49115 MARCH 1983 $2.25 U.S.

RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

03
0 71896 49115

VOLUME 20 NUMBER 3 USPS 509190 ISSN 0033-6866 MARCH 1983

R/C MODELER

THIS MONTH'S COVER

features Miss Apryl Allen shown with a Byron Originals' P-51D Mustang built and flown by Ron Kummer of Pickerington, Ohio. The P-51D is powered with Byron Quadra Drive and utilizes a Royal radio. Transparency by Lewis H. Gray (who, ironically, furnished us with our March '78 and March '79 covers!).

R/C MODELER is published monthly by R/C Modeler Corporation, Don Dewey, President. Editorial and Advertising offices at 120 West Sierra Madre Boulevard, Sierra Madre, California 91024. Telephone: (213) 355-1476. Second Class U.S. postage paid at Sierra Madre, California and additional mailing offices.

Postmaster: send address changes to R/C Modeler, P.O. Box 487, Sierra Madre, CA 91024

EDITORIAL CONTRIBUTIONS are welcomed by R/C Modeler, but cannot be considered unless guaranteed exclusive. Manuscript must be accompanied by return postage and any material accepted for publication is subject to such editorial revision as is necessary, in our discretion, to meet the requirements of this magazine. Editorial material is selected on the basis of general interest to the radio control enthusiast and the publisher assumes no responsibility for accuracy of content. The opinions stated in published material are those of the individual author and do not necessarily reflect those of the publisher. R/C Modeler Corporation assumes no responsibility for loss or damage of editorial contributions. Upon acceptance, payment will be made after publication at our existing current rate, which covers all authors rights, title to, and interest in, the material mailed including, but not limited to photos, drawings and art work which shall be considered as text. Submission of the manuscript to R/C Modeler expresses a warranty, by the author, that the material is in no way an infringement upon the rights of others. Note. The review or discussion of any product by RCM does not constitute an endorsement of that product nor any assurance as to its safety or performance by RCM.

SUBSCRIPTION RATES: The United States $24.00 per year, $47.00 two years. Foreign subscription including Canada and Mexico $32.00 for one year (no two year foreign). For further information, see subscription ad. Change of address notices, undelivered copies and orders for subscriptions are to be sent to P.O. Box 487, Sierra Madre, California 91024. Allow 6 weeks for new subscriptions and changes of address. Back issues available: $2.75 U.S., $3.50 Foreign.

ADVERTISING: Send advertising copy and complete instructions to Advertising Department, R/C Modeler, P.O. Box 487, Sierra Madre, California 91024. Telephone: (213) 355-1476.

FROM THE SHOP

Don Dewey

We had a brilliant idea early last year. How's that for a profound statement? This idea related to our involvement in "Consumer Protection." Although we have no legal control over the hobby industry, their methods of doing business, or their products, we do feel a sincere concern regarding the modeler getting a fair deal on his purchases.

A two page questionnaire relating to various problems was compiled and sent to some forty companies selected from our advertisers index. A portion of the cover letter was as follows:

R/C Modeler Magazine is requesting your assistance by providing information to be used in a series of articles.

This series is intended to advise the consumer of the correct and appropriate action he should take to resolve his dissatisfaction or problem with a product. We plan to publish separate articles on radios, engines, kits and accessories, and mail order buying.

Our inspiration for this series has been prompted by the dozens of letters and phone calls that we receive each month soliciting our advice on getting the readers' problems resolved.

We have no desire to stick our nose in your business operations as we have enough consumer problems of our own. This is an effort to make the situation a bit easier for everyone involved.

The response was prompt and from approximately 90% of those contacted. That's not too bad — but why weren't those articles ever published?

There are several reasons, foremost is that the articles would be too boring since the answers were quite similar. This repetition would also eliminate the value of a series. Then, it is logical that most of the industry people are proud of their companies and products and want to continue in business, all of which is predicated on customer satisfaction. Some of the suggestions and/or instructions that were offered are basically a common sense approval and are, in an abbreviated form, as follows.

First step, if you have a problem, is to contact the place of purchase. If it was a local hobby dealer, that simplifies things; if not, then you should write or phone your supplier. Rule number 1 — be courteous and specific. Intimidations, threats and profanity will not only be unproductive but just might destroy any hopes of cooperation. "It doesn't work," "It's no damn good," It's a pile of junk"; these aren't acceptable descriptions. Be specific, advise of circumstances, what you did or did not do, what the item does or does not do, etc.

Secondly, if you contact the manufacturer, ask for the Customer Service Department. Rule number 2 — not only follow rule number 1 (above) but be honest about the problem. Let's face it, the manufacturer knows his own product better than anyone and can quickly detect a misrepresentation. Also make sure that you have read and understand the instructions. Here, again, describe specific problems as far as possible. This is the time to inquire of shipping, repair costs, warranty coverage, etc., so that you will know what charges, if any, that you may expect. It's better to know these things before you send the product back to the manufacturer, surprises aren't too exciting when they cost you money.

The third step relates to returning merchandise to the manufacturer. As nearly as possible, return the item in its original condition and in the original shipping container. For instance, in the case of radio sets, remove the servos from the mounting tray, it will cost less for you to do it than it will a factory technician. Of course you must include the specific description of the problem in the package. Your previous letter or phone call probably wasn't handled by the service person who will be handling the merchandise. Unless the problem is obvious, you can speed things up by giving them a clue. Just saying "fix it" isn't very specific.

The foregoing words are really saying that you can get faster and better service if you will help them help you. This applies to the established reputable companies. Unfortunately an occasional rip-off operation appears on the scene, grabs a bunch of money and disappears. Con games and scams seem to turn up anywhere there are easy bucks to be made and our hobby attracts its share.

Then we have the honest guy who has a super neat gizmo, his flying buddies and fellow club members all want one so he decides to go into business and get rich. He isn't aware of advertising costs, lead time, cash flow, his own time involvement , and a myriad of other problems that consequently force him out of business. Frequently his struggle for survival is at the expense of the modeler.

You can see that our brilliant idea turned into a can of worms. A subject of this nature gets to be pretty complicated, almost to individual cases. We still have our

to page 201

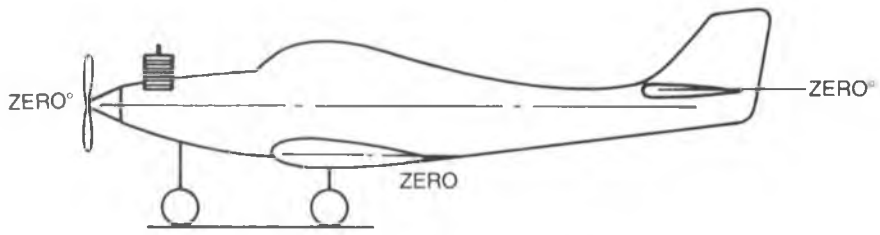
Where do models end and man carrying aircraft begin? Charlie Viosca, big jet pilot extraordinaire and expert scale RC'er, sent in these photos of the Bede 5 jet.

Charlie is shown in the cockpit of the tiny single place fire-breathing speedster. Please do not write for anymore info on the Bede 5 jet, this is all we have.

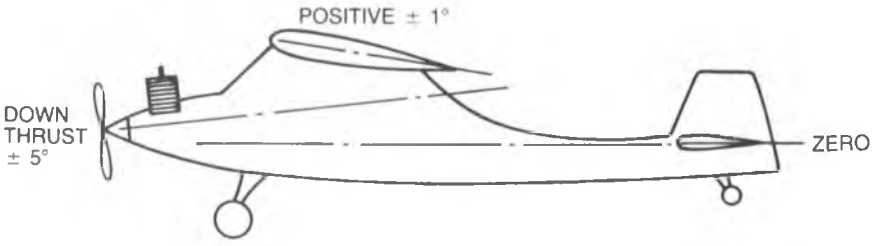
CUNNINGHAM ON R/C

Chuck Cunningham

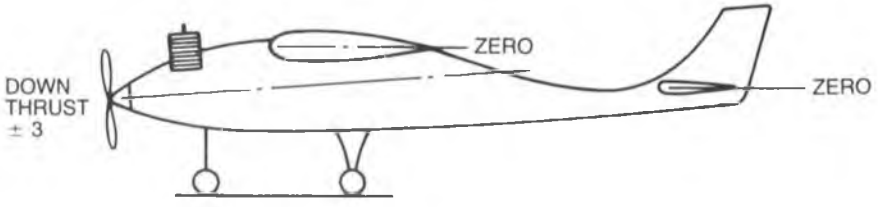
I have been reminded that every few years an entire batch of new people wander into the fantastic world of radio control modeling and flying, and that every few years I need to go back to the basics a bit and pass along as many helpful thoughts and ideas as I can to make this entry easier. A couple of weeks ago I presented a program at a model club that sports 140 members. As usual, only about a third of the membership were at the meeting. I took a very informal survey of the room to find out the number of years spent in the hobby and the interests held by these members. As expected, over half had been in RC for less than two years. Only three of those present had been in modeling for more than twenty years. Interest levels ran about same, with the great proportion having built and flown only trainer type aircraft.



"ZERO" THRUST — ZERO WING — ZERO STAB



BASIC TRAINER
ADD DOWN THRUST



ADVANCED TRAINER
ADD ± 3° DOWN THRUST

The guys who had been chopping balsa and thumbing control sticks for over twenty years had tried just about every phase of RC that is known. The unfortunate thing about RC is that so many come onto the scene, give it a try for a while, overcome that first big obstacle of learning to fly, then slowly fade from sight, never really learning how to fly, and never really learning what enjoyment lies just around the next RC corner.

With these thoughts in mind we are going to embark on a series that should be helpful to the beginner, may provide some information for some of you who have been at this sport for awhile, and may show you what you're missing by not staying with this greatest of all hobby/sport.

This month let's talk about transmitters and receivers --- what they do (not why, because not one modeler in a hundred gives a hoot about why), and what happens to the model when a control stick is pushed in a definite direction. And, what happens to the flight path of the aircraft when that control surface moves to the command of the transmitter.

All of today's radios look somewhat similar, and work about the same. The perfection generated by this radio equipment is super. The sticks move smoothly under your control, and the servos reaction to the stick movement is directly proportional to that stick movement, even on the less expensive sets.

to page 190

POWER BOATING

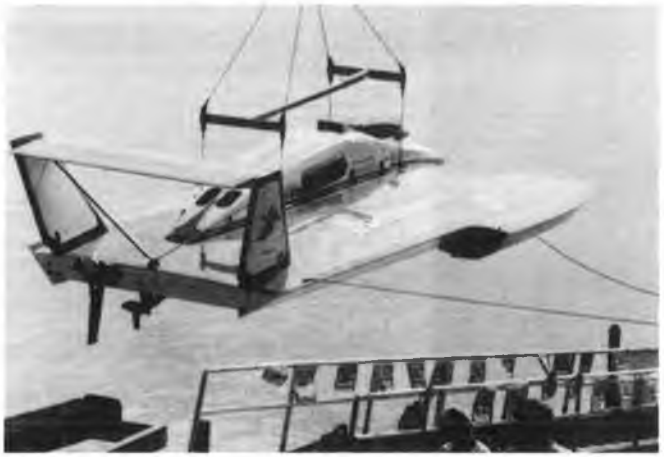
Howard Power

On the weekend of September 17th of last year the Circus Circus Thunderboat Regatta was held in San Diego. We attended this race and came home with a ton of very interesting pictures of the big unlimited hydro boats. My own favorite subject of study was the 81 National Champion U-1 Miss Budweiser shown in Photo 1. The boat is about to come off plane as it enters the pit area. This boat is one of the latest designs used in unlimited racing. The boat features engine offset and a cockpit that is mounted to the left side of the boat centerline. These features improve turning to the left. The boat is powered by a 2,239 cubic inch Rolls Royce Griffon aircraft engine, two of which are shown in Photo 2. Most teams only get three runs on each motor before overhauling is necessary. No wonder the Bud team keeps four to six engines ready for each race.

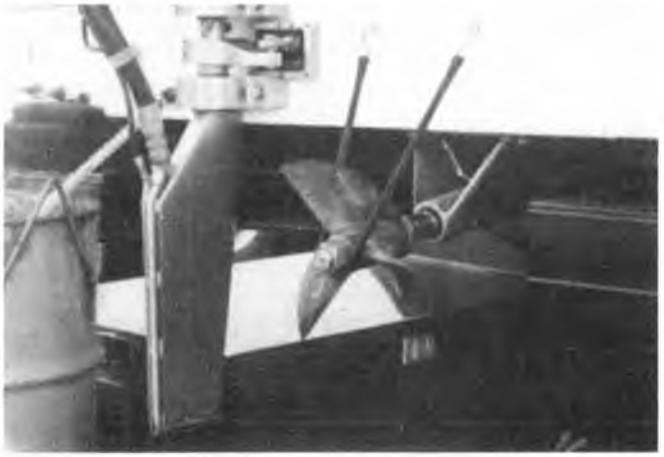
Miss Bud entering the pits.

Photo 3 shows Miss Bud about to enter the water via an overhead crane. This view shows the general arrangement of the boat very clearly. The boat is a cab-over design, hence the cockpit is forward of the engine compartment. Just aft of the cockpit you can see the supercharger intake scoop protruding from the top of the cowling. To the rear of this scoop the engine exhaust stubs protrude from the sides of the cowling. The boat is a three point hydro so it is designed to plane on the two front sponson ride surfaces and the propeller supports the boat at the rear. Miss Bud uses a three bladed propeller which is a bit unusual since most of the other boats use a more conventional two bladed design. The hull has an adjustable horizontal tail surface mounted high above the deck. This aerodynamic surface is used to help stabilize the hull just as the tail of an airplane does. It is adjustable in the pits to allow minor riding trim changes. The hull has a "pickle fork" bow design that reduces the forward generation of lift as air travels around the hull. The aerodynamic design of the hull lifts the boat up when at speed so that the total weight of the boat is not supported by the planing surfaces. Inspection of the transom of the boat shows how the bottom's tunnel-like design helps pack the trapped air under the aft section. The rudder is mounted to the left side of the propeller so that it is not in the prop blast or roostertail. Photo 4 shows the propeller and rudder mounting in greater detail. The rudder has a wedge shaped profile and has a water cooling

Rolls Royce Griffon engines waiting for a heat.



Miss Bud on launching crane.



Miss Bud prop and rudder mounting.

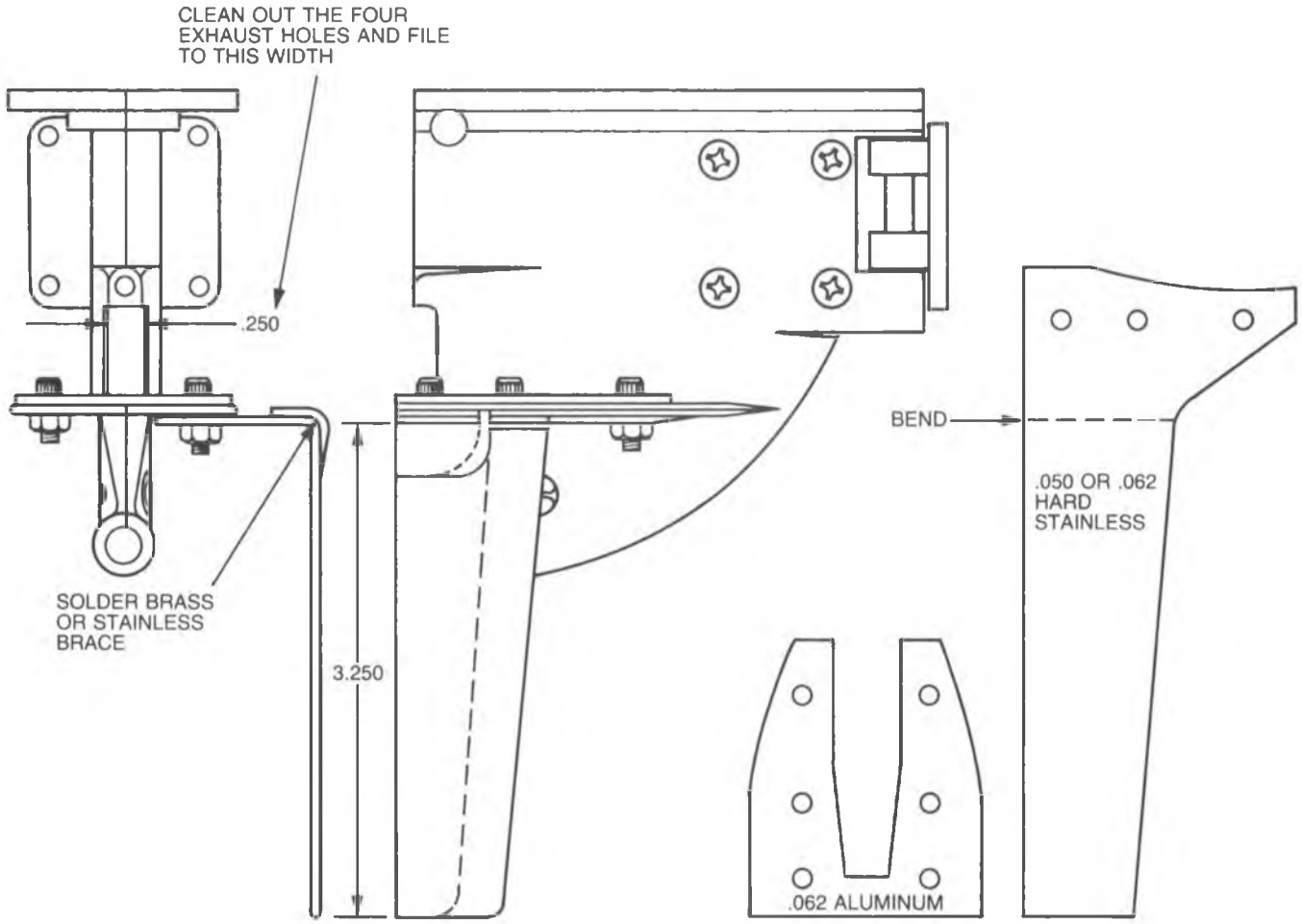
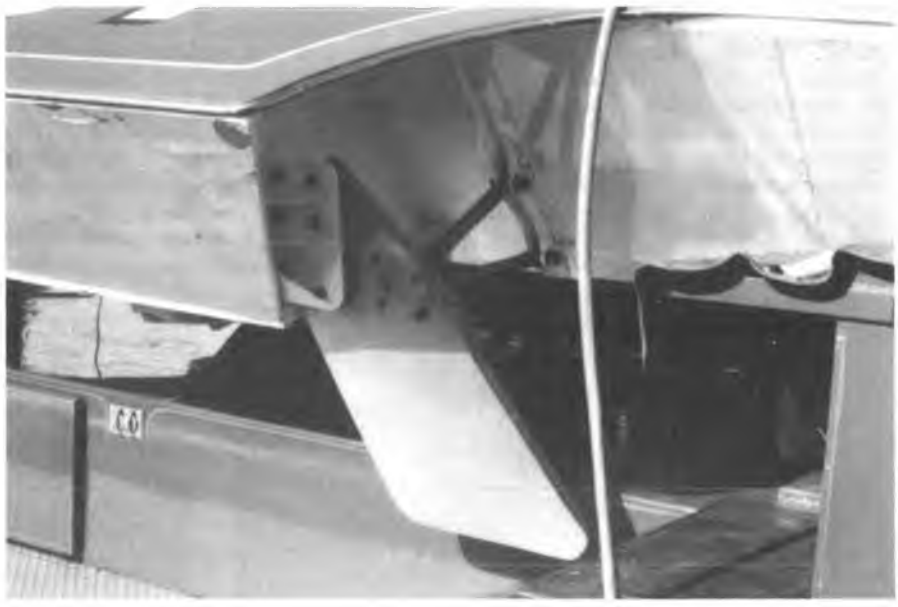


FIGURE 1
OUTRIGGER OUTBOARD LOWER END MODS.

pickup tube welded to the tip and trailing edge of the blade. The high pitch, three bladed, cleaver propeller is attached to the drive shaft with the conventional prop nut and splined shaft arrangement. The strut has two vertical blades which form a vee shape to more efficiently withstand the tremendous side force developed by prop loads. The drive shaft is supported in the strut by a Teflon bushing that has multiple grooves along its axis to cool and lubricate the bearing surfaces. This bushing is replaced when the driver complains of excessive drive line vibration.

Photo 5 shows the turn fin mounting system. I would estimate that the turn fin was approximately 2" thick and, as the photo reveals, is very well-supported. The fin is hung on the outside edge of the left sponson and is tied into the center hull structure by a pair of struts. The fin is very large and deep so that it can develop enough side force to keep the boat from sliding excessively in a tight turn. The fin is angled inward to develop a rolling force that tends to keep the hull level in the turn. These boats turn to the left so that the turn fin is mounted on the inside or left sponson. This inside sponson has a very steep non-trip angle because the boat never slides inward while turning.



Turn fin mounting.

Photo 6 shows a front view of this left sponson. Sharp-eyed readers can see the inward tilt of the turn fin in this view. Also notice that the riding surface of this sponson is on the

outside half of the sponson. Notice the high outside non-trip surface angle and that a smaller non-trip surface is placed on the inside of the running pad so that the boat slides while turning without catching the inside edge. This tends to smooth out turning characteristics. Notice also that the running surface actually has anhedral (the outside edge is lower than the inside edge) instead of the more usual dihedral. I would guess that this angle allows the sponson to develop a side force that helps turn the boat to the left.

Photo 7 shows the side view of the left sponson. The cut-out allows a deeper relief of the inside half of the sponson so that the wetted surface is only the outside half while running at speed down the straights. The sponson brace ties into the center of the hull for added strength. Also notice the aluminum angle stock that has been bolted to the bottom surface of the tunnel just aft of the leading edge. A strip of plexiglass is mounted on this angle stock and presumably indicates that a little too much air was being trapped at high speed. This fence spoils the flow around the leading edge and reduces the lift on the front portion of the hull.

Photo 8 shows the fence and sponson brace more clearly. The right sponson riding surface has dihedral and no inside non-tripping surface. The outside non-tripping surfaces are, however, dual and are at a considerably smaller angle than those on the left sponson. This insures that the outside sponson can slide in the turns without catching.

Many, if not all, of these big boat features can be used to improve our model boat running characteristics. I would enjoy hearing from those of you who modify their own boats to try some of these design concepts. Write to me even if it doesn't work. Many times knowing what **doesn't** work is as important as knowing what will.

★

Jack Garcia of K & B Manufacturing, sent me the drawing of a K & B 3.5 outboard lower unit shown in Figure 1. These modifications are used when the 3.5 outboard engine is used on an outrigger type racing boat. The addition of the large rudder mounted on the cavitation plate allows the motor to develop plenty of turning power. The exhaust holes in the lower unit are also relieved as shown to let the motor breathe better when running at 25,000 to 30,000 rpm! Yes, sport fans, that rpm is not a typographical error. Most racers use 50% nitro fuel and either an Octura 1740 two bladed prop or an Octura 1740/3 three bladed propeller that has some reflex bent into each blade tip. Jack reports that these two props seem to work best on the Wing Ding 20 and Crapshooter El Diablo hulls. Jack personally prefers the 1740/3 propeller since it seems to smooth out the ride of his boat through the corners.

The power head used is the latest version of the 3.5cc engine. This engine features a new case, thicker cylinder liner, strong bar stock rod, and new nylon caged high speed ball bearings. If you use an older engine be sure to replace the rod and bearings with the new parts. If you use a high port timing liner you can expect slightly better top end rpm but the motor will not have as much low rpm torque as the normal port timing liner. If your motor bogs down in the turns, you might be better off with the low port timing liner. The carburetor is removed from the engine and no carb or draw tube is used. You should use a K & B speed needle valve assembly screwed into the front plate housing. If you try to use a carb the motor will not idle because fuel will be caught in the intake and flood the motor out except at high revs. You must use crankcase pressure with this intake set-up. Drill and tap the motor mounting lug to accept a K & B 4-40 pressure fitting.

Miss Bud left sponson configuration.

This pressure fitting is connected to the vent tube of your fuel tank by a length of silicon fuel tubing. Jack also suggests that you balance the cable drive rotor by grinding another drive slot opposite the stock one. The next run of motors will be coming that way from K & B.

Jack suggests that you oil the front bearing after every race since this bearing gets very little lubrication on the outboards. He also suggests that you oil the propeller shaft bearing before starting the motor for each day's running. This greatly increases its lifetime. Sometimes the motor will pick up water when running so Jack suggests that you use a shroud over the intake to get more consistent runs. Jack also used a hull mounted water pickup instead of the stock one. Believe it or not these little motors can actually overheat if sufficient cooling flow is not available.

A word of caution to you sport boaters is in order. These engine modifications are for top performance

to page 187

Left sponson side view.

Right sponson front view.

RCM PRODUCT REVIEW

Johnnie Casburn Mfg. LFX-5

SPECIFICATIONS

Name	LFX-5
Aircraft Type	Pattern
Manufactured By	Johnnie Casburn Mfg. Co. 5821 E. Rosedale Ft. Worth, Texas 76112
Mfg. Suggested Retail Price	$179.95 list ($129.95 — mfg.)
Available From	Both Mfg. and Retail
Wingspan	64 Inches
Wing Chord	11 Inches (Avg.)
Total Wing Area	704 Square Inches
Fuselage Length	54½" (rudder to spinner)
Stabilizer Span	25 Inches
Total Stab Area	156 Sq. In.
Mfg. Rec. Engine Range	.60
Recommended Fuel Tank Size	12-16 Oz.
Recommended No. of Channels	4 or 5
Rec. Control Functions	Rud., Elev., Throt., Ail. Retract Gear optional
Basic Materials Used In Construction:	
Fuselage	Fiberglass & Ply
Wing	Foam, Ply Skins, Balsa
Tail Surfaces	Foam, Ply Skins, Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (1½ pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Airtronics
Engine Make & Displacement	OPS Super .60
Tank Size Used	16 Oz.
Weight, Ready to Fly:	126 Oz.
Wing Loading:	25.7 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

High degree of prefabrication, general appearance of finished aircraft, flight performance.

WE DIDN'T LIKE THE:

Marginal plans and instructions.

The LFX-5 is a .60 powered competition pattern aircraft manufactured by the Johnnie Casburn Manufacturing Company, 5821 E. Rosedale, Forth Worth, Texas. The LFX-5 is advertised at a list price of $179.95, however, it has been regularly advertised at a special sale price of $129.95 by the manufacturer.

The LFX-5 is neatly packaged in two separate corregated boxes, measuring 5" x 11" x 51" and 6" x 13" x 33". A colorful and attractive label showing the finished aircraft and basic kit information highlights the LFX-5 packaging.

Construction:

The 32" x 57" plan sheet is accompanied by one and a half 8½" x 11" pages of written assembly instructions. Both the plan sheet and written instructions are very basic. In addition to the minimal amount of assembly instructions, several errors were noted on the plan sheet. The experienced modeler will be able to complete this kit without any major difficulties, although certain unanswered questions will be raised. For the modeler who is building his/her first full competition pattern aircraft, the LFX-5 will present several perplexing assembly questions. The errors on the plan sheet (landing gear block placement dimensions do not match the shown position, wing tip blocks are shorter than shown, fuselage bulkhead position not shown, etc.) combined with the general lack of useful assembly information, present the most serious flaw in this kit. This is truly unfortunate, as the LFX-5 is in most other aspects a fine kit.

The LFX-5 is a highly prefabricated kit and, in spite of its plan sheet/assembly instruction deficiencies, assembly is quite rapid. The fuselage is a molded epoxy/fiberglass cloth unit with the vertical fin molded in. The glass work quality is excellent although the bottom fuselage seam was slightly misaligned when the two fuselage halves were joined together. The application of a mixture of epoxy and micro-balloons to this area easily corrected this flaw.

The foam wing and stabilizer cores are completely presheeted by the manufacturer with 1/64" plywood. The wing panels also come with the trailing edge cap installed. The LFX-5 has no leading edge strips on the wing, as the manufacturer installed 1/64" plywood skins neatly wrapped right around the leading edge in one continuous piece, from the top to the bottom. The quality of the presheeted wing and stabilizer panels was very good.

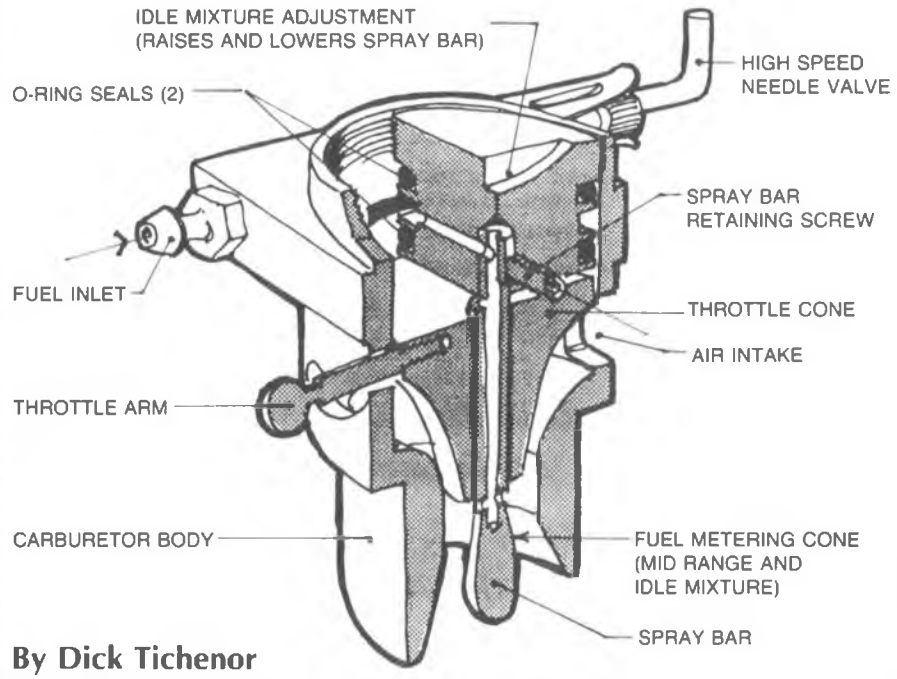
The rudder, elevators, ailerons, and tip blocks are all of pre-cut balsa. The wood quality was excellent. The wing tip blocks were cut shorter than as shown on the plan sheet. This meant that either a piece of aileron stock had to be glued to each tip block or that the ailerons had to be extended to the tip of each wing. We opted for the two piece tip block.

The fuselage formers and blocks are all machine cut and neatly sanded. There was one oval shaped, full fuselage

to page 182

The M & H VARIABLE VENTURI CARBURETOR

A new concept in carburetors for R/C engines



By Dick Tichenor

You may rightly ask, "Egads, another carburetor and what for?" Well, it is because of Joe Martin. Joe has traveled the R/C road for many years in pattern, scale, pylon racing and in manufacturing. Over all these activities he has felt that there could be a better carburetor with a more powerful top end, dependable mid-range, reliable idle, and be very easy (non-critical) to adjust.

Joe asked if we would try one if he sent it to our office. Our answer was something like "Hell, we'll try anything." The next day we received the carb. Weird, it ain't got no hole in the top. After the initial smart aleck remarks we got down to the serious aspects.

Basically, the fuel flows downward through a spray bar inside a movable venturi that adjusts the intake air as it is raised and lowered by a throttle arm riding in a spiral slot in the side of the carb body. Sounds confusing? Okay, that's why we are showing the cut-away drawing.

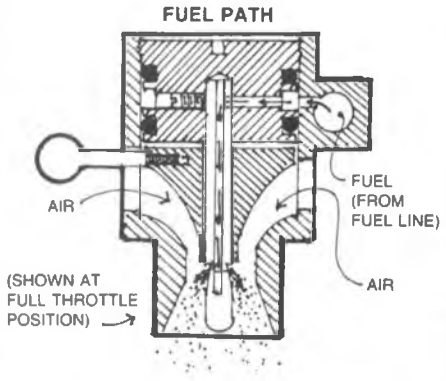
Our test bed flying machine still has the Fox Eagle III (gawd, what a powerhouse) installed and Fox has a bolt-on carb adapter that accepts the M & H carburetor neatly. Incidentally, the M & H carb is for .61 engines.

Without trying to razzle-dazzle anyone with a bunch of numbers we will say that Mr. Martin has achieved his goal. We did realize several hundred more rpm, a smooth transition, and a lower idle. Best of all, it was very easy to set up without having to fret about a couple of clicks on the needle requiring a restart.

As usual our initial linkage between throttle arm and servo arm was rigged for full top end travel with trim centered and low end full travel with trim at bottom. This worked out very well as we were able to get the full range desired with the trim at center and could stop the engine by pulling the stick and the trim to the bottom. That seems a bit better than grabbing the spinner to kill the engine.

We are quite happy with the M & H carburetor and intend to continue using it. If you aren't satisfied with the carb on your 61, Joe Martin's carb just might be what you need. It is available direct from Martin Enterprises, 170 Navaho, San Marcos, California 92069, (714) 744-0200. The price is $30.00, California residents add 6% state sales tax. □

CROSS SECTION VIEW



SUNDAY FLIER

Ken Willard

Now **that's** more like it! What's more like it? I'll tell you. This column is for all of you Sunday fliers. Doesn't matter what you fly, or why you fly it — sport, contest, experiment, relaxation (who relaxes?) — whatever. And yes, it's permitted that you fly during the week, too.

Now I'm supposed to be the **editor** of this column — not the writer. Says so right on the "masthead" page. I'm an "Associate Editor." That means I'm supposed to **associate** with all you Sunday fliers, get your comments and ideas, **edit** them and then present them to all your fellow Sunday fliers for their comments and observations. Yup.

So what's been happening? Oh, for quite some time I'd get a smattering of letters, most of which have some words like, "I've been meaning to write you for some time, but," — and then goes on to say why he (or she) didn't. And there I am, with a deadline coming up, no input, so I have to write something up or Dick Kidd gets on me for goldbricking.

That's easy for him. He's the "Technical Editor." All he has to do is read all that good technical stuff that comes in and edit it. Criminy dutch!

Well, you Sunday fliers finally came through — in spades. All I have to do this month is let you go at it. So go!

Last June I wrote some stuff on biplane arrangements. That started some letters coming in. Then I wrote a bit about pylon mounted props and slipstream. That got some more letters. The pump has been primed.

On biplane incidence settings, Brad Powers, 5470 Castle Hills Drive, San Diego, California 92109, came through with these comments:

Dear Ken:

When you ask for comments from your readers, I feel it is only right and proper to respond. (That'll teach you to ask for comments!)

Re: Biplane Decalage:

Full size airplanes are designed above all for safety so that student pilots, passengers, etc., will live to fly again. The usual criteria are stall problems at landing when control is sluggish due to low speed and no slipstream over the tail surfaces. Under these conditions it is desirable to have the upper wing stall first to bring the nose down to regain speed and avoid a stall. Where there is positive stagger (upper wing forward) this is accomplished by having the upper wing set at greater incidence. In the case of negative stagger (lower wing forward) then of course, the reverse is true. The lower wing should stall first to produce a stable (diving) moment.

While aerobatic maneuverability can be enhanced by some built-in instability such as higher incidence for the lower wing. It is achieved at the expense of safe recovery from a stall when landing.

Re: Wing and Tail Relative Incidence (Decalage):

For an airplane to fly, the wing must be trimmed to the desired angle of attack by the horizontal tail. Most wings on real airplanes are set at the angle of best L/D to get maximum range. This is about 3° for most airfoils. When this is done, the downwash from the wing puts a down load on the tail to trim the airplane. If the tail is properly proportioned it will trim the airplane for cruising speed when set at zero incidence . . . give or take a small amount of trim to accommodate variations in loading.

An airplane with a symmetrical section having zero incidence for both wing and tail will not fly without some up elevator.

Re: Engine Thrust Line:

Ideally, the thrust line should (a) pass through the CG; (b) lie parallel to the line of flight (usually the horizontal reference line). On rockets these conditions are usually both met. On airplanes the assymmetry due to low or high wing locations, landing angles, engine installations, etc., usually produce situations where the thrust line does not pass through the CG, even though it is usually parallel to the HRL. On real airplanes and R/C models this assymmetry is overcome by a small amount of trim. On Free Flight models with high wings, downthrust is necessary to get the thrust line through or nearly through the CG.

Side thrust is also desirable to overcome torque. However, since torque varies with speed, there is no ideal setting. That which is best to overcome torque at take-off may be disadvantageous at high speed. On controlled R/C models, I see no advantage in offsetting the thrust line either vertically or horizontally.

I would agree with Bud Craighead's explanation of the difference in performance when the engine is mounted above the fuselage.

text to page 26

Doug MacBrien with his 1/5 Scale OS-2U Kingfisher. See text for details.

Doug's Kingfisher in action.

SUNDAY FLIER

from page 24

Re: Down Wind Turns:

I missed your classic article on downwind turns, but here are my two cents anyway.

There are two kinds of downwind turns. One involves no hazard, the other can be very hazardous.

If the pilot cannot see objects on the ground he cannot tell whether he is retracing his path at each circle . . . as would be the case in still air . . . or if he is drifting. His airspeed indicator will show constant speed in either case.

To an observer on the ground, the path of the airplane will describe a circle in still air or a path similar to the old penmanship exercises if there is a breeze.

In still air the airspeed and ground speed will remain constant and equal. When there is a wind the airspeed will remain constant but the ground speed will vary . . . increasing on the downwind leg and decreasing on the upwind leg as perceived by an observer on the ground. Since his airspeed remains constant no hazard is posed as he turns while drifting.

If, however, the pilot (or an R/C pilot on the ground) wishes to maintain a constantly positioned circular path . . . say around a pair of pylons . . . which does not drift with the wind, then he must increase speed on the upwind leg and decrease it on the downwind leg. Under these conditions he might very well lose flying speed and invite a stall as he proceeds into the downwind direction while throttling down, and/or increasing angle of attack.

I enjoy your column.

Sincerely,
Brad

Brad is one of the better known aerodynamicists in the field — not only models but full scale as well. His opinions are based on years of study and experience. Yet not everyone will agree with him. Particularly on downwind turns — but fevvin's sakes, let's not get into **that** again.

Brad says flatly, "An airplane with a symmetrical section having zero incidence for both wing and tail will not fly without some up elevator." That's what I said, too.

So, here's our old friend Ted Off, c/o: Ojai Oil Company, 4820 Adohr Lane, Suite A, Camarillo, California 93010.

Dear Ken:

As this is being written in the political season, the word is "equal time." C.F. "My opponent has spoken. I demand equal time."

Your gag on Teed, Ted and Theodore would have been okay if someone could spell (it's not Theordore). In all honesty I can't stand the name Theodore but am stuck with it.

The real reason for this note is biplane downwash with wings of symmetrical section set at zero-zero angle of incidence to a reference line, to which the stab is also set at zero. My comment was that downwash causes the stab to fly at several degrees of negative incidence. You replied, "What downwash? . . . a symmetrical wing section, at zero incidence . . . ***and in this case zero angle of attack*** *. . . provides no lift . . . no downwash . . . the durn thing has to have some up elevator."*

With these fighting words (up elevator!), I called up my local dentist and pattern expert Don Thomey and asked him where the elevator was on his Curare when making a level pass down the runway. He said he cranked in a couple of degrees of ***down elevator*** *. . . take that and that and that.*

I have been misinterpreted. I didn't say anything about ***angle of attack*** *(the angle of the wing to the flow of air the plane is flying through). Obviously to get any plane with a symmetrical section and zero-zero-zero setting off the ground, something must be done to get the symmetrical section lifting (up-elevator, a longer nose wheel, etc.,*

etc.) . . . that is to give the wing a ***positive angle of attack.*** *Without this, the wing won't lift and the plane won't get off the runway. If the plane is flying, the wing must be lifting. If the wing is lifting, there must be downwash. This is true of a biplane or a low wing pattern job. All I said was that biplanes had stronger downwash.*

Sincerely,
Ted Off
Ventura, California

P.S. Can't find my June issue where this whole discussion started . . . ignore the following if it is incorrect: As I remember Dick Technors "Wicked Wanda" started out with a symmetrical section before Dick settled on a "Clark Y" type. My hidden question to the P.S. to my last letter was, "Why didn't Dick try 3° or 4° of positive incidence with his original symmetrical section rather than changing to a flat bottom." Peter Russell, in the English magazine Radio Control Models & Electronics, has been pushing symmetrical sections for "trainer type" models for the past year or so with some good arguments.

Sorry we misspelled your name, Ted. Most everybody gets "teed off" when that happens. It was a typo — like your spelling of Dick Tichenor's name. Guess we all make "mistrakes." We're sorry. But, regarding your dentist friend cranking in down elevator, the obvious question is, "From what original setting?" I can assure you that if the original setting was zero-zero, and both wing and stab are symmetrical, and he cranks in down elevator, he'd better be making that level pass inverted, or he sure as hell will be looking down in the mouth as he picks up the pieces!

Your observation that Peter Russell has been pushing symmetrical sections for trainers brings up a very good point. Why should "trainers" have flat bottomed sections for the wing airfoil? They tend to "balloon" when they come around and turn into the wind, and, if you get the wing setting too close to the stab setting, flat bottomed wings tend to "tuck down" and dive when the model exceeds a certain "critical" speed.

So have at it — all you Sunday fliers. Why? It's a good question. How about sending me your answers? Make it easy for me to edit this column.

Back to that "zero-zero" bit. Here is an absolutely fascinating letter I received from John Brownlee, 2407 Quince Drive, S.E., Decatur, Alabama 35601.

Dear Ken,

After reading your ***tete-a-tete*** *with Mr. Off, I spent about 30 minutes on the old calculator and came up with some poop that might be of interest to your readers.*

Sure, the 0-0-0 set-up will fly like a motorized brick — but with the reference line horizontal. The real experts say, however, that if you place the C.G. at the neutral static longitudal (pitch) stability point, the plane will be trimmed for level flight without elevator trim. Theoretically it should fly okay. It is supposed to stay at the last C_L you aimed it for, so it would also be trimmed for climbing, etc. It probably would not help anyone's precision since it still has to be pointed in the right direction at the right time. It would also require less elevator throw since the wing would be doing a lot of the work.

The calculator work was to determine where on ***Wicked Wanda*** *the neutral point would be. I assumed a 4412 airfoil and 60 mph (probably low for some of the engines listed, but it only affects trim, not stability). The incidence angles were related to the same line the author used. The thrust line was placed parallel to this line; i.e., 0° downthrust. Well, the neutral point calculated out to 45% chord, about 10-12% farther back than shown on the plans. So, anybody wanting to fly inverted without trimming the elevator should just move the C.G. back to about 45% and go to it. Don't blame me, though. Blame those real experts!*

The plane would need an angle of attack of about 1.6°. The zero lift line of the 4412 is about 3.8° off the chord, so the chord line would be -2.2° to the reference line. Interestingly, the net stab incidence required was about -0.9°; about -2.6 to handle the pitching moment, about +0.8 to handle the tail heavy condition and about +0.9 to handle the wing downwash.

I think I have read many times in magazine articles that if you move the C.G. aft of the 25% point by an amount equal to the pitching coefficient (-0.093 for the 4412, or 9.3% of chord, therefore about 34%) you trimmed out the pitching moment. This being true, a 45% C.G. location should require a lot of positive incidence. I quickly found the error of this thinking.

In level flight, a C.G. location aft of the wing A.C. can generate a positive pitching moment only equal to its lift (about 3 pounds in this case) times the distance (about 1.5" in the case of 45% C.G.) for a total of about 4.5 lb.-in. At 60 mph, the total pitching moment of the wing would be a little over 15 lb.-in., so you would have to go about 5" aft of the quarter-chord point to balance out the pitching moment. This is a little bit much for any kind of flyability!

Moving back 9.3% only balances out the moment present at the speed corresponding to $C_L = 1.0$. It seems that all flat-bottom or highly cambered airfoils must fly with down load on the stab if they are stable. You either build in negative incidence or the wing will do it for you in flight!

I have also read quite a bit in model magazines about how stable those good old flat-bottom wings are. I suppose this is because they have a negative pitching moment. You can imagine my surprise on finding the empirical equations for calculating pitch stability did not even consider the pitching moment coefficient! Here's why. Parameters are stabilizing only when they result in a ***change*** *to negative moments when the plane is displaced to a higher than trim C_L. The pitching moment does not change value as a function of C_L, therefore contributes nothing to pitch stability.*

Well, that's about all except that I do not believe all that good stuff about the bipe with upside down 2412 bottom wing because in my opinion your reasoning is not theoretically factual!

Happy writing,
John Brownlee

Wow! Did you follow all that? I **think** I did. But one thing I am sure of. Hey John — I didn't **say** that putting a 2412 section on the lower wing upside down would make a biplane fly with zero-zero settings. What I said was — "Would it? What do you think?" Well — now we all know what you think. Do all the rest of you Sunday fliers agree? This might even be more controversial than the downwind turn! But first I better make my position clear. I posed the question, but I don't have the answer. And I haven't had time to make any flight test so I could tell you what I found out. So tell us; what did you find out?

And that's about it for this month — almost. Let me close off with a letter and some photos from a Sunday flier who typifies the, "I've been meaning to write you," etc., syndrome. And I'm sure glad he did. Here's the letter from Doug MacBrien, 24 Truby St., Granby, Massachusetts 01033.

Dear Ken,

I'm a faithful reader of your Sunday Flier column and have been meaning to write you for quite a while — your little invitation to send a "5 x 7 B & W photo" in your last column spurred me to do it. No 5 x 7 but big enough, I think, to reproduce if you care to. I know you can't use the color but that's for your information, so you can see what the model really looks like.

First of all I want to thank you for sharing with your readers (myself included!) the wisdom you have acquired over the years concerning design of floats, selection of a good design, technique of water flying, etc., etc. As a direct result of heeding your good advice, I designed big floats for

to page 176

GIVE IT A WHIRL

John Gorham

Learning To Fly

Since writing the last column, I've had even more opportunity to travel around the country and mingle with many of the R/C helicopter clubs and groups which, believe me, are now springing up like mushrooms. Not only springing up like mushrooms but actually hovering and flying helicopters. It's very rewarding for an "old timer" like myself to witness this activity. Nice, too, to be in a position where I'm not constantly asked to fly a chopper since there are now many other folks who can do this very competently, too. In the course of my travels I have learned a lot while squatting on the ground, discussing the heartaches of many of the learners. One of the common factors that has emerged as being a major impediment to a fast and easy learning process (which it **can** be) is still the fact that many tyro R/C helicopter fliers have not yet fully appreciated the need for **maintaining** an accurate and neat controls set-up. So many times a beginner who has problems trying to hover his helicopter asked for my help and we worked on his machine together to check it out before I take the sticks. Here's a list of the items which had to be corrected — any one of which could make learning much harder than it need be.

• Control runs which are not free; in other words, which bind in places and cause excessive loads on the servo.

• "Lopsided" linkage set-ups which means that the control will be effective in one direction only. When moved in the other direction the control surface would only move partially.

• Dirty and stiff swashplate and rotor head bearings need frequent cleaning and oiling.

• Chewed up and dog-eared rotor blade tips, due to lots and lots of ground strikes (try holding the ends in shape and drop a little 10 second glue down the end grain).

• Badly out of balance rotor heads (discuss this later).

• Control movements too much or too little — either way makes it hard to fly.

Just imagine the problems the pilot of a full size helicopter would have if his mechanics had allowed excessive friction and slop to build up in **his** controls. Remember a real heli is flown with almost finger tip movements and a model is even more sensitive.

After working with the owners on these points for a while I inevitably find that their helis will then lift-off and hover fine. Even more importantly, the proud owner discovers that he has a much easier time in his next efforts at hovering. His progress is usually much faster, at least for that day! Maybe, also, part of the improvement in his skill is due to seeing somebody else fly his machine. But I believe a great deal of the problems which are encountered are due to an incorrectly set-up and adjusted helicopter. So, here's a few thoughts which I'll pass on this month which may help to get a few more of you flying (then I won't have to even bring my own heli).

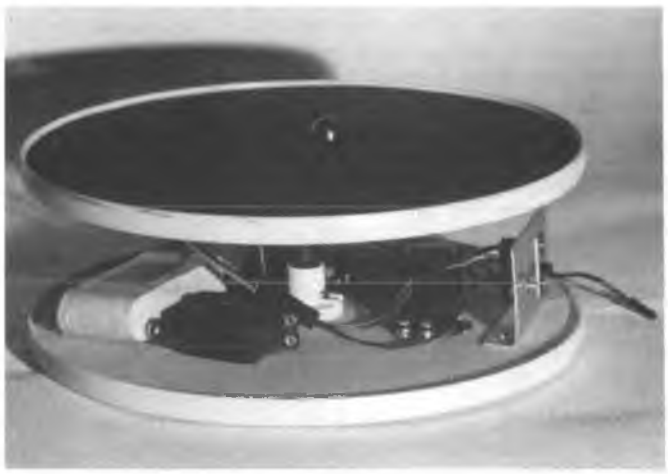
If you're having learning problems with your hovering, do the following before flying next time. Put your helicopter on your workbench and disconnect all the control rods from the servo arm ends. Now move each one with your finger and thumb and check that: (a) all controls connected to that servo move nice and freely, and, (b) the control surfaces that move have **full** freedom in **both** directions, and, (c) when you move the control rod at the servo end, even a 1/16", the paddles or tail blades or main blades move positively and instantly, and, (d) all controls move the correct amount (see manual or local expert).

Maybe a control run needs to be removed, cleaned or even replaced; maybe a ball link is too stiff or too loose; maybe there is dirt in the swashplate or maybe the rotor head bearings are dirty or need oil.

Flying a helicopter is hard enough with a correctly set-up and well trimmed machine, but to try and learn with a machine which is fighting with you because your control corrections are not getting through to the right places will make it very trying indeed for you. So don't forget, your machine should be as carefully set up and checked out every time you fly just as it was the day you first built it; remember?

So far as vibrations are concerned, I still see a few choppers that really have the shakes and I would like to re-emphasize that, in most cases, the main rotor head is the primary cause of these shakes. The best method of

'X'-'Y' Simulator by author, circa 1979.



Author's 3 axis training table.

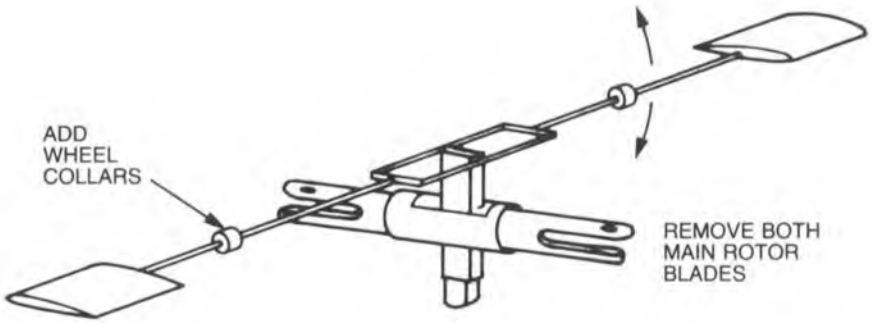


FIGURE 1
BALANCE FLYBAR FIRST

balancing the rotor head, in my view, is as follows:

Remove completely both main rotor blades (but mark which one was which!) and then make sure that the flybar and paddle system is accurately balanced. My method of achieving this is to install a wheel collar on each side of my flybar as an adjustable balance weight (see Figure 1). I can then move one or both of these in or out to accurately balance the whole flybar system. Don't underestimate the importance of doing this **first** — if the rotor head system is out of balance across the axis of the flybar there is nothing you can do to the main rotor blades to compensate for this. The weight shifts must be along the axis of the flybar.

Once the flybar system is correctly balanced, then the main rotor blades can be reattached and, provided there is reasonably static balance of these blades, the helicopter should then be put into a short hover (either by you or a competent flier if you have not yet achieved this status).

The next thing to do is to **track** the main rotor blades (remember, this involves adjusting the blade pitch angles until both tips are coincident as they rotate in a hover).

Once "tracking" has been accomplished, and if a shake is still present, then the following procedure should be followed (see Figure 2).

Take a strip of vinyl blade covering about 1" wide and 4" long from your top shirt pocket where you thoughtfully stored them before you went out to test fly, and fix one around the center of **either** one of the two main rotor blades. Yes, either one. Now, hover the heli again and see if the shake has improved or become worse. Obviously, if it has improved but still isn't good enough, then move the piece of tape out further or add another piece. If the shake has gotten worse, take the tape off that blade and move it to the other blade. This system is now being used more and more commonly over the country, I find, and it really works well and quickly to cure most cases of the "shakes." Of course, it won't work if the main shaft is bent or the blades are badly warped. You certainly cannot cure these problems with a piece of plastic tape but, believe me, if the flybar is balanced and the main rotor blades are in reasonable condition and very close for equal weight, then the "add and subtract tape technique" works. You'll find many experts using it if you watch closely. By the way, don't look for the piece of tape on their rotor blade afterwards because it will have been removed and a new piece of equivalent weight added, on the **under** surface of the blade where it cannot be seen.

Gyros

Now, while on the subject of learning to fly, another topic worth touching on this month is the use of gyros. Recently several new gyros have come on the market. One, in particular, is very low in price and very light in weight. The "Kraft" gyro lists at around $70.00 and has a total weight of 3 ounces. Use of these gyros can readily add "damping" to your helicopter and quiet that "twitchy" tail. And a gyro is not only useful to a beginner — many of the experts are now using them to smooth out their flying, too. I hear that in Japan and some other countries, too, most experts would deem it unthinkable to enter a competition without the use of the yaw rate gyro.

At the moment, in this country, the use of a gyro is much like the use of a toupee: it certainly improves your appearance but it's not something you brag about. For the beginner, the yaw rate gyro, if properly installed and used, helps considerably in tail control. Assistance in this regard helps them to progress a lot faster with the other axis of control. On the other hand there are some learners who seem to find no problem with tail control and, hence, the use of a gyro may just add complexity for them and not give too much assistance. It is uncanny, however, to watch or to fly a helicopter hovering when a gyro is fitted and working properly. It's just as if your helicopter is flying in molasses and not air. The gyro quiets down unwanted yaw motions to a point where it's as if there is no wind blowing at all and the helicopter is a compass needle pointing very firmly and resolutely towards the pole. The use of a rate gyro for damping in the yaw axis of our R/C helicopters is certainly now worth considering.

Training Aids And Simulators

For the past few months we have been "messing around" with some new ideas for speeding up the learning process and one idea was to re-examine the possible use of flight simulators. So, this month, we thought that we would share some of the idea which occurred to us.

Even though we might achieve a well set up helicopter and even have a gyro fitted, it still takes time and effort to learn the required coordination of the eye/brain/muscle reflexes in order to anticipate the helicopter's movements and keep it accurately hovering in one place. And, of course, when needed, moving in the direction that we want it to. Is it possible to speed up achieving these techniques without actually flying a helicopter and, hence, reduces costs and heartaches? Well, it's not easy. Flying a helicopter is a unique task in many ways and certainly not easy to simulate, at least on a modest budget. Technology, of course, is available

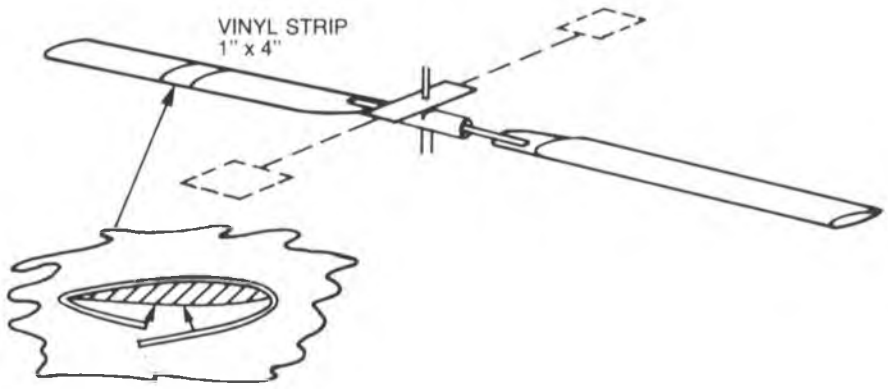


FIGURE 2
REMOVING 'SHAKES' USING PLASTIC STRIPS

today where, given the dollars, we could quite readily simulate exactly the motions and responses of an R/C model helicopter. We could even visually simulate the shape and motions of our helicopters and we could input steady wind and gust disturbances, too, if we wished. We could also "dial in" variable flying characteristics so as to make it easy at first, then progressively harder. So we could learn 95% of the flying techniques without the need to even take a helicopter off the ground. Having said that, however, we now face development of a considerably expensive piece of apparatus.

Over the past 12 years, while model R/C helicopters have existed, there have been many attempts to provide a simple simulation which could aid in our learning efforts. One of the early ideas was to mount the helicopter on a metal frame equipped with casters so that your heli could be skidded around a parking lot and its direction "controlled" somewhat by the use of the forward and sideways cyclic controls (see Figure 3). Tail control also could be used and the apparatus had response in yaw, also. However, your helicopter wasn't actually flying and the dynamics of sliding around a parking lot were not really very similar to the dynamics of flying the actual 'copter. So this idea died out around 1975.

Then there have been other devices such as a training table on which the helicopter can be mounted in a cradle designed to permit limited movement in pitch and roll. This cradle is mounted on a metal rod which will permit the helicopter to rise up in the air about a foot or so (see Figure 4). The use of this device at least helped in learning to set up the engine and also how to lift the helicopter up and down vertically. The main rotor blades could also be tracked. It didn't help much in learning to "fly" pitch or roll but it did demonstrate the reaction in yaw to tail rotor inputs once the model had risen off the table. While a useful device for the purposes mentioned, not a great deal of help in learning the actual **flying** techniques.

Then, thinking about actual simulators, I remembered the table top helicopter trainer designed by George H. Smith and promoted by Don Dewey way back in 1974. This trainer was described in the September 1974 issue of RCM and if you'd look up this issue you'll be able to read a very full description of the device (see Figure 5). It was based on the theory that a helicopter is a neutrally stable system with inertia only and that a rolling sphere on a flat plane has very similar characteristics. Also, if you tilt the plane, the ball will roll as a result of the attraction of gravity down the slope and this action is "similar" to the motion of a helicopter when subjected to a pitch or roll cyclic input. So George Smith's device consisted of a flat plywood plate, pivoted from below with a universal pivot which enabled the table to tilt in both horizontal planes. The table was connected to two servos (pitch and roll axis) in such a manner that the table top would "tilt" according to servo motion. Of course the servos were connected to a receiver/battery set-up and the normal R/C transmitter was used to "fly" the training device. A steel ball bearing was placed on the center of the

to page 166

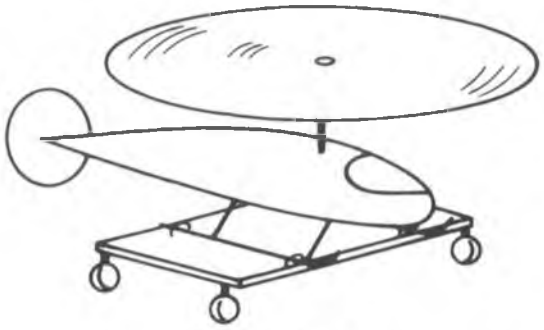
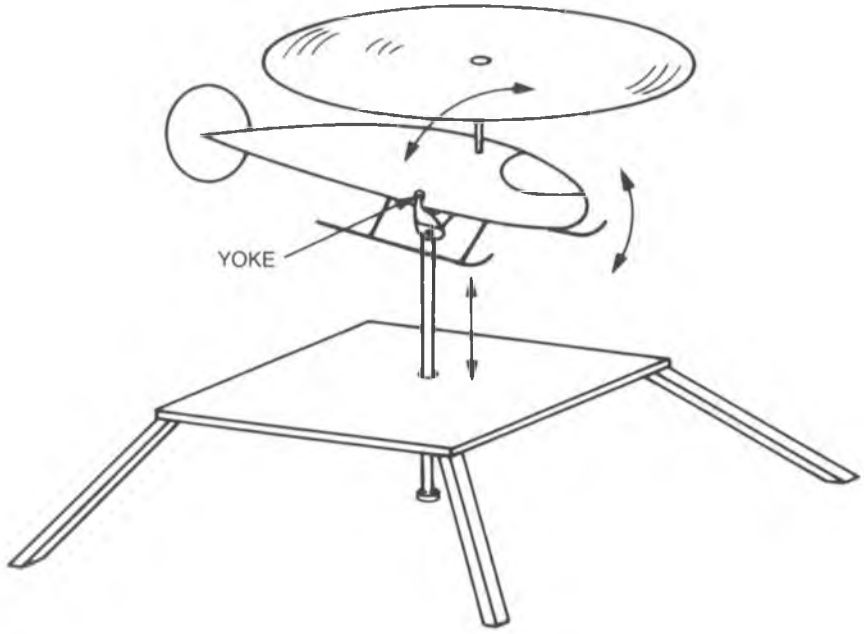


FIGURE 3
EARLY 'TRAINING' TABLE
(GROUND ROLL ONLY)



FIRURE 4
SCHLUTER TYPE TRAINING TABLE

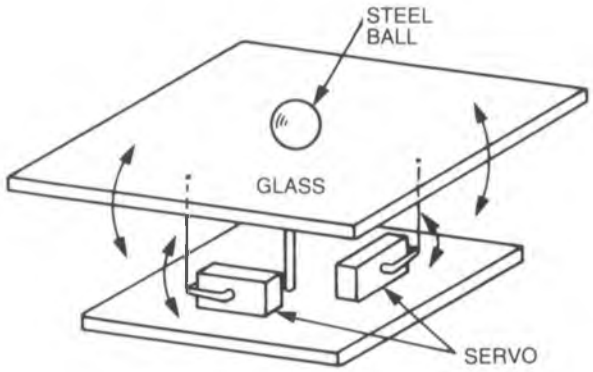


FIGURE 5
GEORGE H. SMITH TABLE

THE B-29 WITH THE RIGHT STUFF

By Ken Willard

Some three years ago, a film company named American Zoetrope Films made the decision to make a movie of Tom Wolfe's fascinating story about the test pilots and the astronauts who challenged the barriers of the outer limits of the atmosphere and then went on to probe the secrets of space travel.

Wolfe's book deals not only with the challenges of the earth's atmosphere and space surrounding it, but more than that, he describes the intense rivalry between test pilots, who flew the machines they rode in, and the astronauts, who, as the test pilots put it, "Went along for the ride, like the monkeys did before the astronauts got aboard their space ships." The book is totally engrossing, if you are any kind of aviation enthusiast. It is equally so if you are interested in the emotions and psychology of proud, capable, and competitively motivated men, and their wives who must live with them through long periods of training, followed by watching their loved ones sit on top of a flaming missile as it roars into the air. Or, in the case of the test pilot's wives, knowing that their man is going to test a flying machine where no man has ever been before.

If you haven't read "The Right Stuff," then get it and read it. Then, some time in the fall of 1983, if the schedule holds, go see the movie. I had a chance to talk with Phil Kaufman, the director, who also wrote the screenplay, when they were investigating the possibility of using models for some of the aerial shots. Kaufman is a perfectionist, and if he got the money it takes to do the job he wanted done, the movie should be a winner.

Bob Campbell holding X-1A model and Art Janson kneeling behind B-29. Photo courtesy Kraft Systems.

X-1A snuggles into B-29 bomb bay. Photo courtesy Kraft Systems.

To show you how accurate Kaufman wanted the aerial scenes to be, he tried to lease a full scale B-29 from the Confederate Air Force, a group of enthusiasts who have a fleet of war planes that they fly in air shows. But they didn't want to have their B-29 modified, as would have been needed, so other methods had to be used. Of course, there are the documentary films, and undoubtedly some of them will be used.

Then, early in 1982, some photos began to appear in model magazines of Bob Campbell's 17' model of the B-29. The special effects man who worked for Kaufman is a model R/C enthusiast. Bingo! He got on the phone with Bob. Would the B-29 fly? Yes, it had already been test flown. Would Bob be willing to modify it and fly it for the movie? Does a cat like liver? After about forty phone calls, a contract was agreed upon. Bob would modify the B-29 (it was originally set up to drop bombs) to carry an X-1, and an X-1A rocket powered model, just like the full size job. The gun turrets had to be removed, a glass nose made to replace the painted one, a hole in the bottom cut out to accommodate the X-1, and the whole model repainted to the same colors and striping of the B-29 used in the original drop of the X-1.

Oh, yes. One change from the desire for perfection. The X-1 had to be enlarged.

"But it won't be scale," Bob protested mildly.

"No matter. It will show up better."

"I'll have to build another one, then. And that'll be extra."

"Do it! And we need you out here at Hamilton Air Force Base in three weeks!"

"Three weeks! Modify the B-29, build another X-1, repaint, make a new nose?" Impossible. But Bob and his crew did it. "You simply work 24 hours a day," observed Bob. And you modelers know that's about what they did.

Next, you gotta get the model out there to California.

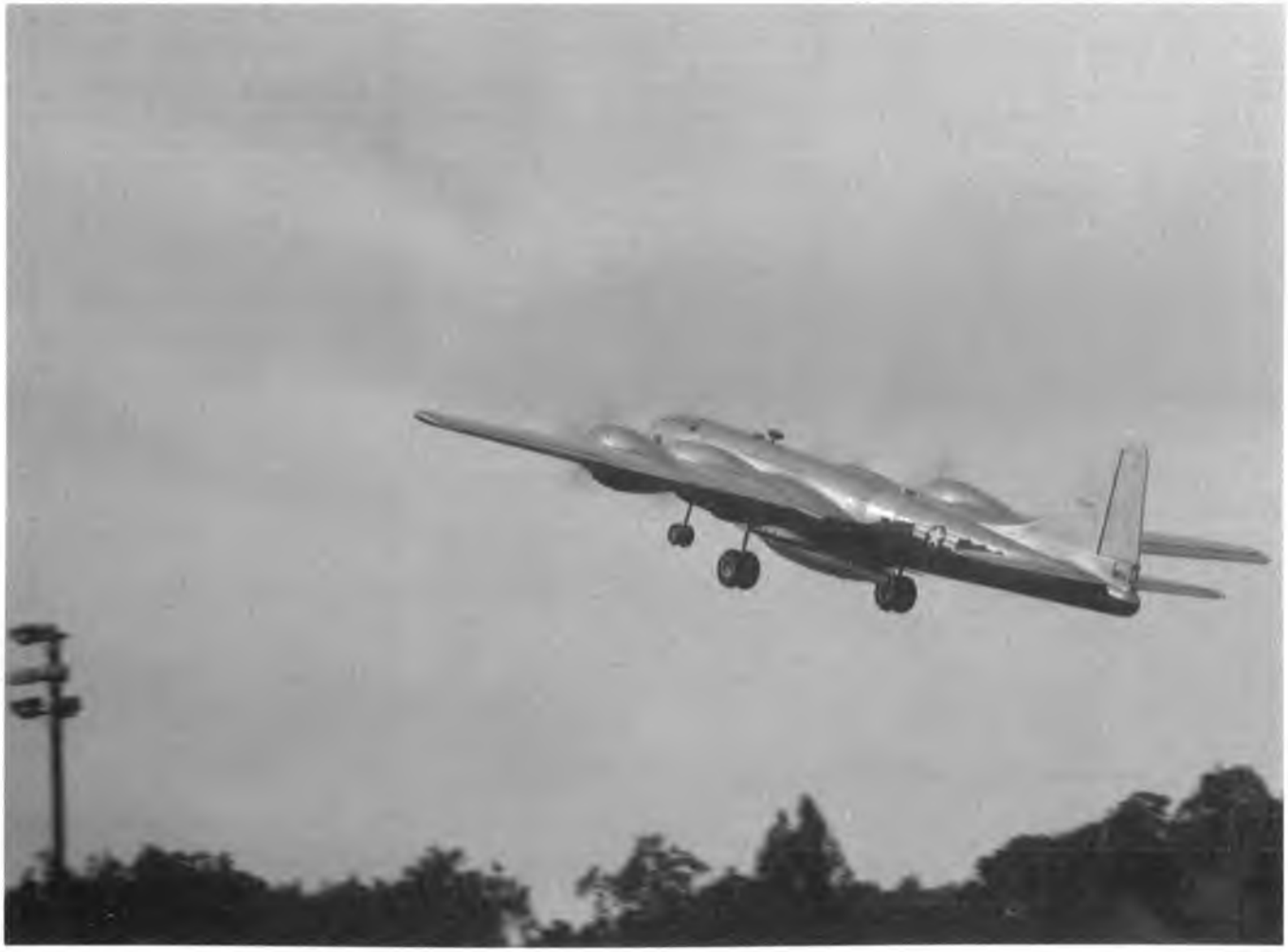
"Rent a U-haul."

"It'll cost $3600.00. How about me using the money and trading my van for a bigger one?" Bob inquired.

"Fine. Just get out here, fast."

So Bob bought a new van, and the next day off they went. Pretty long trip for a new van with only 40 miles on it,

ABOVE: Bob Campbell (left) and Art Janson with B-29. BELOW: Realistic shot of B-29 take-off. Photos by James. M. Wade.



Note X-1A rocket engine.

Ready for the mission, model or full scale?

but it worked out okay.

It was in June 1982 that they made the first drops for the filmmakers, for a screen test.

"We'll see how it goes. We're not sure we'll use the footage; we'll see what you can do, and go from there. But you'll be paid, no matter what."

For the screen test, Bob and his associate, Art Janson, who flies the X-1 and the X-1A models, made four flights. On the fourth flight they dropped the X-1A, and it was at that time Bob was told to build a bigger one so it would show up better.

The bigger model was made --- as big as it could be and still fit in the cradle without the tips interfering with the main gear retracts. It looked good. They dropped it twice; on the second drop, there was a malfunction, and the X-1 crashed. Bob figured that was it --- they'd be on their way back to Ohio.

"Heck, no. Build another one. Persevere," said the producer. Another one was built, dropped, had another radio problem, and busted up. "Build another one." So they did.

Bob and Art were getting ready to fly again the next time then word came out, "Guess you guys are going home. We've had a management shakeup and have to re-group. Maybe we'll call you back. Don't call us --- we'll call you." Sounded like the "kiss off."

So Bob, Art and the families left. Two of the fellows flew back. Art went in the van. He got as far as Denver, called home to see how things were going. His daughter answered the phone. "Good Lord. Get in touch with the movie people. They want you right back!"

Well, that wasn't possible; Bob had things he had to do at home. So he went home, but three weeks later he was again on his way back to California. As he says, "Working with movie people is pretty hectic. Sometimes they don't even know in the morning just what they'll be doing that afternoon!" I could see that the project was getting just a bit frustrating, but Bob didn't give up.

As luck would have it, Bob and Art had planned a practice drop at Hamilton Air Force Base on Sunday, August 15. I made arrangements to meet with Bob and Art, and brought along Jim Wade to take some photos, and Dave Bridges to help with logistics.

Everything was in good order when we arrived at hangar No. 4, so Bob and Art trundled out the B-29, we took some photos, and then proceeded to the flight line. Art fired up the four Kioritz engines (what a beautiful sound!). Bob checked all systems, then taxied out to begin the take-off. It was beautiful, and after climbing to the drop altitude, Art released the X-1A from its cradle, let it drop about 10 feet and zowie! Away went the X-1A under its rocket power. Perfect!

Bob flew the B-29 around until Art landed the X-1A on the runway and retrieved it; then Bob landed the B-29. As it so happened, the left gear didn't extend fully, but Bob set the model down so gently it rolled to a stop, settled down with the left wing at a slight droop, but didn't even break a prop.

I've seen a lot of model flying, with bomb drops, wing tank drops, parachute drops, rocket firings, and all that, but the flight of this B-29, with the drop of the X-1A, looked for all the world just like the documentary shots that I saw of the real thing back when I was in the Air Force. It made my scalp tingle with the thrill.

After I calmed down, it was time to interview Bob about the technical

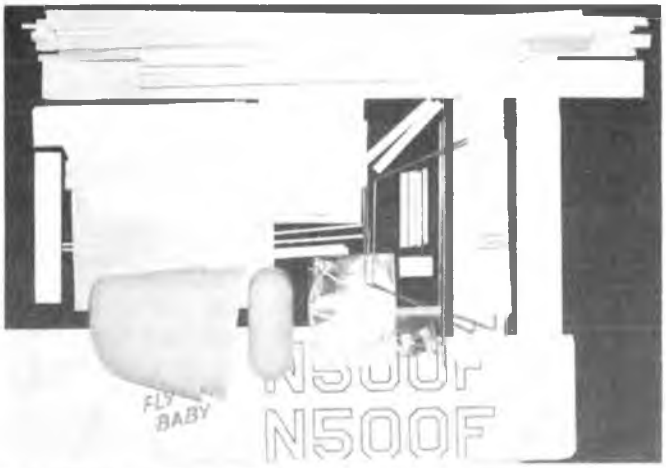
to page 160

Four turning and all systems go!

X-1A climbs out after release from B-29.

RCM PRODUCT REVIEW

Balsa U.S.A. FLY BABY



SPECIFICATIONS

Name	FLY BABY
Aircraft Type	Stand-Off 1/3 Scale
Manufactured By	Balsa USA P.O. Box 164, Marinette, Wisconsin 54143
Mfg. Suggested Retail Price	$99.95
Available From	Direct from Mfg.
Wingspan	112 Inches
Wing Chord	18 Inches
Total Wing Area	1925 Square Inches
Fuselage Length	75 Inches
Stabilizer Span	37 Inches
Total Stab Area	407 Square Inches
Mfg. Rec. Engine Range	Quadra or similar
Recommended Fuel Tank Size	16 Oz.
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (12 pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Futaba 6 channel
Engine Make & Displacement	Quadra 2.2 cu. in.
Tank Size Used	16 Oz.
Weight, Ready to Fly:	292 Oz.
Wing Loading:	21.8 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Good looks, very good instructions and pictures, scale features like the landing gear and flying wires.

WE DIDN'T LIKE THE:

Wing bolt position (see text), tail wheel mount.

When we first saw the Fly Baby Biplane kit from Balsa U.S.A. (P.O. Box 164, Marinette, Wisconsin 54143) it seemed like a sure thing to us that a monoplane version couldn't be very far behind. We weren't disappointed; Balsa U.S.A. has now introduced the low wing edition of Pete Bowers' original Fly Baby. It is referred to as a Stand-off Scale, but with accurate rib spacing and outline. It wouldn't take much imagination to see this 1/3 Scale nine foot four inch span model as a detailed scale project. The kit comes with several pages of scale documentation reprints and has nice touches like functional flying wires that attach to the landing gear axle.

There isn't much to catch the eye about the 7" x 13" x 50" kit box, just a plain brown wrapper. But who cares — inside where it counts is one of the biggest collections of balsa and plywood we've seen. This includes several stacks of die-cut parts and bundles of stick balsa in various shapes and sizes. One end of the box is almost completely filled by the halves of a giant ABS cowl, and the hardware package is exceptionally complete. It has steel flying wire cable, nuts, bolts, and even wheel collars for the oversize axle. On cross country trips, Pete Bowers carried his luggage in a bomb shaped container under the fuselage and as an added feature an ABS duplicate is provided with the kit. Only one part was damaged in shipment and that was because it fell out of the die-cut sheet, a small price to pay for good die-cutting.

Construction:

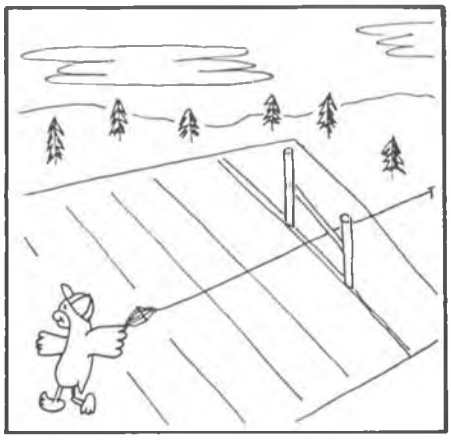
The usual method of unrolling the plans on the dining room table won't work with this kit. There are three main plan sheets, with all parts shown full size. If you are careful during building they could be used to wallpaper a small room when you are done. The fuselage sheet is 36" x 78" with top and side views including the tail surfaces. Each wing has its own plan; the left wing sheet is a mirror image of the right panel — even the writing is backwards. In addition, a 12 page instruction set with pictures will lead you through the building stage. One very important caution! Sort the stick and sheet wood by size and length before you start cutting. The directions are very specific about the sizes to be used for each part, and they mean it.

to page 150

SOARING

Al Doig

OZZIE & BIFF Gene Stetting



I was going to label this section Potpourri, but first I thought I'd better know exactly what it means; it might be a dirty word. The dictionary confirmed my choice, "A musical or literary medley." Medley meaning, "A mixture of things that do not ordinarily belong together." I found that literary is, "Having to do with literature." Now comes the cruncher. Literature is, "The writings of a period or of a country, especially those kept alive by their beauty of style or thought." Oh well . . .

Miscellaneous:

From Aero Smithing, 4420 Darventry Ct., Charlotte, North Carolina 28211, comes an idea for prizes at soaring contests. It is a calendar with spectacular pictures of sailplanes and soaring. The photos are 11" x 10" and when framed will make 14 unusual prizes. At least the leaflet I received showed 14 pictures. They are printed in Germany and I guess they must have 14 months in a year there. Being a metric country I would think there would only be 10. Anyway — the postpaid price is $13.50 east of the Mississippi; $14.00 west; $15.00 Canada; and $15.25 overseas. If you want to take a peek, send for the leaflet.

◇

Any of you guys tired of shagging winch lines? Let's have a show of

STA	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
UPR	0	1.45	2.3	3.75	4.6	5.45	6.65	7.5	8.0	8.5	8.55	7.9	6.65	5.1	3.5	1.65	0.95	0
LWR	0	-1.0	-1.3	-1.75	-1.95	-2.0	-2.1	-2.0	-1.95	-1.7	-1.45	-1.1	-0.7	-0.45	-0.2	-0.1	0.05	0

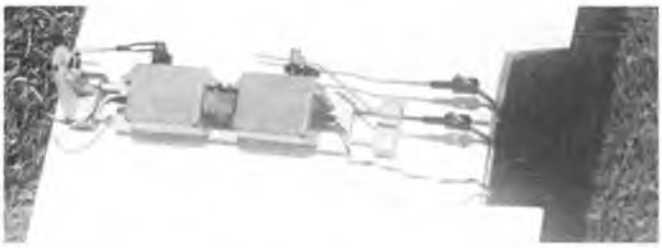
STA	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
UPR	0	1.8	2.6	4.0	4.9	5.65	6.8	7.6	8.1	8.3	8.1	7.2	6.0	4.6	3.0	1.45	0.75	0
LWR	0	-0.9	-1.25	-1.6	-1.95	-2.05	-2.2	-2.25	-2.26	-2.15	-2.0	-1.6	-1.4	-1.15	-0.95	-0.65	-0.3	0

STA	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
UPR	0	1.8	2.75	4.0	4.9	5.8	7.2	8.1	8.7	9.1	9.3	8.85	8.0	6.75	5.0	2.9	1.6	0
LWR	0	-1.0	-1.4	-1.8	-2.0	-2.1	-2.3	-2.2	-2.1	-2.0	-1.6	-0.8	-0.1	0.55	0.9	0.9	0.6	0

Contributed to SOARING FLIGHT by S.O.A.R. Member, Dale Folkening.

RLF Products' retrieval system.

RLF Products' bare bones winch.



Ron Black's variable airfoil.

Larry Jolly Model Products' New Pantera kit, Larry holding.

Howard Short, Lancaster, California, won't give up on flying wings. Here are No's 4, 8, 17, and 18.

hands. I'll bet you're the same bunch who ride carts on the golf course. Anyway — for those of us who had our hands up, RLF Products has a neat retrieval system. They've made it smaller and lighter. For those of you who have never used one — they really do work. It requires somebody to run the thing, but it really keeps the winch busy. The cost? — $197.77 plus $3.00 for shipping in the U.S. They currently give a 5% discount for cash, but will take Mastercharge or Visa. Another item is a neat bare-bones winch. This one can be had for $179.77 (the .77¢ must be the profit or something) plus shipping. RLF has a whole herd of other launching stuff so send for a catalog from RLF Products, R.R. 3, Box 178, Paoli, Indiana 47454.

◇

The last one of these miscellaneous items, which are not all of one kind or nature; of mixed composition or character; is the "Pantera." This is a new sailplane from Larry Jolly Model Products, 5501 W. Como, Santa Ana, California 92703. The Pantera has a fiberglass fuselage. The wing is 100" with an Eppler 205 airfoil and 915 sq. in. area. All up weight is 43 oz. Ballast provisions are made in both the wing and fuselage. Later on, Larry plans to have a straight wing conversion kit available. The cost of the complete kit is under $100.00, which means it costs $99.95.

◇

I lied when I said that was the last miscellaneous item; here's one more. Ron Black and others from the Inland Soaring Society, of San Bernardino, California, have modified the airfoil of their Olympic II sailplanes. They glue a 1/8" square piece of balsa on the bottom of each rib between the leading edge and the spar. They then contour it so it fairs into the leading edge and spar. This creates a slightly undercambred airfoil which they claim improves the flying characteristics. I personally can't say yea or nay, but I applaud people like this who get a kick out of experimentation. Ron also has flaperons on his Oly II. Ron uses the old "one servo sliding the other" trick to change the camber of the airfoil. If the drugstore gets my pictures back in time you can see a photo of the lash-up.

◇

Back on to 2-Meters. I wish everyone would spell it "metres." That would differentiate between a measurement and an electrical instrument. Anyway — a couple of annual "all two metre" contests have come and gone with results that were either disappointing or satisfying, dependent upon your point of view. Both were two day affairs, and both drew 18 contestants. The Grand Valley Radio Control Club of Nunica, Michigan, bash was CD'd by Jim Benson and advertised as a two minute Precision followed by rounds of 8 minute Duration on Saturday.

to page 144

FLYING LOWE

Don Lowe

Circus Circus T.O.C.

The 1982 Tournament of Champions is now history. For those of you who may not know what it is, the T.O.C. is an aerobatic competition sponsored by Bill Bennett, Chairman of the Board of Circus Circus Hotels, in Las Vegas, Nevada. This was the seventh such event (begun in 1974) and has featured the evolution of "Aresti" or full scale aerobatics flown with semi-scale models of the full-scale aerobatic designs. The contest is invitational in nature and brings together 20 of the top fliers from all over the world.

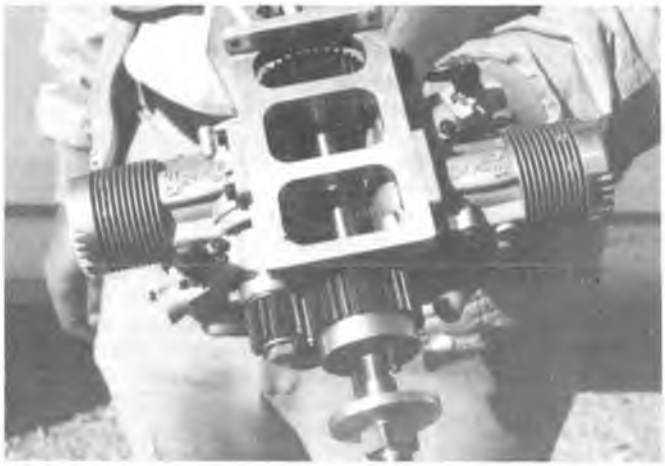
This year, as in all previous contests, Hanno Prettner of Austria emerged victorious and took home a check for $25,000! Every competitor was a winner, however, as cash prizes were paid all the way to last place.

The winning ship. Hanno Prettner's "Dalotel," powered by twin geared S.T. .75's.

Donny Weltz gets down to business fixing engine problems. Donny's Lasers were prettiest ships there. He placed 10th.

Benito Bertolani and wife from Italy with Tartan Twin powered YAK 18. He finished 18th.

Fifth place Ivan Kristensen and helper Don Seals eyes his twin Webra powered Laser prior to flight.



Fourth place Tony Frackowiak's twin O.S. .90 geared system. Ran beautifully and pulled his 19 plus pound Laser with ease.

Don Chapman, left, and Donny Weltz discuss engine problems. Chapman performed miracles with Tartan Twin mods.

The T.O.C. has developed from a format using standard pattern aircraft designs and flying the standard F.3.A. format to the current designs which must be considered very large models indeed.

This year the rules required an airplane of at least 1100 in.^{2} wing area, was permitted to weigh up to 20 pounds, and could use an engine of 4 cu. in. maximum. As it turned out, the average model weighed around 18 pounds, had a wing area of 1500 in.^{2} plus, and was powered by engines capable of turning a 20" D. x 10" pitch prop at 7000 plus rpm static. This average combination permitted very good vertical performance at modest air speeds. This capability opens up a new dimension in aerobatics, in that fairly slow aircraft fly very precise maneuvers in all planes. To me, this capability is a very pleasing style to watch as well as to fly, since the total presentation is placed in close where it is easy to see.

The most popular aircraft design by far was Wayne Ulery's Laser 200. Two sizes were flown: the 1200 in.^{2} bird and the 1600 in.^{2} design. No less than nine competitors flew Wayne's design. In addition, Wolfgang Matt of Liechtenstein flew a large Laser by Topp. The Lasers placed 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 10th, 12th, 16th. Hanno Prettner flew his large "Dalotel" to first place (as usual). CAP 21's were used by four contestants, and Super Chipmunks were flown by four fliers. Benito Bertolani of Italy flew a YAK 18 which he designed.

This year, as in 1980, the greatest developmental effort was devoted to propulsion. The engine line up was something like this:

Tartan Twin — 2.66 in.^{3} — eight contestants; Webra "Bully" — 2.1 in.^{3} — three contestants; Webra Twin, geared .60 — 1.2 in.^{3} — two contestants; Super Tigre Twin, geared .75-1.5 in.^{3} — one contestant; Magnum — 3.5 in.^{3} — four contestants; Twin geared O.S. 90 — 1.8 in.^{3} — one contestant; Belt-driven O.S. 90 — .90 in.^{3} — one contestant.

All but two contestants using the Tartan Twin had modified the engine

to page 134

Tony Bonnetti gets "into it" prior to flight. A little late to try and figure out how its done, Tony! Tony flew Magnum 3.5 powered CAP 21.

The founders of it all: Walt Schroder, left, and Bill Bennett.

A general scene showing many beautiful aircraft and a small part of the large crowds that assembled every day.

Jeff Tracy, left, and cronies with his CAP 21. Jeff had many engine problems but took it all with his characteristic smile. A great competitor and a great friend!

Steve Stricker, left, and friend. Steve did very well in his first T.O.C., flying a Magnum 3.5 powered Chipmunk.

UNDERTAKER

Built around Foremost's 1/2A engine mount, this pylon racer was designed to help you do away with your competition

By Milton R. Sanders and Mike Edmonds

Here is an airplane designed to help you put away your racing opponent for good (or at least until he builds an Undertaker of his own). This machine, like an Indy Formula One, is designed for all-out racing. The lines are clean and all drag producing items have been cut to a minimum. From the 1/2A Foremost engine mount and laminar flow wing (64_1A012) to the triangular fuselage and enclosed linkages, this aircraft is built to race. It won't disappoint you.

The birth of the Undertaker resulted from a sudden desire to compete and the creative thinking of the racing team's chief design engineer, Mike Edmonds. In my 27 years of modeling, I have been a Saturday flier with brief periods of combat and pattern competition. Several months ago, members of the Mid State RC Club (Louisiana) started 1/2A racing, and the bug bit me too. All I could think about for several days was racing. Having previously worked on original designs, I decided to try again. Two weeks later, Mike had two prototypes put together, one ready to fly and the other ready for me to paint. I supplied the engine mounts, fuel tanks, and built the tail surfaces (Mike is the faster builder).

Thursday, after work, was the day chosen for the trim flights. As the Undertaker accelerated out of the launch, it was immediately apparent that I had a very fast, tail heavy aircraft with too much control deflection. After 15 seconds of attempted control, I rolled inverted and applied down elevator. The engine finally quit after three quick outside loops and I sighed with relief as the aircraft slid softly onto the grass.

A quick trip to the shop shifted the C.G. 1/4" forward and cut down all control throws. The next flights were pure joy with arrow straight flight and very sharp high speed turns. Power off glides are deceptively fast because of the large speed differential between powered and gliding flight. A little care must be taken to slow down for landing until the flier is familiar with the Undertaker's characteristics.

After our trim flights, we took the Undertaker to the club field the following Saturday. The pylons had

Author's daughter Amy (7) likes to show off dad's airplane.

Bill Of Materials

- 1 — 1/8 x 3/16 x 36 Balsa — Wing Trailing Edge
- 2 — 1/8 x 4 x 36 Balsa — Fuselage Sides
- 1 — 1/8 x 3 x 36 Balsa — Fuselage Bottom
- 1 — 1/4 x 3 x 3 Balsa — Fuselage Bulkhead
- 2 — 1/16 x 3 x 36 Balsa — Wing Sheeting
- 3 — 1/16 x 4 x 36 Balsa — Wing Ribs, Sheeting, Empennage, Cap Strips
- 2 — 3/16 x 3/8 x 36 Balsa — Wing Leading Edge, Turtle Decking
- 1 — 1/8 x 1/4 x 36 Balsa — Wing Front Strip
- 1 — 1/8 x 1 x 36 Balsa — Wing Spar
- 1 — 1/8 x 1 x 10 Balsa — Wing Tips
- 1 — 3/8 x 36 Balsa Triangle Stock — Fuselage Stiffeners
- 1 — 2 x 2 x 4 Balsa — Canopy
- 1 — 1/8 x 2 x 2 Plywood — Firewall
- 1 — 1/64 x 6 x 30 Plywood — Empennage, Fuselage Doublers
- 1 — Foremost 1/2A Racing Entire Mount
- 1 — 1 oz. Sullivan Round Fuel Tank
- 7 — Small Polypropylene Hinges
- 3 — 4-40 Socket Head Bolts & Blind Nuts for Engine Mount
- 1 — Ace High Performance Needle Valve TD .049-.051
- 1 — 2-56 Screw & Nut for Hatch Retainer
- 1 — Goldberg Small Control Horn for Elevator
- 1 — Set 1/16" Music Wire and Brass Tubing for Aileron Linkage
- 1/2 Roll Monokote for Wings
- Finishing Materials for Fuselage & Empennage
- Small Two-Channel Radio
- Tornado 5/4 Prop
- Cox TD .049-.051

UNDERTAKER

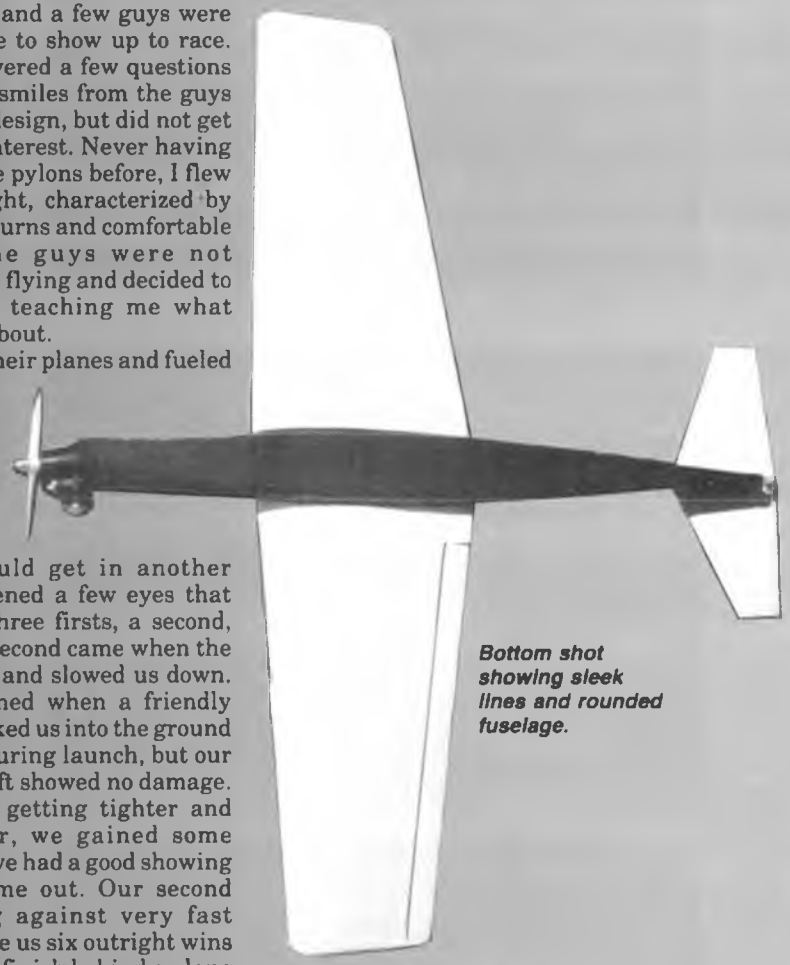
Designed By:
Mike Edmonds & Milt Sanders
TYPE AIRCRAFT
1/2A Pylon
WINGSPAN
31½ Inches
WING CHORD
6½" Avg.
TOTAL WING AREA
202.3 Sq. In.
WING LOCATION
Mid-Fuselage
AIRFOIL
Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL EACH TIP
3/8" (flat across top)
O.A. FUSELAGE LENGTH
27 Inches
RADIO COMPARTMENT SIZE
(L)9" x (W)2" x (H)2"
STABILIZER SPAN
10 Inches
STABILIZER CHORD (incl. elev.)
3⅛" (Avg.)
STABILIZER AREA
31.25 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
3¼ Inches
VERTICAL FIN WIDTH
2¾" (Avg.)
REC. ENGINE SIZE
Cox TD .049-.051
FUEL TANK SIZE
1 Oz. round
LANDING GEAR
None
REC. NO. OF CHANNELS
2
CONTROL FUNCTIONS
Aileron & Elevator
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa
Empennage	Balsa & Ply
Wt. Ready To Fly	**18.5 Oz.**
Wing Loading	**14.2 Oz./Sq. Ft.**

just been set up and a few guys were waiting for more to show up to race. Mike and I answered a few questions and noted some smiles from the guys for our original design, but did not get a great deal of interest. Never having flown around the pylons before, I flew one practice flight, characterized by extremely wide turns and comfortable altitudes. The guys were not impressed by my flying and decided to have some fun teaching me what racing was all about.

They got out their planes and fueled up before I could get in another practice. We opened a few eyes that day by taking three firsts, a second, and a zero. The second came when the canopy came off and slowed us down. The zero happened when a friendly competitor knocked us into the ground with a mid-air during launch, but our well-built aircraft showed no damage. With my turns getting tighter and altitudes lower, we gained some respect and felt we had a good showing for the first time out. Our second contest, racing against very fast competition, gave us six outright wins and a 1/2-second finish behind a plane disqualified for three pylon cuts.

The Undertaker takes a little more time to build than a standard GLH or Quickie, but the time and effort spent can give you a real competitive edge. Mike designed the fuselage dimensions to fit the minimum rules and squeezed the radio in later, putting priority into the aerodynamics. The racing engine mount fairs nicely into the fuselage.



Bottom shot showing sleek lines and rounded fuselage.

The triangular fuselage meets the width and depth requirements but keeps the surface area and cross section at a minimum for drag considerations. The canopy has a sharp leading edge similar to the Convair F-102 and F-106 jet fighters. The laminar wing has a low drag "bucket" at small angles of attack. This allows higher speed on the straights and comparable, if not better, turns with other aircraft. The wing is also double tapered for better penetration, stability, and flying qualities. The flying surfaces have relatively sharp leading and trailing edges to decrease drag in high speed flight. Mike and I are highly pleased with the design and have built five of them in a month and a half (not for necessity, but pleasure and a desire to win). I think you will be pleased with yours too.

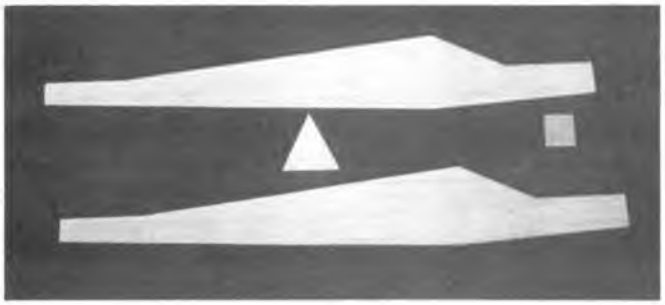
Small cross section, smooth functional lines make "Undertaker" a fast racing machine.

Construction

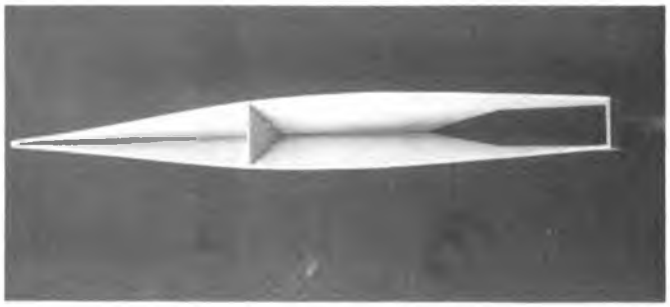
Wing:

Cut out the ribs using the plan as a guide. Take time when making the main spar as this is a major alignement piece. Begin building the wing in the inverted position by gluing the ribs to the spar and upper trailing edge planking. Next attach the leading and trailing edge balsa taking care to ensure a straight wing.

to page 43



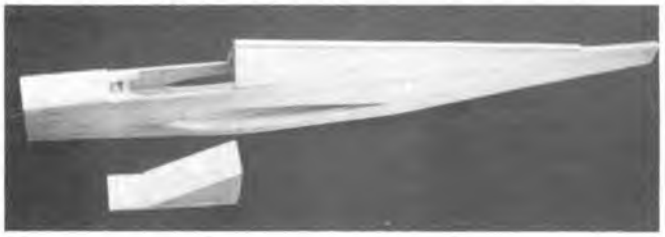
Basic fuselage parts — very simple.



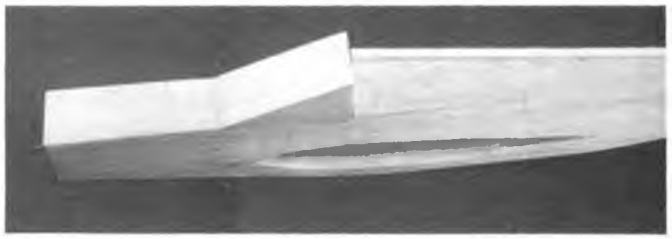
For proper shape, fuselage has to go together in this order.

Top view showing wing cut-out outline.

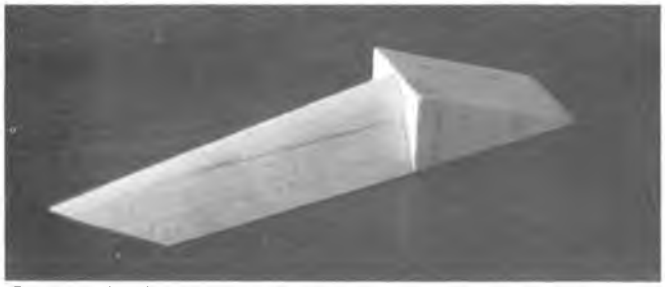
Load bearing structure added to fuselage.



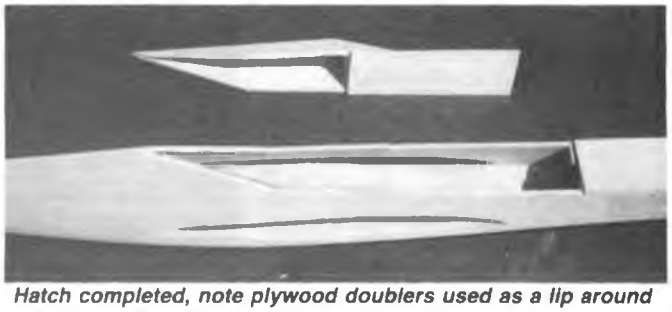
Fuselage ready for hatch and canopy fabrication.



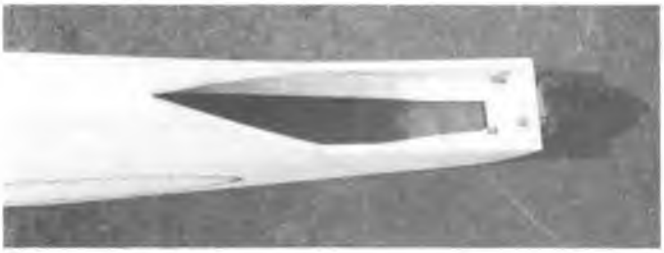
Canopy blocks in place ready to carve.



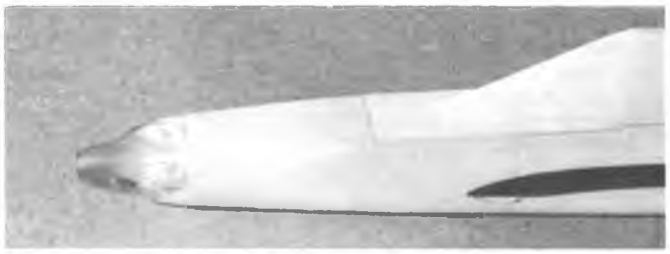
Canopy glued to rear hatch turtledeck, ready for carving.



Hatch completed, note plywood doublers used as a lip around hatch cut-out.

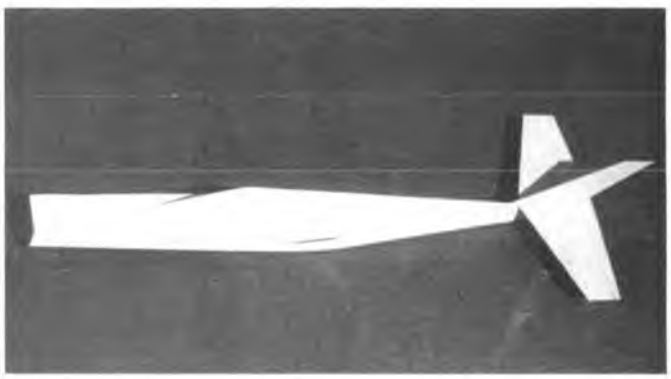


Fourmost 1/2A mount bolted into place.

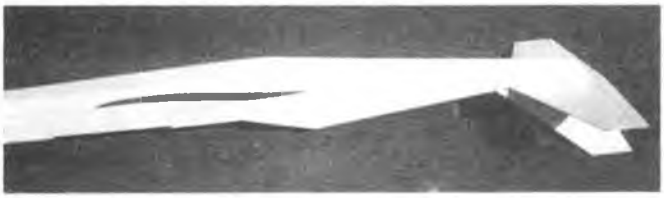


Fuselage nose sanded and shaped into engine mount.

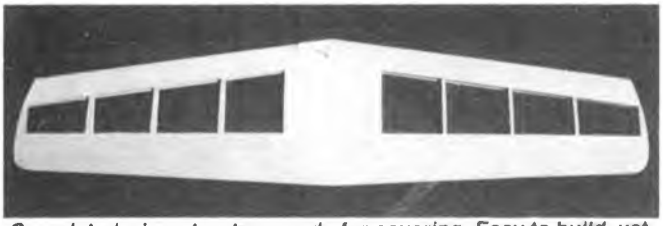
Empennage parts ready for assembly. The Klett hinges were cut off to match the slots shown in the stabilizer.



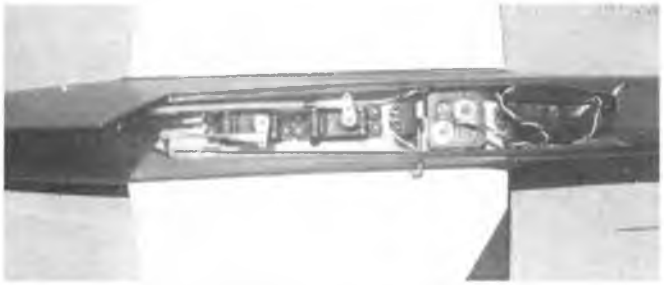
Completed fuselage with tail group.



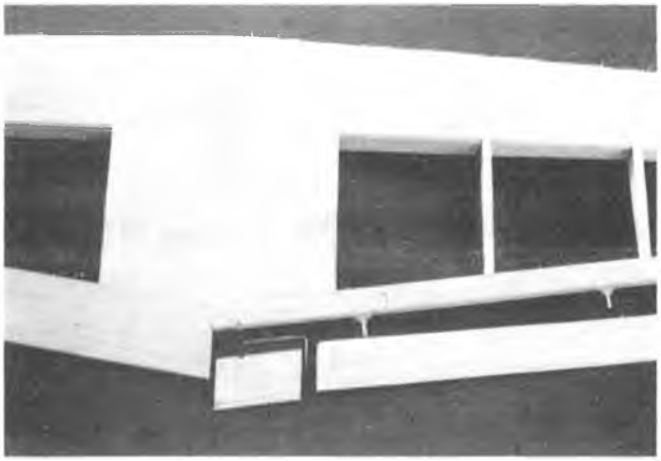
Bottom view of completed fuselage/tail.



Completed wing structure ready for covering. Easy to build, yet light and strong.



Plenty of room for tandem servo installation: Futaba S-20's, Heath 3 channel, Motorola batteries.



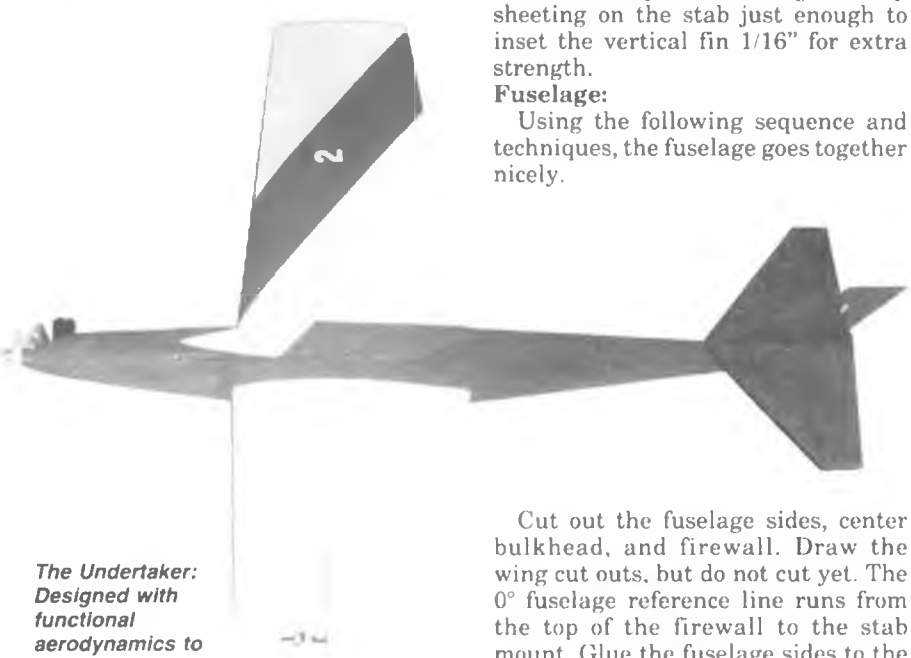
Aileron, linkage, hinge, and trailing edge detail.

KPS-18 servos side-by-side with KPR-7L receiver and Motorola batteries --- all in the wing.

I use Hot Stuff on everything but the firewall and some of the wing sheeting as this cuts assembly time and provides a very light, but strong, airframe. The basic wing structure is now complete and the remainder adds strength and planform.

Carve and sand the leading edge to a triangular section and plank the top forward surface of the wing with a single sheet of 1/16" balsa. Taper the trailing edge and add the bottom trailing edge planking, followed by the top center section planking. Plank the bottom leading edge and center section of the wing. A single piece of 1/16" balsa can be used for the leading edge planking if it is soft enough. Hot Stuff it at the spar, apply Titebond along the ribs, and Hot Stuff the planking at the leading edge, making a strong, fail-safe wing. Cap strip the ribs, then finish sanding the trailing edges. Add the wing tips and sand everything to the proper contours. Fill the ends of the trailing edges with scrap balsa before sanding.

Cut out the right aileron, then cut out the right inboard trailing edge (the piece left from the aileron to the center line). Face the aileron with a 1/8" sq. balsa insert for hinging. Install the aileron linkage as shown on the plans, then glue the trailing edge back on permanently. Fill the openings in the trailing edge and aileron with scrap 1/16" balsa. Fill the inboard aileron section with hard balsa or spruce as a suitable mount for the torque rod in the aileron. Install small hinges and glue with Hot Sutff. Reinforce the forward hinge attachment with baking soda and Hot Stuff. Finish sand the entire wing and cover with MonoKote or your favorite finish.



The Undertaker: Designed with functional aerodynamics to go fast!

Tail Surfaces:

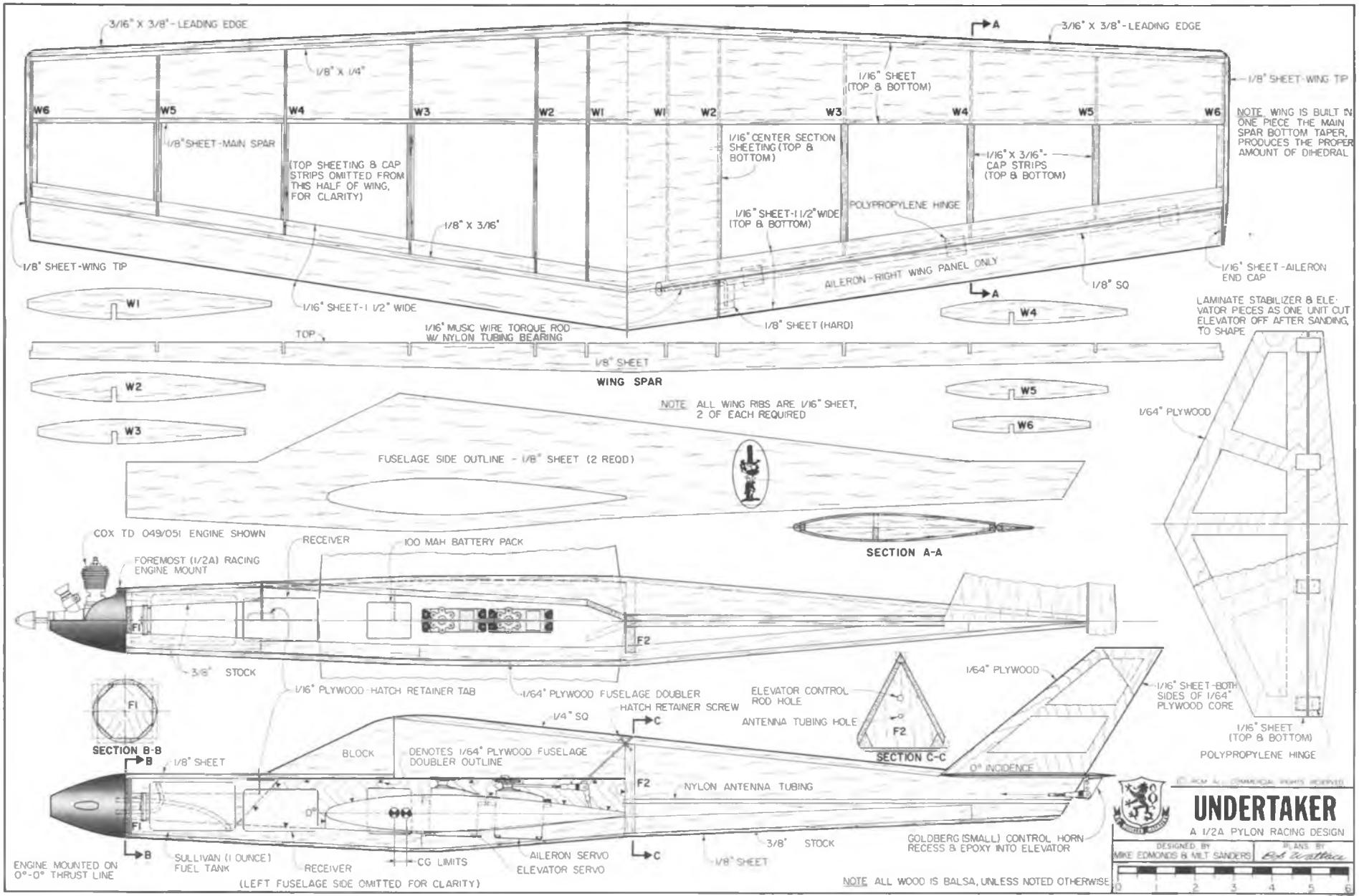
Cut out the basic outlines from 1/64" ply. Hot Stuff the 1/16" balsa over the plywood and sand to **sharp** edges. The plywood helps keep the edges even and straight without chipping. Cut off and hinge the elevator after the stab is sanded to shape. Cut through the top sheeting on the stab just enough to inset the vertical fin 1/16" for extra strength.

Fuselage:

Using the following sequence and techniques, the fuselage goes together nicely.

Cut out the fuselage sides, center bulkhead, and firewall. Draw the wing cut outs, but do not cut yet. The 0° fuselage reference line runs from the top of the firewall to the stab mount. Glue the fuselage sides to the 1/4" balsa bulkhead. Glue the firewall to the fuselage sides being careful to maintain alignment (no side thrust, no down thrust, 0° - 0° wing and tail).

text to page 124


3/16" X 3/8" - LEADING EDGE
1/8" X 1/4"
1/8" SHEET - MAIN SPAR
(TOP SHEETING & CAP STRIPS OMITTED FROM THIS HALF OF WING, FOR CLARITY)
1/8" X 3/16"
1/8" SHEET - WING TIP
1/16" SHEET - 1 1/2" WIDE
1/16" MUSIC WIRE TORQUE ROD W/ NYLON TUBING BEARING
TOP
1/8" SHEET
WING SPAR
W1
W2
W3
W4
W5
W6
A
1/16" SHEET (TOP & BOTTOM)
1/16" CENTER SECTION SHEETING (TOP & BOTTOM)
1/16" SHEET - 1 1/2" WIDE (TOP & BOTTOM)
POLYPROPYLENE HINGE
1/16" X 3/16" - CAP STRIPS (TOP & BOTTOM)
1/8" SQ
1/8" SHEET (HARD)
AILERON - RIGHT WING PANEL ONLY
1/16" SHEET - AILERON END CAP
NOTE WING IS BUILT IN ONE PIECE THE MAIN SPAR BOTTOM TAPER, PRODUCES THE PROPER AMOUNT OF DIHEDRAL
LAMINATE STABILIZER & ELEVATOR PIECES AS ONE UNIT CUT ELEVATOR OFF AFTER SANDING, TO SHAPE
1/64" PLYWOOD
1/16" SHEET - BOTH SIDES OF 1/64" PLYWOOD CORE
1/16" SHEET (TOP & BOTTOM)
POLYPROPYLENE HINGE
NOTE ALL WING RIBS ARE 1/16" SHEET, 2 OF EACH REQUIRED
FUSELAGE SIDE OUTLINE - 1/8" SHEET (2 REQD)
SECTION A-A
COX TD 049/051 ENGINE SHOWN
FOREMOST (1/2A) RACING ENGINE MOUNT
RECEIVER
100 MAH BATTERY PACK
F1
F2
3/8" STOCK
1/16" PLYWOOD HATCH RETAINER TAB
1/64" PLYWOOD FUSELAGE DOUBLER
HATCH RETAINER SCREW
ELEVATOR CONTROL ROD HOLE
ANTENNA TUBING HOLE
1/4" SQ
SECTION B-B
SECTION C-C
1/8" SHEET
BLOCK
DENOTES 1/64" PLYWOOD FUSELAGE DOUBLER OUTLINE
0° INCIDENCE
NYLON ANTENNA TUBING
0°
ENGINE MOUNTED ON 0°-0° THRUST LINE
SULLIVAN (1 OUNCE) FUEL TANK
RECEIVER
CG LIMITS
AILERON SERVO
ELEVATOR SERVO
(LEFT FUSELAGE SIDE OMITTED FOR CLARITY)
GOLDBERG (SMALL) CONTROL HORN RECESS & EPOXY INTO ELEVATOR
NOTE ALL WOOD IS BALSA, UNLESS NOTED OTHERWISE
UNDERTAKER
A 1/2A PYLON RACING DESIGN
DESIGNED BY MIKE EDMONDS & MILT SANDERS
PLANS BY Bob Wallace
0 1 2 3 4 5 6

PLAN NO. 885

ENGINE CLINIC

Clarence Lee

In the July and August columns we reviewed the Fox Eagle III and Fox Schnuerle port .19. I was quite surprised at the number of letters that came in of a complimentary nature in regards to the column. The two columns brought the largest response of any in quite some time. It is pretty obvious that Duke Fox does have a lot of staunch supporters out there.

Our first letter this month is typical of many received but also contains some useful tips for obtaining maximum performance from the Eagle III. I thought that those using the Eagle III might gain some useful information from the letter which, incidentally, comes from a modeler in Venezuela.

Dear Mr. Lee:

I have just received the July 1982 issue of RCM, where your report of the Fox Eagle III engine appeared. I have some remarks about this engine which I think compliments your good work. I am a Fox fan and also import and distribute these Fox products in some shops of my country, and also give warranty and service for them.

The Fox Eagle III is offered in the side and rear exhaust versions, and a rear intake version (Cat. #26600) is being released too. I have found that this engine is a real powerhouse, being even better than the fancy Italian imports in many respects.

The rear exhaust version has a different sleeve with piped timings. It is more powerful than the side exhaust version, and even more when fitted with a tuned pipe using the pipe coupler which is currently available at Fox. The pipe, itself, is out of stock but is available at Mac's Products. Its best performance is obtained with an 11/7 prop, while the side exhaust version performs normally with 11/7½, or 12/6 for scale models. The tach recordings you obtained are in the conservative side, probably caused by the low break-in time you mention. Fox motors usually need a good break-in and I am sure these figures will increase when the engine will be loosened. I am surprised to know that your engine has a somewhat hesitant recovery from idle when operated with 80/20 brew. We found a better behavior of our Eagle III's even in my country where the climate is less tolerant (hot and very humid, if not damp). The idle is good and acceleration is instantaneous with the Fox R/C plug.

Maybe your engine will improve when fully freed. If for any reason the engine still maintains those symptoms after broken-in when operated with FAI fuel, I would recommend use of a hotter plug as a sure cure. I had very good results with FAI fuel and hot plugs such as the Royal Delmar Thermatic, Rossi R/C Hot, Hobby Shack Thunderbolt and probably the O.S. #7. The Fox R/C is a medium range plug but should give no problem even with the 80/20 mix.

There is an added benefit with this engine as you can install your pet carburetor using the Fox Carburetor Adapter #90604 at cost of $5.95. It should be reamed to accept any other brand of carb, although the Fox MKX-D is very good. I should mention also that this carb has a conservative orifice, smaller than the other fancy imports such as the O.S. Max and Webra piped engines, so even extra horsepower can be obtained when a bigger throat carb is installed. Remember that to have full reliability from any Fox engine, a good break-in must be performed. When this is done, a very long life is also obtained because the heat transfer is better in a non-chromed liner even if it is less tolerant to severe overheatings, and the rings will last longer than if fitted to an ABC setup.

In summary, there are some steps to substantially increase the results you showed in your column. (This will apply only for the serious pattern fliers because for all sport and scale applications, the side exhaust should be preferred, being somewhat more reliable.) (1) Prefer the rear exhaust version. (2) Give a good break-in. (3) Install a pipe ***matched to your fuel and prop combo.*** *(FAI fuel would need a pipe with approximately 20% less volume than a nitrated fuel pipe.) (4) Install a bigger throat carb (sacrificing reliability a little, or in other words experimenting a little more to find the optimum). (5) A hotter plug only if you find these aforementioned symptoms. (6) A good brainwashing because many modelers think that the best products are the most expensive (not always true) and those used by the champs.*

Regards
Luis DeSantis T.
Valencia, Venezuela

Dear Mr. Lee:

In regards to the column on glow ignition conversion, you didn't mention the heat problem. Why wouldn't a glow to ignition conversion overheat if no fin change is made? Since alcohol flow is about twice gas flow — that removes lots of heat. No! Or what? You have a great column.

Sincerely,
Ray Propst
Chapel Hill, North Carolina

Generally there has been no heat problems encountered when changing from glow to spark ignition providing, of course, there was no heat problem to begin with. If an engine was running

too hot on glow then it is probably going to give problems with spark ignition.

Gasoline does burn considerably hotter and does not have the cooling effect that alcohol does but what must also be taken into consideration is the engine is also developing less horsepower. Horsepower is a function of heat. An engine might develop 1½ hp at 14,000 rpm burning glow fuel and 1 hp at 9,000 burning gasoline --- the operating temperature staying roughly the same.

Glow engines do not like to be lugged down with too much prop. If so, detonation takes place and temperature skyrockets. With spark ignition and gasoline fuel, the timing can be set manually with no detonation, resulting in a cooler running engine. If the same engine were run with spark ignition and straight alcohol/oil fuel it would run considerably cooler — possibly too cool.

Dear Mr. Lee:

While looking through some back issues I came across your article in the March 1980 issue of RCM on the GHQ engine.

A friend of mine bought one in 1947 or 1948 and we never did get it to run except on a prime for a few seconds.

The reason for this letter, however, is that you brought back the memory of those early postwar years and the great number of junk engines that appeared on the market. I personally was stuck with a kit-form Thor engine for $6.95 and it, too, ran once although a few years later I did see a Thor run quite well at a buddy's house. Another friend bought a Rogers 29 in a Stanzel Baby V Shark which was too underpowered to get off the ground.

Thousands of us kids in those days wasted our paper route money on those "Slag Metal Specials" until we could afford our first Arden or Ohlsson 23.

I realize that you can't devote a full Engine Clinic column to these engines but maybe could do a small feature on what us old timers put up with in those days and newer modelers might better appreciate the high degree of quality in today's mass production engines.

If engine production had been left up to the people who made the GHQ, Thor, Buzz, Judco, Ram, Rogers, and others, we wouldn't have a hobby today. We owe a lot of thanks to men like Ray Arden, Ben Shershaw, Irwin Ohlsson and Harry Rice who gave us some reliable engines in those days. I think Duke Fox should get some credit too as he was one of the few who stuck with the hobby when there probably wasn't a hell of a lot of money to be made from it in the fifty's and early sixties.

In closing I would like to cast my vote for the most trouble-free and reliable engine I've owned in thirty two years in the hobby to the O.S. Max .15. Mine is twelve years old and I can't wear it out.

Thanks for your time, Clarence.

Bob Edelmann
Mt. Clemens, Michigan

I have been kicking around the idea of doing a bit on the "slag" engines but just never seem to get it put together. Maybe I will one of these days.

As you may know, Rogers was the designer of all of these engines which were, in turn, manufactured by Judco with the exception of the GHQ. As far as I know the GHQ was produced by another company.

Actually, although the engines were nothing but junk, Rogers was a real genius when it came to figuring ways of doing things simple and cheap. Too bad his talent could not have been put to better use. Some of the early Rogers engines were of considerably better quality than the Thor, Buzz, Genie, etc., but still not competitive with other engines of similar displacement.

With a few minor modifications some of those engines could have been made to run very well, i.e., the use of a steel sleeve instead of the piston running in the aluminum casting and a bronze bushing for the crankshaft. But this would have added to the cost which they were obviously trying to keep to a minimum.

Dear Clarence,

I have followed your column for years now, and frankly I would have burned up a lot of good engines with that needle valve had I not known better because of your advice.

If you would, I'd like to get your recommendations for a decent torque wrench and where I might obtain it. I feel that I am always tending to over-torque head bolts after a cleaning operation. I am now operating ST .23, K & B .35 and .40, O.S. .30, ST .51, and Veco .61 engines. Also, should I use the recommended torque values for the machine screws listed or does each engine have its own specs?

Please keep up the good work, I look forward to your column each month.

P.B. Bartholomey
Jacksonville, Florida

Torque wrenches are just about useless for model engines due to the small size of the screws. Proto, Snap-on, and many of your larger tool manufacturers make torque screwdrivers that would seem ideal for model use but in actual application just do not work out. You can tighten the screws to the specified setting and then when rechecking with a conventional screwdriver find several loose, several too tight, etc. Friction seems to play too large a part with the small screws. I would not recommend using a torque screwdriver or wrench on anything smaller than a #10 size screw where torque values are high enough to overcome the friction irregularities.

Dear Mr. Lee:

I have a topic which I can't remember seeing in your column. I've always wondered about the guys who show up at the field (winter or summer) and start their cold engines, then immediately set the throttle wide open to adjust the needle valve to maximum rpm's. Is there internal damage to the engine by this procedure, without allowing the cylinder head temperature to rise?

Second, in the never ending topic of after run lubricating oils, I have been using a product specifically made for 2 cycle engines during out of season storage. O.M.C. (Outboard Marine Corporation) manufactures ***rust preventative*** *(fogging oil) part No. 172649 for use in their outboard motors. The part number may have changed as my can is over five years old. Have you had any experience with the product?*

Thank you,
Mark Isenberg
Clinton, Connecticut

Model engines do not really take much in the way of warm up. They come up to operating temperature pretty fast. Unlike automobile engines that should be allowed to warm up for a few minutes before driving to give the oil a chance to circulate, model engines get plenty of lubrication due to the oil being in the fuel. The engine never does come up to operating temperature until operated at full throttle and fairly well leaned in.

In the case of an engine that has been unused for a while it would be a good idea to let it run at low throttle for a few minutes to be sure the bearings have freed up and none of the balls are sticking from old fuel residue. Other than this there does not seem to be any real reason to let an engine run at low speed for a while.

I have had no experience with O.M.C. rust preventative. I would imagine, however, that like most of these outboard oils and additives they are petroleum base and not compatible with model engine fuels. Dissimilar oils can cause the breaking up of the oil film and often result in damage to the internal parts. It is always best to stick with oils that are compatible.

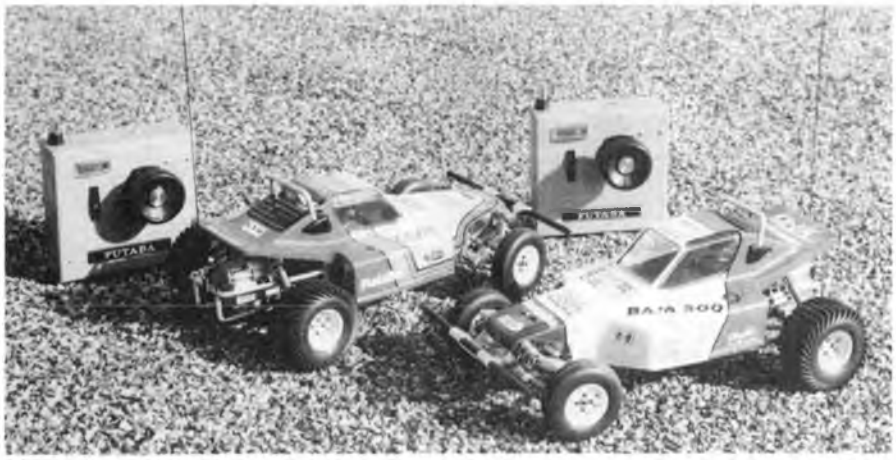
Dear Mr. Lee,

I have a few questions for you. If I put a Fabtronics CDI system on a Rossi .90

to page 120

OFF-ROAD RACING

Bill and Linda Pihl



A winning combination, the AYK car with Futaba radio. Extremely popular on the tracks in Southern California.

In this column we will tell you about oval racing, another aspect of off-road racing. If you are the type of person who likes to go fast, and we mean really fast, oval is for you. The cars need no special modifications, you will find that the standard car will handle very well without any suspension tuning.

Oval racing is not limited to 1/10 Scale cars. Since the track is very smooth, 1/12 Scale cars (and the new to the United States) 1/8 Scale gas off-road cars can use the same oval track. The tracks that we have been using for oval racing are a scale 1/2 mile which means you have 100' plus straightaways. We have found average lap time for an open class car to be 11 to 12 seconds. It's hard to believe that these are not full size cars when you see them kicked-out in a turn and throwing up a 2' rooster tail of dirt. Well charged batteries will have no trouble running the 15 lap heats because there is hardly any strain on the motor. The cars are so fast that any slight bump of another car will put you into a spin making it necessary for you to drive the straightest line to avoid the other cars. A mistake will take you from first and put you in last within a matter of a half second.

We have been running a 1/8 Scale gas off-road car, the Blue Bird car with a K & B 3.5cc motor. The Blue Bird is similar to Kyosho and Thunder Tiger, with horsepower you won't believe in the dirt. We found the standard oval tracks are a little too small for them. What is really needed for these cars is a 1/8 mile track so you can use all of the horsepower. On a 200' straightaway these cars are running over 70 miles per hour. With an efficient muffler or pipe, the noise level is suprisingly low. In a future article we will have pictures and more information on 1/8 Scale gas off-road cars.

★

Chargers are one of the most important tools for 1/10 Scale off-road racing. We have been using a Leisure 109 charger for the last year and a half. Our old reliable 109 just keeps on pumping out the amps. The Leisure 109 is a digital readout charger that tells you exactly what is being put into your batteries, not only in volts but also in amps, with a variable current adjustment. You not only can charge your car batteries but you can charge receiver and transmitter batteries with an adaptor. Speaking of adaptors, Leisure has charger adaptors for Tamiyas, Kyosho Buggy, Airtronics transmitter, Futaba transmitter, Associated, Jerobee, Bolink, A.Y.K. and Latrax cars and boats.

The Leisure 109 digital meter is designed to read both current and voltage to better than 1% accuracy. The variable rate charger allows selection of a constant current charge rate up to 4 amps. This feature permits charging any size nicad pack from 250 mAH to 1.2 Ah. A built-in equalizer circuit tops off the battery overnight for best performance. This information is included in the Leisure instructions and believe us, it is true. How true? We use the charger to charge the camera packs on our J.V.C. video camera. The other chargers that Leisure makes are the 105, 107 AC

A bit of close action in the oval racing.

You can protect your radio with side bars from Fun Racing Products.

Fun Racing Product's rear cage with mono-shock to smooth out those rough spots in the track.

Side bars and rear cage not only look good but offer a lot of protection.

and DC and the 110, which is the 110 volt battery eliminator. If you haven't already bought a charger, we suggest that you consider the Leisure charger.

★

We have received some letters asking some interesting questions which we would like to pass along:

M.D. Miller from Emporia, Kansas, would like to know how to put lights on his Ford F-150 truck. Any of you who have bought F-150 trucks know that they do not have provisions for headlights. Our suggestion is to use a hot knife or a Dremel tool small enough to cut out the existing plastic where the headlight assembly should be. Take a piece of Lexan or other clear plastic material, cut to size and use the new Plasti Zap CA + + instant glue for plastic models to install the clear plastic lens. Using an outside case of a ballpoint pen, cut two 1/2" long pieces and Zap to the back side of the headlight assembly. Next, go to a local electronics store and pick up two 1½ volt grain of wheat bulbs, a small switch assembly and a battery holder for a single AA cell battery. Slip the grain of wheat bulbs into tubes that you have glued on the back side of the grill, squeeze in a little silicone cement, let dry, wire through the switch to the battery holder and you have working headlights for your truck.

To put lights in a Sand Scorcher, just install a grain of wheat bulb inside the headlight assembly. On the Rough-Rider, use the existing light assembly, make a clear lens, install the grain of wheat assembly, wire and battery.

An easier approach is to have your hobby dealer get one of the lighting systems for cars from RAM, Inc. These are assembled and ready to install. RAM even has functional turn lights.

★

Hi:

My name is Al Vazquez and I own a Tamiya 4-wheel drive Toyota.

I would appreciate it if you could send me information on some of the new items for the 4 x 4. The things that I am interested in are: (1) the new brass gear; (2) how to obtain more speed; (3) the fast charge unit.

Thank you,
Al Vazquez

The brass gear will be available in any hobby shop carrying R.C.H. products. Brass gear is installed in place of the nylon gear in the transmission. This will allow you to use any of the high performance motors (Reedy, Check Point, Leisure or Astro Flight). This also answers your second question about more speed. Don't try to use the high performance motors without the brass gear. The last question, about the fast charge unit — if you have the large 4000 milli-amp Tamiya battery pack, it cannot be fast charged; they can only be slow charged. We would suggest using the sub-C, six cell packs as used in the standard off-road cars, so you can fast charge the batteries. The 4000 milli-amp batteries will give you 30 minutes of running time but the pack has to be slow charged. The sub-C battery pack can be fast charged for 15 minutes and will run for about 12 to 13 minutes. After cooling this pack can be recharged and run again. If you want to run the 4 x 4 more than one time, we would suggest using the sub-C batteries.

We have put in some more pictures of the Fun Racing Products rear cage assembly, with the mono-shock set up and side bars. There have been a lot of questions on the use of the cages. They not only help in stiffening the chassis but makes it easier to change gears and motor on the Tamiya car.

Here is something else that we have

to page 118

The Fun Racing Product's side bars and rear cage allow easy access to motor and gear box for quick change.

RCH Products has a brass drive gear for the Tamiya 4 x 4.

SCALE VIEWS

Col. Art Johnson

Bob Walter used panel line and rivet techniques described by Art when he built his F6F Hellcat. Hellcat has combination of flush rivets, flush Dzus fasteners and round head rivets.

Hot tube system produced nice flush rivet pattern on Tom Cook's new F4E ducted fan model. Photo at U.S. Scalemasters Championship contest.

Boom section over wing of P-38 is a study in surface detail variety. Flush, overlapped and hinged panels. Flush rivets, flush cross point screws, round head cross point screws and flush Dzus fasteners all show in photo.

Surface Detail

Everyone has heard of the old adage that "beauty is only skin deep." Well, when it comes to the surface of your latest scale model, that may be deep enough. Probably 99% of scale competition in this country is now conducted under Sport or Giant Scale rules — both having the same concept for static judging. AMA Precision Scale is now conducted under FAI rules and only in these precision FAI competition events will you have judges laying the tape measure on your model and looking inside to see what is under the skin.

So the judges are not going to get closer that 15' to your model so you have no worries about the surface details of the aircraft you are modeling. Wrong, at 15' a 1/6th Scale model will look the same to the judges as would the original at 90'. If your model is to 1/3 Scale, the judges should see what they could see on the real thing at 45'. Next time you are around the airport or air museum, check out what you can see from these distances, you might be surprised.

When all models are judged from 15', it might look as though the larger scale models are at a disadvantage because the judges are seeing them at a distance that would make more small details visible. It may be that this factor evens out in the long run because the models built to a larger scale are almost always of aircraft that are smaller and less complex than are aircraft modeled at the smaller scales. I noticed that about 25% of the models entered in the Reno World Championships were "quarter scalers." All were models of light aircraft or homebuilts and none weighing more than 12 pounds. I suspect that the static judges will find a lot more to keep them entertained while looking at a 1/6th Scale P-38 than they will while inspecting a 1/3 Scale Pitts Special. This will be true even though they are looking at surface details that look as though they are twice as far away as the surface detail of the Pitts.

In the example cited, the P-38 will actually have a longer wing span than the Pitts. The fact is that scale fractions bear no relation to the actual size of different models. The term

Drafting tape in 1/64 thickness is an easy way to lay down panel lines. Craft and drafting supply stores carry the tape.

Sharpened steel or brass tube chucked in Dremel tool makes fast work of producing rivet pattern on models of metal covered aircraft. Two hands for beginner or expert!

"quarter scale" describes the size of a model about as well as the term one-to-one scale describes the size of a real aircraft. You have to name the aircraft you are modeling before a reproduction to some fraction of the original will give you any clue to the model size.

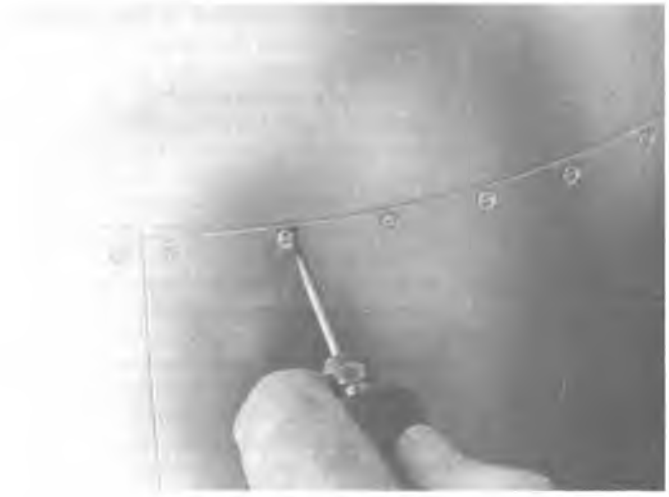
This is not true when you get to surface details, however. Rivets, screws and fasteners do not increase much in size when they are used on larger aircraft. There are just more of them. I recently checked the size of fasteners on a P-40D cowl in an air museum. The Dzus fasteners on the cowl matched a US Penny or about 3/4" in diameter. On your model at 1/3 Scale these will be 1/4" diameter and at 1/6 Scale they will come out at 1/8" diameter. Both sizes are very visible from 15'. As you go down to 1/12 Scale, a 1/16" diameter fastener would be hard to see and the rivets would be even smaller. There is a point when surface detailing becomes impractical. I think you are at this point with schoolyard size scale and with models of some very large aircraft where the fractional scale is very small.

It was not too long ago that Sport and Giant Scale modelers were happy if the skin of their model looked smooth and was covered with a slick pretty paint job. Decorations were added with ink or paint to simulate panel lines and rivets. The end result often looked more like a pretty plastic toy than like a real aircraft. I have seen some very beautiful pylon racing models finished in this manner but no one even pretends that these models are faithful copies of an original.

The fact is that black ink lines and black dots just do not look like panel lines and rivets on a real aircraft. Aircraft with panel lines and rivets are, of course, metal covered with a complex surface and are generally modeled to a smaller scale than wood and fabric aircraft. To model these aircraft using the materials and structure of the original — the ultimate goal of the FAI Precision Scale builder — is practically impossible. Fortunately, there are some easy ways to make the surface of these models look like the original, or they will be darn hard to tell from the original at a distance of 15'.

Panel lines are visible on a real aircraft to varying degrees because metal aircraft are covered with sheets of aluminum which are overlapped, or butted together in the case of most aircraft since WW II. Rivets are standard round head or the flush type introduced just before WW II and many aircraft from this period have both types. Dzus fasteners are recessed and larger than flush rivets. On many aircraft manufactured in the WW II period, these surface details are quite prominent. Their correct rendition adds to the character of the model and helps convince the static judges that your model actually looks like the real thing.

The Navy F-6F Hellcat is a good example of an aircraft with a variety of surface details. The fuselage looks like it might have been made at the navy shipyard; overlapping plates with rivets like a boiler. (Were they made this way to survive Navy landings?) On the other hand, the



Small saw from Dixon puts screwdriver slot in flush Dzus fasteners. Only hard part is to get it in the center.

Final step after color coats are on is to remove panel line tape. End result is a fine groove in the surface that simulates the butt joint of flush aluminum panels.

wing has butted panels with flush rivets. Primer and paint make it difficult to see some of these surface details while others stand out even in magazine photo reproductions.

Overlapping skins of aircraft are most easily reproduced by laying masking tape along the edge and building up the panel with filler before painting. The technique has been described in a number of recent magazine articles so we will skip over that one and talk about the panel lines that result from butted joints. If you look closely at panel joints on an aircraft you will see that there is some gap or edge irregularity that can be seen from a distance. The same goes for access panels and hatches. On painted aircraft the edge of the panels may also show paint wear or shadow where there is a gap in the surface. The joint will not look like a painted black line but more like a fine crease in the surface.

Fortunately, this type of indented panel line can be reproduced quite easily using thin drafting tape. I find it easier to lay out the panel lines with 1/64" tape than to try to ink them. The tape needed comes in small rolls and can be purchased at drafting supply stores. The Chart-Pak brand works well. Before applying the panel lines or rivets, first spray a coat of aluminum over the primed surface of the model. Hobbypoxy silver does a nice job and provides a good undercoat for your final paint selection. You can also use a light coat of your final paint color and save one step in the finish job.

The 1/64" tape follows curves readily and can be stretched out easily for straight lines. It is best to lay the tape past the spot where needed and then trim off the excess with a sharp X-Acto knife. The tape sticks well to a painted surface but it can easily be lifted and moved if you did not get the line just right. The color of the tape is not important as its purpose to disrupt the final paint job when it is removed. When all panel lines are taped the model is ready for the rivets.

The glue drop system is the way to go for ordinary rivets and again this technique is well-known. Flush rivets are another matter and you most certainly do not want to use glue drops to simulate flush rivets. Flush rivets are used on aircraft to reduce skin drag. The idea is to get the rivets head down even with the aluminum skin. The head is also flat instead of round. In practice, the head often ends up slightly below the surface and the metal is depressed slightly around the rivet head. This effect is more visible on aircraft where the metal is not painted or where a light gloss color is used. Flush rivets may not be readily visible on aircraft painted in dark satin colors. The builder must decide from the photos and information on hand, when it is worth the trouble to duplicate the rivet pattern on any particular model.

Flush rivets on a model are easily simulated with one of several techniques which imprint the depressed rivet head pattern using a sharpened piece of metal tubing. I have had good luck using a piece of stainless or brass tubing chucked in a Dremel tool which is then turned at about 4000 rpm. I use both hands on the tool to steady it as only a light touch is needed and it is important to keep the rotating tubing from walking on the surface. Practice on a part from an old model. With a little practice, you will find that you can produce an acceptable line of rivets as fast as you could mark them with a pen. Do not press too hard or you will have a nice neat hole through the skin which will have to be filled.

Flush rivets can also be imprinted into the surface using a piece of tubing chucked into a small soldering iron or wood burning tool. In this case the heated tubing burns its way into the surface leaving the typical rivet pattern. I understand that Tom Cook used this system to produce the rivet pattern on his beautiful new F-4 done in USAF colors.

Flush Dzus fasteners are always larger than rivets so a larger piece of tubing is required but the technique is the same. Dzus fasteners are slotted for a screwdriver so the slot must be added to make them look right. Again this is an easy task with the right tool. I have used a small saw-type cutter made by Dixon that chucks into a Dremel tool. One touch with the tool and the slot is done. This is not a job for a morning when you have the shakes. It takes a steady hand to center the slot in the fastener. Although I have not tried it, I suppose that this job could also be done with a heated tool and perhaps at a faster pace than with the Dremel tool.

When the rivet pattern is completed, a light sanding will ready the surface for the final paint colors. A light coat is all that you want for the final finish so that the rivet pattern will not be filled in. If the panel line tape was laid on to a primer color the same as the final coat, the tape can be removed and the finish is complete or ready for a coat of clear. The grooves in the paint left by the 1/64" tape will look very much like the panel lines of the original aircraft. If the tape was laid over an aluminum primer, then another coat of final color will be required. Aluminum panel lines all over a dark finished model may look pretty but they will not look like a real aircraft. On models finished with a satin flat final coat, either clear or color, a light rub with very fine steel wool will enhance the panel line and rivet detail.

Scalers Need Help:

Every once in awhile I wish that I could buy something that I need for a model to make life easier. I can live with the job of carving scale prop blades, even when it calls for eight blades for a twin engine model. When it comes time to paint the manufacturer's prop logo on these prop blades I get choked up. These darn things were decals on the originals so why can't some enterprising soul make decals for us overworked (lazy) modelers? How about a sheet of decals with sets of four each logos for "Curtiss Electric," "Hamilton Standard," and "Aeroprop." The sheets could include sizes of 1/8, 1/6, 1/5, and 1/4 Scale. It should not be a big deal to make these and I bet they would sell like crazy.

Scale Rules Changes:

Recent publication of proposed changes to the AMA scale rules makes me think that scale fliers are better satisfied with the current rules than they have been in the past. There are fewer proposals this year. A number of these proposals address the question of how to static judge models of different size or different scales. (Not necessarily the same thing.)

Judging by the contests that I have attended recently, I am not convinced that this is a real problem, at least not yet. One of the attractions of the Sport and Giant Scale events, is the simplicity of judging the models which allows more time for flying. In principle, I think we might go slow in adopting any static judging technique which is going to require a CD to set up different distances for his judges to look at different models or different aspects of the same model. We should also avoid handling or movement of the model during static judging, particularly by anyone other than the builder of the model. As I see it, these proposals cannot help but slow the judging process and complicate the administrative problems for the CD.

Another major proposal is to increase the weight limit for single engine models in Sport Scale to 20 pounds from the present 15 pounds. No increase in engine displacement is proposed nor is an increase in weight for multi-engined models included. Looking at this proposal, I find that the present 15 pounds for single engine and 20 pounds for multi-engines has been in the AMA rule books for over ten years. When the RC Sportscale rules first appeared in the 1973 rule book, the engine limit was established at .61 cu. in. instead of the 1.25 then allowed for Precision

to page 118

Christy Cunningham of Tulsa, Oklahoma, on the campus of Oral Roberts University with a pair of "Mongeese."

ABOUT THE AUTHOR

Harold and Tracy Ackeret (father and son) started flying RC in 1976. Their first plane was an RCM Basic Trainer, a taildragger. Tracy's natural progress was to pattern, and from his contest flying is where the need for a ship like the Mongoose was born. They thought it only natural it should also be a taildragger since their first one was, plus Tracy says he just likes taildraggers.

After completing high school, Tracy enrolled at Spartan School of Aeronautics in Tulsa, where he is studying Electronics and Instrument Repair. Tracy's love for flying has taken him to the sky in full size sailplanes, which he states is the greatest high. His contest flying has slowed down since starting school, but he still cranks them up as often as possible.

Harold, originally from Ohio, came to California via St. Louis. He is employed by McDonnel Aircraft as a Senior Engineer, Flight Test Data Lab, Maintenance, at Edwards Air Force Base. He keeps busy with various RC projects and recently started flying RC sailplanes. He says the high desert where he lives is great for sailplanes, or any other RC flying year around.

MONGOOSE II

An excellent tail dragger pattern ship for the novice and beyond. It has all the basic good points without the fancy goodies.
By Harold and Tracy Ackeret.

After Tracy had been flying pattern for a year or so we came to the conclusion that what he really needed was a plane that had very good flying characteristics but didn't need all the fancy goodies associated with pattern planes.

What kind of goodies didn't he need? First, retract gear really wasn't necessary for Novice class; second a plane which could do all the necessary pattern without using a expensive .60 engine with tuned pipe, etc. One that didn't tear up the sky and do maneuvers so fast that a beginner couldn't keep up with it. What was needed was one that was fairly simple to build and repair. One that looked like an airplane. Well, this is what we started out to accomplish and we believe we have done just that.

Now right away you are going to notice this Mongoose is a taildragger, and you say taildraggers are terrible to take-off and land — not so if designed properly. The Mongoose will go down that runway as straight as an arrow with a little practice. And for take-offs, you don't need to haul back on the elevator to get it off the ground, it just lifts off nice and smooth when it reaches flying speed.

The total weight of the Mongoose has been kept to around eight pounds finished, fueled, and ready to fly. Because of this, any good 60 engine will take it through all the maneuvers. You should find it a joy to fly because it does the manuevers gently and gracefully without a lot of speed. On knife-edge, all you will need is a touch of rudder; and rolls, just ailerons and a touch of elevator inverted. After flying the Mongoose for some time Tracy remarked, "There is only one thing wrong with this airplane, and that is I can't find anything wrong with it." Sound good? Okay, let's start building.

Before we start we want to thank Mr. Dick Russ for all the help he has given us. Mr. Russ not only taught us to fly, he also taught us most of the great building methods used in the Mongoose. Everyone who starts in RC should be so lucky and have such a good teacher.

First off, as with any plane, take a lot of time just studying the plans, before even cutting any wood. Some of the items to note: we have provided templates for all major parts, so you don't have to cut up the main drawing to get good templates. Study the simple way it is constructed. Check out how the tail wheel and rudder work. Check how all formers, etc., fit into the plane; all in all, really give the plans a good going over. As you go along you will find it relatively simple construction.

Cut from the plans all templates, oversize, and glue them onto some type of construction cardboard. We have found 3M 77 spray contact cement a very simple glue to use for this. After the glue dries, cut the templates to size. Take all your templates and cut all pieces from proper wood. You will note you must splice a piece to the 3/16" x 4" x 48" to make the fuselage sides. If you make all your parts now you won't need to stop construction to cut parts out later. Be sure you have 2° down in the front of the fuselage sides. We'll break the construction down into major components, i.e., fuselage, wing, stabs, etc. This will enable you to jump around during construction. Throughout construction we will assume you have already cut out all parts. If you cannot find 3/8" plywood for the firewall, use 1/4" glued to a 1/8" piece. Do not substitute 1/4" for the firewall. Be sure you glue on a flat surface when you splice the fuselage sides; use Hot Stuff to glue.

Fuselage:

Before starting, make sure both fuselage sides are identical. Measure back 3/8" from front edge (firewall) and make a line parallel to edge. Glue the 1/4" x 1/2" top stringer in place using Hot Stuff. Start at the line you just made on the sides. Be sure you make a left and right side. During construction you will find we use a lot of Hot Stuff. It has been our experience that using Hot Stuff for practically the whole plane makes for an exceptionally strong airplane, plus saves a lot of weight and speeds up the building process. Hot Stuff and baking soda make a very good filler where parts do not mate properly, and Super-T Hot Stuff and baking soda works well for those larger gaps. Locate the nose doublers and position per plans; mark the 2° down on the doublers and sand accordingly. Using Super-T Hot Stuff, glue the nose doublers in place. Position the wing saddle doublers in place, use the wing bulkhead to obtain correct spacing between the nose doublers and wing saddle doublers. Glue the wing saddle doublers in place

MONGOOSE II

Designed By:
Harold & Tracy Ackeret

TYPE AIRCRAFT
Pattern

WINGSPAN
64¼ Inches

WING CHORD
10½" Avg.

TOTAL WING AREA
690 Sq. In.

WING LOCATION
Low Wing

AIRFOIL
Symmetrical

WING PLANFORM
Swept L.E.

DIHEDRAL EACH TIP
1⅜ Inches

O.A. FUSELAGE LENGTH
55½ Inches

RADIO COMPARTMENT SIZE
(L)13" x (W)2¾" x (H)3¼"

STABILIZER SPAN
25⅜ Inches

STABILIZER CHORD (inc. elev.)
7⅛" (Avg.)

STABILIZER AREA
212 Sq. In.

STAB. AIRFOIL SECTION
Symmetrical

STABILIZER LOCATION
Mid-Fuselage

VERTICAL FIN HEIGHT
6¼ Inches

VERTICAL FIN WIDTH (Inc. rud.)
6⅜" (Avg.)

REC. ENGINE SIZE
.61 Cu. In.

FUEL TANK SIZE
14 Oz.

LANDING GEAR
Conventional

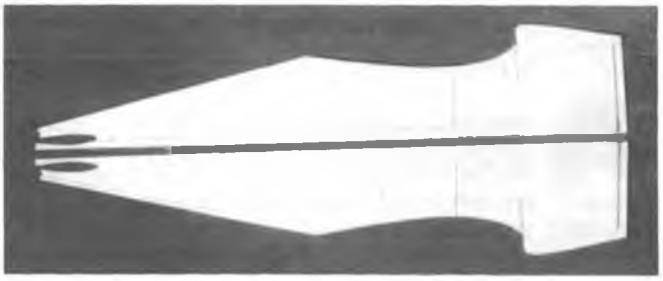
REC. NO. OF CHANNELS
4

CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.

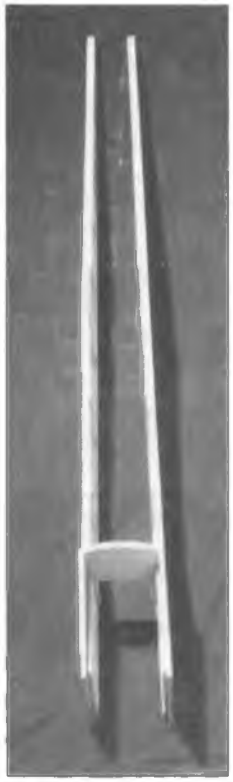
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply & Basswood
Wing ..... Balsa, Ply, Foam
Empennage ..... Balsa, Ply, Foam, Basswood
Wt. Ready To Fly ..... 116-128 Oz.
Wing Loading ..... 24.21-26.71 Oz./Sq. Ft.

Parts cut out.

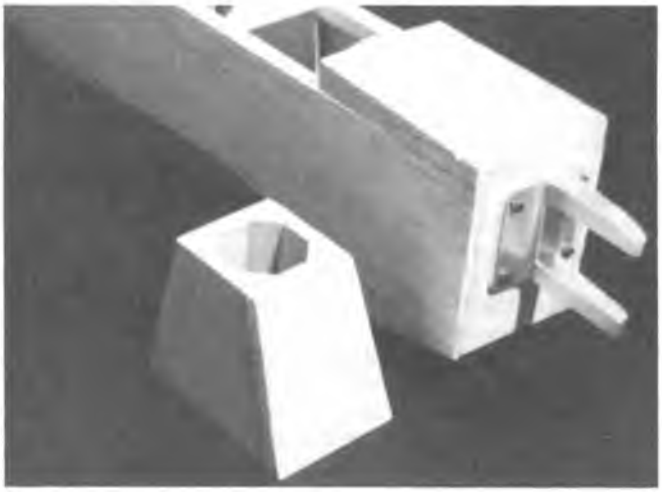
Cutting fuselage side.



Fuselage sides complete.



LEFT: Ready to join fuselage sides. RIGHT: Completed fuselage and nose block, without top sheeting.



Nose section with Fox mount.

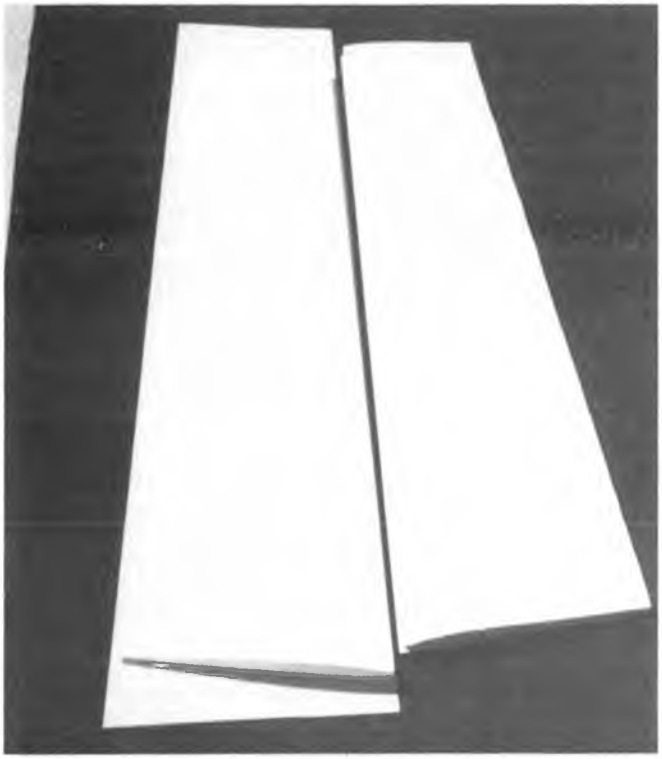
Starting to carve nose section.

Fuselage carved and sanded to shape.

using Super-T Hot Stuff. We have tried many glues for gluing doublers in place but have found that Super-T really works great and it is fast.

Using 1/4" x 1/4" balsa, glue the lower stringers to the fuselage sides(s) starting at back of the wing saddle doubler. We have not made templates for stringers, etc., just cut to size as you go. Lay the fuselage sides(s) on the drawing and mark the position of all vertical stiffeners. Cut stiffeners and glue in place with Hot Stuff. Cut out the first three on each side to go over the wing saddle doublers.

Mark the position of the wing bulkhead on one fuselage side, directly behind the nose doubler. Make sure the bulkhead is square with the side and Super-T Hot Stuff in place. Turn so the fuselage is upside down, apply Super-T to exposed edge of the bulkhead and glue to opposite fuselage side, making sure both sides are square with the bulkhead. It is very important on the next steps to assure the fuselage is straight and true. If you use a fuselage jig you have no problem. If you do not use a jig you must make sure

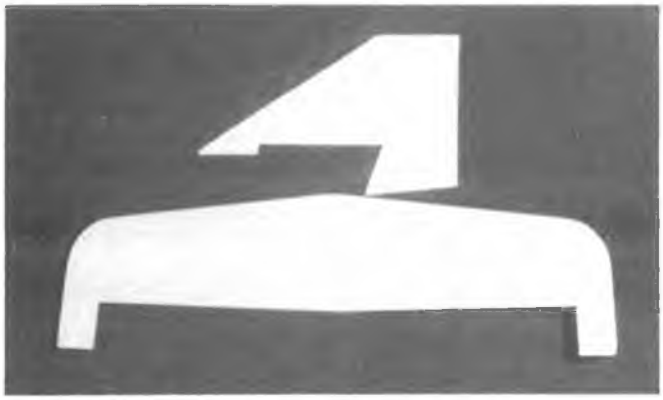


Sheeting wing.

Checking wing incidence.

Ready to start forward bottom wing fillet.

everything is squared up some other way. We draw a line on our building board, longer than the fuselage sides, then draw another line parallel to the first, the width of the fuselage apart, next draw a line down the center of these lines. Place the fuselage, upside down on the lines, put waxpaper between the fuselage and board, pin in place.



Tail feathers complete.

Checking engine and spinner installation.

Installing tail feathers.

Ready to start building wing fillets.

Join the sides together, at the tail, sand stringers to form a V at the tail, check drawing for proper width at the tail. When you are sure of the angle and everything lines up on the centerline, Hot Stuff together at tail. Cut the first four top braces, 1/4" square, starting at the wing bulkhead to length; these are all the same size and square with the fuselage sides. Hot Stuff in place the 2nd, 3rd and 4th braces, making sure you keep the fuselage in line. You will install the number one later after you install the firewall since it is located over the wing bulkhead.

Starting behind the wing saddle, glue the first cross grain bottom sheet in place; note the first is 1/4" x 3" and fits inside the wing saddle doubler cutouts. Sand this piece flat with the bottom of the fuselage. Position the first 1/8" x 3" cross piece in place over the 1/4" you just installed. Do not glue. Now position the next piece of 1/8" in place and Hot Stuff in place. Continuing gluing the remainder of the bottom pieces in place. Note the last piece on the bottom is 1/8" plywood.

Next install the firewall, but first you should drill holes and install blind nuts for your engine mount. We recommend you use the Fox aluminum engine mount. This mount taps very well and the holes will not strip out after a few engine removals. You will find you have to round off the tips of the mount to accommodate the cowling. The firewall template shows the centerline for the engine; work from this point when installing mount.

Align the fuselage to the lines on the board and epoxy the firewall in place, clamp and let dry. Remove from board, turn over, and install the remaining top braces, including number one; the remaining braces need to be tapered ends to fit the curve of the fuselage. Hot Stuff the 3/4" triangle firewall braces in place, behind firewall. Now is a good time to drill the holes for your throttle cable. Fit the tank floor in place and Hot Stuff the floor and the triangle floor braces in place. We have found the Kraft 14 oz. Slim Line tank works best in this installation. Before you install the fuselage top block you want to coat the tank compartment using a good sealer. We use Devcon 5-Minute Epoxy thinned down with Dope Thinner or MEK,, so you can brush it on. Be sure to cover the inside of the top block. Using Hot Stuff Super-T, glue the top block in place.

Glue the fuselage formers F1 through F6 in place with Hot Stuff. Fabricate the nose cowl from the parts cut out, using Hot Stuff. Note the sides fit inside the top and bottom pieces. Hot Stuff the 1/2" triangle pieces inside the cowl with Super-T. After sanding the back of the cowl, check the fit to the fuselage, with the engine mount on the firewall. Now is a good time to drill your drain hole in the bottom of the cowl.

Draw two lines, one 3/8" down and one 1" down (use a felt tip pen, so as not to groove the wood) parallel to top of fuselage. The 1" line will be necessary when you start installing the wing and stab, as the 1" line will be the "0" degree of the fuselage. Since you will be sanding the top to fit the top sheet you will lose the "0" degree line, which is the top of the fuselage sides. Using a plane and/or sanding block, sand the fuselage forming chamfered edge from the top block to the tail using the top formers as a guide. Also sand F1 through F6 to the proper slope to accept the top sheet, front to back. using a light medium 1/8" x 4" x 36" balsa sheet, wet the entire sheet with warm water or, if you don't mind the odor, use ammonia, the kind your wife uses in the kitchen. We personally have found the ammonia works best. Apply a film of white glue to the formers and along the entire length of the fuselage sides, chamfered edge. Place the top sheet in place and hold in place with masking tape (don't tape so tight it dents the wood) until dry. When dry, remove the tape and trim the sheet to the sides of fuselage.

Install the bottom nose block on the fuselage. You may want to place a large piece of balsa between the tank floor and the bottom block on the right side only. With one engine we found the muffler would not clear the fuselage without extending it outward, so we installed a block as noted and carved it out to fit the muffler, see picture.

Tack the cowl in place using Hot Stuff. Cut a large hole in the center of the right cowl and gradually enlarge the size of the hole, to accommodate engine installation and removal. Temporarily install the engine and the CB spinner and backplate on the engine and check alignment of the nose cowl (where nose ring fits), and engine position. Sand as required to obtain clearance and alignment needed for the 1/8" nose ring. If for some reason the cowl is too short to give a good fit, increase the nose ring thickness as necessary. Draw a line around the nose ring when you are sure of the fit. Remove the spinner and engine. Super-T the nose ring in place. Using X-Acto knives and sanding blocks (80 and 120 grit) shape the fuselage to shape and contour shown on the drawing. You will find you need to carve off a lot of wood in shaping, particularly around the nose section, but you must cut off to shape properly. After shaping, check the engine and spinner fit; if all okay, remove the cowl and Super-T permanently in place. After shaping, sand with 320 grit and finish with 400 for a nice smooth finish.

Wing:

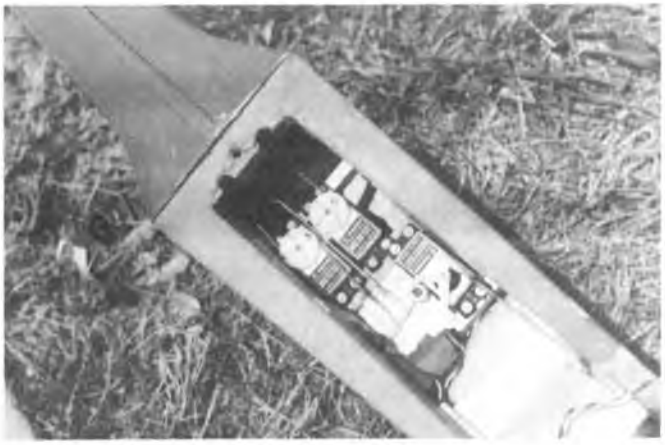
If you use the Dirty Birdy foam wing kit, or the kit available from Wing Mfg., follow the instructions received with the wing, with the following exceptions. Position of gear will be different, follow measurements on drawing. Use the gear blocks, etc., but not the wire gear; you will need to make new ones using the dimensions on the drawing. Note the new wing tips; be sure to hollow the tips to keep them light. When you install the wing bolt bushings (we use fiberglass arrow shafts), let them stick through the bottom of the wing about 1" (this is to accommodate the fillet on the center front of the wing later). If you buy wing cores from another source, use standard foam building techniques. For gluing the wing sheeting on we use 3M 77 spray contact cement. (Caution: **do not** use 3M 77n, it will attack foam.) As a safety precaution always check any glue you use on a scrap piece of foam before using. Be sure to sand the core lightly before applying the sheeting and sand well before covering. We have covered the wing with MonoKote to cut down weight. We cover the complete wing with MonoKote then cut out the slots in the gear blocks for the gears. Install the gear and recess the gear straps, then cover the area with another piece of MonoKote. In case you need to remove the gear later this makes it easier, just peel off the cover piece and remove the gear. Do not cover the wing at this time since you will install the front fillet later. If you should like a built-up wing and not the foam, go right ahead and use the Dirty Birdy built-up wing kit. One of our prototypes has a built-up wing and the other foam, and we see no difference in performance. Both wings came out very close, as far as weight, to being the same.

Horizontal Stab and Vertical Stab and Rudder:

Here, again, if you use the Dirty Birdy horizontal stab kit or one from Wing Mfg., follow the directions with the kit, except that we have added anhedral in the stab. So before you join the two halves check the drawing for anhedral and how to measure. The reason we use anhedral is that the plane will track better on outside loops and be more stable inverted. The stab is later installed on the fuselage and painted as part of the fuselage. We recommend you use standard control horns on the elevators, and not the metal ones that come with the Dirty Birdy stab.

Glue two pieces of the rudder together using Hot Stuff. Make sure you glue on a flat surface. You can make the rudder from one piece if you wish. Now Hot Stuff the basswood sub-rudder to the rudder. Before you glue, rub some baking soda on the basswood where it fits to the

text to page 62



Servo installation, note steering reduction.

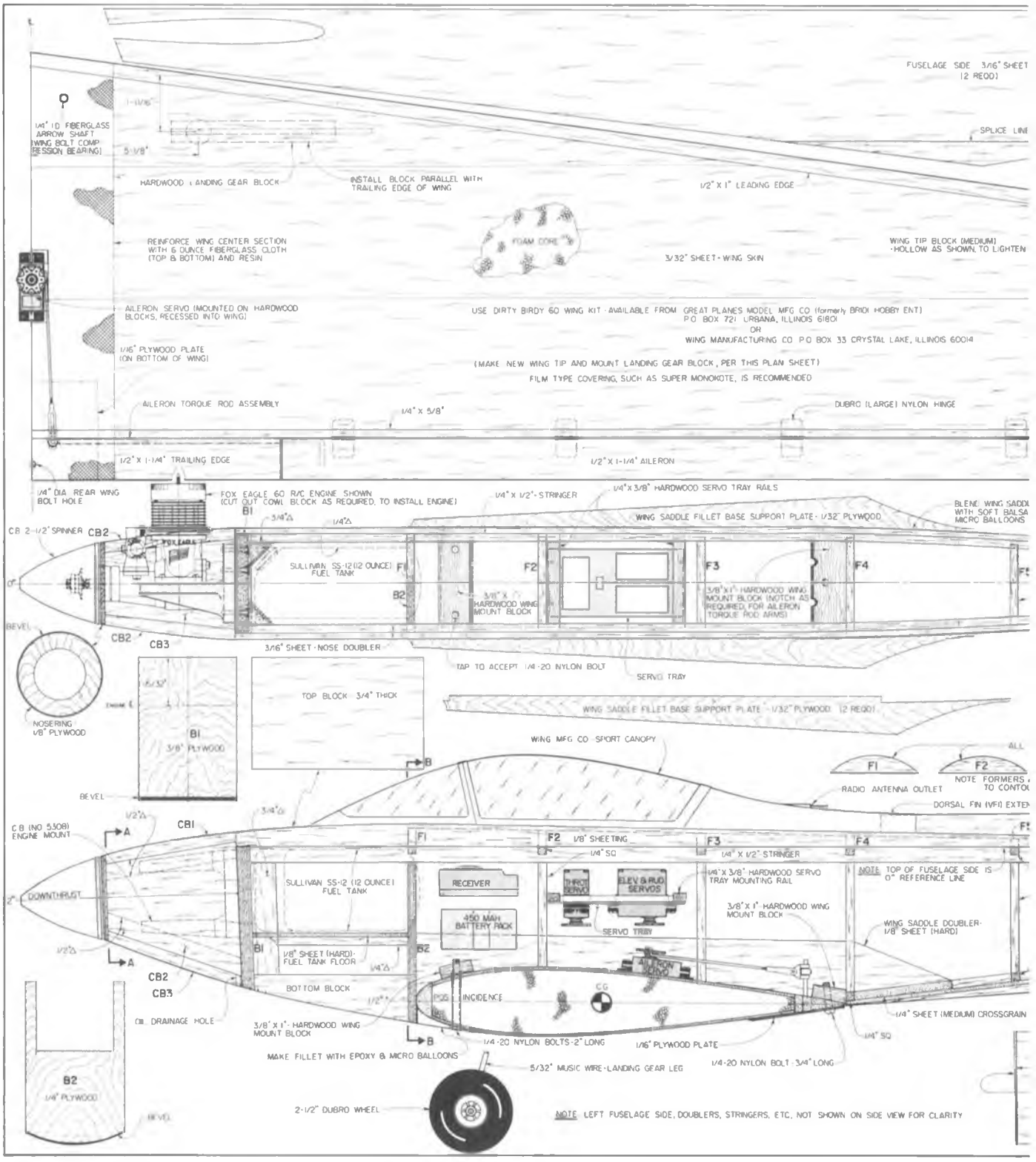
Tail wheel and pushrods, note steering pushrod.

Aileron servo installation, can you tell the built-up from foam?

Completed cockpit.

OS .61FSR installation, note wheel pants.

Twin Mongoose II's, one foam wing and one built-up wing.



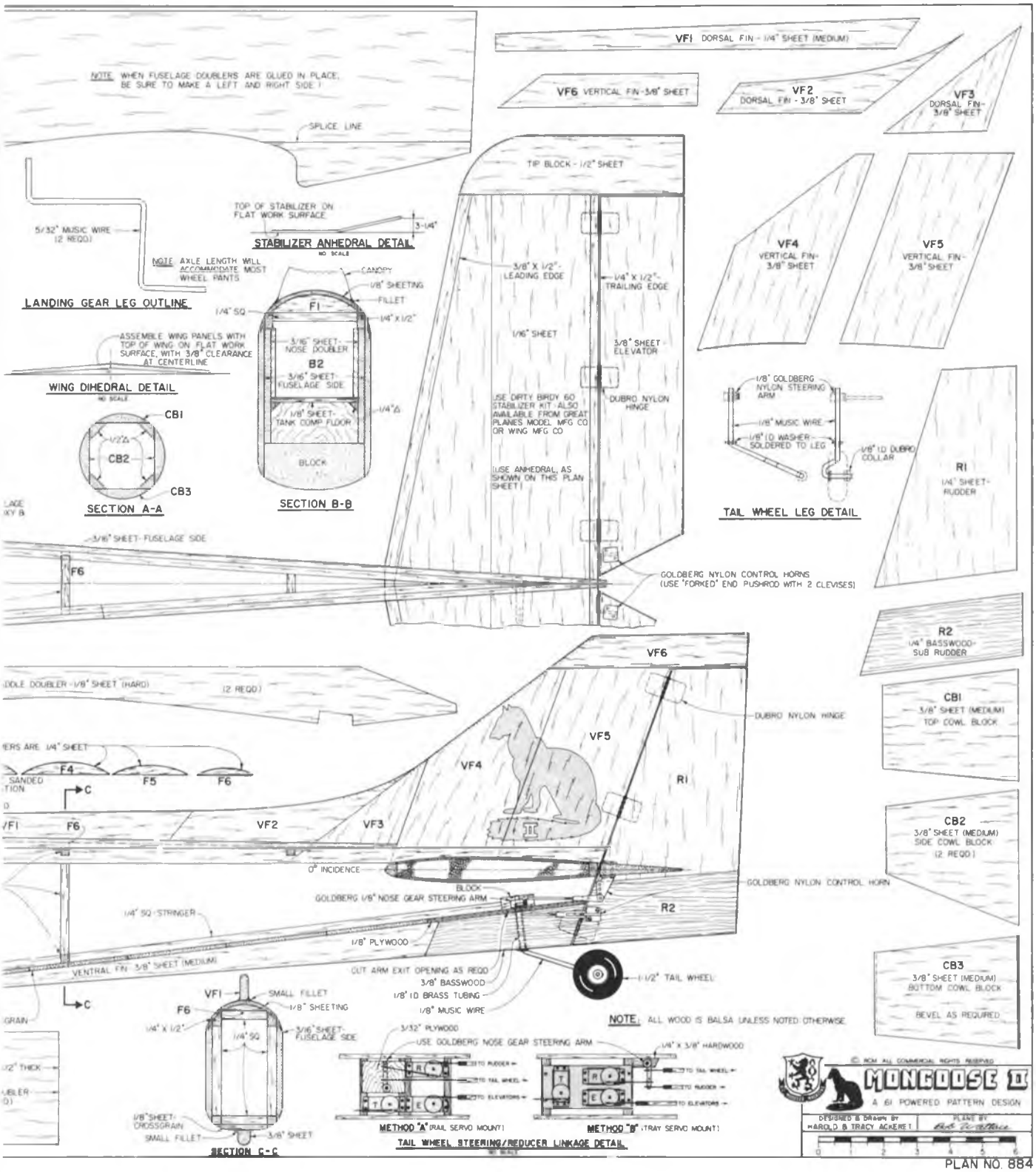
rudder. Anytime we Hot Stuff a hard wood to balsa we put baking soda on the harder wood (makes a stronger joint). Lay three pieces of vertical stab on a flat surface and Hot Stuff it together being sure to keep it square. Install the vertical stab tip with Hot Stuff. Temporarily install the rudder on the stab. Sand the stab and rudder to the airfoil shape. Do not sand down the front too far since you will be joining the dorsal fin to the stab later.

Assembly:

We shall assume that you have shaped and sanded all the components to where they are ready for either finishing, i.e., paint or covering. Weight is a critical factor in any plane, as it is in a Pattern ship. To keep weight down, we recommend covering the wing with MonoKote and painting the fuselage with K & B Super Poxy.

Cut your wing hold-down blocks from hard maple or oak, sand and shape as necessary to fit into fuselage, do not glue yet. Position the wing on the fuselage and check the incidence — 1/2 degree positive. If it is not correct, sand and shape the wing saddle until it is correct. Square the wing up

FULL SIZE PLANS AVAILABLE — SEE PAGE 92



PLAN NO. 884

on the fuselage by measuring from wing tip to fuselage end. When you are sure of the incidence and squareness, put in the wing hold-down blocks and align with the wing. When you are happy with the fit, epoxy in place. With the wing in place and centered, mark and drill the back hold-down block only, being sure you drill at correct angle. Tap the back hole for a 1/4 x 20 nylon wing bolt. Install the wing and hold in place with back bolt. Make sure the wing is square on the fuselage and drill down through the front bolt bushings into the front hold-down block. Remove the wing and if necessary increase the size of the holes and tap for the 1/4 x 20 bolt. Reinstall the wing and Hot Stuff the first bottom cross grain sheet in place; shape as necessary to fit back of wing. Sand the bottom sheeting to flare into the back of the wing. By putting in the back bolt first, and assuring that the wing is centered when you do, then squaring before drilling the front holes, your wing should be on nice and square.

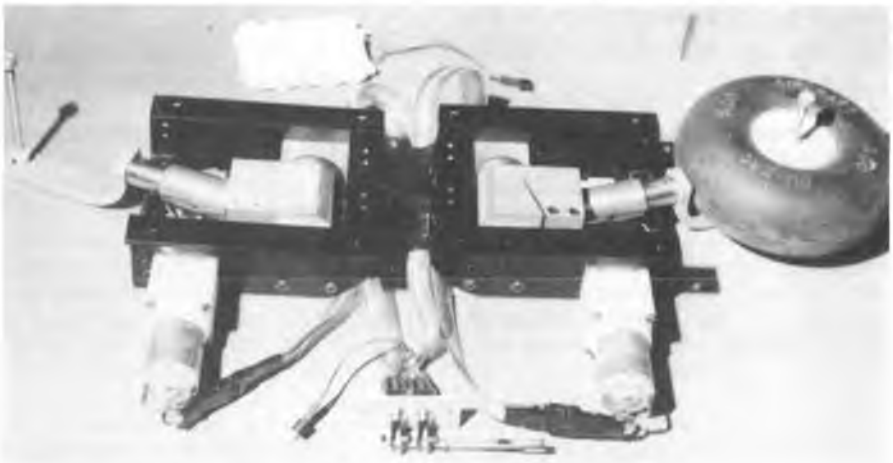
Position the horizontal stabilizer on the fuselage and

to page 178

BIG IS BEAUTIFUL

Dick Phillips

TA 51 Kawasaki engine from CB Associates. Excellent quality engine will be used to power Ziroli AT-6. Should provide adequate power and realistic sound to 1/5 Scale model.



Aeromarine Enterprises' Electric Retracts will be used in authors Ziroli AT-6. Tremendous gearing down provides realistic cycle times and extreme power.

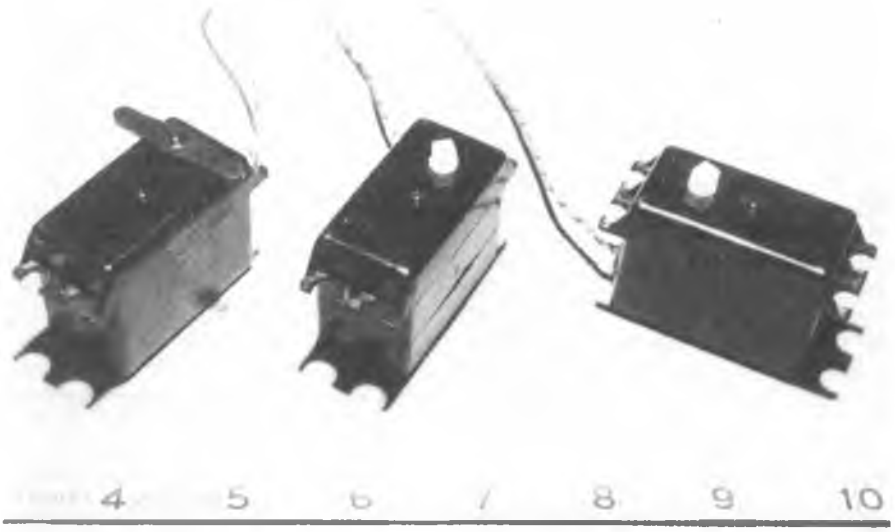
I have a couple of new things on hand since last time and I think both are worthy of mention. I had postponed the start of construction on the Nick Ziroli AT-6 pending the arrival of the engine to be used (Kawasaki TA 51) and the Aeromarine Enterprises electrically operated retract gear for the T-6. Both are now on hand and both are quite impressive.

The retracts are quite large and weigh a tad under four pounds which may seem a bit heavy. However, this is all-up weight including the battery and in such a large model is not excessive. The drive is through a gear reduction and a worm gear. This offers a couple of advantages, first of which is the very prototypical action of the gear. The cycle takes 10 seconds and looks about right for the model rather than moving much more quickly as would be the case with air operated gear. In addition, the gear is locked throughout its cycle by not being able to drive back through the worm and pinion, so no locking device is needed up or down making for a very simple mechanism without a complex locking/unlocking regimen up and down. The gear can also be reversed at any time during the cycle, not having to go to the end before being moved in the opposite direction.

Construction is very strong and durable. You'd really have to pile the model in hard to do the gear any harm. Gear legs are replaceable and are sprung with changeable springs. The standard springs are claimed to be capable of supporting up to an 80 pound model and with stronger springs, probably even larger models.

The package comes complete with battery pack and charger and a full charge is capable of completing 50-60 retract/extend cycles, more than enough for your average weekend of flying. The cost is a bit steep at $275 but the quality is obviously present and worth the cost. Compared to others on the market, most air operated, the cost of adding the air supply and related valving would bring the less costly retract systems very close to the same price. The beauty of the Aeromarine set-up is the very prototypical cycle time without having to add restrictors or some other method of slowing them down for really scale operation. They also make 90° retracts for such models as the Corsair and P-40 so their line is fairly complete. Mine will certainly add to the realism of the Ziroli AT-6.

The Kawasaki engine has already been described many times over, suffice it to say here that it certainly gives the appearance of the high quality it is reputed to have. My initial reason for choosing this engine was that its sound will come as close to anything to reproducing the sound of the full scale T-6, but now that I have one in my hands, I am even more impressed and convinced that it was a good choice for more than my original reason. I'll have more to say on it when it has been flown which will be this



Royal Electronics' RS 150 servo. Same electronics as EWH servos no longer available. Weighs 1.7 ounces and produces 38 in./oz. Same as KPS-15.

Fiberglass arrow shaft pushrod described in text. Wire extension is motorcycle spoke and is blocked in place with hardwood dowel. Makes strong and dependable pushrods for large models. Dotted line indicates depth of dowel plug.

Completed control surface end of pushrod. Motorcycle spokes are threaded with 4-40 thread to fit large Du-Bro ball links making very substantial pushrods.

spring as soon as the snow is gone!

I've been looking for some more large servos to add to my stock over the past few months. I have several of the EWH (Jomac) servos I have mentioned here before, but not enough of them to equip enough models for the four radios I use. I have not been able to get the Jomac servo for some time now and have been casting about for a substitute. I saw Royal Electronics Maxi-Titan in Toledo last spring and ordered a couple of them which I am currently using in the aileron channel of my Fly Baby monoplane. They seem fine and have given me no trouble, but in conversation with Sid Gates of Royal Electronics in Denver recently, he suggested that their relatively new RS150 might do a better job for me. He told me it was basically the same thing as the Jomac servo but with the electronics inside the case rather than outside as is the case with the Jomac. I ordered four of them and with them on hand, will be installing them shortly in Balsa USA's Sopwith Pup. They certainly appear to have all the needed power and I am looking forward to flying them soon and will be able to tell you more about them after that has taken place. The nicest thing about them is the price — where else can you buy a quality, high power servo for twenty bucks!

The Sopwith Pup is a delight to build, even if you aren't a fanatic about building wings (there are four of them). The kit box is enough to stagger the imagination when it is opened. There's a complete lumber yard and hardware store inside it and, at under $130, it's not a bargain, it's a steal!

Ron and the people at Balsa USA have made good use of redwood in the kit for wing spars and the main fuselage longerons, a favorite tactic of mine for many years and I have no doubt that it is the way to go. It's nice to see one of the kit manufacturers doing the same thing. I have added many gussets to the fuselage at a very slight (probably insignificant) weight increase but with a considerable increase in the strength of all those butt joints as mentioned in last month's column.

The Pup has over 29 square feet of wing area and flies well on the small Quadra. The wing loading works out to somewhere about fifteen ounces per square foot and that's not too far off the glider class. With all those wings and other dirty items hanging out in the breeze, the Pup is no great prize as a speed demon but in any kind of a breeze at all, it defies gravity and hangs there in mid air, putt-putting along and providing much enjoyment. At One Third Scale, it's a giant among giants and may provide you with an interesting transport problem. Assembly at the field is neither arduous nor time consuming though, so it's not a real hassle to take it out and fly it and it most certainly is a crowd grabber wherever it's flown. Nice kit and a very nice price tag.

I've talked a bit from time to time about pushrods and about using arrow shafts in place of wooden dowels for them, but have not gone into much detail about it. A recent letter from a puzzled **big** builder wanted more information and it may be of some use to some of you regular readers as well.

I've used several different methods of connecting a servo to a control surface in the past and most of them have been described here at one time or another, often in not a great amount of detail. It's easy for me, sitting here at the typewriter, with many years of experience in modeling to assume everyone out there has that same kind of experience behind them. Most of us who do regular columns on a specific subject make this error from time to time and it isn't intentional nor meant to leave anyone behind. It happens from time to time and most of us will try consciously to avoid it.

One of the methods I have used successfully especially on the rudder — is to run a wire pushrod from each side of the servo arm to horns on both sides of the rudder, providing a pull force on the horn in both directions. This has the advantage of a pretty solid connection between the servo and the surface and there is little lost movement, nor is there much chance of a pushrod bending and not imparting full movement to the control surface involved. The wires used may be either woven or braided wire, as is used in control line flying, or, it can be solid piano or soft wire.

It's important to keep the spacing between the two wires the same at both ends due to the geometry of such a hook-up. If the wires are not parallel to one another, as soon as the servo arm moves from neutral, one wire will slacken a bit and the other will tighten, depending on whether right or left control is given. This is naturally not a good thing and can lead to the very problem we were trying to avoid by going to double control runs in the first place. Keep the two sides parallel to one another, or use another method. Ed Morgan, doing business as International R/C Specialties, 2310 Cimarron Rd., Las Vegas, Nevada 89117,(702) 878-1306, has small diameter, super flexible, no stretch cable that accepts solder. Excellent material at a reasonable price.

In addition, this method can lead to another problem. The temptation is to make the two wires nice and tight and this can lead to excessive wear on the servo's output arm bearing which will eventually lead to excessive lost motion. Servos with ball bearing output shafts are a better idea and the wear will be minimized and not become a problem. It's not a bad idea to check the servo output shaft from time to time to make sure there isn't a problem there, and if there is, to replace the servo case section which is the bearing for the output shaft. The servo wear problem can be avoided by using a bellcrank to take tension loads from the cables and connected to the servo with a short linkage.

As for the wires, I usually make them up using a solder link on one end and a Kwik Link on the other which allows for ease of adjustment as is usual. Using solid wire, you can thread the end of the wire for a distance of an inch or so and this will provide all the adjustment you'll ever need. The solid wire doesn't have to be music wire and it's just as well not to use it if you are going to thread it. Music wire will chew up a 2-56 die in short order!

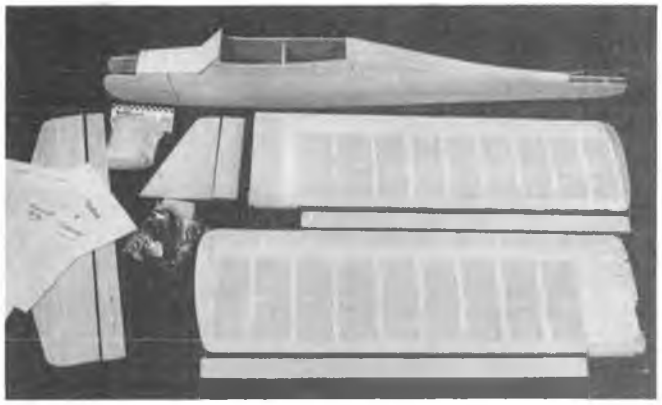
If you are going to use a woven wire, then you'll need to solder a threaded coupler to the end of the wire in order to have something to thread a Kwik Link on to. Be careful here because you are using light gauge wire, you may not get a good solid connection to the threaded coupler. Doubling the wire where it goes into the threaded coupler will help assure you get a good, solid joint.

I prefer the stiff wire myself,

to page 108

RCM PRODUCT REVIEW

Indy R/C CLUB CRICKET



SPECIFICATIONS

Name	CLUB CRICKET
Aircraft Type	Sport Trainer
Manufactured By	Unionville Hobby Supply
	P.O. Box 135, Markham, Ont. Canada L3P 3J5
Distributed By	Indy R/C
	10620 N. College Ave., Indianapolis, IN 46280
Mfg. Suggested Retail Price	$169.95 sug. list
	Indy's price — $129.95
Available From	Retail Outlets
Wingspan	65 Inches
Wing Chord	12 Inches
Total Wing Area	775 Sq. In.
Fuselage Length	50 Inches
Stabilizer Span:	25 Inches
Total Stab Area:	150 Sq. In.
Recommended Engine Range	.40-.50
Recommend Fuel Tank Size	8 Ounce
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Balsa
Tail Surfaces	Balsa
Building Instructions	No
Instruction Manual	Yes (12 pages)
Construction Drawings	Yes

RCM PROTOTYPE

Radio Used	Ace R/C Silver Seven
Engine Make & Displacement	Como .51
Tank Size Used	Sullivan 8 oz. (Incl.)
Weight, Ready to Fly:	81 oz.
Wing Loading:	15.1 oz./sq. ft.

SUMMARY

WE LIKED THE:

Exceptionally complete kit, good construction, flight characteristics.

WE DIDN'T LIKE THE:

Weak vertical fin attachment (see text).

Usually when we hear A.R.F. we start thinking about the foam types. Well think again --- the Club Cricket is an A.R.F. with a big difference. It is an all balsa fully built-up airplane that is designed for all around sport flying and it only takes a short while to get it in the air. Unionville Hobby Supply of Markham, Ontario, Canada, builds the Cricket and it is distributed in the U.S. by Indy R/C, 10620 N. College Ave., Indianapolis, Indiana 46280. By the way, the Club Cricket is a completely different species and has no connection with the Cricket helicopter --- its wings hold still.

Our first experience with the Cricket was interesting. After the top came off of the 13" x 41" x 7" box, we spent a while playing with the nicely covered set of wing panels and then went digging through the crumpled paper to get at the rest of the goodies. By now we were sitting in the middle of a pile of paper with wings and tail feathers and that was it. Fortunately we resisted the urge to get on the phone and find out who forgot to pack the rest. The next day we got another box, there is too much Cricket to fit in just one. This one had the fuselage and one of the most complete hardware packs we've ever seen. Everything is included, right down to the wheels.

Construction:

There isn't much in the way of construction; just join the wing panels and attach the tail feathers. But, you can still do a few things to personalize your Cricket. A twelve page set of modification sheets come with the kit and covers items such as bolt-on wings, enclosed cowl, ski systems, and several other possibilities. The assembly part is covered in another twelve pages of instructions and drawings.

Joining the wing almost seemed like it was an afterthought; there is yet another instruction sheet that covers this process. Actually it was an afterthought — the wings originally came assembled but in order to ship the Cricket they have to be in sections. The method for getting the wing back in one piece is beautifully planned. Two shaped blocks take care of alignment, and dihedral is set by making sure the balsa sheet meets on top and bottom. Once it is joined, the center section is reinforced with construction board. The result is a very strong wing. We decided to make use of one of the modifications shown in the instructions and our Cricket now has bolt-on wings.

When it came to attaching the tail surfaces we found a weakness in the design. After knocking the vertical fin off two or three times it was obvious that we'd better do something. A piece of 3/8" triangle stock was added on each side of the fin where it meets the horizontal stab. It only takes a minute and makes the joint a lot stronger. With everything in place, all that was left was a little finish sanding.

Covering:

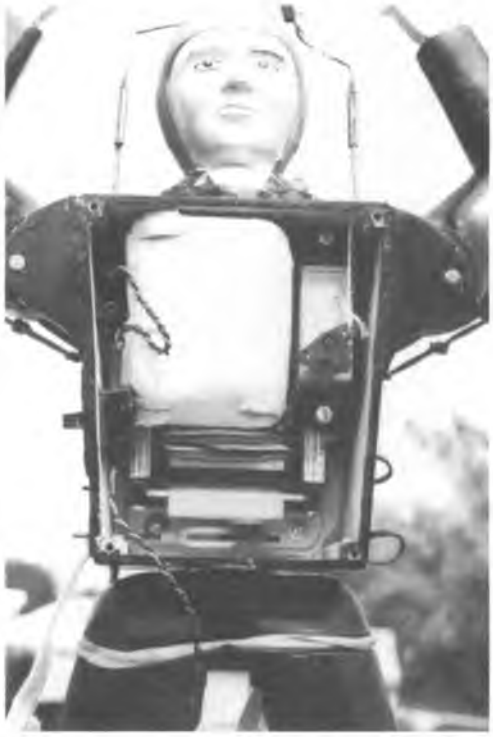
The wings on the Cricket are already covered with a fabric that is also available from Indy R/C. Since the material is unfinished you are pretty well locked into

to page 96

DANGEROUS DAN

Dan suspended from his main chute. The main chute shroud lines attach to the rotating pin on the harness above his head.

A close-up with the chest access hatch removed. The hatch is held down by four screws. The Rx is located in Dan's upper right chest area, and the main chute release servo is just to Dan's left of the Rx. The 250 ma battery is in his tummy area, with the emergency chute release servo out of sight behind the battery. The rotating pin on the wire harness shows well in this shot.



The battery is removed, showing the emergency chute release servo and the push-pull pin.

THE PARACHUTE MAN
AN AIRSHOW HERO

BY RUSSELL DAVIS

Since Konrad Riggenmann's original article describing an R/C parachutist (RCM, February 1976), many of these have been constructed and several have undoubtedly become important acts in AMA Air Shows. Mr. Riggenmann's parachutist used a parafoil-type chute and was controlled by a two channel receiver which deployed the chute and provided steering control during descent. It is reasonable to assume that most of the other R/C parachutists which have been subsequently developed have utilized a similar arrangement.

Air shows put on by the Tucson Radio Control Club have been developed in an attempt to recreate the old style pre-WW II classic shows which were an important part of the Golden Age of Aviation. While we

Close-up of the main chute release mechanism. The servo pulls the string which rotates the spring-loaded hook . . . allowing the rotating pin to rotate upward and release the main chute shroud lines.

Back view, showing the emergency chute in packed position. The rotating hooks (and the push-pull pin) which hold the rubberbands which hold the emergency chute in its pack are visible. The Rx antenna is on the back of the right leg.

Close-up of the "mouse trap" like spring and hinged flap which flip the emergency chute out of its pack. The rotating hooks and the push-pull pin which hold (and release) the emergency chute are clearly visible here.

Dan's shock absorbing (rubberband loaded) shoes and ankles.

An upside down view of the drop plane's underside, showing the tray in position. An access hatch has been opened to show the tray servo. The rotating hooks and push-pull pin are clearly visible.

Dan in position on his tray. His feet point forward.

Preparation for take-off. Dan can be seen in his tray on the drop plane's underside. This type of operation requires a team effort!

Take-off.

Dan has been released from the drop plane; then shown here in his main chute, which will soon be released; and finally, Dan has popped his emergency chute after free falling to Saguaro height level!

occasionally use models of modern aircraft, most of our acts are based on what some of us (those old enough to have attended such shows) remember as being used by the old barnstormers.

No pre-WW II air show would have been complete without its daredevil parachutists. The typical show always made use of a hair raising, delayed free-fall which followed a normal parachute opening. The announcer on the PA system would set up the whole

thing with appropriate commentary. Visualize yourself as a shakey kneed youngster, thrilled half to death at the opportunity to see a whole bunch of real airplanes perform, as the announcer describes the parachute act:

[The drop plane is at altitude, and in position.] "Watch carefully . . . there he goes." [The parachutist falls from the drop plane.] "There, his chute is opening. Ah, perfect! Isn't that beautiful. You folks understand that there is always some danger in parachute jumping, and we always feel better when we're certain our parachutists are okay. Now all he has to do is to ride that lovely chute back down. Looks like fun, doesn't it?" [After a few seconds . . .] "Watch him carefully." [A loud gasp.] "Oh my gosh! What happened?" [As the parachutist releases his main chute.] "He's falling! He must have slipped out of his harness. Good Lord!" [Then an aside to other show personnel:] "Does he have an emergency chute? Does anyone know? Well, If he does, he'd better pull it **now**! . . . pull it **now**! . . . **Now**!" [Finally, the emergency chute is deployed; it opens; the crowd gasps, . . . and then, loud applause . . . and our totally impressed youngster has almost wet his pants!]

As corny as that may seem now, it was (and can still be) very effective. The members of the audience probably knew (or at least suspected) that the announcer was playing games with them; but it was a thrilling game. And besides, it's kinda fun to be fooled a little now and then.

As a result of the motivation, and technological assistance, provided by the Riggenmann article, I decided to build a barnstorming type free-falling parachutist for use in our TRCC air shows. This would require the deployment of a main chute, its release, and (following a long free-fall) the subsequent deployment of an emergency chute. To provide maximum effect for show purposes, the fall must be delayed until a very low altitude is reached, so it was an absolute necessity for the emergency chute to "get out quickly." And because the "inevitable" was sure to happen sooner or later, my parachutist had to be designed to take considerable abuse without receiving unrepairable damage.

Since size and space limitations prevented the use of any more than two servos, the steering function was omitted.

Dangerous Dan, the Parachute Man is the final result of three earlier versions. His basic design (and size) was taken from that provided by Riggenmann (RCM Plan #631), but with the incorporation of several significant modifications.

All radio gear, including the 250 mA battery, is contained within Dan's torso. The two servos are royal Mini Titans. The receiver is a Kraft short-antenna 2 channel, tuned so that one servo (the one which releases the main chute) is operated from the right auxiliary channel on a Kraft 7 channel transmitter, while the other servo (the one which releases the emergency chute) works from the retract switch. Dan's receiver is or

The instant of opening of Dan's emergency chute has been caught in this photo. The "puff" of what appears to be smoke is the talcum powder used in packing the chute to cut down on static electric cling. The hinged and spring-activated flap, which ejects the chute, is clearly seen. Dan did this jump at a show given for 15,000 people at an open house at Davis-Monthan AF Base in March, 1982. His recovery from free fall was at a height of no more than 20 feet and was directly "center stage." Photo by Carl Atherton.

72.960, and the drop plane is on 72.400. We've experienced no proven cases of side by side receiver interference.

The parachutist's head is a 1/4 Scale Williams Brothers pilot bust. His torso is of plywood, but his arms and legs are mostly of balsa. Both the arms and legs are pivotable on dowel pins. The holes through the appendages for these pins are reinforced by ply plates. The arms are movable in one plane (up and down) and could be used to steer. Dan's arms, however, are simply rubberband loaded and held in a normal "shroud line hold" position by strings.

His legs attach to his torso by a short rounded 1/4" dowel pin which fits into oversize holes in his legs. This provides a universal joint effect, making the legs more or less movable in several directions. They are held in place by a rubberband. His ankles pivot (in one direction) and are also rubberband loaded. The soles of his shoes are foam rubber.

All of this allowable movement and rubberband shock loading is important, since landing shock can sometimes be considerable. Dan has twice landed abnormally in hard dirt: once from a "streamer" of the emergency chute — with no damage other than a few dings, and once straight in (when the emergency chute failed to deploy) — with only a cracked chest (the access hatch), a few broken ribs (slight damage to the ply on one side of his torso), and a broken arm. Dan can take a considerable bump!

The main chute is packed external to the parachutist, and it opens as soon as he falls from the drop plane. This chute attaches to the parachutist by two shroud line loops (each loop from one-half of the shroud lines) to a rotating pin at the top of a wire harness over the parachutist's head. This pin is held in "locked shut" position by a spring loaded rotating hook. The servo which is operated by the right auxiliary channel on the transmitter pulls a string which rotates the hook (against the spring) into "open" position, and this frees the rotating pin. The rotating pin then lifts upward and releases the main chute. A length of solder is wrapped around one of the two shroud line loops (holding one-half the shroud lines) and this weight helps in getting the main chute back down more quickly. Even with this arrangement a chute will occasionally thermal, and when this happens a long chase is required.

The emergency chute is packed into a partial backpack which is constructed from 1/16" ply. This chute is placed in the pack, on top of a hinge-like flap which is positioned on top of a mouse trap-like spring arrangement. To pack this chute, the spring is first cocked, the hinged flap is closed down on top of the spring, and the chute is positioned on top of the hinged flap.

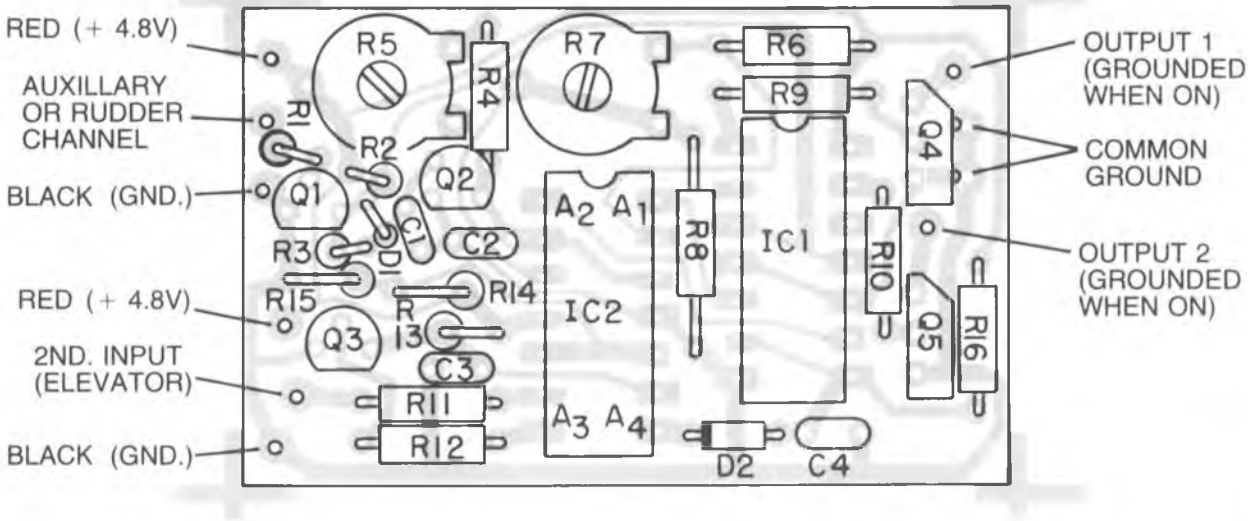
The emergency chute is held in its pack by rubberbands which extend across and attach to two rotating

to page 96

ELECTRIC ACCESSORY BRAKE CONTROLLER

By Joe Utasi

COMPONENT PLACEMENT OVERLAY



Now that radios, engines, and kits have all improved to the point where we can count on everything working reliably, the desire to add extra functions to our models is becoming commonplace.

It's not at all unusual to visit the average flying field on a Saturday and see aircraft firing rockets in flight, pumping smoke, activating strobe lights or producing machine gun sound effects! The typical way that these items are controlled is by an extra servo activating one or more switches on or off. There's nothing wrong with this approach, but some of us have five thumbs when it's time to do the installation, and vibration tends to shake things out of adjustment as time goes on. The **controller** eliminates a servo and two switches, is easy to build and install, and is **adjustable** to suit your needs. It can control loads up to 15 volts and 1 amp, which covers a lot of accessories! Further, it will control two separate items from a single channel — it can be the extra channel on your radio, or it can be parallel connected with the throttle or any other channel. I can see a possible use as a steering indicator for night flying when used with tip lights or leading edge lights! The possible applications are limited only by your imagination . . . I deliberately provided a second input option which will activate both outputs at the same time. This simulates "toe-brake" steering when used with electric wheel brakes on the main gear! With the primary input from the rudder channel, extremes of stick travel can operate each wheel brake separately, while "down" elevator turns them **both** on. It's perfect for scale ground handling, and a **must** when the wingspan is equal to or greater than the width of the runway!

I'm sure that by now you've already thought of at least a dozen ways to use this on your own aircraft or project, so let me explain how it works for the "technical" types in the audience.

As you can see from the schematic, there's not a whole lot to it — the key part of the circuit operation is in "grabbing" the information contained in a single pulse and holding it until the next one comes along.

R1, R2 and Q1 form a simple inverter. D1, R3 and C1 provide a quick turn off and slow turn on to Q2. R4 and R5 control the charge current into C2 when Q2 turns off. The voltage on C2 will ramp up as long as the pulse is present back on the input to the base

PARTS LIST

Resistors:
R1, R11 — 47K
R2, R3 — 10K
R4, R15 — 27K
R6, R8 — 39K
R9, R10 — 4.7K
R12 — 22K
R13, R14 — 100K
R16 — 2.7M
R5 — 50K Piher trimpot (Ace)
R7 — 10K Piher trimpot (Ace)

Capacitors
C1, C2, C3, C4 — .047 ceramic (Blucap — Ace)

Semiconductors:
Q1, Q2, Q3 — 2N3904
Q4, Q5 — D40K1 (GE or Motorola)

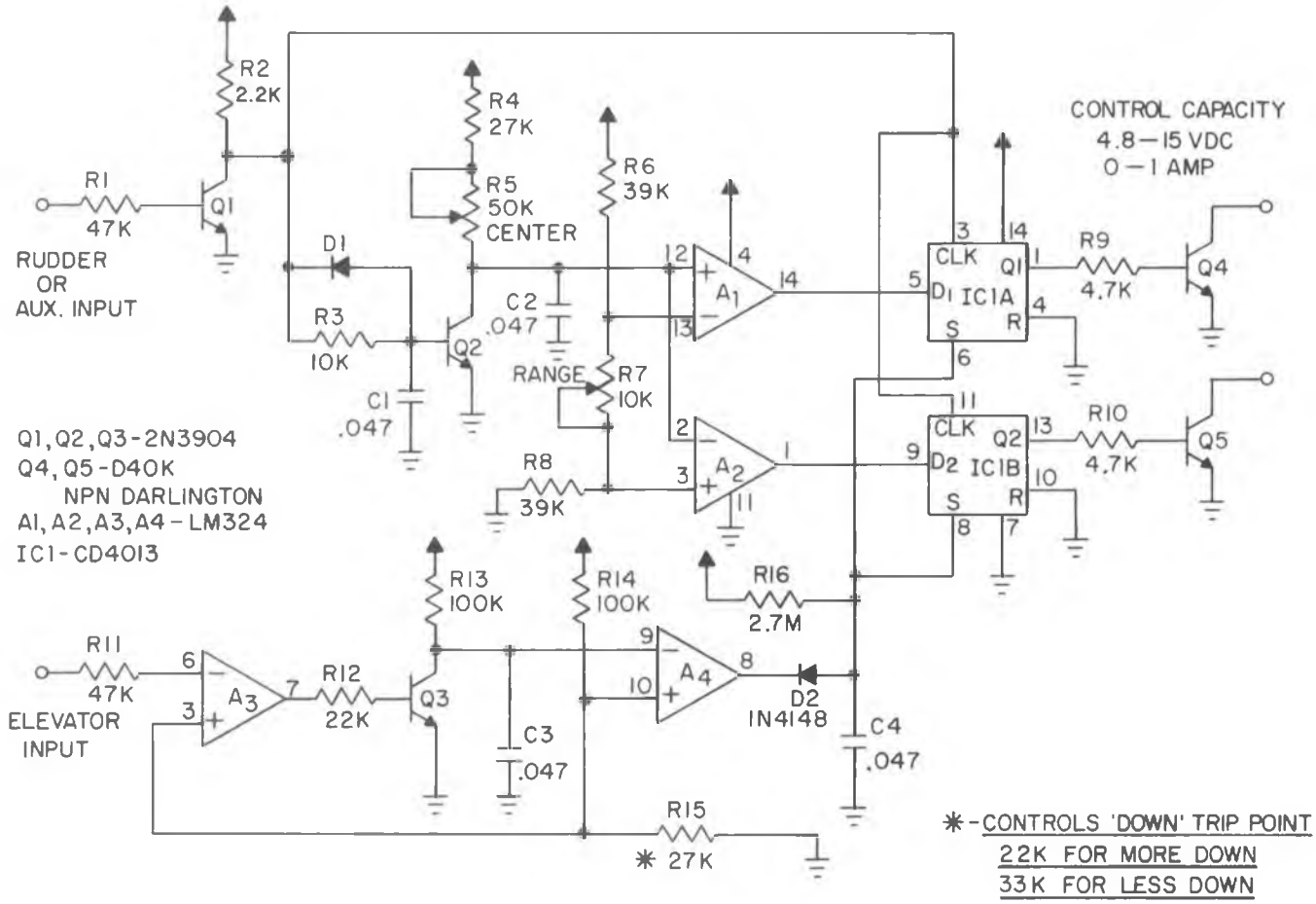
Integrated Circuits
A1, A2, A3, A4 — LM324 Quad Op-Amp
IC1 — CD4013

Miscellaneous:
Printed Circuit Board, wire, solder, connectors

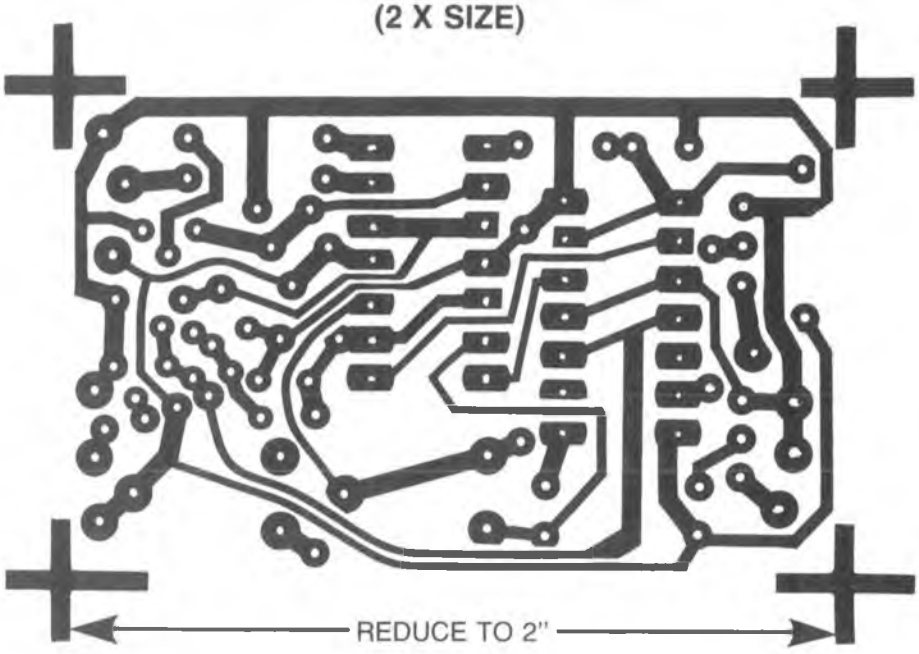
A P.C. Board is available for $7.50, and a fully assembled controller is priced at $29.00, and is available from: Jomar Products, 2028 Knightsbridge Dr., Cincinnati, Ohio 45244.

ELECTRIC ACCESSORY — BRAKE CONTROLLER SCHEMATIC

DRWN. BY:
R. O'HARA



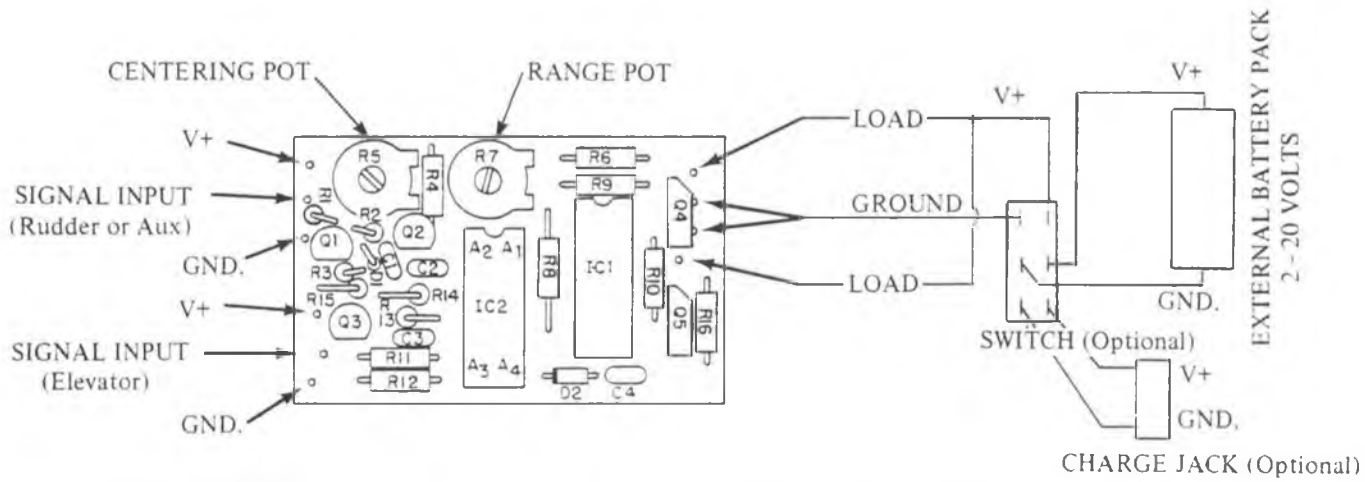
P.C. BOARD BOTTOM VIEW
(2 X SIZE)



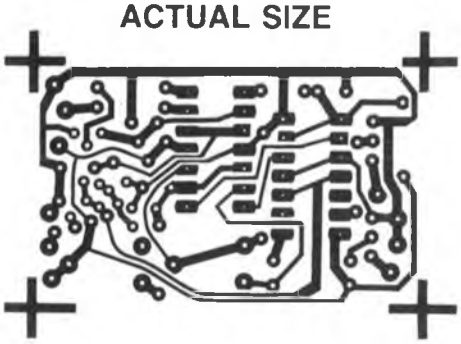
of Q1 — the longer the pulse width, the higher the voltage. This voltage is then compared with a high and low reference set-up by R6, R7, and R8. As the input pulse is completed, the rising edge of the collector voltage on Q1 clocks the data from Op Amp A1 and A2 into the 4013 latch. The voltage on C2 is still present at this time because of the delayed turn on of Q2, which discharges C2 to get ready for the next pulse. The outputs from the 4013 drive a pair of NPN Darlington transistors which act as "switches" to ground when activated.

When connecting the accessories and extra battery pack, be sure that you use wire which is adequate to carry the current with a minimum voltage drop. There is about a .5 volt loss across the D40K1 device, so allow for this when figuring how many batteries you will need for your set-up. One side of your accessory will go directly to the **positive** side of the battery pack, and the other (-or GND.) goes to either of the controller outputs.

To activate both outputs simultaneously, the "set" line on the latches is taken high. A3, A4 and the associated components form a comparator similar to the first one



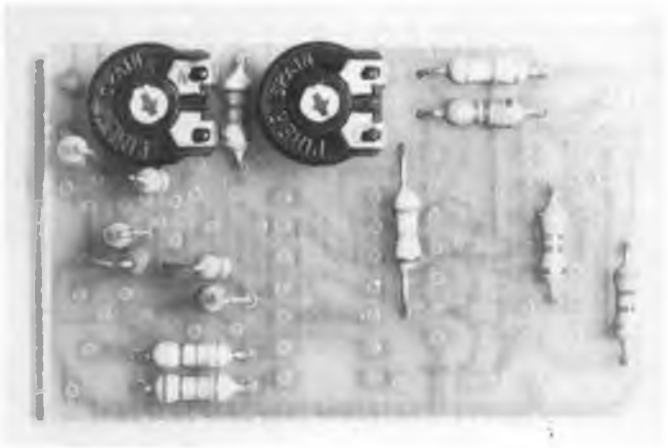
P.C. BOARD ACTUAL SIZE

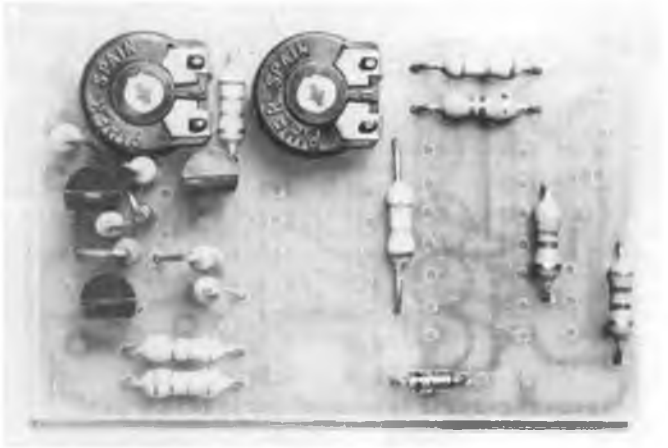


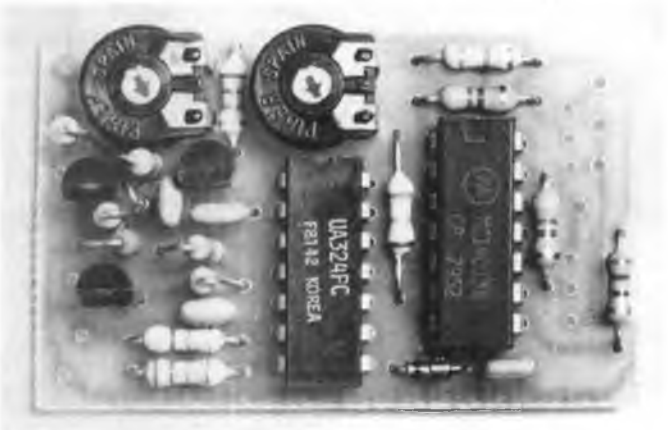
with a new twist — the output must go high for a **narrow** pulse (down elevator), and there are no latches left to use! The output of A4 (pin 8) will pulse to ground keeping C4 discharged until the ramp voltage on C3 stops exceeding the reference voltage determined by R14 and R15. R16 and C4 values were selected so the operation would be reliable with even the longest frame rates used.

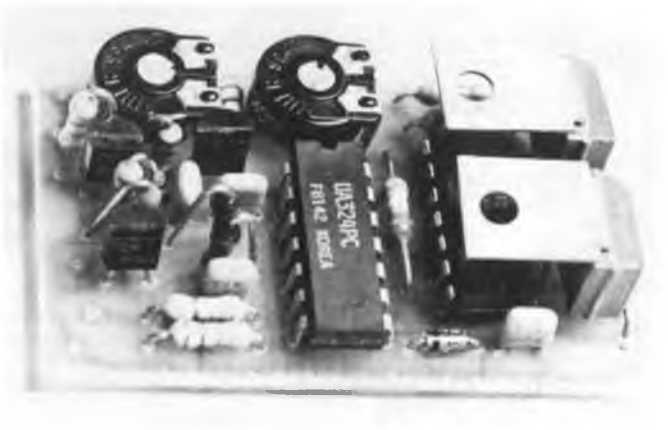
Assembly is straightforward with no tricks. Install the resistors and diodes first, then the capacitors followed by the transistors. Put the integrated circuits in and mount the transistors last. I bent the tabs over 90 degrees on the transistors for a compact installation. Be sure to use a rosin core solder and make clean, shiny connections. Clean off the bottom of the board with acetone or lacquer thinner when you're finished. For those folks who have high current (1 to 2 amps) applications in mind, I would recommend an **insulated** heat sink at least 1½" square on the output transistors.

Alignment is quick and simple. Set the **range** pot fully clockwise, turn on the power, and adjust the **center** pot until both outputs are **off**. The stick or trim lever on the transmitter should be centered when doing this. Now move the **range** pot counter-clockwise to set up the trip points as far from center as you desire. That's it! Now go out and dazzle the guys at the field with your latest electronic triumph! □









1982 CHAMPIONSHIP RACE

By Dave Shadel

The top twenty.

The 1982 NMPRA Formula One Championship Race was held in Seguin, Texas, on October 30-31, 1982. It brought together 35 of the nation's top competitors in a spectacular finale yet to be surpassed by any segment of modeling.

While the field of 35 entries was small compared to past championship standards, none of the competitors will argue that this was the toughest racing that any had ever faced. Even though no new records were set, the times for most of the field were the fastest in Championship racing history.

The competition actually began with Friday evenings static judging at the headquarters hotel. A variety of beautifully constructed and finished racers were checked and re-checked with much deliberation by the four static judges. This year's winner was a colorful Denight Special by Ron Schorr of California.

The first day of competition began at 9:00 a.m. after getting the race course and workers all set for two days of very hard work.

The first heat of the contest saw Tom Christopher of California record a 1:13.4, fast by any standard and just a preview of what would happen as the weather improved over the next two days.

As the first round progressed, many fliers continued to record excellent times, and often a 1:15 was only good enough for a second or third place in a heat race.

In Round Two action, many fliers bettered their times with Tom Christopher flying a quick 1:11.1 which would hold for Saturday's fastest time.

By Round Three, the field was beginning to sort itself out as some fliers began to drop points. Lean needle settings and itchy fingers resulting in cut pylons cost points for a large number of the group.

The always fast California contingent was being pushed hard by the fliers from Texas. The group from Texas was without a doubt the most improved group of pilots seen in the past couple of years. With a little more time to improve their consistency, we'll certainly see more of them in the top places at the major contests.

Consistency begins to play an important part in racing contests after about the fourth or fifth round, and by the end of Saturday's racing, there was only a 5-way tie for First Place. Those were Jeff Bertken, Tom Christopher, Gary Hover, Bill Preis and Dave Shadel.

Saturday night's Annual Awards Banquet went off smoothly, with the

to page 96

TABLE I

NAME	POINTS	DISTRICT
1. Dave Shadel	610.8	W
2. Gary Hover	597.1	W
3. Larry Laulom	553.0	W
4. Dave Layman	542.7	SCW
5. Chuck Greenwood	541.8	SCW
6. Kent Nogy	533.3	W
7. Tony Huber	532.3	NW
8. Eric Ristrim	503.3	W
9. Tom Christopher	498.5	W
10. Tom Castellano	497.7	NE
11. Don Rice	488.6	NW
12. Norm Johnson	480.8	SCW
13. Larry Weddle	479.4	NE
14. Gary Heithold	476.1	SCW
15. Jeff Bertken	472.9	W
16. Dub Jett	469.2	SCW
17. Ron Schorr	467.4	W
18. Gary McPike	447.4	W
19. Bill Williamson	442.2	SE
20. Pete Reed	437.8	NE

TABLE II

NAME	BEST TIME
1. Dave Shadel	1:09.9
2. Jeff Bertken	1:12.3
3. Gary Hover	1:11.9
4. Bill Preis	1:09.6
5. Dub Jett	1:13.4
6. Gail Jacobson	1:13.7
7. Tom Christopher	1:11.1
8. Dave Latsha	1:13.5
9. Kent Nogy	1:16.1
10. Tom Castellano	1:12.0
11. Phil Bussell	1:14.4
12. Dave Layman	1:15.3
13. Chuck Greenwood	1:20.4
14. Gary McPike	1:15.9
15. Scott Kalmus	1:18.9
16. Bob Onori	1:14.8
17. John Hancock	1:20.4
18. Dick Ritch	1:14.0
19. Eric Ristrim	1:13.0
20. Loren Furlong	1:18.9

Best finish winner Ron Schorr with beautiful Denight Special.

The Top 5, plus caller Jim Shinohara and Ron Schorr. L-R: Dave Shadel, Jeff Bertken, Gary Hover, Bill Preis, Dub Jett.

Gary Hover (left) and Jim Shinohara ran their best ever time of 1:11.9. Gary has placed third in the last 4 out of 5 championships.

The Fly-Off for Ninth Place. Won by Kent Nogy (left) with a 1:11.1.

Dick Ritch (left) finished 18th with caller Brian Palacios. Brian was one of the key people in putting on the contest.

Gary Helthold and wife/caller Donna came from Arkansas to race.

On the line. Bruce Richmond (right) needles another melt-down for Ron Schorr.

"Put your money where your mouth is." Second Place finisher Jeff Bertken shows off the trophy and the loot. CD Bill Hager at far right.

Completed Sander: Small tubes on top of motor are for light machine oil to bearings.

Bandsaw Jig: Note compass pencil line at edge of ply, and radial line at front edge of blade.

Drilling Spool & Disc: use drill press for accuracy. Note previously drilled and tapped set screw hole.

Bolt, Nut & Washers: Used to mount disc in drill press for edge sanding with jig.

BUILD A POWER FOR REAL

By John J. Hough

While collecting materials for what was to be my first scratch-built Quarter Scale plane, it occurred to me that the fuselage framework, being of redwood, would require a lot of sanding to get all the pieces to fit snugly after being cut with a Zona type saw to a close fit. What I really needed was a small disc sander that could sit right on the work table where the building would take place. Buying a tool of this type was out of the question since all my "spare" money is being saved for a new radio with more channels for this plane. I decided to try to build one from leftovers --- and you can too in just a few hours, and not more than a few dollars at the most. My total cash outlay was $1.25 for the pack of sandpaper, and that's what I mean by "for real cheap." You don't believe it? Keep reading.

(*Editor's Note:* A catalog available from "Wholesale Tool Co. of Oklahoma, Inc., 7240 East 46th St., Box 45952, Tulsa, Oklahoma 74145, is just full of electric motors, both new and used. These are offered at a good price along with approx. 135 pages of every kind of tool you could name. Catalog price is $1.00.)

A little digging in one of my many junk boxes (all modelers have them) produced a small electric motor about 3¼" in diameter and 2½" long from a worn out humidifier. It had a 5/16" diameter double end shaft and the spec. plate said it was 115 volt, 7/10 amp and turned all of 1500 rpm (when leaned out!). Now that doesn't sound like much power, but when I grabbed that spinning shaft it was all I could do to stall it! I felt it could turn a 5" sanding disc easily.

More digging, this time in the scrap wood box, gave me plenty of small pieces of particle board, in 3/8", 1/2", and 3/4" thickness, just waiting to be made into the stand. (Plywood or pine would be even better.)

Now, some people can build simple things like this or even a cabinet with sliding drawers without any plans, but I can't, so some rough sketches with dimensions were made so I'd know what it was going to look like. (The editor would never allow those rough sketches to degrade RCM, so you get better drawings.)

A few cuts on the table saw gave all the right size pieces (I dadoed the table top and table base for the sides for easier assembly, but it isn't necessary). The vertical motor mount was rounded off with the saber saw. The sliding table base slots are required in order to position the table up close to the disc and also to slide the table back to change sandpaper. These 3" long slots were made by drilling a 1/4" hole at each end for the use of a saber saw. Be sure to place the slots far enough from the table sides to permit turning the wingnuts.

The bolts in the 3/4" base must fit the table slots, so measure carefully and position the bolts so the table can be moved back and forth. Drill the 3/4" base from the bottom side, first with a 1/2" spade bit to allow countersinking the head of the 1/4" x 1½" stove bolt, then drill through with a 1/4" bit. Put the bolts in and epoxy the heads to keep them from turning when the wing nuts are tightened. That takes care of the 3/4" base for now.

Since I used a vertical type motor mount, we'll discuss it first. The motor shaft hole diameter should be 1/8" larger than the shaft to prevent binding, and the center of this hole must be at least 2⅝" from the bottom edge of the motor

DISC SANDER CHEAP !

mount for sanding disc clearance. My motor had four case or housing screws sticking out and these were used to mount the motor. (The drawing shows the layout of these holes in the mount.)

If your motor doesn't have these screws, use the cradle type mount shown in the drawings. Do not use particle board for the cradle mounts as it will not hold the screws in the edges for the light metal straps.

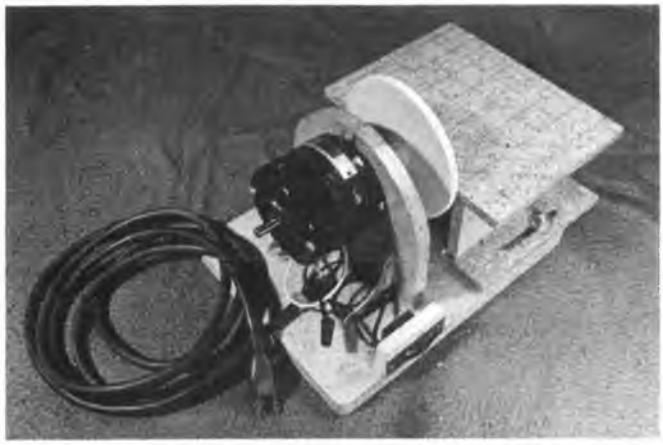
The 90° brackets (from yet another scrap box) were attached to the 3/4" base and the vertical mount with screws. **Note:** Do not glue the vertical mount to the base as it may require shims of thin metal under the brackets to get the disc exactly 90° to the table top.

Cradle type mounts may be glued and/or screwed to the base, as any shimming may be done with strips of cardboard or masking tape under the motor. The metal straps should be installed around the motor as tightly as possible, then remove the motor, place an equal thickness of cardboard on each cradle (curved section) and reinstall the motor. This should give a tight solid mounting of motor to cradle.

The sliding table is assembled using small finishing nails and aliphatic glue. I used Titebond. When the table is dry, use a carpenter's or machinist's square to draw lines with a 4H pencil. These lines are spaced 1" apart 90° and 45° from the edge of the table next to the sanding disc, and are necessary for accurate sanding since a sliding miter is not used. You might even want some lines parallel to the disc. If you feel a sliding miter is necessary, I'm sure you can make one, but I felt it would take too long to make and would actually be in the way for our type of sanding. If you have a number of pieces to be sanded to identical angles, you can clamp a piece of wood to the table at the desired angle.

Now it's time to get the "wheel" made, but first, a few words on why the 5" size disc was chosen. First of all, I figured the little motor couldn't handle anything larger. Second, I knew I could get 5" "Sticky back" sandpaper discs made by 3M, called Press 'n Sand, in medium 80 grit and fine 120 grit in packs of five for about $1.25, and that at least one other company makes 5" self-stick discs, so there should always be a good supply. These discs don't have a hole in the center, which allows the use of the entire disc surface, and they really stick but can be easily peeled off. Last of all, I didn't want this little gem to take up any more space on the bench than necessary. That takes care of the "why" so let's get back to the "how."

The disc must be made of aircraft plywood at least 1/4" or thicker to assure a good flat surface. Check with a straight-edge for any warping before cutting. Use a pencil compass to draw a circle 5-1/16" in diameter, making a definite hole with the center point that you can easily see, since you will need it later on. Saw just on the outside of the pencil line. This can be done with a saber saw, but the jig saw or band saw will produce an almost perfect circle by use of a simple jig, like so: Draw your circle so that the line almost touches one edge of the ply, then on a larger piece of wood that can be clamped to the saw table with "C" clamps, mount the disc to it using a small wire nail through the compass center point so that about 1/4" of the disc extends beyond edge. Draw a radial line from the nail center to where the disc pencil line just touches the ply edge. Position on the saw table until the ply is touching the side of the blade and the radial line is at the front edge of the saw

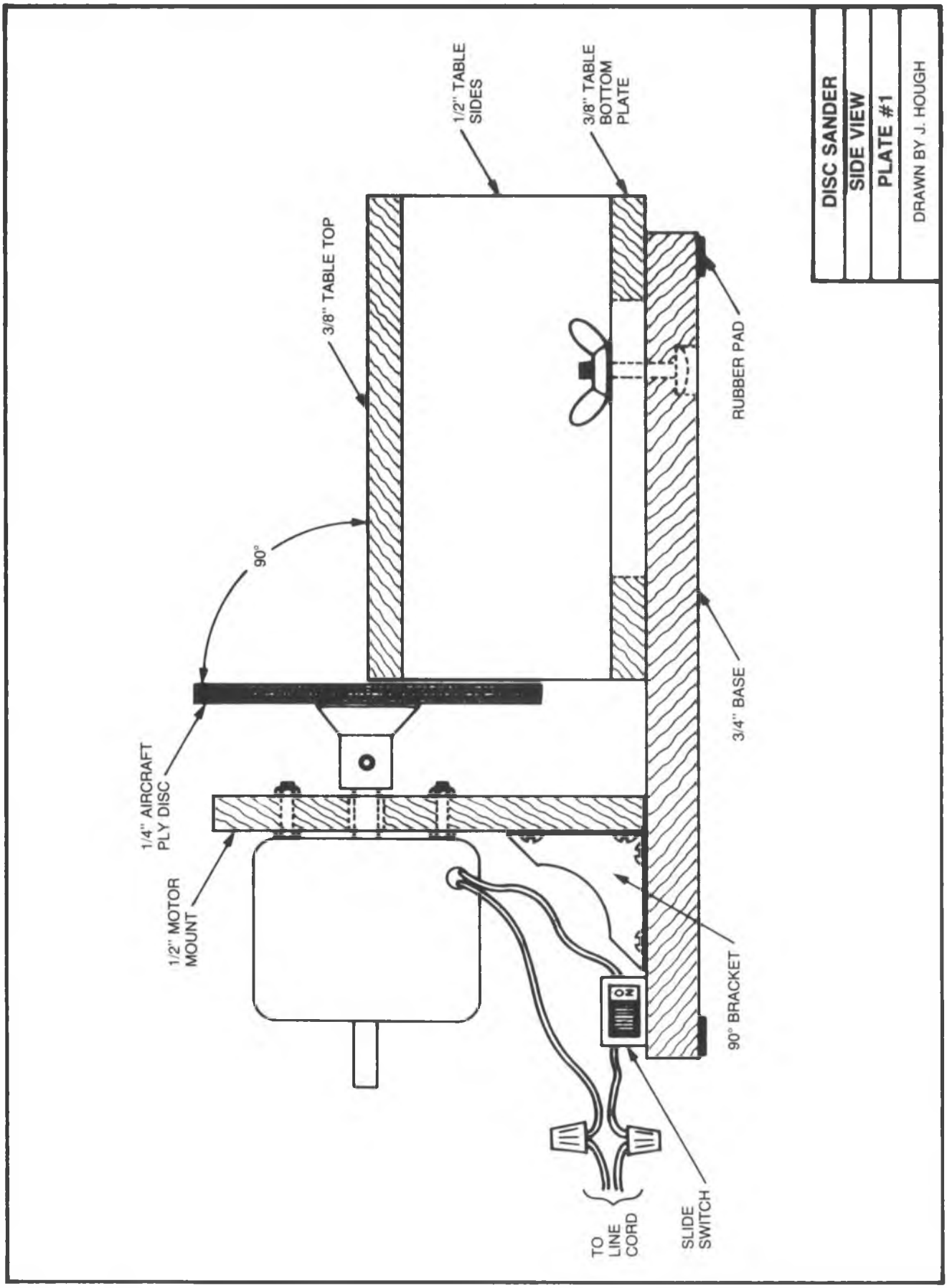


Completed sander.

Jig For Edge Sanding: Lightly pressing unclamped end of 1 x 2 against spinning disc gives true 5" diameter.

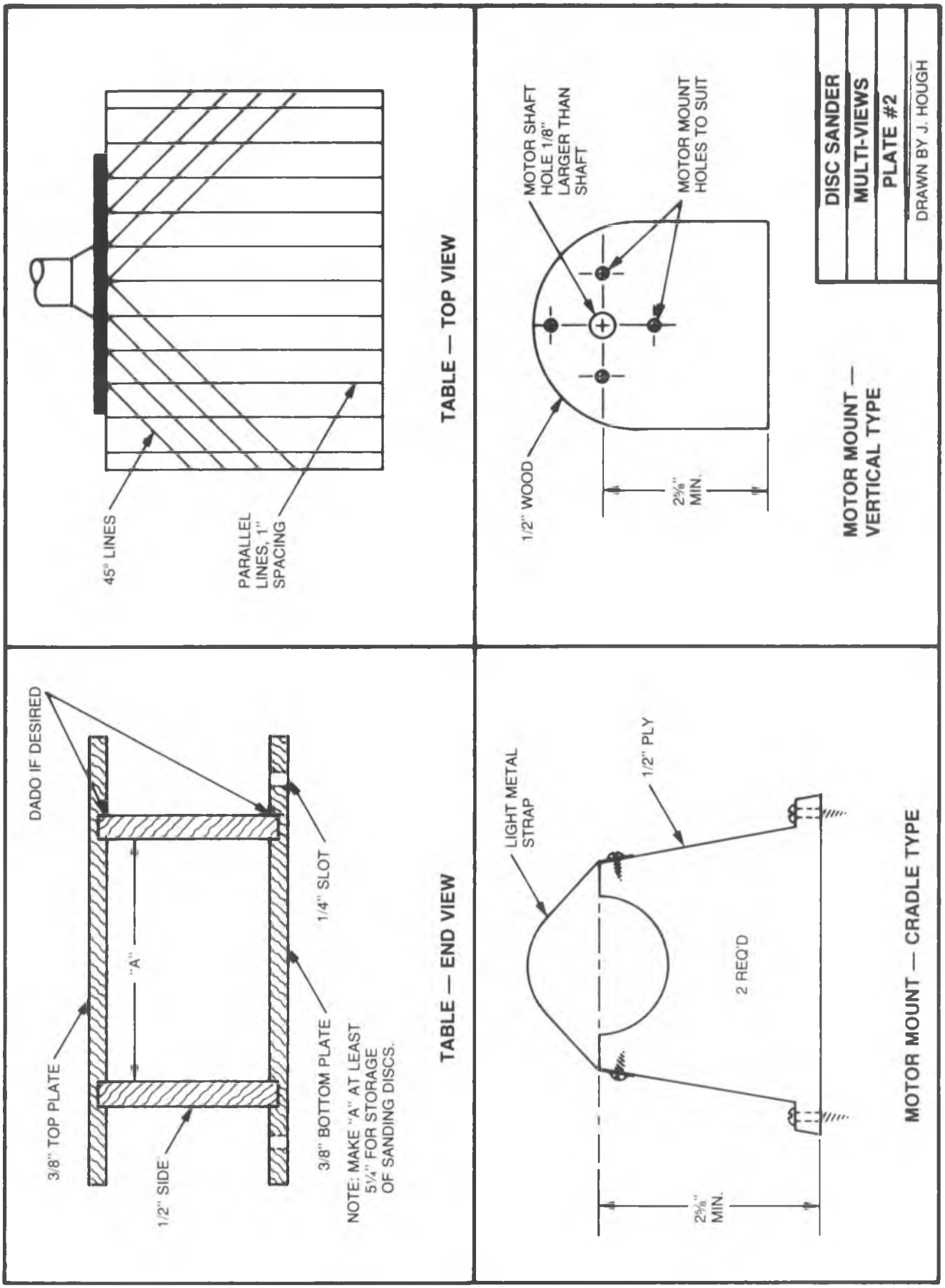
Sub-Assemblies: Note long screws projecting from motor housing used to mount motor.

Checking table to disc for 90°.



blade. Tighten the "C" clamps, turn on the saw, slowly turn the disc and "Voila," a perfect circle. See photo.

Now we need a large wood sewing thread spool from your helpmate's sewing kit. Cut it off to the desired length and as square as possible. Drill the motor shaft set screw hole and thread it with a tap. I used a 1/4"-28 thread Allen set screw about 1/2" long. The drilling and tapping chart called for a #3 bit, but since this is wood and not steel, I used a #4



bit to give the threads a tighter grip. Tap the threads and run the set screw in and out a few times to smooth up the threads. Remove the set screw for the time being. Apply a good coat of epoxy glue to the spool flange end, sight down through the spool hole, centering the compass point nail hole, and press firmly to the disc. Allow epoxy to cure for 12 hours (while you mow the yard, clean house windows inside

to page 88

Note to Subscribers:

Due to the increase in envelope prices and in order to hold down our prices, those subscribers who are currently receiving their magazines in envelopes will receive their magazines in a wrapper beginning with this issue.

POWER DISC SANDER

from page 87/84

and out, and rearrange the living room furniture like she asked you to do three days ago).

When the epoxy is cured, use a drill bit exactly the size of motor shaft **in a drill press** (the disc may be slightly out of round, but we don't want any wobble), drill down through the spool and the disc. It isn't necessary to clamp the disc to the table since the spool hole will guide the drill bit. I'm sure you used a "back-up" board to keep from splintering the disc when the bit goes through.

Now we have to get our disc really round and 5" in diameter --- here's how. Get a bolt that is the diameter of the hole and about 1½" longer than the spool and the disc, two wood washers and a nut. Insert the bolt with a washer under the head from the disc side, slip on the other washer and nut and tighten. Install the set screw snugly. Chuck the assembly in the drill press, and use a low speed. It will probably be slightly out of round. Mine was, so let's make a simple jig to sand it. Staple or thumb tack a piece of sandpaper to the 2" side of a 1" x 2" about 12" or 15" long. Clamp the 1" x 2" on edge at the rear corner of the drill press table so that it almost touches the edge of the disc. Turn on the drill press and lightly press the free end of the 1" x 2" so that the sandpaper hits the high spots of the disc. Take your time and don't force it or you may "spring" the bolt and never get it true. See photo.

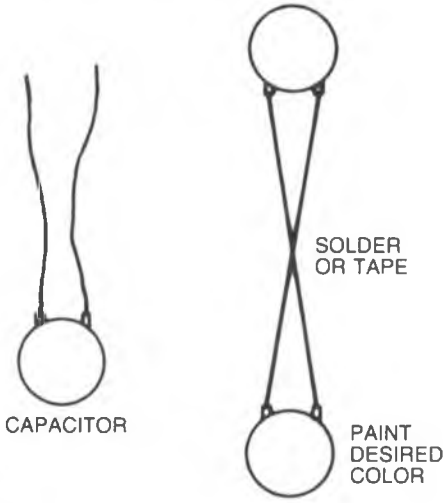
Not much left to do now except find a switch in the junk box, hook up the power cord, and give the whole thing, disc included, two coats of clear polyurethane, and put it all together. When the paint was dry I glued scrap rubber feet at each corner with contact cement, put a 120 grit disc on the wheel, snugged up the set screw, and fired it up.

This is the quietest power tool I've ever seen. No vibration, and it really sands the ends of 1/4" square redwood fast. Sure, you can jam the wood into the disc and stall it, but that's not the way to take just a "scoch" off so it fits perfect. It's easy to sand to a line because there is no vibration and the slow speed does not cause the sawdust to follow around the disc to cover up the line. Sanding balsa formers, wing tips and the like, is a breeze. The table can be removed for freehand sanding, if desired.

If you've read this far, you must be thinking you'd like to have one, but you don't have a motor lying around

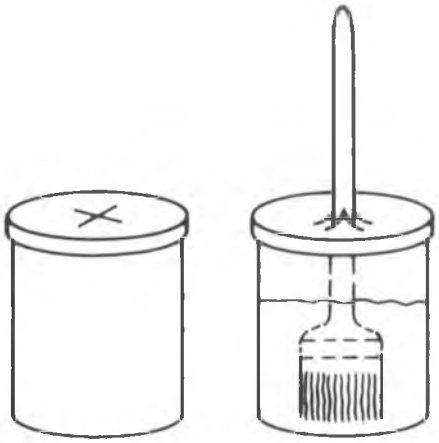
to page 95

FOR WHAT IT'S WORTH



Shawn Blackham of Murrysville, Pennsylvania, uses spare electronic components to make scale details. The following is for pilot radio headsets. Find a couple of capacitors of appropriate size for your pilot. Pull the leads together and solder. Form the leads to shape of head and wrap the joint with tape. Take a length of small diameter insulated wire and coil it around a piece of music wire, stretch it out a bit, stick it to the bottom of one capacitor and you have a coiled headset wire. Paint and stick it on pilot head. This will make an attractive detail for the cockpit, just be sure to work with parts to the correct scale of your airplane. The sketches should help clarify the details.

Here is a goodie from Ken Spears of Arlington, Texas. When painting an airplane with a brush, it's a bother to clean the brush between coats. To solve this problem Ken uses a 35mm film container. A small "X" is cut in the top to allow the brush handle to protrude. The canister is then filled about half with a suitable solvent. The brush is inserted through the lid and the lid is snapped in place. When you need to paint again, simply remove the brush and blot it on a rag. The lid serves to suspend the brush to prevent the bristles from taking a set and also slows evaporation of the solvent. The sketch shows how it is done.



Here's an idea from Mitch Romanauski of San Francisco, California, which has worked great for him.

The problem was trying to get MonoKote to stick to areas where epoxy had been used. By applying a thin coating of cyanoacrylate adhesive over the epoxy, the problem was solved. MonoKote and other heat shrink covering materials stick very well to CA glue; in fact, it's hard to remove it from the surface afterwards. Make sure the CA is dry because it will dissolve the covering material's pigment when wet.

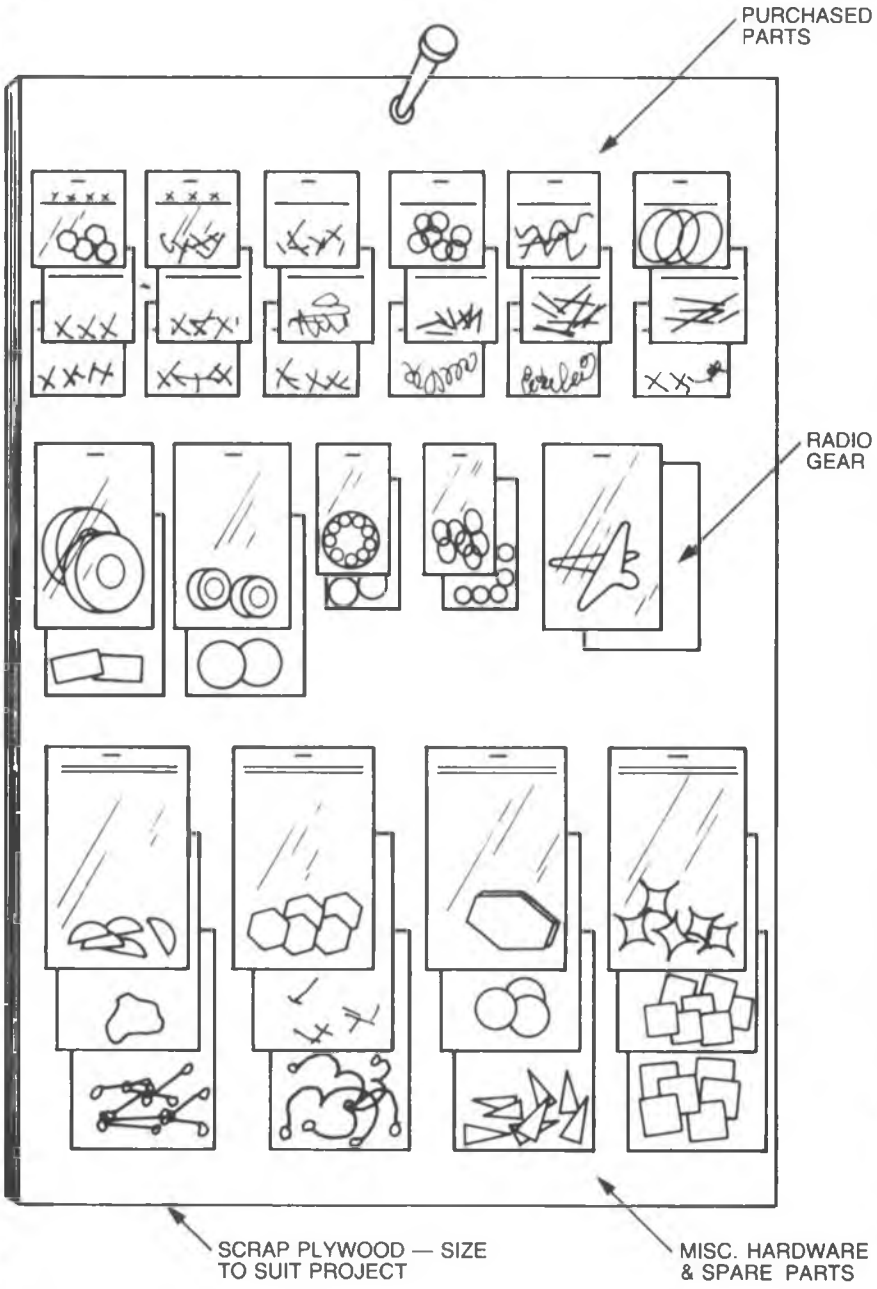
Recently, after picking orange and yellow as a color scheme for his Kadet Jr., Michael Tate of Milpitas, California, decided to go with the trim idea on the box and in the plans. Seeing how nice orange base and yellow trim looked, he needed an accent stripe to define the color change. Having used Super MonoKote and Trim MonoKote, Mike was bound with using striping tape for the accent.

Checking the color chart for MonoKote, and after checking out light blue, dark blue, red, white, black and gold, it was decided that brown brought out the definition of both the orange and yellow best.

Well guess what? No one makes trim striping in brown. After three art stores, drafting supplies, and the like, no product would work, i.e., stretch around curves. As a last ditch try, Mike stopped at an auto parts store, well, well, car pin stripe tape is vinyl! It bends, sticks well, and is fuel proof. It takes clear dope as a sealer very well, and looks great!

Michael Doud of Jacksonville, North Carolina, submitted this idea. A nice addition to the dual rate field charger (RCM July, 1982) is to use a male and female Deans 3-pin connector on the charge as follows: Remove middle pin from both connectors, solder male connector to charger and solder the female connector to various different radios charging connectors that you may be using. Thus, you have a multi-radio field charger.

FOR WHAT IT'S WORTH



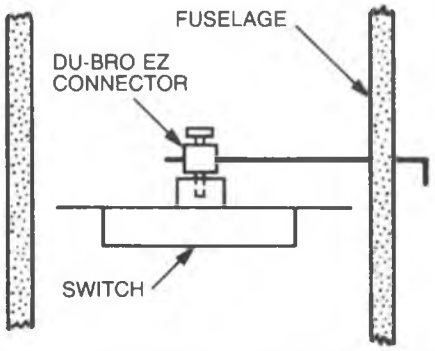
George Harlan of Irvine, California, tells us how he keeps his goodies organized. During any project, George is always making and buying small hardware. It seems that during the time of construction they get put somewhere until he needs them and then he spends a lot of time looking for them. George found that with a piece of scrap plywood, a stapler and some plastic bags, all items can be stapled to the board for fast retrieval. See sketch.

Here is a memory jogger from Bob Bostrom of Santa Maria, California. Each issue of RCM (and other magazines) has numerous tips and ideas which will probably be useful in the future, if not at once; and not all of them are in this column. To index these for future reference, Bob reads each magazine with a Sanford Sharpie pen at hand. As he runs across an item he feels he may want to retrieve later, he makes a brief note on the magazine cover, with the page number. A typical issue, when he is done, will have perhaps three to eight items noted.

Then Bob transfers these items to a small loose-leaf notebook, which has been indexed by category, such as "Ignition Engines" or "Painting and Finishing," for example. The one line description along with magazine initials (RCM) and the issue date enables him to look up all the notes or articles quickly without having to thumb through countless back issues to find a particular article or item. The Sharpie pen is great for this, because it will write on slick surfaces such as RCM's cover.

John Damiano of Madera, California, sent in this suggestion. Modelers building scale general aviation aircraft could make panels using the cut-outs from Avionics ads found in such magazines as Aopa Pilot, Flying, etc., — Kings ads are particularly suited. This way a realistic looking Avionics panel might be created. Ask a pilot friend for his old magazines.

Roger Petroski of Laramie, Wyoming, sent in this sketch on his handy hint. For a clean looking and simple switch linkage, he drills a 1/16" hole in the top of his switch. Epoxy in an EZ connector. Drill a 5/64" hole in the side of the fuselage, then insert a short piece of control rod through the fuselage side and into the connection.



Send your hints & kinks to R/C Modeler, P.O. Box 487, Sierra Madre, Ca. 91024 & win a free book from RCM's Anthology Library Series if your idea is used.

SHOWCASE '83

from page 91/90

The Tartan Twin Ignition engine is available exclusively from World Engines, 8960 Rossash Ave., Cincinnati, Ohio 45236.

LYNX

LYNX (links) n. a wildcat found throughout the N. Hemisphere, having a short tail and tufted ears!
R/C LYNX: a new 52" span sport pattern airplane for a .40 engine, having snappy performance and cat-like agility!

The Lynx is a new fiberglass and foam pattern design by Ultimate Models of Mount Clemens, Michigan. With a hot .40 engine and a little building time, one can have a Lynx tearing up the sky at the local flying field.

It is a basic pattern kit including an epoxy glass fuselage, foam wing cores, plywood firewall, full sized plans, pre-bent main landing gear wires, and instructions and building tips. Building the Lynx moves along quite quickly once you have all the materials required on hand. Included in the box is a complete materials list for items needed to complete the kit. The Lynx is not a beginner's kit.

Flying the Lynx is really exciting. It's one of those fun airplanes you bring out to the field time after time. The Lynx flies like a pattern ship, but does not take up a whole lot of sky doing the maneuvers.

The Lynx has a reasonable price tag of $55.95 on the basic kit. The deluxe kit is available for $89.95 and includes all necessary material. It is available at most Detroit area hobby shops or direct from Aerostar Hobbies, Box No. 17643, Nashville, Tennessee 37217.

□

POWER DISC SANDER

from page 88/84

like this one. Why not ask a neighbor if he has an old electric fan you could have; go to a garage sale; try a junk shop, fix-it shop, or electric motor repair shop. I found one listed in a surplus catalog with a 3/8" shaft, turned 1530 rpm and was rated at 2.3 amps for about $4.00. (Also, refer to Editor's Note at beginning of article.)

A word of caution: Make sure the motor you use doesn't turn faster than 2500 rpm, as 3M has a warning on the package that the disc may lift and fly off above 2500 rpm. You don't need that much speed anyway.

In summation (the professional writers always say this), you don't have to use the same sizes of wood that I did, use whatever you have on hand or can pick up free (house builders throw away stuff like this). You can make it smaller than mine or larger to store the discs in. Make sure the table is 90° from the disc, and your electrical connections are secure and properly insulated.

As a modeler you'll spend a few hours making something that won't fly, but the planes, or boats, you build using it, will fly sooner.

Materials List
(Sizes shown are for my sander. Non-critical dimensions are not shown on drawings)

Base — 8⅜" wide x 11" long x 3/4" thick.
Motor Mount — 6¼" wide x 6" high x 1/2" thick.
Table, Top & Bottom Plates — 8⅜" wide x 6½" long x 3/8" thick.
Table, Sides — 3½" high x 6½" long x 1/2" thick.
Wood Spool — large dia. = 1½", small dia. = 7/8". Cut to 1¼" long.
Disc — 1/4" aircraft ply, 5¼" square.
Metal Corner Brackets — 90° x 2½".
Woodscrews — #5 x 1/2" (8 req'd.).
Slide Switch — rated 115 volts, 5 amps or more.
Allen Set Screw — 1/4" x 28" thread x 3/8" long.
Power Cord — length to suit.
Nylon Clamp — strain relief for power cord.
Electric Wire Nuts — 3 each.
Stove Bolts — 1/4" x 1½" with wing nuts.
Machine Bolt — 5/16" x 3" with nut and large washers.
Rubber Pads — cut from inner tube.
Polyurethane Varnish.

□

1982 CHAMPIONSHIP RACE

from page 82

NMPRA Officers proudly presenting the awards for the top 20 National Season Points to the deserving fliers. The winners of these awards are determined by their placing at local NMPRA district events throughout the year preceeding the awards ceremony.

The National Points Perpetual Trophy was first awarded in 1968 and has been won by a flier from California every year since then, except in 1976, when Bill Hager (then from Ohio) won it. 1982 once again saw the award go to a Californian who has won the National Points Championship three out of the past four years.

In addition, the top twenty in National Points are shown in Table I.

Sunday's racing was even more exciting and faster than the first day, with the competitor's reaching deep into their bags of tricks trying to pull out still another win.

The early leaders of the contest began to have their bad luck on Sunday morning.

Tom Christopher melted down his good engine after leaning on the needle too hard. It cost him a zero and he was out of the First Place tie.

Jeff Bertken was still tough but a Second Place finish in one heat knocked him out of the lead.

Gary Hover blew a prop blade on the line for a zero.

The most exciting (for me, anyway) and fastest heat of the contest was a race between Bill Preis of Illinois, and Dave Shadel of California. At the time of the race, these two pilots were tied for First and this heat would break that tie. Both fliers would really go for it.

At the drop of the flag, four racers were off. Preis and Shadel quickly pulled away from the other racers. Shadel held a narrow lead for 8 laps, then hesitated at #1 pylon and Preis slipped by. The last two laps were wingtip to wingtip with Preis finishing first by a whisker. The times? Preis 1:09.6, Shadel 1:09.9. Bill Preis was all alone in First Place.

In the next round (11), leader Bill Preis lost it all when the wing on his aircraft folded at #1 pylon.

The last round (12) was fast but uneventful for the contest leaders. All won their heats to remain in the respective top five slots. After two days of super fast racing, the top 20 finished as shown in Table II.

Equipment choices of the entire group of entries varied more than they had in past races.

Several of the top finishers flew "mix and match" R/C systems; i.e., one brand of transmitter, another brand of receiver, and still another brand of servos.

Engine choices are still about 90% in favor of the Super Tigre X-40. However, both Kent Nogy and Jeff Bertken had some strong running K & B's. Perhaps we'll see a new engine from K & B in the coming racing season.

Aircraft types were more varied than in the past couple of Championships, with Little Tonis, Polecats, Denight Specials, Miss Dallas', Pitts Pelletss and TomCats all showing good numbers.

Airtronics, K & B Mfg., Kraft Systems, and Prather Products were kind enough to donate their products for a worker's raffle after the contest ended. We sincerely appreciate their support.

Several groups of people were responsible for this event. Groups from Dallas/Ft. Worth, Houston, and San Antonio cannot be thanked enough for their hard work.

Special thanks go to Mr. Brian Palacios, and Nancy and Bill Hager (C.D.) for their efforts in running this event. □

DANGEROUS DAN

from page 76/74

hooks along one side of the pack. The rotating hooks are kept in "hold" position by a push-pull pin from the emergency chute release servo.

When the retract switch on the transmitter is thrown, the push-pull pin is pulled, the two rotating hooks rotate and release the rubberbands, and the emergency chute is quickly and forcefully flipped out of its pack by the "mouse trap" spring.

Because the emergency chute deployment is so rapid and surefire, it is possible to wait out the free-fall until everyone in the audience (and sometimes even the announcer) is absolutely certain that the parachutist will be "killed." Fifty-foot high emergency chute openings are common, and several have been considerably lower.

Both parachutes are 36" diameter flare chutes available from Edmund Scientific, 101 E. Gloucester Pike, Barrington, New Jersey 08007. They cost about $2.00. Those which are now being supplied have an extra shroud line to the top center of the chute, giving the chute a rather strange appearance in the air. I remove this extra line, and the chutes function perfectly without it. Complex multi paneled chutes are prettier in hand, but at a reasonable stand-off distance I can't see that they have any special advantage.

Dan's drop plane is a .90 powered low-winger, with a flat bottomed fuselage (like an Ugly Stick). This flat bottom allows a tray, which is specially designed to hold Dan (and his packed emergency chute) and his main chute, to be rubberbanded (and dowel keyed) to the underside of the drop plane. The tray contains a servo. Dan and his parachutes are held in place in the tray by rotating hooks and rubberbands (and a push-pull pin from the servo) in a similar arrangement as used for the emergency chute pack.

Dan is positioned in this tray on his back (to keep the packed emergency chute out of the fuel residue) with his feet forward. The main chute compartment is located just aft of Dan's head and wire harness. The main chute compartment (and main chute) is covered with a piece of paper to keep out the fuel mess. The tray servo, which allows Dan to fall from the tray, is controlled from the drop plane's transmitter.

In the parachute act in our TRCC air shows, Dan's drop is done from moderate altitude almost directly overhead --- with an attempt to make allowance for wind drift. Once he is safely in his main chute, we wait him out just so long as he continues to drift into a better "directly overhead" position. The instant that he appears to be moving away from this position, his main chute is released and he begins his fall. (Meanwhile, of course, the show announcer has gone through the same sort of "patter," as described previously, to set the proper scene.) If done properly, Dan finally pops his emergency and lands directly in front of the crowd --- accompanied by loud applause! There is no question that Dan is a hero in our air shows. □

CLUB CRICKET

from page 73

..... painting at least the wing. The rest of the airplane can be covered in just about anything. We decided to paint our entire Cricket and, while we were at it, try out the new Black Baron paint from Coverite.

The fuselage was given two coats of Hobbypoxy Filler and then sanded. We left the wings as is and sprayed straight on the fabric; that was a mistake as we later found out. A good quality primer is a must on the wings. The Black Baron paint went on fine and it is one of the few spray paints

to page 106

CLUB CRICKET

from page 96/73

that you can use the whole can without having the nozzle clog. The trouble started when we peeled off the masking tape after painting the trim design. Even a low tack tape tried to lift the paint on parts of the fabric covering; on the wood parts no problem. Next time we'll use a fabric primer like Primex.

Engine:

Our Cricket ended up being a test bed for a number of products and one of them was a Como .51 from Indy R/C. The Cricket is designed for .40 to .50 sized engines so the Como is at the upper end of the recommended range. It's a very well-built engine and after a few tanks of fuel is run through it, the carb can be set so you get a nice tick-over idle but still have good throttle response and top end. All in all we were very happy with it and it fits the Cricket well.

Radio:

While we were finishing the Cricket we bought a new Ace Silver Seven Receiver Kit to go with the Silver Seven Transmitter we've been using for quite a while. The S/S receiver is also a nice unit and quite a bit easier to assemble than some of the other receiver kits. With a 500 mA battery pack and the standard Bantam servos, we were able to balance the airplane at the recommended point without adding any weights. Radio installation is simplified since all the control rods are in place when you get the Cricket and it is well-covered in the instructions.

Flying:

Just like full scale pilots, there are two types of R/C fliers, those who like taildraggers and those who don't. A lot

to page 108

CLUB CRICKET

from page 106/73

of pilots think the nickname "alligator" came from the temperament and not the part that touches the ground. The Cricket goes to show that tail wheel airplanes don't have to be hard to handle. With the controls set just a bit more sensitive than suggested in the instructions — about 1/2" each way for the ailerons and elevator — the Club Cricket is a very smooth flying airplane.

One of the better characteristics is the low speed response. It has a fairly long tail moment so it doesn't get twitchy or run out of control. We've had a grand time flying touch and go patterns with a loop or roll on the downwind leg. Its low speed stability is also what helps to make a good trainer.

Conclusion:

The Club Cricket does take a little more finish work than many of the typical A.R.F's, but when it's done the result is worth it. It flies well and it will take a lot of hard use. The instructions are so complete that anyone from a beginner on up should have no trouble at all with the assembly. In the air, it is stable enough to make a good trainer but that doesn't mean the more experienced pilots can't have a good time with the Cricket, too. Indy R/C sells the Club Cricket at $129.95 and while you're at it pick up a Como .51 --- it's a nice combo. □

BIG IS BEAUTIFUL

from page 72/71

threaded at the control surface end as I feel this is better than depending on the two soldered joints required to use the threaded coupler. One at the servo end is bad enough! Needless to say, any such joints should be prepared with the greatest care to assure solid and safe connections in the control system. Tin the wire and the coupler prior to putting them together and then, once the joint is soldered, put it in the vise and see if you can pull it apart. If you can, it wasn't strong enough in the first place.

That was a bit of a long way 'round to get to arrow shafts, but we finally made it! As all archers, and some aeromodelers, know, arrow shafts are available at most places specializing in archery. They can be either aluminum, which I think to be a bit light, or fiberglass, which I prefer. The photograph shows how I make these up and they are pretty simple to make. Only one end is shown, but the other is made in the same way, only providing for attachment to the servo arm which can be done with the old standby "Z" bend or with a solder link. I prefer the "Z" bend as it gets away from a potentially weak solder joint.

You may notice that the wire used in the one shown seems quite large and it is a bit heavier than usual. The reason for this is twofold (maybe even threefold!). I use motorcycle spokes for the wires as they are readily available almost anywhere and they are quite inexpensive. They're soft enough to bend readily and it's no big deal to cut thread on them.

First I drill a hole the same diameter as the wire in the arrow shaft (a drill press and a "V" block help in this, but are not absolutely necessary). Then I bend the wire to a right angle after cutting off the knob (which secures the spoke in the motorcycle wheel) and discard it. Almost all spokes are threaded on the other end and if you get a domestic spoke, you'll likely find it is threaded 4-40. That works out really well since the big ball links Du-Bro makes are also threaded 4-40 and will thread right onto the end of the wire giving you a good hold and some adjustment. You do have to be careful that you cut the length accurately as there is not a great deal of adjustment available and you want to have a safe hold where the rod is threaded into the ball link end.

Once the wire has been bent, it's usually necessary to cut the right angled section off short so it'll go into the end of the arrow shaft. Once in place, a short length of hardwood dowel is cut to slide into the end of the shaft and trap the wire in place. This should be long enough to go past the spot where the wire passes through the shaft. (The dotted line on the arrow shaft in the pictures indicates about the right length.) Don't drill the hole for the wire too close to the end of the arrow shaft either as you want the wire to be trapped solidly in the shaft so there is no movement whatsoever. Once the short piece of dowel is cut to length, it must then be slotted to fit into the shaft and hold the wire in place. You can just take a flat spot off the dowel, or, as shown, make a rounded slot which holds the wire very tightly in place. Start the dowel into the shaft, put a few drops of Hot Stuff on the dowel and drive it home, flush with the end of the arrow shaft and you'll have a solid connection for whatever purpose.

Make sure the dowel is a good fit and doesn't need to be driven in hard. It should fit snugly and require some force to set it in place, but if you put too much pressure on the shafting from inside, you may crack it and weaken the whole thing. Once the end is complete, you can even wrap it with a layer of fiberglass cloth and add some resin properly catalized. That will make about as solid a connection as you are going to find anywhere.

As for the servo end, I may use a short piece of piano wire put together in exactly the same way. The reason for using the piano wire is that the spokes are a bit too large for most servo arms. If you have to drill the arm out to accept the larger wire of the spoke, it could well leave too little "meat" around the hole to safely hold the wire. If you have big burly servo arms that will stand such a hole, by all means use the spoke wire for this end as well. However, most servo arms do not have the necessary stock to do this safely, so use the smaller wire. The "Z" bend is as good a way to attach here as any and there is little, if any, weakness in it.

If the pushrod is of significant length, then something to inhibit it bending or vibrating is a good idea. The arrow shafting is pretty stiff, so I feel a brace or support of some kind about every twelve inches is adequate. That means there is no more than a foot of unsupported pushrod in the airplane. Supports can be made up from scrap wood or whatever comes to hand. I had some block nylon for a while until I used it all up and I made up a few nylon bushings for this purpose. They look great and are very impressive in the airplane but are not really necessary. In my case, it was just an exercise and I wanted to do something with that nice new micro lathe in the shop!

As I've said before, the secret to good radio and control installation is to assure there is little or no slop in your control hook-ups as you can manage. Everything must be free to move with no hindrance, hinges must be installed carefully and directly in line with one another and control pushrods should have as few bends in them as you can manage.

With really large and heavy control surfaces, they must move with ease and, in the case of very heavy ones which put a strain on the control linkages, may very well require counterbalancing to prevent excessive loads on linkages and, even worse, the possibility of control surface flutter in flight. Most of us are familiar with aileron flutter on conventional sized models and it can be a killer. Models have shed their ailerons in flight with disastrous results and that's no way to make your mark in aeromodelling, especially when that mark is a shallow hole in the earth filled with airplane residue!

to page 118

BIG IS BEAUTIFUL

from page 108/71

Flutter is usually a result of high speed flight and a poor control installation. A control surface which has room to move (the "slop" or lost motion between the actual control surface and the servo driving it) can begin to vibrate in the air with the forces of air moving over the surface of the control area. If there is any slop or give in the linkage, this vibration will amplify itself as it continues until it either results in an uncontrollable model or until it self destructs. Needless to say, this sort of shaking is death on radios and especially servos. The forces available when flutter starts are much higher than the equipment is designed to contend with and the almost inevitable result is damage of one kind or another, often total.

One of the best and surest ways to prevent such problems is to make certain that your control linkages are as free as you can make them and that there is practically no slop anywhere in the system that is going to be moving control surfaces. To risk the time and effort (not to mention the dollars) investing in a model to the uncertain results of less than adequate control installations is foolish and a risk none of us can afford to take for safety reasons, if for no other. The time spent making absolutely sure our radio installations are as near perfect as is possible is time well spent. It just might save you a good deal of time rebuilding!

Now that spring is approaching, and the start of a new flying season is at hand, and you have your new project ready for the air, drop me a line with a sharp black and white picture enclosed. Any unusual projects are more than welcome. See you next month! □

SCALE VIEWS

from page 53/51

Scale. It took only a short time for contestants to decide that many 15 pound models needed more than a .60 engine to fly safely. The engine limit was increased to 1.25 in the 1976 rule book remaining constant to date.

Starting with the 1980 rule book, the Giant Scale event was created to accommodate the growing number of models weighing more than 15 pounds and with engines displacing more than 1.25 cu. in. This event is drawing more contestants as it increases in popularity and, in some areas, Giant Scale has become the dominant contest event. The majority of models competing in the Giant event are in the 15 to 20 pound class although many use engines in excess of 1.25 cu. in. displacement. If we increase the Sport Scale weight limit to 20 pounds, the number of models flying in this event would be expanded at the expense of Giant Scale competition. We would produce an overlap in the Giant and Sportscale events because all the 15 to 20 pound models now flying with ignition engines would still have to fly in Giant Scale because these engines exceed the 1.25 limit.

Another problem is that there is already a disparity between the FAI Stand-Off Scale weight limit of 13 pounds (6KG) and the AMA Sportscale limit of 15 pounds for single engine models. This factor may well have inhibited the U.S. development of a competitive FAI team as many modelers prefer to build to the limits allowed for AMA competition. It has taken years to get the current FAI weights within a couple of pounds of the U.S. rules. This country is still working to narrow this gap. A sudden further gross increase in the AMA Sportscale weight limit would probably scuttle these efforts.

At this point, I do not have a crystal ball telling me how the Sportscale and Giant Scale events will develop as time goes by. I do suspect that if we combine these events now with the type change proposed, that it will reduce the number of options available to contestants for competition. If we are going to see more modelers get into scale, we need to give them a choice of more, not fewer events.

Correction:

When you write a caption about an F-82 during the year 82 the number just keeps coming out of the typewriter. Reference to the F-82 in the November issue should have been to the 1981 NATS. Hal Parenti's F8F Bearcat was the Sportscale winner in 1982 and you will probably read this in 1983.

★

Here's the fourth installment in Pettit Paint Company's continuing saga of Hobbypoxy Color Mixing Formulas For The Scale Model Builder.

This time they have three colors to offer, which will begin a series of Royal Air Force colors. The formulas presented this month are for aircraft in action during the early stages of World War II, 1940 to 1941, which includes the battle of Britain. Most Hurricanes and early models of the Spitfire were finished in these colors. The upper surfaces were painted Dark Earth and Dark Green and the lower surfaces were painted Sky Type 'S.' Here are the formulas:

Dark Earth — 4 parts H65 Bright Red, 2 parts H49 Cub Yellow, 1 part H81 Black and 1 part H70 Gray.

Dark Green — 6 parts H66 Dark Red, 2 parts H33 Stinson Green, 1 part H49 Cub Yellow, 1 part H81 Black and 1 part H10 White.

Sky Type 'S' — 5 parts H10 White, 1 part H26 Lt. blue and 1 part H70 Gray.

The reference source used to develop these RAF colors is "British Aviation Colours of World World War Two" published in 1976 by Arms and Armour Press, 2-6 Hampstead High Street, London NW3 1PR.

The book was very generously loaned to us by Claude McCullough, who was instrumental in getting this color matching project started in the first place. We do not know if the book is still in print in England.

Next month we'll have formulas for German aircraft camouflage of this same early period in the war, for builders of Messerschmitt Bf 109 E models who want to refight the Battle of Britain.

Following that, we'll return to RAF colors for the later stages of the war and then Luftwaffe colors of the same period. □

OFF-ROAD RACING

from page 48/47

discovered. The stock class car can be improved in handling by removing the stock spring assembly on the front end and replacing them with the coil-over springs on the shocks. Also, removing the torsion bar assembly in the rear and adding the coil-over springs will make the car handle much better in the turns and over the jumps. The coil-over kits can be purchased through your local hobby shop. Coil-over spring kits are manufactured by R.C.H. Products, C.R.P., and M.I.P.

As we are writing about oval racing in this column, we would like to mention an enjoyable side light.

We are using a Honda Odyssey (the 3-wheel vehicle) to pull a drag gadget in preparing the track surface. When the dragging chore has been completed we disconnect the drag, and run a few hot laps around the track on the Odyssey. Getting up to 40 mph and skidding through the turns is a lot of fun. In our next column we will discuss the new M.R.P. sprint cars, it really looks good.

Keep the cards and letters coming, may all of your heats and mains be driven perfectly, and don't go over the high side. Until next time, we will see you at the track. □

ENGINE CLINIC

from page 46/45

(marine) what kind of problems would I encounter? Would I lose power and rpm's or is it even feasible? How would cooling be affected?

Thank you.

Yours truly,
P.H. Zajicek
Avoco, Wisconsin

You should not encounter any problems by installing a Fabtronics CDI system on your Rossi .90. However, do not expect it to put out the same power running on gasoline that it did using glow fuel and glow ignition. The main reason for converting a glow engine to spark ignition is to use gasoline and the resulting fuel economy. If it is economy you are after then converting to spark ignition would do it. If you want performance then stick with glow operation. You will not experience any cooling problems providing, of course, you are not experiencing any with glow operation.

Dear Sir:

Recently I purchased a Picco 60 FI SE engine. From the outside it looks beautiful until you get to the exhaust port. The edges of the crankcase around the exhaust port are very rough. So I took the head and backplate off. Internally it looks great, except that all the ports are as rough as the proverbial cob. The crankcase was evidently sand cast and the parts never machined or cleaned up or smoothed.

Is there anything to be gained by polishing the ports? I don't wish to change the timing or anything like that, but the roughness of the ports would seem to be a hindrance to getting the most from the engine.

So the question is how best to get these ports smoothed out? I've had enough experience to have found out that most grinding burrs, etc., load up very quickly when used on aluminum. So what kind of tool would you recommend to smooth out the ports?

Sincerely,
Owen Field Sprague
No. Chili, New York

The Picco engines use sand cast crankcases and as such you can expect the unmachined surfaces to be somewhat rougher than an engine that uses a pressure die-cast case. Some forms of sand casting leave a rougher finish than others depending on the core sand used, moisture content of the sand, etc. As long as the port area is large enough, then smoothing does not buy you a thing. You naturally want to get rid of any large blobs of casting that may have

to page 124

ENGINE CLINIC

from page 120/45

been formed by defects in the sand core but other than this you do not need to polish the transfer ports. Many of your old time racing engines used sand cast crankcases such as the Hornet and McCoy. I have spent many an hour polishing the bypass, etc., only to find it bought absolutely nothing. Some manufacturers using sand cast cases do machine the inside of the exhaust stack but this is for appearance only. It does give the engine a more finished look, but does little for performance.

If the port passages are exceptionally rough in your engine then the only way to smooth them up is with a Moto-Tool and the metal burrs followed by a piece of emory cloth on the end of a screwdriver. It takes some patience. Do not try for a high polish as some fellows seem to think is necessary — just a smooth surface. □

UNDERTAKER

from page 43/40

Use epoxy on thef firewall. When dry, glue the sides together at the tail.

Next glue the top of the fuselage turtle deck together. Add the 3/8" triangular stock from the firewall bottom to the center bulkhead, using two pieces on each side because of the bend in the fuselage. Carve and sand the entire bottom smooth and flat, then add the 1/8" balsa bottom. I used medium soft balsa and did it in one piece for strength, grain lengthwise.

Install the motor mount with 4-40 socket head screws and blind mounting nuts. Make the wing cut outs and temporarily fit the wing. Carve and sand the bottom corners of the fuselage to minimum width (2¼") and blend the fuselage smoothly with the motor mount. Add the fuel tank and plumbing at this time. Bring both the fuel feed and vent lines through the middle of the firewall. Grind away enough of the motor mount so the brass tubing will clear the engine. The fuel feed should supply the engine from the right or bottom side.

When you install the engine, reverse the needle valve assembly so the needle valve sticks up and won't break on every landing. Add the 3/8" triangular stock behind the firewall at the top. Don't forget to use epoxy at the firewall. Install the nose planking back to the hatch line. Remove balsa from the fuselage sides in the canopy area as outlined on the plans to prepare the surface for the solid balsa

to page 126

UNDERTAKER

from page 124/40

canopy. Sand the turtle deck glue joint flat and glue the 1/4" x 1/4" balsa along the top. Carve and sand to shape. Fit the 3/32" hatch along the top.

Form the solid canopy from a balsa block or Hot Stuff three pieces of 1/2" balsa. Glue the canopy to the turtle deck but not the hatch yet. Now cut the turtle deck along the hatch cut-out lines as shown on the plans. Finish shaping the canopy and glue the canopy and turtle deck portion of the hatch to the 3/32" front hatch. Add bracing as necessary to strengthen the hatch. Install the hatch hold-downs, a lip in the front and a screw, a snap, or velcro in the back. Carve and sand the forward fuselage to contour with the motor mount. A little care here will make a super slick looking nose. Sand entire fuselage. Add 1/64" ply doublers on inside fuselage through the wing area. Let them stick above the hatch cut out 1/16" as a lip to seal the hatch behind the canopy.

Assembly:

Align and install the tail surfaces. Add small fillets between the fuselage and stab for further strength. Fit and align the wing in the fuselage. You will need to cut a small hole in the side of the fuselage to slip the aileron linkage into it. Save the piece you cut out and glue it in later. Mark the wing position and pull the wing back out. Now is the time to cut out the servo and battery holes in the wing while you can easily get at it. Cutting those holes after wing installation is possible but much harder. I filled and painted the fuselage and tail surfaces before gluing in the wing. That way I didn't have to mask the wing, and the primer was much easier to sand.

to page 130

from page 126/40

Install, align, and glue in the wing, adding wing fillets as desired. Make your final finishing touches, numbers, and racing stripe.

Radio:

We used two KPS-18's a KPR-7L miniature Kraft receiver, and a Motorola 175 mah battery on the first airplane. The batteries are small and light (1 oz. total), but at $5.00 each, a little expensive. The KPS-18's can be installed side by side, but larger servos which we used in the other airplanes (Futaba S-20, Cannon Super Mini, and Kraft KPS-12) must be installed in tandem. Fit the servos through holes cut into the wing sheeting, but leave the spar, leading and trailing edges intact. Other receivers we have used include a Cannon Super Mini, and a Heath 3 channel. The Heath was removed from the plastic case, taped, and padded in foam. Standard linkages and fitting will fit with a little care. A piece of inner Gold-N-Rod makes a nice antenna guide to the rear of the fuselage. Kraft has a short 18" antenna which only protrudes slightly from the rear for a clean installation.

Preflight:

Add the engine and check the C.G. Adjust so it's between 1/4" to 1/2" in front of the main spar. Any C.G. aft of that point will give you a big handful of airplane. I suggest a forward C.G. to make the plane more docile until you get used to a hot racer. Check and adjust control movements for the following: elevator ± 3/32"; aileron ± 5/32". Too much control movement will really give you a wild ride and will make you think you have a bad airplane. I speak from experience — 3½ outside loops before the engine shut off. Trim all controls to neutral with the transmitter trim also at neutral. Check servos for accurate centering from both directions. I had an inaccurate one on aileron and rocked back and forth the entire flight. Charge the batteries and head for the field.

Flying:

The Undertaker accelerates smoothly from a two-handed launch (one hand on the fuselage, the other on a wingtip). An overhead launch will get you out of the pits faster but requires practice. For practicing by myself, I can launch it easily underhanded by grabbing the fuselage behind the wing and tossing it into the air. A small amount of right aileron may be needed to counteract

to page 134

UNDERTAKER

from page 130/40

torque. Roll is fast and smooth, and pitch control is very responsive. Have your assistant standing by to adjust the trim for you because you won't want to take your eyes off the model or fingers off the sticks if the plane is very much out of trim.

When trimmed, the Undertaker is very stable and penetrates well. Rolling wings level out of a hard turn, I can take my hand off the transmitter and the Undertaker flies arrow straight until I have to turn for the next pylon. I have also flown in 15-20 knot winds with no problems. The tight turn around No. 1 pylon will water your eyes since the plane hardly slows at all. The speed coming out of #3 will be a joy also as you pass anyone close in front of you. Our TD .051 is turning 19,000 with a Tornado 5/4 nylon prop on standard Cox Glow Power fuel, and 20,000 with K & B 1000. We haven't had time to experiment with a lot of different fuels yet, but I'm sure we can do better as the competition edges a little closer.

We had one problem with the TD needle valve backing out, so we switched to an Ace High Performance TD 049-051 needle valve, which solved the problem and also allowed us to set the needle valve more precisely. Our best prop seems to be the Tornado 5/4, but we are still looking.

We like our airplane's performance and handling qualities. With five of them we are having a ball, especially with the competition going bananas trying to keep up with us. Happy flying and turn left, **fast!** □

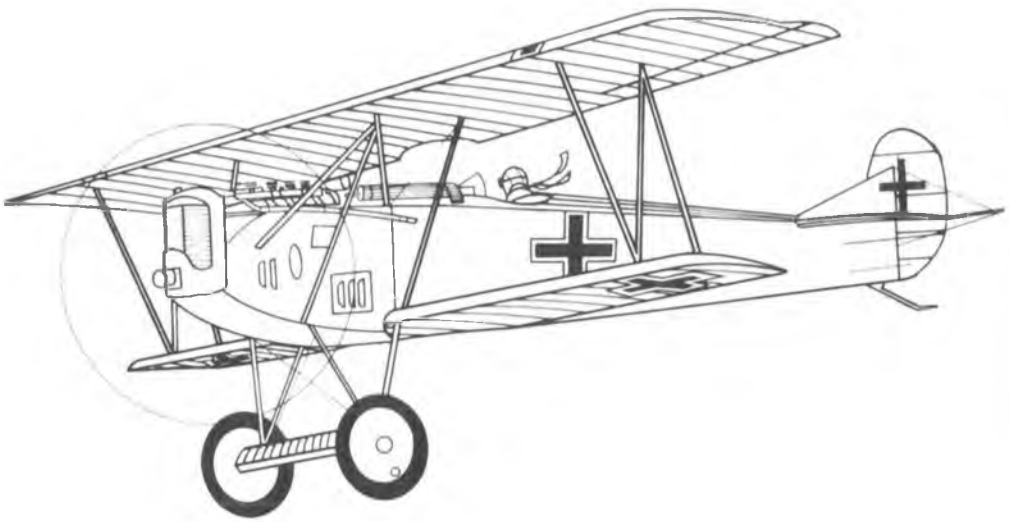
FLYING LOWE

from page 39/38

to some extent. My own featured a redesigned inlet reed system and tuned exhaust using twin O.P.S. pipes. Several used Don Chapman's Tartan modifications which featured Don's own tuned muffler system with revised exhaust timing, modified reed system and an additional cylinder bypass port. Chapman's engines ran very strong and were particularly good in the vertical pull, allowing the aircraft to fly at very constant speed.

Prettner's twin Super Tigre 75's were used with his own 2.1 to 1 gear drive system and pulled his aircraft beautifully with plenty of power to spare.

to page 140



Flying Near Airports? Be Careful!

Free Flight or Radio Control flying near airports, or in any situation which might involve the possibility of models being in the vicinity of full-scale aircraft operations, must be avoided—or conducted so as to eliminate any dangerous situations. Models should not be flown in the proximity of full-scale aircraft operations unless the flyer has someone else with him for the sole purpose of watching for full-scale aircraft and supervising the flying so as to prevent accident possibilities.

PROTECT YOUR RIGHT TO FLY!

Safe Flying Is No Accident!

FLYING LOWE

from page 134/38

Tony Frackowiak did an incredible job of gearing together two O.S. 90's at 2:1 using two sets of gears. The photo shows that the engines were placed front to back to allow this arrangement. Tony tells me that this physical arrangement was chosen to permit a contra-rotating twin prop set-up which he actually flew for a while. He abandoned it due to lack of developmental time needed, but he says that the airplane flew incredibly with it — no torque! Tony ended up driving a 24" prop at fairly low rpm's, so he had more torque to contend with than anyone. The thrust available was tremendous and measured over 30 pounds static!

The brand new Webra "Bully" engine was used by several of the Europeans and looks like a very promising engine. They were taching around 8000 rpm with a special German carbon fibre 20/10 prop. I can hardly wait to try one of those gems myself.

The Magnum 3.5 proved a worthy engine. The best running one was flown by Steve Helms who had performed extensive modifications. It is uncertain at this time whether this engine will be marketed — depends on public acceptance. I must say that the engine pulled the big Lasers and Chipmunks with authority. The power to weight appears better than some other large modified chain saw engines now on the market.

The twin geared Webra .60's had great power but proved temperamental. Ivan Kristensen's Laser was especially strong vertically with his modified unit which used the new Webra ABC side exhaust engines.

Benito Bertolani flew the new Tartan Twin which features an additional cylinder bypass port and a revised intake reed system. The engine is very powerful even with the open exhaust as Benito ran it.

Much credit must go to Circus Circus and the people who organized and ran the contest. Thanks so much to Bill Bennett and Walt Schroder, co-founders and the inspiration of this event. Thanks to "Doc" Edwards for his tireless efforts as Chief Judge and, of course, to the very competent team of judges. Thanks to Phil Kraft for a job well-done as Contest Director. We appreciated those who worked behind

to page 144

FLYING LOWE

from page 140/38

the scenes — without them the job couldn't have been completed.

The T.O.C. has for me been **the** competition since its inception. The technical and professional challenge has been great, and there is no question of the impact this competition has made on all modeling. □

SOARING

from page 37/36

Sunday was three rounds of 8 minute Duration followed by rounds of Speed; Speed to count one-half of Sunday's score. JB had hoped for more than the 18 entries, though last year saw only 15 register.

The Soaring Union of Los Angeles, and CD Rick Norwood, limit the number of entries to 25 and try to get in the maximum number of rounds possible in the two days. They succeeded in getting in a whale of a lot of flying, 19 rounds, but could only attract 18 fliers. Rounds were two 2 minute Precision, followed by two 6 minute Precision/Duration, repeated until 4 O'clock Saturday, and 3 O'clock Sunday. Hardware was won by a Sagitta 600, RO8, and Gentle Ladies in 3rd, 4th, 5th and 6th, at the Michigan contest. In California, it was a Thermal 73, Sagitta 600, Original, K-Minnow, and Original.

Everyone at both contests are reported to have had an exceptionally fine time, and were thoroughly flown-out by the end of the second day. Nearly everyone will return next year. So, if it's so darned much fun, why don't 2-Metre contests attract a larger entry? I guess not too many people have 2-Metre ships. If one only has one or two ships, most fliers opt for larger, more efficient machines. Also, I guess, it's hard enough to keep proficient with one design, let alone two. Many clubs try to encourage the 2-Metre class by allowing both 2-Metre and Open ships to be flown by each flier in club contests. Many will exercise this option just to fly twice as many flights. If forced to choose between **either** 2-Metre or Open Class, most will choose the Open. Now I see yet another class appearing in some areas of the country: 3-Metres and above.

Anyway — sports fans, I like the 2-Metre Class sailplane. They are lots of fun, convenient to handle, and

to page 146

SOARING

from page 144/36

generally cost less than their big brothers. It's kinda fun to try to improve the breed.

◇

Speaking of improving the breed, I've recently switched my flying stock, both 100" and 2-Metre to Eppler 214 airfoils. Both have ailerons and flaps. According to Prof. Eppler, the 214 is a preferred airfoil for flapped sailplanes. If you will observe the profiles of both the 205 and the 214 you will see that if the 214 trailing section is bent up (as with reflexed flaps), it becomes remarkably similar to the 205. So if you can't decide whether you want the floating capabilities of the 214 or the slippery characteristics of the 205, consider the 214 with flaps. However, you don't get something for nothing. You don't really get a 205, exactly, and the flap discontinuity creates a bit more drag. Also, to get the most out of it you must also reflex the ailerons which I don't. At any rate the combination works rather well.

to page 150

SOARING

from page 146/36

Previous to the 214, both ships had Eppler 193 sections. I found the 214 to be noticeably better in light thermals, although not dramatically better. The 214 prefers a more forward Center of Gravity at the wing rod as opposed to the 193 at 1/2" more rearward. Both sections launch very steeply, especially with 10 or 15 degrees of flap.

One characteristic I haven't yet sorted out is a slight yawing tendency. When one turn is immediately followed by a turn in the opposite direction, the second turn starts with a yaw, before rolling into the turn. As the 2-Metre ship shows less tendency to yaw under these conditions than the 100" ship, I suspect that the coupled rudder is yawing the sailplane before the ailerons can overcome the rolling inertia. I'm going to put in another servo and couple aileron and rudder in the transmitter, then I can sort out the problem. It is easier to tune the rudder throw, if it can be independently applied. If I come to some startling conclusions, I'll let you know down stream somewhere.

◇

If the color picture came out okay in black and white, you can see part of a series of 18 flying wings built and designed by Howard Short of Lancaster, California. Howard is a glutton for punishment, but he sure has perserverance. He has long since given up reflex airfoils. Number 17 has an elevator mounted at the trailing edge, above the wing. Howard found that during launch, the elevator in this position was blanked out by the wing. So, number 18 has the elevator mounted below the wing.

Catch you next month, all being well. Howzat! □

FLY BABY

from page 35

Stick and stringer construction is used in the fuselage with the basic structure of 1/4" square and 1/4" x 3/8" balsa. All joints are gusseted and a Lite Ply doubler is added to the forward section. If you are not convinced about the instant glues yet, this one should do it. We built almost the entire airplane except the

motor mount using Carl Goldberg's Super Jet and Regular Jet. The thicker Super Jet is perfect for butt joints and laminating. The motor mount stands off from the firewall and is built up from aircraft grade plywood. It is designed with a Quadra engine in mind so if you are intending to use some other power plant, a little pre-planning is in order. According to the instructions, the mount is assembled after the firewall is installed but we found that it works much better to build the unit before gluing it to the body of the fuselage.

Based on prior experience with several large models, we decided a minor addition to the tail surface would be a good idea. The trailing edges of the horizontal and vertical stabilizers are laminated from two strips of 1/4" x 3/8" balsa. On the forward side we added a piece of spruce to act as a spar. The spruce adds considerable strength and also provides a solid point for mounting the brace wires. With the tail section trial fitted to the fuselage, the tiny plastic tailwheel mount looked silly. The nylon brackets are fine on a little model but not on the Fly Baby. We lengthened the skid by about 1/2" and installed a number 5510HD Heavy Duty tailwheel assembly from C.B. Associates. Much Better! It looks scale and is a lot easier on servos.

Both wing panels are built on the plans and typical model construction techniques are used. The spars are balsa and were slightly bowed. This is quite common with long strips of balsa and, in fact, Balsa U.S.A. talks about it in their instructions. By the time the wing is assembled, everything is straight. A servo access hatch has to be included in the first rib bay and you are left to your own devices on this area. We just made a cover from scrap Lite Ply and held it down with a 4 x 40 socket head bolts and "T" nuts. One change was in the wing attachment bolts. The plans call for the bolts to be tightened from inside the cockpit. This is very difficult if you decide to add a pilot or other detail. We just turned the bolts around and used the servo hatch for access to the bolt heads.

Covering:

Fabric and paint covering looks best on the Fly Baby and we elected to go with Top Flite FabriKote in the Cub Yellow. The FabriKote is pre-finished so the yellow doesn't have to be painted. Almost two full twelve foot rolls were needed to complete the job. FabriKote handles nicely and has an unbelievable shrink rate. About the only problem with FabriKote is that

to page 155

from page 151/35

lap seams won't stick well, once the covering is finished it looks great. We followed the suggestions in the December 1981 issue of RCM and ran a bead of Jet around the seam lines. This takes care of the sticking problem --- just do it before the final shrinking.

The dark trim areas were masked off and painted with Krylon automotive spray paint in a medium maroon. The original Fly Baby had black and white color separation lines and these were duplicated with striping tape. A little trick with the tape really helps it stay put. Take a piece of an old sheet and lay it over the tape, then make a few passes with a sealing iron on low heat. Balsa U.S.A. provides the final touches with a beautiful set of decals and a sheet of scale instruments.

Engine:

Since the kit is designed around the Quadra, it seemed like the most logical choice. The factory cast aluminum mount attaches easily and places the prop in the right position. The engine is inverted and tipped slightly; this puts the carb opening just below the dummy engine cylinders. By the way, Balsa U.S.A. offers the dummy cylinder set as an option for $9.95. It's worth ordering a set with the kit.

One of the good things about the gasoline engines is the pump carb --- no fuel draw worries. Our 16 oz. tank ended up near the C.G. mounted on a layer of foam and held down with rubberbands. We used one of the chainsaw type clunk filters and ran the fill and vent lines out the bottom of the cowl. A Top Flite 20/6 prop completed the engine installation and pulls the Fly Baby very well.

Radio:

If you can't fit your radio in this one, it's probably time you updated the system. Actually, you can put the radio just about anywhere, the problem is keeping it there. You can't just stuff foam in and expect it to stay put. We built platforms for the Futaba receiver and a 1200 mA battery pack and then wrapped them in a lot of foam. Vibration is a radio killer and the big engines do wiggle a bit.

A total of seven servos were used, three heavy duty and four standards. The plans call for the elevators to be joined by a dowel but we chose to separate them and use one heavy servo on each surface. The rudder also has a big servo and fiberglass

to page 158

from page 155/35

pushrods are used on all the tail controls. To help prevent flexing we added a center support and used Du-Bro 4 x 40 pushrod ends. The throttle and ailerons all have one servo each. If you've been counting, the missing seventh servo has a micro-switch attached and is used as an ignition kill.

Flying:

The finished Fly Baby was a bit on the nose heavy side and took a shade over four ounces of lead in the tail to make it balance. This must be typical since the instructions tell you to leave the tail wheel support open so that lead can be added. The control throws were set as recommended but we did add differential in the ailerons --- more up than down. Differential aileron throw helps reduce the rudder coordination needed in turns, especially gentle ones like when you are setting up to land. With sixteen flying and landing wires it takes a while to get them adjusted, kind of like tuning a piano, but it's an important step.

We started the Quadra, made one more check of the wires and added power. The tail came up almost immediately and by the time we had about 3/4 throttle the Fly Baby was off and flying. Just a touch of rudder was needed to keep it straight on take-off. After a few minutes of gentle turns, it takes coordinated rudder and aileron to make a respectable turn, we tried some slow flight. Stalls are quite gentle — it just starts to mush and then sinks. Now that we knew what to expect it was time to land; beautiful --- it really looks great in setting up and slowly dropping on. Landings are best if you carry a little power until you have the field made.

Balsa U.S.A. cautions that the flying wires should be tightened after the first few flights, the wires are the only things keeping the wings on. Ours took three or four times before they stayed adjusted after a flight.

The Fly Baby is no aerobatic hot rod, but it will do all the basics. Loops, hammerheads, and slow rolls are nice but most of all it is just plain fun to watch it in the air.

Conclusion:

In the October 1982 issue of RCM we reviewed the biplane version of Balsa U.S.A.'s Fly Baby; now you can take your pick. They are both very well designed and we were very pleased with the overall quality. The Fly Baby

to page 160

FLY BABY

from page 158/35

would not be a good choice for a beginner, but it would be an excellent first giant scale airplane. It's not that it is hard to fly, in fact, it is one of the most forgiving airplanes we've flown. There are just some techniques in building that require a little experience to do it right. It took a while but we finally got over the worries about the flying wires, they actually make more sense than struts. Besides, you can hear them hum.

If you've been trying to decide about building a large scale model, hop off the fence and order a Fly Baby. The price is certainly right and so is the airplane. Don't forget to order the scale engine and Du-Bro big wheels.□

B-29

from page 34/32

details of the B-29 and the X-1A. But before I did that, I wanted to hear the full story of the mishap of the B-29 during the Mint Julep Fly-In at Rough River Falls. Much has been written, more has been said, and even more has been surmised by some self-appointed "experts" regarding that incident. I call it an incident, because it wasn't serious enough, when the facts are known, to be called an accident. Here are the facts, in answer to my question, "What really happened, Bob?"

"Well, Ken," Bob said slowly, "We took the B-29 down there just to fly it during a break in the show. They gave us permission, but what we didn't know --- and they didn't tell us --- was that there was a problem on 72.080 frequency. At that time, we're flying the B-29 with two transmitters, 75.640 for flight controls, and 72.080 for the engines.

"Shortly before this flight we had put heavier springs in the main gear, which dropped the nose a few degrees down. We started the take-off run, and I started to rotate the nose, as I usually do, just as it passed close by me. It didn't rotate, so I said to my co-pilot, 'Chop the throttles; we're not rotating.' He pulled the throttles back to idle, but nothing happened. 72.080 was completely blanked out. So now we had 135 pounds of airplane going down a 2000 foot runway and we couldn't stop it.

"I still had full control on my transmitter, the crowd was some 200 feet behind me, and the airplane was

ATTENTION R/C MODELER SUBSCRIBERS

If you're moving, want to write us about your subscription, or have missed an issue, fill out this form, attach your old mailing label and mail to RCM.

ATTACH YOUR MAILING LABEL OR PRINT YOUR OLD ADDRESS HERE

PRINT YOUR NEW ADDRESS HERE

Name _____

Street _____

City _____

State _____ Zip _____

R C MODELER MAGAZINE
P.O. Box 487, Sierra Madre, Calif. 91024

about 1500 feet in front of me and away from everybody."

I asked the obvious question. "Was it going **away** from the spectators?"

"Yes, absolutely," Bob replied. "I could not tell what was at the end of the runway, so I decided to turn off the runway and retract the gear; that would stop it. I had full control, but I didn't see the runway light --- it was too doggone far away. The plane hit the light, bent one gear back, and broke two props. The airplane spun around and stopped. There was no one anywhere near it.

"We went down and retrieved it with the truck, brought it back and left it in the truck. That's where we made a mistake, because only a few people saw it and could see the minor damage.

"I never thought this would involve all the hassle and all the writing that subsequently transpired. We endangered no one, we didn't 'demolish the plane' as several people said, but what really shocked me was that nobody called me to find out what really happened, except Bob Beckman from Model Aviation. The whole incident was blown completely out of proportion by people who didn't bother to get the facts."

"Tain't the first time, Bob," I observed. "Nor will it be the last. But at least we've set the record straight."

With that report out of the way, we got down to the details on the models. Bob told us the facts.

"The B-29 weighs 130 pounds, and the X-1A weighs five pounds. The four Kioritz engines are more than enough power to fly it. They are so reliable that all four are connected to one throttle stick, and now the B-29 is flown by one transmitter.

"Kraft Systems did a super job for us. They made a special radio that would eliminate any kind of noise that might occur from all the long extension leads that we have. The extensions come from a special PC board that has two 'nine block' plugs into which the servo leads are inserted. The receivers then plug into the PC board. We use eighteen servos, so the leads, which were 8' to 10' long, were made from heavier wire. They also made up a special battery pack --- four amp hours. The whole unit cost around $1800.00 --- and they put it on permanent loan to us. Isn't that great?"

"Sure is," I opined, "If 'permanent loan' means 'give'." And it does. Very generous of Kraft --- and good public relations.

Bob continued, "Buckeye Balsa donated about half the balsa and plywood, K & B donated the paint, and Aero Marine custom built the retracts for just the parts cost. They'd

RCM'S 1983 MONTHLY CONTEST

DO YOUR THING *with the* REAL THING MOCK TWO

This contest is for the most original/unusual modifications to the Real Thing Mock Two. Use your wildest imagination . . . and anything goes! ★ *YOU CAN WIN* ★

★ FIRST PRIZE ★

From Dremel, Division of Emerson Electric Co., 4915 Twenty First St., Racine, Wisconsin 53406:

A Dremel Delux Model 3801 Ball Bearing, Variable Speed Moto-Kit.

★ SECOND thru FIFTH PLACE ★

From House of Balsa, 20134 State Rd., Cerritos, California 90701:

A ZAP Package consisting of 6 different items (ZAP-A-GAP CA+, ZAP/CA, ZAP LOCK, ZIP KICKER, Z-7 DEBONDER, and Z-ENDS).

Entries to consist of color photo print (do not send slides) and written description detailing equipment used and modifications that were made.

Winners will be chosen each month for 12 months from entries postmarked between first day and last day of each month in 1983.

See R/C Modeler, November 1982, Plan #877, available from RCM Plans Service for $5.75.

RULES

Persons not eligible:

1. Members and employees of RCM or any other model airplane publication.
2. Members and direct or indirect employees of Dremel Manufacturing Co.
3. Members and employees of any manufacturer of hobby kits, hardware or supplies.
4. Anyone engaged in the wholesale or retail distribution of hobby kits, hardware or supplies as a major source of income.

General:

1. All contest entries must be addressed to RCM REAL THING CONTEST, R/C Modeler Magazine, P.O. Box 487, Sierra Madre, California 91024.
2. All photographs and materials submitted by the contestant will become the property of R/C Modeler Magazine and none will be acknowledged or returned.
3. This contest will be null and void in any state or locality where specifically prohibited by law.

cost about $1000.00 if you wanted to buy a set. In fact, you'd spend about $5000.00 to build this job, and that's at wholesale. Add labor, 650 hours at $20.00 an hour (less than half of what you pay for auto mechanics in San Francisco), and the model's worth about $25,000.00. And the movie people insured it for that amount."

"What is the general construction you followed?" I asked.

"The fuselage is 1/4" plywood formers, 1/4" x 3/8" balsa stringers, all covered with 3/32" balsa sheet, and 1/64" plywood over that. Wings and stab are foam, also covered with balsa and ply like the fuselage.

"It took some engineering to make a wing that's detachable, with an engine in the panel, but we figured a way."

"How about the X-1 and the X-1A?" I asked. "And how does the release sequence work?"

"They're pretty conventional construction, and flown by aileron and elevator only. Power is three Estes rockets, in series, in an aluminum tube. We got about a six second burn, and lots of smoke, which is what the movie people want."

"How do you ignite the rockets?"

"We have a mechanism using micro switches. One's on the release system. Until that is actuated, the rockets can't be fired. When it's released, the X-1 drops, then the second micro switch closes a circuit that fires the rockets. The X-1 pilot controls all this action."

It all sounds so logical, as Bob describes it. And it is. But when you get right down to it, a tremendous amount of thought, planning, skill, and plain old-fashioned hard work went into the building and flying of the B-29 model and the X-1 and X-1A rocket powered models. The flight that I witnessed was perfect. I hope that the flight they --- Bob and Art --- make for

to page 166

from page 162/32

the film is just as good, and that it will appear in the movie when it is finally released.

Because, in my opinion, Bob Campbell, Art Janson, and their B-29 and X-1 models, really have "The Right Stuff." □

GIVE IT A WHIRL

from page 30/28

plate, which was faced with a piece of glass to make it smooth.

The object of the exercise was for you to try and hold the ball in the center of the platform by proper movement of the cyclic control stick (hence, tilting the table). There is no doubt that doing this gave the operator a pretty good idea of the need for very small and anticipatory movements which you **must** make when flying (at least accurately flying!) a model helicopter. The problem arose when it seemed a little more difficult to "fly" this trainer than it was to fly the actual helicopter. The 1974 "RCM" article suggested ideas for reducing this difference, such as pre-spinning the ball, which then gave it more gyroscopic stability. This tended to oppose (or damp) the rolling of the ball and it also changed the nature of the friction of the ball on the glass plate. In my view one reason why this device lacks complete realism is because when the helicopter rotor blade system is tilted sideways to create the necessary sideways force (although somewhat analogous to a ball sliding down a slope), there is the additional factor of the increasing aerodynamic drag as the helicopter accelerates sideways. In addition, of course, there is the factor of the fuselage creating moments because of it pendulosity (or hanging inertia) below the main rotor blade system. So it's not easy to reproduce this somewhat complex mechanical system with a single simple one. Even though the differences between real life and the simulator may be small, the "feel" never seemed to be quite representative. Nevertheless, the training table does work, to a degree. It's easy and cheap to construct (or buy) and it could give you a lot of fun during the long winter evenings. In addition, if you are unable to control the ball of this simple trainer table, then it may be that you shouldn't attempt to take up flying the model helicopter. Your reaction time **could** be too slow for this particular task. I believe that "Tower Hobbies" offers a low cost and simple training table

similar to that described but I have not checked out their particular version.

Full Blown Simulation

In 1978, for the 1978 "MACS" show, I conceived the idea of trying to advance a step further with simulation of our R/C models by producing a miniature and captive "flying" helicopter model which would truly respond just as the real model would. One method of doing this is to have a small model helicopter freely moving in all of axis of motion by the appropriate servos and then to "program" the servo outputs so that the response of the helicopter to any given control input would be exactly similar to its response in real life. You can see what we created to do this. A 3 foot square table with X, Y axis movements of a small platform which could be driven to any position on the board by movements of servos in either of the two axis, pitch and roll. A vertical rod extended up from the platform and a model helicopter was mounted on top of this rod. The servos which drove the platform in either of the two axis of movement were "open loop"; that is to say their feedback potentiometers were removed. This meant that they would rotate freely and at an increasing speed in either direction, depending on the direction and amount of control which was applied. They, in fact, became "rate," not "position," servos.

In parallel with these control inputs, there were two small servos mounted in a plastic model helicopter which was fitted on top of the rod so that it could **tilt** realistically sideways and fore and aft at the same time as the signal was sent to the "open top" servos which moved the helicopter itself sideways and fore and aft. Obviously, too, the model could move to any place in the board by mixing fore, aft, and sideways controls, the same way as your model helicopter does. I never did get the up and down movement correct, although this was only a matter of time, but we did have a quite clever tail control. For this axis, I drove the vertical rod which supported the model with another "open loop" servo, but this time through a slipping magnetic clutch. Now, if the servo started to rotate, it would commence to drag the helicopter model around and increase its yaw movements at an increasing speed as the clutch drag created a larger and larger torque on the model. After you stopped the movement, the model would still overshoot as a real helicopter would and could only be stopped "dead" by applying opposite control. So, as far as tail control was concerned, the "simulator" was quite realistic. The next step was to

to page 171

GIVE IT A WHIRL

from page 167/28

program the responses of the platform servos through a computer so that the actual response of the helicopter in space would be exactly similar to our R/C model and **then** we would have had a real simulator.

Well, other tasks became priorties and time marched on so my simulator still sits up on the second story of my factory. Perhaps one day I'll get it out and try again or maybe some of you would like to work on germs of this idea and develop it further. It seemed to me that it wouldn't be a very economical device to produce for an individual modeler, but maybe a club project could be started which would make such a device available and useful to a group of people who want to learn to fly. Better be sure you have some mechanical engineers and some electronic and computer whiz kids in the group.

On the lines of the 1974 table top trainer, though, I did come up with an improvement to it — the addition of yaw control. I'll have a go at providing you with building notes for this updated version next month. The use of a table top trainer does help to establish whether you have fast enough reaction time to stand a chance of learning to fly an R/C helicopter and, second, since my version has yaw control, it will enable even the accomplished flier to practice "nose-in" and sideways on hovering without the need to take a chance of either committing heli-cide with his own model or badly scaring or hurting spectators around him. Even a "pilot walk around" can be practiced with this device so I'll have a go at showing details of it next month.

'Til then. □

from page 27/24

my 1/3 Scale Druine Turbulent, and they were quite successful — RCM published the design in last April's issue! The shape is basically the EDO float, the shallow Vee bottom works great, as you said it would! Subsequently I got interested in the Vought OS-2U Kingfisher when I saw a small (.35 powered, 48" span) model of it fly off the water (designed and built by Leo Mariani, of Ludlow, Massachusetts). You said the big main float with two tip floats was the best design, and I think it is, too. To make a long story short, I designed a 1/5 Scale Kingfisher (because I figured about a 7' span on floats is about right for a Quadra) and test-flew it on wheels in June, on floats in early September this year. Wing chord is over 21" at the root, tapering to 16" at the tip, for an area of 1470 sq. in. With a Quadra the weight on wheels is 20½ lbs. dry, and the model will loop and roll (as the big one probably did!). The main float is 63" long, the tips 16", and the floats add 4 lbs. to the overall weight. Performance on the water is really spectacular! The water rudder works very well at idle or medium speed. Take-off takes less than 75 yards on glassy water, and is very realistic . . . landings can be made with the engine back at idle, with sufficient airspeed. I haven't tried any aerobatics on floats and probably won't, but the model does nice climbing turns and has adequate power — the spray only gets on the wings and aft fuselage, so it's easy to keep the radio dry! I flew it at the Brimfield, Massachusetts, fall seaplane meet in September and everyone really enjoyed it, including an old former Navy pilot who flew the big Kingfishers years ago — he said the model performs just like the "real" one, on the water and in the air!

I'm just completing the final sheet of the plans, and they will be available along with complete instructions and many photos of the construction sequence, plus documentation photos of the OS-2U at the Smithsonian,

to page 178

SUNDAY FLIER

from page 176/24

within a month. I'll be happy to answer any questions from interested readers — this is one super seaplane!

Thanks again Ken. (Incidentally, I have a Servo Gard installed — cheap insurance against a battery failure!)

Sincere regards,
Doug MacBrien

You should see the color photos! What an absolutely beautiful model! Too bad we can't print them. But you can tell from the black and whites that it's a beauty!

So write me! The whole fraternity of Sunday fliers wants to know what you're doing. If you want a personal response, send along a self addressed, stamped envelope. I'll write you direct. If it is of general interest, I'll publish it.

As I said at the beginning of this column — "That's more like it!"

The Sunday fliers want to hear from you.

And I'll give them your message.□

MONGOOSE II

from page 63/57

..... align with fuselage and wing tips. Prior to installing permanently, check for correct incidence — "0" degrees. When you are happy with the alignment, tack in place with Hot Stuff. Now install the vertical stab in place and align. Make sure it is vertical and straight. Align by using wing tips as a reference. Tack in place with Hot Stuff. When you have double checked all alignment, final glue with Super-T, fill any large gaps with scrap balsa, baking soda, and Super-T.

Remove the wing and install the plywood wing fillets. Install the dorsal fin using Hot Stuff. Install the ventral fin with Hot Stuff. **Note:** the rear part of the ventral fin is basswood for fitting the tail wheel assembly; rub with baking soda before Hot Stuffing. All that remains is to make your fillets on the wing and tail assembly. To keep the tail light we recommend you fill in on the stab and fin bases with some scrap triangle balsa; Hot Stuff in place before applying fillets. We use Sears filled epoxy for our fillets. It is already mixed with a filler but we add a lot of micro-balloons to it to make it lighter yet. Keep smoothing fillets with a wet finger until you are happy with contour.

Cover the top of the wing center section with a plastic wrap, hold in

place with masking tape. Reinstall the wing on the fuselage and hold in place with wing bolts. Using Sears filled epoxy and micro-balloons, build up the wing fillets. Here, again, you can fill some of the area with balsa before you apply the fillet. Just build up your wing fillets using the base as a guide for size. Allow to dry overnight before removing wing. Install the wing on the fuselage, put plastic wrap between leading edge and fuselage. We now are going to build up the wing bottom fillet to the contour of the fuselage. You should have left the wing bushings long in front. One at a time cut these down to proper length — we cut them down to about 1/4" below the fuselage contour. Then take a small plastic bottle — a little bigger diameter than the head of your wing bolts — drill a 1/4" hole in the center bottom of the bottle. Put the wing bolt through the hole in the bottom so the head is inside the bottle, install screw back on wing. What you are going to end up with is the heads of the two forward wing bolts will be recessed into the fillet. We have found a product called Evercoat Formula 27 plastic filler (it is a putty type of resin available at most hardware stores) works great to make this fillet. Use cardboard and tape to form your mold and fill and contour. When dry, sand to shape. Cover the wing with MonoKote.

We use the Wing Mfg. Sport Canopy with insert for the Mongoose because its lines blend well to the design, and it is a fine canopy. Mark the position of the canopy on the fuselage, install insert on fuselage. If you want detail, your cockpit before this time. We use the instrument panel provided with the canopy, painting the inside with a black krinkle paint, with an appropriate sized pilot epoxied in place. We also tinted our canopy with a blue dye (follow instructions with canopy). After insert is glued in place, cut and trim the canopy edge to fit the contour of the fuselage. Note canopy extends over dorsal fin. Hot Stuff, sparingly, around canopy edge. Bob Hunter at Hot Stuff told us how to keep the canopy from fogging when using Hot Stuff, and it works. Just wipe a light film of 3-in-1 oil around the inside of the canopy bottom before Hot Stuffing. And if it should fog on the outside, wipe right away with 3-in-1 oil. Using Sears filled epoxy and micro-balloons, build a fillet around the canopy. If you take your time and smooth the epoxy with a wet finger, you should have very little sanding when finished.

Install a very, very small fillet along the dorsal and ventral fins, just enough to cover glue line, no bigger. Using appropriate sized wire, noted on

drawing, make your landing gears. You will note the main gear is left long so you can install the wheel pants. Pants are not necessary but you will find they really finish it off and make it look great. Note how the tailwheel is installed, using a 1/8" I.D. brass tube for bushing in the fin. By using an Allied Hobbies steering reduction arm at the rudder servo (see photo) and a separate pushrod to the tailwheel, then you can set the throw of the wheel for what you need and no more. This arrangement makes for very good ground handling since the rudder may deflect full and the tailwheel only moves a small amount.

Install the rudder and elevators and make sure they deflect okay before gluing. When you install the control horn on the rudder you will find that a ball link works best, due to the angles involved with rudder deflection. The way we install our ball link is to use one that threads onto a 4-40 bolt. Take a bolt of appropriate length and cut off the head. Now find a scrap piece of thin aluminum and cut two 3/8" square pieces. Drill correct size hole in the center of each for the 4-40 bolt. Place one piece of aluminum on each side of the rudder, thread a nut onto the bolt and push through aluminum plate and rudder and other plate on other side; now secure with a nut. Now thread the ball link on the end of the bolt. After you have adjusted the bolt length for correct rudder throw, put a drop of Hot Stuff on the nuts. Be sure to keep all surface hinge gaps to a minimum. We use Rocket City Super-Flex nylon hinges on all our control surfaces, Hot Stuffed in place.

Fabricate your pushrods for rudder, elevator and tailwheel steering. We use 3/8" wood dowels. We do not recommend the use of fiberglass pushrods, since the fuselage is wood, and the expansion rate of fiberglass and wood is different, thus your plane could change trim with weather

changes. The rudder and tailwheel pushrods are just straight with the appropriate length of threaded rod on one end and just rod on the other. We make adjustment only at the surface and not at the servo. The elevator is single wire one end and a V rod connection the other, the elevator is split and adjustable separately. The way we make our pushrod exits is to cut a hole in the fuselage at the proper location, then we put a short piece of Ny-Rod, outer piece in hole and adjust for correct angle; hold in place with Super-T. Then build a streamlined fillet around the exit. This makes for a good exit and cuts down rod flex.

Install the servo rails and the steering reduction arm for the tailwheel. Check the radio and servo fit and make sure all pushrods fit properly and move freely. Before your final radio installation you may want to make sure your radio and servos are all set up properly. As with any plane, servo centers and travel are very important. A good instrument for checking your radio as well as your engine is the H & N Electronics Ack-U-Tach/Pulse. With this one dual purpose instrument you can check your radio pulses, check servo for center, travel and linearity, and check engine rpm. The unit uses a 4 digit, digital readout for rpm and pulse readouts.

Be sure to check engine and muffler fit before painting, in case you need to fit muffler into fuselage side. Finish sand, prime and paint with K & B Super Poxy. Be sure to coat the engine compartment with a good sealer before painting.

Set-Up and Flying:

Before you even taxi once, take some extra time and check all the surface throws and C.G. and balance. We suggest you start with the following surface throws: Elevator 1/2" up and 5/8" down; rudder 1" both sides; ailerons 1/4" up and 5/16" down.

You will note we use differential ailerons and elevators, we believe this is necessary for smooth flying. If you should find these throws are too little or too much, change them after flying a few times, but you should find these are enough.

Double check your C.G. and balance and make sure you don't have a heavy wing tip; if so, epoxy a nail in the opposite wing tip to balance. You should have no surprises as far as flying the Mongoose. If you haven't flown a taildragger, spend some time just taxiing and making speed ground runs before that first take-off. Take-offs are no problem, you will find the plane just lifts off when it reaches flying speed. After some practice you may want to show your skill and get the tail up before take-off. We will not go into any details about trimming your Mongoose since a lot of good articles have been written about the subject. If you don't know how to trim your Mongoose we suggest you consult someone who knows, or get a good book on the subject, since trim is all important to having a ship that flies great and not just flies.

Enjoy your Mongoose and safe flying. □

LFX-5

from page 14

. . . . . former of 1/8" plywood that was not shown on the plan sheet or mentioned in the instructions. We installed it at an angle behind the wing, because that was where it seemed to fit best! The wing center section fixed trailing edge section (between the ailerons) was missing from our kit. We cut substitute pieces from sheet balsa, to match the supplied balsa ailerons.

The LFX-5 comes with pre-bent fixed main landing gear legs and all necessary installation blocks, retainer straps and screws. A nylon nose gear mounting bracket is supplied, although a nose gear landing gear leg is not. We elected to install IM (Circus Circus) mechanical retracts in our LFX-5 so the omission of a fixed nose gear leg did not present a problem.

Also included in the LFX-5 accessory package are all necessary hinges, nylon bolts, aileron torque rods, with brass tubing bushings control horns and screws, and fiberglass cloth for reinforcing. The aileron torque rod assemblies that were supplied in the kit were too short if the strip ailerons are cut to the length as shown on the plan sheet.

Engine & Radio:

For a power source we selected a new OPS (#830) .60 super rear exhaust Schnuerle engine, which was equipped with a matching OPS tuned pipe. A Sullivan 16 ounce fuel tank was installed, along with an Airtronics championship series radio system, which features easily adjustable control surface travel throws, dual rates, servo reversing, and mixing.

Covering:

We covered the wings and horizontal tail surfaces of our LFX-5 with Top Flite EconoKote heat shrinkable film covering in order to keep the overall finished weight to a minimum. The fuselage and vertical fin/rudder assembly were finished with K & B Superpoxy primer and enamels. Carl Goldberg Jet glue and Hobbypoxy Formula II epoxy we used in assembling our LFX-5. Our ready to fly LFX-5 (less fuel) weighed 7 pounds, 14 ounces.

Flying:

Our LFX-5 was test flown under ideal autumn conditions. The weather was clear, with a 50° temperature and a mild wind of approximately 10 mph. After conducting the customary radio system check and adjusting the engine in order to achieve a slightly rich full speed setting and a reliable idle, the fuel tank was topped off in preparation of the LFX-5's maiden flight. The OPS was restarted and the LFX headed into the wind.

Full throttle was applied and the only problem that we encountered with our LFX-5 immediately appeared. The LFX-5 is obviously designed for hard surface take-offs. The plan sheet shows a minimal amount of prop arc clearance. We extended the retractable landing gear units as far as possible in order to obtain the maximum amount of clearance, as we were to do our flying from grass fields. The main gear legs in the wing can be built-in to any desired length. The nose gear was the problem, as the bulkhead which accommodates the wing dowels has to be positioned just in front of the wing saddle. The engine firewall (even with the engine as far back as possible on the metal mount) did not allow sufficient space to extend the nose gear to the length that we had hoped for. We were using 11" diameter props.

The only way we were able to become airborne was with a full throttle, push type assist. The prop would cut a swath in the grass for 15 to 20 feet before sufficient speed was obtained in order to lift the nose and become airborne.

The builder of an LFX-5 who intends to fly off of grass fields would be well-advised to select an engine mount such as a Fox, which has a relatively thin firewall mounting face plate. The engine should then be placed on the mount as far back as possible. The retractable nose gear unit should be mounted as low as possible within the nose gear wall.

Other than this one problem, the LFX-5 proved to be a delight.

The LFX-5 climbed out smoothly with only a slight amount of right aileron trim being necessary. After several minutes of simply "feeling this aircraft out" and dabbling with the aileron and elevator dual rates, trims, etc., we felt completely at ease with

to page 187

from page 182/14

our test aircraft. The LFX-5 is a very smooth flying aircraft!

Conclusion:

In the hands of a capable pilot, the LFX-5 offers contest winning performance. As with any proven pattern aircraft design, just how well it performs is directly proportional to how well it is built, trimmed, and flown. What we are trying to say is that the LFX-5 is a well-engineered competition pattern design that possesses all the necessary ingredients to be a winner! Even if the LFX-5 were to be built and flown strictly for sport pattern purposes, the prospective buyer of this kit can expect a fine flying aircraft with no apparent bad inflight tendencies. It deserves the serious consideration of any RC'er who is in the market for a new .60 size pattern aircraft. The kit quality is good. The LFX-5 's only serious flaw is its error-marred and very basic plan sheet and incomplete written instructions. These deficiencies could easily be corrected by the manufacturer. If pattern flying (for sport or trophies) is your thing — the LFX-5 merits a look! *(Editor's Note: At this writing, there is a new and improved LFX-6. This aircraft is winning many contests and is now available as of January 1983.)* □

POWER BOATING

from page 13/11

and may cause headaches on your sport hulls. The motor will be harder to start and tune until you are very familiar with its running characteristics. **But** if you really want your outrigger to go fast try these modifications. By the way, remember that your engine warranty will not be any good if you do choose to modify your motor.

★

Dear Howard:

Here are a few ideas that might make model boating more fun.

(1) Make sure that the boat you drive is fun to drive and not a missile looking for a target. A boat that finishes four heats in any position is a boat that has potential. Anybody can go upside down in the first turn; it takes a driver to finish a race right side up. When you become a driver, it's only a short time before you can become a good driver,

to page 189

CONTEST ANNOUNCEMENTS

ELKHART COUNTY FLIGHT MASTERS R.C. CLUB

9TH ANNUAL R/C MODEL SHOW

March 12, 13, 1983. Concord Mall, U.S. 33 South, Elkhart, Indiana.

For further info, contact: Larry E. Miller, 56657 Brightwood Blvd., Elkhart, Indiana 46516, phone 293-7974; or Marty King, 56632 Boss Blvd., Elkhart, Indiana 46516, phone 293-4358.

WESTERVILLE (OHIO) MODEL AERONAUTICS ASSOC.

ANNUAL HOBBY SHOW

March 19, 1983. 3850 Stelzer Rd., Columbus, Ohio.

For further info, contact: Show Manager, Rich Ritchison, 1834 E. Beaumont Rd., Columbus, Ohio 43224.

PASADENA SOARING SOCIETY

THERMAL R/C SOARING EVENT

March 19, 20, 1983. Pasadena Rose Bowl, Pasadena, California.

For further info, contact: Jean Rondot, C.D., 2623 Honolulu Ave., Montrose, California 91020. (213) 248-1451.

THERMAL G THROTTLERS OF ERIE, PENNSYLVANIA

3RD ANNUAL MODEL SHOW

April 16, 1983. Millcreek Mall.

For further info, contact: Ed Wolf, P.O. Box 3306, Erie, Pennsylvania 16508.

SOUTHERN INDIANA R/C MODELERS, INC.

MINT JULEP SCALE MEET

April 23, 24, 1983. Rough River Dam State Resort Park, Falls of Rough, Ky.

For further info, contact: John R. Guenther, C.D., R.R. 1, Box 715, Borden, Indiana 47106. Phone (812) 967-2814.

If your club is planning a show or contest, fill out this form and we will publicize the event, space permitting.

Name of Club: _____

Type of Event: _____

Date of Event: _____ AMA Sanction #: _____

Location: _____

For further information, contact: (name, address, phone no.): _____

POWER BOATING

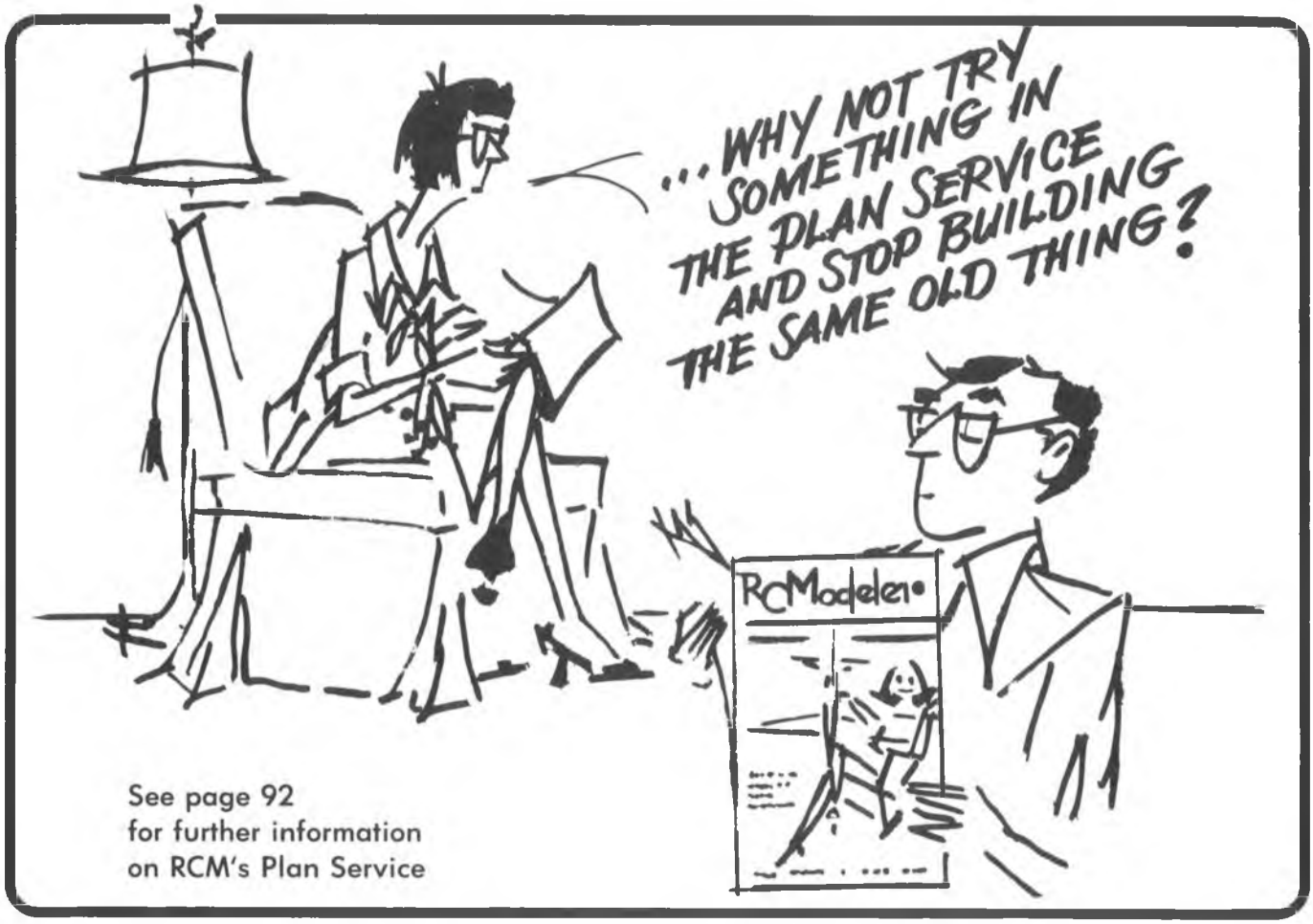
from page 187/11

and a few good drivers become great drivers. Take some extra time and make sure your boat is reliable. Too much speed will keep you a rookie for a long time.

(2) All great drivers have great pit men (or women). Your pit man is the single most important asset in your racing career. Without a good pit man, your chances of having a good year are very low. Just a few things a pit man can do for you are: help repair your boat, keep you from forgetting things, help move boat and gear to and from the pit area, get you off the beach on time, lead you to a perfect start, keep you away from boats dead in the water, help you pass or be passed safely, kick you in the butt when you do something stupid, and shake your hand after a good run. When you choose a pit man, it's best to get a veteran boater who knows the game or have your pit man get instructions from a veteran racer. No District or National Champion has ever done it alone.

(3) Small things really mean a lot in model boat racing. Let's look at a few things that most boaters never think about. How about the number on your back and on your boat. Some boaters have said that it is stupid. Well, look at it this way. It's your license number. No one in NAMBA has that same number, just you. There is a reason for that number other than for the insurance company. It identifies you and your boat to the Contest Director and the judges. Many wrong calls have been made because of the lack of identification. When you are driving your boat, a judge can follow your eyes and know which boat is yours. With a legible number on your back the judge knows who you are. A legible number will get you your ribbons faster and your points properly scored. That number on your boat helps the pit boss put you in the correct area with a minimum of confusion and also it makes your boat look faster! The world's greatest athletes wear numbers.

(4) Another small item that is overlooked is a driver who unnecessarily scratches a boat from racing in the later heats. Some drivers think it is macho to scratch after a couple of bad rounds. Others let their tempers win the last heat or two. What really happens is that when you scratch, you unbalance the heats and some drivers may get a free ride.



See page 92
for further information
on RCM's Plan Service

Everyone hates one or two boat races and many of them are caused by the boater who unnecessarily quits before the day's racing is over. Anything can happen in model boating, keep on racing. It looks good for the spectators and, let's face it, ***you need the practice.***

(5) A couple of small safety rules that are usually broken during the year with ever increasing regularity are: running with the retrieve boat in the water and not wearing the proper shoes. The major insurance claims in the recent past has been because a boater violates those simple rules. Repairing boats is cheap and simple, repairing people should not be necessary. Please play by the rules. Safety is not really an accident!

Model boating is fun --- tell a friend.

Another Boater

★

Well, that about does it for another month. Send your questions, comments and great ideas, etc., to the address at the end of this column. If you desire an answer before magazine publication, enclose a self-addressed stamped envelope so I may answer your letter by return mail. Howard Power, Hobbies Unlimited, 766 Broadway, Seaside, California 93955. Phone (408) 394-1200. □

CUNNINGHAM ON R/C

from page 6

You really don't need more than a four channel radio to get started, but I recommend that you do not go less than a four channel rig. Sure, you can save some money with a three channel, but heck, let the good times roll, and invest in a minimum of four channels. These channels control the elevator (up and down) the rudder (right and left), the ailerons (up and down) and the throttle (high and low).

to page 192

from page 190/6

Some equipment can be purchased with dual rate switches. If your budget will stand it, go ahead and get this set-up. There will come a time when even the sport flier can use the added servo movement. Resist the impulse to get a radio set that is covered with all kinds of levers and switches. You don't need them at an early stage, and often the extra switches can create trouble when passing the transmitter from instructor to student.

The stick configuration that you purchase is up to you. Some transmitters have the elevator and aileron control on the right stick, while some transmitters have the elevator control on the left stick, and the aileron control on the right stick. It really depends upon what is used most in your area. You need help to learn to fly, and if you buy a stick set-up that is contrary to that which is most used in your area, you're going to have a tough time finding an instructor to help. Most people in the U.S. use the transmitter with both primary controls on the right stick (mode II).

In basic Time and Motion study, you learn, that the simplest forms of movement are the easiest. Finger movement is the easiest to do, followed by the wrist and forearm, followed by the entire arm, followed by the upper body and, finally, followed by moving the entire body. The most delicate movement (and the least tiring that the human body makes) is moving the fingers to get the job done. So it is with our transmitters. The tip of the thumb or, in some cases, the tips of the thumb and finger, is all that is necessary to control the flight of the aircraft. Most flying is done with the stick movement limited to about 1/8" in each direction. Sure, I know that the control stick can move one heck of a lot in its housing, and there are times when you need all of this movement, but not in normal flying. When you are driving a car you don't turn the steering wheel all the way to the left, then all the way to the right to get the car to change directions. Just a little bit of movement will translate from the steering wheel to the wheels, giving you a smooth ride. The same is true of the transmitter control stick. Learn to make gentle movements, not to bang the control stick from side to side. "Gently," that's the key word in flying.

Okay, you've been playing with that transmitter stick long enough — now, what does the control stick have to do

with the moving surface, and what does that surface movement do to the aircraft? For our purpose, let's assume that you have a working radio correctly installed in an aircraft and that everything is ready to fly. Turn on both the transmitter and aircraft switches and take a look at the transmitter. Check to see that the trim levers are centered. Now, take a look at the aircraft. Look at the elevator. With the control stick at the neutral position, the moving portion (elevator) of that aft surface (horizontal stabilizer) should be at neutral (level with the stab). Now, moving the elevator stick back toward your tummy should move the elevator to the up position. What does this do to the flight of the aircraft? Actually, by moving the stick back and lifting the elevator surface up, the air forces the tail of the aircraft down, and the engine (if it has enough power) pulls the aircraft upwards away from the earth. If you continue to hold full up, the aircraft will come over in a loop, and keep on looping until you have released the up elevator.

Most aircraft that are flight ready are "trimmed" to fly straight and level. A change in control surface upsets this straight and level flight pattern. A "trainer aircraft" will resume straight and level flight once this control surface change has been removed. Unfortunately, this is not really the case with most trainer type aircraft since most of these aircraft have been designed for the second stage of the learning curve, learning to fly once you have soloed. But, again, let's "assume" that our aircraft returns to level flight. If you push the control stick away from you, you have imparted a "down" signal to the elevator. In fact, you have moved the elevator down, causing the air to push up on the elevator, forcing the nose to go down; and, in turn, the aircraft engine, added to the already strong pull of gravity, pulls the aircraft rapidly to the earth. When learning to fly, avoid using down elevator like the plague. Down can get you into lots of trouble very quickly.

Move the control stick to the left. Watch the ailerons. If they are correctly hooked up you will find that the aileron on the left wing has gone up, while the aileron on the right wing has gone down. The aircraft will rotate on its axis to go into a left bank. What really happened? The left wing aileron, by deflecting up, caused the air to push the left wing down, while the right aileron deflecting downward caused the air to push the right wing up. This opposite reaction caused the aircraft to roll about its primary axis.

How about that rudder stick? When you move it to the right, the rudder

swings to the right. This movement causes the air to push the tail of the aircraft to the left, the nose swings right, the aircraft makes a yaw to the right. Same in reverse. Unfortunately, all is not easy. It takes a coordinated effort on the part of all surfaces to make the aircraft fly in a normal manner. As an example, to make a left turn, lift the nose gently with the elevator, ease into a slight left bank by moving the control stick gently left. The action of the two surfaces working together will bring the aircraft around in a gentle banking turn. Almost all trainers fly just perfectly with inputs of only aileron and elevator. Many will fly the same with inputs of rudder and elevator. Once you have mastered flying with aileron/elevator you should take the time to practice flying with the rudder/elevator set-up, no matter what type of stick box you are flying. One of the easiest dumb things to do is to forget to hook up the ailerons. If you have learned to fly either way you can use the rudder automatically and save your aircraft.

The important thing to consider is that you need to make all control movements gently. A brain surgeon doesn't take a baseball bat and bash in the head of a patient to get at the problem, so why should an embryo pilot think that he should go bashing the aircraft all over the sky.

★

'Nuff for the rank beginner — now some thoughts for those of you who have been at this game for some time, and have some questions about what and why. Let's take a look at a couple of interesting whats and whys.

Thrust line location and angles seem to bother a lot of fliers, probably more so than it needs to. As you know, the thrust line is the line that is extended straight through the engine shaft and out the back end of the aircraft. Aeronautical engineers can go into all of the wordy business about gyroscopic action, "P" factor and all of this, about where the prop wash strikes the aircraft, and why it does this and that. But, for you and me, let's just consider what changing thrust lines on a model generally does to the flight path of that model.

Most modern pattern ships generally have a zero-zero-zero thrust, wing and tail set-up. In other words, the aircraft's engine, wing chord and stab chord, all are in parallel lines. Most modern pattern aircraft fly at about 120 mph and do their maneuvers by the use of lots of engine power. Beautiful to watch, but most of us are not pattern fliers. Most of us want an aircraft that takes off of the ground easily, climbs nicely, flies about the sky beautifully, does an

occasional loop and roll, will fly upside down (inverted), roll out nicely and then come home for a nice controlled landing. Landings need not be a controlled lunge at the ground. Landings should be the same as seen on a full size aircraft — a gentle (there's that word again) contact with the ground. Landings should be made with the main landing gear touching down first, then a rotation onto the nose gear after speed has dissipated somewhat. A tail dragger should land on its main wheels first, then touch down the tail wheel. The much desired three point landing can be learned provided that the aircraft will allow you this courtesy. But we're talking about thrust lines --- what has all of this to do with landings? Lots. It has quite a bit to do with taking off and flying also.

Generally speaking, for most sport aircraft, a moderate dose of down thrust is a must. An aircraft with a flat bottom wing (thus generating high "lift") will balloon up into the sky when power is applied. Large amounts of down thrust will counteract this ballooning and help to hold the nose of the aircraft down. As the engine speed is decreased, the speed of the aircraft slows down, and the lift generated by the wing decreases. All factors are working together as the engine is not pulling the nose down as much when it is running slower.

I have seen many of the so-called "ready to fly" trainers that have ignored this vital thrust set-up. The result is an aircraft that will leap into the sky on take-off, climb for the heavens while the engine is running, then head for the ground at too rapid a rate when the engine quits. Yes, the aircraft is "flying," but the pilot doesn't have "control" of this aircraft. If you have one of this type of aircraft, and are having a hard time controlling it, add a goodly bunch of down thrust to the engine. Do this by cutting hardwood shims and placing them under the engine beam mounts. Don't be afraid of putting in too much. Block up the aft lug of the engine at least 1/8" above the front lug. Give this a try, and if this isn't enough, add some more.

Suppose that you have an aircraft that flies pretty well, but when you chop throttle to land it just keeps on coming, doesn't really slow up much and has to land at speeds that seem way above normal. A bit of down thrust will help correct this also. Consider that the engine is pulling the nose to the ground, but the wing is lifting. Add a bit of up elevator, and the wing lifts just a bit more, yet the engine is still pulling toward the ground. By balancing the power

to page 198

When writing to RCM for answers to your questions, please send a self addressed stamped envelope for a prompt rely.

from page 195/6

setting with the elevator up input, the aircraft can assume a slightly nose high approach to the landing area, dumping off speed as it comes in for a landing, with a resulting soft touch down. Don't overdo the up elevator, because you can stall out the aircraft and dump the whole darn thing into the ground. If you have an aircraft that is a problem, add a bit of down thrust.

Take another example. When flying, with no trim changes, the application of power causes a violent movement upward, while a reduction of power causes a violent downward movement. Power application should make the aircraft move faster, while a decrease of power should allow the aircraft to slow down, but not drop the nose drastically. More downthrust will cure this. What is happening is that the wing, probably sitting at a positive angle to the horizontal stab (more on this next time), increases its lifting ability when the speed of the engine builds up. Then, with a fall off of engine speed, the weight of the aircraft rapidly swings the nose down and the wing moves past the positive level. Everything happens at once. Cram the throttle on high, and up she goes again. If you have this problem, add some down thrust. You may have to retrim the elevator setting just a bit, as quite probably you had been adding large amounts of down elevator trim to counteract the upward zoom of the aircraft. This down elevator trim also caused the snoot of the aircraft to drop rapidly as power is removed.

How about thrust adjustments to the side? Most aircraft with a high drag set-up, like bipes and "dirty" old time type aircraft, need some side thrust to counteract the natural tendency of the propeller to pull the aircraft to the left. So, when in doubt, add right thrust. Just a degree or two will help. Remember, the faster that an aircraft flies, the less thrust offsets it will need and, also, the less control surface movement it will need. If you're flying a slow aircraft, don't be afraid to set up the control surfaces with a goodly amount of movement. Remember, you're going to move the control stick gently, but when you need more movement, such as up elevator on landing, that control stick can be pulled back all of the way. Aileron movement needs to be restricted until you have seen just

to page 200

CUNNINGHAM ON R/C

from page 198/6

what is needed to move the aircraft in its flight path.

I am currently working on a new design based upon the OS .60 4-stroke engine. I know that it will fly pretty slow, therefore, I want large control surfaces with lots of movement if needed. Of course, this aircraft can also be flown with a normal .60 glo engine. But I want something that looks kinda old time, will fly gently, yet take full advantage of the fun things of the 4-stroke type engines, the lack of noise, the ability to swing a larger prop, and the economy of fuel consumption. This aircraft is designed in the parameters that I have been discussing above. I should have it done in time to report on it next month. In future installments we will go into some of the other problems that worry both the newcomer and the more seasoned flier alike.

It is time to remind you that those of you who live in the Southwest should mark you calendar for July 16 and 17, 1983, as the dates of the Sixth Annual Southwestern Jumbo Fly-In, to be held at Thunderbird field, just west of Fort Worth, Texas. This is the fly-in for large aircraft of all types. The only size requirement is that a monoplane must have a wingspan of at least 84" while a bipe must have a span of at least 60". Engine power is up to you. This year should be even better than the past five. Time now to get your big project moving. Don't forget to send pictures of your models that have been built from modified kits or scratch-built, or ones that are unusual. Remember the pictures must be in black and white, and not the polaroid type. See ya next month. ☐

FROM THE SHOP

from page 4

..... concern for the modelers and try to monitor the advertising in RCM as closely as possible. Even if we suspect that something may not be honest, we can do nothing without absolute proof and proof is only available after a wrongful act has been perpetrated. Just keep the faith and be careful.

★

In line with the above, would you believe that you can get something absolutely free from the good ole U.S. Government? Just write a note to Public Documents Distribution Center, Pueblo, Colorado 81009, and ask for Consumer Information Catalog and Mail Order Rights 616K. The booklet is most informative and just reading the titles of other available booklets listed in the catalog makes the exercise worthwhile.

Society of Antique Modelers (SAM)

We received a letter from John Pond, Sec./Treas. of SAM and he was reminding us to pay our membership dues. A check was promptly dispatched to take care of the matter. This episode prompted us to make an appeal to our readers who have an interest in the early days (golden era?) of modeling to support SAM. The newsletter is worth the annual dues of $10.00. Some of us ancient modelers enjoy a smile of satisfaction when we hear of the pleasure someone gets when he discovers R/C Old Timers. Why not send in the ten buck for your membership? Make it out to Society of Antique Modelers, 4269 Sayoko Circle, San Jose, California 95136.

★

Hurry up with your new models, the flying season is not far away. See you at the field. □