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02479

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VOL. 9, NO. 4

AUGUST 1983

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R/C

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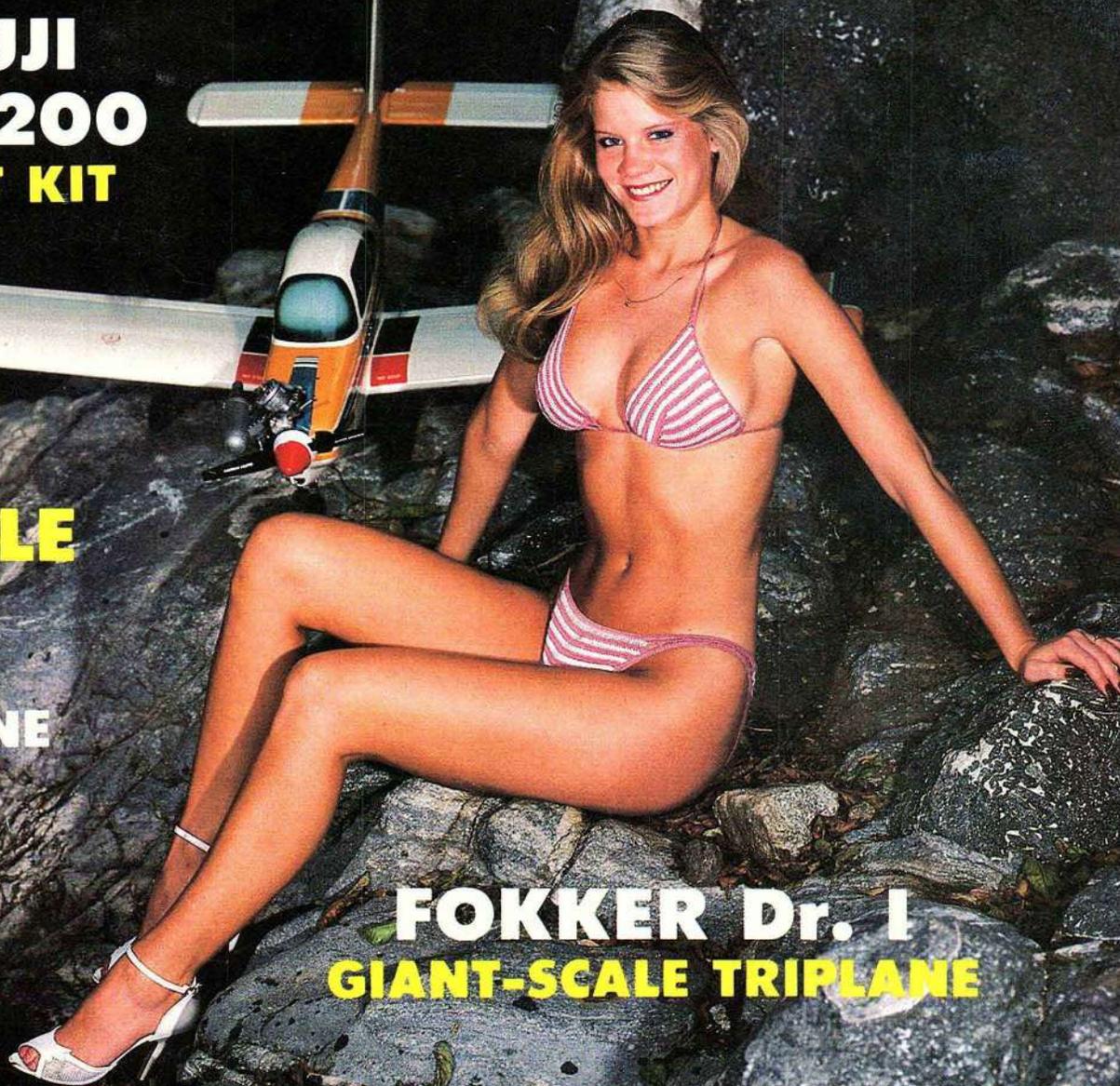
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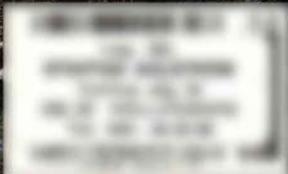
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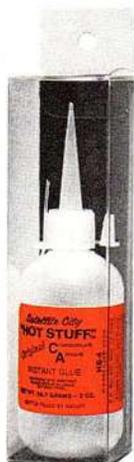
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VOLUME 9, NUMBER 4

AUGUST 1983

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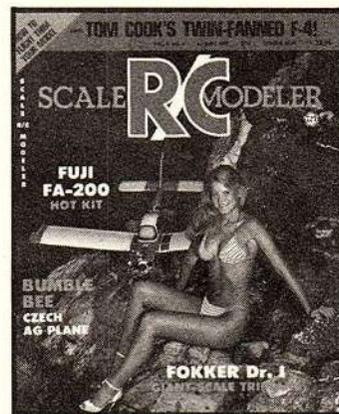
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Lisa Kruger with Circus Hobbies' Fuji FA-200/180. The plane is a good intermediate ship, and is featured in this issue. (Photo courtesy Circus Hobbies)

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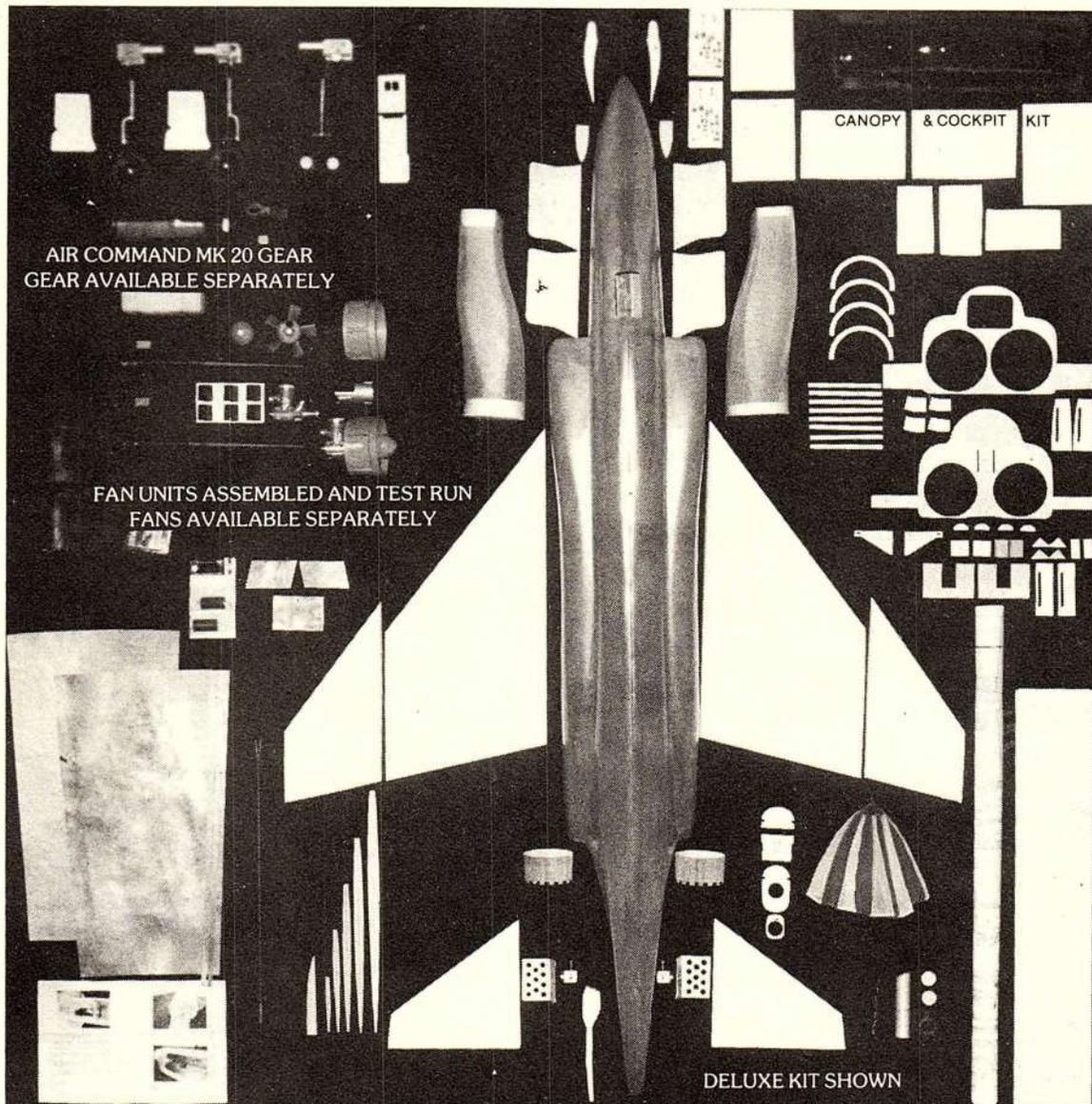
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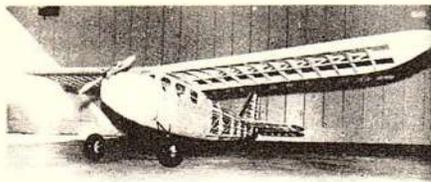
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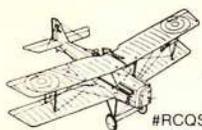
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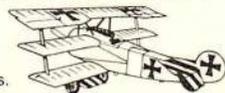
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(Be sure to mix the above formulas 1:1 with H05 Flat Hardener for an authentic matte finish.)

The reference used for these colors is "The Official Monogram Painting Guide To German Aircraft 1935-1945," published by Monogram Aviation Publications, 625 Edgebrook Drive, Boylston, MA 01505.

CORRECTION: The FS number for SEA BLUE should be FS35042, not FS35402, as given in our June issue. □

This month we present four camouflage color formulas used on German Luftwaffe day fighters for the period 1937-1940. The standard factory finish on Messerschmitt Bf 109C, D, E-1, E-2 and E-3 aircraft consisted of upper surfaces in two colors—Black-Green 70 and Dark Green 71, and under surfaces in Light Blue 65. In May 1940, with the introduction of the Bf 109 E-4, the scheme was changed to Black-Green 70 and RLM Gray 02 on upper surfaces, with Light Blue 65 on the underside.

It must also be noted that many field-applied modifications were used to suit local conditions. We are presenting only factory-standard colors. Here are the formulas:

BLACK-GREEN 70—Five Parts H81 Black; Two Parts H33 Stinson Green.

DARK GREEN 71—Seven Parts H65 Bright Red; Four Parts H33 Stinson Green; Three Parts H81 Black; Three Parts H47 Bright Yellow.

LIGHT BLUE 65—Ten Parts H70 Gray; Seven Parts H10 White; Two Parts H26 Light Blue; One Part H33 Stinson Green.

RLM GRAY 20—20 Parts H70 Gray; Two Parts H49 Cub Yellow; Two Parts H65 Bright Red; One Part H33 Stinson Green.

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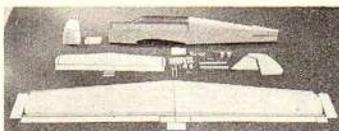
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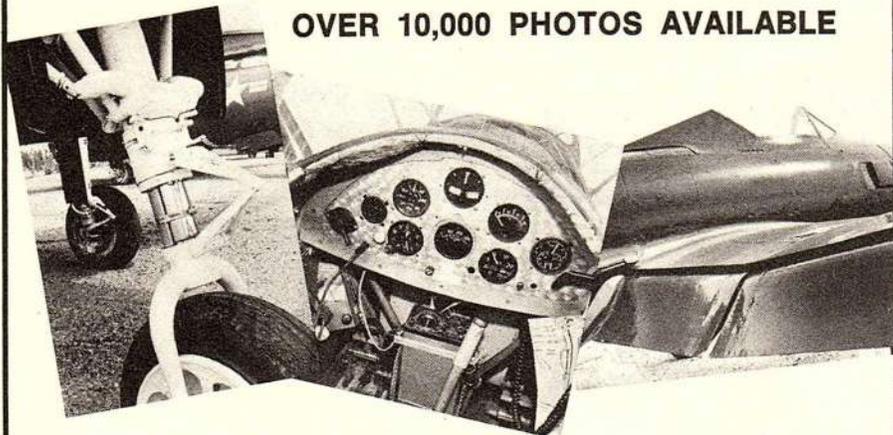
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Book Notes

Reading and research for the builder of the model.



One of the major new book releases is *Jet Planes of the Third Reich*. This monumental work is an all-inclusive treatment of the topic ranging over 400 pages in a large format. Numerous data previously unpublished has been brought to focus in these pages. Co-authors J. Richard Smith and Eddie Creek have outdone themselves in scholarly research and thoroughness.

Over and above that, the book itself is a masterpiece. There are 500 photos, 260 line drawings, 33 color drawings, 40 color photographs and eight color illustrations. To say that the book is lavish is an understatement. No wonder the price is \$69.95. Obviously, this title is intended for only the serious modeler. Considering that even thin paperbound titles exceed ten bucks these days, this item is a definite value.

We confess to having a personal soft spot for these vintage jets, so this title has particular interest to us. We found the prose easy to follow, yet packed with information. The photos are, for the most part, first class, and there's usually enough data on each type to enable the modeler to get a good start on a ducted fan scale project. In our opinion, these early jets, with their power pods and generous areas, are the best choice for fan operation. *Jet Planes of the Third Reich* will show you jet aircraft you probably didn't even know existed.



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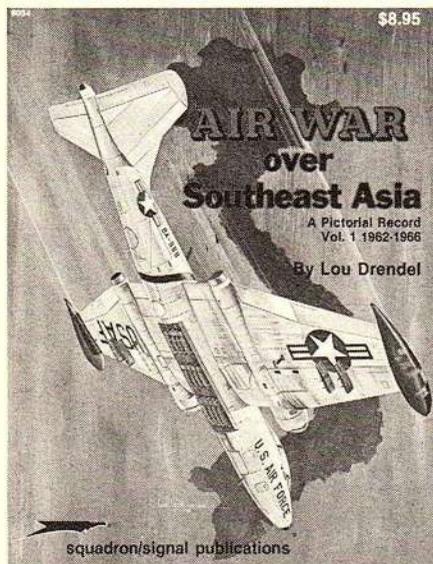
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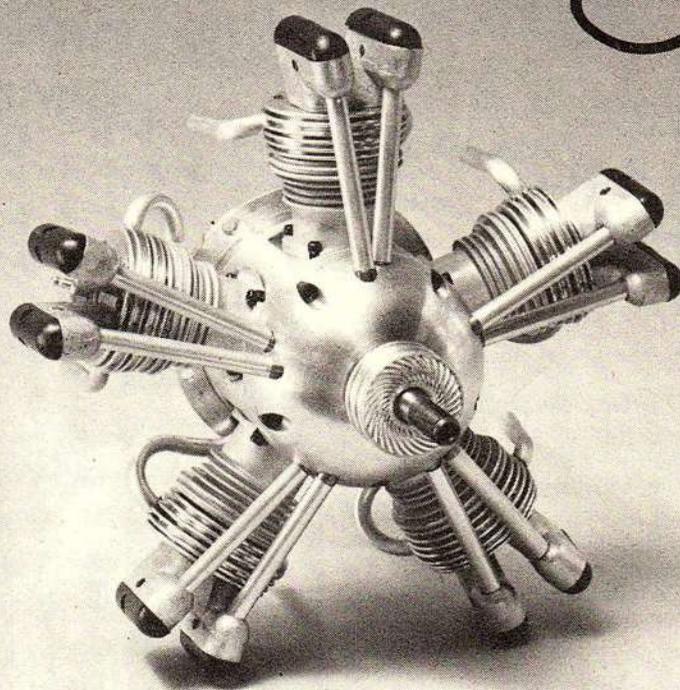


From the prolific presses of Squadron/Signal Publications comes yet another title. *Air War Over Southeast Asia* (Vol. 1) is another of those comprehensive "catch all" books. We must admit that this publisher seems to do the best with narrowly defined subjects, such as their "In Color" and "In Action" series, which usually are restricted to a particular aircraft. Author Lou Drendel, while telling an interesting and factual story, tends to take a major subject and reduce it to a rather brief discussion. Admittedly, the intent of the book is to publish lots of photos, under the pretext of providing us modelers with documentation. But, we see no reason to run out and spend \$8.95 on a book which may only have one or two shots of any given aircraft (there are lots of photos, but remember that they cover a whole war). Admittedly, most of the shots are stock "publicity" photos available from NASM or other sources. Throwing in a couple of pages of color drawings isn't going to sweeten the pie that much, either.

While of some interest, we honestly can't get too excited about this book. Our recommendation is to wait until the publisher starts releasing those specialty titles that he is best noted for, then we can all enjoy detailed presentations on such items as the T-28s, Bird Dogs, *et al* in Korean War colors. Published by Squadron/Signal Publications, 1115 Crowley Drive, Carrollton, TX 75006. Price \$8.95. □

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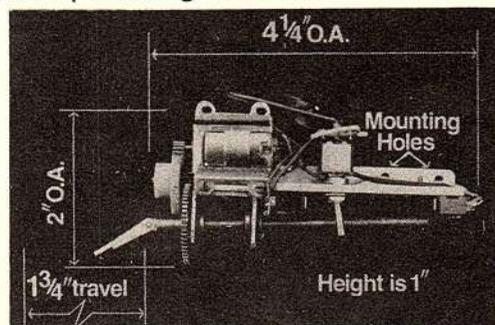
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'TRIM OUT' 'THAT' MODEL

Here's a step-by-step procedure for getting the maximum flight performance from your model.

J. R. Naidish photos

By Brian McNulty

All too often, we scale modelers forget that the planes we fly are subject to the same laws of aerodynamics which govern all aircraft. We finish a model, and the last thing we consider important on the model is to weather it. Then, it's off to the field to see how it flies. Just as long as it gets off the ground, through some rudimentary loops and rolls, then lands safely, we are pleased. So what if the loops drifted a bit? And, those lopsided rolls will be called military rolls at the next contest. Yes, the plane did react a little strangely when the flaps were lowered, and that annoying aileron hunt is probably just a sticky servo. Soon, we have rationalized a totally out of trim model by making the usual excuses.

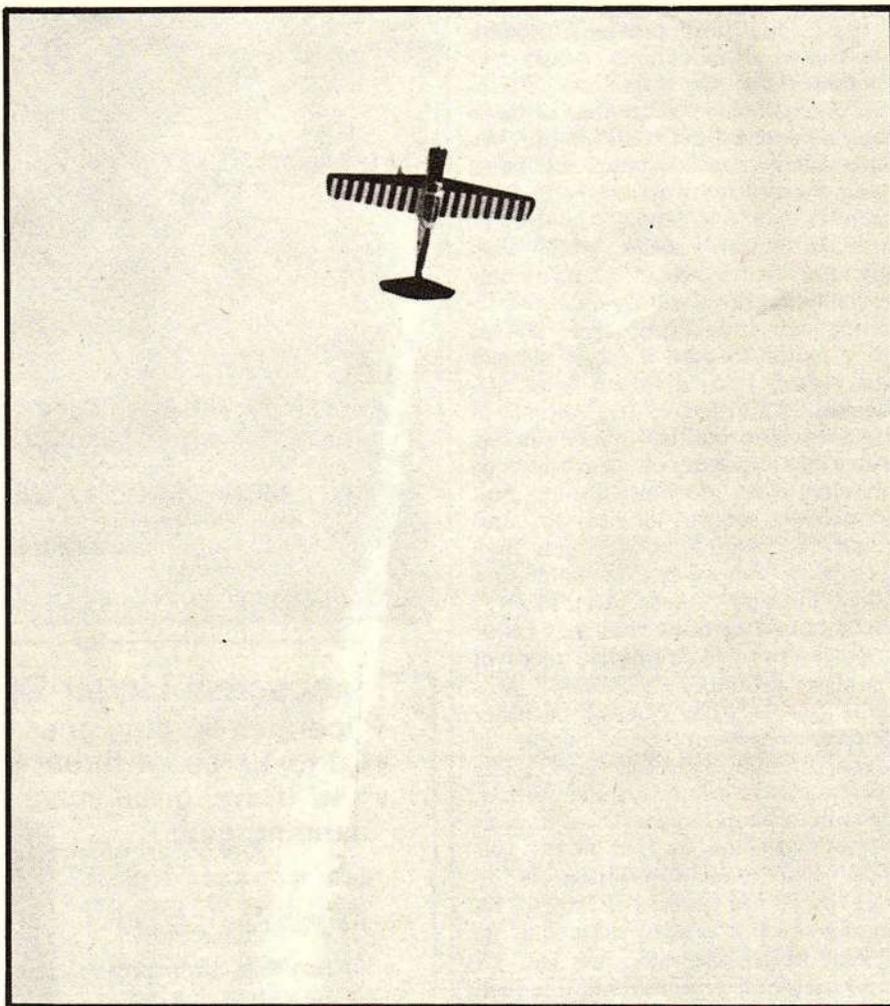
Then, the moment of truth and justice comes. We are at a contest and we get downgraded by "some #%&*+ Pattern Judge" because the loops were out a bit. I mean, heck, the full-size airplane could never do a loop with the exit at the same place as the entry. Okay, so I did have to cheat a bit entering that Hammerhead, but wouldn't the pilot of the full-size machine have stomped his foot on the rudder just as he entered the maneuver, just to make sure he went over the top in the right direction? These judges are just too darned particular. Heck, if I wanted to fly Pattern, I would have built a Phoenix!

So, it's all the contest's fault that we didn't trophy. The plane was fly-

ing great last weekend. It must have been the humidity in the air that changed the way the plane was trimmed. After all, I could have done that Immelmann just perfectly if

there hadn't been one huge thermal coming through when I tried to roll out at the top!

The sad truth is that all of the above are indications that you are



Joe Beshar's Super Chipmunk does a striking vertical climb. A well-trimmed model can handle this predictably every time. Model was featured in June issue.



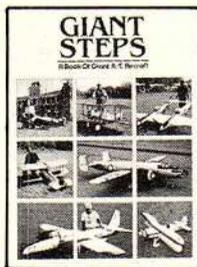
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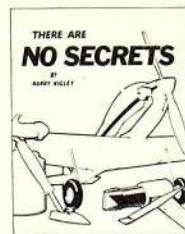
A great addition to any collector's library, or handy to have as a quick reference, or for documentation data. The drawings are so detailed and complete that a model could be built just from this one source. Historical background data supplied with most aircraft.

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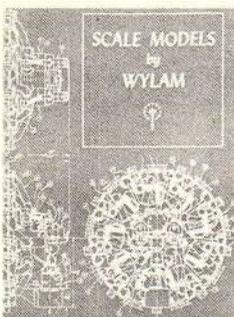
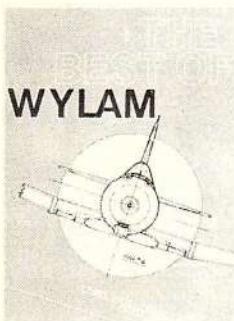
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probably flying an out-of-trim model. If you get caught by surprise now and then by the model doing something erratic . . . maybe at the top of a loop, or halfway through a Cuban Eight, or perhaps just in losing heading through the Fly-By or Horizontal Eight . . . then you are in need of a trim job.

In reality, we place so many flight performance demands on our scale models that they should be better trimmed than most Pattern ships. Pattern birds don't fly near the stall during most of the flight. They aren't as heavily loaded as our machines, and they usually have a better thrust-to-weight ratio to get them out of trouble.

Let's take a weekend and log several dozen flights. The sole purpose of these flights will be to verify the flight trim of your model. The routine is boring as can be, so don't think that you'll have fun. But, you will learn something about what makes your model behave the way it does, and you'll be able to "retrim" very quickly at the next contest, while the rest of the pack spends five flights "getting the plane in the groove." It will take numerous flights, because we must be sure that the symptoms we observe are correct, and that the changes we make to rectify them really were the proper ones.

A model is not a static object. Unlike a car, which can only hunt left or right on the road (technically, a car does yaw in corners, and pitches when the brakes are ap-

A well-trimmed airplane will help you get away with hair-raising stunts like Dean Copeland's full snap roll on takeoff. No room for error here, since the entire sequence takes place below fifteen feet!

plied), a plane moves through that fluid we call air in all directions simultaneously. The plane may look like it's just going forward, but it could also be yawing slightly, slipping a little and simultaneously climbing or diving a bit! The controls interact. Yaw can be a rudder problem, a lateral balance problem or an aileron rigging problem. We must make many flights, with minor changes between each, to isolate and finally correct the problem.

The chart accompanying this article is intended to serve as a handy field reference when trimming your model. Laminate it in plastic and keep it in your flight box. You just might have need to consult it at the next contest! The chart is somewhat self-explanatory, but we will briefly run through the salient points.

First, we are assuming that the model has been C.G. balanced according to the manufacturer's directions. There's nothing sacred about that spot—frankly, it only reflects the balance point where a prototype model handled the way the guy who designed it thought it should. If your model's wing has a degree more or less of incidence, then the whole balance formula is incorrect for you. But, it's a good ballpark place to start.

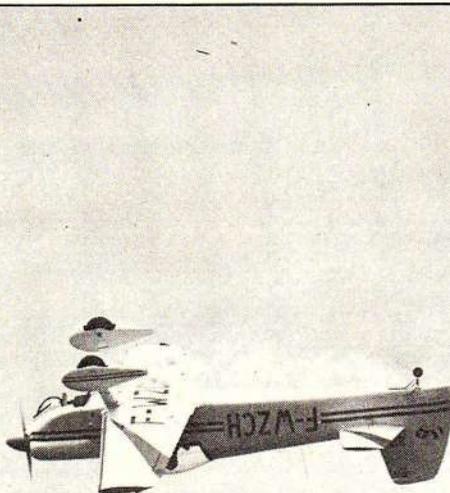
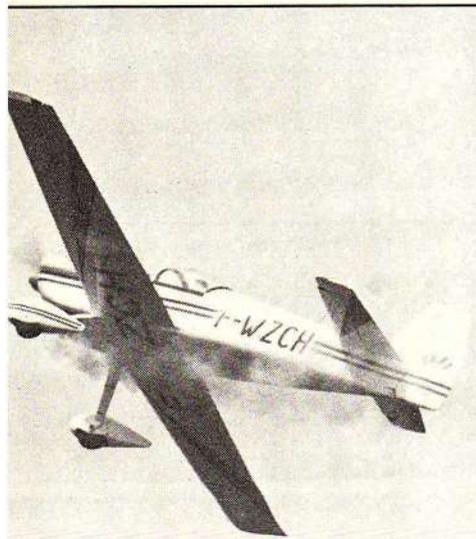
The second assumption is that the model has been balanced laterally. Wrap a strong string or monofilament around the prop shaft behind the spinner, then tie the other end to the tail wheel or to a screw driven into the bottom of the aft fuse. Make the string into a bridle harness and suspend the entire model inverted (yes, with the wing on!). If the right wing always drops, sink

some screws or lead into the left wing tip, etc. You may be surprised to find out how much lead is needed.

At this point, the model is *statically* trimmed. It's only a starting point, so don't be surprised if you wind up changing it all. One other critical feature is that the ailerons must have their hinge gap sealed. If shoving some Scotch tape or Monokote into the hinge gap to prevent the air from slipping from the top of the wing to the bottom, and vice-versa, bothers you, then don't do it.

To achieve the maximum lateral trim on the model, the hinge gap on the ailerons should be sealed. The easiest way to do this is to disconnect the aileron linkages, and fold the ailerons as far over the top of the wing as possible (assuming they are top or center hinged). Apply a strip of clear tape along the joint line. When the aileron is returned to neutral, the tape will be invisible, and the gap will be effectively sealed. Depending on how big those ailerons are, and how large a gaping gap you normally leave when you install hinges, you could experience a 20 percent increase in aileron control response just by this simple measure.

Let's head for the flying field. Take along a tachometer (every *real* scale modeler owns one, you know!). If the engine isn't running the same on each flight, we will experience changes in airspeed. Trim and control responses are different at different flight speeds . . . that's why we have to add more elevator as the plane slows down for a landing, etc. If you have a field rapid charger, it will help. We plan to do a *lot* of flying, and recharging the bat-



teries on the spot will help.

Don't expect to do this routine on a Saturday or Sunday at the field. Getting in the typical one flight each hour is not what we want. We want to take off, do a few rudimentary maneuvers, then land and make some adjustments. Then, we want to take right off again, so that we can immediately detect any change. You can do this alone, but we like to take someone along to "spot" for us. On some of the maneuvers, an assistant standing directly under the flight path of the model can best detect any left or right drift as the maneuver is executed. Use common sense and don't jeopardize anyone's safety. The biggest danger is trying to fly over your own head, getting disoriented and crashing. Crashes tend to really mess up the trim settings of a model, and they are to be avoided.

Your first flights should be to ascertain control centering and control feel. Does the elevator always come back to neutral after a 180-degree turn or Split-S? Do the ailerons tend to hunt a little after a rolling maneuver? Put the plane through its paces. Control centering is either a mechanical thing (binding servos, stiff linkages, etc.), an electronic thing (bad servo resolution or deadband in the radio system), or C.G. (aft Center of Gravity will make the plane wander a bit). The last possibility will be obvious, but don't continue the testing until you have isolated the problem and corrected it.

Control surface throws are a personal thing. We like our ailerons fast, while some pilots like them a little slower to respond. Exercise each control surface independently,

and set it according to your tastes. It's very hard to trim a model that has the control sensitivity wrong . . . a touchy elevator can lead to all sorts of erroneous conclusions about how the plane is behaving; and the same is true of the ailerons. The plane should fly through the maneuvers with a good balance of control inputs.

Now that we have the model under some semblance of control, let's get down to the task of trimming the model. Use the tachometer every time you start the engine, to ensure consistent results. These trim flights must be done in calm weather. Any wind will only make the model weathervane. Each "maneuver" on the list assumes that you will enter it dead straight-and-level. The wings must be perfectly flat, or else the maneuver will not be correct and you'll get a wrong interpretation. That's where your observer comes in. Instruct him to be especially watchful of the wings as you enter the maneuvers.

Do all maneuvers at full throttle. The only deviation from this is if the plane will be routinely flown *through maneuvers* at a different power setting. A friend who had a lightly loaded biplane had so much reserve power from the oversized engine he crammed under the cowl that he did most of his maneuvers at half throttle. The plane will only be perfectly trimmed for one speed, so select the speed at which you will do your flight routine for the judges. If necessary, use a detent on the throttle so that you can hit the same airspeed time after time.

Let's commence with the "engine thrust angle" on the chart. Note that the observations you make can

also be caused by the C.G., so be prepared to change both to see which gives the desired result. Set up a straight-and-level pass. The model should be almost hands-off. Without touching any other control on the transmitter, suddenly chop the throttle. Did the nose drop? When you added power again, did the nose pitch up a bit? If so, you need some downthrust, or nose weight. When the thrust is correct, the model should continue along the same flight path for at least a dozen plane lengths before gravity starts to naturally bring it down.

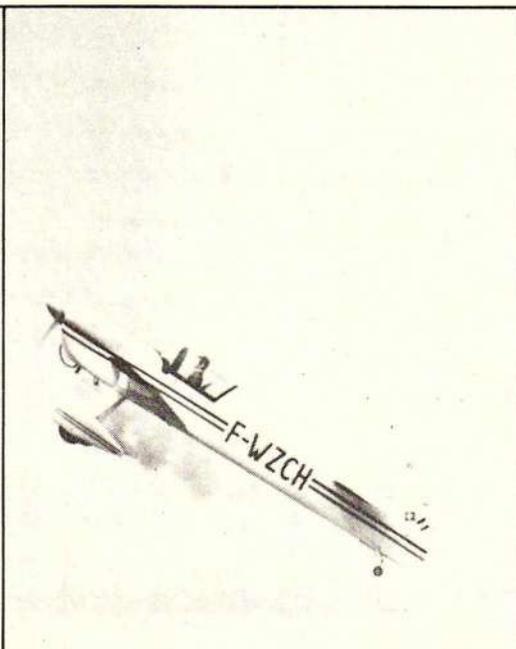
Do each maneuver several times, to make sure that you are getting a proper diagnosis. Often, a gust, an accidental nudge on the controls, or just a poor maneuver entry can mislead you. The thrust adjustments are a real pain to make. On most models, it means taking the engine out, adding shims, then reassembling the whole thing. Don't take any shortcuts. Don't try to proceed with the other trim adjustments until you have the thrustline and/or C.G. correct. They are the basis upon which all other trim settings are made.

Also, while you have landed, take the time to crank the clevises until the transmitter trims are at neutral. Don't leave the airplane so that the transmitter has some odd-ball combination of trim settings. One bump of the transmitter and you have lost everything. The trim must be repeatable, and the only sure way to do this is to always start with the transmitter control trims in the middle.

The next maneuver is somewhat more tricky than it looks. To verify

(See chart on page 14)

(Text continues on page 73)



<u>TRIM FEATURE</u>	<u>MANEUVERS</u>	<u>OBSERVATIONS</u>	<u>CORRECTIONS</u>
CONTROL CENTERING	Fly general circles and random maneuvers.	Try for hands off straight and level flight.	Readjust linkages so that Tx trims are centered.
CONTROL THROWS	Random maneuvers.	A. Too sensitive, jerky controls. B. Not sufficient control.	If A, change linkages to reduce throws. If B, increase throws.
ENGINE THRUST ANGLE ¹	From straight flight, chop throttle quickly.	A. Aircraft continues level path for short distance. B. Plane pitches nose up. C. Plane pitches nose down.	If A, trim is okay. If B, increase downthrust. If C, decrease downthrust.
CENTER OF GRAVITY LONGITUDINAL BALANCE	From level flight roll to 45-degree bank and neutralize controls.	A. Continues in bank for moderate distance. B. Nose pitches up. C. Nose drops.	If A, trim is good. If B, add nose weight. If C, remove nose weight.
SPLIT ELEVATORS (Also Yaw and C.G.)	Into wind, pull open loops, using only elevator. Repeat tests doing outside loops to inverted entry.	A. Wings are level throughout. B. Plane tends toward outside when right side up, and to inside when inverted. C. Plane goes in on regular loops, and out on inverted. D. Plane goes out on both types of loops. E. Plane goes in on both types of loops.	If A, trim is fine. If B, add weight to right wing, or add right rudder. If C, add weight to left wing, or add left rudder. If D, raise right half of elevator (or lower left). If E, raise left half of elevator (or lower right).
YAW ²	Into wind, do open loops, using only elevator. Repeat tests doing outside loops from inverted entry.	A. Wings are level throughout. B. Yaws to right in both inside and outside loops. C. Yaws to left in both inside and outside loops. D. Yaws right on insides, and left on outside loops. E. Yaws left on insides, and right on outside loops.	If A, trim is correct. If B, add left rudder trim. If C, add right rudder trim. If D, add left aileron trim. If E, add right aileron trim.
LATERAL BALANCE	Into wind, do tight inside loops, or make straight up climbs into Hammerheads. Do same from inverted entry.	A. Wings are level and plane falls to either side randomly in Hammerhead. B. Falls off to left in both inside and outside loops. Worsens as loops lighten. C. Falls off to right in both loops. Worsens as loops tighten. D. Falls off in opposite directions on inside and outside loops.	If A, trim is correct. If B, add weight to right wing tip. If C, add weight to left wing tip. If D, change aileron trim. ³
AILERON RIGGING	With wings level, pull to vertical climb and neutralize controls.	A. Climb continues along same path. B. Nose tends to go to inside loop. C. Nose tends to go to outside loop.	If A, trim is correct. If B, raise both ailerons very slightly. If C, lower both ailerons very slightly.
WING INCIDENCE	Knife edge flight.	A. Models tends to veer in nose up direction. B. Model veers in nose down direction.	If A, reduce wing incidence. If B, increase wing incidence.

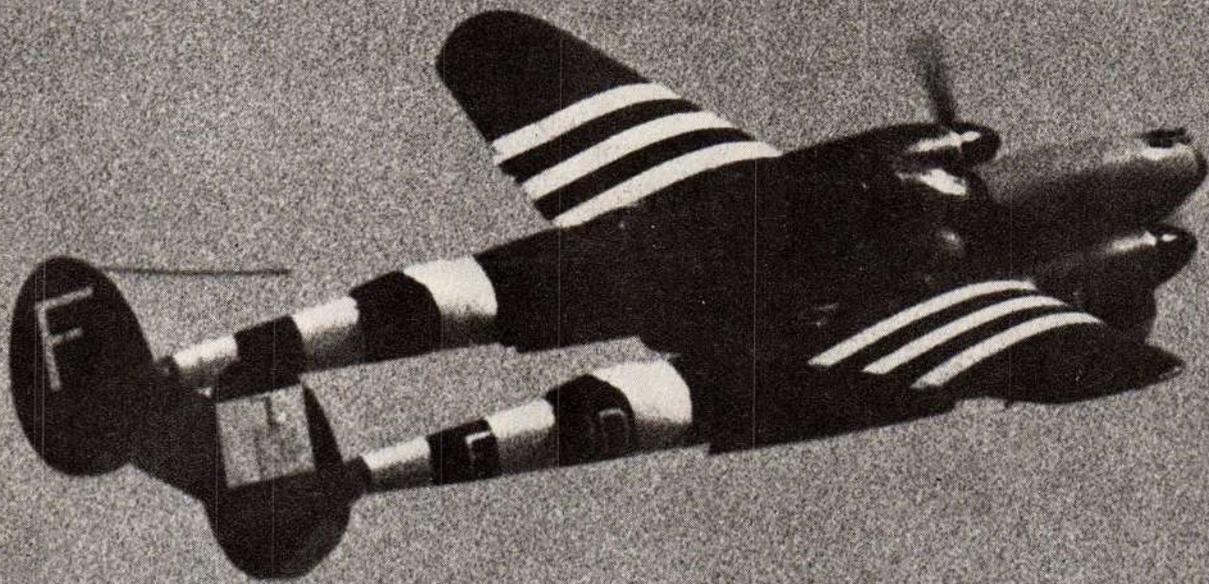
1. Engine thrust angle and C.G. interact. Check both.

2. Yaw and lateral balance produce similar symptoms. Note that fin may be crooked. Right and left references are from the plane's vantage point.

3. Ailerons cannot always be trimmed without sealing the hinge gap.

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THE JOMAR SYNCH SYSTEM



A handy black box to keep those twin engines purring together in sweet harmony.

By Eloy Marez

Photos by the author

The early history of aviation is, as we all know, a little vague, there even being those who claim that powered flight took place even before the Wrights. According to a *History of Aviation*, as edited by a Mr. John W. R. Taylor, which I happen to have in my possession, as early as 1894, Hiram Stevens Maxim designed and built a twin-engine biplane, powered by 180 horsepower steam engines. In 1897, Clement Ader, in France, designed the third of a series which he called the "Avion," later to become the French word for airplane. The Avion was also a twin.

According to the same reference, probably the first really successful multi-engine aircraft was flown by the Short Brothers in England. It was dubbed the "Triple-Twin," because while it only had two engines, it had three props. One engine powered two chain driven tractor props, while the second one drove a single pusher prop.

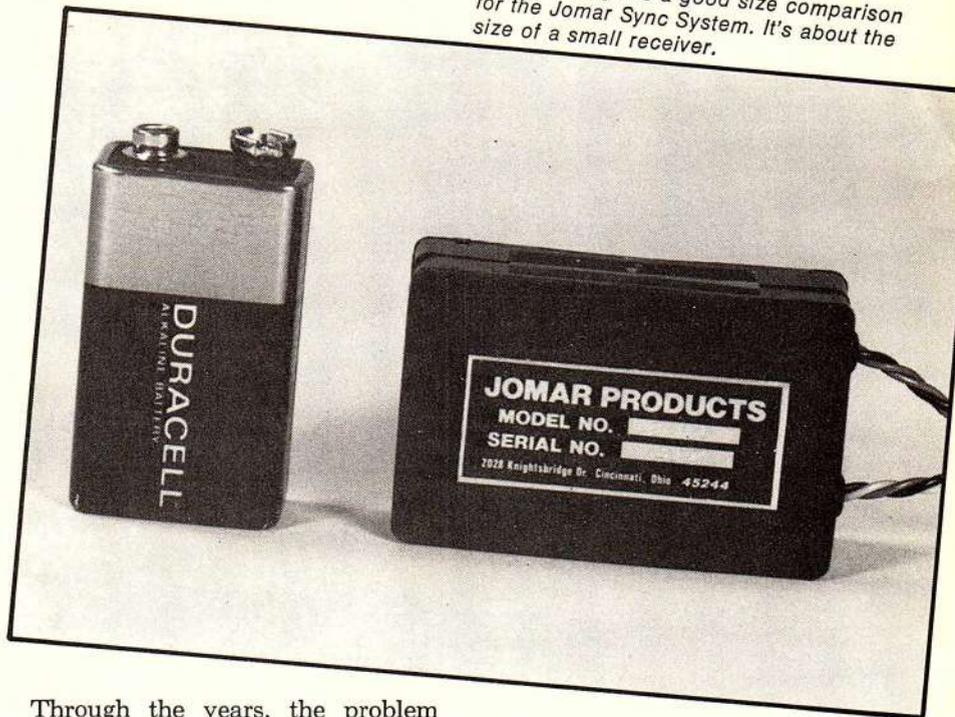
Sometime during that period, these three gentlemen met, and one of the first subjects of discussion, complete with the arm and hand motions that even these early fliers couldn't hold a conversation without, was: "Hey, what are you guys doing about synchronizing the engines?"

Frankly, I made that last part up, but history being a little vague, who's to say I'm really wrong. If the three gentlemen ever did meet, the chances are almost certain that synchronization would have been one of the items of discussion, because the problem of keeping the engines running at the same speed must have been secondary only to the problem of keeping the engines running, period!

Through the years, the problem remained, and we can assume that it was the subject of much research and experimentation, as two engine aircraft became commonplace and the early fours started taking to the air. One wonders what was done in the DOX?

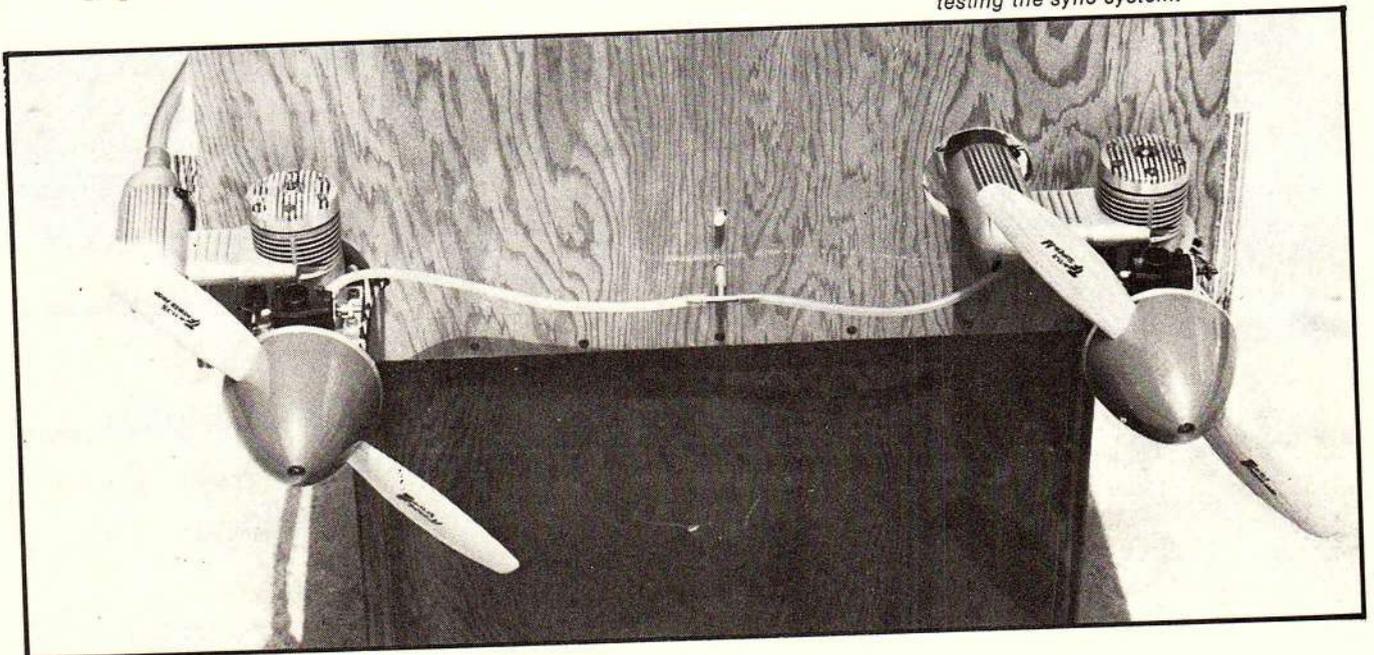
Even relatively modern aircraft, for which sustained flights were no longer the challenge that they used to be, left the problem to engine operation in part up to the pilot's ears. In the C-47/DC-3, it was standard procedure to adjust the mixture by pulling it lean till the engine popped, then ease it forward just enough to make it quit; synchronization was

The battery gives a good size comparison for the Jomar Sync System. It's about the size of a small receiver.



done all by ear. Four engine birds, such as the C-54/DC-4 had a synch instrument which included three little propellers about 1/2 inch in diameter, labeled 2, 3, 4, to represent those engines. Number one engine was designated as the master, and by skillful operation of the pitch control, the crew could synch the others to it, at which time the little propellers would stand still. Too fast an engine speed caused the instruments props to rotate in one direc-

The "Marez Twin." Not the most air-worthy design, but just the ticket for testing the sync system.



tion, too slow, and they would turn in the other.

Eventually, electronics came to the rescue, and towards the end of the large propeller-driven airplane era, the biggies such as the Douglas C-124 had an elaborate synch system which kept all four of its 28 cylinder Pratt & Whitney R-4360 engines purring at the same speed, all controlled by a single lever on the flight engineer's console.

Like so many other problems that have been shared by the designers of man-carrying and model aircraft alike, the problems of synchronizing two or more engines followed more or less the same pattern in both fields. Until now, there has not been anything new in the modeling end. The serious flier buys the best engines he can find, breaks them in carefully with equal amounts of running time, tunes them carefully a little on the rich side and tries to match their speed. Sometimes he uses a tachometer, though just as often in the time honored method by using the ear. The results will often vary, depending on the skill and patience of the individual concerned, and it would sometimes seem like plain luck!

Again, parallel to full-scale avia-

tion, modelers of twin-engine aircraft can now thank electronics for the solution to this ever existing problem, in the form of a mini-black box, from Jomar Products, 2028 Knightsbridge Dr., Cincinnati, OH, 45244. The Jomar Products Sync System does in miniature what the full-scale aviation synch systems do, it adjusts the carburetor, through a servo in our case, to match the speed of the other engine. It does this under the variable load conditions encountered in flight, and uses only the normal throttle control to operate both engines.

And it is beautiful in its simplicity—one of those devices that any electronics technician will look at, and say "Why didn't I think of that?" It is smaller than most receivers. While the weight will vary depending on the length of the wiring required for your particular installation, seldom will the total weight exceed two ounces. In the event of either engine failing, you still have normal control of the remaining engine.

The Sync System uses only three ICs, and a handful of discrete components. This is not to imply that it did not require a considerable amount of imagination, labor, and

engineering skill before it was ready for the modelers. More than anything, it is another fine example of what is possible with today's micro-sized electronic components. To quote directly from the instructions received with the Sync System, it works by:

"Magnets mounted in the engine spinner backplate trigger Hall-effect (magnetic field) sensors which provide rpm signals to the sync electronics. Unless the Master engine is running above 2500 rpm, the Slave throttle servo will be "Y" connected with the master throttle. The Slave engine will be started first, and would be the more reliable of the two engines. This way, it will be able to react quickly and positively to match the rpm of the Master. When the Master engine starts and exceeds 2500 rpm the sync system will engage and take control of the Slave. If the Slave is lagging, the sync electronics will move the slave servo throttle open until the rpm matches that of the Master. If the Slave gets ahead of the Master, it will be reduced until it matches. Small rpm errors will cause small changes in servo position. Large errors may drive the servo to the end points of its normal travel which

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correspond to 1 or 2 millisecond pulsewidth (normal full travel). If the Master rpm drops below 1500 rpm, control of the slave will be returned to the throttle channel.

"The on and off points of the sync system are 2500 and 1500 rpm when two magnets are used mounted symmetrically in each spinner backplate. If lower switching points are required, additional magnets can be mounted in the spinner backplate if space will allow. Three magnets will lower these points to be 1666 and 1000. Four magnets will yield 1250 and 750 respectively."

Unfortunately, the Marez Air Force, which ranges in size from a Telemaster on down to a half-A "Miss Norway" does not include a twin, so I had to resort to a non-flying test vehicle. However, I felt that, as long as everything was there that would be installed in the airplane, I could realistically test how well this device worked.

In all testing, of whatever it might be, it is nice to have everything else involved as dependable as possible. With this in mind, I decided to install the Sync System to control two K&B .61s, which I know will start easily, and will run just as long as I ask them to. They have the type

of throttle response I felt was necessary for a proper evaluation of this system. By a happy coincidence, one of my K&Bs is well broken in. The other one is relatively new, not quite broken in, and a few hundred rpm shy of what the older one is capable of.

This fits right in with the recommended suggestions, that the poorer performer of the two engines be installed as the master, with the better one being the slave. Without really thinking about it, it seems that it should be the other way around, but upon reflection, it makes sense, as there is just no way to force the slower engine up to the rpm of the better one. What actually takes place is that the fast engine is slowed down to the speed of the slow one. This is not detrimental to the use of the maximum available power, as this is exactly what you would attempt to do were you synchronizing your engine with a tach or by ear.

Further selection of equipment for the test bed got us to the choice of spinners. These require the installation of the two magnets into each backplate. Obviously, the use of all-plastic spinners was out of the question, I ultimately settled on C.B.

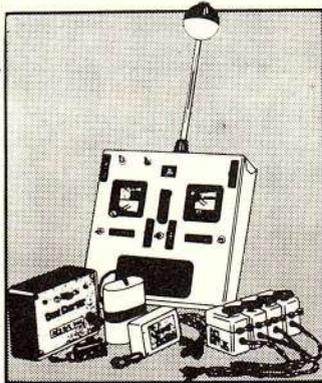
Associates 3" types. The thick aluminum back plate is just the thing to allow the proper and secure installation of the 1/4" diameter magnets. The instructions further recommend that the magnets be installed in 15/64" holes, carefully reamed to the proper size for a press fit. I found that a size "D" drill bit will make the perfect size hole required, without the necessity of any additional reaming.

Realizing that the installation of these magnets would do terrible things to the balance of the backplate. I decided it would be easier to prevent the problem rather than correct it later. This involved the building of a simple jig, consisting of a short piece of metal shaft of the same diameter as the hole in the backplate, screwed to a piece of hardwood. When secured to my drill press table, with the drill bit at the proper distance from center, both holes, or more should you opt for more magnets, as previously explained, would be the exact same distance from the center of the backplate. It only remains to have the center or axial lines perfectly drawn for the correct lateral alignment. Carefully centerpunch the hole locations, and clamp the backplate down to prevent

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Christy Mixer



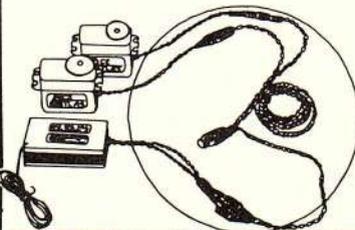
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26K10-Christy Mixer, Bi-Directional \$29.95
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26K17-Noise Trap, Kit \$3.95

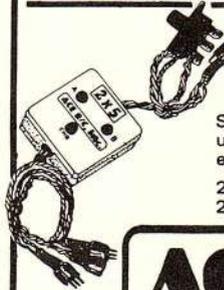


2x5

Redundant Power Source

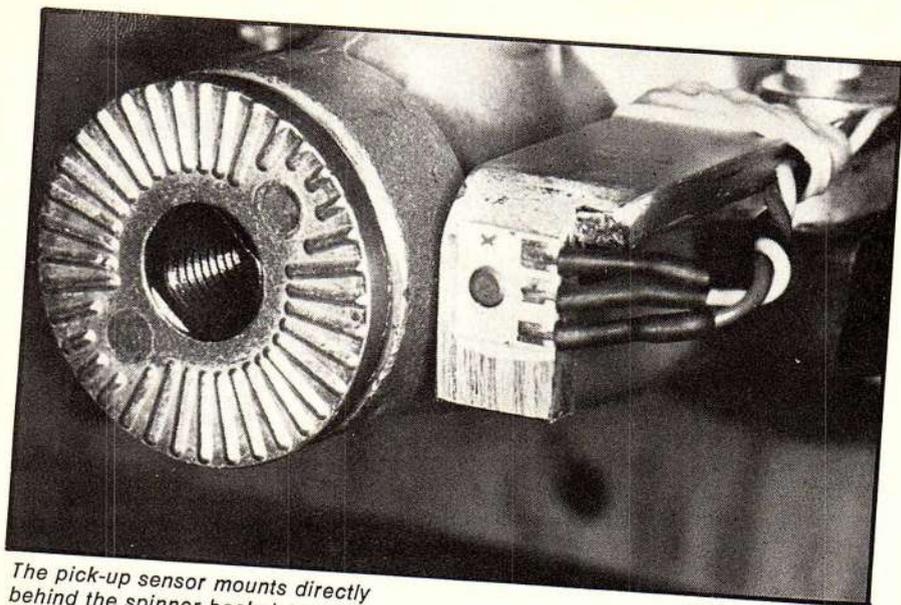
System normally draws from two 5 cell packs unless one fails. . . then the bad pack is switched out. Less connectors, with switch.

26K15-2 x 5 Power Source, Kit \$12.50
26K15C-2 x 5 Power Source, Assy. \$19.95



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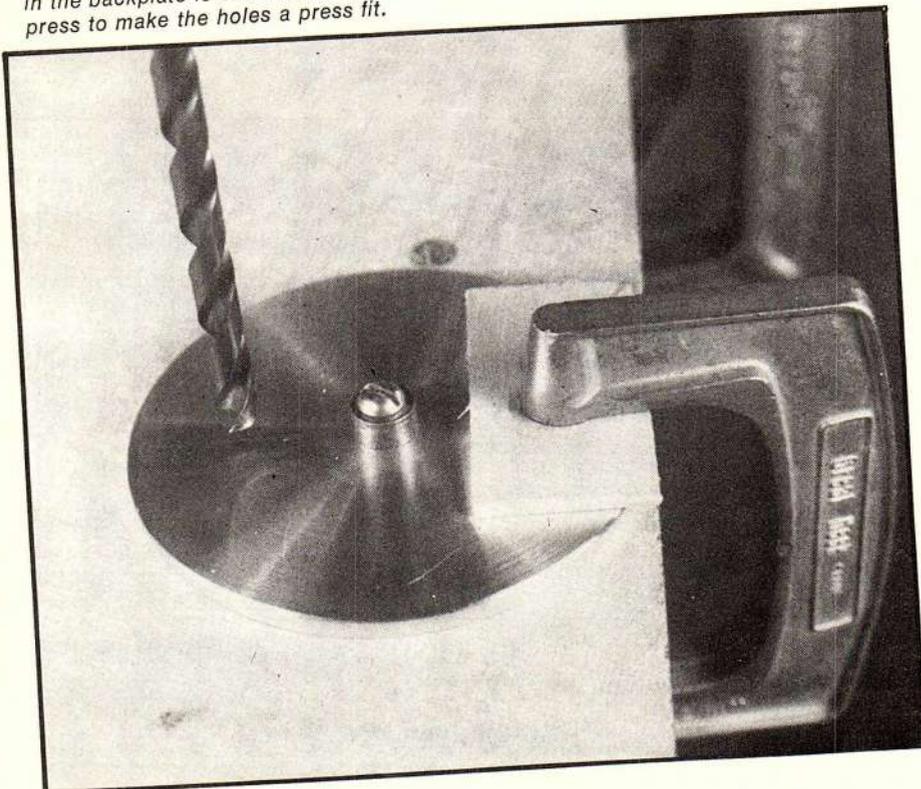
BOX 5111, Higginsville, Mo. 64037 (816) 584-7121



The pick-up sensor mounts directly behind the spinner backplate. Three wires feed data to the black box.

any movement while the holes are being drilled. The magnets will press fit perfectly into the holes, but knowing that sometimes over-kill is permissible, I used a drop of Loc-Tite on each one during installation. Be sure to install the magnets with the red end towards the back. They are thicker than the backplate; whether they protrude out towards the front or back depends on the rest of the installation, as will be explained later.

Getting the magnets securely positioned in the backplate is critical. Use a drill press to make the holes a press fit.



I have run these backplates, with the magnets in place a minimum of thirty minutes each, a lot of that time at full throttle. The magnets remained firmly in place. However, Murphy's Law has not been repealed yet—if you are in the habit of leaning over whirling propellers, now is as good a time as any to quit. A magnet in the eyeball is bound to take the edge off your flying skills!

The sensor has to be installed! It is a small .3" square, with three solder lugs, to which three insulated wires must be soldered. The connections should be protected with short lengths of 1/16" shrink tubing. Note that one side of the sensor

has a small tip in the center, which must face the magnet. The tip, and the center of the magnet, must line up as the spinner backplate rotates on its axis. The distance between the two must not exceed 3/32". Other than that, there are no critical requirements about any of the installation.

The distance between the backplate and magnet centers is not critical, and will depend on the diameter of the former, and how you mount the sensor. This is definitely a case of measure twice, and cut once! For my test installation, I epoxied the sensors on the end of a 1/8" soft aluminum bar, secured with the engine mounting screws. This naturally placed the sensor a certain distance away from the shaft and determined the magnet location in the backplate.

This method of attaching the sensor will work, and is recommended. Use hardware store "Reynolds" aluminum, it is easy to cut and can be bent with a hammer in a vise. Clean both the aluminum and sensor with alcohol, use slow drying epoxy, and a clothespin to hold things together while the epoxy sets. An easier way of mounting the sensor in a model would be to simply imbed it in epoxy or resin in the nose ring. This should work with either a fiberglass or plywood nose ring. Just be sure to maintain the alignment and clearance, and don't cover the sensor tip with the adhesive or paint.

Integrating the Sync System electronics into the R/C system is not at all complicated, and is thoroughly explained in the instructions. It does require a bit of soldering, but that is minor and should not scare you off. The first step is to determine the location of all the components. Then, solder the sensors to one end of the three-wire twisted cable furnished, determine the length required to reach the location of the electronics package, and cut the cable to that length. You can solder the other end of the cable directly to the Sync System, though it is recommended that a connector of some sort be installed somewhere in it to facilitate installation and removal. Three pin Dean's connectors are recommended. Follow the recommended color code—red for positive, black for negative, and the other color for the sensor output, both at the sensor proper, and at the PC board. To keep things even and easy to remember, follow the same sequence at the plug itself, red and black on the sides, and the other color at the center pin.

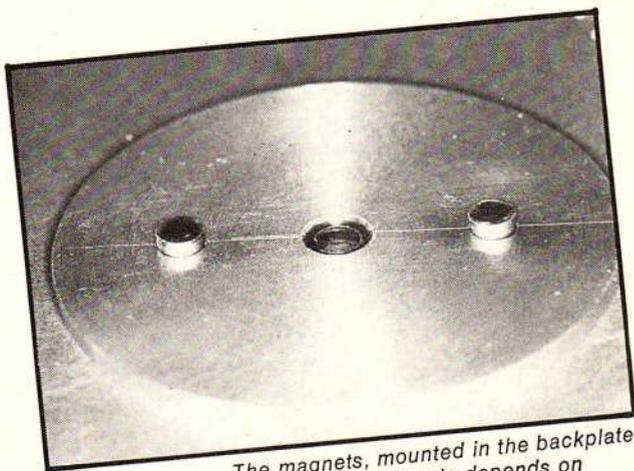
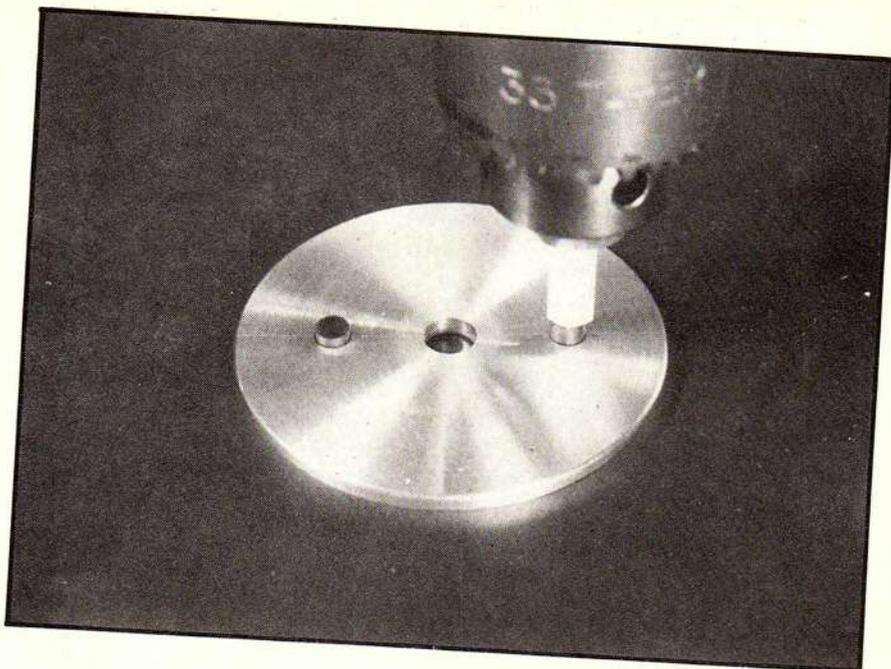
Use the drill press as a machine press, to shove the magnets firmly into the backplate. Cyanoacrylate or Loctite will help keep them in place. Do not accept a loose fit!

You will also need male and female connectors to match your R/C system. You'll need two female and three males. Two female and one male have to be assembled into a "Y" harness, which some of the system manufacturers furnish already assembled. If there is any doubt as to the polarity of the wires used in your system's connections, check with the maker. The red for positive, black for negative, and something else for the control pulse is pretty standard, however there are some deviations, such as JR's, which use red for positive, and brown for negative. The signal wire is orange.

The rest of the test set-up consisted of the normal equipment as it would be installed in an airplane, we did not allow anything that might influence the results.

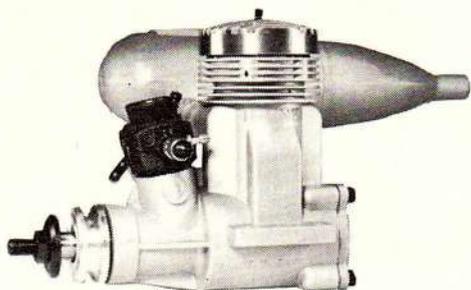
About the results—well, I can't pass along the benefits of many hours of adjusting and testing, as they weren't necessary. The Sync System worked just as advertised right from the first. I followed the instructions, started and adjusted the slave engine, then brought in the master. Just as it says in the instructions, as soon as the latter gained speed, the servos started moving and I soon heard the beautiful music that only two perfectly synchronized engines can play.

I did have a tachometer handy, but it wasn't necessary, you can hear the sync, or lack of it as I unplugged



The magnets, mounted in the backplate. Amount they protrude depends on location of pick-up sensor.

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the slave servo and manually moved the throttle. As the throttle was adjusted with the Servo Cycle back through mid to low range, both engines followed perfectly.

I then richened the mixture at the master engine; the slave throttled back! I momentarily held a finger over the intake of the master; both engines momentarily slowed, as you would expect. From this point, I actually ran it only to listen to the engines. I was already firmly convinced that the system was indeed keeping both engines operating at exactly the same speed. The only thing that will keep a properly installed system from doing so would be a slave engine that is incapable of reaching the speed of the master, due to improper carburetion or mechanical malfunction.

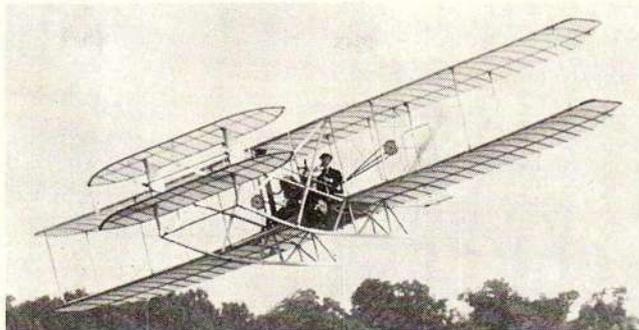
The Sync System was subsequently flown, during which it performed exactly as described. As it turned out, I discovered that one of my good friends was a couple of weeks away from testing a new twin about the time I was running my K&Bs. Upon my assurance that the system did work, and work well, he agreed to install it and try it. Came the big day, and everything went . . . well, not according to the script, as there were some problems, but nothing having to do with the Sync System. Eventually though, it is in the air! Now, a twin always sounds good, but a perfectly synchronized twin on a high speed fly-by is bound to leave you standing there thinking "They're playing my song!"

Unfortunately, the model in question is an experimental airplane about which the designer/builder is not yet ready to unveil. Enough to say that it is pulled through the air by two Webra .61s synched to perfection, courtesy of the Jomar Sync System.

The installation in the model closely followed the instructions above. It is only necessary to say that the Sync System electronics package should be treated just like a receiver during installation . . . a little foam and a clean dry corner is all it asks for.

The Jomar Sync System is available assembled and tested, requiring only that the sensor and servo wiring be added, for \$50, from Jomar Products, 2098 Knightsbridge Dr., Cincinnati, OH, 45244. For you electronics buffs, a PC board, plastic case, and instructions are available for \$10. Either way, you'll have little trouble getting your twin to operate at and maintain the same engine speed throughout the entire flight—and you'll love the sound of it! □

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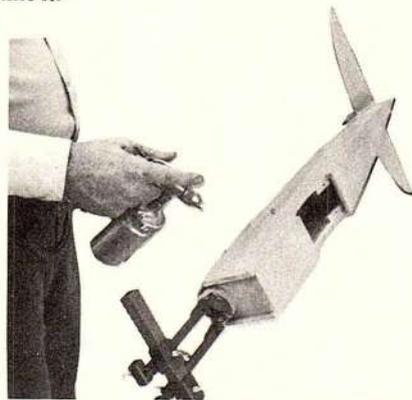
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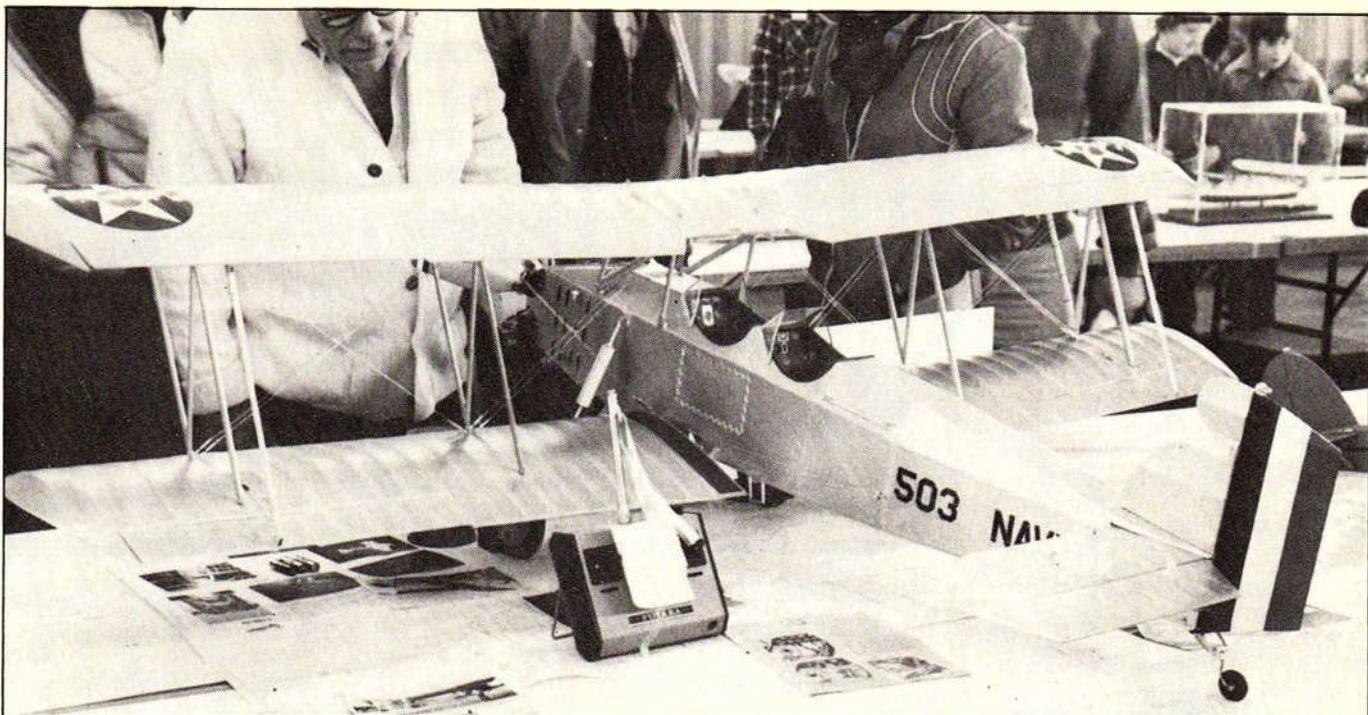
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Best of Show was Fred Pierce's Curtiss Fledgling. Complete inside and out, down to the minutest detail.

Where is Puyallup?

Until this year, we had never heard of Puyallup. Then, when we saw it in an ad for the Northwestern Model Exposition, we couldn't even figure out how to pronounce it (say it like "pulley-up"). For some reason, this small community in the state of Washington triggered something in the industry last year, when it held its first Exposition. The industry looked it up on the map, found out that they could get there, and everybody showed up. Don't ask why . . . it makes no sense, but something clicked on that first weekend in February and a new trade show was born.

Trade shows usually are disasters their first year, which almost guarantees that the second year will be even worse. That didn't happen at

Puyallup. The second year showed definite growth. There were more modelers in the Northwest than was suspected, and they were anxious to attend a trade show. This year, the gate attendance was pegged at 8,000, which was just about maximum capacity for the facilities.

Last year, the host club, the Mt. Ranier R/C Society, was really caught short. They didn't think that the world would beat a path to their door. This year, they had polished the sharp edges and managed to run a very well organized show. Even the weather cooperated. Doing anything in early February in Washington is courting disaster. You have two choices of weather conditions . . . rain, or snow. This year, neither came, even though the area was to

be devastated by one of the worst coastal storms just a few weeks later.

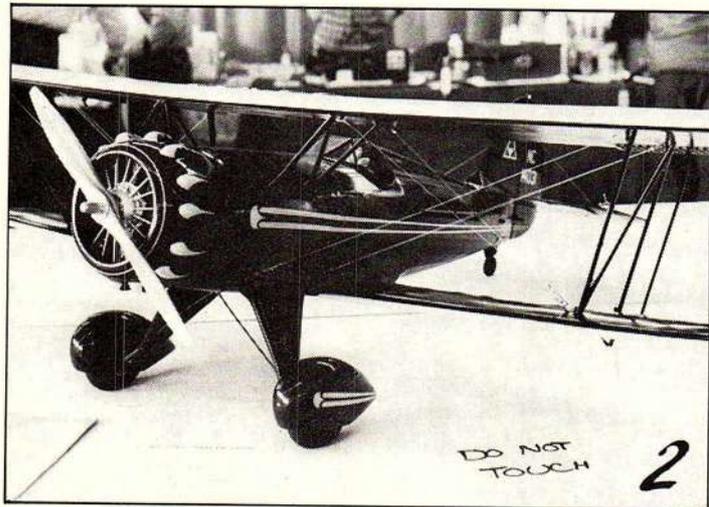
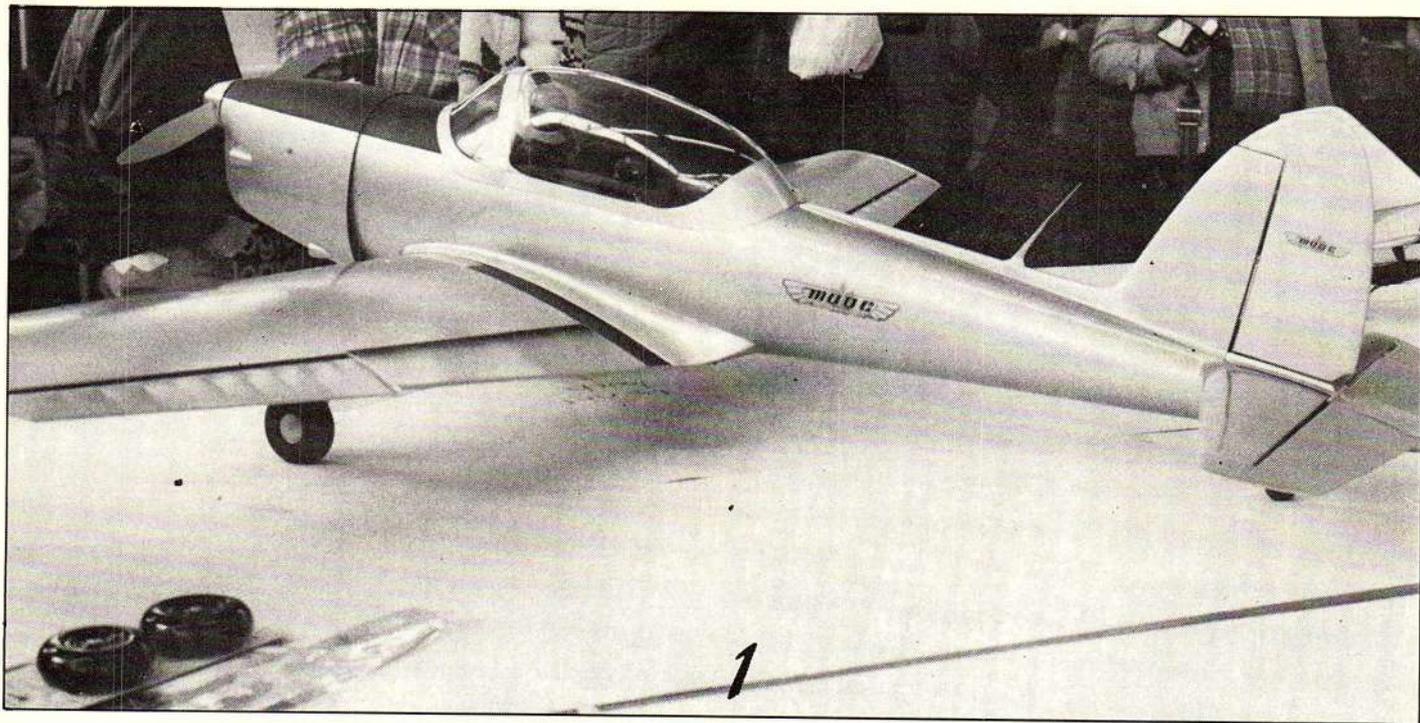
While those who came to gawk and shop came from as far north as British Columbia, and as far south as the Los Angeles area, the industry came from all over the country. Not only were the west coast firms, such as Kraft, Futaba, Bob Holman, etc., present, but major companies like Byron Originals made the trek to the great Northwest. It was a selling show, so the manufacturers were happy that they could offset the cost of the show, and the consumers were thrilled to be able to merchandise which they may not normally have had access to. Technopower came all the way from Ohio, and you couldn't even get near the booth for the crowds. Those round

You'll find it on a map of the state of Washington, and it's the site of one of the fastest-growing trade shows.

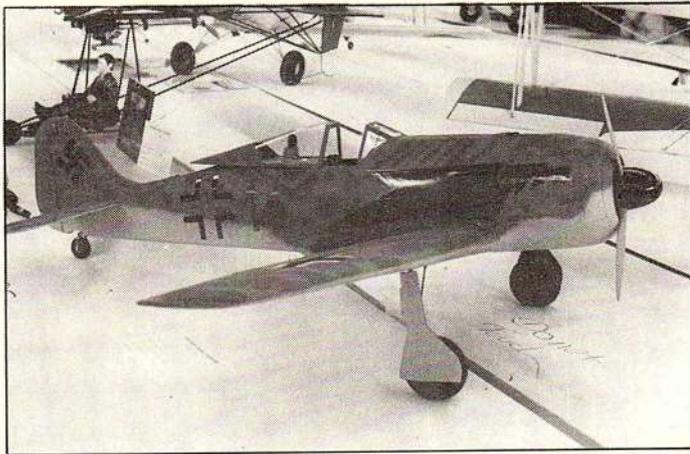
22 scale r/c modeler

By Robert Sweitzer

Photos by the author



1. From Vancouver, Bill Martin's big Chipmunk. 2. Bruce Cooper's YMF-3 Waco bipe. 3. Detail shot of Bob Aydt's Stearman PT-17. 4. Best Finish went to Bob Seng's Stephens Akro. 5. Nice weathering on George Ssuti's Zero.



1



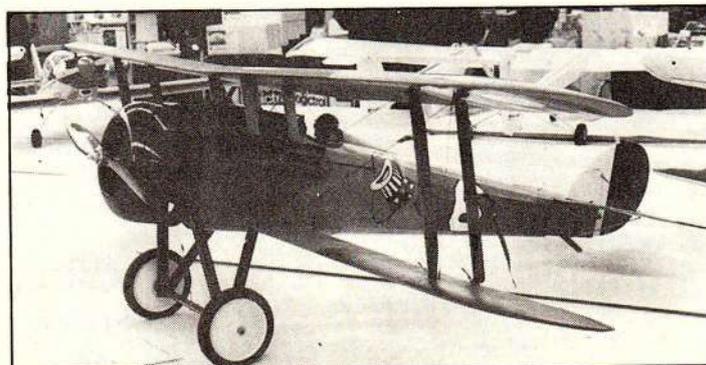
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3



4



5

1. Sharp FW 190 by Mike Carver.
2. Hellcat is covered with insulation material. 3. Al Schatzel's Fairchild PT-19

was beautifully detailed. 4. Beech T-34 looked good. We didn't catch builder's name. 5. Dick Heining's Proctor Nieuport 28 is Tartan powered.

engines really impressed the folks.

"Doc" Brooke was there, showing his fine imported Practical Scale kit line. When the scale buffs saw the quantity and quality of stuff in those big kit boxes, they were walking out with them under their arms in droves.

It's always the small gadgets which fascinate me. The Swingee, by Scan-Am, is a molded pivoting hinge which makes it possible to totally conceal the aileron control linkages in the wing. The hinge actually serves as the control surface actuator. The principle has been around forever on full-size aircraft, and it's good to see this quality product now available for the scale builders.

The exhibition booths were not the only attraction. The display tables with the static models were some of the best we've seen. Planes came from all over the western states to exhibit. What was surprising was that the pack wasn't the usual WWII fighters (P-51s, Corsairs, etc.). Instead, a Curtiss Fledgling, Boeing XL-15A, C-141 Starlifter, B-24 Liberator and two B-17s (a WesCraft and a Royal kit) were among the notables on display. The change of pace was refreshing.

Not only was there variety, but



Ervin Solberg even documented the walking stick of his pilot! The Dr.I took second in Precision Scale.

the quality was exceptional. The models were well-detailed, and the builders had done their homework, with lots of well-prepared documentation in evidence. Ervin Solberg even made sure that his pilot's walking stick in his Fokker DR.I was properly documented! No won-

der the model took second place in Precision Scale.

The real show stopper was Frederick Pierce's Curtiss Fledgling. Fred owns PAS-M-CO, which makes some superb scale fittings and accessories. The Fledgling took first in Precision Scale, as well as Best of Show. The model had every little gadget and fitting in place, even down to the drain holes in the wings. The model had just been completed

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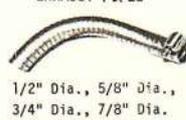
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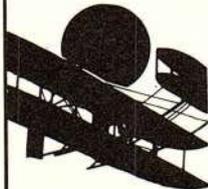
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If you don't recognize the Boeing XL-15A, don't feel insulted. It was a very rare bird, and this model is by Myrl Ingram.

the night before, so I guess the mid-night oil did pay off.

The Best Finish award went to Robert Seng's red and white Stephens Arko. Bob came from Boise, Idaho, to attend the show.

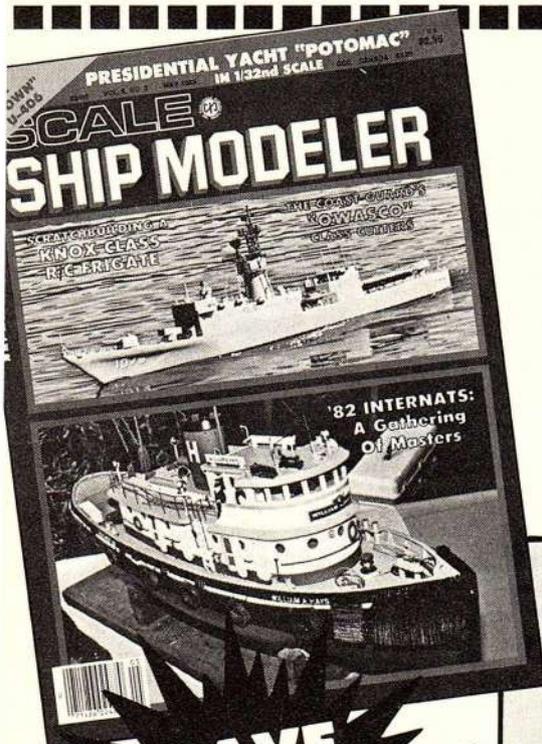
One of the most interesting models was Bill Osterhoudt's F6F. The entire model was covered with a light metal skin, which Bill said was light-

weight sticky-backed insulation material. The result was a most authentic looking exterior, and Bill's neat weathering job gave him a well-deserved second place in Military Stand-Off Scale.

Talk about unusual models . . . Myrl Ingram's Boeing XL-15A could not have been any more oddball. I don't think that anyone looking at it identified it correctly. It's somewhat obscure, there having been very few built. The model, finished in silver Hobbyprox, got lots of atten-

tion, and it should make a good flier, too.

In all, the show was bigger and better than anyone's expectations. The host club is already working on next year's exhibition. With the response the manufacturers have been getting, you can be sure that the industry will be back again, in force. There aren't any promises of good weather, of course, but if you can find out where Puyallup is and can get there, you're guaranteed one heck of a good trade show. □



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For the beginner, or the pilot who wants some aerobatic fun, the Fuji FA-200/180 is a fine choice.

By Gerald Lloyd

J. R. Naidish photos

When a friend told me that he was building a Fuji, I figured that he was pulling my leg. I thought that Fuji was a film. But, I was to learn that the Fuji FA-200/180 is a nifty looking low-winger. It sort of resembles the old Navion around the canopy, but it's much more slender and stylish.

With its low wing configuration and trike gear, it is one of those airplanes which defies easy classification. We always refer to such models

as stereotypes of either "trainers" or "intermediate" models. I'm not sure that the Fuji fits well into either class or, I should say, it fits into both classes very well. The plane is capable of some very lazy, lay-back flying . . . it will cruise all day at half throttle, with just a nudge from the ailerons to keep it within the confines of the flying field.

I trimmed my model to virtually fly hands-off. I tweaked the aileron trim tabs, set the elevator trims to

*"I thought FUJI
made film"*





full up, adjusted the throttle accordingly to maintain altitude, and literally set the transmitter on the ground. The Fuji made big, lazy circles, happily freelifighting on its own. Only when eventually disturbed by what must have been a strong thermal did the model deviate from its path.

So, by all of our commonly accepted definitions, the Fuji (also known as the Aero Subaru 40) is a great trainer. Its trike gear makes it a joy to ground handle. The 2-3/8" wheels are just big enough to not create any problems on grass runways. On paved surfaces, the Fuji will roll along perfectly if the wheels are properly aligned. If you caster the nose strut back just slightly, as shown on the plans, the tracking greatly improves. But, make sure that the main tires are rolling straight.

The contradiction comes when you unleash the Fuji. It will do maneuvers with the best of them. Pour the coals to the engine (I use a .45) and the five pound model leaps into action. You want a roll . . . you got it! How about a big loop . . . no problem. Spins, Immelmans, Snaps, etc., are all part of the Fuji's bag of tricks. There's quite a bit of dihedral, so expect to get a little yaw effect as you try continuous rolls, but that's the only shortcoming I detected. The dihedral doesn't seem to bother inverted flight much, until you tweak some rudder commands in.

There would be nothing wrong with stuffing a .60 into the nose of the Fuji, but such a drastic increase in power really isn't warranted. On the other hand, don't expect a .35, or even some less powerful .40s to cut it. If given the option, and if a .45 wasn't available, I'd strongly consider a .60 . . . but only if I was after aerobatics. If you are in the market for a trainer, then a .40 or .45 will be your best choice. Most modelers are amazed to learn that there's really not that much power difference between a .40 and .60.

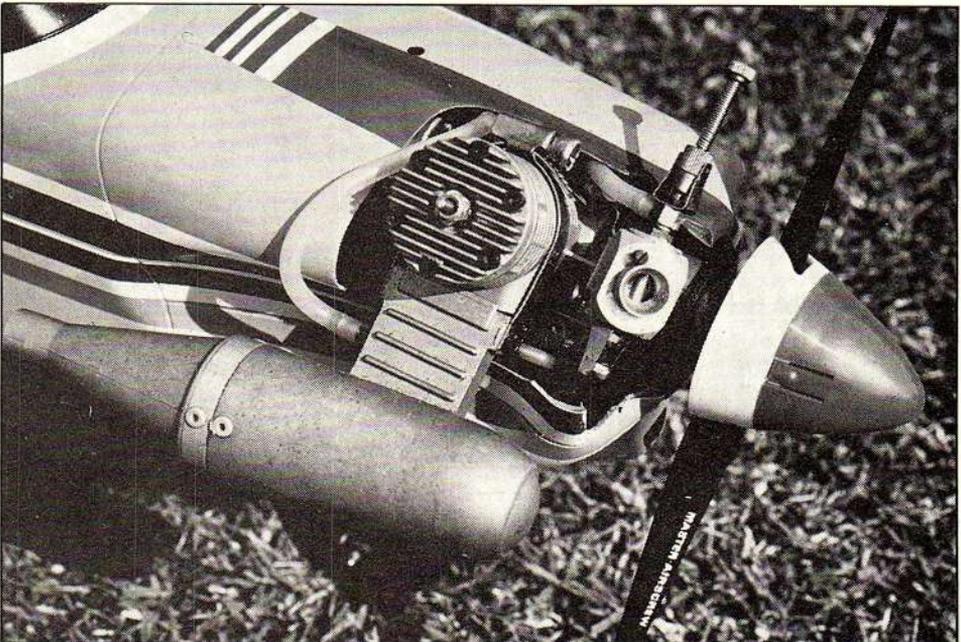
As far as radio equipment, the Fuji calls for either four or five function systems. The difference is whether you want flaps or not. The flaps are pretty small, don't really cause any dramatic changes in the flight characteristics of the model, and should be only considered necessary for scale looks. The flaps do create a little drag. Maybe the way to look at it is that these are great "trainer flaps." If you have never had a model with flaps, throw an extra servo into the Fuji and have



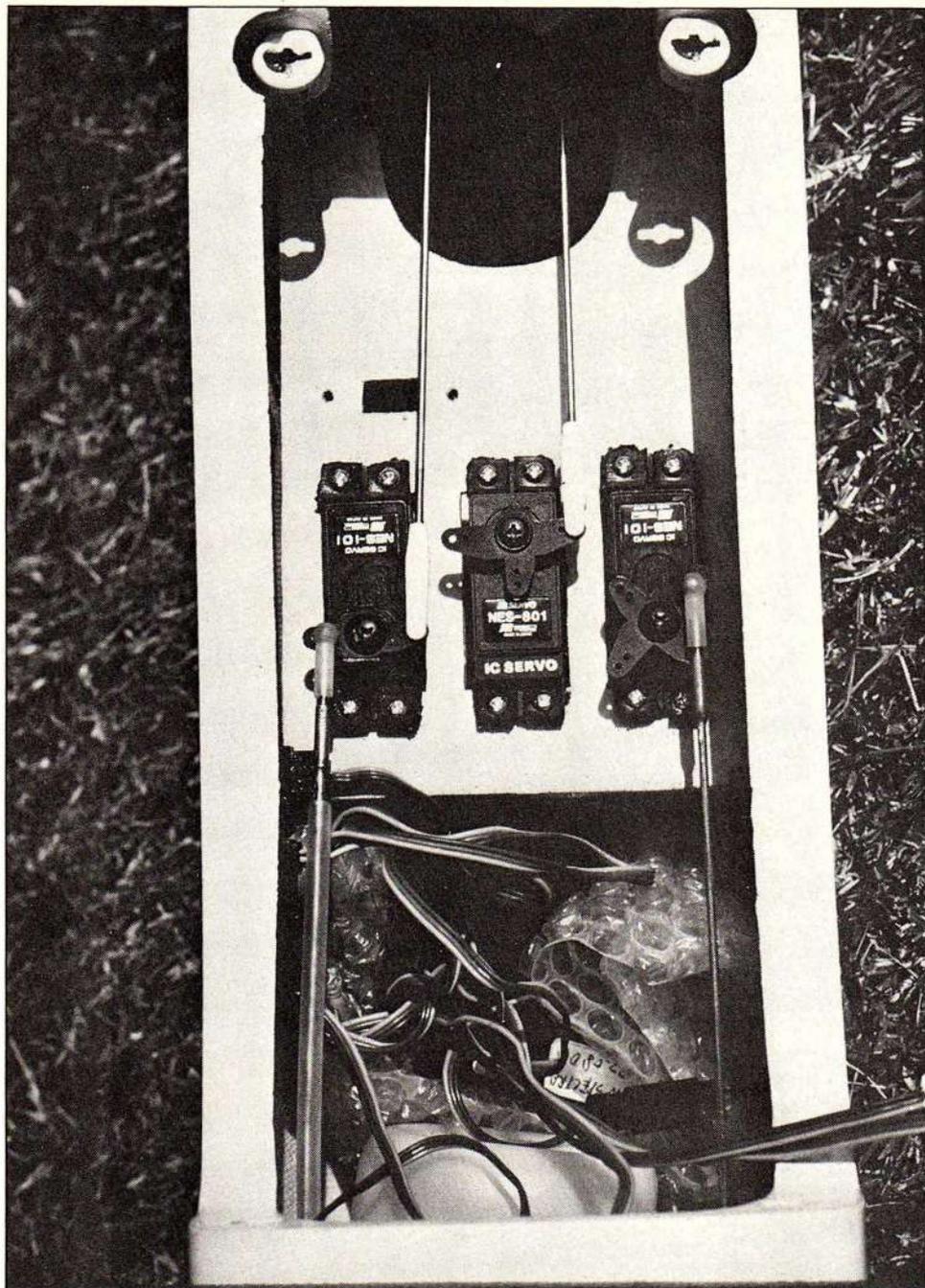
The canopy is reminiscent of a Navion, but the rest of the airplane has its own character.



For an intermediate trainer, the Fuji has a lot more looks and class than the typical boxes that beginners are strapped with.



The engine is a nice fit. The sidewinder installation would be difficult to alter, so hiding the engine is not a good plan.



The Circus radio fits neatly into the supplied hardwood tray. Lots of foam to keep the receiver and battery from the airframe vibrations.

some fun. You won't get into trouble with these flaps.

Since I'm not big on flaps, and since there was never any real consideration of ever entering the model in any sort of scale contest, I kept the full strip ailerons. I wanted more aerobatic performance. There are those who would argue, and rightly so, that the inner areas of the ailerons probably don't do much to contribute to roll. I feel that this extra area could help a tiny bit at really low airspeeds. In the long run, you aren't going to change the flight performance of the model much one way or the other.

30 scale r/c modeler

I can't give any rave reviews to the Fuji as a scale model. Sure, the outlines seem pretty accurate, but it's just not the type of airplane you're going to win this year's Masters with. The canopy is just a painted-on affair. It's quick, but it won't really impress even the blindest of judges. The engine, as shown on the plans, is "sidewinder" mounted and protrudes through the right side of the cowl. That could be remedied by switching to an inverted installation, but it still won't buy you a trophy, and there's a funny depression molded in where the muffler goes.

The FA-200 is best viewed as a good "scale-like" trainer or a good machine with which to learn some rudimentary aerobatics. Not only

does it fly well, but it's a great kit with which to get your feet wet. There's a very prime-quality fiberglass fuse, with the firewall already installed. This saves lots of time, and it also gives the new modeler a taste of what it's like to work with fiberglass.

The remainder of the model is built-up from balsa. The wing is put together from two sections which build flat on the bench, then the dihedral is built in. It's an easy wing to build, and it gets a full balsa sheet skin for strength. The stab and rudder are also from balsa. The wood quality in the kit is rather good, for a Japanese kit, and we didn't have to replace any pieces.

We like the idea of a multiple construction materials airplane. Foam wings are wisely avoided. The beginner gets to taste a variety of modeling materials, none of which pose any particular challenge to even the most rudimentary skills. The only possible trouble spot we might watch is the application of the sheeting on the wings and stab. It's almost impossible to get a warp out of a wing if it was there when the sheeting was put on. Check the panels carefully, then double check them before adding the sheeting, and be especially careful when doing the second side.

If you are a rank beginner, seek some professional advice as you progress with the model. Things like the shear webbing in the wing does not seem too complex, but it can be a real stumbling block to someone who hasn't done it before. Watch those neat little tricks which all kit designers build into their plans, like showing only one wing panel, so that we wind up with two left panels because we forgot to turn the ribs for the landing gear block the right way on the opposite panel. We've all made such foolish mistakes, but that's no reason to follow our lead and do the same!

One of the easiest ways to overcome the shortcoming on the plans of having only a right hand panel shown is to simply remember to build one panel (the right) with the three ribs for the landing gear block facing down, then do the other panel with those three ribs facing up. Since it is a symmetrical airfoil, the ribs don't have a true top or bottom. The kit box forms a neat wing jig, simplifying the entire task.

The kit has a good instruction booklet, as well as some helpful exploded views on two separate sheets. Get very familiar with these, for they can save you a lot of hassles. Note, in particular, the little draw-

ings which show how to align the wing onto the fuse, and how to make sure that the stab isn't tilted. Take your time when checking these references. A straight airplane is very important, whether it's a trainer or a stunt machine.

If you are going to be operating from a rough field, you may want to consider leaving the gear strut covers off. The kit is really loaded with all sorts of goodies, from plastic running lights (dummies) to an illustration showing how to apply the correct colors for a scale paint scheme. The Fuji is a real bargain. The kit includes spinner, fuel tank, wheels, push rods and all the accessories. You simply need glue, covering materials, paint, engine and radio to complete the project. At a price of \$89.95, how can you go wrong?

I guess I forgot to mention the size of this model. It's big, as trainers go, with a 56½" span and 573 sq. in. of area. At a projected weight of five pounds, you'll have a nice and light model.

Finishing the Fuji presents no great challenges. The fuselage, being fiberglass, must be primed, then painted. Use Hobby Poxy or Superpoxy for a good finish. The colors

called for are a lime green and black, over white. If you can't get a reasonable blend of lime green, then use orange as an alternate accurate color. You'll get some experience masking all those lines, but electrical tape will make going around the curves easy.

The flying surfaces can be Monokoted, to save time. If you insist, fiberglass the wing and stab, but it's a lot of work, and it will add weight. There are areas, such as the wing tips and center of the stab, which must be painted. To paint the Monokote, mask off the area, then rough up the surface with steel wool and apply the paint. I used glass cloth on the rudder, so that the difference between the plastic and the fiberglass wouldn't be too obvious. The kit supplies some nice decals to use.

Since I didn't install the flaps, I simply fixed the flap actuation linkages permanently in place. No other modifications to the kit are required. That makes it nice for someone who is just getting his feet wet in the building game. The kit plans really don't show a radio installation, but there's nothing exotic about how everything is mounted. I prefer to use silicone adhesive to mount servo

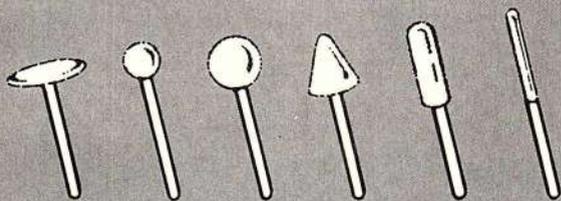
rails in the fuse. The strength of this glue is phenomenal, and it's very resistant to vibration. Be sure to let it cure overnight for optimum strength.

If you are installing the flaps, put the flap servo right next to the aileron servo. Be sure that the linkages don't fowl each other. Mount the radio as far forward in the fuse as possible. Shove the battery pack under the fuel tank, remembering to protect it from fuel with a sandwich bag. I know that some of this seems very elementary but, when you've never done an installation before, there's no such thing as being too basic.

Don't neglect to check the Center of Gravity. The C.G. is right at the landing gear wire in the wing, so you'll know if you are tailheavy, because the nose gear won't stay on the ground. Even with the proper C.G., you'll find that the nose tends to bounce off rather easily. If this becomes a problem, the best fix I have found is to bend the main gear struts back a little, to get them further behind the balance point.

Have no fear about how the airplane will behave. The FA-200 is about as harmless as you could want. Taxi around a bit to get the feel of

rough 'n tough CARBIDE CUTTERS



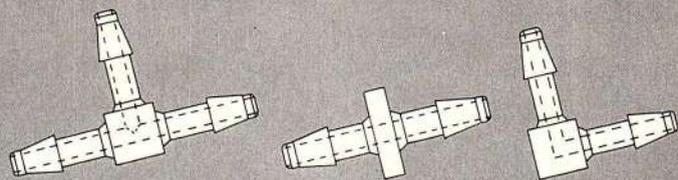
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the controls, and to make sure that the servos aren't reversed (especially check and double check the ailerons). Run the engine and get the throttle response correct. I like to set up the left stick (Mode II) so that the stick all the way back is low idle, and moving the trim tab causes the engine to kill. Having a positive way to completely shut down the prop is a very prudent idea.

If you are going to fly aerobatics, I'd suggest balancing the wing laterally. Put pins in the leading and trailing edges at the exact center of the wing. Put screws, nails or lead into the light tip until the panels remain level. Some may argue that the offset engine adds weight to the starboard side, but I feel that such nit-picking is academic.

If you did a good job of building a straight and true model, trimming the Fuji will be effortless. If you are a greenhorn at the sticks, have a trained pilot take the model up and get the trim adjusted. If you are advanced enough for aerobatics, remember that trimming a model properly at the outset can really make flying it easier. I work on each control surface separately.

The elevators are adjusted first.

The model should not require excessive down stick when inverted. If it does, check C.G. or the incidence of the wing or stab. At the same time, make sure that there's no radical pitch change from power on to power off. If so, the only cure is to shim the engine to change the thrust line. Watch for indications that the model's nose pulls right or left when power is added in the air. Side thrust may also need some alterations. Try to isolate the source of the trim problem . . . they can often mask themselves and they always interact.

The ailerons are adjusted for not only level flight, but also for tracking through the loops. The ailerons affect the front side of the loops, while the back side of the loop is primarily influenced by rudder trim. Both inside and outside loops must be done. Make absolutely sure that you are entering the loops perfectly level, and that your hand isn't inadvertently nudging some aileron inputs on the stick. It will take dozens of loops to get everything just right. If changing the ailerons isn't making matter better, go back and check for a thrustline problem, a heavy wing, or a rudder misalignment.

Trimming a model can take several weekends. The Fuji obviously isn't going to have the precision and finesse of a full-fledged Pattern ship, but that's no reason to not get everything you can out of it.

While I'm not advocating the Fuji as a full-blown aerobatic contest machine, it is one of those rare models which can do just about anything in the book. It's such a colorful and well-proportioned model that it is both a pleasure to look at and a joy to fly. As a scale model, it's little more than all right, but at least you can do those maneuvers with some class! If you are looking for that number two or three airplane, as a beginner, you'll have to look long to find a better choice than the Fuji. It's lightly loaded, builds relatively fast, looks good, and flies better than a lot of so-called "trainers."

Whichever your need, the Fuji FA-200 has something to offer you. At the special Circus Hobbies price of \$89.95 (regularly \$139.95), it's a pretty hard deal to pass up. Available exclusively from: Circus Hobbies, 3132 S. Highland, Las Vegas, NV 89109. Phone (800) 634-6781.

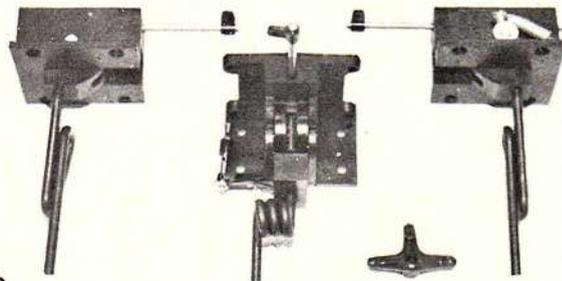
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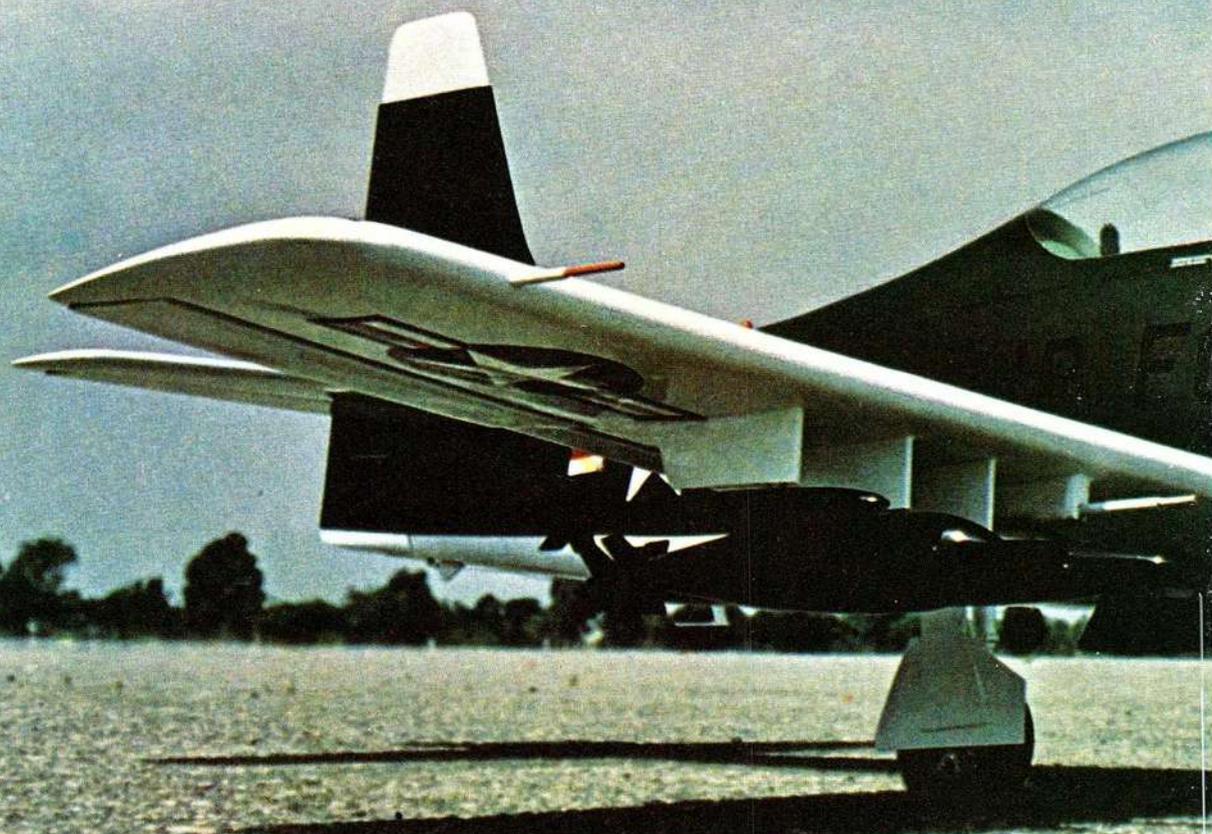
AIRDROME

YAT-28E

Turbine version of the T-28, this model is a great blend of stability and flight performance.

By Shane Cramer

J. R. Naidish photos



Do you have those quiet moments in your building room, when you kick back and just sort of dream? You have just finished a wing panel perhaps, and are sipping a cool drink to unwind, and the thoughts start free flowing. What always is that uncontrolled train of thought about? It's inevitably a daydream about your own personal ultimate scale airplane. It's a model that looks too good for words, flies perfect "10" maneuvers every time it's in the air (usually accompanied by machine gun fire or bombs if you have an especially active imagination), and it's a plane which no one has ever modeled before. It's that last qualifier which makes them all real dreams, for what airplanes haven't been done in R/C?

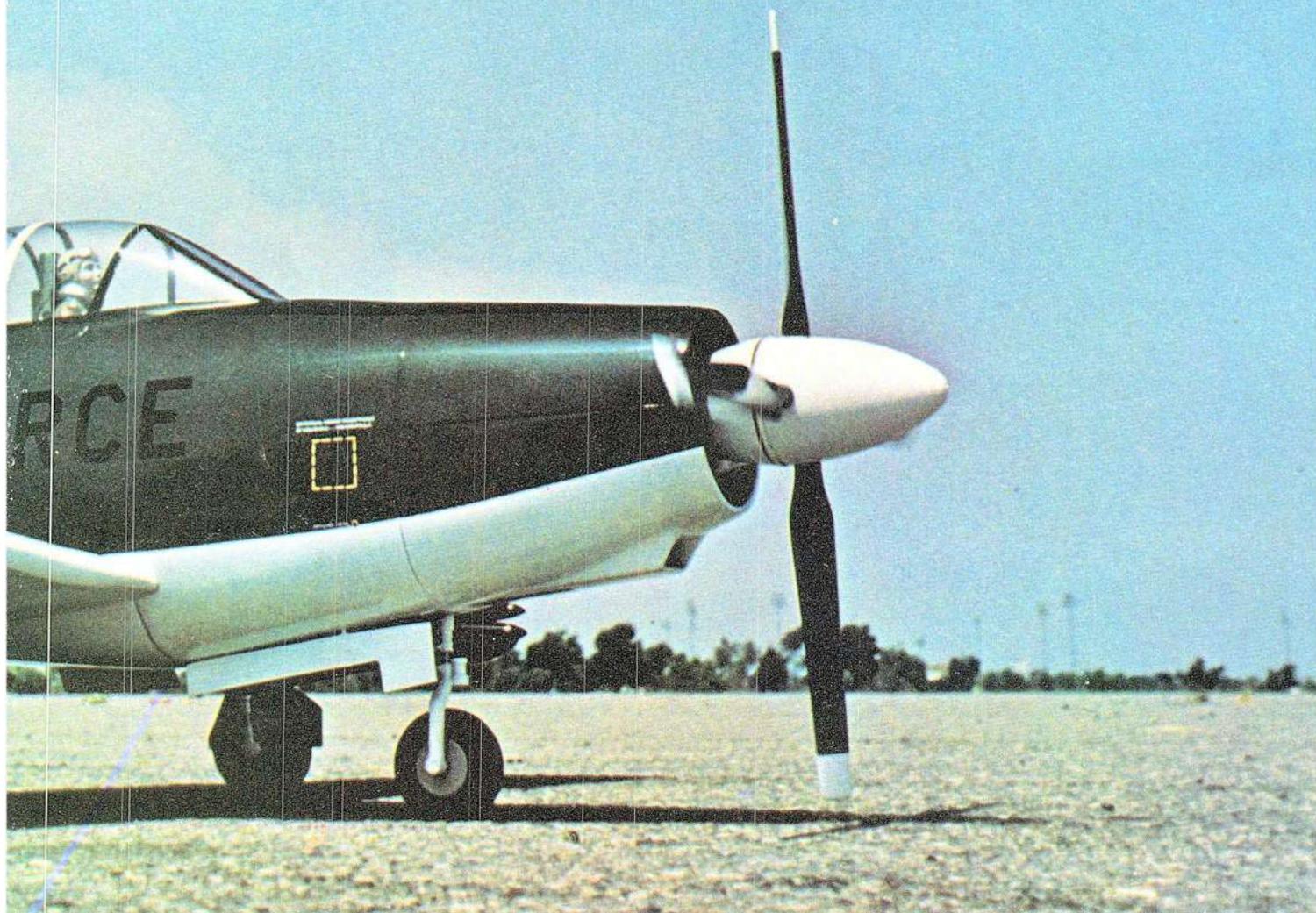
I personally don't know if the North American YAT-28E had ever been done before as a scratchbuilt project. If so, I never saw it. But, I do know that it had never been done as a kit. That's why, when I heard that Tri-R Models was going to close their doors forever several years ago, I grabbed one of the last kits they were to ship. We now have it on good authority that there may be a possibility of the kit being reintroduced, so a review seems in good order. *(We have been unable to verify this, so please don't write the magazine for more information. As soon as something is official, we'll publicize it. PHP.)*

The YAT-28E was my daydream personified. It was elegant to look at, with smooth lines. The large can-

opy would help with the scale cockpit. The long nose and large tail volume would be a boon to stability. The trike gear would take the guesswork out of those contest days when the wind always blows across the runway.

I drooled over the photos of the plane in *Scale R/C Modeler*. My daydream soon turned to a burning obsession. I must state that, as a member of the So. California Scale Squadron, I do have a lot of contacts in the industry, and I have access to a lot of kits. But, the YAT so impressed me that there just wasn't another product which could take its place.

But, I know better than to just get all wrapped up in a scale model for emotional reasons. No scale kit





That realistic looking static prop comes in the kit. Underwing ordnance is operational.

is worth its salt if it can't be documented. The YAT-28E wasn't a well known airplane. It never saw use in the Vietnam War. Some tail flutter stopped the project in its tracks. If you see some resemblance to the T-28, then you are right. The YAT is nothing more than a turbine version of the old T-28 trainer.

At the outbreak of the Vietnam War, there was a need for a good counter insurgency fighter. North American proposed breathing new life into their very old trainers. The program had been tried before, but with limited success. Now, the urgency of the situation made it seem like the right thing to do. Unfortunately, most of the T-28s had been relegated to the scrap piles, but there were some in civilian hands. North American had to go out and buy back their own aircraft.

The modifications were more extensive than just bolting a turbine engine to the nose. Almost the entire airframe had to be revamped. Wiring had to be redone, to allow for the extensive underwing stores. The lengthened nose necessitated extensive changes in the tail section. The fin grew tremendously in height to compensate for the torque and yaw of the big turbo-prop. The stab was enlarged slightly as well. By the time all was said and done, one wonders if it wouldn't have been cheaper for North American to have just started from scratch.

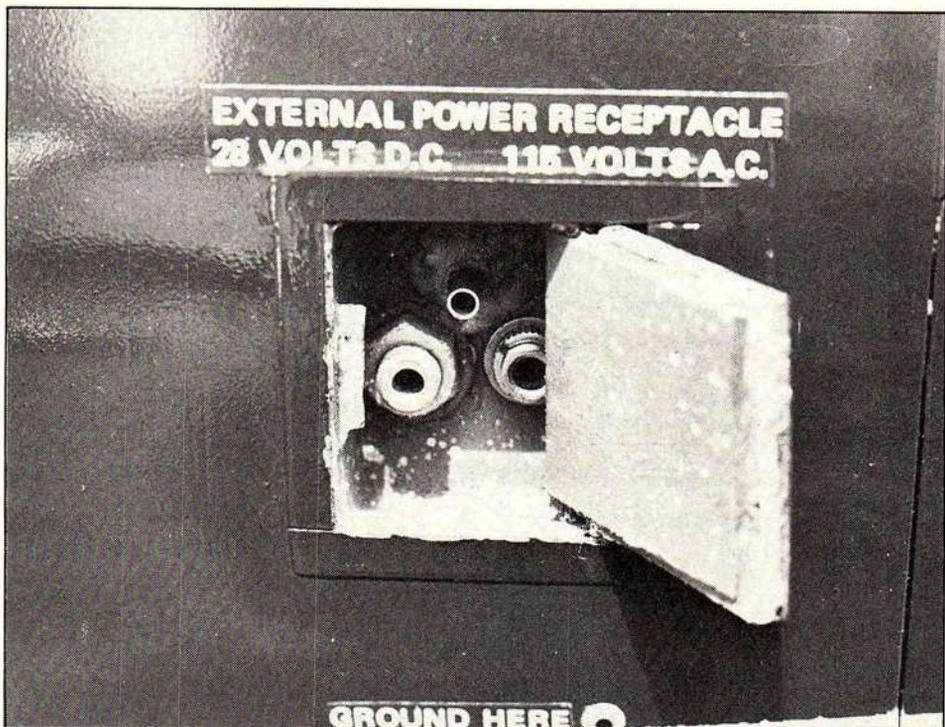
Compared to the old T-28 trainer, the YAT was a real ball of fire. The performance with the turbine was fantastic, and the plane could carry tremendous amounts of underwing stores. However, technology had already left the YAT in the lurch, and it was just another grand scheme which never did the job.

I went to the local documentation guru, Noel Allison. As the chief judge in this area, he is a true expert. He has a reference library that would make NASM envious. Noel supplied some background reference material, but I still didn't have everything I needed, and I wouldn't start the model until I could complete the documentation. I decided to write to North American, in the faint hope that they would send me something. To my surprise, they responded with some three-views and other useful data.

The author kept the exterior of the model unobstructed by hiding the fuel and retract fillers in a small access panel (which is in the scale location and of the correct scale size!).



With that long nose, and plenty of dihedral, the YAT-28E certainly has all the earmarks of a stable machine.





Can you see any T-28 in those flowing lines? The fin has been increased dramatically.

The kit was ordered and arrived in due time. When I opened the box, I was really impressed. There was so much stuff in there that it didn't look as if I was going to make any trips to the hobby shop to complete the model. Now, I can't vouch that the new kit, if it ever is released, will be the same as the old one. Among the goodies in the kit was a static display spinner and some blanks for making the display prop. Unfortunately, there was no spinner for flying, so my friends in the Squadron came to my aid and helped manufacture one. We also had to make a shaft extension, since I didn't want to use the engine location shown on the plans.

The construction manual is good, and there are lots of jigs needed to build subassemblies. Don't try to take any shortcuts and eliminate these jigs . . . you'll go crazy without

them. The construction is moderately complex, but there's nothing that a trained modeler can't handle. The fuse is built in two half shells, a top and a bottom. It will be a big help if you fit the wing and do the entire radio installation in the boat-like bottom shell, then add the top.

The engine doesn't get much cooling. I opened up the scale dummy exhaust duct, which really helped. Since I was using a pumper engine, I relocated the fuel tank aft, to clear exhaust stack. The long nose on the full-size plane was to help the C.G., because the turbine was so light.

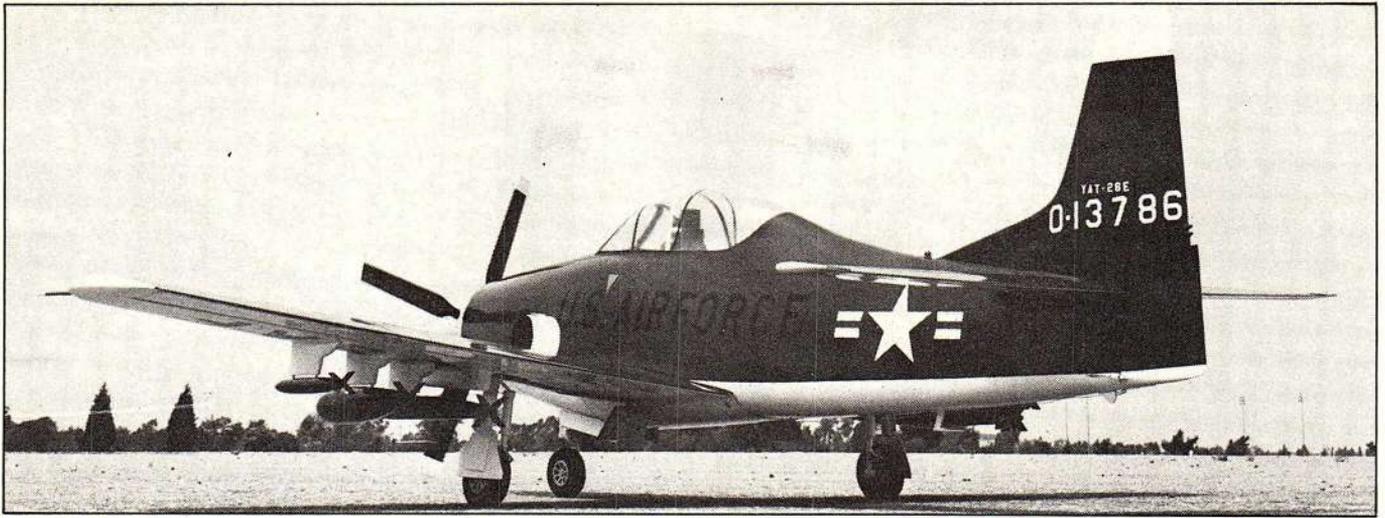
By the way, this is a huge model. The span is 66", and it literally towers over a standard T-28 kit. The model has no provisions for retracts, but all that's needed is to reinforce the spars and ribs with plywood. There's a lot of dihedral (more than twice that of the T-28), so you better make sure that you are getting the angle of the gear legs just right. Pneumatic retracts are sim-

pler to use than mechanical ones in this application.

The 28E's gear doors can be made out of most anything. I made mine from wood, but they could be done in plastic or even fiberglass. The inner doors can be triggered mechanically.

To finish the model, I elected to use the traditional glass and resin techniques. Super Poxly was my choice of paint systems, and it didn't take long to color match the Vietnam green and cloud white, using North American's specifications as a guide. Because I had opened up the scale exhaust, I decided to apply two coats of clear over the mylar decals supplied in the kit box. I didn't want to take any chances on the decals coming off, but perhaps one coat of clear would have been sufficient.

Don't expect to have too much trouble with the balance on the plane. That long nose really does the trick, and I didn't have to add any lead at all. I spent a few evenings just admiring the assembled model



The trike gear makes for great ground handling.

on my workbench. Here, in front of me, was the culmination of my day-dreams. It was a real beauty. Actually, I could have probably spent the rest of my modeling days sitting there before the Trojan. But, Denny DeWeese reminded me that airplanes are made to fly. I shrugged off my reveries and started packing for the flying field.

We set up the plane in the pits, and all of the spectators gathered like flies. No one could identify the plane, and that couldn't have made

me happier. Even after I told them that it was a model of a full-sized modified T-28, I still don't think they all believed me.

We decided to make the first flights without the cowl, just to make engine access easier. Denny agreed with my plan to take it easy on the first flight. The gear would remain down, in case of emergencies. Denny would "talk" me through the flight—that's if I could hear his voice above the knocking of my knees!

The first runs were taxi tests. It took only a pass or two along the runway to know I had a smooth handling machine. That trike gear is so great that you wonder why modelers even build taildraggers. I could taxi the model at high speeds with almost no effort. I looked at Denny, and he gave me the high sign to go for it.

I took the YAT clear down the runway, so that I could let it unwind and have all the room it wanted. The throttle was poured to it,

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and the 28E left forward. I held it on the ground for at least a hundred feet. I could feel that it had wanted to fly long before, but I wanted to make sure. Finally, Denny quietly almost whispered to ease it off, and I obediently cranked in a touch of up elevator. The YAT was off and climbing. What a sight, to see my dream against the blue of the sky . . . it was in its element, after a year and a half of building!

I just let it go gradually, not forcing any controls. Big, lazy turns, gaining altitude all the time. Denny sounded like a nurse next to me, giving quiet advice and just talking to keep my mind at ease. By the time Denny got around to asking me how the trims were, the plane was up at about 300 feet. I eased off the sticks, and saw that the model had a slight hunt to the left. I nudged the aileron trim and the YAT assumed a straight heading. That's all the trim the model ever needed!

I did nothing but cruise up and down for that first tank of fuel. Denny said I had the biggest grin he's ever seen. The second flight saw the cowl put on, since the engine was purring flawlessly. After another smooth takeoff, I elected to



Some may argue as to whether the plan's exterior should be so shiny, but this was a test prototype aircraft and it probably did have a glossy finish.

again leave the gear down, just in case the engine overheated. I decided to test for aerobatics, in a limited way. I did a few lazy Chandelles,

but I didn't get into any rolls or loops because of the extra drag of the gear. Feeling confident, I came down low for some strafing passes of the field. Everyone cheered as the YAT-28E buzzed by. All that dihedral makes fly-bys a snap. This

(Continued on page 75)

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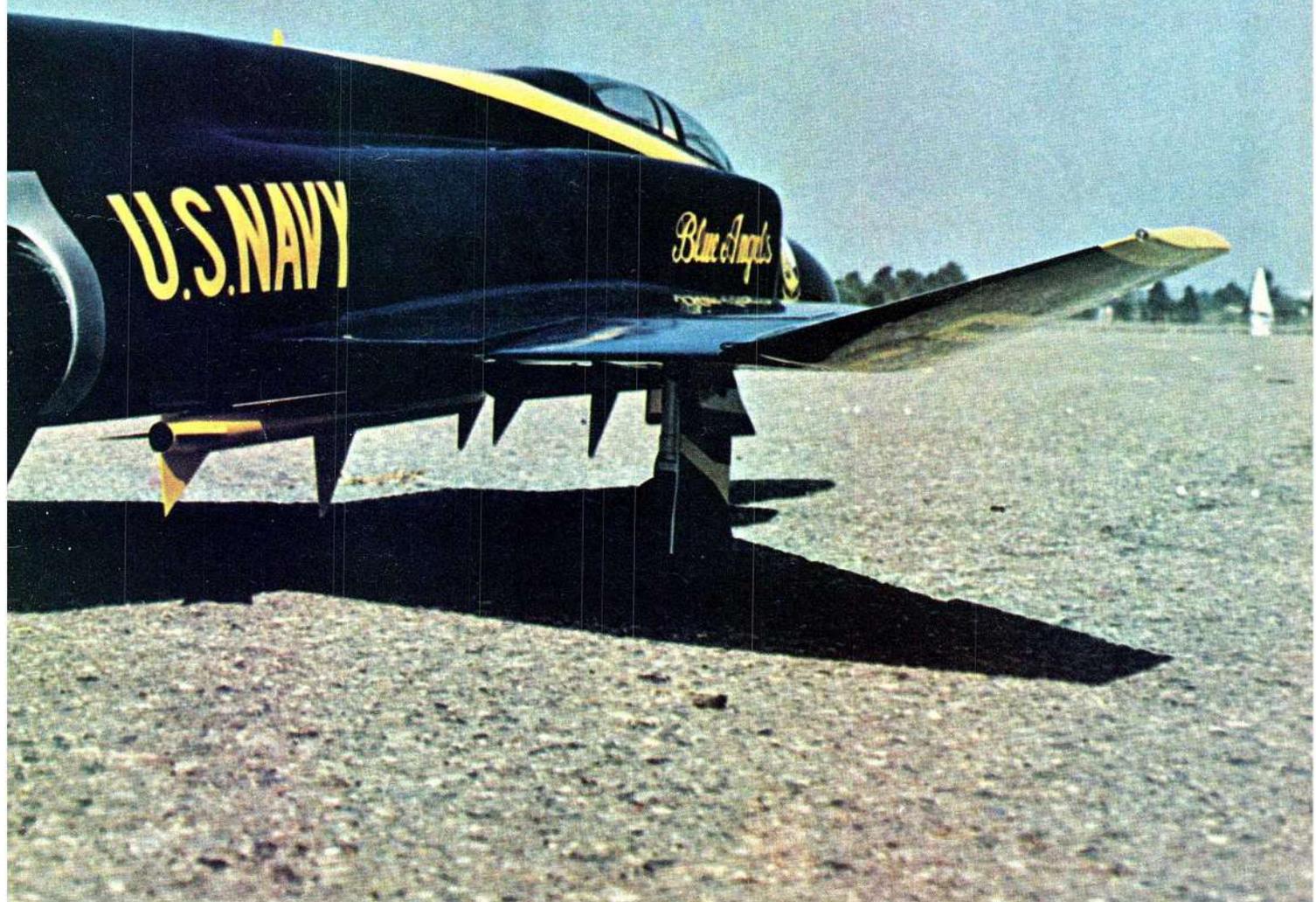
Masters Champion Tom Cook is now kitting his magnificent giant-sized double ducted fan F-4. This one will blow your mind!

By Pat Ventola and Tom Cook

J. R. Naidish photos

PHANTOM II

PART ONE





I think it would be safe to say the most spectacular and most photographed aircraft on the contest circuit during the last few years has been Tom Cook's F-4 Phantom II. Few aircraft have ever excited a crowd like the big F-4 blasting the sky on a low pass, or popping the drogue chute on landing.

My love affair with jets has been

Setting up for a landing at the '81 Masters, the Phantom exhibits its rock-steady stability.

satisfaction were Tom's Me 262 and the F-4. The airplane I built was more or less a prototype for the semi-kit which is now available. Sometimes, I think Tom has me build his airplanes, figuring that if I can do it, anyone can. My contribution to this article will be this introduction and a few comments on building the model.

The F-4 is basically a foam and fiberglass airplane, which assembles much like any Pattern model. The differences are in the scale details

Construction of the airframe is straightforward and very simple. Normally, the most complex element of any ducted fan design is the air inlet. The Phantom's physical layout and the finished nylon/glass inlets make this job a snap.

The F-4 features a full flying anhedralled stab. This complex design problem was solved by simply imitating the mechanism of the full-scale machine. Since the Phantom was not available as a kit when I constructed my machine, I had to



long standing, going all the way back to an article in *Scale R/C Modeler* some eight or more years ago on the now defunct D&B T-2J Buckeye. Tom Cook is a close friend of mine, and I had been privileged to see the development of the F-4 from the first rough drawings, through three prototypes, to the finished model. Therefore, it was only natural that I hounded him constantly to get a set of parts to make one.

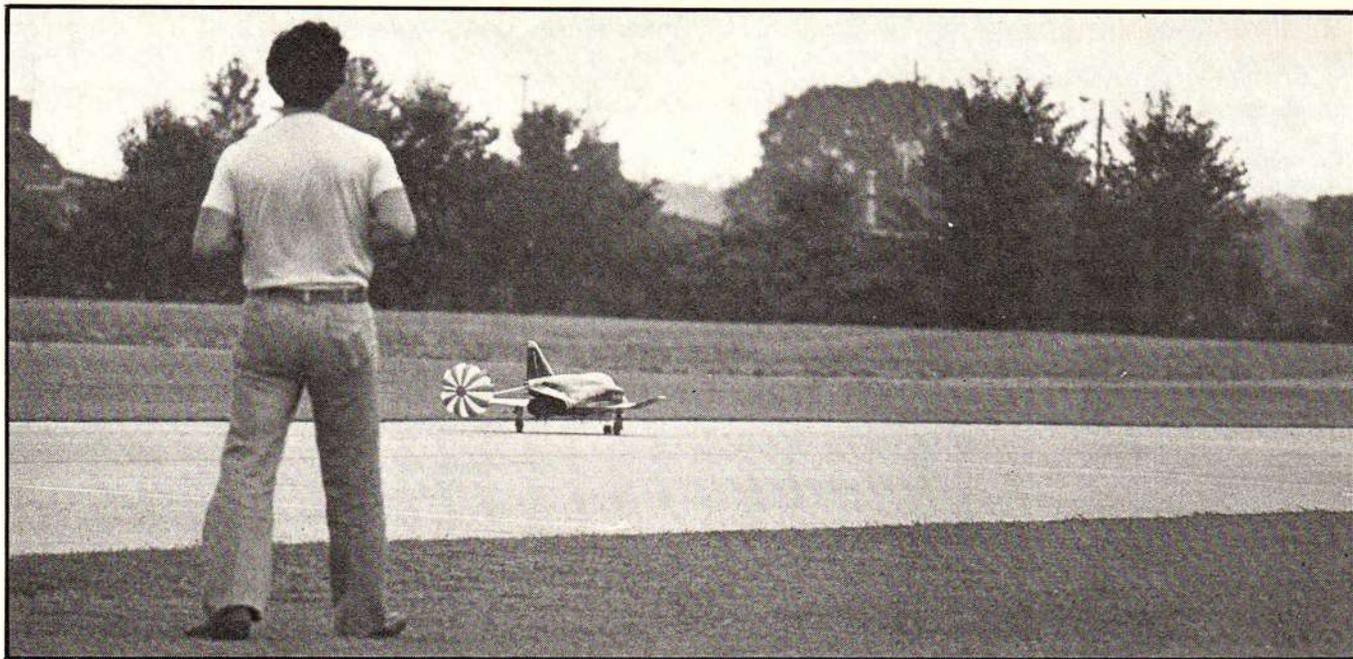
I might add that, in all my years of modeling, the two airplanes which gave me the most personal building

and the small nuances in construction that allow a twin ducted fan model to work.

The first and most obvious component on this airplane is its massive seven-foot-long fuselage. These are hand laid-up by Tom, and the workmanship is flawless. Imagine a fuselage that big, yet I'll swear there is not even one small pinhole. Since no compromises were made from exact scale outline, the aircraft must be made in one piece. (If your only mode of transportation is a subcompact car, the F-4 is not for you.)

make my own components to actuate the stab. This was a very difficult task, which took many hours in a friend's machine shop. This problem has been eliminated in the kit version, as all components are supplied.

The landing gear struts were also very time consuming, as I am not an accomplished machinist. Tom is also custom making landing gear and struts for the Phantom, so those who do not have access to a machine shop and lathe won't have any trouble completing the model.

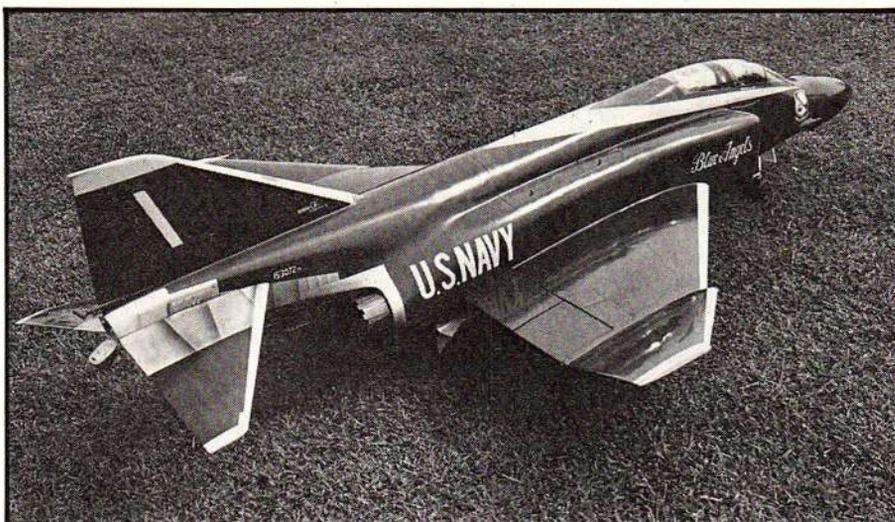


Tom pops the drogue chute, and the F-4 decelerates quickly. This was a real crowd pleaser.

What a clean and lean machine. No wonder the F-4 scored among the top contenders in static points.

It's at this point I'll throw a bouquet to all the designers in the world, men like Platt, Meister, Brian Taylor and Tom. Even with fiberglass components and foam cores, I had to work three-views and scale up everything. What I wouldn't have given to have had the plans and instruction book. Radio manufacturers will love the F-4, as each function requires a servo. This does simplify construction though, and gives precise surface actuation. My Phantom has a servo for each aileron, one for each flap and a separate servo for each throttle, as well as individual servos for the nose gear, main retracts, elevator and drogue chute . . . for a total of ten. Assembling the wiring harness is one of the most difficult tasks in building the airframe, but by taking it a step at a time and labeling each lead, it really isn't hard. Choked leads or Ace "Noise Traps" are required on all leads over 12". My Kraft Signature worked perfectly in the F-4 installation, and I know that the J. R. radios work too. Some other radios seem to get the jitters on occasion, so a lot of care should be taken in the pre-flight checks to make sure everything is working well.

Each wing half was completed and



glassed (with the servos installed) before mating them to the fuselage. I have a small shop, and when the F-4 is together, it takes up a lot of room.

I utilized .06 oz. cloth on all surfaces, and an automotive primer. The finish was done with Hobby Pox and Polly S acrylic paints. An old D&B twin jet cockpit was modified to make the F-4's interior.

The kit will make all variants of the F-4 II except the long-nosed E model. I chose to duplicate Randy Cunningham's carrier-based J model. I selected the aircraft he used to splash Col. Tomb, N. Vietnam's leading ace. I like to research the crew and aircraft I model and recommend *To Kill MiGs*, by Lou Drendall. This book contains drawings and color renderings of all the Vietnam Aces' aircraft, along with some incredible narratives of their sorties. Knowing the crew's story

made finishing the airplane more pleasurable, and gave me the desire to make sure all the markings were in place, reflecting the airplane as it was on the day of its memorable dogfight.

One day, after months of work, the F-4 was finally done. It's difficult to describe my feelings when I looked at it ready to fly. It was so beautiful to me, and was I ever proud of it. I showed it off at every opportunity and it never failed to draw a crowd. Most of us in this hobby are not going to be national champions, no matter how hard we try. I can honestly say that building the F-4 and seeing it completed was emotionally rewarding, and it gave me greater personal satisfaction than anything else I have ever done. If it is successful in a contest, that would be the icing on an already rich cake.

I have not commented on flying

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or setting up the Phantom . . . that's Tom's job. I will say though, that despite its exotic appearance, the F-4 is a pussycat in the air. In my opinion, anyone contemplating the F-4 should spend a few extra bucks and get Tom's custom set-up on the engines and fan units. Tom modifies the carburetion then hand assembles and test runs each unit. I can't count the endless flying sessions we did with a variety of airplanes (including the F-4) testing various engine/carb combinations, trying for maximum engine performance and reliability. People just coming into the hobby can take today's totally reliable radios and exotic aircraft for granted. I can remember not so many years ago, that scale airplanes were the province of a select few crazies; and the success ratio was very low.

The two fans are easily accessible through the top hatch. The radio installation is stashed all around the airframe.

Rocketing off the runway, the Phantom proved itself capable of getting airborne in amazingly confined spaces. Next month's report gives a full flight evaluation.



Is the F-4 the ultimate airplane? There is nothing in the sky today that can fly with the Phantom. However, I did see a seven-foot exact-scale F-14 come blasting across the sky, while sweeping its wings from full extend to a delta configuration! It was the first prototype, and maybe I should start begging for parts . . . but that's a story for another day. Here's Tom and the inside story on what makes the F-4 tick.

* * *

There is one job in the world harder for me than bringing a new project to completion, and that's writing about it. Bear with me, and I'll try and make some sense out of all this.

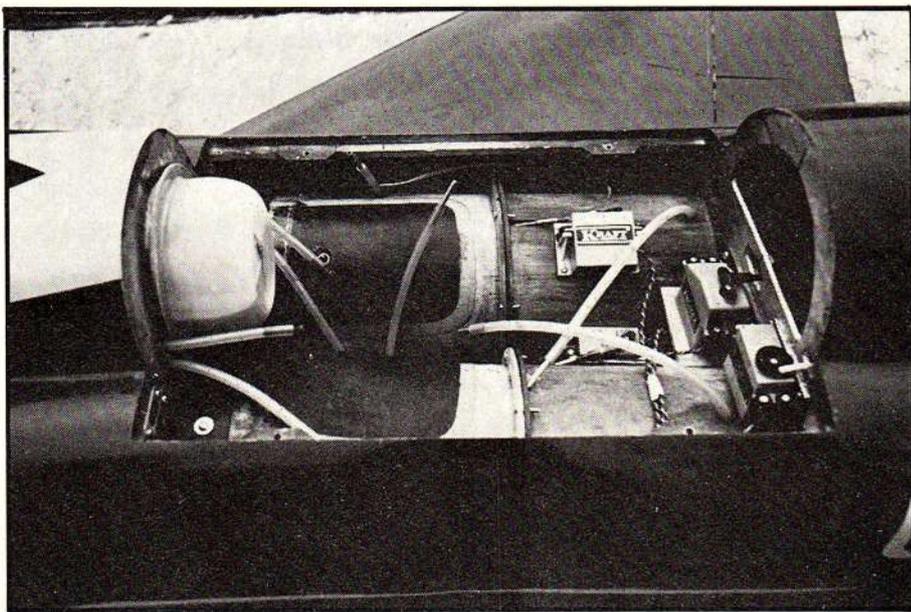
The Phantom was designed for one reason, and one reason only—to win the Scale Masters competition. I had proved to myself that big, twin-engine jets were practical with the Me 262, and I had a great deal of

feeling for the big ugly F-4 Phantom II. If you look at the contest circuit today, you will see that it takes more than a well done airplane to win. In spite of rules, luck and the like, trophies go to great airplanes, impeccably done and then consistently well flown. If you beat the likes of Kent Walters, Art Johnson, Don Lien, Bob Frey and all the rest of the great competitors today, it won't be with luck or a shoddy airplane. It isn't even enough to be a great flier. All elements have to be working perfectly to win.

My goals were threefold. One, to have an airframe that would static in the top five at any meet. Second, have a model with the dependability and ruggedness to make all six flights at the meet and, lastly, have a plane with the flying qualities that allow

method of propulsion demands scale-like smooth, open maneuvers. Items like the drogue chute, operating canopies (which I'll have modified this year) and other elements are not used as point options; but rather to enhance the realism of flight from taxi to touchdown.

The F-4 program was undertaken and prototype No. 1 was constructed. I would love to say it flew right off the boards and only minor transmitter trim changes were required. It wasn't to be. The first airplane had a C.G. problem (tail heavy), and the prototype leapt into the air, slowly lost momentum and stalled. The crash was encouraging though, because it showed me that I had the power to fly the airframe. The stall was straight ahead, indicating how stable the big bird really was.



me to best express whatever flying ability I have.

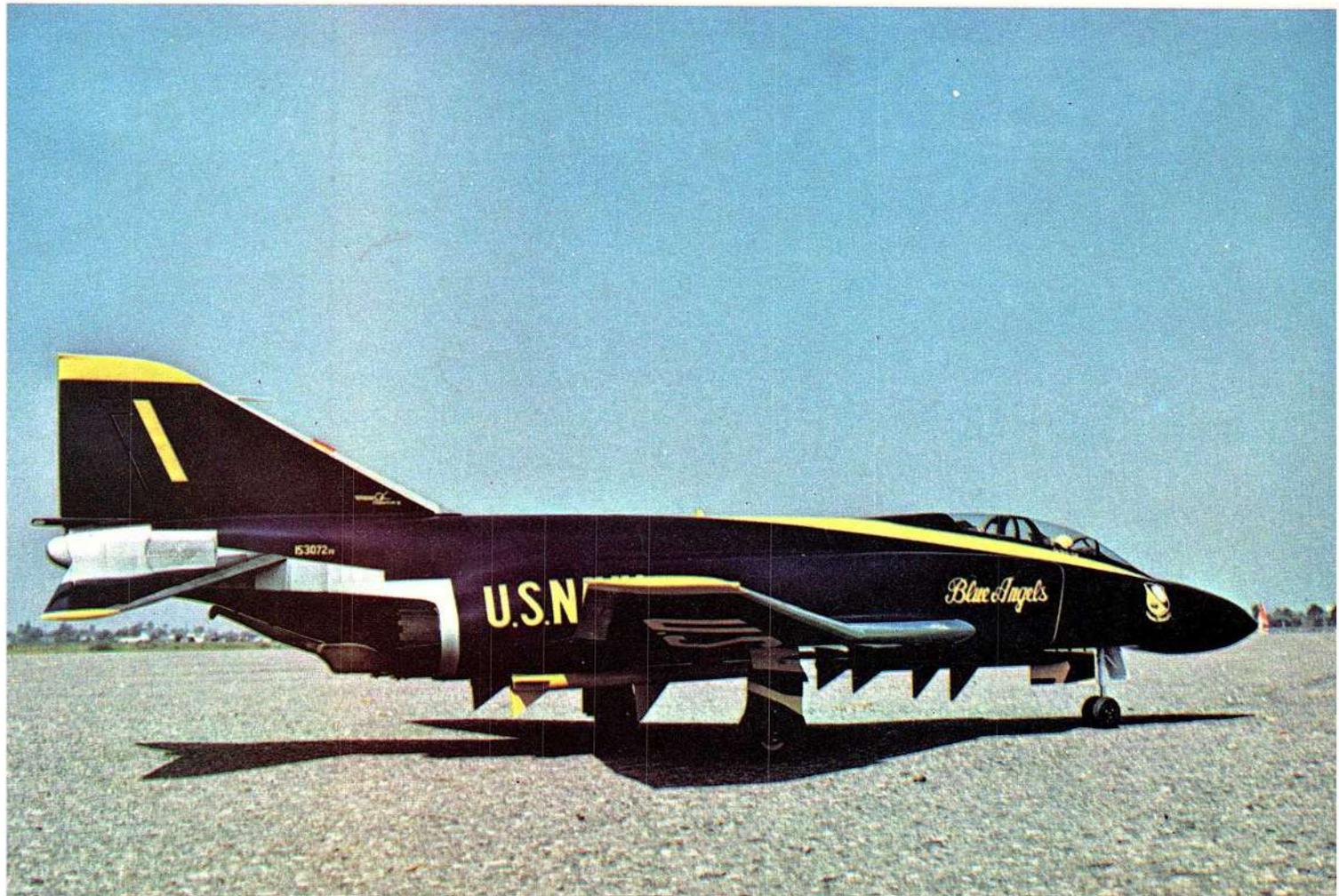
The Phantom has met and exceeded these requirements. The airplane, in spite of its exotic appearance, flies rock steady. It will fly better than I can fly it. Mistakes in the air are my mistakes, and not the airplane's. I think my greatest moment in modeling was a 98 point flight at the '81 Scale Masters. I'm not naive enough to believe I can score that well at every meet, but it does show what the F-4 is capable of.

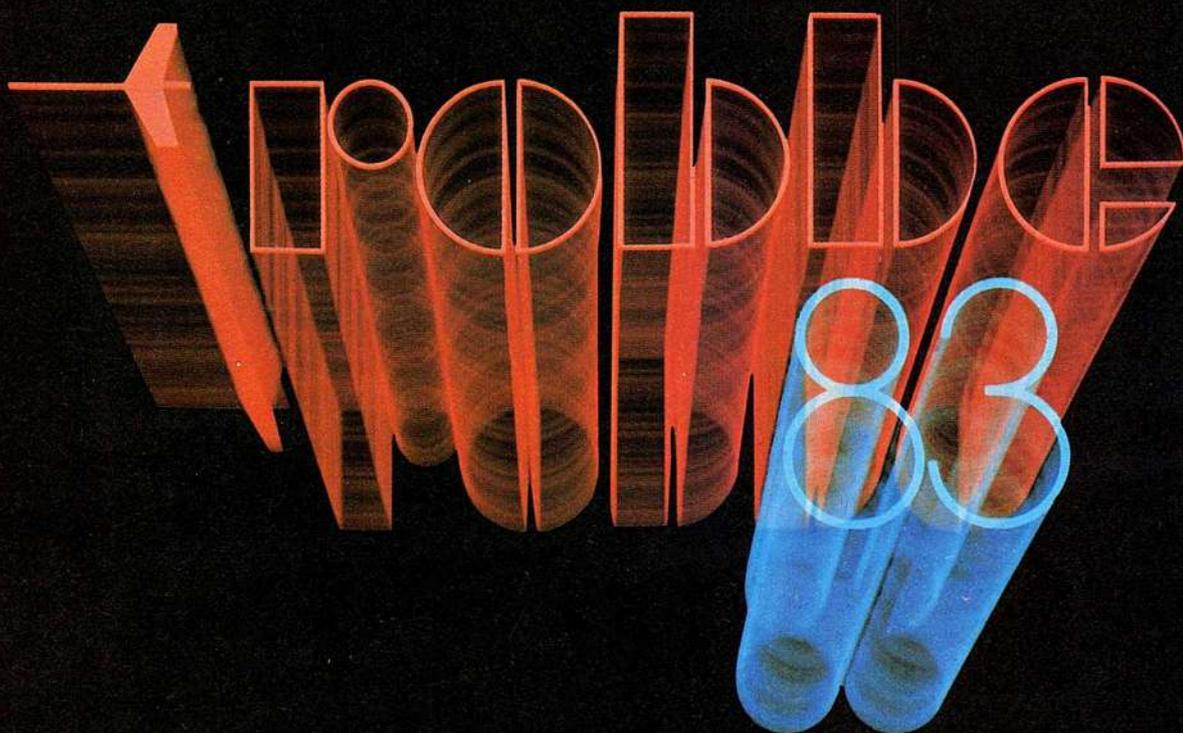
Realism in flight is the most important aspect of today's competitions. This is an area in which I think any jet can easily best the piston driven craft. We don't have an out of scale prop disc; and ducted fans sound more like real jets than model engines do in, say, a P-51 or Fw 190. Also scale speed is more easy to duplicate. You can't fly a model jet too fast, and the very

Unfortunately, you just can't add weight to the nose of a ducted fan powered airplane. Every part of the airframe must be analyzed for maximum strength at the lowest possible weight. This meant all the internal components had to be re-engineered. The engines were moved forward, the inlets and tailpipes redesigned and the radio installation modified. A new prototype was constructed and, six months after the first, number two Phantom took off. This time everything worked. The airplane was very steady and extremely stable. Flight tests convinced me we had a winner. The success of the second prototype gave me a much needed shot in the arm to proceed with the project.

I had originally flown the Phantom without cheater holes, and I felt that takeoff performance could be improved by adding small "cheat-

(Continued on page 78)





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GIANT-SCALE FOKKER TRIPLANE

Photos by David Schneider

Fokker DR.I in a size just right for a chainsaw engine. Lots of wings!

By Larry Bissonette and Jack Capen

As I cleaned up the Big Mack and the D-VII (August '80 *Scale R/C Modeler*) after the last flight of the Fall, I turned my attention to the problem which had been bugging me for the last couple of weeks: What to build this Winter? After disposing of a couple of contract jobs that were keeping me from my workbench, I was ready to go. I had a clean table, fresh glue and plenty of ambition . . . but nothing to build. Because of my ambition, I decided to start a project from scratch. Then I hit upon the Fokker DR.I triplane. Why not? Jack Capen and I had been wanting to do one

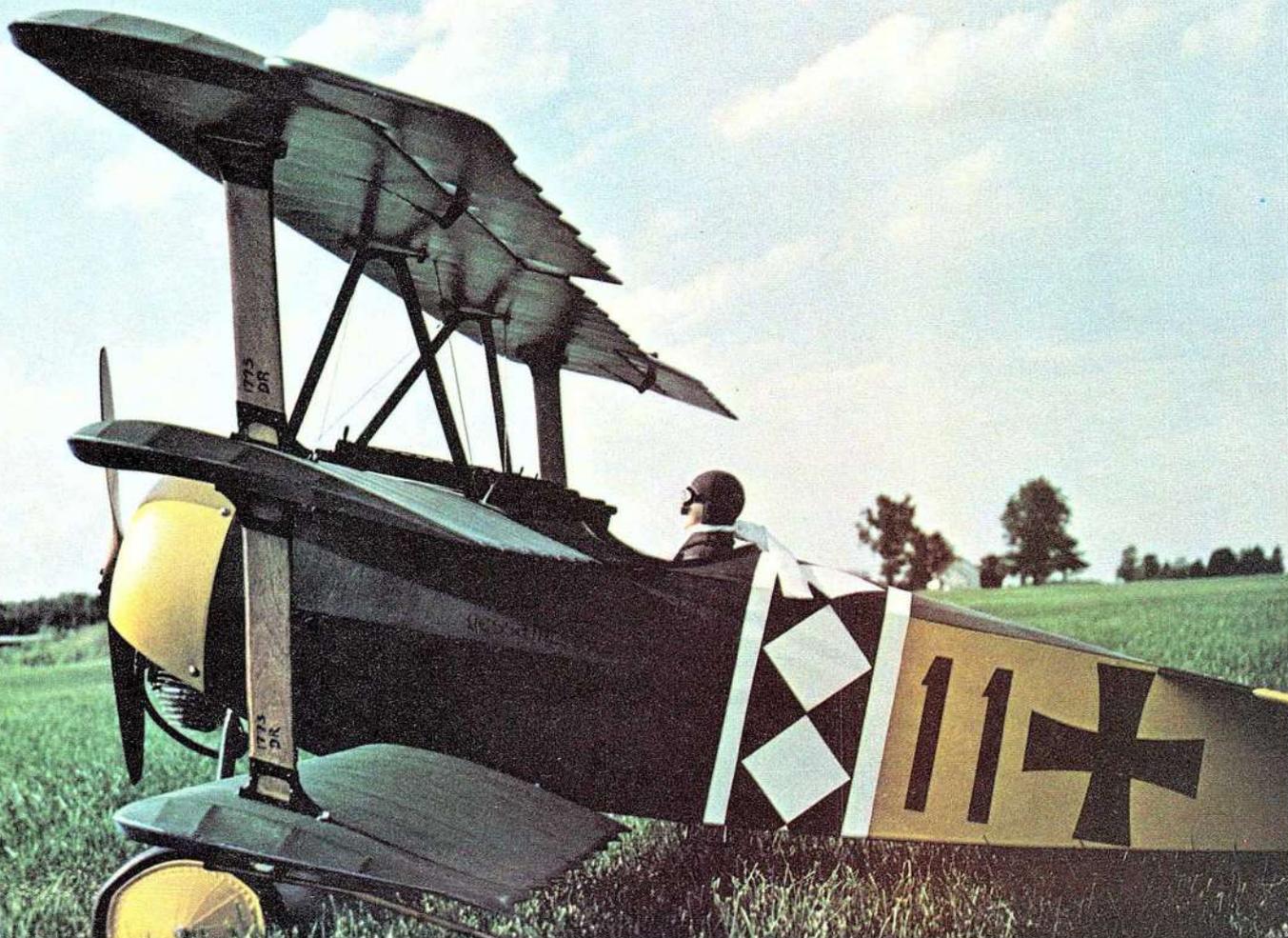
for some years now, but hadn't got around to it. What's another wing anyway? Well, about 600 sq. inches, actually, and quite a bit of rib cutting, but we were not to be deterred.

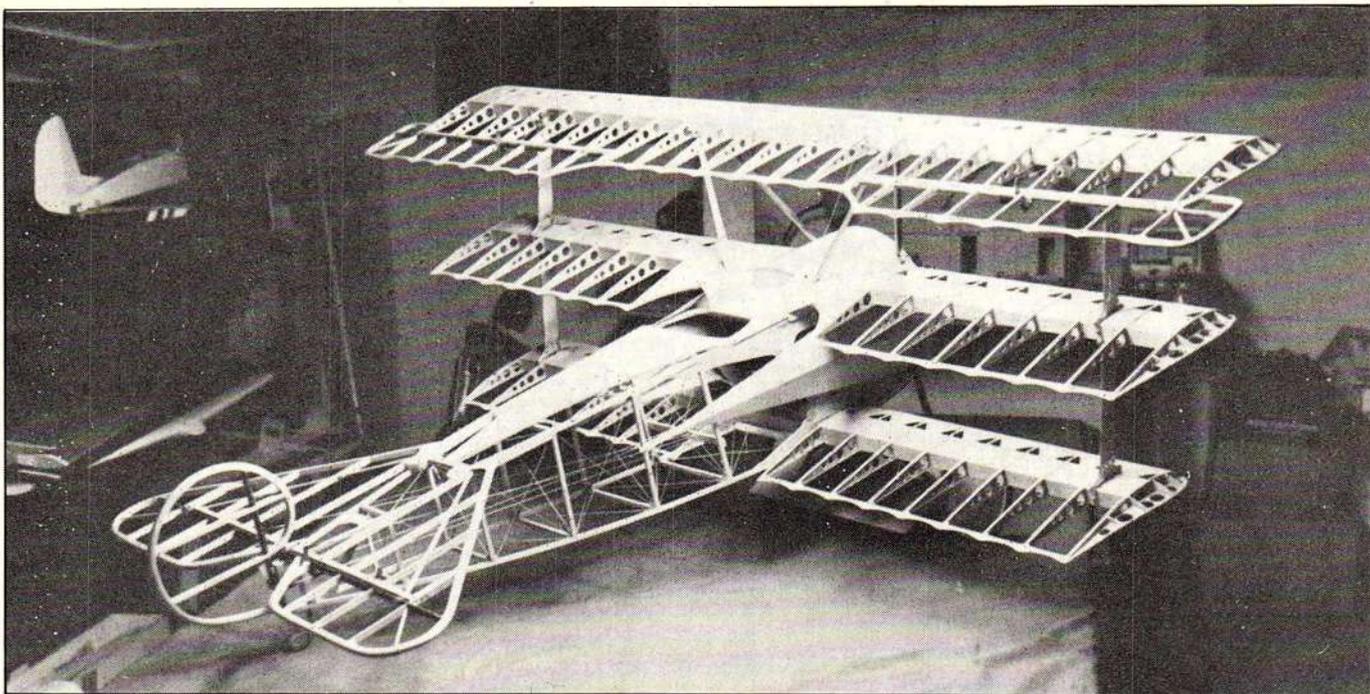
The DR.I was Germany's answer to Britain's very successful Sopwith Triplane. The Sopwith spurred the German High Command to urge the German aircraft manufacturers to build prototypes with three, instead of two, wings to counteract the British threat. The specifications called for the necessary wing area to be in three wings instead of two and, to have bunches of maneuverability and climbing ability.

Tony Fokker gave the job to Reinhard Platz, who came up with a smallish airplane with three thick wings and no struts or bracing. Vibration in the wings caused the manufacturer to install lightweight interplane ties, and to balance and brace the tailplane.

The first three production aircraft were designated F-1, after that models were called DR.I for *Dreidecker* (German for Triplane).

In August of 1917, the first two triplanes were given to Von Richthofen and Werner Voss, who promptly flew rings around their Allied competition. Although lacking in speed and range, the triplane's superb agility and climbing ability more than made up for its faults. It could climb at almost twice the rate of the Allied types, as well as out turn them. Tony Fokker was said to remark that the DR.I was





The uncovered structure is a thing of beauty. Mostly basswood and other hardwoods, are used, with very little expensive balsa.

slow, but Allied pilots would never have a chance to find out because of its maneuverability.

Size-wise the DR.I was quite small, only 200 sq. ft. of wing area, even with three wings. It also was a lightweight, at 1,200 lbs. in an era of 2,000 lb. fighters.

As a quarter-scale project, we come up with 1,820 sq. in. of wing area (including the subwing between the wheels) and a weight of 18 lbs., ready to fly (17 lbs., 10 oz. for the prototype, with Pro-line 15 III servos and 1000 Mah battery pack).

While on the subject of weight, we would like to interject a little Biz Cap Plan Service philosophy here. Make them not too heavy, not too light. This is a fairly simple formula to follow and really helps in building a successful airplane. Too light, especially with a model powered by a chainsaw engine and you have a fragile floater easily affected by the wind. Too heavy, and you have a monster which barely staggers around the sky at full throttle, and which glides like the proverbial brick.

We could have built the triplane lighter by using balsa but we feel that, although balsa is fine for smaller models, it does not have the structural strength for this type of aircraft. We could have built it a lot heavier, but we knew this would definitely not help its flying characteristics.

The basic structure of our model

is white basswood strip stock. The formers and ribs are of $\frac{1}{4}$ " and $\frac{1}{8}$ " mahogany plywood, with $\frac{1}{32}$ " birch plywood for the sheeting and capstrips. This results in a strong lightweight airframe, capable of withstanding the vibration level of a chainsaw engine and landing shocks of this size model over a long period of time. The plans were scaled up to exact quarter-scale from Joseph Nieto's drawings of the original. The only deviation is a half inch increase to the chord of the cowl, to accommodate the Quadra engine.

The fuselage is $\frac{1}{4}$ " sq. basswood with $\frac{1}{4}$ " luan ply used for the forward sides. All bracing aft of the cockpit area is No. 1 picture hanging cable, available in hardware stores or frame shops. $\frac{1}{64}$ " ply gussets were used to add overall strength. The $\frac{1}{2}$ " thick firewall is recessed 1" behind the cowl line, to hold the engine mount and muffler of the Quadra.

The entire upper fuselage section, from the cowl line to the cockpit (including middle wing, cabane struts, top wing, aileron servo and cables) is removable in one piece using only three 6-32 bolts. This feature was borrowed from VK's excellent kit. All fuselage sheeting is $\frac{1}{32}$ " birch ply.

The landing gear is formed from $\frac{3}{16}$ " wire. The legs and spreader bars are silver brazed to $\frac{1}{16}$ " steel plate ends. The axle is $\frac{7}{32}$ " wire. The sub-wing axle is built onto the basic wire gear assembly, leaving a cutout in the bottom and the end ribs to facilitate installing the axle shock cords. The tail skid is $\frac{1}{4}$ " maple, hinged as shown on the plans,

and sprung with a loop of $\frac{1}{8}$ " diameter shock cord. Locate the servos, battery pack, receiver and fuel tank forward, as shown. This puts the weight forward and leaves the cockpit area free to put in a full interior.

The outlines of the stab, rudder and aileron tips are laminated from $\frac{3}{8} \times \frac{1}{16}$ " basswood. Soak the pieces in hot water for 15 minutes, then glue together with Titebond. Pin in place over the plans and allow to dry overnight.

The leading edges of the elevator, rudder and ailerons are $\frac{3}{8}$ " O.D. carbon/glass arrowshafts (Graf Flex No. 7). This material is strong, lightweight and allows for the use of scale hinges made of $\frac{3}{8}$ " I.D. brass tube stock and .016" galvanized tin. Remember to slip short pieces of tube onto the arrowshafts before gluing the ribs. Super-T instant glue works great for gluing wood to arrowshaft material, followed by a small fillet of epoxy.

We used Proctor control horns on all surfaces, and used $\frac{3}{64}$ " Mac-white aircraft grade 7x7 cable with Du-bro threaded couplers and clevises for the hookup chores. The elevators have four cables. Simply tie both up and both down cables together and fasten to each side of the servo arm. The finished stab is bolted to the fuselage with 4-40 bolts and blind nuts.

The wings are pretty straightforward and easy to construct. There are just a lot of them to build. They are one-piece structures, with the spars of the lower and middle wing passing through the fuselage. There is no dihedral, so build the wings

flat on your building surface. Shim up the lower $\frac{1}{4}$ " square spars $\frac{3}{16}$ " to allow for the under-camber of the ribs and shim the rear tip of each rib at the trailing edge to allow for the $\frac{1}{32}$ " capstrip.

The double box spar of the original is duplicated by sheeting in all four sides of the $\frac{1}{4}$ " square spars with $\frac{1}{32}$ " ply. This is time consuming but worth the effort, as it results in a lightweight and tremendously strong wing.

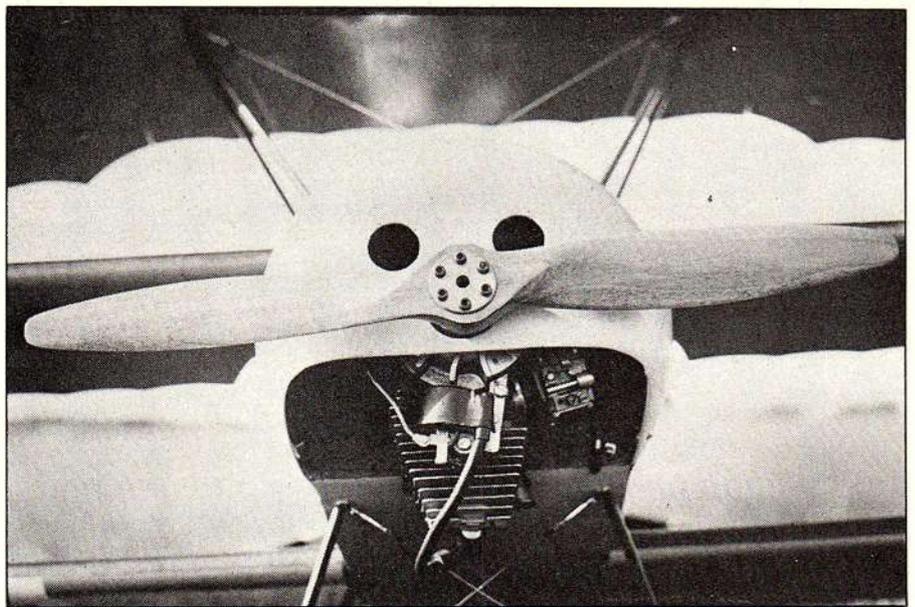
The leading edge sheeting is $\frac{1}{32}$ " ply, put on in one piece. Soak a piece of ply cut to the approximate size in hot water, wrap it around the leading edge and pin it in place. Let it dry overnight and it will hold its shape. After it is dry, trim it to fit, cut out rib locations and glue it in place.

Make sure you remember the holes in ribs, because not only are they scale but they reduce the overall weight of the ribs by 40 percent.

The aileron control system uses $\frac{3}{64}$ " cable with C. B. Associates pulleys outboard, and Proctor pulleys at the cabane location. The cables from the bottom side of each horn pass down through the fuselage, to the aileron servo. The cable from the top of the horns simply dead heads across, from one side to the other. On the prototype, we used a coil spring in the center of this cable to take up any slack in the system. This is probably not a necessary item.

The incidence settings on the pro-

The DR.1 has plenty of appeal. As a performer, it's not as bad as you think it might be.



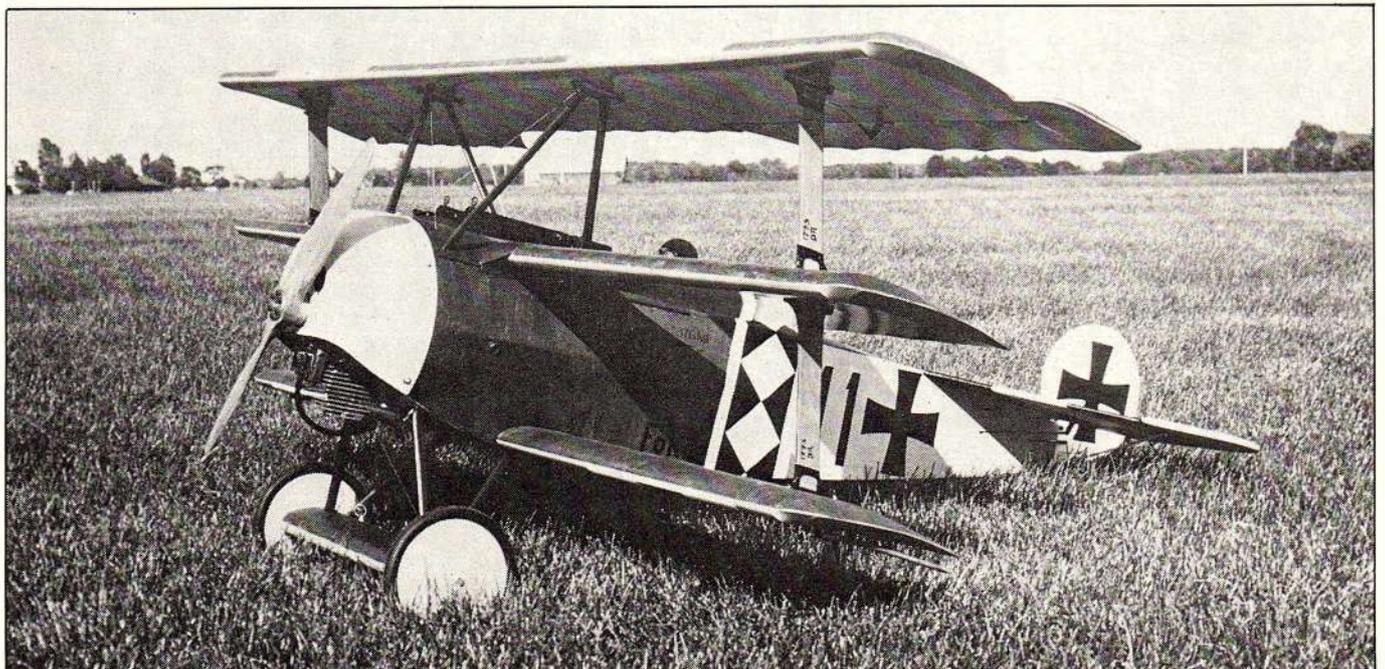
The Quadra really hangs out from under the cowl, but no engine could be totally hidden inside the partial cowl.

toype were the same as the original, $+1\frac{1}{2}$ degrees on the lower and middle wing, with $+2$ degrees on the upper wing, and $+5$ degrees for the stab. There were no thrust offsets. The initial test flights required more down trim and some down thrust, therefore we recommend cutting down on the wing incidence by one degree in each wing, rather than going to down thrust. A scale model looks rather silly with its prop sticking out at a non-scale angle.

To attach the wings to the fuselage, start with the center wing and glue it to the F-2 part of the fuselage. After checking the incidence setting, shim under the spar if necessary. Then attach the finished interplane ties to the top and bottom of the middle wing. Bolt on the lower wing and center it in the cutout in

the bottom of the fuselage. Drill through the main spar (which is filled in with pieces of $\frac{1}{4}$ " birch ply at all attachment points) and bolt it to the fuselage with $\frac{1}{4}$ -20 nylon bolts. Bolt the top wing to the ties then center up and fit the steel tube cabane assemblies by finishing the ends where they bolt to the F-2 part of the fuselage. By the way, 4-40 bolts ($2\frac{1}{2}$ " long) are hard to find so we used 10 penny finishing nails threaded on one end and 4-40 aircraft nuts for the interplane ties.

The forward top fuselage cowl is made in three pieces from $\frac{1}{32}$ " ply. The patterns are shown on the

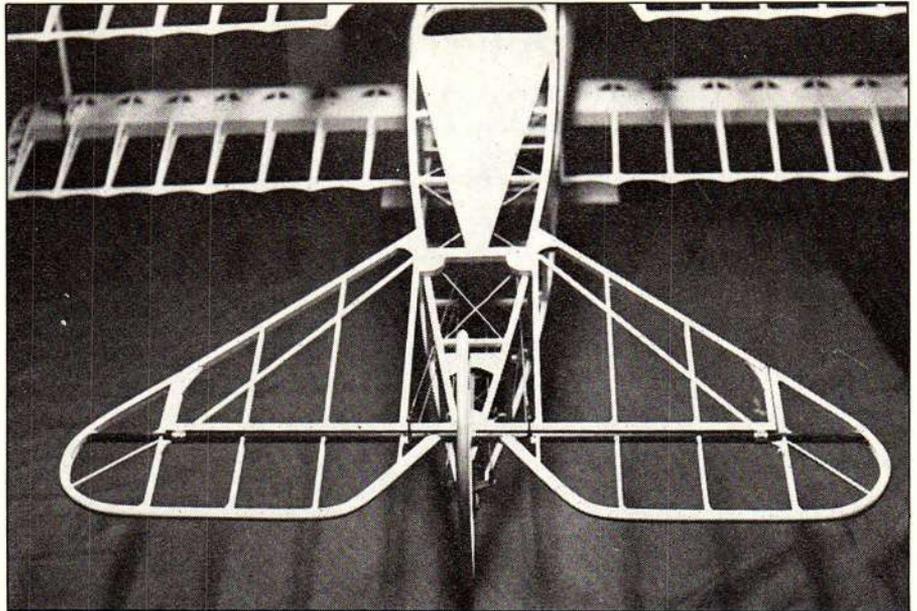


plans. Cut a heavy paper pattern first, then fit it to your model and then cut the ply. Flare in the joints over the wing with Epox-o-lite and sand smooth. You want the finished cowling to look like it was hammered out from one piece of aluminum, as on the original. An epoxy/glass cowl is available from T&D Fiberglass. This is an excellent choice and Tom Keeling does very nice work.

Our model was covered with Super Coverite in antique fabric color, followed by two coats of nitrate clear dope, plus one butyrate. Then apply the color.

The original triplane had a factory finish which was a light blue undersurface, and a noticeable streaked olive green on the sides and top surfaces. The metal cowl and cabane struts were the same shade of olive green done in enamel. The interplane ties were dark varnished wood, with the metal ends painted flat black. The streaked green upper surfaces were given a final coat of orange shellac, which resulted in a faint yellow-brown streak where the green was thin.

We used butyrate dope color coats on the model. The light blue was no problem. For the top, we mixed olive drab and forest green in a 50/50



The empennage shows the functional control cables for the elevators and rudder. Easy to do, and it helps the servos.

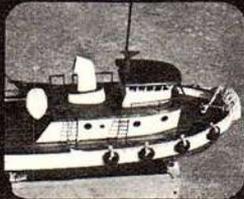
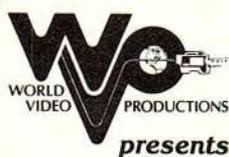
mixture, then cut that 50 percent with clear dope.

We applied the mixture with even strokes and a very coarse brush. Then a final coat of Hobby Poxy clear (with a little orange added) and a flat hardener was applied.

The national markings on the model are Maltese Crosses on white fields and a white rudder. The serial numbers and lettering were done with India ink and a drafting pen.

Be sure and give them a coat of the flat clear mix when the ink dries.

Our finished model balanced slightly nose heavy at the C.G. shown with no additional nose weight. We finally had to stop admiring our work (we ran out of beer) and fly the thing.



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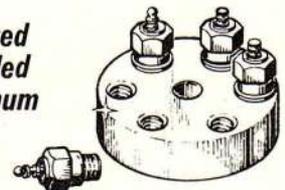
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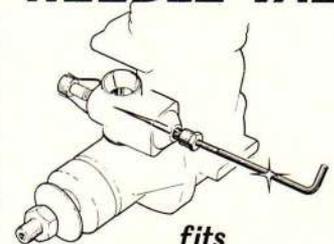
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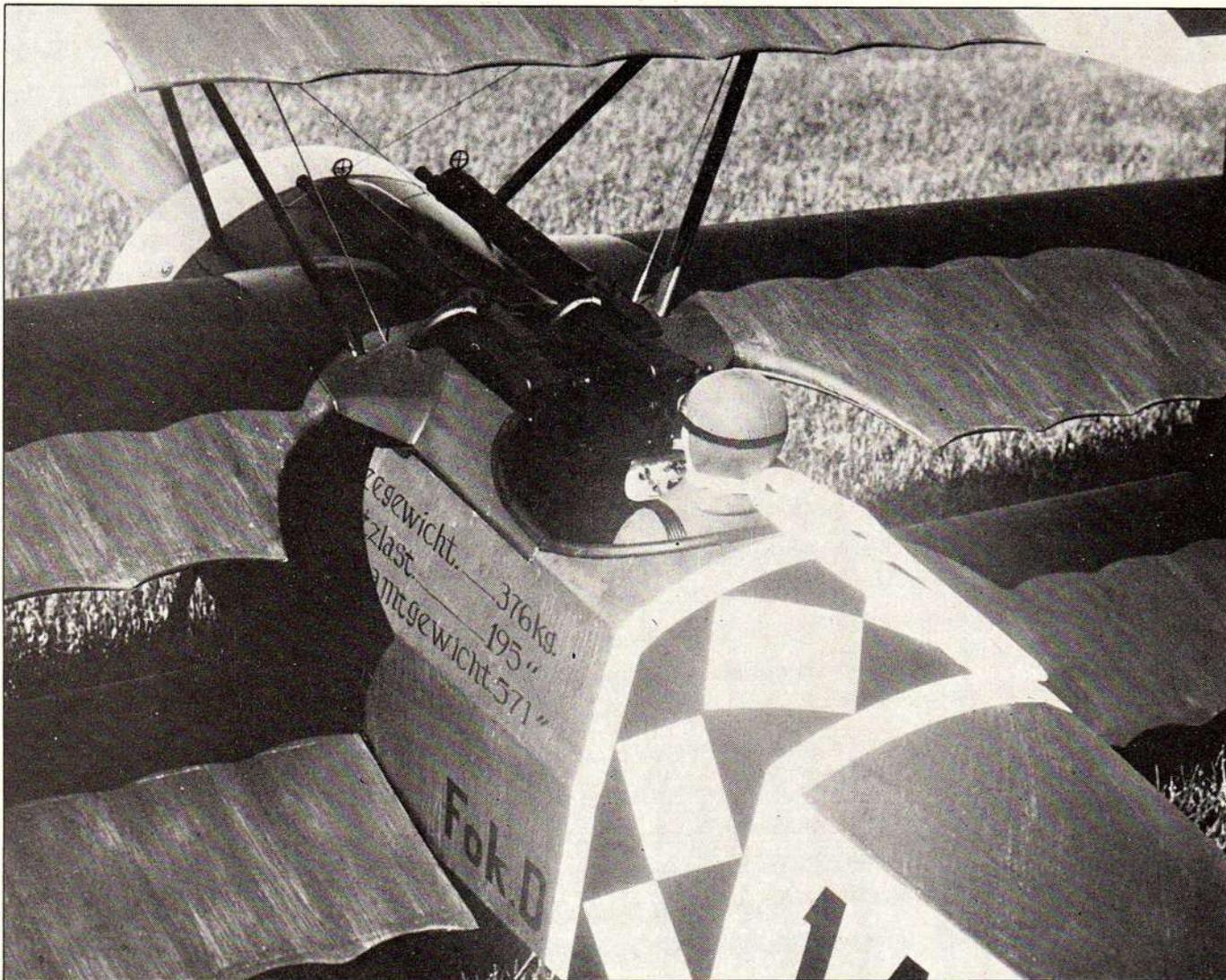


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Dick Watz, Biz Cap's test pilot, did his usual super job on the test flights, and found that we needed a little less elevator travel (it's quite sensitive) and a little down trim. He also suggested that we lock the wheels to the axle and let the axle turn in brass tube bushings under the shockcords (which we did) to help straighten out the takeoff roll (which it did). The scale size rudder has no directional control with the tail down (three-point attitude). Something I have noticed with the full-size replica builders of today is that they make the rudder about 20 percent larger and use a steerable tailskid with a small wheel at the bottom, instead of a shoe. Now I know the reason for this.

Back to the test flight. Jack and I met Dick and Dave Schneider, the cameraman, at the Saginaw Valley Sod Farm.

Dick loves a challenge and, of course, couldn't wait to fly the triplane. After adjusting the Quadra

to its peak, we were ready. Of course, any scale builder knows there is nothing like a first flight to get the blood moving . . . and this was no exception. After a somewhat zig-zag and very short takeoff roll, the triplane was up and right back down so we could make adjustments to the elevator (too sensitive).

After a few more flights and more adjustments, we found that the triplane flies very scale-like. With a power to weight ratio of 1-to-1 can do any maneuver the original could, very quickly. It is a real rudder airplane, even with those large ailerons. Some rudder is required to make a good turn.

Takeoffs are best accomplished with a slow throttle advance, to prevent torque from turning the airplane. Landings are best when a wheel landing technique is used . . . don't try to three-point it.

The particular paint scheme we used was on the cover of *American Aircraft Modeler* March, 1968 issue.

It was a color three-view by Bjorn Karlstrom. The new book from Squadron/Signal Publications, *Flying Colors* has some excellent DR.I color plates. The various Williams Brothers accessories such as wheels, Spandua guns and pilot were used on our model, and they are in perfect scale.

Overall, the triplane is a fun building project (especially if you like wings) and very impressive at the local flying field or giant scale contest.

Full-size plans (including three-view drawings of the original and construction photos) are available from:

Biz Cap Plans Service
4777 South Iva Rd.
Merrill, MI 48637

Price is \$25.00 (postpaid) shipped in a mailing tube. Finished landing gear assemblies and steel tube cabins (all silver brazed) can be furnished along with basswood stock. Write for price list. □



Aviation Album

This section of *Scale R/C Modeler* is dedicated to you, the talented craftsmen who build those beautiful scale ships. You are invited to submit photos of your latest project for publication. Here is an opportunity to show the world your skills, and to allow those who most appreciate the time and effort involved in executing a scale subject to see that you have met the challenge.

Photos must be either black-and-whites, or color slides (no Polaroids). Please send relevant information and statistics about the model. We'll pay \$5 per photo published. Send your best shots to: "Aviation Album," *Scale R/C Modeler*, 7950 Deering Avenue, Canoga Park, California 91304.

Mick Reeves (England) sent a great shot of his world-class Spitfire. Mick won Precision Scale at the World Championships last year.



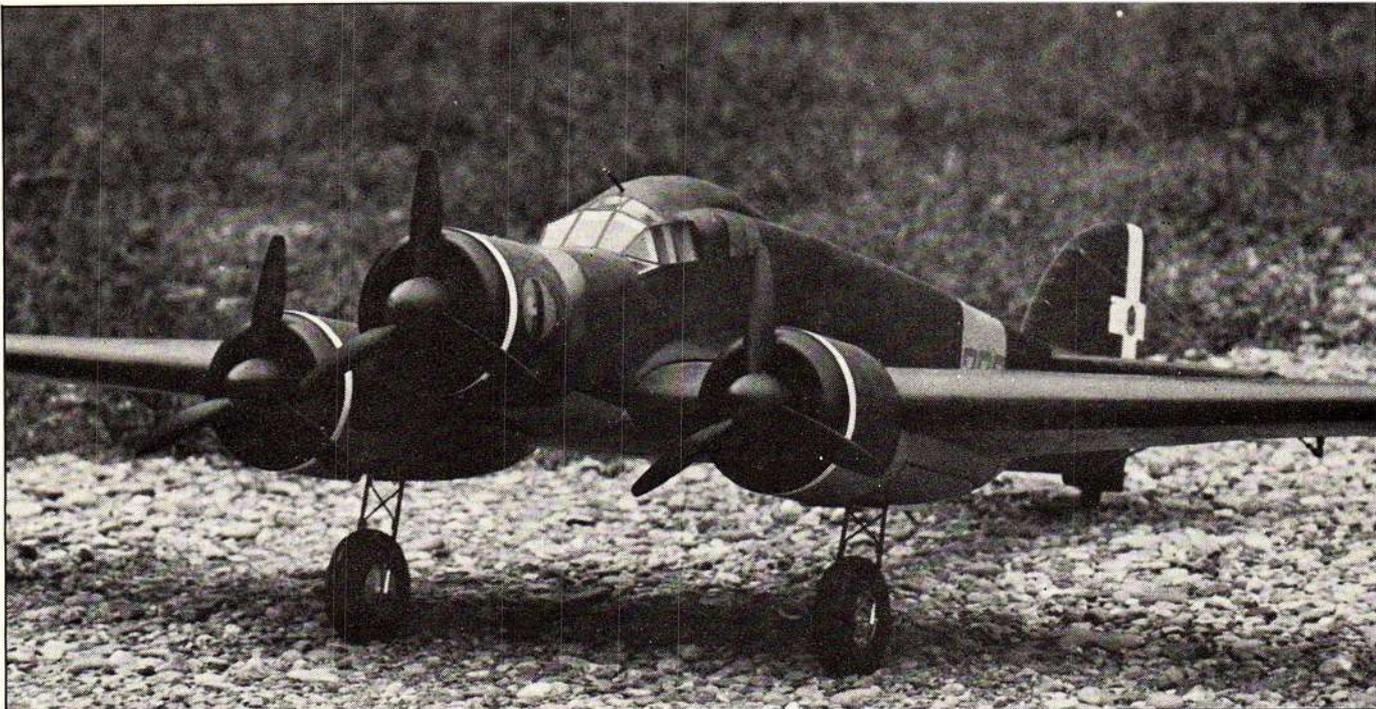
Doug Lillesue (Minnesota) built this model of his dad's full-size Cessna 140. Doug just turned 15 when he completed the model, and the plane is scratchbuilt!



Scratchbuilt Nieuport 17 by Irwin Weintraub (Passaic, NJ). Believe it or not, it's Monokote covered and the insignia are hand painted.

SBD-3 Dauntless took 16 months for Gary Forshey (Pennsylvania) to build. The model is from his own drawings.





Savoia Marchetti "Gobbo Maledetto," by Massimo Zuffi (Bologna, Italy) has a span of 71", and uses only one Super-Tigre .60 for power, the outboard props being dummies.



Bud Debroeck's (Virginia) SB2C-4 Helldiver is from the plans, with operational wing racks and bomb bay, among other features. The 75" model weighs 13¾ lbs.



Me. R. LeGuennou (France) built this Caudron 714 C.1. The 53½" span model uses only a .25 for power!

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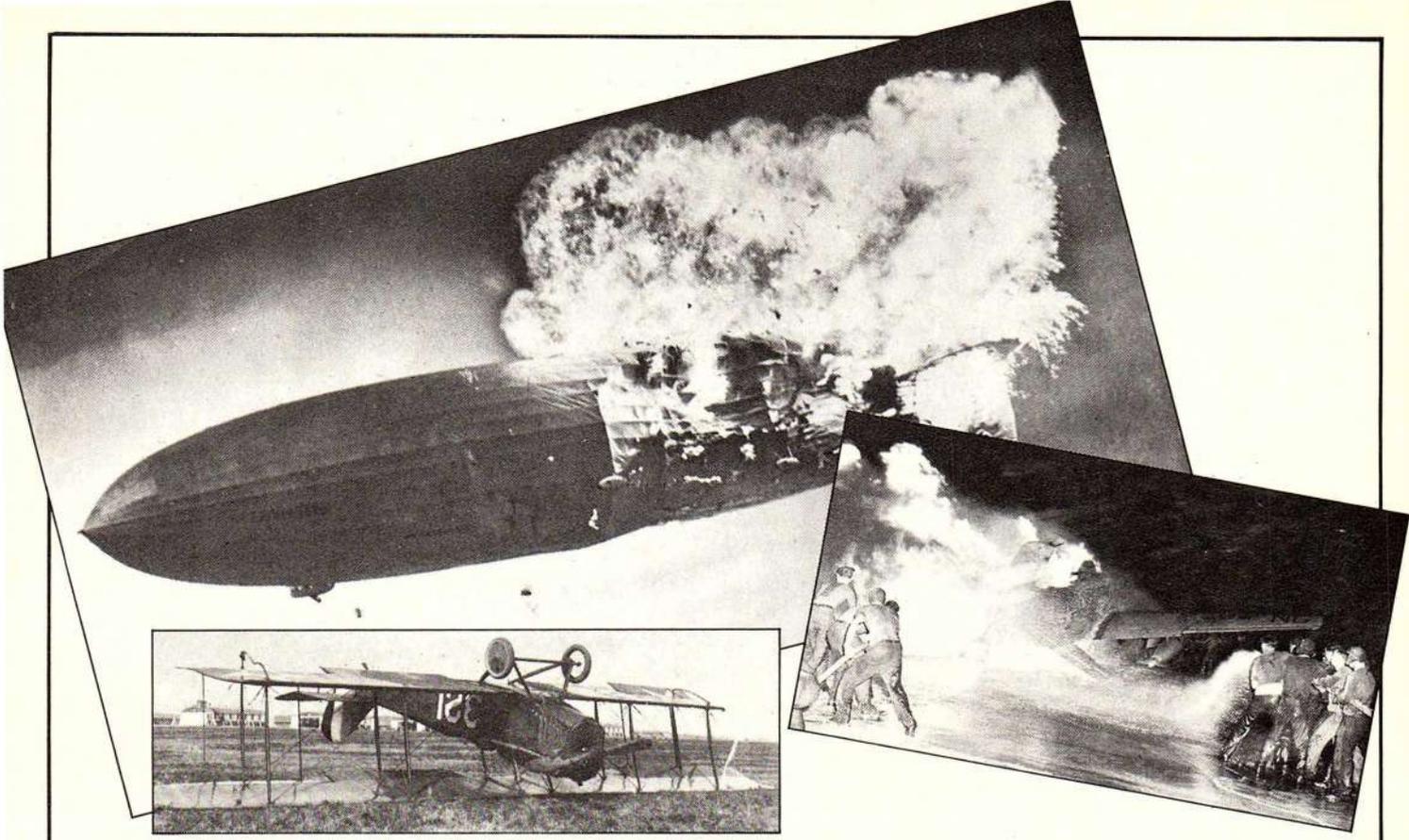
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Maybe it's not the sexiest model in the world, but it's just boxy enough to be kind of pretty.

The airplane serves a major role today in bringing higher yields to agricultural production. Ag planes have always had a certain appeal to modelers, perhaps because they don't look like any other type of craft. They tend to be ungainly, like the Wilga, Ag Cat, Pawnee, etc. They have big wings, to give a safety margin even when their hoppers are heavily laden. They often are excessively powered, so that the pilot can extricate himself from a tight corner just by pulling the nose up.

Ag planes don't do exciting jobs. They aren't as glorious as the fighters. They spread fertilizer, sow seeds, and spray insecticides. They are designed for such tasks, here in Czechoslovakia, just as in the United States. We have the Z-37 Cmelak "Bumble Bee." It is nothing pretty, but what great lines and moment arms for a scale model.

The L-60 Brigadier had been the old standby for agricultural purposes in this country, but it had never

Czechoslovakian Bumble Bee

From Czechoslovakia comes this unique ag plane for a .40.

By Pavel Bosak

Photos by the author

been designed for spraying and dusting. It was decided that a special plane would be desirable, so the Z-37 was started. By the end of 1961, the drawings were approved and test flying was completed in June, 1963. The Bumble Bee is a low-wing monoplane, with fixed gear, very much in the tradition of most ag planes. The wings have corrugated surfaces, as does the stab, to help distribute the stresses.

Ag planes are amazing to watch. They swoop in low over the tree

tops, then almost seem to plummet down to ground level just as they clear the phone lines. The throttle is reduced, so that the plane can allow the fertilizer or seeds to spread properly. The pilot must hold a precise heading just feet above the ground, without any deviations or overlapping passes. It is the most skilled kind of flying, because it is done so low that there is no margin for error. As the plane reaches the end of the field, the pilot must judge his exit perfectly. Pull up too soon

and the crops along the perimeter don't get treated . . . pull up too late, and. . . !

I have had the opportunity to watch these ag planes at work, and they are marvelous. They look as if they will hit a tree, but the wheels just clear it at the last moment. They are so low that they disappear for a second as they follow the contour of a ravine. What nerves and coordination this must take!

The Bumble Bee was so exciting to watch, as it darted around spreading its pollen over the fields, so true to its name, that I decided to build a model of it. The lines of the plane are very basic, with a squarish wing planform and a fuselage that has almost no round areas. The round cowl looks as if it was stolen from the Wilga.

In designing the model, I made a few concessions to true scale, not because they were necessary, but rather because I was planning this as a fun weekend flier. I had no desire to use the plane in competition. I'd recommend checking my drawings carefully against the three-views if you wish to compete with the model. Often, the Czechoslovakian Embassy can assist in getting photos and other information for such projects.

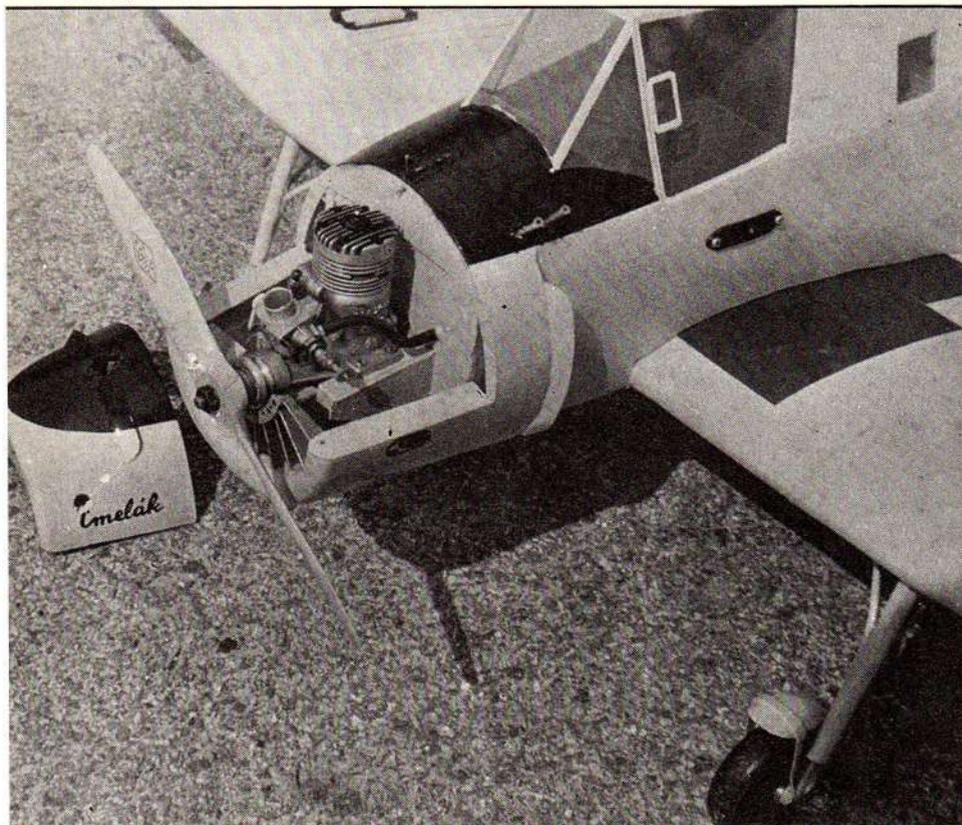
I designed the model for a .40 engine. It would make a tremendous quarter-scale project, but I needed something a little more transportable. After flying the model, I would have to admit that even a .19 could probably get it around the sky. That big wing makes it almost like a powered sailplane . . . it's a floater.

The plans for the Bumble Bee are available from R/C Sweitzer Enterprises, P.O. Box 834, Hillsboro, OR 97123. The plans sell for \$16.50, and they include a materials list and three-view. Add \$4.00 for Air Mail, and throw in an extra dollar if you want the plans rolled. A fiberglass cowl and wheel fenders are also available for \$16.00. If you order the plans and glass parts as a set, it's only \$30.00 (add \$4.00 for Air Mail). Foreign orders add \$12.00. The construction shouldn't pose any problems for anyone with basic scratchbuilding skills. The wing is built in three sections, a center piece, and then the tip sections. The airfoil is the Clark Y, so the entire wing can be built flat on the boards.

Ribs W-1 through W-4 are identical, except for the location of the landing gear reinforcing block cut-outs. Ribs W-5 through W-14 can be done by the stacking method, using the two ribs shown on the plans as



That fuselage looks as if it were designed by someone who didn't think that airplanes had anything to do with aerodynamics.



The entire nose cowl doesn't remove, but rather access is through a partial cowl.

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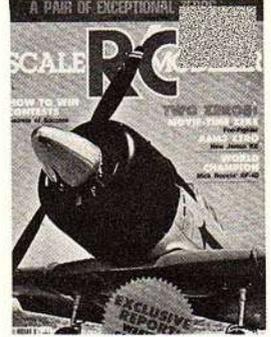
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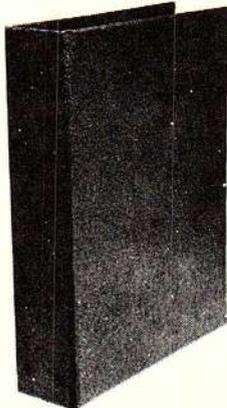


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There's lots of wing area there, and the leading edge slats at the tips insure positive stability.

I'd recommend doing as much of the radio installation as possible at this time, for convenience. I have designed the engine area for beam mounts. You may wish to merely put in a solid firewall and bolt a commercial radial engine mount to it.

Note that the top part of the fuselage ahead of the cockpit is planked with strip stock. The entire cowl is built as an integral part of the fuselage and, only after it is formed and sanded, is a section removed to allow access to the engine. If you desire, a fiberglass cowl could be fabricated, and the whole assembly made removable. Note that the removable piece is lined along the edges with 1/32" ply, to give a clean line at the separation point. The engine cooling louvers are just like those on the Wilga. These must be made to remove with the moveable part of the cowl. This detail is not shown on the plans because I opted to leave the front of the cowl open, since this was to be only a weekend model.

64 scale r/c modeler

The remainder of the model is very basic. The empennage is built from 3/16" balsa frame materials, with 1/8" sheeting on the fin and rudder, and 3/32" sheeting on the stab. You'll note that the canopy is made from flat pieces of celluloid or butyrate, so that there is no need for a molded canopy.

In this country, we use tissue still for covering our models. You will probably want to use either an iron-on fabric, like Coverite, or glass cloth. The corrugated flutes on the wing and stab are strips of balsa. They will have to be attached after the covering is in place. I suggest sealing and sanding them as a long piece before gluing them onto the model. Another idea would be to use strips of ABS or styrene plastic. You won't be able to do much sanding after these are in place, so do them right before the color coats are applied. Note that they are of two thicknesses.

The little items of scale detailing are left to your imagination. I made the oil cooler from a piece of balsa, and the exhaust stacks are paper tubes. The exhaust tubes should be used functionally, to let all the oil drain out of the cowl . . . the total

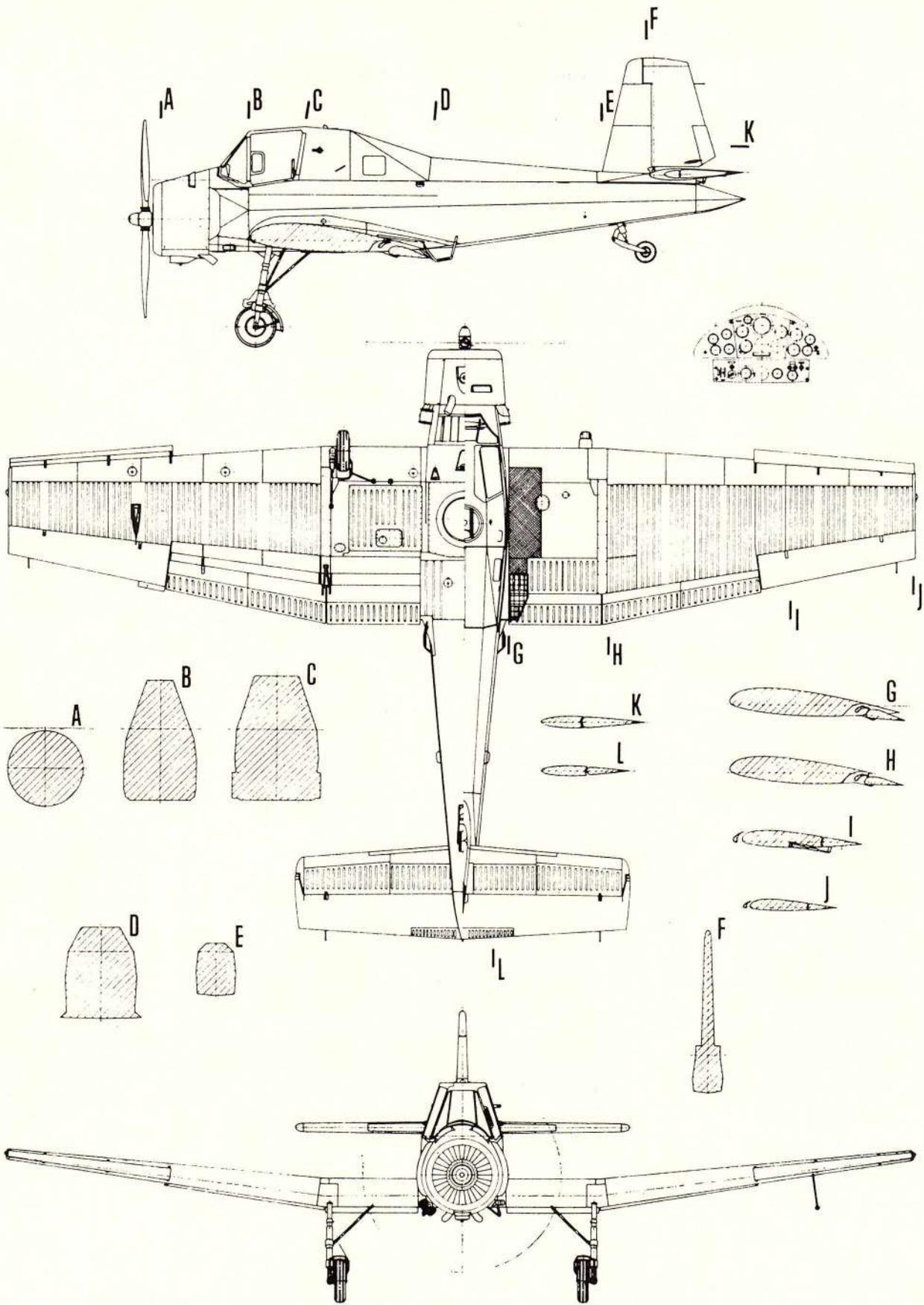
cowl is not removable, remember. A small plywood circle on the fuse top represents the chemical hopper filler cap. The mud guards on the wheels are fashioned from soft copper and soldered to the gear legs. I guess, if you really got carried away, you could even make the hopper functional and drop baby powder.

Most of the Bumble Bees are orange, with some combination of yellow and red, or cream and red. The original prototype was gray, with a very pale green on the wings, fin and stab, cowl and cockpit. These aren't the only possible color combinations, of course.

The C.G. shown will give the best performance. The model has plenty of stab area, so a slightly aft Center of Gravity will not cause too many problems, but I suggest starting with a properly balanced model.

The one disadvantage of the Z-37 is that it has a lot of frontal area. Don't expect it to stretch the glide very far after the engine quits. Of course, all the drag also helps, by making it fly slower when the prop is turning.

The flaps really do a job, so practice with them at altitude. They



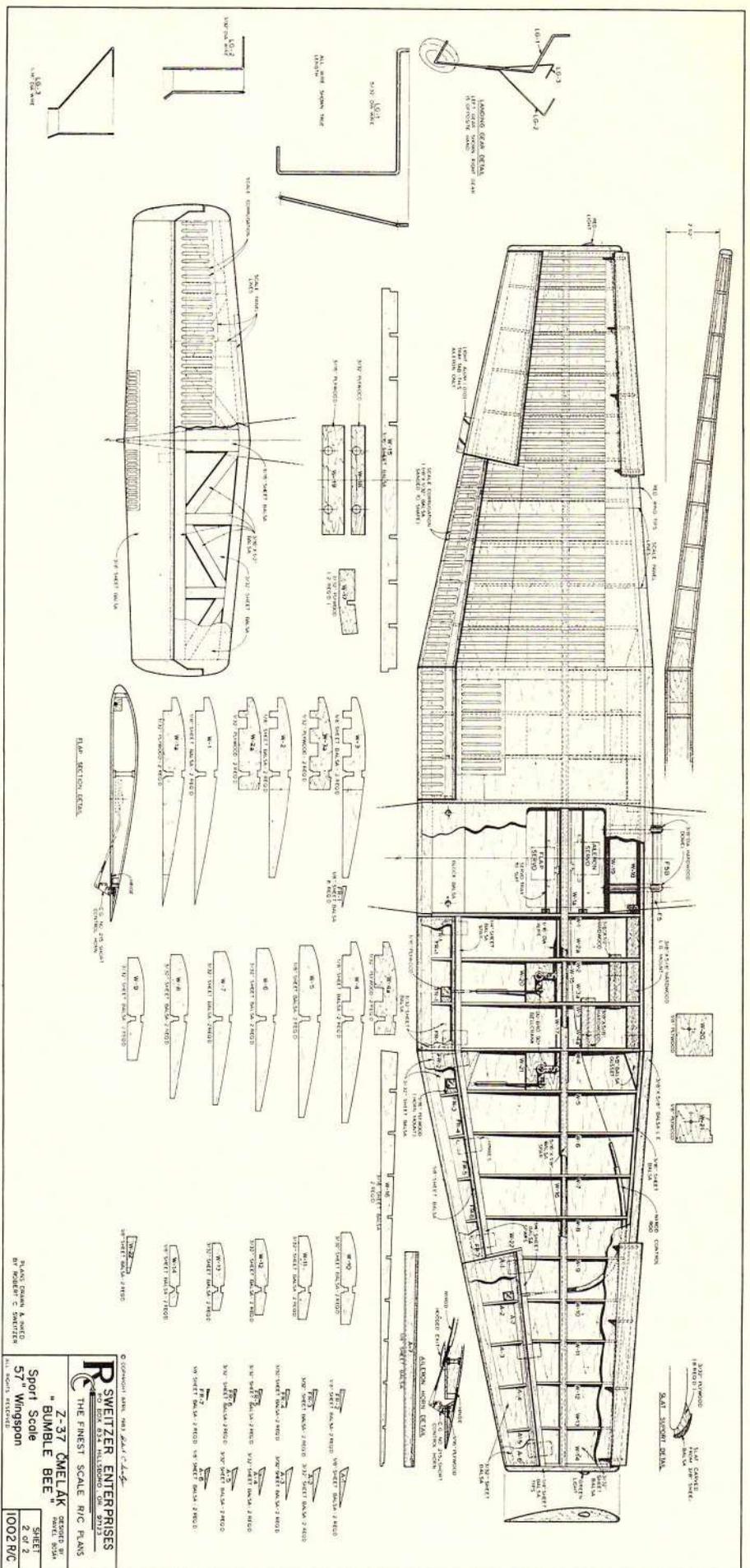
Z-37A "BUMBLE BEE"

aren't effective on takeoff when there's a .40 in the nose. With a smaller engine, the flaps would help if lowered about 10 degrees for takeoff. They lower about 25 degrees on the full-size aircraft, and make a big difference in climb performance and rate of descent. I have used them extensively to simulate the templates in plywood. All ribs are 3/32" balsa. Note that W-1 has a 1/32" ply doubler, while W-2 through W-4 have half ply doublers only along the front half of the rib.

The 1/8 x 1/4" spars are spruce, and note that sheer webbing is laid inside them for strength. The sheer webbing is 3/16" balsa. Don't forget to add the leading edge doubler W-18, as well as the trailing edge support piece W-19. The very end of the ribs are trimmed off, to be reused in forming the flaps. Note that the flaps are in two segments, breaking at the dihedral line. Two bellcranks are provided, and these are tied together in tandem, to drive the two flap sections together. The ailerons are actuated with Ny-Rod. When you have all of the pieces in the center section, close it up with the top 3/32" sheeting (remember to build in the ply dihedral braces).

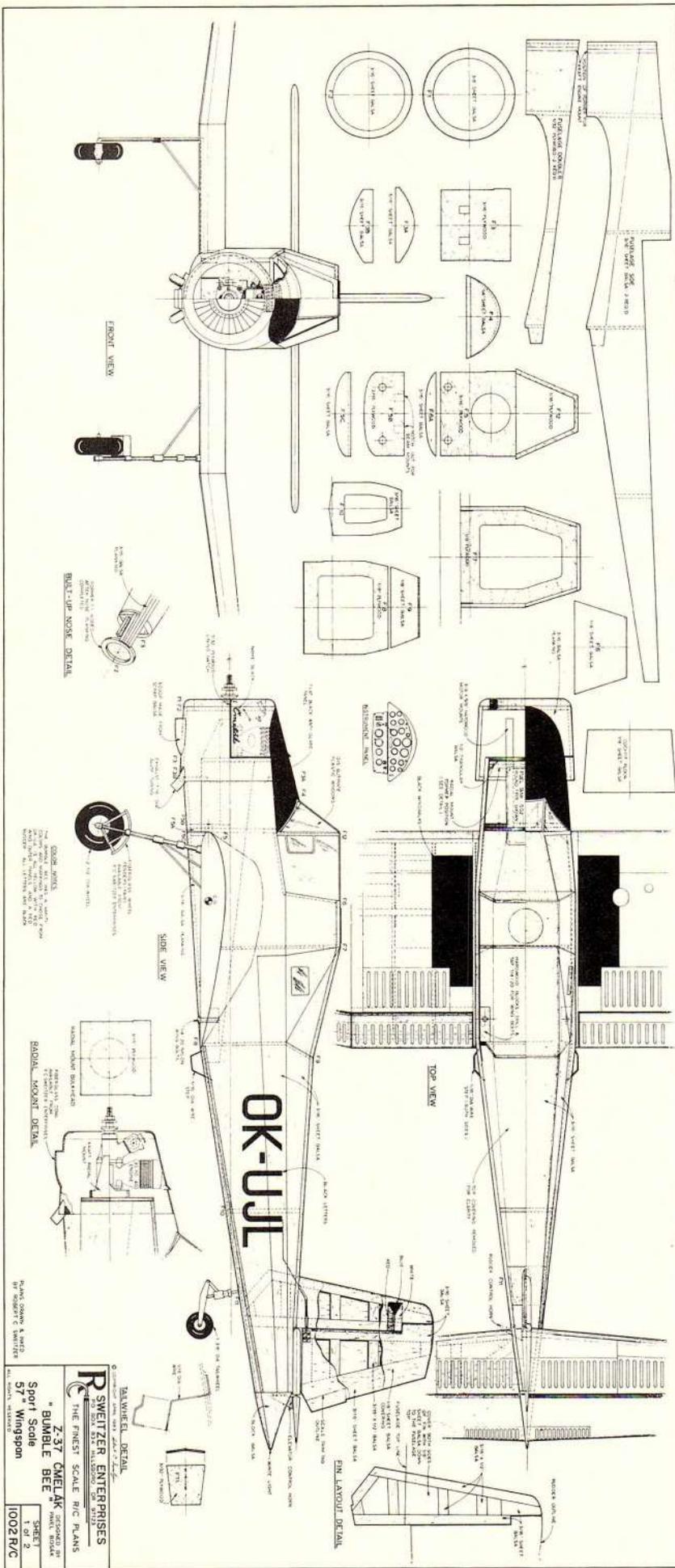
The outer wing panels are built flat over the 3/32" bottom sheeting. Remember to cut off the ends of the ribs and use the pieces for the ailerons and flaps. Note that the flaps decrease in taper as they go out the span, and that the barn door ailerons are inset. You can either build these right onto the bottom sheeting, then cut them free later, or do them as separate pieces.

Before sheeting the tops of the outer panels, run all control linkages through and make sure everything works. You may wish to add small gussets at the front and back of W-4 for better strength in the panel joint. Note that the flaps are not tapered, because they are bottom hinged. If you are in a hurry, make the flaps from sheet balsa, but I would not recommend that for the



FULL-SIZE PLANS AVAILABLE DIRECTLY FROM: R/C SWEITZER ENTERPRISES, P.O. BOX, 834, HILLSBORO, OR 97123. THE PLANS SELL FOR \$16.50, AND THEY INCLUDE A MATERIALS LIST AND 3-VIEW. ADD \$4.00 FOR AIR MAIL, AND THROW IN AN EXTRA DOLLAR IF YOU WANT THE PLANS ROLLED. A FIBERGLASS COWL AND WHEEL FENDERS ARE ALSO AVAILABLE FOR \$16.00. IF YOU ORDER THE PLANS AND GLASS PARTS AS A SET, IT'S ONLY \$30.00 (ADD \$4.00 FOR AIR MAIL). FOREIGN ORDERS ADD \$12.00.

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ailerons, because they would be too heavy and they might flutter.

The fuselage is nothing more than a box with some added angles. If you have a fuselage jig, it will help, although it isn't necessary. Cut two side panels from 3/16" balsa, and install the 1/32" ply nose doublers. Epoxy bulkheads F-3, F-9, F-11 and F-12 between the sides, using the top plan view as a reference guide. Use F-7 for positioning, but do not glue it in yet. Glue in the tail wheel assembly, to help avoid twisting. Once everything is aligned and the formers are glued in, sheet the aft fuselage from behind the wing for more rigidity.

Bulkhead F-7 should be assembled with the wing locator pins and W-15. Align the wing onto the fuse then, when everything is straight, permanently glue in F-7. Remember to check the wing incidence, and sand the wing saddle accordingly. Once this is done, the top of the fuse and all remaining formers should be installed. Since everything is flat panels, this fuselage goes together very quickly.

Be sure to fit and install the fuel tank before gluing F-3 through F-5. hedge hopping antics of the ag pilots. This is great fun. For landings, they are a great help. Please make sure that you have the correct C.G. before toying with the flaps.

Just looking at the Z-37 tells you that it's not an aerobatic model. The .40 gives plenty of power, but there's just no way that a flat-bottom airfoiled model with a boxy structure is going to do anything more than some loops and a lopsided roll or two. The Bumble Bee, true to its name, can turn on a dime, if you kick some rudder in along with the ailerons. If you want to come down really quickly, just try a sideslip!

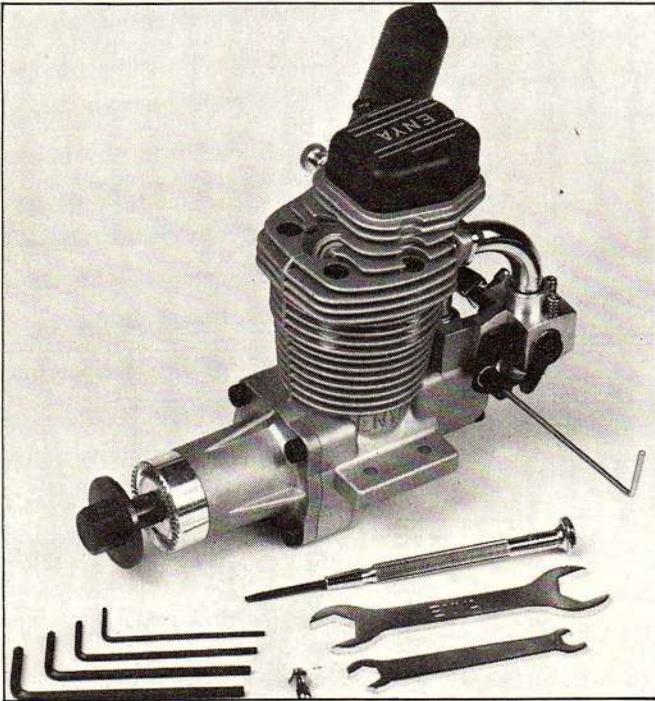
The Z-37 Bumble Bee is a refreshing change of pace for the scale modeler. It won't win any beauty contest, that's for sure, but it is a good flying model which can be built by someone who doesn't have lots of scratchbuilding experience. If I were to build another one, for contest work, I'd go to a larger scale, to take full advantage of wing loading, power loading, and to make scale detailing of things like the skin flutes easier.

I hope that the plane intrigues you. I would like to hear from you about your success with the model. Feel free to write me:

Pavel Bosak
Fucikova 278/IV
Klatovy, Czechoslovakia

SCALE SHOWCASE

Items for the Builder of the Model



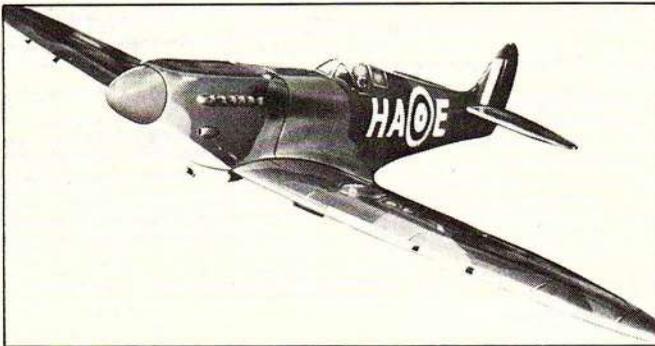
ENYA .90 4-CYCLE

Quarter-scale fliers will appreciate this latest offering from Enya. This one runs on model fuel, not gasoline, and is extremely quiet and free of vibration. The rocker arm covers and pushrod shrouds keep dirt out, and a built-in manual choke makes for easy starts.

For its weight (28 ozs.) the 4-cycle .90 is 50% more powerful than a 2-cycle .60. In other words, even though it has a displacement and weight that's only 30% larger than a .60, it develops the torque of a 1.20 c.i. powerplant. It's just the ticket for those smaller quarter-scale projects that don't need the weight and mass of a chain saw engine.

Check this jewel out at your hobby dealers, as imported by: Enya Model Engines, P.O. Box 286, Fords, NJ 08863.

* * * * *



LARGE MOSQUITO AND SPIT KITS

Large scale, easy-to-fly models of two famous World War II aircraft can be constructed from these British-made kits.

The 1/6-scale Mosquito Mk VI has a 95" wing span, and uses two 10cc or 15cc motors and a six-channel radio. Low speed stall characteristics of the laminar flow wing make it easy to fly, land or take off on one engine.

Included in the kit are a fiberglass fuselage, engine nacelles, tail cone and bomb bay, ply-covered foam wings, two alu-

68 scale r/c modeler

minum spinners, two fuel tanks, 5" wheels, engine mounts and exhaust stacks, as well as ply and balsa wood parts, fittings and linkages.

The Spitfire Mk II is a 1/4-scale model, said to be



the only large version of its kind. With a 102" wing span, it is suitable for engines rated from 25 to 50cc. The precut main parts are made of plywood and balsa. A fiberglass cowl, metal spinner, molded cockpit canopy, metal undercarriage and other fittings and accessories are included in the kit.

Both craft can be made and flown by any reasonably experienced modeler, reports the manufacturer.

Direct all inquiries to: Powermax, 359 Trousdale Dr., Suite A, Chula Vista, CA 92010. No prices for the kits were stated.

* * * * *

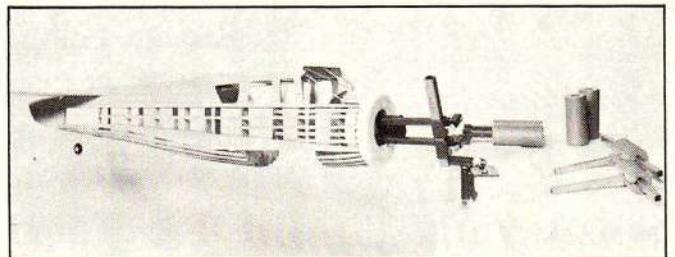
VIDEO TIPS II

Riding hot on the heels of their successful how-to-do-it video tape of Hot Stuff tips, the Hunter boys have released the sequel, titled *Video Tips II*. This new tape takes over where the first one left off, with some really advanced building techniques. It is strongly suggested that you view the two tapes in their proper sequence, so that you can understand the progression. There are some great ideas on these tapes, and there's no better way to appreciate the sequences than by watching someone doing it.

Video Tips I is available as a loaner. Send \$30, and Satellite City will return this deposit when they receive the tape back. Because of the high cost of producing and distributing these tapes, *Video Tips II* is available as a rental. Send a \$35 deposit, and when the tape is returned you will get \$20 of that back. The tape can be purchased outright for \$25.

Send tape orders to: Satellite City, P.O. Box 836, Simi Valley, CA 93062. There are plenty of copies available, so there shouldn't be much of a wait.

* * * * *



MASTERJIG

A quality paint job is something that can make those scale finishing jobs so much simpler. To date, we have had to make do with crude commercial fixtures, or improvise and design our own. None of these alternatives have been

totally satisfactory. But, there's hope, with the new MasterJig 400. This "erector set" is a well thought-out and nicely engineered unit that not only makes a superb paint jig, but also a handy work tool in the shop. It can be reconfigured in numerous different set ups, so that everything from actual building to radio installation are possible.

Made of metal, the unit is designed to be durable and sturdy. We personally weren't too thrilled about having to screw one of the supports to our work bench, but that's a small penalty to pay for the effortless ease it gives to building and finishing. It's a fuse jig, a wing jig, and just about anything else your mind can think of. It adapts to almost any standard sized model, too.

The MasterJig 400 isn't inexpensive, but anything of quality costs money. The \$129.95 price tag on the jig is a fair price. Order directly from: Tide Distributors, P.O. Box 317, Minto, ND 58261. Enclose \$5 for shipping and handling.



RAPIDE

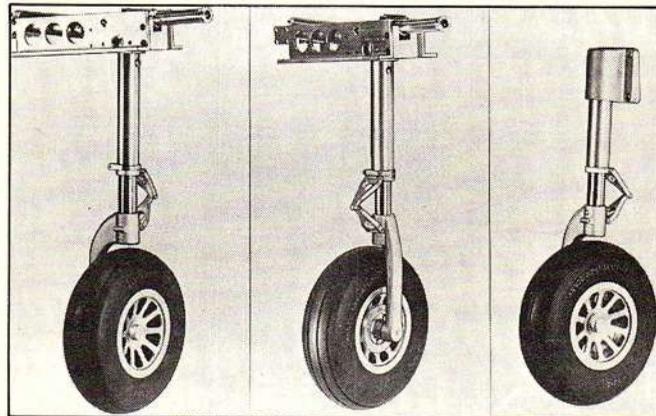
One of the nicest set of detailed scratchbuilding plans we've ever seen comes from Bob Sweitzer. The airplane he selected isn't one that is popular, but it is an exciting subject, nevertheless. The de Havilland DH 89A "Rapide" is one of the most exotic looking twin-engine biplanes you'll ever find. Bob took all dimensions and data from a full-size

restoration. The 2"-scale model has a big 96" span.

The plans are superlative, giving all details needed to build a museum scale model. They are presented on four 3x9' sheets. The plan set sells for \$38.50 (postpaid). They are shipped rolled, and an additional \$3 gets them out airmail.

Bob has a complete set of accessories also available. The canopy and nose light (\$15.00) are a big help if you are scratchbuilding. A pair of glass cowls (\$60.00) will also make life simpler. You can order everything listed above, including plans, for \$99.50. Write Bob for the price on a complete documentation photo pack, as well as a copy of the original maintenance manual for the DH 89A.

Send orders to: R/C Sweitzer Enterprises, P.O. Box 834, Hillsboro, OR 97123.



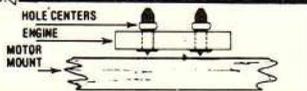
ANCCO RETRACTS BACK

After a period of unavailability, the famed giant-scale Ancco retract system is again on the market. These units are designed for the very big models, like the Nosen P-51 and P-47. These are limited production units, and orders will only

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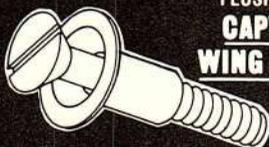
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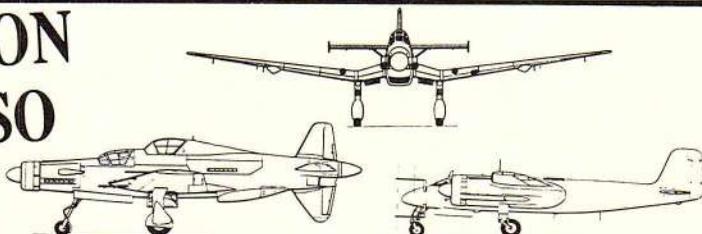
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THE SCALE SQUADRON "UNCONTEST" IS ALSO A TRADE SHOW!

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and learn more about the products you use. The huge flying facility right outside the doors makes it a natural for flight demonstrations.

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SITE: Marine LTA, Tustin, CA

DATE: November 19-20, 1983

be taken on a factory-direct basis. The retracts have been subtly modified to make them even better than before.

Ancco plans to still offer the complete package they had before. You get the retracts, plus a beautiful set of custom scale wheels, as well as all pneumatic valves and accessories. There's a helpful set of installation drawings.

For more information, write directly to Ancco, P.O. Box 23089, Minneapolis, MN 55423. Phone (612) 869-1000. The price will remain \$219.95.

* * * * *



HOT GLUE

Several years ago, the big fad in model building was to use a hot glue gun. We tried it, and the speed at which you could join pieces of balsa was amazing. But, the glue tended to ooze out everywhere when the gun wasn't in use, and it took forever for the gun to warm up. The solution to one problem created problems of its own. We soon abandoned the process in favor of the instant glues.

You can't beat the instant glues, but now that Dremel has introduced two new glue guns for hot glue sticks, you may find it desirable to use hot glue in some applications. The new guns have interchangeable nozzles, and special silicon feed sleeves to keep the glue in the gun until it's needed. The feed system allows anything from a drop to a long bead of glue to be dispensed. The most important feature is that the guns are thermostatically controlled, so that consistent glue quality is assured.

The model #800 and #810 are identical, except that the

810 has the automatic trigger feed system (the other gun requires thumb pressure to feed the glue stick). From experience, the auto-trigger model is the one you want.

Look for the Dremel Pro-Bonder hot stick glue guns at your retailers, as manufactured by: Dremel, 4915 Twenty-First Street, Racine, WI 53406-9989.

* * * * *



STAMPE SV-4

The STAMPE SV-4 is a French Primary Trainer. This kit is superbly hand-crafted with extensive prefabrication. An outstanding feature is the wire cabane strut assembly, which is completely preformed and brazed, ready to be mounted to the fuselage by two collars and a nut and bolt. This is the first production balsa kit to include ready-made cabanes.

Most balsa, hardwood and hardware items are labeled and packaged in clear see-through plastic. Super-quality balsa is used throughout with many parts, including all fuselage formers, machine cut to shape. The wing leading edges are machine shaped and notched for the rib locations. The leading edges are also grooved to allow flush fitting to the leading edge sheeting. Maple parts are cut to shape, drilled and tapped.

The plans are furnished in two rolled sheets and include overlays of both left and right wing and slab assemblies to simplify construction of these units. Also included are cabane installation instructions and illustrations.

This kit will satisfy the most critical builder and will prove to be the best performing and smoothest biplane kit on the market today.

The Stampe has a 56" span (1003 sq. in. of area) and is designed for .45-.60 engines. The projected flying weight is 6½-7½ pounds.

Unfortunately, our literature didn't include a price, and we assume that they will be distributed through hobby shops. For more information, write directly to: Champion Model Aeroplane Co., P.O. Box 891, Woodbridge, NJ 07095.

* * * * *

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U.S. Scale Masters



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Borden, IN 47160
(812) 967-2814

HEART OF AMERICA SCALE REGIONALS

MISSOURI (May 14-15)
Kansas City R/C Club
Dick Taylor, CD
7929 Jefferson
Kansas City, MO 64114
(816) 333-9839

SCALE AIR GROUP (June 4-5)

Buddy Irwin, CD
922 Sundown Lane
Desoto, TX 75115
(214) 223-7838

SPOKANE SCALE INTERNATS (June 10-12)

Barons Model Club
Dr. Joe Fox
615 12th St.
Spokane, WA 99202
(509) 624-4910

EAST COAST REGIONAL (June 11-12)

P.G.R.C. (Washington, D.C.)
Tom Bayne
17102 Earlham Ct.
Upper Marlboro, MD 20772
(301) 627-5118

EGYPTIAN R/C CHAMPIONSHIP (June 11-12)

Sky Squires R.C. Club
Williamson County Airport
Lynn Elston, CD
R-3, Box 153
Carterville, IL 62918
(618) 985-4177

SOUTH EASTERN REGIONAL (June 18-19)

Bill McCallie, CD
10501 Sago
Tampa, FL 33612
(813) 932-0622

COVERITE (BLACK BARON) SCALE MEET (July 9-10)

Sparcs R.C. Club
Mel Katz, CD
9200 Bustleton Ave.
Philadelphia, PA 19115
(215) 676-7618

HILL COUNTRY ALL ERAS SCALE CHAMPIONSHIPS

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San Jose, CA 95134
(408) 262-9566

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Pueblo, CO 81001
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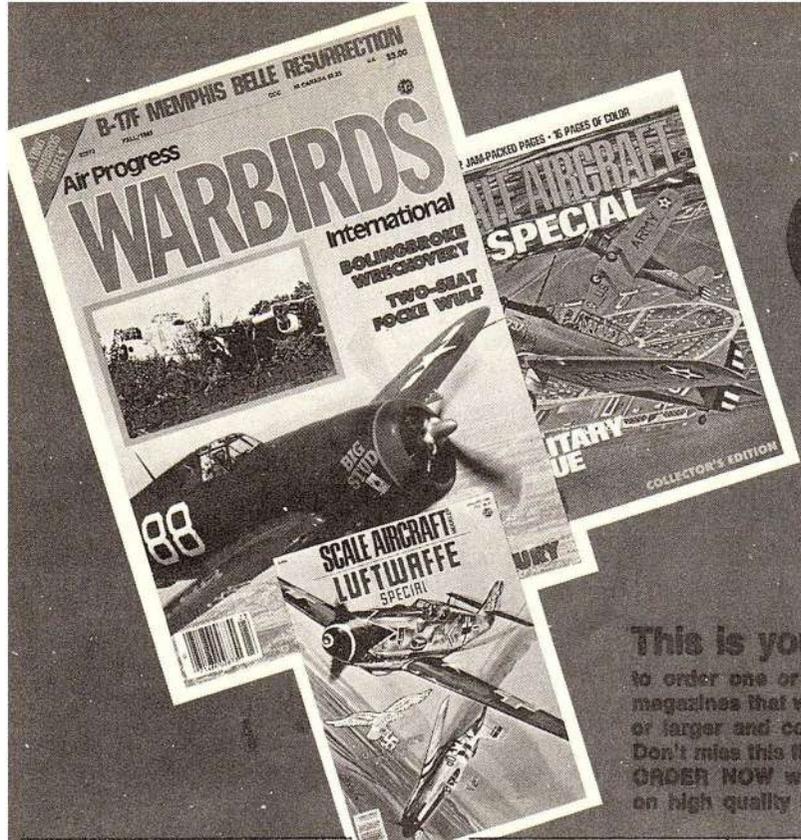
WESTERN SCALE NATIONALS (July 22-24)

So. California Scale Squadron
Bert Baker, CD
15712 Graham, "A"
Huntington Beach, CA 92649
(714) 893-3364

AMA NATIONALS (July 24-31)

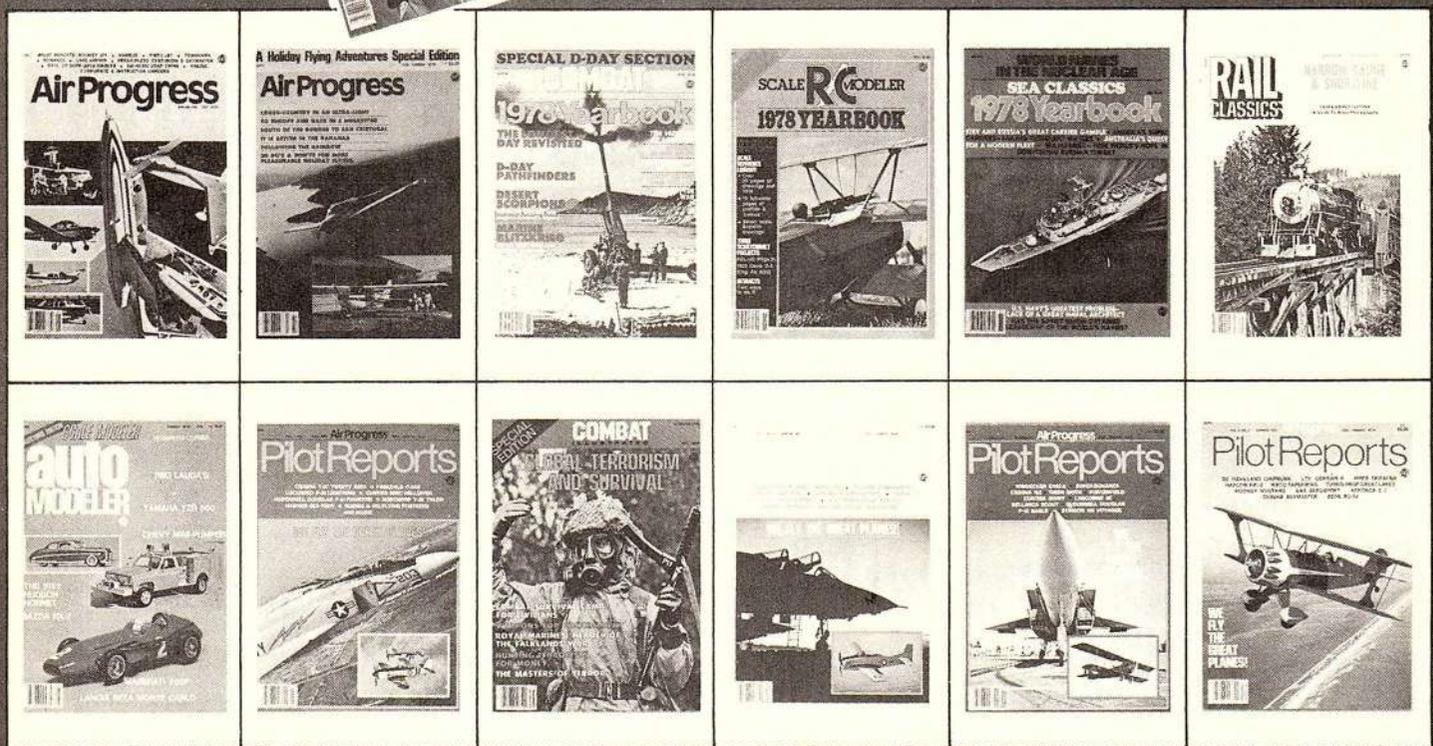
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Check with AMA for details.

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TRIM OUT THAT MODEL

(Continued from page 14)

the C.G., we roll the model up to a 45-degree bank, then take our hands off the controls. The model should go a reasonable distance with the fuse at an even keel. If the nose pitches down, remove some nose weight, and the opposite if the nose pitches up. The trick is to use only the ailerons to get the model up at a 45-degree bank. We almost automatically start feeding in elevator, but that's a no-no. Do the bank in both directions, just to make sure that you are getting an accurate reading of the longitudinal balance.

We now want to test the correct alignment of both sides of the elevator (even if they aren't split, like a Pattern ship's, they can still be warped or twisted). Yaw and lateral balance will also come into play here, so be patient and eliminate the variables one-by-one. The maneuver is a simple loop, but it must be entered with the wings perfectly level. Position the maneuver so that your assistant can observe it end-on. Always loop into the wind. Do several loops, and see if the same symptom persists. Note if the model loses heading on the front or back side of the loop. If you lose it on the way up, it's probably an aileron problem, while a loss of heading on the way back down is most likely a rudder situation.

After you get the inside loops going correctly, do the same maneuver to the outside, entering from an inverted position. Because of dihedral effect, this one may be a bit harder to do accurately with a scale model. We know that you may never be doing outside loops with the plane, but we need to do them to get the trim just right. Before you make too many dramatic changes, glance at the remainder of the chart and note the myriad combination of things we can do just with the ailerons. Each change you make will affect all other variables!

Note that the Yaw test is the same looping sequences. Here, however, we are altering rudder and ailerons, instead of the elevator halves. We must repeat that many airplanes just will not achieve adequate lateral trim without sealing the aileron gaps shut. The larger you make the loops (to a point), the more discernable the errors will be.

The Lateral Balance test has us pulling those loops very tightly. Actually, we prefer the Hammerhead

AMAZING!

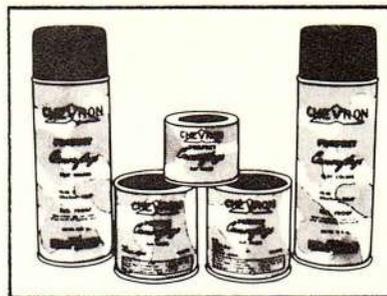
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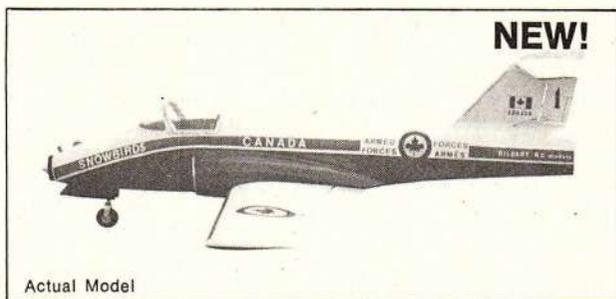
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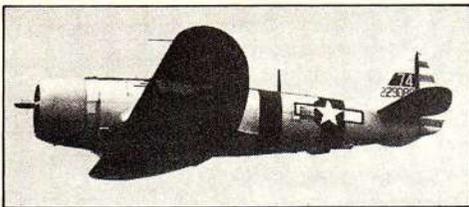
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as a better test for a heavy wing. Pull straight up into a vertical and watch which wing drops. A true vertical is hard to do, so make sure that your assistant is observing from another vantage point. Note that the engine torque will affect the vertical fall off, as will rudder errors. Even though we balance the wing statically before leaving for the field, we are now trimming it dynamically.

The Aileron Coupling (or rigging) is also tested by doing Hammerheads. This time, however, we want to observe the side view of the model. Does the plane want to tuck under a bit? If so, then try trimming the ailerons down a small bit, so that they will act as flaps. If the model tends to want to go over into a loop, then rig both ailerons up a few turns on the clevises. Note that drooping the ailerons will tend to cancel any washout you have in the wing. On some models, the lack of washout can lead to some nasty characteristics at low speeds.

The effects noted with the Aileron Coupling tests can also be caused by an improperly set wing incidence. The better test for this is knife-edge flight. Yes, that WWII fighter will knife-edge. Maybe it won't do it the length of the field, but if it will go for even 3-5 seconds, it will give us a rough feel for what tendencies it exhibits. If the model tends to pull upward, i.e., it swings toward a nose up direction, then reduce the wing incidence. If the model tries to go off heading toward the bottom side of the plane, then increase incidence.

Again, we reiterate that all of these controls are interactive. When you change the wing incidence, it will influence the way the elevator trim is at a given C.G. Reshimming the wing will also change the rigging on the ailerons, in effect, and they may have to be readjusted accordingly.

The whole process isn't hard. As a matter of fact it's rather fun—but very time consuming. It's amazing what you will learn about why a plane flies the way it does, and you'll be a better pilot for it. One thing we almost guarantee, is that your planes will be more reliable and predictable when they are properly trimmed out. They will fly more efficiently, and be less prone to doing radical and surprising things. Your contest scores should improve, too.

We wish to acknowledge the Orlando, Florida, club newsletter, from which the basics of the chart presented here were gleaned. □

YAT-28E

(Continued from page 41)

plane grooves like no other scale model I've ever flown.

The landings are something to behold. That trike gear makes it simple to just float the model over the runway, then settle in for a tail low landing. The flaps on the 28E are most effective, and you'll find them very useful for accelerated rates of descent.

The third flight was rushed, because it was already getting late in the day. We fueled up, and I told Denny that everything felt fine and that I was going to pull up the gear and really let all the stops out. Denny agreed. A third smooth take-off ensued, and I waited until I had some altitude before retracting the gear. Once the model was in the clean configuration, I could see a noticeable increase in speed. The model seemed to respond better to the controls. The elevator trim didn't change with the gear up.

I did a lazy loop, and the big model went through it with ease. There's ample power with a .60 for any sort of vertical performance. The YAT version of the T-28 is so much cleaner that it gets much more altitude when the nose is pulled up. Next, a half roll to inverted, just to make sure that the C.G. and incidence settings were correct. Even with all of that dihedral, the model was very stable on its back. There was none of the anticipated hunt, and I attributed this to the large vertical fin.

The more I flew the YAT, the more convinced I became that it was a near perfect contest model. What more desirable characteristics than a different looking model, with good documentation, plenty of ordnance (I had the underwing pylons rigged with release mechanisms), and good maneuver potentials.

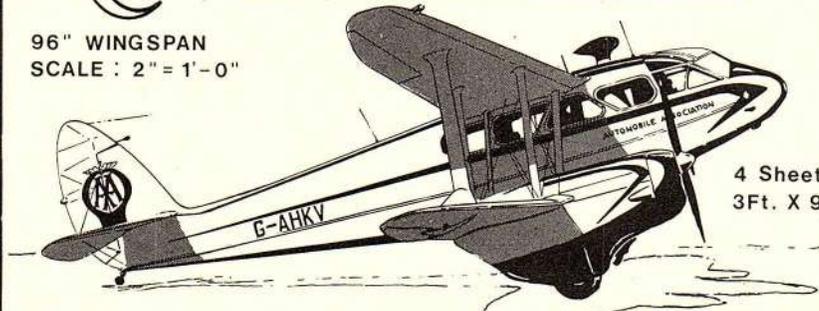
I pulled an outside loop, just to see how the tracking was. I saw some deviation, and made a mental note to check for warps or a heavy wing panel. Denny mentioned that the model might wander a bit off heading in the consecutive rolls, with all of that dihedral. I was pre-

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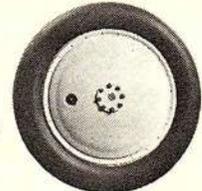


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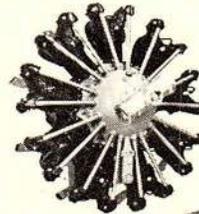
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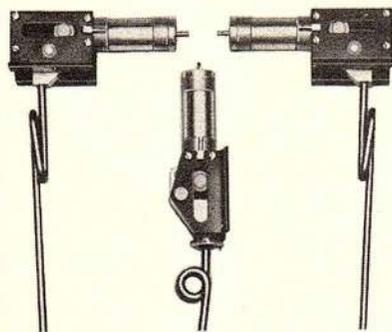
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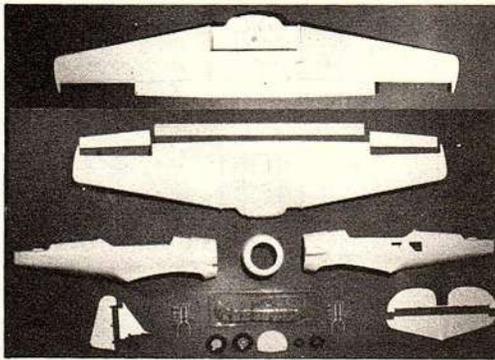


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pared, and started the maneuver with a little extra altitude. To both of our surprises, the YAT-28E waltzed through the rolls as if on a string. Again, I can only speculate that the large fin area, plus the long nose moment, must have something to do with offsetting the effect of the dihedral.

Denny called out a few maneuvers, and I gave them a try. The Cuban Eight was big and open, and I got lucky and nailed the crossover just right. I tried the Horizontal Eight, just to see how well the plane could hold a constant radius turn. The results were most gratifying. The most amazing thing about the model was the nice blend of stability and maneuverability. I couldn't find one attitude in which the plane got squirrely. Even the stall, both power on and off, were very docile. With that big rudder, you can bet that this machine is one spinning fool!

The real proof of the YAT's stability was on the landing. I was already committed, with the flaps down and only about four feet off the runway. From out of nowhere, someone taxied out a trainer of some sort. I suddenly had a fleeting vision of my daydream model becoming a pile of kindling. All I could do was panic and pour the coals to it. I was so slow and low that I couldn't see how a snap could be avoided. The engine came to life, and the nose pitched and a wing tip started to drop. I immediately hit rudder (ailerons would have been a disaster), and the model dipped onto the other



wing. I immediately bumped the rudder in the opposite direction and put the nose down. While the model wallowed, it held firm and never did snap. Later flight tests showed that the YAT could hang in that near stall with little risk of losing control.

I made a go-around, then settled in for a smooth landing. My knees were knocking so bad from almost losing the plane that I put the transmitter down and headed for the beer cooler. Denny went and retrieved the model and sat it atop the picnic table where I was sitting. Within moments, I was cooled down and calm again. I sat there, brew in hand, and it was just as if I was back in my workroom daydreaming. Except, now, it was reality. I had my model, silhouetted against the setting sun. What more could a modeler ask for?!

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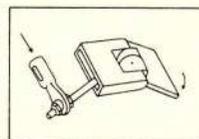
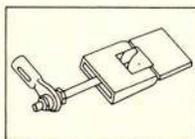
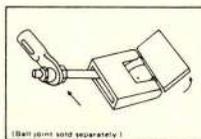
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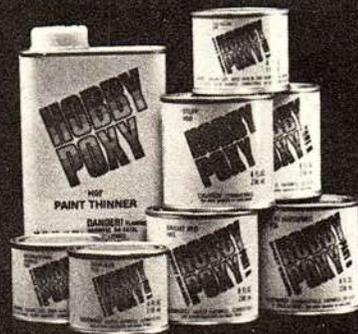
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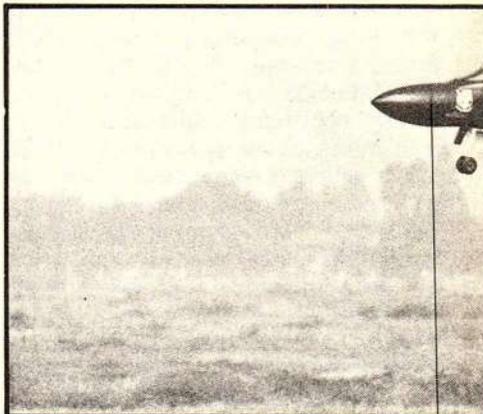
(Continued from page 49)

ers" immediately forward of the engines. Everything was redrawn to exact scale, including a wild airfoil shape on the wing tips.

I was worried about the anhedral stab and reduced the angle a few degrees. Performance of model number two was so good that I modified the stab to reflect the true scale anhedral.

It was time for prototype three, pretty much the airplane I'm currently flying. The drogue chute and scale stab were incorporated on this model. Landing gear lengths were modified to reflect true scale, and to give the F-4 its characteristic attitude. Prototype number one flew at 19.5 lbs. Prototype number three, with all its refinements and scale features, weighed 17.5 lbs. It would

Heading skyward at the So. Calif. Masters qualifier. The big model was a winner from the start.



bore you to death to detail how this was accomplished; but suffice it to say, the weight analysis and ensuing reductions are the heart of the F-4's success.

As the prototype development was progressing, a parallel program was undertaken to increase engine performance and reliability. The 262 had shown me the need to modify the K&B 7.5 engines for more reliable throttle operation. The biggest problem with the stock carbs was an inability to hold a high speed setting, yet maintain a good throttle transition from idle to full bore. I replaced the stock Perry carbs with SuperTigre Mag IIIs bored out to 3/8". This modification worked well in the 262 but accessibility to the

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ANTOM II

low speed needle was a problem in the F-4.

I still felt performance improvements could also be made, and tried several different carbs; H P, Webra, H B, etc., all of which had to be extensively reworked. O. S. Max then introduced their new 7 D carb on the .61-.90 engines. The reworked O. S. carb engines ran like jewels, and reliability was no longer a problem. Nothing is ever easy in this hobby, and O. S. Max discontinued the 7 D. The O. S. 7 D V is its replacement, and although it requires more reworking (boring out), it functions just as well. A small mounting flange has to be machined to fit the carb into the K&B engine.

The last area looked at to meet our design criteria was the landing gear. The third prototype and my contest airplanes have all used Giezendanner electrics and they have performed exceptionally well. However, a 17.5 lb. airplane stresses the



landing gear to the limit and I felt an improvement in durability could be made.

George Burlekamp, a close friend of mine, is one of those rare geniuses who can sculpt in aluminum. Discussing my problems with him one evening, resulted in a handmade set of air-actuated gear that looked like a Swiss watch and worked equally as well. To top it off, the system weighed a few ounces less than what I had been using. This gear is the Air Command M K 20 now being manufactured for the Phantom.

Another gear related problem was tires. Any large airplane will flatten currently available 4" tires. This is particularly a problem with ducted fans as they must roll smoothly

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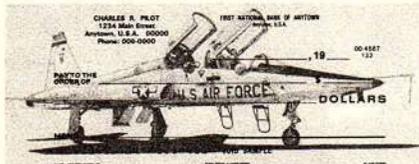
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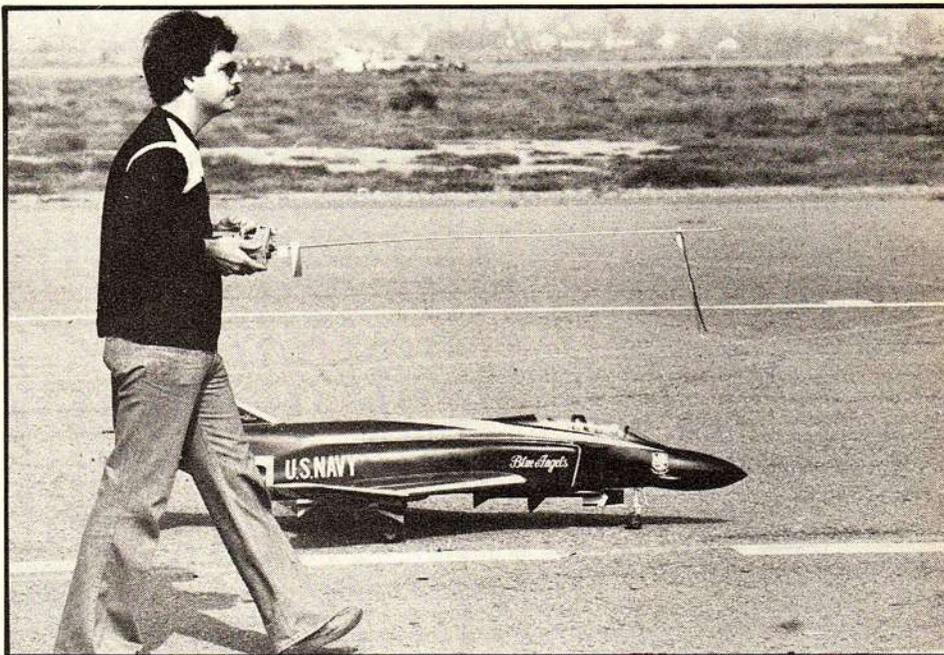
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1-83

to allow takeoff acceleration. Kraft Hayes wheels work really well but they are not available in the size required for the Phantom. At the '82 Masters, the problem was further aggravated by heat. I noticed that the F-4 responded sluggishly on the first two takeoffs. The problem was traced to out-of-round tires. On later flights, the F-4 was blocked up and the tires packed in ice until I was called. This is obviously an unsatisfactory solution. The deluxe Phantom kit has a special design solid rubber main gear tire to eliminate this kind of aggravation.

Once you have the airframe de-

Tom taxis out for a flight. In this perspective, the size of the model is staggering, with a fuse that's over seven feet long!



sign, the powerplants and landing gear, the rest of the airframe is relatively easy. I have to chuckle at Pat Ventola's comments in the first part of the article: "construction is straightforward, except for . . ." and then he adds "little" items that take days of careful work. I'm not going to give the old admonition about the F-4 not being a beginner's airplane. If someone wants to build an airplane bad enough, he'll do it. I have made available a semi-kit that includes all the fiberglass parts, stab actuating mechanisms, canopy plans, and tailpipes. After talking with many people who have purchased the semi-kits, and also to individuals who want to build the F-4 but don't have access to a machine shop, I have decided to offer a complete kit.

The complete kit is not going to be inexpensive; a competitive Masters class model is anything but

cheap. I have decided to offer everything required to build the model, including modified engines and fan units (assembled and test run), custom made landing gear system with scale aluminum struts and scale solid rubber tires, drogue chute and ejector, complete cockpit kit and all wood parts. I am personally cutting each part and making each assembly, so by carefully following instructions, an individual should be able to assemble a Phantom that is within ounces of mine.

I use a glass cloth and resin finish and refer you to Dave Platt's excellent booklet describing the technique. There is no way a kit manufacturer can help with the small detailing work. This, in the final analysis is up to the individual builder, and usually is the difference

between an okay scale subject and a true masterpiece. In building any airplane, there is no substitute for doing it right. If a part has been damaged, or doesn't fit quite right, don't try and make do. Pitch it and start over. It's a lesson painfully learned over many years.

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* * *

Because of the length of Tom's manuscript, we couldn't fit it into one issue, therefore, we must continue this narrative in the next issue. There will also be a postscript by the Editor on the amazing flight potentials of this Masters winning model. (PHP)

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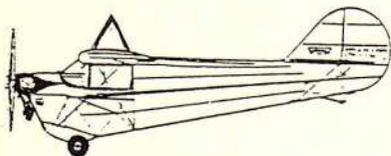
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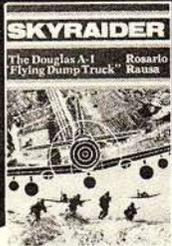
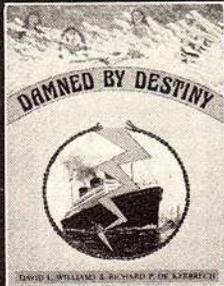
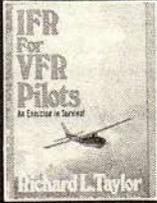


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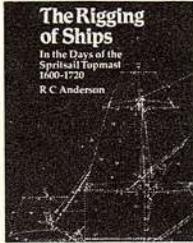
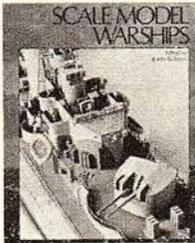
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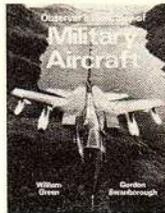
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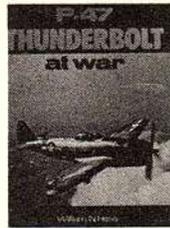
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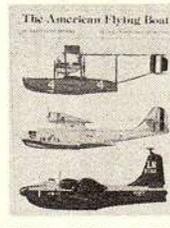


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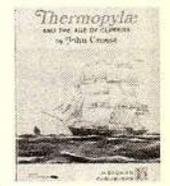
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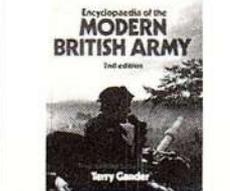
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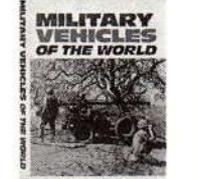


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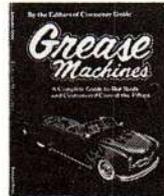
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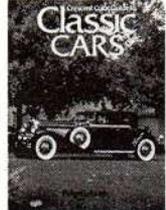
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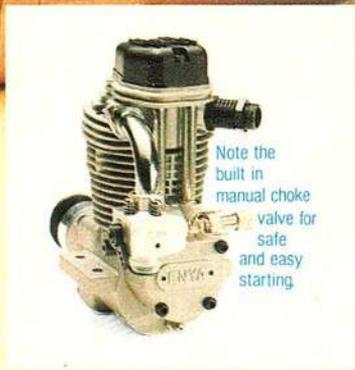
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