49115 OCTOBER 1983 $2.25 U.S.

RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

RCM MODELER

USPS 509190
VOLUME 20 NUMBER 10 ISSN 0033-6866 OCTOBER 1983

This Month's Cover

is a picture of tranquility of the Golden Oldie sitting idle on Jackson Lake, Grand Teton National Park, Jackson Hole, Wyoming. The Golden Oldie is featured as a full size construction article this month, beginning on page 24. The float version, as seen on the cover, will follow next month. Kodachrome transparency by Fred Reese.

R/C MODELER is published monthly by R/C Modeler Corporation, Don Dewey, President. Editorial and Advertising offices at 120 West Sierra Madre Boulevard, Sierra Madre, California 91024. Telephone: (213) 355-1476. Second Class U.S. postage paid at Sierra Madre, California and additional mailing offices. All prices appearing in this magazine are subject to change without notice. All subscriptions will be taken at the prevailing rate. Postmaster: send address changes to R/C Modeler, P.O. Box 487, Sierra Madre, CA 91024.

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FROM THE SHOP

Don Dewey

RCM Celebrates its 20th Anniversary

In October 1963 a fledgling publication called R/C Modeler Magazine made its debut. As hard as it is for most of us to believe, with this issue RCM is celebrating its twentieth anniversary.

During those 20 years, starting with a 32 page magazine that was hand set on an IBM typewriter, to a 200 plus page four color publication, we have seen tremendous advances in the state of the art of R/C. That first issue, 20 years ago this month, carried the plans for Phil Kraft's Stagger-Bi, an article on increasing the performance of escapements, and full size plans for a .010-.020 single channel rudder-only sport aircraft named the "Exodus." I often wonder how many modelers in the hobby still remember arguing over the pros and cons of the SN versus the compound escapement?

Looking back over the past 20 years we've tried to bring you the very best information from the very best writers in the hobby so that this publication could play some part in increasing your enjoyment of the sport. As we look back I take great pride in what our staff and writers have accomplished and remember the many times that we simply "blew it." But, whatever the degree of success this publication has been, it has been primairly due to you the reader and hobbyist for this always has been and always will be **your** publication.

I think that our feelings can best be summed up by reprinting the very first editorial I wrote in that premier issue 20 years ago which was entitled "At The Edge Of The Field." Our goals and objectives have not changed. We have grown older, and hopefully, somewhat wiser. But our enthusiasm and motivation is even greater today than it was then. As a rededication of our original goals and objectives for R/C Modeler Magazine, we would like to reprint that first editorial:

At The Edge Of The Field

I can remember, some twenty years back, being ten years old and scared. Standing at the edge of the flying field, I felt a mixture of excitement at seeing the many gull-winged free flight ships seeking thermals in the warm morning air, and a feeling of embarrassment at the crude results of my own first attempts at model building. I had only been there a short time when a man --- unnamed, but never forgotten --- came over to the edge of that field and helped me strap on the wing and stab. A few minutes later my first model was in the air and actually flying! That man --- who spent most of the afternoon helping a young boy solo --- created an image of a modeler that has never been forgotten or destroyed.

This same image has been everywhere apparent since the very beginning of R/C Modeler. When we began work on the magazine, we were told that we had a 92% chance of failure before we even got off the ground.

And so did that first model, twenty years back --- if it hadn't been for the help of another modeler. When you stop to think about it, if you have a 92% chance of failure, then conversely you have an 8% chance of success! We hadn't been at work too long before we found the formula to success --- when you take that 8% and then multiply it by the number of modelers that offered their help in a multitude of ways --- that came over to the edge of the field --- then we couldn't possibly fail.

So we made it to the flight line. The credit goes to each and every one of you for your ideas and suggestions in your letters; for the handshakes and the words of encouragement from those we were fortunate enough to meet personally at the Nationals. And, too, to the many members of the hobby industry for their time and efforts in helping a new venture

get started. You'll find their names in the advertisements in this issue --- men who are part of this image --- buying space in a magazine they had never seen, written by people of whom they had never heard!

It's called coming over to the edge of the field . . .

We have begun with a challenge --- to bring the finest material together between two covers of a magazine in order to provide you --- the radio control modeler --- with a panorama of the R/C world in a fashion unmatched by any other magazine or medium. It is your magazine --- it will be what you want it to become. This is our promissory note to you --- our editorial policy.

The true riches of any man's life is in the friendships he is privileged to enjoy --- the measure of his success lies in the challenge to be of service to others. In these respects, we consider ourselves among the most fortunate. □

CUNNINGHAM ON R/C

Chuck Cunningham

Why? The magic word. The word that little children ask until it drives their parents 'round the bend. Why? The word that adults tend to forget. We tend to accept things the way they are without asking the question, Why? Children are just moving into our world and, as their minds develop, they want to know why something is happening. Why something works the way that it does, or why it doesn't work the way that it should. This month seems like a good time to question the Why of a lot of things pertaining to R/C model building and flying. There are really a heck of a lot of things that have debatable answers to the question Why, and I'm going to stay away from these questions as much as possible. I'll leave this type of discussion up to Ken Willard and his forum. Let's get started with a few Why's.

The first one that I can think of this morning is, "Why fly R/C?" Go on, you answer that one. My answer is because it is really the greatest hobby sport that the average man can get involved with. This sport teaches you more about just about everything, including living, than any other that I can think of. 'Nuff of the drum beating --- let's get along with the thoughts.

In designing a model aircraft to be flown via radio control, you first must decide what the end result of the model will be. Is it a pattern bird? A Formula I racer? A sport aircraft? A trainer? A Scale entry? Just what the heck is going to be the end use of the model that you're designing, or even what is the end use of the model that you're building from a kit?

Scott Slayman's Miss Texas Ace, 90 powered combo of Miss Texas fuselage and tail with Lazy Ace wings, super flier.

Let's back up a bit and assume that the aircraft that you're either designing or building is to be used as a general sport flier. Which, after all, is the principal use of 99% of R/C models. Is the front end of the aircraft blunt or streamlined? Does the nose of the fuselage just kind of end in a flat firewall, with the engine hanging out in the breeze; or is everything kind of flared into the fuselage with cowels? Bet you a new prop that the aircraft with all the garbage hanging out in the breeze is a lot easier to land just where you want it to land, and that the aircraft can make a more slow, dragged-in type of landing than can its more streamlined cousin. Why? Because the "dirty" aircraft has more drag, thus slowing down the aircraft more quickly on landing. Ever watch a pilot land a Formula I racer? If he is new at the game you will find that he way overshoots the landing area every time. Formula I racers land dead stick, and, because of all the super streamlining and thin wings, this type of aircraft simply keeps on moving. An experienced Formula I pilot will set up his landing way out so that plenty of time is allowed for the speed of the aircraft to sluff off. Not necessary with the "dirty" type model. This same drag can be built in, even though the engine is not allowed to "hang out." Flat surfaces can be designed into the frontal section of the aircraft that work like air brakes to help in slowing down the model.

How about the leading edge of the airfoil? Why should it be blunt rather than sharp? Big problem here. Most models are designed to have a well-rounded leading edge on the wing. But, most kits and magazine plans rely on the builder to round off this leading edge. I don't know how many models that I have seen over the years, constructed by both beginner and more advanced modelers, sport wing leading edges that are almost 90 degrees. In other words, sharp. When I design a model I like to use square balsa for the wing leading edge, set so that the corner forms the actual leading edge. Then, this corner is sanded off to a nice, blunt, round leading edge. Many other designers use this same method. It is fast

building, easy to sand, and strong when completed. Yet, many times the builder just kind of hits the leading edge corner with a piece of sandpaper to very slightly blunt this corner. Sure, in most cases, the aircraft will still fly okay, but not as well as designed.

Why the blunt leading edge? To dampen out the pitching movement of the elevator action and, again, to slow the aircraft down for reasonable landing. The blunter leading edge wing will stall at a slower speed than will the sharper leading edge. When this stall does happen it is usually a much more gentle stall than the stall of a sharp leading edge aircraft. I know that I will get letters from fliers who say that they always leave the leading edge sharp and their aircraft flies just great, and I'm full of prunes. Perhaps the reason that they fly great is that these pilots are really good fliers, and know their machines very well, and so profit by the things that a sharp leading edge can provide for an aircraft --- quicker snaps, faster break into a spin, etc.

I'm not saying that a sharp leading edge doesn't have a place, it certainly does for the right pilot and the right end use of the aircraft, but, for the general sport flier and beginning flier, it's better to use a bit of sandpaper and arm muscle to blunt the leading edge of the wing.

How many of you make a cardboard template of the wing section as shown on the plan, then proceed to sand the wing to match this template. Bet only one in a hundred do this. I know that my old, portly buddy Al Alman does this 'cause Al told me that he did, and I always believe whatever Al tells me. Even if he hasn't flown since he moved to Washington from Texas cause the rain drops and fungus keep closing up the carburetor on his 19 ought 3 Enya engine. Anyhow, the next time that you're building a wing, make a template and use it to get the leading edge to the shape that the aircraft designer intended it to be. You might be surprised at how much better the next airplane will suit your flying style and ability.

Next Why? Why go down to the corner dollar store (used to be the corner dime store) and buy a simple, inexpensive plastic drafting or drawing triangle? Why take a perfectly good drawing triangle and cut a notch about 1/2" x 1/2" out of the 90 degree corner of this drawing triangle? Why? To use it when building your next model, that is why. Get a couple while you're at it — get one that is reasonably small, with about a 4" side, and a larger one with a 8" or 10" side. Use the small one in building and check alignment in the fuselage as you're building; and use the larger one to check the stab to fuselage alignment when you're sticking both the horizontal and vertical stabs to the fuselage. The half inch notch is so that you won't glue the plastic triangle to the surface that you're checking.

Another Why. Why do some radios in some airplanes last longer than do some other radios in some other airplanes? Answer: Generally, vibration. Some aircraft are designed with a lot of balsa around the nose of the aircraft. Good old "good as gold" balsa. An extra supply of balsa blocks and balsa sheets around the nose of the aircraft act as a dampener for the vibration resulting from that one cylinder banger whaming away up in front. Plastic fuselages and fiberglass fuselages transmit much more vibration throughout the entire airframe than does a balsa fuselage.

The size of the aircraft fuselage also has something to do with the longevity of a radio. A small, tight fuselage doesn't allow much in the way of foam padding to be used around a receiver, while a larger fuselage model allows much more room for adequate protection of that good old pal, the receiver.

The same is true for the servo installation. The less vibration that is passed along to the servos, the longer their life will be. Again, I've looked at the radio set-up in a beginner's aircraft and found that, sure enough, he had padded his receiver with foam. But the foam was only 1/8" thick, tightly wrapped around the receiver, held in place with newspaper rubber bands, and this was then crammed down into the aircraft and allowed to bounce around with each vibration of the engine. Build a nice nest of foam rubber, minimum of 1/2" thick, that isolates the receiver from vibration and then pad this receiver nest when

you stuff it into the aircraft with even more foam. Remember, you can't use too much foam --- but, you sure can use to little!

When hooking up servo rails to the sides of plastic fuselage aircraft, add a bit of balsa wood around the place where the rails attach to the fuselage side. Stick the balsa to the fuselage side and to the servo rails with silicone rubber. This will absorb some of the vibration transmitted by the fuselage, and keep some of the vibration away from the servos. Many great aircraft are modeled in plastic, and you can purchase many fine kits using this method of construction. Just give a little thought toward minimizing the affect of vibration on your radio.

While on the subject of vibration, Why should you take the time to balance that new prop? You got it — vibration. The vibration set up by an unbalanced prop can magnify the normal engine vibration many times, and can simply shake an aircraft to pieces. Just a little bit of time spent checking and balancing a prop can result in much longer lived radios and aircraft, to say nothing of engines.

Why should you always filter the fuel going into the fuel tank of your aircraft, and Why is it a good idea to not filter the fuel coming from the tank to the engine? Lots of modelers install a filter between the tank and the carburetor on their engine and, frankly, I really think that this is a mistake. Perhaps you do it this way and, frankly, think that a filter ahead of the carburetor is better. Give a listen. If you filter the fuel going from the fuel can into the fuel tank, then you are cleaning out any foreign substance that might have gotten into the fuel. When it goes into the tank, it is clean. If it is clean, you don't need to filter it going into the carburetor, cause it's already clean. But, if you don't filter the fuel going into the tank, but do filter it going from the tank to the engine, then any foreign substance will get trapped in the filter in the carburetor line. Okay, swell, this stuff won't clog up the carburetor. Yep, that's right, but this matter just may clog up the fuel filter causing a lean engine run --- lean engine run that just might ruin an engine. This filter also only works one way. When you fill the fuel tank, if you fill through the engine pickup line, the filter is back flushed by forcing the foreign material back into the fuel tank, waiting to clog up the filter just a bit more next time. Any gunk coming out of the fuel can is stopped up on the engine side of the fuel filter, so that the fuel in the tank is clean, but just as soon as the engine is fired up the gunk is then drawn into the carburetor. If you pull the fuel line loose just aft of the filter to fill the tank, then you have put unfiltered fuel into the tank, haven't back flushed the filter in any way, and possibly added to the gunk already in the tank. It makes a lot of sense to filter the fuel coming from the fuel can into the tank. Everything is always clean this way.

Why should you always tighten the prop nut to each day's flying? Simple — to make sure that the prop doesn't come off, either on the ground and fly into your or someone else's face, or in the air, causing you to lose the prop nut and front washer. Get into the habit of always checking the prop nut, just as you should always get into the habit of inspecting everything in your aircraft prior to taking it out to fly each time.

Here's a good Why. Why should you always take pictures of your newest bird before the first flight rather than after? Simple — this one little step will insure a long life for that new bird. Planning to take pictures after that first flight is almost standard insurance that something wrong will happen on that first flight. Pictures first — best policy that I know of for a long life model.

Why are there lots of colors of plastic films on the market? There are several answers to this question. The first is that this allows you to make your aircraft just as distinctive as you possibly can. But, the second Why may give you pause to reflect. Many of us are color blind, slightly, or a lot in regards to some colors. Many of us have a difficult time picking out colors in the air. Yesterday I was flying with a group of my good friends. Bill Slater passed me the control box on his Kaos and I tooled it around the sky for a time, but I really wasn't comfortable with it. I have a Kaos, the only model that I have built that wasn't my design for at least the past ten years, and am quite used to flying the Kaos, so this wasn't the reason for my discomfort. What bothered me was that Bill's model was all red save for a white leading edge on the wing. I found that it was very hard for me to see that red aircraft in the air. I had a hard time telling if it was banked toward me or away from me. All of the aircraft that I have built for some time have been basic white with lots of colored trim. I can see these models in the sky. I don't know if it's because of the color of my prescription sunglasses or what, but, to me, white is easier to see. I can also see blue and yellow and orange, but my original Sporty Ace is in green and transparent yellow, and when it is banked for final approach and coming at me, I have a heck of a time seeing it. So what has this to do with you? Well, perhaps you may be having trouble "seeing" your aircraft simply because of its color. Do some experimenting at the flying field the next time. Look at the models in the air. See just which ones seem to be easier for you to see while they are flying. Pretend that you're controlling them and see just which is easiest for you to fly in your mind. It may turn out that the reason that you sometimes get a little confused when your aircraft is in the air is that you're really not "seeing" it. I've had lots of red airplanes in years past, but think that I will not in the future. All of you young guys with super vision can just file this thought away for the next twenty years but, for

some of us older modelers, it's worth thinking about.

Why does it always rain on Saturday and Sunday? Heck, it's sure not going to rain on Monday or Tuesday. No one ever plans to go flying on Monday or Tuesday.

In the July '83 issue of RCM, Jerry Smith presented a set of work tables that are easy to build and give you good building surfaces. Why should you use a good straight building surface on which to construct your aircraft? Because a model built on a warped building board will be a warped model, and a warped model will never fly like it should. Naturally, it will fly, but not fly well. If you do not have a good building board, then get one. A door is the best source of a building board that there is. A friend, who shall remain nameless for obvious reasons, is an apartment dweller. The closets in his apartment have sliding doors. He checked and found that these doors were really straight. So he takes down a closet door and builds on the inside face of this door. When finished, he hangs it back on the track. Whoever looks on the inside of a sliding closet door. You didn't get his tip here, now did you?

Why questions can go on and on. I have only scratched the surface of Why. This hobby sport has so many interesting facets that it is impossible to absorb all lessons at once. You know, keen little Whys, like Why not paint, or glass, in a unvented room; or Why not let the gas in the tank of your big airplane just sit in the tank from flying session to flying session? Or Why is it best to adjust the needle valve of your engine from behind the prop rather than reaching over the front of it? Or Why not just go ahead and switch on your transmitter to make a quick check of your controls even if someone else's clothespin is on the frequency board? Or, Why can't you bring your model home from a day at the flying field, toss it into the corner, then go back the next day and still fly on a week old charge? Or, Why not plan to borrow fuel, props and glo plugs from other guys at the field — Why waste your money buying these things ahead, when you can rely on other guys supplies at the field to take care of you? Or Why isn't it a good idea to start out with a full blown pattern plane, complete with tuned pipe and retracts, as your first R/C model, cause that's what the ace flier at the flying field flies? Or, "what the heck, balsa wood is balsa wood. Why can't I use this soft old wood for wing spars, after all, the plans say 3/8" square balsa wing spars, and balsa wood is balsa wood, isn't it?"

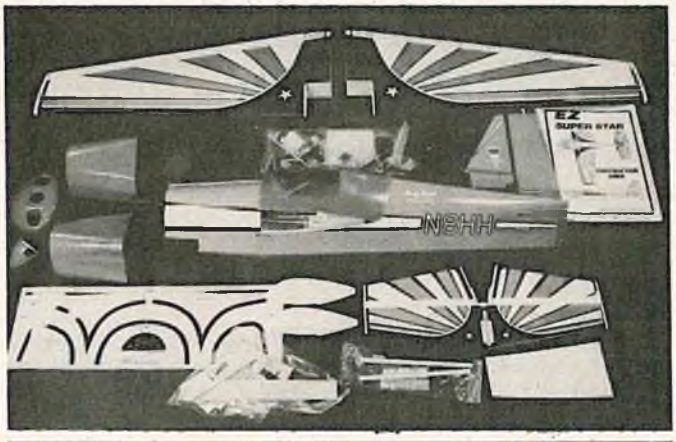
★

Scott Slayman from Memphis sent in a couple of pictures of his combination Lazy Ace and Miss Texas. It sports a slightly modified Miss Texas fuselage, and Lazy Ace wings with the airfoil changed to semi-symmetrical. It has a Max .90 for power and swings a 14/6 prop. Scott is trying to find a name for it. He doesn't like Miss Texas Ace, but is casting around for another combination. Anyhow, another example of a modified existing design that worked out well for the builder.

Elsewhere you've read that RCM is starting on its second twenty years. The first twenty have been great. Wonder what new adventures the next twenty will hold? ☐

RCM PRODUCT REVIEW

Sports Aviation, Ltd.
EZ SUPER STAR



SPECIFICATIONS

Name	EZ SUPER STAR
Aircraft Type	ARF Sport Scale Aerobatic
Manufactured By	Sports Aviation Co. Ltd. Japan
Distributed By	Hobby Shack 18480 Bandilier Circle Fountain Valley, California 92708
Mfg. Suggested Retail Price	$157.00, Sale Price $124.99
Available From	Both Mfg. & Retail
Wingspan	48 Inches
Wing Chord	Root 11", Tip 5¼"
Total Wing Area	403 Square Inches
Fuselage Length	38 Inches
Stabilizer Span	16 Inches
Total Stab Area	85 Sq. In.
Mfg. Rec. Engine Range	.25
Recommended Fuel Tank Size	6 Oz.
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt. Ail.
Basic Materials Used In Construction:	
Fuselage, Wing, Tail Surfaces	Plywood structure with laminated plastic over foam
Instruction Manual	Yes (13 Pages)
Construction Photos	Yes

RCM PROTOTYPE

Radio Used	Aero Sport 6 ch.
Engine Make & Displacement	O.S. .25 FSR w/muffler
Tank Size Used	6 Oz.
Weight, Ready to Fly:	66 Oz.
Wing Loading:	23.57 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Completeness of kit, quality and flying.
WE DIDN'T LIKE THE:
Parts of the instruction manual.

The almost ready to fly (ARF) model has come a long way from the familiar heavy, bulky foam and plastic examples of not so long ago. A new era in ARF design and construction has begun with the introduction of sleek, lightweight models that actually rival their balsa counterparts for performance and appearance. The "EZ Super Star" by Sports Aviation, Ltd., imported and distributed by Hobby Shack, is an excellent example of this type.

The bright colors, clean lines and functional appearance of the full scale Super Star clearly acknowledge the fact that this airplane was designed with two things in mind: smooth, fast flight and crisp aerobatic performance. Designed by top aerobatic pilot Henry Haigh, the Super Star is actually a redesigned Stephen's Akro. It uses the same wing and stabilizer but incorporates an extensively modified fin/rudder and fuselage. At the recent World Aerobatic Championships, Haigh captured eighth place despite having very little practice time on his new aircraft.

Sports Aviation's model is a highly scale representation of this aircraft with only a few minor deviations aimed at reducing weight, drag, and building time. The result of this compromise is a sharp looking, great flying model that is easy to assemble for anyone with moderate building experience. The Super Star should fill the need for a .25 sized ARF sport aerobatic airplane for pilots proficient with more advanced four-channel models.

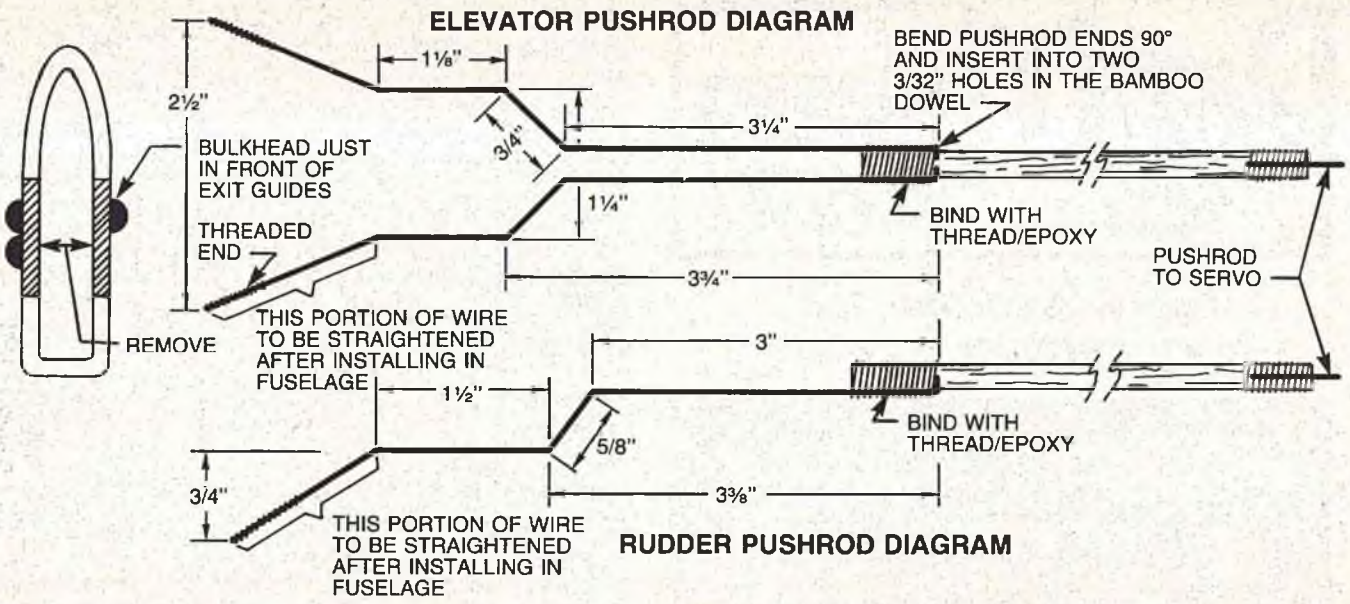
Removing the colorful lid from the 4½" x 14½" x 37¾" box revealed excellent packaging with each major component sealed in a protective plastic bag and set into its own divided section of the box.

Construction:

Boldly printed on the box cover was the famous but misleading phrase "ready to fly." Although the "EZ" kits are highly prefabricated, we spent a total of 20 hours on construction at approximately 2-3 hours per evening for six days. Construction, however, was very straightforward and only required us to assemble the pre-built components and install the radio and engine.

The basic structure of this plane is a beautifully constructed plywood airframe which has been meticulously covered with revolutionary new "semi-soft" foam material. The foam has a plastic skin laminate which has the graphics impregnated into it, covered with a layer of clear plastic for added protection.

The fantastic colors in this plane will not peel, rub off, or be touched by fuel. All stripes and graphics are perfectly matched and the fuselage lettering is superb. The only decals that needed to be applied are the cowl stripes, instrument panel, and the canopy trim stripes. This



minimal amount of trim work results in a very scale appearance in little time.

The basic construction sequence requires joining the two wing halves, installing the "tail feathers," and mounting the engine, cowl, canopy, landing gear, and control horns. Next, route the tail surface pushrods and drop in the radio gear. Particular attention should be paid to the proper alignment of all flying surfaces during assembly as this is easily overlooked on a model that builds this fast.

The 13 page pictorial construction manual guides you through the construction process quite well, despite the awkward Japanese to English translations and many grammatical errors. Each step is illustrated with good, clear photos which make up for the lack of text quality.

Aside from some minor trim work required to mount the fin, assembly went smoothly and without a hitch until we came to the "Y" shaped elevator pushrods mentioned in the manual. None of this type were found in the box, only some bamboo dowels and wire pushrods. There are no diagrams in the manual so we were forced to design and make suitable pushrods. This proved to be the most time consuming step in construction. The included diagrams show the product of our extra effort and should make this job much easier for those building Super Stars. We have recommended to the importer that similar diagrams be included in subsequent kits.

Mounting the "Y" shaped elevator pushrods required cutting out a portion of each side of the plywood bulkhead just ahead of the pushrod exits. We used a razor saw blade taped to a dowel and inserted down the fuselage for this operation. Once these notches are made, the pushrods should slide easily into the exit guides. It is critical that you do not change the internal bends of the pushrods and that the ends are perfectly straight at the control surface to reduce binding. This system is a lot more work but it allows the independently hinged elevators to be adjusted separately for fine trim adjustments.

The manual also failed to adequately describe control horn installation which required small shims of clear plastic to be drilled and placed between the horn and the control surface. These shims obviously keep the horn from crushing the foam, but they were not identified as to purpose or placement.

Engine:

An O.S. .25 FSR was installed along with the kit supplied 6 oz. round style tank. The O.S. .25 drops right into the factory installed engine mounts and seems a very logical choice of power-plant for this model, as anything smaller or less powerful just won't fly it well, and a .40 will turn it into a "rocket ship."

Radio:

The radio system used to guide the Super Star was an Aero Sport six channel. The servo tray provided fit the Aero Sport servos perfectly; it fits down into the fuselage tightly and provides a very secure platform. The tray should be mounted as low as possible, however, so the servos will clear the bottom of the wing center section.

Flying:

The Super Star was carefully balanced starting 1/8" ahead of the conveniently printed C.G. locators on its fuselage sides. Two ounces of nose weight were required to balance the model.

We strictly adhered to the prescribed control surface throws outlined in the construction manual. This airplane has a large elevator which should be treated with respect; throw was kept down to plus or minus 5/8" or less. The ailerons were set up with a small amount of differential as this keeps rolls smooth and axial. The ailerons should be set level or slightly drooped. They should not be allowed to reflex or kick up as this aggravates the stall characteristics of the plane.

Flying the model was a pleasure. The airplane tracks well and the controls are very responsive. The Super Star, when balanced 1/8" ahead of the C.G. marks, will stall quite gently.

This is an aerobatic airplane and it rolls crisply but loops and Immelmans requires reasonable entry speed as do all climbing maneuvers. The Super Star must be flown through all maneuvers; don't expect to hang it on the prop. The vertical performance was altered slightly by using 9/4 and 9/5 wood props.

Smoothness is the key to flying this model. Don't jerk it up on take-off or it will snap left and roll itself into a ball. The aircraft, however, will spin and recover quite nicely.

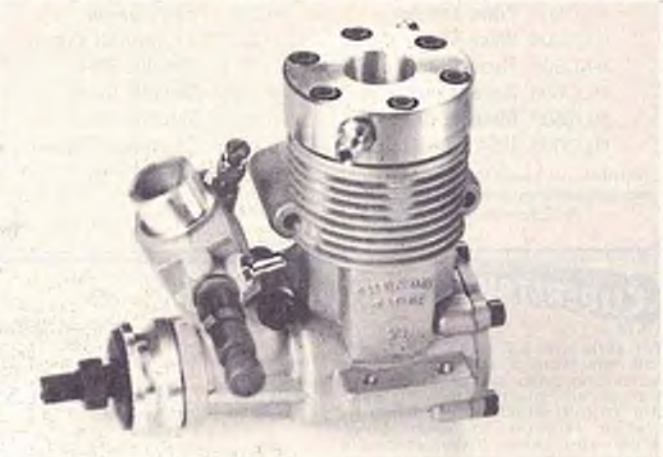
The overall performance of the Super Star is very good. It is capable of performing all of the full scale aircraft's maneuvers depending on your ability to execute them.

Conclusion:

Although expensive, the price of this kit is easily justified considering its completeness, high quality, and the flight performance of the model. You should have no problems assembling the model once you're aware of the few discrepencies and their corrections. If you are searching for exciting performance and great appearance all in an easy to assemble aircraft, you needn't look any further. The Super Star will meet this criteria easily. □

ENGINE CLINIC

Clarence Lee



Newest additions to the Thunder Tiger line of engines. 21 FSR ABC Marine. Also available in .25 disp. See June Engine Clinic for full review of Thunder Tiger 21 car engine.

Thunder Tiger 25 FSR ABC aircraft. Also available with lapped cast iron piston & steel sleeve.

At the time of this writing (late May) the flying season is getting into full swing throughout the country. As a result, the mail load picks up due to all the engine related problems fellows begin having. Roughly about one out of five letters will have to do with tuned pipes. Although I have done several articles strictly on tuned pipes and have answered many letters in the past few years, there always seems to be more questions to be answered.

A good number of fellows would like to run tuned pipes but do not want to be bothered with the starting a little long and cutting off of the manifold or pipe neck in 1/4" increments in order to tune the pipe to the particular engine, prop, fuel, etc., combination. Fellows just want me to tell them the proper length to begin with so they can avoid the adjusting to proper length process. I am afraid, guys, that there is just no way I can do this. There are too many variables involved. Besides the particular engine, prop, fuel, combination, the elevation of your flying site, air density, temperature, etc., all play a part. Sure, I can give a starting length but if maximum performance from the pipe is to be achieved, then you are going to have to tune it to your particular set of circumstances.

The exhaust timing of the engine alone can make a difference in the length of the pipe. That is, an engine with 140° of exhaust duration will require a different pipe length than an engine with 170° of exhaust duration. The easy way is to start with the pipe a little long and, as mentioned previously, shorten it in 1/4" increments until maximum ground rpm is obtained. If you cut the pipe off and lose rpm, just pull it back out of the silicon rubber coupler. It is a good idea not to have more than a 1/4" gap between the exhaust header pipe and neck of the pipe. If you have cut too much and have a larger gap, put one of the pieces back in to fill the space so that the rubber coupler does not sag between the end of the exhaust header pipe and neck of the pipe.

If, in the air, the engine has a tendency to lean out and sag, especially during vertical maneuvers, the pipe is probably a little too short and needs to be lengthened back out. It is always better to have the pipe a little too long rather than too short. If a little long you might not get optimum rpm but there will be far less tendency to go lean, mixture setting will be broader, etc.

One thing must be kept in mind — when the engine comes on the pipe, there is going to be an increase in fuel consumption. If you set the engine off fully leaned out to begin with you can expect it to go really lean in the air. So the mixture has to be set rich enough on the ground to allow for this leaning tendency in the air. Actually it is not really that hard to get a tuned pipe set up but does require a little time and a good tachometer. Frankly, guys, if you do not want to be bothered with adjusting the pipe then you should forget about using one at all. It is not just a long muffler that can be bolted onto the engine and have an instant 1,000 rpm gain. If you are lucky and follow the pipe manufacturer's instructions for a starting pipe length, you should be in the ball park with only a minimum of final tuning to be done.

A lot of fellows have wanted to know if there isn't a formula for determining proper pipe length. There is but, again, it is only a beginning point. Final adjustment has to be done under actual operating conditions. For those of you who would like to figure out on paper the approximate pipe length, use the following formula: $L = \frac{E}{N}V$. This formula was taken from Gorgon Jenning's "Two-stroke Tuner's Handbook."

L is the length from the piston face to a point half way down the converging cone of the pipe. This can easily be measured on a conventional tuned pipe. However, most of us are using the muffled type of tuned pipe where a secondary shell covers the converging cone. You will just have to use a little guesstimation here. We normally measure the distance from the glow plug to the maximum diameter welded seam of the pipe but, in the case of the use of this formula, a different measurement will have to be made.

E is the exhaust open period in degrees. You are going to have to know what the exhaust open duration is. This can be found by putting a 360° protractor on the crankshaft with an appropriate index mark, and

checking.

V is the wave speed in feet per second. Authorities differ on what figure should be used. Most use 1700 but I have found 1650 to be more realistic for our model engine.

N is the rpm of the engine. This is the big variable. You cannot just grab a figure hoping that plugging it into the formula will come up with a pipe length that will, in turn, make the engine turn that rpm. That is, knowing that most piped .60's turn in the 14,500-15,000 rpm range with an 11/7 prop work with these figures. Don't use 16,000 hoping that the forumla will give a pipe length that will make the engine turn this figure.

Using an exhaust duration of 170° which is pretty standard pipe timing, a wave speed of 1650, and rpm of 15,000 we have 170° x 1650 ÷ 15,000 = 18.7" from the face of the piston to a point half way down the coverging cone. This works out to about 13" from the glow plug to the maximum diameter welded seam. But, as mentioned previously, this is still only the starting point. You still have to try shortening or lengthening the pipe from this point to achieve maximum performance.

With all this out of the way, let's get on with the letters this month. The first two are related to tuned pipes.

Dear Clarence:

I have an O.P.S. Big Red .60 Read Exhaust engine. It's installed on a pattern ship and I'm just now trying to set it up for tuned pipe operation. I was wondering if you could give me a clue as to the pipe length to start with and type of pipe if this makes any difference. I've been trying a E.D. pipe at various lengths but have had little success. I've been running 5% Sheldon's fuel, 11/7 Zinger and K & B plug.

What rpm should be expected with this combination?

What pipe length should I start with, etc.?

Your help would be greatly appreciated.

Sincerely,
Perry E. Hudson
Palmdale, California

If you want to go about determining the proper pipe length the scientific way, you can use the above mentioned formula. Generally, with a .60 size engine, 13" is a good starting point measured from the glow plug to the maximum diameter welded seam on the pipe.

Different pipes will give different amounts of gain. Both Mac's Products and International Model Products offer excellent tuned pipes. In the case of your OPS Big Red, the OPS 60SS pipe works very well and is intended for use on the engine. With your fuel/prop combination and the OPS pipe you should get about 14,500 rpm and, if a strong engine, 15,000. Anything over this on 5% nitro could be considered an exceptional engine.

Dear Mr. Lee,

I read your column every month, and you have put logic into my understanding of 2-cycle engines, but here is something that I don't understand.

I have an H.B. 40 pdp in a home-built Pattern type airplane.

The first time out with just the exhaust manifold (1⅝") (pipe section not on); with 15% Sheldon's fuel; 9/7 Rev-up prop; no fuel pump and no pressure; temperature about 75%; humidity about 60%; it turned 14,000 on the ground.

One week later went out with the pipe with me, put it on just as pipe and manifold came from the factory — no increase, only 1/8" gap between pipe and manifold.

By the way I used same prop, fuel and temperature, then I cut 1/4" from the manifold, slight increase. Anyway, I cut 1" off of the manifold and got 750 rpm increase on the ground with pipe coming straight off of the manifold. I stopped there.

The next weekend after that, with the pipe cocked up a little bit at an angle to clear the wing, when I flew the plane it seemed slower. I know it was slower, several other guys said it was slower. I did not have access to a tachometer.

Can you help me? I have $60.00 wrapped up in this stuff.

Thank you,
Mark Lupo
Columbus, Ohio

Providing that the engine was still running 750 rpm stronger with the pipe, then the only thing that could account for the airplane flying slower would be the drag of the pipe. You must have a pretty clean airplane and the drag of the pipe more than compensated for the rpm increase. You should get hold of a tachometer and recheck your rpm figures, however, to be sure the pipe is giving the 750 gain. There is also the possibility that you have the pipe length too close to critical length (too short) so that when the aircraft is airborne and the engine unloads it goes beyond the pipe's range and falls off the pipe. Try lengthening the pipe in 1/4" increments so that you get a little less gain on the ground. In the air the engine unloads and will still be on the pipe.

Dear Mr. Lee:

I read with interest your article on the Fox Twin, as I have two myself, one of which displays all the tendencies you described more than the other, and the fix you mentioned worked beautifully on both.

However, I was wondering what your opinion would be to the Fox Twin's response to conversion to C.D. ignition or diesel.

Sincerely,
M.R. Parrillo
Endwell, New York

Glad to hear that the fix in the column helped your Fox Twins. Quite a few fellows have written in to say the same thing.

As far as converting to diesel — I have not tried doing this to the Fox Twin but did try a Davis diesel conversion on an Eagle III. It worked beautifully so I imagine the same would hold true for the twin. It should be able to lug a really large prop, something in the 16" diamter range. The same thing would hold true for C.D. ignition. It would increase the lugging power with the larger diameter props and you would also have the benefit of using gasoline fuel for economy. I would lean towards the C.D. ignition myself. Mixture adjustment would be easier as you would only have the carburetors to adjust and fuel costs would be lower.

Dear Mr. Lee,

For the past seven years I have eagerly digested each of your monthly

to page 199

GOLDEN

OLDIE

The Golden Oldie is not scale, but rather is a fantasy that grabs the character of the 1920's. The design is ideally suited to the new .40-.45 four cycle engines.

This big, old biplane has really been a lot of fun. It flies slowly, realistically, and it is quiet. It is not the misplaced whine of a high revving engine, but rather there is a low throb as the Golden Oldie cruises down the runway. The power is an OS FS .40 four cycle engine. The slowness is deceiving because there is power to pull the biplane easily up through a loop without seeming to change speed. Perfect hammerheads are easy. The four huge ailerons give precise control, even at low speed, yet they are not sensitive. The Golden Oldie is incredibly easy to fly as it is very light for its size. Lightness is the secret for getting low powered models to perform. The Golden Oldie has a total wing area of 800 square inches, yet it weighs only 5½ pounds.

This is my first experience with a four cycle engine and I am really pleased. The four stroke engine runs much slower than the usual model engine, but has more torque, which allows it to swing a larger propeller. Four stroke engines are much quieter than a muffled two stroke engine. Consequently; four stroke engines can be flown in places where other engines would be a noise problem.

The Golden Oldie is not scale to any aircraft. Designed for the 4-stroke, it resembles the aircraft of the late 20's and early 30's.

By Fred Reese

The Golden Oldie is one-third Jenny, one-third Gypsy Moth and one-third fantasy. I wanted an airplane that looks real and flies like the real thing but I did not want to be confined to a fixed scale design and color scheme. I wanted to be able to express myself and have a flying machine that looks right. I also designed the Golden Oldie to be modified. You may prefer a Sopwith or Rumpler rudder and military markings. Any two inch to the foot accessories would be the right size. You could add a second cockpit and dummy engine cylinders and machine guns that are available from Williams Brothers. If you change the shape of the tail surfaces, maintain the approxmiate areas and do not reduce the span of the stabilizer or the height of the rudder. As shown, the Golden Oldie is very stable, and will be as long as the overall sizes are not changed.

The Golden Oldie was designed for the new .40-.45 sized four cycle engines as currently made by OS, Enya and Saito. They are quiet and economical to run. An 11/6 gives the best performance with these engines. A .60 four cycle engine would fly the Golden Oldie nicely, but they are larger and heavier and would require

changing the design of the front. The firewall would have to be moved back about 1" so as to not make the model nose heavy. Any two cycle .45 to .60 engine could also be used without changing the design and would give excellent performance. The four stroke engine is ideally suited to airplanes that have light wing loadings and are intended to fly slowly like the Golden Oldie.

Since the Golden Oldie is not scale, I designed the rigging and struts to be as simple as possible, yet appear realistic. The monofilament rigging is not really necessary, but the outboard wing struts are. The struts maintain the spacing between the wings and the aileron linkage.

Construction

Fuselage:

The basic fuselage sides are made from 3/16" square spruce and 3/16" sheet balsa. If spruce is not available, 1/4" square balsa could be used. The basic side structure extends from the firewall to the rudder post. The side is sheet balsa with a 1/16" plywood doubler from the firewall to the cockpit and 3/16" square spruce aft of the cockpit. The area under the stab is filled with 1/8" or 3/16" balsa for the pushrod exits. Build two sides over the plan using white glue. Use waxpaper or Saran Wrap to protect the plan. Glue the 1/16" plywood doublers to the sides with Zap or contact cement. Be sure to make a right and left side. Glue the 3/16" balsa nose pieces to the sides raising the front 3/4". This is the right nose taper to fit a 2" spinner.

To one side, glue on the firewall (F-2), the tank floor (F-5), and the bulkhead (F-3). Glue on the other side and pull the tail together and glue. Glue in F-17, the tailwheel mount. Epoxy in the two landing gear mounts (F-13 and F-14) and the wing hold-down (F-15). Glue on the 1/8" plywood nose bottom. Bolt in the engine, add the 1/2" triangle along the bottom edge of the nose and the 1/8" balsa bottom and then fit the spinner ring (F-1). Glue in the cockpit floor (F-6) and all of the 3/16" square fuselage cross braces. Glue in bulkheads F-4 and F-7 and add the 3/32" balsa top sheeting. Glue on bulkheads F-8, F-9, F-10, F-11, F-12, and add the five 1/8" x 1/4" top stringers. The cockpit backrest is added after covering and painting. Add the balsa fillers around the engine from scrap and shape to fair into the spinner. If you are considering adding floats, which will be featured next month, epoxy in the rear float mount (F-16), the 1/8" plywood F-18, and the wire "U" for the water rudder linkage. Sand the fuselage for covering and give all of the structure one or two coats of Balsarite inside and out. The fuselage can be covered and painted and all trim added now.

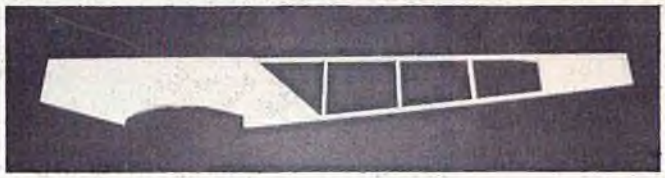
The fin and rudder are made from 1/4" balsa. Note the extra balsa and plywood insert at the base of the rudder for the control horn and steerable tailwheel.

The stabilizer and elevator are made from 3/8" balsa for a little extra strength. The inside curved corners of the elevator are glued in as triangles and then shaped with a Dremel sanding drum or with a dowel and sandpaper. Sand the tail surfaces, give them a coat of Balsarite, and cover. Add the trim and number if desired. After covering, hinge the surfaces together. Cut away the covering on

GOLDEN OLDIE

Designed By:
Fred Reese
TYPE AIRCRAFT
Sport Biplane
WINGSPAN
Upper 56"
Lower 44"
WING CHORD
9 In. (Ea. Wing)
TOTAL WING AREA
800 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constand Chord
DIHEDRAL EACH TIP
1" (Both Wings)
O.A. FUSELAGE LENGTH
44 Inches
RADIO COMPARTMENT SIZE
(L) 11" X (W) 3" X (H) 3"
STABILIZER SPAN
20 Inches
STABILIZER CHORD (inc. elev.)
8½ Inches
STABILIZER AREA
150 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7 Inches
VERTICAL FIN WIDTH (inc. rud.)
7 Inches (Avg.)
REC. ENGINE SIZE
.40-.45 4 Stroke
FUEL TANK SIZE
8 Ounce
LANDING GEAR
Conventional
REC. NO. CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED

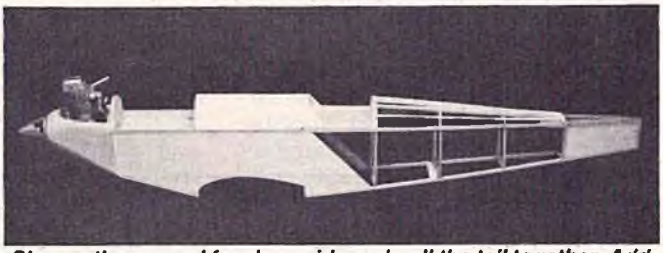
Fuselage	Balsa, Ply, Spruce
Wing	Balsa, Ply
Empennage	Balsa
Wt. Ready To Fly	**86 Oz.**
Wing Loading	**15.6 Oz./Sq. Ft.**



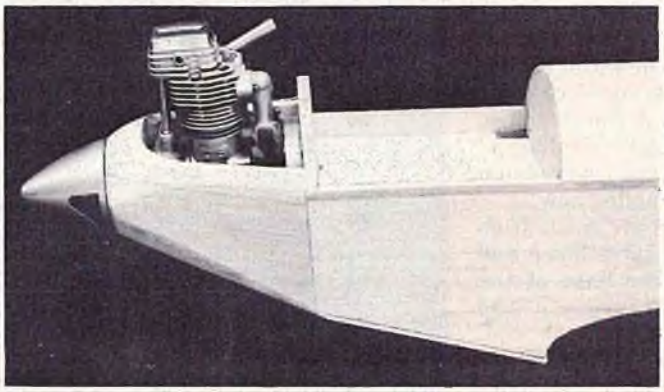
Fuselage side is made from 3/16" balsa sheet with 1/16" plywood doubler and 3/16" square spruce.

3/16" balsa nose piece is glued to the side, blocked up 3/4".

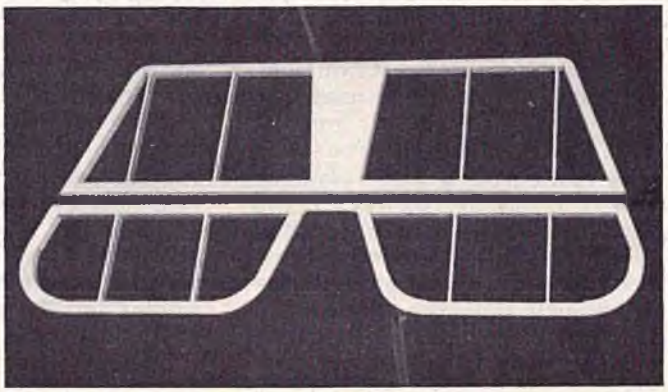
Glue the firewall F-2, tank floor F-5, and bulkheads F-3 and F-4 to one fuselage side.



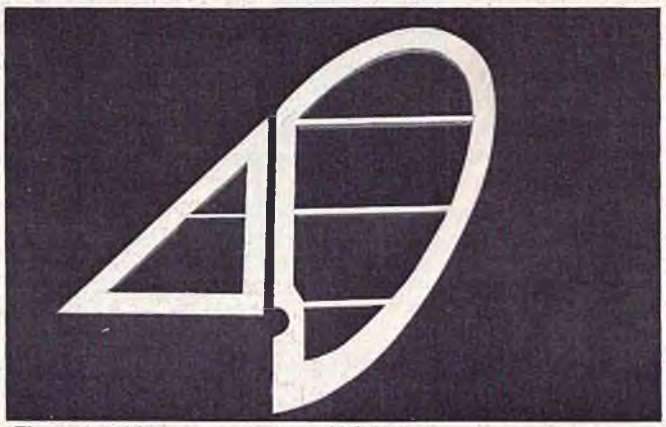
Glue on the second fuselage side and pull the tail together. Add the cross braces, landing gear and wing mount blocks, bottom sheet, top bulkheads, sheeting and stringers.



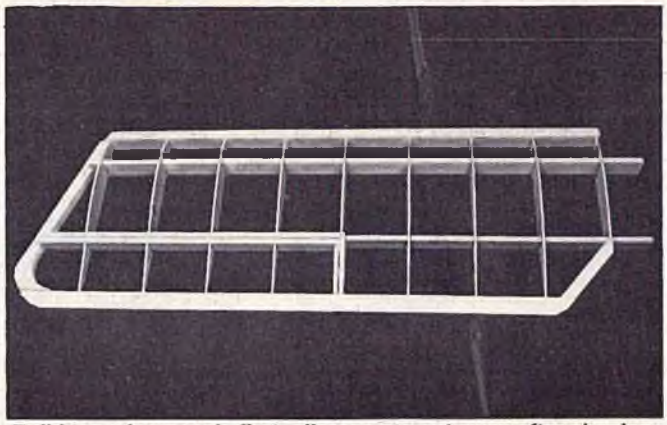
O.S. .40 4C mounted in nose. Just the engine for this bipe.



The stabilizer and elevator are built from 3/8" balsa. Elevator is linked with 1/4" dowel.



Fin and rudder are made from 1/4" balsa.



Build top wing panels first, ailerons are cut away after shaping and sanding.

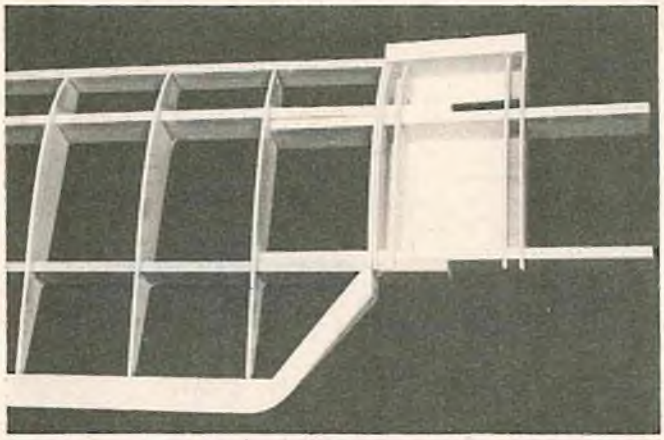
the stabilizer where the fin and fuselage will be glued. Glue the hinged stabilizer and elevator to the fuselage. Mount the tailwheel assembly to the fuselage and fit it into the rudder. Glue the fin and rudder to the stabilizer along with the bottom hinge into the fuselage and the tailwheel wire into the rudder.

Make cut-outs for the cabane struts in the top of the fuselage and epoxy the struts in place. True-up the tops of the struts with a sanding block. The front struts should be 1/8" taller than the rear struts relative to the top of the fuselage. Cut the slots in the struts for the aluminum clips with a hacksaw blade. Shape the tops of the struts and sand the struts to an oval cross section. Epoxy in the clips. Drill through the struts and clips with a 1/8" drill and glue in 1/8" dowel pins. Seal the struts with two coats of clear urethane varnish.

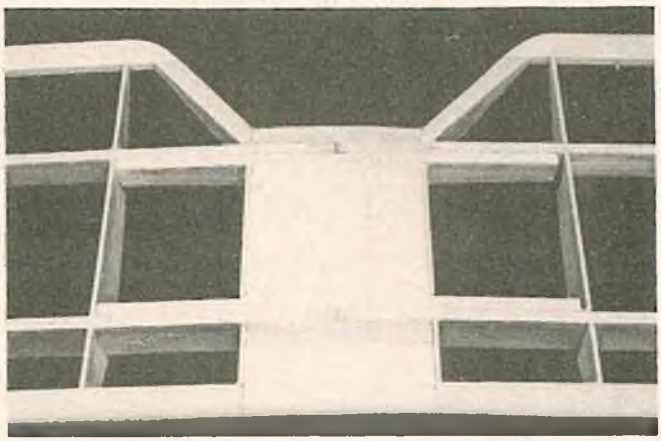
Wing:

The top and bottom wings are basically the same except the bottom wing is two bays shorter on each side. The wing ribs are the same but you don't need to drill the top ribs for a pushrod. I built the top wing first because it is easiest, even though it is larger. Build the two outer panels first and then the center section. Begin by gluing the ribs onto the spars over the plan. Add the leading edge. Glue the full length trailing edge to the W-3 ribs. Glue in the W-5 ribs and the 1/4" x 3/4" aileron leading edge and the 1/4" square filler over the rear spar ahead of the ailerons. Add the wing tips and the 1/2" x 1" piece from the trailing edge to the spar at W-2.

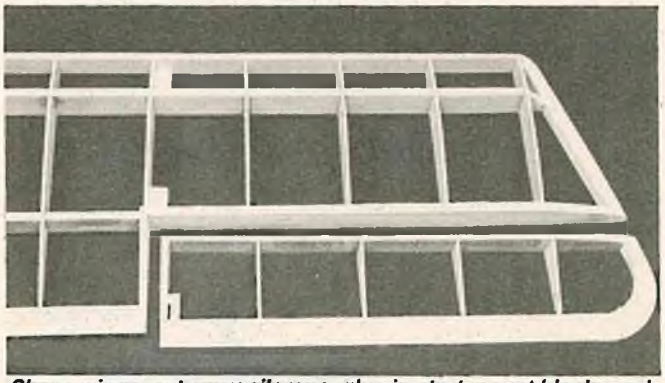
To build the center section, pin



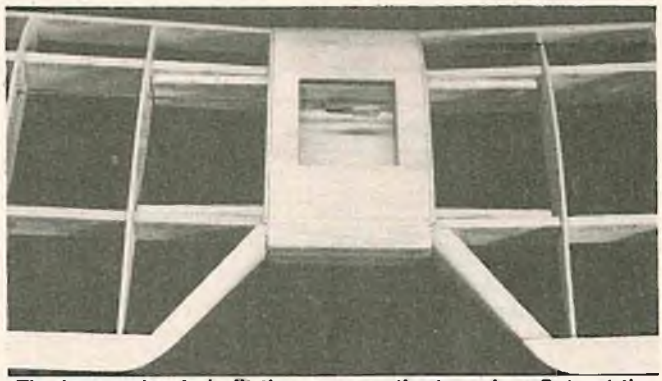
Fit center section to wing panels before adding top sheeting.



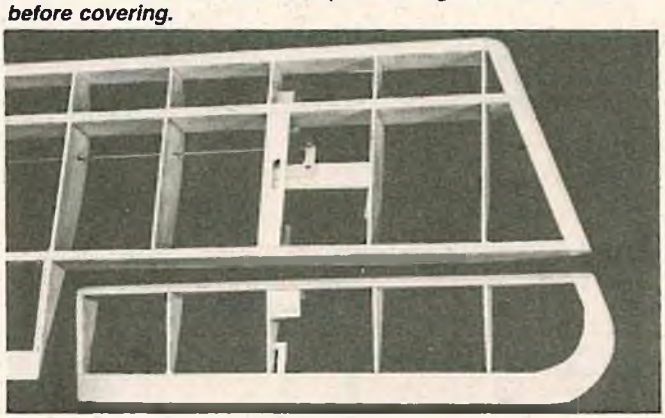
Wing panels are epoxied into finished center section.



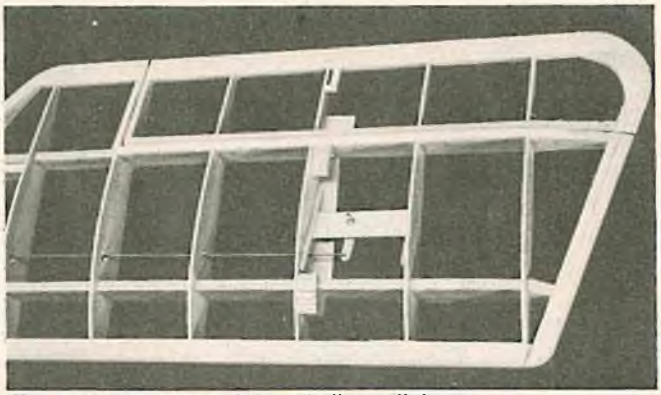
Shape wings, cut away ailerons, glue in strut mount blocks and aileron horn mounts. Give completed wing a coat of Balsarite before covering.



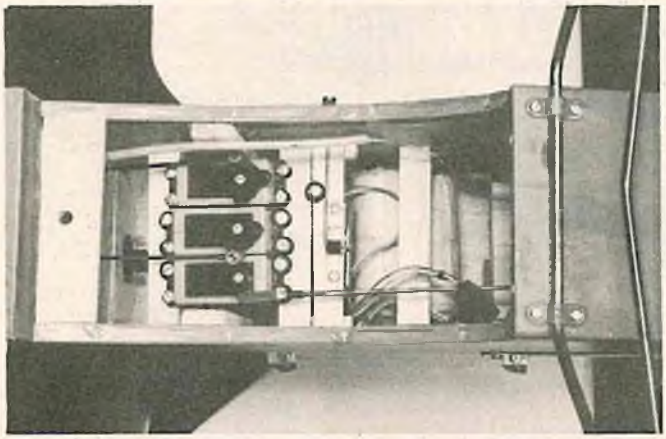
The lower wing is built the same as the top wing. Cut out the opening in center section for aileron servo.



Bottom view of bottom wing and aileron linkage.

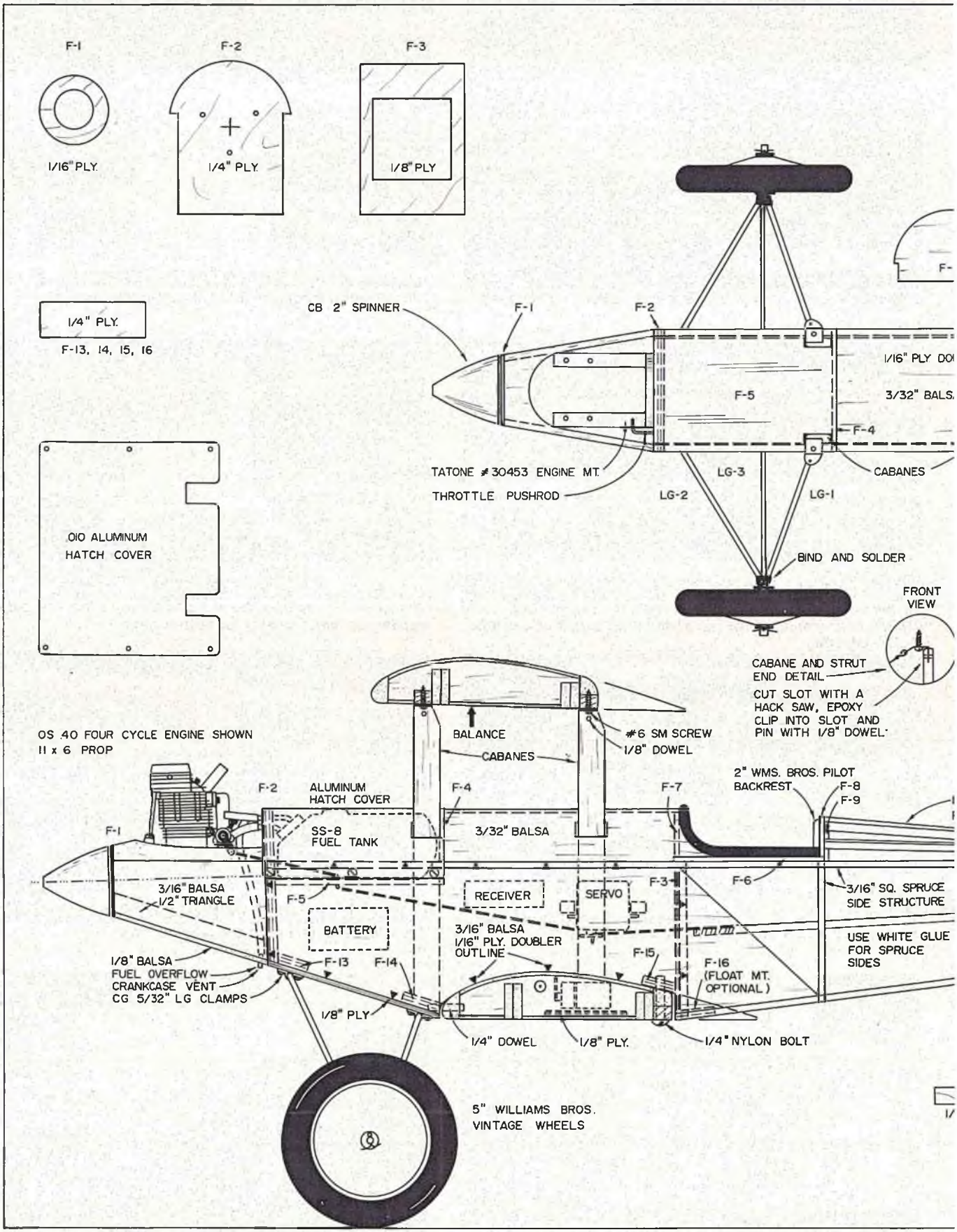


Top view of bottom wing and aileron linkage.

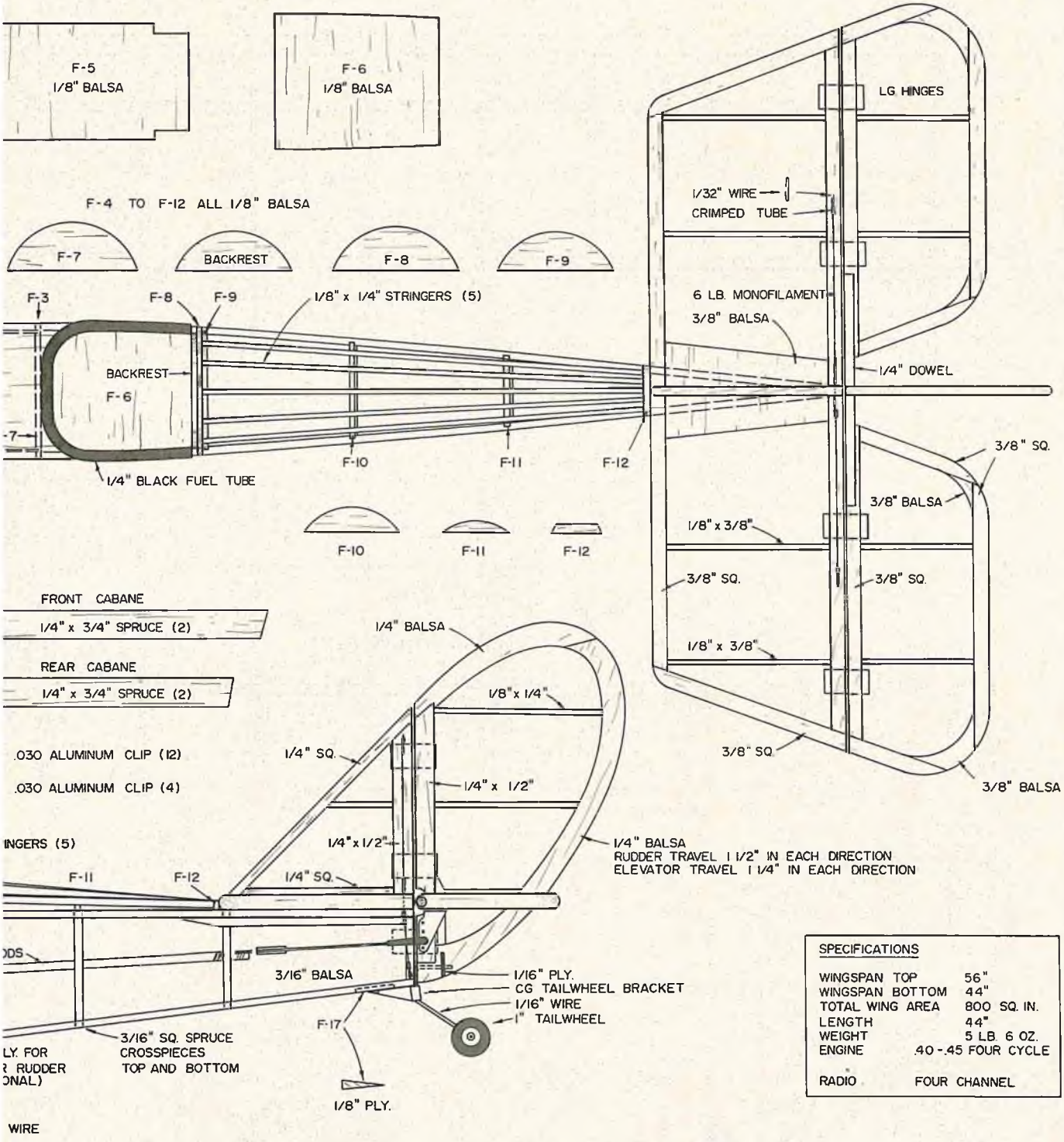


Radio and servo installation. Note the push-pull wire to the radio switch.

Tailwheel, control horns, pushrods and tail bracing.



down the bottom center piece of 3/32" balsa sheet that fits between the two spar joiners. Glue the spar joiners to the bottom sheet. Add the W-1 ribs and the leading edge. Trial fit the center section to the wing panels. Add the top center section wing sheeting. Epoxy the wing panels to the center section, blocking up each wing tip 1".



SPECIFICATIONS	
WINGSPAN TOP	56"
WINGSPAN BOTTOM	44"
TOTAL WING AREA	800 SQ. IN.
LENGTH	44"
WEIGHT	5 LB. 6 OZ.
ENGINE	.40 - .45 FOUR CYCLE
RADIO	FOUR CHANNEL

GOLDEN OLDIE

A VINTAGE SPORT BIPLANE

DESIGNED AND DRAWN BY FRED REESE

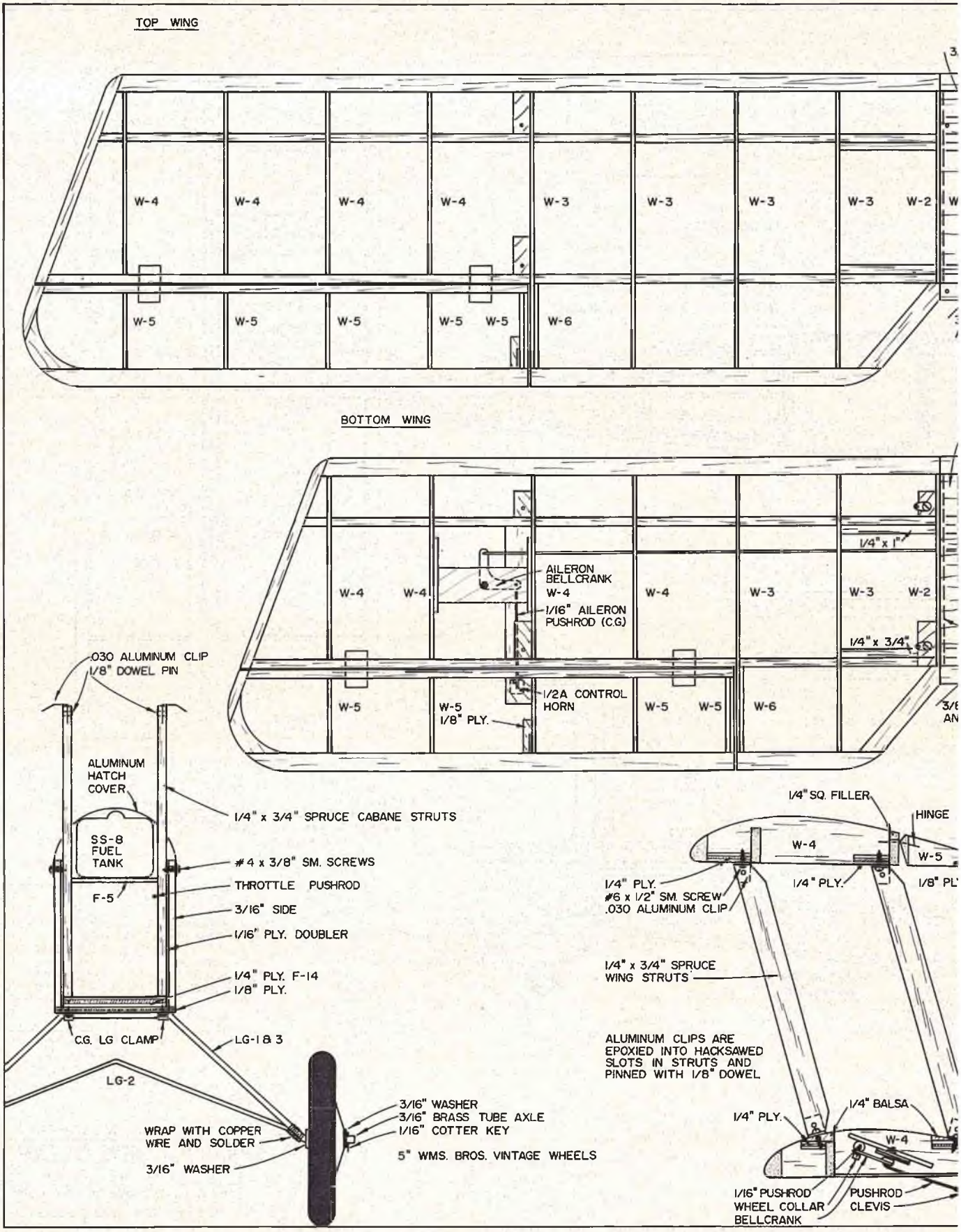
1 OF 2

0 1 2 3 4 5 6

PLAN NO. 897 ②

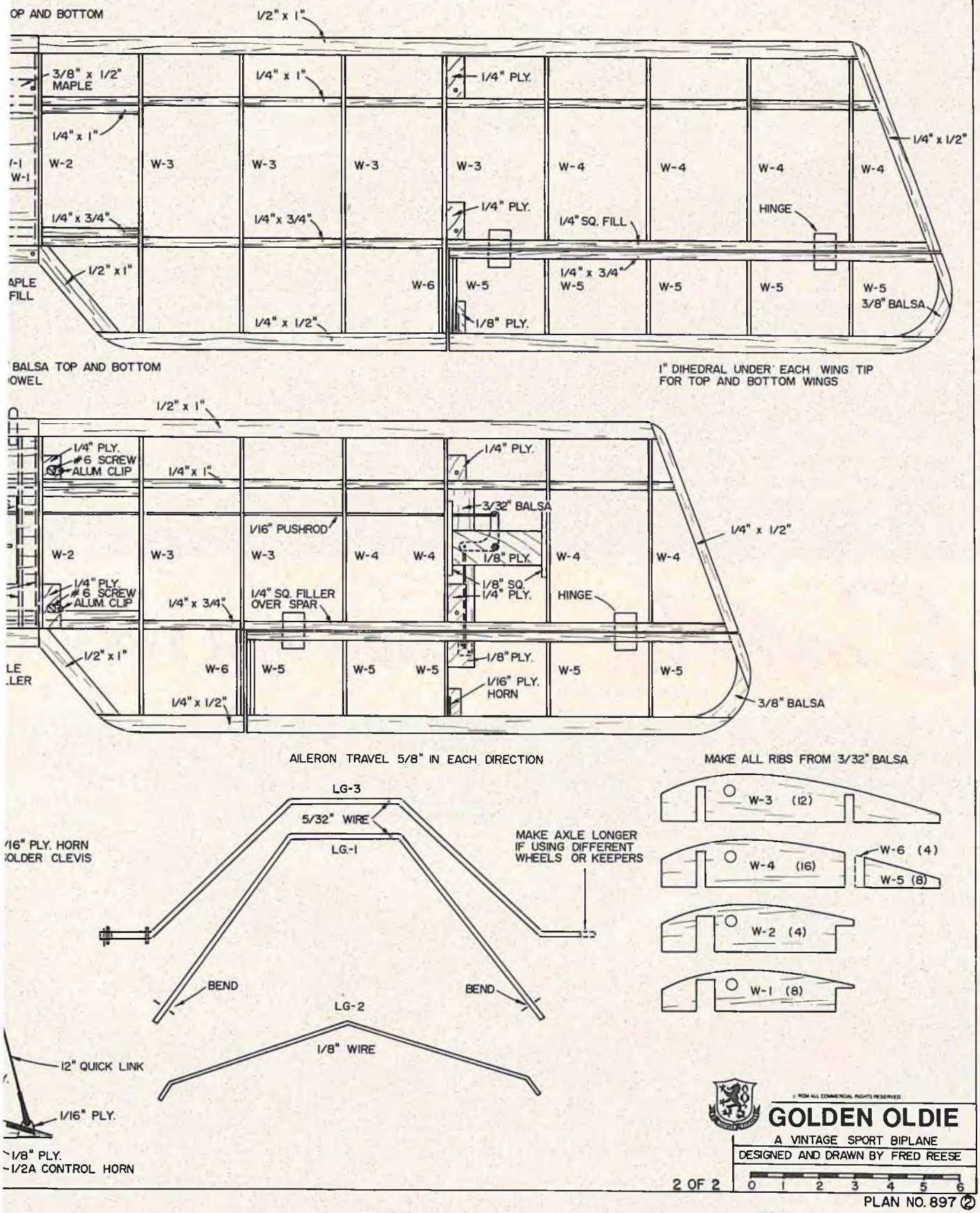
Epoxy in the 3/8" x 1/2" maple wing mount blocks and the rest of the balsa fillers. Sand and shape the wing leading edge, wing tips, and ailerons. Cut the ailerons away from the wing and add the 1/4" plywood strut attachment blocks and the 1/8" plywood control horn mounts.

Build the bottom wing following the



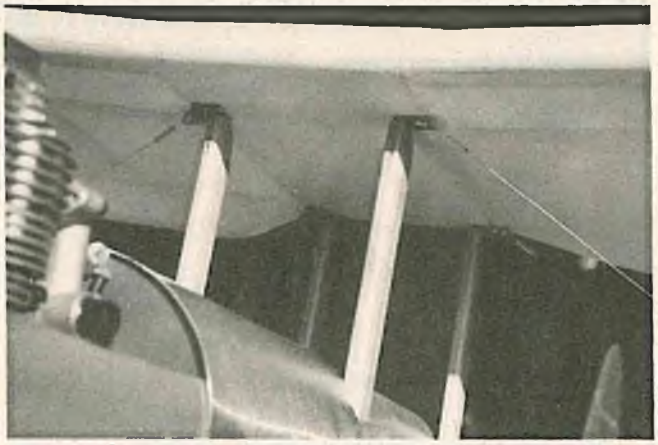
same procedure. After the wing is shaped and the ailerons are cut away, add the aileron bellcrank mounts, the aileron linkage, and the plywood blocks and horn mounts.

Fit the lower wing into the fuselage. Drill the two 1/4" holes into F-14 for the wing hold-down dowels. Insert two short pieces of dowel into the holes and



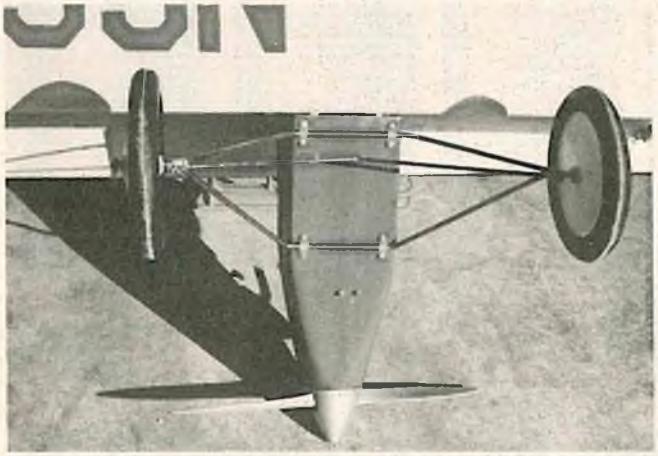
press the wing into the dowels to mark the wing. Drill two 1/4" holes into the wing and glue the dowels into the wing. With the lower wing in the fuselage, drill through the rear maple block and F-15 with a 3/16" drill. Screw a 1/4"-20 tap through the hole to thread F-16. Drill out the wing hole with a 1/4" drill. Screw in a 1/4"-20

Aileron servo in lower wing.

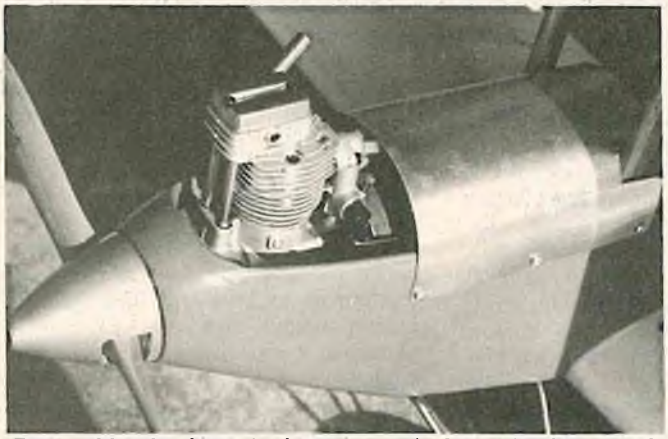


Top wing is attached to aluminum clips in cabane struts with #6 sheet metal screws.

Outboard wing struts and aileron linkage between the wings.



The wire landing gear is attached to the fuselage with Goldberg nylon landing gear clamps.



Removable aluminum tank cover made from aluminum roof flashing from building supply. Engine is O.S. FS-40 four cycle.

Next month the Golden Oldie on floats.

nylon screw. Remove the screw and "set" the threads in F-15 with Zap.

Sand the wings and give them one or two coats of Balsarite. Use two coats if you plan to fly off of water. Cover the wings and apply the numbers cut from trim sheets. The white lettering on the fuselage was hand painted with white enamel.

Lay the finished top wing upside down on a pillow for support and place the fuselage on the wing. Line up the strut clips over the maple blocks in the wing. Mark and drill one hole only with a 3/32" drill and screw in a #6 x 1/2" sheet metal screw. Mount the bottom wing and align the two wings. Mark the other three top wing mount holes. Remove the wing and drill, then remount the top wing with all four screws. Fit the outer wing struts onto the aluminum clips already screwed to the wing. Epoxy or Zap the struts onto the clips. Trim away excess metal and varnish the struts. The monofilament flying wires can be fitted now or later. I used little "S" hooks bent from pins on one end of each flying wire so they can easily be disconnected but still remain attached at the other end. The flying wires are attached by crimping a 1/4" length of 3/32" aluminum tubing over the monofilament.

Servo Installation:

Install the radio as shown on the plan. For the aileron servo, I glued in a 1/8" plywood mount into the wing. The servo was then mounted in an aileron servo mount and screwed to the plywood plate in the wing. The two aileron pushrods and the link to the servo are all connected and soldered inside a short piece of 5/32" i.d. brass tube. The upper and lower ailerons are

connected by a long threaded Kwik Link with a solder link (clevis) at the other end. Small control horns of 1/16" plywood are epoxied into the ailerons. There cannot be any slop or binding in the aileron linkage. If the servo is straining, find the bind and fix it. Aileron travel is 5/8" in each direction. Elevator travel is 1¼" in each direction and rudder travel is 1½" in each direction.

Landing Gear:

The landing gear wires are bent, rebent and sworn at, then wrapped with copper wire and soldered together. I nailed the LG-1 and LG-2 to a board for soldering and adjusted the bends until the ends touched without flexing something. The bent spreader (LG-3) gives some flex to the landing gear, but stiffens it considerably. To mount the wheels, you can simply use 5/32" wheel collars or you can use 1/16" cotter keys as I did. The wire axles are cut off flush with the wheels so only the 3/16" o.d. brass tube is drilled for the cotter key. The wheels must be drilled out to 3/16".

Mount the landing gear to the fuselage with Goldberg or DuBro 5/32" nylon landing gear clamps. These are neat and simple, but eventually you will replace the #2 screws with #4 screws. No redrilling is necessary.

Flying:

Before you fly your Golden Oldie, make sure all the surfaces are going in the same direction. After I got all the "turn" trimmed out on my first flight, the airplane was flying half sideways. I brought the airplane home and rubber-banded a 36" length of 1/4" square onto the bottom of each wing tip under the outermost rib. It was instantly apparent why the airplane wouldn't fly straight. No two sticks were pointing in the same direction. It took about a half hour with my covering iron to rewarp each wing panel into alignment. The hot iron did not affect any paint or varnish over the covering. Just twist the panel as you want it, and run the iron over both sides to remove the wrinkles. I did not put in any wash out.

The flight of this bird is majestic and I felt comfortable with it right away, once I got the warps out. The stall is gentle and straight ahead, but you really have to try to stall it. When I am by myself, I fly it low around me like a U-control model just so I can see it better. The first two times I landed it, I really bounced it in and cartwheeled it (on rough concrete, naturally). Fortunately it did no damage except scuff the wing tips and break the prop. I was used to faster models and a biplane like this really slows down quickly when you cut the power. When the airplane should have been touching down, it was still five feet up — thud! People quickly pointed out the error of my ways. Now I only partially reduce power on final and let the airplane set-up its own natural descent. Just before touchdown I cut the power to idle and flare gently. Landings have been easy ever since. I just wish I could once get all of the bugs worked out without bashing the airplane. Maybe, they aren't suppose to fly right until they are dirty and dinged. I much prefer flying the Golden Oldie from grass. It just feels right and those big 5" wheels will roll over anything. Next, the Golden Oldie on floats. □

IN-FLIGHT PERFORMANCE

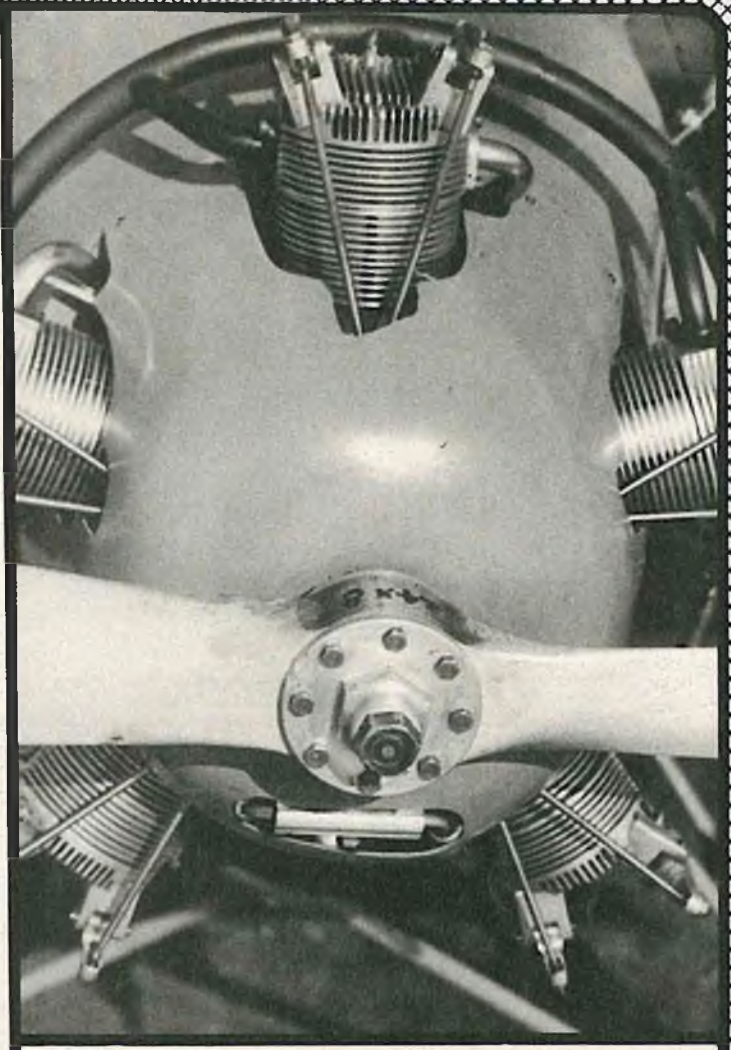
A Form of Telemetry Provides The Information

By Dick Tichenor

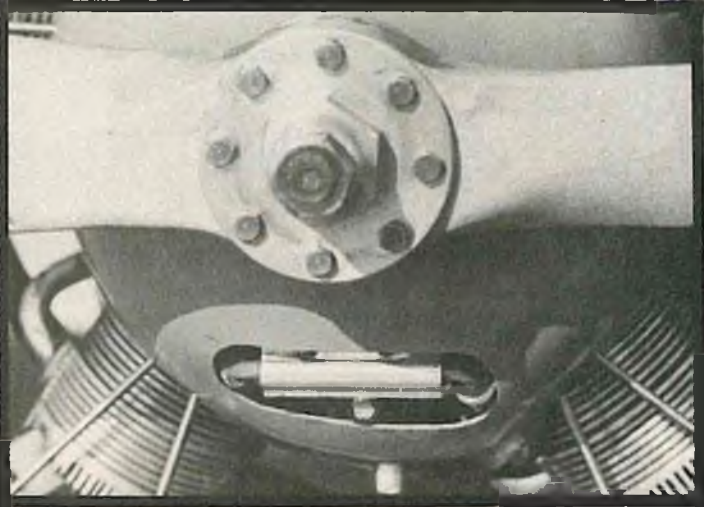
Our July 1983 issue (page 106) contained an article on Forrest Edwards and his four stroke radials. We recently ran into Forrest during one of our flying sessions and were amazed at the increased performance of his Quarter Scale fleet. After listening to Forrest's explanation, we felt that our readers might benefit from his experience.

Our previous article mentioned that Forrest had installed a Digicon TT-01 Tele Tachometer in his Fleet and roughly described its functions. Based on the in-flight data accumulated from the TT-01, Forrest has gradually progressed through various Zinger propeller diameter and pitch combinations from his original 20/10 to the present 24/8 while maintaining his desired 6,000 rpm. The end result is that the 24 pound Fleet performs vertical manuevers like a 650 hp Super Stearman. This bears out what we have known all along, and that is that engine speed on the ground really doesn't tell us what the prop is going to do in flight.

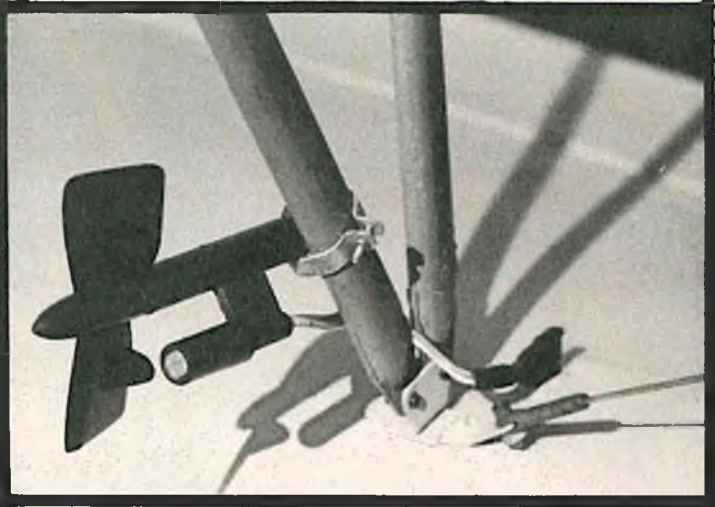
If you are serious about obtaining the most efficient propeller / engine / aircraft performance, we now have the equipment to get it. The Digicon TT-01 Tele Tachometer is available from Condor Hobbies, 17835 Sky Park Circle, Suite E, Irvine, California 92714, phone (714) 556-1888. □



The optimum propeller for Forrest Edwards' Fleet Trainer, powered by his 5 cylinder, 4 stroke engine, is 24'' diameter/8'' pitch determined by airborne information.



The tachometer sensor is circular object mounted below oil pump. The transmitter and battery for the Tele Tach is installed in the fuselage.



Airspeed information is obtained from this device which is mounted on the outboard wing struts. Note plug-in connector. Wires to Tele Tach transmitter run through wing.

DON HARRIS MODEL AIRPLANE FIRE EXTINGUISHER

By Bob Wallace

As most modelers are well aware, one of the most fascinating aspects of our hobby sport centers on the endless variety of accessory items that are available, with new items being constantly introduced. The use value of these accessories range from downright necessities to the "gee, that's nice, but do you ever actually use it" type items.

The subject of this product review is an item that should be in every giant scale modeler's flight box, and is an excellent safety device to be included in any modeler's inventory of field related equipment. This device is the Don Harris Model Airplane Fire Extinguisher. It is available from Don Harris, 23668 Shadow Drive, Auburn, California 95603. (Don Harris is best known for his excellent line of giant scale smoke generating systems, which function in a most impressive manner.) Priced at $9.95, this compact fire fighting unit is both new and unique to the modeling fraternity.

The rapid and continuing growth of giant scale modeling has generated numerous articles in the various modeling magazines and club newsletters relative to the increased fire hazards associated with the gasoline fueled engines. The fire and explosion dangers of conventional glow engine fuel has been well-documented, however, the same hazard potential of gasoline based fuels is far greater.

Any modeler using a gasoline fueled engine would be well-advised to have ready access to a suitable fire extinguisher.

While the vision of seeing one's model destroyed by fire is not pleasant, the potential for serious personal injury should be an even greater reason to induce any giant scale modeler to equip his/her flight or tool box with a suitable fire extinguishing unit.

The most commonly used fire extinguisher in use by modelers is the pressurized, dry powder type that are readily available in discount houses, hardware stores, and building supply outlets. This type of extinguisher does its job very well, but does have a few shortcomings. They are rather large and bulky and, when used, leave a messy residue.

This is where the new Harris fire extinguisher really shines! It is compact, measuring 1½" in diameter and is only 5⅞" high. It weighs a mere 6 ounces. The Harris extinguisher is a disposable, pressurized Halon gas unit, rather than a dry powder type.

What this means is that there is no extinguisher residue when it is used. It is non-staining, non-corrosive, and non-contaminating. This Halon gas extinguisher has a non-offensive lemon-like odor when used. Halon type fire extinguishing systems are being used in computer facilities, laboratories, race car cockpits, aboard the space shuttle Columbia, and in many other areas where valuable equipment or material is stored, or where a high fire risk factor is present.

The no-mess compact features of the Harris extinguisher are even further enhanced by its all important in-use performance. We thought that we would attempt to photograph an example of a fire being extinguished with the Harris unit, however, this proved to be a frustrating endeavor. When the extinguisher was used on our test fire, it was a "now you see it, now you don't" experience with regard to the flames. The Harris extinguisher is a truly impressive safety device. We used our extinguisher between 12 and 15 times and it still appears to have retained about one third to one quarter of its original pressurized fluid volume.

If this review doesn't convince you of its value, seeing a Harris extinguisher in use will do so.

An added benefit not mentioned, but obvious, would be its availability in a modeler's workshop or wherever the flight box is stored when not in use.

In summary, the Harris Halon fire extinguisher is an excellent safety device. Every giant scale modeler should have a fire extinguisher in his/her flight box. The Harris extinguisher, being the lightest, most compact, no mess type unit, is an ideal choice.

□

SIDE POCKET

A .40 sized aircraft that fills the gap between low wing planes with trainer type wings and pattern planes.

By John Miller

Your initial impression of the Side Pocket may be that it's just another .40 sized sport pattern ship. Not So. The Side Pocket is what should be considered a "Basic Performance" aircraft, i.e., a ship capable of all of the existing pattern maneuvers **plus** the ability to land and handle, at low air speed, much like a trainer. To attest to this low speed stability, my prototypes are capable of hovering (right side up **and** inverted!) in a 15-20 mph breeze. The overall performance characteristics are attributed to the wing design which incorporates proven features of existing notable pattern aircraft designs (the late Jim Kirkland's "Intruder" and Rhett Miller's (no relation "Compensator"), plus my own personal touch of designing aircraft over the past eight years.

My design criteria for this .40 sized ship was as follows:

(1) A .40 sized aircraft exhibiting stable low speed flight characteristics, i.e., **easy** to land.

(2) Capable of full pattern performance — smooth rolling, predictable stall turns, predictable inverted characteristics, etc. This requires a double taper wing planform.

(3) Easy to build — not requiring exotic fixtures. The wing and fuselage are built true on a flat work table.

(4) Comfortable sized engine, fuel tank and radio compartment. Side Pocket is capable of accepting (easily) a 12 oz. Slim Line style tank.

(5) Ample room for retracts.

(6) Pleasing lines.

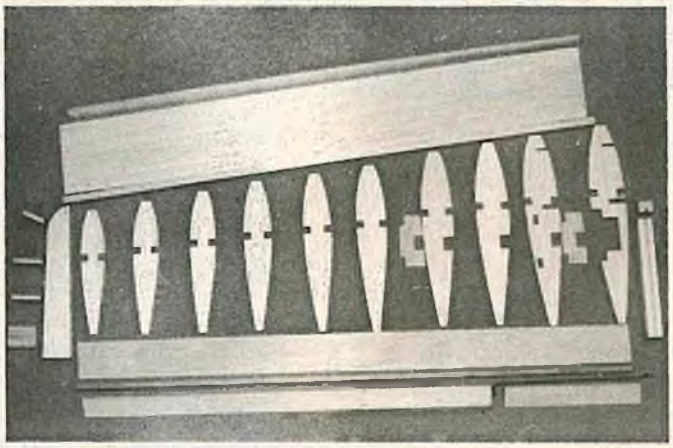
(7) Capable of performing with a non-Schnuerle ported .40.

The prototype uses a K & B .40 and can climb nearly vertical after rotation.

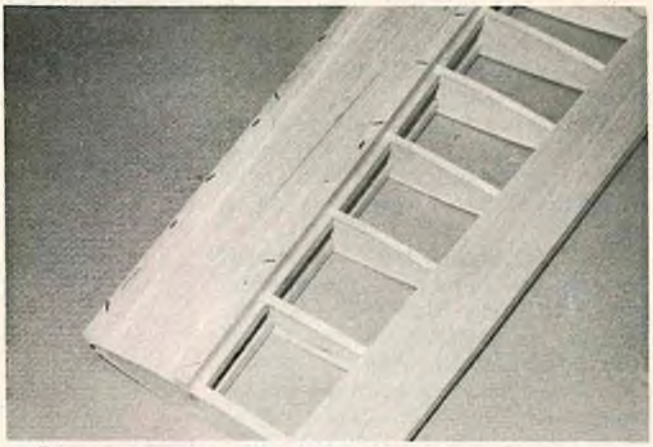
Side Pocket has surpassed all these criteria and my expectations. This is further exemplified by the four ships currently flying in our club, including a retract version. All four aircraft demonstrate excellent low speed stability and high speed performance attributed to the basic design.

Before beginning construction, you will need to cut all the parts to shape. I make my part patterns from sheets of poster board as follows: Lay the plans, face up, over the poster board with carbon paper in between. Pin to the work table. Trace directly on the plans using a ballpoint pen. Remove from the work table. Cut the patterns and lay directly on the wood. Trace the outline with the ballpoint pen. Cut the part out and use a sanding block to smooth any rough edges.

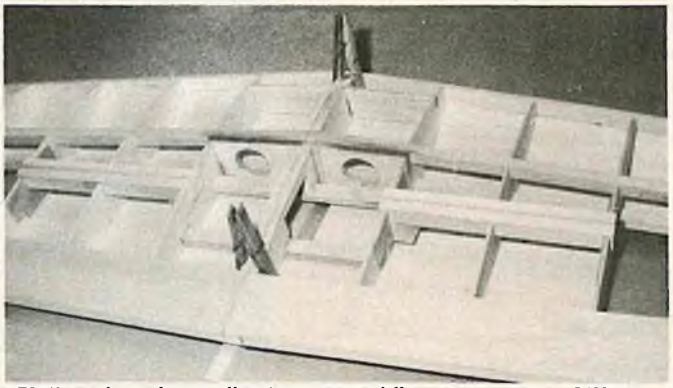
Final Note: The C.G. location is critical in order to obtain nose-high flared landings. Side Pocket has flown with C.G. forward of plan location resulting in "no spins" and a tendency for the nose to sink, objectionably, on landing. The prototype pictured in this article is MonoKoted and required approximately 1½ ounces of



Basic component pieces of wing half.

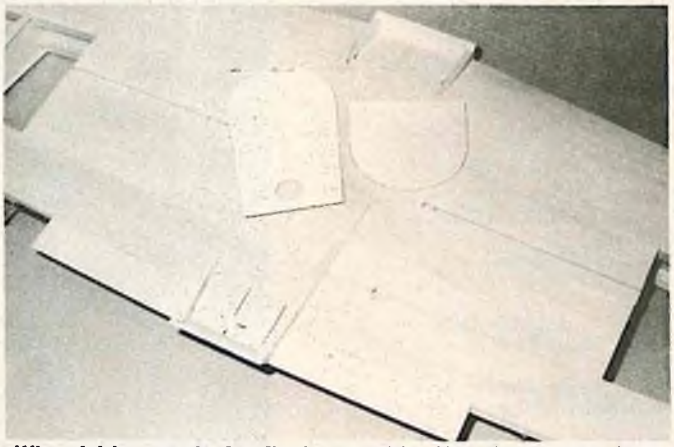


3/8" sq. balsa strips used to hold leading edge sheeting tight while drying. (See Step #11 in wing construction.)

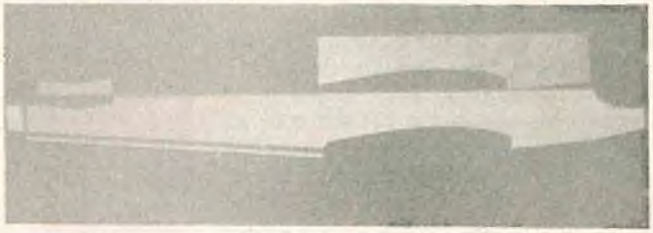


Clothespins clamp ribs together while epoxy cures. 3/8" sq. under center with tips touching table provide proper dihedral.

Masking tape used on trailing edge while epoxy cures. Servo rails are designed into construction and will accept KPS 15 size or smaller servos.

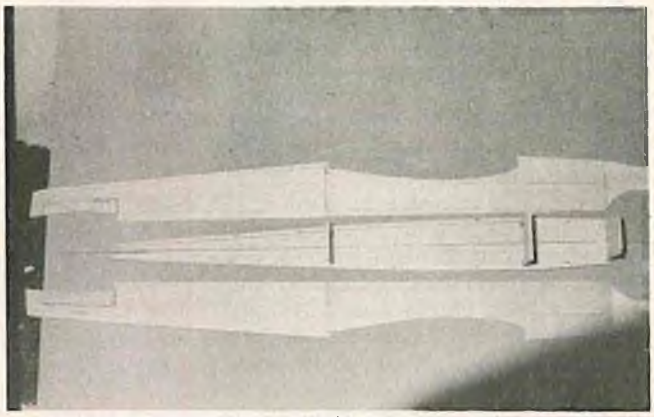


Wing fairing ready for final assembly. Note hefty wing bolt hold-down plate.



Fuselage side components.

Fuselage top block and formers with centerlines and locations marked.



Fuselage ready for final assembly. Designer uses centerline on top block, formers and work table for accuracy. Servo rail and fuel tank supports already in place.

Joining Wing Halves:

1. Turn the wing panels upside down and support rib #1 with a length of 3/8" sq. balsa. Sand, as required, for a smooth fit between wing halves. Insert, do not glue, the servo rails into one wing half. Apply epoxy to ribs #1 and join together. The tips should touch the table and the center is supported by the 3/8" sq. balsa.

2. Fit and epoxy in place both dihedral braces, 1/8" ply webs and servo rails. Insure the braces are flush with the top of the ribs.

Finishing the Wing:

1. Trim, fit, and glue the 3/32" spar webs in place as shown on the plans.

2. Trim and glue the bottom 1/16"

lead **in the tail**! Other Side Pockets flying have also required tail weight.

CONSTRUCTION

Wing:

Both wing halves can be built simultaneously on a flat warp-free table. They do not have to be built over the plans. Halves are built "right side up."

1. Pin the bottom 1/16" T.E. sheets over the plans and mark the location of all the ribs. Use the R.H. Rib Spacing for marking the location of the right hand wing ribs.

2. If not building over the plans, re-pin the 1/16" T.E. sheet to your work table. Glue the 1/4" T.E. flush with the edge of the 1/16" sheet. Pin to table while the glue dries.

3. Using the dihedral template, align and glue rib #1 to the T.E. and T.E. sheet.

4. Glue rib #10 perpendicular to the T.E. and T.E. sheet.

5. Mark the locations of ribs on the bottom spar. Place, do not glue, the bottom spar under ribs #1 and #10. Support the spar, as shown on the plans, with 1/8", 3/16", 1/4", and 5/16" balsa pieces.

6. Glue the remaining ribs to the T.E. sheet and T.E. Align all ribs at locations marked on the bottom spar.

7. Pin the spar to the table at spar support locations. Now, glue all the ribs to the bottom spar.

8. Glue the top 1/16" T.E. sheet to the ribs and T.E. Pin the trailing edge to the table while the glue dries.

9. Glue the top spar in place. If necessary, re-pin the bottom spar so the pins can be removed before the wing is removed from the work table.

10. Glue the 3/8" balsa L.E. to the front of the ribs.

11. Trim the 1/16" top L.E. sheet to shape. Apply a sandable glue to the L.E., top spar and ribs. Pin the L.E. sheet in place. A simple way to achieve a good L.E. and spar joint is to pin 4" or 6" lengths of 3/8" square balsa on top of the 1/16" sheet along the entire joint length. These lengths evenly distribute the compression forces of the pins for a smooth even joint.

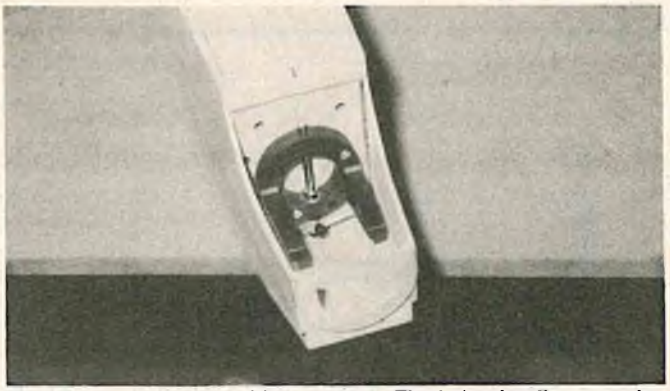
12. When the glue is thoroughly dry, remove all the pins. Remove the wing panel from the table. Trial fit the landing gear blocks and 1/16" ply plates to the ribs. Epoxy the landing gear blocks and ply plates in place simultaneously. Use clothespins to hold the ply plates to the ribs. When cured, fit and epoxy the pine blocking pieces in place. When cured, drill a 5/32" hole through the blocking and landing gear block.

13. Re-pin the wing halves to your work table. Trim, fit and glue the top 1/16" center sheeting to the ribs per the plans. Cut and glue the top capstrips to the tops of the ribs. When dry, sand end of rib #1 flush.

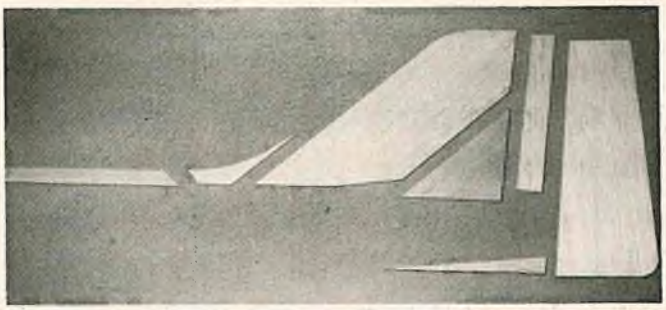
SIDE POCKET BILL OF MATERIALS

Quantity	Size	Usage
	PLYWOOD	
1	1/32" x 6" x 36"	Fuselage Doublers
1	1/16" x 6" x 12"	F-1, Tank Floor Land Gear Block Plates.
1	1/8" x 6" x 12"	F-4, Wing Plate, Dowel Webs, Dihedral Brace.
1	1/4" x 6" x 12"	F-2, F3, Wing Bolt Plate, Dihedral Brace.
	BALSA	
11	1/16" x 4" x 36"	Stab Sheeting, Wing Sheeting, Cap strips.
2	3/32" x 3" x 36"	Ribs #4 through #10.
2	3/32" x 4" x 36"	Ribs #2 & 3, Bottom Fuselage Sheeting, Spar Webs, Stab Ribs.
2	1/8" x 4" x 42"	Fuselage Sides, Stab Doublers, Wing Front & Rear Fairing End Pieces.
4	1/4" x 1/4" x 36"	Fuselge Top & Bottom Stringers, Fuselage Balsa Supports.
1	1/4" Triangle x 36"	F-1 and Wing Bolt Hold Down Plate Reinforcers.
2	1/4" x 3" x 36"	Vertical Fin (5 pieces), Wing Tips, Tip Braces, Wing Trailing Edge, Stab Trailing Edge.
2	1/4" x 4" x 36"	Rudder, Rib #1 (2), Wing Front & Rear Fairing Side Pieces, Stab Rib S1, Tank Compartment Top Block, Fuselage Top, Bottom Fin.
5	3/8" x 3/8" x 36"	Wing Spars, Stab Leading Edges.
1	3/8" Triangle x 36"	F-2 Support
1	3/8" x 3" x 36"	Wing Leading Edges
1	1/2" or 5/8" Triangle x 36"	Chin Block Triangle Supports
1	1/2" x 4" x 36"	Chin Block, Bottom Block, Wing Center T.E. Sections, Stab Blocks.
3	3/8" x 1½" x 36" Aileron Stock	Elevators, Ailerons (Glue 1/8" scrap strip to leading edge and trim trailing edge to achieve suitable shape and thickness), Tail block.
1	3/4" x 2" x 12"	Stab Tips
	MISC. WOOD	
1	1/4" Dowel	Wing Dowels
1	1/4" x 1/2" x 36" Spruce	Servo Rails
2	5/8" x 3/4" x 7" Pine	Landing Gear Blocks and Blocking Pieces.
	HARDWARE	
1	3/32" x 36" Music Wire	Aileron and Elevator Linkage.
2	5/32" x 36" Music Wire	Landing Gear Struts
1	1/8" O.D. Brass Tubing	Aileron and Elevator Linkage.
1	2-56 x 12" Threaded Rod	
1	Wing Sport Canopy	
1	1/4"-20 x 2" Nylon Wing Bolt	
1	Set Landing Gear Straps	

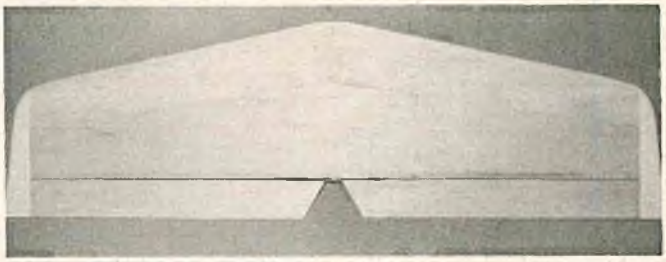
Quantity	Item
1	2¼" Spinner
1	10 x 6 Propeller of Choice
1	36" Length NyRod Set
1	Goldberg or Equal 5/32" Steering Arm
1	#6 Flat Washer
1	Goldberg or Equal Long Control Horn (Elevator)
1	Goldberg or Equal Short Control Horn (Rudder)
1	Pair Klett Short Pushrod Exit Guides
1	Dave Brown or Kraft 40 Engine Mount
1	4-40 Engine Mount Bolt Set
1	Kraft or Equal 8 oz. "Slim Line" Fuel Tank
1	12" Length Silicone Fuel Tubing
1	Strip Aileron Linkage Set
7	5/32" Wheel Collars
3	2¼" Wheels
8	Nylon or Steel Clevis'
15	Klett Small Hinges
4	Solder Links



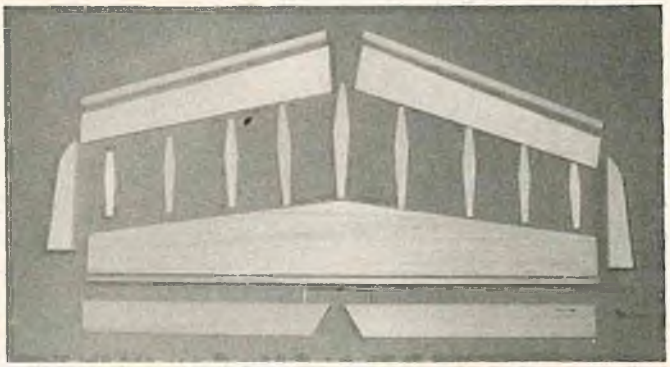
Engine compartment with nose gear. Final shaping line on chin block and triangle pieces.



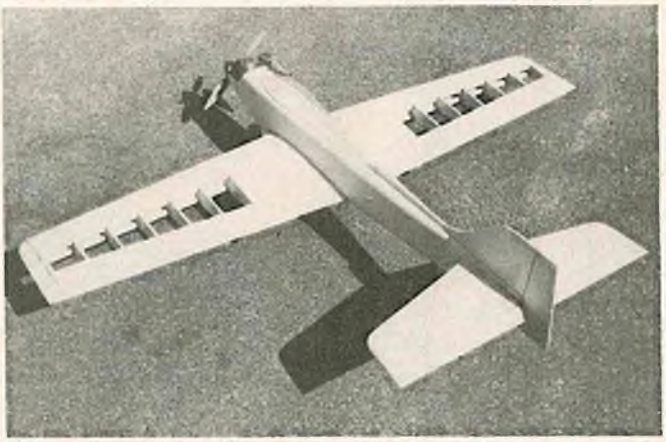
Complete pieces for vertical fin and rudder.



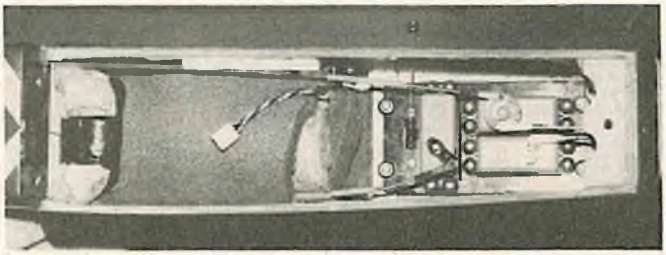
Completed stab and elevator.



Basic components for stab and elevator.



Side Pocket ready for final covering and finishing.



Very neat radio installation. Receiver under all that foam padding.

L.E. sheet in place.

3. Trim, fit, and glue the bottom center sheeting and bottom capstrips in place.

4. Glue the 1/4" wing tips, braces, and blocks to ribs #10 per the plans.

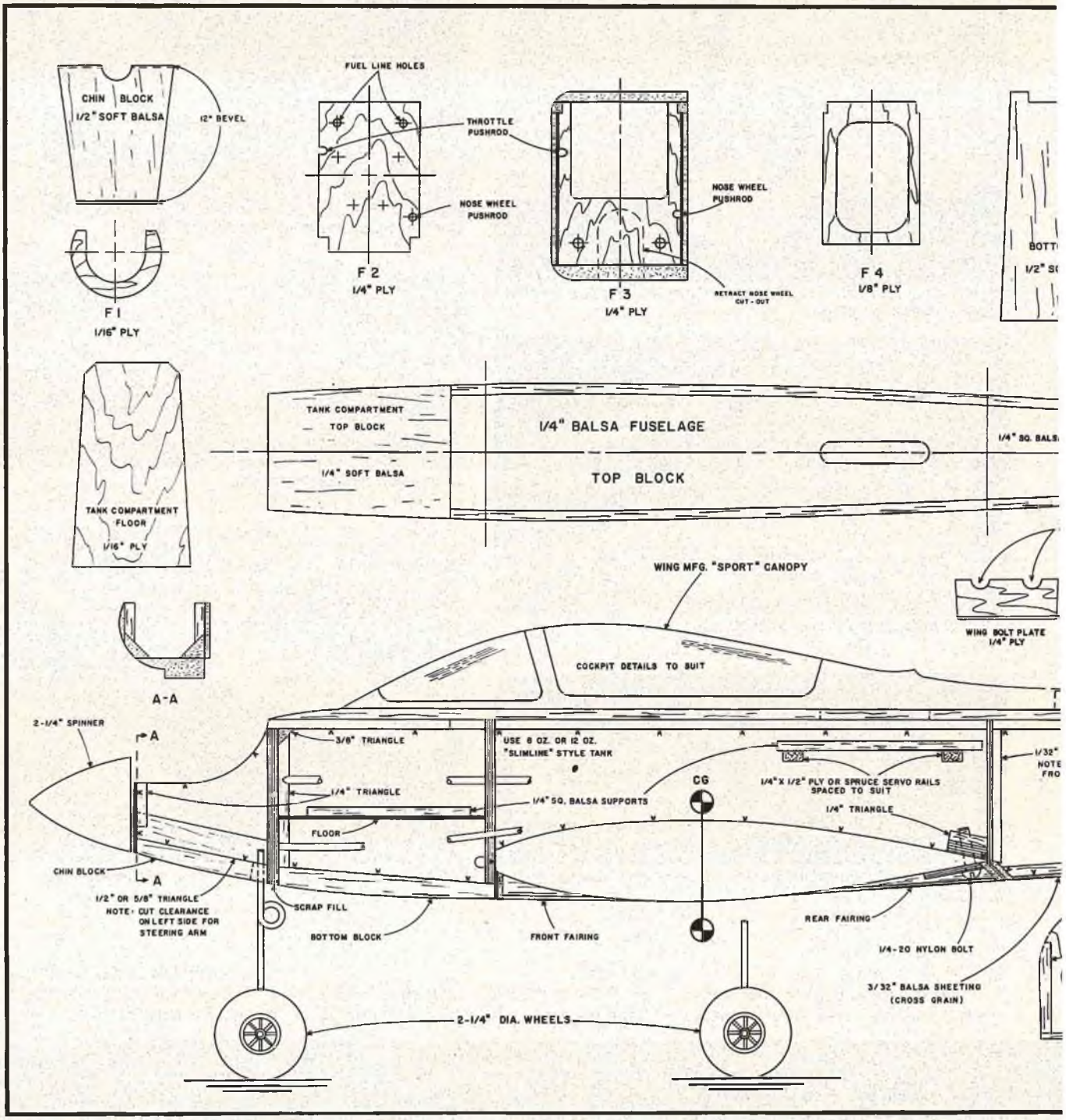
5. Epoxy the center trailing edge to the wing with aileron torque rods in place. Be careful not to get epoxy

SIDE POCKET
Designed By.
John P. Miller, Jr.
TYPE AIRCRAFT
Basic Performance (See Text)
WINGSPAN
57 Inches
WING CHORD
10¼ In. (Avg.)
TOTAL WING AREA
584 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Semi Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL EACH TIP
13/16" or 3/8" under center rib with wing inverted

O.A. FUSELAGE LENGTH
47⅛"
RADIO COMPARTMENT SIZE
(L) 12-1/16" X (W) 2¾" X (H) 2½"
STABILIZER SPAN
25 Inches
STABILIZER CHORD (incl. elev.)
6-11/16" (Avg.)
STABILIZER AREA
167 Sq. In.
STAB. AIRFOIL SECTION
Symmertical
STABILIZER LOCATION
Mid Fuselage
VERTICAL FIN HEIGHT
4¾ Inches
VERTICAL FIN WIDTH (incl. rud.)
8¼" (Avg.)
REC. ENGINE SIZE
.40 Cu. In.

FUEL TANK SIZE
8 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4 (5 for retracts)
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt. (Retracts)

BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa, Ply, Pine
Empennage ..... Balsa
Wt. Ready To Fly ..... 72-96 Oz.
Wing Loading ..... 17.75-23.67 Oz./Sq. Ft.



between the brass tubing and music wire.

6. Sand the wing L.E., T.E., wing tips and ailerons to shape per the plans. **Note: L.E. is a constant radius from root to tip and is important in achieving the outstanding flying characteristics of the Side Pocket.** Cut the servo opening in the top of the wing.

Fuselage Construction:

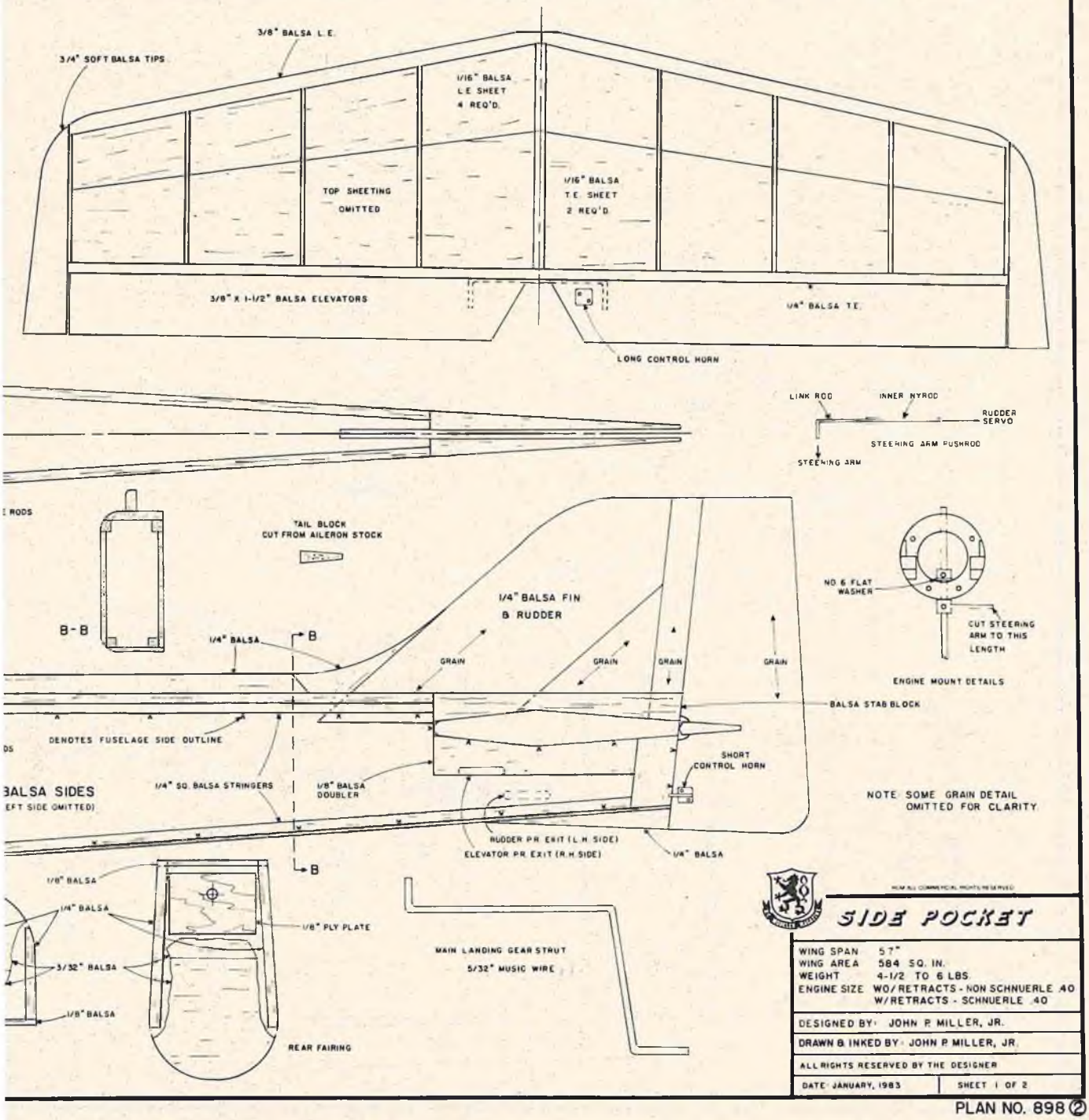
1. Prepare an R.H. and L.H. side by marking the locations of the 1/32 ply and 1/8" balsa doublers on the fuselage sides. Using a **non-water** based contact cement, cement the doublers to the sides. Cut the elevator and rudder pushrod exit slots per the plans. Glue, to one side only, the balsa tail block. Mark the locations of F-2, F-3, and F-4. Mark and glue in place the 1/4" balsa fuel tank floor and servo rail supports. Using sandable glue, glue the 1/4" sq. bottom balsa stringers in place.

2. Glue the 1/4" tank compartment top to the 1/4" fuselage top block, using a sandable glue.

3. When dry, place top block over plans and mark longitudinal centerline and locations of F-3 and F-4.

4. Mark a long centerline on your work table. Pin the top block to the table with centerlines aligned. Mark centerlines on F-2, F-3, and F-4. Epoxy these formers to the top block aligning centerlines and insuring formers are perpendicular to the top block.

5. Using a sandable glue, glue and pin the 1/4" top stringers to the top block per the plans. Glue the 3/8"



SIDE POCKET

WING SPAN	57"
WING AREA	584 SQ. IN.
WEIGHT	4-1/2 TO 6 LBS.
ENGINE SIZE	W/O RETRACTS - NON SCHNUERLE .40 W/RETRACTS - SCHNUERLE .40
DESIGNED BY:	JOHN P. MILLER, JR.
DRAWN & INKED BY:	JOHN P. MILLER, JR.
ALL RIGHTS RESERVED BY THE DESIGNER	
DATE: JANUARY, 1983	SHEET 1 OF 2

PLAN NO. 898 ②

triangle piece to F-2 and top block.

6. Trial fit the fuselage sides to the top block and formers. Due to the airfoil shape of the fuselage, the sides are glued to the top using a two step method. **First Step:** Apply a uniform thin amount of 5-minute epoxy to F-2, F-3, and the top of the fuselage sides between F-2 and F-3. Both sides should be done simultaneously. Apply a slow drying sandable glue to the top of the fuselage half the distance from F-3 to F-4. Assemble both sides to the top aligning F-2 and F-3 with the marks on the fuselage sides. Hold or clamp until the epoxy cures. **Second Step:** Apply slow drying sandable glue to the exposed top of the 1/4" stringers. Apply 5-minute epoxy to the sides of F-4. Draw both sides towards F-4 and the top block. Pin the sides to the top block. Hold or clamp the sides to F-4 until the epoxy cures. Pull the tail of the fuselage together aligning over the table centerline and glue the tail block to the remaining fuselage side.

7. Fit and glue 1/4" triangle pieces to F-2. Glue the throttle pushrod to F-2 and F-3. Glue the tank floor to the supports. Glue the nose gear steering pushrod to F-2 and F-3.

8. Epoxy the 1/4" ply wing bolt plate and the 1/4" triangle pieces in place. Glue the 1/8" balsa piece to F-4.

9. Remove pins from F-4 to the rear of the top block. Cut, fit and glue (cross grain) the 3/32" sheet to the fuselage bottom using sandable glue.

Fitting Wing To Fuselage:

1. The fuselage must now be positioned and pinned to the work

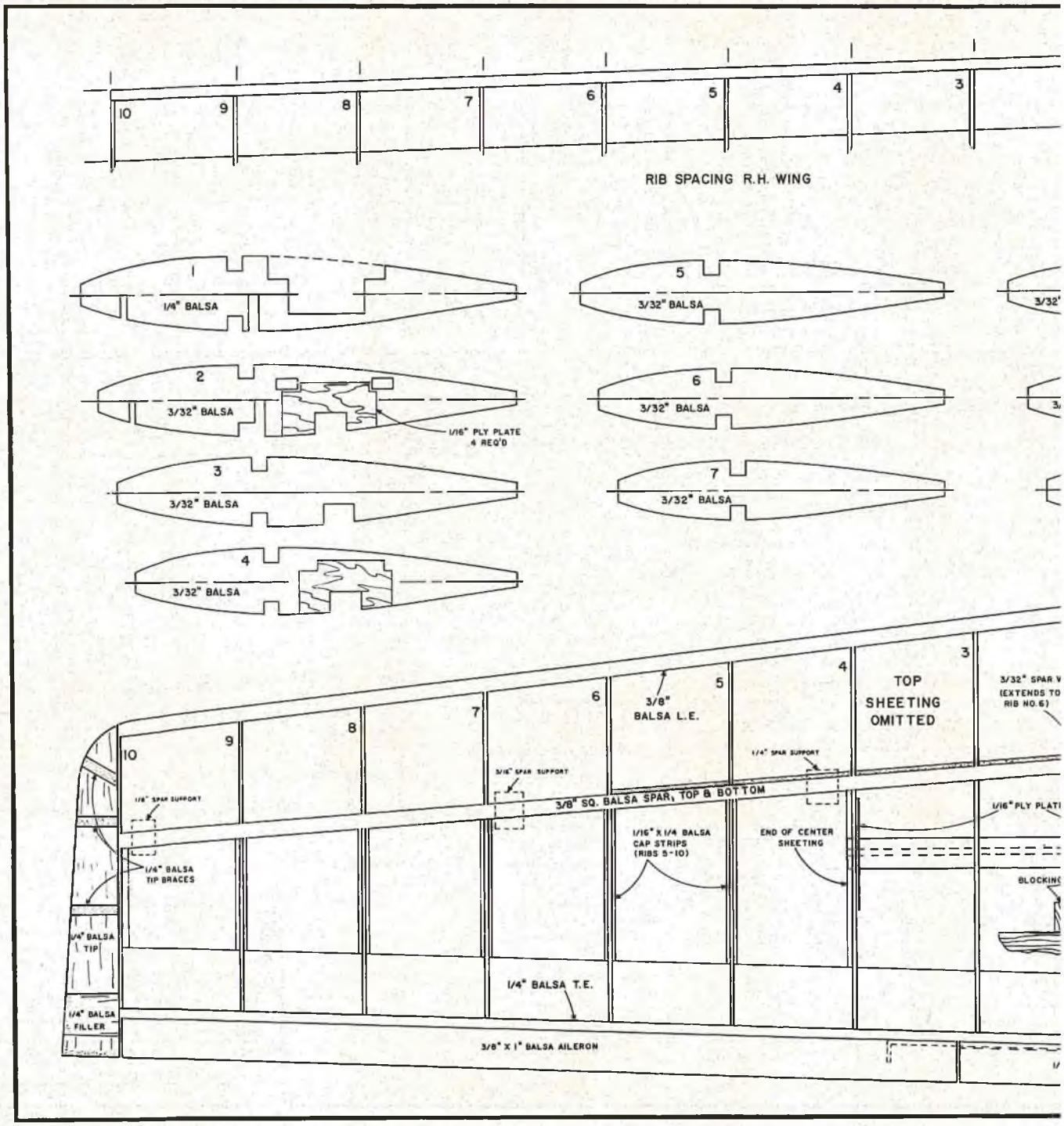


table so the table is under the wing tips with the wing in place in the fuselage.

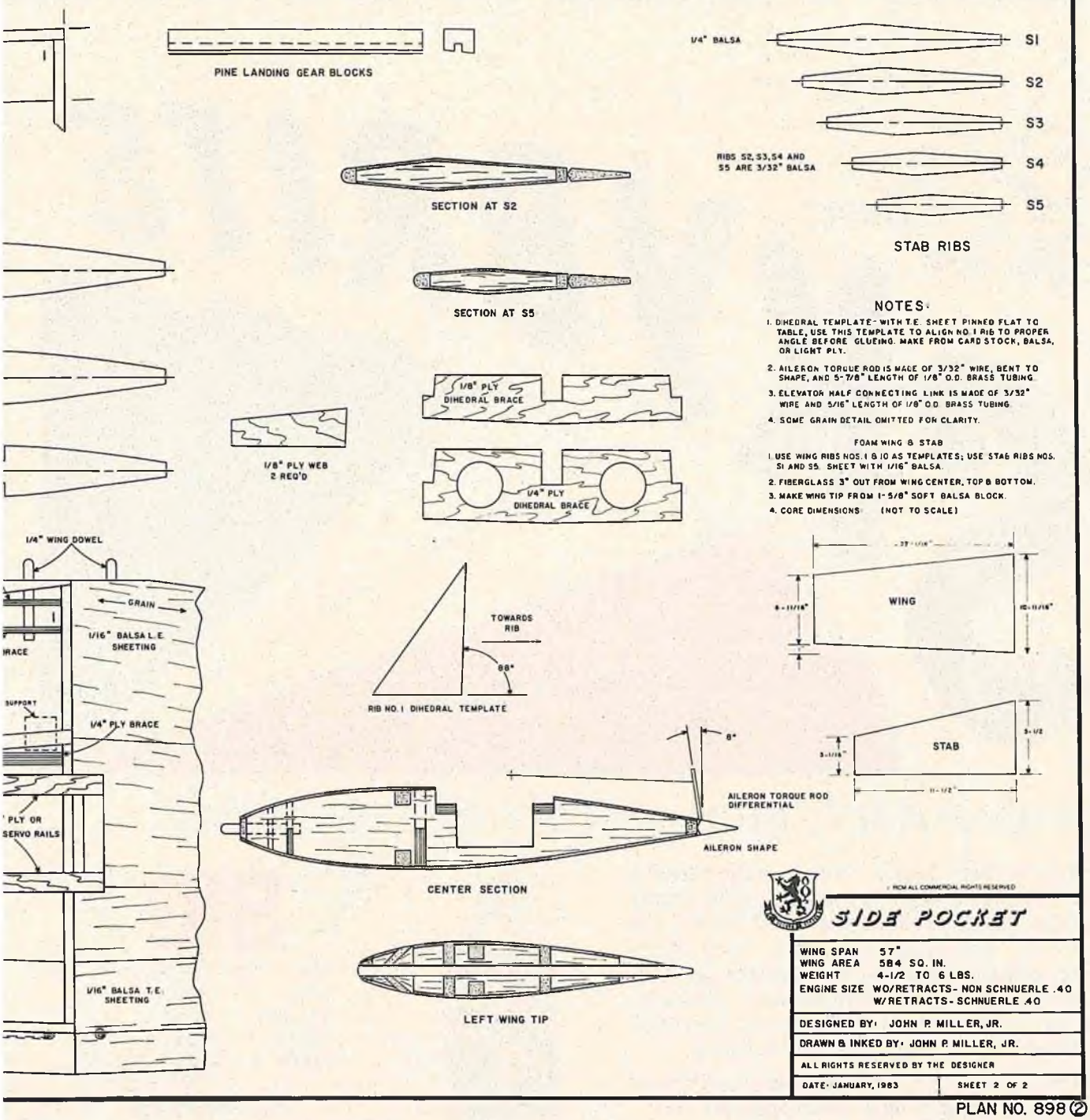
2. Measure and mark the centerline of the fuselage on the 1/8" balsa piece at F-4. Cut and sand the center L.E. of the wing so the wing fits with the fuselage. Seat the wing so wing and fuselage centerlines align. Measure from the table to the wing trailing edge at wing tip. Compare both tip measurements. Carefully sand the wing saddle with the "highest" wing tip until both tips are equidistant from the table.

3. Insert a 15/64" drill through F-3 and drill, by hand, through the balsa L.E. and start the hole in the 1/8" ply web. Do this for both dowels. Remove the wing and drill the holes through the webs and dihedral brace.

4. Insert, do not glue, wing dowels into the wing. Fit the wing to the fuselage with dowels into F-3. Insure for a "snug" fit of the dowels in F-3. Pin or weight down the trailing edge of the wing. Recheck the wing tip measurements and sand the saddle(s) as required.

5. Epoxy the 1/8" wing bolt plate to the wing T.E. per the plans. Mark the location of the bolt hole on the 1/8" ply plate. Drill through the plate, wing and wing bolt hold-down plate using a #7 drill. Tap the wing bolt hold-down plate with a 1/4-20 tap. Enlarge the hole in the wing for a snug fit of the bolt.

6. Remove the wing, epoxy the dowels into the wing, and rebolt the wing to the fuselage while the epoxy cures, being careful not to get epoxy on



PLAN NO. 898 ②

the wing L.E. or dowels that extend into F-3.

Wing Fairings:

Using a straightedge against the fuselage sides, mark the extension of the sides onto the wing at the front and rear fairing locations. Trim, fit, and glue the front and rear fairing side pieces in place, per the plans. Trim, fit, and glue the 3/32" sheet in place. Cut the access hole for wing bolt.

Stab Construction:

1. Pin the bottom 1/16" T.E. sheet over the plans and mark the location of all the ribs. Pin, do not glue, the 1/4" T.E. flush with the rear of the 1/16" T.E. sheet. Glue all ribs in place. When dry, glue and pin the top 1/16" T.E. sheet to the ribs.

2. Glue and pin the top 1/16" L.E. sheets in place. When dry, turn the stab over and glue the bottom 1/16" L.E. sheets in place.

3. Using a long sanding block, gently sand the leading and trailing edges so the ribs are flush with the sheeting. Be careful not to sand too much.

4. Using a sandable glue, glue the leading and trailing edges in place. Wrap masking tape around the edges to hold in place while the glue dries.

5. Sand the sheeting flush with rib S5 and glue the stab tips in place. Sand entire stab to shape.

6. Drill the elevator halves for connecting link. Insure that the L.E. of the link is flush with the L.E. of the elevators and epoxy to the elevators.

Final Assembly:

1. Trial fit the engine mount & nose

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POWER BOATING

Howard Power

This month we will attempt to explain some of the mysteries of the racing motor induction system. These remarks will be applicable to those of you who use exhaust throttles and venturies (or draw tubes) and for those of you who prefer variable inlet area carburetors. Our two stroke motors use variations in crankcase pressure to draw fuel and air into the combustion chamber. The intake valve system (be it piston port, reed valve or rotary valve) opens the crankcase to the outside air when the piston moves toward the top of its stroke. Since the effective crankcase volume increases when the piston moves toward top dead center, a suction is created which brings air and fuel mixture into the crankcase. On top of this is superimposed resonance effects of both the intake tract and the usual tuned pipe exhaust system that also pump fuel and air into the case. The induction system before the intake valve is what we will discuss in this article. The purpose of this system is to provide the exact mixture and quantity of fuel and air that is required by the combustion process.

Historically, one of the best ways to accomplish the mixing of fuel and air has been to use a venturi with a fuel nozzle mounted in the passage at the point where the flow area is smallest. Figure 1 shows the basic venturi set-up and its nomenclature. The airflow enters the intake face (station 1) and, as the air encounters a restriction of cross sectional area from the face to the throat (station 2), the flow velocity increases and the pressure decreases. The section from the throat to the motor backplate (station 3) is usually a constant area or slightly diverging area section that is used to "tune" the intake tract. Station 3 is located where the intake passage starts to diverge rapidly to match the shape of the intake window (station 4) where the normal disk or drum rotary valve is located. This valve opens and closes to time the start and finish of the intake flow into the crankcase.

Let us consider the steady state air flow through the venturi. As long as the flow velocities inside the venturi are below approximately 700 feet per second, the density of all the air fluid particles is unchanged. The flow is, therefore, incompressible and we can calculate its density by using the perfect gas equation of state for air:

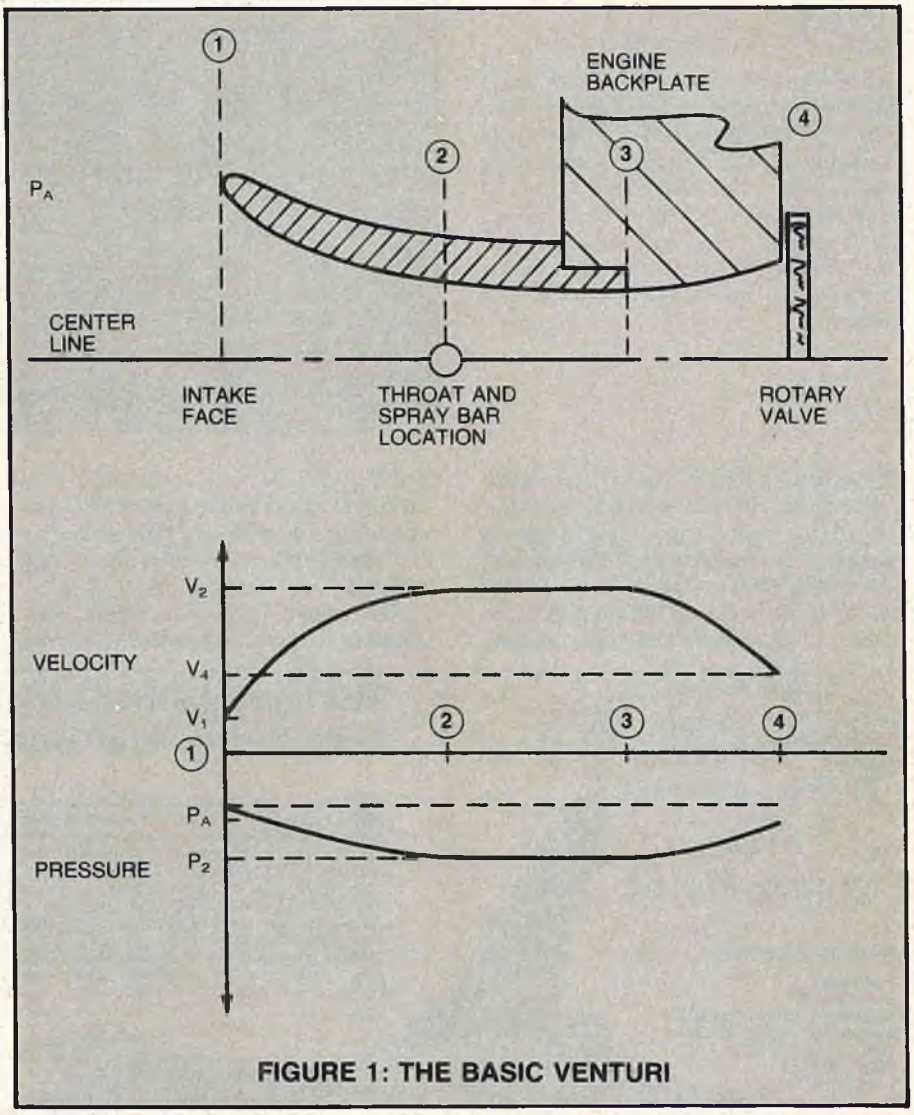


FIGURE 1: THE BASIC VENTURI

Equation 1:

$$d = \frac{P}{1716T}$$

where the density, d, is defined as the mass per unit volume of the air (its units of measurement are slugs per cubic feet), the pressure, p, is the local atmospheric pressure (its units are pounds per square feet) and the temperature, T, is the local atmospheric temperature (this temperature is measured in absolute Farenheit degrees which may be found by adding the normal Farenheit temperature to 459 degrees). On a standard day, the density of dry air is 0.002377 slugs per cubic feet. If the temperature of the air increases without a pressure change, the air density will decrease. If the atmospheric pressure drops without a change in temperature, air density will decrease. Since water vapor weighs less than dry air, the density of the air flow through the venturi will decrease on humid days. Later we will discuss how changes in these air properties affect the mixture strength and power output of our engines.

Now that we have established that the flow through the venturi is incompressible we will turn our attention to its other characteristics. If we look at the air flow through the

venturi it is logical to assume that no air particles are created, destroyed, or stored, so we are led to to the conclusion that the stuff that goes in at station 1 goes out at station 4. In science, this fact is expressed as the conservation of mass flow. The rate of mass flow (measured in slugs per second) is constant. In equation form, this law is expressed as:

Equation 2:

$$d_1A_1V_1 = d_2A_2V_2 = d_3A_3V_3 = d_4A_4V_4$$

where the numbers below the symbols denote the location where we measure the flow properties. A is the cross sectional area (measured in square feet) and V is the flow velocity (measured in feet per second). Since the densities at each station are equal, we can see that only the area ratios determine the velocities in the venturi:

Equation 3:

$$V_2 = \frac{A_1}{A_2} V_1$$

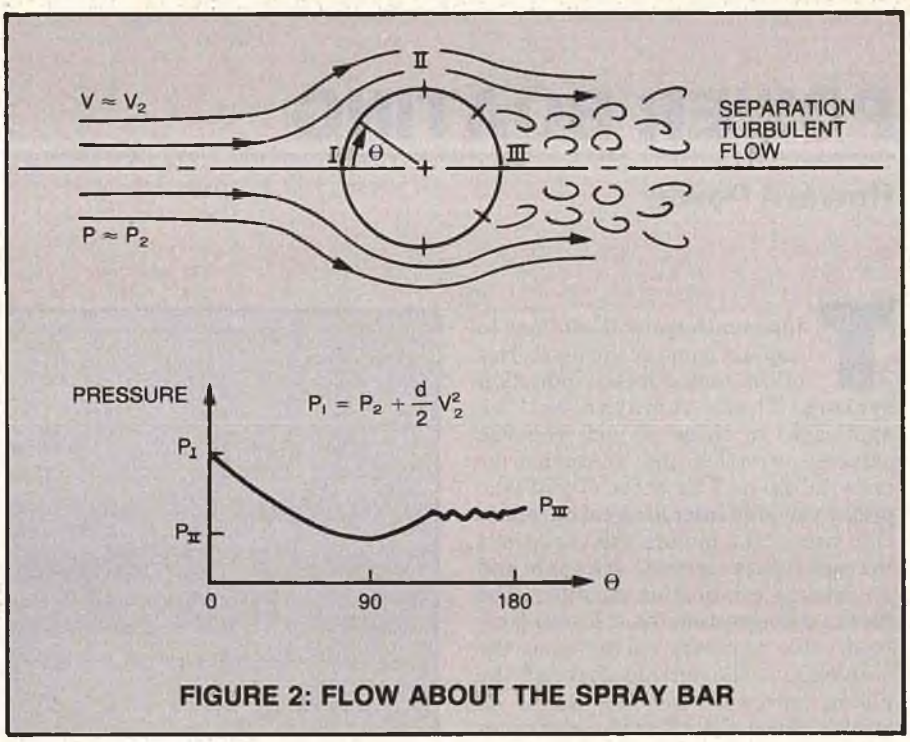


FIGURE 2: FLOW ABOUT THE SPRAY BAR

It is obvious that we can increase the velocity at the spray bar by making the area ratio A_1/A_2 as large as possible. It is also a well-known fact that if the pressure in a tube decreases as the flow travels along its walls, the flow will be smooth regardless of how quickly the cross sectional area changes. For this reason the best shape for the inlet section is a short trumpet shaped intake with a large area ratio as shown in the figure.

We would like to predict what happens to the pressure in the venturi at each station. To predict this we use another basic conservation relationship. Since no work or energy is added to the flow from outside sources, each fluid particles energy will remain constant. Each fluid particle has energy in the form of

kinetic energy (energy due to its mass and velocity) and energy stored in the form or work done by pressure forces required to travel down the tube. In order for a fluid particle to move into a region of high pressure it must then give up some of its kinetic energy (it slows down). The equation that expresses this basic rule is the familiar Bernouli equation for steady fluid flows:

Equation 4:

$$p_A = p + 1/2dv^2 = \text{constant}$$

Where p_A is the atmospheric pressure (in pounds per square feet) and p is the pressure at any station in the venturi. If we apply this result to our venturi we find that the pressure developed at the spray bar location may be calculated as:

Equation 5:

$$P_2 = P_A - 1/2dv\ \frac{2}{2}$$

We can, therefore, make the spray bar pressure p_2 lower than atmospheric by making V_2 large. Remember that V_2 will be large if the area ratio A_1/A_2 is large.

The ability of a venturi to draw fuel is determined primarily by attaining low spray bar pressures. The most

important design feature of a good venturi inlet must be, therefore, a large area ratio. In practice, physical size limits how high A_1/A_2 can be made. If the bell mouth is too large it will be too close to the bottom of the hull and water ingestion will either stop the motor or water drops will cause erratic running.

In the preceding analysis we have looked at only the flow through the venturi assuming the spray bar was not there. In fact, the spray bar restricts the flow at the throat since it blocks about twenty to thirty percent of the cross-sectional area. We must, therefore, consider how the spray bar itself affects the pressure seen at the fuel outlet. Figure 2 shows the typical air flow around a cylinder of infinite length (into the paper) when exposed to a uniform up-stream flow. The flow in our case approaches the spray bar at velocity, V_2, and pressure, p_2. As the flow moves around the spray bar, the velocity increases and the pressure on the spray bar surface decreases to a minimum at the angle Θ equal to ninety degrees. We can see that an additional suction pressure can be developed if we place fuel outlet holes on the top and bottom of the spray bar. The flow behind these points will follow the contour of the spray bar surface for only a short distance, after which it will separate and cause a turbulent area of flow behind the spray bar. The pressure in this area is lower than p_2 but not as low as that found at the top and bottom points of the spray bar. This is why in most cases it is preferable to have two fuel outlet holes located at the top and bottom instead of a single fuel outlet hole located at the back of the spray bar.

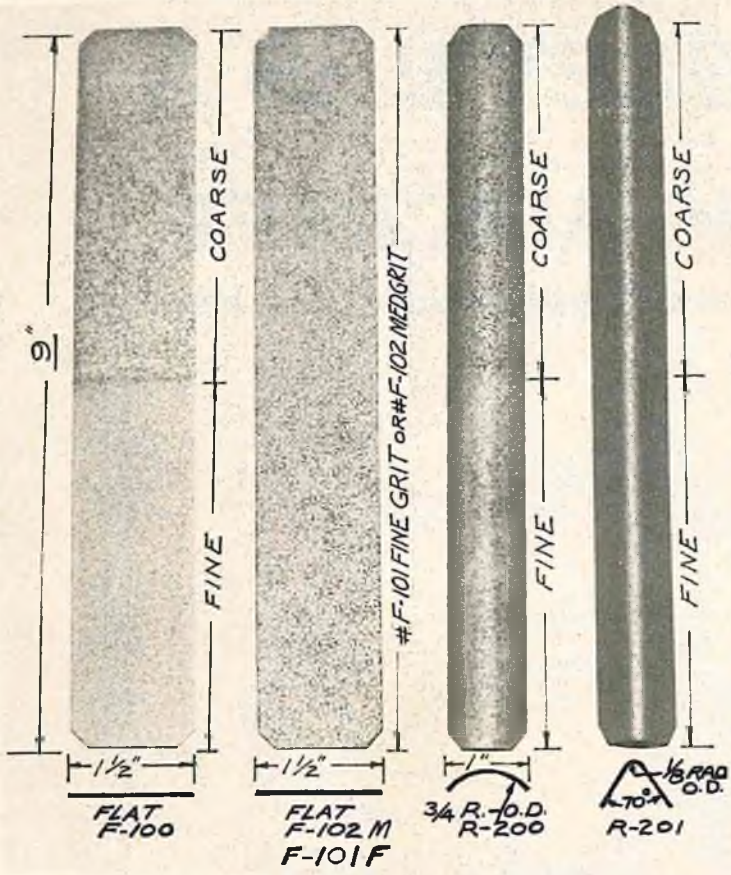
The suction pressure at the spray bar holes is a function of the venturi throat cross-sectional area minus the blockage caused by the spray bar (spray bar diameter times the length of the spray bar). The ability of the venturi to pass a quantity of air is also determined by this effective throat area A_eff

Equation 6:

$$A_eff = A_2 - d_1D_2$$

where d_1 is the diameter of the cylindrical spray bar and D_2 is the throat diameter. We may use this effective throat area to compare the mass flow capabilities of various venturi.

The venturi is a good fuel/air mixing device but it has no provisions for throttling an engine. To achieve variable engine speed we place a device on the exhaust system to regulate the flow of fuel and air through the engine. This exhaust throttle is closed down so that the



exhaust mass flow is reduced and as a result the intake flow must also decrease (remember the conservation of mass flow). Reduced intake flow results in reduced power or throttling.

The usual venturi has a constant choke area size. The disadvantage of this type of venturi is that its fuel/air mixture strength varies. Uniform mixture strength is not always optimum since most high output piped engines require a richer mixture around the maximum torque and/or maximum power rpm regions. The mixture strength of a venturi increases with rpm. We can see from Equation 2 that the mass flow of air varies directly with velocity for a given venturi design. Equation 5 shows that the spray bar suction pressure (hence fuel flow rate) increases with the square of the air flow velocity. As a result the fuel/air ratio increases (the mixture richens) with venturi velocity and rpm. This can sometimes cause mismatches of proper mixture at low and high engine rpm. At low engine speeds air velocity through the venturi is sometimes not high enough to draw sufficient fuel. When you try to enlarge the venturi throat size to maximize top end rpm for a given propeller you find that the mixture strength at low rpm is not always rich enough to allow the motor to run well at launch. As a result the fixed venturi limits the size of propeller you can use. Most modelers use muffler or pipe pressure to insure better fuel flow. Unfortunately pipe pressure decreases as rpm drops so this method insures good fuel flow only at higher speeds. The answer to this problem is to supply a device that has a variable throat size so that the throat velocity will remain high enough at low rpm to suck fuel reliably. This device is the familiar variable intake area carburetor.

Next month we will continue this study and discuss non-steady intake flow effects and venturi and carburetor sizing.

★

Last month I discovered a great new set of tools that are very useful to those of you who build your own hulls. D.G. Products Co. (209 Carrlands Dr., Dayton, Ohio 45429) manufactures a set of sanding tools that are named Perma-Grit sanders. These tools have a thin steel form on which is brazed tungsten carbide grit. The result is a tool that doesn't wear out when used on softer materials such as wood or fiberglass. An additional characteristic is that these tools do not load up but continue to cut material away as long as you keep sanding. In a nutshell, these tools can replace sandpaper, rasps, and carving knives as far as utility is concerned. There are five tools available at a suggested

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THE EAGLET II IS A LOW WING AIRCRAFT

A Conversion of the Popular Goldberg Kit

The Piper Cherokee 140 PA-28-140.

Tom Dobbins compares the Eaglet II (left) with the standard Eaglet.

Dear Carl,

The Eaglet II was completed the end of November by Jake Shirer and myself. We have both been in R/C since the early 50's. The first week in November Jake came into the store and was watching my son Jeff (11 years old) build our first Eaglet. He was impressed with the instructions so out the store went kit No. 2. During the construction, the fuselage just happened to be placed on top of the wing. Back to the store came Jake with the idea. We worked out the details on converting the kit with minimum changes to present your company with maybe the birth of the Eaglet II. I am enclosing the changes, parts, and pictures with this package.

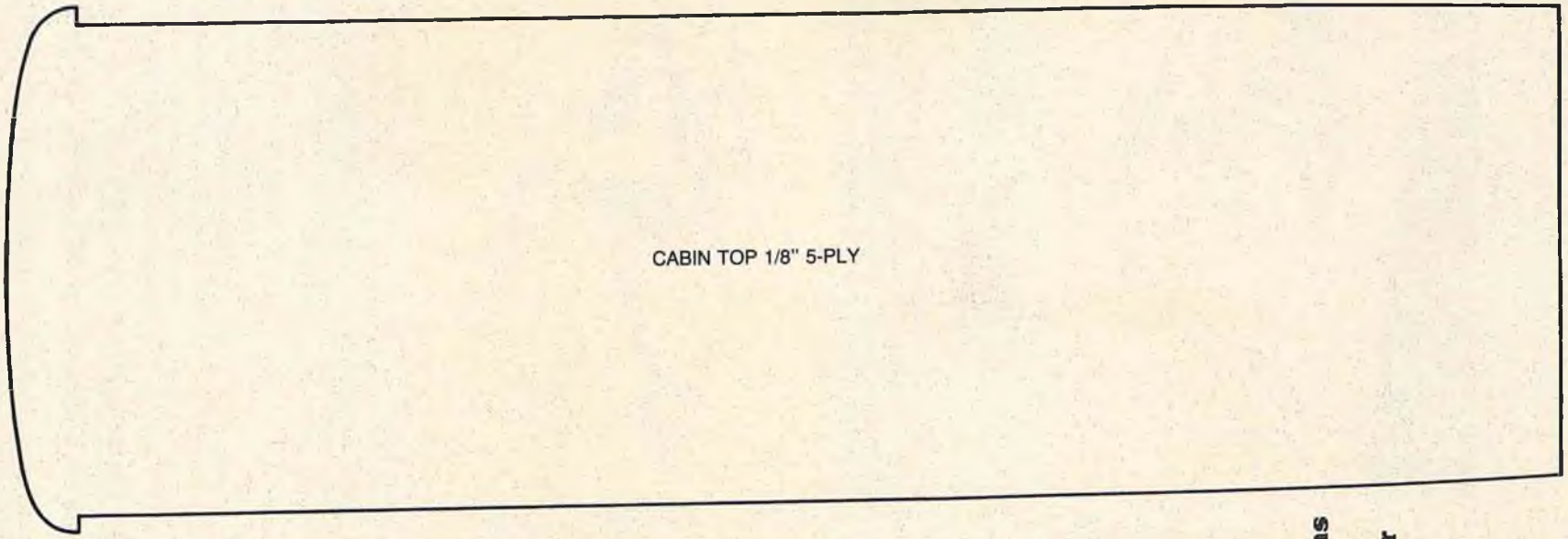
The Eaglet II is a 4 channel aircraft. Rudder alone will not turn the plane at full engine speed. The aircraft will not tip stall and flies excellent even in 20-30 mph winds. Ailerons are effective from take off to landings. In a 5-10 mph wind you can stop the plane at idle engine speed by holding up elevator. Ailerons are still effective until stall. The stall is straightforward with recovery by itself with controls neutral. We now have a stunt wing version yet to be tested for the low wing model.

Tom Dobbins
Bossier Hobby & Crafts

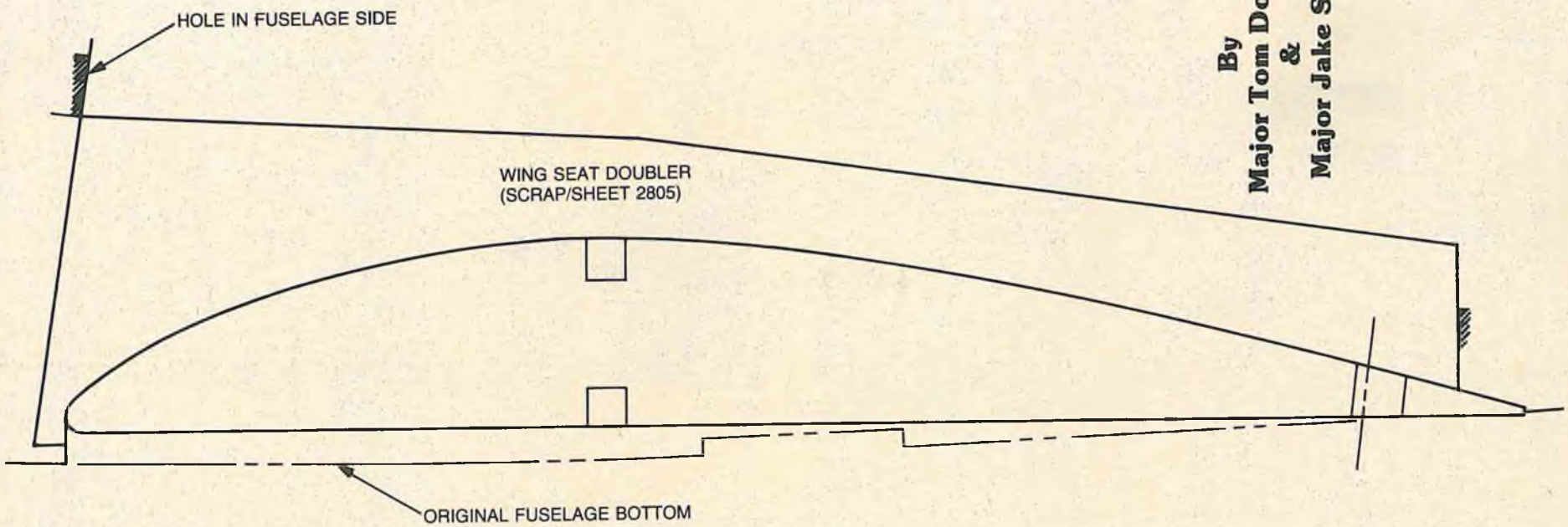
(Ed. Note: The foregoing is from a letter to Carl Goldberg from Tom Dobbins, owner of Bossier Hobby & Craft, Bossier City, Louisana. It is printed here as an explanation of the origin of the Eaglet II. The following is the conversion instructions from Major Jake Shirer.)

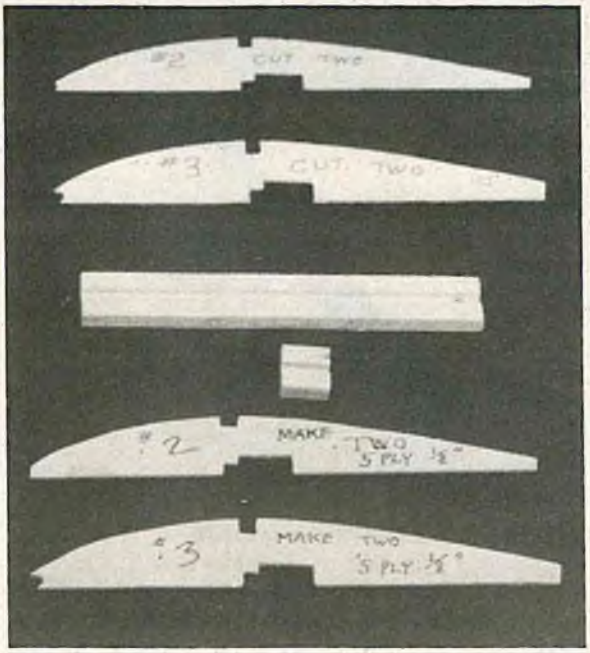
Conversion to low wing configuration is simple.

Like the way your Eaglet flies? But it looks like a trainer? Well join the

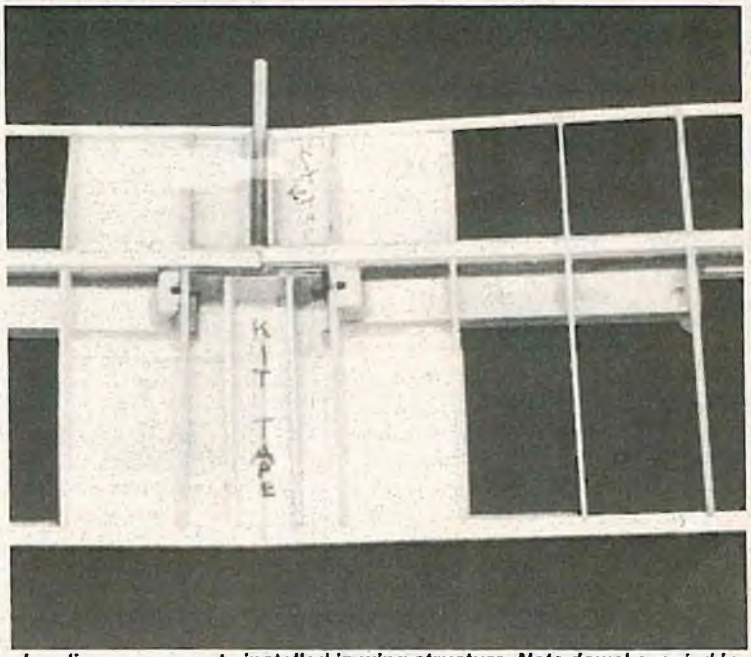


By
Major Tom Dobbins
&
Major Jake Shirer

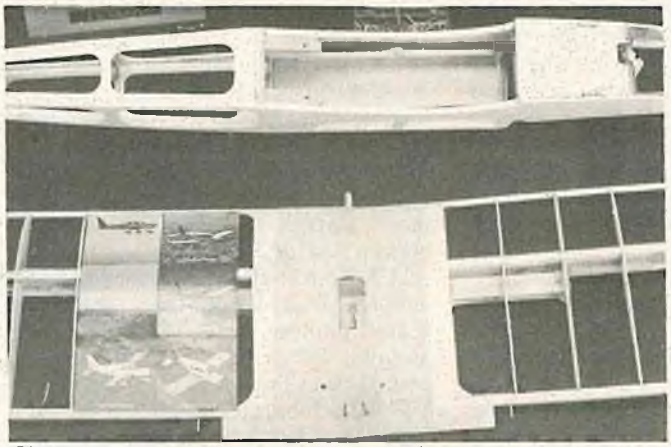




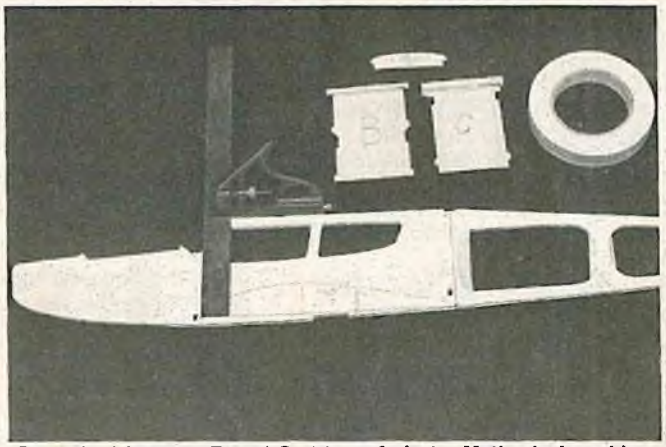
Wing rib revisions and landing gear mounts required for conversion to low wing.



Landing gear mounts installed in wing structure. Note dowel epoxied in leading edge and nylon reinforcing tape at center joint.

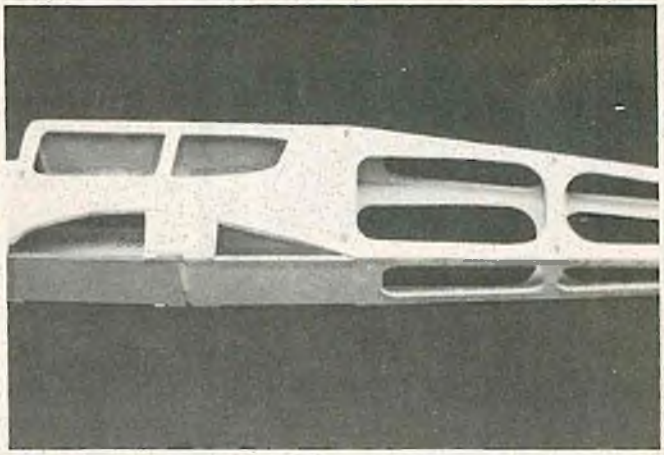


Sig Celastic tape is used to reinforce wing center section.



Reworked formers B and C at top of photo. Method of marking wing cut-out shown below.

Wing position has been cut. Note the notched portion remaining to facilitate joining the fuselage sides.



The fuselage sides have been assembled per kit instructions.

low wing crowd and keep the Eaglet's nice flying characteristics. The low wing looks like a Stand-Off Scale Piper 180 (stand way off). With a slight modification and a minimum of parts, the Goldberg Eaglet makes an outstanding low wing aircraft.

Additional parts in addition to the Goldberg parts list are:

2 — pkg. Sig grooved landing gear mounts #SH 125

1 — pkg. Sig Celastic (light)

The Eaglet II bears a resemblance to the Piper Cherokee.

1 — pkg. Du-Bro wing bolts #164
1 — Sheet 1/8" x 6" x 12" 5 plywood
1 — 1/8" x 36" music wire
1 — 1/8" x 3/16" x 36" balsa
1 — 1/2" x 1/2" x 12" hardwood

Wing:

Build the "B" wing with the following changes. Cut two, No. 2 ribs from the 1/8" ply sheet (Photo 1), include the notch for the landing gear mount flush with the wing spar and 1/16" below the rib. Cut two #2 ribs (from kit) with the gear mount slot. Cut two #3 ribs from 1/8" plywood, gear mount cut flush with bottom of rib. Cut two #3 ribs (kit) with gear slot. Cut two 3/4" pieces from one of the Sig gear mounts (you have four). Assemble the wing according to the kit with the gear mount flush with the rear of the spar. A slot has to be cut in short sheet "B" to go around the landing gear mount. The first #2 rib is plywood, the second #3 rib is plywood counting from center to wing tip. Glue the 3/4" gear mount to the outboard side of the plywood #2 rib. Complete wing according to kit instructions. When joining wings, cut 1/16" from each leading edge dowel's center section. After spars (center) section is glued use the kit tape on the "inside" (Photo 2). Then add the kit dowel pin from the spar through the leading edge, epoxy in place (Photo 2). Glue #1 rib to each side of dowel (add epoxy on top). Add the aft #1 ribs to clear your servo. Finish wing. I use a 5" strip of Sig lightweight celastic around the center of the wing (Photo 3); makes it bullet proof. With the use of celastic no additional structure is needed for the wing mount bolts.

Fuselage:

Before punching formers B & C out, lay a bead of Super Jet along the cut line on top of the formers. Then cut the tops square to eliminate the V for the wing (Photo 4). Tape the two fuselage sides together and locate the wing cut-out by measuring 4" down from the top at formers B & C. Draw a straight line, the line will extend aft of former C. Cut from plans the cross section of the wing. Place cut-out on line just drawn, locating the leading edge 3/32" aft of the cut-out for former B (Photo 4). Cut out wing slot leaving the notch for the bottom sheet joint (Photo 5). Discard the cabin top doublers. Assemble fuselage with kit instructions (Photo 6). From the 1/8" 5 ply, cut to fit the cabin top using the kit windshield top former as a guide for the front curvature. Discard the kit piece. Install the cabin top. Cut the bottom fuselage and sides out using a #11 X-Acto blade. Make the wing seat doublers from scrap wood (Photo 5). Install doublers and hardwood wing mounts, 1/2" x 1/2" x 2" (Photo 3). Install from former B to C a strip of 1/8" x 3/16" balsa to the cabin top and fuselage sides. This is necessary for the cabin windows to fit. A slight notch will have to be made in the center of former B when mating the wing and fuselage. The wing mount bolts holes are 1⅝" forward of the wing trailing edge.

Landing Gear:

From the 1/8" music wire, bend the gear as follows: 3/4" wing stub, 5½" gear block, 3½" gear length, axle length to fit your wheels. Then bend the gear 5 degrees to the rear.

Finish:

The cabin windows were sprayed with Testor transparent blue so that the radio installation wouldn't show.

FLying:

Ground handling improved. Flies just like the high wing with one exception, it is an aileron aircraft, as the rudder just produces a high state of yaw with a slow turn. The test airplane has flown with .15 to .25 power and does equally well on either. And, best of all, no one believes it's an Eaglet. □

Something new. Sort of an R/C TV Guide. In this occasional feature we'll bring you up to date about R/C related video tapes you or your club may want to see. Hobby shop owners may also find our list helpful as they build a library of video tapes for their customers.

While, for this first article, the list may seem short, we want to point out that before we include a video tape we need information about its availability and such from the distributor. For example, while we know of other tapes such as *Magnificent Men, How To Build And Fly Remote Control Helicopters,* and one on applying MonoKote, we hadn't received the information we needed by press time. Hopefully, these and others will be included in our next article. We expect that once distributors learn about this feature they'll be coming out of the walls to let you know about their creative efforts. This time a couple of pages. Next time . . .

For each of the video tapes in the list we give a brief statement of what you'll see, the intended audience, viewing time, and rental and purchase information. Since the production of many of these video tapes are partially or fully underwritten by an R/C manufacturer, their purchase price is usually only what it costs to make and ship the copy. Rentals are available to individuals, clubs, other groups, or hobby shops. With "sponsored" tapes, either all or part of the rental fee is refunded when the tape is returned within the period of time specified by the distributor. If something prevents you from getting a tape back on time or if you have trouble with it, contact the distributor. Most are willing to work with you so long as they know what's going on. If you order a tape be sure to specify whether you want BETA or VHS format. A BETA tape won't play on a VHS machine or vice versa.

Since many hobby shops have a video deck and a copy of some of these tapes, you may want to check with them before you rent one. Wouldn't it be neat if your local hobby shop had a small, comfortable TV viewing area so customers wouldn't have to stand (and block counter space) while they watch? Something we'll look forward to as more and more shops begin to take advantage of this relatively new aspect of our hobby.

Video Tips #1. Intended for beginning or experienced modelers, this video tape is about using Hot Stuff and Super "T" cyanoacrylate adhesives on R/C planes. It also includes other building ideas and short cuts. Viewing time: 1 hr. PAL available. Rental is $30.00 with a refund of $20.00 on return of the tape within the specified time. The purchase price is $25.00 Contact Satellite City, P.O. Box 836, Simi, California 93062, (805) 522-0062. (Reviewed later in this article.)

Video Tips #2. Like Video Tips #1, this one is also intended for beginning or experienced modelers and provides more ideas about using Hot Stuff and Super "T". The use of their Hot Shot (cyanoacrylate accelerator) is demonstrated and more building ideas are presented. Viewing time: 1 hr. PAL available. Rental is $30.00 with a refund of $20.00 on return of the tape within the specified time. The purchase price is $25.00. Contact Satellite City, P.O. Box 836, Simi, California 93062, (805) 522-0062.

R/C Model Helicopters. This tape is intended for a modeler or potential modeler interested in R/C helicopters. It provides information about the design and production of Gorham Model Products' Cricket and Competitor helicopters. About 15 minutes of helicopter flying footage is also included. Viewing time: 33 minutes. PAL available. Rental is $40.00 with a full refund if returned withing 30 days. The purchase price is $40.00. Contact your local hobby shop that handles Gorham Model Products' line or Heli Center East, P.O. Box 1205, Hermitage, Pennsylvania 16148, (412) 342-5500, or Heli Center West, 23961 Craftsman Rd., Calabasas, California 91302, (213) 992-0195. (Reviewed later in this article.)

The World Of Remote Control. An award winning production, this video tape is intended for those considering getting started in the hobby. It provides an overview of R/C model applications including planes, boats, helicopters, and cars and offers some considerations for the beginner in selecting a first plane or boat. Viewing time: 22 minutes. While this tape has only been available for purchase at $59.95 for BETA or VHS and $69.95 for 3/4" U-MATIC, World Video productions has been exploring the possibility of making the tape available on a rental basis. Contact them directly if you'd like to rent a copy. The tape may be purchased through Great Planes Model Distributors Co., P.O. Box 457, Champaign, Illinois 61820, (217) 569-6331 or directly at World Video Productions, 7888 Ostrow St., Suite A & B, San Diego, California 92111, (619) 569-6331. (Reviewed later in this article.)

R/C Video Reviews: Our reactions to the video tapes we've seen.

Satellite City's Video Tips #1

Produced by Bob and Bill Hunter on home video equipment, Video Tips #1 was among the first R/C video tapes made available to individuals, clubs, and hobby shops throughout the U.S. and beyond. In addition to some surprising strength tests and building ideas regarding their Hot Stuff (regular cyanoacrylate) and Super "T" (thicker cyanoacrylate) adhesives, the tape includes several other ideas you'll find useful in building sailplanes or powered planes. For example, they demonstrate using waxed paper treated with a light coat of 3M spray-on contact adhesive to hold your parts accurately in place without pins while you reach for the Hot Stuff. While some of the editing (some glitches here and there) and camera work (we would have liked more close-ups and a few less zooms) on their first video tape venture leaves room for technical improvements in their Video Tips #2 (which is now availble), Bob and Bill's workshop talk approach and super building ideas should hold your attention for the hour of viewing and make you feel like your time is well-spent. If your local hobby shop has a video tape recorder, chances are that they will have a copy of this tape you can watch. (See our list of video tapes for ordering information.)

Gorham Model Products' R/C Model Helicopters

Professionally produced by Mike Mas, this video tape is in two parts. Though there is no break between them, the first 18 minutes, complete

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with sharp camera work, limited special effects, background music and a narrator, is mainly about the production of the GMP Cricket and Competitor along with some nicely done helicopter flying footage.

Because modelers wanted to see more of the air stuff, John has recently tagged on an additional 15 minutes (the second part) of some fantastic helicopter flying including loops, an axial roll or two, an autorotation spot landing (whew) and a long sequence of inverted flight done so expertly we began to think that the model was built with the main rotor blades on the bottom! This second part ends with a John Gorham flown (off camera) Cricket helicopter clip from the feature film, 'All Night Long.' Before watching the second part of the tape we feel it's only fair to warn you that after seeing it you may find yourself calling your local hobby shop to order a helicopter. Note that this tape is not about how to build or how to fly helicopters. If your local hobby shop carries GMP helicopters and has a video tape recorder, they'll probably have a copy of the tape you can watch. (See our list of video tapes for ordering information.)

World Video Production's World of Remote Control

The World of Remote Control is perhaps the most professionally written, photographed, and edited R/C video tape we have seen to date. This is a fast moving view of the range of the hobby including powered planes, helicopters, model ships, boats, a torpedo-firing submarine, and off-road and race cars. The full size ship and submarine sound effects used during these sequences add a nice touch. Some time is also given to getting started with R/C planes, emphasizing what a beginner should look for in a first plane (we wish that a tricycle-gear plane would have been stressed more than it was), how the controls work, different types of R/C equipment (with a soft sell for Kraft), radio frequency safety and some flying footage of bipe aerobatics including a spin, loop, hammerhead, and such. Some comments are also directed to buying a first R/C boat. Our favorite scene is a sequence about R/C cars edited to the background music. Editing to music like that takes time, know-how, and lots of work. Good job.

We think that any hobby shop with a video tape recorder is missing the boat (plane or car) if they don't start a copy of this one rolling each time an unfamiliar, smiling, confused, and questioning face appears on the other side of the counter. (See our list of video tapes for ordering information.)

Good viewing, enjoy, and "learnalot". □

SUNDAY FLIER

Ken Willard

Let's talk about seaplanes. Or, more correctly stated, let's talk about waterborne aircraft --- seaplanes, flying boats, and amphibians. So what's the difference? Or do you care? I'll tell you anyway.

Seaplanes are defined as airplanes which have a fuselage on which floats are mounted in lieu of the usual landing gear. Most of them are convertible.

Flying boats are boat hulls on which wings have been attached. The hull rests directly on the water.

Amphibians can be either flying boats or seaplanes, wherein the landing gear is retractable for water takeoffs and extended for runway operation.

Enough of that. Let's get to the items.

Item number one. The Clear Lake R/C seaplane flying has been cancelled. The winter floods occupied so much time on the part of the modelers in the Clear Lake area that plans just could not be firmed up. Sorry to have to tell you that, but there's good news anyway. The full scale seaplane fly-in is scheduled for four days --- September 29, 30, October 1 and 2. The Clear Lake Renegades will be flying their R/C jobs at times throughout the four days, and if you're of a mind to join in, you're welcome. Better make some reservations, though. The Skylark Motel, where the event is headquartered, is already booked up solid.

Photo 1

Item number two. In the July issue of RCM, I said that the fin of the Seamaster Sport 40 will be enlarged to the shape shown in the drawing when the kit comes out. Well, it won't because Top Flite has decided not to kit the design at this time. So all of you who have been inquiring will just have to settle for making one from the plans --- unless some other

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Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

manufacturer wants to take over. I've talked with a couple, but nothing has been firmed up.

Item number three. Now this is a biggie --- and I do mean really big. I get a lot of invitations to go to seaplane fly-ins, and wish I could go to all of them, but time --- and money --- makes it impossible. I do get to a few, but over the Memorial Day weekend I went to the largest gathering of water flying enthusiasts I have ever seen. It was the Sacramento Red Barons' Annual Seaplane Fly-In, held at a private lake near Sheridan, California --- about twenty five miles or so northeast of Sacramento. There were some two hundred --- yes, two hundred --- seaplanes and flying boats in evidence. Name almost any design you can think of, and it was there. During a break in the action, I went out in one of the retrieval boats and tried to get a picture. The result is Photo 1. And it only shows about half of the flying machines! You just couldn't get all of them in one shot.

Warner Richmond, President of the Sacramento Red Barons, told me that this year's event was the fourth fly-in to be held at the present location, and it is by far the largest yet. People come in RVs, campers, station wagons with tents, or even come in cars and sleep on the ground in sleeping bags. I counted over one hundred RVs alone. It's a family affair, with the kids playing around in the water in an area removed from the flying site, and the wives either sitting around soaking up sunshine, or cooking, or even, in some cases, flying. One enthusiast, Orville Peterson, came all the way from Green Bay, Wisconsin, where he does a lot of seaplane flying. His son lives out here, so he makes it a family affair. He says seaplane flying in Green Bay is very popular.

You get the picture, I'm sure, so let's get to the pictures and stories behind some of the more unusual models.

When Ken Runestrand told me on the phone that there would be a scale model of the four engined Dornier "Wal" at the meet, I just had to go, so I conned my friend Curtis Christen into driving up there with me. I took the Seamaster Sport 40, and he brought along his twin engined Sweet Stick on twin floats. We both put in a couple of flights, then sat around watching the action.

Photo 2 shows Rodger Grotheer with Jimmy Stonedall, the builder of the Dornier, getting ready to check out the engines. Note the four bladed props on the tractors and two bladed

Photo 11

Photo 12

Photo 13

Photo 14

Photo 15

Photo 16

props on the pushers. I asked Jimmy why.

"Because the real one was set up that way," he replied. However, when they went to flying the model, the four bladed props were replaced with two bladed ones --- easier to synchronize that way. The engines are Fox .36s. Jimmy built the Dornier from scratch in about eight weeks! And in addition, drew his own plans from photos and drawings he had of the full scale job. A fantastic effort.

Photo 3 shows the first flotation test. The model set a bit nose down, and later on Jimmy took about three pounds of lead out of the nose, reducing the weight from 28 pounds to 25 pounds. Yes, the C.G. did move back, but was still in an acceptable range for stable flight.

Photo 4 shows the first launching into the water with the engines going. Unfortunately, they never did get all four engines going while I was there, so I never did get to see it fly. Later on, Don Harris, from Auburn said, "Hey, Ken, no wonder they couldn't keep the engines running. Look what they were using for fuel!" Photo 5 shows what he was referring to. Actually, Jimmy just used the charcoal lighter can to hold his fuel, which was regular glow fuel. But I got a laugh out of Don's observations.

Photo 6 shows Jim Stewart, from Nevada City, California, with his Canadair CL 215. It is powered with two .25 Schnuerles, weighs about 10½ pounds, and is a beautiful flier. Photo 7 shows it taxiing back after a fine demonstration.

Photo 8 shows the wide range of models that participated. That's George Steiner getting ready to launch his Miss America which has a set of Lou Proctor's Antic floats. The Miss America is an oldtimer which was designed by Roger Hammer many years ago. A steady flier, as seen in Photo 9.

Photos 10 and 11 show the taxi out and takeoff of a Cub L-4. Ken Runestrand built it, and sold it to the modeler in the photo, whose name I didn't catch.

Photo 12 shows the Cub after stubbing its toe on a wave when landing. The rescue boat is rushing to retrieve it. Dunkings were quite numerous throughout the day.

The Sikorsky amphib shown in Photo 13 was built by Brad Allen, who gave it to John Sorensen, who's holding the model. John says it's a "stand 200 yards off" scale model, and Brad would be out later "after the people stopped laughing."

The one third scale Flybaby on floats, shown in Photo 14 with its builder, Ken Runestrand, put on a

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Photo 17

great show. Ken has a Don Harris smoker installed. Not only the modelers, but the speed boaters and water skiers stopped what they were doing to watch it perform.

That's Curtis Christen (with his head chopped off) and his twin engined Sweet Stick on floats. It attracted lots of attention --- especially when Curt took off and slow rolled on the climb-out.

But I have purposely saved the most unusual model --- and story, for the windup. Take a look at Photo 16. What? A Corsair on floats? You gotta be kidding! But Richard Mendonca and Larry Johnson, the builders, told me the whole story. It goes like this:

Everybody is familiar with the Corsair and the famous Black Sheep Squadron, lead by "Pappy" Boyington in feats of derring do in the South Pacific --- Rabaul, Bougainville, and other exotic islands. But very few people ever knew that a secret group of women pilots --- members of the Womens Air Service Pilots group, known as the WASPS, and headed up by Jacqueline Cochran --- got tired of just ferrying warplanes. They wanted to fight! But the American public would not hear of such a thing as women in combat in WW II. However, now it can be told.

These determined women secretly went to an atoll in the South Pacific, Papaduitume, and set up camp. There was not enough land on the atoll to make a runway. No problem; there was a big lagoon surrounded by the atoll. That would be the takeoff area --- just put some floats on a Corsair! So they did.

No records exist of the exploits of these women. As I said, "Pappy" Boyington and the Black Sheep were famous, but no one ever heard of "Mommy" Girlington and the White Sheep, --- until now.

After the war, "Mommy" got married and had a daughter, Linda. Linda married Richard Medonca, and, in an unguarded moment, told him about the Corsair on floats. So he built a model. What else? It was one of the hits of the Sacramento Red Baron's fly-in.

Linda (who, incidentally, has a teenage daughter) let me take a picture of her with the model of her mother's Corsair on floats. There she is in Photo 17 with the Corsair, and don't you agree that that's about as nice a shot as you'll ever see of Linda, the Corsair, and the floats? On the Corsair, I mean, dummy.

Now if you believe that story about the secret Corsair on floats, please come visit me. I've got a deal for you where you can buy the Golden Gate bridge for a song!

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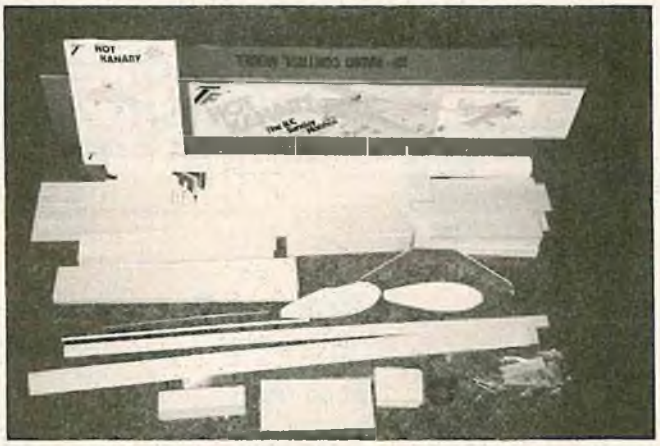
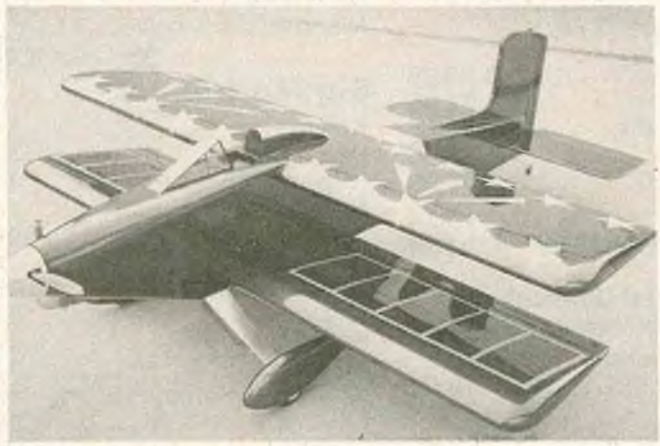
RCM PRODUCT REVIEW

Top Flite
HOT KANARY





SPECIFICATIONS

Name	HOT KANARY
Aircraft Type	Sport Bipe
Manufactured By	Top Flite Models, Inc. 1901 Naragansett Ave., Chicago, Ill. 60639
Mfg. Suggested Retail Price	$89.95
Available From	Retail Outlets
Wingspan	38 Inches
Wing Chord	9.5 Inches
Total Wing Area	674 Sq. In.
Fuselage Length	43.75 Inches
Stabilizer Span:	19.5 Inches
Total Stab Area:	151.125 Sq. In.
Recommended Engine Range	.35-.45
Recommend Fuel Tank Size	8-10 Oz.
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa & Ply
Tail Surfaces	Balsa
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (12 pages)
Construction Photos	No

RCM PROTOTYPE

Radio Used	Futaba 8JN
Engine Make & Displacement	O.S. .40FSR
Tank Size Used	8 Oz.
Weight, Ready to Fly:	80 Oz.
Wing Loading:	17 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Complete plans and very thorough instruction book; completeness of kit.

WE DIDN'T LIKE THE:
No problems.

Top Flite's latest addition to their stable is a Stand-Off Scale model of a nifty little biplane called "Hot Kanary." All the goodies come in a very colorful box measuring 45½" x 7½" x 4".

Upon opening the box you see a very neatly packed kit. The die-cut plywood has its own compartment so the balsa parts are protected from gouging by the harder wood. The hardware package is very complete including pushrod material. All parts are easily identified.

Construction:

Die-cutting on the balsa parts is very good with a light sanding needed to remove a little fuzz. The plywood die-cutting is also good. The parts just fell out of the sheets. Great! Quality of the balsa was very good. All parts fit very well and go together as planned. No "special" equipment is needed. If you have built before, you are ready to build this one.

The kit contains one plan sheet measuring 36" x 48", very clearly drawn and a very thorough twelve page instruction book which also has very neat drawings with each phase of the building. The book opens with a very nice introduction to biplanes and some notes on the "Kanary." Pre-construction notes are next and then into the fun of building this nifty little "bipe."

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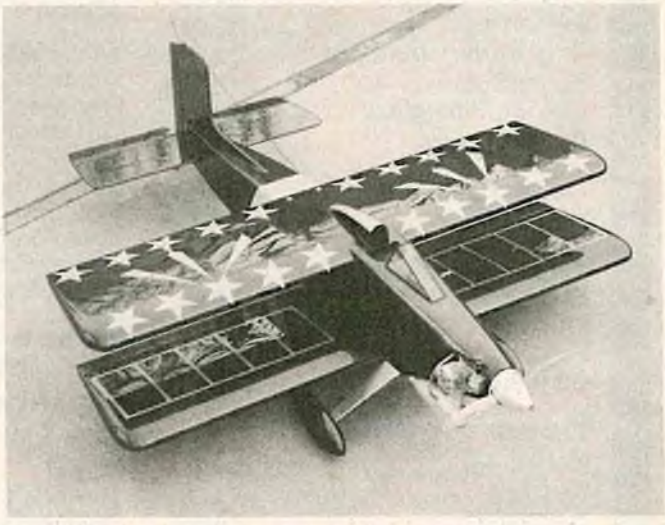


The wings are built first and with the help of today's modern bonding agents they build very quickly. The ribs have a neat innovation that this builder hasn't seen: building tabs with a slot to allow installation of the bottom T.E. planking with the wing still on the board. The top wing is first and easy, no ailerons. Next, the bottom wing with excellent instructions for aileron installation. The tail group is next and very simple and straightforward.

Now for the fuselage, and we would like to dwell on this for a moment. This section starts out with three questions that, when answered, will let the builder move forward on the fuselage construction and not worry about how things are going to fit. In fact, these questions should be answered on any model you choose to build. The fuselage finishes straight and strong. Landing gear is next, then final assembly, covering, radio installation and some excellent notes on flying. Pacer Zap and Slo-Zap with Zap Kicker were used throughout construction except where epoxy was called for.

Covering:

The model was covered with Top Flite's new charcoal MonoKote, with a yellow band on the fuselage, yellow stars and star bursts on the upper wing. Very pretty. In order to make the wheel pants match the charcoal MonoKote, we mixed equal parts of K & B Super Poxy aluminum and black. It made for very sharp wheel pants.

Engine:

For the engine we used an O.S. .40 FSR with a muffler supplied with the engine. The engine mount was supplied with the kit and was the one used. A Sullivan SS 8 tank rounds out the engine department.

Radio:

The radio compartment has more than ample room for any radio you want. We used a Futaba 8JN.

Flying:

Now, hang onto your hat, the fun is about to begin. With everything checked and set according to the instruction manual we headed for the field. The weather was fair and cloudy. We fueled up our little jewel and made an engine run to check everything. All systems in the green. Top off the fuel, start up and taxi out. Ground handling is above reproach. Turn into the wind, take a deep breath and open the throttle smoothly. The little ship accelerates rapidly and lifts off cleanly. Gain altitude and check trims. Two clicks left wing down trim, two clicks up elevator and everything is great. Two clicks of trim on a Futaba 8JN is very minor, so we are going to say it flew right off the board. And fly it did. Very fast and solid. Rolls, snap rolls, spins, vertical roll, you name it, this ship does it with ease. As the instruction book says, this ship will become famous for knife edge flight. This builder has never attempted sustained knife edge flight, so it was very rough the first few attempts. Before long, the "Hot Kanary" was flying all over the sky in this fascinating maneuver, in a straight line that is. Knife edge turns are next. The ship slowed down nicely and cruised along solidly at half power. Pull the throttle back to idle and the glide is very clean and controllable, flare for landing and touchdown smoothly.

Conclusion:

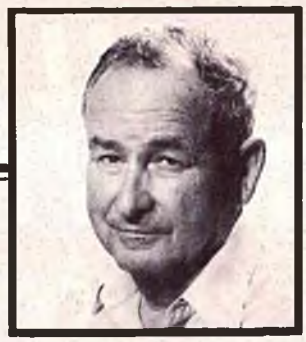
This is not a beginner's airplane, but if you are ready for some excitement in your flying, try a Hot Kanary, you'll love it.

As stated, the ship builds easily; in fact, a beginner could build it but flying takes an experienced pilot because of the ship's quickness.

The kit is a value at retail price because of the completeness of the kit. □

SOARING

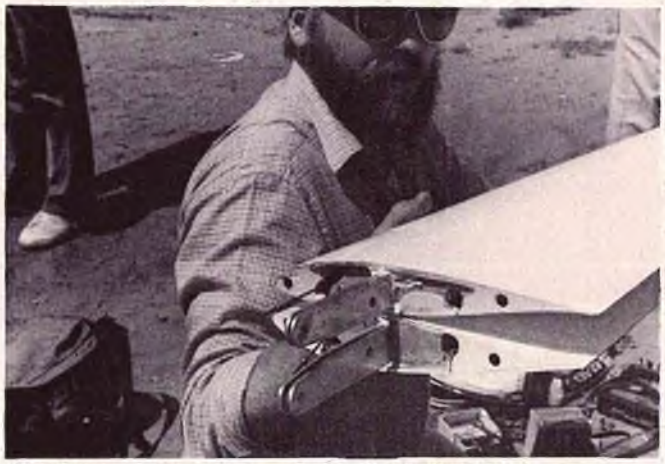
Al Doig



A recent visitor to the famous cliffs at Torrey Pines, San Diego, California, was Christian Ruch from Uerkhein, Switzerland. Mr. Ruch was demonstrating a large Semi-Scale sailplane he will be exporting to the U.S. The ship, named the "Lavey," has a wingspan of 189" and a wing area of 1534 sq. in. The all-up weight is 187 oz., giving a wing loading of 17 oz./sq. ft. Construction is all from Kevlar, including the monocoque wing, which includes a spar. Although the horizontal stab is symmetrical, the elevator was quite undercambered. This, to prevent flutter, according to the designer. Difficulties in translation of technical terms prevented an explanation. I reckon I don't understand all I know about this. Anyway — the Lavey will be imported by Wilshire Model Center, 3006 Wilshire Blvd., Santa Monica, California 90403 (213) 828-9362. Get there early, the supply is limited and the price is only around $1000.00. The ship is very impressive in the air and surprisingly aerobatic; it even rolls. Landings are slow and gentle.

★

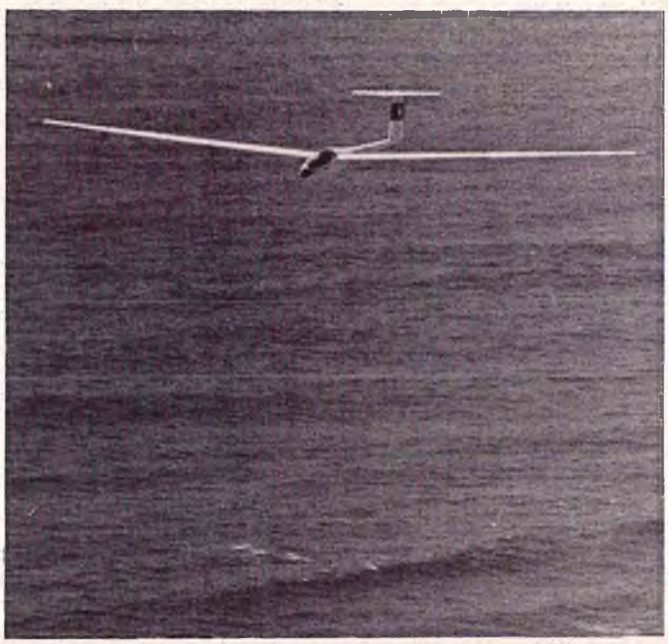
The handsome gentleman holding the large sailplane and grinning like a Cheshire cat is Ken Raymond of Poway, California. Ken is so pleased with his latest creation he can't stand it. Mr. Raymond has found something interesting about Eppler airfoils. If one takes the average of two Eppler airfoil coordinates, one gets a third Eppler airfoil. With this in mind, Ken averaged the E-214 and the E-174 in the design of his new ship. He hoped to get the best characteristics of both (not the worst). He evidently got what he



Aluminum wing tongues — Swiss "Lavey" sailplane.

Swiss sailplane "Lavey" ready for launch — Torry Pines, California.

Lavey sailplane designer Christian Ruch, Verkhein, Switzerland, flies demonstration at the cliffs of Torrey Pines, San Diego, California. Note hang glider traffic in background.



Swiss sailplane "Lavey" on the cliff slope, Torrey Pines, San Diego, California.

wanted; which was a ship to compete in the Southern California Council of Soaring Clubs (SC^2) floater type contests. Ken's "Skyhook" has a wingspan of 112" and a wing loading of 6.8 oz./sq. ft. If you're going to design a sailplane, you should do as Ken did; design it for a specific purpose. A floater needs low wing loading, high lift and at least moderate penetration ability. If flying in a windy weather area, good penetration is a must. Speed/distance has different requirements. There is no best answer to all tasks and conditions. A decision must be made as to the general conditions to be optimized.

I'll bet you've never read a tip on how to fall out of the air. Most articles tell you ways to stay up. I've a sure-fire method of attaining short flights, missing target times in contests and generally turning in poor performances. All you need do is convince yourself and everyone around that you are going to do poorly. I've seen fliers step up to a winch with such a defeated attitude that there isn't a thermal in the world big enough to support a max. They are, at that point, out to prove that they can fall out of the air faster than anyone else. Mental attitude and concentration are almost as important as sailplane characteristics.

How many professional golfers, do you suppose, walk up to the ball saying, "gee, I'll bet I don't hit this shot." None! They not only know they are going to strike the ball well, but know exactly where they want the ball to land. Did you ever see a pro standing over his ball on the putting green, chatting with his caddy?

The most intense flier I've ever seen was Dwight Holley at the 1981 World

Ken Raymond, Poway, California, with his new design the "Skyhook."

Swiss sailplane "Lavey" on the cliff slope, Torrey Pines, San Diego, California.

Champs. I recall one flight where a helper was talking to him. "Shut up," snapped Dwight, and back he went to that consuming attention to every movement of his sailplane. Another time, one of the European teams was standing near, chattering like magpies. Dwight quickly moved out of earshot.

One of my greatest faults is inattention — looking at the ship and not really seeing it. It is so easy, when solidly in a thermal, to start talking to the timer, or your flying buddy. Soon you realize your sailplane is getting larger, not smaller, and you find that the thermal went thataway whilst you were drifting **down the field.** Dave Thornburg used to teach us that thermals have little respect for the direction of fields, fences, or anything else. They tend to drift **downwind** not **downfield;** but not always. Sometimes they will drift sideward. If you're not paying strict attention, your ship may start sinking on one side of the thermal turn. Soon it's sinking on both sides of the turn.

One place where concentration really pays off is on precision landings. It is my observation that more landings are missed by error in heading than error in distance. A smooth, straight approach is mandatory. The final approach is not the time to kill off time with S turns. You've got to keep it coming right down the tape with no deviation in heading. In wind, you can't let the nose come up or you will be off course in an instant and you will be so busy getting things sorted out you will also miss on distance.

Here's one last flying tip. At a contest not long ago, two very good fliers followed a thermal quite far downwind. They were, however, so

high it seemed no problem to get back. When it seemed appropriate, both fliers headed straight back to the field. One landed a quarter of a mile downwind. The other barely made the far edge of the field. The first flier lost all flight points for landing outside the qualifying area (the field boundary), thereby voiding a fine flight. My favorite writer, Dave Thornburg also passes on a tip he got from Dave Shadel. "Never leave your thermal and come straight back upwind. Odds are, the biggest sinkhole is right behind the thermal's core. To avoid it, leave the core by tacking off to one side or the other, and come home in a series of tacks, or zig-zags, like a sailboat. You can see what your plane is doing a lot better if it's in a slight tack than if the nose is pointed directly at you." That sure makes a lot of sense and if I ever catch a thermal, I'm gonna try it.

One side benefit of this job is the interesting mail that occasionally comes to me. I find people fly models in the darndest places. One such letter was received from Grahame Feltis, Panguna, Bougainville, Papua, New Guinea. After a very nice introduction Mr. Feltis says:

I am not at the moment an active glider flier. Bougainville is a very mountainous island where flat land is at a premium. In fact, Panguna is the town associated with a copper mine and is 2800 ft. up in the mountains. I do power flying at the moment, but have to drive to the coast about 20 miles where we are allowed to fly on some land adjacent to the local airport. As the airport does not operate on Sundays, this is when we fly. Anyway, I have always had a yen to try glider flying so have built an E.Z. II sailplane from the August '77 RCM. It is all framed up and ready for covering. I also have on order a C.G. Gentle Lady. I hope to have the E.Z. II flying soon, just hope I can keep it within the confines of our small field.

Since I have to buy all of my modeling needs by mail, I rely completely on what I read in magazines about new kits, products, etc. While I realize you cannot try every new glider kit that comes on the market, would it be possible to obtain some information on some of the more interesting new kits that become available and mention them in your column? Some that come to mind are T/F Metrick, P.M.P. Challenger, Airtronics Sagitta series and Olympic 650, etc. I don't mean a full review, just a few notes on kit quality, whether you have flown one or know somebody who has, etc. Well, keep up the good work in RCM.

Yours in Modeling,
Grahame Feltis

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SILENT POWER

Jim Zarembski

Recently, RCM has been packed with information on Silent Power. If you're contest oriented, you'll find an interesting article by Mike Charles in last month's issue, which unravels the mystery behind the FAI F3E electric event.

A large F3E meet was held on April 16 and 17, 1983, at Costa Mesa, California. This contest was sponsored by the Harbor Society, SEAM #1. Since I could not attend, Dale Willoughby covered the affair for Silent Power. Dale is no stranger to R/C sailplane and helicopter fliers since he was a pioneer in R/C sailplanes in the early 1960's and in helicopters in the 1970's. It appears that he is turning to electric power in the 1980's.

First U.S./International FAI F3E Electric Challenge Results, by Dale Willoughby, AMA 436 — LSF 015.

Southern California weather provided a calm sunny day for the Fun-Fli on Saturday, 16 April, but terrible conditions for the F3E competition on Sunday. A storm front was moving in and though the sky was clear most of the day, the wind gusted up to 25 mph during the competition, and the last two flights of the third round were flown just ahead of the arrival of dark rain clouds. Under such conditions, the American versions of Electro powered models were not quite up to the level of overall performance required by this type competition. The first five places were taken by European designed models.

The photos of the winning designs are captioned to sufficiently identify the combinations of batteries, motors and props that provided the thrust necessary to overcome the inertia of the higher wing loadings. And that is the name of the game in F3E competition.

To give you modelers interested in electric powered models (not necessarily for competition, but just for sport) an idea of the requirements for an electrically powered model, the formula is simple. The airframe should be less than 50 percent of the total flying weight, and with some of the more efficient electric motors coming on the market this year, match your chosen aircraft model with those flown in the early days of ignition motors, and you will be safe in the thrust/weight ratio.

The rules for FAI R/C Electroflight (F3E) can be found beginning on page 117 of the 1982-83 Official Model Aircraft Regulations, published by Academy of Model Aeronautics, 1810 Samuel Morse Drive, Reston, Virginia 22090, USA.

But let me show you the application of the rules by the top F3E winner at Costa Mesa, California, the middle of April, 1983. Mike Charles launched his electroflight model outside the course and climbed with authority to sufficient altitude to complete 11 laps between poles placed 150m (492 ft.) apart within three minutes of entering the course, thus completing

Merchandise prize sponsors who donated valuable products to encourage more American participation in FAI F3E competition. These sponsors recognize the vast potential in quiet, pollution-free model aircraft and have given their support of this first US/International F3E Electric Challenge competition, and have the gratitude of the members of Harbor Soaring Society and S.E.A.M. #1.

Daniel Bosshart came from Switzerland to fly this IBA PB 26 DV. He used a Keller 50/24 motor, 20 Sanyo red batteries, and a 12/6 folding prop. Weighing 3 Kg (6.6 lbs.) he placed 4th in the Challenge competition, with 822 points.

The most innovative F3E model was this twin-pusher designed and built by Ralf Liebler of W. Germany. Spanning 2.9m (114") it carried 21 Sanyo red batteries driving two Keller 35/16 motors with 10/6 folding props. It weighed 7 lbs. and used the new Keller Speed control. He placed 13th but didn't fly the 3rd round.

Roger Roth holds the EBA PB 26 model which was nearly destroyed by radio interference on his first flight. He used 20 Sanyo yellow cells driving an Astro 40 Challenger and a Top Flite 10/6 prop.

The money winners. From left to right: Mike Charles, 1st place; Bob Gerbin, 3rd place; Hein Van't Laar, 2nd place, winning $500, $125, and $250 respectively. Other contestants were awarded merchandise prizes by a "pilot's draw."

Second place winner with an Excalibur glass fuselage and scratch-built wings and stab, with 20 Sanyo SCR batteries driving Keller 100/24 motor. He might have won had he not missed the precision spot landing.

the Distance Task. While the model was still airborne, he started the motor by R/C command, sped through the first marker of the course (he had 60 seconds from the cessation of timing of the Distance Task), thus beginning the timing of the Duration Task. He climbed and flew around looking for **any** thermal activity and used the electric motor only 41 seconds in flying for 301 seconds (5 minutes). Near the end of the 301 seconds, he glided to the marked circles and landed just outside the 30 point circle for 15 points landing score. The scorekeeper gave him 438 points calculated as follows.

First Round

11 laps times 15 pts.	165 pts.
300 pts. minus 1 pt. overtime in Duration + 41 pts. deducted for motor run	258 pts.
Spot landing within the larger circle	15 pts.
	438 pts.

Second Round

13 laps times 15 pts.	195 pts.
295 pts. (4 min., 55 secs.) minus 28 secs. motor run	267 pts.
Spot landing within the smaller circle	30 pts.
	492 pts.
Two round total =	**930 pts.**

As you have already deduced, it takes a trained and alert helper to provide an audible count-down on both the Distance Task and the Duration Task. The pace of the challenge competition was quite leisurely, but when the number of contestants is doubled, it may be necessary to have one contestant in the preparation box, one flying the Distance Task, and one flying the Duration Task simultaneously, providing there is no conflict of frequencies.

This competition was considered one of the "qualifying" contests held to place the newly approved FAI F3E Electroflight rules on a basis for World Championship status. The Contest Director Mike Charles, is to be commended in getting this contest scheduled **and** giving certain American modelers a first hand look at European Electroflight models and their techniques. And I felt that readers of this magazine would benefit in sharing such a first hand look. Frank Heacox, President of SEAM #1 (Society of Electric Aircraft Modelers), expressed it very well when he stated, "FAI F3E competition is necessary to refine and advance the 'state of the art' in America, and I consider these competitors to be the tip of the pyramid with a broad base of thousands of modelers enjoying electric flying."

And, of course, there were rumors of new developments in electric motors. Heinz Keller, of Keller Motors fame, was there competing (placed 5th) and indicated that Leisure Electronics would be marketing his line of electric motors with a shipment in by the time you read this column.

Also rumored was a new battery now used in space technology. Patented by Allied Chemical with twice the energy capacity of nicads and composed of polymer plastic, it is rumored that by 1984 such batteries will be released to the general public. The present rechargeable nickle cadmium batteries only produce about 50 percent of the power for their weight as compared to the glow plug engine and tank. The new polymer plastic batteries have promised to equalize that power output.

Dale Willoughby

Many thanks to Dale Willoughby for providing this report on this exciting F3E contest.

★

I receive a ton of mail that I try to answer as best as possible. I'd like to share with you a few typical questions, and answer them for all of you who were wondering about exactly the same thing.

Larry Glenn from Belleville, Illinois, is interested in electric

powered sailplanes. Here is his letter:

Dear Jim:

I am a great fan of your column in RCM and look forward to the next issue. I have a specific question, or group of questions, to ask of you.

I enjoy flying gliders. Being new to this area (Belleville, Illinois — near St. Louis) and arriving late summer last year, I did not make contact with the local club until well into the fall. For Christmas, Santa gave me Katie II from Bob Martin. I looked forward to flying it in the spring, but found, much to my consternation, that there was no adequate place to lay out my high start without running into interference problems with obstacles and people. As a result, my pretty Katie II has collected dust all summer. I bought an R/C car for my son --- along with a battery pack (MRC-RC-13) and a fast charger (Kraft EP-6), which has started me into the electric power aspect of this hobby.

My question is this --- is it possible to electrify my Katie II (it weighs a bunch --- about 42 oz. with radio) utilizing the RC-13 battery pack (5-cell) and fast charger? I want to hold down the cost as much as possible. If I end up having to buy all new everything, I will opt to buy a Gentle Lady (or similar). I have

seen the ads for the more powerful 05's and the geared 05's, but I am confused and uncertain as to what might work.

Sincerely
Larry Glenn

I strongly do **not** recommend that any novice in electric power attempt to build up a flight system from components from different maufacturers for different uses. Sometimes you'll get lucky and have success. Many times the novice meets with disaster: crashes, burnt up motors, fried battery packs.

It appears that your Katie at 42 oz. without electric is probably too heavy for the 05 electric systems. I've never built or flown Katie, so I don't know what the weight is supposed to be. As a rule of thumb, an 05 ship should weigh in at 32 to 45 oz. RTF. Your Katie would weigh almost 60 oz. with a six-cell 05 system. I can highly recommend the Gentle Lady with either the Astro 05 or Leisure 05 systems in the direct drive mode. I do not believe that there is a need for a gear-driven system with a two-meter or under sailplane. However, a drive such as those manufactured by Astro Flight or Leisure Electronics would allow larger ships such as the Olympic II by Airtronics, Super Monterey by Astro Flight, or the Electro Lite by Larry Jolly Models, to fly well with an 05 system powered by 6 or 7 cells of 1.2 AH capacity.

Ben Furst of Potsdam, New York, writes concerning 05 sport pattern flying.

Jim:

I have been reading your articles "Silent Power" in RCM magazine, and have decided that I should try an electric airplane. I like small planes --- .049 R/C is really my favorite, so I sent off for an Astro .05 electric motor. I was planning to build your electric "Shoestring," and now your plans for the "Wasp" have been published, so I think I will try that first. However, I have a few questions concerning these two airplanes, and I would really appreciate your answers. It would help me a lot.

Question 1 concerns airflow over the electric motor. It seems that in both airplanes no air can flow through the slots in the front of the motor; on "Shoestring" only two small holes blow air on the rear of the motor, and on "Wasp" no air blows on the motor at all. So it appears that you basically do not have much cooling for the motor. Is that okay? From your airplanes, it appears that it is; yet the Astro .05 instructions stress airflow for cooling --- hence, my question.

Mike Charles receives the check in the amount of $500.00 from Roland Boucher, one of the generous sponsors. Mike was also Contest Director in this AMA sanctioned AA contest, which drew 24 contestants, 7 from Europe.

Question 2 deals with "Wasp's" lack of landing gear. After seeing that tiny 1/8" diameter shaft, it seems like it is a good idea to avoid prop and ground contact. It looks like an easy to build shaft. Although my motor only cost $12.95, I suspect it is really not powerful enough for a "Shoestring" or "Wasp," and I will eventually have to get an 05XL, and these are $34.95. Hence, the concern over a bent motor shaft. Again, it seems like that is not too important since you have no landing gear on "Wasp." Can you share your "bent shaft" experience with me? I need a little more confidence before I try a plane with no wheels.

My last questions relates to the electric motors, themselves. The question is, what equipment do you use to re-magnetize a motor? And, do you leave the armature in when doing so? Also, how do you tell which pole is already "North" and "South" before putting the motor in the magnetizer?

Well, thanks very much for the information in your articles, and for any help with these questions.

Ben Furst

The 05-sized sport planes fly well, are practical and, above all, are a fun way to enjoy R/C flying at the local schoolyard.

I have flown the Astro and Leisure motors with little or no airflow through the motors and have not had any problems other than replacing brushes, which is to be expected. However, I am very careful not to over-prop and overload the motors. In the Shoestring and Wasp, I generally use a 6/4 prop with 05 motors and a 7/4 with the Astro Cobalt 05.

The Shoestring has functional air intakes on both sides of the fuselage that do flow air over the brush area at the rear of the motor and exhaust. This heated air exits at the rear bottom of the fuselage. The Shoestring does have a spinner, so there is no direct flow through the motor. But, again, I did not have any problems.

The Wasp plan calls for a spinner with no direct cooling through the motor. I have flown the Astro XL05 and Leisure 05 this way with no problems. If you are interested in providing cooling, just take the spinner off.

In fact, if you use an Astro Cobalt 05 in the motor tube designed for the larger diameter Leisure motors, you have to shim it in place with strips of spruce or balsa. This results in a terrific amount of cooling around the entire motor when the spinner is left off.

Regarding landing without wheels with the Wasp, this ship slows down to a snail's pace for landing. I have flown nearly 200 flights with three prototype Wasps, and never broke a prop or bent a shaft while landing. (Don't ask what happened when I collided with the SPS Technologies Building last summer in Hatfield, Pennsylvania, at the Keystone R/C flying field!) Regular landings should not be a problem.

I discussed magnetizing and re-magnetizing R/C flight motors with both Leisure and Astro Flight, and both said that they did not have any equipment available in their facilities to perform this task. Maybe one of the readers out there familiar with

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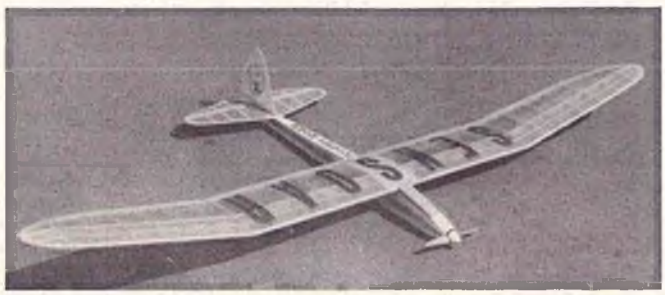
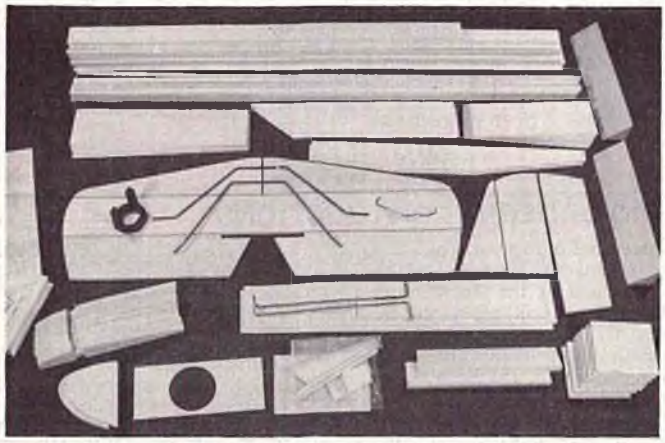
Electric long cabin by Bob Sliff — see text for details.



Sensoar by Hobby Horn — a bargain priced, high quality electric sport trainer.

RCM PRODUCT REVIEW

Model Aircraft Designs
LOADSTAR 40



SPECIFICATIONS

Name	LOADSTAR 40
Aircraft Type	Trainer and Sport Flier
Manufactured By	Model Aircraft Designs, Inc. 23625 Pineforest Lane Harbor City, California 90710
Mfg. Suggested Retail Price	$35.95
Available From	Direct from Mfg.
Wingspan	72¾ Inches
Wing Chord	10½ Inches
Total Wing Area	760 Sq. In.
Fuselage Length	56 Inches
Stabilizer Span:	25 Inches
Total Stab Area:	181 Sq. In.
Recommended Engine Range	.25-.60
Recommend Fuel Tank Size	4-8
Recommended No. of Channels	4
Rec. Control Functions	Rud., Elev., Throt., Ail., Optional Operation: Camera ship, Banner tow, etc.
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa
Tail Surfaces	Balsa
Building Instructions On Plan Sheets	Yes
Instruction Manual	Yes (1 page)
Construction Photos	No

RCM PROTOTYPE

Radio Used:	Airtronics 5 ch. Championship Series
Engine Make & Disp.:	K & B .40FR, Du-Bro Muffler
Tank Size Used:	6 Oz.
Weight, Ready to Fly:	88 Oz.
Wing Loading:	16.6 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Ease of assembly; quality of machine cut parts (fit and material).

WE DIDN'T LIKE THE:
No hatch in fuel tank area.

The Loadstar 40 came to our attention at a recent model expo where it was being displayed by its designer, Joe Bridi. The model looked to be a fun type and would be good on a rough flying field. An order was placed and within the proper amount of time, we received a plain brown box via UPS. No label on the box except notations "Handle With Care" and "Model Airplane Kit." The box was 37.5" x 6.5" x 3.5" which seemed small for the size of model we had ordered. When the box was opened, we found good quality wood and hardware parts well-packed so that no damage had occurred during transit and, as it turns out, there was enough stuff in there to build the model.

Construction:

The plans are easy to follow with adequate detail when used along with the sheet of written instructions. The plans are 30" x 58". Our model went together very quickly with no problems at all during construction. Goldberg's Super Jet was used for almost all of the plane except for the firewall where we used Sig Kwik-Set Epoxy.

The design is normal construction except for the fuselage which has three wide stringers that make-up the rear fuselage members running from the cabin back to the tail. This turns out to be very strong and surely must contribute to the lightness of the plane.

Covering:

After our airframe was completed and sanded smooth, it was covered with Top Flite Super MonoKote. We used Coverite "Stars" from their trim sheet. This proved to be of real value to cover a small hole that was burned through the MonoKote. You do have to keep the hot air gun moving to avoid these kind of problems.

Engine:

To power our bird, we picked an old reliable K & B .40 F.R. that was already bolted to a C.B. Enterprise mount. We chose to use this even though there is an adequate mount included in the hardware supplied with the kit. Our engine already had a Du-Bro muffler installed on it so it was left that way.

For a tank we used a Kress Technology 6 oz. "Stopper Tank" which is a very nice product. Its stopper makes it easy to set up the tank and the protrusion in the front keeps it from pinching off the fuel lines if the tank slides forward against the firewall. This is where the only change was made to the model as presented on the plans. We have a

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SCALE VIEWS

Col. Art Johnson

Starting In Scale:

I have heard the question many times. "What airplane would make a good model for a beginner in scale?" It is a tough question to answer for any number of reasons. First, if there were such an airplane, easy to build, stable, handles well in the wind, no complex markings or mechanical features, etc., it would not appeal to all newcomers to scale. I say this because all newcomers to R/C scale are not necessarily beginners to R/C modeling. In fact, starting with an R/C scale model is not exactly the recommended way to get into this great sport.

I do know some modelers who built a scale bird as their first R/C effort and brought it to the local field all ready for the first flight. Usually the model was built by someone who had built control line or display models in past years and had some building experience. The models were often complex and difficult to fly types like the P-51 or the F-6F Hellcat. The models were usually flyable in the hands of an experienced scale flier but were hardly what a beginner needs if he is just learning to fly R/C. Naturally, the recommendation was to hang up the scale model and build a simple trainer model to get some R/C time under the belt.

Modelers who enter scale with a minimum of R/C flying experience need a model of an aircraft that was easy to fly in the full size version. The flight characteristics of low powered

Mario Yederlinic's fifth big model of the PT-19 AAF primary trainer. Quadra powered — weighs 25 pounds. First in AMA Giant Scale at the '83 Gold Coast Scale Jamboree.

Team Scale may draw out some unusual subjects. This one, an OSU2-3 Kingfisher, by Paul Harding. One sixth scale with Super Tiger 71. Eleven pound model fights gusty wind at Gold Coast contest.

Nicely done Stearman by Robert Bartoe used the 3 plus cu. in. Kawasaki to provide good performance. Black with white trim.

Cessna Agwagon handled well in high winds. 25½ pound model by Charles Herman flew in Giant Scale at the Gold Coast Jamboree.

trainers and light planes usually carry over into model sizes and a model of one of this type aircraft is the best choice for a beginner who is not an experienced flier. No matter how much a newcomer to scale might want to fly his favorite high powered military fighter, he is better off setting his sights lower and starting where he would if he were going to learn to fly the big ones. It is a lot more fun to make repeated flights on your first scale model than it is to rebuild it after every flight attempt.

There is no single kit or aircraft type that is perfect for the beginner. If there were, our Sportscale Sportsman competition events would be pretty boring affairs. Yes, the Sportsman AMA competition event is for newcomers to scale. The rules keep it this way even at the NATS level. Looking back on the entries at many of the contests, I recall a wide variety of models flown by newcomers but the vast majority were of low powered aircraft types. High wing monoplanes with constant chord like the J-3 Cub are perhaps the easiest of all scale models to fly but even these can be a bear in windy weather. For all around weather conditions, a fixed gear, low wing, primary trainer such as the Fairchild PT-19 or DeHavilland Chipmunk, might be a better choice. For example, the PT-19 has good nose and tail moments, simple fixed landing gear, not too much taper in the wing, good dihedral and ample area in the stab-elevator. All features needed in a stable easy to handle model. When you are looking for a kit of some aircraft that appeals to you, remember the features just listed. Unless you are already an expert flier, stay away from models of aircraft with highly tapered wings, low wing area for the fuselage size, small stabilizers, short nose and tail moments, and complex retracting landing gears.

Newcomers to scale are not necessarily beginners in R/C. I know a good many scale modelers who decided to try their hand at scale after years of competing at top levels in pattern or racing events. These fliers face a different problem in selecting their first scale project. Although many competitors in non-scale AMA events build or even design their own models, they do not have to. In scale competition, you cannot buy a model or borrow one from a friend, you must build it yourself. Scale is the only AMA competitive area where the modeler is judged on how much of the model he built and on how well he did the job. A good pattern flier may not have difficulty flying a twin engined P-38 but he will find it a darn sight harder to build than the average pattern or racing model. For this reason, many experienced fliers turn

to the light aircraft aerobatic types for their first scale effort. Models of the Laser, CAP, Pitts, etc., are as easy to build as the more docile Cubs and primary trainers but can still have flight performance satisfactory to the most experienced pilot.

Any discussion of models for newcomers to scale must include some comment on size and weight. Again, this is an area where one must compromise. Larger models are easier to fly, at least while they are in the air. Heavy models must be landed with more care as even a slight mistake can result in damage to the landing gear. Small models react faster in the air resulting in squirrely performance for the beginner but they can stand more abuse on landings. A bounce that would wipe the gear off a 20 pound model might not even bend anything on a 1/2A size model. Inertia makes the difference. On the other hand, you are more likely to bounce the small model and on it goes.

Cost is another factor. Models, like full scale aircraft, cost roughly by the pound. Anyone who tells you that you can build a quarter scale P-38 as cheaply as a 1/8 scale P-38 is not dealing from a full deck. There may be certain types of models where the difference is not as great but the smaller models will always be less expensive. Hopefully, cost will not be your most important consideration. You could wind up with a very small heavily loaded model that would give fits to an expert flier.

Smoke was never used on the original PT-19 AAF trainer but Yederlinic's large bird is modeled from a civilian version rebuilt for show use. The PT-19 in both original and in model form is an extremely stable aircraft.

Finally, if you are interested in competing against other beginners with your pride and joy, you must keep the model under fifteen pounds if it has one engine. (You were not going to start with a twin, were you?) Fifteen pounds is the current limit for the Sportsman-Sportscale event which is intended for newcomers to scale. Go over fifteen pounds and you are in to the AMA Giant Scale event where you compete with all levels of experience.

Prop Logo Decals:

I though that the following extract from a letter by Wilfred Petrick of West Germany would be of interest to RCM readers:

In the March issue, I read that you needed some help in finding a sheet of decals for props. I hope I can help you. Here in Germany, the KDH-factory sells a beautiful set of prop decals in several scales. As you see, the print is very good although the enclosed decals are about 3 years old. They repesent famous propeller builders like Hartzell, McCauley and Hoffman. The complete sheet is about four U.S.

Bartoe's Stearman was heaviest model at the Gold Coast contest but still not easy to fly in the high wind conditions. Heavy models must make good landings and all did at this contest.

A B-24 is not the usual first model for scale competition but variety certainly makes scale meets more interesting. William Boyd's model of the Liberator was entered in the Sportsman Sportscale class at the Gold Coast Scale Jamboree.

High wing monoplanes make good subjects for those starting in scale competition. Super Tiger 46 powered Aeronca C-3 by Lyman Slack flew in Team Scale at '83 Gold Coast Jamboree.

Modern aerobatic aircraft make good starting subjects for newcomers to scale with flying experience in other types of models. This Christen Eagle by Bucky Winokur from the Pilot kit.

dollars and contains some beautiful signs like the Piaggio, the Moravan and the EAA-emblem.

Willfred identifies the company that makes this decal sheet #1147, as Klaus-Dieter Horn, Postfach 2008, 4952 Porta Westfalica, West Germany. The partial sheets that Wilfred was kind enough to send were indeed well-done with the logos repeated in different scales for various size models. In addition to those mentioned above, the sheets included logos for "Flottorp" and "Aero-matic." I would have my order in already but the logos used by Curtis Electric, Hamilton Standard and Aeroprop back in WW II were not included. It is still nice to know that there is something available if you are building the right model.

While we are on the subject of scale props, the following letter from Bob Desjardins of St. David, Maine, describes a problem familiar to a lot of scale modelers.:

I'm building a 1/8 scale model of the F4U-1 Corsair. My problem is, I can't find a scale prop for static display. I have tried Bob Holman and Keefer and none are available. I guess I will have to carve or make my own somehow if I can't find one. Would you know of anyone who might have such a scale propeller for my Corsair? Also, how do I go about carving my own?

I can sympathize with Bob's problem as I have yet to build two scale models that used the same size and type of scale prop. Each required carving a one of a kind (or a couple for twins). The most difficult part of making your own three blade Hamilton Standard as used on the F4U-1, is to get the hub right. The blades are easy and we will describe a quick way to carve these in a future article.

Gold Coast Scale Jamboree:

This early spring contest on the South-east Coast saw a continuation of the trend towards larger models for competition. This year more than half of the models entered were of the AMA Giant Scale type and this year it was fortunate that they were big and rugged. The large models can stand more wind than the smaller Sportscale types and wind is what the Gold Coast contest featured this year. Even though it is down the runway, thirty knots is a bit much for most models. As for realism, no pilot in his right mind would take a real plane off in the scale 100 plus knot winds. However, at a one day contest, it is do or die. R/C pilots do not have to launch their bodies off with the model so they give it a try anyway. The result was a great show of determination and skill with all of the larger models flying and surviving. Some of the contestants with smaller models quite properly elected to keep their models on the ground. This was no time to risk a new Sportscale B-24 with only a few previous flights. There is always the next contest and the hope of better weather.

Mario Yederlinic's large PT-19 may look familiar to scale fans but the model taking first in AMA Giant Scale at the Gold Coast contest was brand new. It was the fifth version of the 25 pound primary trainer built by Mario and the Quadra flies it just the way it should. They say that practice makes perfect and after you build five of the same type model they just have to get better. Actually, all of the large models at this contest were of the light plane or trainer type with Laser 200 models doing well on flight scores. The only retract equipped model to venture into the windy air was Wayne Knight's T-28 which garnered him a first in Expert Sportscale. Bill Schneider's 1/4 Scale Cosmic Wind from the Bridi kit topped out the Sportsman class of Sportscale with good performance in the wind. At quarter scale, this model was eligible for Giant Scale competition but with a 90 engine and coming in under 15 pounds it is also within the limits for the Sportscale classes. This is a somewhat silly anomaly in the AMA rules which apparently does not bother anyone too much. At least no one has seen fit to put in a rules change. Common sense tells me that if a model is small enough to be eligible for Sportscale competition, that is where it belongs rather than in the Giant Scale event.

A special event called "Team Scale" has been a regular feature of many scale contests in the Southeast for a number of years. A similar event has enjoyed some popularity in the West in past years. Team Scale is not an event recognized in the AMA rule book and perhaps it never should be. Scale competition traditionally requires the flier to build his own model. On the other hand, there are a lot of builders who enjoy building scale and can build a flyable model that they cannot fly. Some models are of competition quality at top level and it would be a shame if they were relegated to static shows only or to gather dust in the builder's garage. If one of these builders can see his model fly well or take a prize in a contest, he may get the incentive he needs to become proficient enough to risk flying his own model in a contest.

Team Scale is designed to get a scale builder out to a contest together with a flier with sufficient scale flying experience to minimize risk to the builder's model. The choice of a flier is of course a very personal decision by the builder as he is the member of the team taking all of the risk. At the Gold Coast Scale Jamboree, and at other scale contests in the East where I have seen Team Scale flown, the trophies are awarded to the builder of the model. The flier of someone else's model has received his own reward when he is honored with the trust of the guy who did all the work. If a model wins a trophy in a Team Scale event, the flier of the model has made a contribution to the win during the few minutes of flight time where he was having all the fun. The builder of the model, who makes this event possible, must stand by and sweat out the pilot thinking of all the time and effort that went into his creation. In this situation, we think it only proper

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PIT STOP

Gene Husting

With 120 racers, spectators everywhere and TV crews, it was standing room only at the 11th Annual McCoy Race at Ranch Pit Shop Raceway in Pomona, California. Pit areas were a little crowded but everyone seemed to have enough room to work.

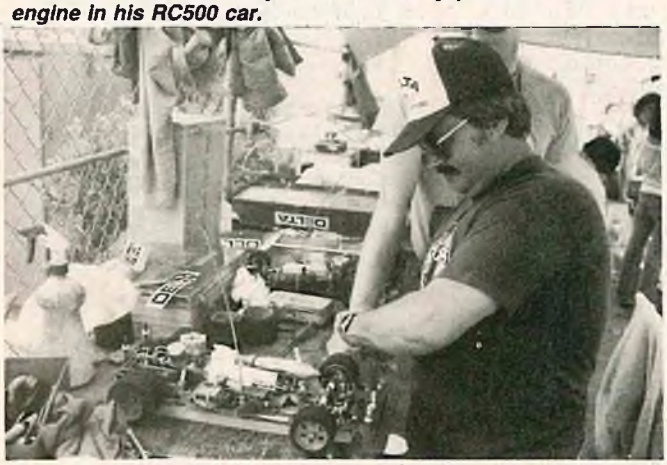
Gay Sullivan, wife of ROAR President Joe Sullivan, won the Concours trophy.

11th Annual McCoy Championships

This race for 1/8 scale gas cars has become one of the three biggest races in the year, along with the ROAR Nationals and the Florida Winternationals. This is the 11th year the Motor Wizard Dick McCoy has sponsored the race. And, I believe one of the main reasons this race has grown so big, is because of the likeable attitude that Dick McCoy has for the racers. Another reason is the PROCAR Club, under the leadership of John Thorp, runs a fair, efficient race. The Losi family, who own the Ranch Pit Shop Raceway in Pomona, California, have done an awful lot of work in improving the track and facilities and it's safe to say it's the

Top Qualifier honors went to McCoy team member Dana Smeltzer. Dana obviously uses all McCoy parts on his K & B engine in his RC500 car.

Dick McCoy has sponsored this race for 11 straight years and it is one of the best races of the year.



Arturo Carbonell was even running one of Dick's new mufflers on the Picco engine in his Eagle car.

When 10 cars try to get through the same corner at the same time something has to give. This is what makes the starts so exciting.

best in the country. The Ranch Pit Shop is also where the 1983 ROAR Nationals for 1/12 and 1/8 cars will be held.

We had 120 racers present, from all over the USA. The introduction of the Delta Eagle and Associated RC500 suspension cars has created an awful lot of new interest in 1/8 gas cars now. Entries at all the big 1/8 races are up this year. The racers are saying now we're racing real race cars! I agree!

Bill Jianas has the track record of 13 laps in 4 minutes 00.2 seconds or 13-4.00.2, which was turned at last years McCoy race. At our last Series race here a couple months ago, on a cold and cloudy weekend, which we all agreed the traction was down, Dana Smeltzer was Top Qualifier with a 13-4.02 and when I was second with a 13-4.04 everyone figured it was going to take at least 14 laps to make the "A" Main this year. We all thought the traction was down, because there was so much oil on the track, so Gil Losi and crew cleaned the track a couple weeks ago. They cleaned the track so good that the traction was now really down. Not only that, but at the 12 hour Enduro race here, we could run over 2 hours on a set of tires and now we were lucky to get a 1/2 hours running time. I had built a new car, trying some new thing, which obviously didn't work. I would have been better off racing my other car, but I wanted to save it for France. I guess we could all go back and say "If I would have only done this or that, I could have gone faster." That's part of bench racing.

The track was open for practice the whole week, and day by day more and more racers were out practicing. Arturo Carbonell had a new front end set-up that he was trying on his Eagle, in an effort to get some additional steering, as well as some new compound front rubber. Rich Lee, Curtis Husting and Roger Curtis were doing a lot of experimenting with 2 speed automatic transmissions, in preparation for the World's Championships next month in France. Associated was also running some new rear rubber that had a lot more traction.

It was certainly great to see a lot of racers that normally race 1/12 electric cars, driving the 1/8 gas cars for this race. Robert Cavazos, Tony Neisinger, Randy Tentschert, Bob Dewald, Terry Ballard, Jeff Abrams and others, all looked like they had been racing gas cars for years instead of days.

Trying to pick a favorite during the practice days was difficult, because at one time or another, there were a lot of guys looking very fast. Lap times were way off because of the low traction, but day by day the traction improved slowly.

We had John Brodbeck, the owner of K & B, and Bobby Toms from K & B as spectators. I was sitting with John in the bleachers at the end of the straightaway where the motors are turning over 31,000 rpm's, listening to those motors hum along, we were wondering how they ever stay together at those revs. But the motors, cars and radios are more reliable now, than they've ever been --- and faster.

Friday was sunny, the first day of qualifying with three rounds scheduled for Friday, three more for Saturday and then the Main events on Sunday. Arturo was one of the first drivers to turn a fast time with a 13-4.05.15. We all know Art is a super driver, but his reflexes can't be too bad either, because in all six of his qualifying rounds, he was always the first one off the line. I'm happy when I can do it once in a while. Gil Losi Jr., is also super quick on the starts and super smooth on the track. He never seems to make a mistake and he took over fast time with a 13-4.02.90. His dad isn't too bad either, as he turned a 13-4.10.33. A fellow most of you have never heard of Ron Paris, nevertheless has been working as hard as anyone for this race and he made it with a 13-4.11.19.

The next day of qualifying on Saturday, was cloudy and cooler and the traction dropped and it didn't look like anyone was going to break yesterday's time, but then things changed. Gil Losi Jr., turned 13-4.02.90 and on his last run it looked like he was going to make a sure 14 lap run, when with 2 laps to go, his fuel filter broke off in the tank and the engine stopped. Ralph Burch Jr., was also on a 14 lap pace, but on the last lap he hit a dot and flipped over and finished with a 13-4.06. Finally, on the last round, it looked like Dana Smeltzer was going to be the first to break 14 laps, but on the last lap, when he was trying to pass another car, he got flipped over and ended up with 13-4.02.76 which made him Top Qualifier. Rick Davis 13-4.08.43 just beat Curtis Husting with a 13-4.08.80, with Rich Lee a tick away at 13-4.09.68. Bill Jianas had tried some new dual action shocks but his car was not running right, and through shear driving skill he made it in at 13-4.11.46.

Sunday was a perfect day. No clouds and about 80 degrees. With 120 drivers, there were 12 main events to run, but the PROCAR club members were doing a super job. I never heard any complaints on how the race was being run. Everything was going off like clockwork. There was even a TV Camera crew from KABC-TV shooting all day long to do a segment on Eye on L.A. I sure hope you get a

It's hard to believe they all made it through the first turn, but it looks like the second turn might be a little different.

Gil Losi Jr., car #2 on the left, qualified 2nd and finished 3rd in the 100 lap Main event. Next, is the 1st place winner Ralph Burch Jr. Ralph won the 1983 Florida Winternationals also, which makes him the driver to beat. Next, is Dana Smeltzer, who was Top Qualifier and finished 2nd. Dana drove a super race here, and also won the 1983 Midwest GT Championships. And Rich Lee took 4th. Rich gambled on running a restrictor in his carb, to make one less pit stop and it almost payed off.

chance to see it.

In the "C" Main, Robert Cavazos showed he came to race. Robert is a 1/12 racer and this was his first race with his new RC500 car. He jumped out in the lead and held it until the 10th lap when he got hit in the side knocking his wing off, so he had to pit. Gary Buriani then took over the lead with Joe Sullivan close behind. Jeff Hollfelder started making his move and soon he passed Joe and then Gary to take over first place. Meanwhile Cavazos was also flying and finally moved back into 2nd place. Jeff took the win with Robert 2nd and Joe 3rd.

"C" MAIN

		Laps
1	Jeff Hollfelder	80
2	Robert Cavazos	80
3	Joe Sullivan	79
4	Gary Buriani	79
5	Ross Kloeber	71
6	Randy Wente	65
7	Francisco Saenz	49
8	Arnan Valle	36
9	Mike Fox	1
10	Gene Husting	DNR

The "B" Main belonged to Tony Neisinger, with everyone else trying to take over 2nd spot, but Mark Miranda had his name on 2nd with John Thorp following in 3rd.

"B" MAIN

		Laps
1	Tony Neisinger	90
2	Mark Miranda	90
3	John Thorp	88
4	Rick Templin	88
5	Tom Wong	88
6	Butch Kloeber	86
7	Paul Sangsahachart	85
8	Jerry Snow	81
9	Bob Mathisen	75
10	Troy Moore	62

The "A" Main drivers were introduced to the crowd. Pictures were taken and the TV crew were doing interviews with drivers. There was a 10 minute practice session, then cars were lined up for the start. I guess when you're Top Qualifier you must be ready to race, because Dana Smeltzer jumped in the lead with Ralph Burch Jr., right on his tail. Next was Rich Lee with Gil Losi Jr., right behind, then Arturo, Ron Paris, Bill Jianas, Curtis Husting, Losi Sr., with Rick Davis's engine dying at the line. The next lap, Rich got a little loose and Losi Jr., took over 3rd and Arturo moved into 4th. Ralph hit a dot and Losi Jr., moved into 2nd with Rich passing Ralph and Art to take over 3rd place. Two laps later Ralph passes Rich and takes over 3rd.

Meanwhile Dana's still leading with Losi Jr., about 2 feet back in 2nd. Two months ago Dana thought he lost all his driving skills. Two weeks ago he was Top Qualifier and won the Midwest GT Championships and here he was leading the McCoy race. Not bad for someone who doesn't think he can drive. On lap 11, Losi gave Burch 2 inches and Burch took it to move into 2nd. But Dana wasn't going to give Ralph anything if he could help it. But on lap 18 Ralph passed Dana for the lead.

"A MAIN

		Qual.	Car	Engine	Laps
1	Ralph Burch Jr.	4.06	Associated	Lee/K & B	100
2	Dana Smeltzer TQ	4.02.76	Associated	McCoy/K & B	99
3	Gil Losi Jr.	4.02.90	Associated	Paris/K & B	98
4	Rich Lee	4.09.68	Associated	Lee/K & B	97
5	Art Carbonell	4.05.15	Delta	Picco	96
6	Rick Davis	4.08.43	Associated	OPS	93
7	Gil Losi Sr.	4.10.33	Delta	Paris/K & B	93
8	Bill Jianas	4.11.46	Associated	Paris/K & B	85
9	Ron Paris	4.11.19	Associated	Paris/K & B	79
10	Curtis Husting	4.08.80	Associated	Lee/K & B	10

After the 1st pit stop it was Ralph, Dana, Losi Jr., Rich Lee then Arturo. Dana stayed very close to Ralph for the next 40 laps. On the 33rd lap Ralph lapped Arturo and 2 laps later Dana passed Arturo. On both passes Arturo moved over and let the leaders go by. I would have to say that this was one of the cleanest races I've ever seen.

Ralph started picking up the already fast pace and Dana started to slowly drop back. By lap 70 Ralph was right behind Dana, but Dana was still

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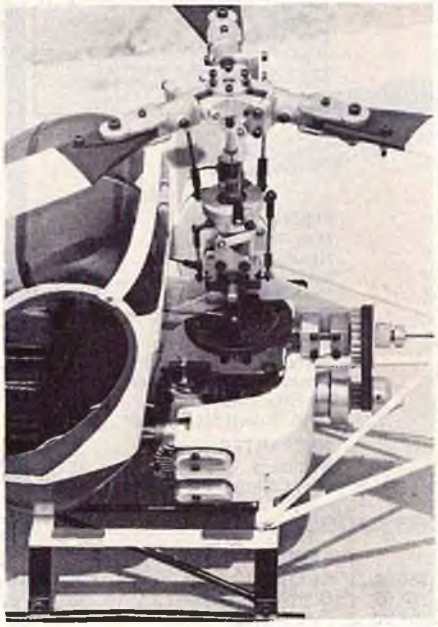
GIVE IT A WHIRL

John Gorham



A highly modified Cricket featuring a homebuilt power drive and three blade rotor by Dan Hale. Power is a Saito FA-45 four stroke engine.

FULL SIZE

Last month we talked about autorotation and I hope that my explanations will provoke some of you into attempting this maneuver which is unique to the helicopter. This month I had planned to present some ideas and suggestions of inverted flight set-up and also techniques for accomplishing it but, as I was going through my mind on the general outlook for the column, it became apparent to me that there was one factor associated with inverted flight which was probably worthy of a column all for itself.

As we said in a previous column, inverted flight of an R/C helicopter is virtually a "nine day wonder." In fact, I just heard from Peyton Enloe, a good friend and flier in Lafayette, Louisiana, who says that he has been doing most of his flying inverted these days and is becoming a little tired of it! Peyton now flies, most of the time, the right way up and ends every flight with an autorotation. But, get this, he starts his autorotations at about 250-300 feet, drops vertically, backs up, does "S" turns and lands "on the spot" nearly every time. Phew! Well,

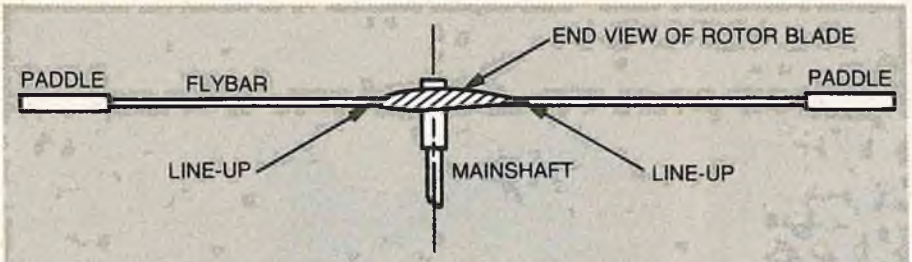


FIGURE 1
ALIGN MAIN BLADE SECTION WITH LOCKED FLYBAR

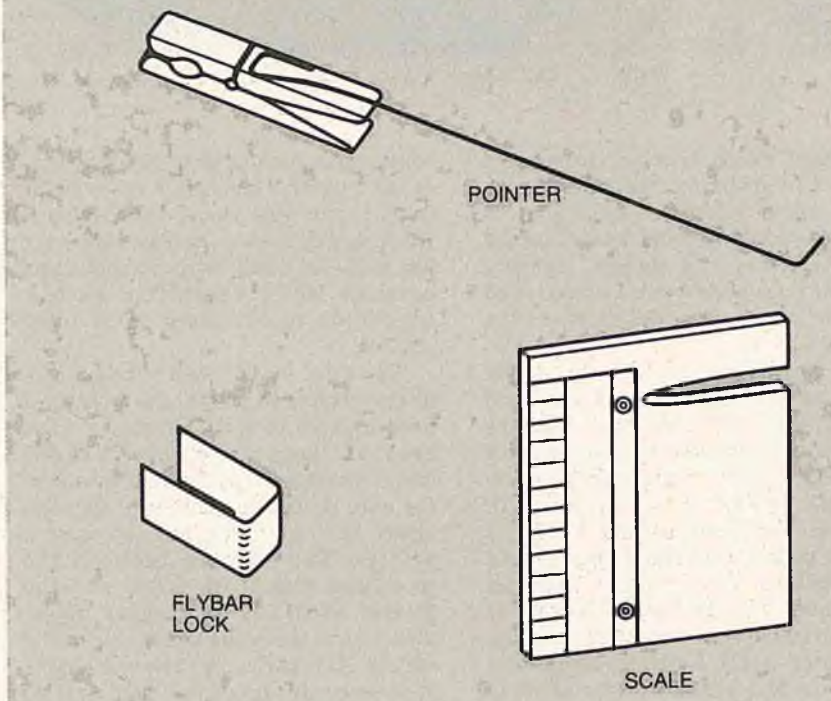


FIGURE 2
THE 3 PARTS OF THE GORHAM PITCH GAUGE

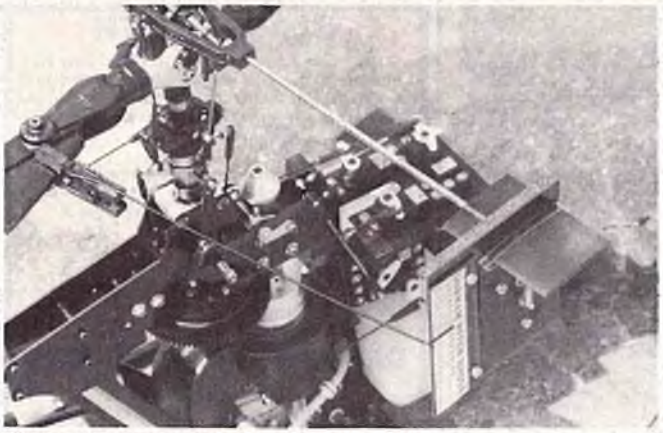
datum setting, **and** have a range suitable for flying inverted. The datum point and the range will be different from that required for good "right way up" flying. However, when the switch is flipped back again, the setting points and ranges must be okay again for "right way up" flight.

So far as the tail rotor is concerned, the need for such precision is less, provided that the zero setting is approximately right for either way up. The main need for precision is associated with the set-up of the collective and cyclic pitch controls which, in turn, vary the pitch of the main rotor blades. If we can very accurately measure the pitch of the main rotor blades, we'll "have it made." At present there are several helicopter pitch gauges on the market but most of them depend upon the flier standing back from his helicopter, squinting down the length of the main rotor blade, lining up the top of his

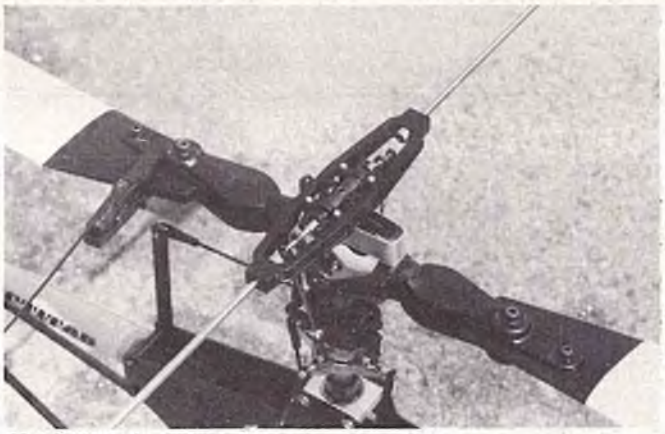
from all of my telephone contacts and letters, I can assure you that there are a lot of fliers in the USA who are accomplishing inverted flight and autorotations, especially now that we have a new generation of helicopters that are very capable of both these maneuvers!

One of the factors associated with successful inverted flying and autorotation is that a much more accurate set-up of your controls is needed than for "normal" flight. It was an awareness of this that caused my decision to delay the inverted flight set-up article until next month so that we could discuss the subject of how to accomplish a more accurate set-up.

The "standard" method now to accomplish inverted flight is to reverse the sense of three of our controls (cyclic fore and aft pitch, collective pitch and tail rotor) while we are flying inverted. This requires us to set-up our links and levers very precisely so that when the controls are reversed they will go to a particular



General arrangement of scale and pointer.



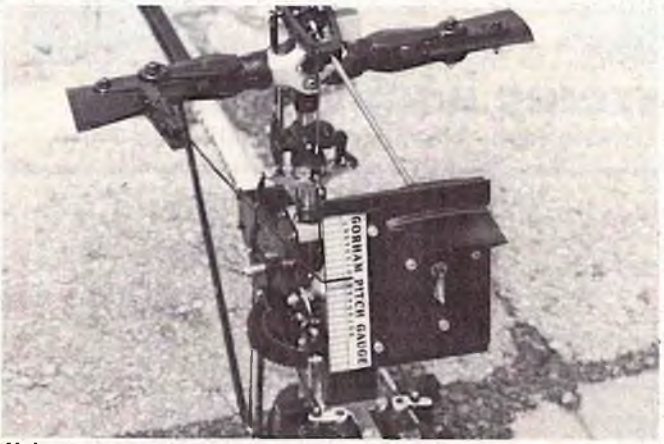
Metal "U" clip to lock flybar.

pitch gauge with the surface of the stabilizer bar (which is locked in the horizontal position), and then setting the scale to read off the angle. All well and good, if you only need to check a particular pitch angle at any one time. But, of course, every time you make a change of pitch of your main rotor blades you have to re-squint and reset the gauge to check the value of the new angle. This process is a step-by-step, and somewhat laborious, method if you are trying to assess the **changing** pitch of the blades in relation to the changes in position of the transmitter controls. Another gauge by "Robart" has a gravity activated pointer which indicates on a scale. This gauge at least shows dynamic movement but you still have to view the gauge along the length of the main blade, and also this gauge demands that the helicopter is sitting level at all times.

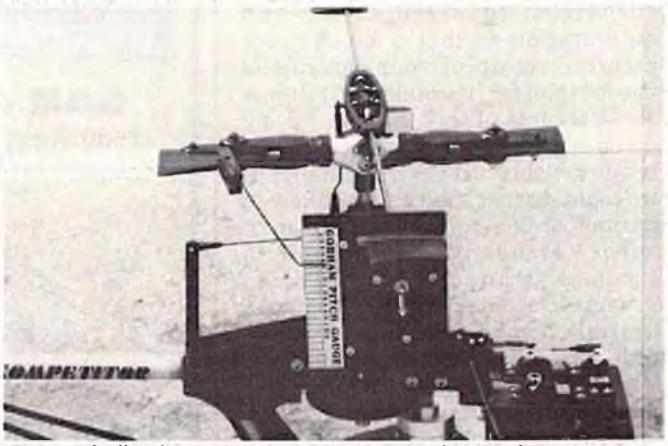
Well, I got to wondering about the problem of accurately measuring blade angles and decided that if I was going to try inverted flight I wanted a much more precise and convenient method of measuring the static and changing pitch angles of my main rotor blades. After some wondering and thinking, I came up with the idea described in this column. I call it the "Gorham Pitch Gauge" because I guess I'll probably manufacture a device based upon this principle. Of course, it could become known as the "clothespin pitch gauge" simply because I used one when I constructed my first prototype model shown in the photos.

The basic principle behind the design of my pitch gauge is to extend the surface of the main rotor blade as far as possible from its rotational pivot axis and use this extended point to measure against a scale marked in degrees. The scale should have the largest possible markings per degree and must be easily viewed continuously by the "setter-uperer." It then occurred to me that, on the helicopter itself, between eight and twelve inches from the rotor shaft is located our flybar paddle, at least on most helicopters (sorry, Hubert!). As we said earlier, we need to lock the flybar and/or seesaw when using **any** of the pitch gauges available today. So we now have a stationary point located a nice long distance from the rotational axis of the blades upon which we can mount our scale. Then, if we extend the rotational plane of our main rotor blades by means of a pointer which will indicate on that scale, we have a very accurate and continuous means of measuring and displaying the changing rotor blade pitch angle. Also, our new device is located such that we can sit side-on to our heli and fiddle with linkages and controls while observing what is happening to our main blade pitch angles.

As you will see from the photographs, to make the pointer I used a piece of 1/16" diameter wire, about 11" long, and epoxied it to one end of a wooden clothespin. The end of the wire should be bent at 90 degrees, about 1/2" from the end, to form a pointer. The distance between the rotational axis of the blade and the pointer should be ten inches if you plan to use the scale provided in this article. Naturally, if you have a longer or shorter distance, you just change the scale accordingly. Half the distance would result in requiring degree markings half as wide. For twice the distance each degree would be twice as wide. Now we need a scale. As you can see from the photos, I used a piece of 1/16" plastic sheet, about 3" x 4". I mounted the scale on it so that it could slide up and down and I glued two other small pieces of plastic into a slot which was shaped like my paddles. The bottom of the slot is spring loaded so that the scale will



Using gauge to check cyclic pitch control.



Pointer indicating −2½ degrees autorotation setting.

hold onto the paddle securely. However, there are probably many ways better than mine which you can use to fix the scale onto the paddles.

The next item to make is a gadget to lock the flybar at right angles to the main shaft. Note: it does **not** have to be horizontal — just at right angles to the shaft. This means that when you use my gauge you can move the helicopter around while you are adjusting the links and controls and it won't change your settings. In the case of the Schluter helicopters, a device for locking the flybar is available. For the "Competitor" I just used a piece of 1/16" aluminum sheet, bent to a "U" shape which I "wedged" between the seesaw and the rotor hub. This locks up the flybar fine. You can see this piece of metal in one of the photos.

Now fit all the three pieces of your new pitch gauge to your chopper and calibrate the device by doing your "one and only" squinting down the end of the blade. Look down the end section of the blade until the zero chord angle is lined up exactly with the flybar. See Figure 1.

Move the scale up or down or bend the wire until the pointer indicates zero on the scale. Switch on your radio and, with your rotor shaft turned so that the main rotor blades are lined up fore and aft on the helicopter (be careful not to touch fore and aft cyclic pitch since the flybar won't pivot in this axis), move your collective pitch lever up and down and you will see your pointer move accordingly. The pointer movement will also indicate for cyclic roll movement. By the way, the swashplate must be set to be at right angles to the main shaft in both pitch and roll axis. You now have a very accurate method of setting main rotor blade pitch angles for all and any positions of the throttle/collective stick. You can also readily observe and set your negative pitch angle for autorotations. Most important, when you flip the inverted flight switch (which reverses three of the controls, remember?) you will be able to see quite clearly what happens to your collective pitch settings. For those of you who can't wait until next month, I use a setting of minus 2½ to plus 7 for upright flight, and minus 3 (or so) to plus 5½ for inverted flight. My nomimal mid-point pitch setting is about 3¾ degrees for the right way up, and about 2½ to 3 degrees for inverted flight. My helicopter uses a semi-symmetrical blade section and the angles for a symmetrical section will be different. The main point is that you can now sit comfortably by the side of your helicopter and really observe the dynamic or changing angles of your blades as you move your control sticks or fiddle with your links and levers.

Another feature of this type of pitch gauge is that you can observe, measure and set your dual rate controls very accurately. With the blades lined up fore and aft, you can measure the roll movements of the swashplate. When you flip your dual rate switch you adjust your low rate setting very accurately. You can also observe if your swashplate/blades move symetrically around zero. Sometimes a servo may be a bit nonlinear and so it will not provide equal motion of your servo arm either side of zero. Or your levers may be set at "funny" angles and the effect of this may be readily observed.

Now, here's a couple more bonus features of the "Gorham Pitch Gauge." Turn your main rotor blades around so that they are crosswise to the helicopter and you can measure your cyclic pitch fore and aft movements. In addition, you can see what trim changes occur, in what sense and what magnitude, when you flip the invert switch. By rotating the rotor slowly and watching the gauge you can see it. A level swashplate results in zero motion of the main blade pitch angle (which it should, of course).

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1983 Hobby Shack 4 Stroke Contest Winners

	Sport Scale	
1. J. MacDonald	Vickers 151	165
2. D. Westergren	Lee Richards #3	164.63
3. J. Kitchen	Clip Wing Cub	164.38
4. R. Larson	Fokker EIII	160.38
5. M. Santmyers	Waco YMF5	160
	Team Scale	
1. C. Byrd	Waco	164.63
2. Zdankiewicz/Tichenor	Little Dipper	160.25
3. Baker/Westlake	Albatros B-1	159.25
4. C. Bruce	Liberty Sport	154.75
5. Priddy/Wiser	Fiesler Storch 156-C	151.63
	Best Saito Powered Aircraft	
Zdankiewicz/Tichenor Team	Lockheed Little Dipper	

The 2nd

By Dick Tichenor

FOUR STROKE CONTEST

Hobby Shack Sponsors A Fine Contest

A quiet weekend at Riverside, California! The four strokers are here in force, but you have to look for them because you ain't gonna hear' em.

The second Four Stroke Contest, sponsored by Hobby Shack and conducted by the Riverside R/C Club, drew possibly the widest variety of scale subjects we have ever seen at a contest. The beneficial attributes of the four strokers are well-deserving of the praise that has been heaped upon them. Modelers who have become familiar with the characteristics of the four strokers are now installing them in higher performance aircraft that benefit from increased propeller diameter / pitch / blade area capabilities.

There were numerous Cubs from Sig and Top Flite and up to Gene White's 1/3 Scale J-3 (Nelitz plans) that was powered by a Kavan Twin. There were several Eindecker E III's (Balsa USA and Ziroli), Pietenpol's (House of Balsa), and a Bleriot, and a Taube, and a Curtiss JN-4 Jenny, and several other slow flying types. Then there was pylon racing champion Tom Christopher with a Saito FA-90T twin mounted in a House of Balsa Pitts Special, unreal vertical performance. Dave Dibble flew a snappy Chipmunk (Tower kit) powered by a Saito FA-45. A. Clies' Tomahawk with an OS Gemini, Buz Watson's FW 190-A3 with a Saito FA-45, Bob Baker's P-51-D (MAC kit) with an OS 60, Pica Waco YMF's by Mel Santmyers (OS 60) and Gary Smith (OS 75), all of these were going machines.

The Riverside R/C Club (Don Lien, Contest Director) outdid themselves in providing manpower and facilities. The 1983 event was a bit more formal than last year with the static judging being performed by members of the Scale Squadron of Southern California while the flight scoring was handled by members of the USPJA.

Hobby Shack provided an outstanding array of the trophies and a mountain of Saito engines and appropriate kits. Upon registering, each contestant received a cap with the contest logo and a bag of useful R/C goodies with a retail value of more than twice the entry fee. Proceeds from entry fees went to the Riverside R/C Club treasury.

The Hobby Shack Second Four Stroke Contest was a fun weekend and, for obvious reasons, the RCM senior citizen is flashing a satisfied grin.

□

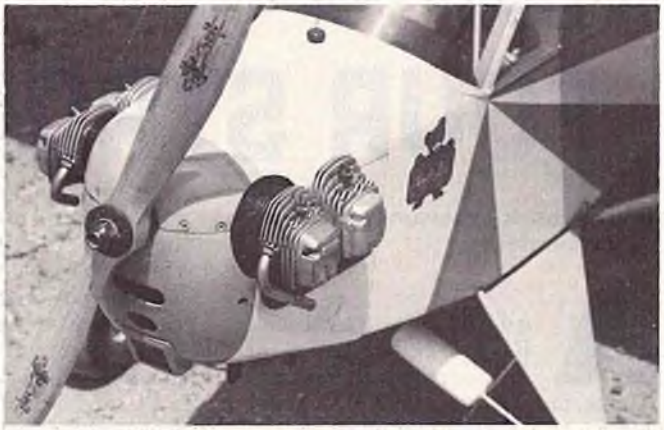
Stand-Off Scale winners: (L to R, standing) 1st Jim MacDonald, 2nd Don Westergren, 3rd Jerry Kitchen. (L to R, kneeling) 4th R. Larson, 5th Mel Santmyers.

Team Scale winners: (L to R, standing) 1st J. Meister and C. Byrd, 2nd J. Zdankiewicz, 3rd B. Baker and (kneeling, left) R. Westlake, 5th T. Priddy and R. Wiser. Fourth place team left early.

Best Saito powered aircraft, Lockheed Little Dipper, Joe Zdankiewicz and Dick Tichenor.

Vickers 151 Jockey Fighter (1932), Webra 91. Jim MacDonald.

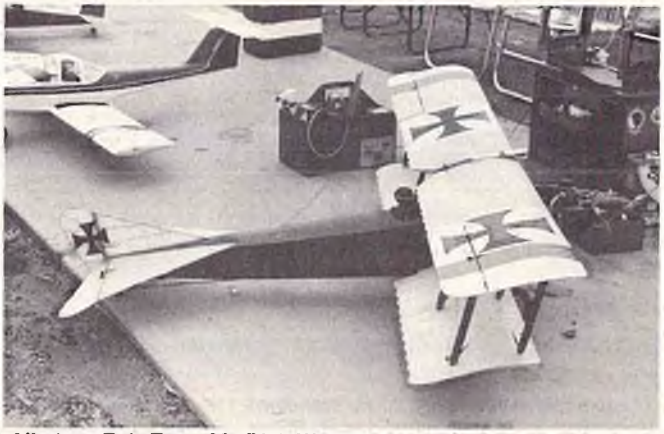
Lee Richards #3, Enya 90. Don Westergren.



Clipped Wing Cub, O.S. Gemini Twin. Jerry Kitchen.

Waco YMF 5, O.S. 60. Mel Santmyers.

Lockheed Little Dipper, Saito FS-90T. Zdankiewicz/Tichenor team.



Albatros B-1, Enya 90. Rich Westlake.

Fiesler Storch 156-C, O.S. 40. Ted Priddy.

J-3 (Top Flite), O.S. 40. John Dolan.

FW 190-A3, Saito FA-45. Buz Watson.

Fleet Trainer, Homebuilt 5 cyl. radial. Forrest Edwards, Sr.

Curtiss JN4 Jenny, Webra 90. Ron Karwacky.

Bleriot XI, O.S. 40. Geary Keilman.

Eindecker EIII, O.S. 60. Dick Skogluna, Bob Knoob.

Super Chipmunk, Saito FA-45. Dave Dibble.

Druine Turbulent (RCM plans), Saito FA-45. Dick Smith.

Waco YMF 3, O.S. 75. Gary Smith.

Sopwith Pup, O.S. 60. J. Hykes.

Piper Tomahawk II, O.S. Gemini Twin. A. Clies.

Piper J-3 Cub, O.S. Gemini Twin. Dick Smith.

Moraine Saulnier, Saito FA-30. Fred Jamieson.

SE5-A, O.S. 60. Mike Morrison.

Liberty Sport, O.S. 60. Doug Boucher.

Druine Turbulent, Saito FA-45. John Price.

Lee Richards #3, Enya 90. Don Westergren.

Nieuport 28, O.S. Gemini Twin. Dave Johnson.

Pietenpol Aircamper, Saito FA-30. Dick Young.

Piper J-3 Cub (1/3 Scale, Nelitz plans), Kavan Twin. Gene White.

P51-D, O.S. 60. Bob Baker.

Pietenpol Aircamper, Saito FA-30. Ernie Payne.

Smith Miniplane, Saito FA-45. John Hodges.

Smith Miniplane, Saito FA-45. Jim Morrow.

Mechanix Illustrated Baby Ace (RCM plans), O.S. 40. Lloyd Barber.

Taube Dove, Saito FA-45. Tom Hamm.

Fiesler Storch 156-C, O.S. 40. Ron Wiser, starting, and Ted Priddy.

Kobe Hughes helicopter, O.S. 60. Gary Hawk.

Cricket helicopter modified to a Hughes 500, Saito 45. Dan Hale.

Joe Zdanklewicz trying to keep his unharmed fingers out of the prop. Blood don't get extra points!

BIG IS BEAUTIFUL

Dick Phillips

I recently talked with an electronics engineer who had become interested in R/C. He bought all the magazines, sought all the advice he could find, then made the usual purchases; a kit, an engine, the required accessories, and a radio. Being a design engineer, he was naturally interested in the design of the radio and took the back off the transmitter to have a closer look at what makes all this tick. He told me he was really disappointed in what he found. Comparing the radios we use with the commonly available electronics in computers, modern ECR's and other common electronic devices, is a bit like comparing a modern car with one of Henry's Model T Fords.

Dennis Waters of Kent England, with his 9' span Quadra powered giant. Model now has over 100 flights.

Hopefully, the new frequencies and the availability of FM will see some advances in the next year or so, particularly in the band width receptivity and the selectivity of our receivers. Sure our radios are pretty good when compared to what we started out with not that many years ago, but they are nowhere near as good as they could be. The determining factor being, how much are you willing to pay for a very greatly enhanced reliability?

I was recently contacted by a communications firm who is doing some market research on this subject in order to determine if they should get into business of manufacturing a receiver which would provide a great deal higher reliability than is presently the case with our radios. Their feeling is that a receiver could be manufactured which would be much more selective than is presently the case, which would reject spurious signals and respond to the signal of the matched transmitter and have a failure rate approaching zero. How much would that be worth? They are targeting for a retail price of between 350 and 400 dollars for a receiver only, but a receiver unlike anything we have seen to date. This receiver would be matched to your existing transmitter and would be very close to 100% reliable, all but eliminating the "radio failure" crash caused from the receiver failing in some way.

Our transmitters are pretty reliable and are not subject to the sort of treatment we give our receivers and the thought is that a redesigned receiver would be sufficient to provide the reliability they feel sure they can provide. I gave them what amounts to an opinion of what sort of market there would be for such an item and would greatly appreciate your comments which I will pass on to them. They have estimated a particular sales volume at the above price. I suspect there are more of us around willing to pay for the reliability they project and this, in itself, would bring the cost down some. Let me know if you'd pay $350 to $400 for a receiver only, which would operate with your present radio and servos, but which would give you almost total reliability. I'll pass the word along to them simply as raw numbers, no one will contact you for an order or for anything, for that matter, we'd just like to know what the demand would be for such an item. I doubt I'll be able to answer such letters, but do let me know what you feel on the subject, pro or con.

Mike Marco has a couple of products on the market, both aimed at those of us who like WW I airplanes. His first item, just in time to go under my Balsa

WW I type wheels from Mike Marco. Wheels are solid and provide minimal springy action. Good looking on author's Sopwith Pup. More in text.

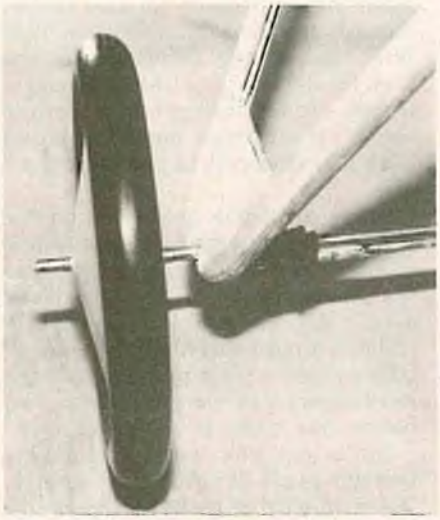
USA Sopwith Pup, is a pair of wheels designed to give the appearance of canvas covered WW I aircraft wheels. I must admit they look very good indeed under the Pup. They are the finishing touch that adds a good deal to the model. I was using a set of the wheels available from Balsa USA which are basically spoked baby carriage wheels and, while they would certainly do the job properly, the number of spokes and their size is not quite right for the airplane. (The price is certainly very good and, covered as were most of the WW I vintage wheels, they would look great.)

Mike's wheels are solid and the cover is added afterward. The wheels are very tough and the tires are solid so there is little problem with the wheels developing a flat spot from sitting in the same position for any length of time. They weigh a pound a piece (at 22 pounds, my Pup can stand the weight!), and at 8" in diameter, they look great. Price is $21.95 a pair plus $2.00 P & H direct from Mike at 83 Whisky Road, Coram, Long Island, New York 11727.

Mike also has 8" 1930 type wheels, slightly larger tires designed for such models as the F4B4, Curtiss Hawk, P-12's and so on. Same price, same address.

Mike tells me he flew his 27 pound Fokker D7 all summer last year on his wheels, no sprung landing gear and off grass with no damage to the wheels or to the airplane, which is quite a recommendation. I must say I like the set I have and they certainly add a good deal to the looks of the model.

Speaking of the Pup, the plan shows standard construction to have no spring in the landing gear. It is a simple matter to provide for some springing much as was done with the original airplane and I would highly recommend it for flying off grass or paved strips. As shown in the photos, the method closely follows that used in the original and the number of wraps of the bungee cord will determine how



Vertical slot over axle permits movement upward of just over one inch. Elastic cord wrapped around axle and secured provides spring action. Works well and is a copy of the arrangement on the original aeroplane.

much spring is provided. (Depends on how heavy handed you are at landing, I guess. I use lots!)

A 1/4" plywood plate was made to fit in between the gear wires with a slightly oversized slot running vertically in the plywood. The bottom of the left and right gear legs was tied together with a piece of piano wire with brass tube soldered in place over the joint. This prevents the gear legs spreading on contact with the ground and binding the wheels. The axle is a piece of 1/4" piano wire wrapped and soldered to the piano wire tie rod. Then bungee cord is attached as shown and the number of wraps of cord may be varied to provide a wide range of stiffness to the gear. The bungee cord is just elasticized cord available from any fabric or sewing shop. Naturally it should be checked from time to time to assure it has not chafed and worn to a dangerous extent. But then, you always check that sort of thing anyway, don't you?

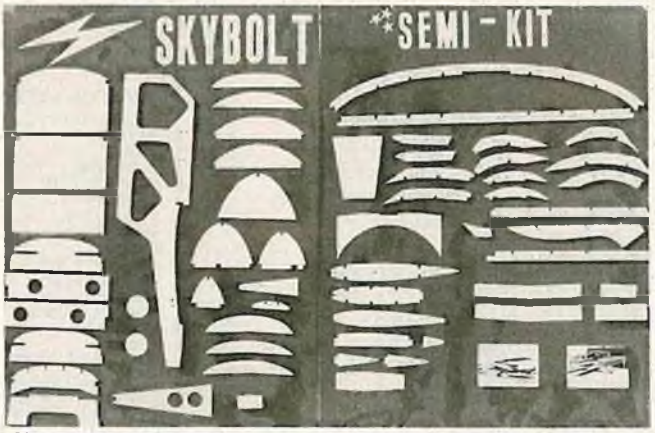
It makes a good looking, and quite prototypical gear arrangement plus making the model a little easier to handle in landing. It doesn't take long to do and adds quite a bit of realism to the model. The slotted guide plate is held to the gear legs with glass cloth and resin as are the wooden gear legs, then faired in with micro-balloons or whatever you use for such filling jobs. The little sort of winglet that goes between the gear legs can still be added so long as you allow for the up and down movement of the axle.

I mentioned Mike Marco having another product to market and quite some time ago I commented on his building of cardboard airplanes. His Fokker D7 is such a project and the color pictures I have of three of them shows no evidence that they were made from such an ordinary material. They are very brightly colored as were many of the original aircraft and, if WW I is your bag, Mike will provide you with one of these beauties for $120, including a set of his wheels, or 100 bucks flat and you provide your own wheels. I don't have a lot of details available on these models so best you contact Mike direct, if you're interested.

There is a facet of our hobby that has been somewhat neglected to my way of thinking, especially in the rather hazardous times in which we live. With the economy being what it has been for the last year (thank goodness it seems to be making a move for the better!) it surprises me there hasn't been more interest in partial or semi kits.

There are some good ones on the market and they make a good deal of economic sense in tough times. First, they are nowhere near as expensive as a full kit, they are very readily shipped almost anywhere by mail or UPS as size is not a problem, and the workmanship in some of them is a lot better than many of us can manage.

Let's say you want to build a Quarter Scale Skybolt, from scratch. There aren't that many kits available and some of the available kits aren't that great. So you decide you'll build from a plan. First thing you'll have to do is transfer all those neat bulkheads and formers, wing ribs, and pieces, from paper to the material you're



Skybolt semi-kit from Medallion Products provides all the cut and shaped parts required to build Dario Brisighella's Skybolt. Nice design on Dario's part and great work on Medallion's part.

Gord Brechin (Medallion Products) doing final inspection and packing of one of several semi-kits he markets. An active modeler and flier, his well-stocked shelves attest to the completeness of his supplies.

going to use in construction. If that's not done accurately, you may end up with a bird that exhibits some strange habits. Then you have to cut all those neat parts out and they had still better be accurate in shape or you could have the same trouble. The partial kit solves that problem for you, in that the parts are already cut to shape, all you need to do is assemble them in the proper order, add the strip and flatwood and you can have a bird as good as the one your pal Joe built from the kit. Not to mention the fact that you can pick and choose the strip and flatwood at the local hobby shop. If you do a good job of choosing the right stuff, you could end up with a better model than Joe got out of his kit.

This is not to suggest that building from a plan is something which should be avoided. Once one has done so a time or two, methods are developed which permit ease of construction and one gets comfortable with building from plans. For the newcomer building from plans, the partial kit makes a good introduction. He is involved in the building of a model from plans without having to go through the rather laborious job of transferring the patterns to the wood and then cutting and shaping all that wood to the correct dimensions and shapes. It makes the move from kit building to plans building possible in a couple of easy steps rather than jumping right into a plan with little past experience. I suspect the abrupt move into building from a plan with little past experience has been the

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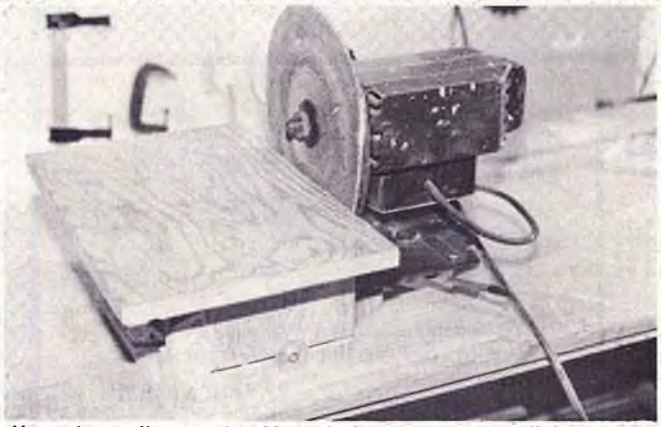
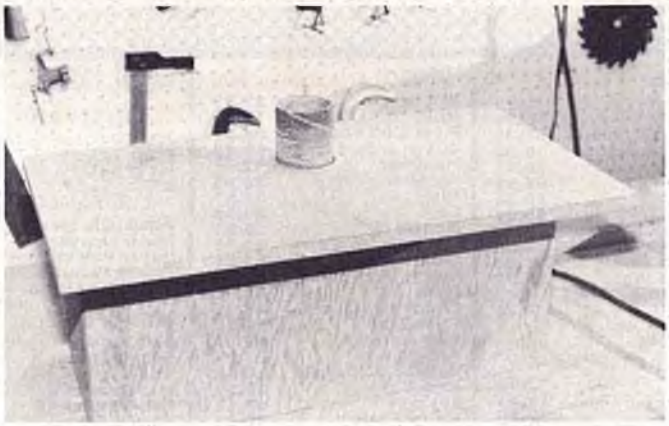


Home brew disc sander. Motor is from worn out radial arm saw (just the rails were worn out!). Disc from Sears and, presto, a great shaping and sanding tool. Discs exactly the right size are a bit hard to find, but this does not create a problem.



Drum sander made from shop scrap plywood, used motor and new sanding drum. (Drum about $3.00 from Sears) makes building from plans a real pleasure. You can see by the worn disc that it has already been earning its keep!

cause of many sticking with kits and thus depriving themselves of some the excellent models available in plan form but not as kits.

I don't think there is anything in the hobby as satisfying as working from a plan, creating a model from what basically amounts to an idea and seeing the thing fully realized and flown. There's a great sense of accomplishment in it and it's one of the real joys in modeling. The only step beyond it is to truly "scratch" build which entails drawing one's own plan and building from it, thus being totally involved in the creation of a new and, usually, different model which has not previously been done. That's not for everyone, of course, but the buiding of a model from a plan is a close second.

I had the chance recently to visit a partial kit maker, Gordon Brechin of Vancouver, Canada. (Medallion Products, 6700 Comstock Rd., Richmond, B.C. V7E 2X6.) Gordon is producing partial kits from some really well-done plans. He has Dario Brisighella's Starduster Too. Dario's new Skybolt will be available by the time you read this and he is also cutting partial kits from some of the excellent plans by Dick Barron.

Gordon's production is not your usual assembly line, each part being jigged and cut by hand. You can imagine this provides very good quality and strict adherence to the designer's plan. His maximum production runs about ten kits at a run, so you can appreciate that the quality of the kits is possible to maintain at a high level as he must handle every part of every kit several times during its construction and for that reason inspection of parts is a part of the production process.

For obvious reasons, Gordon selects only the best material which help assure the quality of the finished product and he has even managed to procure some exotic woods and, should they show obvious improvements over conventional materials, he may incorporate them into production.

Currently available partial kits include Dario's Starduster Too and his new Skybolt (78" span, 17 to 20 pounds for either Quadra), Godfrey's Stearman, Dick Barron's PT-17 and Curtiss Goshawk, with others to be added in the future. All of the above are biplanes and if you consider the time you'd spend cutting wing ribs, the partial kit makes good sense! The Skybolt is $99.95, Starduster Too is $125.00. Dick Barron's 2" = 1' kits are as follows: PT-17 — $65.00, Goshawk — $50.00, Stinson Reliant — $40.00, Gulfhawk — $50.00, and Curtiss Hawk — $50.00. (Prices are U.S. dollars.)

Gord also has some Old-Timers such as the New Ruler, Dalair Sportster (all you old guys out there will remember that one!), Brooklyn Dodger, and two classics, the Playboy Sr., and the Buzzard Bombshell. These range from $16.00 to $30.00 each and are worth it.

Gord will also cut any kit you wish to show him plans for and will quote a cost for you if you wish. For further information, contact Gordon at the address above. If you like to build from plans (and save dollars) but don't have the time to cut all those neat parts, maybe a partial kit will solve both problems for you.

I have always enjoyed building from plans, partly from the sheer pleasure of creating something out of raw stock and partly due to the fact that there are some really fine airplanes I'd like to model that just aren't available in kit form. So, over the years, I've gathered a pretty decent workshop complete with about every hand and power tool you could name. However, a couple I had added lately have added to the enjoyment and convenience of making parts up from plans, or making replacement parts for things I wanted to change in a kit, or to replace things I drop and then step on!

I don't have a belt sander, other than a hand held one, and sanding was a bit of a problem until I managed to find a used radial arm saw motor and added a home-brew table and sanding disc to it. It's a great tool and really makes producing accurate and smooth parts a real pleasure. Rounding out the team is a drum sander made up from another second hand motor and a sanding drum (Sears for about $3.00) mounted in another home-brewed stand. These two tools are a must for the serious builder, whether you scratch-build, build from plans or kits, or just doodle around in your shop. The cost was minimal for both although commercial products are available which do the same jobs if you want to go that route. I have found them both to be well-worth the time it took to make them up and they have shortened the building time required for building from a plan very significantly. The two of them, in concert with the Black and Decker drill powered bandsaw mentioned in a recent column, have rejuvenated my enthusiasm for plans construction and made the whole process an enjoyable one and one which now takes a good deal less time than it used to when I cut things out by hand with a modeling knife. Not to mention the fact that **now** things all match the plan and fit together a lot better than they used to.

You know how the guy supplying the plans always suggests you cut all the parts first and then start construction? I never had the patience for that and cut the parts as they were required. Not any more, it's so convenient now to make parts that I do it their way and devote an evening or two to getting all the bits and pieces ready and then launch into the actual construction. It works pretty great!

I had a conversation last evening with a fellow who had been a modeler back in the days when radios were

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RADIO SPECTRUM

Jim Oddino

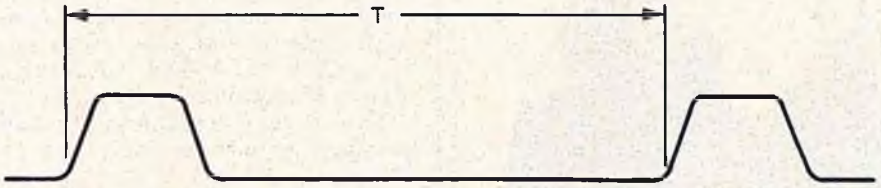


FIGURE 1

In the last couple of columns that I've written (sorry I missed the September issue), I've talked about Pulse Code Modulation (PCM) systems. This month I thought I'd go into them in a little more detail and tell you why I think eventually PCM will take over the industry just like our current Pulse Position Modulation took over in the mid-sixties. I'll try not to get too technical. I've already had some feedback from the July column (even though I'm writing this in June) that the first part was good but the schematics and block diagrams got boring. Hope that you all don't feel that way.

Probably the first thing to sort out is the fact that when we talk about a PCM system we're talking about the way the information we are sending to our model is encoded and not about how the RF carrier is modulated. A PCM system could use Amplitude Modulation (AM) but I suspect most will use Frequency Modulation (FM). The term encoding, in our case, refers to how we convert the transmitter stick position into an electrical signal that can be decoded in the receiver and converted to servo position. The systems we've been flying for the last twenty years use Pulse Position Modulation (PPM) where the information is contained in the time between adjacent pulses. See Figure 1.

When Time (T) equals 1.5 millisecond, we are sending a neutral command. Full up might equal 2.0 msecs. and full down would equal 1.0 msec. Notice I've drawn the pulses with sloping edges and rounded corners. That is because we must filter our encoded pulse train prior to modulating the RF section in order to keep the bandwidth down. This makes it more difficult to measure T. It would be a lot easier to measure accurately if the pulses were square. The fact is, it is not uncommon to get a variation in Time (T) even in a properly operating system. Under strong signal to noise conditions and with static position of transmitter and receiver, one or two microsecond jitter can be measured. In the air I'm sure it gets worse. And I know most serious fliers are now using servos that can detect these small changes. By the way, I think I said it three years ago but I'll say it again, I think the FM systems are definitely better in this regard. I think the limiting in the receiver is the reason.

At this point in the conversation I'm sure many of you are saying that your present system doesn't have any such problem. Hopefully it doesn't under normal conditions. But we all know there is some condition, whether it be next to someone elses transmitter, near some metal buildings, or near a TV transmitter, etc., that your servos will start jittering. Just take your transmitter antenna off and start walking away from your model. At some distance the servos will start to jitter. If you turn on an adjacent channel transmitter you will find the distance without jitter is shorter. Hopefully this doesn't happen when your antenna is on while you are flying but I'm sure you can see that it could. With PCM it can't.

PCM basically consists of transmitting numbers that represent the position of your control sticks. Each channel is sampled sequentially just as in PPM and when all channels have been transmitted, a new "frame" is started. The PCM systems do one more thing each frame. They send out another number that allows the receiver to decide whether all the numbers in the frame were received accurately. This is called a "parity check." For example, let's consider a four channel system where each channel can be in one of 256 positions. With roll, yaw, and pitch at neutral and throttle wide open, the numbers transmitted might be:

Neutral Ailerons = 128
Neutral Rudder = 128
Neutral Elevator = 128
Full Throttle = 256

One could simply add the four numbers and send the sum as that parity check. The transmitter would send 128, 128, 128, 256, and 640. The receiver would add the first four numbers and compare the sum to the parity number (640). If not identical, the receiver would conclude that the information was not accurate and would ignore the whole frame. So if noise of one sort or another in the RF channel changed any number even by one count, it would be ignored and the servo would hold its last good position until it got some new "good" information. I'm convinced you could fly through many conditions where you now get glitched without knowing you lost any info.

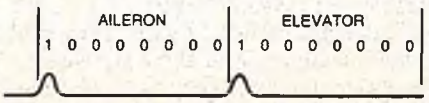
Let's go back to the numbers that are being transmitted. If we wanted to

use the decimal system we would have to detect ten levels whether they be amplitude levels or ten different frequencies. This is messy and is the reason the electronics and computer industries went to binary numbers years ago. In a binary system you only need two levels. The information lies only in the pressence or absence of code pulses and is independent of their amplitude, width, phase, and rise time. This allows more filtering, slower rise time and, therefore, narrower bandwidth.

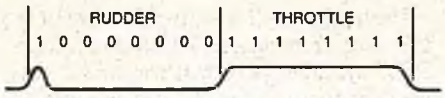
The binary numbers for the numbers in our example are as follows:

DECIMAL NUMBER	BINARY NUMBER
128	1 0 0 0 0 0 0 0
256	1 1 1 1 1 1 1 1
640	1 1 0 0 0 0 0 0 0 0

For every 1 we would send a pulse and for every 0 we would send no pulse. Neutral aileron, followed by neutral elevator would appear as follows:



Neutral rudder followed by full throttle would look as follows:



Hopefully you can now see how the PCM system sends the information and that the shape of the pulse is not important. If the system is designed right, even a very noisy pulse will give solid servo operation in contrast to a PPM system, as long as the pulse is detected.

Unfortunately, binary numbers get long. It takes eight binary digits which we call bits to express the three digit decimal number 256 and ten bits to express the number 640. If we start talking about an eight channel system we end up with a lot of pulses per frame. If we want lots of frames per second, the pulses must be short. The shorter the pulse the faster the rise and fall times must be and, therefore, the wider the system bandwidth. We have run into a basic law. More information requires more bandwidth. Information can be defined as how accurate I know something and how often it is updated. So the system designer has to make a trade between resolution and frame rate if he has a fixed bandwidth to work with as we do in R/C.

Let's take a look at the Microprop

PCM system, manufactured in Germany by Brand Electronik, to see how they made the trade off. The first thing I noticed was a frame time of 29 milliseconds which is quite long compared to the systems I was familiar with which were down in the 14 to 16 msec. range. However, I finally got around to looking at the JR System and found a 26 millisecond frame and this is obviously quite adequate as far as servo smoothness and response are concerned. In fact, I've since decided that the reason JR can get away with their tight deadband is because of the long frame time. I recently set up some servos with Signetics' amplifiers for the JR system and found I could tighten the servo deadband quite a bit, but that is a subject for another column.

So far so good. The Microprop frame time looks okay. The next thing was the length of one bit which I found to be 400 microseconds (μsecs). That says I can have 72.5 bits per frame. The next thing I found was that the sync took 8.5 bits and the parity took 16 bits. That left only 48 bits for eight channels. That is a problem if we want 8 bits per channel. The way Microprop got around this was to transmit only six channels per frame. The four primary channels, aileron, elevator, rudder and throttle are transmitted every frame and two of the other four are transmitted every other frame. Two of those four channels are switched as opposed to being proportional channels so you can't tell the difference unless you can detect an added 29 msec. delay, which I doubt. However, you can detect the difference in the two proportional channels where the servos move in perceptible steps. This will have no affect on performance because you don't move mixture and flaps very often and you don't care if they do move in steps as long as you get the resolution you want. In this case you get one part in 256 which is less than .5%. However, it does not look good on the bench and it might bother some people.

What about the four primary channels? Well, I would have thought .5% accuracy (actually .39%) was more than adequate. For example, if I had a servo with 100 degrees of travel I could position it to within .39 degrees of where I want it. However, the way the Microprop is set up, it doesn't come out that way. As the 8 bit number (called a word) goes from all zeros (zero) to all ones (256) the pulse width out of the receiver goes from .975 msec. to 2.25 msec., for a change of 1.275 msec. If I divide 1.275 by 256 steps I find that the smallest increment I can change the pulse width is about 5μsec.

Looking at a Kraft servo which moves about .13 degrees for every

micro second, you can see that the servo will move in .65 degree steps. Of course you could set you servo to go .10 degrees μsec and get .5 degree steps which you would think would be good enough. But is it? Most good servos will respond to a one μsec change in pulse width as long as we are driving the servo in the same direction. If we change direction we usually find a .5 μsec deadband although I hear that the JR 4001 model is much tighter. I don't know if .5 degree steps are good enough, but I know it doesn't look as smooth as our present systems and I never want to give up performance. One solution would be to go to a ten bit word and have 1024 steps. This really complicates the electronics, so I doubt that anyone will go that way. I took a close look at the Futaba PCM system at Toledo and it definitely did not move in detectable steps and as far as I could tell was every bit as smooth as a PPM system. I don't know how they do it but I do know they have special servos. The PCM servos will work on the PPM systems but the old servos will not work on the PCM system. It could be they have figured out some filtering arrangement that merely hides the steps. We hope to evaluate the Futaba system as soon as they are available, for as far as I can see they are much better than the Microprop.

I failed to mention up front that the PCM signal is converted to pulse width (PW) in the receiver in order to use standard servos. I'm sure that in the future the servo amplifier functions, other than the motor drivers, will be performed in the receiver's micro processor which will make the PCM system even better.

Another potential improvement is to put the signal conditioning, that is the dual rates, mixing, etc., in the transmitter's micro processor instead of using analog circuits as the Microprop system does. In fact, you could store settings for more than one airplane in your transmitter. Of course you could put a dual conversion receiver in the system to eliminate the image and intermodulation problems. So you can see we still don't have the ultimate system.

As far as testing, I did do a lot of bench tests but I didn't fly the Microprop because it came with only two servos and they use an oddball connector that I didn't have mates to.

Number one, the system was on 27 MHz which enabled me to run tests against a citizen band radio which I could put on frequencies 10KHz from the R/C system. With the 4 watt CB transmitter right next to the receiver it had no effect. Next I tried an R/C transmitter on exactly the same frequency. As long as I had more power, that is, was considerably closer

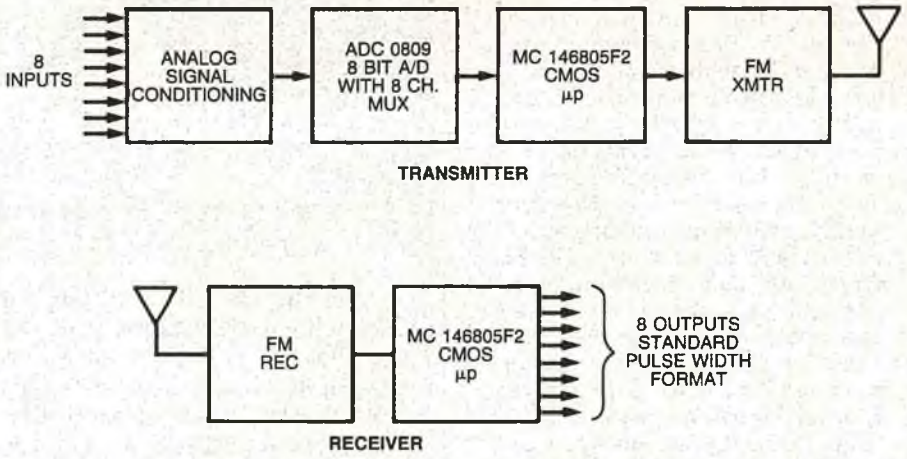


FIGURE 2

to the receiver with its own transmitter, the system worked. If the jammer got too close, of course the system would lock out, that is, the servos would hold their last good position. At no time did they ever get noisy. I tried walking out away from the receiver with both transmitters on the same frequency. It would work for a while, then lock out, then start working again as I moved further away. The bottom line is that you could fly successfully if everyone else operated legally and was not on your frequency. You might have some chance of landing your plane if someone turned on, on your frequency, but I wouldn't want to try it.

Well, I don't think the Microprop PCM will be an instant success but I'm sure the old timers will remember that the first proportional systems weren't better than the much developed reed systems. The first so-called digital systems weren't an instant success either. However, the way things progress these days I don't think you will have to wait too long. As I mentioned, the Futaba looks like a giant step already.

Just so I don't disappoint the guys who like block diagrams I've shown the Microprop system in Figure 2.

Rate Gyros

I promised I'd give you a report on my experience with a rate gyro in a fixed wing pattern airplane. The unit

I've been flying is imported by Kraft Systems and as far as I know is the smallest and lightest available. I also believe it has the lowest current drain at 120 ma. No modifications to your basic system are required if you have the proper connectors. An interfacing module comes wired to the gyro which mixes the gyro signal with the signal from the receiver. In my case I plugged it into ailerons as shown in Figure 3.

The gyro is powered by the system battery. Because of the added current drain I went to an SR 900 ma battery pack.

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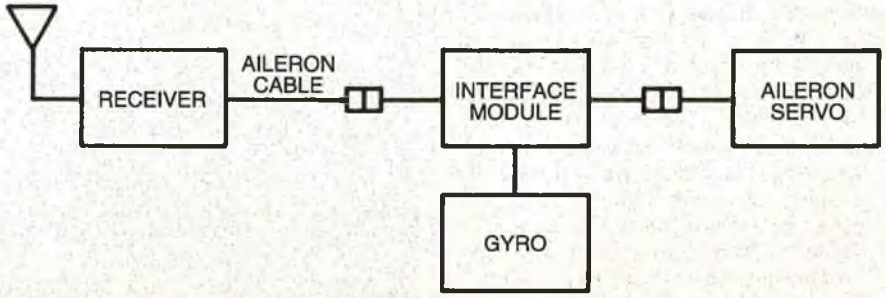
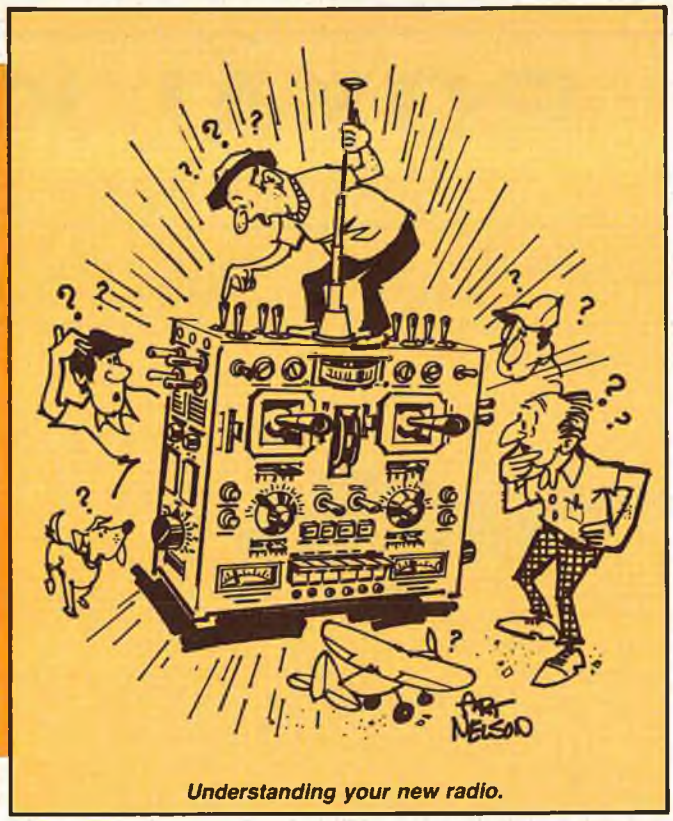


FIGURE 3

WHISTLES AND BELLS

An explanation of radio features

By Tim Renaud



Understanding your new radio.

Dual rates, triple rates, exponential, E.P.A., T.T.A., C.A.R., mixing, coupling --- reading an ad for one of today's new radios can be a very confusing and frustrating experience. The extremely rapid progress made in radio technology in the past few years has presented the average modeler a bewildering array of features and options to choose from when he decides to purchase a radio. As with everything new, all these bells and whistles bring both bad news and good news with them. The bad news is that a person has more to understand when he is buying and operating a radio. The good news is that all of the new features make setting up and operating model cars, boats and planes easier and more convenient than ever before. The purpose of this article is to make the bad news easier to take so you can get down to enjoying the good news.

First of all, let me say that this is not going to be a technically oriented article. I'll leave the theoretical and electronic explanations to writers who are better qualified. I will try to explain as many of the new features and buzz words as I can so that the average modeler can use this article as a reference when he is considering and comparing radio systems.

For the sake of organization, the radio system will be broken down into three parts: the transmitter, the receiver, and the servo. There have been developments in batteries also, but these are more technical than practical in nature, so they won't be included in this article.

In days of old, the transmitter was about as basic a piece of equipment as you could get. They all looked similar, performed the same basic functions and operated the same way regardless of the type or size of model being operated. If a control surface moved too much, the horn was changed and the transmitter remained the same. If an airplane was sluggish on landing approach, but too twitchy at flying speed, you either lived with it or built a different model, but, in either case the transmitter was unchanged. Today things are different, Now transmitters have had features added which make setting up and flying models easier than ever before. They basically fall into two categories, convenience options, and flight options.

Convenience options include anything that makes the model easier to set up and adjust. For the most part these features allow you to modify the servo's direction or amount of travel, but some also allow you to change the transmitter's frequency or type of modulation. Here are most of the new convenience options:

Servo Reversing: In the last three years, this option has found its way into almost every radio on the market.

Top view of Airtronics 7 channel showing the "flight options": dual rate switches and aileron rudder coupling switch along the front of the case, adjustment pots for the rates on top of the case.

Top view of helicopter radio. Switches for dual rates and inverted flight on front edge of case. Throttle hold switch on extreme left of case top. Adjustments for tail rotor compensation on left case top and adjustment pots for rates and throttle hold on right.

The name is self explanatory; by flicking a switch, the modeler can reverse the direction a servo rotates. There is no need to have normal rotation and reverse rotation servos; only one type is required. Servos can be mounted and hooked up in the most convenient way without regard for their rotation direction and the proper movement selected when the installation is completed.

E.P.A. (End Point Adjustment): E.P.A. allows servo travel on one side of neutral to be reduced without affecting travel in the opposite direction. For example, if a particular installation required 15° of travel in one direction and 10° in the other, E.P.A. would make it easy to set up the plane that way without any type of differential horns or bellcranks. By reducing both sides of travel equally, E.P.A. can also be used to reduce the total amount of control throw without adjusting linkages.

T.T.A. (Total Throw Adjustment): T.T.A. reduces servo travel on both sides of neutral equally. This feature is useful for throttle or retracts when 90° of servo movement isn't needed and eliminates fiddling with the servo arm or control horn lengths to obtain the correct amount of travel. T.T.A. also lets the modeler desensitize controls that were initially too twitchy without changing linkages.

D.S.C. (Direct Servo Coupling): When a system has D.S.C., plugging a cable from the airborne system into the transmitter allows all of the servos to be operated without sending a radio signal. This allows trims and controls to be checked and adjusted even while someone else is operating on your frequency.

Plug-In R.F. Module: When a transmitter features a plug in R.F.

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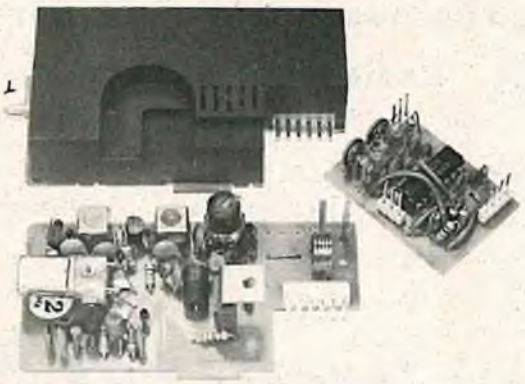
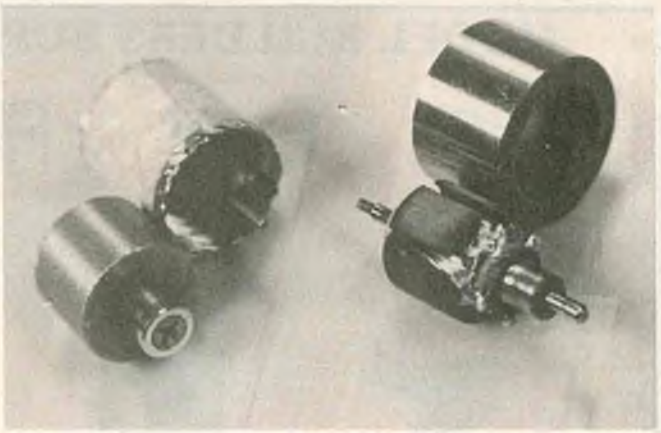
Front view of transmitter showing the "convenience options." Switches are for servo reversing. Adjustments cover total throw adjustments, exponential adjustments, and end point adjustments.



Things to plug into your transmitter. Bottom is AM plug-in R.F. board. Top is FM plug-in R.F. module, and right is mixing module for elevon control.

Cutaway of an Airtronics 94551 servo. Note the bulge in the case to provide clearance for the ball bearing on the output shaft and the brass gear train module on the right.



The internals of a coreless and standard servo motor. On the left is armature "basket" which revolves around the central magnet in a coreless motor. On the right is the armature of a standard motor which rotates inside the magnet.

module, it means that the signal generating part of the transmitter's electronics plugs in and out as a unit. Since no soldering or technical expertise is required to change the module, each individual owner can change his transmitter's frequency, band, or type of modulation easily and relatively inexpensively. With plug-in R.F. modules, one transmitter can be operated on AM or FM and on any frequency in the 27, 53, 72 or 75 Mhz bands.

Transmitter flight options include anything that changes the model's characteristics while in flight. These options are usually operated by switches on the outside of the transmitter as opposed to the concealed convenience options. They mix functions and change the type and rate of control response to expand the performance capabilities and flexibility of both the radio system and the model. The major flight options are as follows:

Dual Rates:

Dual rate has been around for a relatively long time, and many modelers will already understand its operation. Basically, dual rate allows the modeler to choose between full servo throw and a reduced amount of throw while the model is in operation. With the rate in the off position, 100% servo throw is available for maximum control response. Flipping the dual rate switch to "on" reduces servo throw and desensitizes control response. The amount of reduction when the switch is turned on is adjustable, letting the modeler tailor the system to his own needs.

Linear Control Response: When a radio's control response is linear, it means that servo movement is directly proportional to control stick movements. A 10% stick movement gets 10% servo movement, 50% gets 50%, 70% gets 70%, etc.

Exponential Control Response: If a radio is set up for exponential response, it means that servo movement is not directly proportional to stick movement. Over the first portion of stick travel the servo moves less than the stick, making control response milder, and smoothing out level flight and normal flight maneuvers. Over the last portion of stick movement the servo catches up with the stick so that at full stick travel 100% servo throw is available for aerobatics or for panic situations.

Dual Rate Exponential: This functions the same as a standard dual rate, but also gives the modeler the option of choosing either linear or exponential response. The degree of exponential can be varied from none (pure linear) to very pronounced, depending on personal preference. With this adjustable feature the modeler can have the advantages of both dual rate and exponential in one package.

Coupled Aileron and Rudder: With the C.A.R. switch off, the ailerons and rudder function independently. Turning the switch on will electronically couple the rudder to the ailerons. Meaning that when an aileron command is given both the ailerons and rudder will move for smooth, coordinated turns. The amount of rudder movement for a given amount of aileron travel is adjustable to suit each particular aircraft, and the coupling action can be overridden at any time by the rudder stick.

Plug-In Mixing Modules: Some systems are equipped to accept plug-in modules which mix two functions or couple two functions together. This type of module lets the modeler fly elevons or flaperons without using mechanical mixers, or to automatically have elevator compensation fed in when spoilers or flaps are deployed. The number and variety of modules that are available make almost any control system possible without complex mechanical linkages or mixers.

One of the fastest growing areas of our hobby has been helicopters. As the number of helicopter pilots has grown, flight options have been developed specifically for chopper use and specialized helicopter radios have been introduced by various manufacturers. The following are the most commonly seen features for helicopter use:

Tail Rotor Compensation: When the throttle is advanced on a helicopter, the whole aircraft tends to rotate about its vertical axis in reaction to the increase in torque. Tail rotor compensation momentarily increases tail rotor pitch to counteract the increase in torque. The amount of pitch increase and the duration of the increase can be adjusted to suit the particular model and conditions.

Throttle Hold: In normal operation, the throttle stick on a helicopter radio operates both the throttle servo and collective pitch servo in the model. A throttle hold switch freezes the throttle servo in position while still allowing the collective pitch to be operated by the stick.

Invert Switch: When a model helicopter transitions from upright to inverted flight, flipping this switch reverses all flight controls except aileron and throttle so that the pilot can fly the model without having to mentally reverse the controls.

The second area to be covered is the receiver. It would be difficult to cover the developments in receivers without getting technical, so rather than get specific into types of receiver design and function, I'm just going to briefly touch on the subject of narrow band receivers. When the AMA announced the new FCC frequency assignments, everyone became aware that frequencies would be spaced much closer together than they were previously. This led to a rise in curiosity about receivers which could

operate on the new narrow band widths — narrow band receivers.

The situation is this: all receivers will have to be able to operate on a spacing of 10KC, but not for another eight years. In the meantime, it isn't necessary to have a narrow band receiver. Several manufacturers have already brought out designs that will meet the requirements of the future, and this is certainly something to consider when looking at radio systems. However, these narrow band receivers currently cost more, and you shouldn't rule out radio systems simply because the receiver included in that unit will have to be replaced eight years down the road.

The last area I'm going to cover is the servo. Servos are vital links in our radio systems, since they are the mechanisms which actually convert our control inputs into motion. Servos have been steadily and quietly improving in terms of power, resolution, and reliability. These improvements are largely due to improvements in the gear trains and motors used. The following are the major advancements in servos over the past few years.

Coreless Motors: Coreless motors are generally faster and produce more power than conventional motors. The secret of a coreless motor is its armature or "core." In a conventional motor, the armature consists of metal plates with windings of wire around them. Current is applied to the windings to create a magnetic field which is used to spin the armature. A coreless motor has an armature that consists of only a wire basket, so the mass of the armature is less. This makes the armature easier to spin and lets the motor run faster and more efficiently.

Ball Bearing Output Shafts: Servos with this feature have a ball bearing supported output shaft. This makes for smoother and more precise operation and reduces wear and play in the shaft for greater reliability.

Brass Gear Trains: There are several servos on the market with brass gear trains. The advantages over plastic gear trains are obvious; the brass gears can be manufactured and assembled with greater precision and are virtually indestructible.

That's all I am going to cover for the moment. I will not say that I've explained every new feature or term because I haven't, and I'd be crazy to try to completely cover everything in so broad a field. Hopefully, I have covered those terms that crop up routinely in the majority of radio ads and have given an adequate explanation of what they are or what they do. □

1ST TROPICAL R/C FUN FLI AT SAN JOSE, COSTA RICA

By John Gorham

Some of the several thousand who came to see the R/C show.

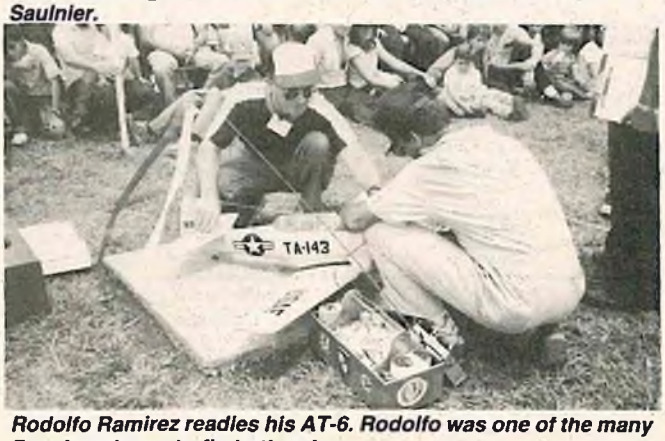
LACSA, the airline of Costa Rica, was very much responsible for helping to put this show together.

During the "Toledo" show a number of us became aware of the existence of a "Costa Rica" booth. We couldn't understand, at first, why it was there since there were no models displayed. After stopping for a chat, however, Dick Kidd and I rapidly discovered that the modeling fraternity of Costa Rica, aided, abetted and sponsored by the country's airline — LACSA, had firm plans to hold a "fun fli" in their country's capital, San Jose, and to invite a number of fliers from the U.S.A. to participate. Dick had his invitation to represent "RCM" but just couldn't make it. (Bet you're sorry now, Dick!) I received my invitation as the helicopter representative of the United States group and so I got "saddled" by Dick to write it up for RCM.

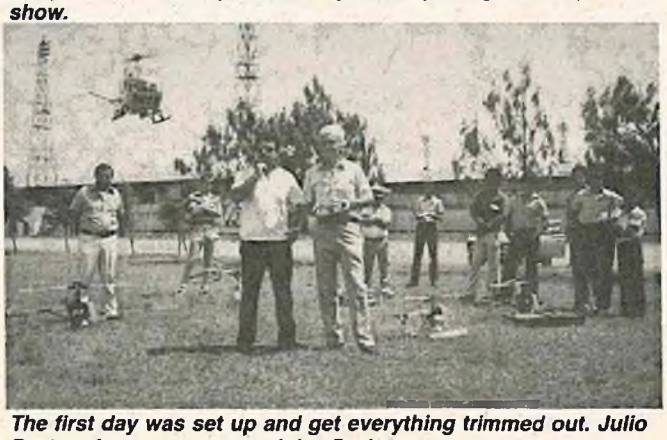
First of all, maybe many of you (like myself) only have a vague idea where Costa Rica is located. I knew it was somewhere down lower than Mexico but higher than South America proper. Naturally, having been invited and having decided to go, I commenced researching this region of Central America. Costa Rica, I discovered, was just south of where all those "problems" are happening in

Dave Brown gives the fine tune to Nick Ziroli Jr.'s Moraine Saulnier.

Larry Wolfe winds up his A4-E prior to putting on his part of show.



Rodolfo Ramirez readies his AT-6. Rodolfo was one of the many Pan Americans to fly in the show.



The first day was set up and get everything trimmed out. Julio Pastora keeps an eye on John Gorham.

Honduras and Nicaragua. In fact, Costa Rica lies directly between Nicaragua and Panama. What I also found out was that Costa Rica is very definitely a democratic country. It doesn't even have an army. A beautiful, colorful country with fun loving and gracious people who seem determined not to fight and squabble as many of their neighbors are doing. The climate is superb since the temperature range is 62 to 81 degrees Farenheit with an average temperature of 72 degrees. It's a tropical country, however, with the rainy season between May and November. The local currency is the "colone" and, at the present time, you can buy quite a lot of colones for the dollar; hence, living in Costa Rica is very inexpensive. Americans living there say that $500 to $1,000 per month income will permit you to live in great style.

Well, back to the "fun fli." The organization of the whole affair was headed by one of Costa Rica's eminent modelers and personalities, Julio Pastora. Julio's collection of model's, radios and engines has to be seen to be believed. Julio (pronounced Hulio) was certainly the driving force behind this event. LACSA, Costa Rica's national airline, was represented by two of their senior officials, Sr. Jose Girault (the General Sales Manager) and Sr. Luis Fernando Reynolds (the System Tour Manager). Both of these gentlemen did a fantastic job in making all the necessary flight arrangements and, of course, handling our accommodation problems in San Jose. We were all amazed and very impressed with the personal attention we all got. The North American contingent finally finished up with about ten fliers representing several different aspects of flying. The fliers officially invited are listed in the chart.

The event took place in San Jose, which is the capital of Costa Rica. San Jose is situated in the high mountain range running down the center of the country at an altitude of 3,900 feet. The actual airfield at which the event was held was the San Jose Model Flying Club's own model flying field. Their field is located inside the grounds of the Los Reyes Country Club and the model airfield area alone covers more than six acres. Los Reyes is situated fifteen miles west of San Jose at an altitude of 2,600 feet. The runway is 220 feet long and paved and there are excellent facilities in terms of sun shelter, restaurant and restrooms. The club has over 50 members, with about 29 of them active. They fly almost any time they can — holidays, weekends, during the week, too, when two or more can get together. The location is in an especially beautiful part of Costa Rica — although the whole country rates as beautiful.

The main organizers of the event were: Julio C. Pastora, Event Director; John Marino, Co-Director (Californian, now living in Costa Rica); Eduardo Ortiz, Co-Director (V.P. Citizen & Southern Bank); Mario Salazar, Air Taxi service owner; Ronald Echandi, Exec. of O.A.S. (Organization of American States); Jose Ayub, Safety Controller.

The "fun fli" itself was planned to take place on Saturday and Sunday, May 28/29, with the public invited to attend Sunday by means of TV announcements and other publicity. As you'll see later, the publicity certainly worked very well, even better than expected! Most of us arrived on our respective LACSA flights from Miami or Los Angeles on Wednesday or Thursday. The moment we stepped off the plane, actually the moment we stepped **on** the plane, we had the full V.I.P. treatment. Clearing Customs at San Jose was certainly painless since several of the model club and LACSA officials were waiting to speed our way through. We were then "whisked" off to the luxury "Playboy" hotel in San Jose, where we were all accommodated in beautiful rooms. The hotel possessed a swimming pool, several bars (complete with Bunnies!), restaurant and a disco.

During Thursday and Friday several tours and events were organized for us, including a visit to the Irazu volcano, which is one of the world's largest craters. One of the San Jose club members also owns a private air taxi service and on at least two occasions I saw Dave Brown, Charlie Hampton and Nick Ziroli, Jr. disappear through the hotel door with Mario to fly off in his plane somewhere. Apparently one of the trips was to a "fantasy island" which is situated in the Gulf of Nicoya, on the Pacific Ocean side of Costa Rica. Others went on shopping expeditions and some (notably one of our younger fliers) just plain disappeared every so often.

Bearing in mind that the local colone was much devalued, there were many good bargains to be found in the city. The price of gasoline was high. Other than imported goods, this

Name	Affiliation	From	Aircraft	Type
Dave Brown	President, Dave Brown Models	Hamilton, OH	Tiporare	Pattern
Paul Clements	Owner, Kitty Hawk Models	Paoli, IN	Skynight 6	Pattern
John Gorham	Owner, Gorham Model Products	Los Angeles, CA	Cricket & Competitor	Helis
Charlie Hampton	Long time modeler	Englewood, NJ	T-38 & Electric Glider	Scale
Larry Wolfe	President, Jet Hangar Hobbies	Los Angeles, CA	A4-E Skyhawk	Ducted Fan
Nick Ziroli, Sr.	President, Major Models	Long Island, NY	Eindecker	Semi-Scale Combat
Nick Ziroli, Jr.	Major Models	Long Island, NY	Moraine Saunier	Semi-Scale Combat
Jim Joy	Show Team Flier	Iowa	MIG 15 & Christen Eagle	Ducted Fan 1/4 Scale
Rick Alter	Show Team Flier	Iowa	CAP 21 & Christen Eagle	1/4 Scale
Willy St. Martin	Model Exports	Miami, FL		

Nick Jr. and Sr. are being carefully watched by Dave Brown. Maybe they will let him fly.

Sr. Jose Ayuba, local modeler, takes care of the frequency clips.

seemed to be the only commodity which was. During one of the days, Julio Pastora picked me up at the hotel and we were whisked off to Channel 2 TV studios where we were politely requested to fly "Cricket" off the studio swimming pool. The flying sequence was taped and shown later on prime time TV. Fortunately I'd been given a hint that this **might** happen and had brought a pair of bright yellow floats inscribed with "Costa Rica" on each side in white letters. What would I have done without them?

Other entertainment provided for us was a very fine dinner at Julio Pastora's French restaurant, Le Coq Hardi. There was also a cocktail party, complete with a calypso group, at Julio's house one evening around the swimming pool. You can see the effect of the party on some of us in the photographs. Then, another evening, after the flying had finished there was entertainment and a "talk session" at John Marino's house where all the participating fliers were presented with beautiful flying jackets. On Saturday night the hotel lobby was turned into a static aircraft display. All our machines and many Costa Rican model planes were displayed. The TV people again turned up to video tape the show and they interviewed Julio and his daughter, Anastasia, who, at 11 years old, flies her own "Pink Panther" R/C plane.

Now to the flying itself. Saturday was the day when we first saw the airfield and were able to make our test flights and set our engines. With the influence of the high altitude and humidity, I found I needed at least 3/4 more of a turn on the needle valve to avoid a lean engine run. Other than this, the effect of the nearly 3,000 foot altitude didn't seem to worry any of us too much. Perhaps the quietness and lack of urgency on Saturday lulled us into a false sense of security and didn't prepare us properly for what was to happen on Sunday. On Sunday we arrived at the airfield early (by Costa Rican standards), around 8:30 a.m., and set-up our models in the pits. The perimeter of the field had rope barriers to hold back the crowd. The total length of these barriers was as least 3/4 of a mile, and by 9 a.m. there was already very little space left in the front row. The most astounding thing, however, happened over the next hour or so while most of us were concentrating on preparing our aircraft and making our first demonstration flights. When I looked up, the crowd was not one but probably 3 or 4 deep all the way around the barriers. And down the hill, entering into the flying field area, was a row of cars which extended as far as the eye could see. We soon learned that over 5,400 people were admitted on a paid basis and after this another 1,500 or 1,600 jumped the fences, determined to watch the show. So the total crowd numbered well over 7,000 and there was a 3 mile line of automobiles parked on the road down to the entrance gate. Because of the large number of people, crowd control was very difficult at times but, all in all, it was conducted admirably by the local club members. The San Jose TV stations were present and gave the show 6½ hours of coverage, with 3

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Rick Alter readies his 1/4 Scale CAP 21.

L to R: Sr. Jose Girault, Dave Brown, John Gorham and Julio Pastora.

hours live on Sunday on the sports Channel 2. All of this air time was donated free. The weather was fine, temperature around 80 degrees, wind out of the west at about 15-20 miles per hour. Julio Pastora, Luis Reynolds and John Marino were busy all the while organizing the various needs of the meeting while Jose Ayub filled the role of safety controller and radio frequency allocater. Jose did a fine job although there were still a couple of slip-ups in frequency control.

Then the flying started. Dave Brown flew his Tiporare 4 or 5 times. The crowd especially loved his "steak knife." For those of you who don't know that term, it is knife edge flight with "wiggles." Dave had a great time while he was there. Dave also represented the North American team very well by having long discussions with the LACSA officials during which they tentatively agreed upon a Pan American contest in Costa Rica, probably in 1984. Charlie Hampton from New Jersey, who works part time for Polk's, has been a well-known modeling personality for many years. "Charlie" flew 3 or 4 times with his glider, on one occasion thermaling for ten minutes before he could get down. Charlie had one great time there and pleased the crowd with his flying. Paul Clements, who owns "Kitty Hawk Models," flew his own "Skynight 6" pattern ship several times. Paul was a great show pleaser and seemed to really enjoy himself. The two Nick Ziroli's flew combat many times with their ships but had terribly bad luck. They were cursed with two mid-air collisions which you would hardly believe could happen and on one occasion, when Sr. got confused after a cross-over flight of their planes, he tried to fly Jr.'s plane with the usual tragic results — a crash. They kept them in the air, however, did lots of fast repair work and were both a big hit with the spectators and the rest of the team. Larry Wolfe flew one of his company's "A-4E Skyhawk II" ducted fan planes, powered by a Turbax III and a Rossi 65. This plane has an estimated top speed of 130 mph. The "jets" and the helicopters seemed to please the crowd the most. Rick Alter and Jim Joy flew their Byron "MIG 15", "Christen Eagles" and "Cap 21" to really impress the crowd with these big ships. The rather narrow runway and high altitude caused a few shaky landings, however.

I was the only helicopter flier present, consequently I flew lots of times on a regular basis and on other occasions when I was needed as a fill-in since some of the "fixed-wings" found the rough spots in the runway upon landing and had to be "hangared" for repairs every now and then. I flew precision aerobatics with the "Competitor" and did an autorotation on each flight. Later in the show, I did some inverted flying for them, too. "Cricket" was flown in a fun fli mode with a few loops and landings on a small table which was put out on the runway. During the last flight of "Cricket" I landed on the table and one skid slipped off. After hitting throttle fast and using a lot of body English and left roll, the helicopter just missed the ground by at least an inch. Got a great ovation from the crowd — guess they thought I'd planned it. All helicopters stayed in one piece until the end of the second day and then someone (who shall be nameless) decided to ground check his plane on the same frequency that "Competitor" was being flown on. Didn't have much chance on that occasion. Fortunately it hit where there were no people. Between events, since I was the only heli flyer there, I was asked to help to get several local helis flying. I set-up two "Crickets," a "Mini-Boy" and a "Mantis" which were owned by some of the local fliers. The Panama team attended in force and represented two of their model clubs.

The ASPADA Club, which has about 100 members, was represented by Jean Miguel, President; Rodolfo Ramirez, Club Secretary; and Erich Dern. The AMPA model club was represented by Rafael Cano, President; and Lizbeth Lee, Secretary.

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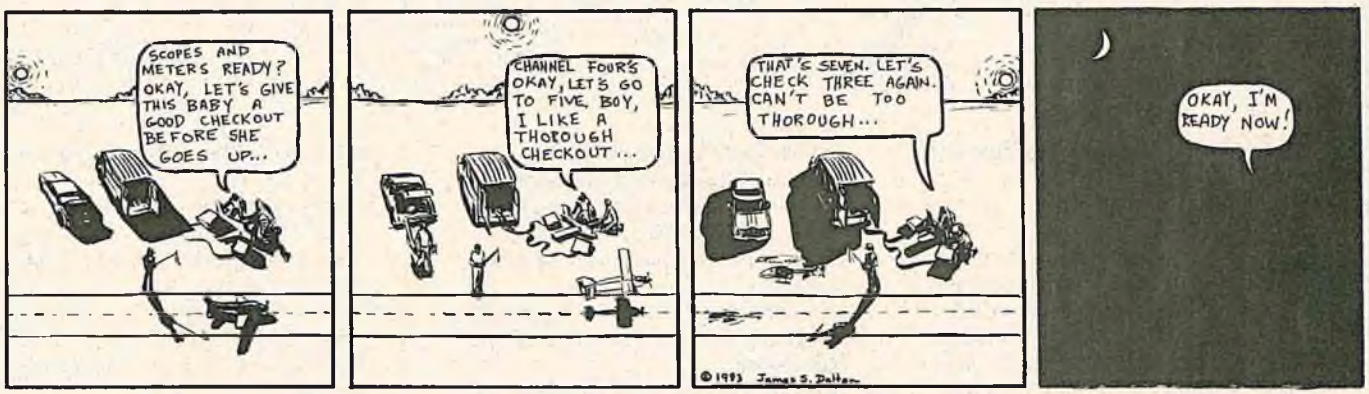
One of the local heli fliers gets some help from John on his Mantis.

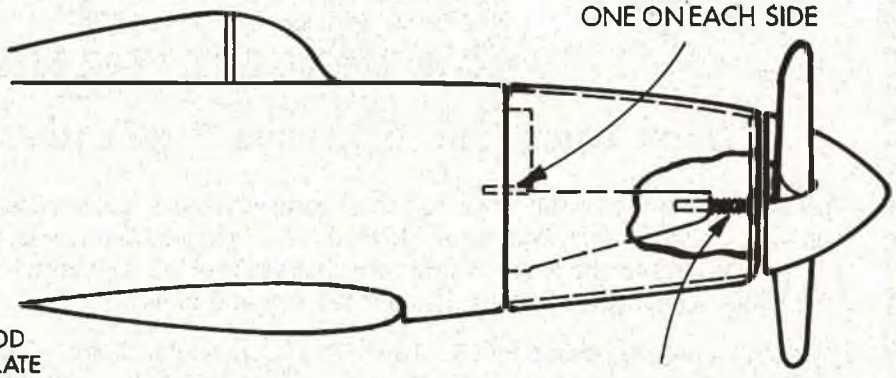
After working hard all day, it's time to play. John and Larry with Fernando Reynolds on right with the happy look.

FLYIN' FOOLS by Jim Dalton



FOR WHAT IT'S WORTH

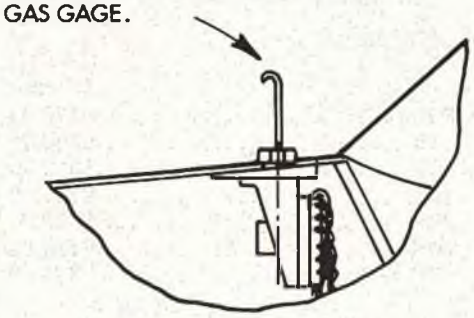
Edited By Jerry Smith



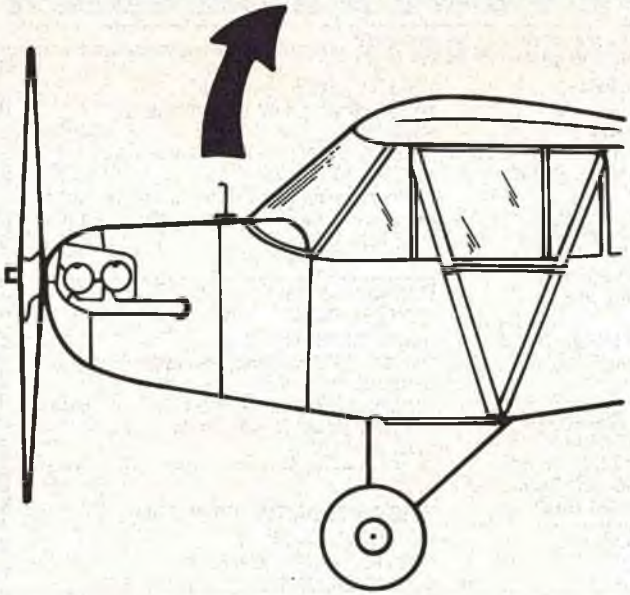
David Plumley of Campbell, New York, shares his method of attaching nose cowlings.

He uses flat head screws that are counter sunk through the molded engine mount. Rear alignment is accomplished with a round toothpick used as a dowel between the rear cowl former and firewall on each side of the engine mount.

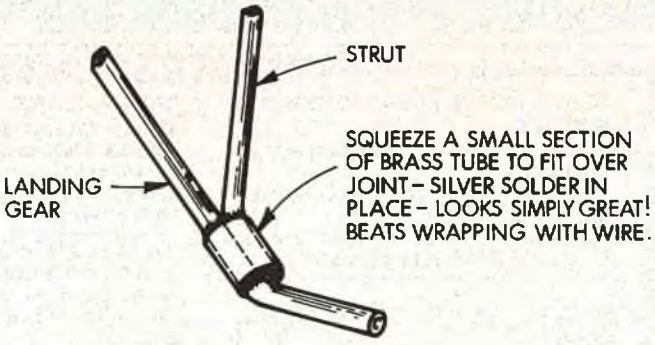
The screw heads are hidden but access is convenient by removing the spinner. See sketch.



DU-BRO KWIK-SWITCH MOUNT

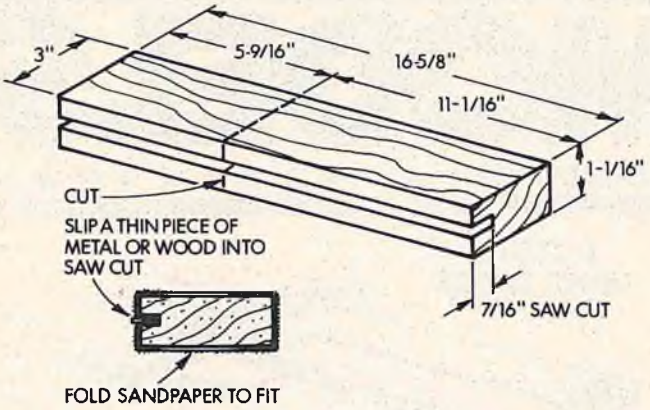


Most scale modelers like to add a realistic touch to their airplanes. Here is a clever idea by Barry McLean of Whittier, California. To simulate the gas cap and gauge on a Piper J-3 Cub, mount a Du-Bro Kwik-switch mount in a vertical position up next to the windshield. Replace the threaded on-off pushrod, supplied with the mount, with a threaded wire bent to simulate the float gauge. Take special care to mount the switch so that it does not lean forward. It may be necessary to shim the Switch Mount to achieve this. The end result: A scale looking gas gauge/on-off switch. See sketch.

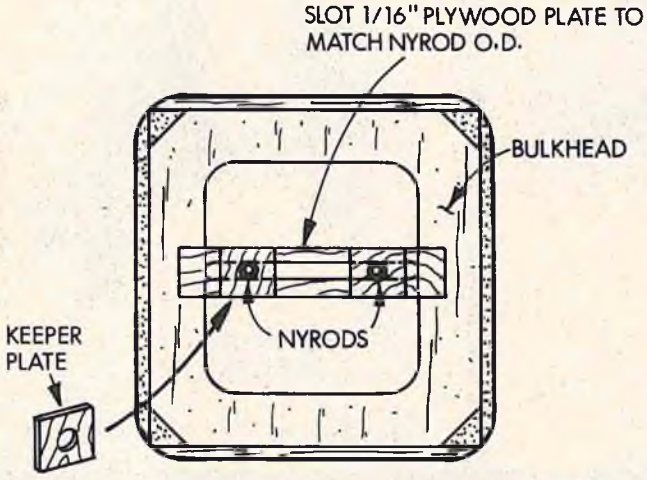


When joining the struts of heavy wire landing gear, according to Robert Sloan, Santa Barbara, California, it is customary to wrap the joint with copper wire and then silver solder. A much stronger, neater and easier to form joint can be made by squeezing a small section of brass tubing over the joint to be soldered. Then silver solder with your favorite product. See sketch.

To every modeler comes a time when it is necessary to sand the inside of a hole. In true Murphy fashion this usually occurs late at night when all the stores are closed. Regardless of when it happens, don't rush out and buy a sanding drum. Instead, search your scrap box for a 3" length of 1/4" dowel. Cut a 1" deep saw slot in one end. Next, fold a 2" square of sandpaper in the middle, rough side out. Slip it in the slot in the dowel. Chuck the dowel in your electric drill or drill press and you are ready to sand the hole. This will work on holes 3/4" and larger. Be careful not to overdo it. Thanks to Don Bucker of Anaheim, California, for this handy hint.



Everyone agrees that a good sanding block is absolutely necessary in model building. It makes the job easier and allows one to get true level surfaces. Like everyone else, Fred Guley Jr., of Binghamton, New York, has spent a small fortune on commercial sanding pads, blocks and holders that did not do the job. Fred has finally discovered the answer. The end result: 1 sanding block 11" long — takes a full sheet of sandpaper. 1 sanding block 5½" long — takes 1/2 sheet of sandpaper. Slip a small piece of thin metal or wood into a 7/16" saw cut to secure sandpaper. See sketch.



SECTION THRU FUSELAGE

Are you looking for a good way to support Nyrods through the fuselage? Don Loewen of Federal Way, Washington, suggests you try his method. The big advantage is: it allows a straighter, kink-free run to servos virtually eliminating binding. Especially in installations where a solid 1/16" wire rod is used in the inner Nyrod.

Make slotted plate and keepers as required and shown in sketch.

(1) Slide the slotted plate and keepers on the Nyrod.

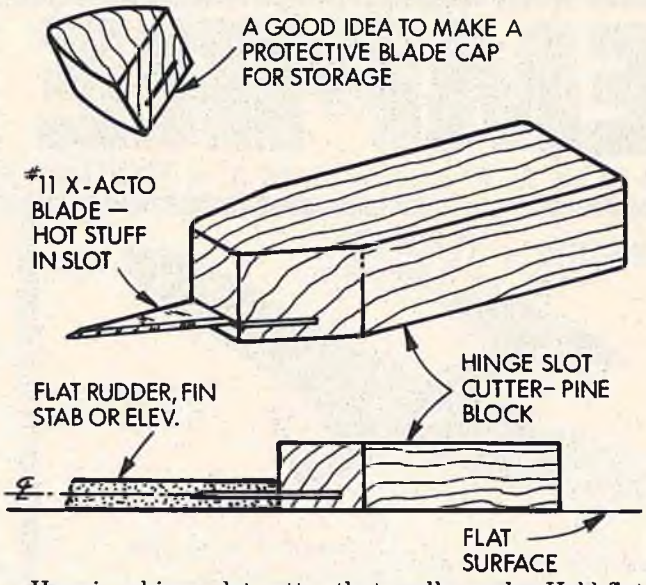
(2) Connect Nyrods to servos.

(3) Position the slotted plate against the bulkhead and rotate until there is no preload on the Nyrods.

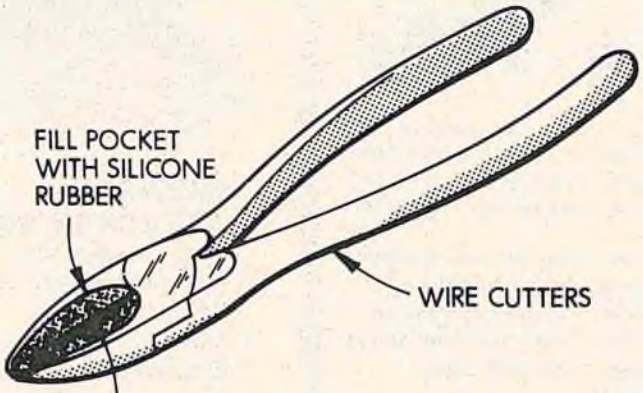
(4) Epoxy the plate to the bulkhead.

(5) Slide the keeper plates in place and epoxy to the slotted plate.

A little extra time in alignment will provide you with a smooth operating pushrod. See sketch.



Here is a hinge slot cutter that really works. Held flat against a table adjacent to a rudder or elevator, one can cut many slots and be assured of good alignment. It will also eliminate the possiblility of binding. The hinge slot cutter as shown here, is good for only one specific thickness of wood. It may be necessary to build several to accommodate all your building needs. Our thanks to Lee Baer of Fresno, California, for this useful idea. See sketch.



Snipping small diameter wire with wire cutters can be dangerous, especially when tiny bits of wire go flying about the room. To remedy this, Pete Paglia of West Seneca, New York, suggests the following: Clean out the pocket next to the cutting edge on your wire cutters with alcohol or solvent. Close the cutters and fill the pocket with silicone rubber. After it has cured, use a razor blade to separate the two halves by cutting along the cutting edge of the cutters. Now when you cut wire, the rubber will clamp down on the free end of the wire preventing it from flying around your work shop --- and also out of your eyes. See sketch.

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

1ST TROPICAL R/C FUN FLI

from page 174/167

The Pan Americans flew many times. The AT-6 of Rodolfo Ramirez seemed to be always in the air. Rafael Cano's "T-28," Jean Gara's "Mach 1," Lizbeth Lee's "Aquarios," and Erich Dern's "Electra" also pleased the crowd. The two days of flying were a fantastic experience for all of us. Spirits were high, very few frayed nerves or tempers and the North American team can only give their greatest respects and congratulations to the Costa Ricans for a wonderful job well-done. International events such as this can do nothing but good in the promotion of our hobby. Comments from the North American team varied from "great," "treated like a king," "an overwhelming experience," and "never been entertained better." Larry Wolfe and I (at least) are going back on personal visits at the end of this year. So many thanks to LACSA, Julio Pastora and his committee, the management of the Playboy Hotel, and all the members of the model club and other organizations who made our visit so pleasant.

Epilog.

After the flying on Sunday most of us were scheduled for a Monday or Tuesday flight back to either Miami or Los Angeles. However, we'd had such a great time and so little time to look around that many of us stayed, and stayed, and stayed. In my own case, I was due back on Tuesday and finished up returning on the following Sunday night. Luis Fernando Reynolds of LACSA must have been very confused by the number of times the United States team called him and postponed, and postponed, their return flights. He also did a wonderful job arranging sightseeing trips, etc., and worked extremely hard. LACSA and San Jose modelers — all you have to do is to invite us again next year and we'll be on that plane. □

RADIO SPECTRUM

from page 154/151

Initially I installed it in my Currare which I was flying with an S & O AM receiver and my homemade transmitter. I ended up with miles of adapter cables and I noticed the antenna-off range was greatly reduced. I flew it that way anyway but noticed I was getting glitched now and then. I also noticed that the roll rate was way down and that high rate felt like low rate used to. I then switched to the Kraft FM system and adjusted the aileron throw mechanically so that low rate moved the ailerons as far as high rate used to. After that I made just a few minor adjustments on roll buttons.

I think the net result is an airplane that looks better in the air, and definitely feels better. It has a very solid feel in turns with no tendency to over roll. The same is true in point rolls. You can roll to a point quickly and still stop quickly without overshoot. It may be my imagination but the plane seems to hold a knife edge better with almost no tendency to roll out. The biggest difference is noted in take-offs and landings. The wings seem to really be locked in. I should point out that the gyro is not a wing leveler or auto pilot. It will not level up wings that are not level to start with. What it does is resist the tendency to roll. Of course the R/C system can override the gyro. The gyro is sensitive to rate not to position, so it does nothing until the airplane starts to roll. Then it tries to roll it back in the opposite direction. It does it a lot faster than the pilot can so the airplane doesn't move as far before it receives a correction. Once you start rolling it will tend to keep rolling at a more constant rate for a given amount

of aileron. I always thought my first roll (in 3 horizontal rolls) looked faster even though I use a roll button.

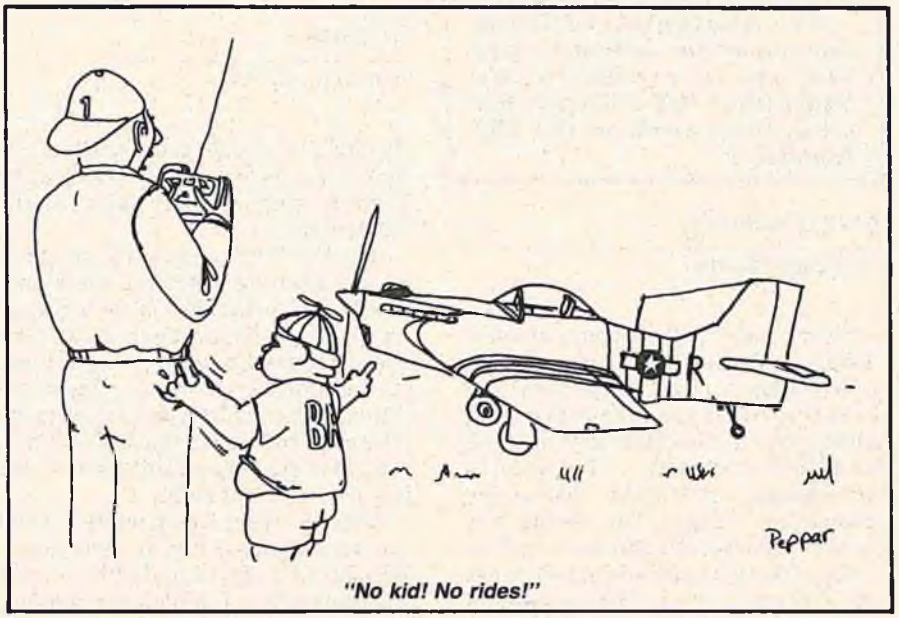
Now let's think about what happens when we neutralize the stick. The servo goes back to neutral but the aiplane doesn't stop immediately due to inertia. So the gyro actually puts in an opposite command to help stop the roll.

Now you could probably get a similar effect if you spent the rest of your life designing and building airplanes and maybe under-damping your servos but adding the gyro seems a lot easier. I would think that the scale guys, especially the World War II military aircraft, would really benefit. There you are stuck with the aerodynamic design.

It was rumored that Hanno Prettner had one or more gyros in his Las Vegas airplane. That is probably the highest recommendation anyone can give. If he thinks they help his flying then they certainly will help everyone else.

As far as taking all the control from the pilot and doing it for him? Afraid not. I'd like to say I was an instant winner after installing the gyro. The truth is I've got a long way to go to get back to where I was before I layed off in 1981 and all the electronic gimmicks in the world won't do it for me.

Till next time — stayed tuned. □



"No kid! No rides!"

BIG IS BEAUTIFUL

from page 146/140

pulse and he eventually lost interest to get into home-built aircraft. He has recently decided to return to the hobby and his comments brought home to me how much things have changed in the past ten to fifteen years. He was amazed at the new developments which have appeared in that period of time and was particularly impressed with what has happened in the past few years with our larger models. His enthusiasm was a delight and it reminded me how good it is now compared to what we used to have to do. The instant glues, heat seal and heat shrink covering materials, convenient and well-designed accessories, reliable radios and literally hundreds of products we take for granted. In the old days, only those who could take almost continual frustration and still come back for more, remained in the hobby. Many got discouraged at minimal successes and went on to other things. The fact that we now have such great products to use has encouraged greater participation which, in turn, has created a larger market and that, in its turn, has provided the incentive to produce the even better products we'll see coming down the road in the future. It's really great to be involved and feel a part of what is happening to us. The current "recession" is showing signs of improvement, so don't despair, things have been bad before and gotten better and it'll happen this time too . . . soon, I hope.

As a last word for this month, can you imagine the models that the fellow I mentioned above is going to be able to build with his home-built experience. He doesn't live all that far from me and I'm looking forward to seeing them, they should be great.

You all heard about the guy new to the flying field who, when asked where the balance of his airplane was, said he didn't know, that's all that was in the kit box? □

Our apologies to Doug Renzelmen for failing to give him photo credit in the September '83 RCM for his great photo work on the TBF Avenger.

GIVE IT A WHIRL

from page 134/128

So you see, for the expense of a few dollars and very little time you can now posses a pitch gauge which, I believe, is more accurate and convenient to use than any of those available so far. Since this arrangement is (to the best of my knowledge) unique, the design has been registered, but the main reason for describing it in this column is to get the idea out to you as fast as possible. It certainly helped me with my set-up problems and I hope it will help you, too. By the way, one more unexpected outcome of trying inverted flight with the consequent need to set-up my helicopter more accurately. I became much more aware of the relationships between servos and controls and also understood much more clearly the proper use of all those pots and switches on my "JR" radio. Most important, I now pay much more attention to setting-up even for just "right way up" flight.

By the way, I've just found a new way to clean glow plugs. Leave them in your pants pocket when they are being laundered.

Well, that's all for this month. It's a busy season, the "Nats" coming up, etc., but I will write more on inverted flight into my next column, and give you all the set-up arrangements and my own experience of this latest phase of R/C helicopter flying.

'Till next month --- and please let me have your comments regarding the pitch gauge. □

PIT STOP

from page 126/121

the 2nd fastest car on the track and it took 4 laps before Ralph could get by Dana, putting Ralph one lap up on the whole field.

Rick Davis lost a lap at the start but he was running about the same pace as Arturo. During the last 20 laps they swapped positions back and forth about 5 times. Curtis Husting's clutch started slipping too much so he pulled the car off about 10 laps. Losi Sr., rear tires chunked from a crash, Ron Paris wore his tires out and Bill Jianas's car just never looked right.

Ralph Jr., kept flying while his dad was trying to tell him to slow down. With about 5 laps to go Ralph hit a dot and flipped over. I think it was his only mishap in the race. But he still finished a lap ahead of Dana in 2nd with Losi Jr., in 3rd, Rich Lee in 4th and Arturo in 5th. There was more TV interviews after the race and then Dick McCoy presented the very beautiful trophies to all the deserving winners.

The next race for these drivers will be in France for the World's Championships and it looks like they should be ready. □

SCALE VIEWS

from page 120/116

that primary recognition go to the team member who did the real work while the other member had most of the fun. If a scale flier wants recognition, let him build his own model.

To confine Team Scale to those builders who really need the event if they are to compete at all, a contestant entering a model in Team Scale is not permitted to enter any of the Sportscale or Giant Scale events. After all, if he can fly well enough to enter a regular scale event, his model does not belong in the Team Scale event. The pilot for a Team Scale model can be drawn from among other contestants or non-contestants at the choice of the builder of the model. As any model eligible for AMA Scale competition events may be entered in Team Scale, a wide variety of types may show up. Anything from 1/2A schoolyard size to the largest Giants. At the Gold Coast Scale Jamboree the winner was Burno Brunelli's Quadra powered L-4 modification of the Nosen Cub.

If your scale contest does not already include a Team Scale event, you might want to give it a try. It is a way to get some nice scale models in the air that otherwise might never be seen at a contest. □

LOADSTAR 40

from page 106

thing about a tank that is hard to get to just in case of a problem. A hatch was made for the tank area and a tank floor was installed in the compartment to make up any strength that might have been lost from the change.

The landing gear wire was soldered up, Goldberg wheels and spinner installed, and we were all set to install the radio.

Radio:

The Airtronics Championship Series 5 channel radio was selected. The radio was installed in the aircraft with no problems whatsoever. The C.G. was on the money with no extra weight being added. The fuselage is very deep so our radio is mounted very high in the cabin, so high in fact that we had interference with the aileron servo so it had to be lowered for clearance. Keep that in mind when you mount your gear. We used 4 channels in this set-up with a 5th channel just waiting for something to do. I'll bet you have already thought of some uses for it already.

Flying:

At last, we were ready to fly. The controls were set with a lot of rudder, 1/2" elevator on the high rate and 1/4" aileron throw which we have in the coupled mode with the rudder. The first flights were from a grass field and the tracking was super for a taildragger. There were no problems getting the plane to trim out with the adjustments on the transmitter. The Loadstar 40 is very stable and flies very much like an "oldtimer." The aircraft was put through all kinds of manuevers and performed well. The touch and goes are a thing to behold. If you un-couple the rudder and ailerons you can sideslip on approach to some degree; remember that this is a very stable airplane.

Conclusion:

To wrap-up this review we can state without a doubt that a Loadstar 40 will be a fine airplane for you to advance your "stick time" with or for just a fun airplane to fly around. Since the first flight from grass we have taken the plane out to our paved club field and found the ground handling just as nice and easy to handle. We feel that anyone with some experience or a first-timer with a good friend to help answer any questions should have no problem building this model. The model can go into the records as a "Trainer" as it is very stable and, with the usual help for the beginner, will be a joy to learn to fly on. The kit is an excellent value for the dollar spent partly because of the savings in not printing the fancy color stuff for the outside of the box. So, don't be put-off by the plain box --- the airplane inside is a good on! Available direct only from Model Aircraft Designs, Inc., 23625 Pineforest Lane, Harbor City, California 90710, for a price of $39.95. □

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SILENT POWER

from page 96/92

magnetizing can answer Ben's questions on this subject.

I also received a letter from Bill Doyle from San Diego, which introduces a 20 amp fuse kit available at a modest cost that can be used in the 05 to 25 electric powered systems. Bill is also planning to kit a two-meter sailplane to be called the "EX-CEL 05" this fall.

Dear Jim:

I am an R/C sailplane builder and flier who has recently become interested in electric R/C aircraft. One thing I have noticed is that almost all of the electric flight systems' manufacturers and electric R/C aircraft columnists recommend installing an in-line fuse on one of the motor leads. A fuse is an important safety device for protecting the flight system from electrical damage or even a fire if the propeller ever becomes jammed with the power on, as in a crash, for example.

The problem with the fuse protecting an electric R/C aircraft is that the standard glass cylindrical fuses are delicate and not reliable in a high vibration environment. To compound the problem, the two most common types of glass fuse holders are both too bulky and heavy for the tight equipment installation required with R/C airplanes.

The plastic flag type fuses used in newer automobiles are small, light and highly resistant to damage from vibration. The hitch with flag fuses is that it is very difficult to find an in-line holder for these little gems. Happily, after much search and research, I have been able to secure a quantity of right angle connectors that are perfect for fusing electric flight systems. These connectors offer a strong positive contact and are fully insulated. I am offering a kit that contains one 20 AMP flag fuse, two right angle fuse connectors, one strip of solder and one set of complete installation instructions. Tools required for installation are a small soldering iron (20 to 40 watts), a small hobby vice (or a third hand with a pair of pliers) and one half inch of electrical insulating tape.

These fuse systems can also be used for protecting on-board starters or any high current (1 amp or higher) aircraft electrical system.

to page 194

SILENT POWER

from page 192/92

The installed assembly dimensions are 1¼" x 1" x 3/16"; system weight is approximately 4 grams with solder.

I am making fuse kits available for $2.50 plus .50¢ postage and handling. To order, mail cash, check or money order to: Bill Doyle, 1929 Oliver Street, #A, San Diego, California 92109.

Enclosed is one fuse kit for your inspection. Wishing you a summer of great flying.

Bill Doyle

★

I received a nice letter and a pack of photographs from Bob Sliff of the Hobby Horn, 15173 Moran Street, Box 2212, Westminster, California 92683. Bob has been flying a 1937 Long Cabin, kitted by Midway Model and (of course) available from Hobby Horn for $42.00 plus postage. This ship has a 78" span and weighs in at only 60 oz. with an Astro 15 geared system. Pulled through the air by a Y & O 13/8 prop, the Long Cabin is a fine flying electric powered Old Timer.

Also shown is the Sensoar, which is Hobby Horn's bid for the beginner's sport sailplane market. The Sensoar uses the Playboy wing and is lightweight, easy to build, and easy to fly.

I'll be back in the December RCM with a report on Silent Power in the Summer of 1983.

Good flying! □

SOARING

from page 90/88

Well, Grahame, it just so happens that I ran across a short review that may help you and other prospective glider fliers. The piece appeared in the newsletter of the Rocky Mountain Soaring Association, "Thermals." They, in turn, had lifted it from the Greater Detroit Soaring and Hiking Society newsletter, Dennis Harvey, Editor. The article is titled "The Sportsman's Corner," and is by Warren Tiahrt, a man of considerable experience in soaring. As I'm running low on space, I'll delete part of the introduction:

Within reason the larger airplane is easier to fly, more forgiving, and is bothered less by turbulence and windy weather. These advantages must be countered by the fact that smaller ships will stand up a bit better to cartwheels and other bad landings. The first part of the list will be the smaller 6 ft. to 2-meter ships with the larger birds at the end of the list. The order will be in accord with my preference.

Olympic 650 *— The quality of the Airtronics' kits is excellent. All the hardware is included. The airplane is a downsized version of the Olympic II. The wing should be bullet proof since the structure is the same on the larger Oly II. The ship is easy to build and fly. No wing planking which makes it easier to build and repair. Good instruction.*

Wanderer 72 *— Mark's Models' kits have excellent die-cutting. Several G.D.S. and H.S. members have built 2-meter span versions with two piece wings and ended up with a very competitive airplane. Good instructions.*

Gentle Lady *— Carl Goldberg's name on a kit assures its popularity. I haven't built one but have looked closely at the plans and observed the models flying very well in the hands of many beginners. Stronger than it looks.*

Drifter II *— The Craft-Air models of Tom Williams fly very well but the ribs don't always fit. Turbulated 12% airfoil has been widely used with great success in AMA events. Center section strength marginal for winch use.*

Paragon *— Pierce Arrow kit. The only manufacturer that is competitive with Airtronics when it comes to quality and fit. Airplane has 118" span with 100" version shown on plans also. The only criticism I have of the kit is the plywood tongue joiner at the polyhedral joint for the beginner builder. Although I have one that is five seasons old and have broken only one tongue, it seems to be a weak point. Ray DeNoble has a version with wire and tube poly joiners that work faultlessly. Low mount stab is susceptible to weed damage. Capable of winning AMA precision duration events.*

Olympic II *— Airtronics kit. Excellent quality. Flies super and is best with some washout in tips, about*

1/4". The low mounted stab and small cross section at rear of fuselage results in some fragility when cartwheeling across the ground.

***Wanderer 99** — A Mark's Models' kit that deserves a very close look. The quality and accuracy of the die-cutting is as good as any in the industry. The spars look too big but it's tough to have a wing that is too strong. Fuselage is wide back by the tail group for strength. (Editor's note: there is a weakness in the fuselage just aft of the wing due to assembly slot for bulkhead and hole for wing dowel.)*

***Windrifter** — Craft-Air 100" airplane that flies superbly. Accuracy of die-cut ribs is marginal. Stab and fuselage are very light and could be stronger.*

Well, that's all folks. Catch you next month, all being well, Howzat! □

POWER BOATING

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retail price of $6.95 each. A flat tool (1½" wide by 9" long) is available that has either fine or medium grit. In addition, this flat shaped tool is available with half its working surface with fine grit and the other half has the medium grit. If I were buying just one of these tools the latter one mentioned would be the one I would pick. Another tool is 1" wide and is shaped in a cylindrical surface whose radius is 3/4". It also has both grits split up on each half of its working surface. The last shape available has two flat surfaces that have a 1/8" tangent radius between them. This tool has both grits and is great for sanding in those hard to get into areas. I have used my tools on plywood, styrofoam, and fiberglass and am very pleased with the results. Since I started using these things I have forgotten about sandpaper except when I need to do very fine smoothing or polishing. They cut fast and work great. These things are amazing and I highly recommend them.

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Dear Howard:

I am writing in regards to a letter in your boating column from Daryl Turbrey of Montana, wanting to know where he could purchase the Anheuser-Busch eagles. Three years ago I was in need of these also. I don't remember how I came up with the place I could get these but it had to be from some article on boating in one of the magazines. The name and address of the person who made the eagles, plus the name Anheuser-Busch, and also the name Natural Light U-74 for me is: Harlan Embrey, 435 Roberts St., Reno, Nevada 89502. I don't know if the fellow is still there or not, but all it will take to find out is 20¢. I hope he's still there as I will be needing some decals myself. He does do very good work. I would like for him to make what I will need for my boat.

By the way, I don't know how you find the time to write the boat column, but all my fellow club members and myself sure hope you keep finding the time as we all get a lot of good information from your column. In fact, in the last one you have a few suggestions about what to do to the Picco 45. This will be a big help to me as I just got one of these engines. Well, that's it for now. Hope the information on the decals will be of some help.

Regards,
Arthur Valdesere
Dover, Delaware

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Dear Sir:

I am a new power boater. I am 16 years old and I love running and building power boats. I built two boats, not from a kit but by myself. I have an air boat which runs well. I run it in a canal in the vicinity of larger boats which makes it hard to work with. I have trouble with my K & B 3.5 outboard boat. First, I am using K & B 1000+ fuel and it runs well at full throttle. But, when I slow the engine down (closing the carburetor to idle), it stops after a while. Could it be the needle valve adjustment or fuel? However, I do not think it is made for a slow idle. Could you tell me if it is or not? The fuel tank is in front of the radio compartment. I haven't run the boat in a canal or pond yet; I'm running it in a pirogue without it moving. The exhaust is under the water so this might stop the engine at slow idle. It might be restricting the flow of air. I'm using propellers that came with the engine and also Octura 2030 and X440. Which one of these

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propellers would be best suited, or should I get another one? The engine is mounted directly to the stern and it cannot be moved. I've supplied the boat with a Futaba FP-2GS. The two servos are FP-S26, indirect drive. What does indirect drive mean? My steering servo goes crazy sometimes --- I mean at the center point it goes back and forth a little. What does this? Is it interference from something like CB antennas? Could it be the batteries being too weak? Or is it the small servo having too much force on it? I believe I'm the only power boater in this town. Please answer my problems before I run it out in the open. It would be very helpful to me.

Yours truly,
Eric Legendre
Lockport, Louisiana

It is very hard, Eric, to set the carburetor unless the boat is in motion. The K & B 3.5 carb is of very simple design and, as a result, does have problems loading up with fuel at low speeds. You have to adjust the rotating barrel stop until it will run without stopping under a load. You must set the needle valve for top speed and take what you get as far as an idle is concerned. Most of these motors will not idle as slow as you might expect them to.

Another possible problem is your fuel tank location. If it is in front of the radio box, it is a long way from the carb. It is best to mount the fuel tank so that its top is about level with the needle valve. The tank should be as close as possible to the carb. If it is not in this position you must use fuel pressurization to get adequate fuel to your motor. Water covering the exhaust also has a tendency to stop the motor at idle. I would recommend that you adjust the idle with the boat in motion, not stationary as you have done. The propellers you mention are reasonable to try, but only running the boat will tell you which is best. For the purpose of trimming the boat you should use an adjustable motor mount so that you can change its tilt angle and propeller depth. Different props require different settings.

The Futaba indirect drive servos do not use the previously normal direct coupling of the feedback pot and the output shaft. They use a feedback pot that drives indirectly through a gear train connected to the output shaft. This new set-up should result in better centering accuracy. You don't say if your servo chattering problem is when you run the motor, or all the time. If it is occurring only when the motor is running, you probably are experiencing noise production from metal to metal contact when vibrating. It would not be from interference from CB radios unless your radio is on the 27 MHz band. Always use fully charged nicad batteries in your boats. Do not use battery packs that have spring loaded contacts. These vibrate and cause lots of problems. Use only the nicad battery packs made for your Futaba radio. These packs have welded connections which are vibration proof. Your FPS-26 servos have plenty of torque to move the 3.5 outboard engine. Be sure to use two pushrods so that when the motor is turned there is always one pushrod with tension on it. This will give you positive control.

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

SIDE POCKET

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gear to the fuselage. Make and trial fit the steering pushrod to the steering arm insuring freedom of movement.

2. Glue the 1/2" fuselage bottom block in place.

3. Glue, with sandable glue, the 1/2" or 5/8" triangle pieces to the chin block per the plans. When dry, fit to the fuselage. Cut/trim the rear of the left triangle for the steering arm. When satisfied with the fit, glue with sandable glue, to the fuselage.

4. Sand the front of the nose flush and epoxy F-1 in place. Glue the 1/4" triangle pieces to F-1 per the plans.

5. Bolt the wing to the fuselage. Position the plane right side up. Support the plane so the wing tips are equidistant from the table top and the top of the fuselage is parallel to the table.

6. Place and fit the stab so stab tips are equidistant from the table top. The stab and top fuselage centerlines should coincide. When satisfied with the fit and alginment, epoxy in place.

7. Glue the three "rear" pieces of the vertical fin together on a flat table. When dry, lightly sand the seams smooth. Fit to the stab and fuselage and epoxy in place. Fit and glue the two balsa stab blocks in place.

8. Glue the remaining top and bottom fin pieces in place.

9. Fit the canopy to the fuselage. If your plane is to be MonoKoted, I suggest MonoKoting the top of the fuselage first, then cut/trim the MonoKote as required and epoxy the canopy to the fuselage. The canopy could then be sanded of any excess epoxy and then painted to suit.

10. Sand the fuselage, wing, and control surfaces to final shape per the plans. Finish sanding and paint or MonoKote per your method.

11. If you MonoKote, I suggest epoxy coating the engine compartment and wing bolt area for protection from the fuel.

12. Install the fuel tank, engine, radio, pushrods, etc. Be sure to balance per the plans for optimum performance and flying enjoyment.

Control Surface Movements
(As used on prototypes)

Rudder: Approximately 25° right and left.

Ailerons: Approximately 1/4" up and 3/16" down.

Elevator: Approximately 1/4" up and down. □

ENGINE CLINIC

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features and have found them to be especially helpful on many occasions toward correcting problems I have encountered with engines.

Rather than asking for assistance, I have recently solved a real problem concerning Fox engines which I felt might be worthy of notice to yourself and other modelers reading your feature.

Recently I have experienced considerable trouble with a Fox .19 BB (with MK-X carb) and a Fox .36RC (with the old carb). I recently retired from the U.S. Air Force in Nebraska and moved to Colorado Springs. Both engines worked fine in Nebraska, but neither one would do more than work well at idle speeds (2500-2700 rpm) and mid-range rpm's. Attempting to run them at the high-end of the throttle setting ended up with a 10-15 second run whether the model was level or nose pointed upwards and then the engines would die-out. This indicated a lack of fuel reaching the carbs and leaning out causing them to cease running. Multiple needle valve settings were attempted, fuel lines changed, tank levels tried in many positions, pressurization of tanks, use of new

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glow plugs of various makes, various sized props and complete and thorough tear-down and cleaning of carbs. New 10% nitro (Sheldon's) fuel was bought as a last try to solve the problem. The fuel ran super in my other make engines. It was at this point that I remembered previous comments you had made concerning fuel for the Fox engines and dug this out along with Fox literature. It became apparent that the nitro content for the Fox engines should be greater than 10% being used on the other engines. Fox recommends Missile Mist which is in the 25% nitro range. Not having this brand, I mixed Sheldon's 10% and 40% for a rough 25% mixture and on the first tank of this brew both engines performed flawlessly no matter what position the model was in. It appears now that the 10% fuel is just too cool for Fox engines at my altitude of 7,200 feet. To cut this short, I recommend modelers in higher altitudes using Fox Engines to go to the 25% nitro fuel as a minimum. I have had no idling problems to date. Now two engines once considered impossible are doing a super job. Please keep up your outstanding features which are both informative and great trouble shooting guides for the beginners and the old timers.

Cordially yours,
Kenneth R. Polley
Colorado Springs, Colorado

Thanks for writing Ken. It is always appreciated when fellows send in solutions to their own problems.

Dear Clarence:

Our field is at an elevation of 7,200 feet. Since I only fly at this altitude, what engine modifications, prop changes, fuel mixtures, etc., would you recommend for my .40 size engines? Also, what brand of oil do you recommend for lubrication protection after each flying session? You have done a super job educating me on model engines — keep it up!

Steve Springer
Colorado Springs, Colorado

The only modification that can be made to a model engine to improve performance at higher elevation is to raise the compression ratio. This requires re-machining of the head which is not always easy to do if you do not have the proper equipment. In the case of a .40 size engine you would want to remove about .025" from the squish band portion and gasket surface of the head. If the engine is of the baffle type, such as the K & B .40, the baffle slot would also have to be deepened by this amount. Increasing the nitro content of your fuel to 25% as per the previous letter will help considerably. The addition of a pump such as the Perry Micro-oscillating and the use of a larger intake carburetor will also be good for additional rpm. Do not try to use a larger intake carburetor without a pump or expect the pump without a larger intake carburetor to increase power.

Any of the after run oils such as Howard Reed's Oil-R or Prather's After Run oil are fine as is any good gun oil. I prefer Browning in the gun oils although it seems to be harder to obtain. Hoppes is also good. Marvel Penetrating oil is also good. 3-in-1 is okay but not good for long term storage since it evaporates.

Dear Clarence:

For quite some time I read your Engine Clinic only now and then since I had gone almost exclusively to gliders for about four years, and had no interest in power. The worst part of it was that when I did read of all the problems your readers were having, my arm remained in a sling most of the time from patting myself on the back for having sense enough to do all my flying without those noisy and troublesome things that spit all that messy or greasy kid stuff over your beautiful bird, while at the same time shaking its guts out.

Well, eventually the old pendulum swung the other way and I got back into power (and now read Engine Clinc regularly) by building the RCM design "Homer." It calls for a .10 to .15 but I dug out my much used, much abused, and many times crashed (had to dig it out of the ground once with a shovel) 12 year old Super Tiger .23. I started out running a 9/4 nylon prop, using some leftover Sig fuel that I purchased for $3.95 ten years ago ($3.95 a gal., that is!). My muffler had long ago fallen apart, so I am using no muffler, no exhaust restrictor, no pressure, no pump, no special carb (just the old original carb), just one fuel line from a 4 oz. clunk tank to the carb, and one vent tube through the firewall straight into the breeze like a pitot tube. I guess the fellows with their special carbs, tuned pipes, pumpers, fancy tachs, etc., would think it not possible to get any results at all from so simple a set-up. But my results, for my purposes anyway, have been near perfect. I just fill the tank, leave the engine on low throttle, hook up the plug and start cranking (with an old Sullivan starter off an old power panel connected to my car battery) and the engine starts with no prime or choke. The idle is so reliable that it almost never dies, and is so slow that I can set the model down on the asphalt and it will not move until I crack the throttle a little. Once moving, it will not stop again, but will go at a slow walk, this with very free rolling wheels and no friction or brakes of any kind. Throttle response is good and top end is almost more than I can handle.

I guess all this proves you can have success and still keep it simple and relatively inexpensive. My model was built with balsa USA bulk bargain balsa, Super MonoKote hinges, which have held up for 100 flights now. I even fashioned the aileron linkages from threaded rods and nylon clevises rather than purchasing a linkage kit. I am now using "Blue Flame" 10% Nitro fuel at a cost of $6.05 a gal. as compared to other brands of fuel that I have seen advertised for as high as $18.25 a gal. for 10% Nitro. I can't tell but what the engine runs just as good on the "cheap" stuff and I haven't noted any stickiness, or rust or anything like that. My radio is an Aero Sport 4. I have another Aero Sport 4 in a Viking, a Hobby Lobby 6 in a Bird of Time, and a 10 year old Hobby Lobby 5 in a four year old Windrifter. So I am keeping the cost down and having a ball at the same time. I am retired and fly several times a week and eveything is holding up nicely.

William E. Stodgell
Jefferson City, Missouri

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