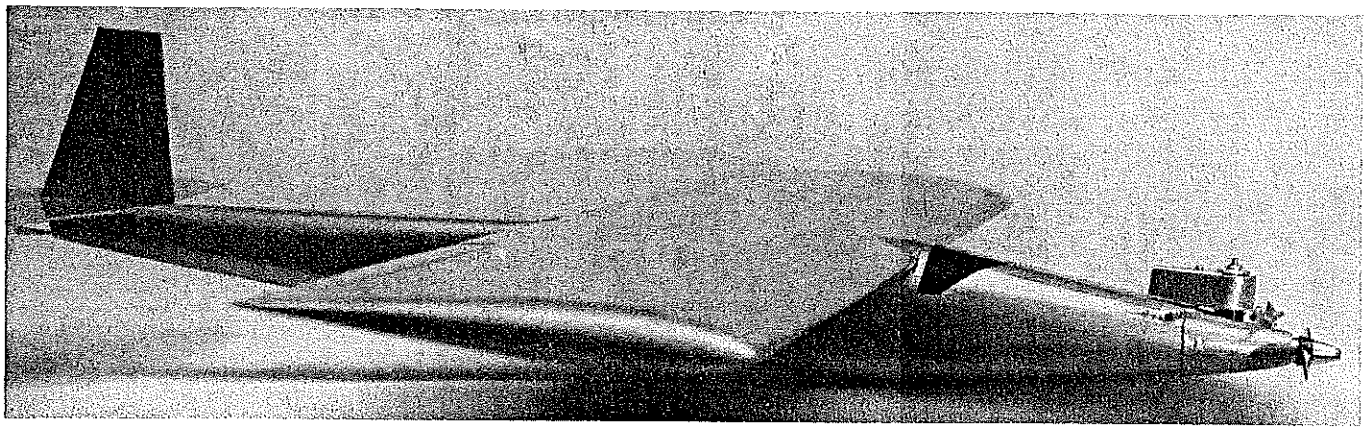
#146

# QUICKSILVER



**The personification of speed is exhibited in every line of design, from the sleek rounded-off fuselage to the shrouded cylinder and the needle nose. Flat-out speeds of newer 1/2A speedsters approach an honest 90 mph—which means times in the 1:20's at 24,500-25,000 rpm. Induced drag minimized.**

Half-A RC Pylon is coming on like gang busters. In addition to plans and instructions this article is a round-up of the latest state-of-the-art. The ship itself is among the fastest in the country.

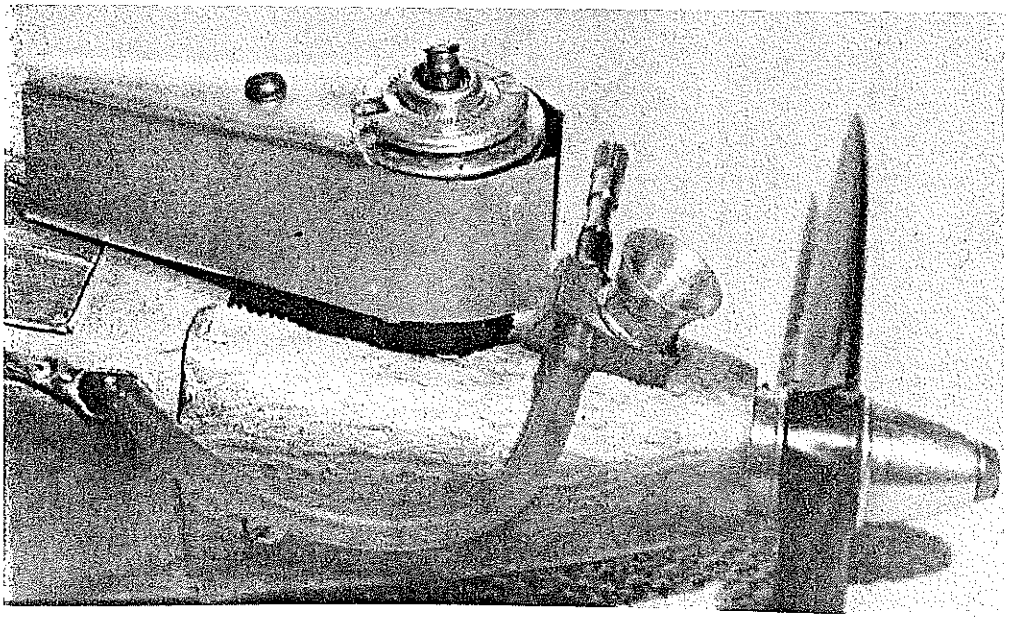
**Vince Calouri**

MANY WORDS have been written about the "fun" of ½A Pylon Racing. Well, it doesn't take long after mixing capability with competitiveness before Fun is spelled Win and Win means Fast! In the Northwest, where ½A Pylon Racing has really grown and developed (don't believe everything you read from California), it is a serious racing event. In terms of the number of participants and number of races held, it is a clear favorite.

The latest vintage of ½A Racer is generally one of the fastest models at the local field (flat-out speeds are approaching 90 honest mph). This speed flown around a short course means race times in the 1:20's which, when combined with that 24,000 to 25,000 rpm TD howl, can generate large chunks of excitement. These, however, are not the only reasons for its popularity or we'd all be racing Formula I. Clearly, if done right, ½A offers the most racing for the least work and money. This is true both from the participants' and the administrators' points of view. It is the only form of flat-out competitive racing that can be held at *any* RC field without a great deal of special equipment.

Although a good deal of common sense is involved, there is none of the Formula I apprehension about safety. The Cox TD at less than $20 is the only competitive engine (no $100 controversy here!). A simple two-channel radio will do. And with no callers or flagmen the winning is left primarily in the hands of the good, aggressive flier. Best of all, even though it's fast and furious, it's still "fun."

Now that you are absolutely convinced to try ½A racing, jump right in at the top. The QuickSilver presented in this article is about as clean an airplane as you can build and is the result of several development cycles. I'll tell you about it, and pass along a summary of the "latest" on engines, pressure fuel systems, fuels and props. You'll also find a description of our racing and the rules we follow, which should allow you to start your own racing event if none exists in your area.



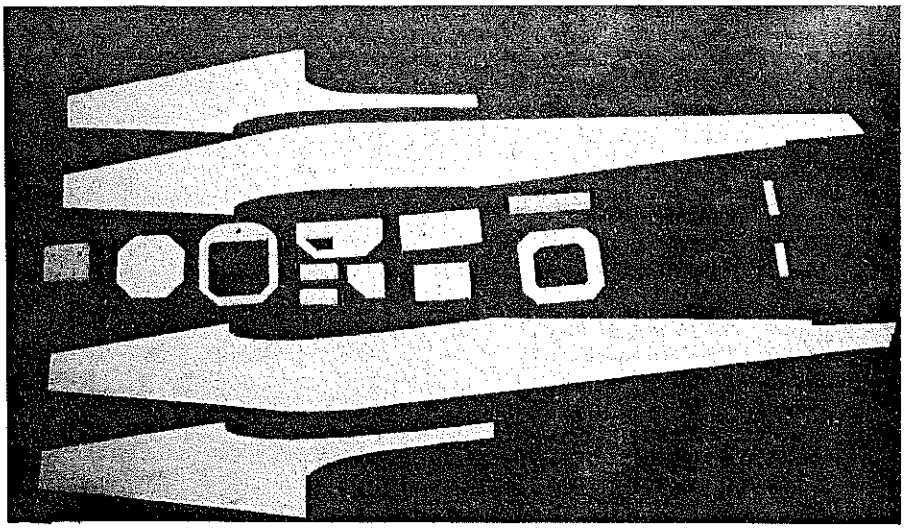
**Close-up of the engine cowling—note the fuel pinch-off at the body exit. The nose shape, of course, dictates a penbladder fuel system. Use any soft, thin metal sheet for the shroud.**

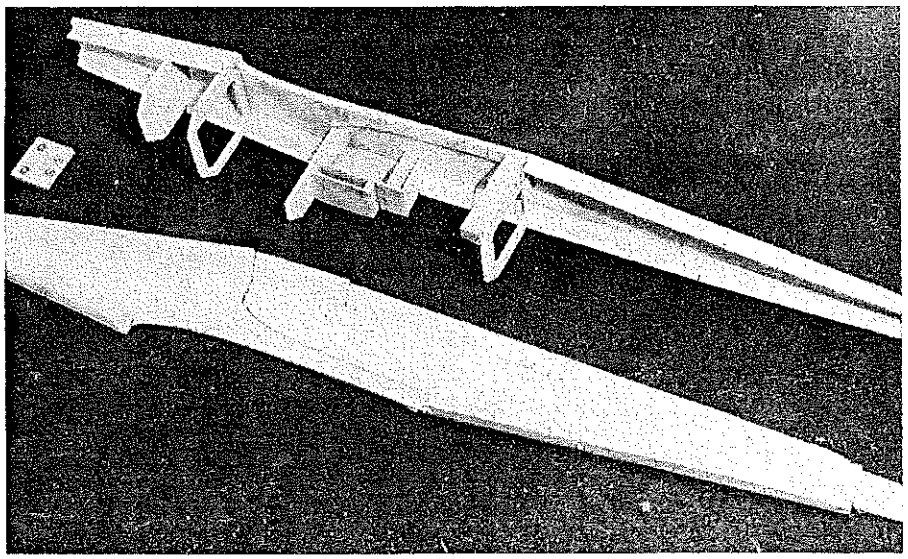
**The Airplane**: Like most people we started with the 1971 *RCM* rules which were laid out around an "Upstart" type of Ace foam-wing airplane which "kinda" resembles a real racing airplane. In our second year of racing, 1973, the mold was broken. Nelson Eddy brought out the first low-aspect-ratio wing airplane which buried everybody, and I "legalized" belly wheels with my LIT Special (*Flying Models* magazine, Aug., 1974). With the conformance rule dropped for 1974, we had a whole rash of new airplanes representing a second generation. All sported low-aspect-ratio wings and few had any but buried wheels. They had started to look like racers instead of miniatures of racers. Pressure systems were common and we had started to go "fast." Lap times in the 1:40's were normal and times in the middle 1:30's were being turned by the really fast. Leading the really fast pack was Bob Mikko's "Snake" which introduced the needle nose fiberglass engine cowl and a round body for lowest wetted area.

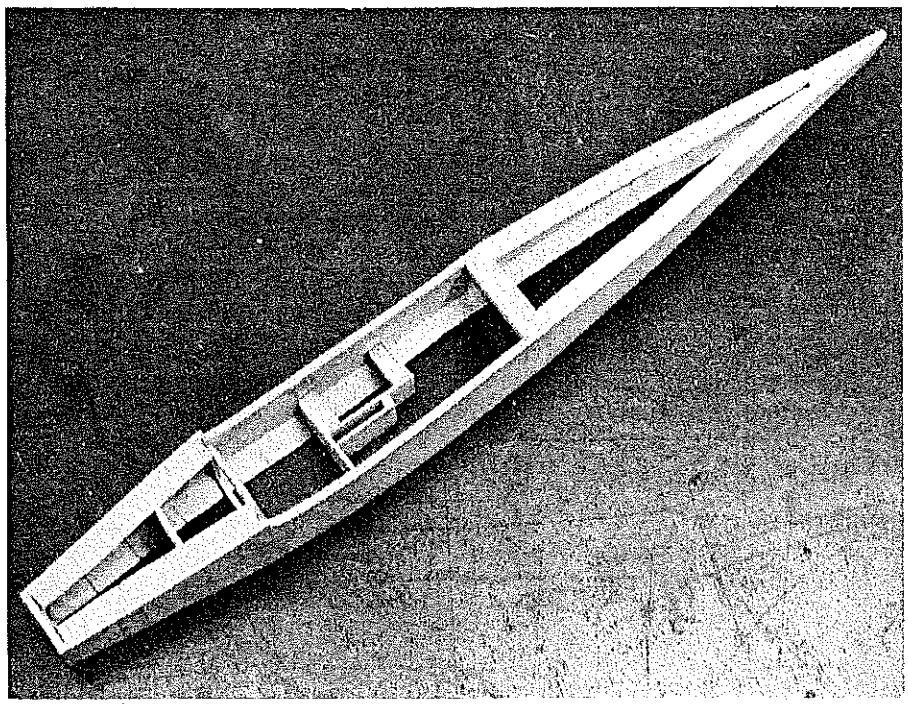
The QuickSilver belongs to 1975's third generation of racer. It incorporates the low-aspect-ratio wing (Gene Weaver's to be exact) cleanly mounted on a rounded body, a needle-nose engine cowling, buried wheels and an engine cylinder fairing/cooling shroud. (Although you might do otherwise, the nose shape dictates a pen bladder fuel system.) It is fast as proven in its first outing where it took five straight wins with a best time of 1:28. It is a very easy airplane to fly, extremely smooth and highly damped in pitch which makes it "groovy." Highly damped in pitch means a large horizontal stabilizer and an easy way to draw the vertical was to make it a respectable percentage of the horizontal—after all you can't have too much stability, right?

My previous airplanes, therefore, have always had large verticals and they have also always exhibited that most annoying tail wiggle in the turns commonly called the Quick Fly dance. It has got to slow an airplane down! Without entering into a long explanation, it's apparent that too much directional stability coupled with little dihedral can lead to this problem. There's no dihedral in the QuickSilver wing but the vertical is small and the fuselage is round behind the wing as well as in front. (Making it less effective in terms of stability.) It has not the slightest trace of dance! Additional verification can be found in the newer pattern airplanes which sport a good deal of forward fuselage area therefore reducing directional stability and also eliminating the pre-knife-edge design's tendency to dance.

The wing is a key element in the high performance of this design. Its low aspect ratio makes it simple to build and light. The low aspect ratio or large chord also result in a "thinner" wing in terms of thickness as a percent of chord and a





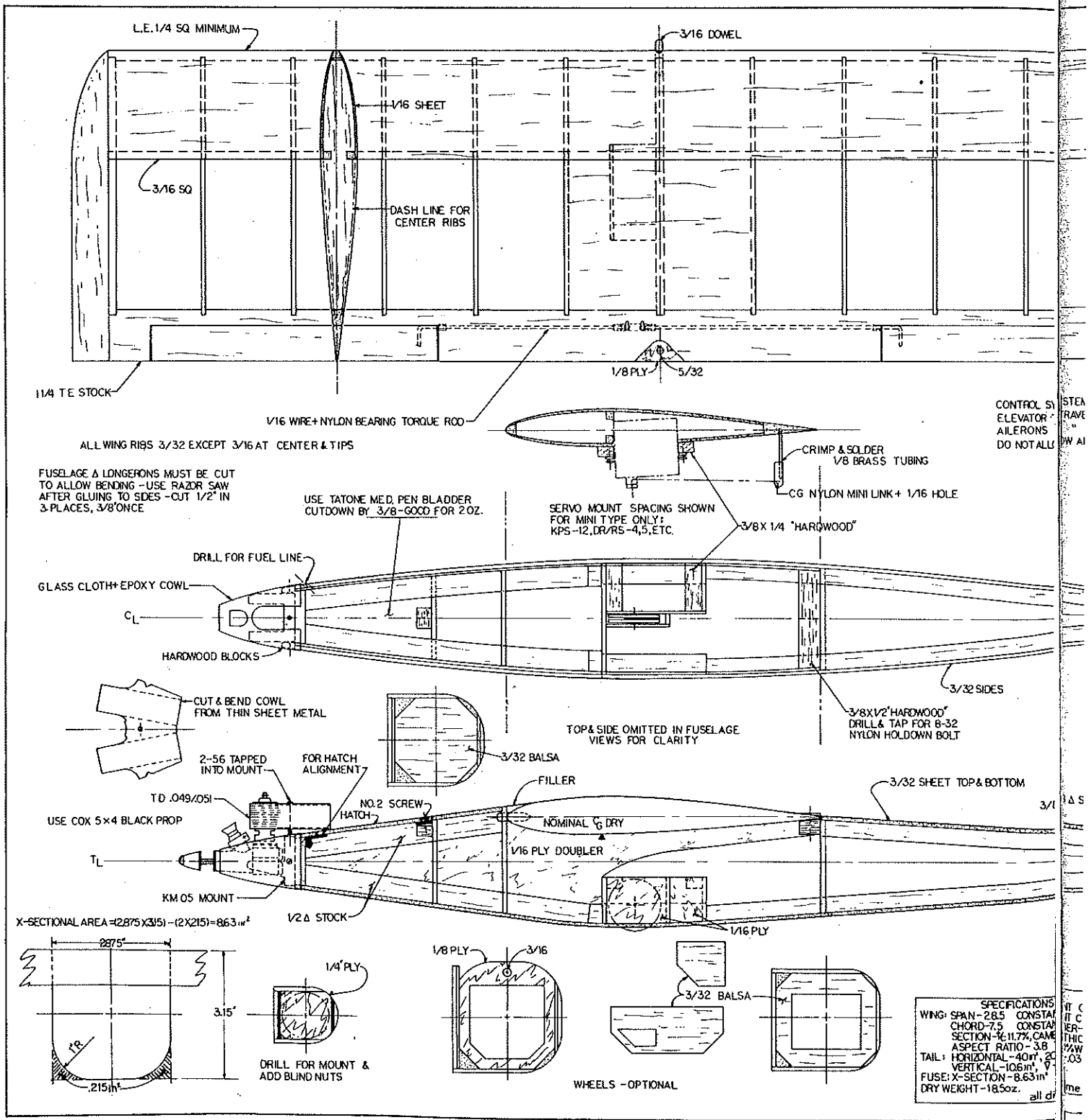


**Top: Layout of the fuselage components prior to assembly. The simpler the design the fewer the parts! Middle: Bulkheads and longerons installed on one side, the other ready to be cemented in place. The longerons or corner pieces are from triangle stock. Bottom: The fuselage complete except for upper and lower planking. Razor saw cuts in the longerons allows them to bend. Rounding off is a job for a razor plane and sandpaper block—like falling off a log.**

higher operating Reynolds number. These factors add up as follows: a lightly loaded airplane will not pull a high-lift coefficient even in a turn, therefore keeping the induced drag to a minimum while the section drag is very much dependent on percent thickness and in this size/speed regime on Reynolds number. Obviously, it's important to keep the weight to a minimum and to fly this type of airplane around the turns instead of giving it a quick "yank."

The round fuselage is very little additional trouble to construct than a slab-sided model, since in this size it only takes some large triangular stock longerons and sandpaper. The engine cowls are really easy to build. I fabricated my nose cowl male mold by tack-cementing an appropriately sized piece of balsa to the firewall and sanding it to shape while I was sanding the rest of the fuselage. It will help if you draw some lines on the balsa to indicate minimum size, specifically, the nose ring and the planform (top view). As shown in the pictures, I used a "very easy does it" method and just wrapped a piece of glass cloth around the mold, added some epoxy glue, pinned it in place and let it dry. The hardest part was getting it off the mold.

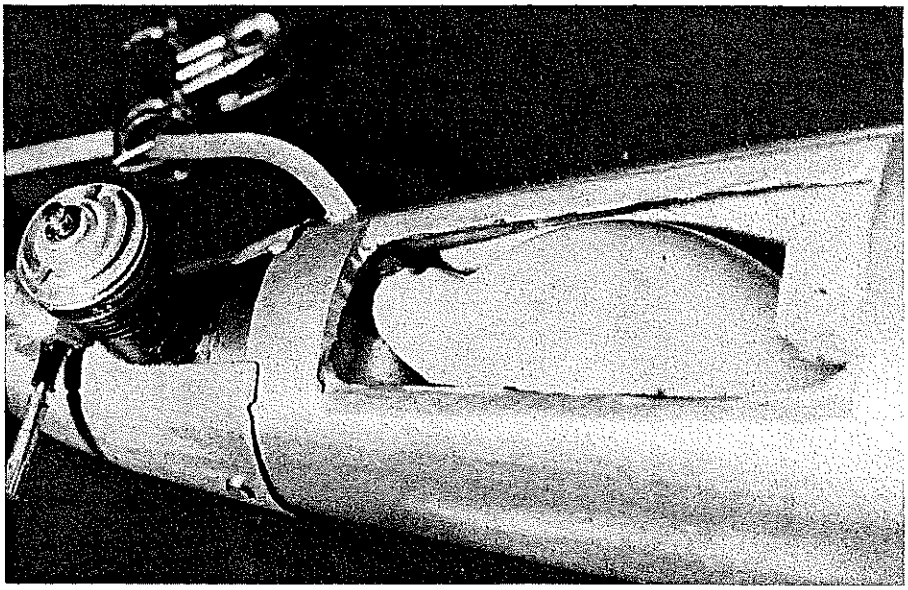
The sheet metal cylinder fairing can be made from any soft, thin sheet metal you have handy. A tin can or some of the K&S sheet stock is fine. One thing I would add that is not shown on the plans is a spacer between the top of the cowl and the engine mount. Any piece of brass tubing big enough for the bolt and cut to the right length will work fine, and will



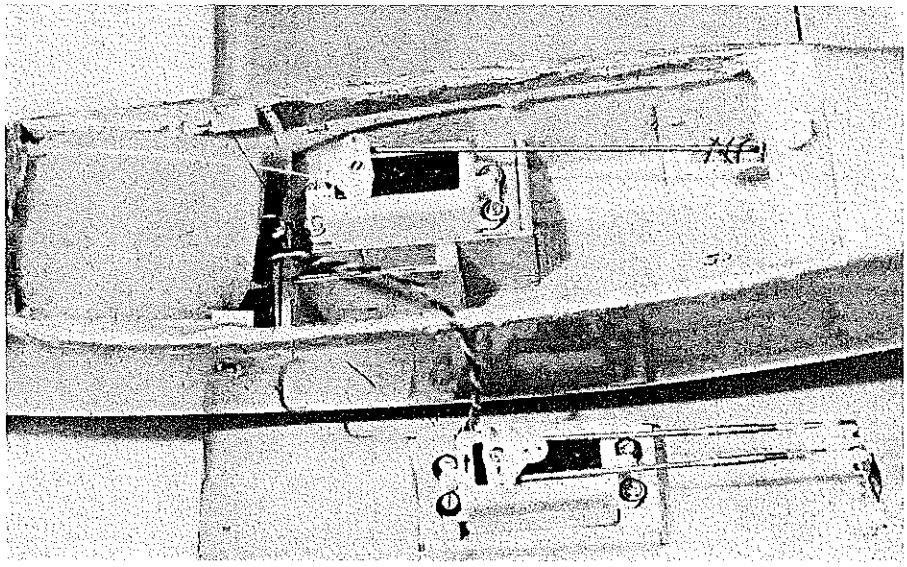
prevent you from bending the cowl when you tighten the hold-down bolt. You can leave this cowl off but I promise you that it is effective both in reducing the drag of the exposed cylinder and from a cooling standpoint. A tightly fit cowl will force the cooling air through the fins instead of around them. This is a very simple airplane to build and the plans are detailed. Keep everything true and the control system tight and it will go great.

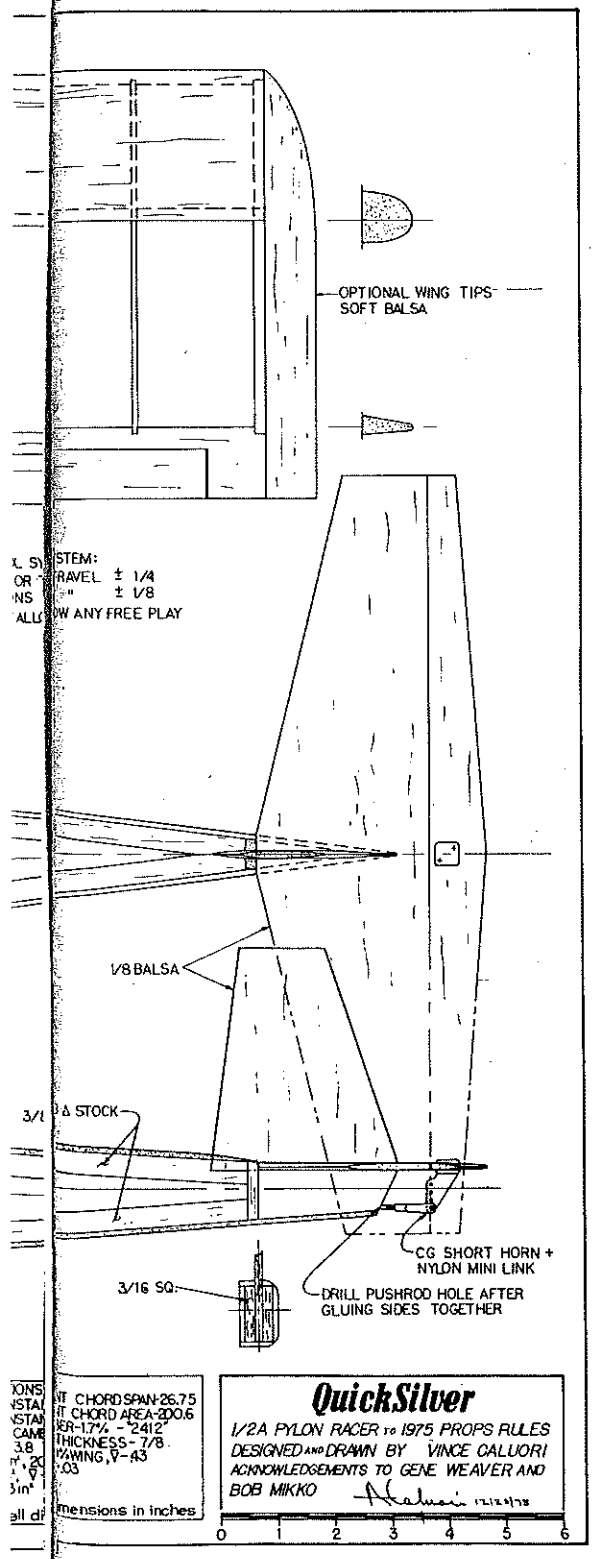
**Engine, Props and Fuel:** Now that we've got a clean airframe all we have to do is make it go as fast as it can. I can't go into all the test and other data that I've accumulated, but I will pass along the results. First, I'll give you a calibration point. Using a stock Cox 5 × 4 black plastic prop a "great" engine will turn 23,500 rpm, a "good" one will be between

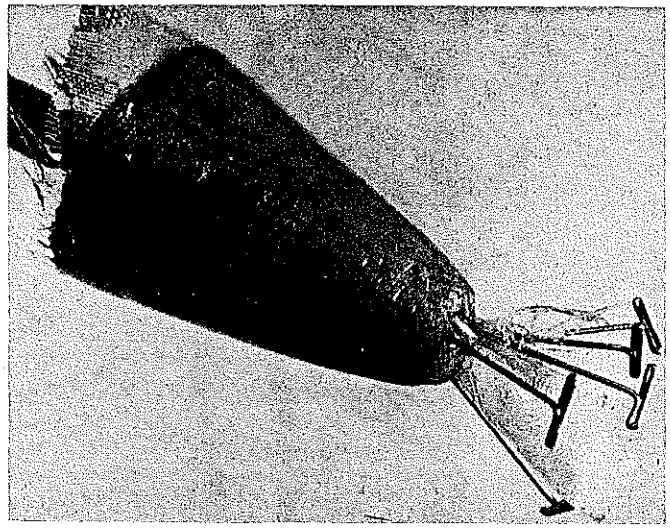
**Below: The metal mount for the Cox TD should make a tight, snug fit between the cowl blocks. If you have a truly competitive engine use the Cox 5 x 4 black nylon. Right: Brass tubing is crimped and soldered for aileron fittings.**



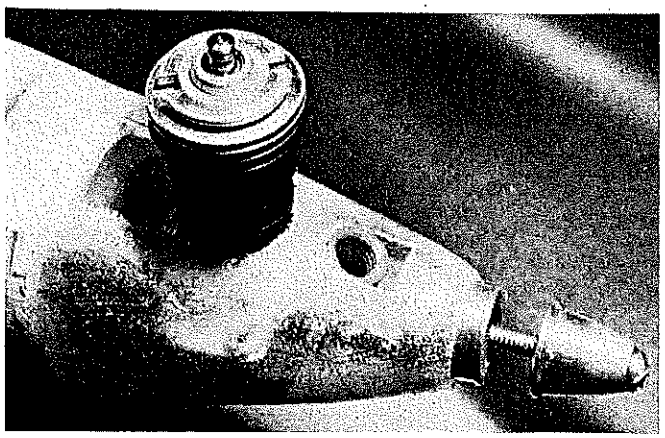
**Above: The penbladder tank inflated with 2 oz. of fuel. Note the use of a spring-loaded paper clip to pinch off the fuel line. Penbladders give more consistent pressure than pressure systems with increasing rpm's. Below: Wide body makes for comfortable radio installation.**







Left: The male mold for cowl is made by tack gluing block to firewall and shaping with fuselage. Glass cloth is wrapped around it, epoxy added and allowed to dry. Below: Check carefully the fit of the cowl to the engine cylinder and the venturi.



## QuickSilver

22,500 and 23,000 rpm and a "competitive" engine will tach around 22,000 rpm. These are static, ground rpm. A "good" engine is putting out approximately .2 bhp and that's really "honking" by anybody's standards. If you're not doing as well as these figures indicate, read on, and if you are doing better then please write and share it with the rest of us.

No one has found a universal engine rework that will result in "good" or "great" results! What it takes is a large venturi whose appetite is quenched with lots of pressure-fed nitromethane and a good cylinder with a loose cylinder-to-piston fit. The latter point can't be overemphasized as a tight fitting engine will not generate the rpm and will most likely break when run on high-nitro fuel.

So, number one on your engine list is getting a good cylinder/piston fit. There are two ways of getting there. You can go through a long and careful break-in of several hours or you can lap the piston to the cylinder. Lapping is neither difficult nor dangerous to your engine and will even pay off on an older engine if it's still tight. Use a fine abrasive such as one of the household cleaners (Ajax, etc.) or an automobile rubbing/polishing compound. I use Dupont #7 rubbing compound. Coat the cylinder walls with the abrasive and gradually work the piston up and down. If you are industrious, insert a piece of dowel in the rod's crank-pin hole for a handle and apply a lot of patience and finger power.

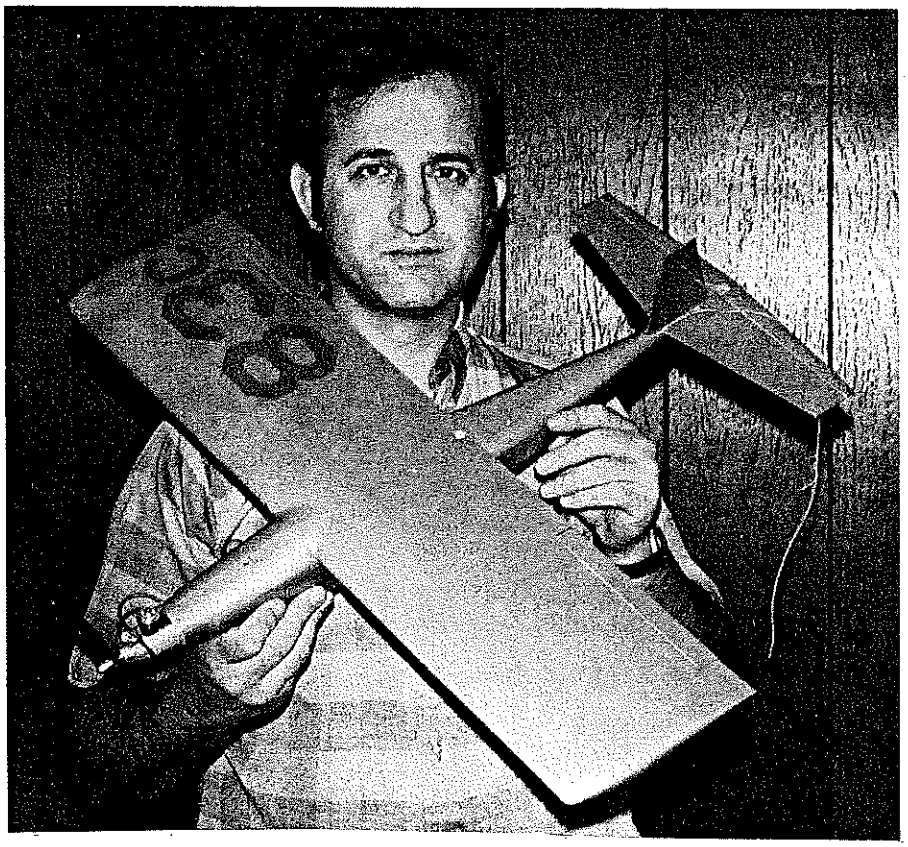
If your tendencies are like mine, and you have an old crank case around, you can make a handy lapping tool. Modify the case by sanding away about ⅛ in. of material at the cylinder seat. This is done so that the cylinder will sit closer to the crankshaft allowing the piston to reach past the top of the cylinder bore. Now you can lap by turning a prop. This procedure is done without crankcase backplate or cylinder head on the engine. Be sure that the crank pin and pistol ball are lubricated.

How do you know when you have gone far enough? Check regularly by thoroughly washing with lots of hot water and seeing if the dry piston will fall back of its own weight after being pushed just past the top of the bore. Dupont #7 is handy here because it is water soluble and really cleans up nicely. A loose engine will feel as though it has very little compression, but remember that it's a running (hot) fit that we're after. The piston should have a frosted look to it, and after a run or two, a thin, highly polished band should develop at the crown. A properly fit engine will not only run faster but will also start easier.

Open up your venturi to 5/32 of an inch as recommended by Cox and replace the stock needle with the Kirn-Kraft needle valve assembly. The latter is essential if you're running a high-pressure system like a pen-bladder as the standard needle will be far too sensitive.

The only thing you will need in order to get this now loose engine to competitive rpms is a high-nitro fuel. By high nitro, I mean between 65 and 70% by volume.

*continued on page 90*



Vince with completed QuickSilver. Large stabilizer area is good dampener. Fin is small. Ship has no tendency to dance. Low aspect wing is light and strong, minimizes drag for speed.

## CL Navy Carrier *(continued)*

is that a skilled pilot with a good plane and an unmodified engine should be getting his share when trophies are handed out.

Some designers are going to larger airplanes in an effort to improve scores. The Detroit area modelers have been moving in this direction for the past couple of years. With the weight of the engine, fuel system, and controls essentially constant, a larger model will have a lighter wing loading and should be able to fly slower. The slight reduction in high speed is now compensated for in improved low speed performance, and the larger models are easier to handle on low speed.

Some modelers are taking advantage of the reduced emphasis on brute power to build dual-purpose airplanes. These ships will compete in Class I with a Supertigre .40 and in Class II with a Supertigre .46 which weighs the same and has the same mounting as the .40. Engines with dissimilar mounting holes could be used just as well by using an RC type of radial engine mount and changing the mount along with the engine.

**Speed Control:** Harry Higley reports good success with his K&B 6.5 cc engine using an HP 61 throttle and crankcase pressure. Harry does not use an exhaust restrictor with this carb. The HP carb is available through Nelson Model Products in Chicago. The only modification needed is to turn down the base of the throttle so that it will fit in the K&B backplate.

**New Products:** I mentioned the new G-S Products Corp. three-line handle in my review of the G-S bellcrank last year. I've had a chance to look at the production versions of both units, and they look good. Both operate very freely. The handle is similar to the Sturdi-built handle, but with some important changes. The G-S handle uses steel throughout instead of aluminum, and the G-S unit has 24% greater throttle movement. The throttle trigger is positioned ¼ to ⅜ in. closer to the rear of the handle which is much more comfortable for me and probably for anyone else who flies with one hand. The G-S handle has much more clearance around the lines where they exit the handle; on low throttle, the handle can be moved up or down 60° before the lines contact the handle or frame—a four-fold improvement in this area. G-S Products Corp. Int'l., P.O. Box 488, LaGrande, OR 97850.

(My address is: 5016 Angelita Ave., Dayton, OH 45424.)

## RC Scale/Atkinson

*continued from page 17*

military aircraft three-views is in *Famous Fighters of the Second World War* by William Green, printed in England. Coverage is extensive. There are several volumes on fighters, and others on bombers. These books may be obtained from book stores throughout the country, that maintain an aviation section.

The Smithsonian Institution, Washington, D.C. is an excellent source for military aircraft pictures and three-views. They have a service for the public and the only cost is the actual cost of printing pictures and/or three-views. If an aircraft was ever produced for the military the Smithsonian will have a record of it, including one-of-a-kind and unusual subjects. Write the Smithsonian giving them the name and designation of the aircraft you are seeking and they will advise you of the cost and what information they have. It usually takes four to six weeks because they have many requests. The picture of the XP-81 with this column is an example of their excellent photographs. This is a rare bird—only two or three were built and it was a turbo-prop. Note the blacked out number on the tail and nose. This picture was taken in the later years of WW II. I obtained this picture from the Smithsonian Institution several years ago. Their address is: National Air Museum, Washington, D.C.

While on the subject of three-views and drawings probably one of the largest collections of scale plans, kits and affiliated parts, such as glass cowls, canopies, spinners, etc. is stocked by Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402. Bob has dozens of detailed scale plans from some of the world's best scale builders and is constantly expanding his scale kit line. There are just too many to mention here so drop Bob a line and obtain his complete catalog of fine line of scale plans and kits.

My address is: 734 North Sixth St. Terrace, Blue Springs, MO 64015.

## QuickSilver

*continued from page 8*

This nitro content atutomatically eliminates any castor oil in the fuel mix as it just will not blend. You will need a 100% synthetic oil like Klotz or Ucon. Be careful here because Klotz also markets a 2-cycle oil labeled "Racing Oil" which is not 100% synthetic. It contains a substantial percentage of bean oil and is ideal for most of our applications, but not for this kind of fuel mix.

I talked to John Klotz about this and he gave me the following identifying numbers for 100% synthetic, KL-200, KL-208 and KL-300. One of these is labeled as a high performance snowmobile oil but it is the same as the others. Use at least 20% oil in your mix with 22% preferable. One of the benefits you will immediately notice with this 100% synthetic oil fuel is how clean it burns. The top of your piston will stay looking brand new and you will never have to clean out varnish formations. The remainder of the fuel mix is methanol with a minimum percentage of 5%. Don't try to run all nitro and oil as it will result in severe detonation.

How do you get a competitive engine up to good or great? I wish I could give a straightforward answer! The difference appears to be in the fit of the crankshaft to crankcase, the compression ratio and in the size of the cylinder bypass ports. Every really good engine I've seen had wide bypasses. Get a few cylinders together for examination and you'll soon see the difference in the ports. Jim Clary Racing offered a reworked cylinder which had wide, deep and raised ports. Un-

fortunately, that firm is no longer in business. Reworking the cylinder bypass ports can be a very difficult task and really should not be undertaken unless you are ready to scrap that cylinder. Most engines will respond to compression-ratio changes which you can achieve by removing glow plug gaskets, turning down the face of the plug and rotating the cylinder by removing material from its crankcase seat. My "good" engines have been left alone in this respect except for running only one glow plug gasket, but others have had good results in this area.

There is other engine work you can do but none has produced either significant or consistent results. Above all, be patient because TD's seem to get better with age and running time.

Frankly, there is only one good way to get lots of hot fuel to that loose engine and that is a pen-bladder system. It is simple, light and just about foolproof. Besides the air leaks and crankcase flooding, the crankcase pressure system's "last straw" was its dependency on engine rpm. The higher the rpm, the higher the pressure. This led to inconsistent needle valve settings when the prop unloaded in the air, increased rpm and richened the mixture. On the other hand, you can usually leave a pen-bladder needle valve setting alone through a set of races. Once you get used to the bladder you'll find that engine starting is even easier. You will need a third hand to hold the airplane since your second one will be required to hold the fuel line pinched off until the engine fires on the prime. The third hand usually takes the form of a plane holder. Cardboard boxes with their sides cut have worked fine. They also will hold just about everything else you'll need.

Props may be where the greatest potential for performance improvement exists. Until recently, 5½ × 4 Cox grey props, cut down and thinned, were the favorites. There are problems with this prop because it takes a lot of time to perform the necessary reworks, however the reworks are not consistent and they break with the slightest impact. If you have an engine that is competitive, the prop to use is the Cox 5 × 4 black nylon. I happened upon this prop while looking for a good test prop. The diameter and pitch were right for our speed/rpm and it only took a few flights to convince me to quit carving the grey ones. Although it has a "mickey mouse" look, if you check it and a grey one on a pitch block you'll find that it has about ½-in. more pitch and that is most likely where the performance comes from. Fortunately, for those of us who are lazy, it is made from the softer nylon which prevents any effective reworking.

**Racing**: We have successfully staged two kinds of racing in the Seattle area. The predominant type sponsored by the PROPS is flown on a 3-pylon course (330′ on the straights and 80′ between pylons 2 and 3) and requires pylon judges and a communication system so that pilots may be immediately notified of cuts. Callers and flagmen are not allowed! Pilots, the starter and lap counter/timers all stand between the #2 and #3 pylons and the start/finish line. This type of racing is similar to Formula I with a good deal of simplification and is the way to go if you can put together a communication system.

If you don't have a communication system and would like to try ½A racing, there is still a simpler way to go. The course flown is around two pylons located approximately 300 to 350 feet apart and on the far side of your normal field runway. You need five "officials"; a starter and an official for each pilot. This official stands with his pilot in the normal pilot's box and counts laps, times and calls cuts. Cuts are also called if an aircraft comes closer then the near side of the runway. This type of racing can also be expedited since everyone pits in the normal field pit area.

In either case we fly 10 laps from a flying start. The fllying start is a race in itself and you should try it because it is the way to go. The flying start is run as follows: At race time minus two minutes

## QuickSilver *(continued)*

the "start your engines" signal is given. Launching of the models occurs at random as they are started and fliers who get up early can take a few practice laps if they desire. Time to go is announced at regular intervals and at "T" minus 15 seconds all models must be launched and those airborne are required to proceed to the left of the first pylon or downwind of the #2 and #3 pylons. If you're not in the air at the T-15 second mark, it is a "no start" and no further engine running is allowed. This ruling is required so that all pilots can hear the 10-second countdown.

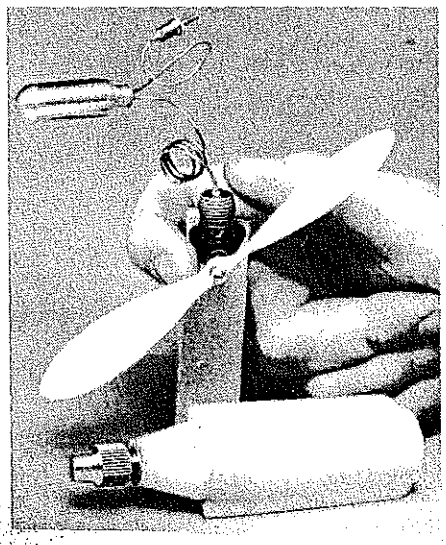
Normally, everyone has gained a considerable amount of altitude circling above the course and the simultaneous dive to the starting line is an exciting race in itself. Occasionally, fliers will chicken out, fearing that they will cut by passing the start line before T-zero is called out. Loops or other maneuvers may be taken to delay your arrival at the line. All clocks start together at T-zero.

All other rules and scoring are conventional. In a nutshell, the airplane rules are as follows: maximum engine displacement .051 cu. inches; weight not less than 20 or more than 32 oz.; fuselage minimum cross section of 8.5 sq. inches; minimum wing area of 200 sq. inches with constant chord and a minimum thickness of ⅞ of an inch. We are still requiring two functional 1.25-in. wheels but they are on their way out. A new rule we have added this year is a requirement for a positive servo actuated engine cut-off. This was done to expedite the running of the races since we were getting some pretty long engine runs after the races were over. It's a simple item to mechanize by using a down elevator command to squeeze the fuel line.

Where do we go from here? Well, one thing for sure, we will go faster. We look for race times to drop below 1:20 before the season is over and there will always be new and clever design innovations. Where we really need to go is to some national standards for the event so we can use a common yardstick to measure our progress and to perhaps compete on a national level. In any case you can always visit us during the winter; on the first Sunday of the month at the Boeing Kent field or on the second Sunday of the month at the Delta Park field in Portland.

Just before mailing this article (late Dec.), I had a chance to talk to Dale Kirn about the availability of his needle valve assemblies, TD parts, piston-setting tools, etc., which Clary Corp. had been marketing. Dale is still recovering from an operation and is not certain about any personal involvement. He did say, however, that a good number of needle valve assemblies were in the distribution pipeline and these should be available (A & L has several hundred according to Dale). There are still many other parts in inventory at Clary and Dale felt these would also find their way to the market. If further information becomes available, Dale will be glad to let you know. You can reach him at: 283 North Spruce Drive, Anaheim, CA 92805.

productreviewproductreviewproductreviewproductreview



**Shark $CO_2$ Engine:** Suitable for Peanut Scale up to 24 in. span, runs up to full power for 45 sec., adjustable to low power runs up to 5 min. Each $CO_2$ bulb charges engine tank from 6 to 10 times. Nylon crankcase, cylinder and piston. With fuel tank, prop and charging gun, price is $19.95. Polk's Model-Craft Hobbies, 314 Fifth Ave., New York, NY 10001.

productreviewproductreviewproductreviewproductreview

## See and Do in Ohio

*continued from page 56*

sonic bomber, World War I and II fighters, plus three presidential planes. The museum is open 9 to 5, Monday through Friday; 10 to 6, Saturday and Sunday.

This is the oldest and largest military aviation museum in the world. In addition to the 130 aircraft and missiles are aeronautical items spanning the period from Kitty Hawk to the present. Admission is free; no pets are permitted.

Photography is encouraged in the museum although flash equipment will be required for most interior pictures. Free movies are shown in the theater on Saturdays, Sundays and holidays. A gift shop, operated by the Air Force Museum Foundation, sells aviation-oriented items, with profits used to assist the Air Force Museum. A Coffee Shop is available for refreshments, and limited picnic tables are available during summer months (but sack lunches are not permitted in the museum building). All exhibits and displays are well identified to permit touring without guides.

Research facilities at the museum consist of selected documents, photographs, and aircraft drawings related to the Air Force Museum program. These historical materials are available for research purposes on weekdays only, 9 a.m. to 4 p.m. and documents may be copied at a nominal fee.

Should your family become saturated with aeronautical pursuits, numerous amusement parks offer varied entertainment. Kings Island is off I-71 just north of Cincinnati and contains 1600 "fun-filled acres." LeSourdsville Lake Amusement Park is on State Rt. 4 off I-75 south of Middletown, Ohio. Cedar Point on Lake Erie near Sandusky, Ohio, offers rides, wild animal acts and 3-D wrap-around motion pictures while Sea World on Rt. 43 off Ohio Turnpike Exit 13 provides aquatic exhibits and shows of all sorts.

**There's something for everyone near the 1976 Nats sites; for further information you may write:**

Office of Travel & Tourism, Box 1001, Columbus, Ohio 43216.

Springfield Area Chamber of Commerce, 102 East Main Street, Springfield, Ohio 45501.

Dayton Development Council, 1940 Winters Bank Tower, Dayton, Ohio 45402.

R. E. Baughman, Information Officer, Air Force Museum, Wright Patterson AFB, Ohio 45433.