YOSHIOKA: PROFILE OF A WORLD CHAMPION

The reigning World Pattern Champion tells his history.

by Tsugutaka Yoshioka / translated by R. Honda

Photo courtesy Model Rectifier Corp.

Yoshioka holds his modified Blue Angel, as he and his mechanic show happy faces of victory.

My inborn nature pushed me to aeromodeling even in my childhood. I do not recall the exact age when I started to build and fly rubber models.

Immediately after I entered middle school in 1959, at the age of twelve, I purchased a glow plug engine for the first time. During the following two years, I concentrated on control line models. All the while, I was saving money with an iron will in preparation for radio equipment.

At last, I bought a single-channel radio with 20,000 yen (about $70.00), which was a large sum of money for a boy of 14. Signals were transmitted by a button and drove a rubber-powered escapement. The plane, called Over the Rainbow, really flew well with this radio.

Two years later, I obtained a multi-channel radio. Thunder Bird, with a ten-channel read system, was my first adventure in aerobatics.

Technological development in radio control systems has been very rapid, adopting many achievements from other fields. It was not long ago when the age of the proportional system set in, and reed systems reached their culmination. I began to use a proportional radio when I was 19 years old. That was an Orbit analogue system with a single stick. I can still recall the first feeling of response on a proportionally controlled model.

After a year and a half, I switched to a digital proportional system with dual sticks and, as my flying skill advanced, the thought of competing in aerobatics entered my head. During that time, I went to see the Japan National RC Aerobatic Championships, and learned much.

In 1969, my dream was realized. My own flying site was set up! This enabled us in the Shikoku region to hold contests regularly. I also took a course at the Aerobatic Judges' School in Tokyo, to study FAI rules, judging methods and contest organization.

I participated in the Japanese Nats for the first time in 1972. I passed the Regional Elimination contest with a sixth place position in May (nine fliers passed). I placed seventh at the Japanese Nats in November. Thus I was allowed to proceed to the Qualification Contest for the World Championships.

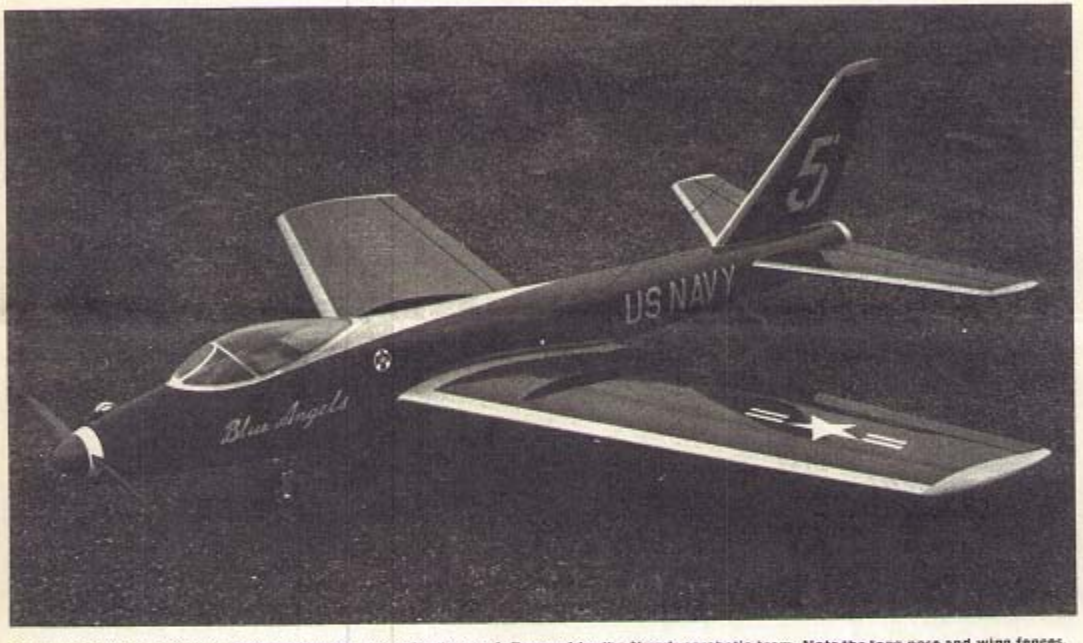
Eight candidates competed to choose three delegates to the World Championships at the Qualification Contest on April 22, 1973. Yoshiki Takahashi was first, Tetsuji Okumura second, and I was third by a narrow margin over Masahiro Kato, the designer of the Blue Angel. My score in the sixth round was the best round-score in the contest. I think it was only luck that I qualified as a delegate to the World Championships at my first participation in the Nationals.

The luck accompanied me, even when a model helicopter crushed the Blue Angel on the ground in August. The damage was only on the right wing and I managed to repair it by the time of departure to Italy. Furthermore, my Enya 60 with a YS carburetor seemed

to be affected by the Italian climate and it ran so hot that the plug melted away in the first practice flight. Therefore, I had to set the fuel mixture slightly rich during the World Championships.

Anyhow, my Blue Angel, the 21st RC model that I had ever built overcame several handicaps and flew quite well in the beautiful, blue Italian sky. This alone was sufficient for my pleasure. But surprisingly, the title of World Champion fell upon me.

Let me take this opportunity of thanking my modeler-friends all over the world, from whom I have absorbed and learned much. The victory is a result of an accumulation of efforts by all modelers. So, the glory must be attributed to them, the FAI officials, and especially to the kind Italian people who were so warm and hospitable.



The prototype Blue Angel, as designed by Mr. Kato after he was influenced by the Navy's aerobatic team. Note the long nose and wing fences.

THE BLUE ANGEL

The evolution of a championship model, as told by its designer.

by Masahiro Kato/translated by R. Honda

Blue Angel, an RC aerobatic model, stems from the Blue Angels Navy aerobatic team.

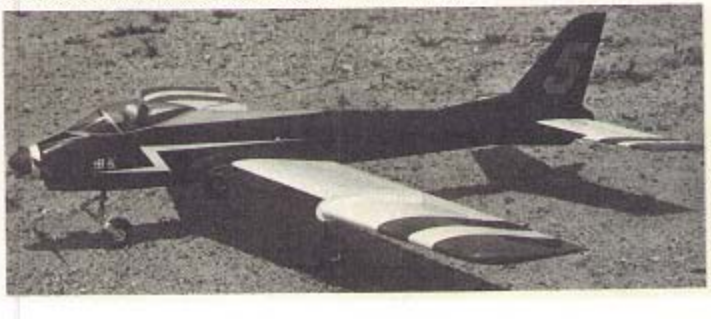
It was at the AMA Nationals that I saw, for the first time, formation aerobatics by the jet planes of the Blue Angels. For me, this was a real shock! That speed, that hedgehopping, that dynamic precision, and those jets! Revelation fell upon me like a bolt from the blue—the model and performance for RC aerobatics must be patterned after this. Here is a completely different type of aerobatics from those of a light plane.

I believe that American RC fliers also like speedy and large aerobatics. But my goal was to add the feeling of a jet plane. Even the characteristic maneuvers of takeoff and landing—running on the runway with the main gears only touching and the nose gear off—should be patterned.

This inspiration was the departure on a long trip to the realization of my dream. For ten years I have been concentrating on this task. I set up the basic idea as follows: (1) To design a semi-scale aerobatic model with swept-back wings copied after a jet plane. (2) To add speed and dynamics to the performance of maneuvers copied after jet aerobatics.

Prototype: In early 1963, the year following my participation in the World Championships in England, I started designing a semi-scale model, the prototype of the present Blue Angel. A long fuselage with a long nose, wings with a large swept-back angle and a short span, was the outline of my image. The proto-

The Second Blue Angel saw some changes by Mr. Kato, namely a more normal nose moment, more extensive wing fences, revamped vertical fin and a sub-fin.



Photos by R. Honda

type Blue Angel was built in 1966, after several partial tests had been completed. The model was painted after the color scheme of the full-size counterpart of the model.

In flying this model, rolling patterns were really beautiful, and I could imitate a long run on the ground, touching the main gears only in takeoff and landing. But it was not suitable for loops, due to the small wing area; and the lateral stability at low flying speed was bad, with a mortal stall tendency.

Second Blue Angel: In the second Blue Angel, the area of the wings was increased, the swept-back angle decreased, the nose shortened, and a thick wing profile used. These modifications resulted in a more aerobatic, but slow and heavy, model. This was not the model that I had intended. The wing profile was changed to a thinner one and the whole weight was decreased to 2800 grams. Thus modified, Blue Angel was too fast to fly the then-revised FAI rules, within the limits of a 100 meter distance and 45° altitude.

Third Blue Angel: I know that ordinary straight wings are much more easily controlled, but I was determined not to abandon swept-back wings and speed, and, by means of my flying technique, to overcome those difficulties characteristic of swept-back wings. The third Blue Angel reached the best compromise between the model and my flying.

The latest version of the Blue Angel shows an even shorter nose, with a deeper profile to accommodate retracts, the absence of any wing fences and a redefined vertical tail.

Although this brought me the title of National Champion of Japan, I placed 30th at the World Championships in Doylestown, Pennsylvania in 1971. It may be a poor excuse to say that I almost fell down on the flight line because of sickness (the translator can attest, as the Team Manager, to this). Much interest from modelers caused Blue Angel to be kitted after it was redesigned to suit average modelers, but still retaining its swept-back wings.

At the World Championships in Italy, Mr. Tsugutaka Yoshioka won the title, using a Blue Angel modified and built from a kit. I was very much pleased at the good news. He has my hearty congratulations.

The goal which exists in my mind is still far away—an ideal that must be pursued forever.

BLUE ANGEL MODIFIED

Yoshioka's mods to Mr. Kato's airplane design. / by Tsugutaka Yoshioka

The original Blue Angel was designed and flown by Mr. Masahiro Kato, former National Champion of Japan. The reason this model attracted me was his philosophy of RC aerobatics—a dynamic and speedy performance of maneuvers by a modern jet-type model, instead of a slower performance by a light plane. And the fact that Mr. Kato had devoted himself constantly to the improvement of the design toward this particular goal was another reason I was attracted to it.

Blue Angel was kitted after the designer, Mr. Kato, flew it at the 1971 Doylestown Internats. I first built and flew one from this kit version. As the result of my experience with this model, I modified the kit as follows:

(1) The original tail part of the fuselage was shaped like a twin jet engine pipe. This semi-scale arrangement caused a twofold problem. The one is, of course, a tail-heavy tendency coming from the weight of additional material, and the other is difficulty of pushrod attachment to the elevator due to a wide tail. The pushrod must be bent more than usual to reach the elevator. The swept-back angle of the stabilizer adds to this problem. The most serious problem is elevator flutter. The simple

and only solution is to shave off the wide tail part of the fuselage.

(2) Another difficulty was the inefficiency of the rudder. More rudder area was necessary to do FAI maneuvers. Shaving off the fuselage tail sides enabled me to extend the rudder to the bottom of the fuselage. Along with this extension, I modified the shape and size of the whole fin to meet my needs and taste.

These two modifications resulted in a light tail (and a light model as a whole), a more positive elevator and an efficient rudder. The model is now called Blue Angel Modified.

Blue Angel Modified has these characteristics due to its swept-back wing and stabilizer: (1) Stable straight and level flight. (2) Good cross wind tracking. (3) Larger fuselage angle of attack in knife-edge flight. (4) No wing drops, especially during loops. (5) Large angle of attack at slower slying speed. These characteristics must be taken into account in performing maneuvers, and the pilot can make good use of them.

The fact that swept-back wings require more effort and perseverance in construction than ordinary ones should be taken into account.

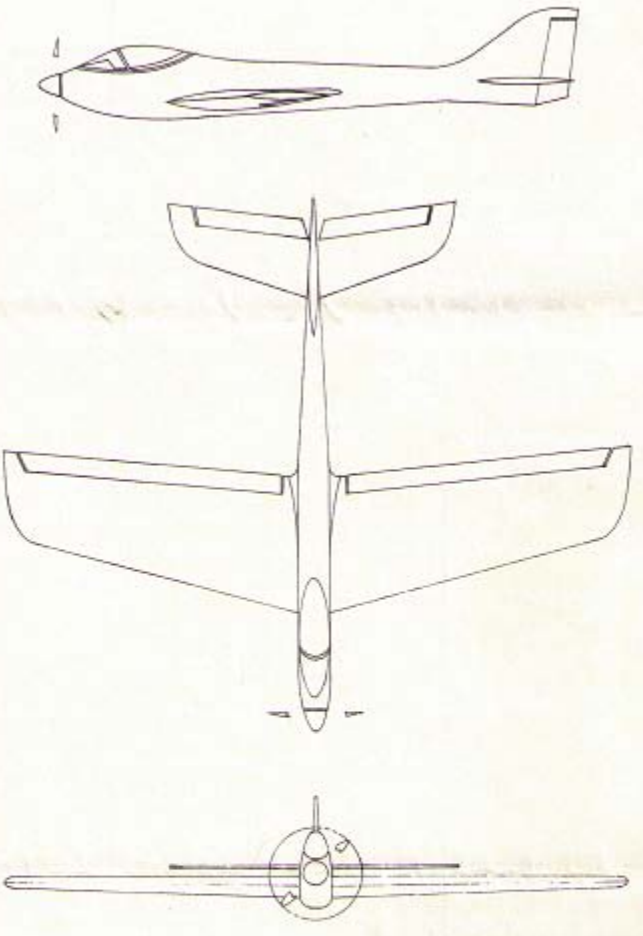
(1) The difference of angle between the ribs at the root and tip of the wing is difficult to detect due to the swept-back angle. Special care must be taken in frame construction. (2) Stress occurs in unexpected places and directions in the wings which are swept backward. In addition, the parts are composed obliquely. Joints must be fitted perfectly, and sufficient cement must be applied. (3) If the ailerons flutter, they should be tapered at the wing tips, and more hinges should be added. (4) In case of elevator flutter, the same procedure should be taken as for the ailerons.

The full throw angle of the ailerons is set based on the time necessary to complete the three rolls. Incidentally, the ailerons of this model are 9 mm thick at the leading edge and 40 mm wide. Such thin ailerons are flexible and have a kind of automatic adjustable effect. They are bent to a smaller angle when the model is flying at high speed, and return to a larger angle when in slow flight.

The up-limit angle of the elevator is set in accordance with the minimum angle necessary for entry into the spins. The down-throw limit must be a little less than the up-throw in order to compensate overcontrols in inverted flight.

When I am flying the model straight and level, my elevator trim is set a little to the down side. That is to say, I am pulling the elevator stick slightly to hold level flight. The exact position of the trim is determined based on the knife-edge flight. With this trim setting, special care must be taken at the entry and recovery of both loops and rolls. The reason why such a rather difficult setting was made is that the model tends to deviate to the direction of up-elevator when the rudder is in knife-edge flight. This tendency could not be overcome by adjusting the engine thrust and the angle of attachment of the wing, so the elevator trim setting was used. When flying the model, I always pull the stick a little regardless of the changes of the CG point caused by the decrease in fuel.

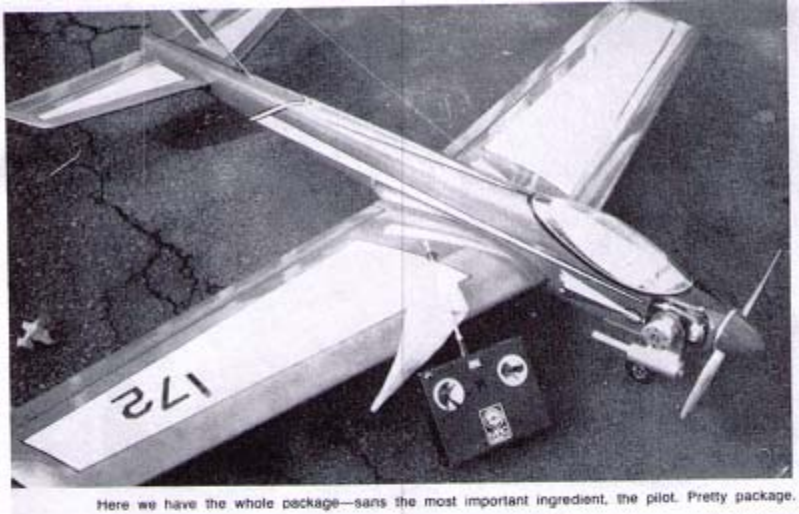
BLUE ANGEL MODIFIED



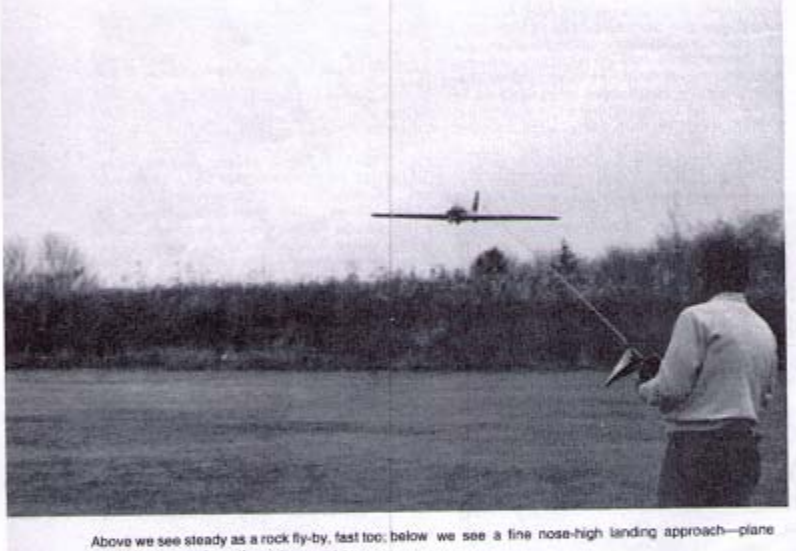
The fuselage combines the wings, tail surfaces and engine into a proper aerodynamic relationship. Any warps or distortions in the fuse will result in poor flight performance. This is especially important because of the swept-back wing. Another valuable consideration is to ensure sufficient strength to the fuselage to eliminate problems of vibration. Pay particular attention to framing the fuselage perfectly straight on all axles.

The engine used is an Enya 60 to which a YS carburetor has been attached. This combination is effective enough to pull a 7¼ lb. model straight up. I am completely satisfied with the characteristics of the combination—easy to handle, yet good power, and long life. The YS carb is an original Japanese innovation. It can be attached to almost any type or make of engine. At Groizia, the Enya had a hot run and melted the plug, mainly because the engine had been adjusted to the humid climate of Japan.

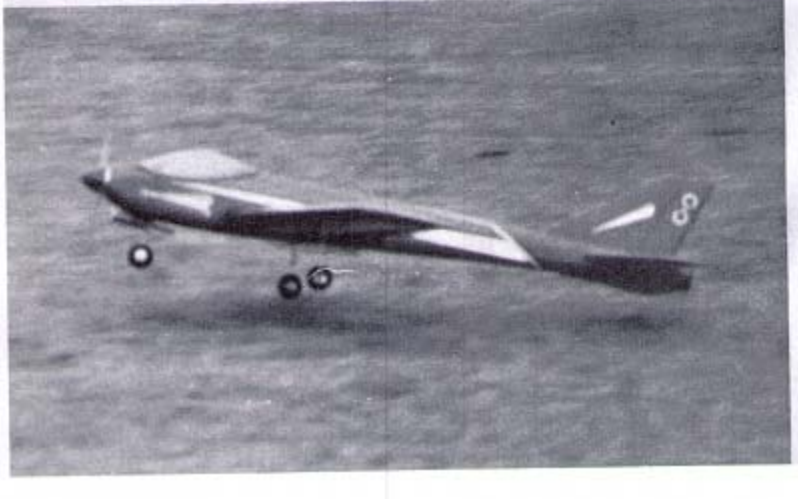
The 1975 World Pattern Internats are tentatively scheduled for Switzerland, Sept. 8-13.



Here we have the whole package—sans the most important ingredient, the pilot. Pretty package.



Above we see steady as a rock fly-by, fast too; below we see a fine nose-high landing approach—plane touched on mains, then nose gear.



Field and Bench

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MRC'S MK BLUE ANGEL KIT

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ENYA III B WITH YS PRESSURE SYSTEM

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MRC MARK V DIGITAL SYSTEM

• With acknowledged R/C powers competing at 1973's World Championship Pattern event in Gorizia, Italy, the winning effort by Tsugutaka Yoshioka of Japan came as quite a surprise. Not that Japan's team wasn't viewed as a very competent group of R/C flyers—they had proved this at Doylestown—but most felt the ultimate winner would be one of the competitors from Europe or America. After all, hadn't the western countries dominated R/C Pattern since the beginning?

Apparently, however, Yoshioka did his homework, because he indeed was the winner and, by and large, the result was a popular one. Europe had broken America's stranglehold on the individual championship some years ago, and now it was Japan's turn!

In the final analysis, the result should not be viewed as unusual. Over the past several years Japan has had the fastest growth in our hobby/sport until today there is a greater variety of kits, engines and radios available there than anywhere else in the world. This, coupled with a naturally competitive instinct that seems part and parcel of Japanese life, and a team with very high individual skills, proved enough to bring the mantle of World R/C supremacy to the island nation.

Becoming World Champion involves more than desire, skill and practice. A well-designed airplane with characteristics necessary for the required flight precision and an engine that is reliable and powerful are also necessary. Yoshioka had such a happy combination in his Kato designed, MRC/MK kitted Blue Angel and a modified Enya 60 III B.

The Blue Angel falls into the accepted FAI Pattern mode—long moments for smooth flight, swept wing, plenty of forward lateral area and a fairly large size for sixty power. The way it combines these elements into a pleasing format is for you to decide; we feel it is extremely attractive. Yoshioka modified his Blue Angel by altering the rudder to give additional moveable area; otherwise his winning ship was identical to Kato's

BY ART SCHROEDER . . . M.A.N.'s editor reviewed and tested kit for the '73 Champion's plane under almost the same conditions existing when combo won it all in Gorizia, Italy—same engine, etc.—it all came up aces.

Japanese National's winner and the MRC/MK kit that we constructed for this report. We understand that the newest kits will show the modifications as flown by the World Champion.

Kit contents were outstanding with excellent wood selection and all parts clearly identified. Rib die-cutting was satisfactory although some cleaning up with sandpaper was necessary. Hardware package was excellent with all horns, hinges, nuts and bolts included. The large canopy was cleanly molded and very sturdy. Our only basic complaint was with the plans that had only Japanese instructions which could cause problems for less experienced builders. Obviously intended for the more advanced Sport or competition flyer, this language problem might not really be important since most modelers really don't read the instructions anyway—that is, until all else fails!

Building Blue Angel isn't at all difficult although a few spots require some thought. Our total time, kit to finished aircraft, less MonoKote, required 52 hours spread over a two-week period; others could probably beat this time since we've never been accused of being a workshop flash.

Construction started with the wing. We like to establish a center line for each rib and then place each rib individually, checking for a parallel condition to the workbench. Ribs are then blocked, glued and pinned in place to the main spar over the plans. Each wing half was built upside down and joined after the second spar, leading and trailing edge pieces were in place. Retract modifications were made to each panel before joining. These were simple and only involved gluing support spars in place. A 1/16" template for the wheel and strut was prepared and a wheel well cut from thick, soft blocks with 1/8" balsa walls for the strut channel glued to it. Ribs W-4, 5 and 6 had to be relieved to accept this wheel well assembly and the whole thing was dropped in place. By the way, Franklin's Tite Bond was used exclusively in building our Blue Angel.

After the wings were joined with the supplied blocks and center section reinforcements, the wing was fully sheeted. Be very careful when sheeting the wing since the rib/spar structure is very weak until sheeting is applied, at which time it becomes as sturdy as the Brooklyn Bridge. We supported the frame in a simple jig of blocks on the bench to avoid introducing warps at this point.

Still another MRC product: their MK pump pours the 'go-juice' into tank as author watches.

A razor plane and sandpaper block made short work of final wing shaping. Tip blocks have a thin saw cut at one end that accepts a thin piece of veneer. After you shape out the blocks you'll understand why this reinforcement is necessary; things get very thin at the tip trailing edge and the veneer will save constant damage to this area. If you've planned ahead, cutouts through the sheeting for retracts and servo are a snap. Final sanding is completed and this assembly can be set aside.

Drawing shows only one wing panel so a second plan must be traced or the plan turned over and oil (or some other material to make the paper translucent) smeared on to make the plan visible. We use 3-in-1 spray oil for this purpose. One thing for sure—*don't build two left panels* or we fear the air will turn blue when you discover the mistake! (and who among us hasn't made 2 of one side at a point in our modeling career: Ed.)

One further wing point: when joining the panels, put all taper in the bottom leaving the top flat; this gives a dihedral appearance and avoids a droop look.

Stabilizer was also built up of spars and ribs and was fully sheeted with tips added before sanding to shape. On both wing and stabilizer use a large sanding block when working on the sheeting to insure a no-ripple job.

Might as well finish up all other surfaces now. Rudder was simply sheet balsa parts glued together and shaped with a sanding block. Control surfaces, rudder, elevators and ailerons are partially shaped and only require finish sanding. There is an exploded view of the fuselage construction on the plan that makes this chore really easy. This assembly is a symphony of thick slab sides, formers and blocks for nose, top and bottom. Once the whole thing is glued together you'll have a ball shaping the thing out and you'll end up with enough shavings to run your fireplace for a month. Only one fuselage point requires some thought. When putting on the various nose blocks, build the right side first, shape it out and make necessary engine cut outs. Then drill the mounts for your engine and install blind nuts. After this is done, complete the left side. Take our word for it, this is the only way this can be done since you can't mount the engine before the right blocks are in place since the *entire support* for these blocks is cut away in the mounting process—i.e. the forward part of the right side.

The stabilizer was mounted before closing up the bottom of the fuselage behind the wing. It was necessary to get both elevator and rudder pushrods in place before closing this up since it can't be done later, so keep

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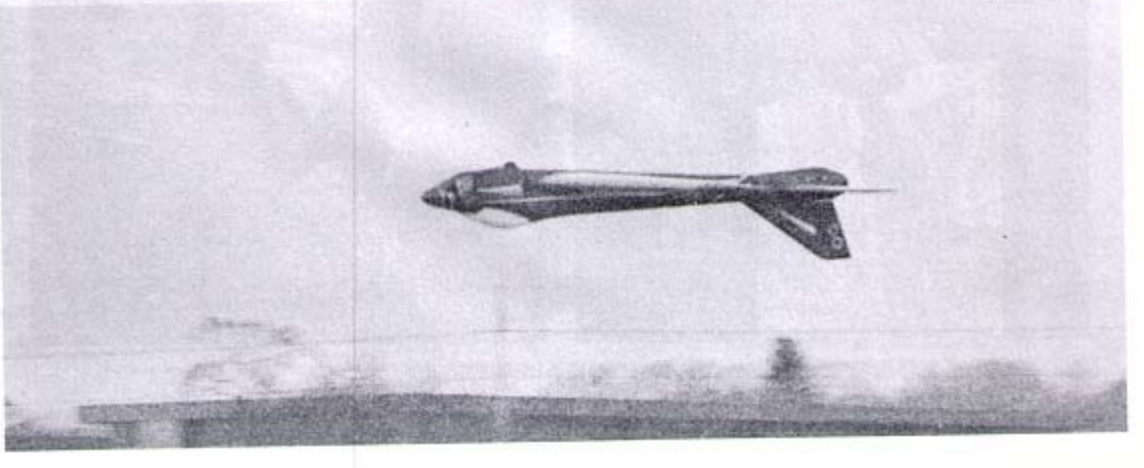
A typical Nick Samardge 'mood pic'—a rainy, overcast day combined with fast, inverted fly-by, and you have this misty shot of the "Blue Angel."



FIELD AND BENCH . . . CONTINUED

this in mind.

We used Rom-Air's retract mechanism for our Blue Angel, and some minor modification to the hardwood mount for the nose gear was required. We offset the gear to the left side by about ¼" to give the retract's cylinder clearance from the motor mount.

The only remaining work is the mounting of the wing holddowns and that requires no particular trick except care and accuracy. Once mounted, the bottom wing fairing can be built in place. Just be careful you don't glue this permanently to anything except the wing, or you'll end up with a very large one-piece airplane!

Canopy installation and a myriad of other odds and ends are evident and soon we were ready for final sanding preparatory to finish.

Our Blue Angel was covered with MonoKote by resident expert Dan DeLuca. If you've never seen a DeLuca MonoKote job you have no idea how great the film can look on a well-prepared aircraft. It not only rivals paint, it *exceeds* it for appearance.

Dan's major tricks involve proper heat (just below the material's melting point) on his standard heat-sealing iron and color schemes that permit covering in relatively small pieces. Dan does not cover the entire plane with one base color and then trim it. Rather, he fits each individual color in place and then conceals the seams with thin pin stipping. All sheet surfaces are punched with fine pin holes to permit heat to escape and avoid trapped air bubbles. Dan avoids all fillers except Stuff, since MonoKote just won't stick to the others properly. Super MonoKote was the only material used—no sticky backed regular MonoKote for anything, including the pin stripes. Properly done, a MonoKote job will last the life of the airplane since it is impervious to any fuel and is easily repaired.

Obviously the only color in which to cover Blue Angel was red, and when we got the ship back from Dan we were so impressed we shot the next two nights just looking at it.

As big as the ship is there isn't that much

Somer's R/C group including Big Wilson admires the pretty bird in its MonoKote covering

room available for equipment since the sharply-sloped top section restricts servo placement. Plan ahead and you'll do ok. Surprisingly, radio components should be kept toward the rear to make balance come out right. Ours came out right on plan position and flight tests proved that was the right spot.

Before closing the wing, we had placed large plastic straws between the ribs to act as a tunnel for the Rom-Air plumbing, so this installation was very easy. The Freon tank was mounted in the rear behind the radio compartment and the slide switch and actuating servo were mounted in the compartment proper.

We decided to follow Yoshioka's lead as far as possible so we converted our Enya 60 III B with the new YS positive pressure system. Here installation became a little tight. We first drilled and tapped the crankcase for the take-off nipple—this required engine disassembly. If this kind of thing isn't up your alley, get a friend who knows what he's doing and has a drill press to do this job for you. This is the only modification needed to the engine except for mounting the new carburetor.

A small ply plate that straddles the mounts holds the pressure regulator. All nipples are connected per instructions with Silicone tubing. Considering the cylinder for the Rom-Air nose gear, the regulator and all those tubes connecting everything, there isn't room left in the engine compartment for anything else. Tight as it is, everything worked out great and functioned fine. As far as we know only MK's 320 cc tank will fit this airplane, so best plan on that one. It is an excellent tank although a slightly larger capacity would have been desirable.

We had been the MRC route this far so we decided to go all the way with one of their new radios, the MRC Mark V. This rig is a completely new offering that looks very competent in its packing case and proves worthy of its appearance after you pack it into your new bird. Servos are very powerful and provide excellent resolution. Receiver is plastic-cased, quite small and easy to mount.

Mark V offers a raft of features that belie its low cost; price is right with no sacrifice in quality. Servos operate on a three-wire system; connectors are mil spec, gold-plated jobs that should be completely trouble-free; sticks are ball bearing pivoted and have a very positive feel and the system is charged by a separate, transformer isolated charger.

We believe these reports should confine themselves to the practical aspects of system operation and not to the technical information that so few of you really want. Our range checks showed Mark V to be very solid in the "how far can you go" department. Some 72 mhz rigs have suffered from interference at our field that is ringed by various commercial antennas but this radio never glitched once through all our flight tests. System operation covered a dozen flights each day of testing with plenty of reserve left in both flight and transmitter battery packs. Flight tests showed resolution and servo speed to be excellent—we felt we had a very positive link with the bird at all times. We sincerely believe MRC's Mark V radio system to be worthy of your attention.

We now had a beautiful bird ready for flight, so why delay? A trip to Westchester

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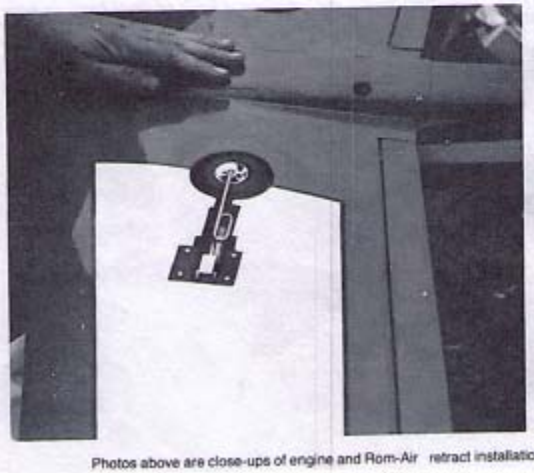

Photos above are close-ups of engine and Rom-Air retract installations. Lots of room for side-mounted engine, snug gear installation.

Field and Bench

(Continued from page 40)

County so Walt Schroder could take the necessary pics was made and even though we tried every excuse we could think of, Walt prevailed and we finally flew the bird.

Blue Angel is a different machine from our usual Pattern bird in that it is a low winger with quite long moments. As most of you know, we have spent the past five years on Eyeballs that tend to react very quickly, particularly in pitch. We were most interested to see what this new design would do. Thirty seconds or so after take-off we realized that smoothness was Blue Angel's greatest single virtue. Every maneuver, and we did them all, was big, fast and impressively smooth. We always get a bit shaky while inverted in a low pass but Blue Angel's positive flying qualities made this maneuver as easy as can be. It wasn't too long before we were virtually dragging the fin across the turf on those low inverted passes.

Roll rate was initially too fast and we eventually cut throw to no more than 3/16" up and down. Elevator throws worked well at about ½" up and down and rudder needed all we could get.

Knife Edge was great, and carried over into fine Four Point Rolls. Figure M required some work but we eventually got the right rudder throw for the stall turn part. The modification Yoshioka used would help this maneuver. The Slow Roll was beautiful from the start; we've never done better ones.

While flight characteristics were excellent, Blue Angel really shone in landings. When on final the plane can be slowed way down to touch on its mains as pretty as can be. We couldn't detect any bad snap qualities—in fact we doubt that the airplane can be snapped without markedly moving the balance point rearward. Since there are no snap requirements in the pattern, we see no reason to do this since spin entries are reliable and easy to come by with balance as shown.

The Enya proved to be an outstanding performer with the YS pressure system. An 11 x 7½ Power Prop was our choice and seemed fine for the engine/plane combination. Our tach was not functioning so we don't know what the actual power increase the pressure system with its wide throat carb provides, but we're sure it's significant. We've used the Enya 60 III B since January of 1973 and this newest example is the best we've run by a wide margin. Big advantage for the pressure system is the positive quality of each run from full to empty tank. RPM's do not waver at all in any aircraft attitude or at any fuel level. In a Top Hat, the engine speed going up seemed exactly the same as that when the plane was in a vertical dive. Cleanliness is important when using this pressure system and a filter is recommended. A small bit of dirt can foul up the pressure regulator so use care in your fuel handling.

It was a kick to build a copy of this World Championship aircraft and we can highly recommend all components of this team—Blue Angel, Enya 60 III B, YS pressure system and the Mark V radio system. All the items are products of the Model Rectifier Corporation, a company that can well be proud of this latest series of achievements. We sure can understand why Mr Yoshioka selected Blue Angel—you really couldn't find a better choice anywhere! ■

Foreign Notes

(Continued from page 6)

the two International contests held to date have proven, are second only to the Americans in Pylon racing performance levels) have wholeheartedly adopted the FAI class, but the same cannot be said for most of the other countries where Pylon racing has any sort of following. In Japan, the major Pylon events are run in accordance with rules that are basically those of the NMPRA except that mufflers are required. In Germany, racing has been largely confined to Formula I although we understand that FAI is being adopted for the coming season. In South Africa, the switch, a couple of years ago, from Formula I to FAI had little support and there was an immediate demand for a