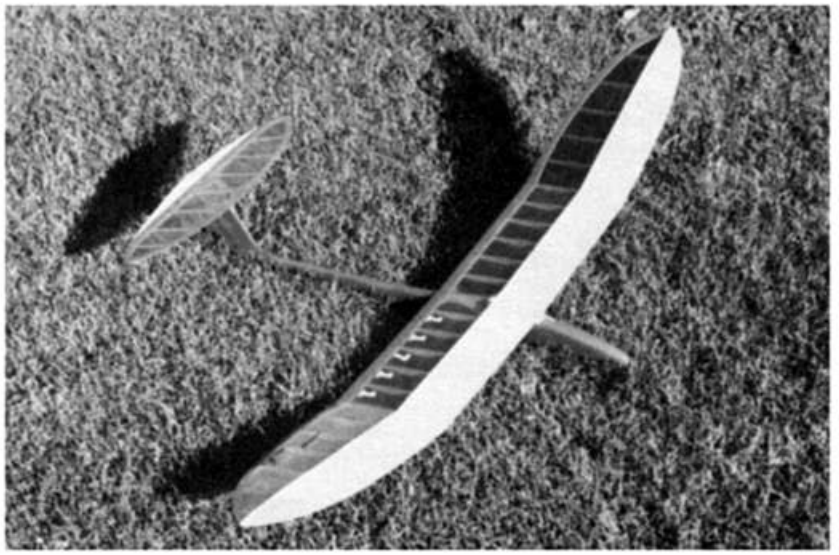
PHOTOS BY AUTHOR UNLESS NOTED



# SUNBIRD

**By DAVE THORNBURG . . . What's this? A 54-inch *hand launch* R/C glider? Sunbird combines the best of both worlds, F/F and R/C. A baseball pitcher's arm is not required, but a light radio is.**

• Here's the built-up version of the sheet-winged glider I took to Europe last summer to help sell the idea of hand-launched R/C sailplanes. It's appearing first in **R/C Model Builder**, then later in the year in the French publication *Radiomodelisme*. Thanks to Tom Kikuchi of Santa Rosa, California, eight Sunbirds have already been built for a special one-design contest in Japan . . . so the little bird already has something of an international reputation.

If you've never seen a glider hand-tossed into lift, you may well be a bit skeptical. Doesn't it take a javelin thrower's arm? How often can you actually catch a thermal? Isn't a 54-inch plane too small to see? How important is it to build light? These are some of the first questions people ask.

As far as muscles go, I've got good legs for running, but only mediocre arm and chest muscles. I can throw a Sunbird to 25 or 30 feet of altitude, at most. But this is more than enough height to catch ground thermals anywhere in the U.S., provided the conditions are right. Ground lift requires only two conditions to be ideal: intense sunlight and low wind velocity. Low humidity helps, but you can live without it. Not that you can't fly handlaunch in the wind, but the bubbles will be smaller and tougher to ride. (Don't worry about penetration; Sunbird has flown unballasted in 22-mph slope winds.) Still, I wouldn't waste much time on cold, overcast, wet, or windy days . . . unless you just need the exercise. It's called SUNbird, see?

Next question: how often can you expect to "go out" on a thermal? I'm averaging three thermal flights for every five launches, at the schoolyard where I fly regularly. But I only go flying on warm, calm mornings, between 9 a.m. and noon. And I take time picking my air. I can't overemphasize the importance of *conditions*: knowing *when* to throw is a hundred times more important than throwing hard. When the air is coming down, as it must do sometimes, tossing a handlaunch glider can get pretty discouraging. That's the time to take a break until the weather changes.

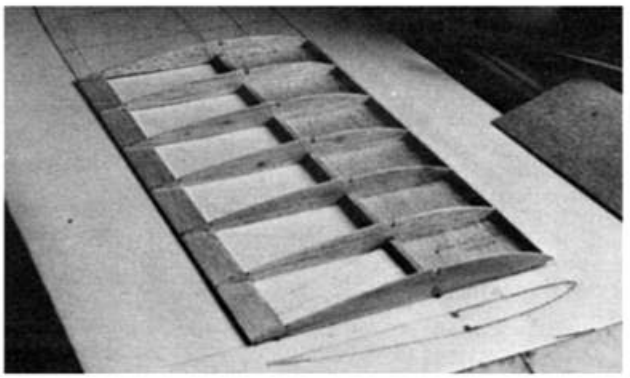
True, the Sunbird is small for a thermal glider. But visibility isn't a problem, as long as you stay close! Sunbird is designed to exploit lift under 100 feet of altitude. Once you get her (or, for that matter, any sailplane) up above 150-200 feet, all the sport goes out of thermal hopping. For this reason, we hold RCHL contest maxes to two minutes. If you can keep her airborne for 120 seconds, you're almost always "over the hump," high enough to be out of trouble. This agrees with my personal philosophy about R/C soaring: you learn more about thermalling *under* 200 feet than over.

The final question is weight: how important is it to build light? If you have to ask this, you'd better think twice about building a Sunbird. The design is STRICTLY for lightweight radios and careful builders. My Futaba equipment weighs under five ounces, and this could be further shaved by eliminating the switch and some of the excess wiring. As it is, the radio is a stock 2-channel with receiver case and switch cover removed. I haven't even clipped the antenna to a pigtail and soldered it to the elevator cable, as I usually do. (This may or may not work with other brands of radio.) Don't even think about building a Sunbird if you don't have subminiature servos and a 225 mah battery pack. If it's a button-cell pack, you'll have to rewire it to fit the fuselage; I don't recommend widening the fuselage for any reason.

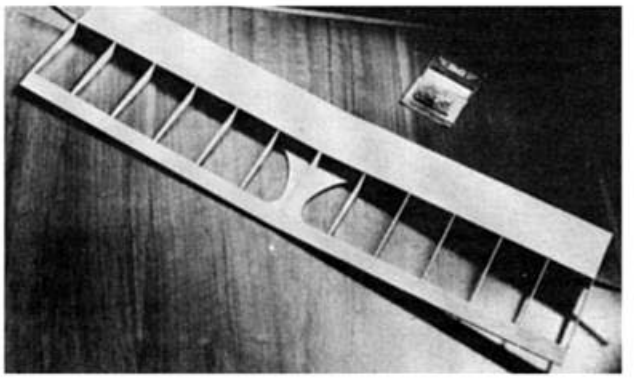
## CONSTRUCTION TIPS

When you're building a ship this size, you need to learn to think in grams. No, not even in grams . . . in *percentages*. For example, if your raw stab weighs 12 grams, and you can sand 3 more grams off of it, that's a whopping 25% weight reduction, and well worth it! (If you don't own a gram scale, the post office will sell you one for under three bucks. Just ask for their "marijuana dealers' scale.")

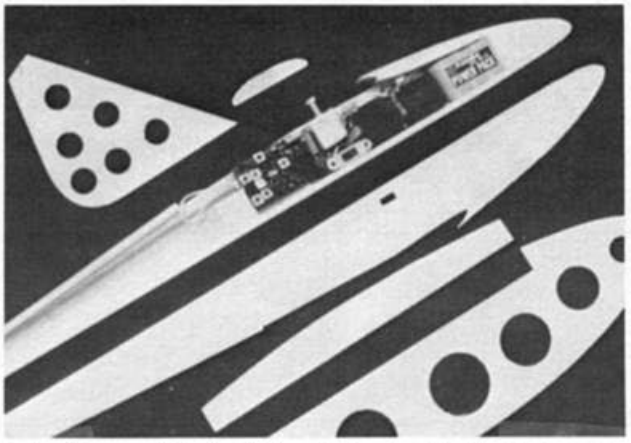
The wing is conventional in structure. If you've had some experience with small free flight, rubber or control line



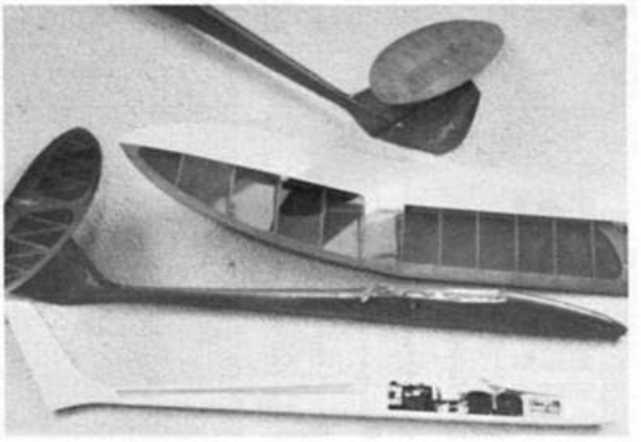
Wing is basically built from 1/16 sheet, sanded to 1/20. Careful wood selection is important to avoid excess weight.



Wing center section before adding pine block for hold-down bolt. Single nylon bolt holds wing in place.



Stripped-down radio is installed on left fuselage side. No, Dave won't be kitting the Sunbird; balsa selection is too critical!



Dave has built five Sunbirds so far. Monokote or Solarfilm covering is heavier than tissue, but much more puncture resistant.

models, you won't find any surprises. Pick your wood with care. I use C-grain Sig balsa for the D-tube sheeting, sanded to around 1/20 inch. If you want to taper this sheet even thinner towards the tips, it will be worth your time. Epoxy the pine wing bolt block to the center dihedral brace. I used white glue for the other dihedral and polyhedral joints, then switched to cyanoacrylates for ribs and sheeting. (Goldberg Super Jet is great for sheeting, as it doesn't dry till the parts are pressed together.)

If laminated leading and trailing edges are new to you, here's how I do it. Cut a piece of 1/8-inch cardboard to the shape of the inner curve. Pin it over the plan and bend each strip of wood around it slowly, gluing the laminations with cyanoacrylate. If the wood requires moistening to bend without breaking, chances are it's too heavy. I like to laminate decreasing thickness of 1/8 stripwood to form the trailing edge . . . saves a lot of heavy planing to get the tapered cross-section. You can feather these trailing edges to zero thickness at the back and probably pick up a little extra performance from the airfoil, but it makes them awfully vulnerable to "hangar rash." Incidentally, Sunbird needs no washout.

Note that the last three tip ribs are shorter than the main rib pattern shown. Just snip two or three pair of main ribs down to the proper lengths, then reshape them until they match the leading and trailing edges. Don't worry yourself sick over absolute airfoil precision on these ribs. I don't.

Close-up shot with wing removed shows Rx mounted for easy access to crystal. No case on switch or Rx. Subminiature Futaba S-20 servos used; anything bigger is a no-no. Check Cannon's mini. Photo by Al Kindrick.

Lay the radio components out on the left fuselage side. Servos are mounted with 1/16-inch thick servo tape. Be sure the controls are not reversed before sealing everything in place. Note that the servo mounting lugs have been removed. (Who the hell would pay $40 each for subminiature servos and then mount them on a bunch of bulky rails and heavy plastic trays?) I like to run both cablerods down the left fuselage side, tacking them every two inches or so with Hot Stuff and baking soda. You'll need a miniature (1/16 O.D.) eyelet to get a slop-free fit of the cable to the output arm; the solder joint calls for a light iron and an even lighter touch. Forget adjustable clevises; they're too bulky. (You aren't planning to build in any warps that will require gross trim adjustments anyway, right?) If you don't use the elevator cable for an antenna, run your regular antenna parallel to it, clear to the top of the fin.

Your radio installation, cablerods, and wing hold-down should be virtually complete before adding the right fuselage side and the right fin sheeting. Be sure to leave the last 1/2 inch or so of elevator cable free, so it can flex fore and aft as the elevator moves. Use the copper tube Sullivan provides to make the little elevator connector: solder 1/16 inch of cable into 3/16 inch of tube, flatten the remaining 1/8 inch of the tube and drill a hole through it just large enough for the straight-pin axle that mounts in the elevator. (The hole in the elevator needn't be as large as shown. A narrow slot is plenty.)

On one of my Sunbirds I got lazy and failed to hollow out the stab . . . just left it solid sheet balsa. That ship took over 1/2 ounce of lead in the nose to balance! Built as shown, your plane should be pretty close to trim without adding noseweight. You could probably save another 10 to 20 grams by covering her with Japanese tissue instead of Monokote, but personally, I'm too lazy for that anymore. Besides, the plane in the pictures has well over 1000 tosses on her, without a single puncture. That alone makes Monokote or Solarfilm worth its weight, to me.

**FLYING**

One of Al Kindrick's lovely close-up photos (thanks again, Al!) shows the aluminum finger grip in my favorite Sunbird. It's on one side only (remember, I'm left handed) and mounted flush with the bottom of the wing. I prefer this skeg to the double-sided one shown on the plans, as it's lighter and less draggy. (If you think drag isn't important on little

*Continued on page 91*

No matter what Dave says in the text, the *real* secret to flying RCHL is wearing the proper headgear. Sunbird weighs only 5 oz./sq. ft., performs well on the slope, too. Photo by Al Kindrick.

**Sunbird . . . . . *Continued from page 29***

airplanes, try running your antenna outside of the fuselage; it cuts average dead-air time by around 15%.)

Sunbird is launched much the same as a free flight HLG. I grip the fuselage firmly between my thumb and middle finger, placing my index finger solidly behind the aluminum skeg. If you use the double-sided skeg shown, index and middle fingers go behind it, and fuselage is gripped between thumb and two remaining fingers. Either way, you want to be sure you're squeezing the fuselage at a point that has plenty of strength; you may want to extend the wing mounting block down deeper into the fuselage for this purpose. Another tip not shown on the plans: I glue one-inch squares of No. 400 grit sandpaper to each side at the grip point. This not only tells you where to grab her, but gives you better traction for hard heaves.

Incidentally, the switch should be mounted flush with the fuselage side, partly for steamlining, and partly to keep you from turning it off inadvertently during the launch! An even better idea would be to substitute a subminiature jack and shorting plug for the slide switch. Set it up so that removing the plug closes the circuit, then tie a BIG RED RIBBON to the plug, so you never launch with the plug in place, or put the model away without it!

Unless you pitch a lot of hardball and stay in good physical shape, you'll want to work up slowly to hard launches. In fact, I rarely throw the Sunbird with "all I got," even in competition. A good snappy toss at maybe 75% of full power will get you 90% of full attitude, and you won't wake up regretting it tomorrow.

If you haven't flown free flight hand-launch gliders before, you're going to have to learn to "pick" air. It isn't hard; you can get enough experience on a single warm, sunny morning to make all your building efforts worthwhile. Free flighters have to run downhill like a gazelle to retrieve their ship after every toss; you can fly yours back and catch it. This lets you get lots and lots of flights in very quickly.

Look for a good breeding ground for thermals: a brown dirt field surrounded by grass, a blacktop parking lot, a small enbankment that lies exactly perpendicular to the sun's rays — any place where the air might heat up a little more quickly than normal. Remember that the sun can't heat the air directly; it must heat some other surface, and that hot surface will transfer the energy to the air.

Take off your shirt, so you'll be more sensitive to air currents and temperature fluctuations. Air is always moving, always shifting and squirming restlessly about, even on the calmest of days. Note the "feel" of the air around you before each toss. Be especially sensitive to sudden shifts in wind direction . . . these are sure signs of building or passing thermals. Cover as much ground as possible with each toss. What you're looking for is "live" air; air that makes a wingtip jump, or causes a sudden and unexpected stall. Remember, when you graze the edge of a lift area, it will usually try to toss you out and away from the thermal . . . don't take *no* for an answer!

You should be able to turn your Sunbird in 10-foot or smaller circles, tight enough to ride even very young thermals. At twelve ounces flying weight, she's sensitive to every twitch and roll of the soft morning air. And unlike "pure" free flight, you can use a Sunbird to explore for lift in all directions, upwind as well as down. In fact, a well-built Sunbird would make a first-rate thermal detector for the serious free flight competitor!

Handlaunch R/C has opened up a whole new world to me, a world of micro-micro-meterology that takes place in the invisible air around us every minute . . . a world of miniature highs and lows, cold fronts and warm, that sweep and dance across flying fields no larger than a baseball diamond. If the romance of this kind of flying appeals to you, I hope you'll try a Sunbird. Once again, I want to emphasize the importance of not compromising with weight. If you decide to scale her up to 78 inches and use larger servos, what you'll wind up with is another ho-hum two-meter sailplane, totally unrelated to the Sunbird. This little plane's equipment is specialized, and its structure requires more than ordinary care, but the payoff is a light, nimble little airplane that will provide a lot of challenge, a lot of thermal-savvy, and a lot of good exercise.

Meet you at the chiropractor's! •