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LOST HORIZONS

The British Government and Civil Aviation
Between the Wars 1919-1939

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History Department
McGill University, Montréal
March 1994

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The British Government and Civil Aviation
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TABLE OF CONTENTS

Abstract.....	i
Acknowledgements.....	ii
Dedication.....	iii
Introduction.....	1
General Review of Background Literature.....	4
1. Without Let or Hinderance.....	9
2. Step-Child.....	18
3. European Skies 1924-1934.....	36
4. Imperial Skies 1924-1934. The Shadow of Empire.....	53
5. Internal Routes 1919-1934.....	68
6. Belated Awakenings.....	75
7. The Makers.....	90
Conclusion.....	112
Notes and References.....	118
Bibliography.....	151

Abstract

In the inter-war period Great Britain lost its pre-eminence in aviation. The new industries centered on civil aviation were not appropriately nurtured. The roots of this decline were in policies struck for military considerations in the pre 1914 period. The emergent institution of the war, the Air Ministry, continued the military priority. Civil Aviation was controlled by an essentially military institution. In the immediate post-war period airline development was inadequately subsidized. The government's chosen instrument, Imperial Airways, failed to nurture civil aviation development. Emergent national aspirations within the Empire and hostile and indifferent governments without frustrated airline route growth. Equally hampered by poor government stewardship was the manufacturing aspect of aviation.

Sommaire

C'est pendant l'entre-deux-guerres que la Grande-Bretagne a perdu sa prééminence dans le domaine de l'aviation, les nouvelles industries qui se concentraient sur l'aviation civile n'ayant pas été suffisamment encouragées. Les politiques adoptées pour des raisons militaires avant 1914 sont à l'origine de ce déclin. Une nouvelle institution créée à cause de la guerre, le ministère de l'Air (Air Ministry), a continué à accorder la priorité à l'aspect militaire. L'aviation civile était donc régie par une institution à vocation essentiellement militaire. Pendant la période qui a immédiatement suivi la guerre, le développement des lignes aériennes a été insuffisamment subventionné par le gouvernement. En effet, Imperial Airways, l'organisme de choix du gouvernement, n'encourageait pas le développement d'une aviation civile. Les nouvelles aspirations nationalistes à l'intérieur de l'Empire britannique ainsi que des gouvernements hostiles ou indifférents à l'extérieur de cet Empire n'ont pas permis la croissance d'une ligne aérienne. En outre, l'aviation a été entravée sur le plan de la fabrication par un encadrement médiocre de la part du gouvernement.

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Finally I wish to thank my wife for allowing this intrusion into her life and time.

For Róbert Vogel

INTRODUCTION

This paper examines British civil aviation between the two World Wars. The fact that the British possessed the greatest aviation industry and capability in the world in 1919 yet by 1939 had lost pre-eminence in civil aviation demands explanation. The investigation becomes a study of the response of a government to a new technology. It can be further presented that to study a specific focus, in this instance civil aviation, is to examine a microcosm of the larger whole. All governments must respond to stress and change. The response of the British government to the potential of civil aviation was important. The growth of aviation as an industry coincides almost exactly with the twentieth century. British civil aviation, particularly commercial aviation, began in 1919. Thus to study this development is to give scrutiny to the British government at a time of great metamorphosis. In 1900 Britain was an Imperial power of world stature. By 1939 it was struggling to maintain that stature. An examination of civil aviation helps to explain that change. That change was brought about by responses to a series of varied problems. These problems were, in some cases, unique to the British experience. Others were common to all states engaged in aerial commerce. The response of His Majesty's Government to these problems becomes the body of this paper.

Geography presented a particular challenge to British aviation. Great Britain, an island, was separated from its Imperial territories. Further, that island hosted some of the worst flying weather in Europe. To reach their Empire, the British had to acquire passage across the airspace of other European states. The diplomatic environment regulating that passage had been largely created by the British insistence on a stance of sovereignty of national airspace in the early pre-war years of the century.

Another obstacle was created by the war itself. The military usurpation of aviation, a natural enough circumstance in time of war, was to become

problematical in the very immediate post-war period. This was precisely the instance when commercial aviation took flight. The response of the British government to that issue became of paramount importance. Another critical early response was how, and by how much, that government was willing to support this new commercial phenomena. The subsidy issue was ever present.

The industrial aspect of aviation created another dilemma in the immediate post-war period. A huge aviation industrial capacity suddenly lost its market. How that problem was addressed was to prove unique and significant.

Another unique institution was Imperial Airways. This quasi-commercial entity dominated the period and, at times, represented the only presence of British commercial aviation. Its problematic progress became the fulcrum of British civil aviation policy.

The efforts of diplomacy in establishing air routes, both within and without the Empire, quickly absorbs much of this examination. Air diplomacy very rapidly assumed a perverse nature that never abated.

The technological problems generated by this, a very technological area, warrant much scrutiny. It was this area that proved to be the most obvious, if not the greatest, failing of the effort of the British in commercial aviation. The problems incurred in producing state-of-the-art, world-class airliners were never completely addressed. How such a challenge eluded the British manufacturers, who were, after all, paramount in 1919, must be pursued.

The last great thread in the perplex tapestry was that of the personalities involved. At once the most enigmatic yet obvious problem, it never is far from any facet of the examination. The influence, positive and otherwise, of key

people readily becomes very important. The relatively small circle of men who influenced an equally limited enterprise must bear considerable responsibility for its shortcomings.

Some dates and periods of time quickly become convenient to build upon. The First World War neatly offers a division of the earliest period into two sections - 1900-1914 and the war years. The half decade 1919-1924 is a useful division. The decade 1924-1934 neatly dovetails into many significant events. The final five years to 1939 are another facile package. As well as this chronological ordering some aspects are considered by subject. Hence European and Empire routes in the 1924-1934 period are examined separately. The growth of the internal airlines is given its own chapter as is the manufacturing aspect.

Whenever possible, and practical, nomenclature and word usage of the subject and period of study will be used. Hence such terms as aerial, aeroplane and aeronautics and their derivatives will be cited. In a like manner the use of the term "service" for military aviation will prevail. The usage of the term civil aviation can be considered to mean commercial aviation in most cases. The other facets of civil aviation, private and sport flying, will be largely ignored. In a like manner airships will only enter the discussion when appropriate.

To be consistent with references, Imperial measurements will be used. When appropriate and convenient, both Imperial and S.I. units will be given.

GENERAL REVIEW OF BACKGROUND LITERATURE

The literature pertaining to this topic is diverse. Prime sources published by His Majesty's Government utilized are principally Cabinet and Command documents and the annual Air Estimates. The Cabinet documentation used centres on two reports. The 1927 Cunliffe-Lister evaluation¹ and the 1933 Geddes summation of the Future of Commercial Aviation² represent major nodes in the study. These two, supported by Cabinet documentation surrounding them, are of principal importance.

From a very comprehensive catalogue of Command Documents pertaining to Civil Aviation, fourteen were cited. Of these, seven are paramount. The 1918 report of the Civil Aerial Transport Committee³ is fundamental. It is the cornerstone document of civil aviation. The International Convention for the Regulation International Air Navigation⁴ (The Charter for I.C.A.N.) of 1919 is another principal document. It established the parameters of international air transport and delineated, quite literally, the rules of passage. Equally significant is the report of the Hambling Committee of 1923 dealing with subsidies.⁵ The Weir Report of 1920⁶ is also necessary to develop a comprehension of the background to the subsidy issue. These early documents give an understanding of the nature of civil and commercial aviation and outline the precepts of government policies towards it. The charter for Imperial Airways is important for establishing the relationship of this entity to government.⁷

Two reports of the 1930's that addressed the need to reform were the Maybury and Cadman Reports. The Maybury Report of 1937⁸ dealt with the lack of domestic airlines. The overall need for reform was dealt with by the Cadman Report of 1938.⁹ These two documents, coming late in the period of

investigation, are critical. These, augmented by a wealth of other Command Papers give the foundation of this investigation.

The annual Air Estimates¹⁰ for the period are a prime source of financial data. They provide a ready indicator of the amount, or lack of, government financial support in any given year. They are also useful for showing the consideration given to civil aviation as compared to its military sibling.

Secondary Sources tend to divide themselves into categories. One genre for consideration is biographical material pertaining to the participants. In such a group F.H. Sykes' autobiography From Many Angles¹¹ assumes a large importance. Weir's biography, Architect of Air Power¹², Hoare's Empire of the Air¹³ and Thomson's Air Facts and Problems¹⁴ bring the considerations of three Air Ministers to the discussion. P.R.C. Grove's Behind The Smoke Screen¹⁵ is useful as a documentation of some of the machinations of the Air Ministry, particularly at the Versailles deliberations. Boyle's Trenchard¹⁶, MacMillan's Sir Sefton Brancker¹⁷ and F.H. Brackley's compilation of her husband's diaries, Brackles¹⁸ represent a trio of works about participants in the events.

At another level, Beaverbrook's Men and Power¹⁹ and Owen's work on Lloyd George Tempestuous Journey²⁰ offer insight into power struggles at a higher altitude. In the same vein, Gilbert's Winston Churchill (Vol. IV)²¹ and Raskill's Hankey: Man of Secrets²² bring considerable expertise to the investigation. Later in the paper Lord Reith's Into the Wind²³ becomes useful.

Monographs that refine the focus were relied upon. International, diplomatic aspects of aviation were well served by Tomb's early work International Organization in European Air Transport.²⁴ This was reinforced by the more recent Peaceful Air Warfare²⁵ of A. Dobson. Dobson's work focuses

on the British-U.S. relationship and is a very comprehensive work that proved useful throughout. The early stage of aviation history in Britain is well serviced by Gollin's The Impact of Air Power on the British People and their Government 1909-14.²⁶

The period of the First World War and immediately thereafter is rich in publication. H.A. Jones' The War in the Air, Vol. VI²⁷ is ever valuable. Two newer works are good for determining the threads that lead to the command structures of the infant R.A.F. They are M. Cooper's The Birth of Independent Air Power²⁸ and J. James' The Paladins.²⁹ As its subtitle A Social History of the R.A.F. up to the Outbreak of World War II would imply, it is primarily concerned with service (military) aviation. It does however give a good description of the relationship of civil aviation to its military sibling and offers a thorough examination of F.H. Sykes' role in both.

The Air Ministry's birth is chronicled by J.M. Spaight's The Beginnings of Organized Air Power³⁰ and C.G. Grey's A History of the Air Ministry.³¹ Consideration must be given to the fact that Grey was an avowed critic of the Ministry and primarily a journalist. These are well augmented by H. Montgomery-Hydes' British Air Policy Between the Wars.³²

The immediate post war period with its emphasis on the subsidy issue is well served by a singular source. M.D. Tolles' study, A History of French Subsidies to Commercial Aviation³³ is indispensable. Despite its title it gives a comprehensive look at both the German and British models as well as the French.

Prominent texts that deal with aircraft development are Brook's standard reference The Modern Airliner³⁴, Munson's Airliners³⁵ and A.J. Jackson's exhaustive, three-volume British Civil Aircraft.³⁶

The refined field of Airline history is aptly represented by two historians of the field. R.E.G. Davies' A History of the World's Airlines³⁷ stands as a definitive study. With his text Britain's Imperial Air Routes³⁸ another aviation historian, R. Higham is consulted. Other complementary texts and articles by this author are referred to.

Aircraft manufacturing and development generated another genre of reference. Two standard works, Dyos and Aldcroft's British Transport³⁹ and Bagwell's The Transport Revolution From 1770⁴⁰ are cited. A more specific reference is P. King's Knights of the Air⁴¹ that deals with the history of British aircraft manufacturing.

Whenever possible the writings of the participants were referred to. Their contributions in articles were sought out. Offered as examples of this refined focus are two works by an Imperial Airways general manager, F. Burchall. His two contemporary descriptions of the tribulations of Air diplomacy "The Politics of International Air Routes" and "The Political Aspect of Commercial Air Routes"⁴² enunciate well the frustration in developing international commercial aviation. A similar source was F. Shelmerdine's "Air Transport in Great Britain - Some Problems and Needs".⁴³ Shelmerdine was the Director of Civil Aviation writing in the era of the Maybury Report and brings a pertinent focus to the investigation. Articles were also utilized to enable the expertise of researchers of a specific area of study to be considered. Thus P. Fearon's contributions to aircraft production "The Vicissitudes of a British Aircraft Company: Handley Page Ltd. Between the Wars" and "The British Airframe Industry and the State 1918-35"⁴⁴ were consulted.

Other examples of concentration are three articles that converge on British civil aviation in Africa. R. McCormack's "Man with a Mission: Oswald Pirow and South African Airways 1933-1939", "Airlines and Empires: Great

Britain and the 'Scramble for Africa', 1919-1939 and "Missed Opportunities: Winston Churchill, The Air Ministry, and Africa, 1919-1921" offered consultation to an area of investigation not over explored.⁴⁵

Whenever a general reference to the period was needed, an excellent guide and mentor was found in Mowat's Britain Between the Wars 1918-1940.⁴⁶ This by no means represents all of the sources cited and consulted. A more comprehensive Bibliography is included with this paper.

CHAPTER 1

WITHOUT LET OR HINDERANCE

Commercial Aviation is an exploitation of the air. That potential readily became the focus of the international diplomatic sphere. By 1919 there was in place a body of international discussion that centred on a series of negotiations.

Between 1899 and 1910 a debate had emerged at various international gatherings concerning aerial navigation.¹ The fulcrum of British policy was a stance that reflected its Naval pre-eminence. It held that its airspace was sovereign. An aggressive assertion of this doctrine at the 1910 Paris International Aviation Conference had managed to dislocate a "Freedom of the Skies" position that was, in fact, the majority position.² This was a significant development as it predisposed all future international negotiations to reflect a sanctity of national airspace. It also ensured that international aerial navigation would be an affair of piecemeal negotiation with every sovereign state over which any international airline wished to fly.

This stance had been largely generated by a military consideration. The C.I.D. secretariat, wary of German airship prowess, had strongly influenced adoption of the position.³ Thus early, very early, a trend of military influence over civil aviation in Britain had been established.

This doctrine became clear in subsequent legislation. Between 1910 and 1913 an Aerial Navigation Act went through various metamorphosis to emerge in 1913.⁴ This bill clearly embodies the sovereignty of British airspace as its prime focus.⁵

When the technological advances to aviation generated by the First World War made it obvious that international commercial aviation was a distinct possibility, this doctrine became an integral part of British policy. The potential for commercial aviation was recognized, and acted upon, in 1917.

On May 22, 1917, The Civil Aerial Transport Committee was given the primary mandate of considering:

"the steps which should be taken with a view to the development and regulation after the War of aviation for civil and commercial purposes from a domestic, and imperial, and an international standpoint."⁶

The final report of this body forms a remarkable document. It can be looked upon as the blueprint for British civil aviation. Its list of contributors reads as a glossary of those who were to contribute substantially to aviation. They include Brancker, Holt-Thomas, Sopwith and Joynson Hicks. Among them was the futurist H.G. Wells. In their considerations of the diplomatic needs they clearly reflect the sovereignty stance expressed at the 1910 Convention. Much of the documentation from the Paris Conference was considered for the report. The sub-committee examining the international aspect of civil aviation used the 1910 British draft as a principal resource.⁷ It is not surprising to find that its conclusions echoed the 1910 position. The committee recognized that:

"the doctrine of State sovereignty in the air space 'usque ad coelum' is in the main a military one. Military considerations dictated the opposition of the British delegates to the proposals pressed by the German representatives at the Conference in Paris in 1910 and we understand that the views of the Foreign Office and the naval and military advisors to the Crown are unchanged. To give foreign aircraft, as a matter of acknowledged international law, the right to fly at will over the territory of the state would give them undesirable opportunity for espionage, and generally to limit the elementary right of a state

to take each and every measure which it considers necessary for self preservation."⁸

This endorsement of current orthodoxy was moderated by other considerations. Civil, particularly commercial, aviation does operate within other parameters. International commercial aviation could not function without some, even limited, access to foreign airspace. The Committee introduced a compromise position. While agreeing that:

"...a state must assert some rights of sovereignty in the air space over its territories",

it also suggested that:

"state sovereignty should be asserted only up to some prescribed level of altitude, above which the flight of aircraft would still be practicable, and that above that altitude the air should be free to all, just as the high seas outside the limits of territorial waters are free to all...

From the purely business point of view the prospects of civil aerial transport in times of peace (this) view has much to recommend it. The commercial advantage of air traffic are to be expected mainly from rapid uninterrupted flights over long distances, and these advantages would be clearly best secured if aircraft above a certain altitude were allowed to fly freely in any direction without let or hindrance imposed upon them by the municipal legislation of the states over whose territories they might pass."⁹

Thus a commercial perspective was presented in a compromise position that recognized both doctrines. However plausible or desirable the position may have seemed it did not penetrate the accepted stance of sovereignty. Despite the obvious analogy to territorial waters and freedom of the high seas, the position was not embraced as policy. To continue the analogy - the maritime was to give way to the naval. The report firmly concludes that:

"the doctrine of State sovereignty in the air space 'usque ad coelum' on which this country acted before the war...is sound, and should be adopted as the basis alike of international agreement and of municipal legislation."¹⁰

The formal British policy at the inception of international civil aviation was to be sovereignty of air space. However, the seed of heresy did flower in a significant minority report.

Frank Pick emerges as an interesting, and very astute, member of the committee. He was at that time Managing Director of the London Underground.¹¹ His minority report was to prove to be prophetic and comprehensive. Pick invokes the yet to be formed League of Nations when he calls for an:

"international code of laws, with rules and regulations to follow, to be applied openly and equally among all nations upon some mutually enforceable sanction".¹²

Such a vision was not compatible with a firm policy of state sovereignty. Pick also enunciated a clear concept of the potential obstacles that adherence to such a doctrine could create. He very accurately pointed out that:

"The very scattered and discontinuous character of the countries constituting the British Empire becomes an obstacle to the development of aerial communication. Other nations bar the access to the great land masses associated to form the British Empire. A clear right of way free from restriction across France and Italy and Spain is essential to effective progress in inter-colonial air communications. Our self-interest, therefore, as a great Power, lies towards an international settlement of air sovereignty...our interest as a commercial and industrial people must lie in same direction. The right to pass across other national territory without let or hinderance...and generally the absence of the apparatus for hampering or artificially routing trade are all wanted".¹³

Pick's critical evaluation does not stop here but continues to deal with other aspects that will be returned to later in this examination.

The end of the war brought the debate back to the international stage at the aviation negotiations that become part of the larger Peace Treaty deliberations. The British delegates to the Aeronautical Commission of the Paris Peace Conference included Frederick H. Sykes, newly appointed as Controller-General of Civil Aviation. Sykes was clear minded in his mandate. He saw his duty as the need to:

"extend the air supremacy which we had gained in the war to civil flying...(and) to secure a universal recognition to the greatest possible degree of the right of aircraft to fly over foreign territories."¹⁴

Here can be seen a recognition of civil aviation's need to access foreign airspace.

Sykes came prepared with a draft convention that reflected the desire to allow for access. The proposed first article states that:

"the aircraft of a contracting State may fly freely into and over the territories of other contracting States provided they comply with the regulations laid down by the latter."¹⁵

This British proposal moves closer to a "freedom" concept. It was not to become international law. What emerged as the International Air Navigation Convention was a reaffirmation of the sovereignty doctrine. The Convention's Article 1 is quite clear in stating that:

"The contracting States recognize that every State has complete and exclusive sovereignty in the airspace above its territory and territorial waters."¹⁶

This confirmation was to exert a major influence upon international civil aviation. The Convention did make some attempts at compromise. The result was Article 15.

It is in the interpretation of Article 15 that the major impediment to international civil aviation comes to light. The Article states that:

"Every aircraft of a contracting State has the right to cross another State without landing. In this case it shall follow the route fixed by the State over which the flight takes place...The establishment of international airways shall be subject to the consent of the States flown over."¹⁷

The British attempted to have the last statement regarding consent for airways to be removed. Their argument was based on the position that contracting states already had the right to fly over each other's territory.¹⁸ Their understanding of this article was that each state should designate lanes of passage, the "airways" cited, across its territory. Once these were established, including the potential development of navigational aides and aerodromes, all contracting states had the right to avail themselves of these facilities.¹⁹ This was to prove to be a very unrealistic interpretation.

The opposing view, invariably dictated by national chauvinism, was loaded with the potential for severe hinderance to international aviation. Each state would enjoy the prerogative of negotiating on an ad hoc basis each instance of a foreign air carrier using its airspace. This would include the length of contract and location of air lanes.

The regulatory organ of the Convention, the International Commission for Air Navigation established by Article 34²⁰ was to labour with these interpretive conflicts. It can be seen that international agreement over civil

aviation was far from established by the early 1920's. Smooth passage was not predictable.

Another, more localized but equally significant, aspect warrants examination. As in 1910, Germany was again to become an unexpected nemesis to British aviation. As part of the Peace Treaty resolutions there was a concerted effort to eliminate German military aviation. Articles 198 to 202 (inclusive) of Section III of the Treaty are specific to this issue.²¹ Civil aviation was dealt with in Articles 313 to 320 (inclusive).²² Their intent was quite obvious. As Article 313 states:

"The aircraft of the Allied and Associated Powers shall have full liberty of passage and landing over and in the territory and territorial waters of Germany."²³

Article 318 went further when it stated that:

"As regards internal commercial air traffic, the aircraft of the Allied and Associated Powers shall enjoy in Germany most favoured nation treatment."²⁴

The intent was to allow German skies to be open to exploitation. There was to be, in effect, a "freedom of the sky" window in German airspace until 1923 when, as Article 320 allowed, Germany could ask for League of Nations admission and membership in the Air Convention.²⁵ It was assumed that, at that time, Germany's return to the international fraternity would include adherence to Article 15 of the Convention.

The unexpected aspect was German civil aviation. While the intent to deny German military aviation was clear, negligible attention was paid to civil aviation. It proceeded to thrive - fed primarily by Scandinavian markets.²⁶ There then arose the need to distinguish between civil and military aircraft as

part of allowing the disarmament process to continue. The vehicle contrived came via General Percy R.C. Groves, Sykes' deputy at Paris. He authorized the soon-to-be notorious "Nine Rules".²⁷ The rules were accepted by the Supreme War Council and incorporated in the Ultimatum of London of May 11, 1921 to stay in force until 1926.²⁸

The rules themselves were draconian and restrictive in the extreme. Rule No. VII, for example, stipulated that any aircraft:

"with a useful load of more than 600 kgs. including pilot, mechanic and instruments...will be considered a military aircraft".²⁹

Any commercial aircraft adhering to this restriction would have been endowed with a negligible payload. These regulations were to take the role of the sleeping dragon until, as shall be seen, they were exploited by the Germans in an unexpected manner.

A diplomatic stage was now set for British aviation. If commercial aviation aspirations were to be realized it was clear that diplomatic, as well as technological, hurdles had to be overcome. By the early 1920's Air Diplomacy had acquired a sophistication and complexity that ensured tribulation for any aviation enterprise involving international aspects.

That enterprise had its own parallel history throughout the same period. By 1920 there were in place in Great Britain the necessary institutions, albeit in immature form, to allow for commercial aviation. Like the diplomatic stage upon which they would be playing, the players had been assembling. It is necessary to trace that congregation and the institutions that they acted upon and created to allow civil aviation to begin. Many of those developments were

unfolding before the end of World War One. By 1919 both convergent paths had met.

CHAPTER 2

STEP-CHILD

British Civil Aviation formally began on May 1, 1919.¹ Although there had been some pre-war activity, including a contrived air-mail event staged to celebrate the Coronation of George V², this date can be established as the effective beginning of civil, and particularly commercial, aviation in Britain.

The fact that the date can be so specific indicates the degree to which civil aviation was very much a creature of government. It did not evolve as a commercial entity pursuing the normal dynamics of commerce and trade. Rather it was given birth amid the gestation of service (military) aviation during the First World War. Aviation in general became a practical entity in the few years immediately preceding the First World War. Civil aviation was to be greatly influenced by this fact. Had its infancy not coincided with a global war that rapidly incorporated this fledgling technology and its institutions, it would have been able to pursue a course more comparable to other transportation technologies. British road and rail transport were already sophisticated and mature entities by 1914. Although they were mobilized for the war effort and universally recognized as military assets, no effort was made to maintain direct military control of them after the War. In a similar manner, the Merchant Marine was allowed to pursue a normal peace-time progress independent of Admiralty control. Civil aviation, however, remained under the direct influence of the Military after the War. To understand the phenomenon it is necessary to examine the institutions of military aviation that evolved during the War and immediately after. The government infrastructures that nourished it became those of civil aviation.³

Nowhere was this more evident than in the makeup of the personnel who were to guide the growth of civil aviation in its very early stages.

Manufacturing aside, all the significant individuals were part of a small group of career servicemen. Apart from the politicians who passed across the stage in transit to other arenas, British aviation had a very small number of key players in the formative years.

Four career officers are quickly identified as dominating the early years of aviation. David Henderson, Sir Frederick H. Sykes, Sefton Brancker and Sir Hugh Trenchard, who, as Cooper states:

"were to enjoy a virtual monopoly of the influential positions in the military air command."⁴

Trenchard was to acquire legendary status in the R.A.F. Both Sykes and Brancker were to become heads of civil aviation. Henderson would die shortly after the war having held command of the R.F.C. and giving service in the Air Ministry. All four were very much involved in the birth of British air power and can claim founding status in that drama. The creation of the Royal Air Force can be looked upon as the opus for which civil aviation was the postscript. The nativity of the R.A.F. will not be related here.⁵ Within that complexity a narrower conflict held major significance for civil aviation - particularly in the all-important early 1920's, a conflict initiated by the rivalries that developed between the four. Each of the quartet pursued careers throughout the war worthy of dramatic representation.⁶ Sykes, as first Controller General of Civil Aviation, needs to be examined closely. His influence was critical in the very early stages.

Sir Frederick H. Sykes emerges as a somewhat enigmatic and maligned individual. His autobiography⁷ gives details of an adventurous, if precarious, early life. Born in 1877, and due to the early death of his father, Sykes was raised in what would have been termed "reduced circumstances". By fifteen he was in Paris, studying, working as a clerk, and participating in walk-on roles

in the Opera. There followed two years as a planter in Ceylon. In 1900 he volunteered as a serving officer in the Boer War. He was severely wounded in the conflict.⁸ Sykes very early revealed some definite skills. He was a gifted linguist and had a clear penchant for organization. Both of these were to allow him prowess as a staff officer. Sykes also manifested an inexhaustible capacity for educating himself. His personal eclectic syllabus included languages, motor-mechanics and, significantly, ballooning, aerodynamics and aeroplane piloting.⁹ By 1912 he was serving under Henderson and forming the new Flying Corps.¹⁰ He is unique in being able to lay claim to have been instrumental in the founding of three Army Corps - the R.F.C., the Machine Gun Corps and the Tank Corps.¹¹

It was his relationship with Henderson that was to be the source of later complaints against him. Sykes claims to have been promised field command of the R.F.C. in the event of war.¹² However, at the outbreak of hostilities, Henderson took command himself, keeping Sykes as his Chief of Staff. Until 1915, Sykes was repeatedly promoted and demoted as Henderson jockeyed back and forth to France and England for Command and health reasons.¹³ The matter finally erupted into a quarrel in late 1915. Little is known of the details, but it is evident that Sykes offered Henderson great displeasure. The offense was great enough to banish Sykes from the Corps and to the Dardenelles.¹⁴

Henderson never relinquished his rancour. Years later he refused to work with Sykes at the Air Ministry and made this clear in his resignation when he stated that:

"my previous relations with Sykes, and my opinion of him, were not secrets, and had I remained in the Air Force, there was grave danger that I may become, however unwillingly, a focus of discontent and opposition. Further, there was very little question of my 'working' with Sykes."¹⁵

Another contemporary, Trenchard, was to find himself pitted in opposition to Sykes and found him "most difficult" and an obvious rival.¹⁶

Sykes has not been treated kindly by the earlier historians of British air power. He fell from grace and was portrayed as the foil to Trenchard. This has proved to be detrimental to establishing his proper significance in the subsequent historiography.¹⁷

As time passed a more objective evaluation of both his actual accomplishments and his theorizing has emerged and he was granted growing recognition. Evaluations more removed in time are kinder. He has been summarized as:

"a man of character and ability, who did the state much service. It would be wrong if he were entirely forgotten."¹⁸

Another view offers further insight when it states that:

"His penetrating mind and superb organizational abilities were to contribute a great deal to the British War effort; but his simple inability to get on with his less complex and more forthright contemporaries, combined with the 'awful intrigue' of which they were never slow to suspect him...(ensured that he was) distrusted or simply not understood by most of his peers."¹⁹

The "awful intrigue" mentioned is an apparent allusion again to Sykes' clash with Henderson. A reference to the omnipresent Hankey offers some light on this affair when Roskill suggests that Sykes' crime was to have aspired too readily to his superior's job.²⁰

When the Air Force bill was passed on November 8, 1917²¹ establishing both Air Ministry and Air Force, it created some political surprises. The assumed claimant to the position of first Air Minister was Lord Cowdray.

Cowdray, as chairman of the Air Board, was the logical choice. Lloyd George, however, opted to offer the post to Northcliffe, the press baron. By bringing Northcliffe into the cabinet it was hoped that his aggressive and sometimes hostile press could be tamed. Northcliffe refused. He took the tactless route of publicizing his refusal as an indictment of the government's aviation policy, and without consultation with Lloyd George. Cowdray, objecting to a process that had excluded him, resigned in protest. This was a regrettable loss. Cowdray took him with considerable expertise. The position then went to Rothermere, Northcliffe's brother, amid rampant suspicions of political favouritism.²² Weir's biographer is useful in indicating the general malaise within the organization that Rothermere took control of when he writes:

"he took over a department in which the forces of intrigue which shrouded the higher direction of the Great War flourished with exceptional luxuriance."²³

Rothermere had also lost his eldest son in action at about this time.²⁴ Thus Rothermere, a stressed man, came as the substitute for a substitute. Further, he was clearly appointed as part of a set of manoeuvres that were responding to blatantly political, as opposed to practical, considerations.

While the political arena offered little tranquillity, the Service aspect of the department was arguably worse. Again, Weir's biographer is very useful:

"The headquarters staff were divided amongst themselves by personal feuds, and the Chief of the Air Staff, Sir Hugh Trenchard, had yet to be convinced that an independent R.A.F. was needed. In fact as a close friend of Sir Douglas Haig, the C-in-C in France, he was much inclined to think that it was positively undesirable...Trenchard disliked and despised Rothermere..."²⁵

The rift between the two men surfaced quickly. The ensuing dogfight was acrid and all-consuming. Some of Trenchard's junior staff took advantage of their Parliamentary seats to attack Rothermere in the House, thus compromising the civil-military relationship.²⁶ Rothermere in turn aggravated the situation with his habit of consulting Trenchard's subordinates inappropriately and making military appointments contrary to Trenchard's design. By April 25 both had resigned.²⁷

The ensuing scramble for both Civil and Military headships of the infant Ministry produced Weir - and the prodigal Sykes. With Sykes came his reputation for scheming. Cooper writes:

"His period away from the air service had done nothing to diminish the suspicion with which Sykes was regarded within that organization. Even when engaged elsewhere he was often suspected of the most Machiavellian plots to regain power in the air command."²⁸

It is significant that the War Cabinet took the time to delve into Sykes' past prior to his appointment as Chief of Air Staff. The Sykes-Henderson affair was researched by Smuts who gave Sykes an endorsement.²⁹ It is important to realize that there were matters of grave concern at hand during this shuffle. On the very day that Sykes' appointment was announced to the Press, Haig issued his "backs to the wall" message in response to the danger of the German spring offensive.³⁰

Due to a set of circumstances similar to those which triggered Cowdray's resignation, the King first learned of the change in command from Trenchard

to Sykes in the Press. This precipitated Royal displeasure which was communicated the next day to Lloyd George.³¹ The Press soon joined in the clamour.³² Further resignations at the Air Ministry, including that of Henderson, followed.³³

This perception of "palace intrigues" amid a time of national crisis could do little to enhance the new Ministry's repute. More specifically, Sykes had arrived at a time that could only hurt his already tarnished image. He was now to be perceived as the man who ousted the very popular Trenchard. He had been a last appointee of the unpopular Rothermere. The fact that his appointment had displeased the King could not be politically beneficial.

His new civil head, Weir, manoeuvred to bring Trenchard back in some capacity almost immediately.³⁴ Further, Weir proceeded to create an arrangement whereby Trenchard, as head of the Independent Bombing Force, reported directly to Weir. This circumvented Sykes. Whether or not this was perceived as adroit personnel management, it is certainly an instance of compromising Sykes in his position of Chief of Air Staff.³⁵

If Sykes held little influence with the first civil chief at the Air Ministry, he was to hold even less with his replacement - Churchill. As Reader so aptly states:

"When Churchill took over the Air Ministry, its future was problematical and its importance was not rated high: certainly not for a professional politician of Churchill's standing. It was tacked on to the more prestigious office of Secretary of State For War: not a good augury. The air, at this time did not greatly interest Churchill...It was certainly a calamity for Sykes."³⁶

The combining of the two portfolios gave credence to the notion that the Air Ministry was to be treated as an expedient of the war and would be allowed to

expire. In fact, at the end of hostilities, the Air Force and Air Ministry were struggling simply to exist.³⁷ Spaight's comment is well taken when he writes:

"At once it was assumed fairly generally that the Air Ministry was being made subordinate to the War Office and the supposed intention of the Government had a distinctly 'bad press'.³⁸

Gilbert, Churchill's biographer tends to agree:

"Churchill's double appointment as Secretary of State for Air as well as for War caused surprise, and even anger...³⁹

His comment would reinforce the contemporary view that while the position may have been expedient and no doubt beneficial for Churchill it did little for the new Ministry. The "Times" agreed when it asked:

"But can any single man cover the huge span of both these Departments of the Army and the Air? We gravely doubt it...One horse, one man; we doubt even Mr. Churchill's ability to ride two at once."⁴⁰

Churchill quickly placed himself in the Trenchard - Sykes controversy. In early February of 1919 he invited Trenchard to return to his controversial post of C.A.S. Further, he asked Trenchard to submit his views on the future organization of the R.A.F.⁴¹ Sykes, being the adroit staff officer that he was, had already in circulation a memorandum on just that subject. Significantly, Churchill chose Trenchard's view.

It is beyond the scope of this discussion to describe either at length. It must be said though that while Sykes' proposals were literally Imperial in scope, were expansive, expensive and gave civil aviation a predominant future, Trenchard's were succinct, inexpensive and definitely focused on service

aviation.⁴² Again time has come to Sykes' support, and many of the recommendations he made were eventually instituted.⁴³ The imperial aspect of Sykes' vision earned an appropriate response by Churchill. For as J. James indicates:

"Sykes envisaged an Empire held together by air power, that is by civil aviation."⁴⁴

Whether Churchill was motivated by Sykes' Imperial rhetoric or was making advantageous use of an apparent pigeon-hole, he created the title of Controller General of Civil Aviation for him and recommended him for a C.B.E.⁴⁵ Groves, the author of the "nine-rules" at the Paris deliberations, and with the Ministry at the time, offers some further insight into this move. He makes the point that Churchill and Sykes had argued sometime in 1919 and that:

"Thereafter, Sykes, and all he stood for was anathema."⁴⁶

Even considering that Groves was a friend and long-time colleague of Sykes, Churchill's manoeuvring invites scepticism as to its purposes. It should also be remembered that throughout this period Sykes, Groves and the Under-Secretary, Seely were mainly in Paris as part of the British delegation. Sykes was, however, consistent in his ability to aggravate those around him in authority and influence. It may also be possible that his successful courtship of Bonar Law's daughter at this time generated accusations of social climbing.

Sykes' new appointment was part of a general re-alignment of the Ministry. Churchill had taken his post as Secretary of State for the Royal Air Force. In March of 1919 he became the Secretary of State for Air.⁴⁷ Under the

new arrangements the Ministry was organized under a scheme that allowed for a Service and Civil department, headed by Trenchard and Sykes respectively, a Supply and Research department headed by a Service officer and a Secretariat.⁴⁸

Two inherent weaknesses in this structure must be underlined here. The administrative position given to British civil aviation tended to contravene the normal requirements of commerce. When G. Holt Thomas founded Aircraft Transport and Travel in 1916 with the intent of introducing flying service between London and Paris, he had to wait for approval from a military agency for three years.⁴⁹ Clearly, in time of war it was logical for all aviation to be controlled by the military. However after 1919, when Holt finally initiated the service, the agency of control was still military. C.G. Grey, writing in 1940, points to the Marine-Naval analogy. He indicated that the appropriate home for civil, and therefore commercial aviation, was a Ministry of Transport or its predecessor - the Board of Trade.⁵⁰ This echoed the wisdom of Frank Pick who, in his minority report of the Civil Aerial Transport Committee of 1917, called for just such an arrangement.⁵¹ Whether or not it might have been more successful can be debated. What cannot be disputed is the anomalous status of civil aviation under the authority of an essentially military bureaucracy.

The other weakness was less obvious but equally severe. The decision to marry the organ of supply and research to the Service side of aviation was to have significant consequences. It set an early precedent for inhibiting the growth of civil aviation.

It becomes evident that civil aviation was confronted with the danger of being crushed in the nest by its larger, older and more aggressive sibling. As civil aviation began its struggle for recognition with service aviation, another, larger drama was unfolding.

Much of the manoeuvring was part of a still-born plan aimed at creating an all-embracing Ministry of Defence with Churchill as Minister.⁵² The Air would have been merely one of the subordinate spheres. Within that context the status of civil aviation compared to service aviation would become a minor consideration for the Minister. Churchill's interests were with loftier matters. The entire episode of multiple portfolio and a proposed ministry was climaxed by the noisy resignation of J.E.B. Seely, the Under-Secretary for Air. He did so publicly as a means of underscoring Churchill's inattentiveness to the Air portfolio, and privately as a means of forcing Churchill's hand.⁵³ The gambit was successful inasmuch as Grey's observation, offered in 1940, that:

"Apparently the protest had good effect because never since then has the Air Ministry been subordinated to any other Department."⁵⁴

However, it effectively ended Seely's career in public office.

If any further indication of the relative insignificance of civil aviation were needed it comes with the structure of finances. The Air Estimates for 1919-1920 underscore the impoverished status of civil aviation. Of the £54,293,320 estimated expenditure⁵⁵, Sykes' department was allotted £518,398.⁵⁶ This represents less than 1%. This imbalance set the tone for future Estimates. Clearly the lion's share was to go to service aviation. In balance, it must be pointed out that the R.A.F. was engaged in small, but costly, actions in Egypt, India, Russia, and the Baltic at that time.⁵⁷ Nevertheless the discrepancy was obvious.

The following year's estimates are more telling. Vote 8, the civil vote, called for £894,540 for civil aviation. At the same time "works and buildings" alone for the R.A.F. were allotted £3,647,000.⁵⁸

James points out similar imbalances in manpower. By 1921 there were 3043 of officer rank serving the Air Ministry. Six were employed in civil aviation. There were even more, nine, active in research and development. The ratio of non-officer personnel is similar, with 43 of the total of 126,497 being employed in the civil department. As James concludes: "Sykes' department was a minor consideration."⁵⁹

British civil aviation was the step child of service aviation. The Air Ministry had only just survived amidst the governmental politics of the period. Somewhere between Churchill's ambition and the War Office, the Air Ministry emerged as a lesser entity. Within it was service aviation's poor sibling - civil aviation. It found itself at the threshold of the "Air Age" with little status, pathetic funding and a perceived pariah at its head.

The initial phase of British commercial aviation can be contained within the years 1919 to 1924. It was a period of enthusiasm, innovation and inexperience. Beset by technological, market and financial difficulties, commercial aviation quickly became a casualty. This failure⁶⁰ brought about the first great crisis of civil aviation. The factors contributing to that circumstance can be isolated.

The lack of purpose-built commercial aircraft was a significant problem. By 1924, the four surviving airlines, Daimler (incorporating A.T. and T.), Handley Page Transport, Instone Air Line and British Marine Air Navigation were still, to a large degree, relying on military conversions.⁶¹

In addition, aircraft specifically designed for the civil market faced considerable obstacles. A brief study of the Handley Page W8, an early and successful commercial design, is illuminating. The prototype flew on December 4, 1919. Despite a declaration of superiority from the Air Ministry⁶² its entry into service was delayed by that same Ministry's reluctance to release the Napier engines needed to power the production models.⁶³ The "B" version finally entered service in 1922 with its passenger capacity reduced by 20% in order to conform to Ministry specifications. They soldiered on into the early 1930's.⁶⁴ This aircraft proved the value of aircraft designed specifically for commercial purposes. In terms of operational costs, it was easily the most efficient of the aircraft used in the 1919-1924 period.⁶⁵

The market itself was exerting influences on the airlines that were poorly understood. There is an interesting paradox that developed in this period. Almost exclusively the Airlines concentrated on the cross-channel market. The London to Paris route in particular soon became saturated. There were simply more Airlines than necessary on this route. At the same time each small

company had to face extensive administrative and maintenance costs. Birkhead isolates this well when he states that:

"The airlines of 1919-24 were too small to cover the fixed charges due to management, administrative staff, buildings and other ground facilities, and...too large relative to existing levels of traffic."⁶⁶

There was also some confusion as to what the market was. Mail, express parcels, and exotic goods were considered the principal cargo in the early stages with passengers as a secondary consideration.⁶⁷ In fairness it must be remembered that these early firms were dealing with an entirely new transportation system.

Above all these factors was the overwhelming issue of state subsidies. It was the issue that led to the ultimate failures of this early period. The concept of subsidies was brought into the Civil Aerial Transport Committee's deliberations of 1918, which concluded that:

- "(a) State assistance to private enterprise
 - (b) State ownership or participation in the ownership of aerial transport undertakings...
- or even a combination of the two"⁶⁸

were necessary to ensure success for civil aviation. In that regard the report also laid:

"the strongest emphasis on the necessity...of an early decision. To postpone that decision until after the war might well be to allow the manufacturing industry to languish for lack of orders, and thus to lose the means of carrying out any policy that might eventually be determined upon."⁶⁹

The advice was not heeded. Despite the example of the French, who did subsidize their civil aviation,⁷⁰ the progress of British subsidies was slow.

To criticize the frugality of the British government towards civil aviation at that time would be inappropriate without considering the general post-war climate towards government expenditure. This was the era of the Geddes Committee on National Expenditure of 1922. In conjunction with a traditional "laissez-faire" economic policy was a genuine desire to curtail spending and thus ease the strain on a war-ravaged Treasury.⁷¹

At Churchill's bidding, Weir returned to the Air Ministry to chair two committees. The first, to consider Imperial Air Routes⁷² echoed the Aerial Transport Committee of 1918 in discussing the options of assistance and arrived at the solution of: "the use of private enterprise with some measure of state aid behind it."⁷³ That "measure" was to be the meteorological and wireless services and airports funded by the government on the Egypt to India Route. This was chosen as a demonstration route to stimulate development.⁷⁴ The committee was able to endorse the suggestions unanimously. It was a good omen considering that both Trenchard and Sykes were members.

Weir's second challenge from Churchill was not to be so pleasant an experience. The "Report on Government Assistance For The Development of Civil Aviation"⁷⁵ was operating with the mandate to:

"consider the essential steps in the national interest which the Government should take to develop Civil Aviation, bearing in mind the need for utmost economy."⁷⁶

The committee met for nine awkward and difficult sessions. Trenchard's loud and histrionic objections to any form of subsidies generated his minority report to the barely agreed upon conclusion of the necessity of State aid reached on

March 11, 1920.⁷⁷ On this very day, Churchill rose in the house to make his famous comment that:

"Civil aviation must fly by itself; the Government cannot possibly hold it up in the air...any attempt to support it artificially by floods of state money will not ever produce a really sound commercial aviation service."⁷⁸

Severely compromised, the committee proceeded to finish its recommendations. It arrived at a scheme that proposed a two-year temporary subsidy of 25% of the gross revenue earned on approved routes by companies operating a minimum of 45 days in 3 months on that route.⁷⁹ The Treasury turned down the recommendations outright.⁸⁰

Events in the marketplace, however, soon forced some activity. By February 1921, faced with the subsidized French competition, the last of the British companies closed down.⁸¹ At that moment there was no British commercial aviation. In a last minute rescue bid a temporary subsidy scheme was arranged in March of 1921.⁸² This was followed by a permanent arrangement in 1922 that very much reflected those of Weir's committee of 1920.⁸³ By this time Churchill had departed the Air Ministry to be replaced by Frederick Guest. Guest held the portfolio alone, but without Cabinet rank.⁸⁴

With the new government of 1922 came Sir Samuel Hoare and a new approach. Hoare skilfully manipulated the current concern over the superiority of French Air Power. While aggressively increasing the strength of the R.A.F., he also managed to be convincing in his efforts to sell a strong civil aviation industry as a practical supplement to service strength.⁸⁵ Dobson credits him with:

"a more realistic view of the industry's financial needs than his predecessors. He realized that existing subsidies were woefully

inadequate and that the industry had to be given long term security if it were to flourish and become independent of government."⁸⁶

This approach brought the Hambling Committee, struck in January of 1923 to consider the present working of the scheme of Cross-Channel Subsidies and to advise on the best method of subsidising Air Transport in Future.⁸⁷ The subsequent report did much to address the problems faced by civil aviation. The future it foresaw called for the creation of:

"a new organization as the solution of a difficult problem...a commercial organization run entirely on business lines with a privileged position with regard to air transport subsidies."⁸⁸

The bolder approach of extending the subsidies over a ten year period was proposed.⁸⁹ It was in fact the blueprint for Imperial Airways.

There is a somewhat ironic footnote to this turn of events. Roughly a year earlier Sykes had allowed his three year tenure of office to expire without taking any steps to continue. He had been asked to stay on for another year by Guest. He refused.⁹⁰ Thus, he missed the opportunity to see the beginning of a vindication of his Imperial vision.

Sykes' successor was his own wartime colleague - Sefton Brancker. He took over as the Director of Civil Aviation - a reduced title and a reduced department.⁹¹ This was offset to some degree by his superior, Hoare, being elevated to Cabinet shortly after the acceptance of the Hambling Report.⁹² Not quite five years after its birth on May 1, 1919, British civil aviation was given its second chance. On March 31, 1924, the board of governors of Imperial Airways was announced.⁹³ The preamble to the agreement forming the

company, originally to be called Imperial Air Transport Company Limited, states that:

"The agreement carries out the recommendations made by the Civil Air Transport Subsidies Committee in their Report dated 15th February, 1923."⁹⁴

Belatedly, but better than not at all, the subsidized, chosen instrument of aviation aspirations had arrived.

CHAPTER 3

EUROPEAN SKIES 1924-1934

The first decade of the renaissance of British civil aviation saw the emergence of the three major challenges that were to persist until the outbreak of War in 1939. The demands of geography, technology and the political-diplomatic arena were to be constant and difficult. At no time were all three successfully and completely dealt with. An examination of the progress of commercial airline development becomes a study of how these three variables combined. A convenient division for examination is the three theatres of activity that emerged - Europe, the Empire, and the Internal routes. The decade 1924-1934 falls conveniently between two important events - Imperial Airways' birth and the Empire Air Mail Scheme. 1924 was a watershed year in aviation. Many significant circumstances either originated or achieved fruition in that year. Their focus was in continental Europe.

The "imperial" in Imperial Airways had to cope with an unavoidable circumstance. Great Britain was separated from its Empire by the European land mass. That land mass was occupied by national governments not always inclined to assist British aviation aspirations. As a result of this, and other factors, the British experience in Europe in the first decade after Imperial Airways' birth was not greatly rewarding.

The technological factor was the most immediate. The fleet that Imperial inherited from its predecessors was a motley collection.¹ The immediate task was to rationalize its routes and array of diverse aircraft. Only three of its inventory were specifically designed as civil passenger aircraft. The rest were military conversions. Had the skies of Europe been a virgin foray this might not have been all too significant. However, because of the delay in creating a state-subsidized monopoly airline, the British were entering the field late.

European aviation had progressed considerably by 1924. This year is generally chosen as the end of the "pioneer" stage. As has been stated:

"In the period 1920-24 the outline of a European air transport system became defined and swift, steady progress was made...the airlines maintained regular operations indicating beyond all doubt that, given suitable official support, Air transport had come to stay."²

The competition was consolidated and technically superior. The two major participants that could comfortably resist a British challenge were France and Germany. France, another imperial power, enjoyed the advantage bestowed by geography. By 1924 French airliners were flying regularly scheduled flights to twelve European countries. As well, Corsica, Morocco, and Algeria were serviced. French aircraft provided scheduled, competent service from Casablanca in the West to Moscow and Constantinople in the East.³ The ability to work down the Mediterranean coast towards her African possessions allowed France a relatively easy access to her imperial skies. The other great advantage that French aviation enjoyed was in state subsidies. From the beginning, France's civil aviation had enjoyed comprehensive government subsidies.⁴

France had then, by 1924, developed a comprehensive network of routes firmly supported by a state-funded policy that nurtured civil aviation. The French did share with Britain a major impediment to development. That obstacle was Germany.

By 1924 German civil aviation had emerged as the surprise contender in European skies. Germany's unexpected prowess in the field was due to a combination of factors. Geography, diplomacy, government policy and technological innovativeness all contributed. These combined to produce a

hindrance of mammoth proportions to any expansion and development of British civil aviation in Europe.

The technological prowess displayed by the Germans, a defeated nation, in aviation was unexpected and unequalled. It was the result of a combination of factors. Unlike Britain, who had a vast overstock of surplus military aircraft to glut the market and stifle new development, Germany had been compelled by the Versailles Treaty to destroy its military hardware. Another unperceived advantage was the lack of a military order desk. Unhindered by an air force to dominate and monopolize financial resources, German designers were able to concentrate upon civil designs exclusively. A ruthless but effective rationalizing of the German industry also contributed. Many of the weaker companies simply perished at war's end. The few survivors were able to consolidate and pursue the focus on civil designs.⁵

An early symbol of this progress was the Junker's F-13 design. The F-13 was a benchmark development in airliner development. It was an all-metal, low wing monoplane that first flew in June of 1919 and saw service world-wide until 1932.⁶

Another example of a progressive design was the Zeppelin-Staaken E4250, first flown in 1920. Also an all-metal monoplane, the E4250, with its four engines and streamlining, bears a striking resemblance to the airliners that were to fly two decades later. It has been accurately defined as:

"the undoubted ancestor of the all-metal stressed-skin monoplane 'modern type' transports which came into general use from the 1930's."⁷

The contemporary first purpose-built civil airliner in Britain was the Handley-Page W-8. While undoubtedly a successful design,⁸ it incorporated

no innovations other than its function. It was a two, sometimes three, engined wood and fabric biplane. It is worth comparing some aspects of this aircraft to the F-13 design. The W-8 proved efficient and cheap to operate. Its operating cost of from twelve to fourteen pence per seat-mile was less than the Junker's twenty-two.⁹ It was designed as, what was then, a long-range multi-engined airliner to fulfil a precise role in a particular market. The Junker's design was a single-engined (and therefore cheaper) multi-purpose craft. It was very rugged and versatile. It could accommodate a variety of powerplants and landing gear including skis and floats.¹⁰ In consequence about 350 F-13's were successfully marketed in many countries on three continents.¹¹ Outside of British Registry, only the Swiss used the Handley-Page allowing for a total production run of 100 craft.¹²

This proved to be an early example of a British tendency to focus specifically for a concise purpose thus limiting the market potential of a given design. German designs tended to be general-purpose and exhibited excellent overall performance that could be adapted to many uses. The Germans were to continue to market aggressively an unbroken line of excellent designs until the outbreak of World War II.

With a nod to the Fokker designs of Holland and some other European designs, it can be stated that the Germans dominated aviation technology and were only equalled by the American entries of the 1930's.¹³ These early developments allowed Germany to establish a lead that was not relinquished until the onset of War in 1939.¹⁴

This technological prowess was equalled by a conscientious effort by German governments of all levels to promote aviation. Their far-sightedness was manifested in a willingness for all levels of government, from municipal to state, to subsidize the development of the new industry.¹⁵ It proved to be a

unique and successful promotion of air-mindedness. By securing a contract, with appropriate subsidies, to operate between two civic centres, many small airlines were able to survive and even grow in the 1919-1924 period. The subsidies were often created by a combination of Federal, State and Civic governments.¹⁶ By 1924 two consolidated and healthy airlines had emerged from a combining of these specific routes - Deutscher Aero Lloyd and Aero Union, which were to merge yet again in 1925 to create Deutsche-Luft Hansa.¹⁷

A series of diplomatic machinations between 1919 and 1924 had allowed Germany another unforeseen advantage in European civil aviation. The aerial navigation clauses of the Versailles Treaty gave the allied powers a "window" of operations until 1923 over German airspace.¹⁸ This advantage was only available to the participants of the I.C.A.N. agreements. The neutral Scandinavian States found themselves in a singular position. These states relied upon Germany in virtually all aspects of aviation technology and service. In order to sustain this relationship, the individual countries negotiated reciprocal arrangements with Germany.¹⁹ Article five of I.C.A.N. excluded aircraft of non-contracting states from using airspace of signatory states, and since Germany had been excluded from participation, the Scandinavians would lose their advantageous position with Germany if they became members.²⁰ This restriction also inhibited development of British aviation in Scandinavia. Since Britain could not offer the use of her airspace to the non-participatory Scandinavian States, there was no reciprocal advantage that could be used in negotiations. As a result of this situation, this area became a sphere of exclusive German development.

In addition this area provided a ready market for the fruits of German aviation technology. Diplomacy had created this convenience at precisely the time that an infant German aircraft industry needed a sure market to allow steady growth.

The "window" of operations into German airspace was closed on January 1, 1923. At this time Germany regained sovereignty of its airspace.²¹ The Germans, somewhat vindictively, controlled the use of their airspace in a very restrictive manner. The infamous "Nine Rules" of Groves²² were trotted out and used as the criteria for compliance with German regulations. These draconian restrictions were now used effectively to stifle all but German aviation east of the Rhine. The particularly zealous enforcement of this policy resulted in some bizarre incidents in which French aircraft were impounded and the Pilots arrested.²³ In an extreme case the sole survivor of a crashed French craft was not only fined for violating German airspace but for destroying the fish stocks of the stream into which he had crashed.²⁴

This diplomatic barrier reinforced the natural restrictions imposed by the Alps and assured that aviation development in Eastern Europe would remain a German preserve. The French, having been frustrated in their own attempts to breach these physical and political barriers to the East²⁵ were not to be expected to be sympathetic to British efforts to do the same.

The other major competing entity in Europe cannot be ignored. Any discussion of European and Imperial aviation history sooner or later rounds on K.L.M. Koninklijke Luchtvaart Maatschappij (Royal Dutch Airlines) which lays claim to being the oldest surviving airline with a founding date of October 4, 1919.²⁶

This Dutch enterprise was to offer an energetic alternative to Imperial and parallel its development at all stages. Often working in concert with, and sometimes in competition against, both British and German airlines, K.L.M. was to establish itself as a major factor in both European and Imperial skies.²⁷ It is notable that in 1924 this airline ran its first experimental flight to the Dutch East Indies.²⁸

K.L.M. enjoyed the benefit of a close and fruitful relationship with Fokker and was able to exploit this aircraft manufacturer's superb designs to great advantage. 1924 saw K.L.M. approach Fokker for a tri-motor airliner design.²⁹ The result was the VII/3M design that established another benchmark in airliner development. Its high-wing monoplane, three-engined configuration was immediately successful. It spawned many imitations and was, for a while, the perceived ideal of what an airliner should be.³⁰

Thus in 1924 Imperial had entered a sophisticated and complex arena. With its limited subsidies and miscellaneous fleet it was now to compete in some very closely contested European skies.

The British government was not altogether unaware of the situation. There is however, an aura of relative naivety in the official British analysis. An early Air Ministry synopsis of October 1919 recognizes that:

"there can be no doubt that Germany has secured a substantial footing, so far at least as the aeroplane is concerned in neighbouring countries."³¹

The report continues to predict accurately a five point programme of German civil aviation policy.³² It would seem that at this early date there was an awareness of the potential for German expertise to become a serious consideration. Yet, in the report of the next six-month period, (October 1919 - March 1920) Sykes tended to underestimate seriously the German threat.

While Sykes was compiling this report, the aviation over which he was Director General did not exhibit a healthy and prosperous state of affairs. A myriad of British airline companies had made their appearance with varying degrees of success. A.V. Roe's entry lasted a mere five months in 1919. Handley Page Transport was operating with very limited success at this time.

Instone, the shipping firm, initiated its contender, The Instone Air Line, in January of 1920. The Supermarine Aviation Company existed for a few flights only in 1919. The North Sea Aerial and General Transport Concern came to its demise in October of 1920, a mere nineteen months after its initiation. Air Post of Banks expired at about the same time after an active life of two months. The history of these lines³³ did not give support to any smugness on Sykes's part. George Holt's Aircraft Transport and Travel, constituted in 1916, after disappearing in 1920, was to re-emerge as a component of Daimler Airways.³⁴ Daimler, along with Instone and Handley Page, became part of the merger that created Imperial Airways in late 1924. Including the short-lived Air Post of Banks, a mere five companies were actually operating during the period on which Sykes was reporting. Yet he felt confident in denigrating the activities of the 25 German lines then in existence by stating that:

"All the companies are as yet undeveloped and the activities... are at present very slight. Although the list of companies and firms engaged in civil aviation is at first imposing, it represents little of real account, in spite of the long press campaign conducted to demonstrate the existence and importance of German civil aviation. The present object of the companies is to interest the public in aerial transport and to keep going until the commercial aeroplane is a practical proposition. Germany has not yet produced a commercial aeroplane suitable for civil aviation."³⁵

What he belittled "The present object...is to interest the public in aerial transport and to keep going" might well have been adopted by the failing British companies of the period. It points to the lack of any coordinated effort on the part of the British government to promote air-mindedness. Sykes' closing statement is highly interesting in light of the fact that by the time the report was published the F-13 was flying commercially.

By 1923 the observations of the Air Ministry had become more realistic. The annual report of that year highlighted the introduction of Königsberg-Moscow service³⁶ indicating that the exploitation of East European air space was well underway. The report also recognized the ability of the German industry to function, even flourish, amid the political instability of the period.³⁷ It must be realized that German aviation was able to grow even amidst the hyper-inflation and political upheaval that characterized the Weimar period.

Significantly, the report pointed out that Moscow service was using Fokker aircraft powered by Rolls Royce engines.³⁸ The fact was presented to illustrate British prowess. While an appropriate tribute to the British firm, it underscores an important point. The Germans, despite their own technological capability in the air, were quite willing to use a Dutch aircraft powered by British engines to achieve their goal. German, and other European airlines, did not suffer from an equivalent of the "buy British" policy mandated to Imperial Airways.³⁹

This is but one indicator of a policy that proved to be a less than beneficial factor to both Imperial Airways and the British aircraft industry in general. Imperial could only draw upon the expertise of a relatively small pool of manufacturers. The manufacturers, presented with an even smaller "captive" market, became complacent in a very aggressive arena. As chauvinistic as they were, the Germans were also pragmatic. To paraphrase - it was a case of "wearing the wing that fit."

The year 1924 must be recognized as the initiating year of another programme that was to have major ramifications for British civil aviation. The Burney Airship Scheme was implemented at this time. At the very moment when the British were attempting to consolidate their aviation penetration into

Europe, very precious resources were being allocated to this expensive and ultimately fruitless endeavour.⁴⁰

The British were not alone in their attempt to apply airship technology to passenger traffic. The Germans were also to pursue this field - with considerably more success. As long as the aeroplane seemed incapable of very long-distance flight, the airship was the obvious alternative. Britain, confronted with her problems of a far-flung empire, was seduced by the long-range potential of the airship. The Germans, it must be remembered, were the initiators of this technology. Further, in Germany the airship was the exception to the rule that civil aviation emerged from its military sibling. Passenger-carrying Zeppelin airships were a viable entity before the First World War.⁴¹ The Germans were able to enjoy a higher success rate with their commercial airships based upon a better fund of experience. The successive financial pies that were offered to British aviation were never big enough to allow for the development of both the airship and the aeroplane as a vehicle of commerce. It proved to be an either/or situation - not both. Again, the absence of the military factor, at this stage, in the German equation was significant. The R.A.F. was consistently drawing the lion's share of finances. There was no Luftwaffe when these early events were transpiring.

Perhaps surprisingly, the major barrier to the British effort to penetrate European aviation proved to be political and not technological. The German obstacle was at its most evident in the failed negotiations to develop a route from London to Prague via Cologne. Prague was important, not only as a goal in itself, but as a staging point to the South and East. Between 1923 and 1928 a series of clumsy machinations proceeded with what have been described as "all the rapidity associated with Government machinery."⁴²

A major stumbling block proved to be the I.C.A.N. agreement to which Germany was not, initially, a signatory. Because of this, the British could not negotiate with this non-member.

At the very moment when arrangements seemed to be in hand with the Czechs, Germany assumed control of its airspace and adopted its restrictive policy toward foreign airlines. When an Anglo-German agreement had finally been reached in 1928 the Czech agreement collapsed.⁴³ These frustrations were characteristic of the British attempts at aviation diplomacy in Europe. The full implication of being forced to exercise basic diplomatic skills upon fragile national sensitivities was being realized. A further frustration was the fact that the French, themselves struggling to exercise some aerial hegemony, were implicated in the obstructive maneuvering.⁴⁴

The Prague route was desirable to the British. However, the root of the weakness in the British negotiating position lay in geographic realities. As an island kingdom, the British had little, or nothing to offer in return for transit rights. The British did not block any routes vital to another country's interest. There was no reciprocal advantage to be offered to the Germans for the Prague route. Indeed, it would have been competition to them.⁴⁵

Another aspect of the Prague negotiations was the air of ineffectiveness which permeated the British effort throughout. Somewhere between the Air Ministry and the Foreign Office a sense of priority and drive was lost. There was a perceptible flatness to the diplomatic effort.⁴⁶ The situation was not to improve. The decade from 1924 to 1934 saw no major initiative in developing any routes, even when diplomacy was not an obstacle. The channel islands are a case in point. A route here would have allowed the accumulation of considerable expertise in cross-water flying. The technological challenge was well within the capabilities of the time. After a period of erratic service, the

island route was only developed on a regular basis by Jersey Airways in the mid 1930's.⁴⁷ This unsubsidized concern had found a niche big enough to warrant the exploitation that the government's instrument had shunned.

There is some explanation for this lack of British drive in the European arena. As early as 1927 the failing situation in Europe warranted a formal investigation. The cabinet Committee formed to examine the situation was chaired by Phillip Cunliffe-Lister who as Lord Swinton was eventually to serve as Air Minister. The committee's report⁴⁸ was secret and ominous. It concluded that "British air transport is lagging seriously behind developments on the Continent."⁴⁹

It offered, however, no recommendations of change to Imperial Airways mandate and expressed satisfaction with the reduction of running costs that had been demonstrated.⁵⁰ The implication was that, as long as it was cost-effective, a policy that allowed for the deterioration of British civil aviation in Europe was acceptable. The solution was not to be a reconsideration of the European routes but a shift in emphasis. If a lost cause, Europe was to be left for greener pastures. The report allowed for provision for:

"the development, in lieu of less remunerative continental services, of long distance Imperial routes."⁵¹

The failing European enterprise was to be superseded by the Empire challenge. It is not surprising that negotiations for European routes became lacklustre in light of this policy shift.

Thus the British government led a retreat from Europe. The combination of a frustrated diplomacy, failure to overcome the realities of geography and the technological prowess of its competitors had precipitated this change of direction and virtual abandonment of Europe.

This lack of success can be credited to other influences as well. Imperial Airways had seemed to be a plausible solution to the debacle of the pioneer airlines of the early 1920's. The Hambling Committee's rationale was sound in that, by consolidating the remnants of a failing industry, a new beginning could be made. There is even evidence of a "master scheme" at work. Imperial Airways was to be balanced with the Burney Scheme. The expected result was to have been a comprehensive development of both aeroplanes and airships as a means of air transport. It is no coincidence that the title of the agreement creating Imperial Airways specifies "the formation of a Heavier-than-Air Transport Company."⁵²

With hindsight it would be easy to dismiss this division of resources, but in 1923 Airships appeared to have a bright future.

There is ample evidence of domestic political circumstance conspiring, as it often can, to hinder development. The year 1924 also saw a Labour election victory. The Labour Government was understandably cautious in implementing two expensive programmes that it had inherited from the previous government.

The policy of consolidating all efforts into one company must itself be examined. Imperial Airways was given a very expansive mandate. It, in fact, had accepted sole responsibility for air transport development. Sykes claimed that he was arguing throughout 1921 and early 1922 for four monopoly companies. Each was to concentrate on developing routes suitable to an area

of proven expertise. Thus the domestic, European, Atlantic and Indian markets would have been allocated to four separate monopolies.⁵³ He garners considerable support from Higham who suggests that, by allowing Instone to develop the Empire routes, and thus build on their experience and expertise gained in shipping, Europe would have received a more concentrated focus from the other three founding airlines functioning as one concern with a more limited mandate.⁵⁴

Sykes raised another concern that is inherent in the Imperial Airways system. He warned that:

"a policy has been adopted of placing the development of British airways in Europe entirely in the hands of a single public company. That company is naturally governed by immediate financial considerations."⁵⁵

His caution was well taken. The long-term interests of civil aviation, or even Imperial aspirations, were bound to conflict at times with those "immediate financial considerations". Those considerations were as often as not contained in the directives of its overbearing chairman.

Sir Eric Geddes (of "Axe" fame) was the full-time director of the Dunlop Rubber Company who is described as:

"a formidable character...(who) thought he could successfully run the new venture of British Air Transport (Imperial Airways) one day a month."⁵⁶

Under his leadership the airline was run, quite literally, as a part-time venture from the offices and board-room of Dunlop. His prime objective was dividends.⁵⁷

He managed to delight a government bureaucracy that yearned for a self-sufficient enterprise free of the begrudgingly given subsidies. While this concentration on the fiscal prowess of the company had merit it did not provide enough emphasis on the developmental aspect of a civil aviation. As early as 1927 the influential aviation periodical "The Aeroplane" was commenting that:

"When Imperial Airways Ltd. was formed, it was believed that the policy was of assistance to the progress of Civil Aviation. That, one is told, is an entirely erroneous idea and Imperial Airways is entirely a money making concern, and nothing more."⁵⁸

As soon as the European routes proved unprofitable, a directorship motivated primarily by profits would need little encouragement to shift to other, greener, pastures.

The management skills of Imperial's leadership are questionable in another area. The pilot's strike of 1924 was, by most accounts, avoidable and unnecessary. It was due to an attempt to economize at the pilots' expense, and to an extremely autocratic stance assumed by the chairman.⁵⁹ It actually delayed inaugural activities for a month and left a lingering heritage of discontent.

Another aspect must be considered in the shift from Europe. The report shows that Geddes had made contributions to the discussions that had preceded and no doubt influenced its thrust. His motivation was economic. The Cabinet made its decision, assumedly, from a position of weakness in the European market. Enticed by what was presumed to be easier going in

Imperial skies, it adhered to the Imperial thrust. However, this report is roughly coincident with the deliberations of Simon Commission that was advocating a reduction of Empire⁶⁰ in the very Indian skies that this thrust was aimed at. This apparent conflict of intent cannot be laid at Geddes' feet. However a cabinet assumedly privy to both sets of deliberations does bear some responsibility for allowing this change of emphasis to take place. In the broad sense a shift to Imperial routes at this time showed, at the very least, some ambiguity of thought.

Other, less obvious, factors contributed to the failure to exploit fully the European market. The governments of the 1920's were never generous to aviation. Any other demand on the treasury was to manifest itself eventually as a tighter drawstring on the government purse that fed aviation efforts. The emergency of the 1926 General Strike cost the government an unexpected £32 million.⁶¹ This unplanned expense occurred at the time when it was only just realized that subsidies to aviation were essential. In 1924 when the European routes were at risk because of financial concerns, the aviation industry as a whole was the recipient of a government expenditure that was one-fifth of the German equivalent and one-nineteenth of the French.⁶² State funding was not to be a strong point of British aviation policy.

This is reflected in another way. One factor is significant by its absence - mail subsidies. The lack of Post-Office participation in British aviation was a serious omission. From the nineteenth century onwards shipping space, used or not, had been subsidized by the Post Office.⁶³ In light of this historical precedent, the omission of a similar arrangement for aviation is a serious failure of policy. This situation was only to be rectified in 1934 with the advent of the Empire Air Mail Scheme.

By 1934 Imperial was still flying essentially the same routes that had been developed a decade earlier. The total mileage flown was even less than that of the accumulated total of the four companies that Imperial had been created from.⁶⁴ It had by that time developed a well-earned reputation for luxury and comfort at the expense of expansion and speed. Its "Silver Wing Service" to Paris had become legendary. Its focus is illuminated by the caustic remark that:

"In the eyes of Imperial Airways the continent of Europe seemed to amount to about five miles around the Eiffel Tower and a few lake resorts in Switzerland."⁶⁵

By 1930 British civil aviation was ranked a poor fourth in Europe, behind Germany, France and Italy. The British managed a mere 25% of the traffic total of Germany.⁶⁶ In 1934 the situation was much the same. By 1934 any attempt to regain parity, let alone superiority, in European skies was hardly possible. The Germans, Dutch and more recently the Americans, were firmly entrenched as suppliers of aircraft to the world's airlines. The various national airlines, secure in their government subsidies, were consolidating and providing overwhelming competition.

CHAPTER 4

IMPERIAL SKIES 1924-1934

THE SHADOW OF EMPIRE

Historically, the progress of British Imperial aspirations had been closely associated to maritime interests. The period immediately following the First World War saw a renewed interest in Imperial matters. There was a logical, if ambitious, assumption that the new technology of commercial aviation would enhance the role held by the merchant marine in Imperial concerns. The air enthusiasts tended to voice their advocacy of Empire as enthusiastically as Milner. Aviation was quickly perceived as the appropriate vehicle for securing communications and "showing the flag". Empire invoked prestige and aviation could be very prestigious.¹ While commercial reality consistently slowed the thrust of optimism, the idea of Empire drove the machine. Imperial Airways was not so named by accident. As a result, the progress of Imperial civil aviation was never far from the questions of diplomacy and Imperial policy. At the same time the Empire was itself changing. It already was undergoing an evolution towards a Commonwealth. However, there was a body of thought that felt that aviation could contribute in a major way to the proposition of Empire. These air enthusiasts were convinced that the mandate was to carry the Empire standard. They were optimistic enough to accept the challenge that "Air transport was assigned the critical task of giving substance to the shadow of Empire..."² This enthusiasm was to consistently be blunted by the equally imposing energy of arising national aspirations within the emergent commonwealth. Equally damaging was the effect of the national ambitions of the states that obstructed the route to the various components of the Empire. The inherent imperfections of the I.C.A.N. agreements were to savage the passage to India. As has been seen in the previous chapter, this was evident in British aviation's tortured progress across Europe. Regardless, the intent of Imperial aviation was to link together the Empire.

The technological challenge alone was daunting. The Empire had an inherent factor of distances - great distances - that constantly demanded consideration. The boast and reality of a world-wide realm generated at once both an obvious impetus and monstrous challenge to air transport.

The idea of Imperial aviation had early roots. As early as 1918 W.G.H. Salmond, then Commanding Officer of the Middle East Command of the R.A.F., initiated the survey of an "all-red" route from Cairo to Cape Town. By 1919 the route was declared ready. It was established, complete with 43 airfields and fuel depots. This notable achievement went somewhat unheeded despite the massive undertaking needed to finish the task.³ The project was encouraged by Milner who, as Colonial Secretary, had endorsed the enterprise.⁴

In the spring of 1919 Salmond, with Sykes in support, approached Churchill at the Air Ministry with a full-blown proposal for an "Imperial Air Transport Company". This was to be a comprehensive Imperial service that would provide flights to Australia via India as well as South Africa. Salmond's draft proposal suggested a Royal Charter Company that struck a compromise between state and private control.⁵ His motivation for such a structure came, in part, as a response to the aggressive lobbying of Vickers Ltd. that was seeking to establish a similar service in Africa.⁶ Vickers had already drawn the Foreign Office into a compromising situation in China with an equally aggressive sales campaign.⁷ Wary of surrendering all development of African routes to private enterprise, Salmond was seeking to give the initiative to a state-controlled agency. While his proposal was not accepted and developed, it is evident that much of it became the substance of Weir's Advisory Committee on Civil Aviation's "Report on Imperial Air Routes" of October 1919.⁸ Its influence is evident also in the eventual structure of Imperial Airways.

Also to be underscored here is the military patronage of civil aviation. Salmond, a senior R.A.F. Officer, initiated a state-funded enterprise that was specifically designed to nurture civil aviation. That the state's role in commercial aviation was in the establishment and maintenance of routes and facilities, as opposed to cash subsidies, can be seen to have had its inception here as well. This entire project, despite its significance in many aspects, was, however, to be given second place in Imperial plans.

The African route fell victim to the lure of India. Weir's Imperial Routes Committee made a very clear decision to give priority to the Cairo to Karachi route. This was in keeping with the earlier decision of the 1918 Aerial Transport Committee to establish a similar priority.⁹ Thus the immediate focus of Imperial aspirations was to be Cairo. Cairo, in the rhetoric of the time, was to become the "Clapham Junction" of aviation. This expression, generally attributed to Sykes¹⁰ describes appropriately the significance of Cairo's location. It was to be developed as the junction of the routes South to the Cape and East to India.

Getting to Cairo proved to be a major problem. If it was to be a junction point, Cairo needed a secure and consistent route to London; otherwise it lost its effectiveness for any Imperial aspirations. As the previous chapter has shown, the perils of European Air Diplomacy were such that security was hard to find.

Imperial Airways passengers had to shuttle between rail and steamer connections across Europe as well as endure frequently changing air routes. These variations sprang from the changes in current diplomatic accords. The struggle to cross civilized Europe proved as much an adventure in diplomacy as the challenge of the "Dark Continent" and the "Mysterious East".¹¹

The utilization of Egyptian airspace itself was not without considerable difficulties. This struggle provided a microcosm of things to come. British Imperial aspirations collided with Egyptian Nationalist sensitivities. The Egyptians wished to exercise their sovereignty and negotiate with all parties for the use of their airspace. The British wanted exclusive use. The strategic sensitivity of the Suez Canal influenced their thinking. Complicating the issue further was the fact that the R.A.F. facilities (in essence the only facilities) were not certified for civil use.¹² This situation was not to be resolved until a compromise was struck in 1921 at the Cairo Conference. The issue of civil aviation was dealt with as part of the larger arena of policy.

The civil-military relationships in British aviation at this period were shown by this Conference. As well as making the historic decision to vest control of Middle East security in the R.A.F., the Conference decided to have the R.A.F. establish a Cairo-Baghdad service to fly the mails and examine the feasibility of a civil route.¹³ In this manner service aviation was empowered to operate a civil service. That arrangement neatly circumvented the issue of allowing for civil airfields. Egyptian aviation was still firmly controlled by the R.A.F.

This solution, while relatively inexpensive, defied all advice and previous recommendations. Sykes had advised against such a move.¹⁴ Weir's Imperial Routes Committee of 1919 had very specifically rejected such an arrangement. It concluded that:

"The Committee have considered this method, and have decided against it. There are weighty service objections against the use of the Royal Air Force for civil purposes."¹⁵

The "weighty service objections" are presumed to have been voiced by Trenchard who sat on the committee. Thus this route, the initial Imperial route, was to be controlled by a Service whose Chief had consistently demonstrated his opposition to civil aviation. Service aviation had once again been given preference over civil even for an unwanted task.

This arrangement held out little promise for a route that was supposed to be the critical proving vehicle for Imperial civil aviation. Writing in 1925, Sykes was predictably negative in his summation. He wrote that:

"It was the intention when it was initiated that it should be the practice ground of future links in the Imperial chain, but...no data of commercial value has been compiled. Running costs are unknown...An experimental service is of little or no use unless it affords sound data of costs and operation, demonstrates the necessity of technical development in commercial and traffic aspects, and co-operates with a supporting research organization...Development of this sort is impossible on government lines."¹⁶

The route, its uniqueness enhanced by the famous ploughed furrow in the desert, was to live on in near legendary status until civil usage was assumed by Imperial Airways in December of 1926.¹⁷ It took a further three years for the passenger route to be developed from Baghdad to Karachi. The R.A.F. had made no effort to extend the route and had limited its mandate to flying the mails to Baghdad. The extension to Karachi was only inaugurated in 1929.¹⁸

The aircraft used for the Cairo-Baghdad-Karachi service were De Havilland type 66 - "Hercules". Six were ordered for this route and built to very precise specifications laid down by Imperial. They were appropriate for their given role. A bonus to their performance was a substantial weight loss due to their construction of wood in a very dry climate. This serendipity allowed for

a corresponding increase in payload.¹⁹ They were an example of the British tendency to design craft for a narrowly specified purpose.

The initiation of the Cairo-Karachi service ushered in a new phase. Amid much publicity, the 1926 inaugural flight had as its passengers the new Secretary of State for Air, Samuel Hoare and Sykes' successor, Sefton Brancker. Sykes' resignation in 1922 was no doubt influenced by the decision to reduce his post to a Directorate.²⁰

Brancker was a popular choice to replace him. His credentials were impressive. He had attained a service rank of Air Vice-Marshal and had been a close colleague of Sykes in the war. He had contributed to the Civil Aerial Transport Committee of 1918, worked with Holt Thomas' A.T. & T., and was head of the influential Air League of The British Empire. He was charismatic, flamboyant and exhibited the all-important social skills that Sykes lacked. Equally important, no doubt, was the fact that he was unemployed and quite willing to take over civil aviation at the reduced rank of Director.²¹ His Minister, Hoare, is generally considered to have been an asset to civil aviation. He had succeeded Guest to the Air Ministry in 1922.²²

A facet of British government in general and civil aviation stewardship in particular is shown in this period before 1922. It was a relatively small world. Sykes' passage from office was engineered by Guest. Guest, Churchill's cousin, succeeded his relative in 1921 and held the air portfolio without cabinet rank. His brief sojourn corresponded to the period of Geddes' restraints. Sykes can be perceived as a victim of the "Axe". Hoare succeeded Guest in 1922.²³ His new civil Chief, Brancker, had followed Sykes throughout the war. Geddes was to emerge as Imperial's Chairman in 1924. More indicative of a passing regime was the fact that Sykes was the outgoing Bonar Law's son-in-

law. This small sphere of influence and power was typical of government. The power base of civil aviation had a small horizon.

The advent of Brancker and Hoare supplied much needed energy and enterprise to civil aviation. The Cairo-Karachi flight was indicative of the new regime.

Hoare was undoubtedly a boon to aviation in general and specifically to its civil component. He was an unabashed Imperialist who described himself as:

"a Conservative who had been brought up in the days of Rudyard Kipling, Joseph Chamberlain and Milner, I saw in the creation of air routes the chance of uniting the scattered countries of the Empire and Commonwealth."²⁴

His initial enterprises in aviation were dramatic. He managed to exploit the anxiety generated by the growing strength of French air power to initiate a growth programme for the R.A.F. At the same time, he secured control of Naval aviation for the R.A.F.²⁵ Hoare can subsequently be blamed for effectively hamstringing the development of Naval aviation. The resulting truce in the power struggle for service aviation, if uneven, did allow for a clearing of the air. The R.A.F. had won that particular joust between the Service rivals. This energetic activity on behalf of the R.A.F. enabled him to acquire sufficient trust and confidence to establish his credibility and pursue a strengthening policy for civil aviation as well. He was thus able to strike the all important Hambling Committee that initiated the process of airline subsidies.²⁶ He convinced a sceptical Cabinet that civil aviation was a valuable reserve to service aviation. He argued that:

"The Cabinet should realize that...we must give constant attention to the possibilities of Civil Aviation, if for no other purpose than to assist in keeping the aircraft industry alive... Civil aviation can be a useful and necessary supplement and it is on this account that it is an essential factor in our air policy."²⁷

With the coming of Baldwin as Prime Minister, Hoare was elevated to Cabinet Rank.²⁸ This gave aviation a much needed champion at the Cabinet level, the first instance of an Air Minister, with responsibilities for that portfolio alone, holding cabinet rank.

It was Hoare's enthusiasm and sense of publicity that placed him on the initial Cairo-Karachi flight. He had deliberately adopted a policy of utilizing air transport in his official capacity. His contention was that:

"What better in those days when every civil flight was regarded as a foolhardy adventure than for the Secretary of State for Air to start the use of aeroplanes for his official journeys."²⁹

He exercised this policy and, with his wife in accompaniment, flew with Brancker on the 1926 inaugural flight of Imperial's Cairo-Karachi service. The flight was an immense success in terms of "air mindedness". Hoare's subsequent account of the epic sold well.³⁰

This flight, however, pointed out some inherent difficulties in the route. Hoare carried letters of introduction in various languages that were designed to solicit the safety of the crew and passengers in the event of being forced to touch down unexpectedly.³¹ They were designed as insurance against harm if the party were to fall into the hands of some local potentate. The intended recipients were assumed to be the relatively "uncivilized" authorities en route. The greatest obstruction, however, was to come from a civilized state that was a signatory of the I.C.A.N. agreements - Persia.

While the British had been moving east from Egypt, the Germans had been busy exploiting their advantage in Eastern Europe and Russia. The two met in Teheran at about this time. The R.A.F. had not exploited the air route beyond Baghdad. The extension was only developed in 1925 by Imperial Airways' surveys. By 1924 the Junkers Company had established a presence and considerable influence in Persia, including a proposal for a regular service to Teheran.

The R.A.F. balked at this perceived threat to Middle East security and had energetically obstructed it. These objections were apparently unknown even to Brancker who arrived on the Hoare flight to find a cool reception in Teheran. Even the immediate presence of Hoare, the Air Minister, did nothing to alleviate the hostility of a Persian government resenting a British intrusion into their commercial arrangements with Germany.³² Deeper was the legacy of anti-British feelings of a Persia influenced by Russia and a history of pre-war Anglo-Russian quarrels over Persian spheres of influence.

The Persian Gulf passage was to be a source of continuous conflict of diplomacy and technical demands. The original agreement with Persia called for a three year period during which Imperial Airways was to use a route that followed the Persian coast down the Gulf. At the end of that period the Persians were to announce a specified air corridor somewhere across central Persia. Thus throughout 1929-1931 the route to India was developed along the Gulf coast.

In 1931 the Persians announced their designated corridor. It was a near-impossible route that featured the worst possible terrain for civil flying and route maintenance. A series of interim extensions of the Gulf route was negotiated as a makeshift arrangement while the future of the route was decided. In the face of Persian intransigence, the remaining practical

alternative was for Imperial Airways to develop a new route along the Arabian coast of the Gulf. The Persian route, replete with depots, telegraphy, and airfields was abandoned and had to be duplicated on the other coast. As well, an entirely new series of negotiations had to be entered into with the various Arab states that occupied the area.

The entire episode³³ was indicative of two basic facts. International air routes were at the mercy of political and diplomatic wrangling, and most importantly, the British diplomatic effort was not up to the task. There was, after all, more at stake than an airline. The British recognized that:

"The Persian Gulf stands to British air power in almost the exact relation as the Suez Canal to the Royal Navy, namely, as an essential link in our air communications to the East, particularly for the passage of air forces in time of emergency."³⁴

The British effort did not reflect this strategic significance. There was an obvious lack of communication between the Foreign Office and the Air Ministry and between the service and civil components of that ministry. This lacklustre performance reflected an inappropriate naivety in underestimating the obstructive capability of a Russian-influenced Persia. The ability of the Persians to deflect this Imperial enterprise did little to enhance British prestige.

The goal of these efforts and source of these tribulations was India. India itself provided some obstructions. Indian Nationalism was very strident at the time that Imperial Airways arrived in Karachi. The first regular scheduled flight arrived on April 6, 1929³⁵ during the proceedings of the Simon Commission. It was a time of major unrest and political ill-will towards the British.³⁶

The Indian parliament did not move with great despatch to facilitate the progress of Imperial aviation aspirations at a time of overt anti-imperial feeling. More precisely, it actually delayed progress by withdrawing support for an extension to Delhi from 1931 until 1932.³⁷ It is significant to note that the French and the Dutch were given rights of aerial passage before Imperial Airways was able to negotiate similar privileges in 1933. Imperial's premature attempt to create a subsidiary company, Indian Airways, occasioned a major gaffe when it refused Indian representation on the Board of Directors.³⁸ A compromise joint company, Indian Trans-Continental Airways, was formed largely under Imperial's control, with a three-sevenths Indian representation.³⁹ Imperial's major concern was to develop a through route to Singapore. The Indian National interests, while aware of the significance of exterior links, were primarily interested in developing Indian air transport expertise in general. These two aims were not always harmonious.

Perhaps the best example of the cavalier attitude of the British in developing the India air route was that exhibited by Lord Chetwynd. As part of a grooming process to succeed Geddes as Imperial's head, Chetwynd was sent to India to obtain experience. His classic comment "Who'd ever fly with an Indian?"⁴⁰ resulted in his rapid resignation on the grounds of ill health. Imperial's Indian experience was not encouraging. It did provide some helpful lessons in dealing with the Australians.

The route through India to Singapore brought contact with this other burgeoning nationalism. Australia's interest in, and development of, air transport had been healthy, aggressive and commercially successful by the time Imperial Airways reached far enough to establish a link. Australia had the highest ratio of air travel per capita in the world.⁴¹ The Australians saw the air corridor to India as critical both to civil aviation and defence. While they welcomed commercial exploitation, they exercised a healthy ambition to

maintain Australian presence and control. While British efforts were reaching towards Australia, K.L.M. had proven to be an aggressive and enterprising competitor. By making reciprocal arrangements with Australian concerns, K.L.M. was consistently able to provide an alternative to any Imperial Airways bid.⁴² Complicating the matter further was the policy of "Australia only" enunciated by the Australians.⁴³ The eventual outcome was the compromise entity, Qantas Empire Airways, that satisfied both sets of national interests with a British:Australian ownership ratio of 49:49, with the remaining 2% held by an umpire.⁴⁴

This endeavour also perpetuated another tendency. The De Havilland - 86 airliner was ordered and built specifically for the Singapore-Australia run. It became another example of a successful, yet limited use, aircraft. While it performed admirably on this route, it proved inappropriate to European routes and winter conditions.⁴⁵

The Indian and Australian experiences had shown that national aspirations were capable of testing the Imperial concept. The epitome of this was to be displayed in Africa.

The Cairo-Cape Town route had been allowed to develop very slowly in order to give priority to the eastern stretch to Australia. While working south from Egypt, not an easy task physically, the Imperial trunk route through British Africa encountered some in-house conflicts. By 1925 a consortium that was to emerge as Cobham-Blackburn Air Lines had concluded successful negotiations to develop regional air routes. Arrangements had been developed in Kenya, Uganda, Tanganyika and the Sudan. Alan Cobham, the air pioneer, had done much to develop this area for the potential of air transport. Cobham-Blackburn Air Lines was very much a realization of his efforts.

As Imperial Airways moved into the area, it exercised its monopoly position to absorb this enterprise. The move was much resented by the local interests who saw in the young airline a source of regional prestige and potential.⁴⁶ A similar action in Rhodesia that absorbed the local air service drew ire there.⁴⁷ These actions highlight a questionable aspect of Imperial's mandate. Charged with the development of Imperial routes, it was perceived to inhibit local initiative along those routes. Cobham, a talented air pioneer and air transport entrepreneur, was quietly eliminated from the field.

Cobham and others had consistently challenged the decision to develop the Indian route at the expense of the African.⁴⁸ The emergence of the Cobham-Blackburn Line had clearly shown that the vacuum created by this delay could be filled by local initiative. When it developed and emerged in regions easily swayed by Imperial's authority, such competition did not fare well. There was, however, a much greater danger in delaying a trunk route, and the subsequent branch lines, to the Union of South Africa.

The vacuum in civil aviation created in the Union had been filled by elements decidedly unfriendly to Imperial aspirations. The personification of these elements was Oswald Pirow, a "notoriously difficult personality".⁴⁹

Pirow, as Minister of Defence of the Union, had pursued a very clear policy. He saw South Africa as an equal to the European powers. His intent was to exploit the continent that lay to the North. The principal instrument was to be the nationalized South African Airways. His pro-German leanings were partially reflected by a policy of buying German. By 1934, S.A.A. was flying a fleet of excellent Junkers aircraft. Pirow consistently belittled British civil aircraft as "antiquated" and "a joke".⁵⁰ This was a premier instance of German technological prowess in aviation coming into direct competition with British products. Unlike other instances where British pressure was able to enforce

a "buy British" policy, Pirow was able to embarrass the British by openly flaunting Junkers' superiority. South African ambition and capability were definitely not friendly to British Imperial aspirations. Thus, during the delay caused by the push to India and Australia, a considerable obstacle had emerged in South Africa.

The struggle for civil air supremacy in South Africa challenged all of the concepts of Empire. South Africa, as a Dominion, exercised under Pirow all the elements of its autonomy that it possibly could in matters regarding air transport. Consequently, the task of developing civil airliner routes became a tangle of political negotiations as more aspects of South African autonomy and Imperial ties were involved. Pirow very adroitly used the air transport issue as a bargaining tool within the greater framework of diplomatic tensions with the Imperial authority. Pirow was agitating for a greater participation in the defence of the Union. Pirow's bid included large naval guns for the defence of Cape Town and greater involvement in the Air Defence of British Africa. Caught up in the negotiations were Royal Naval refuelling capabilities and Imperial Airways' routes. These complexities were parts of the tapestry that included the air transport issue.⁵¹ Pirow consistently frustrated Imperial Airways' ambitions in Africa. This frustration was neatly summed up by Woods Humphrey, the Managing Director of Imperial Airways, when, in 1935, he lamented that:

"Of all the difficulties which are encountered in operating (international) air services...none is greater than those that arise from international politics, for they are based on the uncertain and shifting foundations of national aspirations and prejudices. The 'nationalism' which has developed in all countries since the war has militated against the successful development of international air transport."⁵²

Nevertheless, by 1934 Imperial Airways had succeeded in establishing trunk routes to Australia, via India, and to South Africa. The Empire, barring the North American components, was linked. However, compromises had been forced upon this monopoly by political realities. The competing or unfriendly interests of other states and the emergent aspirations of the Dominions and of India had severely tested the very concept of Imperial aviation. The technical difficulties had been paralleled by the diplomatic challenge. Nonetheless, the service that was in place by 1934 would boast of prestige and luxury.⁵³ It showed the flag with considerable style. More significantly it had entered the British consciousness as an institution. It had a romance all of its own.

CHAPTER 5

INTERNAL ROUTES

1919-1934

British internal commercial aviation was, until the early 1930's, very small in scope and size. There were various factors that created this circumstance. The most obvious was climate. The air pioneer, Handley Page, offered the opinion that it was:

"a tribute to the unquenchable optimism of airline organisers that they should ever have entertained the hope of out-manoeuvring the British climate."¹

Given the capability of the aircraft of the time, and the ground facilities available, this was not an idle comment. The weather patterns of Great Britain were not conducive to regular, scheduled flying.

The other obvious factor was the presence of a mature ground transportation system. The railway networks of the 1920's were certainly efficient and comprehensive. This service, in combination with the growing bus lines, presented a daunting challenge to the new industry. Writing in 1935, the then head of civil aviation, F.C. Shelmerdine, presented a good analysis of the significance of ground transport competition when apologizing for the diminutive state of internal aviation. He clearly indicated that the time factor, when considered "door-to-door", was only advantageous to air transport as the distance increased. The aeroplane's competitive edge - speed - was only effective over longer journeys. The time spent getting to and from airports via ground transport remained a constant.² The criteria established to enable an aeroplane to be competitive called for a journey of at least 200 miles to be covered at an average cruising speed of 150 m.p.h.³ In the 1920's such criteria were very difficult, if not impossible, to achieve given the aircraft available.

Another factor was the serious shortage of pilots and support personnel. This was a new industry with no established labour pool.⁴ Public apathy, if not distrust and fear, also contributed.

There are other aspects that need examination. All centre around the government's role, or lack of it, in nurturing and guiding the growth of the new industry.

The influential Report of the Civil Aerial Transport Committee of 1918⁵ struck the tone. The air sovereignty issue, and its legal implications, both national and international, were given precedence. Its emphasis was clearly on international and Imperial aviation.⁶ This tone was continued in the equally significant Weir report of 1920.⁷ It summarized government policy very neatly when it stated that:

"The British Isles, owing to climatic conditions and their relatively small area, are not suitable for an early development of civil aviation...air service has to compete with express trains...

We are therefore of the opinion that more suitable fields for private enterprise and for the exploitation of British air transport services exist in the Dominions and Colonies and between Great Britain and foreign countries."⁸

Here was a clear emphasis on Imperial and international aviation. This stance also produced a subtle yet consistent influence upon the solution of technological problems that arose in the following years. To remain competitive in the home, or even the European, market, aircraft that could function in poor weather conditions and operate at increased speeds would have to be developed. The temptation was to shift operations to the underdeveloped areas of Empire. In such arenas, speed was not as significant and there would be few, if any, express trains to compete with. An added bonus was that the Imperial routes envisioned were mostly in areas that enjoyed excellent flying

weather. It was simply easier to exploit a known, available level of technology than develop new ones.

The same attitude surfaces again in the Cunliffe-Lister report of 1927⁹ that precipitated the abandonment of the tough, competitive European routes in order to allow priority for the Empire routes. It dovetailed nicely with Imperialist tendencies and influences. The lure was consistently to draw British aviation to what was always perceived as a more appropriate venue. By always moving to the periphery, British aviation sought some relief from the technological demands that needed to be mastered in order to stay competitive. The philosophy of Empire-over-domestic aviation was eagerly encouraged by Sykes. For all his advocacy of technical development, Sykes was in essence an Imperialist. He did little or nothing to promote the development of internal routes. Either by disinterest or default, internal commercial routes were not the concern of government in the important 1919-1924 period.

Even in the critical matter of subsidies, or lack of them, the concept of subsidizing domestic routes did not arise. The Hambling Committee Report¹⁰ addressed specifically the need to subsidize an entity (that emerged as Imperial Airways) to pursue overseas exploitation. This policy is well stated in an analysis of British aviation subsidies written in 1933 when it summarized that:

"England, however, is relying on the future of long distance air transport and has, for that reason, contented herself with fewer and longer (air) lines...All internal services has (sic) been abandoned..."¹¹

This same report contrasted the German response to railway competition to aviation. It showed that German domestic aviation was able to thrive with an effective rail network in opposition¹² and concluded that:

"There is, therefore, in Germany, real competition between air and rail routes".¹³

As has been discussed in Chapter 3, German aviation enjoyed a comprehensive subsidization from all levels of government.

That other major form of government subsidy, mail contracts, is also noticeable by its absence. It was not until 1934 that the Post Office sought to utilize internal aviation for regular services.¹⁴ As late as 1929, when subsidies and the need for them had become evident, the government's sole assistance came in the form of a renewed contract to Imperial Airways that gave that company considerable improvements to its original agreement.¹⁵ In this "climate", to paraphrase Handley Page, there is considerable amazement that any lines did emerge.

Another major problem was the critical lack of landing fields. By 1929 there were four municipal airports in Britain. At the same time there were 80 in Germany.¹⁶ However, not to be forgotten was the willingness of the government to build 43 landing fields in Africa in 1919 for a service not yet in existence.¹⁷ The Imperial preference is clear in this instance. The situation did improve by 1932. There were 12 municipal centres then available. There were also 43 "other" aerodromes available¹⁸ - exactly the same number of like facilities made available for Imperial aviation in Africa over a decade earlier. As late as 1935 Edinburgh had no municipal airport and Glasgow and Belfast had facilities that were only useful in good weather.¹⁹

This situation was the result of some misplaced Air Ministry direction. In 1928 the Ministry circulated a letter to all municipalities with a population in excess of 20,000 encouraging them to develop municipal aerodromes. The major impetus had been the energetic lobbying of the National Flying Service,

an umbrella organization for many private flying clubs. The Ministry, as the regulatory body, issued prerequisite dimensions for airfields including provisions for a 1000 yd. runway suitable for commercial use. In practice the municipalities accumulated the land but only developed the runway to the minimum specifications (600 yds.) with the intent of expanding it, if and when the need arose. The result was a considerable increase in the number of municipally owned and operated aerodromes. The flaw was that none were suitable for commercial (i.e. airline) use.²⁰

Another lack of development was in the field of radio and its potential as an aid to navigation. The developments that were nurtured were used almost exclusively for the continental routes. By 1933 only two stations were allocated to internal route usage.²¹ Belatedly, in 1934, the Air Ministry initiated a programme to augment this number.²²

A more subtle, but no less significant, factor was that of insurance. Premiums were as high as 20% of the value of the aircraft.²³ The issue of insurance was a good indicator of Ministry policy. Had there been better airfields and radio navigation aids, the dependability and regularity of airline service would have improved. Subsequently, insurance rates would have decreased. The Air Ministry was not even capable of properly assessing the situation as it did not compile data on internal commercial aviation. Indeed, as Shelmerdine stated:

"(internal) air transport has grown up quite independently of government control. Government has not hitherto regulated these services or required any statistics regarding them."²⁴

Shelmerdine was speaking as the Director of Civil Aviation!

It was not until the early 1930's that any substantial developments took place. One early success was Hillman's Airways, founded in 1931. Edward Hillman brought two novel approaches to airline management. A bus operator turned airman, he sought the low end of the fare market and did much to debunk the mystique and prestige embodied by Imperial Airways. He treated his pilots as drivers and his passengers as a business commodity.²⁵ It was a hard-nosed, pragmatic attitude that was to typify the new direction in aviation.

Hillman promptly began poaching on Imperial Airways' preserve by running a flight to Paris at a dramatically lower rate.²⁶ This service was a harbinger of things to come. Another entry, Spartan Air Lines, saw the return of Lord Cowdray to aviation, who, as the founder of Whitehall Securities, engineered the financial backing.²⁷ By 1933 thirteen more companies, with varied success, had joined the fray.²⁸

1933 also saw another phenomenon. Stung by the intrusion into their preserve, and the aerial extension of rival bus lines, the Railways began to take to the air. The first such service was operated by Imperial Airways on behalf of the Great Western Railway.²⁹ 1934 saw the creation of Railway Air Services. This was jointly undertaken by the four major railways and Imperial Airways. This service did much to expand the internal route network linking secondary but important centres such as Leeds and Nottingham to London. Also serviced were the outer centres such as the Isle of Wight and the Orkneys.³⁰ The interest of both the railways and Imperial Airways was a strong indicator of the need and viability of internal routes. This rather conservative consortium gave a nod of credibility to such ventures. In the short time between 1930 and 1934 internal aviation services had emerged as a surprise contender. They had grown without subsidies or benefit of mail contracts. They survived amidst government indifference and neglect. Some of this was due to the improvement in the capabilities of aircraft. Much of it was a result of a public

more responsive to and trusting in air travel. Most of this development, however, was an exercising of simple business acumen and an appropriate response to a potential market situation correctly evaluated. There was little glamour, or prestige, in ferrying salesmen from Nottingham to Leeds or holiday makers to the Isle of Wight. None of these routes had the panache of Imperial's "Silver Wing" flights to Paris. They were, however, the stuff of solid airline development. They were a harbinger of the future in that they catered to the future patrons of air travel - business travellers and tourists. The builders of these lines had little or no interest in prestige or status. Their motive was profit. The advantage of no government subsidization or regulation was that there were no dictates of routes, rates, or rules to hinder them. Despite a considerable casualty list³¹ the various internal lines persisted. By 1934 their presence and practices had forced a reconsideration of their activities by the government. They simply could not be ignored. The future of internal routes became one more question with regard to aviation for the government to ponder in the pivotal year 1934.

CHAPTER 6

BELATED AWAKENINGS

The half decade from 1934 to 1939 was one of intense activity in civil aviation. The accomplishments of those five years compare well with those of the previous two decades.

The first obvious gauge of change is produced by Vote 8 - the civil component of the Air Estimates. A decline in allotted funding that had begun in 1930 came to a halt in 1934.¹ By 1937, for the first time, an all time high, reached in 1921, had been exceeded.²

The reasons for this somewhat abrupt change in outlook can be explained. The international political arena, as ever, was to be a large influence. Technological developments, in this instance closely related, were also an impetus. The slow but measurable improvement in the general economy emerging from Depression helped. British foreign and armaments policy had suddenly to adjust to the presence of an aggressive Nazi Germany. This precipitated two major events that influenced civil aviation. They were the seemingly sudden appearance of a possibly superior German air force and the end of the ten year rule.³ These circumstances ushered in a period of re-armament particularly in the air. The obvious benefactor was military aviation. However, many of the benefits were to trickle down to the civil component.

A less obvious, but equally significant event was the final collapse of the Disarmament Conference in 1934.⁴ Much of the Air Ministry's time and energy in the early 1930's had been absorbed with the complex deliberations that centred around the consideration of civil aviation within the disarmament concept. An understaffed Ministry had been hard pressed in its involvement

in these difficult deliberations including a still-born proposal to internationalize civil aviation.⁵ Re-armament, if nothing else, allowed for a focus of effort.

Most important, however, was a shift in thinking in government. This was to be reflected in policy changes that recognized the emergence of airlines other than Imperial Airways as worthy of consideration. The belated entry of the Post Office into the field came at this time. As well, a unified approach of policy, technology and subsidy was to allow a bid for the last great Imperial route - the Atlantic. The "other" airlines were to pass through a series of mergers and evolve into British Airways.⁶ The Post Office entry precipitated the Empire Air Mail Scheme.⁷ These two events had an influence on the development of the Atlantic route.

One component that was to sour this renaissance was the arrival of American civil airline prowess. Most of the technological advances in this period were of American origin. This was the era of their dominance in the field.⁸

The entry of British Airways as a rival to Imperial Airways illustrates for civil aviation in Britain the change in climate. The series of mergers that saw Hillman, Spartan, Northern and Scottish, and Highland Airways in 1935, and Crilly Airways and British Continental in 1936 become British Airways moved with noticeable speed and smoothness.⁹ By February of 1936 the new concern had secured two vital government commitments needed to ensure even a reasonable chance of success - a subsidy and a mail contract.¹⁰ Moreover, crucial government intervention on the new airline's behalf was forthcoming in a way that Imperial never experienced.

Crilly Airways, one of the founding components of British Airways, had set up a route to Lisbon. Baldwin had personally intervened, by means of a

letter of introduction to the appropriate Portuguese minister, on Crilly's behalf. This Prime Ministerial injection of clout, no doubt aided by traditional Anglo-Portuguese cordiality, had secured Crilly, and hence British Airways, a Portuguese mail contract and route approval.¹¹ This type of direct assistance to what was, at the time, a private company should be compared to an apparent ministerial indifference to the tortured diplomacy of the failed Prague route and the great misadventures in Persia¹² suffered by Imperial Airways, the government's chosen instrument.

British Airways very rapidly acquired the credibility to earn consideration as the second chosen instrument, and a legitimate representative of British aviation.¹³ By 1936 this legitimacy had forced a rationalization of overseas routes. A London-Berlin demarcation line was established with British Airways assuming the routes north of the line, primarily in Scandinavia. Imperial agreed to operate south of this demarcation. Both lines operated the lucrative London-Paris run.¹⁴ This division of routes mirrored Sykes' proposals of 1921-1922 that advocated a similar alignment of resources.¹⁵

The London-Paris route highlighted the delicate balance between pragmatism and policy. The Air Ministry allowed British Airways to employ the most suitable aircraft available at the time. Imperial, encumbered with its British-only mandate, saw its new rival cut the run's time by 25% by utilizing Lockheed Electras in 1937.¹⁶ American technology had arrived.

The only British aircraft capable of duplicating this were either earmarked for Imperial's Empire routes or adapted by the Air Ministry as bombers. Such was the fate of the "Britain-First" fast transport that was transformed into the Blenheim bomber.¹⁷ This illustrated a frustrating reality for the airlines. The resurgent interest in aviation during the period tended to centre upon and benefit military more than civil aspirations. At the very moment when "air-

mindfulness" and funding became far more sympathetic, military aviation took the lion's share.

The use of American technology was, in part, a result of the tendency of British manufacturers to build for a specific purpose. British Airways had originally utilized De Havilland-86 airliners on its Scandinavian runs. The DH-86, it must be recalled, was designed for the Australian run. It soon proved relatively unsuitable in the Northern European climate. Subsequently the DH-86's were replaced by Junker 52's and finally by the Lockheeds that were also used on the Paris run.¹⁸ Imperial was facing similar problems on its Swiss runs but did not have the ready solution of American products.¹⁹

While British Airways was establishing itself as the newcomer, Imperial began its last great enterprise. The Empire Air Mail Scheme (E.A.M.S.) was perhaps the zenith of Imperial's progress. Its genesis can be traced in a memorandum prepared for the cabinet in 1933 by Imperial's Chairman, Eric Geddes.²⁰ In this document Geddes presented a skilfully constructed argument centred on two foundations - an airmail contract and the use of flying boats.²¹ It was a blueprint for the E.A.M.S. and was given a very positive endorsement by the current Air Minister, Londonderry.²² The endorsement also revealed a subtle shift in the government's perspective. Londonderry recognized the inevitability of government subsidies to civil aviation. At the same time, he saw that Imperial was not as heavily subsidized as other European lines and yet was still offering good dividends.²³ The memorandum struck an equipoise between the commercial and political benefits of encouraging Imperial. It was a clear acceptance of the dual character of Imperial Airways' operations.²⁴

The Air Mail Scheme was successful. It was a vehicle whereby all first class mail moved throughout the Empire with only a small, and by 1938 no, surcharge on Imperial's aircraft.²⁵ It marked a co-ordinated rationalization of

policy, mail contracts and technology that had been absent previously. It was a marked departure from the previous belief that opening new routes was an end in itself. This was a more thoughtful exploitation of those routes. There were flaws, particularly in the near total commitment to flying boats, but the unity of purpose with capability was significant. This enterprise illustrated the shifting attitude of government toward more support for commercial aviation.

A Report of the Committee on Commercial Air Transport of 1934 to the Cabinet summarized and endorsed the E.A.M.S. At the same time, it reiterated the orthodoxy of:

"concentrating the development of British commercial air transport in the hands of a single strong undertaking" (i.e. Imperial)²⁶

The report also indicated that this policy was under some pressure from the Society of British Aircraft Constructors (S.B.A.C.) who were advocating a return to a more laissez-faire approach.²⁷ They clearly wanted competing airlines as alternative markets. S.B.A.C.'s argument was less effective when Imperial was the only player on the field. The pressure for change was already mounting as a response to the existence of the internal airlines. There can be little doubt that the emergence of the companies then in the process of becoming British Airways was fuelling this challenge. The irony was that eventually British Airways was forced to acquire American equipment due to the unavailability of suitable British aircraft.

A traumatic period was to follow. One casualty was Londonderry, the Air Minister who was to resign in the face of pressure generated by German air prowess.²⁸ Civil aviation became the focus of a series of investigations. The first was the Fisher Committee struck in 1935 to examine the re-entry into European and international routes other than those served by Imperial.²⁹ The

principal result was British Airways, replete with mail contracts, subsidies and mandates to exploit specific routes.

The second set of deliberations resulted in the findings of the Mayberry Committee of 1936 that examined the state of internal aviation within Great Britain.³⁰ The Fisher Committee's examination of the external and the Mayberry focus on the internal set in motion the rational re-thinking of civil aviation.

In the meantime, the credibility and reputation of Imperial Airways, and the government's attitude towards it, were being questioned. The issue of dividends had emerged as a prime bone of contention. The concept of shareholders enjoying good dividends from an enterprise essentially funded by the state was not popular.³¹

The reaction of Imperial's management to British Airways' challenge was sharply criticized. Imperial imposed the infamous "booking ban". This was a process whereby Imperial utilized its influence with the Railway Air Lines and their booking agencies to block the advertising and bookings of British Airways. It was a successful and damaging ploy that cost Imperial much public support.³²

At about the same time Imperial was the subject of a scandal in the upper echelons of the Civil Service. Throughout 1935 Sir Christopher Bullock, the Permanent Undersecretary at the Air Ministry, had campaigned openly and somewhat inappropriately, to succeed Sir Eric Geddes as the Chairman of Imperial. Aside from the fact that an annoyed Geddes had no intention of resigning, it compromised Bullock's position as a senior Civil Servant enough to warrant a Board of Enquiry. In the subsequent report Bullock was disgraced.³³ This episode did little to enhance Imperial's, or the Air Ministry's

image. Coming at the time of the booking ban and Londonderry's disgrace, it added to the discontent. The final issue involved Imperial's pilots.

Imperial had had a history of being cavalier towards its pilots. It proceeded to dismiss some of the pilots who had been instrumental in establishing a pilot's union. At the same time it increased its dividend to an all time high of 9% and increased its Director's fees.³⁴ The pilots responded by forming the British Airline Pilots Association (B.A.L.P.A.) and mounted a very effective campaign in Parliament led by Robert Perkins, M.P., who happened to be a B.A.L.P.A. member.³⁵

The general dissatisfaction with Imperial specifically, and civil aviation generally, precipitated another major investigation. It came in the form of the Cadman Committee. Its subsequent Report stands as one of the most significant documents in British civil aviation history.³⁶ It was a comprehensive indictment of a faltering industry and singled out Imperial and its management for particular criticism. Its publication guaranteed that the status-quo would not persist. The Hambling Committee Report of 1923³⁷ had given birth to the concept of a single state-funded monopoly as the appropriate vehicle to nurture civil aviation. Fifteen years later the Cadman Report killed it. It was the nurturing, or lack of it, that became the principal focus of criticism. The Report was clear when it stated that:

"although subsidies for British services were concentrated on Imperial Airways, the Air Ministry's contracts with that Company provided solely for the operations of specified services, they neither supported nor encouraged the development of new routes."³⁸

Imperial's neglect of its mandate to foster the growth of the aircraft industry met with equal objection. The argument put forth by the S.B.A.C. that Imperial was not enough, gained credibility with the Cadman Committee:

"There has been no consistent and progressive policy directed to encourage manufacturers to provide civil aircraft of types likely to secure a prominent position for the British Industry in European and Dominion markets.

The subsidies paid to Imperial Airways were not conceived with any regard to civil aircraft construction, and the operations of that company, which has viewed itself as an ordinary commercial company trading in transport, have not encouraged the development of types other than those designed for its own special needs."³⁹

Inherent in this criticism was a condemnation of the Air Ministry which dictated the policy. Imperial Airways had looked after the interests of Imperial Airways. The Air Ministry had not looked after the broader interests of civil aviation. The payer was at fault in this instance. The piper had been payed but the tune had not been called for. It is not surprising that the Report called for an overhaul of the Ministry in its relation to Civil Aviation. It advocated a strengthening of the civil component. The changes called for the creation of the office of a Parliamentary Under-Secretary responsible exclusively for civil aviation and a corresponding Permanent Under-Secretary to assume the previously separated responsibilities of research and development and production.⁴⁰ The Report went further in calling for a Director of Aeronautical Production.⁴¹ It was a clear focusing of the appropriate chain of command upon the vital aspect of developing, as opposed to utilizing, civil aviation.

The monopoly enjoyed by Imperial was challenged. The Report clearly broke from established practice when it stated that:

"British external air transport should be concentrated in a small number of well founded and substantial organizations."⁴²

The monopoly position of Imperial Airways had been recognized as not being the appropriate approach. The "well founded" aspect was addressed

with a reference to appropriate subsidies.⁴³ As well, the contentious issue of dividends was settled by holding them to the same level as those of the public utilities.⁴⁴ This was a direct challenge to Imperial's previous management policies.

Imperial's management was heavily criticized in the Report. It clearly presented the opinion that:

"the management of Imperial Airways has been defective in other respects...(it has) failed to co-operate fully with the Air Ministry (and) has been intolerant of suggestions and unyielding on negotiation. Internally its attitude in staff matters has left much to be desired."⁴⁵

It was an accurate isolation of the problems that had emerged from the duality of Imperial's nature. The commercial/political conflict was addressed in the statement that:

"It appears to us that the Managing Director of the Company - presumably with the acquiescence of the Board - has taken a commercial view of his responsibilities that was too narrow, and has failed to give to the Government Departments with which he has been concerned the co-operation we should have expected from a company heavily subsidized and having such important international and Imperial contacts."⁴⁶

The result of this criticism was unavoidable. The logical result was that:

"There should, in our opinion, be an immediate improvement in these respects, and this may well involve some change in directing personnel."⁴⁷

The other recommendation that had direct bearing on Imperial's management was the stipulation that the Chairman be full-time. The same condition was imposed upon British Airways.⁴⁸

Although comprehensive and accurate, the Report did not generate a total reform. The Air Ministry, in particular, managed to dodge the bullet until the post war period. It was only then that its Civil component was overhauled. The corrective measures aimed at reforming Imperial Airways were however acted upon.

The death of the Chairman, Geddes, in 1937 had avoided some of the nastiness that the Report precipitated. Woods Humphrey, the Managing Director, who had been carrying on became very uncomfortable with the heat that had been generated. The search for a new Chairman of Imperial Airways initiated a series of events that had great influence upon civil aviation. They centred on Sir John, later Lord, Reith.

Reith did not want the job. Upon his passage from the B.B.C. he had been lobbying energetically for an administrative function of some form within the War Office.⁴⁹ His reluctance to accept the Imperial Airways' position was indicated by his willingness to become the Permanent Under-Secretary of State at the War Office at a salary of £3500 per annum. The Imperial Chairmanship offered £10,000!⁵⁰

Despite his reluctance, Reith proved a most appropriate choice. He quickly confirmed the allegations that the profit motive was paramount through a series of interviews with Woods Humphrey whose position was that:

"the chairman's first responsibility was to the shareholders; he had to serve them, no one and nothing else."⁵¹

Reith's displeasure with this philosophy that put shareholders first and:

"Not the importance of this national service; the extension of routes and services; the linking of Empire; not that 'the globe-

spread net of speeded intercourse' should be of British weaving."⁵²

Reith's arrival at Imperial Airways precipitated the departure of Woods Humphrey in 1938.

Reith's greatest contribution to British civil aviation involved the demise of Imperial as a separate entity. Within the Cadman Report was a seed of a greater enterprise. The Report had called for a rationalization of international routes between Imperial and British Airways. Imperial was to concentrate on Africa and the East while British Airways developed European routes and pushed west.⁵³ It also introduced the possibility of a joint company operating on the lucrative London-Paris run.⁵⁴ This was developed by Reith and expanded into the concept of a full-blown, Public Corporation created by the merger of Imperial and British Airways.

The gestation period of what was to emerge as the British Overseas Airways Corporation (B.O.A.C.) saw the firm imprint of Reith's vision. He injected what he described as:

"The basic principle of the organization (that) was, as in the B.B.C., functionalism tempered by a considerable measure of regionalism"⁵⁵

More specifically, he called for:

"a Commonwealth or Empire corporation. Flying all the main routes of the world, owned and managed by all the partners in The British Commonwealth, a representative of each on the board - the first of its kind."⁵⁶

It was a management style that reflected the process of change from Empire to Commonwealth. It was an improvement upon the Imperial approach

that had swallowed the local airlines in Africa and been slow to compromise with local sensitivities in India and Australia.

Another translation of B.B.C. experience was reflected in Reith's energetic campaigning to obtain for B.O.A.C. had "the same measure of constitutional independence as that secured for the B.B.C."⁵⁷

In short, he was striving to ensure that the new entity was protected from the inefficient and stifling control of the Air Ministry. He had, after all, experience in directing a corporation that functioned in close proximity to the government.

Somewhat surprisingly, in the light of his condemnation of his predecessors' attitude to dividends and shareholders, Reith managed to score a major success in the financial arrangements of the purchase of Imperial Airways for the corporation. He was able to satisfy both the Government and Shareholders with a compromise package of share price and dividend issue.⁵⁸ These concepts were included in the initial draft, of his own composition, of a bill that was passed on August 4, 1939 to create B.O.A.C.⁵⁹

Perhaps the best indicator of the change that Reith brought is in his own summation of his management style. He stated that:

"It was a profound shock to find in a concern of this size, with such responsibilities, with such a record, that it had in large

measure depended on one individual. When I left the B.B.C. no one need have noticed it. Without Woods Humphrey no one in Imperial Airways knew where they were."⁶⁰

More direct perhaps, but no less indicative was his additional comment that:

"(Woods Humphrey) accused me of smashing up his organization - the organization which, in fact, I had not been able to find."⁶¹

Reith had brought a new management style linked to a new vision of what the flag bearer of civil aviation's role was to be.

Reith proceeded to test his new approach. He marketed his B.O.A.C. concept with the appropriate governments throughout the Empire and Commonwealth and concluded successful discussions in Ireland.⁶² The crucial test came with Reith's presentation of his ideas to Pirow of South Africa. They met in November of 1938 and were able to reach a preliminary agreement.⁶³ Like many enterprises, the establishment of B.O.A.C. was overshadowed by the greater drama of a new World War. The B.O.A.C. that emerged post-war had to function in a new world that Reith could not have envisaged.

There was an uncanny sense of *déjà-vue* in Reith's proposals. His vision was very close to Sykes'. Like Reith, Sykes had envisaged a system of Imperial aviation jointly developed and supported by its component members.⁶⁴ Like Reith, Sykes had lobbied for his project around the world.⁶⁵ The one had been the spiritual father of Imperial Airways; the other had supervised its demise and transformation.

The development of a truly global system had been addressed before Reith's arrival. During the period of committees and reforms of 1934-1939 the last great obstruction had been challenged. The North Atlantic route, if established, would link all of the Empire.

The development of this route can be seen as a microcosm of the tribulations faced in developing civil aviation in general. The dual problems of nationalist feelings and technology came quickly into sharp focus in this arena.

The route itself had been the great objective of many aviation interests. It had held a "man-on-the-moon" lure and challenge to a generation. It had been in the offing since Alcock and Brown had lurched into an Irish bog in 1919.⁶⁶ Sykes had initiated planning for such a route but his plans had been truncated by a defeat at the Treasury.⁶⁷ Despite a series of Atlantic crossings after Alcock and Brown, including the Lindbergh flight, there was not available an airliner capable of duplicating the feat on a regularly scheduled basis.⁶⁸ It was well beyond Britain's, or anyone else's, technical prowess. By 1934, however, the dream was close enough to initiate a series of negotiations aimed at establishing the link. Prestige was at stake.

An aggressive Pan American Airways became a serious contender to develop the route before the British. Complicating the issue further was the potential of an emerging French enterprise.⁶⁹ The fact that landing and flight privileges would have to be arranged in Canada, Newfoundland and the Irish republic added other layers of complexity.⁷⁰

The Americans also enjoyed a technical edge. They already had the equipment to do the job.⁷¹ As late as 1938 the best that could be arranged by the British was a series of flights by the Short-Mayo Composite and some in-flight refuelling by the Empire flying boats.⁷² These developments are discussed at length in the following chapter.

Other difficulties arose with the Canadians. At the 1937 Imperial Conference Canada was strongly resistant to the "buy British" policy regarding

aircraft. Canadian aviation was closely linked to American manufacturers and the Canadians saw no reason to upset their suppliers.⁷³

Canada also challenged the right of the British to negotiate on their behalf. They were suspicious of an Imperial deal that would not necessarily benefit Canadian interests.⁷⁴ This was distant from the Sykes-Reith concepts of mutual benefit and development. Not for the first time, national jealousies and technical shortcomings stalled aviation progress. The globe encircling civil trunk route was to wait. The Second World War caught it before it was ready.

CHAPTER 7

THE MAKERS

The manufacturing component of civil aviation between the wars presents an interesting study in government interaction with a specific industry. That interaction was evident as early as 1918.

At about the same time that the Civil Air Transport Committee¹ was deliberating, the Minister of Reconstruction convened a New Industries Committee. Included was representation from the Society of British Aircraft Constructors (S.B.A.C.).² The mutual objective was to plan for a post-war future that was expected to lose the impetus of war-time production. It became evident that the untried field of civil aviation could not be counted on to sustain the airframe and aero engine manufacturers in peacetime. Recognized as a vital asset to national defence, the aircraft industry needed alternate sources of support. The committee recommended some form of direct financial assistance.³ That particular solution died stillborn with Churchill's "civil aviation must fly by itself" edict.⁴ As has been shown, the consequence to the airlines of that stance was a collapse that provoked the Hambling Committee.⁵ The manufacturing side of aviation responded in a different manner.

A system evolved that became known as the "Ring". The industry was to be kept alive by sustaining a skeletal structure that could be expanded in times of need. The predictably few orders for new aircraft from a drastically reduced R.A.F. were to be parcelled out to "approved" manufacturers. The expertise of the various design offices was to be preserved. The result was the S.B.A.C. cartel. The Air Ministry assumed control of dictating specifications for service aircraft. It also decided who should build what, including engines. As well as new production, lucrative maintenance and modification contracts could be doled out to the various firms. The decision as to who was worthy was

arbitrary. The Ministry also maintained control of Research and Development.⁶ This system was tightly controlled and paternalistic. It did achieve its objective. The industry was saved from collapse. Its major flaw was that it preserved, rather than developed, an industry.

The process that produced a military aircraft was complex. A given set of Ministry specifications prompted a design. This was followed by prototype building, testing and modification. The prototype would then have to receive acceptance from the Ministry. If accepted, production could proceed on the first "mark" that was supplied to a designated squadron. After squadron evaluation, modifications would render a new mark that would enter general production. All this complexity needed careful co-ordination.

In practice there were many difficulties. The Ministry tended to issue very precise specifications that narrowed the scope of the design. There was some consolation in that the costs of prototype development were mostly absorbed by the Ministry. However, the initiative for specific designs was controlled by the Ministry.⁷ Innovation tended to be inhibited. Thus at the outset, a marked degree of conservative practice was the norm.

Moreover, the Air Ministry frequently interrupted the design and prototype stage with alterations to the specifications.⁸ If selected, the type was then produced in a small batch for a specific squadron. The squadron evaluation could result in a great number of modifications that were again time-consuming.⁹ The "final" order tended to be for another small number.¹⁰ The Hyberdad/Hynaidi and Heyford bombers illustrate this point well. Although 79 of the former and 125 of the latter were eventually ordered, no single order exceeded 16.¹¹ Even more revealing is the fact that in the decade 1920-1930, the Short Company produced a total of 36 aircraft.¹² A corollary effect was the loss of skilled labour. No manufacturer could afford to keep idle hands. After

each contract the skilled work force tended to dwindle away.¹³ This in turn created a cyclical effect wherein the manufacturer became comfortable and confident in a piecemeal, hand-crafted type of manufacture that needed a small nucleus of skilled workers. By spreading a predictably small number of orders for military aircraft in peacetime over a large number of companies the Ministry perpetuated this situation. Had the number of companies been allowed to shrink, either by economic attrition or merger, this parcelling process would have been curtailed. The German experience, by comparison, allowed for a concentration of fewer, but effective, concerns.

This piecemeal policy had a very serious consequence. The manufacturer, never certain of a large production run, could not tool up for mass-production. Each batch was virtually hand-crafted. This led to the caustic condemnation of:

"a cottage industry with obsolescent products; sleepy firms with factories little more than experimental aircraft shops employing hand-working methods."¹⁴

During the First World War mass-production techniques had been very successfully applied. Under the system of small-batch ordering the technique simply atrophied. With idle floor space available, the firms diversified with the manufacture of other goods, usually in the ground transport area, such as auto and bus bodies.¹⁵ While many of these activities proved very successful and a blessing financially, in the long run they diluted the aviation expertise of the firms. Successful management teams that had made their mark on the ground were reluctant to risk a loss in the air. Rolls-Royce was a case in point. It had withdrawn from aero-engine production to concentrate on automobiles and was only brought back into aviation by Ministry coercion.¹⁶

As long as a company relied upon the very small market dictated by Air ministry orders for the R.A.F. it had little chance of breaking out of this cycle. The Air Ministry could not be held responsible for the lack of a military market. Their mandate was to nurture an industry but not by purchasing unwanted or unneeded aircraft. There were two other possible sources of orders - exports and civil aviation.

British military exports did relatively well in the inter-war period. They were able to secure a large share of that market.¹⁷ However the disarmament talks and some very effective foreign competition made that market unpredictable. In this arena the Air Ministry naturally had little influence. Foreign powers bought what they needed where they wanted to. However the civil market was another matter. As the Air Ministry exercised a rigid control over civil aviation, it followed that it had a responsibility to promote that market. By promoting the development of civil designs, particularly airliners, it was possible to nourish an aircraft industry. The Germans and Americans were doing just that. The British model proved different.

As has been seen, until the 1930's virtually no domestic market developed for airliners. Two potential customers remained - Imperial Airways and foreign airlines. Both were influenced by Imperial's buying policies. From 1924 to 1934 Imperial was the only domestic market with a realistic capability of influencing the industry. The manner in which Imperial ordered had a direct bearing on the export market. In theory, a manufacturer, after developing a type of aircraft for Imperial, should have been able to sell that model abroad; but this situation did not materialize. The reasons became very clear after 1927 when the European market was abandoned in favour of the Imperial routes.¹⁸ This established the need for a specific type of airliner made for the particular needs of Imperial.

Because the Empire routes were established along a series of staging fields and depots, they represented a series of "hops" of relatively short distances. This was reinforced by the desire and need to "show the flag" and service as much of the territory as possible. K.L.M., in contrast, always had the single-minded goal of pushing through to Batavia with as few stops as possible. Another special requirement was that the aircraft have the capability of utilising somewhat primitive landing facilities. The easiest way of doing that was to keep the landing and take-off speeds low and provide the craft with large, rugged landing gear. Moreover, the machines would need to be serviced in the same primitive conditions, so sophistication was not a premium. Longer range was not a great need so that higher speed, the key to longer range, was not seen as an urgent goal. Furthermore, and very important, comfort, if not luxury, was a goal. What emerged was the need of a large, roomy and slow craft. Imperial Airways specified and ordered precisely that. The best example was the Handley Page type 42 Hannibal/Hercules. When it appeared in 1931 it was at once a symbol of Imperial's prowess and British aviation's backwardness. Its huge biplane wings supported four oddly placed engines amid a virtual spider's web of struts and bracing wires which evoked the comment that it had "built-in headwinds".¹⁹ It looked archaic even in its infancy. Its performance characteristics were well below those of its contemporaries.²⁰ By Imperial's standards it was a resounding success. Furthermore, it was luxurious and had an outstanding safety record. No passenger ever came to harm in a '42 in peacetime.²¹

As an export item it would not have done well. But in any case, because of Imperial's ordering policies, it was never intended for foreign markets. Imperial was able to stipulate complete control over the designs it ordered. That included a limitation on the number built even after Imperial's need had been satisfied. Further, a period of time was to pass before similar models could be sold to any other airline.²²

Whatever expertise a firm obtained making such a craft was limited to its unique qualities. Also, like the Air Ministry, Imperial ordered in batches. Only eight HP42's were ever made. Handley Page could hardly make profits under such conditions.²³

The British consistently did poorly in the export market for airliners in Europe. The first difficulty for British designers lay in the surplus of aircraft and equipment that the war had created. This condition inhibited new production. The surplus products were invariably cheaper. Technical innovation, a vital factor to growth, was equally inhibited. At the same time their major competition in the export market - Germany - was enjoying a production boom precipitated by unforeseen results of the Versailles Peace Treaty. German designers had been handed a unique opportunity. It was well-stated with the comment that:

"The gentlemen who went to Germany after the war and smashed up all their aircraft engines, factories etc. and came away thinking that they had disarmed Germany had overlooked the fact that they could do nothing to destroy German engineering skill. It was a condition that Engineers dream about; that is, all the obsolete stuff wiped out and an opportunity to start off with a clean sheet."²⁴

The Germans, and Fokker of Holland, quickly took advantage and began producing aircraft of superior design. The type of airliner that was to emerge in the 1930's owed much to Fokker and the innovations pioneered in Germany.²⁵

Aviation, like all new technologies, needed innovation to grow. It also needed a willingness to develop aircraft using the innovations that were available. The development of the modern airliner was a culmination of concepts developed in more than one country. It was the Americans who built

upon German and Fokker designs to put together that combination of developments that led to the first "modern" airliners. Such a craft was basically a combination of many effective ideas that were already in existence. The revolution was in the bringing them together in one craft all at once. The essential combination now appears obvious. At the time, it was not.

The first "modern" airliner was a metal, streamlined, low-wing monoplane with a cantilever wing and a stressed-skin monocoque fuselage. Its retractable landing gear and variable pitch propellers completed the picture. The cantilever wing was braced at one end only. That allowed it to stand alone without the benefit of struts or wires. Stressed skin allowed the outer skin of the craft to bear much of the load. A monocoque fuselage exploited a stressed-skin exterior to create a clean, empty interior. The strength of the craft was largely in its outer shell. The result was a light, strong craft that could carry a considerable payload. The streamlining created by the absence of wires, struts and braces and enhanced by retractable wheels and engine cowlings added speed.

All of these components had emerged over a period of years and in many countries.²⁶ An engine cowling used for streamlining, for example, was a British development. The Townend ring was developed in 1927. However, it was soon superseded by American cowlings that extended further back over the engines.²⁷

The first aircraft to utilize all of these features was the Boeing model 247 which entered service in 1933.²⁸ It would briefly be the pacesetter until the advent of the Douglas series of DC-2's and DC-3's in 1934 and 1936 respectively.²⁹ The Douglas craft added the innovation of wing flaps that enabled a fast plane to land at slow, safe speeds.³⁰

Most of these innovations were centred around one key factor - the use of metal. Particularly with cantilever wings and the stressed skin monocoque fuselage, the use of metal became of central significance.³¹ The strength/weight ratios allowed by new metal alloys were exploited by these developments. The Air Ministry did encourage the use of metal in aircraft design. However, its policies clearly revealed a misunderstanding of the full potential of metal.

The Ministry motivation to replace wood with metal was generated by a shortage of wood. The approach was to substitute metal for the wooden ribs and spars within a fabric covered airframe.³² The Ministry retained fabric covered biplanes in this manner and touted them as "all-metal" craft.³³ Not only did this use of metal lead away from cantilever construction - a biplane does not need its advantages - but it missed a key point, uniting the design, manufacture and cost of aircraft. Metal aircraft, true metal aircraft, are only cost effective when produced in large numbers. (Douglas considered the break even point of the DC-2 to be 75 aircraft.³⁴) Because of the lack of mass production facilities, the use of metal by British builders simply became too expensive.³⁵ This forced them to favour the material they were comfortable with - and capable of affording - wood. This, in turn, inhibited development of expertise with metal airframes.

Aviation Research and Development was never satisfactorily addressed by government policy. Provision had been made for two institutions, the National Physics Laboratory (N.P.L.) and the Royal Aircraft Establishment (R.A.E.), to provide for the industry. The N.P.L. was utilized more as a pure research facility, while the R.A.E. provided hard data and wind-tunnel facilities.³⁶ The relationship that developed between the R.A.E. and the manufacturers was never comfortable. The aircraft makers were ever jealous of their manufacture of airframes and engines and regarded the R.A.E. as a

potential rival in an advantageous position. The R.A.E. had little understanding of production problems as a result of this divorce from the process.³⁷ The use of the facility had some negative results. As well as the expense involved, the availability of the R.A.E. did not encourage the makers to build their facilities. A more comfortable arrangement would have been for the manufacturers to develop their own research capabilities. The availability of the government wind tunnel was ever the easier, and less expensive, option. This environment combined with the small production runs tended to inhibit the development of industry-owned wind tunnels and other research capabilities.³⁸

Another inhibiting factor arose over the use of these facilities. Handley Page had successfully developed an anti-stall device that became known as the Handley Page Slotted Wing or Handley Page Slots. After a series of developments, including the co-option of a German rival, Lachmann, Handley Page patented the device.³⁹ Difficulty arose when the Air Ministry claimed to be a co-developer of the device since Handley Page had used the R.A.E. facilities in the testing stages. The manufacturer was forced to threaten litigation to bring about a compromise in 1929 after two years of haggling.⁴⁰ This inherent potential for difficulty in a marriage of a commercial industry to state control was seen also in an earlier case.

Claude Graeme-White had emerged as a successful aviation entrepreneur during the war. He happened personally to own Hendon aerodrome. It had developed as a major R.A.F. base. Its proximity to London made it a desirable commercial location as well. Assuming that the facility was to be returned to him, he developed the site with recreational and manufacturing facilities centered on aviation. The Ministry wanted to maintain it as an R.A.F. facility. As a result, in 1922, when Graeme-White was out of the country, the Ministry engineered a landgrab. By having the Treasury claim an unpaid wartime loan for factory expansion, the Ministry seized the property

and dismissed Graeme-White's employees wholesale. The infuriated owner countered with a cancelled contract claim that exceeded the loan debt. To break the deadlock Graeme-White prepared a legal battle only to discover that, although he had a valid case, he could not execute it. The Crown could not be sued. The episode ended in 1926 when the threat of front-page publicity in Northcliffe's press broke the impasse and the government "compensated" the owner for a rumoured million and a quarter pounds.⁴¹ Northcliffe, it must be remembered, had established himself as a strong critic of the Air Ministry and no doubt welcomed the opportunity to embarrass it.⁴²

The aero-engine field was also not without incidents of Ministry heavy-handedness. One "Ring" member, Fairey Aviation, was deemed by the Ministry to be an airframe manufacturer. Richard Fairey admired American technology. Impressed with the performance of the Curtis D-12 engine, he obtained a license to build it and developed the "Fox" aircraft around it as a private venture. The Fox was an excellent performer yet, as a private venture, outside of the Ministry orbit. Only by the direct intervention of Trenchard was it ordered and then not in enough numbers for Fairey to see a profit.⁴³ Fairey had not only built a superior aircraft as a private venture but had furnished it with what was considered the best power plant available. This procedure should have made commercial sense as a normal business routine, but Fairey was further punished for his transgressions by having the potential of producing aero-engines removed from him. Not willing to allow Fairey to emerge as another aero-engine producer, the Ministry approached first Napier then Rolls-Royce with the mandate to develop a British response to the D-12. As a result Rolls-Royce re-entered the aero-engine field with its Curtis derivative, the Kestrel.⁴⁴ Fairey was left with no aero-engine capability. The lessons learned from the D-12/Kestrel engine set in motion a series of technological advances that culminated in the renowned Merlin. Although hindsight makes the Ministry move to re-activate the potential of Rolls-Royce as an aero-engine designer

look very good, quite another point is made clear by this episode. Fairey can be cited as a good example of a firm willing to take a risk and be innovative. To do this there had to be a willingness to risk private venture capital and utilize all available technology. This was precisely how the Boeing 247 and DC series were developed. It was not that the British aviation industry was incapable of technological prowess. The problem lay in the stifling control imposed by the "Ring" system.

The potential in Britain for the elusive "world-class airliner" was always there. In 1928 a successful British design was developed for a variable-pitch propeller that compared well to the Hamilton Standard model of the 1930's.⁴⁵ A flap-device designed by Fairey had been used in the war.⁴⁶ As already seen the Townend Ring had addressed the need to streamline engines.⁴⁷ In 1920 Oswald Short built the "Swift" aircraft that incorporated a metal monocoque fuselage. It drew attention from the U.S. Army and a dismissal from the Air Ministry.⁴⁸ The American engine, the Wright Whirlwind, that fathered a whole series of powerplants which gave America much of its engine capability was designed by the English engineer S.D. Heron.⁴⁹ The first aircraft maker to incorporate retractable landing-gear in its designs, Airspeed, was kept out of the "Ring" until 1936.⁵⁰ The climate of the British Aviation Industry was not conducive to innovative development on a commercial basis.

There was a discernable air of arrogance within the "Ring's" membership. As early as 1923, Professor Hugo Junkers had been invited to address the Royal Aeronautical Society. Junkers had been building metal monoplanes with cantilever wings since 1915.⁵¹ He, and his innovations, were given cavalier treatment by, among others, Handley Page.⁵²

There was an equally obstinate rejection of American techniques and practices in the 1930's. These included suggestions from the manufacturers for tariffs on American aviation products.⁵³ Much of this resistance to American products came more from a current distaste for their business ethics. The aggressive, if innovative, practices of the Americans produced friction in British circles.⁵⁴ When Napier rejected the chance to develop the American D-12, it was based on an unrealistic appraisal that their own engines did not need improvement.⁵⁵

In considering the difficulties of the British aviation industry, some attention has to be given to its personnel. There were few among the engineers, designers or owners, who held degrees in aeronautics or even engineering.⁵⁶ This, in part, was due to the pioneering aspect of the industry. However, the German and American industries had developed a layer of middle-management personnel who were appropriately trained.⁵⁷ The British aircraft industrialists tended to be a rough and ready "rule of thumb" group whose bluntness reflected that background.

"From senior and middle management down to routine design staff, draughtsman and skilled labour there was a critical shortage of appropriate training and experience...Beyond a handful of university-educated aeronautical engineers of high quality there was no British equivalent, for example, to the phalanx of college-trained engineers apt for bread-and-butter design which abounded in the American Industry."⁵⁸

Ironically, a large degree of misplaced confidence had been engendered by some spectacular successes. The British proved very capable of building racers. The Schneider Trophy victory of the Supermarine racer is a story often told. The mythology surrounding that achievement has been equally well penned.⁵⁹ However, the benefits to the aircraft industry are less easily established. The Schneider Trophy racers were designed to fly with an engine

whose life expectancy was measured in minutes.⁶⁰ They were custom designed and built to a specific task. Their performance criteria were limited - get up, go fast, come down. Their life expectancy was minimal. They had merely to achieve their set racing task. A telling comparison may be made to another, American, racer.

The Hughes racer flew four years after the Schneider victory. In a flat out test of speed, it could not compete with the S-6B Schneider winner. What it did do was two things. It set a series of long distance/speed/endurance records and more importantly, did it with "off-the-shelf" equipment. The significance of the Hughes R-1 was that it was:

"equipped with a standard production power-plant and got its speed from simple aerodynamic refinements that were applicable to everyday aircraft."⁶¹

The S-6B was the exotic product of an extensive design and production team that had an immense stake in national prestige at risk. It was an outstanding propaganda success. The commercial benefits were virtually nil. The Hughes aircraft exemplified the American success in that it was a compilation of readily available commercial technology. This type of comparison of the inherent capabilities of two different aircraft production systems was illustrated in 1934 with even more clarity. In that year the MacRobertson London to Australia race captivated the aviation world. The winner was the De Havilland "Comet" racer.

The "Comet", like the S-6B, was a hand-built purebred designed for one specific task.⁶² It won the monetary prize and the propaganda victory. The true significance of the race was the success of the second and third place entrants. They were a DC-2 and a Boeing 247 respectively.⁶³ The DC-2, a

K.L.M. airliner, added insult to injury by carrying mail and passengers and following its standard route.⁶⁴

The race turned out to be as much a defeat as a victory. Its importance lay in the fact that the purpose-built special "Comet" had been given serious competition by journeymen. The DC-2 and Boeing 247, had shown themselves capable of standards of performance comparable to a highly specialized British product. The American aircraft could also function as commercial carriers. The Comet had a very limited usefulness. The impact was predictable.

The London Morning Post was typical in its reaction when it stated that the results of the race:

"have fallen like a bomb in the midst of every-day commercial ...aviation ... preconceived ideas of the maximum speed limitations of standard commercial aeroplanes have been blown sky-high."⁶⁵

The details of the Comet's construction are revealing. A long distance racer, the aircraft needed the benefit of variable pitch propellers to help to take off and land at a different rate than it cruised. There was not one readily available. A series of negotiations with the American manufacturer, Hamilton-Standard, had failed to procure the wanted propellers. The difficulty centered on the types of engines used. Hamilton-Standard produced a propeller that was designed to fit the radial engines that American airliners used almost exclusively. These engines had a hub that protruded at the front of the engine. A propeller fitted to these power plants had very short shafts allowing for the blades to be extended right down to the hub.

De Havilland designed the Comet with in-line engines. Like an automotive engine, the pistons were lined up in a row as opposed to the radiating design of the radial types. This allowed for a highly streamlined design as this type of engine presents a very smooth profile. A propeller fixed to this type needed a thin, long shaft to protrude through the spinner to the hub. The Hamilton-Standard design could not be altered to fit such engines. The best alternative solution was a French design that was operated by means of a bicycle pump. It had two settings only. Once re-positioned the blades could not be adjusted. Thus the advantage of pitch change was only available on take-off.⁶⁶

The issue of the variable pitch propeller revealed more. Hamilton had tried to sell its invention prior to 1934 in Britain without success.⁶⁷ De Havilland was interested but inhibited by the cost of tooling up to make the device when no orders were in hand. A subsequent mission to the Air Ministry to promote the British manufacture of the propellers and enough orders from the Ministry to warrant a start-up fell on deaf ears.⁶⁸ An innovation of immense potential had been passed by.

The variable pitch propeller was pursued in America because it was needed. Biplanes with a slow speed do not need to alter their flight capabilities when landing or taking off. The variable pitch capability was a by-product of speed. Speed was the result of monoplane development. In 1934 there was not enough high-speed monoplane production to warrant a market in Britain, as the Hamilton representatives had discovered.

The example of the variable pitch propeller was an illustration of an industry badly behind world developments. De Havilland, a very innovative company, had hand-built a superb racer in the firm's tradition of brilliant designs. What they produced was a "white-elephant". Both the Boeing-247

and DC-2 went back to their every day existence as commercial airliners. The Comet became the stuff of legend. Legends could not nourish an industry or fill sales orders. The MacRobertson race to Australia had clearly shown the world the superiority of an industrial system that produced prosaic workhorses capable of running with purebred racers.

As has been seen in previous chapters, there were attempts to rectify faults in the British system. The principal flaw of having too many and diverse companies had been recognized. All attempts at reform came up against the inertia of the "status quo" concentrated primarily in the Air Ministry. There was a consistent resistance to change even after due and careful deliberation.

As early as 1924 an attempt by the Ministry to implement a series of mergers that would have rationalized much of the construction capabilities fell flat.⁶⁹ It is important to note that, at the same time, a successful series of mergers were implemented to create Imperial Airways. The market was being narrowed at the same time that the industrial base was being allowed to remain diluted. Too many were being allowed to sell to too few. In 1931 the May Committee reiterated the need to consolidate. This time the Ministry objected.⁷⁰

One positive change in 1931 was the opening of the College of Aeronautical Engineering, the first institution of its kind in Britain. However, the College only accommodated 35 students.⁷¹ It marked the late and slow rate of recognition of the problem.

The tenacity of the British aircraft manufacturers to persist in a highly competitive field regardless of this situation can be cited as a tribute to their energies. There is evidence that many of the inadequacies were due to their

own perception of themselves and their capabilities. The E.A.M.S. flying boats illustrate this point.

The "Last Hurrah" of British civil aviation before the war came with the flying boats. They epitomise the period and have a mythology all their own. Imperial Airways had operated flying boats built by the Short company since 1928. The Calcutta and Kent/Scipio class boats⁷² had proved successful and popular. Their success helped to spawn the E.A.M.S. programme. The boats had demonstrated their ability to cope with respectable payloads without the need of airfields.

When (in 1933) Sir Eric Geddes presented his arguments to the Cabinet to utilize flying boats, he emphasized the difficulties and expense of building sufficient airfields throughout the Empire routes.⁷³ He was, no doubt, influenced as well by the difficulties encountered in the Persian Gulf that had forced a duplication of facilities. He introduced some interesting technical concepts. The flying boat, he argued, could be increased in size and hence payload capability without altering its landing medium - water. To increase a landplane's size was to necessitate increasing the size of the landing facility.⁷⁴ The flying boat offered a solution that neatly side-stepped the issue. Geddes was arguing from within the paradigm of British capabilities. He was also initiating a commitment to the large flying boat.

Geddes, and Imperial Airways, needed a large comfortable aircraft that could exploit routes dominated by coastal ports. It was possible to maintain all the Imperial routes by exploiting fresh and salt water landing sites. The flying boat offered an opportunity to standardize, to a large degree, the equipment used. The expertise was available and proven. The need to "show the flag" could be served with panache. A flying boat is a majestic and imposing

aircraft. At the same time, it was capable of carrying the mails with dependability and passengers in comparative luxury. It was eminently suitable to Imperial's needs.

Overlooked were some predictable difficulties, and expenses, of operating suitable landing sites for flying boats. Weather, tides and maritime hazards made an inlet or bay more unpredictable than a landing field. Ferrying passengers to and fro and maintenance became more difficult when carried out on water. Re-fuelling in a swell was a difficult experience. Sea salt and humidity added another factor of maintenance. It was for these, and other, reasons that the boats were more expensive to produce and maintain than landplanes. By comparison, the DC-2 and DC-3 could be operated for approximately half the maintenance costs.⁷⁵ It was for these reasons that the landplane was eventually to emerge as the dominant carrier.

There was one clearly advantageous aspect to the introduction of the boats. An order was placed for 28 all at once. For the first time, a civil airliner order enabled the maker to tool-up for a mass run.⁷⁶ The result of this order was the Short Model 23 (S-23) that Imperial dubbed the "C" class or "Empire". Perhaps, no other British civil aircraft has endeared itself so emphatically in the British collective memory. They were, undoubtedly, magnificent aircraft. Yet, like the HP42, they were at the same time a symbol of misplaced technology. Simply put, they were not as good as they seemed.

In a comparison with contemporary American boats, the Empire "C" class simply could not compete in range, performance or cost effectiveness.⁷⁷ Part of the reason harkens back to the E.A.M.S. scheme outlined by Geddes. As envisaged, the E.A.M.S. scheme did not need a long range boat. The greatest "hop" to be faced was 750 miles, on the routes to either Capetown or

on to Australia.⁷⁸ The S-23 was designed accordingly. It was not conceived of as a trans-Oceanic airliner. Destiny was to draft it for such a role.

The Americans, however, were building trans-oceanic flying boats and looking for routes to exploit. The Sikorsky S-42 first flew in 1934.⁷⁹ As a mailplane, without passengers, it was capable of providing non-stop Atlantic service. It was prevented from inaugurating such a service by diplomatic and not technical hindrance.⁸⁰ The Martin M-130 was superior to the S-42 when it established its credentials in 1935.⁸¹ Both were to be surpassed by the Boeing 314 in 1937.⁸² Both the Martin and Boeing boats were capable of carrying mail and passengers on a trans-Atlantic route. Thus, by 1937, the Americans had at their disposal three models capable of non-stop Atlantic service. Furthermore, they were built by three different companies. Only Sikorsky Aviation specialized in flying boats. The oldest design, the Sikorsky, was operated by Pan Am on the New York - Bermuda run jointly with Imperial Airways in 1937. The American craft, although older, were able to provide a faster service. In addition, the Imperial entry, "Cavalier", had to be fitted with long-range tanks to accomplish the route. The unfortunate crash of the "Cavalier" in January of 1939 left the route to the Americans alone.⁸³

Between 1937 and 1939 a series of proving flights by Imperial and Pan American Airways did much to prepare for eventual regular service over the Atlantic. Imperial was forced to withdraw from the route in 1938:

"as it had been found that the non-stop abilities of the Short flying boats would not prove adequate for commercial work over the Atlantic, due to the large amount of weight of fuel they were obliged to carry."⁸⁴

This inadequacy was addressed with varied approaches. A "scaled-up" S-23 "Empire" evolved as the S-26. The Short-Mayo-Composite aircraft utilized

a "piggy back" approach whereby one aircraft was perched on another and separated when both were airborne. A final solution was the S-30 that utilized in-flight refuelling to overcome the range problem. The craft took off with a moderate fuel load and then via the in-flight service, completed the journey. Eight such trips were accomplished in 1939.⁸⁵

However, the most damning fact about the Empire was its safety record. Of the 32 S-23 class boats registered between 1936 and the war, and in use in civil service in that period, eight crashed.⁸⁶ That represents one quarter of them. More importantly, four of these mishaps were found to be the result of failure of the planing capabilities of the aircraft; that is, the causes were a direct result of the aircraft's performance rather than weather or other variables.⁸⁷

There was another troubling aspect involved with these aircraft. The British were very reluctant to accept the superiority of the American rivals. "Flight", the aviation journal, was clearly sceptical of American claims citing them with such a comment as "if the figures published are to be believed",⁸⁸ and:

"it is difficult to believe that the saving can be anything like as great as these figures would indicate."⁸⁹

The reluctance of a British journal to believe the American claims can be understood. The reluctance of professional aviation officials to come to grips with that reality is of a more serious nature.

In 1932 Pan Am had given Imperial Airways the performance data of the M-130. They were ridiculed. In 1933 Robert Mayo, the respected aeronautical engineer and consultant to Imperial, re-worked the 1932 data. He concluded that the claims for the M-130's performance:

"could not possibly be achieved...(it was) quite incapable of operating on an Atlantic service over the Azores-Bermuda, or Ireland-Newfoundland routes."⁹⁰

Both Imperial, and more significantly, the Air Ministry, accepted this conclusion.⁹¹ There is an aura of stubborn chauvinism in this rejection. The M-130 was to proceed to make good the claims made about its performance. It was to operate on the California-Hawaii run that was 17% longer than the trans-Atlantic route.⁹²

This stubbornness did not go away. The British could not accept that their flying boats were not as good as they believed. In 1966 a British historian was quite comfortable in his assertion that the Imperial Airway "C" Class flagship could be attributed with:

"beginning an era of British leadership on the civil air routes of the world such as she had never known before."⁹³

One page later his account describes the ad hoc attempts, using composite aircraft and in-flight refuelling, to match the American boats' long range capabilities.⁹⁴

The Empire boats were another case of building the wrong thing. They were, as stated, designed to be used in a series of medium ranged stages down the coast of Africa and across the island route that stretches from India to Australia. That mission was performed well and competently. The dilemma arose when for reasons of prestige and commercial prowess they were entered into a long-range competition with the American entries.

The Empire boats were eventually to emerge as improved "marks". The S-23 evolved through the S-26, S-30 and its military variant, the Sunderland.⁹⁵

Both the civil and military versions gave stalwart service throughout the war. They constituted, however, a pursuit of another cul de sac. The resources that were absorbed by the flying boat programme inhibited any long-range landplane airliner development. The Americans, with superior capital resources, proved capable of developing both. While they were building their flying boats they were also introducing the second generation of newer, four-engined airliners that were to dominate the next generation.⁹⁶ The British could not match this. They were to end up with ascendancy in neither. This was a sad comment upon the aviation policies of a nation that had lost its status as a leader in civil aviation.

CONCLUSION

The image of Neville Chamberlain waving his famous piece of paper in 1938 has entered the consciousness of history. It became a powerful image because of subsequent events. It was drenched in irony. No less a powerful image was that of the sleek, shiny aeroplane from which he was descending. It was a Lockheed. The British Prime Minister was conducting his harried negotiations by means of an American civil aviation product. Perhaps no other image transmitted the decline of British civil aviation in the previous two decades as effectively. If the point needed clarifying, Sykes was clear in his summation that the British were:

"operating obsolete machines of inferior speed... (Dominion) air lines were equipped with foreign machines, our West Indian possessions were served by American companies and we paid France and Germany 100,000 pounds annually to carry our mails to South America... a loss of our world supremacy in the air."

The "loss of our world supremacy in the air" has been the subject of this investigation. Here we may sum up the factors that gave Sykes' comment validity. The institutions that evolved to direct the new technology in Britain must bear the major responsibility for Britain's loss of world supremacy.

The evolution of international diplomacy that responded to the needs of aviation was a major factor in the fate of British civil aviation. The emergence of the sovereignty doctrine placed considerable inhibitions on its progress. The British government had argued effectively for the doctrine from their perspective as a major power unwilling to cede any form of transgression of their territory. They had hundreds of years of maritime precedent to draw upon. Given the circumstances of their deliberations, it would be difficult to fault that approach. They could not, in fairness, have foreseen the consequence of the I.C.A.N. agreements drafted in Paris. The subsequent punitive actions against

Germany and the reciprocal effects of the "Nine-Rules" were equally unpredictable in their results. The resurgence of German aviation was the surprise factor in post World War One aviation.

What cannot be set aside is the British unpreparedness for the ensuing bilateral deliberations that these developments guaranteed. The lack-lustre calibre of British performance in these negotiations stands out. This was an area in which Britain had expertise and experience. However, the routes across Europe and through Persia were clumsily and tediously negotiated. The confusion generated by a lack of communication between service and civil agencies in the Persian debacle brings to light another major factor.

British civil aviation always existed in the shadow of service aviation. It was never to emerge from that position in the inter-war period. Its resources were strained because military considerations came first. The Heads of civil aviation invariably had held service rank. The post war aviation generation had all learned their trade whether in the flying or building of aircraft in service endeavours. That a natural carry-over between military and civil flying took place was to be expected. What was avoidable was the near insignificant status that the civil sibling obtained. Despite the Cadman Inquiry's advocacy of reforms designed to address that imbalance, the situation persisted to the end of the period. By then, the threat of war justified the dominant position of service aviation.

The critical lack of funding at all levels can easily be isolated as a major factor in the decline of civil aviation. The British subsidization of civil aviation was, at best, meagre. The collapse of the airlines in the pre-Hambling era was a woeful and wasteful episode. The British played from behind from that moment on. The subsequent premeditated policy in 1927 of avoiding Europe and plying the skies of Empire must be cited as a contributing factor.

That obstructive nationalism was encountered in those skies cannot be blamed upon the British. What can be brought home to them was the handling of that phenomenon. Despite a vast experience of diplomacy to draw upon, the efforts devoted to the development of international civil air routes were rarely brilliant. Even within the fold of Empire the performance did not much differ. The Indian experience alone showed a cavalier approach that was neither constructive nor appropriate.

The lack of any encouragement to internal, domestic airline growth must be cited as a serious flaw.

The placing of all the eggs in Imperial Airways' basket and then allowing the management of that concern to pursue a mercantile policy were deliberate and bad decisions and must be criticized. Imperial's management was instrumental in implementing policies that had adverse effects upon civil aviation. It did not address its mandate to foster development. It badly hindered aircraft design and development with its preconceptions of what an airliner should be.

The government's management of the manufacturing aspect of the industry can easily be isolated for criticism. In the attempt to preserve the industry it imposed a system of rules and restrictions too rigid for innovative development. The Ministry opted to preserve a skeletal industry instead of a more rationalized entity that the appropriate mergers would have created. To be sure, it would have contained fewer firms. It would have, however, reflected more accurately the size of its market. It would also have conserved and developed its skilled labour force. What did survive was a virtually dead skeleton. All of these criticisms are more immediately practical in their nature than other and broader considerations.

British Imperial geography dictated the need for long-range aircraft. Of all the aviation powers, Britain had the most compelling need to defeat distance. Aside from the debacle of airships, no attempt was made to address that need in any meaningful civil designs. The policies adhered to by Imperial Airways produced a great irony. In their reach to the ends of the world, they adhered to a short-hop policy that generated short range aircraft. It was a major flaw in their thinking. A nation that was obsessed with the intricacies of railway timetables and interchanges had perhaps extended that concept to the new technology. Cairo as a "Clapham Junction" indicates this trend. The through, express route was never sought. It was consistently seconded to a "trunk route" concept. Distance was overcome by a series of short-ranged routes that did not demand a long-range airliner.

Another British tenet is worthy of consideration here. There is evident in the period a consistent reluctance to address the problems of civil aviation development head on. The provision of facilities and routes was a poor substitute for the obvious need for subsidies: this was the first instance. The French bit the bullet and endowed their industry with good financial support. The Germans evolved a very comprehensive system of subsidies. The British government consistently sought alternate solutions to obvious problems. The "ring" system of manipulating the aviation industry reflects a lack of resolve to face squarely the need to diminish and consolidate the industry in 1920.

The adoption of an Imperial preference for aviation in 1927 neatly sidestepped the lack of competitive capabilities in Europe. The implementation of flying boats was yet another "end-run" that did not work. All of these contributed to not only a lack of a competitive aircraft but the lack of the infrastructure needed to produce one. Time, and other peoples' technological improvements, soon caught up with this British penchant for avoidance.

Finally, there was that element of personalities. The historian of the period, Mowat, made an interesting observation. In an evaluation of the Cabinet of 1931, at the middle of the period under scrutiny, he cites three of them, Hoare, Cunliffe-Lister and Londonderry as:

"hard-working men (but) they were not men to inspire others."²

They were, of course, all Ministers for Air at one time or another. The one man who was credited with that capability to inspire was Churchill. Yet Churchill's role was principally to help hamstring civil aviation in its infancy. Cunliffe Lister was of course to emerge, as Lord Swinton, as a most effective Air Minister in the rearmament period of 1935 on. Churchill's contribution to the resurgence of the R.A.F. is easily cited. However it is their respective contribution to civil aviation that can be questioned.

The heads of the civil aviation branch of the Air Ministry continued the trend. The intercene rivalry of the 1918-1919 period had left the clear loser, Sykes, in possession of civil aviation and it suffered accordingly. The subsequent parade of indifferent men who led civil aviation was interrupted only when Reith arrived to offer any kind of decisive change. Reith did not want the job. An exception may have been Brancker, but his contribution was cut short along with his Minister, Thompson, in the R101 disaster.

The "captains of industry" were unwilling or unable to influence sufficient change. Men such as Handley-Page simply did not have a large enough vision. Firms such as De Havilland and Rolls-Royce could not implement an industry-wide recovery by themselves.

What also was evident was the small sphere of influence that manipulated the industry. Between the manufacturer's cartel, Imperial's

management, and the Ministry a small circle of men influenced and guided its progress. They did so jealously. Cobham was held at arm's length. Hillman had to force his way in with obstinate persistence. Cowdray bought his way back in after leaving the inner circle earlier.

It is interesting to note that some of the more dynamic characters in aviation came from the ranks of the ground transport industries. Pick, whose insight perceived many difficulties early in 1918, was an "underground" specialist. Hillman, the bus operator, showed sufficient acumen to challenge the established order in the early 1930's but died at the point of success. These clever "outsiders" were never really matched on the "inside". The industry tended to be managed by less than dynamic individuals. Geddes was dynamic, too dynamic in the wrong cause - dividends. His disciple, Woods Humphrey, albeit a reasonably good company administrator, was not endowed with a greater vision or purpose in civil aviation.

The surviving impression of a failure of vision is one that Mowat captures when he summarizes the tone of the period:

"This fashioned the character of the governments of the inter-war years: adequate discharge of routine duties, complacency, the failure of imagination and will."³

The comment could have been designed to accommodate civil aviation. What was lost was the premier position in the world in civil aviation. It was lost irrevocably.

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89. Ibid., p. 16
90. Sykes, From Many Angles, p. 299
91. Grey, Air Ministry, p. 124
92. Hyde, Air Policy, App. I
93. Higham, Imperial Air Routes, p. 74
94. Cmd 2010-1923, p. 2

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4. A comprehensive look at French policies is given by M.D. Tolles, "French Subsidies". A comparison to British and German subsidies is offered in this text
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6. K. Munson, Airliners, pp. 150-151; see also P.W. Brooks, The Modern Airliner, pp. 52-54.
7. P.W. Brooks, The Modern Airliner, p. 39; see also P. King, Knights of the Air, p. 280
8. Ibid., p. 51; see also E. Birkhead, "The Financial Failure of British Air Transport Companies, 1919-24", Journal of Transport History, IV, #3, p. 138
9. P.W. Brooks, The Modern Airliner, p. 53
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11. P.W. Brooks, The Modern Airliner, p. 53
12. Ibid., pp. 50-51
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17. R.E.G. Davies, World's Airlines, pp. 22-24
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20. Ibid., p. 50
21. E.P. Warner, "Air Transport", p. 283
22. Ibid., p. 283; see also F.H. Sykes, "Imperial Communications and The Air", The Empire Review, XLI, p. 389
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30. Ibid., p. 59; see also K. Munson, airliners, pp. 141-144
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33. R.E.G. Davies, World's Airlines, pp. 16-19; see also P. King, Knights of The Air, pp. 209-211 and pp. 224-228
34. R.E.G. Davies, World Airlines, p. 31
35. Cmd. 800-1920, p. 17
36. Cmd. 1900-1923, p. 35
37. Ibid., p. 35
38. Ibid., p. 35
39. Cmd. 2010-1923, p. 9
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41. R.E.G. Davies, World's Airlines, p. 5
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44. Ibid., p. 88
45. Ibid., p. 91
46. Ibid., p. 90
47. Ibid., pp. 95-96
48. CAB 24/190, CP 327 (27)
49. Ibid., p. 2
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52. Cmd. 2010-1923

53. F.H. Sykes, From Many Angles, p. 301
54. R. Higham, "The British Government and Overseas Airlines, 1918-1939, A Failure to Laissez-Faire", The Journal of Air Law and Commerce, XXVI, No. 1, p. 12
55. F.H. Sykes, "Imperial Communications", p. 388
56. F.H. Brackley (comp.), Brackles, p. 238
57. R. Higham, "The British Government", p. 12
58. The Aeroplane, Sept. 2, 1925, p. 296
59. N. MacMillan, Sir Sefton Brancker, p. 287; see also F.H. Brackley, Brackles, p. 238
60. C. Mowat, Britain Between the Wars 1918-1940, Boston: Beacon, pp. 377-8
61. A.P. Dobson, Peaceful Air Warfare, p. 43
62. Ibid., p. 43
63. R. Higham, "The British Government", p. 2; see also H.J. Dyos and D.H. Aldcroft, British Transport, p. 381
64. R.E.G. Davies, World's Airlines, p. 60
65. Ibid., p. 59
66. Ibid., p. 63; P.R.C. Groves, of "Nine Rules" fame, rated the British at fifth in his 1929 Article "The Influence of Aviation on International Affairs", Journal of The Royal Institute of International Affairs, VII, No. 4, p. 302

CHAPTER 4
IMPERIAL SKIES 1924-1934
THE SHADOW OF EMPIRE

1. R. McCormack, "Airlines and Empires", p. 88-89; see also H. Stannard "Civil Aviation. An Historical Survey" International Affairs, XXI, No. 4, p. 499
2. R. McCormack, "Airlines and Empires", p. 89
3. R. McCormack, "Imperial Mission: The Air Route to Cape Town 1918-32", Journal of Contemporary History, IX, No. 4, pp. 80-81; see also D. Jones "1919: Forty Three Landing Grounds", The Time Shrinkers - Africa: The Development of Civil Aviation Between Britain and Africa, London: Beaumont, 1970, pp. 12-17
4. R. McCormack, "Imperial Mission", pp. 80-81
5. Ibid., pp. 82-83; see also his "Missed Opportunities", p. 216
6. R. McCormack, "Missed Opportunitites", p. 216 and "Imperial Mission", p. 82
7. The potential conflict that commercial interests can create in the Diplomatic sphere is well described by N. Pugach in his article "Anglo-American Aircraft, Competition and the China Arms Embargo, 1919-1921", Diplomatic History, II, No. 1. Salmond was seeking to avoid a similar development by Vickers in Africa.
8. Cmd. 449-1919
9. Cd. 9218-1919
10. D. Jones, "Forth-Three Landing Grounds", p. 90 (also Footnote); see also R. McCormack, "Missed Opportunities", p. 227
11. R. Higham, pp. 134-136; see also H. Burchall "The Politics of International Air Routes", pp. 92-94. Burchall was a General Manager of Imperial Airways
12. R. McCormack, "Missed Opportunities", pp. 216-217; see also C. Mowat, Britain Between the Wars, p. 110

13. R. Higham, Imperial Air Routes, p. 110
14. F.H. Sykes, From Many Angles, pp. 287-288
15. Cmd. 449-1919, p. 4
16. F.H. Sykes, "Imperial Communications and The Air", The Empire Review, Vol. XLI, pp. 389-390
17. This service is aptly described by one of its participants in Wing Commander R. Hills The Baghdad Air Mail, London: Arnold, 1929
18. A.J. Quin-Harkin, "Imperial Airways", p. 203; see also R. Higham, Imperial Air Routes, pp. 111-119
19. A.J. Quin-Harkin, "Imperial Airways", p. 203; see also K. Munson, Airliners, p. 113
20. R. Higham, Imperial Air Routes, p. 46
21. Ibid., p. 203; see also C.G. Grey, The Air Ministry, p. 124 and p. 131
22. R. Higham, Imperial Air Routes, p. 343
23. Ibid., p. 46
24. S. Hoare (Lord Templewood), Empire of the Air, p. 90
25. A. Dobson, Peaceful Air Warfare, pp. 37-41
26. Ibid., p. 40; see also Cmd. 1811-1923
27. S. Hoare, as quoted in A. Dobson Peaceful Air Warfare, pp. 38-39
28. A. Dobson, Peaceful Air Warfare, p. 46
29. S. Hoare, Empire of the Air, p. 96
30. S. Hoare, India by Air, London: Longmans, 1927
31. Ibid., p. 125
32. R. Higham, Imperial Air Routes, pp. 122-123

33. Ibid., pp. 122-125. This entire episode is described in great detail and accuracy in three articles. Two are by H. Burchall "The Politics of International Air Routes" and "The Political Aspect of Commercial Air Routes". As their titles imply, they stress the political and diplomatic aspects. For a technical aspect of developing the route a good reference is G.W. Bentley, "The Development of The Air Route in The Persian Gulf", Journal of The Royal Central Asian Society, XX. Bentley was the R.A.F. officer in charge of much of the survey work.
34. R. Higham, Imperial Air Routes, pp. 124-125
35. M.R. Dhekney, Air Transport in India, Bombay: Vora, 1953, p. 57
36. C. Mowat, Between The Wars, pp. 377-378
37. M.R. Dhekney, Air Transport, p. 57
38. R. Higham, Imperial Air Routes, p. 165
39. M.R. Dhekney, Air Transport, pp. 58-60
40. R. Higham, Imperial Air Routes, p. 166
41. R.E.G. Davies, The World's Airlines, p. 201
42. R. Higham, Imperial Air Routes, pp. 171-177
43. Ibid., pp. 178-179
44. Ibid., p. 179
45. K. Munson, Airliners, pp. 122-123
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47. Ibid., p. 96
48. Ibid., p. 96 (Footnote); see also his "Pirow", p. 547
49. R. McCormack, "Pirow", p. 544. The remark is attributed to Sir Christopher Bullock, the permanent undersecretary at the Air Ministry who frequently negotiated with Pirow

50. Ibid., pp. 548-549
51. S. Roskill, Hankey, Man of Secrets Vol. III, p. 116
52. G.E. Woods Humphrey, "Imperial Airways - Yesterday, To-day and Tomorrow", The Aeroplane, XXXXVIII, p. 495
53. An excellent presentation of Imperial Airways' lasting image of romance and prestige is given by A. Frater in his book Beyond The Blue Horizon. On the Track of Imperial Airways, London: Penguin, 1987

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3. H.J. Dyos and D.H. Aldcroft, British Transport, p. 389
4. *Ibid.*, p. 388
5. Cd. 9218-1918
6. *Ibid.*, pp. 4-5; pp. 20-24
7. Cmd. 770-1920
8. *Ibid.*, p. 4
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10. Cmd. 1811-1923
11. M.D. Tolles, "French Subsidies", pp. 128-129
12. *Ibid.*, pp. 133-134
13. *Ibid.*, p. 134
14. H.J. Dyos and D.H. Aldcroft, British Transport, p. 389; see also Cmd. 5351-1937, p. 11
15. P. Bagwell, Transport Revolution, pp. 286-287
16. *Ibid.*, p. 287
17. D. Jones, "1919: Forty-Three Landing Grounds"
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19. F. Shelmerdine, "Air Transport", p. 104

20. Cmd. 5351-1937, pp. 17-18
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31. H.J. Dyos and D.H. Aldcroft, British Transport, p. 390

CHAPTER 6 BELATED AWAKENINGS

1. Air Estimates, 1939, pp. 2-3
2. Air Estimates, 1939, p. 3, 1921, p. 2
3. C. Mowat, Britain Between The Wars, pp. 475-479
4. Ibid., p. 423-425
5. For a detailed examination of how the Disarmament discussions related to civil aviation and the subsequent resources they absorbed see A. Dobson, Peaceful Air Warfare, Ch. 3
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7. H. Dyos and D. Aldcroft, British Transport, pp. 382-383
8. P. Brooks, The Modern Airliner, pp. 73-87
9. R. Higham, "British Airways Ltd., 1935-40", Journal of Transport History, IV, pp. 113-114
10. Ibid., p. 114
11. Ibid., p. 116
12. See above Ch. 3
13. Cmd. 5685-1938, p. 45
14. Ibid., p. 14
15. F.H. Sykes, From Many Angles, p. 301
16. R. Higham, "British Airways", p. 116
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19. R. Higham, "The British Government and Overseas Airlines, 1918-1939, A Failure of Laissez-Faire", The Journal of Air Law and Commerce, XXVI, No. 1, p. 10; see also Cmd. 5685-1938, p. 8
20. Cab 24/240, C.P. 110(33)
21. Ibid., pp. 12-15
22. Ibid., attached note
23. Ibid., p. 1
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25. H. Dyos and D. Aldcroft, British Transport, pp. 382-383
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28. H.M. Hyde, British Air Policy, pp. 344-349
29. The Interdepartmental Committee on International Air Communications (I.C.I.A.C.). It was chaired by the Permanent Under-Secretary of the Treasury and Civil Service Head, Sir Warren Fisher.
30. Cmd. 5351-1937
31. Cmd. 5685-1938, p. ix
32. Ibid., p. 21
33. Cmd. 5254-1936 and 5255-1936
34. R. Higham, "The British Government", p. 10
35. Ibid., p. 10
36. Cmd. 5685-1938
37. Cmd. 1811-1923
38. Cmd. 5685-1938, p. 8

39. Ibid., p. 8
40. Ibid., p. 32
41. Ibid., p. 32
42. Ibid., p. 32
43. Ibid., p. 32
44. Ibid., p. 33
45. Ibid., p. 15
46. Ibid., p. 15
47. Ibid., p. 15
48. Ibid., p. viii, p. 16
49. J. Reith, Into The Wind, pp. 309-311
50. Ibid., p. 314
51. Ibid., p. 307
52. Ibid., p. 328
53. Cmd. 5685-1938, p. vii, p. 14
54. Ibid., p. 14
55. J. Reith, Into The Wind, p. 333
56. Ibid., p. 335
57. Ibid., p. 334
58. Ibid., p. 335. The shares stood at 29 shillings on the market. The Treasury position was 32 shillings, sixpence with a ceiling of 33. Reith compromised at 32 shillings, ninepence with a 4% dividend.
59. Ibid., p. 334

60. Ibid., p. 329
61. Ibid., p. 329
62. Ibid., p. 335
63. Ibid., p. 335; see also R. McCormack "Pirow", pp. 555-556
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65. H.M. Hyde, British Air Policy, p. 53
66. Ibid., p. 79
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68. The exception, of course, was the airship service of the Germans. The history of Trans-Atlantic pioneer flights is well represented by F.H. and E. Ellis, Atlantic Air Conquest. The Complete Story of All North Atlantic Flights and Attempts During the Pioneer Years from 1910-1940, Toronto: Ryerson, 1963.
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74. Ibid., p. 99, pp. 103-104

CHAPTER 7
THE MAKERS

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2. P. King, Knights of the Air, p. 207
3. Ibid., p. 207
4. See above, Ch. 2
5. Ibid.
6. P. King, Knights of the Air, pp. 237-239; see also P. Fearon "Aircraft Manufacturing" in N.K. Buxton and D. Aldcroft, eds., British Industry Between the Wars. Instability and Industrial Development 1919-1939, pp. 222-224
7. P. Fearon, "Handly Page Ltd.", p. 71; see also "The British Airframe Industry and the State 1918-35", The Economic History Review, XXVII, No. 2, pp. 222-223
8. P. King, Knights of the Air, p. 238
9. P. Fearon, "Airframe Industry", p. 245
10. P. Fearon, "Handly Page Ltd.", pp. 73-74
11. Ibid., p. 74
12. P. King, Knights of the Air, p. 286
13. P. Fearon, "Aircraft Manufacturing", p. 231
14. C. Barnett, The Audit of War. The Illusion and Reality of Britain as a Great Nation, London: MacMillan, 1986, p. 130
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16. P. King, Knights of the Air, pp. 234-236, p. 260
17. D. Edgerton, England and the Aeroplane. An Essay on a Militant and Technological nation, Houndmills, MacMillan, 1991, pp. 25-26

18. CAB. 24/190, C.P. 327(27); see also Cmd. 5685-1938, p. 41
19. K. Munson, Airliners, p. 116
20. The H.P. 42, first flown in 1930, cruised at 169 km.p.h. with a range of 402 km. The Fokker FVIIa/3m of 1925 cruised at 170 km.p.h. and had a range of 885 km. The Ju. 52 cruised at 245 km.p.h. and had a 915 km range. It was first flown in 1931. K. Munson, Airliners, pp. 35, 57, 84
21. A. Robinson et al eds. The Illustrated Encyclopedia of Aviation. London: Cavendish, 1979, Vol. X, p. 1152; see also A.J. Jackson, British Civil Aircraft, 1919-1972, Vol. II, pp. 237-240
22. P. Fearon, "Handley Page", p. 75
23. Ibid., p. 75
24. P. King, Knights of the Air, pp. 236-237
25. P. Brooks, Modern Airliner, Ch. II
26. Ibid., pp. 53-90
27. Ibid., p. 76
28. Ibid., p. 75; see also K. Munson, Airliners, pp. 10-11, 161-162
29. K. Munson, Airliners, pp. 162-163
30. P. Brooks, Modern Airliner, pp. 81-82
31. There were always exceptions. The Lockheed designs of the late 1920's and early 1930's, known as "plywood bullets", perfected monocoque wood fuselages. In a similar manner, De Havilland developed brilliant wooden aircraft that used the monocoque and cantilever principles.
32. P. King, Knights of the Air, pp. 221-113; see also P. Fearon, "Airframe Industry", pp. 239-240
33. P. Fearon, "Airframe Industry", p. 241
34. Ibid., p. 241; see also his "Handley Page", p. 75

35. P. Fearon, "Airframe Industry", p. 240
36. P. Fearon, "Aircraft Manufacturing", p. 231
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40. P. Fearon, "Handley Page", p. 77
41. P. King, Knights of the Air, pp. 211-213
42. See above, Ch. 2
43. P. King, Knights of the Air, p. 234; see also P. Fearon "Aircraft Manufacturing", p. 226
44. P. King, Knights of the Air, pp. 234-235. The Ministry purchased a D-12 and gave it to Rolls-Royce.
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46. Ibid., p. 82
47. Ibid., p. 76
48. P. King, Knights of the Air, p. 222
49. Ibid., p. 281
50. P. Fearon, "Aircraft Manufacturing", p. 235; see also C.A. Sims, British Aeroplanes Illustrated, London: Black, 1934, pp. 74-75
51. P. King, Knights of the Air, p. 221
52. Ibid., p. 221
53. P. Fearon, "Handley Page", p. 76
54. Ibid., p. 76

55. P. King, Knights of the Air, p. 234
56. Ibid., pp. 230-231
57. C. Barnett, Audit of War, p. 130
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59. The story of Mitchell the designer, the S-6B and the Schneider Trophy has been the stuff of books, films and modern mythology. A good description is offered in P. King's Knights of the Air, Ch. 12, "Winning Streak".
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61. R. Hallion, The Epic of Flight: Designers and Test Pilots, Alexandria: Time-Life, 1985, p. 55
62. C.M. Sharp, D.H., A History of de Havilland, Shrewsbury: Airlife, 1982, pp. 138-150; see also A.J. Jackson, British Civil Aircraft, Vol. II, pp. 139-144
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64. R. Smith, "The Intercontinental Airliner and the Essence of Airplane Performance, 1929-1939", Technology and Culture, XXIV, No. 3, p. 436 and ftn; see also Aircraft Yearbook, pp. 165-167
65. As quoted in K. Munson, Airliners, p. 11
66. C.M. Sharp, D.H., pp. 140-143
67. Ibid., p. 151
68. Ibid., p. 151
69. P. Fearon, "Aircraft Manufacturing", pp. 222-223
70. P. Fearon, "Airframe Industry", p. 244. Sir George May headed the Committee on National Expenditure.
71. C. Barnett, The Collapse of British Power, London: Methuen, p. 214

72. A.J. Jackson, British Civil Aircraft 1919-1972, Vol. III, London: Putnam, 1988, pp. 137-140
73. CAB. 24/240, C.P. 110(33)
74. Ibid., p. 12
75. P. King, Knights of the Air, pp. 290-291; see also P. Brooks, Modern Airliner, p. 91
76. P. Brooks, Modern Airliner, p. 91
77. R. Smith, "Intercontinental Airliner". In this paper he argues very persuasively that the American flying boats were clearly superior.
78. Ibid., p. 441
79. Ibid., p. 434
80. Ibid., p. 435
81. Ibid., pp. 437-438
82. Ibid., pp. 445-446
83. Ibid., p. 442; see also R.E. Davies, A History of the World's Airliners, London: Oxford U. Press, 1964, p. 323
84. F.H. Ellis and E.M. Ellis, Atlantic Air Conquest, Toronto, pp. 206-207
85. Ibid., pp. 207-208; see also R. Smith, "Intercontinental Airliner", p. 441
86. A.J. Jackson, British Civil Aircraft, Vol. III, p. 146, pp. 562-563
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96. P. Brooks, Modern Airliner, Ch. IV

CONCLUSION

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2. Mowat: Britain Between the Wars, p. 414
3. Ibid., p. 144

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