

PROJECT CHEROKEE II—FINAL REPORT

Part II

by STAN HALL

One of the great money-savers in the Cherokee II design is the absence of certified aircraft materials. Except for the main wing fittings, all bolts, nuts, control cables and pulleys plus miscellaneous hardware, there isn't a scrap of "certified aircraft" material in the ship.

This may come as something of a shock to those who have become accustomed to using only the finest material money can buy. You do not have to.

One reason "certified aircraft" material is so costly is because special pains are taken by the manufacturer to make the material light, strong, reliable and small in size. If you are willing to go heavier and larger to get the same strength and reliability there is no valid reason why "non-certified" material can not be used provided you know exactly what you are doing.

You can save money on plywood too. Cherokee II uses commercial Douglas Fir, Double A Exterior Grade plywood. This material is "good" on both sides and is assembled with water resistant glue.

The basic elements which separate aircraft plywood from the Exterior Grade Douglas Fir is the way the splices are made in the veneers, the type of glue used and the fact that aircraft plywood cannot have knotholes. There are other differences but these are the main ones.

I justified the use of the Exterior Grade Douglas Fir (all 1/8 to 5/32 inch thick) on the basis that only very clear material is used, and the same care in selection is applied as in the case of the spruce. Also, the ship was designed so that the combined strength of the outer plies only is sufficient, with no help except "cross-banding" from the core ply. As an added yield, however, only plywood without knots on the inner core is permitted. One is able to see these holes by holding a strong light against one side in surrounding darkness. The light passes easily through the knotholes and makes them visible.

As indicated the glue used in Exterior Grade is water-resistant.



Stan Hall's personal Cherokee II. As of October 1964, a total of 49 Cherokee IIs have been completed. Of these six were built in Canada, four in Australia and one in New Zealand.

That's why it is for exterior use. It is not *waterproof*, however. I would be concerned about this were I building a submarine instead of a sailplane. By careful selection and through the application of two or three coats of good varnish or the newer marine resins one can use Exterior Grade Douglas Fir plywood and spend only about a quarter of what certified aircraft material would cost.

The glue used on Cherokee II is water resistant synthetic resin "Weldwood", obtainable at any hardware store or lumber yard. It is a brownish powder mixed with cold water.

There are literally hundreds of glues and cements on the market, many stronger than Weldwood. However, few builders give second thought to the elemental fact that if the glue is stronger than the wood it is the wood that controls the strength of the joint, not the glue.

The new epoxy glues are becoming very popular, and properly so; they are excellent adhesives. They are also expensive. Regardless, however, of the strength of the glue the FAA will give it credit for having only the strength of the wood used in the joint. This assumes, of course that the glue is at least as strong as the wood. It is critically important to observe that in order to achieve even *this* strength the joint

must be carefully made, and under properly controlled temperature environments. Further, the glue must be waterproof or at least water resistant.

I'm certain that there are readers who are much more knowledgeable on the matter of glues and cements than I. I would enjoy reading an article in *Soaring* on this subject.

But back to the Final Report. The fabric covering on Cherokee II is medium to heavy weight unbleached muslin. Unbleached muslin costs about a third of Grade A aircraft fabric and at the speeds Cherokee II is designed to fly it is perfectly adequate. It isn't quite as smooth when finished as the Grade A but I have seen muslin covered Cherokee II's soar right past Grade A covered ones more than once.

About the work involved in building Cherokee II. I am reasonably certain that some plan purchasers were disappointed to realize how much work it takes to build the ship. I'm sure they expected it to be a "simple" machine as measured in absolute terms. Insofar as I know no aircraft fitting this description exists. I doubt if it ever will.

Cherokee II, when compared with other sailplanes, is simple. And when I say simple, I really mean "easy to build". Some people equate simplicity with the number of parts. If this were true one could carve a sailplane out of a solid