An Air Age Publication

48120 May 1986 $2.50

MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING ...NE Canada $2.75

Build an F-20 TIGERSHARK

Fly Jets!

How to Cover Your Airplane

Airplane Aerobatics

MRC FOX R/C Car Review

Golden Age RYAN STA

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MAY 1986 VOLUME 112 NUMBER 5

MODEL AIRPLANE NEWS

ON THE COVER: Where eagles soar and enemies fear to tread; that's the territory of the Northrop F-20 Tigershark, the newest weapon of the free world toward peaceful skies above our homeland. Developed as a low-cost tactical fighter, the F-20 is a Mach 2, missile-carrying vehicle that serves notice to those questioning us that we will meet and beat any threat to our freedom. Photo courtesy of Northrop.

FEATURES

CONSTRUCTION

COLUMNS

COLUMNS

DEPARTMENTS

Model Airplane News (ISSN 0026-7295) is published monthly by **Air Age, Inc.**, 632 Danbury Rd., Wilton, CT 06897. Second class postage paid at Wilton, Connecticut, and at additional mailing offices. Subscription rates are $25 for 1 year (foreign: $33), $47 for 2 years (foreign: $63), $65 for 3 years (foreign: $89). **Postmaster:** Send address changes to **Model Airplane News**, 632 Danbury Rd., Wilton, CT 06897.

MODEL AIRPLANE NEWS

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SUBSCRIPTION PRICES:
U.S. & Possessions (including APO & FPO): 1 year $25.00; 2 years $47.00; 3 years $65.00. Outside U.S.: 1 year $33.00; 2 years $63.00; 3 years $89.00. Payment must be in U.S. funds.

MODEL AIRPLANE NEWS is published monthly by Air Age, Inc., 632 Danbury Rd., Wilton, CT 06897. Connecticut Editorial and Business Offices, 632 Danbury Rd., Wilton, CT 06897, phone 203-834-2900. Y.P. Johnson, President; G.E. DeFrancesco, Vice President; L.V. DeFrancesco, Secretary/Treasurer. Second Class Postage paid at Wilton, Connecticut, and additional Mailing Office. ISSN No. 0026-7295.

ADVERTISING: Advertising rates available on request. Please send advertising materials, insertion orders, etc., to Advertising Dept., Air Age, Inc., 632 Danbury Rd., Wilton, CT 06897, phone 203-834-2900.

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Editorial

by DAN SANTICH

SINCE 1929, *Model Airplane News* has had the tradition of mixing full-scale aviation with modeling. No other modeling publication does this to the degree or depth that we do. After all, it is our feeling that aviation, be it modeling or full-scale, has a common denominator, and that is aerodynamic lift. If you have that, the size of the flying object is incidental.

Jets are our major form of propulsion for military and commercial aircraft. The absence of a true turbine model jet engine does not inhibit our creativity, however. The F-20 in military inventory represents this time in aviation history where such an airplane is the one by which

all others are judged, and the Tigershark is fast becoming the best-known fighter aircraft in the world. This is the age in which our youngsters identify with jets, and we fully endorse that identity and support it with articles such as those in this issue.

On another subject, when I announced that we would continue with the Tournament of Champions, I received many phone calls and a basket full of mail suggesting how, where, when, and who should run it. Unfortunately, none of the communications received so far have been from the same area or group. Everyone, it seems, has his own idea on how it should be conducted. This wide array of interest and speculation does say something, however—that modelers *want* a TOC.

Of course, the bottom line to any such endeavor is sponsorship, a necessary ingredient that spells success or failure. Thus far, little if any support from the industry has been voiced toward the continuance of the TOC. I admit I'm at a loss as to the reason. It seemed like a good idea to continue this great event, but so far it looks like it was just a dream. Pity.

THIS MONTH. For you scratch-builders, the Ryan STA should really catch your eye. This is one magnificent machine, and not all that difficult to build. In the new kit department, Bob Violett's Sport Shark is a real winner. Although not a scale of anything, it can be modified to look like an F-20. It combines all Bob's years of experience with ducted-fan models into one package, and it is dynamite. Then there is the F-20 Tigershark kit from Knights of the Air, a beautiful example of what can be done with fiberglass and some skill in production. This is one kit you'll want to have when you see it. Doctor (yes, he finally made it!) David Trost took a scalpel in one hand and the MRC Fox in the other and what he came up with still amazes his colleagues.

Springtime will be here when you get this issue, so have a ball!

DBS

Airwaves

Good Service from Dremel!

In this day and age of shoddy merchandise and slipshod service, I would like to share my feelings about excellent service from an excellent company.

Fellow modelers, don't worry about getting poor or slow service from Dremel. Last month my Dremel Model 3801 Moto Tool "gave up the ghost." I immediately felt like one of my hands had been amputated!

I am a teacher stationed overseas at Clark Air Base in the Philippines, so I cannot run down to the local hobby shop for spare parts or service. At this point (with many negative thoughts) I packed up old "3801" and sent it off to Dremel for repairs. I had serious thoughts about cleaning up my workbench and suspending all building projects until next season, when I hoped to see my Moto Tool again.

However, much to my surprise, this afternoon I received my repaired Dremel 3801 in the mail! I mailed it January 18 and it's now February 1. That computes out to be only 13 days to and from Racine, Wisconsin, from the Philippines, and includes time in service. Now we all know how swift the mail is these days, so that makes Dremel's service look even better to me! Dremel, a very big salute and victory roll to you.

Fellow modelers, do not despair if your Dremel products need service. Just pack them up, send them directly off to the Dremel factory, and they will be expertly repaired and returned to you before your cyanoacrylate has a chance to kick!

STANLEY POTTS
Clark Air Base, Philippines

He Likes Harold, Weird or Not!

Here is my version of Ol' Weird Harold, which I built from *M.A.N.* plans. The plane is shown here with my friend Axel Solvason.

We call the model "Halli," short for Hal. It now has 2:53 hours in the air (I log all my models) and is a superb flyer.

ASGEIR LONG
Gardaber, Iceland

P-38 Lightning

I want to thank Budd Davisson for his story and pictures of the P-38 Lightning in the February 1986 issue.

As one of the lucky ones who flew the P-38 in WW II, the article revived many memories. I don't remember that it was "ticklish" to fly but, Budd, put more time in, especially above 10-15,000 feet. It really handled like a high-powered sports car at that altitude.

Maybe my memory is rusty, but it seems to me that the standard firepower was four 50-caliber machine guns and a 37- or 40-mm cannon, not six 50-caliber machine guns.

Budd, keep writing and photographing because I too cherish my Air Force separation card stating that I was qualified as a pilot in P-38s and B-25s.

J.L. MCLAUGHLIN
Matthews, North Carolina

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.

Fifty Years Ago...

by DAN SANTICH

ONE OF THE MOST popular columns featured in *M.A.N.* in May 1936, was "Gas Lines" by editor Charles Hampson Grant. This was a forum established by Mr. Grant to explore, describe, and forecast the progress of "the new kid on the block": gasoline engines for model airplanes.

In one short year, the availability of these powerplants leaped from one (the Brown Jr.) to more than five. The Tlush Super Ace, Baby Cyclone, and Forster were giving the Brown Jr. a run for its money in the competition scene, and along with that came the price competition. The Baby Cyclone sold for only $15.75 and the Brown and the Tlush went for $21.50. Mel Anderson and Bill Atwood, who were both later immortalized by their engine genius, were battling it out on the flying field; Anderson with his Brown Jr.-powered low-wing design, and Atwood with his own design that exemplified his superb cratfsmanship. All of these topics were a matter of great interest to modelers, and the "Gas Lines" column was *the* place to find out what was going on.

In the May '36 issue, *M.A.N.* featured a two-plate set of drawings on the Turner Special, a 7-foot span, high-wing cabin design specifically for gasoline engines. This is a popular feature of the magazine that has been continued to this very day. Kits for gas-powered models were becoming abundant, with offerings from Berkeley, Modelcraft, and Rubin.

Full-scale aviation was going through a transition between high- and low-wing aircraft. The Northrop Gamma 2-G Special, designed for a record speed attempt by Howard Hughes, and the Consolidated Aircraft Corp. A-11 were low-wing, streamlined designs that set the stage for future developments in aircraft refinements, and *M.A.N.* was there to tell you about it, 50 years ago this month. ■

A new entry into the power-struggle was the Tlush Super Ace, an engine that proved its worth.

The Consolidated A-11 powered by a Curtiss Conquerer engine of 700 hp was the U.S. Army's latest attack aircraft.

Basic Balsa

Basics of Radio Control

by RANDY RANDOLPH

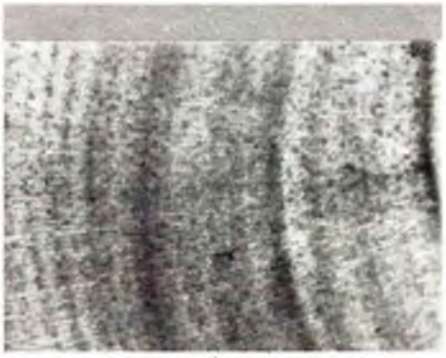
THE VAST majority of R/C airplanes are built from kits and kit selection should encompass things other than size and looks. Material quality is one of those other things. Without knowledge of just what constitutes quality in unfamiliar materials, good judgement is impossible. Hardware, such as wire, nuts, bolts, screws, wheels, etc., is not difficult to evaluate; but simply because balsa wood is white and clear doesn't mean it's ideally suited to the assigned job. For this reason, some knowledge of the most-used material in all model construction is essential.

Kit manufacturers have achieved a very high standard of quality but, regardless of the care they take, sometimes substandard balsa slips into kit boxes. The knowledge of balsa and its characteristics can give a modeler the advantage of replacing a piece of wood from his dealer's stock for just a few cents and saving himself trouble and frustration in the future. Therefore, a few words about balsa are in order.

The majority of balsa is grown in Central and South America. Although there is some cultivation, most of it is harvested from the wild. It is a fast-growing wood, requiring only six to seven years to achieve the proper size for harvest. When cut, the wood retains a high moisture content, which must be removed by kiln or air drying before it is sawed into timbers for shipment.

Because of the insulating qualities of balsa, the ship-building industry consumes millions of board feet of it each year. This demand produces the volume necessary to maintain high production, which results in the low prices we enjoy today.

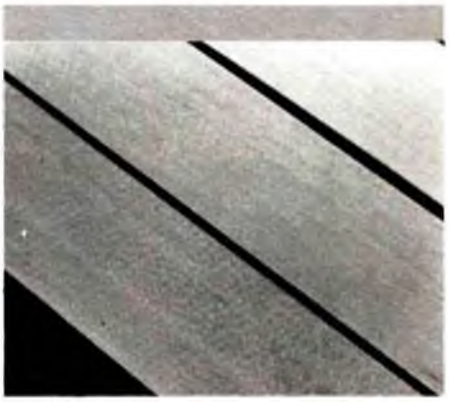
Balsa is the basic construction material for model airplanes, from the lightest indoor models to the largest giant-scale. There is a weight and a cut to fit both ends of the spectrum, and everything in between, for it can be as light as a feather or as strong as pine. Depending on how it is cut from the log, it can be rigid or elastic. It is a unique wood.



This cross-sectional view of a balsa log shows the annual rings and the medullary rays which radiate from the right like spokes of a wheel.

To understand the characteristics that make the wood so unique, look at the cross-sectional view of a balsa plank. The curving rings are not necessarily annual rings, but we will call them that for the sake of description. The light colored streaks that go from the center of the rings outward like the spokes of a wheel are the medullary rays. These rays, and the way the sheet of wood is cut at different angles to them, give the wood its character.

There are three broad types of sheet balsa. Of course, actual grain always runs lengthwise to the sheet, so the types are based on the sheet's relationship to the rays. "A-grain" is cut with the rays perpendicular to the face of the sheet and

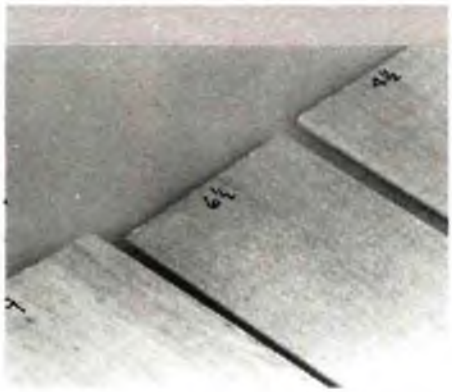


Three sheets of balsa with three different grains; left to right, C-grain, B-grain, and A-grain.

"C-grain" is cut with the rays perpendicular to the edge of the sheet. "B-grain" is cut so that the rays intersect the face of the sheet somewhere between 40° and 70°. In the cross-sectional view of the balsa plank, A-grain would be cut from either the right or left side, B-grain from the bottom, and C-grain along the top third. Depending on which face the sheet is sawed from, this plank would produce all three types of grain. In reality, there are few cut sheets which are exactly A-, B-, or C-grain, but they are close enough for our purposes.

The next photo shows how to identify the different grains in sheet wood. C-grain has a mottled, almost iridescent look. B-grain appears to have a rather short lengthwise grain. A-grain shows long, smooth grain that seems to run the entire length of the sheet. Often sheets will show more than one type of grain from one side to the other because they were sawed from planks closer to the center of the log.

A-grain wood is ideal for sheeting curved surfaces because it is quite flexible across the sheet. In fact, thin sheets can



Three sheets of 1/16-inch balsa that all look alike but are from different weights of wood.

The darker areas in these balsa sheets are the hardest parts. Evenly spaced grain is usually easier to cut.

be soaked in water and rolled into tubes, which is done to make tailbooms for certain types of models. C-grain is rather stiff and is very good for ribs and formers because it tends to hold its shape under stress. B-grain is sort of a general purpose wood which displays the characteristics of the other types, but is not as rigid as C-grain or as flexible as A-grain. It makes good fuselage sides, longerons, and spars.

Grain structure is not the only aspect of wood selection; we must be aware of weight as well. Balsa is available in specific weights of 4 to 15 or more pounds per cubic foot. The lightest is mostly for indoor model airplanes which must be very light, and has little application for R/C. The heaviest wood also has little use because pine or spruce will take its place. The ideal weights then are in the 5- to 10-pound range for most R/C construction. The lightest wood in this range is excellent for solid tail groups and movable surfaces, with the heavier 9- to 10-pound wood being used for spars and longerons. The mid-range, 7- to 8-pound balsa, is fine for ribs, fuselage sides, and leading and trailing edges, and is the weight often referred to as "medium balsa."

When buying 1/16-inch stock for ribs, or any parts that must be cut out with a razor knife, it's a good idea to hold the wood up to a light and look for regular and evenly spaced grain. On occasion, some sheets are soft with rather hard streaks in them that make the use of a razor knife quite difficult when the harder areas are encountered.

As we get deeper into this series, it will become apparent just which weight and cut of wood is right for the job at hand. Kit building is one of the best learning tools there is because manufacturers usually select the proper wood for the various parts so they fit into the complete airframe.

Balsa feels good, so feel it as you build and notice how the knife glides through the different grades and cuts of the wood. It doesn't take long to become an expert.

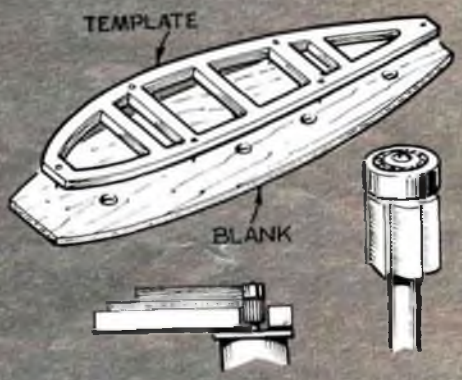
Next time I'll talk about how to hold the pieces together.

Randy Randolph, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

Hints & Kinks

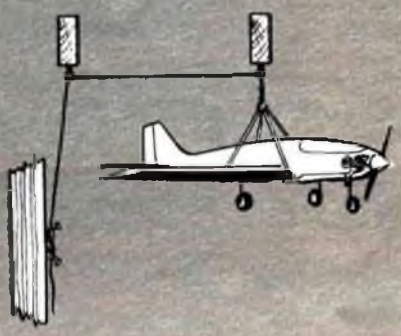
by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



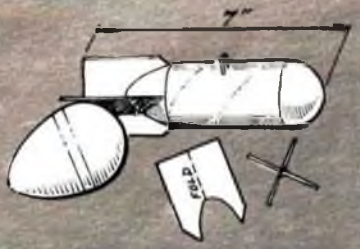
Quarter-scalers! If you make your wing ribs from door skins, here is a production line method of getting the job done rapidly on constant-chord wings. Make a template from ¼-inch plywood, then drive a few brads through so that the points emerge on the back. Cut your rib blanks roughly from door skin, press the template brads into the material, then use an inverted router to quickly run round the template. You end up with well-finished ribs that have nicely radiused corners and that take only seconds per rib. The secret is in using a Straight Trimmer router bit, having a pilot bearing to follow the template. These bits are used for edging Formica, etc. Holes are needed to insert the bit when routing the lightening holes.

Clarke Gehman, Winnipeg, Canada



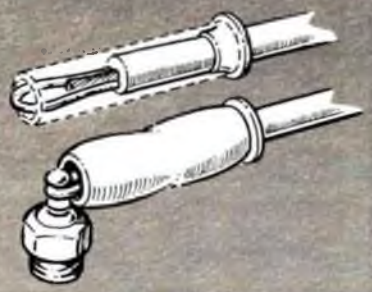
Like many modelers, this enthusiast hangs his models in the rafters—with a difference! To avoid the chancy business of balancing on a stool to retrieve them, he has this arrangement of screw eyes and cord to raise and lower them. A cleat on the wall secures the cord. Make sure the cord is well tied if you don't want to drop-test the gear!

Wayne Parker, Norfolk, Virginia



Those little plastic Easter eggs which come filled with goodies have another use. Their diameter is such that they nicely mate with the cardboard tube from a roll of MonoKote. A few inches of tube assembled as shown with Hot Stuff or similar makes very fine, lightweight bombs for those fun-fly events. The fins are cut from plastic milk jug material and folded 90°, then glued in cruciform arrangement. Don't forget a wad of clay inside the nose cap and, if you have one, a hot-melt glue gun is also useful in assembly.

William Lund, Iola, Wisconsin



Here's a home-built glowplug connector which can be used in the field or as an on-board connection. Use a tight-fitting metal grommet secured with a drop of cyanoacrylate. Solder a loop of heavy copper wire as shown, then slip a piece of silicon rubber tube over the assembly. Pushing back the tube allows the plug terminal to be inserted. The pressure of the tube keeps the loop engaged with the terminal. *Berndt Berndtsson, Falkenberg, Sweden*

Some scale kits require scale-like covering of the landing gear vees like the real ones—and using an iron-on fabric can be a frustrating business, since most of the time it will not bond to wire. Solve the problem this way: wrap the wire with regular cloth-backed medical adhesive tape first, then the fabric will bond securely.

Bill Skipper, Greeley, Colorado

Pattern Matters

by MIKE LEE

WHEN THIS MONTH'S issue reaches your hot little hands, we will be deep into the building of our spring flying projects. With that in mind, let me first remind you of some safety precautions that we all must exercise.

While for a lot of us it's still too cold outside to carry on some of our modeling activities, don't be tempted to do things indoors that are dangerous. One such thing is painting your plane indoors. It may sound silly, but I know guys who brag that they sprayed their new model in the bedroom with a fan pointing outside.

Gents, life is short and precious—far too precious to risk it on getting something finished before the next guy. Be safety-minded during the winter. Always respect the warning labels on anything you use in the workshop or at the field. If you figure it won't happen to you, remember this: behind every warning label is someone who paid the price to have that label put on there. Will you be next? Be safe.

Ed Keck is smiling because he has obviously found a combination to his liking. See text.

About Glowplugs

Let's talk about glowplugs for a minute. A glowplug is the lowly and inexpensive little device that allows the ignition of a fire-breathing pattern bird. What kind should you use and what does temperature mean? Let's see.

If you were to poll the top pilots in pattern and ask them what type of plug they use, you might find that most use a standard, non-idle bar type. This, of course, goes against what other writers are saying about getting the best performance from an engine by using an idle bar type plug. But there is a reason behind this.

An idle bar plug was designed to shield the main portion of the glow element from the direct blast of incoming fuel. A fresh charge of fuel from the intake ports is much cooler in temperature than the hot exhaust gases just expelled. The cooler incoming charge, if not totally atomized, might contain some large droplets of fuel, which will tend to cool the glow element to the point where it can no longer create a spontaneous ignition of the fuel in the combustion chamber. Normally, this occurs at idle or low rpm.

The idle bar on the bottom of the plug is placed there to shield the plug from the oversize droplets. Meanwhile, the normal air/fuel mixture is close enough to the exposed area of the plug to be ignited. With this idea in mind, the idle bar plug works very well indeed.

In actuality, the idle bar plug makes up for any lack of expertise on the part of the pilot in the engine tuning department. For this reason, the idle bar plug works very well. However, once the pilot has reached a level where tuning the engine is done correctly, the idle bar is no longer needed. A correct needle-valve setting will be achieved by the pilot and the correct atomized air-to-fuel mixture will be present in the engine. Now the idle bar is not required, and a standard type plug is more than adequate to keep the fire going. In fact, a non-idle bar plug is hotter than the idle bar type because of its greater exposed glow element area. Most pilots find they have to go to a cooler plug.

So what is meant by hot or cool plugs? This has to do with the glow element inside the plug and its ability to create spontaneous ignition. Very simply put, a glowplug element works by a catalytic process, in which initial heating is started with electric power (glowplug battery) and heat is retained by ignition of the fuel and just enough of a catalytic process to keep the glow element hot in between ignitions. Whew! It sounds a little heavy, but that's the process.

By varying the composition of the metals in the glow element, plus the thickness of the element itself, it's possible to make the element respond to

(Continued on page 110)

Construction

Ryan STA

by BURNIS FIELDS JR.

IF YOU'RE looking for a scale giant that features realism, stability, and capability of aerobatic competition, then you should really consider the Ryan STA. When properly built, this model can do no wrong!

I found out many interesting facts about this plane in *The Ryan Guidebook—Book 3, American Aircraft Series,* by Dorr B. Carpenter and Mitch Mayborn, and you might like to check out this book for more information on this classic old plane. Sig Manufacturing* also has a color photo pak available, which really helped me out.

CONSTRUCTION. Begin building with the wing, which is easy for any average modeler. Start with the wing spars, which are 1/16-inch plywood with 1/4x5/16-inch spruce strips. I used a Dremel Table saw to route the spruce strips to the depth shown on the plans. Glue the strips to a 1/16-inch plywood web with aliphatic glue, press them together to proper size (I used a vise), and fasten them to a flat surface to dry. This should assure a straight spar. Make two front and two rear spars, 48 inches long.

Laminate the wing tips with 1/16x1/4-inch spruce strips. Cover the plans with plastic and put in pins along the inside radius. Wet all the spruce strips, apply aliphatic glue, slowly bend all the strips together around the pins, and pin in place. Allow 24 hours for this to dry.

Note that the aileron spars are routed and rounded. I used C.B. Associates* hinges, which are modified as per the plan. They are installed through the spar and then epoxied in place. When the hinges and control horn are installed, cover and install the ailerons to the wing before the wing is covered.

The aileron control system is spelled out on the plans. Use Sig large nylon U-Control bellcranks and cables. You can also obtain the cable from Lou Proctor, or you could use fishing leader. Secure the cable ends with swages and make sure that the bellcranks are parallel and that the cables are snug, *not* fiddle-string tight. If you use turnbuckles for adjustment, don't forget to safety-wire them.

Assemble the wing center section with four 3/32-inch plywood joiners, two for the front spar and two for the rear. For added strength, cap the joiners with carbon fiber before installing them. Fasten carbon fiber to one side of each joiner with cyanoacrylate glue. Next epoxy the joiners into one wing root, making sure they go all the way to the landing gear support rib. When dry, epoxy to the other wing panel. Glue all center joints at this time.

Put the landing and flying wire fittings in at this time, before the sheet balsa is added to the wing. See the plans for patterns and details. Also before covering the wing, make and install basic landing gear wire to the wing spars. Be sure you bend one right and one left. Fasten the wire to the wing spar with maple blocks and regular epoxy. Allow this to dry 24 hours.

You might want to weld steel support blocks to the landing gear before the gear is installed to the wing spars. The wheel support block that is welded to the landing gear wire is made from soft steel and can be cut with a hacksaw, or maybe you know someone with a milling machine. Mill the top of the block to fit the wire. Drill one hole for a 4-40 bolt and drill and tap two 2-56 holes for a flying wire support bracket. The flying wires help to hold the wheels in alignment.

When the landing gear, the wire

One of the most beautiful designs from the Golden Age.

SPECIFICATIONS

Type: Giant-scale
Scale: 3 inches equals 1 foot (¼-scale)
Wingspan: 91 inches
Wing Area: 1,296.75 square inches
Fuselage Length: 67½ inches

If this beautiful airplane does not get top static points, nothing will. Field's rendition shows what can be done.

fittings, and the ailerons are installed, cover the wing with sheet balsa and finish sanding. When you're satisfied that everything is in and working, cover the frame with Sig Koverall. I used Stix-it to fasten the fabric, which is quick and easy.

The landing gear is fairly simple, but does require some work. The oleos are made from five sizes of brass tubing. (Be careful when soldering the tubing together. The piston must slip *smoothly* inside the cylinder.) The springs can be procured at your local hardware store. The lower yoke is made from .025 aluminum as per the pattern and is reinforced as shown. I used captured lock nuts for wheelpant support screws. Fasten the wheelpants to the lower wheel support with 6/32 screws, two on each side.

Make the upper yoke from soft ½-inch sheet aluminum. I cut the basic yoke with a bandsaw and then filed the top piece to fit inside the piston of the oleo. Screw and axle sizes are noted on the plans.

Carve the wheelpants from balsa blocks. Be sure that when you carve the inside of the wheelpants that you make a pad to fit against the lower wheel support, as this aligns and supports the wheelpants. There is also a 1/16-inch plywood key in front of the pant. The entire wheelpant moves up and down with the wheel.

(Continued on page 26)

How To:

by RANDY RANDOLPH

MAKE A TORSION GEAR AND MOUNT

The torsion bar type of landing gear is able to absorb abuse without transmitting it to the structure of the aircraft better than most other types. The photos show how to make a torsion gear and mount without the use of power tools.

1.

2.

1. The basic mount is made of two pieces of 1/8-inch plywood, 1-inch wide and the length of the outside width of the fuselage, and one piece of 3/16-inch plywood, 2 inches wide and the length of the inside width of the fuselage. Mark the center of all three pieces.

2. Match centerlines and epoxy the 1/8-inch ply to the 3/16-inch ply, separating them 1/4 inch at the center. Epoxy two blocks of 3/16-inch ply, 1/2 inch by 3/4 inch, flush with the ends of the 3/16-inch base.

3.

4.

3. Measure in 1/4 inch from each side of the base and drill 1/8-inch holes through the base on opposite sides of the slot formed by the two pieces of 1/8-inch ply. Drill through the base and the 3/16-inch pads as well.

4. Epoxy the mount in place on the fuselage and fill the slot outboard of, and behind, each hole with pieces of 1/8-inch-square balsa, 1/4-inch long. Sand the edges of the mount to conform to the fuselage sides.

5.

6.

5. Bend the 1/8-inch music wire landing gear to the shape shown. The torsion bar part of the gear should be bent to fit from its hole to the edge of the mount. The anchors should be at least 1/8-inch long.

6. The gear is held in place with two metal landing gear clips and small wood screws available at all hobby shops. The gear shown has survived several hundred landings on all types of fields and shows no ill effects.

Jet Blast

by RICH URAVITCH

ONE OF THE really enjoyable aspects of doing this column is the feedback I get from you guys out there who have joined the rest of us involved in ducted-fan modeling. I occasionally get caught up with all the new things that are going on and forget that there are those among you who have just joined up, so from time to time I'll use this space to review what's been said before. I welcome your questions and ask only that you enclose an SASE for a reply. I can't promise that you'll get your answer tomorrow, but you *will* get an answer. If enough of you ask the same question, I'll try to put together a broad-base response in the column. If you have anything you'd like to see, let me know and I'll try to get it done.

Bob Thacker's SAAB Viggen is Byro-powered.

Ed Hartbauer's Kfir was modified from JHH Mirage.

One of the things I'm going to do—and this issue seems as good a place as any to start—is to every so often devote the major portion of the space to show off all the work you guys out there are doing. As I pointed out a few years ago when I undertook this thing, it's intended to be *your* column, so if you'd like to show off your handiwork on these pages, let's see it. After all, I can't photograph *every* ducted-fan airplane...

Long-time scale builder Bob Thacker has jumped into fans with both feet, designing and building a SAAB AJ-37 Viggen. Bob reports that it has "truly outstanding takeoff performance." The 45-inch span wing has a whopping 1,147 square inches and, when combined with the additional 230 square inches provided by the canard, this 13-pound Swedish beauty has a wing loading of only 21.75 ounces per square foot! You've probably flown sport ships with heavier loading than that!

Bob uses the Byro-Jet fan with a Rossi .81. He realized considerable weight savings through the use of Coverite's Aluminum Micafilm, which duplicates the prototype Viggen quite well. It sure is lots easier than the production aircraft's multi-shaded green "splinter" finish!

I received an exceptionally good shot of E. Hartbauer's Kfir C-2 built from the Jet Hangar Hobbies* kit. El is using the K&B 7.5/Turbax combo. (While on the subject of Kfirs and such, if you haven't already done it, check out the movie *Iron*

Eagle. It has a pretty shallow story line and no real plot, but the aerials make it worthwhile. Larry Wolfe's Jet Hangar Hobbies did the model sequences, which is the first time ducted-fan models were successfully used in a major movie production—hooray for all of us!)

"Shark Bites Man—Once Again!" Adding to the growing list of F-20s out there, Gary Mueller* of Merrill, Wisconsin, sent along photos of *his* version. This ⅛-scale Tigershark uses a Dynamax/Rossi .65 package, which resides inside a fiberglass fuselage, with balsa-sheeted

Gary Mueller's Dynamax-powered F-20.

foam wings and tail feathers. Vitals are a 70-inch length and a 47-inch span with 660 square inches of area, slightly stretched from scale. Empty (less fuel) the weight is 10¼ pounds, which is off the runway and accelerating in climb after a 125-foot roll. Gary has the fuselage mold available for sale should anyone be interested in producing fuselages. Contact him directly for more info.

From o'er the pond where one cannot purchase a ham *and* cheese sandwich ('nuther story, 'nuther time), I've received, via Mike Kulczyk, some nice shots of Allan Walker's impressive F-86 Sabre built from the British "Turbofan" semi-kit. Allan uses what seems to be a very popular combination to fan fliers in the U.K., the Boss 602/Rossi .65. The surface detailing of this '86 is terrific, especially the placarded stenciling. Allan says it flies in excess of 100 mph and has a long, long glide. He admits the incorporation of flaps would have been advantageous. I'd sure like to hear from even more of you folks on the European scene.

Finally, from the fertile mind of Bob Kress*, father *pro tem* of the RK series of fans, comes yet another, the RK-720. This little hummer, in keeping with the philosophy of more horsepower driving more properly designed blades can produce lots more oomph in the same diameter container, uses a K&B 3.5 or O.S. 25VFDF, driving a 7-bladed rotor of slightly more than 3 inches in diameter. To jog some memories, that's just about the same size as the RK-049 which uses a TD .049/.051. I've got one of the prototype units which I'll be testing shortly in my ½A-size F-86. The possibilities are mind boggling. Imagine,

Allan Walker with his British "Turbofan" kit of F-86.

school yard-scale ducted-fans, Korea relived over your ball field, Route Pack Six your backyard, an X-29 on the back seat of your car...

Kress RK-720 at rear with RK-740 in foreground for size comparison.

Late Flash

Last issue I mentioned the activities of some of our neighbors to the North. Well the Canadian group has put together their first fan-fly, which is scheduled for the weekend of May 31/June 1. The site is a fan fan's dream with two 5,000x150-foot runways being graciously provided by the folks at Mountain View AFB in Belleville, Ontario. See you there? For additional info, contact Joe Leboutier*.

For peak performance, stay tuned.

Rich Uravitch, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies and persons mentioned in this article:*

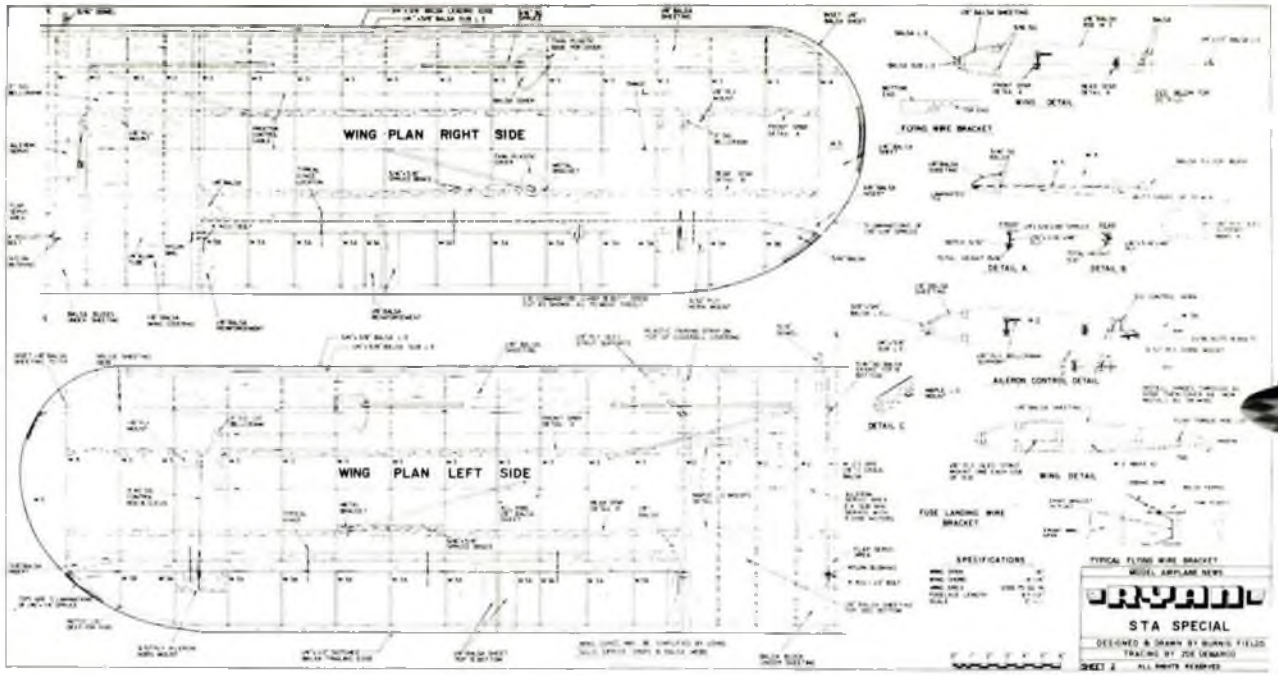
Jet Hangar Hobbies, 12554 Centralia, Lakewood, CA 90715.

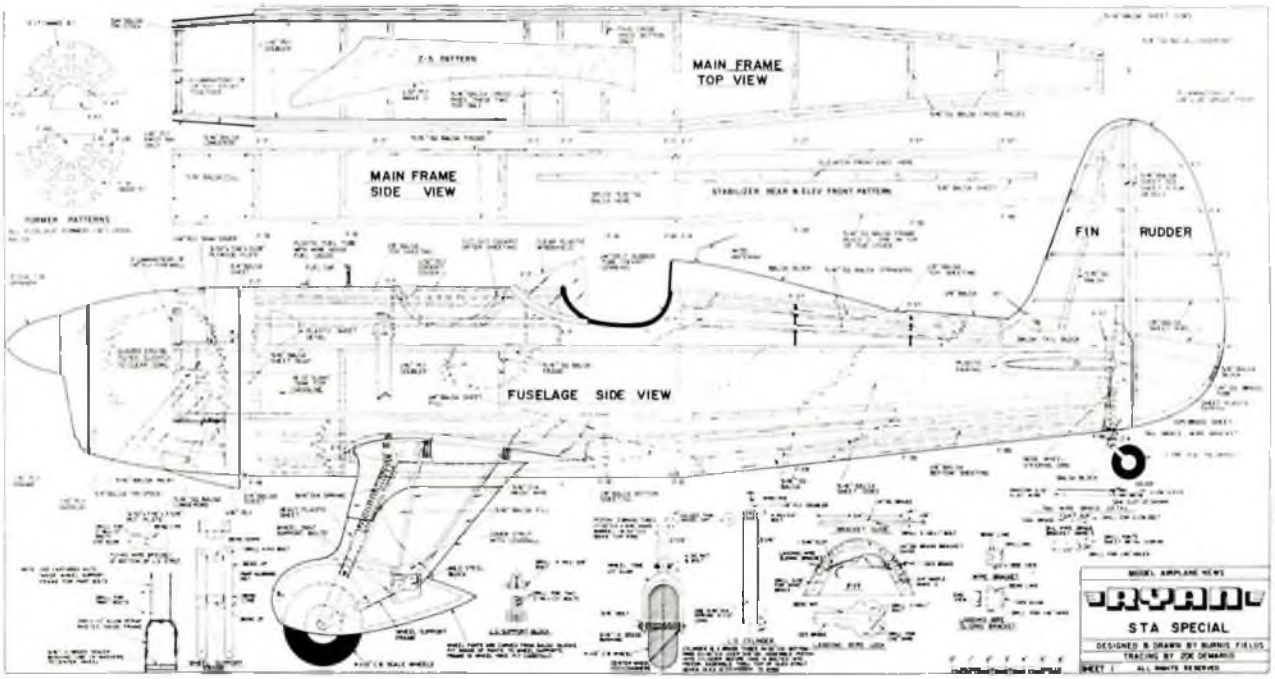
Gary Mueller, N. 1401 Big Eddy Rd., Merrill, WI 54452.

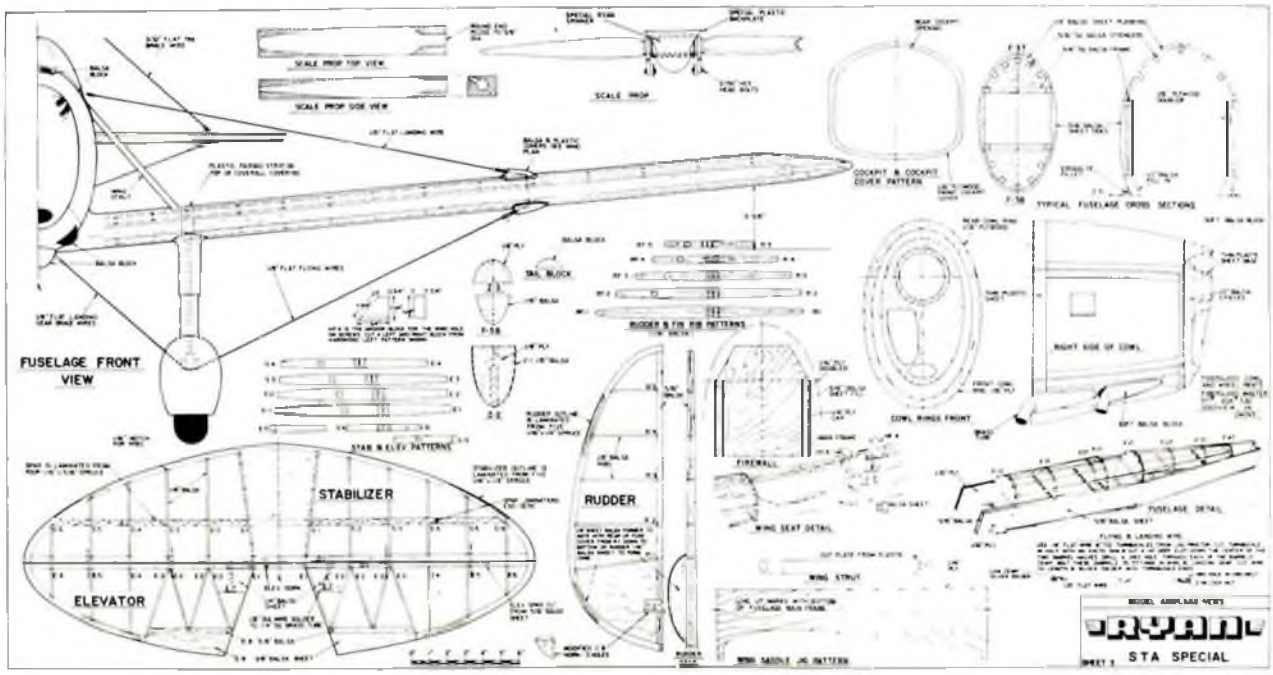
Kress Jets, Inc., 27 Mill Rd., Lloyd Harbor, NY 11743.

Joe Laboutier, 5031 Old Stone Rd., Belleville, Ontario, Canada K8R 1E3; 613-966-3566. ■

FULL-SIZE PLANS AVAILABLE...PAGES 124, 125







(Continued from page 21)

covered, and would be almost unseen.

Pay attention to the way the balsa and plywood parts go together at the nose. They give plenty of beef to the nose, but you don't want any unnecessary nose weight.

Laminate the fuselage sides with one sheet of ¼-inch balsa and one of 1/16-inch balsa. You'll want to use light quarter-grain balsa for this. I used Sigment to build the fuselage, except for the firewall and landing gear support, which I epoxied in. Keep the structure light. Sand the completed fuselage to shape, and cover with Koverall or similar fabric.

You'll notice that the Quadra .35 engine is tilted slightly to clear the cowl. The plastic piece on the carburetor is removed and a couple of washers put in its place. *Don't forget* the washers or you could dimple the cylinder.

Carve the cowl from balsa. Start with a balsa support egg-crated together and fitted between the front and rear 1/16-inch plywood guide rings. Cut the balsa support to the shape of the side view and the top view at the centerline of the fuselage. Once these four pieces have been assembled and aligned, fill in around the outside with 2½x¼-inch strips of sheet balsa. Taper the strips to fit together and set in ¼-inch from the edge of the plywood. Add a block to the front of the assembly, and carve and sand to shape. Cut the inside of the cowl to slide over the fuselage sides, as this cutout holds the cowl in position.

Left and below, shock absorbing landing gear setup.

The fuselage is quite easy to build, but pay close attention to the firewall and landing wire support. I started to use spruce for the longerons, but, due to the construction method, spruce is not needed. You might like to build in a tunnel in the lower front of the fuselage to help cool the engine. This would be very simple to do before the lower nose is

Fiberglass parts for the STA can either be formed as described in text or obtained from Fiberglass Master.

The cowl is held to the fuselage with one bicycle spoke and thimble. Make a brass bracket that will fasten to the coil screw and solder the bicycle spoke to the bracket. The spoke sticks through the cowl just below the crankshaft. If you've done the job right, the cowl will fit very snugly and will not vibrate.

Carve the air scoops from scrap balsa. The scale metal overlay is made from thin heat-forming plastic obtained from Sig. The exhaust stacks are brass tubing.

The tail is very basic. Cut the ribs and the spars from light C-grain balsa. Laminate all outlines the same as on the wing tips and allow to dry thoroughly. Cut all notches. Fasten the spars flat on a table with the notches up. Install the ribs in the notches with Sigment or an equivalent. Add the leading edge and check for alignment. Allow to dry and sand to finished shape. Cover the tail surfaces with Koverall or similar material. I use Koverall because it is light and strong, and, above all, holds paint very well. It also fills quickly.

Make the tail fairings from heat-forming plastic and install them with #0 wood screws, which do the job well and look scale.

For covering I used Sig's aluminum fabric with silver dope and then painted the model red, white, and black after a Ryan I had seen in Sig's photo pak. It had a lot of color a eye appeal.

My Ryan STA was a little nose-heavy, so I added 8 ounces of lead to the tail post. Be sure the model balances properly. It won't hurt if it's a little nose-heavy at first. The prototype weighed in at only 15 pounds ready to fly.

The Ryan STA on the wing is a beautiful sight to behold.

FLYING. The model flew right off the board and was very smooth handling. A little back pressure on the stick and a little right rudder, and she was airborne—a real sight to see!

I've done loops, rolls, snap rolls, Cuban 8s, and humpty bumps.

When you come in for a landing, keep a little power on. Practice will show you how much.

You'll really be proud of this plane. It is sheer pleasure to fly and a winner on the contest trail!

**The following are the addresses of the companies mentioned in this article:*

Sig Mfg. Co., Montezuma, IA 50171.

C.B. Associates, Inc., 21658 Cloud Way, Hayward, CA 94545. ■

Ryan STA Special

RYAN AERONAUTICAL COMPANY located at Lindbergh Field in San Diego, California, first developed the Ryan ST. Although it was a beautiful classic airplane, and even though crowds were drawn to its beauty and performance, not everyone wanted to own it. Because of this, Ryan came up with a new version with more horsepower and a supercharged Menasco C4S engine and called it the Ryan "STA Special."

The Ryan STA was a low-wing open-cockpit monoplane, which was specially custom-crafted for high performance at higher altitudes. This airplane was one of the handsomest in the sky: slender, sleek, trim, and very perky.

As the STM (an export version of the military), it served on training and tactical missions. With the Menasco C4S engine of 150 hp, the performance increased as it went higher.

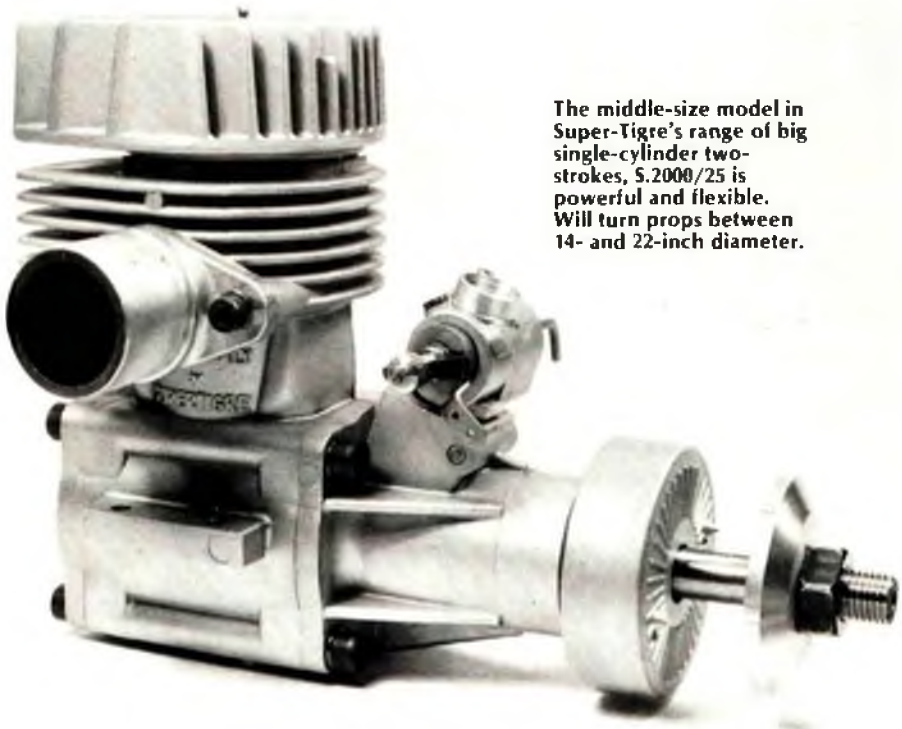
The STA was an all-around eye-opener with a personality of its own. It was easy to fly, predictable, and highly maneuverable. Maintenance was minimal and operating costs were fairly low. The Ryan STA Special received its type certificate retroactively to October 30, 1937.

I had been researching for a ¼-scale aerobatic plane to build and ran across some photos of the Ryan STA Special. (I'm very interested in both ¼-scale and IMAC aerobatics and this plane would do both.) Many STA planes were silver or chrome, but then I saw photos of the one owned by John Gosney, which has a 200-hp Menasco engine. It was red, white, and black and just jumped out at me. I wrote to Maxey Hester of Sig who had built a smaller version some years ago and he sent me a photo pak of the actual plane. The full-scale airplane had an overall length of 21 feet, 6 inches; a wingspan of 19 feet, 11 inches; a wing chord of 56 inches, and a total wing area of 124 square feet. The Special had an empty weight of 1,058 pounds and a gross weight of 1,600 pounds. It looked better and better as a potential model for both scale and aerobatics, which I like to combine. This was the deciding factor in my going with the Ryan STA Special. ■

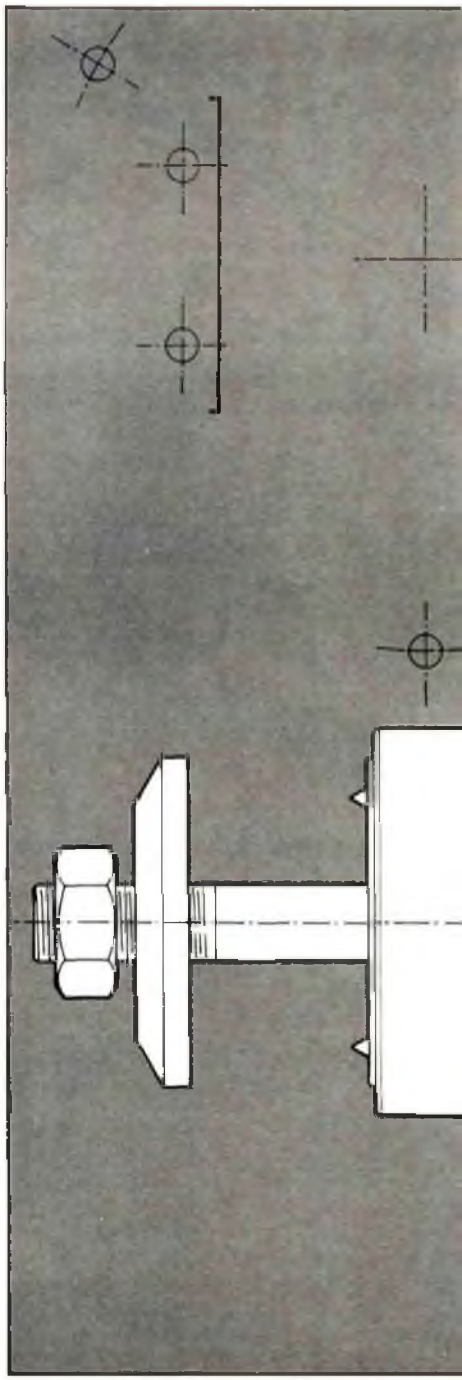
Engine Review

Super-Tigre S.2000/25

by PETER CHINN



The middle-size model in Super-Tigre's range of big single-cylinder two-strokes, S.2000/25 is powerful and flexible. Will turn props between 14- and 22-inch diameter.



SPECIFICATIONS

Type: Single-cylinder, Schnuerle-scavenged, side-exhaust two-stroke-cycle with shaft rotary-valve and twin ball bearings. Throttle type carburetor with automatic mixture control.

Checked Weights: 1,205 grams (42.5 oz) bare; 1,357 grams (47.9 oz) with muffler; 1,482 grams (52.3 oz) with muffler and radial mount.

Displacement: 24.89cc (1.519 cu in.)

Bore: 32.5 mm (1.280 in.)

Stroke: 30.0 mm (1.181 in.)

Stroke/Bore Ratio: 0.923:1

Measured Compression Ratio (full stroke): 10.9:1

Measured Compression Ratio (exhaust closed): 8.2:1

Performance Data—as tested:

Power Output, Net: 2.40 bhp at 11,000 rpm

Torque, Net: 310 oz-in. at 5,200 rpm

Equivalent b.m.e.p.: 80 lb/sq in.

Specific Output, Net: 1.58 bhp/cu in.

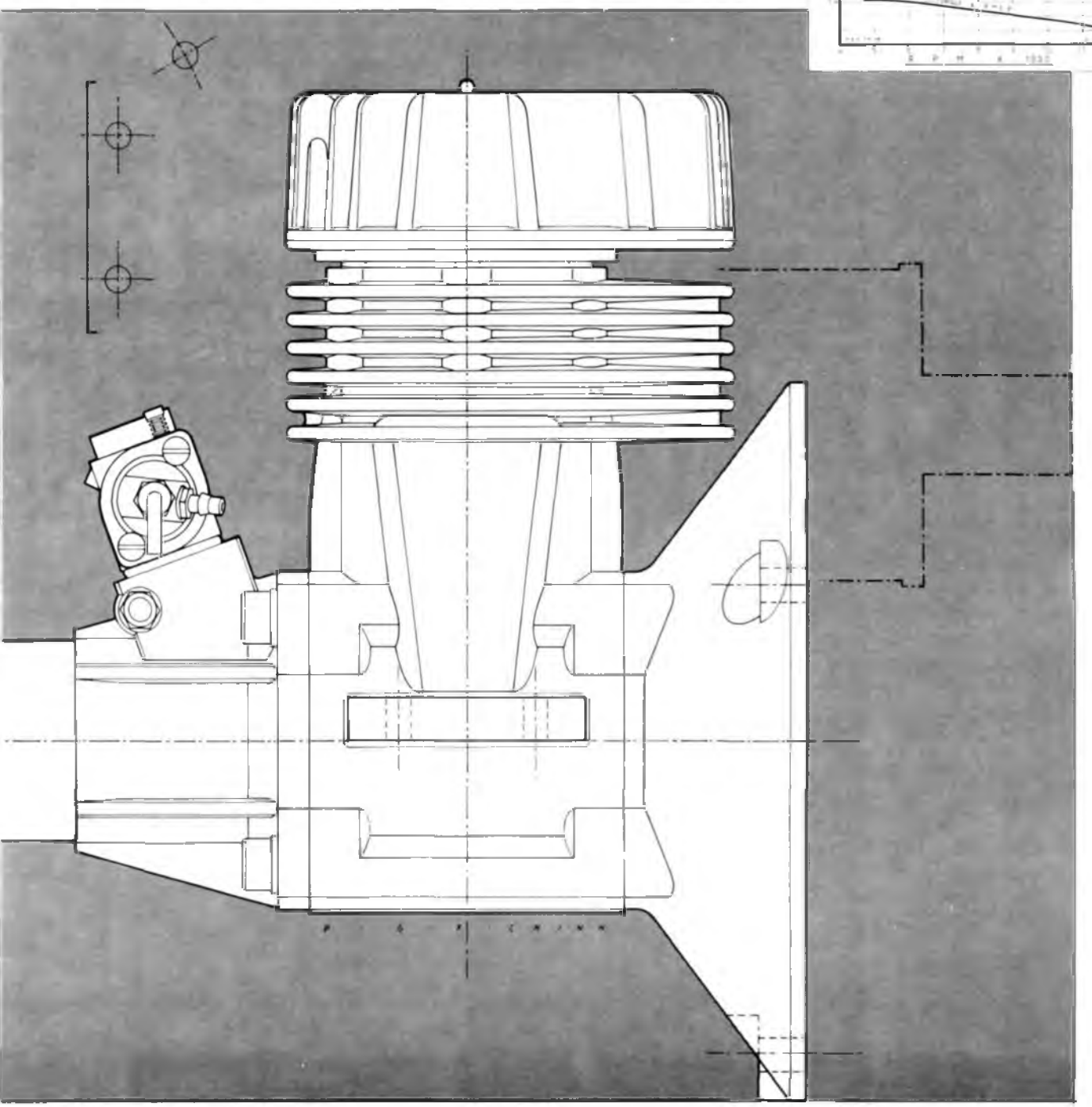
Power/Weight Ratio, Net: 0.80 bhp/lb (beam mount); 0.73 bhp/lb (radial mount)

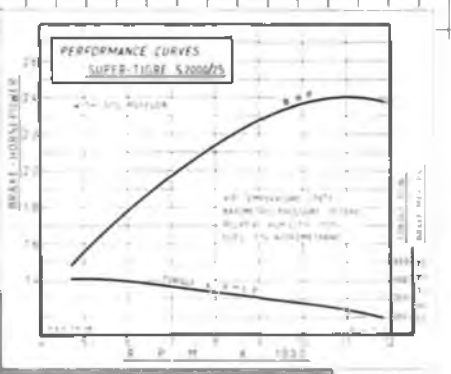
Manufacturer: Super-Tigre s.r.l., 40065 Pianoro, Bologna, Italy.

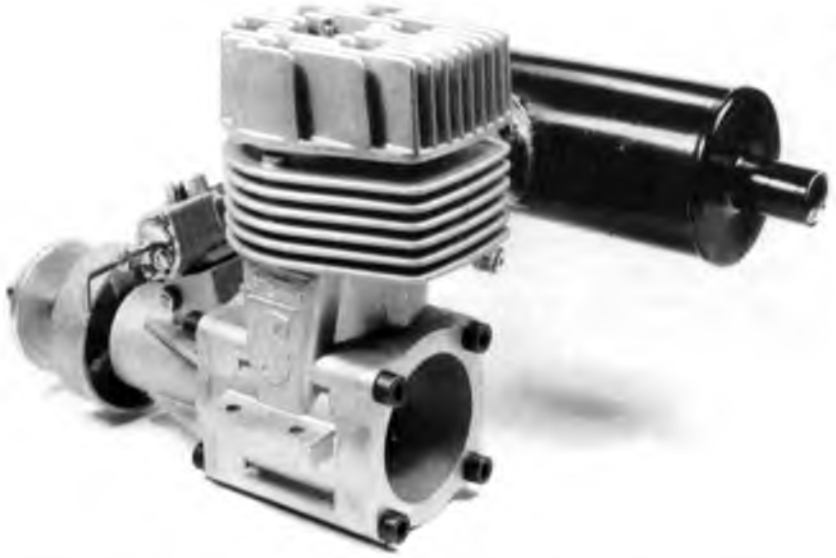
U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, Champaign, IL 61820.

WHEN THE Super-Tigre factory introduced the S.2000 series, it broke new ground by bridging the gap between model engines and the small converted chainsaw/weed-eater/leaf-blower gasoline power units. Internally, the S.2000 followed the conventional model two-stroke-cycle layout in general and Super-Tigre practice in particular. Externally, it was big and hefty and looked nothing like any previous Super-Tigre, but was a better shape for model use than the typical chainsaw type engine and offered an improved power-weight ratio.

Originally manufactured with a 20cc (1.2 cu in.) displacement, the S.2000 is currently offered, also, in a stretched version designated S.2000/25. This has its cylinder bore opened up from 30.0 mm to 32.5 mm, along with an increase in piston stroke from 28 mm to 30 mm.







All tests were carried out with standard Super-Tigre extension chamber muffler fitted.

thereby enlarging the engine's displacement to nearly 25cc (hence the S.2000/25 designation) or 1.519 cu in. Still more recently, the factory has released the S.3000 having a 35x31 mm bore and stroke and a 1.82 cu in. displacement. We elected to use the middle displacement motor for this report.

The purpose of increasing the engine's swept volume is to enable it to turn larger propellers. To turn a larger prop, an increase in torque is required and to extract more torque from any internal combustion engine, it is necessary to introduce a heavier weight of fresh gas into the cylinder. Some increase is possible by improving the engine's breathing—most dramatically with the aid of tuned exhaust systems (two-stroke engines) and superchargers or turbochargers (four-stroke engines)—but, essentially, the torque that an engine is ultimately capable of delivering really boils down to its displacement.

The actual increase in swept volume provided by the larger bore and stroke of the S.2000/25, compared with the S.2000, is 25.7 percent. This does not scale up both torque and power by the same percentage because other factors influencing performance, such as carburetor choke area and the sizes of ports and passages, are largely unchanged. Instead, the shape of the power curve is modified so that its peak is lowered and more power is available when the engine is heavily loaded. This, of course, is just what is needed for large scale models.

Outwardly, the 25cc version of the S.2000 is virtually unchanged. It uses the same castings as the 20cc model and its mounting dimensions are the same, except for a height increase of just over $^{1}/_{16}$ inch and a weight increase of less than $^{1}/_{5}$ ounce.

As already remarked, in appearance, the S.2000 series is distinctively different from previous Super-Tigre engines. Let us take a closer look at its design and construction.

MAIN CASTING. Of pressure cast aluminum alloy, this consists of the crankcase barrel, open at both ends, and the cylinder casing, along with the usual beam mounting lugs. It is noteworthy for its large asymmetrically disposed cooling fins, designed to extract heat from the hottest areas, i.e., fin area is biassed toward the exhaust side and extended well to the rear. The short rectangular exhaust stack has a sharply divergent outlet and is drilled and tapped for the attachment of the muffler adaptor. The bypass channels are nicely contoured to initiate a smooth flow through the liner ports.

CYLINDER LINER. The hardened steel 37 mm o.d. cylinder sleeve has a 2.25 mm nominal wall thickness and is located by a thick (4.5 mm) 40 mm diameter flange. The scavenging system

Fin area on cylinder head is biased toward hottest part of engine to even out heat dissipation.

Pressure-cast firewall mount is included and can be installed in place of standard backplates.

S.2000/25 here equipped with firewall mount. Note sensible size of prop driver.

is Super-Tigre's variant of the Schnuerle-plus-third-port layout. It consists of a centrally bridged exhaust port of relatively moderate area on the right side, flanked, fore and aft, by the usual angled bypass ports, with, diametrically opposite the exhaust, a pair of the familiarly-shaped Super-Tigre upwardly inclined "third" ports.

Port timing is much as one one would expect of an engine of this type. The exhaust opens at 70° before bottom dead center and there is a 12° blowdown period before the bypass ports open. In other words, the exhaust period covers 140° of crank angle and the Schnuerle ports 116°. The third port period is just measurably shorter at 114°.

The liner is lightly shrunk into the main casting. Application of a heat gun to the cylinder fins for a few moments is sufficient to release the liner, should this need to be removed at any time.

PISTON AND CONROD ASSEMBLY. In twenty-five years of testing Super-Tigre R/C engines, we have never had trouble with a piston. The S.2000 cast lo-ex alloy piston follows the usual ST design. Substantial bosses for the wristpin are hung from the underside of the piston head and are wide enough to ensure that the unsupported portion of the wristpin is less than 5 percent of its length; there is a clearance of approximately 0.6 mm between the sides of the

(Continued on page 84)

Piston, rod, and bottom end parts follow conventional model two-stroke practice, except for larger prop driver.

by FRANK TIANO

Bob Violett Models

SPORT SHARK

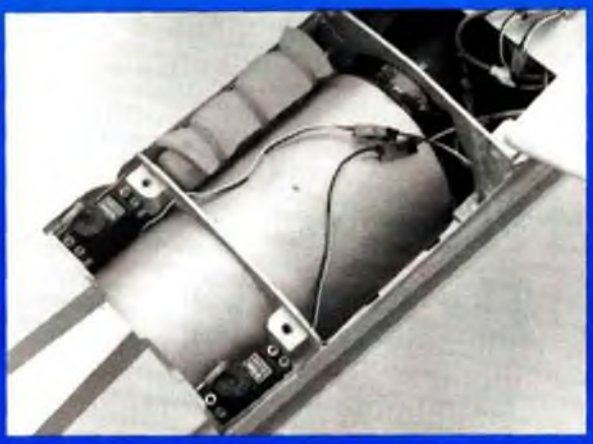
A ducted-fan sport model that may set a trend.

I SAW THE elusive Mr. Bob Violett, his equally elusive Viojett power system, and the mysterious fun-fly jet of the future, the Sport Shark, recently in Fort Lauderdale, Florida, at a local flying field. Now for those of you who thought that Bob's fan and airplane were just figments of someone's imagination, let me tell ya, I saw them with my very own eyes! In fact, my companion for the afternoon, David Platt, saw them too. We both actually touched the model, held it, and goggled at it. And then, in front of eighty or so spectators, we saw it perform three of the most thrilling flights by a ducted-fan airplane since the beginning of the jet craze a few years ago.

Now when Dave and I showed up at the field, I had absolutely no intention of writing an article on Bob Violett Models*, the Viojett, or the Sport Shark. However, since Bob had a couple of kits in his van, along with a few fan units and engines, I decided it might not be a bad idea to grab a few pictures and a lot of information on this new item before anyone else "scooped" me. Okay, now to the nitty-gritty.

Violett is marketing the Sport Shark as a pure fun-fly jet. According to Bob, it will fly faster and higher, land more slowly, and get in the air more quickly than anything offered by the competition at this time. All I can say is that it sure is fast and it sure does land slowly. Any of the problems you

The Viojett fan unit is a well-engineered, efficient, and compact package.



Radio installation is engineered for maximum utility and minimum hassle.

SPECIFICATIONS

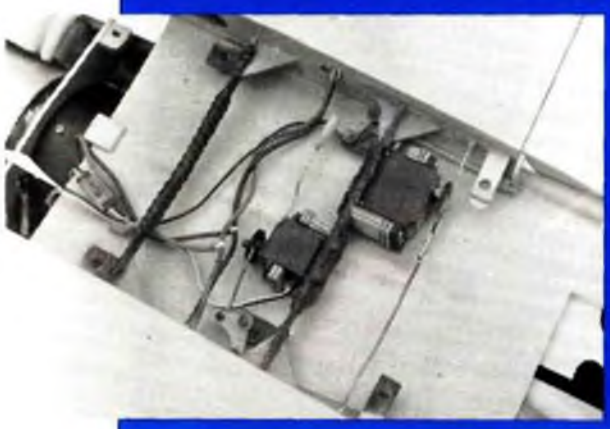
Type: Sport ducted-fan
Wingspan: 53 inches
Wing Area: 630 square inches
Length: 63 inches
Weight: 9¼ pounds
Engine: KBV .72 Viojett fan

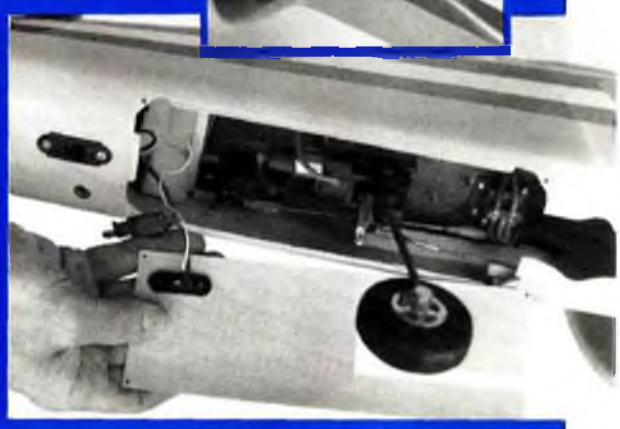
might have heard about concerning the prototype have been worked out, and I have to say that the airplane really can be flown as a sport or a Sunday flyer. The flying stab that caused so much grief on the prototype models has been changed to a more conventional unit, featuring a fixed stabilizer and movable elevators.

THE KIT. Before getting into performance, let's talk about the kit itself. First of all, to call this venture a kit is a bit misleading. The reason I say this is because the Sport Shark has all of the difficult sub-assemblies pre-built at Bob's factory. For instance, the wings, stab, and fin are assembled at the factory from Magnalite

(Continued on page 47)

Photo above shows extensive use of access panels. Right, intakes have large volume for positive airflow.





Left, servo arrangement for wing. Right, another hatch reveals nose gear setup.

How to Cover Your Model Black Baron Heat-Shrink

by DAN SANTICH

Your basic tools: heat gun, iron, razor blade, and straight-edge.

Use plans to cut pattern.

ONE OF THE QUICKEST, easiest, and most attractive coverings available to modelers is heat-shrink plastic film. Since introduced in the 1960s, the use of it has almost dominated the skin application to models of all types and sizes. The reasons are many.

Heat-shrink film covering is lighter, stronger, and applies more quickly than any other type of covering. It is odorless, non-toxic, and almost fool-proof. Trainer, sport, and competition models have all used heat-shrink covering to great benefit. Many advanced modelers have found that the material can be "weathered" to give a scale effect, it can be put on in patches to simulate panels, and it can be indented to simulate rivets, fasteners, and access hatches. It is indeed a marvelous modeling product that can be as simple or as complex as we choose to make our subject aircraft, but the beautiful thing about it is that it requires no extraordinary skill to achieve fantastic results, just a bit of basic knowledge and pre-planning.

Probably the first question to pop up in a modeler's mind is which covering he should use. Since the availability of such material is quite wide, with no less than 10 or 15 different brands, this is a logical question. The answer to it is this: they are all good. Just like the many different brands of radio-control units available, it is whatever you feel more satisfied and comfortable with. Everyone will develop their own preference, and for different reasons. It may be cost,

Lay material in place and tack down at intervals before sealing completely.

Grasp material and stretch while heating with iron.

with Coverite Film

When cutting material leave a little excess.

Be sure to remove protective backing from film.

color selection, texture, working qualities, or availability. Whatever the reason, most modelers have probably tried them all.

Coverite* has had heat-shrink covering for many years. Their Micafilm, ARF Covering, and iron-on fabric materials have almost become a staple item with modelers. In addition, their trim sheets, striping tape, wood preparation liquids, spray paint, pocket thermometers, and pre-cut decal sheets have made the name Coverite synonymous with model covering. The trademark "Black Baron" is a familiar name on any hobby shop shelf; in fact, Coverite has a wider range of products devoted to the covering of models than any other company in the world.

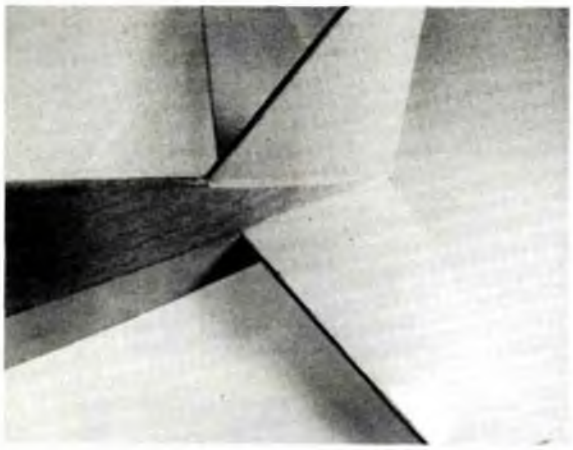
What they have not had, until now, was a glossy, multi-colored variety of heat-shrink film. Well, now they do, and it's great stuff. Not only is it very easy to work with, the colors are computer-matched to their liquid paint, either in ½-pint cans or handy-to-use spray cans. Although the paint is epoxy base, no mixing of a hardener additive is required. It can be applied directly over the Black Baron Film to seal seams and fuel-proof engine compartments with no difference in color match or chance of peeling off.

A great feature of Coverite Black Baron Film is its ability to shrink to almost half its original size with the application of a medium heat setting (275° F) on your iron. The adhesive on the film is designed to transform to a sticky

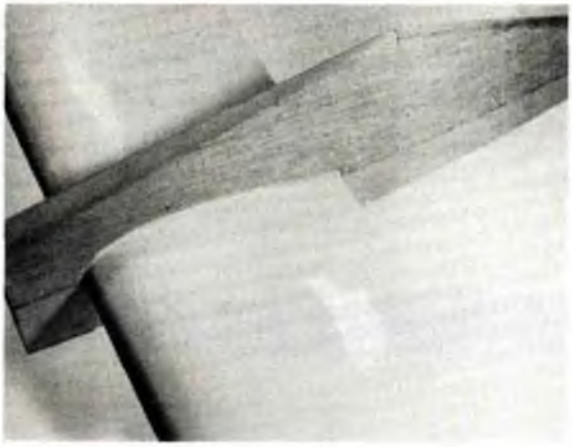
Trim excess material with a sharp razor blade.

In a continuous sweeping motion, use heat gun for final shrinking.

Cover Your Model



Flange at connecting corners will allow overlap.



Fuselage should be the last part covered.

substance at 150°, which makes it possible to cover a styrofoam wing without melting the foam itself. The nominal working temperature is between 250° and 300°, and the melting temperature is 350°.

To be able to shrink and eliminate any wrinkles in your covering is one of the greatest benefits of this material. Another very desirable aspect, however, is its ability to stretch with the application of heat. In fact, you can nearly double its length by heating it and pulling at the same time. This makes the covering of usually hard-to-do areas, such as wing tips, quite manageable, even easy.

The first step in covering any model is preparation. First, get the proper tools. This includes an iron, a heat gun, razor blades, a ruler or a metal straightedge, and a marking pen. That's about all you need. You can obtain a Pocket Thermometer, also from Coverite, that will tell you exactly what your iron temperature is, and is a great aid in preventing the accidental melting of the material.

Before covering your model, sand the surface so that it is smooth and dust-free. I try to get the balsa as slick as possible so that no defects or grain will show through. Generally speaking, the smoother the surface, the better the results. Just make sure you remove all balsa dust with a soft cloth, or better yet, a vacuum cleaner.

Once you're ready to begin your covering job, a bit of planning will save a lot of time, not to mention a great savings in the amount of covering material you end up using. Since most kits offer full-size plans for construction of their model, these plans make a very convenient pattern by which to cut your covering film. Simply lay the film over the plans and mark the outline with a water-soluable marking pen. Be sure to allow some excess so you will have something to grasp while you're applying it.

Cut the outline with a razor blade, peel off the protective covering on the adhesive side of the material, and lay it on the surface of the model. (I usually do the wing, stab, fuselage, and control surfaces, in that order.) Tack the material in place with your iron at each corner, and then at half intervals. Next, run your iron around the entire edge to fully secure it to the surface. Take your heat gun and shrink the covering until it's drum-tight. It's important not to get the heat gun too close to the film, and to keep the gun moving in a back and forth motion. If you get it too close or hold it in one place, you will most likely melt a hole in the film. Certainly you can patch over any hole, but you quite naturally want to avoid having to do so.

Doing a wing tip is very easy, using the proper technique. Stretching the material with one hand and applying the iron while the covering is held above the surface of the wood will let you remove any wrinkles. Stretching it out and then tacking it on the edges until it's secured entirely will give you a beautiful, wrinkle-free wing tip.

When you cover the stab (horizontal and vertical stabilizers), use the same technique. Be sure to leave about ⅜ inch of material at any fillet area, so that when you cover the fuselage you will have some overlap, a must for a fuel-proof surface.

When your model is completely covered, fuel-proof any exposed areas, such as engine compartments, wheel wells, hatches, etc., with Black Baron epoxy paint.

Trim colors can be done in several ways. The paint makes a nice looking trim, or you can use different colors of the film itself, or you can use Coverite Graphics trim sheets. These come in many different colors and are pressure-sensitive. Simply cut your pattern from the large sheet, peel off the protective backing, and apply to the model. These trim sheets are also completely fuel-proof, and the material works great when used as striping tape. Widths as much as ¼-inch can be worked around a tight radius since the material is so pliable.

A well-done, colorful model is a pleasure to own, and the use of Coverite covering products will make the task just as pleasant. Give it a try.

**The following is the address of the company mentioned in this article:*

Coverite, 420 Babylon Rd., Horsham, PA 19044. ■

The Golden Age of R/C

by HAL "PAPPY" deBOLT

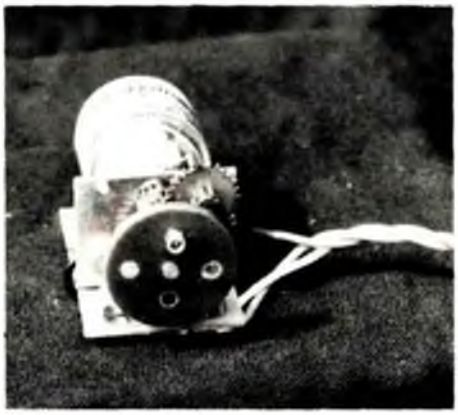
IN A PREVIOUS COLUMN I described the initial Aerotrol-style receivers with a single RK-61 tube. Technically these were of a super-regenerative design, the very simplest form of radio, as compared to the superheterodyne design that *all* radios use today. These got R/C on the road quickly and they were developed considerably before the "super-hets" took over.

In this case, "simpler" did not prove to be "best"; there were serious handicaps. First, they required a heavy battery supply for any reliability. This meant using larger planes than most modelers were comfortable with. Second, the finicky, short-lived RK-61 tube was more than the average modeler could comprehend. To understand this, you have to know that the reliability of the relay switch which controlled the escapement or actuator depended upon the amount of current which the tube could supply to it. If the supplied current was low, as was usually the case, the relay had little power to close its contacts, making them unreliable and subject to vibration. The need was to supply the relay with plenty of current, which the RK-61 could only do at its peak. Happily, these receivers were only the beginning, and advancements came fast and furiously!

Back then, R/C magazines featured active engineers as columnists. Handling the chores at *M.A.N.* was Ed Lorenz, whose livelihood was at IBM. The solution that Ed found leads to some interesting R/C history. In a nutshell, the Lorenz Receiver reduced battery requirements dramatically and considerably improved relay operation. This was a milestone in R/C progress which allowed the use of much smaller models. In fact, using Ed's receiver, the first ½A R/C designs were very successful. The Live Wire Kitten is one of the first examples.

The design's technicalities were simple and effective and two basics were involved. A tube amplified the current it was fed. The RK-61 required very little current to trigger it. The amount of current it then put out depended on the strength of the signal received. The Lorenz design used *two* RK-61s in series. The first signal-detecting tube did nothing but trigger the second tube, which actuated the relay. As a result, the weakest input to the first tube was amplified and the strong signal fed to the relay tube. Thus, the relay tube was always operated at its maximum, providing more reliable relay operation. Also the battery requirements with this design were less critical, allowing a minimum battery complement.

The hand launch; the accepted and preferred method of getting into the air in the early days.



The Multi-Servo replaced the escapement and two-cent rubber band for single-channel control.

Many small commercial operations filled the needs of early R/C. Ed Lorenz's work resulted in one of them, which was typical and interesting to today's R/C community. Another very active R/Cer was John Worth, who was involved with NASA. Realizing the value of Ed's development and the potential of R/C, the two formed the Control Research Corporation to produce the radio. For some time, Control Research filled many of the needs of the growing R/C hobby until the demand became more than a part-time operation could provide. Ed's and John's answer was to pass the effort on to Paul Runge at the newly-formed Ace R/C.

John Worth, in early '60s, at work on a Rogallo Flex-Wing for NASA. Used five-channel Bramco reed set.

Ed Lorenz continued at IBM and recently retired to Florida. John Worth went on at NASA, using R/C for many of their investigations. Eventually John became AMA director.

Any new form of modeling is a challenge. With rudder-only as a control, we had R/C flight. From there the challenge was aerobatics and it's amazing what

deBolt's company, dmeco Models, produced the Live Wire Trainer, one of the best. Here power is Mills .08 diesel.

was accomplished with that single control. With the proper aerodynamics, it was possible to produce a loop or a roll if you could build up excess speed. Without elevator, the needed excess speed was gained by a spiral dive. You could then neutralize and the model's force arrangement would cause it to loop. The arrangement was an excessive angular difference between the wing and the stabilizer. An abnormal forward CG was used to prevent stalling at normal flight speed. Excessive rudder action was also a part of the combination.

While this arrangement made aerobatics possible, the setup required careful piloting for cruising flight. Penetration suffered and a stall was imminent with slight speed buildups.

Experienced pilots used the single control judiciously. After neutralizing the spiral dive, if the loop was not wanted, the climb was allowed to commence and then hard rudder was applied, again resulting in a barrel roll. Obviously there had to be a way to get out of unwanted stalls. The answer was to put the model into a turn just as the stall started, allowing speed to bleed off in the resulting circle. With practice, pilots got pretty clever with this type of aerobatics; you just don't see this kind of flying today.

This early receiver used two tubes and made smaller R/C models practical.

Note that even though only one control was available, the R/C trainer evolved at this early date. There was just no way a beginner could handle a rudder-only setup for aerobatics. Progress came because most kit manufacturers set up their designs in the training mode.

Probably the ultimate in rudder-only performance was demonstrated at the 1953 Nats by one of the fathers of R/C, Jack Port. Jack was an electronics engineer best known for his Control-Aire R/C equipment, marketed by World Engines. He was a dedicated engineer whose equipment commanded a lot of respect. The dedication carried over into his models, where Jack was a strong advocate of rudder-only flying.

With the imminent birth of complicated, expensive, multi-control systems, many thought the growth of R/C would be with the simple, inexpensive single-channel systems which were becoming highly developed through the use of compound actuators and reliable equipment.

Jack's Nats entry was his Hi-Q design, which represented the acme of the aerobatic rudder-only designs. This Nats was to be the first for the newly-developed reed systems that would soon break R/C wide open with multi-control flying.

In the previous year, both Rockwood and Schmidt had limited production of five-channel reed systems, which offered independent rudder, elevator, and engine control. Probably about one-third of the Nats entries were new multi-control designs using reeds or the other new pulse type systems. The oddsmakers heavily favored the multi-control systems, of course. The extensive experience of the rudder-only fliers and the newness of the multis were overlooked.

It always makes your heart feel good when a guy with an handicap has success. Jack and his Hi-Q were a shining example of the underdog when he set the Hi-Q down in the center of the circle in adverse winds during the meet's last flight to outscore all the multis!

This was the swan song of rudder-only in unlimited competition; multi-controls were for real! During lulls in the flying, for example, I was able to demonstrate the first extended inverted flight and outside loops with a symmetrical winged cruiser-style design. Separate classes were established by the AMA for single-channel competition shortly after.

If you compare the Live Wire Trainer picture with Port's Hi-Q 3-view, the aerodynamic changes that developed to enhance aerobatics are apparent. By raising the center of lateral area, for example, the changes reduced the inherent stability, allowing control action to change the flight more easily. These designs were closer to modern practice; they had to be controlled constantly. In

contrast, the Trainer designs possessed the inherent stability of a free flight; the control action only guided the model.

The Live Wire Trainer was the *first* R/C-only kit offered. The size of the model had little to do with R/C. The industry felt that the $15 cost of a larger size would not sell! The design had to be sized to meet the industry's desired $6 price tag. What a difference time makes!

The Trainer was an immediate success with single-channel equipment of all sorts. The engine was the Mills .08 diesel which fit R/C well. For slow test flying it turned a 9x3 prop at the same rpm as it would a 9x6 for the desired faster flight. The engine also had a drum-type throttle for speed control, the forerunner of today's engine carburetors.

The Trainer set all sorts of sales records for kits of that time. Other manufacturers quickly followed: Guillow with the Trixter Beam, Midwest with the Esquire, and Sterling with the Mambo were prominent. I don't have photos of those; is there anyone out there who does?

Chronologically, this seems the proper time to talk about multi-servos, which extended the life of single-channel flying. The shortcoming of escapement-type actuators was the heavy batteries required, the lack of power, and the fragile rubber band. Motor-driven servos were a part of the contemplated multi systems, and we wondered why we didn't use them for single-channel also. They would be so much better than escapements.

The opportunities were so wide-spread in those early days; would you believe I designed and built the first single-channel servo in a couple of evenings? The expectations I had for the first flight were like those of a child on Christmas morning!

For test flying I simply replaced the escapement in a Live Wire Trainer with the prototype servo. On launch I could hardly wait to push the transmitter button. It was so heartwarming to hear that servo cycle through! The design concept was so basically fundamental that no real development was required. Several prototypes were flown with no problems and demonstrated the performance needed for R/C.

The basic design was expanded to provide compound action and multi controls with single-channel radios. Also included were special styles to suit auxiliary controls, such as engine and elevator.

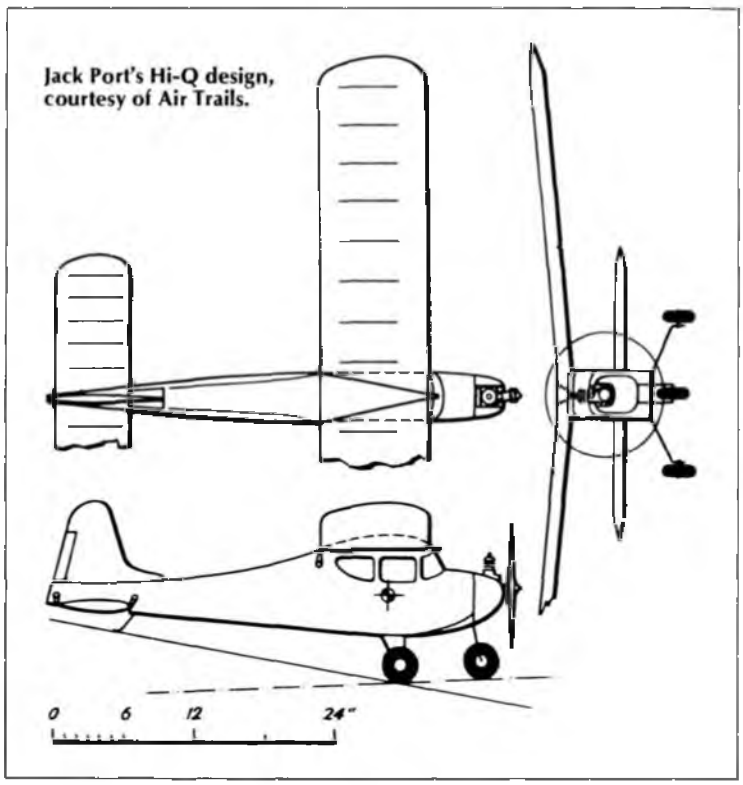
Multi-Servo's such as deBolt's allowed several controls with single-channel radios.

With 2 pounds of thrust, minimum batteries, and a single-channel radio, the multi-servos allowed inexpensive, lightweight, multi-control flying. In conjunction with Frank Schmidt, the multi-servos were produced in the tens of thousands, serving the hobby well for several years. With the growing popularity of the reed systems, thousands of servos were also produced for that need.

In retrospect it's always interesting to wonder what would have been *if* we had back then what we have today. The only servo motors available then were of the toy variety and the batteries were dry cells. The toy motor performance varied so much, an adjustable braking device had to be used to control them. The dry battery output was inconsistent also, so there was a combination of characteristics to contend with—*without* a positive answer. Those servos would have been outstanding with today's servo motors and nickel-cadmium batteries!

A letter from Tom Ailes of Valparison, Indiana, tells where this OT movement is coming from. At 40 years, Tom isn't an oldster by age, but he indicates he started R/C in the '50s with rudder-only and super-regenerative radios. He still has his original Esquire which must be a record. Sorry, no photos and I do lack information and pictures of the Esquire.

(Continued on page 81)



GIANT STEPS

(Continued from page 87)

tapped to take an appropriate thread to the size of the spoke or wire being used. The advantage of using a soft wire is that it will thread easily. Trying to cut thread in piano wire leads to a rather high mortality rate on dies. The length of the shank part of the yoke can be made a suitable size for the amount of adjustment desired, permitting whatever adjustment is felt to be appropriate to the control affected.

Those shown in the photos are cut to accept the CB Associates* control horns which I use almost exclusively. I find the combination to be very strong, quite reliable, and easily adjusted when necessary. For added security, the threaded cross bolt, which passes through the hole in the control horn, can be fitted with a brass tube collar to eliminate wear on the control horn and can have a nylon lock nut added to the free end of the cross bolt to prevent it backing out due to vibration.

The combination of carbon fiber arrow shaft, soft wire ends, and the home brew yoke end provide a reliable and very safe attachment between the servo arm and the control surface. The feeling of security available from such a control linkage makes flying a large model a relaxing activity, as the worry of something going wrong or coming apart is greatly reduced.

In all control linkages, make an effort to keep any lost motion (or "slop") to a minimum. The presence of slop can lead to control surface flutter, which places an extreme load on all the components involved and can lead to early failure. The entire length of a control run should be free to move without appreciable resistance, but should produce no slop when at rest.

In any radio installation, the care you take in assembling and testing the control hookup before flying the model will determine the reliability of the controls. They should also be checked from time to time to insure there is no wear, misalignment, or mis-adjustment occurring which could lead to problems. Just as the full scale pilot does a pre-flight check on his airplane before taking off, we should do the same.

Care in installing our radio systems, continuing inspection as we fly the model, and attention to detail will help assure we do not have any unexplained crashes.

That about covers radios and their installation. Join me here next month for more information on the care and feeding of large models.

Dick Phillips, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Coverite, 420 Babylon Rd., Horsham, PA 19044.

Airtronics, 11 Autry, Irvine, CA 92718.

C.B. Associates, 21658 Cloud Way, Hayward, CA 94545. ■

F&B: VIOLETT SHARK

(Continued from page 39)

(Bob's carbon fiber) composites and balsa. This produces a very light but oh-so-strong structure that's easy to repair and is easily finished by the modeler with paint or plastic coverings.

The fuselage is really a beautiful piece

(Continued on page 76)

F-20 Tigershark

by BUDD DAVISSON

EVERY PILOT has a dream. He dreams of an airplane that feels "personal." It's an airplane that's neither too big nor too little, neither too fast nor too slow. Somehow that airplane is "just right" and only the pilot knows when the right combination is reached. But he knows that combination instantly.

And then there is the Northrop F-20. If ever an airplane was poured through the extruding die of everyman's mind, it's the F-20 Tigershark. This is the airplane most pilots dream about. It's not so big that it dwarfs your hometown, it's big enough to have full-size airplane dimensions and, most importantly, it looks like an airplane is supposed to look. The tail is at the right end of the airplane and the wings are where they should be. Its lines are so perfectly carved and so finely blended that anyone who knows how to shove a throttle wants to have a go at the F-20 Tigershark.

And its looks aren't deceiving. Chuck Yeager loves it enough to use it as a backdrop for his spark plug commercials. Pilots from 18 countries have flown it and loved it. It's everybody's darling.

Unfortunately, nobody loves it enough to take it home. Northrop finds itself in the position of having one of the best looking, least expensive, highest performing airplanes available, but because it hasn't been adopted by the U.S. Air Force, foreign governments are afraid to take the first step. A USAF fly-off competition this summer for aircraft to put in their "aggressor" squadrons will decide the F-20's fate.

Northrop has a long history of doing things the unusual and, like as not, the hard way. Going back to the Thirties, their Gamma series set design and performance milestones. During WW II, their P-61 Black Widow carved up enemy formations in the dead of night, yet lingered in the backwater of fame, hidden from the limelight cast on Mustangs and Thunderbolts.

Northrop's postwar efforts included a series of flying wing bombers that, again, set new records for design and performance, but somehow were swallowed by what have been reported to be political ambushes.

In more recent times, Northrop has proven to be no less adventurous. In the 1960s they designed and built the F-5 Freedom Fighter as their idea of a small, lightweight, highly reliable fighter that could be bought and maintained by entire nations where the average education stops at first grade. To this day the F-5 forms the front line defense for dozens of countries, with over 2,500 of them flying worldwide. This is no small feat considering that the entire program was done using only Northrop's money. Taxpayers didn't have a dime in it.

Recognizing the F-5 for the thoroughbred she was, Northrop modified their design with their own money to become the T-38 Talon. Today the Talon is the standard USAF advanced trainer and the machine in which many of our pilots bust Mach for the first time.

The F-20 comes from the same mold and entrepreneurial concept Northrop has followed in recent years—take a good idea, spend your own bucks, and make it work.

And boy, does it ever work!

At combat weights (half fuel and missiles) it

Pilot's view of his "office" (above left) is a far cry from those of just a few years ago. Photo above shows the wide range of external stores and armament carried aboard. Northrop photo.

photos courtesy of NORTHROP AVIATION

has 1.12 pounds of thrust for every pound of weight. What this means is that gravity doesn't exist for the F-20. It can point its blowtorch at the pavement and accelerate going straight up.

Lots of airplanes can put the same statistics on paper that the Tigershark can. In fact, airplanes like the F-18s, F-15s, and F-so forths can all sit on their tails and disappear from sight. What they can't do is keep working for any length of time without coasting into the friendly neighborhood mechanic for a tune-up. In fact, most fighters take about 65 man hours to keep them aviating for a single hour. The F-20 does it for one-third that time.

Too often the term "state-of-the-art" is just another way of saying "complex." Recently America's combat readiness has come under fire from various governmental and press organizations. Among other things, it seems to take so long for the gyros to spin-up for their navigational systems that they are sitting ducks. A WW II Mustang might have gone up and hassled a Messerschmidt when its compass was on the fritze, but you can't take something in the F-15 category and throw it into the air unless its navigational system is working. Stop signs and landmarks get really

(Continued on page 52)

Control Tower

by CHARLIE KENNEY

THIS MONTH I'd like to discuss some products I saw at the recent R/C Hobby Trade Association Show in Chicago. First, some general observations of the show are in order. It was very professionally conducted with Thursday and most of Friday being given over to trade customers, dealers, etc., and Saturday and Sunday to the public. The show was switched from its original location, the Arlington Racetrack, because of a disasterous fire. The new location was the O'Hare Exposition Center in Rosemont, Illinois, just about five minutes from the O'Hare International Airport. The show location was also just about five minutes from O'Hare to the Rosemont Hyatt-Regency, plus a short walk to the Exposition Center.

My impression of the show was that it was well-conducted. There were R/C cars everywhere, also many boats from catamarans to deep-Vs. There were two large car tracks for both off- and on-road racers, as well as a large boat pool. The boat pool was really not large enough for racers, but the "rag" sailers and steam and electric boys had a lot of fun. Wind was provided by a couple of fans located at one end of the pool.

With respect to new products, I had a chance to look at the new Byron Originals* Corsair, F-15, F-20, and Purr-Powered Quadra 50 package. I had a nice conversation with John Tatone and viewed his new line of J'Tec* products, which included mufflers and motor mounts. I also enjoyed seeing the Great Planes* Super Acromaster with its updated features. I plan to do a review of this updated model in a future issue.

I also met Dennis Hunt of Zimpro Marketing* who is importing some very fine looking models from Zimbabwe Model Products in Africa. The spectrum of model kits includes a variety of basic and advanced trainers through pattern and Turnaround aircraft. On display at Chicago was Ivan Kristensen's Summit pattern model, which should be released early this year.

Satellite City offers all you could want in the way of quick-set adhesives for your models.

I also renewed my acquaintance with Paul Carlson of Off the Ground Models*, a new company that has a very unique model glider called the Tantrum. This easy-to-build, all-balsa, ultralight sailplane can be assembled in about half the time required for most trainer-type sailplanes. The Tantrum combines several unique features into the model that can be built two ways: a conventional ultralight sailplane, or one with a folding wing. For the beginner, the conventional wing is easier to build and the Tantrum performs very well.

For the more advanced modeler, the folding wing offers a totally new dimension in R/C soaring. The 11-inch outboard wing panels fold underneath the inboard panels by means of a hinge located at the polyhedral joint and are held in place by a pin that protrudes from each side of the fuselage. This effectively produces a sailplane with a completely symmetrical airfoil and a 22-inch wingspan that can be hand-launched as hard as possible without stressing the airframe or looping the plane. Right before the apex of the launch, the outboard panels are released, converting the model into a graceful, high-performance sailplane. The Tantrum can also be launched on a light Hi-Start.

Either version of the Tantrum offers exceptionally smooth flight characteristics as a result of careful, computer-aided, aerodynamic design. The wing utilizes Michael Selig's computer-designed, ultra-efficient S4061-096-084 airfoil. Even the placement of the wing spars and turbulator were designed using a computer analysis of this particular airfoil. The wing is held on the fuselage by a simple, impact-release mechanism and one nylon bolt, concealed by the canopy. In the case of a hard landing, the nylon bolt shears, releasing the wing and preventing possible damage to the plane, so carry a spare.

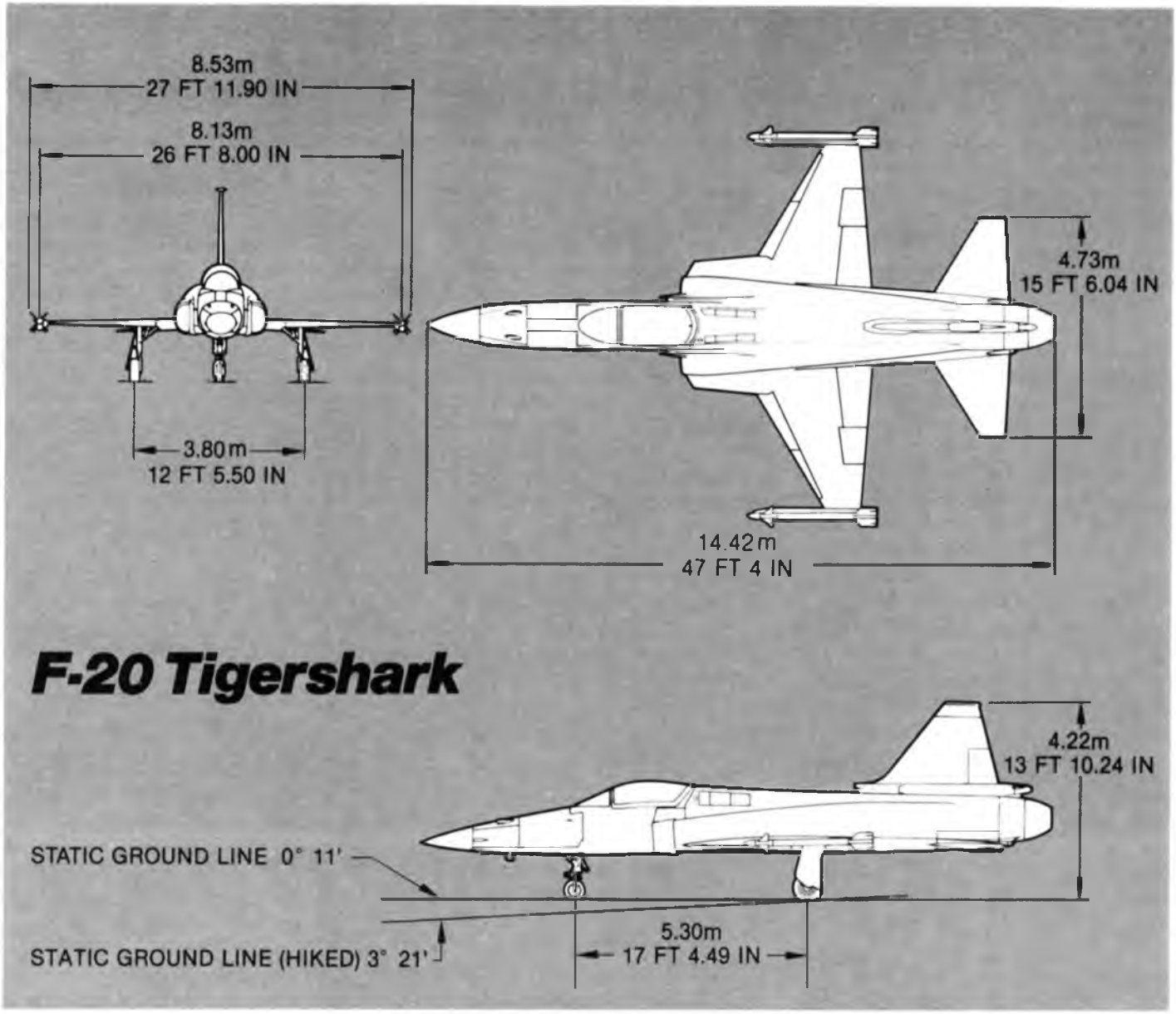
The Tantrum's clean design and efficient airfoil permit the plane to fly a very large envelope, ranging from slow thermalling flight to the fast flight required for slope flying or for getting back to the flying field after chasing a thermal way downwind.

The Tantrum's small size not only allows it to ride to the flying field fully assembled in the front seat of your car, but it also allows it to be flown virtually

(Continued on page 54)

photos by SUE KENNEY

Calico Miniatures Sanding Table is used here with Dremel sanding disc adaptor.



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Contingency spare parts for the F-20 on a month-long deployment are quite compact and can be carried in the back of a pickup truck. Northrop photo.

Photos below demonstrate the awesome firepower adaptable to the F-20. Sparrow air-to-air missiles, Sidewinders, 2.75-inch folding fin rockets, 30-mm gun pods, and seven Mk 82 bombs are all part of its ordnance. Northrop photo.

close together when you're running along at Mach speeds.

Northrop has fixed that little problem by using what they call a "ring laser" inertial platform. Although I've never seen the inside of this goody, if it is similar to the Honeywell laser platform, the concept replaces the conventional spinning gyro with something that looks like the main power secret in the time-warp DeLorean in the movie *Back to the Future*. A laser is trapped in a small race track which is attached to the airframe. As the airframe moves, the laser has to travel longer and shorter distances to make it around the track. The phase shifts that occur are measured and that tells the computers how much and in what direction the airplane moved. And we thought Buck Rogers was futuristic.

The really nice thing about a laser-based guidance system is that it comes on line in 22 seconds as opposed to the 5 to 10 minutes for conventional systems. When this is combined with the ability of the GE F404-GE-100 engine (same as used in the F-18) to light off in 5 seconds and be ready to go in 30 seconds, you have an airplane that can go from cold to off the ground in less than a minute. From the time somebody hollers "scramble" to being at 32,000 feet chasing MiGs takes less than 2½ minutes!

If you really want to deal in amazing numbers, how about an initial rate of climb of 53,800 feet per minute? That's 600 mph *straight up*!

Of course, once you get where you're going in the F-20, you have to remember that the primary mission is to deliver some ordnance on some fool who wants to deliver some ordnance on you. In this game it's "first come, first served" and the F-20 does its best to be the first with the most. It has seven store stations that can handle more than 9,000 pounds of external ordnance and fuel in addition to its two on-board 20-mm cannons (450 rounds). It can deliver AIM-7F radar-guided Sparrows, the tried-and-true AIM-9 Sidewinder, the Maverick, and the old-fashioned 2.75 folding fin rockets we've used since WW II. It can mount a 30-mm gun pod and become a tank killer or carry the Harpoon air-to-sea missile when it wants to take on ships. Yes sir, just your basic hired gun that will take on any job.

If the F-20 has a drawback, it's that most of us will never get a chance to fly one. But, we still have our daydreams. ■

(Continued from page 51)

anywhere, including large backyards and gymnasiums.

Despite the Tantrum's small size, the fuselage is large enough to easily hold two standard size servos and receiver, but a 100-mAh battery pack is recommended to help save weight.

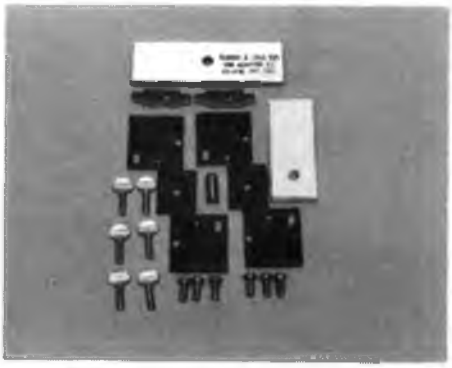
The kit includes all the necessary hardware, full-size plans, complete building instructions with plenty of assembly photos, and precisely machine-cut and sanded parts (no die-cut parts) that fit where they are supposed to.

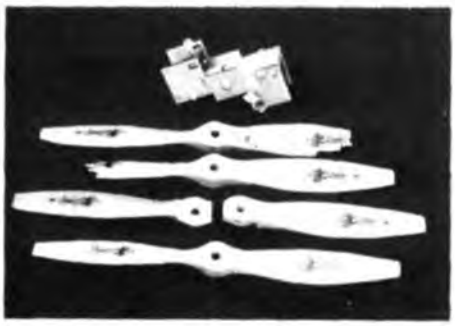
The following summarizes the Tantrum specs: wingspan, 42 inches; wing area, 210 square inches (1.458 feet); wing loading, 6 to 7 ounces per square foot (ready to fly); airfoil, the ultra-efficient S4061-096-84; aspect ratio, 8.4; overall length, 27 inches.

Off the Ground Models also displayed two new products, the Prodigy, a 2-meter sailplane utilizing carbon fiber reinforced spruce wing spars and, like the Tantrum, no die-cut parts. The specs are: wingspan, 78½ inches; wing area, 508 square inches; weight, 26-30 ounces (ready to fly); wing loading, 7.3-8.5 ounces per square foot; airfoil, S4061-096-84; aspect ratio, 12.1/1; overall length, 37.5 inches; radio, 2-3 channels.

Ultra Foam was the other new item shown by Off the Ground Models. This material is very lightweight, fuel- and water-proof, and provides very good impact and vibration protection. It's perfect for those narrow sailplane fuselages and I've used it for receiver protection in several off-road racing cars. Measuring 1/16-inch thick, it comes in a 2x3 foot sheet. I recommend it.

Another product seen at Chicago was the Calico Miniatures* sanding table used in conjunction with a Dremel scroll saw sanding disc. To use, place the sanding table under the scroll saw base lip in front of the power takeoff. Select the sandpaper, affix it to the 3-inch disc, and you're ready to sand.





Eldon J. Lind has a new product called the Prop Saver. See text.

Several other products have crossed my desk recently. First was a batch of goodies from the Hunter Brothers of Satellite City*/Hot Stuff fame. Included were Hot Stuff Super T for gap filling, two different size kick-it pump spray accelerators, and Ultra-Super Solvent which works like gang-busters.

Rounding out the column this month is a new product from the prolific mind of Eldon Lind of E.J. Lind Company*. His latest product, the Prop Saver, is something we all should have thought about many years ago. I can't tell you the number of broken wooden props I've thrown away, but with Eldon's new jig, you can rejoin your broken props as long as you have two broken ends of the same brand and prop size. For example, if you have two broken ends of an 11x7 Zinger prop, you can rejoin them with Eldon's jig, which can aid you in cutting and rejoining the two prop halves. I think the accompanying pictures portray the process better than words, but suffice it to say that the mating prop halves must be spliced around the center shaft hole, with half of each prop hub cut away to mate the hubs, which are then epoxied together and clamped in place for true pitch. After the epoxy dries, the prop should be trimmed to remove excess epoxy and then balanced in the usual way to make sure the prop is ready for use. If you break as many props as I do, the E.J. Lind Prop Saver is a good buy.

Charlie Kenney, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

J'Tec, 164 School Street, Daly City, CA 94014.

Great Planes Model Mfg. Co., P.O. Box 721, Urbana, IL 61801.

Zimpro Marketing, P.O. Box 3076, Oak Ridge, TN 37830.

Off the Ground Models Inc., 606 W. Anthony Dr., Urbana, IL 61801.

Calico Miniatures, 8825 Juniper Ct., Orland Park, IL 60462.

Satellite City, P.O. Box 836, Simi, CA 93062.

Eldon. J. Lind Co., 1040 Clearwater Ct., Lake Havasu City, AZ 86403. ■

ABOUT ENGINES

(Continued from page 89)

went bellowing overhead every ten minutes or so, nobody nearby could possibly object to the puny sound of a half-hp-at-best model airplane engine.

But they did! We only used that field less than a dozen times before the cops came by during a flight test session and told us we couldn't fly there any more: too much noise...

The evidence seems plain to me. More than a million modelers running their motors in the spark ignition era caused insignificant annoyance to the public, because at low rpm their engine's sound wasn't particularly bothersome. But when the glowplug came along and boosted rpm into the 12,000-18,000 range, the higher-pitched racket became definitely disturbing. Even a ½A motor could upset the neighbors if it was turning 15,000 revs or more.

And nowadays it seems that just about everybody runs his two-cycle engines at high speeds. Most .40-powered R/C models I've seen lately use the same size props as I put on my .29s. Thus they make a lot more uproar, even muffled, than they should—and waste power besides. Their fast-spinning props merely churn the air at full throttle.

Sure, if you're flying a pylon racer or a U-Control speed job, you *need* high rpm. But 85% or more of us R/C fliers do almost all our flying with sport-type airplanes. With these, high speed is of no advantage. Engine *thrust* is always important; but we can get that just as well with big props turning slower. At the same time, we'll be making much less annoying racket.

I know that this is true, because I've been doing it myself for years. I live in a small town with a substantial number of elderly retired residents. In fact, there's a retirement home sixty yards from my house. I break-in my engines (in the slow, old-fashioned way) in my back yard regularly. And I never use a muffler when running in a new motor. I've had no complaints whatsoever about the noise I make, because I keep the rpm under 10,000 at all times.

More than that: I do most of my model flying right in town, from the high school athletic field or the college football stadium. I fly both U-Control and R/C, mostly with unmuffled engines. No one objects. People come to watch, ask questions—and sometimes to take a turn on the transmitter themselves. They do not call the police to come put a stop to all that awful racket. Why not? Because, one, I stay with .15 and smaller engines for my in-town flying; and, two, I use large enough propellers to insure that my motors never exceed 10,000 rpm. That means sizes such as 6x3 for a Cox Pee Wee, 7x3 on a Black Widow or a G-Mark .06, and 9x4 for an Enya .15 R/C.

Flying models near home is great fun! It's a lot more enjoyable for me to walk a few blocks with an airplane in one hand and a small flight box in the other on a summer evening; to fly for an hour or so from the soft, cool grass of the school athletic field; then to stroll homeward again—than it is to pack my stuff in the car and drive 14 miles to the reclaimed limestone quarry which is the area's R/C club's only available flying field, having been forced away from two much nicer sites by the neighbor's noise complaints.

Joe Wagner, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

Radio Control Ne

by ART SCHROEDER

IN RADIO CONTROL, as in much of life, competition keeps interest at a peak. Even on so-called "sport" or "Sunday" flight lines, competition is usually evident. Sometimes it will be the most spins or who can make the lowest inverted pass (a lot of airplanes have been lost to this "event"), but often the competition will be individual in nature—"Will my next flight be better than my last?"

Formal competition usually starts with club "fun-fly" events. All over the country, clubs stage picnics and concoct seemingly endless collections of unusual ways of selecting a winner (some of these events are more difficult than regular pattern or Formula 1). I've seen everything from doughnut drops to limbo to shortest takeoff/landing and everything in between. *Model Airplane News*' annual Aero Picnic and its two-minute maximum flight is a great example of fun-fly formalized competition.

And it's all great fun. Competition doesn't necessarily require high pressure and, regardless of type, leads to better personal modeling and flying.

Of course, more formal events such as pattern, formula racing, scale flying, soaring, and helicopter accelerate participant growth and also improve model design, engines, technique, and accessories.

Our competitive events cover *some* of the things airplanes are designed to do—maneuvering, speed, and time. This is along with realistic aircraft flying epitomized by scale, where little is left in flight operations that hasn't been explored.

One area of aircraft operation that hasn't often been seen in R/C competition is weight lifting. Years ago, small engine powered free flights competed in a PAA-Load event (so called because its original sponsor was Pan American Airways; whatever has happened to corporate sponsorship in model aviation—names such as PanAm and Plymouth have disappeared?) and it all resulted in some very interesting design approaches to improve a model's ability to lift weight.

A lovely project indeed and very intricate in its structure is this scratch-built Shorts SD3-30 by Ralph Pearson.

I think it would be fascinating to resurrect a payload event for R/C, perhaps with .15 power. Limitations on overall wing area would be needed, but such an event should otherwise be wide open as to bare weight, aircraft type, or cross sections. Flight rules could simply be "X" number of ounces lifted or "X" number of ounces lifted to a maximum flight time on limited engine run. Complexity could be added—do not rules always do this? How about points for weight, points for high speed over a closed course, points for slow flight over the same course, and spot landing?

The thought of playing with airfoils, aircraft shape and style, flaps, spoilers and other controls, engine operation (the diesel should do well), and flying techniques really charges me up. By the way, Andy Lennon's Crane would be an ideal departure point for such an event. If you've had any thoughts along these lines, let me know.

My competition fantasies are mine—what are yours? The old timer group has been flying antique and old timer free flights with R/C for time for years. I've never understood why modern free flights—original designs of today—haven't found an R/C home. I love free flight, I just can't chase them anymore, and would really enjoy a duration event that would require some new design thinking. Nostalgia is great, but we are living in 1986 and R/C designers could have a great deal to say about powered endurance.

Pearson with his latest creation got a taste of the full-scale version as well.

Competition is wonderful, it provides

fun, learning, and a definite challenge. Now that we can maneuver better than full-scale, now that we can go faster per c.i. than full-scale, now that we are more realistic than full-scale (that's a fairly pretentious statement but I've seen Byron's "Striking Back"!), let's learn competitively to lift more and fly longer than full-scale. Are there any ideas out there?

This Month's Better Mousetrap

Every so often, a designer develops an airplane that is destined to be a classic. Such an airplane has been designed by Claude McCullough and is found in a kit by Sig* called Kadet Senior.

Make no mistake, this is a new design that shows a great deal of thinking as to what is needed for beginners and those

The dream of all scale modelers is to fly in their own subject, a fact realized by Pearson courtesy of Alleghany Commuter Airlines.

who appreciate truly lightweight design for model airplanes. It is not simply an enlargement of the Sig Kadet, as fine a beginner's airplane as that may be.

Claude McCullough has spent a lifetime designing model airplanes that have given substantial pleasure to us all. And he has, over the years, learned a great deal about what is easy for beginners to build and fly. All of that knowledge is embodied in this kit.

If one had to define a beginner's

(Continued on page 120)

FOUR-CYCLE

(Continued from page 94)

Matador 60

Is there a new four-cycle engine on the horizon? Well yes, sort of. But this one is for those of you in Four-Cycle-Land who are *really* ambitious. And as you read further and think that I'm really getting carried away this month, remember guys like Forrest Edwards, who have designed and built their own four-cycle five-bangers. The Matador 60 isn't all that impossible for many of you.

Now that I've got your interest up, I can tell you that the Matador 60 is a roll-your-own 10cc four-stroke engine, described in the pages of *Radio Control Models & Electronics* magazine, published in England.

It's an all-bar-stock project, which, according to the description in the October and November issues, can be machined totally on a small lathe. The author, Derek Giles, mentions a Myford lathe, which is available in the U.S. I would imagine that something like the Unimat 5 would be ideal for this purpose. He does state that a mill makes some of the operations easier, but that one isn't absolutely necessary.

Anyway, full-size, fully-detailed construction drawings with all necessary dimensions are available for the paltry sum of £3.00, plus 50p for postage. They include recommendations as to materials used, the necessary bearings—in fact, it's all there, and all you need is a clear place for the shavings to fall.

You really didn't think that I was going to leave you hanging with those pounds and pence, did you? The price for the drawings in dollars is $4.50 and I would include a couple of extra bucks for Air Mail postage. It would also be convenient to have the complete original articles and they will probably furnish copies on request with any orders from the Colonies.

Order your drawings (RC1498) from the MAP Plans Service*.

Eloy Marez, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

MAP Plans Service, P.O. Box 35, Wolsey House, Wolsey Rd., Hemel, Hempstead, Herts, England HP2 4SS. ■

Knights of the Air

F-20 Tigershark

by TAM HUYNH

AH, YES! THIS HAS GOT TO BE one of the all-time best experiences in R/C modeling—flying your own jet, and especially a sexy jet! This is exactly what the Knights of the Air* F-20 Tigershark is all about. It is excitement and R/C modeling at its best!

If you are flying pattern or can master any of the smaller, faster models, you can fly a jet. The flying characteristics of this model are very similar to those of a pattern airplane. In fact, it will land slower with the leading edge slats and speed brakes down than most pattern jobs.

The full-size F-20 Tigershark, designed and manufactured by Northrop in California, is the world's most contemporary single-place combat fighter. It's designed to replace the current F-16 Falcon. Being more easily maintained at less cost than the F-16, it will be easier for any modern-day Air Force to equip and maintain themselves in today's world of high-cost defense equipment.

The model F-20, however, isn't competing with any F-16 and is just as easy to maintain and fly as any other comparable model on the market today. It's a big model, measuring a whopping 7-feet-plus long, and weighs in at 12 to 16 pounds, depending on the number of options you build into the model. The sleek lines and the lean, mean look of the ship make it one of the most exhilarating shapes in the sky! It's got to make your juices flow just looking at it.

Knights of the Air has done a magnificent job of rendering, in 1/6-scale, this terrific modern-day fighter. The entire kit is first class with very good workmanship throughout and incorporates some new technological advances for ducted-fan models. The most prominent of these are fuel tanks that fit in the wings! That's right, they're in the wings, just like full-size aircraft. This is a great advantage in keeping the fuel on the CG (center of gravity) at all times and allows the interior of the fuselage area to remain clear for a smooth flow of air to the fan unit. This makes for the best performance possible of a ducted-fan. The tanks hold enough fuel to run a Rossi .81 at full throttle for 15 minutes, and longer at a reduced throttle setting.

THE KIT. The kit is very complete and for the price is a good buy. Everything is there for you, including the balsa and other goodies such as retracts and functional oleo struts, the previously mentioned fuel tanks, all hardware, decals, and, of course, a beautiful fiberglass fuselage and foam wing and stab cores. The oleo struts work great, especially on a rough field, like the one I fly from. They take the punishment of a hard touchdown and smooth out any landing, even those on an asphalt runway. Another neat point is that the struts extend on takeoff, just like the full-size aircraft, to fit precisely inside the fuselage center section.

The model's powerplant is a Byron* fan unit and a Rossi .81 from Condor Hobbies*. This combination provides plenty of power for very realistic, modern jet-like operation. The best part of a scale modeling project is to see the finished model dashing off into the wild blue for an imaginary mission and flying by in a jet-blast of speed and glory. This is the ultimate in the R/C experience! It gives me goose bumps!

SPECIFICATIONS

Type: Sport scale
Scale: 1/6
Span: 52 inches
Length: 88 inches
Weight: 12 pounds
Engine: .81 with Byron fan unit

Jet fans, your call to glory is here in the form of a sleek, dynamic jet model that will let you pull out all the stops!

F-20 Tigershark

Clean and mean, when you get to this stage of construction on the kit, you'll hardly be able to wait to get it in the air.

CONSTRUCTION. To get there, though, you have to build the model. Any of you who have built a few models and are familiar with fiberglass and foam construction should have an easy time of it. The construction of the F-20 is straightforward. Originally, Knights of the Air had a cable system for controlling the movable flight surfaces, but they have now introduced another pushrod system. The pushrods are a little harder to install but, like the cables, help to insure a flutter-free operation. The choice is up to you and both work fine.

The wings and stabilizer are conventional foam core and are balsa covered. The fuel tanks are installed in the wing before sheeting, as are the retracts, and the two wings form a nice neat package when done, ready for installation to the fuselage. Two options are available for the wings, and these are the flaps and leading edge slats. I built both of them into my model for maximum lift of the wing to help me on takeoffs and landings. The slats and flaps created a great deal of lift, did just as I had expected, and helped to shorten the takeoff roll and slow the landing approaches down to a very easily managed slow crawl. The stabs are very straightforward to build and use a pivot rod and an actuating pin to form a two-point operation to prevent fluttering in high-speed flight. They are mounted to the fuselage with 4° of anhedral (downward slant), just like the full-size aircraft.

The speed brakes are another option and since I wanted the ultimate, I built these also. I found that they're very desirable for slowing the bird down and would be the best thing you could do if you're flying out of a small field. Since the fuel tanks are in the wings and out of the way, and the radio is tucked neatly, either up front when using the cable system or separated and placed in an out-of-the-way corner when using the pushrod system, the center of the fuselage is cavernous with plenty of room to work in. There is a ton of room for the tuned pipe and Rossi .81.

The manufacturer has designed the model to accommodate a full cockpit for the best scale realism. Knights of the Air informed me that they will very shortly

(Continued on page 117)

For speed the Fox is way

MRC-Tamiya

The Fox

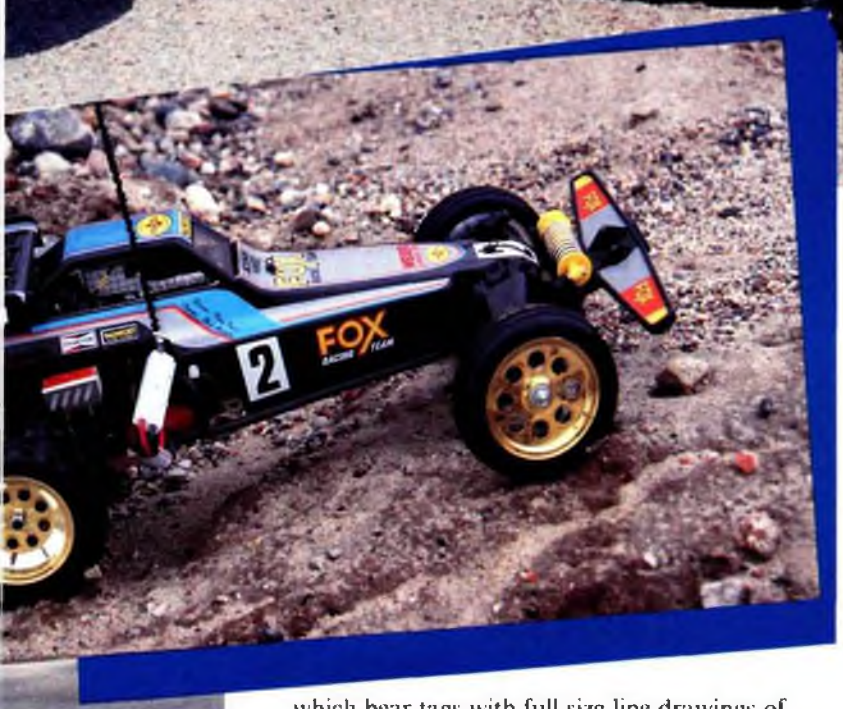
by DAVID TROST

IMAGINE A STOCK electric off-road buggy that can go 80 feet from a standing start in just 3.5 seconds. You might say that it's a fantasy, but Tamiya has produced just such a car. The Fox is the latest offering from the prolific designers at Tamiya and it's distributed by Model Rectifier Corporation*. They are so sure that the Fox is the fastest R/C buggy on the market that they've challenged other manufacturers to beat their claim. I have to admit that when I first received the Fox, I was a bit skeptical myself, but I'm not any more.

THE KIT. The Fox comes packed in a box with full-color drawings of the car. All parts are attractively arranged in bags or blister packs. The quality of the parts in this kit is outstanding. You never have to worry about parts not fitting in a Tamiya kit; it simply doesn't happen. The plastic trees are individually bagged to prevent damage during shipping. All small hardware is organized in bags

handling, and looks, ahead of the hounds!

photos by A. PALERMO and LOUIS V. DeFRANCESCO Jr.



which bear tags with full-size line drawings of each part.

The 20-page instruction booklet is one of the best I've ever seen. It contains a list of all the tools and equipment needed to complete the car, the assembly steps, and a nice section on troubleshooting any problems that might arise. The manual breaks the assembly down into 38 steps, each fully illustrated and more than adequately documented.

There's really no need for me to go through the step-by-step assembly of the Fox because the manual is so good. What I *will* do is describe in some depth the features of the car.

The basic chassis is composed of two plastic shells which completely enclose the radio gear. The radio gear is installed very early in construction and the two chassis pieces are screwed together. This assembly forms the backbone of the car and all other assemblies are added to it during construction. This arrangement makes for a strong, water- and dust-proof radio box/chassis, but it also makes it difficult to get to the radio gear when it needs service or adjustment, since a fair portion of the car must be disassembled to reopen the radio box. There are rubber seals on the switch, the steering arm, and the wire entering and exiting the radio box to protect the radio from the elements.

The radio I used for this review was the ACOMS Techniplus two-channel radio-control system from Altech Marketing*. It has a basic two-stick, dry-cell transmitter which feels good in the hands. The stick assemblies are smooth and the servo response is very linear. The receiver is small and will fit into any car with ease.

The servos are standard size and feature tough gears and a water-resistant case, making them well-suited for R/C buggies. The servos

(Continued on page 80)

The slower you roll, the harder they are to do.

article and photos by BUDD DAVISSON

The Slow Roll

A roll is a roll... or is it?

THE GAP BETWEEN little airplanes and big ones is getting narrower. You know it's narrow when we have models in the 12- to 15-foot range and full-scale birds like the Pitts Specials that only measure 17 feet.

As the size difference disappears, so does the difference in flight characteristics. We now have a generation of models that possess exactly the same good and bad points their bigger brothers exhibit. For that reason, the techniques in flying the models are beginning to have much more in common with full-scale piloting techniques than many modelers (or pilots) would believe. And nowhere is this more true than in aerobatics.

Probably the only real differences between doing aerobatics in a ¼-scale Great Lakes, for instance, and the full-size one are that the model has much more power, the driver's point of view is different, and you don't have to keep a barf bag secreted away in a shirt pocket. Otherwise the same aerodynamic principles apply, which means the modeler and the pilot have exactly the same problems in physics to contend with and must use exactly the same control inputs. Oh yeah, one other thing is different when flying models—screwing up isn't nearly as painful.

Doing an aerobatic maneuver and doing it right is just as difficult in a model as it is in the full-size machine, and the famous (or infamous, depending on whether you've mastered it) slow roll is a case in point.

The slow roll combines every nuance aerobatics has to offer and doing it correctly ain't easy. However, doing it in a mediocre fashion is dead easy. But then, who wants to be mediocre?

First, it's important to know what separated the slow roll from its other nausea-inducing cousins, the aileron, barrel, and snap rolls. We'll ignore the snap roll since it has nothing in common with the rest because it's a stalled maneuver that is essentially a spin in a horizontal direction. The difference between the other three is basically how you orient the

One of the most difficult maneuvers in full-scale and modeling, the slow roll gets frantic going past the 180° point.

The Slow Roll

maneuver in relation to a reference point.

In doing all aerobatics, and I do mean *all* aerobatics, you absolutely must relate each maneuver to a given reference point. Maybe it's a cardinal heading, like north, or maybe you're headed toward a church steeple. It makes no difference what you use as a reference, so long as you have one that you can use to judge how well you are doing the maneuver. Also, as you'll see, it's the reference point and how you use it that spells the difference between a slow roll, an aileron roll, and a barrel roll.

Boiled down to basics, when doing a barrel roll, you are rolling around a point; describing a "barrel" in the sky. The aileron roll entails picking a point over the horizon, putting your nose on it, and then letting the nose slide down to the horizon in the course of doing the roll. Aileron and rudder into the roll are used and the nose is dropped in such a way that the airplane always has positive "G" on it.

And then there is the slow roll. This bugger is tough because you pick a point slightly above the horizon and then keep the nose on it during the entire maneuver. That means, if you are in a full-size airplane, you are hanging from your full-size seat belt part of the time, and your full-size lunch is very close to the back of your throat. Sitting there with a transmitter in your lap isn't likely to cause a technicolor yawn, but in many ways the maneuver is even harder because you aren't looking through the windshield.

To hold your nose on the reference point, you have to be aware of several things happening at the same time. The first is that an airplane that's in a 90-degree bank wants to turn because the wings are lifting 90 degrees to the flight path. The second is that in a 90-degree bank there is nothing to keep the nose from sliding down except the rudder.

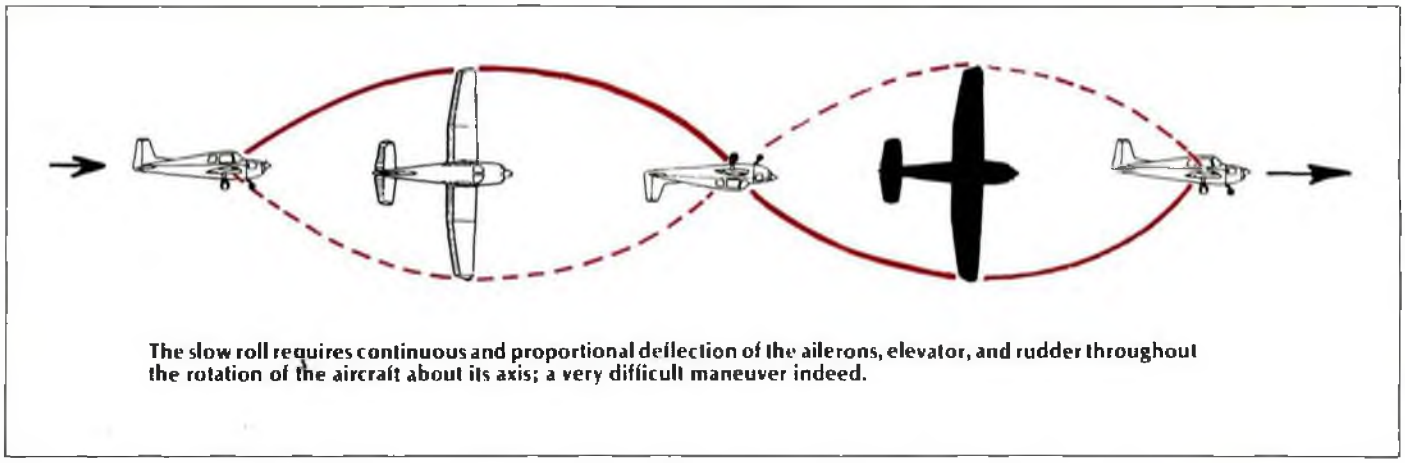
The third thing to remember is that part of the time the airplane is inverted, which means that even though the lift is being generated from the "wrong" side of the wing, the adverse yaw still wants to pull the nose in the opposite direction you are rolling, or to the outside of the roll. When starting a left turn (or roll), the adverse yaw caused by the outboard aileron increasing lift (and drag) on the *right* wing must be compensated by *left* rudder. For the same thing to happen, when the wing is inverted and lifting in the "other" direction, the controls must be crossed, i.e., *left* aileron is still needed to keep the roll moving but *right* rudder cancels out adverse yaw and keeps the nose on the point. If you keep left rudder in all the way around and make the airplane go negative by keeping the nose on the point, you'll see the spinner slewing left (left from the pilot's inverted point of view, right as seen from the transmitter) as soon as the airplane goes inverted.

Okay, those are the basic problems, now let's talk our way through a left-hand slow roll. We'll talk about the progress of the roll in terms of degrees, i.e., 90 degrees is knife-edge left, 180 degrees is flat inverted, and 270 degrees is knife-edge right.

(I hope someone is taking notes, so they can explain this to me later.)

We'll start the roll just like a left turn, left rudder, left aileron. As the wings approach a 90-degree bank, there's a tendency for the nose to start to move left and down. In that position, with the rudder parallel to the horizon, and the elevator at right angles to it, there is a shift in control functions. The rudder acts like an elevator to keep the nose up and the elevator acts like a rudder to control the right and left movement of the nose.

From the pilot's point of view, nothing really changes, but from the transmitter's view, it does appear as if there is a change in functions, but only at the 90- and 270-degree points. It's the 90- and 270-degree points that give everybody fits. You need just a skosh of "top" rudder to keep the nose up at both points and an equal amount of forward stick is called for to keep the nose from turning.



The slow roll requires continuous and proportional deflection of the ailerons, elevator, and rudder throughout the rotation of the aircraft about its axis; a very difficult maneuver indeed.

As you progress past 90 degrees you've ventured into the land of "negative" G. The airplane is inverted; "up" and "down," "right" and "left" have changed, at least as far as the airplane is concerned. You'll need a touch of forward stick to keep the nose from falling and that right rudder you are holding at 90 degrees as "top" rudder continues because it's needed to fight adverse yaw.

As you approach 180 degrees, the inverted position, you're hanging in there with more forward stick, and left aileron, but the right rudder has increased just a little as the negative G builds to exactly 1G.

Now comes the really tough part: going from 180 degrees inverted, to about 260 degrees, just past the right

(Continued on page 113)

National Warplane Museum

An American Treasure Found in the Foothills of New York.

by JIM GRAY

IF YOU ARE EVER IN western New York State, plan to visit the village of Geneseo, about an hour south of Rochester. It's a sleepy little college town nestled among the rolling hills and broad valleys of western New York—scarcely different now than it was when W. Austin Wadsworth's ancestors settled there shortly after the American Revolution. They loved the land, farmed it, raised children and horses, got involved with their friends and neighbors in local government, and stayed.

Austin inherited some of this valley not too long ago and made an airport—not all by himself of course, but with the help and interest of others who also liked to fly and needed a home for their planes.

I recalled having heard that there was a small airfield near Geneseo that hosted some military aircraft, but this seemed highly unlikely, as I had driven through and past the town for many years without ever hearing or seeing anything resembling an airport, much less a military aircraft museum. Nevertheless, being a bit early for an appointment, my wife Peggy and I stopped at a gas station and asked about the rumored airport.

We got directions and continued on our way and soon spotted some small buildings at the side of a broad, flat field, and in the distance, what appeared to be a double line of aircraft parked in front of one of the buildings. Too far away to determine what it might be, I thought there was something very familiar about one of these planes. It stirred a long-forgotten memory.

"Success!" I shouted to Peggy, who had been my faithful companion for three decades of airport antics. "Look, there are some planes!"

"Not unusual for an airport," she

Right, the Vultee BT-13 was for intermediate to advanced pilot training. It had a fixed landing gear and a 450-hp engine.

Left, Craig Smith prepares to mount his PT-19 for another flight.

Right, the 1941 Airshow at NWM featured the Grumman Avenger Torpedo Bomber of WW II fame. This one made by General Motors under contract with Grumman.

Left, Canadian Warplane Heritage owns this beautiful FG-1D Corsair built by Goodyear Tire & Rubber Company.

remarked dryly, tempering my loud enthusiasm with matter-of-fact logic. Peggy was used to these outbursts of enthusiasm, and had even managed to suffer through a whirlwind courtship in a war-surplus PT-19 open-cockpit trainer that I acquired before owning an automobile.

We pulled up and parked near a hangar situated at the edge of a neatly-mowed lawn, and as we got out of the car, I could see a familiar shape just inside the partly-opened hangar door. Yellow wings, blue fuselage, wide stance, open cockpits, and a varnished wooden propeller.

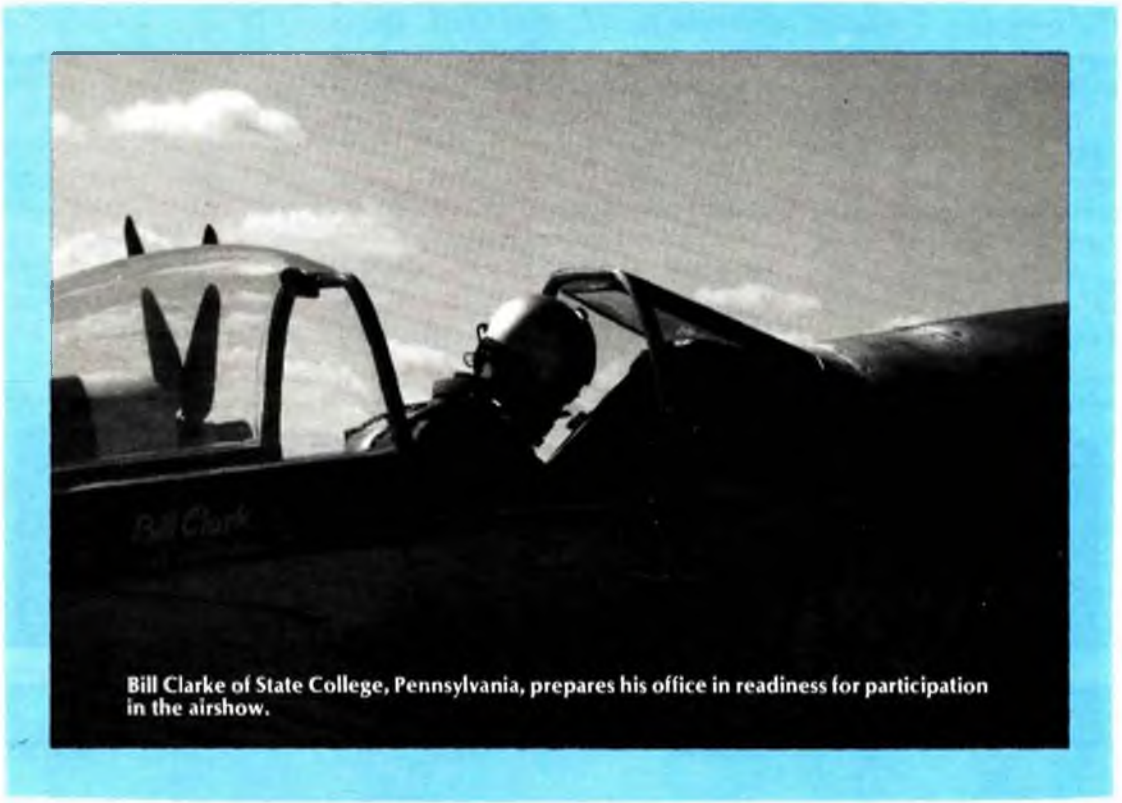
"Isn't that our old PT-19, Jim? It looks just like it!"

Memories came flooding back in that instant: the feel of the wind, the roar of the Ranger in-line engine, and the view of Peggy's helmeted and goggled head in the rear-view mirror that perched atop my windshield.

with yellow wings and blue fuselage, sat a Taylorcraft tandem two-seater, called an L-2 by the military and used in dual roles of liaison machine and trainer of new pilots. I had seen one of these, once, dressed like this with large yellow numbers standing out against the blue flanks just ahead of the tail. Later, I had even flown a rented civilian version from a small airport in Pennsylvania. Before me now sat an anachronism — ready to spring into vivid life.

Coming toward us, around the tail of an equally beautiful and properly restored J-3 Piper Cub, were two men animatedly talking and gesticulating at the L-2.

"She'll be ready soon. All I have to do is find out whether the roundels and the stars were on the tops and bottoms of both wings or on the top of one and the bottom of the other, so I can finish painting."



Bill Clarke of State College, Pennsylvania, prepares his office in readiness for participation in the airshow.

"Remember?"

"How can I ever forget?"

"Let's go in and look around."

We hadn't seen anyone yet, but in the dim recesses of the hangar, behind the PT-19, a small, blue-shirted figure with greasy hands was probing the innards of a familiar-looking piece of machinery that had obviously been removed from a Fairchild.

"Okay if we look around for a few minutes?"

"Sure, no problem. C'mon in."

We ducked around the wing tip, passed a few bits and pieces of the airplane scattered on the floor, confronted a BT-13 basic trainer in a state of "annual inspection," and passed into an adjoining hangar. By this time, my mind was boggling, but quite prepared by a sense of keen anticipation for whatever might next appear out of the past. There, in her pristine-like newness,

"Sure is a beauty. Is she yours?" I asked.

"Yep, she's mine. Just finishing her up to fly. Never flown one before, but gotta get some good info about the markings. I've been trying to restore it as close to the original as possible, and don't want to let her out until she's properly dressed. Don't know anything about the insignia, do you?"

"Well, I've flown one like her, and even saw a couple in maybe '41 or '42 decked out the same way, but can't remember how the stars were placed on the wings. Might have been top left and bottom right."

"Nope, I don't think so; from what I've been able to find out from a guy who actually flew one, they had stars top and bottom of both wings."

"Name's Jim Gray. I have some friends who might know. I'll ask them."

"Thanks. I'm Bob Flesch. If you can find out anything about

(Continued on page 114)

F&B: VIOLETT SHARK

(Continued from page 47)

of work, which is also very light, and hatches are even offered as separate pieces to save the builder countless hours of cutting and fitting. All inlets, inlet lips, and the tail pipe are epoxy-molded for a "Full Flow" design. No cheater holes in this baby!

The wings are even set up for retracts. Just bolt a set of Rhom's or B&D's gear in it, and in minutes the installation is complete.

Okay, you say you've heard of ARFs before, so what makes this one special? Well, there are a lot of innovative devices and doo-dads incorporated in the design of the Sport Shark. Take the retract mounts, for instance; they're mounted on a special carbon fiber "Flex Plate" to withstand any landings you can throw at them. These Flex Plates are in turn mounted internally to very tough carbon fiber blade spars.

Wing flaps and strakes are completely engineered and built for you. These leading edge strakes and trailing edge flaps are what give the Sport Shark its wide performance envelope. Both contribute to its stable attitude at slow speeds. The flaps are especially neat because the builder simply hooks them up to a servo. All the rotten, tough stuff has already been done at the factory. The wing and stab alignment is absolutely insured because the alignment recesses are already molded in. Servos are mounted on a carbon fiber tray (provided), a unique new product from the Magnalite Division of Bob Violett Models.

There's even a slick "saddle bag" type of fuel cell system included for a real special touch. Other special touches include some very neat injection-molded parts designed to make our lives a lot easier. For instance, there's a hatch attach group, a cowl keeper group, and even a tuned pipe mount. All these parts are molded from a lightweight but strong material for the Sport Shark. There's much more to talk about, but I suggest you drop an SASE to Bob Violett Models at the address listed at the end of this article for a more in-depth look at the Sport Shark and the Viojett.

Oh yeah, I almost forgot! The Shark is 63 inches long and has a compact 53-inch wingspan with an area a hair over 630 square inches. If you're real sloppy, you might get it to weigh 10½ pounds, but 9½ to 10 pounds is more the average. It's set up to use only the Viojett propulsion system, so keep this in mind.

The Viojett power unit for the Sport Shark is another neat item available from Bob Violett Models. It's a finely-tuned, precisely-engineered piece of equipment that certainly lights a fire under the Sport Shark's tail feathers! This ducted-fan deviates from many "sacred cow" ideas formed years ago in reference to design parameters for an ultimate ducted-fan unit. Bob's Viojett features an outside diameter of only 4.8 inches, yet allows absorption of 3 to 4 horsepower at a realistic and obtainable 21,000 to 23,000 rpm. Again, the brochure will explain it in further detail than I have room for, but let me say that the design is extremely compact and very well thought out.

The one I saw fly was powered by a KBV .72 but Bob offers the unit pre-set up for Rossi and O.S. engines as well. However, this KBV .72 is made right here in the U.S. to Bob Violett's specs for his Viojett unit and it really puts out some horsepower. It features a special carb, as well as many other parts that make it a true ducted-fan engine. A different shaft and bearings, as well as a few new design features, provide a power-

plant that will stay together for a long time at high rpm. In other words, you won't have pieces falling off the engine every couple of flights or so.

The fan unit is not a kit. All assembling and balancing is done at the factory and the modeler simply attaches a couple of fairings to help smooth out the airflow. A nice feature is the new shock-mounted engine bearers. I noticed no vibration whatsoever at any throttle setting, and you're gonna love the remote needle-valve.

FLYING. The Sport Shark I flew was Bob's No. 4 prototype, the one on which the final version is based. He thoughtfully changed the radio to a Mode II system for me the weekend we went to see the Epcot Center, and I had a great time (both at Epcot and at the flying field).

The Sport Shark is really a neat airplane. Yes, it's very, very fast, but speed doesn't impress me so much after a few hot passes. What impressed me was the general stable attitude exhibited at all levels of speed. This ship flies like a true sport airplane. Slow flight has to be seen to be believed. It turns awfully tight if you want it to, and has good control right down to walking speed. When throttled up it will literally power through as many large loops as you care to throw at it. It's completely aerobatic, yet docile and simple enough for anyone who can fly a four-channel low-wing sport ship. The flaps add a nice touch and help considerably if you've got a field with rather short approaches.

Oh yes, for you real hot-rods, I'd say that the Shark was airborne in about 85 feet or so, starting from a standing stop at idle. And to answer your next question, yes, it will take off from grass, but because the wheels are only 2¼ inches in diameter, the grass had better be on the trimmed side. All the power in the world ain't gonna drag the Sport Shark through a swamp!

I couldn't even venture a guess at the thrust/weight ratio of the aircraft I flew, but it must have been somewhere close to 7 crotons per molescupe. That probably approaches a 1:1 ratio here on earth. On the other hand I realized what an excellent engine-out glide the Shark has because I ran it out of fuel twice! This is not your typical streamlined concrete block. This sucker really glides! After making the field, I just dropped the flaps and the ship settled in for a real nice landing.

Clean-up involves a couple of swipes with a cloth, because there's just no residue anywhere on the airplane. Even the tailpipe was clean. Another few seconds to undo the four wing hold-down bolts and the Sport Shark wing is off in a jiffy for easy transportation. Yes, that's right, it's a two-piece airplane.

So there you are. This is not really a kit review because there ain't much to build! Let's call it a "product review" instead. As the brochure says, it's "a significant step into the fan jet future." The Sport Shark is truly a sport machine and the Viojett definitely offers jet performance. Together they offer a rare combination of beauty, finesse, and brutality—because one thing's for sure, this is one brutal son of a gun.

**The following is the address of the company mentioned in this article:*

Bob Violett Models, 1373 Citrus Rd. H, Winter Springs, FL 32708. ■

INSIDE TRACK

(Continued from page 99)

Draw pencil lines where the masking will be cut away for the first color shot. You'll want to shoot the darkest colors first because a lighter color will not bleed through a darker color. If the lighter color is shot first, your white paint might

come out looking like any other color except white.

After drawing the cut lines, go ahead and get a coke or a cup of coffee. When you come back, take a good look and see if this is the body you want. Often, taking a small break and then coming back to the project will reveal small faults which you can see more easily with a fresh eye.

Once you're satisfied with the cut lines, go ahead and cut them and remove the masking for the areas to be shot first.

As there are a number of different types of paint that can be used, and the methods of their use also differ, I won't go into the paint preparation. You can follow the manufacturer's instructions for that. Let's assume you've decided to spray paint the model. Like any other painted surface, the paint will react in certain ways to the plastic. As plastic doesn't breathe and isn't really porous, the paint will stay on the surface only. Spray the first coat of paint lightly and from a distance of about 18 to 20 inches. If you're afraid of overspray on the outside of the body, you might want to quickly mask off the outside. Just before you make the first pass with the spray

gun, press down the masking tape one more time for insurance. Spray the paint lightly and evenly, and let it dry for 10 to 15 minutes.

You can now apply a second or a third coat, again allowing 10 to 15 minutes between each coat. You'll find that your light coats of paint are building up quite nicely, and the third coat will normally be enough. Check your coverage by holding the body up to a good source of light and viewing it from the inside. Any light spots will readily appear. Reshoot these spots.

One of the tricks to getting a clean line is to remove the masking as soon as possible. The longer wet paint stays around the masking, the better its chances of seeping under the tape. When removing the tape, always peel it back onto itself or toward the painted areas. This way, if any cobwebs form, they will lay back onto the painted rather than the unpainted portions. Work carefully and watch your fingers. There's nothing more aggravating than sticking your own finger in the paint.

You should now have a half-painted car. Great. Now set the body aside to dry completely and come back tomorrow.

The remainder of the painting job should go pretty much like the first part, except that you won't have to mask off any areas already painted, just spray right over them and there shouldn't be any bleed-through. Once the painting is complete, touch up any flaws and dress up the beast with sponsor stickers, pin stripes, and a driver. Pin stripes have a nice way of really making the colors stand out, and they should last at least as long as the body in hard racing.

That's it! You are now the proud owner of a new custom-painted body ready to fit to your favorite road burner. You'll find that even though you frosted over the entire inside of the car when you sanded it, the outside is as glossy as it was when it come out of the box. With a little practice, the chore of body painting can really go fast. Try this method some day. Who knows, you may be the guy painting everybody else's bodies after they see yours.

Mini-Mini Road Racers

Sometimes, you get that urge to run a car but you really don't feel like heading out to the track across town. To solve this problem, Parma International has a neat little hod rod called the Cheetah. This pocket-size racer is a 1/8-scale road car that uses a 6-cell half-sub AA pack, mini servos, a mini resistor speed con-

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have fairly good centering, torque, and speed. The Fox is set up to run the radio off of the motor battery through a voltage step-down circuit. This circuit replaces the radio battery case and switch, and plugs directly into the motor speed controller. The battery eliminator isn't included in the kit and must be purchased separately. It's available with connectors to fit most major brand radios.

The ACOMS radio fit perfectly in the Fox. I usually find radio installation one of the most annoying jobs in building a car. I don't like having to fiddle with servo arm lengths, positions, and linkage adjustments. However, the design of the Fox is so well thought out and the instructions are so complete that no trial and erroring is needed. All the necessary information is provided to make radio installation a 15-minute job.

The front suspension is a double wishbone type utilizing a single spring coil-over oil dampener unit connected to both of the lower front suspension arms. The dampener is fully adjustable. Three differently baffled pistons are provided, allowing a choice of shock characteristics. Spring spacers are also provided to stiffen the suspension. The steering tie-rods attach directly to the servo through a servo saver. No bellcranks are used, ensuring a minimum of play in the steering setup. Several different servo saver wheels are provided to fit most of the major brand servos. One nice feature of the Fox is that a reverse servo isn't required for steering. That's nice if your radio doesn't have reversing switches, since most radios come with only normal rotation servos.

New AC/DC Quick Charger from MRC can even be used from your car's cigarette lighter. Was very dependable.

Rear end assembly (right) and damper suspension are truly state-of-the-art technology. Below, chassis assembly was straightforward and proved to be quite durable.

The front tires are a straight-ribbed, low-profile semi-pneumatic type. They spin very freely on metal axles with plastic bushings. Ball bearings are available as an option.

The gearbox housing not only encloses the drive system but it also forms the center structure of the rear suspension. The differential and drive gears are made of reinforced nylon. Eight ball bearings are used to support the flexible rear drive shafts and the drive gears. The rear flexible drive shafts came pre-assembled and incorporate rubber dust boots to protect the joints. The motor provided in the kit is the industry standard RS-540S. Other motors are available from Tamiya. Two pinion gears (15- and 18-tooth) are provided.

The rear suspension is also a wishbone configuration. However, it utilizes a coil-over dampener on each wheel. The dampener mounting tower is made of fiberglass for stiffness. The rear tires are a low-profile, oval block tread design.

The battery used for this review was a Tamiya racing pack. This is a 6-cell, 7.2-volt pack which is wired in two, 3-cell rows. This car will also accept a 6-cell "hump" pack. The battery pack is easily changed through a hinged door support from the bottom of the car.

The charger I used was the MRC Quick Charger RB-465. It's a timer-regulated quick charger which can be

operated from a 12-volt battery or a 110-volt house current. It charges only 7.2-volt 6-cell batteries. Charge time is 15 minutes. The charger also incorporates a discharge circuit to ensure safe charging of an unknown pack and to determine the capacity of a battery. The RB-465 can also serve as a trickle charger to maintain batteries at peak charge until they are needed. I found this charger easy to use and its dual voltage capacity was much appreciated.

The Fox goes together so easily that the basic construction took less than 6 hours from the time the box was opened until it was running in the street.

All that remained was to cut out the polycarbonate body, paint it, and add the decals. I used Tamiya's paint specially formulated for polycarbonate resin. It adheres well, comes in many different colors, and when wet cleans up with soap and water. When it dries, the paint becomes waterproof, but it stays flexible enough so that it doesn't crack when the car gets bounced around. Tamiya provides a very nice set of pressure-sensitive decals to add the finishing touches to the Fox.

PERFORMANCE. Now I come to the most important part of the review: how does the Fox run? Well to make it short, the Fox lives up to Tamiya's claim. It may very well be the fastest totally stock car on the market, and with the addition of optional ball bearings and a modified motor, the Fox will be a real terror on the track. It handles well on smooth ground, and holds a very straight line over rough terrain. Its suspension absorbs 1-foot jumps without a wimper and it has a very low CG, so the inner wheels stay planted on the ground even on very high-speed cornering. The Fox may be the best-handling buggy I've ever driven. It goes where you point it and it goes there fast.

The Fox is an excellent kit which builds into a great buggy. So get one; you won't be disappointed.

**The following are the addresses of the companies mentioned in this article:*

Model Rectifier Corporation, 2500 Woodbridge Ave., Edison, NJ 08817.

Altech Marketing, P.O. Box 286, Fords, NJ 08863. ■

GOLDEN AGE OF R/C

(Continued from page 46)

Tom reports that the newer members of his Midwest Sundowners club consider his experience ancient history. Yet, when he takes an OTer to the field, the considerable interest is apparent. The onlookers are fascinated at seeing a model perform with only rudder control, the thought being that flight could not be so majestic with such a simple R/C system!

Tom has just completed a Live Wire Custom bipe, and I wish I knew the formula that makes this one so attractive to the OT activity.

Hal "Pappy" deBolt, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

INSIDE TRACK

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troller with wiper, and Lexan chassis and body. The car is perfect for indoor carpet and shopping mall and garage short track racing. They are plenty fast enough to challenge the reflexes and the Lexan chassis will withstand tons of abuse. There could be a whole new racing class coming with this one. See the guys at Parma for more info.

That's about it for this pit stop. I had a real good time at the R/C Speed Week race in Las Vegas, and a full race report is available in the Spring '86 issue of our exclusive car publication, *Radio Control Car Action*. To get this great magazine, credit card holders can call toll-free 1-800-243-6685. One year of this quarterly publication is $9.95, two years is $17.95. You can also fill out the coupon elsewhere in this issue and send it in with your check or money order. I hope to see you there.

Drop me a line and let me know what kind of action is happening in your area. I may even feature your race right here in "Inside Track."

'Til then, foot to the floor and happy motoring.

Mike Lee, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Parma International, Inc., 13927 Progress Parkway, N. Royalton, OH 44133.

Polk's Modelcraft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304.

Model Racing Products, 18676 142nd Ave. NE, Woodinville, WA 98072. ■

ENGINE REVIEW

(Continued from page 33)

conrod eye and the piston bosses, when assembled.

The piston has a nominal head thickness of 4 mm and a height of 30.6 mm, the skirt having rectangular cutouts, fore and aft, to avoid masking the bypass passage entries. A single compression ring is used, vertically pinned to prevent the ring gap from rotating into the ports. The wristpin is tubular, with an 8.0 mm o.d. and is closely fitted to the bosses, where axial movement is contained by wire snap rings.

The connecting-rod is machined from high duty bar stock aluminum alloy and is 52 mm (1.73 x stroke) between centers. Both rod eyes have bronze bushed bearings: 9.5 mm wide with one oil hole at the

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Giant Steps

by DICK PHILLIPS

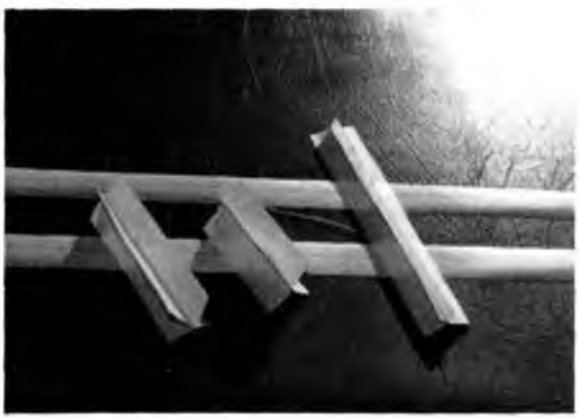
THIS MONTH I'm going to talk a little more about control installation in large models; specifically, hinging control surfaces and pushrods for larger models. While an adequate number of commercial nylon hinges will provide secure hinges for larger models, I've come up with a method of making my own hinges, which works well, provides practically no resistance to control movement, and also closes the usual hinge gap completely.

I make my own hinges by sewing strips of Coverite* together with the adhesive surfaces facing one another. These may be made in any convenient length and then cut to the sizes required by the particular installation. Do the sewing of the strips on a standard sewing machine, using the smallest stitch possible.

First, cut strips of Coverite to the appropriate width. I usually make these wide enough to cover the wooden edges of the surfaces being hinged. In other words, if the material used at the edge of the surfaces being hinged is ½ inch, I'll make the strips wide enough to cover the edge from the centerline of the hinge to the edge of the wood on both sides; in my example, a little over 1 inch. Next mark each of the two strips required with a line down the center to aid in keeping them aligned and to help in sewing a straight line. Sew the two strips together along the centerline, with the adhesive sides of the Coverite facing inward toward one another.

Once sewn together, the preparation of the hinge is complete and it's then just a matter of applying it properly to the surfaces of the two parts being hinged. The parts are completely covered, although not painted, when this is done. A coating of Balsarite applied to the areas where the hinge will seal will make a very good joint, although the Balsarite should be applied sparingly.

Super Coverite works for hinges even on giant models. These two strips will be sewn together.



Sections of sewn hinge in various sizes.

You can trim the ends of the hinge (see photos) in order to make an attractive and neat-looking job, or to match the edges of the surface(s) being hinged. Once sealed in place, these hinges have tremendous strength, are practically invisible after painting, and the usual gap between the surfaces is completely eliminated, which will make most control surfaces more effective than if there is a gap which permits air to flow between them.

The parts can then be painted as usual and hinged in place, and the hinges will almost disappear as they are painted. Take care to avoid a heavy buildup of paint between the surfaces being painted, as this buildup could crack as the hinge is operated, creating unsightly paint cracks in the hinge line. A careful application of several light coats will avoid this sort of thing. (The use of "flexibilizer" or "plasticizer" in the paint will also help, which is a good idea in any paint being applied over fabric.)

The pushrods used to transfer movement from servos to control surfaces in

Finished Z-bend is hard to do correctly with a pair of pliers.

Arrow points to end of wire connector trapped by hole in arrow shaft.

large models need some attention as well. We need to consider reliability, longevity, and safety, and one of the better ways to do this is illustrated.

I've been using carbon fiber arrow shafts for pushrods for some time now and find them to be readily available, relatively inexpensive, and easy to work with. They're also very strong for their light weight. (Note: any long pushrod inside a model should be supported over a long run, about every 12 inches is usually adequate.)

The photos show the method I use in making such pushrods and I've yet to have one fail. The wire used can be any readily available size and piano wire or a softer wire can be used. If you use the softer wire, the wire sections of the pushrods should be kept fairly short to prevent excessive flexing. In casting about for suitable soft wire, I've used bicycle spokes, motorcycle spokes, and sulky spokes. Bicycle spokes are a little light for our models and motorcycle spokes are a little heavy (although they're available in a variety of sizes and thicknesses). Sulky spokes, if available in your area or through your wheeled goods dealer, are just about right. They're soft enough to be easily threaded and bent to shape, and in short lengths have adequate rigidity for this purpose.

The most common method of attaching one end of the pushrod to the servo is the Z-bend. The soft wire will tolerate this handling where piano wire may be dramatically weakened by the final bend.

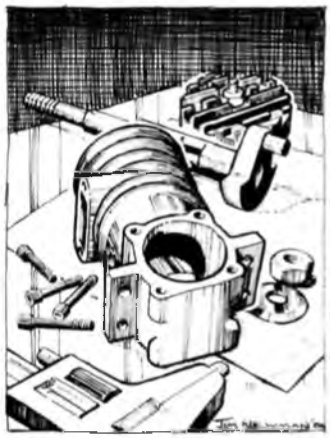
When using the heavier-than-normal wire, it's necessary to drill slightly larger holes in the servo arms to accept the wire size. Be sure the servo arm is wide enough to accept this enlarging of the hole without drastic weakening. The servo arms from Airtronics* show more than adequate "meat" to accept the larger wire without dramatic weakening of the servo arm.

The spoke wire might accept solder links in the larger sizes, if preferred, or can be threaded to accept quick links or any other means of making an attachment. The Z-bend is still my favorite method of making the attachment at the servo arm end. It's so simple that there's little to go wrong with it.

At the control horn end, I make a special little attachment of my own, which has the advantage of providing a very solid and safe connection to the horn while still allowing adjustment. These are made from aluminum drill rod stock and are not difficult to fabricate. A small lathe is a real advantage here, but these could be made with simple hand tools. (I hope one of the accessory manufacturers will see the advantages of this item and make it available commercially.)

The aluminum drill rod is cross-drilled and tapped to take an appropriate thread (2-56 or 4-40) and the yoke is then slotted using a hacksaw blade (or two of them in tandem) and then drilled lengthwise and

(Continued on page 47)



About Those Engi

by JOE WAGNER

THIS MONTH'S topic is engine noise and there's a lot to be said on that subject! Some modelers seem to be in love with the racket their powerplants produce. Like motorcyclists, they're happiest when their motors shriek the loudest. Other people loathe the sound of our model airplane engines. Unfortunately, some of them feel so strongly about it that they manage to have our flying fields taken away from us, to get rid of the noise we make.

Although model airplane engines have been in fairly common use since about 1935, they didn't seem to bother people much until the 1950s. That's when noise complaints began to make problems for model fliers. Over the next 35 years these complaints have increased severely, and we've lost many flying sites because of them. And this has happened even though the use of model engine mufflers has become almost universal by now.

Let's take a careful look at the noise problem to see if there is any solution to it. Perhaps something useful can be found by examining the past...

Nowadays there are somewhere around a hundred thousand modelers in the U.S. who operate model engines. But forty years ago there were over a million! Today, nearly all flying of model airplanes with engines larger than ½A takes place in open country, well away from residential areas. Then, most models were flown in, or near, cities. Now, few modelers run their engines much in test stands at home, but in the 1940s it was customary to put hours of break-in time on a motor prior to mounting it in an airplane.

The Atwood Super Champion instructions called for a full hour of break-in time before advancing the spark from full retard. The DeLong "30" paperwork stated: "...top performance may not be reached until after 6 or 8 hours of running." Forster Brothers said about their .29 spark ignition engine: "It will require running-in for a period of several hours of intermittent running." Even the Ohlsson instructions (for their .19, .23, and .60 engines) warned that at least two hours of break-in was necessary to avoid piston seizure or "other damage to the closely working parts, resulting in delay and costly repairs."

Most modelers followed these directions religiously. In fact, for many of us it became a sort of ritual; as much a part of the model airplane hobby as carving balsa or doping Silkspan. And we did all this engine running at home. I had a test bench in my garage. Most of my friends did too; others had portable test stands they could set up in their back yards. And, especially just after World War II, we had *lots* of engines to run in.

Yet I never had any noise complaints at all about my engine running at home. I operated every type and size of motor, from Arden .099s (three hours run-in required) to OK Twin 1.20s (minimum of one hour under 4,000 rpm called for). I ran motors just about any time of day and as late as ten o'clock at night. Thirty feet south was an apartment house with four or five families living in it; thirty feet north was the residence of two old ladies. Yet there were no complaints. Not one of my friends received any, either.

The 1946 Atwood Super Champion .60 with both rear rotary disc and crankshaft intake ports.

At one time the best big R/C engine in the world was the 1962 Veco .45 R/C engine.

Were people more tolerant in those days than now? Maybe. Yet there was no TV then, and the major source of entertainment was radio broadcasts. FM had yet to come along, so static and fading in the AM bands was often a problem, making it difficult at times to hear all of Amos 'n Andy's comedy dialogues, Lowell Thomas' news reports, or Glenn Miller's music.

And the "background noise" was much lower then: no big diesel trucks roaring, power lawnmowers clattering, or stereos blasting rock music. I would think that people in those days should have been more sensitive to extraneous noise than they are now.

When did noise complaints begin to make trouble for modelers? As far as I've

es

been able to find out, it was around 1947, in the Los Angeles-Santa Barbara area. U-Control models were then customarily flown in public parks, ball fields, and school yards. Control-line flying was so overwhelmingly popular, and the weather of southern California so unfailingly good, that the continual "wooow-wooow-wooow-wooow" sound of circulating model airplanes became a powerful irritant in many neighborhoods.

As a result, model flying was forbidden in some places. In others it was restricted, say from 10:00 a.m. until 6:00 p.m. To try to alleviate the problem somewhat, modelers came up with various home-made mufflers for their motors. Typical was a metal pepper can stuffed with steel wool with perforations at one end and an opening to fit the exhaust stack on the side. It was held in place by a coil spring stretched around the cylinder. This sort of crude muffler did work, but it cut power, made the engine run hotter, and looked ugly. Nobody liked them, except perhaps the neighbors.

The last American sideport model engine, and Hi Johnson's final motor, the Gilbert 11.

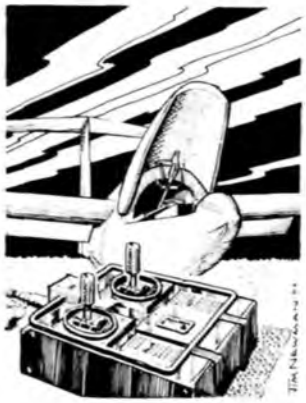
The first commercially-produced muffler for model engines came out soon afterward. Called the "Mart-Lee," it was a long tubular affair designed to fit the .60-size U-Control Stunt-type engines of that time, such as the Atwood Champions, the Super Cyclone, and the Anderson Spitfire. The Mart-Lee muffler cut their sound output down a lot without affecting their power much. But it never became popular. It was too long, reaching nearly all the way back to the stabilizer of a stunt model such as a Zilch or a Madman Sr. and it made priming through the exhaust port impossible. Thus it died a quick death. I don't know of a single one now in existence, even in an engine collection.

Aside from southern California (where there were as many people flying model airplanes in 1948 as there are now in the whole U.S.), noise complaints didn't restrict model flying very much until the glowplug overwhelmed spark ignition, and high-revving motors took over from the slower-turning sparkers.

It was then that high speed became the norm for model engines; rpm levels jumped about 50% in a very short time—and so did the noise complaints.

It wasn't so much the volume of the sound as the *quality* of it. For example, while I was chief engineer at Veco we used to test-fly our control-line designs in a small park a few blocks away. Although this park was in a residential area, we didn't think the noise from our .29-displacement motors would bother anybody. The park and the homes around it were just off the upwind end of Lockheed Air Terminal's main runway. Several times per hour a transport airplane such as a Constellation or a DC-6 would take off, with props in flat pitch and all four 2,500-hp engines at full throttle. Surely, when ten thousand mighty horsepower

(Continued on page 55)



Soaring News

by JIM GRAY

MANFRED SEIDEL*, a reader and correspondent from Germany who recently completed his Master of Science degree in Mechanical Engineering at Purdue University, has sent along some information about the gentle art of aerotowing R/C sailplanes behind powered R/C models. Manfred has made many such tows, both as glider and as powerplane pilot, and invites *M.A.N.* readers to correspond with him for more information and exchange of ideas.

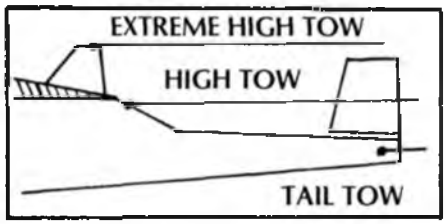
In addition, there has been more information forthcoming from England and Canada—all about aerotowing, which appears to be far more common there than here. So, without further *adieu,* here's Manfred.

"In Hannover, West Germany, we have no slope soaring facilities, and we use towing when the guys with the electric winches don't show up at our club field. Mostly we tow gliders in the 3-meter span class and use trainers or pattern ships with .60 engines as tow planes. Two-meter gliders can be towed by .40-powered, slow-flying trainers, while 4-meter and above gliders need .90- or Quadra-powered tow planes. Once I saw two 3-meter gliders being towed by one .90-powered plane.

"The glider and the tow plane must be speed compatible, which means that the towing should be done at the normal speed of the glider or somewhat above. The faster the glider is towed above its usual speed, the more unstable and nerve-wracking the towing will be. Due to their high speed, high-performance gliders can easily be towed with .60-powered pattern ships. Flat-bottom airfoils on the tow plane are needed when you tow slow-flying gliders (which often also have a flat-bottom airfoil). In well-matched teams, the glider can be flown hands off.

SKETCH 1

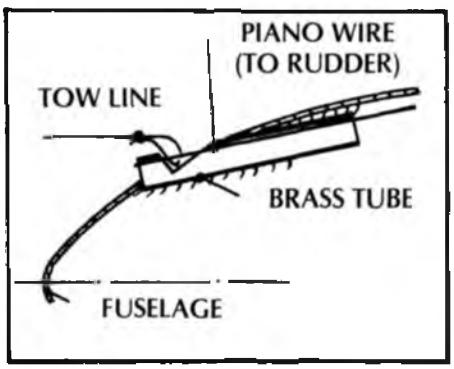
Three possible locations for tow hooks.



"I've seen towhooks in all three locations shown in sketch 1. Personally I prefer the 'high tow' position because it introduces the smallest moments on the tow plane. With the tail position, the towing force has a large leverage on the tow plane and an unexperienced glider pilot with a heavy glider can get the tow plane into serious trouble. When you use the tail position, be sure to increase travel of elevator and rudder.

SKETCH 2

Release mechanism (top view of fuselage). Similar mechanism is used for tow plane.



"In Germany, towing release mechanisms are commercially available, but most people use the mechanism shown in sketch 2. It consists of 1/8-inch brass tubing epoxied into the side of the glider fuselage and a 1/32- or 1/64-inch steel wire which is connected to the rudder servo. The sling in the tow line should be released from the notch when the rudder has full travel to one side. Most of the force should be exerted on the tube and not on the wire, or the mechanism will not work reliably with a weak servo.

"We use 10 to 15 meters of 10- to 20-pound fishing line for the tow line. Some ping-pong balls distributed along the line provide better visibility during towing and help to retrieve the line from 'the pits.' We tried some rubber bands as shock absorbers in the line, but that didn't work too well. Unless the runway is clear of all obstacles, I wouldn't land with the tow line attached.

"A dolly is needed only for heavy gliders that have no wheel. A pilot-operated release of the dolly (or some vertical dowels on the dolly which loosely recess into the glider's fuselage) are needed to prevent the dolly from slipping backward, getting caught under the tail section or the elevator, and providing material for the next club bonfire.

"Depending on the stability and weight of the glider, as well as the towhook position of the tow plane, turns can be a problem. They should be announced by the tow plane pilot and flown very wide. With a powerful tow plane you don't have to bother with turns since straight towing will give you enough altitude before you loose sufficient eye contact.

"With a speed-compatible team, towing is easier than you think. One Sunday the winch guys weren't out and everybody was towing, so I rigged my 3-meter glider with the mechanism discussed earlier. It took a little more than a half-hour. Without further instruction my glider was put on a towing line and the tow plane, a .60-powered trainer with symmetrical airfoil, went full throttle while someone held my glider. The glider was released with a slight push since it

Participants in the TOSS Great Race assembled prior to the start of competition.

had no wheel. Without my doing anything, the glider became airborne while the tow plane made use of the entire grass runway. I didn't touch the sticks until the release.

"In conclusion, I can say that towing is easier than you think, so go for it and the best of luck, or *Holm und Rippenbruch* as we say in Germany."

TOSS' Great Race

Although we seldom announce contests, except those of unusual interest, these exceptions come along frequently enough to attract attention—and this one is worth mention and review because of the great interest among soaring pilots in cross-country soaring. We all thank the Thousand Oaks Soaring Society of California, and particularly Charlie Griswold* for sending the report and photos.

Third place winners in the TOSS Great Race: Ittner, Bame, Krainock.

Cross-country soaring is a team effort, and the pilot is well supported by a "spotter," the driver of the "chase" vehicle, an assistant, and one or two others. The sailplanes are generally large, stable, and capable of penetration through strong winds at altitude. The size means visibility and the inherent stability means control at the limits of visibility. If the sailplane can climb like an angel, but can't move against the wind when it gets to altitude, it's of little use for cross-country racing—unless the race is strictly a "vulgar downwind dash on a corking day" as the late Phillip Wills, dean of English soaring pilots, used to say.

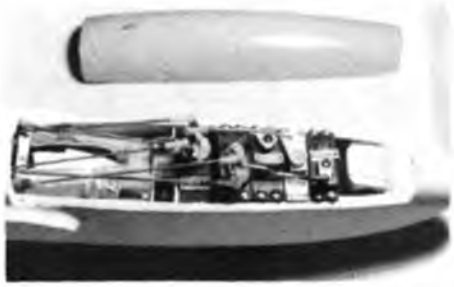
Thirteen teams entered the TOSS event (its third annual race), which consisted of a 20-mile course, goal and return, held at the Taft Free Flight Field. Team captains were Don Northern, Bob

Goldie, Jerry Krainock, Joe Wurts, Dick Turner, Ed Oldenberg, Dean Clark, Gary Ittner, Vern Oldershaw, Larry Jolly, Don McNamee, and Clarence Nikkel. Not all the teams finished, but they all logged mileage. These were: Art & Don McNamee (8th) with 19 miles (Sagitta XC); Dick Turner (9th) with 5 miles (Sagitta 900); Clarence Nikkel (10th) with 4 miles (Sagitta XC); Don Northern (shared 10th) with 4 miles (Sagitta XC); and Ed Oldenberg (11th) with 2 miles (Paramount).

The finishers of the distance were scored against time, and those were ranked in order of the least time required to complete the course. The weather was dry and hot for all of the contest days, producing some exceptional thermals which were violent enough to turn a large sailplane upside down—or, in one case, to tear the wings off. Altitudes when setting out on the course measured in the thousands of feet.

The winners and their sailplanes over the two days of competition were: 1. Team NASA, Joe Wurts, Silent Knight original design with Eppler 374 and flaps, 44 minutes and 53 seconds; 2. Team P.S.A., Larry Jolly, Comet kit, Eppler 205 and spoilers, 46 minutes and 35 seconds; 3. Team Pigeon Packin' Mamas, SFVSF Gary Ittner, Little Pigeon original design, Ittner 2016 airfoil, 57 minutes and 6 seconds; 4. Team Jerry Krainock SFVSF, original design, no details, 101 minutes and 32 seconds; 5. SWSA Team, Keith Kindrick, 11-foot Gemini design variant original, Mike Bame airfoil, 102 minutes and 46 seconds; 6. Team TOSS, Wayne Meredith, Comet Eppler 205, spoilers, 105 minutes; 7. SMSS Team, Dean Clark, Veguer kit, original design airfoil, flaps, 119 minutes and 9 seconds.

First place winners at TOSS: Wurts, Janet and Gary Ward.



Business end of Bob Rondeau's Dodgson Saquila shows linkage for spoilers, flaps, and control mixing.

Some teams launched many times, and one launched seven times to become the winner with the best single flight over the two-day period. The length of the course permits several starts each day, yet is long enough to satisfy the LSF Level V requirements. One advantage is the straight roads which allow an arrow-straight out-and-back course. According to the participants, there is nothing quite like cross-country racing pitting team against team; it's fun, challenging, interesting, and spectacular.

There are lots of sailplanes capable of winning, so the results are up to the pilot and his team. It's supposed to be relaxing as well, and from what I've heard, I guess it's just that. There are cross-country races held in the east, the midwest, the south, and, of course, the west, where it all started. Canada has its annual "Dash for Cash," which has become very popular among Canadians and U.S. entrants.

See you next month with more information about our favorite subject, soaring.

Jim Gray, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

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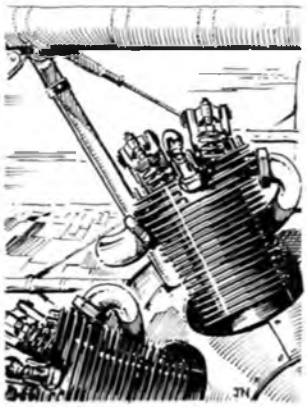


Four-Cycle Forum

by ELOY MAREZ

HAVE YOU NOTICED that the most enthusiastic among us are usually beginners? Unfortunately for them, and for the sport, manufacturers, hobby shop personnel, and even we so-called experts in the field too often forget that everyone around doesn't have our knowledge and experience. The simple things that we take for granted can sometimes create insurmountable problems for the R/Cer with his first, second, or even third model. With the present level of technology in R/C, can you imagine how confusing and intimidating it all must be to the neophyte?

I recently heard from Garry Brandenburg of Albion, Ohio, on this and other interesting subjects. He writes:

"Help! I'm fairly new to R/C and I like it a lot. My first kit was a Kadet MkII with an HB .40.

"My next project nearing completion is a Crane (see *M.A.N.* March and April 1983 for plan #4831 for $13.50). The engine I chose for this plane is an HP .49 four-cycle. The design requires the engine to be inverted.

"I put the new engine on a test stand in a normal cylinder-up position. I connected fuel lines and pressure lines as shown (Fig. 1), but I plugged the normal tank pressure inlet vent. It ran, sort of. I was using Tower 10% two-cycle fuel.

"Should I use a fuel blended for four-cycle use? What is the correct setup for fuel/pressure lines? What is the nipple for at the top of the rear head of the cylinder head? Is it a vent or a pressure fitting if a muffler is not used?

"The reason I'm asking all these questions is because I want to learn how to do it right. I also appreciate engine instruction manuals with lots of pictures, reasons given for doing things one way, and consequences if proper procedures are not followed.

"I really don't mean to pick on the instruction manual too much, but it does seem like manufacturers sometimes assume that people who buy their products have been in R/C for 10 or 15 years, so only minimal instructions are provided.

"In addition, the instructions lose something in the translation from French, Japanese, German, etc., to English. Please give me your thoughts."

Hobby Shack's ¼-scale Diablo (described in text) is a fully capable aerobatic design with a four-stroke engine.

Taking last things first, I think that we all agree with Garry on the subject of instruction manuals. I can even top his comments. Just recently I received a "Glossary of Common Modeling Terms" with a new product, which includes a description for a "wing rib" as: "The airfoil-shaped piece that connects the leading edge, spars, and trailing edge of the wing and holds them in place." It sure does shock you to learn that you've been so wrong for so long, doesn't it?

I don't know the answer to the manual problem, which might even increase as we see more and more non-modeling interests gain control of model product manufacturing companies. Past history is on our side in that respect, as we old-timers can look back and remember a number of companies that are no longer around, and whose demise took place soon after control went to non-modeler-run companies. Our only means of fighting back is to let the manufacturer or importer know that his instructions are incomplete. After enough of us tell him that, and certainly after sales start to drop off, he might start to listen.

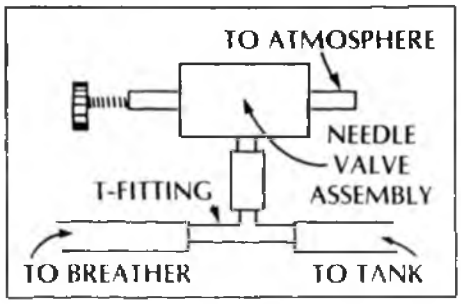
There is another side to this particular story. I've noticed that if a thick manual is furnished, often it will go unread because, "I don't have time to read *all* that!" A skinny manual gets the same treatment because in this case, "It's not thick enough to contain anything important!" However, the happy medium is out there and, fortunately enough for us, some suppliers seem to find it.

I really don't have a solution for Garry's problems. In fact, I can only compound them. Garry, I'm afraid you have made the wrong choice of powerplant for your Crane. Incidentally, that's an interesting project, and you are to be congratulated for tackling it so early in your R/C career. But your HP .49 is incorrect on two counts.

First, it simply won't produce enough power to fly the Crane properly, which was designed and flown with an O.S.

Max .45 two-cycle engine. The HP .49 isn't in the same power range and, in all fairness, no claims have ever been made that it is. You might be able to construct your model light enough for safe flight with the HP, but you simply will not have enough power to bring out all of the exciting capabilities of this airplane.

The range is decreasing with every new generation of four-cycle engine, but it's still fairly safe to assume that you'll only have about 60% of the available



power from a four-cycle engine as you will from a two-cycle of equal displacement. And that's far from being an accurate statement, as there can be a broad range in the available power of two-cycle engines of the same size, depending on many factors.

The second reason your HP .49 isn't the best choice is the inverted engine requirement for the Crane. Four-strokers simply don't like upside-down installations because the plug finds it extremely difficult to stay lighted due to the long period of time between ignition strokes and the raw fuel that it's subjected to in between ignition cycles. You might be able to play with the plugs long enough to come up with one on which the engine will run acceptably well at high speed, but idle is another thing. A reliable idle in this case can only be achieved with an on-board ignition system. Naturally, this will add further weight, thus requiring more engine power, which will only compound the problem.

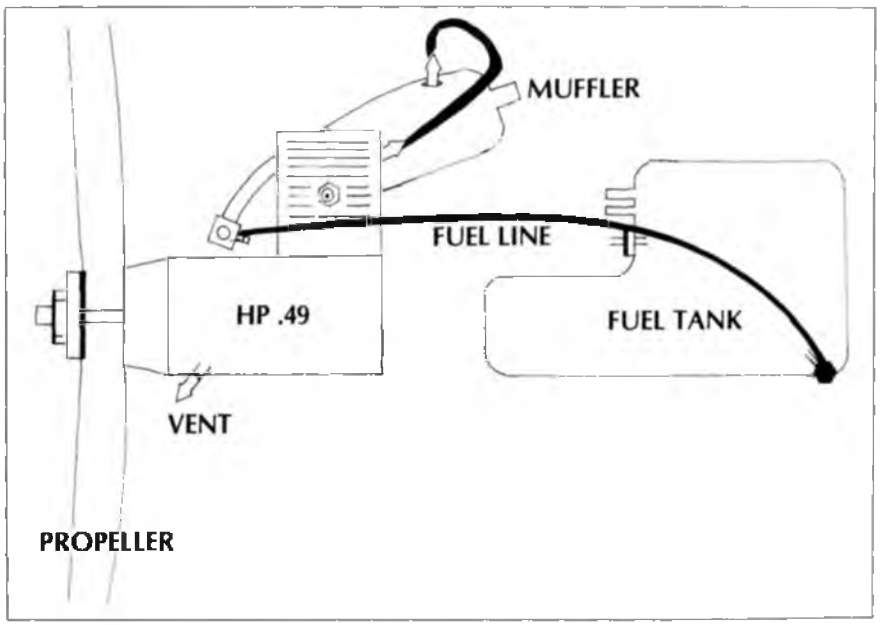
The best advice I can give you, Garry, is to forget the HP for this project and stick to the engine recommended by the designer of the Crane, or one very similar in design and size.

On the subject of mounting engines, some differences should always be expected when changing from one position to another. For example, I've recently been flying an O.S. FS120-powered Hobby Shack Diablo, a ¼-scale at 69.5 inches, as seen in the photograph. Incidentally, this is a great flying airplane that flies so well that it's being used by a number of successful competition fliers as a practice bird.

Anyway, the O.S. received a test bench break-in and adjustment in the normal upright position. It was then mounted horizontally in the Diablo. The first time to pull back to idle was a real revelation—my friends standing by for the big moment thought that I had a smoke system on board and had just turned it on.

I could keep it running at a fast idle, but man, was it ever rich. It took quite a change in the low speed adjustment of the carburetor to bring it into range; all in going from upright to sideways! Incidentally, the tank *was* in the same relative position on my test stand as it was on the Diablo.

Now let's get to Garry's other questions. He enclosed a number of sketches of what he thought might be the proper installation. I'm only showing one—the correct one! His first query is about fuel. Garry, your engine will run on "regular" glow fuel, but most experts now agree that a fuel with a little less oil is desirable. Depending on what's available locally, use something with about 16% oil. I've been having good results from Kool



Power four-cycle blend; you might try it.

Next, he asked about the tank outlet tube. As can be seen from the sketch, Garry is using a Kraft type tank with two outlet tubes. This allows him to pressurize the tank, and use the second line as a filler. Obviously, this second line must then be plugged, in order to maintain the internal pressure. During filling, of course, the tank is filled through one line, the supply line to the engine. The other must be open to allow the air in the tank to escape.

When pressure isn't being used, the tank is usually filled through the engine supply line, and the other becomes an overflow. During operation, this line *must* be kept open to allow ambient air into the tank, otherwise a suction will occur as the fuel is used up and eventually the engine will stop, not being able to draw fuel against this suction.

The nipple on the side of the cylinder head is there for lubrication purposes, and is normally connected, as in Garry's sketch, to a similar nipple on the muffler, where it receives some of the oily fuel residue from the exhaust. You know, that stuff that is generally referred to in other less complimentary terms at the end of the day's flying.

This line can also be interrupted with a T-fitting and used as a pressure source for the fuel tank. A lot of fliers have found that the available pressure is more than required, and an adjustable valve using a needle-valve assembly has been evolved to control it. The entire procedure is detailed in my June 1984 column in *M.A.N.*, and a sketch of the pressure controlling assembly is repeated here (as Figure 2) for you newcomers.

All that is left to say is "Good Luck, Garry," and let us know how things work out for you.

(Continued on page 58)

ENGINE REVIEW

(Continued from page 84)

wristpin end and 8.5 mm wide with two oil holes at the crankpin end. The rod shank is 6.4 mm thick and tapers from 12.4 mm at the bottom end to 10.7 mm at the top.

Reciprocating weights are: piston and ring 29.5 grams, wristpin 8.0 grammes. The conrod checked out at 17.4 grams.

CYLINDER HEAD. Like other recent "S" series Super-Tigres, the S.2000 cylinder and sleeve extend upward only so far as is necessary to contain the full stroke of the piston. In other words, the head is flush fitting instead of being plugged into the upper part of the liner. The combustion chamber is the usual bowl-and-squishband shape, the chamber being almost hemispherical; 7.2 mm deep and 20 mm in diameter. Externally, the head carries a very large cooling fin area. The fins are tapered and are up to 17 mm deep.

Six 4 mm socket head cap screws tie the head to the cylinder and there is a 0.2 mm (0.008 in.) soft copper gasket between the head and the top of the liner. The head is fitted with a Super-Tigre KW standard long-reach glowplug.

CRANKSHAFT AND BEARINGS. Typical of traditional single-cylinder model two-strokes, as distinct from those engines having their origins in chainsaws, etc., the S.2000 has an overhung crank. The overall length of the crankshaft is some 5.7 inches, the main journal is 20 mm diameter and adequate support is ensured by large well spaced ball journal bearings. The shaft is made in one piece, with a 9 mm diameter crankpin on a counterbalanced crankdisc. The shaft is bored 14 mm for the gas passage, which is fed from a conventional rectangular valve port. This registers with a parallel sided intake port in the front housing to give a rotary-valve timing of 42° ABDC to 52° ATDC.

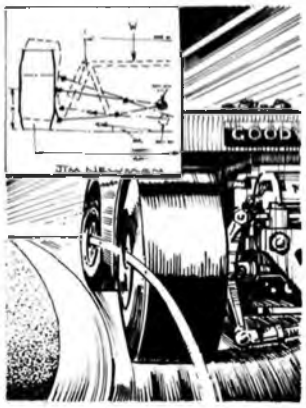
The shaft is supported in a 20x42 mm 9-ball steel-caged ball journal bearing at the rear and a 10x26 mm 7-ball steel-caged shielded bearing at the front. Additional protection against the entry of foreign matter is provided by a special steel-cored rubber sealing ring that is inserted into the front bearing housing in front of the bearing itself. A 10 mm i.d. x 13 mm o.d. x 5.5 mm steel distance-piece is positioned in the center of the seal, in front of the inner ring of the front ball bearing, to locate the prop driver collet.

PROP DRIVE ASSEMBLY. The prop driver itself is of sensible proportions, i.e., 50 mm diameter with a 47 mm diameter driving face to transmit the engine's substantial torque. (Incidentally, it is not so much two-stroke engines, like the S.2000 series, that require large prop-driver/prop-boss diameters, as some of the larger single-cylinder four-stroke engines. Here, the maximum-to-mean torque fluctuations, through the four strokes of the operating cycle, are much more severe and are a major cause of prop slippage and loosening when driver diameters are inadequate. Many propeller manufacturers, also, have yet to appreciate the importance of providing large diameter bosses for the larger props now in use.)

The S.2000 prop driver is an aluminum pressure casting and is fitted to the crankshaft with a brass split taper collet. The shaft end has an M10 x 12.5 metric thread. A hefty 42 mm aluminum washer and steel hex nut complete the assembly.

FRONT HOUSING. This is a con-

(Continued on page 102)



Inside Track

by MIKE LEE

LET'S START this month with some product news from around the track. The racing season is in full swing and getting the latest in hot stuff is important to making the cut.

If you're not familiar with the name Parma International*, you should be. Parma has an extensive line of products for all sizes of cars, and their line of car bodies is most notable. Parma makes literally dozens of bodies from tough Lexan plastic. Their latest offerings come in the shape of the 1963 Corvette, the Frog Jumper, a Chenowth, and the Well's Coyote for off-road vehicles.

The Corvette body fits in the "Nostalgia" class, is 1/10-scale, and is suitable for fit to a number of different vehicles. The Frog Jumper is a direct replacement body for the MRC-Tamiya Frog vehicle, and it includes a wing and mounting hardware. The Chenowth body was designed to replace the new Monogram Lightning body should it get worn out, and the Well's Coyote fits the popular Hot Shot from MRC-Tamiya. All come in clear Lexan and are ready to paint. See your hobby dealer or drop a line to Parma for information.

Parma is also offering a new set of oil-filled dampeners for use on the Yokomo off-roadster. Called the Parma Short Shocks, these new dampeners feature lightweight, short body length, and Teflon pistons for long life. Look up part #12622 for these hot ones.

The fine people at Polk's Modelcraft Hobbies* are at it again with economical and dependable equipment. This time it's an updated version of their very popular Challenger trigger radio for cars. This new radio features far more channel versatility, handle reversing, point adjustment, and transmission on the newer 75 MHz frequencies. The radio receiver is also updated, featuring smaller size, finer tuning, higher rejection rate, and longer range. Even the servos have been updated. They not only have a stronger gear train, but water resistance and isolated pots for better reliability. The kicker to this whole radio system is that the price will not change—it's still a measly $59.95.

If you think that's great, wait a bit longer. Lewis Polk has informed me that they have plans for a ready-to-run off-road vehicle than can wax the Production class cars. This car will feature a full suspension, standard 6-cell battery,

The Chenowth for the Monogram Lightning is designed as a direct replacement body and is made of tough, clear Lexan for durability.

The ASA Dodge Daytona is one of Parma's new 1/10-scale Lexan bodies.

The Wells Coyote is designed to fit the popular Tamiya Hot Shot.

The Frog Jumper body was designed as a direct replacement for the Frog.

charger, and radio (yes, I said radio) for under $150. If that ain't interesting, then you need another hobby. Stay tuned for details on this one because I'm going to have the first line on it the moment it hits the streets.

The people at Model Racing Products* are also up to speed with a new off-roadster called the PRO-110. This car will feature ball bearings all around as standard equipment, resistor speed controller, a tough reinforced fiberglass chassis, variable motor positioning, oversize oil-filled shocks, and a Funco type clear body shell. MRP says this car is capable of conquering virtually any class of off-road competition and from the looks of it they might be right. Again, look for this car to make the review pages here as soon as I can get my hands on it.

Painting Techniques

Many times I'm asked how to paint on a clear plastic car body. Most guys find that the paint doesn't adhere well, so let's run through this process and see if this can be prevented.

The 1963 Corvette is Parma's entry into the nostalgia car body market in 1/10-scale.

Parma's Short Shocks have been developed as a lighter weight replacement. Made with Teflon pistons and replaceable seals to fit 1/10-scale cars.

With most clear bodies, first cut the body to fit the chassis. This is important because later on, once the body is painted, cutting or trimming might scratch the paint. After trimming, mask off the windows or any other portion of the body that will remain clear. I normally use a plastic type tape for this task, such as electrical tape, because it renders a better edge and has less tendency to allow paint bleeding. When trimming the tape to the masked area, use only a good cutting blade with a sharp tip. A dull blade or one with a blunt tip only causes you to push down harder and increases your chances of punching through the body.

Take your time and work carefully. Peel away any excess tape, and then firmly press down the tape that is masking off the windows or other masked areas. Figure out what paint sheme you'll use. I find this a real pain because my imagination gets the best of me and it usually takes me a good two days to settle in the final layout.

Once you've made your decision, carefully sand the entire *inside* of the car body. The masking over the windows should protect them. Use a fine grade of sandpaper, such as 240- to 320-grit. You can also use medium steel wool. The idea here is to sand the body to the point where it looks frosted. Leave no clear or glossy areas. This is actually the key to making the paint stick to the body. Normally, paint won't stick to the polycarbonate bodies we use, but when the body has been sanded, the paint will have something to hold on to and the minute scratches will get filled with paint, thus hiding them.

After sanding, begin masking the rest of the body. You'll first want to mask the entire inside of the body. Of course, if a single color is all you're going to shoot, then no masking will be required, other than on the windows. I'll assume that you'll be shooting at least two colors.

While masking, make sure that your masking tape reaches all areas of the body, including any corners, bends, and other lines the body might have. You won't want to have the paint seep into a corner you didn't mask. Press the masking tape firmly to the body. Check to see if the tape is down by looking at the body from the outside and noting the tape adhesion. Once done, it's time to get a pencil or marker.

(Continued on page 77)

Product News

DONZI Z-65

Dumas Products (909 E. 17th St., Tucson, AZ 85719) announces a 49-inch scale model of the spectacular new Donzi Z-65 Tournament Sportfisherman. The model boat was developed using the actual plans and drawings for the full-size 65-foot fishing machine/yacht. Designed to be constructed for display or as an electric- or gas-powered radio-controlled operating model, the Donzi Z-65 features a fiberglass hull with die-cut wood decks and superstructure. Even the materials for the railings, pulpit, tuna tower, and outriggers are included. The model is available from hobby shops or directly from Dumas Products as kit #1226. The running hardware kit is #2353. Dumas offers a complete color catalog of all their models for $2.

WORLD ENGINES BRAT AAC

World Engines (8960 Rossash Ave., Cincinnati, OH 45236) introduces a new line of R/C engines called the "Brats." They come in the 21- to 28-size range and feature a new AAC piston cylinder assembly. (Aluminum piston riding in a chromed-aluminum sleeve.) The Brats also feature a new revolutionary idea: interchangeable pistons and cylinders with no loss in rpm. All feature ball bearings on the shaft, Schnuerle porting, and a nice low idle. It's available in a 21 car, 25-R/C, 28-R/C, and 28 Helicopter.

NEW & IMPROVED

Model Rectifier Corporation (2500 Woodbridge Ave., Edison, NJ 08817) is proud to announce improved versions of the Trainer Hawk and the Skyhawk for 1986 in their line of ready-to-fly R/C airplane kits. With these kits, practically everything is installed and pre-hinged. Improvements in raw materials and construction techniques, and modeler's comments have made these kits a great value for 1986. As a bonus, MRC will enclose a set of wheelpants in every Trainer Hawk and Skyhawk kit.

KADET SENIOR

The Kadet Senior from Sig Manufacturing (Montezuma, IA 50171) is the "hands-off" R/C trainer. It flies so slowly and gently that just about anyone can handle it. The Senior can recover and return itself to level flight if you simply let the sticks snap back to neutral. Even experts will enjoy the unique qualities of the Senior. It's just the thing for out-of-the-rut flying, doing something besides the FAI pattern. It has an exceptionally low wing loading of 12 ounces per square foot and a 78-inch span for .29 to .40 cubic inch glow or .35 to .45 cubic inch four-strokes. The plane goes together quickly; less sheeting and straightforward construction with die-cut balsa and ply parts cut building time.

BEST WIRE BENDER

Hobby Lobby International (5614 Franklin Pike Circle, Brentwood, TN 37027) announces the new Best Wire Bender, an 11-inch long heavy steel wire bender that will make sharp bends and coils in 1/8-inch and 5/32-inch music wire for landing gears, nose gears, and cabane struts. The wire clamp is its best feature; it prevents the wire from creeping forward as a bend or coil is made. This assures that the wire you are working on will be exactly the length you need.

NEW MONOKOTE COLORS

Top Flite Models (2635 S. Wabash Ave., Chicago, IL 60616) announces the addition of yellow and black MonoKote trim sheets. The brightly-colored trim sheets are 5x36 inches and are excellent for putting the finishing touch on a model, as well as making easy and instant field repairs. Pressure-sensitive mylar MonoKote trim sheets provide brilliant detail and eliminate the need for masking or painting. Modelers can now choose from 21 different colors, including the checkerboard variety. Top Flite also offers SparkleKote, a prismatic (rainbow-like), 6x12-inch pressure sensitive trim sheet in four colors. These special trim sheets add depth and brilliance to any type model.

Descriptions of new products appearing in these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News**, or guarantee of performance or safety by **M.A.N.** When writing to the manufacturer about any product described here, be sure to mention you read about it in **Model Airplane News**.

TIPO PLUS

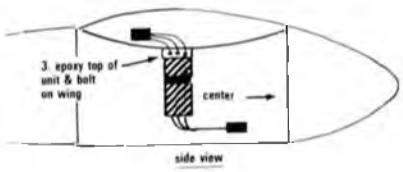
The Tipo Plus from Dick Hanson Models (5269 Lucky Clover Ln., Murray, UT 84123) is a refinement of the Tiporare design that is intended for FAI pattern. The pluses are: no bellypans, no hatches, no flaps, no spoilers, no special landing gear, no plug-in wings, no contact-cemented parts, no carved tip blocks, and no hardwood wing skins. The airfoils and control surfaces have been changed to provide precise snap and roll characteristics. The fuselage has been slightly restyled, the wing sweep is increased, and the stabilizer has been relocated and increased in size. Weight is 7 to 8 pounds and the wing area is 750 square inches. It's easy to build and flies very well with a side exhaust .60 and a muffled pipe.

KYOSHO ASSAULT

The Kyosho Assault is designed to lead the fastest growing trend in R/C cars—gas-powered buggy racing. The 1/10-scale kit from Great Planes Model Distributors Company (P.O. Box 4021, Champaign, IL 61820) comes complete with an O.S. CZ-1 .12 cubic inch engine, a built-in glowplug starting system, and all hardware. The only additional items required are fuel, a two-channel radio, and a D-size alkaline battery for the glowplug starter. The Assault is a super performer on any terrain, thanks to four-wheel independent suspension and four oil-filled shocks. It's very fast and won't let you down on the race track.

ROYAL TACHOMETER

Test for best glowplug, find out which fuel works best in your engine, determine the most efficient propeller, synchronize engines on twin aircraft, and measure optimum engine performance with the new digital photocell tachometer from Royal Products (790 W. Tennessee Ave., Denver, CO 80223). Featuring a liquid crystal display for accurate, easy reading, this tachometer has an rpm range of 100 to 29,000 in increments of 100 rpm. It doesn't put drag on the engine and the photocell pickup allows you to keep a safe distance from the engine. The tach has a handy field box size and is for 9-volt operation.



AUTO SERVO CONNECTOR

With the Automatic Aileron Servo Connector from U.S. Connection (P.O. Box 4208, Vero Beach, FL 32964), you'll never again have to be concerned with plugging in your aileron prior to flying. It will connect the wing servo to the radio when the wing is bolted to the fuselage. Use it for sport, pattern, scale, ¼-scale, pylon, and gliders. Install one for each function: ailerons, flaps, retracts, multi engines, and battery connection. They're totally safe!

DAVIS DIESEL CONVERSION

Here's another big diesel conversion head from Davis Diesel Development (P.O. Box 141, Milford, CT 06460). It's for the O.S. 1.08 or .90, or the Webra 91. These dieselized engines will run as smoothly as they did on glow, and at lower rpm. The fuel consumption of a dieselized .90 is 2 minutes to 1 ounce of fuel. And these engines are quieter than either a four-stroke or chainsaw engine of comparable power. Other diesel converters are available for over 75 different Schnuerle-ported engines from .049 to 2.68 cubic inches. Conversion is as easy as changing the head, fuel, and fuel line. No special tools are required.

ROYAL CHIPMUNK

The ready-to-fly Chipmunk .25 from Royal Products (790 W. Tennessee Ave., Denver, CO 80223) has a wingspan of 51½ inches, a fuselage length of 40 inches, and a wing area of 425 square inches. The Chipmunk uses a .25 to .40 two-cycle or a .40 four-cycle engine, and a four-channel radio. The kit includes all necessary hardware. There is lightweight foam/plywood construction, a beautiful pre-painted, high-gloss, fuel-proof finish and pre-hinged surfaces. This kit has a "buy today, fly tomorrow" assembly. The Chipmunk is easy to fly, yet highly maneuverable.

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ventional aluminum alloy pressure casting that plugs into the crankcase barrel and is secured with four 5 mm hex socket head cap screws and spring washers. A large O-ring, rather than the usual paper gasket, is used to ensure a gas-tight seal between the crankcase and front housing. The housing incorporates vertical and horizontal stiffening webs; there are actually four of the latter, i.e., two each side. The intake boss is square in section but is bored to a 17 mm internal diameter for the carburetor. As the standard Mag-V carburetor spigot is 15 mm o.d., a parallel split sleeve is inserted in the intake boss to accommodate the difference.

BACKPLATE AND RADIAL MOUNT. The S.2000 series engine comes fitted with a standard backplate, but included with each engine is a robust pressure diecast radial mount backplate to enable the engine to be bolted directly to a firewall rather than to beam mounts, where the owner prefers to use this method of installation. The mount is just over 4½ inches in diameter and is fitted in place of the standard crankcase backplate with extra long (25 mm) 5 mm socket head cap screws and spring washers. It adds slightly less than 4½ ounces to the weight of the engine.

CARBURETOR. The carburetor is a standard Super-Tigre Mag-V automatic mixture control type with 9 mm choke and 2.5 mm spraybar width, giving a 42 sq mm effective choke area. This is exactly the same as the carb fitted to the much smaller S.61 and S.75 engines previously tested for *M.A.N.*, but is quite adequate. The smaller engines use this carburetor to enable them to breathe freely at speeds of up to 15,000-17,000 rpm where their maximum power outputs are realized. The S.2000/25 is designed to peak at much lower revolutions and does not need such a large choke area.

MUFFLER. The standard muffler supplied for use with the S.2000 series engines is a plain cylindrical expansion chamber that is fabricated from aluminum sheet and tube. It is 5 inches long, just over 2 inches in diameter and is fitted to the engine through the medium of a short cast aluminum stub pipe that is bolted to the exhaust stack. The muffler is then clamped over this with a worm drive hose clip. The muffler has a volume of 190 ml and an outlet area of 150 sq mm.

PERFORMANCE. The Italian/English instruction leaflet issued with the S.2000/25 leaves something to be desired so far as the English translation is concerned, but the gist of the manufacturer's advice is clear enough. Fuel recommendations indicate that standard commercial model two-stroke fuels are not suitable since they contain too much (e.g., 20 percent or more) lubricant. For breaking in, a methanol/castor-oil mixture containing 15 percent lubricant is approved, after which the oil content should be cut to between 10 and 12 percent. If the owner wishes, between 5 and 10 percent nitromethane may be included in the mixture to slightly improve performance and idling.

We used an 85/15 mixture of methanol and castor-oil for the first 60 minutes of running time and an 85/10/5 blend of methanol, castor-oil, and nitromethane for all tests. The engine ran well on these mixtures.

Significantly, the S.2000 series, unlike virtually all other Super-Tigre engine/muffler combinations, offers no means

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Offshore

by JOHN OIAN

THIS MONTH you were going to get a complete report on the Florida Winter Nationals Boat Race. It promised to be quite a show with 140 entrants and 300 boats. It could have been much bigger but entries were limited to this number! Entrants came from as far as Wisconsin and Texas.

Things started to look a little ominous Thursday evening with rain showers predicted for Friday and Saturday. Friday morning it drizzled all the way to the race site (fortunately I only live 20 miles away). Driving to the site should have told me something when I almost got stuck in the mud. By 2:00 p.m., between showers and floating weeds, only 22 heats were run out of a planned 151 for the weekend. Shortly thereafter we decided to quit for the day due to a thunderstorm. I heard on the radio that it had rained over 7 inches in about 5 hours—a record for the area.

Saturday morning I again headed back to the lake. The rain had stopped and the weather was clearing, but unfortunately the weather had done its dirty work. The level of the lake appeared to have risen about 3 feet, completely displacing course markers and covering the safety nets. The road to the lake site had become almost impassible and, as I found when I arrived, the race had been postponed until the first week in March. A hole in the fence had been made and boaters were trying to get their vehicles out through the orange grove with the help of a local tow truck.

The most exciting point of the morning was Sid Broughton's 150-yard banzai charge down the impassible road out the gate (single lane, fence on one side, canal on the other). He did this in his very large motor home. Great driving, Sid. Well so much for the Winternats.

Try Sailing for a Change

Tired of smelly, greasy, fickle, gas-powered boats? How about considering a sailboat? Sailing is a totally different game than powerboat racing. If you've ever tried full-size or model-size sailing, you know what I mean. If not, I'll try to give you some idea of what it's about.

Sailboats can be very challenging as well as lots of fun. Here some close maneuvering before start of the race.

Sailing is probably the most mental form of boat racing going and might best be compared to a chess game. Winning a powerboat race takes mostly boat speed around the course. Sailing, on the other hand, is very tactical. Of course boat speed helps, but due to the rules, a slower boat can, if properly sailed, beat a faster boat by completely legal tactics. This may at first sound tacky, but it is really the heart of yachting, model or otherwise.

For example, a slower boat, by positioning itself downwind and slightly ahead of a faster boat, will actually benefit from the upwind boat's sails, while at the same time feeding the faster boat "dirty" air from its own sails, slowing it considerably. Books have been written on sailing tactics and the possibilities are endless.

A few other advantages are: fuel is free, a real advantage in this age of $30- or $40-per-gallon nitromethane; the life expectancy of a sailboat is almost limitless, barring unforseen catastrophes the boat will probably last longer than your ability to run it; they very seldom break (try saying that about your powerboat); and they are quiet enough to use anywhere. And boy do they attract a crowd!

I'm presently working on a product review of the Robbe* Pirol sailboat. This is a 50-800 class boat. Translated that means the boat is 50 inches long and has a sail area of 800 square inches. There are several different classes of R/C sailboats. The two main types are "one design" classes, where all dimensions of the boats are strictly controlled. In this type of class everyone will have essentially the same boat (at least that's the intention of the rules).

The other major type is the "development" class. The 50-800 and 36-600 are both development classes, with the rules being very loose; length and sail area are the only controlled dimensions and all other options are up to the sailor and can

result in some really wild ideas.

Getting Ready for Boating Season

Now that winter is over and boats are starting to show up again in some of the more northern climes, how should you re-activate the old bomb? Fill it up and fire it up, right? Wrong. You might get away with it, but then again you might not.

The first thing you should do is take the engine out of its warm, dry, well-oiled box. (Well okay, if you're like most of us, take it out of the dusty old boat on the shelf.) Now is also a good time to disassemble, check, and oil the drive line parts. Remove the backplate and glow-plug from the motor and in a well-ventilated place rinse the engine well in a solvent such as acetone (no smoking, please). After all the old oil and gunk have been washed out of the motor, carefully and slowly turn the crankshaft over, checking for any tightness, grittiness, or strange noises. The most likely thing you'll find is grittiness. This is probably due to either dirt or rust in the bearings. Wash it a couple of times and try again. If it still persists, you probably have a rusted bearing. Remove and check the bearings (get help if you've never done this before). If the bearing is rusty, even just a little, it will have to be replaced.

This M class (50-800) sailboat shows unique features.

George Losey's 36-600 sailboat is super clean.

If the checkup to this point seems okay, give the motor a good visual going over, looking for cracks, loose parts, or screws. Be especially watchful of the fit of the carburetor to the body of the motor. Also check the condition of the usual gasket in this area; if there is a leak, you'll have no end to the troubles that will come later. At the previously mentioned Winternats, I spent a good deal of time and frustration trying to richen up a balky, lean-running motor, only to discover a leak around the gasket. When you are satisfied all is well, re-oil the engine and get ready to race.

This is also the time to give your radio a good going over. If it has been sitting untouched all winter, it would be a good idea to charge and discharge your batteries a couple of times. The best thing for this is one of the cyclers on the market designed specifically for this purpose. If you don't have one, borrow one from one of your R/C buddies. Check all connectors in your system; in a damp radio box they can corrode in a hurry. Replace any that show signs of corrosion. Check the antenna, including all connectors, and check it all the way to the circuit board in the receiver. This is a

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Tim LeCroix holding a soon-to-be-completed Robbe Pirol at left. He's smiling because he thinks he's actually going to get to sail the boat. Parts above show excellent quality.

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of pressurizing the fuel tank: the suction created by a 25cc displacement, with a 42 sq mm choke area, makes this unnecessary.

Piston seal was good, resulting in good compression and reliable starting from new. Nevertheless, there was a noticeable improvement in running qualities after breaking-in. The torque required for starting is beyond the capabilities of standard electric starters and the use of unprotected fingers is not really recommended with engines of this size. A chicken stick is the obvious solution and the engine responded readily to this.

The factory's claimed nominal power rating for the S.2000/25 is 2.8 metric horsepower (2.75 bhp) but the conditions under which this figure was determined (i.e., fuel and whether with or without muffler, or even with a tuned exhaust system) are not disclosed. All our tests were undertaken on 5 percent nitro fuel and with the standard muffler fitted. As the performance curves show, a maximum torque of 310 oz-in. was recorded at approximately 5,200 rpm under these conditions. The torque curve declined at a fairly even rate, as load was reduced to raise rpm, and, from this, a peak output of 2.40 bhp at just over 11,000 rpm emerged.

These are good figures and demonstrate the usefulness of this big Tigre's extra cubic inches. Let us, for example, compare the S.2000/25's performance with that of the S.75 model tested in *M.A.N.* 2½ years ago. The S.75 is within 1 percent of being exactly half the displacement of the S.2000/25. It would be reasonable to suppose, therefore, that the S.2000/25 would produce twice the mean torque of the S.75. In fact, it does rather better than this. If, for convenience, we express torque figures in terms of cylinder pressures (i.e., brake mean effective pressure) we find that the S.2000/25, with its standard muffler, indicates a figure of 80 psi, compared with 76 psi for the S.75 *without* muffler. (With muffler, the S.75 recorded only 61 psi, but it is only fair to remark that the M-60 muffler supplied with the S.75 is very restrictive and cuts the power of the engine drastically.)

Of course, in terms of specific power output (i.e., bhp per unit of piston displacement) the S.75 still has a substantial edge (2.48 bhp/cu in. less muffler, or 1.76

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bhp/cu in. with muffler) compared with that for the S.2000/25 (1.58 bhp/cu in.) but the S.75 only reaches such levels through its ability to breathe at very much higher revolutions (14-15,000 rpm). Here, the prop sizes needed to achieve such revolutions are becoming unrealistically small (11-12 inches) even for the smaller, lighter types of models used with two-stroke engines in the .60-.80 cu in. displacement group.

The manufacturer's instruction leaflet lists 18x8, 18x6, and 16x8 as suitable prop sizes for the S.2000/25. These sizes are certainly well matched to the S.2000/25's capabilities but, as the following prop/rpm figures show, the engine will cope readily with the larger sizes that may be desirable for a large slow-flying model. It will also run willingly and smoothly on slightly smaller sizes if the owner is aiming to achieve peak power output in, for example, a smaller, faster model.

Taking the larger sized props that might be best for a large model of a low wing-loading, 5,300 rpm were obtained on a 22x6 Airflow beech prop, 5,850 rpm on a 20x8 Top Flite maple, and 6,500 on a 20x6 Top Flite maple. In the medium range, 6,600 rpm were recorded on an 18x10 Zinger maple, 7,050 on an 18x8 Top Flite maple, 7,450 on an 18x8 Zinger maple, 7,750 on an 18x6 Zinger maple, and 8,450 on an 18x6 Top Flite maple. Finally, on the smaller diameters, such as might be necessary to push rpm up nearer to the peak of the power curve for the extra power necessary to fly a faster model having a higher wing-loading, a 16x8 Airflow beech was turned at 8,400 rpm, a 16x6 Top Flite maple at 9,450 rpm, and a 15x6 (cropped from a 16x6 Top Flite) at exactly 10,000 rpm. A 14x8 Airflow was turned at 10,500 which would mean that rpm would accelerate to slightly beyond the peak of the power curve in actual flight as the load on the prop lessened. (All the above figures are, of course, static readings to which about 10 percent should be added for approximate level flight rpm.)

The general handling and running qualities of the S.2000/25 were good. Starting, as previously noted, presented no problems and, after breaking in, the engine held steady rpm readings. That is to say, there was no power loss on warming up. (With all engines, there is no such thing as a rock steady speed:

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slight variation is occuring all the time, which generally makes it impracticable to attempt to record rpm to less than 0.5 percent.)

A feature of all current Super-Tigre engines is that they all use the same needle-valve. This is fine for the dealer, who does not have to stock a dozen different needles to suit a wide range of engine sizes. However, it also means that response to needle adjustment varies according to the size of the engine and, with the really big engines, needle-valve adjustment then becomes rather too insensitive, sometimes making it difficult to find the optimum mixture setting. Response to the throttle, on the other hand, was good with safe idling as low as 1,600 rpm on a 20x6 prop, rising to 1,900 on a 15x6.

The S.2000/25 is a sturdily made and well engineered motor. It came through the tests with no problems and all parts were found to be in excellent condition on subsequent inspection. All photographs of our test motor and its parts were taken *after* the tests.

Peter Chinn, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

PATTERN MATTERS

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heat and the catalytic process in different ways. In short, they can make the element glow hotter or cooler.

A hot plug is one that can retain its heat easily despite varying conditions which are less than ideal. This has to do with a crummy needle-valve setting. The plug can withstand a rich-set idle and maintain enough heat to allow a good transition to full throttle. Of course, there is a price to every advantage. In the case of a hot plug, it might not last as long as a cooler plug because the element burns faster.

A cold plug normally has a thicker element and less tendency to withstand a bad needle-valve setting. However, when the engine is fed correctly from the needle-valve, the cold plug allows ignition at a very progressive rate within the combustion chamber, thus preventing false setting from pre-ignition. The result is a smoother-running engine which eventually runs cooler. The disadvantage is that it isn't very tolerant to

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PATTERN MATTERS

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sloppy needle settings. This could be a plague to a pilot who can't figure out why the engine runs fine at all settings on the ground and dies when throttled back in the air. On the ground, the engine runs hotter due to less airflow over the engine. Once airborne, the engine actually runs cooler, air/fuel mixtures become more critical, and you lose glow power.

So how do you find which plug is correct for you? Begin with a commercially available standard plug such as the K&B* or Fox* plugs. Once installed, check the response of the throttle from idle to full bore in the air. If the engine responds with a crack, the plug is probably too hot and you can afford to use a cooler plug.

If the engine lugs from idle to full power, reset the needle-valve at idle until it responds crisply. By tuning the engine to a cooler plug, you can save on engine life, and your plugs might last longer, thus saving you money. Try it out and see.

By the way, I've run across some very good glowplugs made by Bridi Aircraft Designs*. Joe Bridi has formulated some standard type glowplugs specifically designed for pattern engine use. I can tell you that these plugs have displayed consistent performance and long life. Of course, let Joe know you found them in "Pattern Matters."

Maneuver Placement

As I've mentioned before, this column is for pattern and sport pilots who are on their way to the top. So, for the next few columns, let's talk about some techniques that will help you score better in front of the judges.

One of the most important factors in making a top score is the ability to perform maneuvers for the judge. Although most of you can perform the given maneuver with precision, getting that good maneuver delivered to the judge is another thing. There is more to doing a maneuver than just flying it.

One of the biggest factors in losing precious points is not centering the maneuver on the judge. What is meant by "centering" is placing the maneuver in front of the judge so that he has an advantageous view. Because the judge wants this advantageous view, it will be necessary to plant some maneuvers right in front of him, while others will be placed just off center from him. Let's look at a few examples.

In performing loops, the pilot should execute the maneuver with the beginning of the loop right in front of show center in relation to the judge. Note I said "in relation to the judge," not the runway. The top of the loop should be situated right over the bottom of the loop, and the exit from the maneuver should be right where it started from. This is a maneuver which is centered on the judge.

Now, let's examine the stall turn. This maneuver is called for execution when the aircraft passes show center on the judge, but is not actually done until the ship is about 30° to the side of the judge. When done this way, the judge can see the aircraft make the vertical line upward, as well as the turn itself. This is the most advantageous view of the maneuver. If this same maneuver were to be executed on show center, the judge wouldn't be able to see the stall turn itself, because the ship would be turning directly into or away from him. He can only see the side profile of the plane, and not the arc of the turn. Thus, he downgrades you for bad placement and hiding a defect.

In general, placement of the maneuvers is in two distinct zones. Looping maneuvers are centered on the judge. Stalling maneuvers are offset to the judge's side. Rolling maneuvers are centered on the judge where the mid-portion of the rolling maneuver coincides with show center. Those maneuvers that combine looping and rolling are centered on the judge so that the entry and exit points are on show center in relation to the judge.

Placement of maneuvers is also not limited to putting the maneuver in front of the judge's eyeballs within a given zone from side to side. It is just as

important to have the aircraft execute the maneuvers at viewing angles which are comfortable to see, meaning the angle from a level horizon to the top of the maneuver being executed.

Vertical placement of the maneuver means that the pilot should allow some room out front, which permits him to execute a high arcing maneuver without making the judge bend his neck backward to watch. If the pilot places the maneuver too close to himself, a loop maneuver will certainly make the aircraft appear to go over his head. If the judge "rubbernecks" it, he will let you know that he did so with a downgrade. Remember to place the maneuver out in front of you with just enough distance to view it comfortably.

By the way, the reverse of the above is also a downgrade. By placing the maneuver too far away, the judge may downgrade you because he can't see any fine detail in the maneuver. This is construed as attempting to hide a defect and he will give you a defect downgrade even if you didn't do one. The book recommends a maximum of 300 feet distance. Stick to it for maximum points.

As you can see, placement of pattern maneuvers is no easy matter. Proper placement can mean the difference between being in first place and being just another competitor. It is usually the only difference between a good pilot and a well-polished pilot.

Next time, I'll talk about performing the maneuvers themselves to get you ready for the summer season.

Drop me a card and let me know what new pattern bird you're building this season. Maybe if I get enough of them, I'll poll the responses and see what everyone favors to fly this year.

'Til then, we're on the pipe and airborne.

Mike Lee, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

K&B Manufacturing, 12152 Woodruff Ave., Downey, CA 90241.

Fox Manufacturing Co., 5305 Towson Ave., Fort Smith, AR 72901.

Bridi Aircraft Designs, 23625 Pineforest La., Harbor City, CA 90710.

SLOW ROLL

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knife-edge position, is where everybody blows it. This is where everybody either dishes out of their roll or falls out in a screaming split-S.

The problem with this third 90-degree portion of the roll, 190 to 260 degrees, is that even though you are (actually, your airplane is) inverted, you are approaching another knife-edge position, where you need "top" rudder to hold the nose. But "top" rudder, in this case, is *left* rudder and you've been holding *right* rudder because of the inverted adverse yaw. Aha! You've got to gently shift from right to left rudder at that critical 270-degree point and maintain forward stick to kill any turning tendency.

Suddenly, you go past 270 degrees and you are no longer inverted. Instantly, you need a little "up" elevator to keep the nose from falling and you need more left rudder to keep the nose on-center. This is the moment of truth. This is where most folks lose it. Grab the up elevator too soon and your nose goes kiting off into space, as you "dish-out." Over-do the left rudder or delay the change to up elevator and you push the nose down during the last quarter of the roll.

(Like I said, this thing ain't easy.)

In a pattern ship, practically none of this applies because most of them fly like jets—lay some aileron into it and watch it roll. But every bit of it applies to the larger-scale birds. Now, it's really not necessary to go through all these gyrations to get your airplane to cavort about its axis. This technique is only necessary if you care about doing your slow rolls right—and slow. The slower you roll, the harder they are to do and the more important all the foregoing becomes.

So, are you ready to settle for mediocre or are you ready to do it right? ■

OFFSHORE

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common spot for broken or frayed wires, which will kill a boat faster than anything else.

Check the switch to make sure it works perfectly. If the radio is twitchy with the switch on, or if you have to wiggle it around to get it to work properly, its contacts are corroded and you should replace it immediately! If you don't, it will most likely turn itself off in the middle of a race. It's a lot cheaper to replace a switch than to repair the results of a run-away boat.

Range-check the system when it is fully charged. Push the transmitter antenna all the way down and walk away from the boat, moving the controls until you get a loss of control. Your range will vary with the radio, but anything less than 30 feet is highly suspect and the cause should be determined before you run the boat. With these simple checks, you should be able to eliminate a lot of the normal first-day blues at the pond.

John Olan, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

Robbe, 180 Township Line Rd., Belle Mead, NJ 08502. ■

WARPLANE MUS.

(Continued from page 75)

the markings, let me know. I'd sure appreciate it."

By this time, Peggy had disappeared, so I strolled back out into the sunshine of a beautiful August afternoon, just in time to see her standing near another small hangar chatting amiably with a couple of pilots in front of a tiny home-built.

I introduced Peggy and myself.

"Hi, I'm Joe Palermo. What do you think of this little crate? Got that engine for fifty bucks. Ever see an A-40-4, Jim?"

"Sure have," I admitted, "but it's been awhile—fact is, I flew behind one of those a long time ago. In a J-2 Cub, I think."

Peggy and I moved away from the group, leaving Joe and his friend in animated conversation. We walked around the hangar, across the lawn, and out to the double row of parked aircraft we had seen when driving in.

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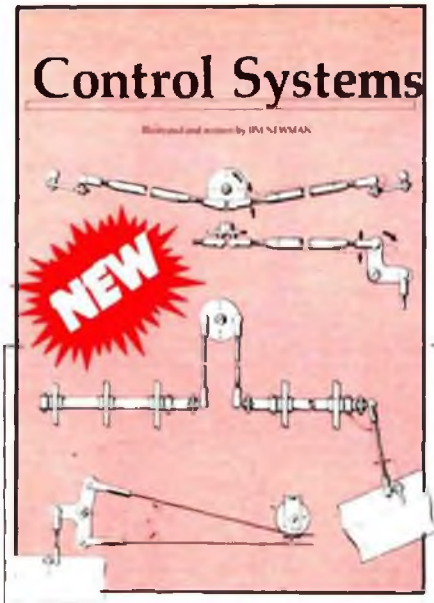

Model Airplane News presents...

CONTROL SYSTEMS

Model Airplane News magazine is pleased to present the definitive answer to control system hookups in this beautifully illustrated book by Jim Newman. This effort is a great achievement and will serve to help you immeasurably in constructing your next model or in modifying the one you're already flying. From beginner to expert, this book shows you many different and better ways to install your controls. Topics covered are:

1. Aileron Cable Systems
2. Aileron Pushrod Systems
3. Torque Tube Systems
4. Detachable Wing Panels
5. Elevator Pushrods and Cables
6. Dodgson Itegrated Systems

What will probably soon be referred to as the "bible" on control systems, this book will most certainly be a useful addition to your workshop for many years to come.

Model Airplane News
632 Danbury Rd., Wilton, CT 06897

Enclosed is $ ____ for ___ copies of *Control Systems* at $4.95 each. Postage and handling: Within the U.S., add $1; foreign, add $1.50. CT residents add 7½% sales tax.

Name _____

Address _____

City _____

State, Zip _____

Charge to: ☐ Visa ☐ MC ☐ AmEx

WARPLANE MUS.

(Continued from page 114)

Kunming, China, 1942? North Africa, 1943? It could have been, for here before us is a P-40E Kittyhawk resplendent in olive drab, sitting hub deep on its gear in lush grass. The top sides are hot under the sun which gleams from the polished canopy, and leaves little heat waves dancing from the plane's wings. The three-bladed prop behind the red spinner out on the pointed nose is ready to spring into shimmering life at the urging of the big Allison V-1710 liquid-cooled engine. The canopy is slid back and a seat-pack 'chute nestles in the aluminum bucket—straps at the ready—waiting for the pilot. There is an occasional murmur of voices; now and then a bark of laughter at some obscure joke breaks the silence...

No, this is Geneseo, New York, 1985, the home base of the National Warplane Museum*. The Kittyhawk belongs to Bill Anderson, a local orthodontist, who flies it for fun and relaxation—and often for airshows, where it's a most popular visitor.

Bill is no spring chicken, as testified by his close-cropped graying hair, leathery tan, and crow's feet around the eyes. In his khaki flying suit, he could be the squadron mate of a Phil Cochran or Robert Scott from another generation.

Bill is typical of the pilots who fly the warbirds—neither professional nor military aviators for the most part—just average men from average walks of life who find a thrill in bringing to life an airplane from the past and flying it to show people how things were back in the "good old days."

Chatting over a soft-drink Anderson commented: "We're not a bunch of stiff-legged millionaires walking around trying to impress someone with our new-bought warplanes. Heck no, we're just grass-root enthusiasts who love to fly and don't mind getting dirt under our fingernails; common, ordinary men and woman who enjoy these old ships and who have been searching the face of the earth for more of them that we can bring in here, work on, and get flying again."

Having flown that old Fairchild PT-19A myself, I could feel and understand Bill's dedication and fervor.

Those who fly and love aviation in all its forms and guises will recognize the aircraft restored and flown by the members and pilots of the National Warplane Museum: the P-40E, AT-6, and PT-19 already mentioned, plus a Beechcraft C-45, Vultee BT-13, Aeronca L3B, Taylorcraft L2, Piper J-3 (L4) Cub, L-21 Super Cub, and a P-51 owned and flown by Bill Clark from State College, Pennsylvania—just an hour's flight to the south.

That's what they mean when they say "...we're a grassroots organization, much in the tradition of the Experimental Aircraft Association." The EAA is a phenomenally successful group of enthusiasts who build and fly their own aircraft with government approval and licensing.

"Who are these people?" I asked him and his reply gave me some names, most as yet unknown to me: Austin Morris, Joe Palermo, Bob Moses, Tim McCauley, Bill Anderson, Jeff Ethel (famous for his articles and books on warbirds), Bob Flesch, and Bob Huston, to name a few.

This group has just acquired a B-17G Flying Fortress and hopes to get a Fairey Swordfish (British aircraft), and many others over the next three years. There will be a large hangar (now only a model and assorted chalklines on the floor); 25 aircraft, restored and flyable; a part-time curator and full-time director; and last, but by no means least, many, many new

members—several thousand of them if plans are successful. Efforts are underway to tie the NWM into the local school system, the ROTC at the State University of New York—Geneseo, the Civil Air Patrol, and other groups where the NWM's educational value as an historical and instructional organization can be most helpful.

Come visit the 1941 Airshow held every September. Experience NWM's gala meeting of pilots, friends, enthusiasts, warbirds, and, of course, the public. It's a gala, fun-filled event for everyone. Museum aircraft will be on display in the air and on the ground. You'll find the traditional refreshment stands, aerobatics, items for sale, and that unmistakable environment of people enjoying themselves. The Canadian Warplane Heritage will probably be there, and possibly a representation by the Confederate Air Force. Individual pilots in their own warbirds may attend and show off their own museum pieces.

Call it what you want—a labor of love, an obsession, a dream—but whatever it is, it's certainly a testimony to our aviation heritage and a tribute to the pilots and planes of simpler, and some say better, days—days which motivated and inspired us to deeds of sacrifice and glory.

**The following is the address of the museum:*

The National Warplane Museum, P.O. Box 5, Geneseo, NY 14454. ■

F&B: KNIGHTS F-20

(Continued from page 62)

be releasing a 1/6-scale modern-day jet pilot especially for their popular F-20 kit. They now have a great selection of other pilot figures that are some of the best around. Check them out!

FLYING. If it sounds like I'm happy with the F-20, you're right! But the best is yet to come. The flying, as with any new model, is looked forward to with great anticipation and emotion. Out at the flying field though, I tried to put the emotion aside and let the coolness of my mind prevail.

The Rossi roared into life and when I felt the powerful thrust blasting out the tail, I knew the F-20 was ready. After a short taxi to the end of the grass runway I turned it into the wind and advanced to full throttle. The model started to move down the center of the strip and accelerated rapidly to flying speed. A few hundred feet later I rotated and she flew cleanly off to make the most beautiful sight you can imagine. Up with the gear and, a few moments later, up with the flaps and slats and I was off to the greatest adventure of my life. There are no words to describe the good feeling when you see your creation flying through the air with all the glory and sound of a modern-day jet fighter. Fortunately there were no enemy aircraft in the area or they would have surely met their demise against the F-20. The aerobatic capabilities are excellent in all areas and every landing is trainer-style with slow approaches and touchdowns. After the first flight I re-fueled and went back up into the blue until the batteries in the radio ran down. I'm very happy with my F-20 and my hat is off to Knights of the Air for creating the best adventure in my R/C career!

**The following are the addresses of the companies mentioned in this article:*

Knights of the Air, 1400 Rte. 32, W. Friendship, MD 21794.

Byron Originals, Box 279, Ida Grove, IA 51445.

Condor Hobbies, 17971 Sky Park Circle, Unit D, Irvine, CA 92714. ■

Club of the Month

We are pleased to present the "Club of the Month" award for May 1986 to the Manned Space Craft Center Radio Control Club of Houston, Texas. The club, which is made up of some of the best modelers around, is also a community unto itself. The Manned Space Craft Center is the "hub" of the United States space program, and most of the members work directly with that effort. The modeling efforts that go on in Houston can literally be termed "out of this world."

As with most any club involved in modeling, their activities parallel those of clubs all over the country. They have fun-flies, "un-contests," static shows, and even contests. Their meetings are geared toward an evening of enjoyment. For example, Debbie Rihn recently gave a talk and video presentation of the World Aerobatic Championships in Hungary. Astronaut Hoot Gibson, pilot and commander of prior shuttle orbiter missions and also a club member, recently gave a talk on space flight.

It is also noteworthy to mention that this club considered the members of the ill-fated Challenger crew "members of our community." A fine tribute to them was given by club president Brad Prior in the February 1986 issue of their newsletter.

Model Airplane News is pleased to award two free one-year subscriptions to this club, which are to be given by them to their deserving junior members.

Congratulations!

Each month **M.A.N.** will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). **M.A.N.** will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletters to **Model Airplane News**, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

R/C NEWS

(Continued from page 57)

airplane, it would be one that is light (no matter what a builder might do), with plenty of wing area that has very soft flight qualities. It would be an airplane that could recover from nearly any "ham-fisted" attitude into which it might be put. The Kadet Senior is just such an airplane. The biggest charm of this airplane is its construction with "sticks"! We learned about model airplane construction years ago with sticks of balsa and hardwood and the Kadet Senior takes us back (or forward) to that most sensible building mode. A ¼-inch stick of balsa can be likened to the tubing used in typical light plane construction today. Any airplane built of sticks, as opposed to typical slab side (sheet balsa) construction will be lighter simply because air weighs less than balsa wood. And a stick airplane can be just as strong. Believe me, a lifetime of free flights have proven that to me.

In any event, this is a model airplane that will suit the novice flier and he will learn a lot about model building. It will also suit the old time modeler who may be most interested in sport flying. The kit reminds me of where we've been with enough modern thinking to make building and flying this bird an easy task. The balance of moments, wing area, incidences, and stabilizing surfaces are right on the money.

Even if you don't opt for a Sig Kadet Senior as a building project, do yourself a favor and beg, borrow, or steal a set of the plans and the instruction book. The two items truly constitute a course in model building; particularly the instruction book that covers areas of alignment, parts cutting, proper joints, sanding, pushrods, covering and finishing, balance, and flying. Indeed, the booklet and plans will go a long way toward making you a better modeler. When you graduate from Sig's "Kadet University," you'll be ready for anything in this modeling world!

Mailbag Moment

Awhile back, I commented on the use of silicone rubber as an adhesive to secure hinges on R/C aircraft. Actually, I got the idea from Doss Steed and it proved a real winner; epoxy-bound hinges are now a thing of the past. Even if the silicone gets into the hinge, it remains flexible and doesn't hurt a thing. Even so, one wonders if the adhesive

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NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to: Model Airplane News, Name the Plane Contest (state issue in which plane appeared), 632 Danbury Rd., Wilton, CT 06897.

Our mystery aircraft pictured in the March 1986 issue was built by Columbia Aircraft and was designated XJL-1. It was Grumman designed and only two were ever built, one of which still remains intact and is in private ownership in Tucson, Arizona. Conceived by Grover Loening in the 1920s, it would be 20 years before it would become reality. October 25, 1946, was the day it finally flew, but by then it was too late to serve a useful purpose for the U.S. Navy. Having a wingspan of 50 feet, a length of 45 feet, 11 inches, and a range of 2,070 miles at 119 mph, the XJL-1 was powered by a 1,350-hp Wright R-1820-56 air-cooled radial engine.

Congratulations to Charles E. Hughes of Bel Air, Maryland, for correctly identifying this aircraft. Other correct entries were received from David Inskeep, Glenn C. Simpson, Benjamin W. Hartley, Richard Gleason, and many others.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail. If already a subscriber, the winner will receive a free one-year extension of his subscription.

R/C NEWS

(Continued from page 120)

would be satisfactory over a long span of time. Well, the following letter from Ralph Pearson sheds some additional light:

"I noted with extra interest your paragraph on using silicone for that pesky hinge problem. I find no fault (with the material) either. About 13 years ago I glued a hinge into a scrap block of balsa with silicone (I usually put a couple more holes in each tab). You know what happened; I broke the hinge trying to remove it. I have used this method all these years and never had one come loose. I'm glad you brought it out—I wouldn't have been believed.

"I've found many uses for the stuff. I have cast it, dyed it with Rit; I just love

the way Col. Art Johnson used it so he could remove the tail cone on his P-43 for linkage inspection.

"I couldn't resist sending along a few pictures of my SD3-30 Shorts. This, after 55 years of modeling, is my first scale attempt. I had to make my own plans from a small factory three-view to a scale of 1 inch to 1 foot. The span is 75 inches with an aspect ratio of better than 12 to 1. Power is two O.S. .10 engines. I incorporated brakes on the down elevator function.

"You may be interested that I used white Micafilm to cover outer wing panels and open areas of the fuselage. This was scuffed with dry 320 (two pieces rubbed together to take some of the "bite" out); K&B Superpoxy sticks like sin. I used two coats with 400 wet between coats, but must wait for warm weather to apply the trim. The finished airplane should fly in late June. A local dentist friend cast 10 blades for me from denture material—beautiful. These are for display scale props.

"A tip: Coverite's Balsarite is the best I've used for gluing sandpaper to sanding blocks. Two coats on bare balsa initially, one on sandpaper (back) and then apply to block with a heat gun or iron. This will

(Continued on page 127)

Classified

RAZOR BLADES: single-edge industrial quality, super sharp. 100 $4.25, 200 $8.50, 300 $12.50, 500 $20.50, 1,000 $40.50; add 10% postage west of the Mississippi. Cobbie's Gifts, Box 2, Deal, NJ 07723; 201-922-9898.

1930-1950 model magazines for sale. Low price. $1.00 for list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3.

THE BEST OF W'LYAM, BOOK IV: Don't miss this W.A. Wylam classic. *Book IV* covers "The Stinson Story" and "The Curtiss Family." Book is $5.00, plus $1.75 for UPS shipment. *M.A.N.*, 632 Danbury Rd., Wilton, CT 06897.

WANTED: R/C F-Control planes from Cox, Wen-Mac, Comet, Aurora, Testors, etc., complete or pieces, buy or trade. John Fietze, P.O. Box 593, Lynbrook, NY 11563.

SCALE MODELS BY WYLAM: Another classic by W.A. Wylam, this volume is a companion piece to the *Best of W'lam*. It covers the Consolidated A-11 through the Wright Whirlwind engine. Book is $5.00, plus $1.75 for UPS shipment. *M.A.N.*, 632 Danbury Rd., Wilton, CT 06897.

ANTIQUE MODEL IGNITION ENGINES—PARTS CATALOG, 40 pages, precision cast timers, original cylinders, point sets, drive washers, tanks, for O&R, GHQ, Bantams, Mortons, O.K., others. Large catalog $2.00 pp. Chris Rossbach, RD 1, Queensboro Manor, Gloversville, NY 12078.

SERVO SIMULATOR bypass circuit; runs your servo without R.C. Build for under $10. Send $1 pp. for schematic to J.A. Guerrero, 10940 Foothill Ave., Gilroy, CA 95020.

FIREWORKS—Fun, Safe, Patriotic; top quality, lowest prices, illustrated catalog $1; (refundable). Pyro-Sonic Devices, Box 711MA6, Grand Haven, MI 49417.

HARDWARE AND SOCKET HEAD cap screws, all sizes, low prices. Write for complete list. Example 6-32x1" only $4.25 per hundred. Lane Distributing, P.O. Box 42A, Netcong, NJ 07857.

WANTED: ***SCALE R/C MODELER*** **BACK ISSUES:** Will pay premium or swap for the following back issues: Dec. 1975; June, Aug., Oct., Dec. 1978; Oct., Dec., 1979; Feb., Apr., June, Aug., Oct., Dec., 1980; Feb., June, Oct., Dec., 1981; Apr., June, 1982. Call collect (days only) 216-759-7007. Evenings 216-759-3363. Bob Jones, 4353 Sampson Rd., #4, Youngstown, OH 44505.

GET LONGER FLIGHTS SAFELY: Monitor your in-flight fuel supply. LCD countdown timers. Beeps when counter reaches zero. Mounts easily to transmitter. Two button time set. $14.95. Keyboard time set. $19.95. Add $1.95 for postage and handling. Modelcraft, Box 435, Grayslake, IL 60030.

BEGINNERS: Discouraged by too-fast R/C "trainers"? Send $1 for three-page no-holds-barred dissertation; 20 models rated for ease-of-flying. Jim Waterman, 3818 Deerfield Dr., San Antonio, TX 78218.

LIGHTWEIGHT ALUMINUM NUTS AND SCREWS. Also large selection of stainless steel, nylon, titanium and colored aluminum fasteners. Catalog $1. Samples, sticker, catalog $5. List preferable sizes. Lightweight Fasteners, 10158 Stagg St., Sun Valley, CA 91352.

CUSTOM EMBROIDERED EMBLEMS, CLOISONNE, ENAMELED PINS: Your design, low minimum, excellent quality, low prices. Free booklet. A.T. Patch Co., Dept. 135, Littleton, NH 03561; 603-444-3423.

NELITZ 1/3-SCALE J-3 KIT: Manufactured by R&M Quarter Scale Specialist. Complete kit includes tube steel, scale landing gear and cabane, machined metal fittings, and wood (plan set included also). A.W., 111 Honeysuckle La., Summerville, SC 29483; 803-873-5534.

WANTED: SUPER-TIGRE .56 R/C B.B. F.R. new or near-new. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3.

R/C SCALE PLANS: Stinson SR9, Curtiss P6E ¼-scale $22.50, ½-scale $35.50. Catalog $1.00. Richard Barron, 11506 Ohio Ave., Youngtown, AZ 85363.

ANTIQUE ENGINE COLLECTORS: Very rare Ollison and Rice Twin. Only 26 built in 1943. SASE for pictures. Asking $1,750.00. Don Anderson, 1725 S.E. Cochran Dr., Gresham, OR 97030; 503-666-6712.

BOOKS—RAF ENTHUSIASTS: We recommend *Lancaster to Berlin* as must reading. Pocket edition $4.95. Other titles available, send $1.00. Mail Media, Inc., P.O. Box 8392M, Gainesville, FL 32605.

WANTED: Kits: Jeteo, Shark .45; Ringmaster Imperial; Stuntwagon; New Bipe; Super Bipe; Nifty; All American. Old Engines: Ohlsson; Atwood; McCoy; Forster; Torpedo; Hurricane; Drone. Gordon Boisseau, 3360 LaPerade, Ste-Foy, P. Quebec, G1X 2L7, Canada.

SUPER CYCLONE "CLASSIC" IGNITION ENGINES: .604 cu in. Factory tested ready to run (less batt., mt., prop). In display box. Dual ign. $229.50. Single ign. $199.50. Second head included FREE! Add $5.00 handling and shipping. Visa and Mastercard okay! For lit. send large SASE. Parts price list $1.50 pp. Super Cyclone Engines, Box 26390, Phoenix, AZ 85068; 602-870-3342 (auto. ans.)

WANT TO BUY: Spark plugs ¼x32 original production Champion V-2, V-3, or equivalent A-C, Autolite, etc. Any quantity. Woody Barteli, 1301 W. Lafayette, Sturgis, MI 49091.

PAPER AND STYRENE GLIDER CONTEST: For information, send SASE to Blaine Mount, 1628 Fair Park Ave., Los Angeles, CA 90041.

SCALE DOCUMENTATION: PLAN ENLARGING, photo packs, 3-views, drawings for 1,600 aircraft. Super-scale R/C plans for giant, sport, 30-page catalog $3.00. SASE for information. SPPS, 3209 Madison, Greensboro, NC 27403-1424; 919-292-5239.

AERO CLUB OF ISRAEL needs your support for aeromodeling activities. Send SASE for Newsletter. Friends of the Aero Club of Israel, 147-02C 29th Ave., Flushing, NY 11354-1441.

FOR SALE: Proctor Nieuport 28. Ready to fly; Tartan Single; $600.00. Kits for sale, send stamp; list $4.50. Monty Baker, 5045 Heather Dr., Cross Lanes, WV 25313; 304-776-4047.

FOR SALE: See air model building the way it was. *M.A.N.*, 1959 through early '75. *Flying Models*, '59 through '64. *American Modeler*, '63 through '64. *Model Aviation*, '60 through '66. *American Aircraft Modeler*, '67 through '73. Plus those old classics, *Air Trails Model Annuals*. All in good condition. P.E. Heflin, 6901 Starlite Dr., Omaha, NE 68152; 402-571-7244.

Send ad and payment to: Classifieds, *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

Non-commercial classified ads (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, $4.50 payable in advance. No charge for name and address. Additional words, 25¢ each.

Commercial classified ads (rate applies to anyone selling on a commercial basis—retailers, manufacturers, etc.). Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number.

Closing date for either type of ad is the 15th of the third preceding month (for example, January 15th for the April issue). We do not furnish box numbers. If you would like your ad to run in more than one issue, multiply amount of payment by number of months that ad is to run.

ADVERTISERS INDEX
MAY 1986

(Continued from page 123)

not loosen with hard usage but can be removed with a little heat. Subsequent pieces of sandpaper can be applied by coating only the back of the new paper.

"I enjoy your excellent articles."

Thanks, Ralph, the Shorts SD3-30 is a most unusual subject and beautifully done. I hope to tell you all about the bird's successful flights in June.

Things Used and Liked

There is a new servo connector that automatically connects an aileron servo to its receiver when you attach the wing. Manufactured by the U.S. Connection*, the unit's primary connector is a substantial L-shaped two-part molding. The "L" leg epoxies to the fuselage side, while its foot is secured to the wing's bottom. This installation is accomplished while the unit is connected. When finished, this primary "L" disconnects automatically (or vice versa) each time the wing is attached or removed from its fuselage. In a crash, if the wing flies free, the same automatic disconnect comes into play. Each half of the primary unit is connected to receiver and servo wires by the usual plugs that are available for both Airtronics and Futaba equipment. This unit is really slick for ailerons, flaps, retract servos; indeed, any function where the servo is in a removable part of the aircraft separate from the receiver unit.

The trade show season is upon us as I write this column. The California show and the WRAM show are already history. It won't be long before we know what new products will be absorbing our hobby dollars in 1986 and beyond. I'll tell you this, Byron* has a new airplane that is a real departure from anything they've done before; *perhaps that anyone has ever done before.* This is a trainer that is so simple, little more than four or five hours are needed to assemble it. The bird has a fuselage that is nothing more than a one-inch aluminum pipe. A molded ABS pod encloses equipment and wings and stab come from Byron's recent Glasair. The entire concept is very clever and makes the best test bed and trainer I've ever seen in the giant aircraft area. You'll hear more of this in future columns.

Art Schroeder, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Sig Mfg. Co., Montezuma, IA 50171.

U.S. Connection, P.O. Box 4208, Vero Beach, FL 32964.

Byron Originals, P.O. Box 279, Ida Grove, IA 51445. ■