Album, undated

Einn Bhreagh, near Baddeck, Nova Scotia . February 2, 1909. Messrs. Mauro, Cameron, Lewis & Massie, 620 F St., Washington, D.C. Gentlemen:

Many thanks for your telegram of the 30th ult.

Messrs. McCurdy, Baldwin and Curtiss are here and have gone over very carefully with me your specification on the Hammondsport work of the Aerial Experiment Association; and, in accordance with the recommendation contained in your note of January 19, we have taken up the claims seriatim to ascertain who had, and who had not, contributed the subject matter of each claim.

As the result of our investigation we have unanimously come to the following conclusions: —

(1) McCurdy, Baldwin, Curtiss, Selfridge and Bell have each contributed to the subject matter of some of the claims.

(2) Mr. F.W. Baldwin alone has contributed the subject matter of claims 1,2,3,4,5,6,7,8,9,10,11,13,14,15, and 16.

Under these circumstances we should be glad to have your opinion as to whether it would be better to make this a joint application in the names of all the members of the Aerial Experiment Association, including Lieut. Selfridge; or to make two applications, one in the name of Mr. F.W. Baldwin alone and the other a joint application.

We should be much obliged if, in deciding this matter, you would consult with Mr. Charles J. Bell who will act as 2 Trustee of the Association, and to whom, as such Trustee, the patents should be assigned.

Yours sincerely,

Jan. 11 1909 Mr. Baldwin : Did they actually make the same speed?

Douglas : Only difference was in getting under way. The machine would have to go further when it got its speed up.

Mr. Baldwin : I should think it would start if you flatten out your angle a little bit.

Douglas : If you flatten out your angle you would change your angle of the front control. If you get your propeller thrust it would give 192 lbs. that will drive your machine at a certain speed. If you have that, is there any advantage in reducing your load down to the smallest possible quantity or are you using just as much power.

Mr. Baldwin : 192 lbs. will keep you going. 192 lbs. are at a certain load, now reduce the load won't that 192 lbs. enable you to go at a reduced angle.

Douglas : What is the good of trying to cut down your weight if the machine will fly at that speed.

Mr. Bell : I would like to know what is the idea on the main proposition. You are driving the machine at a determined angle of attack and a determined velocity of 35 miles an hour. angle at 6°, will it require more power to drive a loaded machine or a weightless machine.

Mr. Baldwin : I should think a weightless machine would rise up and you would either have to bring her down by the front control. You are using more useful H. P. or the same H. P. because you are carrying less load. I don't see where you gain anything by the heavy machine. The other boy would go faster that is all or you might shift your weight forward.

Mr. Bell : That is, take the same power. There is your aeroplane 2 at a certain angle and moving with a certain velocity it would take the same propeller power to push that whether it is loaded or not.

Douglas : That is true:

Mr. Baldwin : I should think a less power would give you the same result at a less angle.

Mr. Bell : We have a fixed angle and a fixed velocity and a fixed direction and his proposition is that the same power would drive that whether it has a load or not, Is there any fallacy there?

Mr. Baldwin : I should think it would be going up or down unless you introduce something else in it. A certain speed fixed in every respect gives a certain lift. Reduce that lift and the thing goes up.

Douglas : Maintain that horizontal flight in some way. Now maintain it by your control.

Mr. Bell : If you do maintain by your control you put a load there.

Mr. Baldwin : That depends entirely on whether your bow control is so arranged that it necessitates a downway. Now say may be carried flat like the other. You don't introduce a down force at all.

Douglas : Supposing you are flying with one man, the load is different for the same point when he is flying with one man if his speed is the same or his angle the same he must hold his machine down some way in order to preserve the horizontal flight. You must let that control up a little bit and let your control go horizontal now and in both cases your are carrying the same load.

If the machine is going to be designed to carry one man you have an engine which will drive it at a certain speed. Now that propeller thrust will mean that you can put this plane at a certain angle, will mean that you can carry a certain load.

Mr. Baldwin : If you don't have to carry negative surfaces you gain. The assumption is then that Wright in making one man flight has his bow control at a certain angle which gives it a downward pressure equal to the weight of a man.

Mr. Bell : Now the practical application of it is here. That the flying machine now has a heavy engine that does not give satisfaction. The whole thing weigh t s how 860 lbs. Now Douglas finds that if he gets an ordinary automobile engine he has the same thrust and gets an engine that will work all day long.

Douglas : From working it out from theoretical conditions it will take 600 lbs. more theoretical lift 1423 you lift 860, difference about 600.

Mr. Baldwin : If your proposition is right you have a reaction of 600 lbs. on your bow control.

Douglas : You have a leverage.

Mr. Baldwin : No a direct reaction, a downward component equal to the difference. Well you must be spoiling it with your bow control. You could tell if you were spoiling it to the extent of 600 lbs.

Douglas: Unless that leverage differs there will pull that angle down and reduce the angle of incidence of your plane to such an extent that you are not getting that lift. Your speed is greater. This is what I mean if the *** your propeller thrust is constant no matter what your angle is. Now 4 if your propeller thrust is constant and your machine will fly at 35 miles an hour, that is all you want, why then you might just as well put a little more weight in your machine.

Mr. Baldwin : I don't see any evidence of excessive lift of 600 lbs. I don't think you have 600 lbs. or you would know it.

Douglas : You would know it if the angle maintain itself at a constant number of degrees but it does'nt. It will tend to go up.

Mr. Bell : What would the pressure on the front control be if calculated for the main surfaces. That is certain pressure on the upper surface of the front control could through leverage suppose you don't have that front control you had that pressure directly on the main surfaces. What would it be then. Suppose that the angle is fixed. Now according to our supposition he has a weight, as it were, on the main surfaces produced by leverage on the thing. Now what would 600 lbs. on the main surface be if compared with the leverage of the front control.

Douglas : In that case it would have to be 600 lbs. Mr. Baldwin The turning would only change the angle. It has to be the full weight.

Douglas : That is not what happens. What really happens it that the machine comes down, reduces its angle, the lift is different, we will have the same propeller thrust as we had before.

Gardiner : In reducing your angle you reduce the angle of the main surface too. It means you fly easier.

Douglas : You are lifting less load now. You reduce that angle to such an extent that your theoretical lift at that 5 angle is exactly what you are lifting — 860 lbs. You gain speed.

Mr. Baldwin : If you are in equilibrium your lift is equal to your weight. If you are only lifting 800 lbs. actually and the theoretical reaction on the surfaces gives you 1400 lbs. then you must have a downward reaction somewhere of 600 lbs.

Douglas : That is not the proposition. If your machine is going to fly at 6° at 35 miles an hour it is going to lift 1423 lbs and flying at 6° at that speed it will require 192 lbs. thrust. Now then put your 192 lbs. thrust in there you may as well carry a load in that machine, the propeller can't push the machine any faster, you have your thrust, your propeller and flying what is the good in letting your angle go up, you won't make anything more. You have your propeller pitch and have the same theoretical speed as before and then your angle won't come down until your theoretical lift is equal to your theoretical weight.

Mr. Baldwin : Provided you still have speed at your propellers to pick up. If that is the case, of course, that may contribute to keep you down. But granted that your 192 lbs. is a constant push then you can travel faster by reducing your angle.

Douglas : Now, supposing you want to travel at 6° and you wnat to put a little more weight in it and you get the push of your propeller to drive it at 6° then y ou might as well travel at your weight.

Mr. Baldwin : You could put 600 lbs on that machine and still fly it? I think the theoretical lift is too high or you would notice an awful tendency to go up in the air.

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Douglas : Not at all. You take a neutral position on the machine and you won't notice it. You get your bow control in a position and you —

Mr. Bell : Now as I understand the matter the propeller is capable of going 35 miles an hour. If the machine goes less than 35 miles an hour then you have aerial foam behind the thing. If it travels up you put it at such an angle that you would try to travel faster. You have a negative slip so that if you fly at the required angle at the required velocity; if you don't if you tend have your if you tend lead have your load you have to put on a load on the top to keep it there. If you fly at a less angle you get a useless demand to go faster which you cannot do.

Mr. Bedwin : I think that what Casey said there, you would not notice it. If you get that angle fixed at 6° you would notice it there and it with your bow control you would notice it.

Douglas : You are steering an automobile you don't look at the wheel to see which way you are steering. When you are flying the machine you don't look at the control to see what the angle is at.

Mr. Bell : Have you any photographs Douglas in the air which shows the angle of incidence of the front control.

Douglas : Yes, but an instantaneous photograph would not mean anything.

Mr. Baldwin : How much was the theoretical lift of the June Bug?

Douglas : ****so would not push down on the bow control. You would not get resistance on the bow control to pull her down if the balance was right.

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Mr. Bell : I think Douglas has given us something to think of. Would cut down machine horizontal now. If this comes down you would have to change the angle of the front control a little bit.

Mr. Bedwin : What brings it down in the first place.

Douglas : Instinctively. It is like an automobile, everyone knows which way the wheels are turning.

Mr. Bedwin : You have to get it down after all if you could maintain that 6° angle you would have to take it up.

Douglas : That will always have the same angle if the thing comes down it is the same thing. But what really happens when you have not your weight, what happens is this.

There is your machine, now your control has taken a neutral position there; if this comes down that way you have to change that angle there. You would not know it.

Mr. Bell : Now tell us about the automobile engine that you examined. First of all you have had a endurance test of the Curtiss engine.

Douglas : That was just a speed test. That was not a fair test of the engine and we had to start her off. We shut her off. What we ran it for was to see if it held its power right along. So we started her up and ran her for about two minutes. Took readings as we could to see if the revolutions held every minute. It registered 800 and then it dropped 50 and it held 750 right along. The only trouble was I had to keep changing the mixture all the time. That was 7 minutes of a total running. It was running all right but we had to shut it off because the water was boiling away.

There was no radiation of the head. The heat will be carried 8 off and the water will come back to the engine cool, when in the air. There has been no brake tests made.

With that same propeller thrust we could carry a little more weight all right. we looked at an automobile engine to see what they would do. We went over to an d automobile factory and saw an engine there. I did'nt see the brake test of it but the man said it 42 H.P. It weighed 392 lbs, as it was, then the fly-wheel and the pipes that would come off would make a weight for a flying machine of 325 lbs.

Mr. Bell : With everything, what would it weight.

Douglas : We would have the same in both cases. About one hundred pounds heavier and gives 42 H.P. It was a 6. That was just one engine, there are probably a lot better engines than that.

Mr. Bell : If you have 600 lbs. to spare in your lift, what about the turn of that.

Douglas : The radiation would be all right. One is tried and the other is not. That is why he wanted to take the engine up to the shop and give it a test.

Mr. Bedwin : I had a letter from Curtiss the other day and he said they shipped the Siver Dart and took the engine up to the shop to give it an endurance test and a brake test.

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In thinking over the necessities of a really practical aerodrome the idea grows upon me that it would not be wise to rely upon a single motor or a single propeller. Accidents are always liable to happen and a break-down of either motor or propeller will cause the aviator to descend at once and in a practical machine this might mean landing in the middle of a town or in the middle of a tree. He could not choose his place of descent.

But with two independent engines and two independent propellers, each worked by one of the engines, the doctrine of probabilities indicates that the chances of both propellers or both engines breaking down at the same time are very remote indeed; so that it would be practically certain that no accident could happen which would deprive the aviator entirely of motive power. In the vent of one engine or propeller being crippled he would not be obliged to descend at once but could choose a suitable place of landing. I have been urging upon Douglas and Casey the importance of considering this point in planning a practical aerodrome for army purposes.

This double engine, double propellered concern would be safer also from a military point of view. A shot could smash a propeller or an engine and yet not disable the machine; but with a single motor and a single propeller the engine and propeller constitute vital parts, and a single shot suitably placed could bring the machine down.

Two propellers, acting in the same central line and rotating in opposite directions, and two engines in which the revolving parts rotate in opposite directions, have the further advantage of neutralizing each others torque and 4 byroscopic action thus introducing

definite elements of safety. The breaking of one propeller too would not cause the machine to swerve to one side as in the case of the Wright Brothers' machine for both would be acting in the same central line.

Douglas and Casey have been considering the advisability of getting a thoroughly reliable commercial automobile engine. But they will be lucky if they can get one weighing less than 400 lbs. In view of the great weight it would probably be impracticable to use two of these engines on the same machine. I want them to discuss the feasibility of using two light engines having less power individually.

If one of these engines and one of the propellers should have sufficient power to keep the machine in the air the other represents surplus power which could be utilized to increase the speed; a point greatly in favor on a machine for military purposes. A.G.B.