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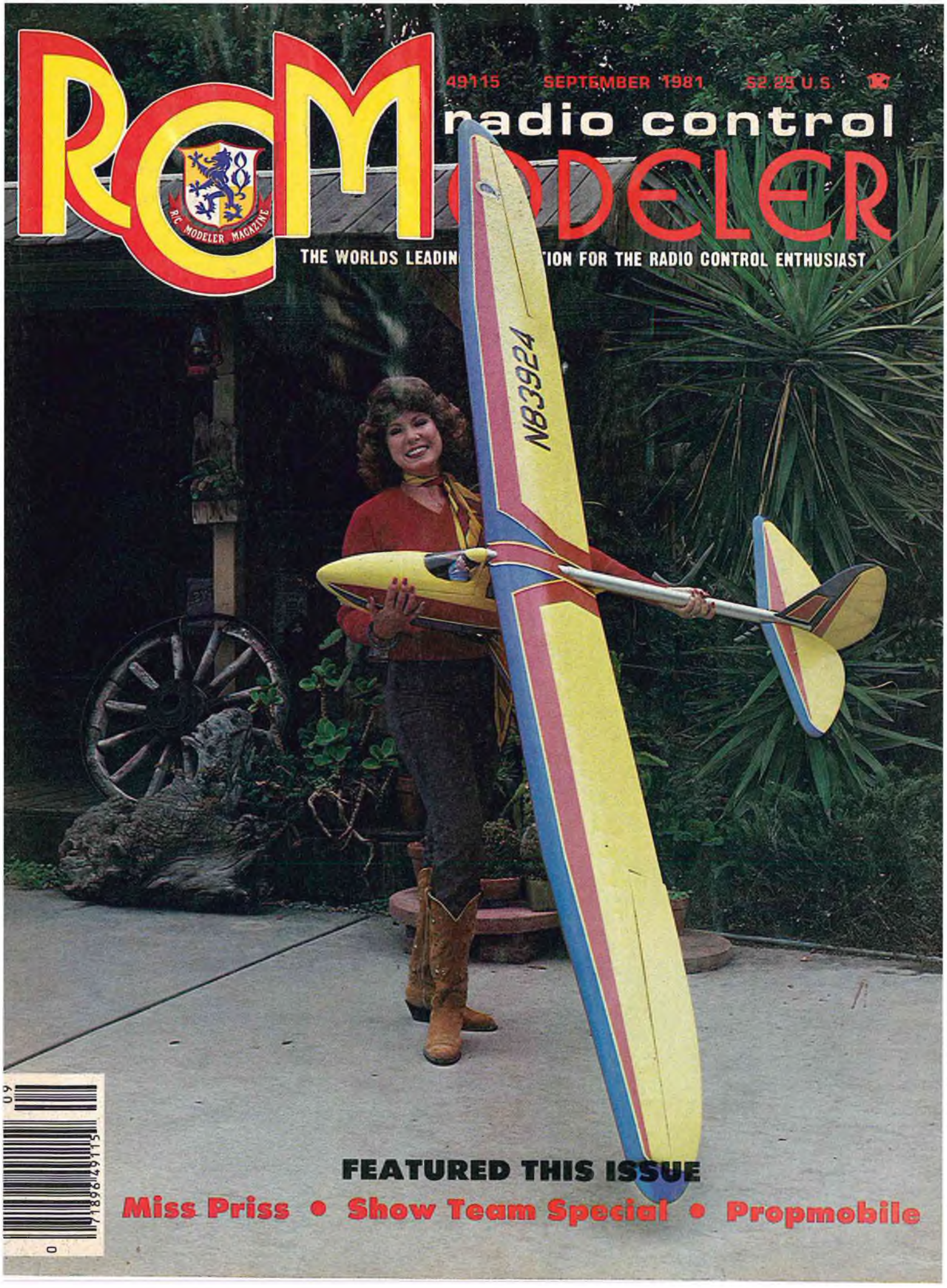
RCM radio control MODELER

THE WORLDS LEADIN[illegible]TION FOR THE RADIO CONTROL ENTHUSIAST



FEATURED THIS ISSUE

Miss Priss • Show Team Special • Propmobile

VOLUME 18 NUMBER 9 USPS 509190 ISSN 0033-6866 SEPTEMBER 1981

RCM MODELER

This Month's Cover

Features talented and appealing Ruthie Dyche displaying Warren Watson's 1/4 Scale Bowlus "Baby" Albatross. Wing span is 11 feet 3 inches, and the aluminum tube measures 3 feet in length. Ektachrome transparency by Warren Watson. See page 87 for more info.

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FROM THE SHOP

Don Dewey

Recently, during one of our staff meetings, we were knocking around the cost of doing business, budgets, and other unpleasant subjects necessary to publish our product. The worst aspect is inflation. Coincidentally, on that same day, we received a letter from Steve Halvorson, Doraville, Georgia, on the subject with an analysis and solution for combating inflation. The following letter speaks for itself:

Dear Don:

If you have had occasion in the past year or so to read the newspaper, or have had some spare time to watch the TV newscasts (while waiting for the glue on the latest model to dry) you would have become aware that the number one problem being discussed is the United States economy. More specifically, inflation is going up faster than an out of trim Quicky 500. There is major disagreement as to what is causing the inflation spiral and, likewise, there is a lot of controversy on how to cure the problem.

Now I am not an economist, but it does not take too much smarts to figure out what is going on in the United States of America. All you need to do is apply a little commonsense, use some logic, and you can identify the problem — and the cause!

***What is inflation?** Inflation is when you go to the hobby shop and it costs you more to buy the balsa or glue, or whatever, than it did the last time you bought the same item. My experience over the past two years indicates we are experiencing an annual inflation rate of 20%, i.e., balsa costing 35¢ in 1979 today cost me 50¢. Therefore, I must disagree with the giants in Washington, D.C. who claim inflation is in the 9% to 11% annualized range. If you believe their numbers you must also believe in the tooth fairy; in which case I would like to talk with you about a bridge I own in Brooklyn.*

***What causes inflation?** All the experts disagree on exactly who, or what causes inflation, but they generally blame: OPEC; Deficit spending by U.S. Government; Federal Reserve Board's manipulation of the money supply; High interest rates.*

And only a few voices in the wilderness blame inflation on the true cause --- declining productivity!

*Now that we have identified the problem — **Inflation** — and isolated the singular cause --- **Productivity** --- should be able to determine why there is a problem facing this great nation of ours.*

***What is productivity?** To use terminology that both you and I can understand, productivity is when the quantity and quality of work produced by an individual employee increases at a rate equal to, or greater than, his/her wages are increased! Let me state it another way, for this is a very important point that must be completely understood before we proceed with our analysis of the American economy. The boss would like to get more (not less) work from us when he grudgingly gives us a token increase in wages, an increase which is always much less than the current inflation rate of 20% (per my study).*

To recap the problem, an employee does less work, gets more money for doing it so the boss has to raise prices — then the vicious circle starts over again and the nation is now in an inflationary spiral which is comparable to getting your scale R/C aircraft in a flat spin with an inoperative elevator. You don't like it but there is not a lot you can do about the problem.

Loss of productivity does not have an immediate impact on inflation, but leads by about 3 or 4 years. The productivity in America started to slip in the early 1970s and inflation became a buzz word in 1975/76, and has continued to present time. So, all we need to do is determine what course of events took place in the early '70s to cause the drop in productivity!

Momentarily let's forget about the economy, which is a painful topic, and talk about our hobby of radio control. Are you aware that the greatest technological improvement known to mankind has taken place in R/C and it started in the early '70s?

Digital radio was introduced replacing the unreliable antiquated earlier devices!

Iron-on covering became common; good-bye to silk/dope and the vast amount of time!

Model magazines were expanded to provide more coverage along with a lot of advertisements!

Kits became more plentiful with a more varied selection to choose from and build. Then we got into foam, fiberglass fuselages, ARF kits!

Reliability of engines improved and cost decreased as the overseas manufacturers flooded the American market!

New glues (Alpha-Cyanoacrylate), accessories, tools, hardware, and building material became readily available. Building was much faster.

The number of hobby shops and mail order houses tripled in a few years. Credit cards eased the purchasing pain as we could spend money we did not have.

This technology explosion is still underway, the new generation of radios are priced lower than ever and yet have more bells and whistles than in the past. We have the Quarter Scale; helicopters are taking-off; jets are all over the place and who knows what will appear in the next several issues of RCM that we really have to have!

Conclusion

When did productivity start to slip? Shortly after the technological revolution got underway in R/C! Very logically, inflation followed about four years later! The conclusion is very obvious, in fact, it mystifies me why our all encompassing government cannot see why our economy is so very weak!

*The simple truth is that a **very few** mavericks in our hobby started taking the R/C magazines and catalogs to the office to read on "lunch hour" --- and whenever the boss was not looking. Before long they were ordering new kits using the company phone which*

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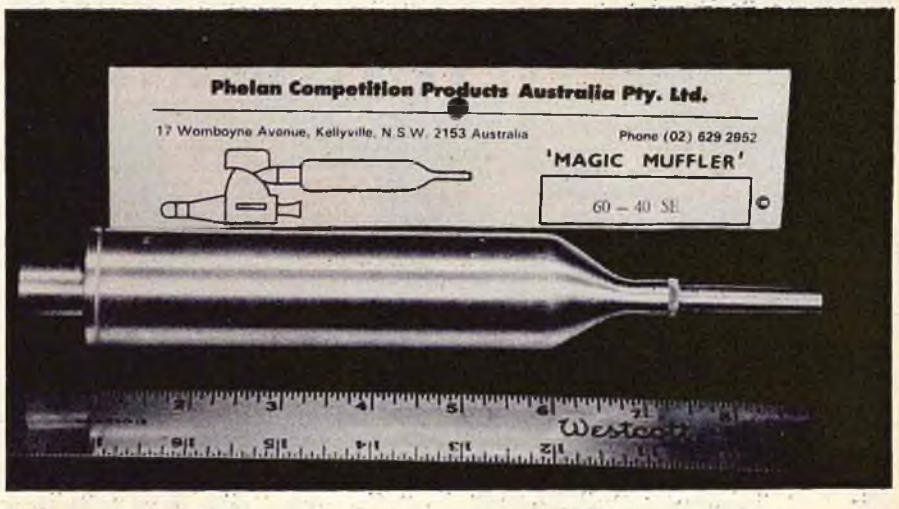
ENGINE CLINIC

Clarence Lee

Clarence Tests the Magic Muffler



Those of you who have been reading my old friend Pappy deBolt's "Flight Line News" column in Model Airplane News know that Pappy has devoted considerable mention this past year to a new muffler under development in Australia for which the fellows developing the muffler were making some pretty spectacular claims. The new muffler is called the "Magic Muffler." Pappy, being a friend of one of the developers, had received a prototype model for testing and had, in turn, come up with some very interesting — and puzzling — results. When using straight alcohol/oil (FAI) fuel in a K & B 6.5 some pretty spectacular power gains were obtained. However, when using high nitro fuels, such as those used for Formula I racing, there was little or no power gain. Several other fellows in the U.S. received prototype mufflers for testing this past year and obtained very interesting results; Bob Violett and K & B being two that I know of.

Due to Pappy's write-ups this past year, and the resultant interest created, many fellows (myself included) were looking forward to obtaining one of the production models.

This past May the first production Magic Mufflers reached the U.S., they were imported exclusively into the U.S. by another old time friend Cliff Rausin through his import company "Condor Hobbies." Cliff is also one of the larger U.S. exporters through his parent company "Exportations."

As soon as the first Magic Mufflers arrived in the U.S., Cliff sent me four versions for testing. At present Magic Mufflers are available for .15-.25 side or rear exhaust engines — .40-.45 rear exhaust — .40-.60 side exhaust or rear exhaust — and .60-.65 rear exhaust.

The Magic Muffler was initially developed for use on the .40 size engines using FAI fuel for FAI pylon racing. A gentleman named Ian McCaughey had the original concept back in 1973 and, in turn, joined with Ranjit Phelan in building the first prototype mufflers. The design was copyrighted in June 1974. Ian and Ranjit were later joined by Barrie Clarke a well-known engine man in Australia. Barrie, in turn, helped with the development of the .60 and other size mufflers. More recently, Bob Lumsdaine a well-known Australian pattern flier joined the group. These fellows formed the company "Phelan Competition Products Australia Pty. Ltd." and are now manufacturing the Magic Muffler.

Since the Magic Muffler was initially developed for FAI pylon racing using the .40 size engines, and my main interests are in pylon racing at present, I did most of my testing of the muffler using the K & B 6.5 front rotor and rear rotor engines. However, I did run brief tests with the K & B 3.5, K & B .61 and an OPS .60 "Big Red." Some very interesting results were obtained. I have also received quite a bit of feedback this past month from other fellows who have tried the Magic Muffler — some with great success and others who received less than successful results. So I will try to clear up a little of the mystery as to why, in some cases, a large power gain is obtained and, in other cases, little or none was gained.

First off, the Magic Muffler works on the same principle as a tuned pipe, however, a normal tuned pipe utilizes pressure waves to increase the fuel density charge in the combustion chamber and gives a resulting increase in power. The Magic Muffler uses both pressure waves and acoustic resonance in its operation which broadens the power range over that of a conventional tuned pipe. The design of the muffler also allows for a more compact size. Although slightly heavier than most conventional mufflers, they are lighter than full length tuned pipes with muffler shields.

Several variables affect the operation of the Magic Muffler and herein is where many fellows not experienced with tuned pipes have run into problems. Many fellows are expecting to stick a Magic Muffler on their engine and immediately see a 1500 or more power increase. I have heard of power gains in the 2500 rpm range but, personally, was never able to obtain more than 1500. However, a gain of 1500 is pretty darn impressive, especially when this was achieved with low or no nitro fuel.

With a conventional tuned pipe it is necessary to "tune" the pipe to the engine. This is done by starting with the pipe a little on the long side and shortening in 1/4" increments until maximum rpm is achieved. The Magic Muffler is pre-tuned. Each size muffler has instructions giving the distance from the piston face to the front face of the muffler. This is a critical dimension, but other than this no other tuning is necessary. But this is where some fellows have run into a problem with no increase in power. Each Magic Muffler is tuned for a specific power range. Using the .40 rear exhaust size muffler as an example — the power range is 17,000-33,000 rpm using FAI fuel to a maximum of 40% nitro. Many fellows purchased this particular muffler to use on the K & B 6.5 for Formula 500 racing. The prop normally used was a 9/6 Top Flite Maple and the fuel K & B 500; K & B 500 is 12% nitro. With this combination, a good stock 6.5 will turn in the 16,500-17,000 rpm range. If the engine turns below 17,000 rpm it is below the power range of the Magic Muffler and no gain is going to be achieved. However, in the air the engine unloads and a power gain will be seen. This can be proven on the ground by running the same engine/fuel combination but going to a smaller prop that will let the engine turn in the 20,000 rpm range. A gain will then be seen but, again, another variable is involved — the port timing of the individual engine. For the Magic Muffler to show maximum gain, full pipe timing must be used the same as with a full length tuned pipe. Again, using the K & B 6.5 front rotor engine as an example, if the K & B 6.5 #9130 that comes with the Perry carburetor and muffler is used, a very small power gain will be

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noticed. This due to the conservative exhaust timing. Most fellows racing in the Formula 500 event install a 6.5 rear rotor Formula I piston/sleeve assembly in the engine which is timed for mini-pipe use. Either this or purchase the K & B 6.5 #9140 free flight/U-control engine that comes without a carburetor or muffler and has the same piston/sleeve as the K & B 6.5 rear rotor Formula I engine. With this piston/sleeve assembly, a considerable power increase will be achieved — I personally saw just about 1,000 rpm but others have claimed as much as 1,400. The K & B Formula I sleeve has an exhaust timing of 165° (the exhaust is open for 165° of crankshaft rotation). By increasing this to 170° or, in some cases as much as 180°, even more power gain can be had but at the expense of more critical needle valve adjustment. Big Bill Wisniewski, K & B's engine designer in charge of R & D, was using 182° in a test engine he was working with but Bill is also using something different in the way of an exhaust shape. Only the center of the exhaust port is raised — not the whole top edge of the port. I also gave this a try and got a maximum gain of 1,400 rpm. However, this was using a prop that would let the engine turn in the 23,000 rpm range with 15% nitro fuel.

When using the Magic Muffler on a K & B 6.5 rear exhaust Formula I engine and 60% nitro fuel, only a 400-500 rpm gain was achieved. However, I attribute this to the fact that the .40 size Magic Muffler is tuned for low nitro fuel and did not have the capacity to handle the larger volume of exhaust gases that higher nitro fuels create. I did try the .40-.60 size muffler since it is larger in capacity, but this did not even work as well. This was due to the fact that higher nitro fuel requires more volume but a shorter length pipe. The .40-.60 size Magic Muffler, although having more volume, was too long for the .40 with high nitro. A muffler especially for high nitro will have to be developed and I imagine one will be available in the future. Similar results were obtained with both the K & B 3.5 and .61. With conventional exhaust timing, a small gain was achieved. By raising the exhaust for pipe timing, as much as 1,500 was achieved. With a little more experimentation with head shape, head clearance, and compression ratio, I am sure there is more gain to be had.

One point that I would like to make clear and one that is very important --- read the instructions that accompany the size Magic Muffler you purchase and **note** the power band. **Don't** try to run the engine below the power band and expect a large rpm increase. Even though I say this now I know that there will be guys who will want to run a 14/6 prop on their .60, stick on a Magic Muffler, and then when they do not get a large rpm gain feel they have wasted their money. The .60-.65 size Magic Muffler has a power range of 13,000-20,000 using FAI to a maximum of 15% nitro fuel. Lug your engine down below the 13,000 figure and you are not going to get much in the way of a power gain. However, you will still have a very quiet muffler that does not cause any power loss --- at least not more than 200-300 at the most and very few conventional mufflers can match this. Those that do are considerably noisier.

So how about the noise level. I found the Magic Mufflers to be very quiet. The rpm of the engine naturally has an effect on the noise level but an overall average, taken at 10 meters (32.8 feet) which is the distance being used for FAI competition throughout the world, the mufflers were in the 82-90 dB range. The OPS .60 Big Red was the loudest and the K & B 3.5 the quietest as one would expect. Comparing this to conventional closed chamber mufflers, the Magic Muffler is the quietest I have tested that did not cause any significant power loss and, in the case of the Magic Muffler, was showing a gain. I have tested conventional mufflers that were quieter but they also caused a power loss in excess of 1,000 rpm. When compared to a tuned pipe, they were quieter than a standard tuned pipe but not quite as quiet as a tuned pipe with a muffling shell on the back portion.

Many of you are probably wondering what other advantages there might be to using a Magic Muffler over a full length tuned pipe. Actually my findings are that a properly tuned full length tuned pipe will show a little more power gain. However, the full length tuned pipe is more "peaky" and has a narrower range where it performs at optimum. The Magic Muffler has a considerably broader power range where it comes in tune and does so at a lower rpm than a conventional tuned pipe. This means more torque at lower rpm than with a conventional tuned pipe that peaks at a higher rpm.

Prices are a bit rough and many of you will probably wince when it comes to laying out the hard earned cash. The .15-.25 size lists for $36.95 — the .40-.45 and .40-.60 size for $39.95, and the .60-.65 size for $49.95. The last one being the one that will hurt the most.

Your local hobby shop can obtain the Magic Mufflers from Condor Hobbies. If you do not have a hobby shop near, you can order direct. Condor Hobbies, 17835 Sky Park Circle, Suite F, Irvine, California 92714.

I am sure readers of this column would be interested in hearing of other fellow's experiences with the Magic Muffler so after some of you have given the muffler a try let us know your findings. Many fellows will be wondering how their Webra Speed, O.S. Max, Super Tigre, etc., will respond before investing in one on their own.

★

Dear Mr. Lee:

I have been involved in R/C flying for ten years and I have read your column since May '79 when I began subscribing to R/C Modeler.

Now, I am enjoying the hobby of 1/8 gas cars and I have some questions about the oils used in these engines.

I am racing with an OPS engine, OPS glow #250 and Carlson Silencer. For break-in I use 20% Castrol MSSR, 5% nitro and 75% alcohol. Some guys tell me, after the break-in period, I must use 10% Aero Shell Turbine Oil 750 (ASTO 750), 20% nitro and 70% alcohol.

I can't get the Asto 750 but I can get the Asto 500. The accompanying photocopies are of Aeroshell Turbine oils and typical properties. I have marked in red the differences between ASTO 500 and 750. I think the difference could interfere in the good running of the engine.

And now the questions.

(1) Which type of oil would you advise me to use, ASTO 500,750 or Castrol MSSR?

(2) How much oil should be used in the fuel for break-in and after the break-in period? (I run at sea level altitude and sometimes in wet weather.)

Congratulations on your excellent column and I hope to read your answers soon.

Yours sincerely,
Jesus A. Serrano
Spain

I imagine quite a few fellows have been using the aircraft turbine oils with some degree of success but I also know of quite a few cases where their use had disasterous results — a completely burned up engine.

The aircraft turbine oils are of very low viscosity and were developed for lubrication of the bearings, etc., in jet engines. Bearings running at extremely high rpm require a very low viscosity oil but in a jet engine this oil is supplied under pressure. This makes a big difference over just mixing in the fuel as we do with our model engines. Although the jet engine turbine oils can withstand high temperatures and have high shear strength and load carrying ability, they are too thin for model engine use.

To compare viscosity — the specification sheets you enclosed show ASTO 500 to have a viscosity of 5.4 Centistokes at 210°F and ASTO 750 a viscosity of 7.7 Centistokes at 210°F. For the benefit of readers not familiar with Centistokes, this is a term or means of viscosity measurement used by oil manufacturers that has a broader range than the SAE automotive oil method. Saybolt Universal Seconds (SUS) is oftentimes used, also. Castrol's Super M which was developed for model aircraft use has a viscosity of 23.7 Centistokes at 210°F. Union Carbides MA-731 developed for model aircraft use has a viscosity of 22.6 Centistokes at 210°F. I could not find a viscosity listing for Baker AA castor oil at 210°F so cannot include it. The Baker specification sheet lists the viscosity at 25°C

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SUNDAY FLIER

Ken Willard

Let's Put On An Air Show

How many of you radio control club presidents, or maybe just one of the members of the club, have had something like this happen? The phone rings.

"Hello, is this Joe Harris, President of the Memphis Radio Control Club?" (Substitute your own name and your club's name.) "Well, this is Jim Sudshead, Recreation Director for Steamerfoam Beer. We're having a company picnic, and we wondered if you'd like to put on an air show for us?" (Substitute any name and company, or even a city, state or federal organization.)

"What did you have in mind?" you ask.

"Oh, whatever you think would be entertaining. I've been out to your club field and have seen some of the flying, and I was amazed at what you guys can do. So, I'll leave it up to you. Figure on mebbe a half hour or forty-five minutes."

You say, "Let met talk to the club members and I'll get back to you."

"Great. We'll be looking forward to your show."

At the next club meeting, you bring up the subject. Reaction varies all the way from, "Let's do it," to hey guys, we're not all that good. Why don't they get one of the AMA

Have a pilot's meeting before the show, so everyone knows his part.

Display aircraft behind a crowd control line, but close enough for the crowd to see.

Be courteous and informative, as Bob Fish is doing here, explaining the details of his FW-190 to Lt. Mike Lanfranchi, one of the full scale show pilots.

Bob Fish's Antic opens the show. Blimp hangar in background.

Gene Martin's fabulous Curtiss F6C-1 wowed the Navy crowd during the "Golden Age" act.

Duke Crow's flight with his 1/4 Scale Fleet got lots of applause — great landings!

Have a show announcer keep the crowd informed by calling out the maneuvers as they are performed. (Ken Willard "hypes" the crowd during the aerial "combats.")

Aerial combat practice by two allied fliers — Don Loughridge's SE-5 and Gerry Wolfram's Sopwith Pup.

A roar from the crowd greeted Gary Korpis' "Bearcat" as it took off and turned towards the far hangar.

show teams to come and perform?"

So you take a vote, and the majority votes in favor of putting on a show --- even if it's just a couple of guys flying around and doing a few maneuvers. After all, the audience won't be too critical.

You could be wrong. There are thousands of enthusiasts for the sport of radio control flying --- but there are millions of aviation enthusiasts, many of them very knowledgeable. You can't afford to disappoint them.

So, if you're going to put on a show, make it a good one! Even one man with one airplane can do that, if he plans it in advance. That's the secret --- planning. You don't have to be a bunch of expert fliers; plan a show which is within the capabilities of a group of Sunday fliers, and you'll have a better show than an unplanned presentation by expert fliers tooling around in the sky.

Here are the basic elements for a well-planned show. They are not listed in any particular order of importance, since every element is just about equally important. Except one --- safety. So let's consider that item first and foremost.

We are all aware of the potential dangers that exist in radio control flying --- failures in the radio link, structural failures, runaway aircraft, etc. You can't eliminate them entirely, but you can minimize them to an acceptable level.

The first step is to assure that the fliers are competent pilots, who can keep their aircraft in the assigned air space. They should also be well-known for the reliability of their airplanes and equipment; their radios work, their ground support equipment works, their airplanes are proven performers, and, if an emergency should arise, they don't panic.

Next, ample provisions for crowd control are a must. The AMA requires that spectators at a model airplane show be contained behind a crowd line barrier, and that all flying be well in front of that crowd line. If a rope and stanchions are not available, then members of the club should station themselves along the crowd line and maintain crowd control in that way. Much better to have the rope --- and even better yet if some sort of waist level fence is provided.

If more than one flier is involved, frequency control by any one of the accepted methods should be instituted. Frequency pins, badges, paddles --- whatever works best for your particular club. Assign one of the club members to direct the frequency control system. Transmitter impound is a good idea, but if the fliers are warned not to turn on their equipment unless they have the frequency pin, that should suffice.

Frequency monitors are available which can scan the band and immediately identify the presence of interference on the frequencies most generally used in the 72 MHz band. If your club doesn't have one, get one.

In general, the most critical part of a flight, when crowds are present, is the take-off; and the next most critical is the landing. As a safety precaution, station members of the club along the crowd line, and if a plane veers toward the crowd on take-off or landing, their job is to keep the model from going into the crowd. Not pleasant, but better than the alternative. They will at least have some idea of how to stop the model with minimum risk to themselves, the crowd, and the model.

A public address system serves two functions; it lets the crowd know what is happening, and, if necessary, can be used to

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The dogfight between Terry Davis' "Tony" and Gary Korpis' "Bearcat" had the crowd on its feet and shouting, "Come on Navy!"

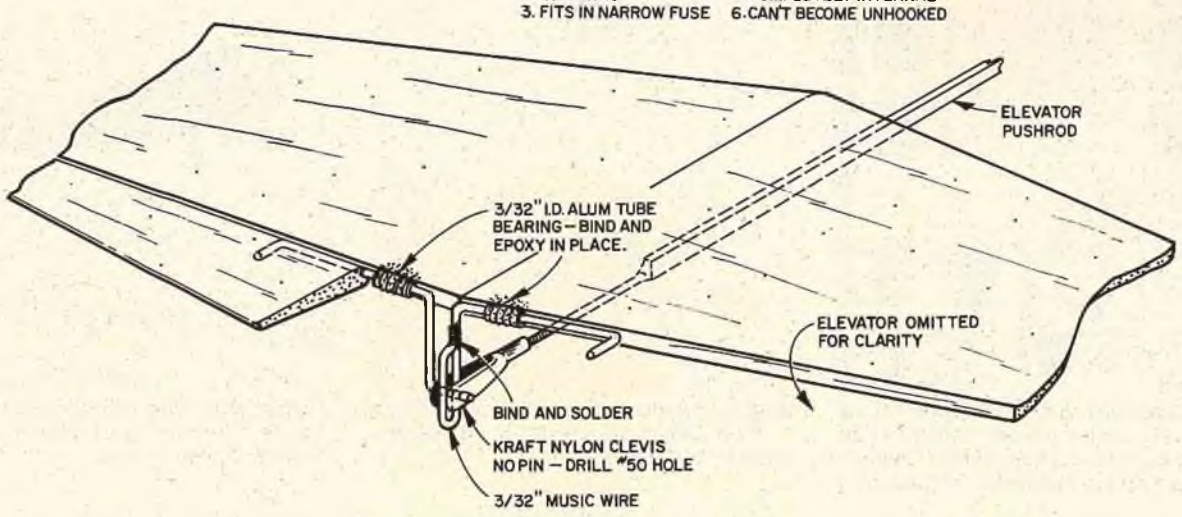
Dave Bridges' "Star Cobra" was a favorite of the crowd. (One TV station devoted their whole air show time to it!)

Don Coulter's "Trident" was right out of "Star Wars." Some of the kids in the crowd shouted, "May the force be with you!" as Dan Bignardi rolled, looped and did split-S dives.

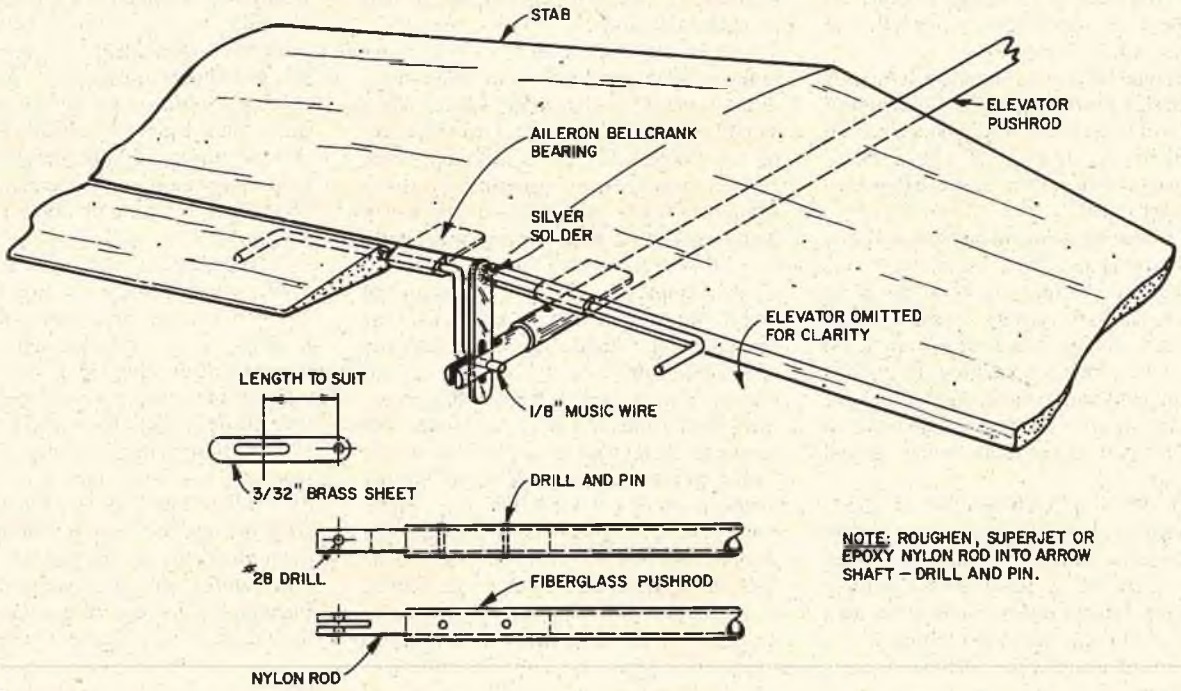
HERE'S HOW

By Jerry Smith

ELEVATOR LINKAGE FOR DIHEDRAL STAB
SUITABLE FOR SPORT (UP TO .15)
— ADVANTAGES —
1. VIRTUALLY NO SLOP
2. LOW DRAG
3. FITS IN NARROW FUSE
4. ONLY ONE PUSHROD
5. COMPLETELY INTERNAL
6. CAN'T BECOME UNHOOKED



ANHEDRAL STAB ELEVATOR LINKAGE FOR PATTERN AIRCRAFT



NOTE: ROUGHEN, SUPERJET OR EPOXY NYLON ROD INTO ARROW SHAFT – DRILL AND PIN.

Have you ever wondered how to hook-up elevator linkage to a dihedral or anhedral stab? Generally you think of a pushrod split at the rear that provides a clevis, for adjustment to each elevator. Most pattern fliers prefer this arrangement for trimming. However, it does make a complicated pushrod difficult to install for most Sunday Flyers.

Keith Shaw of Ann Arbor, Michigan, has been using the idea shown here for quite awhile. Two versions are shown. The idea should be quite clear from the sketches. The small version has been in use on many aircraft and recently several pattern aircraft in his area are sporting the new heavy duty version. Keith's design relies on all parts being able to slide on each other. It is sometimes helpful to drill out one side of the clevis a little larger than the other. This still leaves a very tight linkage (no slop) but does allow for slight misalignments.

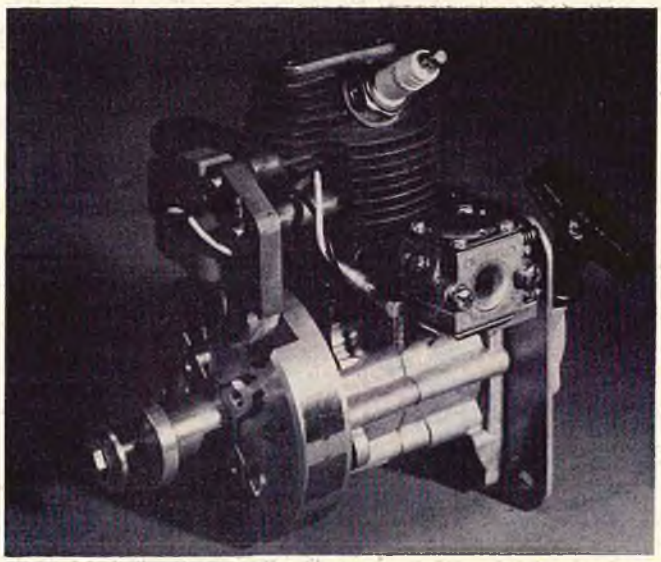
Installing and hinging the elevators, with Keith's idea, is very much like installing ailerons on a wing with torque rod bellcranks. Here's How Keith installs his typical elevator linkage arrangement.

(1) Mount the horizontal stab to the fuselage.
(2) Link the two halves of the linkage onto the clevis (with the pushrod attached).
(3) Insert the pushrod in from the tail end and align the linkage halves in place.
(4) Bind the support bearing tubes (or slot and install bearings).
(5) Mount the elevators and hinge.
(6) Use the adjustable clevis at the servo end.

Many thanks to Keith Shaw for sharing his super idea with us. Sharing is that wonderful form of communication from which we learn through other's experience. Keep the ideas coming and we will **share** them with **you**. □

BIG IS BEAUTIFUL

Dick Phillips



Mag Aero's new 1.9 c.i. engine. Offers point free transistorized ignition and rewind starter. Engine is by Kioritz and of high quality, more in text.

Alan Walkers' sleek and beautiful Zlin 526 AS. This 105" span model looks ready to leap into the air. That flying field in the background looks pretty great too (more in text).

Helldiver by Bob Smolinski of Mt. Clemens, Michigan. Plan is available for this 96" span Curtiss SB2C, more in text.

Detailed cockpit of Alan's Zlin adds greatly to the overall effect of this large model. Note full length pilot figure, sliding canopy, shoulder harness and first aid kit with first aid marking on canopy. Nicely done.

If you have not lived in one house for many years, then moved to a new house in a new city, let me offer one word of advice: **don't**! As you read this, I am now settled in a new house in a new city, and am probably pretty comfortable. However, at the time of writing, the actual physical move was two days into the future and it was anything but pleasant. Imagine, if you will, living in a house for well over ten years, collecting all the neat stuff we collect, accumulating all the expensive tools we really need, acquiring a number of models, some in boxes, not started, some partially complete and a few ready to fly, then decide to move 500 miles. It's quite an experience!

It makes the column a little hard to do as well, due to the fact that much of the reference material I use is packed, most of my files are sealed and ready to go and a lot of the material I use is not readily available to me without unpacking and re-packing it and there is no way I am going to go through that again! Anyway, what follows is what I have managed to get together for this column, if it seems a little disorganized, now you'll know why. (And if it doesn't, then you just haven't been paying attention!)

Had a note and a set of plans from a modeler in England recently and his plan for a Quarter Scale Zlin 526 AS is a beauty. The span is 105" using a foam wing, with an area of 1500 square inches. Finished weight is (on the prototype) 16½ pounds and the plan is very nicely done. Construction is quite straightforward and should not create a problem with a builder who has scratch-built before. The prototype was flown on a Webra .91 direct drive although a prop driver is being considered in order to improve the vertical performance of the model. The cowl will take a Quadra and that will be the route I go when I build the Zlin. It's one of the few modern aircraft that appeals to me, its lines are sleek and it is fully capable aerobatically in the full scale machine, so flying it like a pattern airplane would be quite appropriate to the model.

The landing gear is sprung in the vertical plane (a good idea) and is designed to shear off without damaging the wing in the event of a severe landing. Despite the rather narrow tread on the gear, the model is claimed to handle well on the ground.

The plan is available from Alan Walker (5 Farm Close/Belper/Derby DE5 1RY England. Note that the / indicates line ending). The plan is on three large sheets and totals 72 square feet and is nicely done. Cost of the plan is 11 pounds, including postage. The pound is equal to $2.40 U.S. at the moment, but your bank can tell you the current rate and will sell you an international money order in pounds. Alan also says cash equivalent is quite okay. I would guess it would be, the old U.S. dollar may not be doing all that well at home, but it's popular everywhere else! At $26.40, the plan is certainly in line with others these days. If a Zlin is in your future, this looks like a good one.

I mentioned Bill Effinger here awhile back as having an SE-5a in the works. I ordered one as soon as I heard about it and, after a slight delay, it arrived. If you happen

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Karin Refsdal and Miss Priss.

MISS PRISS

Miss Priss is a classy lass; she can soar, she can bomb, and she can win the limbo. What else can you ask for?

ABOVE: Miss Priss is a lean machine with a pleasing shape. ABOVE, RIGHT: Polyhedral is a major factor to Miss Priss' stability. RIGHT: This arrangement should appeal to the senior citizens, work on the model in a standing position.

By Paul Denson

MISS PRISS

Designed By: Paul F. Denson

TYPE AIRCRAFT
Motor Soarer
WINGSPAN
60 Inches
WING CHORD
Root — 9¾", Tip — 8½" (Avg.)
TOTAL WING AREA
545 Sq. In.
WING LOCATION
High Wing
AIRFOIL
Clark Y 12%
WING PLANFORM
Center — Constant Chord
Tips — Tapered T.E.
DIHEDRAL EACH TIP
4 Inches
O.A. FUSELAGE LENGTH
42 Inches
RADIO COMPARTMENT AREA
(L)8" x (W)2" x (H)4"
STABILIZER SPAN
17½ Inches
STABILIZER CHORD (incl. elev.)
5½" (Avg.)
STABILIZER AREA
93½ Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
6½ Inches
VERTICAL FIN WIDTH (incl. rudder)
4 Inches
REC. ENGINE SIZE
.15-.20 Cu. In.
FUEL TANK SIZE
2-4 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3-4
CONTROL FUNCTIONS
Rud., Elev., Eng., Bomb Drop
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa & Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 38 Oz.
Wing Loading ..... 10 Oz/Sq. Ft.

Miss Priss was designed for a number of reasons, first and paramount was simplicity; anyone can build it. Secondly, hands-off flying; it makes a fine beginner's plane. Third, everytime I picked up a pencil the sketches always looked the same, just like Miss Priss.

For stability, it had to have a high wing with polyhedral and to have a low Center of Gravity, it became a cabin job. In order to make take-offs easier, the long tail moment was necessary. There are some of us who do not have tall waving grass, short stubby grass, or even green concrete. We fly from a brown concrete called adobe and wheels are a necessity. If you want to fly it occasionally without wheels, they are easily removed, however, we would advise a landing skid to keep the grass stain off the bottom of your fuselage. Much of the time, even though we fly with wheels, we do not bother with a standard take-off, just stand back and heave it into the air.

Miss Priss may be considered to be a motor soarer, the 5' wing makes up in chord for what it lacks in span. The wing area is almost identical to many 2-Meter gliders. She held up well, wheels and all, with a Windfree and a Drifter II, both of which had auxilliary engines. In fact, we were surprised how well she really did as a thermal machine.

The bomb carrying capability came about as a necessity, our club **always** has a bomb drop event in every fun fly. The club members are so good, the C.D. recently inspected one plane for a Norden Bomb Sight, the pilot was so accurate. We have discovered that with the slightest breeze, low throttle and full up elevator, Miss Priss will almost hover. Can't you see the technique, just hover over the target and, when ready, flip in full down and the bomb scores a perfect hit. Please watch the plane, not the bomb so you won't be the first to score a perfect hit with both the bomb and the plane.

After loading the bomb, please check elevator movement with full up to make sure the controls are free. We loaded the bomb, checked movement up and down and, of course, the bomb dropped out on the flight box. So nothing to do but reload; this time we were smart and did not check movement. Sure enough, the bomb was in crooked and the controls were locked in, full down. The flight following a hand launch was the shortest on record. Fortunately, only the prop and the ego suffered any damage. (P.S. the wing does pop off with a quick stop.)

Miss Priss is a beginner's plane, both building and flying, but if you have never built a R/C model we would strongly recommend you purchase the RCM Flight Training Course, Vol. 1, from your hobby dealer or directly from RCM. This publication will prove invaluable to you both for building and flying. It will become a basic text for your R/C library. Read it from cover to cover --- then you will know where to go back and check when you get in trouble.

The wing is simple and straightforward; it is built flat then joined with polyhedral later. Always cover your plans with a clear plastic wrap or waxpaper. Lay down the two center section leading and trailing edges, bevel them slightly where they meet on the centerline, pin in place, bevel and add all bottom spars. Then put in the bottom sheeting and glue in place. Wing ribs 1A are added on top of the botoom sheeting. Install all Number 1 ribs between leading and trailing edges. The T.E. is notched with three thicknesses of hacksaw blades. When you have finished the center wing sections, build the tip sections. Slant the ribs to match the polyhedral lines and glue in place where the sections join. Add the top spars and allow these sections to dry thoroughly, then add the center section top sheeting.

To assemble left and right wing halves, prop each tip up 4" from the workbench; be sure and glue the small dihedral braces to the bottom spars. A clearance notch must be cut in each of the two adjoining Number 1 ribs for this brace. The two halves are butt joined using epoxy. After sanding, the center sheeting top and bottom will be covered with 3" fiberglass tape.

The fuselage sides are cut from 3/32" medium sheet balsa. A doubler is also cut from 1/32" ply. This doubler goes back just beyond where the pod and boom join, giving this area extra strength. Affix the doubler to the balsa sheeting with epoxy or contact cement.

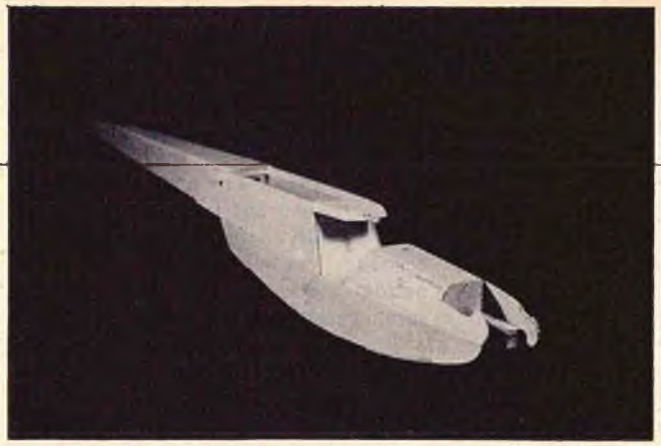
Place the right fuselage side on the plans and mark the former locations on the ply side. There are marks outside the fuselage plan view for this purpose. Transfer these locations to the ply side of the left fuselage half. Then add all 1/8" x 1/4" stringers and doublers.

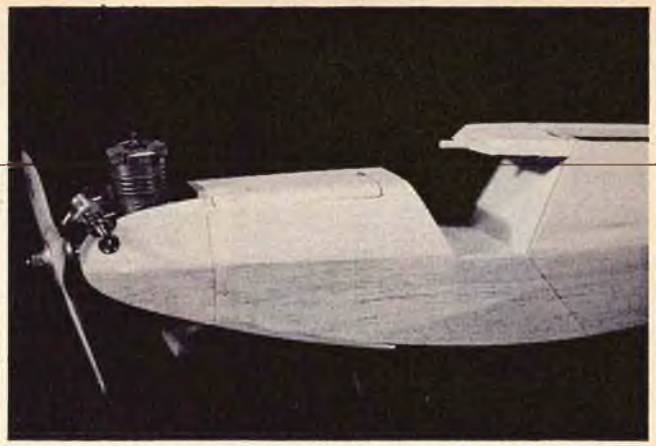
To fit the shape of the formers, the sides must be folded, please do not let the coffin shape of Former Number 1 influence your thinking as to your success in fuselage building. Make the cuts from the balsa side. Cut through the balsa layer and score the ply — do not cut all the way through the ply — try to fold it; the ply should crack then fold. If you have to exert too much force, score again then fold.

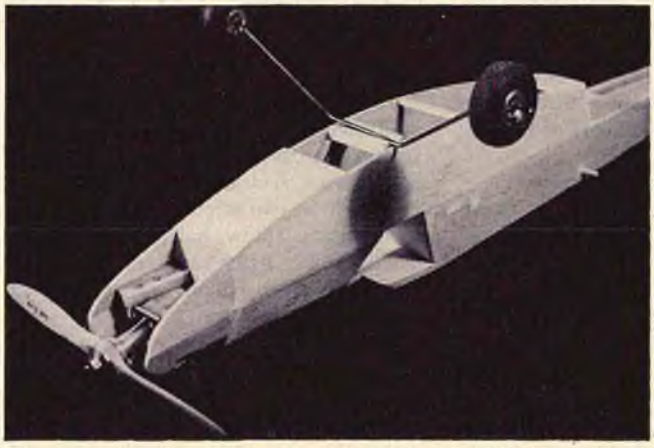
Put glue on Formers Number 1 and Number 4 and assemble the center of the fuselage into a box. Hold things together with masking tape or rubberbands till dry. Add the other formers.

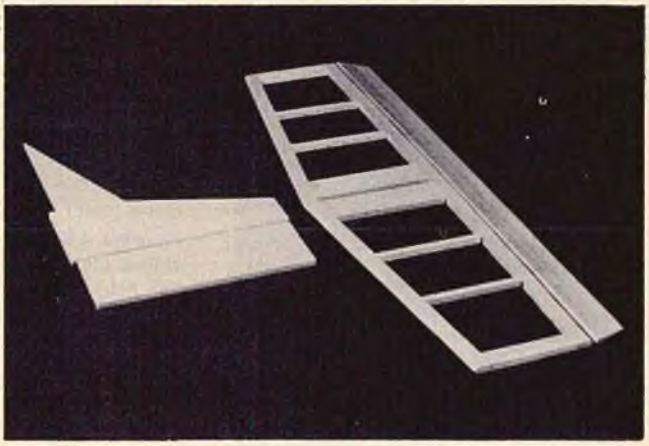
The choice of beam or manufactured engine mount should be made at this time and the firewall should be notched or drilled as required. Do not forget holes for fuel lines and the throttle linkage — trying to do it later may prove embarrassing. Add the firewall, backing it up with 3/8" triangular stock. The built-in down thrust is sufficient.

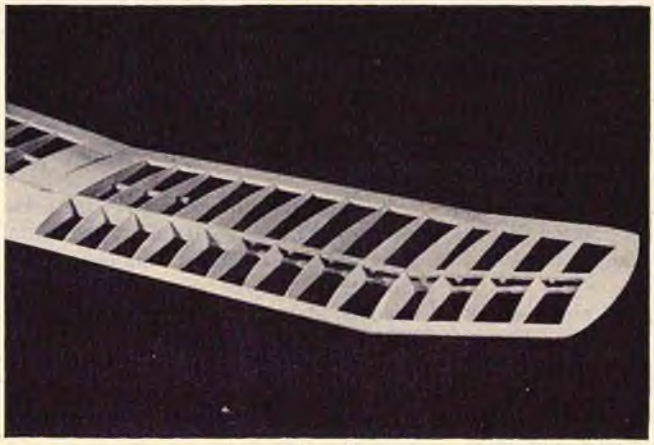
Cover the bottom of the boom from the back side of Former Number 4 to the tail with 3/32" balsa cross-grain. Then the back pod-block is added. The cockpit roof is









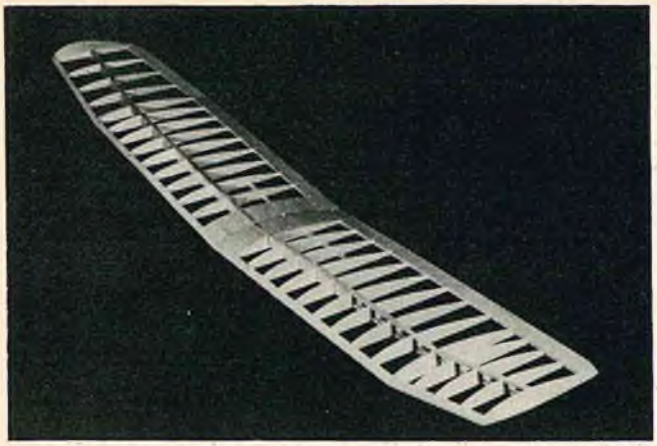


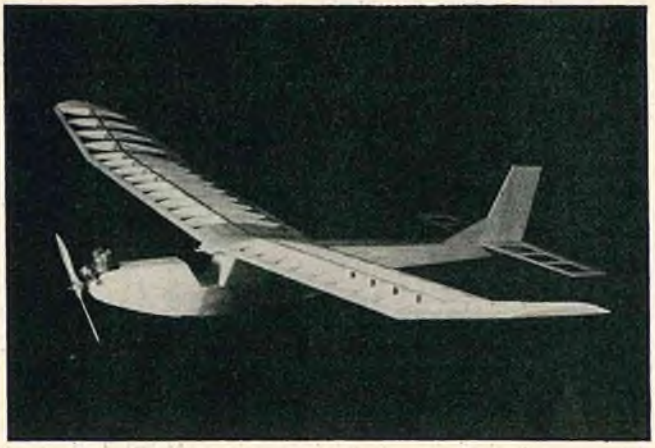
TOP ROW, LEFT: Simplicity of construction is in evidence here.
TOP ROW, RIGHT: Easy access is provided for engine and fuel tank.
2ND ROW, LEFT: Bottom side details are clearly shown.
2ND ROW, RIGHT: Tail surfaces are light and simple.
BOTTOM, LEFT: Note spar webbing in inboard panels.

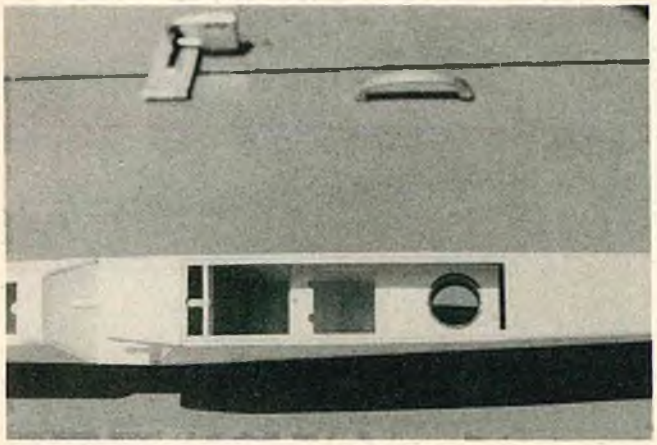
easiest built on the fuselage. Cement the 1/8" ply top piece to the top face of Former Number 2. Drill a 3/16" hole through Former Number 2 just under ply roof. Push a 3⅝" piece of 3/16" hardwood dowel through this hole, slide Former Number 3 on the inner end of the dowel, epoxy the dowel and Former Number 3 in place. Add pieces of 3/16" scrap balsa under the roof to hide the dowel and then sand this sandwich to the shape shown on the plans.

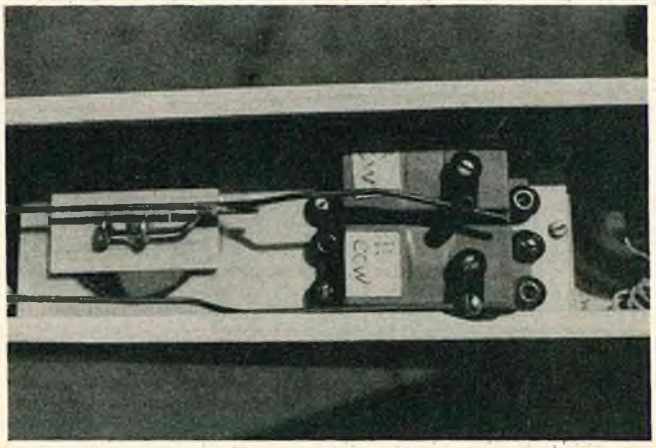
Cement the 3/16" x 1/4" stringers on the inside of the fuselage to hold the ply servo tray. In the proper location, cut a hole in the servo tray. The diameter of this hole depends on the size bomb bay tube you have at hand. We used the tube on which MonoKote comes rolled, a T.P. roll, paper towel roll, etc., would work fine. Cut the same size hole in the center of a 3" wide piece of 1/8" sheet balsa. This sheet will be glued to the bottom rear of the pod to anchor the bomb bay in a vertical position. Decide your servo locations and cut holes for them. When this is all completed, the bomb bay may be epoxied in place. When assemblying, be sure the top of the tube is flush with the top surface of the servo tray. The tube may stick out slightly at the bottom and be sanded flush later. Finger paint the inside of the bomb bay with 5-Minute epoxy to keep out moisture.

When you folded the sides of the fuselage, the balsa parted into a "V" shape; this groove may be filled with a long triangular strip then sanded to match the fuselage contour. Fit your engine and remove material from the fuselage sides to allow installation of the muffler and insertion of the needle valve. Make the hatch cover for the fuel tank compartment and spot glue in place. The wheelwire anchors must be made from some harder wood such as pine or spruce. Look at the plans and cut them to shape and fit; insert and glue in place. The remainder of the bottom is now covered with rather hard 1/8" sheet balsa. Sand the whole fuselage

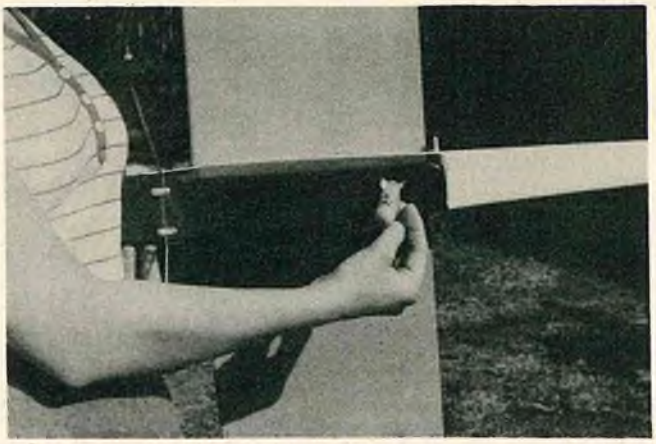








TOP ROW, LEFT: The wings can be quickly built with instant glues.
TOP ROW, RIGHT: Ready for covering.
2ND ROW, LEFT: Servo mount and bomb drop tube are shown.
2ND ROW, RIGHT: Elevator servo also operates the simple bomb release.
BOTTOM, RIGHT: Bomb is installed from the bottom.



rounding all corners.

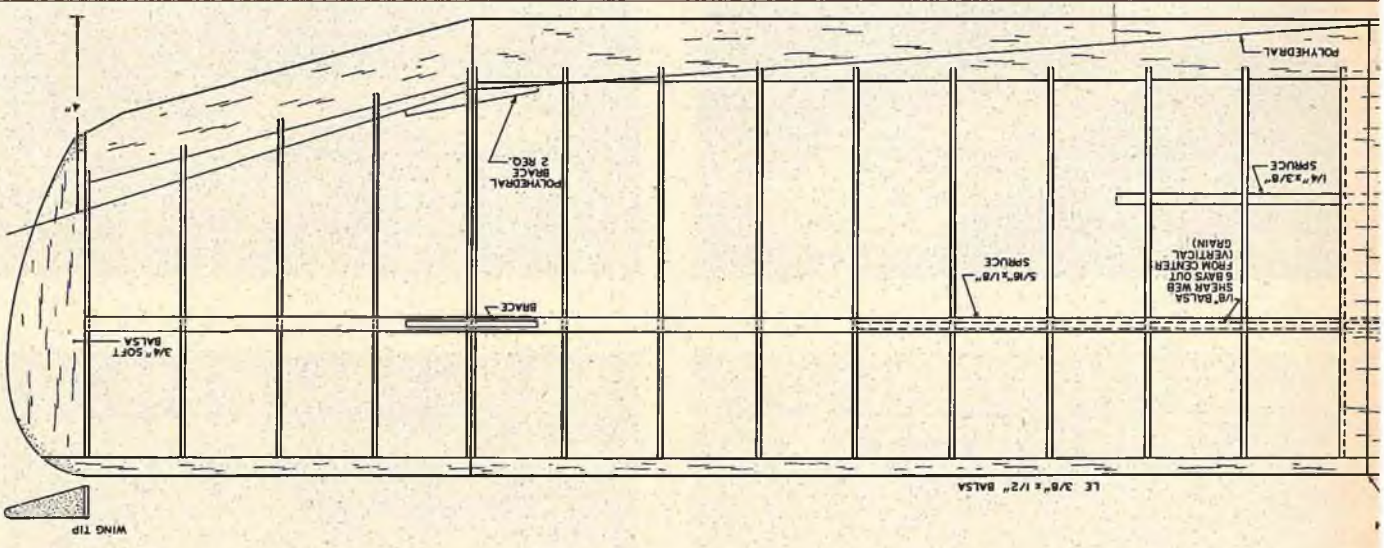
Build the empennage with stock as shown on the plans. The fin has a tab which anchors it in a notch in the stabilizer; be sure you allow for this tab when you cut the fin from 3/16" balsa. The rudder may be cut and sanded from the same sheet. The elevator is 1¼" aileron stock.

It is recommended (if you intend to use a steerable tailwheel) that you consider exiting the elevator pushrod under the stab in the conventional manner rather than as shown on the plans. There is a possibility that in the narrow confines at the tail, the elevator pushrod could get hung up on the tailwheel wire and cause a crash. The prototype had a tail skid.

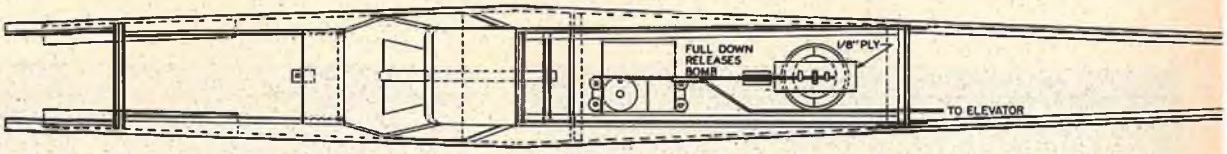
If you use the very small servos, there is room enough in the fuel tank compartment for the throttle servo, otherwise it must go in the radio compartment and the pushrod must pass through the cockpit.

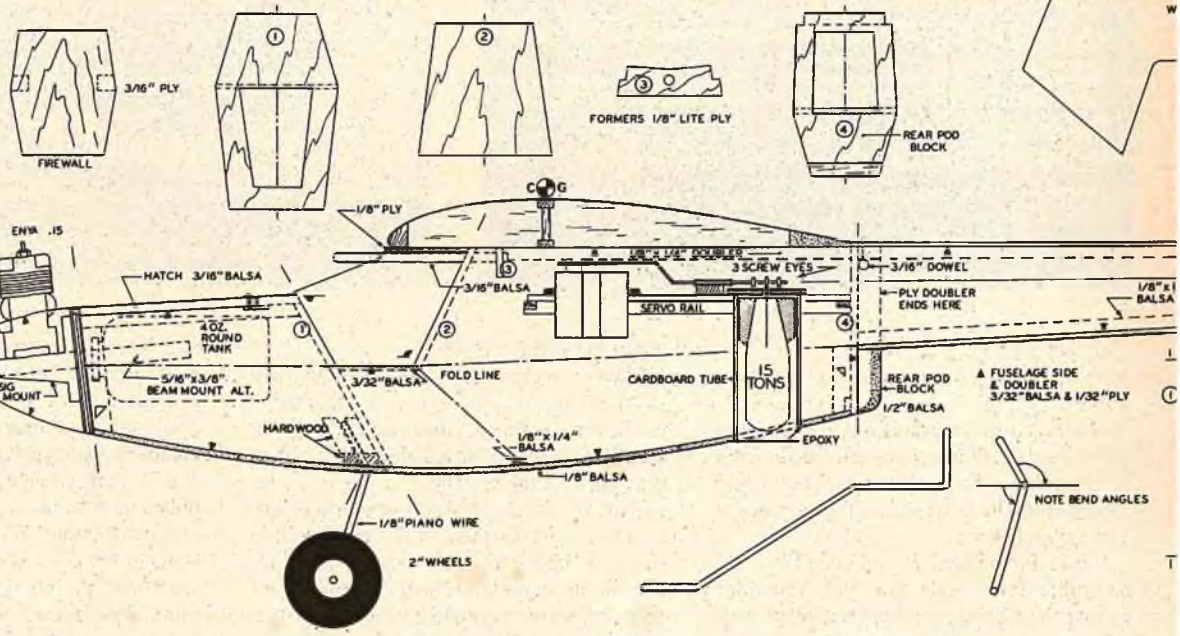
Any of the heat shrink coverings are recommended as there will be very little stress on this plane. Do construct as lightly as possible. It took two sets of landing gear wires before we were satisfied and even then we had to do a little twisting to get them to the position we wanted. One length of 1/8" piano wire was sufficient.

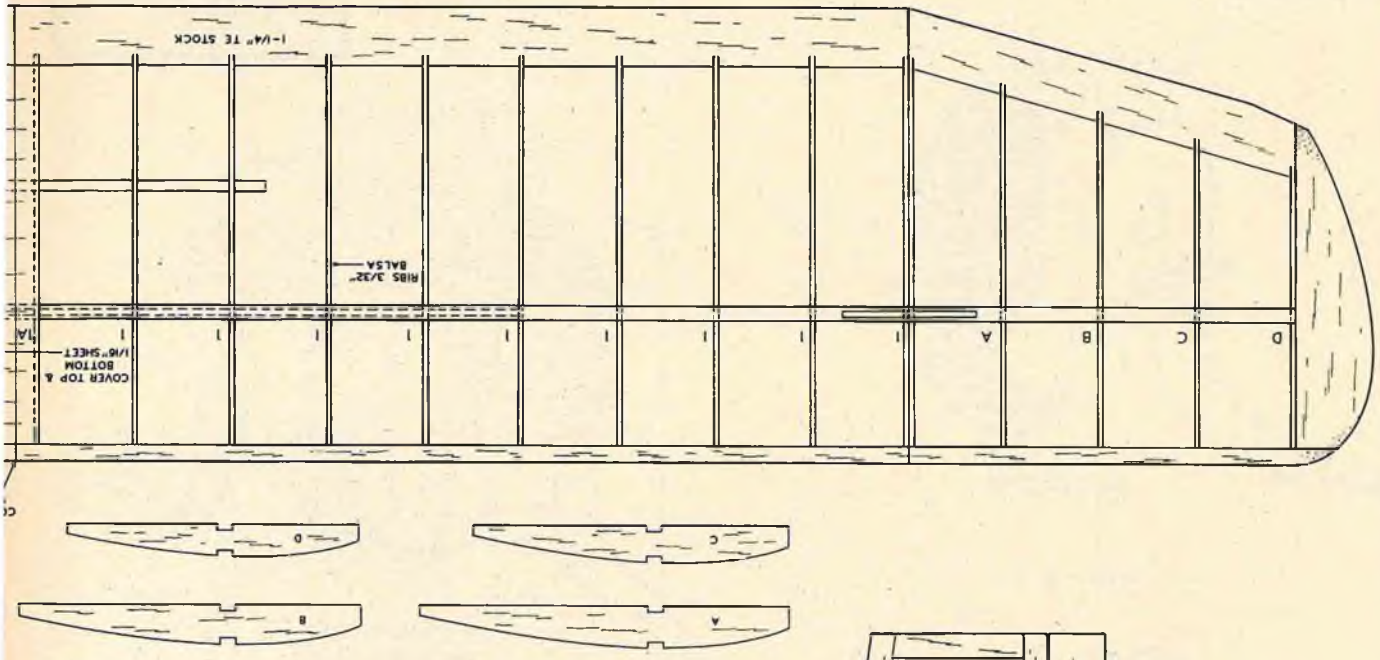
The first flight of Missy was from our backyard --- we have a valley about 300' deep and the west wind blows up our side making a perfect slope soaring location. Wonder if that had anything to do with our decision to purchase? The plane was hand launched under power out over the valley and it went straight up. The throttle was pulled back to an idle to keep it down within reasonable range. When the fuel ran out, we brought the plane back overhead and slope soared on the uplift for 10 to 15 minutes more. We haven't been able to coax the bulldozer operators, putting in house pads across the valley, to come over here and carve us out a landing strip. We figure they will be over here soon enough, and it won't have anything to do with model airplanes.□

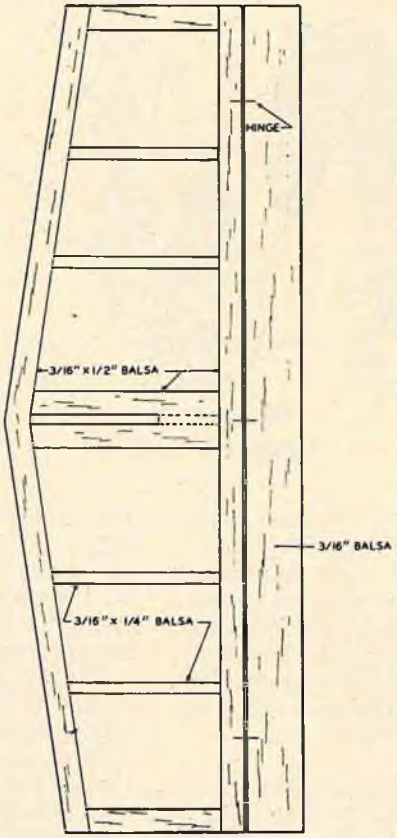

POLYHEDRAL
POLYHEDRAL BRACE 2 REQ.
BRACE
3/4" SOFT BALSA
WING TIP
1/8" BALSA SHEAR WEB 6 BAYS OUT FROM CENTER (VERTICAL GRAIN)
5/16"x1/8" SPRUCE
1/4"x3/8" SPRUCE
LE 3/8"x 1/2" BALSA

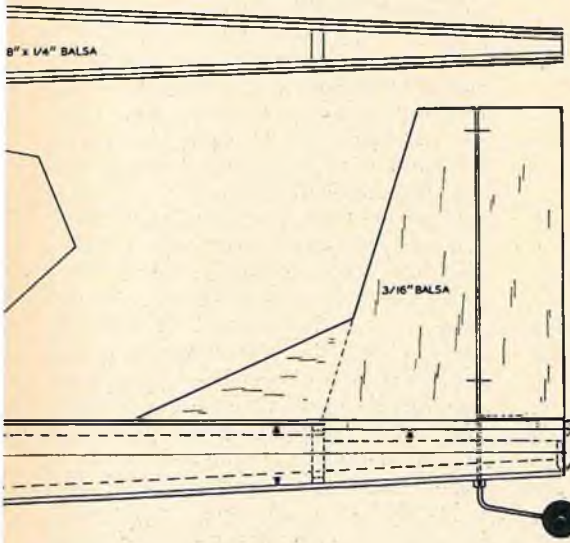

1A
1


FULL DOWN RELEASES BOMB
1/8" PLY
TO ELEVATOR


3/16" PLY
FIREWALL
FORMERS 1/8" LITE PLY
REAR POD BLOCK
C G
1/8" PLY
ENYA .15
HATCH 3/16" BALSA
4 OZ. ROUND TANK
5/16"x3/8" BEAM MOUNT ALT.
SIG MOUNT
3/32" BALSA
FOLD LINE
HARDWOOD
1/8"x1/4" BALSA
1/8" BALSA
1/8"x1/4" DOUBLER
3 SCREW EYES
3/16" DOWEL
3/16" BALSA
SERVO RAIL
CARDBOARD TUBE
15 TONS
EPOXY
PLY DOUBLER ENDS HERE
REAR POD BLOCK
1/2" BALSA
A FUSELAGE SIDE & DOUBLER 3/32" BALSA & 1/32" PLY
1/8"x1/4" BALSA
1/8" PIANO WIRE
2" WHEELS
NOTE BEND ANGLES







T BALSA - SCORE PLY
D FOLD. FILL WITH
IANGULAR STRIP - SAND

NGLED SIDE GIVES
TRA STRENGTH

'MISS PRISS'

DESIGNED BY	DRAWN BY
PAUL DENSON	PAUL DENSON

0 1 2 3 4 5 6

PLAN NO. 846

FLYING LOWE

Don Lowe

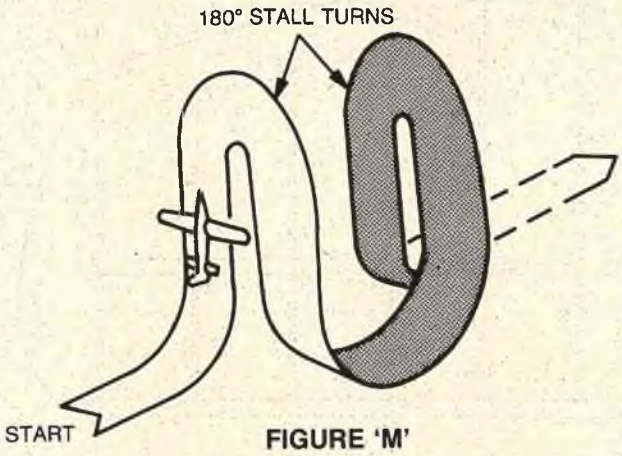


FIGURE 'M'

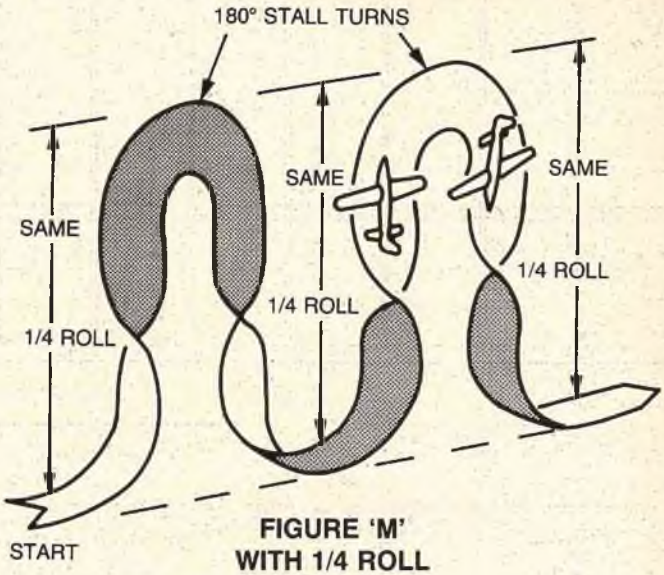


FIGURE 'M' WITH 1/4 ROLL

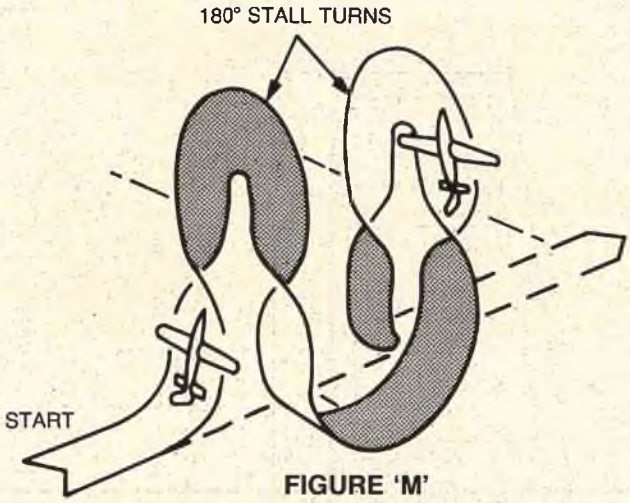


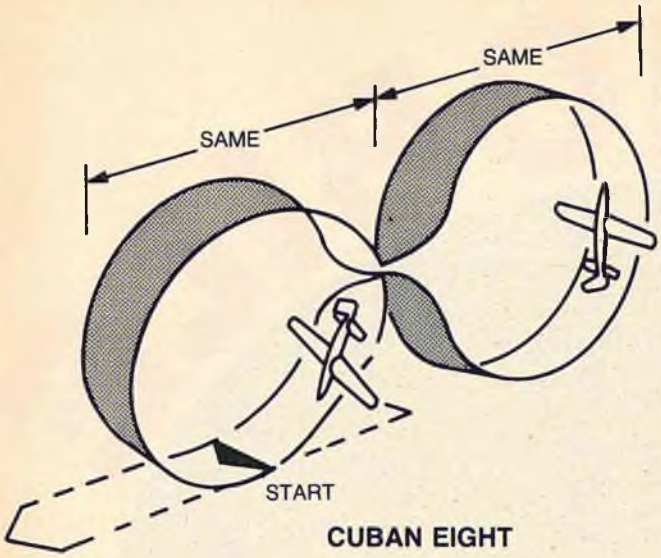
FIGURE 'M' WITH 1/2 ROLL

This month we will continue our saga on pattern flying by discussing some additional maneuvers. Up to now we have discussed basic procedures, trimming, and set-up. We have also discussed the following maneuvers: Take-off; wing-over; inside and outside loops; Immelman turn family; rolls — point, slow, and axial.

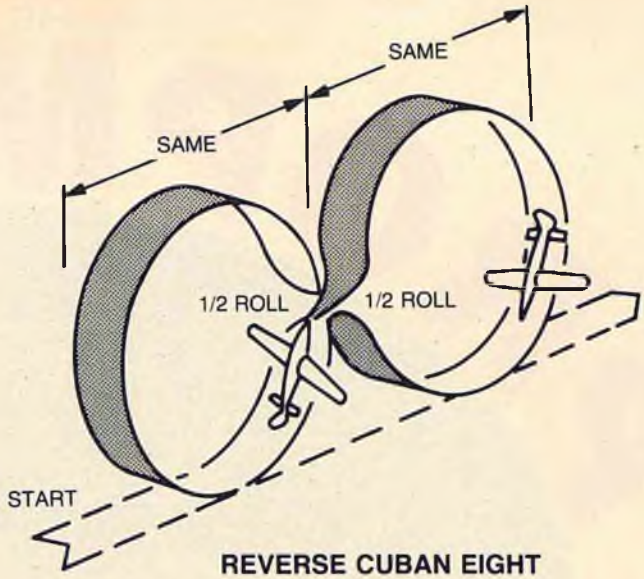
Fig M's:

Let's continue by talking about the Fig M family. There are three variants: Fig M without rolls, Fig M with 1/2 roll, and Fig M with 1/4 rolls. The Fig M without rolls is the easiest maneuver, followed by M with 1/4 rolls. Interestingly, the expert pattern uses the most difficult M (1/2 rolls). Fig M with 1/4 rolls is easier than 1/2 rolls since the upline allows pivoting into the wind, which is always easier. The M with 1/2 rolls can be a bear if you have significant cross wind for a downwind stall turn pivot. These maneuvers are best performed in a rather bold fashion, i.e., with a fairly quick pitch-up in both the stall turn entries and in the half outside loop. Also, a fairly tight stall turn at the top impresses the judges; never fly-around. Think of the maneuvers in basic elements with each presented distinctly from the other elements; never allow the pitching, rolling, and stall turn elements to "flow" together. This looks better, makes it easier to judge, and impresses the judge that you really know what you are doing. As in other maneuvers, the similar maneuver elements are to be balanced and equal and the total maneuver is centered.

Okay, let's go through the simple Fig M. Enter the maneuver by pitching up smartly into the wind. Establish an absolutely vertical line, hold for a couple seconds and chop power to a fast idle. Using identical techniques which I described for the wing-over, pivot on top to a straight vertical downline. As previously discussed, this is the toughest part of the maneuver; the objective is to slow almost to a stop and pivot tightly to a downline parallel to the upline. Okay, hold that downline for a couple of counts and then push into a smart half outside loop to a third vertical line. Now perform a second stall turn as before into a downline and then exit as you initially entered the maneuver with the same pitch rate. The maneuver must be centered, the stall turn tops the same, and the bottom of the outside half loop the same altitude as entry and exit. Most modelers will vary the half outside loop in order to center the maneuver; if you entered early or you have a strong wind, you will have to stretch it a bit — but **don't** put a flat on the bottom — try to make it a smoothly rounded 1/2 outside loop. Don't let the maneuver get excessively tall — if you have a super fast ship, try entering at partial power. As with most maneuvers, you want it as close as possible without exceeding the vertical limits — this means it can't be a mile high — also the judge can't see it as well and his perspective of maneuver balance and symmetry gets all distorted. Remember what I previously said about cross wind track correction and the method for preventing oscillations after the stall turn pivot. The M's with 1/2 or 1/4 rolls are basically variants of this maneuver. You simply add a 1/2 or 1/4 roll in the **center** of the up and down lines. You will need more horizontal distance to perform the 1/4 roll maneuver since the pivots are in the direction of flight. Personally, I prefer the 1/4 roll maneuver since it presents better and is easier to judge. For this latter reason I feel you have a better chance for a very high score. In the Masters Class, I have never



CUBAN EIGHT



REVERSE CUBAN EIGHT

seen any M used other than the one with 1/4 rolls.

Cuban 8:

The Cuban 8 and reverse Cuban 8 maneuvers are among the prettiest maneuvers we fly. Unfortunately, they carry only a 2 "k" factor and one rarely sees them in the Masters pattern. They certainly are not easy in that it is difficult to accomplish symmetry in the two loops and precisely intersect the downlines in the center. The judges will really zonk you for that lack of intersection because it's easy for him to judge. Rarely do I see this maneuver performed with symmetry and precise intersection. The problem is, the maneuver can look very pretty and be technically very **bad**. Most fliers are usually shocked by their poor score on this maneuver — which occurs when the judge really knows his business. Remember, you are trying to perform two precise **round** loops with the 45° downlines being precisely centered. Enter the maneuver by flying past and pulling into a **round** loop — concentrate on **round**. Break it off on a 45° downline and half roll in the center of the downline. Next, pull into a second loop equidistant on the other side. Break off on a second 45° downline and half roll. Complete by pulling up to level flight exactly where you began the maneuver. Most fliers make distorted ovals out of the loops and fly a very shallow downline. You will have to practice spacing the loops right and left to permit the correct intersection.

The reverse Cuban 8 is basically an inverted version of the standard Cuban 8. It's initiated by pull up into a 45° upline from your right or left (depending on direction of flight). Half roll in the center of the line and then pull into a loop, continuing until you are again into a 45° upline. Half roll and complete a second loop finishing on the bottom exactly where you began the maneuver. A common mistake involves flying two exaggerated split S's and missing the cross-over by a mile. You must pull up before it reaches center stage or you can't properly center the maneuver. The most common mistake is waiting until the ship is about center and then pulling up.

Top Hat:

The Top Hat and reverse Top Hats are neat maneuvers requiring precise aircraft trim and good technique. Your ship must be able to turn fairly tight corners, inside and outside without pulling off. It also should hold a nice straight vertical line without fighting it. This can be a problem for long vertical pulls — most any kind of trim will suffice for vertical dives. Remember, the vertical and horizontal legs of these maneuvers are the same length.

The Top Hat is performed by pulling rather smartly into a vertical climb, establish a straight climb, 1/2 roll, continue the climb, pull inverted, fly level inverted, pull straight down, 1/2 roll, straight line, and pull out at same altitude and heading as entry. Remember, as in most maneuvers, think of it as maneuver elements and don't let things flow together. Try to make your turn radii the same. The maneuver is balanced in front right and left. A couple of hints: you can get those nice tight corners easily if you have quick strong servos and plenty of control throw. When you pull inverted on top, remember to hold a little down since the ship has slowed perceptibly and, of course, you must retrim for inverted flight. Keep your speed up for the pull down and chop the power as you pull; this will give you a better corner.

The reverse Top Hat turns it all around. From altitude, pitch straight down, hesitate,

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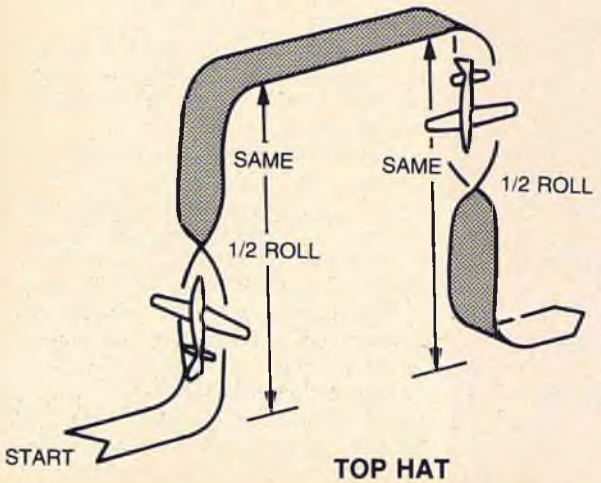
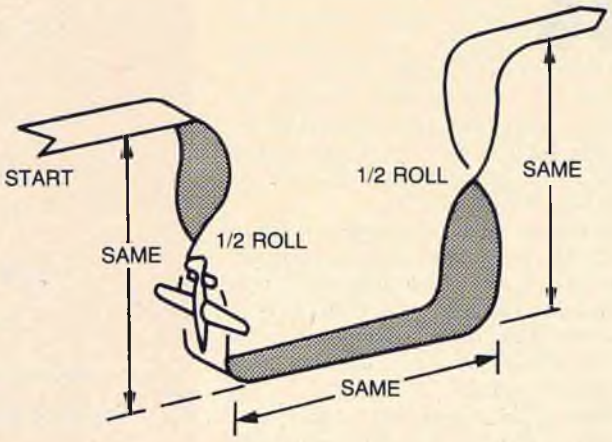


TOP HAT



REVERSE TOP HAT

PROPMOBILE

Put that unused radio to work in this simple to build fun machine.

By Ron Dexter

PROPMOBILE
Designed By: Ron Dexter

TYPE OF VEHICLE
Sand and Snow
BODY LENGTH
14½ Inches
OVERALL LENGTH
16½ Inches
BODY WIDTH
3½ Inches
OVERALL WIDTH
10 Inches
WEIGHT
23 Ounces
FUEL TANK SIZE
2-3 Ounces
ENGINE SIZE
10-.15 Cu. In.
REC. NO. OF CONTROL FUNCTIONS
2
REC. CONTROL FUNCTIONS
Steering and Throttle
WHEELS
2 Inch
COVERING AND FINISHING
See Text
BASIC BUILDING MATERIALS

Body	Balsa & Ply
Skis	Balsa & Ply
Canopy	Balsa Block

After a year of being a novice in flying radio controlled airplanes, I wanted to widen my horizons in this hobby. Wanting to be able to use my radio unit, summer and winter, I looked into model cars. After not finding much in the way of year-around vehicles, I decided to design and build my own type of land vehicle.

Now came the question of how to power it. The idea of a transmission came first, but that was eliminated due to the complexity of such a unit. The only way left was to use a propeller. What the heck, if airplanes can be moved on the ground by a propeller, why not a land vehicle?

After what seemed like weeks (two nights) the plans for my new creation were done. The first question that arose was **"will it work?"**

The answer to that question is a definite yes . . .

Back Skis:

Trace or cut out the following patterns from the plans: 2A, 2B, 2C, and the runner outline shown on the ski assembly elevation.

From 1/32" plywood, cut out three ski bottoms, part 2C, and one runner. From 1/8" plywood, cut out three ski vertical pieces part 2A, and two ski braces, part 2B.

Fabricate one ski at a time using the following assembly sequence: Take one ski bottom, part 2C, and soak it in warm water for five minutes, flexing back and forth so as to get it thoroughly saturated. Remove part 2C from the water and bend in the curvature shown on the plans. (Bend it a little farther than is shown, because it will tend to straighten out somewhat when drying.)

Dry part 2C by holding it in a curved position by the heater of a vacuum cleaner hot air outlet. It should stay in the curved position when released by hand. If it doesn't, repeat the process.

Cut out two pieces of 3/8" triangular balsa 5½" long. Glue the triangular balsa to each side of part 2A so the bottoms of all three pieces are flush. Once the glue is dry, shape the triangular balsa, so its front has the same curvature as the bottom of part 2A.

Epoxy this assembly to 2C, centering it in the middle. This should leave about a 1/2" space between the front of 2C and 2A. The back of both pieces should be flush.

Repeat the above procedure to fabricate the other two skis.

Front Ski:

Use one of the previously made skis in making the front ski.

Take the two parts 2B, previously cut out, and glue them to each side of 2A (note plans). Next, take the ski runner and epoxy it to the center of the bottom of the ski part 2C.

Completely sand all of the skis.

Body Construction:

Cut sides A and B from 3/16" sheet balsa wood. (Note: pattern on plans is backwards from what it should be. The end that measures 2⅝" is glued to part 1C.) Put both sides together and sand edges to assure both sides are the same all around.

Glue 1/4" triangular strips to the inside of A and B. These strips add beam strength to the body.

Cut out formers 1A, 1B, and 1C, from 1/8" plywood. Sand all rough edges smooth before assembly.

Stand sides A and B on the plans over the top view. You will note that the lower corners of the formers will need to be trimmed (or the 1/4" triangular strips) to allow proper fit. Do one or the other. Epoxy formers 1A and 1B in place making sure everything is lined up according to the plans. When dry, remove assembly.

When gluing former 1C to the sides A and B, make sure that 1C sets square and true against the sides.

Instead of trying to plank the top, I opted for an easier way. I used cardboard (approximately 1/64" thick) which was the cover from an old paper tablet. Actually any cardboard of a suitable thickness could be used, as long as it bends easily without creasing or kinking.

Starting out at the front of the model, measure 3/8" down from the top of the sides, and draw a line from front to back along the sides. Smear this area with white glue (not too thick) from former 1A to former 1B. Lay the cardboard on the line, press and let dry.

Smear glue on top of formers 1A and 1B and along the opposite side of the model, again only from former 1A to 1B. Carefully bend the cardboard over the top and down the other side. Hold in place with clamps, tape, or rubberbands. Let dry. Repeat this process for the back half of the top of model body.

Remove any excess cardboard with a sharp X-Acto knife, after the top cover has thoroughly dried and set in place.

As far as the canopy goes, you can purchase a ready-made one, of plastic or, if you want to, you can carve a canopy out of a balsa block, and shape it to suit your own style.

Draw out a pattern of your own or use the one indicated on the plans. If you carve the canopy from a balsa block, it is not necessary to hollow it out, just curve the underside enough to conform to the top of the model body.

Epoxy the finished canopy onto the carboard sheeting. Hold in place with rubberbands while drying.

Cut out part 3A from 1/8" plywood and epoxy in place.

Completely sand the model until smooth.

Rear Running Gear Assembly:

The metal part, which is the actual gear, is a landing gear made by Royal. The width is 1½"; span from end to end is 10" and the mounting area is 2½" x 1½". This part or a similar one, is obtainable from any hobby outlet.

Center the running gear on mount plate 3A. Drill two 1/8" holes through the gear and part 3A, to accept two 4-40 mounting bolts.

Cut a piece of foam, 1½" x 3½" x 1" thick. Line the foam up against the running gear and drill the two holes through the foam. The mounting bolts used are 4-40 x 3/4" long. Put these in the running gear holes and through the foam. Push this assembly into the holes in part 3A. Put one nut on each bolt and tighten each equally until the foam is 1/4" thick. Add another nut to each bolt and tighten the nuts against each other. This will keep the nuts from vibrating loose and having the assembly come apart. An alternate method is to use lock washers under the nuts. To be extra safe, put a dab of epoxy on the nuts.

The purpose of the foam is to act as a shock absorber. Without it, unwanted vibrations will be transmitted to your radio system.

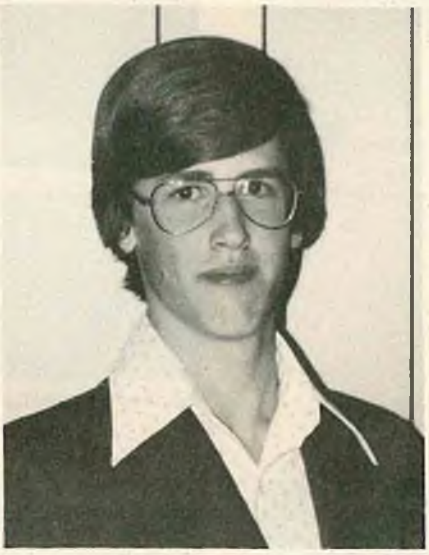
The skis are mounted by using a 4-40 x 1/2" bolt and a nut tightened to the running gear. The ski mounting brace should be on the outside of the rear metal running gear.

For summer use, the wheels are mounted in the usual way. Run a bolt through the wheel and place a washer on the other end. Put a nut on the bolt but leave a 1/16" gap between the washer and the wheel hub. The wheel should turn freely when the bolt is held. Slide the bolt through the hole in the running gear. Put a nut on the other side, and tighten the metal running gear between the two nuts. The wheel should then turn freely.

Front Running Gear:

As you probably have noticed, the front steering gear is homemade. I suggest that you purchase a ready-made steering wheel system. Many companies sell them at a reasonable price. These are usually better than a home-built one. If you purchase one, be sure to buy one that doesn't have a prebent wire, otherwise you will have it the wrong size to fit this model. Mount the steering assembly to part 1A. Bolts are supplied with the steering mechanism. Center the steering assembly so the straight wire (the part before it goes into the coil) is in the center of the model. Next, attach the wheels or skis to the rear running gear. Bend the front steering wire so that with wheels, or skis, attached, the bottom of the model body is level.

Drill a hole in 1A behind the arm on the



ABOUT THE AUTHOR

Ron Dexter lives in Bear Lake, Michigan, a little village with a population of about 500. He is currently a student at Bear Lake High School. After graduation he plans to go to flight school and become a commercial pilot. Ron's main interests are basketball, track, R/C and full scale airplanes. He has been in the hobby of radio control for one year and enjoys it very much.

Bill Of Materials

Plywood
6" x 12" x 1/32" — (1 req.)
6" x 12" x 1/8" — (1 req.)

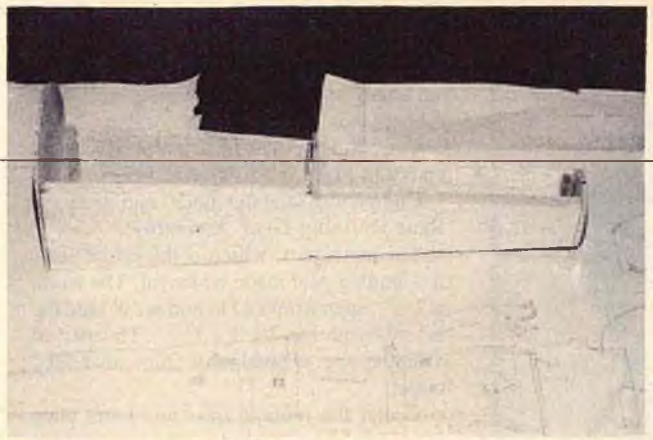
Balsa Sheet
Two 5/8" x 13¼" x 1½" x 3/16" — (L)
2" x 19" x 1/16" — (1 req.)

Cardboard
7" x 11" — (2 req.)

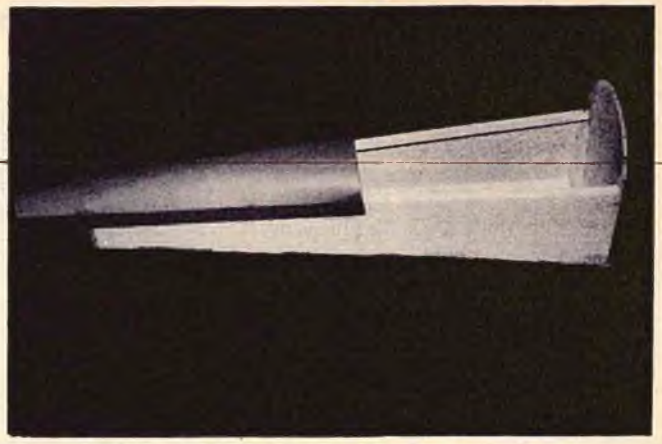
Balsa Block
1½" x 5½" — (1 req.)

Balsa Tri-Stock
60" x 1/4" — (1 req.)
15" x 3/8" — (1 req.)

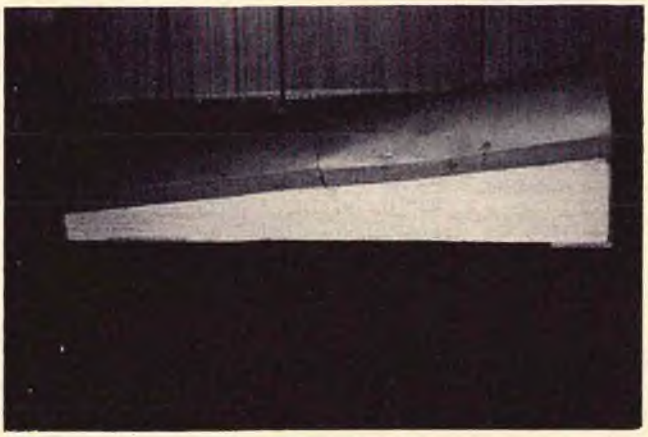
Misc.
2 oz. fuel tank
Pushrods
Mounting bolts
Motor mounts
Running gear
2" Du-Bro wheels
Fuel tubing
Dope
Covering (optional)



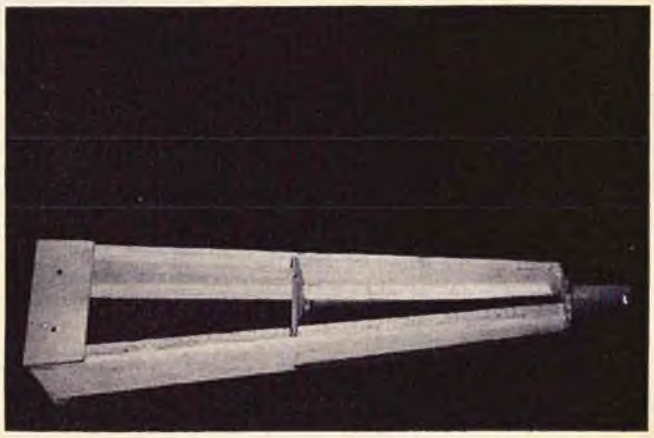
Sides and gussets lined up on plans and glued.



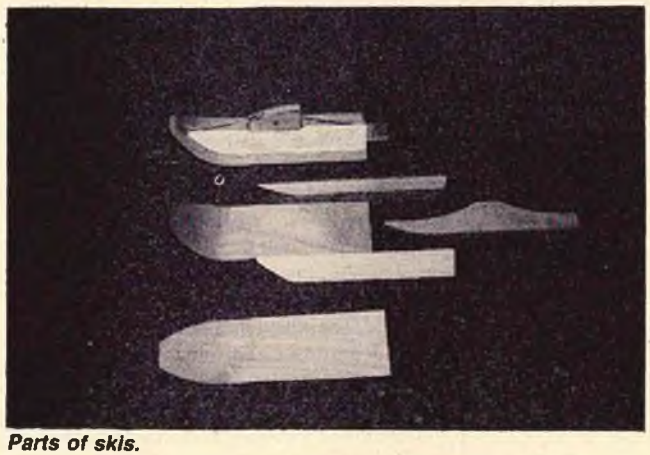
Cardboard formed and glued to front of body.



Whole top sheeted with cardboard.



Running gear mount plate glued to bottom and view of radio area.



Parts of skis.

Soaking ski in warm water.

steering unit where the pushrod wire will go through.

Engine Mounting:

Attach all three skis or wheels to the running gear. Put the propeller on the engine, and attach the engine to the motor mounts.

Now, set this assembly up against part 1C, so that there is at least 1¼" space from the propeller tip to the ground, and the motor is centered on part 1C.

Mark the mounting hole locations on part 1C, and drill 1/8" holes through the plywood part 1C being careful not to drill into the gas tank, if it has been installed previously.

The next step is to mount the engine assembly to part 1C. Use 6-32 x 3/4" long bolts, with nuts and washers. Tighten securely in place.

One final note: do not mount the engine so high that the fuel cannot reach the engine.

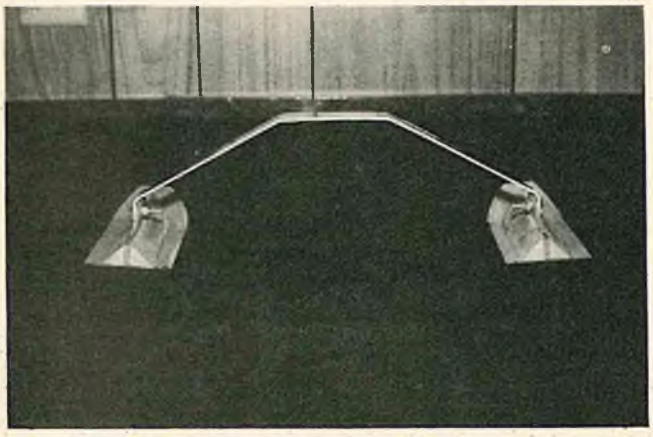
Radio Installation:

The servos are mounted in an upside-down position. A normal servo tray that comes with a radio system can be used or, if preferred, servo mounting tape can be used. If servo tape is used, put a thin layer of epoxy on the balsa side panel before mounting the servo. Let the epoxy dry first before mounting the servo.

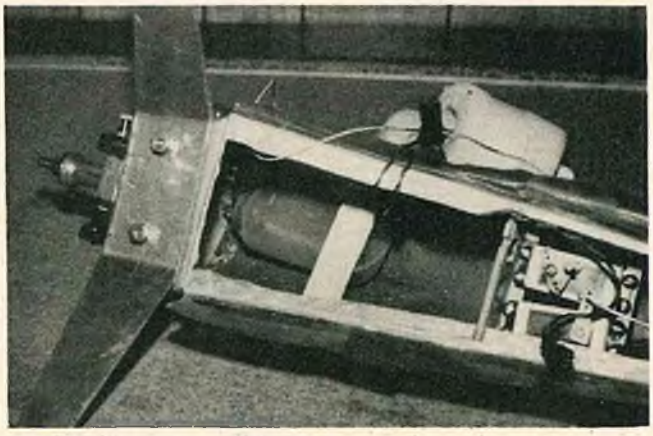
The pushrod steering assembly is a piece of 1/16" music wire. The distance from the

Drying ski using vacuum cleaner.

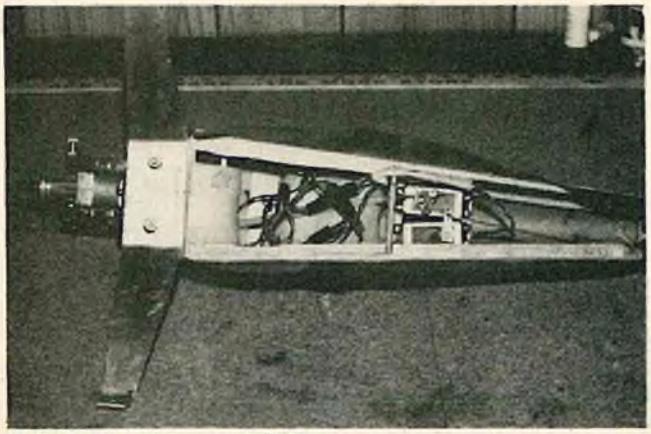
Finished front ski. Note runner on bottom and built-up top.



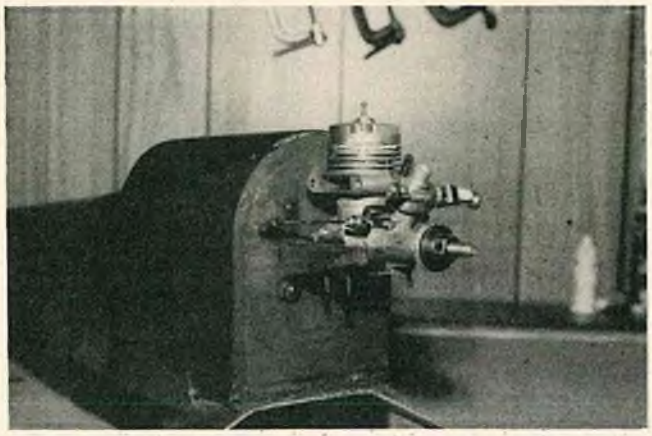
Note angle of mounting skis to running gear.



Fuel tank and servo installation.



Entire radio system installation.



Engine mounting details. Note shock absorbing foam between the running gear and body.

servo to the steering unit is too short to use a wooden pushrod, plus the music wire absorbs small vibrations.

An item that I have found very useful is the Du-Bro E-Z Connectors. These little connectors attach to the servo arms and have a hole with set screws in place. This allows the pushrod to be easily adjusted to the proper length.

I used a NyRod to connect the servo to the throttle. These are nice in that the pushrod moves freely in an outer tube, and the receiver, tank, and battery pack can lay right against the pushrod without any harm.

Wrap the batteries and receiver in foam, tape in place with masking tape, and cover with plastic wrap. The foam absorbs shocks, and the plastic wrap keeps out spilled fuel.

The receiver is tucked on top of the throttle pushrod, and is held in place with foam.

The battery pack lays on top of the mounting plate for the back running gear. It is also held in by jamming foam between it and the walls.

I routed the antenna straight out the side and ran it around the outside edges of the model. The reason for this was to minimize any radio interference.

Finish:

Sand the body and skis completely

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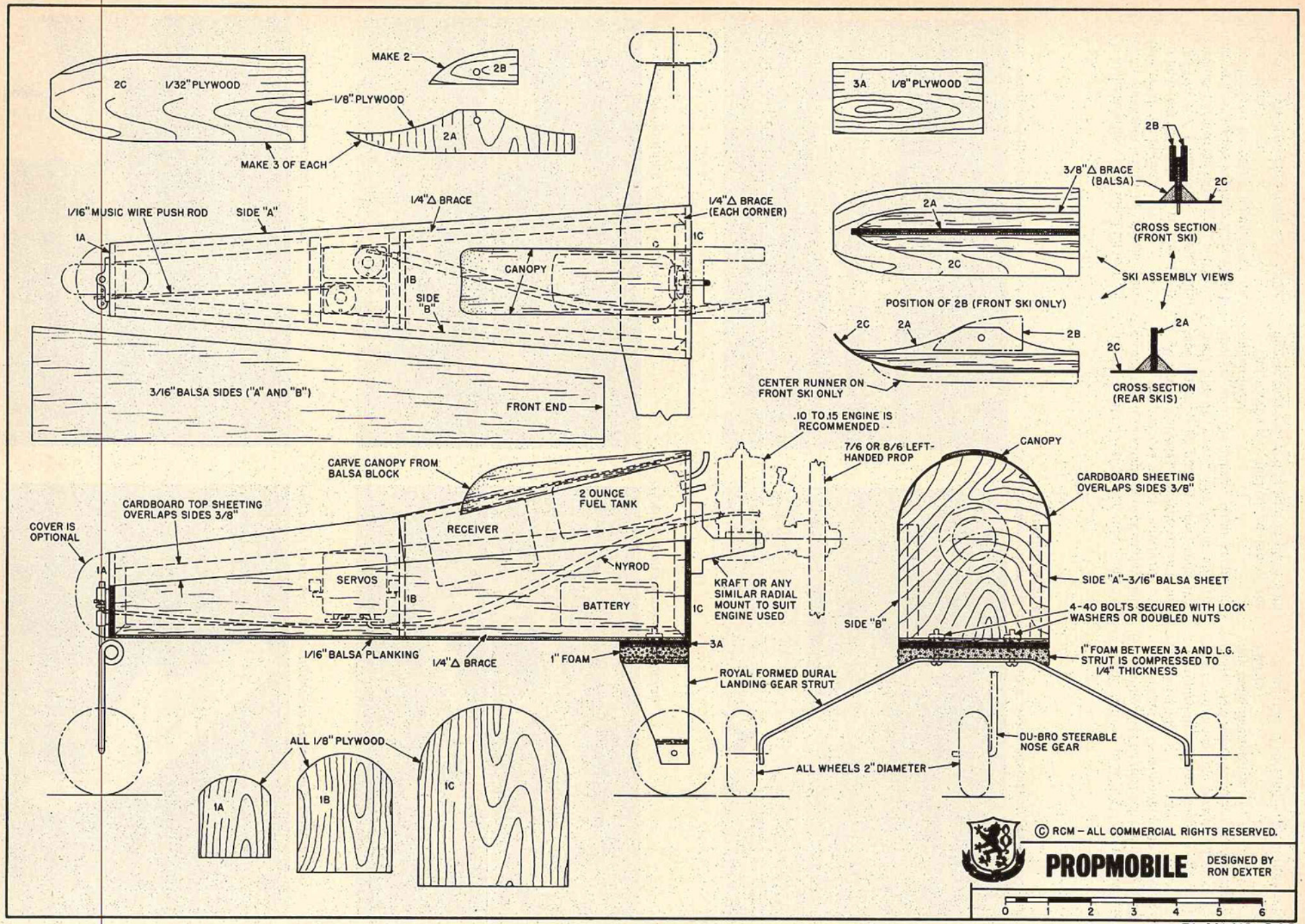


PROPMOBILE DESIGNED BY RON DEXTER

0 1 2 3 4 5 6

PLAN NO. 848

CUNNINGHAM ON R/C

Chuck Cunningham

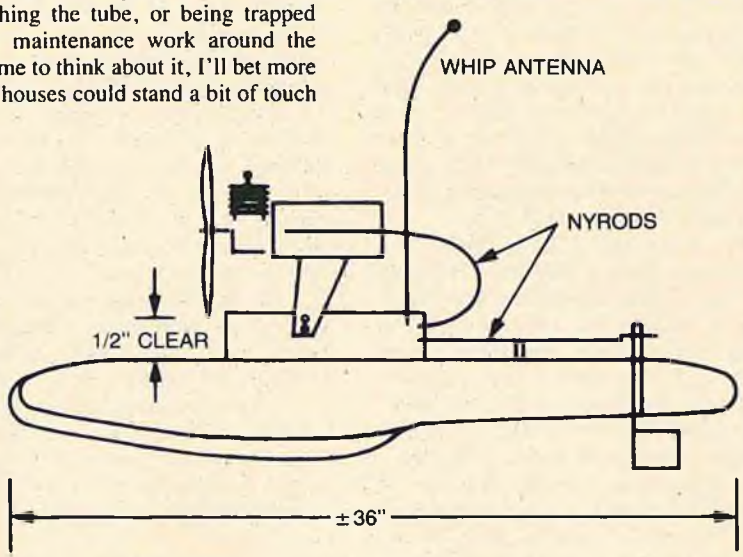
Cunningham Gets Cabin Fever In Bad Weather

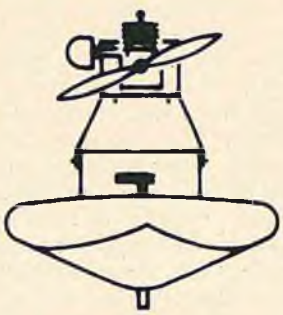
Weather --- kinda like something that rides on your back all of the time, isn't it? I'll bet that most non-RC'ers really don't pay too much attention to what the weather is doing all of the time but, with our fraternity, it's a different matter. Right now it's raining outside. This is the Memorial Day weekend, Sunday morning to be exact. Yesterday the wind was blowing at a nice twenty plus gust clip, and hardly anyone ventured out to the flying field to get in a few flights. Everyone was primed to get in lots of flying today and what happens, rain all last night and, so far, rain all this morning. Wonder what the last day of this three day weekend will hold. It does seem that the weather works in weekend cycles, with perfect days on Tuesday, Wednesday, and Thursday, and crummy weather Friday, Saturday and Sunday. I've seen some terrific Mondays out of the window of my office, how about you? So what? Well, it just brings up the point that I like to make in the winter (but is good anytime of the year), always have another project on your building board so that if you cannot go out to fly, you can at least get some work done on your next bird. It's really terrible to be caught without something to fly if the great Crash God reaches out and smites your aircraft. I've even seen the Crash God crunch an aircraft with a car door --- it doesn't even have to be a pilot screw up. Anyhow, pick out your next project and get to work on it. Don't spend those crummy days watching the tube, or being trapped into some maintenance work around the house. Come to think about it, I'll bet more modeler's houses could stand a bit of touch up paint than non-modelers houses. We might take a national poll.

With the terrific choices of radio equipment available today as well as their very low price tags most active builders and fliers purchase several sets of radio equipment. Quite often the beginning flier purchases a two channel radio with a trainer type aircraft, and then, after a bit of time, progresses to a four channel rig to use on larger, more typical, RC aircraft. All too often this two channel radio gets tossed onto the back of the workbench and is rarely used. Why not use this radio to control another type of model, one that you can use on those days that you cannot get to the flying field due to the earlier mentioned crummy weather. You can build or purchase a simple electric boat that uses two channels for steering and motor control, and run this boat on any local pond. In fact, I've just ordered an electric boat from Hobby Shack to run around on my swimming pool. I plan to lay out a race course using balloons with a small weight attached to an anchor string to keep them in place. Also, another idea is to put a slightly sharpened piece of 1/16" wire sticking out from the prow and use this to try to pop a floating balloon. Of course, with electric power the batteries tend to run down rather rapidly, but you can build up flite (whoops float) packs of larger nicads purchased from Radio Shack, or take apart an old flite pack that will not hold a charge and see if some of the cells are still usable. Even if the batteries do fail, you don't crash, the boat simply drifts over to the side.

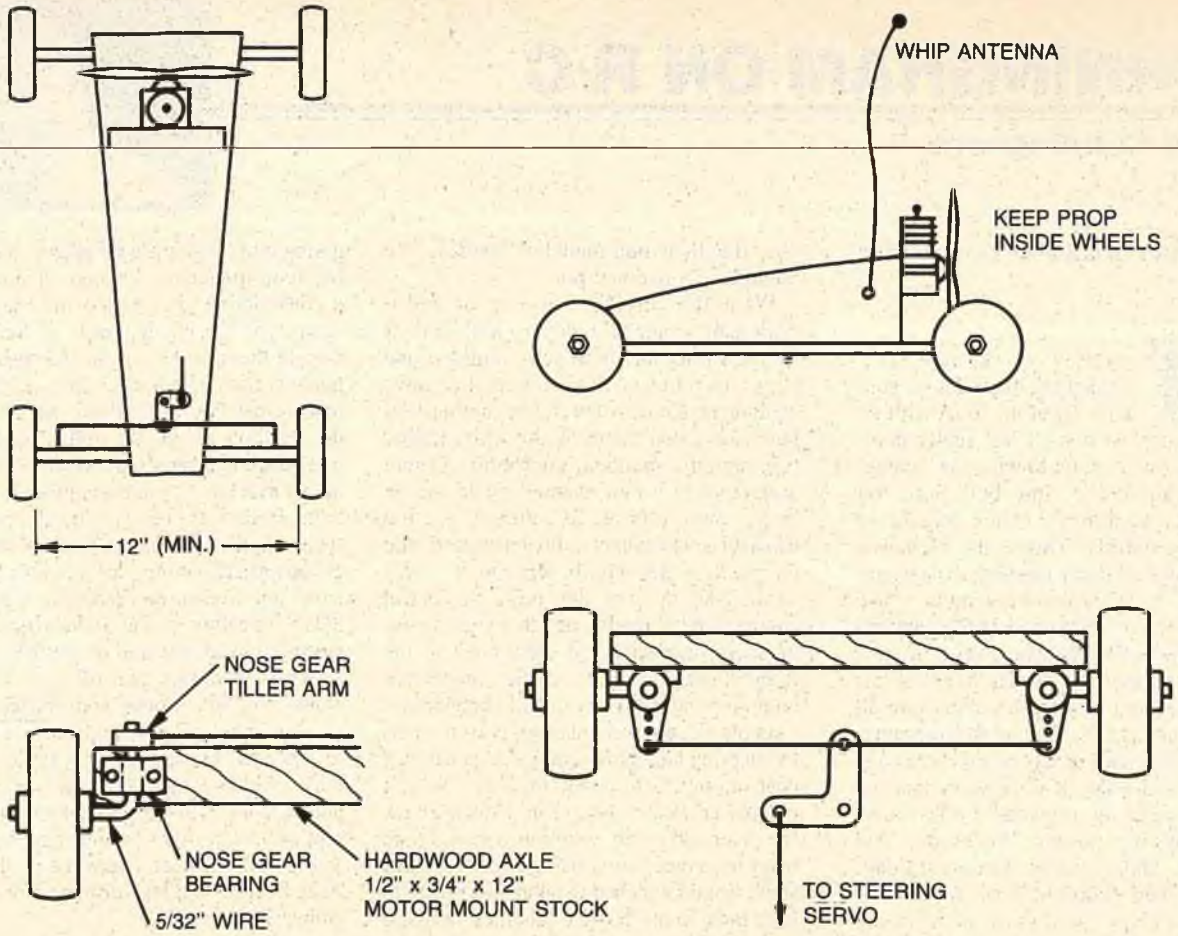
Some years ago I built a very simple air boat by using a child's foam float board for the hull. I mounted a box on top of this hull, gluing it to the foam with epoxy. Inside the box (constructed of plywood salvaged from a construction site) rested the radio, two servos and the battery pack. Bolted to the box on the outside was an old sheet metal landing gear. The bottom parts of the gear that normally hold the wheels were bolted to the plywood. On the top of the landing gear was bolted another simple plywood box that held the fuel tank, and the engine was bolted to the front of the box. At the aft end of the foam "hull" I epoxied a piece of plywood on the top and bottom, drilled a hole through from top to bottom, inserted a piece of 3/32" wire with a water rudder (made from a scrap tin can soldered to the wire) on the bottom, and a nose gear tiller on the top. I connected the throttle and rudder to the servos with NyRods, and had an almost instant boat. I used a rather wide float board with a kinda boat-type bottom molded in, and it really worked great. Don't run this type of boat in your swimming pool though, as the fuel will really ruin the pool water. Take it to a small lake or pond, for a lot of simple fun.

Another way of using that two channel radio and a small engine is to build a simple air car. Again, a number of years ago I built a simple car, sometime before the current breed of racing car got started. It was easy to build, and we ran it for months in the parking lot after club meetings. The only things that you need are a two channel radio, a .10 or at the most a .15 engine, four wheels from aircraft, 2½" to 3", some standard model fittings, such as nose gear blocks, and wire and wheel collars. Again, with a bit of wood liberated from a construction site you can build a really super little car. Mine was fitted with a braking system that was tied into the low throttle. The engine operated on the top half of the throttle servo movement, and the brakes operated on the





SIMPLE TWO CHANNEL AIRBOAT



SIMPLE TWO CHANNEL AIR CAR

bottom half of the throttle servo movement. Generally, you would never want to operate the high engine and brakes at the same time, so that when the brakes were released the engine would then pick up speed. Really worked great. You also need a pusher prop, but these can be purchased from well-stocked hobby shops. Tornado makes a plastic pusher prop. I had to give up both the boat and the car in a move some years ago, but am planning to build another car soon, so will include pictures and plans for it at some future date. It really doesn't take much thought for a modeler to work out the problems of making either a car or a boat.

One word of caution, please make sure that when you're operating these items that you do not operate near any flying site. I know that I will probably get cards and letters saying, "Cunningham, you're nuts, only certain frequencies are set aside for cars and boats." Yep, but I'll bet you bucks to broken props that more radio systems are being used for other than aircraft than you can imagine. If some of you radio experts would come up with a simple, home-built, device that could be clipped on the antenna to limit the range of a radio to, say, 100 yards, this really would be a breakthrough for controlling the output of the non-flying radio.

Another word on the air car; for starters, keep the turning of the front wheels very low, even less than you turn a nose wheel on a trike geared aircraft. You will be surprised how fast these little cars can go. If you use a wide spaced wheel axle and narrow turning radius, the little cars will not flip over. You can go one step farther by constructing a "fan cage" around the prop and use a starter rather than a finger to get it going.

Some rough sketches are included to give you some idea of both the boat and the car. As a matter of fact, since it is raining today, it's out to the work shop to build another car. With any modeler's collection of old parts, engines and wheels, it is a simple, fun project that can be done in a pretty short time. I haven't figured out how to cover mine with MonoKote, so I'll have to spray paint it with Rust-Oleum paint which is fuel proof. My latest tool box is painted with this paint, and it is totally fuel proof.

Now, as they say on Monty Python, for something completely different. The other day I was looking through the newspaper, trying to locate some news crammed in among the ads when I came across a wire service photo and a very short, non-descriptive article about "Groupies gather on the edge of war." The picture with the article was captioned, "Eva Chute, former New Orleans schoolteacher and now war groupie, holds a remote-controlled model airplane capable of carrying explosives and downing Soviet helicopters in use in Afghanistan." The picture showed a rather normal sized RC aircraft with a sweptback wing, but in place of the horizontal stab it had another wing of the same size as the normal wing, with normal acting elevators in this aft surface. It appeared to be .60 powered with normal trike gear. The minimal text in the article said, "A Briton was developing a 'secret' weapon for the Afghan insurgents when he mysteriously disappeared, reports his American partner, former schoolteacher from New Orleans, who awaits his return." So much for the information. I really can't understand the need for two wings, unless it's lifting a tremendous bunch of weight. I'm not too sure just how easy it would be to home in on a helicopter and bash into it at full bore, but once again here is RC aircraft being used for something other than fun and games. Speaking of that, did you notice the news release recently about the Israeli "unmanned" spy plane that was shot down by a missle. Pushbutton warfare really isn't very far off. How about letting the world leaders settle all of their problems by working a TV "game" and leave the rest of us to go about our business, like going out to fly if the wind and rain ever lets up.

Recently I received a letter from Bob Evens, commenting about my column on scratch-building:

Dear Chuck,

I read your column each month in RCM and enjoy it very much. I have just finished

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AN ESSENTIAL MODELERS PREDICTION TOOL

A power factor to predict flight capabilities of your aircraft.

By Guillermo Villa Novoa

There are many times when a modeler needs to predict how efficient his engine in his airplane will be, or whether it will fly at all without the painful trial and crash procedure. Experienced R/C pilots sometimes develop a good feeling and may tell you that it won't fly with that engine. But what can a newcomer, or less experienced modeler, do to know in advance how his plane will fly, if at all for the first flight?

This question is always in the mind of most everyone with his first plane; or the creative modeler giving birth to his own design; or one who has made modifications to some original design; or ended up with a heavier than specified model; or when the kit specifies "for engines from 0.19 to 0.40 and you are in the lower range; or when you have to fly at high altitudes, etc.

I am relatively new in the hobby (only a few years) and, like most modelers, have been puzzled about this question and for which I could not find an adequate answer. In talking to experienced modelers or reading the magazines and books, the most I could find is a plain relation of engine displacement to weight, but that is not enough. So I decided to do my homework and try to get a general formula which may answer the question.

After doing some aerodynamic studies and proving formulas, it was hard to come to a conclusion since I found so many variables and so little information on most of them. I gradually modified some formulas and, after literally thousands of calculations and weeks of meditation, I developed the formula given here which is more an empirical than a scientific one, but it works satisfactorily.

The problem in obtaining a formula is quite complex since it involves many important variables such as:

(1) Weight.
(2) Wing area.
(3) Type of airfoil.
(4) Pitch and diameter of propeller.
(5) Rpm's developed by propeller.
(6) Air density affected by altitude and air temperature.
(7) Drag coefficients (induced, parasitic, profile).
(8) Friction of wheels on land.
(9) Aspect ratio.
(10) Dihedral, stabilizer and fin area and

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TABLE 1

Prop Size Factor = Z	
Prop Diameter	**Z**
4	1.296
5	2.539
6	4.527
7	7.600
8	12.152
9	18.455
10	26.847
11	38.416
12	53.156
13	72.366
14	96.049
16	162.901
18	260.604
20	400.144
22	591.427
24	850.305
26	1.184.507

To calculate other diameters use formula:

$$Z = \frac{(D+3)^4 D^{0.6}}{4.22}$$; where D = diameter

Above table is for two blade propellers. For three blade propellers you may multiply factor by 3/2.

TABLE 2

Altitude Factor = A	
Ft. above sea level	**A**
0	830
1000	865
2000	900
3000	937
4000	973
5000	1008
6000	1044
7000	1080

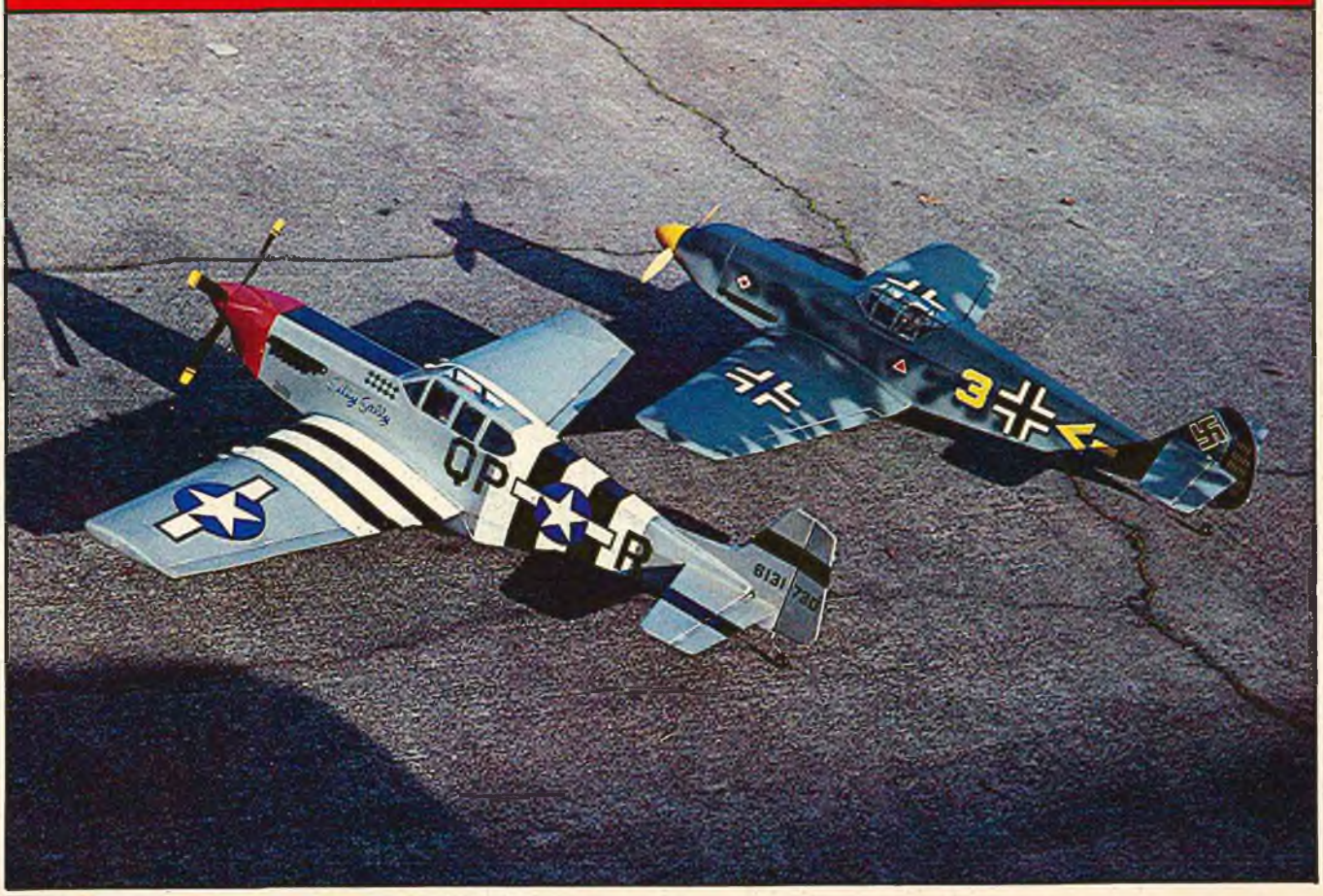
For different altitudes, extrapolate data.

TABLE 3

LIFT FACTOR		
Type of Airfoil	**Maximum Thickness-%**	**Lift Factor**
Undercambered	8	1.30
	9	1.35
	10	1.40
	11	1.45
	12	1.48
	13	1.51
	14	1.55
Flat Bottom	8	1.25
	9	1.27
	10	1.29
	11	1.30
	12	1.31
	13	1.32
	14	1.33
	15	1.34
Semi-symmetrical	9	1.07
	10	1.11
	12	1.14
	14	1.17
	16	1.20
	18	1.22
	20	1.22
Symmetrical	9	0.85
	10	0.86
	12	0.88
	14	0.94
	16	1.00
	18	1.02
	20	1.04

The above lift factors are figures estimated by the author for the sole purpose of calculations of the P.F. formula of this article. They are similar to maximum coefficients of lift of most common airfoils and for an airfoil not represented above, the wind tunnel data for maximum coefficient of lift may be used if available.

SHOW TEAM SPECIAL



Good grief — not another ME-109!!

Your imagination and a few cosmetic changes to the basic Show Team Special design allows you to build a wide variety of Stand-Off Scale aircraft.

By Darrel C. Stebbins

Not really, but it kind of looks like a ME-109. It also sort of looks like a P-51C. And resembles a Hawker Hurricane, or maybe a P-40, or a MIG-3, or a Lavochkin LaGG-3, or a Kawasaki Ki-61, or a Dewointine D-520, or a Yak-1, or . . .

The attrition rate of planes used in the "dogfight" segments of our Barons Flying Circus Air Shows is quite high, and we simply cannot afford the time and money required to field high-quality scale models for this activity. Since the spectator appeal lies mainly in the excitement of spirited pursuit and near mid-air collisions, the configuration of the planes can stray quite far from true scale without detracting from the performance. Colors, markings and general outline can convey the scale impression adequately — we really don't need true scale models for Air Show combat.

Consequently, I was searching through the old files and magazines for something suited to our purpose and happened across a construction article by Danny Reiss entitled "Two WWII Fighters for Sunday Flying." Danny presented a basic airframe that could, with merely cosmetic alterations, be either a Kawasaki Hein "Tony" or a ME-109. These were very attractive models, with no pretense of being exact scale, and designed for easy building and sport flying. He called them "semiscale." *(Editor's note: Romey Bukolt designed the "Warbirds," a three-in-one 1/2A powered model that appeared in RCM, April 1973.)*

With Danny's plans as a jumping-off point, I developed the plans into what we needed for the Air Show Team — a basic plane that could, with minor modifications and appropriate color schemes and markings, resemble a ME-109, a Hawker Hurricane, a P-40C or even a P-51C. This gives us the planes we need for our Normandy Invasion Segment — the Bad Guys bomb our tanks, then are set upon and driven off by the Good Guys. These aren't Scale airplanes, they are Sort-Of-Scale. Even that terminology must be regarded as a broad-stroke description.

For our purposes, the planes are completed with an absolute minimum of sanding and such. Painted with flat or low-gloss camouflage color schemes, with all the identification markings we can reasonably find room for, from 50' away they exhibit all the authenticity the uninitiated eye requires — they are indeed Messerschmitts and Hawkers and Warhawks and Mustangs. There is almost no expensive balsa or aircraft plywood used in the construction, they go together very quickly, and they fly very, very well.

A plane that is quick and easy to build, cheap, attractive, identifiable, and flies well. Exactly what we needed for our Show Team. You may find a use for one, too.

Materials:

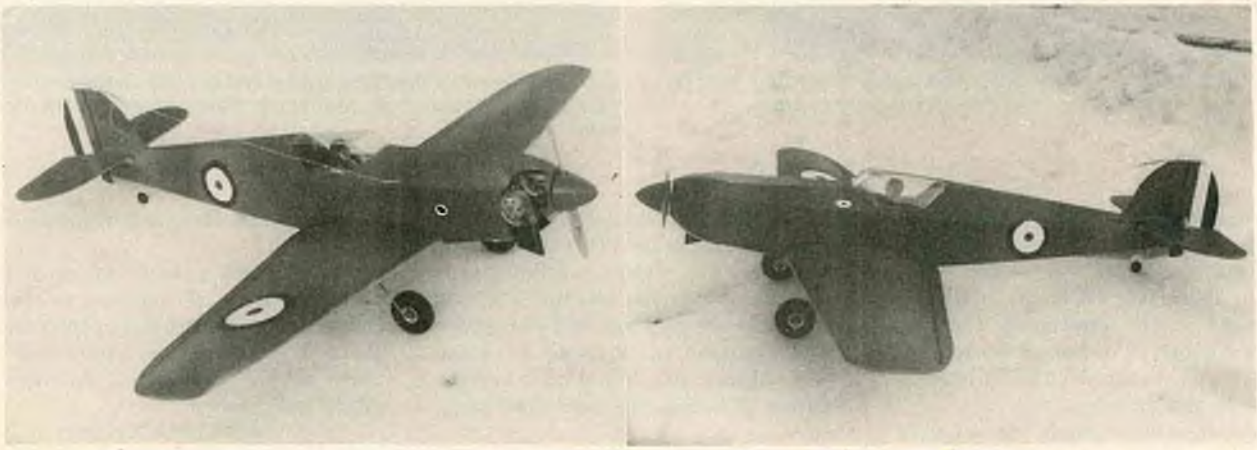
As some of the materials used are not commonly found in kits, a brief discussion of materials is in order:

Basic construction material for the fuselage and empennage is 3/16" Foamboard. This material is an inexpensive, lightweight laminate of 1 lb. per cubic foot density foam core with glossy coated paperboard on both sides. It can be found at art supply houses, some hobby shops, or can be ordered from Sig if you don't have a local source. It costs about one-fourth as much as balsa. Using it will require you to learn some new building techniques, but it is easy to work with once you get used to it.

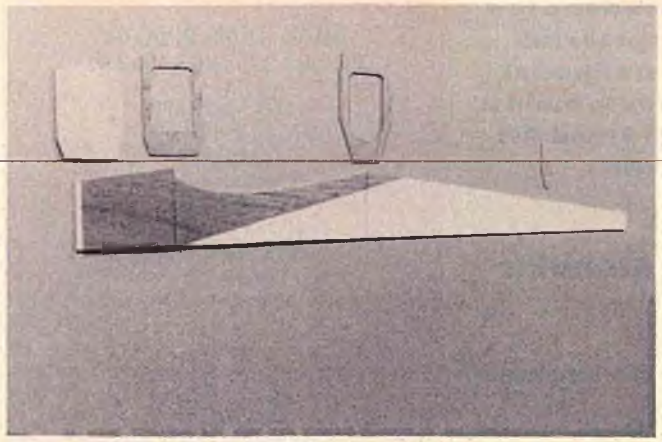
The wing is made of cardboard-covered foam cores, also very easy to build once you understand the process. The cardboard we

SHOW TEAM SPECIAL
Designed By: Darrel C. Stebbins

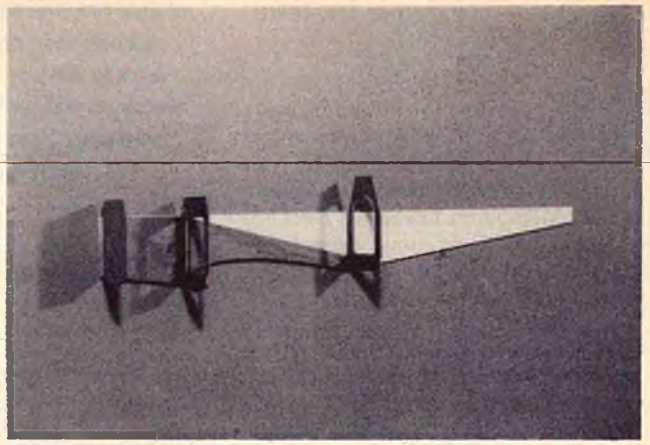
TYPE AIRCRAFT
Sport Semi-Scale
WINGSPAN
49¾ Inches
WING CHORD
Root — 12", Tip — 6"
TOTAL WING AREA
444 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Semi-symmetrical
WING PLANFORM
Double Tapered
DIHEDRAL, EACH TIP
1⅛ Inches
O.A. FUSELAGE LENGTH
45¾ Inches
RADIO COMPARTMENT AREA
(L) 11½" x (W) 3¼" x (H) 4"
STABILIZER SPAN
19 Inches
STABILIZER CHORD (incl. elev.)
4½" (Avg.)
STABILIZER AREA
85.5 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
(ME-109) Mid-Fin
(P-51) Mid-Fuselage
VERTICAL FIN HEIGHT
4¾" or 5½"
VERTICAL FIN WIDTH (incl. rudder)
6½" (Avg.)
REC. ENGINE SIZE
.40 to .61 Cu. In.
FUEL TANK SIZE
8-10 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Foamboard & Ply
Wing ..... Foam Core & Cardboard Skin
Empennage ..... Foamboard & Balsa
Wt. Ready To Fly ..... 78 Oz.
Wing Loading ..... 25¼ Oz./Sq. Ft.



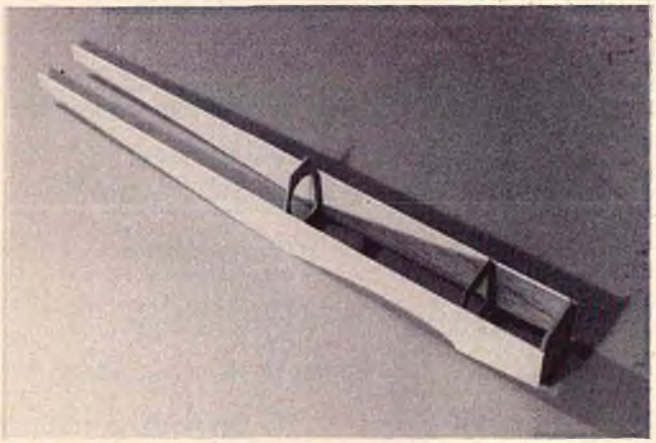
2 views of the Hawker Hurricane version built by Dick Motz of the Barons Flying Circus Air Show Team.



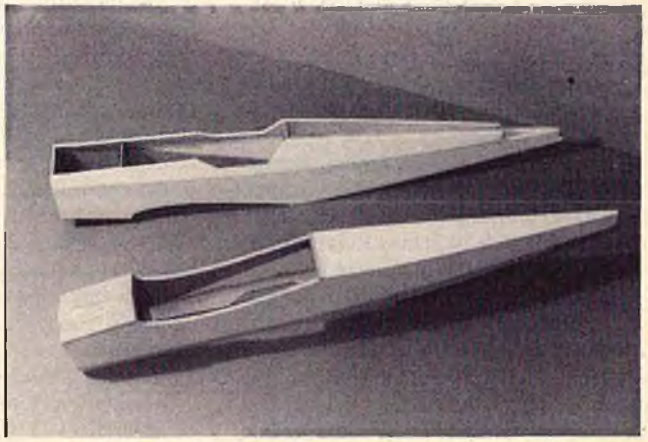
Foamboard fuselage side with ply doorskin doubler, 1/4" birch ply firewall and ply doorskin bulkheads.



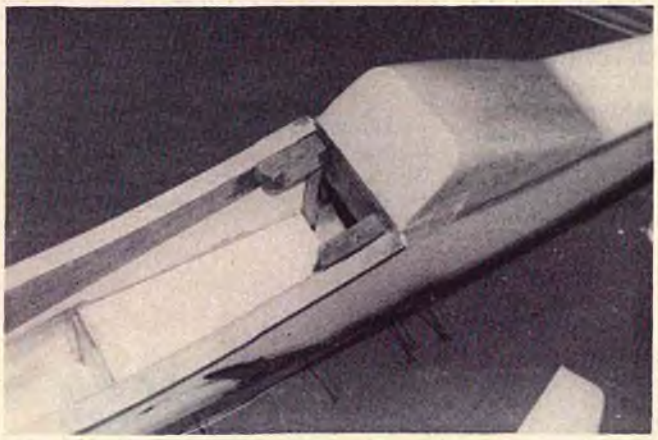
Bulkheads in place on fuselage side.



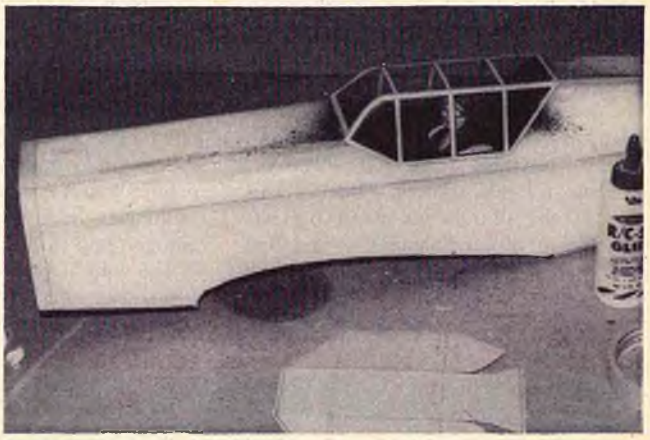
Fuselage sides in place on bulkheads.



Top and bottom of fuselage. All foamboard except forward fuse bottom between firewall and first bulkhead.



P-51 fuse bottom w/foam belly pan, wing mounting blocks, foamboard cockpit floor. Pins holding canopy in place.



Cockpit interior painted black, pilot and acetate canopy in place. Canopy frame made from card stock. Note canopy pattern along side.

use is called "Tagboard" and is available from art supply stores. It is the same color as a standard file folder, but a little lighter weight material. Other lightweight cardboard can be substituted: Railroad Board, Kromekote or Bristol Board. The tagboard will cost you about half-a-buck for enough to skin the wing.

Doublers and bulkheads are cut from "Doorskin" plywood. This is the facing material used in fabricating hollow-core doors — if your local lumber yard doesn't stock it, they can order it for you. You may have to buy a 4' x 8' sheet, but the big sheet will probably cost you less that a 1' x 4' sheet of aircraft plywood, and you'll have enough material for a couple of dozen planes. Lighter, too. If you can't find the doorskin plywood, Sig Lite-Ply can be used.

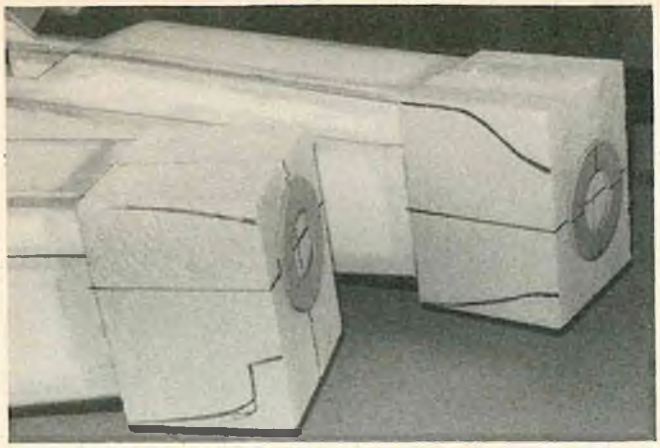
Our aileron stock is cut from cedar house siding — beautiful, strong, light, and straight-grained. Balsa may be substituted if you prefer.

The cowling is a one-off lay-up of glass cloth and epoxy. If you want to make a bunch of them, you can pull a plaster female mold from the first one; but for one-of-a-kind, the method described is easiest and cheapest.

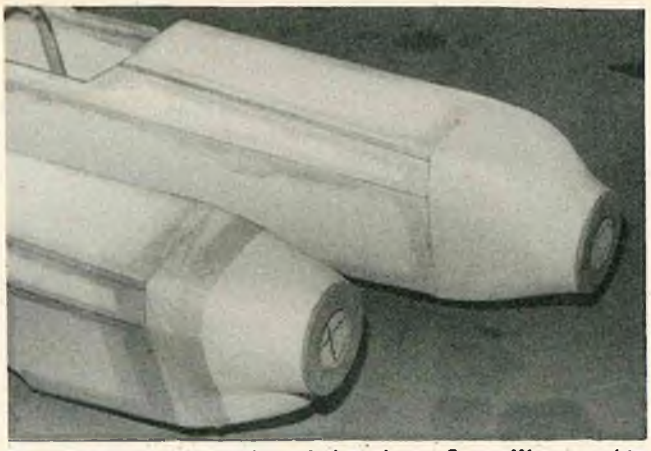
CONSTRUCTION

Wings:

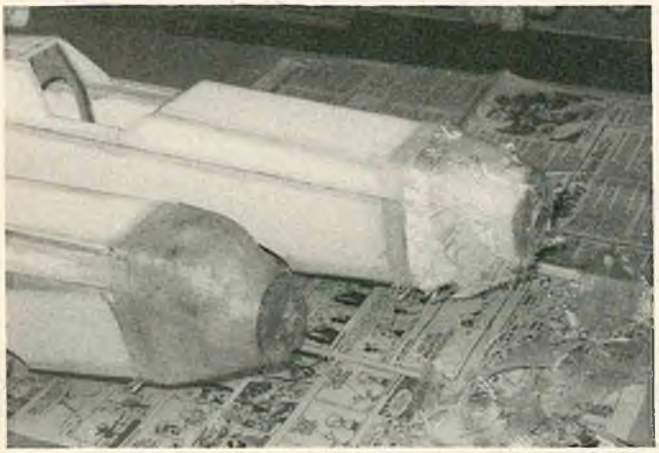
The wing is of very standard



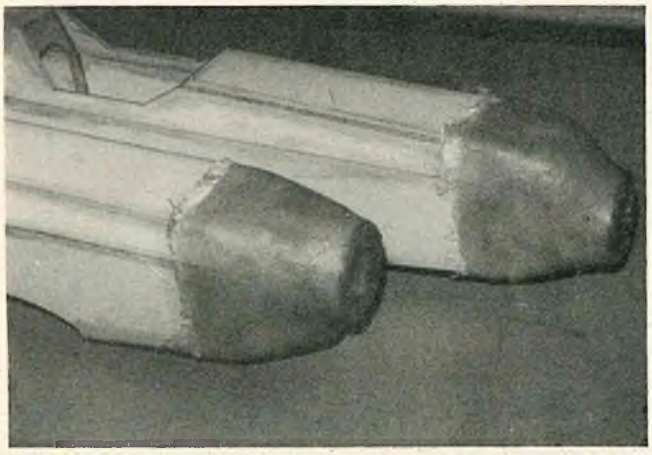
Foam blocks glued to firewall (P-51 L & ME-109 R). Felt tip pen used to outline shapes. Ply nose rings glued in place.



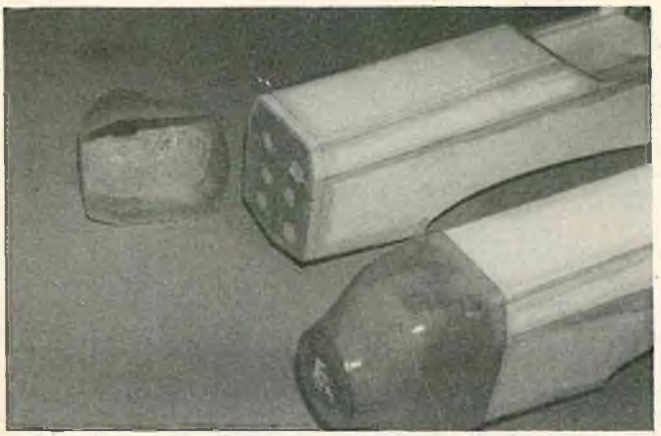
Foam blocks carved and sanded to shape. Saran Wrap used to prevent cowling from sticking to fuselage.



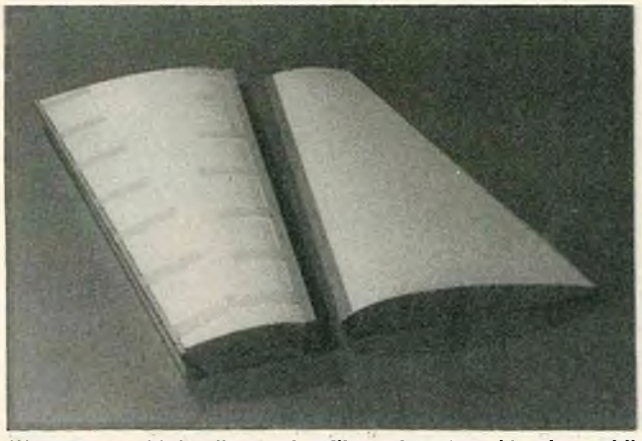
Epoxy-fiberglass layup for cowlings. Good use for scrap pieces.



Epoxy-fiberglass layup complete. Next, sand smooth with 80 grit, 100 grit, then 150 grit. Final step, coat with 5-Minute epoxy.



Completed cowling popped loose, trimmed, placed back on fuse and line drawn on fuse for location. Foam can then be removed from cowl.

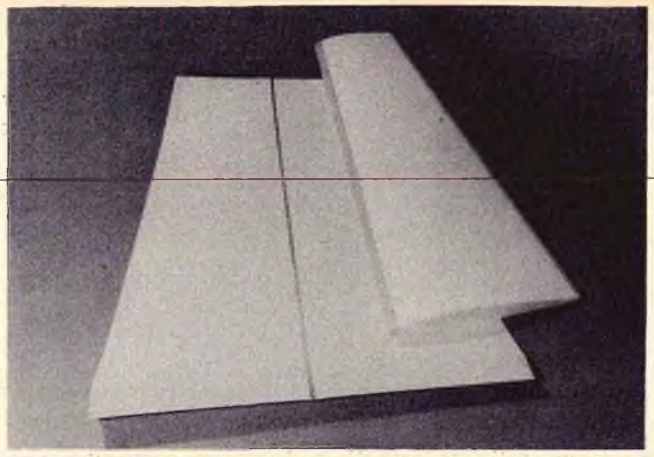


Wing cores with leading and trailing edges taped in place while glue dries.

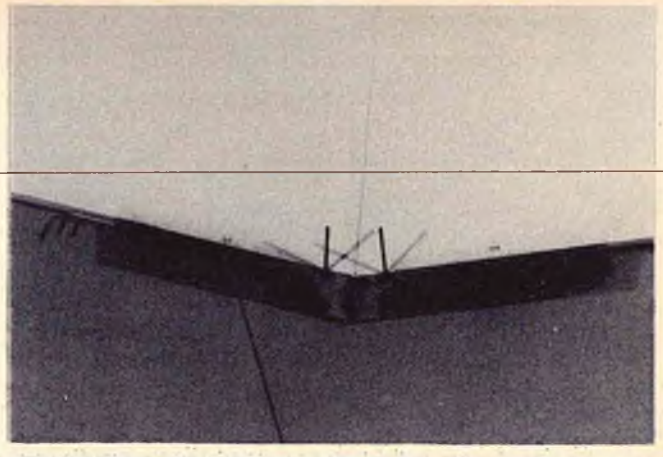
construction, foam core and tagboard covering. When cutting the cores, be sure to line up the tip template as shown to provide the 1° washout. The leading edges and wingtips are just about the only balsa used in the construction of the model — substitute cedar if you so desire.

Sand the wing cores carefully with a long block sander to remove cutting wire lag marks and to insure that all surfaces are in a straight line span-wise. Cores cut with the wire too hot usually exhibit a concave line between the templates; lay a straight-edge along the thickest part of the wing span-wise and check for any concavity. Install the leading and trailing edges, plane them down flush and round the leading edge as shown. Sand them smooth, vacuum all the balsa and foam dust away, and you are ready for covering.

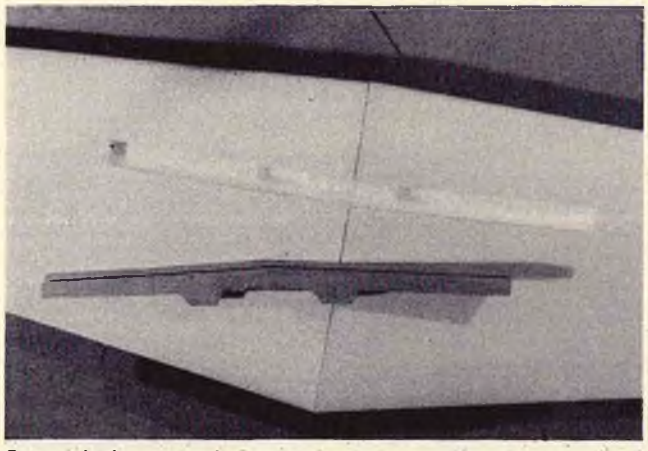
The tagboard covering is wrapped completely around the wing panel in one piece, which generally requires a little persuasion at the leading edge. Lay your tagboard on a smooth, hard surface and lay a straight-edge where the centerline of the leading edge is to be. With a ballpoint pen, using a moderate amount of pressure (you want to actually bruise the paper slightly), draw the centerline of the leading edge. Now draw three more lines at each side of the centerline — spaced 1/32" at the tip and 1/16" apart at the root. These little



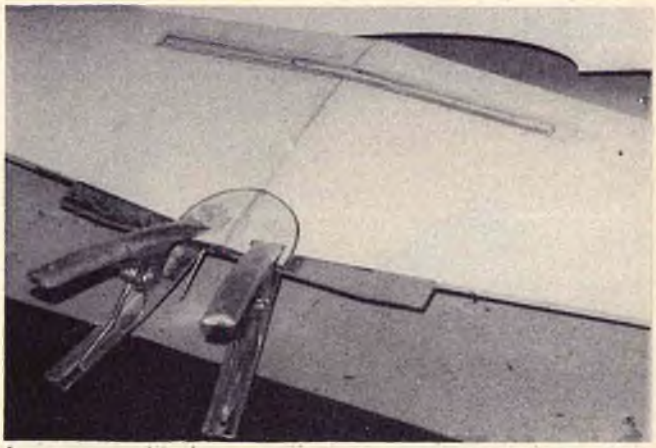
Tagboard wing skin with leading edge centerline marked to locate skin on core.



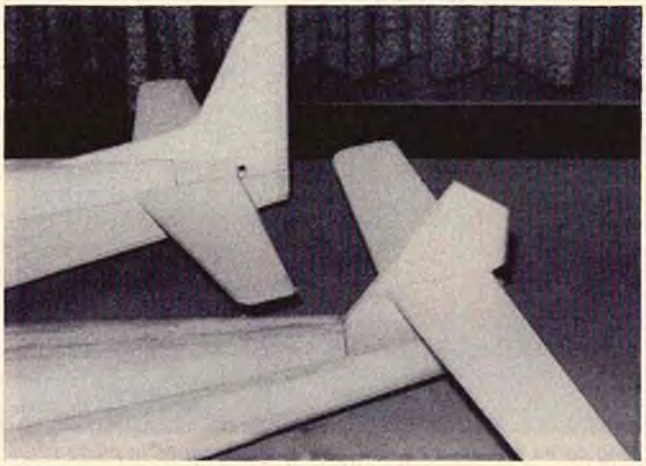
Cedar trailing edges with strip aileron horns in place.



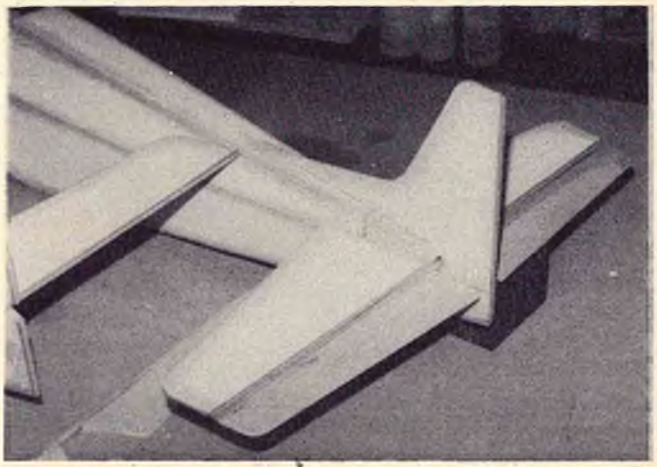
Covered wing cores has recess cut for hardwood landing gear block.



Landing gear block epoxied in place. Wing bolt reinforcing plate being epoxied in place.



P-51 tail group in background. ME-109 tail group in foreground.



P-51 elevators installed. These are made from 3/16" balsa.

corrugations are drawn on the **inside** of the covering, and will help it to bend around the leading edge. (You will omit this step as you become familiar with working with the tagboard, but it might help you on the first wing.) Lay your core on the tagboard and draw around the perimeter with a soft pencil. Flop it over and trace around the other face, then cut the covering shape out of the sheet, leaving about 1/2" excess all around.

Mix up about 2/3 ounces of Hobbypoxy II epoxy glue. Spread newspaper over your workbench, or the floor, or wherever you are going to be working, and lay your wing skin down with the inside (contact surface) up. With a polyethylene squeegee (or 1/16" plywood, or micarta, or aluminum or whatever), spread the 2/3 oz. of epoxy over the entire surface of the wing skin. You may think you don't have enough glue, but 2/3 oz. is plenty — just work it out with your squeegee. Get it spread as evenly as you can, with a slightly thicker coat around the perimeter and down the center. Now go wash off any epoxy you may have gotten on your fingers, and you'll be ready to apply the skin to your wing panel.

Incidentally, I would highly recommend that you wear rubber or throw-away plastic gloves while working with epoxy. Some folks are, or can become, highly allergic to epoxies — and once you become sensitized

you can't even stand to be in the same room with the stuff. Play it safe and keep your skin protected from the glue.

Hold the wing core with the trailing edge up and place the leading edge on the centerline you previously drew. Roll the bottom of the core down on the tagboard, then wrap the upper surface over the core. Working on the top and bottom sides alternately, smooth the tagboard into snug contact with the core. Work from the leading edge to the trailing edge, getting the covering very tight at the leading edge. When you have it all snug and smooth, pop it back into the foam blocks you cut the core from and weight it down for an overnight cure. Repeat the process for the other wing panel.

This method will result in a smooth, light and very strong wing. The epoxy "case hardens" the tagboard for a true stressed-skin construction. Do not spread glue over the foam core — enough will transfer from the tagboard to provide an excellent bond. Coating the foam core with glue will only use up a lot of glue and add a lot of weight. Do not use latex glue or contact cement — it doesn't provide any strength to the tagboard.

When the panels have cured overnight, trim the excess tagboard with a sharp knife and sandpaper. Sand the proper bevel at the root ends to provide 1⅛" dihedral under each wingtip. Line the panels up properly and glue together with 5-minute epoxy. Cut the trailing edge stock to length and epoxy the outboard lengths in place. Form the aileron horns from 3/32" welding rod or piano wire — don't forget to slip on the 3/32" i.d. brass tubing bearings before you make the final bend on the wire, and be sure to make one left hand and one right hand assembly. Groove the trailing edge stock pieces at the wing root to accept the aileron horns and epoxy them in place.

Glue the wing tips in position and sand the tips and the trailing edges flush with the tagboard skin. Avoid sanding the tagboard — it's very thin and scuffs up easily in its raw (unpainted) state.

Cut the landing gear block from hardwood (bass, maple, alder) to the shape shown — note that it is one-piece, which provides a tremendous amount of strength at the wing center section. Groove and drill it as indicated for the 5/32" piano wire landing gear struts. Measure the exact position of the block on the undersurface of the wing and, with a very sharp hobby knife, cut straight down to the proper depth all around the perimeter. Strip off the tagboard and dig the foam out to the required depth. Dig it out with the knife point to almost the proper depth, then dress down the final 1/16" or so with rough sandpaper glued to a small 3/4" wide block. Trial fit the landing gear block in the recess — it should slide easily into place and be flush with the tagboard surface.

Combine sufficient Hobbypoxy II and micro-balloons to make a syrupy mix, coat both the foam recess and the landing gear block with the mixture and press it firmly in place. Scrape off the excess epoxy as it squeezes out around the block — to avoid having to sand it off later. After an overnight cure, trim the leading and trailing edges at the center section as shown, to fit the fuselage wing saddle. Wrap the center section with a 4" wide strip of fiberglass cloth epoxied in place. This wrap is not so much for center section strength as it is to provide a hard, tough surface where the wing contacts the wing saddle on the fuselage.

Fuselage:

You'll find the foamboard an easy material to work with, but there are a couple of precautions: the paper-foam-paper laminate will dent with excessive pressure — press your thumb into a scrap piece to get an idea of how much pressure you can safely apply; and always use a very sharp knife to cut the foamboard to avoid ragged paper edges. Sanding will scuff up the surface, so wipe or scrape off excess glue as you go, to avoid as much as possible having to sand it off later on. All exposed edges must be coated with epoxy, as painting solvents will attack the foam if they are left uncoated.

Trace out the patterns for the fuselage panels and the empennage on the foamboard and cut to shape with a sharp hobby knife. Cut out the plywood formers and doublers, and laminate the doublers to the foamboard sides with epoxy, aliphatic glue or contact cement. Carefully mark the former locations on the fuselage sides with a soft pencil, and shave the aft ends of the fuselage sides so they will feather nicely into the vertical stab.

The firewall is laminated from two pieces of doorskin plywood, epoxied together; or use 1/4" aircraft plywood. Square up the firewall and Formers "B" and "C", and draw a vertical centerline on each, then epoxy them in place on one of the fuselage sides — making sure that they are at exactly 90° with the fuselage side. When the epoxy has cured, set the assembly upright on a flat surface and epoxy the other side to the formers, checking to make sure that the fuselage sides are square to the flat surface.

Block the fuselage in place over a centerline drawn on your building board, lining up the centerlines you drew on the formers with the centerline on the building board. Draw the aft ends of the fuselage together, with a temporary 3/16" spreader between them, and epoxy Former "D" in place with its centerline directly over the building board centerline.

Cut the vertical stab to shape (note that it is to extend clear to the bottom of the fuselage) and trail fit it in place. If all is well, coat the leading edge of the stab (where it contacts Former D) and the shaved ends of the fuselage sides with epoxy, draw the sides together on either side of the vertical stab, and clamp in place with clothespins. Before the glue sets, check to make sure that the aft end of the stab is directly over the centerline, and that the stab is vertical and correctly aligned fore and aft.

Cut the upper fuselage sides to shape and bevel the bottom edge as shown. Note that the bottom edge of these panels is not a straight line — it will have a slight curve aft of the cockpit due to the bowed shape of the fuselage as viewed from above. These panels stop at Former "D" — you can continue them all the way to the trailing edge of the stab, but it's easier to fit a shaped balsa block at this area.

Level the top edges of the upper sides with a sanding block after they are glued in place, then install the fore and aft fuselage tops. When the epoxy has cured, trim and sand flush with the upper fuselage sides.

The forward fuselage bottom pieces are cut from doorskin plywood and glued in place, then the aft fuselage bottom installed. Install the cockpit floor and front.

Rounding the corners to a 3/16" radius is easy once you get the hang of it, but try it on a scrap piece of foamboard first. Gently draw the flat side of your knife blade lengthwise along the raw edge of the foamboard at a 45° angle — to bend the paper surface and slightly crush the foam. Repeat the stroke, varying the angle of the blade until you have a nicely rounded corner. Once you have the corners of the fuselage taken care of, you can proceed to round the edges of the tailfeathers in the same fashion — working first one side and then the other until you have a nice smooth radius on all edges.

As previously stated, all the raw edges of the foamboard must be coated with epoxy. Smooth the epoxy on the edges with your fingertip (inside a rubber glove, remember). A somewhat smoother job can be had, if you are fussy, by thinning the epoxy slightly with alcohol, sanding the edges after the first coat, then applying a second thinned coat.

Cowling:

The cowling is an epoxy-fiberglass cloth lay-up over a styrofoam male form. The first step is to determine the proper length — your engine and mount will establish this. Cut the foam block 3/16" shorter than the total length of the mounted engine to the front side of the drive washer. Make sure that the faces of the block are parallel. Tack glue the foam block to the firewall. Mark the centerlines top and bottom of the foam block, and the thrust lines on the sides. Continue the lines across the front face to locate the centerlines of the nose ring. Glue the nose ring in place on the foam block and you are ready to start carving. The foam can be easily carved with a very sharp paring knife; get the main contours worked out, then rough it down with sandpaper. If you gouge too deep, build it back out with spackle. When the foam is at the proper shape, and reasonably smooth, tape a strip of Saran Wrap or Solarfilm backing over the junction between foam and fuselage, lapping 1/2" or so onto the foam and 1" or 2" onto the fuselage. This is to keep you from epoxying the cowl to the fuselage.

Coat the foam and nose ring with Hobbypoxy II (1/2" past the foam-fuselage juncture). Let it set up 'til sticky, then start laying 1" wide strips of 6 oz. fiberglass

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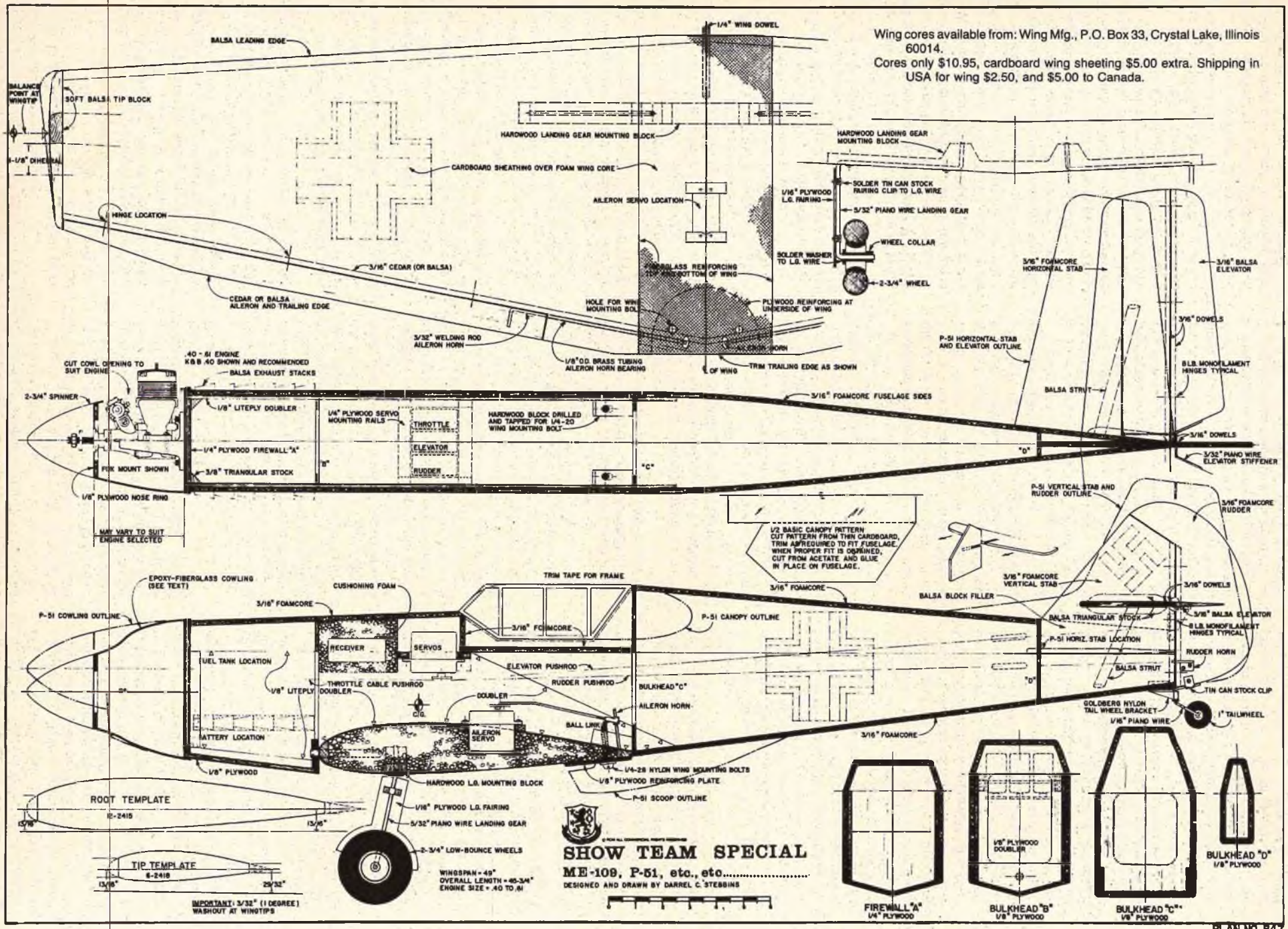
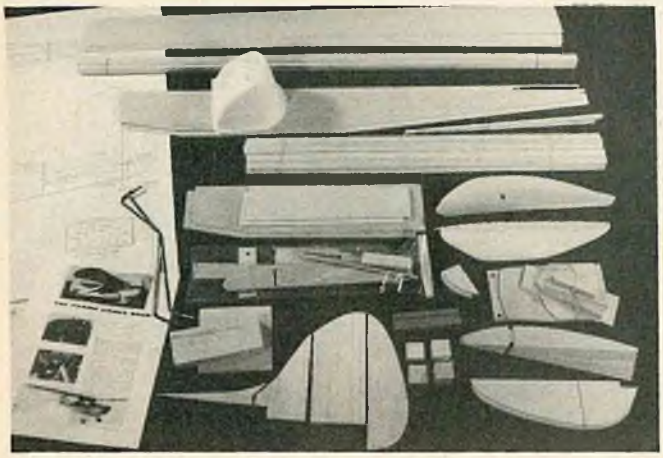

Wing cores available from: Wing Mfg., P.O. Box 33, Crystal Lake, Illinois 60014.
Cores only $10.95, cardboard wing sheeting $5.00 extra. Shipping in USA for wing $2.50, and $5.00 to Canada.
BALSA LEADING EDGE
1/4" WING DOWEL
SOFT BALSA TIP BLOCK
BALANCE POINT AT WINGTIP
4-1/8" DIHEDRAL
HARDWOOD LANDING GEAR MOUNTING BLOCK
CARDBOARD SHEATHING OVER FOAM WING CORE
AILERON SERVO LOCATION
HINGE LOCATION
3/16" CEDAR (OR BALSA)
CEDAR OR BALSA AILERON AND TRAILING EDGE
3/32" WELDING ROD AILERON HORN
1/8" O.D. BRASS TUBING AILERON HORN BEARING
FIBERGLASS REINFORCING TAPE ON BOTTOM OF WING
PLYWOOD REINFORCING AT UNDERSIDE OF WING
TRIM TRAILING EDGE AS SHOWN
1/16" PLYWOOD L.G. FAIRING
SOLDER TIN CAN STOCK FAIRING CLIP TO L.G. WIRE
5/32" PIANO WIRE LANDING GEAR
WHEEL COLLAR
SOLDER WASHER TO L.G. WIRE
2-3/4" WHEEL
3/16" FOAMCORE HORIZONTAL STAB
3/16" BALSA ELEVATOR
3/16" DOWELS
P-51 HORIZONTAL STAB AND ELEVATOR OUTLINE
8 LB. MONOFILAMENT HINGES TYPICAL
BALSA STRUT
3/32" PIANO WIRE ELEVATOR STIFFENER
CUT COWL OPENING TO SUIT ENGINE
.40 - 61 ENGINE K&B .40 SHOWN AND RECOMMENDED
BALSA EXHAUST STACKS
2-3/4" SPINNER
1/8" LITEPLY DOUBLER
1/4" PLYWOOD SERVO MOUNTING RAILS
THROTTLE
ELEVATOR
RUDDER
HARDWOOD BLOCK DRILLED AND TAPPED FOR 1/4-20 WING MOUNTING BOLT
3/16" FOAMCORE FUSELAGE SIDES
1/4" PLYWOOD FIREWALL "A"
FOR MOUNT SHOWN
3/8" TRIANGULAR STOCK
1/8" PLYWOOD NOSE RING
MAY VARY TO SUIT ENGINE SELECTED
1/2 BASIC CANOPY PATTERN CUT PATTERN FROM THIN CARDBOARD, TRIM AS REQUIRED TO FIT FUSELAGE. WHEN PROPER FIT IS OBTAINED, CUT FROM ACETATE AND GLUE IN PLACE ON FUSELAGE.
P-51 VERTICAL STAB AND RUDDER OUTLINE
3/16" FOAMCORE RUDDER
EPOXY-FIBERGLASS COWLING (SEE TEXT)
CUSHIONING FOAM
TRIM TAPE FOR FRAME
3/16" FOAMCORE
P-51 COWLING OUTLINE
RECEIVER
SERVOS
P-51 CANOPY OUTLINE
FUEL TANK LOCATION
THROTTLE CABLE PUSHROD
1/8" LITEPLY DOUBLER
ELEVATOR PUSHROD
RUDDER PUSHROD
BULKHEAD "C"
DOUBLER
C.G.
AILERON HORN
BALL LINK
AILERON SERVO
BATTERY LOCATION
1/8" PLYWOOD
3/16" FOAMCORE VERTICAL STAB
BALSA BLOCK FILLER
3/16" DOWELS
BALSA TRIANGULAR STOCK
3/16" BALSA ELEVATOR
8 LB. MONOFILAMENT HINGES TYPICAL
P-51 HORIZ. STAB LOCATION
RUDDER HORN
BALSA STRUT
TIN CAN STOCK CLIP
GOLDBERG NYLON TAIL WHEEL BRACKET
1" TAILWHEEL
1/16" PIANO WIRE
3/16" FOAMCORE
1/4-28 NYLON WING MOUNTING BOLTS
1/8" PLYWOOD REINFORCING PLATE
P-51 SCOOP OUTLINE
HARDWOOD L.G. MOUNTING BLOCK
1/16" PLYWOOD L.G. FAIRING
5/32" PIANO WIRE LANDING GEAR
2-3/4" LOW-BOUNCE WHEELS
ROOT TEMPLATE
TIP TEMPLATE
IMPORTANT: 3/32" (1 DEGREE) WASHOUT AT WINGTIPS
WINGSPAN = 49"
OVERALL LENGTH = 45-3/4"
ENGINE SIZE = .40 TO .61
SHOW TEAM SPECIAL
ME-109, P-51, etc., etc.....
DESIGNED AND DRAWN BY DARREL C. STEBBINS
1/8" PLYWOOD DOUBLER
FIREWALL "A" 1/4" PLYWOOD
BULKHEAD "B" 1/8" PLYWOOD
BULKHEAD "C" 1/8" PLYWOOD
BULKHEAD "D" 1/8" PLYWOOD
PLAN NO. 847

RCM PRODUCT REVIEW

Gemini Models SUPER CHAMP



SPECIFICATIONS

Name	SUPER CHAMP
Aircraft Type	Trainer/Sport
Manufactured By	Gemini Models 311 Lakeview Ave. Clifton, New Jersey 07011
Mfg. Suggested Retail Price	$54.95
Available From	Both Mfg. and Retail
Wing Span	56 Inches
Wing Chord	11 Inches
Total Wing Area	600 plus Square Inches
Fuselage Length	39 Inches
Stabilizer Span	20½ Inches
Total Stab Area	100 plus Square Inches
Mfg. Rec. Engine Range	.20-.35
Recommended Fuel Tank Size	6 Ounce
Recommended No. of Channels	3
Rec. Control Functions	Rud., Elev., Throt.
Basic Materials Used In Construction:	
Fuselage	Balsa, Ply
Wing	Balsa
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (12 pages)
Construction Photos	Drawings

RCM PROTOTYPE

Radio Used	Futaba
Engine Make & Displacement	O.S. Max .30
Tank Size Used	6 Ounce
Weight, Ready to Fly	60 Ounces
Wing Loading	14.4 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Wing mount system; isometric drawings; appearance.

WE DIDN'T LIKE THE:

Limited instructions; lack of hardware (see text).

If you look at almost any small airport there will usually be at least one or two examples of the Aeronca Champ or one of its recent updates. Over the years the full-size Champ has proven to be a versatile airplane that is fun to fly. Gemini Models, 311 Lakeview Ave., Clifton, New Jersey 07011, is now kitting an R/C version called the Super Champ. The kit is not quite a scale rendition, more of a "stand back and squint" scale, but it still has the flavor of the original and with a lot less work. Gemini's Champ is designed to be used as a trainer or for relaxing sport flying. It can be built as either a tail dragger or, like a few of the full-size Champs, it can be modified to have a nose wheel.

The materials to build the Super Champ, including an ABS plastic cowl and wing tips, are packaged in a 6¼" x 36" x 4¼" white box with a color picture of the finished model on the front. Inside we found machine cut parts and bundles of stick and sheet balsa. We were a bit surprised by the lack of hardware; aside from the main landing gear, the only hardware is for the wing mount assembly. Whether you choose the nose or tail wheel version, you provide the parts. The box does list the necessary hardware needed to complete the kit.

The wing center section is packed in a separate plastic bag and is one of the most interesting features of the Gemini kit. This is the "Snap On" wing mount, no bolts or rubberbands are used. During normal flight the wing is solidly mounted but it will pop loose in the event of sudden contact with the ground. The kit version of the mount is built up from dowels and springs but a brochure included with the kit has details on a machined aluminum unit available from Gemini for use in other models.

Construction:

Instructions for building the Super Champ are quite brief but there are several very nice isometric drawings including a full cutaway view by Hank Clark that does a lot to clarify the details. Two rolled plan sheets are provided, one 26" x 40" for the wing, and the other 25" x 41" sheet for the fuselage. Usually we like to see construction photos but, in this case, the drawings probably do a better job of explaining the building steps. Gemini Models are preparing new plans for this kit which will include more isometric drawings, photos, and suggested control throws.

The wing is assembled in three sections, two identical outer panels and the center section. Only one outer panel is shown on the plan sheet so be a little careful when it comes to sheeting the panels that you build both a left and a right side. The wing is flat bottomed and is built on the plans. With only six ribs per side it goes very quickly especially if one of the gap filling super glues like Goldberg Super Jet is used. We ran into a minor problem when it came to putting on the leading edge sheeting, the plans show the 1/16" balsa sheet butt joined to the leading edge but the instructions show the leading edge beveled with the sheet overlapped. The instructions are right, shape the leading edge as shown in the drawings, just don't overlap the sheet too far. The balsa sheet is just barely wide enough and we suggest trying the fit before starting to glue.

Fuselage construction follows the basic box type with stringers used to shape the upper portion and provide a realistic look after

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By Col. Richard L. Uppstrom

BLUE BELIEF

OR, HOW NOT TO PAINT YOUR MUSTANG

● Of the many thousands of aircraft photographs from the World War II period, only a few have become "classics." Perhaps the most "classic" of this small group is that famous series of formation shots of yellow nosed P-51s from the 361st Fighter group, lead by the now famous LOU IV. These beautiful shots of those most photogenic aircraft have become the data source for countless modelers, from the plastic builder to the radio controlled scale flier. At least one full scale restoration of a Mustang carries the LOU IV scheme today. Without a doubt, these photos are outstanding "proof of scale" documentation; for other than their excellent clarity, they are unique in that they show three different variants of the Mustang in formation.

For readers of 'just that right age,' our first recollection of LOU IV and her brood probably was the center page pull-out color photo from the March 1945 issue of Air Trails. If you recall those days, Air Trails produced a 12" x 20" photo well-adapted for wall hanging; it was Photo #1 to be exact. In my own case, it hung in a favored spot in my workshop/bedroom for many a year until, tattered and stained by Scotch Tape, it fell prey to either a major redecorating job or some newer favorite of my fickle aircraft allegiance. I believe it was the Lockheed F-90, if memory serves me well at this long range. No doubt about it, though, these four birds were beautiful, the day almost perfect for air-to-air photography and a classic picture, or series of pictures, was bound to be the result.

But for all this, a very pervasive myth has sprung up as to the markings of the 361st (or at least these four), excellent photographic documentation notwithstanding. And this myth is about to be put to rest. So charge your airbrushes model builders, since you have some touch-up to do should you read on:

But first, a few background details about the players and the day in question --- 21 June 1944. (For the cast of players, see chart.)

Since so many different views of this famous formation have found their way into print over the years, I had fallen into a trap — assuming that they were a series of prints from motion picture footage. This assumption, along with several others, have proven to be quite false. Even a little thought would soon have caused the movie theory to be quickly discarded, since a blow-up of a 16mm combat motion picture frame could have never produced the quality we see in these photographs.

A second mistaken idea was that these had been taken on a combat mission --- doubtless returning from a strike deep into Europe --- perhaps a parting salute to the "heavies" from the "little friends" before they broke off to recover at their own station. Wrong again! Here, that same bit of

A/C #1	Name	T/M/S	Serial#	Pilot	Unit
E2-C	LOU IX	P-51D-5	(4)41-3410	Col. Tom J.J. Christian	CO 361st Ftr GP
E2-S	---	P-51D-5 (w/fin mod.)	(4)41-3926	1/Lt Urban L. Drew	375th FS 361st FG
E2-A	Skybouncer	P-51D-5 (w/o fin mod.)	(4)41-3568	1/Lt Bruce W. Rowlett	375th FS 361st FG
E2-H	Suzy-Q	P-51B-15	(4)2-106811	1/Lt Tom Glankler	375th FS 361st FG

close observation would have told a quite different story. All four Mustangs still carry their 75 gallon drop tanks, so no combat was seen this trip. And a close look at the gun muzzle panels of E2-S (in some shots) show them to be relatively clean, suggesting no use on this mission. We now know that the shots were taken over the English countryside, in the general vicinity of the Cambridgeshire home of the 361st at Little Walden. In fact, the mission was put together specifically to get some formation shots of Mustangs for the record. The B-17 photo ship must have been very near its maximum gross weight in photographers, cameras, and film, from the great number of shots we have seen in the last 35 years.

One last mistaken assumption has lingered long, and is the point of this article --- the myth of the top side color of the aircraft of the 361st Fighter Group. **"Blue,"** you say (followed by a long discussion of the exact shade thereof). Put away your Munsell color standards and reference books, we are wrong again! How can that be (I heard someone say) there is much reference material that swears by blue and the 361st? Full-sized restorations of P-51s sport the blue uppers, and nobody would invest that kind of money without absolute proof from unimpeachable sources. Thousands of kits are on the market depicting LOU IV in blue livery. More than a few R/C models have flown and won in blue (and drew high praise from the judges, too, I hasten to add). Wrong again!

Read on, if you dare, for I shall disclose the source of this newfound primary source data, as it is referred to in the halls of academia. The "blue belief" can be traced back through Volume 3, Number 1 of the

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Photo 1 (OPPOSITE PAGE) was taken on July 21, 1944, over Cambridgeshire, England from waist gun position (starboard side) of B-17. E2-C Col. Thomas J.J. Christian Jr. C.O. 361st Ftr. Gp.; E2-S 1st Lt. Urban L. Drew 375th F.S.; E2-A Capt. Bruce W. Rowlett 375th F.S.; E2-H 1st Lt. Thomas Glankler 375th F.S. Photo 2 (BELOW) is of Col. Thomas Christian, Jr., in his beloved "Lou," inspired leader of the "Yellowjackets."

GIVE IT A WHIRL

John Gorham

I thought that last months's report on the 'MACS' show would be the last show report until next year. However, we did finally decide to visit the 'last show of the year' put on by the South West Modelers Club and held at the Holiday Inn at Dallas on May 16th and 17th.

The Dallas Show

The show itself was held in the Dallas Forth Worth Airport Holiday Inn — very convenient, especially if you had rooms in the hotel, as most of us did. A small show, but well attended — lots of public interest in all R/C modeling and in R/C helicopters especially. Doesn't sound too different from the Toledo show? Well it wasn't, until the tornado struck the hotel at 2:00 a.m. on the morning of the first day. Guess which floor was in the most danger — and guess where many of us were staying? You're right — the top (8th) floor. At 2:00 a.m. a pounding on the door: "All out and to the lobby." So we all duly trooped down the eight flights of stairs (by flashlight) to the lobby. Seems that the tornado had literally blown right through eight of the rooms and ripped off a few hundred feet of hotel roofing as well. We were not allowed back to the 8th floor that night and were given new rooms on the 1st floor, which was fine until it started raining at 4:00 a.m., on the bed, because of the absence of roof covering! The move to the 3rd room of the night seemed to finally end all problems until I turned on the shower in the morning. I guess a cold shower is a good way to wake up after a nearly sleepless night.

The show itself went on as usual as all good shows must and, although small, it was a happy and a seemingly successful venture.

Finally the flying. By the first day of the show, the wind was down to around 30-35 mph so we all trooped out to a grass field in front of the hotel and we flew two "Crickets" for the crowd. That was it for the rest of the show, mainly because of the rain and the winds! Well, it **will** be better next year.

Some time ago we promised that we would publish the newly formulated FAI R/C helicopter competition rules so that is what the main body of this column will be about. However, looking back I realize that I promised to give more hints and tips for the beginner this month and I started writing a short treatise on vibration and rotor blade set-up. After writing for a while it became apparent that this should not be a short, or fill-in, topic so next month I will attempt to deal with this somewhat complex subject of vibration and balance to the best of my knowledge.

F.A.I. R/C Helicopter Rules

The F.A.I. (Federation Aeronautique International) is, as its name implies, an international organization set up to standardize, as much as possible, any matters pertaining to aviation — model or otherwise. A world record by any model or full size aeroplane must comply with the relevant F.A.I. rules.

Well, we have rules for R/C model helicopters, too, and these would be the ones which would be used for any world championship. Our own A.M.A. rules are different in many important respects and an application is already in process to bring our competition rules in line with those of the F.A.I. Our U.S.A. representative in the formulation of these F.A.I. rules is Horace Hagen of New Jersey, and the text which follows shows the rules and maneuvers recently agreed at a plenary meeting of the C.I.A.M. held in Paris in December, 1980. First, though, the safety rules, which were agreed at an earlier meeting, are worth publishing.

SAFTEY CODE FOR R/C MODEL HELICOPTERS

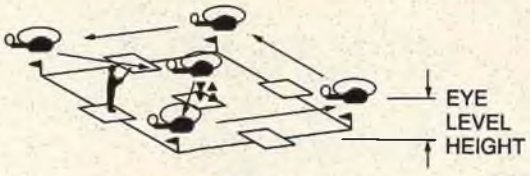
1. Premise

It is of the utmost importance that all model fliers observe first of all the safety rules. Any accident caused by carelessness is a hindrance to the progress of model aviation.

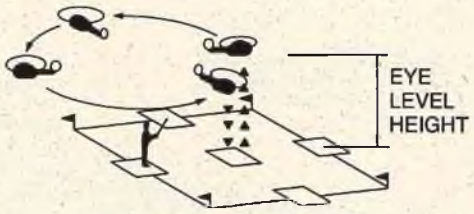
The safety rules are not an obstacle to the enjoyment of model flying but guidelines established to prove that model fliers are the responsible people they proclaim to be.

It is not a sign of intelligence to show one's own skill among spectators. The flier may know what he is doing but has no way of knowing what anyone else will do. So, it is his personal benefit to make certain that no action on his part will result in an accident. It is therefore very important not to fly any model aircraft in competition or in the presence of spectators until it has been proven airworthy by having been previously

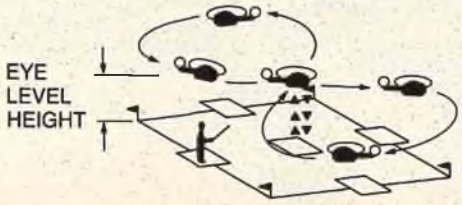
A. REQUIRED MANEUVERS



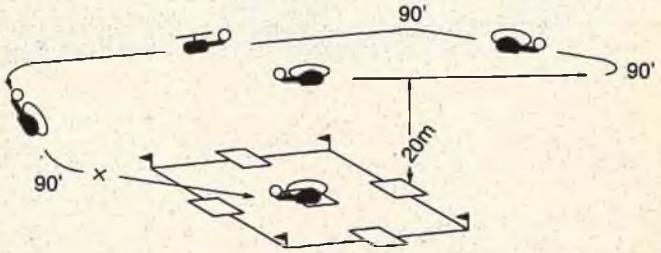
1) HOVERING M K=6



2) HOVERING CIRCLE K=6



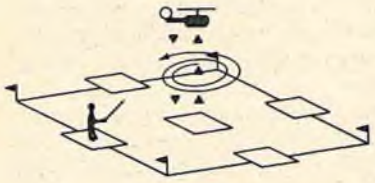
3) HORIZONTAL EIGHT K=8



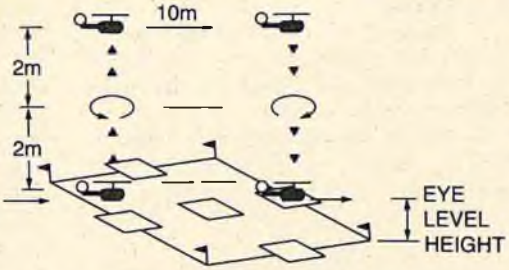
4) RECTANGULAR APPROACH K=6

5) LANDING K=6

B. OPTIONAL MANEUVERS — CHOOSE FOUR

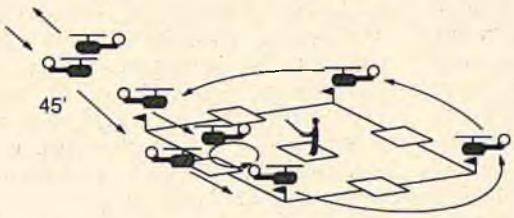


1) DOUBLE PIROUETTE K=8

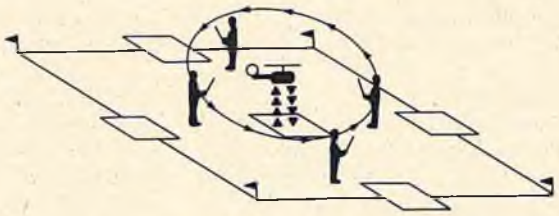


2) TOP HAT K=8

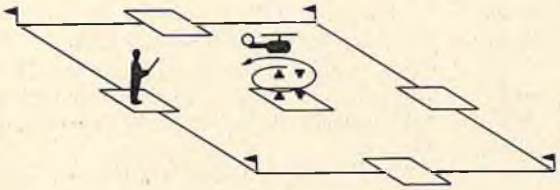
3) SWISS CIRCLE K=9



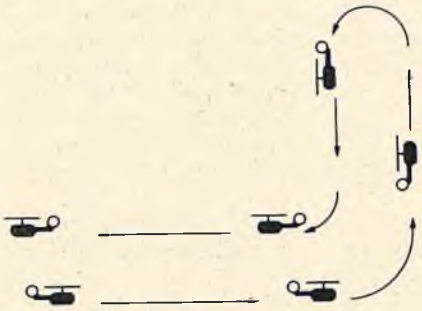
4) SHOVEL K=9



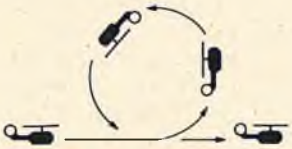
5) PILOTS PROMENADE K=8



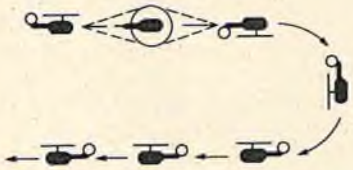
6) PIROUETTE K=6



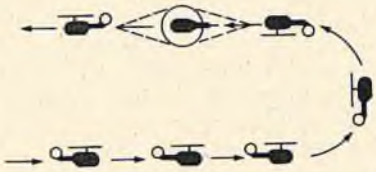
7) STALL TURN K=6



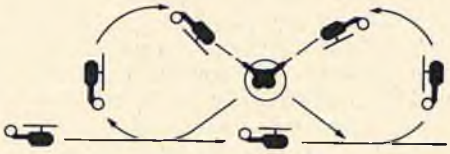
8) LOOK K=8



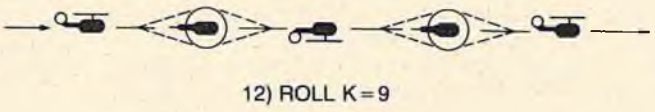
9) INVERTED IMMELMAN K=8



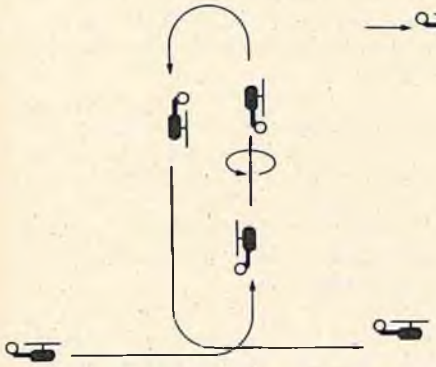
10) IMMELMANN K=8



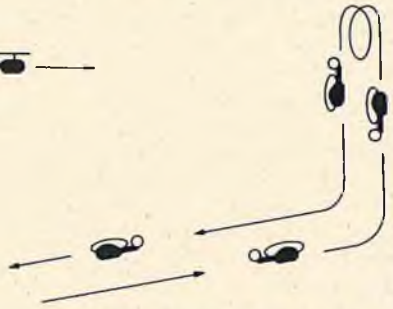
11) CUBAN EIGHT K=9



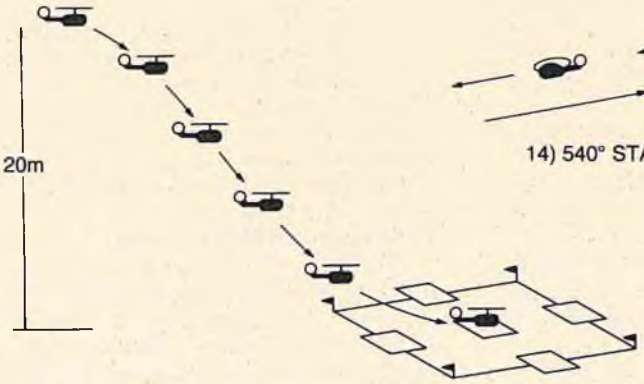
12) ROLL K=9



13) BELGIAN STALL TURN K=9



14) 540° STALL TURN K=7



15) AUTOROTATIVE DESCENT AND LANDING K=10

flight tested.

2. Competency on Safety

The following officials are competent to apply and enforce the safety rules:

— the Jury
— the Contest Judges
— the Contest Director
— the Circle Marshalls
— the Timekeepers
— the Processing officials
— the Leaders of the Organization

3. Regulations concerning the models and their parts Prohibited

a. Metal bladed rotors

b. Knife edge leading edges on main or tail rotor blades

c. Non-shock mounted radio equipment

d. Any ballast or heavy part subject to jettisoning

Recommended

a. Blade attachment by a single through bolt with self-locking nuts which allows the blade to lead or lag if one of them hits something, thus prolonging blade life.

b. The model should bear a sticker listing the modeler's name, address and phone number.

c. Radio antenna should be restrained in such a manner as to eliminate any chance of its entanglement with any moving or rotating part of the helicopter.

4. Pre-flight checks

Before each flight, the modeler should make the following check:

a. Be certain that the frequency being employed is clear and properly authorized for use by the modeler. Where large groups of modelers fly together, a system of identification of frequencies should be established.

b. Test for good functioning of all controls with the engine stopped.

c. Test for good functioning of all controls with the engine running. It is strongly recommended that the model **not** be held in the hand by the tail boom while checking blade tracking and control functioning and trim. This can be done, while the model is sitting on the ground, with weights on the landing skids if desired, or while the model is held overhead by both skids by a helper. This should be done at a safe distance (10m) from other people or helicopters in the pit area.

d. Models should not be run-up free, hovered or test flown in the pit area but only in a clear area at least 30 meters square.

e. Models should not be flown in the presence of spectators until they have been properly tested and proven airworthy.

5. Flight procedures

Before and during flight the pilot should observe the following:

a. The helicopter should be carried, not flown or taxied, from the ready box to the take-off pad.

b. Do not fly toward or over spectators, pit or parking area in such a manner that a malfunction could cause the model to crash into the spectators.

c. Do not fly solo in the presence of spectators until you are a qualified flier, as judged by an experienced helper.

d. At the sign of any malfunction land as quickly as possible.

6. Flying sites

a. The flying site should be large enough to provide a minimum of about 200 meters by 100 meters clear space containing no buildings, people or highways.

b. At flying sites within 5 miles (8 km) of airports, models shall not be flown higher that 400 feet without permission of the airport operator.

GENERAL RULES

Definition of a Radio Controlled Helicopter.

A helicopter is a heavier-than-air aeromodel which derives all of its lift and horizontal propulsion from a power driven rotor system(s) rotating about a nominally vertical axis (or axes). Fixed horizontal supporting surfaces up to 4% of the swept area of the lifting rotor(s) are permitted. A fixed or controllable horizontal stabilizer up to 2% of the swept area of the lifting rotor(s) is permitted. Ground effect machines (hovercraft), convertiplanes or aircraft which hover by means of propeller slipstream(s) deflected downward are not considered to be helicopters.

Prefabrication of the Model.

Permitted: A helicopter which is assembled by the builder from prefabricated parts and in which the builder installs the equipment.

Not permitted: Models which are completely prefabricated and require only a few minutes of unskilled effort for their completion or complete ready to fly models which have been built by a person other than the pilot.

General Characteristics.

Area: Maximum swept area of the lifting rotor(s) counting only once any area of superimposition, 300 dm2, except for coaxial helicopters whose rotors are farther than one rotor radius apart, in which case the total area of both rotors is counted.

Weight: Maximum 5 kg without fuel.

Motor: Piston motor displacement: maximum 10 cm^3 electric or extensible motors: no restrictions.

Yaw Rate Gyro: If used, shall be kept on during all maneuvers.

Rotor blades: Metal main or tail rotor blades are forbidden. Knife edge leading edges are forbidden on main or tail rotor blades.

Contest area lay-out: A descriptive sketch of the contest area, helipad, public line is provided for in Annex 4.

Number of Helpers.

Each pilot is permitted one helper.

Number of Flights.

Each competitor has in principal the right to three official flights.

Definition of an Official Flight.

There is an official flight when the pilot is officially called, whatever the result. The flight may be repeated, at the Contest Director's discretion when for any unforeseen reason outside the control of the competitor the model fails to make a start, such as:

a. The take-off cannot be made within the allowed time limit due to safety reasons.

b. The competitor can prove that take-off was hindered by interference from outside.

c. Judging was impossible for reasons outside the control of the competitor. (Model, engine, or radio failures are not considered outside the control of the competitor.)

In such cases take-off may be repeated immediately after the attempt, or after reporting to the Contest Director, during the same round, or with the approval of the Contest Director, after the round.

Markings.

Each maneuver may be awarded marks between 0 and 10 by each of the judges during the flight. These marks are multiplied by a coefficient which varies with difficulty of the maneuvers. Any maneuver not completed shall be scored zero (0). The maneuvers must be performed in an airspace which will allow them to be seen clearly by the judges, approximately 60 degrees vertically and 90 degrees horizontally. The non-observance of this rule will be penalized by loss of points. There shall be an official located in a position where any flight over spectators can be observed, and a visual and audible signal shall be given to indicate such overflights. If this happens before a maneuver is completed no points shall be given to this maneuver. The judges shall score all the maneuvers. If an infringement has been made, the scores will be deleted on all cards.

There shall be no score when:

a. The competitor flies a model that has been flown in the same contest by another competitor, or flies a model that does not comply with the definition and General Characteristics of a radio controlled helicopter.

b. The competitor starts his model not in the prescribed starting sequence.

c. The competitor does not deliver his transmitter to the compound or does operate his transmitter during the rounds without permission.

d. The competitor does not release his model at the prescribed take-off point or requires the assistance of more than one helper.

e. The competitor gets his transmitter from the compound before the first call.

f. The competitor switches on his transmitter before the second call, to start engine and adjust model.

g. The competitor enters the take-off square (helipad) before the final call to fly.

Classification.

The final classification will be determined by the sum of the best two flights. In the case of a tie for the first place, the final result will be established by a fly-off. Any fly-off must take place within one hour of the normal finishing time of the contest. In case only one flight has taken place the final classification will be obtained by this one flight.

Organization for Radio Controlled Helicopter Contest.

A competitor must be called at least five minutes before he is required to enter the starting box. A starting box, at least 2 meters square, will be provided away from the flight line and a safe distance from spectators, competitors and models. The competitor is given five minutes to start his engine and make last minute adjustments without the model leaving the starting box or rising above eye level. When the flight in progress is completed the competitor in the starting box carries his helicopter, with engine running, to the take-off square or helipad and awaits the signal from the judges to begin his flight. At this time the next competitor moves to the starting box and another competitor is called to stand by.

If the competitor in the starting box fails to get ready within five (5) minutes the timer will start the watch measuring the alloted time for the first set of maneuvers.

Schedule of Manuvers for Radio Controlled Helicopters.

The maneuvers are in two groups: "required" and "optional". The pilot is given ten (10) minutes to complete the total group of maneuvers in the order they are listed on the score sheet, with the chosen optional maneuvers underlined by the contestant and numbered in the order they will be executed. The total group of maneuvers shall consist of 9 maneuvers of the total group of maneuvers:

a. Obligatory, the maneuvers 1, 2 and 3 of the 'Required" group.

b. 4 maneuvers selected from the "Optional" group.

c. Obligatory, to finish, the maneuvers 4 and 5 from the "Required" group (Rectangular approach and Landings).

When the autorotation is chosen, this maneuver can be executed after the maneuvers of rectangular approach and landing in the "Required" group.

If the alloted time expires before the maneuver is completed, that maneuver will be scored zero and the pilot is required to land as soon as possible. A landing is not required to be one of the optional maneuvers.

A new score sheet is issued for each contestant for each round. Only the contestant's number, not his name or nationality, will appear on the score sheet. The required maneuvers are executed as described with landings performed only where listed. The optional maneuvers should be performed in a smooth flowing sequence. Preferably one maneuver should be performed on each pass before the judges. The pilot need not perform the same set of optional maneuvers on every flight.

The name of each maneuver and its start and finish must be announced by the pilot or his helper. Unannounced maneuvers will not be scored. The competitor may make only one attempt to execute each maneuver during any one flight.

DESCRIPTION OF MANEUVERS.

Required Maneuvers.

Maximum points 320. The pilot stands in square midway between flags 1 and 4 of the 10 meter square except for Horizontal Eight and Rectangular Approach and Landing.

(1) Hovering M — K = 6

Pilot stands in the outer helipad, model takes off from central helipad and climbs vertically to eye level, hovers briefly. Whilst heading constantly into the wind, model moves along diagonal line to flag 1 at the near right corner, hovers briefly then moves forward to flag 2, hovers briefly and so on to flag 3 and 4 and then to a point over the helipad, hovers briefly and descends smoothly to the helipad. Points will be subtracted for the following reasons:

1. Model tilts, turns, or moves horizontally during take-off and climb.
2. Model changes altitude, heading or speed during horizontal flight.
3. Model goes off course or fails to hover directly over flags.
4. Take-off or landing is rough or sudden.
5. Model does not land completely on helipad.
6. Pilot steps out of the outer helipad.

(2) Hovering circle — K = 6

Pilot stands in the outer helipad, model takes off from central helipad, climbs vertically to eye level and hovers briefly. Model flies sideways to left or right, holding constant altitude, maintaining constant distance from pilot and keeping tail always pointed towards pilot until it returns to starting point directly over the central helipad, model lands. Complete circle must have a diameter of about 10 meter.

Points will be subtracted for the following reasons:

1. Take-off and landing rough or with heading changes.
2. Take-off or landing non-vertical.
3. Altitude changes during flight, radius of circle not constant and tail does not always point towards pilot.
4. Model does not land completely on helipad.
5. Speed changes during flight.
6. Pilot steps out of the outer helipad.

(3) Horizontal eight — K = 8

Pilot chooses a fixed location and positions himself accordingly. Model takes off from central helipad, climbs vertically to eye level and hovers briefly, then starting forward begins a circle turning either right or left, maintaining longitudinal axis in alignment with the flight path. The circle passes over the two flags on one side of the square and ends over the center of the helipad. Without slowing down, the model continues and makes a circle in the other direction, flies over the other two flags and returns to a point over the center of the helipad, hovers and descends smoothly and vertically onto the helipad and lands.

Points will be subtracted for the following reasons:

1. Take-off and landing not smooth.
2. Climb or descent non-vertical.
3. Model tilts, turns or moves horizontally during climb or descent.
4. Model does not maintain constant speed and altitude during circles.
5. Models longitudinal axis is not in alignment with the flight path.
6. Circles are not round, equal and do not pass directly over the flags.
7. Pilot moves away from the fixed location chosen by him.

(4) Retangular approach — K = 6

The model flies over a spot situated at 20m above the central helipad. Model flies forward (upwind) at a medium speed and with constant altitude during approximately 30m, makes a 90° left or right turn, flies crosswind straight and begins a uniform descent, another 30m turns left 90° flies straight on and continues the uniform descent downwind. Model has now flown approximaxtely 60m. Model now turns 90° in one movement to align itself with the line joining the outer helipad to the central helipad.

Points will be subtracted for the following reasons:

1. Deviation from straight flight path between turns.
2. Sudden or too wide turns.
3. Changing altitude during first straight line.
4. Not constant rate of descent during three last straight lines.
5. Flight paths not parallel to sides of square.

(5) Landing — K = 6

After turning on final leg of the approach, model gradually looses speed as it approaches helipad and comes in to land smoothly without stopping above the helipad.

Points will be subtracted for the following reasons:

1. Erratic flight path.
2. Yawing motion of model.
3. Overshooting the helipad.
4. Landing roughly or not completely on the helipad.

ADDITIONAL MANEUVERS

Maximum points 1220.

(1) Double Pirouette — K = 8

Pilot stands in outer helipad, model takes off from central helipad, climbs vertically, hovers briefly and at a constant altitude performs a slow 360° rotation about the yaw axis, hovers and descends vertically towards the helipad where it lands softly. The highest points will be given to a rotation made at eye level.

Points will be subtracted for the following reasons:

1. Model tilts, turns or moves horizontally during climb or descent.
2. Rotation is not made on the yaw axis or is not exactly at 360°, regular and slow.
3. Short stops are not marked.
4. Model changes altitude during rotation or stops.
5. Take-off or landing is rough.
6. Pilot steps out of the outer helipad.

(2) Top Hat — K = 8

The pilot stands at a fixed position chosen by him, the model flies at eye level 10m forward, straight and at a constant altitude. It hovers briefly vertically above the outer helipad and starts a vertical climb of 2m.

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RADIO SPECTRUM

Jim Oddino

Last month we were so busy talking about the of R/C equipment we saw at the trade shows, we didn't leave space to talk about anything else. I did want to say a few words about conversations I had with George Myers who writes for Model Aviation and Bob Aberle who writes for Flying Models. It was very interesting to compare notes, I was particularly interested in their experiments with exponential. George had written a glowing report some months ago and yet no one on the west coast had done anything with it and none of the pattern fliers I had talked to had anything good to say about it. (I suspect no one had really tried it.) Anyway George said he really wasn't quite as enthused with it as he had been. I was ready to come home and start a campaign to kill exponential, but after talking to Dean Koger, I had to reconsider. Dean is flying an Ace Silver Seven with the eponential board and says he likes it. He did admit that he had used the resistor set-up that yields the least bend in the curve (the closest to linear) and that you still need dual rate. He mentioned that he liked the feature that allows adjusting the end travel independently in each direction to take care of the servo non-linearity. Dean is still flying Proline servos and receivers. I'm sure Fred Marks hadn't intended these adjustments for that purpose but if it works use it. The adjustments were originally put in to take care of unbalances in the diodes in the circuit. The lesson to be learned from this discussion is that end point adjustment whether it was planned or not, is a desirable feature one should consider before purchasing that next R/C system. I'm still not too sure about exponential. It seems that anything with diodes is going to change with temperature. Dean didn't mention that he had run into this problem but it looks like it could be a problem.

There was lot's of other radio and airplane talk with Don Lowe, John Britt, Tom Walker and others. Probably the biggest lies were told on Sunday night in the kitchen of Pat Crews' suite when master fliers Don Weitz, Tony Bonetti, Steve Helms, Joe Bridi and I were comparing results of everything we had tried from props to tail skids. Don Weitz said he thought coupled flaps (coupled to elevator controline fashion) helped all of his maneuvers. Tony said he was ready to go back to a simple five channel system with no complications. Steve Helms was convinced the variable pitch prop was the thing everyone would eventually have and so it went. Jerry Nelson came up with a couple of requests for circuits that we'll try to cover. The first being a means of coupling rudder to ailerons (at the transmitter) and still have independent control of rudder. His other idea was to provide a way of plugging in your digital pulse meter to the direct servo controller which is becoming popular on many new systems.

All in all the Toledo show is a great experience. Pat Crews had told me about the great Sunday night party so I even stayed over for that. She was right! Can't wait till next year.

Isotronic Electronics Master Series

One of the new radios shown at Toledo was the Isotronic Seven Channel Master Series which can be purchased from Tower Hobbies at a reasonable price. As we mentioned last month everyone seems to be trying to add features while holding the price down. The Master Series is no exception with servo reversing switches and dual rates as standard equipment. The transmitter has electronic trim via slide type trim pots. A front panel meter is provided which monitors both R.F. output or battery voltage at the flip of a switch. I assume the transmitter is within the legal limits as far as output goes, but as far as tests on a field strength meter it seemed to put out twice as much as anything else I had in the shop on 72 MHz. The R.F. section is similar to Proline but uses a 2N3866 in the final power amp which really puts out. The encoder is built around the Signetics 5044 linear ramp circuit and with the Signetics 544 linear servo amps you are guaranteed a linear relationship between control stick and servo output. It is amazing how many of the so-called top of the line systems there are, that don't have this feature.

The receiver is a conventional double tuned front end with three IF transformers. The decoder is based on the work Signetics did with the 5045 decoder and includes all the external circuits to make the circuit immune to noise and RF flutter. However, it does not use the NE 5045 but is built up with two standard integrated circuits. Many people have found that the voltage regulator in the 5045 oscillates and causes trouble in the receiver.

Although this system is built in Canada it has probably got more U.S. parts in it than many so called U.S. systems. The gimbals and servos are from Dunham and I believe he makes the transmitter case too.

Probably the most important feature of this system is something you can't see. This

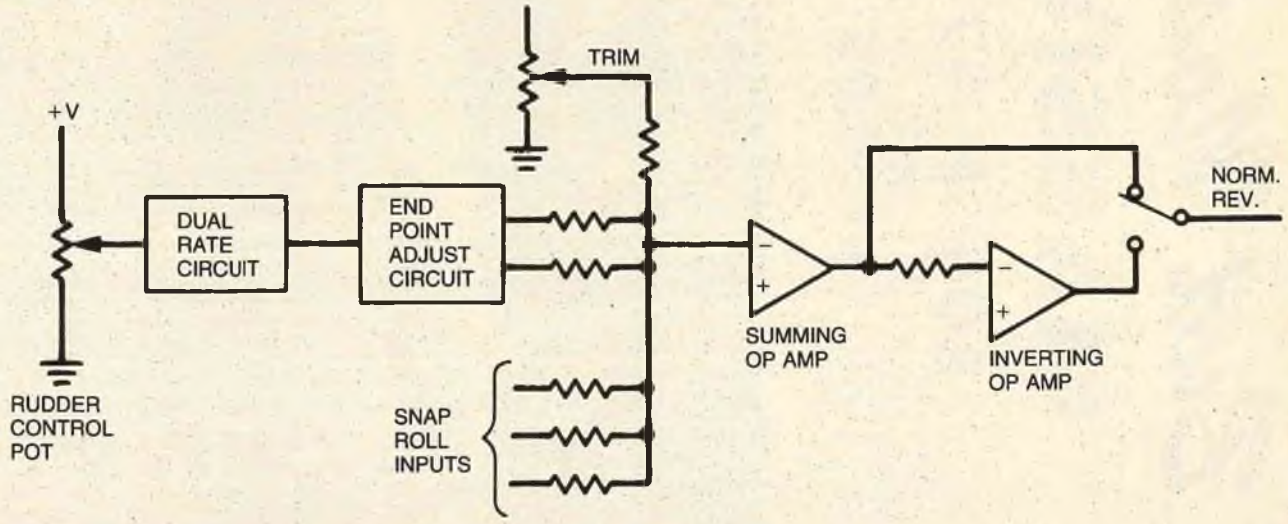

FIGURE 1

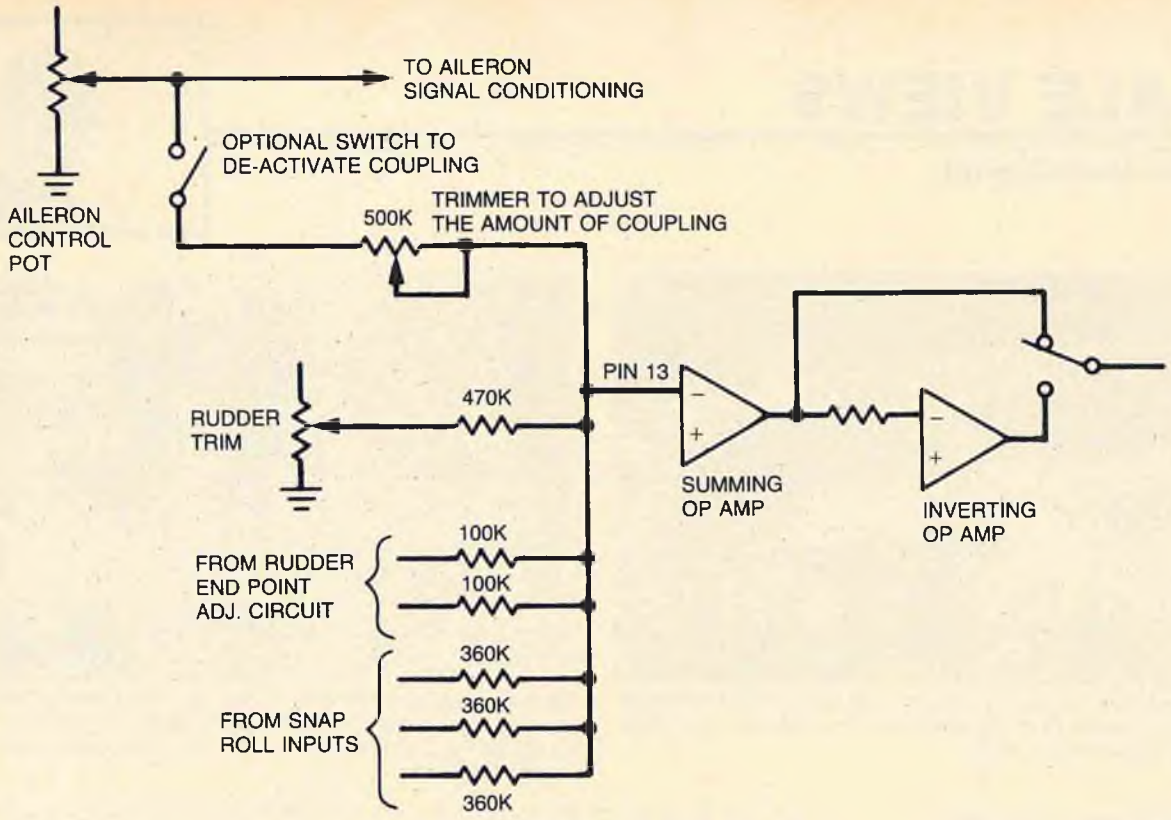

FIGURE 2

is the fact that it is burned-in at the factory for at least five hours. Everyone in the electronics business has heard about "infant mortality" which has shown that many electronic parts fail in the first few hours of operation. Now needless to say you don't want to buy a radio and then have to finish the production of it yourself (the burn-in) and perhaps have to send it back if something fails and then start the whole procedure over again. Most guys want to get out and fly and not run a lot of tests. In fact I've heard of guys getting a new system in the morning and flying in the afternoon.

I have heard that Futaba is another company that pays attention to burn-in. Perhaps that is the reason for their success and perhaps Isotronics will rival that success.

I have been busy trying to get ready for the Masters with the little modeling time I have these days so friend Bill Spalthof put the Isotronics System in his glider and put it through its paces. He said he could fly it out to where he could barely see the plane and it still worked great. It is ready for a power plane now.

So if you are considering a new system and have a limited budget you might take a close look at this system. It is hard to tell with a sample of one, but I suspect this system might be more reliable than many.

Coupling Rudder To Aileron Control

This is for Marty Barry and anyone else who has a JR Unlimited Series 8 channel system and wants to be able to couple the rudder to the aileron control in the transmitter and still have rudder control with the rudder stick for maneuvers such as take-off.

There are so many ways you could do this in a JR that I'm not sure which is best. A block diagram of the rudder signal conditioning circuit is shown in Figure 1.

Notice that the servo reversing is not done in the usual manner of reversing the polarity on the control and trim pots but by a single pole switch at the end of the string. This switch selects the voltage at either the input or the output of an inverting operational amplifier. This is convenient for making sure you get right rudder when you command right aileron. I would start out by

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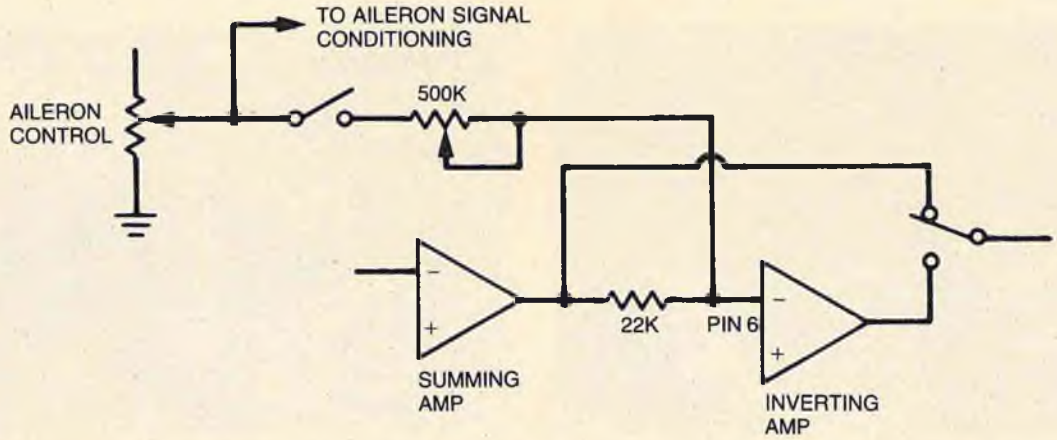


FIGURE 3

SCALE VIEWS

Claude McCullough

Larry Scott (Harlan, Iowa) has another winner in this sharp Kawasaki powered Waco Taperwing in the well-known markings of air show pilot Bob Lyjack.

Sig team members Bill Fleming, Ken Breiting, Dave Falkenhagen leaning in the wind with the prototypes of the Mike Gretz designed Sig Clipped Wing and J-3 kits. Note prevalence of tie downs in the pits.

A Gathering Of Big Birds

The volatile Midwestern weather mix did its best to put a stop to the "Condor Convergence" fun-fly for Giants over the May 16-17 weekend at Council Bluffs, Iowa. Forecasts were ominous, causing some pre-entries not to show. On Saturday winds rose steadily, reaching 35 to 40 m.p.h. in the afternoon, making flying a white knuckle affair. Nevertheless, 41 entries from seven states got through one full round at the cost of a couple of bent models. The roughest crack-up was suffered by Al Kretz (Peoria, Illinois) who lost his twin-engine biplane beauty, a Curtiss Condor in the markings of Admiral Byrd's Antarctic expedition. Planned as a 1981 Nats entry, it bought the farm after flying in convincing fashion. Sunday delivered an additional punch from the weatherman in the form of steady rain that pretty well dampened the spirits of the fliers. A shame, for Bud Kilnoski of Bud's Hobbies, in Council Bluffs, who has organized and directed a number of memorable contests and fun-flys, had outdone himself to insure that this would be a great meet. A cool $1000 and some kits were distributed to participants by random "door prize" drawings. More formal awards went to winners picked by popularity vote in the following classes:

Best Model Overall — Hugh Jones — P-51

Military Biplane — Wayne Menninger — Jungmeister

Military Monoplane — Hugh Jones — P-51

Non-Military Biplane — Larry Scott — Waco Taperwing

Non-Military Monoplane — Dave Drumm — Lazor 200

Sport Biplane — Bob O'Brien — Big John

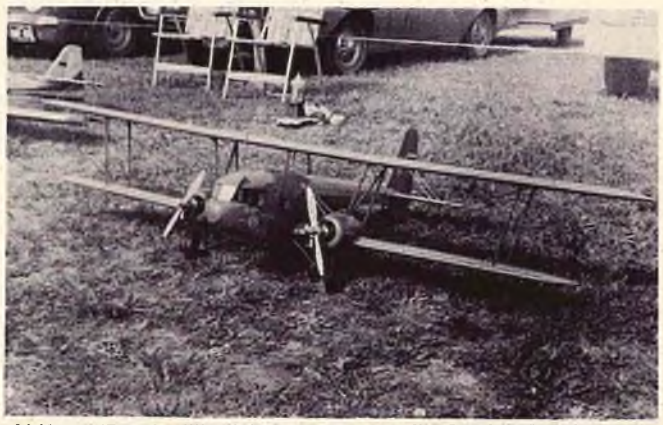
Sport Monoplane — Bill Bennett — Kougar

(I started to list that last one as a 1/4 Scale Kougar, then I realized that this would make it have a wingspan of 12½" when actually it is a double sized 100" biggie!) Good show, Bud. Maybe you can try it again next year with a better break on weather. Thanks to Mike Gretz and Frank Prouba for the photos.

Smile When You Say Dummy

One of the questions I hear most is, "Who makes a ready-made engine for the J-3 Cub." (Or Fly Baby, or Aeronca, or . . .) On aircraft with cylinders protruding out in the breeze, this really is a necessary item for that realistic look. The only one I know of is the vacuum formed 1/4 Scale version soon to be furnished as a part of the new Giant Sig Clipped Wing and J-3 Cub kits. While this engine is custom fitted to the formed cowl that is included in the Sig kit, it is available separately right now as an accessory and can be adapted to other 1/4 Scale kits with a little fitting and perhaps a bit of Epoxolite putty.

Byron Originals P-51 by Hugh Jones (Austin, Texas) took 1st in Military Mono and Best of Show. Quadra power, 24 lbs., had servo operated sliding canopy.



Al Kretz (Peoria, Illinois) built this 11½ lb. Curtiss Condor from Sid Morgan plans. Powered by two O.S. .40s, it was badly crunched in a crack-up.

Cut out on the line and the Sig 1/4 Scale dummy engine is ready to attach to the cowl.

A little paint gives the final touch. This is Sig No. SH 617 and the set sells for $6.95.

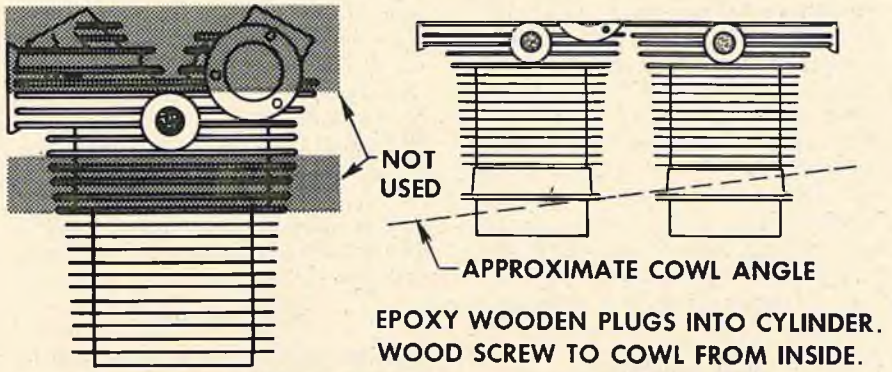
But that doesn't answer the problem as it relates to the smaller Sig kits for the Clipped Wing and J-3, or for the newly released Top Flite Piper J-3 and some others, none of which have a formed dummy engine included with the kit. For these models the builders must hand make a dummy from bits and pieces. Louie Gerding, who flies with the Illinois Valley RC Club of Ottawa, Illinois, has created a nice looking dummy engine that gets past most of the tough part by using sections of the Williams Brothers #202 2" scale Wright Whirlwind J-5 cylinders. As you can see by the accompanying drawings and photos, use a razor saw to cut out sections of the cylinders that are not needed. Glue the remainder together as the basic cylinder to be used in the Cub dummy.

The top of the modified cylinders are flat and this is installed parallel to the fuselage datum line. Since the cowl tapers, the bottoms of the cylinders must be cut off at an angle so that the heads will be even with each other. Use the bottom flange provided in the cut on the front cylinder, but not on the back cylinder. Also note that the left side bank of cylinders are slightly farther back (about an 1/8") on the cowl than those on the right side. Louie reworked the rocker arm covers that came with the Whirlwind and installed them on a homemade cylinder head. Or you can carve some rocker boxes out of balsa. Assorted bits from the kit produced the other details. The Wright exhaust and intake pipes were sawn and re-glued to simulate those on Cub-type engines. The weather shield on top was cut from thin sheet aluminum. Add spark plug ignition wires and you've got a good representation of the full size mill. For guidance in putting on details, look up the Winter 1960 issue of Air Progress, which has a full page engine drawing by Jim Triggs. A book by Triggs called "The Piper Cub Story" is in the Modern Aircraft Series listed in most current aviation book catalogs for $4.95. It has several different engine 3-views, plus a lot of other Cub detail drawings and photo coverage.

K & B's Kups and Kolor Kards

A while back, as I was reading the

Louie Gerding's Sig Cub with converted Williams Bros J-5 Cylinders.



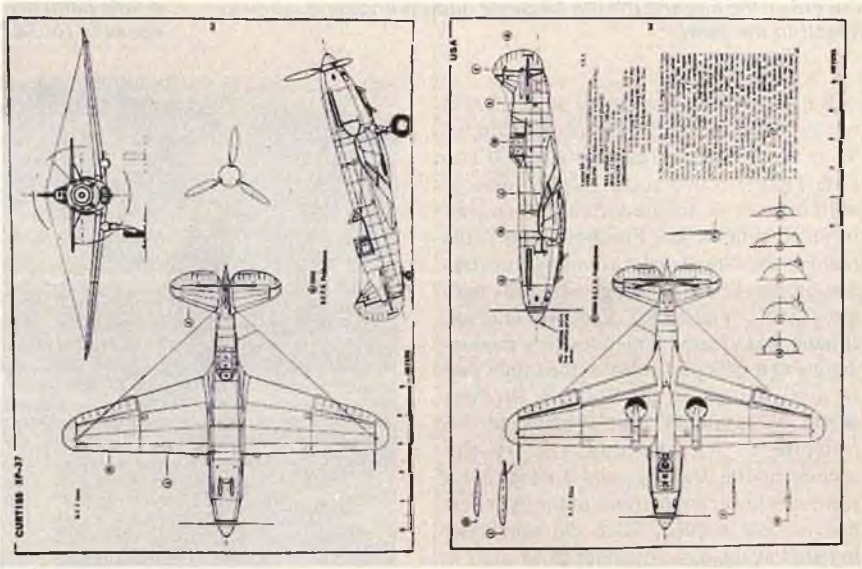
published item in Scale Views about the color mixing chart and booklet of another company, I was reminded that K & B used to have a similar set of publications for their Super Poxy paints. Since I hadn't seen them anywhere for a long time, I wrote and asked if they were still available. By return mail, I heard from President John Brodbeck that they were indeed still available and would be supplied free to anyone who requests them. The color card had mixing formulas for converting the basic Super Poxy colors into other shades. Color chips show the result of the mix. The accompanying booklet, illustrated with line drawings and diagrams, has complete directions for the application of their "Matched Finish System." A lot of practical and useful hints on preparation and finishing models are included in the book and I recommend it for your data file. Send a self-addressed business size envelope to K & B Manufacturing 12152 South Woodruff Ave., P.O. Box 809, Downey, California 90241, for your copies.

John noted our mention of K & B one ounce graduated mixing cups in the May issue and said that there are now two additional sizes. He sent along samples and they turned out to have handy snap-on lids. The pot life of Super Poxy can be extended considerably by putting the mix in the refrigerator. The lids will be handy for this cold storage as well as for other purposes. A set of cups will last a long time for epoxy and other resins will not stick to them and set-up batches can be popped out or peeled off of them for re-use again and again. The pack of six 4 oz. cups and lids is No. 8197, 8 oz. versions are packed four to a box, No. 8188. Ask your dealer for these useful color mixing aids.

Scale Bookshelf

Airplane Scale Views B.C.F.K. Publications, P.O. Box 128, Midland Park, New Jersey 07432. 22 pages, 8½" x 11". $2.00.

Although B.C.F. Klein has been issuing aircraft drawings for many years, with this edition he starts a new format, so it is numbered "Vol. 1." His specialty has always been the unearthing of rare and little known designs and it is continued in this effort. Ten aircraft are shown in 5-view drawings, eight of them on two pages each.



5-views of the Curtiss XP-37.

A 5-view should always be considered the most useful, since 3-views are short on both bottom and opposite side detail that are essential to accurate model building. How many of you experts out there can correctly describe this list of subjects? MAI Kavant, Curtiss XP-37, I.A.R. 80 (prototype), Kawanishi J6K1, F.F.V.S. J.22, Messerschmitt Me 109 TL, Cant Z.1014, Hispano HA-1112-M1L, SAAB 19 and V.E.F. I-16. I'll have to confess that the XP-37 was the only one I recognized. At 20 cents per drawing, this booklet is a bargain for plan collectors or builders looking for out-of-the-rut subjects.

Scale Data Bank

Smithsonian Drawings: The April Scale Views listing of Waco factory drawings available from the NASM of the Smithsonian was a popular item. The Aircraft Drawings department there has other drawings on which relatively quick delivery can be made. ("Quick" here meaning requiring no individual research work.) The first listing below is of drawings by Joe Nieto that appeared some years ago in Model Airplane News. They are approximately 23" x 31" and cost $1.00 per sheet. The number in parentheses following the name of the aircraft indicates the number of sheets for that particular subject. The majority are 3/4" to the foot scale, a few are 1/2".

Alexander Eaglerock (2); Bellanca "Columbia" (2); Boeing MB 3 and MB 3A (2); Boeing P-26A (1); Consolidated PT-3 (1); Curtiss JN4 and JN6H (4); Curtiss R3C-1 and 2 (1); Curtiss Robin "OX" (2); Douglas 0-43A (2); Travelaire 2000 (2); Travelaire 6000 (2); Waco 240A (1); De Havilland 5 (1); Nieuport Nighthawk (2); Sopwith Snipe 7F1 (2); Nieuport 11 (1); Nieuport 28 (2); Albatross C-5 (1); Fokker E-111 (1); Fokker D-7 (4); Fokker DR-1 Triplane (2); Roland LFG D2 and D2A (1); Rumpler RU-D1 (2).

The next list is a variety of both airplanes and scales, drawing size not given. Cost is also $1.00 per sheet and the number of sheets is indicated in parentheses.

Wright Bros. Kitty Hawk Flyer (1); Wright Bros. Military Flyer (1); Wright Bros. EX "Vin Fiz" (1); Curtiss A-1 — USN (3); Curtiss "Headless Pusher" (1); Burgess-Dunne Hydro Aero Plane (1); Verville-Sperry "Messenger" (1); Fokker T-2 (1); Fokker F-10 "Super Trimotor" (1); Loening C-2 Cabin Amphibian (1); Ryan NYP Spirit of St. Louis (1); Sikorsky S-38A Amphibian (1); Sikorsky S-38B (1); Vultee

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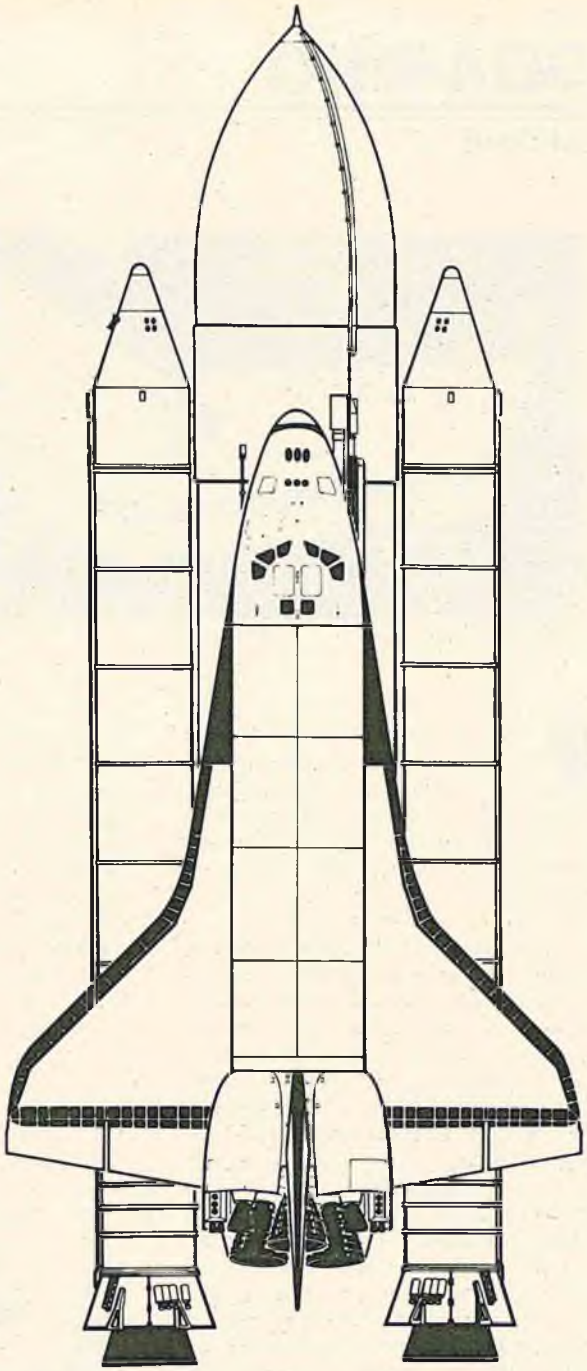
SPACE SHUTTLE
See Scale Views

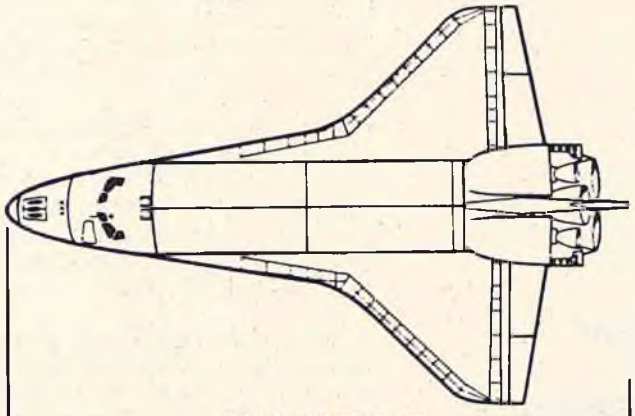
DIMENSIONS AND WEIGHT

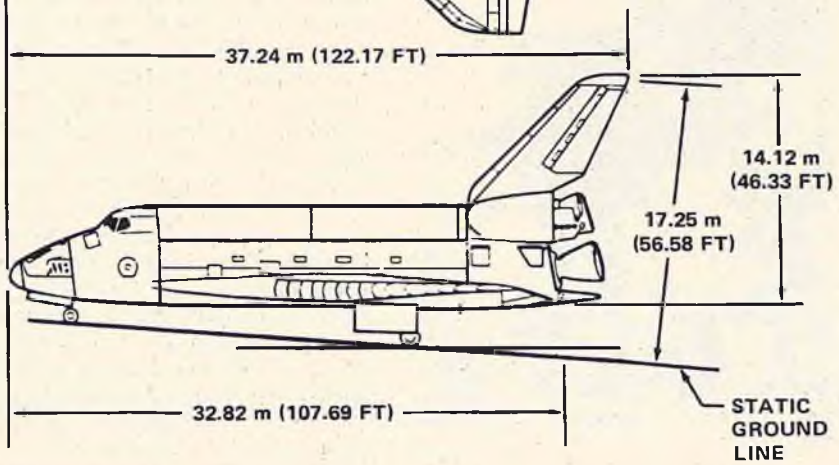
WING SPAN	23.79 m	(78.06 FT)
LENGTH	37.24 m	(122.17 FT)
HEIGHT	17.25 m	(56.58 FT)
TREAD WIDTH	6.91 m	(22.67 FT)
GROSS TAKEOFF WEIGHT		VARIABLE
GROSS LANDING WEIGHT		VARIABLE
INERT WEIGHT (APPROX)	74 844 kg	(165 000 LB)

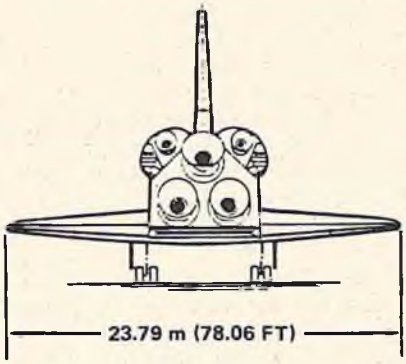
MINIMUM GROUND CLEARANCES

BODY FLAP (AFT END)	3.68 m	(12.07 FT)
MAIN GEAR (DOOR)	0.87 m	(2.85 FT)
NOSE GEAR (DOOR)	0.90 m	(2.95 FT)
WINGTIP	3.63 m	(11.92 FT)



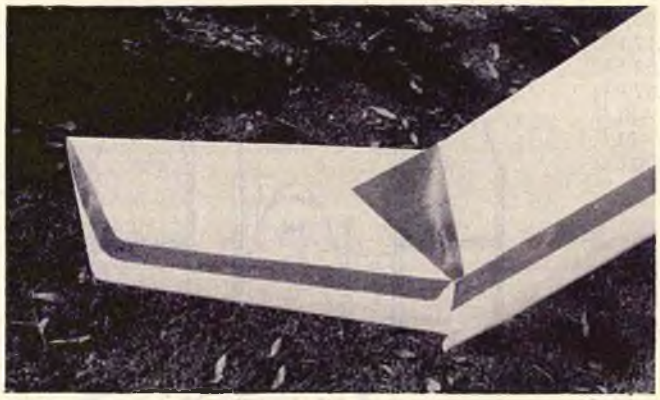




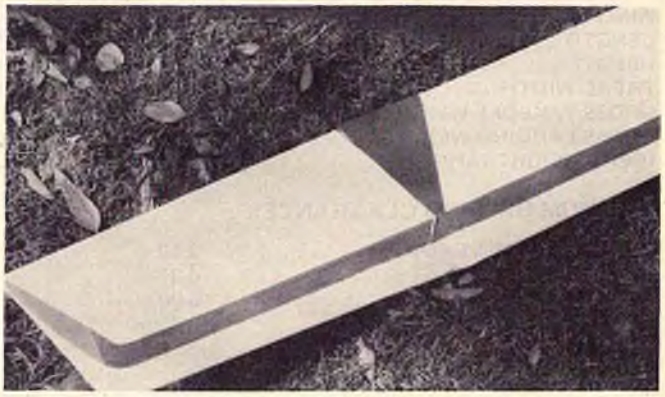


SOARING

Al Doig



Swing Wing swung.



Ted Yee's Swing Wing extended.

I just finished covering a spoiler without removing the backing from the MonoKote. This requires patience, perserverance, and a towering propensity toward stupidity. It's a pity that Ken Willard's Dum-Dum contest has concluded.

★

It looks like the 1982 2-Meter World Cup is going big-time for sure. Co-sponsors, San Fernando Valley Silent Flyers and Southern Nevada Soaring Society, are in final negotiation with a large Las Vegas hotel for their participation. This event attracts the innovators and designers to the challenge of the tasks. I predict that next year will see fierce competition from people who have really been practicing, and not been finishing planes the night before the contest. I hear that Dave Johnson of Portland, Oregon, has been winning open contests with his 2-Meter K-Minnow. Dave captured third place in the 1981 2-Meter World Cup with this ship. I suspect he's going after the 1982 first place in top gear. So, see you in Las Vegas. You may make your expenses in a casino, and then, again, you may not.

★

Seen at a Pasadena Soaring Society contest at the Rose Bowl, California: How to get a sailplane out of the top of a glider-eating tree in a safe manner --- you glide it out. Unidentified, courageous tree climber decided a launch was a better risk than straining the sailplane through the leaves and branches on the way down. The plane landed right on the spot, but the time in the tree didn't count.

★

At the same contest was a swing wing tip glider designed and built by Ted Yee, member of the San Fernando Valley Flyers, who lives in Northridge, California. The photos show the wing in both the extended and swing positions. Servo actuated, the swing mechanism may be stopped in intermediate positions. Ted says that the reduction in profile drag in the swung position results in a 10% to 13% increase in speed. As the swinging wing tips reduce the measured wing spread, Mr. Yee and I discussed the what-if's of a 2-Meter swing wing, or servo extended wing, or whatever. AMA rules state: "Class D — Two-Meter Class Sailplanes. Projected span at rest limited to 2 meters or less. No other limits." I remember the 1980 NATS and Ken Olson's Gentle Lady with the wing tips that hung down, at rest, and swung up under load to increase the span, in flight, to 100". The C.D. ruled it legal, under the definition. The rule was not tested, however, as Ken removed the tips to avoid protest. Rule making is, at best, a chanceful thing. Make a set of rules and straight away someone will find a path around them. I suspect that one day someone will turn up at a contest with a 2-Meter sailplane that unfolds, on command, into an Open Class ship. I suppose that if someone is clever enough to design such a ship that would also attain superior performance, he deserves the advantage.

How to retrieve a sailplane from glider eating tree.

★

I hear that Lee Renaud, Chief Honcho at Airtronics, now has a 14' version of the Sagitta. It was built to compete in the Great Race sponsored by the S.O.A.R. group in Illinois. Don't send in your kit orders for this colossus quite yet. Airtronics doesn't have that much balsa wood.

★

At a flying field recently, someone asked how to calculate how big the vertical tail feathers should be on a sailplane. There were a number of quick answers, all related to percentage of something; like 50% of the stab area, or 5% of the wing area, or whatever. The reason for use of such an approximation is that, in truth, there is no exact way to calculate proper areas of the vertical fin/rudder. There is also, perhaps, a lack of appreciation for the importance of vertical areas to turning characteristics of sailplanes. In the August 1980 issue, I gave a formula for calculating the horizontal stab area with reasonable accuracy. In the December 1980 issue I related a method of empirically tuning the vertical stab using a mini-model. Now I'll give you a handy dandy formula for calculating the vertical stab area that is better than nothing. But, I'll

also give you some criteria used by some popular designs for further guidance.

We will deal with a dimensionless number called the Vertical Tail Volume Coefficient which = Sv lv/S b. Where: Sv = Vertical Stab/Rudder Area, lv = Moment Arm of the Vertical Stab (the distance from the C.G. to 1/4 of the average chord of the stab/rudder), S = Wing Area, b = Wing Span (total). In calculating this coefficient for quite a number of popular sailplanes, all fell within the range .01 to .03. For instance, the Camano-100 = .022, Gentle Lady = .0177, Paragon = .0157, Gemini = .0143, Olympic II = .020, Olympic 650 = .0227, Aquila Grande = .0128, and the Sagitta 900 = .019.

As stated before, the meaning of the coefficient is less than precise. The reason is that while it includes some important factors not included in guesses based on wing area; it ignores, for good reasons, other most important factors such as dihedral, and a lesser factor — fuselage side area.

Let me digress for a moment and talk about spiral stability. When a plane banks into a turn, there is a component of lift generated toward the center of the turn. If not countered, this force will cause an ever tightening spiral. A tendency of the ship to yaw, or turn, to the **outside** of the turn will stop this increasing spiral. The main factor causing a yaw to the outside of the turn is dihedral. The greater the dihedral, the greater the tendency toward outside yaw. Now, a large vertical stabilizer prevents yaw, holding the ship on course, giving it yaw stability. If the vertical stabilizer is sufficiently large, it will overcome the dihedral effect which is trying to yaw the ship toward the outside of the circle, the spiral will tighten. In an extreme case, even opposite rudder may not counter the stabilizing force of the entire vertical surface. This is called spiral instability. It is caused either by too little dihedral, or too much vertical stabilizer area, or both.

Back to Vertical Tail Volume Coefficient. The greater the coefficient, the greater the dihedral needed to prevent spiral

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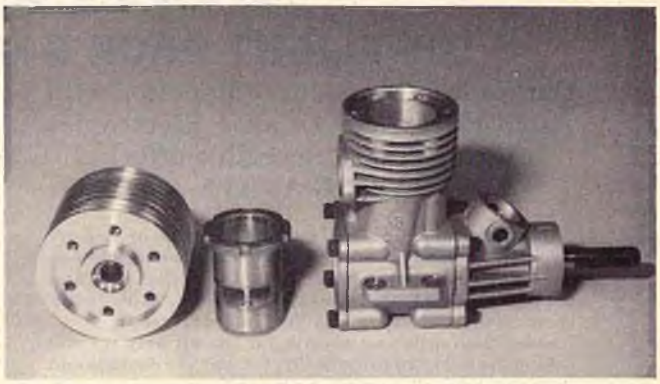
PIT STOP

Gene Husting

K & B's new #8800 R/C car engine. Made especially for cars featuring new one piece head-heatsink. Approximately $95.00 less carb and muffler. Note strengthening web at mounting flange.

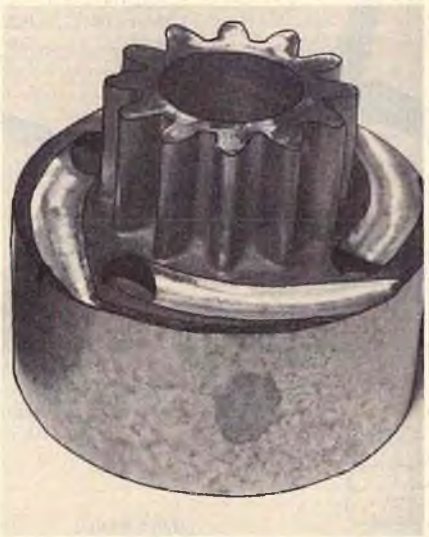


New thicker sleeve with new material and port timing ideal for cars. New fully machined double bushed rod. New crank. New nose. New bulletproof large bearing. It's a winner.

K & B's New 3.5 Engine Plus Clutch Tricks

K & B's new 3.5 R/C Car engine should be on the dealers shelves by the time you read this. How good is it? I think you're going to be pleasantly surprised. I have been helping K & B by testing hand built prototype models of their new 3.5 engine for over a year now. These engines were designed, built and assembled by Bill Wisniewski, who has to be considered as one of the best engine designers in the world today. The prototypes I ran were faster than anything I'd seen to that time, on the prop and on the track as well.

At the time of this writing, it's one week before the Annual McCoy race in Pomona, California. Three weeks ago I went to K & B hoping to pick up a few of the new production engines for the race. They weren't quite finished yet. But Bill Wisniewski graciously donated four cases, sleeves, pistons, rods and pins. The balance of the parts I used were McCoys'. I did my usual things to the engines, I just can't resist grinding and polishing.



We'll show you how the Experts modify their clutch bells for increased performance.

The results were incredible! As you know, Rich Lee builds the fastest K & B-McCoy engines in existence. Rich's engines are as fast or faster than any other type 3.5 engine running. I got one of Rich's engines for comparison testing. This was a well above average engine. Fuel for the tests was K & B 1000 with castor oil. Tachometer was the exact same as used by K & B and Dick McCoy. As you know props vary greatly in rpm's, so this is not comparable to any prop readings you might achieve, but is intended solely as a comparison between these engines. All engines used the same props and same Perry pumper carb, same McCoy can muffler.

	9-4	8-4	7-4
Rich Lee Modified	15,100	21,000	24,800
K & B — #1	16,000	21,000	24,400
K & B — #2	16,100	21,500	25,100
K & B — #3	16,500	21,900	24,700
K & B — #4	15,500	21,300	24,700

The important readings for R/C car use, are the 9/4 and 8/4 readings. The 9/4 represents low speed torque, which is what we need to accelerate out of corners. The 8/4 would represent mid-range acceleration and the 7/4 would be at the end of the straightaway. All of the K & B engines were excellent. They did vary quite a bit,

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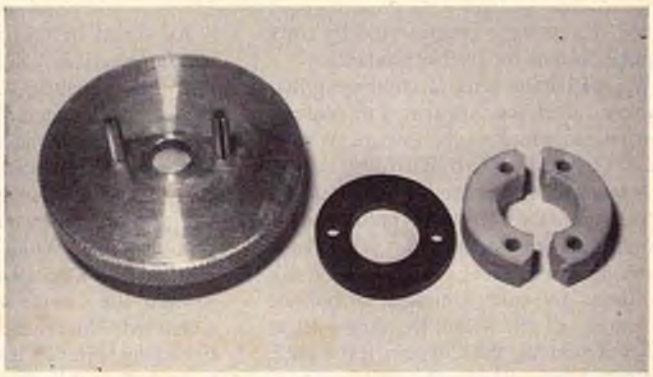
Dremel cut-off disc, on the left, is used to rough cut the air grooves in clutch bell and the small tapered stone is used to finish the grooves.



Flywheel for Associated RC300 car, B & B #SP102 clutch spacer and #SP38 teflon shoes. All available from Associated to modify your clutch.

POWER BOATING

Howard Power

A few months ago I recommended the use of International Product's pipes on boats because of their extra wall thickness and performance. At least one other manufacturer has been listening to the requests of many of us in boating for high performance tuned pipes designed especially for power boating. Mac's Products (Sacramento, California) has been producing tuned pipes, muffled tuned pipes, mufflers, and head pipes for many engines. They have just released two marine pipes to their already large line of products. These pipes have a couple of features that make them unique. The pipes are made with a thick wall that should hold up to our kind of abuse. They also feature a diverging cone that has double tapers. This feature has been used on high performance motorcycles but, to my knowledge, Mac's Products is the first commercially available model pipe to use this feature. The double tapered diffuser section allows better energy recovery because it slows down the gas without causing it to separate from the wall. The use of double tapers also results in a reduction of diffuser length which allows the designer to use a longer head pipe. The length added to the head pipe tends to increase power below the power peak because it increases low speed torque. Tests I have made on these pipes have lead me to believe that this unique feature has greatly increased the performance of the new marine pipes compared to the aircraft pipes that have been available from Mac's. I have used the 7.5cc Marine Pipe (#1345) on the OS 46 and find it to be a super combination. An 11cc Marine Pipe (#1365) is also available and works well. The 7.5cc pipe lists for $27.95 and the 11cc pipe sells for $29.95. See your favorite hobby dealer because these pipes will be available by the time you read this.

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Dear Howard:

I have read your articles in R/C Modeler and that is why I am writing. I have been a modeler for almost 25 years, building mostly plastic scale and electric models. However, my main interest is power boating and I have designed the enclosed hydroplane.

Power boating has always been of interest, as mentioned, however, I know very little about designing, etc., and that is why I am writing, to of course solicite your advice as to the following questions.

The model is designed after the famous Miss Supertest, winner of the 60-63 Hormsworth and Gold Cup. I have built the superstructure out of 3/16" plywood. The bottom is also 3/16" plywood and the sponsons are 1/8" plywood. Decking will be 1/8" plywood. The inside of the boat has been fiberglassed and all members were epoxied.

I plan to use a K & B 7.5cc/.45 Marine racing engine with K & B hardware. K & B 2/3AR Rudder Assembly with water pick-up, strut and drive shaft assembly. My problem is this. I am not sure what hardware to use. For example, do you think that a K & B 7.5cc is the proper engine for a 30" model? I'm not particularly interested in racing, but having fun. The weight of the model without hardware, etc., would be about 8 lbs. Also, I have indicated

(1) ALUMINUM MOTOR MOUNT
(2) HUGHEY CABLE NUT
(3) HUGHEY FLEX SHAFT ASMBLY. #6666
(4) 1/4 O.D. K & S BRASS TUBE
(5) OCTURA SURFACE DRIVE ASMBLY.
(6) MUCK RUDDER ASMBLY.
(7) TURN FIN & BRACKET

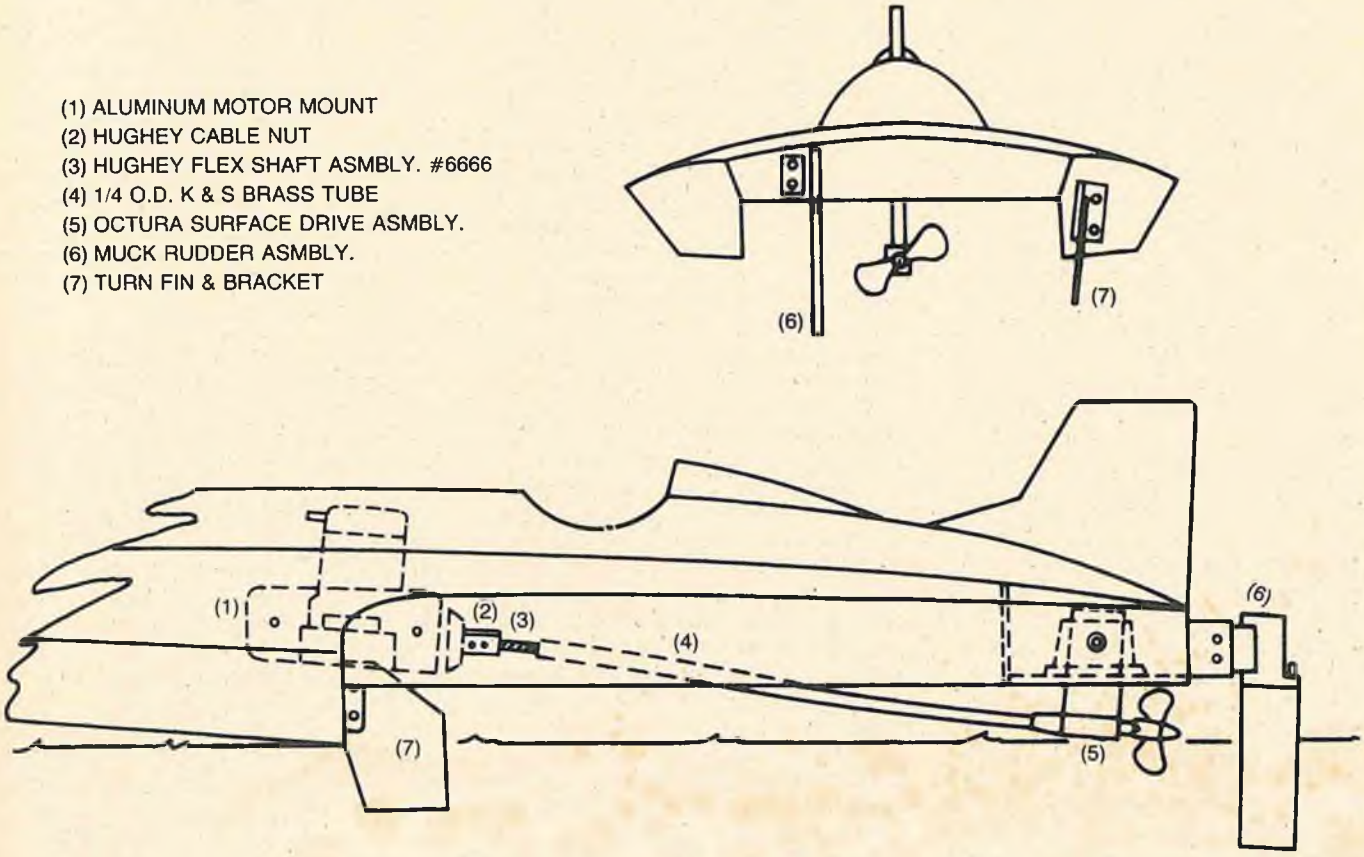

FIGURE 1
TYPICAL SPORT HYDRO HARDWARE

in pencil the position of strut, rudder, etc. The rudder is offset on the left side of the transom with the water pick-up.

I do not have the specs, etc., on the hardware, therefore, it is difficult to be specific in the drawings.

Would you, therefore, please look over the enclosed plan, and make a list of parts, etc., which you think I should have --- engine, shaft (length and type), strut, rudder, etc., and any other information which you feel I should know.

I certainly appreciate your help and look forward to hearing from you as soon as possible, as I am anxious to have the boat in the water this summer.

Many thanks for your time.
Sincerely,

Geoff Webster
Naponee, Ontario, Canada

Thanks, Geoff, for sharing your new project with me and my readers. Many of you are interested in scale looking hydros for use in the Scale Hydro and Sport 40 Hydro racing classes as well as for just plain fun. Your construction description indicates that your boat will be on the heavy side. A model the size of yours usually has the superstructure frames and bottom built using 3/32" ply, sponson sides and decking from 1/16" ply while the sponson bottoms are made of 1/8" ply for strength. I use Sig 15-minute epoxy for all construction including a thin coating of all parts inside and out for water proofing. Fiberglassing is not necessary with this kind of construction but if you must, use light cloth or you will have a very heavy model. Your empty weight of eight pounds is excessive. You should shoot for a total boat weight of seven to ten pounds ready to run. Remember that the boat has to lift clear of the water surface to plane properly. The propeller supplies this lift at the rear, so a heavy boat means wasted power and sometimes (if weight is excessive) the boat will not get up on plane.

The K & B 7.5 engine has plenty of power for a model this size. If you want to use an exhaust throttle (a very good system), I suggest that you replace the K & B assembly with one made by Prather or Steve Muck. These throttles have a rotating barrel whose seal will remain tight for the lifetime of the motor.

Figure 1 shows the hardware set-up that I would recommend. Use a strong metal motor mount. Octura and Steve Muck both make good high strength extruded aluminum mounts that are suitable. The motor rotates the flexible drive shaft by its connection with the cable nut. I recommend a Hughey cable nut that uses set screws to hold the cable. Octura and Norco also make cable clamping nuts. If you use one of these, be careful that you don't overtighten them. Overtightening causes distoration which produces a wobbly shaft and power robbing vibration. The drive shaft is made by Hughey, also. It has a 3/16" cable silver soldered to a 3/16" hardened steel stub to which the drive dog is secured. After cutting to the proper length you must hard silver solder the end of the cable where the set screws bite using 45% silver content solder (also available from Hughey) and a propane torch. The flex shaft is supported by a 1/4" O.D. brass stuffing tube that is glued to the hull and bulkheads. This tube usually has a gentle S shaped bend so that it lines up with the cable nut and the strut. K & S brass tubing in the 36" length is recommended for the stuffing tube but you can splice 12" lengths together by sweat soldering the next size larger tubing over the joint if your hobby shop only stocks the short lengths of tubing.

I recommend that you use an Octura surface drive strut mounted as shown in the figure. A slot is cut along the centerline of the hull so that the strut blade pierces the bottom. The bracket is mounted inside the hull on the bottom. A bulkhead must be placed ahead of the strut to keep water out of the radio compartment. This strut allows you to adjust the prop depth and angle. This adjustment is very important. The strut has a flat pad on the bottom which helps to keep the boat on plane through the corners. Trim is accomplished by raising or lowering the strut and by increasing or decreasing prop shaft angle. For your first try at strut position set the boat on a level surface with turn fin and rudder removed. The boat bottom should set level when resting on the sponsons and the strut. This should also result in a sponson angle of approximately six degrees. Try a strut angle of approximately six degrees. When you test run the boat it should run level with no tendency to blow off. If it "drags its tail" or "blows off" you must increase strut angle and/or strut depth. Each different propeller choice will require readjustment. If the hull "bucks" (oscillates in pitch) while running down the straights the strut angle and/or depth should be decreased. I would try Octura 1400 series propellers on scale type hydros. The 1450 or 1455 would be the place to start for the 7.5 class while a 1462 or 1465 would be appropriate for the 11cc class scale boats. I recommend the use of needle or ball strut bearings for the prop riding hydro boats. Bushings have a short lifetime in this application but will work if you watch for excessive clearance and replace the bearings at the first sign of slop.

The rudder should be very strong and much larger than scale size. I recommend the 20 size adjustable wedge rudder assembly sold by Steve Muck for 7.5 powered boats. This rudder is super strong, has adjustable fore and aft angle adjustments, and has an integral water pick-up for motor cooling. The 11cc boats will require the 60 sized Muck wedge rudder or the large Octura wedge rudder. A single high torque (40 in.-oz. or larger) servo is adequate to turn the rudder on 7.5cc boats but for really good turning performance dual rudder servos are required for the 11cc scale hydro boats. The rudder is usually mounted to the left side of the drive line.

The turn fin is also very much larger than scale size and is usually mounted on the back of the right hand sponson. As boat speeds have increased, people have been using larger and larger sized turn fins to allow the boat to turn corners fast without spinning out. Make the turn fin so that it is removable. Most people use a turn fin mounting bracket made of a piece of heavy duty aluminum angle which is mounted securely to the sponson. The turn fin is bolted to this bracket. A 7.5cc boat will need a fin approximately 2" wide and 1½" deep. Make several different sizes and try them all to decide which one is best. Too large a fin causes "hooking." Hooking is a characteristic where the turning radius steadily decreases at a constant rudder angle deflection. This causes an unstable turn and should be avoided. Cut down the turn fin area until the boat stops hooking and you will be close to the optimum size. The turn fin usually is tilted at an angle of approximately 5 to 10 degrees so that the tip is moved toward the boat centerline. This angle prevents the boat from lifting the inside sponson when turning. The turn fin should be made of heat treated aluminum stock at least .064" thick. Be sure that the turn fin is accurately aligned or it will cause a turning tendency when the rudder is neutral. Also be sure to sharpen the leading edge of the fin to decrease drag.

This hardware set-up has been used on many Sport 40 and Scale Hydro boats running in my area. The results have been very good so I am sure that if you use the above items your boat will run successfully.

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Dear Mr. Power,

After having been away from R/C boating for several years due to my decision to enter military service, the term of which recently ended, I have decided to get back into this exciting hobby. However, I have noticed that the sport has really grown up in these last few years, mainly in the aspect of advanced technology. However, your article in the May issue of R/C Modeler really answered a lot of my questions. It was concise and written in layman's language and your drawings were first rate and to the point. Keep up the good work. As I said earlier, I am just rejoining the sport and I need some information on the new boat classes, rule changes, etc. I have already written to the IMPBA, however, I have been told by my neighborhood hobby shop that I now have to belong to both the IMPBA and NAMBA and I can't seem to find an address for NAMBA. The 1981 racing season in Florida has already begun, and time is running out for me. Besides, the club I wish to join requires that I be a member of both IMPBA and NAMBA before I can be accepted for membership. Please, Mr. Power, if you could send me the address for NAMBA I would really appreciate it.

I also have a technical question for you. I recently purchased a used Lil' Lightning tunnel hull in wood with the usual K & B 3.5 outboard on the transom. After running it once I have come to the conclusion that it is not properly rigged for real competition. It seems to me that the engine is mounted too low on the transom as the prop centerline is

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By Paul Denson

Bootlegger R.C. Products'

FOAM CUTTING KIT

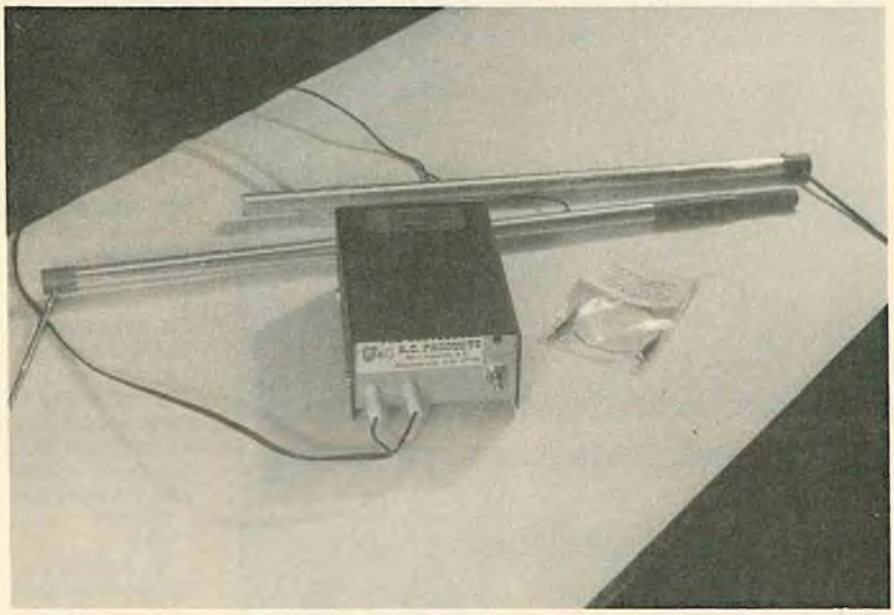
Here-to-fore, unless you are an electrical genius and have all kinds of electrical equipment available, that plane you day-dream about had to have a built-up wing. How many planes in "do it yourself" magazine articles have you fallen in love with only to have your feelings dashed to the ground when you saw that exquisite wing was carved from a hunk of foam?

Don't despair. The Bootlegger R.C. Products, 8617 Ironside N.E., Albuquerque, New Mexico 87109, (505) 821-5929, has the answer to your needs at a price you can afford. They have marketed a foam cutter, simple in design and easy to assemble and use. The transformer isolated power supply plugs into any 110v outlet. On the panel are jacks for the leads to the bow and a toggle switch for power to the cutting wire. Two sets of cutting wires are included in each kit and are cut to exact length with grommets secured to each end of the wire. The bow is assembled on a wooden dowel insert and the electrodes are inserted in predrilled holes at each end of the bow. The cutting wire is strung on the 36" bow in almost the same manner as you would string a hunting bow.

Plug the ends of the power cable into the jacks on the panel and flip the toggle switch. Don't be tempted to test the wire with your thumb as we did. Didn't know branding yourself smelled so painful. Take our word for it, that wires gets hot.

We made a root and tip template, from formica, for our wing then drew a longitudinal reference line down both sides. Each template was divided into eight proportional parts. If two people are going to handle the bow, each one must know at all times how far through the cut you have progressed. Usually one person calls out the progress, the other keeps up.

One person can cut a pretty fair wing core if it is a constant chord wing. With a tapered tip wing, a second pair of hands is helpful.



Foam cutter kit or what you get in the box.

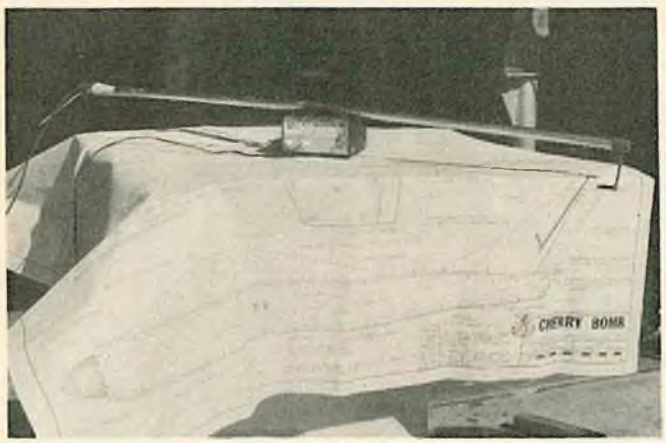
We have available a large Variac and our own cutter is similar to the one in RCM's Foam Wings book. It is heavy and cumbersome but turns out a fair core. We looked with doubt upon this little lightweight piece of equipment until we cut our first core. "Hey, that's not too bad," we agreed, "in fact it is a pretty great piece of gear." The core we cut was comparable in every way to ones we have cut with the high powered Variac. It was definitely easier to handle, the pulley suspension system of the old cutter was not necessary at all. The bow is so light that only fingertips are necessary to guide it through the cut.

If you cut wings for a couple of bipes you can recover the full $39.95 cost price. The replacement cutting wires are less than $2.00. Bootlegger R.C. Products also has available a 48" cutter bow and replacement wires. Almost every city has a plastics company where foam is available at a minimal price.

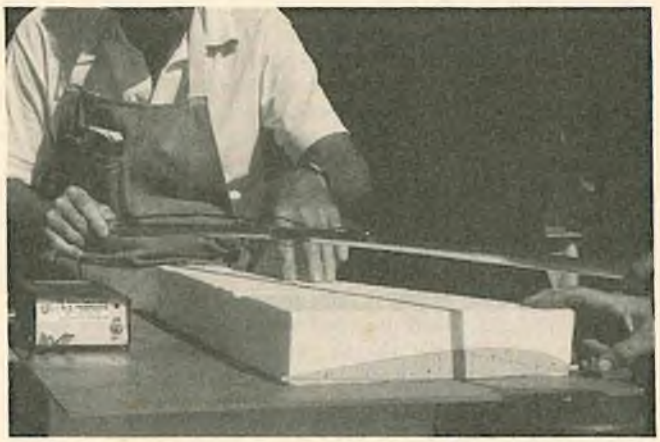
Having one of these foam cutting kits would be a good project for your club, this way, the price for a set of foam wings would entail the foam only.

Before you make your first incision into a piece of foam, stop by the local hobby shop and pick up a copy of RCM's excellent text Foam Wings. If one is not available there, fill out the coupon near the back of a copy of RCM, include $4.95 plus postage and your copy will soon be on its way. It is the last word on building foam wings, and a welcome addition to any RC'ers modeling library.

□



Parts assembled ready to use.



Cutter in use. A second pair of hands is desirable for cutting tapered panels.

RCM PRODUCT REVIEW

Hobby Lobby GRUMMAN

SPECIFICATIONS

Name	HOBBY LOBBY GRUMMAN
Aircraft Type	1/4 Scale
Manufactured By	Horizon Models — Hobby Lobby Rt. 3 Franklin Pike Circle Brentwood, Tennessee 37037
Mfg. Suggested Retail Price	$219.00
Available From	Hobby Lobby
Wing Span	93 Inches
Wing Chord	13 Inches
Total Wing Area	1209 Square Inches
Fuselage Length	65 Inches
Stabilizer Span	38 Inches
Total Stab Area	290 Square Inches
Mfg. Rec. Engine Range	.Not Given
Recommended Fuel Tank Size	N.G. (used 16 oz.)
Recommended No. of Channels	N.G. (used 5)
Rec. Control Functions	Rud., Elev., Throt., Ail., Flaps
Basic Materials Used In Construction:	
Fuselage	Plastic, Ply & Fiberglass
Wing	Foam & Balsa
Tail Surfaces	Foam & Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (4 pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Westport Int. Variant
Engine Make & Displacement	Evra 190
Tank Size Used	16 Oz.
Weight, Ready to Fly	326 Ounces
Wing Loading	38.8 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

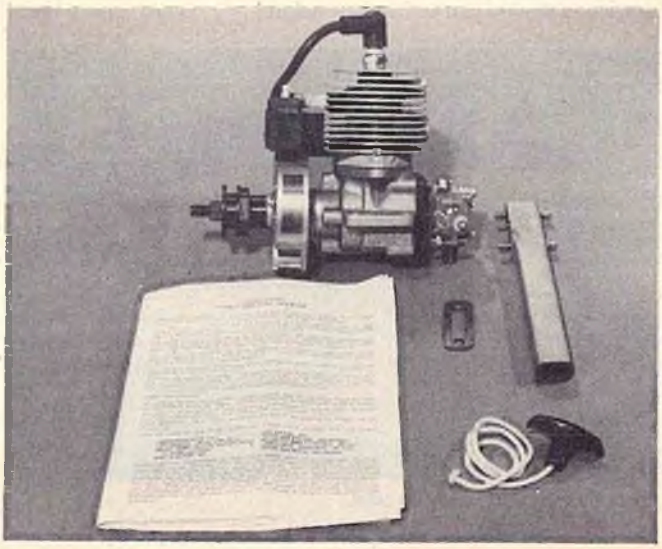
Quality of the pre-sheeted foam components — color brochure by Grumman Aircraft.

WE DIDN'T LIKE THE:

Plans and instructions are poor (see text). Plastic molding only average — molded canopy very thin on sides.

The Grumman American Tiger is a 1/4 Scale aircraft that is available from Hobby Lobby International of Brentwood, Tennessee. The Tiger is kitted exclusively for Hobby Lobby by Horizon Models of Canada, and is designed to be powered by gasoline fueled engines such as the Evra or Quadra. Conventional .60 size glow engines, which are equipped with propeller reduction drive units could also be utilized. The Grumman Tiger is priced at $219.00 and is, in all probability, one of the most highly prefabricated 1/4 Stand-Off Scale kits available.

The Tiger kit is shipped in two large corrugated boxes, with the wings in one container, adorned with a nice four color label of the Tiger in profile, and the remainder of the kit component pieces are in the larger box, which measures 12" x 12" x 60". Upon opening the larger carton, we discovered two cracked areas on the nose of the fuselage. These damaged areas were undoubtably the result of mis-handling in transit, as the component parts are all carefully packaged and cushioned within the carton with literally hundreds of "foam plastic peanuts." The volume of these foam cushioners was sufficient to nearly fill a 30 gallon trash container! The box has been changed so this kind of damage no longer occurs. Hobby Lobby has made a conscientious and sincere effort to package the Tiger in a manner that would insure that it would arrive at the buyer's door in undamaged condition. The shipping cartons are sturdy and are also clearly labeled "Fragile, handle with care" in both English and French. The cracked areas were repaired with fiberglass cloth, resin and micro-balloons. Hobby Lobby provided us with their Tiger accessory package, which included many of the necessary items needed to complete the aircraft. This accessory package was comprised of the following items: Four rolls of Superkote (white) covering film, two packages of Devcon 5-Minute Epoxy, a Sullivan 16 ounce fuel tank (see comments on fuel tank), and Evra cast aluminum engine mount, a Rual 6 bolt prop adapter hub assembly, a Rual spinner adapter, a 3½" Midwest spinner, two Du-Bro flexible



control cable assemblies, two maple servo mounting rails, Du-Bro landing gear wheels, and Sonic Tronics foam wing seating tape. An Evra 190 engine was also provided by Hobby Lobby to power our test aircraft.

The Tiger is advertised as being an "ARF" (almost ready to fly) kit. The reader should bear in mind that the term "ARF" is largely one of "definition" and, like the term "straightforward," it is one of the most over-worked or abused terms in the world of R/C. In this reviewer's opinion, ARF should mean exactly that . . . almost ready to fly; an aircraft that can be assembled and be flying with minimal assembly time. The Hobby Lobby Grumman Tiger, highly prefabricated as it is, is not the type of kit that can be bought, built, and flown within a day or two.

The assembly instructions included in the kit are printed in both English and French, and each set of instructions covers four 8½ x 11" pages. The 22" x 46½" plan sheet is very basic and little more than a three-view which includes hinging and wing attachment details. The assembly instruction are intended for use with more than one of Horizon Model's kits. They are very brief and, in some construction phases, rather confusing. For example: reference is made to a tail wheel installation (the Tiger doesn't have one) and also to an alternate method for mounting the landing gear to the fuselage instead of to the wing (the Tiger landing gear can only be wing mounted). There is no information provided on radio, engine, or fuel system installations. The Grumman Tiger is not a beginner's aircraft, nor is it intended to be by the manufacturer. The high degree of prefabrication does make detailed instructions somewhat unnecessary for the experienced builder. However, a beginner or even a relative newcomer to R/C, would be subjected to numerous assembly pitfalls, unless assisted by a more experienced modeler, during construction.

We assume that the French version of the assembly instructions is identical in context to the English, and would rate both the assembly instructions and plan sheet as being poor, due to numerous phases of construction that are not even mentioned and because of the confusing material that is included, that does not even pertain to the Tiger. This information deficiency is a problem that could be easily rectified by the manufacturer. *(Ed. Note: The kits now being shipped have complete instructions which includes eight written pages with drawings included.)* Included in the kit is a beautiful color brochure from Grumman Aircraft, which shows all of the factory available paint schemes and interior colors for the Tiger and several other Grumman aircraft as well. This brochure is a valuable aid to the scale builder, who is striving for authenticity. Two Grumman American pressure-sensitive decals are also enclosed, to further dress up the model.

Construction

The wings are foam and come completely sheeted with balsa and have the balsa tip blocks and leading and trailing edge pieces glued in place. The ailerons and flaps, which are also foam, are completely sheeted with balsa. The quality of materials and workmanship was very good. According to the instructions, the first wing construction step is the joining of the two wing panels. We opted to first install the ailerons and flaps with all linkages, in each wing panel and then join them together. Nylon tubing has been installed by the manufacturer in each wing panel to accept the nylon aileron control rods and music wire flap torque rods. However, we elected to install an aileron servo in each wing panel directly connected via a straight linkage rod to each aileron. The factory installed nylon tubing was utilized as a "conduit" for routing the wiring for the aileron "Y" harness assembly. This modification was a personal preference only, and not a criticism of the manufacturer's suggested method. The wing halves were then joined together at the proper dihedral angle and the center section was reinforced with fiberglass cloth and epoxy. Large pieces of hardwood dowel are provided for use as wing mounting bolt bushings. The wing center section was cored to accept these dowels, which were epoxied in place and then drilled to accept the wing mounting bolts.

The vertical fin and horizontal stabilizer are of pre-sheeted foam construction; the same as the wing panels. The elevators and rudder are solid balsa. All that is required of the builder is to hinge and shape these control surfaces, install the control horns and fine sanding them.

The fuselage is molded from a plastic material which the manufacturer calls "polyflite." This material is very similar to ABS plastic. The firewall and all internal reinforcement pieces are factory installed and high stress areas are also reinforced with fiberglass cloth and resin. The builder need only finish the fuselage joining seam, which runs laterally along each side of the fuselage, to complete the basic fuselage unit. The wing is then bolted in place and a preshaped plastic piece is installed on the bottom of the wing center section, which blends into the fuselage contour. This "U" shaped plastic "belly pan" must be supported at the front and rear with scrap balsa after it is trimmed to fit the wing/fuselage assembly. We left the wing bolt support dowels extending out of the bottom of the wing and cut them flush with the inside of the plastic "belly pan" as further support for this assembly.

After trimming, the molded clear plastic canopy fits very nicely into a recessed area which is molded into the fuselage. The canopy is advertised as being 1/16" thick. Ours appeared to be much thinner than that so we decided to measure it with a micrometer. Our canopy measured .035 at the top (a little thicker than 1/32") and a very thin .015 (1/64") on the sides. As we did not intend to add any great amount of cockpit detail to our test aircraft other than an instrument panel, we elected to tint the canopy with Rit Dye to subdue the starkness of the bare cockpit area, which was painted flat black. Once the canopy is glued in place, its thin gauge was partially minimized.

The tail surfaces were then fitted, trimmed and installed onto the fuselage unit. We used 1/4" hardwood dowels for control pushrods on the elevator and rudder, and also used internal control horn linkages. We would rate the Tiger's hardware package as being only fair to average.

Before installing the Evra 190 engine, we mounted it on our test stand for break-in and carburetor adjustments. Included with the Evra engine is a starting pulley and cord. We initially attempted to start our Evra by hand flipping the prop. This proved to be an exercise in frustration, as the engine simply would not start. We checked the ignition system and discovered that obtaining good spark via hand starting was very difficult, as the prop could not be

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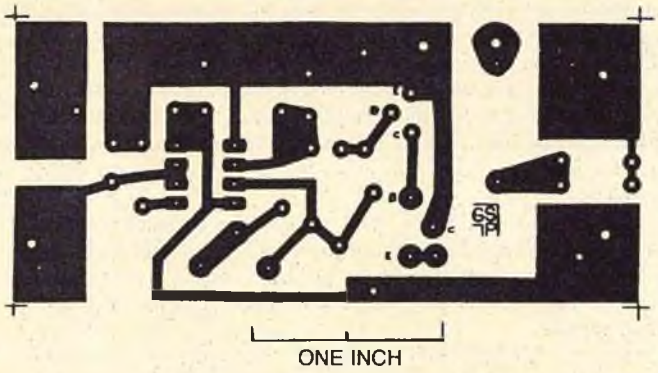
By George P. Steiner

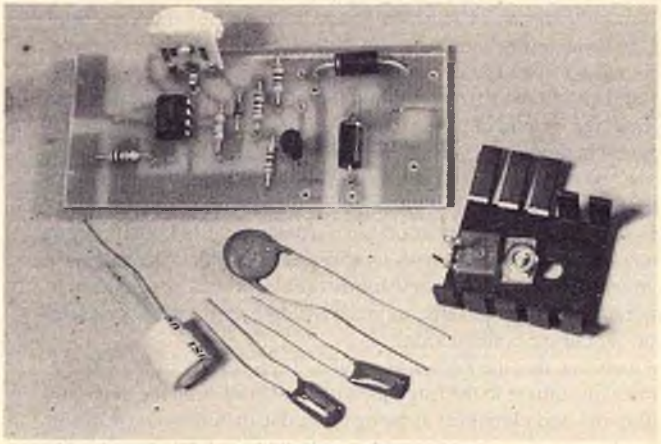
GLOW STARTER

Glow plug drivers have been around for a long time and are becoming more and more popular as modeling goes along. This is mostly due to the use of electric starters that require a single 12 volt battery. It is a good way to do away with the extra 1.5 volt starting battery and utilize one common one. Also, nowadays we have a wide variety of glow plugs requiring different power requirements to make them glow at the proper point for starting your engine.

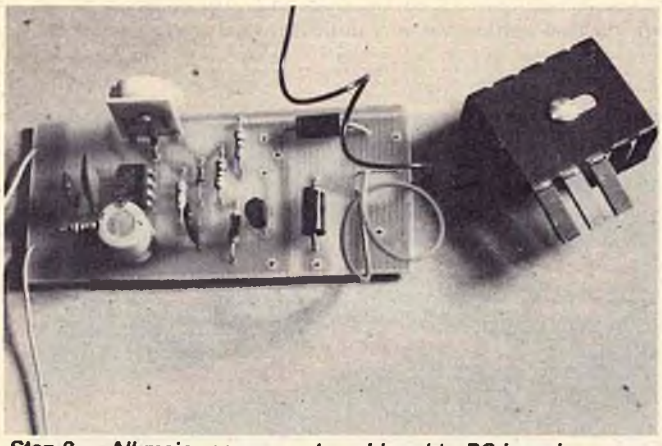
The glow plug driver Glow Starter presented here gives a wide range of power to drive your glow plugs. It is simple and straightforward, compact in size, no special features, just a simple device you can build using (almost entirely) Radio Shack parts at



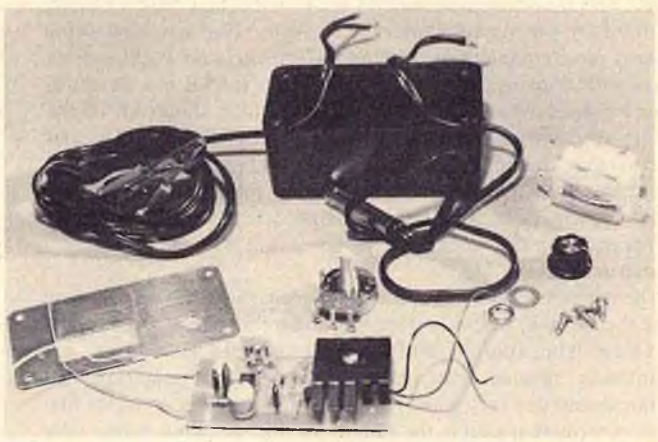
PC BOARD LAYOUT (POSITIVE)



Step 1 — Soldering components to PC board.



Step 2 — All major components soldered to PC board.



Step 3 — Face plate ready for meter and 50 K ohm pot.

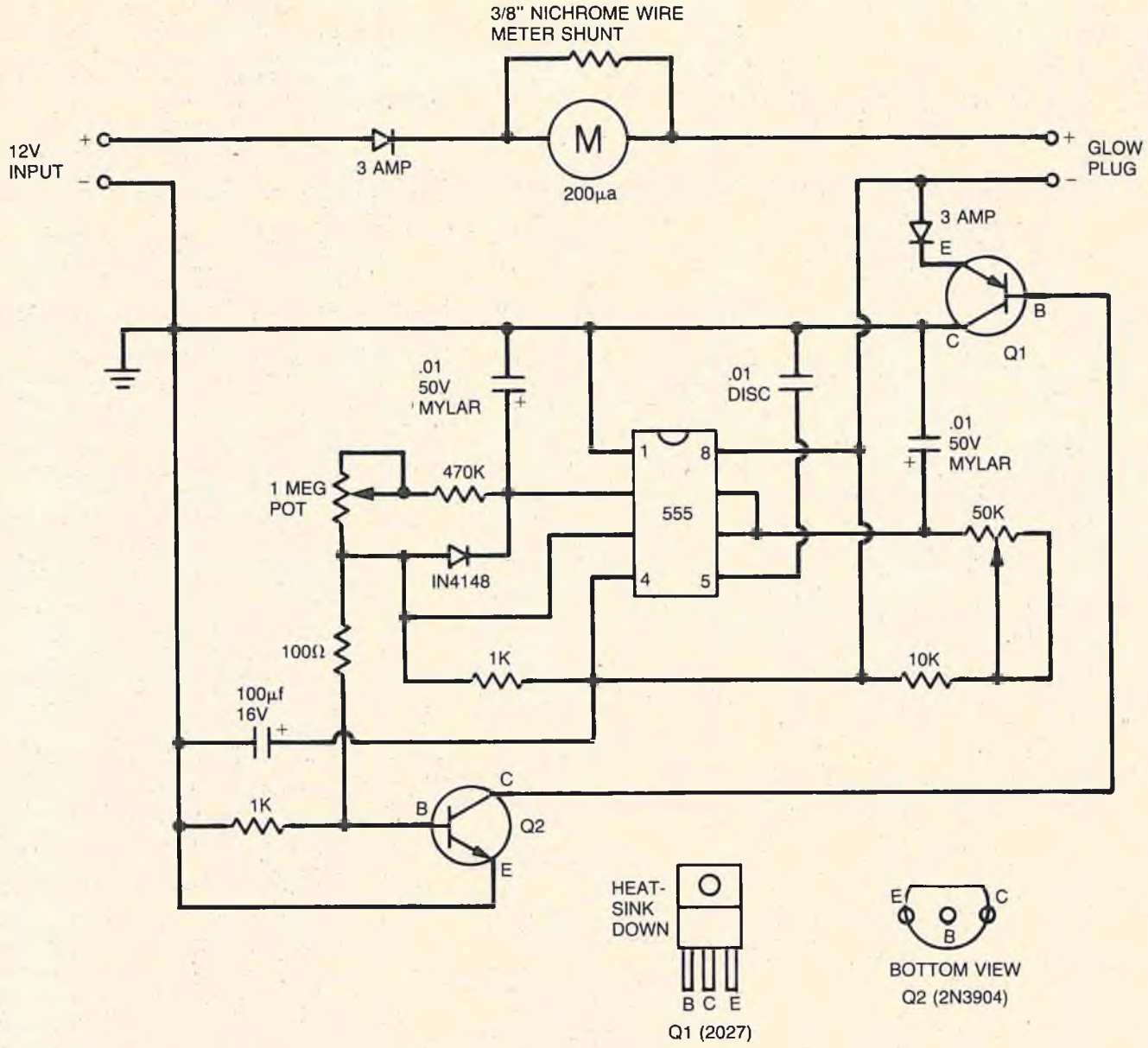
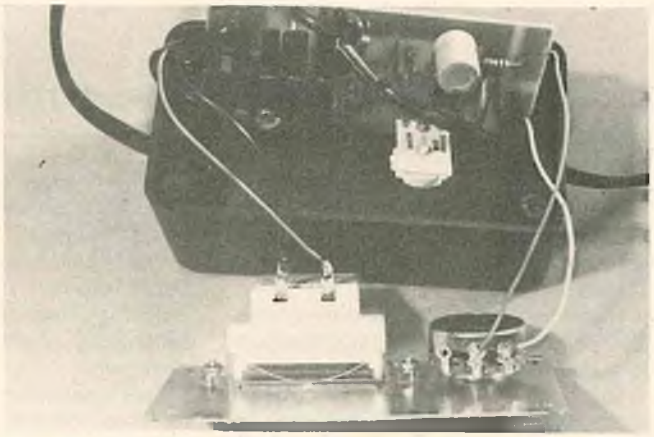


FIGURE 1
SCHEMATIC

Step 4 — Finished all wiring, ready for test.



Step 5 — Final assembly and placement of PC board in case.

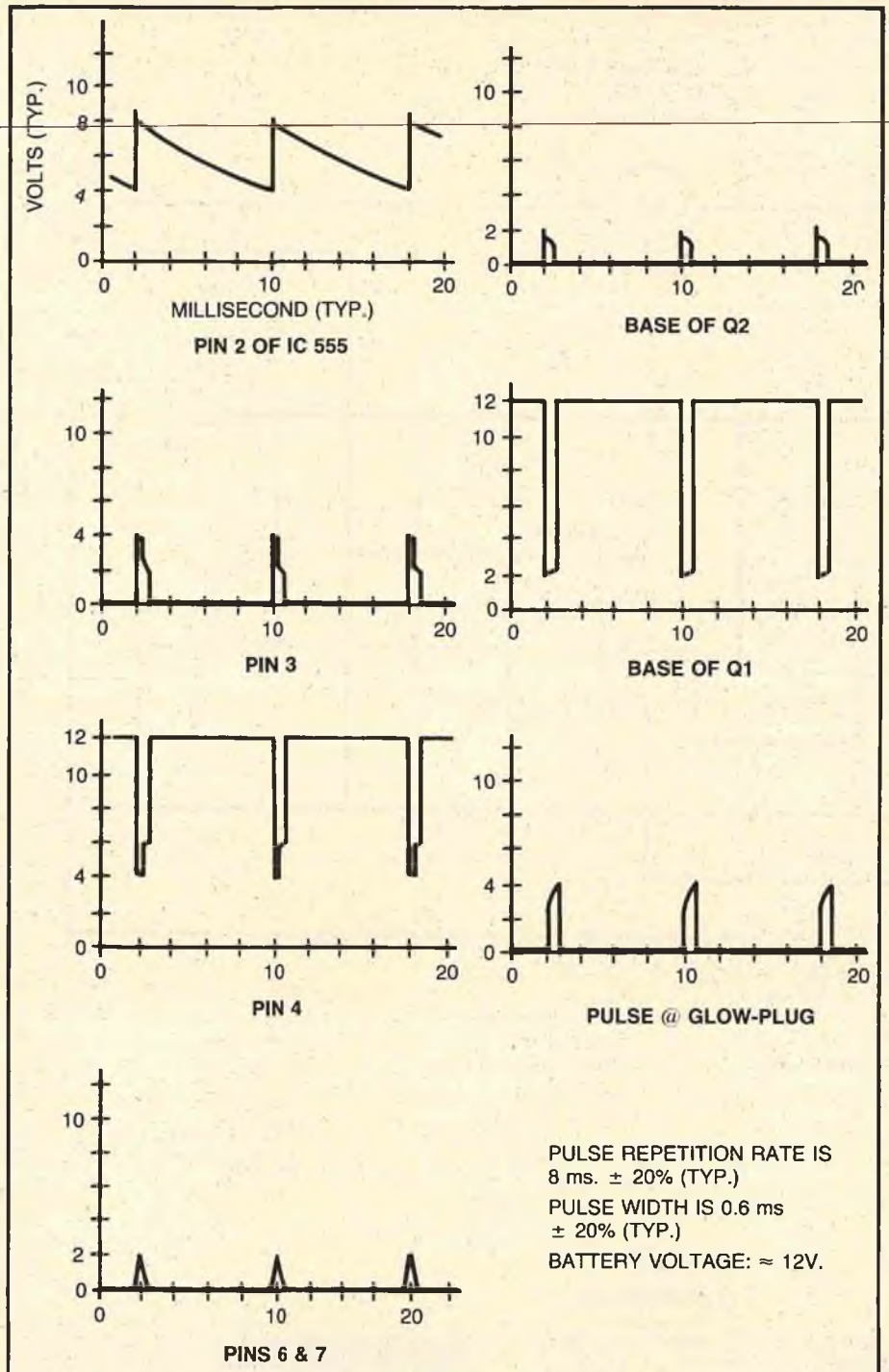


FIGURE 2
TYPICAL OSCILLOSCOPE PATTERNS

a cost way less that $20.00.

The unique design of glow plug drivers make them more desirable than just using one common battery for your R/C ground support tote box.

Glow plug drivers pulse the current to the glow plug at a high voltage, but at a rate not long enough to destroy the glow plug.

This concept produces a very efficient device. Power consumption or battery drain is reduced greatly over just a straight low voltage battery. Better drive power can be had over a wider range of supply battery. This, then, can make up for long lead length to the glow plug.

The one presented here can be operated from 8 volts to 15 input power. There really are not any disadvantages except that if it is not properly adjusted it will burn out your glow plugs.

Looking at the schematic, Figure 1 shows the layout with a IC 555 timer chip running as a "A" stable oscillator. The 50K potentiometer adjusts the pulse width and the 1 Megaohm potentiometer determines the repetition rate.

One unique feature about the design is that as the battery voltage is pulled down, the repetition rate is increased. The result is the ability to maintain a constant glow from the glow plug even when an electric starter is being used across the same 12 volts.

From the output of the 555 drives Q2. Q2 collector drives power transistor Q1 that handles the current in series with the glow plug.

The typical scope pattern (Figure 2) displayed will show what to expect at various points in the glow starter.

Construction should start by checking the parts list to see if you already have some of the parts on hand. It might be wise at this point to get together with one of your modeling friends and build it together. You could cut the cost considerably if you do this project as a twosome, due to the fact that in the Radio Shack packaging most of these parts come two or more together.

The meter in this project came by way of the CB market. That is the reason for SWR and SET markings on the meter face in the photographs. Any 200 Microamp meter will do. Even one of some other value would work, but a slight adjustment of the meter shunt might be required for good indication.

The component layout shown in Figure 3 should be viewed and placement of parts can go in any sequence. Parts are not critical. I will point out some installation points that are critical. The meter shunt is a piece of Nichrome .015" wire, the type used in foam wing core cutting. The kind used here came from a Sig Model Products #S4-135 package that contains 5'. You will need a piece not over 1/2" long as indicated on the parts list.

The critical part is to be sure to get a good soldering joint on the Nichrome wire after you have pulled it down through the PC board. Be sure you have at least 1/8" of the exposed wire covered and soldered to each end. When making your wiring connections to the 50K potentiometer (Figure 4) or to the alternate wiring method as indicated in the drawing (Figure 5), be sure to have the white and green wire on the lugs as shown. You want to be able to turn the Glow Starter front knob in a clockwise direction to increase drive power and counter clockwise to turn power off. This is important when we get to the testing so that the first glow plug inserted will not go up in a puff of smoke.

The installation of the Q1 power transistor should be done with the heat sink attached and bending the transistor leads to match the holes on the PC board. The reason for this is in order to have the heat sink centered in the right place over the PC board (Figure 7). If not, trouble will be encountered when installing in place in the little plastic box (if used).

If the Radio Shack plastic box is used the placement of the component PC board stands up on its edge to one side in order to

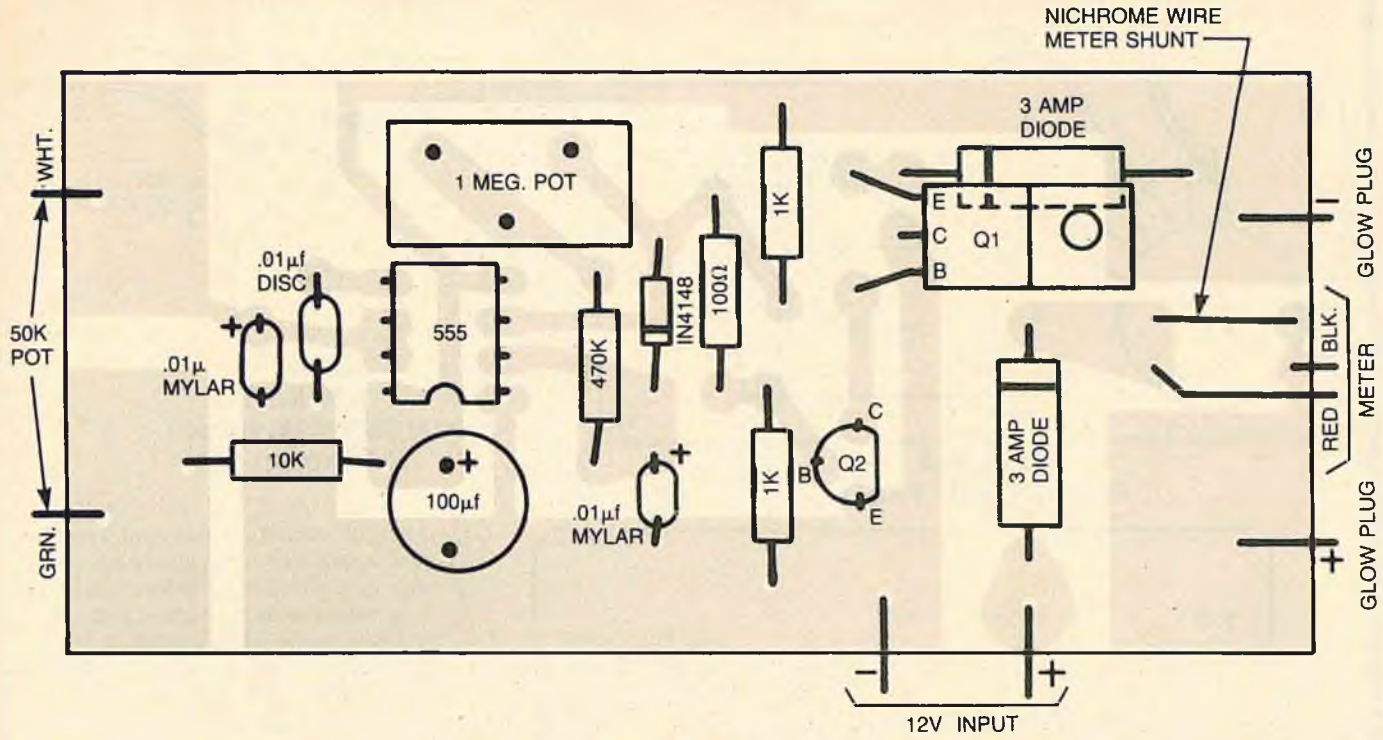


FIGURE 3
COMPONENT LAYOUT

clear the 50K potentiometer and meter when the face plate is installed.

Face plate cut out dimensions are shown in the drawing (Figure 6) and must be followed, otherwise everything will not fit in the small chassis box RS270-231.

Final check-out and testing should be followed or disaster could result.

Testing

First, after you have checked all your soldered connections, place a short circuit or clip lead across the wires to the glow plug. Put your glow plug in your pocket for now. Next, turn the front panel 50K potentiometer full counter clockwise. On the PC board, facing the 1 Megaohm potentiometer with the IC 555 directly behind it, turn the 1 Megaohm trim potentiometer full clockwise. This sets the Glow Starter for minimum output control. Now apply your battery power momentarily. Be sure you have a good 12 volt source. A slight indication should have been read on the meter movement. If it went full scale, check your soldering connection on the meter shunt. If that is not the problem then it means the IC 555 is not working or supplying adequate drive to Q1. At this point, if every time you apply power to the Glow Starter the meter goes full scale, it is recommended you place a 12" clip lead across the meter. This will prevent you from wiping out the meter till you find your problem. This clip lead across the meter will still let you get some sort of reading.

If no reading was indicated when you applied power, check to see if you have proper positive voltage to the Glow Starter with the positive going to the 3 ampere

Glow Starter Parts List
Using Radio Shack Parts

Capacitors		
1 — 100 MF	RS 272-1028	.79
2 — 01 Mylar	RS 272-1065	.60
1 — .01 Disc cap	RS 272-131	.30
1 — 555 IC	RS 276-1723	.99
1 — Transistor PNP	RS 276-2027	1.49
1 — Transistor NPN 2N 3904	RS 276-2009	.89
Resistors		
2 — 1 K Ohm 1/4 Watt	RS 271-1321	.39
1 — 10K 1/4 Watt	RS 271-1335	.39
1 — 100 Ohm 1/4 Watt	RS 271-1311	.39
1 — 470K Ohm 1/4 Watt	RS 271-1354	.39
1 — Potentiometer 1 Meg.	RS 271-229	.59
1 — Potentiometer 50K	RS 271-1716	1.09
If 50K not available use 100K shunted with a 100K 1/4 W resistor	RS 271-1722 RS 271-1347	
2 — 3 Amp diodes	RS 276-1141	.79
1 — 2N4148 diode	RS 276-1122	.99
1 — Heat sink	RS 276-1363	.79
1 — Knob	RS 274-391 or 274-415	1.60
1 — Chassis box	RS 270-231	1.69
Hardware		
Grommets	RS 64-3025	.99
1 — 4/40 or 6/32 to hold the heat sink	RS 64-3011 or RS 64-3012	.99

From GSP Products
2238 Rouge River Drive
Sacramento, California 95826
Semi Kit including
4 Pieces of #26 wire 4" long.
1 Piece of Nichrome wire .015" x 3/16" Meter Shunt
1 PC Board
1 200 uA Meter ... $9.00
Option ... PC Board only, each ... $5.00

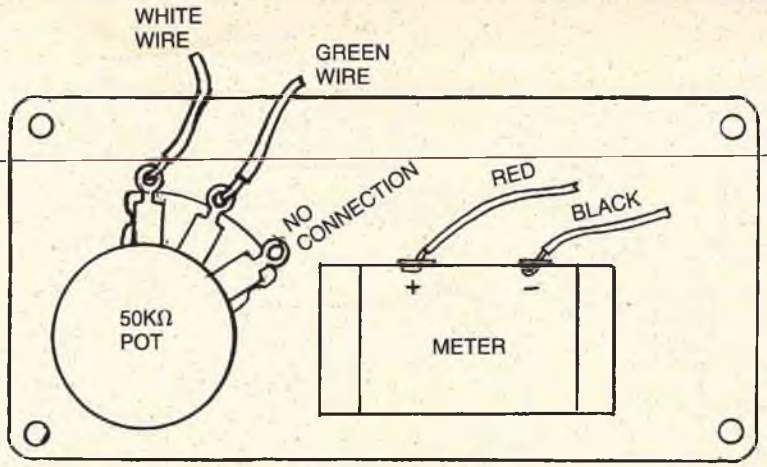


FIGURE 4
REAR VIEW OF PANEL

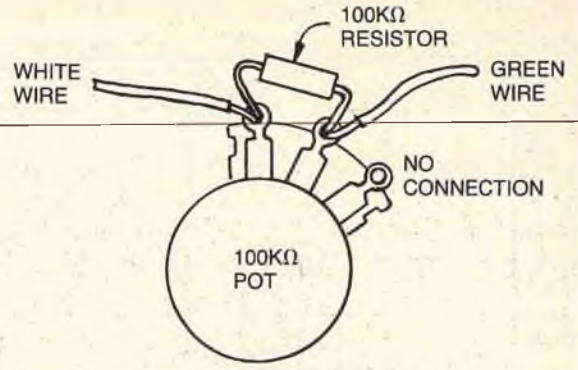


FIGURE 5
ALTERNATE WIRING WITH 100KΩ POT

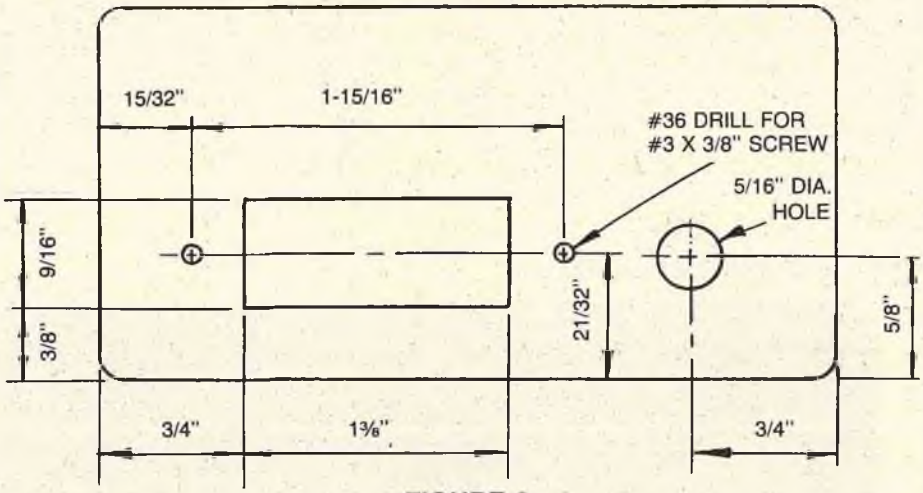


FIGURE 6
FACEPLATE DETAILS

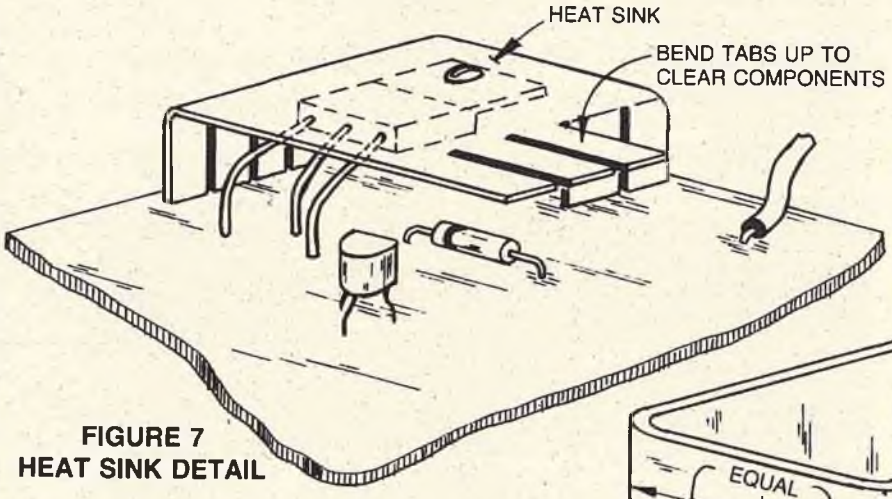


FIGURE 7
HEAT SINK DETAIL

diode on up to pin 8 of the IC 555. You could have your main power plus or minus reversed. If and when you get some sort of small indication through the meter you can now remove the short from the glow plug wires and take the glow plug out of your pocket and place it in the circuit. Holding the glow plug in such a way so that you can observe the coil element, turn the front panel 50K control clockwise till a dull red glow is indicated at the glow plug. At the same time you should observe a near full scale indication in the meter. If the glow plug fails to give a dull red glow, turn the 1 Megaohm trim potentiometer control in a counter clockwise direction till it does.

At this point you can turn down the main control and turn up the inside trim 1 Megaohm potentiometer control to get the desired indication on the plug and meter. If for some reason you desired more control, and want to see the glow plug glow white hot, you can change the .01 MF capacitor that is connected to pins 6 and 7 of the 555 IC to a .022 MF. This might be necessary because sometimes the component make-up will not let you get enough drive to the glow plug. What this does is increase the pulse width allowing the glow plug to be turned on longer between pulses.

The meter indication is only relative. Remember, keep it at a dull red. When using any new type of glow plug that you are not familiar with, you will have to make the look/see test on the glow plug, checking what indication it takes on the meter. Otherwise, the glow plug can be destroyed.

This Glow Starter can be left connected to your battery source all the time. The only time any battery drain is taking place is

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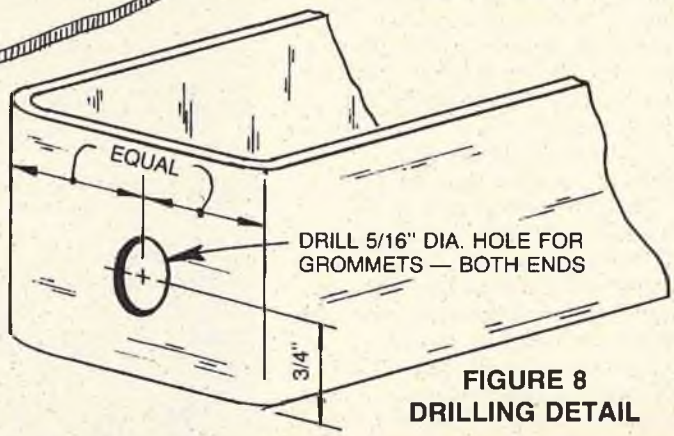

FIGURE 8
DRILLING DETAIL

R/C IN THAILAND

The Fourth Asian "Open" Aerobatic Contest Held in Bangkok, Thailand

By Dr. Narong Pichaichanarong & Dr. Reynaldo M. Lesaca

For the last four years, since the Don Muang R/C Model Club of Bangkok, Thailand, became a member of the Federation Aeronautique Internationale or F.A.I., an Internationl Competition has been organized annually. Some of these competitions were entered in the F.A.I. yearly calendar, but some, like this event, are not, owing to technical inconveniences. Our club is a young amateur club, but not yet formally recognized. Because of this, to the disappointment of highly developed R/C Aeromodeller Team, e.g., Japan, it was impossible for such teams to take part in any event unrecognized by F.A.I. Japan itself, however, has never won in any F.A.I. World Championship since 1974.

Among the twelve nations invited to this competition only four were interested and dispatched R/C fliers to join the competition. The People's Republic of China sent four fliers; Singapore, two fliers; Indonesia, one flier, and Thailand, the host country, eight fliers. Malaysia indicated initially its intention to participate but in the end only two observers were present.

We missed the Hong Kong Team who, at the last minute, sent in a telex informing us that, due to sudden illness, their modelers could not attend the contest. The Philippine Team was unable to answer our registered invitation as well as those from New Zealand, South Korea, India and Sri Lanka. Australia, due to communication difficulties, received our invitation only a couple of days before the scheduled date and were, therefore, unable to send contestants. They, however, promised to take part in this event next year. Thank you, dear friends, from the Land Down Under!

This was the first time for the People's Republic of China team (after hesitating to join the contest last year) to participate in such a tournament abroad. They proved to themselves afterwards that the title of World Champion in this kind of sport would no longer be a distant possibility.

The Singapore and Indonesian Teams have always joined the contests since they were begun four years ago, and our thanks to their whole-hearted cooperation and sportmanship.

The 4th Asian "Open" Aerobatic Contest was held March 20-22, 1981, in Bangkok, Thailand. Those who organized the contest were Air Chief Marshal Chanya Chulajata, the incumbent President of the club, Air Chief Marshal Chalerm Divavej, the Vice President, Dr. Narong Pichaichanarong, Secretary-General, and other club officials. It might be mentioned in passing that Dr. Narong is a well-recognized surgeon in a prominent hospital in Bangkok, but spends weekends at the Club's "Aerodrome," 22 kms. from the heart of Bangkok.

Although the competition was appointed as "Open" it was scored in both "individual" as well as "team" events. Team fliers were limited to three contestants, but one who is team flier could also be considered as "individual" if his score enabled him to compete with the others.

Every participating country nominated a representative to take part in the jury or board of judges, which consisted of three members from the competing countries for each event, but assigned in such a manner that no jury member sat in to score a contestant of the same country.

Trophies were awarded to the best **three** individual competitors and **one** for team winner.

The tournament was conducted under the "Sporting Code 4A, 1979" of the Rules of the Federation Aeronautique Internationale (F.A.I.). The top ten winners of F3A events, Scheduled A & B, participated in the Fly-off flight.

Whatever the results were, however, friendship and cameraderie always came first. That was the heart of this competition.

The draws on flight order were made in the morning of each flying day by every contestant. This event alone created really amusing and better understanding among the competitors. They were excited, yelling and joking happily with each other although in six different languages!

The climate was rather windy and really hot with temperatures in the lower nineties. But the fliers all tried their best. After the competition was over, M./Sgt. Passakorn Yenpunya of Thailand emerged the overall individual Champion (with a total score of 2501 points) and was accordingly awarded First Prize, a cup of honour given by His Excellency The Prime Minister of Thailand, General Prem Tinasulanonda.

The Second Prize, a cup of honour given by the Supreme Commander of the Royal Thai Armed Forces, General Serm Nanakorn, was won by Mr. Han Zhong Shing of the People's Republic of China (with a total score of 2438 points), while the Third Prize, a cup of honour given by the Chief of Staff, Royal Thai Armed Forces, General Sai-yud Koedphol, was won by Mr. Liu Hanmao, also of the People's Republic of China (with a total score of 2365 points).

There were only two teams and the team winner was the People's Republic of China Team (7136 points). Thailand, the other team, scored 7090 points.

The closing ceremony in the afternoon of Sunday, March 22 was performed with colored-smoke trails made by high wing R/C planes. One high wing plane dropped parachutes and pamphlets.

Air Chief Marshal Dawee Chulasapya, the President of the National Olympic Games Committee of Thailand, distributed awards for the individual winners and team winner. The closing exercises were held at the Royal Thai Air Force Officers' club located in Bangsue, a district in northwest Bangkok. All contestants and guests were very happy and the fliers promised to join the 1982 contest to be held in Bangkok again, since there was no host offer for the competition next year from among the participating countries. □

FAI-F3B: THE NINE SECOND SPEED RUN

By David Register

The past few years of RC soaring has seen a growing emphasis on speed and efficiency for contest ships. Much of this emphasis has been brought about by the success of the Austrian "Dassel" and its derivatives which have exhibited incredible (by U.S. standards) times in the FAI-F3B speed run. The success of this design trend has strongly influenced several American sailplanes (BoT, Sagitta and a number of originals) to the general benefit of both F3B and thermal soaring.

Although F3B speed activity has certainly affected the evolution of present ships, it seems as if this design trend has reached a nearly impenetrable barrier — the nine second speed run. The question arises: are we faced with a design shortcoming or a real physical limitation akin to the 4 minute mile in track? The answer to this question is really quite important since, if there is a design shortfall, we should look for improvements. However, if the speed aspect of our sailplanes is limited by the real world, then we should look to optimize other parameters (distance, duration) to obtain a better balance of capabilities.

In order to answer the question we'll have to dive into a minor physics lesson, but the results are quite instructive. The first thing we must know is what are reasonable speeds to expect from the present crop of F3B ships for a given wing loading and altitude entering the FAI course. This part of our task involves some guesstimates for lift and drag coefficients which can claim only ballpark accuracy — any given design may be slightly better or worse — we'll be looking at the average. Having obtained some average figures for velocity, we then must ask if these are attainable considering the launch altitude one can expect under the F3B rules. The combination of altitude and velocity puts some severe constraints on the times one can expect and leads to some interesting conclusions on loading versus launching trade-offs. Let's get started!

As with any model calculation, a certain number of assumptions must be made. In the present case, we will assume we're working with a fairly average class of F3B sailplanes similar to the sizes and configurations being flown at present. Specifically, we'll take an 8½" average chord wing which is 9% thick. A sailplane wing of this type flying at 100 ft./sec. will exhibit a Reynold's number of 450,000. This is an important number since drag coefficients scale with Reynold's number. Fortunately in the range of R_n's above about 100,000 drag coefficients scale in a pretty predictable way and for the wing chosen, a drag coefficient (C_d) of .013 is quite reasonable (Abbott & vonDoenhoff : "Theory of Wing Sections"). Now that takes care of 2/3 of the guess work in this analysis. The rest comes from estimating the residual drag associated with parasitic effects due to non-lifting surfaces and intersections (fuselage, tailplane, etc.). From an analysis of polar data at R_n's of around 100,000, a good guess for this number (scaled to wing area) is .005 which gives a total drag coefficient for an average F3B ship of .018.

That takes care of the guess — now for our physics lesson. The reason we need that drag coefficient is so we can figure the lift coefficient. Strange but true! It turns out that

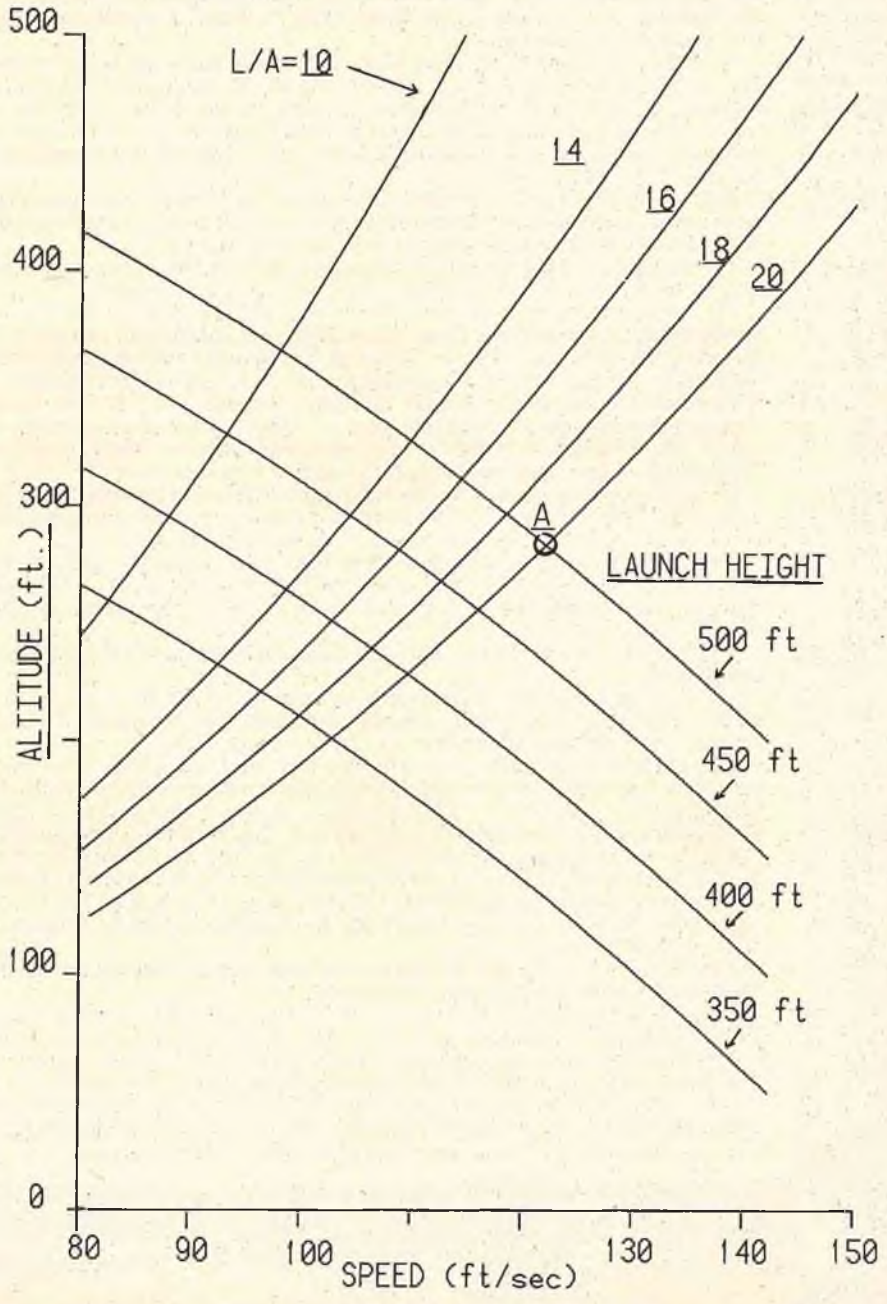

TABLE 1:

F3B SPEED (ft./sec.) FOR A GIVEN ENTRY ALTITUDE AND WING LOADING

Entry Altitude (ft.) \ Wing Loading (oz./ft.^{2})	10	14	16	18	20
250	81.4	96.4	103	109	115
300	89.2	106	113	120	126
350	96.3	114	122	129	136
400	103	122	130	138	145
450	109.3	129	138	147	155
500	115	136	145	154	162

TABLE 2:

VELOCITY AND ALTITUDE LOSS IN THE ENTRY DIVE

Velocity (ft./sec.)	Time (sec.)	Altitude Loss (ft.)
90	1.8	110
100	2.1	140
110	2.4	173
120	2.8	209
130	3.1	248
140	3.4	290
150	3.7	336

TABLE 3:

F3B SPEED (including dive) FOR A GIVEN ENTRY ALTITUDE AND WING LOADING

Launch Height (ft.) \ Wing Loading (oz./ft.^{2})	10	14	16	18	20
500	98.5	110	114	119	121
450	93.5	105	109	113	117
400	88.5	99	103	106	110
350	83	93	97	100	103

TABLE 4:

F3B TIME FOR A GIVEN ENTRY ALTITUDE AND WING LOADING (1100 ft. course)

Launch Height (ft.) \ Wing Loading (oz./ft.^{2})	10	14	16	18	20
500	11.2	10.1	9.7	9.2	9.1
450	11.8	10.5	10.1	9.7	9.4
400	12.4	11.1	10.7	10.4	10
350	13.3	11.8	11.3	11	10.7

we know the lift to drag **ratio** for flying the F3B course, so if we know the drag, we know the lift. It's kind of backwards but it works. So how did we know the lift to drag ratio? Simple, it's just the F3B course length divided by the altitude lost in doing the run. Since a good value for the course length (including the turns) is about 1100 ft., we can write the L/D for the course as:

$$L/D = C_L/C_D = 1100 \text{ ft./altitude loss}$$

or:

$$C_L = C_d\ 1100/\text{altitude loss} = 20/\text{altitude loss (ft.)}$$

Combining this C_L with the sailplane wing loading then gives the velocity on the course and, thus, the time we're after. This comes from rearranging the standard Lift equation:

$$L/A = .00119\ C_L\ V^2$$

to give:

$$V = \sqrt{(L/A)/(.00119*C_L)}$$

where L/A is the wing loading in lbs./ft.^{2} (Lift/Wing Area), C_L is the lift coefficient and V is the velocity in ft./sec. The .00119 constant is to make it all work out right at sea level. Combining all these equations leads to values of velocity as a function of entry altitude (assuming 0 altitude left over at the end of the course) which are given in Table 1 for a number of different wing loadings. An optimistic look at the table says that if you could enter the course at 500 ft. with a 20 oz. wing loading and a velocity of 162 ft./sec. you could do the run in 6.8 secs. and all the folks back in Peoria would be right proud!

Then how come nobody's done it yet? Well the answer to that is a little more physics. Simply stated it says you don't get something for nothing. In other words, how did you get to 162 ft./sec. at 500 ft.? Gravity is the only way for a sailplane to get speed and it works down, not up. So you had to work powerful hard to get that high that fast. Usually you can't do it and we're talking usuals (averages) here!

In fact, what are the real world conditions that limit our reaching these kind of times? Well, in F3B the maximum launch you can get is about 500 ft. At a 20 oz. loading not too many pilots think very seriously about thermals and most enter the course directly from there. The other limitation is that you don't release from the tow at 162 ft./sec. but more like in the mid-30's (say 32 ft./sec. for this analysis). The only way you can pick up the additional speed is via gravity — the old altitude to airspeed conversion. So let's now look at the physics of that situation.

First of all, after release from the tow, you have a certain amount of energy:

$$E_0 = M\ G\ H_0 + 1/2\ M\ V_0^2$$

where m is the mass of the sailplane (in slugs for you dimensional freaks), G is the gravitational constant (32ft./sec.^{2}), H_0 is your initial altitude and V_0 is your initial velocity (assumed to be around 32 ft./sec.). In order to get to entry velocity, you have to dive. The length of that dive is going to determine the final altitude and velocity. The energy at this new point will be given by:

$$E_1 = M\ G\ H_1 + 1/2M\ V_1^2$$

where H_1 and V_1 are your final altitude and velocity, respectively. Now neglecting the small amount of energy lost due to friction (drag), we can set $E_0 = E_1$ and solve for the final velocity as a function of altitude loss:

$$V_1^2 = V_0^2 + 2G\ (H_0 - H_1)$$

which is independent of mass. So contrary to popular opinion, the velocity you pick up is **independent** of wing loading and only depends on your altitude loss! Table 2 summarizes the result of this calculation and it is immediately obvious why you can't make that 6.8 sec. run since, in order to get to 160 ft./sec., you have to dive nearly 400

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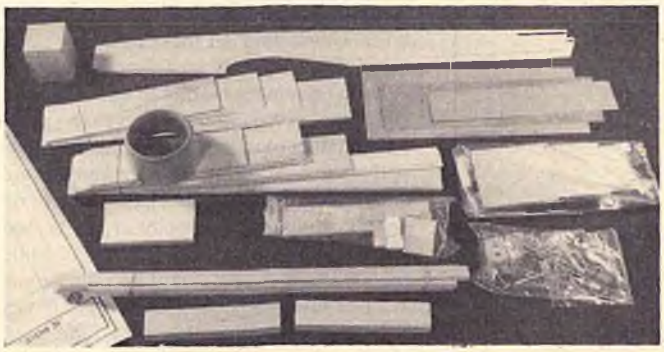
RCM PRODUCT REVIEW

Midwest Products Co.
JETSTER



The "Jetster" . . . a name that certainly seemed better suited for something the Jetsons might fly around in. And yet, here was Midwest Products brazenly touting the Jetster as "an ultra simple design for introduction to ducted fan flying." It was easy with this fully maneuverable sport ship, according to their ads.

We accepted the challenge, partly due to the lure of something different, and partly because we had a built-in, iron-clad guarantee not to break any props.

Measuring a scant four feet from wingtip to wingtip, the Jetster, in kit form, fits easily into the 36" x 9½" x 6" box assigned to it . . . with room to spare. Parts are neatly bagged and readily identified, mainly because there just aren't too many of them.

Construction:

The plans, on two 36" x 50" sheets, are clearly drawn and reproduced. All the building instructions, supplemented by easy to understand drawings, are also on the plans. This same quality is found in the die-cut and machined parts, the molded inlet cowl, and the hardware package.

Construction proved out Midwest's boast about this being an ultra-simple design; the entire plane is as easy to build as any kit We've ever encountered. The fuselage is the usual boxy affair to start with, but 1/2" triangle stock allows for a goodly amount of sanding and shaping . . . and streamlining.

The semi-symmetrical high lift wing holds no surprises during assembly, either; its leading edge sweep is pleasing to the eye and causes no construction problems. The recommended dihedral, 2" under each wingtip, seemed very excessive for an aileron ship, so we built the wing with only half that amount. It definitely looked better, and we knew that the leading edge sweep would effectively add to the actual dihedral.

SPECIFICATIONS

Name	JETSTER 20
Aircraft Type	Ducted Fan Sport Flier
Manufactured By	Midwest Products, Co. 400 S. Indiana Street Hobart, Indiana 46342
Mfg. Suggested Retail Price	$54.95
Available From	Both Mfg. & Retail
Wing Span	48 Inches
Wing Chord	9½ Inches (Avg.)
Total Wing Area	430 Square Inches
Fuselage Length	38¾ Inches
Stabilizer Span	19½ Inches
Total Stab Area	91 Square Inches
Mfg. Rec. Engine Range	.20
Recommended Fuel Tank Size	6½ Oz. (Included)
Recommended No. of Channels	4
Rec. Control Functions	Elev., Ail., Throt., Steering
Basic Materials Used In Construction:	
Fuselage	Balsa and Ply, Foam Cowl
Wing	Balsa and Ply
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (33 pages)
Construction Photos	Yes Plans have drawings, booklet has photos

RCM PROTOTYPE

Radio Used	Kraft Spectrum Six
Engine Make & Displacement	K & B 3.5 R/C
Tank Size Used	6½ Ounce (part of fan unit)
Weight, Ready to Fly	68 Ounces
Wing Loading	22.9 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:

Simplicity of design; prefabricated fan unit; quality of wood; good instructions; excellent flying characteristics.

WE DIDN'T LIKE THE:

Short nose strut; inlet cowl not having tapped inserts; having to make the tailpipe out of 1/64" plywood.

The whole tail assembly is made from 1/8" sheet and, since this design has no movable rudders to trim with, care must be taken to get the vertical fins parallel to the thrust line. Being aware that fan efficiency would depend quite a bit on airframe weight, we put the whole bird together with regular and Super "T" Hot Stuff.

The mains were no problem, but the nosegear was too short, which would have hiked up the plane's rear end. We substituted a longer gear and got her sitting level to avoid any zooming and/or jumping on take-off.

Slow and easy was the name of the game when we got around to the Axiflo RK-20B fan unit; we didn't know beans about fans so the detailed plan sheets and the 33 page instruction booklet were carefully studied. Unlike Midwest's .049 and .40 fans, which are kits, this .20 sized unit was fully prefabricated out of nylon. All six major parts --- spinner, rotor, mount, front shell, rear shell, and fuel tank --- went together nicely and, although this Axiflo is primarily designed around the K & B 3.5cc engine, it can also accommodate the OPS .21 and the Webra Speed .21 engines.

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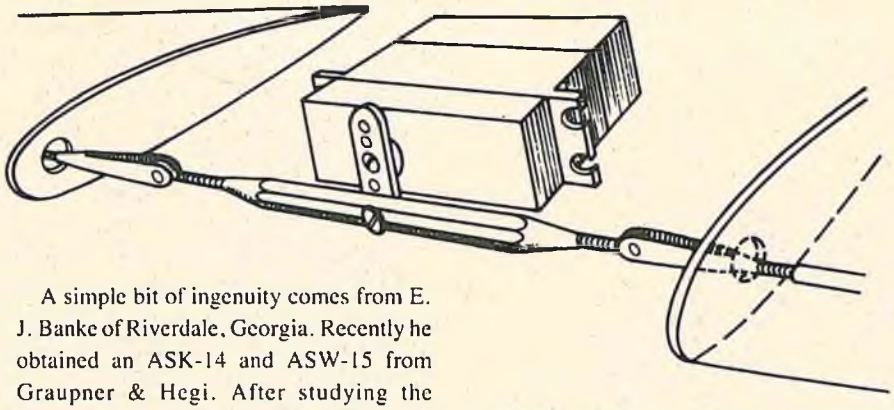
FOR WHAT IT'S WORTH

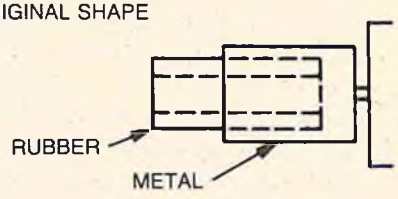


A simple bit of ingenuity comes from E. J. Banke of Riverdale, Georgia. Recently he obtained an ASK-14 and ASW-15 from Graupner & Hegi. After studying the respective plans, he thought that surely there must be a better way to get aileron control without all the slop with slotted cranks, etc. Being also into R/C yachting, the idea finally dawned to use a large turnbuckle between the aileron NyRod ends. These turnbuckle end holes and center safety wire hole were enlarged to 7/64". A 2-56 machine screw was slipped through the safety wire holes and force screwed into the servo arm and voila, it works. Leave about 2" of NyRod free of the outer sleeve for the rotational flex.

Anyone who has used the Astro 1/2A starter with a plastic spinner knows how quickly the spinner is ruined by the friction.

Here is a simple solution and it works. Simply carve out the rubber tip as shown in the sketch and your problem is solved. With this modification the rubber spreads and does not grind away the spinner. Submitted by Steve Tischler, Editor of the Barnstormer newsletter of Portland, Oregon.

ORIGINAL SHAPE



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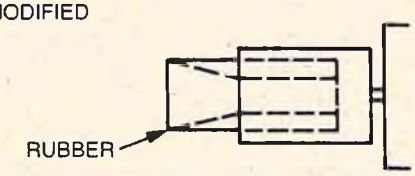
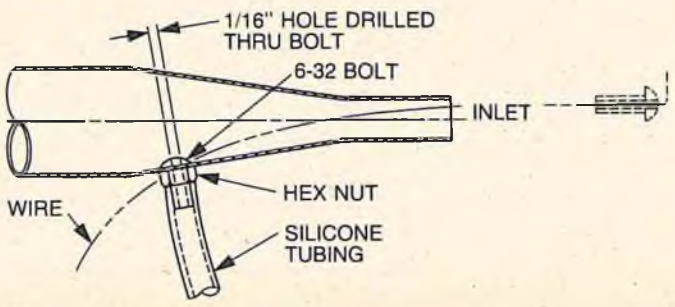


This covering suggestion was submitted by Ron Post of the Manitowoc Flyers, Manitowoc, Wisconsin.

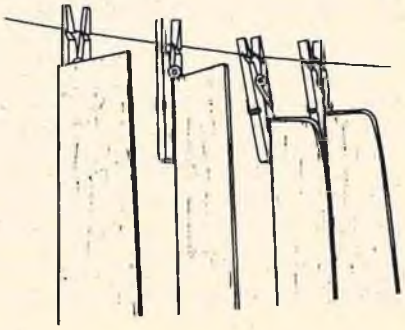
Recently while covering a wing with Midwest Microlon, Ron encountered a few problems with the dope not brushing through the fabric in order to adhere it to the framework. As he lifted one area to dope under the edge, the area he had stuck down previously came unstuck. By the time he thought he had it stuck down completely, the fabric had dried and had come loose in a few areas.

After thinking for awhile, Hot Stuff came to mind. It works beautifully. Just lay your wet fabric on the wing and smooth out all the wrinkles. Then, carefully go along the edges with Hot Stuff. It will flow right through the fabric and will stick immediately. Just be sure your fabric is pulled evenly across the wing, because once you apply the Hot Stuff, it's stuck.

A pressure tap in a thin wall tuned pipe or muffler where tapping may be difficult, can be done by using the method shown in the sketch. The 1/16" hole can be drilled using a small lathe, drill press or by hand if you are very careful. The tricky part is the installation of the bolt into the hole of the pipe or muffler. This can be easily done, however, by pushing a long thin wire through the hole drilled in the pipe/muffler and out of the inlet. The bolt is then placed on the wire (as shown in the Phantom lines) and held in by a 90° bend. The bolt can now be pulled into place and the nut screwed on. The nut is tightened while holding the bolt lightly on the threads with pliers. The wire is pulled out, straightening out the 90° bend, and completing the job. You now have a pressure tap fitting that won't strip out. This idea was submitted by Richard L. Shirey of Sewickley, Pennsylvania.

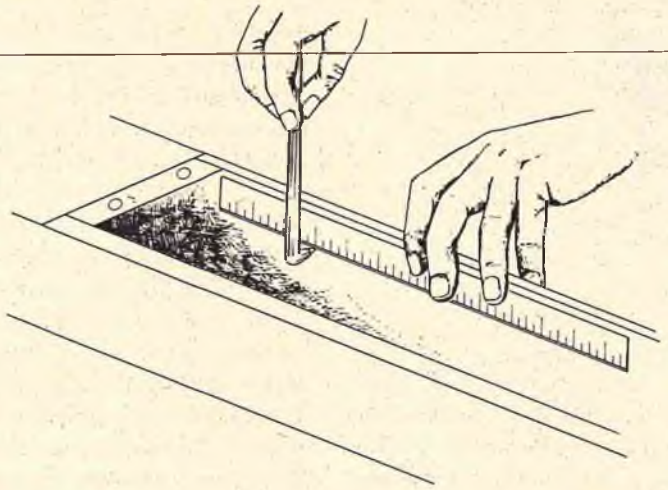


Jim Boydston of Boeing R/C Model Club of Renton, Washington, sent in this clever idea. This has to do with hanging up parts to dry after painting. Just take a spring type clothespin and cut a diagonal slot approximately 3/4" from the open end. Then clip it to whatever part you are going to paint --- for example, an elevator with hinges already installed. Attach to the hinge and hang on a line or wire in a dust-free area. It certainly makes the job a lot easier.



This helpful hint for scale buffs was sent in by Joseph Bukovchik of Vista, California. Joseph has found that he can color the wood on his 1/4 Scale Sopwith Pup by using leather dye. The dye works on doped, lacquered or even fiberglassed wood. He even dyed the propeller a deep, rich brown. They look so much better than the pale, natural finished props. The leather dyes come in many shades and colors. They add no weight, allow the wood grain to show through, dry almost immediately and are applied with the little applicator that comes with the bottle of dye. A 4 oz. bottle will dye enough planes and props to last Joseph forever.

FOR WHAT IT'S WORTH



This handy hint comes from Ken Heatlie of Garden City, Michigan. While having problems drawing lines inside tight places, such as fuselages, Ken decided to modify a regular 19¢ plastic ballpoint pen. He bent it at a 90° angle, as the sketch indicates. This allows you to draw marks in tight places where a regular straight pen wouldn't work. First remove the ballpoint and ink reservoir. Rotate the outside of the pen over a flame until pliable and bend to a 90° angle. Reinsert the ballpoint and ink reservoir.

Fred W. Schmidt of Livonia, Michigan, tells how he answered the following questions.

Ever wish you had a fuel gauge?

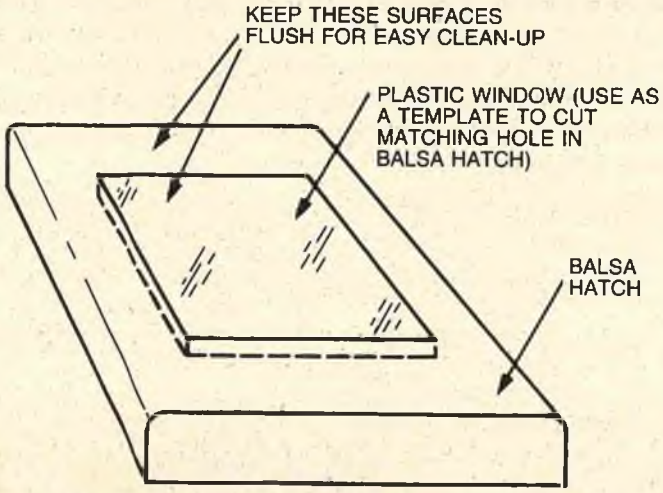
Tired of wasting fuel due to over-fill?

When you've made several landings during a flight, do you wonder if there is enough fuel for one more "Touch and Go?"

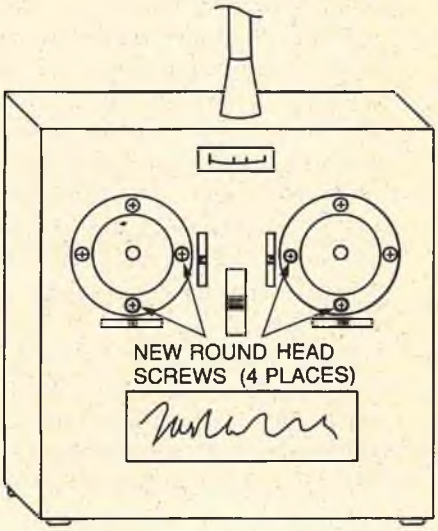
Here is Fred's solution. He simply Hot Stuffed a piece of 1/8" clear plastic about 2" wide by 3" long into a matching hole cut into the fuel tank cover/hatch of his Falcon 56. Since the hatch is not a structural member, the window can be as large as the tank. Now he can easily see his fuel level! See sketch.

When it comes time for forming the blocks between fin and stabilizer, tack glue in pieces of wood the same thickness as the fin and stab instead of fin and stab. Glue the fairing blocks to the fuselage proper and tack glue to the scraps. Sand the entire tail section to blend in with the rest of the fuselage, remove scraps, and you will have slots left remaining in which to glue the fin and stab. This good method was submitted by Stan Zdon of Coon Rapids, Minnesota.

Cover your plans with clear shelving paper (i.e., Contact, Kwikover, etc.) and it will make your plans tear resistent and glue proof. This For What It's Worth was submitted by Eric Lew, Rancho Palos Verdes, California.



Walter Laich of Spring, Texas, came up with an idea that makes flying a bit safer. This idea helps to center trim tabs and also determines their location (either up or down, left or right, etc.) without having to take your eyes off your plane. Walt has replaced the flat-head screws next to the trim tabs (see drawing) with round-head screws. In this way, he can feel center and adjust his trim tabs as needed. With this method there is no danger of taking one's eyes off the airplane and possibly losing it in a crowded sky with a crash soon to follow.



Steve King of Greenwood, Indiana, solved his blushing problem with the following method. Recently Steve was finishing a plane with acrylic lacquer. As he was spraying the final color coat on he noticed that a portion of it had blushed. This was due to the extremely high humidity of the outside air. He was using a "hot" thinner and still got the blush. Steve happened to have his Top Flite Heat Gun out and used it to remove the blush with the heated air. It worked great as it brought the shine right back into the lacquer as it removed the moisture. You must be careful not to hold the heat too long in one place as it will blister the finish.

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

air-cooled Quadra hobby engine fitted with a Quadra-Charger tuned pipe, which will produce speeds of 35 to 40 mph. A two channel radio is required with a heavy-duty servo to operate the rudder. Available for the J-5 Thundermarine is the J-5 Drive-Train, which comes complete with a clutch. The clutch is essential for giant size boats, because they become a little difficult to hand launch. The clutch also allows for easier starting of the engine. The J-5 Thundermarine is at home in 1½' to 2' waves, is a real crowd pleaser and is a thrill to operate.

Four boat races for 34cc class boats are scheduled for the 1981 season. For further information contact J-5 Enterprises, P.O. Box 82, Belmont, Ontario, Canada, N0L 1B0, (519) 644-0375.

NEW SIZE SUPER JET

As you know everyone who is using Super Jet just loves it. They love it so much that we have decided to add a larger bottle. A full 2 oz. which at $12.95 is over a 1/3 saving for the consumer.

JETSTER

from page 78

Because of the good fit and clear instructions, fan assembly was fast. The plan sheets show how to fabricate a needle valve extension and also illustrate two

This Month's Cover

This radio control glider is a 1/4 Scale model of one of the most distinctive sailplane designs seen around American gliderports during the 40's and 50's. The Bowlus "Baby" Albatross was introduced in 1939 by its designer William H. Bowlus. It was intended to be a low cost medium performance sailplane that could be homebuilt by relatively unskilled builders from prefabricated kits costing around $385.00, factory built ones for about $750.00.

There were approximately 50 Bowlus's built prior to World War II, with 17 reported remaining and going strong as late as 1968. The Bowlus "Baby" easily identifiable and somewhat unique with its short streamlined pod and an aluminum tube boom, joining the tail section, made it eye catchingly different from other sailplanes. The tubes were made in standard 12' lengths that firmly established the wing to tail dimensions.

Most "Baby's" were originally built from kits and then further modified through the years so no two were alike. Warren Watson is the builder of this 1/4 Scale Bowlus "Baby" Albatross. He drew his own plans which he scaled down from a 3-view drawing appearing in a Bowlus catalog from the 1940's. Its wingspan is 11' 3". The aluminum tube measures 3' in length.

Building radio control planes is a hobby of Mr. Watson's. Photography is his trade. Using Ektachrome transparency for the photographing of his "Baby" Bowlus, Warren has called upon a friend, the appealing and talented Ruthie Dyche, a model, singer, and composer of songs, to give a visual display of his efforts, skills, and hobby.

The venture was photographed by Warren at the Eaton Canyon home of Roy and Ruthie Dyche in Pasadena California.

different ways to hook up the throttle control. We opted for an extension arm on the throttle similar to the needle valve set-up because it would simplify throttle adjustments and fan removal.

As recommended by Midwest, we used a High-Point balancer and found it did an outstanding job on the rotor. As a matter of fact, we got down to the nitty-gritty of balancing by following Axiflo designer Bob Kress' advice and Hot Stuffing very small amounts of micro-balloons inside the rotor hub. According to Mr. Kress, this finite balancing is absolutely vital for maximum power and fan longevity.

There's a separate sheet that contains patterns for cutting the tailpipe out of 1/64" plywood. Accomplishing this was not quite the piece of cake Midwest made it out to be, and it was accompanied by some knashing of teeth. The completed exhaust pipe was then Hot Stuffed to the rear shell flange.

Since the inlet cowl must be tight against the front shell flange during fan operation, but must also be removable to facilitate maintenance and disassembly, we tried Midwest's idea of using small sheet metal screws through the flange and into the foam cowl; however, the foam got wallowed out by the screw threads and the cowl became loose. We solved this problem by epoxying 3-48 nuts into the foam to accept the 3-48 bolts coming through the flange. This worked well, as we found out later, inlet cowls will be available with screws and tapped inserts from Kress Technology.

Covering:

Realizing that visibility could be a problem with a small bird like this, we made the plane solid red with large areas of white trim on the top of the wings and horizontal stab. Superkote was used for covering the wings and tail section and also for the trim; the fuselage was glassed with Hobbypoxy and 3/4 ounce cloth, and sprayed with red Hobbypoxy.

Engine:

We chose the K & B 3.5 R/C since the fan was designed for it. This engine has built up a good reputation and proved to be extremely powerful, yet docile. The 3.5 came with a very short header pipe which was not at all suited for fan operation since it spewed the hot, messy exhaust all over the inside of the fan. Midwest recommended Mac's Products 4" header pipe so we obtained one and found it did an admirable job. The pipe got that messy exhaust out of the duct and, because it tends to fill the drag producing void behind the cylinder head, this header actually increased power a bit.

The high rpm needed for effective fan operation does produce a noise level that could be a problem for many fliers. Since a muffler is totally impractical in this kind of installation, a tuned pipe with its excellent ability to attenuate sound and increase power would be the only answer for those in need. We decided to stay with the 4" header because noise is not a problem where we fly and we didn't want any pipe sticking out the rear of the fan making it look like we had

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JETSTER

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"mickey moused" the whole thing.

The four mounting pads were Hot Stuffed to the bottom of the forward shell and the 6½ ounce fuel tank was put where it belonged, on the rear of the unit. The completed RK-20B was then mounted on the top of the fuselage and secured to its hardwood cradle by four 4-40 socket head bolts going up through the cradle and mounting pads and into blind mounting nuts epoxied inside the fan duct.

Once again we followed Midwest's recommendation and set the fan up in a plywood cradle for test running and to get acquainted with its operation. This is a bit different than a conventional prop-type installation and does require additional familiarization. At first we planned on running with a 5% nitro mix, but ended up using our standard 15% fuel for two reasons: We wanted maximum thrust and the needle valve tuning was much too broad with the 5% stuff. We tached an even 20,000 with the lower nitro fuel and 20,700 with the 15%; according to the performance curve in the back of our instruction booklet, this additional 700 rpm gave us a healthy third of a pound more thrust. With a gross take-off weight of 4½ pounds, this 3.3 pounds of thrust pushed our thrust to weight ratio up to a very substantial .77.

It's virtually impossible to know what you're doing with a ducted fan unless a good tachometer is used. The one we took all our readings with was a Royal Pro-Tach borrowed from a friend who loves engines . . . so we're pretty sure it was accurate.

Radio:

We got to use our brand new Kraft Spectrum Six in this bird. The elevator, throttle and steering servos, along with the receiver and battery pack, fit into the nose section; the aileron servo, as usual, took up residence in the wing center section.

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Flying:

The 30% Center of Gravity shown on the plans turned out to be a good, safe starting point; this also happened to be the very first time we've ever had a plane balance right on the money. We made good use of the Spectrum Six's elevator and aileron dual rate capability; both control surfaces were set for 1/4" travel on low rate and 1/2" travel on high rate.

An exceptionally good range check gave us the confidence to try a few high speed ground runs. We were concerned about the fan's "inherent" throttle lag but found it to be over-emphasized; although slower than a prop would have been, the rotor came up to speed without hesitation.

After checking rpm one last time, and setting both rate switches to low, we taxied back to the runway, asked for divine guidance . . . and gave her full throttle. She seemed a little slow at first, so we let her eat up most of the 260 foot runway before easing in some up elevator; the Jetster came off smoothly and assumed a shallow climb. If it hadn't been for the high pitched whine of the fan, we could have easily thought she was just another well behaved prop-job grabbing for altitude.

The Jetster picked up speed while climbing and, by the time we leveled off, she was really trucking. The lack of rudder control precluded stall turns or spins, but in all other respects this bird performed quite well. Rolls looked very good and so did loops . . . as long as she had enough speed coming over the top. The weight of the pod seemed to pull her over on her back if she came over too slow.

There was nothing viscious about her stalls; she'd mush along for a bit and then drop her nose until speed built up. At low rpm, and especially while setting up a landing pattern, the drag of the fan was noticeable and helped her attain a steady, predictable sink rate. Between the efficiency of the fan and this bird's streamlining, a **low** idle is a must for decent landings; otherwise she'll come in smoking and gobble up all of the runway, plus whatever there is for over-run . . . and then some. By flying a traffic pattern and allowing the plane to bleed off speed, good landings are almost assured.

Dick Sarpolus deserves a "well-done" for designing a sport ship so well-suited for use with the RK-20B fan; they make a viable, off-the-shelf combination. We do think, however, that perhaps Midwest got a little carried away in referring to the Jetster as being "fully maneuverable." In truth, the lack of rudder control is a limiting factor for some aerobatics.

Conclusion:

There's absolutely no doubt that even a rank beginner could build this airplane; however, the mechanics involved in installing the fan and, especially, the flying of this machine, would be more easily and safely handled by an experienced RC'er.

The Jetster's small size, coupled with its ability to accelerate and really move out, definitely takes it out of the trainer or beginner category.

The Jetster looks good, is fun to fly, and has a nice price. It's an honest airplane that offers a "no sweat" transition to ducted fan flying. □

THE NINE SECOND SPEED RUN

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ft. That doesn't leave anything left over to fly the course!

In order to determine the speeds (and times) that are attainable for the F3B run, we must combine the results of these two tables. This is best done graphically and the results are given in Figure 1. What we have done here is assume that we can launch to a certain altitude (500 ft., 400 ft., or whatever) and then dive long enough to reach a desired velocity (this is the data from Table 2 and is represented by the downward moving curves in the graph). The limitations on this dive are such that at the desired velocity there must be enough altitude left over to complete the course at this speed (this is the data from Table 1 and is represented by the upward moving curves in the graph). Where these curves intersect, we have a balance of dive/flight conditions which represent allowed combinations for running the course.

By way of example, one of the intersections (A in the graph) can be explained as follows. Assuming a 20 oz./ft.^{2} loading, a sailplane can be launched to 500 ft. and then dive to about 265 ft. to acheive a speed of 123 ft./sec. At this point it intercepts the Table 1 curve which says that a 20 oz. loaded sailplane flying 123 ft./sec. and entering the course at 265 ft. can just make it through at that speed and have 0 altitude left at the end. This represents an allowable condition, any other dive/flight combination will not represent an optimum run through the F3B course. The results of this analysis are summarized for several possible wing loadings and launch heights in Tables 3 and 4.

Now let's glance over Table 4 (estimated speed run time versus loading and launch height) which is what we've been trying to get to all this time. For the conditions defined in this study, it is obvious that the limitations on the F3B speed run are almost exclusively due to the nature of the task and the real physical world. Further design evolution strictly based on speed considerations is not going to significantly affect the results. As a matter of fact, the emphasis on wing loading may have been overplayed a bit. Note from the table that a 14 oz. loaded sailplane launched to 500 ft. can do the run in about the same time as a 20 oz. loading launched to 400 ft. I'm not all that convinced that one can launch the heavier sailplane even that high. Clearly there is an optimum somewhere which is a

sensitive function of the specific capability of the pilot/sailplane system.

So how can someone break the 9 sec. barrier? Well, by now someone probably has — but not by much. Flying at the FAI limit (24 oz./ft.^{2}) may help if you can get full-altitude launches. This will probably require flaps to assist in getting the height — something only a very few original designs are doing. Getting off the tow at high speeds will also help — if your ship can take the stress and your winch or runner has got the necessary energy. Drag reduction may also help somewhat but the numbers used here are probably optimistic. To beat 9 sec. may require extremes in construction for low drag that are just not available to the average builder. And, of course, there's the old luck factor — never turn down a booming thermal! This alternative is not one to be counted on but certainly one to be exploited when it comes along.

So, what's the conclusion? Simple, the 9 sec. speed run stands very much like the 4 minute mile — a goal to be broken occasionally but not usually. Very little help can be seen in pushing past this barrier short of changing the task. In a way that's great. A few years back U.S. fliers were terrified of the super slick European molded wing technology. Now U.S. times in the 9's and 10's are not unusual. So let the Europeans push the limits and whack out an occasional 8.8. If we can stay close (low 9's to mid-10's) in this task, then we've got the edge in thermal and distances since speed ships are generally not good thermal sailplanes (when was the last time you saw a slope ship win a real thermal contest?). This analysis doesn't spell the end of the Dassel dominance, but it gives hope (to me at least) that it ain't the only game in town! □

GLOW STARTER

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when the glow plug is in the circuit. This is also indicated by a meter reading showing you have continuity or a good glow plug.

When using the Glow Starter over a long period (continued use under power with a hard starting engine) you will note the power transistor and heat sink get quite hot. Don't be alarmed. It is normal. With that, I say --- have fun on an interesting electronics project for the R/C modeler. □

HOBBY LOBBY GRUMMAN

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hand flipped quickly enough. We then installed the starting pulley and used the cord. The Evra roared to life on the second pull! By using the starter cord, the Evra started easily and ran very well with minor adjustments. The aluminum Evra engine mount comes with Lords-type vibration bushings. We tried

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HOBBY LOBBY GRUMMAN

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mounting our Evra with the Lords mount and also via the rigid mounting system. Use of the Lords mount does not eliminate vibration, it simply confines most of the vibration to the engine/mount assembly. Rigid mounting the engine transmits the vibration throughout the airframe, which is better for the engine, but harder on the structure and radio system. This is a problem associated with virtually all of the larger gasoline fueled engines currently being used in R/C aircraft and in Full Scale airplanes. We also attempted to start our Evra engine with a conventional 12 volt Sullivan starter, which was connected to an automotive battery. This proved to be inadequate.

In view of the difficulty encountered in hand starting our Evra engine, we regarded a mechanical starting system for this engine as being a necessity. The starting pulley and cord that comes with the Evra cannot be used if the Rual 6 bolt hub and spinner adapter are installed. The Rual 6 bolt prop hub is a nice well-machined unit that allows the track of the prop to be easily set or adjusted. As with any large diameter prop, having it track properly is equally important as balancing is, in order to minimize vibration. Our summary observation of the Evra is as follows: It is the lowest priced engine of its type. It mechanically starts very easily and runs well. On the negative side, it has no built-in choke on the carburetor, which presents a minor problem when the engine is cowled-in and, as mentioned, it is a real challenge to start by hand.

We decided to initally use the Lords mount in our test aircraft. The wheel pants are molded plastic halves that must be glued together and reinforced before installation. The instruction sheet did not provide any information on how to best handle this construction phase.

We used polyester resin to assemble our wheel pants and placed a strip of two ounce fiberglass cloth over the seam on the inside of the pants for additional strength. The main gear pants were reinforced with several layers of six ounce fiberglass cloth and resin on the inside face of the pant where the axle bolts would attach to the dural landing gear. We used Du-Bro axle shafts and wheel collars for mounting the wheel and pant assembly.

The nose gear assembly, while non-scale, is a nicely made double leg unit, complete with shock loops and a cross axle. How to best attach the plastic nose wheel pant to this unit will present more of a challenge to the builder's innovative abilities. We used a brass plate, contoured to match the inside of the top of the wheel pant, to which we soldered two brass wheel collars. This plate and collar assembly was attached to the wheel pant with fiberglass cloth and resin. Du-Bro flexible control cables were installed for the throttle and nose wheel.

While construction of our test aircraft was under way, we were informed that the Sullivan fuel tanks are not suitable for use with gasoline/oil type fuels. Therefore, we elected to fabricate a fuel tank using an old one pint metal paint thinner can. All fuel tubing (including the internal fuel tank "clunk" line) was black neoprene tubing. A Westport International Variant radio system was installed, complete with a 1200 mah battery pack.

Finishing:

Our Tiger was finished with Hobby Lobby's Superkote, heat shrinkable film type covering on the wings. K & B Super Poxy primer and Ditzler acrylic lacquer was used on the fuselage, tail assembly, and wheel pants. Our ready to fly Grumman Tiger (less fuel) weighed in at 326 ounces (20 lbs., 6 oz.).

Flying:

After photographing our Tiger, we departed for the flying field. The usual pre-flight check-out was conducted and, in order to start the Evra, we were forced to remove the spinner and 6 bolt Rual hub and install the cord type starter pulley. The engine was started and after checking for any sign of engine ignition-induced radio interference, we taxied out for take-off. The throttle was opened gradually and after a take-off run of about 100', the Tiger lifted off with only a slight amount of up elevator being required. After gaining a few hundred feet of altitude and correcting the elevator and aileron trims, our Tiger was quite steady and docile. The Tiger's in-flight characteristics could be described as "realistic," "majestic," or "slow," depending on your point of view.

The use of coordinated rudder and ailerons produces the most effective turns, much the same as a full size aircraft. We were able to loop our Tiger, but only after picking up forward speed by first lowering the nose. Landings are slow and easy. We didn't find a great deal of difference in landing with and without flaps. The flaps do allow for a slower touch-down speed, however, the Tiger flares out nicely without the use of flaps as well. The Tiger is obviously not a high performance aircraft. Its in-flight appearance is trainer-like. However, the need for coordinated control surface turns would preclude its use as a trainer.

In summary, the Hobby Lobby Grumman Tiger is a highly pre-fabricated Quarter Scale kit, but not an A.R.F. by this reviewer's definition of the term. The plan sheet and instructions were poor. The molding quality is fair and the balsa covered foam wing and tail surfaces are very good. Wood quality was also very good. The Evra engine requires either a starter cord or electric starter. Ours simply would not start by hand cranking. In-flight performance we would rate as being average. This kit will undoubtably find its greatest appeal amongst Quarter Scalers who favor a high degree of pre-fabrication. · □

POWER BOATING

from page 66/65

too far below the bottom of the sponsons thus nearly completely submerging the prop even at wide open throttle. It has been my

experience (since I at one time was a pit crew member for a full size real McCoy outboard racer) that when you rig a tunnel, you rig it so that (depending on the distance between cavitation plate and prop centerline or gear case centerline) the prop or gear case centerline is such that the gear case will be running only about half submerged at best when the boat is at speed. However, the individual who I purchased the boat from disagrees, saying that raising the engine any more would cause engine cooling and handling problems particularly in turns. I say the problems would be solved by a different prop and the installation of a small turn fin on the inside of one of the sponsons toward the rear. What do you think?

Also, I have seen where K & B is marketing a movable transom plate for their outboards which makes it possible to adjust the engine height and even tilt angle without either removing the engine or using wedges and shims. This seems to be a rather novel innovation, in fact, I am considering finding a way to connect a third servo to this thing so I can adjust the trim angle while the boat is underway like they do on the real ones. In short, this device would be analogous to the device Mercury Marine calls "power trim." I'm curious, though. Is my idea unique or has it been tried before? If it has, I

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POWER BOATING

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would like some information on how it was accomplished so I will have a starting point to work form. In fact, if my idea works I'm thinking of trying it on the trim tabs of a friend's deep vee! That's all the questions I have for now. Again, congratulations on a really great article. Keep up the good work.

Sincerely,
Harry R. Rivenbarsh
Daytona Beach, Florida

I would recommend that all of you boaters out there join one of the two national model boat organizations even if you don't plan to race. Both organizations supply their members with liability insurance coverage and information about the boating activities in your area. These organizations are:

NAMBA International
North American Model Boat Association, International
Myrtle B. Coad, Executive Secretary
6073 Sunrise Drive
Lower Lake, California 95457
Phone (707) 994-6643

IMPBA
International Model Power Boat Association
Pat Bridge, Secretary
24310 Prairie Lane
Warren, Michigan 48089
Phone (313) 779-0338

In the July issue of RCM I believe that I discussed setting up outboard tunnel hulls with respect to prop depth. To make a long story short, Harry, you are correct. Your full scale experiences do translate into model boating. The movable transom plate, in my opinion, is essential to fine tune any outboard rig. To my knowledge, no one has been very successful in using "power trim" or controllable motor tilt in model boats. I suspect that because we are not in the boat it will be hard to use this feature successfully.

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POWER BOATING

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The modeler has very little information with which to judge the attitude of the boat. Since models are small in weight they react very quickly to disturbances. These two traits make it hard for the driver to see "blow off" coming soon enough to be able to prevent it by retrimming. The increased weight and complexity of such a system will probably decrease speed and reliablilty to such a degree that any increase in performance will be neutralized. Most fellows trim their hulls by making adjustments on the shore. By running your boat in different water conditions you can find the best trim for each water condition. When conditions change at a contest you will then know what trim changes to make.

Well, that should do it for another month. Send all your letters and photos to the address at the end of this column. Please remember to include a stamped, self-addressed envelope if you want a quick answer to your questions. Howard Power, 766 Broadway, Seaside, California 93955, Phone (408) 394-1200. □

PIT STOP

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one to the next, but this was mainly because I had no control of piston-sleeve fit. These were used as supplied by K & B. Rich Lee's McCoy pistons and sleeves are all hand selected and fit by Rich. His engines are closer to identical.

I told Bill Wisniewski and John Brodbeck Sr. about how pleased I was with the engines I built. John Brodbeck Sr., is the 'B' of K & B and the head man at K & B and John asked me, if they could get a few production engines ready, would I test them and have some of the guys run them at the McCoy race? I said sure, and a week later I picked up six engines at K & B and went to Rich Lee's house to do the testing this time. Now, the important thing to remember here is that these were production engines, right off the production lines, and assembled by the girls on the lines.

	8-4	9-4
Rich Lee Engine	21,100	16,300
K & B — #1	21,000	16,100
K & B — #2	20,300	
K & B — #3	20,300	
K & B — #4	21,000	16,200
K & B — #5	20,800	
K & B — #6	20,200	

It was a little hard for Rich and I to believe that these production engines were as fast as Rich's custom engines. But what could we say? We ran the tests! Rich generally doesn't prop test with 7/4 props because he

feels torque is more important for R/C cars rather than rpm. One of the engines was sent to Rick Davis in Detroit, who has the honor of winning the first R/C car race with the new production K & B's. It certainly worked for him. Dana Smeltzer received one of the engines and with it turned identical times at Pit Shop Raceway (formerly Thorps) in Pomona, as Bill Jianas, so the engine is certainly working for Dana also.

What's new or different on the engine you ask? Almost everything! Pat O'Brien is the General Manager at K & B and he's determined to make the best R/C car engine available — period. He asked me, as well as a few other people what they would like to see changed and then they just did it! From the outside, the most obvious change is a new one piece head-heatsink designed for R/C long plugs. The case itself is beefed up and is visibly different with the addition of strengthening webs at the engine mounting lugs and below the exhaust port. The nose or front piece has a larger carburetor mounting flange and hole to accept the popular OPS, Delta, Perry and Preston size carbs. Inside, the new sleeve is .015 thicker, making it stronger. The upper flange is also much thicker to make it less apt to deform. But the most important part is that a new type of brass is used for the sleeve which accounts for most of the gains in horsepower. The case is likewise bored out .015 larger for the sleeve. The sleeve port timing is also changed towards increasing torque as well as rpm. The crankshaft is brand new. Timing is the same, but the crank now has rolled threads for greater clutch concentricity. The rod is now fully machined and bushed at both ends. Piston and pin are the same. One of the biggest problems we used to have is now eliminated with K & B's own new large bearings. This bearing uses a plastic retainer, and the ones we've used show no signs of wear. Incidentally, don't heat the nose to remove these bearings as you'll probably melt them. I know you're going to like this engine.

Clutch Tricks

With all the new engines putting out more and more horsepower, the demands on the clutch go up too. This results in more heat, causing clutch and bearing problems. We'll show you how the experts eliminate that problem on Associated's RC300 cars. These same ideas will also work on other cars.

What we'll be doing is grinding some cooling vents in Associated's #2667 vented clutch bells. These bells have four holes in them for cooling, but because the bells revolve so fast, it's hard for the air to get through the holes. We'll be grinding some airway grooves leading air directly into the holes, thus forcing the air through the holes. This really works fantastic.

The grooves will be first rough cut with the Dremel cut-off disc shown in the photo, and then finished with the small pointed stone. **Do not** try to do the whole job with the small pointed stone, because it will not only take you longer, but the small pointed

stone will "walk" into the gear teeth, as you're grinding, and you'll destroy the teeth.

The clutch bell turns in a counter-clockwise direction, so make sure you cut the grooves as shown. Looking at the gear, and at the lowest hole, the groove should be as wide as the hole, and extend to the right from the hole towards the outside of the clutch bell, and close to, but not touching the next hole to the right. The groove should be about half the thickness of the bell at the hole and then a little less as it goes out.

Start with the Dremel cut off disc and cut a rough groove as shown, all the way to the outside. When you've got approximately the shape and depth you want, stop and then finish forming the groove with the small pointed stone. Be careful not to hit the teeth. Do all four holes. Now hold the clutch bell at eye level and sight down the groove towards the hole. You'll see the air will be hitting the back wall of the hole. So, using the small pointed stone, go on the **inside** of the clutch bell and bevel that back hole wall about 1/8" long. This would be on the opposite side of the hole as the outside groove. Also use that stone to grind off any burrs around the hole. Polish the whole inside of the clutch bell with #600 wet or dry sandpaper. This is important. If you don't polish the bell, you'll wear the clutch shoes very fast. Thoroughly clean the clutch bell and install new bearings. You do not have to lubricate the #2662 bearings. They are lubricated already with a very high temperature oil.

Install #40 drill blanks in your flywheel, in place of the two roll pins. If the roll pins are already in your flywheel, as shown in the photo, use a pair of pliers (dykes) to grab then and you'll be able to pry them out. Cut the #40 drill blank in half. Slightly bevel one end and insert in flywheel. Use a hammer to tap the pins in. They should go in hard. Cut the pins off with your Dremel, so they extend .450 out of the flywheel. Then slip a B & B #SP 102 anodized aluminum spacer on the pins. This spaces the clutch shoes farther inside the clutch bells, towards the bearings and lessens the load on the bearings. Install the #SP38 teflon clutch shoes on the pins. With one pin towards the top or at 12 o'clock, put the clutch shoe on so it goes towards the right side. Do not use a clutch spring. Do not trim any weight off the clutch shoe yet. See if the clutch bell will go on and spin freely. If it will not, you'll have to trim the clutch shoes to close more. Using an X-Acto knife, trim the inside of the clutch shoe where it contacts the clutch nut. Cut a small groove inside the clutch shoe to clear the points on the clutch nut. Do this until you can put the clutch bell on over the shoes and spin the clutch bell freely. Don't cut off more than you have to. Install the clutch clip. But first, take pliers and gently close the clip a little to make it tighter on the clutch nut.

You can adjust this clutch by changing the weight of the shoes. The stock shoes will

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PIT STOP

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be close to correct. Run the car, and if the clutch slips too much, add a 4/40 set screw for additional weight in the open holes in the shoes. If the clutch does not slip enough, lighten the shoes by cutting the shoes a little shorter at the swing end with your X-Acto knife. Only cut about 1/16" at a time and try it, before you cut any more off.

Improper gear mesh can be very hard on clutch bearings, whether the mesh is too tight or too loose. If the mesh is too tight, that is the gears are too close together, it puts that much more unnecessary load on the bearings. And if it's too loose it puts a shock load on the bearings. It shouldn't take you 2 or 3 minutes to set the gear mesh correctly, but it's very important. What you want is to have the two gears as close together as possible without touching or bottoming out. You should be able to hold the large plastic gear still with your hand, and then rock the clutch gear with your other hand. There should be a very, very small rocking between the gears. If there is no rocking motion, the gears are too tight. If there's too much rocking motion, the gears are too loose. The plastic gear should be checked at about 6 different points, all the way around. Set the clearance at the closest points.

Well, with your new K & B engine and your new clutch, you've got a good start on your competition. Go out and beat them. Good luck in your racing. □

SOARING

from page 63/62

instability. Why not build in a lot of dihedral and use a very small vertical stab? Well, you not only need enough control authority to turn the glider, but enough area is needed to damp-out side to side oscillations, or "Dutch Roll." Too much dihedral will result in a wobbly ship that doesn't turn well.

Another point — anything that affects wing drag during turns will directly affect the turning characteristics. The wing tip area has a large influence on the yaw during a turn. Narrow chord at the tip would generally result in less drag and, therefore, less outside yaw. So, tapered tips call for a lower coefficient. Tip airfoil and wing tip configuration also play a strong role.

Fuselage vertical areas also affect the yawing characteristics. A slab sided fuselage requires less vertical tail area. A pod and boom fuselage requires more vertical tail area.

Everyone doesn't like the same turning characteristics. A slope sailplane can be flown closer to spiral instability than a thermal floater, especially one designed for aerobatics. There are an infinite number of

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SOARING

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variations you can try, unfortunately. Finding a winning combination is as much a matter of luck as anything. But, if you are looking for particular turning characteristics, variations in dihedral, vertical tail area, and wing tip configuration will keep you busy for a while. Gliders with pluggable wing tips are somewhat an aid to configuration experimentation. At least you don't have to rebuild the whole wing. In any event don't ask **me** what you should do. I don't know anymore about it than the next guy! Howzat! □

SCALE VIEWS

from page 60/58

V-1a (2); Stinson A-1 Trimotor (1); Stinson SR-9B (1); Herrick HV-2A Vertoplane (1); Martin B-26 (1); Fokker D VIII (1); Douglas DC-4 (1); Waterman Aerobile (1); Akron Airship (1); Waco JTO (1).

The NASM has some 2,000,000 scale drawings and, of course, they do not keep copies of all of them on hand for delivery upon request. If you have a special request, the research to locate and copy the plan must be done on an individual basis. And in this case I really mean "individual," for the Aircraft Drawing department is a one-man operation. Robert B. Wood, a dedicated specialist, seldom (if ever) runs out of a back log of requests for plans. So I want to caution scale model researchers to go easy on writing to the Smithsonian every time they want a plan. Try to locate them elsewhere first. As we regularly point out in this column, there are a number of readily accessible plan sources. Actually, since part of the NASM drawing collection consists of 3-views from back issues of model magazines and their references for certain aircraft may consist mainly or entirely of such drawings, you can locate the issues these are in by looking in the RCM Scale Reference Guide book. (See the RCM book ad in this issue.) This will avoid clogging up the works at the museum unnecessarily. They do have a lot of material that is unique. For example there are 35,000 Waco factory construction drawings. You can imagine how difficult it is to locate particular drawings in a stack of this size. An index on blueprint paper is part of the collection but it is not complete and is had to photocopy. But for someone restoring a full-size Waco or a modeler doing a super detailed project, copies of the Waco index can be had at a cost of .15 cents per photocopy page. I believe that copies can be obtained of the individual drawings on 105mm microfilm (4" x 6") at $1.00 each or on vellum (18" x 24") at $7.00 each. The microfilm is diazo film from which enlarged copies can be

reproduced on blueprint paper at commercial copying operations with the proper equipment. You must wait your turn on research requests. Order the drawings listed above from: Aircraft Drawings, National Air and Space Museum, 3904 Old Silver Hill Road, Suitland, Maryland 20023. Further information can be obtained from Mr. Wood at (202) 287-3407 between the hours of 9 to 11 a.m. Eastern time.

From The Mailbag

In Scale Views for May, we had coverage on Weldon Smith's model of the Bell RP-63, the armored piloted aircraft that had plastic bullets shot at it by student fighter pilots. Ivan L. Hickman (509 N. 2nd Ave., Norton, Kansas 67654), who was one of the lucky (?) fliers who sat "in the hot seat" on an RP-63 tour of duty, sent in some interesting comments of historical value:

You mentioned the red light that blinked, registering hits. I'm not sure about the G model; I flew the A & C model only, but the hit registering light was located on the prop spinner on the latter. The 20mm cannon, which protruded through the spinner on the regular P-63, was removed on the RP-63 to permit the installation of electronic counting gear. A red light was installed in the resulting spinner opening. It would be interesting to hear from anyone who might have flown the G model. I believe all of them were located in the Southeast part of the U.S. I don't believe any of them were located at Kingman (Arizona) or Indian Springs (Nevada) where I was stationed.

As far as the actual flying was concerned, about the only recollection I have is of eternal boredom, spiced with occasional moments of terror when an oil or coolant temperature gauge began to rise. The concept of the "Pinball" (that's what we called the machines) was sound, but the designers didn't count much on human nature. The armor protected only from the front. The coolant radiators were located under the aircraft at the wing roots. Although strict instructions had been issued to gunners and instructors alike to stop firing at the termination of the fighter's curve of pursuit, many of them continued to shoot after we had banked sharply to pull away. Our instructions prohibited crossing underneath. The result was that bullets sometimes penetrated the unprotected radiators and the loss of coolant or oil caused many aborts. Fortunately there were many dry lakes in the vicinity of our range at Indian Springs and it was a relatively simple matter to pick one and land. That is, when we couldn't make it back to home base.

As I recall, we only lost one pilot during the relatively short period of time the "Pinball" program was in being. (He tried to stretch his glide during a forced landing.) Most of the pilots were less than enamored with the program, feeling that if we were to be shot at, we should at least get combat credit. The result was that after awhile we began to belly the ships in on the dry lakes with the anticipated damage to the expensive electronic equipment. During the initial periods we would always extend the

gear and save the airplane, but this changed. We lost a lot of airplanes and I think this had some effect on the decision to cancel the program long before the war was over.

Ivan says he is definitely going to visit Lackland AFB and see the last remaining RP the next time he is in the vicinity. Incidentally, Weldon Smith took his model to Toledo and placed second in the Precision Scale division.

Clarke Stallworth (148 Glenhill Dr., Birmingham, Alabama 35213) wrote wanting to know where he can obtain a 3-view of the Space Shuttle so that he can build an RC scale model of it. He has written to NASA (the government agency, not the scale association) twice but received no answer. □

RADIO SPECTRUM

from page 57/56

feeding the aileron control pot voltage into the summing Op Amp as shown in Figure 2.

If you end up with the wrong direction (it depends on your individual set-up and position of your reversing switches) you would feed it into the Inverting Amp as shown in Figure 3.

As shown, the aileron rate changes and end point adjustments won't affect the rudder travel nor will any of the rudder adjustments, except the one added, when the aileron stick is moved. This may not be the best and in fact you might want to feed the aileron control voltage from the end of the aileron signal conditioning circuit (at the reversing switch) into the rudder circuit. Then the aileron rate switches and end point adjustments would affect the rudder when it is coupled.

I don't recommend anyone except a top technician try to attempt this mod. The JR transmitter is very, very packed full and is not easy to work on.

Toko KB 445 and 446

I received a nice letter from Mick Wilshire of World Electronics in England, in answer to my plea for information on the New Toko integrated circuits for radio control. Mick enclosed a schematic which appeared in a publication called Electronic Today International. The problem is that it is only five channels and designed for 27 MHz. Mick built one and has been flying it for some time with no problems but they don't have CB in England yet. At least legally. The most interesting thing about the receiver design was what appeared to be a crystal filter between the RF amplifier and mixer at 27 MHz. It was designated SFE 27.0 on the schematic. Now I'm curious to know if these filters are available on other R/C frequencies and what their characteristics are. Could be just what we've been looking for.

Mick also sent over the proposed radio control frequency standards for the 35 MHz band in England. They are looking at 20 channels, 10 KHz apart between 35.01 and

35.2 MHz. We'll study this plan further and pass on any significant dope. I sure like the way they go about it. The letterhead for the Society of Model Aeronautical Engineers Ltd. the flier's national body, lists the Duke of Edinburgh as patron and an Air Vice Marshal Sir Bernard Chacksfield as President. With those kind of credentials I suspect they might get what they want from the home office. What we need is a movie star as President of the AMA in order to have some pull in Washington.

Distance Between Flying Fields

We received a couple of letters with feedback on distances between flying fields. Ed Gerhardt of Basking Ridge, New Jersey, reports that they use three fields with one and two 3 miles apart and one and three 2 miles apart. He says once in awhile an old timer or sailplane at high altitude might have a problem but he thinks 3 miles is adequate for normal flying.

Al Horner, Vice President of the Toronto R.C. Club says their field is only 1¾ to 2 miles from another club field and a third field is another 1¾ miles away all in a straight line. They don't have any problems. They ran some tests first by using the same frequencies at both fields while staying in touch with C.B. equipment. They flew one model as far as they could see it toward the other field and then switched on the same frequency, no problem.

Ed Gerhardt also mentioned his experience with carbon button wipers on plastic pots in his D & R sticks. What he found was that after a few hours the wiper had deposited a layer of carbon on the pot that caused problems. Now he is going to try ceramic pots with hard carbon wipers. He said if that doesn't work he's going to a stick that uses the old Allen-Bradley pots.

Well Ed has found out what I've been saying for years. You've got to start with a good pot in the transmitter gimbals and there is nothing you can do to make up for a bad one. If you get a good combination let us know Ed, because many people still have problems on the servo end. By the way, have you tried Giezendanner wipers yet?

Comments On My Recommendations

Recently I made some recommendations on radio control equipment and I really did expect to catch a lot of flack. However, I thought I was pretty complimentary to Kraft equipment and was certainly surprised by the following letter.

Dear Mr. Oddino:

Your recent article on Kraft, Ace and JR gear should end your sparse mail — it will probably make you more controversial — most terrible writings tend to produce these results. You write that you "do not fly Kraft servos" you also wrote you "always felt this was the weak link in the Kraft system." No personal flight experience with them but you demean them. You write you wouldn't stake your reputation on Kraft AM on 72 but allow "it can't be too bad," etc. What B.S. Many are influenced by "wouldn't stake my reputation." You have the audacity to report on Kraft carbon wipers knowing you may not have had the proper combination of

wiper/pot. You say looking at the Kraft Rx you see "no special features to give it an edge."

Listen Mr. Oddino. The reason your article offends me is because it implies a major weakness and an ordinaryness in the Kraft system. So that you will have some real experience to use for your judgment I will give you the following info:

I have been in R/C since 1963 (18 years+). The club I belong to has been through many brands of gear. We are avid fliers and are very involved in keeping track of the quality of R/C gear. Over the years we have tried E.K., Micro Avionics, World, Orbit, Proline and, of course, Kraft and many other brands.

All the equipment other than Kraft is now out of my collection. I have been using only 5 and 7 channel Kraft gear and flying the hell out of all of it for the past 8 years. Never a failure — servos have seen 4 to 5 seasons of hard use with no trouble. After this — pot cleanup is all that is required. My experiences are the same as others in the group. We think the Kraft 15's are among the best servos ever made. The radio Rx and Tx are super reliable — by this I mean year in year out they work to perfection. The few others in our club that use other gear have all kinds of problems and eventually get Kraft — and all of our Kraft stuff is on AM. And we fly in and near large metropolitan areas — factories and generating all types of spurious signals without creating the slightest problem for us.

It is really understandable that you do not give Kraft the credit it deserves because if you don't know any better then the evaluation makes sense. It is quite another thing to compare JR equipment in the same article to Kraft and I was pleased that you didn't.

Advice to someone who thinks that he needs your advice to buy a Kraft Tx, Novak Rx, Kraft 20 H's (for general use even in a .60 — crazy) and possibly modify with Giezendanner wipers — if he is confused now who would wonder why.

I know I have a lot to learn about R/C and you have a lot to learn about R/C but it is

important that you learn it very soon because you are the one with the pen advising the public.

Yours very truly,
Don Gwirtz
Philadelphia, Pennsylvania

Well I'm sure this letter will sell more Kraft equipment than anything I can ever say. It is nice to know that there are people out there that are so happy with their radios. However I will continue to look for something better as long as I'm messing with R/C and I'll try to pass what I learn along to the rest of you and hope that you will tell me of your experiences if they are good like Don's, or bad like most of the letters I get. □

GIVE IT A WHIRL

from page 53/50

Hovers briefly, rotates then slowly 360° to the left about the yaw axis. Hovers briefly and climbs again for 2m. Hovers briefly and moves forward for about 10m, at a straight and constant altitude until it is vertically above the opposed helipad where it hovers briefly. Then it descends 2m vertically, hovers briefly, makes a slow 360° rotation about the yaw axis, to the right hovers again briefly. Descends again 2m vertically and hovers briefly. The model flies again at eye level 10m forward, straight and with a constant altitude.

Points will be subtracted for the following reasons:

1. The model does not fly horizontally or vertically in the described parts.
2. Altitude changing or horizontal deviation during the 360° rotations.
3. Deviation of the vertical plan of the maneuvers.
4. Brief hoverings are not made at the described place.
5. The rotations are not equal to 360° or irregular or not performed about the yaw axis of the model.
6. The 360° rotations are performed at different altitudes.
7. The rotations are not performed in the described directions or not vertically above the helipads.
8. The described altitudes are not

respected.

9. The pilot leaves the fixed point chosen by him.

(3) Swiss Hovering Circle — K = 9

The pilot stands in the outer helipad, the model takes off, with the nose pointed towards the pilot from the central helipad, climbs vertically to eye level and hovers briefly. The model flies then sideways to the left or right, maintaining a constant altitude, maintaining a constant distance from the pilot and keeping the nose always pointed towards the pilot until it returns directly above the central helipad. It hovers briefly and descends towards the helipad and lands slowly, keeping the nose towards the pilot. The diameter of the circle shall be approximately 10m.

Points will be subtracted for the following reasons:

1. Take-off and landing are rough or with heading changes.
2. Altitude changes during flight, the radius of the circle is not constant or the front of the model is not always pointed toward the pilot.
3. The model does not land entirely on the helipad.
4. The speed changes during the flight.
5. The pilot steps out of the outer helipad.

(4) Shovel — K = 9

Pilot stands in the central helipad facing the model which has an altitude of 20m. Model begins slow descent of 45°. Model stops at eye level vertically in line with outer helipad, hovers briefly. Model now flies sideways either right or left towards the corner of the square and hovers. Model begins a half Swiss circle and continues as far as the opposite vertical corner, hovers briefly and moves sideways in order to return to the outer helipad where it again hovers briefly. The model then performs a slow 180° rotation on the yaw axis, hovers briefly and regains its initial heading and continues the same journey, maintaining the same speed as originally employed during the descent.

Points will be subtracted for the following reasons:

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1. During descent or climb model tilts, changes heading or speed and these are not maintained at 45°.
2. Model does not stop exactly above the outer helipad and corners of the square.
3. Deviation from flight path described above and has not maintained constant altitude and speed.
4. Half Swiss circle was not performed at a constant altitude, radius and speed.
5. The 180° rotation was not made on the yaw axis.
6. Model has not made a turn of 90° to begin and finish the half Swiss circle.
7. Pilot steps out of the central helipad.

(5) Pilots Promenade — K = 8

Model takes off from central helipad, climbs vertically to eye level, remains stationary on a fixed course. Pilot commences a slow, even circular walk around his model.

Points will be subtracted for the following reasons:

1. Model tilts, turns or moves horizontally during take-off, climb, descent or landing.
2. Model changes altitude or course during stationary position.
3. Pilot's walk is irregular.
4. Model does not land completely on central helipad.

(6) Pirouette — K = 6

Identical to the double pirouette with the exception that the model makes a constant regular and slow 360° rotation about the yaw axis.

(7) Stall Turn — K = 6

The model flies straight and horizontal for about 20m, climbs then vertically with a sharp curve of 90°. At the precise moment the vertical climb stops, the model turns 180° about its yaw axis, half a rotation, so that the nose points downwards. While diving the model follows the same path as when it started the maneuver.

Points will be subtracted for the following reasons:

1. The model vibrates, changes heading or altitude during the horizontal flights.
2. The curve which brings the model in a vertical climb is too wide or too sudden.
3. The model does not climb exactly vertical or does not end its vertical flight.
4. The model drifts away during the vertical flight or rotation.
5. The model does not turn exactly 180° and vibrates before diving.
6. The model ends the maneuver on a different flightpath as the one it started on.
7. The speed changes during the flight or after turning.
8. The maneuver is not performed directly in front of the Jury or is performed too high.

(8) Looping — K = 8

The model flies straight and horizontal for about 10m. It climbs for a looping while

maintaining the nose in the direction of flight. The model ends the looping and flies again straight and horizontal for about 10m, on the same heading and same altitude as at the start of the maneuver.

Points will be subtracted for the following reasons:

1. The model vibrates, changes heading or altitude during the horizontal flight.
2. The looping is not round or is too small.
3. The model vibrates or does not stay in the vertical plane it started the looping with.
4. The looping ends on a different altitude or heading than that of the start.
5. The speed is not constant during the flight.
6. The looping is not performed in front of the Jury or is performed too high.

(9) Split S — K = 8

The model flies straight and horizontal for about 20m. By making half a roll on the flight path the model goes to inverted flight and maintains this for a short moment before it starts a half downward circle which brings it back to the normal flight altitude, it continues its route by flying straight and horizontal on a heading opposed to the one it started with. It covers about 20 meters.

Points will be subtracted for the following reasons:

1. The model vibrates, changes heading or altitude during the horizontal flights.
2. The speed is not constant during the maneuver.
3. The model vibrates or does not stay in the vertical plane it started the Split S with.
4. The half roll is not on the axis of the horizontal flight.
5. The inverted flight is not distinctly separated before the half circle is performed.
6. The half circle is not round or is too small.
7. The Split S is not ended on a heading directly opposed to the one of the start.
8. The maneuver is not exactly performed in front of the Jury or is performed too high.

(10) Immelman — K = 8

As for the Split S (also called Inverted Immelman), but the model makes the half circle upward and makes a short inverted flight before making the half roll which brings it in a straight and horizontal flight.

(11) Cuban Eight — K = 9

The model flies horizontally and at a constant altitude, then climbs for an inside loop, continues until it dives at an angle of 45°. At this moment it makes half a roll followed by another inside loop until it is again diving at an angle of 45°. It again makes half a roll and ends the maneuver on the same altitude and at the same heading as the one at the beginning.

Points will be subtracted for the following reasons:

1. The model is not horizontal at the beginning.
2. The loopings are not round.
3. The model does not stay in the vertical plane during the maneuver.
4. The model is not precisely at a 45°

downward track when it makes the half rolls.

5. The two loops do not have the same diameter.

6. At the end of the maneuver the model is not at the same heading and the same altitude as at the start of the maneuver.

7. The two half rolls are not executed at the same point.

8. The speed is not constant.

9. The maneuver is not performed exactly in front of the Jury or is performed too high.

(12) Roll — K = 9

The model flies straight and at a constant altitude of about 10m and starts a slow roll in either direction around an axis which coincides with the line of flight and continues this roll in the same direction until it flies again horizontally and at a constant altitude for about 10m.

Points will be subtracted for the following reasons:

1. The roll is too fast, too long or too short.

2. The model loses altitude during the roll.

3. The model ends the maneuver on a different heading from that on which it started on.

4. The maneuver is not performed exactly in front of the Jury or is performed too high.

(13) Belgian Stall Turn — K = 9

The model flies straight and horizontally for about 10m; then climbs vertically with a sharp curve of 90°. During flight it performs an axial roll. At the actual moment that the vertical climb ends, the model turns 180° around its yaw axis, this is half a rotation so that the nose points downwards. By diving and a horizontal recovery with a slow curve of 90°, the model ends the maneuver when it flies straight again and horizontally for about 10m on the same heading and at the same altitude as at the start of the maneuver.

Points will be subtracted for the following reasons:

1. The model vibrates, changes heading or altitude during the horizontal flights.

2. The 90° curves are too wide or too sudden.

3. The model is not precisely climbing or diving vertically.

4. The half roll is not in the axis of the vertical climb.

5. The model does not turn 180° precisely around its yaw axis and vibrates before diving.

6. The model is not on the same heading and has not the same altitude before the vertical climb and after the horizontal recovery which follows the dive.

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7. The maneuver is not performed exactly in front of the Jury or is performed too high.

(14) 540° Stall Turn — K=8

As for the stall turn, but the model turns 540°, that is one and a half rotation, before descending vertically.

(15) Autorotative Descent and Landing — K=9

The model approaches the helipad on a final minimum altitude of 20m and flies at a speed which requires less power than the stationary flight. When it reaches a position, depending on the wind, where an autorotative descent will bring it approximately on the helipad, the model must reduce the collective pitch to obtain the optimum autorotation. The engine must be stopped, and the model must land as close as possible to the center of the helipad.

Points will be subtracted for the following reasons:

1. Brutal landing.
2. The model lands while it still has a forward translation speed.
3. The model does not land entirely on the helipad.
4. The model deviates from a straight line when descending, except when touching down.
5. Yawing of the helicopter.

Well, if you haven't seen R/C helicopter competition rules before, the foregoing is plenty to digest for now. Promise the column on vibration next month. Keep 'em whirling. □

BLUE BELIEF

from page 49/48

International Plastic Modelers Society Quarterly to a statement from the 1956 Harleyford epic, **"Aircraft Camouflage and Markings, 1907-1954"** by Bruce Robertson. That probably started the whole thing, but it was perpetuated by several articles in the IPMS magazine by Mr. Al Schrager that drew the same unreliable sources and produced several very invalid conclusions from poor data. Where these impressions originally came from is unknown, or is it of any consequence at the moment, but it started us all down the wrong path.

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

Almost all photos we all use for study or to prove our scale building accuracy as to color/markings/insignia for anything from a full scale aircraft to a model are, at best, a third or fourth generation product of the darkroom. The lithography process for magazine and book prints may add yet another degrading step or two to the process. There is absolutely no doubt that the upper sides of the aircraft in these photos have a definite bluish tint, as the accumulated errors of age and developing chemistry take their toll of authenticity. That bright blue English summer sky did its share of distortion, too, as it is picked up by the color camera. (Notice what a silver section of these aircraft looks like in these same photographs, particularly Photo 2.)

If one should start looking at the photographs with the known colors in mind --- the orange-yellows (614) and the insignia red (619) white (601) and blue (605) --- and adjust to bring them to their true colors, the upper surfaces must also shift further toward the green end of the spectrum, and toward a more recognizable olive color. This experiment could doubtless be done with far greater accuracy in a darkroom by one so equipped and inclined, but I am content to listen to an expert in this dark art rather than dip into the task myself. Also, far better proof than any of this is to follow.

At the reunion of the American Fighter Aces at the United States Air Force Museum in mid-summer of 1980, I had the opportunity to meet and talk at some length with Major Urban Drew. Preparations for the reunion activities resulted in the knowledge that Ben Drew had been in the 361st for part of his career, and I felt I had an excellent opportunity to seek out some of the elusive "primary source" data mentioned previously. My idea was rewarded beyond what could be pure chance, for not only was Urban Drew in the 361st but he was the #2 in the formation shots we see here --- E2-S! But these reunion weekends being what they are, the conversation never got finished. Armed with color prints (those copies of copies) obtained from the Defense Audiovisual Agency Still Photo Depository (1221 Fern Street, Arlington, Virginia 22202), correspondence followed back and forth across the Atlantic, since Ben Drew is the U.S. Director of South Africa's Caprivi Airways. Supplying Ben with a set of prints of this formation, he was asked for data and opinion on the color/markings/insignia of the 361st. It is to Ben that we owe all the information contained herein and an end to our search for truth: from his detailed

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logbook, personal papers, and photographic memory. The well-known bottom line of all this can simply be a quote from his letter, "Concerning the camouflage . . . I agree with you, the camouflage was olive drab . . . and further agree that the "blue" interpretation was given by British authors through the years . . . a casual look could lead one to believe they were blue . . . but olive drab it was . . ." I rest my case for olive drab --- shade 613.

Epilogue: For 613, try 5 parts red, 7 yellow, 6 blue and 1 of black. It may not be perfect, but it sure ain't blue.

Footnote: If one mystery has been solved, another appears. The aircraft record cards of these four, obtained from the Albert F. Simpson Historic Research Center, Maxwell AFB, Alabama 36112, show LOU IV (44-13410) to be an Inglewood-built P-51D-10 NA. However, the tail number seems to indicate that it is a Dash 5 built without the dorsal fin, and the Dash 10 identification from the aircraft records seems to be in error. ('The change-over point for factory installation of the fin was 44-13904 and later aircraft.) Further, these same records indicate that Drew's aircraft, E2-S (44-13296) is a Dash 5 NT built at the Dallas site. Even if we accept that the fin was added on as a field modification, there is still a discrepancy, since the block containing E2-S (44-13252 through 44-14052) is generally thought to be an Inglewood (NA) production batch. Until a bit more research is done in this very dusty corner of aviation history, we are left to decide for ourselves if the record cards are in error. Or were the productions runs different than we think as regards to location and fin installation? □

SUPER CHAMP

from page 47

. . . covering. Now is the time to decide if your Champ will have a nose wheel or tail wheel. Either one is scale since there have been a number of Champs converted to trike gear. We picked the tail wheel version and used a Goldberg tail wheel mount; it's simple and it works. The nose wheel version calls for drilling a hole in the engine mount to act as the gear support. Instructions for both types are included.

The wing center section is the last major construction step; it is the most complex but also has the best instructions. The hold-down system is quite an ingenious collection of sliding blocks, dowels, and springs. During assembly be very careful that everything stays square. We found that

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a little sanding was required before it worked as intended. The parts should be snug but there should be no binding. When it came to fitting the center section to the fuselage we had to remove about 1/16" from the wing saddle before the pre-drilled holes would line up. Joining the wing sections is accomplished by cutting a 1/8" slot in the two root ribs and epoxying the dihedral brace to the spars. Once this is done and the top sheeting is added, the Super Champ is ready for cover.

Covering:

Since the original Aeronca Champ was fabric covered, we decided to use the new FabriKote by Top Flite and were delighted with the results. Two types are available and our choice was the pre-painted variety. This stuff shrinks like you can't believe, even compound curves are easy --- just keep shrinking until it fits. Once it was done we had a very strong finish that looks realistic. We also found that FabriKote will accept almost any kind of trim. The windows were painted with Pactra Formula-U and the rest of the trim was done with regular MonoKote.

Engine:

The Super Champ is designed for engines in the .20 to .35 range and with a flat bottom airfoil and light wing loading it doesn't need one of the hot rod types. Our Super Champ was equipped with an O.S. Max .30 and the standard muffler. Gemini recommends mounting the engine at a 45 degree angle and we found that this allows mounting of the muffler with just the right amount of clearance. It also directs the exhaust away from the wing saddle area. A Sullivan SS-6 tank was installed behind the firewall; there is enough room for larger tanks but 6 oz. will give plenty of flight time with the milder engines such as the O.S. .30 or .35.

Radio:

The radio area is quite large and will easily handle any of the radios currently on the market. We used three channels of a Futaba four channel and the standard servos. The battery was placed under the tank and wrapped in foam for protection. All three servos were mounted well forward in the cabin to avoid any tendency toward tail heaviness. No hardware is provided for the control hook-up so we used Sullivan semi-rigid Gold'N-Rod, the one with the blue outer cover. One 48" length is enough to do both tail surfaces and when the rod is installed, be certain to secure it at the front and rear to prevent flexing.

Flying:

We did the balancing act while installing the radio and have found the recommended C.G. point to be just fine. There are no suggestions for control throws in the instruction booklet so we guessed and set the elevator up with 1/2" each way. For the rudder we used the maximum available

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without hitting the elevators. For training purposes we suggest that the rudder be set up a little milder, about 3/4" left and right. This will still give good control but without getting too jumpy.

It's always nice to say that the first flight went smoothly, unfortunately honesty prevails. Besides there were too many witnesses. We did all the correct things, range check okay, and had someone else double check the control directions. Only one small problem, as the throttle went forward the mind disengaged and we went back to steering on the ground with the left thumb; works fine with four channels but not at all well on three. Nothing except ego was damaged in the wild zig-zag and aborted take-off. After an engine restart and a mental reminder, we tried again. With neutral trim the tail was up in a couple of feet and just a touch of rudder is needed to keep the Super Champ straight. Climb-out is very quick, even with a mild engine, and we found that about 1/2 throttle made for very nice flying.

The Super Champ is not particularly aerobatic nor is it intended to be; it will do the basic three channel maneuvers but we like the slow fly-bys and touch and goes the best. There is plenty of prop clearance and the gear is far enough forward that it has very little tendancy to nose-over even on our rough grass field.

Conclusion:

The Gemini Super Champ is a nice looking bird and although it isn't quite scale it is close enough to be recognized. If closer scale fidelity is desired, wing struts could be added, however, for most of us they would just be an extra piece to get in the way of flying fun. The wing mount system is really slick — it is the quickest method we've seen and has worked out very well.

Once we got our thumbs convinced about who does the driving, the Super Champ proved to be a stable airplane and, like the original, it's fun to fly. We're not too sure about the Super Champ being the world's greatest trainer, as stated in some of the ads, but it would certainly do a creditable job as a trainer and it still looks like an airplane.□

SHOW TEAM SPECIAL

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cloth into the epoxy. When the cowl is completely covered with cloth, apply another coat of epoxy. Repeat the cloth application, trying to run the cloth strips at right angles to the first layer. Now one more time, with 3/4 oz. cloth, for a total of three layers. By this time it will be messy and lumpy, but you'll have a nice light tough cowling. Coat the whole mess with one more coat of epoxy, using the 5-minute kind this time. When set-up, start sanding to get rid of the lumps and bumps — work it down

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reasonably smooth with 80 grit paper. Now another coat of 5-minute epoxy, and let it set up overnight. After it is cured out, break the foam loose from the fuselage and trim the overlap smooth — leaving about 3/8" overlap onto the fuselage. Mark a line around the fuselage to indicate the overlap.

Melt the foam out of the cowling with thinner or solvent, or break and scrape it out. Trial fit it to the fuselage just to make sure all is well, lining it up with the line previously drawn. Drill four holes for the mounting screws; then remove the cowl, install the engine mount and engine, and make the required cut-out for the engine, needle valve, muffler, etc. Complete the sanding to smooth down the outer surface of the cowling.

Epoxy the wing-locating dowel in the leading edge of the wing. Line up the wing and epoxy the plywood reinforcing plates at the rear center bottom of the wing. Install the wing hold-down blocks, position the wing and drill for the wing hold-down bolts. Drill and tap the hold-down blocks as shown.

Empennage:

The hinged sides of the tail surfaces are stiffened with 3/16" dowels. These provide strength as well as a tear-out-proof edge for the figure-eight thread hinges. Wrap a piece of 320 sandpaper around a 1/8" dowel and sand a groove in the foam between the paper sides of the foamboard to receive the 3/16" dowels. Cut the straightest dowels you can find to the proper length and epoxy them in the grooved foamboard.

Do not neglect to install the piano wire stiffener between the elevator halves. The dowel goes straight through, of course, but the wire stiffener gives the elevators a little more authority. Epoxy the wire to the dowel and to both elevator halves where shown.

Hinges:

All control surfaces are hinged with 8 lb. limp nylon fishing line, laced in a figure-eight pattern. Drill sets of six 1/32" holes, 1/8" apart and 3/16" in from the edge, in each surface where hinge locations are indicated on the plan. Double sew the fishing line through — up through the hole, down through the gap, up through the opposite hole, down through the gap, and so on. Wedge the lines in the end holes with a toothpick dipped in epoxy, then cut the toothpick off flush with the surface.

Modifications:

Get out your three-views, and use your imagination. Shapes of the empennage, wingtips, cockpit canopy and cowling can be altered to resemble a number of prototypes. Distinctive silhouette features, like the P-51 belly scoop, need not be full scale, just provide sufficient indication to convey the general impression.

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Epoxy-coated foam blocks will do the job.

The location of the thrust line may be varied within reason to alter the cowling configuration; as can the vertical location of the horizontal tail.

Try to keep the **areas** of the tail surfaces about the same as shown — the outlines can vary considerably. Do not alter the tail moment arm appreciably, as the long moment contributes to the smooth flying of the airframe. If you must shorten the tail moment, you must also increase the empennage area.

Painting:

Spray or brush on a coat or two of primer; sand with 200 grit paper, taking care not to scuff up the cardboard wing covering or the paper surface of the foamboard. Paint the cockpit interior matt black or matt dark green, install your pilot, install the canopy.

Find a color scheme to fit your plane — a matt camouflage paint job requires less paint and hides the rough spots better. For the Show Team planes, we don't try for a super finish — if it looks okay from 20', it's good enough for us. Do it your own way, but keep in mind that these are not even Stand-Off Scale, so don't waste time putting a contest finish on a sport airplane.

Flying:

Balance where shown on the plans. The landing gear stance is wide enough to cut down on the ground looping tendency of tail draggers, so just feed in a little right rudder, let the tail come up, and don't lift it off too soon. Get a little altitude and try gentle turns until you get the feel of the plane. When you have it trimmed out to fly straight and level, pull the nose up a little and see how it rolls. When you figure out what you need to do with the roll rate, try a loop to see if you have a heavy wing. Grab a little more altitude and see if it stalls straight ahead or snaps — if it snaps, you'll probably need a little nose weight.

Bring it around in the traffic pattern and try a landing — at about 40' above the ground. If all is well, bring it on in the next go-around. Change your pushrod lengths as necessary to bring your trim levers back to neutral.

Ours fly well — quite fast and very responsive. We can put on one heck of a dogfight — without worrying about wiping out six months of work by cutting it a little too close. And the audience really enjoys seeing Mustangs mixing it up with Messerschmitts — rather than red Ugly Stiks chasing yellow Ugly Sticks. □

MODELERS PREDICTION TOOL

from page 39

airfoil.

(11) Covering or finishing material, and

much more.

Please note that I purposely did not mention size of engine because the important fact to consider is: how many rpm's you are getting with what propeller. From the above factors and any other you may think of, I selected the first six items as the most important ones and also as the ones you can easily measure, so I combined them in the following formula:

$$P.F. = \frac{Z \cdot P}{A \cdot W} \frac{\left(\frac{R.P.M.}{1000}\right)^2}{\sqrt{\frac{Wl}{Lf}}}$$

where:

Z = Propeller size factor. Use Table 1.

P = Pitch of propeller.

RPM = Actual meaure of rpm's of your engine (catalogs may say something different, please measure rpm's of your engine with your propeller at your altitude with your fuel).

A = Altitude factor. Use Table 2.

W = Weight of your aircraft with fuel in ounces.

Wl = Wing loading effective in ounces per square foot. Please deduct fuselage and tip areas of wing when calculating.

Lf = Lift factor. Use Table 3.

Note: If more than one engine is used, multiply by the number of engines if they are equal or, if not equal, calculate P.F. for each engine and use the sum of them.

This formula is not very complicated and with any of the new pocket calculators with square root function, you can calculate you P.F. in a couple of minutes, and may help to save your plane.

I have tested this formula in about 200 airplane designs and product reviews published in the last four years in R/C Modeler Magazine. I have also tried it on about 100 airplanes belonging to friends in the field who were patient enough to let me question them and measure, weigh, and observe their airplanes. In all cases the formula has worked to predict power capabilities to initiate and sustain flight. I even tried it on a few full scale planes on which I managed to get information and it worked. So, the formula can be used with confidence for airplanes with engines from 0.020 to Quadra or similar.

The parameters to be used are:

(a) Please do not try to fly with a P.F. of less than 35.

(b) The most adequate P.F.'s will be from 50 to 100 with the highest factor giving the best performance.

(c) Anything above 90 will result in unnecessary overpower.

(d) If you fly with factors from 35 to 45, be sure to have a long smooth runway or have the plane hand launched if it is small. Make smooth climbs and shallow turns at low altitude.

It is important to note that this P.F. does not represent a relation to speed but, rather, is a factor of the ability to gather safe flying

speed with your engine. For example, a 0.61 pattern airplane with a P.F. of 80 will do beautiful maneuvers and may seem overpowered, because of the high speed developed, while a glider with a 0.049 engine, which has the same P.F. of 80, will appear to fly slowly and still moving its wings as if it had a problem flying but, in fact, both airplanes will be flying at very safe speeds. If flying at 300 ft. you reduce the throttle to half, you will notice that the pattern airplane will start to glide at moderate speed and you should prepare your approach to land, or apply full throttle. On the other hand, the glider at half throttle will continue to glide for as much as five minutes before landing, provided that there is no thermal activity. By the way, if you have a pattern craft with a P.F. of 80, it will perform pretty good and seem to be a very fast and secure flying machine, but if you reduce the throttle to half, let us say from 14,000 to 7,000 rpm's, the P.F. will be reduced to 20 and that is not enough to maintain flying speed in a horizontal position. In this case, you should dive a little or feed full throttle to gain speed. Trying to keep it in a horizontal attitude at low rpm will result in a snap roll and a possible crash if you are not prepared.

Low altitude snap rolls and crashes after take-off are very common accidents at flying fields. Many times this is due to insufficient power to provide safe flying speed in the few seconds you have to take-off and gain safe altitude. The airplane may have sufficient power to take-off but increasing the angle of climb, banking the plane or getting gusts, all require higher speed. Add to this the fact that many times the three factors are present together and you will find that your engine may not provide the necessary power to maintain the necessary higher flying speed resulting in the airplane dropping a wing fast. When this happens near the ground is almost always disastrous. Apparent speed is not enough, it has to be related to other variables so an apparently fast pattern airplane may still snap roll and an apparently lazy low weight parasol may fly slowly but safely. A safe P.F., as given here, is essential for any model regardless of the type of plane.

Speaking of safe flying speed, you can also have a good estimate of the minimum airspeed at which your airplane will fly using the formula given below. Any attempt to fly slower should result in a stall. Of course, it is difficult to measure or even estimate the real airspeed at which your model is flying, but you can still use the formula to compare different models and gain further knowledge about what you can expect from them.

Again, this is more an empirical formula and this time it has only been checked from about 50 light, full size airplanes, on which I obtained information. Correlating it to small model airplanes will be useful to you as it has been to me, for the purpose of comparing different planes and provides another tool to predict performance.

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MODELERS PREDICTION TOOL.

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$$\text{stall velocity (miles/hour)} = 4.0\sqrt{\frac{WI}{Lf}}$$

The above formula is for sea level. Correct it by increasing 2.2% for each 1000 ft. of altitude above sea level. *(Ed. Note: The author resides in Mexico City, Mexico, and his flying field is at an altitude of 6000 feet above sea level.)*

I am happy to be able to share my experiences with my hobby colleagues and I hope it will be as valuable to the readers as it has been to me. □

CUNNINGHAM ON R/C

from page 38/37

the current column on 'scratch building.'

When you make your copy machine reproductions, try laying them face down on the sheet wood and iron with a hot MonoKote iron. The image will transfer to the wood perfectly.

Different machines give different results, but I know Xerox will make two good transfers from each copy, so you can get a set of left-right ribs for a tapered wing from one copy. Of course the printing is reversed, but that doesn't matter.

Good flying,
Bob Evens

Thanks for this tip, Bob. Anyone else with some good scratch building techniques, please feel free to write to me, and I'll include them in future columns.

Here's a pretty good tip for all of you beginners who are taking your aircraft out to the flying field to be test flown by others, and who need a bit of help in flying, be it total help, or just to get over the rough spots. Along with your aircraft also take a box of extra goodies that you may need to make changes or field repairs. Most experienced fliers have a tool box containing the things that they need to make minor repairs, and to keep everything flying, but they may not have the equipment available that you need.

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CUNNINGHAM ON R/C

from page 170/37

You don't need an exotic flight box to begin, you can use a shoe box or a cigar box, or just about anything, but you do need to bring along things to make your chore easier. For example, you need your own fuel, extra props, pins, 5-minute epoxy, servo arms and screws for your radio, extra Kwik Links, extra wheel collars, etc. Often you can come across a small plastic box to hold all of these small pieces. You're going to need field repairs, and you're going to need to make changes in your first model, more often than you realize. Most old time modelers are quite used to the beginner showing up at the field with an aircraft, a radio, and the desire to learn to fly, but very little else. Come prepared, the other guys will thank you for it. If you have a friend in the hobby, he will help you over the rough spots, but if you are alone, it's pretty tough for a brief acquaintance to provide you with all kinds of help and supplies. Most modelers who I know are more than helpful to just about anyone and everyone who shows up at the field and wants to get started, and most of us know full well that of every ten beginners that we help, only about two or three will stick to it long enough to become skillful enough to help someone else down the line. It's a tough hobby/sport to get started in, and it's a tough one to stick to, but if you do, the rewards are really outstanding in the way of enjoyment, self expression and self confidence, and, after all, that's what any endeavor is all about.

Yesterday, on a very windy Saturday, I was helping two friends in their quest for mastery of the sky. One has been at it for some time, and is doing very well, while for the other, this was his first day out with his newly constructed Lucky Lady. (We were using Futaba radios with a buddy box cord, connecting them.) The first flight was made with my fingers placed on top of his thumbs and not using the buddy box system. After the first flight, we went to the buddy box system and each time that he would get into trouble, all it took was letting off of the master button on my transmitter and flying the model out of its problem. I know that buddy box systems have been around for some time, but this was the first chance that I had to teach someone with this system. Can hardly wait to get to take-off and landing this way. In the last flight of the day Tom got the Lucky Lady into trouble, I let go of the master button and took over, and suddenly realized that I couldn't get her out of trouble either. It had all of the earmarks of radio interference, but no one else was at the field with the same frequency; in fact, there was only one other aircraft in the air. I couldn't get much operation out of the

ailerons, so I started using rudder and ailerons together, with the throttle at low. The aircraft was way down field near some trees, so with some careful jockeying the throttle and elevator and some help from rudder/aileron we were able to soft land the aircraft about four hundred yards away. I really couldn't figure out what the heck had happened until we walked up to the airplane. The engine was still ticking away at idle, the aircraft was sitting on the grass with the nose pointed into the wind, and the rudder was hanging off of the vertical stab. Both hinges had pulled loose from the vertical stab, and the rudder was really only held in place with the pushrod and tail wheel bracket. All of this made it almost impossible to control the aircraft in yaw or roll axis. Why did the rudder pull out? The hinges had been pinned with toothpicks --- hadn't they? We had finished the aircraft in my garage one Sunday morning, and drilled and pinned all of the hinges, except that we only drilled the holes for the toothpicks in the rudder hinges, but neither of us had installed the toothpicks! So the moral of this tale is to take the time to thoroughly inspect a new aircraft. Remember Murphy's Law, "Anything that can screw up will screw up." We were lucky this time and everything came back to the ground in one piece. For you beginners, make sure that you've checked over everything, and for you instructors, make sure that everything is correct, nothing will discourage a beginner faster than taking home that first airplane in a basket. □

PROPMOBILE

from page 35/32

smooth with fine sandpaper. Also cover the bottom of the body with 1/16" sheet balsa. Medium to hard grade is best, applied with the grain running across the body. Either put a hatch for battery access or mount a charging jack on the bottom of the body.

I used cloth airplane covering to finish the body, and applied seven coats of Sig Super-Coat dope over the cloth, sanding lightly between each coat.

Next, I painted the canopy and put on the strips and numbers with black paint.

Over the entire body, two coats of Sig clear dope were applied to give the body a shiny surface.

The skis were painted with 10 coats of dope thinned 50-50, with thinner. Again, sand very lightly between each coat with sandpaper. After they are dry, wax the skis with paste wax. This makes the skis slide easier, and the snow won't stick to them.

Running:

Test runs turned out very satisfactorily. At first, I thought the model would have a tendency to tip on a tight turn. To my

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PROPMOBILE

from page 173/32

surprise, it handled very well and was quite stable. I did have trouble with tipping and over-turning when I tried to take the model over a jump from a ramp.

Weight, balance, and speed of the model, determine its stability in this sort of situation.

You will have to have to experiment and put your model through trial runs to see what it will do.

For me, this was a very interesting project. I hope you have as much enjoyment from this model as I have. □

FLYING LOWE

from page 31/30

1/2 roll, hesitate and push inverted (hopefully before you contact terra firma). Fly inverted, push vertical, pause, half roll, pause and push to horizontal at the same altitude and heading as entry. Some hints: you will need lots of down elevator to get a square corner on the bottom from a vertical descent; don't panic and over push on the bottom, but make it very flat. It's best to keep the bottom a bit high to avoid a panic push and climb on the bottom. The second vertical will really test your flight attitude and trim; you must be absolutely level when you push or you won't climb straight and your ship must roll very axially to maintain a straight line. Don't undershoot your starting altitude by shortening the second vertical leg; this is common. Personally, I find this a more difficult maneuver than the normal Top Hat — maybe it's because I don't like vertical dives from high altitude — a reverse pitch prop may help!

Variable Pitch Props:

I was yakking with Steve Helms recently, while in Florida, regarding his experience with the vari-prop (variable pitch). He says he likes it because it helps on the downlines to slow up the airplane. He went through quite a development program. He threw blades early and cured this problem by keeping static rpm below 14,000 and through the use of new blades with fiberglass reinforcement. He drives the pitch change with **two** servos hooked together to get the necessary thrust required at high rpm's where the load gets very high. He also uses a very strong and tight linkage and sets it up for maximum mechanical advantage at high speed; i.e., the servo arm and pushrod are aligned in this position. On the control side, he has three selectable positions which he selects with one of the three position auxiliary control switches on his JR transmitter. It's set up basically so he normally flies at one pitch setting and then he can momentarily select another switch selected positioned by pushing a button. This allows short term change to flat pitch; for example, on downlines — also to reverse pitch following landings! Steve is convinced that it helps his flying. Obviously it's not for everyone, but for the hot pattern flier or the guy who wants to play with his sport what-cha-ma-call-it. One of these days I'll find time to try it myself. Right now it's too close to team selection to tinker — I must get out and practice, so I will close this for now. □

BIG IS BEAUTIFUL

from page 22

to be a WW I addict and have been debating about gettting into Quarter Scale, don't miss this one; it's the best done plan I have seen for anything in this size out of that era. For those of you who do not recognize the name, how about Berkeley Kits --- remember them? Well, Bill Effinger was Berkeley Kits and there must be thousands of us around who built his kits right up to the **big** war.

The SE-5a was researched from the Wylam drawings, cross-checked against RAF Factory drawings and Bill himself referred to the actual aircraft in the Royal

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Air Museum at Hendon, England. Better authenticity than that would be hard to come by!

The drawings are excellent, pattern sheets are included as are stencil patterns for making the markings for Mick Mannock's SE-5a which was his mount while scoring 73 aerial victories.

The prototype has been flown with the Mag-Aero K21 engine at a weight of approximately 12 pounds. A larger engine would fit (up to 2.4 c.i.) and an extra heavy rendering of the model would still fly well on a Quadra.

The features of this plan and the service Bill offers are much too complete for me to detail them here --- so, send Bill a buck for complete details (tell him Dick sent you)! and he'll put you on the list for a four page brochure of good news. Oh, yeah --- you can deduct the buck from your first order. Bill has other good things in the works, but I'm not going to spoil the fun by telling you everything all at once! Send to W.E. Technical Services, Inc., P.O. Box 76884-R, Atlanta, Georgia 30328.

Another new plan recently out is Bob Smolinski's Curtiss Helldiver (SB2C) for those who are interested in a model out of the Second World War. The span on this one is 8' so it is a good sized bird. While the plan is not as professionally done as some I have seen, it is adequate to build the model as you can see by the accompanying picture of Bob's version of the Helldiver. The finished model weighed in at 22½ pounds and that's about the area the Quadra performs best in. It flies well, according to Bob, but it does need the flaps to get some of the speed off it for landing. It is a hot flier; Bob says the first flight used up about 2½ years of his life in a few minutes so it was a little hairy, to say the least.

Bob has the plans available for $20.00 at 886 North Esplanade, Mount Clemens, Michigan 48043, if you are interested in a Helldiver.

Bob is also planning to model a Trell T-106 which was a new one on me. It's a pusher, high winged mono, with trike gear and a constant chord wing. The original was built back in 1937 and by its looks, it was advanced for its day. The cabin area is somewhat egg-shaped and the cabin area is almost entirely ahead of the wing. The tail assembly is mounted on a couple of booms mounted on the wing outboard of the cabin. It's a smart looking machine and Bob is going to keep us in touch with the project as it progresses. If any of you have back copies of Sport Aviation, there was a photo of the airplane on the cover of the January 1961 issue.

New from Mag-Aero (P.O. Box 490, Freeland, Washington 98249) is their K-31 1.9 c.i. engine. This is a transistorized,

— FLASH —

RESULTS OF THE 3RD R/C SOARING WORLD CHAMPIONSHIPS

Individual Standings

1st D. Holley, United States
2nd S. Bannister, Great Britain
3rd G. Schaffer, F.R. Germany

Team Standings

1st F.R. Germany
2nd United States
3rd South Africa

Complete coverage will be in the November issue of RCM.

pointless engine which weighs 4½ pounds. The coil does not show in the picture as it is separate and mounts on the firewall. Judging from the picture (as I have not yet seen one up close) it is a husky little rascal and the weight is sure in the right place. These engines are actually from Kioritz and from what I have seen of them, they are well-made and the use we put them to should result in many years of trouble-free service, especially if we avoid abusing them. For futher details, drop Mike Galion a line at the above address.

Did you ever notice how fast the flying season passes and how slowly the winters go by, those of you who, like me, have a winter? It seems we just nicely get a start made on a flying season and it's gone. You'll be reading this about the middle of August and will have gotten a good start made on the season and here it is already time to start thinking about going to Las Vegas for the QSAA Rally in October.

Dates for this year are October 8 through 11 and the headquarters will be the Showboat hotel again, same as last year. However, the flying will not be out on the dry lake bed as has been the case over the past four years. I for one, am delighted that we are not going to have to face the dry lake bed again this year.

The flying site this year will be the Silver Bowl Stadium which is only seven miles from the Showboat and which will eliminate the dust problem. The flying strip is a 75' x 1375' paved area and that should be adequate for anything flyable you can carry to Las Vegas. The area over which pilots will be flying is 500' by one half mile and, while not as large as the dry lake bed, it's not going to be dusty, and that should make up for the somewhat smaller size. In the past most of the flying has taken place in an area not much larger than that provided at the Silver Bowl Stadium anyway.

Camping will be permitted in RV's, but since there are no plug-ins or such amenities available, no services will be provided. Judging from the information I have available at this time, the stadium area will provide for rest rooms and food services and those facilities will again be an improvement over the dry lake bed. The QSAA have done the best they could under the circumstances in the past and have conducted some tremendous fly-ins.

If you are planning to attend as a pilot, you can get a registration form from Pat Bunker, Secretary of QSAA (6532 Bourbon Way, Las Vegas, Nevada 89107). All must be pre-registered by September 10, 1981, and the cost is $30.00 which covers as many planes as you can move to Las Vegas. Room reservations can be made on the same form for one of the 250 rooms to be made available at the Showboat. Rates are $30.00 per night and a one night advance deposit is required with the reservation. Additional banquet tickets can be ordered as well, so, if you're going to be there, get your name in the pot soon.

If you are going to attend as a non-flying observer, make a room reservation by

sending $30.00 to: Rex Perkins (900 Crazyhorse Way, Las Vegas, Nevada 89110), and enclose a self-addressed, stamped envelope if you want a confirmation. Banquet tickets will be available from Pat Bunker at $16.00 each person. Get your orders in early if you wish to attend the banquet as it was sold out last year. It's a sit-down beef dinner which will be followed by a program and preceded by a **free** one hour cocktail party with the banquet ticket. Pilots registered will have one banquet ticket included in the registration.

It's still the world's largest conglomeration of **big** models in one place at one time and a chance to see what all the other guys (and gals) are doing. Many countries will be represented and I, for one, want to see what the German group is going to spring on us this year. They have successively, created a horrendous crash of their first B-17 in 1979, successfully flew B-17 Number 2 in 1980 and I will be surprised if they do not have another eye-opener this October. I am going to have to be there just to see what it is! Hope to see many of my friends and readers there as well.

I expect to have more details next month as the International Miniature Aircraft Association (IMAA) will be having its First Annual Fly-In at Tom Sawyer State Park in Louisville, Kentucky, September 25, 26, 27. To date, that's about all I know except that Don Godfrey and the Louisville group have planned a super show for those who can make it there. It's a bit distant for me, especially as I must also earn a living, much as I'd like to be there, but I'll have more information next month on what is being planned for the September dates.

Alan Walker, the chap in England with the Zlin plan which was mentioned at the beginning of this column, had a few comments on other things as well. He mentioned that the cost of our hobby in England is very high, even higher than it is for those of us who live in Canada, and I'm, sure everyone in the U.S. has noticed that prices continue to rise.

In those areas of the world where prices are exceedingly high, it is important to get good value for money spent and Alan found recently that he had not done so. In buying some new servos, Alan had found they were not adequate to the task required and, in fact, delivered less than half of their advertised output. He then ordered some more servos of a different make, and, after determining they would function with his radio, decided to test them for output. In talking with the dealer, he had been told the servos would deliver 9 pounds at the end of the arm. On testing them, it was found the actual force delivered was 3½ pounds!

Alan did not specify how they were tested, but a simple scale rig should give us some kind of an idea what to expect from our servos and it would not be a bad idea to have such a set-up to check that we are getting what we expect from them.

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The use of a spring scale such as that used for weighing fish, while not really accurate enough for scientific purposes, would at least give us a means of comparing servos and also give some idea of their capabilities. Be careful you don't get one of those funny scales designed to impress other fishermen!

As Alan suggests, testing servos before mounting them in our **big** new bird would be a good idea and one which might well save us from a disaster.

It should not be that difficult to rig up a scale which would make a servo work hard enough to determine that it was really adequate for the larger models we are flying. Don't forget we are moving much larger than 'normal' control surfaces requiring a lot more force to get them, and hold them, in the correct position.

I've had pretty good success with using standard servos in my large models, but I make a couple of provisions to assure that I'll have good control. I use stiff or woven wire lines from both sides of the servo arm to double control horns on both sides of the surface to be moved in order to assure positive movement and practically no lost motion in the hook-up. It's all well and good to be able to move a control to the required place, but if it won't stay there, then we've wasted the time and effort required to move it in the first place. Where it is not possible to use the push/pull control wire set-up, I make sure that I do have positive control, and that any movement imparted to the surface stays that way and I do all I can to eliminate any 'slop' in the controls.

On ailerons, it's a good idea to use a separate servo for each aileron as they are usually very large in our models and can easily be blown down if our servos are not adequate to do the job. Using a servo for each aileron gives a little more assurance that they'll stay where we put them until we're ready to let them come back to neutral.

A sad note recently, MAAC, the Canadian equivalent to the AMA in the U.S., lost a good friend and a President. Warren Hitchcox, long time President of MAAC, died suddenly of a heart attack while attending the Annual Meeting in Ontario. Warren was a dedicated (and very good) pattern flier and was a source of inspiration to many of the younger fliers aspiring to the ranks of championship pattern. Warren was still a young man at heart and in fact, being in his mid-fifties. His long involvement in the affairs of MAAC will be missed and many of us offer our sympathy to his good lady who attended many of the events with Warren. Gordon van Tighem of Calgary, Alberta, will be carrying on in Warren's place and we all wish him well.

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BIG IS BEAUTIFUL

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I doubt that any of us are ready to go when our time comes, but to face that call, when it comes, doing something we have enjoyed with people we like, must have some value.

Most of us who write regular columns for RCM live far from the RCM offices in Sierra Madre, California. While mail will reach us at that address, mine will be changed by the time you read this so I'll repeat it here for the convenience of those who have been writing me at the old address and for those who don't want to have their letter entrusted to the care of the postal service twice! Dick Phillips, 9 Geneva Crescent, St. Alberta, Alberta, Canada T8N 0X3. Phone (403) 459-3727.

See you again next month; hopefully, I'll be a little better organized by then! □

SUNDAY FLIER

from page 13/12

alert the crowd to a potential mishap should one of the fliers run into trouble. If your club does not have one, then make it incumbent on the promoters of the show to provide one.

That brings us to the next point of importance in putting on an air show --- communication. Every club has at least one member who can handle a microphone, and most of those who can talk to a public gathering are also well-versed in the various phases of radio control flying. Appoint a qualified member of the club to take the responsibility for two important parts of the airshow. One is to inform the public about the fliers, the planes, and the maneuvers. The other is to keep on top of the program and see to it that there are no delays.

Now that you've taken the necessary measures to assure the maximum amount of safety for the crowd, and arranged for a

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means of informing them about what's going on, it's time to decide what you are actually going to do in the way of a show. As I said, just flying around isn't enough. Have a plan.

Establish a show theme which is appropriate for the audience. True, most people are intrigued by the fact that the remote control works as well as it does, but you can really get them to identify with it if you show some specific aspect of flight. For example, if you have an audience mainly of grammar school and junior high students, you have to grab their attention right away. Start with a gentle trainer plane, and have a club member select one of the students, maybe two, for a "flying lesson." After that (make sure the announcer calls out the name of the student, so all his friends know) you can go on to more sophisticated flying. Perhaps a race (not a real one, but staged) during which the kids can cheer one or the other.

That's just one idea. There are so many more. But plan ahead.

Military installations frequently like to have radio control demonstrations. Sometimes the show is part of a full scale air show and open house. Yes, the AMA show teams do have great shows for that purpose, but you can do a good job. For example, here on the west coast, at Moffett Field Naval Air Station, the Pioneer's R/C Club of Santa Clara has put on several shows during the past few years. In 1980, the show had a theme of, "The full scale show in miniature." In the full scale show, parachutists descended. We had a model drop a parachutist. There was a full scale glider demonstration. We had a couple of 10' gliders duplicate the maneuvers. Military aircraft performed. So did our miniature P-51s and T-28s. The Christen Eagles put on a fantastic show, but their formations were loose compared to the tight diamond formation of the "Blue Birds." The crowd loved it.

This year the Pioneers had an entirely different theme, one which almost any good sized club could duplicate. It was called "Cavalcade of Flight." Here are the events.

CAVALCADE OF FLIGHT EVENTS

I. The Early Years. Pre-World War I flying machines.

Bob Fish and his "Antic" (Possibly accompanied by Gary Korpi flying Bob's second "Antic'.)

Theme Music: "Magnificent Men"

II. World War I aircraft.

Mike Jones and his Eindecker, Don Loughridge and his SE-5, Gerry Wolfram and his Sopwith "Pup" (and whatever other WW I aircraft are available and not on conflicting

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frequencies. Jim Caughran and his Pup).

Theme Music: "Marseillaise"

III. "The Golden Age" of aviation.

Duke Crow and his Fleet Biplane, Mike Valco and his Rearwin Speedster, Gene Martin and his Curtiss F6C-1 fighter (flown by Dennis Griggs).

Theme Music: "Over the Rainbow"

IV. World War II aircraft.

Gary Korpi and his Bearcat, Rick Meyers and his Hellcat, Bob Fish and his FW-190, Curt Christen and his FW-190, Jerry Davis and his Kawasaki "Tony" or possibly his P47D "Jug" and maybe more, if frequency conflicts can be avoided. Gary Dahl — FW 190.

Theme Music: "Anchors Away" & "Off We Go."

V. Post World War II sport aviation.

Jim Kelly will direct a Quickie 500 race of five or six laps with four fliers (think he's collared Paul Benezra, Dan Bignardi, Jerry Manser, and a couple of back-up pilots in case someone's engine doesn't start).

Theme Music: "Racing With The Moon."

VI. Special Flight Demonstration

Terry Fish and his 1/5 Scale Model of Bob Hoover's P-51 Mustang. Or Ron Thompson and Lear Jet.

VII. Aircraft of the Twenty First Century.

Dave Bridges and his "Star Cobra," (flown by Gary Korpi). Dave Bridges and his M-1 Flying Wing (flown by Dave.) This is a "Ringer" --- actually designed in 1940, but it looks futuristic.

Don Coulter and his "Trident" Fighter, flown by Dan Bignardi. Looks just like one of Darth Vader's Fighters in "Star Wars." Jerry Davis and "Scimitar."

Theme Music: "Star Wars"

Each of the above segments is assigned five minutes. That means **be ready to fly when your time comes.** Kelly Ogle will be the flight line "whip." Jim Wade will direct the static display. Static display will be from 10:00 a.m. to noon, both days.

Note that we included some theme music with most of the events. If your public address system can handle the switching from voice to cassette, the addition of music at times during the program adds another dimension to the pleasure of watching the show. Fit it in with your commentary, like this:

"Now we come to the years of World War I, when airplane design took giant strides as the Allies did aerial combat with the Huns over the battlefields of France." (As the airplanes are starting up, play a few bars from the French National Anthem. Fade to your commentary when planes are airborne.)

In addition to the flight demonstration, many other club members participated by having their models on static display.

So put on a show!

You **can** do it. □

ENGINE CLINIC

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which converts to 77°F and would not give an indication of the viscosity at the higher temperature where oils thin considerably. At any rate, comparing two well-known synthetic oils you can see that the heavier viscosity ASTO 750 is still only about 1/3 the viscosity of the Castrol Super M or UCON MA-731. I also could not find a viscosity index for Castrol's MSSR you have been using but imagine it is in the same range as the Super M. Quite frankly, I would stick with the Castrol MSSR if that is all that is available to you. I do not know how the MSSR compares to the Super M. I believe the MSSR is a synthetic for automotive/motorcycle, etc., use and imagine the viscosity would be lower than for the Super M. I have a listing of all the Castrol oils but it does not include the MSSR. Possibly this is a discontinued oil or has been replaced by the Super M. Castrol oils are not as popular in the U.S. as in foreign countries and only the petroleum base oils are readily available.

As long as you are only using 5% nitro, the 20% oil content would be fine for both break-in and running the engine after it is broken-in. Just be sure and run it rich during the break-in. Extra oil just adds to the carbon and varnish build-up — especially during the rich running break-in period.

Dear Mr. Lee:

I have been getting a lot of rust on the rear bearing of my O.S. Max .61FSR ABC. I run out fuel and add engine run out oil after flying.

I changed the bearing, and now I remove the front assembly after every flying session. I clean it with WD 40 and dry it out well then add oil. This is a lot of extra work but no rust has appeared. My question: Is there anything I could add to the fuel to stop this rust?

I have been using Sheldon's 10% nitro synthetic oil fuel.

Thanks for your help,
Stan Philip
San Carlos, California

Unfortunately, the use of synthetic oils, nitro methane, and mufflers/tuned pipes create rust in our model engines. Taking the motor apart and thoroughly cleaning out the remaining fuel residue is one way to avoid the problem, but is something few modelers would want to contend with. Sooner or later you will probably end up with a stripped front plate screw from the continual removal and replacing. Frankly, there isn't much that can be done other than run the engine out dry by pulling the fuel line and then

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loading the engine with a good penetrating oil. By loading I mean make sure plenty of oil reaches the lower end. A drop or two down the intake and in the exhaust is not enough. In fact, most fellows using tuned pipes do not even add any to the exhaust. In this case the glow plug should to removed and a healthy shot applied here.

I have mentioned running the engine out dry by pulling the fuel line, many times in the past. 99% of the time this is done with the engine idling. Actually this should be done with the engine at full rpm. Pulling the fuel line at idle still leaves a lot of fuel residue in the engine; also more moisture than if the engine is run out dry at full speed. This in itself will help with the rust problem.

I do not know if Ron Sheldon is using straight synthetic or adding some castor to his fuel. A little castor (2%-3%) added to synthetic oils will help the rust problem. Be sure the fuel does not already have castor added, however. Many fuel manufacturers already use a combination of synthetic and castor — Sig for example.

Dear Mr. Lee,

I am writing to you regarding the use of standard mufflers supplied by the engine manufacturers for their respective engine models. I have a "Super Tigre Blue Head 0.60" disp., with a Super Tigre muffler. The members of my club say that the engine is too noisy with this muffler and that I should install another muffler.

My question to you is what make of muffler will quiet my engine down but will still give me good performance?

Also, do you have any figures on other engines which would indicate why my engine, with muffler, is still very noisy compared to other club member's engines of this displacement?

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ENGINE CLINIC

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Will I have to go to a closed-end muffler instead of using the flow-through Super Tigre?

Sincerely,
Yves Lemire
Longueuil, Quebec Canada

Generally speaking, the flow-through type mufflers are noisier than the closed chamber type. If you are using a flow-through type then going to a closed type would lower the noise level quite a bit --- particularly in the pit area where I imagine you are receiving the most complaints. In the air, some of the flow-through type mufflers can be just as quiet as a closed chamber muffler. It depends on the particular engine and size of the tail pipe on the muffler. The larger the tail pipe, the louder the muffler. Of course, the larger tail pipes cause less power reduction so a compromise has to be reached.

The exhaust timing and port size also plays a large part in the noise level of an engine as does compression ratio. An engine with high compression ratio will have a crack to the exhaust that a lower compression engine of the same make will not have. Large exhaust ports or ports that have early opening will also be noisier than smaller later opening ports. The power of the engine also plays a part. The more power, the louder the noise. You did not say what you are using for a propeller. An 11/7 turning at high rpm will be considerably noisier than an 11/8 turning slower, so many factors are involved.

A full length tuned pipe with the muffler shell or one of the new Magic Mufflers will be an easy way to stop any noise complaints you are receiving. You will have the benefit of low noise level and a power gain besides. □

FROM THE SHOP

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. . . ultimately lead to long conversations with the flying buddies while at work. Some even went so far as cutting out of work early in order to get in some mid-week flying. Productivity nationwide started to slip through the misguided --- but innocent --- actions of a few R/C fliers.

To compound the problem started by these few; since the early '70s not only has the number of individuals flying R/C increased tenfold, but someone decided R/C was good for miniature cars and later decided to try boats. This was really going too darn far, not only was the economy of the country sliding down hill but our frequencies were becoming congested, which caused everyone to take off work that much earlier! Final result was economic chaos for the entire country!

Solution

President Reagan must recognize the source of the problem and stop wasting all his time and effort on budgets and cost cutting; his priorities are all mixed up. We need more frequencies, flying fields in every company parking lot, shorter working hours with at least a two hour paid "flying break" every day, tax deductions — including depreciation — for our investment in the hobby and include all flying time as productive! Overnight the productivity of the United States will have a dramatic increase --- and, as economists, we all know productivity has a direct impact on inflation.

America can once again becom economically healthy, all you and I have to do is fly a lot more!

Think about it.

Steve

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Don't know where we picked up the following, but we will close this month with:

In New York there's a Broadway Nite Club run by Indians and what a gimmick they have, they charge $24.00 for a Manhatten."

If you think education is expensive, try ignorance."

See ya at the field. □