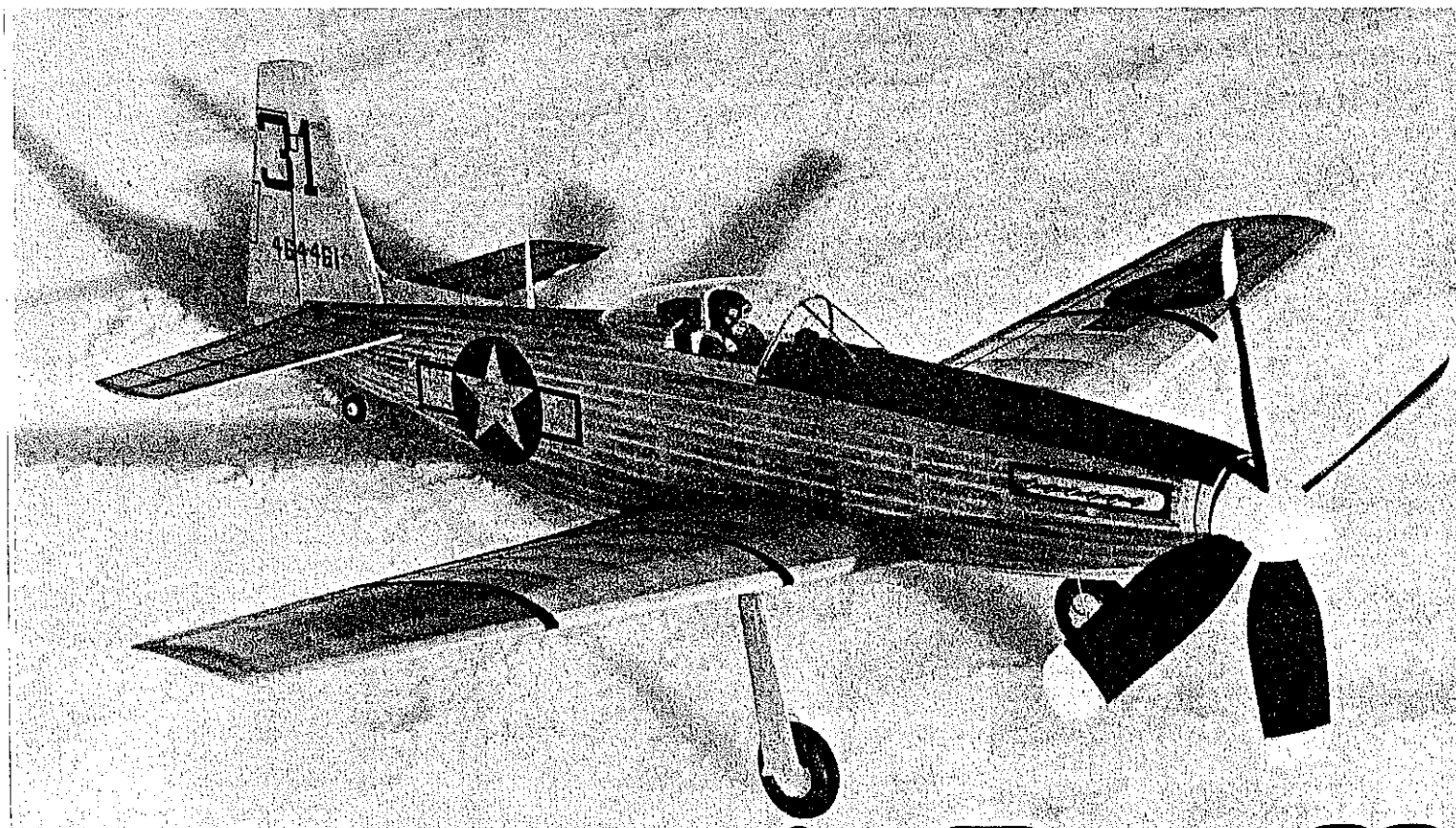


Koutny's P-51H

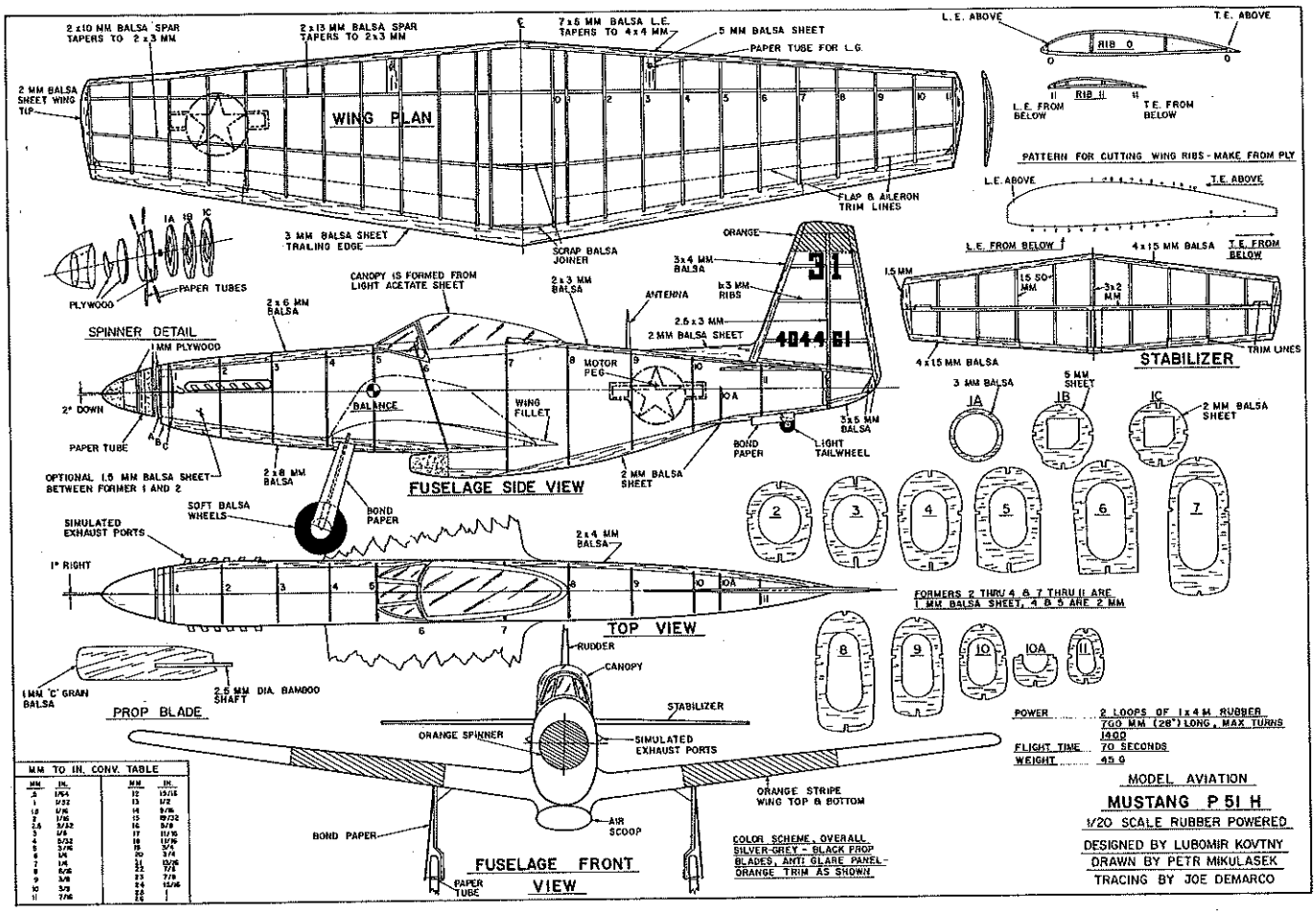
Rubber Scale flight is alive and well in Czechoslovakia. This P-51H is an excellent example. A developmental end point in the Mustang's evolution with its pretty lines, larger wings and tail, the H variant makes a perfect modeling subject with its characteristically dependable and stable flight. We thank Bill Warner for his help in getting it in publishable state. ■Lubomir Koutny

Big picture: Mr. Koutny has built several P-51H models in various sizes and structural techniques. The plane pictured here is his original model that the plan depicts. He built it in 1980 to 1/20 scale. The model has a wingspan of 570mm and weighs 48 grams. This version has recorded up to 70-second flights. Above: The author is seen here displaying his original P-51H.

About the author: Lubomir Koutny is known throughout the world modeling community as one of the most accomplished designers and fliers anywhere. He has many years of experience in all fields of rubber-powered aircraft. Today in Czechoslovakia, Peanut Scale and 1/20-scale are all the rage, the latter being mostly planes of World War II due to their clean configurations and high performance potential. The P-51H is one of the finest all-around Rubber Scale models in the 1/20 class, and is representative of the fine work being done today in Czechoslovakia.

THE FINAL production variant of the legendary Mustang fighter, the P-51H was also the fastest in this line of World War II aircraft. Although it came along too late to take part in European operations, a few did see action against Japan in the closing days of the war. As a modeling subject, this developmental end point of the Mustang fighter series has distinct advantages over the P-51D: a larger tail, a simplified under-

Full-Size Plans Available . . . See Page 196



carriage with smaller wheels, and a low-drag wing. An excellent model, the P-51H has been flown successfully by many Czech modelers when the other 1/20-scale ships were confined to the model box due to bad winds.

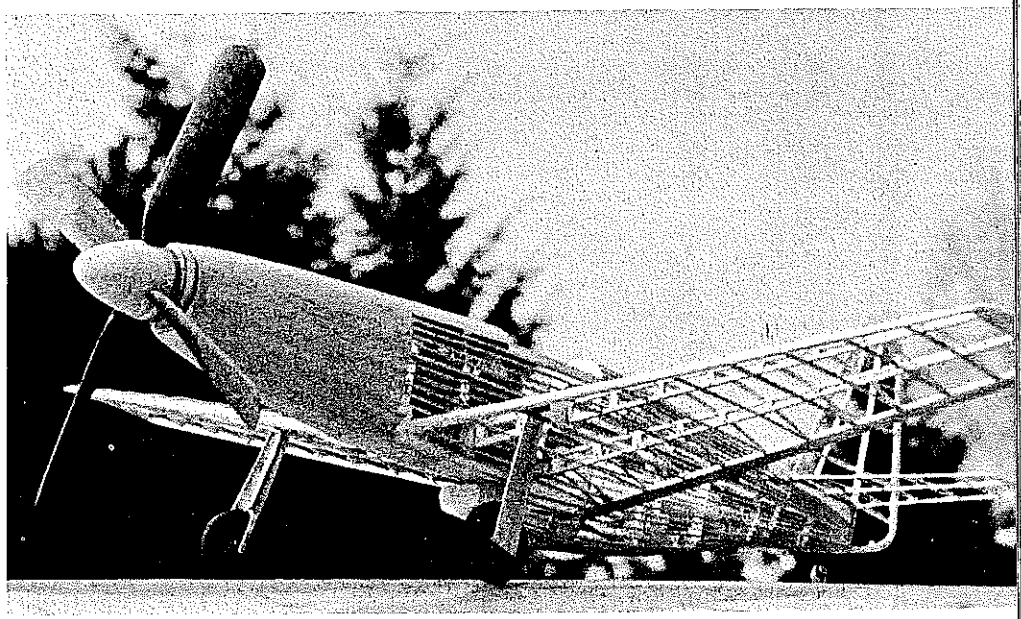
Though it's not recommended for beginners, constructing this warbird won't be too difficult for those who have built a few Scale models. Choosing the right balsa (light but strong) and using a light glue will result in a flying weight not exceeding 50 grams. The model has a wingspan of 22¾ in., which should translate to a favorably light wing loading.

Wing. The ribs are made from 1/32 C-grain balsa sheet. Use the stacking method, if you wish. In that procedure, a root rib and tip rib, each made from hard material, are placed on opposite sides of a stack of 1/32 blanks and held together with a couple of pins. Planing or sanding them down until they match at either end produces the evenly tapered sizes in between. The blanks will then require only minor finishing before installation. Slots for two top and two bottom spars of 1/16-sq. hard balsa can be sanded in while the stack is still joined. Note the notch sanded into each rib attachment point at the trailing edge on the plan.

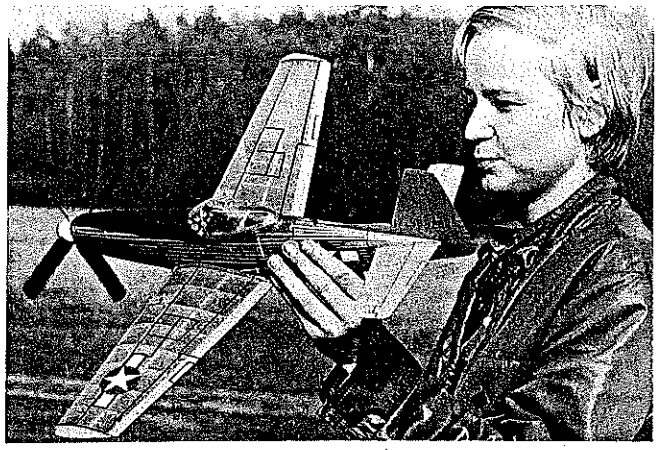
An easier and lighter wing construction method, the sliced rib technique, is shown on the plan. After making a pattern of thin plywood, plastic, or aluminum sheet as shown, slice *both* the upper and lower portions of each rib from 1/16 sheet and trim to the indicated lengths. Note that the lower surface of the wing is not flat. Block up the rear of each rib a little so that the trailing edge will follow the downward curve when attached. The leading edge is tapered and will be above the building board due to the upward curve at the front of each rib. Washout is recommended; it can be built in by raising each wing tip a bit at the trailing edge during construction. A more stable glide can be accomplished by slimming down the airfoil on the right wing slightly.[1]

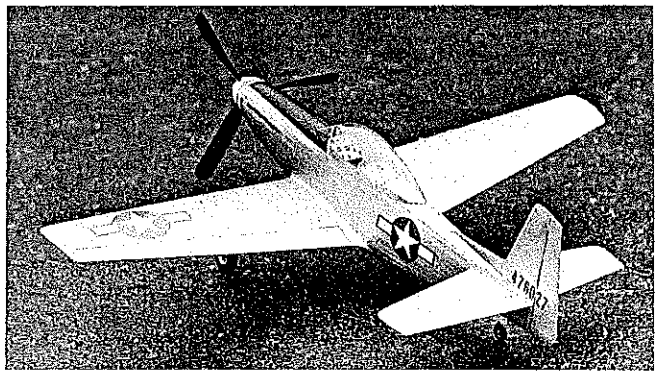
The choice of dihedral angle is determined by where you're going to fly the model. When flying wheels-down indoors it will require a little more dihedral than shown. An outdoor model flown gear up should have 1⅜ to 1¾ in. of dihedral.

Fuselage. An "on-the-half-shell" construc-



Pictured here in its bare bones is Mr. Koutny's latest version of his line of Mustangs. This airplane has a sheeted fuselage front for strength and realism. The wing spars are built up, and sliced-rib construction is used on the ribs as well as on the stabilizer for weight reduction.





Mr. Koutny isn't the only one building rubber-powered P-51H Mustangs in Czechoslovakia. On the left, Radek Koval shows off his P-51H featuring solid rib construction and an all-sheet tail surface. This airplane dates back to 1973. Above is a P-51J variant built by Ivo Ceresnak in 1975. Note the different cockpit and exhaust stack configuration. It flew well despite its heavy sprayed-silver paint job.

tion method is used. Pin down the upper and lower 1/16 sheet keels, cut the 1/32 sheet bulkheads in half vertically, then cement the left side halves in place perpendicular to the plan at the locations shown. The left side outline keel, cut from 1/16 sheet, is glued on and allowed to dry.

Remove the left-half fuselage assembly from the board and install the right halves of the bulkheads. Add the right side outline keel piece, and the basic fuselage is ready to receive the stringers.

The stringers are sliced from strong, medium-weight balsa. Soft material will allow the stringers to pull in between the bulkheads, giving a "starved-horse" effect. Use 1/20 sheet, and slice the stringers following the curve of the fuselage for best results, tapering them from 1/20-sq. at the nose to 1/20 x 1/32 at the tail to save weight.

The stringers are glued on top of the bulkhead formers rather than fitted into notches, and are quite closely spaced (about 3/16 in.) to give a fuller, more realistic look while still retaining lightness. Standard straight stringers are not used, as they tend to distort the fuselage. Don't add the bottom stringers until after the wings are attached.

The radiator block is carved from very light balsa and installed after the model has been covered. The front end of the fuselage can be sheeted for extra realism and strength, as shown in the latest version of the model.

Tail. Use the lightest, strongest balsa you can find. Pin the wood down on plastic wrap to avoid its sticking to the plan. Note that an airfoil is sanded into the top of the stabilizer. The tail surfaces may also be made from 1/16 sheet if desired.

Undercarriage. Make the landing gear detachable by plugging it into built-in paper tubes in the wing. The model looks and flies better without the gear dangling down. Make the wheels from soft balsa or Styrofoam with small rolled-paper tubes through the centers for axle bearings.

Propeller. Cut four blades from strong C-grain 3/32 sheet. Glue in the bamboo axes. Sand in the airfoil section (Clark Y) and twist the blades using a hot iron. They can also be made from three laminations of 1/32 sheet formed over a molding block. Finish the blades with nitrate dope. Czechoslovakian modelers find that a spray used in shoe repairing does an excellent job. We use polystyrene around the wire hook of the prop shaft.[2]

Take care in carving the nose block and spinner assembly to ensure a good fit. Make sure the paper tube blade inserts are installed straight to keep the blades from wobbling. Don't glue the bamboo blade stubs in solidly until after flight testing has been finished.[3] Note the circular plywood "ramp" for freewheeling inside the spinner. There should be a 1° right and 2° left downthrust built into the nose block.

Covering. Use either Japanese tissue for lightness or the lightest grade Modelspan for greater realism. Japanese Sakai silver tissue works well. Cover the model carefully, and finish with well-thinned nitrate dope. Finishing with a solid color, such as one from the Humbrol line, adds weight but also enhances realism. It should be applied sparingly with an airbrush. Remember that silver finish accentuates any construction

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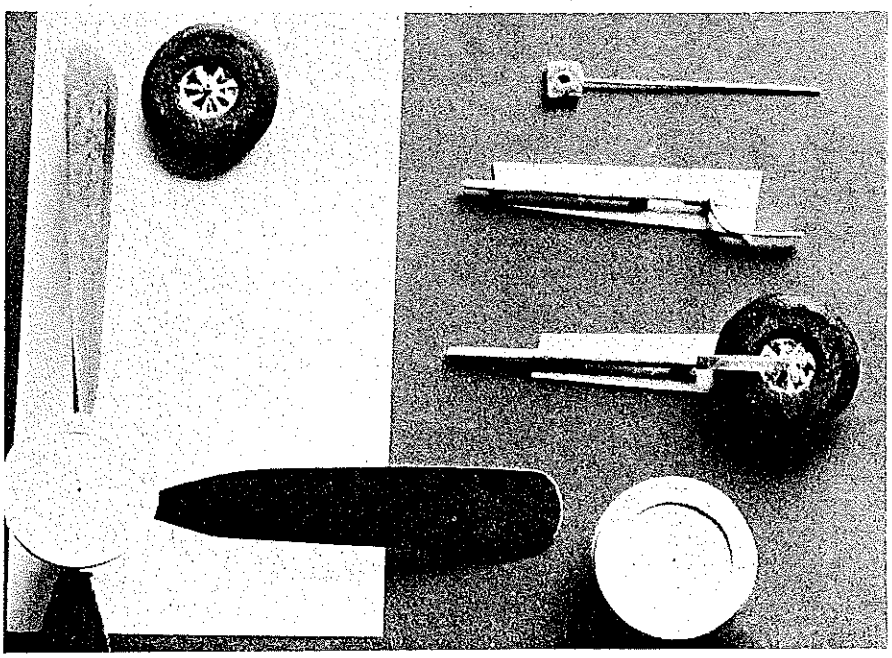
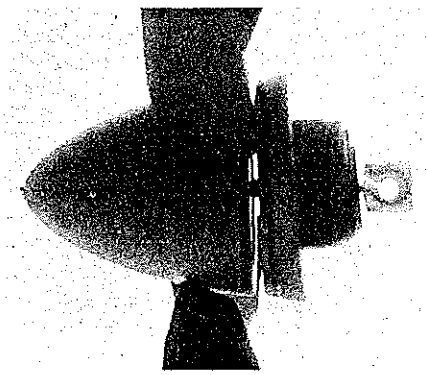


Details of the propeller, nose block, hook, and landing gear. The undercarriage legs are constructed from bamboo with an epoxied aluminum yoke for the Styrofoam wheels. The landing gear legs plug into paper tubes built into the wings in order to facilitate removal for flying. The prop blades plug into paper tubes built into the spinner on bamboo stems. They may have to be adjusted to get best flight performance before being permanently glued in place.

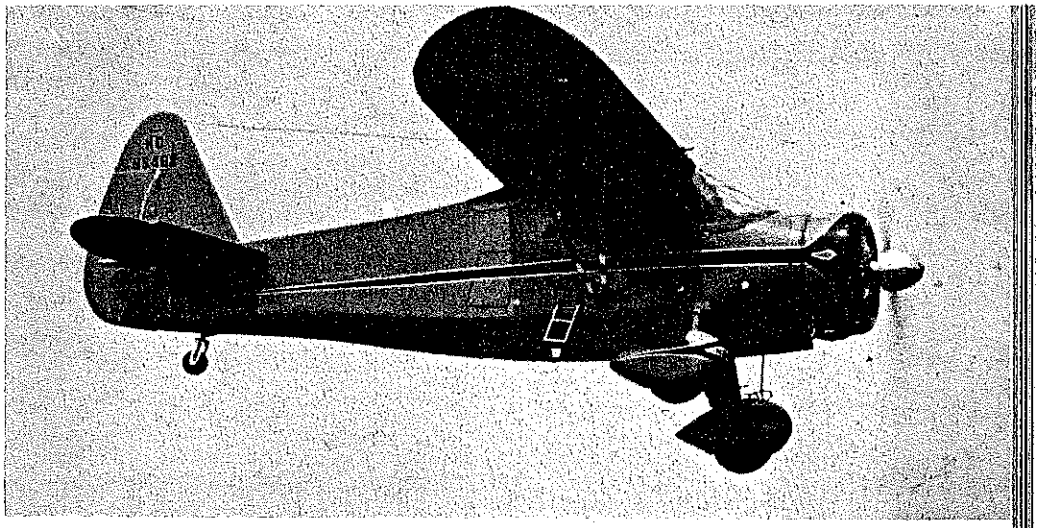


This close up of the nose block/spinner shows the "Czech hook" encased in transparent plastic. Its purpose may best be described in Mr. Koutny's own words: "Make the Czech hook on axis from polystyrene, it is better one opposite some cordon. It is needed for the perfect rubber and prop working." It's left to the reader to figure that out.

Control Line

Scale

Bill Boss
77-06 269th Street
New Hyde Park, NY 11040



Scratch-built Howard DGA by Sam Abdow (Fall River, MA) is a real looker. A good example of a simple, well-constructed, and finely finished model. Bird's done well during competition on the East Coast. This month's discussion of Sport Scale rules points out that this type model can compete with the sophisticated military planes. Photo by Boss.

LAST MONTH I covered the basics of finding a Scale kit, how to locate Scale plans for scratch-building, and where to uncover source data for making plans. This month we'll take a simplified look at the Sport Scale rules and how they might influence your choice of model. My aim is to provide you with an overview of the rules, setting the stage for you to review and better understand the specific regulations as set down in the AMA *1988-89 Competition Regulations* (a.k.a. the rule book).

As you'll recall from last month's column (on the proposed Sport Scale scoresheets), the judging is done in two phases—static judging (max. 100 points) and flight judging (max. 100 points). As you can see, both judging categories have the same maximum of 100 points, making each equally important in attaining a good overall score in the event.

Model requirements are few. A Scale model must be a replica of a heavier than air, man-carrying aircraft that actually flew. Static judging is done from a distance of 15 ft. Therefore, extreme detail, such as extensive panel lines, rivet patterns, etc., isn't really needed, only that which can be clearly seen from the prescribed judging distance.

Moreover, the rules state that cockpit detail, even if included in the model, is *not* to be judged. That rule was developed because only a certain degree of detail can be seen 15 ft. away, and eliminating extensive cockpit and surface details will reduce the work and anxieties of newcomers to Scale. The only detail required in the cockpit is a pilot, or at least a bust, if the pilot had been visible in the prototype during flight.

Profile fuselages are permitted. However, the judges will appropriately downgrade your score for lack of a cross section shape. The model's engine must be equipped with a muffler or silencer to limit noise. Ducted fans and electric motors are exempt from the muffler requirement.

Static judging is conducted in three categories: Accuracy of Outline (40 points max.), Craftsmanship (30 points max.), and Finish, Color and Markings (30 points max.).

Accuracy of Outline: To be eligible for Accuracy of Outline points, you must provide the judge(s) with one of the following: a three- (or more) view drawing; a selection of photographs that show the side, front, and plan views; or a commercially available, unpainted, and unmodified plastic model of the prototype.

If you can't furnish any of the above, then no points will be awarded for accuracy of outline. You can see that it's very important to pick a subject/model that can be documented. If documentation is unavailable, then it would be wise to select another subject.

Craftsmanship requires no specific documentation. Scoring in this category is done strictly on the basis of appearance, which is influenced by how the overall model is completed, both in construction and finish. Note that points will be awarded for craftsmanship even if no proof-of-scale and/or finish, color, and markings data are supplied.

Finish, Color and Markings data must be supplied if you're going to win points in this category. Proof of color scheme must be given to the judges in one of the following forms: 1) photo or photos; 2) magazine or other published color painting or drawing; 3) the three-view drawing used for accuracy of outline which may also contain the necessary data to support the color and markings applied to the model; 4) a detailed, written description of the color scheme and/or markings from a reliable source, if no visual documentation is available.

Note that *no* points will be awarded for Finish, Color and Markings if documentation is not provided. Once again, if you can't document it, you should consider choosing another airplane. Thirty points is too much to give up in any contest.

Flight judging: The flight plan consists of 10 maneuvers, four of which are obligatory while the other six are chosen by the contestant based on the type of model.

Obligatory maneuvers are Takeoff (10 pts. max.), Airborne Laps (one pt. per complete lap, 10 pts. max.), Landing (10 pts. max.), and Realism in Flight (10 pts. max.). The six optional maneuvers can be performed during or after the 10 airborne laps (but before the landing). They may include any aerobatic maneuver or flight operation typical of the prototype aircraft, such as engine control, wing flap operation, retract and extend landing gear, taxi, bomb or fuel tank drops, touch-and-go, and multiengine sequences. Other, less common options might be banner towing and crop dusting.

All flight maneuvers or operational features are scored on a scale of 0-10 based on how well they are performed relative to the prototype, as well as on scalelike qualities. There are three options scored on a scale of 0-20 (two options each):

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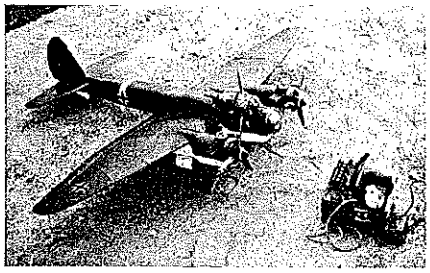

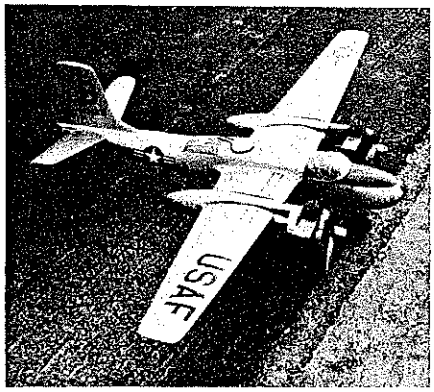

Ron Gillam (Tucson, AZ) with his Sterling Kit Corsair (L). Span is 36 in., power is a K&B .40 with functional scale exhaust. Model is finished in Aerogloss over silk, weighs 3 ½ lbs. Ju-88 by Roland Baltes, San Pedro, CA (middle photo). B-26 (R) by Marvin Martinez (Phoenix, AZ) was scratch-built from *American Modeler* plans, is 10 years old. Two OS .35 RC engines amply power this 7-lb. model.

my Czech, much of it will be less than crystal-clear to the average modeler. I apologize for the verbal inadequacies, and urge the builder to carefully examine the model photos and plan to help clarify things. You may also write to Mr. Koutny with questions or to tell him about your model. *Bill Warner.*

Footnotes: The following notes are presented in Mr. Koutny's exact words, to allow for various interpretations:

[1]"For a better gliding stability is good if the right half of wing (tip) has some slimmer aerofoil opposite the left."

[2]"Make the Czech hook on axis from polystyrene, it is better one opposite some cordon. It is needed for the perfect rubber and prop working."

[3]"Make a pattern for the correct blade angle's adjustment pitch in 0.160mm is 350mm."

[4]"It is very good if the elevator has a little twist (2mm is enough)."

[5]"Engine: 12g FAI rubber, 6 x 1/24 x 3/32 in. for flight without undercarriage, or 8 x 1/24 x 3/32 in. for ROG."

CL Scale/Boss

Continued from page 79

touch-and-go, taxi lap, and retract and extend landing gear.

Because the flight portion of the event counts for half the total score, the importance of choosing a model with good flying characteristics will be readily apparent. Of course, the capability and experience of the person holding the control handle play a large part in the success or failure of a model in flight. The key word here is *practice.*

At this point it might be worthwhile to inject an extra thought on the flight portion of the event. Much has been said in the past about military fighter and multiengine models having an advantage over the less sophisticated civilian-type aircraft during the flight portion of the competition. I don't think that's entirely true, because there are many aircraft which are basically simple designs yet compete effectively against the more sophisticated types.

Even the simplest of subjects is judged for the four obligatory maneuvers, and finding maneuvers to fill out the six optional selections, which can be chosen from options listed in the AMA or FAI Scale rules, should present little difficulty. Most models are capable of taxiing (two options), performing a touch-and-go (two options), engine control with engine cutoff (one option). That's five of the six options needed. The last option could, depending on the subject modeled, be the operation of wing flaps, crop dusting, or other similar maneuver.

In summary, you should choose a model that can be documented for both Accuracy of Outline and Finish, Color and Markings, has the necessary features and options for filling out the flight plan, and has good flight characteristics. If you're careful in selecting your subject and gathering your data, and if you're able to fill out the flight plan as well as learn the flight characteristics of your model, you'll be rewarded with many

hours of good flying and a great sense of self-satisfaction.

Once again, we must credit and thank Gerry Deneau, of Aurora, CO, for the lion's share of the ideas and thoughts in this presentation of the Sport Scale rules.

The Sport Scale Scoresheet Committee has been formed. Response to the request for help with standardizing a Sport Scale scoresheet for the competition rule book has been good.

The following will serve on the committee: Gerry Deneau, 6464 So. Andes Pl., Aurora, CO 80016; Charles Bauer, 4944 No. Orange Ave, Norridge, IL 60656; Mike Welshans, 976 Pearson, Ferndale, MI 48220; William Rammage, 411 North 5th Ave., Tucson, AZ 85705; and the writer, address at the top of this column. If you have any ideas or suggestions concerning the Sport Scale scoresheets that appeared in the July '89 column, I am sure that any of the above-named would be more than glad to hear from you. Don't miss out on this opportunity to be heard.

Please send ideas, contest reports, and especially photos on CL Scale to me at the address found at the very top of this column.

CL Aerobatics/Fancher

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ditional lift and cause the wings to fly level.

On early Stunters the common cure was a considerable amount of wing asymmetry. The deBolt-designed All American, Sr., for instance, had an inboard wing nearly three inches longer than the outboard one and utilized no tip weight. The Ares, Chief, Nobler, and others of the vintage era had inboard wings which were roughly two inches longer and had anywhere from zero to one ounce or so of wing tip weight. The lighter the overall weight, the less tip weight would be called for. All of these ships had wingspans of roughly 50 in. and were very competitive in their time.

Modern Stunters are much larger in span, averaging 60 in. or so, and often have little or no asymmetry. Equal-span wings are common, and many designers advocate them for reasons which are not germane to our current discussion. A common denominator in all of these equal- (or nearly so) span ships is the need for significant amounts of tip weight. Three, four, or even more ounces are often necessary to counteract the additional lift of the faster flying, equal-size outboard wing.

So far, the problem and its solution seem simple. If the outboard wing is too large and flies high because of its excess lift; you simply load it down with tip weight until it "don't do that no mo.' " Problem solved, yes? Well . . . not exactly.

Unfortunately, that three-ounce (or whatever) tip weight weighs three ounces only in level flight. Any time you maneuver the ship you develop significant acceleration ("G") loads, and that three-ounce mass is proportionately multiplied. Because wing tip weight is a concentrated mass of high-density material located a fair lateral distance from the model's CG, its effect is greater than the mass of the inboard wing which it statically balances in one-G level flight. In a 15-G hard corner it becomes 45 oz.—and that's the good news! The bad news (with apologies to Paul Walker) is that since the 45 oz. is generated 30 in. or so outboard of the center-of-gravity, it generates a rolling moment about the CG.

The result is a tendency to bank away from the pilot during maneuvers. We Stunters call this banking tendency "hinging." Hinging is most obvious during hard corners such as the bottom right of the Triangle where the outboard wing might drop so far as to be visible to the pilot. While it's not a major error, an expert pilot should recognize this as an undesirable trim condition which might adversely affect his score. He should be able to properly evaluate and correct it.

To correctly diagnose hinging it is important to observe three distinct symptoms:

First, in level flight—both upright and inverted—the wings should be absolutely level. If the outboard wing is up with the plane in one attitude and down when it's in the opposite attitude, you have a warp which must be corrected. If it's up both ways—or down both ways—tip weight should be added or subtracted as appropriate. This step assures that the static balance of tip weight to lift is correct for level flight.

Second, as accurately as possible it must be ascertained that the lead-outs are correctly placed. Improperly located lead-outs, especially if too far aft, can also induce hinging. A good ballpark criteria is to observe that the outboard wheel is visible just slightly aft of the inboard one in calm air (assuming that the landing gear is accurately aligned to start with). If, on any ordinary .35- to .60-powered ship, the midpoint of the lead-outs falls within 1¼ to 1½ in. aft of the CG when measured at the wing tip, you can consider it adequate for this purpose.

Third—and most important—you must consistently observe that the bottom of the outboard wing is visible on inside maneuvers and the top visible on outside maneuvers. Perhaps the most obvious place to observe this is in the intersec-