The Great Aviation Bake-Off

Sunscreens can prolong the lifespan of your avionics and interiors

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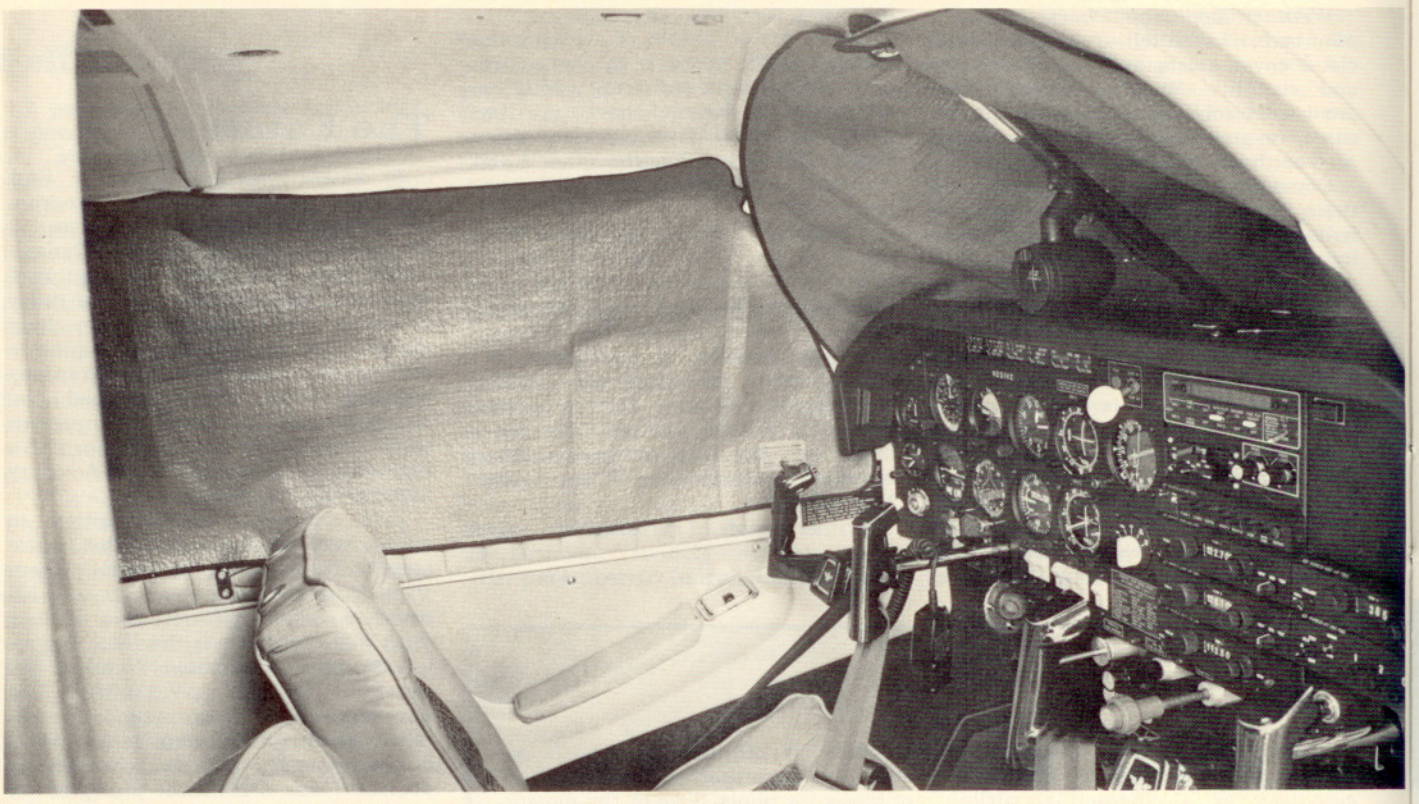


Sunscreens, like the Thermacon ready-fit model shown in this Mooney 201, reflect up to 92% of the sun's infra-red heat waves, thus protecting valuable avionics and aircraft interiors from life-robbing heat damage. They're also lightweight and extremely easy to touch into place or to stow away.

First off, let's say I'm a believer in protecting an investment. I try not to ignore little maintenance jobs around the house, the family station wagon is kept showroom new and, well, you get the picture. If it's worth having, it's worth taking care of.

When that investment is an airplane, and its purchase price rivals the house mortgage, you can bet it's going to be looked after. If I'm ever going to see my Skyhawk to that golden age where it begins to appreciate, I had better not only operate it wisely, but arrange for its care even while it's tied down at the airport.

One of the biggest robbers of aircraft life—one many of us overlook—is the sun. Sometimes, there's not much we can do about it. If, like me, your aircraft budget comes up with minuses when a hangar is considered, you have little choice but to leave it out where the sun, in varying degrees, either just shines on it all day or slow-bakes it.

It's a whole lot easier to protect the interior of your aircraft from the harmful rays of sun than it is to protect its paint job. The sun's ever-ready team of subtle destroyers—infra-red heat waves and ultra-violet rays—can promote failure of your radio equipment, make the colors of your aircraft interior fade, rot the fabric seats and carpeting and even fade instrument faces. The airplane may look nice sitting in the sun with a fresh wax job, but you can be sure ol' Sol is doing his incessant, silent damage.

Heat trapped inside an aircraft parked in the sun can easily soar well above the outside air temperature. It's not at all uncommon, in fact, to find the inside aircraft temperature at least double that of the outside air temperature.

Your avionics, to consider just one victim of the sun's mischief, just can't take that heat. "Typically, TSO (technical service order) requirements for avionics equipment allow for operation at 131°F maximum for a short term operation not to exceed 160°F," Robert Honn, director of quality assurance for King Radio Corp., has noted. Yet, Honn added, a comprehensive study proved alarmingly that "aircraft parked in the sun where the outside temperature was 85°F developed cabin

temperatures in excess of 160°F."

Even now, in the icy grip of winter, that sounds like a scorcher. And when you think about the lifespans of those relatively sensitive electronics components ebbing away, the situation should be alarming. Sure, your radios may go on working—for now—but when they poop out, would you think to blame the sun?

One of the best ways to protect your avionics and interiors is to invest in aircraft sunscreens that hang inside the windshield and windows. Since they don't actually touch the plexiglass, the screens can't scratch, rub against, or otherwise harm the windows.

Sunscreens, available for all the window areas of most popular general aviation aircraft, are lightweight, weighing from around 10 ounces to less than a pound, and are flexible for easy storage. The screens are hung in place in just minutes by use of Velcro® self-gripping nylon fasteners. One part of the two-piece Velcro fastener is sewn on the sunscreen, while its mated part is glued to the aircraft interior around the window area. The sunscreens are then lightly touched into place.

Most of the sunscreens I've seen in various aircraft consist of layers of high-insulation-efficiency material all bonded together into a single piece. These sunscreens are generally made of aluminized plastic film, with the side facing the sun being silver-colored to reflect the sun's powerful rays. Altogether, the average sunscreen is about 2.5 mils thick, or about the thickness of a lawn-and-garden trash bag.

The aluminized material from which many sunscreens are made is called Astrolon®. This insulation material was developed by NASA during the Apollo space program and has now been commercially marketed under various names, but generally is referred to simply as a "space blanket." The product has also found widespread commercial use in sporting, camping, hunting, and boating applications.

At least two sunscreen makers we know of, however—Morgan Stanford Aviation and Lloyd Spiro and Associates—market sunscreens that have been especially developed for specific use in aviation. Morgan Stanford wasn't happy with the durability of normal space blanket material, so the firm developed its own version of the blanket. Such concerns as interaction of sunscreen material with aircraft plexiglass, the degree of temperatures likely to be experienced, and what is termed the "outgassing" of aircraft upholstery were considered during product development, the firm says.

Lloyd Spiro (AOPA 575068), an aerospace engineer with Rockwell Int'l. and head of his own aviation consulting firm, was concerned with getting his sunscreen model to "breathe." If sunscreens aren't permitted to breathe, he said, it is possible under certain conditions for condensation to form on the inside of aircraft windows, since heat could build up between the sunscreen and the windows.

Spiro's system involves vacuum-depositing the silver reflective coating on his sunscreen, instead of using a process whereby the aluminized coating is applied in a liquid form that plugs up all the pores in the sunscreen.

Curiously, Spiro's own tests have shown that a white-colored reflective material would be more efficient than the aluminized reflective material used on his and most other sunscreens. "But how am I going to convince the public that the white reflector is best, when all my competitors are using silver?" he said.

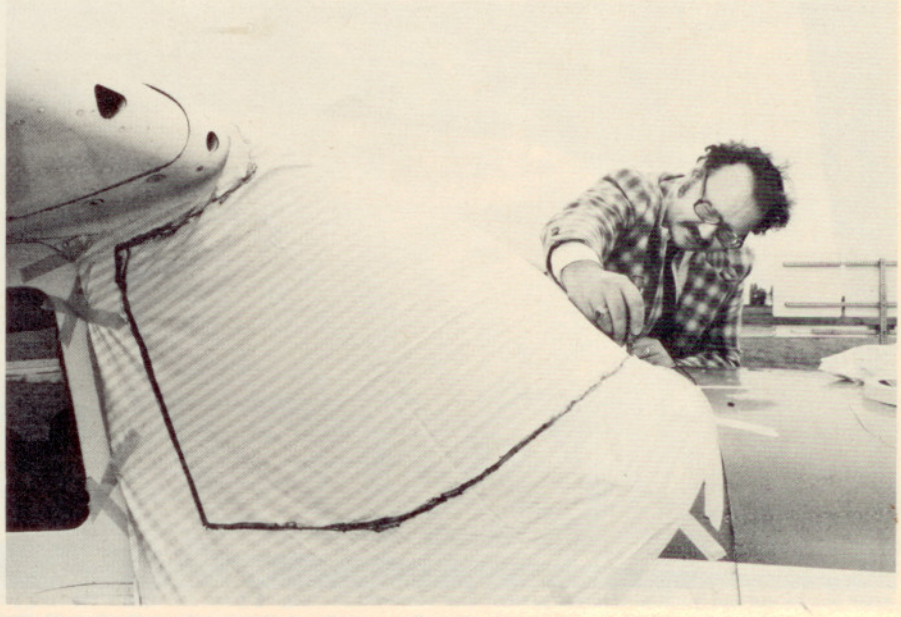
Regardless, though, of the composition or quality of material, all sunscreens work on the same principle. When your aircraft is parked in the hot sun, the infra-red heat component of sunlight shines through the plexiglass windshield and windows and is absorbed by whatever happens to be in the aircraft interior.

Another ingredient of sunlight is ultra-violet rays, which are generally absorbed by the aircraft plexiglass. Plexiglass windshields and windows have to be chemically treated with strong ultra-violet inhibitors to prevent eventual deterioration from these rays.

If both of these rays are permitted to enter the aircraft, and then remain there, it is possible for your fabric interior to deteriorate just as some household draperies rot from constant exposure to the sun. One sunscreen manufacturer, Pro-Tec-Prop, claims that its studies have shown that use of sunscreens can prolong, by nearly three times, the expected life span of interiors that would otherwise have been subjected to sunlight deterioration.

But, it's your aircraft radios and electronics that really take the beating. And, depending on your panel, it's quite likely that replacement of radios will cost you considerably more than a new interior.

Surprisingly, too, it doesn't take an



The first step in building your own sunscreen is to make a pattern of your aircraft windshield. An old sheet can be taped into place over the windshield and a pattern made by lightly tracing the plexiglass edge with a felt marking pen.

abnormally high inside aircraft temperature to damage your avionics. The failure rate of a radio component operated at 150°F has been found to be *50 times greater* than the failure rate of the same part when operated at 80°F. "It is possible," King's Honn said, "that a piece of radio equipment may fail catastrophically—that is, be totally unusable when operated for a short period of time at an accelerated temperature."

If the radio in a parked aircraft is exposed to a great temperature range, and includes operation at exceptionally high temperature, the result will be a weakened radio, which will eventually fail. Simply put, although the damage was gradual and took place over the summer months, failure may occur the following January.

Once the sun's rays have penetrated the cockpit, they are reradiated as radiant heat. Theoretically, because this radiant heat has a longer wave length than do the infra-red rays that enter the airplane, it becomes trapped in the cockpit. This creates an accumulative so-called "greenhouse" effect.

I'm not sure frankly what the technical differences are between sunlight's long and short wave lengths, but I do know how my aircraft keys feel after they've lain on top of the instrument panel for awhile. Wave lengths or no, I get the message.

What a sunscreen effectively does is keep most of that infra-red heat from entering the aircraft. Depending on the quality of the product, commercially available sunscreens—and even those you can make yourself—can reflect upwards of 80% to 92% of that infra-red heat right back out the plexiglass.

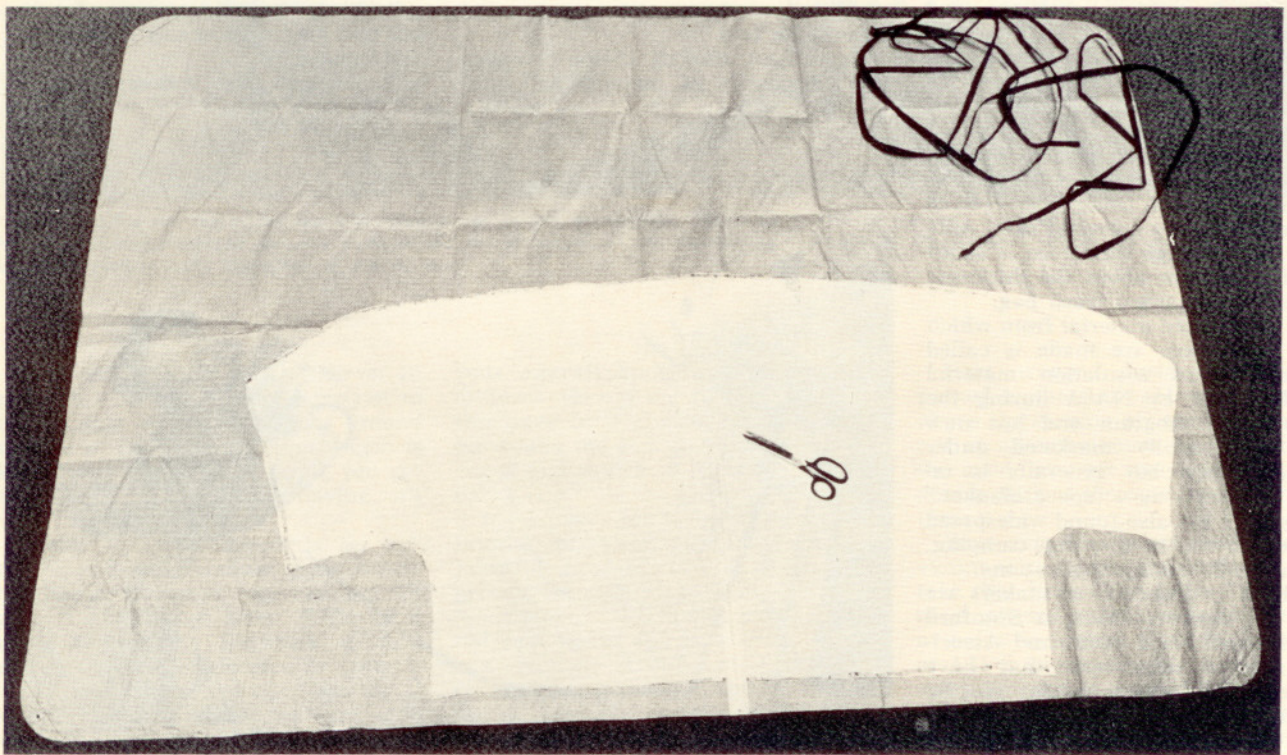
In this way, sunscreens will work to significantly lower the inside air temperature of your aircraft. In fact, inside air temperatures were found to remain within 10 to 15 degrees of the outside temperature using the Thermacon® sunscreen made by Morgan-Stanford. Considering how aircraft interior temperatures can easily double the outside temperature, on an 85°F day the sunscreen can reduce the inside temperature by a significant 65 degrees.

Not only will the interior features be subjected to less abuse, but so will the pilot. A cool, comfortable cockpit may prevent you from hurrying through a checklist in order to get the airplane moving and the cabin cooled down some. There's another safety factor here, too, in that sweaty brows and steamed-up or slipping eyeglasses obviously have no place in the takeoff procedure.

Because they're constantly bombarded by the sun's infra-red rays and absorb, along with your window areas, destructive ultra-violet rays, most sunscreens have a life expectancy of three to four years. Some may go longer; conversely, the reflective surfaces of some sunscreens may begin to flake in a year's time. Flaking of the reflective film, incidentally, is how you tell your sunscreen is nearing the end of the line.

Even with a life expectancy that may not outlive your airplane payment book, sunscreens are still a good investment. From just a few cents to maybe a couple dollars' investment a month, they're worth the money.

Sunscreens currently on the market are pretty much a take-your-choice proposition. The Thermacon sunscreens are ready-made to fit all the window areas of most aircraft and sell for between $65 and $75. Other companies, like Pro-Tec-Prop, offer a ready-made sunscreen for around $40 to $50. Still other concerns, such as Sporty's Pilot Shop (which markets Lloyd Spiro's



After you've cut out your windshield pattern and removed the edging from the space blanket, your build-your-own sunscreen project should look something like this. By carefully positioning the pattern on the sunscreen material, you may be able to get more than one sunscreen out of a single blanket.

sunscreen), offer kits in which you cut out your own sunscreens. Check your local pilot supply store or mail order catalog and carefully compare features before buying.

Having been sold on the effectiveness of the sunscreen, I decided to save a little money and make my own for the windshield of my Skyhawk. If yours is a high-wing aircraft, with the side windows shaded by the wings, covering only the windshield will provide surprising protection. Those of you with low-wingers, though, should screen all the window areas to get maximum utilization.

It takes very little in materials or time to build a sunscreen, which I'm told will have about the life expectancy of a year. For materials, you'll need one aircraft; one "space blanket" (the one I used is marketed by the Thermos Division of King-Seeley, Norwich, Conn., and is called an "all-weather sportsman's blanket"), some masking tape; also, an old, light-colored twin-sized bedsheet; a felt marking pen; a pair of scissors; a seam ripper; a sewing machine; thread; a tube of contact cement and either about two feet of Velcro® self-gripping fasteners or eight to ten individual Velcro® dots.

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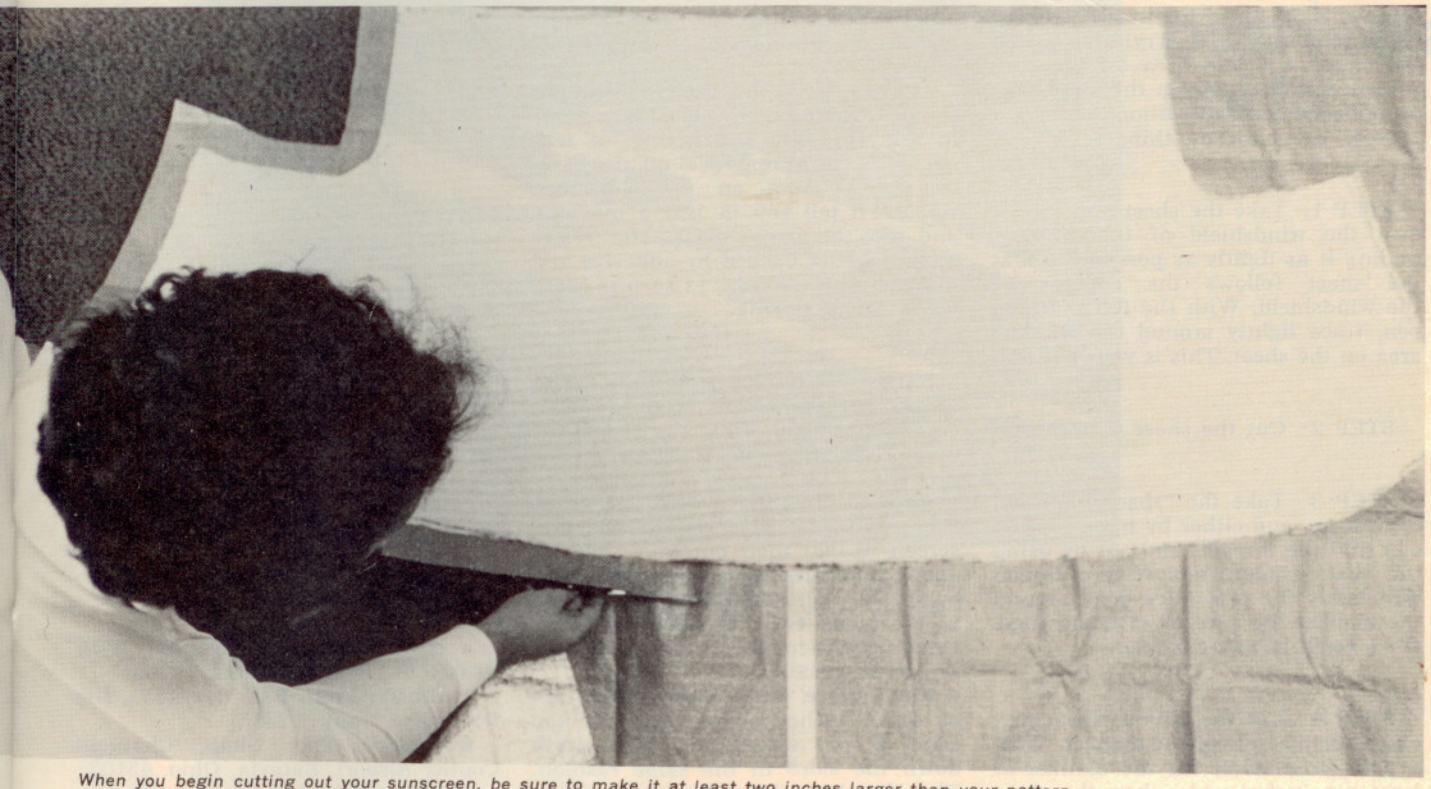
This fuzzy-side-up Velcro dot on the Thermacon sunscreen gives you an idea of how much space to leave between the Velcro dots, or strips, and the outside edge of the sunscreen.



When you begin cutting out your sunscreen, be sure to make it at least two inches larger than your pattern. This will allow for pattern tracing errors and provide ample room for later sewing the edging and Velcro fasteners on the finished sunscreen.

Whether you prefer to purchase or to build your own sunscreen, you should find the investment in prolonged radio and interior life to be well worth the money.

The Velcro I used comes in ¾-inch wide strips and costs around 75 cents a foot, while the dots are slightly more expensive at 49 cents for a package of four measuring 1¼ inches in diameter. Larger sizes—up to squares measuring 4½ inches in diameter—are available, and I highly recommend using the larger sizes. Trying to match too small a Velcro area on the sunscreen with its mate on the aircraft is an unnecessary aggravation.

Now, let's build the thing.

STEP 1: Take the sheet and tape it over the windshield of the aircraft, pulling it as tightly as possible so that the sheet follows the contour of the windshield. With the felt marking pen, trace lightly around the window area on the sheet. This is your pattern.

STEP 2: Cut the sheet pattern out.

STEP 3: Take the "space blanket," open it up, and either by hand (if you can find the thread's end) or by using the seam ripper, remove the thread that holds the protective edge around the blanket. Be sure to save the edge, since you'll be using it later.

STEP 4: Lay the cut-out sheet pattern over the spread-out blanket. With a pair of scissors, cut the blanket *at least two inches wider* than the sheet pattern. This will allow for pattern tracing errors and provide enough room to sew on the Velcro fastener material later.

STEP 5: Sew the protective edge back on what is now a sunscreen.

STEP 6: Note that the Velcro fasteners have different material on the faces. The fuzzy side is what you'll be sewing on the sunscreen. The other Velcro part, with the prickly little hooks, will be applied to the aircraft interior.

If you use the Velcro dots or squares, you have the added advantage in that they are self-basting, or self-sticking. You simply peel off the backing, stick them on the sunscreen where I'll tell you in just a moment, and sew them into place. The Velcro strips are not backed by adhesive and may be a little harder to keep in place while you're sewing.

STEP 7: If you're using Velcro strips, cut them into sections about two inches long. If you're using the dots or squares, you're already set for this step.

Position the strips or dots, fuzzy side up, on the silver side of the sunscreen so that their outermost edge is about a half-inch from the sunscreen edge. You can begin by placing them in the upper corners, since you know you'll need them there to hold the sunscreen in place.

Next, place more pieces about six or seven inches apart along the top edge of the screen and then work down the sides in the same fashion. The idea is to keep the screen from sagging. The bottom won't need any fasteners since it will be tucked above the instrument panel.

STEP 8: Sew the dots or strips into place on the sunscreen. They can also be stapled into place.

STEP 9: Take the completed sunscreen out to the airplane. Position it inside the windshield, tucking the bottom up above the instrument panel where it meets the windshield. Holding the sunscreen in place at top (it helps if you have someone help you), lightly mark in pencil on the aircraft interior where each Velcro strip or dot on the sunscreen will require its mated part.

STEP 10: Cement into place the prickly part of the Velcro, let dry, and you're ready to hang your sunscreen. Your three or four hours and around $10 folding money will give you an investment worth many times what you put into it.

If you'd rather not bother with this artsy-craftsy approach, we've put together a list of the sunscreen manufacturers or distributors we know of. Prices and specifications differ too much to be included in this listing, but the following can supply the information you'll need:

- Morgan Stanford Aviation, 2510 Russell St., Berkeley, Calif. 94705.
- Pro-Tec-Prop, P.O. Box 1551, Big Bear Lake, Calif., 92315
- Sporty's Pilot Shop, Clermont County Airport, Batavia, Ohio, 45103.
- Thermoguard, P.O. Box 153. Bissell Station, South Windsor, Conn. 06074. □