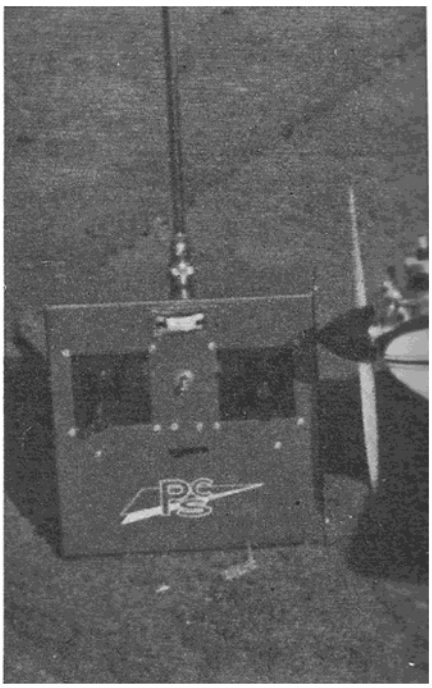
THE



RCM's Chief Sunday Flier has come up with a four-footer that is one of the most versatile models ever designed. Prototypes have been flown on single channel servos, Galloping Ghost, and full house proportional, with engines ranging from .10 to .35. This one will put you at the head of the flying class!

"HEY! What's the big idea of discriminating against us?" It was Jim Sunday, our local friendly hobby dealer, greeting me as I entered the local friendly shop for some supplies.

"Whaddaya mean?" I bristled a little. "I've never discriminated against anybody. In fact, some people say I'm not the discriminating type."

"Well, when are you gonna come out with a design for us guys who like to fly larger airplanes than the Schoolmaster? We're Sunday fliers too, y'know."

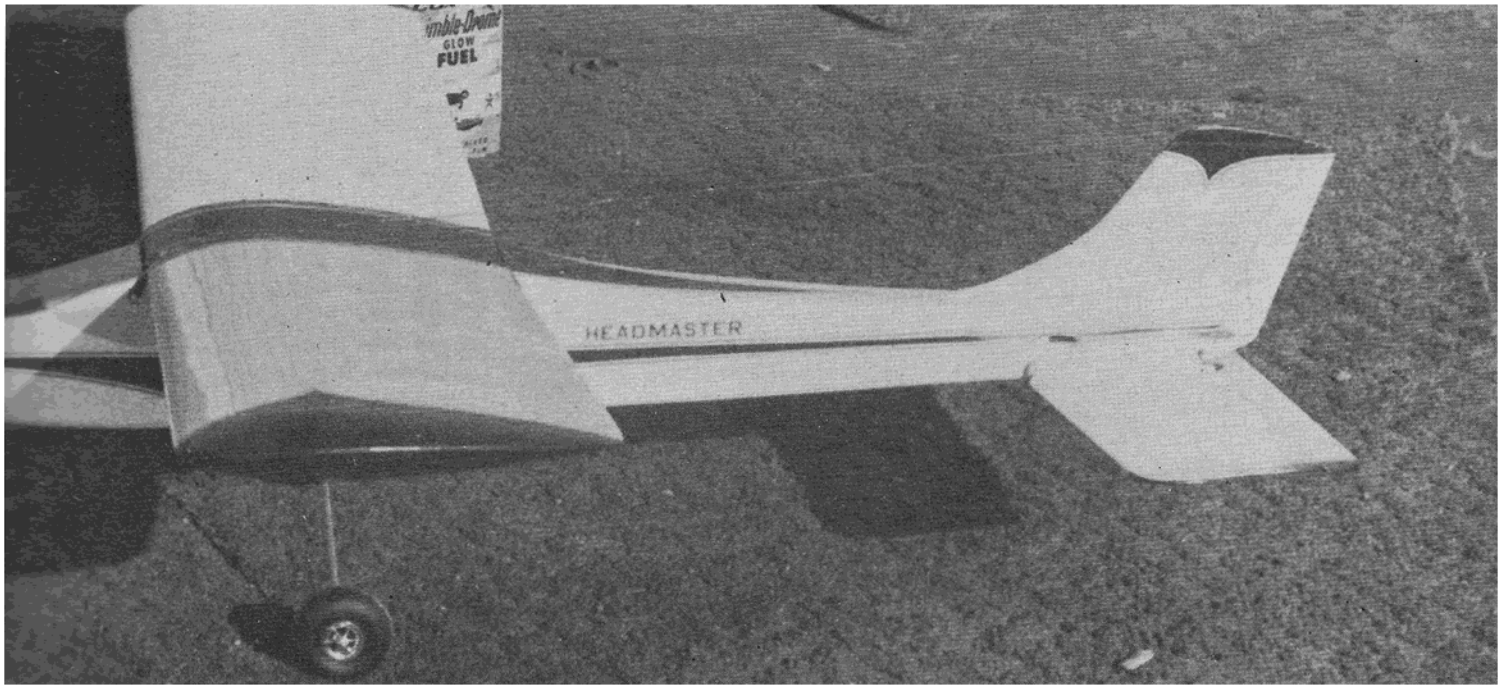
"Yeah — I guess any guy named Sunday would have to be a Sunday flier — as soon as he learns to fly!"

"Ho-ho. I mean ho-hum. Big joke. But I'm serious. How about a big version of the Schoolmaster — one we can stick heavier gear in, and maybe add ailerons if we want to. And while you're at it, make the wing semi-symmetrical for better penetration and inverted flight? A lot of flyers would like to have a change from the low wing lookalikes —something sort of scale-like in appearance but with good performance."

"OK, Jim. I'll think about it." So I did — and the more I thought about it, the more I liked the idea — except I didn't go for the six-foot span. It should be medium size — about four-foot span. Thus it would be big enough to handle multi and propo gear, but still small enough for rudder-only flying with escapements or servos, or galloping ghost. And the basic design lends itself

EADMASTER

by Ken Willard



to all three types of control, as evidenced by the variations in control systems used on the Schoolmaster.

So I sketched out a four-foot version of the Schoolmaster, with the modifications which Jim had suggested. As luck would have it, the four-foot size made it possible to use a Top Flite Tauri type wing, with the span shortened to four feet. Also, the Tauri landing gear fitted right into the plan. At first I thought it looked a little big, but I went ahead with it anyway, and the Tauri landing gear makes the model exceptionally easy to handle on the ground, plus the fact that it certainly reduces damage to the plane, and particularly the prop, in hard landings.

So what to call it? Well, the Schoolmaster of a big school is called the Headmaster. And that's what it is. You'll learn a lot about flying R/C from the Headmaster — and it'll forgive you for all but the most violent mistakes.

Construction is so simple and conventional that you can probably build it right from the plans without reference to any explanatory text. Also, during the building of one of the prototypes, my friend Bob Andris took several construction shots in sequence. There are only a couple of points which might bring up a question in your mind, so let's see if I can anticipate them beforehand.

FUSELAGE

This is a typical "slabsider," but you can disguise it. The 3/16" square longerons give an excellent gluing surface for the top and bottom sheeting, then, after the "box" is completed, you can round the corners. Section A-A shows how it appears in cross section at that point — and you can do the rounding all the way forward on the top to the rear of the wing, and the full length of the bottom, fairing it out slightly at the plywood plate where the main landing gear is mounted. The rounded corners also work very well in the top forward front area where the hatch is. Just spot glue the hatch in place, round off the top, and then cut the hatch away.

Incidentally, you may wonder why the hatch is shown as having a short section which slopes up to the simulated windshield. This is necessary in order to be able to insert and remove the four-ounce Williams tank.

The engine is shown mounted on a "breakaway" 1/8" plywood plate. Since there will be so many different engine installations suitable to the Headmaster, I haven't shown any specific mounting holes. Drill them to suit your engine. The plate will take any engine from a Max. 10 to a .35. Mount the plate to the 3/8" square hardwood engine bearers with either 3-48 bolts and blind nuts — or 4-40 if you go to the larger engine size like the .35.

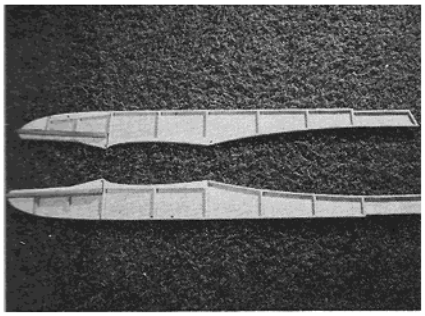
You can get the Tauri type landing gear in most hobby shops, or order it direct if necessary. Full instructions on the nose wheel installation are included in the Top Flite package.

Another thing you might wonder about is the servo linkage to the nose gear. This serves two purposes — first, it puts the nose wheel pushrod takeoff at the rear of the servo, leaving more room in the center of the equipment section for the inevitable "spaghetti" pile of wires and connectors. Second, it is a reduction linkage which reduces the angular travel of the nose wheel. We had a devil of a time making takeoffs without this feature, since the nose wheel turned too much, even with the slightest servo movement, when a direct drive was used.

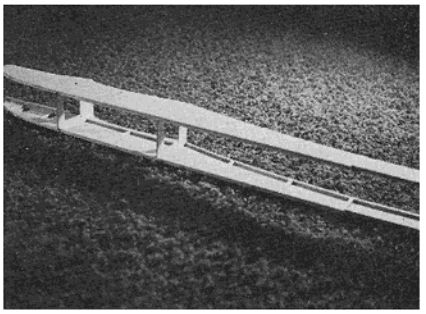
WING

The wing is a variation of the Tauri wing, using the same airfoil. Since the model is slightly smaller and lighter than the Tauri, 1/16" sheet for the leading edge, trailing edge, and cap strips is plenty strong enough. For those of you who prefer it, the wing can be fully sheeted. Or, for those who don't want to take the trouble to build up a wing, Jack Doty, of Foamcraft, has standard Tauri foam wing cores available, and you can use them merely by cutting the span down to the Headmaster's 48 inches.

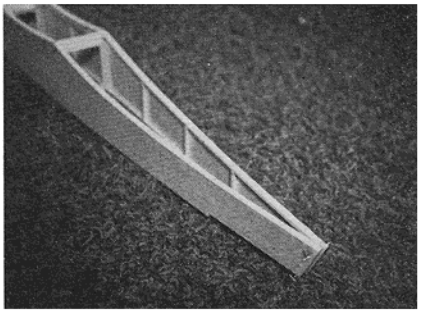
Note that several dihedral angles are suggested. Again, the reason is obvious. The more control you have, the less dihedral you need. The angles I've shown represent recommended average figures for the various types of control.



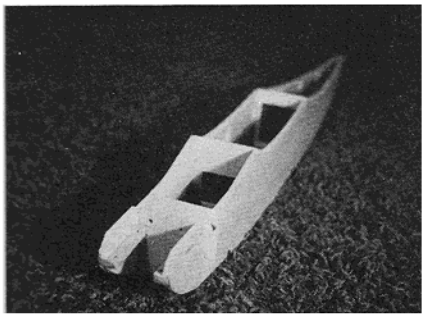
Sides and framework.



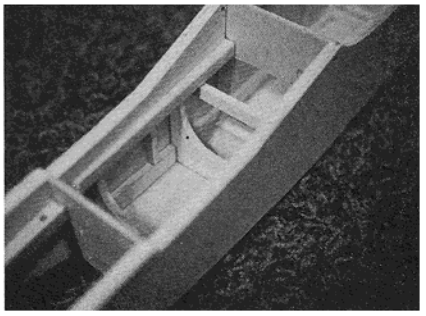
Joining sides.



Tail pulled together.



Nose pulled together.



Forward compartment detail.

Optional aileron well.

Pick the one that best suits your individual need.

Finally, some of you may want ailerons. The standard Tauri strip ailerons and fittings work very well. All that is necessary is to reverse the installation so that it is on the bottom of the wing rather than the top. Bob Andris installed ailerons on his prototype, using an "Ailerand" from Rand Manufacturing. There's no doubt about it — it certainly makes it easier to fly inverted, and the rolls are much smoother, if ailerons are installed.

TAIL SURFACES

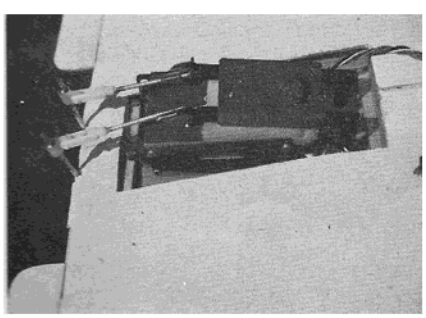
The fin, rudder, and elevator are all cut from 1/8" sheet. The fin is made from two pieces, butt jointed, and with the grain of the forward piece roughly parallel to the top forward edge of the fin, and the grain of the rear piece parallel to the fin trailing edge.

The stab is built up with 1/16" sheet bottom and top and a framework of 1/8" square in between. This construction has proven very sturdy and warp free. Rand "slip on" hinges fit the fin and rudder together very simply, and if you want to use them on the elevator-stab, add a 1/8 x 1/2 x 1 balsa block between the top and bottom sheeting of the stab at the elevator hinge points, then cut away the sheeting so the hinges slip over the blocks. Make slight cutouts in the elevator leading edge and the stab trailing edge where the Rand hinges are to fit, so the separation between the stab and elevator is reduced. Leave just enough room for the hinge pin to be inserted.

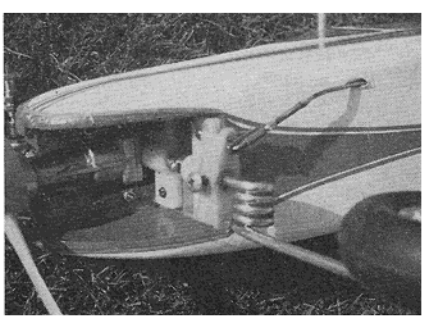
The fin is butt glued to the top of the fuselage, but before you do it, be sure the bottom of the fin fits snugly to the top of the fuselage line, then add the 3/16 in. square fillets before glueing the fin in place. This makes it easier to shape the fillet as shown in section A-A.

COVERING

When it comes to covering I think I'll leave it entirely up to you. Silk, silkspan, dope, Hobbypoxy, lacquer, MonoKote — there are so many to choose from, and each modeler seems to have his own choice. As for me, I've become a solid booster for MonoKote — with an assist from Hobbypoxy. For me it is absolutely the quickest possible way to get an airplane finished and flying. I use Hobbypoxy on the wingtips, engine well and mounting plate, and stab tips — all of them are places where it's a bit tricky to make the MonoKote fit around the curves. I like to sand the tips, for example, give them a coat of Hobbypoxy "Stuff" and sand that down, then a coat of Hobbypoxy. Then put the MonoKote on the wing (after first covering the open areas with silkspan like the instructions for MonoKote say you should) and then cover the joining line between the MonoKote and the Hobbypoxy with a thin strip of striping cut from MonoKote, then paint the edge of the striping where it overlaps the Hobbypoxy with a layer of clear Hobbypoxy to seal it. After that, you can go as wild as you like with MonoKote trim strips — scallops, sunburst, lightning lines, dots — anything you want to dress up the finish.

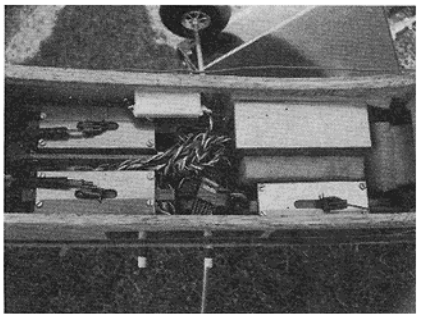


Ailer-Rand installation.

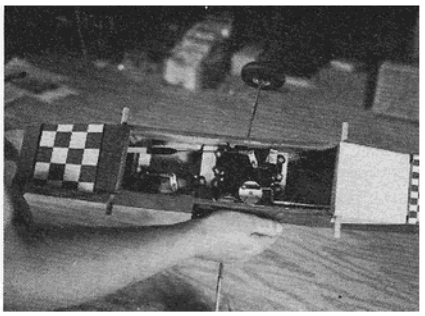


Tauri nose gear.

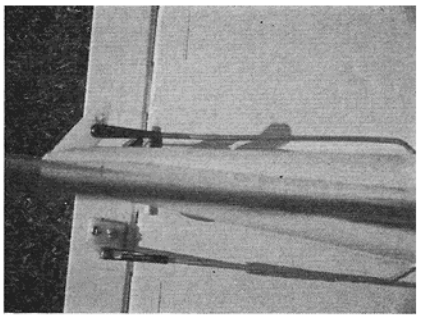
Tank and engine.



PCS installation.



Orbit servo installation.



Rudder, elevator linkage.

GUIDANCE EQUIPMENT

The Headmaster design is all purpose design — and on purpose. It can be flown rudder-only, using an escapement, or Royal Products or Hinode Servo. It can be flown with pulse rudder, using an Adams actuator. Any one of the leading galloping ghost installations, such as Rand, World, or Tomoser will make it perform well — just use the maximum throw position on the rudder horn (since GG action tends to reduce the mean effective angle of the rudder) and the minimum throw position on the elevator (to reduce the gallop when you pull full up and the pulse rate slows down). The downthrust angle of the engine keeps the nose down under power and aids the penetration when flying with rudder-only control, then when the engine quits, the nose comes up to give a very gentle glide angle.

The prototype, as shown on the plans, has a PCS proportional control system installed. Why? Because I was talking with Cliff Weirick one day during the construction period, and he says "Look. You've been saying for years that the only way to fly is with proportional control, but until somebody comes up with a proportional control system that can be installed in a small airplane, you're gonna stick with what's available in light weight gear. Well, you've gone to a slightly larger ariplane than you usually design and I've got a lighter weight proportional unit than most of the ones available, so why don't you stick one in the Headmaster and try it?"

I certainly couldn't argue with Cliff under those circumstances, so I did what he asked and installed the PCS gear, using rudder, elevator, and motor control. The all up weight of the prototype, with a Max. 15 in the nose, was slightly over three and a quarter pounds.

The very first test flight proved out the value of proportional control. After taxiing around a bit, I gave the Headmaster full power. Down the runway, about twenty feet from the end, I pulled slight up elevator, and the flight was under way. Great! Gingerly I tried out the response, and as soon as I knew it was good, started a few maneuvers. Right in the mdidle of one, off came the nose wheel! Wouldn't you know it — and on the first flight, naturally. Well, I throttled back, positioned the model for landing and carefully made an approach. As the model neared the ground I leveled it off, then as it slowed down and sank to the ground I kept increasing the back pressure so the Headmaster hit on the main gear. I held the nose gear, minus wheel, off the ground as long as possible, but finally the speed dropped to the point when the nose dropped, and the axle dug into the ground and brought the model to an abrupt stop — without any damage!

No one — and least of all myself — can argue with the basic premise that if you can afford it — and your airplane can carry it, a proportional system is the ultimate for flying. And now, with PCS at 18 oz., and Bonner's new Digimite RSat 12 oz., it has been amply demonstrated that a four foot airplane like the Headmaster, with a .15 or .19 installed, is an ideal Sunday Flier's sport R/C model. It's small enough to get in most cars without ousting the passengers, yet it's large enough to fly under any condition that a .45 or .60 powered model can handle.

But the problem of "affording it" still exists, and for those who can't quite make it, the proportional control which is available through the galloping ghost concept is certainly the next best — and it keeps getting better, what with decoders and separate actuators.

Finally, a word about power. The Headmaster, without radio gear installed, will weigh in somewhere in the 2½ to 3 pound range, depending on the balsa you use, the covering, and the finish. So, with a simple rudder-only servo, or escapement, or actuator, your guidance system may only weight 6-8 oz. Now, if you've built light, your airplane may weigh around three pounds. If so, a Cox .09 or a Max. 10 will handle it for gentle sport flying, and a .15 will make it very lively.

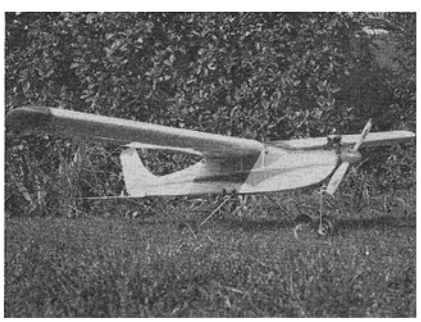
My prototype weighed 3¼ pounds, and with a Max. 15 I was able to perform outside loops. The second prototype, built by Bob Andris, weighed over four pounds, and was sluggish with a .15. Yet with a good .29 installed it performs almost like a contest job.

Actually, the wing construction which is used is strong enough that a .35 can be installed. Thus, the Headmaster has the versatility to handle almost any power and guidance combination that you may want to install in it. The only real limitation will be your own ability to handle the airplane if you choose to go the maximum power route.

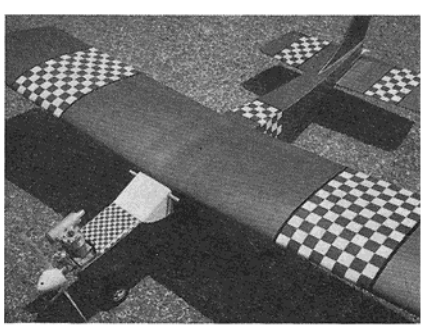
So let me know how you make out. I would particularly like to hear from those of you who go the simple, lightweight route (rudder-only, with a .10 or .15) and those of you at the other end of the spectrum (full house, with a .35). The Headmaster should be able to handle even the most difficult students.

Especially those who go to Sunday school with him!

Tauri main gear.



Taipan .20, acrylic finish.



Bob Andris; 4 lbs., .35!