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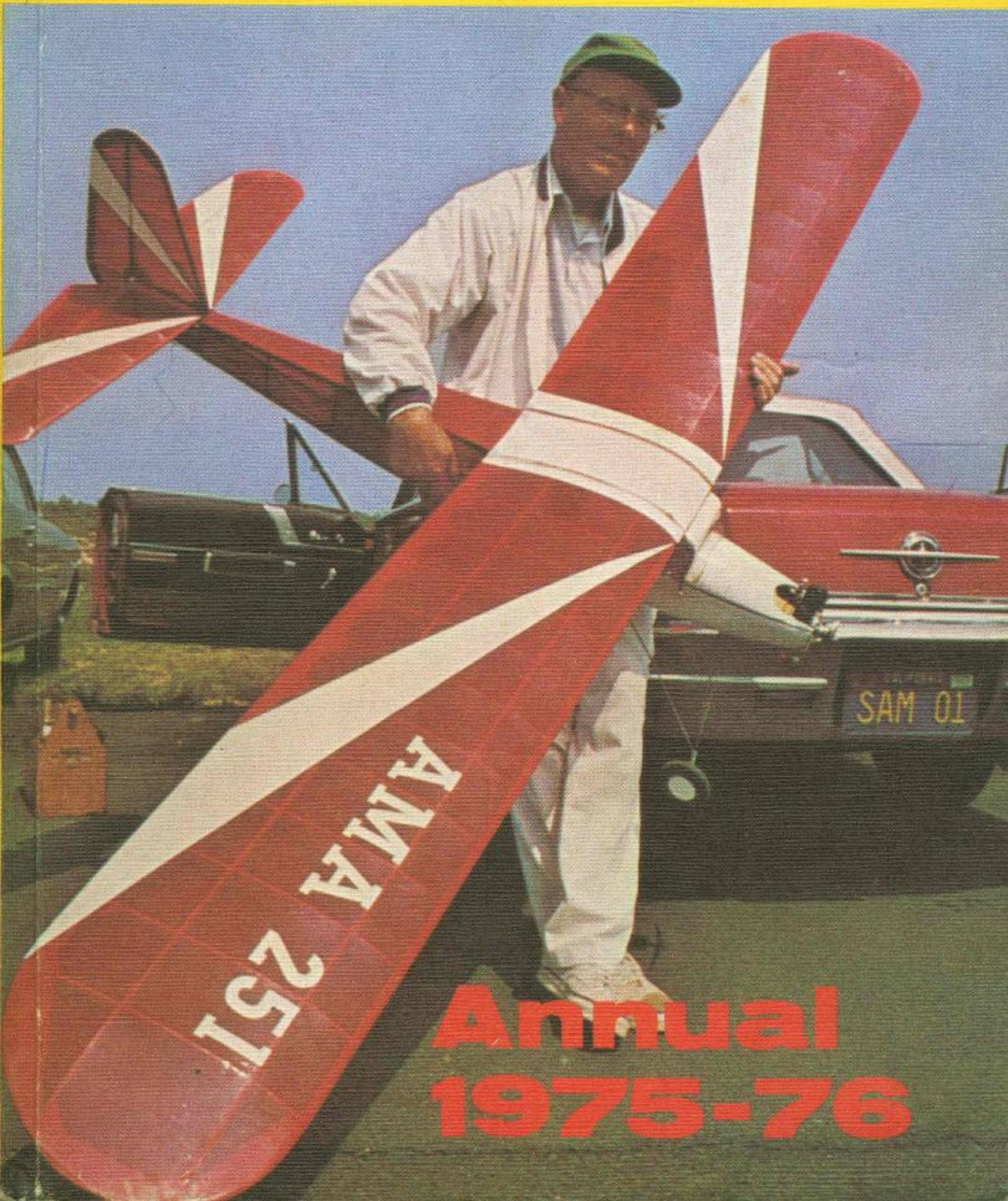

Annual 1975-76

AEROMODELLER ANNUAL 1975-76

A review of the year's aeromodelling throughout the world in theory and practice: together with useful data, and authoritative articles, produced by staff and contributors of the *AEROMODELLER*

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AEROMODELLER ANNUAL 1975–76

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INTRODUCTION

Despite the galloping inflation which has sent prices rocketing in all directions except downwards, aeromodelling has continued to enjoy the incredible boom which we noted this time last year. If anything, the boom has been even greater, for although Value Added Tax went up by 17% on radio equipment, the gross cost of a radio outfit in Sterling prices is far cheaper for the British modeller than for his opposite numbers in other European countries.

The imported items have risen as the international monetary exchange rates knock the Pound Sterling lower, and a reaction to this has been (at last!) the blossoming in Britain of many small firms making kits.

For years we have campaigned for new kits to suit the novice aeromodeller and now we have lots. Sleeve bags of balsa parts for chuck gliders, simple boxes for kits to make A/1 gliders or small rubber duration designs are just what have been needed. The new brand names are sure to find a welcome market. One of them secured the agreement to make the BBC Hawk, a double delta take-off of Frank Ehling's famous Dart Dip which has sold by the hundreds of thousands in the U.S.A. The Hawk was demonstrated in the 10 part BBC-TV programme "Model World" and so had a magnificent send-off in mid year. It ought to go on for ever as a standard first-time recommendation by all model shop proprietors and club leaders as it offers instant success after an hour or two of very simple structural assembly.

But balsa is no longer cheap—*was it ever*? At one stage it was also rare. Empty warehouses in Britain were a symbol of their reliance upon an unstable South American situation. When the crops (bananas etc.) and oil are more remunerative, the shippers are less interested and our supplies suffer. It never ceases to surprise us how manufacturers maintain the flow of balsa kits, sheet and strip wood from what is after all, a weed growth in the Ecuadorian highlands!

The year started with a disappointment which although only affecting about 200 modellers directly, had a significance that might change the international outlook in Coupe d'Hiver. What happened was that a postal strike paralysed French communications at the end of 1974. The French Model Federation could not proceed with organisation of the Coupe d'Hiver International in February 1975 although the strike was by then long settled. As originator of the class and this particular event, Maurice Bayet of *Modele Reduit D'Avion* was naturally dismayed and he has given sanction for the Anglo-French challenge to take place near London during November '75. What the support will be is anyone's guess but it might possibly provide just the right kind of boost for the class in Britain. World Championships take place too late in the year for us to comment here: but the National Championships in May were big, well attended and cold enough to remain a permanent memory for all who attended. The suitability of R.A.F. Finningley is questionable but it was Hobson's Choice for the S.M.A.E. and they made the best of a 2 mile concrete strip by filling every niche with the 40 contests. Of all the impressionable events and the fine International support, our particular recollection is of the youngsters taking part in Sue Miller's events for the under-16s. The standard glider (a *Sattelite*,—the model which narrowly lost the vote for being the F.A.I. Standard Junior glider design) was a great success and to see an eleven year old towing an A/1 masterly in a 15kt breeze when adults elsewhere were making a muck of it, was very heartening.

Among the contests we've seen in the months since writing last year's intro to the Annual, the one which gave us greatest satisfaction was the *Militky Pokal* in Switzerland—for electric power; the greatest thrills came in the Combat finals at the Nats, and the most emotive was the Class B team race final where for once in twenty years the Taylor, Yeldham, Oates and MacNess team had to watch (their old model fell apart in heats, and its repaired tank failed the test by becoming oversize) and after a dramatic hare and tortoise start the Parisian Magne—Sugurue team won the British Trophy at the cost of a French finger tip.

Quite a year—and one which will confirm the solid support for Aeromodelling when all around us in the world teeters on the brink of collapse.

On the Cover

John Pond—United States ambassador for old time (note his car registration) and the R/C assist which he promotes in following pages.

"Mr. Old Timer" himself, with Merco 60 powered "New Ruler" converted to radio control as described in this feature. See also, the cover photo of John Pond with his far travelled car and R/C assisted "Dallaire" with Ohlsson 60.

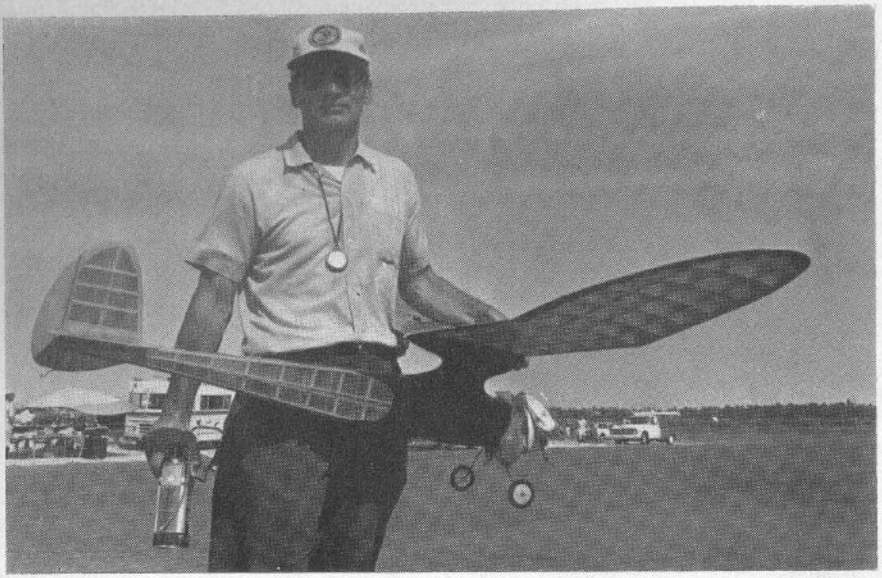
OLD TIME FREE FLIGHT WITH RADIO ASSIST
by John Pond, "SAM 01"

Without a doubt, the emergence of the old Timer Events in the sixties was the best thing that could have happened to the ever dwindling interest in sport free flight. During the past decade, the concept of old timers has spread from the United States across both the Pacific and Atlantic Oceans. In Australia, the events have been adopted as a formal competition event at their Nationals.

Just about the time the old timer movement was fully recognized by all phases of modelling, an even better fun idea developed on the Eastern Coast of U.S.A. in the form of *radio assisted* free flight. This idea swept the Atlantic Seaboard like wildfire. Here was a chance to fly those old nostalgic models of huge wingspans competitively from small fields with no fear of losing many months of loving labour (not to mention the extraordinary cost of balsa nowadays).

It soon became quite apparent with radio control assist, the average modeller did not have to conform to the hot pylon concept for ultimate performance. With models being controlled with in-flight trim, many of the excellent performing (and realistic looking!) cabin designs formerly powered by slow turning engines, were then able to utilize modern high power R/C glow engines. This very fact brought out many modellers who had enough of modern high speed stunt models going under the guise of sport or trainer types.

Of course, certain types of models will dominate any sport based on the ease of construction, availability of kits, and general pleasing lines. In addition, any model enjoying a modicum of success at the competitions is immediately copied as there is an implied guarantee of success for the imitator.



Most popular of all the subjects for R/C assist is the Cleveland Playboy Senior, a pylon design for '49 to '60 engines which performs well on wheels or floats and has relatively simple structure. It looks great when covered with bright silk.

For the modeller who wants to fly from congested areas in just about any type of weather, the old timer radio assist model offers not only nostalgia, pride of craftsmanship, and realistic flying, but a most relaxing form of flying; a combination of power and glider operation that allows the pilot to relax and converse with his fellow modeller and friends.

By this time, the reader's interest has been aroused to the point to ask *what* is the best model to use? Experience has shown that the most popular kit designs (in their day) are *still* the most popular and for good reason; they *still* fly well! Probably the best cabin models (if size is no objection) are Taibi's *Powerhouse*, Scientific *Miss America*, Berkeley *Super Buccaneer*, Scientific *Mercury*, Comet *Clipper*, and the redoubtable *Buzzard Bombshell*. In the pylon area, the *Playboy Senior* is far and away the most popular of all. Simple of construction, high performance, and ease in handling are the attributes leading to the great numbers of this model in use. Those preferring time consuming intricate construction (which show craftsmanship at its best), the Comet series of *Sailplane* and *Zipper* are best.

Surprisingly, there are quite a few sources of old time kits in the U.S.A. The most popular are the P & W Partial Kits (producing ten models) and Chuck Gill Distributor manufacturing the *Powerhouse* and Scientific *Coronet* Cabin models. For those who prefer other designs, plans are available for scratch building from John Pond Old Time Plan Service, the "Model Builder" magazine, and a few scattered designs from Aeromodeller Plans Service. All plans provided are strictly free flight designs, and certain modifications are in order for radio control installation and use.

Before any construction is attempted, it must be borne in mind the models

will be powered by modern glow engines. In addition, the model will be carrying a payload of almost a pound. These two factors, added weight and faster flying, will induce stresses that were not considered in the original design. Of all parts, the wing is the most vulnerable and will be considered first.

The writer has found from long and often bitter experience that spruce spars are the best. By reducing the size of the original spars where say $\frac{1}{4}$ sq. in. balsa is specified, to reduce it to $\frac{3}{16}$ sq. in. spruce; the addition of added weight is very small, while the strength factor is more than doubled! In addition, the writer prefers the combination of "D" spar and box spar. (See *Fig*. 1). This has proved to be virtually unbreakable.

In converting the wing to radio control then, the design must consist of two forward spars with two rearward spars forming the "box". These spars are then webbed, that is to say, vertical soft $\frac{1}{16}$ in. (watch your weight here!) balsa sheet is placed between the ribs and glued to the spars. At the centre section, $\frac{1}{8}$-in. birch (three to five veneer) plywood is employed for at least two bays of ribs on each side of the dihedral joint. You may smash your leading and trailing edges, crumple the ribs, but you won't be breaking any spars!

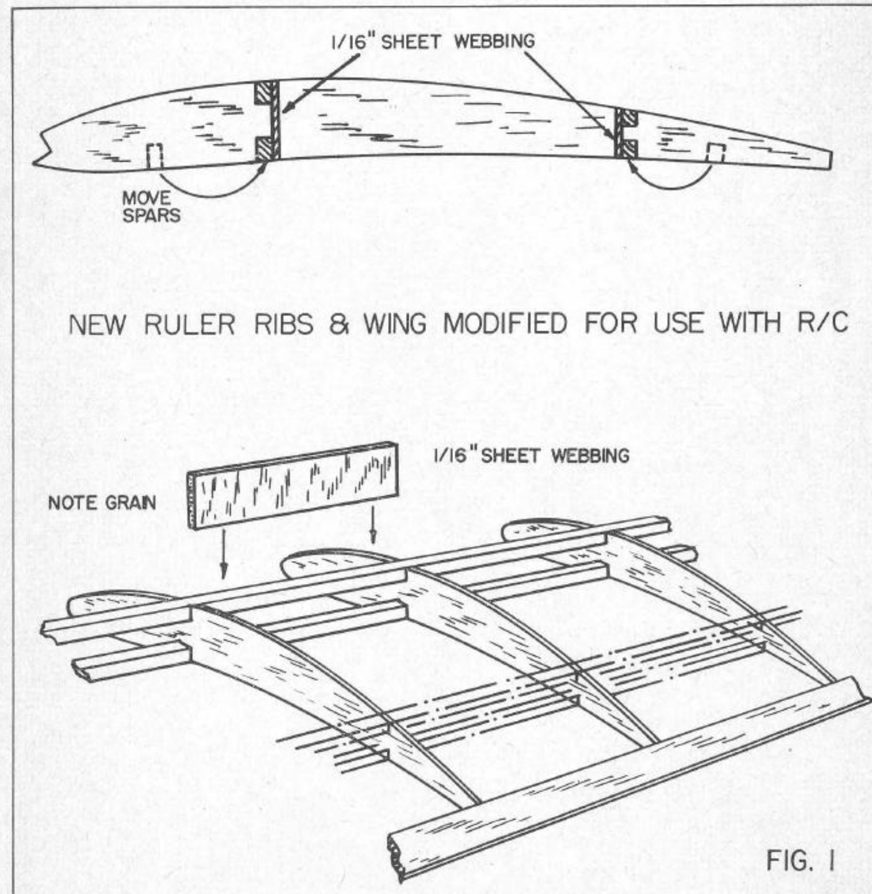


FIG. 1

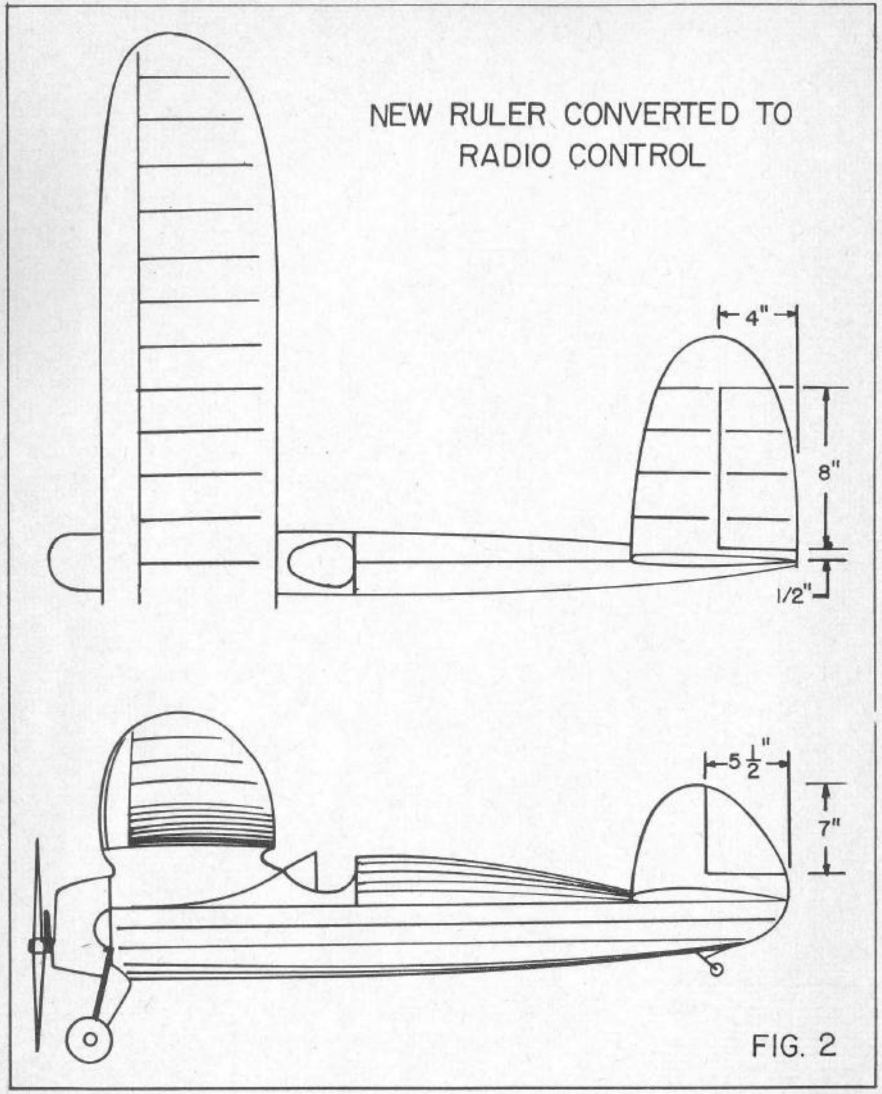


FIG. 2

For maximum strength, the writer uses $\frac{1}{16}$-in. soft balsa sheet leading edges, top and bottom. This forms the "D" spar referred to earlier. One can fully stunt his old timer, a feature to be prized, as many times the model will loop in a high wind of its own volition. Moreover, the model can be dived or spun with impunity allowing the model to escape some of those remarkable updrafts known as thermals.

The tails now come in for our scrutiny. Referring to *Fig*. 2, the reader will immediately notice the very large control surfaces. Contrary to any other line of reasoning, these large elevators and rudders with commensurate large movement

are absolutely essential in the glide. Granted, controlling the model under power will be a shade touchy, but if the model is properly trimmed like any good free flight should be, then the amount of flight correction during the power run should be minimal. After all, we *are* flying free flight with occasional radio interference!

Once the power has cut, the glide, which is generally superlative, is quite slow. Hence, large surfaces and large angles of movement are required. A good ratio to bear in mind would be a rudder at least 40% of the original fin area.

Elevators fall in about the same category but can be flown as low as 25% of the original stabilizer. Movements should be unrestricted, employing the full throw of the servo and any multiplying factor available on the horn. This will be discussed later, on flying trim.

The fuselage (the thing that holds the wing and tail together) is the last item to consider. Fuselages can be reinforced rather simply by the addition of sheeting around the nose and heavier plywood firewalls. Allowance should be made to hold the tails to the fuselage with nylon bolts. Rubber bands for these surfaces are to be avoided. On the other hand, wings are *always* rubber-banded on to the pylon or fuselage.

The selection of the proper power plant generally depends on your particular interest, sport or competition. The present rules for the limited engine run duration events dictate the hottest engine you can crowd into the nose (and yet conform to power regulations). The majority of model builders use glow plug engines as they are easily obtainable, reliable, and operation is simple. A third servo is generally used to retard the throttle, which if set properly, will give the same effect as a shutoff timer. There are advantages to being able to throttle your engine, particularly in the test flights. Now you don't have to stand in agony while your model spirals in a death dervish towards the ground. Simply chop the motor and straighten the turn! The mortality rate on radio assisted free flight models is quite low.

In the **Texaco** type events, when the emphasis is on engine economy, the model is given $\frac{1}{4}$ oz. of fuel per pound of model up to seven pounds. Most glow

A Comet Clipper R/C assist is released, the payload making little difference to the sprightly take-off characteristics. Scene is the 1974 SAM Champs at NAS, Lakehurst.

Embroidered patch souvenir of the 1974 SAM Champs (left) where the Radio Control Assist event was well supported, especially by resident Cdr. Jack Bolton, USN (right) with his personal fleet of Old Timers, covering all classes and with a "New Ruler" prominent in the foreground.

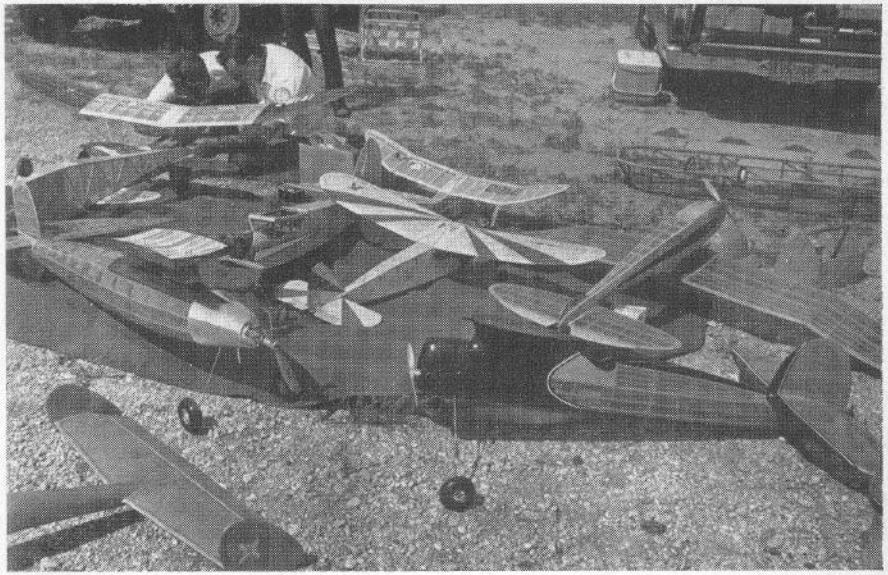
engines are notoriously poor on fuel economy. Hence, it is best to use an old ignition engine or better yet, convert one of the modern glow engines. With new engine porting developments, metallurgy progress, and better quality control, the modern glow engine when converted to ignition is a remarkable fuel miser. The writer has never had less than seven minutes motor run of $1\frac{3}{4}$ oz. of fuel utilizing a Veco 50 or Enya 45. Surprisingly, the Merco 61 is the champion of all fuel hoarders running well over 10 minutes on the same allotment. (As discovered by Maynard Hill in his world record attempts).

However, there are certain drawbacks to be overcome when using spark ignition. The radio receiver must be completely shielded from the ignition components. Copper boxes are best, but brass and tin can be used to house all ignition parts *including the batteries*. (Tests show batteries give off quite a lot of RF). Articles have been published on how to seal the ignition box and properly ground it, so the writer will not repeat this process. One word of caution. Do not use sensitively tuned radio sets as they more readily accept the signals given off by the ignition. Many of the older sets are excellent for this purpose.

A few construction hints are in order before we complete our "free flight". Generous use of the expoxy glues on dihedral joints and other high stress points is highly recommended. In addition, the expoxy should be painted on all firewalls, inside of cowls, and other areas exposed to exhaust fuel. After all, we are going to keep this model a long time! No out of sight flights here!

Covering: Probably the most debatable subject of all, but for long wear and tear resulting from hundreds of flights, the new mylar coverings such as "Monokote", "Solarfilm", etc., are by far the most durable. Best of all, the weight saving over silk and dope is surprising! Try weighing silk with six coats of dope and compare! Regardless what the purists say, we want the model to look good and most of all, to LAST!

So we have now arrived at the day we have completed our *Buzzard Bombshell* with a hot ·29 cu. in. engine in the nose, and we are ready to fly. While dozens of articles have been written on how to trim a free flight, only a few principles apply here. Assuming you have built the model so that the tails line up with the wing (as viewed from the front), check to see if you have at least one to two degrees of incidence in the wing. The motor should also have a slight amount of



downthrust, varying from two to three degrees. The model should be balanced *exactly* on the centre of gravity for maximum performance. A nose heavy condition for the initial flight is preferred.

Before going to the field or before attempting any flights, check the motor idle to see that the engine quits when the throttle lever is pulled to full retard. This is a must for any trial flights! Some idle should be retained for low power-on attempts. Also, check your tail surfaces to be sure all moving surfaces are dead zero-zero. Before flying, put in *down* trim on the elevator by use of the elevator trim lever. This will keep the model from zooming too steeply on take-off. Looping on take-off is generally fatal for any type of model. Check the location of the pushrod in the control horn. It should be at least one hole away from the most sensitive set-up (the closest hole to the moving surfaces). Control should be no less than $\frac{1}{2}$-in. each way at the trailing edge. The more the better! The amount of desired control can be arrived at after several flights.

Now, assuming everything is in order, the model is carefully lined directly into the wind and the motor is started. For a start use only $\frac{2}{3}$rd power. Any less than this is as bad as full power. You simply cannot control a slow responding model. Make sure you have someone with you who knows how to control a radio model. Learning by yourself is a laborious process of rebuilds!

As noted before, release the model directly into the wind. As the model gathers speed, gently (and I mean *gently*!) feed in a little *up* elevator. As soon as the model breaks ground it should climb of its own volition. If it is found the model is still climbing too steeply, the pilot will have to push the elevator stick gently forward. In any case, give the model a chance to fly! Do not immediately go through a series of corrections, most of which it turns out are unnecessary. After all, this design used to fly by itself. It isn't going to need that much help!

The initial flight is always the one that generates the butterflies in the stomach. If your first flight is successful, fly again immediately! The main point is to get the model trimmed out to the point where a minimum of commands are required. Of course, on windy days, the model must be kept heading into the wind, necessitating alert control to any bad turning characteristics.

The power cuts. You are probably better than 300 feet high. Now the real fun starts. You are immediately amazed at the transition to a slow and stately glide. This is the point where you can relax and start showing off your old free flight prowess in hunting up a thermal to prolong the glide portion of the flight.

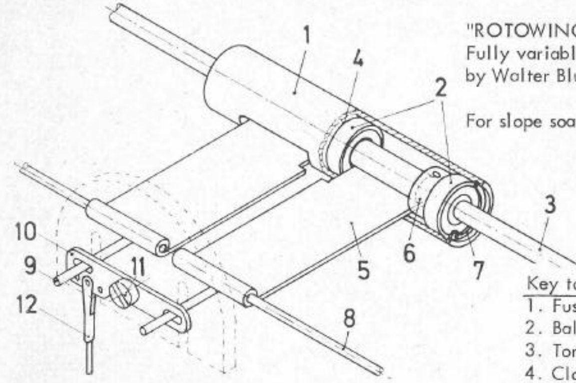
Although it has been said many times, repeating the old warning won't hurt. *Don't let the model get downwind* during the early stages of learning. When facing the model downwind, all rudder commands are reversed; something the neophyte finds hard to overcome. Radio models have been lost this way! Besides, it is a lot easier to fly the model in front of you.

If you haven't been converted to this form of flying by now, you will be when you bring the model in for a landing and find it will practically glide in by itself. A short walk to retrieve it (perhaps a dozen or so steps at most) will make a believer out of you! This old timer *radio assist* is the greatest thing yet!

ALL-MOVING SURFACES

by Walter Blumer, Switzerland

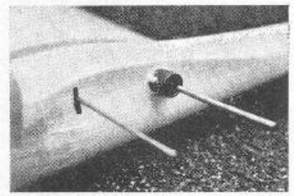
Use of fully articulated surfaces for extreme efficiency in aerobatics has long been the subject of experiment. In the U.K. it has two main proponents in Messrs. Annenberg and Falconer but few models have actually appeared. The Weybridge "Dumbo" man-powered aircraft has all-moving wings for different reasons, and proved the practicality. Now the concept has been developed for aerobatic slope soaring in Switzerland and these sketches from "Aero Revue" will inspire others to experiment.

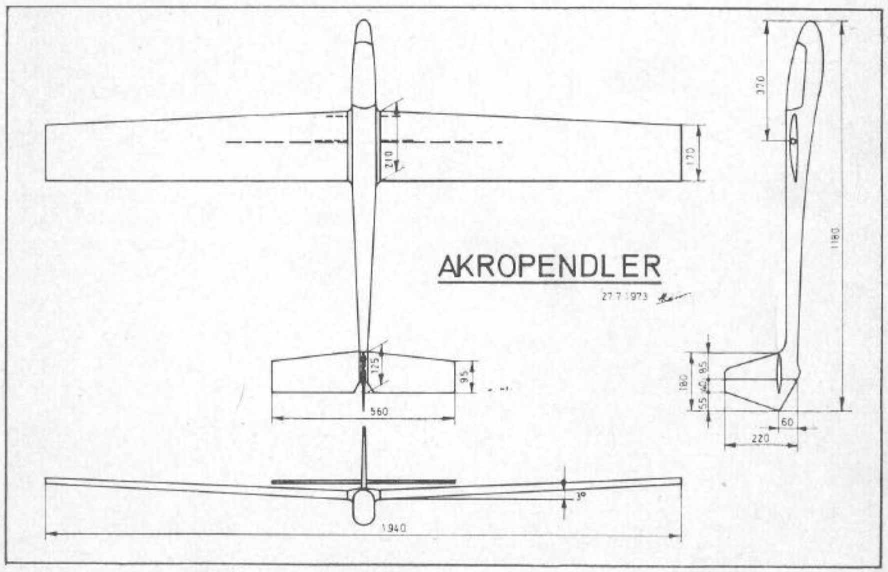


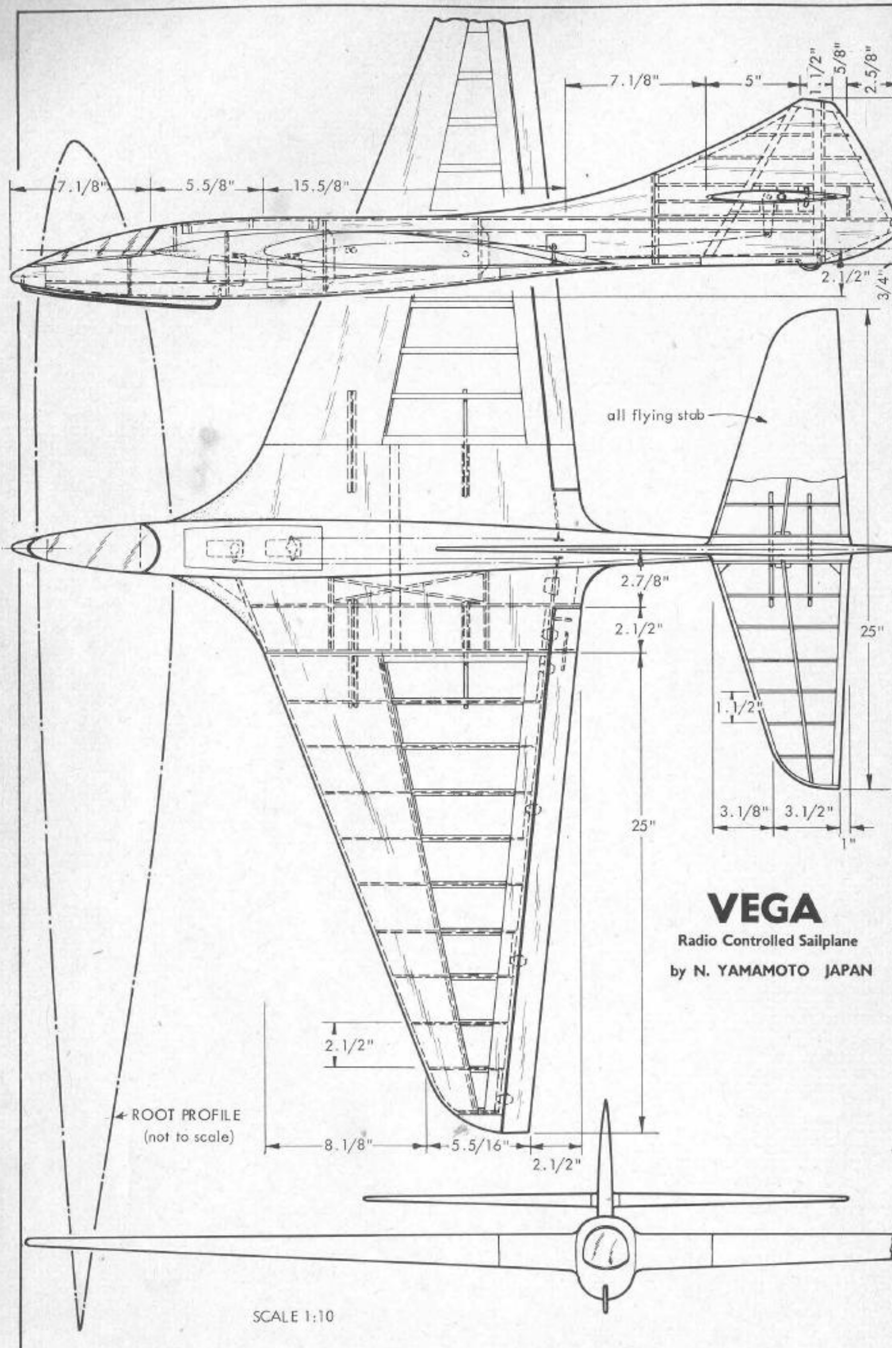
"ROTOWING"
Fully variable incidence wing control
by Walter Blumer, Nussbaumen, Switzerland

For slope soaring aerobatics

Key to sketch
1. Fuselage mounted outer casing
2. Ball Bearing torque rod supports
3. Torque arms/wing panel joiners
4. Close tolerance bearing and spacer
5. Incidence actuating plate
6. Locking ferrule
7. C ring retainer
8. Front spar position rods
9. Actuating link
10. Tee crank on
11. Crankpivot
12. Servo clevis





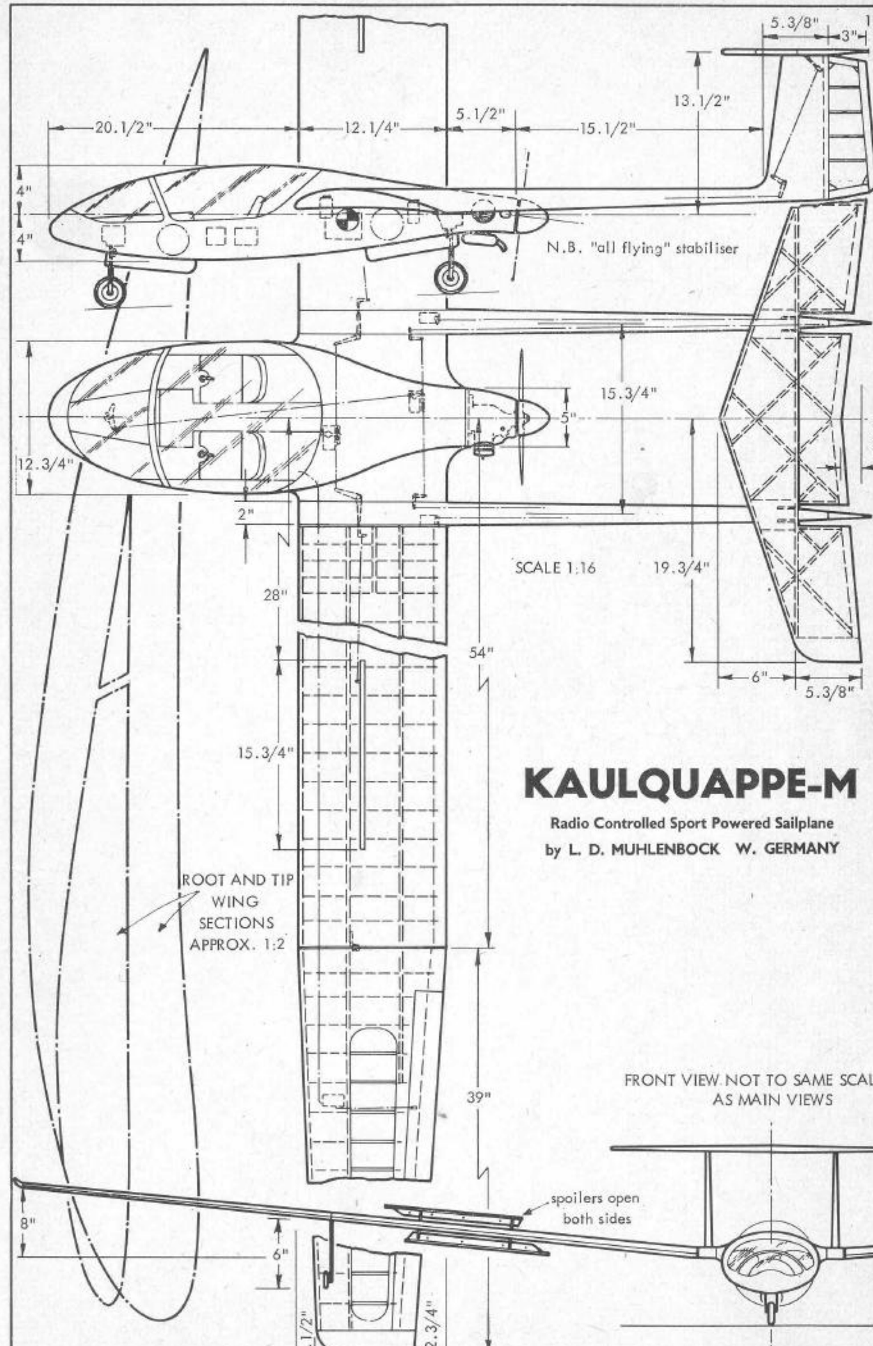


VEGA

Radio Controlled Sailplane

by N. YAMAMOTO JAPAN

R/C TECHNIQUE JAPAN

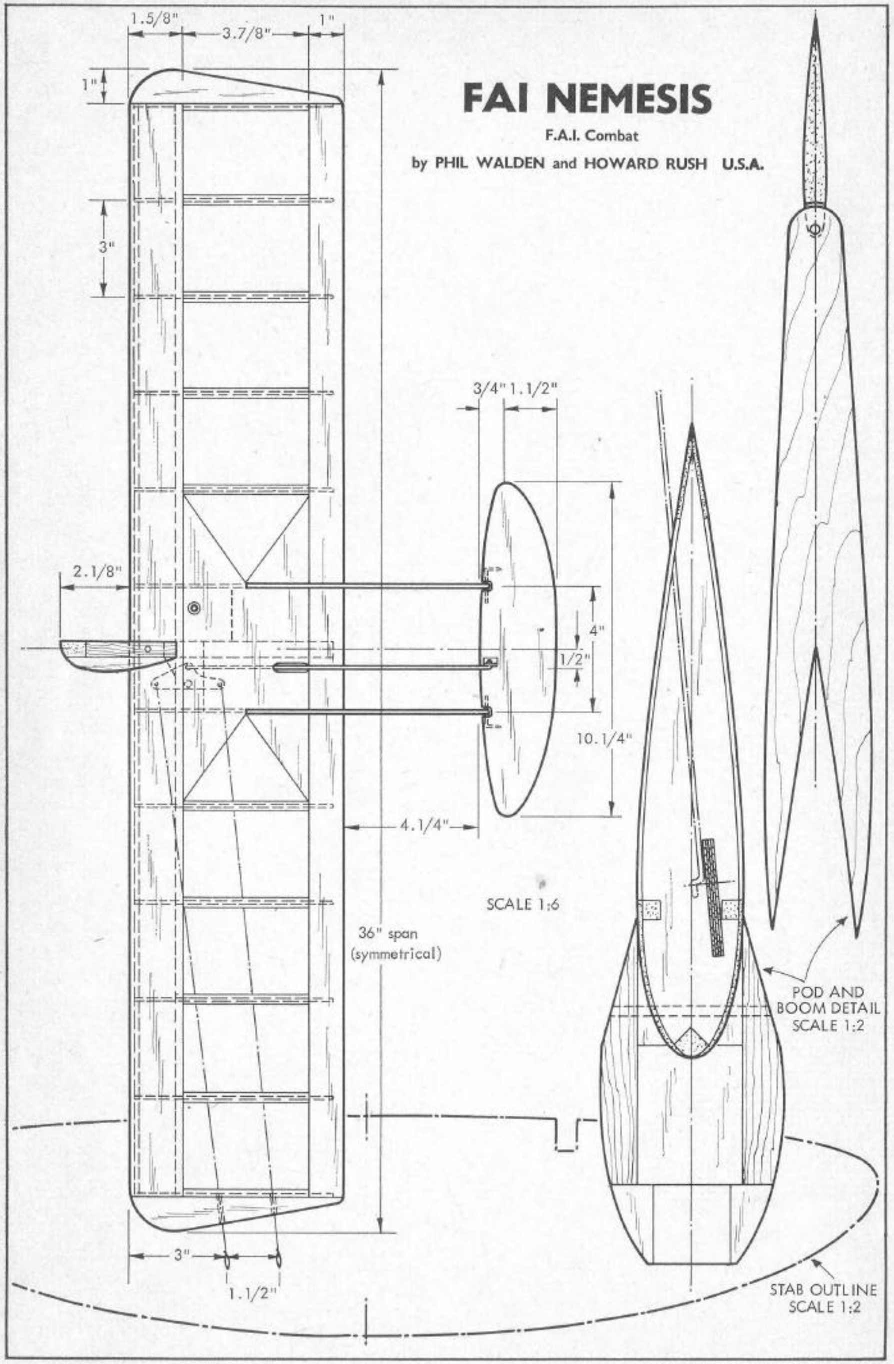


KAULQUAPPE-M

Radio Controlled Sport Powered Sailplane

by L. D. MUHLENBOCK W. GERMANY

MODELL W. GERMANY



VANCOUVER G.M.C. CANADA

Peter Tribe really started something when his "Razor Blade" plan was published in 1959—the basic planform remaining the standard for many years. The section was thin with the leading edge just 3/8 in. deep, and had spruce spars for rigidity, while the trailing edge was from 1/4 in. sheet—still frequently employed today. A classic design—and the use of an Oliver Tiger shows just how long this diesel has reigned supreme.

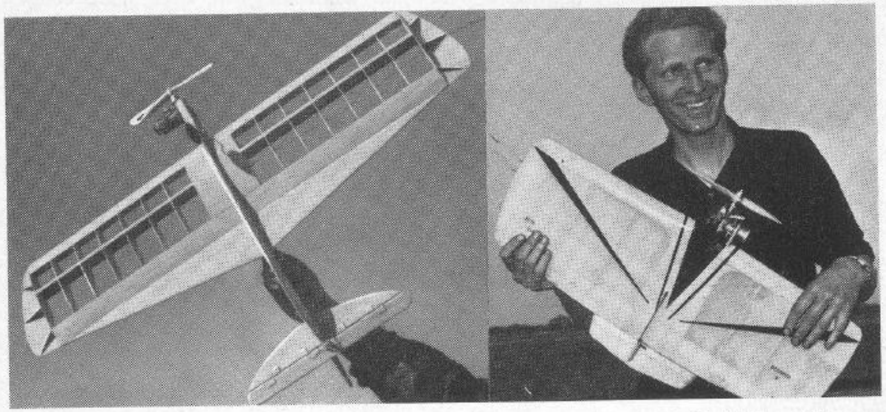
COMBAT—WHICH WAY NOW?

by P. S. Richardson

SINCE combat flying was introduced into Gt. Britain in the mid '50s it has rapidly progressed to being the most popular and best supported competitive control line event. This is hardly surprising, as the event has proved to be enormous fun for both competitor and spectator alike, while the models themselves are quick and cheap to make; in addition suitable engines are not prohibitively expensive to buy. As success depends upon highly manoeuvrable and fast machines, quick reflexes from the pilot plus a "well trained" pit crew, the event appeals particularly to younger enthusiasts flying in the company of like-minded club members.

In common with any other competitive class of aeromodelling, model design is constantly changing in the search for a better machine, but there have been several "landmarks" over the years, which have caused a slight stagnation of ideas. The purpose of this feature is thus to trace the history and determine the current design trends.

Since combat flying originated in the U.S.A. (albeit with 0·35 cu. in. motors) it was logical that their models should be copied, but scaled down to suit "our" rules which then insisted on an engine capacity limit of 3·5 c.c. These were commonly profile-fuselaged stunt models with wing areas in the region of 300–350 sq. in., or else "plank wings" with an upright engine mounted on a rectangular box fuselage which carried a conventional tailplane close to the trailing edge to give a very short moment arm.



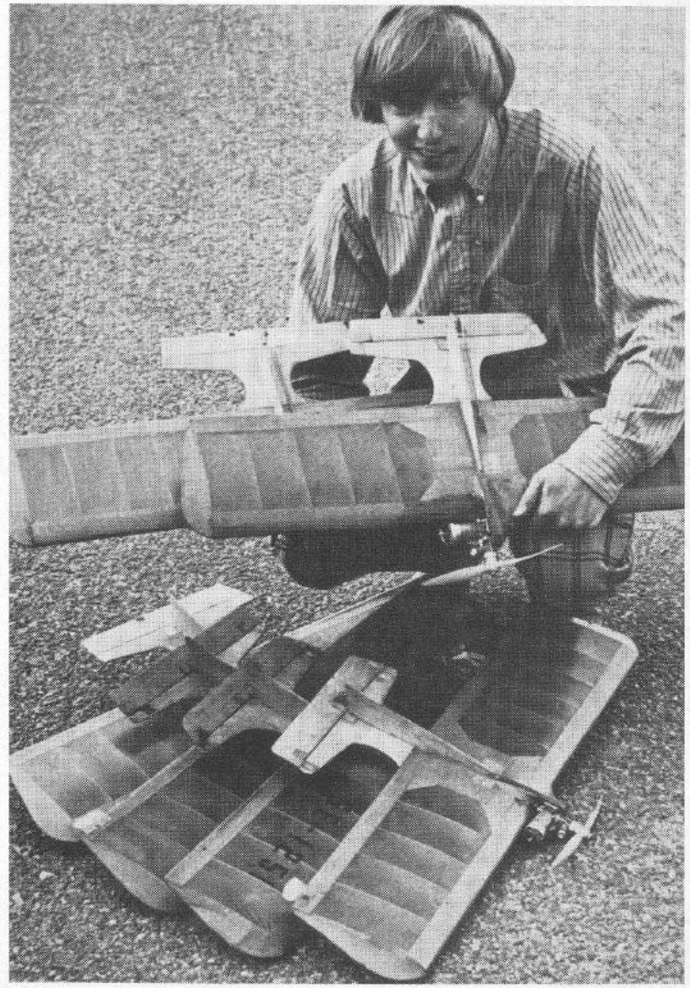
Two milestones in design. At left is George Aldrich's famous "Peacemaker" with its profile fuselage and very sturdy wing construction. A really good flier, but too heavy and slow to be competitive today. Compare the wing platform shape with "modern" trends. At right is Mike Davis' "Dominator", first of the "new breed" of flying wings, with its "flat" sectioned ribs, thick, rounded leading edge and absence of spars. A really tough and highly successful model—still an ideal combat trainer.

Perhaps the first "classic" design to emerge in this country was designed by an American—George Aldrich who gave us the much loved *Peacemaker*. This profile fuselaged, thick wing sectioned model had an excellent aerobatic performance, but was handicapped with a weight of around 20–22 oz. for its 280 sq. in. wing area. Nonetheless, it remained quite competitive for several years, and was widely copied. However, modellers were quick to appreciate the drawbacks of a conventional profile design—the tailplane was rather vulnerable in a crash and fuselage breakages were quite common. Working on the principle that "what isn't there can't get broken", the flying-wing increased in popularity, the "standard" for many seasons being Pete Tribe's *Razor Blade*, a design which won or was placed in nearly every combat event entered in 1958. This model featured a thin symmetrical wing section, a pair of spruce spars to aid rigidity, and a very strong "fuselage" arrangement with bearers extending over the full chord. Being basically a $32 \times 7\frac{1}{2}$-in. "plank" the wing had a trailing edge extension to carry the elevator—a basic shape that has retained popularity through the next 17 years! No doubt about it, the *Razor Blade* was a milestone in combat development, and while many modellers attempted variations on this theme, nothing radically different appeared until the middle '60s. That is not to say other approaches were not tried, they were, but most people stuck to wing areas of around 220–260 sq. in. thin symmetrical airfoil sections and quite flexible, spar supported structures, although weight-conscious people were striving to keep the total to under 16 oz.

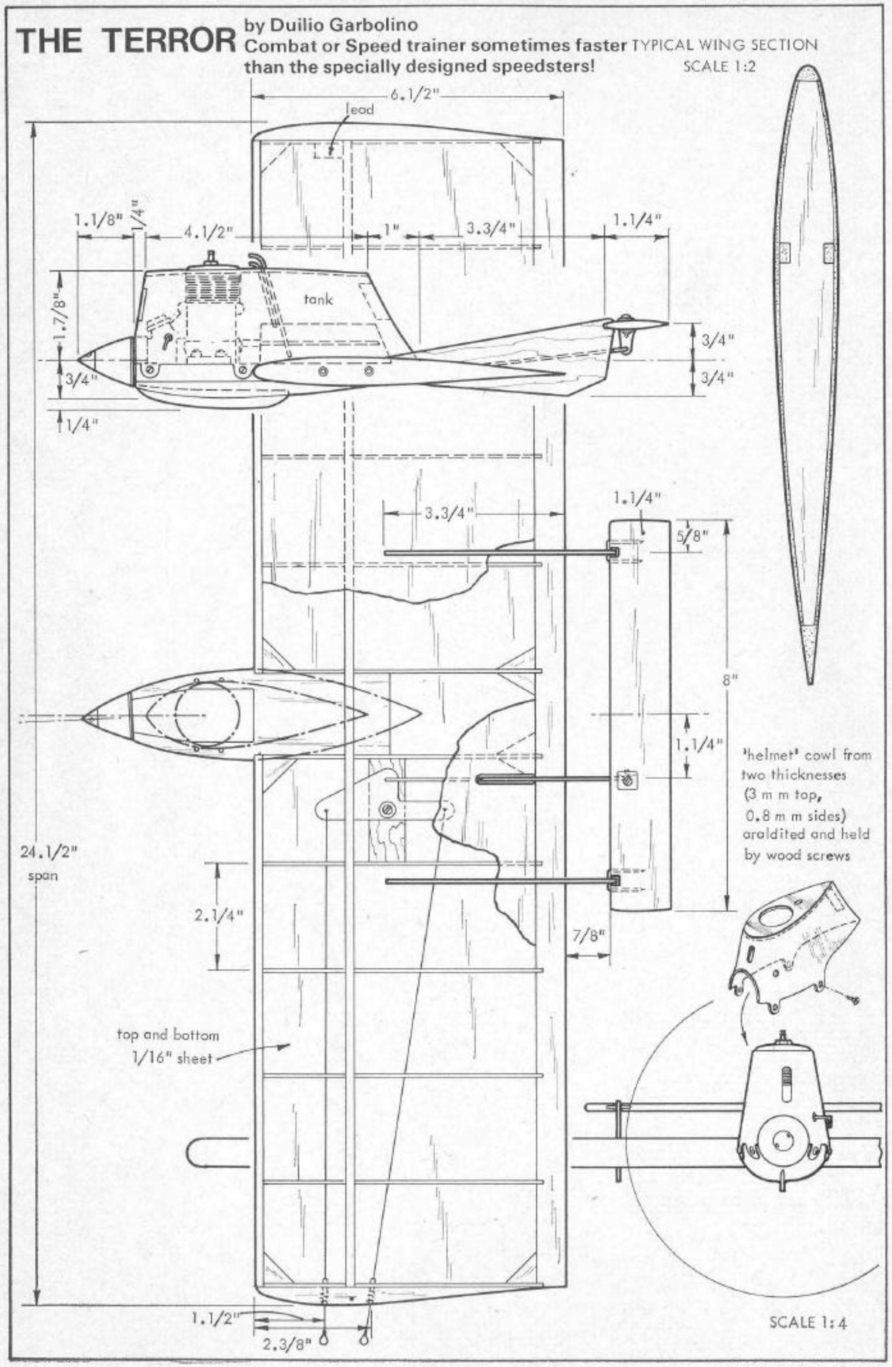
However, in 1965 Mike Davis won the Criterium des As meeting in Belgium with his *Dominator* design, and what a change that was! Gone were the thin sections, fairly high aspect ratios, spar reinforced wings, and in their place was a model with a "strange" airfoil, being one inch thick and dead flat for 33% of the chord before tapering down to the sheet trailing edge slotted into the ribs. The

leading edge was laminated from sheet and was well rounded, while area was up to around 275 sq. in. Spars were dispensed with, and the "fuselage" abbreviated to a smaller pod to house the motor.

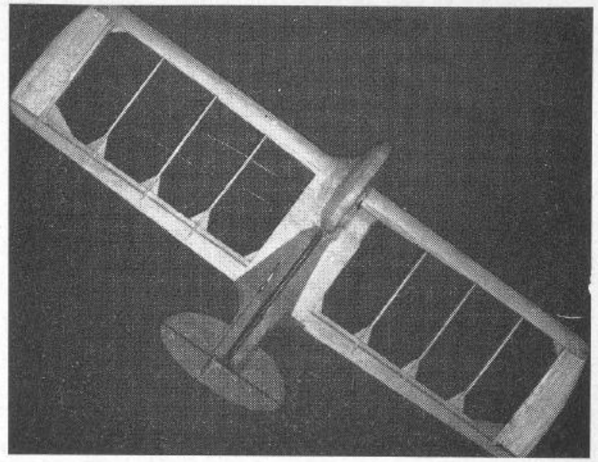
The benefits were manifold. The flat wing section enabled models to be built directly on the work bench, so that a perfectly "true" wing was easily made—very important for any model. The robust leading edge was U-shaped in section which "keyed" the ribs in place while slotting the trailing edge into the ribs aided rigidity and this, combined with the lower aspect ratio, enabled spars to be completely eliminated. This in turn made it easier to install the fuel tank, although a ply plate had to be added to carry the bellcrank mount. However, this was made adequately strong by anchoring it in place with a dowel passing through the bearers. The "fuselage" was very much shortened, but the flat section enabled the bearers to be epoxied directly over the centre section sheeting, and they were



Sweden's Steffan Larsson discovered the secret to success was light weight at the expense of strength—typified in his "Ruter-ess" model. The leading edge consisted of a $\frac{1}{16}$ in. sheet "D" box which was light (but hard to repair), while the separate tail-plane set off another design trend.



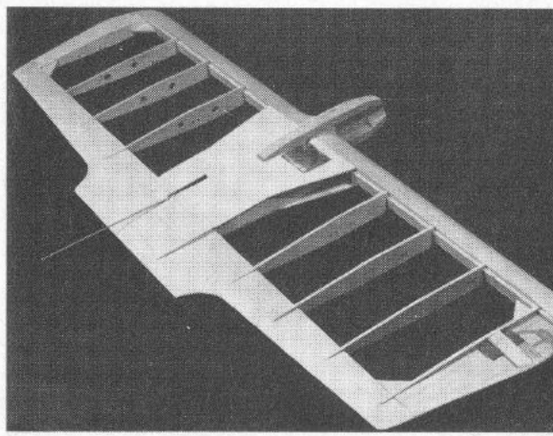
MODELLISTICA ITALY



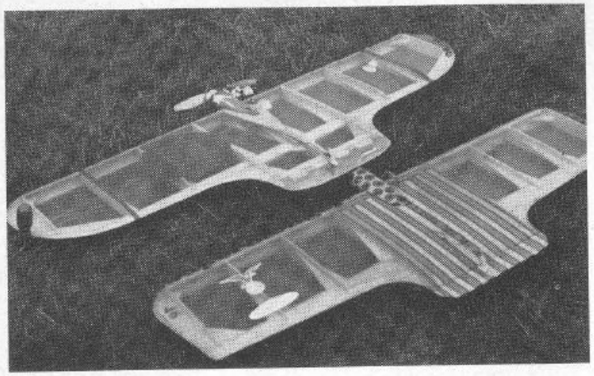
Steve Jones continued the "Ruter-ess" theme with his "Orcrist", which adapted the layout to "British" constructional ideas, which certainly improved the strength. It was very successful, as he won the 1971 British Nationals, although the separate tail proved somewhat vulnerable in "accidents".

supported by a $\frac{1}{16}$-in. ply plate and $\frac{1}{2}$-in. balsa fairing. In all, a very robust design which proved extremely successful. However, with the advantage of hindsight, Mike made just two "errors". Firstly, the swept leading edge meant that the C.G. was rather far forward, it often being necessary to add tail weight to bring it back to the correct position, and secondly, there was just a little too much wood in the design—it was all too easy to end up with a model weighing 18–20 oz. unless great care was taken in wood selection. Certainly another landmark in design!

From here, however, designs seemed to revert back to the *Razor Blade* plan form—albeit with smoother styling and lower aspect ratio—but the construction techniques exploited by the *Dominator* were continued. The "flat" wing section certainly did not harm performance, and made it much easier to build a warp free wing, so they remained. Sheet trailing edges let into ribs also gave a good compromise for strength and rigidity versus acceptable weight, so they too stayed. Leading edges, however, were frequently from 1-in. square section balsa, often supported to some extent by spruce, and all these design features were typified in the *Warlord*, a model which has many people claiming as its designer, although



The "Warlord", designed by Vernon Hunt, met with enormous success and was the first competitive combat model to be commercially kitted. Note the "standard" design features of a spruce reinforced 1 in. square leading edge, $\frac{1}{4}$ in. sheet trailing edge, "flat" sectioned ribs and sturdy engine pod. Lack of reinforcing gussets at the rib/trailing edge joint caused a weak point, but the design was highly competitive when built to weights of around 13–14 oz.



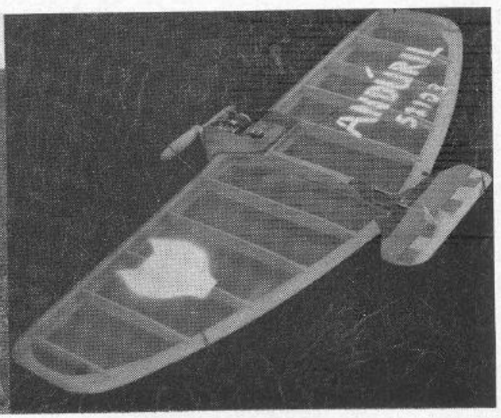
And then models began to grow! Richard Evans first produced his "Ironmonger" design, enlarged it slightly to form his "Super Ironmonger" (fore ground) then "stretched" it and increased the chord slightly to form his "Vertigo" design, seen behind. Note too how the centre section sheeting has been reduced to the minimum, the lightening holes in the trailing edge extension, plus the use of iron-on mylar covering.

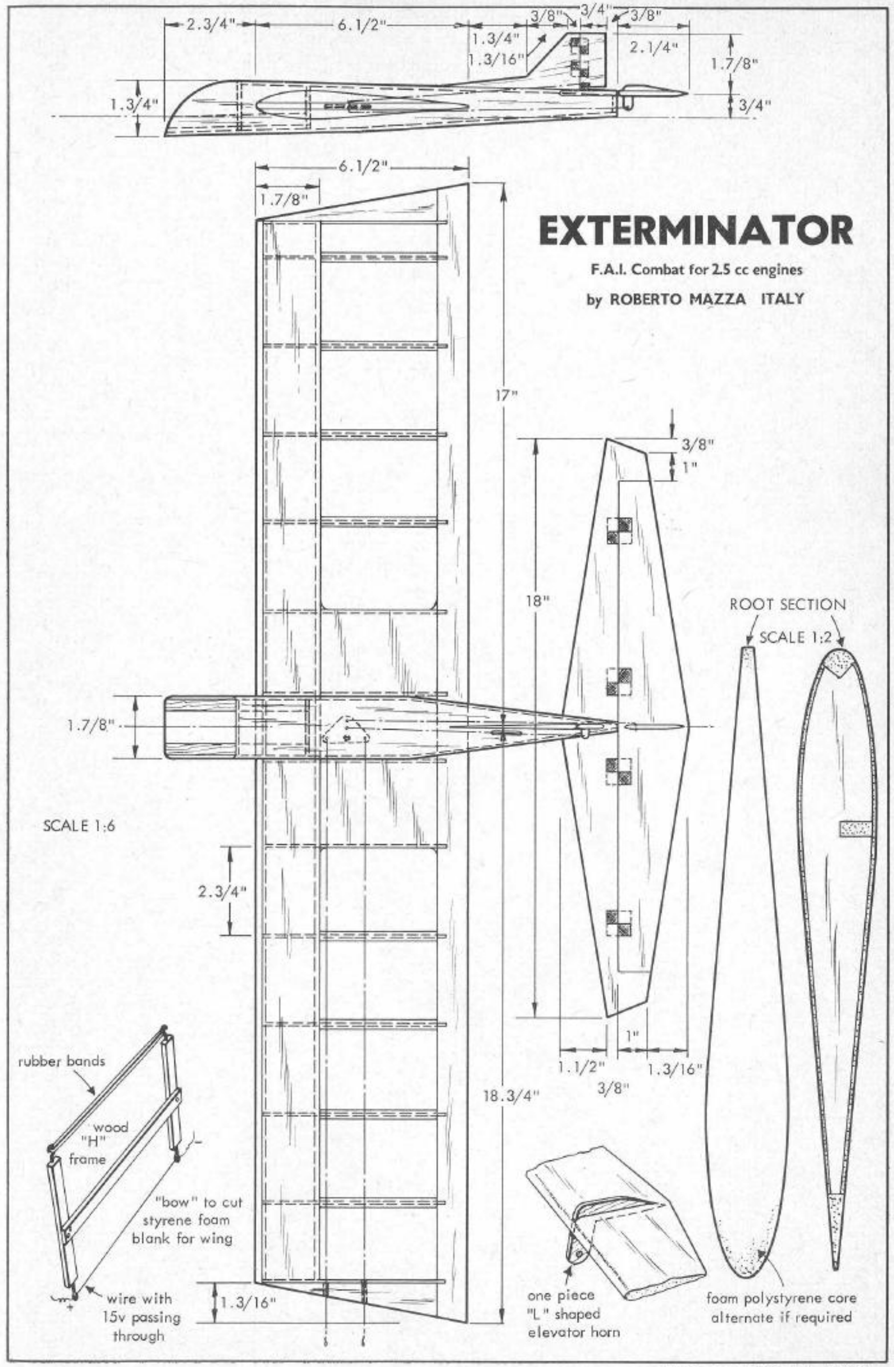
credit is normally attributed to Vernon Hunt who has had such outstanding success with it, particularly in the early 70s. Wing area incidently was approximately 280 sq. in.

By this time, light weight was becoming the obvious answer to success, and strength was being sacrificed to this end, with lighter and lighter grades of wood being used. By retaining relatively thick sections of wood (1-in. square leading edges, $\frac{1}{8}$-in. thick ribs, $\frac{1}{4}$-in. sheet trailing edges,) stiffness was retained while weight reduced.

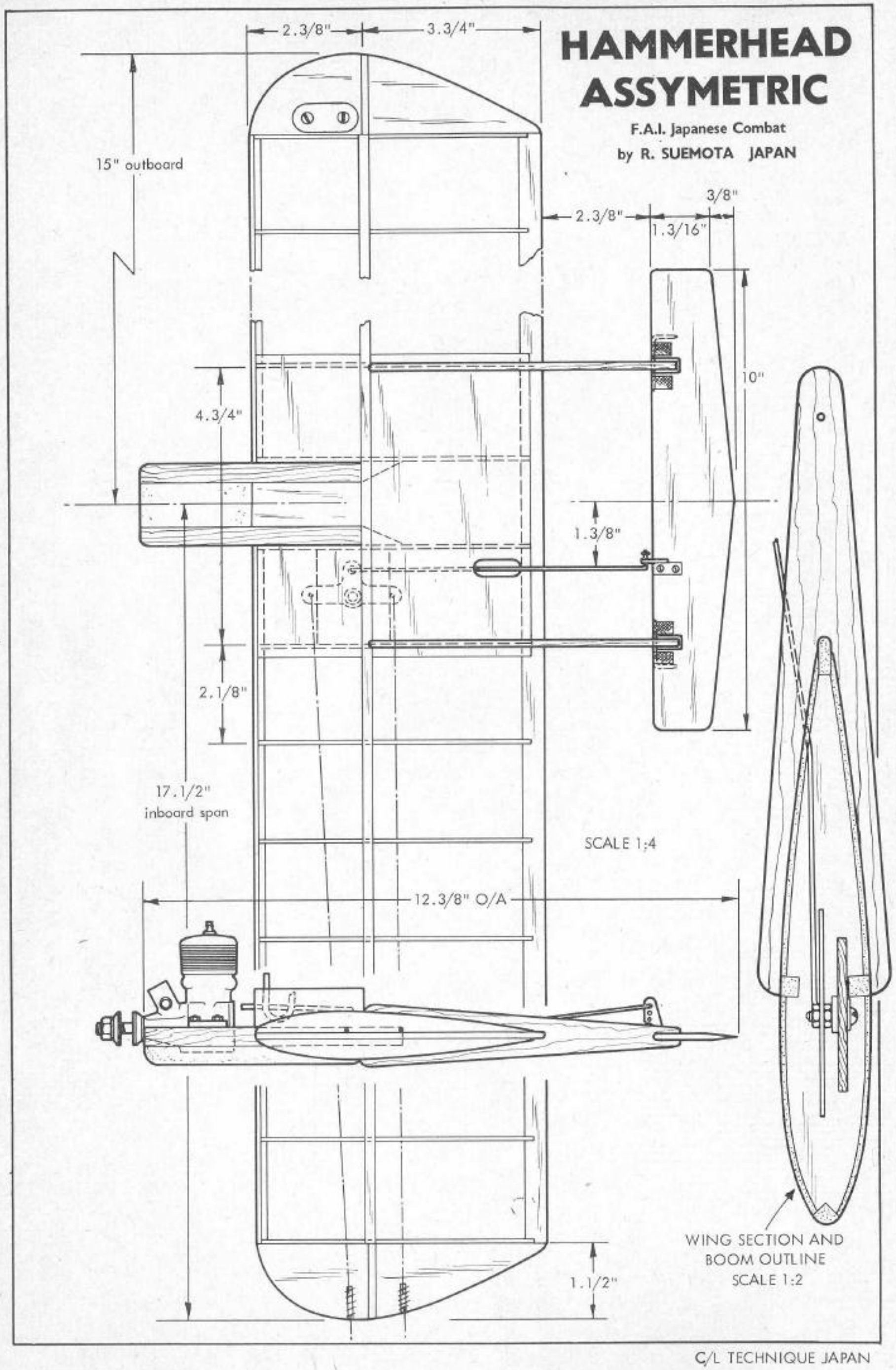
All the designs mentioned so far have been British—for the simple reason that the event was particularly popular in the U.K., and the European's, while "catching on" fast, had much to learn in both model and flying styles. However, as a "flashback", we should also mention the *Ruter-ess* design of Sweden's Steffan Larsson and Roger Holmberg, published in 1968. This was quite a different approach—the model being extremely light (12–13 oz. was typical) and featuring a tail mounted behind the wing's trailing edge. It was an extremely "hot"

Typical of the current trend of large taper-wing designs is DaveWood's "Titan"—seen at left. The model on the right has the centre section covered in nylon, the tips with mylar film. The "Titan" is now available in kit form. At right is an early version of Mick Tiernan's "Anduril" design, which has had much competition success. The later, straight-tapered trailing edge version, is now being produced commercially in kit form. In this model, Mick is employing a crankcase-pressurised fuel tank system.





MODELLI IN EUROPA ITALY



Vernon Hunt joined the ranks of the "big model" brigade—this design having around 390 square inches of wing area, tipping the scales at between 13 and 14 ounces. The leading edge is channel-sectioned for lightness, and spruce reinforced for strength. Root chord is nearly 12 in. wide while the span is 35 inches. He qualified for the 1975 European Championships with this model.

performer, but never really captured the imagination of U.K. fliers as it was also fragile, featuring as it did a $\frac{1}{16}$-in. sheet "D" box leading edge, plus $\frac{1}{16}$-in. sheet ribs. It also featured a true "airfoil section" and had a wing area of just 230 sq. in. Perhaps if it had been designed by a British flier more would have been seen around the combat circles! However, the design was not quite forgotten—Steve Jones took the basic layout but utilising "British" style construction and increasing the wing area by another 50 sq. in. produced his *Orcrist* design which won the 1971 British Nationals event, and sparked off a whole spate of "separate tail" designs.

About this time, Mick Tiernan took this "separate tail" design layout and added it to a tapered wing design, which in plan-form closely resembled Mr. Aldrich's *Peacemaker*! Almost full circle perhaps . . . The incredibly tight-turning radius of this model, together no doubt with its very different appearance, resulted in a whole new breed of taper-wing designs, typified by Mick's later *Anduril* design and Steve Wood's *Titan*. Both models feature minimum balsa content, highly tapered wings and separate tail planes, but most important of all, the wings are large—approximately 36-in. span and around 300 in. in wing area. At last the answer is becoming clear: a model in practical terms cannot be made lighter than around 13 oz., so for maximum performance, the wing area is increased to lower the wing loading. Frankly, it seems that the wing plan-form has little bearing on absolute performance, nor has airfoil section: it is the *lightest wing loading* that counts! Naturally, this cannot be taken to extremes—too big a model will be too weak, and would need a much more powerful motor to "tow it around" at a competitive speed.

Thus we now determine that the model should have a wing area of at least 300 sq. in., weigh around 13–14 oz., be structurally stiff, and still of course be as crash proof as possible. The question is, how to achieve it? Let us examine the various important design areas and see how they can be improved.

Wing Plan-form

One advantage of a tapered wing is that a very wide root chord has to be employed—this means that the tailplane/elevator is mounted up to 15-in. from the motor, the heaviest individual part of the complete model. Thus a broad chord means that ballast is virtually never needed to bring the centre of gravity back to its optimum position—a weight saving over the "conventional" wing right away. However, if a lower aspect ratio, constant chord wing were employed, this would have the same effect, while saving the weight of sections of leading and trailing edges (longer ribs are lighter than longer L.E. and T.E.'s). Unfortunately this would also mean that if a 1-in. deep section is employed, the percentage thickness is reduced, and efficiency may suffer. Worth experimenting perhaps? A separate tail means extra balsa, which must be heavier, so perhaps elevators will be boom mounted once more (easy to mount on a tapered wing) or lighter still, hinged directly to the trailing edge.

In qualifying the earlier statement that plan-form has little effect on absolute performance, it should be added that a tapered wing design will have far less tendency to tip stall in very tight manoeuvres and is probably better in windy weather.

Wing Section

Most combat fliers will admit that the actual wing section is relatively unimportant—but don't tell the aerodynamicists! The flat-sectioned wing aids building considerably as already mentioned, but one drawback is that where the trailing edge slots into the rib, there is a severe weak point. The usual answer is to employ large gussets at each wing rib/trailing edge joint, but one answer may be to continue the "flat" portion of the rib to 80 or 90% of the chord—see *Figure 1*. This leaves a lot of "meat" on the rib around the potential weak point and is lighter and quicker too! At least one top combat flyer is currently trying this approach.

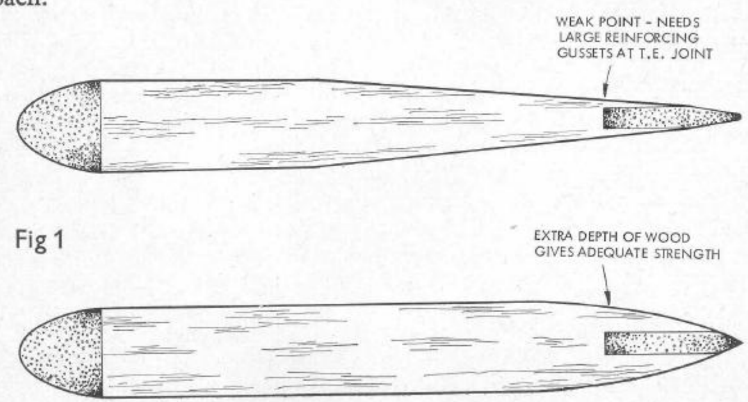


Fig 1

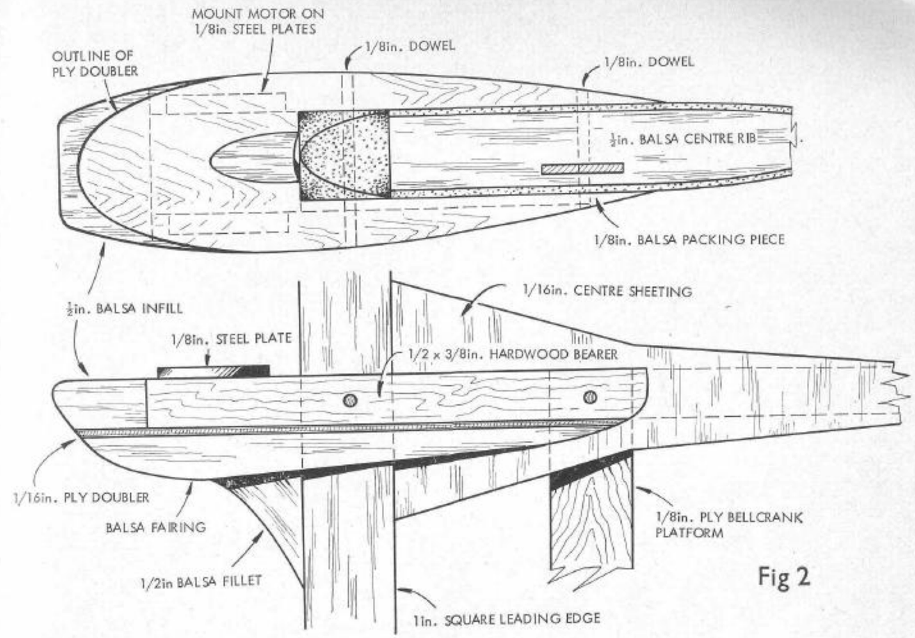


Fig 2

However, there is now something of a return to a "proper" stunt section i.e. a thick, fully symmetrical airfoil—but the success of this largely will depend on the power of the motor: read on for further details!

Wing Construction

The only way to save weight is to use less or lighter materials! As for the leading edge, this can be reduced by using moulded-section balsa, as available from Ripmax or Veron, or even laminated from separate pieces of wood to form a basic U-shape. As for the trailing edge, a balsa/spruce lamination can save weight without sacrificing stiffness if the width is reduced accordingly. At the centre section, sheeting is now reduced to a minimum, just sufficient to give support to the covering material being employed. Whereas nylon covering was once the "standard" for these models, one of the iron-on plastic coverings such as *Solarfilm* or *Kwikcote* is now popular as they are lighter and quicker to apply. However, they do not add strength as nylon does, so sometimes nylon is employed around the centre section, and film for the tips.

A further, and relatively unemployed development, would be the incorporation of a veneer and expanded polystyrene "sandwich"—this could doubtless be used in areas such as wing tips where it provides a stiff and very light structure. Perhaps further experimentation would reveal that polystyrene could be employed for rib centres etc., provided that it is suitably stiffened with conventional materials.

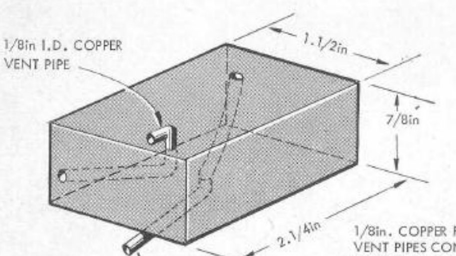
Engine Pod

The currently employed fuselage or engine pod is probably the best possible compromise between strength and weight, so it is unlikely that this could be bettered. Do remember the gusset between pod and leading edge though, as well as the $\frac{1}{8}$-in. dowels (see *Fig.* 2). These really help rigidity—and a motor that is not rigidly mounted wastes power through vibration.

* * *

So far we have not mentioned the all important engine. For so many years now, the Oliver Tiger diesel has remained supreme, both in standard or Copeman tuned guises. However, while it is extremely reliable, it is now being challenged by one or two others. The MVVS diesel is more powerful, but less reliable and unless modified, prone to breaking con-rods etc. as the standard of workmanship leaves something to be desired. Also, the use of glow engines is beginning to catch on, as they provide more power (and this is easily increased by adding nitro methane to the fuel) but are only for the experienced combat flier with an equally experienced pit crew, as they are harder to operate satisfactorily. Note too that some glow engines offer a weight saving over the traditional diesel. These glow engines need a pressurised fuel system (such as shown in *Fig. 3*). but probably the best is a bladder (*Fig. 4*) or 'pacifier' (*Fig. 5*) tank. This "tank" may be housed in a cardboard tube or balsa box (fully fuel proofed we should add) and which again is lighter than the normal tin-plate tank used for diesels. And while on the subject of tanks for diesels, we should point out that the Uniflow (*Fig. 3*) gives the most consistent feed. For so long now modellers have used "Mustard tin" tanks, looking upon them as the ultimate, but we would query why? The sole advantage of these tanks (which derive their name from the fact that Messrs. Coleman used to supply mustard powder in these tinplate containers) is that they are easy to make, just requiring soldering the seams and lid together. They are not a "magic" shape, and in fact are too deep in section to fit neatly within a normal model.

We have already shown how large-area models have a better aerobatic performance—but there is of course a snag: you cannot expect a big model to fly as fast as its smaller brethren when using the same power—drag is a speed killer.



◀ **Suggested "Uniflow" tank for diesel motors.**

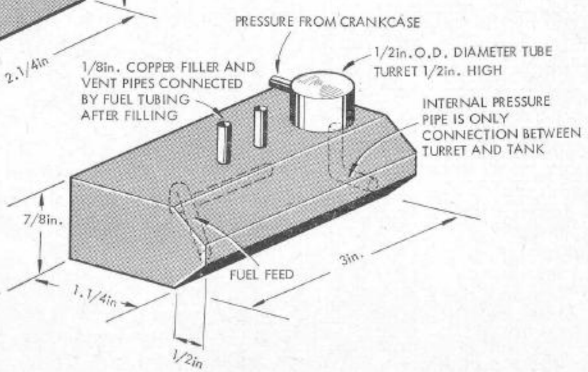


Fig 3

Suggested pressure tank for glow plug engines. ▶

Returning to the combat scene after a number of years absence, Richard Wilkins set the 1975 scene alight with his outstanding flying ability, married to his very fast Super Tigre G15 glow powered, large area design which features polystyrene foam wing tips and leading edge sections for lightness. Motor runs on a pressurised fuel supply—using a metal tank, not a "pacifier".

The answer to this problem would seem to be the glow engine as they can give the necessary power to really tow a big (but light, remember?) model along at a good speed. In addition, we previously mentioned thick wing sections now being popular: a "good" glow engine will cope with a really big model (380 sq. in. 40-in. wing span, $1\frac{1}{4}$-in. thick section) but a diesel could not hope to compete on

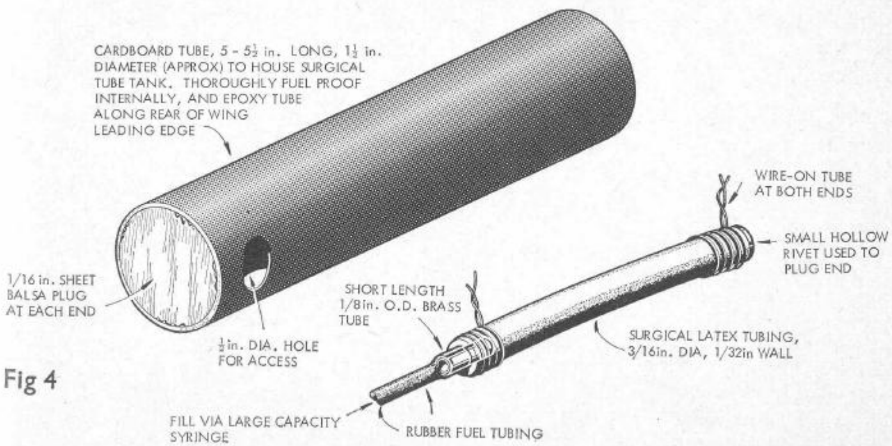


Fig 4

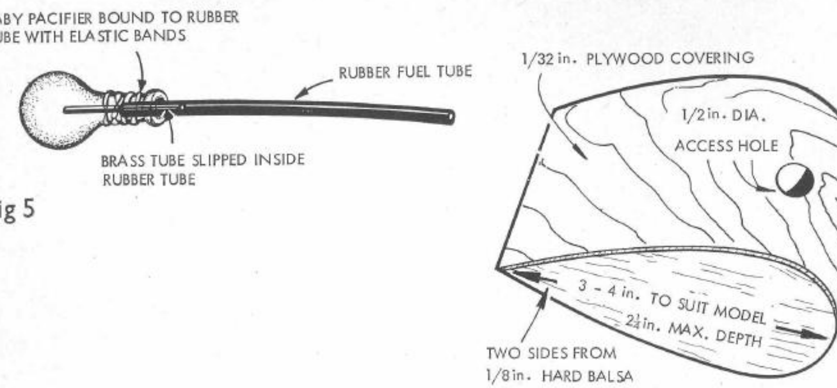
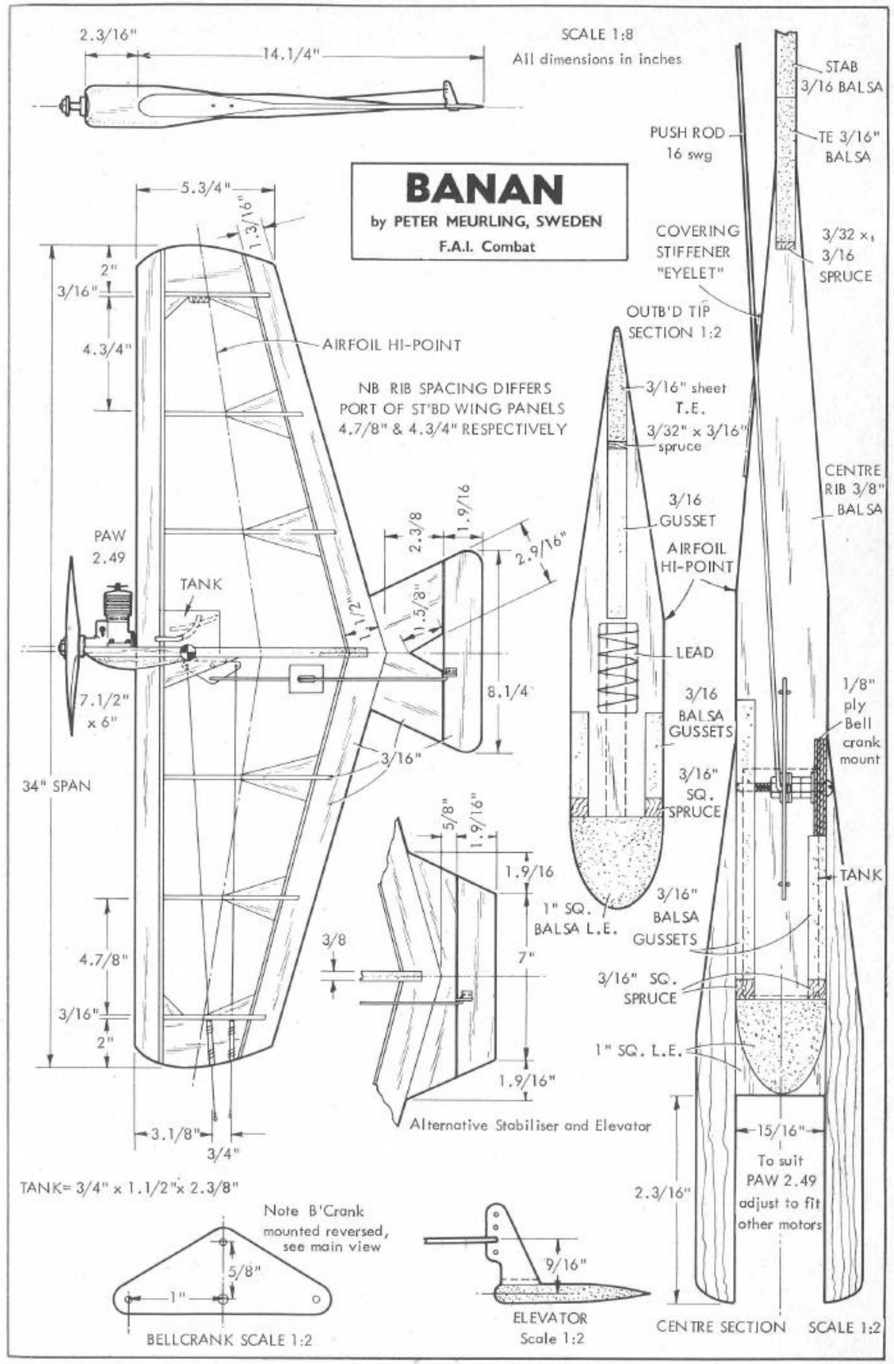


Fig 5

level terms. If you really prefer to stay with diesels, we would suggest a wing area of around 325 sq. in. and with a section not more than 1-in. thick—possibly less. And even this size demands a *really* good diesel.

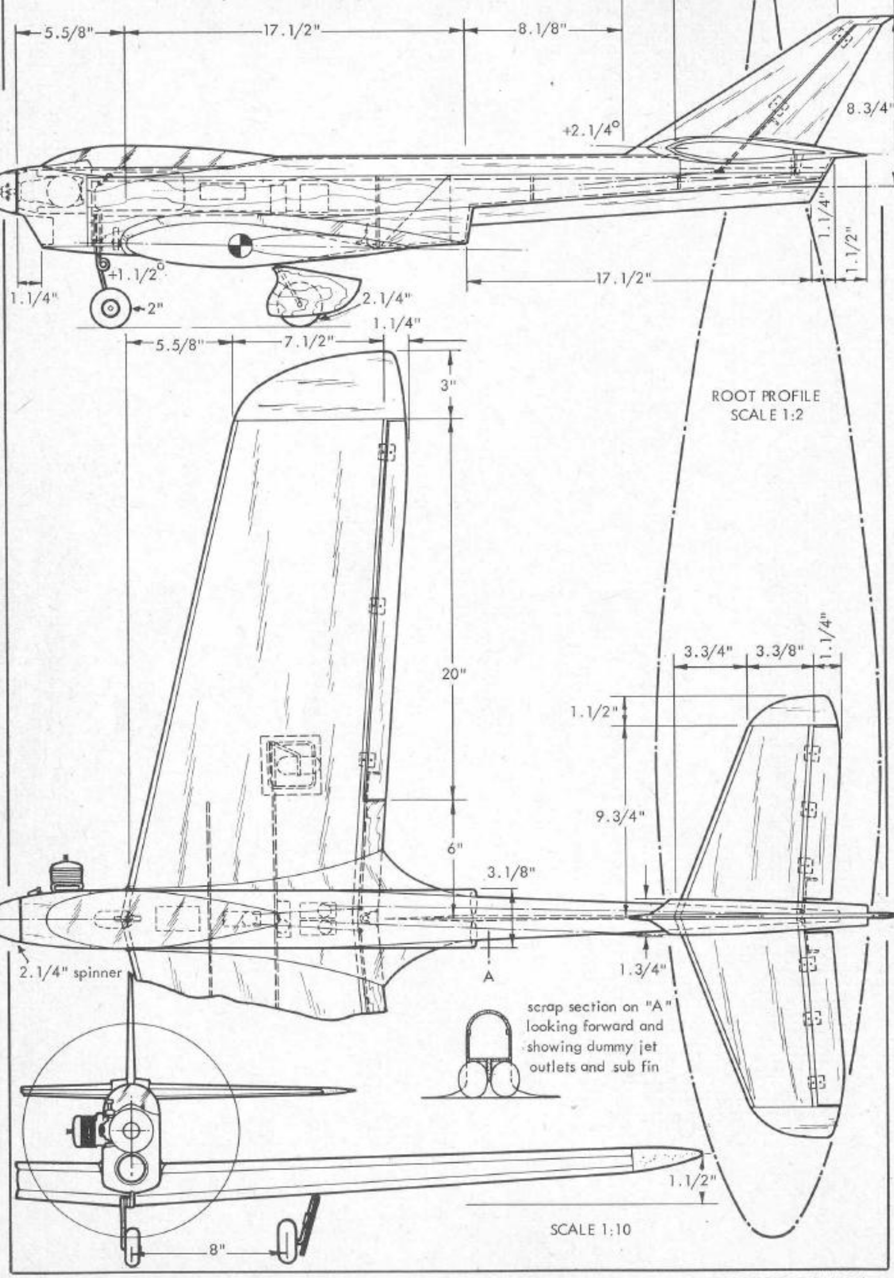
Which glow engine to choose? At present the Super Tigre G15 FI is the most popular, and cheapest, being readily available and having a good power output, while also being quite economical on glow plugs—an important factor. However, the Australian Taipan 15 is a most promising design, while wealthy fliers will no doubt be tempted by the Rossi 15 for the ultimate in power . . . but success with this latter motor will need some experimentation.



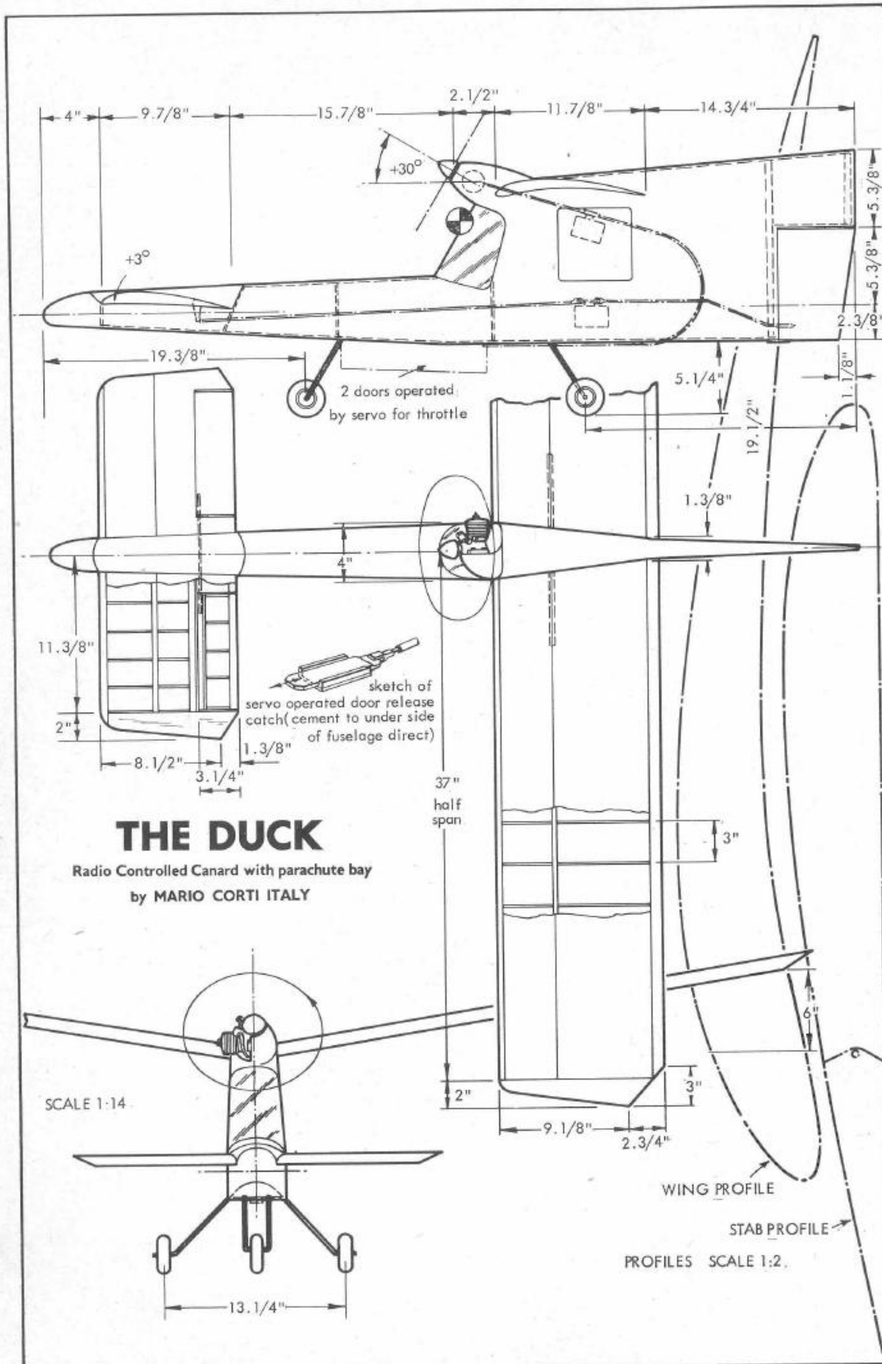
STABBEN - SWEDEN

NORTHERN EAGLE

Radio Controlled jet-like aerobatic by DAVE GIERKE U.S.A.



FLYING MODELS U.S.A.

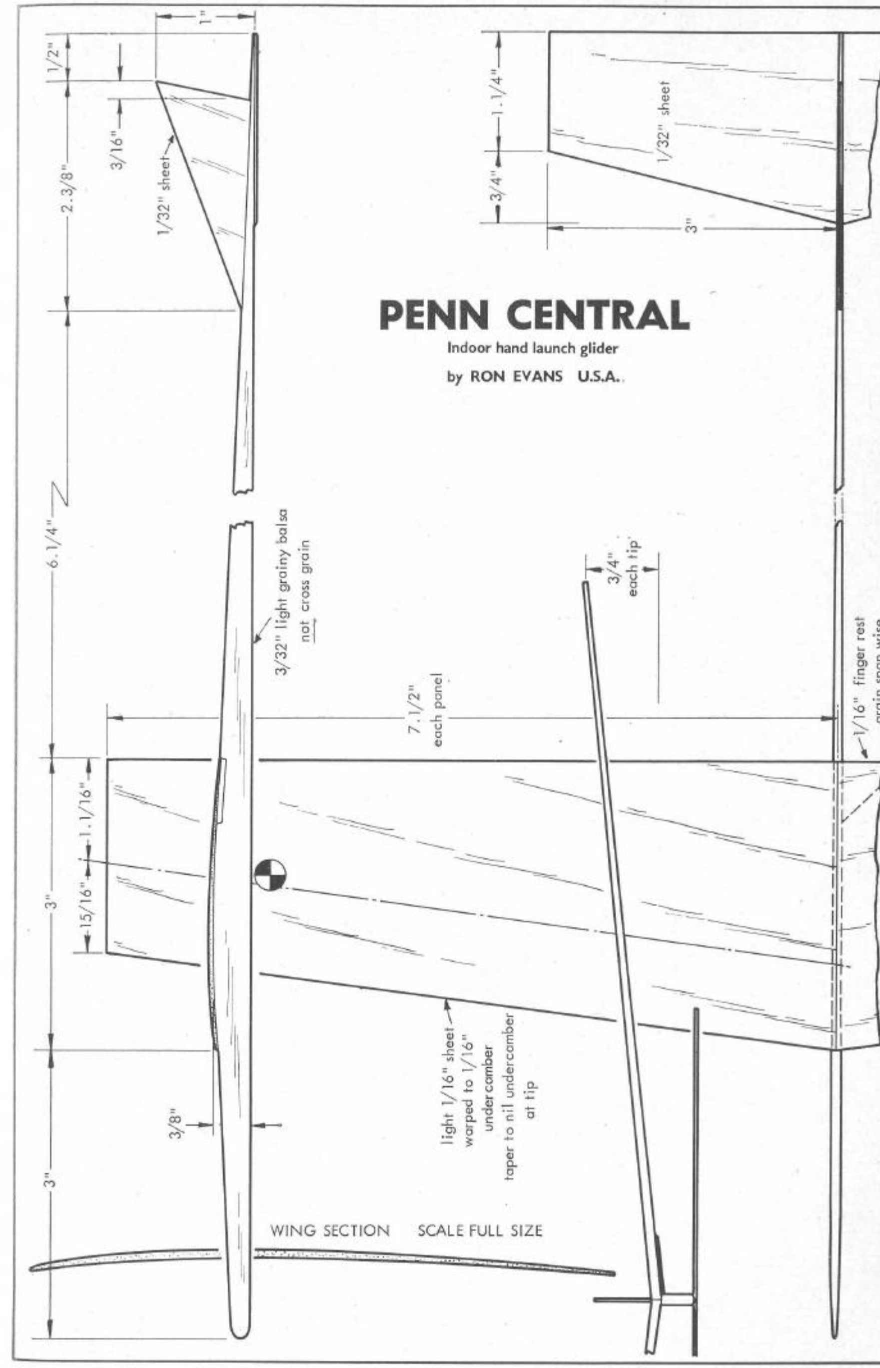


THE DUCK

Radio Controlled Canard with parachute bay

by MARIO CORTI ITALY

MODELLISTICA ITALY

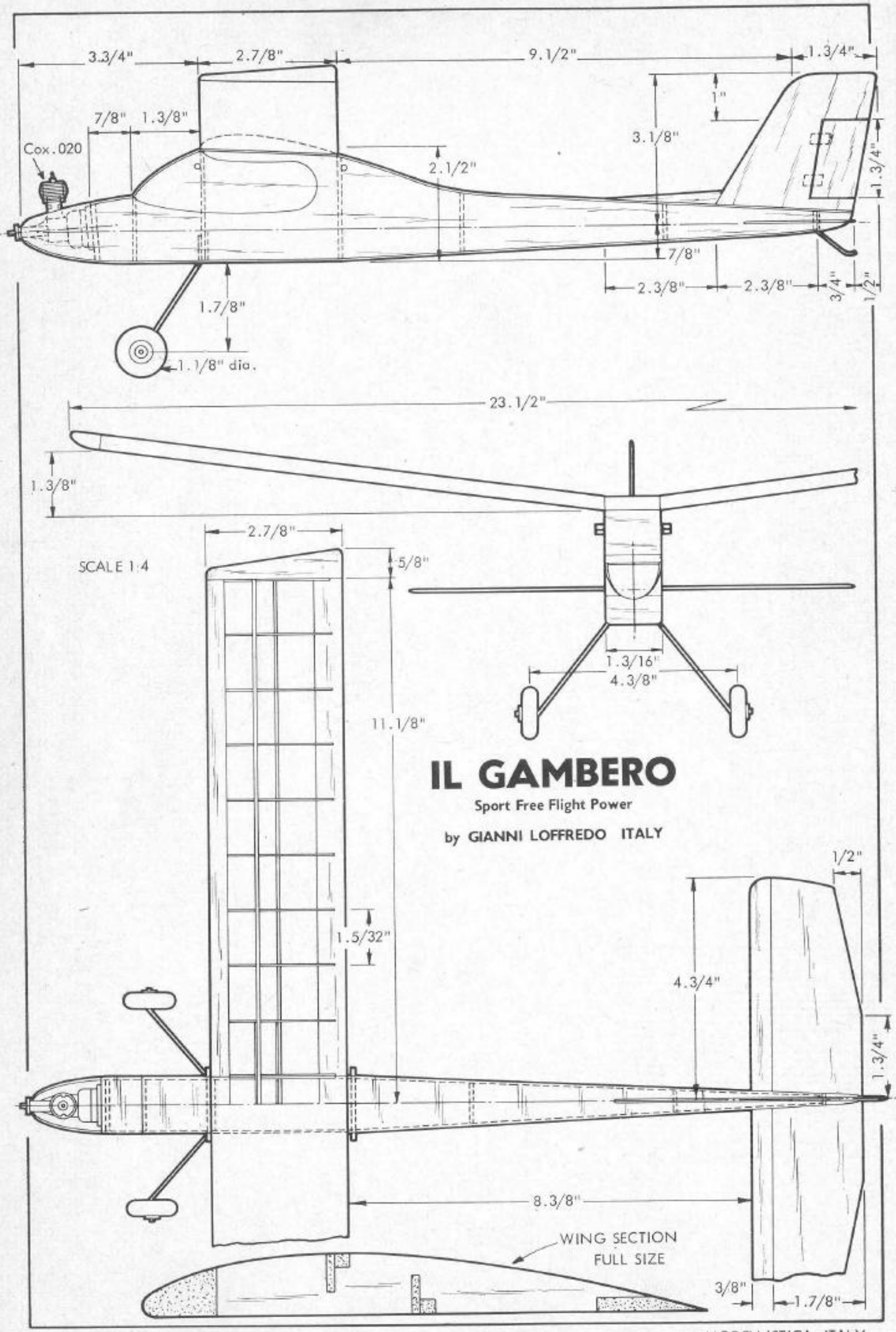


PENN CENTRAL

Indoor hand launch glider

by RON EVANS U.S.A.

STAR SKIPPERS NEWSLETTER U.S.A.



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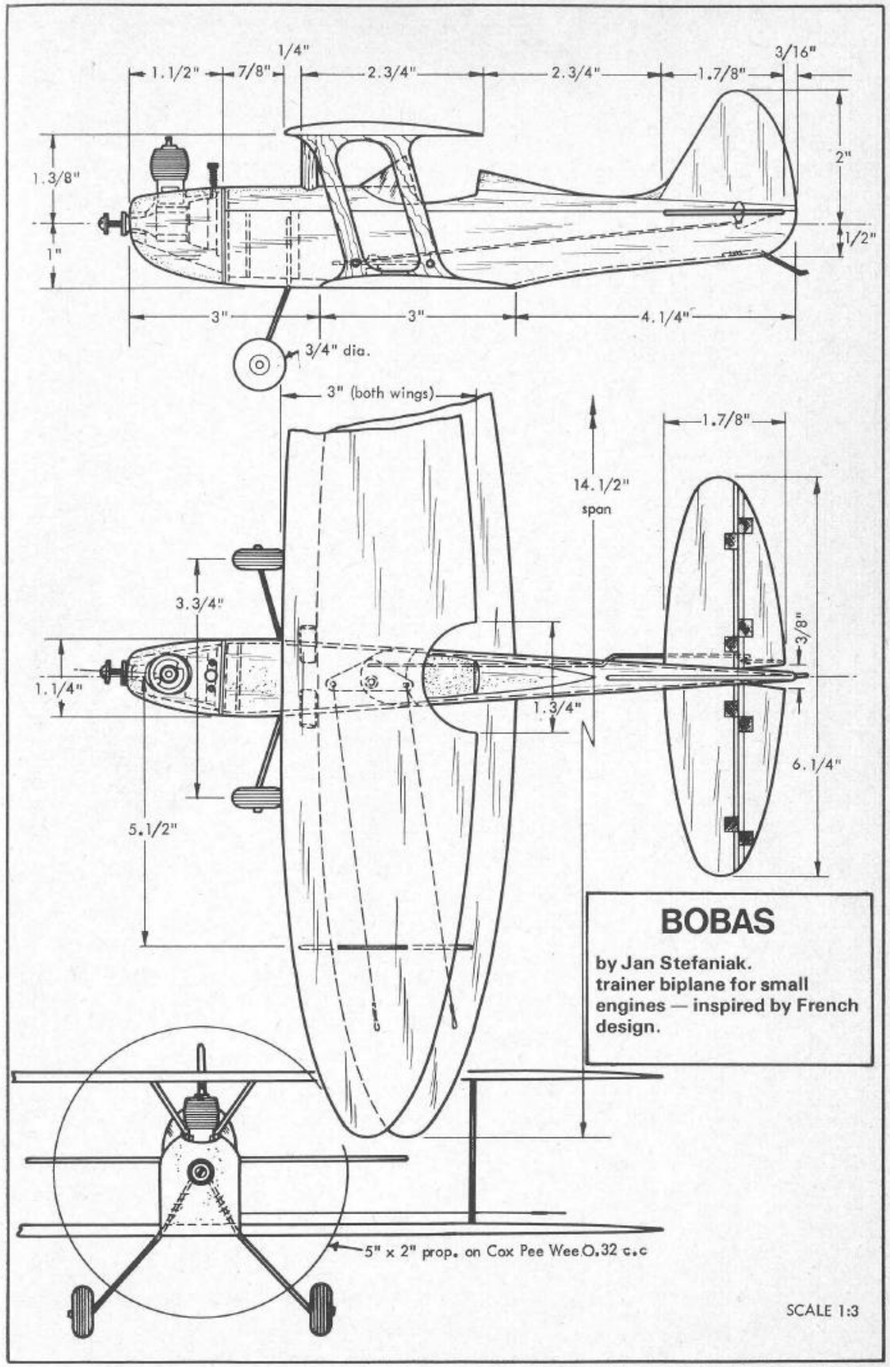
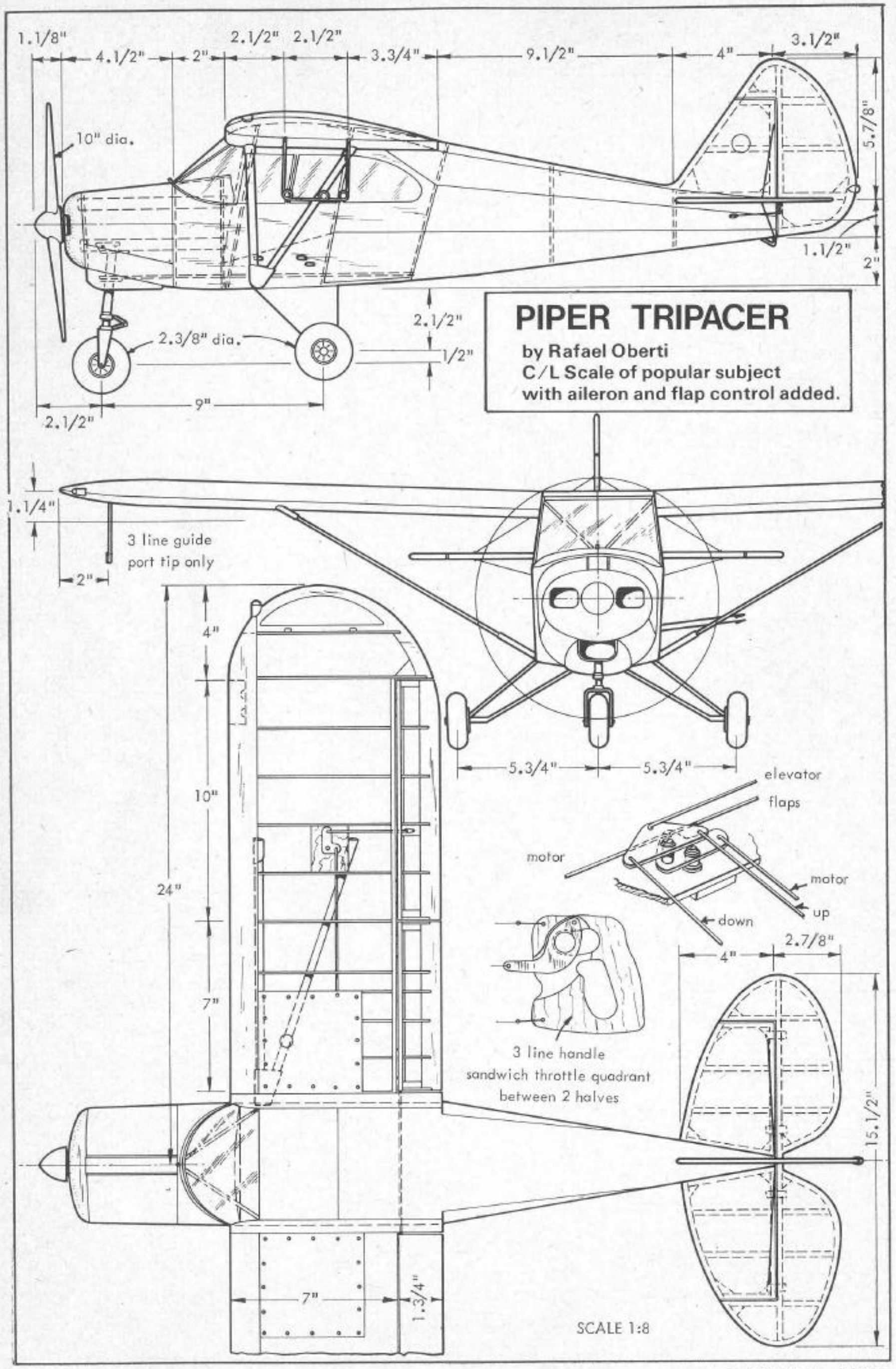


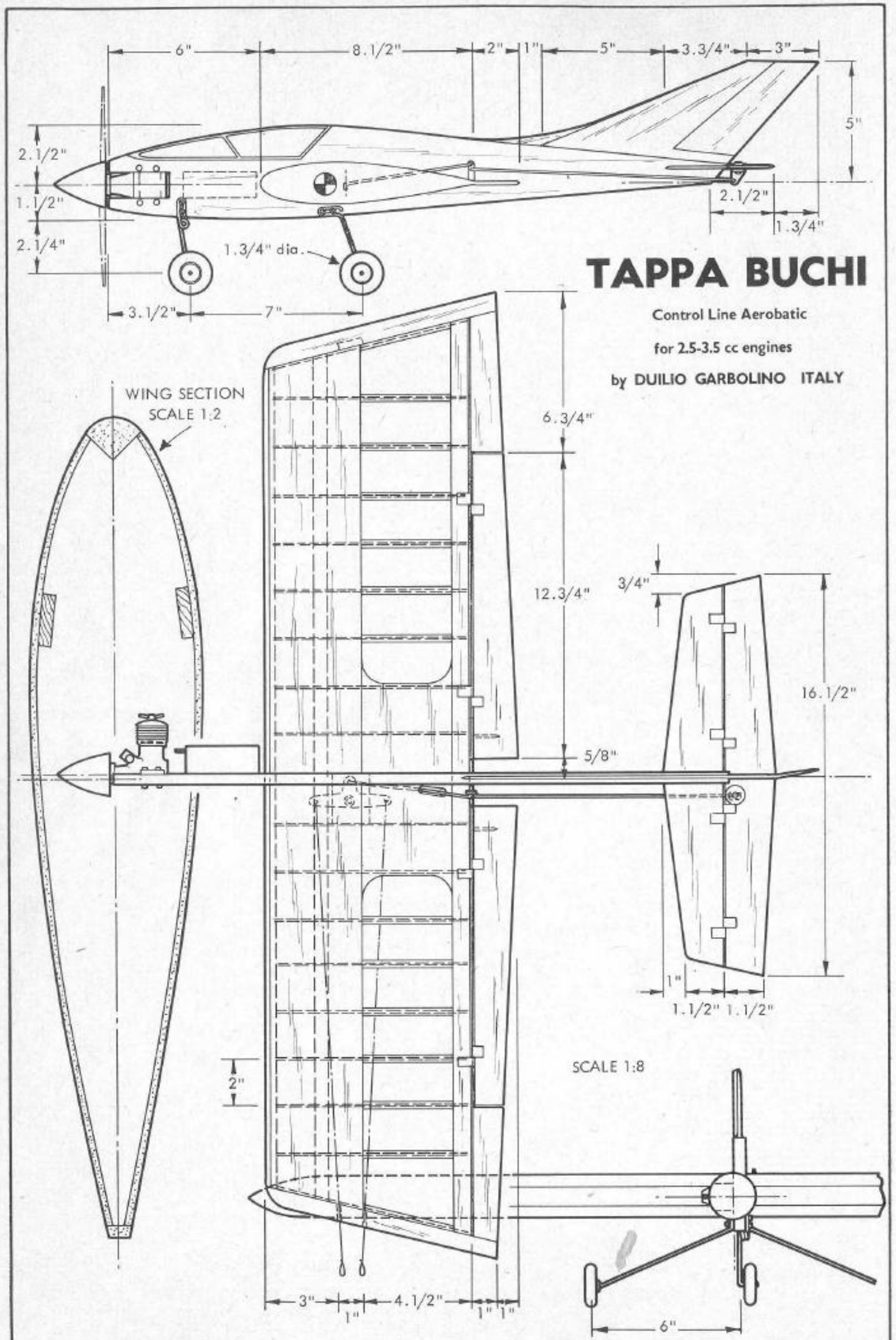
SKRZYDLATA POLSKA after MODELE FRANCE



PIPER TRIPACER

by Rafael Oberti
C/L Scale of popular subject with aileron and flap control added.

MODELLISTICA ITALY



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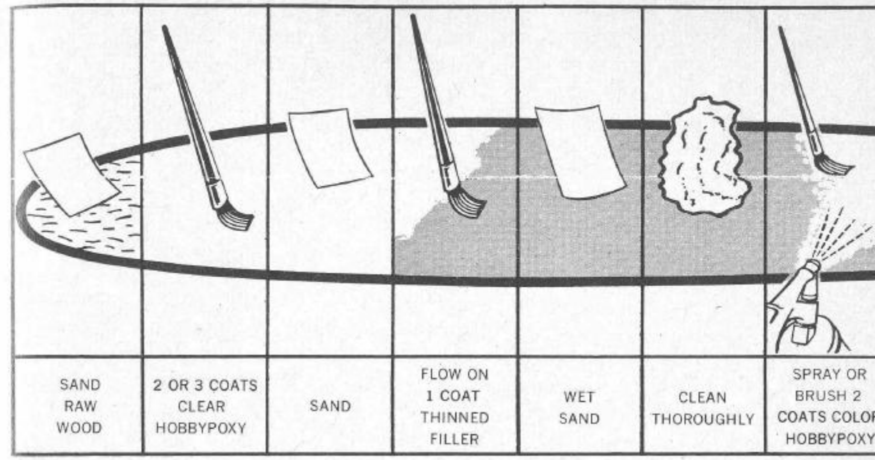


MODEL FINISHING WITH EPOXY, ACRYLICS AND BUTYRATES

To the average British modeller, any form of model finish that breaks away from the traditional cellulose seems to be foreign and difficult to appreciate. Even the word Nitrate on a can of clear dope, can lead to queries as to suitability when bought in the model shop. Yet there are nowadays several new forms of model finish which have found a wide acceptance overseas, especially in the U.S.A. This trio of reprinted features deals with three areas which appear to create most difficulty in understanding. We start with the Epoxy finish, made up with a two part mixture which covers by chemical action rather than solvent evaporation, and since they were among the very first in the field, we quote direct from the very experienced Pettit Paint Company Inc. leaflet on **"Hobbypoxy"** painting pointers:—

Preparing the Surface

Bare balsa should be sanded smooth, and nicks or dents filled with Stuff (a Hobbypoxy filler) and resanded. *The finish begins with the structure.* No amount of filler and paint will hide bad wood joints or uneven surfaces. After all sanding is done, vacuum the model, the room, yourself, and the model again. Put the dog out in the garden.

If your model has fabric-over-wood surfaces (tissue, Silkspan, silk over sheet balsa) you've probably adhered the fabric with dope. Seal the surface with a few more coats of dope, then let it dry for 72 hours. That's *three* days. No kidding, if the dope is still releasing solvents, even though it feels dry, it'll mess up the Hobbypoxy. Let it dry! Meanwhile, let the dog in and feed him. Now sand the dope with finest grade paper.

Painting

At last! Lock the dog outdoors again. Now vacuum the model (carefully, but thoroughly), the model room, yourself etc. Get rid of *all* the dust. (It's been proven by scientific testing methods that most of the dust that destroys your paint job was there *before* you started painting. It didn't sneak in later).

Now mix your Hobbypoxy colours.

Start by stirring **A** (the coloured part) to make sure that the pigment is thoroughly mixed. Do the same with part **B** if it's the Flat Hardener. In fact, even if it's not Flat, stir it anyway to make sure everything is properly mixed. No sense taking chances. Now mix *equal* parts of **A** and **B** together in a glass or metal container. Do *not* mix in a paper or plastic container! And don't think you're going to make the paint cure faster by adding more of part **B** (Hardener). It won't work. In fact, it will *lengthen* the curing time . . . perhaps forever!

Stir the mixture for a while, then let it stand for 45 minutes.

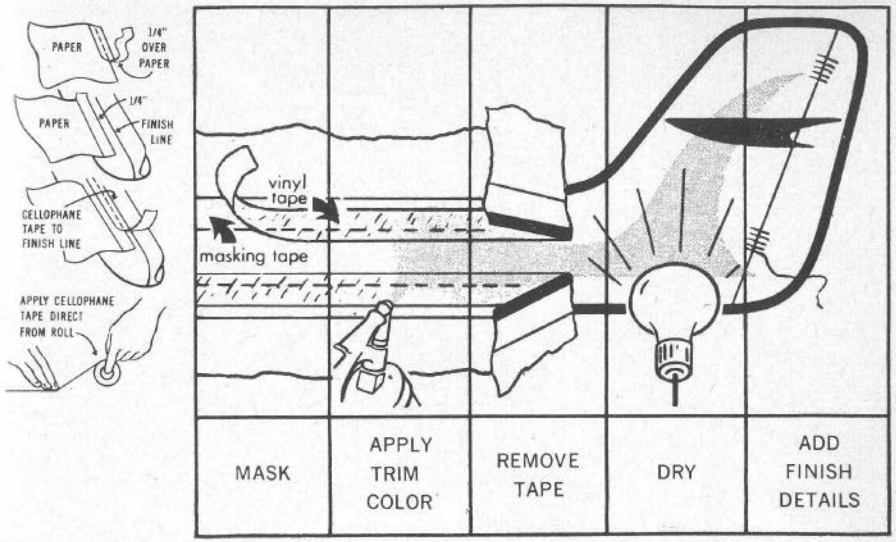
Why wait?

Well, actually you could use the enamel right away. But if you wait for a half hour or so, the chemical mix becomes more complete (in case you got tired while you were stirring and didn't do a thorough job) and the paint will cure just a little bit faster after application. In fact, it's a good idea to add the thinner during mixing so it too will be completely dispersed through the paint during the waiting period. Some people think this waiting time is a terrible disadvantage, but it's not that bad . . . use the time to wipe your model with a tack rag to remove last-minute dust.

You might also want to support the model on some sort of rack or hanger so that you can paint it in one shot without having to handle it. Time not up yet? How about straining the enamel through an old nylon stocking a couple of times to remove any foreign matter that might have fallen in.

Okay, now you're ready to paint. If you're brushing, flow the material on smoothly. Don't brush it out. Let it level out by itself and it'll look almost as good as a spray job. We've found that the new-fangled foam brushes are fan-

The simplest form of "air-brush", the Badger 250 Mini Spray Gun which is a spray atomizer operating on a suction principle. There is no needle but control can be achieved by variable pressure on the spray button. Opposite: Finishing sequence diagram from "Hobbypoxy Painting Pointers".



tastic for applying Hobbypoxy enamels. They don't leave brush marks, they don't shed hairs, and they're inexpensive enough to throw away after use.

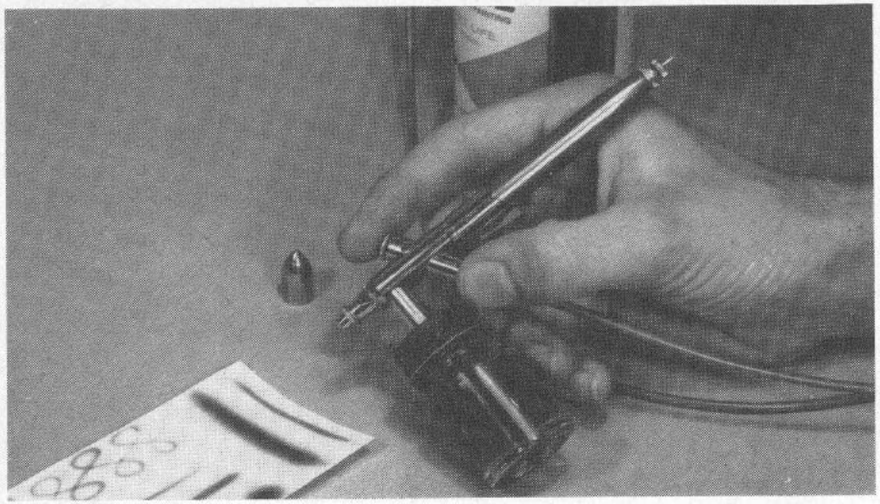
If you're spraying, Pettit Paint have a few suggestions: Be sure to have adequate air pressure for the particular gun you're using. Thin the enamel enough so it will spray properly; if it's too heavy it might spatter and leave excessive orange-peel, if it's too thin it could drip and run. It's always a good idea to test your gun and paint mixture before applying paint to the model. Try spraying a few old tin cans first, adjusting the mixture until you're satisfied with the results. Shoot a light mist coat first, then go over it with a slightly heavier "wet" coat . . . wet enough to flow out, but not so wet that it drips and runs. Spray painting is *all* technique, regardless of the paint being used, and practice is the only way to insure good results.

The Binks "Wren Model B" airbrush or the Badger give good control of the spray with minimum overspray. Best method to use is to spray a light "mist" coat over entire surface, moving in vertical strokes. Then go back over same area with horizontal strokes, applying slightly heavier coat. This method often covers completely in one application. Keep airbrush moving at all times! If you don't, you'll get a big, runny, dripping mess! Spraying goes better if Hobbypoxy is heated no hotter than 140°, near a 100 watt bulb.

Masking

If you're like most modellers, you want more than just a solid-colour model. Trimming with Hobbypoxy is easy because it covers so well; one coat of a contrasting colour should be all that's needed to completely hide the base colour. Of course it helps if you're applying dark colours over light ones, but it's not impossible to put light ones over dark ones.

Masking should not be done until at least 24 hours after the previous coats were applied. Normal masking tape will work, but many builders prefer vinyl electrical tape or Contact for masking. It's thinner and more flexible, has



The Badger 200 displays its quite extensive range of lines, for all kinds of modelling. All brushes are now designed to fit propriety air cans but air compressors would be the best investment in all cases where extensive use is envisaged.

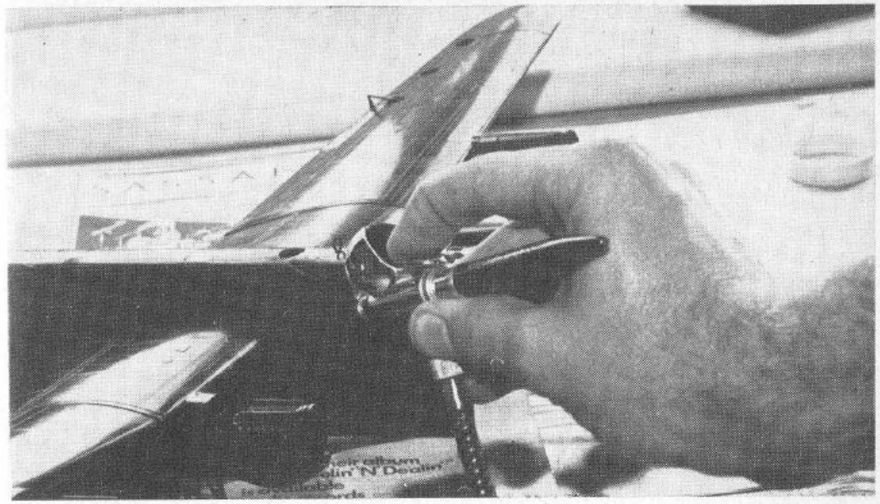
low "tack", and prevents "creeping" better than crepe-textured masking tape does. Cover large areas with wrapping paper, then apply tape over the paper at the edges, and up to desired trim line.

You can brush or spray, your trim colour, but spraying is always better. Now, unlike what you would do with dope, you should remove the tape immediately . . . before the Hobbypoxy begins to set. This technique prevents ridges from forming at the edge of the tape line; the Hobbypoxy will settle down to a smooth surface, but it will not flow beyond the line. You'll be amazed at what a smooth, sharp trim line this produces. Always pull the tape back slowly *over itself*, never straight up from the surface. Again, allow the trim colour to cure for 24 hours before handling or applying another colour.

Rubbing

If you sprayed your topcoat under ideal conditions you shouldn't have to rub the finish. But if you're like 99% of the modellers we know, a few stray specks of dust have probably found their way onto the paint. And maybe a little orange-peel, if things didn't go exactly right. Or brush marks, if you brushed.

The first thing to do is to let the enamel cure COMPLETELY. Give it a week if you can. Rubbing a "soft" finish just produces an overall haze . . . not a brilliant shine. If the imperfections are bad, wet sand with 600 paper, to smooth them down. For rubbing we recommend white rubbing compound. Don't use the brown stuff as it's too coarse. Use the white compound according to instructions on the can and you should get a very shiny finish. If you want to go all-out, you can follow up with a final rubdown with a silverware polish. Incidentally, Brasso metal polish which works on dope, doesn't do a thing to Hobbypoxy except make it very dull.



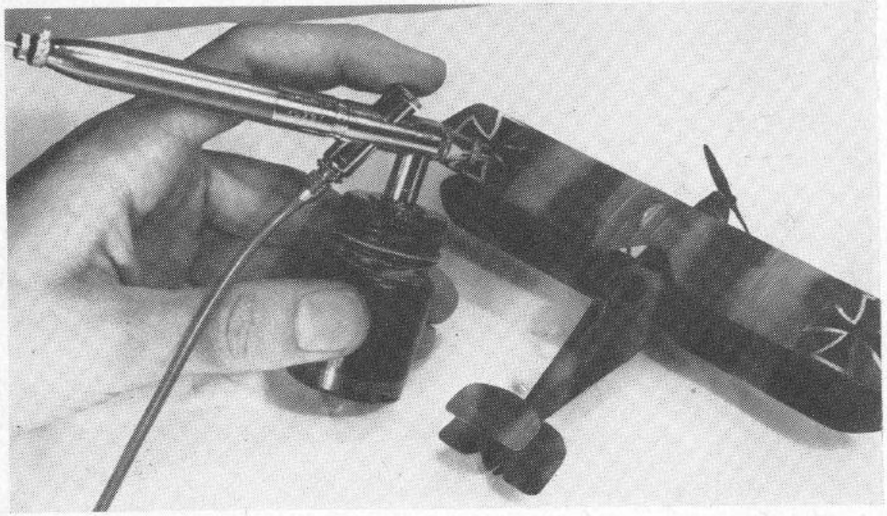
The Aerograph 63, one of the most wellknown and respected air brushes with an adequate bowl for covering larger areas. Very fine control can be achieved, the brush is capable of large area coverage down to fine line artistry on a wide range of model subjects. It is the longest established and most sophisticated of all the studio type air brushes.

Repairs

One of the many advantages of a Hobbypoxy finish is that it can be repaired easily. The primary reason for this is because Hobbypoxy sands beautifully without tearing or shredding. If you've dinged a balsa surface you can sand the Hobbypoxy down to bare wood, fill the dent with Stuff, sand it smooth, and reshoot with colour. If you've ripped unsupported fabric where dope was used under Hobbypoxy, sand through the Hobbypoxy down to the dope. (Actually, you probably won't be able to sand unsupported fabric. The best thing to do is to cut out the ripped panel, then sand through the Hobbypoxy on the edges of the framework.) Apply a new panel of fabric, using dope as an adhesive and to fill the weave. Sand to smooth the edges of the patch, then apply Hobbypoxy colour. If you use a spraygun, try this for refinishing a patched area: Spray the area around the patch with Hobbypoxy thinner just before you apply colour. While the thinner is still wet, spray on the colour. When the thinner evaporates you'll have an almost perfect patch job without the usual oversprayed ring.

Painting Plastic

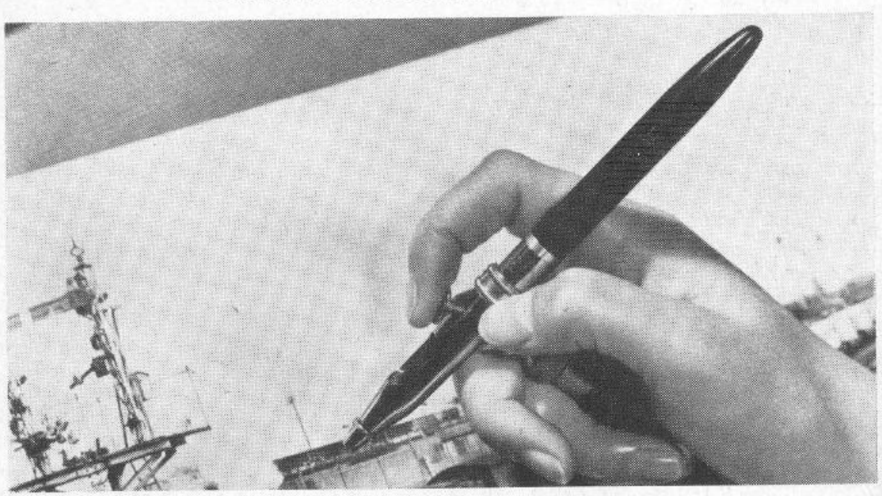
Many models have plastic structures which present specific problems regardless of the type of paint used. Most moulded parts have a smooth surface to begin with, and require no special preparation before colour painting other than a good cleaning with alcohol or thinner to remove mould-release lubricant and fingerprints. However, it's best to test a small area to see if it softens in Hobbypoxy thinner . . . if it does, you'll have to wash it with alcohol only and spray paint because brushing will pull the plastic and ruin your finish.



Badger's 200, an air brush manufactured to a price ideal for a modeller, and using suction feed from a standard size jar with pressure from an air canister. Advantage of this brush is its larger needle adjustment and the large capacity paint holder jar.

If the moulded part has flash or mould parting-line ridges, you'll probably want to sand them smooth. Wet sand with fine paper (sometimes soap and water works better than plain water) until the ridges are gone. You'll now have a dull piece of plastic, and, depending upon the type of plastic, it may even have a slight "peach fuzz" texture. A coat or two of Undercoater, followed by wet sanding, will cure this. Again, spraying will be better than brushing.

The Aerograph Super 62, a very well tried tool, that is ideal for touching up photographs and artwork, as can be seen here. The body only carries a brushload of paint, but is the finest instrument for adding final detail on a model.

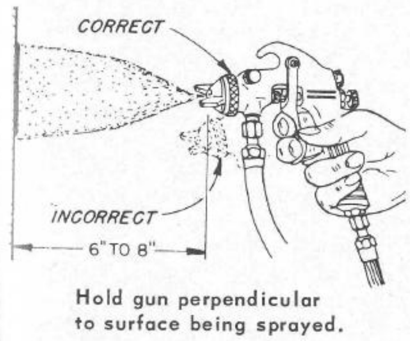


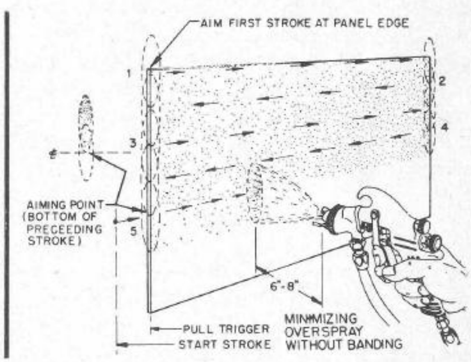
Fibre Glass parts generally need nothing more than a light wet sanding, a thorough wash with Hobbypoxy thinner, followed by Hobbypoxy colour.

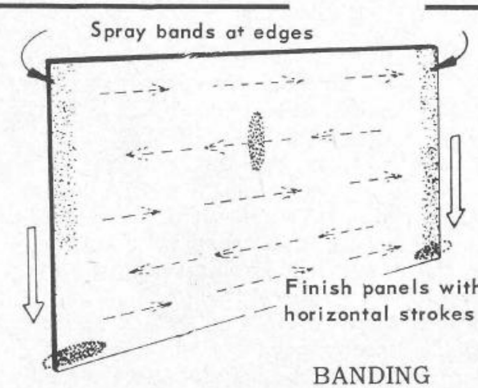
A few words about painting styrofoam: If you put Hobbypoxy enamels on bare styrofoam, you will make the styrofoam disappear! The solvents (and in most other model painting products, including polyester resins) will melt styrofoam. (They will not melt urethane foams, so if you don't know what kind of foam you have, test it by putting a little bit of thinner on it. If it melts, it's styrofoam.) Before painting styrofoam you'll have to provide some sort of barrier between the foam and the paint. Balsa sheeting, paper, cardboard, old roof shingles, or . . . Hobbypoxy epoxy glue. Brush on a coat or two of Hobbypoxy Formula 2 glue, sand it, and paint. Unless you've sanded into the foam, in which case apply more glue.

FINISHING MODELS WITH ACRYLIC LACQUERS
By Tom Carey

THERE are four factors that control the quality of model finish. The *paint* must be of uniform quality, formulated with solvents which provide the correct viscosity and drying time. The *operator* must be trained in the use of the equipment. The *equipment* must be suitable in design for applying the desired paint, and the *surface* to be painted should be properly prepared.

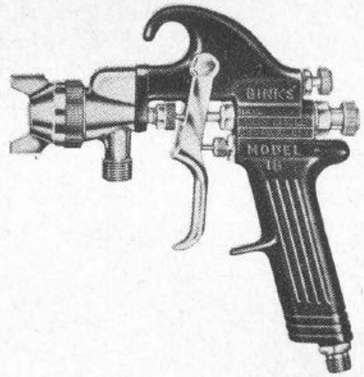






BANDING

Diagrams from the Binks "Air Spray Manual" show how to use an air brush properly, also applies to Aerosol or simple spray unit technique.

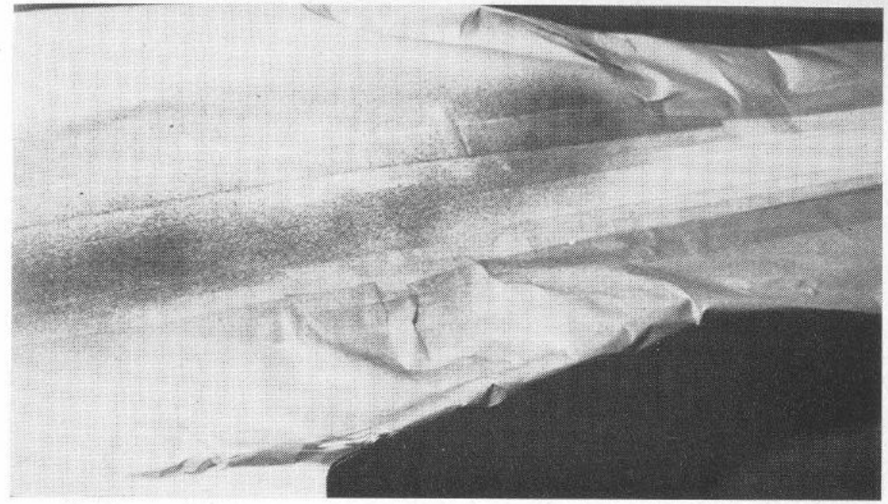


The Binks professional Air Brush with full control over air supply and paint mixture. Binks also supply a simple airbrush unit for modellers in the U.S.A., known as the "Wren", with a full back-up service of miniature compressor, foot-switch, 3 different fluid control nozzles and various container sizes.

Good spray painting is accomplished by the correct motion of the spray gun. The gun should be held six to fourteen inches from the part being sprayed with continuous motion exactly parallel to the work. A natural tendency to move the gun in an arc will result in a varying distance and hence inconsistent paint thickness. Runs or sags will develop at the point where the gun is closest to the work. At the ends of the arc, spray dust, or overspray (caused by paint drying before it contacts the surface) will result. Work with straight uniform strokes, moving back and forth across the surface in such a way that the spray pattern overlaps the previous stroke by 50 per cent. The speed at which the gun is moved is a function of how much paint the operator wants deposited. For example: the first coat, or "mist coat", is usually deposited by rapid motion of the gun across the surface. This mist coat provides a holding surface for the next coats. If the mist coat is not applied, chances are the weavier, final coats will run before drying. When spraying model aircraft, where weight is always a problem, only two coats of paint are necessary—the mist and final coats.

The spray gun trigger controls the action of the gun and should be used during each stroke. To avoid building up the paint at the beginning and end of the stroke, the correct procedure is to begin the stroke, then pull the trigger releasing it before the stroke is completed. Triggering is the key to spraying technique.

Another problem plagueing the painter is overspray—that part of the spray at the edges of the fan that dries *before* it reaches the work, causing a "sandy" surface. To avoid this, keep the surface "wet" so that the overspray is dissolved by the previous strokes. To minimize overspray, spray all corners and edges first. Commence spraying parallel from the edges to cover the flat surfaces, overlapping as previously described by 50 per cent. Overspray can be reduced by proper atomizing pressure. If a painted surface is kept wet enough, most of it will be absorbed. Overspray can also be reduced by careful spraying procedures but it cannot be totally prevented. Two methods are commonly used to remove overspray once it occurs. A final mist spraying of a 9:1 mixture of thinner and retarder will dissolve overspray and flow it into the finish. If this mixture is applied too heavily, runs will result. If applied properly, it will eliminate the necessity of rubbing the finished paint job to achieve a high gloss. This technique is particularly useful for blending spot spray repairs. A spot spray will always be encircled by an overspray which must be compounded out after the paint is dry.



Areas to be painted (trim line etc.), are masked off with tape and remaining areas covered with BROWN paper which prevents second application paint seeping through to damage base colour. Seal all folds in paper with tape. Warm the job over an electric fire and then spray 80/20 thinner/paint a little at a time to avoid runs.

Application of this thinner-retarder mixture over the spot repair dissolves the overspray ring, blending it with the surrounding finish.

Another final coating procedure that eliminates overspray and achieves a high gloss is the use of clear acrylic. A thin mixture of clear acrylic adds a super gloss to the base coat and markedly improves the finish. The same gloss can be achieved by rubbing, but it is hard work.

Prior to applying the finish coats, a suitable primer must be used. This serves as a bond between the model and the finish. Primer coats are heavy and should be lightly sprayed and sanded with 400 wet or dry paper. Remember, when spraying acrylics, a plasticizer must be added. This applies to the primer as well as the finish colours.

Below are listed the more common difficulties in spraying acrylics, with their causes and cures.

Problem: "Orange peel"—circular-like crater formations.

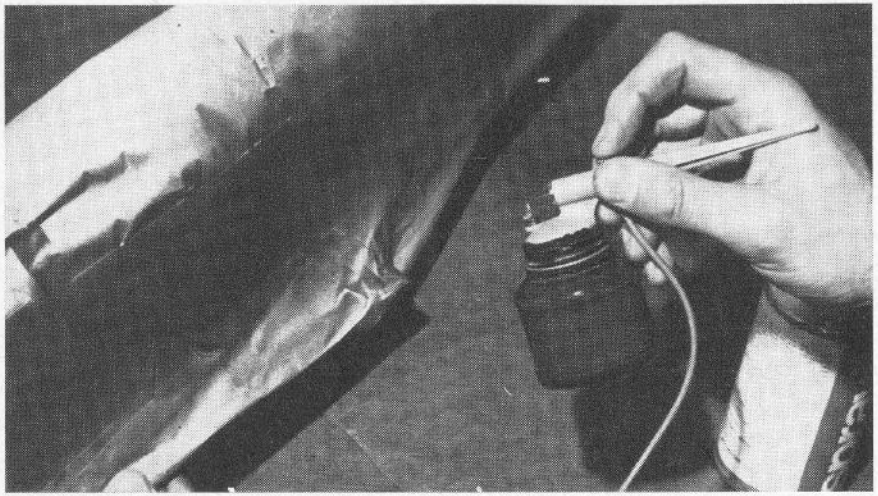
Cause: Improper solvents, insufficient atomization, incorrect viscosity. The solvent retained in the coating after it has been desposited on the surface is insufficient to allow proper flowout. Use only that solvent recommended by the paint manufacturer. On very dry (low humidity) days, even though a proper solvent is used, a high evaporation rate could prevent flow-out. In this case, use more solvent. If the air pressure is too low, improper atomization will result and cause orange peel. Use the recommended air pressure.

CURE: The finish must be sanded smooth and another final coat applied, using the recommendations above.

Problem: Runs or sags.

Cause: Too much thinner, too slow a thinner, too heavy coats, too wet coats.

CURE: Reduce material according to label directions. Regulate the fluid flow of the spray gun to reduce the flow of material. Do not spray too close to the work.

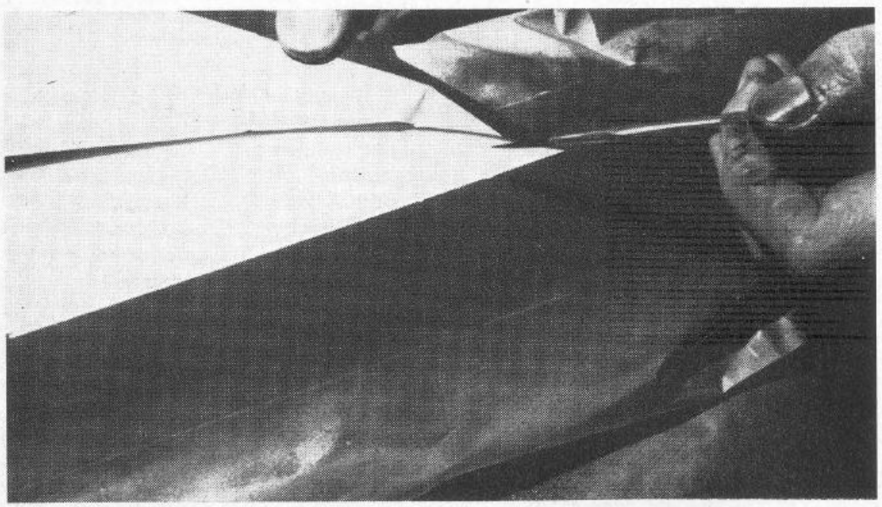


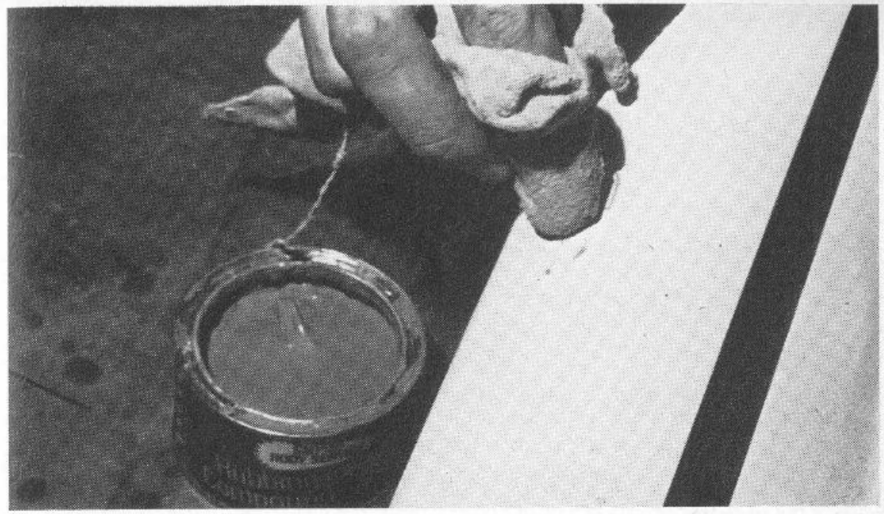
As paint builds up, the risk of runs becomes greater. By warming the job first, the paint dries rapidly, thus minimising the risk of a paint run. If such does occur, it may be possible to just wipe out the run with a finger, followed by a fine blow-out.

Problem: "Fish eyes"—circular-like indentations in the painted surface. Contamination from lubricants, polishes and waxes.

CURE: Remove finish by sanding. Clean work with "prepsol", a DuPont product specially formulated to clean surfaces prior to painting. Respray.

When paint is sufficiently dry, carefully remove masking paper. Work deliberately, using a sharp knife to aid removal of paper. Tape mask to trim line is removed last. It is important when removing tape to peel right back on itself to avoid risk of tearing off base coat paint—which is quite a possibility. However, risk is minimised by this procedure, and by first rubbing fingers along tacky side of tape before masking up.





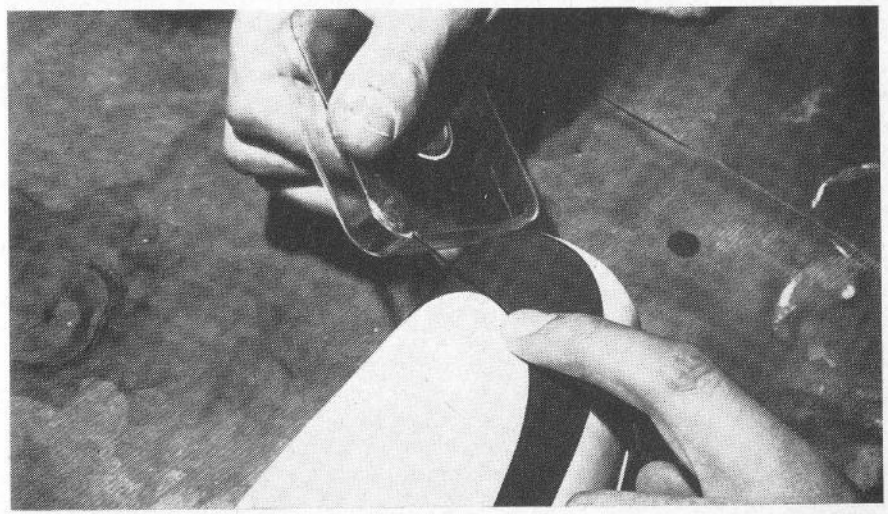
Even after careful masking, it is possible that spray will get through one or two folds in masking paper here and there. These misty patches can be easily removed with fine rubbing compound.

Problem: Blushing.

Cause: Condensation of water in or on paint films which have cooled through evaporation below the dew point.

CURE: Slow the drying process by adding a retarder to the paint mixture and respray the work. In case of very humid conditions—don't spray!

Fine pin-stripe lines are very difficult to apply in paint and one solution is to use fine artists' tapes which are available down to $\frac{1}{32}$" wide. When applying, avoid stretching, as the tapes will thereafter contract back to near original length and will pull away from curved lines as seen being worked here. Tapes will stay in place if generously fuel proofed.



Problem: Blistering.

Cause: Improper undercoat, fingerprints on primer surface or moisture on the surface.

CURE: Sand off the finish and clean surface with Prepsol. Be sure the surface to be sprayed is above the dew point. Use the recommended undercoat.

Much of the material presented in this article, has been extracted from a Binks publication entitled: "*Air Spray Manual*", T.D 10–2, printed by the Binks Manufacturing Co., 3114 Carroll Ave., Chicago. IL.60612, U.S.A.

SOME SUGGESTIONS FOR FINISHING WITH BUTYRATE DOPE

by Bill Battis

A PROPERLY applied butyrate dope finish can be made to have a good gloss with no compounding and with only a little extra effort. There are three important points to consider in trying to get a good finish with butyrate dope. These are:

1. *Apply colour coats over a good base.*
2. *Plasticize the dope.*
3. *Slow the drying time with a good retarder.*

A good base for butyrate colour coats can be obtained on balsa as follows: First, apply two coats of clear dope over well sanded, bare wood. These two coats should be well thinned—about 50%—for good penetration. For these two coats, use either nitrate dope, or non-tautening butyrate. (Keep in mind that butyrate can be applied over nitrate dope, but nitrate cannot be used over butyrate.) The advantage to using the nitrate clear dope for the early coats is that nitrate dope has better adhesion than butyrate. It is usually not necessary to plasticize nitrate dope, but it is desirable to plasticize butyrate to minimize its shrinking tendencies. Plasticizing butyrate dope helps alleviate, to some extent, its adhesion problems. (More about this later.) If non-tautening butyrate is not available, make your own by adding one to two teaspoons of triphenyl phosphate or tricresyl phosphate, or a packaged plasticizer such as Southern RC Products Flexall (U.S.A.) to an unthinned pint of dope. Plasticizing is important to prevent warping or bowing of sheet balsa since unplasticizing butyrate shrinks and continues to shrink for a long period of time after its application.

Following these two coats, sand lightly, and apply silk or silkspan with a *third* coat of clear dope. This coat of dope should be plasticized, but not thinned as much. Continue to build up the surface with clear nitrate or your plasticized butyrate—brushed on—and thinned no more than necessary to facilitate brushing. Sand lightly between coats. You are ready for the colour coats when the doped surface is uniformly dull in appearance after a light sanding. (No tiny pits or low spots that appear shiny when the model is held up to a light, or "skylighted".)

Mixing a small amount of talc or corn starch with the clear dope used for the build-up will speed filling the grain of the silk or silkspan. If you choose to use talc, avoid breathing the dust created by sanding as there have been recent warnings about possible respiratory problems which may result.

For open bay structures covered with silk, follow a similar procedure used for the butyrate build-up, but don't plasticize the first coat. Gradually add plasticizer to successive coats as the silk tautens. Again, nitrate won't require any plasticizer here unless you have unusually flimsy wing.

One problem with butyrate dope is low adhesion as mentioned earlier. As an example, consider a 2-in. wide aircraft finishing tape pulled at 90 degrees to a fabric surface. Butyrate dope has a one pound peel strength and nitrate dope has four pounds. Nitrate, however is not as flame resistant as butyrate dope and does not last as long as fabric-covered aircraft, although the latter point is not too important for our models. Butyrate dope is more resistant to methanol-based model fuels than nitrate dope, and, in addition, it dries to a much higher gloss.

If you chose to fuel-proof your aircraft with clear epoxy paint over colour dope, you will have much better luck applying the epoxy over nitrate dope than you will over butyrate. However, nitrate colour dopes are more difficult to find.

About Filleting

One of the bad features of butyrate adhesion (or lack of it) is "filleting". This is the raising of the butyrate film at the junction of surfaces at near 90 degree angles, it is caused by poor adhesion, as mentioned, as well as by excessive shrinkage of the dope film. Observation of the following precautions will help to minimize these problems.

1. The surface should be perfectly clean and free of all sanding dust before applying each coat of butyrate (clear or colour). Use a tack rag!
2. Allow at least an hour between successive coats of butyrate dope. Too fast a build-up will result in the surface of the paint film drying and beginning to tighten before the underlying layer is dry—this allows the paint film to pull up in concave areas.
3. Don't allow the model to set for long periods of time between coats. Successive butyrate coats adhere best when applied before curing is too far along (butyrate solvents continue to evaporate or "gas-off" for a long period of time after application, but this process is most significant during the first few days.)
4. Don't overlap silk or silkspan sections at concave joints such as at the fuselage side and horizontal stabilizer. Leave a small gap (about $\frac{1}{16}$-in.). This will help prevent filleting.
5. *Do* fully plasticize colour coats.

Any irregularities which are visible when you start to apply colour will become more apparent after the finish is applied. A little extra effort exerted at this point to provide a perfectly smooth base for the ensuing coats of colour will pay great dividends when finished.

Spraying is the easiest method for applying coloured butyrate. This is particularly true if you are concerned about weight build-up since the uniform coats obtainable with spraying equipment will provide maximum coverage with minimum build-up. Use a siphon-type gun for the best atomization, and follow the manufacturers recommendations for air pressure (usually above 30 p.s.i.) Thinning will almost certainly be necessary for spraying fifty to one-hundred per-cent will usually be suitable. You will have to experiment here, since these figures will vary with the solid content of the dope that you are using, the type of spray equipment, and the air pressure being used.

Importance of Retarder

For all colour coats, add a good *retarder*. This is important because it will slow the drying time and allow each colour coat to flow out. This results in a much smoother finish, and one with a higher gloss. The amount of retarder varies—a good rule of thumb is to use retarder for $\frac{1}{15}$ of the thinner that you would add. This is for a day of "normal" humidity. For instance, if you thin your paints 50% for spraying, you would add 40% thinner and 10% retarder. The use of retarder will also help prevent the blushing of your finish. On days of high humidity if you must paint, it would be a good idea to increase the amount of retarder that you add. Blushing is a phenomenon that occurs when moisture from the air condenses on a freshly painted surface. This happens because evaporation of the solvents from the dope lowers the temperature of the painted surface, causing the condensation. When blushing occurs, the painted surface looks "chalky" or "milky" after the dope dries. In addition to looking bad, this causes a reduction of the paint film. Some good retarders are: Dupont, R-M, Randolph Universal Retarder No. Y-9910, Ditzler Duracryl DTX-1140, all from the U.S.A.

Believe it or not, if you retard butyrate colour dope adequately, it is possible to brush on the colour and have a finish that is virtually indistinguishable from a sprayed finish.

The retarder allows the dope to really flow out and eliminate irregularities and brush marks which are ordinarily apparent in a brushed-on-finish, and which usually require considerable sanding to eliminate. Flow on the finish when you apply it. You will have a finish which is slightly heavier than that which you get when you spray, because the paint film will be thicker and less uniform, but you won't be able to tell it by looking.

Back to spraying—have you ever tried to paint up to a previously painted section only to find that the dope applied previously has started to dry so quickly that the overlap, or edge, is very apparent? You will be pleasantly surprised when you use a retarder.

After you have completed application of the colour coats, allow the model to set up for a few days for curing. During this time, brush marks and other slight irregularities in the paint film (such as a *slight* tendency to orange peel) will gradually become less apparent as the surface film cures and shrinks. Resistance to hot fuels improves during this time also. After a few days, apply a coat of wax (Johnson's Pledge is good) to enhance the shine and facilitate cleaning.

If you accidentally spill hot fuel on the finish and notice an immediate discoloration, *don't wipe it*! Let it dry, and then apply a coat of wax or castor oil over the spot. It will disappear completely.

If you use fuels that contain only synthetic lubricants, more frequent re-waxing to prevent a dulling of the finish will be necessary. Fuels containing castor oil will help maintain the gloss. Castor oil is good for butyrate finishes.

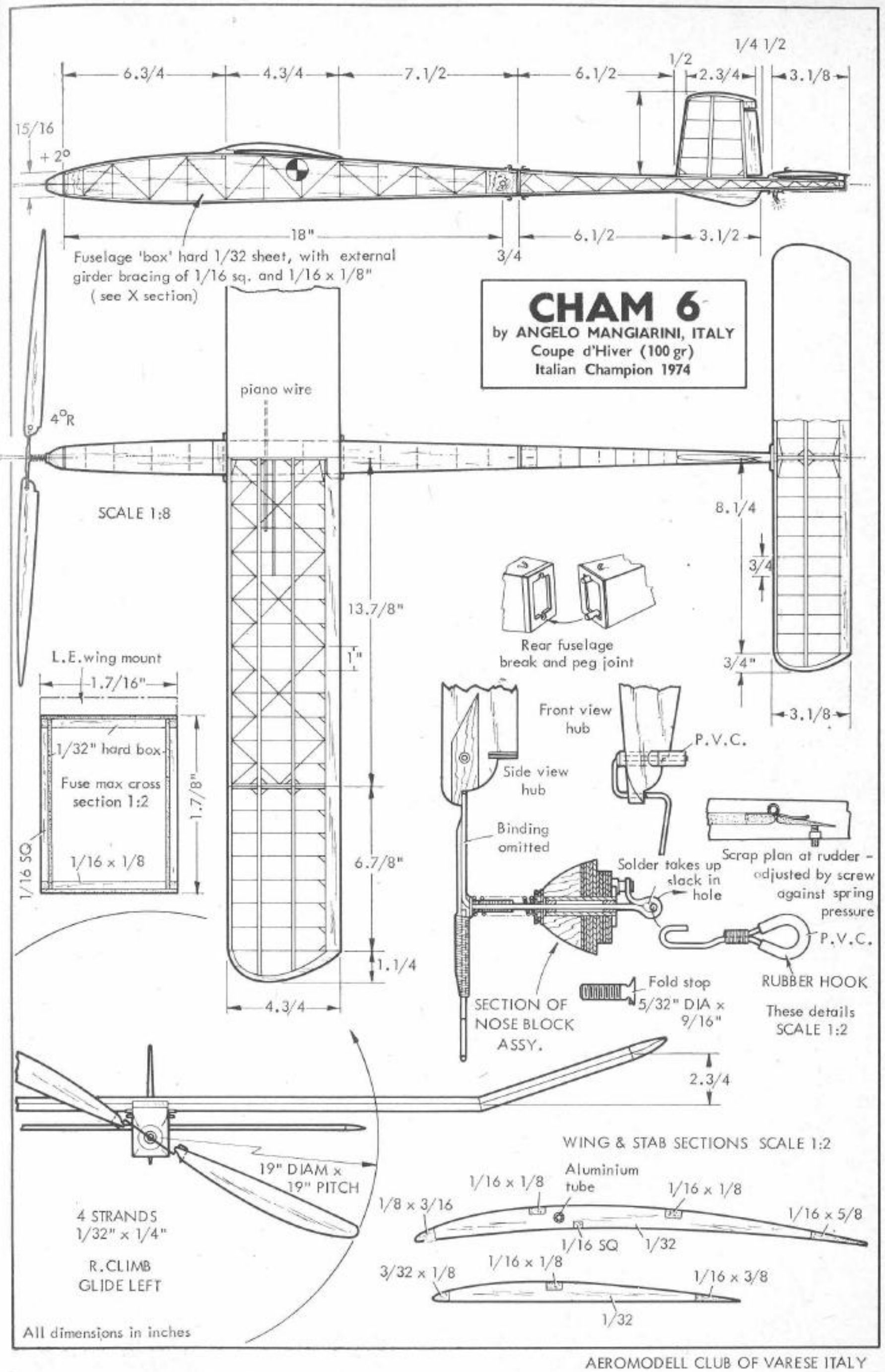
Be sure the dope you buy is really butyrate—it is getting hard to find butyrate dope in hobby shops these days. If it doesn't say butyrate on the label, it probably *isn't*.

An important note—use dopes only in a *well- ventilated* area away from the pilot lights and open flames.

The preceding instructions, when adhered to diligently, will result in a retarded, plasticized, sanforized, Simonized butyrate super finish! *GOOD LUCK*!

Credited to: AMA'S Competition Newsletter and *Flying Scale News and Views, Rockwell International Flightmasters.*

Thanks to these newsletters the Pettit Paint Company and Binks Manufacturing Co. of the U.S.A. for permission to reproduce these useful extracts.

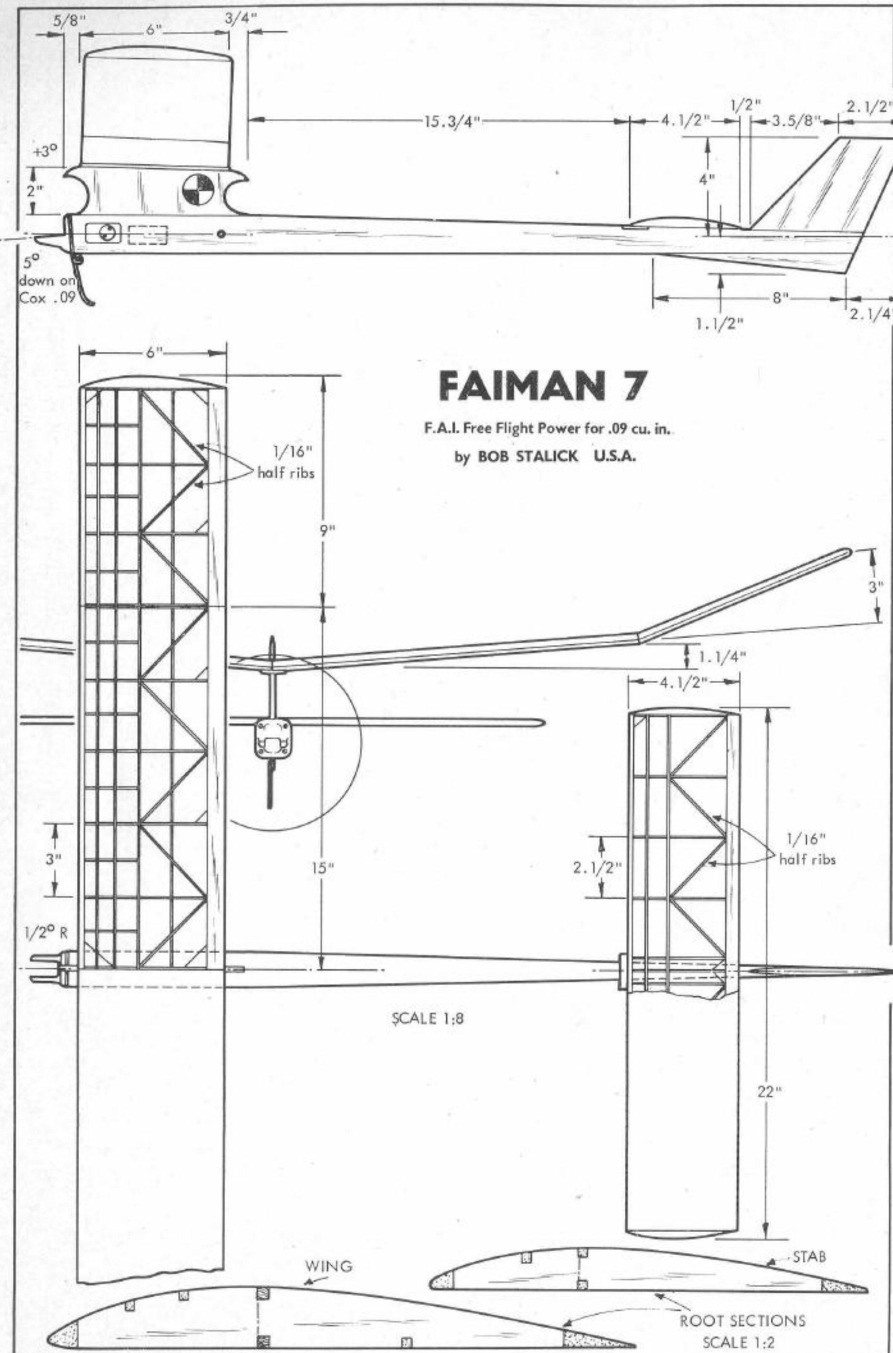


AEROMODELL CLUB OF VARESE ITALY

FAIMAN 7

F.A.I. Free Flight Power for .09 cu. in.

by BOB STALICK U.S.A.

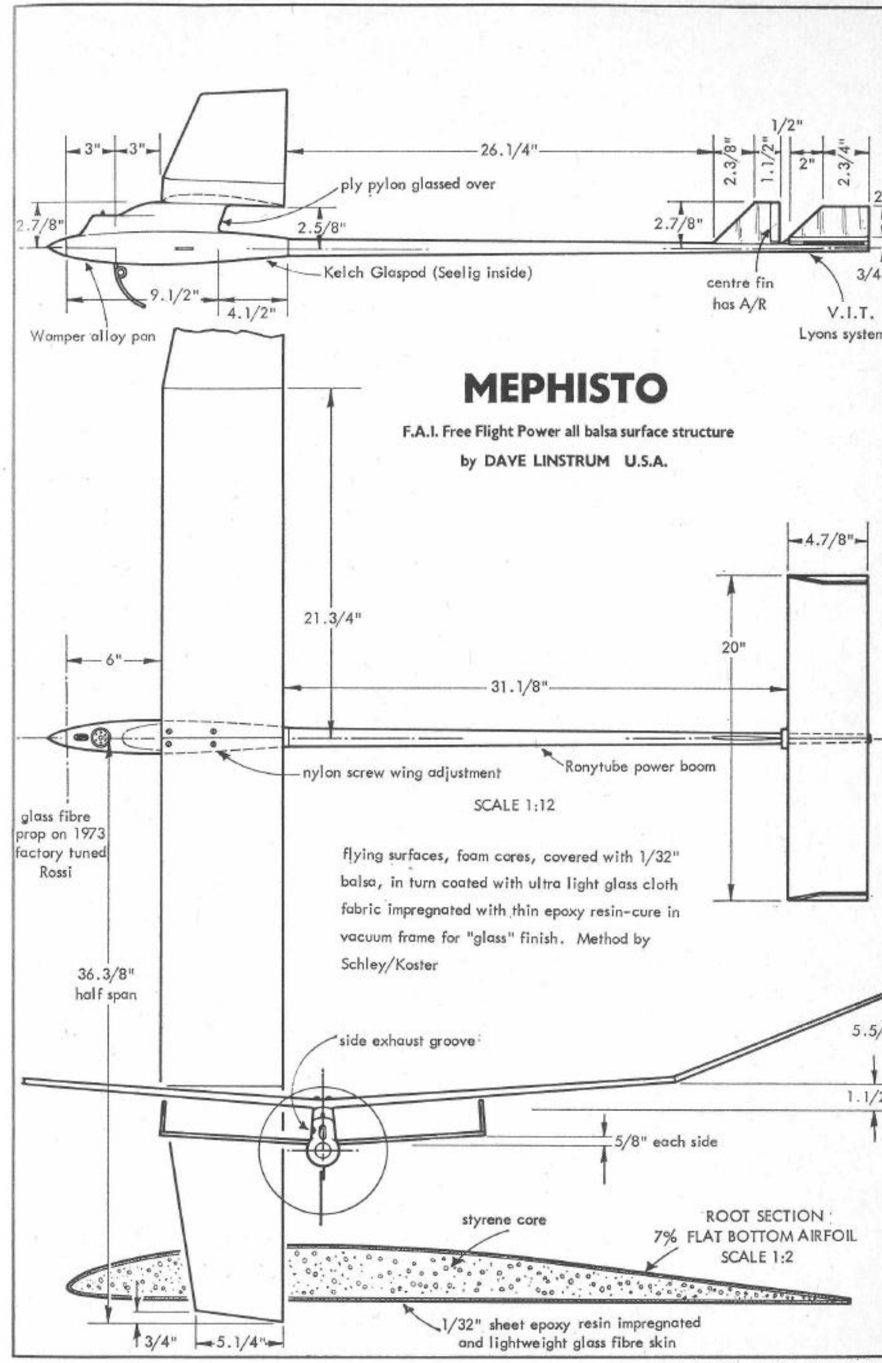


MODEL BUILDER U.S.A.

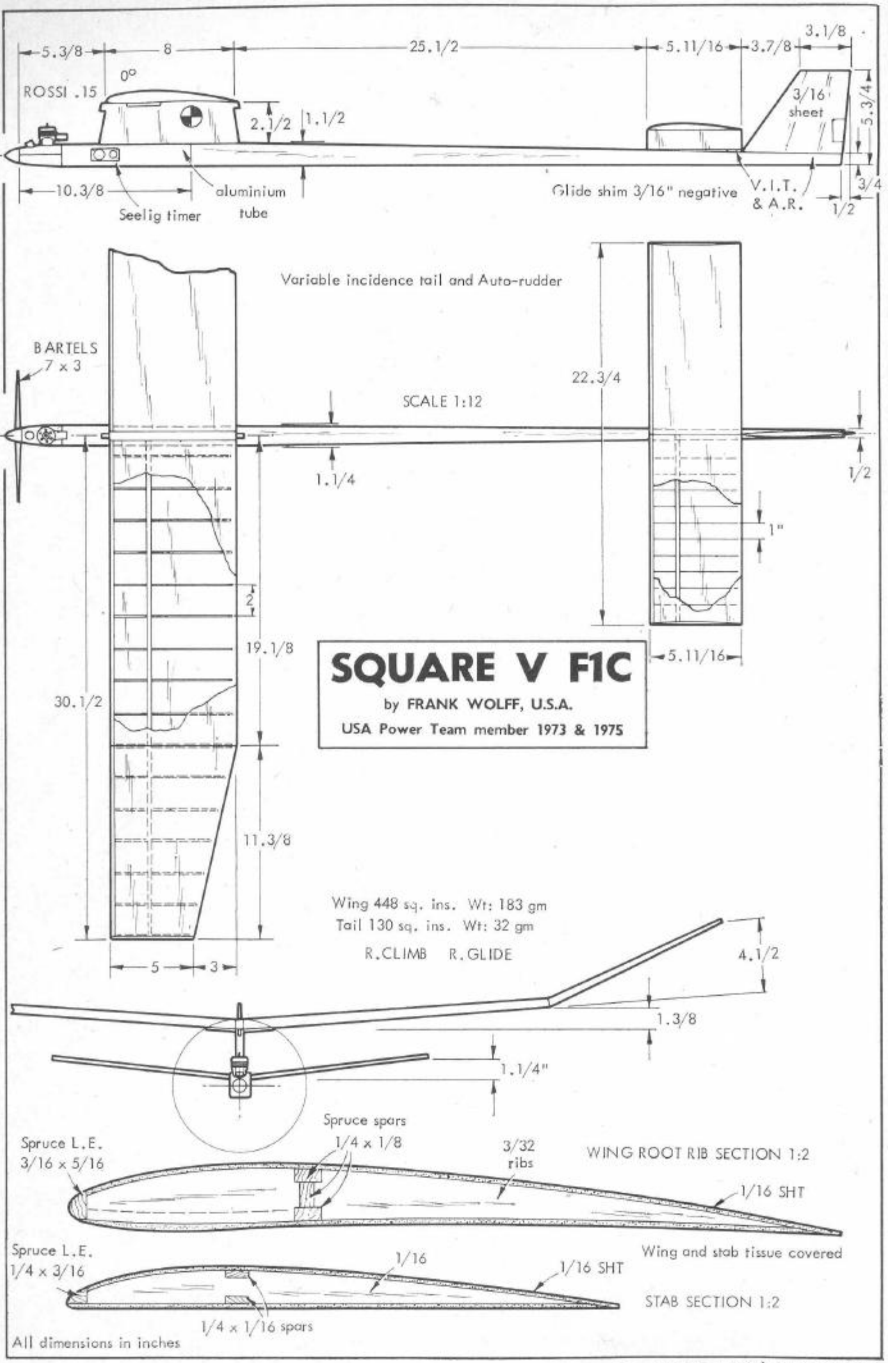
MEPHISTO

F.A.I. Free Flight Power all balsa surface structure

by DAVE LINSTRUM U.S.A.



CHICAGO AERONUTS U.S.A.

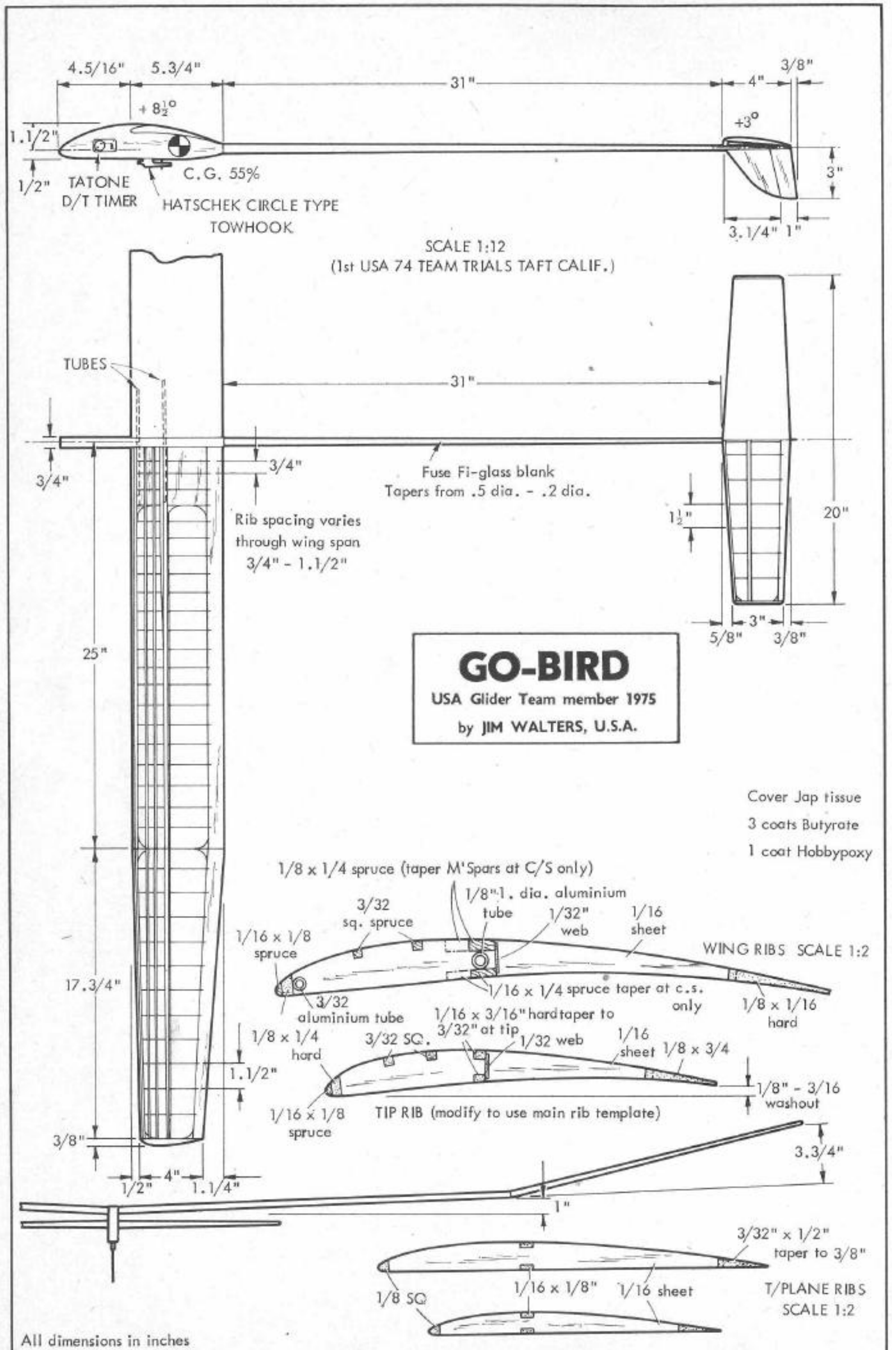


SCATTER + VTO, MODEL AIRPLANE NEWS USA

GO-BIRD

USA Glider Team member 1975

by JIM WALTERS, U.S.A.

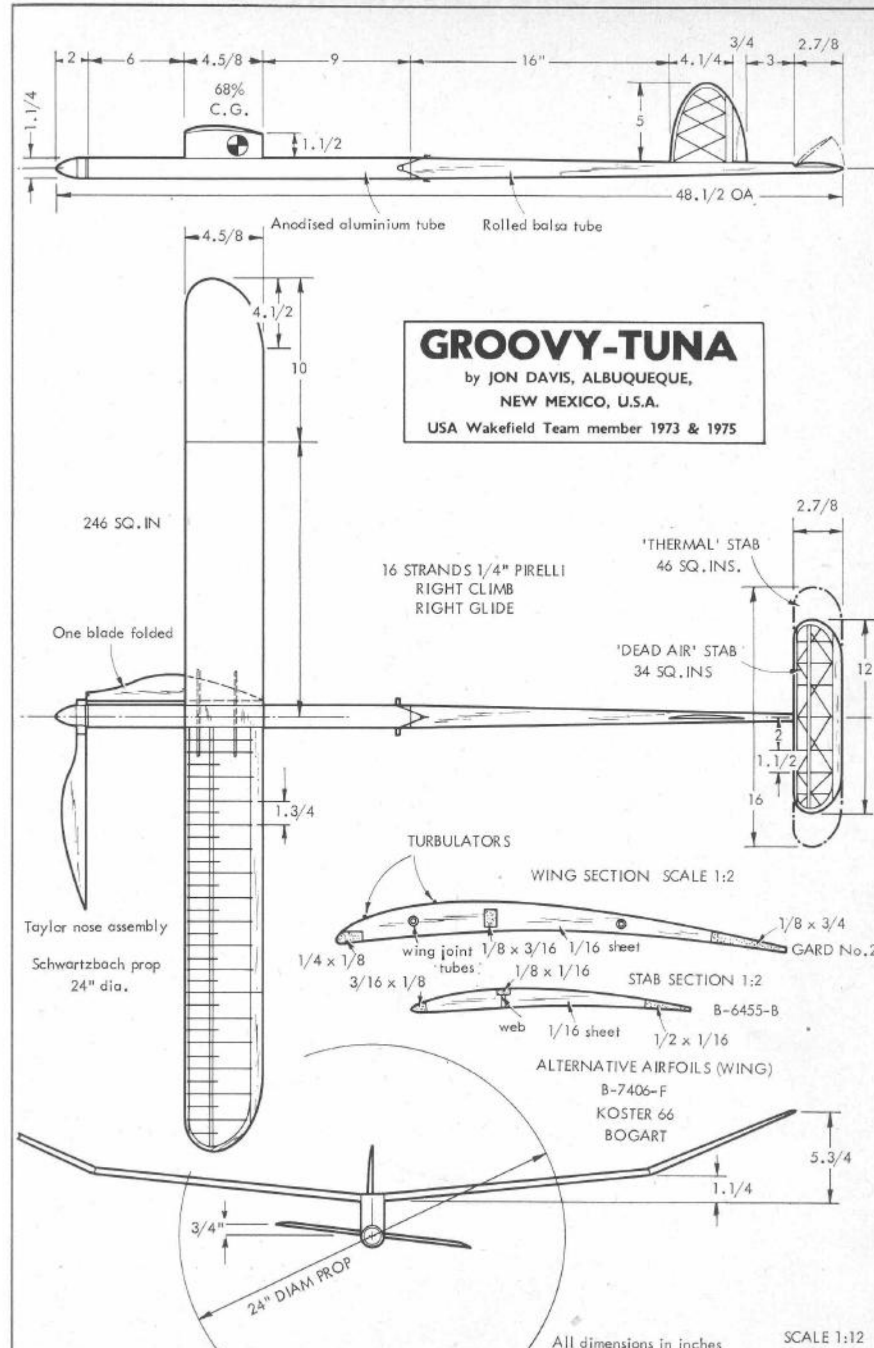


SCATTER — U.S.A.

GROOVY-TUNA

by JON DAVIS, ALBUQUEQUE, NEW MEXICO, U.S.A.

USA Wakefield Team member 1973 & 1975



SCATTER NEWSLETTER S.CALIFORNIA USA & MODEL AIRPLANE NEWS

"MONOLITH" TEAM RACE MOTOR FROM KIEV

Since first revealed early in 1974 this advanced concept of a streamlined integral power unit for team race models, has become recognised as a striking advance in developing techniques. Designed and made by the Samoilenko brothers from Kiev in the Ukraine, the motor is best described in their own words:—

"One of the basic requirements for any contest motor is to ensure efficient cooling. Our engine has a good aerodynamic shape that fits the natural model line; from the appearance and aerodynamic points of view, no motor cowls are required. In order to improve heat transfer, the exposed surfaces of the motor have been anodised black. It is bolted directly to the model fire-wall.

"The motor has three transfer passages and a front exhaust. The front exhaust position means that the *hottest* part of the motor receives the *coolest* air supply, ensuring very uniform cooling. This uniform cooling enables higher operating temperatures to be used, before thermal distortion causes seizure, and therefore the motor's thermodynamic efficiency is increased, and more power results. Comparative tests of two identical motors differing only in the orientation of the exhaust port have shown that a front exhaust position, is distinctly superior. There are some other advantages: in particular, the transfer passages fit very well into the motor design.

"The transfer passages are of minimum length, the main transfers being particularly short, necessitating the use of a full depth slot in the liner. Transfer passages designed in this way give little resistance to gas flow and ensure good cooling and lubrication of the little end, also the piston is more symmetrically cooled than is usual. Timings are 128–130° for the transfer and 144–146° for the exhaust, the actual port widths and directions follow normal Schnuerle design practise.

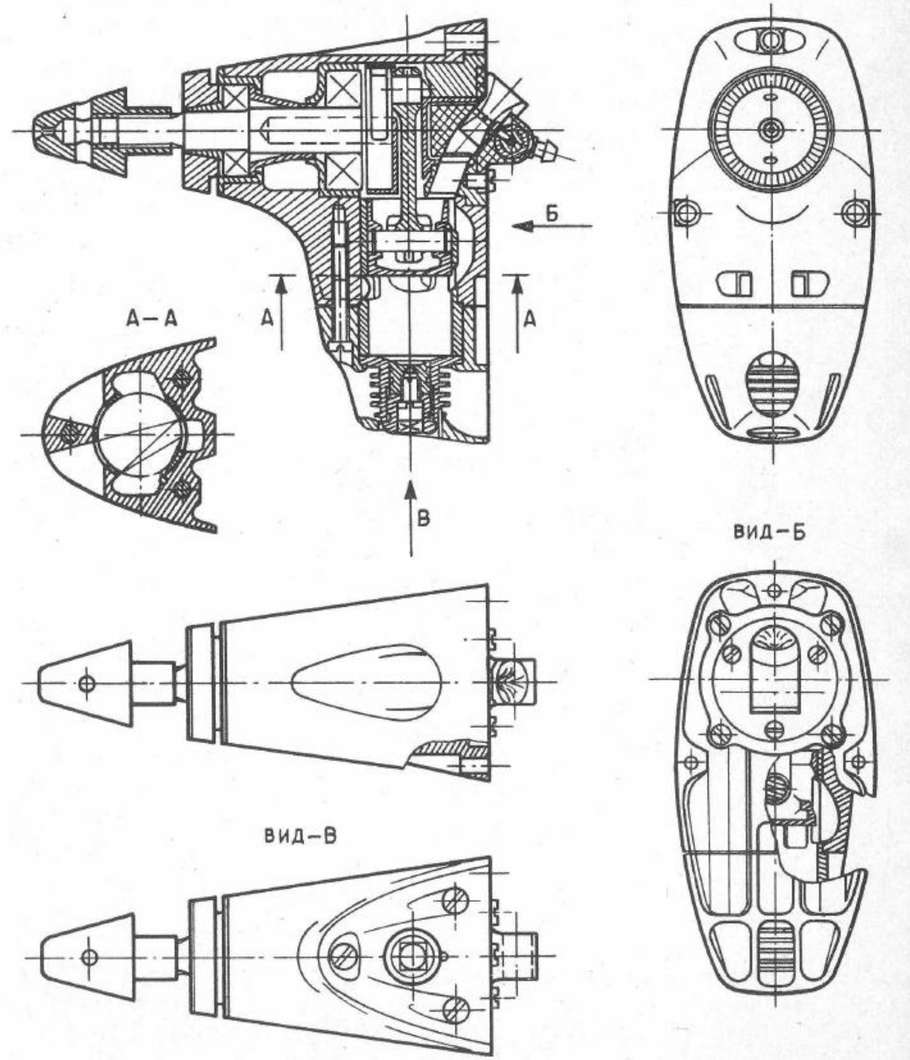
"An especially short and compact rear-induction system is employed, having been developed from the Natalenko Start motor design. The induction period starts at 45° after BDC and continues for 180°. The induction passage is short and only slightly bent and is so directed that the fuel/air mixture goes directly into the space underneath the piston. This is achieved by using a relatively large drum diameter of 12 mm, and the passage continuity is given by a 'Tufnol' insert inside and drum held stationary by bolting it to the back-late. The design was developed after studying and testing numerous designs—for example, the HP-style drum, the K & B style drum, the Super Tigre disc and the ETA-style disc.

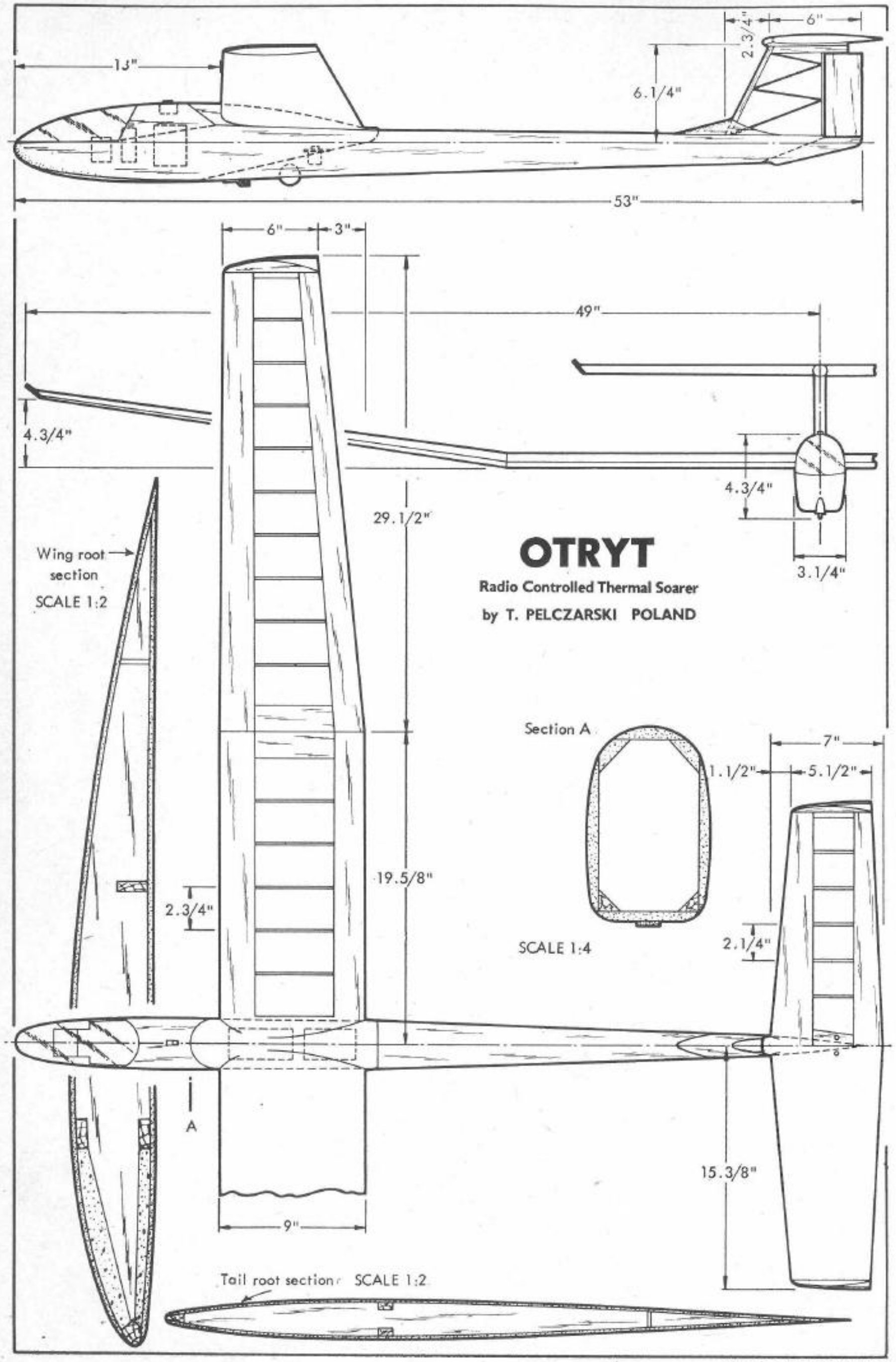
"The cylinder head is designed to give proper cooling and also provide very fine compression adjustment. It consists of a finned fixed portion into which fits the movable contra-piston of 7 mm diameter, and its positioning screw which allows a total movement of 2·5 mm. These parts are constructed in bronze, chrome-plated in places, and are retained by a cast cylinder head which is bolted to the motor. The contra-piston stroke is sufficient for any fine compression variation dictated by weather changes. Coarse variation, required by fuel or prop. changes, is achieved by shimming the whole unit. The outer part of the head has three cooling ducts cast-in to direct air right on to the fixed part of the contra-piston.

"The motor has a cast, heat-resisting aluminium alloy case, a forged aluminium alloy con-rod, a pearlitic grey cast iron piston, a through hardened liner (Rockwell 'C' 60–62) and a case hardened shaft (0·5–0·6 mm. thick case at

Rockwell 'C' 58–60). The shaft is carried on two ballraces, 7 × 17 mm. front and 8 × 22 mm. rear, behind the rear race is a removable seal bush with a 0·010–0·015 mm. clearance around the shaft to prevent gas leakage through the front housing. The all-up weight of the motor, minus prop. and tank, is 200 grammes."

Thanks to "Wings of the Fatherland" and Dave Clarkson's translation in "Aeromodeller" for this data on a most advanced model engine power unit concept.



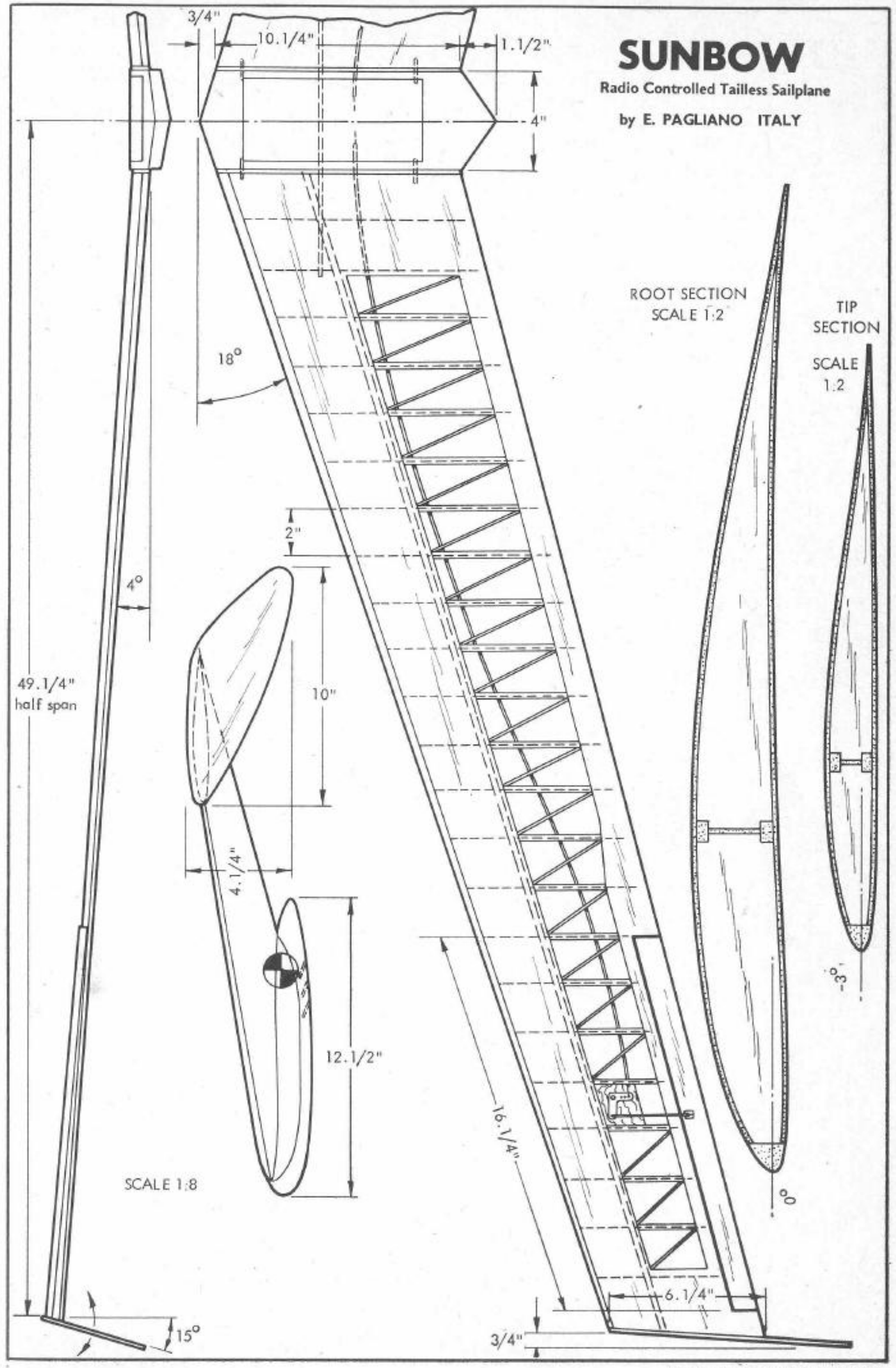


OTRYT

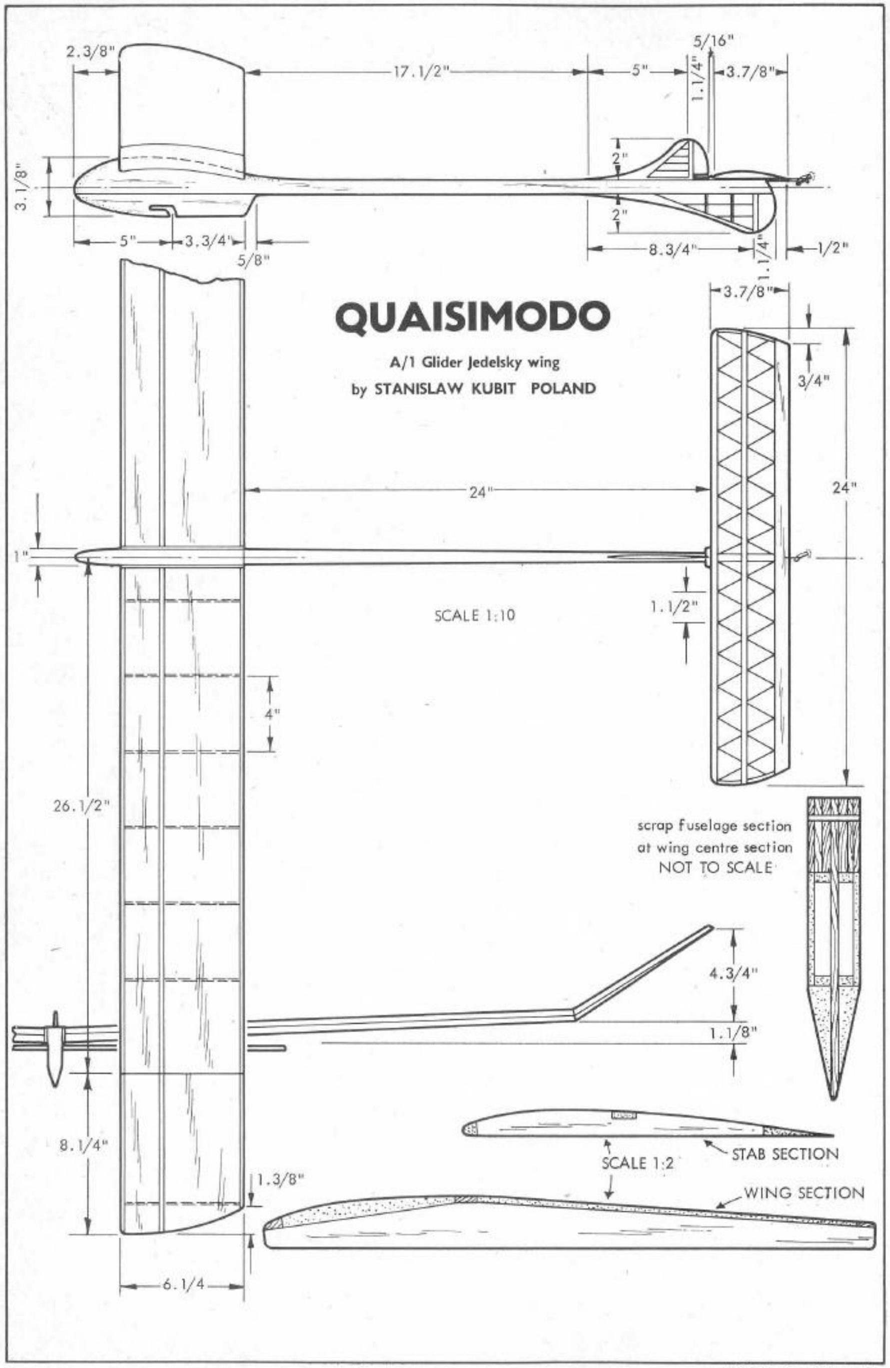
Radio Controlled Thermal Soarer

by T. PELCZARSKI POLAND

MODELARZ POLAND



MODELLI IN EUROPA ITALY



MODELARZ POLAND

SELF-LAUNCH DEVICE FOR GLIDERS

Hank Cole has devised this unique glider-self launcher. It actually throws the model into the air at the right angle and speed to give a trouble free launch. The hinge is a variable spring tension type (spring-loaded door hinge). Tighten the spring so that arm supports the glider in launch position. The arm swings forward when you start to run. The balsa block takes up the shock of the stopping arm. Launch is very good, even in dead calm.

(From NFFS Free Flight Digest "Gimmicks & Gadgets" by Pres Bruning.)