

Nov. 26~ 1

Dear Mr. Marvin.

I have your letter of 19~ and am much pleased to learn that you deem the papers sent you interesting. Please keep them. They were compiled for you, and upon sending a copy to Mr. Wright he says that they agree with his records, but that "tests in the wind" No. 1, 2 & 3 were made with surfaces concaved $1/15^{\text{th}}$, and tests 4, 5 & 6 with surface trussed down to $1/19^{\text{th}}$. With the latter form the glides of Aug. 8~ & 9~ were made. He also thinks that in computing the glides we should allow the full speed of the wind for the A.M. of Aug. 8; $3/4$ thereof for the P.M. of same data, and $2/3$ for the P.M. Aug. 9 in consequence of the position of the observer with the Anemometer.

The important thing is to test the instrument. I send you by express both of my anemometers to be tested at my expense. The one used at Kitty Hawk was the Richards instrument, which we suspect of having registered 10 to 15 % too much. It had been cleaned, but not compared, before the Kitty Hawk experiments, by Mr. Gaertner formerly with Smithsonian Inst. And was compared with the Anemometer at Kitty Hawk towards the close of the experiments. I find now that it is out of order. Probably a grain of sand has got into the marks. Please have it cleaned at my expense.

As to the points raised by you, I would say:

1. Wright's weight is 145 lbs. Loaded machine 240 lbs.
2. We had no way of measuring the angle of the surfaces with the resultant wind. Can you tell me of a good way of doing so?
3. In consequence of its weight and size, the machine was not started by the operator's running. Two men grasped the and ran forward, releasing it as soon as a sustaining pressure was obtained. Photo No. 5 here enclosed was taken just after this moment. It shows an angle of about 2° with the hill, and as the latter slopes down 10° , the machine seems to have had a negative angle of 8° . Photo No. 4 (I have no duplicate) already sent you shows an angle of machine with horizon $-7\frac{1}{2}^{\circ}$ and of $+3\frac{1}{4}$ with the hill. Photo No. 9 herewith shows angle with horizon $-8\frac{1}{4}^{\circ}$ and with hill $+3^{\circ}$. I also send photo No. 10 which shows negative angle.

There is a question in my mind as to the best method for computing these glides. Lilienthal seems to have considered the wind pressure as the motive power, gravity being annihilated by the lift, and this makes calculation very simple, but it seems to me that there are three propelling forces, 1. gravity, 2. the initial velocity given which may be greater than resistance, and 3. the tangential force found by Lilienthal.

I know that as to the latter Obermayer says that "thus assumption is contrary to the laws of mechanics," but did he not omit to consider that the impinging wind speed is first decomposed into two velocities, one normal to the surface, and the other parallel therewith, which produces only friction on a plane, but may act as a small propelling component on an arched surface?

This is not to say, however, that Lilienthal's coefficients are correct. As I said in a former letter their accuracy has been invalidated by the glides of Mr. Wright (with the man prone) and the latter has been making experiments with small models to get a new set of co-efficients. I have not yet obtained the results.

I hope you will feel sufficient interest in the matter to analyze the forces in operation in the same masterful way as gave, for the first time, an account of the forces in operation on a kite.

I do not think the three last tests (4, 5, 6) of the machine at rest can be discarded. They should serve as a basis, after the Anemometer has been tested as to accuracy, and then the glides themselves ought to be capable of computation.

Yours truly
O. Chanute