the landing speed beyond the desirable point. A good sixty will kick her along quite smartly.

Interested in building? Before you start, here's a few words of advice. Study the plans **carefully.** Make your choices **now — before** you start. Write them down and stick with them. Mark your plans. Cross out the rejected alternatives. Choices you must make:

Configuration Variables

- Type: Monoplane or biplane or convertible
  - Open cockpit or canopy or convertible
- Landing Gear: Conventional or tricycle or convertible
- Engine: Upright, inverted, or side mount

Construction Variables

- Wing: Covering — sheeted or silked
  - Spar — Twin spar or egg crate
- Wing Tips: Tapered, club and/or plated
  - Attachment: Bolted or banded
  - Other: Adapt existing wing for monoplane
- Fuselage: Faired or simplified bottom
- Cowl: Balsa or fiberglass
- Landing Gear: Dural or wire (biplane conventional)
- Control System: Flex cables or push rods

Some of the alternatives may need explaining, so we will run right down the list.

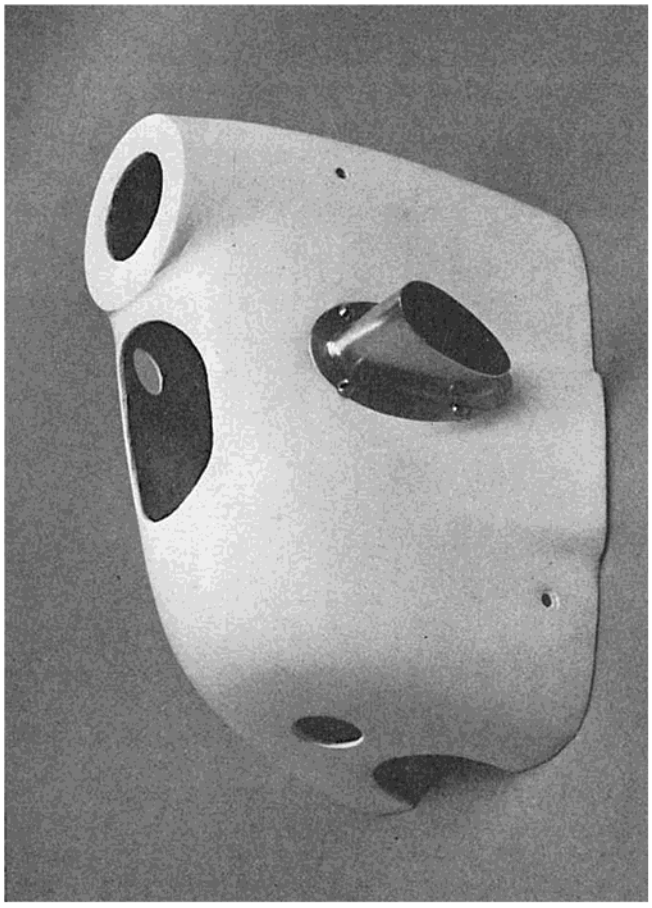
The convertible airplane is a lot of fun. Fly one a while, then the other. It's a crowd pleaser. **But** it's a whale of a lot of airplane to build at one time. Just think, three wings, seventeen hundred inches! May be better to build one then the other. One hint, build **both** wing saddles while they can be sanded against the fuselage.

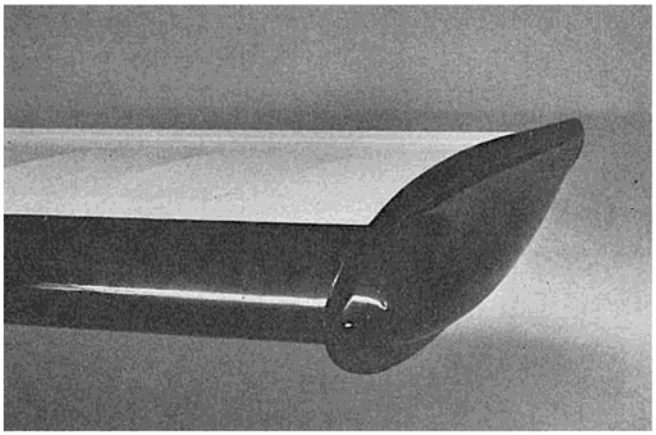
The tricycle landing gear just doesn't do much for the bipe (see pics). I prefer conventional. For a little extra weight and work, you can have both and change them as you choose.

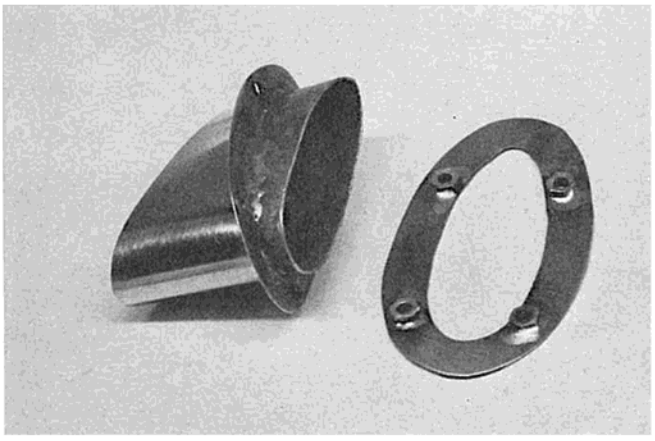
It would be a crime to stick the engine out through the top of that deep cowl, yet there have been times when that inverted engine has tried my patience. Make your choice, looks or convenience. Or maybe you know how to handle inverted engines.

If you are still with me and determined to build, let's consider the construction variables. The wing may be completely sheeted or partially sheeted and covered. The prototype was sheeted. Count the sheets of 1/16 x 3 — count again. That right . . . 24 sheets for the bipe — yipe! On the other hand, count the yards of silk. Still with me? A beautiful bipe would result from carefully applied colored silk finished clear with polished colored dope over the wood. The same treatment on the monoplane would be very much in taste for a 1930's sport plane.

The choice of wing spar type may be dictated by the equipment available for your use. The slotted or egg crate spar would be my choice provided a jig saw were available. Cutting slots in 1/8" hard balsa is difficult without one; however, this type spar presents less problems in the long run. But for those who like to build over







Left: Trike-geared, canopied version of Mono-Bi. Above: Completed cowl showing cut-outs and flange around spinner area.

Top, right: Plated club wing tip. Below, right: Exhaust stack and flange ring.

the plan and don't mind cutting out lots of little pieces, twin built-up spars are provided.

And now the wing tips. This is the hard one. Those tapered sheeted tips aren't really hard, but they do take more time than club or plated tips. I can't imagine Mono-Bi with square tips, but if you can — build them that way. Club tips and tricycle gear would move the airplane into the post-war era.

The plans detail only the bolted wing attachment. So you don't like bolts — forget them. Cross out all reference to lower wing bolts and provide standard dowels. As was stated earlier, you call the shots all the way through.

Here's something to consider. By chance do you have a Cherokee wing handy? Make a wing saddle to fit, bolt it on, and band on the wing. Or, glue the saddle to the adopted wing and bolt the whole mess on. If you want to experiment, bolt the tail on. Think of the possible combinations of wing, stab, and rudder. You might even develop a contest-type monoplane.

Take a good look at the fuselage. The rounded fairings are great for looks but add nothing to performance. Once again, my vote goes for looks. Mono-Bi is the type of ship you will fly for a long time, and believe me, it will attract attention wherever it is flown. Here's a touch of the romantic era when airplanes looked sporty. Mono-Bi is no swept back swish nor is it a box or barn door. It doesn't take a long look to see a little Ryan ST and Howard Ike, and Waddell Williams Racer in her. Has the jet age produced prettier airplanes than these? But — if you insist — cut everything on the broken line and save yourself some work.

Unless you are allergic to epoxy resin, the fiberglass cowl is by far the best bet. It's not hard to make — see construction details.

The prototype sports a wire and fiberglass conventional gear. Not that it looks particularly better, but wire I had and dural I didn't. Besides, since we are mixing fiberglass anyway. . . . The wire gear may be a little more costly in time, so. . . .

My last two ships (counting Mono-Bi as one) were equipped with flexible control cables of the World Engines variety. They work very well and are a joy to install. They should be kept as straight and in line as possible. Naturally, the aileron cables must have a 90° bend, but no short kinks. A little play or sloppiness is inherent and cannot be eliminated. Some vibration may result. This situation will not worsen with age. With their faults, they are not all bad. The good part is a free-working, easy to install, trouble-free system. But . . . if you like push rods, feel free.

Got your plans marked up and your mind made up? One last discouraging thought, Mono-Bi ain't cheap! It will soak up an enormous bundle of wood and glue and dope and wheels and time — time — time. But when you are through, **two** beautiful ships.

Mono-Bi is recommended for construction by the sport flyer with some multi experience. Though the bipe makes an excellent trainer, it's just too much airplane to horse around with. Good trainers are plentiful that are cheaper and easier to build. A pranged Mono-Bi is a sorry sight, believe me!

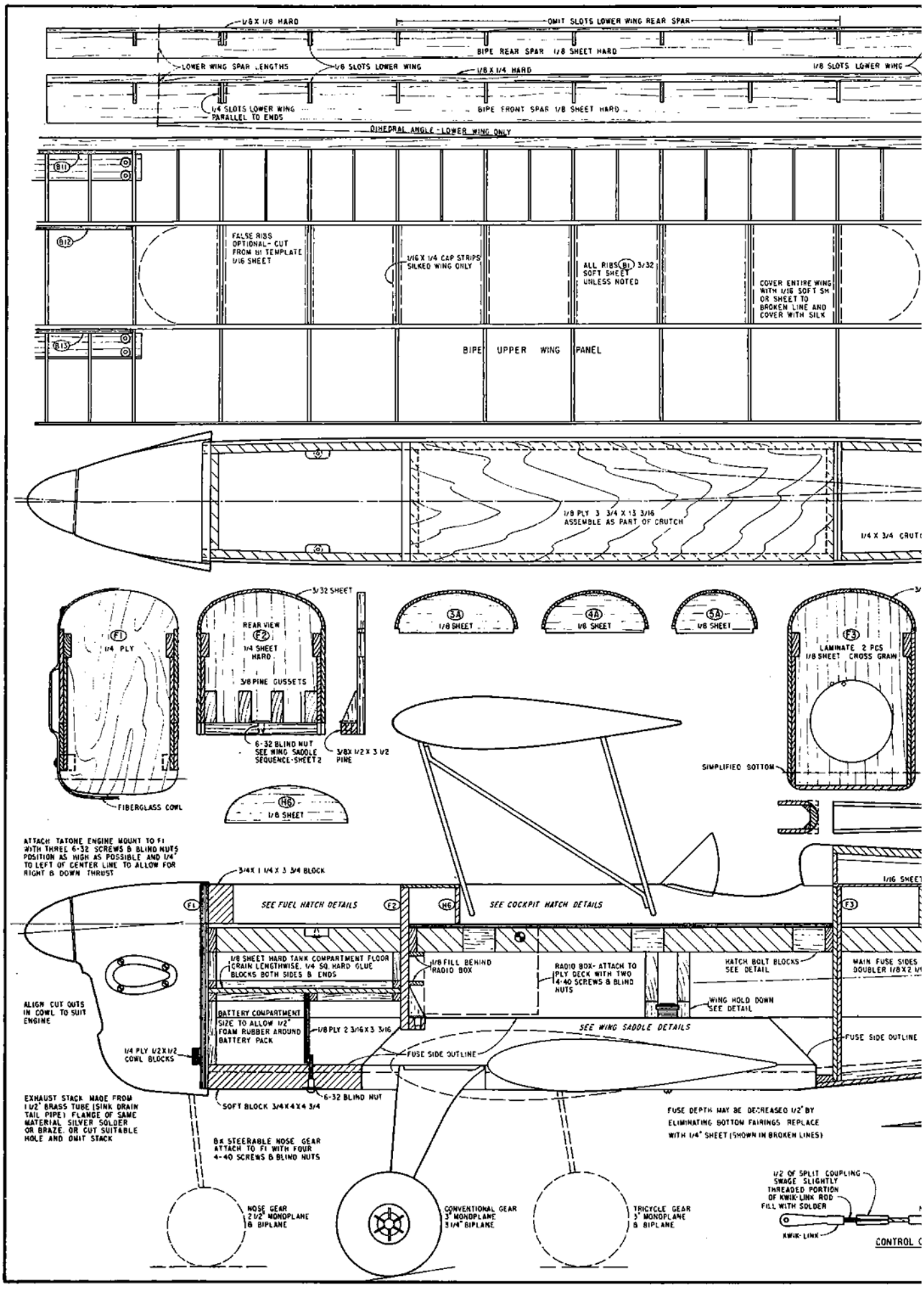
If you are an experienced builder you have already decided to skip over this part, so go your way and leave the gory construction details to the less experienced.

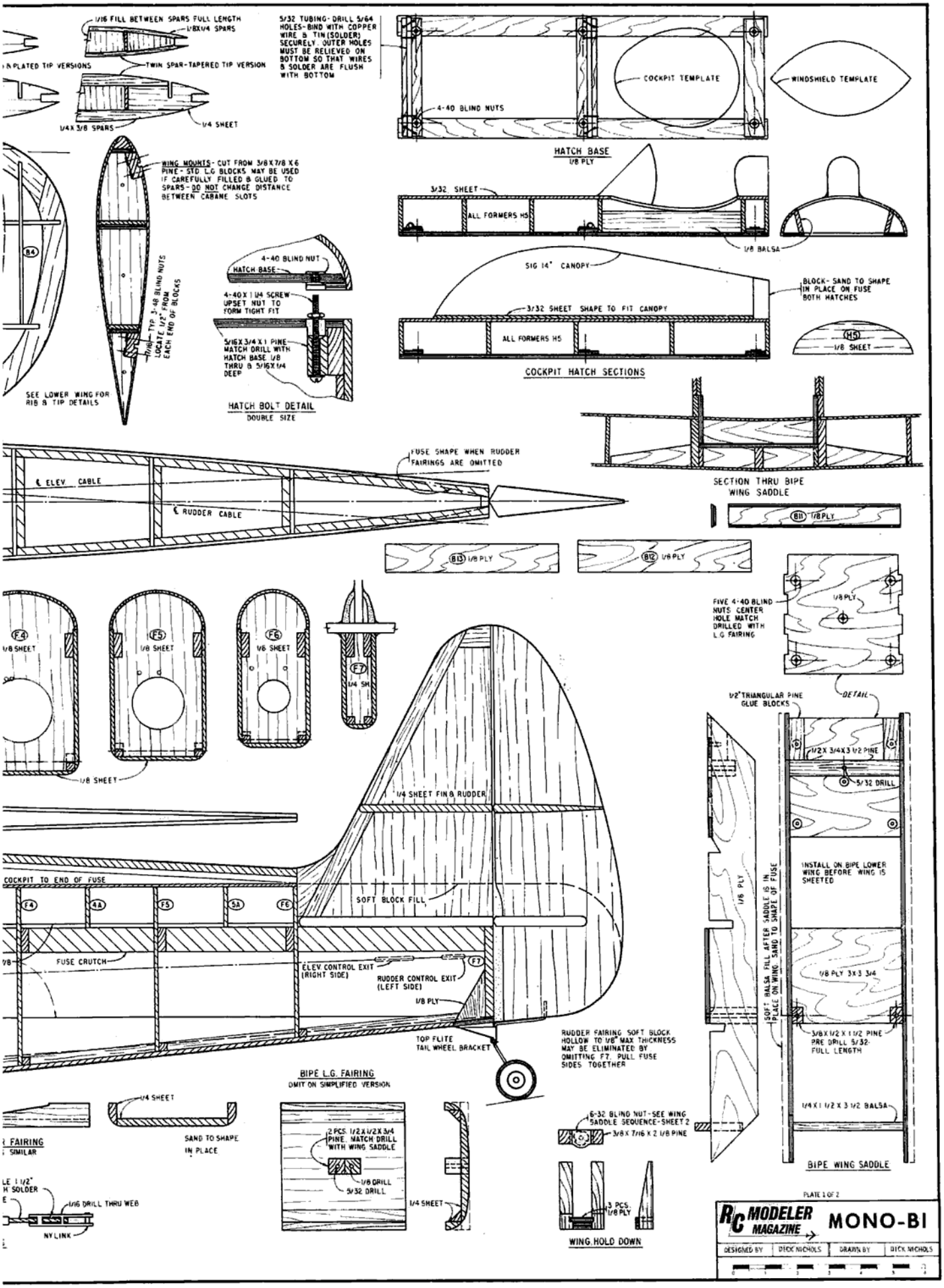
Before we start construction a few words are in order about tools. A most useful tool in building Mono-Bi, or most any other model for that matter, is a metal straight edge three to four feet in length. A good tri square is a must. Several sanding blocks about two inches wide and the length of a sheet of sandpaper with a couple of grades of garnet paper attached are esesntial. Quarter and ½" dowels about a foot long covered with sandpaper are quite useful. Of course, the general run of modeling tools will be required also. You probably already have the tools listed above and I mention them only to encourage you to **use** them. And now, on with the tedious part.

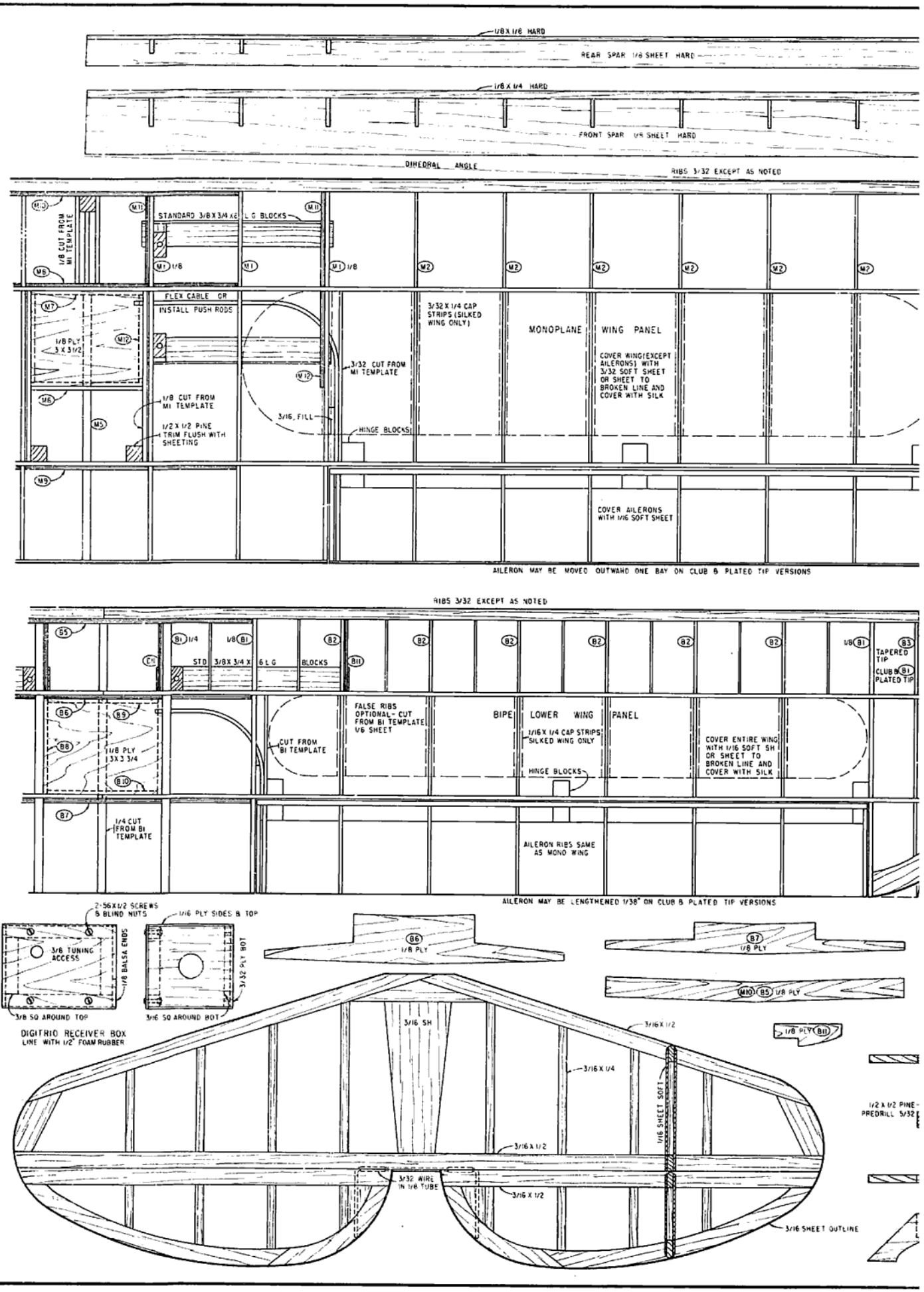
Construction details are not complete to the extent that each and every step is covered. There are just too many variables; and besides, if you are building Mono-Bi you should have enough experience to build from the plans only. But since Mono-Bi is different, the troublesome areas will be discussed.

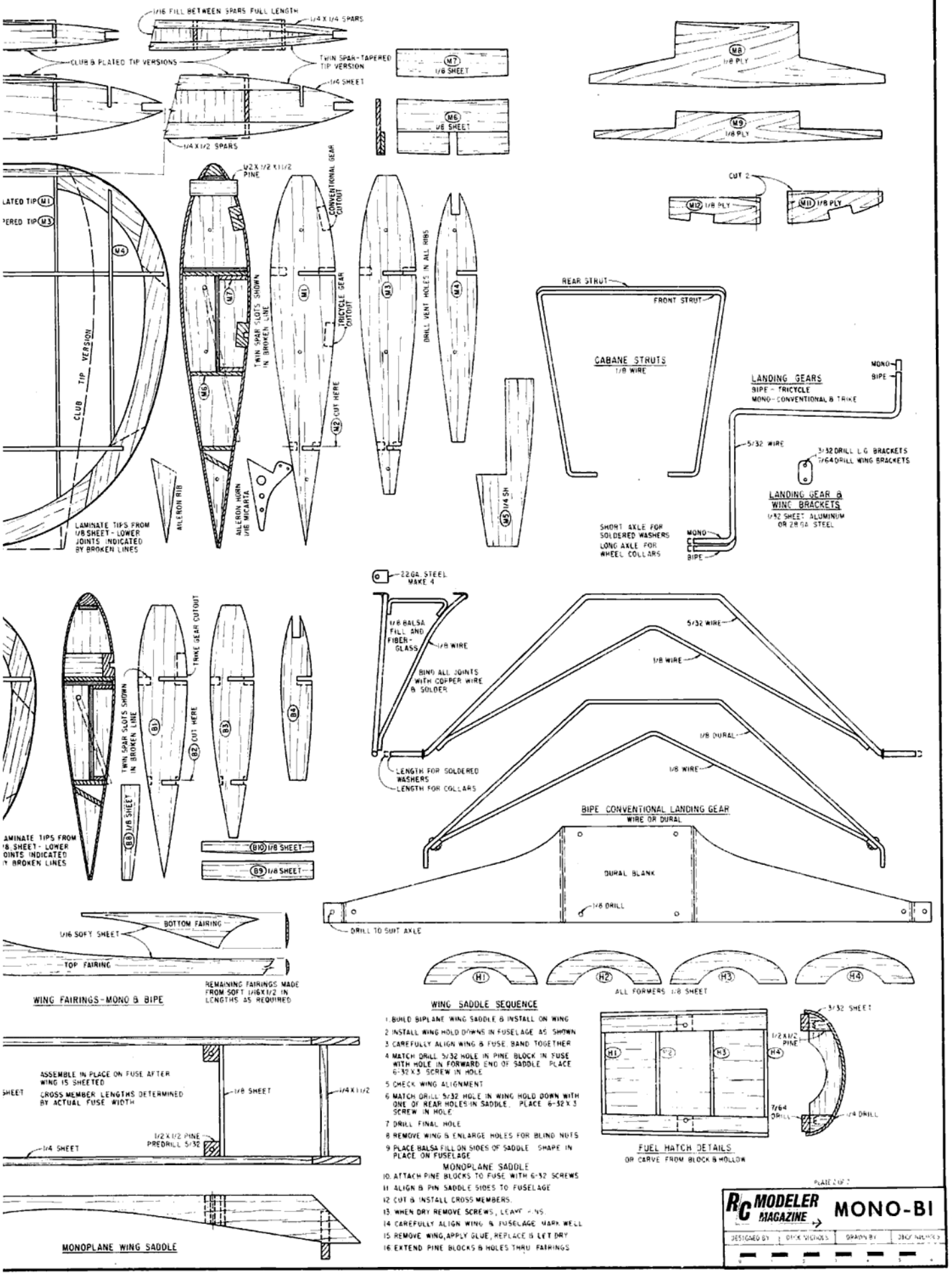
Wings

With three wings to build, you may want to start here and get them out of your way. Accurate metal or plywood rib tem-


1/8 X 1/8 HARD
OMIT SLOTS LOWER WING REAR SPAR
BIPE REAR SPAR 1/8 SHEET HARD
LOWER WING SPAR LENGTHS
1/8 SLOTS LOWER WING
1/8 X 1/4 HARD
1/8 SLOTS LOWER WING
1/4 SLOTS LOWER WING PARALLEL TO ENDS
BIPE FRONT SPAR 1/8 SHEET HARD
DIHEDRAL ANGLE - LOWER WING ONLY
B11
B12
B13
FALSE RIBS OPTIONAL - CUT FROM B1 TEMPLATE 1/16 SHEET
1/16 X 1/4 CAP STRIPS SILKED WING ONLY
ALL RIBS B1 3/32 SOFT SHEET UNLESS NOTED
COVER ENTIRE WING WITH 1/16 SOFT SH OR SHEET TO BROKEN LINE AND COVER WITH SILK
BIPE UPPER WING PANEL
1/8 PLY 3 3/4 X 13 3/16 ASSEMBLE AS PART OF CRUTCH
1/4 X 3/4 CRUTC
F1
1/4 PLY
FIBERGLASS COWL
3/32 SHEET
REAR VIEW
F2
1/4 SHEET HARD
3/8 PINE GUSSETS
6-32 BLIND NUT SEE WING SADDLE SEQUENCE-SHEET 2
3/8 X 1/2 X 3 1/2 PINE
5A
1/8 SHEET
4A
1/8 SHEET
5A
1/8 SHEET
F3
LAMINATE 2 PCS 1/8 SHEET CROSS GRAIN
SIMPLIFIED BOTTOM
H6
1/8 SHEET
ATTACH TATONE ENGINE MOUNT TO F1 WITH THREE 6-32 SCREWS & BLIND NUTS POSITION AS HIGH AS POSSIBLE AND 1/4° TO LEFT OF CENTER LINE TO ALLOW FOR RIGHT & DOWN THRUST
3/4 X 1 1/4 X 3 3/4 BLOCK
SEE FUEL HATCH DETAILS
SEE COCKPIT HATCH DETAILS
1/16 SHEET
1/8 SHEET HARD TANK COMPARTMENT FLOOR GRAIN LENGTHWISE. 1/4 SQ. HARD GLUE BLOCKS BOTH SIDES & ENDS
1/8 FILL BEHIND RADIO BOX
RADIO BOX - ATTACH TO PLY DECK WITH TWO 4-40 SCREWS & BLIND NUTS
HATCH BOLT BLOCKS SEE DETAIL
MAIN FUSE SIDES DOUBLER 1/8 X 2 1/
ALIGN CUT OUTS IN COWL TO SUIT ENGINE
BATTERY COMPARTMENT SIZE TO ALLOW 1/2° FOAM RUBBER AROUND BATTERY PACK
1/8 PLY 2 3/16 X 3 3/16
WING HOLD DOWN SEE DETAIL
SEE WING SADDLE DETAILS
FUSE SIDE OUTLINE
1/4 PLY 1/2 X 1/2 COWL BLOCKS
FUSE SIDE OUTLINE
EXHAUST STACK MADE FROM 1 1/2° BRASS TUBE (SINK DRAIN TAIL PIPE) FLANGE OF SAME MATERIAL SILVER SOLDER OR BRAZE. OR CUT SUITABLE HOLE AND OMIT STACK
SOFT BLOCK 3/4 X 4 X 4 3/4
6-32 BLIND NUT
FUSE DEPTH MAY BE DECREASED 1/2° BY ELIMINATING BOTTOM FAIRINGS REPLACE WITH 1/4° SHEET (SHOWN IN BROKEN LINES)
BX STEERABLE NOSE GEAR ATTACH TO F1 WITH FOUR 4-40 SCREWS & BLIND NUTS
NOSE GEAR 2 1/2° MONOPLANE & BIPLANE
CONVENTIONAL GEAR 3° MONOPLANE 3 1/4° BIPLANE
TRICYCLE GEAR 3° MONOPLANE & BIPLANE
1/2 OF SPLIT COUPLING SWAGE SLIGHTLY THREADED PORTION OF KWIK-LINK ROD FILL WITH SOLDER
KWIK-LINK
CONTROL


1/16 FILL BETWEEN SPARS FULL LENGTH
1/8X1/4 SPARS
TWIN SPAR-TAPERED TIP VERSION
1/4X3/8 SPARS
1/4 SHEET
5/32 TUBING- DRILL 5/64 HOLES- BIND WITH COPPER WIRE & TIN (SOLDER) SECURELY. OUTER HOLES MUST BE RELIEVED ON BOTTOM SO THAT WIRES & SOLDER ARE FLUSH WITH BOTTOM
COCKPIT TEMPLATE
WINDSHIELD TEMPLATE
4-40 BLIND NUTS
HATCH BASE
1/8 PLY
WING MOUNTS- CUT FROM 3/8X7/8 X6 PINE- STD L.G BLOCKS MAY BE USED IF CAREFULLY FILLED & GLUED TO SPARS- DO NOT CHANGE DISTANCE BETWEEN CABANE SLOTS
TYP 3-48 BLIND NUTS LOCATE 1/2" FROM EACH END OF BLOCKS
SEE LOWER WING FOR RIB & TIP DETAILS
3/32 SHEET
ALL FORMERS HS
1/8 BALSA
SIG 14" CANOPY
BLOCK- SAND TO SHAPE IN PLACE ON FUSE BOTH HATCHES
3/32 SHEET SHAPE TO FIT CANOPY
ALL FORMERS HS
H5
1/8 SHEET
COCKPIT HATCH SECTIONS
4-40 BLIND NUT
HATCH BASE
4-40 X 1 1/4 SCREW UPSET NUT TO FORM TIGHT FIT
5/16 X 3/4 X 1 PINE MATCH DRILL WITH HATCH BASE 1/8 THRU & 5/16 X 1/4 DEEP
HATCH BOLT DETAIL
DOUBLE SIZE
FUSE SHAPE WHEN RUDDER FAIRINGS ARE OMITTED
℄ ELEV. CABLE
℄ RUDDER CABLE
SECTION THRU BIPE WING SADDLE
B11 1/8 PLY
B13 1/8 PLY
B12 1/8 PLY
FIVE 4-40 BLIND NUTS CENTER HOLE MATCH DRILLED WITH L.G FAIRING
1/8 PLY
F4
1/8 SHEET
F5
1/8 SHEET
F6
1/8 SHEET
F7
1/4 SH
1/8 SHEET
1/4 SHEET FIN & RUDDER
COCKPIT TO END OF FUSE
F4
4A
F5
5A
F6
SOFT BLOCK FILL
FUSE CRUTCH
ELEV CONTROL EXIT (RIGHT SIDE)
RUDDER CONTROL EXIT (LEFT SIDE)
F7
1/8 PLY
TOP FLITE TAIL WHEEL BRACKET
RUDDER FAIRING SOFT BLOCK HOLLOW TO 1/8" MAX THICKNESS MAY BE ELIMINATED BY OMITTING F7. PULL FUSE SIDES TOGETHER
BIPE L.G. FAIRING
OMIT ON SIMPLIFIED VERSION
1/4 SHEET
SAND TO SHAPE IN PLACE
2 PCS. 1/2 X 1/2 X 3/4 PINE. MATCH DRILL WITH WING SADDLE
1/8 DRILL
5/32 DRILL
1/4 SHEET
1/16 DRILL THRU WEB
NYLINK
6-32 BLIND NUT- SEE WING SADDLE SEQUENCE- SHEET 2
3/8 X 7/16 X 2 1/8 PINE
3 PCS. 1/8 PLY
WING HOLD DOWN
1/2" TRIANGULAR PINE GLUE BLOCKS
DETAIL
1/2 X 3/4 X 3 1/2 PINE
5/32 DRILL
INSTALL ON BIPE LOWER WING BEFORE WING IS SHEETED
1/8 PLY
SOFT BALSA FILL AFTER SADDLE IS IN PLACE ON WING- SAND TO SHAPE OF FUSE
1/8 PLY 3 X 3 3/4
3/8 X 1/2 X 1 1/2 PINE PRE DRILL 5/32- FULL LENGTH
1/4 X 1 1/2 X 3 1/2 BALSA
BIPE WING SADDLE
PLATE 1 OF 2
RC MODELER MAGAZINE
MONO-BI
DESIGNED BY
DICK NICHOLS
DRAWN BY
DICK NICHOLS


1/8 X 1/8 HARD
REAR SPAR 1/8 SHEET HARD
1/8 X 1/4 HARD
FRONT SPAR 1/4 SHEET HARD
DIHEDRAL ANGLE
RIBS 3/32 EXCEPT AS NOTED
STANDARD 3/8 X 3/4 x 6 L G BLOCKS
1/8 CUT FROM M1 TEMPLATE
FLEX CABLE OR INSTALL PUSH RODS
1/8 PLY 3 X 3 1/2
1/2 X 1/2 PINE TRIM FLUSH WITH SHEETING
3/32 CUT FROM M1 TEMPLATE
3/16, FILL
HINGE BLOCKS
3/32 X 1/4 CAP STRIPS (SILKED WING ONLY)
MONOPLANE WING PANEL
COVER WING (EXCEPT AILERONS) WITH 3/32 SOFT SHEET OR SHEET TO BROKEN LINE AND COVER WITH SILK
COVER AILERONS WITH 1/16 SOFT SHEET
AILERON MAY BE MOVED OUTWARD ONE BAY ON CLUB & PLATED TIP VERSIONS
RIBS 3/32 EXCEPT AS NOTED
STD 3/8 X 3/4 X 6 L G BLOCKS
TAPERED TIP
CLUB & PLATED TIP
FALSE RIBS OPTIONAL - CUT FROM B1 TEMPLATE 1/16 SHEET
CUT FROM B1 TEMPLATE
1/8 PLY 3 X 3 3/4
1/4 CUT FROM B1 TEMPLATE
BIPE LOWER WING PANEL
1/16 X 1/4 CAP STRIPS SILKED WING ONLY
HINGE BLOCKS
COVER ENTIRE WING WITH 1/16 SOFT SH OR SHEET TO BROKEN LINE AND COVER WITH SILK
AILERON RIBS SAME AS MONO WING
AILERON MAY BE LENGTHENED 1/38" ON CLUB & PLATED TIP VERSIONS
2-56 X 1/2 SCREWS & BLIND NUTS
3/8 TUNING ACCESS
1/8 BALSA ENDS
1/16 PLY SIDES & TOP
3/32 PLY BOT
3/8 SQ AROUND TOP
3/16 SQ AROUND BOT
DIGITRIO RECEIVER BOX
LINE WITH 1/2" FOAM RUBBER
1/8 PLY
1/8 PLY
1/8 PLY
3/16 SH
3/16 X 1/2
3/16 X 1/4
1/16 SHEET SOFT
3/16 X 1/2
3/32 WIRE IN 1/8 TUBE
3/16 X 1/2
3/16 SHEET OUTLINE
1/2 X 1/2 PINE - PREDRILL 5/32


1/16 FILL BETWEEN SPARS FULL LENGTH
1/4 X 1/4 SPARS
CLUB & PLATED TIP VERSIONS
TWIN SPAR-TAPERED TIP VERSION
1/4 SHEET
1/4 X 1/2 SPARS
M7 1/8 SHEET
M6 1/8 SHEET
M8 1/8 PLY
M9 1/8 PLY
CUT 2
M12 1/8 PLY
M11 1/8 PLY
LATED TIP M1
PERED TIP M3
M4
CLUB TIP VERSION
LAMINATE TIPS FROM 1/8 SHEET - LOWER JOINTS INDICATED BY BROKEN LINES
AILERON RIB
1/2 X 1/2 X 11 1/2 PINE
M7
M6
M1
M2 CUT HERE
TWIN SPAR SLOTS SHOWN IN BROKEN LINE
CONVENTIONAL GEAR CUTOUT
TRICYCLE GEAR CUTOUT
AILERON HORN 1/16 MICARTA
M3
M4
DRILL VENT HOLES IN ALL RIBS
M5 1/4 SH
REAR STRUT
FRONT STRUT
CABANE STRUTS
1/8 WIRE
LANDING GEARS
BIPE - TRICYCLE
MONO - CONVENTIONAL & TRIKE
MONO
BIPE
5/32 WIRE
3/32 DRILL L G BRACKETS
7/64 DRILL WING BRACKETS
LANDING GEAR & WING BRACKETS
1/32 SHEET ALUMINUM OR 28 GA STEEL
SHORT AXLE FOR SOLDERED WASHERS
LONG AXLE FOR WHEEL COLLARS
MONO
BIPE
AMINATE TIPS FROM 1/8 SHEET - LOWER OINTS INDICATED N BROKEN LINES
TRIKE GEAR CUTOUT
TWIN SPAR SLOTS SHOWN IN BROKEN LINE
B1
B2 CUT HERE
B3
B4
B8 1/8 SHEET
B10 1/8 SHEET
B9 1/8 SHEET
22GA STEEL MAKE 4
1/8 BALSA FILL AND FIBER-GLASS
1/8 WIRE
BIND ALL JOINTS WITH COPPER WIRE & SOLDER
5/32 WIRE
1/8 WIRE
1/8 DURAL
1/8 WIRE
LENGTH FOR SOLDERED WASHERS
LENGTH FOR COLLARS
BIPE CONVENTIONAL LANDING GEAR
WIRE OR DURAL
DURAL BLANK
1/8 DRILL
DRILL TO SUIT AXLE
BOTTOM FAIRING
1/16 SOFT SHEET
TOP FAIRING
REMAINING FAIRINGS MADE FROM SOFT 1/16 X 1/2 IN LENGTHS AS REQUIRED
WING FAIRINGS - MONO & BIPE
H1
H2
H3
H4
ALL FORMERS 1/8 SHEET
WING SADDLE SEQUENCE
1. BUILD BIPLANE WING SADDLE & INSTALL ON WING
2. INSTALL WING HOLD DOWNS IN FUSELAGE AS SHOWN
3. CAREFULLY ALIGN WING & FUSE. BAND TOGETHER
4. MATCH DRILL 5/32 HOLE IN PINE BLOCK IN FUSE WITH HOLE IN FORWARD END OF SADDLE. PLACE 6-32 X 3 SCREW IN HOLE
5. CHECK WING ALIGNMENT
6. MATCH DRILL 5/32 HOLE IN WING HOLD DOWN WITH ONE OF REAR HOLES IN SADDLE. PLACE 6-32 X 3 SCREW IN HOLE
7. DRILL FINAL HOLE
8. REMOVE WING & ENLARGE HOLES FOR BLIND NUTS
9. PLACE BALSA FILL ON SIDES OF SADDLE SHAPE IN PLACE ON FUSELAGE
MONOPLANE SADDLE
10. ATTACH PINE BLOCKS TO FUSE WITH 6-32 SCREWS
11. ALIGN & PIN SADDLE SIDES TO FUSELAGE
12. CUT & INSTALL CROSS MEMBERS.
13. WHEN DRY REMOVE SCREWS, LEAVE NUTS
14. CAREFULLY ALIGN WING & FUSELAGE MARK WELL
15. REMOVE WING, APPLY GLUE, REPLACE & LET DRY
16. EXTEND PINE BLOCKS & HOLES THRU FAIRINGS
ASSEMBLE IN PLACE ON FUSE AFTER WING IS SHEETED
SHEET
CROSS MEMBER LENGTHS DETERMINED BY ACTUAL FUSE WIDTH
1/8 SHEET
1/4 X 1 1/2
1/2 X 1/2 PINE PREDRILL 5/32
1/4 SHEET
MONOPLANE WING SADDLE
H1
H2
H3
H4
1/2 X 1/2 PINE
3/32 SHEET
7/64 DRILL
1/4 DRILL
FUEL HATCH DETAILS
OR CARVE FROM BLOCK & HOLLOW
PLATE 2 OF 2
RC MODELER MAGAZINE
MONO-BI
DESIGNED BY
DICK NICHOLS
DRAWN BY
DICK NICHOLS

plates are highly recommended, not that the airfoil is critical, but absolute uniformity is desirable. False ribs in the bipe wings are optional. The prototype had none and the leading edge sheeting pulled down somewhat between the ribs. The scalloped appearance isn't particularly objectionable, but I prefer the looks of a straighter wing.

If you have chosen the twin spar version, build the wing directly over the plans or follow your own favorite method. The sheet spars require a little different technique. Cut all spars from 1/8" hard balsa. Be sure they are straight along both edges. Lay out the position of all slots and ribs. Care must be exercised when placing the cap strips over the rib slots. The purpose of the strips is to provide a means of straightening the spar. When the slots are cut, the spar will have a tendency to warp. Straighten the spars, glue in the cap strips, and the spars will remain straight. This straightening process should be done before the ribs are glued. Of course, the ribs must be in place before the strips are installed. The sheet spar version lends itself readily to building in the air, or off the board. No need to worry about warps or twists as long as the spars are straight. Just exercise reasonable care to keep everything fairly well lined up.

When ready to apply the tips, place the wing panels over the plans and correct any misalignment. The tips should hold the ribs square to the spars. The dihedral angle is identical for the monoplane and the bipe lower wing. It is exactly 1/32" vertical for each 1" horizontal. This information may help you in cutting pieces that fit around the wing saddles. The bipe top wing is straight, or bend it if you prefer, but you will have to work out the details.

The biplane lower wing saddle is installed after the panels are joined and before they are sheeted. The monoplane wing is sheeted before the saddle is installed.

Install control cables or push rods, all blocks and braces, and the wings are almost ready to sheet. At this point, drill vent holes in all the ribs if you failed to do so earlier. Also, drill holes through spar webbing to allow cross venting. Be sure there is no entrapped air anywhere in the wings. Vents must be provided to the atmosphere. The lower wings may be vented through the rear spars under the ailerons. One or two holes will do. The bipe upper wing must be vented through the sheeting. Install a couple of brass grommets under the center section. Changes in temperature can pop or loosen sheeting unless it is vented.

If you are building the tapered tip version, it will be necessary to fair the tips before covering. Bend a piece of 1/16" sheet over the tip and note the high spots. Sand them off with a long sanding block. Remove only enough material to allow the sheeting to seat properly and form a smooth contour. The laminated tips will be triangular in cross-section near the trailing edge when properly faired.

It is most important that the wings be jigged during the sheeting process. It will be impossible to completely remove warps and twists after the sheeting is glued in place. But on the other hand, a properly sheeted wing will be highly warp resistant.

Wing jigs need not be complicated. A very simple jig can be made by lightly nailing a straight strip along the edge of a piece of 3/4" plywood. The strip should extend above the plywood 3/4 inch for the biplane wings and one inch for the monoplane wings and should be beveled to fit the trailing edge of the wings when placed upon them. The whole works should be carefully checked for trueness. Be careful to keep the trailing edge of the bipe upper wing straight, as any warp or curve will be very apparent.

Trike-geared version of biplane. Building the Mono-Bi takes only half as long as deciding on which configuration!

It was stated earlier that the sheeted tapered tips are not particularly hard to make. Start all sheeting at the center of the front spar. True each sheet before it is applied. All joints must fall over spars even if two sheets must be glued together and trimmed before they are applied. Use Titebond glue throughout, but don't smear it around. Dope will not stick to it as well as wood. The first sheet is roughly trimmed to length and shape at the tip. Wet about six inches of the tip end with water. Apply glue to area to be covered. Securely pin sheet to spar and leading edge from the first inside rib out to the last full length rib. Work the leading edge of the tip down first using straight pins and clothes pins. Proceed around the tip. Notice that the back of the sheet has extended itself to behind the spar at the tip. Trim the excess back to the center of the spar. If glue dries during this process, add more glue and pin down securely. The second sheet may require a little trimming at the rear spar. The clothes pins will leave rather deep indentations in the wet sheeting but they are easily filled.

Since the biplane top wing is straight, cross joints in the sheeting should be staggered. That is, they should not all occur at the center and no two should be in line.

The club tips are soft balsa block in case you have been discouraged by the description of the tapered tips. The tip plates are not detailed because I detest them. I only mention them because Ed Thompson likes them. If you want details on tip plates, write to Ed.

Wing saddles and building sequence are on the plans.

Fuselage

Start by building the fuselage crutch over the plan. Be sure cross members are vertical or square to the board. The plywood servo deck is assembled as part of the crutch. While the crutch is pinned down you may want to install a temporary diagonal brace across the front bay to insure alignment when the sides are pulled in.

The fuse sides must be straight. As you will note, the edges of the main sides are the reference lines for all of the horizontal surfaces. This is where the long straight edge comes into play.

The ship has a tendency to be tail heavy, so don't select cast iron for the sides. In fact, 3/32" sheet would be adequate for the sides if not overly sanded. Add the bottom pieces to bring the sides to full shape and add the doubler. With a ball point pen and tri-square, lay out the position of all the bulkheads and wing hold downs on the inside of the fuse sides. (I trust you have one right hand and one left hand side.) Lay out lines full length of the sides 1/8" below the top edges. This locates the top edge of the crutch. When the crutch and sides are mated, this layout work will pay off. The control cable locations are spotted on the bulkheads. Drill holes before bulkheads are in place. Be sure bulkheads are placed on the proper side of the crutch cross members and are square with the crutch. From here on, follow the plans and do what comes naturally.

(Continued on Page 21)

MONO-BI

(Continued from Page 20)

A word of caution about the tank compartment deck. It is designed as a structural member to distribute the load placed on the firewall to the whole fuselage. It should be installed exactly as specified or better. In addition, at least one layer of fiberglass should be wrapped around the outside of the firewall and extended back onto the sides and top and bottom blocks. Shape and finish the fiberglass before the fuel hatch is made.

Covering the turtle back and hatches with sheet balsa may pose some problems if you are not careful. Let's run through the sequence and be sure. We have several hatches to make and all must match.

Sight the bulkheads behind the cockpit and remove any high spots. Cut two pieces of 3/32" x 3" medium soft sheet about 14½" long. Thoroughly wet one side of one piece with water. With the wet side out, place one edge along top edge of the fuse side. Piece should extend from F3 to F6. Pin securely to fuse side and slowly bend over formers. Mark along the approximate center line of the fuse and cut in place using a straight edge. Pin down. Repeat other side except don't trim at center line. Let dry thoroughly and remove. (I hope you didn't glue them.) Glue first piece and pin. Align the second piece, mark and cut to fit against the first and glue in place. The reason the sheeting is not glued while wet is to allow for shrinkage as it dries. Shrinkage causes scallopping. Use the same technique to cover the area between F2 and H6 on the fuse.

Make all the cockpit hatches now you intend to make. Make as many hatch bases per plans as needed. Drill the biplane base for blind nuts using 1/8" drill and place in position on fuselage. Match drill servo deck with hatch base. Place remaining hatch bases one at a time on fuse; carefully align and match drill with servo deck. Just to be sure, drop a 4-40 screw into each hole just after you drill it. Enlarge holes in hatch bases and install blind nuts. If you are careful you won't have trouble with misaligned screws and blind nuts. Now is the time to make them fit — before they are covered. Place a hatch base on the fuse over a piece of Saran Wrap and bolt down. Glue all formers in place. Leave about 1/32" clearance at ends. When dry, carefully cut covering sheets and follow technique used on turtle back up to the point of final gluing. Remove the base, replace the Saran Wrap with a new piece and proceed as above. Remember the pin holes in the first piece of Saran? Should glue find its way through an empty hole (and it would) the hatch would become a permanent part of the fuse. Take all subsequent hatches through this point before sanding any of them.

The fuel compartment hatch is made similarly to the cockpit hatches. After all are complete, the fuse is sanded to shape. Be careful — you can thin out 3/32" sheet before you know it. If all the humps and bumps were removed before covering was applied, you are in good shape. If not, you have some thin spots. The rest of the fuse is easy — just follow the plans.

Cabane Struts

The cabane struts are bent from details on Sheet 2 and the side view on Sheet 1. Be careful to maintain the difference in length as shown on the plans and be sure the long one is behind the short one. If you want to lower the upper wing, shorten both struts by the same amount — and figure out a new diagonal strut.

The struts are assembled in place on the hatch base. It is better to do this before the hatch is completed as damage to the hatch may result and more room is available to bind the lower joints. The joints and the copper binding wire should be thoroughly cleaned before assembly. When soldering use plenty of flux (paste, not acid) and heat. Apply heat to the joint — not the solder. Don't use the little thirty watt pencil you used to assemble your Digitrio. A big gun works well here. Final alignment is accomplished by assembling both wings and fuselage. Sight trailing edges of both wings. They are not in line are they? By applying heat to one of the cabane joints and corrective pressure to the wings they can be aligned. Chances are that one or two of your joints did not come out where you wanted them anyway. By analyzing the situation, you can probably correct at least one misplaced joint while aligning the wings. Be sure to allow plenty of time for the solder to cool before you relax the pressure or even breathe. If the joints moves even the slightest amount while cooling, it will crystallize and fail.

While we are soldering, why not solder the wheels on? Soldered washers, in my opinion, are far superior to wheel collars. That is, if they are properly installed. The secret lies in cleaning the washer and axle until they shine and roughing up the axle with a file so the solder can bite. Tie a string around the axle between the wheel and the washer. This keeps paste out of the wheel bearing and provides the necessary clearance. All soldering is done with the axle vertical. Apply enough solder to cover the end of the axle and form a hemisphere the size of the washer. Looks neat and they will not loosen and come off.

Cowl

The fiberglass cowl is made over a male balsa mold. Scrap block and rough sheet are struck together to form a hollow block. After it is carved to rough shape, it is tack-glued to the firewall and sanded to final shape against the fuselage. It is then removed and extended with ¼" sheet on the back to provide overlap onto the fuselage. Glue a handle to the back sheet. Forms for the side vents are cut from ¼" sheet and glued in place. Position will be determined by your engine. The block is then cut in pieces in such a manner as to permit removal of the pieces when completely surrounded by fiberglass. Think about that for a moment and you will see that the pieces must be cut so that they will strip inward. This can be done so that all the pieces may be salvaged and re-used if necessary. Stick all the pieces back together with hot parafin and heavily coat the entire form. Excess parafin can be scraped off with a knife when cool.

Mix and apply a coat of resin followed by layers of fiberglass. I like to work with pieces of glass about three by four inches. All areas are covered with two or three layers of glass and thoroughly saturated with resin. It is allowed to set. When hard, work down with a wood rasp and apply second coat of glass and resin. The area around the spinner should be quite thick. You probably didn't cut enough right and down thrust into the block and it will have to come out of the cowl.

The whole mess is worked down again with a rasp and sanded smooth. The material should appear to be between 1/32" and 1/16" thick. Check by drilling a hole where a cutout will be made. If it isn't thick enough, have another go at it. Usually though, enough material can be applied in two coats. If it's too thick, work it off.

Complete as much finish work as you can while it is still on the mold. When completed, remove mold by running hot water over the outside. Save the pieces — you may need them. You may want to use a female mold. If you are more familiar with them, then that's the method to use.

The exhaust stack is definitely worthwhile if you have the equipment to silver solder or braze the flange to the stack. If not, consider having it done. The stack should be extended to within about 1/16" of the engine exhaust port.

Nose Gear

The BK nose gear was selected for the prototype because it detaches readily. The control arm is placed at the top of the bracket and the spacer collar at the bottom. It is removed by loosening the screw on the control arm and allowing the gear to drop out. A dummy was made from a piece of 5/32" wire about 2¼" long with a washer soldered on one end. It is substituted for the nose gear to keep the control cable in place.

Finish

Select your own finish — just keep it light. The original Mono-Bi has a medium gloss butyrate finish that looks nice and is fairly heavy. The entire model was sheeted and covered with lightweight Silkspan. The purpose the Silkspan serves is still somewhat of a mystery and I doubt that it will be used again on any of my models. Two interesting articles containing finishing methods appeared in the July issue of R.C.M. Unless you are expert in this field, I suggest you read them. See pages 62 and 68.

Fillets add a lot to the appearance of a model and Mono-Bi was made for fillets. Most of the fillets are made from soft 1/16" x ½" deeply beveled along both edges. See plans. A razor plane bevels the strips quite easily. They are wet with water and applied wet with Titebond glue. A short length of ½" dowel is used to press them in place. Very short lengths are applied around the leading edges of the wings. When dry, fill gaps and openings with Supermold and sand with a sandpaper-covered ½" dowel.

If you are installing Digitrio or other end output servos, one must be converted to top output in order to fit in the aileron servo well. This can be troublesome unless you like to make small metal parts. The plastic case World Engines is marketing solves this problem very nicely as far as space is concerned. I don't know how they work because they were introduced after I had made a bunch of small metal parts. They look good, though. (The plastic cases, that is.) Another answer may be the Throttle-Eze Rocket City Specialties recently introduced. This looks particularly good for reaching around the radio box for the throttle and nose wheel control cables.

Final Assembly

The radio box is a direct steal from the Cherokee. Use it if you like. If not, provide means of access to the forward cockpit hatch screws. You will use them often so don't cover them up. Be careful about routing the throttle and nose wheel control cables over them. Carefully locate the power switch and charging jack away from the hatch screws and on the side opposite the exhaust stack. Remember, inverted engines exhaust on the side opposite upright engines. (I didn't remember.)

Assemble the airplane in the monoplane form without the cockpit hatch. All of the equipment should be in place with the exception of the throttle, rudder, and elevator servos. Control cables or push rods should be in and cut to rough length. Mark the balance point on the fuselage sides. Position the three remaining servos on top of the servo deck. Check balance. Adjust the position of the servos until the proper balance and desired arrangement are obtained. Install servos on the proper side of the plywood deck in about the same position and your ship should be balanced and ready to fly.

Changing configuration doesn't change the balance point enough to notice. A study of the weights, forces and moments show why this is true.

If flexible control cables were your choice, be sure that both ends of all nylon tubes are securely anchored. Rudder and elevator tubes must be supported by a cross member behind the servos. Throttle and nose wheel tubes may be bracketed to the fuse sides. Cut all tubes short enough to allow full cable movement, but no more. In other words, leave them as long as possible. Provide support as close to the end of the tubes as possible. Epoxy tubes to supports at ends. Rough up tubing with a knife to provide a surface epoxy can bite. If tubes can move or slip, controls will be soft — very soft.

Flying

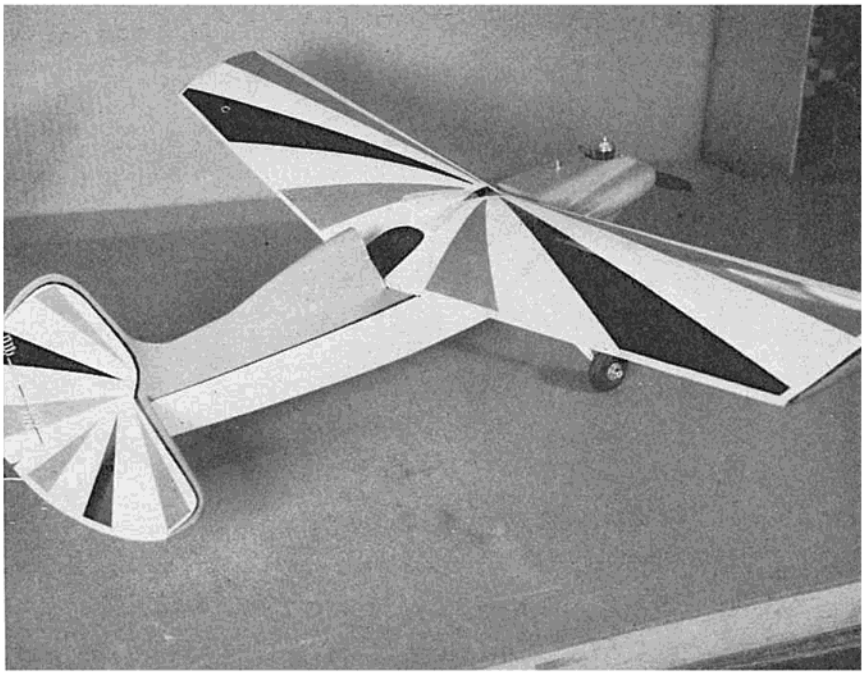
With the ship properly balanced and everything working smoothly, you have nothing to worry about. Whether you fly the monoplane or the biplane first makes little difference. Linkage should be in outer holes on all surfaces and everything trimmed neutral. Take-offs on conventional gear are easy provided you have plenty of room upwind. Just let her weathercock and seek her own heading. She will lift off quickly but gently. Gain altitude and make your first turn gently.

She is all yours.

Owen Kampen's

SKAMPY

25" span rudder-only for the Adams "baby" magnetic actuator. An RCM Shop & Field full size plans presentation.



THIS article follows closely the Shop & Field bits on balsa selection, use of tools, etc. Here's a chance to put some of that knowledge to work.

A model design can come into existence for a variety of reasons and a variety of purposes. SKAMPY would not have been born at all but for a late at night phone call from Dick Adams announcing the birth of a new "BABY." It took a while to penetrate my sleep-fogged mind, but it soon became clear he was talking about a new actuator and not an addition to the Adams family, a healthy happy group of nine, not including the dog, assorted guppies, and guinea pigs. As the excited father became more coherent the specifications took on meaning. The 9/16 ounce BABY actuator now made possible a complete 2.4 volt system, weighing under 3 ounces and it became clear that this exciting new product would open the doors to a new concept in small R/C airplanes.

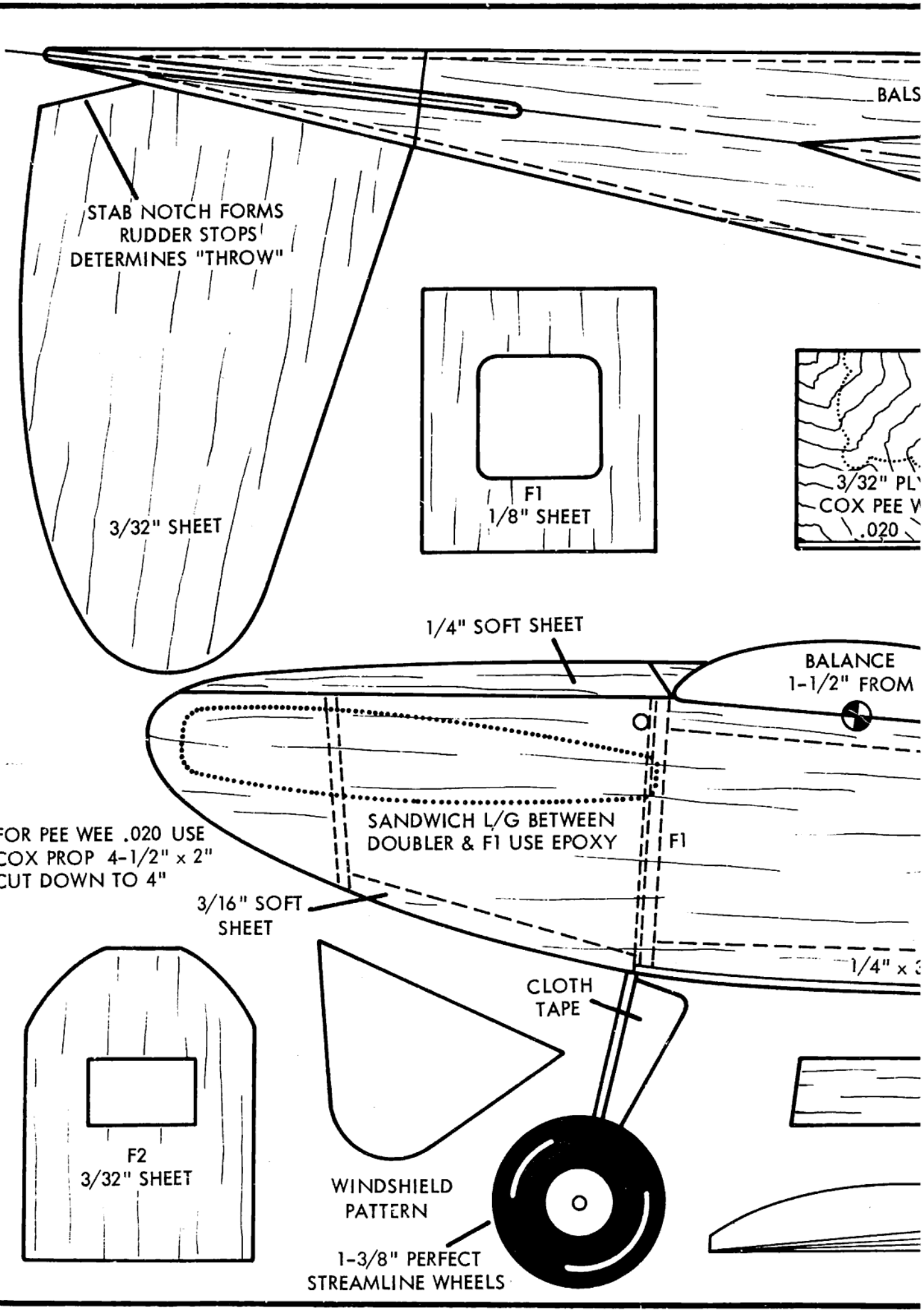
Next day the drawing board was cleared for action as this challenge was too much to resist. The goal was to be an easy-to-build, stable, and responsive 8 ounce R/C model having the look and feel of a full scale sport plane. In the years past, several small designs had made brief appearances as novelties and, as a group, could be characterized as just that. In the air they tended to be nervous and twitchy and impossible to control by all but the most experienced hands. Under these conditions, the novelty wore off fast. Hopefully, Skampy was to be different; a plane that would be easy to fly yet hold enough challenge to maintain more than passing interest. Now with the BABY, true proportional control was available which would smooth out the gentle maneuvers and still give full solid rudder reaction when desired.

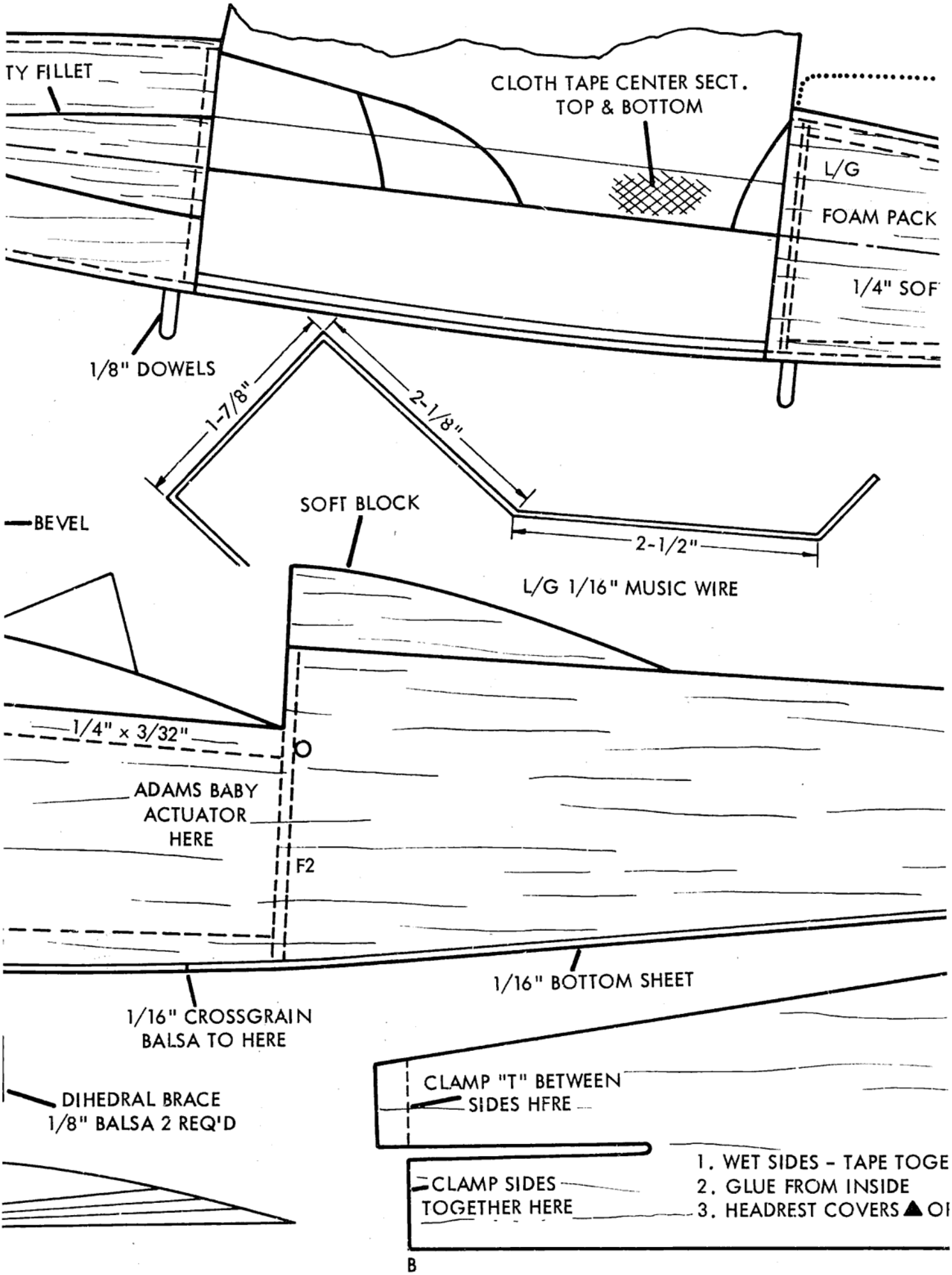
Construction was begun almost immediately and completed not many hours later. The whole experience was a reminder of younger days and rubber motored free flighters.

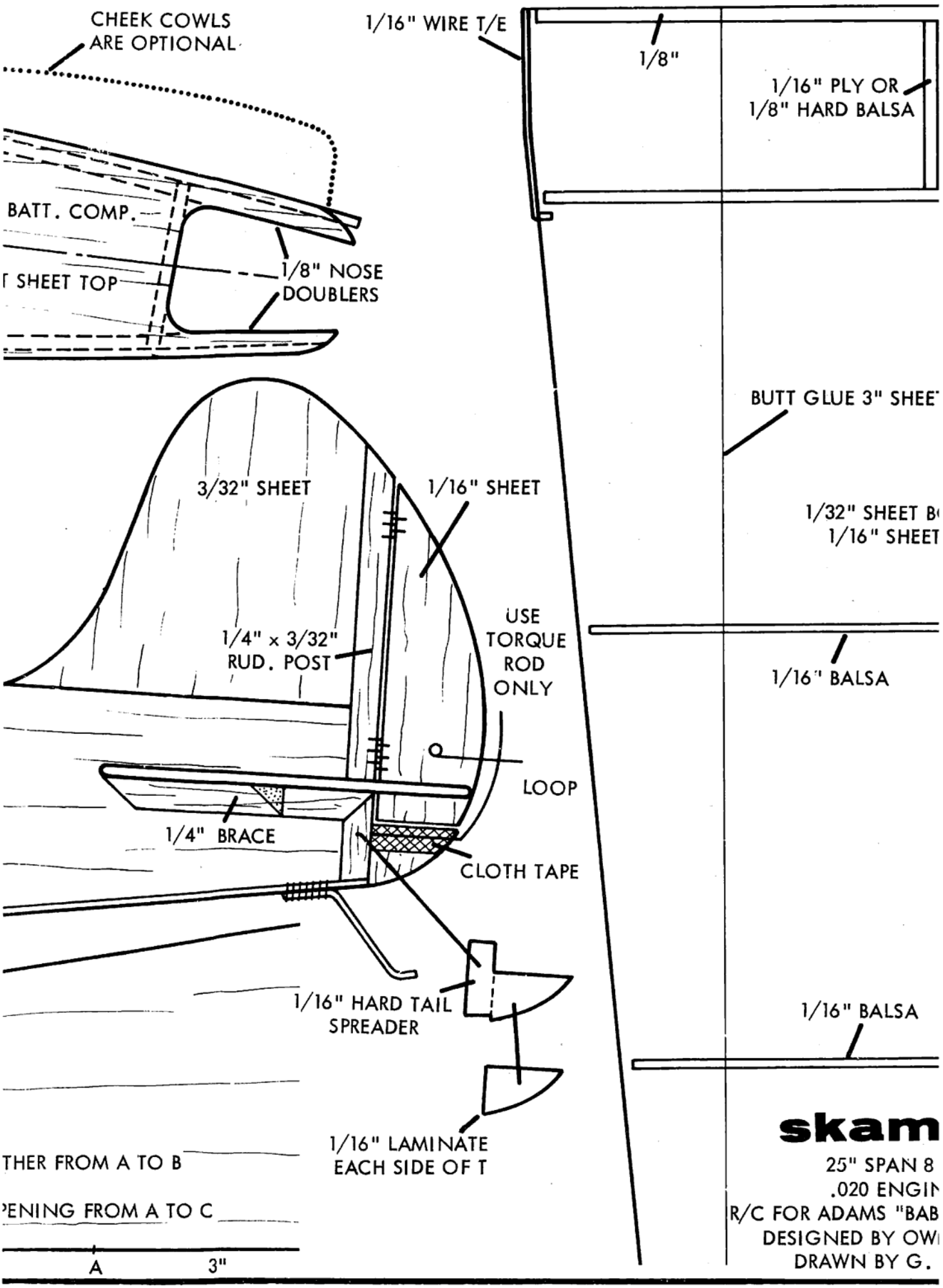
Finally as I looked at the perky little job sitting proudly on the work bench an unnerving thought occurred. For years, this designer has cringed when well meaning friends have referred to a small plane as "cute." But damn it — this one **was!** Work had proceeded so rapidly that I was ready to go days before a hand-tooled prototype actuator became available. At last Dick drove to Madison from Janesville with Baby number 4, and we were ready to go.

The new Adams actuator, sporting black and red high impact plastic molded coil headers and bearing plate, the metal shoe carefully nickel plated and the magnetic heart of the unit (a specially manufactured rotor of Alnico 8), all added together gave it the appearance of a little jewel. This was the end product of over 15 years of continued experimentation and refinement.

In this age of highly exotic components the fundamental simplicity of the patented Adams magnetic actuator has been overlooked by many, but the fact remains that with it's one moving part and rugged construction, it is nearly indestructible and good for years of use. It is not generally known, but Testors came to the same conclusions when they chose the Adams Actuator as the driving unit for thousands of


BALS
STAB NOTCH FORMS
RUDDER STOPS
DETERMINES "THROW"
3/32" SHEET
F1
1/8" SHEET
3/32" PL
COX PEE W
.020
1/4" SOFT SHEET
BALANCE
1-1/2" FROM
SANDWICH L/G BETWEEN
DOUBLER & F1 USE EPOXY
F1
FOR PEE WEE .020 USE
COX PROP 4-1/2" x 2"
CUT DOWN TO 4"
3/16" SOFT
SHEET
1/4" x
CLOTH
TAPE
F2
3/32" SHEET
WINDSHIELD
PATTERN
1-3/8" PERFECT
STREAMLINE WHEELS


TY FILLET
CLOTH TAPE CENTER SECT.
TOP & BOTTOM
L/G
FOAM PACK
1/4" SOF
1/8" DOWELS
1-7/8"
2-1/8"
SOFT BLOCK
BEVEL
2-1/2"
L/G 1/16" MUSIC WIRE
1/4" x 3/32"
ADAMS BABY
ACTUATOR
HERE
F2
1/16" BOTTOM SHEET
1/16" CROSSGRAIN
BALSA TO HERE
CLAMP "T" BETWEEN
SIDES HERE
DIHEDRAL BRACE
1/8" BALSA 2 REQ'D
CLAMP SIDES
TOGETHER HERE
1. WET SIDES - TAPE TOGE
2. GLUE FROM INSIDE
3. HEADREST COVERS ▲ OI


CHEEK COWLS
ARE OPTIONAL
BATT. COMP.
SHEET TOP
1/8" NOSE
DOUBLERS
3/32" SHEET
1/16" SHEET
1/4" x 3/32"
RUD. POST
USE
TORQUE
ROD
ONLY
LOOP
1/4" BRACE
CLOTH TAPE
1/16" HARD TAIL
SPREADER
1/16" LAMINATE
EACH SIDE OF T
1/16" WIRE T/E
1/8"
1/16" PLY OR
1/8" HARD BALSA
BUTT GLUE 3" SHEE
1/32" SHEET B
1/16" SHEET
1/16" BALSA
1/16" BALSA
THER FROM A TO B
ENING FROM A TO C
A
3"
skam
25" SPAN 8
.020 ENGI
R/C FOR ADAMS "BAB
DESIGNED BY OW
DRAWN BY G.

R/C EQUIPMENT
1. TESTORS 2.4V SUPERHET RCVR.
2. 2 BUTTON CELLS
(NICKEL CADMIUM)
3. ADAMS 2.4V BABY ACTUATOR
NOTE: LET ANTENNA TRAIL BEHIND
FROM TAIL SKID

C

COVER LEADING EDGE WITH 3/4" VINYL TAPE AFTER DOPING IS COMPLETE

BEVELED
1/8" SQ. L/E

1/8" DOWEL L/E
RECOMMENDED

SIDE PATTERN
1/16" SHEET

RIGHT DOUB.

3/32" SHEET

LEFT DOUB.

1/8" DOWEL OR
1/8" SQ. HARD BALSA

ALTERNATE
CURVED
SPADE TIP

SOFT BLOCK
TIP

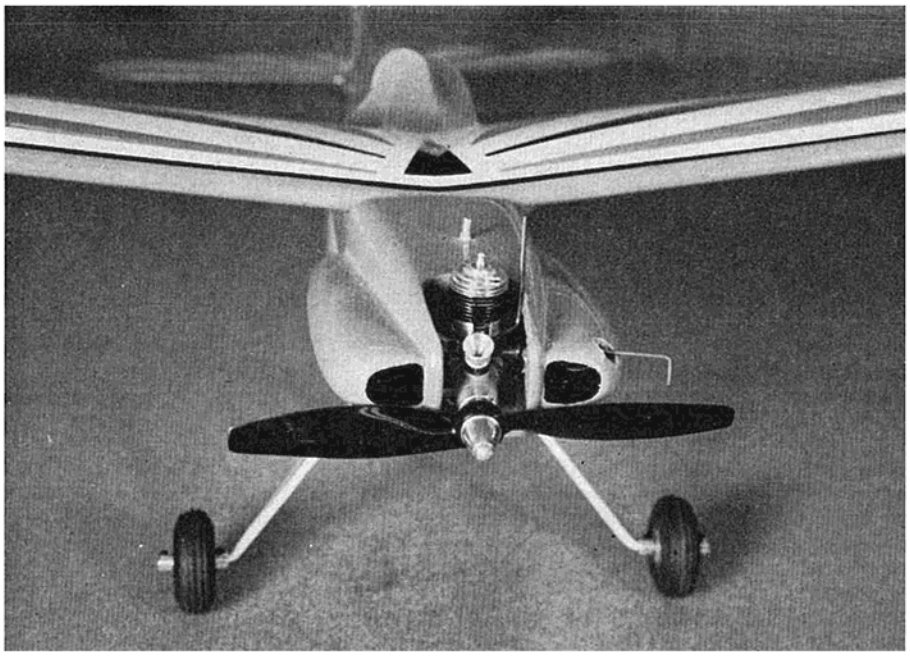
2-1/2"

1/16" BALSA

2-3/4"
BLOCK TIP

CTUATOR
AMPEN
ES

TOTAL DIHEDRAL MEASURED AT OUTER RIB



ready-to-fly Skyhawks. Reliability and simplicity were the critical factors in their decision, and time has proved it to be sound.

The BABY was installed in a matter of minutes, and what a surprise to see and hear the rudder bang against the stops. No butterfly power here! The little one not only looked pretty, it had muscle!

The first flights were soon underway at the local high school athletic field, and several things became immediately apparent. Most of the design goals had been met. The SKAMPY was stable and responsive but the Cox .010 engine couldn't lift SKAMPY much higher than 10 feet. It was a real strange feeling to be flying so slowly and lowly. With a change to a Cox .020 Pee Wee things began to happen. Nice climb out, excellent response, loops — rolls, the whole rudder only routine. It looked like this one was indeed more than a teeny-flopper novelty!

What was going to be a couple of test flights soon turned into a whole evening of flying. This was fun on limited funds and a cup of fuel. Two nights later, flying out of Dick's back yard, we achieved the dubious honor of being shot down full bore from 150 feet by, of all things, lightning. Ask your technical friends about this! In any event, something else became immediately clear, SKAMPY could take it. Having hit head-on a conveniently located concrete road, the total damage amounted to a broken firewall. Concrete dust had to be filed from the prop screw before it could be removed, but the airplane was intact. Wow!

Repairs were made and I lost SKAMPY to Adams who flew it in demonstrations at contests in Chicago and Minneapolis. Grab this if you can, but even the big proportional plane drivers wanted to try this one, and all were amazed at its performance and control! None of them would normally be caught dead with a ½A rudder only plane but SKAMPY apparently had broken the small plane barrier.

Since it soon became obvious that Adams wasn't going to give me back my cute airplane — if I wanted to fly I'd have to build another, so I did.

SKAMPY 2 had some new features and a liability. The stabilizer span was increased slightly and wing tips rounded. An .020 T.D. was mounted up front, but to open up a range of performance from putt-putt to screamer, the .020 was equipped with a Carl Vogt exhaust restrictor.

These were first used with great success in the O.K. 202 twin engined model which appeared in M.A.N. about three years ago. They don't look like much but they sure do work! SKAMPY could now be flown at head height at a dog trot speed or opened up to the white knuckle stage. As of yet I've not dared try it much more than 1/16" open and this gives a 200' altitude in very quick order. Howard McIntee has described these restrictors in considerable detail in A.M. They are not adjustable in the air. The manual speed control unit is available from Carl for $2 and a note to 4210 Dempsy Road, Madison, Wis. 53716.

The next move was to eliminate the plastic Cox tank, replace it with the spare plastic back plate and add a thin brass shimstock tank 7/8" diameter by 1 1/8" long. Now SKAMPY had about an eight minute engine run and at last I could get even with the ten gallon multi jobs. There's an old engineering law, however, which goes something like: "You don't never get something for nothing" and I soon relearned it. Weight was now at a ridiculous 10+ ounces giving a wing loading of about 15 ounces per square foot and while this is quite acceptable for most ½A jobs, scale effect took effect, and when the engine quit, SKAMPY came down like a lifting body research vehicle.

Some added wing area has since solved this but be forewarned, **there are practical limits on this model and they must be respected.** Simply said it means BUILD LIGHT and this in turn means **contest weight** balsa throughout. Midwest Micro-Cut is as good as you can get. If while bending balsa at your local hobby emporium, you discover that the light weight stuff is all gone or has been splintered by some heavy handed squeezer, I'd suggest going down a size in wood. Wing, 1/32" top and bottom and 1/16" for the tail surfaces. F1 can be a harder 3/32" piece and the headrest hollowed. An all up weight of 8-8½ ounces is the goal to shoot for and this means the airframe, engine and wheels should total 4-5 ounces.

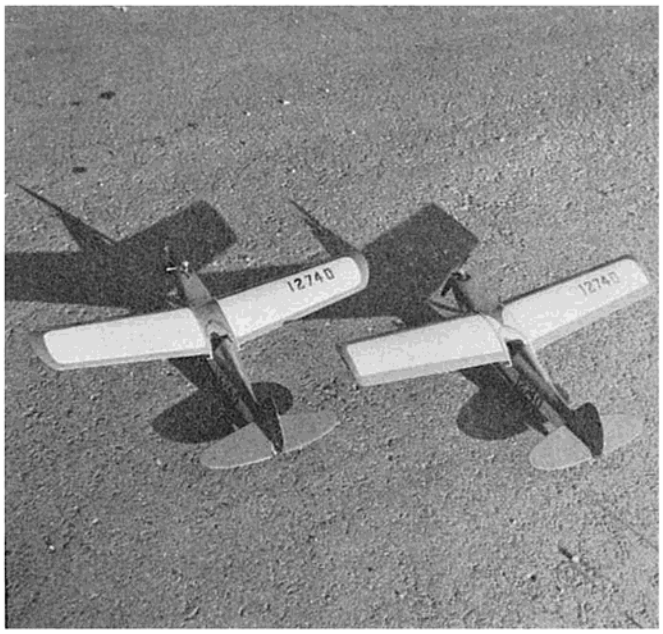
For general sport flying I'd recommend using the Cox Pee Wee for convenience and low cost. If you've built and flown a Whiz Kid this should be a natural for you. And you old pros, if your super deluxe 19 channel proportional rig is tied up at the cleaners you can build and fly SKAMPY while your exotic stuff is still in the mail. Gee, Gang, at these prices what can you lose?

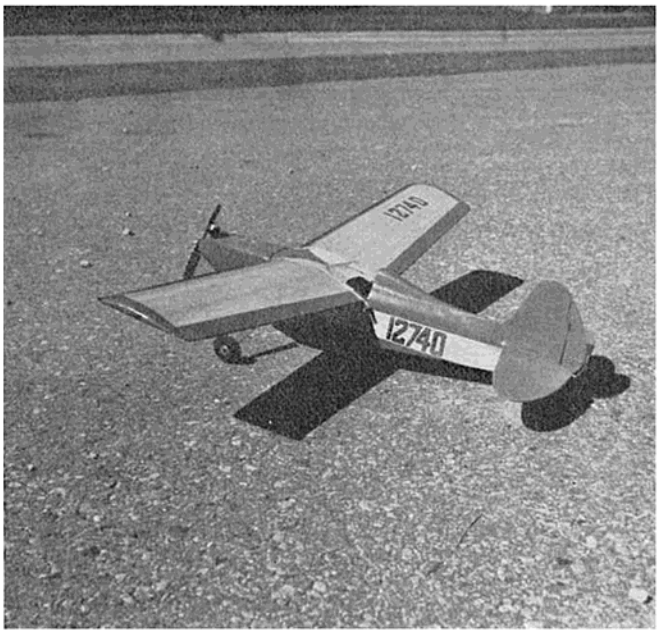
Following are some construction notes, and I urge you to give a look, as some time saving hints are tucked away here and there regarding the ancient are of balsa bending. In case you're interested, bent balsa is stronger than a straight or flat section. When you see SKAMPY still intact after cartwheeling for 20 feet you'll understand what I mean.

CONSTRUCTION:

FUSELAGE: Wood selection should be light weight and straight grained balsa. Both sides can be cut from a single sheet of 1/16" insuring equal bendability.

1. Locate the nose doublers carefully and contact cement in place making sure there is a LEFT and a RIGHT side. Be sure to allow room for the landing gear wire.
2. Formers F1 and F2 are next and the sides joined at these stations. Let dry thoroughly.
3. Next come the 3/32" sheet braces between the two formers.
4. Glue and clamp the tail together keeping sides lined up. Don't forget the spacer T in the lower part.
5. Now moisten the upper half of the rear fuse on the OUTSIDE and both sides will start to bend in. Measure 3" back from the cockpit and using masking tape around the fuse, close the sides together and glue with white glue from the inside. This will leave a small triangular opening which will be covered later by the headrest.
6. Install blind nuts to fit the engine of your choice and epoxy the firewall and landing gear in place.
7. Glue the nose bottom in place and tack glue the top nose in position and add nose doublers.
8. Finish covering the cross grain fuselage bottom just short of F2.
9. Do some sanding and shaping to round off the nose and using a block, sand the rear deck opening flat to take the carved headrest.
10. Add the rudder post and laminations on each side of T at the tail bottom.
11. Glue fin in place being careful to keep alignment straight. NOTE: The fin and stab should be light but fairly stiff c-grain or quarter cut balsa to prevent warps. This can be identified by its scaly or flecked appearance. This cut is also good for wing ribs. Careful, here, as this wood cracks easily.
12. Glue the stab in place and add the 1/4" triangular braces where it meets the fuse.
13. Line the nose with styrofoam leaving room for batteries. If you've built your own tank it should be in by now. Reglue the nose top firmly in place and give everything a couple of coats of clear dope to seal the wood.





14. Glue the tail skid in place and add the sheet balsa fairings to the landing gear if desired. **Caution:** make sure these are taped and glued tightly in place as they have an effect on the aerodynamic trim of the plane — particularly if they are out of line. They act like little rudders or drag brakes. NOTE: Do not attach rudder until all doping is completed.
15. Actuator installation comes next and then the bottom of the fuselage can be closed in.

(SEE ADAMS INSTALLATION INSTRUCTIONS)

WING CONSTRUCTION:

A couple of tips here; do the sanding of the balsa sheets BEFORE starting assembly. This eliminates the ridges and thickness variations resulting from sanding over ribs.

1. While 3" sheet can be used, 4" will make the job easier. Use a steel ruler and trim the sheet edges absolutely straight then butt glue together to make a sheet 4½" wide. Ken Willard's method of using a strip of masking tape as a hinge which can be opened to allow glue to be beaded along the edges and then closed to dry, makes this easy. A thin tipped glue gun is also a big help.
2. Cut the bottom tapered panels to size and pin over waxed paper to an absolutely flat board. Use a ball point pen to locate the ribs. Build wing in halves.
3. The use of ⅛" dowels for the leading edges really saves bruises and is strongly recommended. Line them up flush with the leading edge of the bottom sheet and white glue in place.
4. Add ribs and dihedral braces and let dry.
5. Cut the top sheeting about 3/16" oversize and now follow closely. Using 1" masking tape, run a full span strip under the bottom leading edge with a little over half the width showing sticky side up. Carefully position the top sheet in place snug against the dowel. Then wrap the exposed tape around the leading edge and over the top of the wing. A couple of tries may be necessary to get the right position. Now open up the works and apply glue to the ribs, trailing edge, etc. The masking tape acts as a hinge and all will fall back nicely in place. Use weights and pins to hold down while drying, preferably overnight.
6. The wing tips are added and the two halves butt glued together making sure the dihedral is correct. When dry, cloth tape is applied with a coat of glue over the top and bottom of the wing joint.
7. Cloth tape or 1/32" wire can be used at the trailing edge as protection from the rubber bands.

FINISHING:

Be a weight watcher here. 2 coats of clear, one coat of color trim (let the natural balsa show where not trimmed) and finish with 2 thinned down coats of clear.

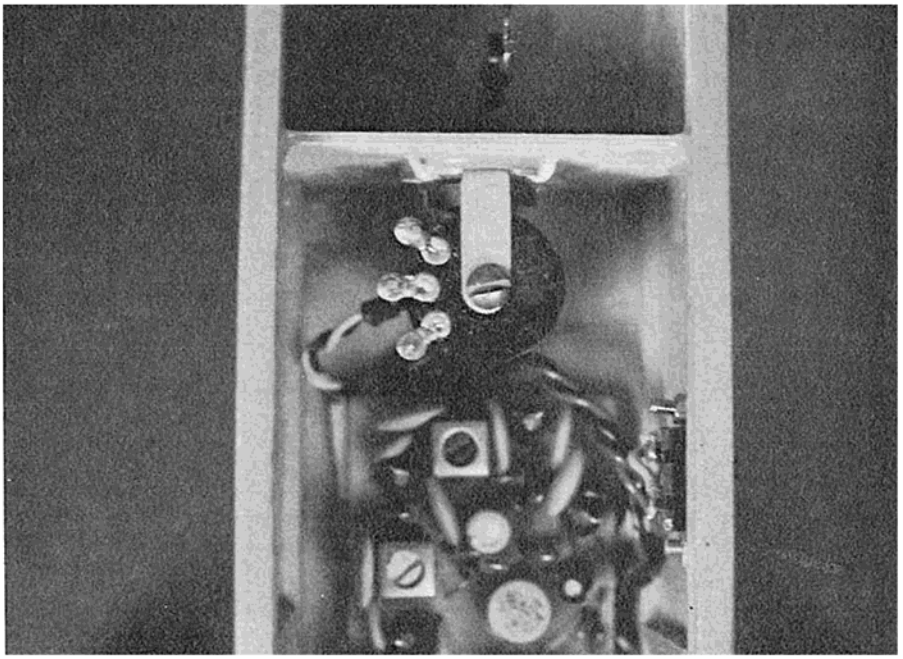
FLYING AND TRIM:

The wing incidence and engine offset angles represent average settings. Depending on engine, engine speed and weight, some adjustments may be necessary. More down thrust for the hot ones, more incidence for the heavy. If, in spite of warnings, you end up in the 10 ounce bracket don't give up. SKAMPY will handle fine under power but the glide won't be anything to cheer about. Don't despair however as this can be improved by cutting the wing in half and adding a 2" center section to bring the wing loading back down.

You'll find the SKAMPY very responsive to rudder and if this turns out to be more than is comfortable, then cut down the rudder throw by closing the gap in the stab by 1/16" to ⅛" each side. The plane will fly well at a wide variety of speeds and you can choose to suit yourself.

Have a ball and yet us know if you want more small ones.

Close-up of Adam's actuator installed in "Skampy."



INTEGRATION
WITHOUT PROCRASTINATION

R/C design considerations for integrated circuits.

By John A. Hinchey

Part II

NAND GATES

THE term Nand is a nomer being the combination of **Not** **and** it represents the following circuit responses.

The output from a nand gate is at the zero level only when **all** of the inputs are 1; conversely, the output is 1 only when **one** or **more** of the inputs are O. Descriptively, this is;

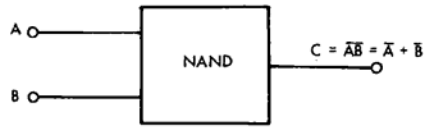


FIGURE 14

and the positive logic truth table is;

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

TABLE 2

It is to be noted that while clock pulses are permissable inputs they are not necessary and hence this type network is considered digital only because the inputs are admitted as binary (that is, all inputs below a certain voltage level are taken as zeros and all inputs above this threshold potential are ones).

CW NAND GATES

The CW stands for clockwise motor rotation, i.e., these gates detect and initiate correction whenever CW rotation is needed. The general response is a 0 level output pulse when the individual feedback reference generator's pulse width is **longer** than the corresponding incoming channel pulse width. For example, channel #1 has a pulse width characterised by AB. The #1 feedback generator pulse width designated by S_1. The waveforms are (remember that S_1 is triggered as A goes positive thus A and S_1 have simultaneous leading edges):

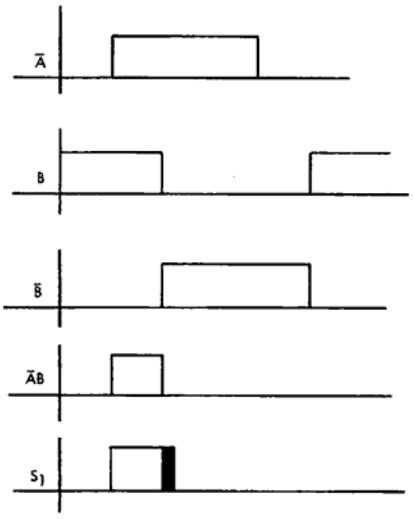


FIGURE 15

What is needed is circuitry to determine the shaded area of the S_1 pulse waveform; this is the error pulse. Referring to the diagrams it is clear that only B and S_1 need be considered in this determination. This is true because S_1 can be longer than the desired or incoming pulse only if B goes positive before S_1 goes negative since as was explained above the leading edge of S_1 is coincident with A. Thus the following circuit suffices to signal the correction circuity (which will be described subsequently) whenever the S_1 pulse is longer than commanded.

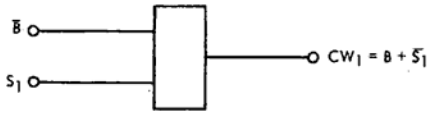


FIGURE 16

Thus, graphically;

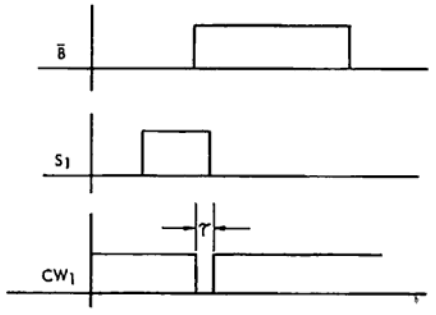


FIGURE 17

For time interval all inputs (B & S_1) are positive thus CW_1 becomes zero for this time only and the output is seen to be identical to B + S_1 (read B **or** S_1). After CW is inverted the desired waveshapes are available; positive pulses to activate the correction circuity. The integrated circuit used here is the SN7331 triple three input Nand gate (these are what make an integrated three channel system so attractive) with schematic depicted in Figure 18.

The inverted clock pulse input line to 14 , 10 , & 8 is to provide deadspace and prevent chatter. It is a negative pulse which prevents the gates from assuming the zero level for the duration of the clock pulse time interval which is approximately 200ms. **Tech Editor's Note:** This would seem an excessive deadband and could possibly be reduced by differentiating the clock pulse to provide less inhibitation of the gates.

CCW NAND's

These logic blocks decide when the Sn pulses are **shorter** than desired. The hardware is identical to the CW devices being one SN7331 per three channels of operation. The algebraic formulation is:

$$CCW_1 = S_1AB$$

This yields a zero level when S_1 is shorter than AB (channel #1) as in the following diagrams.

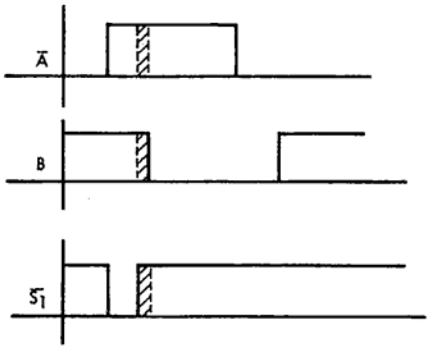


FIGURE 19

The cross-hatched area represents the time interval wherein the proper conditions are met for a CCW motor correction. The block diagram is:

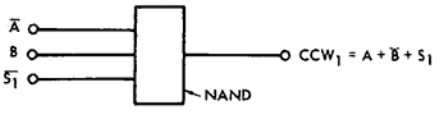


FIGURE 20

and the actual hookup is;

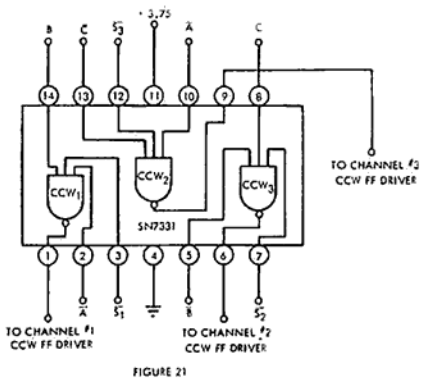


FIGURE 21

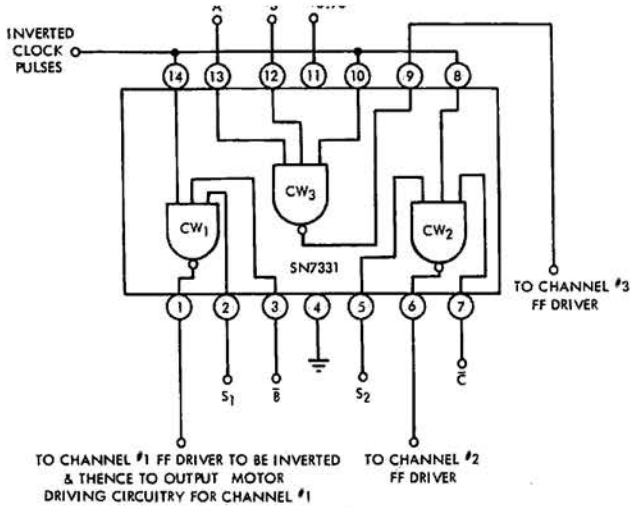


FIGURE 18

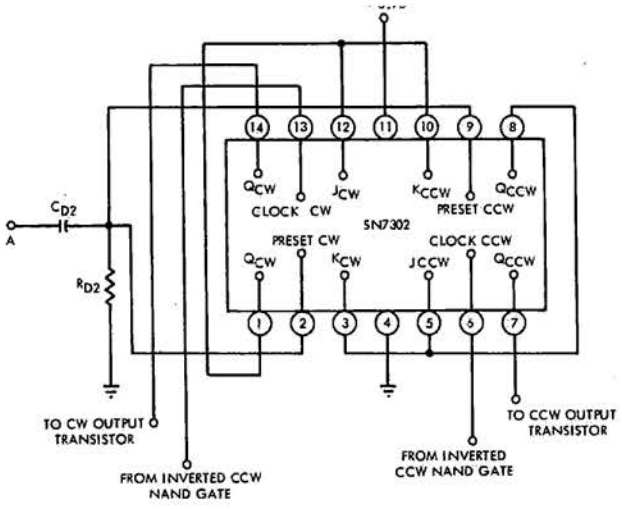


FIGURE 23

There is no need to add deadspace here as the appropriate interval has been incorporated in the CW stages.

FLIP-FLOP DRIVER NETWORKS

We come now to some unique circuitry this paper is offering. Up to now the circuitry described has been devised from converted conventional ideas. To further reduce the size and weight of present multi R/C gear an attempt is made to utilize integrated circuits in the output stages also. Thus, only the receiver components and the output power transistors in this system are discrete. More subtle advantages of off-the-shelf integrated networks will become apparent as the explanation is continued; some rather pleasant surprises were unfolded as the research for this phase progressed.

The basic building block for output operations is the Texas Instruments SN7302 dual Flip-Flop (as in the decoder). Up to this point in the system we have available only signal pulses that specify the reference generators' pulse widths relative to the desired conditions. The problem now is to convert these pulses into smooth motor driving voltages. These requirements themselves suggest the solution. The conventional answer is to provide resistive-capacitive stretching networks to hold a voltage level sensing device (Schmidt trigger) operative. How simple it would be to utilize the two state properties of a flip-flop for this purpose. If this is done turn off pulses must be provided to deactivate the circuitry at proper intervals. This turns out to be a rather trivial restriction as the required logic is fortunately already available. This fact will become obvious as the function of the output FF's is reported.

The SN 7302 is a dual J-K multivibrator package. The J-K designates that not only is it a two state device but it also has certain logical properties of use, and the letters are derived from the last names of its co-inventors. The truth table of Figure 22 contains the essential information;

	t_n		$t_n + 1$
	J	K	Q
ROW 1	0	0	Q_n
ROW 2	0	1	0
ROW 3	1	0	1
ROW 4	1	1	$\bar{Q}_n$

t_N ⇒ time n, a general term for a specific, instant of time prior to the n+1 clock pulse

$t_N + 1$ ⇒ the instant of time immediately after clock pulse n+1 has arrived

J ⇒ the state of the J terminal which can be either at the 0 level or at the 1 level

K ⇒ in a similar manner the state of the K terminal

Q ⇒ the state of the output terminal, i.e., either 0 or 1

It will be of value to examine the preceding truth table row by row. Row 1 states that if J=0 and K=0 prior to the clock pulse then afterwards the output Q will not have changed; that is Q_{N+1} will be identically Qn.

Row 2 states that if J=0 and K=1 before the clock pulse then regardless of what Q was before the clock it will assume the 0 level afterwards. Similarly, Row 3 means that for J=1 and K=0 then $Q_{N+1}=1$. Row 4 is simply the common multivibrator that changes state after each clock pulse. If J=1 and K=1 then the output Qn+1 will be opposite of Qn (more compactly: $Q_{N+1} = Q_N$).

With this as background, the operation Figure 23 will next be defined. This is the actual arrangement used in the system.

Figure 23 is labeled as the channel #1 output FF. A is differentiated by C_{D2} and R_{D2} and applied to both the Preset CW and Preset CCW terminals (pins 2 and 9). This clears both FF's by setting QCW and QCCW to the 1 level. Note, that under these conditions JCW = QCW = 1 and JCCW = QCCW = 1. Also, KCW = QCCW = 1 and KCCW = QCW = 1. These are the conditions of Row 4 in Figure 22. Suppose now the incoming channel #1 pulses are longer than the pulses generated within the channel #1 servo. Thus, there will be an output pulse from the #1 CCW Nand gate. Although this happens soon after A goes positive (which occurs on the leading edge of the first received pulse) it can never occur simultaneously. Pin 6 of Figure 23 is connected to the output of the #1 CCW gate (actually, as noted on the diagram, there is an intermediate inverter since the FF clock terminals require positive pulses: refer back to Figure 2) and hence QCCW goes to zero (in accordance with Figure 22). QCCW now equals one and the CCW output circuitry is energized (this can be a one or two transistor amplifier and is noncritical since by the nature of the output scheme it is either off or heavily saturated). In the breadboard setup of Figures 24 and 25 the

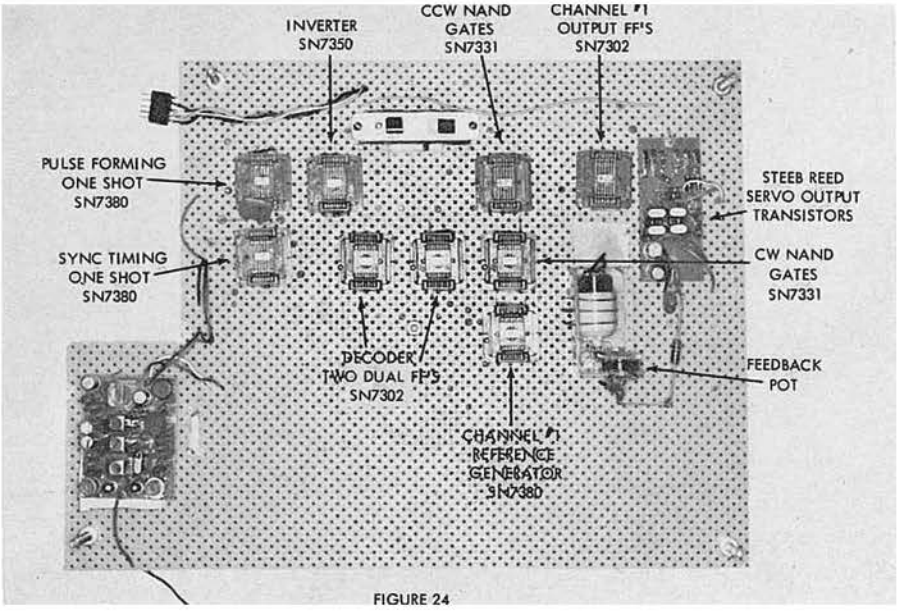
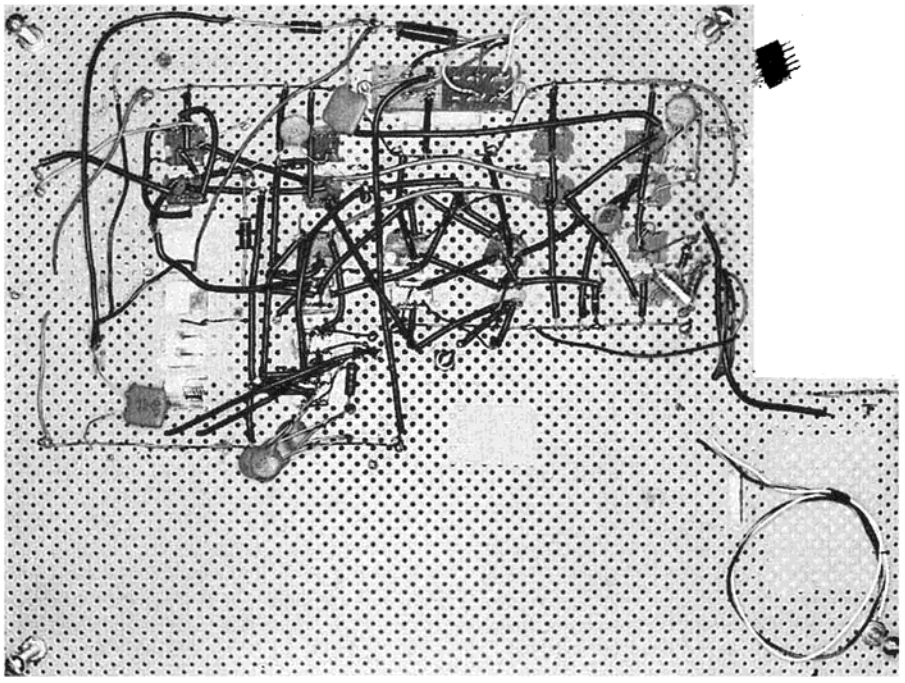


FIGURE 24



output amplifiers are merely the power transistors of a Steeb reed servo amplifier). Now the motor will drive the potentiometer in a corrective manner (increasing resistance to increase the pulse width). Examining the logic terminals with $Q_{CCW} = 0$ it is noted that $K_{CW} = Q_{CCW} = 0$ and $J_{CW} = Q_{CW}$ which remains at one. This is Row 3 which states that under these conditions $Q_{N+1} = 1$ identically. This is important, it means that once the CCW side of the FF is operated the CW side **cannot** operate regardless of any intentional or stray input pulses. By symmetry, the opposite holds (i.e., onoce the CW side flips the CCW side cannot). This is quite a satisfactory state of affairs since we have inherent protection against the possibility of both output transistors operating at the same time (an effective battery short). It is of further note that now $K_{CCW} = Q_{CW} = 1$ and $J_{CCW} = Q_{CCW} = 0$ and from Row 2 of Figure 22 it follows that; $Q_{N+1} = 0$. This is also a desirable situation as the circuit has in effect locked itself on and stray interference type pulses (such as the coincident operation of one of the other servo motors) are noncontaminating. Thus, it is readily apparent that this system takes full advantage of the time separation between the various channels, yielding near maximal stability with no loss in flexibility or performance.

If a method to provide efficient turn off features is incorporated, the system will be complete. This is done quite readily by utilizing the preset terminals. Recall that the Sync Timer has a time constant such that its pulse width is somewhat greater than the frame duration but less than a full cycle (time between the leading edges of successive channel one pulses). When it (the Sync Timer) does complete its one shot the positive going edge resets all FF's of the decoder. When the pulses begin ar-

(Continued on Page **33***)*

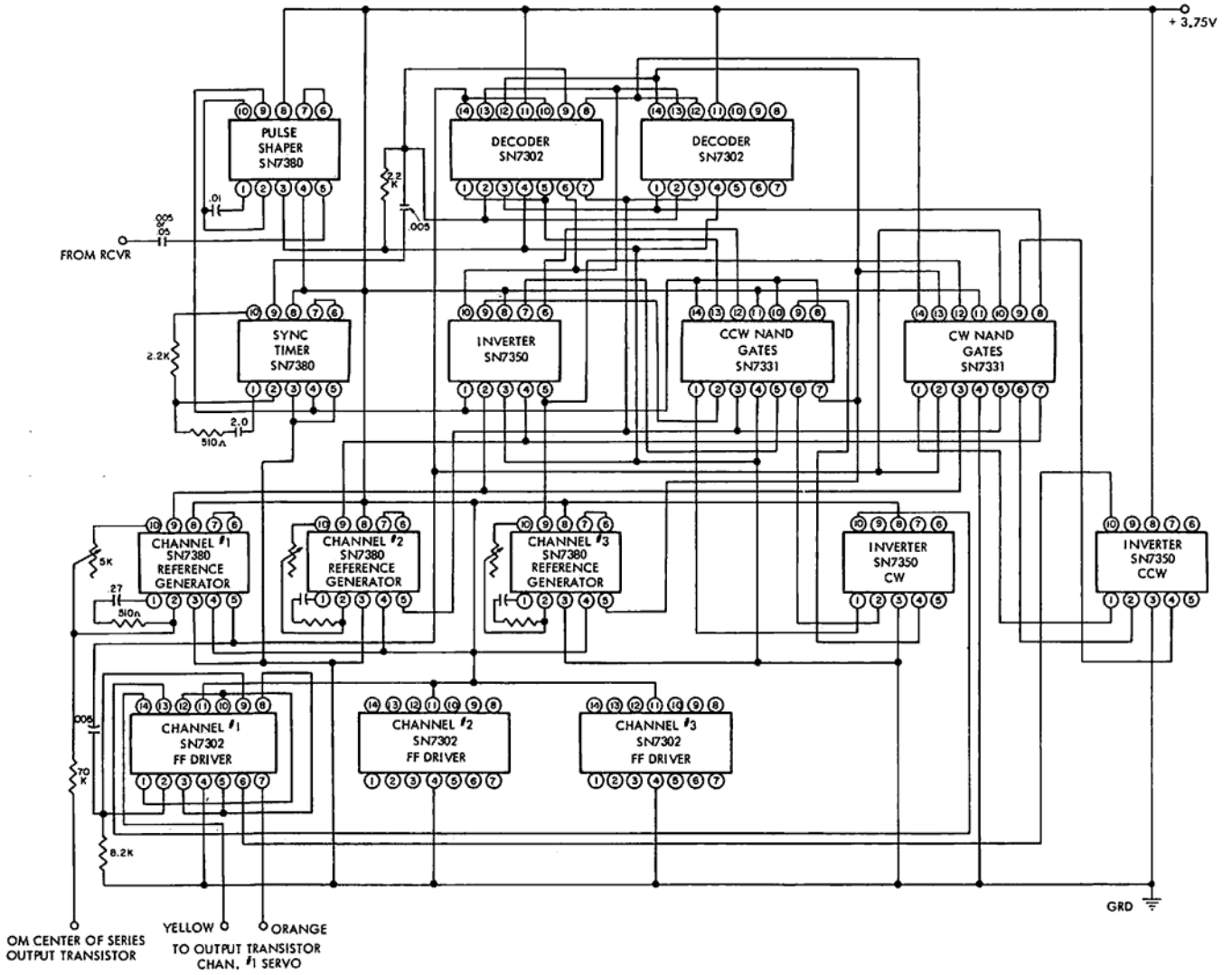


FIGURE 26

INTEGRATION

(Continued from Page 32)

riving the output FF's are reset insequence. Thus, the first pulse into the decoder effects A such that A = 1. As explained above this positive going edge is differentiated by C_{D_2} and R_{D_2} (see Figure 23) and the FF's are preset and any motor action ceases. Similarly, B presets the #2 FF's and C likewise presets the #3 FF's. A moments reflection leads to the correct conclusion that once any FF is operated it will remain on for an exact cycle. And once turned off (preset) it may be operated again one channel pulse width later (either incoming or reference generator, whichever is shorter). From this fact, it is seen that holding networks are not required since the transmitted pulse train contains the needed information.

One unpleasant possibility remains, however, if any motor is running and reception of the transmitted pulses is interupted for any reason the output FF will never be reset and the motor will run to its limit. A solution is to add an RF detector that will reset the output FF's upon loss of carrier, however, the reliability of the proposed system is such that inclusion of this feature was deemed unnecessary.

Figure 26 is a schematic layout of the overall system. A 70K ohm resistor is tied back from the center of the series connected servo output transistors to the feedback pot of channel #1 (the other channels are of course identical). This provides damping action to prevent motor hunting (reference The Digitrio Series).

OBSERVATIONS

The system was built using my Kraft KP-6 transmitter and hence the waveform diagrams all depict a six pulse frame. The system constructed is for three channels only and requires the following IC's;

No.	Type	Cost Each	Subtotal
5 —	SN7380 One Shot	$ 9.75	**$48.75**
5 —	SN7302 dual flip-flop	$11.30	**$56.50**
2 —	SN7331 triple 3-input Nand	$ 7.00	**$14.00**
3 —	SN7350 quadruple inverter	$ 5.65	**$16.95**
		Total	**$136.20**

Throw in the cost of Rc, Tx, motors, miscellaneous timing components, printed circuits, and batteries and it is apparent that the system is economically prohibitive. However, the system is designed to operate (with slight modifications) with presently owned Transmitters as a small flying field backup. Also new devices are constantly being developed and, shortly, low priced equivalents of these circuits should be available. The ease of using these devices should promote easily assembled kits such that owners of digital proportional equipment can construct three channel airborne systems to be used with their present transmitters in lightweight reliable miniture aircraft. Thus, **along** with the fun available with the larger models and the control provided only by feedback proportional, and R/Cer will have the convenience and accessability provided by the smaller variety.

Dick Adams with Owen Kampen's "Skampy."

SHOP & FIELD

Technical information and installation notes on the Adams "baby" actuator.

THE Adams Baby Actuator is a miniaturized version of the standard low voltage single rotor actuator which has been on the market for the last three years. It is expressly designed for use in the ultra small, ultra light .01 and .02 size radio control aircraft. The "Baby" weighs 9/16 oz. and is designed to operate at 2.4 volts furnished by .225 nicads of the Deac button cell type. When used with the Testor Superhet receiver and the above batteries, the flying weight of the equipment is approximately 2⅝ oz. with an operation time of 1½ hours per charge on the nicads. In areas where super regen receivers are practical, the Ace K3V or the Controlaire 5 with the Ace Add on Switcher work very well at 2.4 volts to make a slightly smaller and lighter equipment package. Pencells at 3.0 volts have proved very unsatisfactory. Only nicads should be used.

The Actuator should be firmly mounted to a 1/16" plywood bulkhead. Use button and carpet thread to sew it to the wood through the holes in the brass eyelets of the actuator and through holes drilled in the wood directly outside the outer diameter of the actuator and in line with the brass eyelets. Liberally coat the sewed areas with glue for greater firmness in mounting. The output arm is bent in such a manner that the unit should be mounted in the airplane with the coil vertical and the arm pointing downward into the airplane. With the actuator mounted in this position, it is possible to install rails vertically in the sides of the fuselage to permit the mounting board to be slid in and out from the top, thus making it possible to use the actuator in more than one airplane. A three pin segment of a Deans male connector may be soldered to three wires and attached to the three lugs of the coil to facilitate plugging into the three output wires of a dual output receiver (Testor) or into the output wires of a single output receiver with Ace Add on Switcher (see wiring diagrams).

Torque rod installation is necessary (per diagram) to get the most out of the available torque of the unit. Push rod installations have a tendency to pulse unevenly and overload the "Baby Actuator." The white dot on the rotor lines up with the white dot on the red bearing for neutral. Rotation of the rotor should be restricted with stops, either at the actuator or at the rudder, to prevent the rotor from rotating more than 35° each side of neutral. Too high a pulse rate will cause uneven pulsing or galloping of the rudder. The pulse rate should be as slow as practical for the best proportional control response. Rate should be just high enough to prevent the airplane from yawing back and forth with each rudder movement in flight. .045" music wire has been used for a torque rod in most installations tested. When using superhet receivers, make sure to insulate all metal parts from each other to prevent interference with the receiver operation. This is best accomplished by putting a small piece of shrink tubing or similar thin walled plastic tubing on the output arm of the actuator and on the output crank of the torque rod at the rudder end. Super regen receivers are not as susceptible to metal to metal electrical noise so the insulation may be eliminated.

It is extremely important that every part of the control system be free moving in order to use all the output torque of the actuator. Nylon or dacron thread may be used for sewn, figure 8 hinges on the rudder. The torque rod must be free to rotate in its front and rear bearings and must not drag on any of the internal structure of the fuselage. Make sure that the actuator shaft is aligned with the center of the torque rod and that there is no bind or tightness where the output arm slips into the loop on the torque rod. Also make sure that the hairpin on the rudder is open enough to prevent any drag on the output crank of the torque rod.

PRECISION PATTERN AIRCRAFT DESIGN

part VIII

A study in Class III Aerodynamics by

BEN HERMAN
JACK CAPEHART

Design Factors

THE first design factor listed at the end of the last article was configuration. We'll discuss this factor first, although we won't necessarily discuss the remaining factors in the order listed.

The most widely used configuration at present is, of course, the low wing, trike geared, tractor configuration. This configuration seems to be very firmly entrenched, to say the least, and although current designs are certainly very capable performers, theory predicts, and experiments seem to confirm that perhaps these current, run of the mill designs are not optimum. We also feel that even the present, well developed low wing designs have not been fully exploited. Part of our current design efforts have been directed towards this latter end; that is, refining to a higher degree the current designs. One obvious reason for this effort is that, like most of the current Class III buffs, we have more experience with this configuration.

At this point, perhaps it may be interesting for us to consider why the low wing configuration enjoys its present popularity. We feel that a good deal of the popularity is a matter of historical accident. When Fred Dunn first took the daring step of placing the wing of his Smog Hog on the underside, thereby creating an "instant" Astro-Hog, the improvement over the high wing version was so vast that everyone immediately jumped on the band wagon. Also, this gave a real "tough" looking airplane, especially compared to the Smog Hog (in order to make up for prior insults, yes, Doug, we do think that the Stormer was better looking than the Smog Hog). So great was the tide toward low wing designs which followed, that the supremacy of the low wing design was simply accepted as fact. In all the intervening years, few people have ventured to swim against the tide. One notable exception, of course, has been Doug Spreng and the aforementioned Stormer. We're compelled to report, as you all know anyway, that more recently, despite his very convincing arguments for the shoulder wing, Doug has turned around and begun to swim with the tide with his Thunderstormer and Twister designs (you are in England now, aren't you Doug?). We were happy to note that at the last Nats, another well-known designer, Bud Atkinson, has bucked the tide and flew a mid or shoulder wing design in Class III (and did quite well with it).

So many people for so many years have been using low wing designs that there must be some advantages to them. As we see it, these are:

1. Convenience of installation and strength of the main landing gear (we're thinking here of the popular torsion type gear).
2. Fuselage construction is relatively simple and strong.
3. Most modeler's think the appearance of the low wing design is superior.
4. With all our years of experience, we know their characteristics quite well. Any fool can design one (as proof, we have).
5. As has already been pointed out by Ed Kasmirski with his Taurus design, the low center of drag on a low-winger tends to help keep the nose down with speed increases.
6. Inverted, the low winger is more stable than the high winger. This is due to the "pendulum" effect and also to dihedral.

Thus aerodynamically, the only two advantages that we can think of are items 5 and 6 above. Item 6, of course, is very important for performance of our current pattern.

There are, in our opinion, certain disadvantages of the low wing design. These will be covered in our discussion of the mid-wing configuration as this latter type to a large degree, corrects for these shortcomings.

Without going into a lot of detail, here are some thoughts on ways which we think would improve the low wing configuration. We feel that the tapered wing, which is seeing increasing usage, has many advantages over the rectangular planform mainly because of the decreased damping in rolling maneuvers. However, most of the tapered wings we have tried suffer from severe tip-stalling tendencies, especially on landing approaches. A tapered wing which did not have this tendency would enable us to have our cake and eat it too. Aerodynamic theory indeed gives us a way out, but you have to pay for it. We are thinking here of the elliptical planform ala Spitfire. This planform has the theoretical advantage of stalling uniformly along the entire span. If you haven't already guessed, most tapered wings in use today have a decided tendency for the tips to stall first, resulting in you know what. Now most modelers won't want to take the trouble of designing and building an elliptical wing, and we can't blame you, we haven't built one either. However, fortunately, there's a lazy man's way out. A close approximation to an elliptical wing is one with equal taper, front and back, rounded tips, and tip chord about 60% of root chord, as shown in Fig. 42.

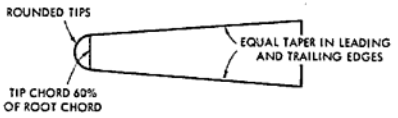


FIGURE 42

Most tapered wings currently in use fail to fulfill one or more of the above specifications, and in this case some taper is worse than no taper at all. A close approximation to the elliptical wing, nearly fulfilling the above specifications, is Pappy DeBolt's Interceptor wing. Although we've never seen one fly (one of the TRCC members currently has one under construction) taking Pappy at his word, this wing does not seem to have tip stalling problems. On the other side of the picture, Ted White's El Gringo, although being one of the finest designs in the air that we have flown, is extremely prone to tip stall on landing approaches. This is a case where we feel a definite improvement could be had by changing the wing planform to more closely adhere to that shown in Fig. 42. Some of you modelers may never have experienced tip stall with tapered wing designs, but do us and yourselves a favor and go and weigh the planes. Exceptionally light designs (say 6 lbs. or less) certainly can be slowed down to a higher degree than those heavy monsters, without experiencing any

(Continued on Page 35)

(Continued from Page **34***)*

problems. Altitude is, of course, another factor. In Tucson, we're at 2500 ft. elevation, with a corresponding 10% decrease in air density as compared to you sea level guys, which, of course, demands a higher flying speed and/or a higher angle of attack of the wing. Under these conditions, tip stall during landing approaches more readily occurs. We might add that the straight wing stalls at the root first, a definite advantage, but this type of wing suffers from excessive roll damping.

Another area where we feel an improvement can be made is in the airfoil sections. Here again, we are in agreement with Pappy DeBolt when he states that there is no advantage to be had in the use of sections with greater than 15% thickness. Besides lift to drag ratio, which Pappy very ably covered in another magazine a few years back, there is something else to consider here; namely "separation." Here again we meet a term often used but not so often understood. By separation, we mean the tendency of the air stream, which divides upon striking the leading edge, part going above and part going below the wing, not to re-unite upon flowing past the trailing edge. This flow pattern is shown in Fig. 43.

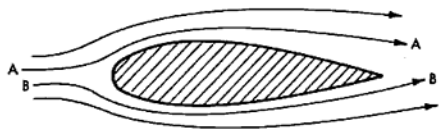


FIGURE 43

In this figure we see that the streamlines of air flow, A and B exit at the trailing edge with a separation distance greater than that at entry at the leading edge. We see that near the trailing edge less air is flowing than would be the case with no separation occurring. Thus, an aileron deflected into this air stream would have less effect than a similar deflection into a non-separated air-stream. Without going any deeper into the subject, we can state that the exceptionally thick airfoils normally give rise to more separation than the moderate (15% or so) airfoils, and thus, these sections usually have poorer aileron response for the same deflection, everything else being equal. We think that this is in part at least, the reason for the relatively slow roll rates in thick-sectioned planes such as the El Gringo (18% tip) and the Kwik Fli II (18%). We suspect (we haven't tried) that 15% sections on both these models would show marked improvement in rolling rate. Another "out," which is probably better than increasing the aileron deflection, is to employ turbulators, small spanwise strips, at or slightly in front of the thickest point of the section.

We next consider the subject of aerodynamic drag. As Pappy DeBolt has stated so often in his many interesting construction articles, drag never helped **any** airplane, a statement with which we wholeheartedly agree. We feel that there is still room for improvement on drag reduction on our current low wing designs. Some of the more obvious means of reducing drag by employing good, clean designs, fillets, retractable gears, and smooth finishes are well known and only the following brief points will be made. First of all, any bodies attached to, or protruding from the wing will give rise to far greater drag forces than the same bodies attached to other parts of the air frame. Drag of this sort is frequently called interference. For example, with but few exceptions, our current low wingers have landing gear struts extending from the bottom of the wing. The best solution, of course, is to retract the gear, but in lieu of this, streamlined fairings on the wire struts would be a considerable help. Wheel pants should also not be overlooked here.

Before we proceed with the rest of this discussion, it is perhaps in order to point out the two basic ways in which aerodynamic drag arises. The first type of drag is called viscous, or skin drag. It arises by virtue of friction between the aircraft skin, and the neighboring air molecules. The second type of drag is called pressure drag. It arises as a result of pressure forces in the surrounding atmosphere caused by the movement of the aircraft through the atmosphere. The components of these pressure forces which oppose the forward motion of the plane are called pressure drag forces. It should be noted that not all pressure forces give rise to drag; namely, the vertically upward pressure force caused by the wing. This force, as has previously been described, is that all important lifting force which makes our planes fly. The following example of pressure drag caused by the wing may help clarify matters.

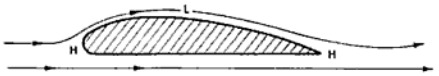


FIGURE 44

In Fig. 44 we have indicated how the air would flow over an idealized (non-existent, we might add) airfoil in which there are no energy losses due to drag. Flow of this kind is sometimes referred to as potential flow by the hydrodynamicists. In this case, the air curving around the top of the airfoil is accelerated by the pressure force from high to low pressure (marked H & L on the drawing) and thereby gains momentum. In going down the trailing edge side from low to high pressure it is de-accelerated by the pressure force until, upon reaching the trailing edge, it has lost exactly that energy gained during the initial, accelerated path around the leading edge. It therefore arrives at the trailing edge with exactly the speed it had upon entry at the leading edge. Note in this case, no separation has occurred at the trailing edge. This type of flow, of course, is ideal and never occurs in nature, as some drag is always present.

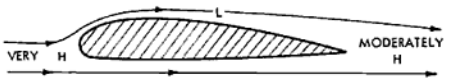


FIGURE 45

In Fig. 45 we indicate what is more generally the case. In this situation the air is accelerated as before from high to low pressure around the top side of the leading edge. However, due to viscous drag over the wing surface, some of the energy is lost to the air stream. As a result of this energy loss, the flow cannot continue around the trailing part of the airfoil into the high pressure area. This results in the phenomena called separation. This simply means that the streamlines of air flow are separated more at the trailing edge than they were upon entering at the leading edge. This resulting airflow also leads to lower pressure at the trailing edge than at the leading edge. The result is that we have a net pressure gradient force from the leading edge to the trailing edge. This force, of course, is in opposition to the forward motion of the plane and tends to slow it down. It is called pressure drag. Sometimes, when considering drag forces on the wing only, both pressure and viscous drags are called "profile" drag. There is a further drag force associated with the functioning of a wing which is called "induced" drag. This drag is associated with the downwash of air at the trailing edge of the airfoil, and is proportional to the lifting force of the wing. At this point we come to the second advantage of the elliptical type of wing. This type of planform has the lowest induced drag. This should give a definite advantage in any maneuvers involving changes of angle of attack, thereby changing lift. It will also allow the plane to reach a higher cruising speed in straight and level flight, all other drag forces being equal. This increased speed has obvious advantages for most maneuvers.

At this point we may also point out how turbulators work. As has been pointed out, turbulators are small protuberances placed on the air frame, most generally the wing, to increase turbulence. Referring to Fig. 45, if we imagine a small protuberance placed on top of the wing at, or slightly ahead of the thickest point, we will create a certain degree of turbulence. The net effect of this turbulence is to bring some air originally a considerable distance away from the airfoil, and therefore having suffered little energy loss from frictional effects, to the wing surface. This air has higher energy than the air which it replaced, and therefore the flow is more able to penetrate into the high pressure region near the trailing edge. Thus, separation effects are greatly diminished. This has two benefits. First, we have reduced pressure drag because with less separation the pressure at the trailing edge is more nearly equal to the pressure at the leading edge; and second, we get the air flow back down to the ailerons where it can do its job in rolls and turns.

In closing we should point out that these suggested improvements are not limited to the low wing configuration and would be equally applicable to the mid and high wing configuration. Next time we'll discuss what we consider the optimum wing placement, namely the mid-wing.

SHOP & FIELD

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Editor

•

KATHLEEN ACTON
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FUNDAMENTALS OF R/C • PRODUCT REPORTS • HINTS AND KINKS

IN the first two installments of Shop & Field we discussed the basic shop requirements and inventory of tools, followed by a brief discourse on the various materials used in building the R/C model. The third segment, presented last month, was a roundtable discussion between three of the RCM editors concerning the beginner in R/C.

This month we are going to present actual recommendations for the various categories of beginners, or newcomers to R/C, based on actual in-the-field testing and experiments we have conducted during the past year. There will undoubtedly be some disagreement with our choices as to specific aircraft and specific radio systems, but they have proven themselves under our conditions of recommendation in actual "baptism of fire" in the hands of beginners we have used for the test program that preceded this series. As with any such recommendations, there are always exceptions to the rule — a certain percentage who, for various "unknowns" will have difficulty with the units recommended. However, we feel confident that if you are new to our sport and hobby, or a sport RC'er who is having difficulty obtaining a reasonable degree of success the results of our own testing will be of value to you, and will put you that much closer to continued successful flying.

Basically, there are two major categories of absolute beginners in radio control. The first is the non-modeler, that individual who is starting out in R/C with no previous modeling experience. The second is the modeler, or former free flighter or ukie enthusiast, who is switching over to R/C. And, even though you may feel that it would be a simple matter to categorize these these two and make specific recommendations for a long term modeling program, such is not the case. For example, in the case of the non-modeler, there is a wide range of associated and non-associated backgrounds with regard to modeling, despite the lack of actual model making experience. As a case in point, the dentist is used to working with small tools and intricate work, and more often than not, has a natural inclination toward modeling, whereas the business executive who spends little time in precision, craft-type work may find the demands of modeling much more difficult and taxing. Yet, that same businessman may have built exact scale, detailed miniature antique furniture for a hobby, and find that once the fundamentals of our own specialized hobby are learned, the "going" is relatively easy. Thus, these recommendations of our own are general in nature, and only you can determine in which category you belong. Just remember — it's better to start conservatively and learn each step well, than to set your sights so high, and try to do too much all at once, that the goal of someday flying like Phil Kraft becomes completely unobtainable.

1) The Non-Modeler

The first decision you, as a newcomer to R/C must make, is what type of equipment to buy. This, you must decide before you can select your first aircraft. The basic types of radio equipment are as follows: (See fig. 1.)

As you can see from the chart, you can invest anywhere from $75 to $300 or more, depending upon your finances and interest level.

Here are our specific recommendations: If your finances permit, and if you are convinced that you plan to stay in this hobby and sport of radio control, then by all means purchase one of the leading brands of multi-channel proportional systems. The first step, in this case, is to send for the manufacturers sales literature on each system, read them carefully, then discuss the subject with your local hobby dealer, or your mail order house. Those systems tested and recommended by RCM are, in alphabetical order: Bonner 4RS; E. K. Logictrol; Kraft; Micro-Avionics; PCS. The many remaining systems not mentioned are not necessarily on the "not recommended" list, but many have simply never been submitted to RCM for test and evaluation. Those we did mention, have been flight tested and are recommended for your consideration.

The so-called "full house" proportional system, although the most expensive, can be considered a wise, long-term investment in your hobby, for it will serve you well from apprenticeship through competition, if you desire to eventually participate in the latter phase of the sport. Depending upon the system you choose, it will enable you to duplicate virtually every control function found on full size aircraft. Each of the systems mentioned has proportional control of rudder, elevator, ailerons, and throttle, with trim for each function. Each of the manufacturers mentioned has a system, or systems, with additional auxiliary channels for added functions such as flaps, retractable gear, mixture control of the engine, independent braking — al lof which are an exciting part of R/C, but which you **must** disregard during your apprenticeship.

If you have selected your system with your choice of control stick arrangement (see Cunningham's article in this month's Shop & Field), then you are ready to select your first aircraft. You have two ways to go:

a. Build a model from plans or from a kit.
b. Buy a prefabricated "Almost Ready To Fly."

If you feel that you would enjoy building your first aircraft, and if you have the assistance of an experienced RC'er, or belong to a club where you can seek such assistance, then we recommend that you read

GENERAL EQUIPMENT CATEGORIES

Transmitter & Receiver	Actuator(s)	Control Functions	Price Range and Remarks
Single Channel	Escapement	Non-proportional rudder only (motor control can be added.)	$75 and up. Not recommended.
Single Channel	Magnetic Actuator	Proportional rudder only	$75 and up. Recommended.
Single Channel	Single channel servos	Non-proportional rudder. (Throttle and elevator can be added.)	$80 and up. Not recommended.
Single Channel	Galloping Ghost	Proportional rudder, elevator, trimmable throttle.	$120 and up. Recommened as specified in text.
Single Channel	Decoded Pulse Proportional	Proportional rudder and elevator, trimmable throttle.	$150 and up. Recommended as specified in text.
Multi Channel — Reeds	Reed servos	Non-proportional rudder, elevator, aileron, trim, and throttle.	$200 and up. Not recommended.
Multi Channel — Proportional	Proportional servos	Proportional rudder, elevator, aileron, throttle and auxiliary functions.	$300 and up. Recommended.

Chuck Cunningham's two-part article on "The Professor" an aircraft designed for full house proportional and the larger engines — one designed especially for you in learning to fly with the aid of an instructor. The first part of this article appears in this issue, while the plans and construction details will appear in next month's Shop & Field.

If you prefer to build from a kit, then we suggest you purchase "Das Ugly Stik" by Jensen Enterprises. Use one of the following engines: Veco .45, Enya .45, or Super-Tigre .46. This plane-power combination has proved to be the best combination trainer for Class III, or "full house" for the beginner **who has the assistance of an instructor**. The "Ugly Stik" with a .45 flies at a reasonable speed, is not "jumpy," and can be brought in for some of the slowest landings you have ever seen. It can also be flown without ailerons by increasing the dihedral. Second choices would include Carl Goldberg's "Skylane 62 or Vic's Custom Models Trainer."

If you wish to purchase a prefabricated model, then we suggest that you start with Lanier's "Transit" or "Comet." These models have been field proven throughout the country and require very little in the way of shop time to get them ready for flight. The "Transit" is a Class II model — that is to say, it has rudder, elevator and throttle, but does not use ailerons. The "Comet" is, virtually, a modified "Transit" with ailerons. If you have a competent instructor who will work with you for your first dozen flights or so, we recommend the Class III type ship. If not, then start with a ship that does not utilize ailerons. Another choice in the "Almost Ready To Fly" category is Lazott's "Solo MK I," a sturdy, high wing ship made of heavy grade ABS Sheet. (See Shop & Field Product Report in this issue). This is a Class II type ship that can withstand heavy abuse under certain conditions, as mentioned in the report. It is fairly stable and easy to fly.

If your choice of radio system was the Bonner 4RS system, the new, small proportional system, then, seemingly, your choice of ships is greater, since this system can be used in much smaller aircraft. With all due apologies to Ken Willard, we must mention the old saying that "a good big man is always better than a good little man." The same is true for the medium to larger size aircraft in comparison to the smaller ships. The larger machines fly without the "jumpy" tendencies of their smaller counterparts, and can handle a much wider range of weather conditions. In addition, the R/C engines with the finest running and handling characteristics are to be found in the larger bores. You may disagree with this, pointing out the many smaller ships that have been published in this and other publications. You must remember, however, another old saying — "Don't believe everything you read. It's not the gospel just because you saw it in print." A magazine must please a wide latitude of readers — and their interests run the full gamut of size and type of aircraft. The 39" Under Dawg, a low-wing full-house machine designed by Don Dewey, Ken Willard and Bob Andris, which will be presented soon, may appeal to you, but it's small size isn't going to make it any easier for you to handle! We suggest that even if you did buy one of the smaller systems, such as the Bonner 4RS, you use it in one of the models recommended until you become proficient in flying without the aid of your instructor.

Now let's go down to the other end of the scale. We'll assume, for the moment, that you are contemplating getting into R/C, or that the bug has really bitten you, but in either case, you can't, or don't want to, go the $300 route. Don't, for one moment, feel that you're going to be relegated to the "poor relation" in the fun you're going to have in R/C. Far from it! The challenge of rudder only flying is exciting, and for some, they have chosen this aspect, Class I, for their competition flying.

In this category, we have one specific recommendation which we feel is head and shoulders above all others. From the radio standpoint, we strongly recommend the Testor's transmitter and receiver with the Adams Dual Actuator combination. We have found this to be one of the most reliable single channel radio systems we have ever tested in the past 4½ years. For the aircraft we recommend Owen Kampen's "Whiz Kid," a design presented in RCM which utilizes Midwest Products' foam wing and stab. Full size plans are available from RCM and the foam wing and stab from your dealer or direct from Midwest Products. Midwest has also recently released a complete kit of the Whiz Kid.

Why this particular airplane? Not just because it was presented in RCM — it wouldn't matter who published the article — it is **the finest single channel, rudder only trainer ever designed.** It has no equal. It is rugged, stable, and forgiving. It has been flown by nine-year-old boys and sixty-year-old men with no previous experience. Coupled with a Cox Quiet Zone or Golden Bee .049 engine, you will learn the fundamentals of R/C quite rapidly and without the tranquilizers often necessary in the larger, hotter ships, carrying around several hundred dollars worth of equipment. If you look up the RCM article on the Whiz Kid, you will see that the equipment used there was a Galloping Ghost transmitter and receiver with Rand LR-3 actuator (Rand GG Pak). This was done for the benefit of those modelers who felt they would eventually step up to Galloping Ghost after they had served their apprenticeship on the Whiz Kid and rudder only. If you fit in this category, then you can follow this step — using only the rudder portion of the Rand actuator.

Our second choice for the beginner is the Testor Skyhawk. This is a completely ready-to-fly unit which, when taken out of the box, consists of everything you need to get in the air, including airplane, Testor's receiver, transmitter, Adams actuator, and rechargeable nickel cadmium airborne battery supply. You can fly the Skyhawk, and the price of the unit is almost paid for by the complete instruction manual that comes with it. This is one of the finest works we have seen for the beginner. Compared to the Whiz Kid, however, the design of the Skyhawk is a second choice, simply because of the fact that a low wing ship is not as stable or forgiving as it's high wing brother. Coupled with the rather short tail movement of the Skyhawk, and it's overall weight, the Skyhawk comes out slightly more difficult to handle, marginal on power, and slightly more difficult to handle for the **absolute** beginner. This is not to say that it is not a good airplane nor that you will be incapable of handling it. But as Don Mathes once said "Single channel is basically free flight with occasional radio interference." Although intended as a humorous statement, this **must** be true for the **absolute beginner.** When he lets go of that stick, the airplane **must** return to level flight of its own accord. This will not be necessary on the second or third airplane, but must be true on the beginner's first attempt, especially if he's "going it alone" without benefit of instructor.

And there you have both ends of the scale for the non-modeler. Next month, we'll take up the case of the beginner with some modeling experience as well as going down the middle of the road — Galloping Ghost and Decoded Pulse Proportional.

Chuck Cunningham's

PROFESSOR

Part I

FOR the past several months we have tried to deal more directly with problems associated with getting started in the sport of R/C flying. We have concentrated our thinking toward the man just coming into R/C who has purchased a small rig, such as galloping ghost. Even our question and answer session has been aimed in this direction. We realize that quite a few new fliers though, are interested in large radio gear, powerful engines, and big ships. With this thought in mind we are presenting in this and the next issue, a two-part series called the Professor.

Two years ago, in the RCM Annual, we launched this type of writing with a long article entitled the Instructor. This dealt with getting started in R/C and how to fly with reed gear. Now, reeds have almost disappeared and proportional has taken over the sky. The Instructor was a smaller ship for the engines in the .19 to .40 range. The Professor is a grown up Instructor for engines in the .45 to .61 range. We will be presenting plans in the January issue for this shoulder wing ship that can handle any type of high power, fly either fast or slow, has a nice slow landing approach, and is rugged.

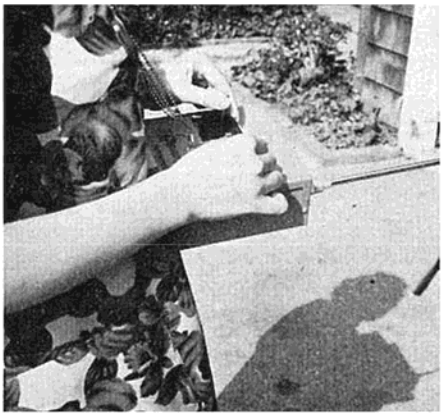
If you are thinking of buying new proportional gear, one of your most immediate problems is what mode to buy. That is, what stick arrangement best suits your needs. This can be a real head scratcher to those not familiar with radio flying. You can get the transmitter with the stick set up in two differing ways. Mode I has the elevator on the left stick, and the ailerons on the right. These are the two primary controls, and the other stick functions are very secondary. If you choose this set up you will be using both hands to control your ship at all times. This is an easier arrangement for an ex-reed pilot to use, but I personally think that Mode II is the better all around way to fly. Mode II has the elevator and aileron on the right stick and the throttle and rudder on the left. This concentrates all of the functions of normal flying on one hand, and if you are right handed makes it easier for your brain to control your flying. As you know, the control stick in a full scale aircraft is designed to have one hand operation, so why not follow this lead and set your transmitter up the same way? I have flown both ways; in fact, my first proportional flying was done with Mode I and it wasn't until I had flown over one hundred and fifty flights this way did I decide to change over and fly all on the right hand. It wasn't an easy transition, as I seriously over controlled the elevator with my right hand, but it was worth the change and seems to be much the better way of flying.

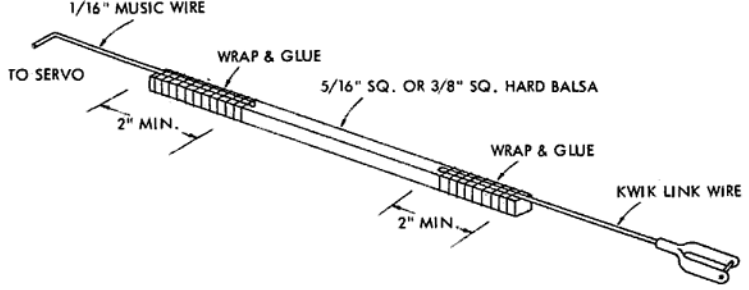
I don't know if the radio builders will do it but if you are left handed, I suggest that you see if you can get the two primary controls on the left stick.

The method of holding the transmitter, again, is a matter of individual choice. There are three methods of holding a double stick box, and one method of holding a single stick box. I don't wish to get into the argument of two sticks vs. one stick, but will say that the great preference of the top fliers in both this country, and around the world, seems to lie with the two stick type of box. This is the one that we will talk about from here on in. You can hold the box with both hands wrapped around the box, with your thumbs resting on top of the sticks. This is the normal method. Your thumbs control all of the functions of the sticks. This may seem odd to someone who has not flown R/C before, but it is surprising how much "feel" that you do have in your thumbs. The second method is to hold the box with your left hand and grab the right stick between the thumb and first finger of your right hand. This seems to be an easier set up for a beginner, but leaves the problem of how to control the left stick up for grabs. When you want to change throttle, or use a little rudder, you have to shift your grip, and this can be hard to do if your ship is fast, the box is slippery, or you're sweating up a storm! The third method of holding the box is an adaptation of the second method, in that you use a saxophone lanyard to hold the box while you use both hands to grab the sticks with thumb and fore finger. Transmitters do not come equipped for this installation but, if this is the way you want to fly you can modify the transmitter yourself. Locate the balance point with the antenna extended, drill a small hole in the face of the transmitter (**don't** drill into any components), get a screw eye at the hardware store and bolt in place. Then go to a store that sells musical instruments and buy a sax lanyard for about 65c. Most of the European fliers seem to prefer this method. I have tried this also and like the support that the lanyard gives to the box. I don't use this method of flying much, but if you are worried about dropping the transmitter, then go this route.

No matter which method you choose to use, before you do any actual flying it is a good idea to practice with your transmitter while everything is safely on the ground. I call this "dry flying." Picture your aircraft in the air, and then practice moving the transmitter sticks to correspond to flight maneuvers. Keep in mind that it only takes a little movement on the stick to give you a lot of reaction in the air. Always practice moving the stick just slightly. You must learn to fly that thing up there in the air, and not try and fly the box on the ground. You must keep your eyes glued to the aircraft and never look at the transmitter. Flying aircraft have a way of not being where you last saw them if you look away, so keep your eyes on your ship! Fly the ship by what it is doing, not by what you are doing on the box. If you are pulling a little up and the ship has not reacted, then give a little more up. Don't get caught by thinking about the transmitter, think only about the aircraft. In "dry flying" you can picture to yourself what the ship is doing and how to get it to do something different.

We will get to the actual flying a little later in this series, but right now we are still working on the bench. If you have been following Don's excellent series, Shop & Field, you will by now have a good idea of construction tools and techniques, so I will not go into this here. The main thing





TYPICAL PUSHROD CONSTRUCTION

to remember in building your high powered, fast flying proportional ship is to build carefully and strongly. I have seen several fine kit models come apart in the air recently, all built by beginners and built according to the instructions, but the builders skimped on the most critical part of all, the wing joint. This **must** be strong, and if you skimp on glue or time in this spot, it's only a short while until you will be building a new ship! Student pilots have a habit of doing very violent maneuvers and subjecting the model to stresses that it was not designed to resist. Make sure that you don't fall into this category.

When installing the radio gear make sure that you do not screw down the servos too tightly nor that they are so loose that they may come out of their mounting holes. This can be worse than the "too-tight" situation. I think that wood screws are the best way of holding proportional servos to the servo board. Screw them down until the head of the screw just contacts the rubber grommet on the servo case.

With the servos installed it is time to make pushrods. These should be made from good hard straight grained balsa, either 5/16" square or 3/8" square, or use the new fiberglass rods. On the end of the pushrod that connects to the control surface use a DuBro Kwik-Link. Bend a 90° bend in the wire of the Kwik-Link and press this into the wood of the pushrod. Be sure that you have plenty of clearance on the inside of the fuselage for the pushrods so that they will not bind. Wrap the wire to wood connection with thread and then coat with glue, model airplane cement can be used here. You can also use electrical or plastic tape (not friction tape) to wrap this connection. I like this way of doing it because it is fast. Make sure that the wire overlaps the wood about two to three inches. The wire portion of the pushrod should not be too long as this will cause undue flexing of the pushrod at high speeds. The easiest way to get pushrods of the correct length is to lay the rod along the outside of the aircraft and then set the wire in place and see just how much length you need.

The other end of the pushrod is equipped with a piece of 1/16" wire, again wrapped like the aft end. At the servo, make a right angle bend in the wire and secure it to the servo with a keeper such as the Rand Swing-In Keeper, or the small brass set screw collars.

Check your pushrod hook up carefully and make sure that it is connected properly at both ends. Be sure that everything works perfectly. If not, take the time to build another set of rods. At the control surfaces use nylon horns. Where the horn sits on the balsa surface make a small saddle of 1/32" plywood about twice as large as the surface of the butt of the control horn. Make one for each side of the surface as this will spread the lead of the horn over the balsa surface make a small saddle of 1/32" plywood about twice as large as the surface of the butt of the control horn. Make one for each side of the surface as this will spread the lead of the horn over a wider area of balsa wood. It is no fun to have a control horn pull out of a balsa surface when you are doing a loop!

Pushrod connections to the throttle and the nose gear are done in several different ways. I like to use straight pieces of 1/16" wire to make these connections, but the new nylon within nylon tube system appears to be a great way of getting around corners. At the throttle be sure and use an adjustable link. I like to use a nylon link here to eliminate any electrical noise. The connection to the steerable gear can be bent at both ends, if you wish since the tiller is its own adjustment.

Aileron hook-ups are made in two different ways. First we have the conventional ailerons requiring the use of bellcranks installed in the wing, or we have the easier strip ailerons with torque rods fitted at the trailing edge. Whichever type of ailerons that you are using, be sure that all linkage works before you cover it, and make sure that all bellcranks have been safetied and that they cannot work loose under vibration.

Protection of the radio receiver and the battery is of great importance, especially for a beginner with a new ship, since this is a time of great risk. Some fliers simply wedge the receiver into the fuselage with a few pieces of foam rubber stuck around it for protection. This may be OK if nothing ever happens, but for all around protection it's a good idea to wrap it in foam and then secure the foam with plastic tape. I like to go a step farther and tape a piece of 1/8" plywood, cut just a little larger than the receiver can to it, then slip this into a plastic bag, then wrap foam around the receiver package and again slip this into a plastic bag. The plastic over-wrapping keeps dust and dirt out of the receiver and also it is a good protection from a leaking fuel tank. Also the plastic wrapping allows any pushrods going to the nose of the ship to slip by the receiver easily. Around the fuel tank slip in pieces of foam wrapped in plastic. This will keep the tank from banging around and the plastic wrap will keep the foam from becoming soaked with fuel as well as allowing the pushrods to slip by easily.

The battery should be protected in a similar manner. Wrap it in foam and then encase it in a plastic bag. This will keep the battery protected in the event of a crash, and if it does get in the way of a load of fuel it will not be hurt. Batteries can have their lives shortened considerably by a dunking in glow fuel!

With all of your installation complete, and with your practicing done in the living room, it is time to learn to fly. We will save this lesson for next month along with the construction of the Professor.

Make sure that your engine is thoroughly broken-in before you attempt to fly. An experienced pilot can get away with a stiff, not broken-in engine, but it will only spell trouble for the new pilot. Always check all of your radio installation with the engine running to be sure that everything works properly. If it does not, then take the time right then to dig into the aircraft to see just what is wrong. It is easier to find troubles at home than in the anxious moments at the flying field. Be sure that the steering hook-up is right, that the nose gear steers in the same direction as does the rudder, and that the ailerons are installed and hooked-up properly. Remember, that to turn right with ailerons, the left aileron goes down and the right aileron goes up.

Dumas Boats new Sk Daddle 40. This kit, by the way, is without doubt one of the finest I've seen for the boater who wants to **"build"** his own and compete on favorable terms with the pros.

The large engine class was strictly White Heat all the way. First place going to Mike Meelbusch's O & R powered beauty with Steve Muck taking second place with his Rossi powered White Heat 4 — 60 with a surface prop — steering strut drive. **Harold Cox took a distant third.**

All the multi was on a point system for winning first, second or third in two qualifying heats. With high point winners going into the finals for a run off if necessary. It soon became obvious that you had to take first in both of your heats to reach the finals. Here's where reliability really pays off. If your engine won't start, you set your needle to rich, a link breaks, your radio falters, etc., your out. Multi racing truly divides the men from the boys and is by far the biggest attraction for the spectators too. I love it!

The host, San Francisco Club, was thoughtful enough to run the multi in a clockwise direction — turns to the right. It's finally become obvious that right hand turns are much better; fewer flips, faster races and more boats running the whole race. I think the West has finally been converted.

General Comments

I've been an active R/C boater for four years. It's amazing how much improved and more interesting this competitive hobby has become in such a short time. To me the biggest change has come from the increasing availability of top quality boat kits, hardware, etc., from the manufacturers. This was so obvious at the Internationals. No longer is this a hobby for those few who have access to complete home machine shops. Certainly, some of the world record holders make their own stuff but look what happened to world record holder Steve Stevens at the Nationals. Blown up Rossi's and too lean mixture settings made it impossible for him to go over 47 MPH and he had to settle for fourth place in his event. On the other hand, Mike Meelbusch, running commercially available kits, engines, and hardware, won four firsts, two seconds and one third. I look on this emergence of so much top quality equipment by the model boat manufacturers as the high point of the 1967 IMPBA Internationals. Don't sit on the sidelines any longer, "thinking about it." Go buy a kit, get started and I'll see you at the 1968 Nats — probably in the winners' circle.

SHOP & FIELD

PRODUCT NEWS

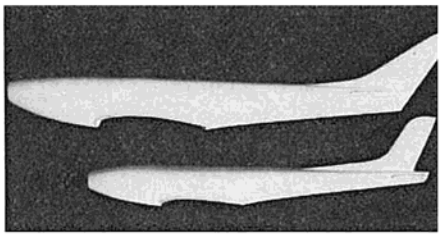
Sterling Models, Belfield & Wister St., Philadelphia, Pa. 19144, has released an advanced version of the Sterling Command Master Control System. Intended for Class II and III flying applications, the aircraft surfaces are controlled by proportional feedback servos on rudder, elevator, and coupled aileron, as well as a trimmable engine servo. The control system is also provided with a complete fail-safe feature neutralizing each of the surfaces and returning the throttle to idle, upon absence of the command signal. The basic control system is by means of pulse width and pulse rate variations of a pulse tone transmitted signal, and reportedly provides for very smooth and linear control between the control limits of the servos. Price is $249.95. Current owners of the previous Command Master System may return their complete unit to Sterling for conversion to the feedback system for $125 plus mailing charges.

Fliteglas Laminates Inc., P. O. Box 915, Felton, Calif. 95018 will soon be releasing their P-51D, a magnificent undertaking in fibreglass and foam which promises to be one of the most extensively pre-fabricated aircraft ever attempted in the fully scale field. Designed for the scale modeler, the new Mustang is designed for retractable or conventional gear, flaps, and normal full-house proportional installations. Further information on this one as soon as it becomes available.

Vintage Model Aircraft Co., 13636 N. 33rd St., Phoenix, Arizona, has released three single channel aircraft — a 45" span Silorsky S-39 for .09 engines; a Heath Parasol with 45" span for .09's and GG; and a Bellanca Columbia at 38" span. All kits contain die-cut parts, decals, pre-formed struts, landing gear, hardware, and covering material. The Columbia also includes a metal cowling. Price is $12.95 for the Parasol and Columbia, and $14.95 for the S-39.

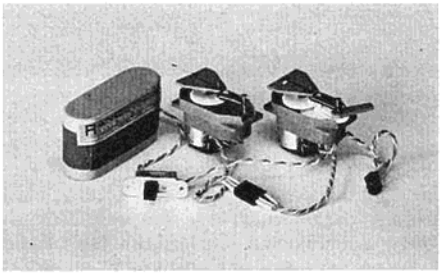
Canada Custom R/C, 189 Woodville Avenue, Toronto 6, Ontario, Canada, announces their Waco UPF Barnstormer which sells for $250 finished, or $185 ready for silk and color coats. The Waco is 95% scale and is designed for full house control. Canada Custom custom-builds virtually any model from kit or plans, but U. S. RCM readers are warned that the above price does **not** include shipping charges or the Customs duty charge which is approximately 35% of the retail price.

Fiber Foam Products, P. O. Box 12091, Plantation, Florida 33314, has released the

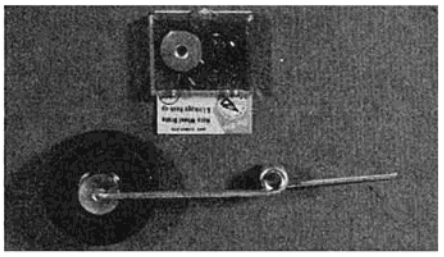


fruits of a year of research into fibreglass processes with their new Tiger and Phoenix fuselages. With a high strength to weight ratio, both fuselages sport reinforced nose and wing saddle areas while careful attention has been given to the seams so that they disappear with one coat of paint. The one piece vertical fin is molded in place. The Tiger is designed for use with a standard Falcon 56 wing (with added conventional tip ailerons) with standard dihedral for the advanced beginner, or as a hot, small competition design with a swept wing for the proficient flier. Price is $32.95. The well known Phoenix design is a very effective acrobatic craft, and is designed for either straight or swept Phoenix type wings. Price is $39.95. Fuselages tested and approved by RCM.

Modest Models, 1325 173rd St., Hammond, Indiana 46324, has produced an R/C airboat called the Hydro-Scat. This is a completely assembled, ready-to-operate boat constructed of styrofoam and aluminum. The radio receiver is connected to a motor driven actuator which gives the boat positive control. The engine used is a Cox .049 Golden Bee. The design is reported to be unsinkable. Factory direct price for the Hydro-Scat is $79.95. Dealer and distributor inquiries are invited.



Du-Bro Products Inc., 7667 Milwaukee Ave., Niles, Illinois 60648, has made available their new mechanical R/C brake. The eleven piece package comprises one complete brake and linkage hookup and is priced at $2.95. RCM tested, approved, and recommended. The second item from Du-Bro is their package of 15 ready-made nylon hinges, priced at $2.49. These hinges feature two nylon pieces using a wire hinge. Ready for installation, raised letters on each hinge half provide an excellent bonding surface for epoxy glue. Tested, approved, and recommended by RCM.

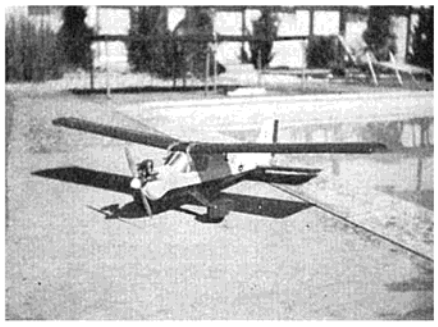


Rocket City R/C Specialties, 1901 Polk Drive N.E., Huntsville, Alabama 35801, has come up with a most unique method of mounting servos. Called Qwik Mount Servo Tape, this new product is a powerful, double sided adhesive tape that allows you to mount your servos without any nuts, bolts, screws, washers, blind nuts, etc. The only requirement for mounting is that the surfaces be oil and dust free. The wood servo mounting platform should be treated with one coat of clear dope. Using a 1" strip of tape across the mounting holes of each servo, the protective paper is peeled off and the servo pressed in place. And, although you may be somewhat concerned, as we were, concerning the strength of this mount, all such fears will be dispelled when you attempt to remove the servo! And added plus is the vibration damping benefit of this material. Tested, approved, and recommended by RCM.

The Angel Mini-Flite Co., Box 437, Fitchburg, Mass. 01420, is distributing the new Weller battery operated soldering iron with tip temperature control to the R/C industry. This lightweight soldering iron operates from your 12V car battery and is provided with battery clips for this purpose. Excellent for on-the-field repairs of broken landing gears, wires, etc. Priced at $14.60. Tested, approved, and recommended by RCM.

SHOP & FIELD TESTS THREE OF THE ARF PREFAB'S

LAZOTT SOLO MK I



THE Lazott Solo MK 1, in my opinion, is probably the best multi trainer of the "ready-to-fly" group on the market today. I base this on my observations at the field of other people attempting to fly some of the so-called trainers. In most cases, these planes seemed a little "squirrely" in comparison to the more sedate Solo. The Lazott people seem to have concentrated solely on designing a **true** trainer and not an "eventual" Class III Stunter. The material used is ABS sheet, the same material used for football helmets. This material can be painted with dope with excellent results.

However, before one can begin to train, one must first be able to get his trainer off the ground and this proved to be a problem with the Solo. With the skid located where it is, the elevators sit squarely on the ground. At first glance, this wouldn't seem to make much difference. But attempts at the first takeoff were hilarious. The plane would gather a little speed and start a turn, I corrected with rudder, and the plane immediately ground-looped to that direction! Finally, we hand-launched!!!! and at 5½ pounds all-up flying weight, this was no breeze! Jim Sunday did the honors and afterwards walked away muttering something about a hernia.

Anyway, the plane flew "off the board" with very little trim necessary. The muffled Max .30 performed flawlessly as did the radio. In flight, the Solo really looks pretty. On the first flight, we did consecutive loops, Immelmans, and a few attempted rolls (the Solo needs a lot of speed to roll but it can be done with practice). So, as a stunter, it really isn't — but as a trainer, it shines! It will fly hands-off and it seems to correct itself when you forget to.

With regard to better ground handling, the addition of an extended tail-skid (see photo) improved the plane 200%. With this skid, it's possible to completely control any ground looping tendencies.

Lazott's claim to fame with the Solo is its strength. With this claim, I heartily agree. On one particular dead-stick approach, there wasn't enough altitude to make the final leg so I was forced to land in extremely rough, sun-baked adobe clay. Since the Solo's glide is very fast it hit the ground, caught a wheel in a chuck-hole, and cartwheeled at least six times — wingtip over wingtip! This kind of treatment has been the death of many other models but when we reached the Solo, the only thing broken was a motor mount (see close-up photo of engine) and a crack in the L.G. fairing (see photo). As a matter of fact, the plane was flying again within 20 minutes with the snapped motor mount — no problem since.

I think Lazott could pay a little more attention to some of the finishing details. For instance, you'll notice in the enclosed photos a shot of the servo installation. In that same shot you can see how the rear wing hold-down dowel is crooked. This could conceivably cause a problem when the spent oil from the engine makes this dowel slippery. Also, the stab had to be propped up on the left side to make it level. These things are not too important though, and in general the Solo is far and above its competitors in general finish.

Another problem lies in the adhesive used at the fuselage seams. Subsequent landing (hard variety) caused the seams to split open, necessitating epoxy repairs. All-up weight is excessive due to the material used, but strength is far above normal.

Finally, when asked if they would recommend the Solo as a **true** trainer for multi, the people (experienced flyers) asked said definitely "Yes."

EQUIPMENT

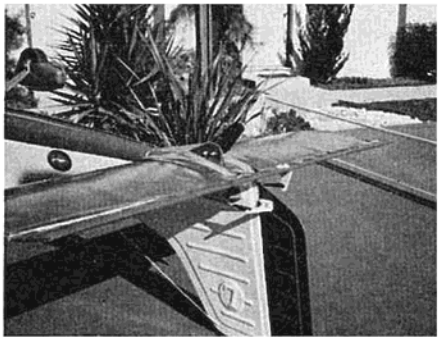
Engine: O.S. Max .30 R/C w/muffler.

Radio: Kraft KP-3 for rudder, elevator, and motor.

All-up ready to fly weight: 5 pounds 8 ounces.

CHARACTERISTICS (Observed)

Slow to moderate speed, extremely stable, fairly fast glide speed with a fairly high sink rate. Stunting ability is hampered by the flat-bottom wing, but with sufficient airspeed it can do most maneuvers. Very high resistance to crash damage.



TECH AIRCRAFT AND ELECTRONICS "SKYSHARK"

WE received Skyshark plastic ready-to-fly for testing and promptly set about to assemble it. This aircraft is constructed very similar to the popular Dee Bee Stinger, in that it has a swept wing, and both the wing surface and the tail surfaces are covered with .10 vinyl sheeting. The mechanics of fabrication were very good, the wing covering was well glued to the foam core, as was the tail, and the fuselage molding was well done. The first problem that we ran into was in trying to hook up the elevator controls. The horizontal stabilizer has a rearward sweep on its trailing edge, thus necessitating a split elevator.

The hook-up as indicated in the instructions was totally unsuitable as it did not allow for any independent adjustment of the elevators, nor, did it allow for any adjustment of this surface, a much needed item on any aircraft. We finally settled on external elevator horns with DuBro links working off a single pushrod. The rudder had a similar problem in that the sweep of the rudder made it hard to connect to the built-in wire horn. We solved this by using a Rocket City aileron horn fitting.

The ailerons were the easiest to hook up as the Rocket City fitting coupled with Rand torque tube fittings made this a neat assembly.

We replaced the wing attachment with wooden dowels epoxied to the fuselage sides. The manufacturer's method of holding the wing on, we felt, would not be suitable for an aircraft flying at the speed that the Skyshark should fly. The kit mounting consisted of a dowel at the leading edge while the trailing edge was held in place with two sheet metal screws, the latter screwed into the flange formed at the wing saddle. Since these screws went into just the plastic it was felt that this would not be rugged enough.

We mounted servo rails along the sides of the fuselage with epoxy to take our Logictrol servos. There was ample room for three servos, radio, battery and a six-ounce tank. For power we used a well broken-in Super Tigre .40. After making all

of the above changes we were ready for flight tests. The evening that we went out to fly the wind was blowing at a moderate 10 to 12 miles per hour, just right for test flights. We started the engine, checked out the control system, and set the ship in place for takeoff. The balance point had been checked with the tank empty and it balanced as indicated in the instructions. The engine was gunned for takeoff and away it went. It bounced down the runway, picking up speed. I slowly eased back the stick but it stayed glued to the runway. Finally at full up on the Red box it lifted off the ground about two inches, and then settled back to the ground. It did this three times before running off the end of the 300-foot runway. We chopped throttle and brought it back. We cranked in a couple of turns of up on the Kwik Links and went to a lower hole on the elevator horns to give us more up elevator and tried again. We also changed nose wheels to give us a positive setting on the ground to help in lift off.

Again, we let go at full throttle and off she bounced down the runway. I say bounced since that is the appearance that it gave to those of us watching from the rear. This time, I again eased back on the elevator, and again found that I was at full up, with the nose just lifting. Finally it became airborne, and lifted off at a very gradual climb. The engine sagged just a bit (I had leaned it out to try and gain as much power on takeoff as possible, planning to throttle back in the air), the nose dipped just slightly, and suddenly it snap rolled to the left and crunched into the ground from an altitude of about four feet. At no time did it show any signs of stalling out, nor was the take off attitude violent. In fact, it was in a very shallow climb out. When we went over to pick up the ship (it had come down in grass), we found that this slight crash had totally demolished the ship. The fuselage, made of high impact polystyrene, had broken in about seven or eight pieces and the wing and tail had parted company from their mountings. The ship was a total write-off as there was no possible way of repairing the fuselage. Not only had the glue joints on the fuselage broken, but also all the pieces where wood had been epoxied to the plastic side had broken loose.

In summation, and in all fairness both to the readers and the manufacturers of this ship, I must say that both of us engaged in testing this ship have had a great deal of flying time, and we have both owned and flown for quite some time the Lanier ready-to-fly ships and the Dee Bee Stinger, and had none of the problems with them that we encountered with the Skyshark.

It is possible that with a large smooth flying field such as an abandoned airfield the ship would get off the ground, but landing would be another matter. With the snap rolling tendency shown on the test flight takeoff there would be no way of slowing this ship down for a landing safely without risk of another snap roll.

The material selected for the fuselage is totally unsuited for R/C models as it is very brittle and has no ability to snap back. If flexed one way, to ninety degrees, it will break. The crash that the test ship sustained would have resulted in some slight damage to a balsa ship or one of the Lanier or Dee Bee ships, but not a total washout. After assembling and attempting to test fly this aircraft, I cannot recommend it to the R/C flier as currently manufactured.

AMERICAN PRODUCTS "TEMPEST"

I AM sure that there is no one in our R/C fraternity that has not on some occasion collided with Mother Earth. In simple terms, crashed! In the act of demolishing an aircraft, we have a decided **plus** factor that few aviation enthusiasts can equal. We consistently walk away from our mistakes to fly another day!

Whether you are a Sunday flier or a contest type the "Ready Fly" has advantages for you. The obvious disadvantage is the price tag. What with saving for that new proportional or wag about, there just isn't any latitude in the greens for a "Fly-a-plane that you didn't build!"

But, wait a moment! Take a look the next time you are in the hobby shop at the price of R/C grade balsa. Compute the material cost of your last ship or that dream design you are working on. Now add the cost of hardware like landing gear, control hinges, control horns and items like steerable nose assemblies and engine mount. The price you have now arrived at will be close to the cost of one of the cheaper Ready Flies, that require some assembly, and still short of the more deluxe "Put-your-R/C-equipment-in-and-fly-product." If we were to figure our construction time at the minimum wage, the Ready Flies would win hands down, but of course we can't do that. The point is that the price tag of a Ready Fly is not so exorbitant when all the facts are examined.

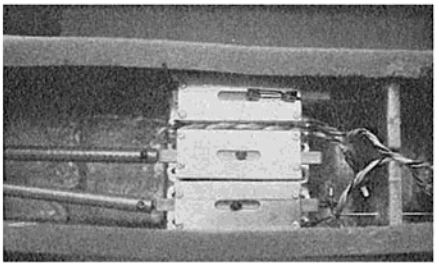
The price is still out of reach for some modelers, but with the advancements in plastics and the soaring price of balsa, the Ready Fly is here to stay. If I may be allowed a prediction; the time is not too distant when the Sunday flight line will have more Ready Flies aligned than home brews. This is not to say that we won't still build our own pet designs, but rather, that the Ready Fly will become the fill-in aircraft to keep us in the air between construction projects.

American Products, Inc.'s Tempest is truly a ready-to-fly aircraft when you lift it from the shipping box. It arrives well packaged with all control surfaces hinged and the wing in one piece. All that is required is the installation of your radio equipment, linking your servos to the control surfaces, and installing your engine, fuel tank, and bolting on the landing gear. The Tempest arrives fuel proofed in either white or orange. Without adding paint trim, one evening's work will place you in the air.

Hardware includes Tatone nose gear engine mount, all formed landing gear, clamps and screws to hold on the main gear, rudder control horn and canopy. The stabilizer and 66-inch wing are foam with balsa and tissue covering. The fuselage is balsa with light plywood sides. The structural basis of the ship is sound and airworthy, but my personal opinion is that it will not endure much abuse like rough landings without some minor strengthening. I cut a hatch behind the firewall on top of the fuselage so that the rear of the firewall could be glassed. This hatch will also aid inspection when installing the fuel tank and battery pack in this area. If wood dowels are installed for wing tie-downs, then the fuselage sides in this area can also be glassed. While it is not mandatory, I recommend that the landing gear block be glassed over to add that extra strength for hard landing or rough field operation. It is necessary to provide some protection to the strip aileron linkage where the wing tie-down rubber comes in contact. If other wing tie-downs, such as plastic bolts are used, there would be no problem, but the tension of the rubber bands over the aileron linkage can cause a bind and a restriction to aileron travel. I fiberglassed the trailing edge of the wing on both sides to provide this protection.

The Tempest was equipped with Orbit Analog Proportional and a Super Tigre .51. On the maiden flight full elevator down trim was required to correct a tail-heavy response. For the second flight, the engine was changed to a Super Tigre 60, a 3/32" negative shim was placed under the horizontal stabilizer and ½ lb. of ballast was added to the battery compartment. With these changes the ship flew well, being very responsive to aileron. The landing approach is flat and smooth with good control response right to touchdown.

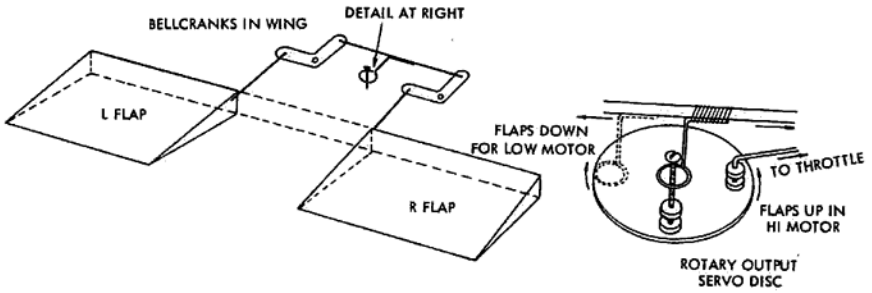
The Tempest is not a hands-off beginner's choice, but once it has been flight trimmed it is easy to fly. It will maintain a straight heading with no tendency to slide off for a considerable distance. It would be a good trainer for the transistion from shoulder wing rudder elevator to low wing aileron design.



SHOP & FIELD

LOU GOLDBERG says the following technique for flap operation on your model plane works quite well. This method requires the wheel type output servo, such as Orbit or Micro-Avionics but could probably be adapted to work with a linear type servo as well. Adjust the linkage for no flaps at full throttle and full flaps at approximately half throttle. Do not set flaps for too much throw until you are familiar with the flight effect of flaps on your particular aircraft.

— DC/RC Newsletter



Renald Chartrand of Sherbrooke, Quebec, uses Nyrod pushrods in his Lanier ready-to-fly models, and once installed, fills the tail section of the fuselage from the trailing edge of the wing all the way back with Sig plastic foam. This, reportedly, results in a rock hard fuselage for maximum strength while only adding an ounce or two of weight. Pushrod exits, fuel line exits, and motor section are sealed with G.E. Silicone Rubber. His receiver and battery are wrapped in a plastic bag and the bag sealed off by tying snugly at the junction of the wires to the receiver and/or battery.

— MARS "Pulse"

To remove the odor of dope, thus promoting domestic tranquility, add a few drops of Oil of Wintergreen. To plasticize butyrate dope, add one ounce of TCP and one quarter ounce of TPP. These two additives give the dope greater brilliance, flexibility, and reduce its flammable tendencies. The old standby, castor oil, is not compatible with butyrate and will, in time, be expelled, resulting in a substantial loss of resiliency.

— Dick Hill, South Jersey Fly-Aways

Did you ever think that your engine starts much better at idle? With your throttle closed in the normal idling position, fill the tank in the normal way. If you're using a 3 tube fuel tank, and the overflow tube shows a full tank, pinch the tubing so that fuel will flow to the carburetor and allow the equivalent of five to six drops for a .49 to .61 engine. Turn over propeller five to six times, then connect the battery to the glow plug. Once familiar with this method, you will find that your engine usually starts on the first flip, and almost always on the second. If you're using a two tube tank, connect tubing to carburetor when the tank is filled, add a few drops to the open carb, then close to idling before turning over. In both cases, leave the glow plug on the engine long enough for it to "warm up," then disconnect, throttle up to clear motor, and away you go. An added bonus is the realism of idle starts.

— Ray Gareau,MARS

When using polyester or expoxy resin, a much better penetration on balsa can be obtained if you add a small amount of acetone to the resin while mixing. The acetone evaporates, the resin sets up, and there is little, if any, loss of strength.

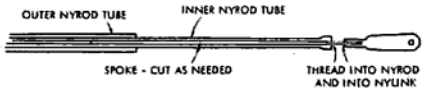
— Ed Lowe

Ever since getting into proportional I have been annoyed at the methods of installing the equipment. Recent articles in RCM concerning vibration and crash protection prompted me to build a servo mounting board which I like to think is a little different. The glass epoxy board is 9" long by 3½" wide and will fit most multi jobs. As an alternate, the board may be made from good 5-ply ⅛" plywood. The six mounting holes should be large enough to take rubber grommets and this is mounted to full length servo rails. The switch harness is bolted in place from underneath the board and the two plugs epoxied in place very lightly. The three servo plugs are made up from Deans connectors, soldered together back-to-back and epoxied heavily in place. The fourth slot is to allow the throttle servo cable and plug to go through the board. The receiver box must be put together carefully, assembled on the board and glued securely with epoxy. Use strips of fiberglass cloth to reinforce the corners on the outside. The area beneath the servos, up to the edge of the receiver box, could be covered by a removable slab of foam to protect the wiring. Servos may be plugged out and removed for maintenance or replacement.

— Pete Branday, Georgetown, Ont.

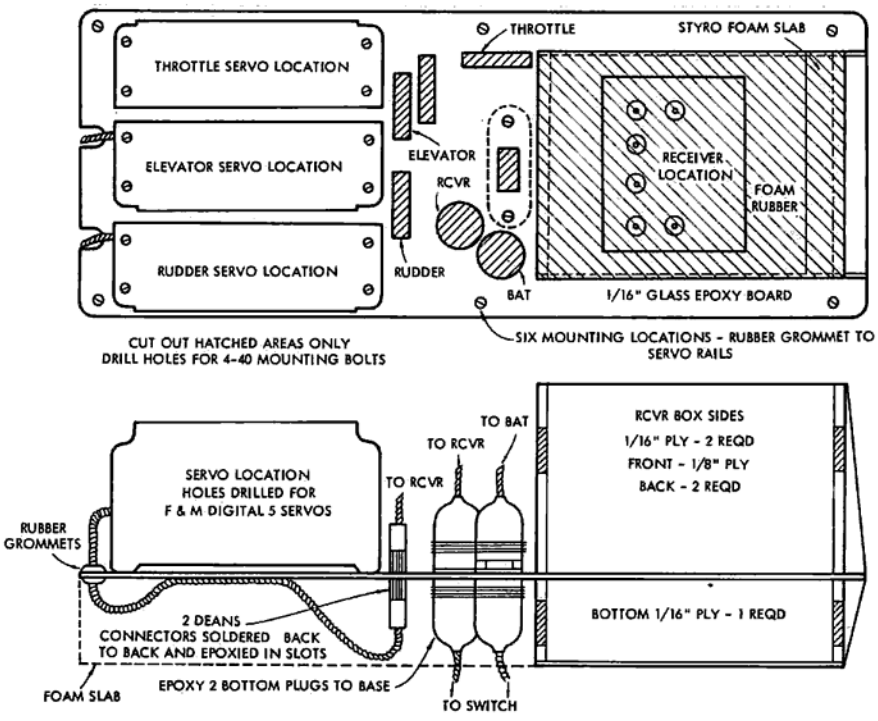
Here's another hint when using Nyrod pushrods: If the inner tube extends unsupported for some length, a piece of music wire or tubing can be slipped inside with a little epoxy to stiffen that area. This idea refers to the unsupported length where it exits from the plan's fuselage to the control horn. To simplify and improve this idea, use an appropriate length of bicycle spoke, the unthreaded end going into the inner Nyrod tube first, then threading the threaded end into the Nyrod for ⅛", the remainder of the threaded portion attaching to the control horn on the moving surface.

— Soo Modelers "Glitch"



Contact and Stix are two trade names for polyvinyl, self-adhesive shelf and wall covering that costs about 49c per linial yard. Most come in 18" width, although Firestone is working on a 36" wide Stix. Many patterns, colors, and color combinations are available including brick and stone masonry (if your plane flies like that), and this material enables you to quickly cover a large wing in approximately one hour. Cut the contact paper ½" wider than the chord of the wing by following the guide lines on the paper backing. Four pieces are needed — two for the top of the wing, and two for the bottom. Starting with the bottom of the wing, peel the paper off one of the bottom sections starting ½" past the center of the wing. Lay and stretch the material toward the end of the wing. This

(Continued on Page 47)



KITS & PIECES

BERNIE MURPHY

FOR most of us, this flying season is rapidly drawing to a close. Time again to clean up the shop and dig into some new building for next year. It's also a good time to touch-up and repair the past season's aircraft. Our ships need maintenance just as the big ones do. A little time spent reinforcing and patching those little fatigue cracks that appear during the coarse of a flying season can add a lot of flying time to the life of your ship.

Now is also the time to service your radio equipment. Most of the commercial equipment currently in use does not allow for the average R/C'er to do much on his own. You can, however, safely check the connector and switch harnesses for frayed wires. These should be trimmed and resoldered. The antenna connection at the receiver is also subject to failure. It is also a good idea to clean the connector contacts (a rubber eraser works well), removing the oxidation that builds up and causes poor contact (or total loss of contact). If your system has flown reliably for over a complete season, it might be well to return it to the manufacturer for a complete check-up and re-alignment. As components age, the tuning will change slightly. This is a far better time to have your equipment at the factory than to wait and be without it when the weather turns nice again.

While on the subject of radio gear, it is wise to operate your equipment occasionally during the winter months and also to keep the batteries charged! Putting a system away with discharged battery packs could cost you for a new pack come spring.

Our own new production for this month reached the soaring height of zero! Traveling and building just don't mix. We did, however, manage to complete one long talked about project, that of flying a movie camera. Two years ago, when our Proctor Antic was first built, we felt that it would make an excellent platform for a flying camera, since it had so many desired characteristics. It flies slow and very steady — a must for smooth film, and in addition is capable of carrying the added weight. The exhaust stack on the Antic throws 99% of the oil below the ship, leaving the top cowling nice and clean, plus, there is ample space in the radio compartment for an extra servo.

The new Kodak Instamatic M-12 super eight movie camera is perfect for aerial filming! This little camera measures only 2" x 3" x 4⅝", is battery powered, has a convenient trip button, and weighs only 19 ounces complete with film and batteries! The price was also right, about $25.

Mounting of the camera to the Antic was ultra simple. A piece of ⅛" x ¼" balsa (to level camera), a piece of ¼" foam, and four or five #64 rubber bands attached to the cabane screws. A simple wire rocker, activited by the auxiliary servo, trips the camera release. We also modified our PCS transmitter so that the camera (aux channel) could be tripped via a push button, rather than the lever. This was done only for convenience, and is not recommended, unless you know **exactly** what you are doing!

Our initial checkout was made during the Labor Day weekend fly for fun at Indiantown Gap, Penna., hosted very ably by the Keystone Radio Control Society. During the course of the meet, 200 feet of film were shot, mostly takeoffs and landings, with a few passes along the crowd, a few loops, etc. Then the long wait to see the processed films. When, at last, the films returned, they were spliced together into one 15-minute stomach churning spectacular — ugh!

The results were even better than anticipated. No sign of engine vibration, and no trouble shooting through the prop — also no oil on the lens. The sensations felt while watching the films are impossible to describe, but a takeoff gives the impression that you are being dragged along the ground on your belly at about 50 miles per! UGH! The turns and landings are something else. If you haven't tried it, now is the time. Just don't show more than a couple minutes of film at a time — it's more than most stomachs can stand! Great for cutting down refreshment costs at your next club meeting!

●

Through the efforts of the AMA and in particular, their Public Relations representative, George Wells, we had the privilege of not only attending, but participating in the National Aviation Day Air Show at Dulles International Airport. The show, sponsored by the National Aviation Club, was one of the finest and smoothest run air shows ever presented. The show schedule called for a 1:25 start and a 4:20 finish. During the two hours and fifty-five minutes in between, 17 acts were billed, each scheduled for from 5 to 30 minutes — with no time allocated between performances! The fact that the show ran on schedule is a tribute to the fine planning of the National Aviation Club.

Two R/C demonstrations were scheduled into the show. One to open the show and again after the USAF Thunderbirds in the middle of the show (now there's a tough act to follow!). Since the spectators were spread along more than a mile of runway, five R/C sites were spaced about ⅓ mile apart in order for the spectators to see. On each site an R/C demonstration was given, with various types represented — dual gliders, Goodyear pylon, Antique (Antic), Aerobatic, and Biplane — six ships in all. The pilots, Joe Solko, Walt Good, Ray Smith, Pete Rawlings, Gail Jacobson, and yours truly were advised that we would be furnished transportation to our respective sites and would be expected to start engines and take off immediately on signal from the tower! The schedule must be maintained!! Ever watch the beginning of a Goodyear race? Getting four engines to start on cue just doesn't seem to work.

As the time for our first flight approached, so did our "transportation," in the form of a small StepVan. Everyone climbed aboard — six pilots, six airplanes and six mechanics. Inside were two walls, a roof and a floor with not a sign of a handhold! As soon as all were on board, the driver "took off" — 30 miles per down the grass and miraculously we all managed to get to our positions with both body and ship intact. On signal from the tower, the two gliders leaped into the air on their Hi Starts and simultaneously four engines sprang to life — within 10 to 15 seconds six R/C ships were in the air, to the delight of the crowd (and the fliers).

The second demonstration went on cue just as the first and certainly somewhere in that crowd of 75,000 to 100,000 people there must be a few converts to the "Sport of R/C." The AMA is to be commended for presenting such a favorite picture of our hobby to the public.

●

More and more of the "ready-to-fly" breed seem to be appearing on the field. We are currently working on a Lanier Sabre, and will report on it in a future issue. Appears to be exceptionally nice, with a realistic appearance.

For the flyer who wants stock kits or custom built balsa ships, Canada Custom, 189 Woodville Ave., Toronto, Canada, may have the answer. Canada Custom will build just about anything. We recently received from them a model of the Waco Bipe used by the Movieland of the Air Museum. The ship is built basically from a Sterling PT-17 kit, modified as required. The construction and workmanship in our ship were excellent. The models are shipped in STRONG wooden crates and ours was received in perfect condition. The prices, which vary depending on the ship, are high, but reasonable for the amount of work involved. The only difficulty that we encountered was in getting the ship delivered to us. Although shipped by Air Express, at a cost of $37, the 6½ foot crate took two weeks to arrive. Another 2 days delay getting it to customs and finally we went to pick up our ship. Upon arriving at the U. S. Customs office, we were greeted by the friendly inspector, pinch bar in hand. The crate was opened, the inspector looked in — "yeah, it's a model airplane." Then the crushing blow as the inspector leafed through his customs book to the heading TOYS!!! "Stuffed — mechanical — inflatable — spring motor — electric motor — plastic — OTHER. Yes, this must be it, other, since you can't fit the other classifications. That will be 35%!$$!"

It is our opinion (based on our sample)

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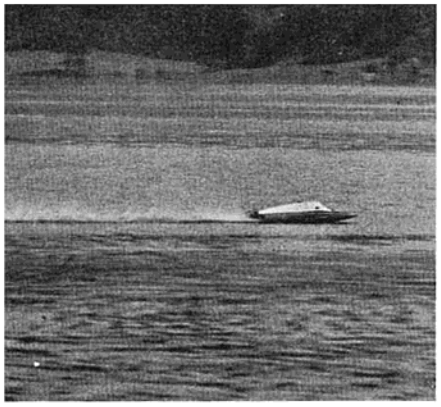


Above: Ed Kalfus' White Heat 60 at over 52 mph and not a record! (See text.) Right: Thirty years of model boat racing experience, Ed Kalfus and his "Oops."

New record holder. Happy Allan Schwemmer of Fresno, Calif., set new all time monoplane speed record of over 32 mph.

1967 I.M.P.B.A. INTERNATIONALS

By Jim Whitlatch

THE San Francisco Model Yacht Club was host for the 1967 International Model Power Boat Association International Regatta, August 12 and 13 on Spreckels Lake in Golden Gate Park and Lake Merced.

By using two lakes just a few miles apart, one for ¼ mile oval and the other for 1/16 mile straight away many more attempts were made by the contestants. Even so, on noon Sunday when the lakes were shut down so that the multi boat racing could start, there were many still anxious to get "one more time" thru the traps.

I'll leave the description of the boats to Cy Crites in the Roostertail Column. Just let me ramble on about impressions gathered by first a contestant and secondly a reporter.

1/16 Mile Straight Away

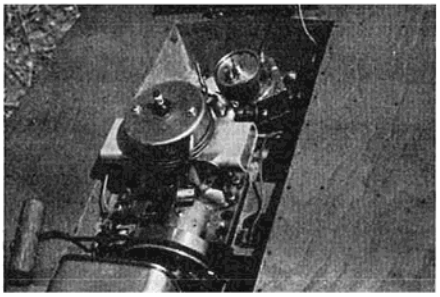
The San Francisco Club certainly deserves a lot of praise. They came up with a we-l run meet and a stroke of genius — the use of two lakes. It was surprising to me to see how much more interest there was in the 1/16 mile straight versus the ¼ mile oval. There was always a long list of "waiters" at Lake Merced where the 1/16 mile traps were set up, while at the ¼ mile oval on Spreckles you could run almost immediately.

Even the Mid-Westerners, who are so hot on the ¼ mile, were lined up waiting to be timed thru the 1/16. Some outstanding times were recorded at both lakes. Being such a ski boat enthusiast I was probably most impressed by the very first run of the Meet. Allan Schwemmer of Fresno, Calif. ran thru the 1/16 with a two way average of over 32 m.p.h., the fastest time ever recorded by a monoplane hull! He did it running a very unusual hull, the Flying Flapjack "1". The design is an original by Glen Spickler of Bakersfield, Calif., and is strictly a straight away record hull if I ever saw one! Allan was running a new Super Tigre G 21/40 of .40 cu. inch displacement with a stock Super Tigre carb throttle. He had an Octura X-50 prop on an articulated type drive shaft, however he was using this only to straighten out the thrust line. He steered by a conventional deep blade rudder behind the prop. His "scratch built" digitrio radio worked flawlessly — (don't they all — Ed's. note).

The .49 class hydro record in the 1/16 also was raised. Griff Parker of the San Diego Argonauts turned a very hot 39.82 M.P.H., he was pushed hard by Dick Norsikian who was also close to record time.

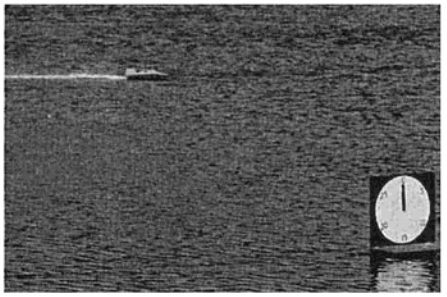
Certainly one of the most outstanding model boats ever seen on the coast was entered by Ed Kalfus of Poughkeepsie, New York. The hull was an Octura White Heat 60. Power? Ed's ex-tether boat record holding .90 cu. inch home made beauty! All the hardware including the articulated steering strut and the prop were hand made, or I should say made by Ed in his home machine shop! No boater had ever seen such acceleration! From a bare idle to full top speed in just a few feet. And what a top speed. Over 52 m.p.h. —faster than any RCM model boat has ever gone. A new record? No, sad to say it wasn't. One of the IMPBA rules states that on record runs you can have only five minutes of "water time," (time after launching). Ed's radio must have gotten too much cold San Francisco fog because it kept going into "fail safe" at the end of his runs. Finally,

Ed's power house. Homemade right down to the castings. Ex-record holder in his tether boats.



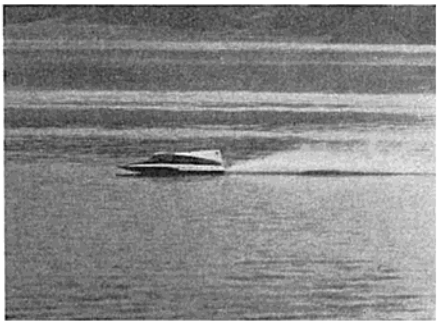
Mike Meelbusch prepares to start his Hydro Phobia "Full house" O&R powered White Heat XV.

Mike's very hot hydro going down the back stretch on his way to winning large engine class multi race, floating 30 second starting clock showing.



Jack Henderson with scaled down White Heat 30. Super Tiger 19 square port won three first place trophies. Spreckels Lake with its curb.

Don Tucker with potent White Heat 4-60, Rossi powered. First place in hotly contested 60 class ¼ mile oval.



Steve Muck's surface prop driven White Heat 4-60 with Rossi, second place in Multi Race.

after several hot runs up and down thru the timing traps the radio went completely out of range and again into fail safe — engine at an unbelievably low tide idle and rudder neutral. The heart breaker to Ed was that he couldn't get the boat back into the beach before his five minutes were up and the engines wouldn't quit, either, so his fastest of all times couldn't be officially recorded as a record. He tried again Sunday after doing some radio check out but, again, had electronic trouble and couldn't get in his required official runs. Better luck next time Ed.

¼ Mile Oval

Although there was more interest and entries (58) in the 1/16 versus 40 entries in the ¼ mile there were four new records set in the oval and only two in the straight away. Class C (.29) Mono and Class D (.40) Monoplane ¼ mile oval records were set by the author's old reliable little ski boat. I was running a K & B .29 rear rotor in C and a new Super Tigre G 21/40 (.40) in D, and of course alternating engines in the same hull to change classes. The times were 40.4 seconds (22.27 mph) for C and 38.2 seconds (23.56 mph) for D. The Kraft three channel digital works so well with no attention I almost forget I'm running R/C.

Gary Preusse from the Chicago area, lowered the Class E (.60) monoplane ¼ mile oval record to 38.4 seconds (23.43 mph) running a Rossi in his Thunderbolt all fibreglass ski boat. Gary tells me that his Thunderbolt Kits are turning out to be his best sellers and after seeing them run I can see why.

Mike Meelbusch from Northbrook, Ill., and the DeVry Dolphins set a new F class (above .65) monoplane ¼ mile record running a ski boat powered by an O & R. The O & R was "full house Octura." Rotary valve conversion replacing the reed valve and a racing carb also from Octura as was all the other running hardware. An unusual but very effective feature for a ski boat was the use of an articulated — steering strut. So a day and half of record attempts came to a close with six new ones on the books. Not bad considering how difficult it is to get the correct fuel, prop, needle setting, etc., in a new climate especially in the cold damp fog situation in San Francisco's so called "summer."

MULTI BOAT RACES

The Sunday afternoon multi boat races were divided into three engine size classes (.00 — .20) (.21 — .50) and (.51 and over) with all hull types combined, running hydros against ski boats. In an attempt to keep the Mid-Westerners from relying on their reflex action while running the standard ¼ mile oval the San Francisco Club decided to modify the multi course. It was a rectangle with four markers and a long straight away. Frankly it didn't seem to help or handicap either East or West. The expected challenge from the West's surface prop hydros never materialized so the absence of the sharp and tight corners of the standard ¼ mile oval didn't help them.

In the small engine finals Jack Henderson of Sylmar, Calif., ran away and hid from Steve Muck and Jim Gale, fellow Modeleers Club members from Los Angeles. Jack had previously won both straight away and oval events with his "scaled down" White Heat 30 with steering strut and Super Tigre 19 power. Jack's three first place trophies prove you don't have to be an old timer to be successful in R/C boating!

The .40 size class ended up with all three top places going to almost identical ski boats. I was lucky enough to take the top spot with Dick Norsikian of Los Angeles taking second and Steve Muck third. Both Dick & Steve were running replicas of

(Continued on Page 53)

40 class multi winners—all ski boats. Jim Whitlatch on right, first place; Dick Norsikian left side, second place; and Steve Muck middle, third place.

All bench jockeys' eyes were on the lake during Ed Kalfus' runs.

The Roostertail

The Official Publication of the International Model Power Boat Association
General Office:
3638 S. 61st Court, Cicero, Ill. 60650

MR. FRANK SNOWDEN of the San Francisco Model Power Yacht Club promptly mailed the Roostertail the results of the I.M.P.B.A. Regatta. To make things even better, he has provided some additional information of general interest. For example, he has provided a breakdown of entries:

Monoplane
Straight 1/16

Class A — 2
B — 4
C — 1
D — 9
E — 12
F — 7
Total 35

Monoplane

Oval 1/4

Class A — 1
B — 7
C — 1
D — 7
E — 7
F — 4
Total 27

Hydroplane Straight 1/16

Class A — 0
B — 1
C — 0
D — 5
E — 15
F — 2
Total 23

Hydroplane Oval 1/4

Class A — 0
B — 1
C — 0
D — 6
E — 4
F — 2
Total 13

Multi Boat Racing

Class A — B — } 9
C — D — } 16
E — F — } 23
Total 48

The above data will be of use in determining the expected turn out in the engine, hull, and course events. I believe this is the first time we have had a breakdown of entries, and we will make an effort to obtain this statistic in the major regattas in the future.

Before we head into the results by class let us review the records that were broken at the meet.

1/4 MILE OVAL

Holder	Class	MPH	Time
Gary Preusse,	E-Mono	23.43	38.4
Jim Whitlatch,	C-Mono	22.27	40.4
Jim Whitlatch,	D-Mono	23.56	38.2
Mike Meelbusch,	F-Mono	23.25	38.7

1/16 MILE STRAIGHT

Holder	Class	MPH	Time
Alan Schwemmer,	D-Mono	32.23	6.98
Griff Parker,	D-Hydro	39.82	5.64

Congratulations! This sort of progress indicates that the potential in speed is being exploited and that we can look forward to finding out what it took in the way of equipment to accomplish this type of performance. The next Roostertail will contain a detailed description of the record holders' boats and the following winners:

Straight 1/16th

Class A 0 to .10
Monoplane — 1st Jerry Dunlap, Seattle, Wash. 9.0 MPH.
Hydroplane — No entries.

Class B .10 to .20
Monoplane — 1st Steve Muck, L. A., Calif. 20.23. 2nd Jack Krohn, L. A., Calif. 19.70. 3rd Dennis Helgeson, Seattle, Wash. 15.89.
Hydroplane — 1st Jack Henderson, Sylmar, Calif. 24.01.

Class C .20 to .30
Monoplane — 1st Jim Whitlatch, L. A., Calif. 29.87.
Hydroplane — No entries.

KITS & PIECES

(Continued from Page 44)

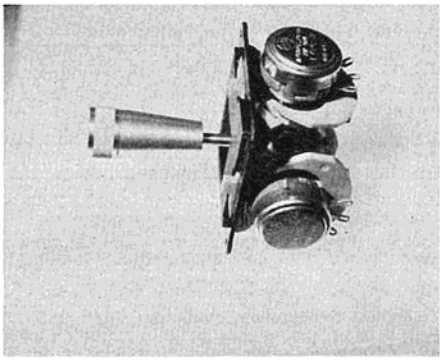
that the quality of Canada Customs Products warrant the prices, and can thereby recommend them to the well heeled R/C'er. We do feel, however, that the additional shipping and duty charges are a bit unreasonable, and would recommend that some correspondence precede delivery in an attempt to reduce these costs.

●

Mor-Crafts Products (they're the people who make field boxes, storage racks, etc.) have branched out into the accessory field. Of particular interest at the recent Indiantown meet was their new vertical whip antenna for R/C aircraft. The unit allows the whip to be completely retracted into the ship when not in use, eliminating that dangerous piece of wire jutting from the plane. As an added feature, should you neglect to extend the antenna, the antenna remains full length even though retracted! This little jewel is highly recommended. Tentative price, about two bucks!

●

Another item receiving rave reviews at Indiantown was the new three axis control stick from R/C Development, 1836 Alabama Ave. Fort Wayne, Indiana. Just the thing for Digitrio builders. A separate third axis stick is also available to fit the Bonner control stick. If you like single stick operation, this could be for you. We are currently using one of these on our Digitrio — we like it!

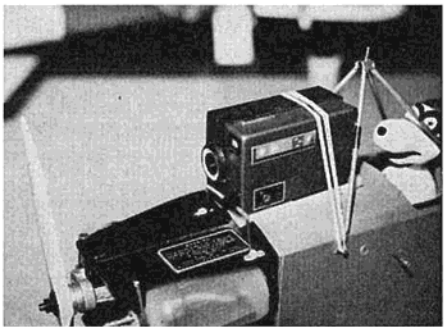


●

And so, as Snoopy climbs to the cockpit, armed with a new 8 mm — don't be surprised if someday a pooch flies up to you and says — "Smile, you're on candid — *doghouse*?"

Till next month—Curse you Red Baron!

Snoopy's new 8mm machine gun!



SHOP & FIELD

(Continued from Page 43)

leaves about ¼" beyond the leading and trailing edges which are wrapped around. Using a knife, and working on the plastic side, the curve of the wingtip was cut off flush. The opposite bottom wing panel is done in the same fashion, resulting in a ½" overlap in the center section. The top of the wing is done in the same manner except for the tip. Here, the Contact was cut with the knife about ½" beyond the tip and small slices about ¼" were made from the trailing edge to the leading edge, and wrapped around, starting with the trailing edge. Each little strip overlapped the one before it, leaving a fairly smooth edge which was rubbed smoother by using a small piece of wood and working toward the trailing edge. This material has no odor, is not too heavy, and does come in various thicknesses. Variations in temperature does cause slight sagging although it will return to a nice tight fit.

— Si Corson, Valley Forge SS


EXPANDING
THE LEGENDARY
FEATS OF
HERCULES
170.000 HOURS...
HELLENIC AIR FORCE