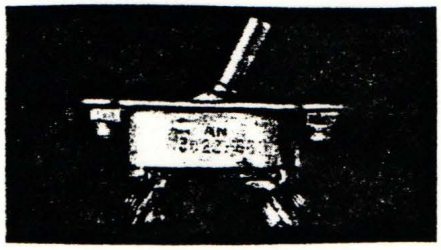
Robert Janes - Builder's Hint - Have heard from several sources that good ole epoxy is a better vapor (water) barrier than varnish or lacquer. So, I scraped the urethane varnish off my prop and refinished it w/ 2 coats of epoxy- . Then white paint on top of that for U/V protection. Now the white prop not only lookes good, but should not shrink and/or expand with changes in humidity. Remember the report in Canard Pusher of Dick Rutan losing his prop. because it dried out and the loose prop. bolts sheared off?

Robert Hummel - Builder's Hint - The following is from the June issue of Sport Aviation published by the Experimental Aircraft Association and would be good for the newslette

SWITCHES AC VS DC



by **Art Bianconi (EAA 92330)**
Technical Counselsor 1216
99 Dover Green
Staten Island, NY 10312

Some years ago I was fortunate to be able to work alongside engineers from Underwriters Laboratories (UL) during destructive testing of electrical devices. It was part of my apprenticeship as a designer for a major electrical manufacturer and it was during this period that I acquired an appreciation for the vital differences between AC and DC ratings for switches.

I share this with you because I am growing increasingly concerned at the widespread lack of appropriateness most aircraft builders demonstrate when selecting switches for the cockpit environment. Each time a builder asks me to perform a pre-FAA inspection of the aircraft, I carefully inspect the switches and to date over three-fourths of the projects inspected have turned up AC rated or non-rated switches in DC circuits.

There is a large scale misconception that any switch can be used so long as its current rating exceeds the maximum load in the circuit. "Current is current; what difference does it make whether it's DC or AC? Besides, I'm using a 125 volt AC switch in a circuit with only 12 volts!" The differences in load carrying capability are dramatically non-linear and are best appreciated by carefully inspecting a high-quality switch carrying both AC and DC ratings. Typical of this is the roller and bar micro switch made by MICRO Corporation (Part No. DT-2RV23-A7). Rated at 10 amps at 125 or 250 volts AC, the same switch can only carry .3 (that's three-tenths!) of an amp at 125 volts DC. If DC voltage is increased to 250 volts, the current rating drops even further to .15 amps! In real terms, this represents less than 1/60 of the original load carrying ability and all we did was go from 250 volts AC to 250 volts DC!

Those of you who can still remember the old Kettering coil ignition systems will recall that when the condenser in the distributor went bad, the points generally turned blue and melted down in just a few minutes. Cockpit switches don't have the benefit of condensers to absorb the electrical inertia present in a DC circuit and, as a result, the gap temperatures get hot enough to weld contacts, even those made with exotic high temperature alloys.

The reason for this is simple enough to appreciate: because AC current changes directions 120 times a second in a 60 cycle circuit; there are 120 times when there is no current flowing at all. The current actually helps turn itself off the moment it sees a gap and switch designers use this phenomenon to help reduce the cost of manufacturing AC switches. In DC circuits, however, the "push" is constant even when the points begin to open and the resulting arc is DC current's way of demonstrating its resistance to termination.

"But won't my circuit breakers protect me?" No, they won't. Fuses and CB's provide overload protection and a welded set of contacts will not, by themselves, cause an increase in circuit load. Furthermore, what often happened during UL testing was that the points welded shut making it impossible to open the circuit. Cycling the switch to the open position was often misleading — yes, the lever moved but inside the switch, the cam had separated from the welded points and while it appeared to have interrupted the circuit, the circuit was, in fact, still hot. If the circuit involved was your fuel transfer pump or fuel boost pump and you thought it turned off when in fact it was still running, what would the consequences be? If it were a flap or elevator trim motor or a gear retraction device, how would a tripped circuit breaker save you if the activating switch was welded closed and in a mode other than what is required for a safe landing?

A DC rated switch will cost you about 3 times more than an AC rated switch of identical current capacity. If your panel sports 10 switches (which is not likely) the difference will be less than $35 (in 1986 dollars). You've gotten this far. Is it worth jeopardizing your investment or your safety by cutting corners with cheap or improperly rated switches?