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Canada's Air Position

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MR. CHAIRMAN AND GENTLEMEN:—I am indeed most grateful for this warm reception, and I wish to tell you how much I appreciate the honour that you are doing me in asking me to address your Canadian Club today.

The subject I have chosen is one in which I am naturally most keenly interested, and I am grateful to your Committee for the opportunity of giving to you, who are leaders of thought in this Country, my views for what they are worth on how we stand in aviation in Canada.

We stand at this moment on the threshold of the greatest development conceivable. This development must not in any way be looked upon as one purely affecting the flying industry, but also, both from the military and commercial angles its results will affect practically every section of our industrial life.

It is from many points to be regretted that the necessity for re-armament *should* exist, but from the point of view of the immediate future of the business life of this country, we are in a unique position, due to the fact that we are geographically the only logical part of our Empire in which to establish a potential arsenal for Great Britain.

It must also appear to France, owing to her close relationship to Great Britain, that this is the logical place for her to place her orders for munitions and aircraft.

Before dealing further with our present position and the necessity of full public support in the *near* future, it has occurred to me that there are many problems associated with this industry; problems dealing with the more or less simple angle of the scientific side, on which people would like to be enlightened, that I propose going into this briefly.

Since the Wright Brothers started flying in 1903, the development has been staggering in every direction. But the question arises: where will this development cease? What is the limit of the possibilities of aeronautical performance?

There are two factors which must be closely studied to determine where the limit of the aircraft is. They are the limitations of the engine and the limitations of the human body.

To take a simple analogy, there are obvious geographical limits to the swimming of a fish. It cannot swim at a higher level than the surface of the sea, nor lower than the ocean bed—a vertical range of some five miles. The air ocean in which the aeroplane has its home is, however, more complex. The lower three and one-half miles of ascent contain, by weight, half the whole atmosphere; the other half spreads itself upwards, almost indefinitely. It must be remembered that in reality the whole atmosphere is but a close-fitting turbulent sheath around the globe.

So although the aeroplane is less restricted in its movements than is the fish, there is no doubt that, so long as it depends on the presence of air, flying must be limited to a thin shell of freedom surrounding an imprisoned globe. This is the most obvious of the limitations to flight.

The great point in common between the engine and the pilot is that they both breathe the same necessary oxygen of the air, which although free, is hard to obtain in sufficient quantities at great heights.

While the human body is affected much the same way as the engine, it is, never the less, more adaptable. For instance, although the body is accustomed to live at sea level or thereabouts, it is possible for robust individuals who are not being required to exert themselves, to breathe at as great an altitude as well over 20,000 feet.

When I ask, therefore, where is the limit in height, this cannot yet be determined because aeroplanes have been flown nearly 60,000 feet by the use of specially built suits that maintain an even air pressure on the body. Also trips, as you know, have been made in balloons through the stratosphere even higher, and with the prospect of new

refinements in present equipment and new inventions, so far as the human being is concerned, it is difficult to forecast to what height he can go.

The engine, however, is another matter. Oxygen is her life blood as much, as it is for the pilot. It is equally necessary to feed it to her artificially. Her consumption of oxygen at heights is tremendous and we find a limit here due to the fact that methods and equipment to feed oxygen in such quantities to the engine means a fatal weight which cannot be carried above certain heights.

New metal alloys, stronger and lighter than their predecessors, will continue to be found, but in spite of that, at any given time we will find that, so far as height is concerned, there will be a limit, and the limit will arise from the requirements of the engine and not from those of the human body.

While still on this comparison, there is nevertheless one aspect of the struggle to achieve the utmost in which the human body is very far from being the leader, and that is the speed of response. In an emergency the delay between the pilot's mental response and physical reaction is slower than the automatic action of an aeroplane at present high speeds. With still greater speeds this vital difference must obviously increase.

Now as to speed. The development of speed has not been stagnant. In the last few years the speed records have risen to nearly four hundred and fifty miles per hour. Can this increase go on? This is a mechanical question because there is no reason to believe that the human body will not be able to stand any speed.

To rapid changes of speed, however, the body is exceedingly sensitive, and this is why the problem of manoeuvring at these new high speeds is so very important.

When one realizes how closely all aeroplane design margins are cut, one sees how tremendous is the barrage put up by Nature against further advances in this direction. To all this the human body is quite insensitive; the boundary is one set by the machine itself and by the medium in which it flies, and not by human limitation.

The question however of manoeuvring at high speeds and of rapid changing of speeds is one where the human element meets its Waterloo. And this same point applies almost equally to the design of the machine itself. It is not generally realized that the greatest loads that come on an aeroplane arise not in steady flight, even at the highest speeds, but in the manoeuvring of the craft. With limited strengths there must therefore be limited manoeuvres. Nature sets a barrier here.

Now as to size. With the knowledge at our disposal no man dare forecast where this limit will be met.

Range is the next thing to be considered, and there are several factors working in favour of a rapid increase: the increasing improvement in strength to weight ratio of new materials, and the increasing economy of the engines due to improved fuels and methods of construction. As a result ranges are rising rapidly, and with the limited dimensions of the earth there is every reason to expect that before long every point on its surface will be able to be reached in a single flight.

In the last twenty years the range for single flights has increased from one thousand to over six thousand miles, and it is still rising.

What I have been discussing is purely in relation to heavier-than-air craft: of airships I have said nothing. But they are incapable of high performance except in range, and if the aeroplane can get anywhere in the world, airships can do no more. Moreover, for civil use, hydrogen is impossible—the fire risk is too great—and helium is most unevenly distributed, costly to obtain even at the well, and loses vitally in weight carrying capacity.

Such are Nature's boundaries to human flight.

All this leads us to the question of how vital aviation is to Canada at this moment.

The importance of Civil Aviation has of course been very much overshadowed this year by the European War danger. We in Canada have our own problems of National Defence which require looking after, and since the last War we have not realized until recently how vitally we need this defence.

I think today we are fully awake to the necessity for immediate action. The spirit of Canada is eminently British. All thinking men and women of our Country realize that our destiny lies with the British Empire. She has long protected us. We, an exporting Country, rely entirely upon her Navy to protect our great trade routes, and we must realize that the British Navy is still the bulwark of our whole Empire. For there is danger lest, with Europe so much in our minds, we forget it is an all important fact that we are an Oceanic Empire. That, if ocean communications are cut, the Empire comes to an end.

Recently we have been visited in this country by several Air Missions from the British Government, for the purpose of working out plans whereby Canadians will make British machines for them. I feel they should have done this some years ago before the present emergency reached such a point of crisis—but that is neither here nor there. They have been here, and they are placing orders, as I understand, to the fullest extent that our young industry in Canada can handle without suffering from undue indigestion; this possibility being due, I regret to say, to the lack of skilled labour for this particular and specialized industry.

Young Canadians are flocking to England to enlist in the Royal Air Force, and are being received with open arms. But negotiations are also well under way, and will I believe be carried through shortly, whereby Canadian, and possibly English pilots as well, will be trained in schools in Canada under the supervision of the Royal Canadian Air Force for the Royal Air Force.

This will call for further, and higher class equipment, than our Air Force has as yet received, and will be of distinct advantage to this Country commercially as all divisions of industry will be affected, and what is more important still, there is every reason to believe that this expansion of industry should be permanent.

It all means that a great development in flying is bound to take place immediately in this Country—a development that will stimulate and help all Canadian industry.

We who are in Aviation carry a heavy responsibility on our shoulders for, while we have been drawing the world closer together in peace, we have stripped the armour from every nation in war. It is no longer possible to shield the heart of a country with its army. An army can no more stop an air attack than a suit of mail can stop a rifle bullet.

Aviation has, I believe, created the most fundamental change ever made in war. It has abolished what we call general warfare. It has turned defence into attack. We can no longer protect our families with an army.

So I now come to that vital question of defence. For some reason or other, people will not realize that the question of defence is one that requires certainly not only lots of money but also, another equally important factor, time. It takes time to train personnel, but it takes long preparation and a great deal more time to organize the forces to produce the necessary equipment to train this personnel. I hope that with this factor of time in mind, a loyal Canada will see that the necessary funds are available at once so that unpreparedness will not leave us, as part of this Empire, open to further humiliation.

Preparedness now is more essential than in 1914, for the Great War worked up to a climax. Now we must face the possibility that the climax will come at the beginning, and we must be sure that we can stand the initial assault.

You ask—Where does all this expenditure for defence purposes, and all this money that is going to be spent on armaments, lead us? I can give you the answer. It is that without security we can get nowhere, and without proper protection and defence we cannot get that security for ourselves.

These measures cost money, much as insurance costs money, but, not only for ourselves, but for our children and the future of our Country, we *must* have security, and we can only get it through spending the money for adequate defence.

I am not one of those who believe that war is inevitable, but wiser heads than mine seem to feel that it is a definite possibility. But any question of rearmament in this Coun-

try or in the Empire raises no distrust in other Nations, because all the world knows our arms will never be used for aggressive purposes, and that the Empire is making herself strong in order that she herself may be strong and thus be an effective friend of peace.

In the development of our Air Force in particular, and the training of pilots for the Royal Air Force, we will move into a new field of training; that is, much faster machines, much finer equipment, requiring more up-to-date and more *dangerous* methods of training.

A great many questions have been asked as to why the Royal Air Force has so many fatal casualties. The answer is a simple one. You cannot make omelettes without breaking eggs. And it is impossible to create an effective Air Arm without taking risks, and such casualties are the unavoidable result.

It is impossible, and will be in Canada, to train an effective Air Force capable of operating under War conditions, without accidents occurring. But there again comes the price of security.

In regard to the matter of this training, we are fortunate indeed that at this time we have a Department of National Defence fully awake to the necessity of organizing along the up-to-date lines required to meet these new war conditions and, *given* full public support and the necessary appropriations, I am *certain* the most efficient results will be produced.

It is surely unnecessary for me to state what must be obvious to all; that our Air Force is being expanded as rapidly as money and circumstances allow.

While it is hardly fair to judge our air strength by the present strength and equipment of our Air Force itself, one is apt to forget that it could be considerably augmented from somewhat unexpected sources. The so-called bush operations in the northern mining area have developed a peculiarly skilled type of pilot, equal to any emergency. Trans-Canada Air Lines will also develop skilled pilots accustomed to the fastest and most up-to-date types of aircraft. Here we have a potential reserve of pilots whose

combined experience covers the entire field of aviation. Also such machines as Trans-Canada Air Lines are being equipped with can readily be converted into first line bombers.

The crisis that so steadily crept up on us in the last few months appeared to be over at the end of September by what might almost be termed "An Act of God". Events and rumours in the last few weeks, however, prove to us that we are still on very treacherous ground. Grateful as we are for this breathing spell even if it proves not to be permanent, we must not lose sight of the fact that we are still in danger.

We are living in a topsy-turvy world and from day to day we do not know what may happen. It is a world in which the creeds that we were taught are no longer believed. The Shiboleths in which we were brought up have now become myths. The sacred things that we learned at our mother's knee are now forgotten, and we face the events of each day, almost with dread. And what do we see around us? Democracy, which is the great heritage of the British race, is being menaced on all sides. Dictatorships have grown up over night in countries, which from the standpoint of rivalry to our Empire, we once never considered. This Empire which we love, and which we have always been ready to defend, has been, within the last few months, menaced by nations that a few years ago were insignificant powers. For we must remember that the danger of Dictatorships is—if they are going to break down, they first break out.

That lesson as we read it is that as long as a dictator administers at home he is safe, and that when he seeks to dominate supreme abroad, he is doomed to be destroyed. Germany appears to be united, but the unity surely springs from the liberty which Hitler permits the Germans to exercise—the liberty to do exactly as he pleases.

Therefore, there is a great lesson for all of us in the present situation of the British Commonwealth of Nations. Modern science and modern inventions have rendered it impossible for England to adopt the stand of ages past and be proud of the statement that she could muddle through.

It is not now a question of England muddling through. It is a question of England and her sister Nations in the British Commonwealth so adapting themselves to the existing situation that the present will be made as glorious as the past, and the future be made secure for the generations still to come.

This Empire has weathered worse anxieties than this. We hear much of our rearmaments, but there is something even more important than rearmament, and that is the spirit behind rearmament. In this respect nobody should make the mistake of thinking the spirit of tenacity of the people of this country has in any way changed in recent years.

We live in an age of dictatorship. The British Empire, U.S.A. and France are the last refuge of freedom of thought and freedom of action on the part of the individual. If, to preserve that, it may mean more sacrifices on the part of our people, then I call upon all men who believe that the freedom of the individual is the most precious heritage of the British race, to assist whatsoever government may be in power to protect that heritage. There is a school of thought in this Dominion which, taking refuge under the wings of the Munroe Doctrine, says that Canada will never be attacked by a foreign power while the United States are on this continent. It is true, gentlemen, that we are Americans because we live on the American continent. It is also true that we are Canadians because we are Canadian citizens. *But* it is true, first, last, and all the time that we are citizens of the British Commonwealth of Nations.

I, personally, feel that any policy of isolation for our country is a most short-sighted one; that the days when isolation was a practical policy have gone. History proves that it has been gone more than twenty years. The United States were honestly convinced during the earlier part of the last war that it was none of their business, that there was no conceivable reason for *them*, a self-contained nation, to mix up in a brawl three thousand miles away.

As you know, they found out how totally wrong was their attitude. Unprepared for a war of such great dimensions, they were therefore equally unprepared to guard their

own neutrality, and neutrality requires protection as much as a nation at war requires defence.

A lot is said about there being no necessity to keep any real armed force in Canada. Review for a moment our peculiar position. We are part and parcel of the British Empire. We are closely related to and in daily contact with the States. We are, in fact, the proper link between the two great powers who honestly will sacrifice anything for peace.

We are faced with two alternatives. Either we can say to ourselves: 'Why should we build up a defence force when we are so fortunate as to be protected the world over by Great Britain, and in the event of trouble on this continent, by the United States as well?' Or we can say: 'Are we, a young and vigorous nation, willing to accept protection from Great Britain and the United States, and be unable to offer them our aid if the need should arise?'

Canada would be the strategic point for the invasion of the United States by a foreign power. But a Canada able to protect herself and repel such an invasion would be an invaluable ally to the United States.

I am reminded that this country, due to its diverse population, has been rent in twain during several elections in the last forty years over the question of contribution to Empire defence.

Governments have differed on that question, but I say today that for the future, it is not a question of politics, it is not a question of race against race; it is higher than that. It is above and beyond the mere question of party politics. It is the question of the preservation of the most precious thing that has been given to this country by the two great races which govern it—*freedom* inherited from those who govern the greatest Empire in the world and from those who made it possible to make Britain the most democratic nation of her time.

There is in my mind a singular significance in the fact, that the people of Canada for the first time in twenty years have just recently awakened to the *thought* of national defence. Our habit has been to treat this matter as a waste-

ful extravagance and not a necessity. As late as a year ago the average Canadian felt that the troubles of the other side of the world were not his affair nor his danger. World events in the last few months have shaken our complacency on this point, and have steered us to the realization of our own particular vulnerability. We have so long sheltered ourselves under that glorious flag the Union Jack that in some ways I feel we have become spoilt children—asking all and giving little.

We are a nation arduously working on our export trade, a nation controlling some of the greatest transportation systems ever built up throughout the whole of the world, and we forget that this—the life blood of our nation—our export trade—is something that we do little or nothing to protect—something that we rely on our motherland to protect. Where, with our great trade routes, would we find ourselves without the protection of Great Britain? In other words, if the British Empire has any obligations to Canada, it follows as a matter of course that Canada has obligations to that Empire. This very simple and obvious fact is sometimes lost sight of. Concerning what those obligations are on both sides, there may be wide differences of opinion but it is surely clear that they *do* exist.

I am sure I am expressing your opinion when I say that we feel our sacrifice in the last War was not unavailing. If we had not made every sacrifice in those perilous times, to enable the Allies to achieve a victory over those who threatened the freedom of the world, there would be now no British Empire and the world would be in a worse position than it is today. The British Empire has stood for generations as the policeman of the world; it has been able, on many occasions to save peace—sometimes by diplomacy, but more often because its might was so feared by all other nations and powers.

Since the end of the War in 1918, England has striven in every way to lead the world to disarmament. Regarding arming as a definite danger to world peace she was sincere, but a lot of the rest of the world evidently was not.

I am afraid that integrity of purpose has, in the last few years put our Empire in a difficult position. It is

possible that in September Britain had to resort to diplomacy because she and her Allies needed time to become strong enough to come to an issue with the dictators. This must never happen again. The stronger Britain is, the greater is the certainty of peace.

And so, gentlemen, as to the future of Canada in the British Commonwealth of Nations, everything depends on ourselves. No one can tell what the future holds but what we *can* do and must do, is to build our house on a rock of integrity and strength.

In conclusion there is real danger of a fight ahead of us, and Canada will be in this fight because she cannot remain out of it, and because she will be battling, not in defence of the United Kingdom alone, nor in the general interests of the British Empire, but for her own survival; and for this she must be prepared.