Theory of Soaring Flight

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ducted elaborate studies of the thermodynamical influences of mountain ranges upon the wind sweeping over them.

It is not necessarily a physically extensive obstacle that the wind must encounter to be deflected upward. The mere slowing down of the surface wind where it encounters increasing surface roughness suffices to force the remainder of the wind masses to climb over the slowed down air masses. A rough estimate of the magnitude of this effect can be obtained for the idealized case of a wind sweeping over a relatively smooth surface and then suddenly hitting a decidedly rough surface region like a seashore or a forest. The law governing the decay of velocity through friction can, according to contemporary theories of skin friction, notably as expounded by Th. von Karman, be approximated by the transverse profile $u = U\left(\frac{z}{\delta}\right)^{1/7}$ at the height z in a wind of free speed U prevailing beyond the boundary layer of local thickness δ while the latter grows at the rate $\delta = Cx^{4/5}$ with the distance x downstream from the leading edge of the roughness. As far as the small density change which accompanies the ensuing vertical displacement may be neglected, the continuity of the medium postulates $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial z}$ where v is the vertical velocity component. Integrating up to a height z within the boundary layer:

$$v = -\int_0^z \left(\frac{\partial u}{\partial x}\right) dz = -U \int_0^z \frac{\partial}{\partial x}\left(\frac{z}{Cx^{4/5}}\right)^{1/7} dz$$

$$= +0.1\, U\left(\frac{z}{Cx^{39/5}}\right)^{1/7} = +0.1\,\frac{uz}{x}$$

The wind v/u thus appears to be of the order of 1/10 of the slope of the line of sight toward the leading edge of the rough area. It is strongest close to the leeward of this leading edge. If the exponents of z and x in the expressions for u and δ are m and n rather than 1/7 and 4/5 respectively, then the slope factor is mn/(1+m) instead of 1/10. Fig. 2

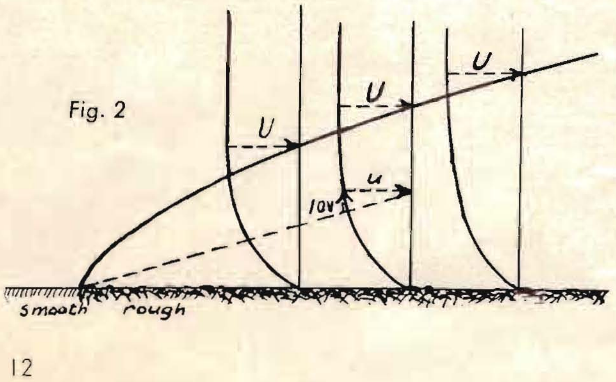

Fig. 2

Meet
JACK LAISTER

No desk-born executive is Jack Laister, President of Laister-Kauffmann Aircraft Corporation. At 13 building national prize winning model airplanes . . . at 14 his first glider and at 15 making his first flight, it is no wonder that a few years later Jack Laister was earning his tuition at Detroit's Lawrence Institute of Technology as the school's gliding instructor. Here he designed and supervised the building of experimental gliders—two of which were in use by the Army for glider pilot training. Star of this group was the famous Yankee Doodle, veteran of numberless State and National contests and high honor contender at the 1939 International Aerobatic Contest in Paris.

While in college he served as a mechanic in a Detroit experimental laboratory and by the time of his graduation he held the position of Assistant Chief Engineer in another Detroit organization. Thus, in 1938, when Jack Laister was graduated as an Aeronautical Engineer, he could approach the business world with the confidence born of achievement seldom seen in a youngster of 24. Therefore, it was no surprise when a responsible position with an aircraft manufacturer took 25-year-old Jack Laister to California. And when, two years later, he accepted a job of still more importance in the Middle West, friends agreed that it was just what they had expected of him!

When gliders assumed their present tactical importance in the war, it seemed almost a foregone conclusion that Jack Laister would build them for our government.