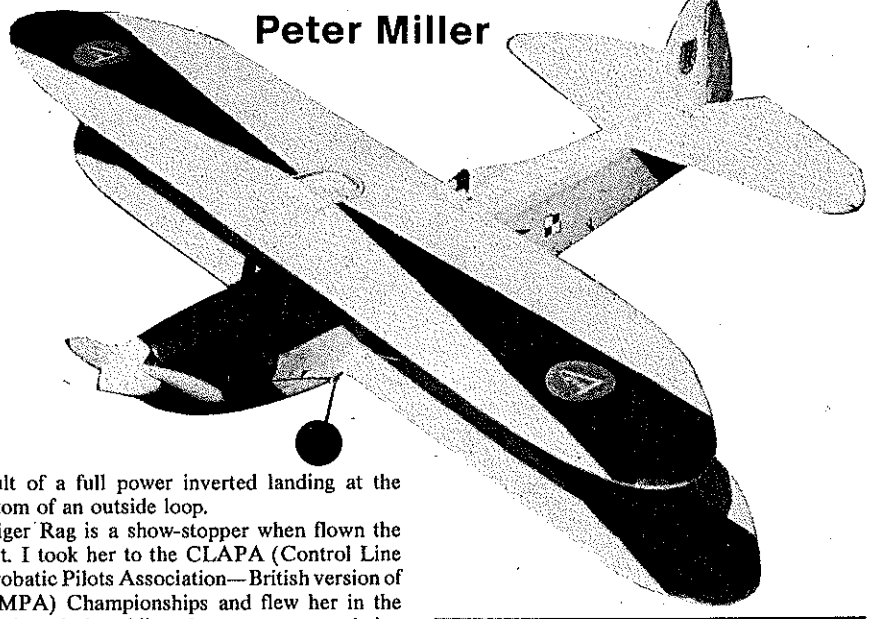
TIGER RAG

Peter Miller

IN THE WORLD of full-size aerobatics, the biplane can hold its own against the best monoplanes. No air show would be complete without at least one biplane performing in a small area right in front of the spectators. In the model world it is unlikely that a biplane would be competitive in contests, although the judges would probably appreciate a change from watching the same type of model for hours on end. But for display work and for pure fun, flying the biplane Control Line Stunt model is perfect. Another advantage is lower cost of building, often less than half the cost of a normal size .35-powered Stunt ship. Because the biplane has a simpler structure and each component is small, this makes it ideal for people with limited building space. The small size also makes transport easier. Tiger Rag will fit in the trunk of any compact car.

My first biplane Stunter was built in 1961, and from that time on I experimented with this type of model between other aeromodeling activities. Around 1970 I finally made the breakthrough which gave an aerobatics performance nearly equal to current monoplane Stunters. Since then, various refinements have been made and different structural methods tried.

The layout of Tiger Rag seems to be the optimum for this type of model: thick wing section, equal areas for both wings (with the thrust line passing just above the center line of the gap between the wings), large stabilizer and elevator with big control deflections—and no flaps. Light weight is also a critical factor. The construction shown is very light. The model is very easy to repair, and most of the photos show my current Tiger Rag after its second rebuild, the result of a full power inverted landing at the bottom of an outside loop.

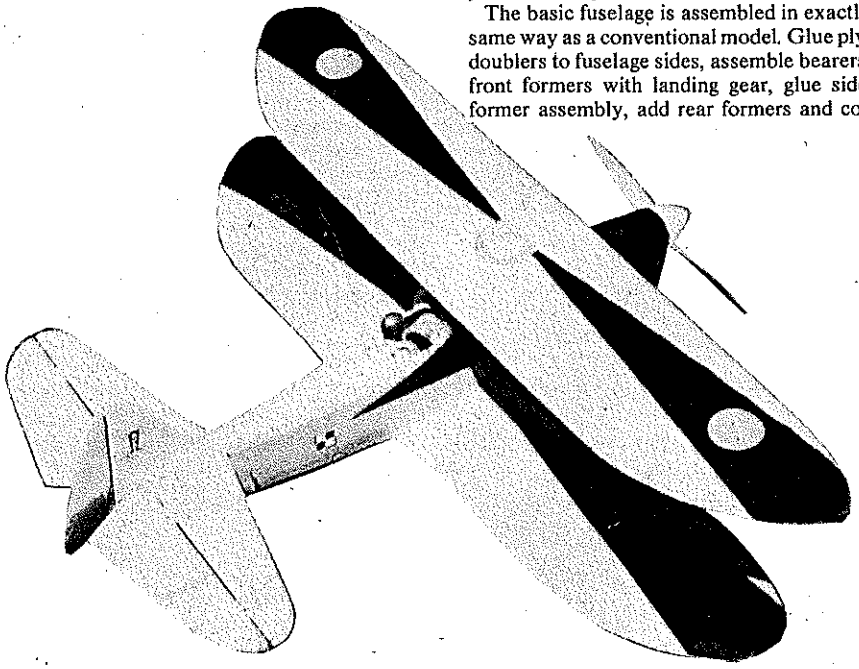


Here is Tiger Rag in its latest incarnation, powered by a Fox .36. It's an unusual-looking Control Line Stunter that flies beautifully.

Tiger Rag is a show-stopper when flown the limit. I took her to the CLAPA (Control Line Aerobatic Pilots Association—British version of PAMPA) Championships and flew her in the practice circle while other events were being flown. I am told that most people stopped watching the contests to watch Tiger Rag. Two Tiger Rags have been built by Piotr Zawada, top Polish Stunt flier. He and a friend used to fly Combat at displays in that country, where they created a tremendous amount of interest.

Construction is very easy. I am a lazy builder, so I design for ease of assembly. I shall simply give the basic sequence and concentrate on areas peculiar to biplanes.

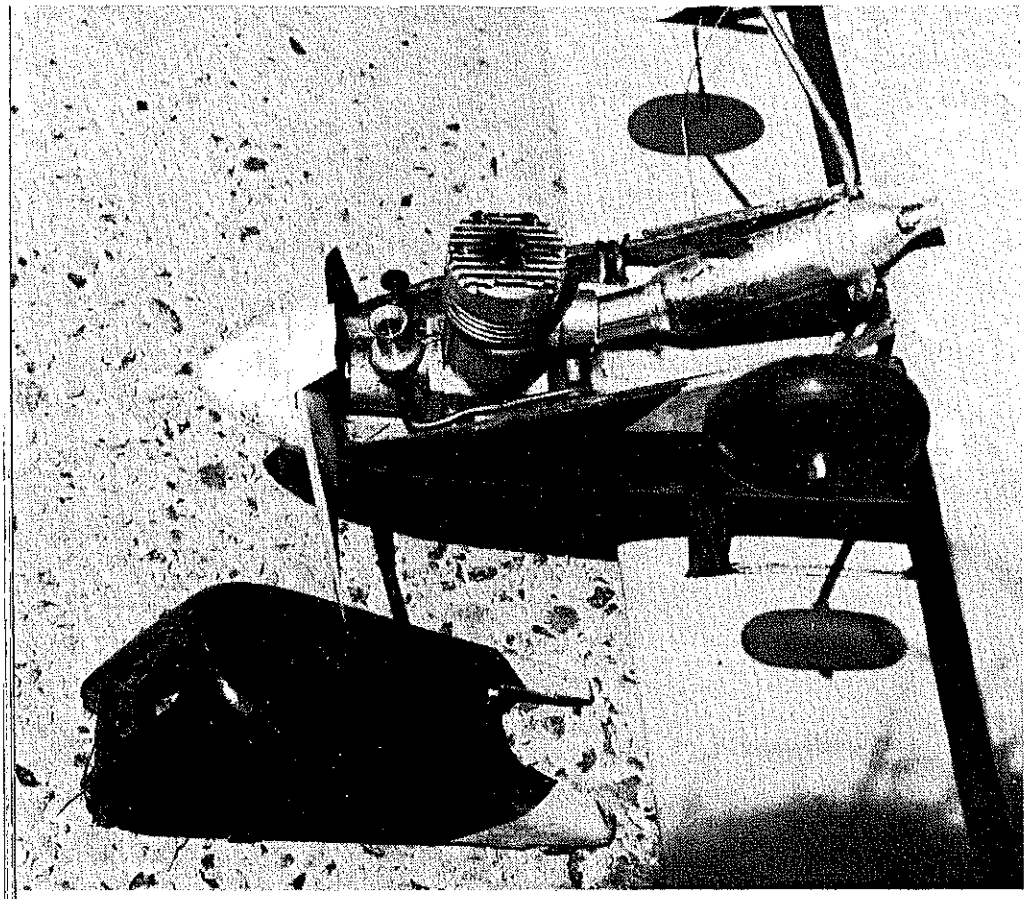
The basic fuselage is assembled in exactly the same way as a conventional model. Glue plywod doublers to fuselage sides, assemble bearers and front formers with landing gear, glue sides to former assembly, add rear formers and control assembly, cover top front decking with rolled sheet and rear top with stringers. Do not add bottom stringers until lower wing is fitted. The cowl is made from 3/16 balsa ply sides (laminate your own ply with contact adhesive), sheet bottom and block front. Tailor it to fit engine used. It is held on with ply tongues and four screws through fuselage sides.



Care must be taken with the lower wing seat to ensure that it sits at 0 degrees incidence. The cutouts in the ⅛th balsa sheet side for the cabane struts must be accurate. The rolled sheet turtle deck in front of the cockpit can be fitted before gluing in the cabane struts. It is then trimmed to allow the struts to fit flush with the sides. The cabane struts must be cut and fitted accurately, because they provide positive location of the top wing at 1 degree incidence, which is an essential part of the aerodynamic layout of the aircraft. It is a good idea to glue the cabane struts in place with a glue that is comparatively easy to separate, as the cabanes will usually break in an inverted landing. This is intentional, as it can save the top wing from serious damage. The top wing and elevators are not fitted until the model is complete (including fuel-proofing).

The tail surfaces follow conventional practice. The elevators must move through a total of 90° travel, 45 deg. each way. The control system must be completely free. This is far more important with Tiger Rag than any other type of model, because when flown to the limit, there will be times when the model is literally hanging on the prop with no line tension, and the controls must

From Merrie England comes this biplane Control Line Stunter. A Biplane? You better believe it. Though not intended for high level Precision Aerobatics, it can do maneuvers that'll bug your eyes out. It's fun.



Rear-exhaust Fox .36 RE requires this muffler setup, keeps plane looking very clean. Sheet balsa must be placed between muffler and tank to keep fuel from boiling away.

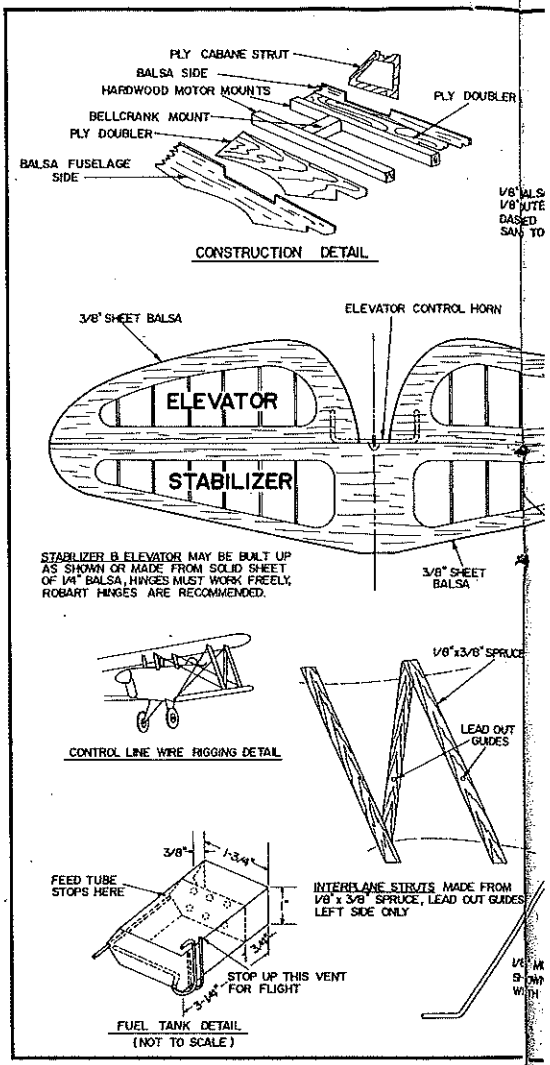
still work fully and freely in this condition.

The wings are simple to build. There is no leading edge sheet, and the center section sheet ends in a straight line. This again reduces damage by providing a designed break point. The central spar does mean slightly more work in cutting out wing ribs, but the smooth wing section that results makes a very marked improvement in performance. The spar combined with the inset trailing edge and leading edge provides a very warp-resistant structure.

Slide ribs onto the spar, making sure that strut ribs are in correct locations. Insert trailing edge and leading edge into slots in ribs. Block up assembly over plan, and glue all joints. Laminate tips while the wing is drying, and then fit them in place. Lift completed wing from board, and add center section sheeting. Remember that the top wing has extra ribs and slots in the lower surface of sheeting for cabane struts. Add ¾ oz. of tip weight on top and bottom wings to complete the job.

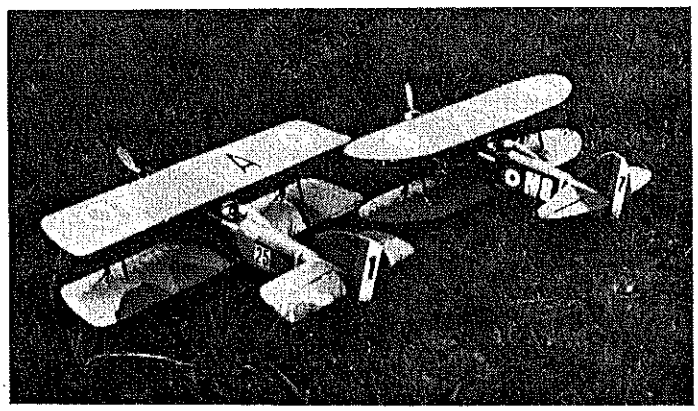
The cabane struts are designed to push right up to the top sheet on the top wing, thus ensuring accurate alignment. The tank shown gives very good steady engine runs, but muffler pressure can be used if preferred. The tank should be easily removable. If you can get at it, you will have no problems, but if it is built in permanently it will leak—another example of Murphy's Law. I used the Fox Rear-Exhaust .36 Stunt on the current Tiger Rag. If you use this engine (or any other rear-exhaust engine), it is vital that you insulate the tank bottom with ⅛th sheet balsa and extend a piece of pipe down and back from the engine. Otherwise, the fuel will simply boil out of the vents, making for short runs and mucky models . . . it is also expensive. Side-exhaust motors present no problems, and the cowl is designed so that a muffler can be fitted with no extra work.

The power range is fairly critical on the model. Too little power will result in poor performance, but simple aerobatics can be performed with a good .25. On the other hand too much power prevents the model from doing some of the more

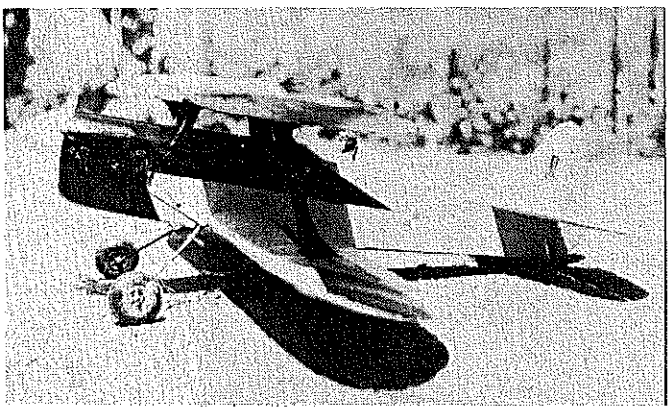


way-out contortions described in the section on flying. I would recommend good .29s and most .35s used with 10 x 6 props. The first Tiger Rag was a 42-in. span version with a Schnuerle .40 Fox, and that was how the series got its name . . . Hold That Tiger!

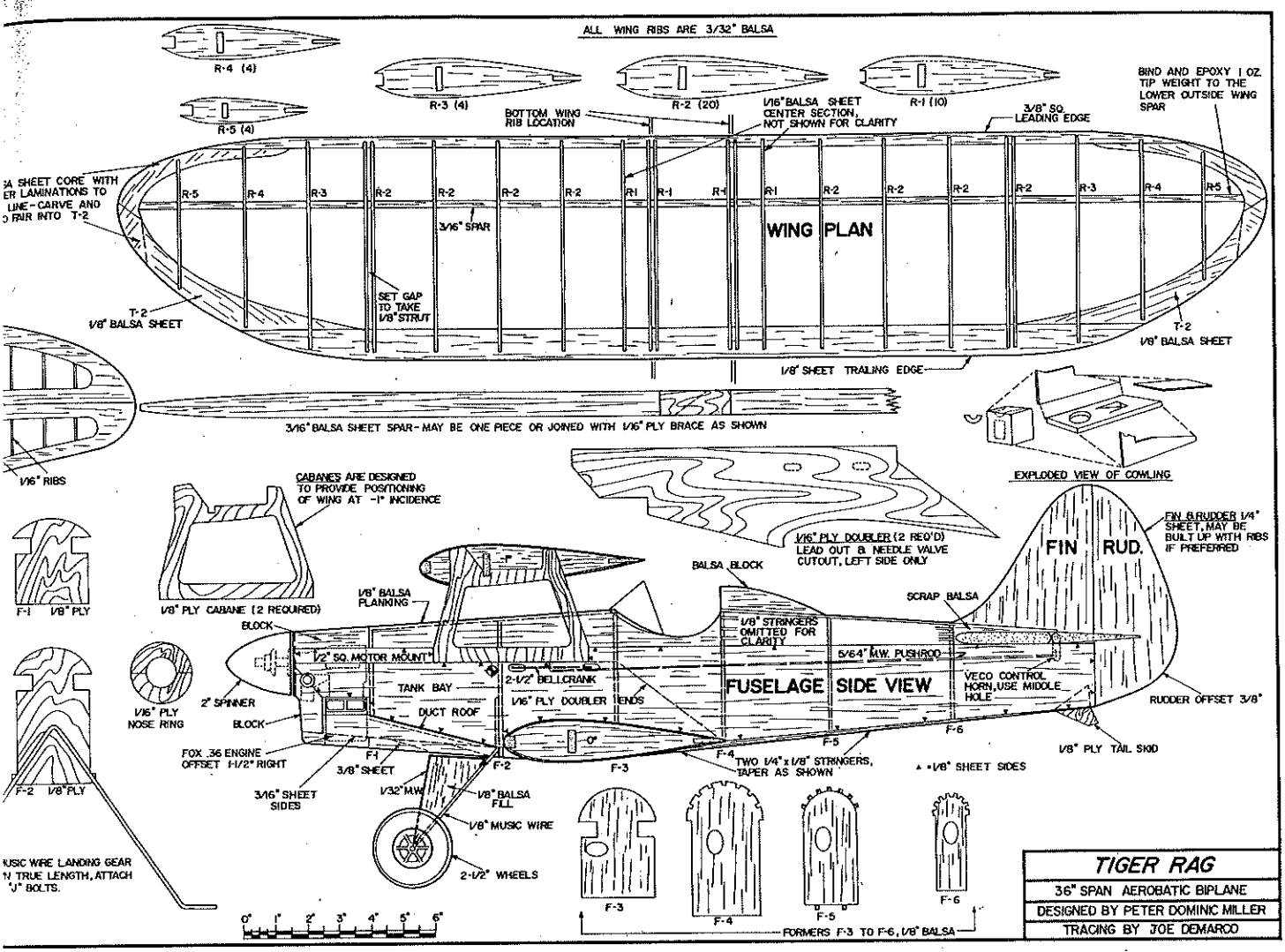
Covering and finishing can be to the builder's choice. Some Tiger Rags have been covered with heat-shrink film, while others used tissue and dope. The main thing to remember is not to add too much weight. The large areas covered with tissue mean that filling the grain is kept to a minimum. I always use nitrate dopes (you cannot get Butyrate dope in England) and then paint the model with car touch-up spray cans. This is followed by a two-part fuel-proofer.



Polish Stunt champ Piotr Zawada sent this shot of his two Tiger Rags, spruced up to look like WW I fighters. Ship raises eyebrows everywhere.



Struts on this version of Tiger Rag are simplified, due to creative laziness of author (or so he claims).



FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 140

Once the model has been fuel-proofed, the elevators can be fitted and the top wing added. Hinging the elevators should be done with RC hinges, either hinge points or flap-type hinges with a pin. The top wing and interplane struts are fitted in one operation. Slit the covering between the double ribs to take the interplane struts, glue them into the lower wing, and then glue the top wing onto the cabane struts and interplane struts. Check for alignment, and make sure that the cabane struts are pressed against the top center section sheeting of the top wing.

The all-up weight should not be more than 40 oz., since excess weight has a very marked adverse effect on performance. I have seen a version built by a friend that was 50% heavier than my own, and it was very soggy to fly. Balance point should be as shown on the plan, as this is just about the best location—but a little farther forward will not do any harm. There is room to experiment with line rake and C.G. The line guide on the interplane strut makes alterations of line rake very simple.

Variations. You should now have a standard Tiger Rag, but knowing that most modelers like to change things on a model to suit their own taste, let's look at what alterations are permissible without seriously affecting performance.

The layout of wing incidences, thrust line, balance point, and tail moment are critical. The only alteration in this area would be to increase the tail moment by up to 2 in. This would not have too much effect on the looping radius, but really should only be used if one is trying to make

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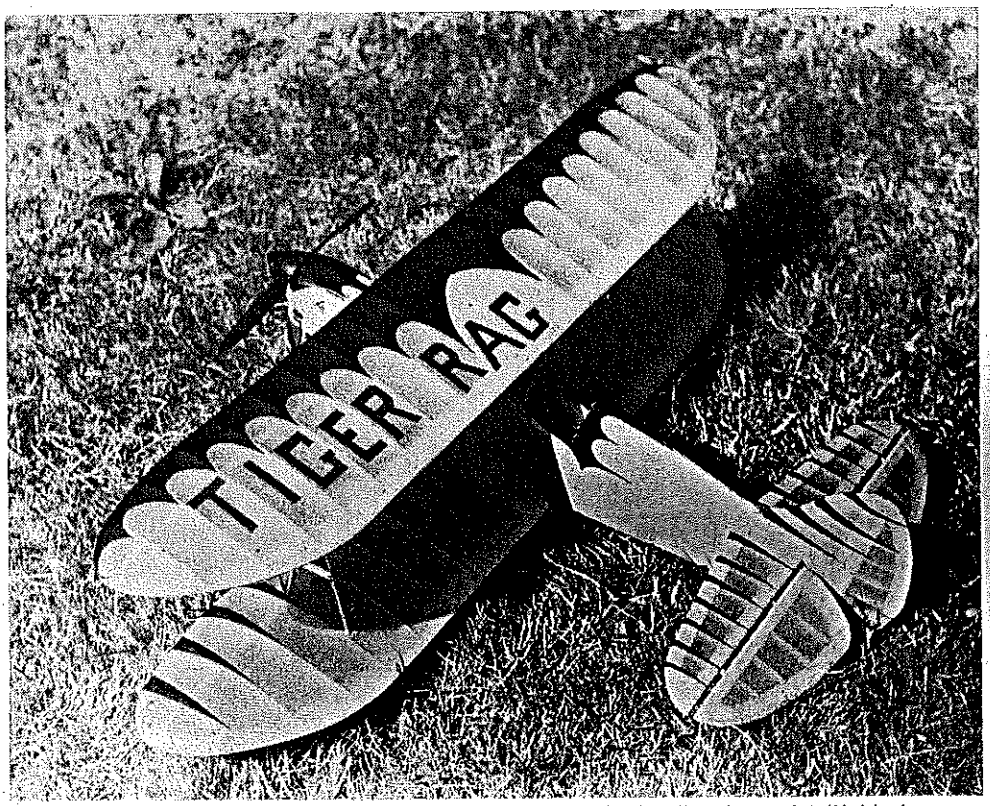

This 42-in. span version is powered by a Fox Schnuerle .40. Covering is yellow tissue, detail is black tissue doped over yellow. Little ship is capable of some remarkable flying!

section and is 105 ft. high, usually with very good conditions. One of the regular fliers is Bill Tyler, model aviation pioneer. The photo shows Bill with his Manhattan Cabin model and his famous grin. Another shot shows another Manhattan flying past one of the many statues which decorate Low Library; meet Euripedes, Greek dramatist and author of 19 plays!

New technology! One of the pictures shows a close-up view of a unique wing post used by Brian and Bradley Fulmer. The post was made from carbon fiber rod, and the material was obtained from a special sample given to their father. This material may not be available except on special order, but this example shows the ingenuity of modelers—ever alert for new materials and techniques!

Thank your newsletter editor! Each year, I try to remind you just how much the average model club member owes the editor of his club's newsletter. I receive many newsletters which are traded for my own, and often see other newsletters as well. These newsletters range from single-page sheets which announce meeting topics and flying sessions, to ones 10 pages long or longer, with technical articles, hints and kinks. In particular, those clubs with winter-only Indoor activity (and Scale clubs) typically have very large newsletters with excellent plans and many Indoor hints and plans. Truly, all this free information is a boon to almost all club members, and there is no other way you can get that much information free! Have you hugged your editor today?

Bud Tenny, P.O. Box 545, Richardson, TX 75080.

Tiger Rag/Miller

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the model resemble some full-size aircraft. Wing tip and tail surface shapes can be altered, providing that area is added or kept the same. The area of both wings must remain equal.

A major alteration would be to make the top wing sweep back. If this is done, move the top wing forward by half the amount of sweep-back. Strut arrangements can be altered, but the incidence angles must remain as designed. A central pylon could be used instead of the cabane struts. Another alternative is to cut the struts from sheet aluminum so that they can be splayed outward or converge like the Pitts. Again, watch the incidence angles; do not try this unless you are sure of retaining them unchanged.

Two experiments that have been tried are flaps and connecting the rudder to the elevators. The flaps had no beneficial effect. The coupled rudder actually reduced performance, and it was very quickly set in a fixed position. Other ideas that have been tried on various models: throttled motors (which added to the display potential but the third line hindered the aerobatic ability), parachute dropping (with the parachute attached to the right interplane strut and released by a timer), and an operating crop dusting hopper.

Flying. All the above modifications and additions show what can be done with the model, but in its basic form as shown on the plan, it is a superb fun-flier. I have kept stressing the performance, so let's look at flying in detail. Bipes are not like lesser breeds of aircraft. They will take off from reasonably long grass (by reasonable I mean 2½ in. long when fitted with 2½-in. wheels). Just hold on full up, and go—leveling off as soon as airborne.

Once you have gained confidence, and are sure of the engine, you can keep full up on, and the takeoff goes into a half-loop and into inverted. This scares the pants off spectators who are not ready for it. Once airborne, the model is very stable both upright and inverted.

When you have familiarized yourself with the handling characteristics of the model, you can start learning to use the peculiarities of the biplane to their full potential. Do a fairly tight

loop starting and ending about 15 feet up. Continue into a second loop, but as soon as the model reaches the vertical climb position, apply full up elevator. The model will loop in its own length. The first few times you do this, neutralize the elevators as the model reaches the normal upright flight position, and just fly round. The next step is to continue the flick loop until the model is again pointing straight up, then neutralize the elevators. At this stage one of three things will happen (depending on the power available). If there is not enough power, the model will start to sink slowly in a tail slide; in this case, apply full down at once. When the nose has dropped, fly away normally.

If the power is just right, the model will slowly climb vertically, and as soon as any lost height is regained, the flick loop can be repeated. The third possibility (which is rare) is that the model will hang without gain or loss of height. Very spectacular and quite safe. Slight application of either up or down elevator will tilt the model, and it will start to move around the circle. By slowly increasing elevator control, you will get a steady transition into level flight, upright or inverted. Alternatively, the model can be made to sway forwards and backwards by using slight up followed by slight down elevator. This technique can also be used in the slow climb situation.

I once demonstrated the perfect hover at a big Scale rally with a semi-Scale SE-5. Afterwards, someone came up to me and told me that he had looked up while the model was hovering. He was convinced it was just about to crash. From the chap's attitude, it was obvious that he did not really believe what he had just seen.

Once you are doing flick loops, there are two things to be careful of. The first is that one gets so fascinated by the maneuver that one keeps doing it until the lines lock up. A few outside loops are the order of the day every so often to unwind the lines. The second point to watch is that it is sometimes possible to do consecutive flick loops with some height loss between each one. Very often the last one will just brush the ground with the tail or will drop the model onto its wheels (which is then followed by a normal takeoff). This is the stage when most crashes happen, but they are at such slow speed and from so low that normally there is no damage.

It is quite possible to fly every stunt in the book with Tiger Rag, but do each one a bit at a time until you are completely familiar with the handling of the model. For example, outside loops tend to be bigger than insides and with less line tension.

Landings are easy, but keep the nose down. No attempt to float the model around the circle should be made, because the high drag of the bipe bleeds off speed fast.

Wind is no problem to this model. It helps in those flick loops and hovers. In breezy conditions I always take off at about 45 deg. into the wind and go straight into inverted. This prevents the wind from getting under the tail and tipping the model on its nose, and it also allows the speed to build up before coming into the wind. In very windy conditions the entire flight can be made on the downwind half of the circle. I have also made complete flights just lying on my back on the ground.

I hope that you will be tempted to build Tiger Rag. I can promise that you will never regret it. If you are the first in your club to build it you certainly will not be the last, because the bug is infectious (it is also incurable).

CL Aerobatics/Paul

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team tryouts since 1973 that the writer would suggest to new President Preszler that he create the new post of "FAI Coordinator for PAMPA" for Keith, now that he has retired from the PAMPA presidency, and hope that he would accept this position with idea of keeping the FAI tryouts the outstanding contest that it has been for several years. Basically, this would mean that Keith would accept the responsibility for administering and organizing the FAI tryouts every other year. PAMPA should not lose this outstanding administrator and superior Contest Director. Keith has always had a very deep concern for the FAI program, and his interest in this should not be wasted. As we all know,