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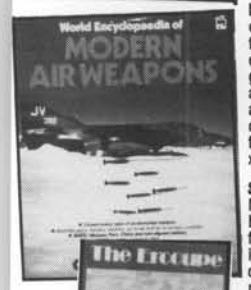

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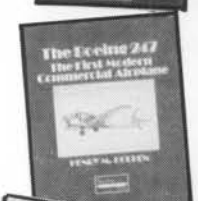

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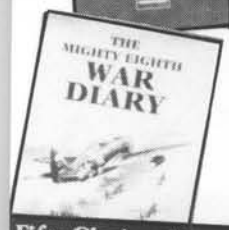

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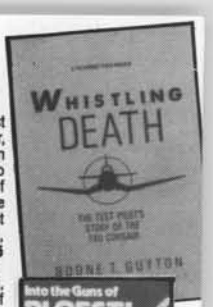

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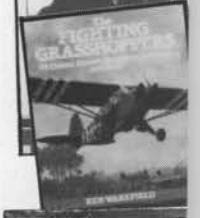

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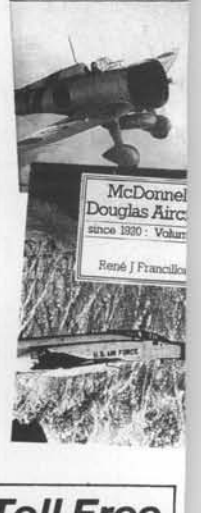

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ON THE COVER

This Tom Cook F-4 Phantom built by Aurelio and Miguel Alvarez of Miami, Florida, was one of many spectacular models seen at the Coral Springs Jet Rally, featured on page 40. Inset photos: Great Planes' Ultra Sport 60 kit is reviewed on page 70; Three helicopters hover in extremely close formation at columnist James Wang's request, see page 56.

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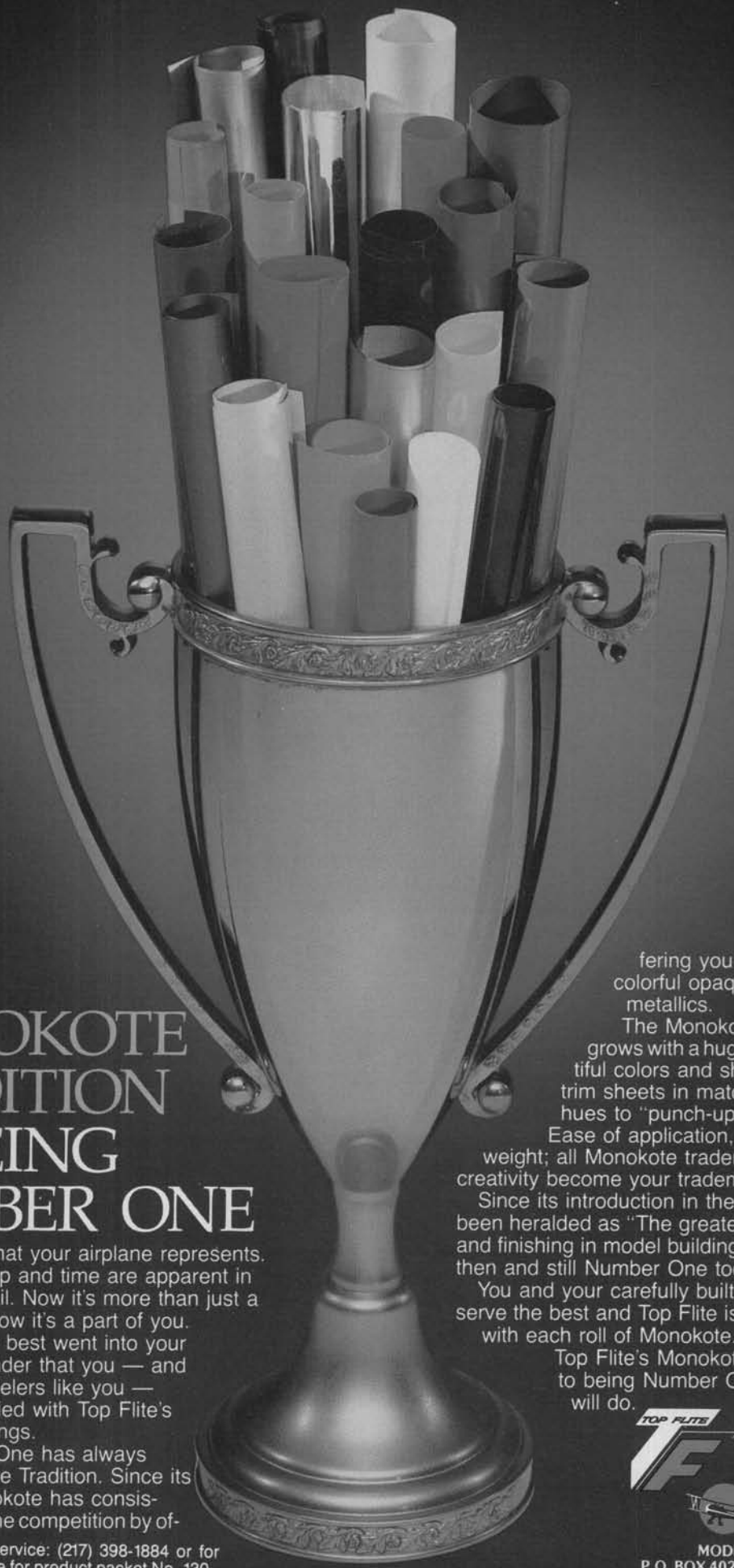

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BILL NORTHROP'S WORKBENCH

We are the foreigners!

When it comes to being multilingual, the average teenage US citizen is far behind his or her counterpart living in Eastern and Western Europe, or in the Asian countries of the Far East. Of course, except for concentrated pockets of US immigrant settlements, particularly in the large coastline cities, such as Seattle, San Francisco, Los Angeles, San Diego, Boston, New York, Philadelphia, Baltimore, and Miami, in addition to major melting pots like Chicago, most US citizens have had little need to know more than the basic English language in its variety of accents, dialects, and figures of speech. On the other hand, if one were to leave Frankfurt, Germany in the morning, and drive most of one day, they could very easily have need to be able to communicate in German, French, and Italian! In Switzerland, for instance, depending on where you are, you need to be able to communicate in French and in German. It's almost as if the people living in eastern and western Pennsylvania spoke two entirely different languages! In other words, multilinguality (wow, that has to be worth at least a dollar twenty-five!) is almost a necessity in Europe, but not in the US.

This "Name That Modeler" subject is so well known by most old-time modelers that we won't even give you the slightest hint. Sure would like to hear the story he was telling about that snapper turtle-powered model! Photo by the late Bev Smith.

However, in the last half century, the world has been shrunk, or pulled together by telephone, Fax, satellites, air travel, etc., to the point that more and more people from all countries and from all walks of life are becoming able to communicate with each other, and fortunately for those of us living in this country, English seems to have become the most common world-wide language.

Unfortunately, we in the US have not been as cooperative in this move toward commonality of communication. There is one language that is most important for all of us in the world to know and use in common, and the US is the last hold-out in adopting it . . . the language is Metric! OK, like the bookie, you say, "Numbers is numbers, no matter what language." True enough, but the weights and measures to which you attach the numbers are different "languages;" ounces and inches vs grams and centimeters, and 10 of one is not the same as 10 of the other!

To us, speaking in centimeters and speaking in inches is similar to speaking in English and speaking in, say, French. When first learning the language, the teacher says to you, "Comment allez vous?" You think to yourself that she just said "How are you?" in French, and so you are going to answer that you are "Very good, thank you very much," so your mind translates that to "Tres bien, merci beaucoup." When you have become proficient in the language (I never did), you hear the question, "Comment allez vous?" and your brain simply triggers the direct answer, "Tres bien, merci beaucoup," without going through the translation to and from English. By the same token, when someone tells you that their pencil is only 7-1/2 centimeters long, you should not have to think about an inch being 2.54 centimeters, therefore the pencil is . . . let's see . . . about three inches long, so I'll tell him he better get another one. When you have learned the metric "language," you immediately visualize the pencil as being almost too short to use for even writing your score on a golf scorecard, without having to mentally translate the measurement to inches.

Old-time RCers should enjoy this current photo of Darold Wilken, from Louisiana, with his Sterling 44-inch span, OS .10 powered, single-channel Tri-Pacer, and his 48-inch span, Fox .15 powered, Ace Stomper pulse rudder controlled Mambo. SBD is Cox .049 powered Guillow model, with Ace single-channel.

Metric weights and measurements are very slowly becoming more common in the US, especially measurements. Today's auto-

mobile mechanic better have two sets of sockets for his 1/4, 3/8, and 1/2-inch (!) drive wrenches in order to work on most cars. So many engines and chassis are coming into the country from the other side of both the Atlantic and Pacific Oceans with metric fasteners that the cars are becoming chef salads of metric and inch-type bolts. The modern mechanic knows he can get away with a 13mm socket for 1/2-inch bolts, and vice-versa, but that's where the similarity ends! We're slowly but surely building an 11-foot span Minimoa scale sailplane from a German Wik kit, obtained from Hobby Lobby. The instruction book is in German and in English, with two numbered parts identification lists, one in each language. But the wood sizes and lengths are in metric in both lists. A few more of these and I won't be interpolating measurements . . . 15 centimeters is about . . . that long.

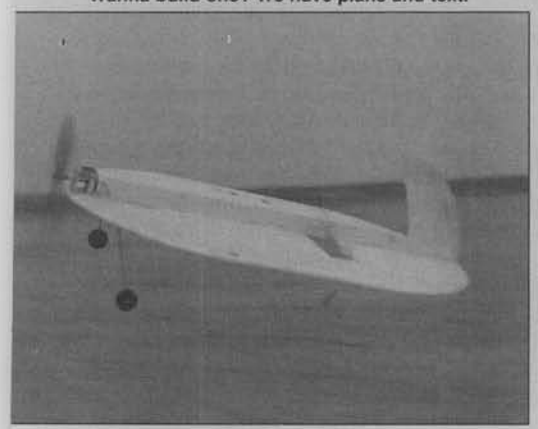
Obviously, a complete transformation of the "language" of weights and measures in the US would take generations to accomplish. Children would have to be educated in metrics from the moment they begin to recite numbers, and relate them to measurements . . . a tough job for the teachers who have to convey a message with which they themselves are not familiar. It's a major and long-time conversion that has to take place sooner or later, the sooner the better. We can't remain at odds with the world, or it will pass us by . . .

AUTOGYRO HARDWARE

Some modelers have expressed concern about the availability of Cox .049 crankcases and shafts to use when constructing the popular RC twin-rotor autogyro from our plan and construction article No. 4751, by Skip Ruff. In the article, Skip specified the use of two crankcases and shafts from spare Cox .049 Babe Bees, of which hundreds of thousands have been made and sold over the past 30 or so years, to be used for the two rotor bearings. However, if a modeler doesn't have access to the seemingly bottomless pit of old Cox .049's that are laying around, there is another way. We checked with John Elliott at Cox, and found that they can supply, from their own bottomless pit, replacement .049 case and shaft assemblies com-

continued on page 12

Yes, Roy Clough is alive and well! This is his little electric powered, sheet foam "Slot-Saucer." Roy sent it to Skip Ruff, who added landing gear to protect the foam from Taft's rocks and gravel. Wanna build one? We have plans and text.



ADVICE FOR THE PROPWORN—

BY JAKE

Dear Jake:

I just bought one of those one quarter size R/C car chassis with a chain saw motor. My buddy and I were talking about what would be a good body to go on it. We agreed on the Barracuda. How would I go about scaling down a Barracuda to the right size?

Rodder in Redwood, California

Dear Rodder:

I'm a fresh water fisherman myself, but I'm sure the same procedures would apply. Hold your barracuda by the tail, scrape the scales from the tail toward the head, and keep scraping until all the scales are gone. If that's not small enough, just keep scraping, I guess.

I see you call yourself a rodder. Do you prefer spinning tackle or bait casting?

Jake

• • •

Dear Jake:

What's a butterfly carburetor?

Joe in Jonestown, New York

Dear Joe:

It's a fuel/air mixture device on a Harley Lepidoptera.

Jake

• • •

Dear Jake:

A year and a half ago we bought the kids an adorable little puppy. That adorable little puppy now weighs 115 pounds and is required to sound a warning beeper whenever it backs up.

My parents, God bless 'em, treat the pup like another grandchild and shower him with presents. Last month they sent a little rubber toy shaped like an airplane. It had one of those squeakers in it and emitted annoying squeals whenever the pup chewed on it.

It seemed harmless enough, until today at the flying field. The pup apparently spotted a resemblance between his toy and my airplane because he trotted over and bit through the fuselage. Having done that, he got a puzzled, disappointed look on his face and walked away.

As much as I hate having to repair the plane, I think I can at least understand what happened. Having gotten used to chewing on a rubber airplane, the pup just thought he was doing the same thing on a larger scale. I do kind of wonder why he reacted like he did, though.

George in Grove City, Ohio

Dear George:

He probably couldn't figure out why it didn't squeak.

Jake

• • •

Dear Jake:

Low-wing and high-wing I can understand. They're pretty much self-explanatory, right? But what's the difference between mid-wing and shoulder-wing?

Fran in Frederick, Maryland

Dear Fran:

Picture the fuselage as a human body. A high-wing is up by the hat. A low-wing is down by the shoes. A mid-wing would be at the belt line. A shoulder-wing, naturally enough, would be up near the shoulders. The only one you left out would be mounted above the knee. This is the little-known three-quarter-thigh-wing.

Jake

• • •

Dear Jake:

My name is Gerald Smith. I am Tommy Smith's uncle. I am writing on behalf of the entire Smith family to urge you to stop encouraging Tommy by publishing his letters.

We have tried to steer Tommy out of modeling, away from super glues, and into a safer pastime such as stamp collecting or ant farming.

Tommy cites you as an example and his idol, and insists on continuing his exploits with wood, plastic, and instant adhesives. Consequently, no insurance company will carry us, and there isn't a domestic animal in the neighborhood without at least one bald spot.

No family member is immune. I myself have been wearing a toupee continuously for over four years now because it won't come off. Aunt Harriet had to have the paramedics remove a telephone receiver from her grip, and Cousin Irene's spandex toreador pants had to be shaved off by a surgeon. (That one may not have been Tommy's fault. Irene has put on a few pounds lately.)

Please reweigh the entertainment value to your readers of Tommy's adventures versus the potential damage to life on this planet as we know it. I urge you to either cease publishing Tommy's letters, or better yet, warn him in print of the danger he faces.

Thank you, Gerald Smith

Dear Gerald:

I always felt Tommy's imagination added a flair to his stories that embellished considerably upon reality. Apparently not.

I will do what I can.

Jake

Dear Tommy Smith:

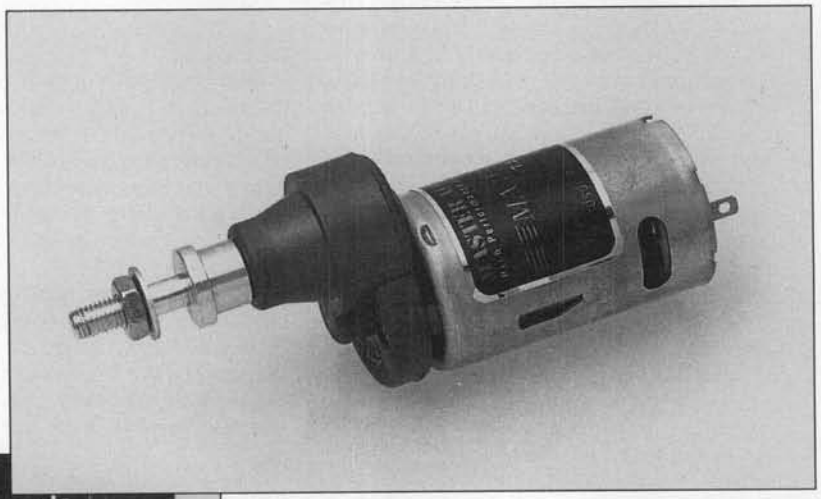
WARNING! Do not . . . I repeat . . . Do not *loan your hat to Uncle Gerald. His toupee*

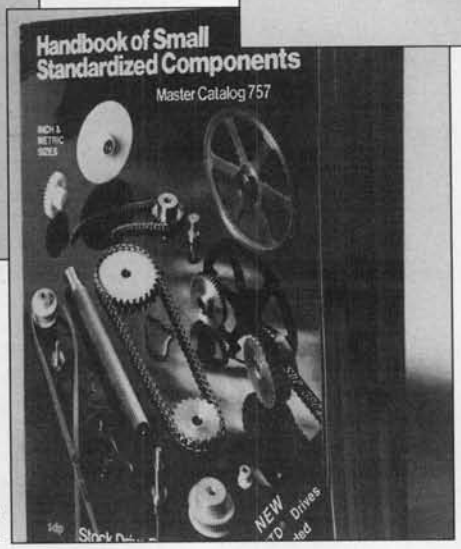
continued on page 12

OVER THE COUNTER

Electric glider motor from Twister Motors.

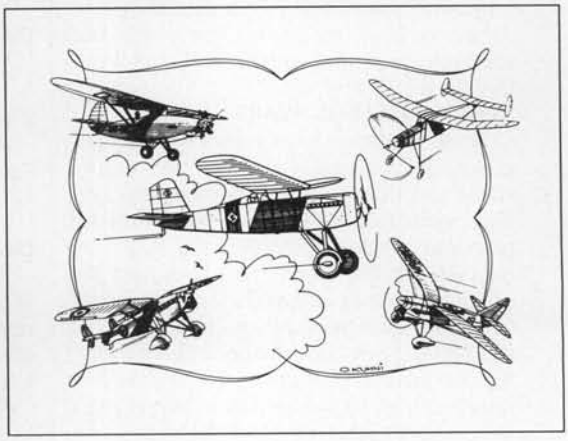
Master Airscrew gearbox for 05 motors.





Stock Drive Products catalog.

Some sketches found in Oldtimer Model Supply catalog.



Aside from the general slow-downs in the hobby industry as a result of the recent war in the Persian Gulf, the RC electric powered car industry has been suffering from a distinctive slump in consumer sales over the past year or so. Some manufacturers see it as a leveling off, with the majority of sales going to the hard-core enthusiast who is staying with the hobby through thick and thin, while others feel that the low-priced "toy" imports being sold through chain and discount supermarkets are stealing away . . . and in many cases, "turning off" . . . many potential new hobbyists.

However, every happening has its good side. In this case, many of the manufacturers of car-related items are looking for, and finding, new outlets for their products in the model airplane and boat hobbies. The development and manufacturing know-how that has benefited the RC car hobby in recent years is beginning to rub off into airplanes and boats, bringing about rapid improvements in the electric motors, speed controls, battery charging and monitoring systems, and generally increased understanding of the use of electric power by the consumers.

An example of this "manufacturer's switch" is the new line of "Air Force" motors being offered by Twister Motors, 657 E. Arrow Hwy., #H, Glendora, CA 91740, phone (818) 914-6177, Fax (818) 335-1659, a long time supplier of high quality competition motors to the RC car hobby. To quote Twister, its new "Air Force" motors, "are the result of countless hours of testing in the air and on the dyno to develop the finest aircraft motors available. These motors bring new levels of performance and efficiency to electric flight while giving you Twisters' well known reliability and quality. `Magnatorque' magnets provide maximum torque and more run time than cobalt motors and Twisters exclusive welding and balancing give you maximum reliability."

At the top of the "Air Force" line, Twister offers four motors listing for $85.00. These include the Glider, for optimum climb rate and run time; the Direct Drive, which is claimed to have 30% more power than OEM motors; the Gear Reduction, which has 30% more power and extended duration for planes with transmissions; and the 6, 7, or 8-cell Helicopter, with 20-30% power improvement and flight duration, for the "Whisper" and Concept "EP" helicopters.

An example of the valuable lessons learned about the "care and feeding" of motors for electric power, is the detailed instruction

All material published in *OVER THE COUNTER* is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by *MODEL BUILDER* does not constitute an endorsement of that product, nor any assurance as to its safety or performance.

Hitec's Focus 6 transmitter.

Tran-Sil electronic spark ignition module for twin ignition.

Metal bearing solder paste from Unival Corp.

Bondhus T-Handle hex tools.

sheet that comes with the motors, which explains in detail the process of proper cleaning, the care and maintenance of brushes, the use of capacitors to avoid radio interference, and general hints on wiring.

In addition, Twister has less expensive motors, such as an economy ball bearing motor, an economy bushing direct drive, an economy gear drive, and an OEM replacement motor which lists for $24.00. Accessories include six and seven-cell SCE Maxi-Flight matched battery packs, single SCE cells, and an aluminum precision variable ratio gear drive transmission which lists for $50.00.

Look for the distinctive red, white, and blue packaged "Air Force" motors at your local hobby, or contact Twister directly . . . and be sure to tell them that you read about it in *Model Builder*!

• • •

Bent prop shafts on gear drives for electric motors should be a thing of the past with the new Master Airscrew gearbox for 05 electric motors. This gearbox features a 3/16-inch steel gearshaft guaranteed unconditionally against bending. The glass-filled nylon output gear is molded directly onto a steel shaft, which in turn is mounted in two ball bearings. The 1/4-inch prop shaft will accommodate large diameter wood props, and combined with the Master Airscrew 12 x 8 folding propeller, is said to deliver performance and efficiency. The interchangeable gear sets provide 2.5, 3, and 3.5:1 ratios. Suggested retail is $15.95, motor not included. For a free catalog and/or further information, contact Teresa McTernan at Windsor Propeller Co., 3219 Monier Circle, Rancho Cordova, CA 95742, phone (916) 631-8385.

• • •

As Ed McMahon might say, "Everything you'd ever want to find in the way of small, off-the-shelf, inch and metric drive components manufactured and marketed by Stock Drive Products are featured in the new 1991 edition of its 768-page Handbook of Standardized Components." To which Johnny Carson would reply, "Not quite so, Teflon Lubricant Breath'!"

Anyway, Stock Drive's handbook is available for $5.95 postpaid from Stock Drive Products, 2101 Jericho Turnpike, Box 5416, New Hyde Park, NY 11042-5416, phone (516) 328-3970, contact Herb Arum.

There are over 24,000 items listed in the catalog, which is divided into nine product sections, including belt and chain drives, gears, speed reducers, motors, couplings, universal joints and flexible shafts, shafts and bearings, fasteners, and vibration mounts and unique components, such as constant force springs, splined bushings, and industrial 'V' guides. All components in the catalog adhere to the following parameters: 20-pitch gears or finer, 1/2-inch shafts or smaller, and 1/4 HP devices or less. Every experimental modeler should have this catalog handy. In this case, McMahon could be right!

continued on page 27

ELECTRONICS CORNER

BY ELOY MAREZ

VARIETY IN ELECTRONICS

Consistent readers of EC know that I have been known to stray from the main subject of RC electronics . . . but, hey, you know what is said about variety. And one way or another, it all has to do with our favorite pastime, RC model airplanes.

Well, this month, our opener is dedicated to a group whose efforts I enjoy and respect: scale builders and fliers. It's a fact that Barbie's measurements, in 1:1 scale, would be: 39-23-33! No, I didn't do all of the pertinent research on that particularly interesting fact myself, I ran across it in a non-modeling newsletter. On to other interesting subjects:

50 AND 53 MHZ OPERATION is the subject of our first letter this month, from a very lucky flyer in Arizona. John Lambert, WA2LLX, writes from Tucson with the following question. I consider him lucky because . . . well, read the second sentence in his letter:

"All my RC equipment is on 53.5 MHz AM. I have never experienced any interference whatsoever. Due to the fact that there will be no changes on the 53 MHz RC band for 1991, is there any reason I should go to a dual conversion receiver? Is there any reason to consider FM or PCM? I wouldn't think so, but maybe I'm missing a point somewhere. I seem to recall reading that AM radiates more effective power than FM. I need to decide between building an Ace Silver Seven receiver or the Model 91."

John is correct in that no changes were made to the 53 MHz frequencies assigned for RC flying. The fact that there are few such frequencies and that they are spaced 100 KHz apart is a tremendous advantage, as it makes them completely free of all the problems, real and imaginary, that plague 72 MHz fliers.

Before I answer John's questions though, it is important to discuss why the newer 50 MHz frequencies have come to be. Apparently, much more ham radio activity, in the form of repeaters, is taking or will be taking place on the top end of the band, up there where we have been flying. Therefore a sort of gentlemen's agreement has been struck between our AMA and the American Radio Relay League (ARRL), the non-government body that acts for hams as AMA does for us. They have agreed to try to keep the 50 MHz spots designated as clear as possible for us to fly on. I say "try," because they cannot legislate such things to the radio amateur community, and there are always those who will find the relatively clear frequencies attractive and use them to share weather reports and such. Anyway, we are supposed to be vacating the 53 MHz frequencies, or at least use them with more risk than before. In keeping with this, some of the current systems are no longer available on 53 MHz, only on 50 MHz

There is another fact that I believe has some bearing on all this, assuming that the information about the ham use of repeaters is correct. And that is that the entire country is not all of a sudden going to blossom out with repeater antennae and associated equipment using up all of our 53 MHz spots. True, in large metropolitan areas, there may be enough such activity to render all 53 MHz unusable, or dangerous for us, but in the smaller areas, such as Tucson, there will be lots less repeater activity, leaving much of the band useful for our purpose. Best to check this with the local ham club or equipment supplier; they will know what frequencies are in use or being planned for.

In general, I consider the move to more modern equipment a move in the right direction...

Now, for John! Unless the hams move in on 53.5 MHz in Tucson, there really seems to be little reason to change equipment. However, let's take a closer look at the overall picture. First, that business about AM being more effectively radiated! I too have read that, though I don't remember reading anything about what made it so. Unfortunately, the approaching monster that many considered 1991 to be, brought out a lot of self styled radio experts, and whatever you might have wanted to read on the subject, good or bad, has appeared somewhere in the model press. In this case, effective radiation or not, the fact has to be considered that we are dealing with a *system* here, a transmitter and a receiver, and the latter is a very important part of the loop. An effectively radiating transmitter is not going to do much for us if it is paired up with an inefficient receiver! Then too, we are operating within a rather limited range, that of our eyes, and a system, mind you, a system, not a transmitter or a receiver but the combination of both, that is capable of providing reliable and consistent contact at the necessary distance is basically all that is required. Under normal conditions, we know from experience that both AM and FM systems are quite capable of doing that!

Which brings us to another gray area . . . that of Pulse Code Modulation, PCM! I refer to it as a gray area not for the manner in which it works, but for the manner in which it is understood . . . actually, not understood. Thanks again to the model press, and in part to overzealous advertising, PCM is thought by many to be some new exotic high-tech type of signal transmission. It is not. PCM, as the full name indicates, is a form of modulation; the encoding or transformation of your mechanical control inputs into electronic impulses. The actual transmission of this encoded information is done, and received by, normal FM methods.

In general, I consider the move to more modern equipment a move in the right direction, one which can easily extend the life of the airplanes in which it is flown. Why? Well, because being more complex in nature, it has required the makers to tighten up all the way around; FM and FM/PCM equipment of good quality is better built mechanically, and designed to closer specifications and with modern circuitry and components. The narrow band requirements now in effect for transmitters are now forcing the design of improved receivers; no more can RC equipment tolerate the practices of earlier years. In the case of the Silver Seven receiver, it is an excellent design for its time, and while I would not hesitate to fly it on the 100 KHz spacing of the 53 MHz band, I would still choose the Model 91 because it is a more modern design with tighter requirements. I don't know the cost difference, but even my oldest, most tired airplane is worth more than either receiver.

Another plus for the more modern equipment is the features to be found on the transmitters. No, I don't use buttons to do

continued on page 35

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BY FRANCIS REYNOLDS

GLOW PLUG RECYCLING

The glow part of a glow plug is more than a simple electric heater element. It must be made of platinum and other precious metals which will catalytically react with the alcohol fuel and the oxygen in the air-charge to promote combustion. There was an article in the February issue of *RCM* on the effect of recent tremendous increases in the cost of platinum and an even more precious metal, rhodium, on the price of glow plugs. The amount of precious metals in a single glow plug is very small, in pounds, but at several thousand dollars per troy ounce, there is a lot of precious metals in a glow plug.

In our throwaway society, throwing away burned-out glow plugs has been taken for granted. It shouldn't be. We now recycle old newspapers and other scrap in most cities; stuff that is worth only a few dollars a ton, but we modelers still throw away precious metals. No biggie, there is still precious metal in the ground in South Africa (and the political situation might continue to permit us to buy it), but is there plenty more where this came from? If so, why has the price of glow-plug-element wire gone up six hundred percent in the last year?

Dentists sell the silver/mercury alloy fillings, and the gold and platinum they remove from patients, back to precious-metal scrap dealers. Used catalytic converter elements from automobiles are recycled for their precious metals by the shops that replace them. Glow plugs we throw away.

Dan Fulmer and his slip-off wing slope original.

I just had a telephone chat with Rodger Austin, office manager for Fox Manufacturing Co., about the possibilities of glow plug recycling. He refers us to an article in the *Wall Street Journal,* last December, about the effect the political situation in South Africa is having on the supply of precious metals.

I asked Rodger if he knew roughly how much is spent per year for glow plugs worldwide. He did a few quick mental calculations and came up with, "Well over a million dollars; maybe four million."

That's a lot of glow plugs, and a lot of precious metals. If we throw them all away for the next fifty years, that is fifty times "a lot of precious metals." So how do we start recycling glow plugs? Rodger agreed with my suggestion that the hobby shops could collect old plugs as they sell new ones. On used automobile batteries there is a "core" rebate. That is, your new battery costs you less if you turn in an old one. Most of the weight of a car battery is lead, and it is worth money.

I don't know what the precious metal in a single glow plug would be worth on a scrap-metal basis. It will depend, among other things, on the labor and energy required to reclaim the precious metals from the plug, which is mostly steel and insulation. Yes, the precious metals are a small percentage of the plug weight, but I'll bet the percentage of platinum and rhodium in a glow plug is many times greater than the percentage of these elements in the ores from which they were originally obtained.

It would be nice if a burned-out glow plug turns out to be worth a nickel or two. Most of us recycle for free, to better conserve our dwindling resources, but small monetary incentives would get a few more people into the game. I'm neither in the glow plug business nor in the scrap metal business, so talking about the need for glow plug recycling is all I can do. Manufacturers? Manufacturer's Association? A private recycling business opportunity?

I will win no brownie points from the hobby shops for this suggestion, but let's start turning in our old plugs when we buy new ones. Ask the hobby shop owner to please recycle them. Your hobby shop can throw them into a small box until the right people get the recycling system underway. There will then be hundreds of small collections of old plugs around the country to prime the system.

SLIP-OFF WING MOUNT, TYPE II

In my June 1990 column, I proposed a new type of model airplane wing mount system which permits the wing to separate from the plane in all types of crashes, thereby greatly reducing the damage incurred in the crashes. It works, as shown by many test crashes and by actual unplanned crashes. I talked again about progress on this wing mount development in November 1990 and in March of 1991. If you missed these discussions, back issues of *Model Builder* are available by mail order.

After the original slip-off wing mount ar-

ticle, Dan Fulmer, of San Francisco, California, asked if I had any ideas on how the idea might be applied to planes with two-piece wings. I sent him some thoughts, and forgot about his letter. Fortunately, Dan didn't also forget about it, he went to work and designed and built one.

Dan, who flies slope gliders, wrote, "I have always wondered why a more damage-proof method of wing attachment had not been thought of before."

I'm glad your creativity and need led you to do more than wonder, Dan. I don't normally build two-piece wing gliders or big birds, so I hadn't considered that application for the slip-off mount.

As you can see in the photo of Dan and his slip-off-mount-equipped glider, it is a big one. Wings this size are almost always two-piece, for transportation reasons. A conventional two-piece wing mount is probably more subject to crash damage than a conventional one-piece wing mounting system, however. Therefore, assuming these big airplanes sometimes crash, two-piece wings are prime candidates for the slip-off wing mount.

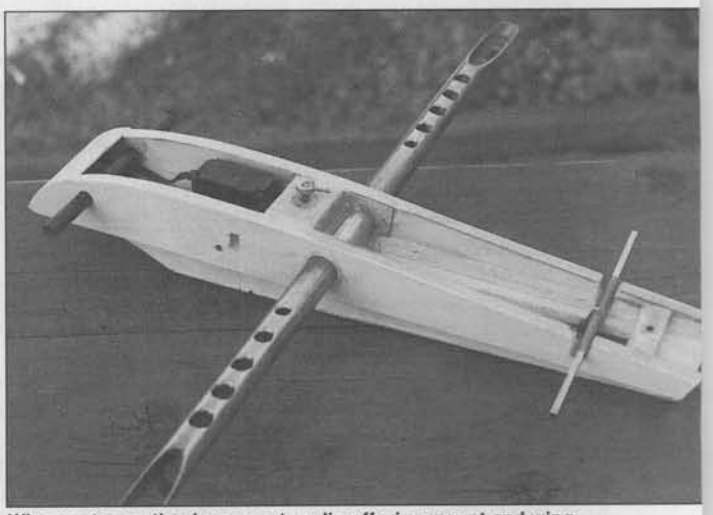
I trust you will recall that my basic slip-off wing mount has a "T" slot in the edge of a structural bulkhead in the fuselage. A long single sturdy metal wing-mounting bolt, installed vertically in the wing next to the spar, carries a nut which engages the "T" slot in the bulkhead. In a crash the nut can slip out of the slot in either direction, thereby reducing the amount of kinetic energy available for fuselage or wing crumpling, and greatly reducing the wracking forces which tear up structures. The wing is held in the proper location and orientation by a light wooden shear pin at the trailing edge.

At my suggestion, for his two-part wing, Dan added to these basics a wing center section "box," which supports the wing panel joining rods. This center section mates with the fuselage and holds the wing mounting bolt which extends down and engages the slotted bulkhead. Without the slip-off mount, no separate center box is used, since the wing joining rods are normally supported by the fuselage proper.

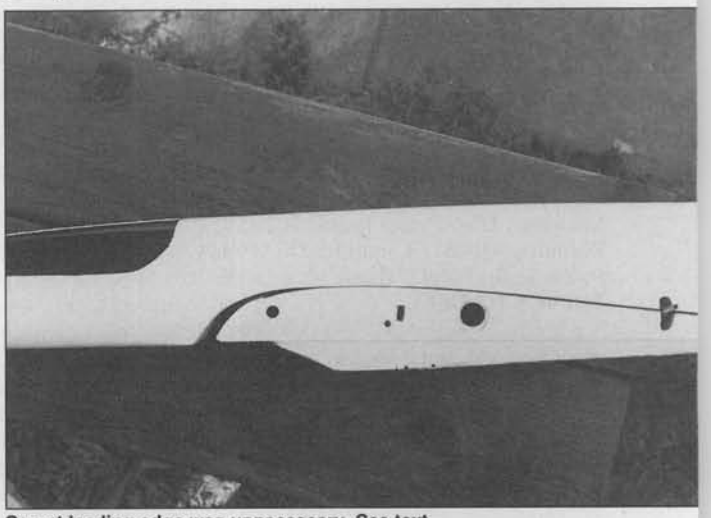
Dan sent more good photos of details of his development than we can publish, but from these selected few I hope you can get the picture. I see one feature where Dan apparently misunderstood what I intended. Someday I will learn how to write more clearly or draw better sketches.

Note the tapered gap Dan put between the center box and the fuselage at the leading edge. It is there to permit the wing to come forward in a nose-on crash, far enough to disengage the wing mounting nut from its slot without jamming and damaging the leading edge. Dan's design will do that job, but it ain't pretty, and the gap would add a bit of drag. The neat and drag-free way is to use a little more generous radius at the front of the wing saddle in the fuselage, then build the box out ahead of the wing leading edge, to fit the saddle. See Figure 1 of my original slip-off wing mount article, on page 32 of the June 1990 issue. See, Ma, no open gap, therefore no drag and no uglies. The radius lets the wing slide freely out of the mounting slot with a curving motion.

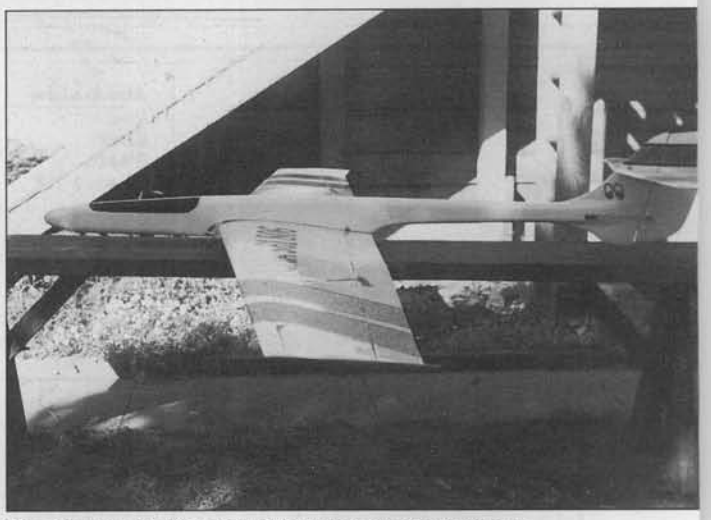
Dan reports he has had one hard crash so far with this slip-off mount glider, and the damage was minimal. The release mechanism worked perfectly. He said he had to reinforce the fuselage wing saddle to take the shear loads imposed in a cartwheel type crash. That is necessary, but it is a tradeoff between fuselage opening shear strength and wing-mount aft shear-pin size. Dan is using a 1/8-inch dowel shear pin. That sounds about right to me, for that size model. Recognize that a normal wing mount will rip up the fuselage, wing, or both in a cartwheel. With the slip-off mount we are trying to eliminate that damage, and we are doing it. Congratulations Dan Fulmer, and thanks for sharing your two-piece-wing development of the slip-off mount.



Wing center section incorporates slip-off wing mount and wing-joining rods. Note slip-out nut.



Gap at leading edge was unnecessary. See text.



Slip-off wing mount is applicable to low or shoulder wings. Snoopy approves of the innovation.

WIND SHEAR EFFECTS CONFIRMED

In my October 1990 column, I commented on the fact that the wind velocity decreases to zero at the surface and theorized that this should make our models land more rapidly in a headwind than they would in still air, and make them tend to float more in downwind landings than they would in still air. That was theory on my part. I have never noticed (nor looked for) the phenomena in practice. I just got a letter from reader Stan Zdon of Coon Rapids, Minnesota (love that name). I quote Stan in part:

"I noticed that landings made downwind were always smoother than upwind landings. When landing upwind, the airspeed would suddenly decrease as you neared the ground and the plane would stall. However, when landing downwind (sometimes we have no choice), the tailwind would decrease near the ground. This gave the net effect of increasing airspeed and the plane would flare and land very smoothly. I had often wondered why this was so, and the idea of wind shear seems to be the explanation."

Thanks for your observations, Stan. The theory has now been substantiated by at least one person's direct experience. I recall reading where Einstein predicted several things, in connection with his theory of relativity, that have only been observed and measured in recent years. You may continue to call me Francis. "Albert" would be pretentious.

continued on page 39

WORKBENCH *Continued from page 5*

plete with hex drive plate (Cat. #380) for $4.45 each, along with the needed backplate mounting bolts and prop shaft bolt set (#1996) for $1.45 each, or a total of $11.80. Add $3.00 for domestic orders, plus Calif. sales tax, if applicable. If overseas, write Cox Hobbies, Inc., 350 W. Rincon St., Corona, CA 91720, for details and prices.

US FAI RC PYLON TEAM SUPPORT

Unfortunately, qualifying to become a US FAI Team member, whether it's pylon, aerobatics, helicopter, free flight, control line, etc., not only requires the highest skills in building, flying, and competing, it also requires financial independence. Although the AMA covers the cost of travel, board, and a few other items, there's a whole bunch it can't cover because of budget restraints. It's frustrating to realize that this greatest nation in the world cannot totally support its World Championship Team representatives, but so be it. AMA is unable to drum up the whole package, so the individual teams have to beat the bushes to gain financial assistance for the many loose ends. If you can back up your pride in our US Teams with some financial support, now is the time. This particular request comes from the Pylon Team that will be traveling to Australia this coming October to defend its World Champion title. Send your donation to Wayne Yeager, Team Manager, USA Pylon Team, 38235 Castle, Romulus, MI 48174, made out to "1991 USA Pylon Team Fund." Thank you!

THINGS TO DO

May 24, 25, and 26, 1991: A little late to enter this one, but it should be interesting to take in if you're an RC soaring nut living in the northwest. It's the MID COLUMBIA CUP Slope Soarer's Race, located at Richland, Washington's Eagle or Kiona Butte, and featuring "the highest of high-performance RC sailplanes adhering to FAI 24-oz wing loading limit, in man-on-man pylon format." There's a minimum $2,000.00 cash purse, trophies, and prizes. Entry is limited to the first 50 applicants, who are to pay a $50.00 fee, with preregistration only. Event is put on by the Tri City Soarers, Rt. 4 Box 9544, W. Richland, WA 99352, in accordance with the AMA Rulebook, No. 454, Slope Soaring - Unlimited, Task S2 - Pylon Speed. Official event hotel is the Clover Island Inn, 435 Clover Island, Kennewick, WA 99336. For further information, call John (509-627-2603), Wil (509-627-5224), or Roy (509-525-7066).

June 6, 7, 8, and 9, 1991: The joint AMA Nationals and US Indoor Championships for Free Flight will be held at East Tennessee State University, Johnson City, TN. The Mini-Dome will afford everyone a opportunity to fly their models in a world-class site. Put on jointly by the Academy of Model Aeronautics and the National Free Flight Society.

June 18, 19, 20, 21, and 22, 1991: The AMA, assisted by the NFFS, SAM 57, and the Flying Aces Club, will present the Outdoor Free Flight Nationals, at the Mid-American Air Center, Lawenceville, Illinois.

October 7, 1991: The 25th (Silver Anniversary) NORTHROP Flying Wing Contest, for free flight only, will take place during and at the same location as the '91 SAM CHAMPS, in Jean, Nevada. Rules are the same as in past years: Jr., Sr., and Open combined in all events; entry fee $4.00 for each event; events are Rubber Power, Glider (164 ft. towline), Scale - any power (20 sec. official), and Gas (25 sec. eng. run)/Electric (35 sec. motor run)-combined event. In case of controversy, opinion of CD and Judge will be final. Chief CD, Carl Hatrak, 3825 W. 144 St., Hawthorne, CA 90250, phone (213) 676-2833. Scale and Flight Judge, Bill Stroman. Note: Proxy entries are encouraged. Send models to flier of your choice, NOT to *Model Builder* or CD. **MB**

DEAR JAKE *Continued from page 5*

must be absolutely moldy by now.

Jake

• • •

Dear Jake:

What's the hardest thing for a novice R/C flier to learn?

Hank in Handley, New Mexico

Dear Hank:

Some would say it's to learn to reverse right and left when flying toward yourself. I would say it's learning to keep your temper when the crowd at the crash scene starts chanting, "Pilot error . . . Pilot error . . . Pilot error."

Jake

• • •

Dear Jake:

How's your book coming along? What did you decide to call it?

Reader in Reading, Pennsylvania

Dear Reader:

We've decided to call it "Not Necessarily the Worst of Dear Jake," because the publisher thought "The Best of Dear Jake" was an oxymoron. You remember what oxymorons are, don't you? They're self-contradictory terms like "jumbo shrimp," "pretty ugly," "military intelligence," and "The Nixon Library."

The book is not going too well because nobody outside the modeling hobby understands any of the material. Come to think of it, most people in the modeling hobby don't understand any of the material.

All is not lost, however. The book needs to sell about a million copies in order to be a profitable undertaking for the publisher. Since we have a few hundred thousand modelers in the States, that means the project will be a go if each one of you promises to buy five copies.

So, send in your pledges, I'll forward them to the publisher, and we'll get this sucker off the ground.

Jake **MB**

RISER "100"

Designed By: *Mike Pratt*

Wing Span: 100 in.
Wing Area: 1000 sq. in.
Ready-To-Fly Weight: 45 - 49 oz.
Wing Loading: 6 - 7 oz/sq. ft.
Fuse Length: 51-1/2 in.

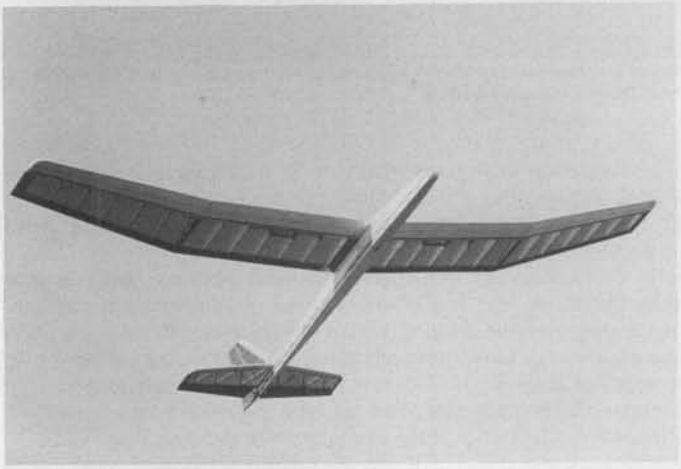
SIG
KIT NO. RC-62

$67.95

Radio Requirements:

2-Channel for elevator, rudder
3-Channel for elevator, rudder, spoilers
Accepts standard size servos

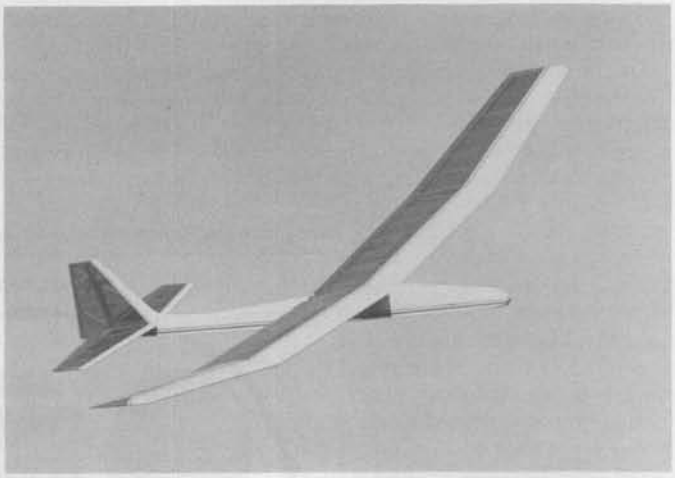
Standard Class Sailplane



KIT FEATURES:

- **Easy-To-Build All-Wood Design**
- **Die-Cut Lite-Ply Fuselage - Featuring Fast "Tee-Lock" Construction**
- **Easy-To-Transport Two-Piece Wing**
- **Shaped & Notched Trailing Edges**
- **Choice of Rubber Band or Bolt-On Wing Mounting**
- **Everything For Installing Optional Spoilers**
- **Flexible Nylon Tubing Pushrods**
- **"Easy Hinges"**
- **Complete Hardware Package**
- **Full Size Plans**
- **Photo-Illustrated Instruction Book - Takes you from the open box to the flying field!**
- **Helpful Flying Tips for Novice Soaring Pilots**

The Riser "100" is a standard class sailplane that is the perfect choice for a beginner who wants to get started in R/C soaring, or for an experienced glider guider that needs an easy to build multi-task sailplane. The Riser "100's" modified Eppler 205 airfoil and 1000 sq. in. of wing area gives you the ability to fly in all types of conditions. Great "hang-time" in light lift conditions, and excellent penetration on those blustery contest days. It's rugged construction allows the modeler to spend more time at the flying field and less time in the shop. The sport of R/C soaring is a silent and relaxing type of flying that is attracting more R/C pilots every day. Launch the Riser "100" with a standard high-start, a winch, or just pitch it off a slope, and enjoy the thrill of silent flight.



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BIG BIRDS

BY BRUCE EDWARDS

KEEP YOUR LEADS SHORT

The terror of northwest skies, Baron Von Solberg, and his twin-engined. The Ugly Stik continues to earn its title in spite of variations.

Steve Stephenson and Norm Osbourne enjoy some northwest sunshine, with Steve's "Robin Hood 99."

Have you started your flying season yet? If so, you probably have cycled your battery packs, which is an excellent practice;, however, there is another item to check regarding NiCd batteries. It would be a good idea to examine the negative conductor on all your battery packs.

The copper wire should be bright and shiny under the insulation. If it is tarnished, you may be headed for the "black wire syndrome." If this phenomenon is allowed to progress to its worst condition, the negative wire will turn black and will not allow current to flow. It will only take a few minutes to check out your receiver and transmitter packs.

Speaking of wiring, several new members of the "Lesser Seattle Giant Aero Squadron" (LSGAS) were seeking more information regarding I.M.A.A.'s mandatory kill switch for big engines that have magneto ignition. Personally, I favor the use of kill switches, but only when they are properly installed. The leads from unshielded magneto wires give off high energy radio frequency waves, which may cause radio interference. Many Big Bird flyers have experienced difficulties when they routed the wires from the magneto back into the fuselage, where they were attached to a switch that was servo operated, allowing the magneto wiring to upset the receiver.

The whole secret to a good kill switch installation is to keep the leads as short as possible. The switch on the engine of my Fleet biplane was glued on the magneto and total wire length from magneto through the switch to the engine case was less than six inches. The switch was energized by Nyrod linked to a servo, no wiring went past the firewall.

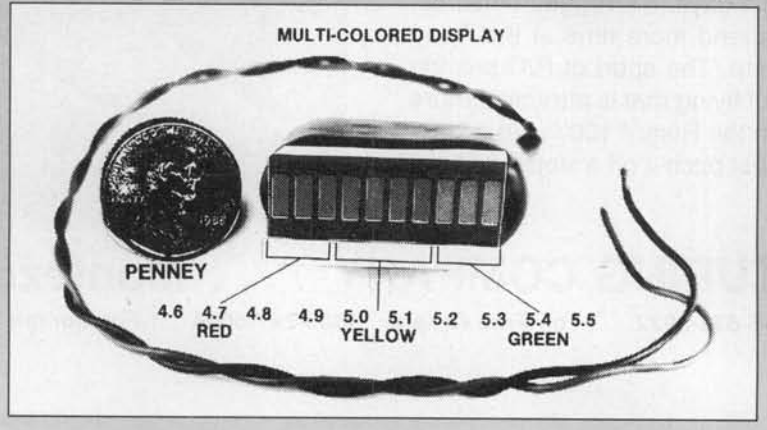
If you are fortunate enough to have a throttle-coupled spark advance ignition system, such as a C.H. or an Al Diem unit, the switch from the system's battery pack becomes your kill switch.

The kill switch is one of those items that seems unnecessary until you get into trouble and really need it. An example would be if your throttle linkage or throttle servo malfunctioned; imagine trying to stop your engine!

Big engines with magneto ignitions usually have Walbro or Tillotson-type carburetors, which means there is nearly always enough gas remaining in the carburetor to allow the engine to run a few seconds. That is plenty of time to create a lot of mischief, if the ignition is not dead.

If you are unsure of the method to install such a switch, there should be someone at your local IMAA Chapter who will be pleased to share such knowledge with you. If no one is available, feel free to drop me a line in a stamped, self-addressed envelope, and I will provide you with a simple diagram (see address at end of text).

Dandy little E.S.V. manufactured by Jim Wardrope mounts in your model. See text.



Bennie Phillips, president of the LSGAS, came to our first meeting in February with his usual bag of goodies, which included a very nice electronic expanded scale volt meter. This unit was quite small and designed to fit in the airplane of your choice. It could be mounted in the instrument panel or just inside of the cabin or cockpit window.

The Astrodata E.S.V. is made by James L. Wardrope, 421 S.W. Blakely Ct., Bend, Oregon 97702; telephone (800) 323-

5492. Its accuracy and standards can be traced back to the National Bureau of Standards, and such accuracy is very impressive to me because much of the test equipment I use in my job requires trace-ability to the National Bureau of Standards.

This little unit will inform you of several important battery and receiver conditions, such as, voltage-load capacity, non-centering servos, stalled and difficult to move control surfaces, and cell condition. With your transmitter off, the device becomes sensitive to interference. It is also reverse polarity protected.

The modern radio control set is an electronic engineering marvel, with many excellent sets available to us. One of the best ways to determine which radio is giving good service is to visit the local flying field. You will be able to observe the radios under flight conditions, which should be a good indicator as to the best one for your needs.

I am flying with a Multiplex Commander seven-channel P.C.M., a Futaba 1024 P.C.M. five-channel, and two six-channel Specialists on AM, which have been narrow-banded and tuned to R.C.D. Platinum receivers.

These radios are not cheap, because it crew did a very good job for me. I did not rush Dick, but asked him to bring the set to the Northwest Model Exposition in February where we settled up my account.

Dick informed me that shortly before receiving my radio he experienced the failure of his frequency counter, which set back his return schedule. However, the purchase of some expensive new equipment has facilitated the reduction of any backlog.

The second Specialist radio was sent to Fred Morgan's RC Service, Box 1474J, Black Canyon Stage 2 (OK for UPS), Phoenix, AZ 85027; telephone (602) 582-9454. Fred did

Mark Reynolds and his Super Tigre powered Ace "4-120." Note fire extinguisher handy to flightline.

Charlie Townsend prepares to "light the fire" on his Sopwith Pup. Nice background scenery.

Folks, the real problem with E.S.V.s is convincing everyone of their importance. Last summer, while visiting many IMAA fly-ins, it seemed to me that only one Big Bird flier in forty took the time to preflight their batteries with an E.S.V.

Those of us who do use these devices on a regular basis feel that they are among the least expensive pieces of protection, not to mention the protection of our fellow fliers from an out-of-control model that has lost its battery power. It is a good practice to check your batteries prior to each flight regardless of the size of your RC model plane.

does not make sense to use a cheap, poor quality radio in an expensive Big Bird. Big Birds are my hobby, so it seems like a good idea to protect my investment with good radio equipment and accessories.

Just for drill, and not suspecting I would soon be writing this "Big Birds" column, I used two separate radio repair services to upgrade my Specialist radios to narrow-band AM and align them with their new R.C.D. receivers.

The first set was sent to Anything RC, West 3029 Hoffman, Spokane, WA 99205; telephone (509) 327-4579. Dick Carson and a very creditable job on the narrow banding and tuning. The time involved was slightly more than two weeks, which seemed like a quick turnaround to me.

The R.C.D. receivers seem to be of high quality and should give years of service, provided they are properly installed and maintained. The R.C.D. receiver comes with a special cover called a "flight preserver," which should be used as a minimum protection. It still seems like a good idea to wrap an additional half-inch or more of good SIG or Goldberg foam rubber around the receiver.

continued on page 66

Dave Cobb really enjoys relaxed flying with his Bruce Edwards-designed "Humungous Sage Hen" (*MB* Plan No. 5891).

Bennie Phillips, shortly before melting into the runway at the Crow's Landing Mini Festival.

BY BILL FORREY

SUPPORT OUR F3B TEAM!

Now is the time for all good glider pilots to come to the aid of their country's FAI soaring team! And the Inland Soaring Society of Riverside, California, spearheaded by Harvey Jenkins has done just that ... in a big way.

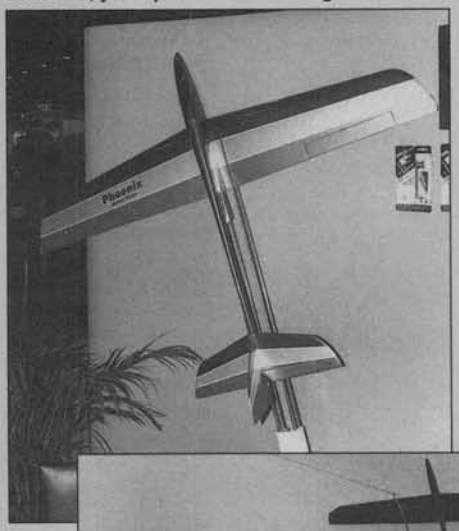
Sunday, March 10, 1991, 57 contestants plus various family members came to fly and show their support for their nation's top three reigning multi-task soaring champions. The 1991 US FAI/F3B team members, Larry Jolly, Joe Wurts, and Daryl Perkins, were not only honored, but were present to fly and compete with friends. Although the event was held on the same weekend as many other So Cal club contests and a major regional hobby show, many out-of-towners showed up anyway to help the cause.

The combined gate total of all classes flown was $356.00, all of which was turned over to Team Manager Randy Spencer in the form of a check from the ISS treasury. Taking into account other forms of donations, like patch, pin, hat, and shirt sales (which were good), and a nice raffle sponsored by Hobby Club USA of Ontario, California, the team probably cleared over $500. This money will go towards team expenses in Holland this summer.

The contest was simply three rounds of five-minute precision duration with a landing bonus scored on a standard AMA 25-foot radius, graduated 100-point tape. Open flight order was the rule, and no "sandbagging" delays were observed. The models flown varied in type all the way from two-meter trainer types up to full-fledged F3B models. The weather cooperated beautifully throughout the entire event so that all

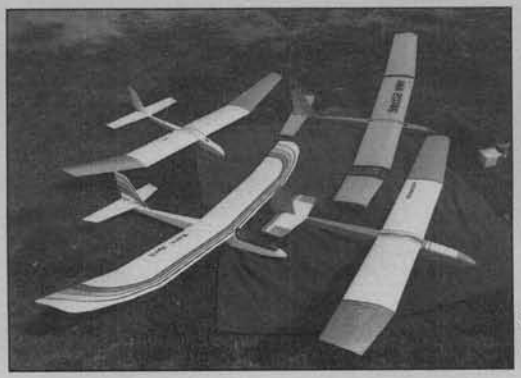
At the Los Angeles Model Hobby Show, the wonderfully charming Kim Davis shows us the MC3 slope glider from RC Products. The MC3

Klingberg's Future Flight has teamed up with AeroTech to produce this rocket assist aerobatic sailplane prototype which claims to be fast and aerobatic, yet capable of thermalling.



Helping the 1991 USA Soaring Team get to Holland is the ISS club and Harvey Jenkins (right) who is handing TM Randy Spencer a check for $356. Team members (L to R) Wurts, Jolly, and Perkins were present to compete at the benefit contest and give entertaining performance demonstrations afterwards.

Joe Wurts launches his modified Falcon 880 at the ISS F3B benefit contest. Finished in second place by a point or three behind Larry Jolly flying his trusty Pantera.



Seen at the ISS F3B benefit contest: clockwise from upper left: Airtronics "Olympic 650," Carl Goldberg Models "Gentle Lady," Dynaflite "Wanderer," and the new Great Planes Model Manufacturing's "Spirit," the 1991 Glider of the Year.

had equal opportunity to win.

After these three five-minute rounds, a fourth seven-minute round was flown pitting the top 12 fliers against each other, man-on-man, to determine the final winners. Would you believe Larry Jolly and Joe Wurts were involved in a fifth-round fly-off to break a first place tie? Yep, they were, and both made their seven-minute flight times within a second of perfect . . . then it came down to a game of inches in the landing circle!

As I watched Larry touch down and skid to a stop, I distinctly heard the "tap" of his Pantera's fiberglass fuselage against the landing tape's metal stake. He had nailed (bad pun!) a near-perfect 98-point landing! Cheers went up all around. Joe was next to land. His approach looked good . . . but it fell inches short of Larry's landing. Larry was declared the winner.

If other clubs are interested in holding F3B team benefit contests, I would personally like to encourage them to do so. I have met almost every flier of every US team ever picked to fly in the world championships. We have fielded some very good teams in the past, but never before have I seen a more friendly or naturally talented bunch than the team we will be sending to Holland this year.

Jolly, Wurts, and Perkins are good friends, and they live near each other. And yes, they practice together A LOT! They GLADLY help each other as model builders and fliers! They have good local support from clubs like the Soaring Union of Los Angeles and the ISS. Their expertise in all forms of advanced soaring . . . F3B (multi-task), F3F (slope racing), F3J and AMA thermal duration events, and cross country . . . along with their combined skill in composite structure scratch building, is ENORMOUS! With any luck, they will be the best team in 1991 . . . mark my words!

I would also like to plug the team support products: raffle entry, $10.00; hats, $10.00; T-shirts (all sizes), $12.00; official pin, $3.00; and patches, $5.00 each. Team Manager Randy Spencer may be reached at the team's P.O. Box 3242, Lakewood, CA 90711-3242. Please allow two to three weeks for delivery, and add 10% of the product total for shipping and handling. Of course, any money above and beyond this is welcome as a donation.

L.A. MODEL HOBBY SHOW

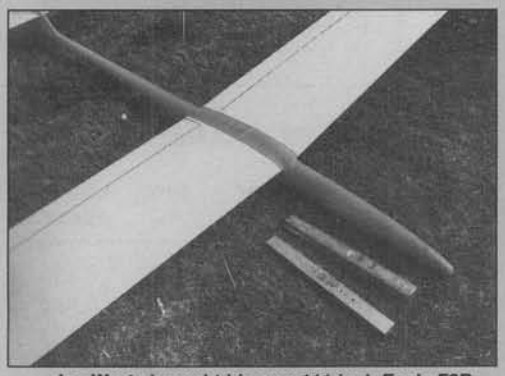
Pomona's Fairplex was once again the chosen site for the third annual Los Angeles Model Hobby Show sponsored by the Radio Control Hobby Trade Association. For those who have never attended one, a RCHTA show is a non-selling, R/C modeling, plastics, and model railroading exhibition that tends to cater mostly to the larger, more commercially viable model manufacturers and distributors.

Because of these factors, fewer "cottage industry" types are present. This typically means fewer soaring related products are present as well. Nevertheless, there were two booths with attention-getting sailplanes making their debuts.

RC PRODUCTS

Testing the market for their innovative, high ticket, and entirely-ready-to-fly slope aerobatic glider were the folks in the RC Products booth. Radically more creative than the company or the product's name would suggest, the new MC3 glider from RC Products is a slick new slope machine that comes fully built (with radio installed) and packed inside a durable travel case.

The MC3 is a totally molded plastic model

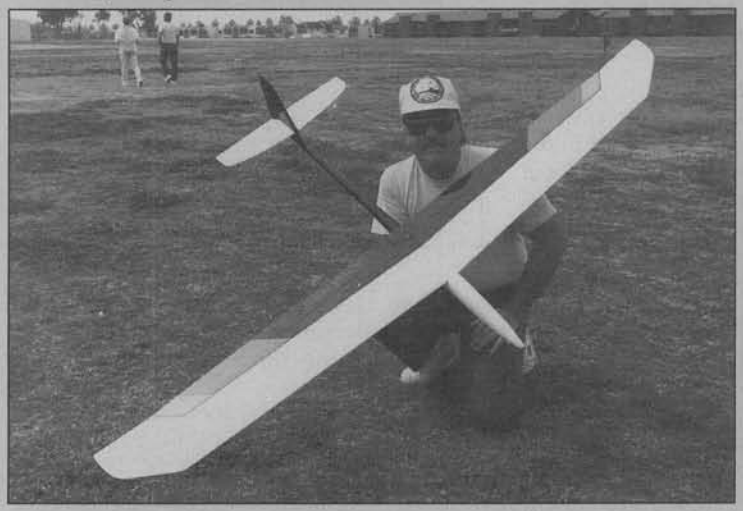


Joe Wurts brought his new 111-inch Eagle F3B ship for all to see. Uses fiberglass fuse from Mark Allen's soon-to-be-kitted Thermal Eagle 120-incher. Joe molds lead bars for up to 4 lbs. ballast. A 14mm solid C/F joiner rod keeps C/F sheeted blue foam core wings together.

Bob Andrews of ISS and his first-to-be-seen-flying factory kit Airtronics Legend. Bob is extremely happy with it, and says it is a typical Airtronics quality kit. Took four weeks of holiday time from work to build it. Weighs 80 ounces.

Pete Olsen helps his teenage daughter, Robin, launch her 2-meter Gemini. You see, flying appeals to ladies, too! At ISS benefit. If it was U-control, we'd say, "Don't fly near power lines!"

ISS president Harvey Jenkins and his Mark Allen 2-meter Falcon 600. Built stock, he says its an excellent flier.



Ian Douglas is ready for the next ISS RC HLG contest for Class A gliders this coming June 2nd at Riverside's University Middle School athletic field on Spruce St. Model features fully sheeted foam core wing with Selig 3010 airfoil on a Paraphrase fuselage. Weighs about 14 ounces.

with a high gloss finish that is available in several "rad" graphics packages. It is available in white with USAF graphics, black with Russian AF graphics, tan with camouflage graphics, or even "custom" colors.

The MC3 is so ERF that only an overnight charge on the Futaba 4NBL radio and 60 seconds of simple field assembly gets you ready for the friendly skies. Then stand back for the claimed "advanced, high performance" flying which you can see for yourself in the available RC Products video tape.

Features include: aerodynamically efficient design, modified Eppler 205 airfoil, 55-inch wingspan, 318 square inch wing area, pivot-wing aileron control with separate elevator or pitcheron control (your choice when equipped with on-board electronic mixing), 24-ounce flying weight, rubber nose cone, protective travel case, and interchangeable replacement parts.

for good launch performance also results in a high L/D and an exceptionally large speed range during glide as compared to conventional R/C gliders of similar size. In spite of its aerobatic nature, the Phoenix can also easily be thermalled for long duration flights. A computer optimized airfoil gives low drag at high launch speeds, a low sink rate glide, full aerobatic capability, and reasonable thickness for a high strength wing. The Phoenix is designed to handle the high speeds and high accelerations of the launch, while retaining light weight and ease of construction."

The pamphlet goes on to say that the rocket motor gives 2.5 pounds average thrust for 10 seconds, then it can be reloaded using propellant "modules" to reduce operational costs to only 30% of normal rocket motors. AeroTech motors are claimed to be over three times as powerful as similar size and

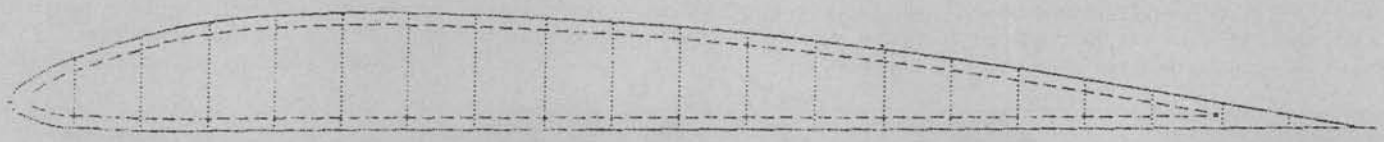
can see, the Spirit has a clear canopy with pilot figure which adds a little extra visual pizzazz, plus that wide-tip, multi-taper wing gives it a unique planform.

Stay tuned for a complete review of this fine little trainer sailplane in an upcoming issue of *Model Builder!*

AIRFOIL OF THE MONTH: RHODE ST.GENESE 29

Here is an unusual airfoil that I think deserves a try by all who favor scratch building thermal duration sailplanes. It is from the mind of Rhode St. Genese of Belgium, and beyond this I know nothing of its history . . . it just looks good!

I found this airfoil published in the excellent book of aerodynamics by Fernando Gale of Italy. This good book contains a wealth of information in both English and Italian, and scores of unusual airfoils. If this interests you, you might still get a copy from



AIRFOIL OF THE MONTH: RHODE ST.GENESE 29
Rib plot courtesy of Foiled Again software.
Data courtesy of Fernando Gale and Foiled Again software.

AIRFOIL FILE NAME: RSG-29

Line #	Stn. %	Upper coord.	Stn. %	Lower coord.
1	0.00	2.130	0.00	2.130
2	1.25	3.760	1.25	0.980
3	2.50	4.530	2.50	0.530
4	5.00	5.530	5.00	0.270
5	7.50	6.400	7.50	0.140
6	10.00	7.150	10.00	0.000
7	15.00	8.100	15.00	0.000
8	20.00	8.530	20.00	0.000
9	30.00	8.660	30.00	0.000
10	40.00	8.270	40.00	0.000
11	50.00	7.600	50.00	0.000
12	60.00	6.530	60.00	0.000
13	70.00	5.200	70.00	0.000
14	80.00	3.600	80.00	0.000
15	90.00	1.800	90.00	0.000
16	100.00	0.000	100.00	0.000

Max. Thickness....66% at 30.0% chord
Maximum Camber....33% at 30.0% chord

All these features and conveniences come at a price, however, and THAT is in a state of flux at press time. Initial estimates of the to-your-door and immediately out-to-the-slopes price is a relatively high $975 plus California sales tax if applicable. The price is claimed to be justified by the extremely high ready-to-fly condition of the model. The plane may also be available by itself (sans case or radio system) for about $500. For current price and availability, a phone call or letter to RC Products is highly recommended: RC Products, 7044 Arlington Ave., Riverside, CA 92503, (714) 351-9715. Ask for either Mike Longfield or Mike Davis when you call.

AEROTECH AND THE FUTURE FLIGHT PHOENIX

The man who brought you X-wing 1/2A power planes and Klingberg Wing flying wing gliders has branched out in yet another off-beat, yet creative direction . . . rocket boosted aerobatic R/C gliders!

Introducing the Phoenix prototype. Quoting from the flyer I picked up, "The Phoenix is a high performance, rocket launched, aerobatic glider. It uses an AeroTech RMS rocket motor to provide a high speed vertical launch of up to 1,000 feet of altitude.

"Phoenix has smooth, precise handling on launch, while being fully aerobatic during the glide. The low drag design required

weight motors.

The Phoenix specifications are: 50-inch wingspan, 360-square inch wing area, and 25-ounce flying weight. It is designed to launch from a Mantis G launch pad, and have its motor ignited by a Interlock launch controller using Copperhead electrical ignitors.

As of this writing, it is not clear when the Phoenix will be ready for the hobby market. By the time you read this, more details may be available. Contact either Future Flight, 1256 Prescott Ave., Sunnyvale, CA 94089, or AeroTech, 1955 So. Palm St. Suite 15, Las Vegas, NV 89104, (702) 641-2301 for details.

GREAT PLANES' SPIRIT

The Spirit has just won the 1991 International RC Model of the Year Award in the Glider/Motorglider category. As one of about ten international reviewers who judged it, I can say with confidence that it is going to be a popular model. With slightly better performance and better looks than other models of its two-meter trainer class, it will probably appeal to a wider range of fliers. Plus, its recent win at the 1990 AMA Nationals might even make the thermal contest crowd take notice!

I have included a photograph of my Spirit review plane alongside three other models of its class for a visual comparison. As you

Fernando Gale, Via Marconi, 10, 28042 Baveno, Italy via air mail for about $53 (1987 price). It also comes with Foiled Again's software.

If you have questions about model soaring, feel free to call me at (714) 245-1702 between 7 and 9 p.m. Pacific (California) time! **MB**

"ARF PLANE OF THE YEAR"
–Model Builder Magazine, 1989

Superb engineering and hand crafted quality are a tradition at *SKYWARD R+D*. The fact that our Model *40* and Model *60* were voted ARF trainers of the year proves it.

And now, in the same tradition of excellence, we're proud to introduce the ***SKYWARD 120***. A giant 1/4-scale version of the ultimate ARF trainer.

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At *SKYWARD R+D* we think ahead. When you've mastered the art of flight with your SKYWARD 40, you can modify it using our high performance, semi-symmetrical Sport Wing (sold serparately).

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Sold only at better hobby shops the world over.

SKYWARD	25	40	60[1]	120[1]
2-cycle engine	20–25	35–45	45–61	108
4-cycle engine	20–26	48–61	60–91	120
Wing span	53"	63"	72"	108"
Length	37"	44.25"	56"	76"
R/C channels	3–4	3–4	4	4
Wing area*	449	730	909	2127

* (sq.in.) [1] *SEMI-SYMMETRICAL AIRFOIL*

THE SKYWARD 40 FSR

Engine Size: 40
Displacement: 6.40 cc
Net Weight: 420 gr

Two Stroke/ Glow Plug
.97 HP @ 15,000 rpm

ABC Construction
Double Ball Bearing

Schnuerle Porting

Muffler included

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STRICTLY SCALE

BY AL TUTTLE

JETS OVER DE LAND

This was the second Jet Pilots Organization (JPO) "Jets Over De Land" get-together. A few months ago, I covered the inaugural event, which was held in August 1990. The temperature in Florida at that time of the year is a bit warm, so the organizers chose to have the second event in February (9th and 10th). This was a wise choice, as the weather cooperated and the temperatures during the two-day get-together were in the low to mid- seventies with very little wind.

Pilot registration was up from about a dozen last year to thirty-one pilots and fifty-one airplanes this year. This could very well turn into the premier ducted fan event in the country. The facilities are first class and the paved runway is large enough for the not-so-proficient jet jockey.

Last year I covered this event in its entirety. However, this year, as the "Strictly Scale" columnist, I photographed the *scale* ducted fans only. Those scale models present were works of art and there wasn't a ramp rat among them. These guys came to fly, and fly they did!

The most outstanding scale model, and the one taking home most of the awards, was Terry Nitsch's Violett F-86. Terry won one of the two Spectators Choice awards as well as awards for Pilots Choice Most Outstanding Performance and Best Military Static Scale. This same model placed first in scale at the 1990 Toledo Show and seventh at the 1990 Top Gun Invitational in Mesa, Arizona. Terry said that he lost two of his four flights there due to mechanical problems. He feels he would have placed higher if it wasn't for that.

Terry's F-86 has to be seen to be believed. It is powered by a KBV .81 and fan unit. Finish is K&B Super Poxy with an automotive acrylic urethane overcoating, and weighs 12.5 pounds. All rivets and raised panel lines are of the rub-on type. There are *thirty thousand* rivets. Terry said it took him two weeks, working late every evening and all day on weekends, to apply the rivets and panel lines. He would do a small section, then apply a light clear coat to protect that area before continuing.

The decals are dry transfers also. All of the dry transfers, including the rivets and raised panel lines, were manufactured by a graphics outfit in Chicago, to Terry's specifications. The cockpit details are constructed from typical model railroad material readily available at most hobby shops, i.e., plastic I-beams, tubes, flat sheets, etc. Using photos of the full-scale cockpit, Terry cut out the plastic sheets, formed the rods, etc., to match the photos.

The instrument panel is from Bob Dively's model jet kit interior. He cut pieces from it and glued them on to fabricate the instrumentation. Photos cannot do justice to this plane. Terry uses a JR PCM 10 radio and is very happy with it and the model's in-flight performance. Terry flew this magnificent model several times each day and put on a special solo performance on Saturday. Terry not only is a fantastic craftsman but an accomplished pilot and super nice guy as well.

Roger Young, from Charleston, South Carolina, was there with a Tom Cook twin-ducted fan F-4 Phantom and a Jet Hanger Hobbies Kfir. Tom's Kfir has a fiberglass fuselage and built-up balsa wings. The wings are covered with MonoKote, with automotive paint on the fuselage and an enamel clear coat overall. It is powered with a Dynamax fan and Rossi .81 engine. Robart retracts are used and the radio is a Futaba 5-

Terry Nitsch deservedly took top honors at De Land, Florida, with his F-86 Sabre, a magnificent piece of workmanship. With a KBV .82 and fan combo, it's no slouch in performance, either. (Insert top) The rivets (all *30,000* of 'em!) and the "Puddy Tat" art on Terry's F-86 are dry transfers that were professionally custom made just for this particular model. Must have cost him a small fortune. (Insert bottom) Cockpit details of Terry's F-86 Sabre.

channel PCM. The model flies very well and has an exceptionally fast roll rate. Roger won one of the two Spectators Choice awards with his Tom Cook Phantom. I don't know why, but I failed to get a photo of this pretty model.

Bob Fiorenze had a Tom Cook F-4 Phantom as well. Bob and Roger put on a dazzling flying display on Saturday. Unfortunately, problems with Roger's Phantom on Sunday prevented a repeat performance, much to the chagrin of the spectators.

Another pretty model was Owen Penk's Violett F-86 done up in the Royal Canadian Air Force Golden Hawks color scheme. Owen hails from Canada and flies as a first officer for Air Canada. His F-86 is powered with a KBV .82 and fan unit. It is finished with DuPont Centuri Gold. This is a metallic gold paint and is very pretty. All large markings and lettering are hand painted; the small lettering is from the dry transfers furnished with the kit. This particular paint scheme was plane number six in the full-size show team and was the last color scheme used on the Sabres. Radio is a Futaba 8-channel PCM. Owen said the plane flies quite nicely, is docile in the air and makes him look good. The external tanks are droppable and Owen managed to release them directly in front of him each time he flew. A nice model, flown extremely well.

Carl Spurlock, from Des Moines, Iowa, was there with his fleet of Byron Originals ducted fan models. Carl won the Most Realistic Flight award with his Byron F-18. This model is *huge* and weighs 17.5 lbs. It is powered by a single O.S. .91 and Byrojet fan unit. The flying surfaces are covered with EconoKote and the entire plane is painted with K&B Super Poxy. The model even has an operational speed brake. Carl says it isn't very effective but sure looks nice when it is raised up and down. Radio used is an Airtronics 7-channel PCM Spectra. I believe Carl put in more flights than anyone else, because every time I looked up, one of Carl's models was in the air. In addition to the F-18, other Byron models that he brought were an F-20, F-16, and F-86.

Roger Young drove down from South Carolina to fly his Rossi-powered Kfir, built from a Jet Hangar Hobbies kit.

Canadian jet enthusiast Owen Penk finished his F-86 in the livery of the RCAF "Golden Hawks" air show team. Features external drop tanks that can be jettisoned.

Carl Spurlock's F-18 really moves with an O.S. 91/Byrojet fan combo.

Latest kit from Bob Violett Models is this F-16, two prototypes of which were flown at De Land by Bob and Dave Ribbe (seen here).

Carl was accompanied by two of his friends, Jerry and Duane. Duane had a new Byron F-16, but didn't fly it because of a problem discovered during its test flights on Wednesday and Thursday. These three arrived at the motel at 1 a.m. Wednesday morning, and were at the field by 9 a.m., and flew until dark. They repeated this on Thursday and Friday, and flew continually on Saturday and Sunday. Carl is a real congenial person, an outstanding craftsman and accomplished pilot. I'm sure the local modelers will be looking forward to seeing Carl, Duane, and Jerry next year, or sooner.

Bob Violett and Dave Ribbe flew the new Violett F-16s. Bob demonstrated the model's flight characteristics, which are excellent, to say the least. It has a speed envelope that has to be seen to be believed. It looks like Bob has another winner and we should be seeing a lot of these models this season. I have seen the kit and it looks to be very well done, with a high degree of prefabrication. The retracts are designed by Violett and are as close to scale as you can get. Just watching the gear doors cycle through their retract and extend positions is worth the price of the kit alone! Fascinating!

The F-16 pictured is one of the prototypes built by Dave Ribbe. It weighs 13 pounds. Glass cloth is used on the wings, the entire model being finished using the K&B finishing system, including K&B satin clear coat. Radio used is a JR PCM 10. Dave worked for Violett three years while he was in college and helped in the development of the Violett F-16. Dave still works for Bob on a part-time or as-needed basis.

Pilots choice for most outstanding finish went to Jerry Caudle, from Metropolis, Illinois, with his Violett F-86. Terry Nitsch put his Violett Viper through the speed trap at a blistering 222.0 mph for the fastest time of the weekend. Rather than plaques, the awards were crystal plates with the event info etched on them, plus a display stand. Different and attractive.

Ken Basso was the contest director, and he and his staff

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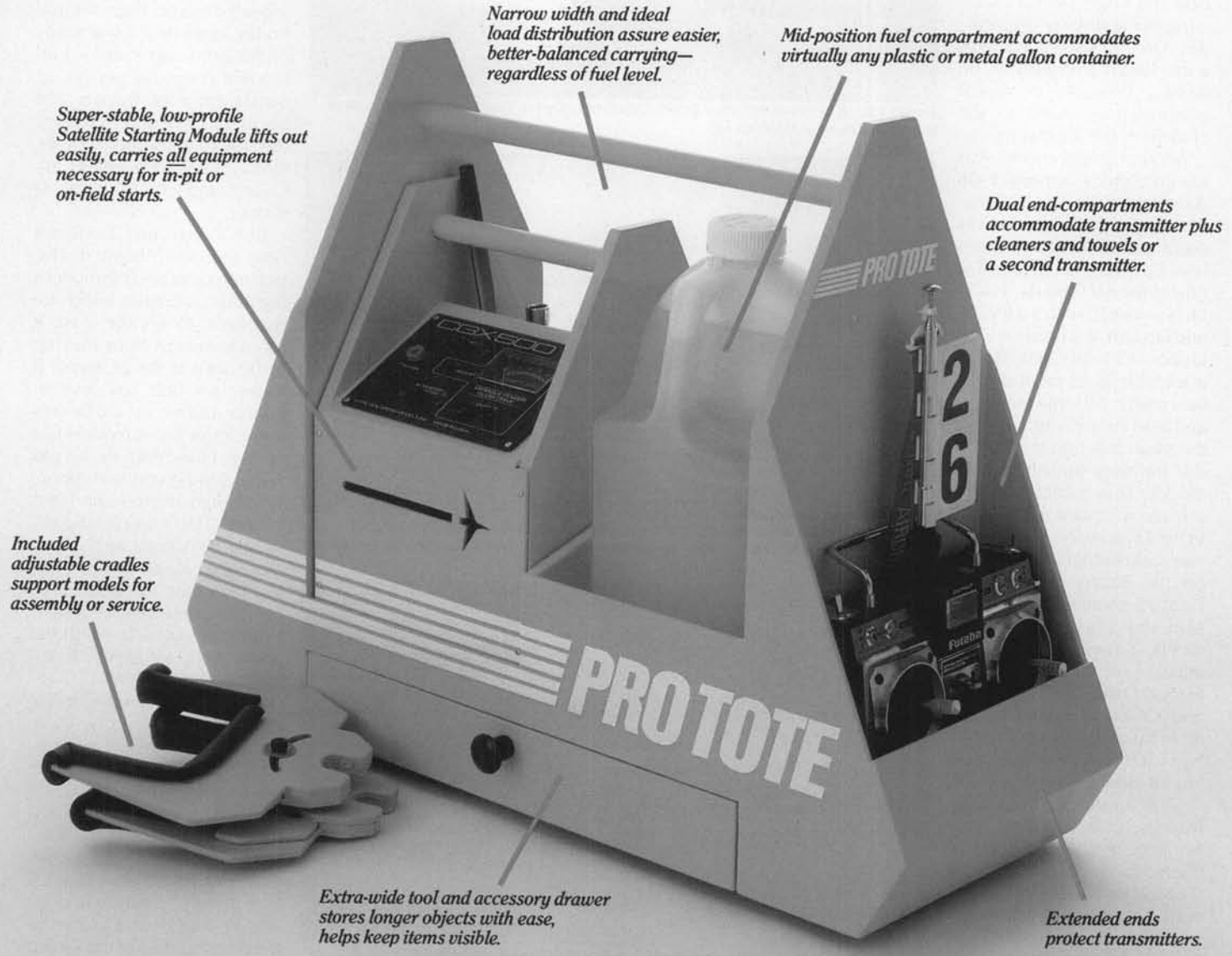

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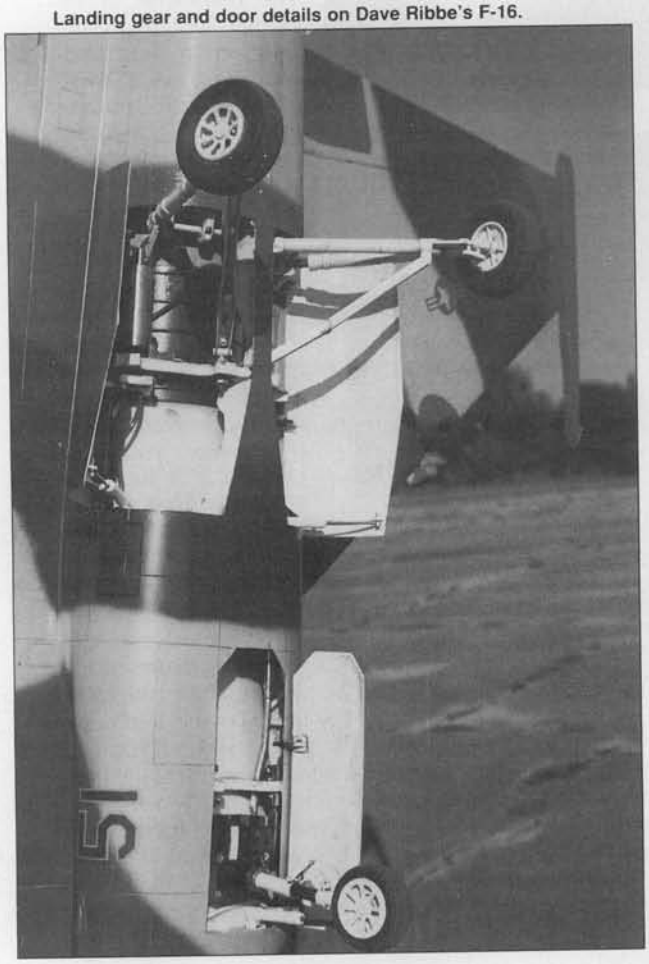
CARL GOLDBERG MODELS INC.

Most Realistic Flight award went to the Byron Originals F-18 Hornet built and flown by Carl Spurlock. Carl is what you'd call a dedicated jet modeler, having arrived at De Land with the F-18 as well as F-20, F-86 and F-16 models, all Byron kits.

Landing gear and door details on Dave Ribbe's F-16.



did a superb job of running the show. I am looking forward to next year's rally . . . should be a good one!

• • •

Like to use automotive finishes but can't buy in small quantities? Have I got news for you! Lanny Lucas, of Lucas Auto Paints in De Land, Florida, now has available, in half pint cans, Ditzler (PPG) automotive acrylic enamels. Clear coat is available in pint cans, hardener in one-quarter pint cans, and reducer (thinner) in quart cans. The clear coat uses the same hardener as the enamels, so you do not need two different hardeners.

These paints are not as sophisticated as others, which makes them easy to use. Also, they are not as harmful to your respiratory system as others. Some types of automotive paints require you wear a mask with an external air source, plus protective clothing, to prevent the fumes from being absorbed through the skin pores. The average modeler does not have all this equipment, nor can he afford to buy it.

Ditzler and its hardener can be used with a normal respirator. You still want to shoot it outdoors or in an adequately vented room, however. Enamels cure from the inside out, yet masking tape can be removed two hours after painting. Lanny gives an example of how quickly you can paint a model if pushed: "I did a Byron P-51 Mustang. I got up at four in the morning to start painting. The plane was already in primer and sanded. I painted it silver, taped it off, painted the yellow on the nose, and painted the white for the invasion stripes. Let that set, went over to the hobby shop (which is approximately twenty miles one way), bought a set of decals as I didn't have decals for it, came back, painted the black invasion stripes on it, let it set, put the decals on it and clear coated it. I took it to the Daytona Club and won model of the month with it that night. Of course, I didn't wet sand between coats as I wasn't concerned about weight."

Paints will be available in MonoKote colors. Lanny says these colors will be mixed in gallon amounts and then put in half-pint cans, so as to better

continued on page 66

R/C PRECISION AEROBATICS

BY RICK ALLISON

BASIC FLIGHT MANEUVERS

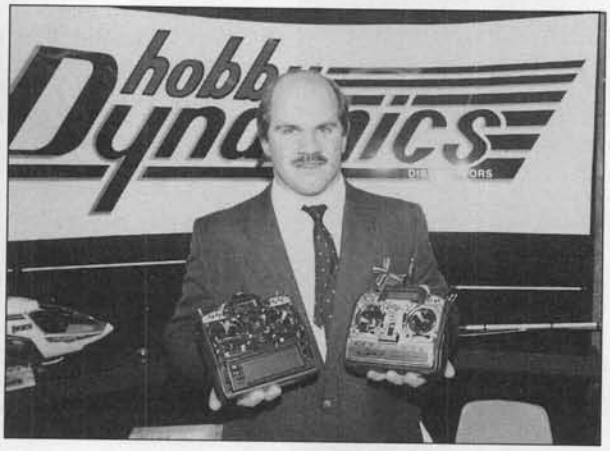
This month we pick up where we left off on our discussion of basic flight maneuvers. Somewhere in the last column, I mentioned in passing that as one progressed up the pattern skill ladder, these basic maneuvers would constantly reappear as elements of more complex maneuvers. Pondering that piece of data brings us inescapably around to the conclusion that it is a good idea to spend the time and effort necessary to master the simple fundamentals, because the simple fundamentals are not going to go away. If you can't do a decent Stall Turn, a Figure M with 1/4 rolls is going to be a teensy bit difficult to learn, don't you think?

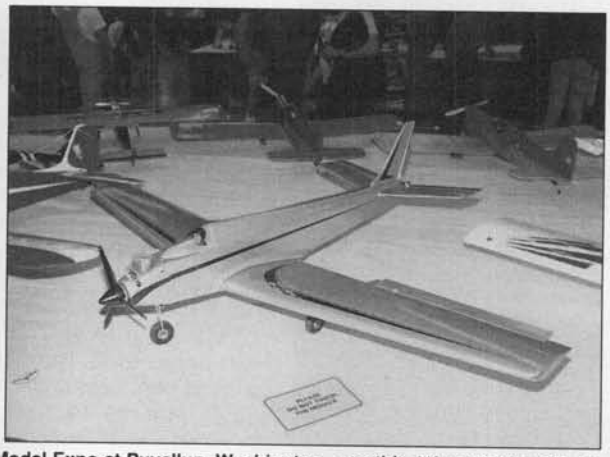
Accordingly, having previously chewed our way through Stall Turns, Loops, and Immelmanns, this month's discussion will consider Cuban Eights and rolling maneuvers.

The Cuban Eight, like the Immelmann, is a hybrid maneuver, made up of both rolling and looping segments. Unlike the Immelmann, it is symmetrical. Symmetry, in a nutshell (funny place for it), means that which you have over *there*, you have to have over *here* as well. Actually, according to Webster's, it means the balanced correspondence of opposing parts on both sides of a median line or about a center or axis, as to size, shape and relative position.

From that, you should derive that each of the two partial loops which make up the body of the Eight are supposed to be identical; the 45 degree down lines which connect them should intersect exactly in front of the pilot, and the half rolls should be centered exactly both at the mid-point of the down lines and on each other. If you aren't very good at deriving things, you can go read all of this stuff in the maneuver description section of the rule book. This is the first really complex maneuver encountered in the pattern hierarchy, and it usually takes most folks a little while to consistently perform it well. The maneuver is included in the present Sportsman and Advanced classes, and half Cubans are common turnaround maneuvers in FAI style classes.

Cubans are tough maneuvers to do well, tougher to score well on, and even tougher to judge well. The main reason for this is simply that the maneuver is composed of so many elements. From the obligatory straight and level entry, you must perform a 5/8 loop to a 45 degree inverted down line, a half roll at line mid-point (centered on the judges) to a 45 degree down line, a 3/4 loop to another 45 degree inverted down line, another half roll (centered on the mid-point of the second line and the first half roll and the judges) to the final 45 degree down line, and finally a 1/8 loop to a straight and level exit. This comes to a total of eleven different elements. The thing takes a long time to do and is full of more easy places to make a mistake than the bad





(Top left) The winning "pattern plane" (!) at the Northwest Model Expo at Puyallup, Washington, was this 1/4-scale Cap 20L by Harold Leninger. Obviously a beautifully built ship, but not pattern legal, of course. (Top right) Model Dynamics' Kevin Burner shows off the JR PCM-10 (left) and the new JR X-347 computer radio at the N.W. Expo. (Bottom Left) Richard Verrano with the Futaba 9VAP (left) and the new "Super Seven" 7UAPS PCM 1024 radio for pattern fliers on a budget. (Bottom right) A blast from the past. Remember Maxey Hester's Komet? This example, by an unidentified builder, was entered in Sport Monoplane at Puyallup.

side of a big city on Saturday night. You have the airplane whizzing around up there right in front of the judges the whole time, and each one of them has only ten points to give you, or ten to take away!

While it isn't exactly easy to do under any conditions, the Cuban can be especially devilish in the wind. As the maneuver appears in the Sportsman and Advanced classes, it differs from other looping maneuvers in that it has a downwind instead of an upwind orientation. In a significant amount of breeze, this can be a problem. As always, the maneuver is wind corrected, that is, the aircraft is flown in such a way as to allow for the influence of the wind on the track of the aircraft. The geometry of the maneuver must remain unaffected; the loops must be round, the intersect point or "cross" still centered, etc. In other words, you have to make it look to the judges like it ain't windy up there, and if you can, make it look easy.

With, say, a 15 mph tailwind, the aircraft is obviously going to take a bit more elevator for a round loop than it will if headed into a 15 mph wind. The downwind 45 degree descent will have to be flown a bit steeper in attitude to allow for drift and the upwind line flown at a more shallow fuselage angle. The line must be 45 degrees to the horizon, and the aircraft attitude should be anything it takes to achieve that objective.

While the throttle is usually retarded during the descents and rolls, given a strong enough breeze, you might have to fly upwind descents at partial to full throttle. With a crosswind component, you might have to do everything described above and also hold rudder into the wind. The point is, this one maneuver can teach you a heckuva lot about properly flying an airplane. Respect it and practice it often under as many different conditions as you can

Common errors to watch for are flattening the bottoms of the loops, over or under pulling the 45 degree descents, habitually rolling late or early, making the second loop larger than the first, and consistently performing the whole maneuver off center.

Expect to make errors. This maneuver appears on the schedule of two classes in a row because it's difficult to do well. At one time, the Cuban Eight appeared on the Sportsman, Advanced, Expert, and Master schedules! Try to guard against making the same error so many times consecutively that you end up practicing the error. Get your coach or another pilot to critique you, and listen. You can't see the forest while you are practicing the trees.

Rolls come easy for some people and hard for others, and it doesn't seem to correlate much with smoothness or skill with other maneuvers. I believe the folks who have a hard time don't think upside down very well. For some reason, when the aircraft goes on its back, their minds select either the OFF or PANIC modes, and their thumbs are left to struggle through the thing alone. The cure is to keep your mind in the cockpit and realize that the aircraft flat doesn't care if it's upside down or not.

Watch the wings and the fuselage angle relative to the horizon while you roll, and coordinate the elevator input to hold the heading and the horizontal line. All planes need elevator input to hold a line through consecutive rolls. Some need more, some need less. Some folks like to just provide a quick shot of down elevator when the aircraft comes inverted. Other folks use both down and up elevator as the plane switches sides from upright to inverted and back again, in kind of a rowing motion. I have seen good results using both methods, so do whatever feels comfortable. For the three Horizontal rolls, the roll rate should be set to give three rolls in four or five seconds. In the AMA classes, I recommend doing this with the low rate switch, because it is much easier to keep a constant roll rate with the stick over against the stop. Rolling to the right usually works better for most people, but if rolling to the left works better for you, do it.

Aileron differential (more up than down) should be whatever your particular aircraft takes to achieve a nice axial roll horizontally. Sometimes, with some aircraft, this will be a little different setting (usually less) than what works perfectly for vertical rolls. To check your differential for horizontal rolls, do some half reverse Cuban eight turnarounds. (Note: This is the common pattern "Split-S." Pull to a 45 degree up line, half roll, continue the line, and 5/8 loop to level flight.) If the tail of the plane yaws in the same direction as the roll, increase differential. If the tail yaws in the opposite direction, decrease differential.

Generally speaking, the further to the rear your CG is located on a given design, the better that airplane will roll, and the less

(Top left) NSRCA District 3 Champions for 1990, top row (from left): Paul Verger, FAI; Tony Stillman, Masters; J.W. Smith, Expert T/A. Bottom row: Brian Austein, Novice; Wendell Dietz, Sportsman; Ron Segura, Advanced. Congratulations to all! (Top Right) The "Partial Eclipse" as created by Paul Verger features an Eclipse fuselage with a dorsal fin added, and a new 840 sq. in. wing with 12% root and 8.8% tip airfoils. The result, Paul reports, is a ship with better lateral stability and improved knife-edge performance. (Bottom Left) Roy and Dorothy Speights with Roy's new "break apart" Conquest 120. Everything breaks down and unplugs, and the entire model can be packed into a regular size suitcase! (Bottom Right) This is how the fuselage separates on Roy Speights' Conquest 120. With the ship assembled, the parting line is barely visible.

elevator will be needed to maintain altitude. Be careful. Like with chocolate, fine spirits, and fast cars, it's very easy to go too far.

The center point of the three Horizontal Rolls maneuver is the inverted portion of the second roll. Common faults in the three rolls are performing the maneuver off center, gallops in elevation, improper altitude (I like to center the maneuver in the bottom half of the aerobatic frame. Too high scores very low. Too low is dangerous and shows every fault in elevation), changes in heading or roll rate, and crashing. The latter is a very grievous fault, since you not only get a zero for the maneuver, you get to go home early and build a new airplane.

I'm going to go on and cover Straight Inverted Flight, although it really isn't a rolling maneuver. As far as I'm concerned, it really isn't a maneuver at all. It's more like an exercise, similar to piano scales. It does help to think of it as a two-point roll. The center point is the mid-point of the inverted portion, and the rules are simple. Roll in on a line, roll out on a line, and fly a line in the middle. It looks better and usually scores higher to roll in and out slowly and gracefully. Fast or slow, make darn sure the roll rate is the same on both ends. This is one of the easiest spots in the Sportsman pattern to steal points. The flip side is that the thing is so easy to do right that a judge will usually zing you in total disgust if you mess it up.

So where are we now? We've looked at lines, entries and exits, flying straight and hopefully level, stall turns, loops, rolls, Cubans, Immelmanns, and inverted flight. This just about covers the "building blocks" of pattern flying, with the exception of snaps and spins, which will have to be a future subject. All of the more advanced maneuvers are merely combinations of the above. Think of it all as a giant pizza menu in the sky. ("Yessir. You want half rolls on that square loop? How about a couple vertical lines with a half roll and a half loop in the middle? We call it the Humpty Bump Special...") The Aresti Catalog of aerobatic maneuvers used by the I.A.C. and the I.M.A.C. people is actually set up that way, with "K factor" degree of difficulty values assigned to the elements which make up maneuvers, rather than to the maneuvers themselves.

If you get a decent grip on the basics we've covered, you'll be able to call yourself an aerobatic pilot without blushing, and winning at the Sportsman level won't be a problem. Unless, of course, your opponent reads this column too. In that case, you may have to resort to drastic measures, like increasing your practice time. More important than winning, you'll be in good shape to move on to the more complicated stuff. After awhile, you'll stop being intimidated by impressive lists of strange maneuvers, because as you read down them, all you will see are combinations of the old friends you have practiced before.

• • •

Now let's talk about goodies. I recently returned from the Northwest Model Exposition at Puyallup (pew-ALL-up), Washington. Over the last eight years or so, this has grown up to be a pretty decent "major" show, with a good many of the bigger (and smaller!) manufacturers in attendance, hordes of roving modelers, lots of beautiful airplanes, a swap meet that would turn a Turkish bazaar green with envy, and demonstrations of cars, helis, and this year, electric airplanes!

The pattern plane turnout in the exhibition portion of the show was disappointing . . . no entries! The show comes early in the year, and nobody had a finished project, I guess. Actually, somebody did enter the category . . . a fellow named Harold Leninger won the thing with a 1/4-scale Cap 20L. Nice bird, even if it wasn't exactly a pattern airplane.

Kevin Burner of Hobby Dynamics (JR) and Richie Verrano of Futaba showed off the latest in computerized pattern radios. Almost all of us are familiar with the "lab standard" JR PCM-10 and the Futaba 9VAP systems by this time, but both Kevin and Richard had new seven-channel rigs for the pattern pilot.

New from JR is the X-347 PCM computer radio, and Futaba's newest offering is the 7UAPS PCM 1024 radio, dubbed the "Super Seven." Both are priced almost 300 bucks less than the top line systems in their respective lines, but both have just about everything you really need to do an excellent job in the pattern wars, including programmable mixing, dual rates, exponential, field changeable RF packs for frequency switching, snap roll switches, timers, four model memory, and four standard servos. The last feature represents just about the only item with either system that one might wish to upgrade for serious pattern flying. Both radios offer many different features beyond what I've outlined here, so go check

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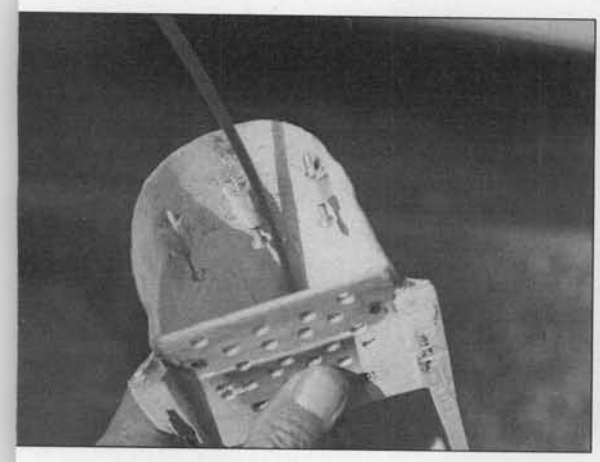

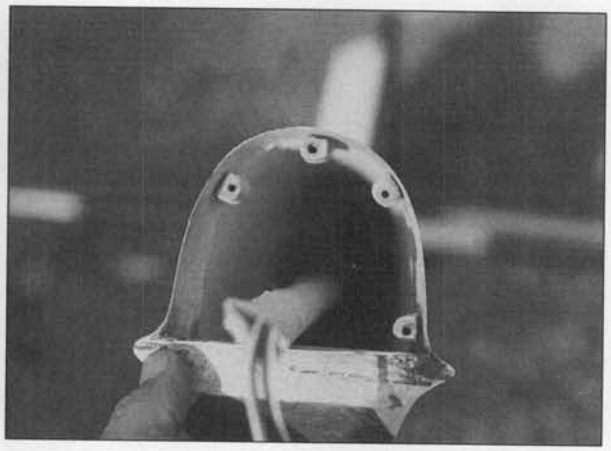

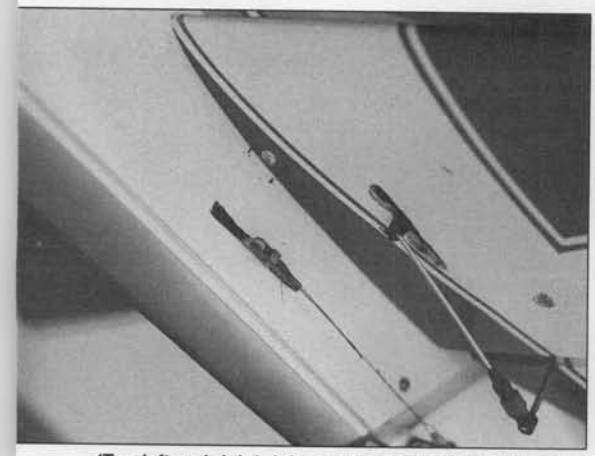

(Top left and right) Joiner details on the front (left) and rear halves of Roy's Conquest 120. With the rudder and elevator servos mounted in the tail, there are no pushrods to connect each time he goes out to fly. (Bottom left) Close-up of the tail surface control hook-ups on Speights' Conquest 120. (Bottom right) Bolly props and pipes being handled by Aero Products of Snellville, Georgia. From left: EQ 45 CF tuned pipe, 12x12 CF prop, 12x11 QT (quiet tip) prop, 12x10 glass prop, 12x10 CF prop, and EQ 60 CF pipe. More in text.

COUNTER *Continued from page 7*

Old Timer Model Supply, P.O. Box 7334, Van Nuys, CA 91409, is a mail order hobby shop specializing in rubber powered model goodies like those that were found in the hobby shops of the 1930's.

Among the items offered, which some of our readers may recognize, are: graded balsa, real Japanese tissue, balsa wheels, sawed prop blanks, prop hardware, winders, stooges, Hinoki wood, colored nitrate dope, bamboo, and rubber strip. There's also a selection of books on Oldtimer and Nostalgia modeling.

Several hundred plans are also stocked for sport, contest, and scale ships that were designed or kitted during the Golden Age of modeling from the 1920's up to WW II. The most fun is testing your skill at identifying the many beautiful Otto Kuhni sketches of models for which plans are available. They're scattered through the 15-page catalog, and you can check 'em against the plan number shown next to each one. The illustrated catalog is $2.00, postpaid.

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Tran-Sil Products, Inc., 200 South Orchard Drive, North Salt Lake City, UT 84054, phone (801) 298-7254, manufacturers of electronic spark-ignition modules, now offers updated units. The update features include increased spark voltage to overcome possible plug fouling, and adding, under license permission, a right-angle version of the McDaniel RC Head-Lock(TM) stainless steel plug connector and shield. Use of the Head-Lock plug connector minimizes accidental plug disconnects, and the complete cable and plug shielding assures quiet, noise-free radio operation.

The Silent Spark ignition features an adjustable mechanical Throttle-Coupled-Timing-Advance that is said to assure optimum programmed timing throughout the entire throttle range to compensate for changes in prop size, fuel mix, and field altitude. Units are available in kit form or custom installed. Ignition modules are packaged in a gold anodized, hard drawn aluminum shielding case.

All models are diode protected against accidental reverse battery connection, and Silent Spark continues to be the exclusive user of the Echo spark coil because of its reliable, zero-failure rate. Modules are available for two and four-cycle engine models and sizes. Timing kits available for all popular O.S., Enya, Saito, and Super Tigre engines. Send a dollar for literature and prices, and be sure to tell Al you read about it here in *Model Builder.*

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Hitec R/C USA, 9419 Abraham Way, Santee, CA 92071-2854, phone (619) 449-1112, Fax (619) 449-1002, has announced the release of its new Focus Series radio systems. There are five systems altogether, available for RC aircraft; a six-channel, a four-channel standard, a four-channel electric, a four-channel glider, and a five-channel helicopter. The Focus systems include the latest SMT design and component technology, to assure the modeler of a top quality, yet affordable system.

Exclusive features of the Focus series include the popular RCD Platinum receiver, high quality precision gimbals with adjustable stick length and tension, Sanyo nickel-cadmium airborne pack, and an ergonomically-designed transmitter case for fatigue/error-free operation. All systems are AMA listed 1991 FM, dual conversion and RCMA gold-stickered.

The Focus 6 features end-point adjustment for throttle; ATV (Adjustable Travel Volume . . amount of throw) for aileron, elevator, and rudder; trainer cable capability;advanced four-pot stick assembly; and fully proportional six-channel control, ie, flap control is fully trimmable rather than up or down only.

The Focus Heli 5 (six-channel) features exclusive helicopter controls; hovering throttle control, ATV for aileron and elevator, revolution up/down rate control, and Channel 5 gyro switch.

The Focus 4 Standard offers ATV on all four channels (aileron, elevator, throttle, and rudder), trainer cable capability, four servos, and is also available with the Micro receiver.

The Focus 4E (for electric) includes ATV on all four channels, trainer cable capability, Micro 535 receiver, two Micro servos, and a 1003 electronic on/off switch.

The Focus 4G (for gliders) includes two Micro servos, the Micro 535 receiver, trainer capability, and a 270 mAH airborne pack.

Another handy little doodad from Hitec is called the "Jam Check'r." This little unit plugs in between the battery and receiver. When a servo is plugged into the receiver and moved to its max throws with linkages connected, the Jam Check'r detects and alerts you to jam-ups through three LED's: A red light says there's a major jam, a yellow light cautions you that there is some drag in the system that will quickly drain batteries, and a green light means everything is OK. When all the lights go out, you have achieved the smoothest setup possible. For only $14.95, this is cheap insurance against possible trouble, and every field box should have one!

For more information on the Focus Series radios, and all other Hitec radio gear, contact Dave Abbe at the above address or phone.

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Sandy Berk, of Unival Corporation, 498 Nepperhan Ave., Yonkers, NY 10701, phone (914) 969-6922, was completely taken by surprise at the reception his products received at his first ever model trade show appearance. By the time he had finished a busy weekend at the WRAMS show in White Plains, New York, February 22, 23, and 24, Sandy knew he had a winner for the hobbyist who builds and repairs his own models.

Nothing we've said so far, including the name of the company, gives a hint as to the identification of the product line; a series of solder pastes that will handle most any kind of metal-to-metal joint in a manner that can be accomplished by any novice. The metal bearing pastes (silver, aluminum, copper, and pot metal) are each supplied in handy, no-mess, no-waste syringes. The paste is simply applied to the joint, and is then heated to its low melting point using a match or "cancer stick" lighter, leaving a solid joint of metal that closely matches the metal being joined. Simple as that!

Probably the best way to introduce your-

continued on page 35

PLUG SPARKS

BY JOHN POND

THIS YEAR'S FIRST MAJOR CONTEST

This columnist always likes to cover the first major contest of the year, the Southwestern Regionals, annually held during the first or second month in the Phoenix, Arizona, area. Originally known as the "Buckeye Regionals" when staged near the town of Buckeye, it has in recent years been held in Eloy, Arizona.

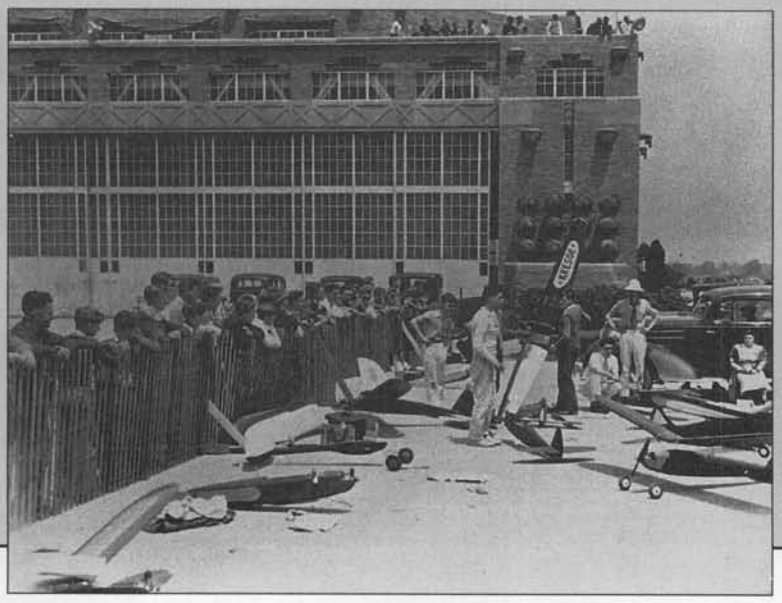
Reports of the meet were extremely sparse, but we did pick up a free flight report from the SAM 56 (Kansas) boys who attended the 41st annual event in January. In free flight, both AMA and O.T. events were held. Weather was actually good despite a poor start with cold and windy conditions on Saturday. Finally, the wind switched and the contestants thoroughly enjoyed themselves.

Dan Smith and Jim Kutkuhn reported Monday was the best of all, as the RC boys stayed an extra day to fly O.T. RC glider. Speaking of which, Gerald Martin of Here-

Very pretty scaled-up (to 100-inch span) Jasco "Thermic" took first place in the O.T. RC Glider event for Texas flier Gerald Martin, at the 1991 Southwestern Regionals held at Eloy, Arizona.

Scorpion Major, an early 1935-36 design by Danner Bunch, has won plenty of prizes for Eut Tileston in the RC L.E.R. events.

Elfin diesel-powered Lanzo RC-1 is Ken Kullman's choice for the RC Class A Ignition event.



A classic shot of the Kresge Club at the 1936 Detroit Nationals. See text for identification.

ford, Texas sent in the photo featuring his Jasco Thermic 100 with the enclosed fuselage type taken from the Thermic 50.

Inasmuch as Eut Tileston attends the SW Regionals quite faithfully, we would be remiss if we didn't run the photo showing his Bunch Scorpion Major. Eut is an excellent craftsman and the worst part of all (from his competitors' standpoint) is that his models perform exceedingly well.

We have been missing Ken Kullman at the various meets due to his retirement and a two-year period of traveling the United States, but one of this month's photos shows Ken with his all red Class A version of the Lanzo RC-1. No question about it, his association with Tileston has resulted in more than one win at the various meets. Although Ken is still traveling extensively, he seems to schedule his trips to catch the major meets like the SAM Champs at Lawrenceville. Once a modeler, always a modeler!

Speaking of modelers who like to fly year-round, one of this month's photos depicts George Stephenson, originally from Newcastle-Upon-Tyne, England, with his Lanzo Duplex. George, a retired architect and very neat builder, now lives in Carmichael, California.

MG REVISITED

Ever since this author saw the photo of the Kresge Club Fliers in the February 1937 issue of *Popular Aviation*, he was thoroughly entranced by the MG (unknown at that time). Thinking the model was a Ben Shereshaw design, this writer waited patiently for it to appear in one of the *Flying Aces* issues between 1937 and 1939.

At that time, Shereshaw was responsible for many of the designs seen in the photo, to wit (left to right): unknown cabin, Cumulus, Gerstenmeier (most advanced design award), high dihedral model (Gerstenmeier), Walt Dickinson, Ben Shereshaw, Mike Granieri (completely shaded by Shereshaw), Cavalier (on ground), Charley Kinney with XP-1; two viewers, Castle and Stander (kneeling) with unnamed cabin; Mrs. Dickinson and brother, Nimbus, and finally, Granieri's MG. Note the unnamed cabin features the engine mounted above the wing. This most interesting photo shows probably the largest collection of big models at the Wayne County Airport Nationals, in 1936. Needless to say, the display drew a tremendous amount of spectators and modelers.

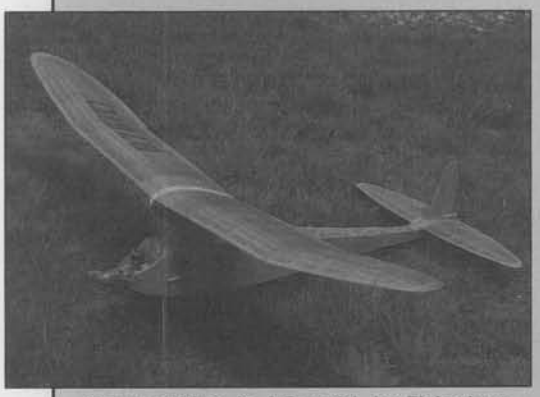
The MG design first came to light when Howard and Randy Carman, then located in Hightstown, New Jersey, organized the SPOT (Society for the Preservation of Old Timers) club, SAM Chapter 15. Mike Granieri subsequently became interested in Old Timers and joined up. Upon his statement that he still had his old MG model in the attic, immediate efforts were made to restore the model while Mike drew up a set of plans.

This model has turned out to be one of the most popular models on the East Coast for the Antique and Texaco events. The performance of the model has more than justified its worth. One interesting fact that came to light in Granieri's letter is that the cabin version of the MG was built first in 1934, when Granieri was only at the tender age of 14. The parent version placed fourth at Detroit with a flight of 26:40.

Granieri has maintained his interest in Old Timers since joining the SPOT club. He

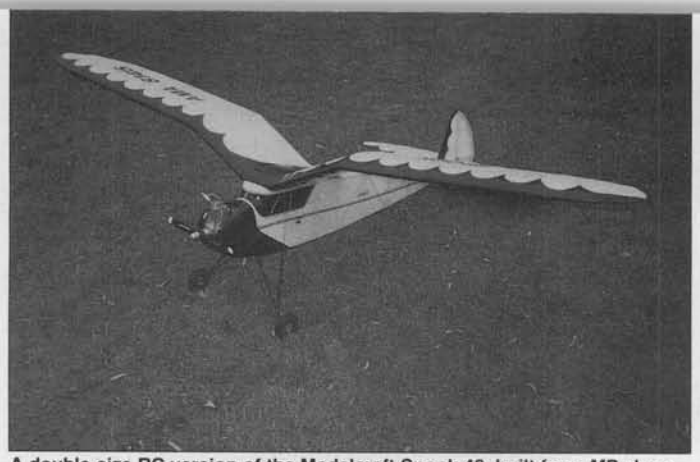
Americanized Englishman, George Stephenson, who enjoys the year-round flying in California, is seen here with a Lanzo Duplex Cabin.

Here's a rare one: a DeBolt "Blitzkrieg" built for RC and flown very successfully at Lawrenceville by L.A. Johnston of Keller, Texas.

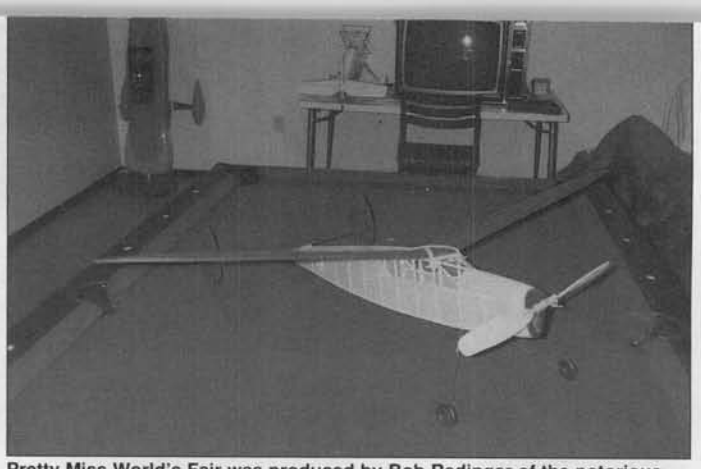


To get a 500 sq. in. A-B model, Joe Elgin chose to scale *up* the Baby Playboy rather than scale *down* the Playboy Sr.; text tells why.

Our columnist is really pushing the idea of RC Nostalgia. Seen here is Ron St. Jean with his famous "Ramrod" design.



A double-size RC version of the Modelcraft Spook 48, built from *MB* plans by George Fleck of Ohio. All those scallops were done by hand *without* masking tape.



Pretty Miss World's Fair was produced by Bob Redinger of the notorious SAM 39 gang. Kits for this model are available from A-J Free Flight Service in California; see text for address.

is presently serving as Eastern SAM vice-president. Mike and wife, Dorothy, have been responsible for running the RC desk at the Champs held at Lawrenceville and Westover AFB, plus numerous other meets. Such dedication is not lost on the membership.

HURRICANE REVIEWED

In reviewing the Fresno Gas Model Club newsletter, this writer noticed the announcement that A-J Free Flight Service is now marketing the old Advanced Engineering "Hurricane" as designed and flown by Artie Armstrong of Fresno, California, back in the early forties.

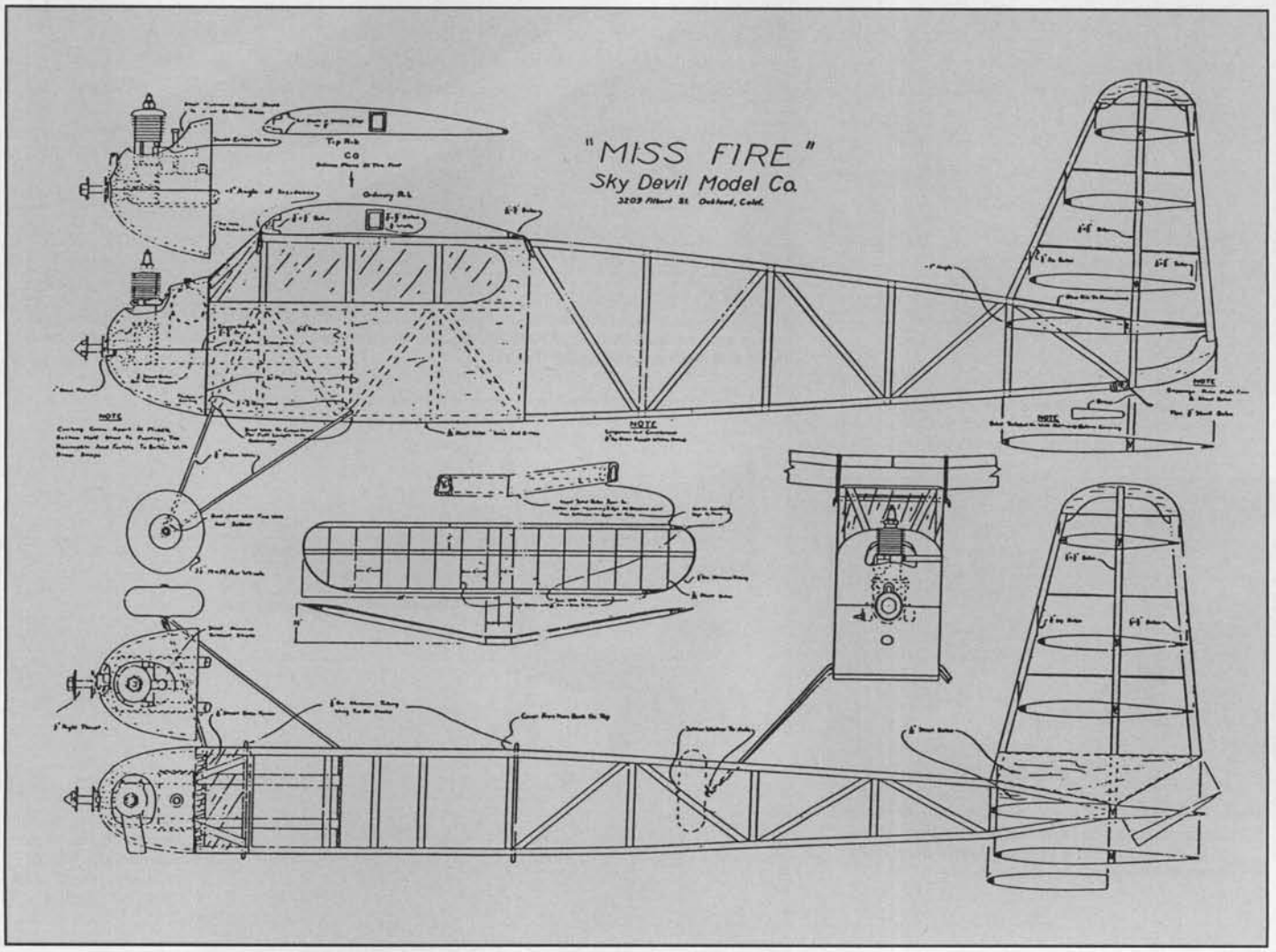
The design is an unabashed take-off on the Comet Sailplane, with the center panel of the wing reduced to 3-1/2 inches in width. The fuselage is much simpler, a circular section built on a crutch. The original model was powered by an Ohlsson 60 Custom. After the war, this writer used a McCoy 49. A-J's Russ James, in a telephone conversation, gave the following figures on the new items they are now producing:

Hurricane 69	$49.95	(O.T.)
Vanguard	$49.95	(O.T.)
SWAT 440 (A-B)	$34.95	(Nostalgia)
SWAT 600 (C)	$34.95	(Nostalgia)
SWAT 750 (D)	$34.95	(Nostalgia)
All American Sr.	$38.95	(Control Line)
Barnstormer	$38.95	(Control Line)

If you are interested in more stock items, send a dollar to Russ James, A-J F/F Service, 4840 E. Leisure Avenue, Fresno, CA 93727. Better yet, call (209) 255-2422.

TO BE OR NOT TO BE

Hamlet's soliloquy seems to be most appropriate when addressing the problem presented by L.A. Johnston of Keller, Texas, wherein he submits a photo of his latest creation, a Harold DeBolt "Blitzkrieg." Al-



though the model has been submitted to the SAM Historian for approval, no one seems to be sure if the model is "to be" an Antique, or "to be" more likely (in this writer's opinion) an Old Timer.

This is based on an extensive search through years of *Model Airplane News* editions. Found on page 27, July 1941, is the photo showing Hal DeBolt's "Blitzkrieg" taking off with Ohlsson 23 power. This excellent action shot was taken at the Second Allegheny Mountain Area Competition held at the Pittsburgh-Butler Airport. This meet was sponsored by the Aero Club and Boys Club of Pittsburgh and attracted many famous figures in model aviation.

The onset of WW II ruined many a promising annual meet and this one was no exception. Model aviation really took a beating for four years!

ENGINE OF THE MONTH

We are again indebted to Bob McClelland, MECA secretary-treasurer, for the use of this month's subject, the early 1937 Chunn. In addition, the marvelous article by John Krickel that appeared in an early *Model Engine Collectors Journal* was an invaluable source of information.

First off, it should be recognized that Bob Chunn was not a machinist by trade, but earned his living as a barber! Chunn was blessed with that special aptitude for special complex engines, among them the full-size Cord engines, the "hot car" of its day.

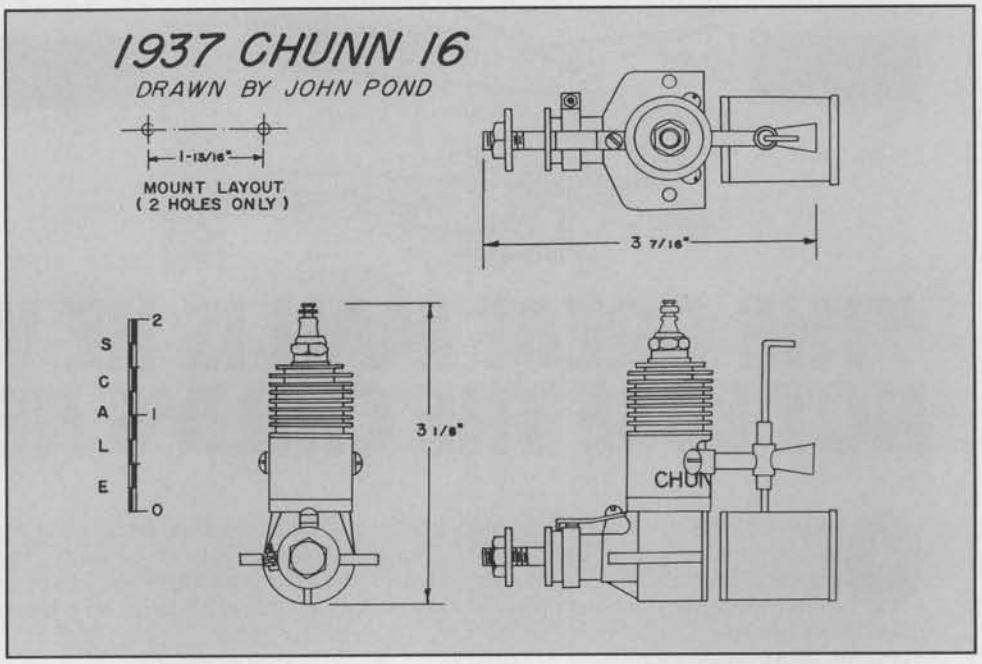
Bob started off rather conservatively, building a Fokker D-8 powered by a Brown Jr. However, even in those days, large models were expensive and large fields hard to find. Upon acquiring an Elf engine, Chunn immediately set to work to produce his own engine based on the famous craftsmanship of Dan Calkins of Elf fame.

Naturally, Bob Chunn would not be satisfied to copy someone else's work, and started to produce his own small size engine. Actual production began in 1936, utilizing the back room of his barber shop! That's really starting from scratch.

The year 1937 saw the incorporation of Chunn Engines, with space over his barber shop being utilized for production. Nearest estimates place about ten employees utilizing three lathes, one turret lathe, milling attachments, and several drill presses. All parts required excellent finishes and close tolerances. Chunn devised a series of jigs and fixtures to assure uniform manufacture and interchangeability of parts. No mean trick in those days!

The Chunn engine first attracted national attention when advertised in the September 1937 issue of *Model Airplane News*. Berkeley Models also carried a photo ad of the Chunn engine selling at the price of $17.50. Regular production was announced.

The 1937 Chunn engine incorporates several features found in other engines. The successful Baby Cyclone Model B featured a fixed timer; this was adopted by Bob Chunn as this did simplify engine starting and running. The tank resembles the Brown Jr. in that it is not bolted to the engine.



Another feature similar to the Brown is that the cylinder assembly screws into the crankcase. Again like the Brown, the engine was mounted on a hardwood running stand which could be used for shipment or direct mounting in the airplane.

This engine, weighing 3-1/2 ounces, had a bore and stroke of 5/8 inch by 17/32 inch respectively, giving a displacement of .163 cu. in. Rated hp was 1/10. These sizes were maintained in subsequent models, however, it should be noted that Bob Chunn was fascinated by small engines, producing several of 1/2-inch bore. His greatest feat was the production of a 5/16-inch bore x 1/4-inch stroke spark ignition engine. The .019 cu. in. engine was demonstrated and flown at the 1937 Mississippi Valley Champs at St. Louis. Despite its success, the engine was deemed impractical for mass production. With the right kind of precision centerless grinding equipment, Chunn could have been the first Leroy Cox!

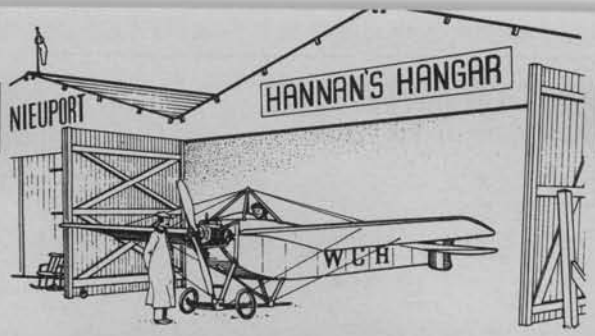
50 YEARS AGO, I WAS . . .

I was there when Winnie Davis flew his "Big Gull" at the 1938 National Championships. Keith Dentel of Falls Church, Virginia, observes that the November issue of *Model Builder* brought back the memories of this model:

"Winnie was starting the design (late 1936) about the same time as I was putting the finishing touches to my first own design gas model, an eight-foot wingspan powered with one of the first Ohlsson engines. I ran the new engine for him. He was impressed and planned to order the Ohlsson Miniature.

continued on page 80

A Scotty Murray "Answer" under construction by SAM 39's Bucky Walter. The kitted version of this ship (by Bay Ridge) was known as the "Topper."



BY BILL HANNAN

"THE GREAT MAN IS HE WHO DOES NOT LOSE THE CHILD'S HEART"

Our lead-in line this month, by Chinese Confucian philosopher Mencius (372-289 B.C.?) was shared with us by Texas model builder/philosopher Dick Johnson. Certainly many modelers gained enthusiasm for airplanes as children, which has motivated them for a lifetime.

Marvin Kincaid, of Columbus, Ohio, built a Comet ten-cent stick-and-tissue model when he was a youngster, and never forgot it. Employing his dad's razor blades and his mother's sewing pins, Marv eagerly commenced construction. Alas, production was halted when he found out the glue in the small glass vial was dried up. He bicycled back to the five-and-dime store and bought a five-cent tube of model airplane cement, noting that he "already had a 50 percent cost overrun."

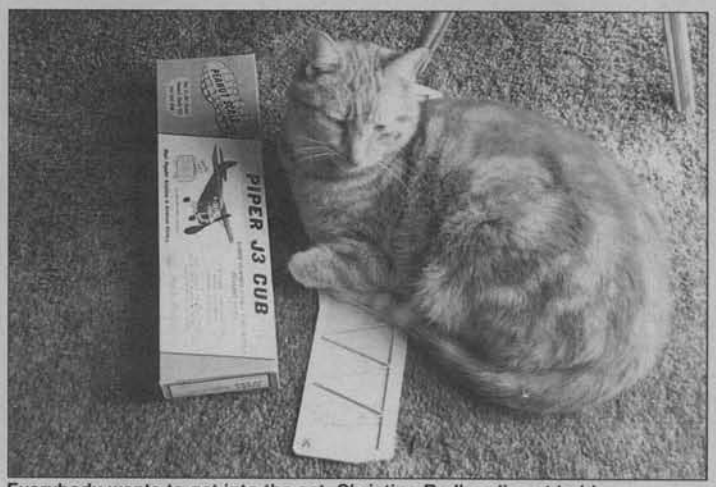
Famed Earl Stahl launches a Stahl "Hurricane" constructed by Bud Carson. Photo by Tom Schmitt.

However, in addition to learning how to build a model, Marv was also absorbing aviation history, and finding that a Puss Moth piloted by Jim Mollison had been flown westward across the Atlantic during 1932.

Several other truths about model aircraft emerged:

"They were expensive, they were slow abuilding, and they took away time for other things like baseball and swimming in the creek. With only time out for eating, sleeping and delivering newspapers, I spent two days and one night building a Puss Moth. From the kit box cocoon it emerged, its metamorphosis complete, a beautiful miniature airplane, green and white, 16 inches from wing tip to wing tip. I cut the registration letters from the plan and glued them to the wings . . . G-ABXY.

"Would it fly? It looked ready to take off sitting on the tarmac of my bedroom table. It was as light as a marshmallow. I checked its balance according to the plan, picking it up by the wing tips; it was tail heavy. A half-dozen lead pellets glued to the nose block made it balance correctly. As I moved the plane to the flight test section of our backyard, a crowd gathered: my brother, sister, and two neighborhood kids. I told them to stand back as I wound up the rubber-band motor. The moment of truth had come. I wished I didn't have an audience. With a gentle shove, I launched the Puss Moth and held my breath . . .



Everybody wants to get into the act. Christine Redhead's cat holds up progress in England.

"Glory of glories, it flew! Slow and steady, the little bird crossed the grass of our yard just as Jim Mollison had crossed the Atlantic waters. Over the sidewalk at the edge of the yard the rubber-band ran down, and my airplane began its landing approach from three feet up. It glided gently onto the street and rolled to a stop. I let out my breath. The retrieval team ran to bring back my creation. In that moment I was infected with the flying disease. I have never recovered."

Although Marv's Puss Moth had a short life, he moved on to 25-cent kits and even one 50-center, but, he explained: "Whether bigger or better fliers, none ever gave me the elation and joy of that first flight."

Many years passed, and during 1986, Marv visited England. There he met Mike Vaisey, owner of a full-size de Havilland Gipsy Moth, cousin to the Puss Moth, and was thrilled to be offered a ride in it:

"Was I dreaming? How could I really be floating here, looking past the white fabric wings at that quiet village below us? I waited for us to turn and head back to Henlow, but Mike held a steady course. The fields below us were like a painting, laid out in intricate shapes, yellow and green and tan. After ten or fifteen minutes of this ecstasy, I looked down and saw a flying field with two grass strips lined with biplanes. Could this be Old Warden? Was Mike flying me to Shuttleworth? This could only be a dream.

"When we landed and taxied up to the parking area, spectators behind the fence snapped pictures of us, as if we had just flown in from the past generation. As my new English friend led me along the flightline of old biplanes, I felt again like a visitor to the past, that this grassy field was a Brigadoon of flying, to disappear after today into its sleeping ever more.

"We walked down the line of old planes I had only read about: SE5a, Sopwith, Avro 504K, Bristol Fighter. At the far end, I stopped.

I sighed. My skin tingled. There, sitting alone, expectantly, was a beautiful blue de Havilland Puss Moth.

"Mike was at my shoulder. I heard him say, `Come on, let's take her up,' as we walked toward the Puss Moth. We were flying again, Mike in the front, peering right and left looking for traffic. I sat in the back seat trying to absorb all that was happening; the sound of the engine, seeing the structure inside the plane, looking down at the Shuttleworth mansion. I wanted to remember it all. I had waited so long and come so far...

"I reached overhead and stroked the steel tubing bracings. This was a real Puss Moth I was flying in. I shut my eyes.Was it really? Or was I a tiny, Tom Thumb character riding in that 16-inch Puss Moth on its backyard flight? Or an invisible passenger looking over the shoulder of Jim Mollison during those long hours over the Atlantic in G-ABXY?

"My reverie ended as we touched down, taxied in and Mike shut down the engine. As I got out and walked away from this dream machine, I turned and looked back at her. I could almost hear her speak to me, `Goodbye, Marv, I'm glad we met.' `Yes,' I whispered, `so am I.'"

Condensed from the *Shuttleworth Prop-Swing,* Ian Harwood, Editor.

GOOD OLD DAYS KITS

Those fondly remembered 1930s kits are still available, thanks to Scale Flight Models Company, in reproduction form. Among them are designs formerly produced by Comet, Megow, Peerless, Scientific, Madison and Dallaire. These kits are quite authentic, with contents that include good quality strip and printwood balsa, lightweight tissue, turned hardwood wheels and nose buttons (remember those?), wire propeller shafts, rubber strip, and even old-fashioned semi-carved balsa propellers. (Proprietor Jack Fike explained that those props are made on a machine created by O.G. Corben, of Corben Super-Ace fame!)

These very complete kits are reasonably priced by today's economic standards, with many costing less than ten dollars postpaid. So, for a trip down nostalgia lane, send a stamped, self-addressed envelope for a complete list to: Scale Flight Models Co., 1219 S. Washington St., Bloomington, IN 47401.

SPEAKING OF KIT COMPANIES

One of the oldest, Guillow, is still very much in business, just as it has been for more than 60 years, according to an article by Mike Lemish in the *Atlantic Flyer,* sent to us by Mark Fineman. Paul K. Guillow, the company founder, had been a WW I aviator, and he ventured into business with a "Lucky Lindy" card game, shortly after Lindbergh's trans-Atlantic flight. Unfortunately, the idea was soon imitated by a much larger, more successful manufacturer. Thus, Paul Guillow turned to some other products, balsa wood model airplane kits, and prospered.

Although Paul passed away in 1951, his wife continued the business, which today employs about 37 people. According to company president Al Smith, some 60% of sales are hand-launched gliders, with millions per year sold. The remaining percentage is accounted for by scale model kits. One of them, the B-24 Liberator, is said to require 50 to 75 hours of construction time by the customer, most of whom are thought to be males between the ages of 30 and 38. Apart from the cost factor, most youngsters now seem to have very short attention spans, and prefer television. How fortunate that there are exceptions!

George Perryman of Georgia, with one of his "usual unusual" designs, this time a twin-motored Bostonian. See article.

How's this for wing area? George Benson's Peanut Scale Farman "Carte Postale" has novel features, described in the text.

MORE NEW (AND OLD) PRODUCTS

Edward Schlosser, P.O. Box 412, Ridgefield, New Jersey 07657, offers very thin (1/1000 of an inch) tempered alloy metal sheet suitable for model applications. Weighing less than two ounces for 10 square feet, it can be adhered to balsa with a special adhesive. In addition to greatly stiffening the structure, its bright aluminum color can also increase visibility on high-flying models. It may also be scoured or engine-turned for cosmetic purposes. As for the "something old" products, Edward also markets plans for 1939-1947 rubber-powered sport models and a towline glider. Other similar vintage items offered include music wire, machine-cut propellers, ball-bearing thrust washers, split bamboo, sable brushes, etc. A stamped, pre-addressed return envelope will bring you complete information.

HOW'S THAT AGAIN?

Frank Scott noticed a caption in *Sport Aviation* magazine by the builder of a full-size homebuilt. He had been working on the craft for four years, and says he is now "95% done . . . only 45% more to go!" Just as true for scale modelers.

CANARD PROPELLERS?

According to a *New York Times* article sent by Ed Whitten, a newly patented propeller design features small canard surfaces linked to the main blades, and can obtain forward, neutral or reverse thrust while maintaining a constant direction of rotation. The concept is said to have application to boats, aircraft and helicopters.

HOW TRUE

Jack Hereford, of New Haven, Missouri, says: "The projects I **must** work on and the projects I **want** to work on, seem to consume about 1.5 days per day." Amen to that!

BENSON ON BUILDING

The Farman Carte Postale (French for postcard) Peanut shown in one of our photos employed some interesting construction techniques, according to its builder, George Benson, of Mill Valley, California. For example, the cowling was made from molded Kleenex tissue! George's approach was to first make a suitably shaped wooden form, which he covered with stretched polyethylene plastic to serve as a release agent. Next, Kleenex tissue was saturated with a mixture of water and aliphatic resin glue, applied to the form and allowed to dry. A second layer of glue-soaked tissue was next applied and dried. After a light sanding with 400-grit paper to smooth the wrinkles, a third and final layer was applied. The result after drying, trimming and removal from the mold was a lightweight, strong papier-mache cowling.

For the dummy radial engine cylinders, George simply sanded a balsa stick to a round shape and threaded it through a 1/4-20 nut, creating visually effective cooling fins much more easily and uniformly than trying to wrap sewing thread around a dowel.

George also employed a short-cut in notch-

ing the wing ribs, by sandwiching together two fret saw blades with their teeth facing in opposite directions. The resulting hand-held tool cuts equally well pulled or pushed, making slots as narrow as 1/32-inch. For wider slots, simply add the required number of additional blades. There seems to be always more to be learned in this hobby!

SPECKLED BIRD BUILDER

George Perryman, of Georgia, is a well-known competitor in many free flight events. Another of George's preoccupations is naming his models after various sorts of speckled birds. One such critter is featured in one of our photos, named the "Too Timer Speckled Bird," although one might wonder why it isn't "Two Timer" instead. Be that as it may, the twin-prop Bostonian model weighs 14 grams and features a 3-1/4 inch wide lifting body.

Another of George's curious Bostonians is identified as the "Little Fat and Flat Pot-Bellied Peg-Legged Tub-O-Lard Speckled Bird." Or, how about his Cargo Event Speckled Bird, which was named S-CARGO (as in snail). We say **was**, since it flew away during the Nationals and hasn't been seen since. George had borrowed the dummy payload pilot for it and is seeking a replacement, which he thinks was manufactured by some model builder's wife. Anyone know who that lady may be?

George is recovering from recent health problems, and has become doubly appreciative of his friends who have helped him continue his competition flying. His contest log for 1990 indicates completion of 320 official flights!

SOMETHING FISHY?

In the April "Hannan's Hangar," on page 33, a couple of strange errors crept into print: Under the title Hungary, rules are mentioned for COD models. That should have been CO_2 models! In the next column, under ALSO FROM JAPAN, O.O.5 should really have been O.O.S. (Out-Of-Sight) of course. Ah well, nobody's perfeckt!

EVERYBODY'S DOING IT

Even collectors of full-size aircraft maintain interest in models: "The head honcho of Old Rhinebeck Aerodrome hisself, `Black Baron' Cole Palen, showed up to do a little gummy-band flying with some of the models he built." From the Mid-Hudson Model Masters newsletter *Wing Tips*, edited by Scott Smith.

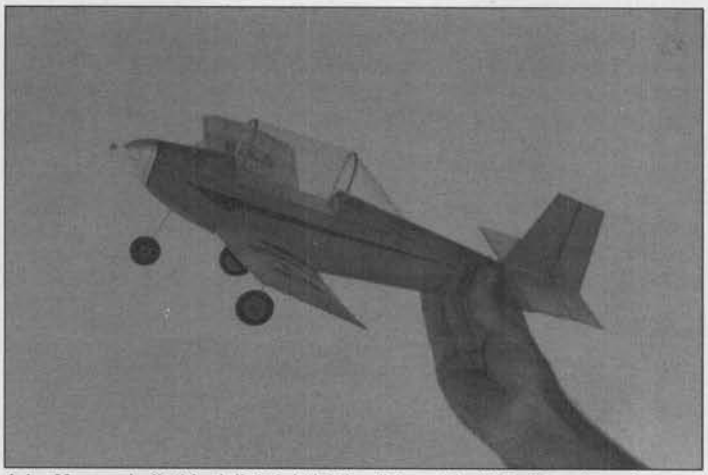
BOB PECK MEMORIAL

Condolence messages have arrived from parts of the U.S., and foreign countries including England, France, Germany and Japan, regarding the passing of Bob Peck, co-owner of Peck-Polymers. In Bob's hometown, San Diego, Fudo Takagi of the Orbiteers model airplane club is creating a Bob Peck Perpetual trophy, to be awarded each year to the top club scale model flier. Fudo suggests that Bob has now joined his good friend, the late Walt Mooney, in the "land of perpetual thermals."

AND IN ARIZONA

The Cactus Squadron of the Flying Aces Club is conducting a postal contest in honor of Walt Mooney, according to Dave Smith. Anyone may enter from now until September 1991 in any or all of three events: 1. Any Walt Mooney designed Peanut; 2. Any Mooney designed Bostonian; 3. Any Mooney designed Peanut which has been enlarged up to double size.

Simply send your flight times and model identification to: Glenna Tarango, FAC Arizona, 10 S. Cooper Road, Chandler, AZ 85225. Entries must be postmarked by September 23, 1991. Prizes in each category will be Golden Age Reproductions kits. While you are writing to Glenna, ask for details of other forthcoming events and how to subscribe to the Cactus Squadron newsletter.



John Meaney built this delightful "Ichiban" from *Model Builder* plans, but gave it to a friend in Bahrain before having a chance to test fly it.

Yoshindo Harada of Japan, with his "old timer" which is powered by an Italian compressed-air motor. Eighty strokes of the air pump yields 40- to 50-second flight durations.

AVIATION IS WHERE YOU FIND IT

Who would expect anything relating to aviation in the "Dear Abby" newspaper column? But there it was, as found by Warren Shipp. One of Abigail Van Buren's readers had wondered if anyone was still around who had personally witnessed Charles Lindbergh's landing in Paris. Response was immediate and plentiful, filling the entire column. Obviously, the charisma of this modest but heroic pilot remains as strong today as it was during 1927.

SPEAKING OF LINDBERGH

Plans for Lindy's specially constructed Menasco-powered Miles Mohawk are now offered by Al Lidberg. This colorful orange and black low-winger has excellent proportions for a rubber-powered model. Of traditional stick-and-tissue construction, the craft spans 35 inches. Accompanied by detailed instructions and proof-of-scale documentation, the crisply-drawn plans are priced at $6 plus 15% postage (domestic) or 25% for air postage to foreign countries, from: A.A. Lidberg, 614 E. Fordham, Tempe, AZ 85283.

MODELS IN THE MEDIA

Gil Coughlin, of Tacoma, Washington, was the subject of a two-page newspaper article in *The News Tribune Soundlife*. Gil, who started modeling at age six, eventually became a professional builder for Boeing, remaining there until his retirement, which enables him to now devote nearly full-time to his hobby. His interests have encompassed nearly everything, including ornithopters, control line, Wakefields, and more recently, Peanuts, profiles and Pistachios.

His home has become a mini-museum for models, and features separate rooms for drafting and an unusually complete machine shop. Reporter Elizabeth Scherman chose a particularly appropriate title for her article about Coughlin, "A Model Citizen." Our thanks to Charlie Glassie, also a Tacoma model builder and architect, for sharing this story.

SIGN-OFF

According to Merv Buckmaster, editor of the Australian magazine *Airborne*, "It is nice to win a scale contest, but it is even nicer just to be there and see the models fly." ***MB***

COUNTER *Continued from page 27*

self to the Solder It(TM) line is to obtain the Soldering Kit (SPK 8). This kit contains one silver bearing solder paste syringe, one copper bearing solder paste syringe, one aluminum solder paste syringe, one pot metal solder paste syringe, a refillable butane pencil torch (2450 degrees), a hands-free torch stand, a reusable vinyl pouch, and complete instructions.

Judging by the reactions of modelers to the demonstrations of this product at the WRAMS show, it will become standard equipment on everyone's workbench. Contact Sandy Berk for further information, and be sure to mention that you read about it in *Model Builder.*

• • •

Bondhus Corporation, of Monticello, Minnesota, announces its new line of T-Handle BALLDRIVER(R) hex tools, both in inch and metric sizes. The inch tools range from 5/32 to 3/8, and the metric tools range from 4mm to 10mm. The blade and handle lengths vary with the tool size; from about 8-1/2 to 11-inch blade length, and from 2 to 5-inch handle length. The welded handles are covered with a cushioned grip for more comfort in use. Check your local tool supplier, or contact Lynn Terese Wood, Bondhus Advertising, 1400 E. Broadway, Monticello, MN 55362, phone (612) 295-2162, Fax (612) 295-4440. ***MB***

ELECTRONICS *Continued from page 8*

(not fly, just DO!) snap rolls, etc., though admittedly I don't fly in competition. And some of the advertised features are about as valid as a used car salesman's claims, such as the nine-channel transmitter capable of being programmed for half a dozen different airplanes but for which it is impossible to buy any additional airborne equipment. However, there are features on some of this class of equipment that we can all use. As anyone who owns one of these systems will tell you, it is a real pleasure to set up a new airplane with electronics that include servo reversing, throw adjustments, idle adjustments, etc., without having to juggle servo and control horn mechanical settings. Do yourself a favor; if you haven't already done so, take a close look at some of these new goodies!

ELECTRICS AND SWITCHES AND SO FORTH is the subject of the next letter from long-silent Dick Henderson in Phoenix. (Good to hear from you again, Dick.) He and I discussed this here in EC some years ago, but it is timely and worth repeating in part.

"I was interested to note your diagrams of the speed control system for a twin hook-up, using a switch and a servo for high and low speed.

"A few years back there was a plan for a plane called the `Pleaser' in the May 1983 *Model Builder* with a wiring diagram that was Hi-Off-Lo as per the enclosed diagram. It uses a servo and a Radio Shack DPDT mini-toggle switch #275-1545, six amp. The system shown used 18-guage wire and for larger motors, larger wire would be recommended.

"I have tested the system with an 05-075 Astro ferrite motor with the six 1200 mAH cells and have tested the Astro 15 ferrite using 14 cells with the 18 gauge wire . . . no problems have ever occurred in all the bench testing I have done and the system works really well. I have not tried a twin setup but I am sure it could be worked out to perform on one servo/switch by wiring the two motors into the system.

"Another interesting thing about the system is that it will charge 12-14 1200 mAH cells with a regular 6-7 cell charger when set on Lo. When the system is installed in the plane the motor should be shut off with the servo, turn the main switch off, then return to Lo with the servo to charge. Main switch remains "Off" during charge.

"I thought you might find this interesting. Everyone I talked to says you cannot run a system when batteries are in parallel, nor can you charge with them in parallel. Wrong, I've never had a bit of trouble with the system . . . never heated up during motor runs nor during charge."

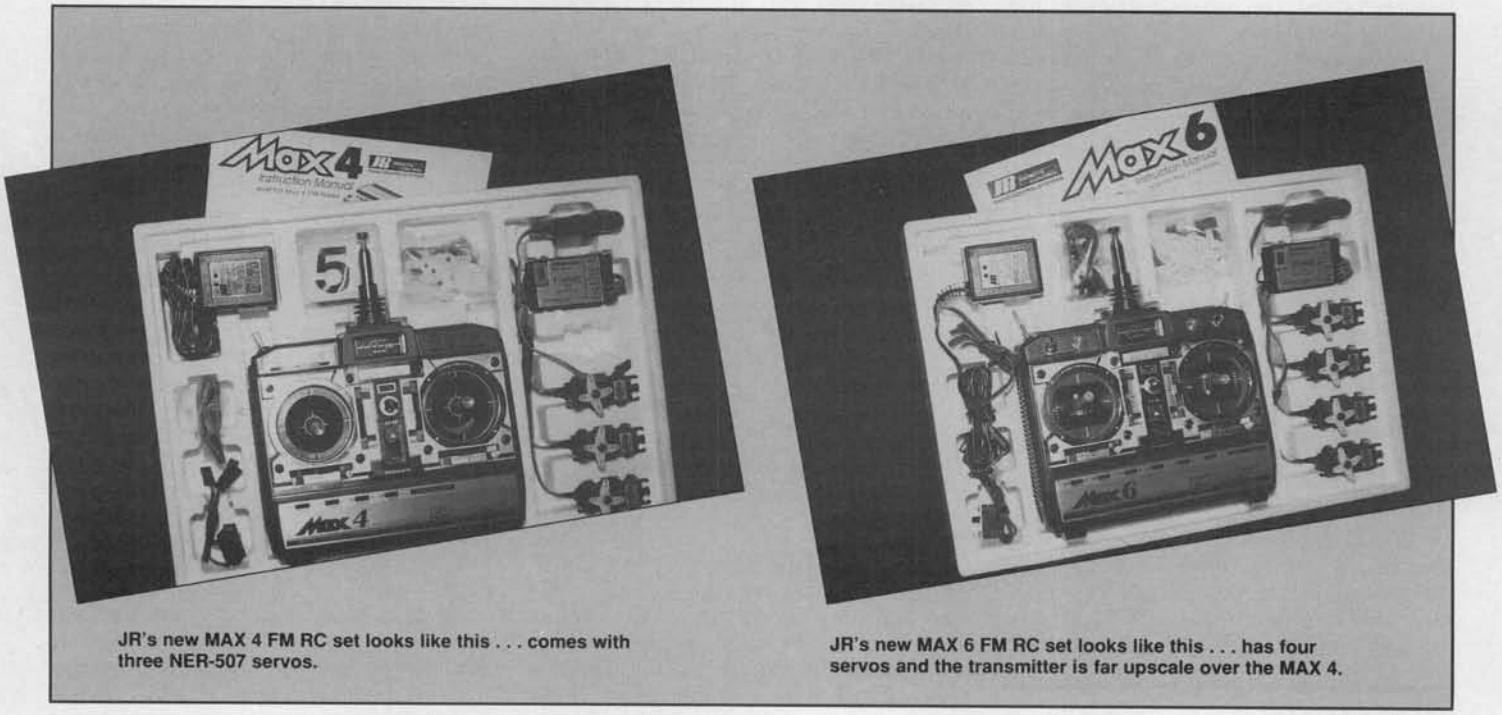
Dick enclosed a greatly expanded drawing of the switching system from what appeared in the original Pleaser article. It would take a full page to do it justice, otherwise reducing the space available to me, so I am asking those who have an interest in such things to send in your SASE for a copy. Even with the (CENSORED) raise in postage, it is a bargain.

Even though I agree, as the saying goes, that "if it works, don't fix it," I feel that Dick's findings require a bit of clarification. First of all, in the size of the wire. Though no currents are mentioned, and the small wire in use might be perfectly capable of handling those that are involved, the fact is that wire has resistance, and the loss incurred by it increases as the current goes up. The direct transformation is that larger no-loss wire will result in higher motor rpm, and since too many electrics can't be considered as exactly overpowered, it helps not to lose any unnecessarily.

Parallel battery charging . . . and discharging . . . will work! But, looking at it strictly from the efficient storing and use of energy, it won't be as efficient as will a single battery. A charger sees a battery as a resistor; parallel batteries are parallel resistors. Unless they are perfectly matched, and few stay matched even if they start off that way, each battery will be charging at a different rate, one high, one low. If we stop charging when the high rate battery is fully charged, the other one did not reach full charge. Conversely, if we charge until the low battery is

continued on page 39

Products I·N U·S·E



JR's new MAX 4 FM RC set looks like this . . . comes with three NER-507 servos.

JR's new MAX 6 FM RC set looks like this . . . has four servos and the transmitter is far upscale over the MAX 4.

JR MAX 4 & JR MAX 6 FM Radios

Distributed by Hobby Dynamics

BY STU RICHMOND

One thing is certain . . . today's new modern 1991 radios are so good, so cost-effective (inexpensive!), and work so well at isolated as well as super-busy RC flying fields that it just doesn't pay to spend a single dime trying to save or upgrade an older RC system.

The five members of the Central Florida RC Think Tank who put these columns together fly far more air/hours than the average model builder does. As a result, the unreliable equipment seems to show up fast. We've all shied away from AM (amplitude modulated) systems and leaned toward FM (frequency modulated) and PCM (pulse code modulated) systems. It appears that the FM systems cost the least to manufacture and the PCM systems seem to cost about a hundred dollars more, on average, since they are based on exotic space-age tiny computers in both the transmitter and receiver. The PCMs are much more versatile for the dollar spent.

When the AMA's busy volunteer Frequency Committee met in Orlando in 1990 they held an "open" meeting for questions and answers . . . most interesting! Representatives from virtually all of the RC system manufacturers were there, and we enjoyed their straightforward, no-nonsense answers to our questions. We asked if FM or PCM was best; that's a question that truly has no answer. We asked why the nice shiny upscale RC sets were coming with servos that were of bargain basement pricing and matching performance. They answered that the systems were shipped with the basic lowest/lower cost servos because that was the only way the distributors who supply our hobby shops could sell today's fine performing RC sets to us at the low prices we demand; the price cut occurs in the cost of the servos. Our AMA president, Don Lowe, was there. He mentioned that he was flying FM only. Then the people from the manufacturers stunned me by saying that they, too, chose to fly FM systems. They avoided the PCM systems since (except in one case only) it is not possible to totally inhibit or totally disconnect the fail-safe feature that is inherent in PCM. They said they'd rather "take the hit" with an FM set than be flying a PCM set, get "hit" and maybe have the system go into fail-safe, disrupt the flight, and hit the ground

while in failsafe! Most of us have seen that happen, I'm sure.

Later, our AMA president said: "I don't know why they don't just make a simple four-channel FM system that works!"

Well guys, they do! We've got it now in the new JR MAX 4, a simple no-frills four-channel FM system that works. It's one of a new pair of high-technology AMA certified (transmitters come with the gold sticker already attached) four-channel and six-channel, budget-priced radios that Hobby Dynamics Distributors has in local hobby shops as you read this. They're so easy on the pocketbook that it's truly not very smart to spend money upgrading and/or retrofitting older transmitters and receivers to "save a system." Even the low-cost bargain basement servos coming with these new systems (NES-507 is their designation) far surpass the measured up-link performance of our last or older generation of servos.

The new generation equipment is, simply stated, so good and so inexpensive that it's dumb to fix old stuff and throw good money after bad.

The MAX 6 FM in this review is flying in my Skat Kat sport contest pylon racer . . . the most demanding contest flying a system can have. The MAX 4 FM will soon go into a new model for Old Timer RC Texaco flying. Let's take a close look at these price-busters.

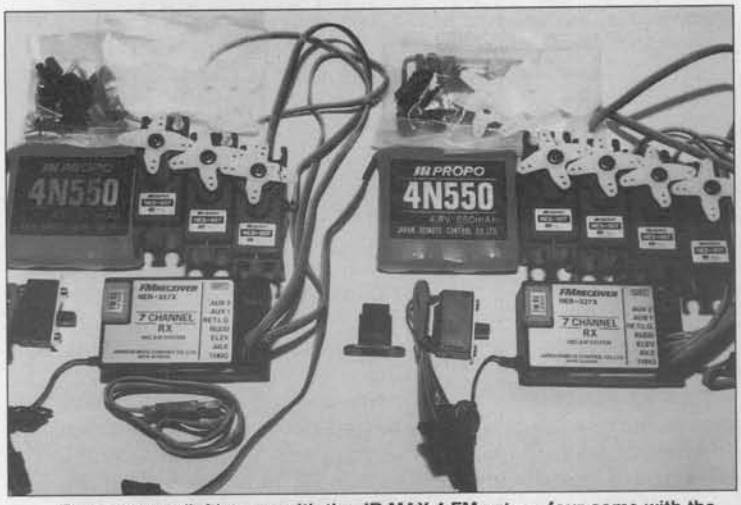
The MAX 4 FM has the fine quality Sanyo batteries, charger, aileron extension cord, switch harness, instruction manual with warranty card (one full year from purchase), an NER-327X seven-channel receiver (it's AMA-listed also) and three of the budget NES-507 servos. The MAX 6 FM comes with all of the above, plus a fourth servo. The 327X receiver also comes with other higher priced and fancier JR systems that use more channels. JR finds it more cost-effective to supply the seven-channel receiver with the four- and six-channel systems than start up a new assembly line for another receiver with fewer channels.

Both of these budget-busters have JR's Trainer System already built in. The optional JRATC001 trainer cord costs under ten dollars. We'd judge you can buy the MAX 4 FM set near $150, and the MAX 6 FM set near $200.00 at your local hobby shop. If you bought a father-son pair of radios, the hobby shop would probably toss in the trainer cord for free. These columns seldom discuss prices; in this case, we thought we should! Don't think the extra money spent on the MAX 6 FM set is only buying you a pair of dual rate switches, plus a retract and flap switch. You get much more inside the MAX 6 FM's transmitter.

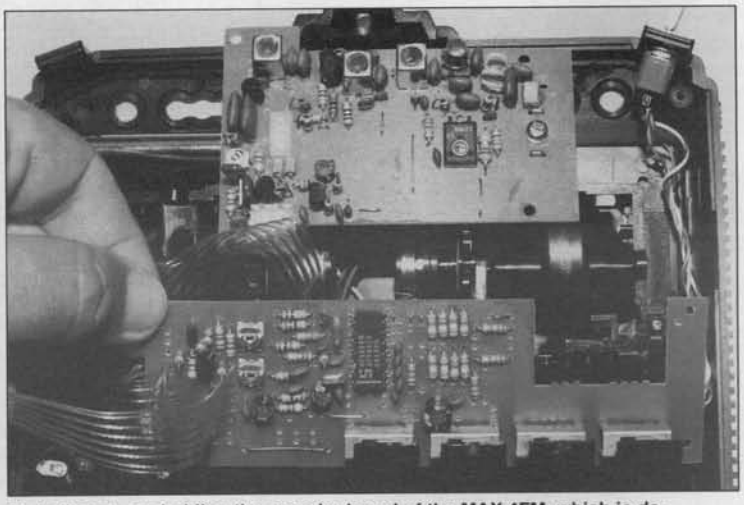
The extra $50 to $60 more you might spend on the MAX 6 FM does give adjustable dual rate switches that often cause flier-induced crashes. But you get switch control retract action and switch control flap operation (these can be used for fun things like candy or toilet paper drops) on the MAX 6 FM, along with a fourth servo.

The biggest advantage in the MAX 6 FM is that its transmitter has the superb contest-type stick and gimbal assemblies built in that the MAX 4 FM doesn't have. These extras give you adjustable length sticks, adjustable tensions on stick centering, a wonderfully smooth up-scale feel, and most importantly, the trims are electrical rather than mechanical. The MAX 6 FM comes with the exact same stick assemblies that JR builds into its top-of-the-line brand new X-347 "super system" that is probably one of the world's most modern RC sets! The electric trims are so precise that each click of movement causes a corresponding servo movement that you can readily see.

The transmitter trims on the MAX 4 FM are

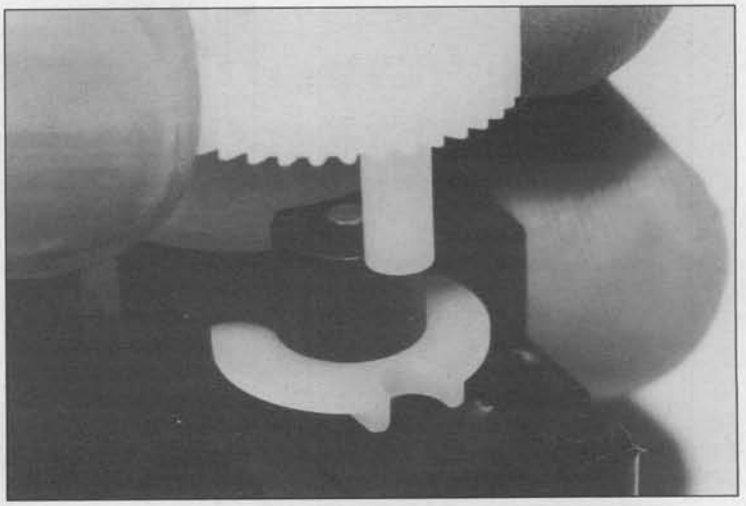


Three servos (left) come with the JR MAX 4 FM set . . . four come with the JR MAX 6 FM set . . . both sets are priced to bust below-price barriers . . . details in text.



Stu's fingers are holding the encoder board of the MAX 4FM, which is de-mounted and turned so you can see the four reversing switches that normally face forward. The radio frequency (RF) transmitting board (upper area) has also been de-mounted and laid in place for this photo.

(Left) Here we see the uniform neatness of assembly that comes with automatic high volume production. The Signetics NE5044 chip is used by several manufacturers around the world with great reliability. (Right) The output gear of a NES 507 servo is in Stu's fingers and shows the spoke that protrudes downward. The spoke fits into a matching yoke that drives the delicate feedback pot inside the servo. This "spoke 'n yoke" is indirect drive that lessens measured up-link performance, but makes servos last much longer in a vibrating environment.



not electric, but are mechanical linkages that move the mounting of the control potentiometer itself back and forth from center. It's the mechanical linkages that cause the three clicks of "no action slop" movement before the servo reacts to your input. The Sunday fun-flier would probably never notice this slop; it's the contest flier who should spend the extra money and buy preciseness.

These sets, as price busters, have another feature that caught us by surprise in the MAX 4 FM. Kraft Systems used to make a popular Sport Series radio that also had mechanical trims, plus their control sticks had the overall "slop" grow with use of the mechanics. Think Tank member Dr. Ted Noel carefully studied the MAX 4 FM stick assemblies and spotted a touch of design brilliance in that, although the control sticks of the MAX 4 FM may feel like they have a bit of mechanical play or slop under your thumbs, the actual feedback pot and its controlling shaft that rotates does not! The mechanism is designed such that the control shaft is spring driven back to a solid neutral every time . . . a bit difficult to explain here, but trust us. This is good stuff! Some design engineer at Japan Remote Control Company Limited knew his stuff well. You may feel slight end play on the lower cost transmitter's control sticks, but your servos won't.

On the MAX 6 FM it is possible to tighten and loosen the mechanical drag on the throttle action with a simple screwdriver adjustment. This is long overdue. Virtually all stick gimbals, of all RC transmitters, of all brands, have throttle stick movement that is far too loose. If you pay an extra $50 or $60 for the MAX 6 FM, you get your money's worth!

The user manual for the MAX 4 FM specifies, with the transmitter antenna removed, a minimum ground range test of fifteen feet. The manual for the MAX 6 FM doesn't specify the range, but since the electronics are identical, the test should be, too. Both sets range checked (antenna removed) to seventy feet, the same as we got on the MAX Computer 6 PCM set we reviewed in last November's *Model Builder*.

In fairness to dual rate switches, the Central Florida RC Think Tank offers these brief comments. We fly with rates dialed "out" so that servo action is identical regardless of switch position. Dual rates, we feel, make as much sense as having dual rates on your car's steering . . . and on the brake pedal, too. Can't you just imagine the hypothetical discussion between you and the police officer? "Officer, I didn't mean to hit that fire hydrant . . . I was on low rate steering . . . and I coulda stopped in time, too, if'n I hadn't been on low rate brakes." Enough!

For the few Americans who fly Mode 1 (throttle on the right stick) like I do, the MAX 4 FM is easily changed over. The MAX 6 FM requires extensive disassembly as one of the photos shows, and I've heard the people at Hobby Dynamics say they'd be happy to speedily help your local hobby dealer get your MAX 6 FM set on Mode 1 . . . same goes for the MAX 4 FM.

The inside of these transmitters is quite neat. Wiring is tied every couple of inches with what looks like tiny fuel line.

Both of these systems have another "plus" we've not seen for years. The transmitter meter is much more than a simple battery meter; it actually is a quick and easy verification that the transmitter is emitting a signal, as it is a true RF radio frequency output meter. The meter will read low emission when the antenna is retracted, but extend the antenna and watch the meter rise, indicating the transmitter is putting out full power. Never fly any system with a partially extended antenna. After your system is installed we suggest you put a strip of clear plastic vinyl tape over the reversing switches to prevent them from being accidentally moved and causing a re-kitting.

The receivers with these systems are the JR NER-327X that are built on two printed circuit boards. The photo(s) show three integrated circuits, two ceramic filters (LF-H6SJ and LF-A), a large blue Rubycon 6.3-volt capacitor (it cleans and/or filters the voltage going to the integrated circuit it's mounted upon), the frequency controlling crystal, plus a zillion more parts, all neatly positioned and wave-soldered in place. The smaller of the two boards mounts on 1/4-inch stilts, has five capacitors, two transistors, six resistors and neatly mounts on top of one of the three integrated circuits and practically hides it from view. The component side of the receiver has a vibration-absorbing mastic selectively applied to components for that extra degree of class and reliability. We're seeing this class act with more and more of our modern RC sets . . . another reason why it doesn't pay to upgrade older sets.

These systems come with NES-507 servos. The 507s are virtually identical to the 517s that come with the new JR X-347 system (wait until you read the review on the X-347 that's coming in *Model Builder*), except they have a white nylon bushing in place of a precision ball bearing in the 517 unit. These are indirect drive servos that will probably last the life of your system due to ultramodern electric feedback pots. They're indirect because the servo's output gear has a spoke-like molded arm that sticks downward into a yoke-like opening in the molded part that moves the delicate feedback pot. This spoke-and-yoke design mechanically serves to isolate the feedback pot from shocks, flutters and vibration subjected to the output wheel in flight and on the ground.

The 507s and 517s are inexpensive, as we discussed earlier. The JR 9001 servo has superb performance, but it's quite expensive . . . fine for the contest flier who needs the ultimate and will spend to get it (it's also not of indirect drive design).

The suggested retail price of the new MAX 4 FM is $249.99. The suggested retail price of the new MAX 6 FM is $319.99. The service location for JR systems is JR Service Americas, 4105 Fieldstone Road, Champaign, IL 61821; telephone (217) 355-9511 for inquiries. **MB**

ELECTRONICS *Continued from page 35*

completely restored, the other one is overcharged. Neither will show much immediate effect, though the less than fully charged battery will of course produce less operating time, while the overcharged one will sooner or later exhibit reduced capacity and/or shortened life. All of these effects might be small, and possibly inconsequential in the face of other advantages gained, but they are there.

Now, when two charged batteries are connected in parallel, again unless they are perfectly matched, they will produce slightly different voltages. Again in this case, a high and a low one. What is going to happen? Well, the high voltage battery will attempt to charge the low one to its voltage . . . exactly as happens when you use a 12-volt battery to charge a six- or seven- cell pack. Admittedly, the current flow will not be as high as in the latter case, but even a fraction of a volt difference will cause a few mils to flow. Eventually, the batteries will reach equal voltage, and the charging action stops . . . for a while. As batteries sit, self-discharge starts, and sooner or later the voltage imbalance will reoccur and charging will again take place. What is going on is not simply a passing of energy back and forth; there are always losses, and eventually both batteries will be down below their end point

In use, parallel batteries, again because of unbalanced voltage, will actually deliver different current rates, affecting the time for which any given rate can be delivered.

Theory can sometimes be hard to accept when we can see something quite different apparently working well, but it is also important to understand what is actually happening.

THE PRICE OF FUN IN THE AIR, like the price of gasoline there for a while, seems to go up every day. There are bargains; personally I consider most of today's RC systems, with all of their advances, as true bargains. But some of the other items needed before you can put that radio to use don't fall into the bargain category at all.

Latest negative impression I get is a German import, an electric airplane, of interest to the writer of a recent article because it is capable a "top speed in excess of 90 mph." For about two minutes! This from an airplane for which one is asked to shell out over $200 for the kit and a similar amount for the motor, plus at least that much more for special batteries, a speed control or some motor control device, covering, etcetera, etcetera, etcetera!

I will admit that cost is not always the first consideration for some of the projects I get involved in, especially purely electronic ones when often one can buy a product for less than the cost of building one. However, there is pleasure to be derived from being creative, or learning something, that is not there when building a Heathkit.

No doubt, pure speed can be exciting . . . try an Ace RC "GLH" (Goes Like Hell!) and a Cox .051. Equal or greater speed if you are good with props, infinitely greater maneuverability, five or six times the flying time, and all for around $150, including the radio!

What say you? Eloy Marez. 2626 W. Northwood, Santa Ana, CA 92704. ***MB***

MODEL DESIGN *Cont. from page 11*

Keep letters like these, and on any other technical stuff that interests you, coming, please. Include photos and sketches where you can. I would like to make this column more dialogue and less monologue than it has been in the past.

VORTEX GENERATORS

This retired engineer belongs to two aero technical organizations, the American Institute of Aeronautics and Astronautics, and the Flight Research Institute. I recently attended a lecture sponsored by the latter group, at the Museum of Flight, Boeing Field, Seattle, Washington.

The speaker was aerodynamicist Paul Robertson. His subject: vortex generators. We have all heard of wing tip vortices, the induced-drag-causing spiral airflow behind each wing tip due to greater pressure under the wing than over the wing. But I was largely unaware of a favorable kind of vortices until this lecture.

You may recall that the boundary layer of stagnant air next to the skin surface of a wing causes separation and stall at moderate angles of attack. There have been a number of methods of "boundary layer control" proposed and tried over the years, to delay stall and therefore decrease takeoff and landing speeds.

Vortex generators were invented and tried for this purpose many years ago, and they work, but their adoption has been slow. The vortex generators (VGs) are little aluminum tabs which are arranged in a spanwise row on top of the wing, ten to twenty percent aft of the leading edge. They stick straight up above the wing surface about one centimeter and are three or four centimeters long, chordwise. Almost chordwise, that is. They are alternately cocked about 20 degrees right and 20 degrees left, so they create mini vortices in the airflow over the wing, which alternate in clockwise and counter-clockwise rotation.

The little vortices produced scrub the semi-static boundary layer, causing the airstream to follow the contour of the wing over a wider angle-of-attack range. When applied to a Cessna 340A, vortex generators will reduce the minimum takeoff roll by 30%, and the landing distances go down by 25 to 40% depending on approach speed.

One might think the VGs would cause more drag in normal flight, since they interrupt the airflow. For the most part, they would if they did but they don't. Translation: They hardly interrupt the airflow at all in

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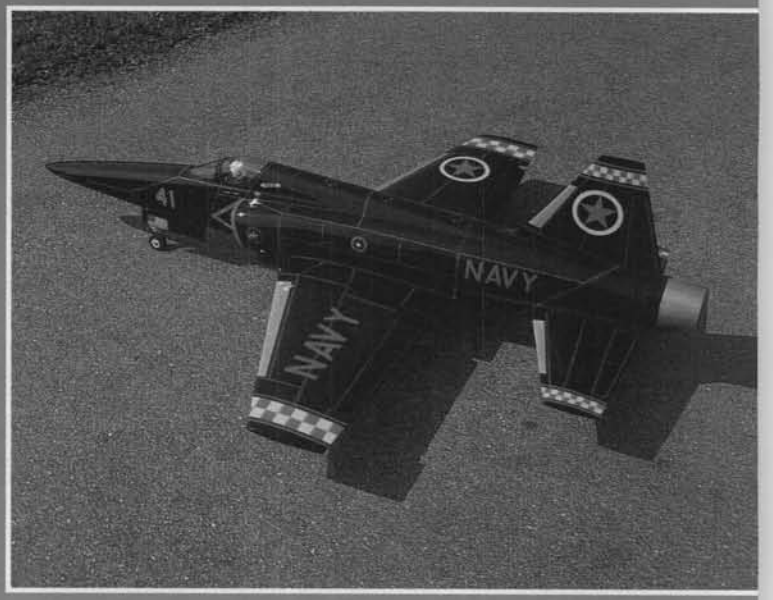
CORAL SPRINGS CONDORS' JET RALLY



(Top) Charlie Chambers' stunning and great flying Aggressor II in Top Gun Aggressor color scheme. Note Russian star on tail and wing. (Above) Norm Holland with his old campaigner, the Byron BD-5J. Norm has been flying this model for four years. (Opposite, Top) Craig Wilson's F-86 jet, a super flying airplane. Craig is truly a master craftsman. (Bottom) Ray Kleber's super-flying Sterner kit of the P-80 Shooting Star.

BY WALLY ZOBER

The Coral Springs Condors held its first annual Jet Rally in October 1990 at Coral Springs, Florida, under the direction of Paul Woodward and Charlie Chambers. The Coral Springs Condors came up with some neat ideas for this fly-in, i.e., pilots and club members barbecue, a half-time airshow with the Florida Air Show Team, helicopter demonstrations and continuous raffles for spectators and competitors. Awards were given for Fastest Jet, Best Scale Jet, Pilot Choice, Condor's Jet Rally Trophy, Critic's Choice, and Best Craftsmanship.

The Condors have a beautiful flying site with a 500-foot paved blacktop runway. The pit area has plenty of room for the pilots' airplanes, support equipment and the show teams. Bleachers were set up for spectators, who they were not permitted in the pit area except during a thirty minute break to take pictures.

continued


FT·725

Lewis Russell's F-16 on top of his unique and very practical Flite Line Support Cart.

Tim Staples with his modified Bob Parkinson "Regal Eagle." Model flies extremely well. Modifications made it lighter, and faster.

Bob Fiorenze with his pit crew, readying his Yellow Aircraft F-4 Phantom.

The only fly in the ointment was the weather. Saturday was partly sunny but very windy and unfortunately it was 45 to 60 degrees crosswind to the runway. The pilots really had to work to keep their jets on the runway during takeoffs and landings. This condition did take its toll on a few jets. Sunday had the same windy conditions, with a few rain showers in the afternoon. The spectators stayed and there were people still coming in while it was raining.

Bob Violett Models kits dominated this fly-in with twelve jets; followed by five Byron F-16s and one BD-5. Yellow Aircraft had two jet models, one of which was an F-16C prototype.

As I said earlier, the weather was not kind to the fliers, but this did not discourage the Jet Jockeys, especially Craig Wilson of De Land, Florida, and Ray Kleber of Boca Raton, Florida. Both of these men flew their jet models to the limit repeatedly, despite the nasty crosswind that lasted both days.

Ray Kleber was awarded the Condors' First Annual Jet Rally Award. The judges felt he made a significant contribution to this Jet Rally. Ray kept the crowd on its toes, hot-dogging his beautiful vintage P-80 Shooting Star, built from a Sterner kit, and his gorgeous F-16. The crowd held its breath when Ray made a forced wheels-up landing with his P-80 Shooting Star (I understand that Nick Ziroli Jr. now owns the rights to the Sterner P-80 model. I wonder if he is going to release a new kit of it? How 'bout it, Nicky? It sure is a great flying jet model). Kleber was awarded a Knights of the Air F-20 Tiger Shark kit, valued at $450, plus a special trophy commemorating this event.

Craig Wilson, an experienced jet model pilot and also a custom model builder, started things off on Saturday with his beautiful red and white Viper. He did some very high speed passes; the 45-degree crosswind didn't seem to bother him. Craig posted the fastest time of the day on Saturday despite unfavorable winds. He was clocked by radar gun at speeds exceeding 140 mph. Craig also made a spectacular wheels-up landing on the grass. No damage to his Viper. Craig won a Futaba Conquest seven-channel FM radio worth over $400.

The Best Scale Jet award was presented to Bob Violett for his 1989 Scale Masters winner, the F-86 Sabre. This has to be one of the smoothest flying jet models in the country. Bob is one of the pioneers in the jet model industry. He is the man who put speed into jet models and made them perform like real jets. Bob was awarded a beautiful plaque and $100 cash. Violett also won the Fastest Jet Model award, flying his Aggressor II to an earth-shaking speed of 192 mph. The spectators shouted and applauded Bob when his speed was announced. Bob took home another trophy and $100 cash.

The Critics Choice award was also won by Violett with his stunning F-16C. This trophy was donated by Frank Tiano Enterprises.

The Pilot's Choice award went to a very popular jet model pilot, Bob Fiorenze, who flew a very aerobatic and sharp-looking Yellow Aircraft F-4 Phantom, done up in low-vis colors. Bob flies the Phantom as though he's in the cockpit. He won a trophy, $100 cash, and a 50% discount certificate on a 7-channel JR radio donated by Hobby Dynamics.

The Best Craftsmanship award went to Charlie Chambers for his superb Aggressor II, done up in a Top Gun Aggressor color scheme with Russian star in a circle insignia. He won $100 cash plus a trophy donated by Frank Tiano Enterprises. You have to see Charlie's Aggressor to appreciate it.

Byron's F-16 has been around a long time, however, the earlier models with the lower powered engines appeared to be flying on the backside of the power curve. Lately, I've been seeing a lot of Byron F-16s using Rossi 80s and 90s, O.S. 91s and Picco 80s. With these larger and more powerful engines, the F-16s performance is absolutely outstanding. The Byron F-16 has a broad flying envelope: 35 to 140 mph. It is probably one of the best advanced jet model trainers on the market today.

Another interesting model was Norm Holland's BD-5J. He has been flying this model for about four years. It has been powered with an O.S. 77, Rossi 90 and Picco 80. At the present time, it is powered with an O.S. 77 and Byron Fan. Norm just repainted the BD-5J. It looks and flies great.

Tim Staples of Port St. Lucie, Florida, had a modified Bob Parkinson Regal Eagle built by Tom Savado of Vero Beach. Tom made it a low-wing model with a single fin, raised the stab and made it a little bigger. He also made the model lighter. The model is quite fast and a very stable. It is powered with a Picco 80 and a Byron fan, Spring Air retracts, and a Futaba seven-channel RC system.

Lewis Russell had a very neat-looking Byron F-16 in a General Dynamics paint scheme. It is powered with a Rossi 81, a Byron fan, and a Futaba RC system using five servos. Lew also had a very practical and useful piece of equipment, which he calls his "Flite Line Support Cart." It carries everything you need to support your jet model.

Ron Schaefer had a sharp-looking Aggressor II in a U.S. Air Force camouflage color scheme. The model has in-flight mixture control, mechanical retracts, a JR PCM-10 RC system, and working doors.

David Ribbe had two B.V.M. jets at this meet. His red Aggressor II is an extremely fast jet model. I've seen it reach speeds of 180 mph or better. Dave also had a very attractive F-16C finished in desert camouflage colors. This one is 100% scale with exact scale landing gear and working doors. Dave came into some bad luck on Saturday due to the high crosswinds. On his takeoff roll, the model weather-vaned into the wind. The wheel strut hit a rut on the edge of the runway and flipped the F-16, causing some minor damage. You win some and you lose some.

Another very impressive model was Wayne Knight's Mirage 2000 (a Jet HangarHobbies kit) in sky camouflage colors. His model was powered with a Rossi 65 and Dynamax fan. The model is ten years old and was built by Bob Walter. Wayne claims his R-6 glow plug is a year old. He uses Byron 5% fuel. Maybe that's his secret!

The brother team of Aurelio and Miguel Alvarez of Miami flew a beautiful and super-smooth flying red, white and blue Byron F-16. It is powered with a Rossi 90, has Byron retracts and is finished in Perfect Paint. They also had a magnificent Tom Cook F-4 Phantom, though it was not ready for flight as it still needed some work. Keep

continued on page 82

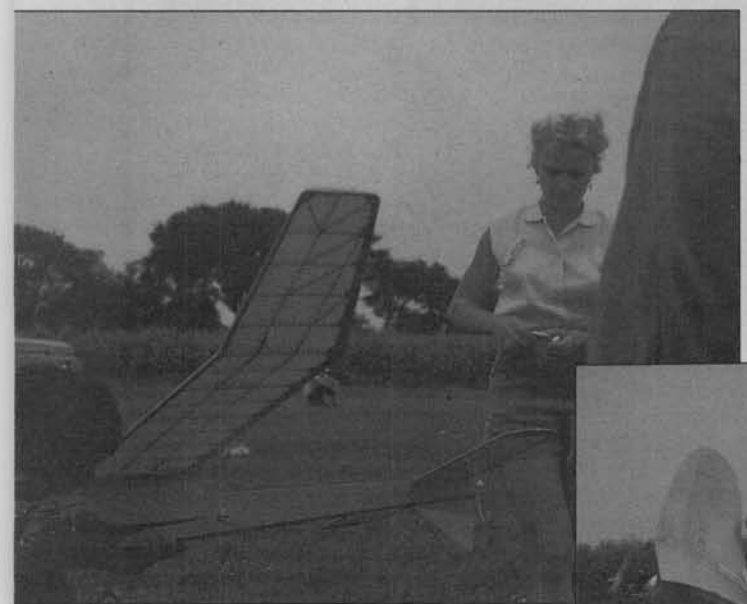
James Sultan's super sleek F-20 Tiger Shark, a Knights of the Air kit.

FREE FLIGHT

BY BOB STALICK

CARRYING THE LOAD

The late, great Carl Goldberg with an A-B Cumulus (Carl's own design) at the 1949 Nats at Olathe, Kansas. Photo by Howard Robinson.



(Left) That's none other than the famous Sal Taibi priming the engine in his A-B Spacer, his wife (and pit crew), Nan, at right. Another 1949 Nats photo by Howard Robinson. (Below) C.O. Wright also flew a Cumulus at the 1949 Nats; power appears to be an Arden .19 on spark ignition. The Cumulus spanned 54 inches, and with its single retracting wheel, was regarded as one of the hottest ships of its time. Howard Robinson photo.

Last weekend, for the first time in many months, I had the chance to fly outdoors again. The event was the annual Misery Meet, sponsored by the Kent, Washington Strat-O-Bats. Although the weather was less than ideal with wind, showers, and temperatures in the high 40s and low 50s, it was, nonetheless, a real treat to get out and fly.

One of the events added to the S.O.B.'s (Strat-O-Bats) schedule this year is Payload. Even though the event was only announced about three weeks before the contest took place, five fliers showed up with their payload ships and flew. Since the event calls for R.O.G. takeoffs and the S.O.B.'s couldn't muster the required takeoff boards, we did try launching from a stretched-out tarp over the rough prairie ground. Most had no difficulty in getting their ships off the uneven strip. Fred Guilfoyle took first with his Harry Murphy "Pay-triot" design and managed three two-minute maxes.

Notable flights were entered by the Paytriot design, flown by Guilfoyle and Bruce Kimball. Original designs were flown by Mark Sexton, whose ship looked like a modified Zeek; Dennis Weatherley, who did a special fuselage for his Pee Wee 30 Maverick; and Bob Stalick, who shrunk down a 1/2A Spacer to Payload size. Because the event, on such short notice, drew a nice contingent of contestants, there is talk of adding it to the events list of many of the N.W. contests this year. For those of you who haven't tried Payload, you might give it a look. The rules are very simple and many existing gas models can be converted to qualify.

Related to the Payload event is Cargo. While the objective in Payload is to achieve standard maximum flights with a minimum weight, the object in Cargo is to lift as much weight as possible. One of the most successful Cargo models in history is this month's three-view, the Atlas. Before looking at this ship, however, a review of the minimum specifications for the Payload and Cargo events is in order:

• Payload: The model must have a projected wingspan not to exceed 36 inches, have a two wheel landing gear, and provide a minimum of .5 sq. in. visibility on both sides and to the front. Power is by any engine not exceeding .025 cu. in. and the model must carry a dummy that weighs at least one

ounce and has minimum dimensions of 1.5-inch height, 1.0-inch width and .5-inch thickness. Total minimum weight of the model with dummy is five ounces. The winner is the model with the highest time for three flights wins.

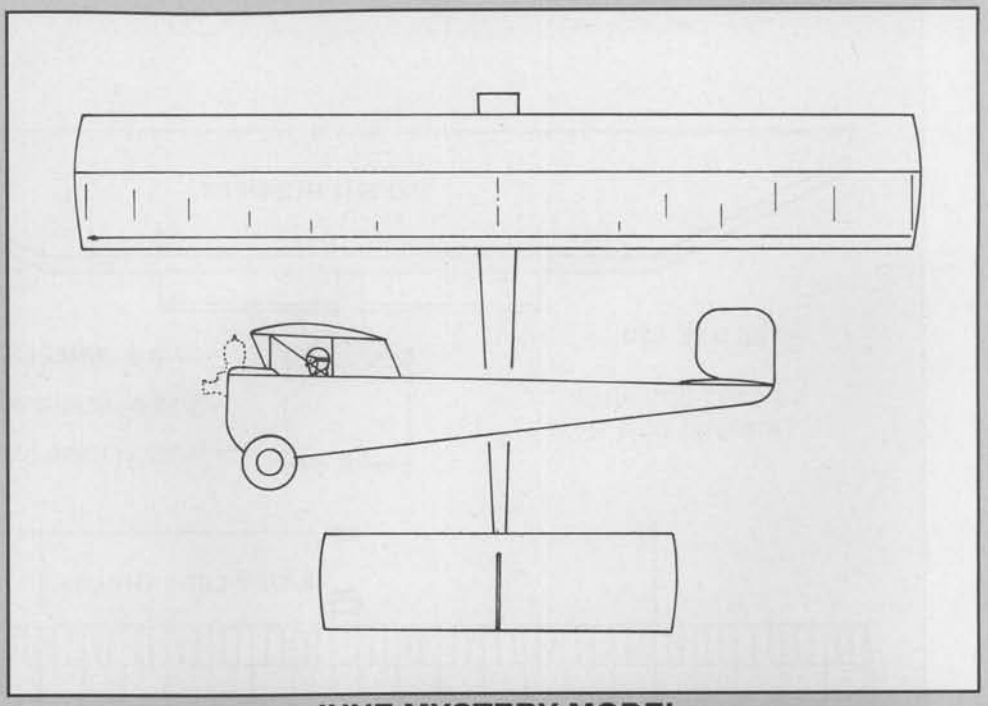
• Cargo: The model must have a projected wingspan not to exceed 48 inches. The other model requirements are the same as Payload except for the minimum weight of the model. Since the object of the event is to lift as much weight as possible, enclosed weight boxes are permitted wherein the weight can be carried inside of the model. All official flights are required to exceed 40 seconds. The winner is the model that lifts the most weight for the best three official flights.

For further information and a complete set of rules for these two events, see the current AMA rules book for events numbered 108 and 109.

JUNE THREE-VIEW—ATLAS, BY ROMAN RAMIREZ

According to information from the 1983 NFFS Symposium, where the Atlas won Small Gas Model of the Year, the original Atlas was built in January 1976 and set a record of 76 oz. at its second contest. The ship has held the AMA Cargo record for five of the first seven years that Cargo has been an official event. At the time the NFFS article was written, Roman had attributed his success in setting a record of 100.2 ounces to attention paid to takeoff. Wheel size has been increased several times and rudder area was increased twice. Each change added to takeoff stability. Another reason for the increased performance was the improvement in engine power. The original design had a box-stock .020 Tee Dee and subsequent records were set with a modified engine, which included 65% nitro fuel, a thinned prop shortened to a 4.25-inch diameter, venturi drilled to .094-inch and a machined glow head to provide a squish band. It would turn over 23,300 rpm.

Roman also noted that he tried to keep drag to a minimum with this design. To do so, he took a sanding block to the front of the fuselage and rounded it off. He also uses a wire axle mounted through a dural landing gear to limit ground looping.



JUNE MYSTERY MODEL

So, there you have some of the tips behind a winning Cargo design. If you tire of the traditional duration type events, need to fly from a small field, and have the urge to try something really challenging, take a good look at the Cargo event. This ship would be a fine place to begin. Full-sized plans for the Atlas are available through NFFS Plans Service. Contact Bob Klipp, 10115 Newbold Dr., St. Louis, MO 63137. Send an SASE for complete plans listing and prices.

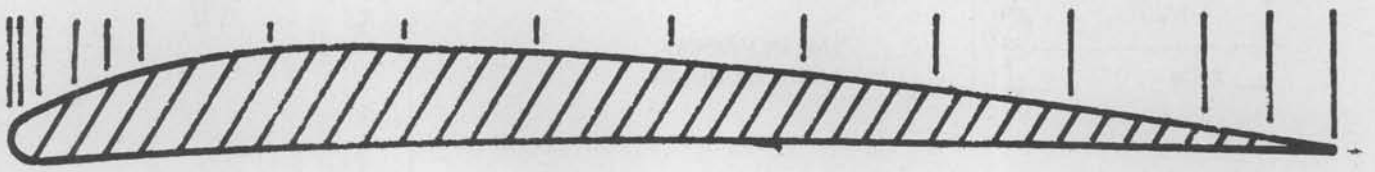
JUNE MYSTERY MODEL

Back in the good old days, when each national magazine carried full-sized plans for free flight, control line and radio controlled models, the designer of this ship was featured just about anywhere you looked. Whether the design was scale, control line, or free flight, hardly a month passed when one of his designs did not appear. This month's Mystery Model is one of his cute little sport free flights. Constructed almost entirely of sheet balsa, it sported a Cub .049 engine and no timer. So, it was intended for lazy flying sessions and no competition. With a wingspan of about 36 inches, it was easily transported. With its pilot's head peering around and through the cabin struts, it was a cutie. Anyhow, if you know the name of the ship and its designer, you could win a free subscription to *Model Builder* magazine. Just drop your best guess into an envelope and send off to Bill Northrop, c/o *Model Builder*. And thanks again to Dan Ciesla for providing the material and inspiration for this month's Mystery Model.

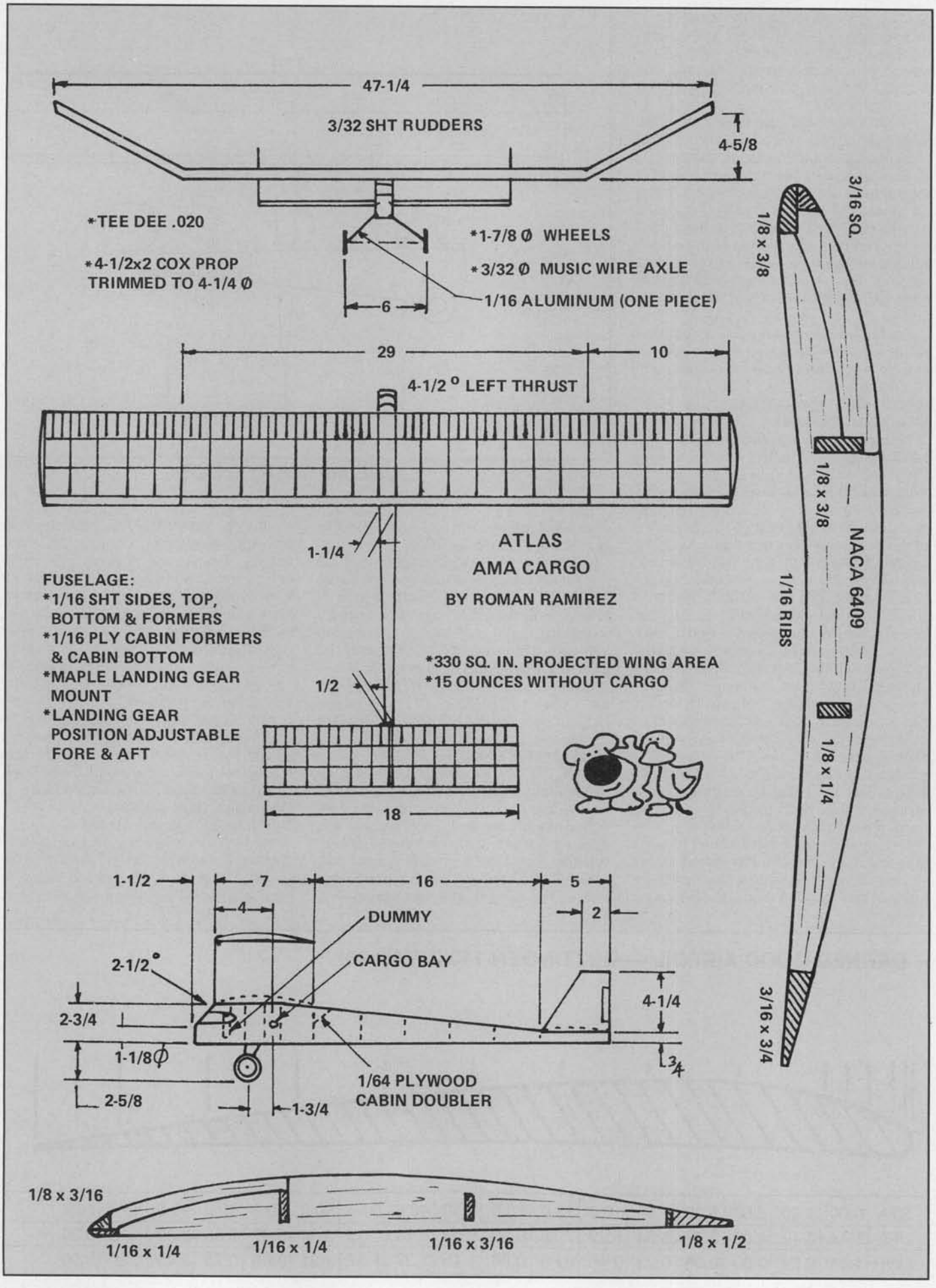
DARNED GOOD AIRFOIL - GOTTINGEN 143 (MVAH 20)

We look, once again, at the *Comprehensive Book of Airfoils* and find another in the series of sections developed and tested by the Gottingen Laboratories in Germany. This

DARNED GOOD AIRFOIL — GOTTINGEN 143 (MVAH 20)



STA	0.00	1.25	2.50	5.00	7.50	10.0	15.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	95.0	100.
UPR	1.44	3.17	4.03	5.48	6.34	6.92	7.78	8.30	8.53	8.10	7.35	6.34	5.07	3.63	2.02	1.15	0.29
LWR	1.44	0.29	0.00	0.06	0.23	0.46	0.69	0.86	1.15	1.27	1.27	1.21	0.98	0.75	0.45	0.20	0.00


47-1/4
3/32 SHT RUDDERS
4-5/8
*TEE DEE .020
*4-1/2x2 COX PROP
TRIMMED TO 4-1/4 Ø
*1-7/8 Ø WHEELS
*3/32 Ø MUSIC WIRE AXLE
1/16 ALUMINUM (ONE PIECE)
6
29
10
4-1/2 ° LEFT THRUST
1-1/4
ATLAS
AMA CARGO
BY ROMAN RAMIREZ
FUSELAGE:
*1/16 SHT SIDES, TOP, BOTTOM & FORMERS
*1/16 PLY CABIN FORMERS & CABIN BOTTOM
*MAPLE LANDING GEAR MOUNT
*LANDING GEAR POSITION ADJUSTABLE FORE & AFT
*330 SQ. IN. PROJECTED WING AREA
*15 OUNCES WITHOUT CARGO
1/2
18
3/16 SQ.
1/8 x 3/8
1/8 x 3/8
NACA 6409
1/16 RIBS
1/8 x 1/4
3/16 x 3/4
1-1/2
7
16
5
4
DUMMY
2
2-1/2°
CARGO BAY
4-1/4
2-3/4
1-1/8Ø
3/4
2-5/8
1-3/4
1/64 PLYWOOD
CABIN DOUBLER
1/8 x 3/16
1/16 x 1/4
1/16 x 1/4
1/16 x 3/16
1/8 x 1/2

one is a hybrid section originally developed in 1917 as a lightplane airfoil. From a free flight perspective, it has many of the same characteristics as the Goldberg G-610B, although it is thinner. The highpoint is close to the front at 30% and the rear of the section is flatter with a very thin trailing edge. Construction techniques would favor a fully sheeted wing or a wide trailing edge in order to provide sufficient thickness to avoid warping. Another system would be to use capstrips for the rear 70% or so with either false ribs or a D-box for the front 30%.

Because of its forward highpoint and undercamber, the section should be a good one for Cargo or other load carrying models with restricted surface areas. Other applications could be in FAI events or in heavier gas models. I think it shows promise wherever you might use a moderately thin undercambered section.

NFFS SYMPOSIUM CALL FOR TOP TEN MODELS

I hope this notice is not too late, but if you have nominees for the 1991 NFFS Symposium Top Ten models, now is the time to contact the chairman of the selection committee. That person is Bruce Augustus, P.O. Box 430, Sun Valley, ID 83333, or telephone (208) 788-2927.

If you are unaware of the categories under consideration, the following list should be helpful: AMA Large Gas, AMA Small Gas, Outdoor Large Rubber, Outdoor Small Rubber, FAI-F1A, FAI-F1B, FAI-F1C, All Indoor, Scale, and Special Awards. The special award is given to that model, design, or contribution which adds to the overall improvement of the free flight hobby. Consideration of the final selection is given to those designs which feature new technical developments, contest records, design innovations, technology, or intangible factors.

The time is very short for nominations to be submitted, so contact Bruce immediately if you have any.

STAN FINK'S CHEAPER BEEPER

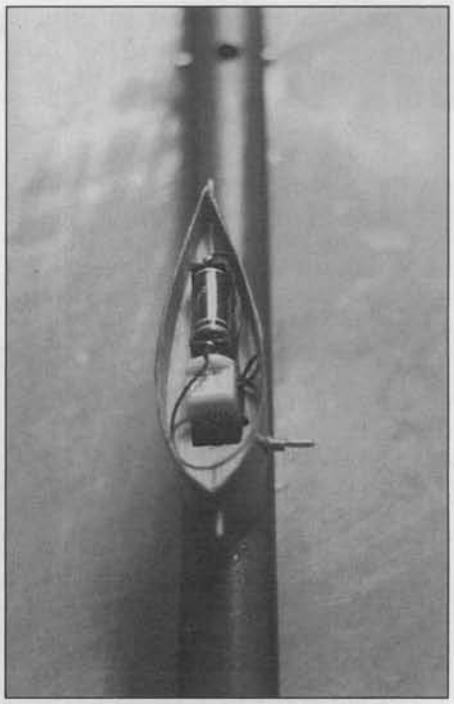
Recently I received a letter from my old flying buddy, Stan Fink. Stan used to live and fly here in the Willamette Valley, but left the area several years ago to try his luck in Philadelphia. Consequently, he has hooked up with the indoor folks who fly at Columbia as well as the Skyscrapers FF club and others who fly at Galeville. At any rate, Stan keeps me informed both by letter and his very informative newsletter, the *Domeduster*. My latest letter from him had a good description of how to make an inexpensive beeper to assist with the location of ost models. According to Stan:

"Since I started flying at Galeville a few years ago, I started to look for a way to retrieve planes lost in tall weeds. As you've probably heard, Galeville is a tough place to fly. During the late summer and fall, weeds with purple flowers completely take over the field. They normally reach a height of 4-6 feet. Retrieval can become a time-consuming and frustrating job. A loud sound coming from a plane in the weeds is an excellent way to locate it, since visual contact is usually not made until the plane is almost stepped on. I'm sure you're aware of the various systems selling in the model press. What's different about mine is the extreme low cost, $5.00, and the simplicity of installation and maintenance. You also get the pleasure of `doing it yourself' and not depending on a kit.

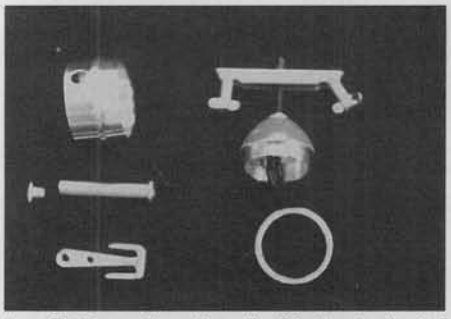
"Unlike some of my hard-boiled comrades, I've always hated losing an airplane OOS; to me it doesn't prove anything other than stupidity. I forgot to light the fuse, or push the timer button, or I just put a few turns in for a test flight and an unwanted thermal sneaked up on me. Even worse is losing a model that you saw come down, because of difficult terrain, tall weeds, a cornfield, rolling hills, lack of landmarks, or plain ol'lack of attention and `where did it go.' It might be a hundred feet away, but it could take an hour to find.

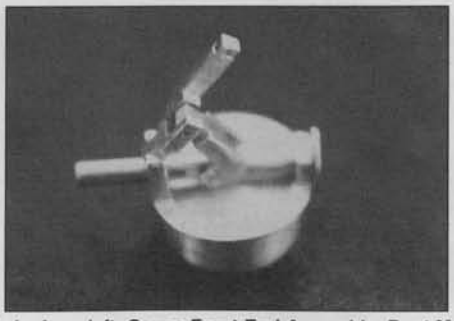
"Along with the acceleration of technology in free flight in recent years, clever minds have come up with various devices to help locate that errant model. I'm sure you've seen beepers, buzzers and even radio-controlled devices to solve the problem. The purpose of this article is to describe how you can make your own locating device out of readily available parts at Radio Shack that will weigh under an ounce and will cost about $5.00. If this intrigues you, stick around for the details.

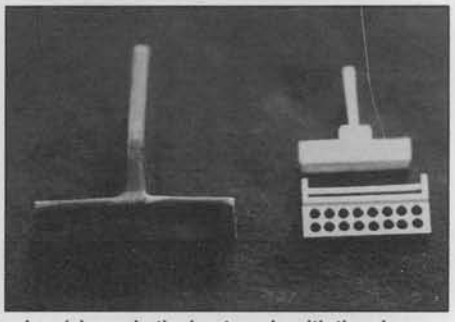
"Although there are several options at Radio Shack, you need three components: a buzzer, a switch, and a battery. A battery holder is optional, but I chose to use it to insure a better contact. Look for the parts by number: buzzer #273-0053, toggle switch #275-624, and an `N' battery and holder. Total weight of these parts is 24 grams. If you need to go lighter, skip the battery holder and tape the leads directly to one NiCd battery matching the voltage of the buzzer. This will lower the total weight to about 15 grams. The NiCd will also give you a louder buzz, but it will probably not last as long as the `N' cell. You don't need to buy any wire because it comes with the buzzer. The correct wiring diagram can be found with this article.



Installation of the Fink "Cheaper Beeper" in a Wakefield fuselage pylon. Text tells how you can make your own for a paltry $5.00, using readily available parts from Radio Shack. Stan Fink photo.







Free Flight goodies offered by Starline Products include, from left: Coupe Front End Assembly, Bunt Mechanism (shown in the bunt mode with the plunger retracted), and Power and Wakefield Stabilizer Mounts. More info in text. Bob Stalick photos.

"The unit can be used in all types of free flight machines including gas, rubber and glider. The only limitations are weight and space. In a gas model, you can put the unit in the pylon or the fuselage. In rubber or glider models, the best place for this unit is in a pylon or on the fuselage near the C.G. In a Wakefield, for instance, there really is no other choice. The pylon should be at least 1.5-inches high to fit the components. After cutting the appropriate slots so that all components are a tight fit, solder the switch

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CONTROL LINE

BY JOHN THOMPSON

MOVING THE WORKSHOP

Next to slack lines, it may be that the one event that a control line model aviator dreads most in the world is **moving the workshop.** But nearly every modeler's personal life at one time or another is going to take some kind of turn that will require uprooting the household, including the workshop, and moving it to some new location.

Just such an event at *Model Builder's* control line headquarters prompts a return to a subject we've touched on in the past: the workshop. It was moved not once but twice in the latter third of 1990, and as this is written in January of 1991 our personal airplane factory has just gone back into operation. We find that a move brings model building and maintenance activities to a virtual halt for one to two months, as the first priority becomes moving and setting up such bothersome details as the kitchen, bedrooms, office (for producing this monthly report, naturally), and so forth.

But once the new shop is in operation, if all has gone well, we've become just a little more efficient in arranging it for effective work.

How effective the workshop will be depends to some degree upon the physical space it will inhabit. But whether the room is spacious or tiny, there are some things we can do to make it a productive factory.

Just as the successful competitor takes an organized approach to his work on the flying field, he also will devote planning to the organization of the workshop. Even a large shop, when it is piled high with junk, will be inefficient. On the other hand, a carefully organized small shop can be an excellent work space.

Our personal circumstances will determine what space we can set aside for the shop. Some fliers will be forced to work on the kitchen table and store everything in a cupboard when not at work on a project . . . a circumstance that requires the utmost patience and dedication. Most modelers are able to devote some space for a permanent shop.

Shelves and a good-sized bench are workshop necessities. Pegboard helps organize small parts and accessories. Lots of drawers, shelves and cabinets provide space to organize tools and materials.

Workshops are found in garages, basements, spare rooms, attics or even big closets. Probably the best circumstance is a large basement with room for multiple workbenches, cupboards, shelves, etc., where nails can be driven into walls, sawdust won't track the living room carpet, and lots of light and heat is available.

Wherever it is, the permanent shop has several needs:

- Workbench space.
- Cupboard and/or shelf space.
- Aircraft storage space.
- Strong, well-distributed lighting.
- Heat.
- Ventilation.
- Electrical outlets for power tools.

A more personalized look at our headquarters may help to give you some ideas for setting up a productive workshop.

In a succession of four moves over the past seven years I have gone from a free-standing outbuilding to a spacious basement, to a garage, to a smaller garage, to my present shop in a spare bedroom. Each circumstance has had its advantages and disadvantages.

The basement and the garages had enough space that one of my two workbenches was able to be stand free in the center of a room, so that I could work around it on all sides. It's a great situation for handling big airplanes, swinging wings around, working with large pieces of wood, etc. The basement, however, had the disadvantage of a low ceiling (be careful with the wing tips!), and the outbuilding and garages were difficult to heat, and thus hard to use in winter.

As a person with a busy non-modeling life, I find it desirable to have a workshop

that I can slip into for 15 minutes and get 15 minutes worth of work done. At a few minutes a day, every day, it's surprising how much can be accomplished. Needless to say, a space that takes a half hour to heat up is one that won't be used for short sessions. That makes the present spare bedroom situation an excellent "hit and run" workshop.

On the other hand, the spare bedroom can easily become useless if the modeler's inevitably growing collection of equipment, materials and aircraft isn't intelligently stored and kept stowed out of the way when not in use. A shop that is not kept clean, so that it takes 15 minutes to clean it up to get it ready for work, won't be used for short sessions. Therefore, I work hard to keep the shop organized by putting tools and materials away after every session, with the exception of the actual items being used at that time.

A bigger shop in a garage or basement allows the worker to be a bit more sloppy without complete loss of efficiency, but the rule still applies: the cleaner the shop, the better the work.

Here are some of the considerations involved in making a workshop efficient:

Benches: If possible, at least two benches are desirable. I use one bench for plane construction and another for engine work, sawing, drilling, etc. The plane construction bench has a piece of soft wallboard on it so that pins can be driven into it. It also has an electrical junction box and a vise. I keep fuel and other chemicals away from it. The other bench has a hard wood surface on which stand my power jigsaw, drill press, and bench grinder. This bench has an electrical junction box also.

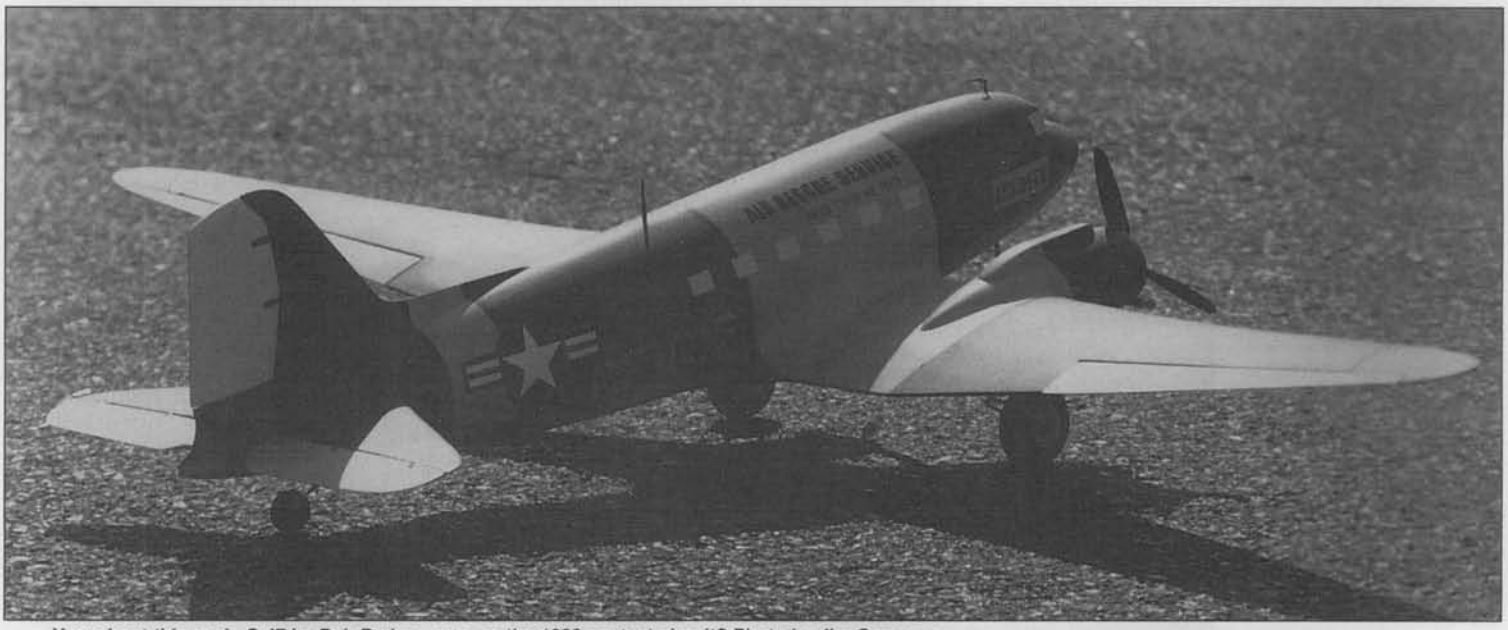
Drawers: I'm fortunate to have acquired in a previous residence a large workbench that contains 21 drawers (this is the engine workbench mentioned above). I've labeled the drawers and stored materials in them in a way that I can easily find what I'm looking for. It's a one-of-a-kind piece of furniture, but drawers can come in a variety of forms. My shop also has two small chests of drawers of a type that can be picked up very inexpensively in second-hand stores. Besides providing drawer space, they provide a little more countertop space for storage of toolboxes, etc. Drawers get tools and other miscellaneous items off the workbenches and out of the way until they are needed. If you have enough drawers, they allow you to find what you're looking for quickly without lengthy searching.

Shelves: Most hardware stores have various styles of brackets that can be used for quick installation of shelving that can be useful for getting things out of the way. I have three sets of shelves in my shop. What's on them depends on their location in regard to the type of work being done in that part of the shop. Items that are used frequently, and desirable to be within arm's reach, are good candidates for shelving.

Pegboard: Another item available cheap in hardware stores is 1/8-inch pegboard and the hooks to mount on them. This is a way to array your little packages of modeling hardware, hang power tools and whatever else you want to have close at hand during construction work. I put my pegboard right over the plane-building workbench with hooks for power tools and supplies.

Cupboards: If your room doesn't have cupboards, you may be able to acquire some at inexpensive, second-hand outlets. Engines, fuels, kit boxes and other items may be able to hide away until needed in well-organized cupboards. My work room has some recessed cupboards under a stairwell, and I brought with me from one of the earlier shops a small metal cabinet for engine storage.

Lighting: It's an unhappy experience to show up at the flying field all filled with pride and ready to show off your latest masterpiece, only to discover a variety of nicks and flaws that you didn't spot in the dim light of the shop. One of the first things I devote attention to in setting up a new shop is the potential for lighting. My new spare room shop has good overhead lighting, but I have supplemented it with a single hanging bulb over the plane-building bench on an extension cord suspended from a plant hook; I may add another over the engine bench. In my garage shops I've been known to hang six or eight bulbs to get proper lighting; somebody with a little electrical skill probably could produce more permanent installations . . . the point is to light your work spaces brightly and without annoying shadows.



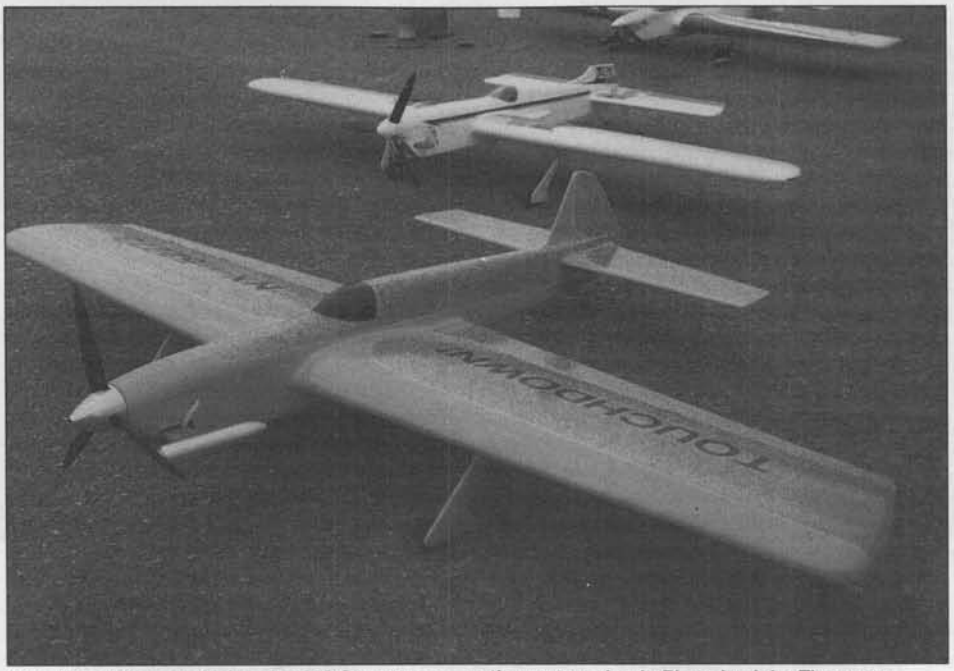
How about this scale C-47 by Bob Parker, seen on the 1990 contest circuit? Photo by Jim Cameron.

Heat: Naturally, your heat will depend upon your circumstances, but anything that can raise and stabilize the room temperature should be done. Insulation can make a garage more useful in winter. Wood stoves, space heaters, or just an open door from the house to the garage can help. If the temperature drops significantly when the shop is not in use, it's difficult to work with adhesives, and some, such as Sig Core Bond, can be ruined by freezing temperatures. At the least, you may be forced to either store your adhesives elsewhere or heat them in a pan of hot water before using them (Be careful! Some adhesives can become explosive or give off dangerous fumes when overheated (don't use direct heat). *CAUTION:* Take special care in your handling of chemicals in conjunction with your heating system. Many of the materials we work with are either flammable or can give off explosive fumes. Acetone, thinners, solvents, paints and fuel ingredients should be handled only in well-ventilated spaces. Remember that fumes can travel and could be ignited by open flames such as those produced by gas or wood heaters. No workshop should be without a small fire extinguisher.

Ventilation: In addition to concerns about

flammability, many of the chemicals we work with can give off harmful fumes. Your shop should have windows or other ventilation that can protect you and members of your family or pets from the fumes. Even with good ventilation, masks or respirators should be used, particularly with epoxy paints. I always use a dust mask when working with balsa wood because I, like many people, am sensitive to the dust.

Aircraft storage: In a garage you may have lots of rafter space to hang planes. Otherwise, it may be a challenge. Aircraft seem to take up the least space when suspended by the leadouts. In a house, spare clothes closets can work nicely. In my basement shop, I used flying wires, several of them wound together for strength, as a "clothesline" for the planes. In the past two shops, I have used another method: two-wheeled metal tubing clothes racks, purchased long ago (as clothes racks!) through the Sears catalog. These inexpensive mobile racks have a bar from which several airplanes (easily a dozen combat planes and six or eight profiles) can be hung. The wheels allow them to be pushed around to get them out of the way. I have them stored in a utility room because there isn't room in the shop itself.



"Touchdown" is Don McLave's 1990 Stunter seen on the contest circuit. Photo by John Thompson.

For most CL fliers, it's the flying that gives the hobby its real thrills. An efficient workshop optimizes the time that can be spent on the flying field and in the air. Giving a little thought in advance to setting up that shop, or to rearranging it for more efficient production, can enhance not just the building, but the flying as well.

In the "amazing coincidences department," as this discussion of workshops was being written, we received a note from another modeler who is going to be facing the prospect of setting up a new shop soon. Paul Forrette of Ben Lomond, California, who was mentioned in last month's column as someone who had recently returned to control line flying and had some questions about whether bellcrank "stops" were advisable, has an unusual and unfortunate reason for needing a new workshop:

"My flying has been limited to 1/2A RC at the schoolyard lately," Paul writes. "I have no place to build, except outside, and only in mild weather. Our house fell down in the 1989 quake."

Paul reports that the house had to be demolished and he is working to get the permits, contractor and other details in order for reconstruction. In the meantime, his family lives in a recreational vehicle.

"Every airplane I had was broken in some way," he adds. "I did the easy repairs and fly two or three. But the Flite Streak is OK, just that I can't find the lines and stooge. Everything was salvaged in a hurry before demolition, and is stored in one of four locations, all piled into whatever boxes or bags came to hand. Needless to say, we hope to have a house again. Every try to live in a single `room' as a family of four? Avoid it if you can."

Paul has not come in contact with other CL fliers in his area, the Santa Cruz area of California, but I'll bet there are some who would be more fun to fly with than that missing stooge. If I'm right, they can contact Paul at Box 3022, Ben Lomond, CA 95005.

• • •

They say that necessity is the mother of invention, but a good many inventions probably can be traced to a dose of frustration. Anyone who has ever tried to spray paint an airplane, holding the spray gun in one hand and the plane in the other, while not touching the painted area, not putting painted fingerprints all over the wrong parts of the plane, and not coming unglued (figuratively) in the process will appreciate a new product from Craftsman Models.

It's called, appropriately, the Finishing Friend System. Proprietor Steven Bales has come up with a "third hand" that he says will hold your airplane away from everything while allowing you to work with both of your natural hands. A series of photos in his brochure shows happy model builders demonstrating the tool for painting, filleting, sanding, installation of servos (what are they for?), etc.

The Finishing Friend System costs $39.95, including the tool, wing attachment system, mounting plates, and bench mounting bolts. Without the wing system, it's $33.95. Various accessories are available. For a catalog about products, write Craftsman Models, 1311 E. 161st St., Westfield, IN 46074.

• • •

There isn't a more Nobler name in model aviation than that of George Aldrich, creator of . . . of course . . . the Nobler, along with some other much respected modeling products. George was for many years a premier model engine reworker, among other things. George is back in business, and his brochure says he plans to offer "research and development and kit development, specialized import/export supplies and custom engine rework and repair. New to the business will be old-timer ignition engines, to be reworked and/or restored. We will try to supply most any item common to CL or FF based on availability." At least one series of new engines is to be part of the product line.

A list of his products and services is available. Write Aldrich Models at 12822 Tarrytown, San Antonio, TX 78233.

• • •

We're glad to mention that a new 1/2A combat kit is on the market, produced by Forward Models of Victoria, B.C.

It's called the Lite Kite and has a 28-inch span with what looks like (from a drawing included with the brochure) a lot of wing area and very simple construction. It's intended for competition with an appropriate engine such as a Cox Tee Dee, or for sport flying with a less powerful engine. The company plans also to release a sturdy 1/2A control line trainer in the near future.

For information, write Forward Models, 1183 Lockley Road, Victoria, B.C. Canada, V9A 4S7.

• • •

The second installment of our "Newsletter of the Month" feature puts in the center of the circle the *Topclass News*, the official publication of the Topeka Control Line Association of Kansas. It's edited by Travis Taylor of 3201 "H" Randolph, Topeka, KS 66611.

Topclass News, as of December 1990 was up to Vol. 16, No. 12, so it's been in existence for quite some time.

The December issue included:

- Club news and meeting minutes.
- Tips for improving the fuel pickup system in a Cox reed valve engine.

continued on page 84

PUZZLED ABOUT THE BEST CHOICE IN .30 SIZE R/C HELICOPTERS?

X—CELL THIRTY/FORTY SERIES

"You cannot accomplish what I have done this past year without very reliable equipment! It is nice to know that the precision and excellence that has become standard features in the .60 size X—CELL was also bred down into the .30 size machine." Wayne Mann

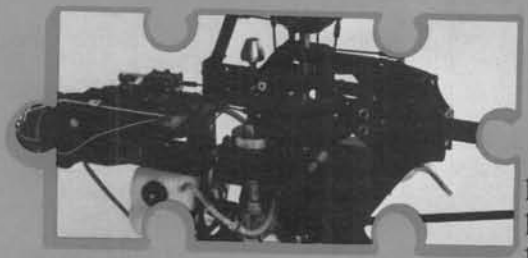
When the pieces come together, the X—CELL .30/.40 series is the **only choice.** While other .30 size models may be considered, the X—CELL .30/.40 series inevitabley draws the modeler searching for top quality, performance, and reliability.

"I use the X-CELL 30 exclusively at the R/C Flight Training Center due to its superior durability, stability, and forward flight characteristics. We've trained over 80 pilots and logged 2,600 flights with less than one percent of lost flight time from mechanical failure!" Ernie Huber

A Few Standards:
- X—CELL .60 rotor and control system.
- Autorotation w/reversible main gear.
- 6061-T6 anodized framework.
- Largest .30 size rotor dia. plus C.G. blades.
- Self-aligning clutch.
- Lowest parts prices.

The X—CELL is ideal for novice through expert, with full F.A.I. aerobatic capability as proven by national wins against all factory teams.

With 75 percent of its parts directly from the X—CELL .60 series, parts availability is unequalled!



1008	X-Cell .30 Helicopter Kit
1008W	X-Cell .30 Helicopter Kit with white frame set
1009	X-Cell .40 Helicopter Kit
1009W	X-Cell .40 Helicopter Kit with white frame set

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AN INTERVIEW WITH WAYNE MANN

BY JAMES WANG

For modelers who have been flying helicopters for the last two or three years and who have been to some helicopter contests, the name Wayne Mann might ring a bell. Wayne has been flying helicopters for six years. For the past two years he has entered numerous FAI F3C helicopter contests all over the country and chalked up many first and second places, which include 2nd place at the 1990 Nats, 1st at the Michigan Championships, 1st at Schluter Cup, 2nd at the 30-size Kyosho Contest, and many more.

*I first met Wayne at the Kyosho/*Model Builder *Challenge, in November 1990 in Reston, Virginia. I interviewed Wayne, and he revealed some of the setups that he uses for his contest machines. During the chat, Wayne said his goal is to be on the USA F3C helicopter team and compete in the 1991 F3C Helicopter World Championships. Wayne says he nowadays does more contest practicing than hot-dogging. A good contest machine is set up differently from a hot dogging machine, and you must practice the same contest maneuvers over and over to be consistent.*

Sometimes he will just go through hundreds of ball links while watching TV, to find the ones that give the right tightness. Wayne's profession is making a special stamped component that holds furniture together. Flying helicopters is just a hobby.

Wayne's contest machine is the stock X-Cell 60, Futaba 1024 9VH, and Blueprinted O.S. 60. Unlike other contest fliers, Wayne does not modify the models, but sets them up very carefully. The only option that he prefers is a fiberglass fuselage. He thinks that helicopters, especially contest models, fly a lot better with a streamlined fuselage.

We will be covering the US team trial for the F3C team when that takes place in May. Wayne has a good chance to qualify for the three-man USA team. We wish him good luck. Now, let's begin the interview.

Wayne Mann flies the X-Cell 30 with a Super Tigre 34H engine at the June 1990 Kyosho/*Model Builder* challenge in Champaign, Illinois. Here Wayne is doing the Nose-in hover maneuver. Tim Schoonard is calling for him.

Model Builder: What are the pitch curves that you use for your contest machines?

Wayne Mann: For normal pitch curve it's -3 degrees at the bottom, 6 degrees in hover, and 12 degrees on top. For Idle-up 1 it's -2, 5 and 9.5. For Idle-up 2, it's 0, 5 and 9.5., and for throttle hold, it's -5, 5 and 13. Normal pitch curve is used for hovering, and Idle-up 1 is used for everything else, including forward flight aerobatics.

MB: Do you use exponential controls?

WM: Only on the two cyclics. 16% each.

MB: Do you use auto dual rate?

WM: I used to when I was using the PCM-10, but not anymore.

MB: Do you use ATS tail rotor mixing on your Futaba 1024 radio?

WM: Yes, but I use the programmable mix instead of the ATS.

Helicopter WORLD

Wayne at the 1990 Reston, Virginia contest, doing the FAI Hovering-M maneuver with his stock X-Cell 60. The caller is Wayne Sumner.

Now Wayne calls for Don Chapman, of V-Tech and Whisper Tech tuned pipe fame, and IRCHA president. Don is flying his Concept 30 at the Kyosho/*Model Builder* Challenge.

MB: Any stunt trim when going into forward flight?
WM: Yes, I use the programmable mix to automatically feed in some forward cyclic, left cyclic, and left rudder. (See *Model Builder* March '91 and April 1990 issues for how to program the Futaba 1024 9ch and JR PCM-10 for stunt trim and tail rotor mixing.)
MB: What engine do you use?
WM: The O.S. 60 Short Stroke, ringed version. But I'm now trying a Long Stroke rear exhaust and maybe will put this in the new X-Cell Triumph.
MB: As you are using the U-shaped tuned pipe, do you adjust the header length to tune the engine?
WM: No.
MB: What glow plug do you use?
WM: Enya number 3.
MB: How do you break in the engine? On the bench?
WM: No, just in the heli. Heat range is not critical for ringed engines.
MB: What fuel do you run now?
WM: Magna 30%, and I run the engine rich, with lots of smoke.
MB: How do you set the top end pitch?
WM: I set it so the top end just bogs down slightly.
MB: What is your collective setting for rolls?
WM: Half-stick on entry and all the way to zero degree pitch when the model rolls to the 90 degree position.
MB: Any tail rotor input during the roll?
WM: Yes, some just to bring the nose right.

Tim Lampe, of Great Planes, awards Wayne the second place plaque at the 1990 Kyosho/*Model Builder* Challenge. Wayne travels all over the country at his own expense to compete with RC helicopters.

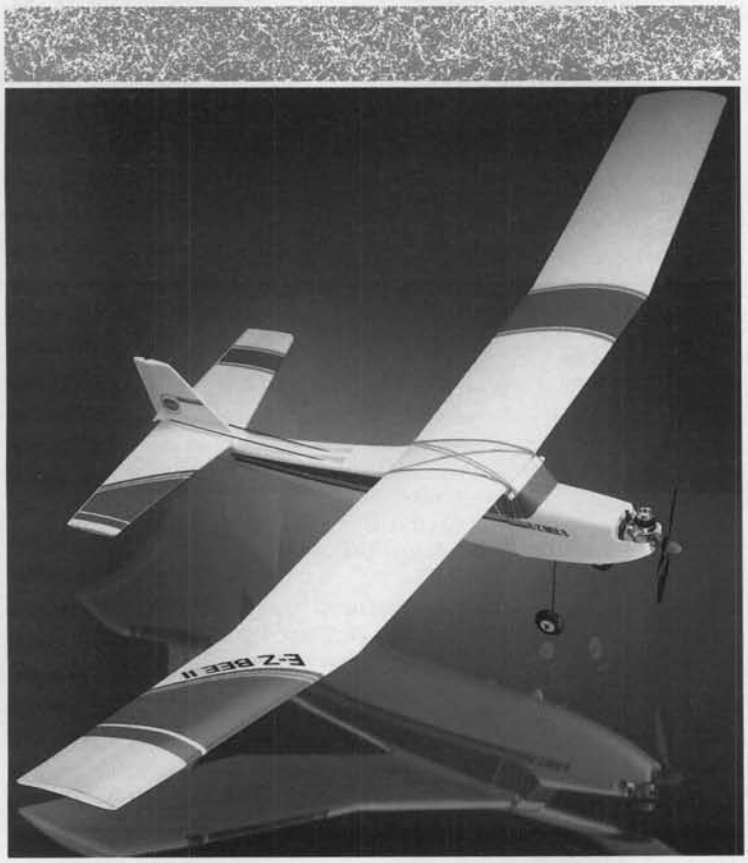
MB: Do you pull back on the elevator during the roll.
WM: No.
MB: Do you perform the rolls downwind?
WM: Yes.
MB: When doing the FAI loop, do you correct with left/right cyclic?
WM: Yes.
MB: Have you tried programmable mixing the left/right cyclic with elevator command to correct for the elevator/aileron phase?
WM: No, I just correct for it. Also in hover, the elevator/aileron phasing is different than in forward flight aerobatics. The ideal way is to have an inflight adjustable phase change mechanism.
MB: On the rolling stall turn do you start the half-roll just before the model reaches full vertical?
WM: No. You need speed for this maneuver.
MB: Do you perform the rolling stall turn upwind or downwind?
WM: Always upwind.
MB: Regardless of which way the wind comes, you always do your maneuvers with respect to wind direction and not to the ground?
WM: That's correct. I have to be comfortable doing the maneuvers from the left or right.
MB: For the 540 stall turn, do you yaw to the left or right?
WM: It doesn't matter.
MB: For the 540, do you go upwind or

continued on page 85

Avoid ARF Shock

ARF shock *(Almost Ready to Fly* shäk) **n. 1.** sinking feeling that occurs when dreams of quickly assembling and flying an "ARF" labeled R/C airplane are dashed **2.** initial reaction to the sight of scores of pieces that need to be built, and parts that must be glued **3.** dismay that costly additional component purchases are needed

COX Airplanes Live Up



E-Z BEE II 55″ Wingspan
31″ Length
Cox .049 Engine Powered

The most stable, best flying engine powered beginner R/C airplane. Now, two servos provide independent rudder and elevator control.

Take the lid off the package of any Cox brand R/C airplane and it's immediately apparent that Cox has set the standard for the term "ARF" by providing the world's most complete, "user friendly" R/C airplanes.

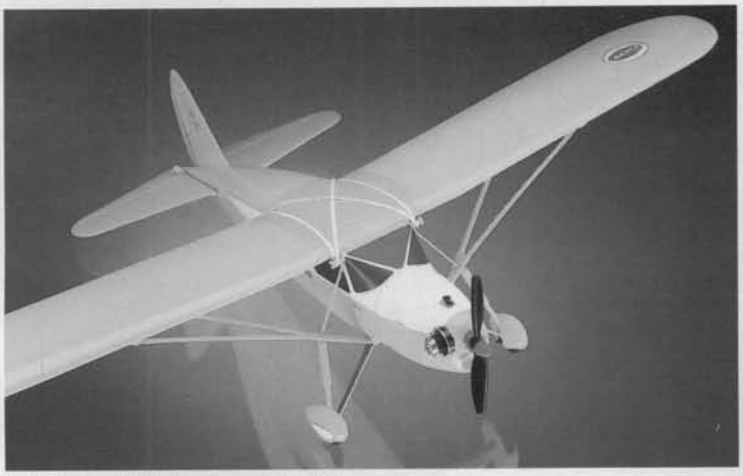
Right at the factory, Cox takes care of all the difficult, time-consuming, error-prone steps that are common to the R/C airplane building process.

All the construction prevalent with other ARF brands has already been done by Cox. In fact, every Cox R/C airplane is designed with such extreme attention to ARF considerations that even the most common step in typical ARF kits, that of gluing, has been completely eliminated! All that remains is for you to assemble the finished component parts.

Purchasing a Cox R/C airplane requires no additional, costly accessories. When you purchase a Cox R/C airplane with radio, your only required separate purchases are Alkaline batteries for the radio system and, if your model is engine powered, a Cox 400 or 990 kit with fuel and starting battery. Cox electric airplanes always include Nickel Cadmium motor batteries.

Each Cox ARF is outstanding in flight. They all have different flight and performance characteristics. Read about each individual airplane and ask your local hobby store for the one that fits your needs best.

Cox Hobbies, Inc.
350 West Rincon St.
Corona, CA 91720



FAIRCHILD 24 38″ Wingspan
28″ Length
Cox .049 Engine Powered

A classic favorite among scale airplane buffs, the Cox .049 Fairchild provides an attractive, stable scale R/C airplane at a very affordable price.

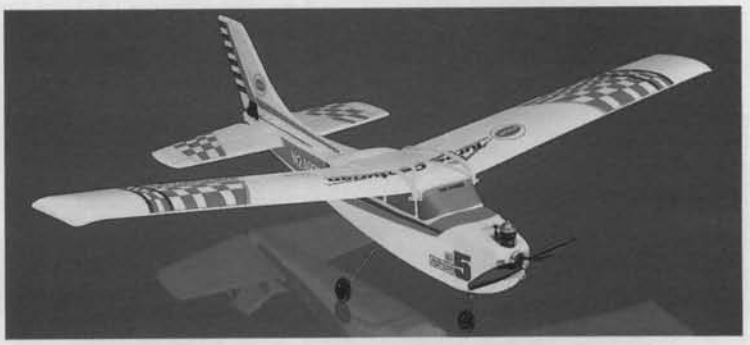
CESSNA SKYLANE 36″ Wingspan
31″ Length
Cox .049 Engine Powered

Cox's fastest model, this "turn-on-a-dime" R/C airplane also provides the stability novices need to learn intermediate level aerobatics.

To The ARF Claim . . .

ELECTRIC SUNDANCE 55″ Wingspan
31″ Length
Electric Motor Powered

Large, glider-style wings and two-servo rudder/elevator control enable beginners to learn to fly and advance to basic aerobatic maneuvers.



TURBO CENTURION 27″ Wingspan
20″ Length
Cox .020 Engine Powered

The easiest to fly gas powered R/C airplane ever. The accompanying FailSafe radio system replaces transmitter sticks with buttons. To turn, just push the right and left buttons.

FLYBOY 27″ Wingspan
20″ Length
Electric Motor Powered

Everything possible . . . motor, radio system, rudder, push rods and even decals . . . is factory assembled. Incredibly easy to fly, the special FailSafe radio system enables anyone over 9 years old to fly.

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Helicopter WORLD

CHOPPER CHATTER

BY JAMES WANG

In this month's "Chopper Chatter" column, we'll go over some of the models that we have reviewed in the past few months, to share new things learned after logging many more flights on these models. We will finish up from where we left off last month on setup techniques for the beginners. We also have a short story from a beginning RC helicopter pilot, who will be telling his experiences regarding his first week of RC helicopter flying. His experiences may be very helpful to other beginners.

By the way, the picture of the dog chewing on a helicopter was taken after my friend Gary Frank accidently rammed his new X-cell 40 into my Schluter Champion in mid-air. It was not the dog who did the damage. The collision was a nasty experience. We saw parts raining down from 100 feet, spreading over a 100-foot diameter, and one of the servos was never found. The moment the mid-air occurred, we both stood there aghast and looked kind of dazed. The collision was so harsh that Gary's servos, receiver, and battery pack were lodged inside my helicopter and came down with my helicopter. Not a single lead wire on his five servos remained. His main blade also chopped my Champion tail boom cleanly in two.

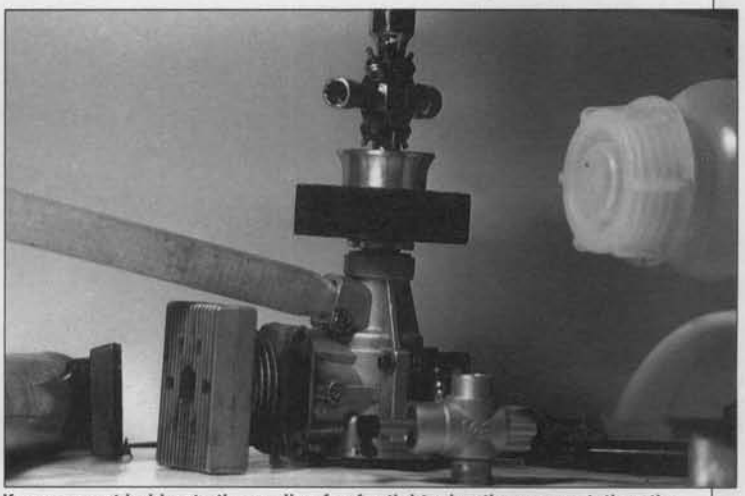
This is like Chicago O'Hare Airport at rush hour. The three GMP Legends belong to (from top to bottom) Jim O'Brien, Mike Donnell, and Peter Cooke. Our columnist promised them that the closer their rotor blades got, the more likely that their picture would be printed in the magazine.

This is what happens when you leave the helicopters unattended and go to the car to grab your lunch. A torn up Champion and a badly damaged X-Cell 40. The dog is only adding insult to injury! Read the text for more details.

Okay, the tip for this month is to get yourself some Zap A-dap-a Goo, made by Pacer Technology, the same people who make Zap CA glue. The Zap A-dap-a Goo is less than $5 a tube. It is not like CA glue, nor like silicone glue, it is more like plastic model airplane glue. It has that strong model cement smell. This stuff is excellent for gluing plastics together. It glues canopies together better than CA because it does not make the plastic brittle; it sort of melts the parts together. I have also used it for repairing Concept windshields, and mended cracked Concept servo trays. This glue does not dry hard. It remains slightly flexible, but not as flexible as silicone rubber. It dries in two minutes, but takes 24 hours to fully cure. It is excellent!

The other tip is that most people know that JR servo connectors can plug into Futaba radios without any modification. And, they will work fine, too. Futaba servo plugs require some shaving, then they can also be plugged into JR radios. However, Airtronics servos have the plus and minus wires reversed from the JR or Futaba. Instead of cutting the pigtail off a JR or Futaba servo when you want to fit them onto an Airtronics receiver, here is an easier way of exchanging the plus and minus wires. Look at the flat side of the JR or Futaba connector, you can see the gold plated contacts have a little clip protruding from the black plastic connector. Just take a model knife and lightly press on the gold plated connector clip from on top of the plastic connector, then the wire connector can be pulled out. Then just exchange the plus and minus and slip them back into the plastic connector. Same thing can be done for the Airtronics connector. But

The Robbe/Schluter Prokopter mechanics. It is made from molded glass-filled nylon. Very light weight and strong. Similar to Heim mechanics, it has counterclockwise rotation main rotor, and needs CCPM mixing. This unit is for the pod-and-boom Prokopter, but it is ideal for Robbe's scale fiberglass fuselages.



If you cannot hold onto the cooling fan for tightening the prop nut, then the proper way of preventing the crankshaft from turning is to stick a hard maple wooden piece into the engine to prevent the crankshaft turning. The carburetor must be removed to do so. Never stick anything into the exhaust to prevent the piston from moving. That will ruin the engine immediately!

shaving still needs to be done for the Airtronics connector to fit the JR or Futaba receiver.

The next tip is regarding painting of the canopy *(In helicopters, James refers to the whole body pod as the "canopy," not just the see-through portion. wcn).* Fluorescent colors are the `in' thing. These day-glow neon colors are easy to see, too. Pactra makes these neon colors for RC cars, but they come in a little spray can that is barely enough for one canopy. The local auto store like, Pep Boys or Trak Auto, sells large 14 oz. neon spray paint at really low prices. Before spraying the clear canopy, a coat of white undercoat must first be sprayed on. The white undercoat increases the brightness of the neon colors. Let the white paint dry completely, at least one day, then spray the neon color. Then add all the decals. The neon color will have a matt finish look now. Therefore, a coat of clear Formula-U must be sprayed over the entire canopy to bring out the shine. The clear also seals the decals and protects the neon paint from fuel and grease.

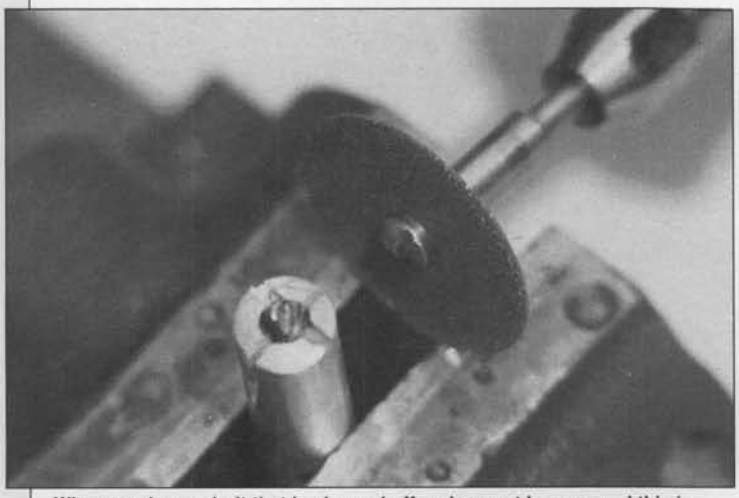
This Concept 30 with Hughes 300 body parts belongs to Herb Carter of Virginia. He is a new member at the local MRWV Club.

Jim O'Brien's Legend with a long Hatori tuned pipe. It sounds very good, and has lots of power, too. The header is from Century Super Tuned Pipes. Royce Brademan did the paint job.

Now, let's re-examine the Robbe Whopper autogyro that we reviewed in the March 1990 *Model Builder.* We are now using the new narrow chord and Clark-Y, flat bottom airfoil blades on our Whopper. These blades are an optional accessory from Robbe. Everyone who has flown the Whopper agrees that these new narrow chord blades are a "must" for the Whopper. They are three inches longer and come with lead weight already glued in by the manufacturer. They improve the performance substantially. The stock kit blades have very wide chord (about 3.25 inches) and have a strange undercamber airfoil that does not work well. With the new blades the takeoff run reduces dramatically, and the Whopper can fly a lot slower. They just seem to be a lot more efficient.

We also had a new O.S. 61 engine installed. With the new engine and 12-6 prop and Robbe header/MAC tuned pipe, we can get 13,000 rpm on the prop. You should tach your engine, and be sure to get 13,000 rpm before trying takeoff.

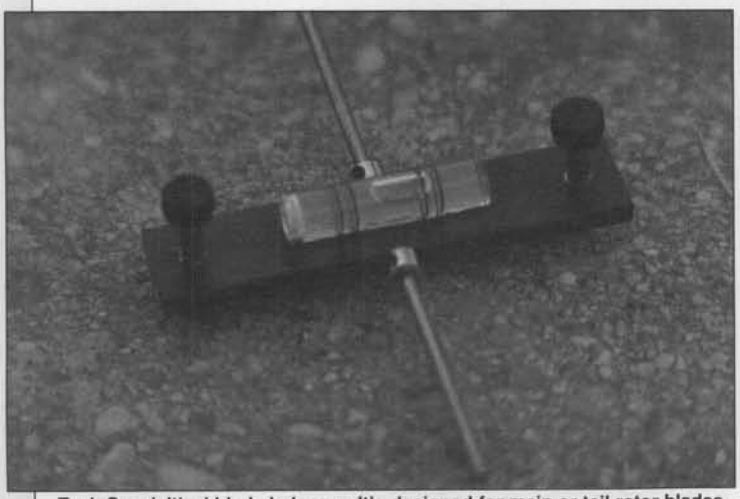
My friend Gary Frank suggested that it is actually easier to



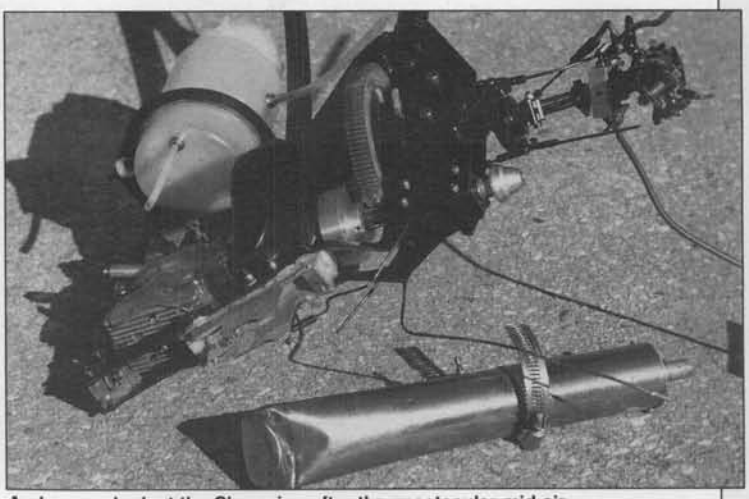
When you have a bolt that is sheared off and cannot be removed this is what to do. Take a Dremel cutting wheel *(The House of Balsa Tuff Grind Wheel is better. wcn* and cut a slot in the bolt and the part that the bolt is stuck into. Then you can use a small flat-head screw driver to unscrew the stud.

Our columnist, James, trying to land his electric Whisper on top of the wind sock. Full review in the next issue.

disengage the main rotor drive after the Whopper has lifted off the ground by about five feet. This ensures the rotor speed will not decay. Even though the rotor drive is engaged during the first seconds after getting airborne, it did not seem to cause the model to yaw immediately. Gary even looped my Whopper (at least five



Tech Specialties' blade balancer. It's designed for main or tail rotor blades. The unit can be held by fingers or put on a High Point balancer or on two razor blades.



A close-up look at the Champion after the spectacular mid-air.

times!) and then proceeded to try a roll. Yes, this is the same Gary who crashed into my Champion at 60 mph! Half way through the roll we saw the blades almost came to a stop. He chickened out, and pulled back on the elevator and did a split-S out of the roll. Another friend, David Ramsey, told me that Mark Powelson has rolled his Whopper. Well, another local flyer, Jim O'Brien, suggested that maybe instead of doing a roll with just the roll cyclic command, full rudder needs to be fed in at the same, too. We will try that and let you know the results. During the loop, a lot of rudder correction needs to be fed in to keep the loop straight.

After we put on the new blades we were very impressed by the Whopper. It is certainly a very unique flying machine. Everyone at the field enjoys watching it. The trick to a soft landing without the blades coming down to strike the vertical fins is to reduce the airspeed all the way. The model will not tip-stall like airplanes; it will just sink. If it is sinking too fast, just add some power. You should always do the takeoff run on a smooth grass or asphalt surface, because bumpy ground causes the Whopper to ground loop or bounce into the air prematurely. The consequence is that the rotor blades will flap downward too much and strike the balsawood fins. This hazard is almost unavoidable because the autogyro rotor shaft must be tilted back to produce lift, this makes the tip of the blades dangerously close to the fins.

The next update is on the Concept 30. We reviewed the Concept 30 SE in June 1990, and the SX in May 1991. In the last issue we suggested adding a half-inch long piece of nylon tiewrap underneath the rubber O-ring in the main rotor head to help stiffen the blade flapping action. After extensive flying with this setup, we really like the cyclic response of this modification.

Helicopter WORLD

Comparing my modified SE to a beginner's SE that is unmodified, there is some difference. From a hovering position, my Concept can now tumble nose down into an inverted hover. To do this stunt, simply hover the model about 50 feet high, then punch in full collective and full forward cyclic at the same time. The model will flip forward and become inverted. With the extra cyclic response, my friend Peter Cooke was doing fast hovering rolls with my Concept without any problem (However, he likes to fly them ten feet off the ground). Even with the modification, the head is still too soft to do the snap roll maneuver. My old GMP Cobra does great snap rolls. To do it in forward flight, just zero the collective pitch, then pull full up cyclic, full right cyclic and full left tail rotor.

We have found that the perfect blade weight for the Concept and Enforcer is around 90 grams. This gives excellent autorotation capability, and the dynamic stability in hover and forward flight is also improved. And this significantly reduces the nose-up tendency in forward flight. For a slightly more lively aerobatic performance, 85 grams will be fine. The stock foam blades on the Concept weigh 77 grams. The expert wood blades are about 85 grams. Tech Specialties in Pennsylvania makes Concept and Enforcer blades that weigh 85 to 90 grams and with a lot of balsa wood at the trailing edge to help move the chordwise center of gravity forward to prevent flutter. The forward chordwise cg blade also acts like the yaw rate gyro to introduce feedback effect to help stabilize the entire helicopter. The tiewrap mod improves the blade tracking on Concept, too.

Bill Curtis is the fellow running Tech Specialties. He has taken over the GMP product line. Bill says he will be continuing the production of GMP Rebel and Legend kits, and is now introducing a new modified Legend called the Phoenix. The new 60-size Phoenix/Legend has a machine-cut delrin main gear that gives 9.3 to 1 engine to main rotor gear ratio. The old Legend has 8.7 to 1 ratio. Most 60-size machines now on the market have between 9 and 10 to 1 gear ratio. Higher gear ratio is better at transferring torque from the engine to the main rotor and also allows the main rotor to rev slower while the engine is still kept at peak rpm.

The new Phoenix will also have new side frames to accommodate the new gear. It will also come with new style landing gear, new canopy and new seesaw and mixing arms that give a different mixing ratio. I am not sure why Bill changed the mixing ratio, the old Bell-Hiller mixing ratio seems to be quite good. Bill says instead of washers, the new Elite head has O-rings to shim the bearings. We have not seen the Phoenix yet, we will let you know when the production starts. If you like to know more about it, call Bill Curtis at (412) 588-1335.

If you are already doing aerobatics and would like a pint size rocketship that tracks beautifully in forward flight, then give the Shuttle ZX some serious thought. This machine does not exhibit pitch up tendency in forward flight. It flies very much like a scaled-down 60-size bird. Without any modification, the stock ZX gives +10 to -7 degrees of collective pitch travel. The main blades are also longer and narrower than other 30-size helicopters. This improves the main rotor efficiency.

Considering the price, the ZX with the Enya 35 already installed is a very good deal. I was quite surprised that two of the ZX kits I have seen do not have any engine vibration at all. These two are ARF kits and have the engine installed by the factory. We are quite impressed by the flight performance (see Dec. 1990 issue). However, the crash-worthiness may not be ideal. When a Shuttle crashes the results are a little nastier than a Concept crash. But Shuttle parts are relatively inexpensive. The way the Shuttle flies, it is so smooth, and the cyclic responses are crisp and fast, it is well worth a try.

The Concept is just one incredible machine, it can just keep on taking abuses. Of all the models on the market, we rate the Concept as the model that has the best crash worthiness. This makes it almost ideal for learning or tooling around the sky. The only weakness is that the blades can flap too easily which can cause tail boom strike.

For Concept and Enforcer owners, you may want to try a Schluter Champion or Junior tail boom. The Schluter tail boom has a slightly smaller diameter but it will fit the Concept or Enforcer without any problem. I have replaced my Concept tail boom with one from an old Champion. Schluter tail booms have a much thicker

cont. on page 86

ELECTRIC POWER

BY MITCH POLING

CALCULATING EFFICIENCY

You may have seen pretty graphs called "motor curves" in some of the advertising for car motors, or in Bob Boucher's book on electrics. So far I have not said much about how to draw motor curves, though I have given you most of the information to do so. I like motor curves because they make a "picture" of the motor performance. I use the percent efficiency, power out, and current draw graphs to decide how I want to use the motor.

There are several ways to calculate percent efficiency. The easiest is what Ed Westbrook calls the "lossless wonder," where the internal losses of the motor are not accounted for. This is the method I have described in previous columns. But, motors do use up energy just to turn themselves. This affects efficiency, especially at currents below 15 amperes. Finally, the battery pack also has a percent efficiency, due to internal resistance and wiring resistance. The combined efficiency of the power package is the motor efficiency times battery efficiency. This is the curve I find the most useful.

You need the voltage constant for the motor (K) and the armature resistance (R) to make graphs. There are several methods for measuring these. I described the "spin up" method last month, and simultaneous equations using props in previous columns. The next step is to decide how many cells the motor will run on for this graph. Please note, the graphs do not tell you what the best cell count is. You have to decide that for yourself. One way to do this is to try several graphs, going up in cell count until you have an optimum percent efficiency and power out. The constraints will be current and rpm. Generally you will not want to run above 20 amps for ferrite motors, 30 for cobalt, and above 15,000 rpm for ferrite, perhaps 20,000 for cobalt.

If you want to do percent efficiency that accounts for motor internal losses, you will also need the motor terminal voltage and current draw for the unloaded motor on the

(Above right) Fred Sauerberger contributed all of this month's photos, taken at the last KRC meet. Seen here is electric guru Keith Shaw getting his "King Crimson" flying wing ready for a flight. From this angle, you can see the four motor nacelles (Leisure 05s), but you'd never guess this monster spans a full ten feet.(Right) Laddie Mikalasko shows his "Easy-E," a high-performance, high-wing aileron ship for 05 power systems.

battery pack you plan to use for the graph. Call these V_o and I_o. These will give you the "loss resistance," that is, the amount of resistance the motor needs to overcome just to turn itself with no load. The loss resistance, R_L, equals V_o/I_o. The Kyosho LeMans 480G motor, for example, on six cells with no load shows a motor terminal voltage of 7.38 volts at 1.2 amperes. The loss resistance is then 6.15 ohms.

At this point it is easier to do the rest of the calculations if we use a concept called the "back voltage." This is the voltage generated by the motor if it is spun by an outside source, i.e., acting as a generator. The back voltage formula is: V_b = Kxrpm, or V-IxR where K is the motor constant, R is the armature resistance, I is motor current, and V is the motor terminal voltage. Using back voltage, the power out is IxV_b for a "lossless wonder" motor. If you calculate the effect of losses the power out is $IxV_b - V_bxV_b/R_L$.

Now we are ready to do a graph. The following table is for the LeMans 480G motor on six cells, R = 0.093 ohms, K = .33 volts/1000 rpm. The pack is assumed to be 1.25 volts per cell, internal resistance 0.009 ohms per cell (Note: most packs are 0.012 ohms/cell, the 0.009 is for the handwired packs I described in the April column), 0.020 ohms for the wiring.

I	V	Pi	PO	RPM	M%	MxB%
2	7.35	15	6.0	21500	40	39
5	7.13	36	27	20400	75	71
10	6.76	68	54	17700	79	71
15	6.39	96	71	15000	74	60
20	6.02	120	80	12600	67	54
25	5.65	141	81	9970	56	42
30	5.28	158	74	7400	46	32
35	4.91	172	58	4970	33	22
40	4.54	182	33	2500	18	11

Let's do 20 amperes as an example: I = 20, so V (motor terminals) = no. cells x 1.25 volt - no. cells x current x resistance per cell - current x resistance in wire = 6x1.25-20x6x.009-0.020x20 = 6.02 volts at the motor terminals. Power in is motor terminal voltage x current = 6.02 volts x 20 amperes = 120 watts. Back voltage is terminal voltage - current x armature resistance = 6.02-20x0.093 = 4.16 volts. Power out including internal losses is current x back voltage - back voltage squared divided by loss resistance = 4.16x20-4.16x4.16/6.15 = 80.4 watts. The "no loss" power out is back voltage times current = 4.16x20 = 83.2 watts. Rpm is the *no loss power* out times 1000 divided by current and the motor constant = 1000x83.2/(20x.33) = 12,600. Percent efficiency of the motor is 100 times power out divided by power in = 100x80.4/120 = 67%. Battery pack efficiency is 100 times motor terminal voltage divided by the unloaded pack voltage (i.e., 6x1.25) = 100x6.02/7.5 = 83%. The overall power package efficiency is the motor efficiency times the battery efficiency divided by 100 = 67x83/100 = 56%.

Now for graphing. The vertical axis is percent, power out, and current. I like to use the horizontal axis as rpm. Often manufacturers prefer to use torque for the horizontal axis. Torque (Nxcm) = 0.955 x current x motor constant. If you like oz.-in., use 1.35 instead of .955 in the equation. The rpm and the torque horizontal axis graphs will look much the same, except that the rpm graph will look reversed compared to the torque graph. This causes no problems in using it, though. I usually use a scale of 0 to 100 for the vertical axis, and make a note underneath showing what multiplier is needed to make the scale read amps, or watts. Efficiency, of course, reads very nicely as 0-100. The result is the graph as shown here for the 480G motor. I did all the calculations on a TI 30 hand calculator, and the graph on the good old engineering graph paper I remember so well from college. I don't have a computer; in a moment of brain fade, I left my Atari 800 XL in storage when I moved. It would have done nicely for doing all the calculating and plotting work. I have ordered a computer so I can crank out these graphs by the dozens!

The dotted line shows the percent with no motor losses. You can see that at currents of 20 amperes or higher it is pretty much the same as the percent with losses. At 10 amperes or less, it is quite different, of course.

Using the graph: a good operating rpm for this motor is 12,500. Draw a line straight up from 12,500, and you find the system is at 53% efficiency, and 80 watts, close to maximum power. This is a good rpm for direct drive. For gear drive, 15,000 rpm is a good point; efficiency is 60% at a current draw of 15 amperes, and the power is still high, about 70 watts.

Thank you, Ed, for the info on loss resistance, that was the key to getting these graphs. I welcome any letters from readers who try the motor testing methods and graphing, as I would like to know how it works for you. I know that it looks technical, however, the math is not difficult, especially with a calculator. When you are done, you get a feeling of accomplishment, and a much better feeling for what motors can do. The cost for the test equipment is reasonable; the Royal tachometer is less than $40, and so are the digital voltmeters.

I did some more "spin up" testing, and here are some more motors to try:

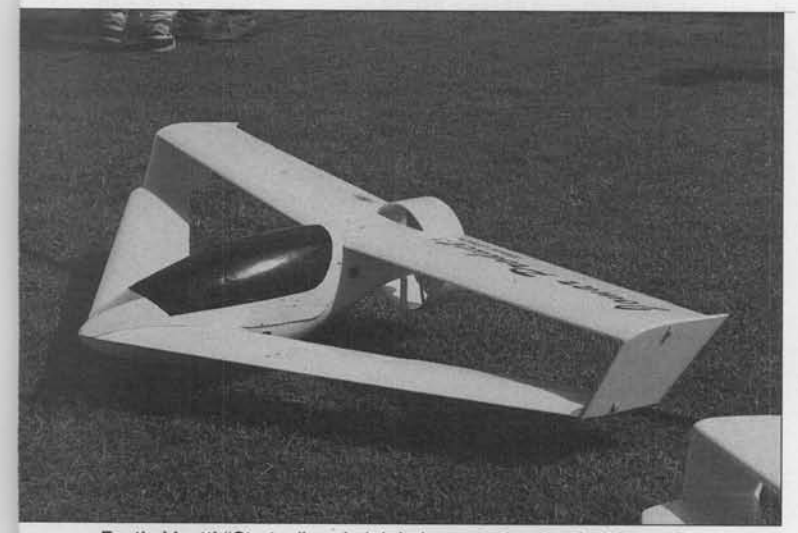
Motor	K (volts/krpm)	R (ohms)
LeMans Kyosho 240E	0.406	0.114
LeMans Kyosho 240S	0.276	0.061
1987 Astro Ferrite 15	0.826	0.312
Keller 25/12 cobalt	0.973	0.382
Keller 50/24 cobalt	1.876	0.244
LeMans AP 29	0.310	0.142
1988 Twister	0.314	0.107

Most of these motors draw about 1.0 to 1.5 amperes on no load, no matter what the battery pack. This means you can estimate the loss resistance for all of them, just use the number of cells x 1.25 volts divided by 1.2 amps (an average value). This in turn means you can do graphs including losses for all these motors, and the ones from the May column as well. Some motors do draw more or less than the 1.2 amp average value. Small motors draw about .5 amperes. Large

(Top) We love it! Quarter-scale Ford plane, by an unidentified builder, makes a cute and interesting subject, needs only the addition of dummy engine cylinders. Uses a direct-drive Astro cobalt motor of unknown size. (Above) Another quarter-scale electric, a Velie Monocoupe, also by an unidentified builder; but at least in this case we *do* know it was built from Bob Boucher's plans that appeared in the August '78 *MB*.

motors, especially the cobalt motors, draw up to 3 amperes on no load.

I have a question for some of the experts, or even those who would like to venture a guess. The no-load current is nearly a constant for a given motor, no matter what the size of the battery pack. For example, the LeMans 480G motor, no load, draws 1.0 amps on two cells, and 1.2 amps on six cells. Why does the current stay so nearly constant? Why doesn't it go up? I don't know the answer!



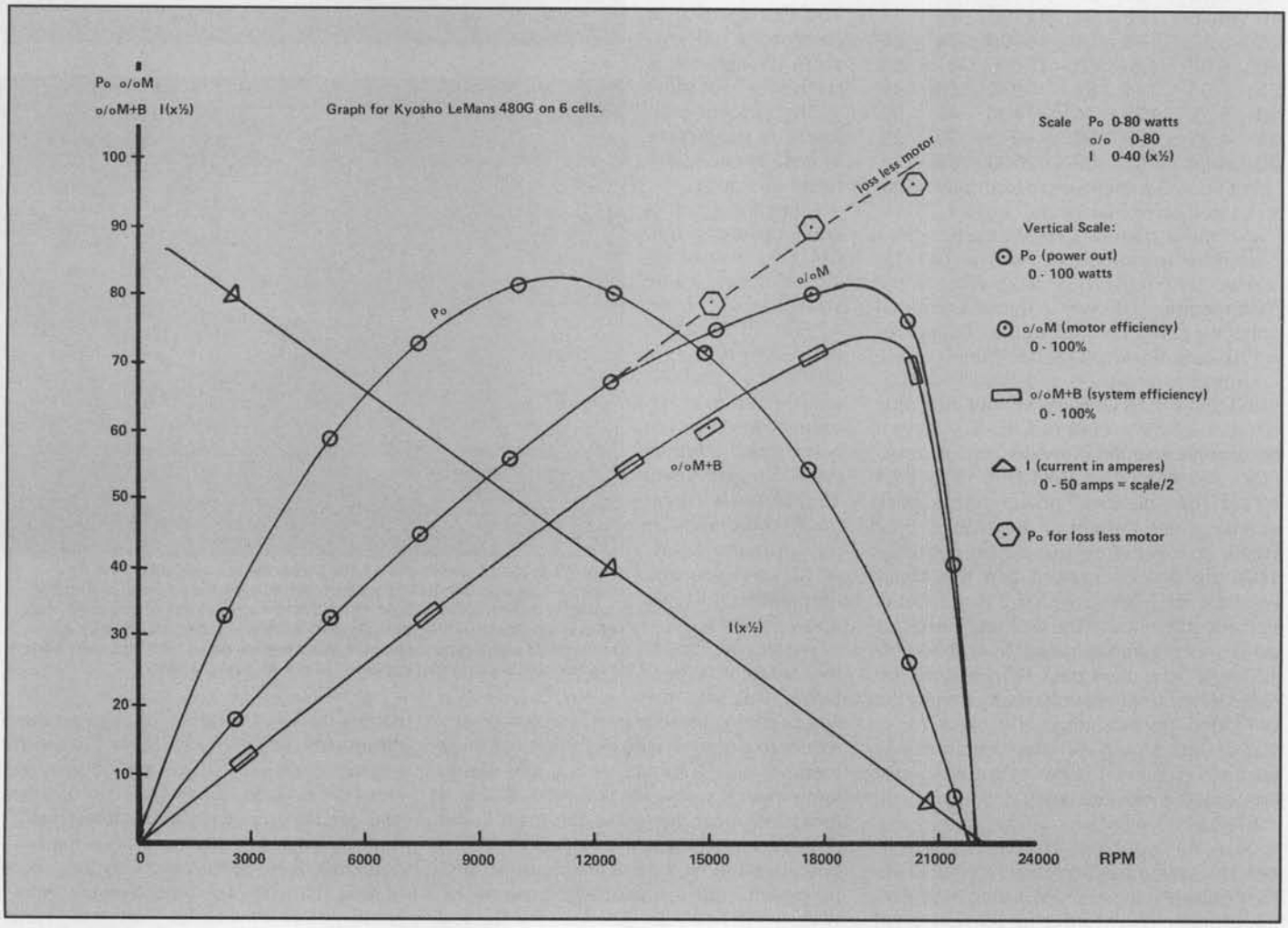
Exotic Ligetti "Stratos" scale job belongs to Joe Utasi of Jomar Products. No reports as to how well it flies.

A few months ago I mentioned a product that has been advertised with claims that it enhances electric contacts. John Mountjoy gave it a mention in his column in *RC Report* also. The following is a quote from Application Note 13, Revision 1 from D.W. Electrochemicals Ltd., Canada: "Stabilant 22 is an initially non-conductive block polymer that in a thin film under the effect of an electrical field or when used in a very narrow gap between metal contacts, becomes conductive." Later in the note it says, "While Stabilant 22 exhibits surfactant action it is not sold as a contact cleaner. Equally it exhibits quite good lubricating properties but is not sold as a contact lubricant. Its metier is in its active properties when used in a connection and the other properties are a bonus."

Sounds good, so I asked for, and got, a free sample, from TEN Industries, P.O. Box 126, Essex, VT 05451. Prices, by the way, are steep: $38.99 plus $3.00 shipping for a 15 ml bottle that is diluted to 20% Stabilant 22, 80% isopropyl alcohol (drugstore rubbing alcohol). By the way, I still don't know what Stabilant 22 is; there is absolutely no information on that in all the pages of writing I got on it. That would have been interesting to me, as I am a chemist.

Anyhow, I did tests on it, and got the following: Sermos connectors, 0.28 milliohm before S22, 0.25 mohm after; gold-plated pin connectors 0.39 mohm before, 0.32 mohm after; Molex tin-plated connectors 2.1 mohm before, 2.0 mohm after; homemade brass tubing connectors 0.33 mohm before, 0.34 mohm after. Keith Shaw also ran tests and got similar results. I wrote Terry Norton at TEN Industries saying that essentially I saw no improvement with Stabilant 22. Terry replied, "The tests you ran are pretty good, but you are just a little bit off base on what Stabilant 22 does. I am an electrical engineer myself, and I know nothing is going to improve a connection that is already perfect, not even Stabilant 22. Stabilant 22's properties are excellent in the reliability department." Later in the letter he says, "High current through a connector causes heat, which in turn causes the connection to become more susceptible to oxidation, resulting in more heat. The cycle

continued on page 102



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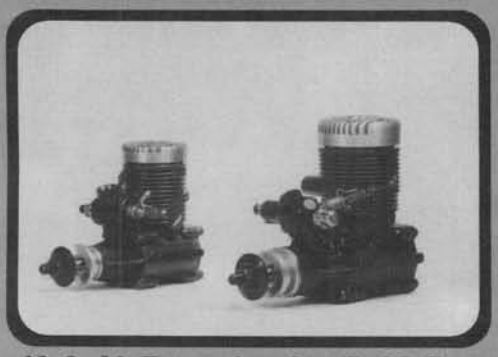

40 & 61 Front intake Gold Cup

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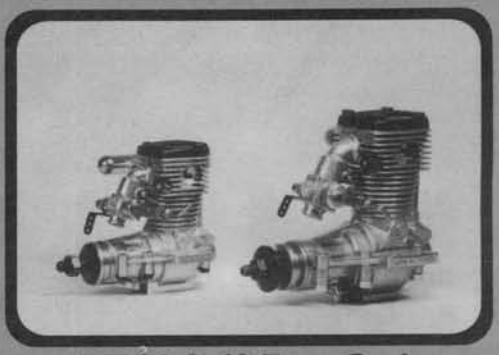
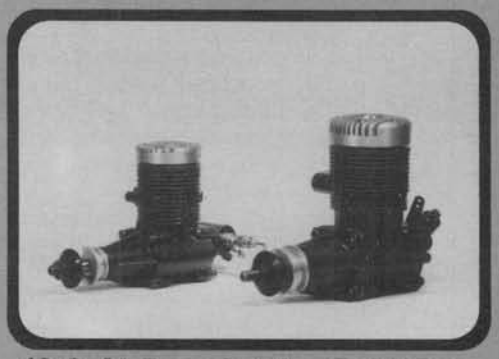


VT 21 & 49 Four Cycle



40 & 61 Rear intake Gold Cup

HP is well known for their ultra high quality and design innovations. A leader of model engine technology since the mid 1960's, they pioneered Schnuerle porting and rotary four cycle valves.

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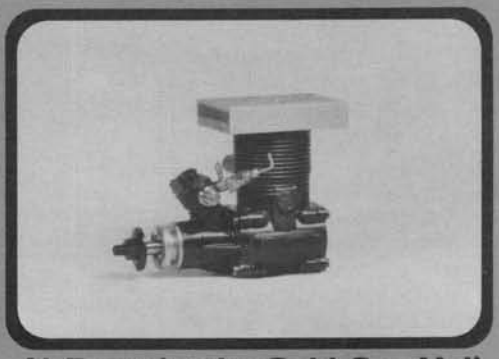
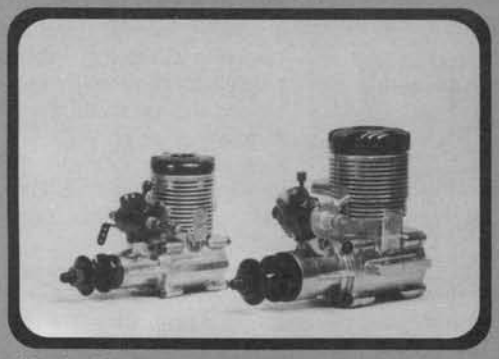
HP is American owned by RJL Industries, so parts, service and technical assistance are just a phone call away with the owners of the factory, not just an importer or distributor.



61 Front intake Gold Cup Heli



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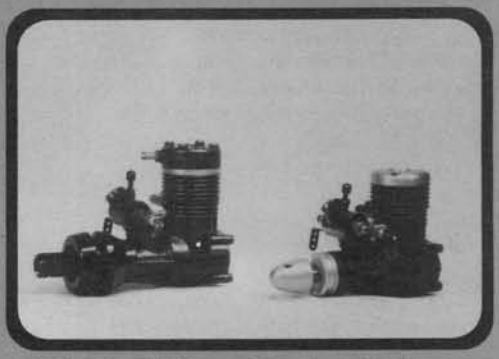
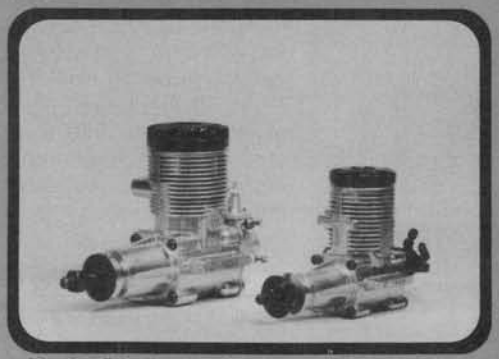
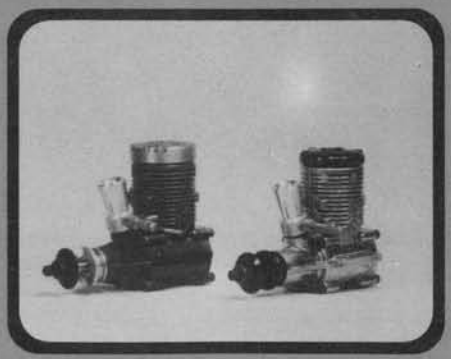


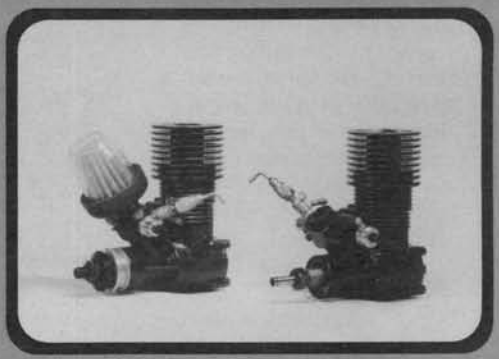
20 Gold Cup Marine & Aero



40 & 61 Rear intake Silver Star



40 GC & SS Control line



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PYLON

BY WAYNE YEAGER

BUILD A MECHANICAL STARTING CLOCK

As mentioned last month, we have a design for a clock mechanism that is completely mechanical, resulting in a maintenance-free, easy-to-use, starting clock. We have tried the electric versions that ran fast at the start of a contest and ran slow at the end, and always seemed to need calibration again some time during a race. I've seen a couple with voltage regulator circuits that eliminate the problem, but those clocks still require battery charging, which is a pain because it is just one more thing to be remembered.

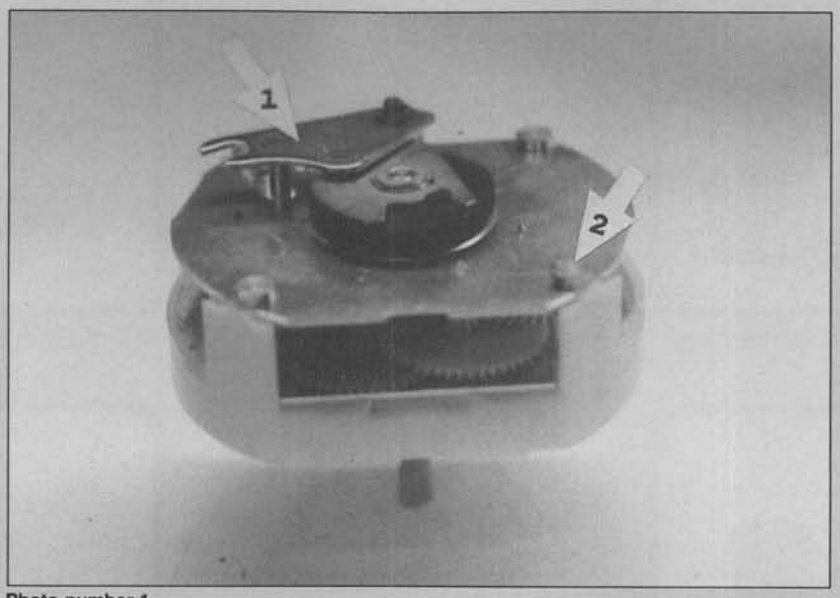


Photo number 1.

A couple of years ago, I built a mechanical clock that ran well, except it was built utilizing a modified two-minute timer, resulting in less than a full 360 degree sweep for the required 90 seconds.

Since then, I've had a couple of conversations with Henry Bartle from the "Left" Coast, and after exchanging some ideas, Henry went on a research and development mission, and found a way to modify a mechanical timer to give the desired results. His designed timer makes a complete 360-degree sweep and works very well.

Following is a short "how-to" from Henry that we're inserting at this point.

"Yes Martha, there is a simple and inexpensive way to build a 90-second clock. The mechanism can be built in less than 30 minutes; you don't need an engineering degree; no batteries are required, and the total investment should be under $25.

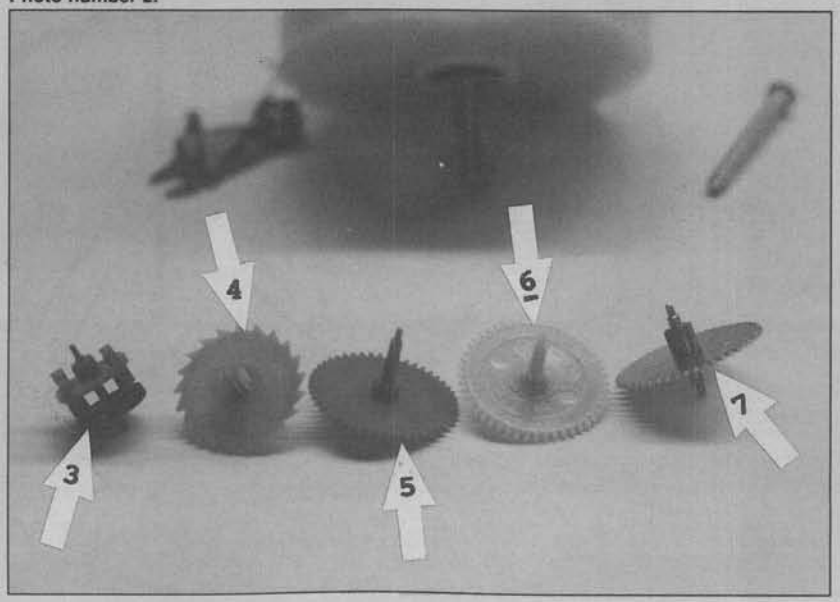
"Start with an Intermatic 30-minute spring wound timer, model F30M, available from your local hardware store. Open the case and remove the timer unit. Remove the "C" clip that holds the trigger mechanism and discard the trigger (#1) and associated pieces. Using pliers, remove three of the four pins (#2) from the back of the timer (see photo No. 1).

"Looking at the gears on the side (photo No. 2), you will see a rocker gear (#3). The flyweight on this will be trimmed later to calibrate the timer. The next gear in line (#4) is saw toothed and must be flipped over so the teeth are now pointing in the opposite direction. The next gear in line (#5) is removed and discarded. The following gear (#6) is moved to the spot vacated by #5. The last gear (#7) is then moved to the spot vacated by #6.

"Reassemble the timer with the gears in their new order. Wind the clock one full turn and check the time with a stopwatch. It will probably be near 1 minute and 50 seconds. Carefully remove the rocker gear (#3) and trim a little from the flyweight. Reassemble and time the unit again. Continue to trim the flyweight until you get a running time of 1:30 to 1:35. When satisfied, replace the timer into the case. A small grommet (#8) can be used to eliminate the loose fit around the clock shaft (photo No. 3). Trim the grommet as required and ZAP it in place.

"A 3/16-inch drill stop or wheel collar can be used to anchor your sweep second hand to the timer shaft. Weld a 1/4-inch collar to the 3/16-inch collar (#9) to hold a 1/4-inch arrowshaft which is used for the sweep-second hand. For a two-foot di-

Photo number 2.



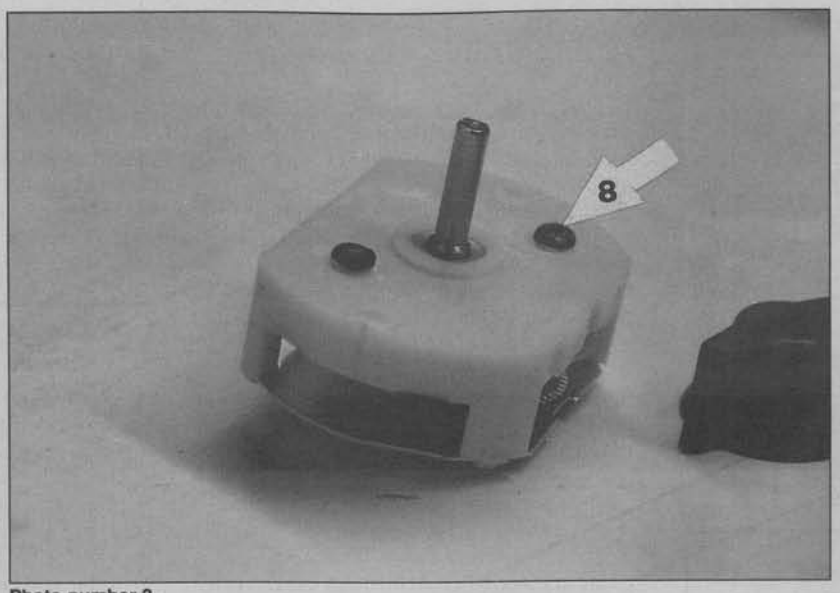


Photo number 3.

ameter clock, cut the arrowshaft 14 inches long. Add counterweight (#10) to one end of the arrowshaft to balance it in-line with the timer shaft.

"The clock face is the hardest part of the entire project. Use plywood, plastic or whatever else is handy. A little paint, striping tape and stick-on numbers will finish your creation. Take your time (pun intended by H. Bartle) and do the job right. Now check radios on, you're on the clock! Clock by Henry Bartle, translated into plain English by Lou Rodriguez."

First, I must thank Henry for completing the research on this. How he determined you must reverse the saw-toothed gear is beyond me. Since then, this writer tried one of his own with very slightly different results, which I must include. I couldn't find the timer Henry suggested using. However, I did find an Intermatic 15-minute timer (Model #F15MB, or on the timer case, F15m03J) and used the same tricks on it.

The mechanisms look identical, and we followed Henry's procedure. Pulled the pins, and at this point I found it difficult to separate the two halves before I realized the spring mechanism is holding it together. I really didn't want to completely separate it. Therefore, I slipped a screwdriver under the aluminum plate at one of the upright legs and with a slight twist, raised the plate enough to allow removal of the various gears.

Followed Henry's instructions concerning the gear removal and replacement, and buttoned the whole thing back together. When I ran my timer for a time check, it took one minute for a full sweep. At this point my modification differed from Henry's, because his ran over 90 seconds for a full sweep and mine was under 90 seconds.

To explain the theory at this point, Henry removed material from the flyweight because he wanted the mechanism to run faster and use less time for a full sweep. By removing weight, the rocker gear which contains a small flywheel, runs faster. As my mechanism only used one minute for a full sweep, I had to force it to run slower and take longer for a full sweep so I added weight to the flywheel. I soldered a small lump on the outside edge of the flyweight and ran the timer for a check, which picked up 15 seconds. I soldered another drop on the flyweight edge and ran it once again. This time it was right on the money at 90 seconds for a complete 360-degree sweep.

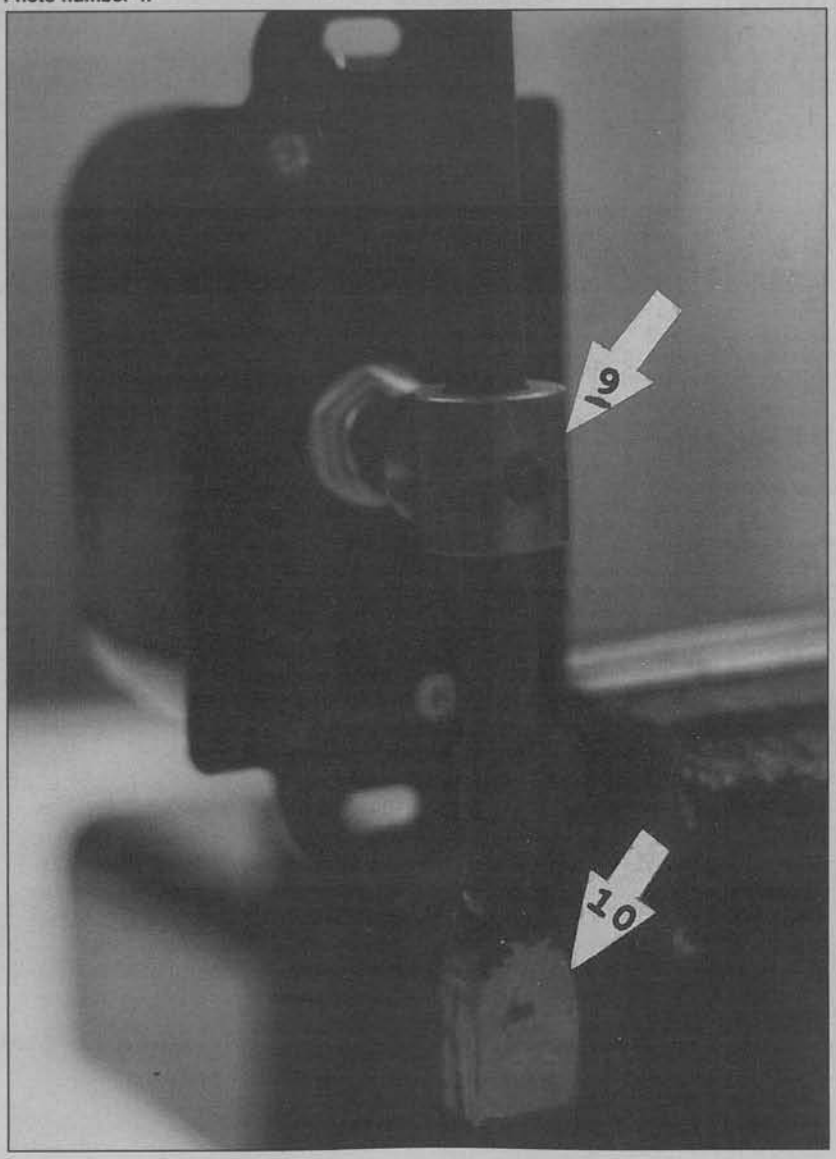
After that, it's a simple chore to reassemble and mount on your favorite clock face. Both Henry and I used a fiberglass arrowshaft for the clock arm, because it is hollow and will accommodate lead or something heavy for a counterbalance, and will not bend or bow with moisture like wood would. Get that? Wood would! Balance the arm very closely so that there is no load on your clock mechanism.

Thanks again to Henry Bartle.

On another note, there probably will be a change in the Nats flying schedule from what was originally announced, because usage of one of the runways may not be available as was planned. It appears we will be back to flying the same hours as last year, unless the airport authority backs off on keeping one of the runways open for students. This means we pylon folks will be at it early again, although it won't be quite as bad because of Quickie gaining an extra day. We will sleep in at least a half-hour for that event, however, I'm sure we will go early for Quarter Midget because we didn't gain any time for those guys.

More to come on these issues; bye for now. ***MB***

Photo number 4.



MODEL DESIGN *Cont. from page 39*

cruising flight, because they are so low that they are almost entirely hidden in the stagnant boundary layer, which isn't going anywhere anyway.

VGs are included in the design of most modern jetliners, but are not original equipment on most current light planes and business planes. They no doubt will be on future designs. In the meantime, there is a sizeable retrofit business, by Micro Aerodynamics, of Anacortes, Washington, for one. For more information, see the article "VGs Lower Stall Speed," in the October 1990 issue of *Flying* magazine.

And when am I going to talk about their use on models? Now. After the lecture, I asked Mr. Robertson about how low the Reynolds Number could be and still show gains in lift coefficient through use of vortex generators. His answer: "A few hundred thousand." So unless you are building a precision scale model of a plane equipped with VGs, don't bother to put them on your models. We don't build big enough, nor stall at high enough speeds, to generate that kind of RNs.

LORD WAKEFIELD

While reading *Aerospace America* magazine, I ran across a familiar name. Let me quote: "Lord Wakefield, the British philanthropist known as the `Patron Saint of Aviation' because of his generous financial support of aviation, died fifty years ago at the age of 81. Among many aviation events, Viscount Wakefield financed the long-distance Australian and South African flights of Sir Alan Cobham and others. He also provided Wakefield scholarships for RAF cadets, and as vice-president of the Institution of Aeronautical Engineers, presented an annual gold medal for the best invention for safety in flight. He also bestowed aviation's Wakefield Cup and similar awards."

Some of the newcomers to modeling may not be aware that the "Wakefield Event" is a popular rubber-powered, free-flight endurance contest, which is held annually in national and international competition. Thanks for not forgetting model aviation, Lord Wakefield. R.I.P.

PARTING WORDS

Convert dreams into goals, can't into cans, ideas into designs, and designs into models. Don't merely think it . . . ink it . . . then build it and fly it (partly borrowed).

Send your comments and questions (with SASE) to Francis Reynolds, 3802 127th Ave. NE., Bellevue, WA 98005-1346; telephone (206) 885-2647. ***MB***

BIG BIRDS *Continued from page 15*

All too often, when a Big Bird receives its fly-in inspection, receivers are found to be inadequately protected from vibration.

This "Big Bird" column is expressly written for you, so that you may enjoy flying your Big Birds to the fullest. It would be impossible for me to cover so vast a field of material without your input, so please feel free to send newsletters or pictures, ask questions, or share information that will be of benefit to us all. Brickbats or bouquets, let's hear from you. If you desire a personal reply, please send a stamped, self-addressed envelope. My address is: 8304 53rd St. Court West, Tacoma, WA 98467; telephone (206) 564-4416. ***MB***

STRICTLY SCALE *Cont. from page 23*

control the uniformity of colors. If someone wants a special color in a half pint, they will mix it. But if you reorder the same color at a later date, there may be a wee bit of variation from the original. Lanny uses state-of-the-art mixing and matching equipment and the people doing the mixing have years of experience in this business.

Lanny also has all the stock full-size paint numbers for Waco, Piper, Cessna, etc. They will mix any colors that you want—just furnish the paint number or a paint chip. If you are using other brands of mylar heat-shrink covering materials and want them matched, just send in a small sample with your order. They package sticks and strainers with all paint colors. Everything is pretty much ready to spray when you receive the

continued on page 73

Straight-A aerobatics... and you barely even studied.

ULTRA SPORT 60™

Your sport flying skills reach a new level of excellence the first time you pilot the **Great Planes Ultra Sport 60.** Knife edge, inverted, snap rolls, and more—the Ultra Sport 60 performs all maneuvers with ease, letting you build a repertoire of dazzling stunts out of an average sport flying background.

"The Great Planes Ultra Sport is everything it claims to be—and more!"

—Model Airplane News, July 1990

With .60-sized power and dimensions, your maneuvers are bigger and better than ever. Using its symmetrical airfoil, correct wing and power loadings, and correct moments, the Ultra Sport 60 gives you every advantage.

And it builds straight, true, and fast—the result of kit design and manufacturing expertise that has earned Great Planes the best reviews. . .

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Fliers everywhere agree. Great Planes models are #1 at the workbench and at the field.

For sport flying at its best, get your hands on a Great Planes Ultra Sport 60—available now at your local hobby dealer.

Write for your FREE copy of the Great Planes Manufacturing catalog.

Wingspan: 61-1/2"
Length: 55-1/2"
Wing Area: 707 sq. in.
Weight: 7 lbs.
Wing loading: 23 oz./sq. ft.
Engine: .60-.65 cu. in. (2-cycle)
.70-.91 cu. in. (4-cycle)
Radio: 4- or 5-Channel

Ultra Sport 40
Wingspan: 55"

Ultra Sport 60
Wingspan: 61-1/2"

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ALL ABOUT ARFS

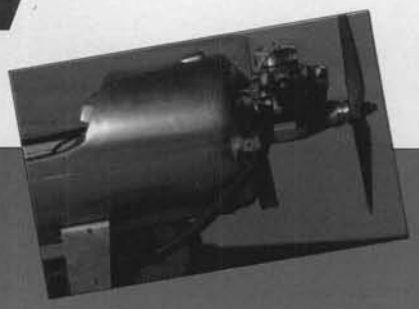
BY ART STEINBERG

BUILDING A 'RECON'

I first met Mack Beauchamp, of Beauchamp's Aircraft Company, at the Las Vegas quarter-scale fly-in last October, as I was admiring his prototype ARF Bearcat (see March 1991 issue of MB, page 28, for photo and details). Mack showed me his distinctive line of ARFs, and asked me if I would like to assemble one for evaluation in this column. I was certainly amenable to his kind offer, so I selected a nostalgic looking World War I monoplane, and a couple of weeks later the kit reposed on my workbench, ready for my undivided attention.

This particular model is called the "Recon," and it vaguely resembles the old German Eindecker *(Our vote goes for the French Morane Saulnier.wcn).* The Recon is by no means a scale airplane, but it has all the flavor of one of those ancient fabric covered crates. With just a little effort it can be decorated to look like the real thing, especially when viewed from any distance at all. My good friend Phil Garrard is associated with Beauchamp in this project, and he assured me that he has built and flown a number of Recons, and he was highly enthusiastic about their flying qualities.

The Recon is not an ARF in the sense that it is virtually ready to fly with only some minor assembly. No, that it is not. However, it will definitely appeal to the builder/flyer who likes to place some of his own personality into a model. So here's what you do get in a Recon from B.A.C. The first eye-popping thing I took out of the box was a superbly crafted fiberglass fuselage. Yes, I said *fiberglass,* and not plastic, or vinyl, or foam board! This fuselage was expertly executed and finished, and after just a light scuffing with fine sand paper, was ready for painting. As if to gild the lily, B.A.C. also includes a fiberglass cockpit section which attaches to the wing, and a pair of fiberglass



(Right) Flying with hands-off stability, the Recon displays its snappy paint job. This model is very reminiscent of the aircraft of yesteryear. (Top Insert) The exhaust leads from the engine to a "SNUFLER," which is remotely mounted on the right landing gear leg. This is not only a super-quiet setup, but it keeps most of the goo off the airplane. (Bottom insert) Art Steinberg appears to be pleased with the performance of the B.A.C. Recon, as he shows it off between flights.

wing tips. And then, to top it all off, a magnificent fiberglass cowl is provided.

The fuselage had been made so that it looked as if it had longitudinal stringers underneath a fabric covering, lending an even more authentic WW I appearance. Inside the fuselage was a built-in 1/4-inch plywood firewall, landing gear supports, and servo support railings. I was absolutely astounded at the care and effort which had gone into the fiberglass parts of this model. If anything, the quality of the fiberglass components was much too good for use in a sport model, and would have been more at home in a top notch scale airplane.

When I examined the wing, I found that the attention to quality was still highly evident. The wing consisted of two ready-sheeted foam cores. The unusual sheeting material was some kind of hard blue composition, and a strip of wide fiberglass tape was provided for use in joining the two wing halves. The tailfeathers were supplied already framed up of sturdy 5/16-inch thick balsa, and would require some finish sanding and covering.

The Recon comes with a heavy-duty, two-piece flat aluminum landing gear. These struts slip into snug slots in the fuselage and are held in place by two small screws. Also supplied are the aileron torque rods, the elevator connecting wire, and the pre-formed tail gear wire. Wheels and control surface hinges are not supplied, nor are control horns and materials for pushrods.

I first epoxied the two wing halves together, then covered the joint with the wide strip of fiberglass tape from the kit. As I have been doing for some time, I saturated the tape with thin cyano in lieu of the old epoxy method, and I was pleased with the resultant apparent strength of the wing joint. As the strip ailerons were not separate from the wing, it was necessary to slice the trailing edge from the wing in order to fabricate the control surfaces. This was easily done with a straight edge and a sharp blade, especially as the wing had been factory marked to show the cutting lines. The trailing edge of the wing plus the leading and trailing edges of the ailerons were then faced with balsa strips. Next, the fiberglass wingtips were attached with epoxy and the fiberglass cockpit structure was faired into the wing center.

The vertical and horizontal stabilizers and their control surfaces were next finish sanded, then covered with Solartex. A few coats of clear nitrate dope and a color coat of aluminum paint finished off the tailfeathers.

The fuselage was painted in the same aluminum color scheme, and the fiberglass cowl was done up in a bright Fokker Red finish. A pair of Williams Brothers vintage wheels in the five-inch size were painted in red, white, and blue markings which really helped contribute to the illusion of a WW I fighter.

With the landing gear, tail surfaces, and tailwheel mounted, it was time to turn my attention to the engine installation. The recommended powerplant is a 60 two-cycle engine, and that gave me the go ahead to use my favorite O.S. .61 ABC long stroke workhorse. I always enjoy using this engine because it is so powerful and extremely reliable. However, it does seem to have one minor drawback, as the conventional factory muffler does not effectively reduce the exhaust noise. As a matter of fact, using the factory muffler and an 11x8 prop, the O.S. .61 produced 101 decibels at full throttle, far too loud for use at my local flying site. It was clear that some sound reduction efforts had to be made, so I turned to John Tatone of J'TEC Model Engine Accessories for his advice and assistance.

John has brought out a number of products which are of immense help in setting up state-of-the-art exhaust systems, and we both decided that use of his "SNUF-LER" muffler would tame down the unpleasant roar of this particular engine. However, it wasn't practical to install the SNUF-LER on the factory muffler in the usual manner, owing to restricted space inside the cowl. He licked the problem by specifying the use of one of his in-cowl two-cycle mufflers. This was set up so that it exhausted into a neoprene tube, which John supplied, with the tube finally connected to a SNUF-LER which was bolted to one landing gear leg. For esthetic purposes the SNUF-LER could have been mounted inside the fuselage with a small exhaust outlet, but in the interests of simplicity and accessibility, I placed it on the outside of the fuselage.

To complete the job, the engine was mounted on a J'TEC "SNUF-VIBE" isolated engine mount, which is designed to isolate engine vibration and reduce engine noise, and a 16-ounce fuel tank was fitted just behind the firewall, leaving enough room to add at least another large tank if I decided to add a smoke system later on.

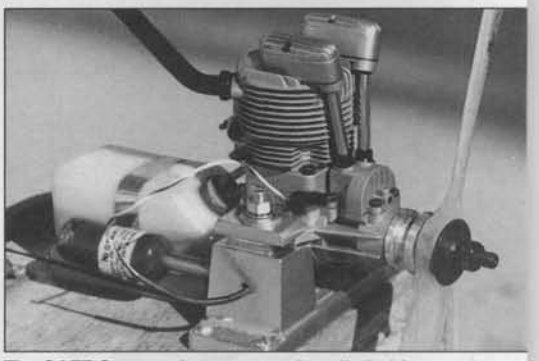
The propeller chosen was an APC 12x10, because it could be expected to be a useful factor in the effort to hold the exhaust noise down. The APC prop has a kind of vintage appearance, so it looked very much in place on the nose of the Recon. However, take note that when you buy an APC prop in a twelve-inch diameter with a high pitch, for some reason the price just about triples to somewhere around eight dollars retail. Now pattern flyers have been coping with expensive propellers for years, and a lot of them, especially at the Las Vegas Tournament of Champions, have developed a technique to prevent nicks and dings. To make their props last longer, they keep their taxiing down to a minimum, taking off in as little space as possible, commensurate with good flying practice. When landing, they chop throttle completely so that the engine stops just before touch down, with the prop in a horizontal position. They don't mind walking out to the plane if it means keeping the airscrew in good condition. I know this system works, because my APC prop is on its second plane with a hundred or more flights to its credit, and appears as good as new.

Very little remained to be done at this

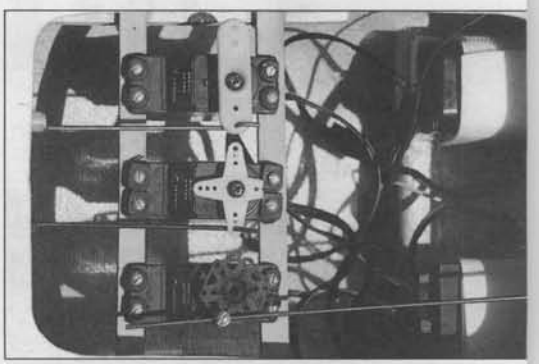
continued on page 103

This ancient Ready-To-Fly plastic U-Control model was made by A.C. Gilbert Co.; has a Gilbert .07 engine with twin exhausts. Does any reader know how old it is?

The Recon wing is retained by a single bolt, which detaches easily for transportation of the model.



The SAFE Start engine test stand easily holds almost any size engine. It has a remote locking socket for attachment of a glow plug starter. See text for more information.



This is what is called a really neat radio installation. Easy to do when there's so much room to work with.

Great Planes Ultra Sport 60

BY AL TUTTLE

When asked by Bill Northrop if I would like to do a product review on the Great Planes Ultra Sport 60, I jumped at the chance, as for the past several years I have been involved in the heavy iron end of the sport and welcomed a change of pace.

In due time, the kit arrived via UPS. The box and contents were unscathed in spite of the fact that it was shipped from Urbana, Illinois, to Newport Beach, California, and finally to Port Orange, Florida. This was unusual for me anyway, as lately some of my UPS packages have been received in varying degrees of damage. One flattened package actually had tire tread marks on it!

The kit box is very attractive and its contents were well packed, with absolutely no shipping damage. First inspection revealed that the balsa and ply die-cut sheets looked very good. The ply die-cut parts were easily removed. There are two sheets of rolled plans, one of the fuselage and empennage and the other of the wing. Plans show an optional retract installation and several different four- and two-stroke engine installations. I thought that this was great as too many of today's kits only show one type of engine installation.

The instruction book is a 48-page affair

and it's obvious that a tremendous amount of effort went into its contents. The manual has a section on flight trimming, and a flight trimming chart which should be a big help not only to the newcomer but to old timers as well. The last two pages contain the parts list, complete with all part numbers. The cover page has a photo of the completed model and a warning that this is neither a toy nor a beginner's airplane, and to join the AMA.

The inside front page has the table of contents. Page three contains the introduction, precautions and common abbreviations used in the book and on the plans. Page four has a section titled *Decisions You Must Make Now,* plus other items required and supplies and tools needed. Page five has the die drawings identifying the die-cut parts. Construction starts on page six. Because this was a product review, I followed the instruction book to the letter (except for one slight deviation in construction sequence) and made no changes in the construction itself.

EMPENNAGE ASSEMBLY

The first item built is the "Tail Feathers" (that's what the book calls them). Fin and rudder are pre-cut balsa and went together easily, and the parts shape conformed well to the plan. The horizontal stab and elevators were also assembled from pre-cut balsa and the fit was good as well. The only problem here was that the 3/8-inch thick sheet balsa stab rear was as hard as a rock and just as heavy. I couldn't push a T-pin through it. If your piece is as hard, I advise you to drill lightening holes in this piece or replace it altogether. I didn't, and ended up with a tail heavy airplane. The hinges were next installed, but not glued into the control surfaces.

WING ASSEMBLY

The wing is constructed next. It is of the D-tube type and construction is straightforward. The Great Planes people thoughtfully included a pre-shaped trailing edge jig for use if the wing is to be built over the plans. Holes are already punched in the die-cut wing ribs for those who elect to use a Great Planes Wing Jig, available from your local hobby dealer. I decided to build my model as a taildragger and installed the landing gear blocks accordingly, as shown on the plans.

The leading edge sheeting is prepared, the die-cut balsa ribs removed and the edges sanded smooth. The bottom spar is put in place and the ribs, top spar, trailing edge, shear webbing and leading edge sheeting installed. All wing pieces fit together well, and when both panels were butted together the fit was perfect. The wing tips are balsa blocks glued to the wing, then carved to shape. Fiberglass cloth is installed at the center section. Here again, the instructions are precise and the photos self-explanatory. There is a section, however, that could cause one to get into trouble. Prior to glassing, the instructions call for sanding "flats" on the leading and trailing edges at the center section. The instructions tell you how much material to remove. This step is critical, as it determines the fit to the fuselage. I would suggest that this sanding step, the fiberglass step and the wing dowel installation be moved to the section where the motor mount is to be drilled. At this stage, the fuselage is completed to the point where the wing can be fitted. Recognizing this potential problem, I fiberglassed the center section first and did not sand in the flats or install the wing dowels until at the section just suggested. This change resulted in a perfect wing/fuselage fit.

FUSELAGE ASSEMBLY

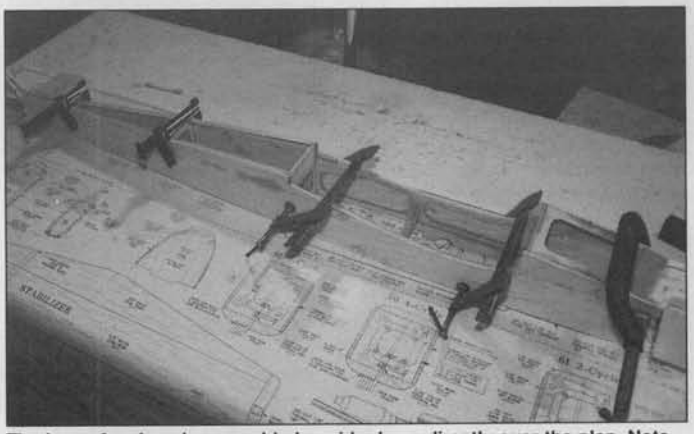
The fuselage sides are of 3/16-inch balsa with 1/8-inch die-cut plywood doublers. There are two sizes of die-cut plywood firewall spacers for use with either two- or four-stroke engines. The proper spacers are installed when assembling the doublers to the balsa fuselage sides. Here again, the die-

ULTRA SPORT 60 SPECIFICATIONS:

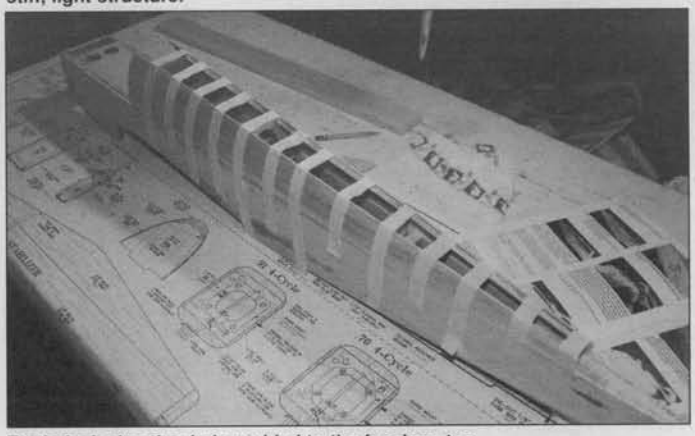
Suggested retail price	$124.95
Wingspan	61-1/2 inches
Wing Area	707 sq. in.
Weight	7 lbs.
Engine	.60-.65 cu. in. 2-Cycle .70-.91 cu. in. 4-Cycle
Radio	4-6 Channel

What you see is what you get for your $124.95. Kit quality is typical Great Planes . . . excellent!

The partically finished right-hand wing panel upside-down on the workbench. Construction is completely conventional D-tube, yielding a strong, stiff, light structure.



The lower fuselage is assembled upside-down directly over the plan. Note the die-cut 1/8-inch plywood doublers glued to the inside of the balsa fuselage sides.



Turtledeck sheeting being added to the fuselage top.

cut plywood doublers fit perfectly. The lower fuselage is assembled upside down over the fuselage top plan view. The 1/4-inch ply firewall is then drilled for the engine mount and fuel line exits and installed into the fuselage. Instructions call for the drilling of engine mounting holes in the motor mount at this time. The servos and pushrod guide tubes are installed and the wing is fitted to the fuselage.

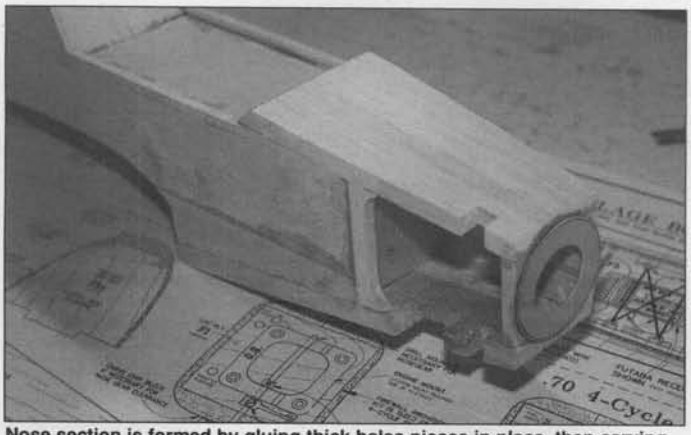
The turtledeck is added next. The turtledeck sides are 3/32-inch sheet balsa with a 1/2-inch balsa top. After the adhesive cures, the top and sides are carved and sanded to shape. The nose section pieces are installed next. The top is of 1/2-inch balsa and the razor plane can make short work of this tedious task, however.

Next, the wing is attached to the fuselage and the wing fairing blocks are assembled to the bottom of the wing and then carved and sanded to shape. Optional wing fillets can be installed if desired; die-cut ply material is included in the kit for this option. The horizontal stab and fin are assembled to the fuselage and the servos, control horns and pushrods installed. All pushrods are furnished with the kit. The rudder and elevator pushrods have short lengths of plastic tubing installed at 2-1/2 inch intervals on the wire rods, which act as spacers for smooth operation inside the pushrod guides.

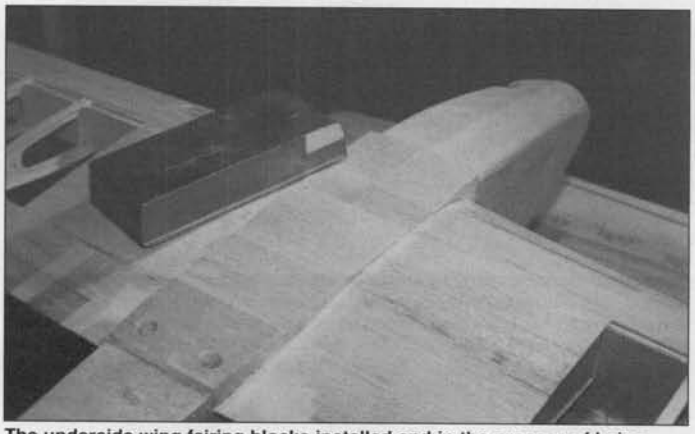
COVERING

I covered the model using Coverite's Black Baron film. The colors are metallic red, metallic blue, and white. The metallic colors really stand out and certainly add a lot to the plane's appearance. The pilot, canopy, control surfaces, radio, engine and fuel tank are now installed and the plane balanced as per the instruction manual. The instructions are very precise and clear on this vital step. Total construction time: 110 man-hours.

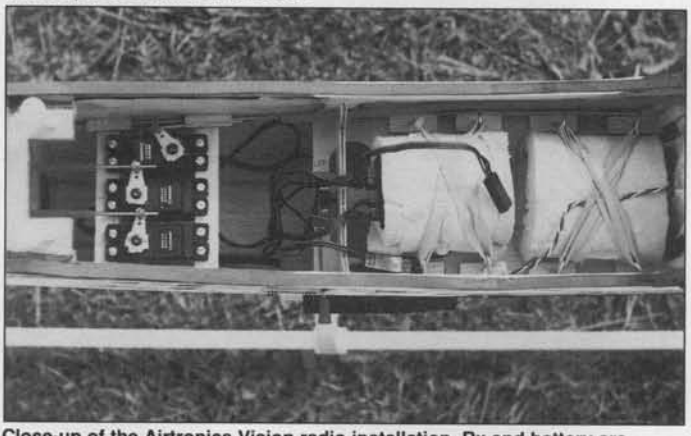
The last sections of the manual are Pre-Flight and Flying. These sections are well written and easily understood. There is a



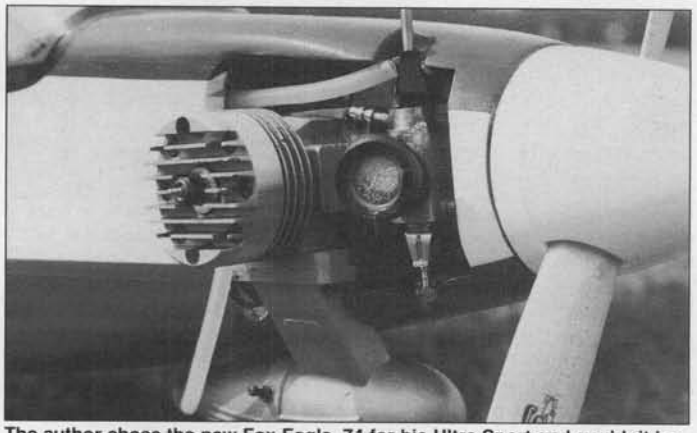
Nose section is formed by gluing thick balsa pieces in place, then carving and sanding the whole thing to shape. This is probably the most tedious task required on the entire model.



The underside wing fairing blocks installed and in the process of being sanded to blend into the fuselage.



Close-up of the Airtronics Vision radio installation. Rx and battery are wrapped in foam and secured with rubber bands for easy removal if necessary.



The author chose the new Fox Eagle .74 for his Ultra Sport and couldn't be more pleased with this combination . . . see text for comments.

chin and nose sides are of 3/8-inch balsa. The length of these pieces is determined by the particular engine used.

The instructions and photos clearly show how the parts are fitted around the engine, which is temporarily mounted during this step.

FINAL ASSEMBLY

Now comes the fun! If you are into wood carving, this next operation is for you, as the fuselage nose area is to be sanded to shape. The instructions state that some heavy sanding is required to properly shape the nose area. This is the understatement of the year! There is a *helluva* lot of hacking, carving and sanding involved. A good wood rasp and

FINISHING

The entire airframe is final sanded as smooth as possible and all dings and cracks filled in. The canopy is prepared and fitted to the fuselage, but not installed at this time. A nice feature with this canopy is that it has a protective plastic coating on both the inside and outside of the canopy to protect it from scratches. This plastic film is removed just prior to canopy installation.

The entire engine compartment must be thoroughly fuelproofed. I extended the fuelproofing over the outside of the fuselagelage nose area as well. With the engine temporarily installed, the wings can now be attached to the fuselage and the plane balanced laterally, to compensate for the side-mounted engine.

highlighted box with recommended control surface throws for both high and low rates.

ENGINE

I chose the new Fox Eagle .74 BB Ring Schnuerle engine, as I have used the Fox Eagle .60 III in the past and have found it to be reliable, extremely powerful and possessing an excellent rpm ratio between idle and full throttle. The engine was broken in using the Stu Richmond break-in method. The break-in procedure is involved and takes several hours to complete. However, the results are well worth it, as I ended up with a strong, smooth running, easy-to-handle engine.

continued on page 106

STRICTLY SCALE *Cont. from page 66*

order. The small detail spray guns such as Binks, Badger, etc., work super with these paints. The paints also air brush very well.

The aluminum, when applied, looks the way aluminum should look—not too "flashy" as other so-called aluminum paints. The paints are fuel-proof and even heat-proof . . . these same paints are used on automobile engines which see temperatures of 220 to 230°F. The paint and the clear coat will not "craze" when applied over fabric. Even though the enamel cures from inside out, it does stay a wee bit pliable. A flex agent is also available; this agent is used in the paint when painting over flexible plastic bumpers on cars. Lanny will also be packaging a flattening agent for use with those colors that need to be dull instead of shiny. Of course, colors that require a dull finish will come pre-mixed with the flattener in it.

Prices: according to Lanny, they will be very competitive. As of this writing, the price list was at the printer. From what Lanny told me, you will be pleasantly surprised with the prices.

There you have it. We scale nuts now have a source available that will mix and match any color that our favorite project requires and, as I understand it, at no extra charge for mixing the special colors. In addition to paints, Lanny also has available green Fineline tape which most of us are acquainted with, plus the new blue Fineline tape which is far superior to the green for going around compound curves. These tapes will be on the price list as well as tac rags. In other words, a complete custom finishing package will be available. Lanny hopes to have, in the near future, a color chip card available for his standard colors. This is a tremendous undertaking as you can well imagine, as these will be actual paint chips, not color print reproductions. If you are interested, write or call Lanny at: Lucas Auto Paints, 1150 North Woodland Boulevard, De Land, FL 32720; (904) 734-8378. Tell him you saw it in *Model Builder*. **MB**

PRECISION *Continued from page 26*

'em out at your local dealer. As far as I'm concerned, this was a great move by both manufacturers, because one of our biggest needs for years has been an affordable radio system for pattern that could really do the job. Both are 1991 certified, of course.

The Aerospace Composite Products booth had the usual carbon fiber goodies on display . . . just about all the CF rods, sheets, laminates and what have you that you'd ever need . . . plus a new goodie I must tell you about, called Kev-Cord. This is an eight-strand, braided Kevlar control cable encased in a high density vinyl jacket. The stuff looks great, and is available in two sizes, .038 diameter 85-lb. test, and .054 diameter 215-lb. test. Supposedly, Kev-Cord will not stretch. Get it from your local dealer or ACP direct, at (714) 250-1107.

Randy Smith of Aero Products has several new additions to the Bolly prop line worth mentioning. There should be a photo around here showing a line of pipes and props. The second prop from the left is the new Bolly QT (Quiet Tip) shape, now available in the common pattern sizes like 12x11, 12x12, etc. The prop has some increased blade area in addition to the cranked tip which is supposed to be good for about one db less noise. Also rumored to be near release are some new sizes, like 12.5x11.5, 12.5x12, and 12x13. Check with Randy for the rest of the scoop. Get him at (404) 979-2035.

Just out from Macs Products is a new 10cc Long Chamber Quiet Pipe for the long-stroke engines. It resembles the O.S. pipe in appearance, is about like an Hatori 650 in weight, and exhibits excellent workmanship. At a list price of $52.95, it should be a very competitive product. I picked up one for testing purposes and should have some numbers for you next month. Macs also has some new long headers for most of the popular engines. You can see this stuff at your local dealer, or call (916) 456-6932 for more information.

That's all for this month. See 'ya at the field. **MB**

JET TRAILS

BY SCOTT STAUFFER

LET US SPRAY

Before you try your first spray paint job, for jet or prop models, read this article

In my last column, I described the sheeting of foam wing cores, and the use of fiberglass wing skins. Now I'd like to continue this process to it's ultimate completion, the complete painting procedure, from bare wood to the final clear coat.

The author in his homemade spray booth as described in the text, suited up for two-way protection, and applying a coat of primer to the model. Protective glasses left off to set camera for photo. Note spark-proof exhaust fans, fluorescent lighting, and gravity-feed type spray gun.

BARE SKINS

If you have been following along, by now you should have a set of glass skinned wings (physically or mentally), neatly attached to your fuselage, ready for painting. After working with these fiberglass wing skins, from Aerospace Composite Products, I find them to be absolutely fantastic. Given the choice, I'll take the glass skins over the balsa, they're that good. This is not to say that you can't achieve the same results with balsa, it just takes more effort. I'm going to begin with the equipment I used and how I built my paint booth, followed by the actual painting steps.

EQUIPMENT

The proper equipment, and how you take care of it, is as important to a successful paint job as the paint itself.

Let me start by saying I am not a professional painter or graphic artist. I am just an average modeler, with an above average interest in perfection. I also have yet to achieve (by my standards) the perfect paint job. Each paint job I do, though, seems better than the one before. So I am making progress, however slow. Now let's get with it.

First, you're going to need a compressor; a small one of about half to one horsepower will do, with a seven-gallon or larger reserve tank. A pressure regulator and moisture trap are a must. I also installed a line filter and moisture trap right at the gun as well. A quick disconnect makes removing the gun and attachments a snap. Speaking of guns, I use two. For the majority of the bulk work, I use a Devilbiss GF-502 gravity feed gun. This is my personal choice of spray guns. There are lots on the market. My advice is to choose one that best suits your needs and price range. Most of the equipment and supplies are available at your local auto paint supply store, just look in the yellow pages. By the way, if you choose the GF-502, I must warn you that it sells for about $225.00. I had to save quite awhile to get mine. The second one is a Paasche Dual action air brush. This is used for finer jobs and blending of colors. These, as well as Badger air brushes, are available from your local hobby store, for less than $100.

DUST

The single biggest source of dust in any paint booth is the person using it! Lint, dust, and hair all seem to leap off you and onto your paint job. To help combat this problem, your local paint shop sells white plastic-coated fiber coveralls. They're not expensive, about $5.00, and can be washed and reused. They also sell a nylon hood to go over your head. They cost about $2.00 and are also reusable.

Surgical gloves keep the paint off your hands, and the dirt on your hands, out of the paint. Plastic booties over your shoes protect them as well. A pair of safety glasses will help protect your eyes. Yes, I know, you don't see me wearing them in any of the photos. I took them off to adjust the camera and forgot to put them back on. I assure you, I had them on during the spraying! To keep from coating your lungs, spend a few bucks and get a decent charcoal filtered air mask. They sell for about $35.00. This more or less completes your wardrobe. Looking like the Pillsbury Doughboy and sounding like Darth Vader, you're ready to terrorize the wife and kids, and completely freak out your dogs. No kidding, the first time I wore this getup, I was bitten by the dog!

ROOM WITH A VIEW

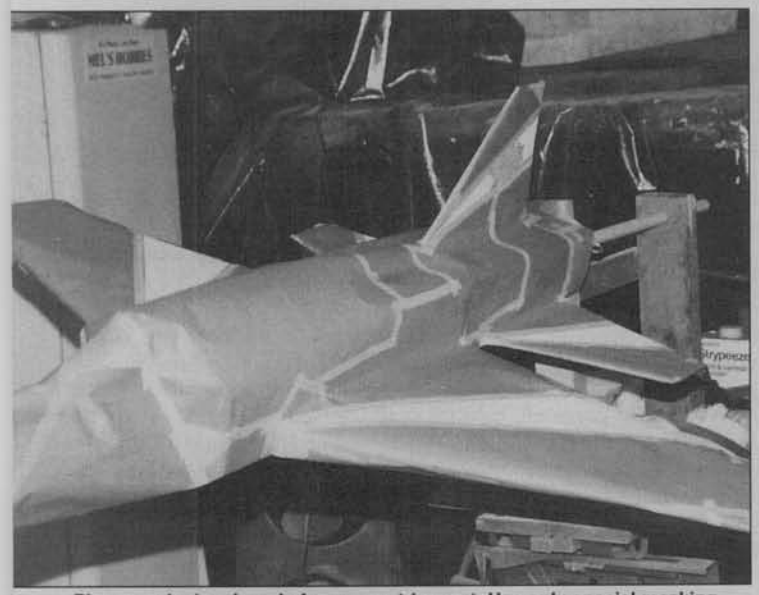
The second biggest source for dust is the spraying room itself. Here is basically how I went about making my paint booth.

I chose a seldom used room in the basement of my house, with a window and an

Wet-sanding is messy, but essential. Clip light used for CLE (critical light examination). See text.

outside door leading into it. It's best not to use the same room you build in, because of all the balsa dust from sanding. I then went to the hardware store and purchased the following: A couple of packs of black plastic, the kind house painters use for drop cloth; a couple of fluorescent lights and some electrical wire; one clip light; a thermometer; and a roll of furnace filter material, about eight feet long; also a screen door and spring.

Using a staple gun and small squares of cardboard to prevent tearing of the plastic, I attached the plastic to the sealing and draped it down the wall, allowing about one foot extra onto the floor. I used tape to seal all the seams. Then I placed boards on the one-foot overlay on the floor to keep the plastic sides taut and the rest flat on the floor. I actually only used half of the room. In the pictures, the right hand side wall is just the plastic draped down. When not in use, the plastic is rolled up, to gain access to the other part of the room. The plastic helps seal the room off from dust, and also has a static charge that attracts the dust to it, instead of your plane!



Plane masked and ready for orange trim coat. Use only special masking paper for reasons explained in text.

I then wired up a couple of fluorescent lights to help see what I'm doing. I also use the positionable clip light for more direct lighting. Next, I stapled the furnace filter material to the screen door and attached the door to the doorway. A spring holds the door closed tightly. This filters the air entering the booth. The purpose of the thermometer will come up later.

In the background of the pictures you will notice a metal cabinet used to keep the paint and equipment. I got this at an auction for $2.00. I use a piece of scrap sheet metal to spray on for testing and setting the spray gun. It's a good idea to keep the compressor just outside the booth and feed the air hose through a small hole in the wall. You don't want the compressor to suck in the paint over-spray. Next, I went to a refrigeration parts supply store and purchased two sealed evaporator fan motors. They cost a total of about $50.00. They must be sealed motors, otherwise the brush arc could set off the paint spray. WABOOM!

I next remodeled the window and cut a piece of plywood the same size as the window opening. Then I cut two circular holes and mounted the fans in them. The fans, naturally, should blow outward. This draws the air into the booth through the filtered door, across the room and out, creating what is referred to as a side-draft paint booth.

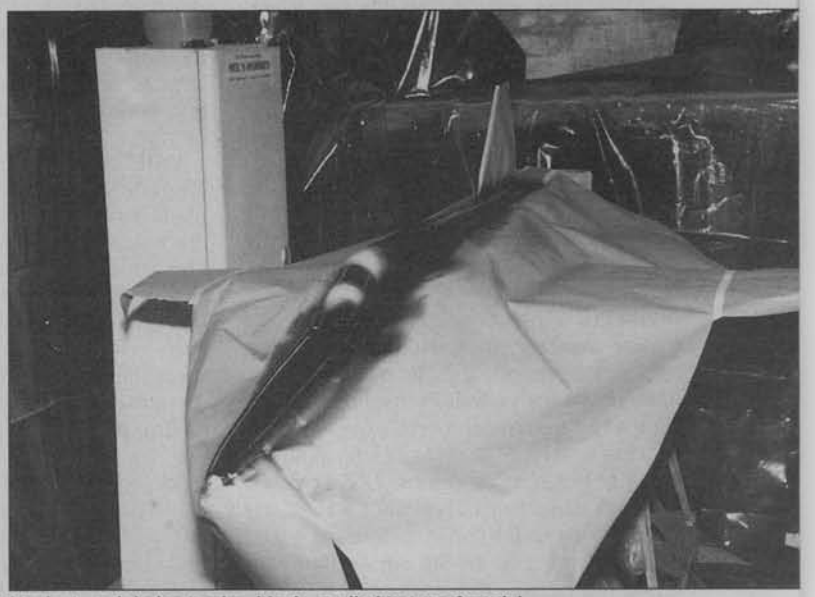
I then constructed a stand to hold the plane while I painted. Using a Black & Decker "Workmate" bench, I clamped down a piece of plywood and nailed to it two lengths of 2x4's, along with a cross brace. Then I drilled a hole in each of the 2x4's, thus making a kind of spit, like a barbecue. I shoved a broom handle up the back of the plane and attached it to the engine mount inside. Then I mounted a piece of cardboard to center the rod at the back and to prevent over-spray from going up the thrust tube. I now could rotate the plane into any position for painting. A small jam screw in the rod holds the plane in position for hands-free operation. I now have a complete paint booth, ready to use anytime, without making half the family sick from paint fumes. I've used this booth for over two years without a complaint (except for the dog!).

Now for the second part; the final preparation and painting of the model. I started by block sanding the model into its final shape, using 80-grit paper and a sanding block. Then I filled in all nicks and imperfections with spackling compound. Next, I used a combination of hand-held 120-grit paper and the same grit paper attached to a six-inch aluminum T-bar. To further smooth out the plane's surfaces, I must admit, the six-inch T-bar (from by Applied Design Corp.) is my favorite sanding tool.

You should end up with a smooth, flat surface. To check this, hold the plane up to a light source and look down the surface towards the light. Any mistakes will be immediately visible. I call this procedure a Critical Light Examination, or CLE. Using this process, I located and filled any remaining visible defects. I say visible, because at this point, it's still pretty hard to catch all the imperfections. Using a combination of compressed air, vacuum cleaner and tack cloth, I removed any sawdust left.

Now we actually get to start slinging some paint! For the next step, you'll need a 3/4-inch camel-hair brush, a can of K&B clear epoxy paint and a can of K&B satin catalyst, a small mixing cup, and a couple of packs of half-ounce glass cloth. Remove all hatches and plates and set them aside, we'll do them separately. I started by cutting and smoothing out the glass cloth onto the bottom of the plane. Then mix up a small cup of K&B clear and satin catalyst, mixed one-to-one with no thinner. The satin catalyst is used because it's easier to sand than the gloss. Satin catalyst is used throughout the color application on the plane. Don't worry about being dull, the clear will bring back the shine.

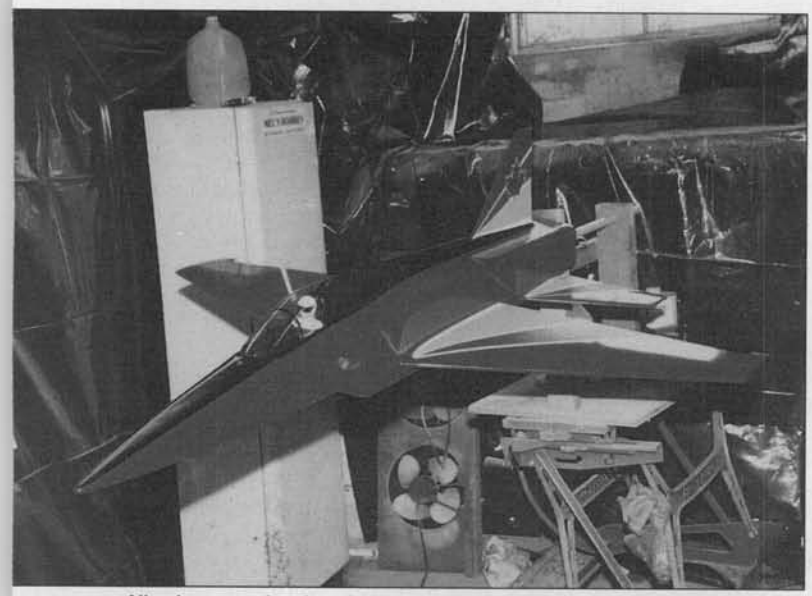
Using the camel-hair brush, apply the clear to the cloth. Work from the center outward. When finished with the bottom, flip the plane over and do the top, again working from the center, down the sides towards the bottom. Apply it to the dry cloth in order to stick it to the wood underneath. Don't get carried away and blob on a lot of paint. Just wick the paint into the cloth, carefully blotting up any excess paint with paper towels. You want to stick the cloth to the wood, not soak the wood. Also try and keep the number of seams in the cloth to a minimum. Apply the cloth to all the wood parts of the plane. Then do the same to the hatches and panels. After this all dries, trim off the excess cloth and sand the seams and



The last, and darkest color, black, applied to top of model.

lumps. Be careful not to sand through the cloth. At this point, the plane should have a fine fabric texture to it.

Now mix up another batch of clear and apply a second, heavier coat to the surface. This will fill in the weave. From this point on, I wet-sand. Using 400-grit paper, both hand-held and T-bar mounted, wet-sand the second coat, again don't sand through the cloth. A third coat may be necessary to fill the weave completely. By now you should have a reasonably smooth surface, and we're ready for the primer. Start by masking off anything you don't want painted, such as the canopy and intakes, etc.



All colors completed, and ready for final sanding and lettering before clear coating. Although satin finished at this point, it already looks smooth and glossy; note reflections.

HOLD THE HEADLINES

Newspapers are for reading, not wrapping! They are the worst thing you can use to mask a paint job. Compressed air and paint loosen the fibers of the paper, not to mention the ink residue, and blow them into your paint. The second worst thing is brown wrapping paper. Basically the same thing happens. So what do you use? The best thing I've found is a plastic-coated paper that is sold at the auto paint store. It's light, easily trimmed, and masking tape sticks to it nicely. A thousand-foot roll costs about $25.00, but should last a long time.

After masking, mount the plane in the holder in the paint booth, tack and wipe the plane down with either Prepsol or alcohol, using a lint-free paper towel, also available from the auto paint store. In a clean glass jar, mix up about 30 tablespoons of K&B primer, 30 equal size scoops of primer catalyst and 25 scoops of K&B thinner. Before each use, clean out the cup of the spray gun. You would not believe the amount of dust that gets mixed into the paint and sprayed out. I then filter the paint into the gun using a paper cone filter that I've lined with a nylon stocking for extra filtering. Now suit up, turn on the compressor, the lights and fans, and wet down the floor around the compressor and the floor of the booth to control the dust.

Set the compressor regulator to about 35 to 40 PSI and start shooting. Paint the bottom first, then the top, working from the tail to the nose. It takes two coats and just over a can of primer to get good coverage. Let the paint set up about 20 to 30 minutes between coats. After the final coat, use the 3/4-inch camel-hair brush and dob extra primer onto any leftover dings and pin holes. Don't panic about putting on so much primer, because you're going to wet-sand 80% of it off. Let the primer dry for about 24 hours.

After it dries, remove the model from the booth, and take it to the work shop. Starting with 320-grit paper, both hand-held and T-bar mounted, wet-sand the primer, working your way from 320-grit to 400-grit and finally 600-grit paper. After the final grit, the surface should take on a kind of polished sheen. Hold it up to the light while sanding and give it lots of CLE's. If you find any mistakes, go back and dob on some more primer.

Once you're done sanding the primer, the surface you end up with is as good as your final paint job will look. No amount of paint will make up for a mistake after this step, so be sure your primer surface is pristine.

With all this rubbing and sanding, the plane tends to build up a static charge. This attracts dust like a magnet, so just before I go back to spray each color, I lightly spray the model with dry, unscented Static Guard, the stuff they use on clothes. It works on planes, too. Use it after you wipe the plane down. Don't worry, the dry formula leaves no residue and does not react with the paint. Just stand back a couple of feet and mist this stuff over the plane.

After each use of your spray gun, be sure and disassemble and thoroughly clean your gun. Don't just run a load of thinner through the gun and expect it at be clean. There's nothing worse than spraying yellow and having a blob of red come out.

With the primer sanded and wiped down, we're ready to start shooting colors. By now, you're probably wondering why you have read three-quarters of the article and are just now starting to apply the colors! That's because 90-percent of a good paint job is surface preparation. The paint job is only as good as the surface on which it's applied. Paint hides nothing.

With little exception (exception being very dark colors like black), I like to start by painting the entire model white. Lighter colors come out much brighter when sprayed over a nice white base coat . . . unless you *want* your colors darker.

I've already discussed how to suit up and prep the booth, as well as mixing and filtering the paint. So, from now on, I will just discuss the specifics of applying the colors, because the setup is basically the same for each color. I use a combination of K&B and Ditzler Deltron automotive paints. They are both enamels, and can be applied over each other without any problems.

Just be sure to mix each brand with its own brand of thinner and catalyst. For my base white coat, I use Deltron DMD-663 base white. It drys smooth and hard, it's mixed one-to-one. One part paint, one part catalyst and one part reducer. I use classic CVA-121 catalyst in all the Deltron colors, except the clear. When mixing, I like to add a little extra reducer to help it smooth out and prevent orange peel. Just a few extra scoops, say three or four. Reducers come in four temperatures: cold, medium, hot and very hot.

The author and his finished model, finished and painted as described in this month's column. The lettering tells you what it is.

They are DT-860, 870, 885, and 895, from cold to hot. That's why the thermometer in the booth. It tells me what reducer to use. Be careful with the very hot stuff; too much of it and the paint won't dry at all. It is called a retarder. When you go to purchase the paint, ask for a product information sheet on the paints. They will give detailed information on the product, as well as safety tips.

Next, I masked off areas for the red. For stripes, I use a plastic 1/8-inch tape, called Flex Mask. It leaves a sharp line, with no residue, and is available from both the hobby shop and paint shop.

I chose Deltron DAV-73753-T "Hot Licks Red" as my primary color. It costs $30.00 a pint, and I had lots left over. It's a good idea to remove the masking tape as soon as possible after spraying. If you wait until it's dry, the paint may tear when you pull the tape off. Also you can see any over-spray and remove it before it dries. After allowing the red to dry, I then masked it off for the next color, K&B orange.

Once the orange was dry, and to save paper and time, I carefully removed only the trim and masking tape from the plane. After the orange was completely dry, I masked over it and cut out the paper for the next stripe. You can see the orange over-spray in the picture. Then I shot the next color, K&B yellow. After the yellow, I removed all the paper and remasked for the final color, K&B black. Be sure to use satin catalyst on all the K&B colors. It makes them easier to sand.

After all the colors are on comes . . . yes, you guessed it . . . more sanding! You're going to sand out any dust, over-spray, and orange peel you may have in the paint, as well as sand the sharp lines off the stripes. I use 1000-grit paper for this job. Wet-sand the entire plane. Be careful, you can very easily sand through the paint to the base coat. Mount some of this paper onto your T-bar and use it to sand off the sharp stripe edges. You just want to knock off the sharp edge. The clear will smooth it out further later on.

With this next step you may think I've gone nuts. Using 1500-grit paper, I wet-sand the clear canopy and the adjoining paint lines! It becomes dull and semi-translucent. The first time I did this, I thought sure I'd ruined it. But rest assured, the clear will bring back the shine and transparency.

The decals and lettering are next. I am no artist, so I cheat. I go to the local sign company and get computer-cut letters. They come in any style, size and color you want. Also, they are very thin and when clear-coated, you can hardly feel them. I will warn you they are expensive; 50 cents a letter is the norm. The ones you see on this plane totalled $40.00, but they saved a lot of time and anguish.

Next, I decided to checkerboard the bottom of the plane. It's not very hard to do, just a little time consuming. Check out the pictures. Using a piece of glass, I taped a metal straightedge parallel to the edge. The size of the square determines the distance from the edge of the glass. I chose 3/4-inch. Slide the four-inch trim sheet under the straight edge and line it up with the edge of the glass. Next, make a cut with a single-edge razor blade along the straightedge. You now have a four-inch long, 3/4-inch wide strip. Reinsert the strip, endwise, line it up with the edge of the glass and make a second cut. Now you have a perfect 3/4 square. To

continued on page 108

ENGINES OF THE WORLD

BY STU RICHMOND

TINYMITE TREASURES

This month Stu brings us worldwide variety. See text for descriptions of these six "tinymite treasures." (Insert) On the left is the rear of Jiri I. Patrman's miniature that weighs less than a quarter of an ounce! On the right is the rear of Giovanni Ceccarelli's "T. Wasp," which may be headed into the Guinness Book of Records.

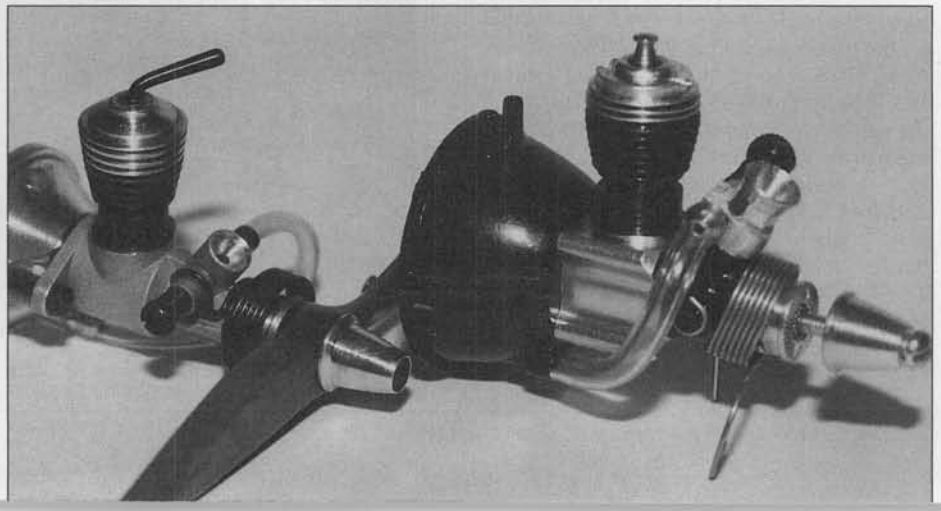
This month we present an around-the-world view of model airplane engines that are far below average in size. Each is a masterpiece. We think this month's lead photograph will receive far above-average interest. It shows six different units, and all are tiny!

If you like small engines, you can rush right on down to your local hobby shop and buy the engine on the left in the front row. It's a current production version of the world-famous Cox .010 that first appeared about thirty years ago and startled the world with its screaming performance. It weighs 15 grams (28 grams = one ounce), comes with a Cox 3x1.25 molded gray prop, and most of these engines will turn that prop a whistling 27,000 rpm.

My wife gave me a Cox .010 for my birthday in 1962, and it made many flights in a small original design free flight that used a tiny eyedropper for its fuel tank. I'd hold the model, engine screaming, until the fuel level ran down to the point where the engine wouldn't run too long after launching. Happy memories of a USA-produced jewel!

The middle engine in the front row is made by Giovanni Ceccarelli of Italy, who is a commercial flower grower as well as an engineer. Technical thinking has been applied to efficiently operating his greenhouses, and the same technical genius has been applied to producing a small number of

On the right is the presently available Cox .010, one of the world's most famous and successful miniature engines. On the left is a "T. Wasp" that's 6/10 the size of the Cox engine.



varied tinymites. Shown in the photo is an 0.10cc diesel, which translates to .006 cubic inch displacement, about 6/10 the size of the Cox .010. Giovanni also makes a glow plug version of this engine; the November '87 issue of *Model Builder* carried that story. The engine was not conceived for commercial purposes, but for the pure satisfaction of accomplishing excellence.

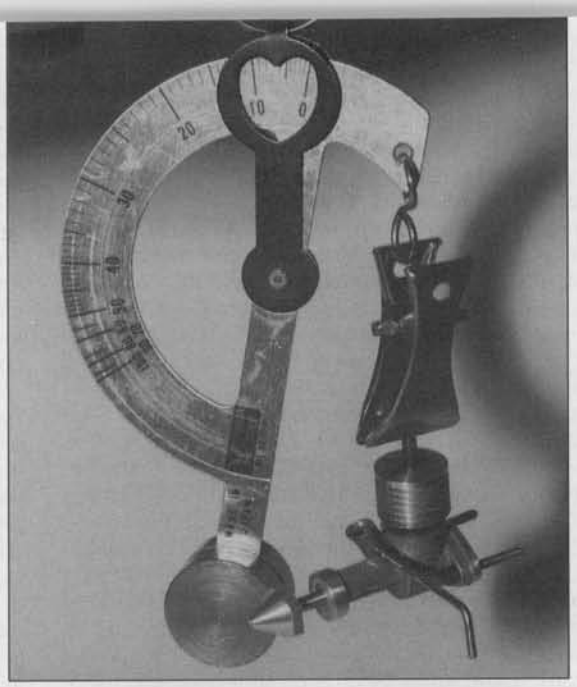
Giovanni wanted to name his engine "Tiger Wasp," but in Italy the Super Tigre engine producer has all rights to the word "Tiger," so the engine is now simply called the "T. Wasp." The only way you can obtain one of these is to have a very small and very rare, excellent condition tiny engine . . . and swap it with Giovanni, so he can add to his own miniatures collection. My two model building sons, Bruce and Brian, each received from me a "T. Wasp" among 1989's Christmas presents.

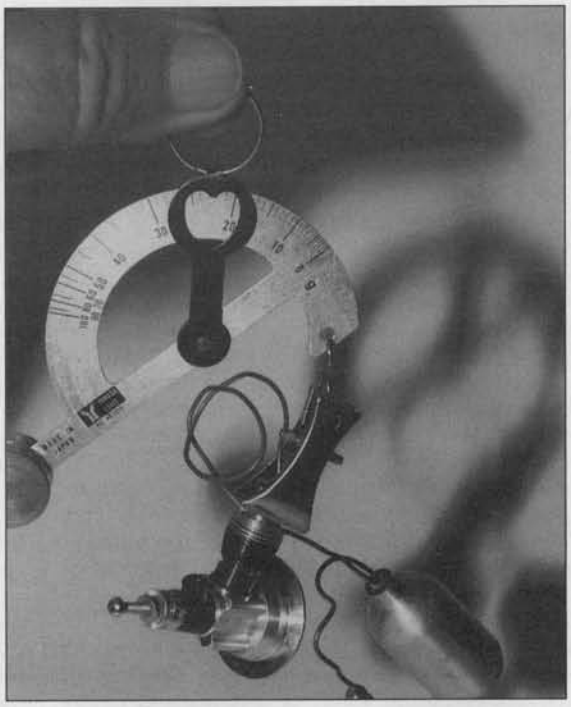
The engine on the right in the front row is more like a piece of jewelry. It weighs only 6-1/2 grams and is the craftsmanship of Jiri I. Patrman of Czechoslovakia. It weighs less than a quarter of an ounce! The cast crankcase is gold anodized or eloxed (stands for electric oxidized). The engine is 3/4-inch high to the top of the fins, and less than 7/8-inch long to the face of the prop driver!

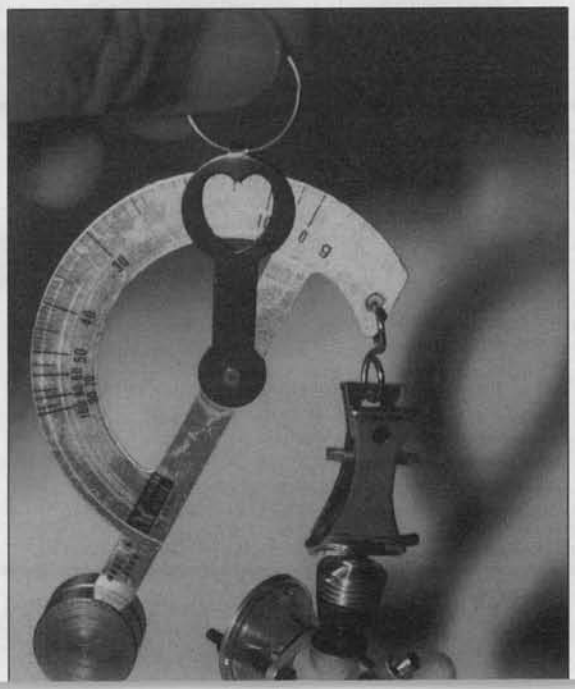
I probably have one style of every engine Jiri has ever made. Under the past communist system, it was only safe to make three engines of a type, it seems, and it remains to be seen what freedom brings for the wonderful people of Czechoslovakia. I believe the engine in the photo is the only one of its kind that Jiri ever made!

If you think the engine on the right in the back row is a motor rather than an engine, you're right! If you think it looks kinda Cox-like, again you're right! Yes, this is an item that you can buy. It's a carbon dioxide (CO_2) powered conversion of the new Cox .010. It's plumbed to a tiny CO_2 cylinder that is positioned at the model's center of balance. It turns a rubber-type Peck-Polymers prop near 3,000 rpm, and is the magic needed to make a small rubber-powered model fly better, longer, and higher! Speed is controlled by the knurled adjuster just above the cylinder. Inside the adjuster is one of the world's smallest ball bearings, which acts as a CO_2 gas valve. The piston slightly contacts the ball bearing at TDC to let more gas into the cylinder, which pushes the piston down and turns the prop. It's a product of the fun genius of Bob Davis, Davis Diesel Development, P. O. Box 141, Milford, CT 06460. Davis Diesel is deep into unique power for model airplanes. Send a stamped self-addressed #10 envelope and $2.00 for a full catalog. Like Bob says, "Flying with CO_2 is a gas!"

In the center of the back row is an in-







line, twin-cylinder diesel engine . . . a real beauty in conception, design and manufacture. It seems only three have been made. If you study the round emblem below the twin exhaust stacks, you can barely make out "JIP." Yes, this is one of Jiri (pronounced YEE-CHEE) Patrman's world-famous in-line twins. This treasure weighs 95 grams and is 2-1/4 inches long up to the face of the prop driver. The left side of the engine has a bellmouth single air intake that feeds the air/fuel mix into a plenum at the uppermost level of the crankcase body. The needle valve angles back behind the engine. Each cylinder's displacement is .5cc, so this is a 1cc engine (.061 cubic inch displacement). This engine was built in 1983, and I regard it as one of the world's priceless tinymite treasures.

If you think you're seeing a hunk of metal on the left end of the back row, with maybe a jumping kangaroo on a paper label, you're probably wondering what it has to do with model engines. Well, if you get one of these hunks of metal along with the printed instructions, and do everything specified in those instructions, you will have built your own model airplane engine, and I assure you that you will then regard the resulting .12 cubic inch (2cc) powerplant as a personal "tinymite treasure" rather than a simple hunk of metal!

The block in the photo is really a precision aluminum extrusion that's in the front profile of a small model engine. The label says, "Mate Extruded Crankcase Material:A1 6061-T6, Part Number: MD-01." And that *is* a bounding, jumping kangaroo superimposed over the outline of Australia, from where this unique project originated. The extrusion weighs 5-1/2 ounces, or 155 grams, initially. With a small home workshop lathe, hand tools, patience, perseverance, and pride, it will result in a running diesel (or maybe glow) model airplane engine. The word "mate" is Australian for the American words "friend" or "pal."

This unique project is the clever brainchild of David Owen, P.O. Box 264, Fairy Meadow, New South Wales 2519, Australia. Send two international postal reply coupons directly to David for simple ordering details. David has

continued on page 108

(Top) Jiri Patrman's micro engine is gold anodized, weighs less than 1/4-ounce and is made like fine jewelry. (Center) Stu's gram scale shows that the Davis Diesel Development CO_2 conversion of the Cox .010 weighs 22-1/2 grams (28 grams equals one ounce). These motors are commercially available. (Bottom) Giovanni Ceccarelli's Italian-made "T. Wasp" tips the scales at 14 grams; that's exactly half an ounce. Giovanni thrives on the challenges of micromechanics. Engine is not commercially available, but text tells how you can own one.

PLUG SPARKS *Cont. from page 31*

"Later on, I visited his small apartment where he was about 3/4 through the construction of his big one. The model took up about half of the apartment; the wife and the children lived in the balance. Later on, I saw one of his early flights. As Pop Schreiber said, it had a very low climb angle, flying in a near straight line for about a quarter mile and landing with a near flat glide.

"I have several minor differences with your article. First, Pop Schreiber's shop on Prospect Avenue was not the old `Country Club Model Shop,' located on Troost Avenue about four miles away. Those four miles on a bike, trying to carry model materials, meant most of the fellows near Central High School went to Pop's shop.

"Pop was quite a guy, usually chewing a cigar that I never saw lit! It meant a lot that he interested the kids in models and donated prizes to increase interest in the local contests near Central H.S.

"It is my recollection that Winnie installed an Ohlsson engine rather than a Brown Jr. The model was just too big and the power too low for a good climb angle. As a third point, I seriously doubt if Pop had much to do with the building of the Big Gull. No question, he did provide some tips on the design and trim of the model.

"So you can imagine my surprise when the AMA Museum Curator, Hurst Bowers, showed me the parts of the construction I saw 53 years ago! As a side note, Winnie is still around, in Kansas City, Missouri."

JOE ELGIN SAYS

I received a copy of a letter directed to Floyd Carter, written by Joe Elgin, commending the TIM-4 ignition system. In his letter, Joe states he has scaled up the Baby Playboy in two versions, one for 1/2A Texaco and the other for Class A-B. As can be seen in the photo, this 500 sq. in. Baby Playboy is just perfect for Class A-B.

Some fellows will ask, why not scale down the Playboy Sr. or the Playboy Junior to size? If one looks carefully, one can see the exceptionally long tail moment, which gives a superlative glide and much easier handling under high power. Power for this model is the green head Torpedo 19 or 23. Those interested might write to Joe Elgin at 13019 Ridge Creek Road, Strongsville, OH 44136. He may even have a copy available!

NOSTALGIA REPEAT

With all the excellent photos taken by Dick Everett, this writer cannot help but run a few to promote the new RC Nostalgia event. The latest photo from Gene Wallock is a classic shot of the vertical takeoff mode (VTO) as demonstrated by Ron St. Jean and his world-famous "Ramrod."

Dave Lewis, erstwhile president of SAM 21 and former F/Fer from the San Valeers Club, says the vertical takeoff is really fun using radio control. After flying Old Timers all this time, Dave was quite surprised and delighted with the superlative gliding qualities of the Denny Davis "Hogan" design. Dave said this S.T. 35 powered model maxed with the greatest of ease. Perhaps (in this writer's opinion) we should go back to the late fifties when we ran ten-minute maximum flights. Like all new events, the rules will suffer some growing pains.

For those modelers desiring to get some of the inside dope on flying and adjusting Ramrod models, Ron St. Jean is still active and can be reached at 3384 Dale Dr., Carson City, NV 89706.

READERS WRITE

A most interesting photo was received from George W. Fleck of Sylvania, Ohio, showing an eight-foot 1940 Spook. As a guess, this writer would estimate this model is a double-size Spook 48. Fleck reports this scratch-built model is covered with Sig Coverall, butyrate dope and trimmed with black urethane enamel. The trim was painted by hand, with no masking tape employed. Good work!

This 9-1/4 pound model is powered by an O.S. 61 four-cycle engine and flies very steadily. Of course, it is radio controlled as good free flight flying fields are few and far between in Ohio!

MODEL OF THE MONTH

In line with featuring little-known and even lesser-seen models, we present three-views of the "Miss Fire" as kitted and sold by Sky Devil Model Co. of Oakland, California.

This hobby shop was the popular hangout of the Oakland gang: Rod Doyle, Joe Culver, Dick Schumacher, et al. It wasn't long before the proprietor, Ted Morrison, arranged for Dick Schumacher to draw up one of his successful models, called the "Miss Fire." According to the original sketches in this writer's collection, the design was faithfully kitted from the three-view drawings. Of interest is the overlay sketch showing an inverted engine installation giving a clean cowl and shorter landing gear.

This 1936 design, when kitted, showed a Baby Cyclone engine for power. To help promote kit sales, the plans also showed the installation of the popular Bunch Gwin Aero (later the Tiger). Of note is that Dick was fond of the RAF 32 airfoil. That, plus the built-up hollow box spar. With cyanoacrylate glues nowadays, these hollow box spars can be built up in very short time. Not many modelers care to do this, but this writer has found them to be extremely sturdy and lightweight.

In later years, Dick became known for his series of RC models somewhat resembling this featured model. These were developments of his early "Hoiman" design followed by MkII and MkIII series. Quite a few of his designs appeared in foreign magazines.

Schumacher was a Western Air Lines pilot for years. His career was cut short about 15 years ago when one of the hydraulic controls locked during a training flight. This rolled the plane into the ground on takeoff. Ironically enough, "Schooey" had been utilized as a trainer pilot between regularly scheduled flights. We lost a very versatile modeler who tackled everything and anything from indoor to free flight to control line, and finally radio control.

LETTER WRITING TIME

Received a most interesting letter from SAM 39 activist, Robert "Bucky" Walter of Sandusky, Ohio, who sends information and photos of their activities on a regular basis. This time, Bucky writes to point out that famous modeler Dick Korda is now in a nursing home and can be reached c/o Mentor-Way Villa, 8903 Schaefer, Mentor, OH 44060. Walter is hopeful that perhaps some of Dick's old buddies might drop him

a line to cheer him up. Joe Elgin concurs with Bucky's idea, but cautions that Dick may be unable to reply due to health.

Several photos of other SAM 39 activities were received, among them one of a Scientific "Miss World's Fair" built by Bob Redinger. This model was built from the kit produced by A-J Free Flight Service. Bob was one of those fellows who flew control line after WW II on the west side of Cleveland. Bob became associated with Dick Korda at that time and participated in all CL activities.

In addition, Bucky Walter sends in a shot of his latest folly, a Scotty Murray "Answer" (the *Model Airplane News* version of the Bay Ridge "Topper"). He has been the victim of several comments by Tom McCoy regarding the Ritz airfoil used in this model. The rib section has very high lift and is great in a thermal, however, it will practically fall out of the air with no thermal conditions. Bucky says he will fly it only in thermal conditions. This model should be a winner under Bucky's rules. Haw-w-w!

MODEL KINKS

The name may not be new, but a lot of the ideas are. Jack Tatum, SAM 74, Box 4294, Clearlake, CA 95422, writes to say the easiest way to get rid of cyanoacrylate glue off your fingers is to use Avon "Skin-So-Soft" hand and body lotion.

Jack says this stuff will remove CA glue from glass, metal, and most plastics. The proof was when he sprayed some on a counter where CA glue had been on the surface for nearly a year. He let it sink in for a few minutes and it came right off. No kidding!

Another gimmick noted is from Bobby Taylor, newsletter editor of the LaGrange RC Club in Georgia, who points out if you can't find K2R spot remover for getting oil off wood, then use a solution of cornstarch and common rubbing alcohol. Mix it into a paste and spread it over the oil soaked area. Let it soak overnight, then brush away the oil-soaked powder (as you would with K2R). The alcohol is absorbed into the wood. It breaks down the oil and evaporates, carrying the oil to the surface. Then the powder or cornstarch absorbs the oil as it rises to the surface. As you remove the powder from the wood, you are also removing the oil. Best part is that you can apply additional coats until the wood is clear of all oil stains.

THE WRAP-UP

First off, we have the inevitable "obit" notice that saddens all of us. The latest postcard from Otto Curth of Northbrook, Illinois, reports that longtime modeler and propeller manufacturer, Alvin Anderson, died in October 1990, at the age of 72.

Anderson was noted for his large models, the most notable being his "Anderson Pylon" of 1937 vintage. Close comparison of Carl Goldberg original diamond pylon (listed as the "Gas Bird" by this writer to obviate confusion from the number of diamond type Zippers built) shows a remarkable coincidence of lines and shapes.

This was brought about by the relation between Goldberg and Anderson, who flew very similar models during the 1938 contest season. Goldberg used a Dennymite of .56 cu. in. displacement in a 48-inch wingspan model. Talk about a sensational climb! Anderson used a model with a Brown Jr. mounted sidewinder style. Needless to say, the boys were paralyzing the competition.

The announcement of the Comet Zipper in the February 1939 *Model Airplane News* did acknowledge help from Anderson in the development of the Zipper. This was probably the most sensational kit of 1939. The design dominated the 1939 Nationals and all subsequent contests.

Where Goldberg went into the hobby business via Comet Model Airplane Co., later Top Flite, and finally his own business, Carl Goldberg Models, Alvin went into the full-scale aircraft propeller business first at Fort Wayne, Indiana, and then at DuPage County Airport west of Chicago.

Alvin is survived by his son, who will continue the propeller business. Fame is such a strange thing; Alvin missed his in the modeling game.

Unless you are a native of Southern California, the name Virgil Rice might not register. Virgil, who recently died, was the mainstay of the V-G Speed Team . . . V-G standing for Virgil plus Granger (Williams). With Rice

working the engines over and Granger with his classic flying, the team was so successful that the "V-G" was kitted by Modelcraft Model Supply of Los Angeles.

For those looking for plans to the V-G Racer, you will be pleased to know that Arnie Snyder of Modelcraft kitted the design under the name of "World Champion Tether Model." This is Plan #33F6, selling for $6.00 plus $1.20 postage, and 6% sales tax in California, out of the Pond Plan Collection. **MB**

JET RALLY *Continued from page 43*

an eye on this team. I understand they are building two Yellow Aircraft F-14s. They could be our next formation show team. I have a special affection for the F-14, as I worked on the full-size ones for twenty-two years.

Ron Temple had a very attractive Byron F-16 painted blue and gray. It featured a Rossi 8l, Rohm Air Retracts, and K&B paint. Vertical performance was great with the Rossi 81 engine.

James Sultan put on a great show with his F-20 Tiger Shark, a Knights of the Air kit. Everything was going great until he developed a violent elevator flutter. Jim wisely aborted his flight, and brought the F-20 in for a safe landing.

Rick Canderelli, who has been flying jets for 3-1/2 years, brought his Viper, a very fast jet model. It is powered with a KBV 82 engine turning a B.V.M. fan, and has retracts with full working doors. It was finished with K&B paint overcoated with Imron clear.

Roy Stella's F-16 flew with authority, using the O.S. 91 ducted fan engine with a Byron fan unit. The F-16 was equipped with Spring Air retracts and was finished with urethane paint.

During the half-time break, the airshow began with a helicopter demonstration by Danny Melnik, Brett Bures and Mike Mas. This was followed by a banner towing American flag, a flying Ferrari, a flying Batmobile and, last, but not least, Snoopy and his flying Doghouse.

For a first time event, I have to say that this fly-in was a great success. I asked Paul Woodward and Charlie Chambers if they would have this fly-in again and their answer was a resounding "Yes." I think they made the right decision.

Until then, stay well and keep 'em flying! **MB**

FREE FLIGHT *Continued from page 47*

wires to the switch terminals and stop! Don't solder the battery leads to the buzzer and switch until you have installed the unit in the pylon. Drop the switch in place, glue with epoxy or CA, put in the buzzer and glue in the battery holder. Now finish solder the remaining wires to the positive and negative poles of the battery holder. To make sure the battery won't leave its holder on impact, tape it down. Test the unit before flying to make sure everything works properly. Don't forget to pull the switch before launching. Listen for the buzzing sound in the grass when searching for your plane. I've had planes lying in the weeds for over an hour and when found, the buzzer was still loud. Carry extra batteries as the continuous buzzing shortens battery life. Hopefully, we've taken some of the stress out of finding your plane."

STARLINE PRODUCTS—PART 2

Last month, I allocated quite a bit of space in this column to a description and set of tests conducted on the Starline selection of free flight timers. I noted that Sal Fruciano, proprietor of Starline, also had a number of other custom free flight goodies that would be of interest to you. I think three of these items are particularly interesting and worth a few extra comments:

1. The Timer Start Switch with lock. This device is a thumb or finger operated switch that allows the timer to be mounted close to the engine but the on-off switch to be located in a more convenient and remote location. Essentially, the switch, when pressed into place, locks into position and keeps the timer from operating. When pushed a second time, it unlocks and the timer starts. The device is made from aluminum and weighs only 1.8 grams. It is neatly made and worked over 100 times without flaw in the tests that I ran. It sells for $10.

2. The Bunt Mechanism. This device is made to fit on the back end of a tubular fuselage. It's a circular ring upon which is fitted a bunt plunger. When in the power position, the plunger is held in place by a line from the timer. For the bunt, the timer line is released and the plunger retracts, allowing the stab to move into the bunt position. Once again, I tested the device dozens of times, and it worked flawlessly and smoothly each and every time. The device is .55-inch in diameter, weighs 2.2 grams, and sells for $15.

3. The Coupe Front End Assembly. This is a machinist's jewel. It is well worth buying just to look at. However, it is also very practical and useful. It features a nose assembly with mounting ring, a spring-loaded drive shaft, and folding prop blade mounting hangers. The device works smoothly and is exceptionally well made. The prop mounting hangers are screw stop equipped and accept prop blades mounted on a dowel. They are adjustable to many different pitches. The weight is 14 grams, the tube diameter is 1.15 inches, and the cost is $20.

All of the other pieces of equipment not specified above are of similar quality and workmanship. I do not think you would be unhappy with any of them, and the costs are very reasonable.

BIG T-BIRD KIT FROM CAMPBELL

Shortly after the information about the new kits from Lee Campbell appeared in "Free Flight," I received another surprise from Campbell's Custom Kits . . . a Big T-Bird Nostalgia kit. This one is a 150% version of the original Russ Hansen design and is intended for engines in the .19 to .23 size. The wing is 58.5 by 9.0 inches for a total area of 526 square inches. The stab is 26 by 7.5 inches, providing an area of 195 square inches and a stab percentage of 37%. The fuselage length, not including the engine and mount, is 37 inches. Dave Platt drew the full-size plans, and the whole kit is complete with hand-cut and selected balsa and plywood parts. All wire and tubing is provided. Once built, you will need to provide the covering materials, engine, mount, timers

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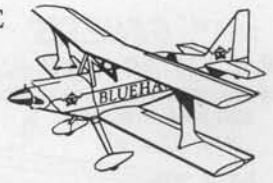

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and the like. The kit is an excellent value at $59.98 postpaid. It is a good addition to the Campbell line. For further Information or to place an order, contact Campbell's Custom Kits, 401 Executive Center Drive, Suite H-108, West Palm Beach, FL 33401; telephone (407) 686-7824.

AMA RULES REDUX

The last couple of "Free Flight" columns carried some of my personal comments about the proposed rules changes for free flight events being considered by the AMA Free Flight Contest Board. Fortunately, enough of you made your wishes known, and the proposed reduced engine runs were deservedly defeated. Most of the rules that were passed were intended to clean up currently confusing and conflicting language, so the contest board did its job well. If you haven't talked to or dropped a note thanking your FF board member for his intelligence, do it now.

COMMENTS ABOUT RECENT COLUMNS

I received a number of comments about recent columns that don't fit anywhere else, but which might be helpful to fellow free flighters, so here they are:

1. Bob Beecroft noted that he bought the Radio Shack hygrometer to assist him in controlling the blushing problems he had encountered in covering his models. He also noted that he uses the hygrometer to determine when to mix his fuels. Since methanol-based fuels are extremely moisture sensitive, Bob mixes only on the driest days for the best results. He also takes his hygrometer to the flying field to determine which fuel to use.

2. Bob also noted that he obtains his replacement screws for Tatone timer repair from Micro-Fasteners, P.O. Box 42, Netcom, NJ, 07857. These are 0-80x1/8 allen head screws, available in grade 8 steel or stainless.

3.Tom Dixon from Marietta, Georgia, notes that he handles blush on models by rubbing out the paint, as blush is merely water vapor trapped by the quick drying outer skin of dope. It can be removed by polishing compound, steel wool, Brasso, even toothpaste. So, Tom suggests it's a waste of time to wait for "good" weather. On a typical tissue or silk FF, just going over it with steel wool would be sufficient to get the blush out. Of course, the rubbing is done by hand.

THE END

This month's column has run a bit long, so the usual feature of "How I Got Started in Free Flight" will be continued in the July column. Since the weather has been getting more conducive for flying all around the country, go out and hook a few thermals and put in some good flights until next month. ***MB***

CONTROL LINE *Cont. from page 50*

• A trip down one modeler's Memory Lane.
• A report on the club's regular "Breakfast Circle" meal and flying sessions.
• A year-end report on 1990 activities.

- Photos of the club's Nats trophy winners.
- Notes on upcoming events.
- An article on tank venting.
- The AMA safety code.
- Photos of some historic aircraft.

Todd Lee is president of the Topeka club. John Canada is vice-president, Jim Lee secretary-treasurer, and Dale Hrenchir safety officer.

Those in the area may want to drop in on the regular meeting, which is at 7 p.m. on the second Tuesday of each month at Gage Park Model Airplane Circle (May through September) or at Dee & Mee Hobbies, 628 Kansas Avenue (October-April). The newsletter can be received monthly by sending $5 to Jim Lee, 827 SE 43rd, Topeka, KS 66609.

• • •

As usual, club news, photos, technical tips or questions, contest reports and news of upcoming CL activities are welcomed. Write John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. ***MB***

WAYNE MANN *Cont. from page 53*

downwind?
WM: I travel downwind.
MB: When do you use Idle-up 2?
WM: Only for the roll.
MB: When do you hit throttle hold for the 180 auto?
WM: I fly on Idle-up 1, then hit throttle hold, then start the descent.
MB: Do you really need driven tail rotor for the 180 auto maneuver?
WM: Yes, to prevent yawing at the flare. Hirobo or a similar slipping type driven auto mechanism is the way.
MB: What's the ideal blade weight?
WM: I like 185 to 190 grams.
MB: Are the hovering maneuvers easier than the forward flight maneuvers?
WM: Not really.
MB: How do you rank the hovering maneuvers, from easiest to hardest?
WM: Nose-in circle, Hovering M, Figure 8, and Tophat.
MB: How do you set up your two-position gyro?
WM: I use 75% for all the hover maneuvers, and 50% for forward flight aerobatics.
MB: How about rotor rpm?
WM: I like 1300 for hover and 1850 for forward flight aerobatics.
MB: As the helicopter tilts to the right in hover, do you do your Nose-in circle clockwise (when looking from the top)?
WM: Yes. This helps keep the model level in the maneuver.
MB: What is the effect of such low rpm on hover?
WM: The hover cyclic response is slower, but the collective is less sensitive.
MB: How do you hold the transmitter sticks?
WM: With thumbs only.
MB: Do you use a transmitter strap?
WM: Yes.
MB: How do you balance the main blades?
WM: I place the blades at 45 degrees on a razor. Do this twice to find the spanwise and chordwise center of gravity.
MB: After balancing the main blades, do you also balance the complete rotor head with the blades?
WM: Yes.
MB: Do you also balance the tail rotor blades and tail rotor hub as a whole?
WM: Yes.
MB: Do heavier blades reduce the cyclic sensitivity?
WM: Not really.
MB: How do you like to set the rotor head stiffness?
WM: Soft, but without being mushy.
MB: How many shim washers do you put in your X-Cell rotor head?
WM: Just one on each side.
MB: Where do you set the helicopter fore and aft balance point?
WM: Slightly nose heavy. This takes the pitchiness out of forward flight.
MB: Do you move the trim tabs or hold the sticks when transitioning from hover to forward flight?
WM: No. When I move into forward flight, I switch on Idle-up 1 which automatically kicks in the forward flight trims.
MB: When you fly a model helicopter, where on the model do you focus your attention?

The rotor disk, the skids, or canopy?

WM: I watch the center of the model, engine and frame area.

MB: Do you use inflight adjustable needle valve?

WM: Yes, this is really helpful. An extra micro servo is used to turn the main needle valve on the Super Tigre carburetor. It can move up to a 1/4 turn.

Thank you very much, Wayne. Well, folks, I hope you have picked up a trick or two. In the future, we will interview some more great pilots. ***MB***

CHATTER *Continued from page 59*

wall, therefore they can take a tail boom strike!

Concept and Enforcer have very soft flapping rotor heads that can ding into the tail boom on a hard landing or in a badly executed autorotation. Usually, instead of using the foam blades, when wood blades are used, they really do a good job on the tail boom. I have had some Hybrid Hobby wood blades came into contact with the boom and neither the blade nor the boom were damaged. The Champion tail boom also comes with the nylon support for the tail drive wire already installed! However, Schluter tail booms cost twice as much as Concept tail booms, and they need to be cut down in length.

Remember, if any of you have a plastic helicopter (almost all the 30-size helicopters are plastic), the Zap A-dap-a Goo is great for gluing the plastic parts together. But, please, do not glue things like plastic blade grip or rotor hub, or other high stress parts together. These parts are under a lot of load and if they come apart in the air, they can kill someone!

If your helicopter's main rotor head has a floating-axle design, and the blades sometimes go out of track in flight for no reason, then here is a cure. Usually the reason is the head becoming too soft and mushy due to the O-rings getting old, or more washers need to be added to stiffen the rotor head flapping action. Try to grab each blade in your hand and tilt the rotor head. It should feel pretty snug and springy without slop. When the blades are moved up and down the rotor spring effect should restore the rotor disk to level very well. If the head does not return level, then replace the O-rings, or somehow "tighten" the head by adding thin washers on the axle. Schluter and X-Cell kits come with very, very thin washers. You may need to get more. Usually adding just one more on each side will do the trick. By the way, adding the half-inch long tiewrap underneath the O-ring in the Concept will also improve the tracking on Concept. Now the Concept blades will stay in track even in heavy aerobatics.

For the Kalt Excalibur (reviewed in Aug. and Sept. 1990), there is a set of harder O-rings from Hobby Dynamics. The hard O-rings stiffen the K-5 rotor head and quicken the cyclic response. The stock Excalibur comes with the soft O-rings which make the Excalibur very smooth but maybe too slow in cyclic response for hot dogging. In the November issue we showed the picture of the modification of replacing the stock Excalibur clutch, fan and clutch bell with a GMP unit from the Legend. This is because the stock clutch shoe will fatigue and grab and break.

A fellow modeler suggested that changing the clutch lining to X-Cell lining on the stock Kalt clutch will also solve the problem. So far we have put in many dozens of flights on the GMP clutch and the system works very well. A set of X-Cell 60 clutch, clutch bell and fan can also be used. But both the GMP or X-Cell fan needs to be reduced in height slightly to fit the fan shroud. We found that 190 to 200-gram Tech Specialties blades work very well on Excalibur. My friend Peter Cooke thinks that my Excalibur is one of the most fun machines to fly. He does excellent rolling circles with it.

Another weak spot on the Excalibur is the 90-degree angle piece that is bolted onto the side frame. X-Cell and Legend have the bottom of the side frame bent to 90 degrees so there is a flange for mounting the landing gear struts. On Excalibur, instead of a 90-degree bend, an extra 90-degree angle piece is bolted on, then the landing struts are bolted onto the angle piece. This is an excellent idea because on X-Cell and Legend, after a while the 90-degree bend area may crack and the entire frames need to be replaced.

On Excalibur, only the 90-degree angles need to be replaced. But unfortunately, the 90-degree angle is bent too sharply, after a few hard landings the angle will fatigue and crack. The solution is to add some rubber blocks in between the angles and the struts to absorb the shocks. The idea is use those Lord style shock dampers as used by pattern plane modelers for mounting their engine onto the firewell. Kalt sells these Lord style rubber shock absorbers for the Excalibur. They are about $15 for a set of four. We highly recommend them because they will prevent the angle from cracking. They will fit other helicopters, too. Hirobo also sells similar rubber Lord mounts at a similar price.

One inexpensive source for these Lord mounts is when you buy a set of Century Imports brand of nylon strut landing gear, it comes with a set of four Lord mounts. These are not as nice as the Kalt ones, but they are included free in the gear set. They are available from Heli World in California. Look in the ad for their number.

Now let's finish off with some comments on setting up a new helicopter for the beginners. Last month we described how to set up the servo throws and the basics of using helicopter radios in our Concept review. Now let's quickly go over the tail rotor mixing. As many articles have been written on tail rotor mixing, we will not dwell on it too much. An excellent book that I recommend to all beginners is Ray Hostetler's

continued on page 92

BY A. G. LENNON

The OSPREY

The Osprey is all set to fly. It is an easily flown sport model, with interchangeable wheeled landing gear or floats.

This model was designed from the start as a sturdy, easily flown sport model, with interchangeable wheeled landing gear or floats, the latter designed specifically for the Osprey.

It was originally powered by an O.S. Max .45 FSR engine with a Davis diesel head and was flown for two years with this power. However, due to the very dirty, black exhaust residue, use of this diesel conversion has been stopped. Experience with another model powered by the O.S. Max .46SF, swinging an 11x8 prop, is convincing proof that this engine is ideal for the Osprey. The drawings show this engine, along with an 8-ounce fuel tank. A 3/4-inch Fox shaft extension permits better cowl streamlining.

Features of the Osprey include:

- Ducted, easily removed and low drag cowling.
- NASA droop and RAO slots ahead of the ailerons that permit very high, unstalled angles of attack, with effective aileron control for slow flight.
- Big, slotted flaps that virtually double the wing's lifting capacity. Together with the droop and slots, these permit slow, steep approaches and landings, and quicker takeoffs.
- Ailerons have a 2:1 differential, and have no adverse yaw!
- The floats run with spray well controlled due to the "chine flair" shown on the drawing. The twin water rudders provide excellent low speed control on the water.

Flying this model is a pleasure. It is stable, easily flown, adequately aerobatic, and is capable of a wide range of air speeds. The model has low aerodynamic drag and a very flat glide, so much so that full flaps are recommended for shorter landings, and half deployed for quicker, steeper takeoffs.

For engine starting, it is recommended that the model be inverted on your field box, thus turning the engine upright, for priming and easier starting. Use of a ball check valve in the pressure line to the tank is needed to prevent fuel flowing from the tank to the muffler when inverted. This valve is made from a two-piece aluminum in-line filter, with a 1/8-inch diameter ball bearing installed inside so that when the model is upright, the ball sits on the screen. When inverted, the ball falls away from the screen into the conical cavity and effectively seals it off. The ball valve should be positioned as close to vertical as possible.

Building this model is not difficult; the drawings are very detailed and the following is the assembly sequence for each major component.

WINGS

Assemble the flaps first. The flap pivot

arms will locate the flap support ribs of the wing. **Do not** drill the pivot holes in the arms.

The location of the flap support arms on ribs C and E is critical to properly locate the pivot hole for correct flap operations (see wing section EE). A jig for this assembly is recommended.

Cement cable sheaths to ribs A-D-G and short ribs F1 and F2 to rib F, and short ribs K to rib G. Those for installation alongside rib A will be installed during wing assembly.

One of the photos illustrates the wing assembly jig; 3/16-inch sq. balsa rails under the wing spars are used. The bases are pressed wood shelving, which are both rigid and straight. Note that the rails under the rear spar are close to the shelf edges, permitting the flap support ribs to hang out in space.

Assembly of ribs, spars and webs is straight forward. Install the cable sheaths at this point. These may be bent carefully, over a candle flame, before installation. Glue them securely in the sheath anchors and the ribs through which they pass.

Apply the balsa skins. Use of liquid ammonia on the convex side of the leading edge skins will aid this installation. Keep the wing's panels weighted down at all times during this process to assure a straight wing.

Aileron assembly is straight forward. When wings, flaps and ailerons have been assembled, install the flaps using the balsa alignment jigs shown in wing section FF to accurately locate them. Drill 3/32-inch diameter holes in the flap pivot ribs using the holes in the flap supports as drill jigs. Subsequently enlarge these to 1/8-inch diameter and install 1/8-inch O.D.x3/32-inch long brass tube bushings. The pivots are 3/32-inch diameter music wire, 7/32-inch long, and are inserted after covering the wing, flaps and ailerons. Check that the flaps operate freely, as shown in section EE.

FUSELAGE

Assemble the two sides, right and left, adding rails, uprights, doublers, servo supports, longerons, diagonals and 1/8-inch balsa corner strips behind the wing; add 1/8-inch balsa sheet from ahead of bulkhead #8 to the fin spar. Note, the cut out for the stabilizer and the cross-hatched 1/8-inch balsa sheet behind the stabilizer. This is cut out to install the horizontal tailplane and is then cemented back in place.

Using a fuselage jig, assemble the two sides, installing the cross pieces, top and bottom, and plywood bracing where indicated, the 1/8-inch balsa upper and lower corners, and bulkhead #8. Bulkhead #8 should be a subassembly with the tailwheel strut and linkage installed before fuselage assembly is started.

Add the plywood bulkhead #1, tank mount plywood, and receiver/battery box cover. Install the receiver and run the antenna down the fuselage, ready for installation in the fin.

Install cable sheaths for the rudder and elevators. Note that the cable is **without** sheathing at bulkhead #8, between the rudder cable sheath anchors. Glue the sheaths to anchors and other bulkheads.

Install the water rudder cable sheath anchors, which are designed to clamp on the sheaths, yet permit the sheaths to be withdrawn if floats are not installed.

The floats were designed specifically for the Osprey, with Sullivan cable linkage to the water rudders.

The Osprey has just landed.

HORIZONTAL TAILPLANE

Assemble the stabilizer and both elevators. Connect the elevators with the horn and 3/32-inch diameter music wire. Install double Monokote elevator hinges. Cover the assembly, install block tips and balance weights, but leave an area, both top and bottom, bare for cementing the tail to the fuselage. Attach clevis and cable to elevator horn and thread cable into sheath while inserting tailplane into its slot in the fuselage. Replace cross-hatched portions previously cut out; cement securely.

FIN

This is built on the fuselage. Before adding second skin, pull the antenna up through the holes provided, and anchor it with thread to the hole in the block tip. Add second skin.

RUDDER

This is a simple assembly, and is hinged to the fin during the covering process. Note the small block, below the plywood horn, that permits radiusing of the rudder bottom to conform to that of the fuselage.

FLOATS

Assemble bulkheads 4 and 5, the 1/4-inch plywood pads and triangular stock; and bulkheads 7 and 8, plywood pads and triangular stock as subassemblies.

Assemble bulkheads and sides in a fuselage jig, for accurate alignment. Add top 3/32-inch balsa sheet, 1/4-inch sq. balsa strips at chines, and forebody and afterbody keels. The drawings show the upper corner treatment clearly. Bolt float struts and spreaders in place, joining the floats before adding bottom sheeting and forebody chine flair strips. The water rudder cable sheaths should also be installed before bottom sheeting. Add nose and rear blocks.

COWLING

The drawings are explicit. Note that the lower detachable portion of the cowl is installed by sliding it **sideways from the muffler** side so as to engage the flat holddowns. The front holddown should be well into the slot in the 1/32-inch plywood cowl parting line formers when so doing.

When upper and lower cowl portions have been assembled from 1/2-inch balsa and triangular stock, the interior should be hollowed out to fit the engine and muffler installation. A drum sander and a Dremel tool will do this quickly and dustily. Adjust the cowl length to suit your installation, allowing a 1/16-inch gap between the spinner backplate and the plywood spinner ring/cooling air entry subassembly. The outside of the cowl is shaped to blend in with the spinner, fuselage and canopy.

CONTROLS/ INSTALLATION

The drawings show the six servo locations, receiver and battery locations and

FULL PAGE PLANS ON NEXT PAGE.

switch installation. All control cables have the DuBro mini-link clevises glued with CA to the cable at the control surface ends. At the servo ends, the cable is likewise glued into the brass threaded couplings onto which the clevises are threaded. Control throws and trim adjustments are made at the servos.

The water and air rudder servos are "Y" connected to the receiver. Note the water rudder cable crossover (L.H. rudder connected to R.H. side of water rudder, servo, horn and vice versa), which permits the air and water rudders to act in the same direction.

Note also the aileron "double decker" horns that provide for a 2:1 aileron differential.

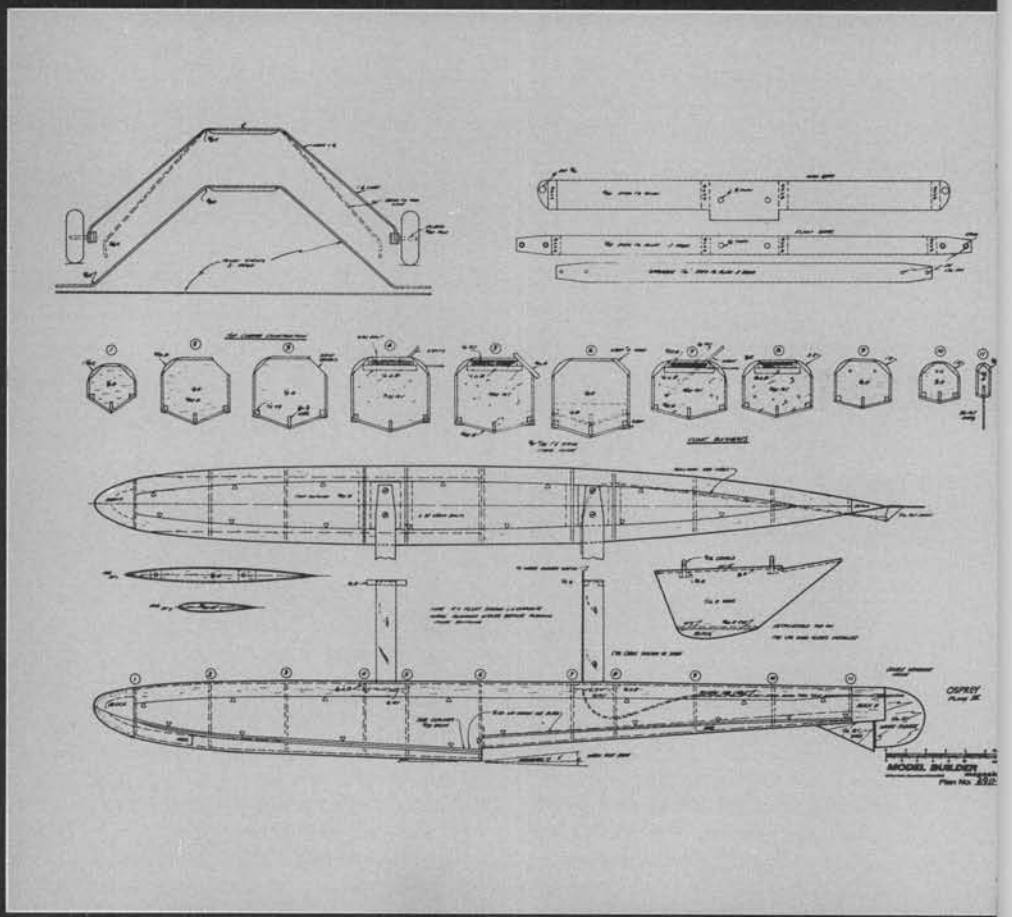
If floats are to be used, wrap the receiver and battery in plastic bags before installation, for obvious reasons.

COVERING

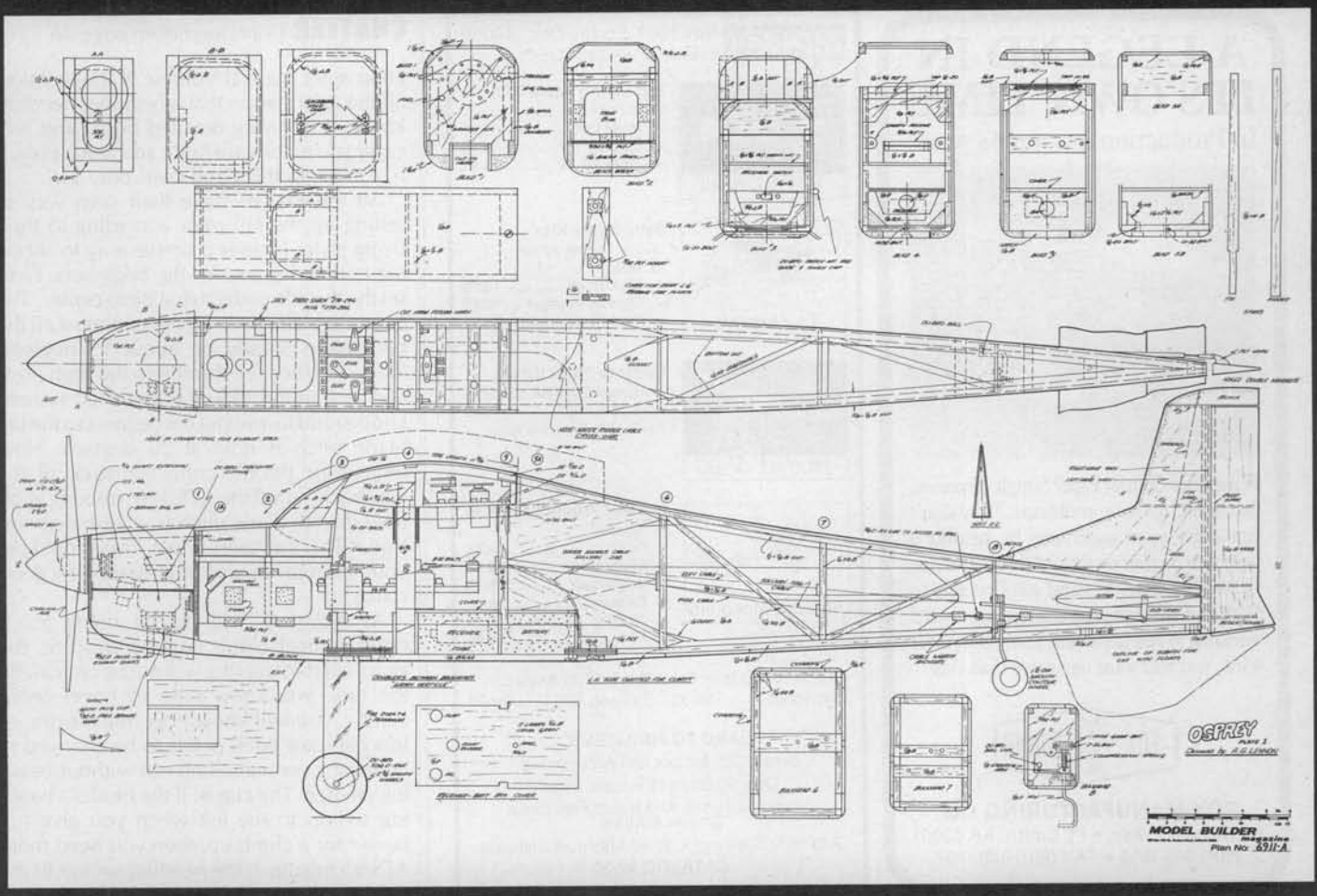
This model was covered with Monokote. Use your favorite plastic covering, but on the floats insure a 1/4-inch overlap and that *no bare balsa* is exposed. Balsa is porous and water will penetrate it as though it was not there. That's "hard experience" talking.

Hinging with double Monokote is used on ailerons, elevators, rudder and water rudders. This is flexible, gap sealing hinging that the writer has used successfully for many years.

Good luck. Enjoy this model; flaps will open up a new flying experience for you. ***MB***



The slotted flap underside is fully deployed showing hinges and clevis.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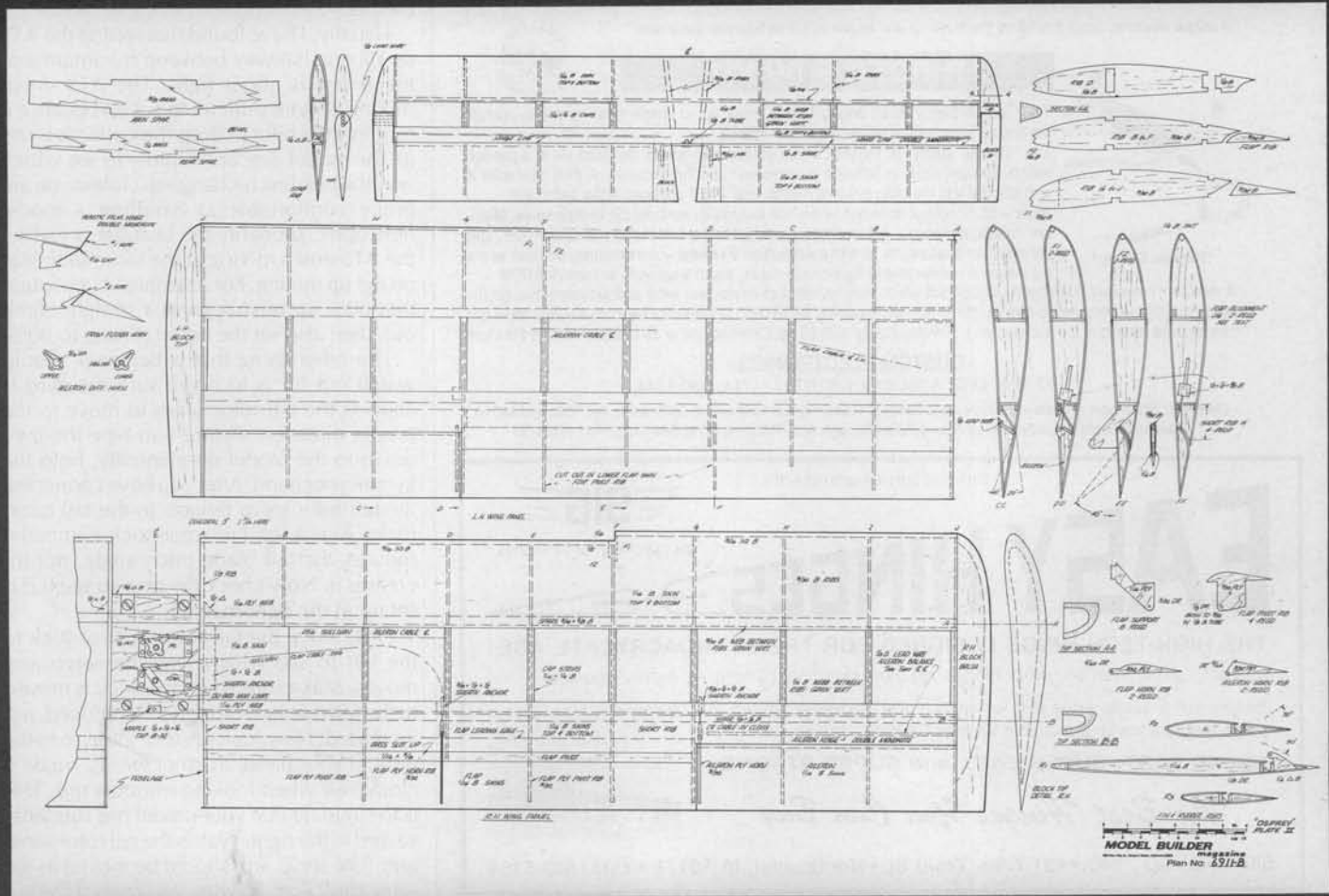
'OSPREY'
PLATE 2
MODEL BUILDER
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CHATTER *Continued from page 86*

Helicopter Manual Volume 9. It has almost all the information that a beginner needs to know. It is a very detailed book, and will carry you to forward flight and aerobatics. It is 209 pages thick and costs only $15.

All the experts have their own way of setting up the tail rotor according to their flying style. Here is a simple way to set up the tail mixing just for the beginners. First, set the throttle collective stick to center. The tail rotor blade pitch angle for almost all the helicopters should be about 15 degrees. Next, advance the throttle to the high position. Adjust the ATS (automatic tail system) knob to add in an extra ten degrees so the tail blade pitch is now at 25 degrees. Now reduce the throttle collective stick all the way back, adjust the ATS down mixing knob until the tail blade pitch is at zero degrees. Voila! That's all there is to it. This should put your tail rotor mixing at a reasonably good start.

As beginners will not be doing much rapid vertical climb out and descent, the exact tail rotor mixing will not be critical. By the time you know how to hover proficiently, you will know how much extra, or less tail rotor pitch needs to be changed to perform a vertical climb out without heading change. The cue is, if the model's heading swings to the left when you give full power for a climb up, then you need more ATS up mixing. If the heading swings to the right on climb out, then reduce the ATS up mixing.

Usually, I have found that setting the ATS up mixing halfway between minimum and maximum is about right. The ATS down mixing is more difficult to set up because it requires the pilot to drop the collective and let the model descend rapidly to see which way the heading is changing. Unless you are pretty comfortable at handling a model helicopter, probably the best bet is just set the ATS down mixing at the same setting as on the up mixing. For example, if you found that 60% up mixing gives a straight climb out, then also set the down mixing to 60%.

The other thing that a beginner should watch out for is to make sure the gyro is causing the tail rotor servo to move in the proper direction. Before you tape the gyro down to the model permanently, hold the gyro in your hand. After you have connected the tail rotor servo linkage to the tail rotor, make sure a left tail rotor stick command reduces the tail blade pitch angle, not increases it. Now check the gyro to see if it is set up in the right manner.

First, move the tail rotor control stick to the left to see which way the servo arm moves. Make sure when the stick is moved to the left that tail rotor pitch is reduced, not increased! Now, quickly turn the gyro to the right in your hand, in other words, rotate it clockwise when looking from the top. This is to simulate that your model has suddenly yawed to the right. Watch the tail rotor servo arm. The servo arm should be moved in the same direction as when you moved the tail

rotor control stick to the left. This means when the helicopter suddenly yaws to the right, the gyro will automatically sense it and tell the tail rotor servo to give some left tail rotor command to correct the model's heading.

In this example, if the servo does not reduce the tail rotor blade pitch when the gyro yaws right, then it means you need to reverse the gyro "reverse switch" on your gyro amplifier. Some inexpensive gyros do not have a reverse switch. Simply mount the gyro upsidedown, and that will solve the problem. The gyro should be mounted to the model with thick double-sided foam tape. The gyro has a fragile motor spinning two flywheels. This mechanical assembly can get damaged if too much vibration gets transferred to it.

If your gyro has been through some crashes and your radio is getting glitchy, then take the gyro apart and have a look. There is a small capacitor soldered across the two terminals on the electric motor. This capacitor is there to remove the electrical noises from the motor brushes. This capacitor has a tendency to come apart at the solder joint under heavy vibration or in a crash. By soldering it back, it will solve the radio glitch problem.

As it has been many years since I first learned to fly an RC helicopter, I may have overlooked what beginners really want to know, though I have taught many people how to fly. The following excerpt is from one of my recent students, describing his experience after the first week of training. He has less than a dozen flights, but he can already hover his Concept for few seconds, three feet off the ground. The fellow is already ecstatic about it. Now he's beaming a big smile from ear-to-ear. Let's share his new experience:

"My name is Peter. As many of you already know, James' monthly articles frequently deal with the highly detailed and technical aspects of RC helicopter construction, setup, and flight. So this month he asked me if I would share my experiences from a novice heli pilot viewpoint.

"My interest in RC modeling began a few years ago when I first saw RC airplanes fly at a local RC club field in Columbia, Maryland. Like many curious onlookers, I was fascinated by the speed and agility of these flying models as they fly maneuvers through the air. Immediately, I purchased a copy of a modeling magazine and began reading about my new found hobby. Two years passed and after some initial setbacks, I became an accomplished RC pattern plane pilot. Shortly after, I met James while studying rotocraft engineering. He introduced me to RC helicopters, which is more impressive and complex than any model I have seen. Eager to take advantage of James' flying experience, I began construction on my first helicopter, a Concept 30 SE.

"Along with the Concept, I purchased the following equipment: An Airtronics helicopter radio, Airtronics rate gyro, O.S. 32H engine, a mini tuned pipe, and two 36-inch

long 1/2-inch diameter wood dowels and four whiffle balls for making training gear.

"Now to explain the equipment. All modern RC helicopters today need at least five channels to control the throttle, collective pitch, tail rotor, forward/back cyclic, and left/right cyclic. The throttle function simply regulates the engine power by controlling the air/fuel mixture entering the carburetor. Through some electronics inside the transmitter, collective pitch is automatically coupled with the throttle so that advancing the (collective pitch) causes the main rotor blade pitch angle to increase or decrease. Together, moving the throttle and pitch will cause the main rotor to generate more or less lift to raise or lower the helicopter.

"To counteract the engine's torque as the main blades spin, the tail rotor produces varying amounts of thrust to keep the helicopter's nose from yawing. The job of a yaw rate gyro is to sense the unwanted yawing motion due to gust and disturbance and automatically correct for them by varying the tail rotor's pitch to vary the tail rotor thrust. The use of a rate gyro for this purpose is highly recommended for beginners, to make the machine more stable. I found that flying without a gyro is nearly impossible!

"The two cyclic control functions are much like the elevator and aileron functions on airplanes. To maneuver a helicopter sideways or forward, we tilt the rotor disk to produce thrust sideways or forward. If enough cyclic input is given, a helicopter will roll or summersault almost without changing altitude, or moving forward or back. The key point to remember here is that we need only small stick movements to affect the helicopter.

"The last item on the equipment list is used to construct a training skid for the novice pilot. Again, this is highly recommended. The two wood dowels are joined together to form an X. The dowels are wrapped with thread and glued together with lots of 5-minute epoxy. The whiffle balls can be bought at toy stores and are affixed to the dowels by drilling 1/2-inch holes on the balls. Then epoxy a 1/2-inch inside diameter washer on each side of the balls on the dowel. The balls should be able to spin freely. It is best to practice flying on smooth pavement instead of grass, because we want the helicopter to be able to slide on the ground during the first phase of learning. This will help you feel out the helicopter yaw control. Grass surface does not allow the model to slide. Instead, the training skids can get caught and might even cause the model to tip over.

"I highly recommend that beginners consult accomplished RC helicopter pilots to help them build, set up, and fly their new helicopter. A small mistake made during any of these steps will lead to major problems in flight. An improperly built machine may actually be unflyable, or uncontrollable. And, without the help of more experienced fliers, beginners may unnecessarily subject themselves or others to the danger of a rotor blade tip moving at 200 mph. RC modelers are generally a great bunch of people who are more than willing to assist you if you just ASK. Joining a local RC club is great for obtaining helpful hints from other modelers, plus it makes for a more enjoyable flying environment. If you need the address of a local heli club, just contact the Academy of Model Aeronautics in Virginia, and they will send you a list. Their address is 110 Samuel Morse Dr., Reston, VA 22090. Or call them at (703) 435-0750.

"Now that the safety lecture is over, let's get on with the flight training. First, find a flat paved parking lot without cars, people, and other obstructions. Then, fasten the training gear that you have built to the skids using rubber bands. Many hobby shops and mail order places sell these X training gears for around $15. Trying your first hopping lesson without these training gears is asking for trouble.

"To gain confidence in my machine's flying capability, James hovered my Concept and flew it around to make sure the model was trimmed. At this time we checked for: 1. blade tracking, 2. vibrations, 3. trim, and 4. control effectiveness. Only after all these things are inspected and corrected should beginners attempt to fly. A correctly

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- The SP7P is a 7-channel digital proportional narrow band radio system. It weighs 37 ounces, and has a power output of 600 MW. The frequencies available are 50, 53, and 72 Mhz. Modulation is FM/PCM. Power supply is from a 9.6-volt NiCd, with a current drain of 230 MA. Temperature range is 0-160 degrees, and the pulse width is 1.5ms (nominal). The receiver type is a dual conversion FM/PCM super narrow band.

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set up and trimmed model is 'unbelievably' more stable, controllable, and easy to fly.

"After double checking the machine one more time, I took the transmitter in hand to attempt to hover with the nose pointing into the oncoming wind, and the tail facing me. If you have the help of an experienced pilot, ask him to control the right stick (which are the two cyclic controls), while you control the left stick. This allows you to concentrate on just the throttle/collective and tail rotor. This makes life a lot easier! Usually, on the first or second flight, your instructor could allow you to lift the model up to a three-foot hover. This method allows you to learn just two controls first without overheating your brain! It also builds up confidence, because now you know the model will fly and you will be a happy man, too. So all during the first few flights, James was flying the right stick while I got a feel for the left stick. After a few flights like this, and it has wetted your appetite, it's time for you to practice all by yourself. Now you need to learn the right stick also.

"Begin by slowly and smoothly increasing power while correcting for the engine torque with the tail rotor. You will see that the machine will tend to slide to the left as you increase the power. This is normal as the tail rotor thrust is pushing the helicopter to the left. Do your best to keep the nose pointed away from you and keep the machine from sliding sideways or forward and back. Use the right stick (cyclic controls) to correct for the sliding. After some bouncing around, you should begin feeling more comfortable with the controls. Next, try to maintain a beginner hover about six inches off the ground without chopping the throttle abruptly. This is to build up a good habit, because at higher altitude, chopping the throttle abruptly to come down and land suddenly will cause the main blades to flap down and strike the tail boom. Tail boom strike can be avoided if you quickly, but smoothly decrease the throttle when you get into trouble.

"During my first phase training, James was flying the right stick for me so I could concentrate on the throttle and tail rotor commands. I began by bouncing the machine with choppy throttle commands, but was quickly able to sustain an altitude of two feet before the first flight was over. This tandem buddy system hover training gave me a lot of confidence in eventually being able to hover alone. At the end of the day, I was able to point the nose into the wind and hover three feet high for the whole 10-minute flight while James flew the right stick. I am sure you will achieve greater success with this buddy system hovering exercise, so do your best to get help.

"During the second day of training, I attempted to fly both sticks, without James flying the right stick. Nevertheless, he was still by my side to give commands and encourage me throughout the flight. This again, is very useful for the beginners. For my solo flights, most of the time was spent sliding on the parking lot pavement while

slowly lifting off to a height of about six inches. This day was rather frustrating as the wind was gusting up to 20 mph, and the model was ballooning up and down. Eventually, after a few flights, I managed a few six-inch hovers for less than five seconds. Just as I began to get comfortable, a gust of wind came, and the machine suddenly gained altitude. The moral is, do not fly when there is lots of wind. Without remembering the golden rule of no chop-stick, I pulled back completely on the throttle in fear of gaining more altitude, and the Concept came crashing down. Luckily, only one rotor blade tip was slightly damaged, and the boom was dented slightly. Beginners must remember to remain calm and respond to problems by smoothly reducing the throttle. I will be sure to avoid the chop-stick reflex in the future.

"The next day, I was more determined to learn to hover than ever. James insisted that I should maintain throttle to elevate the helicopter to three feet above the ground to get above the ground effect. Simply explained, ground effect occurs when the helicopter rotor is less than one rotor diameter distance from the ground. For example, for a four-foot diameter rotor model, the rotor will escape ground effect when the rotor is four feet above the ground. When the helicopter is in ground effect, turbulence will throw the model all over the place making the machine difficult to hover. I feel that if a beginner can maintain a steady hover, then he should raise the machine and try to hover out of ground effect. It becomes slightly easier to hover at three or four feet high than at one foot high. But now it becomes more important than ever to avoid the chop-stick reflex response, and remain calm.

"By the end of my third day of heli training, I was really surprised at how quickly and delicately the controls had to be moved to maintain hover. As James explained, you have to make small, but frequent movements of the sticks to keep the model over one spot. If you over-correct the machine's motion, you will cause pilot induced oscillations (PIO), which cause the machine to wander all over even more. The key for hovering successfully, therefore, is to actually anticipate what the machine will do next. James says this process is similar to balancing a broom stick in your palm. With enough practice and experience, you will learn the skill and your brain will be trained to respond to disturbances to a hovering machine without ever thinking about it.

"Well, that's the story of my hovering training. I will continue to practice hovering until I am completely proficient. After that I will began forward flight exercise. I am told that forward flight is very similar to fixed wing RC flying. I hope you will one day learn to hover. It has really been a gratifying experience for me to be able to hover an inherently unstable helicopter and enjoy the excitement of controlling a six degrees of freedom object while defying gravity. Good luck and may your persistence and patience prevail. I will let you know what's it's like to do forward flight as soon as I try it." ***MB***

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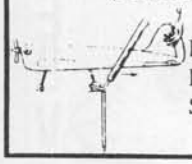

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ELECTRIC POWER *Cont. from page 62*

continues until the connection isn't as good as it used to be. This is where Stabilant 22 shines. You will always have the perfect connection, hopefully even after years of use."

OK, folks, there you have it! I personally will clean contacts when they get dirty, and maybe even use a $1 pint bottle of isopropyl alcohol to wipe them off! The benefits of Stabilant 22 are still unclear to me.

Yet more photos from KRC! John Sauerburger sent such a nice bunch of photos, I can't resist. Once again, thank you John! Leading off with some quarter-scale planes, the Velie Monocoupe is in a very pretty lime green color scheme. This plane is available as plans from *Model Builder* (Plan No. 8781, $17.00). It was designed by Bob Boucher, chief man at Astro Flight. Bob's original plane was powered by an Astro cobalt 25 and weighed an incredibly light seven pounds. I think for most of us ordinary flying types, an Astro 40 would be best, with plenty of power. I'm sure it could carry a cobalt 60 also. Bob's plane is a masterpiece of lightweight construction. If you are considering quarter-scale electrics you should get the plans for the Velie just to see how quarter-scale electrics should be done. Unfortunately I did not get the builder's name for this one; if you recognize your handiwork, drop me a line and I'll give you an acknowledgement! The same is true for the Ford Flivver in the next photo, nice work, but I don't know whose. It looks like an Astro cobalt on direct drive in the nose, so I would guess an Astro 60. Drop me a line if you know more!

The next photo shows Keith Shaw's big red "King Crimson" flying wing powered by four Leisure 05 motors. This is awesome in the air! Joe Utasi's exotic pusher tandem wing plane is a scale model of the Ligetti "Stratos." Joe makes the Jomar throttles, which come recommend from me as the best available.

The last photo is of Laddie Mikulasko with his "Easy-E." It uses an Astro cobalt 05 with six 1200 SCR cells, turning a 9x6 prop. It has four channels, and weighs only 2 lbs., 2 ounces! Laddie designs hot planes; I have seen his Hydro Star fly, it is like a guided missile! The Easy-E is now available as a kit but I don't know from whom.

Well, for now, get in the picture, fly electric! My address is: Mitch Poling, 7100 CSW/MC, Box 734 PSC 2, APO NY 09220-5300. ***MB***

ADVERTISER INDEX

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ARFS *Continued from page 69*

point. The wing was painted yellow with olive camouflage markings, and commercial decals in the form of French WW I roundels were placed on the wings and fuselage. Pushrods were constructed of fiberglass arrow shafts, and with all the available room in the generous sized fuselage, the radio installation was a piece of cake. Anxious to test-fly the Recon, I decided to hold off on a few finishing touches, such as the machine guns and pilot.

Making certain that all batteries were well charged, I headed for the local dirt field on a sunny morning; glad to note that the breezes were gentle, though somewhat in a crosswind direction. Radio range testing was normal, so the tank was fueled and the engine was easily started by hand.

The J'TEC exhaust system performed far better than I had anticipated. With the engine at full throttle, the noise was under 88 decibels, so quiet that I could easily carry on a conversation in a normal voice while standing in close proximity to the airplane! Hence, I am greatly indebted to John Tatone for his kind help with this project.

The Recon showed beautifully responsive ground handling as it made its way to the center of the runway. Showing their usual deference and courtesy *(And fear? wcn)* to a fellow pilot embarking on an initial test flight, the other fliers had temporarily ceased operations. The throttle was fully advanced, and the plane gradually moved forward, continually picking up speed, with the engine emitting no more than a powerful, low-pitched hum. The tail lifted from the ground, and a straight take off track was maintained with no need for correcting rudder. After a comfortable run, I applied just a touch of up elevator, and the Recon was airborne, maintaining a shallow climb, rock steady in every way. Upon reaching a comfortable altitude, I tried some gentle turns, and aileron application resulted in gentle and realistic turns. Using rudder only, turns were brisk, but due to the small amount of wing dihedral, the turns were on the flat side.

The plane was flown into a number of deliberate stalls, which were of the straight ahead variety, quickly settling back into level flight when flying speed was regained. Next, full throttle aerobatics were undertaken, and the resulting maneuvers were so predictable that one could almost classify the Recon as a novice pattern trainer. Rolls were crisp and true, inverted flight required only a touch of down elevator, and snaps and spins were on the really spectacular side, fast and precise. Landing was no problem, as this airplane has an amazingly flat glide, and by the end of the resoundingly

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successful first flight, I felt completely at home at the controls.

With a wingspan of 69 inches, the Recon is a fairly large sport plane, and mine came out with a weight of eight pounds. The wing area is 724 square inches, so the wingloading computes out to be slightly over 25 ounces per square foot, perfectly reasonable for a sport plane of this type. I get an immense kick out of flying my Recon, and will probably put many more flights on it before it passes on to some other owner. Judging from its sturdy construction, it should be around for a long, long time.

In addition to the Recon, which is obtainable directly from the manufacturer at $149.95 plus shipping, B.A.C. offers three other models with similar fiberglass fuselage construction, and they will be glad to furnish additional information if you write B.A.C., P.O. Box 520, Nipomo, CA 93444, or contact them by telephone at (805) 929-5647.

(RCers from the early '60's may remember Mack's "Viper," a pattern ship that was far ahead of its time. We regret having loaned out our Viper fuselage to someone who was going to duplicate it, when it was no longer available. It was never returned. Please, Mack, do you still have the mold? wcn).

A TEST STAND WHICH STANDS THE TEST

One of the most important tools a modeler can have in his arsenal is a test stand for checking out engines prior to installing them in a model, and for experimenting with different props, fuels, and exhaust systems. Many such test stands are hastily improvised, and often are simple arrangements, such as a wooden board with the engine simply bolted on.

I like to have a test stand around which allows me to mount and dismount virtually any engine in a couple of minutes, and for that reason I use another J'TEC product, the giant size JT-TS2SS "Safe-Start" test stand which accepts all engines from l/2A to 2.5 cu. in. displacement. Made from cast aluminum, it has great strength, and dissipates engine heat quite efficientJy, but its most remarkable feature is that it has a remote glow plug clip which helps keep fingers away from the propeller arc while test running engines. I've mounted my test stand on a wooden box filled with bricks, and on the top I attached a carrying handle for easy transportation of the whole setup. This is one of those products which is built like a tank, and should provide faultless service for a lifetime. The test stand lists for $36.95, and is available from your local dealer. If you desire more information on this and other J'TEC products, write to John Tatone, 164 School St., Daly City: CA 94014. The telephone number is (415) 756-3500.

Thanks for the great reader input I've been getting, and it's always a pleasure to answer your questions by mail (please don't forget the SASE) when you write me at 2267 Alta Vista Drive, Vista, CA 92084. For those who need a vital question answered in a hurry, you can phone me at (619) 726-6636, and for you high-tech types, send me a FAX at (619) 726-6907. ***MB***

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ULTRA SPORT *Cont. from page 72*

I can't say enough about this Fox engine; it is easy to start and is a real honker! Service is outstanding, too. A few months ago, I saw a Fox .74 powered model smite the ground vertically. The engine was severely damaged and was sent in to Fox on Monday and was returned all repaired and ready to run less than a week later. The repair bill was modest and the modeler was totally satisfied. That's what I call service!

FLYING

As stated earlier, the model came out tail heavy and several ounces of lead in the nose was required to balance the plane. Weight of the model, ready to fly, less fuel, is 7-3/4 lbs. Radio is an Airtronics Vision and their #741 servos. Fuel used is Byron's 15% nitro, castor-synthetic blend. I have been using Byron fuel since it became available and have run it in everything from .25 through S.T. 3000 two-stroke engines as well as several four-stroke engines, and have yet to experience any problems with the fuel.

The model was test flown on what the Floridians call a windy day, and what the rest of the country calls a light breeze. Although the crosswind component was 90 degrees to the runway, it did not appear to bother the model's track very much. It was readily apparent that I had over-propped the plane, so the flight was kept short. Landing in the crosswind was uneventful.

The prop was changed to a wooden Zinger 12x6, and another flight was made. A few rolls and snap maneuvers were attempted, as well as knife-edge flight. The model performed very well, and appeared to have no nasty traits. The model now has over a dozen flights on it, and the only fault I can find is that the wing appears to need a bit more dihedral, as it is slightly unstable around the longitudinal axis. When trimmed for level flight, it will wander into a very shallow left or right turn and continue until brought out of it. During knife-edge flight, it is fairly difficult to hold the wings in a vertical position.

All in all, this is a nice, stable, easy flying airplane and flies like a Super Kaos. If you have been flying moderately high performance high-wing four-channel trainers, the Ultra Sport 60 would make a good first low-wing model. It has a large speed envelope, which allows you to fly it at high speeds or just laze around the sky at half throttle. Landings are slow and predictable. Rudder, elevator and aileron controls are effective right down to stall speed.

The Fox .74 engine is an ideal choice for this model, as it has the power for vertical maneuvers, starts easily and has a beautiful idle. The engine was over-compressed, inasmuch as it would hesitate and slobber when going from idle to high speed. Two .010-inch shims were placed under the head, which cured the hesitation problem. I look forward to many happy flights with this engine and plane.

I want to thank my flying buddies, Don MacGeorge and Stu Richmond, for the help and antagonism given me during this project. Don, for furnishing the magnificent

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decals, and Stu for his help and advice in breaking in the Fox .74. They have been getting stick time on this plane and both agree that it is a good-looking model that is fun to fly. **MB**

JET TRAILS *Continued from page 77*

apply them, start at the straight trailing edge of the wing. Evenly space them apart across the edge. Then move up and stagger them. Continue to peel and stick your way up the wing, until you have it covered. It took me about five hours to do the whole plane. The last detail I put on was panel lines. They are nothing more than black #2 pencil lines. Put them down using a plastic flexible ruler.

I used alcohol to wipe the plane down before the final clear coat. Prepsol tends to take the pencil lines off and alcohol does not. I used Ditzler concept DCU-8200 clear, mixed up two parts clear, two parts reducer and one part DU-4 or 5 catalyst. Then I added a few extra scoops of reducer to help it flow better. I like to use a slightly hotter reducer to help slow down the drying time a little. It takes me 15 to 20 minutes to get it all on and if it dries too fast you may end up with some over-spray.

Clear is the most difficult "color" to put on. I use a clip light and lots of CLE's to get it on evenly. When you're done, flip the plane upside down to dry. That way, if any dust does decide to settle, it's on the bottom. Let the plane dry for at least two days before handling it, to be sure it's completely dry. You may think this process will lead to a very heavy model. Not so! The ready-to-fly weight of this plane is 10-1/2 lbs. Just right, and that's with six servos and an O.S. 91 engine. I've seen this model fly quite well at 12 lbs. and an 80.

Sorry about the length of this description, but I wanted to put in as much detail as I could without turning it into a book. Speaking of books, there is one book on this subject I do recommend that you read. It's Harry Higley's, "There Are No Secrets." It goes into further detail.

I'd like to also thank Denis Berheimer of BAPS Auto Paint Supply for his helpful advice. It all boils down to this. If you spend a little extra time and care, your paint job will be all the better for it.

Next time, I'll be writing about new products seen at the New York WRAM Show. Until then, keep your gear up, your burners lit and watch your six. **MB**

ENGINES *Continued from page 79*

smartly made contact with a known and respected American engine-making enthusiast, and set him up as a sales agent, so if you live in the US, send a large stamped, self-addressed envelope to John Morril, 143 Richmond St., El Segundo, CA 90245. Yes, this is the same John Morril who made those beautiful Simplex engines a while back!

If you have interest in owning a complete Mate ready-to-run diesel, David in Australia has sent five extrusions to Ladislav Davidovich (one of the world's "golden handed" engine-makers) in Czechoslovakia. They're being machined into completion, and it seems three of them may be for sale. I can help you make proper contact. If you write me c/o *Model Builder* and wish an answer, please send a stamped, self-addressed envelope. **MB**

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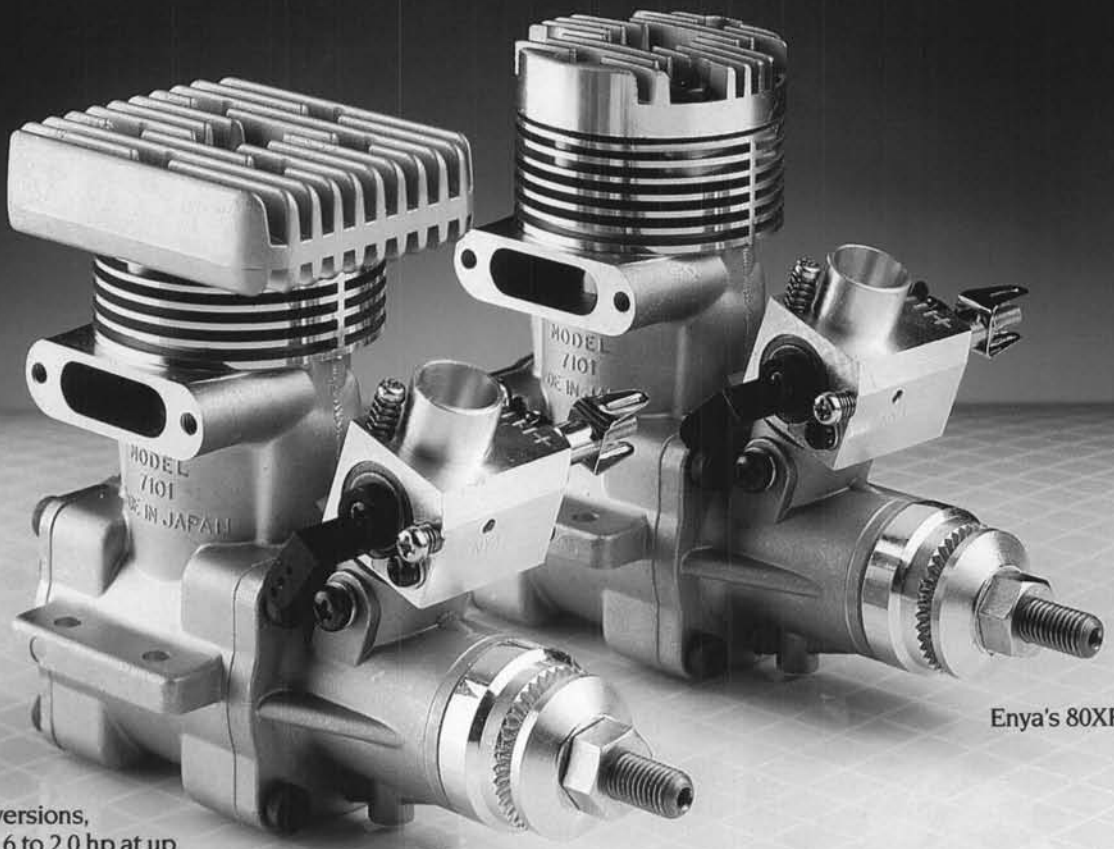

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80XF-H

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