

**SUPER-DUPER PRODUCT REPORTS ISSUE**

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# SCALE **RC** MODELER

VOL. 4, NO. 3  
JUNE 1978  
PDC \$2.50



**FOCKE  
WULF  
FW-190A**  
Oldie but goodie

**WW II  
SPYPLANE**  
Lysander with color 3-views

**TWO TWINS:  
TIGERCAT  
AND C-47**



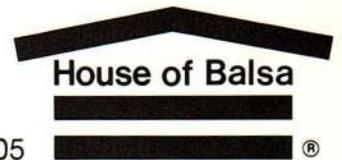
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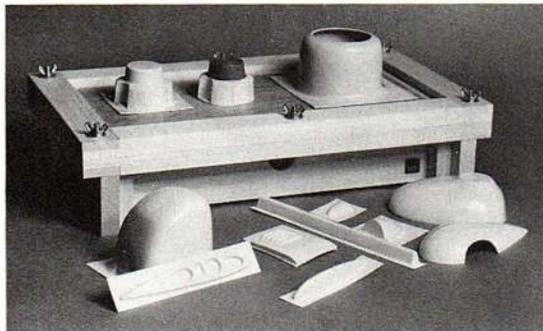
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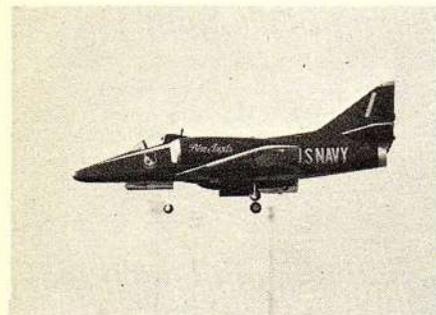
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**COVER:**

What better pose for a Sopwith Camel than this traditional post-landing position, so typical of WW I aircraft? Col. Bob Thacker's immaculately detailed biplane caught "doing its thing" for the camera. Model has been Grand Champion at several prominent contests. (J. R. Naidish photo.)

# SCALE R/C MODELER

VOLUME 4, NUMBER 3 JUNE 1978

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## Staff Report

Then we introduced the Specialist line of radios to the modeling public in the August '77 issue, we never thought that these systems would evolve into the successful series of radios they are today—a mere year after their initial release. Developments and improvements have occurred so rapidly that we felt it incumbent to “round out” our initial report with this update. We must frankly admit that, the more we examine the unique features of these units, the more ideal they appear for the scale flier's needs.

The radio that “does everything” is now even better. The Specialist Eight, which set the modeling world on its pots with such features as Exponential Rate (variable ratio of servo-to-stick travel) and an exclusive optional electronic mixer built right in, has been released as a single stick. And what a

single stick it is, too!

As one might expect from so innovative a company, Millcott has designed the stick so that the entire face plate can be rotated (within 30°), so that the pilot can comfortably cradle the transmitter—this also helps eliminate involuntary twisting of the stick's rudder control knob. In keeping with the Specialist's all-out emphasis on total reliability, the stick itself houses the complete pot assembly for the rudder (no fear of lost contact through wear or abuse).

The single-stick flier will really appreciate the well-laid out console of easy-to-reach secondary command controls located on the right side of the case. All knobs and levers are differently shaped, so that there's never any doubt as to which command or trim is being used. Aileron and rudder trims are out of the way, on the top of the case. They'll even install an optional secondary rudder command lever on the top of the case, thus

freeing the right hand for full concentration on elevator and ailerons.

As we pointed out in our full review of this unit in the August '77 issue, the roll, spin and throttle maneuver buttons are a great boon to precise flight control. The real forte of this radio is the smooth control response available from the Dual Rate feature (move the stick a lot and the servo moves only a little—the exact amount is fully adjustable on the control panel) capabilities of the radio.

The optional Exponential Rate feature desensitizes the stick around neutral, yet full servo travel is gained at the extremes of stick throw. Just envision how smoothly you'd fly if the ailerons and elevator could be “softened” around neutral!

The transmitter control panel offers great convenience. Flip a switch and the servo direction is reversed . . . tweak a pot and the servo travel is decreased. Too much throttle servo throw? Simply make a screwdriver

# “SUPER-RADIOS” REVISITED



The Specialist 8 channel unit offers all the “goodies” a scale flier could ever want, including Dual Rate or Exponential Rate, three maneuver buttons and a complete control panel.



The latest addition to Millcott's top-of-the-line 8-channels is the single stick transmitter. Note comprehensive control panel on side of case.

adjustment, even in flight, and everything is readjusted. You can trim out the airplane perfectly in a matter of minutes, and never even have to touch a clevis! Throw another switch and the optional electronic mixer couples two (three on special order) servos together for operations like coupled rudder and ailerons. The new single stick is a welcome addition to the already popular two-stick Specialist Eight.

A short time ago, Millcott revamped their standard 6 channel to be expandable into a deluxe Specialist Eight. The scale flier now has a "basic" radio with which he can grow, as his personal needs dictate. No more buying too much radio, or getting too little system for future growth.

Further than that, the Specialist Six already comes with Dual Rate, as well as an aileron maneuver control (Roll Button). This enables the flier to sample the joys of flying a deluxe radio, without having to invest in a full-blown

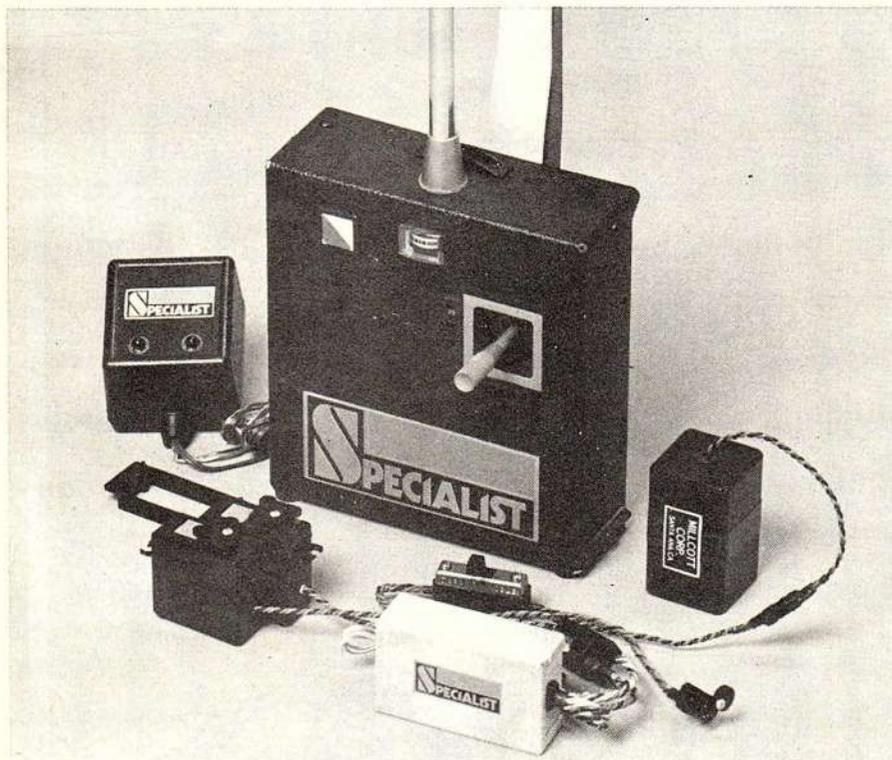
Specialist Eight. We believe that the Roll Button alone will convince you that the two optional buttons (Spin and Throttle) are certainly worthwhile having, even for sport flying.

Since the Specialist Six is essentially a "no-options" version of the top-of-the-line Specialist Eight (the mechanics and electronics are identical), the scale flier is getting one heck of a bargain in terms of radio design and engineering value per dollar. When you also consider that the factory can later add any of the optional features you desire, the long-term investment is certainly most appealing.

Here's an opportunity to get such custom features as all-metal open gimbals, crossed electronic trims, an interconnect cable that permits operation of *all* primary flight functions without generating RF, and matched servos. When you're ready, the radio can have numerous options added, such as Exponential Rate, one or two more maneuver buttons, or go whole

**An updated report on the radio system which offers a multitude of control capabilities to the scale flier.**

PHOTOS COURTESY MILLCOTT CORP.



The Specialist 3 channel is a cut above most "small" radios, with features like electronic mixer, full ni-cads and deluxe metal open-gimbal stick. A super deal for Schoolyard Scale.

hog and have the complete control panel added. This latter feature would permit reversing servos, adjusting primary controls right on the panel, and even provides an exclusive electronic mixer.

For the Schoolyard Scale clan, Millcott has introduced a nifty 3 channel that has some really impressive features. You get the same all-metal receiver that comes with the Specialist Eight. This "small" radio also features maximum-performance servos, full ni-cads and a superb electronic mixer. Obviously, this is not your run-of-the-mill plastic radio!

The compact - sized transmitter (5.15x5.6x1.8") is vinyl-clad metal, with a quality Dunham semi-open gimbal assembly. It's a single stick, too—not some weird two-stick affair. The trims are mechanical, and the Tx uses conductive plastic pots for optimum reliability.

This is the only 3 channel to come with an electronic mixer as standard equipment. Just flip a switch on the Tx and you can mix the primary stick outputs, for interconnecting rudder and elevator on V-tailed models, or as "elevons" (elevator/ailerons). At the discretion of the pilot, he may specify mixing of the auxiliary third function with the aileron output, for a "flap-eron" (flap/aileron) interconnect. Millcott will gladly custom-tailor the unit's mixer to your individual requirements.

The MC-2 servos are small enough to easily fit into almost any Schoolyard Scale model, yet they're powerful enough for .60-sized ships. The flier may specify either standard or reversed rotation servos.

Millcott guarantees all of its transmitter and receiver batteries for one full year. The flier can order the traditional 500 mah pack (flat or square), a special vibration-resistant 450 mah pack, or a compact 225 mah pack. This small pack permits operation of the airborne system (with 2 servos) for approximately 1 3/4 hours!

We've really just scratched the surface in describing these advanced radio systems. There are so many little "extras" that the only real way to appreciate the Specialists is to stop by your dealers and examine one up close. The next best thing is to send a buck to Millcott (1420 Village Way, Unit E, Santa Ana, CA 92705) for their comprehensive instruction manual, which details the complete operation of all their radios. Once you've checked them out, we're sure you'll concur that, for the specialized needs of the scale flier, the Specialist systems are indeed "super-radios." □

# SR/CM LOOKS AT ... HYDRALOCKS

PHOTO BY J. R. NAIDISH

Want retracts that will never fail again? These gizmos use hydraulics to improve the performance of that undercarriage.

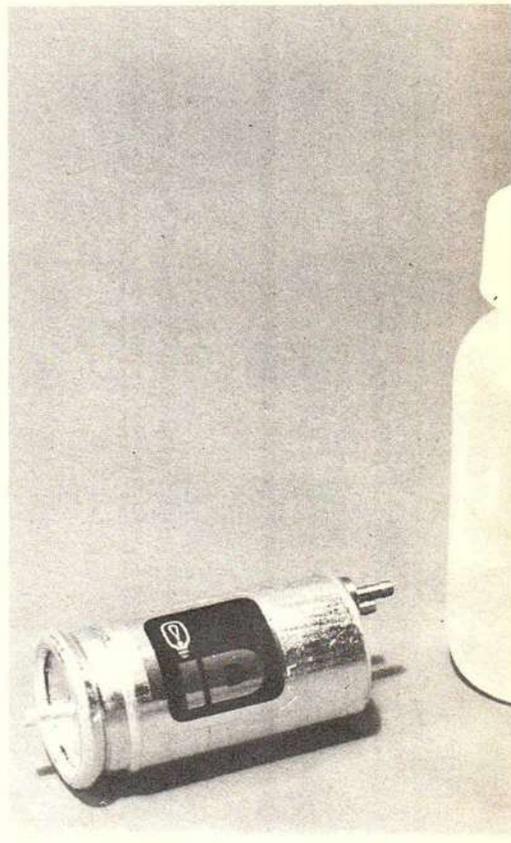
**N**ecessity is the mother of invention. The problem was air-operated retracts which sagged in positive-G maneuvers, or the proverbial gear that failed when that 13 lb. model landed a little crooked. A secondary annoyance was a scale undercarriage that whacked into the wing at Mach retraction speeds. Notice that this is all in the past tense. A little gadget, no larger than a film canister, now converts those unreliable, unscale-like pneumatic retracts into hydraulic-assisted devices.

The Hydralocks work on a very simple principle, by incorporating a neoprene bladder in a hydraulic tank to dampen primary motion. As anyone who has ever used a hydraulic jack or tool knows, a given amount of energy will do an amazing amount of work through fluid dynamics. A normal

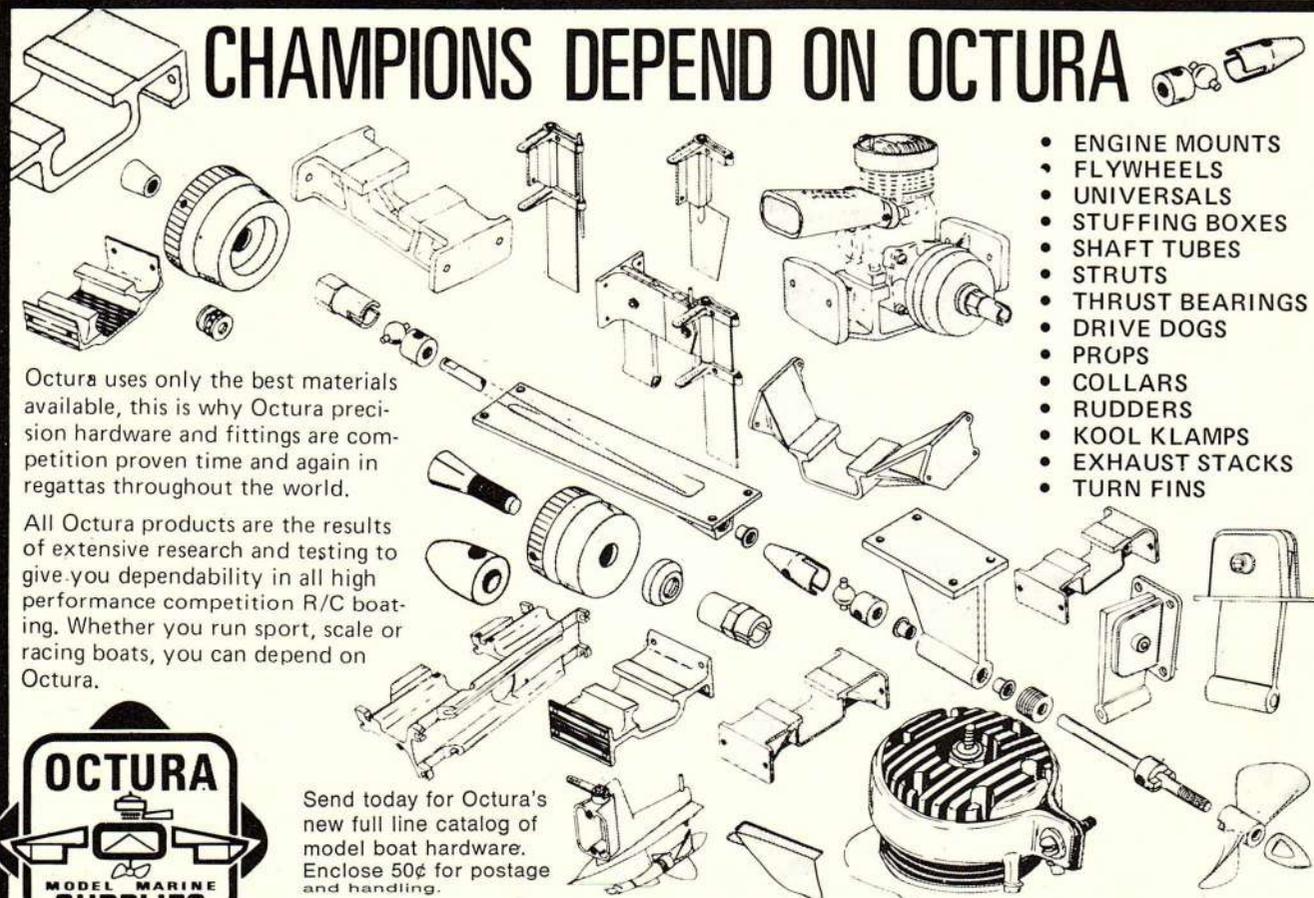
pneumatic retract system can be converted so that it has well over double that potential power, through an oil-operated interface. Thus, the gear down lock can be doubled (as can the up lock). With a Hydralock installed in the line, you'll literally rip the entire retract mechanism out of the wing before you can fold the strut.

Tricky undercarriage set-ups become practical with these 22x41 mm cylinders. The spindly legs of a Focke Wulf FW-190 become rigid. The long struts of a B-24 or AeroCommander Shrike lose all their slop. By installing them in a slightly different configuration (switching the hose lines), the up-lock can be supplemented, so that the wheels will never sag out of their wells. For complex gear problems, where both up and down locks need assistance, two cylinders can be incorporated.

The big advantage to scale aircraft is that the retraction speed can be controlled *accurately*, without having to diminish the pressure to the retract mechanism. Wheel collars are still used, but their effect is amplified be-



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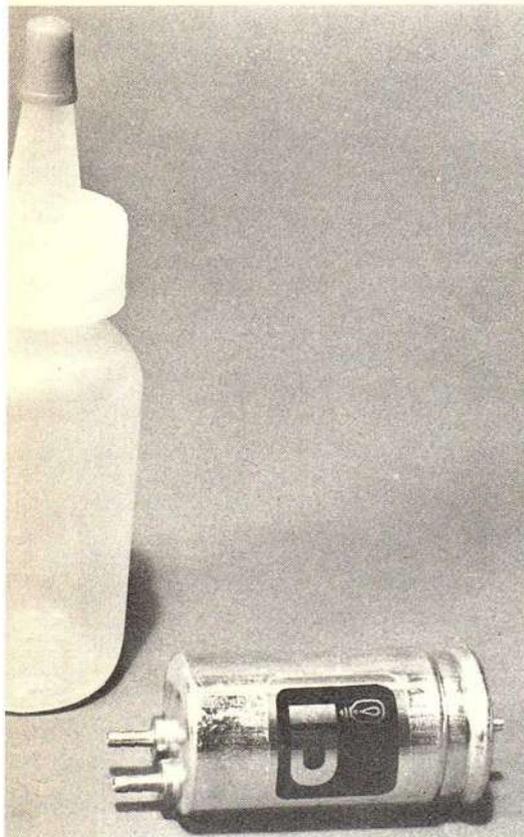
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cause of the dampening effects of the hydraulics. You can actually set up a retraction sequence that is measured in terms of minutes, without any loss of power to the gear mechanism! An ancillary benefit is that Hydralocks provide automatic and continuous lubrication to the O-rings in the pneumatic retracts—this is especially critical if you use freon, instead of air pressure.

Installation of the cylinders is extremely simple. A single cylinder replaces one of the T-fittings in the air lines (depending on whether you want an improved up or down lock.) On a trike gear set up, or where an extremely heavy undercarriage is being used, two cylinders are recommended. The cylinders are then carefully filled with transmission fluid, refrigeration oil or a comparable fluid. A handy filler bottle is supplied for this operation. When everything is set up properly, there will be oil in the Hydralock cylinder and in the lines to the pistons of the retracts. The line from the air reservoir to the Hydralock will still be full of air.

When the retract system is actuated, the air pressure forces the bladder diaphragm inside the Hydralock to expand, forcing the oil pressure to actuate the retract pistons. That oil pressure on the retract piston is analogous to a hypodermic syringe filled

with a viscous fluid . . . it takes some muscle to move that plunger.

A hidden advantage of this system is that, if you use a separate cylinder for nose gear (or a totally independent one), it can also simultaneously actuate turrets, flaps, sliding canopy, etc.

Hydralocks add an insignificant amount of weight to the retract system, and they are compact enough to be easily hidden in the wing or stuffed into a corner of the fuselage. They are ruggedly constructed of high-quality materials, so reliability should be no problem. It is important, for obvious reasons, that the O-rings in the retract pistons be in tip-top shape, but a well-maintained retract system will provide flawless operation. The maintenance to the undercarriage mechanism is reduced to almost zero, since the O-rings are continuously bathed in oil.

We're obviously highly impressed with Hydralocks. They're a simple and inexpensive solution to one of the most critical problems in scale aircraft operations. These little cylinders have done for retract reliability and performance what the IC chip did for servos.

Hydralocks sell for \$8.00 each (\$14.00 per pair) and are only available direct from Idea Development, P.O. Box 7399, Newark, DE 19711.

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# PUT A LITTLE LIFE IN YOUR

**Our second installment in this "how-to" series gets into the nitty-gritty of dolling up a realistic scale pilot figure. It's easier than you think!**

In our first installment (April '78), we discussed the basic concept of using pilot figures for not only their added aesthetic appeal, but also to hustle a few extra points in static scoring. We reviewed the basic types of figures available—there were a myriad of them, if dolls, military miniatures and the like are considered. Now that you have examined some basic references (library, art catalogues, etc.), and perhaps even done some experimenting with paints, let's jump right into the tools and techniques.

**LIGHT:** It is important to have adequate lighting while working on a pilot. Drafting lamps are ideal but high-intensity desk types are also useful.

The important point is that the subject be properly illuminated while it is being "operated on." Artificial lights all exhibit properties which subtly change the basic quality of colors. The most obvious example is a mercury street lamp, which removes all blue light from the spectrum. Most household light sources have been designed to correct colors, so the concern is more academic than real, but the perfectionist might want to take note of the light source being used. Most importantly, avoid harsh, direct lighting which may cast deceptive or unnatural shadows on the pilot's facial contours. Most of the textured effect of the facial expressions should be painted on.

**MAGNIFIERS:** Some sort of magnifier can be helpful, especially during detail painting. The headband type seems most efficient, and has fewer limitations than the stand-mounted or hand-held type. High-powered magnifiers tend to distort (we aren't trying to

inscribe the Lord's Prayer on the head of a pin!). A 4X magnifier is usually sufficient. Some portable magnifiers with built-in light sources are fine, providing they can be mounted in a vise so that both hands are free.

**BRUSHES:** Fine quality sable hair artist brushes, from an art store, are strongly suggested for pilot painting, as cheaper brushes will make good results difficult to attain. Three are desirable: One flat type, about 1/8" wide; one round, say a #4 or 5; and one small round, such as a number 0 or 00. Forget the super-small sizes, contrary to some opinions, they are not as efficient as a larger size with a perfect point. The ability of the brush to form such a point, may be tested with plain water before buying it. After all, it's your money! With care in cleaning, good quality brushes should last for years.

**PAINT:** It is *possible* to paint dummy pilots with virtually any type of paint,



# MODEL (Part II)

By Bill Hannan

as long as it is compatible with the pilot's base material. However, certain paints have characteristics more suitable than others. Oils take forever to dry. Model dopes attack plastic, and are usually available in very few colors. Acrylics are suitable, as are enamels, water colors, and certain specialized paints, such as Floquil. Military miniature shops stock paints formulated just for the purpose. Some railroad modelers, paints have exceptional flow qualities.

Regardless of the type, the paint should be of the matte (flat) variety, as nothing looks more toylike than a pilot with shiny skin! Even in the case of racing or military helmets, which may be glossy in full-size form, a semi-gloss paint will often be more convincing in model usage.

Straight from the bottle or tube, paints will seldom produce the desired results. Rather, they will need to be mixed with other colors, for more sub-

tle and pleasing effects. While serious miniaturists utilize a varied array of colors, the casual modeler can probably get by with flesh, white, red, black, brown and blue. The smallest available quantities will do just fine, and reduce costs.

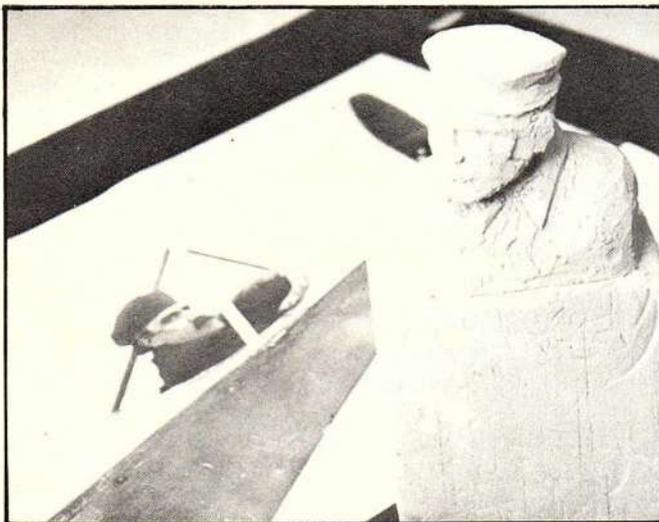


The Williams Bros.' Standard pilot fits most "classic" aircraft. Good molded detail make these ideal for practicing your painting techniques. (Warren Shipp photo)

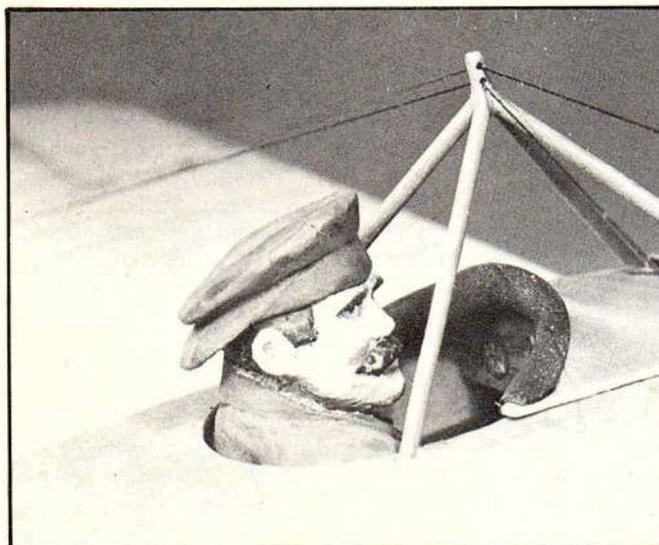
One other consideration, before we leave the subject of paint: If your pilot will be fully enclosed or protected, you will not need to be concerned about water or fuel-proofing. Otherwise, some sort of suitably resistant paint or fuel-proofer may be required.

**MIXING SURFACE:** A plain white dish or white enameled pan should be used for mixing colors, and as a palette.

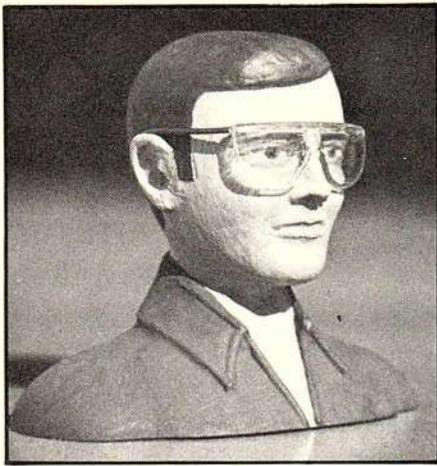
**PROCEDURE:** Our first example is a standard Williams Brothers pilot, to be finished in a straightforward manner, with no special alterations. First, the two halves are checked for fit. If necessary, the mating edges may be dressed down on a sheet of fine sandpaper, for a closer fit. Next, apply liquid plastic cement, join the halves, and secure with rubber bands while they are drying (preferably several hours). When dry, remove the bands, and scrape down any surplus plastic at the joint line.



Take a hunk of balsa and whittle away until you achieve a realistic likeness. The author carved this bust of Charles Nieuport (Edouard's brother) from a book photo. How-to sculpturing books from art stores are a big help in projects like this. (Hannan photo)



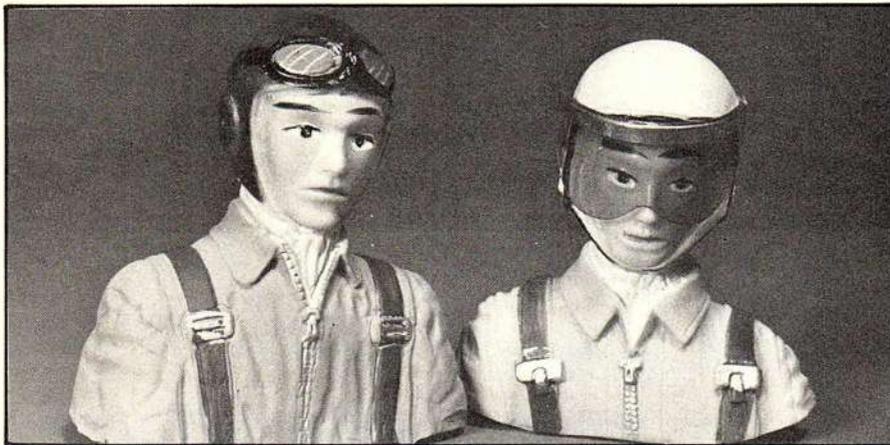
Fantastically realistic self-portrait by Don Typond began life as a Williams Brothers' off-the-shelf pilot. Extensive resculpturing, plus homemade harness, glasses and chute ripcord housing breathe new life into this standard accessory. (Typond photo)



Perhaps the most popular pilot figure is the Williams Bros.' Sportsman version. It lends itself readily to self-portraits, as well as to simple modifications. (Warren Shipp photo)



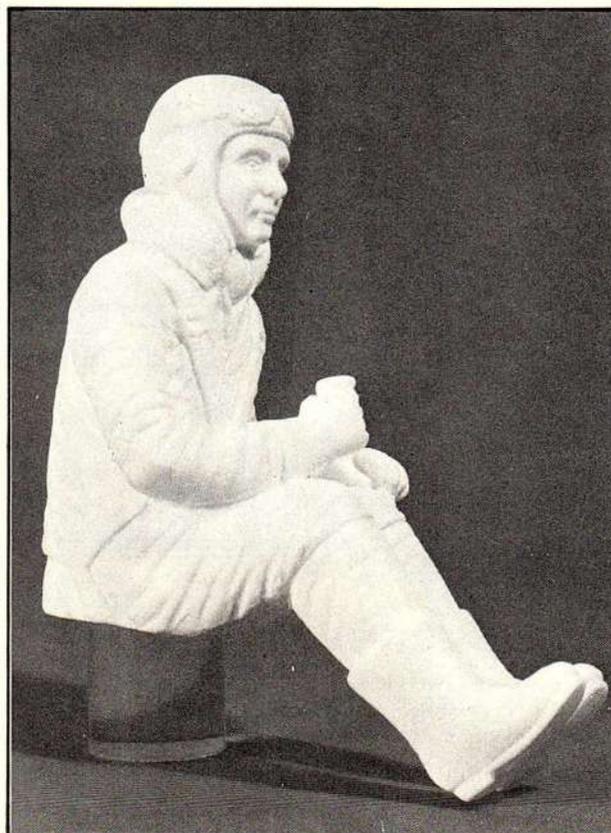
A decal and moustache make this Williams Bros.' pilot distinctive enough to appear personal. (Williams Bros. photo)



Guess what country these figures come from? The WW II and jet jockey are from

IM Products, as imported by MRC. (Naidish photo)

Full-length pilot figure by IM Products is now available through MRC. Legs are glued on at the knees, so that figure can serve as partial pilot only. (Naidish photo)



Next, scrub the pilot in a solution of lukewarm water and liquid detergent soap. This is to remove any traces of mold release, which might prevent proper paint adhesion. Allow to dry thoroughly. The pilot may be affixed to a small block of wood with double-sticky tape or rubber cement. This block will serve as a handle, to avoid the need for touching the actual pilot.

Since the pilot is molded in flesh-colored plastic, some builders simply add the features, paint the clothes, and go away whistling. However, greater realism may be achieved by painting the flesh areas as well, since human faces vary in color, and are not a uniform tone overall.

Select some color photographs to use as a guide, and keep a mirror handy as well. Rather than trying to call out exacting formulas for color, we suggest trusting your own visual perception to arrive at a reasonable approximation. If you miss it a little bit, so what? Start by placing a small amount of flesh color on your mixing dish. This may be toned to suit your preference, by the addition of a bit of brown, red, black or white.

Don't be afraid to experiment. You might care to dab a small amount of this onto your reference picture for direct comparison. (Remember that most paints dry a little darker) If satisfied, apply a uniform coating to the entire pilot face. Don't worry about any slight overlaps onto the surrounding helmet area.

Slightly darken the flesh mixture on your palette, and apply to shadowed locations on the pilot's face, such as under the jaw and inside the ears, etc. Refer constantly to your reference photos, and note that color transitions are generally gradual, not radical. Perhaps the cheeks will be a slightly rosier tone, or weather-beaten from years of exposure to the elements, depending upon the subject. Ideally, there should be a smooth blend from tone to tone. If the contrast seems too extreme between your adjacent colors, try flowing it together with a light application of thinned flesh color. With some types of paint, plain thinner can be brushed sparingly to blend the colors together.

The highlighted areas, such as the top of the nose, and forehead should receive slightly lightened flesh colors. By keeping the paints thin, and thus more transparent, it should be easier to achieve a realistic effect.

FEATURES: When it comes to the individual facial features, exercise restraint. Don't for example, make your pilot appear to be wearing lipstick (unless it's an aviatrix!). Lips are not as red as some may think. A very slight amount of brown or red added to the basic flesh color should do the job.

The eyes are usually stumbling blocks, even for fairly experienced ar-

tists. Again, study your reference photos carefully. Avoid at all costs, the staring "zombie" look that fairly shouts "amateur" at a viewer. As usual, the answer is subtlety. The amount of white showing should be minimal, and need not be pure white at all (but a slightly greyed white, for less visual intensity).

The colored irises of the eyes should be "quiet" colors, such as pale blue or pale brown, to avoid a "beady-eyed" appearance. Tiny dots of somewhat darker color may be added for the pupils. A very tiny white highlight may be added to each eye if desired. Some painters prefer to use a pen point for this.

Using a brownish flesh tone, add the color to the eyelids, which will reduce the area of the eyes actually exposed, considerably. Note that in some individuals, the eyes may appear as mere slits. Wide open eyes produce an alarmed or hypnotized look which detracts from naturalness. Too many model occupants appear as if in a constant state of terror but, considering the way some models are flown, the look may be genuine and appropriate! Note also that eyes need not be focused straight ahead, but can be looking to one side or the other . . . preferably both in the same direction, of course.

Muted tones of brown or dark grey are suggested for the eyebrows, as black is too potent, and imparts a heavy-handed effect. The same comment applies to hair, mustaches and beards, which incidentally are often variegated in color.

All right, the toughest part of the task is over, and you can relax by painting the clothing. For simplicity, the helmet and jacket may be painted the same color. A leather-like brown is quite suitable. As with the face, slight shadows (such as in the helmet creases) and the highlights may be added, by adding touches of black or white to the basic color, as required. The scarf may be painted in the color of your choice, as may be the shoulder straps.

**MODIFICATIONS:** To create a unique pilot from a commercial product, features may be carved down, or built up, using a suitable plastic putty. The head may be removed and repositioned to a different angle . . . after all, rubber-necking is one of the first rules of aerial safety! The cut of the clothes may be altered, straps removed, or a fur collar added. In fact, your imagination is the only limit.

\* \* \*

In the continuation of this article, we will delve into the art of converting toy figures, creating your own pilots from scratch, and touch lightly upon the subject of pilot installations in scale models. □

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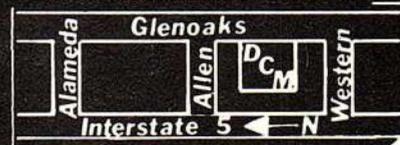
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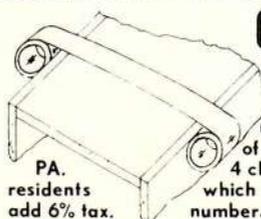
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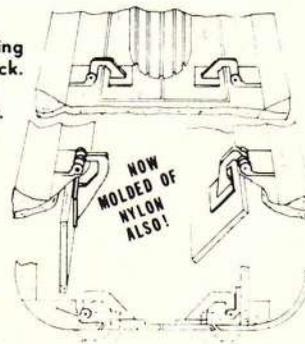
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The '78 Cannon Mini-Sport radios are a very tantalizing proposition. For the budget-minded, the prices are below many of the popular imports, yet there are custom features which put these radios a notch above some "deluxe" units. As we shall see later, the modeler can even opt for a kit version of any of these systems.

The radio is offered in five separate configurations, from two to five channels, in all single or two-stick modes. Since these are all developed around a standardized unit, the prices are at a bare minimum, because the manufacturer doesn't have to pass on the expenses of maintaining duplicate inventories and several production lines. Thus, the only difference between the basic two-channel, dry-battery equipped radio and the complete five channel are the sticks, a handful of components in the Tx and Rx, and the conversion to full ni-cads.

A secondary benefit is that the smaller two and three-channel rigs have the same sophisticated electronics as the five-channel system. Open

**Better and less expensive describe this new series of radios. In five different system configurations (from 2-5 channels), these units feature full expandability and top quality performance.**

Staff Report

up any Mini-Sport transmitter, and you'll find the same RF section for all frequency bands (they even have the European 29, 35 and 40 MHz spots, and the new Canadian 72 MHz crystals available). Pry open the compact receiver, and you'll be hard-pressed to distinguish the two channel from the five . . . no cheaper components or cut-rate circuitry.

Through this standardization and interchangeability concept, expandability becomes a very inexpensive proposition. Cannon will factory-

expand any radio for the difference in retail price of the units, plus a mere \$10.00. The ramifications of so inexpensive a modification are staggering, since the modeler can start with a very basic radio, then expand the unit when the need arises . . . and pay only ten bucks as a premium for this versatility.

Here are the optional configurations for the Mini-Sport. The nifty two-channel unit is a single-stick (all dry cells), so that the Schoolyard Scale aficionado doesn't have to come to terms with any awkward two-stick set ups. Add a throttle lever as the left stick and you've got a three-function system (ni-cads optional). By installing another of the Dunham open-gimbal assemblies on the left quadrant, the radio becomes a full-blown four-channel rig (with ni-cads), and a toggle switch added yields four-plus-re-

**The Mini-Sport five channel features open-gimbal transmitter, new high-capacity battery pack, small servos and a compact receiver . . . all for a price that's almost too good to be true.**

# CANNON'S MINI-SPORT SYSTEMS

PHOTOS BY J. R. NAIDISH



tracts. The four or five-function systems can be ordered with a three-function single stick mounted on the right quadrant (the left stick assembly then has a throttle stick only). Naturally, the two-stick flier can specify Mode I or II. Cannon states that they will gladly custom-tailor a unit to fit any special needs.

So, you say, exactly what do I give up by going to the Mini-Sport radio series? Actually, you relinquish almost nothing, and you do gain some rather significant plusses. These can best be appreciated by a run-through of our five-channel test system. Since all the systems are derived from a set standard, the comments apply to any of the configurations enumerated above (with the exception of dry-cells in the two-channel unit).

The transmitter is really compact (1 11/16 x 4 13/16 x 5 5/16"), and is molded of hi-impact plastic. The aluminum-accented Dunham open-gimbal sticks give the unit a nice look (trims are mechanical). All systems feature a meter, which reads both voltage and RF. The recessed on/off switch is a nice safety feature. A new 48" antenna replaces last years 54" one, and this helps give the Tx a very nice balance in the hand . . . even our gorilla-sized mitts felt comfortable with this diminutive transmitter. The case is so small

that the single-stick flier can hold the Tx as if it were a two-stick, operating the left stick throttle easily.

Internally, the transmitter operates on 9.6 Volts (more on Cannon's new 500 ma ni-cads later). All the components are mounted on a single board, with the RF and encoder components on the right end and the channel logic on the left. The components are nicely and logically laid out (something the kit builder will appreciate). You'll find no ICs here, for the manufacturer has gone to discrete components for optimum reliability (I know, that sounds like a contradiction in terms!). Most IC encoders drop out at 6.5-7 Volts, but the Mini-Sport was found to be capable of putting digital logic on the airways down to almost 2 Volts! Naturally, the system isn't 100% solid at such critical voltages, but you could theoretically get enough signal through to land the plane.

This radio is noteworthy for its brute RF output. This is one of the few radios we've used that delivers the maximum allowable 750 mw. That can do wonders for range, or to punch through a signal at an electronically "dirty" flying site.

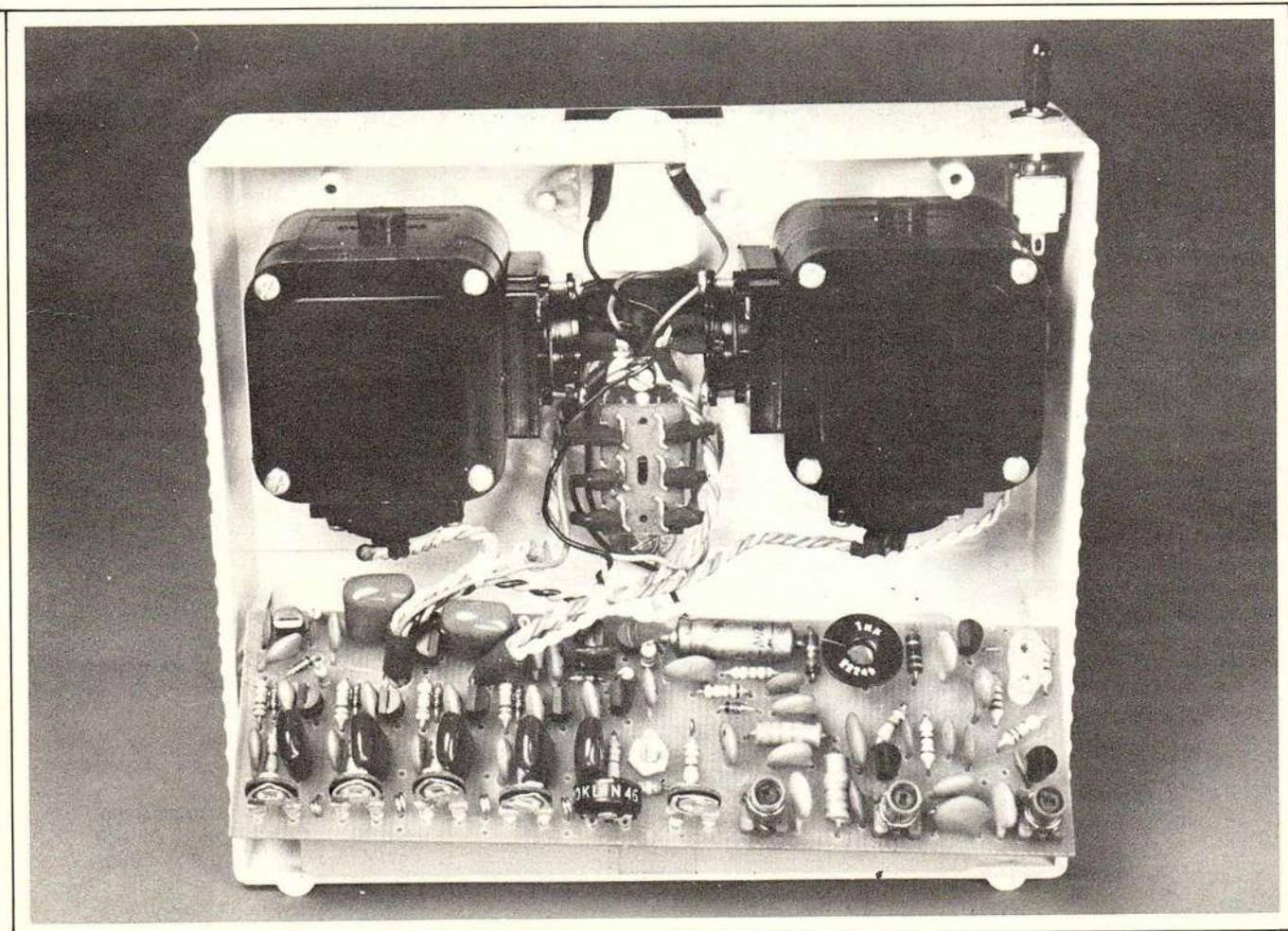
That 3/4 x 1 19/32 x 1 27/32" receiver is a marvel of radio technology. Inside that tiny case are the electronics of a double-tuned, voltage regu-

lated dual-FET front end, dual-AGC receiver, utilizing an 8-bit CMOS shift register decoder (two and three-channel systems have J-K flip-flop decoders). All this is achieved with a nominal current drain of 8 ma., and a package weight of about 1.15 ozs.

We've heard some comments about receiver problems with older Cannon units, and the manufacturer is the first to admit that some of the units shipped several years ago had headaches. Old impressions and rumors die hard, and we can only say that these new-generation receivers are sound. We have three of last year's systems which are still going strong, and our new Mini-Sport has noise rejection that surpasses some of the most expensive receivers we've tested.

One strikingly convincing test which really brought home the integrity of this system was to pit the Mini-Sport against Cannon's 1977 model of their top-of-the-line Gran Prix . . . operating both transmitters simultaneously! The Gran Prix Tx was tuned to be compatible with the Mini-Sport's receiver,

**The insides of the Tx reveal a single board for all components. With 14 components per channel, this radio makes a great candidate for the kit builder. At 750 mw output, the Cannon packs a real wallop in today's 350 mw world.**



then it was turned on while the Mini-Sport's transmitter was actually flying the receiver. The superb selectivity of the receiver showed its stuff, and that 750 mw transmitter output didn't hurt either. The system continued to fly the plane, with never so much as a twitter of a glitch.

In all fairness, it must be mentioned that the '77 Gran Prix transmitter put out only 350 mw of power (comparable to almost all other current radios), so the test is analogous to pitting the Mini-Sport against most any other radio brand. Cannon has since upgraded all their systems to deliver that magical 750 mw.

The flier has two servo options. The "larger" (and we use the term advisedly, since they measure 23/32 x 1 3/8 x 1 1/2") CE-4 servos weigh a scant 1.25 ozs. For the flier who needs plenty of thrust, these beauties deliver four full pounds of static thrust. With a transit time of .5 seconds, these servos draw only 6-8 ma. (static).

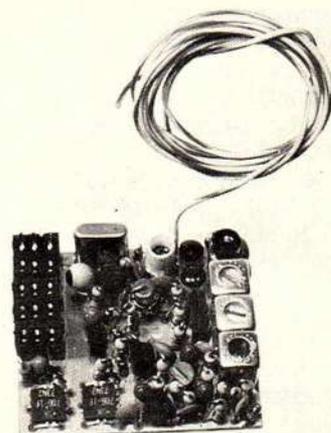
If you're into Schoolyard Scale sized aircraft, the mini CE-8A servos are super-small (19/32 x 1-7/32 x 1-7/32"), and weigh only .75 oz. The transit time is a tad slower than the CE-4, at .6 seconds, but the thrust is 2.5-3 lbs. at a current drain of only 6-8 ma. These are the same servos we tested in our Cannon Super-Mini review last

year (February '77), except that the 8 ohm motors have been replaced with 12 ohm ones to reduce current drain. The new motors also give more positive centering and smoother transit. Both servo styles feature the proven TI 28604 IC chip.

One of the biggest innovations in the '78 Mini-Sport radios are the nicads. While most manufacturers are "making do" with derated cell values (and thus, shorter flying times), Cannon has upped the mah ratings on all their batteries. These G. E. high-capacity cells are still AA-size, and Cannon lists them at 500 mah. In actuality, these are derated 600 mah batteries, and they deliver a true output of 550-600 mah in normal use. That's 10-20% more flying time!

In the smaller sized battery packs, Cannon has switched to Sanyo cells. Their 450 mah pack is a true 450 milliamperes-per-hour. The 250 mah pack is physically slightly reconfigured, and it now delivers 25 ma. more than last years 225 mah pack.

As can be seen, the airborne systems offer wide varieties of configurations. The flier in the market for an economy 2-3 channel no longer has to take what the manufacturer supplies, but he can select his servos and battery pack. Typical three-channel airborne weights are 8.8 ozs. (CE-4



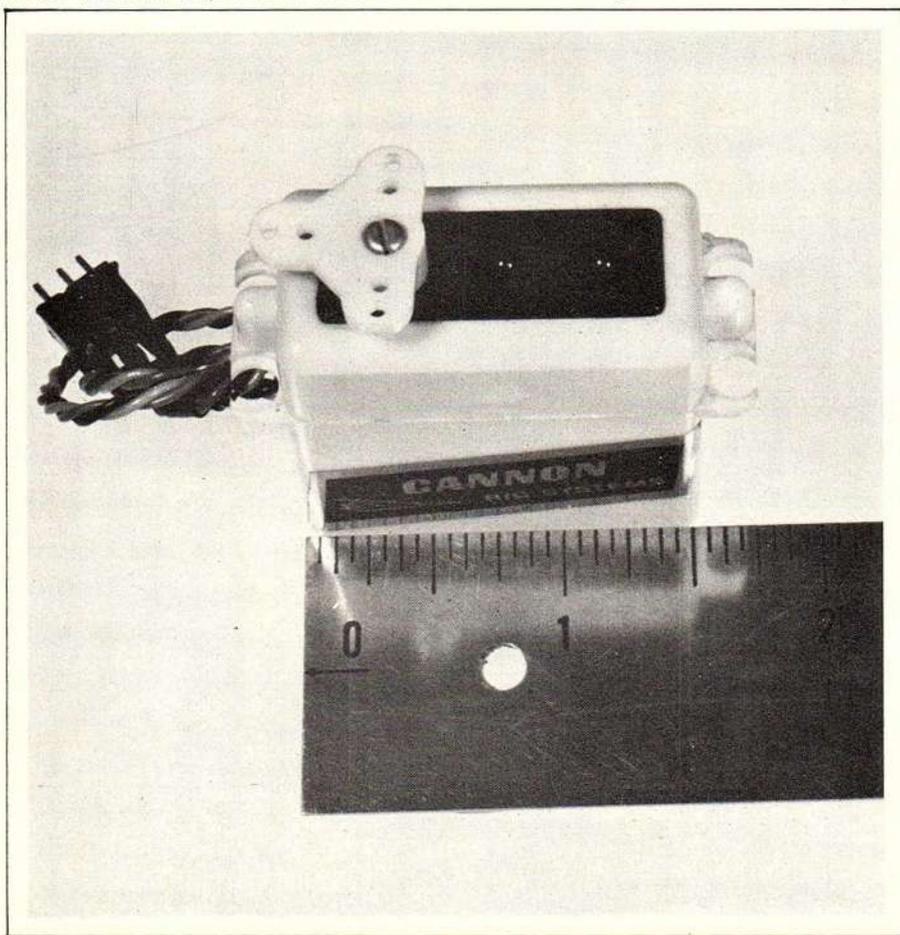
**CE-4 servos are small, as shown here, but Cannon makes an even smaller CE-8A for the Schoolyard Scale crowd.**

servos and 500 mah pack) or 4.8 ozs. (CE-8A servos and 100 mah pack). They are still among the lightest airborne systems available today!

Our test system, which was obtained off a dealer's shelf, performed flawlessly. As was noted, the receiver came through with flying colors, and the servos behaved admirably. The servos tracked right with the sticks, with immeasurable deadband and very positive centering (within 1/16" on a 7" arm). We were never left with the feeling that we had compromised our standards of radio quality with the Mini-Sport, even though the price was pocketfuls lower than other five channel systems.

Cannon has prepared an impressive 28-page brochure which illustrates the complete radio line. Available upon request (send three 13¢ stamps), the catalogue details all the radios, including the Gran Prix and Super-Mini series systems. We have been in-

**The receiver board features Dean's connectors. Double tuned, voltage regulated dual FET front end and dual-AGC receiver is one of the most advanced in the industry. Current drain is only 8 ma.**



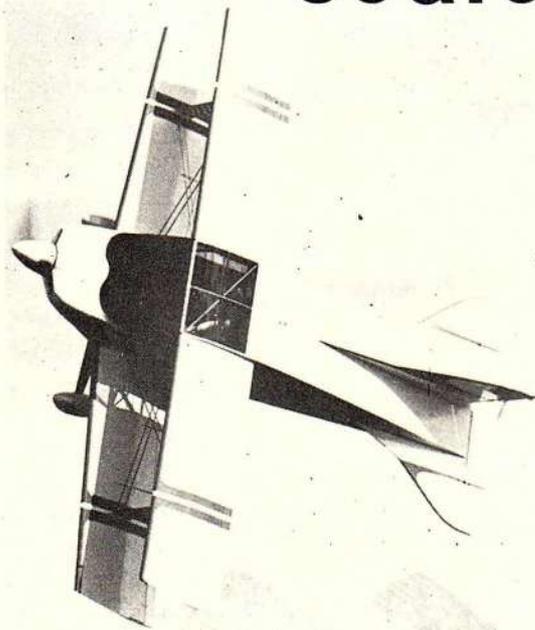
formed that the first one hundred customers to order a Mini-Sport will receive a polyethylene packing case at no extra charge. This briefcase is handy for transporting the radio, or it would make an ideal tool box. A little icing on an already tempting cake!

As mentioned at the beginning of this article, the do-it-yourselfer can build his own Mini-Sport. Cannon has authorized Charlie's R/C Goodies to be the agent for these kits. Not only total systems, but servos and other accessories are also available in kit form. Cannon pioneered radio kits years ago with such innovations as using a factory-built servo to tune the Tx. These new kits are simple to put together, and they're amazingly inexpensive. These kits are identical to the factory production models, but are distinguishable by their light oak colored cases. Obviously, the color of the radio is different so that fliers won't mistake someone else's handiwork (or mess) with the high-quality fabrication in the factory-assembled radios. If you have the know-how, and want a great radio for a minimum of dollars, write for prices to: Charlie's R/C Goodies, P.O. Box 192, Van Nuys, CA 91408.

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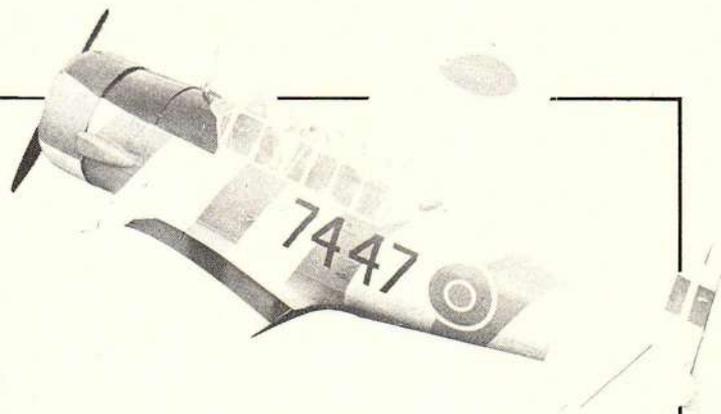
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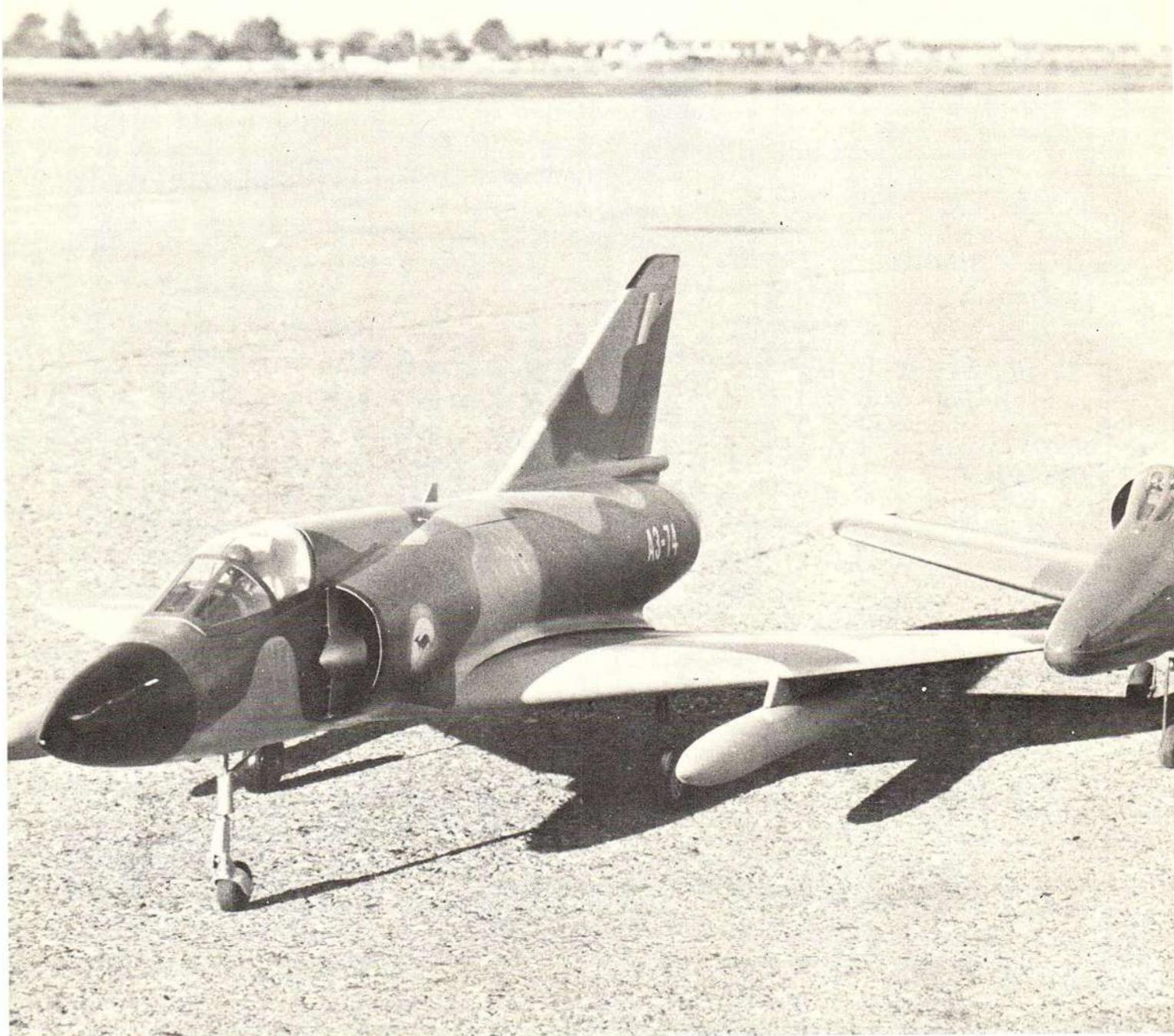
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# FANTASTIC FANOMENON

By Patrick H. Potega, Executive Editor

THREE DUCTED FANS IN THE AIR  
SIMULTANEOUSLY. A PAGE OF MODELING  
HISTORY WAS WRITTEN THE DAY A TRIO OF  
FAN JETS TOOK OFF IN A RACEHORSE START.



**T**he scream of three K&B 6.5s revving at over 22,000 rpm sent chills up the spine, like someone scraping a fingernail on window glass. The low slung trio of jets looked deceptively innocent as they sat on the runway, the jet blast from their tailpipes being the only visible sign that they weren't merely parked. It was indeed a momentous occasion in the annals of modeling history, for the ships were about to make a racehorse start, in the world's first simultaneous flight of three fan jets.

The thought of the magnitude of the occasion was staggering. We thought back to the early days, when Bob Violett flew his Sundowner—way back in '68. The Scozzi Turb Ax I fan was a new gimmick then. Today, that fan was improved, and installed in Bob's

A-4 Skyhawk. The blue and gold scale version of the "Blue Angels" aerobatic jet looked most convincing. We've come a long way, baby!

Next to Bob was Larry Wolfe. Larry's been a jet devotee for years, and he's tried almost every design and fan combination imaginable. Some worked, but most were only partial successes. As the proprietor of Larry's Jet Hangar, he's sort of made ducted fans his byword. Today, the new Mirage which he and Dave Lindsay co-designed, was poised on the runway, chomping at the bit to get airborne. Done up in Australian markings, the jet looked lethal.

But the real success story of the day wasn't these two seasoned veterans . . . they knew their stuff from years of bitter-sweet experience. Standing

out there with the big boys was Al Arnold. His background is certainly what one would call average. Before he set out to build his A-4 from the Violett kit (it took him a little over two weeks to finish the plane!), he had built exactly five R/C models. The Skyhawk was only his second scale project, and his first fan model. Could this upstart cut it with the big boys?

This wasn't the first flight of the day for any of the pilots. Larry had arrived early, to check out the Mirage. True, the ship had over forty flights under its belt, but there was no mar-

---

**A trio of high-performance jets. Larry Wolfe's Mirage (left) is available as a semi-kit, while the two A-4s, by Al Arnold and Bob Violett respectively, were built from the Violett kit.**

PHOTOS BY J. R. NAIDISH



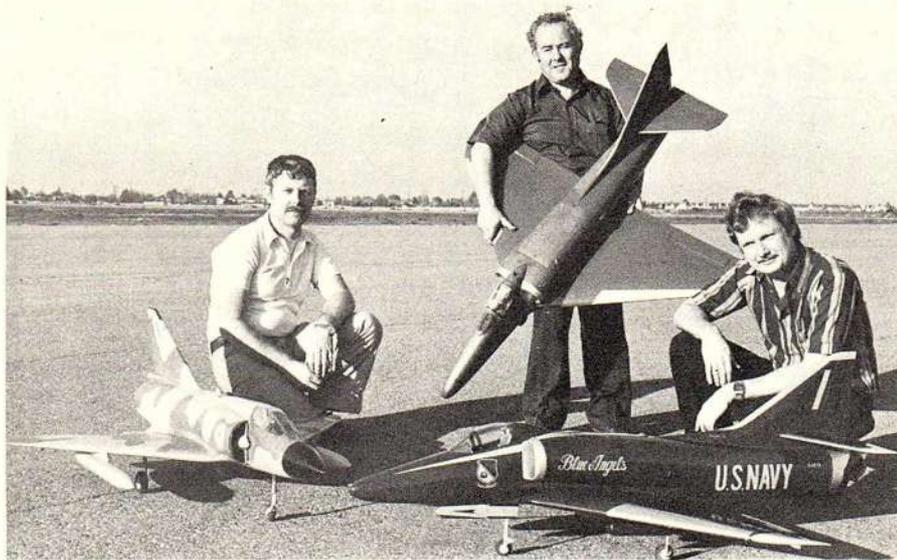
gin for error in today's program. The Mirage is a near-ideal design for fans. The 60" span delta wing sports 715 sq. in. of area. At an amazingly heavy 10½ lbs. (forthcoming kit versions will be somewhat lighter), the wingloading is a reasonable 32 oz./sq. ft.

The Mirage was designed as a no-fuss fan model. Something that builds quickly (fiberglass fuse) and can be flown on weekends, without any exotic hardware. The Scozzi unit is stock, and is fitted to a rolled 1/64" plywood tailpipe to keep the exhaust air straight and laminar. The K&B 6.5 runs on a rather docile brew of 25% Nitro fuel, and the engine is equipped with a Perry pump and racing carb. Two eight ounce tanks buried in the wing supply ample fuel.

There's nothing tricky about the Mirage. Sure, there's an OPS tuned



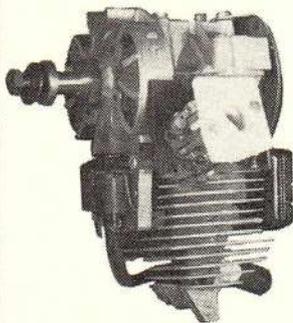
Wolfe's Mirage caught midway through a roll.



pipe (with muffler canister) but in today's piped pattern ship world, that's no big deal. Some modelers may cringe at the thought of a power plant turning 22,500 rpm, but that's what it takes to get that fan to displace enough air to fly the model. The engines are certainly up to the task, and it's really a matter of getting used to tuning the needle for that just-right howling sound.

As far as field maintenance is con-

Three names in the ducted fan record book. Larry Wolfe (left) and Bob Violette flank the true hero of the day, Al Arnold. As can be seen, they all took their birds home without even a scratch.



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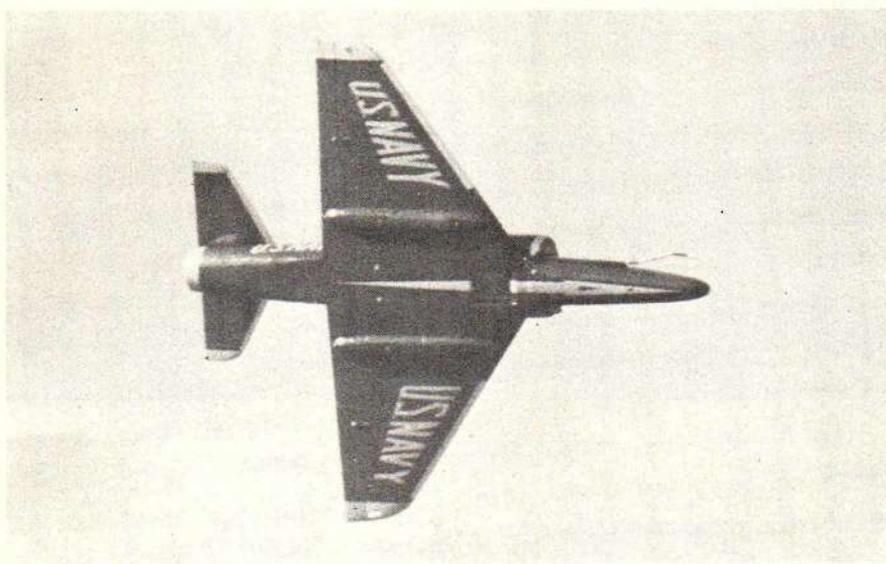
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cerned, these models can be treated like any sport ship. Larry hand starts the engine by flipping the spinner backward against compression. The engine actually misfires, then kicks forward through the correct compression stroke. Balking engines are started boat-style, with a starter and belt. The engine sucks air through not only the scale air intakes on the fuse sides, but also through a "cheater" hole in the underside of the wing. Once running, one can grab the tail and get a feel for the thrust that the Scozzi Turb Ax I develops . . . it took some muscle to hang on!

The Mirage was throttled down and neatly taxied onto the runway. Takeoff acceleration was immediate, and the fighter was off in less than 200 feet. No wobble into the sky, like some lame stork, the jet climbed out at a re-



A slightly blurry record of the big moment. Violett's A-4 claws for the sky, as Larry Wolfe's Mirage begins to rotate. Al Arnold's Skyhawk is right behind them, out of the picture.



spectable 30° angle. On the first pass down the runway, the Mirage was already doing slow rolls. On the second pass, Larry half rolled inverted, then pushed the nose down (up) into a perfect reverse Immelmann. The vertical capabilities of this bird are frankly amazing!

As Larry landed the Mirage (he even taxied back to the pits), Bob Violett arrived with his brand-new A-4. He had just completed the model from his own kit, so he wanted to get in a trim flight before the attempt at the

Violett's Skyhawk did superb axial rolls.



Mig-21



F-16



F-5



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That's scale realism! Violett's A-4 even has the gear rotating forward, as per the full-size Skyhawk.



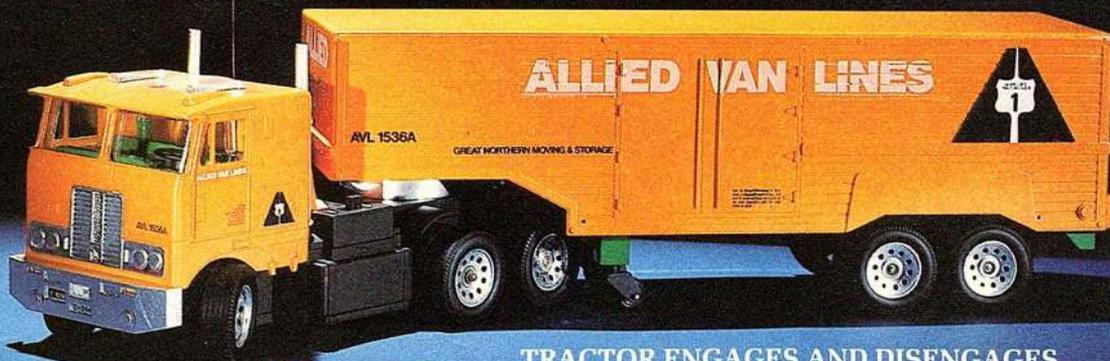
Wolfe's Mirage is done up in Australian markings.

three-plane flyoff. The Skyhawk is a compact machine, with its 57" span wing packing in a generous 660 sq. in. of area. At 8½ lbs., the sleek model definitely falls into the lightly loaded class. One of the real "secrets" of a good fan model is to build the airframe light, light, light!

Bob also runs a stock K&B 6.5, with Perry Pump and carb (the Turb Ax 1 can be ordered with the engine, pipe and all necessary equipment already installed). Being a pylon racer at heart, Bob prefers 40% Nitro fuel, which gives him well over 22,000 rpm. The A-4 is retract and flap equipped, with the undercarriage folding forward in true prototypical fashion. The Skyhawk is certainly one of the best looking sport scale models we've seen . . . unmarred by a prop on the nose, it really looks exciting on the ground and in the air.

Violett doesn't believe in taxiing all over the place. As with a full-size jet, a small stone sucked into the impeller blades could wreak serious consequences. Once on the runway, the A-4 wasted no time in getting airborne. Nose high, it literally skyrocketed off the ground. Within a few passes, Bob had the ship doing all the maneuvers. The rolls and loops were of contest  
(Continued on page 80)

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The Gooney Bird poses with a few of the Challenge "Warbirds" fleet in the background. B-26 currently being restored, while BT-9, Kate and glimpses of a Zero can be seen further down the flight line.

# WORKHORSE WITH WINGS

By Dick Hager

PHOTOS BY J. R. NAIDISH

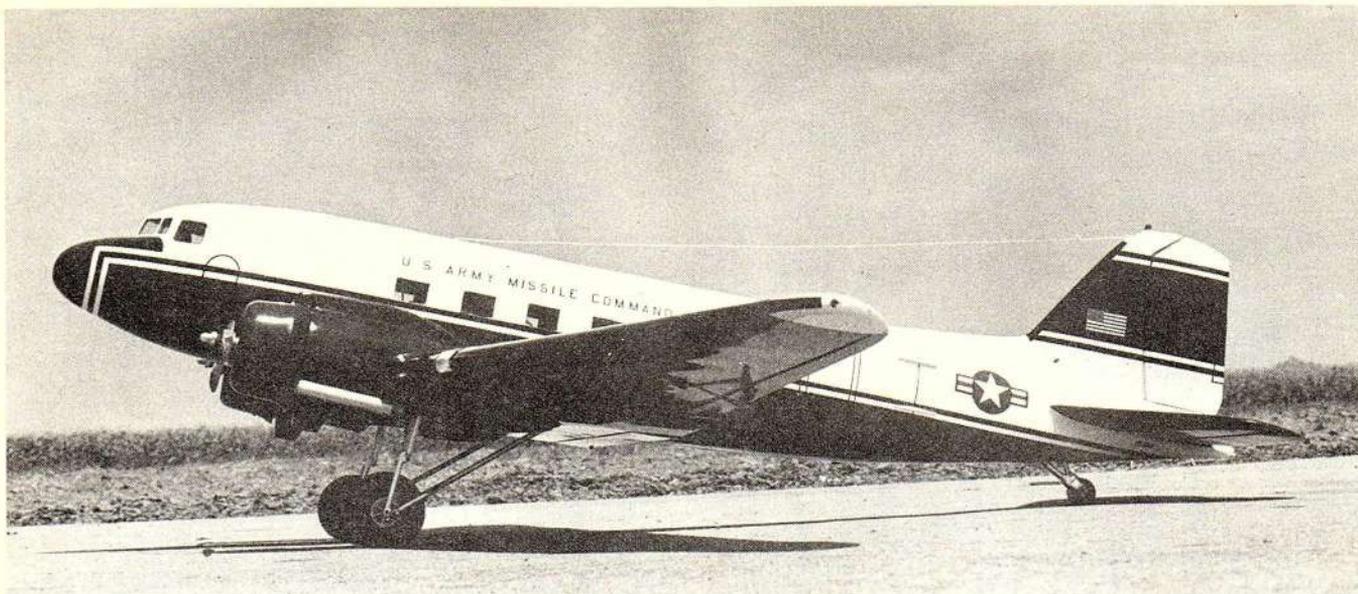


When General "Hap" Arnold went looking for an "aerial mule" to haul military personnel, equipment and supplies, it only seemed natural that he should turn to his close friend Donald Douglas for an acceptable design. After all, hadn't Douglas single-handedly reversed the plight of the floundering airlines in the mid-thirties with the DC-2 . . . then topped himself with the inimitable DC-3? These "silver fleet" ships had pioneered the safety and practicality of twin-engine, all-metal, cantilever-winged aircraft. They

**Royal Products' GOONEY BIRD makes an excellent model of the famed Douglas C-47. As a competitive aircraft, the scale SKYTRAIN shines as a beautiful replica of the "Proud Lady of the Airways."**

proved that flaps, foot-operated brakes and variable-pitch props were mandatory equipment (they even showed in-flight movies . . . in 1934!).

And what a workhorse the "Proud Lady" proved to be in her new-found military livery. "Gooney Birds" (over 10,000 of them) performed near miraculous feats, as they hauled everything from phone cables to other airplanes in all theatres of war. The "Sky-



**The author's C-47 (R4D), prior to its first flight, still lacks navigator's observation blister and various antennas.**

train" (or "Skytrooper," depending on which of the over fifty variants you're referring to) was modified, butchered, mid-aired, shot up, patched and re-patched . . . and it still kept hauling cargo. They towed gliders twice their size then, with engines removed as the XCG-17, they towed themselves as gliders.

So good was the "Dizzy Three" that, like the Corsair, it lived on even after the war. Reconfigured as DC-3s, the planes were pressed back into commercial transport service on numerous trunk lines. They were decked out as plush executive aircraft, and even re-

**Tail high and heading for a successful flight at the Nats, the Gooney Bird's coupled rudder and throttles make ground handling a cinch. See text for details.**

juvenated as attack ships in Vietnam. Over forty years after the original design took to the air, the proud lady is still flying on seemingly ageless wings. One DC-3 logged over 90,000 air hours (equivalent to 10¼ years of 24-hour-a-day flying)!

It's no wonder that General Eisenhower wrote of the Gooney Bird that "Most vital to our success in Africa and Europe were the bulldozer, the jeep, the two-and-a-half-ton truck and the C-47." Paradoxically, none of the enumerated items were originally designed for military purposes! For adaptability, longevity and performance, the Douglas DC-3/C-47 was truly a workhorse with wings.

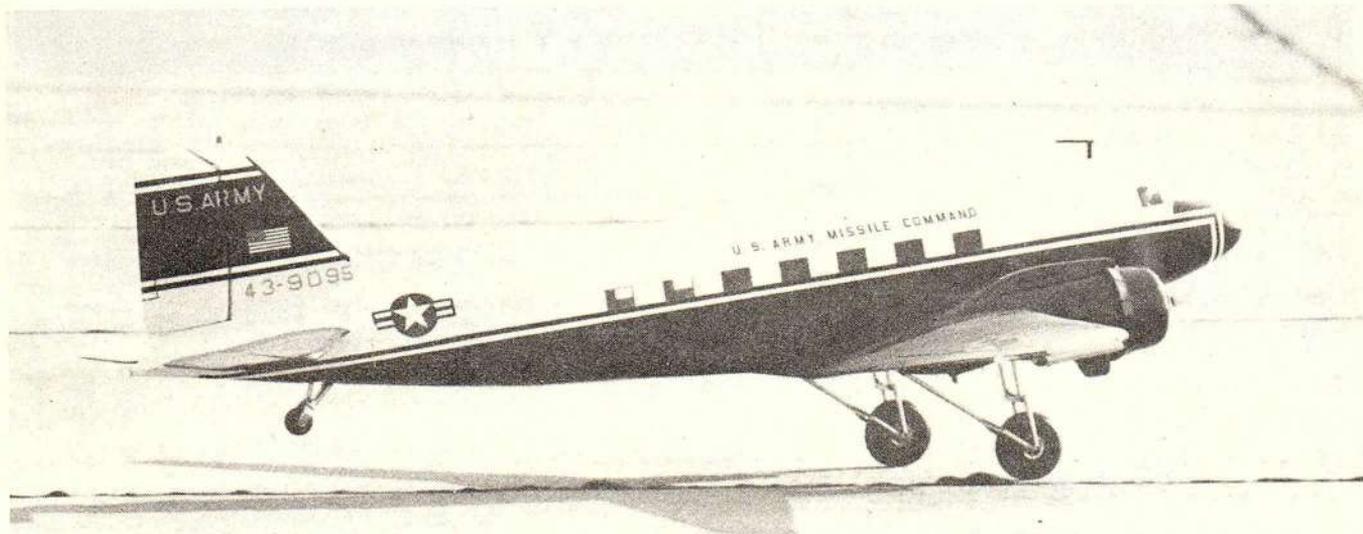
\* \* \*

My model's prototype really began (or rather continued) its existence during the Douglas design's 40th anniversary, when the U.S. Army Missile Command had thirty R4Ds (Navy designation for the C-47) commissioned

at Redstone Arsenal. The blue-and-white paint scheme looked better than most color arrangements, so I decided to pattern my Royal kit after one of these ships.

The all-balsa kit is noteworthy for the quality of its wood—even the die-cut plywood is cleanly done. The package is most complete, with the usual hardware included. The plans are sufficient for the experienced builder, and the printed instruction sheets are a big help. This is a model of medium complexity, of course, and Royal had done much to keep construction as simple as possible. One particularly bad error on the plans eventually caused me to crash the plane at last year's Nats . . . as we'll later discuss.

Being a perfectionist, I disregarded Royal's retract system and engineered a very complex system which would yield exact-scale retraction speeds (45 seconds!). This feature precipitated the aforementioned wipeout, as we shall later see.

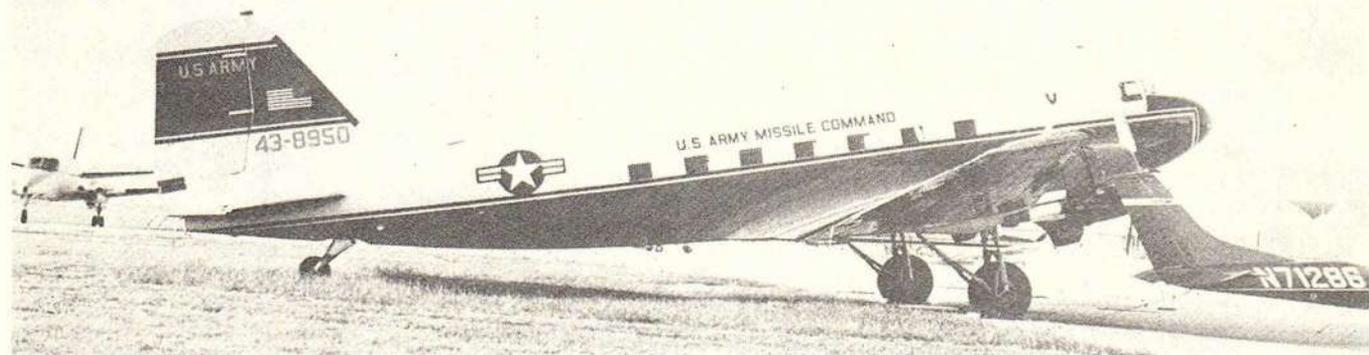




With lines like that, it's no wonder that the DC-3/C-47 was known as the "Proud Lady." Text describes some of the author's interesting personal mods to the fine-quality Royal kit.

Had the author done his homework when documenting his ship, he might have run across this photo of the model prototype's sister ship, as it appeared

in July '74 AIR CLASSICS magazine. Caption then clearly described color scheme as O.D. and white. (SR/CM file photo)



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You better like sheeting, for the Royal kit has more planking than there are flies on a Tijuana hot dog. I immediately dismissed the half acre of 3/8" x 1/2" strips supplied as masochistic, and I cut my own wider pieces. These were soaked in water then pinned in place. A water-soluble white glue is imperative for this operation.

I made the mistake of not starting out with a matched set of power plants, which was like wearing brown pants with a black tuxedo . . . both tend to make you look a little foolish, but doing donuts on the runway while trying to get airborne is definitely more embarrassing. The nice guys at K&B really were most considerate in helping me correct the power problem, and they personally reworked the two .40s until they were within 100 rpm throughout the throttle range.

Much to my amazement, the ship still hunted all over the runway. After a little research, I learned that the full-sized ships had very insensitive rudder control until the tail came up. Normal procedure was to juggle throttles. I thought of separate throttles, but the model was already a handful without this added control complexity. The crazy idea of coupling rudder and throttle somehow struck me as a logical approach to the dilemma.

I engineered an "elevon style sliding servo tray for the throttle servo, then ganged two rudder servos, via the traditional "Y" harness. As the sketch shows, I used a reduction bellcrank, so that the sliding throttle servo traveled only about  $\pm 3/32"$ . As it works out, the amount of differential to the throttles is maximized at low throttle, and at a minimum for high throttle. This makes it ideal for coordinated take-offs. The system worked so well that

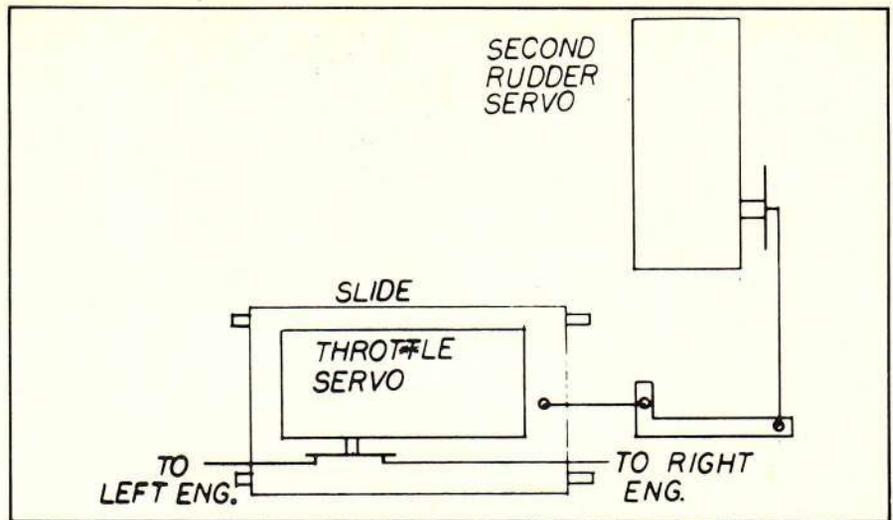
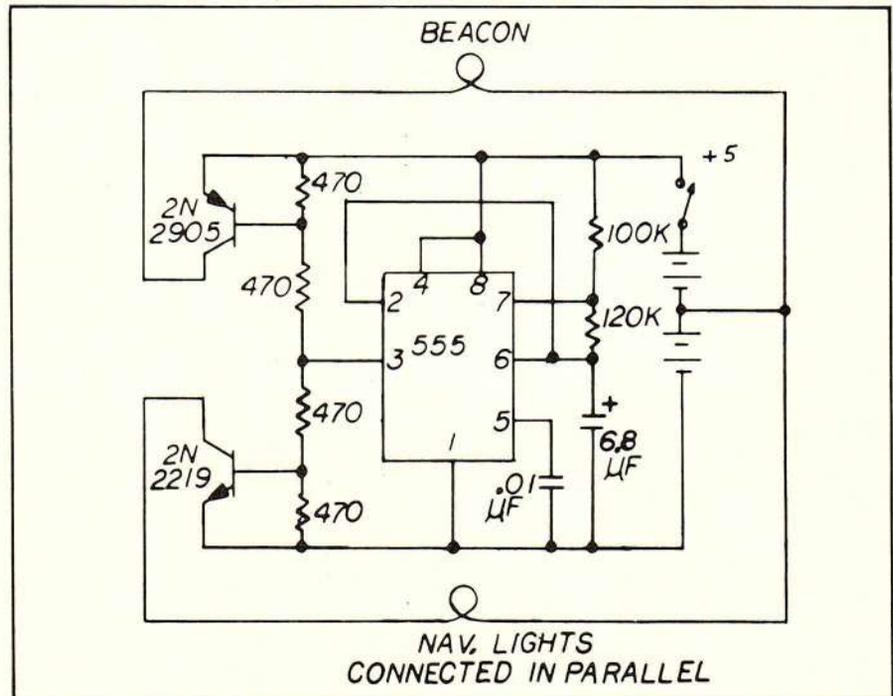
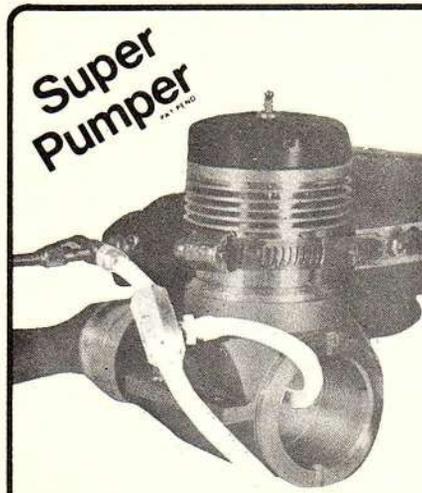


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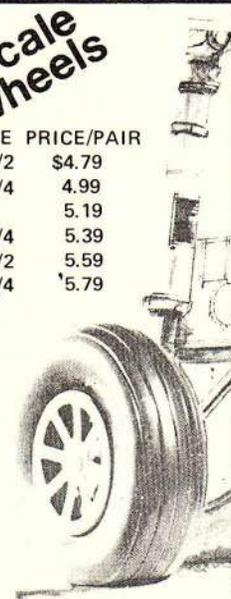


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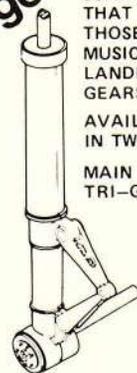
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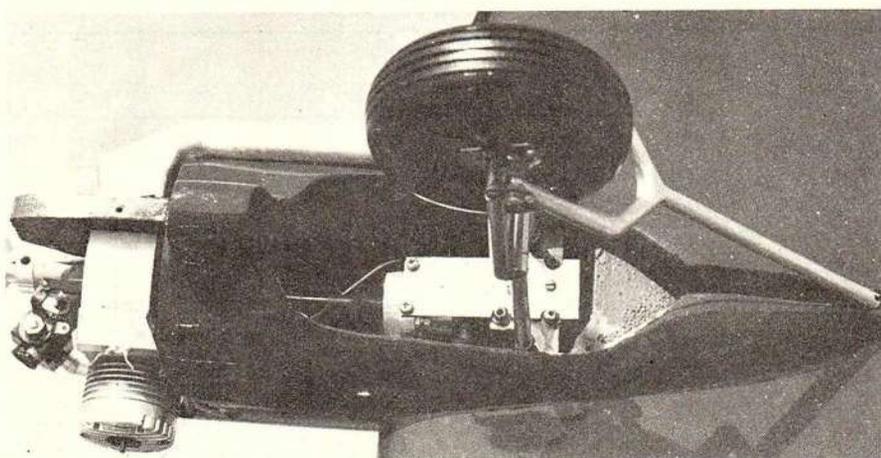
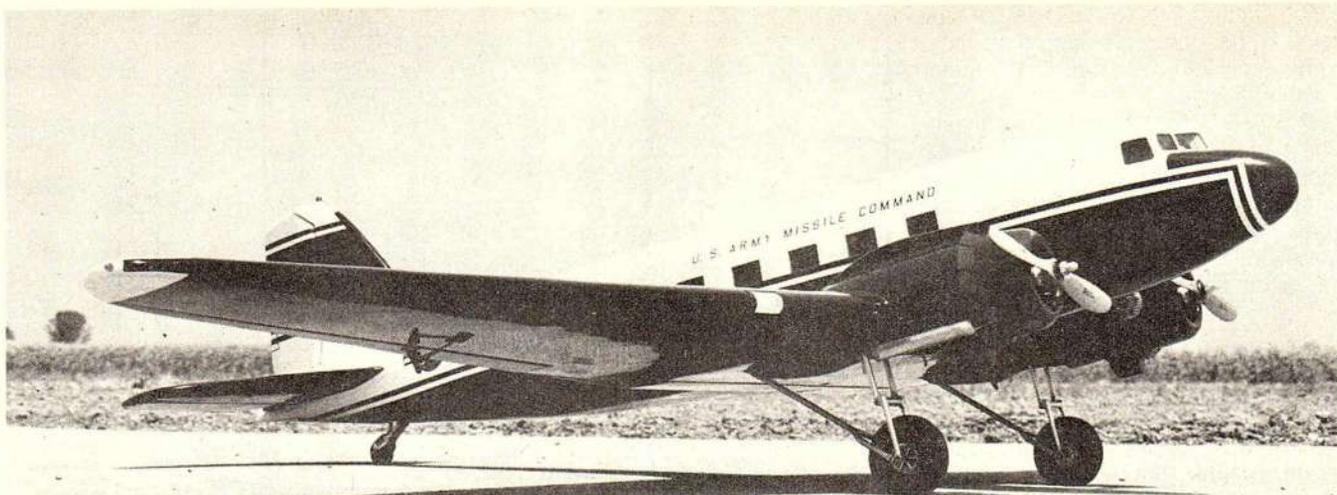


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Author's odyssey of changes and alterations certainly are familiar to anyone who has ventured into scale modeling. The rewards were worth it.

Detail shot shows author's custom-built retracts and scale exhaust manifold. Item visible in wheel well is Perry pump, which was relocated to this independent location.

mine was one of the few models to perform extensive taxi demos in the high winds at the Riverside Nats. Even as a taildragger, the C-47 could turn downwind on the runway without difficulty.

Later, a "damper" was installed in the throttle linkage to prevent stalling the servo at the extremes of throw. Du-Bro throttle overrides were installed at the engines (not at the servo) with the springs compressed tightly, so as to not permit too much slop in the system. The throttle response must be kept immediate.

I also designed a set of scale-look-

ing exhaust manifolds which would supply sufficient back pressure at idle. To guarantee reliability, I wired a wet-cell Nicad to the glo-plugs. I detected some resonant vibration when the engines came through certain speeds. I suspect that the interphase of the piston travel vectors create most of these shakes. It should help to mount the engines at 45° angles (sidewinder style). The angled engines will put piston travel out of line with the wing structure.

By the time I got through all of these modifications, I realized that I had almost no stick time on the ship . . .

and the Nats were getting really close. It seemed to be one little nuisance after another, none of which had any bearing on the Royal kit itself. With the fuel tanks so high and far away, the Robart Pumpers wouldn't maintain proper fuel flow as the "head" on the tanks changed. These pumps are flow regulated, and not pressure regulated (only pressure driven). The only way was Perry pumps, but these wouldn't fit inside the cowls. I finally wound up mounting the Perry pumps *behind* the firewall, independent of the engines. The Robart pressure tap was then attached to the Perrys (using brass tubing), and they work just great in their remote location.

Some extra touches which will aid the performance of your DC-3/C-47 are to use wire and bellcranks for the ailerons. I used Nyrod, and had terri-

*(Continued on page 71)*

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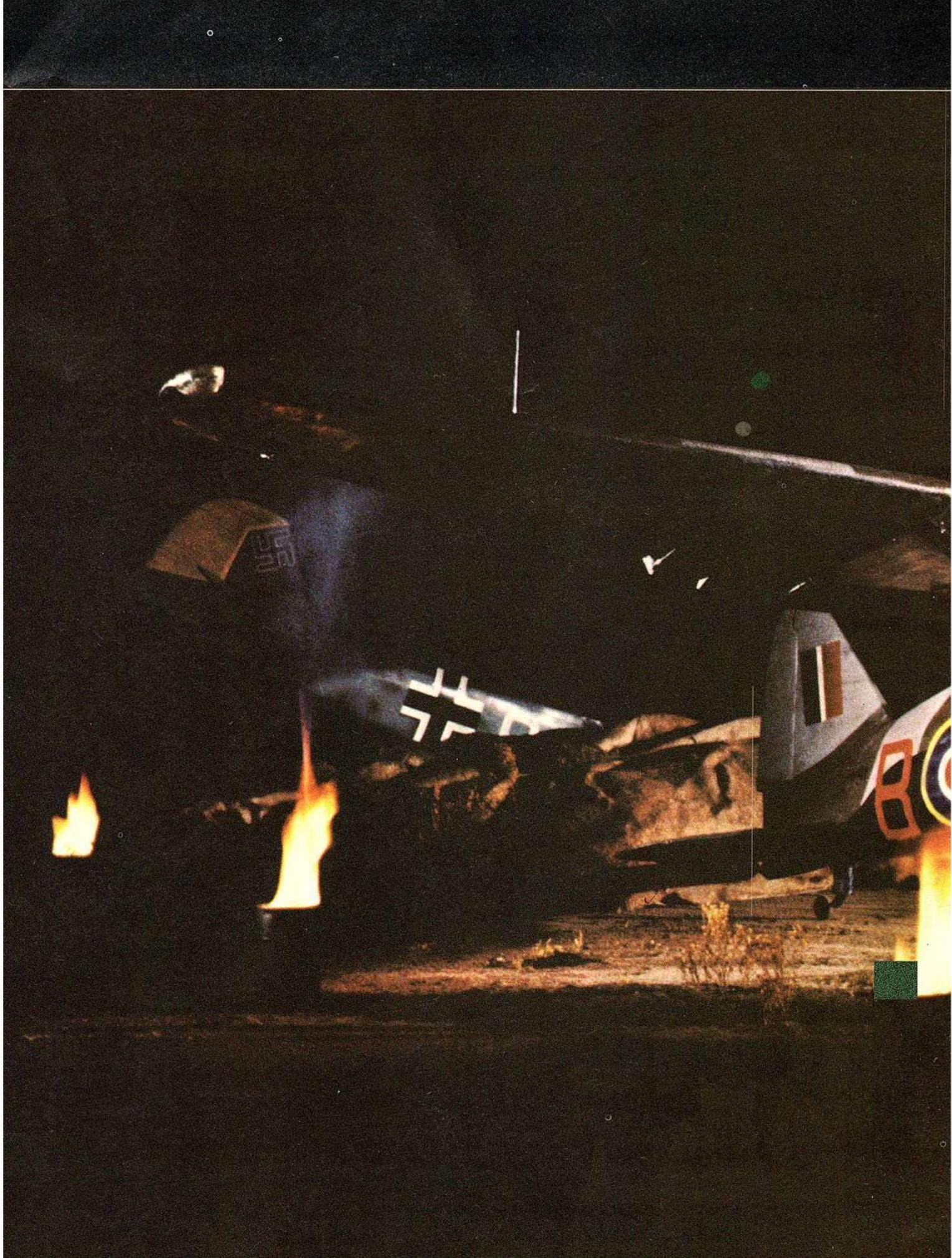
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The Douglas C-47 was pressed into service when the need for airlift aircraft arose. Many C-47s were pulled from storage and flown to Europe still in their original World War Two camouflage. The C-47 provided faithful service and operated throughout the treacherous German winters. (Douglas)



The C-47 Dakota (British designation) is still flying in the South African Air Force. Markings are identical on the starboard side, except "South African Air Force" appears in English. (SR/CM file photo)



# CLOAK & DAGGER LYSANDER



Capturing scale models in realistic setting is Harri Petricek's forte. His camera artistry is seen at its best in the opening photo of this article. Color prints, suitable for framing, are available for numerous models, and ordering information can be found in the In Scale Productions ad elsewhere in this issue.



In 1941, a plaque at the Royal Observer Corps training center in Oxford read: "There is a difference between a barrage balloon, an aeroplane and a Lysander . . . the aeroplane can't stand still in the air—which makes it difficult to identify." This ably sums up the Lysander's remarkable low-speed capabilities and its singular appearance.

By Ed Reints

The mystery ship of WW II has to be the Westland Lysander. Designed in 1935 as a fighter, the machine's exceptional STOL potentials soon found it whisked away for more important work. The 50 foot span, high-aspect ratio wing employed full leading edge slats. The outboard set would pop out when airspeed reached about 90 mph, while the inboard set would deploy at around 60 mph (and automatically extend the trailing edge flaps at the same time). Consequently, the Lysander had a rate of descent comparable to the proverbial lead sled. This was the first practical STOL aircraft in the RAF inventory.

Take offs were achieved in about 250 feet, so that getting in and out of marginally sized hayfields was the Lysanders forte. What better aircraft to use as a spyplane? Shortly after the

fall of France, a secret organization called the Special Operations Executive, was set up to encourage and support the French underground. A new Squadron, No. 138, was secreted away to an innocent-looking farm at Newmarket (later, the first RAF jet—the Meteor—was to make its evaluation flights from this same field). The special Duties squadron engaged in activities so clandestine that it was decades after the war before most of their "sorties" emerged.

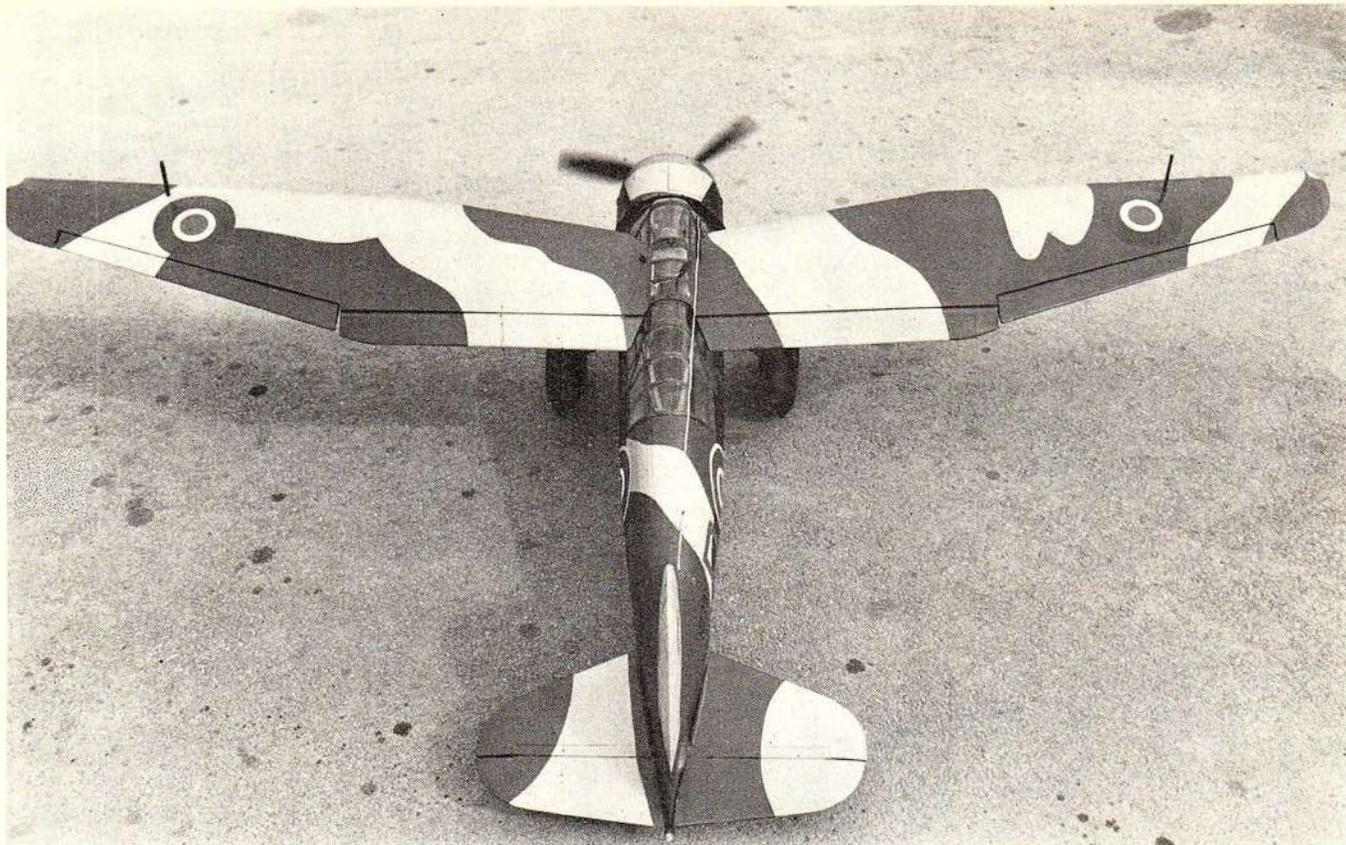
Almost always under the cover of darkness, these speedy planes (209 mph on a 870 hp Bristol Mercury) scurried low over the channel to drop munitions, saboteurs and supplies to the "Resistance." Wounded were removed, or a real-life spy would be whisked off to Britain. Among its unsung dramas was the rescue of M.



Dwight Brooks' immaculately restored spyplane (above) served as the prototype for the author's model (below). The model is a very creditable representation of the full-size ship, as these comparison photos show.



PHOTOS BY J. R. NAIDISH



**The Lysander's planform reveals wasplike wings, with ample flay area. Note short-coupled nose and tail moments, with plenty of stab area for good pitch stability.**

Vincent Auriol, who later became President of the French Republic.

The Lysander was ideal for those touch-and-go (literally) escapades. A big ship (the wing was 14' from the ground), the bombardier/gunner/navigator had a bomb bay directly beneath his folding seat. A twin Browning helped him thwart nose boogies. The huge wheel spats housed not only the landing lights, but a pair of .303 Brownings for strafing actions. Later models sported winglets cantilevered outboard from the wheel spats, on which were carried bombs or rockets.

Most "cloak-and-dagger" Lysanders were painted matte black overall, and a few bore only a big red question

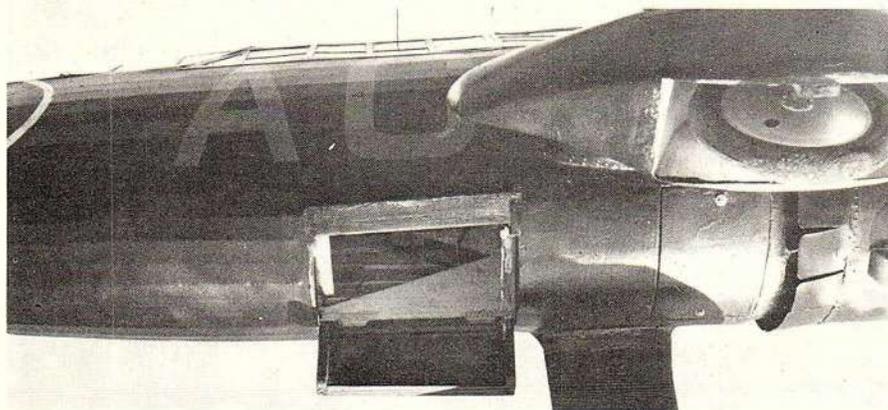
mark on the fuse sides as insignia. A ladder was permanently affixed to later models, with the rungs painted fluorescent for obvious reasons. In all, Lysanders sneaking in and out of remote French farm fields coveted away some 293 "agents," and rescued some 500 more individuals from right under the noses of the German occupational forces.

After doing some preliminary research on the prototype in preparation for my AMA Scale model, (I was totally shocked to discover that the only flyable Lysander in the world was hanged only minutes from my home, at Van Nuys Airport. *(Since then, the Lysander has been donated to the*

*Smithsonian, where it will be on permanent display after a year at Wright Patterson AFB. PHP).* I contacted Dwight Brooks, who had invested almost two years of around-the-clock labor to totally transforming a rotting hulk of an airframe into a mint-condition Lysander. You can imagine my exultation when Dwight gladly threw open the hangar doors for me.

Brooks, who flew 33 combat missions in Korea, is also an avid R/Cer, with some beautiful scale models to his credit. As a matter of fact, he fabricated some 25 miniatures of the Lysander in order to determine the correct finishing colors and their placement. Dwight's assistance to me in properly duplicating his magnificent restoration was invaluable, and I appreciated it all the more knowing that he was a fellow modeler.

What a gorgeous airplane it is, too! Its sheer size makes one stand in awe. It takes three giant steps just to scale those tear drop-shaped wheelpants. Once in the pilot's seat, you tower over every other aircraft on the apron. I had the opportunity to witness the refurbished Lysander's maiden flight, and I'll never forget the roar of that 9 cylinder radial as Dwight "hung it all out" in a max performance, low-and-slow fly-by. The tail was pitched down at a ridiculous angle, yet the ship hung on the prop (and slats). It was a moment that very few people



**Good view of the bomb bay, which is a big plus in garnering extra flight points. Author plans leaflet drops in future contests.**



Angular wing planform, stubby wheel spats and carrot-shaped fuse all add up to a most intriguing scale subject.

will ever see again, and it spurred me on to complete my model.

When I received the three large plan sheets from Bob Holman, I admired the professional drawings of England's Dennis Bryant. I photocopied all the necessary templates (you could just purchase two sets of plans), so that I was able to simply rubber cement the plan pieces to the appropriate balsa or ply. A few minutes at the Dremel saw, and I had created my own "kit." This method is extremely accurate, it saves time and cuts balsa waste to a minimum.

The fuse is basically an internal box, around which are erected form-

ers, longerons and stringers (42 of them!). As you proceed on the fuse, make allowances for the radio installation. I not only built the scale bomb bay, but allowed for access hatches for batteries, a light switch panel, etc. You'll probably want to modify the nose formers and firewall to accommodate a 12-16 oz. fuel tank.

I'll confess to two minor deviations from exact-scale. There is some obvious wisdom in not fabricating a set of functional leading edge slats . . . the engineering would be absurdly complex, and flying such an automatic-slatted model would be as safe as flying blindfolded. The second deviation

was to make a steerable tailwheel. The fuselage is short-coupled, so this was a prudent move (although the model still won't taxi well in crosswinds).

The canopy is mostly straightforward, except for the small curved section atop the windshield. This is easily fabricated by molding some heated butyrate over a wooden plug.

The wing is built in five sections, to accommodate all those insect-wing curves. I sheeted the center section with 1/16" ply, as a precaution. The struts should be considered functional, with that small wing mounting area the canopy provides. Washout of 1/2" was



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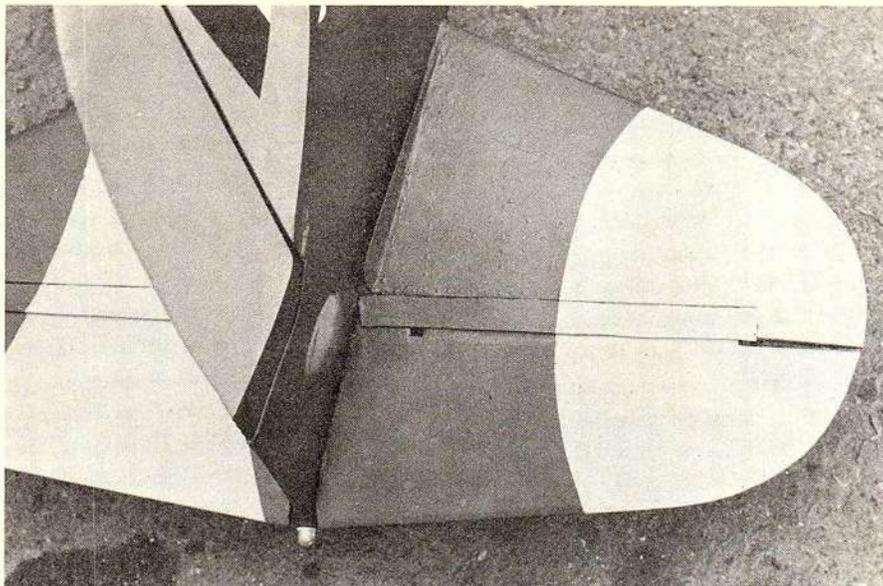
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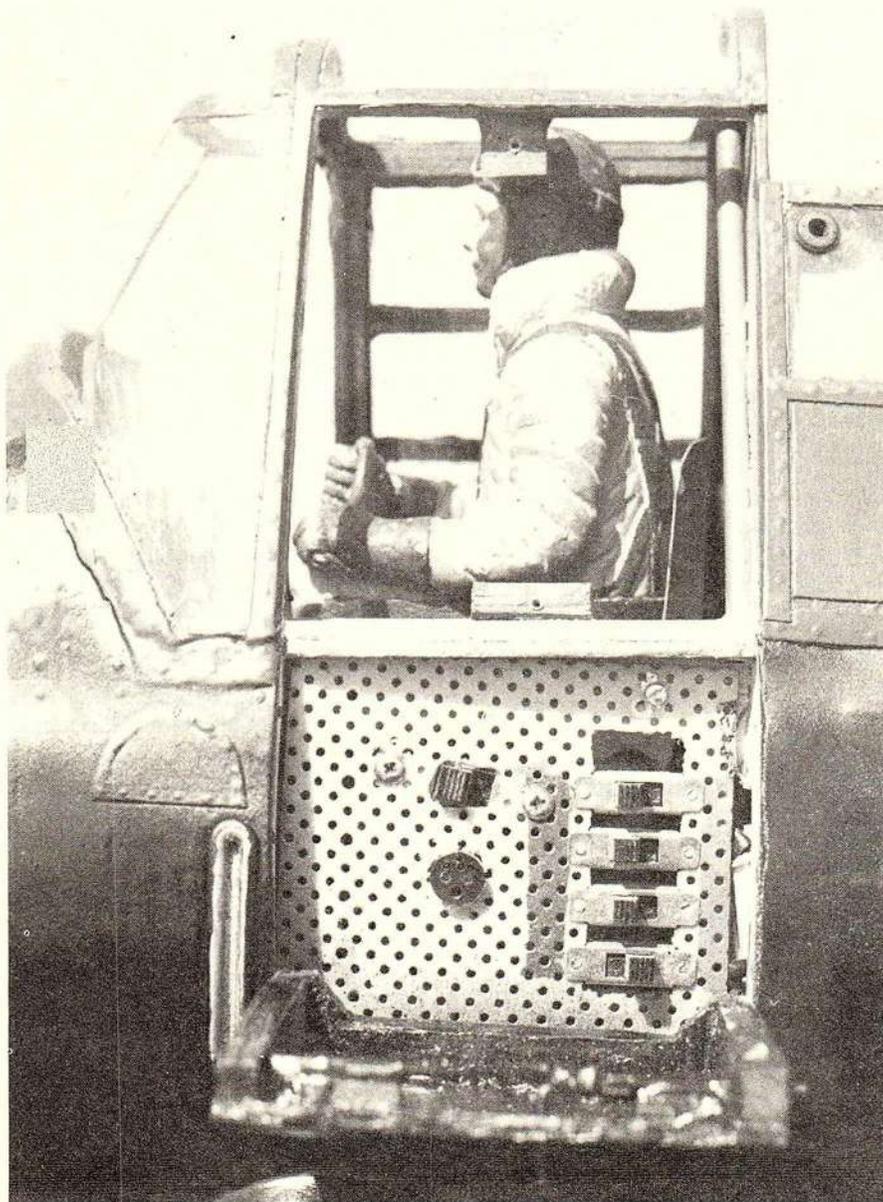
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Fairing on elevator hinge is made from silicone rubber. Bump on fuse side is rudder control horn fairing, which is functional and scale.

Hidden panel gives access to on/off switch, charging jack and panel of switches to control the nav and beacon lights.



built into each tip panel. A pair of Sig 1/2A canopies were used for wingtip nav lights. I set up the electrical system so that the landing lights turn on when the flaps are lowered.

The covering is scale, with fiberglass on all sheeted sections, and Perma-Gloss Coverite on all open areas. Two coats of nitrate dope, a shot of K&B Primer, then color coats of Hobby epoxy constitute the final finish. The cowl blisters were formed from women's artificial finger nails. They're just the right contour, and the material works easily. When all was said and done, I had a 13 pound airplane . . . a tad on the heavy side for that high-aspect ratio 81" span wing. More judicious sanding would have kept the weight down to a more reasonable 10 pounds.

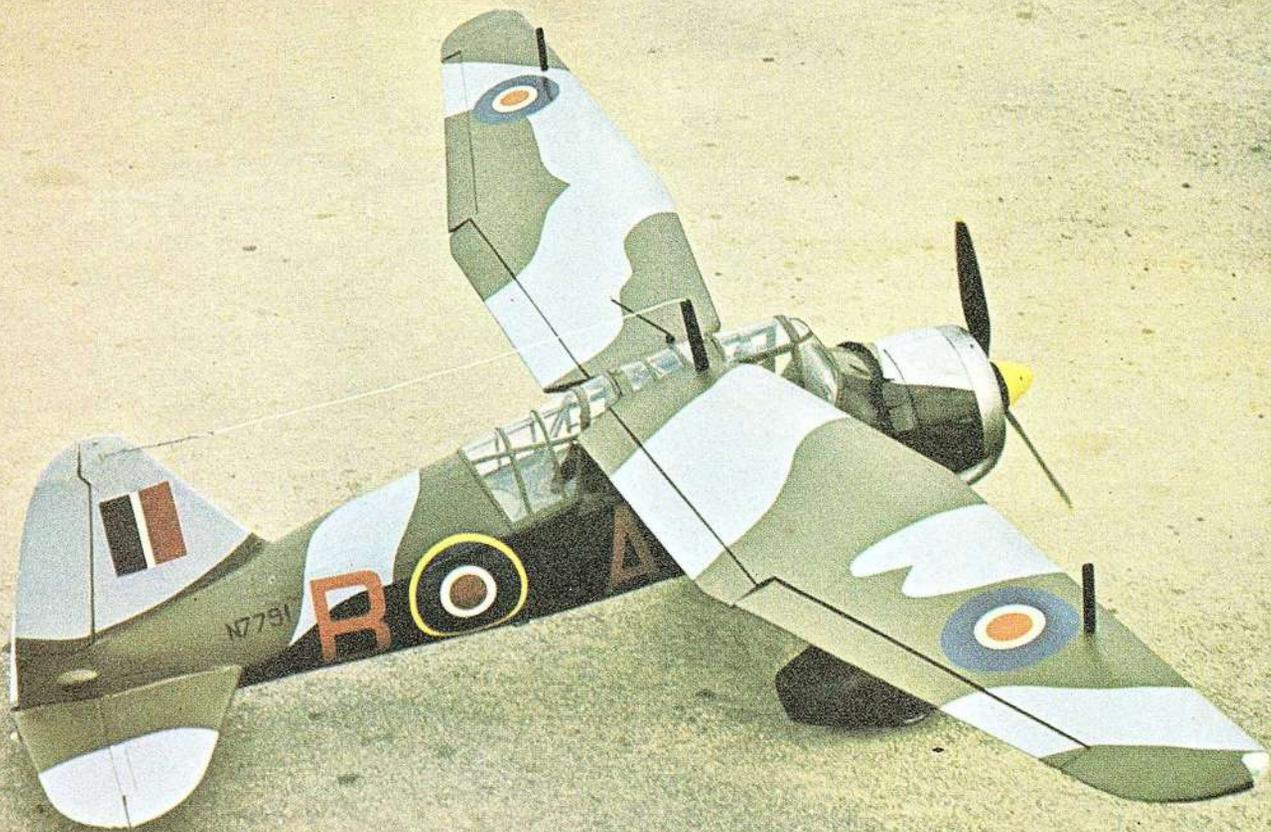
I pre-flighted the ship amidst the usual question from the crowd: "What is it?" As I taxied out, it was obvious that such a distinctive planform could only belong to a Lysander. Ground handling was satisfactory, although all that vertical side area prohibited any crosswind maneuvers. As power was applied, the tail lifted nicely and that huge rudder proved its effectiveness. The model got airborne with no hassles, but the engine was a little on the fat side.

After a landing to reset the needle, I executed a very pathetic attempt at another take off. For some unknown reason (pilot error?), the Lysander was airborne and trying to climb at a high angle of attack . . . and the engine was only at half power. The subsequent stall showed the Lysander's teeth . . . it had a vicious bite!

The next time around, I treated the 13 lb. model with more respect. The plane handled easily, as one would expect from its high-wing configuration. Flaps are effective, yet there's no significant pitch change as the airplane begins a pronounced sink toward the runway. Use throttle for pitch control in the flap down configuration—not elevator.

The landing gear system has about as much resilience as a Ming Dynasty vase, so try for smooth, well-flared touch downs. Any jarring shocks are transmitted through the wing struts, and right into the wing.

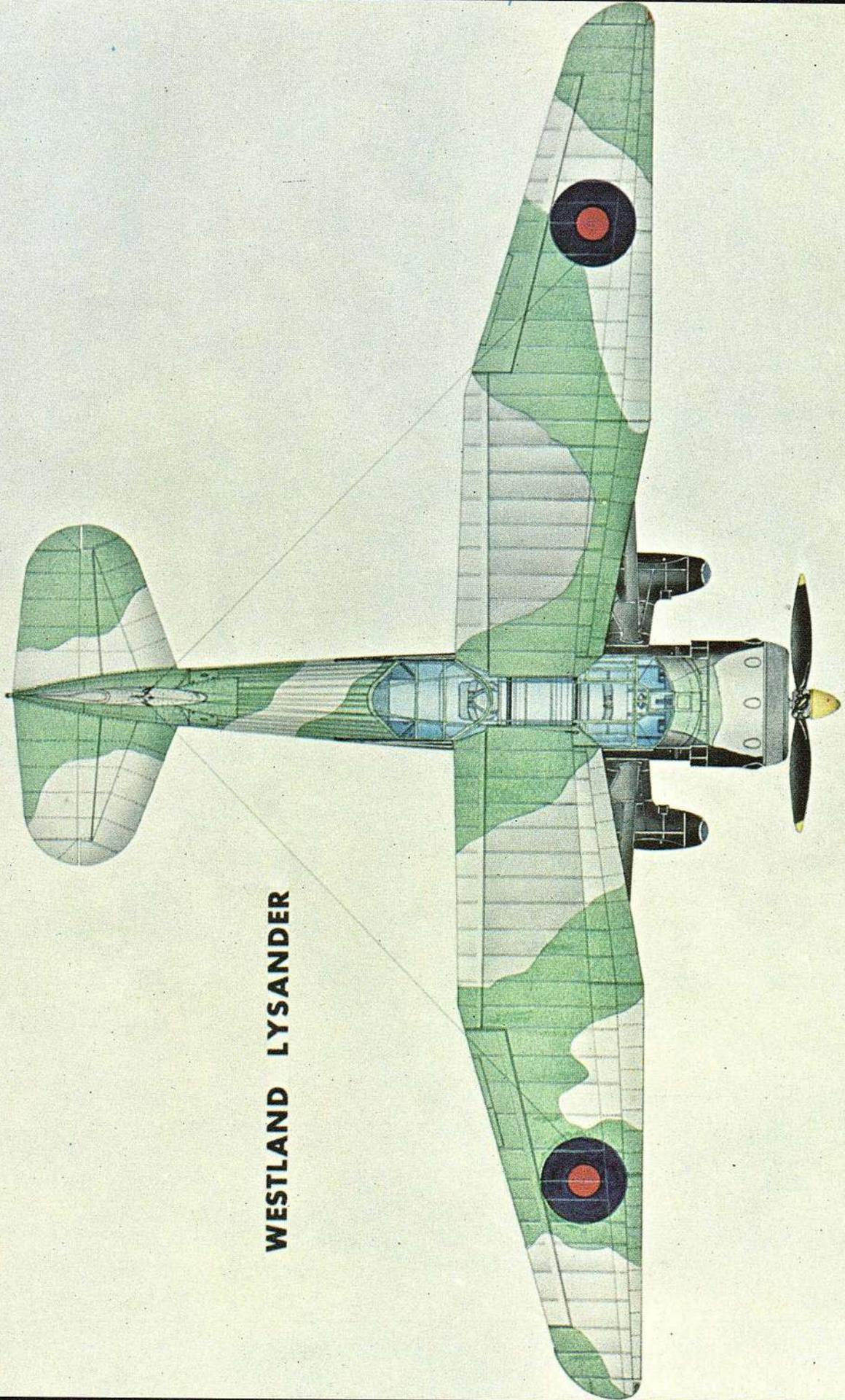
I'd classify the Lysander as a semi-complex scratchbuilding project, with flying characteristics that are most docile. It's different looking enough to get the judges eyes, and it will hold its own against the usual WW II fighters in static points. With functional bomb bay, dropping leaflets or ordnance is worth a few extra points. The flap demo is convincing enough to get high marks for that option. In all, one would be hard-pressed to find a more ideal contest model than the cloak-and-dagger Lysander. □

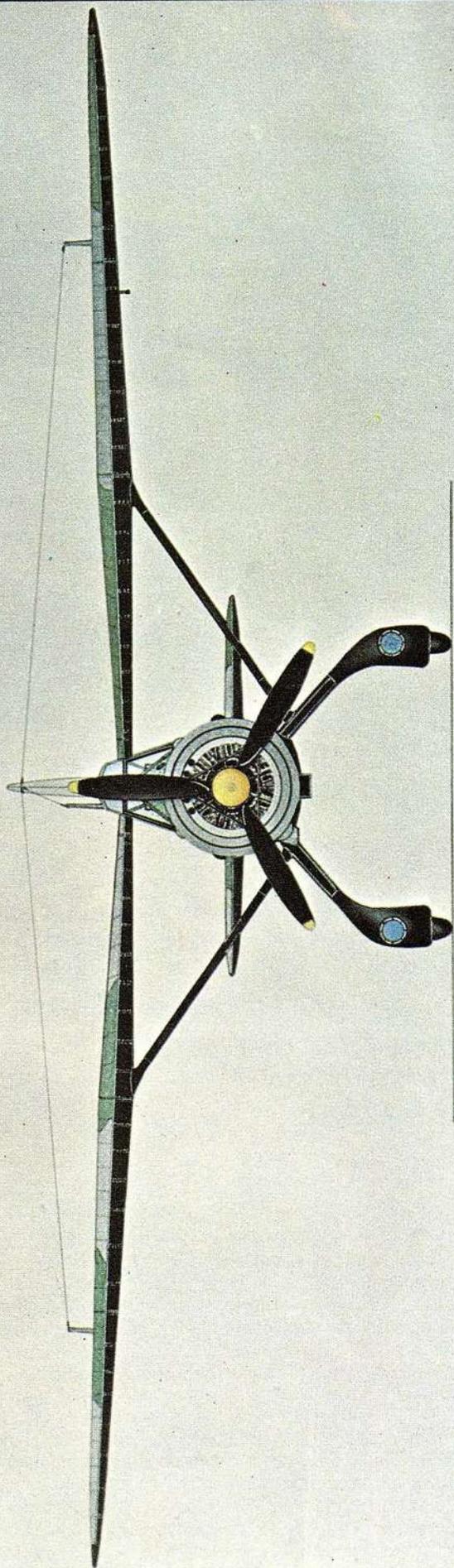


Dwight Brooks' restored Lysander is the only flyable aircraft of its type in the world.



**WESTLAND LYSANDER**







# FOCKE WULF ROYALE

With all the new scale kits on the market today, one tends to overlook those that have been around for a few years. Such is the case with Royal Products' Focke Wulf FW 190-A, which has been around longer than even I care to admit remembering. I had almost totally forgotten about this old standard, when my annual "Focke Wulf Fever" began to act up. My enthusiasm for this classic fighter has always been keen, and last winter the idea of building the "Butcher Bird of Bremen" finally got the better of me. Given the choice of model types, I'd definitely opt for the "A" version . . . in spite of the current popularity of the FW 190-D9. The short nose and small stab on the earlier model are what really give it the aesthetic appeal of a thoroughbred fighting machine. So I opted for the Royal kit.

The Royal kits are of all balsa construction which does add to building time, but the extra effort is well worth the weight saved (as compared to foam/fiberglass). These kits are *not* designed with the beginner in mind, but they are not difficult at all if you have at least one Sport Scale ship

**A kingly kit of the short-nosed "190," the Royal Products' Focke-Wulf is a long-lived standard which has recently had a face lift.**

**By Jerry Antczak**

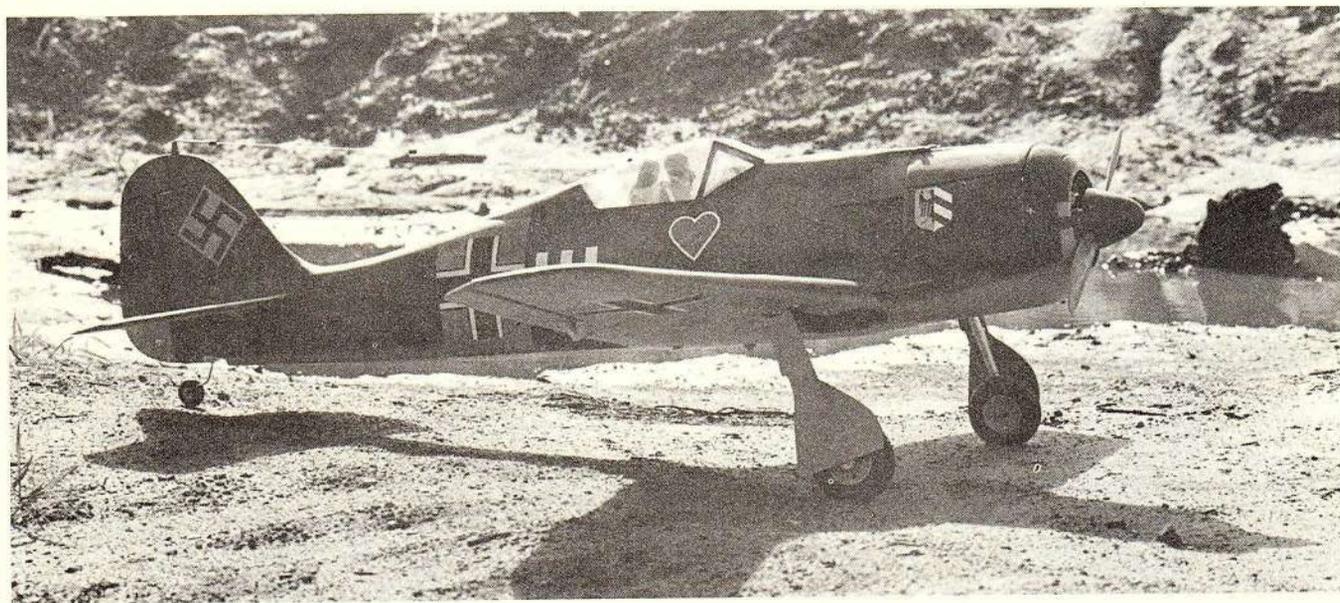
behind you. You will find *no* vacuum-formed parts (except canopies) offered by Royal; however, because of the well-engineered kit design, carving and sanding are held to a minimum. Spun-aluminum cowls are provided for the radial engine types. Recently, Royal revised all their plans to include provisions for retracts, flaps, scale detailing, all shown with numerous illustrations. All the parts are drawn full-size, which can be invaluable when the need to duplicate a part arises. The revised canopies include armor plating details, and their quality is very fine. Accompanying the plans is a very

comprehensive construction manual, which gives data on the full-scale ship.

The balsa provided in my kit was of excellent quality; however, the plywood seemed to be a little weak (as compared to plywood available from Pactra or Sig. Another item I didn't care for were the foam-wing tips. They were immediately replaced with balsa. It seems as if all the kit manufacturers are replacing the traditional balsa wing tips with foam . . . with the price of balsa nowadays, why not? The hardware provided is very adequate, but the control arms on the aileron horns should be definitely longer to allow for

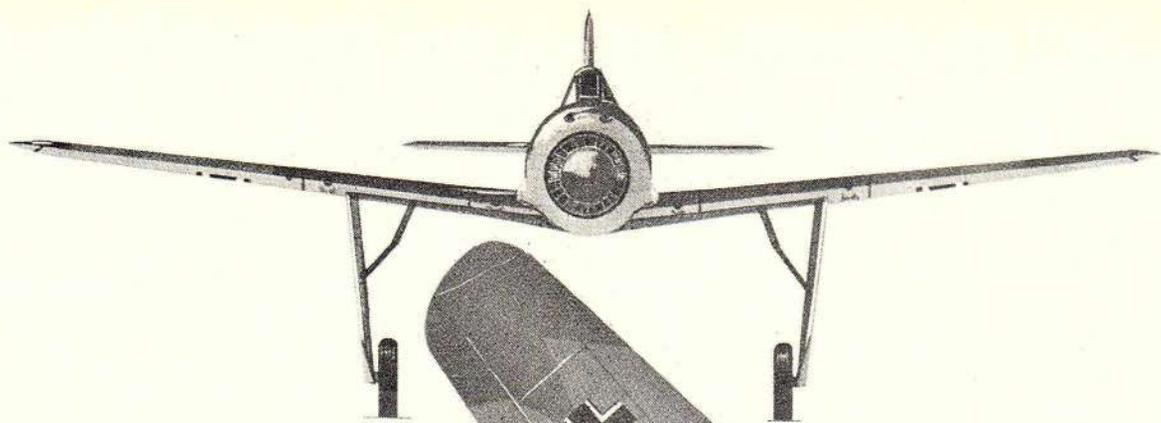


The stubby, rotund fuselage of the "A" version has a certain aesthetic appeal that was lost when Kurt Tank redesigned the Focke Wulf as the long-nosed "D" variant.

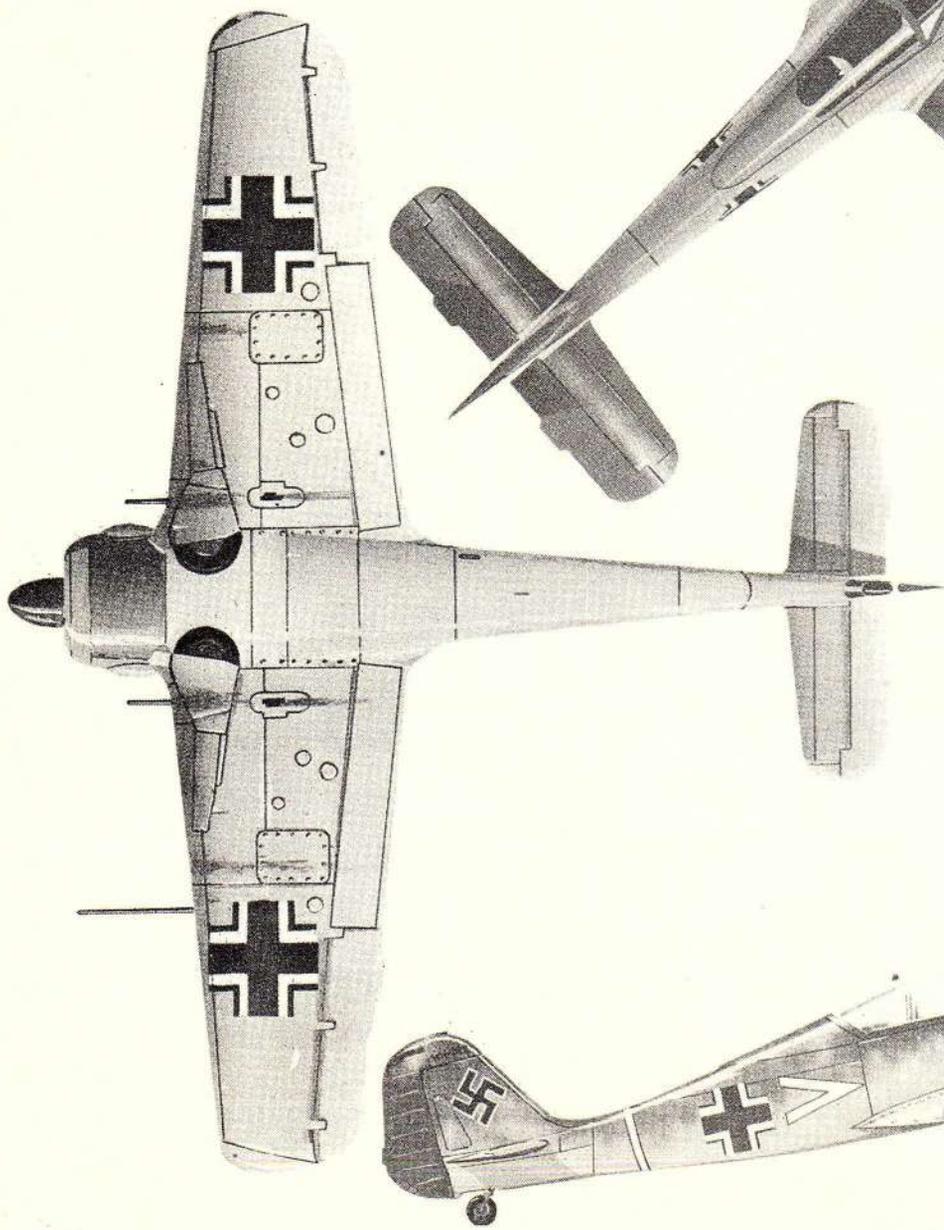


PHOTOS BY THE AUTHOR

Although the author didn't mention it, the model's gear legs seem somewhat abbreviated. The full-scale Focke Wulf had a most distinctive long and spindly undercarriage. For Sport Scale, the angles shown here are more conducive to reliable takeoffs and gear retractions.



0 1 2 3 4 5 6 7 8 9 10



FOCKE WULF FW 190-A



All insignia and markings were done with paper stencils . . . no decals.

less throw. No decals are provided in the kit but, even if they were, I would have put them on my building room door. If you are going to spend time constructing a plane like this, it would be a shame to put decals on it. Markings and insignia should be painted on (my particular method will be covered later).

Before starting the Focke Wulf project, I contacted Ron Murray of Royal Products. He was extremely helpful,

and recommended that I add about 20% to the area of the horizontal stabilizer to prevent a tendency to snap roll. Obviously, to build the 190-A version with a full-scale stab would be risky to say the least. Mr. Murray informed me that the new Royal plans (I had the old blue lines) provided for both exact-scale and Sport Scale horizontal and vertical stabilizer surfaces. Since my model would compete in Sport Scale, I had no qualms about

adding 20% to the area. You would have to be an authority on the FW 190-A to tell, anyway.

The wing is built up the same way any standard balsa-constructed wing is. Jigging the wing before applying the top sheeting is mandatory. Not to do so would make the wing warp like a pretzel! All I did was lay the wing on a flat table and add shims at the leading and trailing edges of the wing tips. At the same time, I added approx-

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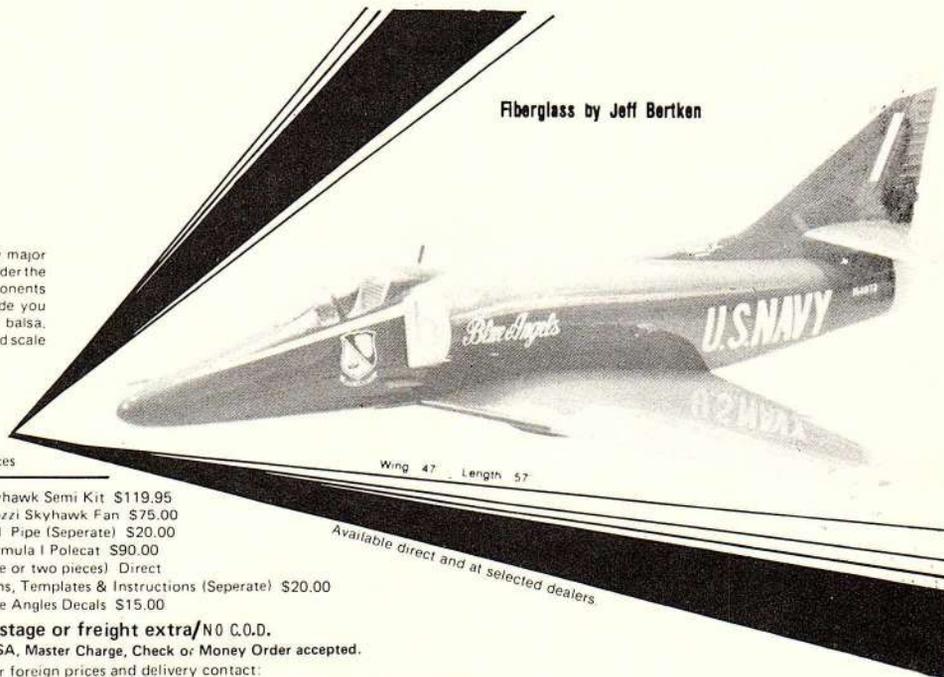
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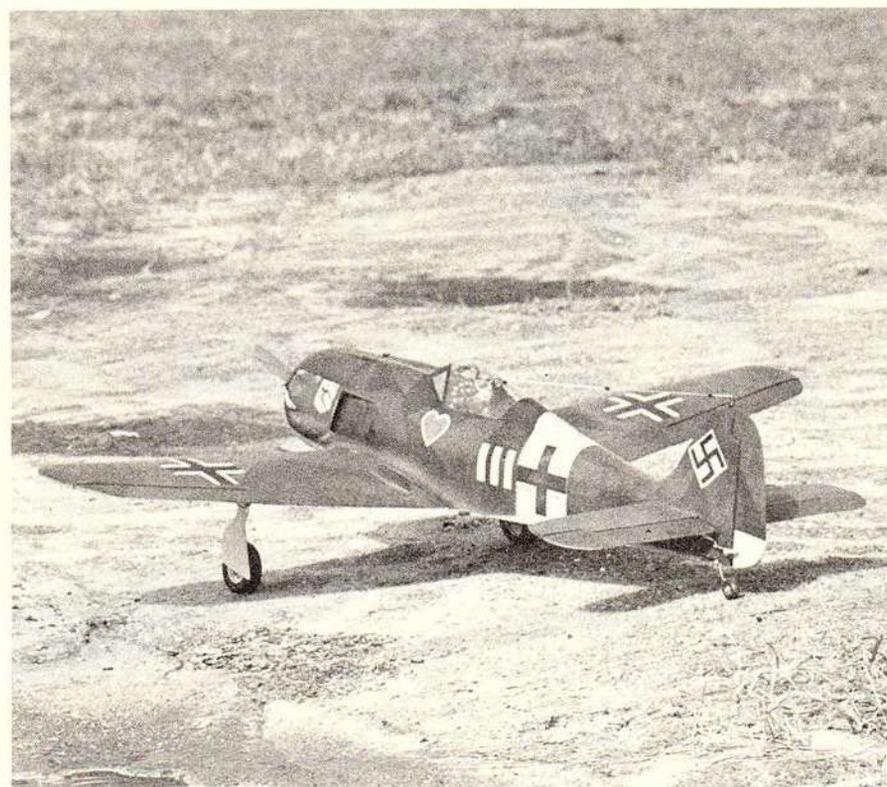
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Fiberglass by Jeff Bertken





The 20 percent enlargement in the stab is not readily apparent, but it certainly contributes to positive flight stability. In spite of short nose and bigger tail feathers, the author's model came out noseheavy.



imately 2° washout, to help counteract stall tendencies. Check carefully along the leading and trailing edges of both panels to make sure you get equal measurements. Add the top sheeting (bottom skinning is done prior to shimming) and you'll have a true wing.

I used Rhom-Air's FW-190 retracts. It is necessary, however, to use 3½" wheels (instead of the 3¾" wheels shown on the plans). The smaller wheels will nest between the spar and leading edge, with about ⅛" clearance on each side. As mentioned earlier, larger aileron horns were substituted for the ones in the kit to minimize aileron throw. When adding the landing gear doors, provide ⅛" clearance between the edges of the doors and the wing, to make sure the wheels will retract without interference.

The fuselage goes together quite easily, so only the key points will be touched upon. For one thing, try to build the tail light. This model does have a very short nose moment, which means much more nose weight would be needed to properly balance it. When applying the turtle deck, an exit hole should be added to string the radio-antenna in a scale-like fashion. Do this before gluing on the canopy. The semi-finished balsa wing fillets provided were a real chore to work with, but I really don't know how else to do



them in the case of the FW 190-A, so I guess they're OK. Nyrods were used for the rudder/tailwheel and elevator, to keep weight down. Remember, you don't want much elevator throw so attach the clevis to the last hole in the elevator horn. As the elevator linkage is internal, no adjustments can be made to it later, without ripping apart the tail area.

The cowl and hatch were applied as shown on the plans, with no trouble at all. A D&B FW 190 interior kit and an Aircom Luftwaffe pilot were used to dress up the cockpit. Around \$19.00 was sunk into the cockpit area, but it sure does look realistic. The canopy

was secured with cyanoacrylate. I like this method better than using epoxy, since it's not as messy as epoxy.

Spackling compound and micro balloons/resin were used for filling holes, dents and for making the stab-fin fillets. The entire plane was then sanded. I covered the model with two coats of K&B resin, followed by two coats of K&B primer. I guess I was too lazy to add fiberglass cloth, but look at the weight I saved! (*Two ounces, at most!* PHP). Gun blisters, guns, and detailing were now added, and I faired each of these in with spackling compound. A coat of Pactra "Silvaire" silver dope was sprayed over the entire

plane. Silver is good because any dings, rough spots, etc., will easily show up. When weathering, you can just chip or sand away the final top coat of paint to reveal the realistic-looking undercoat. Presto, you have metal skin showing through!

I then painted the plane with Pactra flat dopes, mixed to match WW II Luftwaffe color chips. I needed yellow and red for some of the trim colors, but Pactra does not have flats in yellow or red. This can be easily remedied by adding flat clear to make the paint come out matte.

Insignia and markings were added by home-made stencils, applying one color at a time—lightest colors first. Stencils were made of *very thin* paper and adhered to the model with rubber cement. When the paint has dried, remove the stencil and rub off the rubber cement with your fingers. I find this method very easy, fast, and the results are fantastic. Nothing enhances a model more than painted-on insignia and markings . . . *if done right*. When applying your own markings, you don't have to stick to a particular version, as when using kit-provided decals. I really don't like seeing four planes at a contest with the same markings. Also, I'm sure the judges take this into consideration when points are being handed out.

(Continued on page 81)



# THE BIG BRIDICAT

The Tigercat is a mean-looking hulk of a machine which gets its impression points from sheer visual impact. The plane got to WW II too late to distinguish itself as a fighter but it was still a trend-setter in several areas. It was the Navy's first twin-engine fighter, and the first carrier-based aircraft to use trike gear. Those cigar-shaped nacelles tend to make the stubby wing look even shorter, but the wing is surprisingly adequate.

There were no great aces who achieved staggering kill records at the



controls of this fighter, and the jet age soon drew down the curtain on what was a superbly designed fighting machine. Just looking at the moments and areas tells the experienced scale modeler that Grumman knew what a well-designed model should be when they created the F-7-F.

I had thought of scratchbuilding a Tigercat for years so, when Joe Bridi mentioned that he was planning to release a scale F-7-F, I immediately volunteered to do R&D work on the prototype. A few months before the

**A new breed of cat, the Bridikit F-7-F Tigercat tames the wild "twin-engined" beastie. Two .40s make it purr, and it's docile as a kitten.**

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**By Jerry Ortega**

PHOTOS BY J. R. NAIDISH

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Nats, I got a call from Joe . . . the prototype kit was in a box, waiting for me to pick it up. If I played things right, I could have the ship ready as my Nats entry.

The 1¼"=1' scale kit has an epoxy-glass fuselage with molded-in fin, nacelles and two separate fiberglass cowls. The wing and stab are balsa-sheeted foam, and the elevator and rudder are balsa. The plane takes two .40s for power, and uses six channels (optional flaps and retracts). The wing is a generous 65" span, with 775

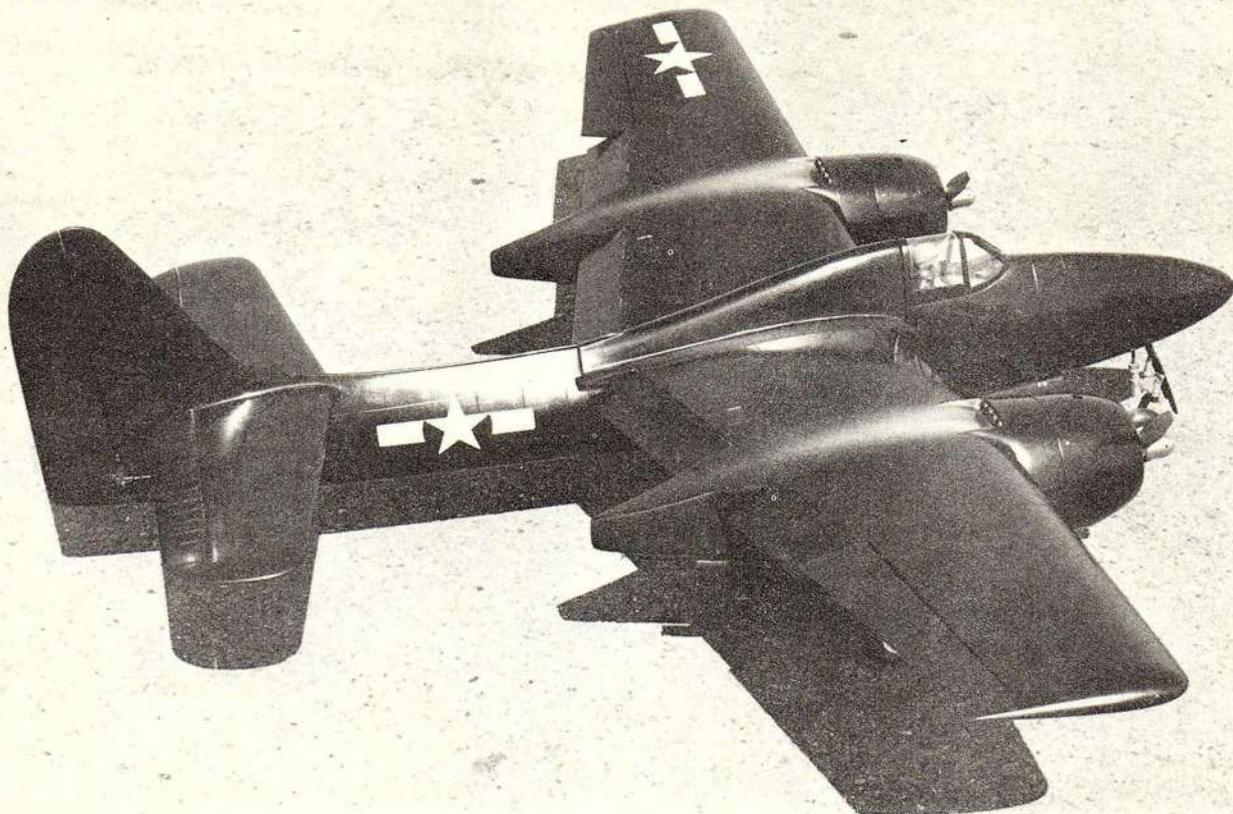
sq. in. of area. As with all the Bridikits, the balsa sheeting, fixed-gear assemblies, special hardware and Bridi Hobby metal engine mounts come in the box. Surprisingly, my kit box contained *five* engine mounts. There were the required two .40-sized mounts, and three .19-sized mounts. I figured that it was a mistake, and that the prototype kit had erroneously been packed with a small bonus for me.

Building the plane was a lot easier than I expected. By putting in a lot of time evenings and weekends (and

taking off a bit early from work here and there), it was built and flying in six weeks! Just in time for a few test flights before the Nats.

As I went through building the plane and installing the gear, I found a couple of ideas that made things easier and better. To make the fuel tanks inside the nacelles accessible, the firewall has a large cutout through which to slide the fuel tank from the front. Then a ply plate is bolted onto the bulkhead, to which the engine mount is installed.





**Props well forward of the C.G., lots of wing area and a generous tail moment make the F-7-F a natural twin-engine scale subject.**

The best idea though, which was a surprise, was how the retracts are mounted. You guessed it, the extra engine mounts! The nacelles and fuse nose have 1/4" ply bulkheads at the locations of the landing gear. A .19-size Bridi Hobby engine mount is installed onto these bulkheads. Then the Rhom-Air retracts are mounted to the arms of the engine mounts. Later, during one of my test flights, the ship hit the runway hard on a downwind landing (after one of the engines quit), and I discovered an advantage of this kind of installation. Instead of tearing up a bulkhead, nacelle, or wing, the arm on one of the mounts broke. A couple of minutes later a new engine mount was installed and I was flying again. Great idea!

I only ran into a few problems with the prototype—but then, that's why there are prototypes. The first problem was with the design of the wing saddle. The width of the wing saddle was more or less 90° to the fuse sides. Because the wing has a healthy amount of dihedral, it rested on the inside edge of the wing saddle leaving a gap along the fuse. I modified the wing saddle. The only other thing I found was that the tail of the fuse was about 1/4" short, so I added on a piece. Both of these problems have already been corrected in the production version of

the kit. One addition I made was to cap the foam ends of the ailerons and wing, at the aileron cut-out, with 1/64th ply. That was a lot quicker and easier than trying to sand and finish the foam.

The wing and stab were covered with 1/4 oz. glass cloth and resin, with a 3" width of 3 oz. glass cloth and resin over the wing center. I just used resin (no cloth) on the elevator and rudder. The plane was finished with K & B Superpoxy.

Incidentally, while on the subject of painting the Tigercat, I'd recommend copying the fire fighter version, instead of the military. I say this because I noticed that the dark blue airplanes (at the Nats and other contests I've entered) don't seem to do as well in static judging as the brightly colored planes. It's also very difficult to get a color photo of the military version of the Tigercat for a presentation. You know from black and white photos that the ship is dark navy blue, but I just couldn't come up with a color picture of the plane. Patrick Potega of *Scale R/C Modeler* even tried to locate a color photo for me, and he came up empty-handed too. If it weren't because I worried about the plane being tail heavy by going to the large fin version of the fire fighters (and if I knew then what I know now about the static judging), mine would have been a red, silver and fluorescent fire-fighter aircraft.

Flying the Tigercat was a real expe-

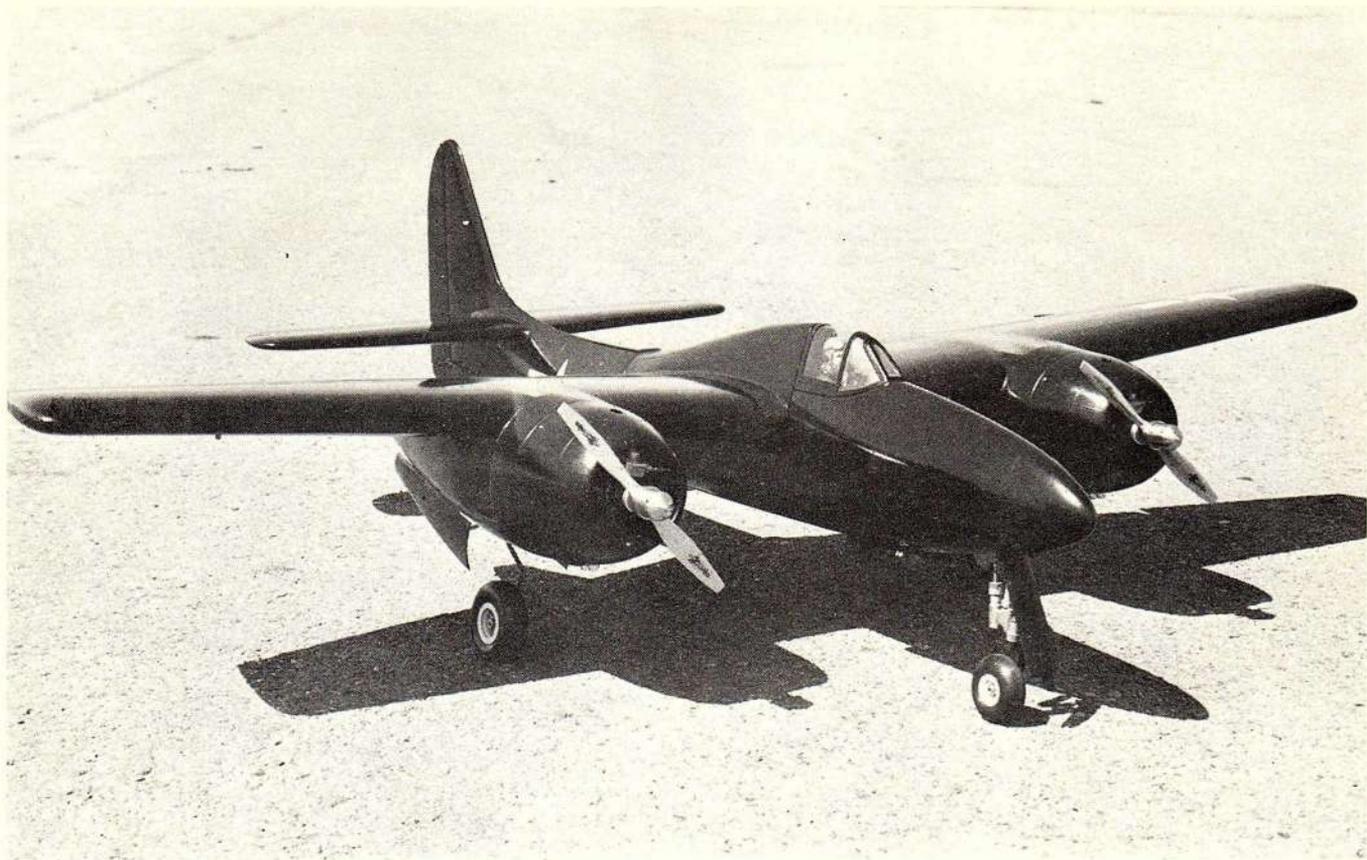
rience for me. I've had a little stick time flying a P-38, but I must admit that my knees did rattle on those first flights. Fortunately, Lou Stanley worked with me all the way, and that sure helped out.

When the plane was ready, we decided to go take the first flights step by step. First some taxi tests. Then, with the cowls off, we'd make the first flight—leaving the wheels down and the flaps at zero. After that we'd try the retracts, the flaps, etc.

The taxi tests went fine. They went so well I almost went for broke. It's a good thing I didn't though, because a bit later in that run one of the engines quit. One thing at a time!

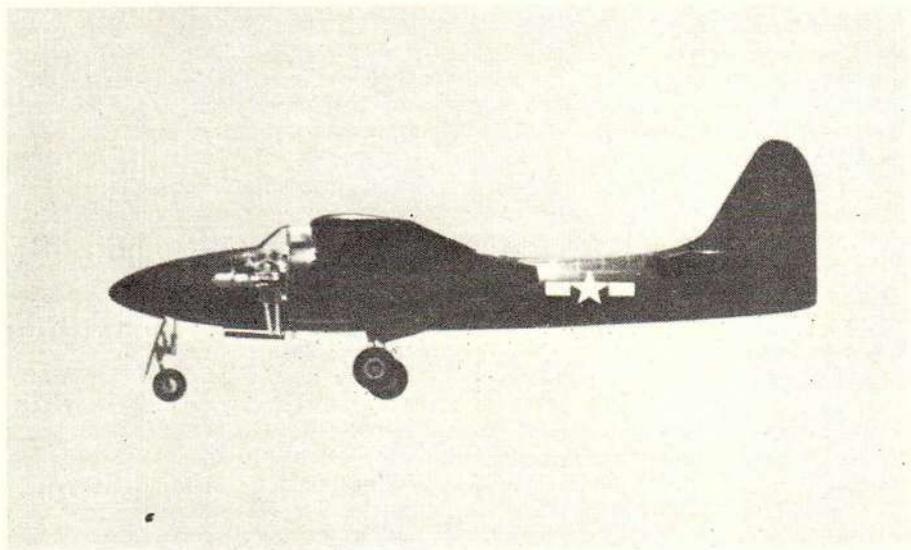
On our second outing we planned to take it off. The engines were started and set a little rich. I taxied out to the runway, took a deep breath, held my knees together so the runway wouldn't shake, and gradually opened up the throttles. The plane picked up speed, but took all of the runway. I fed in a little up as it approached the end, then a little more. It's a heavy plane (13 lbs.) and I wasn't used to it. When I added the additional up elevator, the plane rotated smoothly and lifted off.

The F-7-F was a little sluggish, compared to the single-engined planes I've flown. Otherwise, it handled really well. The only thing I didn't like was that the controls were sluggish. Of course, the gear was down, and I hoped that cleaning up that drag would make the difference. When I



**Jerry didn't have the flying props ready for the photos, so excuse the deviation from scale. Look at the size of those nacelles!**

**Caught on its maiden flight, the Tigercat was sluggish on the controls, until the gear was retracted. Model virtually leaped forward when wheels disappeared.**



cut the power on final, the plane dropped faster than I expected. It landed smoothly though, even without the flaps.

On the second flight, the takeoff felt much better. I tried a few maneuvers, and the ship looked like a winner from the word go. I tried some slow flying, to see if the plane had any tendency to tip stall. It was steady as a rock. No tricks. And my landing was better—especially since I anticipated the sink rate this time.

The third flight was retract-testing time. After I made the first turn out of the takeoff pattern, I tucked in the gear. At that moment, the plane lifted a bit and instantly picked up another 15-20

mph. It became a different plane entirely. The controls were more sensitive (they had felt sluggish before) and the ship felt more buoyant in the air. I throttled back a bit to get some practice flying at more scale speeds.

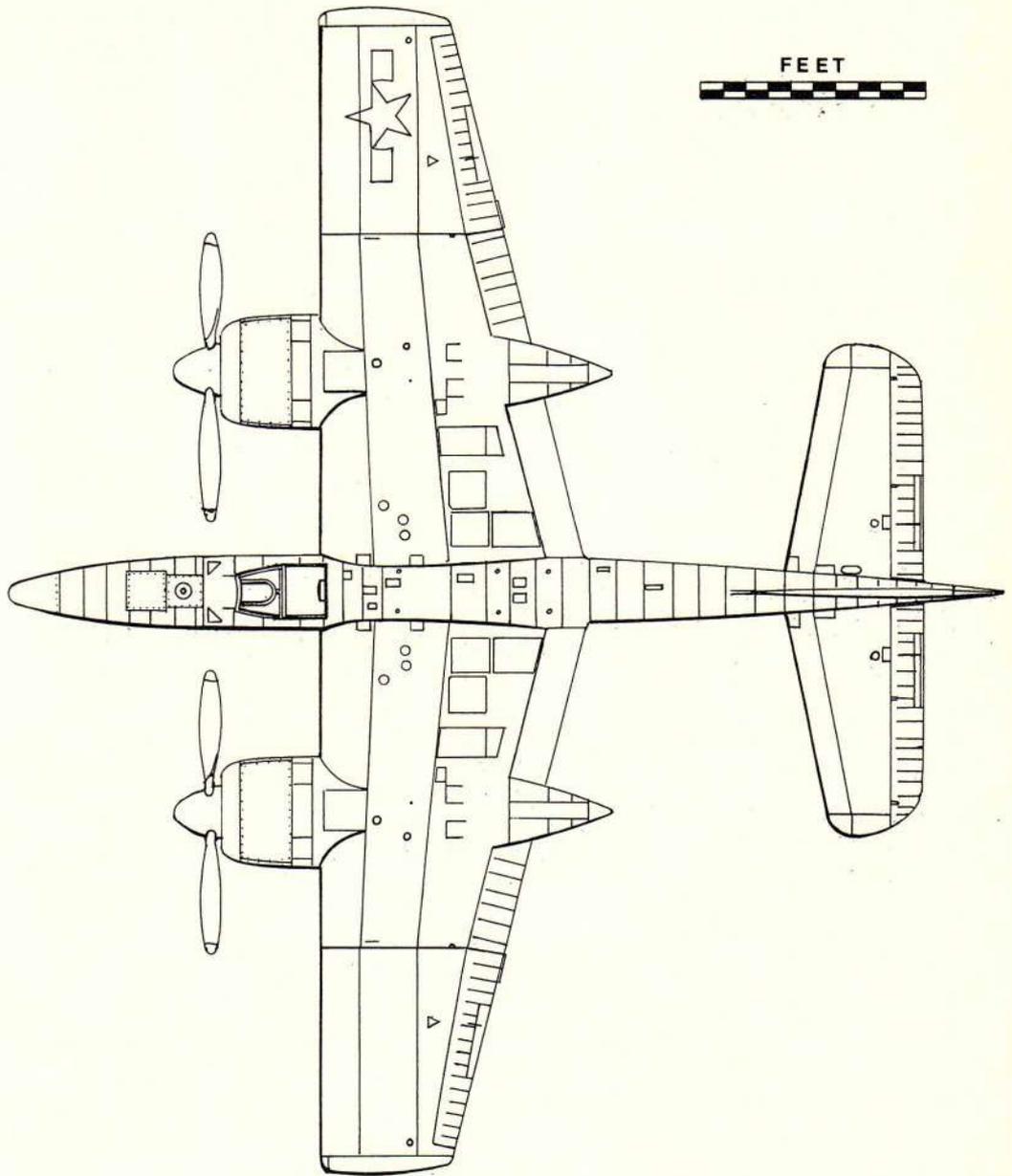
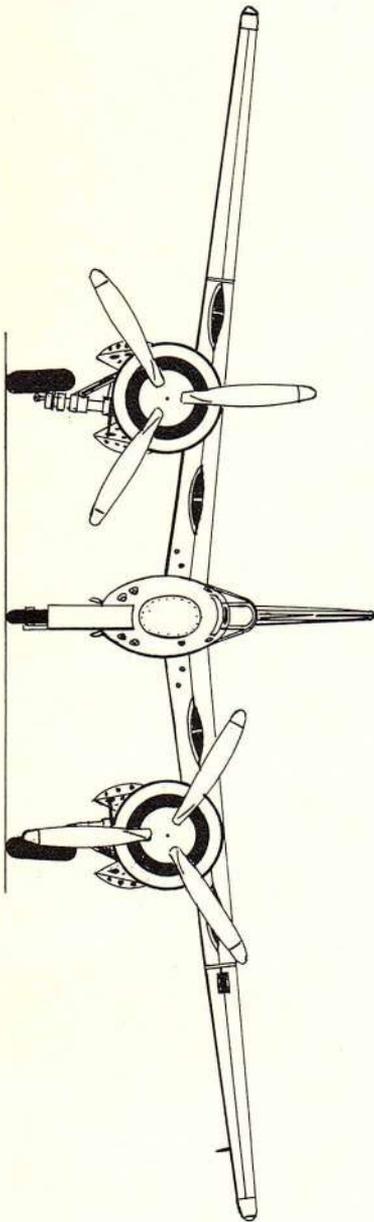
Now it was time to try the flaps. I was still flying without the cowls, so as to not overheat the engines. Incidentally, I had marked the transmitter so I'd know how far to move the lever for 10%. That worked well. Actually, that's what I've ended up using all of the time. With 30% flaps, the plane looks as though it is stopped in the air!

The last test. Add the cowls. I had cut out the whole front of the cowls, with the idea that I would get maxi-

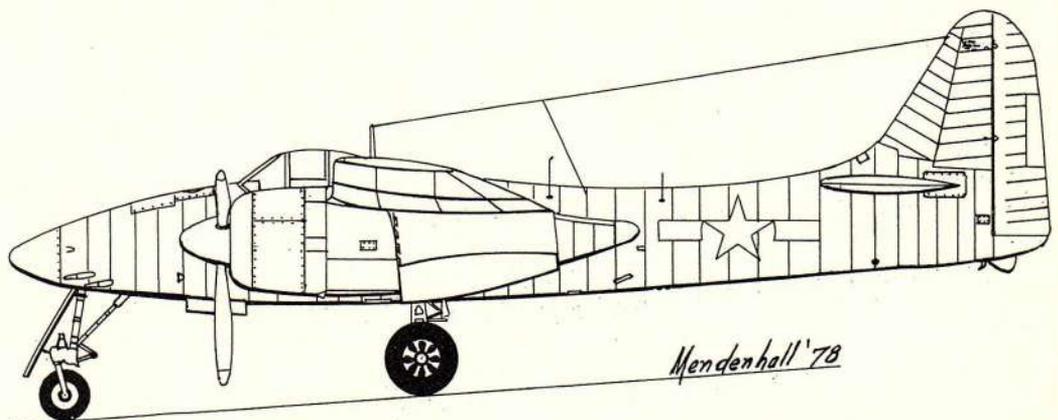
mum cooling that way. I dropped the flaps 10% and made the takeoff. The Tigercat rolled down the runway, became light on the wheels, and lifted off very nicely. The plane was flying so well that I felt ready to go through some maneuvers in preparation for the Nats. Little did I realize that I was about to be baptized a twin engine pilot! When the plane was in the back leg of the Horizontal Eight, it suddenly snapped to the left and went into a spiral dive.

At first I thought that my radio went out, but Lou shouted that I had lost the left engine. I immediately followed the book and shut the right engine down. The plane tamed down instantly, and everything looked good. I dropped the flaps 10%, dropped the gear, and got ready to land. Because I didn't have enough altitude. I was forced to make a downwind landing. That flubbed landing proved the utility of using an engine mount for the landing gear. Needed: one new engine/retract mount.

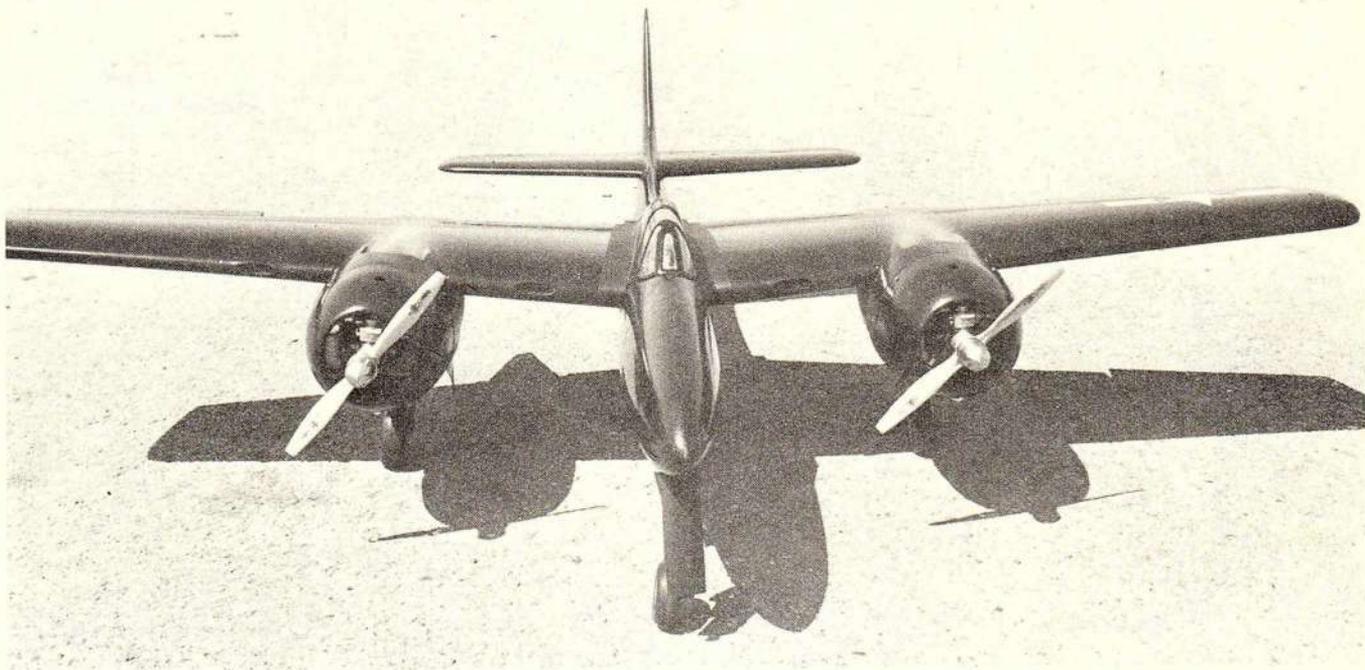
When Lou and I discussed what had happened, we decided that the engine



GRUMMAN F7F  
TIGER CAT



*Mendenhall '78*



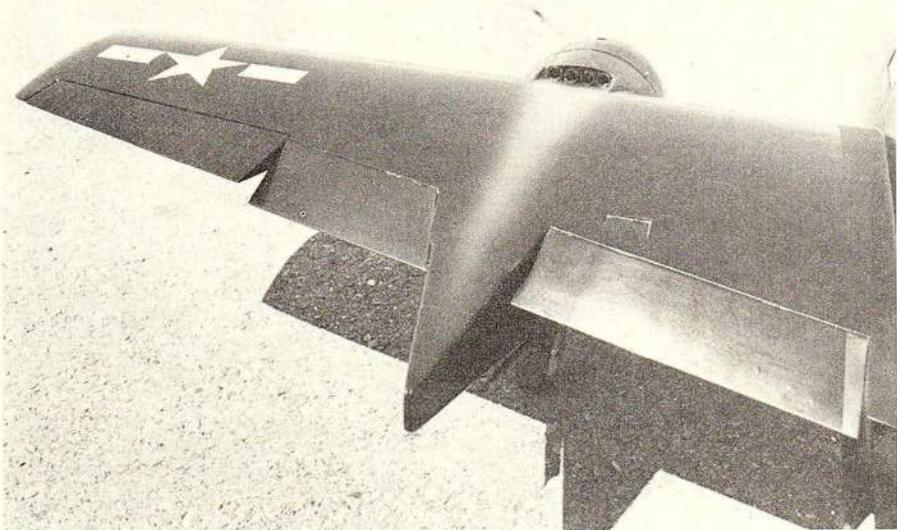
**A pencil for a fuselage! This angle gives some feel for the minimal drag of the F-7-F.**

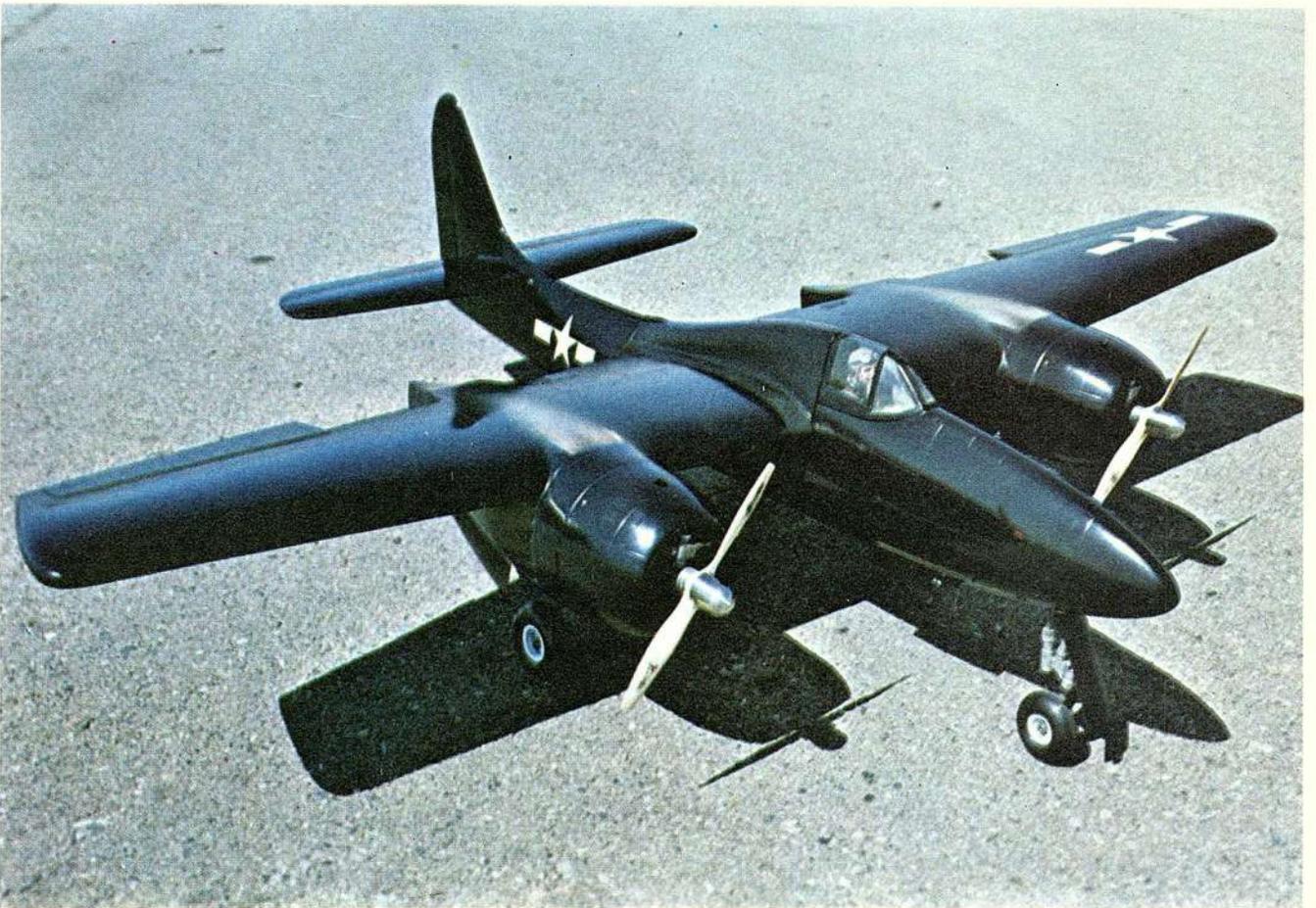
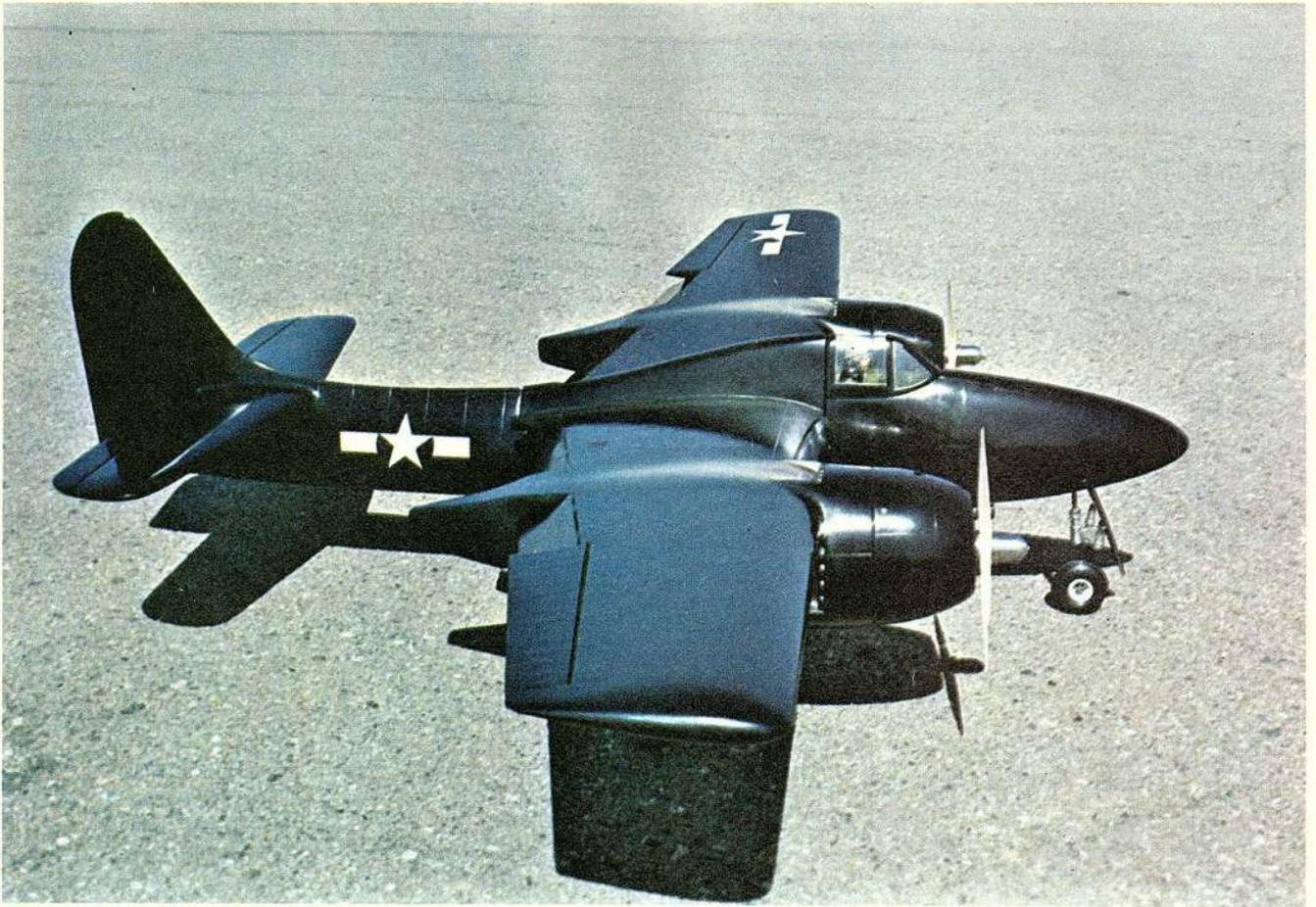
**Split flaps are extremely effective. Lowered this far in flight, the model looked as if it had stopped cold in its tracks.**

had overheated. We designed a plate for the front of the cowl with a pie-shaped cut-out in the top. We calculated that this would force the air over the cylinder head. Since the next flight of the Tigercat would be at the Nats, we hoped this would do the trick. And it did. Since then, I've never even had an engine sputter.

My showing at the Nats was more or less what you'd expect from a relatively new model, on which I had a minimum of stick time. It wasn't really the flight points that kept me out of the winner's circle, but rather the plain-looking overall-blue military paint scheme. I've concluded that the F-7-F is competitive, and is capable of out-flying most single-engine models. With flaps and retracts, plus the "bonus" of twin-engine points, the Tigercat is extremely competitive.

I've been flying the model on weekends for some time now, and have amassed about 45-50 flights. You can literally drag the tail on landings, without any stall or snapping tendencies. The Tigercat is a very stable animal. It's definitely a cut above any of the twins I've flown. I'm glad Joe Bridi gave me the opportunity to fly the very first of his Bridicats, and this is one breed of cat that makes a fine friend.





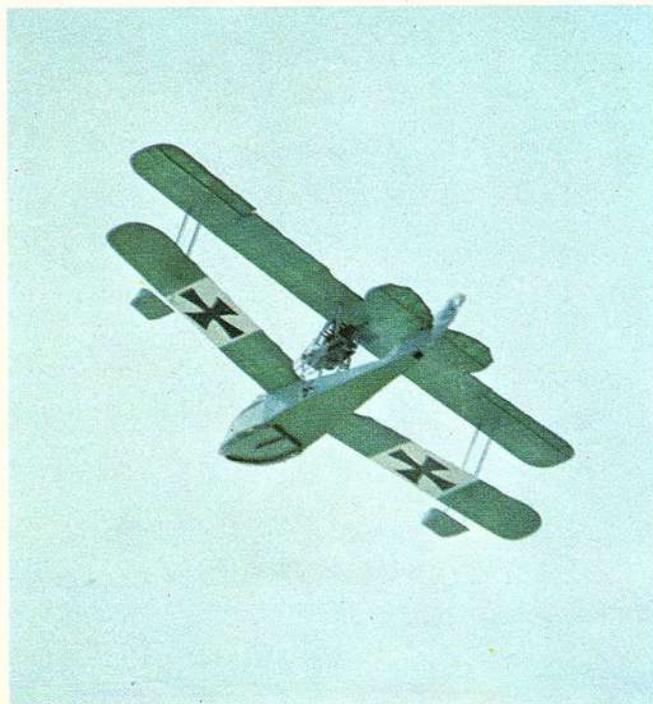
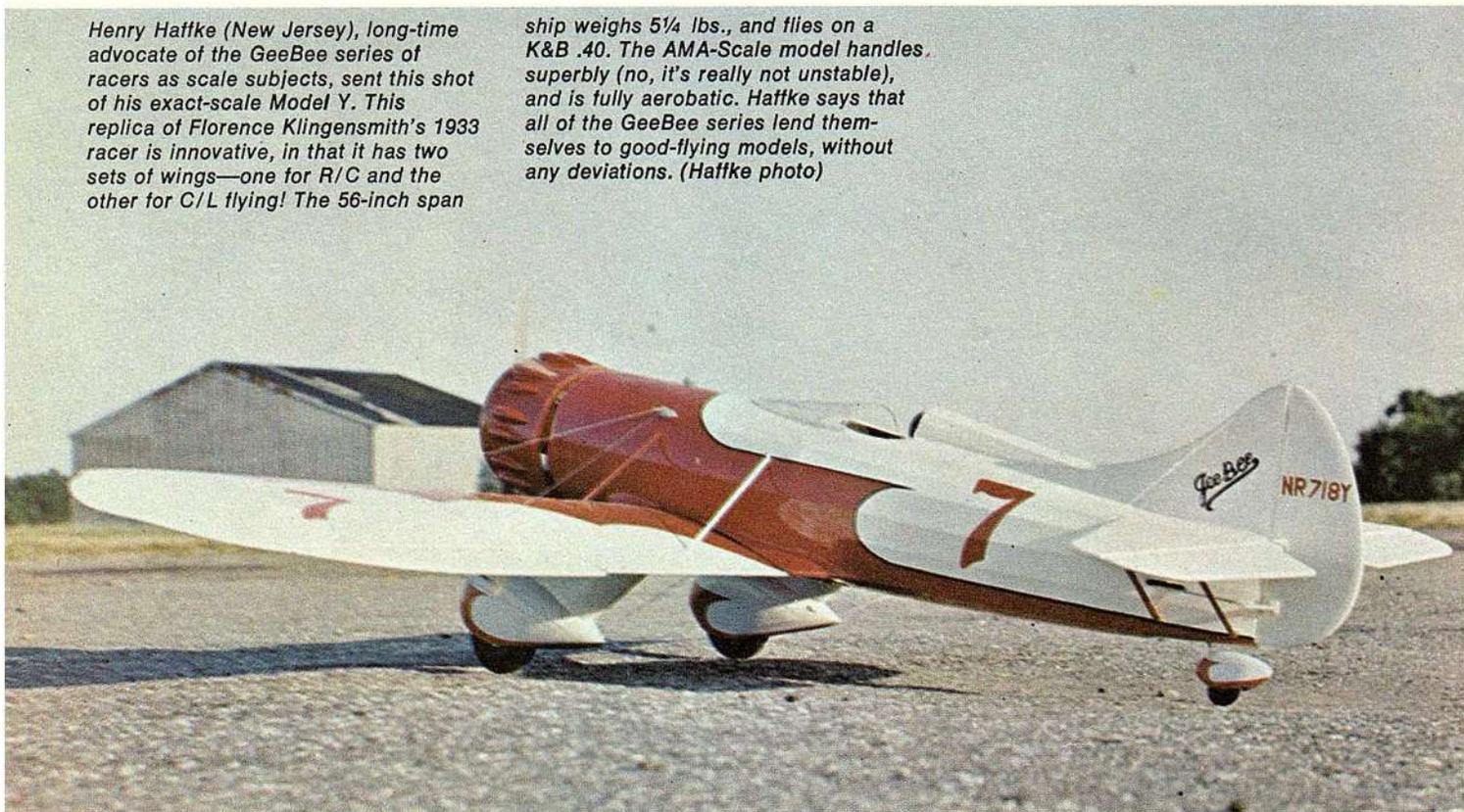
# Aviation Album

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.

*Henry Haffke (New Jersey), long-time advocate of the GeeBee series of racers as scale subjects, sent this shot of his exact-scale Model Y. This replica of Florence Klingensmith's 1933 racer is innovative, in that it has two sets of wings—one for R/C and the other for C/L flying! The 56-inch span*

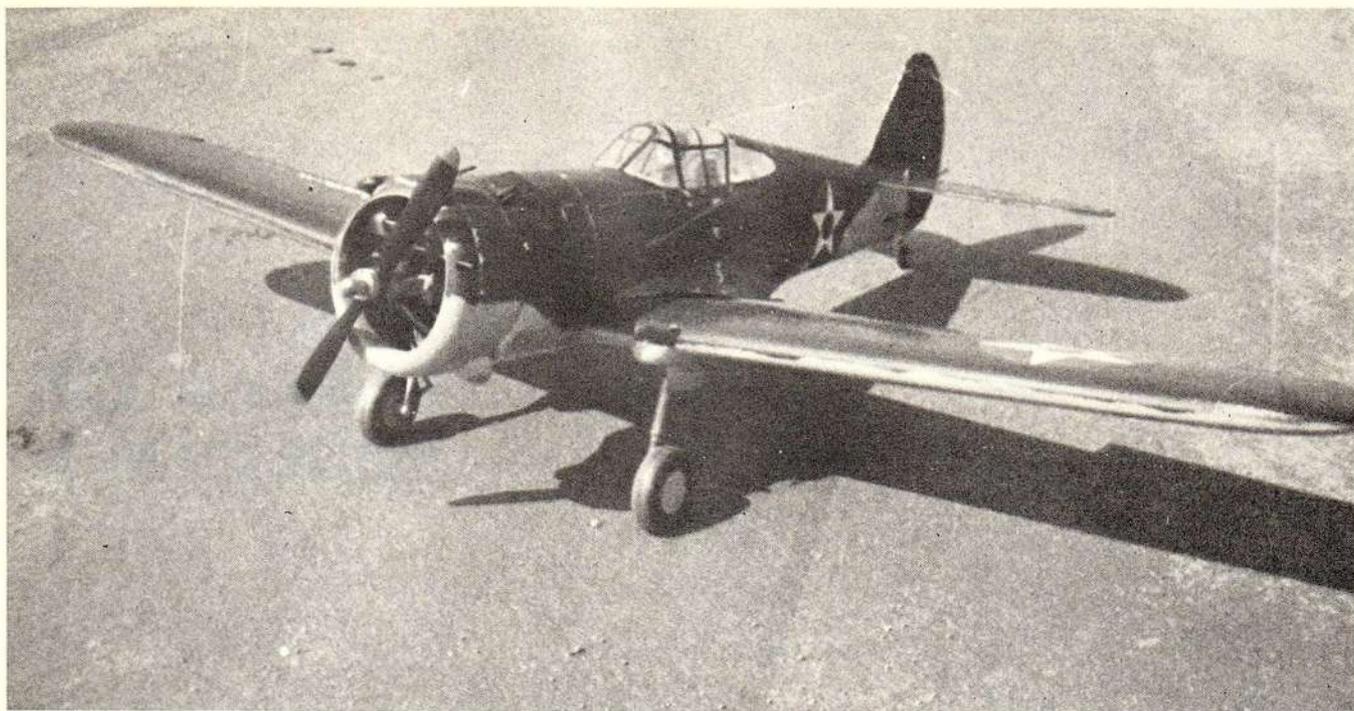
*ship weighs 5¼ lbs., and flies on a K&B .40. The AMA-Scale model handles superbly (no, it's really not unstable), and is tully aerobatic. Haffke says that all of the GeeBee series lend themselves to good-flying models, without any deviations. (Haffke photo)*



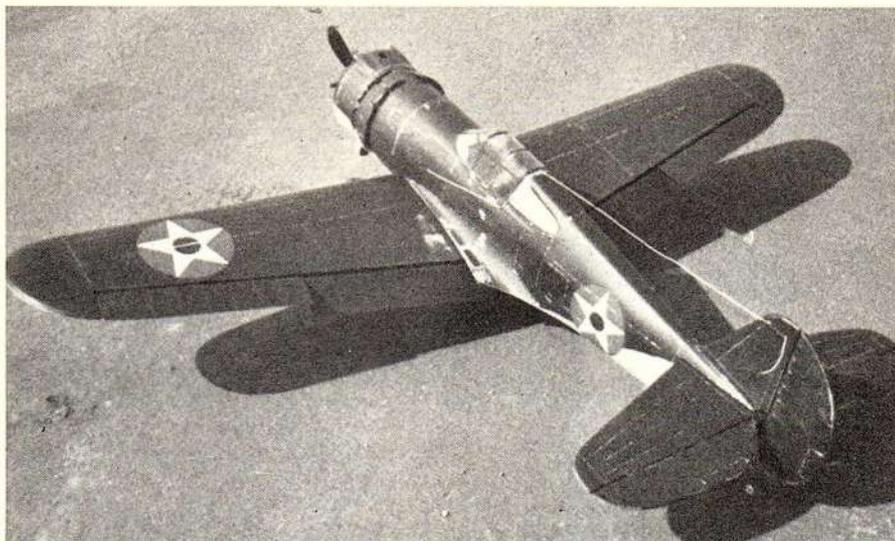
*Joe Tschirg's (California) often-photographed Hansa Brandenburg W-18 flies superbly on a four-bladed prop. Ship R.O.G.s from a drop-off dolly, and lands on its tape-protected hull. (J. R. Naidish photo)*

*Bob Frey's (Arizona) campaigning Jug, from a Top Flite kit. Ship is a veteran contest machine, but it was retired at the '77 Nats, when a bit of pilot error caused the P-47 to smite the tarmac. From the Top Flite kit. (J. R. Naidish photo)*





From Brazil come these photos of N.J.A. Rogers' XFL-1 Aerobonita. This is a kit modification from Top Flite's P-39, per our article in the June '76 issue. Ship features Kraft Multicon retracts, and is reported to be extremely aerobatic. (Rogers photo)



A competitive contest kit conversion is Tom Berby's (Connecticut) Hawker Fury, which started out as an Acro-Star from Cox/Airtronics. The biplane has scored as high as 80 in the static circle. Ship flies on a fifteen-year-old ST .60 at half throttle. The author reports that the modifications were a bit more work than originally anticipated. (Derby photo)



Scratchbuilt F-4 Phantom by Capt. Steve Vejckik, Jr. (USAF) swings a prop on the nose, but is otherwise a superb execution of this famed jet fighter. Ship has retracts, functional oleo struts, flaps and a full-flying anhedralled stab. A very difficult subject to model properly, Capt. Vejckik (Virginia) has done a remarkable job of scale miniaturization. (Vejckik photo)



Sometimes, I'm just plain cantankerous and ornery about the way I build my scale airplanes. A creature of habit, i.e., slow to catch on to new ideas, I am often *too* traditional. Such was the case when a friend attempted to convince me that vacu-forming could cut days off my building time. Heck, I figured, who wants to work with plastic. Besides, I'm not so dumb as to not realize that, if you figure out the extra time to make the male mold, one could just as quickly make the needed part for the model.

That's what I thought before this same friend brought over not one, but two scratchbuilt Stinson SR-7s. When he pointed out that numerous parts in the well-detailed dummy engine, the cowl, wheelpants, strut fairings, gas caps, and even the complete cockpit interior (seats, instrument panel, etc.) were all vacu-formed pieces, I really sat up and took notice. He had built two planes in a little more time than it took to build one. The extensive use of plastic assemblies made this practical. Shortly afterward, I reluctantly borrowed his Wing Manufacturing "Magic Molder."

**The molds in the foreground were used to make the duplicated plastic parts on the sheets. Author did all this in one weekend.**

Rather than just raving about all the neat goodies I made with the Magic Molder, I thought I'd not only do that, but also give some hints for speeding up the molding processes. I'll be the first to admit that my first attempts, as seen here, are not the most intricate and complex, but they are functional. What's most amazing is that I picked up the vacu-former on a Friday, and "pulled" all the items shown here on Monday evening! One weekend taught me that vacu-forming is easy, and it also tends to become so much fun that it could easily develop into an obsession.

The Magic Molder is a precision-made piece of equipment. The frame, bed and platen are metal, to prevent warpage or distortion from the numerous heat cycles to which these parts are subjected. All the builder supplies is a vacuum source (shop or household vacuum sweeper) and the kitchen oven in which to heat the plastic sheets.

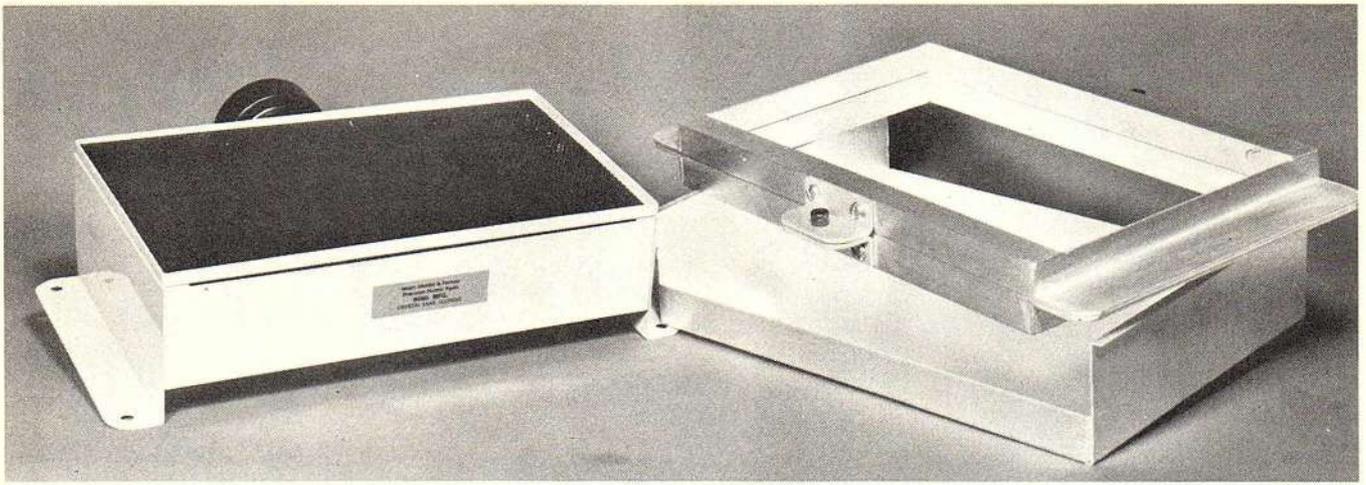
The molding operation is quite simple. An 8" x 10" sheet of plastic (vinyl, ABS, ASA, butyrate, etc.) is secured, via screw clamps, in between the two-piece platen (frame). The plastic is put into the oven, where it rests above a reflector pan. This keeps the plastic from touching the oven racks, and

## THE By Thaddeus Califa MAGIC O. MOLDING

*Fabricating all sorts of scale plastic goodies is easy with the "Magic Molder." You'll use this machine so often that vacu-forming will become habit forming.*

PHOTOS BY J. R. NAIDISH





helps distribute the heat evenly over the plastic.

The vacuum base is a metal box, with a perforated screen material as the molding bed. The vacuum sweeper hose is connected to this suction chamber, using tape and/or foam to seal all air leaks. The parts to be molded are placed on the perforated bed, and the hot plastic sheet is simply set atop this. Instantly, the vacuum suction draws the plastic down against the screen, permitting it to contour with whatever is on the bed. In one-tenth the time it takes to describe it, the process is complete and you have

a nicely molded plastic item.

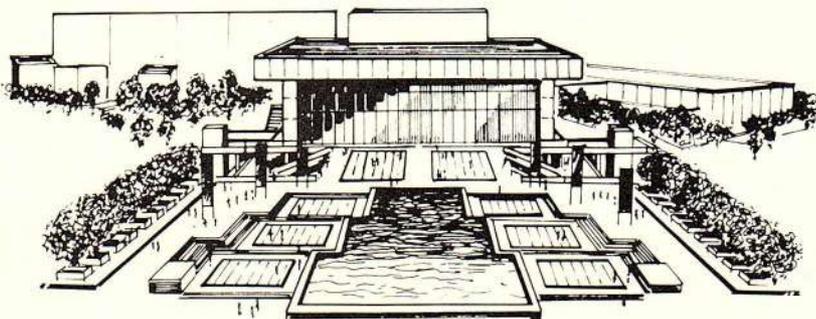
The results are totally dependent on the quality of the male mold, so I'll spend some time discussing the techniques and materials I used. There are countless variants, I'm sure, so don't be afraid to experiment. Any material or substance that is temperature stable up to about 175-200° F works fine for making molds. If the material wouldn't melt out in the sun on a very hot day, it is good enough for vacu-forming. The list includes many plastics, nylon, wood, fiberglass, plaster, rubber, silicone, ceramics, epoxy, etc. This affords the scale modeler wide flexibility

**The Wing Mfg. "Magic Molder" is of all-metal construction. Vacuum chamber (left), with perforated bed, connects to household sweeper. Platen (right) clamps plastic in place for oven heating, and is shown here resting atop reflector pan.**

in preparing the molds, so use the medium that works comfortably for you.

Bear in mind that the Magic Molder is intended to make *multiple* or *spare duplicate* parts, and it would be a total waste of valuable building time to do up a mold for only one piece (except the case of fabricating a custom can-

## 8th Annual Model and Craft Show April 22-23



**Long Beach  
Convention Center**

**R/C Model Spectacular.** This is the most exciting and biggest Model and Craft Show yet, presenting a panorama of models: planes, helicopters, cars and boats. Also U-control and free-flight models.

**Model demonstrations** will again attract thousands — both indoors and outdoors. The new Long Beach Convention Center has an artificial outdoor lake for boat demonstrations. A special indoor track will allow the demonstration of electric model cars.

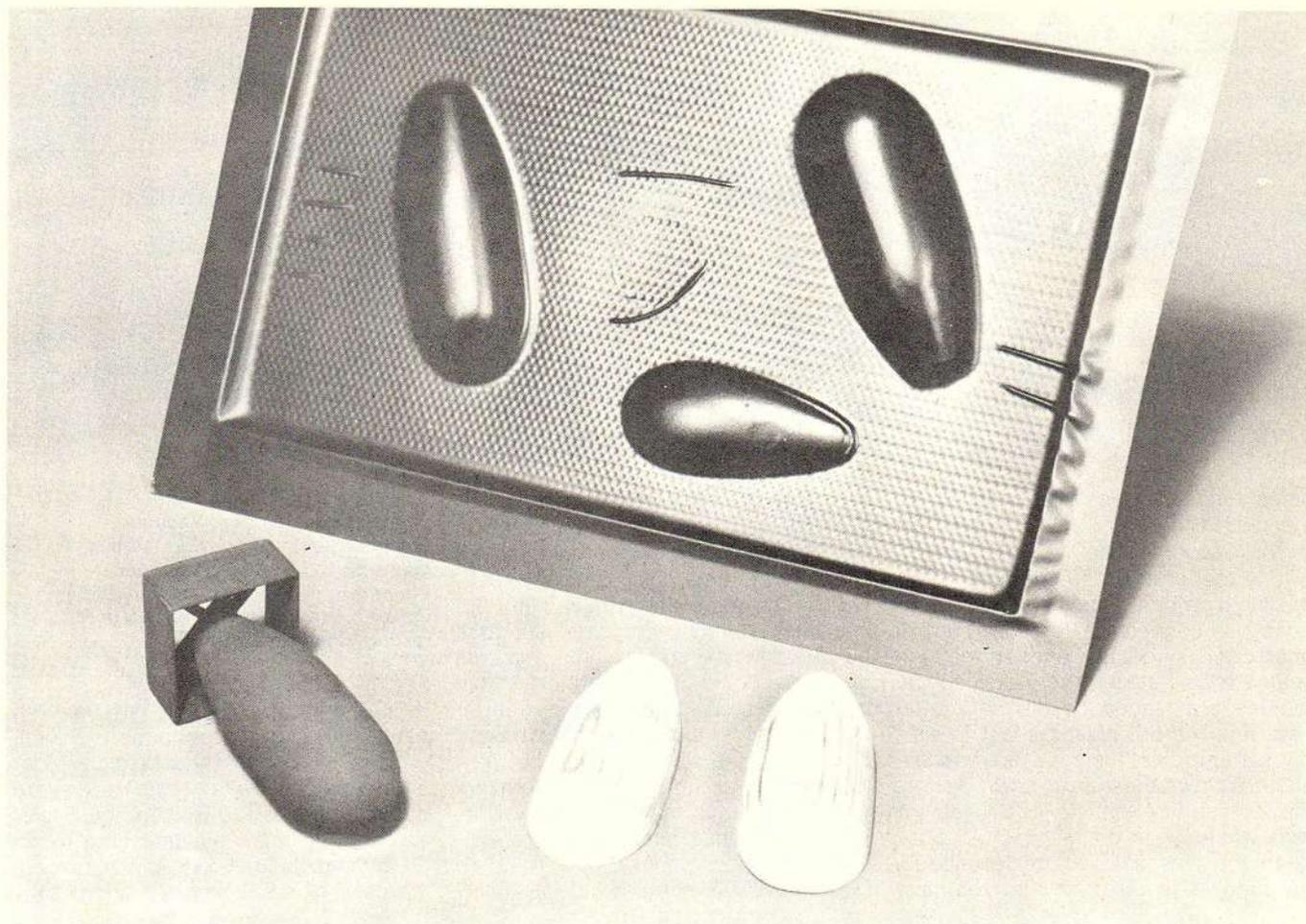
**The giant MACS Hobby Contest,** open to all hobbyists, will present more than 200 awards for outstanding models and crafts. Hundreds of entries will be on display throughout the show.

**Show hours** during this giant two-day-only show are Saturday, April 22, 10 a.m. to 8 p.m.; and Sunday, April 23, 11 a.m. to 6 p.m. Special dealer-only hours are scheduled Sunday, 9-11 a.m.

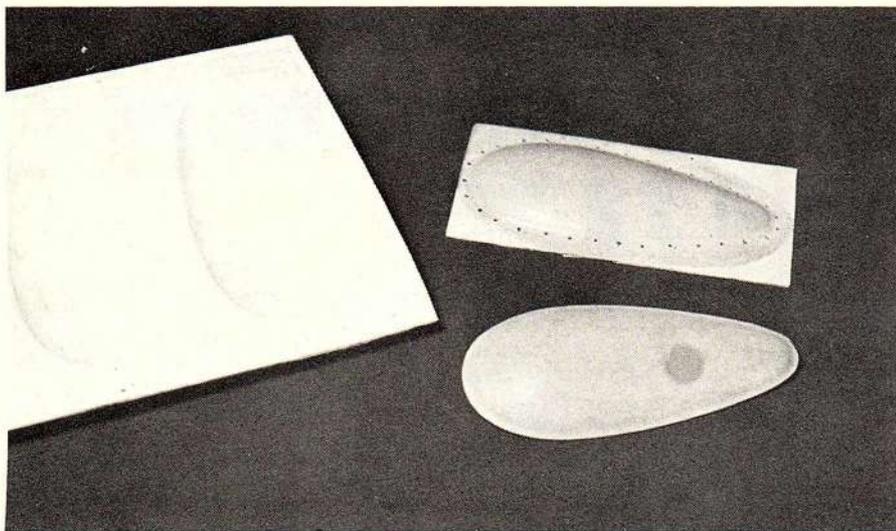
Long Beach Convention Center on beautiful Long Beach, CA Harbor  
MACS Model and Crafts Shows, Inc.

# MACS

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For information call (714) 986-8570



**Completed plastic bomb, along with original broom handle molds which were used to vacu-form the sheet shown here. Wood was primed and sanded to a reasonable smoothness.**



**Five-minute epoxy and micro-balloon paste was poured into these commercial plastic cowl blisters. Plywood mounting plate attached for convenience. Whole process took ten minutes!**

opy, where a mold must be made anyway. If you only need one cowl, then make the original for the model; not as a mold. The little dummy bomb shown here will have to be replaced on almost every flight, so it was a wise thing to make a master mold of it.

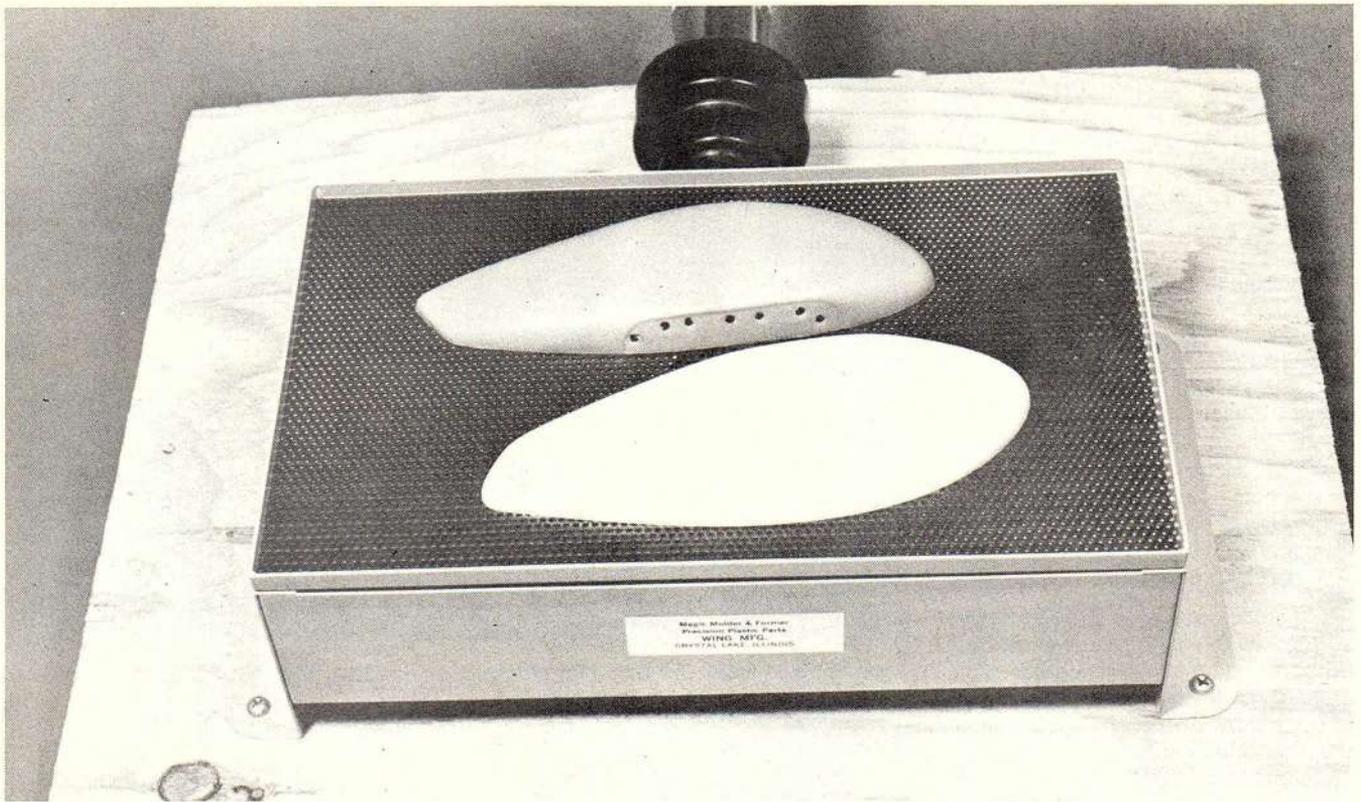
My first "get acquainted" experience with any sort of mold making was to "re-duplicate" a set of commercial cowl blisters. The first step was to wax the original part with fiberglass mold-release. I then simply poured a mixture of 5-minute epoxy and micro-balloons into the cavity and let it cure.

In ten minutes, I had a perfectly shaped mold for vacu-forming innumerable cowl blisters, each one the correct contour and size. On items like this, it's often more expedient to make several molds, and pull a half dozen or so per sheet.

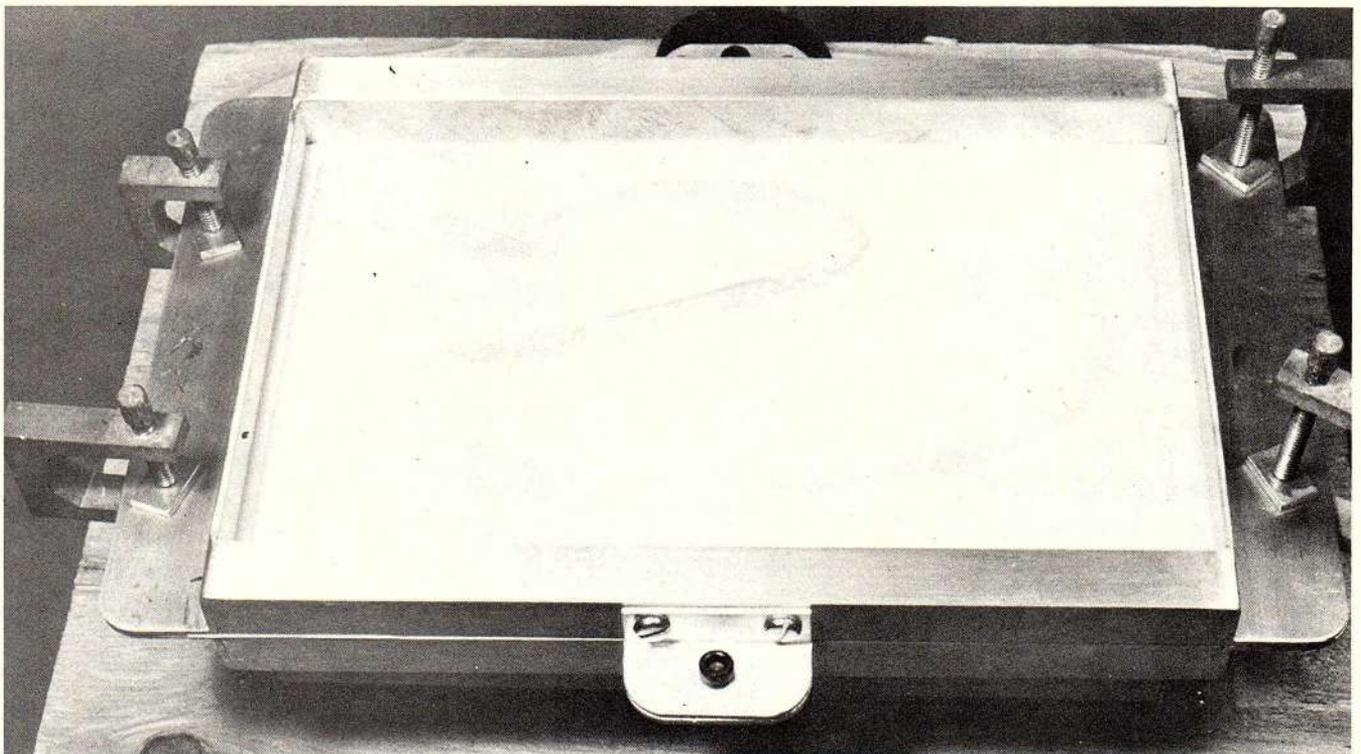
When picking an item to mold, remember that a reverse cut or undercut will not release once the plastic is pulled over it. The little bomb I made is again a good example. The mold started out as a piece of broom handle, which was turned to proper contour on a lathe. It was necessary to split

the mold longitudinally. If the cut had been off center, the larger half of the mold would have had a poor draft," which would have made it impossible to remove from the formed plastic sheet.

One critical property of vacu-forming is the plastic's inability to pull totally to the very bottom edges of the piece being molded . . . the thicker the plastic used; the more radius will appear around the base. Thus, on the mini-bomb, it was necessary to add a piece of 1/16" ply (or balsa) to increase the height of each half. This extra depth is



The vacuum chamber has been secured to a scrap plywood base, and a pair of wheelpants are ready to be molded. Holes visible in mold are to create suction in this undercut area, so that plastic will pull snugly into the cavity. White mold is original Sig wheelpant, filled with plaster.



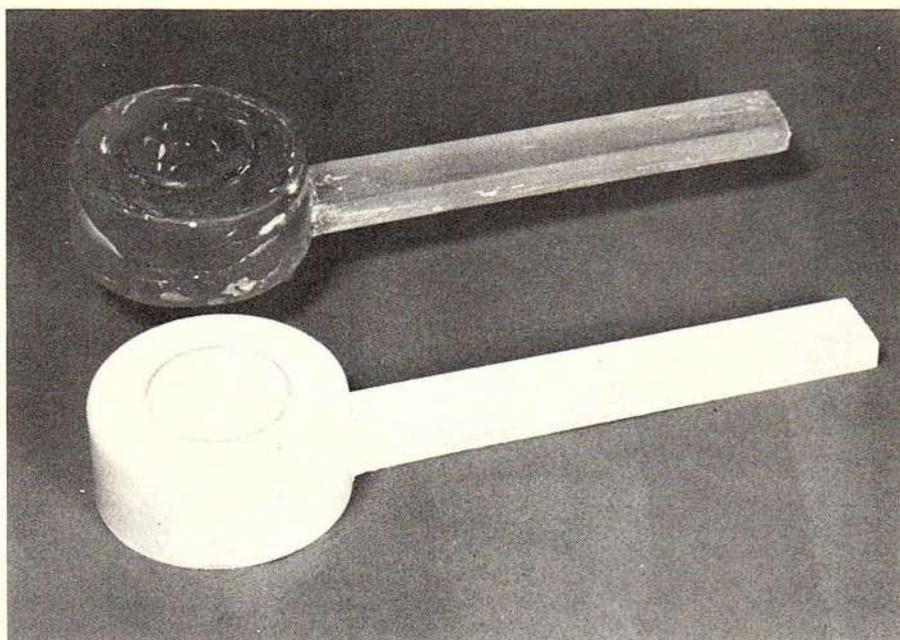
The heated plastic has just drawn down over the molds. Note how undercut wheel recess has contoured. Extra clamps keep plastic from creeping out of frame and causing wrinkles.

trimmed off the plastic pieces, making it possible for the completed product to be a circle again, when joined. If you wanted to get fancy, you would file a thin slit where the extra thickness pieces have been added. When the plastic part is pulled, this scribed line will leave a faint "trim" mark, such as is often seen on commercial canopies.

The poured epoxy/micro-balloons method of duplicating an existing structure was also used for the wheel-pants. The glue matrix was coated on the inside of the Sig wheelpant (remember the release agent). When the wall thickness of the glue was about 3/32", the remainder of the cavity was filled with plaster of Paris.

The cowl shown here was done in a similar fashion. The original for the mold was a foam instant soup bowl. The only difference in procedure was that the second glue coat was a matrix of fiberglass matt and epoxy. Once the glue layer was about 1/4" thick, the remainder of the shell was packed with plaster of Paris.

Acetone was then used to dissolve the foam outer shell, and spackling compound was used to fill any minor irregularities. A series of #65 drill holes were put around the inside of the top lip, where the plastic would need to pull down into this recess.



Paint cap and maple landing gear block were screwed together to form original mold at bottom. From this plug, a fiberglass female mold was made, which was then filled with casting resin. Completed resin mold at top has flaws filled with spackling compound. Final wheel well liners were pulled from both molds, with original one working just as well as the other.

Molds this deep (about 3") need heavy plastic. Our first pull was with .030 vinyl, but we wound up using .050 ASA for rigidity.

My personal *piece de resistance* was the plastic wheel well liners seen here. The first plug was simply a nylon cap from spray paint and, believe it or not, a maple landing gear trunion block (what else?!). I decided to use

(Continued on page 78)

## NEW FROM THE MODEL MERCHANT

Easy to build. Aerobatic. Stable. Our unique wing builds quickly. Our plastic is the best: tough, light, flexible ASA. And as Mr. Chabot sums us up in April '78 Scale RC Modeler, "This is one of the most intelligent ways to build a model I've ever seen."

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**SPECIFICATIONS**  
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AREA—225 sq. in.  
WEIGHT—22-24 oz.  
ENGINE—.049-051-10  
RADIO—2-5 channels

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# DUELLIST II

See feature article in Model Airplane News (May 1978)

## No, it isn't scale ... but ...

..this twin doesn't need to be scale to be beautiful and exciting! A fun step forward from sport/pattern singles; or a wise stepping-stone from scale singles to scale twins.

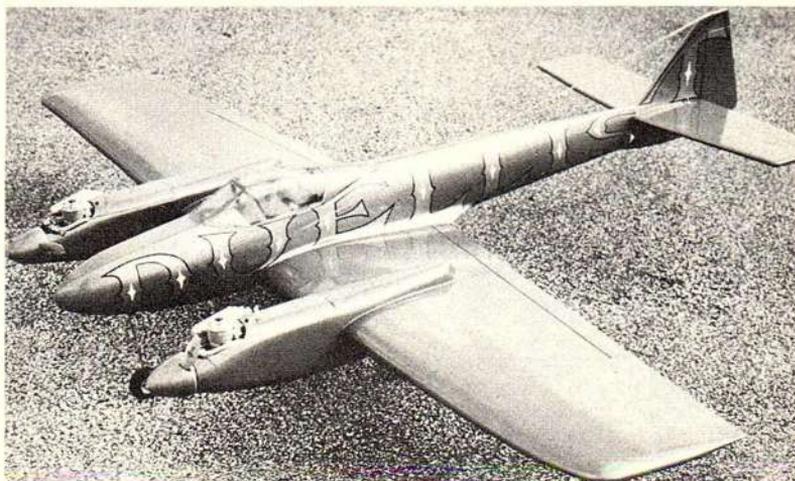
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SPAN 69 ins. AREA 850 sq. ins. WEIGHT 8 to 9 lbs. ENGINES 2 similar .25 to .40

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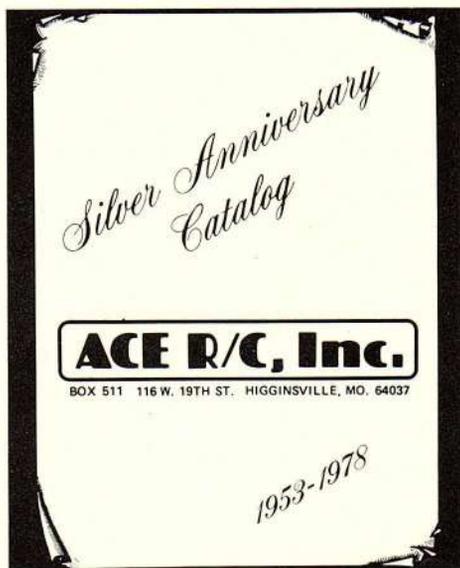
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# SCALE SHOWCASE

## Items for the Builder of the Model

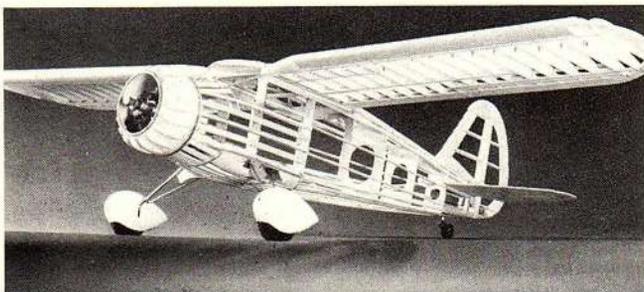


### SILVER ANNIVERSARY

In a hobby which can count its age in terms of decades, it's really something when ACE R/C announces that 1978 will be the year that company celebrates its 25th Anniversary. In 1953, Paul Runge started a small mail-order business. The name ACE R/C was chosen because it fit the company's projected product lines of Accessories, Components and Equipment. The whole idea was to make radio components and parts available for the new breed of aeromodeler who was discovering that he could build a functional (?) radio from magazine plans.

ACE's first catalogue was a two-sheet affair. Now, a quarter of a century later, the company has just released their Anniversary Edition, all seventy pages! They're still in the radio parts business, but they've added just about every model product imaginable to their list. In recent years, they have pioneered aircraft design with the ever-popular ACE foam wing, and even introduced their own radio brand. To enumerate all their accomplishments would take a book, so all we can suggest is that you send ACE a buck for their 25th Anniversary catalogue. It will tell you the whole story.

Salutations and continued success to the guys at ACE R/C . . . may you have several more such celebrations! ACE R/C, Box 511, 116 W. 19th Street, Higginsville, MO 64037.



### STINSON SR-6

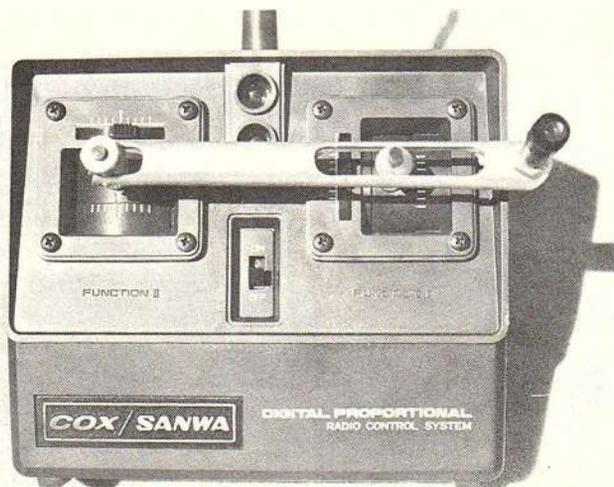
Among the unprecedented "classics" of the R/C scale industry is the forthcoming Stinson SR-6 from G-S Products. This 1½"-scale ship follows in the footsteps of its predecessor, the Howard DGA-15, in terms of accurate scale outline

and construction. The kit has been engineered from a file of full-scale materials which has been gathered over the past thirty years.

The 62" span wing of this excellently designed kit features a revolutionary "internal" wing mounting system, to preserve the exact-scale appearance of the plane's exterior. This miniaturization of the last of the straight-winged Stinson Reliants will sport 610 sq. in. of wing area, and is designed to fly on .40-.60 engines. Among the other "custom" features to be found are a true-scale cowl, with rocker arm covers formed in place . . . the cowl comes in three pieces, just as did the real plane's.

The scale modeler will appreciate the pre-shaped spruce master stringers in the fuselage. No bending of wood to get the contour, and thus no chance of warps. The stringers are also pre-notched. The Stinson is designed with spruce spars, so that any type of covering material may be used (covering materials not supplied). If you're looking for a scale ship that has been engineered to near perfection, then the SR-6 is a fine choice. As with the Howard, a separate float kit will be available.

Price of the Stinson SR-6 is \$89.50, as sold by G-S Products Corp., Box 488, La Grande, OR 97850.

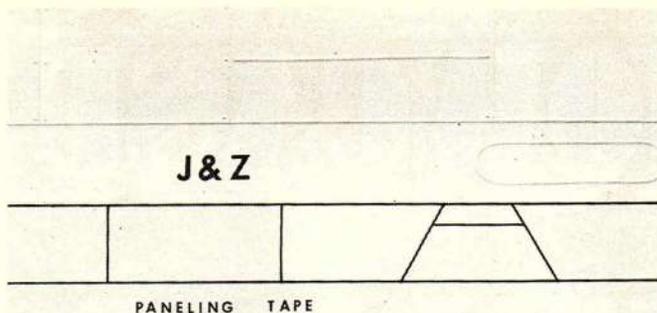


### STICK FIX

The popularity of the Cox/Sanwa and Futaba radios in their two channel configuration has been overwhelming in Schoolyard Scale applications. The ultra-small servos and the inexpensive price have attracted numerous users, but many of them have found it difficult to adapt to the two-stick/two-control transmitter configuration. But Robart Manufacturing has come to the rescue with a simple stick fix. This interconnect mechanically couples the two sticks so that the pilot gets both, control responses when the single control handle is moved.

The device takes only minutes to install, and the transmitter can be returned to its original arrangement at any time. With the converter, anyone who flies Mode II or single stick can satisfactorily operate the Cox/Sanwa or Futaba radios. Naturally, the linearity of control is somewhat compromised because of the geometry of the system, but a little loss of linearity is a small penalty indeed when compared to having to almost relearn how to fly.

The Robart stick conversion is available at your hobby counter, as manufactured by Robart Manufacturing, 203 E. Illinois Ave., St. Charles, IL 60174. Price \$8.95.



## PANELING TAPE

Tired of the Rapidograph method of doing panel lines, with messy ink and the hassle of getting straight lines on curved surfaces? Then J&Z's new paneling tape is just the ticket for you. This .020 thick tape is thin enough to leave just a raised line, which gives the look of a realistic panel edge. It contours extremely well, even around the tightest curves.

The tape comes in two styles: the white is intended to be applied before the final primer coat, and it gives the most convincing panel lines. The black tape is designed to be used over the completed model, with a final coat of clear to seal the tape edges. We've tried both and were impressed with the results. It's the fastest way yet for detailing a scale model, and it only took us about an hour to complete an entire wing. With this product, there is now no excuse for losing out to a paneled airplane at a contest, since the J&Z tape takes most of the challenge out of doing a panel-detailed model.

Available at all hobby outlets, as manufactured by J&Z Products, 23018 So. Normandie, Torrance, CA 90502. Price is \$1.39 per roll.



## NEW BATTERY PACKS

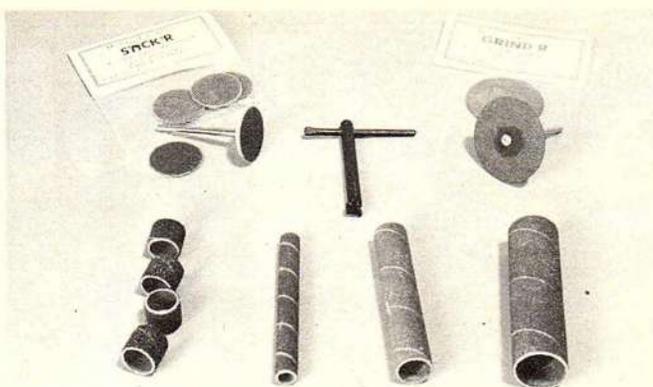
The heart of any airborne system is the battery pack which powers it. Realizing the importance of this vital item, Robinaire has released some nifty new flight packs. Their 450 mah flat pack (2-9/16" sq. x 9/16") contains imported SAFT batteries for maximum reliability.

These cells hold up very well in high-vibration environments, according to the manufacturer, because their internal plates are fully supported. They're packaged in a high-impact plastic case, which adds to their durability. In model applications, with the smaller loads our flight systems put on batteries, these 450 mah cells are actually rated at closer to 475 mah.

The pack comes without connector (they have Kraft and Futaba connectors available as an extra), and retails for \$15.95.

Robinaire also has a super-compact 180 mah pack for Schoolyard Scale aircraft. Measuring 1-5/16" sq. x 13/32", these little jewels will easily fit in even the smallest 1/2A installations. These are also a special cell, to yield high vibration immunity and total reliability. The price on these is to be announced.

For more information, write directly to Robinaire, Box K, Boca Raton, FL 33432.



## SHOP TOOL EXTRAS

Here are some neat accessories to increase the versatility of your hobby motor-tool. The DRUM'R is a replacement 1/2" sanding band for power tool mandrels, which facilitates contouring those hard-to-reach areas on a model. A package of four, in your choice of either fine or coarse grits, sells for 59¢.

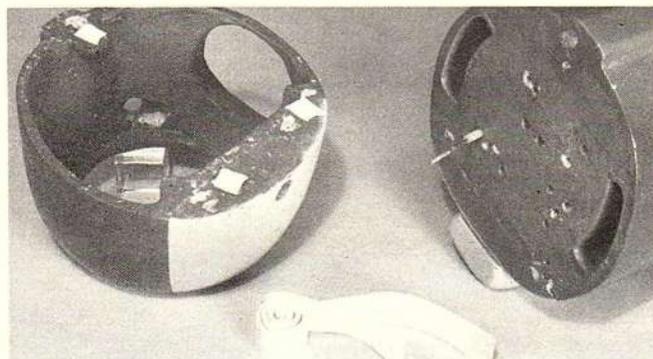
The GRIND'R is the attachment which really impressed us. It's a thick, extra large stone disc which makes cutting even the thickest music wire a snap. It isn't susceptible to breakage as the usual thin wafer wheels, and it lasts longer. Price is 69¢.

At last a sanding disc that can be used flat against the work surface. The STICK'R is a flexible rubber sanding wheel which accepts adhesive-backed sanding pads. This system certainly simplifies contouring corners, or small flat areas. When a sanding pad wears out, just peel it off and stick on another. The complete tool is \$1.89, while a pack of four replacement sanding pads sells for 89¢.

One tool you'll never be without again, once you've used one, is the SAND'R FILLET TOOL. Available in three diameters (1/4, 1/2, and 3/4") in fine and coarse grits, these three-inch sandpaper drums are ideal for fillet contouring. They also work well for inside radii, such as the areas around the canopy. They sell for 59¢ each.

Concluding this listing of "R's is the REAM'R. Unlike most prop reamers, which are pushed through the shaft hole, this device is pulled through. The 1/4" shaft thus serves as a pilot guide, ensuring a perfectly centered hole every time. Made in sizes to fit most engines, they sell for \$5.98.

All these items are available through hobby shops, as manufactured by Hobby Products, 18719 Covello Street, Reseda, CA 91335.



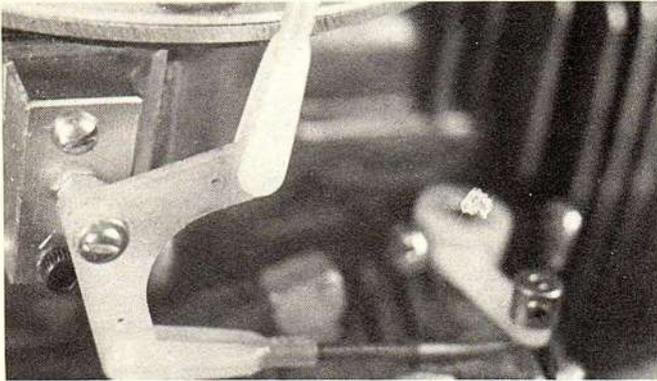
## STIK-IT

Ever lose a contest because your cowl fell off in the middle of a flight, or the hatch worked loose and deposited the battery pack instead of the bomb in the middle of the runway? When we received a sample of Stik-It, which claims to hold almost anything in place, we were a little skeptical. It looked like the putty used to hold paintings and posters to the wall. Then we touched it! Like flypaper, we couldn't get the stuff off our fingers.

The tenacity of this flexible material has to be seen to be believed. Some small pieces were adhered to a cowl, and the cowl was pressed onto the fuselage. When it came time to remove the cowl, the Stik-It stuck so well

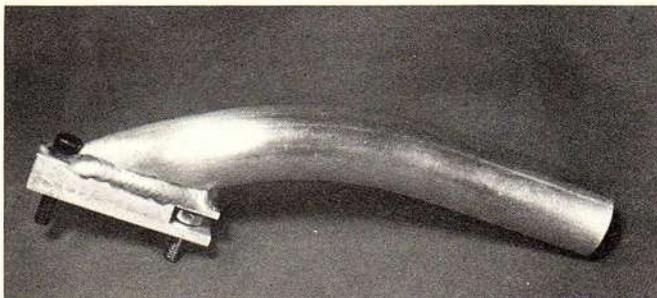
that we pulled off paint (you can see this in the photo). The applications for a product like this are numerous: securing battery packs, anchoring fuel lines, holding removable pilots in place, etc. Even heavy-duty jobs like holding on wing struts are practical with this super-adhesive clay material. Scale fliers will find good uses in sticking on antennas, guns, ordnance, etc. (the stuff that always breaks off every time you pick up the model). Stik-It is totally fuel proof, and cleans up easily with lighter fluid.

A two-foot length of Stik-It sells for \$2.00, direct from Idea Development, Inc., P.O. Box 7399, Newark, DE 19711.



#### QUADRA CARB LINKAGE

Being a chainsaw engine originally, the Quadra conversions for R/C scale have a carburetor which doesn't readily lend itself to easy coupling to the servo. E.W.H. has a simple adaptor plate and bellcrank assembly, which permits a straight shot from the servo to the carburetor. The linkage is designed for smooth and linear engine response throughout the throttle range. While you're at it, why not contact them about their latest prices on Quadra engines, as well as an extensive line of engine accessories. The Quadra carburetor linkage package sells for \$6.95, as sold by E.W.H., 607 East Abram, Suite 10, Arlington, TX 76010.



#### TUNED PIPES IN SCALE

While we seriously doubt that tuned pipes will ever be feasible or practical in Scale, the manifold header which adapts side-exhaust engines to the pipe set-up are just

the ticket for scale exhausts. The header is compact, extending out from the engines only about an inch, and can be easily modified, with conduit pipe and the like) to route the exhaust almost anywhere under the cowl.

The big advantage of the Jenesco manifold header is the way it mounts. A socket head bolt and cap-screw stud enable the manifold mount to be secured directly to the exhaust stack on the engine, eliminating those ghastly straps. In many scale designs, the header can be used as is, neatly dumping the exhaust goop out behind the engine head.

Currently, only K & B, Kraft, O.S. and Webra (all .60s) manifolds are available, but the line will be extended soon to accommodate all engine styles. You may not find these at your local hobby dealers, in which case you should write directly to Jenesco Engineering, 1649-1 W. Sepulveda Blvd., Torrance, CA 90501. Price is \$17.00 (specify engine when ordering).



#### THUNDERBIRDS' TALON

There's nothing more exciting than watching the Air Force's crack precision-stunt team do their aerobic routine . . . nothing, except perhaps building and flying your own scale version of the Thunderbirds' T-38 Talon. Although it's a prop-job, the new R/C Kits Mfg. T-38 captures all the flavor and excitement of this gorgeous jet. The 55" span model sports 575 sq. in. of area, and is designed to fly on a .60.

The kit is nicely executed, with foam wings (all sheeting supplied) and a built-up fuselage. Complete building instructions are supplied, and the kit also has formed canopies and illustrated cockpit detailing. A really superb feature is the manual, which gives full 3-views, color information and even color photos. All the documentation needed is right in the box.

True to form, the Talon is an extremely aerobatic machine, capable of duplicating all of the Thunderbirds' masterful maneuvers. The roll maneuvers are crisp and precise, just like the full-size airplane's.

The kit is now available at your hobby dealers, or direct from R/C Kits Mfg., 353 Briar Avenue, North Canton, OH 44720. Price \$89.95.

## COMANCHE *Twin* 50" LENGTH



**\$139.95**

**AVAILABLE NOW**

See review in Scale R/C Modeler "Bonus" Issue.

**775"² AREA**

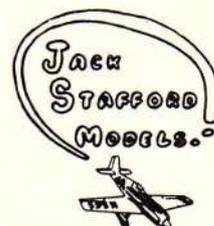
**72" SPAN**

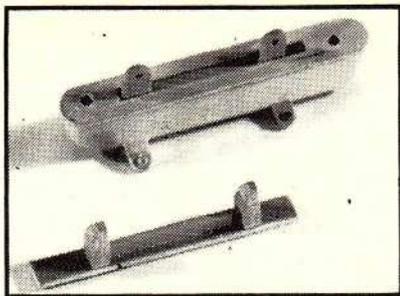
**9½ lbs.**

**FOR TWO .40's**

Send 25¢  
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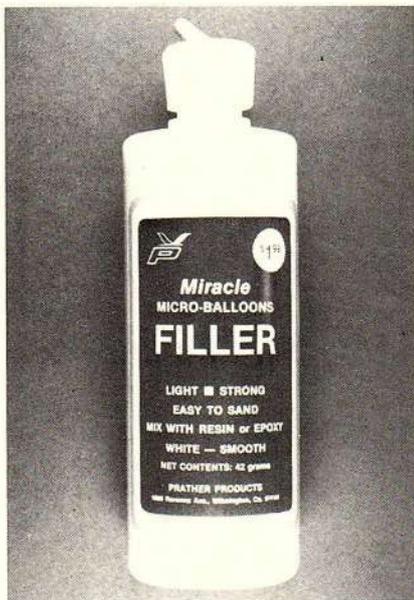


## BOMBS AWAY!

Stumped by a reliable method of releasing those bombs, fuel tanks or ordnance? This complete weapons release device solves the problem handily. The mechanism is very small (2½" x 3/8") and mounts internally with two sheet metal screws. It's small enough to fit in a scale ordnance wing pylon, and the triggering mechanism can be actuated by either a pushrod or cord pull motion.

Molded of gray nylon, a nice feature of the gadget is that one doesn't have to turn on the transmitter to connect the payload . . . simply clip the bomb or tank in place and it's there to stay until the release command is given. The lock is positive, so there's no fear of losing the payload prematurely.

The basic unit retails for \$4.98, while extra release clips are sold separately (two for 98¢). Look for these at the hobby counter or order direct from Vortac Manufacturing, P.O. Box 469, Oak Lawn, IL 60453.



## MIRACLE BALLOONS

Micro-balloons—the material with a thousand-and-one uses on the building board. And now Prather Products has improved them. Their new "Miracle" micro-balloons are ground to an ultra-fine consistency . . . so fine that they pour out of a glue-cap dispenser. No more lumps when mixing micro-balloons with glues or resins. These powdered particles sand beautifully, and are white so that they don't show through even the thinnest coverings.

Once you've used these, you'll never go back to the old-style brown stuff again (although Prather will continue to manufacture both types). The new white micro-balloons are so finely ground that they can even be mixed into a thin paste with resin and used as a grain filler. They add just enough body to resins or epoxies that the adhesive won't run out of a corner. You'll find numerous applications for "filled" epoxy, since the micro-balloons only enhance the properties of most adhesives or fillers.

At all hobby shops at \$1.98 for a 42 gram bottle, as manufactured by Prather Products, 1660 Ravenna Ave., Wilmington, CA 90744.



## BRIDIRACERS

Bridi Hobby Enterprises has recently announced that they have taken over the production rights to Bob Seigelkoff's 1/4-scale Minnow racer. This design was featured in our "Giant Scale Models" special issue a few months ago, and it's truly an outstanding sport scale machine. The Minnow will now be available through all normal retail outlets, and the complete deluxe kit (includes all sheeting, spinner, wheel pants, etc.) will list for \$139.95.

Soon to be in full production will be a companion Cassutt racer, also in 3" = 1' scale. If you want a really pleasurable modeling experience, try one of these big machines. With a good .60 up front, they fly at Pattern ship speeds. Their size makes them most impressive, and they're big enough to be extremely stable and easy to handle.

For more information, see your local hobby dealer, or contact Bridi Hobby Enterprises, 1011 E. Sandison St., Wilmington, CA 90744.



## DUCTED FAN HEINKEL

Nick Zirola first flew his ducted fan He-162 over a year ago, with what was then the prototype of the Midwest Axiflo RK-40 fan unit. Because of the model's generous wing area and surprisingly light building weight (7 pounds, complete), the performance was exceptional. Wouldn't it make a great kit?

Apparently, Midwest thought so, for they have released the famed German experimental jet as a full kit, as a companion to their "you-build-it" Axiflo fan kit. The kit is probably above the proficiency level of the hack modeler, the fuselage in particular is full of lots of parts. But anyone who knows something about putting a scale ship together should find no problems. The wing is a foam core, and the required sheeting is supplied.

The Heinkel is an excellent modeling subject for the fan enthusiast, since the entire Axiflo unit is conveniently mounted atop the wing. Powered by a .40, the 56" span He-162 should perform well if the recommended weight is not exceeded.

Midwest is planning release of their .049 fan unit, perhaps also with an accompanying kit, at any time now. Further down the line, a .60-sized Axiflo will also be marketed.

Check at your hobby dealers for the Heinkel and Axiflo kits, as manufactured by Midwest Products, 400 So. Indiana, Hobart, IN 46342.



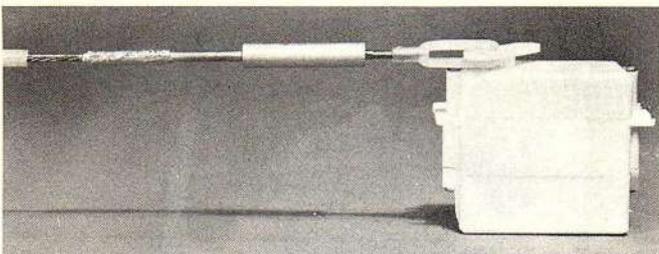
### MINI-GLUIT

One of the finest aliphatic glues we've run across for modeling applications is Pica Product's GLUIT. It dries in about 15 minutes in most glue joints, and sands out very easily. We've never had it ball-up or clog the sandpaper, even when used for butt-joining wing skins.

Actually, we've found that many of the gluing jobs for which we used to rely on epoxy are just as strong with GLUIT. The aliphatic glue gives much better wood penetration than epoxy, so the bond is much better. This adhesive also seems less brittle than epoxies.

The eight ounce size of GLUIT will last a lifetime. Under normal circumstances, this is actually too much glue, and our first bottle is still half-full on the shelf. But now Pica has GLUIT in a handy four ounce size, which is much more convenient and, in the long run, probably more economical too.

The new size is now on the hobby shop shelves, as manufactured by Pica Enterprises, 2657 Northeast 188 Street, Ojus Branch, Miami, FL 33180.



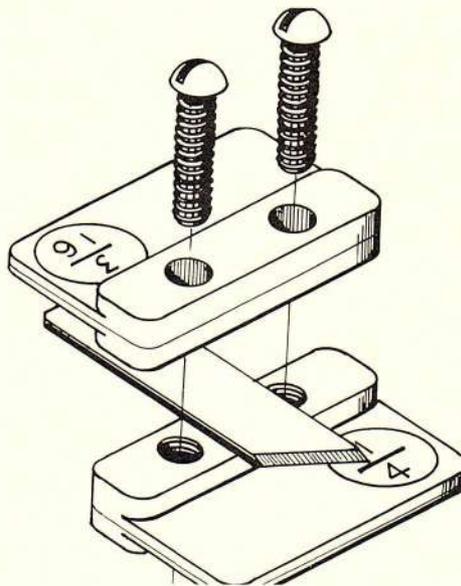
### SHOCK LINK

Want to destroy a perfectly good servo? Simply connect it to your nose gear without any override protection, and you'll be amazed at how quickly the mechanics will go to pot. Most overrides on the market today have been engineered

for the light-duty job of throttle protection. We recently used a practical and functional gizmo called the "Shock Link," which is specifically designed for the rugged stresses of nose gear wear and tear.

This unit is compact, and provides push and pull shock absorption. The spring tension is solid enough to take jarring loads, yet still maintain positive nose wheel steering. One end of the cylinder accepts either a solder-on clevis or a coupler for a braided cable linkage. There's no concern with the linkage binding against the fuse sides, since the moving parts are sealed inside the metal container.

Available from Robinaire, Box K, Boca Raton, FL 33432. Price \$1.50.



### HINGE SLOTTER

Lately, there have been numerous tools on the market to simplify the age-old dilemma of cutting neat, straight hinge slots. One that we've found particularly handy is the Fourmost Gapless Hinge Slotter. Two screw-together pieces of precision molded plastic slip over the piece of balsa to be slotted, and the supplied blade is run in and out until the desired depth is achieved.

Essentially designed for the Fourmost vinyl Gapless Hinge, it serves well for all standard hinges, as well. By reconfiguring the two plastic jiggling guides, the tool can be set up to center a perfect hinge slot in 3/32, 1/8, 3/16 and 1/4" balsa. We've used the tool for every imaginable hinge style, and got excellent results. Tapered surfaces present a bit of a problem, but the more normal straight runs go quickly, and an elevator can be hinged in less than a minute.

At all hobby outlets, as manufactured by Fourmost Racing Products, 4040 24th Avenue, Forest Grove, OR 97116. Price is \$1.95.

# FW 190 D-9

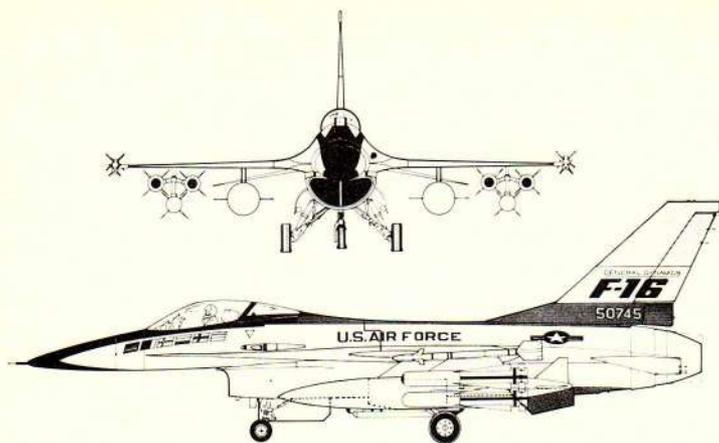
The qualities that make a model a NATS winner are the same ones that Sunday sport-scale fliers look for. Exceptional appearance to start with, of course. The FW 190's stark and sinister shape has always excited modelers. But even more important are friendly flying qualities. Our designs have always emphasized safety at low speeds, and the FW 190 has inherited the ability to fly from 80-90 mph right down to a near-hover for landing. The wide-track gear makes it an ideal first "tail-dragger."

**Kit features:** Full-size plans showing radio and retracting gear installation. Color schemes (and decals) for THREE different FW 190's. Separate 16-page instruction booklet with cutaway diagrams and in-depth flying hints. Diecut and machined balsa, nylon fittings, formed wire cowl, canopy, etc. Span: 65", Area: 730 Sq.", 4 to 6 channel, Engine: .60



**Dave  
platt  
models**

2657 N.E. 188th Street, Miami,  
Florida 33180 Telephone 935-1436



### F-16 DRAWINGS

Morrison Repla-Tech sent us the first copy of their just-completed F-16 drawings. Done on four double-sized pages, these are the finest renderings of this famed fighter that we have seen. All the data is included, such as internal structure, ordnance and even several paint schemes are illustrated. These are true masterpieces, worthy of mounting and framing.

Repla-Tech has perhaps the world's largest collection of aircraft drawings, all ideal for scale documentation. Everything from a complete file of the famed Hirsch race planes (over 250 of them), to aircraft of both wars are available. Some of the 3-views are on a single sheet, while the more elaborate 5-views are presented on multiple sheets.

There are so many offerings that the total list takes three catalogues. These can be had for \$1.00, from Morrison Repla-Tech, 48500 McKenzie Hwy., Vida, OR 97488.



### A BETTER BOX

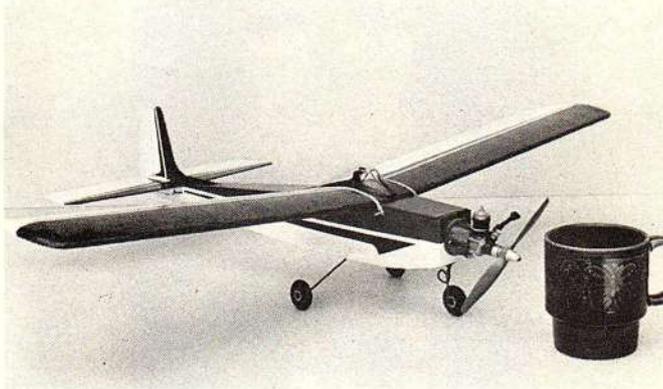
Field boxes always seem to be a perennial problem. They either are too big, too small, require construction, or fall apart after a few uses. It took Craft's-Air's sensible approach to such problems to solve the dilemma. Their new Field Support Box, while not bearing the most original name in the world, certainly makes everything else on the market look paltry.

Of roto-cast polyethylene, this attractive yellow box is virtually indestructible (you can even jump up and down on it). Lots of handy little compartments are molded in, so that the starter has its own pigeon hole, as do the battery, transmitter and a gallon fuel can. A separate tray is inset into the top, so that a handful of tools can be toted off to work on the plane, etc. The capacious drawer holds as much as most fliers will ever need, and it's deep enough to accommodate more than just screwdrivers.

You can't destroy it, stain it or damage it, but you can mount a power panel, or build an optional aircraft cradle on it. The Field Support Box was obviously designed with the modeler in mind, and you'll quickly appreciate the

convenience and practicality of the yellow box.

Sold at hobby shops, as manufactured by Craft-Air, 7851 Alabama Ave., Canoga Park, CA 91304.



### IS IT SCALE?

Peck Polymers, the "Peanut People," have introduced a new R/C model for ultra-miniature sized radios. Essentially a 1/3-scale version of the famed Goldberg Senior Falcon "Liberty Bell," one must speculate as to whether or not it is a scale model. Granted, it doesn't duplicate a man-carrying aircraft, but it is a miniature of a very famous airplane (the ship which Bob and Doris Rich flew across the U.S.).

We seriously doubt if it will ever be accepted by the scale judges, but the Mini-Bell is a great little knock-about ship for the local schoolyard field. The 25" span model flies well on two or three channels (mini radios only) and can be powered with a Pee Wee or Tee Dee .020. The building manual is very comprehensive, and the wood selection will make you drool, it's so light and straight.

The Mini-Bell is at hobby shops now, as manufactured by Peck Polymers, P.O. Box 2498, La Mesa, CA 92041.



### 1/4-SCALE TANK KIT

If you're running a chainsaw engine in that new 1/4-scale project, you've already discovered that a large-capacity tank is hard to come by. E.W.H. has a 33 oz. tank kit, complete with special clunk, brass fittings and neoprene fuel line. This item sells for \$1.95, and you can't even buy the parts to make one that cheaply. It's important to note that they also sell neoprene fuel line (65¢ per foot), since most standard synthetic fuel lines don't work with gasoline.

Available from E.W.H. Specialties, 607 East Abrams, Suite, 10, Arlington, TX 76010.

# WORKHORSE WITH WINGS *(Continued from page 33)*



The Forca Aerea Portuguesa acquired a number of C-47s after the war. This example is painted white above, and natural metal below black cheat line. Insignia (both sides of fuse) are black-outlined white circles, with red crosses. Fin flash is red and green, the green occupying the smaller segment. Anti-glare panels, props, etc. are flat black. (SR/CM file photo)

ble trim problems because of heat expansion. I finally wound up using 1/16" piano wire, with 1/2" segments of the inner tubing affixed every 3", in order to eliminate the linkage problems. Build the wing center section so

that only the bottom halves of the two center ribs are used. Glue a 1/8" ply floor to these to facilitate equipment installation. I used 1/8" plastic for the windows. This minimized the distortion from the thinner plastic supplied, and eliminated the recesses called for on the plans. Finally, I designed a little electronic "goodie": for functional navs and beacon (see attached schematic). This uses a separate 4.8V pack, with two LEDs for the wing tips and incandescent bulbs for the tail and beacon.

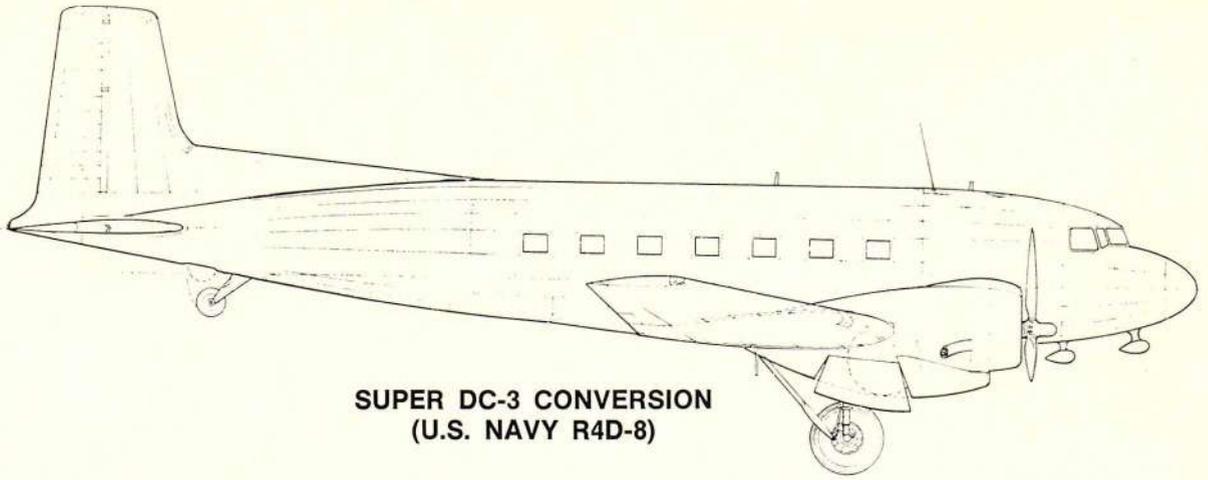
All decked out, the Royal kit was a royal sight to behold. The elegant

double-tapered wing and cigar-shaped fuselage make this a most impressive model . . . as they say, a classic. I only wished the model would have flown as well as it looked!

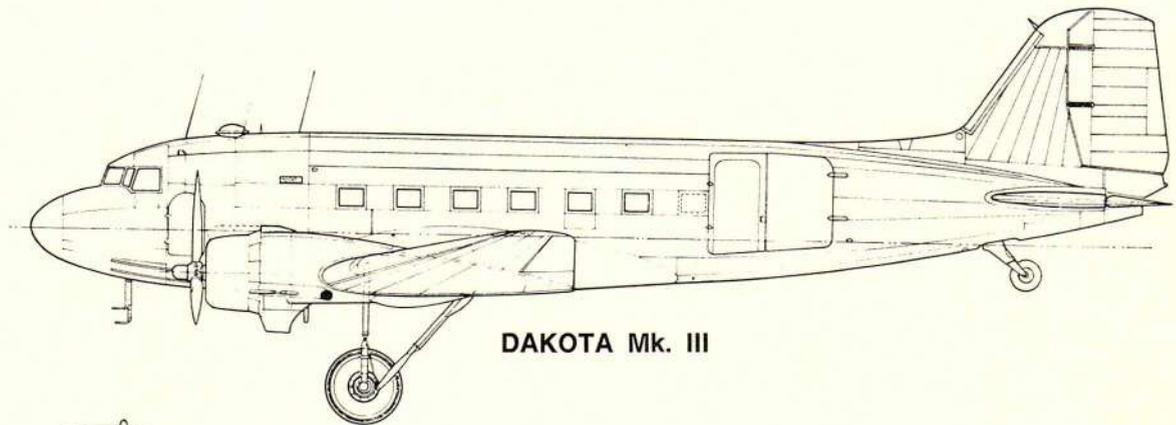
Chuck Smith, proprietor of Smith Bros. Hobby Center (Northridge, California) is an acknowledged expert in flying unproven models, so I naturally gave him the first honors. Right off the bat, we encountered the severe groundlooping previously described, and that's when I had the engines checked and installed the coupled rudder/throttles. That solved getting the bird into the wild blue, but it turned



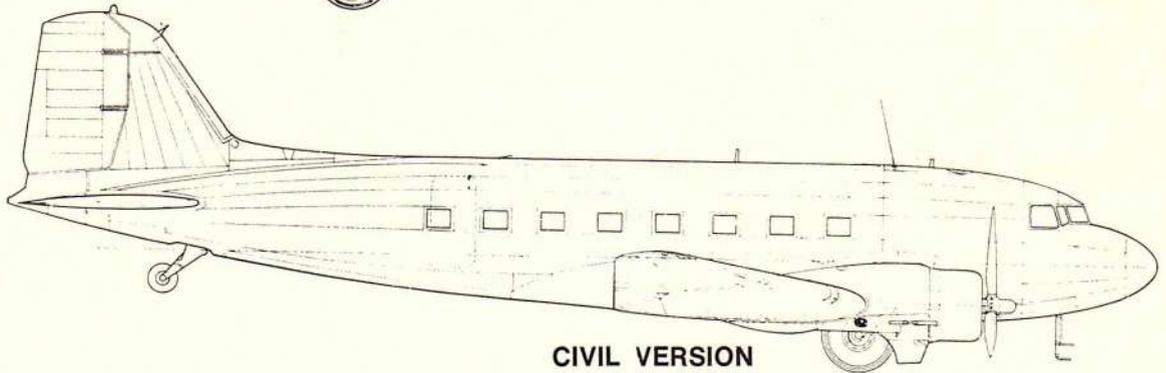
Brand-spanking new C-47 gets checked out over the California coast in 1943, before being shipped abroad for duty as a cargo ship. (Douglas photo)



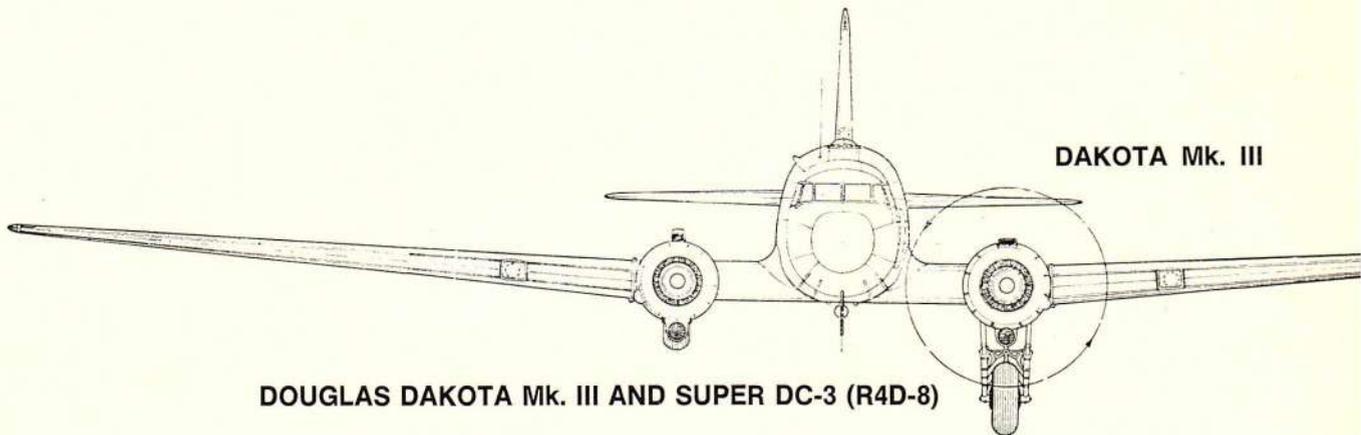
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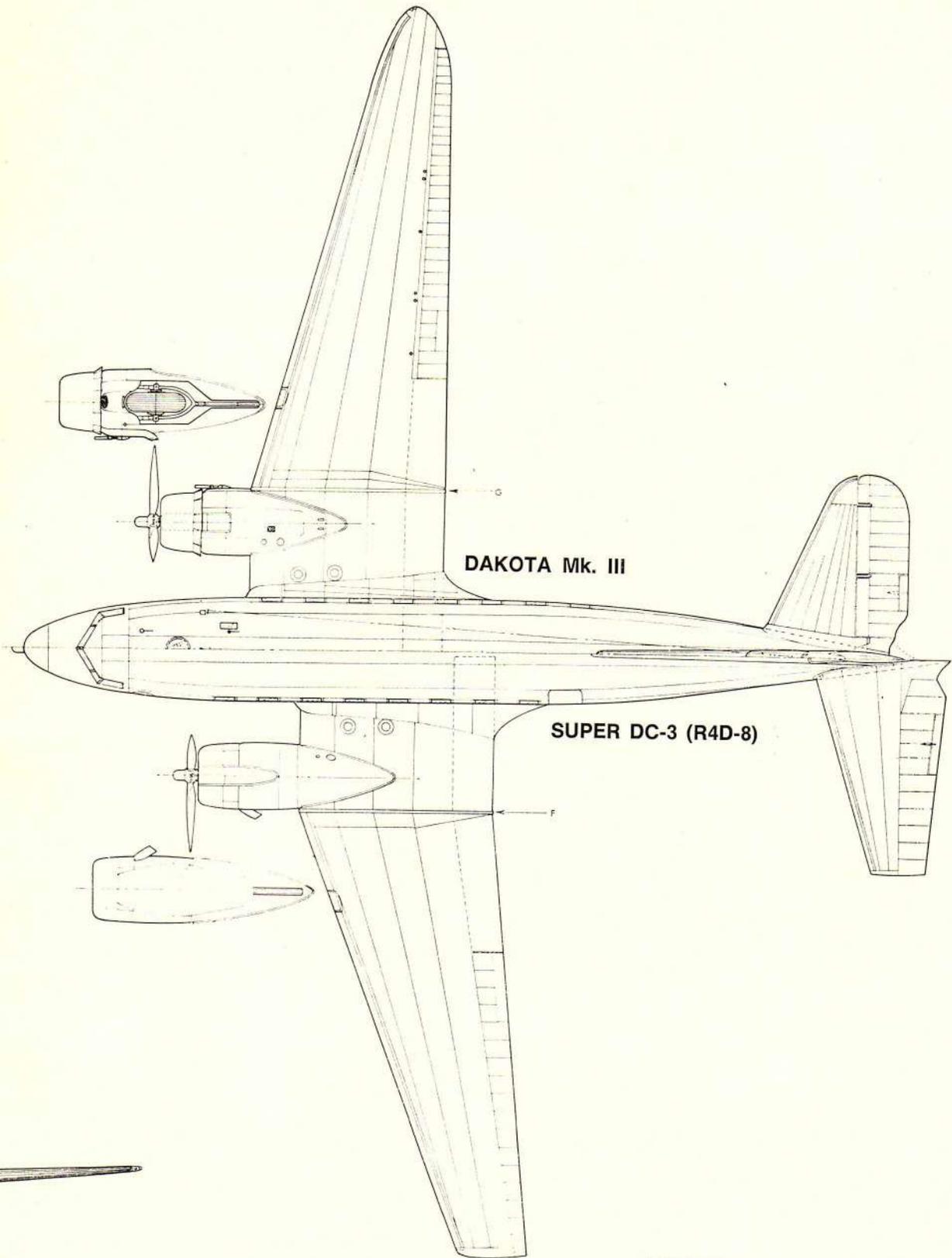


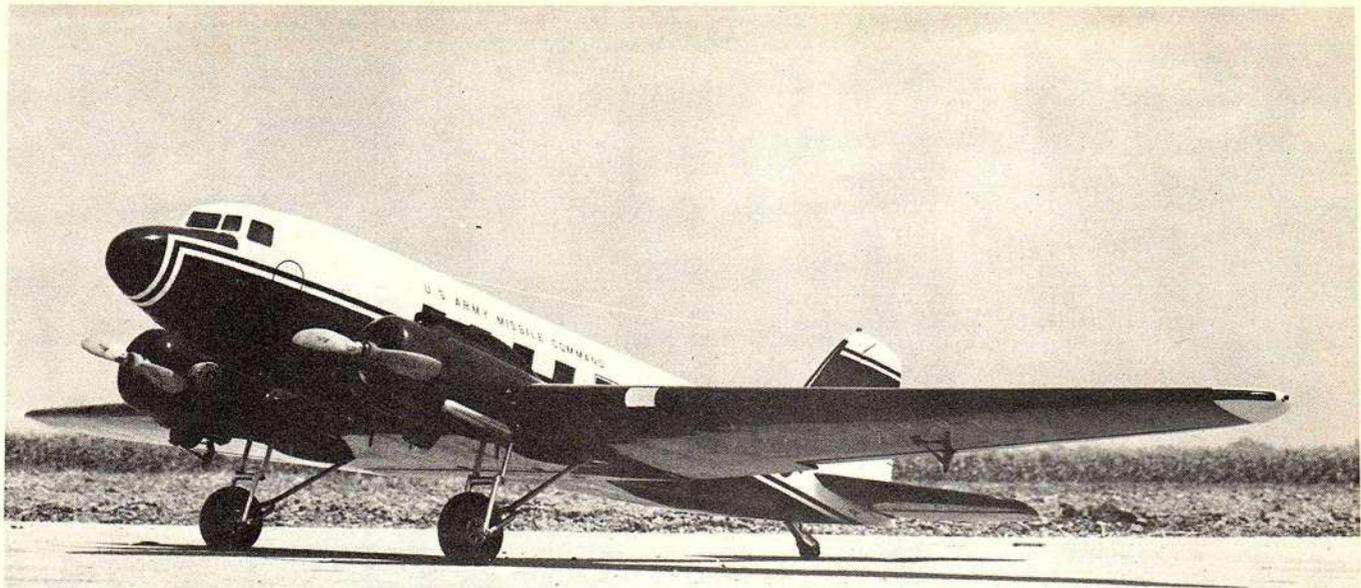
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**All that detracts from total realism are the flying props. Ship features operating navs and beacon.**

out that the only thing wild in the blue was my blue-and-white turkey.

Just breathe on the elevators and the model would pitch up violently and tip stall. Turns would initiate fine with ailerons, but it always took rudder to recover. In all, it behaved as if the C.G. was located somewhere near the stab! We checked the plans and were dead on with the center of grav-

ity. We tried more nose weight, but the condition still persisted.

The Nats were only a week away, and I was committed to fly an airplane which required the utmost diligence to even maintain level flight. No one could come up with a cure, so I wound up going to my first-ever contest with my first-ever scale model . . . a machine that exhibited all the stability of a ball bearing balanced on the edge of a razor blade.

And I would have pulled it off, ex-

cept for a slight confusion about my scale retracts on the last flight. On the two previous flights, I had been allowed to demonstrate that the gear folded up with a single fly-by. Bear in mind that it took almost a full minute for the gear to complete a full cycle. On that fatal third flight, the judges insisted on two passes to prove that the gear worked. With only eight ounces of fuel per engine, I just plain ran out of gas near the end of the flight. Fortunately, the plane pancaked

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in and the damage wasn't total.

As my labor of love splattered itself into semi-oblivion on the runway, I reflected on the naive futility of the exercise through which I had just been put. What judge could have even remotely ascertained exactly how long my gear-sequence was, as the R4D zoomed by at 80+ mph? Couldn't they see the slow gear extension as I began my landing approach? The same holds true for the flap demo, especially with the postage-sized affairs hidden under my dark wings. Wouldn't it be more practical to allow the contestant time to demonstrate these functions before the engines are fired up, so that the judges can see their operation up close?

While refurbishing the wreckage, the Editor called and said that he had just talked to Jim Bonanno, who had recently put the maiden flights on his C-47. Jim suggested relocating the fuel tanks so that they were directly over the C.G. He also said that the correct center of gravity for his model was located by using the aft edge of the second window as the reference point (and to check the C.G. with the model inverted).

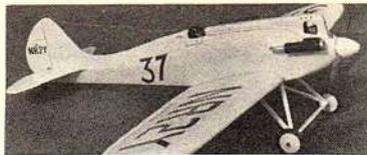
I followed these simple hints, and the difference was like night and day. The plans show the tanks so far aft of the C.G. that full tanks can shift the balance point past the 50% section of the airfoil! The matter was brought to the attention of the folks at Royal, and they are including revisions to all future kits.

With the relocated tanks and correct C.G., the R4D/C-47 handles like a dream. The model is now so stable that I lost an engine right after rotation on one flight, and the model kept going as if nothing was wrong! The need for the coupled rudder/throttles was drastically reduced, but it's a good feature to have for contest work. The "Gooney Bird," as kitted by Royal Products, certainly lives up to the fine reputation for performance that made the full-size "Proud Lady" the preferred airplane of both commercial and military aviators.

\* \* \*

ADDENDUM: Just to point out how research information on a model can fool you, I copied my R4D after a color presentation in *Profile Publications*. A short time after the Nats, S.F.C. Donald Bates, who was crew chief of the prototype aircraft at Redstone Arsenal, sent me a color photo of 43-9095. The plane wasn't blue at all, but rather Olive Drab! I have since repainted the model to conform to the photo. I guess you have to double-check even the most "authentic" documentation sources!

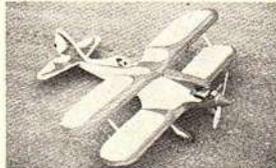
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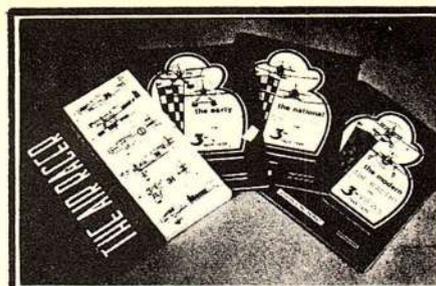


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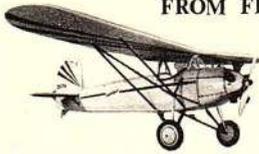
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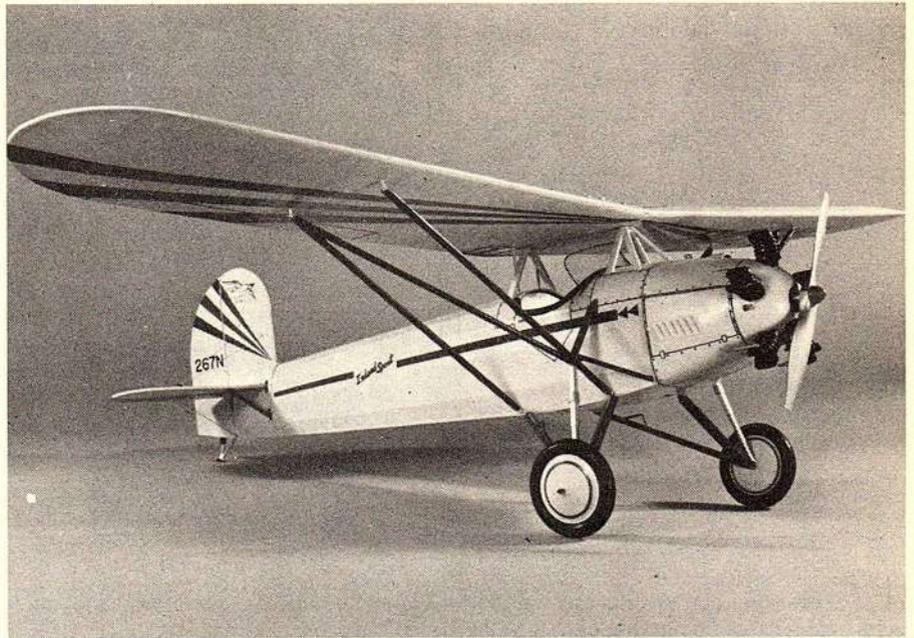
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# the schoolyard scene

(Continued from page 9)



The Inland Sport by Flyline Models is a majestic-looking 37 1/2-inch span model, designed for .020-.049 power.

new Specialty Models 1/2 A Me 109. He reports that they work very nicely, and that the price is OK too (\$9.95 a pair). I have not had a chance to use the Adjusto-Jig 1/2 A retracts yet, but they are also available now, and I have been told they work very well.

\* \* \*

The following letter really captures the spirit of Schoolyard Scale,

*I happened to pick up a copy of the December 77 issue of the Scale R/C Modeler last week. I was on a night flight from England and to be very honest, yours was the only magazine that the airport (in Maine) newsstand had that wasn't girly oriented.*

*It has been a great many years since I've worked on any form of modeling. And I found your article very interesting and stimulating. I now find that I've been bitten with the desire to build a Schoolyard Scale craft.*

*Would you know of any kits or plans that might be available to get things rolling?*

Lee D. MacMahon  
Bellflower, CA

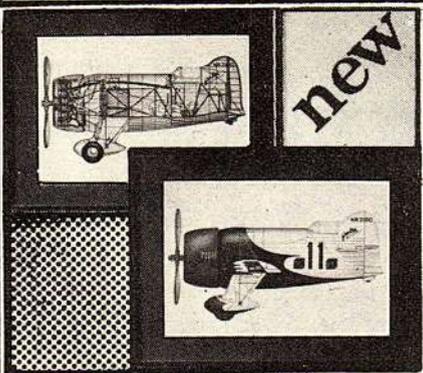
Lee, in response to your letter, if you have been away from modeling for any length of time, you have a pleasant surprise in store. The state of the art in modeling is fantastic today. There are kits of almost any airplane, and the quality of the kits is superb. The radios work well, the engines start

readily and the accessories (such as retract gear) will boggle your mind. To answer your question about the kits available, just look at the ads in *Scale R/C Modeler*. The number of models available are just too numerous to mention. Feel free to write, and I will be glad to be of help in any way I can. We are always pleased to see a former modeler come back to our great sport/hobby.

\* \* \*

I had an occasion to use Pactra's Formula-U Polyurethane Spray paint and, believe me, this is great stuff. This paint is formulated for use on foam as well as plastics (ABS, ASA, etc.). The nice feature about it is that it dries dust free in about 15 minutes. You can handle the model in about 45 minutes, if you are careful. After overnight drying, it is really bulletproof. Pactra makes a complete line of military flats.

If you need a small amount of paint for airbrush work, just take the aerosol can and spray it carefully into the cup for the airbrush. The paint is just the right consistency for spraying as it comes out of the aerosol can, so no thinning is necessary. I used alcohol to clean out the airbrush and it seemed to work fine. Another thing I like about this paint is its ability to cover. It is not transparent at all, and covers immediately. It has no tendency to sag or run, even when sprayed on in heavy coats. It went on uniformly over foam and plastic. Be sure to use this paint in a well ventilated area, and best results are obtained when the temperature is above 70°F.



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**HANDY HINT:** While painting a mini-scale P-40, I looked at the canopy and thought what a job it was going to be to mask off and paint all that canopy framework. It would sure be neat if someone made flat-camouflage striping tape. Then the dawn came . . . paint some D. J.'s striping tape with the paint I used on the rest of the plane. I selected some striping tape that was the proper width and lightly sprayed about 6 feet of it with polyurethane paint. Once dried, I simply applied it to the outside of the canopy. It looked great, and the color was a perfect match.

\* \* \*

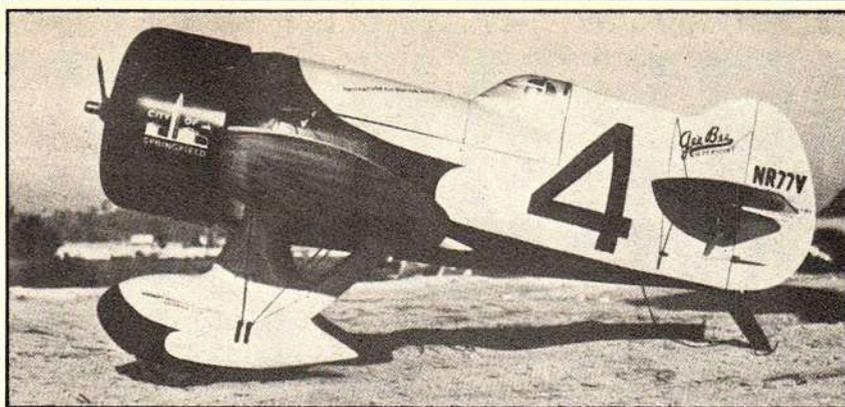
**BYLINE: FLYLINE**—Flyline Models has carved a comfortable niche in the Schoolyard Scale market with their mini-scalars. Most are designed for .020 to .049 power, and the kits maintain the tradition of the stick-and-tissue model. The subject matter is always a little offbeat, but the airplanes are always attractive, stable and unique.

Such is the case with their latest "cuties." The Luton Minor is a British lightplane that is so rare you'll have to search far and wide for even a reference to it. But the popularity of the Flyline model is growing daily. This 34½" span model is one of the easiest kits to build, and it flies almost hands-off. We'd recommend this one for the beginner, or for the weekend schoolyard crowd who want a relaxing, fun ship.

Designed for an .020, the kit contains top-quality printed balsa (you cut out the pieces yourself, to avoid die-crushing), decals, dummy cylinders and a rolled set of plans. This one is available now at all hobby shops, for a mere \$12.95.

The Inland Sport is another ersatz prototype from which Flyline models has engineered a Schoolyard Scale kit. This one comes from the "Golden Age," and was developed from data supplied by the son of the Inland Aircraft Company's test pilot—authentication like that is hard to beat. The dummy five-cylinder radial makes this ship particularly attractive. With 37½" span, this model flies nicely on an .020 or .049. Again, the kit contains printed balsa, rolled plans, decals (and even proof-of-scale data). At \$13.95, it certainly is worth investigating at your local hobby shop.

These Flyline models will fly nicely on rudder only, although two small servos work nicely. There are over a half dozen various designs currently available from Flyline Models, and a catalogue is available for the asking, by writing to them at 2820 Dorr Avenue (B-2), Fairfax, VA 22030.



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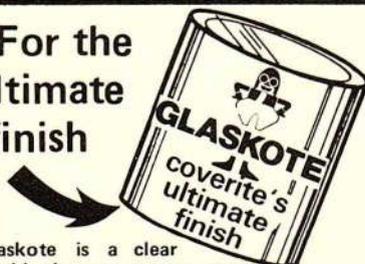
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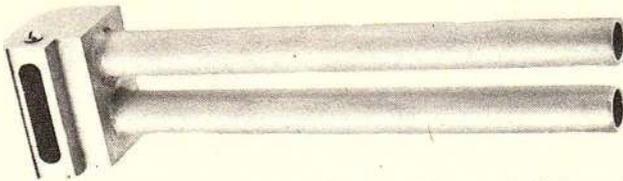
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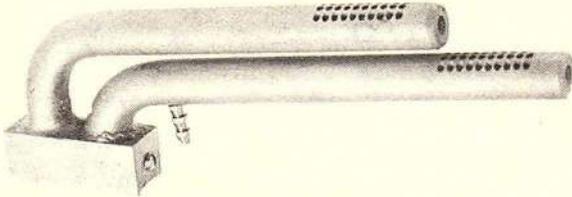
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this as a form from which to make a fiberglass female mold, which would then be filled with casting resin (not fiberglassing resin). The resulting solid resin plug would then be used to form the plastic. Such extensive work is only necessary when numerous final pieces of comparable quality are needed.

As it turned out, I used the original paint cap and wood piece to mold the plastic (I filled the nylon cap with plaster for strength). This worked as well as the solid-resin mold, and would have eliminated several long hours of work. This only proves that molds need not be ultra-sophisticated for vacu-forming. Do try to achieve smooth surfaces on the molds, since minor blemishes will show through the plastic, especially when thin sheet sizes are used. Obviously, this characteristic of the vacu-forming process means that really intricate details, for things like rivets on molded panels, will show nicely on the final product.

However, the final surface of the mold need not be glass-smooth. Minor scratches usually won't show. Canopy molding requires a slightly different approach. The original wood plug should be painted with laminating resin (not surfacing resin), to which has been added a small quantity of black paint pigment powder. The paint pigment makes potential sand-throughs easy to spot.

Sand down everything to the 400-grit stage. Do not polish the mold past this point. If the mold is too smooth, moisture is trapped under the hot butyrate as it is being formed, which causes "blushing." If done correctly, no mold release will be required when pulling the plastic (Pam cooking spray works very well, and should be used when molding colored plastics). It is also important that both the mold and clear plastic sheet be as dust-free as possible.

Here are a few handy hints for the actual vacu-forming process. Use Pam, or a good silicone mold release, to preserve the prolonged usefulness of the mold. I pulled all mine dry, since I only needed about a dozen of each item. Make sure there is adequate vacuum suction, especially if you're pulling deep molds with thick plastics. A shop vacuum is desirable, although I had no problems with a ten-year-old household sweeper. Set everything up near the oven . . . you'll have to move quickly once the plastic is heated.

I had a minor problem with the plastic sheet developing wrinkles as it heated in the platen. Adding extra C-

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1953-1978

# FANTASTIC

(Continued from page 26)

caliber, and it was very obvious that there was no lack of power. Recalling the vintage jets of a few years ago, it was amazing how much of an improvement had occurred from increased engine power and more efficient airframes.

As one might imagine, people weren't falling over each other to see Al Arnold's airplane, since Bob and Larry were really monopolizing the show. Al simply went about the task of assembling his model. However, when the crowd heard the banshee cry of his piped K&B, all eyes turned toward Al's A-4. Many were undoubtedly watching for that potential disaster . . . after all, an ordinary pilot trying to handle one of those skittish fan jets! Once airborne, you would have thought that the model belonged to Violet.

Arnold handled the machine like a real pro, and he's the first one to admit that the model is very stable and easy to fly. When asked what special "tricks" he used on his ship, Al frankly stated that the Skyhawk was built per plans. The engine was purchased off the shelf (it's the control-line version, and he adapted the pump and carb himself).

While the A-4 flies much like a Kaos, there are some differences between prop jobs and jets. The jet can't be "hung on the prop," since it relies on a fast-moving column of air for thrust. Lift is achieved solely from the flying surfaces, so one must avoid maneuvers that might totally stall the fan and wing. With a ducted fan, a hammerhead stall is literally a stall of not only the wing, but also of the power plant. Recovery requires acceleration of both the fan and airplane, to get them both in unison again. The new engines develop sufficient power that recovery from unusual attitudes is not critical.

Now that everyone's trim flights were finished, the three ships were readied for the big event. If they pulled this one off, it would be the first time in history that three fan jets were airborne simultaneously. The very fact that the three models had successfully flown without any major problems was a clear indication of how well the "bugs" had been ironed out of ducted fans.

Three burning (or is it still "turning?"), Bob and Larry firewalled their respective throttles. The A-4 rotated first, with the Mirage airborne a few feet later. Al Arnold's Skyhawk followed in a matter of seconds, and the three ships actually intersected at the far turnaround point. A new page in ducted fan history had been written. □

# ROYALE

(Continued from page 49)

The radio was then added and, with the size of that fuselage, the equipment could have been put in with boxing gloves. Remember, keep the radio as far forward as possible! I mounted the receiver battery in the engine compartment. The completed model weighed in just a hair under eight pounds and, to my surprise, balanced a tad nose heavy. Oh well, the wing loading calculated out to 28.6 oz./sq. ft., which is not bad at all considering the model's size. Make sure there is no slack in the control surfaces, and that control gaps are held to a minimum. I kept all control surface throws at a maximum of 17°. One thing I did not want to do on this ship was to over control. An O.S. Max .61 Schneurle was installed with a 12-6 prop.

It was a nice day in May when I test hopped the FW 190. I had Bill Bertrand test fly the plane for me, as he is considered an expert in scale models of this type. After checking out the radio and retracts, the O.S. was fired up and the plane was taxied around a bit. It handled on the ground beautifully. Tracking was no problem whatsoever. Full throttle was applied and the thing just lifted its tail and took off.

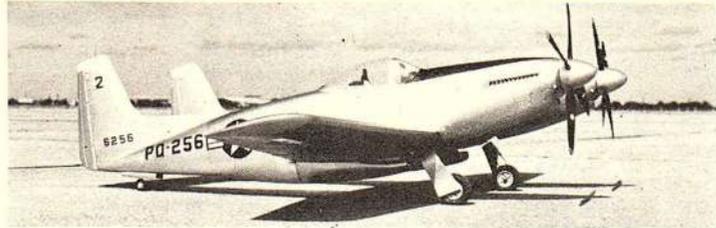
Once airborne, the Focke Wulf was taken up high, out of harm's way, and stall characteristics were tried out. Bill cut the throttle, applied up elevator and eventually the plane finally dropped a wing; however, recovery was very easy. We were both amazed at how hard the plane was to stall. The added area to the stab and the wing washout really made a difference.

Landing was no problem. However, on the second flight, we tried to extend the flare just before touchdown, the plane did stall and nose over. It does not have to be landed as hot as some scale ships, but the up elevator used at touchdown should be kept at a minimum. As the engine is very confined inside the cowl, it did overheat (as anticipated), but this situation will be remedied by adding baffles to direct the air around the head.

In general, the plane flew outstandingly. I did fly the FW 190 on its third flight. I was extremely impressed with its ground handling characteristics. By way, the Rhom-Air retracts performed flawlessly, just as they did in my last two scale ships.

Royal does have a multitude of fine scale kits to choose from. So next time you are planning a scale project, have a look at one. I'm sure you'll be impressed.

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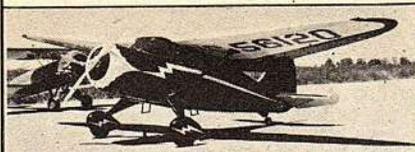
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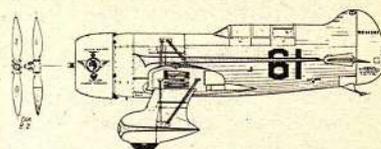
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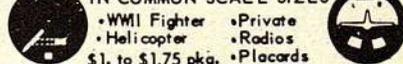


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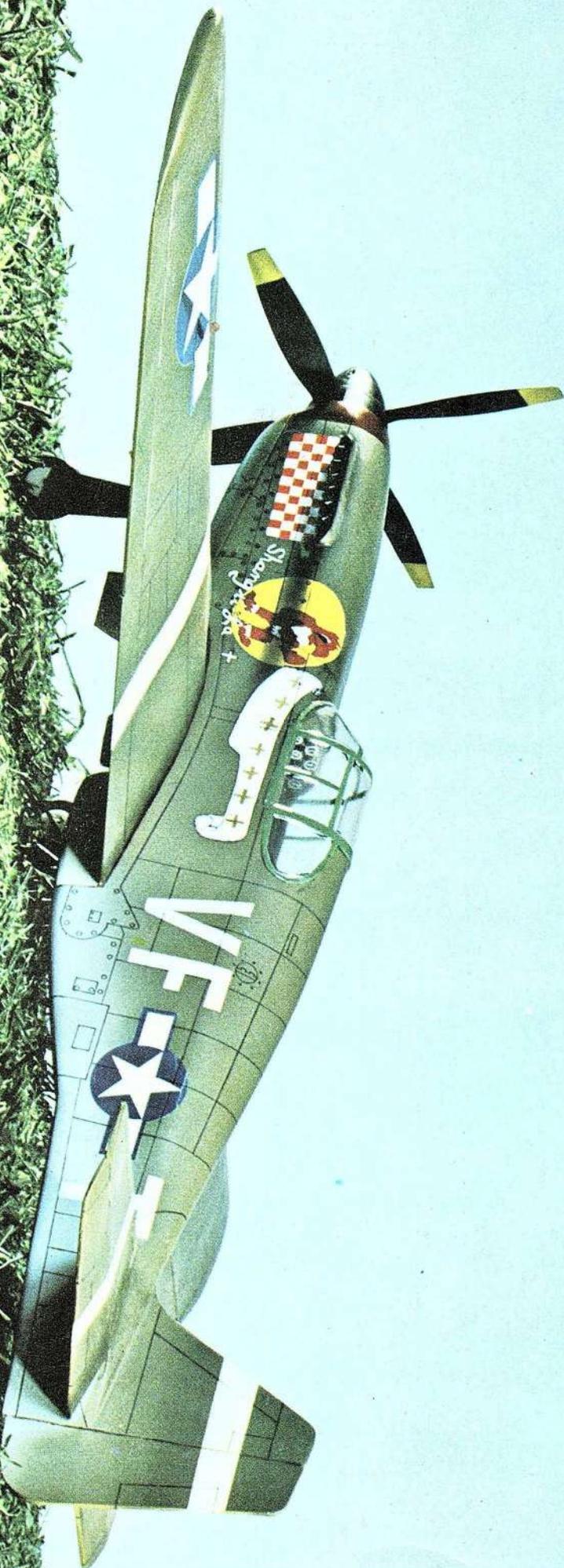
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