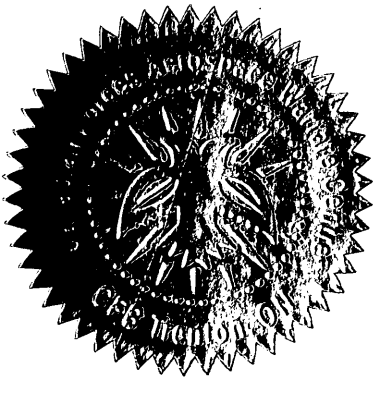
THE CREATION OF A NATIONAL AIR FORCE

THE OFFICIAL HISTORY OF THE ROYAL CANADIAN AIR FORCE VOLUME II



W.A.B. DOUGLAS

The Creation of a National Air Force

The Official History of the Royal Canadian Air Force Volume II

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Note: In the writing of this volume the author has been given full access to relevant official documents in possession of the Department of National Defence. The inferences drawn and the opinions expressed are those of the author himself, and the department is in no way responsible for his reading or presentation of the facts as stated.

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Preface

This book, the second of four projected volumes in the official history of the Royal Canadian Air Force, is about the origins and development of the RCAF as a national institution. The first volume, *Canadian Airmen and the First World War*, recorded a notably generous Canadian contribution to the war in the air from 1914 to 1918.

Several failed attempts to create a national air force out of that contribution formed curious, but important, elements in the early history of Canadian military aviation. Two short-lived organizations, the Royal Canadian Naval Air Service and the Canadian Air Force overseas, both established in 1918, had no institutional links with the Canadian Air Force that came into being two years later. However, the CAF and later the RCAF had unmistakeable connections with the past; thousands of men, from Air Vice-Marshal Sir Willoughby Gwatkin to the youngest airmen qualified during the First World War, created a pool of knowledge, experience, and commitment from which to draw. Aircraft, facilities, and equipment left over from the war provided the initial resources for postwar aviation. Above all, 'air mindedness,' resulting from wartime experience, was a vital prerequisite to winning Cabinet approval for government aviation services of any kind.

Military necessity brought Canada into the air age. In the peaceful 1920s, civil more than military concerns governed the shape, size, and functions of the RCAF; in the following decade the rise of international tensions forced the service to concentrate on its military role. During the Second World War the RCAF grew from a few hundred airmen to a force of some eighty squadrons and nearly a quarter of a million people. RCAF squadrons, wings, and groups took their place beside other Allied air forces in many theatres of the Second World War, and in the process acquired capabilities in virtually every phase of air warfare.

But the roots of the RCAF's growing reputation in overseas theatres – especially in the Northwest Europe campaign – were to be found at home. Responsible for the British Commonwealth Air Training Plan in Canada, the RCAF trained large numbers of other Commonwealth and Allied airmen as well as Canadians. Charged with the air defence of Canada, it built up a big Home War Establishment which played a significant part in the defeat of enemy attempts to destroy Allied shipping, particularly in the Battle of the Atlantic.

A number of RCAF maritime squadrons served on the other side of the ocean in the Royal Air Force's Coastal Command. Their anti-submarine operations have been included in this volume not only for their own intrinsic importance but also to provide a coherent and balanced account of the air war over the 'Atlantic bridge,' which was fought from the United Kingdom and Iceland as well as from Canada and Newfoundland. Most of these overseas squadrons also participated in anti-shipping strikes over the English Channel and North Sea in 1942 and 1943, and in operations directly related to the invasion of northwest Europe in 1944 and 1945. However, those parts of their story have been left for Volume III of this history, which will deal with operations overseas.

It must be remembered that half of the Canadian airmen who served in Coastal Command were not even in Canadian squadrons. They flew with other Commonwealth and Allied units. Their duties were as onerous, the risks they took were as great, and their sacrifices comparable, but to recount the story of their war would involve a comprehensive history of every facet of martime air operations, an approach which constraints of space make impracticable in a volume devoted to the evolution of the RCAF as an institution. Regrettably, a number of other groups – for example, groundcrew, weather and radio technicians, and the Marine and Women's divisions – also deserve more attention than the few references it has been possible to make. They also served and played significant parts in the development of the air force, but economy dictates that their stories, too, give way to those operational functions of organization, strategy, tactics, and procurement that are most central to the thrust of this series.

This book has been written from a wide variety of primary sources. RCAF historians during and just after the Second World War prepared a number of undocumented and somewhat narrowly conceived narratives which nonetheless provided a basis for further research into operations record books and daily diaries, as well as both RCAF and Royal Canadian Navy files held in the Directorate of History and the Public Archives of Canada. British Cabinet, Dominions Office, Air Ministry, Admiralty, and Intelligence records, as well as archival records in the United States, have also been indispensable sources. Some of these documents, particularly British Intelligence files, only began to be available in the later stages of research, and we realize that our use of such sources is far from complete. There must be a limit to all things, and future scholars will have the opportunity of following up leads which may have been revealed by our efforts.

As author of record, I take full responsibility for the accuracy and interpretation of the facts in this book. Like all previous Canadian official histories, however, this has been the work of a closely knit team. I am particularly grateful to Norman Hillmer, senior historian at the Directorate of History and chairman of this volume's editorial committee. Dr Hillmer co-ordinated the entire research, writing, and editorial effort, as well as carrying a good deal of that load personally.

W.J. McAndrew, who has become the authority on the origins of the RCAF and its early growth, wrote the successive drafts of the chapters in Part I, and offered

valuable advice during the rewriting process. M.V. Bezeau and Brereton Greenhous carried out the preliminary research and wrote drafts for the section on training in Canada. Captain Bezeau also prepared preliminary chapters concerning the air defence of the east and west coasts, and is responsible for many of the detailed charts and graphs in the volume. Ben Greenhous, whose critical eye has sharpened the perceptions and clarified the prose of so many historians, not just those writing Canadian official history, was an indispensable part of the editorial committee.

Stephen J. Harris wrote the first draft of Chapters 7 and 9, and of Appendix C; his energy and enthusiasm was a great asset as the book was brought to publication. F.J. Hatch, whose *Aerodrome of Democracy: Canada and the British Commonwealth Air Training Plan*, has paved the way for all future studies of this endeavour, carried out his research over many years at the Directorate of History before his retirement. J.D.F. Kealy prepared the first adequately documented studies of Eastern and Western Air Commands, and of RCAF anti-submarine operations. Robert Baglow's statistical analysis of Eastern Air Command submarine sightings in 1942, prepared in co-operation with Mr Kealy, filled a large gap in our knowledge.

Carl Christie, the secretary of the editorial committee, wrote an early draft on 1943 EAC operations, and shares responsibility with Dr Hatch for Appendix D. Roger Sarty, with unmatched persistence, unearthed new material on intelligence and anti-submarine operations for the final part of the book, and prepared the drafts from which much of this section has been written. Marc Milner's contribution to the Battle of the Atlantic section was also a vital one; in addition, he made the preliminary selection of photographs. William Johnston proofread the entire manuscript, verified references, prepared the index, and made astute observations on the use of evidence which has led to important revisions in the text. Major John Armstrong arrived at the directorate in time to assist greatly with the page proofs.

The work of the Directorate of History's cartographer, William Constable, deserves special mention. He has devoted long hours to the preparation of each map, table, and graph in the book. Colonel R.A. Grainger, director of cartography at National Defence Headquarters, and the Canadian Forces Mapping and Charting Establishment, under Lieutenant-Colonel D.T. Carney, provided essential support in the production of maps. Dr M.A. Weinberger and his staff at the Directorate of Mathematics and Statistics were our computer experts, solving our many problems as we developed a statistical data bank on Second World War members of the RCAF. Equally important has been the Directorate of History's senior archival officer, Owen Cooke, as well as David Fransen, Paul Marshall, and others who dug up, accessioned, and catalogued documents. Lieutenant-Colonel David Wiens gave consulting and translation services of signal importance, adding to German language sources so carefully built up by the late Fred Steiger. J.J.B. Pariseau offered useful suggestions in helping to prepare maps for the forthcoming French translation of the book. The complex typing and word-processing requirements for this volume have been handled with their usual efficiency by the directorate secretaries, Gloria

McKeigan, Elsie Roberts, and Loretta Wickens, and by a much put upon word-processing unit at National Defence Headquarters under the supervision of Yvette Landry and Annie Rainville. Over the years, furthermore, students employed for the summer period have made many contributions to the preparation of the volume.

Acknowledgment must also be made to the generous help given by a number of serving and retired officers who have offered constant encouragement and much useful information. General G.C.E. Thériault, recently retired as chief of the defence staff, together with his predecessors, General Ramsey Withers and Admiral R.H. Falls, gave their full backing at every stage of the project. Air Marshal Larry Dunlap and Air Vice-Marshal Clare Annis, as chairmen of the RCAF Memorial, have enthusiastically supported our research. The efficiency and goodwill of Brigadier-General C.J. Gauthier, director-general of the Department of National Defence's Executive Secretariat, has contributed substantially to the preparation of this book. Colonel C.P. Stacey, whose many publications have created a framework for the writing of Canadian military history, was kind enough to comment on portions of the manuscript. The late Air Vice-Marshal G.O. Johnson granted a helpful interview in 1981; so at various times did Air Vice-Marshals Kenneth Nairn, F.V. Heakes, T.A. Lawrence, George Howsam, and Kenneth Guthrie, as well as Colonel R.A. Logan, and many others. Lieutenant-General R.J. Lane read certain chapters in draft and offered valuable comments.

This is a fitting time to pay tribute to Dr W.I. Smith, who recently retired as dominion archivist. Dr Smith and his staff at the Public Archives of Canada, particularly Bernard Weilbrenner, the assistant dominion archivist, and Jerry O'Brien, Barbara Wilson and Glenn Wright of the federal archives division, have performed outstanding service in organizing and making readily available the enormous volume of Department of National Defence records. Air Commodore Henry Probert, head of the RAF's Air Historical Board and his predecessor Group Captain Freddie Haslam, opened the way to Air Ministry documents essential to our research. J.D. Brown, head of the Royal Navy's Naval Historical Branch, generously provided copies of the *BdU* War Diary in translation, and Bob Coppock of his staff answered difficult questions about U-boat operations. R.D. Suddaby, keeper of documents at the Imperial War Museum, London, provided further research assistance. We are also indebted to the Public Record Office, and its keeper, Dr G. Martin. Nor can we forget Major-General J. Huston, the former chief of the US Office of Air Force History and his successor, Dr Richard Kohn. Admiral J.D.H. Kane of the US Navy's Naval Historical Division and Dr Dean Allard, head of the Operational Archives Division, responded promptly and helpfully to various requests, as did Professor Dr Jürgen Rohwer, head of the Library of Contemporary History at Stüttgart, and the members of the *Militärgeschichtliches Forschungsamt* in Freiburg. The staff of the Canadian War Museum was always attentive, Hugh Halliday and Fred Azar in particular, as was Carl Vincent, whose *Canada's Wings* has brought out many titles in Canadian aviation and military history. Professor David Syrett, of the City University of New York, stimulated me to think again

about air operations in the Battle of the Atlantic. J. Tuzo Wilson provided us early access to his father's papers. Professor Claude T. Bissell and Dr Hector M. Mackenzie provided us with research materials on the 1939 BCATP negotiations. Our University of Toronto Press editor, Rosemary Shipton, cast her expert eye over the entire manuscript.

As air historians, we owe a great deal to our predecessors, particularly that devoted scholar, Wing Commander Fred Hitchins, the official air force historian from 1946 to 1958, who could not in his lifetime realize his dream of an official history of the RCAF. A special word in this regard must also be reserved for Dean S.F. Wise of Carleton University, Ottawa. All air historians in Canada are in his debt. He provided the inspiration and knowledge for the first volume of this history, introduced the subject to those who would write subsequent volumes, and helped develop the methodology by which they would proceed.

In the final analysis, it is the members of the RCAF themselves who must receive credit for this book. They were worthy successors to that great generation of pioneers who found their way into the field of aviation before a Canadian air force was formed. This volume is therefore dedicated to Canadian airmen in the RCAF from its earliest days, and those who served the organizations which will be described in the pages to follow.

Abbreviations

A/AMAS	assistant air member for air staff
ABC-1	Anglo-US Defence Plan, 1941
ABC-22	Joint Canadian-United States Defence Plan No 2, 1941
AC	army co-operation squadron
ACHQ	Area Combined Headquarters
ACI	Atlantic Convoy Instructions
ACNS	assistant chief of the naval staff (RCN)
ACT	army co-operation training squadron
ADC	Aircraft Detection Corps
Adm	Admiralty records at the Public Record Office, England
AFCS	Air Force, Combined Staff (Washington)
AFGO	Air Force General Order
AFHQ	Air Force Headquarters
AFRO	Air Force Routine Order
AFU	Advanced Flying Unit
Air	Air Ministry records at the Public Record Office, England
AMAS	air member for air staff
AMO	air member for organization
AMP	air member for personnel
AMS	air member for supply
AMSO	air member for supply and organization
AMT	air member for training
ANS	Air Navigation School
AOC	air officer commanding
AOCinC	air officer commanding-in-chief
AOS	Air Observer School
App.	appendix
A/S	anti-submarine
ASB	50 centimetre air-to-surface vessel radar
ASD	3 centimetre air-to-surface vessel radar
ASG	10 centimetre air-to-surface vessel radar
ASV	air-to-surface vessel radar
ASW	anti-submarine warfare

ASWORG	Anti-Submarine Warfare Operational Research Group (US)
ATFERO	Atlantic Ferry Organization
B	bomber squadron
BCATP	British Commonwealth Air Training Plan
B-Dienst	German naval radio intelligence service
BdU	*Befehlshaber der Unterseeboote* (German submarine headquarters)
B&GS	Bombing and Gunnery School
BR	bomber reconnaissance squadron
BS	Cornerbrook-Sydney convoy
BW	Bluie West, Greenland
BX	Boston-Halifax convoy
CAAATC	Coast and Anti-Aircraft Artillery Training Centre
Cab	Cabinet documents at the Public Record Office, England
CAC	coast artillery co-operation squadron
CAF	Canadian Air Force
CAFA	Canadian Air Force Association
CAM	catapult aircraft merchantman
CAS	chief of the air staff
CAHS	Canadian Aviation Historical Society
CCNF	commodore commanding Newfoundland Force (RCN)
CFS	Central Flying School
CGS	chief of the general staff
CHL	chain home low – early warning low flying radar
CinC	commander/commanding-in-chief
CMAB	Combined Munitions Assignment Board
CNA	Canadian Northwest Atlantic
CNS	chief of the naval staff
CO	commanding officer
COAC	commanding officer, Atlantic Coast (RCN)
COMINCH	commander-in-chief, US Fleet
Comm	communications squadron
CTF	commander Task Force (US Navy)
D/AMAS	deputy air member for air staff
DAE	director of aeronautical engineering
DAP	director of air personnel
DCER	Documents on Canadian External Relations
DCNS	deputy chief of the naval staff (RCN)
Defe	class of intercepted German radio messages at the Public Record Office, England
Det	detachment
D/F	direction finding
DHist	Directorate of History, National Defence Headquarters
DND	Department of National Defence
DNI	director of naval intelligence (RCN or RN)
DO	Dominions Office records at the Public Record Office, England
DOC	district officer commanding

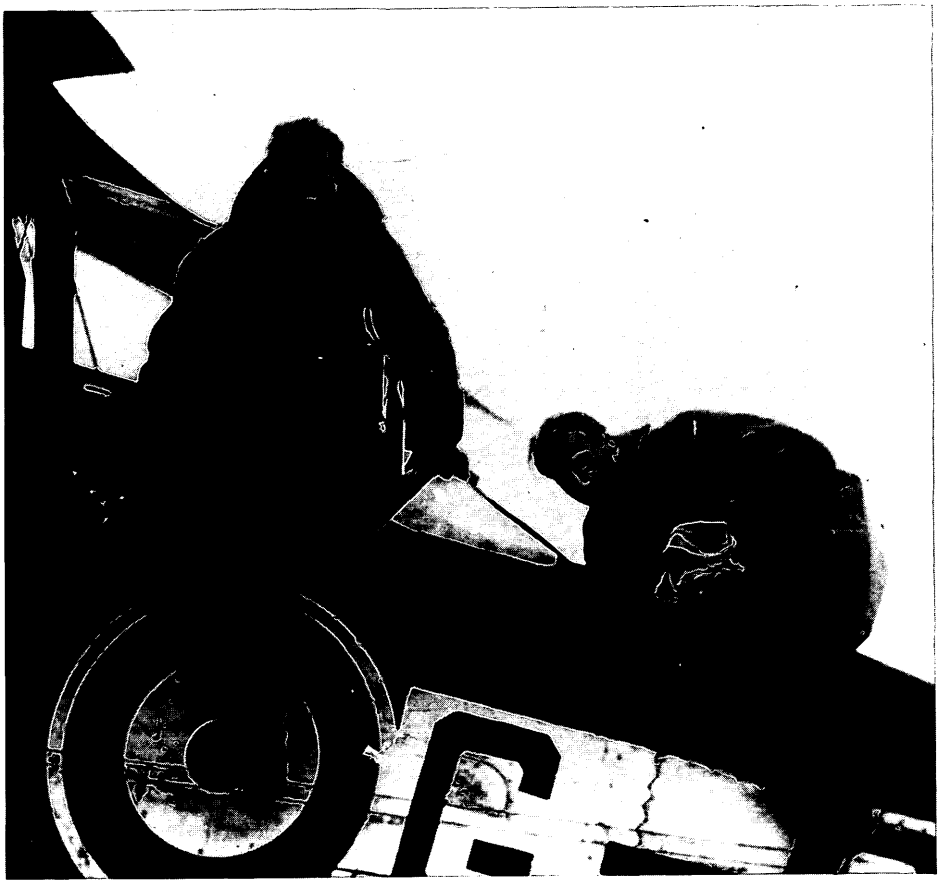
DOD	director of operations division (RCN)
DOR	director of operational research (RCN)
DOT	director of operational training
DPO	director of plans and operations
DWT	director of warfare and training (RCN)
EAC	Eastern Air Command
EATS	Empire Air Training Scheme
ECFS	Empire Central Flying School
EFTS	Elementary Flying Training School
F	fighter squadron
FB	flying boat squadron
FIS	Flying Instructors School
FONF	flag officer Newfoundland (RCN)
FTS	Flying Training School
FY	ferry squadron
GMT	Greenwich Mean Time
GP	general purpose squadron
GR	general reconnaissance squadron
GRS	General Reconnaissance School
GS	Greenland-Sydney convoy
HF	high frequency
HF/DF	high frequency direction finding
HMCS	His Majesty's Canadian Ship
HMS	His Majesty's Ship
HNMS	His Norwegian Majesty's Ship
HOMP	Halifax Ocean Meeting Point
HQ	headquarters
HT	heavy transport squadron
HWE	Home War Establishment
HX	fast eastbound transatlantic convoy
IFF	identification friend or foe
IG	inspector general
ITS	Initial Training School
JAG	judge advocate general
JCS	Joint Chiefs of Staff (US)
K	composite squadron
LN	Quebec-Labrador convoy
LORAN	long-range aid to navigation
LR	long-range (aircraft)
MAC	merchant aircraft carrier
MAP	Ministry of Aircraft Production (UK)
MD	Military District
MEW	microwave early warning
MWT	Ministry of War Transport (UK)
NCO	non-commissioned officer
NCSO	naval control service officer

NDHQ	National Defence Headquarters
NHS	naval historian's files
NID	Naval Intelligence Division (RCN or RN)
NL	Labrador-Quebec convoy
NOIC	naval officer in charge
NRO	naval routing officer
NSHQ	Naval Service Headquarters
NWAC	North West Air Command
OC	officer commanding
OIC	Operational Intelligence Centre (RCN or RN)
ON	fast westbound transatlantic convoy
ONM	medium speed ON convoy
ONS	slow speed ON convoy
OR	operational research
ORB	operations record book
OT	operational training squadron
OTU	Operational Training Unit
PAC	Public Archives Canada
PARC	Public Archives Record Centre
PC	order-in-council
PJBD	Canada-US Permanent Joint Board on Defence
Prem	Prime Minister's office files at the Public Record Office, England
PRO	Public Record Office, England
QS	Quebec-Sydney convoy
RAAF	Royal Australian Air Force
RAF	Royal Air Force
RAFDEL	RAF delegation, Washington
RCAF	Royal Canadian Air Force
RCMP	Royal Canadian Mounted Police
RCN	Royal Canadian Navy
RCNAS	Royal Canadian Naval Air Service
RFC	Royal Flying Corps
RN	Royal Navy
RNAS	Royal Naval Air Service
RNZAF	Royal New Zealand Air Force
ROYCANAIRF	cable address for RCAF Overseas Headquarters, London
SAO	senior air officer
SASO	senior air staff officer
B	Sydney-Cornerbrook convoy
SC	slow eastbound transatlantic convoy
SFTS	Service Flying Training School
SG	Sydney-Greenland convoy
SH	Sydney-Halifax convoy
SO	senior officer (of a convoy escort group) or staff officer
SONAR	sound navigation and ranging
SPAB	Sydney-Port aux Basques convoy

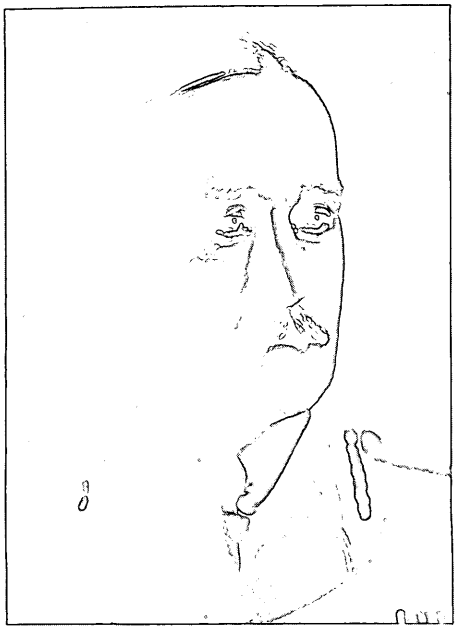
SQ	Sydney-Quebec convoy
Sqn	squadron
T	transport squadron or Treasury records at the Public Record Office, England
TB	torpedo-bomber squadron
TCA	Trans Canada Airlines
UK	United Kingdom
UKALM	United Kingdom air liaison mission
US	United States
USAAC	United States Army Air Corps
USAAF	United States Army Air Forces
USN	United States Navy
USNA	National Archives of the United States
USS	United States Ship
VLR	very long-range (aircraft)
WAC	Western Air Command
WEF	Western Escort Force
WESTOMP	western ocean meeting point
WHO	Western Hemisphere Operations
WLEF	Western Local Escort Force
WOAG	wireless operator (air gunner)
WPL 51/52	US Navy hemisphere defence plans
WS	Wireless School
WT	wireless telegraphy/radio
XB	Halifax-Boston convoy
Y	radio wireless service/intelligence (British and Canadian)
Z	naval designator for GMT
ZTPG	series of German naval messages

PART ONE

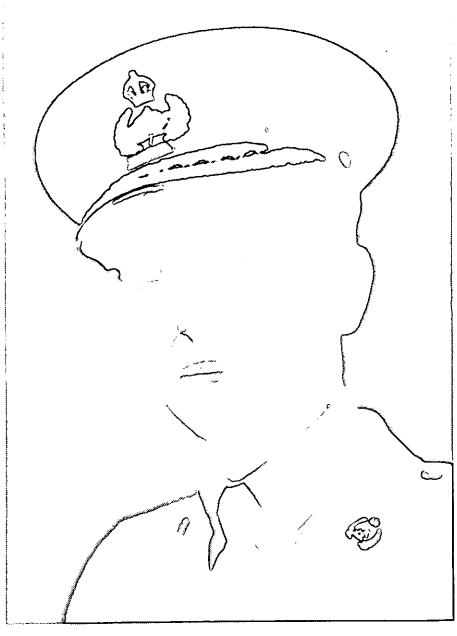
Between the Wars



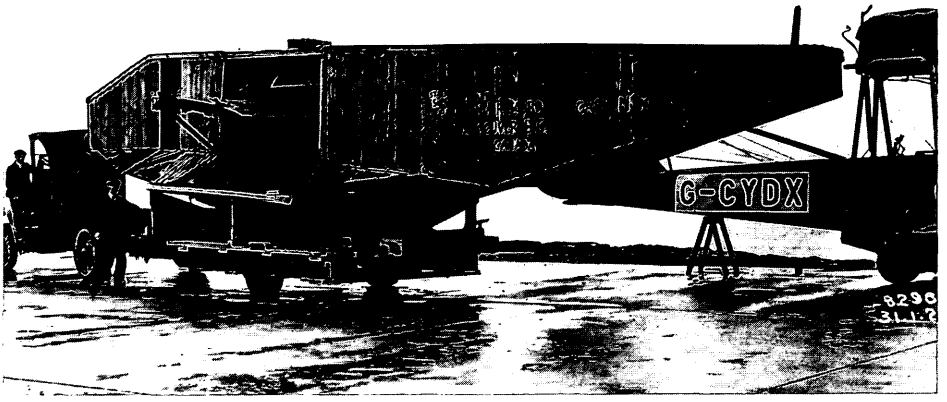
Air Commodore A.K. Tylee and C.W. Cudemore, left, arriving in Calgary during the trans-Canada flight, 1920. (RE 20776-19)



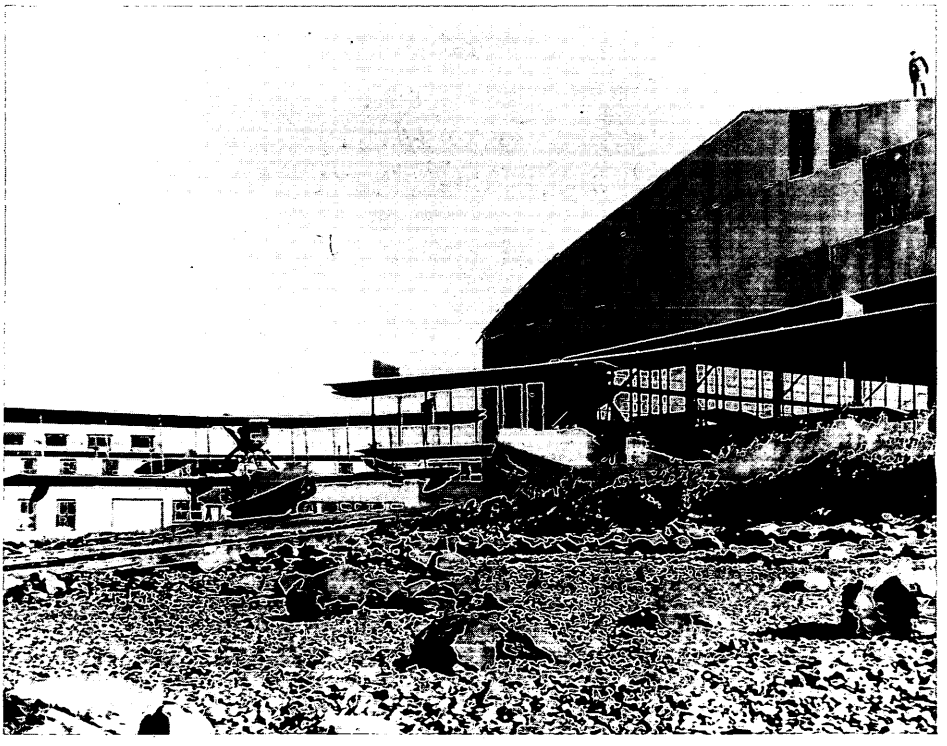
Air Vice-Marshal Sir Willoughby Gwatkin, inspector-general of the Canadian Air Force, 1920–2.
(PL 117508)



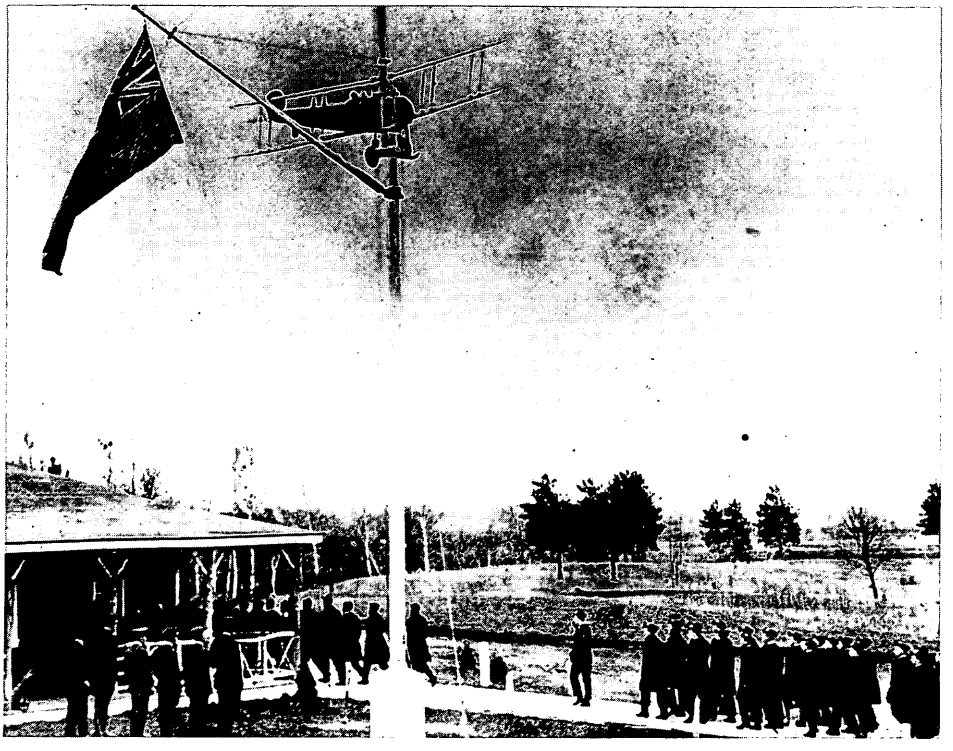
Air Commodore A.K. Tylee, first air officer commanding the non-permanent Canadian Air Force, 1920–1.
(PMR 82-189)



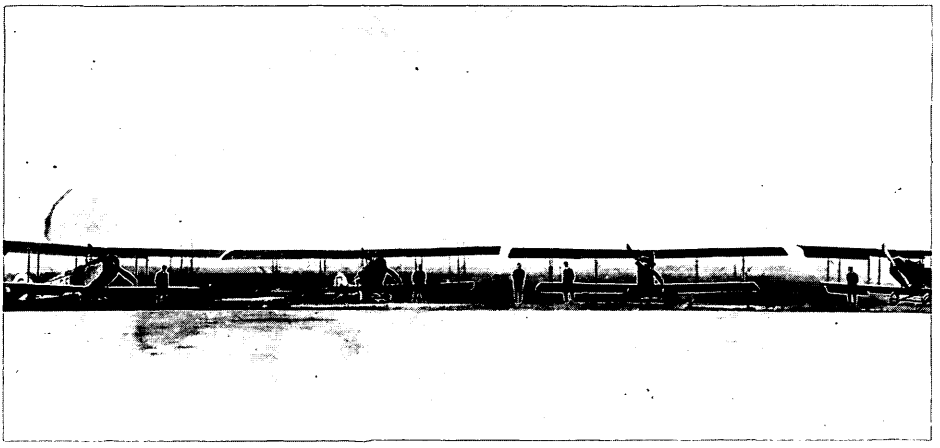
A crated Felixstowe F3 arrives at Vancouver, one of the gift aircraft acquired from Britain in 1919–20. (PA 114756)



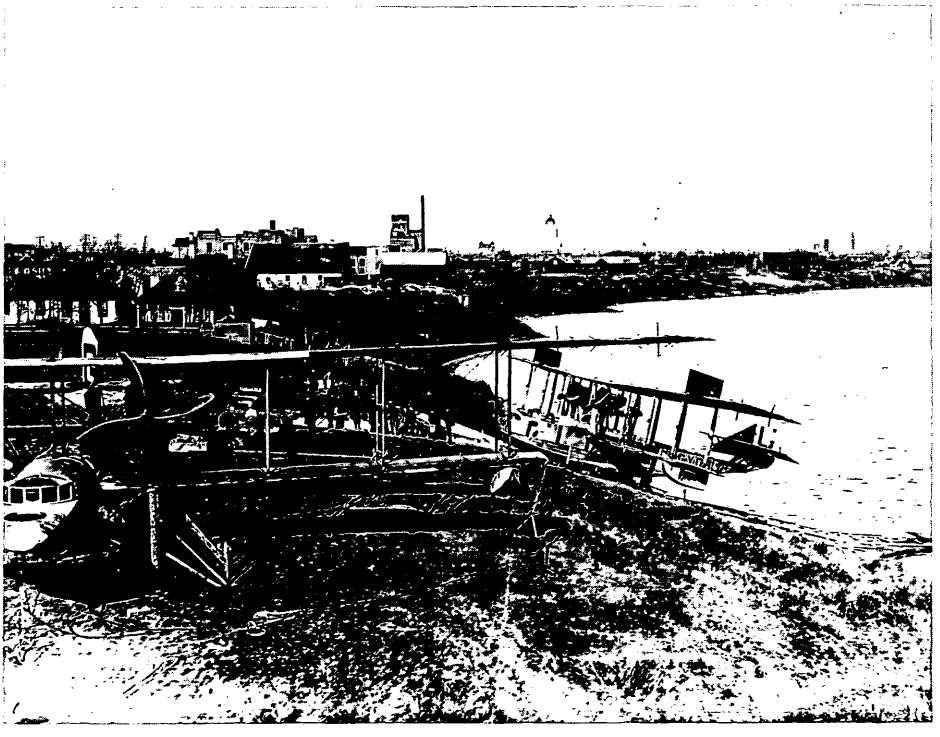
Curtiss HS2L flying boats at Dartmouth Air Station, 1920–1. The United States Navy turned over a dozen of the versatile aircraft to Canada at the end of the First World War. (RE 17725)



'Eye-e-e-e-e-s Left!' A column of airmen salute the RAF ensign, raised at Camp Borden, 30 November 1921. (RE 13081)

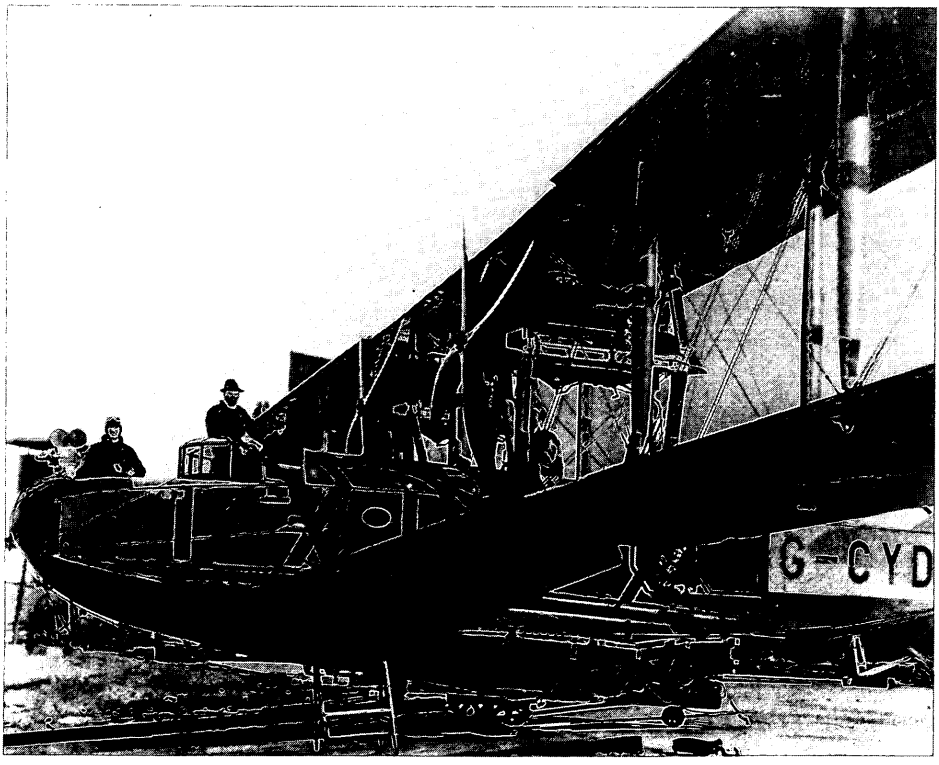


In 1921–2 the CAF's Ground Instructional School at Camp Borden constructed four Curtiss Jennies from spares left at the camp after the war. (RE 12816)

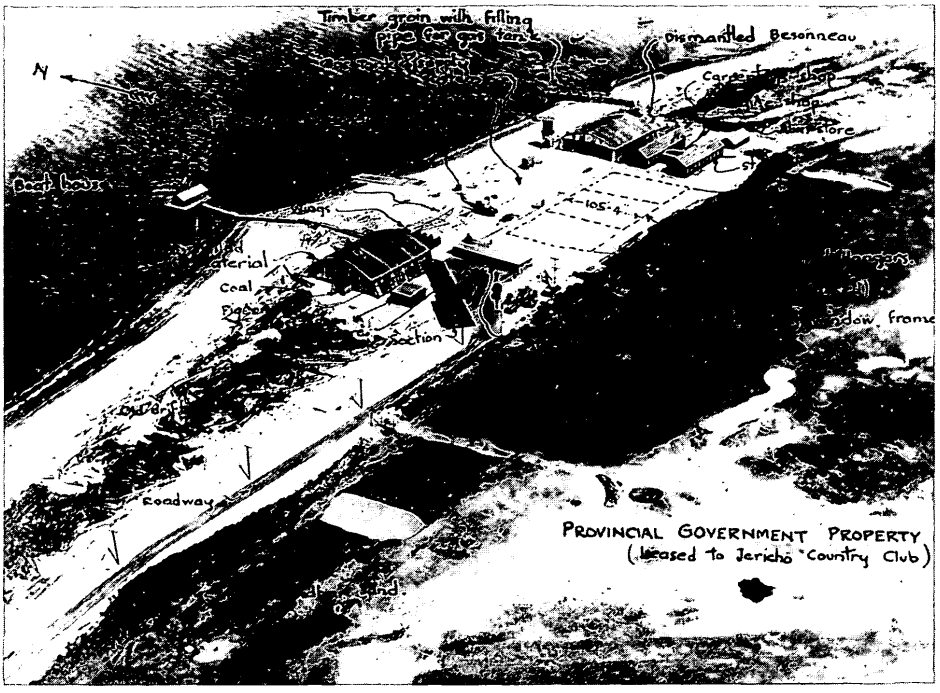


Felixstowe F3s on the slipway at Winnipeg, 1921. These large flying boats, obtained from the United Kingdom at the end of the war, were uneconomical for bush flying. (RE 13548)

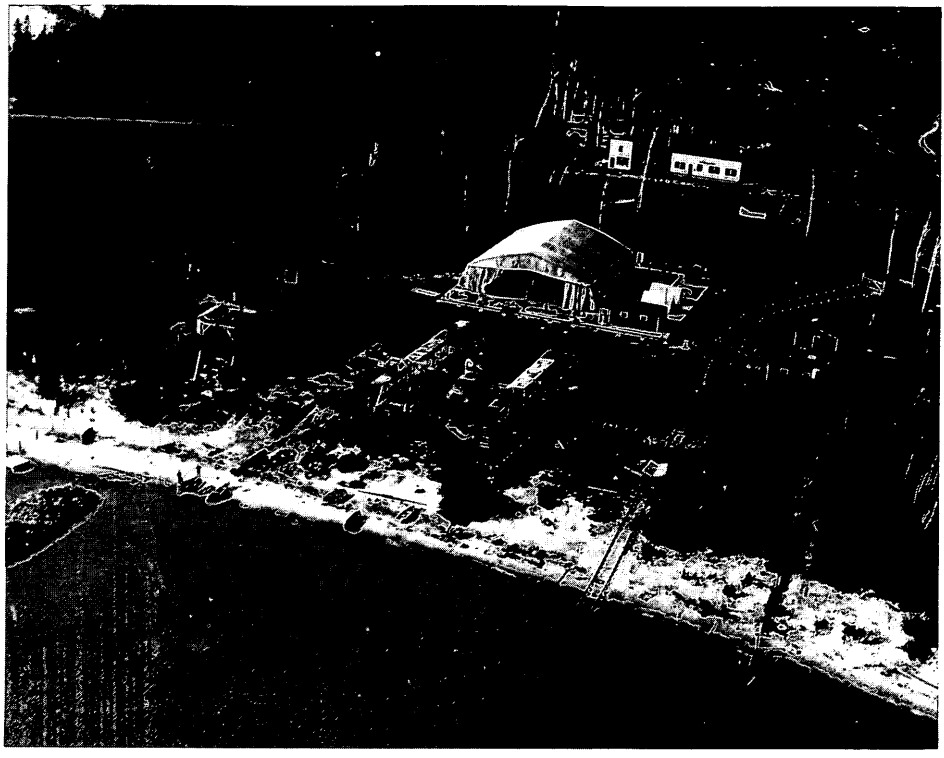
Officers of the Canadian Air Force: left to right, Flight Lieutenant A.T.N. Cowley, Squadron Leader A.E. Godfrey, and Pilot Officer E.L. MacLeod at Jericho Beach, Vancouver, 1921. (PMR 79-288)



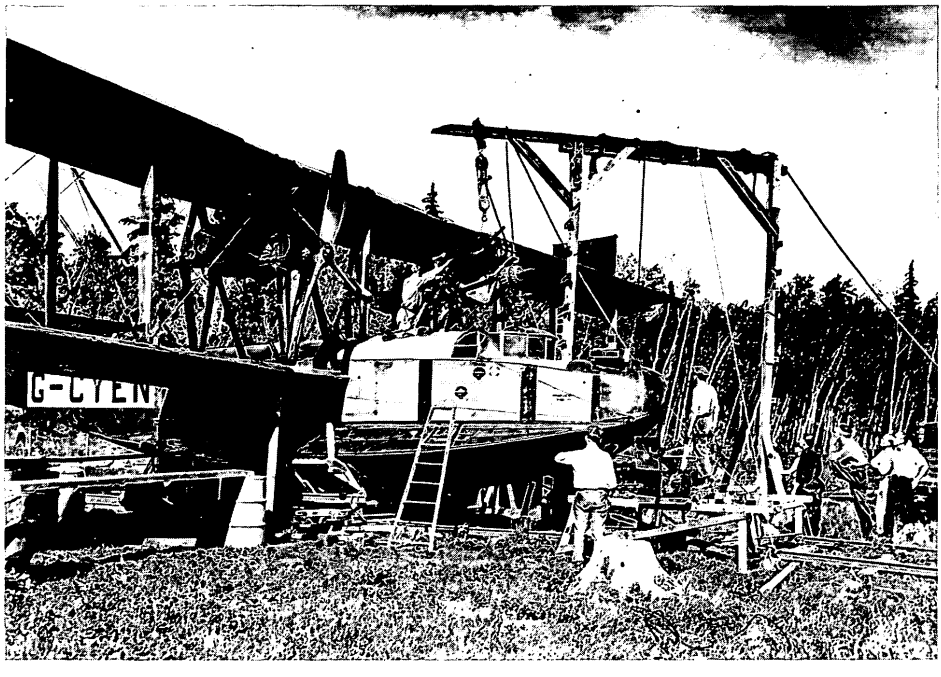
Clair MacLaurin and his Air Board crew in Felixstowe F3 G-CYDI at Jericho Beach, Vancouver, 1921. (PA 28591)



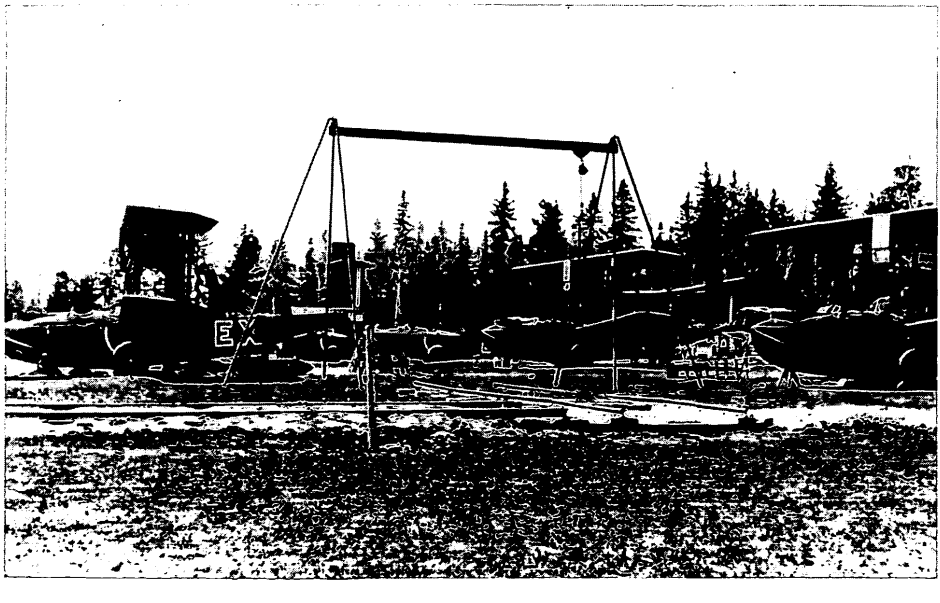
Jericho Beach, Vancouver, was the principal west-coast air station in the 1920s. (PMR 84-976)



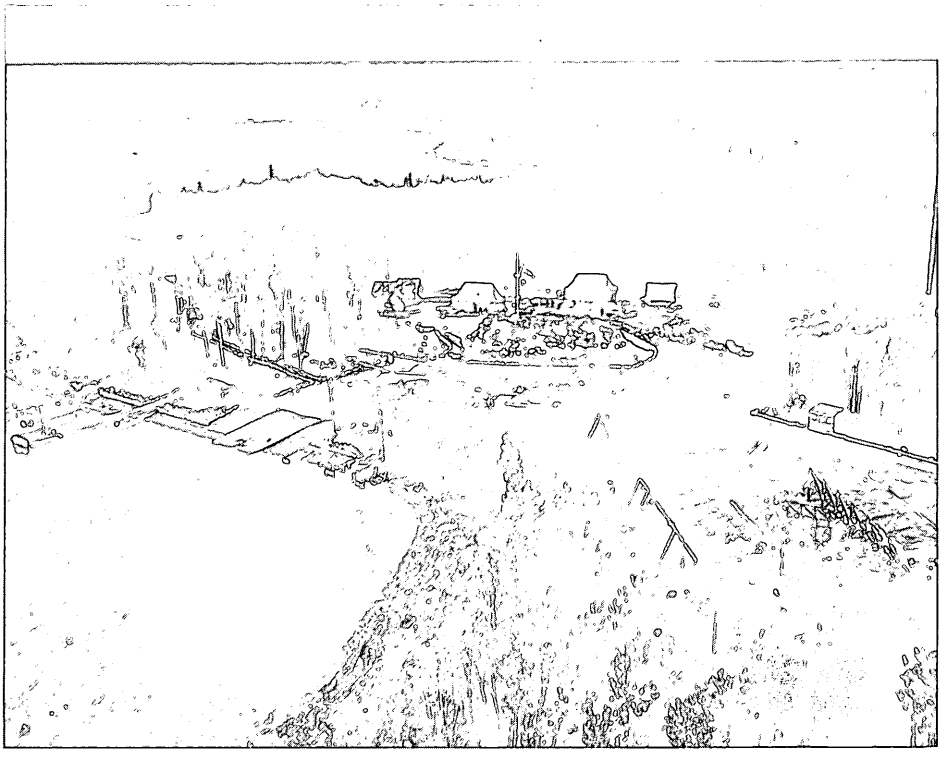
Victoria Beach Air Station, Man., in its early days, with two Felixstowe F3s in the foreground. (PMR 84-975)



Civilian Air Board mechanics change an engine in a Felixstowe F3 flying boat at Victoria Beach in 1922. (PA 053249)

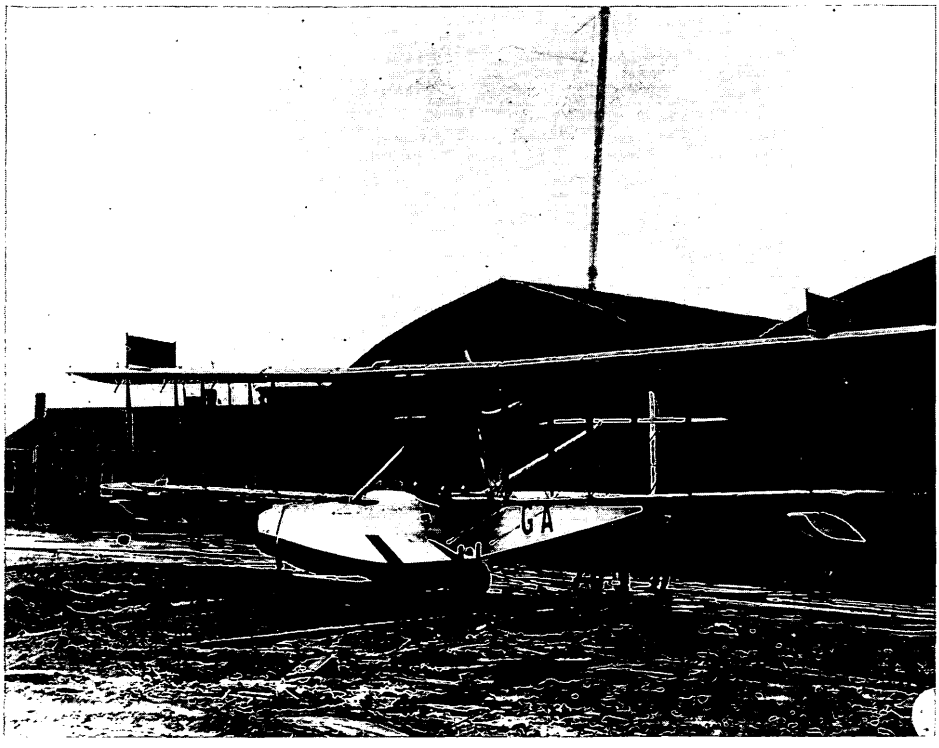


Vickers Vikings being readied for a summer season's civil operations in the Manitoba bush. The RCAF aimed to start flying as soon as the inland waters were free of ice. (PA 53340)

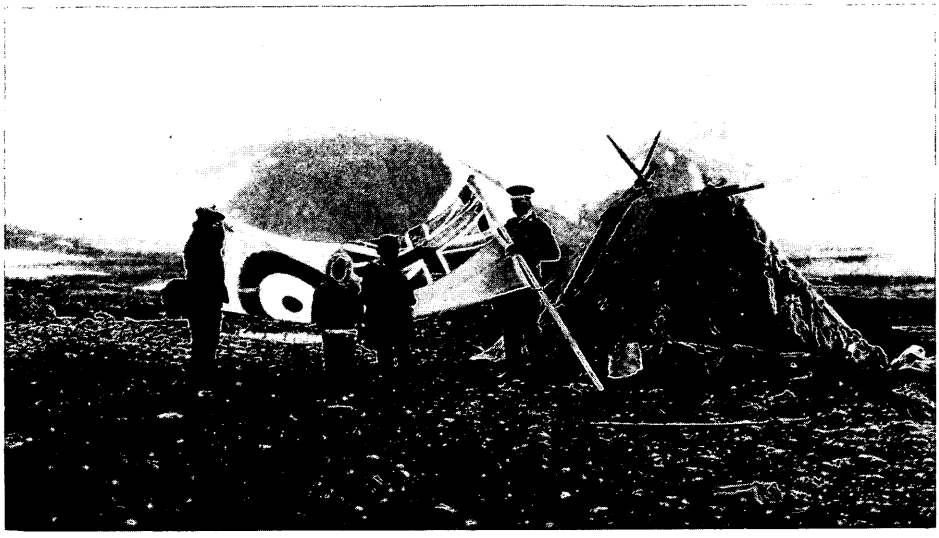


RCAF sub-base, Cormorant Lake, Sask. Through the 1920s forest and photo patrols were extended across the Prairies. (PMR 82-160)

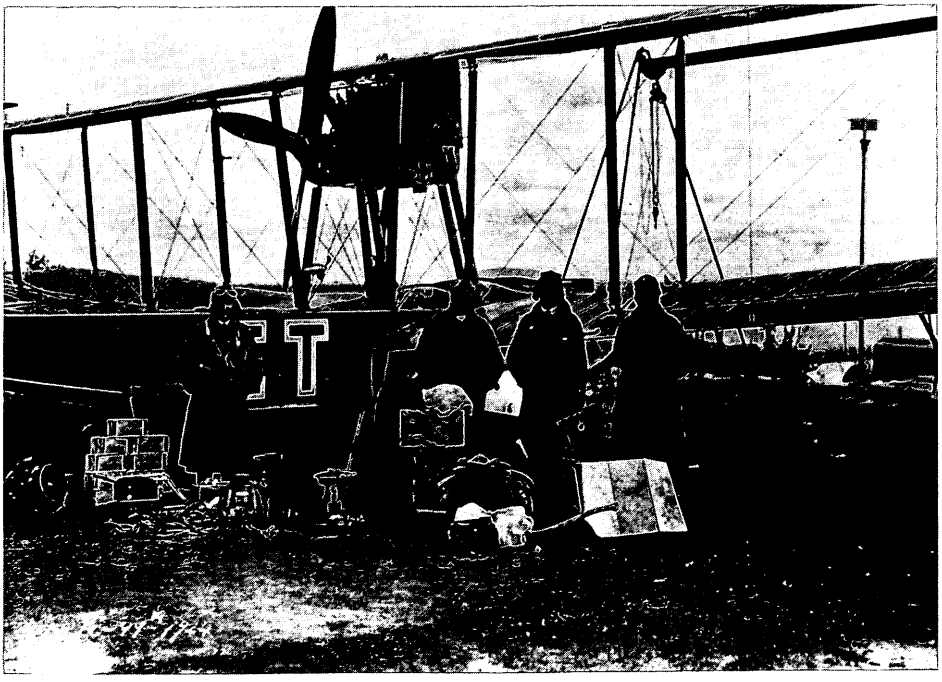
Operating a camera from an open cockpit. This demanding, tedious, and often cold work was the RCAF's contribution to mapping Canada's hinterland. (PA 062960)



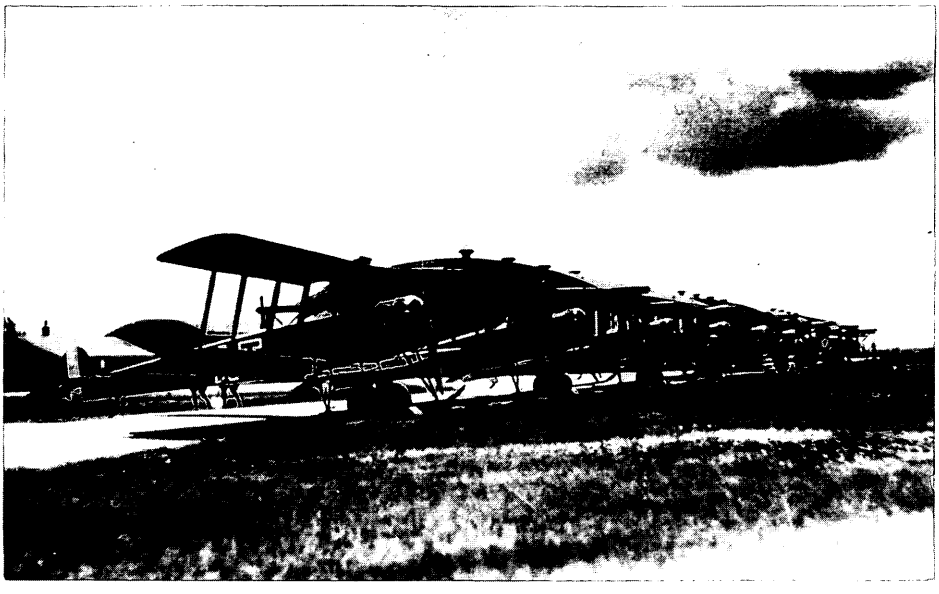
The Curtiss HS2L was a workhorse of the air force's civil operations in the 1920s. (PA 140637)



Squadron Leader Robert Logan displays an RAF ensign at Craig Harbour, Ellesmere Island, during his 1922 Arctic expedition. (RE 13080)



Squadron Leader Basil Hobbs and his crew prepare for their extensive 1924 reconnaissance of the water routes in northern Manitoba and Saskatchewan. Their gear overloaded the Vickers Viking, forcing them to remove its wheels and tail skid. (PA 140640)

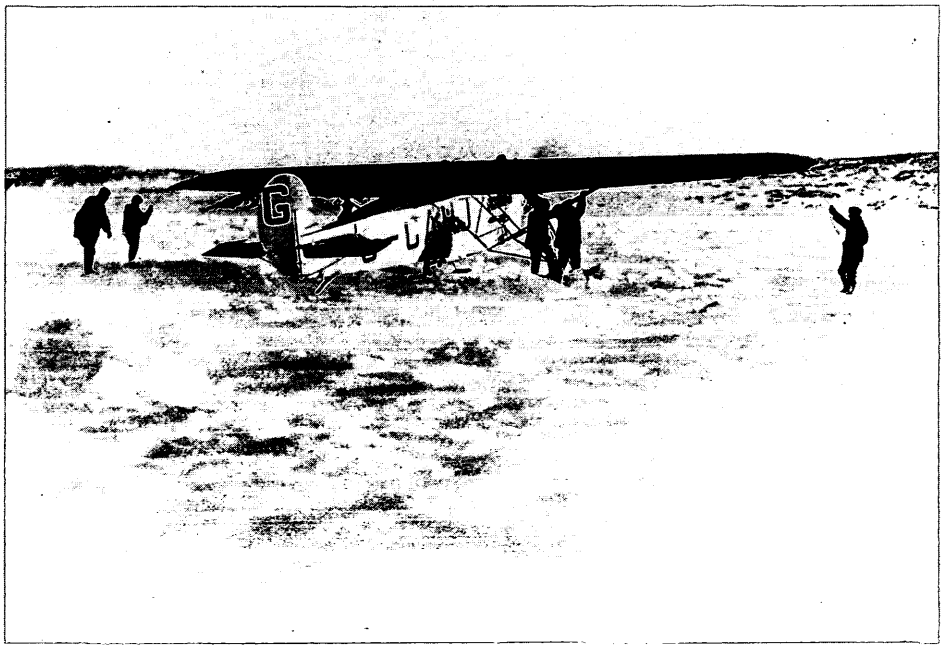


Avro 504Ks on the flight line at Camp Borden. Inspections of the trainees and their aircraft were a familiar occurrence. (PA 140639)

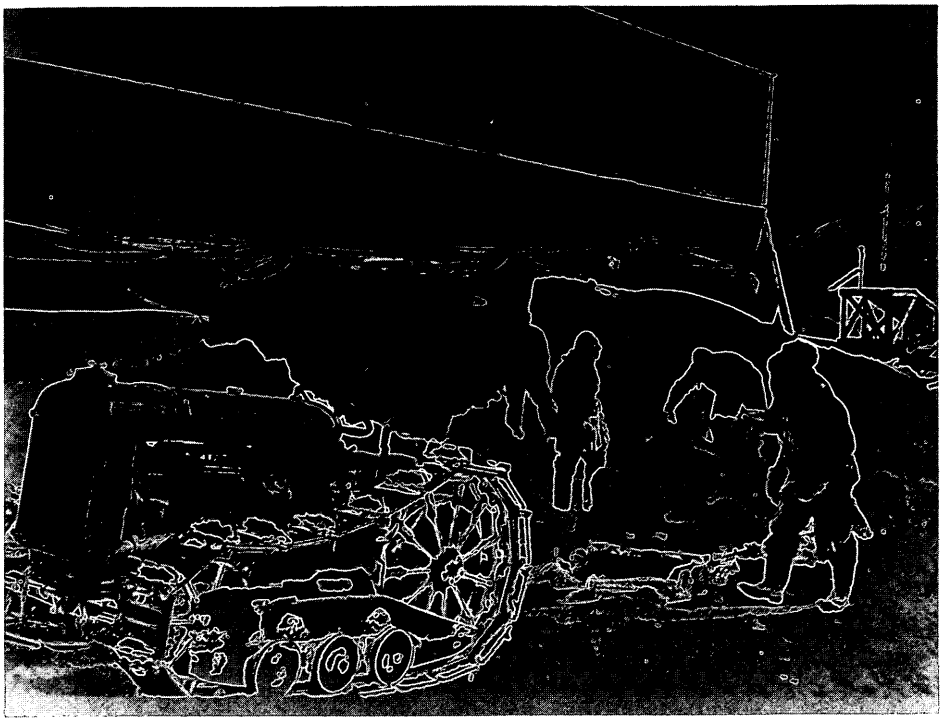
Norway House, the principal base for civil government air operations in northern Manitoba and Saskatchewan. (PMR 82-155)

On 1 February 1927 the RCAF began pilot training courses at Camp Borden for NCO pilots. The first three, A. Anderson, R. Marshall, and A.J. Horner, received their wings on 30 April. (RE 16603)

Three Fokker Universals on the Hudson Strait Expedition, 1927–8, where the open-cockpit, enclosed-cabin monoplanes proved their worth. (RE 13778)



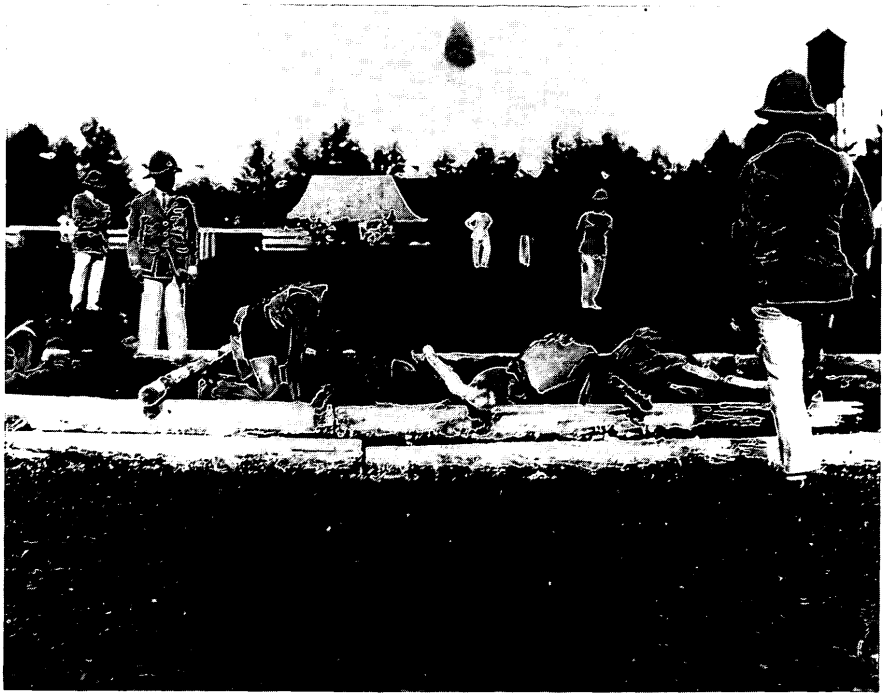
A Fokker Universal readied for an ice patrol at Base 'B' in the Hudson Strait. Engines and oil had to be pre-heated for starting in Arctic temperatures. (RE 13826)



Fordson tractors were used to move aircraft and heavy equipment during the Hudson Strait Expedition. (RE 13772)

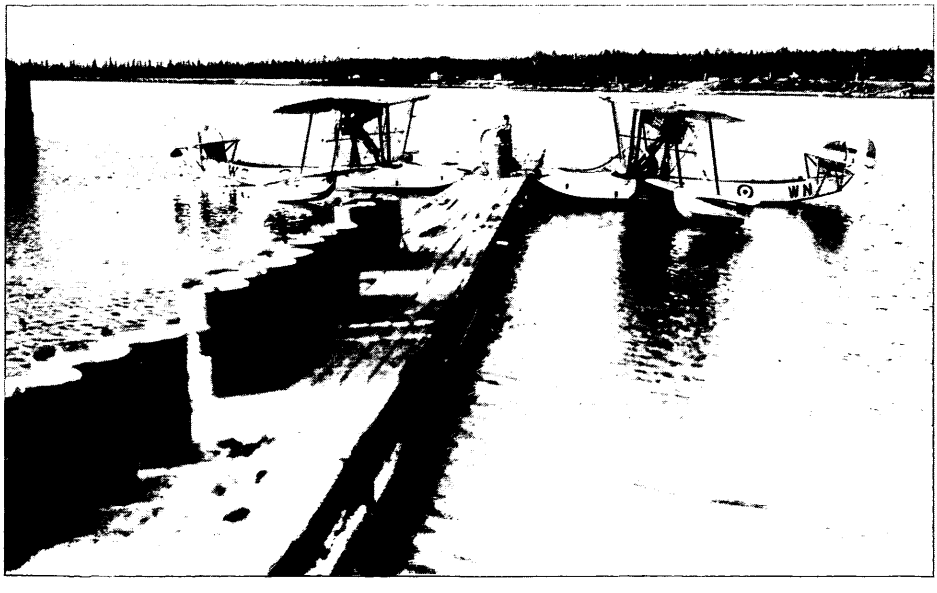
Fairchilds on the spring ice at Lac du Bonnet, Man., 1929. (PMR 82-154)

Group Captain J.L. Gordon, director of the RCAF, 1922–4, and senior air officer, 1932–3. (PMR 85-90)

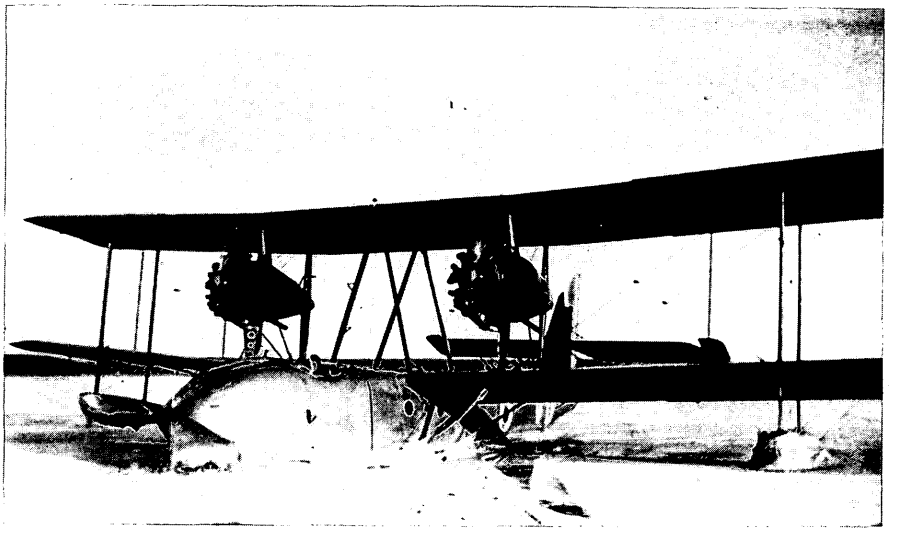


Under the careful eyes of sun-helmeted judges, airmen struggle over – and under – an obstacle course during a sports day at Camp Borden in 1929. (PMR 82-167)

Flying Officer E.A. McNab at left, Flying Officer F.V. Beamish, RAF, centre, and Pilot Officer E.A. McGowan, members of the RCAF's first aerobatic team, the Siskin Flight, Rockcliffe, 1929. On 15 August 1940 McNab was the first member of the RCAF to shoot down an enemy aircraft. (PA 62612)

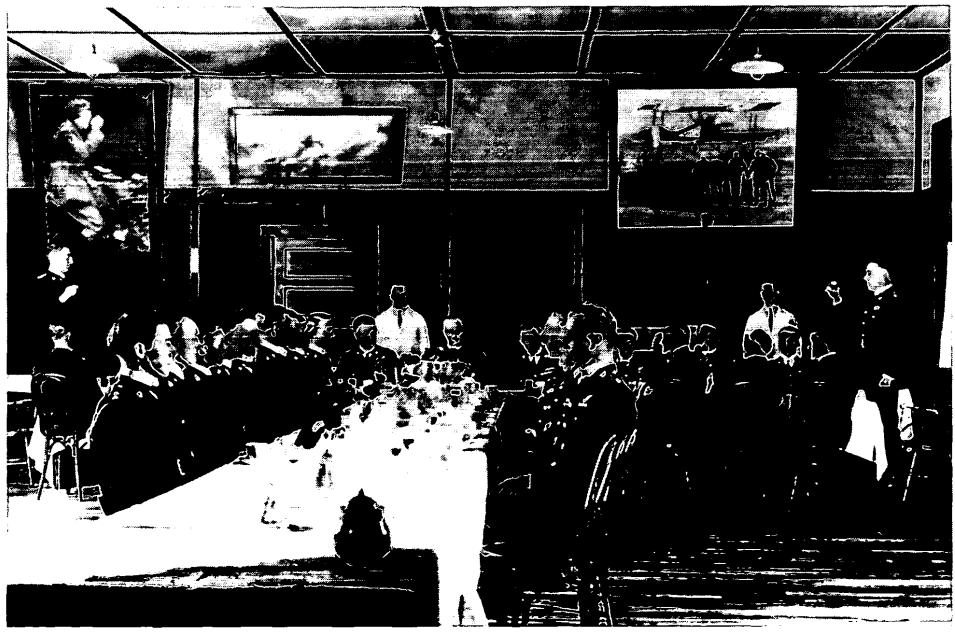


The graceful Vickers Vedette was the RCAF's main aircraft for mapping and bush flying by the early 1930s. (PMR 82-162)



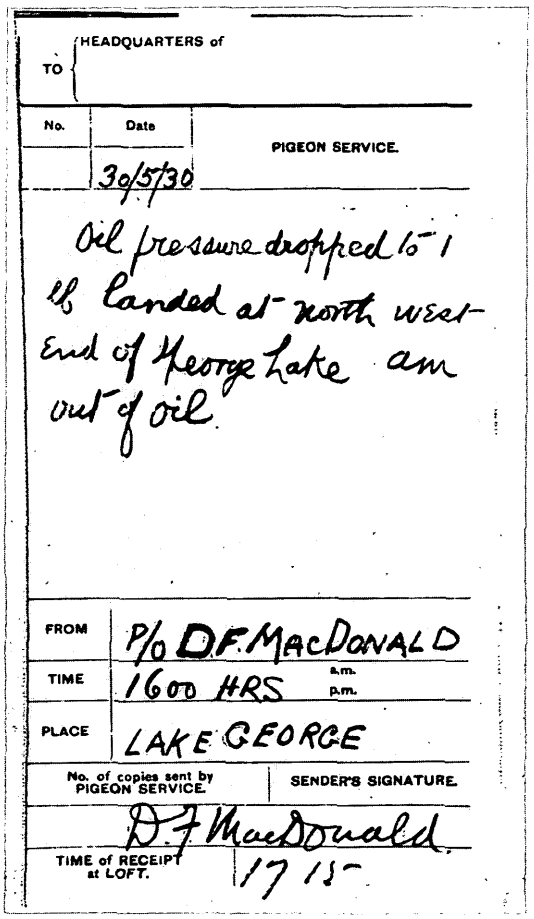
A Vickers Vancouver, straining its engines in a futile attempt to pull itself free from an early freeze-up. It later had to be dismantled on the spot. The twin-engined Vancouver was usually used to support operations by the smaller Vedettes. (RE 64-2668)

Airmen's canteen, 119 (Auxiliary) Squadron, Hamilton, Ont. (PMR 77-258)



'Mr Vice – The King.' Observing the military niceties of a mess dinner at Camp Borden. (RE 12821)

J.A. Wilson, secretary, Canadian Air Board, 1920–2, controller of civil aviation, 1922–41, and director of air services, Department of Transport, 1941–5. (PL 117438)



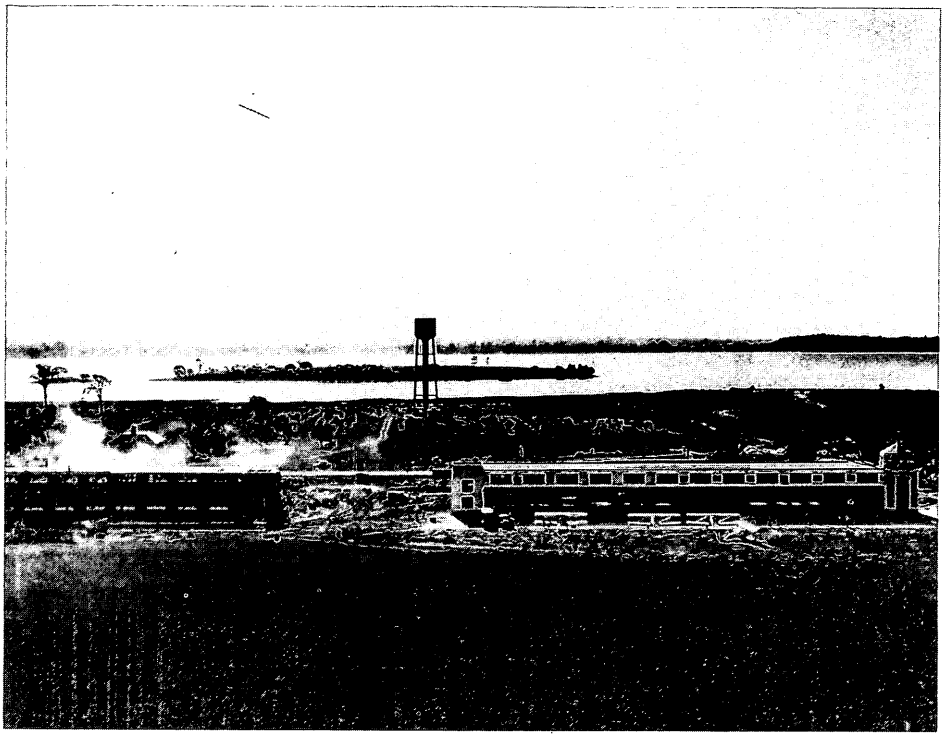
TO HEADQUARTERS of

No.	Date	PIGEON SERVICE.
	30/5/30	

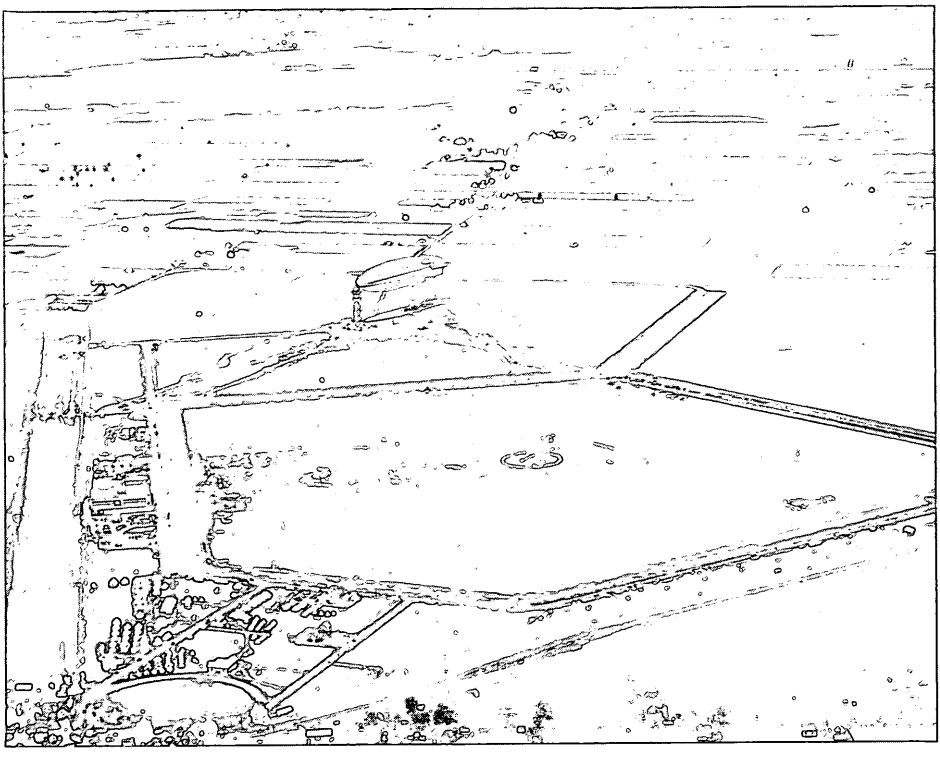
Oil pressure dropped to 1 lb landed at north west end of George Lake am out of oil.

FROM	P/O DF MACDONALD
TIME	1600 HRS a.m. p.m.
PLACE	LAKE GEORGE
No. of copies sent by PIGEON SERVICE.	SENDER'S SIGNATURE.
	D F MacDonald
TIME of RECEIPT at LOFT.	17 15

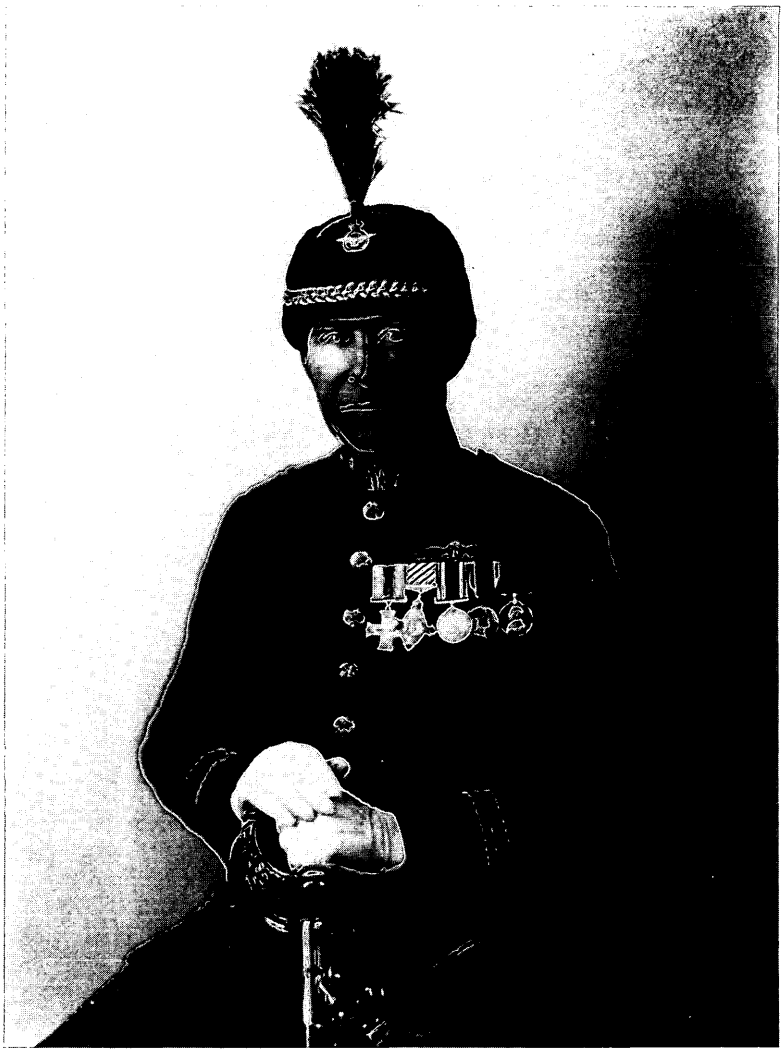
In an era before the widespread introduction of reliable radio equipment for aircraft, homing pigeons provided an essential means of communication. (PL 9336)



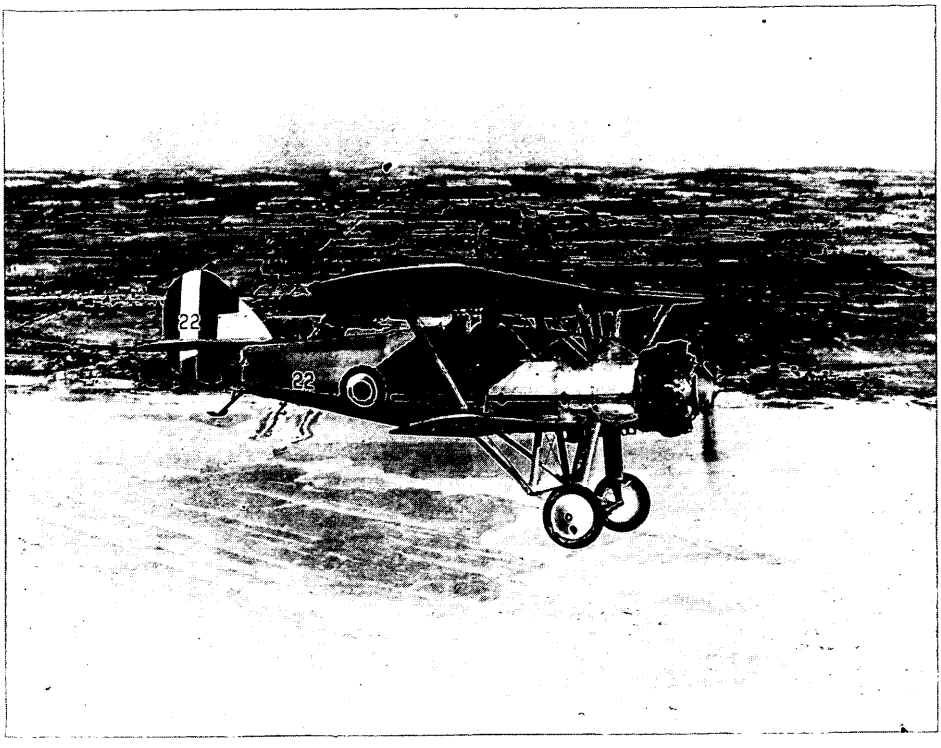
RCAF Station Trenton in the 1930s. (PMR 82-157)



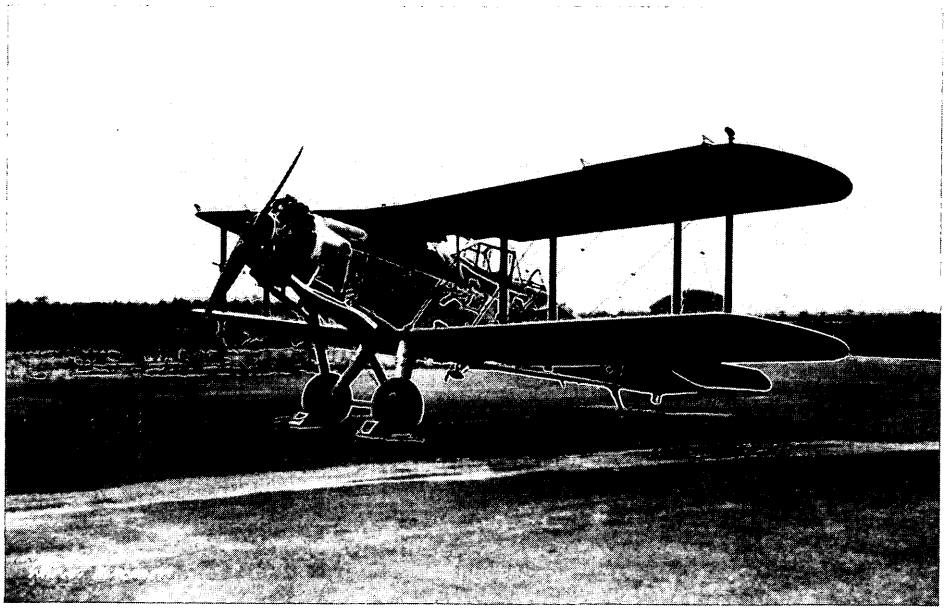
The British airship R-100 at St Hubert, Que., 1930. The runways and other facilities, built to support airship operations, proved more lasting than the dirigible experiment. (PMR 73-562)



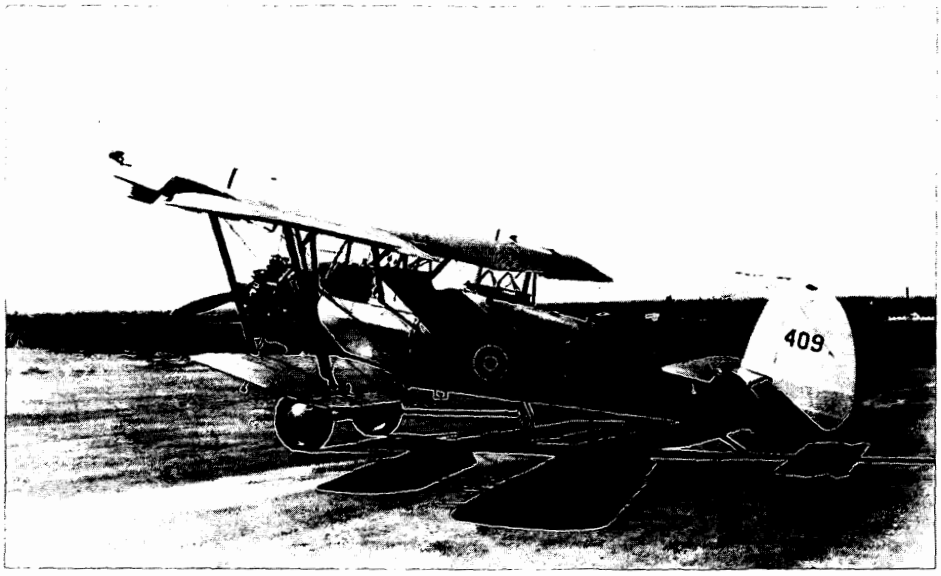
Squadron Leader A.E. Godfrey, MC, AFC, in the RCAF's curious interwar full-dress uniform, which included a fur-trimmed leather cap complete with plume. (PL 117416)



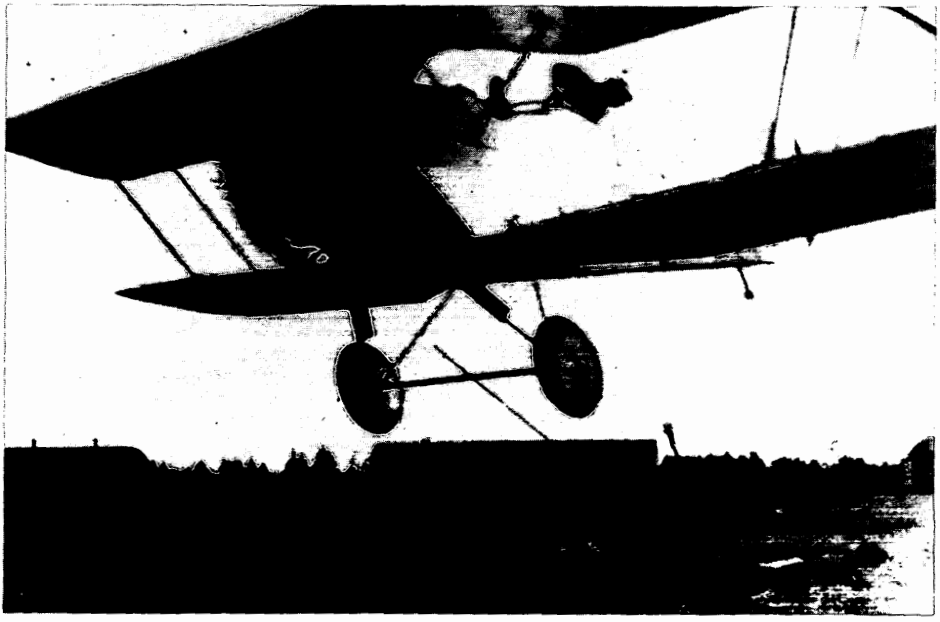
A few Armstrong Whitworth Siskins were the only RCAF fighters until Hawker Hurricanes were purchased in 1939. (RE 64-2646)



The RCAF acquired several Westland Wapitis, the force's only bombers in the 1930s, at bargain-sale prices. 'From the pilot's point of view the aircraft was a beast ... it glided like a brick.' (PA 063307)



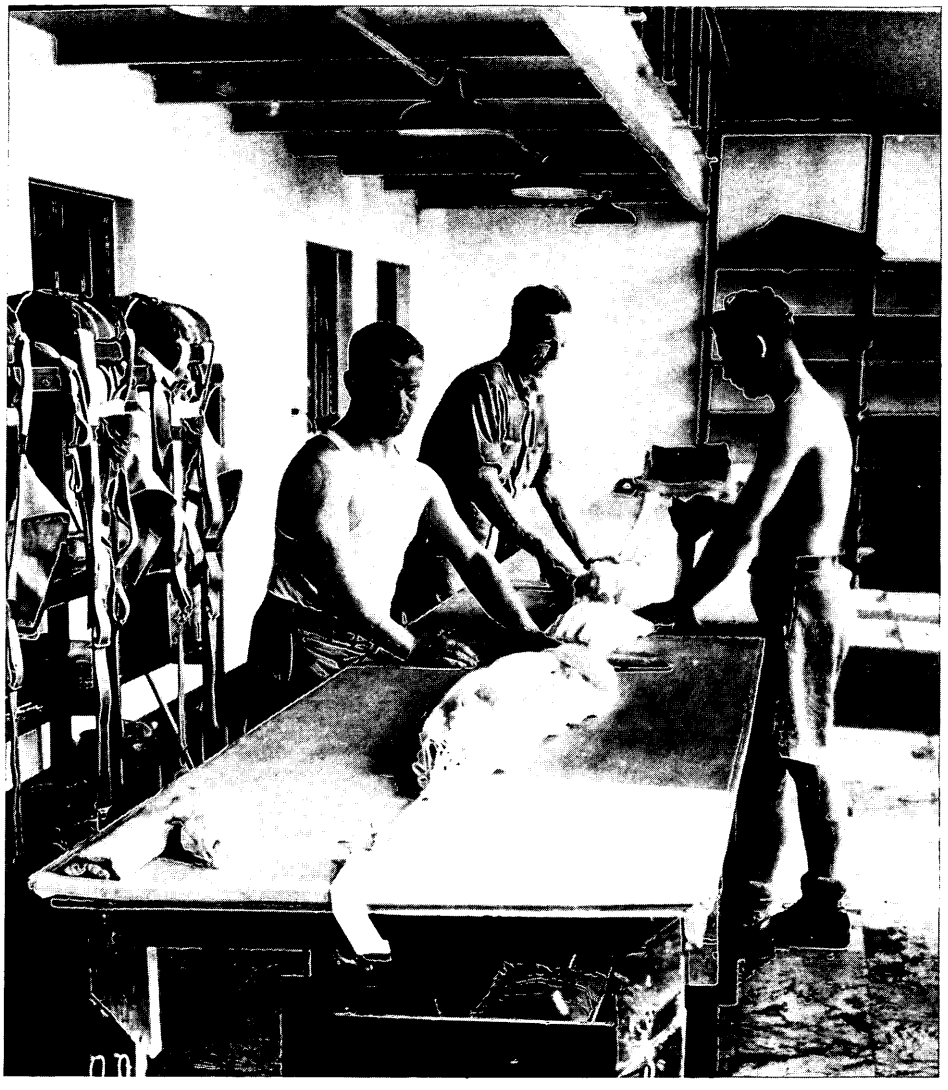
Until the Second World War the RCAF used the Armstrong Whitworth Atlas for its army co-operation role, particularly on militia summer manœuvres. The bar and hook arrangement under the fuselage was used for snatching messages from the ground. (PA 063304)



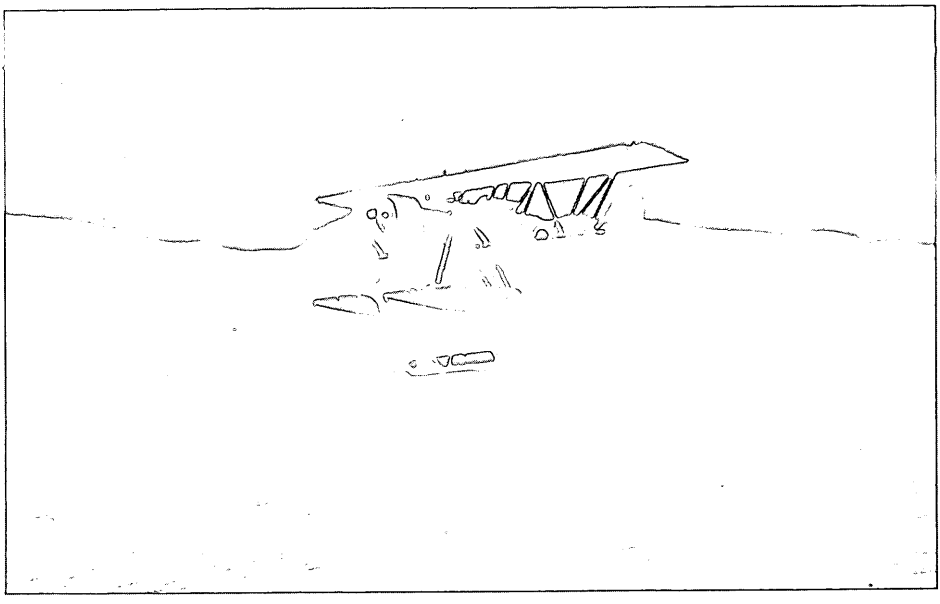
An Armstrong Whitworth Atlas on a message pick-up at Camp Borden. Note the two rifles used to suspend the line. Army co-operation procedures did not advance beyond First World War practice. (PMR 82-183)

Prewar gunnery training, 112 (Auxiliary) Squadron, Trenton, 1936. Pilot Officer A.H. Olloway takes aim at a target simulated range of 200 yards, while Corporal S.C. Martin, the instructor, looks on. (PMR 85-71)

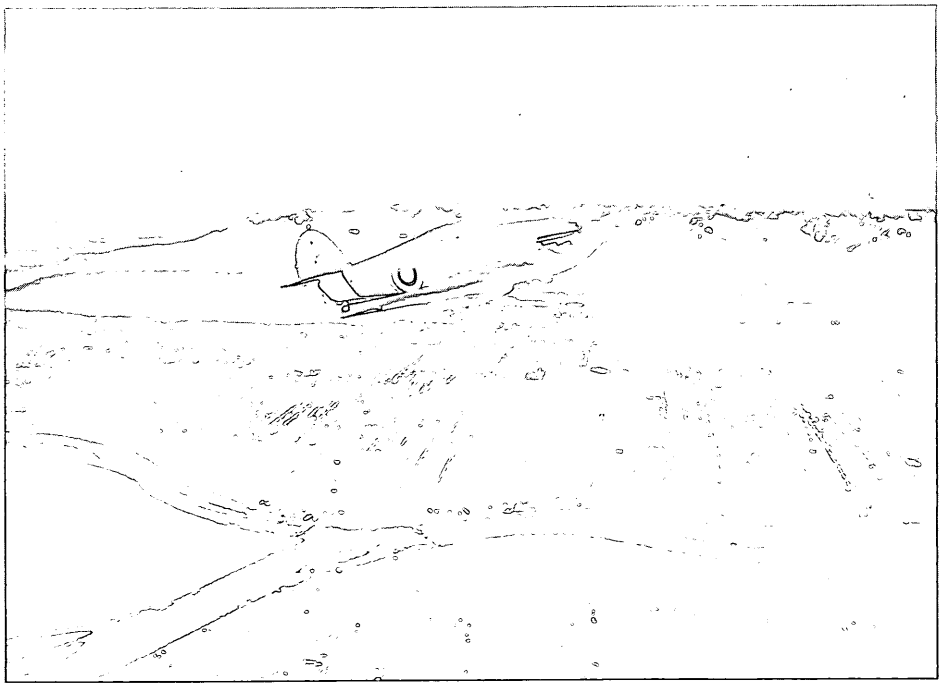
Preparing for war at Camp Shilo, Man., in an Avro 626, July 1939. (RE 18552-1)



Packing parachutes at Trenton, 1939. (PMR 74-275)



A Blackburn Shark drops its torpedo during a training exercise off Vancouver Island in the summer of 1939. (PA 141381)



A Hawker Hurricane of 1 (F) Squadron over Vancouver in the spring of 1939 – one of the first monoplane fighters to fly over Canadian territory. (PA 501526)

Introduction

In the immediate aftermath of the First World War, Canada's need for an air force was not readily identifiable. The country faced no discernible external threat. Canadians had little appreciation of the potential of airpower and little enthusiasm for expenditures on such esoteric military commitments. A minuscule active militia and an even smaller navy had served the national interest in prewar years and would continue to do so, but there was no institutional tradition for an air force to build upon. Thousands of young men had served in the British flying services during the war, but they had served as individuals and they returned home as individuals. A few had briefly become national heroes through their exploits, but memories of their achievements were bound to fade. The short-lived Canadian Air Force, formed in England during the last months of the war, had been left in limbo by the Armistice, without links to the Canadian Corps abroad or the Department of Militia and Defence at home.

The initiative for responding to the challenge of the air age was left to a small group of middle-ranking civil servants in Ottawa. The initial interest of men like J.A. Wilson and C.C. MacLaurin lay in converting the expansive potential of aviation, so clearly demonstrated in war, to constructive peacetime uses, a focus of commitment which coincided nicely with the prejudices of an unmilitary people tired of war and a government bent on economy. The real foundations of a nation's airpower, it was reasoned, lay in the widespread development of civil aviation, including extensive commercial operations and a healthy aircraft manufacturing industry. This in turn would provide the foundation on which a military air force might later be built.

Largely at Wilson's and MacLaurin's urging, the government delegated responsibility for aviation to an autonomous Air Board in the summer of 1919. The board based its approach on a broad, generalized conception of airpower, concentrating particularly on the promotion of civil flying in the more remote and sparsely populated regions of the country. The board's first tentative step towards creating a military air force was to establish a small non-permanent Canadian Air Force along 'militia' lines, firmly tied to the civil sector and intended to be used in close conjunction with it. After the formation of a unified Department of National Defence in 1922–3, the Royal Canadian Air Force emerged as a permanent force, although a directorate of the army. The RCAF did

not achieve full independence until 1938, but from the beginning the force granted its own commissions, wore its own light blue uniforms, and used rank titles paralleling those of the fully independent Royal Air Force.

The RCAF's ties with the past remained intact through the officers and men, the originals, who had served with its predecessors during the First World War. Nevertheless, its duties were more closely related to civil than military operations. In its early years, the RCAF found its *raison d'être* in pioneering the application of aviation technology to an array of challenging tasks – forest patrolling and firefighting, aerial surveying and photography, exploratory flights, medical rescue, aerial policing, crop and forest dusting – in hitherto inaccessible areas of Canada. The force had responsibility not only for its own narrow service concerns but also for overseeing the development of the entire field of Canadian aviation. RCAF officers and airmen found themselves with tasks ranging from registering civil aircraft and controlling Canadian air space to supervising the design and construction of machines and attempting to stimulate an indigenous aircraft industry. The RCAF was also significantly involved in, and affected by, the transformation of Canadian aviation in the late 1920s, when in only a few years waterborne aircraft were replaced by wheeled machines using a national airway of interconnected airfields in the populated southern portion of the country.

The RCAF's civil functions were focused inwards, towards the economic development of Canada's hinterland, while the force's service traditions were directed outward to Britain and the Empire-Commonwealth. Even while its primary concern was civil flying operations, the RCAF preserved a measure of military identity by participating in exchanges with the Royal Air Force and by sending officers and airmen to training courses overseas, especially to the RAF Staff College and the Imperial Defence College. Then, when the somnolent 1920s gave way to the international anarchy of the 1930s, the RCAF was converted into an almost exclusively military force. Since it alone had the potential to defend the Atlantic and Pacific coasts from air and sea attack, it became the favoured of the three services, charged with the responsibility for providing Canada's first line of direct defence.

1
The Birth of the RCAF

When the Canadian government decided at the end of the First World War to disband both the Royal Canadian Naval Air Service and the two-squadron Canadian Air Force in Britain, the future of aviation in Canada was left in considerable doubt.[1] Four years of bloody fighting had ushered in the military air age, but few Canadians were aware of the extent or implications of the change. The war had been fought a long way away. The well-publicized exploits of Canadian airmen had generated excitement and pride, but not much understanding of flight or support for the development of a national air policy. A knowledgeable government official lamented that '90 per cent of the people in Canada have never seen an aeroplane and consequently are not alive to the possibilities.'[2]

The government's piecemeal wartime approach to aviation, moreover, had left a badly fragmented inheritance. No single minister, department, or agency had been made specifically responsible for aviation. The scattered aeronautical resources accumulated over the previous four years were disposed of as casually as they had been acquired, except for the air stations at Dartmouth and Sydney. These, together with twelve Curtiss HS2L flying boats, remained the only tangible legacy of the short-lived RCNAS and the 1918 anti-submarine patrols along Canada's east coast. The Royal Air Force soon abandoned all but one of its training bases in Ontario, leaving only Camp Borden to be turned over to the Department of Militia and Defence. The thousands of airmen overseas were demobilized as quickly as they gained release from their British squadrons. The result was that 'every month sees the dissolving and diffusion of this valuable manpower, which has cost millions to consolidate, and will cost millions to re-create at a later date.'[3]

The first object of any postwar aviation policy would be to arrest the drift. In the process the place of military aviation in the country's defence structure would have to be considered, and a suitable relationship between aviation's civil and military sectors sought. There were few guiding precedents. The state of the art had advanced remarkably in the decade since J.A.D. McCurdy took the *Silver Dart* precariously into the air. Bombers – their designs easily modified to civilian purposes – now had a range of 1300 miles with a payload of 7500 lbs, flying at nearly 100 mph at heights of 10,000 feet. Smaller machines could fly

higher and faster. War needs, quite naturally, had channelled the course of technological development. The processes of civil design, invention, and production could now be expected to assert themselves.

The immediate post-Armistice months, however, were not a promising time for innovation in Ottawa. Formed in 1917 to implement conscription and fight the war to its conclusion, Sir Robert Borden's Union administration lost much of its credibility, if not legitimacy, with the Armistice. The prime minister himself was preoccupied with international and imperial affairs, spending much of his time abroad, and his Cabinet lacked sustained direction. There was, moreover, little apparent support in Parliament or the government for aviation; certainly the young air veterans were not well placed to have much impact on the people who mattered. One close observer, after discussing aviation with a number of parliamentarians, found that 'with one or two exceptions they know nothing at all ... they say "Yes, I have read the stories about our aviators and they are brave men, but about the possibilities of aviation in Canada we know nothing."'[4] Another suggested that the Borden government was 'somewhat skeptical' about aviation.[5]

The prime minister, it is true, had included aviation in the mandate he set for the Reconstruction and Development Committee created in 1917. Among other things the committee was to 'consider the future possibilities of air service for certain national purposes,' under the general rubric of transportation.[6] That same year Borden asserted that the 'formation of the Canadian Air Force would doubtless tend toward giving a greater impetus to the interest which will be taken here in aviation after the war.'[7] Little happened, however. Although he was chairman of the Reconstruction Committee, Borden did not involve himself in its deliberations on policy, leaving the details to his vice-chairman, A.K. Maclean. He received the reports of the British Civil Aerial Transportation Committee in May 1918, but held them for five months before finally passing them along to Maclean without much comment. At the end of the war Borden wrote from London that there should be 'one service for both military and naval purposes';[8] from Paris a few months later he added that 'in any permanent military organization Air Service must have an effective part.'[9] That was the extent of his contribution; a peacetime aviation policy would have to be generated elsewhere.

Participation in the aviation discussions at the Paris Peace Conference in 1919 demonstrated, to begin with, the need for domestic legislation to guide national aeronautical development. In Europe the control of international aerial traffic was already an issue that could not be avoided. Aircraft could take to the air, but there was no mechanism for regulating cross-border flights, monitoring their progress, or setting common safety standards for aircraft and crews. Consequently, the International Commission on Aerial Navigation convened in Paris in 1919 to arrange an international regulatory system. Borden delegated Colonel O.M. Biggar, the judge advocate general, and Arthur Sifton, the minister of customs and inland revenue and a former premier and chief justice of Alberta, to represent Canada in its deliberations.

As in many other areas, Canada's aviation interests diverged from those being

pressed by the British government, which incorrectly assumed ready colonial acceptance of strong imperial leadership. Sifton reacted scathingly to British attempts to impose a European-based, centralized system to control international air space, pointing out to the prime minister its irrelevance to North America. 'An International Air Convention,' Sifton wrote in his unruly prose,

> is the latest and probably the worst case in which an effort is being made to take advantage of the presence of representatives of different countries here to foist on them an absurd, poorly drawn document, evidently prepared by people without the slightest knowledge of the subject of which they are dealing, aside from the actual flying and that under war conditions when the rights of non-flyers and even states remained in abeyance. The whole subject of air traffic from a commercial standpoint is so utterly unknown, that for anyone to sit down and attempt to draw a treaty for the civilized world is a manifest absurdity, and to attempt without consultation to include a country like Canada where if commercial air traffic is a success it will be of vastly more importance than it is likely to be in any of the countries who are assuming to settle the matter, is a blunder that would generally be called a crime. The only excuse that I have yet heard for the haste is that a factory in Great Britain is very anxious to start work making airships.[10]

Sifton's perspective was that of a jurist and not an airman, but his sense of differing British and Canadian aviation needs was accurate. The British were primarily interested in establishing aerial transportation between European population centres, flying over relatively short distances with ready access to ample ground facilities. Canada's problems were quite different: vast distances, an almost complete absence of ground facilities, and a strong international connection only with the United States. As a result, Sifton concluded, 'I could hardly credit the fact that a country like Canada for instance with a boundary line of four thousand miles over a large portion of which aircraft could start or land without any assistance from an aerodrome and which would be largely interested in air traffic, could ever agree to be governed even in regard to technical matters by a commission meeting in Paris ... and having one representative out of probably fifty.'[11] Yet the international convention finally accepted in Paris provided a convenient framework for Canadian flying regulations adopted in 1920.[12]

Regulations were needed. Before 1914, flying had been informally supervised, where it had been supervised at all, by Canadian affiliates of the *Féderation aéronautique internationale*. During the war, civil flying was restricted under the War Measures Act. When the war ended the Aero Club of Canada had been prepared to assume a supervisory role. In February 1919 it grandly informed the government that its parent, the Royal Aero Club, had delegated it 'entire control for the Dominion of Canada, and [the Canadian branch] is now engaged in issuing aviator's certificates to officers of the Royal Air Force and others who can pass the required flying tests.' In the same letter it also urged the Cabinet 'to enact legislation at an early date, governing flying throughout this country, as in a large measure the future of aeronautics depends on the attitude and policy of the Canadian Government.'[13]

Safety alone demanded more formal control. Early in 1919 the Canadian head

of the Imperial Munitions Board, Sir Joseph Flavelle, began to dispose of hundreds of now surplus Curtiss Jennies which Canadian Aeroplanes Ltd had assembled in Toronto. Flavelle, however, 'hesitated to make sales in Canada to sundry persons desiring to buy, until regulations are established in which flying shall be authorized and the necessary repair shops available.'[14] Overcoming his reservations, Flavelle found an American purchaser for most of the obsolete machines who, in turn, sold some of them to sundry Canadians for barnstorming and joyriding across the country.[15] Some aircraft, apparently, ended up in less than responsible hands. A former RAF officer living in Toronto complained a few months later that there was '"stunting" over the center of the city at extremely low altitudes. In fact, yesterday, there was a plane "spinning" not more than a couple of hundred feet above my house. Some day we will have a "proper" crash here and then the "fat will be in the fire."'[16] Not long afterwards an aircraft crashed in Winnipeg killing two passengers and seriously injuring the pilot.[17]

These concerns were readily shared by a small group of officials in Ottawa, and it was they who were the real authors of Canada's postwar aviation policy. The Department of Militia and Defence was the department most directly involved but, as Sir Willoughby Gwatkin, the chief of the general staff, said in 1919, 'Everybody's business is nobody's business. Nearly every Department of State is concerned but no one Department is charged with aviation.'[18] The most immediate difficulty therefore lay in clarifying jurisdictional responsibility. To fill the vacuum Gwatkin drafted an order-in-council for his minister in February 1919 extending the militia department's wartime control and permitting the appointment of an air board to supervise all aspects of aviation development.[19] The Cabinet, however, declined Gwatkin's submission. It seems likely that it was unwilling to confide aviation to military direction while its future was so uncertain.

Gwatkin's interests, in truth, ranged far beyond military aviation. In 1917 he had been opposed to a separate Canadian air force, considering it unnecessary and militarily inefficient, but he thought then that one 'should undoubtedly be formed' after the war. Furthermore, he had pointed out, 'if the C.F.C. [Canadian Flying Corps] is to be a success, it must be something more than a unit of the Canadian Militia. To some extent it should be commercialized, working in conjunction, for example, with the Topographical Surveys, Geographers' and Forestry Branches of the Department of the Interior, perhaps with the Post Office Department, certainly with the Department of the Naval Service.'[20] By early 1919 he foresaw an air board with the widest mandate:

> multifarious are the questions with which it would have to deal. Here are some of them: The acquisition of aerodromes, aeroplanes and aeronautical equipment, by purchase or otherwise, from the Imperial Munitions Board; the use to be made of pilots and mechanics trained during the progress of the war; international conventions and domestic legislation; aerial transport in its civil and commercial aspects; the transport of mail, express freight and passengers; the control of private enterprise; industrial development; the standardization and inspection of machines; licenses and certificates; meteorological observations and technical research; air routes, air charts, landing

grounds and wireless stations; the establishment of bases, depots and parks; forestry protection and the protection of fisheries; the execution of surveys; excise and police; defence and prohibited areas; co-operation with the Royal Navy; the organization of a Canadian Air Force; the formation of an Imperial Air Staff; the assistance to be rendered towards the establishment and maintenance of an Imperial Air Service.[21]

Ways of adapting aviation to productive peacetime use also interested a few well-placed federal public servants. As early as 1915 Charles Camsell, deputy minister of mines and resources, had proposed using flying boats for transporting geologists to isolated locations. Foresters wished to experiment with aerial patrols to control fires which annually burned uncounted acres of woodland, and both the Ontario and British Columbia governments wrote to Ottawa about airborne fire patrols in 1919-20.[22] Aerial survey intrigued others. Neil Ogilvie of the Geodetic Survey thought that aerial photos could be used in topographical surveys to aid mapping. The surveyor general, Edouard Deville, noted that aerial photo survey was 'more a problem of aviation than a problem of surveying; if the photographs can be obtained economically there is no difficulty in making good use of them for mapping. They would be particularly useful for the exploration of unsurveyed country if the lack of landing places can be overcome.'[23] J.J. McArthur of the International Boundary Survey, whose surveyors were practised in photographing regions from mountain tops, suggested the use of airships, which had the great advantages of range and endurance.[24] Parliamentary support came from Alfred Thompson, the member for the Yukon, who spoke glowingly of the possibilities of the 'largest undeveloped oil field in the world' in the Mackenzie River valley. Mineral deposits in the region promised to be more extensive than those of the Cobalt, Porcupine, and Klondike fields. 'The scientists could by airplanes be taken from almost any part of the northland into the very heart of this country in a few hours, and they could stay there through the summer and come out in the fall. There need be no fear of a lack of landing places. The country abounds in lakes and rivers and an airplane could land on a river or lake almost anywhere.'[25]

These ideas were imaginative but largely unfocused. Nor were they attuned to aviation's technical dimensions until two officials of the Department of the Naval Service gave them a hard, practical edge. J.A. Wilson and Major C.C. MacLaurin had become interested in the peacetime uses of aviation while working together during the war. Wilson had joined the Department of the Naval Service in 1910 and was its director of stores and subsequently assistant deputy minister. MacLaurin was among the first Canadian pilots trained at the Curtiss Flying School and enlisted in the RNAS. He flew coastal patrols off Britain before going on staff in Washington and then Ottawa. He and Wilson worked on the departmental committee which organized the Canadian Naval Air Service. Their experience persuaded them of the almost unlimited potential for using aircraft, especially flying boats and seaplanes, in the Canadian environment. In November 1918 Wilson wrote the first of his many papers on aerial development – 'Notes on the Future Development of the Air Services Along Lines Other Than Those of Defence' – and early in 1919 MacLaurin circulated his 'Memorandum

Regarding the Formation of a National Canadian Air Service.'[26] The papers shared a number of common themes; both authors freely borrowed ideas from within the international aviation community and undoubtedly discussed them with the Ottawa bureaucrats who were thinking along similar lines. Perhaps their most valuable contribution was to cast theoretical possibilities in a pragmatic and politically acceptable institutional framework.

Wilson and MacLaurin argued that aviation must be developed at the national level, and that the federal government should create the necessary regulatory mechanism. Only Ottawa had the resources to promote development on the broadest scale. While they took due note of the military factor, both emphasized the primacy of civil aviation in the postwar years. There were almost limitless possibilities for employing aircraft – in forestry patrols, surveying, policing, transportation. These, Wilson pointed out, were 'largely Government operations, and a national air service would very largely pay for its own maintenance and cost, and the existence of such an organization would obviate the necessity for subsidizing companies to undertake the work.' Several government departments, he noted, were already considering how they might utilize aircraft in their work, but each was faced with large start-up costs in forming its own aerial organization. A centralized air service made available to interested departments would be more economical and efficient. Large savings would also be realized, both Wilson and MacLaurin stressed, if flying boats and seaplanes were employed, thus avoiding the immense capital costs of constructing aerodromes for landplanes. 'The whole subject is fraught with so many possibilities, promises such great developments and the time is so opportune,' Wilson concluded, 'that it would appear only reasonable that the Government should take some steps so that the whole problem should be carefully examined and that some action should be taken without further delay to consider seriously the whole subject of Aerial Transport, not only within Canadian territority, but also how it will effect [sic] Canada in her external relations.'

Of the many common features of their proposals – a centralized, federally controlled air service with multi-purpose civil functions – Wilson's and MacLaurin's commitment to hydroplanes was perhaps the most significant and appealing. While climatic extremes and inhospitable terrain naturally restricted flying in Canada, the biggest topographical asset was provided by an abundance of lakes and rivers. Both seacoasts, the great lakes system, the major river networks, and uncounted minor lakes and rivers provided the basis of a national aerial communication system. There were, of course, plenty of fields and open spaces where landplanes could take off and land, but building equipped airports would be prohibitively expensive. Canada already had in place a costly, overdeveloped rail network, and the possibility of generating the capital investment which an airway would need was remote. Early action was vital, MacLaurin concluded; 'The United States is preparing a gigantic Aircraft policy. Practically every other country in the universe is awake to the possibilities and is preparing a progressive programme. Should Canada not have a National Service, a service embodying all the principal branches, a public utility in connection with aeronautics and an industry that will, within a

few years, compare with motor-car building, shop building, or even railroading?'

Both Wilson and MacLaurin were convinced that once civil aviation was developed comprehensively the military sector would follow in good time. A nation's airpower, they reasoned, could not adequately be defined in narrow, purely military terms. Rather, it comprised the sum of aviation's many parts: a viable commercial sector, a healthy aircraft manufacturing industry, widespread training and instructional facilities, technological research, and an active programme of experimental flying operations. Wilson, in particular, had been profoundly influenced by his experience with the Royal Canadian Navy in its formative years. He often cited as appropriate to aviation an analogy with the growth of sea power, emphasizing the close association of the Royal Navy with the Merchant Navy. In Wilson's view, the failure to foster a like relationship had been a fatal flaw in the prewar RCN. 'I spent the best ten years of my life in that endeavour,' he wrote to Charles Grey, editor of *The Aeroplane*, 'and know how true it is that the house was built on sand and had no permanence.'[27] Without a solid civil foundation, Wilson concluded, the navy was never able to muster the material, technological, and moral support it needed to prosper; consequently, it remained an artificial construct imposed on a disinterested public, fighting a continual rearguard action for survival.

Wilson was convinced that a similar fate awaited any attempt to develop Canadian aviation on a narrow military base. As he later explained in the *Canadian Defence Quarterly*, he believed that the First World War had distorted the development of aviation, and that 'there should be an interim period, during which civil aviation might have time to build up [its] organization.' 'Had there been no war, it is probable that the development of the civil uses of aircraft would have preceded the military uses. The natural growth of civil aviation from small beginnings would have resulted in a healthy, sound and useful development as time went on, confidence was gained and new outlets for aviation were discovered. The immense military development has retarded civil aviation not only by stopping it entirely during the war, but also by giving the study of aeronautics an unnatural bent and false direction.' Military aircraft were 'far too costly to operate successfully under peace conditions,' and designers had to turn their attention 'to producing economical, low-powered aircraft, which, by their efficiency, make up for their lack of power.'[28] Concentration on civil aviation would redress the imbalance between civil and military development. Strong public involvement would be required, both to regulate the air space and fly experimental operations until they could be assumed by private companies. The military organization that followed would be able to take advantage of the sound material and technological structure that had been established. Such a structure would, Wilson argued, 'automatically create a self-supporting aircraft industry and a reserve of trained pilots and mechanics for the air defence of the country.' If the government were to adopt Wilson's views as policy, 'there would be little necessity for the maintenance of any permanently embodied Air Force units, other than those existing for staff and training purposes. The permanent Air Force would be almost wholly an organization of that kind, containing the

picked men of all classes engaged in aviation as instructors and staff officers.'[29] The full development of aviation was a precondition of true airpower, on which effective military aviation ultimately depended.

These ideas had the force of logic, economy, and consistency. Not content to leave the future to chance, Wilson and MacLaurin circulated their proposals to influential individuals and groups. Publicity could also help, and it is likely that they had a hand in an editorial which appeared in the spring 1919 issue of the *Canadian Forestry Journal*. The forestry industry was becoming impatient with government inaction, and the *Journal* had received 'communications from many senior aviators who looked upon an aerial forest patrol as a simple, effective and inexpensive proceeding.' Moreover, the editors 'understood that topographical survey, the geodetic survey, the Royal Northwest Mounted Police, and the Post Office Department are thoroughly convinced of the advantage of airplane service in increasing their efficiency and in certain instances reducing their cost of operations.' While the bureaucracy was persuaded, however, government ministers appeared uninterested, and 'a refusal on the part of a Cabinet Minister to take action gives an instant quietus to the departmental agitation.' The forest industry could not be similarly ignored: 'Those bodies ... which have taken an interest in Canadian forest policy are not as sensitive to this official denial and may be depended upon to intensify their requests until proper consideration is given.'[30]

Perhaps as a result of such lobbying, perhaps because some action was necessary, Wilson was asked to prepare legislation for Cabinet consideration in March 1919. He had a draft ready within two days, arguing for the creation of an air board to set and implement general aviation policy. Cabinet sent the document for review by the service chiefs, sitting as the Naval and Military Committee. Wilson suggested that the board should provide advice to the government on air defence, but this was unacceptable to the service chiefs. Since it was still unclear whether any future Canadian air force would be completely independent or incorporated into the older services, neither the militia nor the navy wanted to surrender any freedom of action or authority, real or potential. They therefore advised that the board's mandate be restricted, so that it would do no more than 'co-operate' with the armed forces until peacetime defence policy and organization had been settled.[31]

Thus modified, Wilson's paper formed the basis of the government's first postwar aviation bill, presented to Parliament on 29 April 1919. It stipulated a five-to-seven member air board with a minister of the crown as chairman, and representatives of the Departments of Militia and Defence and the Naval Service.[32] Speaking on behalf of Cabinet, A.K. Maclean admitted that the board was only a temporary expedient: 'the Government has no settled policy in respect to aeronautics.'[33] Like the government, opposition members were content with a flexible enabling authority to experiment and set policy in a field about which they knew little. They called for only a few additional details and some assurance that wartime flyers would receive due recognition. The bill passed after perfunctory debate.

Although Wilson had recommended that board members have technical

knowledge and expertise, the better to comprehend, evaluate, and guide programmes and activities, the Cabinet assembled a panel more attuned to the realities of politics.[34] Two Cabinet colleagues joined Arthur Sifton, the chairman, on the board – S.C. Mewburn, minister of militia and defence, and C.C. Ballantyne from the Naval Service – along with R.M. Coulter, deputy postmaster general, and E.S. Busby, a customs officer. O.M. Biggar, as vice-chairman, was chief executive officer and, after a few months, Wilson was appointed secretary. Biggar and Wilson were good choices. Biggar's experience at the peace conference had introduced him to some of the complexities and technicalities of aviation; both men were superb organizers with extensive and influential contacts in Ottawa's political and bureaucractic world.

The Air Board met for the first time on 25 June 1919. A letter from the minister of finance, Sir Thomas White, was immediately put on the record: 'from a financial point of view alone, it was out of the question that aerial services should be generally established by the Government.'[35] Board members, even so, agreed that about $500,000 would have to be spent over the next year. Aircraft would have to be maintained, meteorological and wireless services established, air regulations prepared, and a permanent staff recruited.

The government halved the Air Board's estimate, and in the end the board spent only $100,000 in the first year. This was enough to make a solid beginning. Within a month of the Air Board's first meeting it had settled its internal organization, establishing a certificates branch to license pilots and aircraft and perform other regulatory functions, an operations branch to conduct government flying, and a secretariat. Not long after a technical branch was formed. The board's organization roughly paralleled, and was probably modelled on, the British Air Ministry.

Recruiting for the new organization posed certain problems. Most wartime flyers were still in their early twenties; few had any experience of civilian employment, and the characteristics of an effective combat pilot were not necessarily those of a civilian flyer. The Air Board wanted men with 'good records,' not only as fighting pilots but also as administrators, a requirement that effectively disqualified most wartime flyers who had served as relatively junior officers on squadron service.[36] Furthermore, as a civil agency the Air Board was obliged to hire its staff through the Civil Service Commission, conforming to the normal government career pattern leading to a pension after half a lifetime of service. The board, however, wished to avoid long-term commitments to men who would be too old for operational flying long before they qualified for a pension. It took some time and discussion before the commission could be persuaded that this was a special case, and accepted the principle of making three-year appointments.[37]

Recruiting began in July 1919. Wilson and Lieutenant-Colonel A.K. Tylee, whose wartime experience had included command and staff experience with the RAF's Canadian training organization, formed the selection board, and vacancies were widely advertised. Though the board wished to give preference to wartime CAF members,[38] few applied. Some, like Raymond Collishaw, accepted RAF commissions; others, like W.A. Bishop, W.G. Barker, and R.H. Mulock, had

taken up civilian careers. Among those who did join the Air Board was Robert Leckie, whose wartime career included command in 1918 of the short-lived CAF in Britain. He joined the RAF in 1919 and was seconded to the Air Board as director of flying operations. Lieutenant-Colonel J.S. Scott, another of the few air veterans with administrative experience, became superintendent of the Certificates Branch. The salaries of Leckie and Scott were less than those for comparable service rank and responsibility. Scott, for example, received $4500; as a militia lieutenant-colonel he would have earned $4970.[39]

The first Air Board was the object of some criticism because it included neither a military officer nor a representative of the Department of the Interior, the civil department most concerned.[40] In the spring of 1920, as the board began its first season of field operations, its membership was altered. By an order-in-council of 19 April the more 'professional' body recommended by Wilson the previous year received official sanction. The chairman was now Hugh Guthrie, minister of militia and defence, although the board did not function in any sense under that department.[41] Organizational continuity was ensured through the reappointment of Biggar and Wilson. Leckie and Scott represented the board's operational and regulatory functions, Captain Walter Hose the navy's interests, and Edouard Deville those of the Department of the Interior. Finally, there was Sir Willoughby Gwatkin, recently retired as chief of the general staff and now air vice-marshal and inspector general of the new Canadian Air Force.

Despite the inclusion of the quiet, intellectual, witty Gwatkin on the new board, military aviation was to play a subordinate role in the scheme of things, at least in the early stages. In the confused aftermath of war Canada's future defence needs were as vague as the country's external obligations with which, presumably, they had to be co-ordinated. Moreover, defining an appropriate role for military aviation within the shrunken peacetime defence structure was bound to be difficult. Canada's armed forces were still patterned on the British model and, in Britain, wartime arguments supporting the principle of unity of the air, which had led to the creation of the RAF in 1918, were being challenged by both the army and navy.[42] Until that question was resolved and Canada's postwar defence posture determined, the board's military aviation policy remained of necessity partial and temporary.

There was, however, an issue outstanding from the war which forced the board to early action in mid-1919. When the British government formally offered Canada and the other dominions a gift of surplus aircraft in June 1919, a caveat was attached, the 'object of His Majesty's Government being to assist Dominions wishing to establish air forces and thereby develop defence of the Empire by air.'[43] This was sufficiently vague to invite contrary interpretations, and it promptly did. The possibility of obtaining aircraft had first been raised with the RAF in March by the Canadian Overseas Ministry[44] (at the same time that, independently, Wilson was drafting the Air Board Act). Soon afterwards the ministry staff began selecting surplus machines from a variety of combat and training types. They were interested in aircraft suitable for the military air force they had been pressing on Borden since the Armistice. The Cabinet decision not

to repatriate the overseas squadrons as a military unit disrupted these plans, leaving the status of the British offer in doubt.

Lieutenant-General R.E.W. Turner, Canada's senior military officer overseas, thought the 'offer may be withdrawn should the Canadian Air Force not be proceeded with.'[45] Consequently, the Overseas Ministry chose to apply the narrowest interpretation to the British condition; that is, that Canada would have to maintain a military air force if it were to be given the airplanes. The ministry informed the Air Board that it had stopped selecting aircraft until 'a definite statement that machines would be accepted in terms of the offer' had been received.[46]

The Overseas Ministry perhaps viewed the aircraft as a convenient lever to pressure the Cabinet into accepting a military air force. Fortunately, the British were flexible. Their chief of the air staff, Sir Hugh Trenchard, told the Canadian liaison officer in London, Major D.R. MacLaren, that 'it is the policy of the Air Council and the Air Ministry to further in every way possible the efforts of Dominions to establish Air Services either for Military or Civil service purposes.'[47] MacLaren, in turn, informed the Overseas Ministry soon after that 'No stipulation has ever been put forward by the Air Ministry that these machines must be used for military purposes only.'[48] When Wilson visited London in October 1919, he found Trenchard was 'rather disappointed with the Canadian Government not seeing their way to maintain a Fighting Force,' but he agreed that 'it was far better to start on a small scale and work up than have a large programme have to be cut down and perhaps disrupted altogether.'[49] Wisely, the British government chose not to involve themselves further in what was clearly a Canadian decision.

The Air Board – barely functioning at this time – wanted the aircraft. While its projected operations were not absolutely dependent upon them, the surplus machines would expand the board's capabilities at little additional cost, and Colonel Biggar became alarmed at the prospect of losing them. He immediately told the Overseas Ministry that 'Terms of Imperial offer thoroughly understood and purpose outlined by Air Ministry is what Air Board has in view,' adding it was 'Most important that machines should be secured.'[50] The types of aircraft initially selected were all landplanes – DH9s, DH9As, Bristol Fighters, SE5s, Dolphins, and Avro trainers – whose utility would be severely limited in Canada by the almost complete absence of adequate ground facilities. The board's primary need was for flying boats and seaplanes, which could be quickly deployed on civil duties. Biggar requested that the discussions with the Air Ministry be reopened with a view to obtaining more flying boats. He also wanted to ensure that sufficient ancillary equipment was included with the aircraft to make them readily operational: 'it is the opinion of the Air Board that they would rather have a small number of machines, and such additional Technical Equipment as to ensure their operations being successful, than to have a large number of machines without such equipment.'[51]

The negotiations with the Air Ministry continued but were only partially successful. Despite Trenchard's apparent support, the equipment staff in the Air Ministry found it did not have enough surplus flying boats to meet all the

Canadian requests.[52] They found eleven Felixstowe F3s, two Curtiss H16 boats, as well as one Fairey IIIC seaplane. Besides these, the final list included sixty-two Avro 504 trainers, twelve each of DH9As, DH4s, and SE5As, along with one Bristol Fighter and one Sopwith Snipe. There were also twelve airships, six kite balloons, and a generous amount of spares and technical equipment. The lot, conservatively valued at more than $5 million, was collected by the wartime CAF's rear party, packed, and shipped to Canada, the first crates reaching Camp Borden early in 1920.[53] As a separate item, the Air Ministry also turned over to Canada a number of captured enemy aircraft. These war trophies, however, were not intended to be used other than for exhibition purpose, as 'what it is desired to avoid is the pushing into prominence of enemy-built aeroplanes ...' Consequently, the Air Board did not take them on its charge and some were given to interested museums.[54]

While the surplus aircraft obtained from Britain did not dictate the form of Canadian aviation policy – it was already being shaped before the British offer became an issue – they did provide the Air Board with the means of equipping a military training organization which would complement and expand the board's overall programme. When Biggar was negotiating the acquisition of aircraft, he had hinted at the type of training organization the board was considering. 'Although the Government has not approved of the establishment of a Canadian Air Force as a permanent force,' he told the Overseas Ministry, 'it ought to be possible to organize some sort of militia force, if the machines are available, without too heavy an investment, and the question of organizing such a force will be one of the first subjects for the decision of the Air Board.'[55]

The idea of forming a non-permanent militia air force was a natural extension of the views of those who were mainly responsible for shaping postwar aviation policy – Biggar, Gwatkin, Wilson, and MacLaurin. It was also an ingenious and pragmatic solution to a perplexing dilemma. Any Canadian air force at this time had to be many things to many people: economical yet efficient, unobtrusive yet effective, unmilitarist yet military. A case for maintaining a new fighting service which promised only to be very expensive was not easily made. As the recently elected leader of the opposition, William Lyon Mackenzie King, asked in the House, 'Where does the Minister expect invasion from? ... defence against whom?'[56] Merely to raise the questions illustrates their complexities. What sort of air force would best suit Canada's defence needs? For what contingencies should it prepare? Against what threats might it concentrate its efforts? How many squadrons and of what types – bomber, fighter, reconnaissance – would it require? A non-permanent militia organization, solidly in the Canadian tradition, would enable the government to skirt the tough political, strategic, and technological obstacles that inhibited the immediate development of military airpower. Moreover, it could be organized quickly by making use of the many wartime flyers who wished to maintain their connection with aviation without taking up flying as a career.

Colonel Biggar sought the Air Board's concurrence to form the Canadian Air Force as a non-permanent service at its sixth meeting, on 28 November 1919. Specifically, he suggested three initial steps: that an invitation be issued to

former officers and airmen to enlist on the understanding they would be called for active duty no more than five weeks in any two years; that authority be obtained to form provincial Canadian air force associations to administer the service; and that the British Air Ministry be asked to release RAF reserve officers from their obligations once they joined the CAF. The board members agreed, and asked Biggar to prepare a formal recommendation for submission to the Cabinet.[57]

Biggar's proposal was a significant statement of aviation policy. It began by embracing unreservedly the principle that air forces would play a significant role in any future war, their relative importance increasing progressively 'the longer the period intervening before the commencement of such a war.' Having accepted the need for an air force, the problem lay in determining its most effective form. In Canada's case, the probability of severe financial limitations meant that 'a professional military air force must, by reason of its cost, be so small as to be almost negligible in war, since war strength in the air will, as in other branches, depend primarily upon numbers.' There was also the need continually to turn over flying staffs. Consequently, there would be no place for those 'who are beyond the average efficient flying age for war flying,' making 'the profession of a military air force officer ... a "blind alley" profession from which he must be compelled to retire at a comparatively early age.' In combination, 'these difficulties and objections weigh so strongly against a purely military air force as to practically exclude resort to it.'[58]

Biggar emphasized, however, that aviation employed skills and equipment which, even more than the other services, were 'capable in a large measure of useful exercise in peace.' Relatively few air force officers might perform 'useful civil duties, such as mail carrying and surveying'; most civil flying would be done by commercial companies, whose pilots would constitute an air force reserve. 'It follows, therefore, that war strength in the air must ultimately depend upon civil or commercial air strength; that most of the members of a war air force must normally pursue peaceful occupations (preferably, but not necessarily, in connection with air navigation), that war formations should exist only upon paper and not in the form of embodied units, and that war training should be periodic, intensive and widespread.' Even training and administrative cadres should be made up of 'civilians temporarily assuming military duty.' Biggar acknowledged this would be less efficient than having regular staffs, but 'peace efficiency is not the primary consideration.' In fact, '[a] war organization so constituted as to be comparatively inefficient in peace but reasonably efficient in war is very greatly to be preferred to a war organization which shows a high degree of efficiency in peace but breaks down when it is called upon for war service.'[59]

The government accepted Biggar's reasoning and approved the CAF's formation in February 1920. Rather than framing specific legislation, the Cabinet acted by order-in-council,[60] relying on the permissive authority given in section 5 of the Air Board Act 'to employ such officers and men' as it might require. Their decision was unfortunate. It was a tenuous foundation on which to organize a national air force.[61]

Sir Willoughby Gwatkin became inspector general of the CAF in April 1920. The Air Board wished to offer the position of air officer commanding to Colonel R.H. Mulock, who had commanded the RAF's No 27 Group – the special long-range bombing force formed in England near the end of the First World War, too late to be used.[62] When he declined because of business commitments, the board approached Lieutenant-Colonel A.K. Tylee, who accepted an initial nine-month appointment in the acting rank of air commodore and opened his headquarters in the Air Board offices at 529 Sussex Street in Ottawa on 17 May.[63] He was later joined by Wing Commander R.F. Redpath, Flight Lieutenant G.J. Blackmore, Warrant Officer H.H. Atkinson, Flight Sergeant F. Aldridge, and Sergeant A.H. McKay.[64] All of these, it must be emphasized, were untenured appointments in the non-permanent militia, terminable at will by either party, and conferring no pension rights.

The CAF regulations compiled by this headquarters staff over the summer of 1920 were adapted from those of the RAF.[65] Approved at the end of August, they made the air officer commanding 'responsible to the Air Board through the Inspector General.' The latter's task was to ascertain 'the state of discipline and efficiency in the air force from time to time and report to the Air Board all such matters as in his opinion require to be brought to notice.'[66] Broad policy and day-to-day administration were the work of the Canadian Air Force Association, which was formed in June 1920 by incorporating six members of the Air Board under the Dominion Companies Act.[67] Provincial branches (the Maritime provinces comprised a single branch) of the CAFA were manned by volunteer executive committees, each with a full-time secretary.[68] The central CAFA body in Ottawa set policy, while branches were made responsible for recruiting, maintaining rosters and records, selecting officers and airmen for regular training or for courts martial and other duties, and advancing generally 'the interests of the Canadian Air Force.'[69] This still left a wide array of responsibilities to individual commanding officers, charged (among other things) with promoting 'a good understanding,' preventing disputes, discouraging 'any disposition ... to gamble or to extravagance,' and checking 'any tendency ... to practical jokes ...' among the militiamen who made up their commands.[70]

Unlike their non-permanent army counterparts, all CAF officers and airmen were considered in continuous service but on inactive, unpaid leave except when on refresher training. Provisional commissions granted to suitable applicants in their highest previous RAF rank were confirmed on completion of the first training period. Officers invalided out of the RAF might be enlisted if judged capable of further productive service, and the usual RAF flying age limitations (for example, thirty-two years of age for flight lieutenants) were relaxed to avoid losing the experience of older pilots. When reporting for his first tour of training, each officer selected a specialty, such as administration, photography, or equipment, in which he could be employed when beyond flying age. All officers were eligible for CAF staff and training appointments, which were continuously rotated among those qualified every three to six months.[71] Royal Air Force ranks and traditional army ranks were both acceptable,[72] and apparently used

interchangeably at the whim of the holder. Daily pay rates ranged from an air commodore's $9.50 to a pilot officer's $3.00; from a warrant officer's $2.05 to $1.00 for an air mechanic second class. Men on active duty longer than the training period received double rates for up to one year, and after that one and one-half times the norm.[73]

The uniform was distinctive. Styled after army dress, it featured a dark blue serge tunic and slacks, blue or white shirts and black ties, with white wing collars and bow ties for the mess. Army-style rank badges (crowns, stars, and stripes), and all insignia, including pilot and observer wings, were silver. A new CAF crest with the motto *Sic Itur ad Astra* ('This is the way to the stars') adorned cap, collar, and lapels. All ranks could wear either a field service or a forage cap, on the peak of which squadron leaders and above sported a row of silver leaves. Duty officers carried canes.[74] Air Commodore Tylee told the first convention of the Canadian Air Force Association that the uniform was 'democratic and economical'[75] and would enhance the identity of the service, but many incoming officers preferred their wartime ranks and outfits, particularly breeches. No one seemed to mind. As one recalled, 'for the first two years, at least, we were allowed to wear any combination of uniforms while on duty at the aerodrome. This was to permit us to wear out our old R.F.C., R.N.A.S. or R.A.F. clothing. At the Officers Mess we could wear anything (or next to nothing, in the hot weather) at breakfast or luncheon but we were always supposed to be dressed in C.A.F. blue at dinner.'[76]

CAF training was concentrated at Camp Borden, the wartime home of the RAF Canada flying training scheme.[77] It included machine-shops, schools, garages, offices, quarters and messes, a central heating plant, paved roads, a swimming pool, golf course, and tennis courts. Most important, there were eighteen hangars each able to house ten aircraft.[78] But when the newly appointed station superintendent, Captain G.O. Johnson, arrived on a snowy 8 January 1920, he found the buildings deserted, except for a caretaker and his assistant. Johnson and the nine men who reported for duty four days later had to find rooms in the nearby village of Angus, and travel the five miles back and forth to camp in sleighs while they reopened the buildings.

Their task was to prepare the base to receive the gift aircraft then en route by sea from Britain. The first arrived by rail in mid-January, packed in cases weighing two to four tons. These were, Johnson reported, 'lifted from the cars by means of a differential chain tackle, lowered onto a sleigh and drawn into a hangar by horses. It was a very slow and tedious process involving a lot of heavy work but gradually better equipment was acquired. Drifting snow was a great handicap, for every morning it was necessary to cut a roadway through the drifts by hand so that the sleigh could get into a hangar. During the month of February the drifts were from eight to ten feet deep.'[79] The spring thaw slowed unpacking until the men, who had to open up quarters and kitchens between shipments, rigged a wheeled, team-drawn trailer to replace the sleighs.

Hiring casual labour allowed the skilled mechanics to concentrate on assembling aircraft. All had been damaged in transit and needed careful attention before they could be flown, but Johnson had the first, an Avro, fitted with

Curtiss snow skids and test-flew it himself early in March. Johnson tested each of the other machines as it was assembled, including four DH9As which were then shipped west for the first trans-Canada flight later that year.[80]

An advance party reinforced Johnson's crew for the training season. Sixteen officers and thirty-five airmen joined Squadron Leader F.G. Pinder, who arrived at the camp on 7 June. Of the first instructors, two, Flight Lieutenants A.A.L. Cuffe and N.R. Anderson, later attained air rank in the RCAF, as did two of their earliest students (at the camp for a refresher course), Flight Lieutenants W.A. Curtis and Harold Edwards. The medical officer, Flight Lieutenant H. Norman Bethune, was later a surgeon with the Communist forces in China. The first CAF reservist to complete a refresher course was Wing Commander J.S. Scott, who arrived on 16 August and completed his tour in eleven days before returning to his civil duties with the Air Board. Scott and most Air Board employees, as F.H. Hitchins has pointed out, were 'filling the dual role of civil servants under the Air Board and officers or men in the CAF, [and] represented the only permanent thread through the period of late 1919, when the Air Board began to develop, until April 1924, when the permanent RCAF came into being.'[81] Far outnumbering them, however, were those CAF trainees who were in occupations other than aviation, arranging through their provincial associations to report to Camp Borden when their circumstances allowed.

Subsequently, training was carried out by No 1 Wing, CAF. Formed at Camp Borden on 7 September 1920, it comprised a School of Special Flying equipped with Avro 504K trainers; 1 Squadron with two flights, one of SE5A single-seater fighters and another of DH9A bombers; and a ground instructional section to handle engine and aircraft repairs, wireless telegraphy, photography, gunnery, and navigation.[82] So far as possible both flying and ground training followed the RAF model. The instructors had all passed through the original School of Special Flying in England, which is described in the first volume of this history.[83] Regular refresher training began on 1 October, and by the end of the year 86 officers and 111 airmen had completed courses, and an additional 50 officers and 209 airmen were undergoing some form of training all year round. The camp's total for 1920 was 733 flying hours; for 1921 refresher training totalled 2620 hours.[84]

Camp Borden's informality encouraged initiative. R.A. Logan, who had spent the last years of the war in a German prison camp, was posted to No 1 Wing on 8 September 1920, where he organized the Ground Instructional School. 'When I took over the school,' he recalled, 'I had a big empty building, one or two corporal instructors and no typewriter. On my first trip to Ottawa I asked for a clerk and for a typewriter. I was told that there was not enough work for a clerk and less need for a typewriter. As I left Air Force headquarters that night I picked up a typewriter from one of the desks, carried it back to Camp Borden and kept writing letters to the C.O. to be provided with a clerk so that I would not have to devote so much of my valuable time to typing when I should be lecturing. I got my clerk and it must have been three or four months before the Ottawa office discovered that they had a typewriter missing and that it was at Camp Borden.'[85] Logan and his instructors salvaged useful instructional aids from Borden's

considerable stock of wartime aircraft parts. They accumulated enough components to convince two NCO mechanics, Romeo Vachon and C.S. Caldwell, that they could assemble two complete machines. Logan agreed to teach both of them to fly if they were able to make the aircraft airworthy, and 'we eventually had not one but *four* Jennys in good flying condition.'[86]

Unfortunately, there were too few like Vachon and Caldwell. Although the provincial branches had little difficulty filling their officer quotas (1281 of 1340), the recruiting of airmen, especially qualified mechanics, lagged badly. Only 1350 had applied by the end of 1921 for 3905 vacancies,[87] and, at Camp Borden, the problem was aggravated by a lack of continuity and infrequent training periods. The small groundcrew pool, continually rotating through the Training Wing for a month at a time, provided all maintenance and repair, although most of its members had no previous training on aircraft. Only about 12 per cent of the airmen then enlisting in the CAF had air force experience. The small number of mechanics with wartime RAF service had gravitated towards more attractive employment, some with the Directorate of Flying Operations [DFO]. It took an estimated three to six months to train an automobile mechanic to a suitable standard of proficiency on aircraft engines or to convert a carpenter into an efficient rigger. Safety standards were bound to deteriorate unless enough qualified groundcrew were found, but the poor pay and lack of career development opportunities made it difficult to attract them. Meanwhile, aircraft had to be serviced. As Logan, who doubled as a representative of the Maritimes branch of the CAFA, pointed out:

> The main trouble in getting the right kind of man here is that there is nothing to attract them ... A man may be here for a year and know as much as a man here for twenty-eight days. Very often a man leaves his own job to come here, and somebody else gets it. Until we can offer him something better, he is going to think twice before coming. We are getting two classes of men. The class out of a job will take anything. All he wants is to hang on until he learns just sufficient to keep him on. There is another class. The one who is coming to learn, who is not worried about the pay. He is considering training, and comes up for all the instruction he expects to get. As soon as he considers himself good enough, he will take up a civil position, because there is nothing to attract him to the CAF at present. As soon as we get a good man, and he gets the offer of a good job, he is gone ... So long as we are trying to run things as we are at the present time, I do not see how we are going to better it. In flying we must depend on mechanics, and nobody wants to fly in a machine that is liable to go to pieces. Good mechanics will not come at the present rate of pay. Most of the men are not here out of patriotism. It is for what they can learn. In the meantime we have got to entrust our lives to these men.[88]

Growing discontent about these unsatisfactory conditions came to the government's notice early in 1921. Two members of the Ontario CAFA, Lloyd Harris and R.W. Leonard, reported complaints made to them by CAF officers at Camp Borden. The problem, they thought, was the Air Board's policy of operating parallel organizations, one for civil and the other for military aviation. Both the DFO and the CAF employed staffs at Borden for equipment and stores,

repair shops, and administration and recruiting, but the DFO civilians were much better off. Civil mechanics, for example, received permanent appointments, and their minimum rate of pay was $5.00 per day compared to $2.05 for the same class in the CAF. The immediate need, Harris and Leonard thought, was 'to bring the two branches together with one central authority and direction.'[89] Subsequently, efforts could be made to bring status and salaries into line.

The Air Board was aware of dissatisfaction,[90] but Wilson thought a strong military presence would be detrimental to the development of Canadian civil aviation. Any difficulties which had arisen, he claimed, were not from organizational faults but from the failure of officers employed in the military branches 'to carry out loyally the intention of the Air Board.'[91] He provided no specific examples.

Wilson's arguments notwithstanding, complaints were brought to the Air Board's attention when the CAFA branches convened at Camp Borden in June 1921. The civilian DFO and the CAF, it was argued, needed a professional permanent officer who could command and give direction to the whole of the operational flying system, both civil and military. Moreover, the air force needed a permanent staff. Stability and continuity could not be secured when command and staff appointments were rotated through officers who happened to be available for three- to six-month duty tours. As one of the Manitoba delegates complained:

> We have yet to have defined to us the true significance of the Air Force Associations, whether our recommendations or otherwise receive the consideration they are entitled to ... Unless we get better co-operation, with a permanent head, and at the same time, with a nucleus of a permanent staff, you cannot expect any one to come down and assume command here for one year and then get their walking ticket. Unless this breach is filled in some way, you are going to have a lot of resignations, the resignation of all the secretaries of the C.A.F.A. This will be done as a protest against the lack of co-operation ... It is in the mind of everyone here that there is absolutely no co-operation between the two branches, and we firmly believe it would be in the best interest of flying to have a permanent head to look after the C.A.F. and civil flying.'[92]

Other criticisms were voiced. The DFO had been given a monopoly on civil flying, it was alleged, which eliminated competition and hampered the growth and development of civilian commercial firms. Delegates argued that some operations, for example those being conducted at cost for provincial governments, should be put out to tender with competing civilian aviation firms given preference over the DFO. There were also complaints concerning the board's centralizing training at Camp Borden and the testing of pilots seeking commercial licences by Ottawa-based Air Board officials when qualified CAF pilots in the regions were readily available as examiners.

It was ironic that the strongest arguments for a permanent cadre came from non-permanent CAFA members, while the CAF's only regular officer offered a restraining caution. Air Vice-Marshal Gwatkin warned the delegates that if the association pressed too strenuously, 'people who are jealous of military

establishments' would set back whatever progress had been achieved.[93] He had already acknowledged many of the difficulties and was moving to correct them. At an Air Board meeting in March 1921 he had suggested, in the interests of economy, combining the two aircraft repair shops at Camp Borden under the CAF. He had also pointed out that it was not possible to perform repair and maintenance work effectively with a temporary staff employed for short periods of duty, and proposed to employ a regular nucleus of trained mechanics under a permanent superintendent 'who would be responsible not only for the execution of repairs, but also for the technical instruction of air mechanics under training at Camp Borden.'[94] The board had agreed, and Gwatkin now promised the CAFA that he would 'tell the Minister ... that the time has come when the Directorate of Flying Operations and the C.A.F. should be merged in one show, one department, under one head, and that head to be the C.A.F.'[95]

In July 1921 the board enhanced the degree of co-ordination between its civil and military components by making two important joint appointments. Wing Commander J.S. Scott, the controller of civil aviation, became the CAF's third commanding officer as well. At the same time Squadron Leader J.L. Gordon, an assistant director with the DFO, became the fourth commander of No 1 Wing at Borden. This represented only a partial solution. When it had formulated its military aviation policy in the fall of 1920, the Air Board had stressed that 'uncertainty on the point of the primary or ultimate purpose of an organization always results in confusion and inefficiency.'[96] The Camp Borden discussions revealed that many CAFA members were unclear about their role and that the part-time CAF pilots were not getting enough flying time. If the latter could not fly with the small DFO, they could look only to their one month's refresher training periods or to employment with commercial flying companies. The essence of the Air Board's developmental strategy had depended on a strong private sector which would absorb trained flyers looking for an outlet for their flying skills. Commercial aviation, the board expected, would not only make productive use of available pilots, but also create a demand for aircraft which would stimulate a domestic aircraft manufacturing industry. When, in the postwar depression, private aviation failed to prosper, the Air Board's strategy, and the hopes for a vital civil-military relationship which underlay it, were placed seriously into question.

The election in December 1921 of the Liberal government of Mackenzie King brought further problems for the board. The election had inconclusive results, continuing the disruption of the traditional Canadian two-party system which the formation of the Union Government had begun four years before. The new prime minister's chief political concern lay in managing a fragile, minority administration, while his policy preoccupation was to reduce government expenditures. His views on aviation were yet to be formed. Later King gave considerable support to civil flying in the 1920s and then to air defence in the 1930s. To this point, though, he had revealed little of his attitude, if indeed he thought about aviation at all. In opposition King had criticized the Conservatives' aviation estimates, particularly those on 'an air service for military purposes [which] is the height of absurdity.'[97] But it was an isolated reference. His party's emphasis

on budget cuts, however, made Gwatkin wary. 'They are pledged to rigid economy; and what their attitude towards the C.A.F. will be, I do not know,' he wrote Trenchard, adding that 'I am a little afraid of an attempt being made to bring it under the Militia Council.'[98]

Gwatkin's antennae were well tuned. Since the war, proposals to integrate military forces had become fashionable. Both the British and American services debated the question, with Canadians as interested onlookers. Sir Arthur Currie, late commander of the Canadian Corps and inspector general of the militia, recommended integration to the government in 1920, but his suggestion was premature in the midst of rapid demobilization. Major-General James H. MacBrien, the chief of the general staff, had also become an ardent advocate of integration while serving on a number of British postwar reorganization committees. Within days of King's election, MacBrien sent him a proposal for consolidating the three military services in a single ministry of defence.[99] MacBrien's submission was strengthened by another from Currie, and a third from Eugene Fiset, the deputy minister of the Department of Militia and Defence. Currie suggested that service integration could 'effect a very large saving.'[100] Fiset was more specific, arguing that 'By such amalgamation a strong and experienced man could save between three and four million dollars a year ... by reducing (by amalgamation and absorption) the four different staffs now administering these different services – in reducing the Permanent Force and Permanent Staff of the Militia Department – the staff and rank and file of the Air Force – and the staff and ratings of the Naval Department.'[101]

King thought Fiset's 'a good suggestion.'[102] He found his 'strong and experienced man' in his one-time leadership rival, George P. Graham, a man with no military background but a reputation as a sound administrator. King issued firm marching orders: 'I want defence consolidated ... a "cleaning up" of the dept. and a "showing up" of expenditures and waste ...' He was, at first, doubtful 'as to Graham being firm enough for that,' but he need not have worried.[103] By mid-February King was able to note that 'a good deal straightened out on consolidation of defence forces.' He seemed unconcerned that one result of the reductions was that 'air force civil end abolished.'[104]

Graham introduced legislation creating a unified defence department in March 1922. Debate was insubstantial; Graham simply informed the House that he wanted 'to have a well organized, snappy defence force that will be a credit to Canada without being too expensive.'[105] The National Defence Act received royal assent on 28 June. It was short and general in nature, setting up the Department of National Defence under a minister of the crown 'charged with all matters relating to defence, including the Militia, the Military, Naval, and Air Services of Canada.'[106] The act was to come into force on 1 January 1923.

While the government's administrative intentions were plain enough, its underlying purpose was anything but straightforward. Military aviation would now come under the Department of National Defence, but the civil sector was set adrift, at least temporarily. Beyond his desire to cut costs, the minister displayed little apparent interest in the subject, and nowhere did he articulate a practicable alternative to the Air Board's approach. There was no attempt by Graham or any

other political leader to define the first principles either of air defence or civil aviation. Rumours which had circulated that responsibility for civil aviation would be turned over to a civil department of government proved unfounded.[107] The government simply introduced additional legislation, the Aeronautics Act, which gave to the minister of national defence all the functions previously exercised by the Air Board.[108] Now he and his departmental officials had full responsibility for both military and civil aviation. It remained to be determined what they would do with it.

For the air force, military integration meant less the opportunity for a larger role than a threat of losing the status it had already gained. By this time the Canadian Air Force had achieved a real if ill-defined independent standing as a non-permanent service. Unlike the militia and navy it lacked the institutional advantage of its own separate government ministry, but the air force granted its own commissions, controlled much of its internal administration, wore a distinctive uniform, and, in practice, its headquarters and training staffs served as a regular cadre. Gwatkin had also opened a correspondence with the British chief of the air staff, Sir Hugh Trenchard, from whom he received considerable moral support. Their exchanges had resulted in an agreement for the CAF to adopt the RAF's ensign as its own; at Camp Borden, on 30 November 1921, it was hoisted officially for the first time, an important symbol of the air force's identity and its close relationship with its British counterpart.[109]

Moreover, CAF independence was tacitly acknowledged by the militia and navy, an achievement largely attributable to Gwatkin's enormous personal stature. In January 1920, while he was still representing the militia on the Naval and Military Committee, a joint services body, Gwatkin had suggested broadening its membership to include the Air Board. Colonel Biggar declined at the time, but suggested that the air force be invited once it had been formed. Gwatkin agreed. He also liked Biggar's suggestion that the committee be redesignated as the 'Defence Committee,' 'an embryo, which, after a period of gestation, might develop into an organization second only to the Cabinet in power and importance.' Eight months later, Gwatkin, now inspector general of the CAF, formally requested air force representation. This, and the change in title, was speedily approved.[110]

Gwatkin firmly supported the principle of consolidating Canada's defence forces, judging that it 'would make both for efficiency and for economy.'[111] But the principle of integration was one thing, its implementation quite another. While common administrative requirements might well be rationalized, Gwatkin wrote Trenchard, the CAF should be 'organized and administered as a third service.'[112] In the same vein he told MacBrien that he was 'opposed to the C.A.F. being brought under the Militia Council.' Rather, he wanted 'a Defence Council on which each of the three services would be represented.'[113]

By the end of 1921, then, Gwatkin had become anxious about the CAF's future, and with good reason. MacBrien, who had gained the minister's ear, believed (like most of his British Army peers) that the air force was a subordinate, supporting arm, not an independent military service. He had not participated in the discussions which had led to the creation of the Air Board; his

perspective on aviation had been formed within the restricted confines of brigade operations on the Western Front. Especially in Canada, MacBrien wrote, the defence establishment 'will not be large enough to warrant a separate Branch of the Service such as the Royal Air Force, and our Flying Corps should be part of the Army with attachments to the Navy as required.'[114]

MacBrien's concern with the military aspects of aviation was probably confirmed from what he was able to observe of the Air Board's programmes. He had been an attentive listener at the CAFA convention at Camp Borden, observing not long after that 'the present organization of the Canadian Air Force is unsound and extravagant in the extreme. Its unsoundness lies in the association of civil servants and non-permanent airmen in the same Force. A friction of the most acute type is certain ever to be present in such an organization.'[115] Now he gave Gwatkin cold comfort regarding the future status of the CAF. 'If it be the policy of the Government to expand the present C.A.F. and increase the annual expenditure on it,' MacBrien told his old mentor, 'then, in my opinion, separate representation for C.A.F. on the Defence Council might possibly be justified but not otherwise.'[116]

A fundamental factor influencing MacBrien was the organizational imperative of ensuring that Canada's military structure conformed to the greater imperial pattern.[117] The relationship of the CAF to the militia, therefore, was largely dependent upon the fate of the RAF in Britain; if it managed to retain its independence there would be obvious pressures to keep the CAF much as it was. MacBrien was convinced, however, that the RAF's days were numbered. As his deputy, Brigadier-General A.G.L. McNaughton, advised: 'The best opinion inclines to the view that the Air Force is still in the stage of an auxiliary arm; it adds an increment to the power of the Army or Navy, but of itself it can do little. The value of the work performed in the air is in direct proportion to its sub-ordination [sic] to the wishes of the naval or military Commander concerned, and, while it is conceded that the progress of science and invention may ultimately make the Air Force capable of undertaking independent operations, it is recognized that that time is not yet.'[118]

It was MacBrien's intention to establish himself in the Department of National Defence as the senior military adviser to the government, through whom the navy, air force, and others would channel their own views on defence policy to the minister. He proposed making the CAF 'a purely military organization and a Corps of the Active Militia,' with permanent and non-permanent sections, headed by a director responsible to him as chief of staff. DND's new air directorate, replacing the Air Board, Directorate of Flying Operations, CAF Headquarters, and the controller of civil aviation and technical branches, would need a headquarters of only five officers and ten clerks because the air force could call on the more senior and experienced militia staff.[119] Officers would receive common militia commissions (temporarily employing air ranks and nomenclature when seconded for air duties), thus extending their military careers beyond operational flying age.[120] The result would give the CAF a relationship with the army much like that of the Royal Flying Corps to the British Army during the greater part of the war.

The minister, Graham, was content to let MacBrien lead, and in the weeks before Parliament approved the reorganization scheme, the Air Board and CAF, along with the navy, could only fight a delaying action to preserve what they could. The Air Board reiterated that it 'was willing that all services not distinctly aeronautical in their nature should be pooled,' but emphasized that 'any effort made to divide its aeronautical functions among other organizations should be opposed.'[121] This advice was ignored. Biggar and Gwatkin submitted memoranda stressing the need for autonomy and unified direction if aviation was to be effectively developed. Reluctantly, Graham heard them out in a meeting of senior officials, but he was unmoved; 'nothing that can be said will alter the intention of the Government to carry out the proposed consolidation.'[122] With his 'only object ... economy and efficiency,'[123] the aviation budget was slashed 60 per cent to $1 million and, while Graham acknowledged that the navy's objections were making the reorganization 'a much more difficult and irritating task than anticipated,' he remained convinced that 'The co-ordination of the Air Force ought not to be difficult in working out. My colleagues and myself believe the best results can be obtained, and the least friction caused by, as far as possible, utilizing the services of the present Officers, having consideration of their rank, seniority, etc.'[124]

MacBrien's militia staff implemented the reorganization. They ordered the CAF Directorate to move to a location near the new departmental offices. The interim establishment of the force was sixty-nine officers and 238 airmen, recruited from those in the CAF and the DFO who wished to have a permanent military career. The National Defence staff began amalgamating supply, ordnance and equipment, pay, intelligence, medical, engineer, central registry, and library services, leaving the CAF without any direct responsibility but flying and aeronautical technical stores. The air stations operated by the DFO were to be closed following the 1922 summer flying season, replaced by air force training centres at Vancouver, Winnipeg, Camp Borden, and Halifax. CAF flying training at Borden came to an end, and all efforts were directed to the military training of those converting from civilian to service duties.[125]

Consolidation proceeded apace over the summer of 1922. However, even before its statutory authority was formally in place, the plan to incorporate the air force as a militia directorate – such as signals, engineers, and artillery – encountered unexpected difficulties. However much they may have wished to do so, Graham and MacBrien found they were unable to ignore the comprehensive legislative responsibility for all phases of aviation which the department had inherited from the Air Board. The department was the government's sole aviation agency, responsible for both military *and* civil flying. The manner in which it exercised its responsibilities to civil aviation are considered elsewhere; suffice it to say, MacBrien's ideas about the role of the air force as a civil force underwent rapid change.

MacBrien's views on the air force's status as a separate military service also changed. The lead came from London. In March 1922 the British government concluded that 'it would be a retrograde step at this time to abolish the Air Ministry and to reabsorb the air service into the Admiralty and the War

Office.'[126] The decision fundamentally altered the terms of the Canadian debate. MacBrien found himself trapped in his own logic. He and his staff had based their case against a separate air force on what they assumed would be a clear British precedent. The RAF's separate identity was now assured, and it followed that any Canadian air force had to be similarily organized.

On behalf of the CAF, Gwatkin immediately took note of the changed circumstances. He sent MacBrien an extract from the parliamentary debate in which the British government announced its decision, telling him that, in order to ensure imperial standardization, Britain 'has best right to specify the form, the common form, which organization should take,' and 'therefore, that – within limits imposed by local conditions – the Canadian Air Force should be organized on a system uniform with that of the R.A.F.'[127]

MacBrien moved slowly, but eventually asked his judge advocate general to review the legal implications of full or partial air force independence. The JAG reported in October 1922 that the CAF was currently operating under a mix of provisions derived from both the Air Force Act (Imperial) and King's Regulations and Orders (KR and O) for the Canadian militia. Once integration was completed, he pointed out, problems would inevitably arise when members of the militia and air force served together unless they were governed by common regulations. In addition, the jurisdiction over air force personnel by officers commanding military districts would have to be clarified, as would the scope of the Militia Pension Act, if the air force were to be brought under the army. 'The joint administration of both Forces,' he noted, 'might prove difficult and complicated, if it was carried out under an entirely distinct set of legislation, etc, for each Force so administered.'[128]

Whatever regulations were adopted, he went on, depended on the type of air force wanted. There was the British model, based on the premise that 'the functions of an Air Force are so entirely dissimilar to those of a land force that special and distinct legislation is desirable for the government of such force. If such a force was administered under an organization separate and distinct from that administering a land force nothing would be gained by having both forces administered under the one set of legislation.'[129]

If Canada accepted this model of an independent service, it was advisable to have specific legislation for it. The alternative was simply to make the CAF a corps of the militia (under Section 22 of the Militia Act which authorized the Governor-in-Council to create corps as it wished), a course the JAG preferred because both the militia and air force were located in the same government department. He reasoned: 'In Canada ... in view of the creation of the Department of National Defence, the situation is different [from Great Britain], and if, as a result of the amalgamation of the various Departments, the Canadian Air Force will become to all intents and purposes a Force corresponding to what was the Royal Flying Corps, Military Wing, then the administration of both the Air Force and the Militia under one set of regulations appears to be desirable.'[130]

On weighing the two options, MacBrien was apparently more impressed with the need to follow the RAF model. He appointed a staff committee to produce regulations for the air force which would combine the essential provisions of KR

and O with those governing the RAF, informing committee members that 'It is considered wisest for the status of the Canadian Air Force to be kept as close as possible to the Royal Air Force.'[131] When the committee reported back early in January 1923 with an acceptable regulatory compromise,[132] MacBrien made his final decision. 'It is intended,' he informed the adjutant general, 'that the Air Force will be a separate Service from the Navy and Militia and that it will be divided into permanent and non-permanent sections.'[133]

MacBrien's departmental fiat was significant in permitting the air force to retain the autonomy it seemed to be losing. However, it by no means finally settled the question of service independence. Until just before the Second World War the air force remained subject to the direction of successive chiefs of the general staff. 'Service as a whole is, at present, administered as a Directorate of the General Staff,' MacBrien wrote in 1923. At the same time, he added, 'It is a separate service, and when its expansion so warrants, its administration will conform to the other services of the Department.'[134] Meanwhile, he wrote:

> The objective aimed at in making an Air Force Directorate was to give the newly created Force the benefit of the experience of the senior Officers of the Militia stationed at Headquarters. At the same time it has been the endeavour to organize the Royal Canadian Air Force as a separate branch of the Service, so that it can without hindrance fulfil its full functions in case of war. One of the many reasons for the adoption of a purely military organization was that the Defence Forces of any country cannot be considered complete or effective if they lack a well trained military Air Force. This is generally accepted by all countries in the World in which Air Forces are maintained. Organization is based upon that of the Royal Air Force, so that should war again come to the Empire any unit that might be sent by Canada would be similarly organized and trained to those in other parts of the Empire.[135]

A mark of the air force's renewed status was a change in its title. At the 1921 Camp Borden CAFA conference one of the participants had suggested 'that His Majesty be approached and requested to use the name Royal Canadian Air Force.'[136] The notion gained unanimous support and the Air Board duly submitted such a request. It appears that nothing was done at that time, but in the spring of 1922 the idea was revived by Lieutenant-Colonel E.W. Stedman. He pointed out that the Australian Air Force had been made 'Royal' in the previous year. As he was leaving his post as inspector general of the CAF in April 1922, Gwatkin asked the chief of the general staff to seek permission for the CAF to do likewise, 'as soon as things have settled down ...'[137] Accordingly, on 5 January 1923, an application was sent to the governor general through the Department of External Affairs: 'Such a distinction would be most highly prized by all ranks and would add greatly to the prevailing esprit-de-corps.' Attention was drawn to the thousands of Canadians who had flown with the British flying services during the war, and 'by their efficiency, gallantry and devotion to duty added lustre to the name of Canada.' The survivors of this group had organized the new CAF.[138] After the Department of National Defence received notification of the King's approval, a Weekly Order, No 21/23 of 12 March 1923, placed it

formally on record. It was subsequently announced that the Royal Canadian Air Force would adopt the light blue uniform of the RAF and use its motto *Per Ardua ad Astra* ('Through adversity to the stars'). The promulgation of air force regulations, on 1 April 1924, marks the official birthdate of the RCAF.[139]

Not all the pioneers made the transition from Air Board to RCAF. Colonel Biggar remained in government service as chief electoral officer and came back to civil aviation work in the mid-1920s. Robert Leckie resumed his interrupted RAF career, although he returned to Canada after the outbreak of the Second World War, eventually becoming chief of the air staff. Assured that his adopted service would be preserved, Sir Willoughby Gwatkin retired; the death in Britain of this remarkable officer in 1925 went almost unnoticed in Canada.[140] A much younger Clair MacLaurin died tragically in 1922. While station superintendent at Vancouver he took an HS2L into the air on a routine flight. Seven minutes later his machine dived into the sea off Point Grey and he drowned before he could be freed from the wreckage.[141]

Those who did join the RCAF formed a closely knit group whose influence on Canadian aviation flowed far beyond their limited numbers and slender resources. There were just sixty-eight officers and 307 airmen scattered from Dartmouth to Vancouver. All the young officers of the new air force, the most senior of whom were barely thirty, had some First World War experience as well as a postwar association with the Air Board. Over the next two decades they exchanged postings, appointments, and commands in the minuscule service. Thirty-three of the originals rose eventually to air rank, but at the beginning, with their director a mere group captain, they were clearly outranked by their more senior militia colleagues in the defence department. It was perhaps this factor which helped produce an internal cohesion able to surmount the inevitable personal and professional differences in a small, peacetime military force – between those with considerable combat flying and those with more staff and training experience, and between those with quite different backgrounds in naval and military aviation.[142]

Group Captain J.S. Scott, who succeeded Wing Commander W.G. Barker as acting director in May 1924, became the force's first full-time director on 1 April 1925.[143] A veteran of the British air services, Scott had earned a Military Cross on the Western Front before injuries sustained in a crash caused him to be invalided home. After commanding units in both Ontario and Texas as a member of the RAF's North American training organization, Scott left the RAF in 1919 and was soon appointed to the newly formed Air Board as controller of civil aviation. As a former commander of the Canadian Air Force and the first Canadian officer to attend the RAF Staff College, Scott was a logical choice as director. A no-nonsense commander – tough, forceful, and direct – his somewhat arbitrary manner was more apt to generate respect than affection during his four years as the RCAF's senior officer. Retiring in 1928, Scott returned to the RCAF in 1939 as a training officer with the British Commonwealth Air Training Plan.

The RCAF's three assistant directors were Squadron Leader G.O. Johnson (air staff and personnel), Wing Commander E.W. Stedman (supply and research), and J.A. Wilson (secretary). Johnson, the former commander of No 1 Squadron

CAF in England, had originally been appointed an assistant director when the Department of National Defence was formed in 1923. Posted to command RCAF Station Winnipeg in May 1925, Johnson held various commands and appointments including that of acting senior air officer from June to December 1933. As secretary, Wilson retained his responsibilities for civil aviation, and continued to exercise his considerable influence on organizational and operational policy. The RCAF's chief technical officer, Stedman, was a British-born and educated aeronautical engineer who joined the Royal Naval Air Service and ended the war as an RAF wing commander. Afterwards he became chief engineer with the Handley Page firm of aircraft manufacturers before being recruited by the Air Board to organize and head its technical staff. Stedman was intimately involved with all aspects of the RCAF's aircraft selection, testing, and procurement throughout the interwar and war years before retiring as an air vice-marshal in 1946.

Many other senior and middle ranking officers helped shape the air force in the early years of its development. Wing Commander J.L. Gordon, who had previously commanded the CAF as acting director from July 1922 until succeeded by Barker on 1 April 1924, also served as senior air officer of the RCAF from November 1932 until May 1933. A bilingual Montrealer who had attended McGill University, Gordon had joined the Royal Naval Air Service in 1916 and was awarded the Distinguished Flying Cross for his coastal patrols off Britain. He gained valuable experience while employed by the Air Board as superintendent in the Directorate of Flying Operations and commanding officer at Camp Borden. Less abrasive than Scott, Gordon was especially effective in working with the many civil government departments which had an interest in aerial operations. He also graduated from the RAF Staff College and became, in 1931, the first RCAF officer to attend the Imperial Defence College.

George M. Croil flew on operations in Salonika and the Middle East through much of the war, spending part of his time as T.E. Lawrence's pilot on missions into the desert. Released by the RAF in 1919, Croil joined the Air Board the following year and helped to establish the air stations at Morley and High River, Alta. He was sent overseas in March 1925 to serve as RCAF liaison officer at the Air Ministry prior to attending the RAF Staff College. After five years as commanding officer at Camp Borden, he returned to England in 1932 and completed the Imperial Defence College course. Croil succeeded G.O. Johnson as senior air officer in 1934 and became the first chief of the air staff as an air vice-marshal in 1938. Reserved and retiring, Croil's demeanour was in sharp contrast with that of Lloyd Breadner, acting director from 1928 to 1932, and Croil's successor as chief of the air staff in May 1940. Breadner was another former RNAS pilot, a bluff, hearty, and ebullient commander who later directed, in the Second World War, the RCAF's expansion into one of the world's largest air forces. Hired by the Air Board in 1920 as a certificate examiner, Breadner was commander of the RCAF's training centre at Camp Borden when the RCAF observed its official birthday on 1 April 1924.

The matter of the RCAF's status was finally settled, but its future role remained to be identified. The Air Board had found it both prudent and productive to

consider airpower in its broadest sense, concentrating its efforts on building a firm civil base while allotting military flying a secondary priority. Now reorganization had eliminated the previously favoured Directorate of Civil Operations, leaving only a skeleton military air force whose actual functions were anything but clearly defined. A directive written at the time of its official inception in 1924 gave the RCAF three tasks: to carry on air force training, to maintain a nucleus around which a military air force could grow if required, and to conduct flying operations for other government departments.[144] The mandate was broad enough to ensure that events, not tidy preconceived doctrine, would determine the service's future.

2
The RCAF and Civil Aviation

It took until 1924 to complete the transition of the air force from a diffuse national movement to a small permanent military service. Although it emerged from the reorganization as the federal government's sole aviation agency, its role was anything but evident. As a military air force it fell heir to the legacy of Canada's fighting airmen of the First World War. It also inherited the Air Board's responsibility to oversee and control the entire spectrum of Canadian civil aviation. Relatively simple in the early years, that task became increasingly unmanageable as the civil sector grew and bush flying was complemented by the construction of an airway connecting Canadian population centres. During its first decade the RCAF attempted with only indifferent success to locate an appropriate balance between the sometimes compatible but often conflicting demands of military and civil aviation. It was an elusive goal, and the relationship between the two sectors was not always an easy one.

By the time the RCAF assumed responsibility for aviation, the Air Board had taken a number of key decisions concerning its development. Initially, there had been some disagreement within the board over the direction Canadian civil aviation might take. Robert Leckie and Colonel O.M. Biggar were attracted for a time by the possibility of using landplanes to carry mail between larger population centres. Biggar was certain that airmail carriage would come eventually and that it was the Air Board's duty 'to investigate, examine, and report on proposals,' but the idea was premature. The Post Office decided not to provide a service which promised only marginal improvement to its existing rail service. J.A. Wilson argued the brief for bush flying, and from the board's first meeting in June 1919 pressed for a forthright commitment that attention should be directed 'for the immediate future, to the question of air services along the natural waterways of Canada by means of flying boats.'[1]

Earlier that year Major C.C. MacLaurin had already proposed a forest survey experiment to the Saint Maurice Protective Association, which controlled the largest timber limits in the province of Quebec. Wilson arranged the loan of two of the Curtiss HS2L flying boats which the Department of the Naval Service had at Dartmouth, and the association hired a former RNAS pilot, Stuart Graham. Graham tested the first boat on 2 June, and three days later, with neither his tachometer nor his air speed indicator working, lifted off from Halifax harbour

against a light wind. With him were his wife as navigator and a mechanic, Bill Kahre. Dressed in a pair of drill knickerbockers with puttees and an overcoat, Mrs Graham passed map information to her husband at the controls by a cord and pulley. Their route took them to Saint John, Lake Temiscouta, Three Rivers, and up the Saint Maurice River valley to Lac-à-la-Tortue. Doing their own maintenance, flying on low-grade motor gasoline, and fighting bad weather all the way, their memorable flight covered 645 miles in almost ten flying hours over three days.

Although Graham arrived after the spring fire season, he had a productive summer spotting fires, surveying forests, taking aerial photographs, and transporting company and government officials over vast remote regions. The forest association's manager was highly impressed, finding he was able to sketch timber stands rapidly and accurately from the air. Ellwood Wilson judged that a forester could get a clearer impression of a fifty-square-mile tract in a two-hour flight than in a two-week ground trek. He found that aerial photos could map 200 square miles a day, while a party of two men using a plane table could cover only a quarter of that area in a month. Wilson became an enthusiastic supporter of aircraft operations, and his report of the experiment, published in the British periodical, *The Aeroplane*, undoubtedly influenced others.[2]

The success of the forest survey provided a tangible demonstration of the worth of employing aircraft in remote regions and of the potential utility of similar civil operations. In the fall of 1919 the Air Board commissioned MacLaurin and three other officers, Major A.G. Lincoln and Captains J.W. Hobbs and G.O. Johnson, to conduct a national survey to determine 'what public services could more efficiently, and in the broadest sense more economically, be performed by air than by existing methods.' Each took a separate geographical region, and early in the new year they assembled in Ottawa to report to the board. Unsurprisingly, they recommended 'that the most favourable fields for commencement of operations were the less thickly settled and less thoroughly explored portions of Canada.'[3] The next week the board convened a meeting of departmental officials concerned with resource development to consider how to employ aircraft in their work. At the same time the newly organized Directorate of Flying Operations [DFO] located suitable base sites at Dartmouth, Roberval on Lac St Jean, Ottawa, Morley in the Alberta foothills, and Vancouver. Sub-bases were later added at Haileybury and Sioux Lookout, both communities in Ontario's rugged and sparsely settled Canadian shield. From these bare beginnings, made over the winter of 1919–20, evolved an ever expanding programme of government civil flying operations in the Canadian bush – a programme which was to preoccupy the Air Board, and then the RCAF, for the next decade.

Despite delays in getting aircraft from Camp Borden to their field sites, the DFO made almost 400 flights over more than 33,000 miles in a variety of tasks during the 1920 season. Dartmouth was used primarily to erect and repair seaplanes. From there, two HS2L flying boats were flown to Roberval, where they were employed in forestry patrols, reconnaissances, photographic surveys, and other tasks. Ottawa-based aircraft were flown to Haileybury transporting

officers of the entomological branch of the Department of Agriculture on a survey of a large forest tract infested with spruce budworm. From a rudimentary landing strip at Morley, patrols of DH4 and Avro aircraft were conducted over the Rocky Mountain Forest Reserve. The patrols convinced the dominion forestry branch to dispense with the construction of a ground lookout system and to rely on air patrols instead. After securing facilities at Jericho Beach, Vancouver, the Air Board operated an HS2L throughout the fall months on forestry, survey, fishery, and transportation flights for the federal and provincial governments.

A trans-Canada flight, in which the Canadian Air Force would play a prominent part, was to provide a climax to the season's activities. There were, it is true, risks of failure, but it seemed to airmen of the day worth trying to prove the feasibility of transcontinental air transport. Besides, it offered an opportunity to demonstrate the capabilities of aircraft and crews, especially to commercial interests; and there was reason to hope that success would stimulate public support for the fledgling air force.

The Air Board was to complete the Halifax-Winnipeg leg by seaplane or flying boat, the Canadian Air Force taking over the Winnipeg-Vancouver portion of the flight with DH9A landplanes. Wing Commander Robert Leckie, accompanied by another RNAS veteran, Squadron Leader B.D. Hobbs, lifted off from Halifax harbour on 7 October 1920, but high winds buffeted their Fairey Seaplane so severely that its engine cowling came apart near St John, NB. In the HS2L flying boat ferried over to Leckie from Halifax, as a replacement for the seaplane, he had to struggle through driving rain storms all the way to Ottawa. The leg to Winnipeg was less eventful, although fog and radiator trouble caused problems at Kenora, and Leckie finally arrived at Selkirk, Man., a few miles short of his destination, on the morning of the 11th.

Two CAF officers, Flight Lieutenant J.B. Home-Hay and Air Commodore A.K. Tylee, began the second portion of the flight a few hours before Leckie arrived. Forced down by engine failure in Regina, Tylee had to use a replacement aircraft flown in from Moose Jaw by Flight Lieutenant C.W. Cudemore to continue on to Calgary. There they were met by Flight Lieutenant G.A. Thompson in another DH9A, and both aeroplanes set off over the Rockies on the 13th, again after a period of bad weather. Storms caused them to land in Revelstoke, BC, and it was not until 15 October that they were able to leave. A further two-day delay because of weather kept them in Merritt, BC, and it was not until the 17th that they finally arrived in Vancouver, 247 hours after Leckie had departed Halifax. This was by no means the success hoped for, and it taught the lesson that for the foreseeable future weather would determine when flying took place. Even on good days transcontinental operations would not be feasible without an effective ground organization and widespread maintenance and repair facilities.[4]

The 1920 season was a pioneering one, designed above all to demonstrate the potential of aircraft in a huge, diverse, and undeveloped land. The Air Board's major task in its early years was marketing and public relations: persuading potential users of the variety of ways in which aircraft could be put to practical use. Since this could only be done by actual operations, the board accepted

almost any task which might produce tangible results. In late November 1920 the board convened a second interdepartmental conference to evaluate the season's results and lay plans for the following year. The attendance clearly indicated widening interest. The Department of the Interior was represented by the surveyor general, the commissioner of dominion parks, and the superintendents of the Natural Resources Branch, Geodetic Survey, and Forestry and Topographical Survey. The Commission of Conservation sent its assistant chairman and chief forester; the Department of Agriculture, the dominion entomologist; Marine and Fisheries, the superintendent of fisheries; and Indian Affairs, the inspector of Indian agencies. The commissioner of the RCMP and the deputy minister of mines also attended. A wide-ranging discussion took place, as a result of which the Air Board prepared a varied and ambitious programme of flying operations for the 1921 season.[5]

Operations in 1921 and 1922 built on those which had been started during the first summer. From Ottawa, photo flights were made over London, Ont., the Welland Canal, and the St Lawrence River system. Little flying was done at Dartmouth, but the Roberval forestry patrols were continued. A new base for forestry patrols was opened at Victoria Beach on Lake Winnipeg during 1921. The following year temporary sub-bases were established further north at The Pas and Norway House. In Alberta, the original base was shifted to High River because of the treacherous and turbulent flying conditions at Morley. Vancouver-based operations included mosquito eradication experiments for the Department of Agriculture and anti-smuggling patrols for the Department of Customs and Excise.[6]

By the end of the 1922 season the operations of the Air Board had developed considerably, and a firm beginning had been made to promote aviation more generally. The Ontario government had organized its own air service and civilian firms had taken root, such as the Laurentide Air Service and the Dominion Aerial Explorations Company which took over contract work for the Quebec government. More requests for aerial services were being received through the annual interdepartmental conference than could be accepted. Standing commitments for forestry patrols and aerial photography forged strong links between the Air Board and its principal user, the Department of the Interior.

The Air Board's burgeoning programme of civil flying operations was placed in some doubt when the Department of National Defence took control of government aviation. As we have seen in Chapter 1, Major-General J.H. MacBrien's initial impulse had been to reverse the civil-military relationship created by the Air Board and form a strictly military air force. The complaints he had heard voiced by non-permanent CAF officers during the 1921 Camp Borden conference had undoubtedly reinforced his own view that the air force should be staffed by regular officers. He therefore ordered the closing of Air Board stations at the end of the 1922 season and their replacement by four air force training bases at Vancouver, Winnipeg, Camp Borden, and Dartmouth.

Although MacBrien and his militia staff may have preferred to place military ahead of civilian development, they could not avoid an active role in the civil

sector. The Department of National Defence had assumed the statutory authority originally assigned to the Air Board to regulate and control all aspects of Canadian aviation, and the department had an obligation to provide the necessary means to administer it. Air Vice-Marshal Willoughby Gwatkin, the retiring inspector general of the CAF, had attempted to retain something of the old relationship by suggesting that a civil branch be made directly responsible to either the deputy minister or MacBrien rather than the air force director, in order to maintain a clear separation between the civil and military sectors.[7] MacBrien declined, preferring to make the senior civilian official, J.A. Wilson, one of three assistant air force directors. This solution pleased Wilson least of all. He was so discouraged at first that he sought other employment, but within a few months, he thought that he had detected a change in attitude. 'General MacBrien and his staff are keenly interested in the Air Service and I am sure that things will work out very well in the long run. I do hope, however, that they will not insist on too much Air Force routine and discipline on the stations in the field as an excessive rule for this will certainly spoil the practical usefulness.'[8]

Since the government was determined to create a regular military air force, Gwatkin and Wilson pressed MacBrien to preserve the Air Board's civil flying programme. They were encouraged by his response. However military minded, MacBrien was not averse to civil flying operations which, he readily conceded, constitute 'excellent training for Military Operations.'[9] In April 1922 he asked Wing Commander J.L. Gordon, who was acting as director of flying operations, to draft an outline of the measures which would be necessary to enable the department to continue civil operations from the proposed CAF training bases. MacBrien and his deputy, Brigadier-General A.G.L. McNaughton, were becoming more aware of the potential advantages of an active civil role. McNaughton, in particular, was an ardent advocate of employing military specialists on productive civilian tasks. He seconded engineers to civil work, for example, and sent signallers to operate remote radio links throughout the north. Airmen could perform even more varied tasks, in the process enhancing the visibility and public presence of a barely tolerated military establishment at little additional cost.[10]

MacBrien and McNaughton must also have listened attentively to the parliamentary debate on the CAF's future roles when the minister, George Graham, introduced his aviation estimates in May. Although the government had no definite views on aerial development, the debate made plain that members were more interested in the civil rather than military aspects of aviation. 'What,' opposition members wanted to know, 'does the Civil Aviation consist of?'[11] And how, they asked, was it going to be affected by the reorganization then in progress? The minister's response was unenlightening. His governing principle, he stressed, was to reduce expenditure. Graham attempted to persuade the House of Commons that the budget ceiling of $1 million, which represented a 60 per cent cut-back from the previous year, would allow the CAF to continue the Air Board's civil operations on the same scale. This would be accomplished by charging users the full costs of their flying operations.

The opposition sympathized with Graham's intention of reducing expenditures, but they doubted that his method amounted to anything more than an obfuscating shell game. While the defence budget might be slimmed down, overall aviation costs would remain the same, their details simply buried in other departmental accounts if the level of operations remained as it then was. The government merely wanted 'a way of camouflaging it, of disguising it.'[12]

The parliamentary debate revealed more than Graham's bookkeeping idiosyncracies. It established the primacy of civil over military operations, even if the former were now to be flown by uniformed aviators. Only one opposition member queried the apparent neglect of the military sector. 'Why should men who are acting as fire rangers throughout the country be listed as part of the defence forces of the country?' Donald Sutherland, a future defence minister, asked if 'The air force was going to be a much more prominent feature of warfare in the future than it has ever been in the past.' Graham thanked Sutherland for his intervention, 'because my great trouble during the past two weeks was in the opposite direction. The majority of people complained that I was making this all military and not leaving any civil force.' He denied, however, that concentrating on civil operations would inhibit the development of a military capability. Echoing MacBrien, he pointed to the benefits of a close, continuing civil-military relationship: 'This work which they do in doing civil aviation is for civil purposes, but it gives them possibly the best training they can get. They are really training for defence purposes in the work they are carrying on. For instance, flying over the forests, photographing the ground beneath, is just the work they would be doing on the battlefield. While civil aviation is to be carried on, the bulk of it will be carried on by members of the Civil Aviation Force who will get the best training in air work in that way.'[13]

The path of least political resistance appeared to be in keeping the same pilots in the same aircraft on the same civil tasks as before, even if now the airmen would be in uniform. Pilots had previously been employed by the Air Board in a civilian capacity even though they held commissions in the CAF. The new arrangement meant that airmen would now be full-time air force officers who would spend their summer months flying civil operations. Ends and means were juxtaposed. Instead of having the military air force train pilots for civil operations, civil operations would now be used to train pilots for their ultimate military role. This approach also received the blessing of the British government at the 1923 Imperial Conference. The Air Ministry made it clear to the Canadian prime minister that 'it was preferable to have a military aviation to do the civil flying for the Government than to expect any civil development to serve a military end in time of need.'[14]

Despite their altered status, the fortunes of the military and civil spheres continued to be closely linked. The air force was left not only with the Air Board's programme of civil operations but also with its problems. Many soon surfaced. The board's efforts to persuade government officials of aviation's potential benefits had been all too successful. Requests for a variety of operations proliferated and the air staff found that, rather than having to cajole bureaucrats to use aircraft, it had to arbitrate between competing and equally justifiable demands for more and improved service.

In demonstrating the varied utility of aerial services the Air Board had deliberately chosen to put the overwhelming bulk of its resources directly into operations. By 1923 it had spent all but $160,000 for this purpose, or about 3 per cent of the $5 million appropriated for aviation since the war.[15] The board's reliance on First World War vintage gift aircraft, which allowed it to delay capital expenditures, meant that the air force took over a fleet of rapidly deteriorating aircraft which could no longer be depended upon to provide reliable service when needed. The problem was aggravated by the fact that the board's mechanics had been employed in a civilian capacity, at civilian rates of pay, and were 'not prepared to enlist as privates with small pay in military service.'[16] As a result, most of the board's mechanical staff quit when its civil establishment was abolished and the air force was left with too few groundcrew to service its remaining aircraft properly. Combined with 'financial limitations, adverse weather and the unsettled conditions due to reorganization of the service,'[17] these difficulties badly disrupted the 1923 flying season, leaving a number of dissatisfied civil officials. Government departments which had planned their field programmes on the assumption that aircraft would be available had quickly to improvise alternate plans. It was not a good beginning for the air force in its first operational season.

In November 1923 Wing Commander Gordon, now acting director, met with the interdepartmental committee to review the season's performance. His purpose was to impress upon the members the need for a systematic capital procurement policy. By this time the government had dropped its original intention of splitting aviation estimates among user departments, deciding instead to consolidate them as an air force appropriation. The actual costs of civil flying operations thus remained buried in a politically unpopular military budget. Each civil department simply informed the CAF of its requirements for the following year and the air force prepared estimates and attempted to deploy its dwindling resources to meet them. Gordon pointed out that the service badly needed a storage and distribution depot, a new training base, improved housing and maintenance facilities in the field, and, most important of all, new aircraft. These long-term needs had to be acquired over several years. Gordon asked the departmental representatives to predict the flying hours they might require. The CAF would determine which operations could be conducted with the equipment at hand, and calculate the additional resources needed for the balance. 'A complete record with cost will then be placed before higher authority, and it will then be for the decision of the Governor in Council as to what flying is to be carried out, and what is not to be performed.' It was unlikely, he said, that the Department of National Defence would be able to muster sufficient financing on its own: 'we cannot on our own initiative, get the necessary appropriations for the operations ... the bulk of our flying is for other Government departments, consequently we ask your assistance in obtaining the necessary appropriation.'[18]

Specifically, Gordon suggested that it would be in their own interests if ministers supported aviation estimates when they were considered in Cabinet. As he pointed out, 'When the Minister in Council says, "We will cut off $100,000 from the Air Service," the Minister of the Interior for example is perhaps not aware that that is cutting it out of his own pocket.'[19] Gordon's

request seems unexceptionable, but several committee members, perhaps still displeased with the experience of the previous summer, objected. They saw no point in estimating their flying requirements on the assumption that the necessary aircraft would be available. They were concerned with next year, not the long term. The officials wanted Gordon first to guarantee them a specified number of flying hours; otherwise they would make alternative arrangements for their surveys, fire patrols, and scientific experiments. As one representative noted, 'We have to organize our work on the basis of some other [forestry] protection, and we cannot wait until next spring to do that. The time for us to know what to do either way is now.'[20] This uncertainty created an awkward impasse, one that was never fully resolved. The air force could not improve its imperfect service without the funds for an aircraft acquisition programme, and it could not obtain sufficient funding without materially improving its service.

Complaints of interrupted and inconsistent service continued over the next few years while the RCAF tried to obtain the aircraft it needed. In 1926 Parliament was disrupted when the minority Liberal government was temporarily replaced during the summer by a short-lived Conservative administration. New elections then returned the Liberals to power in September. In the political confusion, delay in approving estimates threatened to cut off funds for civil operations. The RCAF was resigned to the situation, making little effort to protect its budget. However, the civil departments whose work depended on aircraft successfully fought to have funds restored. Having taken the initiative to ensure the financing of their civil operations, they then moved to gain more control over the flying programme.

The Committee on Civil Air Operations, formed in May 1926 to rationalize the planning and conduct of the flying operations, was the result. Chaired by Colonel O.M. Biggar, former vice-chairman of the Air Board, its members included the director and secretary of the RCAF, three representatives from the Department of the Interior, the director of forestry, the chief aerial surveys engineer, and the assistant director of topographical surveys. The committee provided the Department of the Interior with a measure of control over RCAF expenditure on civil operations. Its mandate was to 'recommend methods and organization for carrying out all civil air operations; to submit a program for civil operations on a three year basis, including the necessary details as to allocation of bases, aircraft, etc; to analyze the expenditures and progress made in carrying out such program from time to time; when necessary to visit the various stations to study requirements for improving air operations and meeting unforeseen circumstances; and to submit a report each year on the progress made.'[21] The Biggar Committee met frequently over its first year, but its tenure was abbreviated. It was overtaken by events which raised broader questions about the RCAF's relationship with the private sector of aviation.

Until the mid-1920s there had been too little civilian flying to cause concern, although there was a brief flurry of activity just after the war when stocks of wartime Curtiss Jennies were released on the market. A number of adventurous souls took their decrepit machines barnstorming around the country until they crashed or wore out completely, but such enterprises had no commercial future.

Canada's two most famous Victoria Cross flyers, W.A. Bishop and W.G. Barker, persuaded some Toronto and Montreal businessmen to finance a venture aimed at flying passengers between Toronto and the Muskoka Lakes district. 'The Bishop-Barker Company was best remembered for two things; it was a commercial failure and it was a great deal of fun.'[22] The few successful private firms were those which took over the bush-flying experiments in forest survey and aerial photography pioneered by the Air Board.

The board had formulated a policy towards the private sector early in 1921. It cancelled ambitious plans for a regular aerial service in the Mackenzie River valley when it received – and approved – privately sponsored proposals for an air link in the region. Its approach to commercial flying was cautious but not restrictive. 'Wild enterprise' had to be checked to protect the public interest, regulations enforced to limit accidents, and the board's technical expertise made freely available to legitimate interests. The board also decided not to offer public subsidies, a practice many other countries had adopted. Nor would it construct 'terminal air harbours' as 'this would have the effect of stultifying local effort and thus hinder rather than advance general development.'[23] The board, in sum, determined to limit its direct involvement in the aviation market-place, leaving its growth to private initiative. The RCAF inherited this laissez-faire outlook.

For the scale of private investment aviation required, the Air Board had looked to 'the existing railway and steamboat companies,' but they had displayed little 'desire to establish their own services.'[24] The Canadian Pacific Railway Company obtained an amendment to its charter permitting it to operate domestic and international air services but declined to exercise its option for many years.[25] In the mid-1920s there were only fourteen aircraft firms in Canada, with just forty-four registered machines. For most Canadians the world of flight remained romantically unfamiliar; Canadian aircraft were as rare as prairie buffalo.

Within a decade, however, the face of Canadian aviation was transformed beyond recognition. A series of spectacular flights – Charles Lindbergh's 1927 Atlantic crossing was only the most dramatic – stirred the public imagination. In Canada, appropriately, bush flying led the way to growth. In order to exploit promising mineral discoveries at Red Lake, Ont., mining companies hired aircraft to ferry men and equipment to the remote site before freeze-up in the fall of 1925. This tentative beginning sparked the boom in Canadian bush flying which has since become legendary. All phases of aviation prospered. Statistics highlight only part of the story. Between 1926 and 1930 the number of firms operating aircraft in Canada increased to one hundred, while the number of registered civil aircraft rose to 527. Mileage flown and the number of passengers carried multiplied almost twenty times. Significantly, much of the expansion was in land aircraft rather than water-borne planes. In 1926 only fifteen of the forty-four registered machines were landplanes; four years later the number had risen to 318 out of 527. Ground facilities were expanded to keep pace, the number of licensed airports rising from four to thirty-one. Along with another thirty-eight lighted intermediate aerodromes they provided a substantial beginn-

ing for the development of a national aerial transportation network, with important military as well as civil implications and benefits.[26]

It was natural that the pace of expansion would raise some very fundamental questions about the civil-military relationship. New companies, most with only one or two machines, began actively to seek contracts for transportation and other work. Bush flying was precarious at best, with high initial capital costs, unpredictable flying conditions, and a short operating season. Small-scale operations needed regular contract work, particularly from government departments, simply to survive. It is understandable that small commercial firms came to view the RCAF as an unfair competitor holding a monopoly on bush flying for civil government departments. The question began to be asked: Did a military service have any role at all in civil aviation?

D.R. MacLaren, a much-decorated First World War flying ace and founder of the one-aircraft Pacific Airways, raised a strong protest about the situation in the spring of 1926. He sent his memorandum, 'Development and Control of Civil Aviation in Canada,' first to the minister of public works, who referred it to his colleague, the minister of national defence. MacLaren complained that the RCAF was 'strangling' the natural evolution of private aviation in Canada, and questioned the legitimacy of the RCAF's conduct of civil government operations beyond the experimental stage. Once the worth of particular operations had been demonstrated, he argued, the RCAF should step aside. Without the RCAF's further involvement, federal government departments would have to contract out their requirements to private firms. This would provide the stable financial commitments they needed to survive. As well as experimenting, the RCAF could assist the private sector by training civilians during the winter months, upgrading flying standards generally, and providing paid employment for pilots while their companies were unable to operate. In turn, the pilots could be enrolled as air force reservists, the foundation on which an effective military air arm could be built.[27]

MacLaren's memorandum percolated through the national defence chain of command until it reached a sympathetic J.A. Wilson. MacLaren's views echoed, in almost identical language, those which Wilson had been promoting since 1919. Wilson referred the director of the RCAF, Group Captain J.S. Scott, to a similar paper on the subject which he had prepared two months earlier, in which he recommended the splitting of the annual aviation appropriation into civil and military segments. A common budget, Wilson argued, was restricting the full development of both sectors. The demand for flying services had outpaced the RCAF's capabilities, and there was no longer any need for a strong central aviation agency. The time had arrived when government departments could either establish their own aviation branches or, as MacLaren argued, contract out their requirements to commercial flyers in order to provide the indirect subsidies they needed to grow. Sceptical about military control of civil aviation, Wilson doubtless welcomed MacLaren's intervention. For some time he had thought the RCAF was allowing itself to be seduced by the obvious attractions of civil operations; in the process it was losing sight of is own long-term interests.[28]

Wilson also agreed that the RCAF should provide winter facilities for civilian pilots as part of a wider training programme. At this time there were no flying schools for civilians, and commercial firms were still relying on pilots trained during the war. The RCAF ran the only primary flying training course in the country at Camp Borden and, while some civilian pilots were given refresher training there, it was not as part of any systematic programme. The lack of facilities to produce the crews needed by an expanding civil sector clearly limited its potential for growth.

Wilson expanded on MacLaren's suggestion that the RCAF train civilian pilots. He proposed that the RCAF give financial support to organize civilian flying clubs across the country which would train a new generation of pilots. With only modest backing, clubs could be formed through which interested individuals would be able to gain easy access to training facilities, and successful graduates would be available to meet the rising demand for pilots. This would be in the public interest because, as MacLaren had remarked, the new pilots would constitute a ready reserve for the RCAF. In addition, by tying the RCAF's financial support to a commitment by the clubs to provide their own ground facilities in conjunction with local municipalities, it would be possible to develop a system of urban aerodromes. The federal government could then link the major airports with intermediate airfields equipped with the necessary ground organization, navigation aids, lighting, and radio services.[29]

Group Captain Scott readily endorsed the flying club scheme. He pointed out to the chief of staff, General MacBrien, that similar projects, made technologically possible by the rapid commercial development of light aircraft, were becoming successful in Great Britain and Australia. When introduced in 1925, the de Havilland Moth, costing only $5000 and economical to operate, had brought flying within reach of the general public. Scott pointed out that as the generation of wartime flyers matured to inactivity, the RCAF would be dependent on civil aviation for reserve pilots. But there were no organized schools of instruction in the country to train them. If primary flying training were delegated to civilian clubs, which could advance trainees to wings standard less expensively than the RCAF, service instructors could concentrate on advanced training. With only a modest expenditure and active supervision to ensure the maintenance of 'adequate standards of instruction and equipment,' the RCAF would be able materially to expand its shrinking base of trained manpower.[30]

To anticipate slightly, the argument proved persuasive. The 1927 estimates provided for two training aircraft for each of sixteen approved clubs in the first year, and one more machine in each subsequent year matched by a similar purchase by the club. A grant of $100 would be given for each private pilot's certificate earned by a club member; in return, clubs had to agree to make available a qualified instructor and air engineer, and to enrol thirty members for flying instruction. Twenty-four communities applied for the first sixteen grants, and by the summer of 1928 fifteen clubs were operating in Halifax, NS; Montreal and Granby, Que.; Toronto, Hamilton, Ottawa, London, and Border Cities (Windsor), Ont.; Winnipeg, Man.; Regina, Saskatoon, and Moose Jaw, Sask.;

Edmonton and Calgary, Alta; and Victoria, BC. Vancouver joined in the following year, along with six other new clubs.[31]

The establishment of flying clubs, however, was only a partial solution. By the fall of 1926, senior RCAF officers agreed with Wilson and MacLaren that there was need for more fundamental change. In September Scott wrote MacBrien, strongly recommending that a clear distinction be drawn between military and civil aviation. He suggested that the common financial appropriation

> is at the present time checking the development of aviation in Canada because in peace time it is not to be expected that any large increase of appropriations will be voted to the Department of National Defence for no matter what purpose, with the result that the development of aviation for Civil Government purposes is checked by the fact that the appropriations must be voted for the Department of National Defence.
>
> Our experience has shown that the work required by other Government Departments is increasing so rapidly that at the present time it is impossible to carry out anything like the full program required on the appropriations that are voted for this purpose.
>
> In addition to this, the program of work for other Government Departments requires the purchase of a great deal of equipment, for which funds must be provided, and unless some way can be found for obtaining very much larger appropriations for the Royal Canadian Air Force for Civil Government purposes the natural development of aviation is going to be held up more seriously from year to year.[32]

The first need, Scott claimed, was to amend the Aeronautics Act to relieve the RCAF of its responsibility for general supervision over all phases of Canadian aviation. This would permit other departments either to form their own air branches, or contract out their requirements directly with commercial firms. Not only would this encourage the natural evolution of the civil sector, but the RCAF could concentrate on its military responsibilities. This would be possible 'because while it is very doubtful whether increased appropriations can be expected for National Defence, under the present circumstances, there is on the other hand very little to suppose that with a stable Government the present appropriations would be reduced even if the other Departments had their Air Services. With the present appropriation a very efficient Air Force of small size doing real Air Force training and possessing modern equipment could be operated.'[33]

MacBrien disagreed, but he referred Scott's proposal to the judge advocate general for a legal opinion on the scope of the department's jurisdiction over aviation. His response was that current legislation prevented other departments from forming their own air arms, because the act 'vests in the Air Board [sic] the control and management of all state owned aircraft.' However, the act was 'not so restrictive as to prevent any Government Department making a contract with a civil aviation company for the carrying out of any aerial services which such department might require.' MacBrien sent the opinion to Scott, minuting simply that 'This clears the situation and so there shouldn't be any further misunderstanding on the point.'[34]

SYNOPSIS OF FLIGHT FROM DARTMOUTH TO SELKIRK, CONDUCTED BY THE DIRECTORATE OF FLYING OPERATIONS.

STATION	DATE 1920	FLYING MILEAGE	FLYING TIME	ELAPSED TIME	AVERAGE SPEED	AIRCRAFT TYPE
Dartmouth	7 OCT	m.	h.m.	h.m.	mph	* Fairey III Seaplane
Rivière du Loup	7 OCT	430	7:45	23:20	55.5	HS2L Flying Boat
Ottawa	8 OCT	820	13:55	49:45	58.9	F3 Flying Boat
Sault St. Marie	9 OCT	1304	21:47	72:30	59.9	
Selkirk	10 OCT	1999	32:42	94:30	63.1	

* NOTE: Fairey III Seaplane crashed at Whelpley Point.
An HS2L Flying Boat continued on to Rivière du Loup.

SYNOPSIS OF FLIGHT FROM WINNIPEG TO VANCOUVER CONDUCTED BY THE CANADIAN AIR FORCE.

STATION	DATE 1920	FLYING MILEAGE	FLYING TIME	ELAPSED TIME	AVERAGE SPEED	AIRCRAFT TYPE
Winnipeg	11 OCT	m.	h.m.	h.m.	mph	DH9A Aeroplane
Calgary	11-13 OCT	2816	42:42	150:55	65.9	
Revelstoke	13-15 OCT	3026	45:57	199:50	65:9	
Merritt	15-17 OCT	3166	47:22	245:40	66.8	
Vancouver	17 OCT	3321	49:07	247:25	67.6	

ALASKA (U.S.A.)
YUKON TERRITORY
Mackenzie River
NORTHWEST TERRITORIES
Great Slave Lake
Slave R.
Lake Athabasca
Peace R.
BRITISH COLUMBIA
ALBERTA
Fraser R.
Athabasca R.
Edmonton
Churchill R.
SASKATCHEWAN
MANITOBA
Nelson R.
HUDSON BAY
James Bay
Hudson Strait
LABRADOR SEA
LABRADOR
Revelstoke
Merritt
Vancouver
Agassiz
Calgary
Bassano
Saskatchewan R.
Lake Winnipeg
Medicine Hat
Moose Jaw
Swift Current
Grenfell
Regina
Winnipeg
Selkirk
Kenora
Mail conveyed by road from Selkirk to Winnipeg
ONTARIO
Port Arthur
L. Superior
Red R.
Sault Ste. Marie
North Bay
Mattawa
Pembroke
Ottawa
Montreal
Three Rivers
St. Hubert
Quebec
Sorel
St. Lawrence
Rivière du Loup
Edmunston
Aroostook
Fredericton
Woodstock
Whelpley Pt.
Saint John
Dartmouth
P.E.I.
N.B.
N.S.
L. Michigan
L. Huron
Toronto
L. Ontario
L. Erie
Boston
ATLANTIC OCEAN

FIRST TRANS-CANADA FLIGHT

7-17 OCTOBER 1920

0 100 200 300 400 500 mi
0 100 200 300 400 500 600 700 800 km

Landing places ..... Fredericton
Overnight stopping places ..... Ottawa

Scott, however, was not content to leave things as they were. In January 1927 a canvass of his senior staff confirmed that they shared his misgivings about the existing relationship. Although they approached the problem from different perspectives, each believed that the RCAF had become too involved in civil operations, to the detriment of both sectors. Wing Commander E.W. Stedman's prime concern was with military flying. The RCAF 'as it stands at present is not equipped or manned for its real functions in case of national emergency. It is merely a training organization for the civil operations, whereas the civil operations should be a training organization for the Air Force.' Stedman thought the civil branch would be better placed in a civil department. Wing Commander J.L. Gordon was concerned that the private sector should be given more encouragement. He advised 'that the interest now being evinced in civil aviation throughout Canada foreshadows a rapid development which cannot be taken care of with the present organization. The greater this growth, the greater will be the ultimate strength of the RCAF to this country. The Government should therefore do its utmost to encourage civil development and the fewer restrictions imposed, the more natural and rapid will be the progress.'[35]

If for different reasons, the senior RCAF officers were all equally troubled that the air force had become too preoccupied with civil flying. Scott now approached MacBrien again. The RCAF should discontinue its civil operations, its director recommended, 'as soon as this can be done without disorganizing the present services,' so that the RCAF could 'assume its proper service function of preparing in peacetime for war.' Scott pointed out that twice as many RCAF officers and airmen were being employed on civil as on military duties. This was inefficient, and caused instability in the permanent force as 'Special regulations must of necessity be made applicable to the permanent air force to meet the peculiar responsibilities incurred, many of which do not arise in a civil organization.' Reminiscent of MacBrien's own remarks at the 1921 CAFA conference, Scott felt it 'impossible' to maintain a high standard of discipline or military training in an organization doing civil work which, if it were to be successful, required intimate and continuing contact between officers, airmen, and civil employees of the federal government. Most importantly, he considered that the RCAF had lost sight of its primary responsibility – to prepare for war. In consequence, the permanent force had neither the equipment nor the men to develop essential military skills.[36] 'The first stage' after reorganization, Scott wrote later in the same year, 'should be the building up of a small permanent force, efficient in personnel and equipment. This permanent force will principally exist for the organization and training of a large Auxiliary and Reserve Air Force based on and administered through Military Districts.'[37]

Scott's proposal was still premature. MacBrien remained adamant, replying tersely 'that in spite of disadvantages the present policy is the best.' Parts of the air force's civil activities might be discontinued, he conceded. For instance, forestry patrols could be turned over to the provinces, but aerial survey was valuable training for war when the RCAF could be expected to work closely with survey sections of the Royal Canadian Engineers. MacBrien agreed that the RCAF needed an establishment sufficiently large to allow it to form units able to

conduct proper military training. But, alluding to his recent participation in the 1926 Imperial Conference, he recalled that 'the opinion was expressed ... that it was a wise policy to use a military air force for work for other Government Departments, as has been the policy in Canada. It was also stated that it would be wise to have civil aviation controlled in the same Department as military aviation, as the two matters were so closely related.'[38]

There the matter seemed to rest. However, at the same time that MacBrien and Scott were differing over the RCAF's proper role, the civil-military relationship was raised in Parliament, not of course for the first time. Based on past experience, the Liberal government knew only too well the potential for political controversy inherent in the mere discussion of defence issues. The government, invariably attacked for doing either too much or too little, found the benefits of civil aviation much easier to justify than the training of young boys for military service. As Prime Minister King told the British during the 1923 Imperial Conference, aircraft 'could be used for civilian purposes – surveying, anti-smuggling, etc. – and the matter could be therefore to some extent disguised.'[39] Even the most ardent anti-militarist found it difficult to argue with attempts to eradicate the spruce budworm, stamp out wheat rust, deliver mail to remote communities, fight forest fires, or map the country.

When he returned to London in October 1926 for his second Imperial Conference, King once more pledged his support for aviation. Before the discussions began, he made it clear to his closest advisers that 'at this Conference emphasis should be laid upon air development and defence.'[40] Later, after proudly describing the RCAF's civil operations to the delegates, he acknowledged the close ties between the civil and military branches: 'As civil aviation has a direct relation to the creation of a Military Air Force and serves to create a reserve thereto, in this field Canada may be in a position to lend very great assistance in Imperial Defence. By the Air Force Regulations an individual who obtains a pilot's certificate automatically becomes a Reservist.'[41]

King's enthusiasm did not lag when the estimates came up for parliamentary debate in the spring of 1927. On the few occasions when members discussed aviation in the House their concerns usually centred on the nature of the civil-military relationship. Was the civil sector being stifled by military control and a common financial appropriation? Were the RCAF's civil operations merely a disguise for the build-up of a military air force? Opposition members were generally in favour of the separation of civil and military aviation. E.J. Garland admitted that 'the civil air force in this country has been doing a remarkable work,' but questioned the wisdom of continuing 'the evolution of our civil air force within a military department.' His recommendation was to remove civil aviation from the military's control and place it under a newly created department of transportation. Other members agreed.[42]

In planning the 1927-8 aviation estimates, the Cabinet decided to separate civil funding from that of the military. The Cabinet discussion on the subject was one of the few occasions in which the government gave the civil-military relationship consideration at this level; the prime minister's views on aviation were normally confined to contemplating the obvious political advantages of

having the RCAF engage in civil flying. King, however, on this occasion demonstrated his commitment to the Wilson view of airpower. The prime minister wanted it 'understood that the Civil work should form the basis of the whole, the military to be an outgrowth rather than vice versa.'[43]

When the estimates were presented to Parliament – $2,222,539 for civil and $1,669,694 for military aviation – it was unclear whether separate funding meant that the government also intended to split the air force into separate civil and military components as well. Members of Parliament were understandably confused. When asked whether he had given serious thought to the issue, J.L. Ralston, the defence minister, replied that the government had the 'general idea' under consideration. King intervened soon after to say that the Cabinet was 'entirely of one mind that the two should be separated, but as to whether they should be under a different minister than the one who now has charge of the Department of National Defence is a matter which we will have to consider further. As to keeping the two services distinct there is but one view in the cabinet.' Later he explained that the government had not had time to complete its plan for reorganizing the aerial services.[44]

MacBrien, who had submitted his resignation as chief of staff after a long battle over his salary and status in the department,[45] was clearly surprised by the prime minister's statement that consideration was being given to separating civil and military aviation. Perhaps worn down by his dispute with the government, perhaps still hoping to win the politicians' favour, MacBrien now reversed his position and immediately submitted a memorandum to Ralston advocating the removal of civil aviation from military control. The memorandum reflected the views of the RCAF's senior officers. It stated that it had been foreseen 'some years ago' that civil aviation would 'possibly' pass through at least two or three stages in its development:

> *First Stage*: In its very early days of development owing to its small size, administration and control to be kept along with that of the Royal Canadian Air Force.
>
> *Second Stage*: To be controlled under the Minister by a specially elected official with a practicable knowledge of aviation, in the same department of the government, so as to have the assistance of technical officers and experts of the military air service available to assist in the examination of aircraft, inspection and testing of pilots etc., and so save duplication of these important technical advisors.
>
> *Third Stage*: When commercial aviation had assumed large proportions, then consideration would be given to having it under another ministry such as Railways, Communications, or Transportation.[46]

The time for the second stage had arrived, and a major reorganization of the RCAF took place along these lines. By the spring of 1927, Wilson told his friend Charles Grey, it had become clear that reorganization was badly needed because the government's civil operations were too dominant. While the military was in control, 'there was a disinclination to do anything for the commercial end outside the Government operations. The minute Colonel Ralston took hold, we had a chance to work towards a saner and more practical policy and when

MacBrien resigned the whole structure he had created on a purely military basis collapsed.' Although there is no other evidence of Ralston's role in the reorganization, the change was the kind of reform Wilson had been promoting. 'I am glad to say,' he wrote, 'that everything I fought for in the past five years has been granted and that we get back practically to our old Air Board organization.'[47]

On 1 July 1927, when the new organization came into effect, the RCAF was relieved of the direct responsibility for the control of civil aviation. As Wilson pointed out, the new scheme, in many respects, resembled the old Air Board. Four separate branches were formed. The Directorate of Civil Government Air Operations [CGAO], headed by Wing Commander Gordon, took over all civil operations. The controller of civil aviation [CCA], J.A. Wilson, continued to supervise the administration of air regulations, the inspection and licensing of air harbours, aircraft, and air crews. The Aeronautical Engineering Division [AED], run by Wing Commander Stedman, exercised a general supervisory function over all technical matters. The RCAF, under its director, Group Captain Scott, was left to concentrate on military aviation, especially training. All branches remained in the Department of National Defence; all except the RCAF were placed under the direct control of the deputy minister. The air force remained responsible to the army chief of staff. Units, facilities, aircraft, and equipment were divided. Winnipeg, High River, Dartmouth, and Ottawa (including No 1 Depot and the Photographic Section) became air stations of the CGAO. Camp Borden (three squadrons, the Ground Instruction School, and the RCAF Repair Depot) and Vancouver (two squadrons), along with the Communications Flight were kept as RCAF units. The Committee on Civil Air Operations was reorganized. O.M. Biggar resigned as chairman, and the committee was reconstituted under the direction of the deputy minister.[48]

The 1927 reorganization to some extent met parliamentary criticism by placing 'all government flying operations and the control and supervision of civil aviation under civil control and administration.'[49] But Wilson's initial impression of a fundamental shift proved false. Consideration was given to converting all branches except the RCAF to civilian status, but only the CCA was actually affected. The others remained staffed by the RCAF; the 174 officers and airmen with the CGAO and the seventeen with the AED represented more than half the RCAF's uniformed strength. Although the branches had well-defined duties, the closest co-operation was essential for the wellbeing of each. Frequent cross-postings between them ensured this, but also blurred their separate identities. It mattered little whether a sergeant or flying officer was training others at Camp Borden or flying in the bush, his life went on much as it had before the reorganization. Consequently, while the change produced considerable shuffling of offices and appointments, its effect on flying operations was more apparent than real. Parliamentary critics could still direct their displeasure at having civil aviation located in the Department of National Defence. Commercial operators still objected to the RCAF's monopoly of government flying. RCAF officers who wished to concentrate all their efforts on building a military air force found themselves so restricted by the need to staff the CGAO that

their military air force remained a distant dream.[50] Bureaucratic inertia and political indirection combined to limit change. As the annual *Report on Civil Aviation* for 1927 explained: 'The reorganization of the other branches (Civil Government Air Operations and Aeronautical Engineering) is not an easy matter and requires time and the utmost care during the transition period to ensure that their important functions are not interrupted by any sudden change.' There were also 'questions of length of service, pension rights, etc. ... [and] permanent Air Force officers with many years service are entitled to every protection in regard to such matters. The success of the Civil Government operations programme is largely due to them and its continuance on a sound basis is dependent on their experience and knowledge of the work.'[51]

Firm direction from the top could, undoubtedly, have cleared obstacles, but the initial impetus for a clear delineation of the respective spheres of civil and military aviation was not sustained. Major-General A.G.L. McNaughton, chief of the general staff from 1929 to 1935, was a strong believer in the RCAF's participation in civil operations. Group Captain Scott, perhaps disappointed at the lack of substantive change, retired in 1928. The RCAF's senior appointment went to Wing Commander Gordon, who was made head of the CGAO and represented the RCAF on the Defence Council. In a clearly subordinate position was Wing Commander L.S. Breadner, who served only as acting director of the RCAF until 1932.

The government's decision to make Gordon the *de facto* senior RCAF officer reflected its disinclination to make a clean break between military and civil aviation. When estimates were considered in 1929, opposition members returned to their familiar theme of questioning the involvement of the defence department in civil flying. The minister, Ralston, went to great lengths to deny any military intent. The civil flying programme was controlled by the RCAF only because it was more economical to have a centralized aerial agency. It was 'a matter of opinion,' he said, whether the RCAF's service was satisfactory. But, he continued, 'if we placed civil aviation under another department we would be doubling our overhead. Then the Department of the Interior would want an air force, as would also the Post Office Department and the Department of Railways, each with its own organization, and we would be trebling or quadrupling the overhead in that connection, and would not have uniformity of training.' Ralston saw 'another drawback' which he could not 'stress too strongly.' This was that flying required discipline such as could only properly be enforced in a military service:

> There is no other activity in which you need more, not the sort of discipline known as parade discipline, saluting and things of that sort, but the sort of discipline which will make men follow a certain line of routing day after day and month after month in order that they may recognize, for instance, the necessity of inspecting a certain part of the machine every morning, whether they think it necessary or not. That condition is more easily attained when you have the men doing those things because they are so ordered rather than leaving it to them to decide whether they will do it or not. For instance they might get the view that 'We do not have to inspect the machine this morning, we

inspected it yesterday.' ... it seems to be necessary for the sound foundation of civil aviation in this country to develop that care and caution and ceaseless attention to these matters of detail, which, if not necessary, it is at least desirable that they should be taught by the influence of discipline and routine ... there is no activity where the simple failure to carry out a particular order will lead to such disastrous results as the activity of aviation.[52]

For four more years, until events combined to force yet another reorganization, the RCAF's primary function continued to be the training of pilots and crews for civil flying operations. The pace of training picked up, and the CGAO's activity grew apace under the new arrangement – from 3777 flying hours in 1927-8 to 9372 the next year, and then to a peak of 13,640 in 1930-1. The increase matched the remarkable growth of commercial flying in the period.

The late 1920s also saw the beginning of a fundamental structural transformation in Canadian aviation. In a few years float- and seaplanes were gradually replaced by landplanes, which could make use of an interconnected transcontinental airway system. Although the RCAF was only peripherally involved in bringing about the changes – they were primarily in the domain of the controller of civil aviation – the service was fundamentally affected by them. When the RCAF was eventually freed from its responsibilities to conduct civil operations, it was able to take full advantage of a developed system of aerodromes and ground facilities. It is necessary, therefore, to digress slightly in order to sketch the background of the transformation from a water-borne to a land-based aerial system.

Much of the push for change apparently came from the United States. American federal legislation in the mid-1920s served as 'cornerstones for the development of commercial aviation in America' by permitting the Post Office to let airmail contracts. These provided the indirect subsidies which produced an extremely rapid development of the major US trunk airlines. At the same time, 'a rather liberal policy of placing experimental orders for prototype aircraft' promoted the commercial development and production of aircraft.[53] J.A. Wilson was a close observer of these events. As he noted, the purpose of the US government 'has been threefold, first, to secure better development of this new form of transportation for commercial purposes; second, to create private commercial services which can relieve the post office of its direct expenditure upon air mail, and third, by the creation of a large commercial air fleet with its accompanying personnel and its background of the manufacturing industry to give a fundamental military reserve to the country.'[54] These were uncannily similar to the objectives Wilson wanted to achieve in Canada.

Fast growth in the United States had major implications for Canadian aviation. 'The Americans were expanding aviation at an enormous rate due to very remunerative airmail contracts and also to the enormous expenditure being made by the Department of Commerce in building and organizing airway routes,' Colonel R.H. Mulock, the outstanding First World War airman who was closely involved in commercial aviation, recalled. 'It was the boom period ... It was at this time that we saw the whole of Canadian aviation floating into the

hands of the Americans.'[55] In just a few years the major US trunk lines – United Air Lines, American Airways, Transcontinental and Western Air Express, Pan American – had spanned the continent and were establishing international connections in the Carribean, South America, Newfoundland, and Canada. A mail and passenger air service between New York and Montreal was established in 1928, and another connecting Toronto and Buffalo followed soon after. Others were planned.[56]

Like Mulock, Wilson became alarmed at the prospect of Canadian aviation passing by default to American companies. While there was as yet no public demand for airmail and passenger transportation in Canada, he had written prophetically in 1922, it would 'follow inevitably when they succeed in the United States.'[57] Five years later that time had arrived, as Canadian aviation 'may be said to have passed beyond the pioneer stage' and must be prepared for the next, which 'will undoubtedly be the operation of air routes.'[58] This would bring aviation within reach of the bulk of the Canadian population and forestall American expansion, but it required a major policy shift and mobilization of resources. Flying operations in the remote regions, where flying boats and seaplanes had been able to use the almost limitless Canadian inland waterways, had paid large dividends on a very small investment. But the very nature of the water-borne system imposed clear limitations on its development. Such aircraft were unable to function effectively during fall freeze-up or spring break-up; intercity transportation of mail, passengers, and freight had to be regularly scheduled on a year-round basis if it were to gain acceptance over other forms of transport. This meant landplanes, which needed landing fields, ground maintenance facilities, ground control systems, and navigation, meterological, and radio aids. It was predictable that as the scope of operations grew, only ever larger firms would be able to offer the efficiency and economy which characterized successful modern business enterprise. Consequently, the companies operating the aircraft had to be closely linked to the existing transportation network, with access to capital and management skills not needed for bush flying.[59]

Wilson had in mind a three-part approach to promote this new phase of aviation. The first part required flying clubs to train the new generation of pilots needed by a growing commercial sector. The second was related to the section in the clubs' charter that they must provide themselves with a licensed aerodrome and adequate ground facilities. Most clubs were able to construct fields in conjunction with their local municipalities, and by 1929 the combined ground facilities of the twenty-two functioning clubs provided the foundation for a national airway. The government's role was to link the local airports with a network of intermediate airfields equipped with the necessary ground organizations, navigation aids, lighting, and radio services. The third part of Wilson's strategy called for an integrated air mail system. He stressed that an aerial transportation system must be developed in conjunction with existing forms of transport, not competitively as highway transport had challenged railways. Despite the fact that Canada already had a more than adequate rail system, there was a place for a compatible air service for that part of the public which would

benefit from an estimated cross-country time-saving of three or four days. Wilson also pointed out to critics of government expenditures that 'Every form of transportation has had state aid ... fast trains are largely paid for by mail contracts.'[60]

Until the late 1920s only unscheduled mail had been carried, as an ancillary service to isolated northern and eastern communities. In 1926, however, the Post Office signalled a change in its attitude and the RCAF was alerted to provide ground support and meteorological facilities. The next year the Post Office appropriated $75,000 for air mail carriage, a new departure and a small but important support for Canadian aviation. The RCAF's function was to prepare the way. Initially two geographical regions seemed most promising. The first was to hasten the delivery of transatlantic mail, the other to serve the Prairies.

Interest in Atlantic mail was part of the more general process of expanding imperial air communications which the 1926 Imperial Conference, an enthusiastic Mackenzie King included, had attempted to promote.[61] Charles Lindbergh's 1927 transatlantic flight had been widely acclaimed as the forerunner of oceanic commercial air transportation. Canada was strategically located astride the great circle route to Europe. Atlantic Canada jutted into the ocean and, west, along the St Lawrence, Canadian territory provided the most direct route between the major population centres of Europe and the American midwest.[62] Airships were one exciting possibility, but proved unworkable. Technological limitations ruled out the early use of long-range aircraft, but even then it was possible to foresee the development of commercially feasible ocean-spanning airliners. In the meantime, a combined ship-aircraft system might fill the gap. Aircraft could meet regularly scheduled ships in the Gulf of St Lawrence, pick up their mail, and quickly deliver it to Montreal. From there it could easily be trans-shipped to its ultimate destination. Hours and perhaps days could thus be saved in delivery time. Commercial companies were to operate the system, but before contracts were let the RCAF flew a series of trials in the fall of 1927 between Rimouski and Montreal. The Post Office was pleased with the results and the following spring awarded a contract to Canadian Transcontinental Airways to continue and extend the connections to Ottawa and Toronto.[63]

The St Lawrence mail flights were able to make good use of a major airport constructed at St Hubert near Montreal. Its origins lay in the commitment made by Mackenzie King at the 1926 Imperial Conference to support the proposed British airship service (a scheme which the RCAF staff considered premature and technologically unsound). At the St Hubert site, selected in 1927, a mooring mast with elaborate docking aids was erected; more important, as things turned out, two hard-surfaced runways and a taxiway for aircraft were added, along with hangars, radios, field lighting, meteorological equipment, and a control tower. In July 1930 the British R-100 arrived at St Hubert on a trial flight, after which it toured parts of Quebec and Ontario to considerable fanfare and public enthusiasm. There were no other flights. That October another British airship, the R-101, crashed and burned in France while on passage from Britain to India. The airship scheme was dead. The sole Canadian legacy of the ill-fated project, and it was a significant one, was a fully equipped airport

within easy reach of Montreal and capable of handling all-weather aircraft traffic.[64]

The process of linking St Hubert and the scattered municipal airports with intermediate landing fields and other equipment went on in stages over many years. The CCA divided the country into four geographical regions – the Prairies, the West, the Maritimes, and northern Ontario – and each was intensively surveyed for suitable landing-field sites. The prairie section was easiest to develop. The early objective was to inaugurate a regular service connecting Winnipeg and Calgary. Main and intermediate sites were selected, electric beacons installed, and acetylene lanterns fixed at ten-mile intervals along the route to light the flight path. This section was ready by the end of 1929. The following year the Post Office let contracts with western operators for regularly scheduled deliveries which were maintained on a nightly basis for two years until the Depression forced the Post Office to suspend the service because of lack of funds. Meanwhile, other intercity connections were established by making use of municipal airports, the construction of which the flying clubs had done so much to encourage. In Atlantic Canada, Halifax, Moncton, and Saint John were connected with Montreal and then to Toronto and Windsor. Before the Laurentian Shield was tamed, mail could also be sent by air via the United States to Manitoba to connect with the prairie section. Within a relatively short time the route across the Rocky Mountains was functioning and Vancouver and Victoria were included in the system.[65] By the end of 1929 there were one thousand miles of surveyed air routes for night flying, although the airway was far from being free of difficulties. In 1930 one complaint noted that 'the beacons between Moose Jaw and Swift Current are a disgrace as only an occasional one can be picked up, and then only if the pilot knew exactly where to locate it ... there are only two fields on which it is safe to land between Winnipeg and Regina.'[66]

The transformation of Canada's aviation resources in only a few years was remarkable. The water-borne system of bush flying, which was still opening up the northwest, had been supplemented by a land-based aerial network almost spanning the country. It had not been until 1926, when the possibilities of a new phase of development were first being discussed, that the first cross-country flight by a single aircraft – a seaplane – had taken place. Four years later, on the Prairies alone, fully equipped lighted municipal airports in Winnipeg, Regina, Moose Jaw, Saskatoon, Medicine Hat, Lethbridge, Calgary, and Edmonton joined more than 1300 miles of lighted air routes.[67] The Canadian system also merged with others. 'The magnitude of the air mail services on this continent is seldom realized,' Wilson enthused. 'A correspondent at Aklavik, on the Arctic coast of Canada, can post a letter there and it will be conveyed by air, without a break, to Pembina, thence by American air mail routes to Mexico City, Central America, the islands in the Caribbean Sea, and to any country in South America, as far as Buenos Aires or Valparaiso. The gain in time and convenience is immense and the constant exchange of traffic by air means much to the commerce of the countries on the western hemisphere.'[68]

Although the bulk of the developmental work in the new phase of Canadian aviation was under the direction of Wilson as controller of civil aviation, the

RCAF was involved in all phases of the expansion. It had much to gain from the enlargement of the country's aerial capabilities. The construction throughout the country of facilities able to maintain and service landplanes had military and strategic importance, the full significance of which became clear within a few years.

While this new era of aviation was taking shape, the majority of the RCAF's resources, men, and equipment remained preoccupied with civil operational flying – either flying themselves or training others to do so. There seemed little prospect of drastic change as the interdepartmental committee which oversaw the civil air operations of the RCAF met in mid-January 1932 to allocate the CGAO's aerial resources for the coming season.[69] Those attending – the deputy ministers of the Departments of National Defence and Mines, as well as several branch heads from other user departments and senior RCAF officers – were well aware that worsening economic conditions would probably reduce their estimates further. The committee noted that in the previous year savings of more than $1 million had been realized when the control of their natural resources had been handed over to the Prairie provinces, thus eliminating the RCAF's western fire patrols. It recommended that a further reduction of $301,500 could be achieved by eliminating two photo and one general-purpose detachments, reducing transportation flying by 600 hours, and postponing the purchase of a new, twin-engine aircraft. Although this would mean that fourteen officers and twenty-seven other ranks would have to be let go, the reduction would not affect essential tasks.

The mood of the meeting was cautiously optimistic, noting in particular the growing use and popularity of aerial photography. User departments were satisfied with the work of the RCAF. Except for the Post Office, which contracted out its requirements, departments simply continued to request flying services which the civil government air operations directorate then co-ordinated, approved, and implemented from funds appropriated in the aviation estimates of the Department of National Defence. The director of the Geological Survey, Dr W.H. Collins, commented that 'so long as the RCAF was in a position to undertake operations ... little work would be passed out to commercial companies, as the coordination of civil government air programmes permitted a definite economy which would probably not be realized if departments were to budget their own requirements.' The committee concluded:

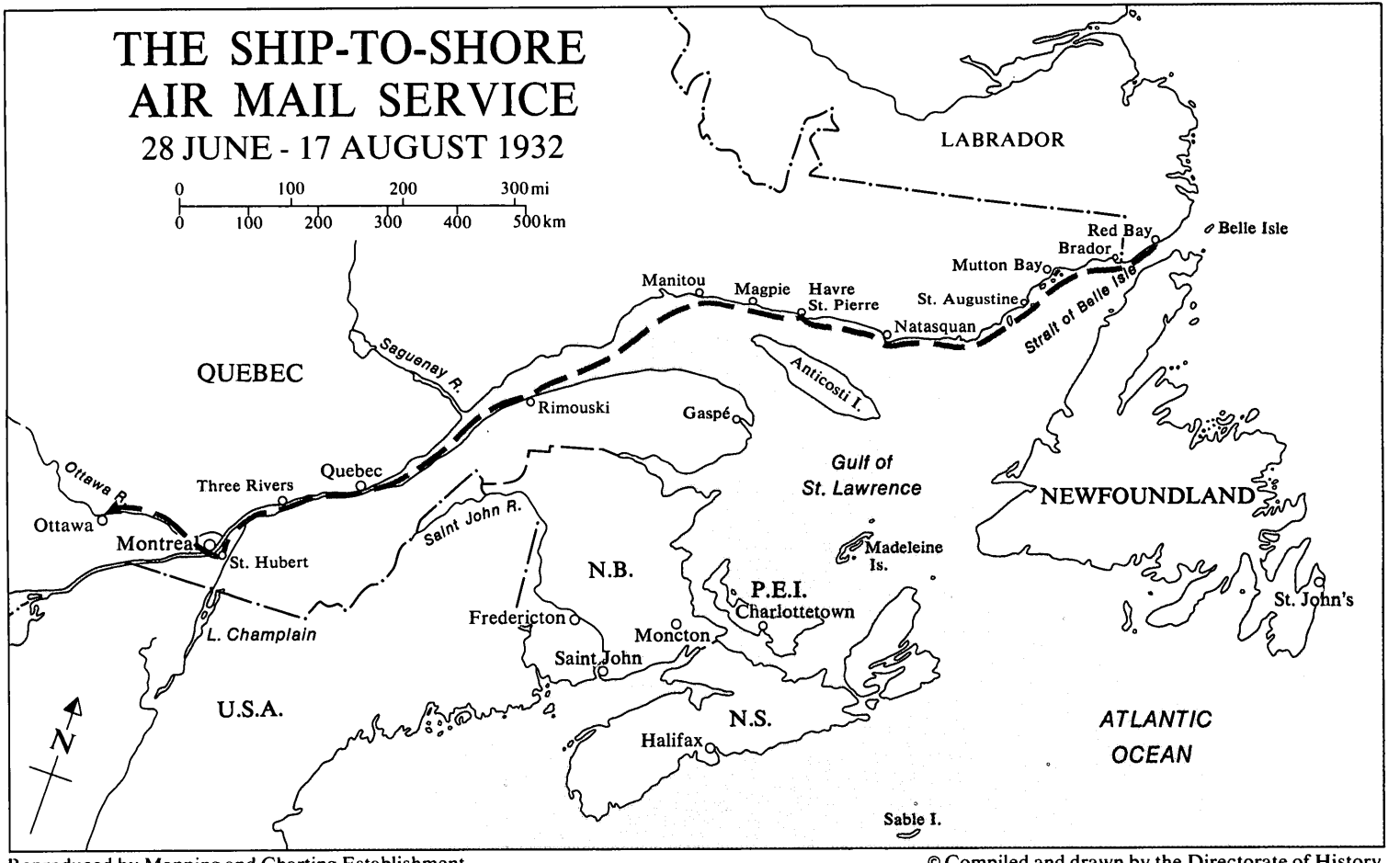
> The Civil Government Branch of the Royal Canadian Air Force is the central flying organization for the Dominion Service and all operations undertaken by it are for Government Departments. In serving the Departments, a portion of the Air Force obtains practical and valuable training. The Committee commends this policy of combining training and productive work connected with investigation and development of the natural resources of the country particularly in the remote areas which are more or less inaccessible. This policy has already produced an Air Force that compares favourably with those of other countries in general efficiency, that leads in the operation of seaplanes and ski-planes and leads in application of the aeroplane and air photography to exploration and development of natural resources.[70]

Commercial operators outside the meeting, and Wilson in it, objected to the apparent complacency. In the five years since the 1927 reorganization, the civil-military relationship had reverted to its earlier status. The RCAF-CGAO still dominated civil-government flying. The process had been more acceptable during the years when there was enough aviation business to go around, but now, as the economy contracted, the civil sector was being squeezed. On 15 February, exactly one month after the interdepartmental committee's meeting, the government sent word of the cancellation of air mail contracts to private firms, in a stroke undercutting one of the main props of commercial aviation's financial stability. R.B. Bennett, the prime minister, preoccupied with reducing expenditures to meet the increasing charges on the national debt, thought the RCAF could carry the mail at less cost 'due to the fact that they can operate for out-of-pocket expenses,' while the commercial companies had to maintain their profit margins.[71]

Wilson completed yet another of his critical reports, repeating many of his now familiar arguments. The RCAF had strayed from its mandate to experiment only, withdrawing from civil operations once they became commercially viable.[72] The original intention to form reserves from the pool of available commercial pilots had never been fulfilled. Consequently, the RCAF lacked the backing of a significant outside constituency, potentially its strongest support, when it most needed it. Instead, commercial pilots were bound to resent the RCAF's dominance of civil activities. The unfortunate result was to divide the small aviation community, leaving the RCAF isolated from its fellow flyers, who otherwise might have been inclined to support its claims. Nevertheless, the RCAF had no choice but to fly air mails if ordered. For example, in the summer of 1932 it temporarily took over the sea-to-shore route on the Atlantic coast which earlier had been flown by Canadian Airways. During the Imperial Economic Conference of 1932, two RCAF detachments of ten pilots flying seaplanes and flying boats ferried official mail in stages from Red Bay on the Labrador side of the Strait of Belle Isle to Ottawa.[73]

When the prime minister had presented his budget in June 1931, he announced that the aviation appropriation for the fiscal year would be reduced by $2 million as part of the government's commitment to financial retrenchment.[74] This had resulted in some contraction of services, but it was followed the next year by far more drastic economies. For 1932, the combined vote for the RCAF and CGAO was slashed by almost 70 per cent. All phases of training and operations were affected, with a mere $1,750,000 allotted for the service's diverse activities. The Department of National Defence's annual report for 1933 summarized the effects of the 'big cut':

> the release of 78 officers, 100 airmen and 110 civilians; vacancies occurring during the year not being filled; curtailment of training in Canada and abroad; normal flying training of provisional pilot officers discontinued; discontinuance of flying for other government departments, except where funds were provided by those departments; no new aircraft or engines purchased; bare maintenance charges only expended; reduction of Ladder Lake and Buffalo Park sub-stations to care and maintenance basis; suspension



of construction at Trenton, etc; etc; intermediate aerodromes used for night flying in connection with air mail routes placed on care and maintenance basis; construction and improvement in civil airports suspended; cancellation of air mail contracts; reconditioned or used aircraft issued to flying clubs instead of new ones, etc; etc.'[75]

This severe curtailment of funds and flying services produced yet another reorganization of the air services. When Group Captain Gordon returned to Ottawa from the Imperial Defence College, he was told to organize a new structure to manage aviation. The new scheme, which took effect on 1 November 1932, consolidated the operations of the RCAF, CGAO, and AED. Gordon was given a new title – senior air officer – while remaining responsible to the chief of the general staff. CGAO stations returned to RCAF control, but High River, Dartmouth, and several sub-bases were placed on a 'care and maintenance' basis. Development of the new Trenton base was stopped. Camp Borden remained the main training centre and Station Ottawa controlled a reduced number of mobile detachments. The CCA branch, and Wilson's civilian staff, continued to answer to the deputy minister.[76]

The next few years were lean ones for Canadian aviation. Commercial companies folded as contracts disappeared, again raising fears of American competition. The deputy postmaster general, for example, feared that if air mail were discontinued, all Canadian air mail traffic would become 'subsidiary' to the American system.[77] Aircraft companies which had expanded in the promising climate of earlier days now had to close, and the RCAF found itself presiding over a fleet of obsolescent aircraft which it was unable to replace. But not all was lost. The trans-Canada airway was an early casualty of retrenchment and many municipalities which had committed funds to the construction and operation of their airports were let down. The airway programme, however, was revived when the Department of National Defence was placed in charge of the government's principal unemployment relief scheme. One of the major projects was to clear land and prepare intermediate landing fields across the country, as well as construct a number of terminal airports. By the time the programme was ended in 1936, the unemployment relief scheme had at least partially completed forty-eight fields and built numerous hangars and other buildings at RCAF stations and municipal and provincial airports.[78]

The airway, then, benefited from the Depression. As General McNaughton told a British visitor:

while the route had been settled entirely on economic, geographic and meteorological considerations with a view to serving in the best possible way the civil interests of Canada, particularly as regards the handling of mails between centres of population from the Atlantic sea-board to the Pacific but that as a bye [sic] product the Airway would give us a great military advantage which we did not now possess, namely, the ability to rapidly reinforce by air, our Pacific coast if that were required either on account of our being engaged in war with a trans-Pacific power or by the reason of the maintenance of neutrality in a war between the United States and a trans-Pacific power.

I pointed out that at present if we wished to move the fighting aircraft located at Trenton to Vancouver we would have to dismantle the machines and ship them out by rail or alternately we would have to obtain permission to fly over American routes between Detroit and Winnipeg and again from Lethbridge to Seattle. I said that I anticipated that in a state of tension this permission would be very difficult to obtain. On the other hand when the Trans-Canada Airway was completed and in operation and equipped for night flying and with radio beacons as it would be, we would be able to move our fighting aircraft from Central Canada to the West in the space of 24 hours. I told him that our Post Office schedules contemplate approximately 23 hours from Halifax to Vancouver, and that while fighting aircraft would not be able to make such good time nevertheless with the organization of supply available at intermediate refuelling points they would be able to move very rapidly indeed.[79]

Before then, however, the RCAF's civil flying operations were drastically affected. Some of the more important tasks were continued, albeit on a much reduced level, through strenuous efforts to combine flights and cut down on flying time in order to economize on men and equipment. This was a stop-gap measure, with user departments paying only operating costs and incidental expenses while the RCAF supplied the aircraft and crews. No charge was made for depreciation of aircraft, and the RCAF had to function with existing equipment and no provision for replacement. The situation clearly could not go on indefinitely, but it was better than letting men and equipment stand idle. Although the RCAF continued to perform some civil tasks, especially aerial photography, right up to the outbreak of the war, the government came to the view that the civil sector was too large and complex to keep within a Department of National Defence with growing military responsibilities. In 1936 the new Department of Transport assumed control of civil aviation, and the following year the creation of Trans-Canada Airlines as a national carrier opened a new era of intercity aerial transportation.

Until the mid-1930s, the RCAF had found its affairs touching those of the civil sector at almost all points. On four occasions – in 1918-19 when the the Air Board was formed, in 1922-3 at the creation of the Department of National Defence, and in 1927 and 1932 when events forced major organizational change – the civil-military relationship could have been more clearly defined with benefit to both sectors. It was not. The result, by default rather than design, was that the air force found itself performing civil functions not usually the responsibility of a military service. The impact on the RCAF as a military institution is difficult to gauge. Airmen had little opportunity to prepare for aerial warfare, but this mattered little in the 1920s and early 1930s. It is exceedingly unlikely that the RCAF would have been able to acquire the fighting aircraft and other resources to make it a credible military force. At the least, civil operations gave the RCAF a valid, useful, and politically acceptable role to perform in an unmilitary era.

3
Bush Pilots in Uniform

RCAF pilots wore air force blue, saluted, drilled, and otherwise observed the eternal military verities, even though their day-to-day working lives for most of the interwar years were spent on civil flying operations. The future air marshal and chief of the air staff, C.R. Slemon, recalled that 'I never thought of a weapon; I never saw a weapon or fired a machine gun or whatever. We were just as busy as we could be doing purely civil government flying. We began to get some military training – all along there were military elements, but they were tiny in comparison to the civil government air operations.'[1] 'We were,' another officer recalled, 'bush pilots in uniform.'[2]

Training these 'bush pilots' to fly was the RCAF's primary military function in the 1920s and early 1930s. Air force training remained concentrated at Camp Borden until Trenton was opened in 1931. As far as practicable, training methods were modelled on those used by the RAF for individual flying and ground instruction, and, later, for service or unit training. British course syllabi and training manuals were employed, and officers and airmen sent to RAF courses for advanced and specialist training – flying instruction, army co-operation, photography, armament, air navigation, wireless, explosives, and aeronautical engineering. In time these specialists formed a nucleus of instructors with which the RCAF staffed its own schools.

Recruiting and training airmen, mechanics, and tradesmen had initially proved difficult. When the RCAF became part of the permanent force many skilled men employed as civilians by the Air Board declined to join up, and others were overage or medically unfit. They were not easily replaced. Little in the way of formal instruction for airmen existed in the early years, and the RCAF depended on enlisting men who already possessed related trades qualifications. The recruit then entered into an apprenticeship to learn fitting, rigging, and other skills on the job. He gradually acquired more specific aviation experience and through specialist courses was able to improve his technical grade. Military subjects were injected along the way. In 1927 the RCAF completed arrangements with selected technical training schools to recruit students. Those successful in a trial summer course at Camp Borden were enlisted in the rank of 'boy' for further service until they reached eighteen years of age.[3] As they gained experience, however, many were actively sought by civilian firms with offers of higher pay.

When Wing Commander G.M. Croil commanded Camp Borden in 1928-9, he complained that 'If they do not actually approach them whilst here they do so by letter after their departure from this station and go so far as to pay the sum necessary for the airman to purchase his discharge.'[4]

There was less difficulty attracting officers for the air force. CAF regulations had stipulated that pilot and flying officers would be required to retire at age thirty, flight lieutenants continuing for an additional two years. Officers in these ranks comprised the bulk of the early force's commissioned officers, most of them veterans in their mid-twenties, so there was little problem at first. When new pilots were needed, a training scheme aimed at university students (which had to be deferred for a year during the reorganization) went into effect in 1923. Candidates were required to be members of the Canadian Officers' Training Corps [COTC], enrolled as degree students in applied science or engineering, under twenty-one, and unmarried. The course of instruction consisted of three terms in consecutive years during the university summer break from May until August. While at Camp Borden the pilot trainees were granted temporary commissions as provisional pilot officers in the non-permanent force and received $3.00 a day during the first term, $3.50 the second, and $4.00 the final term. Quarters, rations, uniforms, travelling allowances, and medical and dental treatment were provided. All those successfully completing the course were to be appointed RCAF pilot officers, but with no guarantee of a permanent commission. The terms of the training plan, indeed, emphasized that there would be only a limited number of such appointments. Those not wishing, or not offered, permanent commissions were eligible for appointments to the non-permanent force. Alternatively, they might be transferred to the reserve of officers, which meant that they would have no further direct contact with the RCAF unless called up in time of emergency.

The pilot training programme was scheduled to start with thirty cadets but, because of a late start, undergraduates across the country were not informed of the scheme until too late in the 1922-3 academic year. As a result only nine trainees reported to Camp Borden for the first course on 15 May 1923. One was forced to drop out a month later for medical reasons. The others completed the first term of training at the end of August. Six returned for the second term; four qualified for their wings in December of that year and were awarded commissions in the permanent force. Two of the graduates were subsequently killed in aircraft accidents and one resigned his commission. The fourth was Pilot Officer C.R. Slemon.[5]

The initial flying training scheme produced the first new air force pilots trained in Canada since 1918. Later, to meet shortages, a number of trained flyers were granted short-service commissions, and some university graduates in engineering and applied science courses were enlisted directly. Serving non-commissioned officers [NCOs] provided another source. The first NCO pilot course began in February 1927, and over the next five years thirty of forty-five students attained wings standard.[6] When this scheme had been proposed, Group Captain J.S. Scott enquired about the RAF's experience with NCO pilots. His liaison officer in London reported that 'The scheme is working most satisfactori-

ly. The standard of Airmen Pilots is just about the same in the Royal Air Force as that of the Short Service Commissioned Officer Pilot, but Airmen Pilots in relation to those officers appear to take things rather more conscientiously.'[7] Canadian experience was equally favourable.

In the early phases of pilot training, a great deal of time was spent on ground subjects: the theory of flight, basic areonautical engineering, air pilotage and map reading, aerial photography, meteorology, as well as military organization, administration, drill and physical training, and signalling. Flying began with the student seated in the back of an Avro 504K. The instructor, calling instructions through a speaking tube from the front seat, guided his pupil through a controlled programme over several days, introducing him to the aircraft's flying controls, the basics of level flight, stalling, diving, gliding, take-offs and landings, turning in the air, standard procedures for engine failure and forced landings. Finally the student flew alone. Instructions in side-slips, cross-wind landings, aerobatics, and low flying followed, all leading to wings standard. Once qualified, the new pilot went to Vancouver for a seaplane conversion course. There he mastered the different controls on flying boats and floatplanes, practised landings on heavy seas and glassy calm surfaces, and was introduced to marine navigation, wireless, engine, float and hull maintenance, and the use of carrier pigeons. He was about to become, after all, a bush pilot; a difficult and lonely job where he was dependent upon only his training and self-reliance.

From Camp Borden and Vancouver most new pilots went directly to one of the air force's sub-bases scattered throughout the northwest where they began forest patrolling, the staple of the RCAF's civil flying operations during the 1920s. As we have seen, the Air Board had been highly successful in demonstrating the productive contribution that aircraft could make to the forest industry. Conserving woodland resources with fire patrols was potentially of enormous economic importance. Forest production in 1920 totalled more than $300 million; forests covered almost one million square miles, about half in timber, the rest in pulpwood. Fires regularly destroyed huge sections of forest cover, the equivalent of one-third the annual consumption of standing timber and an additional 1.3 million acres of young growth. Traditional means of forest protection had proved marginally effective at best. In some regions ground systems included lookout towers, telephone networks, fire lanes, guards, and prepositioned equipment and pumps. To an ever greater extent, however, the foresters of the early 1920s still relied on foot, horse, or canoe patrols. Some ranged two to three hundred miles, but unless fires were visible from the waterways or routes used, they were almost impossible to detect. The provincial forester of Manitoba estimated that up to 75 per cent of the forest fires in his area of responsibility remained unobserved or unreported.[8] By contrast, regular air patrols could easily cover vast expanses. 'Even the Ottawa Valley lumberman, than whom no more conservative animal exists, is convinced of the soundness of our ideas,' J.A. Wilson wrote early in 1923. 'Two years ago he did not admit that there was such a thing as an aircraft; one year ago he treated them as a joke; six months ago he was inclined to violently oppose the idea that they were any use and now he admits their presence in the scheme of things but, of course, still

objects to their cost even though he sees every year millions of dollars of timber burned, a large proportion of which could be saved by adequate protection.'[9]

Costs varied from region to region. The Ontario Fire Service concluded that the $125 per flying hour it subsequently paid for detection, suppression, sketching, and survey was amply justified. The federal Department of Forestry projected the cost of protecting its 120 million acres of woodland in the northwest by aircraft at one cent per acre. It judged this reasonable. Foresters reluctantly accepted higher initial expenses because 'an era of high costs is a necessary preliminary to organization on a permanent basis.' The cost effectiveness of aircraft patrols had to be reckoned in the same light as ordinary fire insurance, the premium being measured against the potential economic return.[10]

The aircrews' work included detection, reconnaissance to assist ground firefighters, and the movement of ground parties and equipment. The emphasis given to each task varied by region. In British Columbia an extensive rural telephone network provided the basis for a ground detection system so that in normal circumstances aircraft only supplemented ground crews during peak fire seasons. Their greatest contribution was in transporting fire crews and equipment to remote locations. In Alberta, where few landing sites were available on the forested east slopes of the Rockies, air patrols concentrated on detection. Their introduction in 1920 had been well timed. The dominion forestry service had been about to make a major capital investment to construct an extensive network of ground lookout towers. The foresters were very quickly convinced that aerial surveillance would be more cost effective. Over the foothills, wireless-equipped landplanes were able to communicate with their High River base, which in turn had a telephone link with the forest service. Once the location of a fire was plotted, the district forester could move his ground crews to the scene. Initially, patrols covered only the Waterton Lakes and Rocky Mountain Park areas, but they were gradually expanded to include the Bow River, Crow's Nest, and Clearwater reserves. By the mid-1920s, there was also a sub-base at Grand Prairie in the Peace River district.[11]

The British Columbia and Alberta patrols were important, but they were soon dwarfed in scope by those in the vast forests of the northern Canadian Shield. The Department of the Interior, the responsible department, concluded in 1923 that this area provided the best conditions for the use of aircraft, and 'it is in these regions that their greatest value in fire protection can be secured.'[12] In April 1924 the Departments of National Defence and the Interior formed a joint committee to prepare a detailed plan for extending aerial fire protection to the 120 million acres of forests between the Ontario border and the valley of the Athabaska River in Alberta. They proposed a five-year expansion programme, adding sub-bases annually at locations ever further west. The project began in the 1924 flying season. Once the aircraft were in place each spring, the district forest rangers, after considering weather conditions and the fire hazard, would recommend patrols in specified areas. When a pilot spotted a fire he contacted local rangers, either by wireless or message drop. Supression aircraft might also be sent with crews and equipment. If the fire were spotted before it had time to get out of control, chances were that it would be contained.[13]

A typical operation occurred in June 1924 near Rice River. A flying-boat patrol, carrying the assistant district inspector of forest reserves, spotted a fire late one evening while returning from Norway House to Victoria Beach. The inspector called for a suppression aircraft and fire crew. A Curtiss HS2L dispatched the following morning was able to taxi within 100 yards of the fire. Ten minutes later a pump and 600 feet of hose had been unloaded and the crew was playing a stream of water from the downwind side of the blaze. Later in the day another pilot took photos of the area, confirming that the pump and fire crew were in action at the most effective location. Work continued until late afternoon, when heavy rain clouds to the southeast convinced the fire crew that they could return to base. Two days of rain virtually extinguished the fire. A single fire-ranger was then able to finish the job of extinguishing the large stumps and roots that were still showing flame.[14]

Endless summer patrolling took its toll on the aircraft, and the RCAF was faced with a need to replace them. The Air Board's reliance on the postwar gift aircraft from Great Britain allowed it to delay any capital expenditures for replacements. The Avros were adequate for Camp Borden training. The DH4s employed on Alberta fire patrols, however, were decrepit. An alarming report told how one had failed in the air from 'general deterioriation.'[15] Wood shrinkage in the laminated main spar had opened up dangerous structural cracks, an especially serious fault in the turbulent flying conditions encountered in the foothills of the Rocky Mountains.[16] Moreover, as one pilot drily commented, the aircraft had its fuel tank between the pilot and observer, making himself 'simply the meat in the sandwich' in the event of a crash.[17] Of the flying boats, the heavy twin-engined Felixstowe F3s and Curtiss H16s were seldom flown because they were too difficult to maintain.[18] The Curtiss HS2Ls were the workhorses, versatile and reliable for bush flying. Yet one station superintendent complained in 1921 that 'unless a new and more suitable type of machine can be produced, there can be little progress made.'[19] RAF practice at this time was to rebuild a wartime vintage aircraft after five years, renewing all its wooden parts, after which it was flown for no more than two additional years. By 1922 the Canadian machines were all more than five years old, and none had been rebuilt.[20]

The Air Board wanted replacements designed and built specially for Canadian conditions. Robert Leckie, the director of flying operations, had noted the environmental and functional factors which were bound to influence the type of machines needed. 'Aircraft in Canada will be used very extensively in the opening up and development of comparatively unexplored land,' he wrote, and both forest protection and photographic exploration demanded long patrolling over rough terrain with few maintenance facilities. Aircraft, therefore, had to be reliable and possess ample range. They needed good short take-off and landing capability in order to operate effectively from small lakes surrounded by trees. They had to be adaptable to wheels, floats, and skis for all-season use. In response to a request from E.W. Stedman, the head of the technical branch, Leckie drew up requirements for three machines: a small and a larger landplane, and a single-engine flying boat.[21]

Designing an aircraft to certain specifications was easier than procuring it. Sources of supply presented a major problem. Once the wartime facilities of

Canadian Aeroplanes Ltd were liquidated, there was no manufacturing or even assembly capability left in Canada, and foreign companies were just beginning to convert to peacetime production. Canadian Vickers Ltd, interested in broadening its Montreal facilities to include aircraft, offered to open up a Canadian branch plant with access to its British parent's technical capacity; it demanded, in return, an exclusive contract to supply the board's aircraft.[22] Stedman was unimpressed. 'This is pure bluff,' he minuted to Wilson. 'If we tied ourselves up to Vickers we should effectually strangle any industry that would otherwise grow up and we should be at their mercy as to price. They should compete with other contractors for our contracts.' Leckie was even more succinct: 'The attached proposal I consider absurd and quite out of the question.'[23] Wilson replied more diplomatically, thanking the company for its interest, but pointing out that the board did not wish to restrict itself to an exclusive contract. He acknowledged that buying from Vickers 'might result in quicker action and faster progress,' but the drawbacks of limiting competition outweighed potential benefits.[24] Moreover, he emphasized, any capable Canadian manufacturer would be given preference. The principle of promoting domestic manufacturing was one to which both the Board and later the RCAF gave continuing priority.

Wilson did not want Vickers to lose interest, however, and tried to impress upon them that aviation in Canada had an unlimited future from which manufacturers might reap substantial rewards. The company, in turn, kept the board aware of its new products. Two in particular were of interest: a flying boat named the Viking, which was just coming into service, and an Avro (Vickers was acting as the Canadian agent of the A.V. Roe Co) modified to take a more powerful Wolseley Viper engine.[25] Stedman kept a close watch on these and other developments in both Britain and the United States, but none of the newer machines seemed entirely suitable without structural alterations. As Stedman recalled, 'we were interested in producing aircraft that, from the start, had been designed to do the work for which they were required and under the climatic conditions that were likely to be experienced.'[26] In the meantime, the only aircraft the Air Board acquired were several more HS2L hulls purchased from surplus American stocks.[27] These were the circumstances which lay behind the aircraft procurement problem, growing to crisis proportions, that faced the RCAF when it displaced the Air Board.

In October 1922 Wing Commander J.L. Gordon, the acting CAF director, informed his superior, Major-General J.H. MacBrien, of the situation. Like Stedman, Gordon stressed that new aircraft should be built in Canada, noting that the wood used by British manufacturers 'undergoes considerable shrinkage due to seasoning when used or stored in this country.'[28] The urgency of the situation was soon made abundantly clear when Gordon called his commanding officers to Ottawa to consider their requirements for the next year. Their reports were gloomy. All of the air force's thirty flying boats were obsolescent; only half would be serviceable for operations. Even if ordered immediately, replacements were unlikely to be found in time for the 1923 spring fire patrols. Gordon needed no persuasion. The next day he suggested to MacBrien that $500,000 be

requested in supplementary CAF estimates for an immediate order of twelve flying boats and eight single-seat landplanes. For the former, Gordon recommended the Supermarine Amphibian, which could use Rolls Royce Eagle engines the RCAF had in stock; for the latter he preferred the Avro Viper. MacBrien added an additional $40,000 for radio equipment and sent the proposal to the minister.[29]

The Cabinet authorized half the requested amount in November 1922. Tenders for eight flying boats and six landplanes were immediately called from several British, American, and Canadian firms. Delivery of the first aircraft was to be made by the end of March 1923 and the remainder within two months. Bids were accepted until 2 January and later extended for a month, after protests from some of the companies. Even so, lack of time, both to prepare proposals and deliver aircraft, discouraged a number of prospective bidders. Ericson Aircraft Ltd of Toronto declined, as did the Hall Engineering Co in Montreal. The Ottawa Car Manufacturing Co Ltd tried to locate either a British or American aircraft manufacturer interested in establishing a Canadian branch, but without success. Laurentide Air Service Ltd was more successful and submitted a joint bid with the British Supermarine Co. Nineteen British firms were notified of the competition, and eleven submitted bids. Two American firms, Glen L. Martin and Dayton-Wright, also competed.[30]

The pressure of time eliminated the possibility of waiting for new designs. The Amphibian and Viking were the only two aircraft considered beyond the experimental stage. Stedman confessed a 'slight preference' for the Amphibian, but British Supermarine planned to construct their machines in Britain. Vickers promised more. It would erect the first two Vikings in its British factory, in order to meet the March deadline, and complete the order in a plant to be built in Montreal. Despite an added cost of $6450 to build the boats in Canada rather than at the parent factory, Vickers still offered a significant price advantage – $150,650 compared with Supermarine's $177,400 for eight flying boats. The Vickers bid was accepted, while the order for land patrol aircraft was held over.[31]

Wing Commander Scott, the liaison officer in London, was the target of considerable criticism from unsuccessful British firms when rumours circulated 'that it was a foregone conclusion that Messrs. Vickers Company would be awarded the contract.'[32] But allegations of favouritism were unfounded. The Vickers proposal best fit the tender, even though Scott had his own doubts about the Viking. Reports of its flight trials were mixed. One test pilot cautioned: 'the machine would probably sink as a result of the hull being swamped if it was necessary to taxi at sea with a beam wind for any length of time.'[33] Moreover, its favourable flying characteristics had been achieved with a powerful 450-hp Napier Lion engine. The RCAF planned to install smaller 360-hp Rolls Royce Eagles left over from the British Air Ministry's postwar gift. Scott recommended thorough testing because there were 'great doubts' that such a configuration would meet RCAF specifications.[34]

The order was confirmed, nonetheless, and the first operational machine, Viking ED, was delivered in July 1923, three months late. Scott's reservations

were sound. One RCAF mechanic who had already served in three other air forces – the RFC, RAF, and CAF – remembered how 'the *Vikings* were the last thing in flying boats, constructed of beautiful mahogany planking with millions of rivets. Those aircraft had to be beached after every flight and polished every day with cedar oil. The engines were First World War vintage and valve springs were always breaking, mags [magnetos] burning out condensers and points, and they were a mechanic's headache.'[35] They were, as well, underpowered. The Eagle engine was an unimpressive performer. 'On take-off,' wrote one airman, 'I would climb out from the back over the windshield and stand with the photographer up front to change the centre of gravity enough, moving it forward, to get the aircraft up on the step. When she was up and running, we could clamber back to our positions for take-off. It used to take us an hour, on a good day, to get to 5,000 feet with a load of stuff in the aircraft.'[36]

The Viking purchase was an interim response to a long-term problem. The air force wanted domestically designed and built machines because others were technically inadequate for Canadian operating conditions. Stedman reckoned it would take from eighteen months to two years to produce new types. This, however, required long-term planning and funding, luxuries the RCAF did not have. In Britain, the RAF first issued specifications to a number of competitors before narrowing their list to three companies, which would be asked to produce prototypes. Rigorous testing eliminated two, and the survivor then constructed six to twelve machines for service trials, after which suitably modified production models were ordered.[37] By contrast, the air force had no competitive domestic aircraft industry on which to draw, government funding was woefully inadequate, and estimates were restricted to a single fiscal year. In addition, a two-year lead time was out of the question because of accelerating operational demands for the immediate replacement of aircraft in the field.

More Vikings were needed for the 1924 season, as well as an improved, Canadian-designed flying boat, replacements for the DH4s in Alberta, and either new or reconditioned training machines for Camp Borden. Stedman catalogued the requirements and set his technicians to work preparing specifications for them. He described to MacBrien, perhaps wistfully, the ten-year development programme being considered in the United States, which had allocated $15 million annually for aircraft. The Canadian equivalent, he calculated, would be about $1 million a year. Such sums remained elusive. Perhaps, however, because of demonstrated need, perhaps through continued parliamentary and prime ministerial support for civil operations, the air force was able to take its first real steps towards acquiring some of the aircraft it needed in the spring of 1924.[38]

The precise origins of the Vickers Vedette are obscure. Others besides the air force were interested in a Canadian flying boat at this time. In 1923 the Laurentide Air Service flew its own Viking and talked with Vickers about an improved boat. Vickers complied with some preliminary designs. Early the following year the Canadian Society of Forest Engineers formed a committee to draft specifications for the aircraft types it considered necessary for effective patrol work. It recommended two models: a single floatplane, adaptable for skis,

for survey and fire detection, and a larger single-engine flying boat for firefighting and other patrols.[39] Stedman's technical branch then redrew the foresters' specifications and sent them along to Canadian Vickers. In April 1924 Stedman asked the firm for an estimate of costs for a prototype of the flying boat; Vickers quoted $15,000, including the installation of the RCAF's own engine. The company added that, if assured of an order, it would bring a designer from England and construct the boat in Montreal towards an October delivery date.[40]

Wing Commander W.G. Barker, who succeeded Gordon as acting director for a few weeks in 1924, continued negotiations with Vickers. Barker disliked floatplanes, considering them unseaworthy, and before leaving to become the RCAF liaison officer in London he reached a verbal agreement with Canadian Vickers to proceed with the construction of two flying boats. The smaller single-engine boat, the Vedette, would carry three and be employed on fire-detection and photo patrols. The larger boat, the Varuna, would carry seven and be used for firefighting and general transportation. A contract was duly let in August, by which time Vickers' designer, W.T. Reid, was already in Montreal and working with considerable dispatch to construct the Vedette by the promised October deadline. He succeeded. The Vedette was taken into the air for its first flight early in November, and further testing and modification continued until the end of the year. Most of the Vedettes later supplied to commercial operators used the American-built, air-cooled Wright Whirlwind J4 radial engine, while the RCAF adopted the Lynx for its production models in the interests of standardizing on British types.[41]

The Vedette was not exactly the flying boat the air force had in mind when it drew up its original specifications. It did not have the high-lift, thick wing construction Stedman preferred, nor was it ideal for aerial photography because of its relatively low load capacity.[42] But it gave good all-round service for several years. Squadron Leader B.D. Hobbs, commanding officer in Winnipeg, reported the next spring that the Vedette was 'exceptionally suitable for Patrol or Transportation service,' and could be used for limited-range photography flights.[43] RCAF pilots flew more than a hundred operational trial hours on the first machine during 1925, and found they could get it off the water in a flat calm in under ten seconds, then climb to 10,000 feet in about thirty minutes. It was reliable, economical, and manoeuvrable in all weather.[44]

The larger boat, the Varuna, which was introduced in the fall of 1925, was less successful. The Varuna was powered by two Lynx engines and carried a photographer in the nose, the pilot and mechanic in a forward cockpit, and four passengers in a rear compartment. Designed primarily for forest-fire suppression, the Varuna was also used for general transportation work, but its need for a lengthy take-off run and a poor rate of climb restricted it to larger lakes. The RCAF bought thirty Vedettes but only seven Varunas.

The Vedettes were not fully operational until the 1926 season. In the meantime Barker's successor as acting director, Wing Commander Scott, found he could not wait for the Vedette's eventual delivery. He had undertaken a cross-country inspection of RCAF bases soon after assuming command in May 1924, in the course of which he was struck by the urgency of the need for new

aircraft. He became sufficiently alarmed after talking to RCAF officers in the field to decide that an interim machine was needed until the Vedette was ready, and immediately began drafting plans to supplement the long-range flying-boat development project with other types which were readily available. Scott's three frequently conflicting concerns were quick delivery, economy, and standardization. He concluded that the quickest, least expensive alternative was to fit Avro Vipers with floats. By making them fully convertible to wheels and skis as well, the Vipers could be adopted as a standard patrol type, while the Vedettes were used for aerial photography and the Varunas for fire suppression and transportation. Consequently, the RCAF placed an order for ten float-equipped Avros in December 1924. They were ready for the 1925 season.[45]

The Vipers were themselves far from ideal. They 'were known to throw connecting rods occasionally with disastrous results,' one fitter remembered.

> Once when Flying Officer Bill Weaver, flying one of these contraptions, was forced down on tiny Stormy Lake in central Manitoba I was taken in to investigate the damage and found that the engine was a total wreck as two con rods had smashed through the crankcase.
>
> It was a problem to land another aircraft as the lake was only a mile long and a little over 100 yards wide, surrounded by high trees. Flying Officer Frank Wait came in to find out what was required and stalled on take-off; that meant that we had two aircraft in this pothole and something had to be done about it. Joe Maskell was then flown in to Beresford Lake and hiked through the bush to give us a hand. The crashed aircraft was towed to shore by making a winch between two trees. The engine was removed and the mud and slime taken out, the serviceable mags and carburetor were removed from the wrecked engine. One engine was made out of two, installed in Flying Officer Weaver's aircraft, tested and flown out by Flying Officer Roy Slemon.
>
> To fly the aircraft out the fuel was reduced to a minimum, the tail of the aircraft was tied to a tree and when the engine was at full throttle I cut the rope with a sharp axe and the aircraft just made it over the trees.[46]

The new aircraft which the RCAF gradually acquired were put to a remarkable variety of uses. Requests came in constantly: to spray forests for spruce budworm and wheat acreage for blister rust; to take census of reindeer and buffalo herds; to transport geological surveyors, mining engineers, Indian agents, RCMP officers, and medical rescue missions in remote regions; to locate, classify, and sketch or photograph stands of timber; to conduct route surveys for railway construction. Each task was worth doing, but threatened to detract from the primary responsibility of forest patrolling. Since forest fires occurred randomly, forest service officers insisted that the aircraft must be continually on call and not diverted elsewhere. For the forestry branch, 'The essential justification of the use of aircraft in forestry work lies not in any possible economy which may be effected, but in securing a greater degree of efficiency than can be obtained in any other manner. In fire protection nothing short of an organization adequate for all emergencies is worth while for a permanent proposition. The reason for this is that inefficient fire protection is *no* fire protection at all when it is most

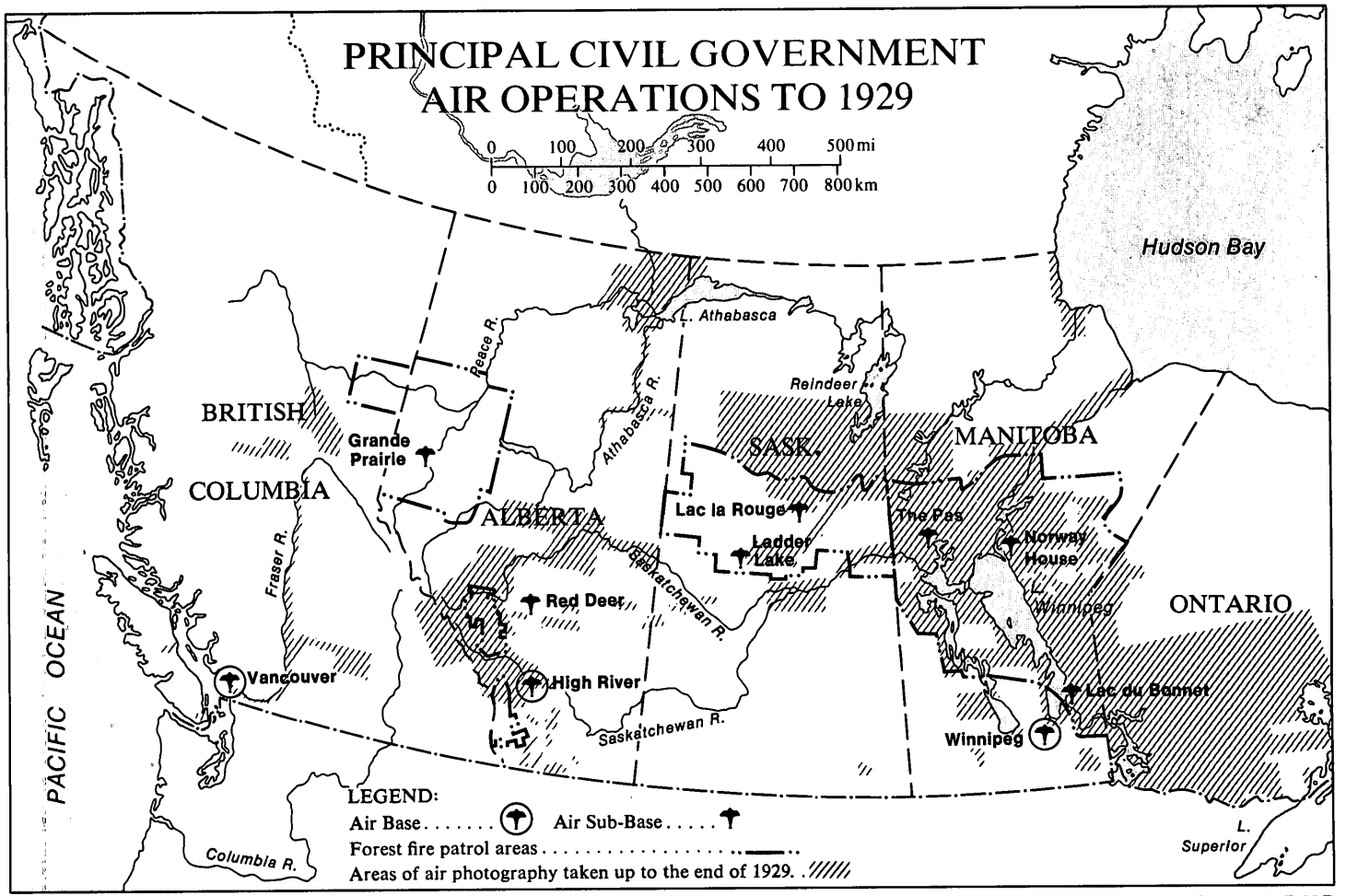
needed. A properly functioning organization is therefore not an ideal but a necessity.'[47]

Aerial photography, however, was one task that could be carried out without removing patrol aircraft entirely from their primary mission. Air photos were in great demand, and they had potential as an effective means of offsetting the high fixed costs of forest patrol bases by employing their resources more efficiently. Beginning as an off-shoot of forest protection, aerial photography became the RCAF's major civil operational function by the end of the decade.[48]

Aerial photographs, providing basic topographical data, had innumerable uses. Planning of water power developments, irrigation schemes, railway routes, and other engineering projects was simplified. More accurate and rapid surveys of forest and mineral regions were possible, and aerial photography had its widest application as an aid to mapping. The potential wealth of timber and minerals created a demand for accurate maps which could be paid for in part by flying aerial surveys from established RCAF bases. By 1924 the precision and thoroughness of new aerial photo techniques had all but revolutionized map-making in Canada. For the first time it was feasible to map systematically the whole of the Canadian land mass.

The joint DND-Department of the Interior committee, which had earlier prepared a five-year scheme to expand into the west, accepted the principle of using the fire patrol camps as bases from which photo missions could be flown. During the 1924 season, when the lengthy programme to map Canada systematically from the air began, machines based in Manitoba flew more than 160 hours on surveys, covering some 27,000 square miles. The highlight of the season was a major exploratory flight by Squadron Leader Hobbs in the Reindeer Lake-Churchill River district. With Flying Officer D.J.R. Cairns operating the camera, R.D. Davidson (a civilian) acting as navigator, and Corporal J.A. Milne as mechanic, Hobbs flew a pioneer survey of a vast unmapped expanse of forest and lakes, using fuel caches which had been placed the previous winter. He initially planned to run his photo flights at a 5000-foot altitude, taking three pictures every three miles at a ground speed of 60 mph. In the event, he was forced to operate 1000 feet lower because his heavily laden Viking could fly no higher, although Hobbs had removed the wheels and tail skid to lighten the load. Despite bad weather and almost continuous mechanical difficulties with the camera, Hobbs and his crew managed to take about 1700 photographs during their four-week trip.[49]

At first photo missions were conducted when aircraft could be spared from fire patrols, but as more equipment became available, independent photographic detachments, controlled directly by the Ottawa air station, were formed. When topographical surveys and RCAF Headquarters jointly selected a region to be photographed, the flight unit would be briefed so it could position fuel caches. The surveys branch provided a map of the region, if available, and deployed ground parties to locate control points. When lakes and rivers were free of ice in the spring, the photo aircraft would move to their assigned locations and begin flying, following a series of parallel lines related to the control points. On non-operating days the crews maintained their machines, moved supplies, and



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coped with a variety of unexpected problems requiring a high degree of initiative, patience, and practical intelligence.[50]

Centralizing control of the mobile detachments in Ottawa, where the topographical survey branch had its central photo library, made for easy co-ordination. An effective operating technique gradually developed to meet the increasing demand for photos and maps. Topographical survey formed the central aerial surveying unit, a central clearing house and depository for photographs, which co-ordinated all survey requests from other organizations. By 1927 it had indexed 163,000 photographs covering almost 200,000 square miles.[51]

Photographic patrols over the vast expanses of the Canadian northwest were not without hazard, particularly when air-to-ground radio was inadequate or non-existent. Pilots often relied on pigeons for reporting accidents and forced landings in remote areas, and a number of stations had qualified pigeoniers 'to maintain, breed and train the birds.'[52] During the 1930 season pigeons were dispatched after eight forced landings, and on fourteen other occasions by crews needing assistance or reporting fires.[53] Natural flying hazards were often exacerbated by smoke from forest fires which obscured visibility and could cause pilots to lose their bearings. On a morning patrol in late August 1929, Sergeant J.M. Ready could not find Gordon Lake in the smoky haze of a nearby fire and lost his bearings as he attempted to turn back to Lac du Bonnet. Descending through heavy smoke, he became disoriented and, lacking instrumentation for 'blind flying,' was forced to bail out 500 feet above the water with the machine doing 125 mph. He plunged into Lac du Bonnet, but managed to swim to shore despite the fact that his life preserver failed to inflate. After a five-mile hike to Davis Lodge, he was able to obtain a boat to return to base. This was apparently the first emergency use of the parachute in RCAF history.[54]

Most bush flying was less dramatic. Sub-bases established in the northwest began their operations as temporary, tented camps which were gradually improved each year. They remained small, accessible only by aircraft or boat, and detachment personnel were on their own through the May-to-October flying season. The hours were long, the work hard and usually boring, and the need for ingenuity and improvisation ever present. For the 1926 flying season, the two officers, ten airmen, and three army signallers who comprised the Norway House, Man., detachment operated a Viking flying boat and an Avro 552 floatplane. During the summer the flight crews spotted and took suppressive action against thirty-three forest fires in the district. In addition, they made experimental flights for the Department of Agriculture, transported Indian agents to pay treaty money, flew several emergency medical flights, and conducted survey missions. Although the abnormally wet season reduced flying time, pilots logged more than 271 flying hours before closing up in the autumn.[55]

Keeping the machines in the air was no easy task. When the fire hazard was at its worst, in July and August, the planes were continually on patrol, away from base up to seven hours each day, refuelling from predistributed caches. Maintenance was carried on out of doors with little support equipment. The Viking IV provided few problems, requiring only one engine change during the

season, but the Avro 552 detection aircraft was less reliable. Immediately on arrival at Norway House, its engine had to be replaced and the aircraft completely rerigged. The engine problem eventually proved to be the main bearing, which had been improperly assembled when the engine was overhauled during the winter. The engine and spares then had to be stripped down and reassembled in the field.

The Norway House detachment also had to maintain itself, and amenities and support services were anything but lavish. The base had been considered a temporary one when first established, but in the late fall of 1924 a civilian contractor had erected the shells of a cook house, mess, quarters, workshops, and offices. In their spare time over the following season the men of the detachment completed the interior finishings, installing and painting window casings, frames, floors, panelling, and ceilings. They also dug a large cesspool and erected two closed latrines.

But this was only the beginning of their construction tasks. Some years before, the forestry department had installed a sixty-foot dock on the opposite side of the island which the detachment used to unload its summer stores. This meant that every year some 200 tons of freight had to be transported across the island, until the detachment decided to construct a freight and passenger dock closer to the workshop and storage area where it was needed. A seafront built up to dock level and extending back thirty feet provided useful space for unloading heavy supplies and equipment. Next came a new 30 by 100 foot slipway, with a top platform large enough to accommodate four Vikings, so that aircraft could be brought out of the water for maintenance. But first the shoreline had to be cleared by hand of about 150 tons of rock. The men cleared rock from a further fifty feet of beach next to the slipway so that aircraft could be brought to shore for refuelling without interfering with the mechanics working on the maintenance platform. Then came a fifty-foot mooring dock as well as repair and winter storage facilities for the base motor boat. In their spare moments the detachment also cleared, graded, and sanded permanent paths and walks to connect their shore facilities with the base buildings.

All this was done by a very few men. The Norway House commander's 1925 annual report had recommended that the unit's establishment be increased because there were so many non-flying tasks on the remote base. Instead of gaining the four additional men he requested, the detachment was reduced by three. Undaunted, the commander removed the airman cook's helper from the kitchen and put him in charge of the unit's ground equipment. He then hired a civilian for kitchen duties, paying him out of unit funds. The next annual report dryly commented: 'In no other way could the heavy Station construction work of building the slipway and aircraft platform have been carried out by so small a sum of money other than this private employment of civilian labour, as no Government funds were available.'[56] When the unit was unable to obtain more reliable water transport, the detachment made do by hiring a heavy freight canoe (again with unit funds) while the engine of the motor boat was completely overhauled. When yet another engine job on the tired craft proved insufficient, the detachment collected enough mess funds to buy a new boat. Thus RCAF

officers and airmen became skilled at improvising and making do with very little.

Such experience stood them in good stead when the RCAF participated in a sustained and difficult operation in the eastern Arctic in 1927-8. The purpose of the Hudson Strait expedition was to determine the nature of ice conditions in the strait in order to assist navigation in Hudson Bay. An aerial reconnaissance of Hudson Strait had first been suggested by C.C. MacLaurin in 1919. The following year, the Department of Railways and Canals requested an ice survey. The Air Board expressed interest in the project but quietly dropped it when the department pursued it no further. During the next seven years little interest was shown in the eastern Arctic – with one exception. In 1922 the air force sent an observer when the Canadian government dispatched an exploratory expedition to the Arctic archipelago to establish a number of police posts. At the urging of the Department of the Interior, the Air Board detailed Squadron Leader R.A. Logan to report on flying conditions in the region. Logan, who had been a dominion land surveyor before the First World War, was an expert in meteorology, navigation, and wireless.[57]

The expedition sailed from Quebec on 18 July 1922 and returned on 2 October, having visited the north end of Baffin Island as well as Bylot, Ellesmere, and North Devon islands. Because of the short season, and because its primary task was to place police posts, Logan was unable to undertake any research or exploration in depth, but his report was full of acute observations. Aircraft, he thought, could play a large part in the orderly development of the region by mapping the inaccessible interior, assisting the RCMP, transporting surveyors and geologists, developing a caribou and reindeer industry, and conducting ice patrols to assist navigation. Logan concluded that coal and probably oil-shale were located in the area, possibly in sufficient quantities to supply any air bases established there, and he judged that ski-equipped aircraft could be used for more than half the year. He recommended that all air patrols be conducted in pairs, each carrying adequate ground survival gear, and that an Inuit always accompany a patrol because 'an Eskimo can find food and direction where a white man would be lost, starved or frozen to death.' Before beginning any major flying operations, adequate preparation was essential. Logan suggested that personnel should travel north to familiarize themselves with climatic conditions, take meteorological observations and tide soundings, and observe surface and air conditions. While on the ground they could also conduct experiments in heating aircraft instruments, starting air and water-cooled engines, and using skis under different conditions.[58]

Logan's recommendations went no further in 1922. The federal government, however, did not completely abandon the possibility of using the Hudson water route as a way of gaining access to the interior of the continent. The idea of an ice reconnaissance in the strait was revived late in 1926, when planning was in progress to complete the Hudson Bay Railway to Churchill. The value of Churchill as a port for shipping western wheat to Europe depended upon the length of the shipping season. Estimates varied all the way from six weeks to six months, and an extended monitoring of ice conditions was crucial. In December

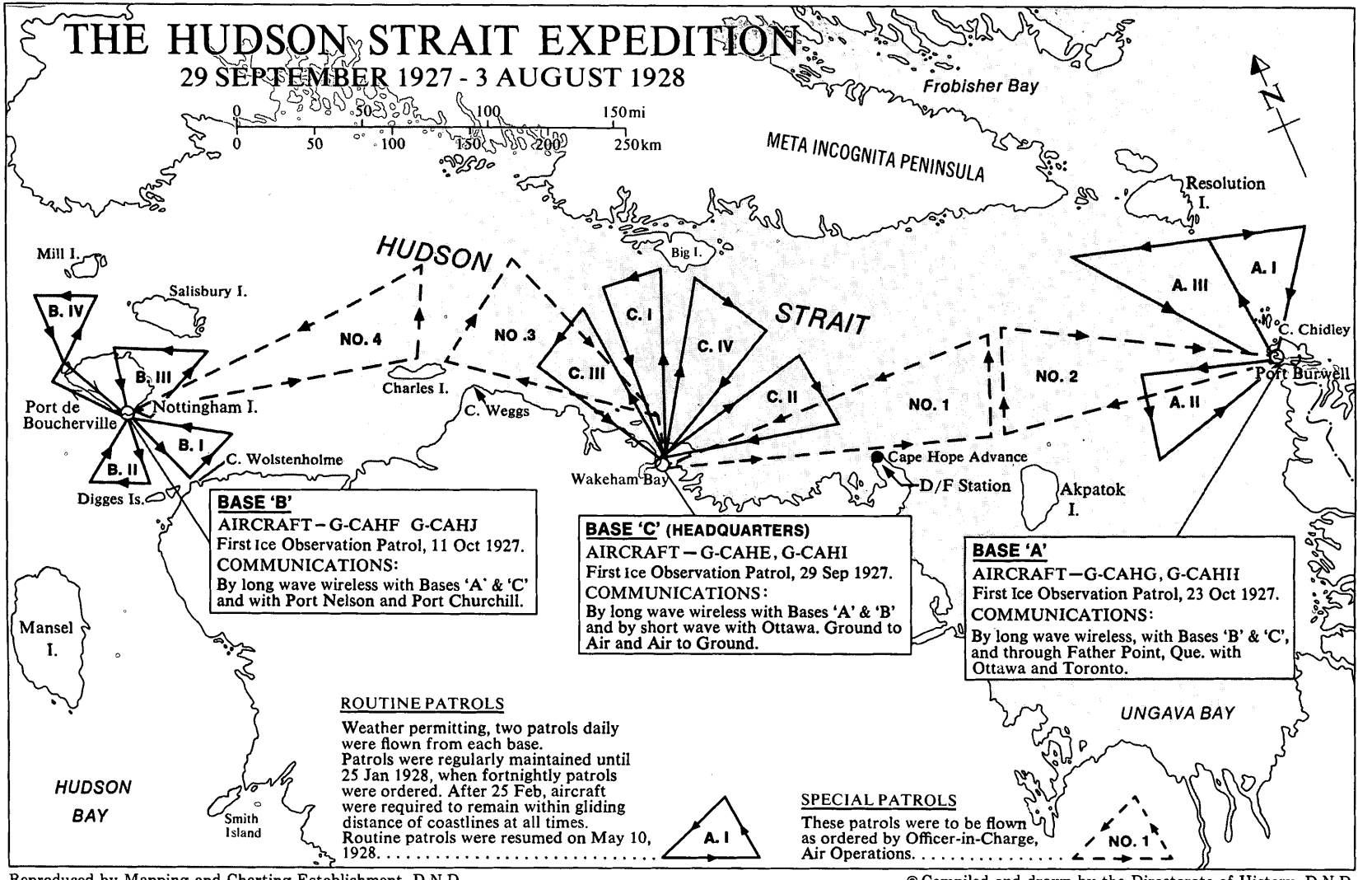
1926 the Cabinet created an advisory board to lay plans for an expedition, headed by N.B. McLean of the Department of Marine and Fisheries, and including Group Captain J.S. Scott, the RCAF director.[59]

The air force had experience in winter flying, but not in severe Arctic conditions. Pilots would need a machine which was versatile, extremely rugged, fitted with a spacious cabin, and equipped with an absolutely reliable engine. The chief engineer, Wing Commander Stedman, and Flight Lieutenant T.A. Lawrence, a staff officer at Headquarters who was promoted to squadron leader and given command of the expedition's flying operations, evaluated several British and American types. None of the British aircraft companies was interested in filling a small order of six specially designed machines within a deadline of three months. The Dutch designer, Anthony Fokker, who had set up shop in New Jersey, agreed to the difficult terms. Fokker and R.B.C. Noorduyn, later the designer of the Norseman, quickly produced and delivered six Fokker 'Universals.' These five-place, high-wing monoplanes had steel-tube fuselages covered with fabric, with wood covering on the wing, an open cockpit and enclosed cabin, and were powered by a Wright Whirlwind engine, capable of a cruising speed of 98 mph with an endurance of four hours. The usual operational load, with crew, fuel, emergency supplies, and cameras, was about 1700 pounds. Purchased by the Department of Marine and Fisheries at about $16,000 each, the aircraft had civil registrations, although the RCAF provided the crews.

Lawrence has recalled that the selection of aircraft divided senior officers. Originally the plan called for modified Avros. When Lawrence strongly objected, Scott sent him to New York to test fly a Fokker. Lawrence liked it, and in the event these seaplanes gave exceptional service. Two problems did surface, however: the floats and fittings proved structurally weak; and all photography had to be carried out through a window in the side door. In addition, the RCAF acquired a float-equipped de Havilland 60 Moth for preliminary reconnaissance flights of possible base sites.[60]

Six pilots and twelve mechanics went on the expedition, as well as a number of civilian specialists: four wireless operator-engineers, three doctors, three storekeepers, and three cooks. They assembled at Camp Borden for instruction in winter flying, meteorology, navigation, engines, first aid, seamanship, snow shoeing, skiing, shooting, dog handling, welding, carpentry, rigging, photography, and instrument servicing. Pilots underwent refresher training intended to 'raise the standard of their ability' and 'to correct any bad habits they may have acquired.' Attention was given to emergency supplies and to the recreational and reading needs of the men, who would be isolated for at least six months.[61]

The expedition set off from Halifax, NS, in the middle of July 1927 aboard two old vessels, the CGS *Stanley* and the SS *Larch*. Jammed in with the aircraft, prefabricated buildings, and a construction crew, expedition members sailed in leisurely fashion up the coast of Labrador, arriving at Port Burwell ten days later. In their reconnaisssance seaplane Lawrence and Flight Lieutenant A.A. Leitch reconnoitered base sites. After thoroughly examining both sides of the strait, they decided to erect camps at Port Burwell (Base 'A') at the eastern end, Nottingham Island (Base 'B') at the western end, and Wakeham Bay (Base 'C') mid-way



between. All hands immediately set to work preparing the sites for winter; by the time the ships departed with the construction crews in November the buildings were habitable if unfinished. McLean, a leading figure in the expedition's formative stages, remained on board ship throughout, and did not disembark. Lawrence, who never received written instruction, was left in charge. He concocted his own operation order on the way north.[62]

Lawrence organized a system of routine and special patrols for all three bases, to provide regular and systematic coverage of the strait as well as to ensure the safety of the flight crews. Weather permitting, daily patrols were carried out from all three bases, and aircraft from different bases sometimes arranged to rendezvous, ensuring a continuous monitoring of ice movements. Pilots filed detailed flight reports after each patrol and air photographs provided a permanent visual record. Crews maintained wireless communication with the ground by means of transmitters using trailing antennae. Both voice and key methods were used and a remote control device enabled the pilots to use the radios. While on patrol the crews communicated with their bases regularly at five-minute intervals.

Routine patrols began on 29 September from Wakeham Bay, and continued for almost two months before freeze-up forced a halt. Even so, flights were intermittent: fog, wind, snow, and dangerous shore ice prevented flying on all but ten days in that period. During the three-week freeze-up period, conditions were unsuitable for either floats or skis. Squadron Leader Lawrence reported: 'Some idea of the conditions to be contended with in eventually getting a runway over the rough shore ice to the bay ice can be visualized ... Tons of ice and snow were chopped down, filled in, levelled off and packed into a runway, using the tractor as a roller. At each change of tide, this runway, which extended across a beach about 200 yards long, would heave up and crack until eventually after much labour it became a solid bridge of ice, rising and falling with the tide, but immune to serious damage.'[63] On 12 December more routine patrols became possible with the Fokkers on skis, and these continued until 18 June 1928. A short period again followed when ice conditions prevented the use of either floats or skis. On 29 June 1928 the expedition was able to resume the Wakeham Bay flights with aircraft on floats, and these continued until the expedition completed its work.

Regular patrols from Nottingham Island began on 11 October 1927 and went on until 16 November, when freeze-up set in. Colder temperatures on the island shortened the interval between float and ski operations, and regular flying on skis could be undertaken on 23 November. Floats were refitted at the end of May 1928. At Port Burwell the regular float patrols began on 23 October and continued for thirty-one days. Ski patrols began on 13 December, and these aircraft also reverted to floats in May.

The expedition established three communications systems. Radio technicians from the Department of Marine and Fisheries operated a short-wave link from Wakeham Bay to Ottawa, as well as long-wave links between the three bases. The Royal Canadian Corps of Signals maintained an air-to-ground system. This provided one-way communication only, the aircraft having no receivers, but it

enabled pilots to signal ground bases by both voice and key. Messages were always duplicated, transmissions being sent first by key, then voice. Navigation equipment was primitive. Because the aircraft had to remain below cloud cover to carry out their visual reconnaissance, most navigation was simple map reading, using Admiralty charts from the 1830s, on which land contours proved surprisingly accurate. There was, therefore, no need to rely on the two magnetic compasses, the earth inductor compass (similar to the one used by Charles Lindbergh on his transatlantic flight), or the Bumstead sun compass with which each of the Fokkers was fitted.[64]

Pilots and crews soon perfected a procedure for starting the Fokkers in the severe Arctic weather. After each flight the engines were completely drained of oil, which was then stored in a warm place until needed again. To start up, the groundcrew towed the machine to its take-off position, faced it into the wind, and covered the engine with a fitted asbestos cover. They then directed the heat from two or three blow torches through a length of stove pipe into the air space around the engine. After 30-45 minutes heating, during which the mechanic regularly turned over the propeller, the torches were removed and engine oil, having been heated on a stove, was poured into the lines. Finally, and very quickly before the engine cooled, the engine was started. The system worked well, even when aircraft were forced down away from base.[65]

There were three occasions during the winter when aircraft became lost. On 15 December 1927 Flight Lieutenant Leitch and his crew were returning from Erik Cove at Cape Wolstenholme to Nottingham Island. Half way back to base they flew into a snowstorm and lost their bearings. Not sighting land, Leitch landed on a six-inch thick ice-floe and waited out the storm. The crew drained the engine of oil and made themselves as comfortable as possible. That night the temperature dropped to minus 16 degrees Fahrenheit and the men suffered minor frostbite. The following day Leitch calculated his navigational error. Then, using emergency equipment carried in the plane, the flyers warmed the oil, poured it back into the engine, and started up. They arrived back at base with only a quart of fuel remaining.[66]

A second incident occurred on 8 January 1928 when Squadron Leader Lawrence set out from Wakeham Bay en route to Nottingham Island. When he encountered a heavy snowstorm about twenty miles east of Cape Digges, he turned back and landed at Suglet Inlet. The next day he attempted to reach Nottingham but again snow forced him down, this time at Deception Bay. For the next nine days storms battered the area while Lawrence and his crew camped near the Fokker and lived off their survival rations. The weather eased on 16 January. Flying Officer B.G. Carr-Harris from Wakeham Bay located the missing aircraft. By the time Lawrence's crew was able to dig their Fokker out of the snow and make it airworthy, the short Arctic day was almost over. It was therefore necessary to spend another night at Deception Bay. Both aircraft returned to base the following day.[67]

The third occasion on which an airplane became lost was the most serious. It began on 17 February 1928, when Flying Officer A.A. Lewis took off from Base 'A' accompanied by Flight Sergeant N.C. Terry and the usual Inuit guide. Their

route for the day was across Hudson Strait to Resolution Island, half-way to Frobisher Bay, and by return course across Grinnel Glacier and the strait to base. The outward passage was routine. When he headed across the strait for home, however, Lewis ran into a blizzard driven by hurricane-strength winds. The snow forced him 'to let down to within a few feet of the ice-pack where accurate navigation became well nigh impossible, what with the local magnetic disturbances, the oscillations of the compass needle, the extreme turbulence of the air and almost zero visibility.'[68] With darkness approaching, and the aircraft rapidly running out of fuel, Lewis began to look for a clear patch of ice, all the while tapping out a message on his radio key to inform base that he was lost and trying to land on the ice pack. Heading the machine into the wind, he could see nothing except rough ice formations on which to land. 'Suddenly I saw immediately below what appeared to be a stretch of clear, greenish ice and fervently praying that it extended ahead at least a short distance I cut the engine whereupon the aircraft dropped like a stone almost vertically and then using the engine for a short burst I set it down on the ice and immediately cut the switches. When we hit the ice, so strong was the wind, that the aircraft stopped almost immediately but the pinnacles were so numerous that we could not avoid hitting one head-on and the aircraft finished up with the tail up in the air and the nose and skis buried in a deep snowdrift against an ice-pinnacle.'[69]

Lewis, Terry, and Bobby Anakatok, the Inuit guide, immediately set to work constructing an igloo, which proved reasonably snug. Their survival kit, fortunately, was not damaged. They had a .303 rifle with fifty rounds of ammunition, rubber raft with pump and two paddles, hard-tack biscuits, six slabs of high-concentrate chocolate, several bottles of Horlicks malted milk tablets, a tin of butter, a can of matches with sealed lid, tea, a snow knife, three jack-knives, fishing line with hooks, a primus stove with a gallon can of kerosene, three sleeping bags, and a bottle of brandy. It was sufficient to keep them alive for a time, even if they were unable to shoot a seal, walrus, or polar bear.

Were they in Ungava Bay or the Atlantic Ocean? Flying into the northwest wind, Lewis had allowed a twenty-degree margin for drift: 'I couldn't reconcile in my mind the fact that any gale would require a greater correction than that.' He concluded they must be on an ice-pack in Ungava Bay, and that by walking east they would reach the shoreline. After a few hours rest the three set out eastwards into continuing strong winds and a temperature of about minus 40 degrees Fahrenheit. Lewis reckoned that the ice conditions would improve as they approached shore, but after two hours he realized that they were in fact getting worse. He called a halt, and they built another igloo. Lewis now believed that they must be in the Atlantic, not Ungava Bay. They would have to retrace their steps. The next day was clear, and Lewis hoped they might be able to sight the range of Labrador mountains which follow the eastern coast:

> We were completely surrounded by tightly packed ice-pinnacles and could not immediately sight anything on the horizon, so climbing to the top of one of the pinnacles I was almost afraid to look towards the west for if I saw nothing it would without doubt

dash all our hopes for our survival, however when I at last glanced to the west, there clearly etched in the sky, were, what appeared to me to be mountain peaks white with snow, I could scarcely contain my joy at this definite confirmation of my theory. A rough calculation convinced me that we must be about 50 miles out in the Atlantic, for taking into consideration the height of the mountains roughly three thousand feet on a clear day one has a range of vision of approximately 50 miles.[70]

For the next seven days the small party walked westward. Luckily they were able to shoot a walrus to replenish their diminishing food supply. Three times they had to cross open water, the last on an ice-pan after Bobby had quietly abandoned their rubber boat so that he could carry an extra quantity of walrus meat. Finally reaching the coast, the three turned north hoping to find the native village at Eclipse Harbour. After another four days, by now suffering badly from hunger and exposure, they met an Inuit family who helped them to the village. After a short rest and some food, the three set out again with another native escort for Port Burwell, which they reached in the middle of the night of 1 March. Other than frostbite, Lewis and Terry suffered no lasting injury.

The expedition continued patrolling until ice observations ceased on 3 August 1928, when all hands began packing up for the return trip. The plan was to fly the Fokkers back to Ottawa. During the summer a series of fuel caches had been established along the eastern shore of Hudson Bay. The five surviving aircraft assembled at Erik Cove on 24 August. The next morning the Fokkers prepared for take-off despite heavy seas running into the cove from the northeast. Only three got airborne. One failed to take off because of engine trouble, and another crashed with a damaged float. A machine immediately landed to rescue the crews, and Lawrence radioed the SS *Larch* and CGS *Montcalm* for assistance. The remaining aircraft were now examined closely, and it was found that salt water corrosion had weakened both the undercarriage mounts and float fittings on two of them. Consequently, Lawrence decided to evacuate the expedition by sea. The aircraft were dismantled and placed aboard ship for the return journey.[71]

The expedition's long season concluded at the end of November, when the ships reached Quebec. In eleven months of flying the crews had flown 227 reconnaissance patrols over difficult terrain and through weather ranging from bad to impossible. They brought back with them a valuable film record of over 2000 air photographs, a great deal of practical knowledge about working and flying in northern weather, and much information on ice conditions in the strait. In his report, Lawrence noted that ice had first appeared on 16 November at the western end of the strait near Nottingham Island, and did not entirely clear until 3 August the following summer. The weather had been continuously bad, with fog, cloud, and vapour diminishing visibility, and ground conditions were especially difficult during the in-between seasons of freeze-up in the fall and break-up in the spring.

Lawrence's primary recommendation was that an effort be made to prepare accurate maps and charts because the existing ones were 'so inaccurate ... as to present a large and dangerous factor in the development of the strait as a commercial water route.'[72] A hydrographic survey was also needed, but only

after a prior detailed aerial survey with vertical photographs. Lawrence thought that a small crew operating from temporary bases at Lake Harbour and Wakeham Bay could photograph both sides of the strait in a summer season. He also noted that at least one aircraft located in the region at all times would be able to give invaluable assistance to ships, informing them of ice conditions by radio, and thus enabling them to navigate through ice-free channels. The ideal machine for Arctic flying, Lawrence thought, would be a twin-engined amphibious flying boat, with air-cooled engines and ski attachments, having an endurance of seven-to-nine hours at about 100 mph, capable of carrying radio equipment and a crew of three or four with full emergency kit and rations for sixteen days.

Lawrence's report was recognized as an important contribution to the development of the Hudson Bay transportation route. Radio stations were established as aids to navigation and in 1930 a government icebreaker, *N.B. McLean*, began regular patrols. Nevertheless, the route's potential remained unrealized and it was not until after the Second World War that interest in the region was revived, and then for strategic rather than economic reasons. Nor did Lawrence and his men gain public acknowledgment until the 1970s, when the National Film Board production, *The Aviators of Hudson Strait*, featured an interview with Lawrence and made extensive use of original film footage taken by the expedition's cameramen. In 1980, belatedly, Lawrence was made a member of the Aviation Hall of Fame.

The purchase of the Fokker Universals for the Hudson Strait expedition had been a significant departure from past procurement practice. Precedent and convenience had previously led the RCAF to rely on Canadian Vickers for its aircraft, but the irregular nature of its procurement policy caused difficulties for both. Lacking other orders which would justify continuous assembly-line production, Vickers had to hire extra tradesmen each winter to meet the air force's latest crisis, and then let them go for the summer. No one knew whether there would be money for more machines next winter or whether the RCAF would have to make do with what it had. It was not a process suited to the retention of skilled workers or the maintenance of good quality control. The result was that Vickers was usually behind with its production, commitments were broken, and the RCAF was left shorthanded. The possible advantages of having one principal supplier were thus largely negated by an unhealthy dependence on one unable to deliver.[73]

The problems came to a head when the RCAF tried to standardize its aircraft fleet around a family of Vickers machines. As the Vedettes and Varunas came into service the force ordered experimental models of the Velos for vertical photography, the Vanessa for general transportation, and the Vigil and Vista as patrol aircraft. The force planned to test the machines early in 1927, and then specify modifications before ordering production models of each for use in the 1928 season. Unfortunately, Vickers was unable to deliver the aircraft in time for proper testing and the procurement timetable was badly disrupted. The Velos prototype, particularly, was an abject failure; it was so overweight that when snow accumulated on its wings, as it lay overnight at its moorings, it sank tail first. Neither it nor the others were taken to the full production stage.[74]

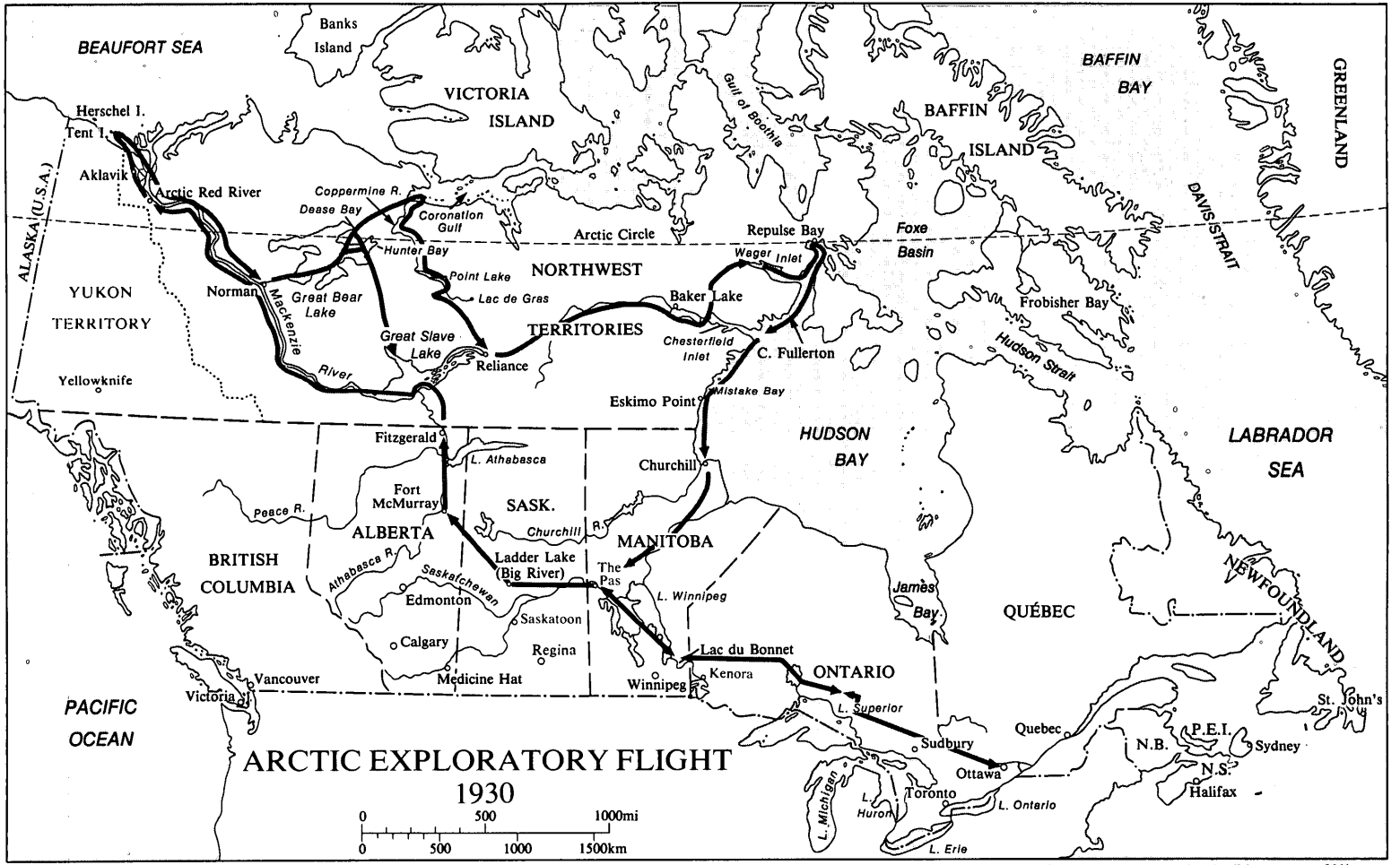
Finding insuperable difficulties in depending on one supplier, the RCAF

modified its attempt to standardize and began to look to several manufacturers to fill its needs. It proved impossible to maintain its policy of giving preference to Canadian and British firms. Canadian industry was slow to develop and British companies seemed unable or uninterested in producing aircraft for Canadian conditions, particularly those suitable for civil operations. In the summer of 1929, Group Captain J.L. Gordon asked the liaison officer in London to attend the forthcoming International Aeronautical Exhibition to find prototypes on display which would be useful in Canada. His report was not promising; the only possible patrol type was the Saunders Cutty Sark, which had not as yet been tested. There were no suitable photo machines at all. Ironically, within a few months the British trade commissioner in Canada wrote to the Department of National Defence stressing the desirability of buying British to meet RCAF needs for aircraft equipment. The deputy minister pointed out that the department had already purchased a large amount of equipment in Britain, 'though I am unable to say that this has been quite successful. Questions of prompt delivery and of service within Canada have necessarily influenced the choice of aircraft and firms in the United States have certainly shown greater readiness to meet the needs of the Department than has been shown by British firms.'[75]

One of the American firms well able to meet Canadian needs in the mid-1920s was the Fairchild Co. S.M. Fairchild had begun by building aerial cameras and moved on to designing aircraft to accommodate them. His FC-2 was a high-wing monoplane with heated cabin and large windows for oblique photography as well as a glass panel in the floor, so that a vertical camera could be used.[76] The air force was much taken with the FC-2 and by the end of the 1928 flying season it operated seventeen, including the larger more powerful version, the FC-2W. Further developments of this aircraft specifically for RCAF requirements resulted in the new design, the 71B. Fairchild machines of various types and modifications were used throughout the 1930s for aerial photography and reconnaissance flights. Fitted later with light bomb racks under the fuselage, some of them were even used for practice bombing and army co-operation exercises at Camp Borden in 1937 and 1938.[78]

A Fairchild was the first RCAF aircraft to reach the Beaufort Sea. On 2 July 1930 two planes, under the command of Flying Officer J.C. Uhlman from Station Winnipeg, left McMurray, Alta, to carry Lieutenant-Colonel E. Forde of the Signals Corps and two officials from the Departments of Indian Affairs and Agriculture on an inspection tour of posts along the Mackenzie River valley. The flight stopped at Fitzgerald, Hay River, Fort Simpson, Fort Wrigley, Fort Norman, Arctic Red River, and Aklavik in the Northwest Territories. They also flew to Herschel Island in the Beaufort Sea. By the time they had completed the round trip at McMurray the two Fairchilds had accumulated 140 hours in the air and had flown over 11,000 miles, for the most part over unfamiliar territory.[79]

Even this marathon tour was surpassed by a party leaving Ottawa as Uhlman was flying down the Mackenzie River. On 6 July 1930 Flight Lieutenant F.J. Mawdesley in a brand-new Fairchild 71B, and Flight Sergeant H.J. Winney at the controls of a Vickers Vedette, left Ottawa to explore the main water routes in the Northwest Territories and to inspect the RCAF's gasoline and oil caches along the way. Flying via Lac du Bonnet, Man., Ladder Lake, Sask., and Fitzgerald,



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Alta, the two headed north along the Mackenzie to Aklavik, where they landed on 19 July. After fog prevented a flight to Herschel Island, Mawdesley and Winney continued on to Great Bear Lake, Coronation Gulf on the Arctic Coast, and Reliance on Great Slave Lake. After photographing the water routes between Great Slave Lake and Coronation Gulf, they flew east to Chesterfield Inlet and then north as far as Repulse Bay on Melville Island. Having completed the inspection tour, the flight returned to Ottawa through Churchill, Man., along the western shore of Hudson and James bays. When the Fairchild and Vedette touched down on the Ottawa River on 1 October, Mawdesley and Winney's party had flown almost 15,000 miles and taken more than 3000 photographs, the longest exploratory flight undertaken in Canada to that time.[80]

The Fairchild was not the only new workhorse. Another was the Bellanca CM-300 Pacemaker, also a high-wing cabin monoplane, well suited to aerial photography and similar in construction to the Fairchild but faster and with greater load-carrying capacity and/or endurance. Of the thirteen Pacemakers purchased by the RCAF, one remained in service until 1940. In 1931 there were eleven photo detachments in the field flying a mix of aircraft types. Three of the detachments flew Vedettes, seven were equipped with Fairchilds, and one with Bellancas.[81]

All the aircraft were heavily used for a variety of purposes and airmen frequently showed considerable initiative and ingenuity. On 29 March 1931 Flying Officer A.L. Morfee's detachment at Cormorant Lake, Man., received a wireless message to pick up a sick woman at Mile 214 on the Hudson Bay Railway. The railway was not operating, and no knowledge of the woman's condition was available. The nearest hospital was at The Pas. Morfee's Fairchild was lashed to screw pickets driven into the lake ice. He and a crewman poured in hot oil, started the engine, got airborne, and found their rendezvous where they put down safely on a nearby creek. Morfee's starter had been damaged, and so he kept his engine turning over while the patient was carried on a cabin door to the aircraft. A strong crosswind and rough snow hummocks made take-off difficult – almost a series of take-offs, Morfee recalled – and this affected the patient directly. Her baby was born before he could reach the hospital and a very surprised receptionist. The boy, probably the first Canadian aerial baby, was christened Lindbergh Wright Cook.[82]

A much rarer aircraft was the Keystone Puffer, which was used on RCAF crop-dusting operations in the late 1920s. In 1926 the Department of Agriculture had requested that two aerial spraying experiments be conducted, one in Manitoba against wheat rust, the other in Cape Breton against the spruce budworm. In memoranda submitted to the air force, the department reviewed experiments in spraying cotton in the United States, concluding that a special low-speed, low-flying aircraft would be required for both tasks and that the importance of the experiments could hardly be overstated. It was estimated that over 200 million cords of pulpwood in eastern Canada had been destroyed over the previous twenty years by the spruce budworm and that 'no satisfactory methods for immediate direct control of active outbreaks have yet been devised. Airplane dusting with arsenicals offers the only definite hope for a successful direct control of large areas.'[83]

The department initially recommended that the experiment be contracted out to a commercial company in the United States. A debate promptly ensued on the relative merits of conducting the experiment on a contract basis or purchasing the necessary equipment for the RCAF to do it. The director, Group Captain Scott, recommended that a contract would be much more economical than purchasing a special spray aircraft which could not be used for other military or civil tasks. If no suitable Canadian bids were submitted, the contract should be given to an American company, many of which had developed considerable expertise in the field. The chief of staff, Major-General MacBrien, disagreed. The principle that 'generally speaking, all experimental work should be carried out by the R.C.A.F.' should be maintained. Moreover, he was not in favour of a contract being let out to an American firm.[84]

MacBrien's inhibitions about contracting with a US commercial firm apparently did not extend to purchasing aircraft manufactured in that country. Negotiations were opened with the Keystone Co of Bristol, Pennsylvania, for the purchase of two aircraft specially designed for aerial spraying. The Keystone Puffer was a shapely single-seater biplane, powered by the ubiquitous Whirlwind engine, again easily convertible from wheels to floats or skis and fitted with a 600-lb dust-storage tank and a spreading mechanism along the lower wing. In April 1927 Flying Officers J.M. Shields and C.L. Bath were sent to the US Department of Agriculture's cotton dusting laboratory at Talullah, Louisana, for a short training course in aerial spraying. There Shields and Bath were taught the theory of dusting, methods of controlling the rate of spray, and low flying in the aircraft.[85]

The Cape Breton experiment, conducted with a float-equipped Puffer, had limited objectives. As an initial experiment it was primarily designed to overcome the technical difficulties involved in placing arsenic dust accurately in a given area in different degrees of concentration, and in establishing cost data for dusting operations generally. Although hampered by wet and windy weather, the experiment was relatively successful, enabling the dominion botanist, Dr J.M. Swaine, to conclude tentatively that an application of between twenty and thirty pounds of dust would be sufficient to control an infestation of the spruce budworm effectively.[86]

The experiment also exposed some difficulties involved in flying a single-engine aircraft low over treed areas. Unless there were lakes in the immediate area, any engine failure meant that the pilot would have little chance of survival. When the experiment concluded, Flying Officer Bath reported that even an old HS2L would be better for the job because with its much greater wing surface it could be pancaked onto the trees at a much slower speed. Bath also pointed out that the low capacity of the Puffer made it uneconomical; the machine got rid of its dust in about one and one-half minutes but it took half an hour to an hour to reload the aircraft with dust before starting another run.[87] The spruce budworm experiment was continued in June 1929 in the Welcome Lake district of northern Ontario, west of Sudbury. The dangers of low flying prompted the RCAF to obtain a Ford tri-motor for the job. This aircraft had a hopper capacity of 2000 pounds and its three motors made it a much safer aircraft for flying over forests.

On completion of the Welcome Lake experiment the aircraft and crew moved to the province of Quebec where another very successful experiment in spraying to control Hemlock Looper disease was completed near English Bay.

The other major experimental dusting programme was conducted on the prairies to combat wheat rust, which was common throughout Manitoba and Saskatchewan and caused an estimated average annual loss to Western farmers of around $25 million a year. Pending the development of a rust-resistant high-quality wheat, it was thought that aerial dusting with sulphur would be the best, quickest, and most economical way of combating the disease. In 1927 the second Keystone Puffer, this one on wheels, was sent to Winnipeg to conduct the initial experiments. Despite difficulties of weather, problems in locating effective test fields, and the low capacity of the aircraft, the results were moderately successful. Compared with the average yield in the region, all the dusted fields showed considerable improvement both in yield and grade. The experiments were continued over the following years and delivery techniques refined.[88] The results of this research were widely disseminated through scientific journals to a wider community. The collaboration in agriculture research between the scientists and the flying personnel demonstrated another valid use for aircraft within the RCAF's overall aim of promoting aviation.

Another task, anti-smuggling patrols for the Royal Canadian Mounted Police, occupied more than half the air force's civil flying time during the depression years – an incongruous precedent for the anti-submarine patrols which the service would fly in the Second World War. Liquor smugglers had developed a sophisticated system for avoiding RCMP coastal patrols. Schooners and motor vessels plying the West Indies-St Pierre/Miquelon-Maritimes circuit could easily evade authorities until making contact with their associates on shore, who would then dispatch small boats to pick up cargoes. The police lacked the resources to cover the extensive coastline adequately, and early in 1932 Major-General J.H. MacBrien, now the air-minded RCMP commissioner, asked that RCAF patrols be arranged off both coasts to supplement ground and sea policing efforts to reduce smuggling. The air force soon established four preventive detachments, one at Vancouver and the others on the Atlantic coast, where the major problem was located.[89]

On the east coast the RCAF established a joint headquarters with the RCMP in Moncton and deployed detachments at Gaspé, Shediac, and Dartmouth. Using a small number of Vancouver flying boats and Fairchilds to cover the Gulf of St Lawrence as well as the coasts of New Brunswick and Nova Scotia, the RCAF commander in Moncton co-ordinated the patrols, acting on requests from his RCMP counterpart. The pilot determined his own routes and timings according to weather conditions and the capabilities of his aircraft. When they spotted a suspected vessel, the crew, which usually included a local RCMP constable, would plot its location and course and drop a message to the nearest patrol boat or to police headquarters. The air force was prohibited from boarding and searching their targets, although in 1933 three landings were made to allow police constables to do so.[90]

In 1934 the preventive detachments on the east coast were organized as 5

(Flying-Boat) Squadron, and at Vancouver as 4 (FB) Squadron. Although wireless transmitters improved response time, smugglers adapted quickly and began using larger, faster, better-equipped motor vessels. They were able to lurk well offshore for several days, coming in quickly under darkness to unload cargoes onto smaller boats. Flight safety restrictions kept RCAF aircraft within twenty-five miles of shore in daylight, and they could not fly at night or in bad weather. At Dartmouth in 1935, for example, fog and weather grounded patrols for half the summer; moreover, flying had to be discontinued in October. The RCMP found better methods, notably a system of detection which employed radio direction-finding to locate vessels when they communicated with their shore contacts, and the air force withdrew from preventive patrols after the 1936 flying season.[91]

Such civil operations, while a long way from military flying, had their compensations. Two years after returning to the Royal Air Force, Leckie reflected on his time in Canada. His role in the peacetime RAF was 'interesting,' Leckie wrote J.A. Wilson, 'just as interesting, I think as military work can ever be, but frankly the Civil operations interest me very much more. It is distressing to spend one's life and energy assisting in the building up of a machine destined only for destruction, and destruction of a particularly disagreeable nature. I envy you in your simple, honest straightforward problem in Canada, and while I have no doubt you are not entirely free from political and other intrigue, the fascination of the work goes a long way as a recompense for the difficulties of the situation. Canada is too fine a country to stay away from indefinitely, and sooner or later I must return there.'[92] As Leckie said and appreciated, civil operations were visible, productive, and personally satisfying. Beyond this, they were the means by which a generation of officers and airmen learned their craft as commanders, staff officers, pilots, mechanics, storemen, and photographers. Advancing technology rapidly made their aircraft and equipment obsolete, but their experience taught them to handle adversity and improvise in unfamiliar circumstances which could not be foreseen in any training manual. The indispensable military virtues – endurance, flexibility, determination, self-discipline, technical proficiency, professionalism – were nurtured in Canada's remote regions.

4
Towards a Military Air Force

In the postwar years the military potential of airpower seemed almost limitless to many airmen, and there was a surprising unanimity among them about how that potential might best be applied. The two leading theorists were Sir Frederick Sykes in England and Brigader-General Giulio Douhet in Italy. Sykes, who had been the British chief of the air staff at the end of the war, preached a doctrine in which the enemy would be defeated by the strategic action of airpower. He contemplated (in the Lees-Knowles lectures of 1921) that: 'air war ... will be carried into the enemy's country, his industries will be destroyed, his nerve centres shattered, his food supply disorganized, and the will power of the nation as a whole shaken. Formidable as is the prospect of this type of air warfare, it will become still more terrible with the advent of new scientific methods of life-destruction, such as chemical and bacterial attacks on great industries and political centres.' However, to achieve that end it was important that the Royal Air Force retain its hard-won status as an independent service since 'essential independent strategic action would be irretrievably impaired by the reabsorption of the Air into the Army and the Navy ...'[1]

Almost exactly the same views were being expressed at the same time by Douhet, a former chief of the Italian air service, in his seminal work, *Il Domino dell'Aria* (*The Command of the Air*). Douhet proclaimed that the air would be 'the decisive field of action' in any conflict.

> In general, aerial offensive will be directed against such targets as peacetime industrial and commercial establishments; important buildings, private and public; transportation arteries and centres; and certain designated areas of civilian population as well. To destroy these targets three kinds of bombs are needed – explosive, incendiary and poison gas – apportioned as the situation may require ...
>
> To have command of the air means to be in a position to wield offensive power so great it defies human imagination ...[2]

Douhet, too, called for independent air forces, 'accorded equal importance with the army and navy ...' In fact, by 1929 he had gone much further; the air force should be the pre-eminent arm, and wise nations would 'concentrate the bulk of all national resources in the decisive field, the air.'[3]

Sir Hugh Trenchard, who succeeded Sykes as RAF chief of the air staff in January 1919 – Sykes sought an air force unacceptably large to his political masters – was a pragmatist, not a theoretician, a man whose success had always been more attributable to character than intellect, though he was well blessed with common sense. As commander of Britain's so-called 'Independent Force' of strategic bombers in 1918, he had become thoroughly disillusioned with the actual strategic capability of airpower at that time, but there was a visionary element in his character which enabled him to see that its prospects might be better in the indefinite future. He adopted a modified version of Sykes' theories while emphasizing the powerful economic argument that airpower was cheaper than either land or seapower; indeed, he was able to demonstrate this in the policing of imperial deserts during the early 1920s. Airpower could make a wilderness and call it peace, either in the natural wildernesses of the Middle East or (he implied) in the urban cornucopias of western Europe.

First World War technology, tactics, and training – which were all still the rule in the RAF throughout the 1920s – were, in fact, quite inadequate for the more complex environments of European war, at least on the strategic level. However, Trenchard made little attempt to develop any of these during his ten years in office. He placed his emphasis on organization and morale and Trenchardian doctrine was never subjected to any kind of rigorous operational analysis. Not until long after his retirement in 1929 was anything practical done in the RAF to implement his explicit final claim that 'It is not ... necessary for an air force, in order to defeat the enemy nation, to defeat its armed forces first.'[4]

Douhet had been just as categorical a year earlier in proclaiming that 'there is no longer any need to break through the enemy's lines to reach an objective ... Armies and navies have lost the ability they once had to protect the nation behind them.'[5] The Second World War would show that both had carried their ideas too far, but their expositions created an intellectual ferment at the highest levels of service thought, some of which doubtless filtered down to ordinary airmen. Some of it even reached the dominions.

Not unexpectedly, perhaps, the RCAF produced no airpower theorists. During the war no Canadian had held an appointment even remotely comparable with those held by Sykes, Trenchard, and Douhet. Very few had ever worked on air staffs at all. They had been combat flyers and now they were 'bush pilots in uniform,' their minds focused on the practical, technical, and administrative problems which beset them on every side. There was no RCAF Staff College to stimulate their thinking on strategy and doctrine, and when merit and good fortune took one or two a year to the RAF college in England, it must have been an exhilarating experience. Those that went absorbed the prevailing Trenchardian strategic doctrine. A 1924 graduate, Wing Commander J.L. Gordon, wrote on his return:

> It would appear ... that in stressing the necessity for establishing Air Superiority prior to carrying out aerial operations which may be of vital importance to both an Army and a Navy, the work of these two services must suffer considerably in the opening phases of any campaign. There would appear to be only one practicable means of establishing this

very much desired condition, and that is offensive operations against the enemy's means of production ... It should be realized ... that offensive operations in the air, as distinct from purely cooperative measures, should concentrate on what must eventually be their main object. This, it seems, is the principal centres of the enemy, and from the foregoing it will be seen that it is practically impossible, and perhaps inadvisable, to delay the carrying out of these operations until definite Air Superiority has been established.[6]

'The moment war is declared,' Squadron Leader G.E. Wait said in 1931, 'Air Power must be ready to exert direct pressure upon the enemy's internal organization.' Centres vital to the enemy's war-making capacity would be the prime bombing targets, but 'to safeguard her home interests,' the possibility could not be ruled out that Britain might 'be forced into direct air attack on enemy populations.' 'Civilian casualties [would] be unavoidable.' It would never be possible to destroy the enemy's air forces completely, but bombers provided the necessary element of flexibility to take the initiative and force the enemy to respond:

We strike first, then, at another and equally vital point, within range of both our bombers and fighters. Well directed bombing will cause a clamour for protection. The tendency will be for the enemy to divert some, maybe all, of his fighters to defend the threatened point.

But the result will not be a proportional increase in resistance to our attacks. We have the advantage of initiative, choice of objectives, approaches, methods, and times of attack. Also, being forced on to the defensive will react adversely on the morale of defenders ...

Having attained air superiority to-day, does not mean we shall have it to-morrow. Such superiority is never permanent. It must constantly be fought for, and can only be maintained by resolute bombing, *co-ordinated* with equally resolute air fighting. We shall always be operating in the face of hostile air power.[7]

In the same vein, Flight Lieutenant G.R. Howsam attempted to bring bombing theories home to Canadian realities. 'Bombers, supported by fighters,' he wrote, 'are the embodiment of air power which is applied by air bombardment.' While fighters provided the means for defence, which could only be partial at best, bombers were the prime weapons: 'In the last resort air power is one of the instruments whereby a nation is guarded, but without air bombardment an air force becomes an ancillary to the other services. Abolish air bombardment and there is no air power, no air striking force, no air defence and no *Air Menace*.' Canada was not vulnerable to attack, Howsam continued, but technological advance would make coastal raids from carrier aircraft feasible within ten years. Fighters could offer some protection against attacking bombers, but the principal defensive weapons were bombers. They would attack the carriers without which enemy aircraft were useless. Heavy bombers with a 900-mile range could attack up to half that distance. Allowing for ships' night movement during which they would be undetected, 'no carrier or other surface craft can approach unmolested within 150 miles of our shores if protection

aircraft (bombers) are employed.' Canada's Pacific coast, he thought, was the more vulnerable. To defend it 'our requirements in military aircraft are bombers, fighters and flying boats for the Air Force proper. These are subject to air strategy and would be employed chiefly in Coast Defence.' Howsam proposed to circumvent the high costs of permanent units by forming auxiliary squadrons with permanent cadres initially on the scale of one flying boat and one bomber squadron for each coast. 'In the 20th Century there may be a Seven Days War – an air war,' Howsam concluded.[8]

It would be misleading to place too much emphasis on these expressions of personal opinion. Junior officers regularly publish their thoughts in military journals, particularly after the intellectual stimulation of a staff course. There RCAF officers could reflect on their military role and exchange viewpoints with their peers free from day-to-day distractions. Years later Howsam recalled: 'We had no Staff College in Canada at all. That level of thinking, that level of doing, was completely unknown. It was a godsend. Without it, we'd have been absolute neophytes.'[9]

The reorganization of 1927 had, in part, been designed to allow the RCAF to become 'purely air force in character and functions' with aircraft that would be 'strictly Air Force or Service types.'[10] As a result, the RCAF purchased nine Armstrong Whitworth Siskins, first-line British fighters, and six Armstrong Whitworth Atlases, the latest RAF army co-operation machines, during 1928-9. They were the first Canadian military aircraft obtained since the British gift aircraft of 1919. Since the reorganized RCAF did not abandon its civil role after 1927, they remained the only military aircraft in the RCAF until ten more Atlases were purchased from the Air Ministry in 1934.

Although they were never used in anger, the Siskins made a big impression. For several months after they were assembled at Camp Borden the Siskins were very carefully tended, rolled out from hangars to tarmac before the envious eyes of trainees. Pilots selected to man the Siskin Flight were a fortunate few; 'It was the realization of every pilot's dream.'[11] In 1929 the flight flew in a number of public air shows, including the Canadian National Exhibition. One pilot recalled:

> Two days before the C.N.E. Dave [Harding, a RAF exchange officer and Flight Commander] decided that as the U.S. Air Corps was bringing up a full squadron of Curtiss Hawks we had to do something spectacular so he added to our few manoeuvres, *spinning in formation*. We had one practice at Camp Borden consisting of No. 1 and 2 wing men moving out two spans from the leader, the three aircraft then picked a point on the horizon, put the aircraft in a right hand spin coming out on the picked point on the third turn. It worked! During the years I spent on *flight formation flying* I never heard of any unit in the U.S. or U.K. even contemplating incorporating this manoeuvre in their program, but they didn't have a Dave Harding and two dumb wing men.[12]

The Siskin Flight was organized into a regular aerobatic team and performed until the early 1930s, including displays from Charlottetown to Vancouver with the 1931 Trans-Canada Air Pageant, which the Canadian Flying Clubs Association arranged to stimulate interest in aviation.

Performing aerobatics on Siskin fighters was the closest the air force got to simulated aerial combat. The RCAF was in fact a military air force in name only until the early 1930s, when two unrelated circumstances combined to jolt it out of its largely civil role and begin its tranformation to a military air force. The first event has been described. The 'big cut' of 1931 set in motion a chain of events which led to a structural separation of civil from military aviation. The second was the Geneva Disarmament Conference.

In January 1931 the Council of the League of Nations had announced plans to open its much delayed disarmament conference early in the following year, and it was ironically appropriate that disarmament talks about the efficacy and ethics of aerial warfare got underway as Japanese bombs were falling on China. The interminable posturing and wrangling in Geneva need not concern us here, except to say that the conference ultimately foundered on the fundamental incompatibility of France's demand for security and Germany's for equal status. Germany's withdrawal from the conference in October 1933 set the world on a downward slope to war.

On any international scale Canada's participation at Geneva was insignificant. The process of preparing for the disarmament discussions, however, was important for Canadian defence planning. The government formed an interdepartmental committee to report on the country's defence requirements, whose recommendations in January 1932 framed Canada's negotiating position at Geneva. More important, the re-evaluation of the country's military requirements led to a reordering of its strategic priorities and a fundamental readjustment of the defence structure.

For the chief of the general staff, Major-General A.G.L. McNaughton, the timing of the defence review was fortuitous. After assuming the top militia appointment in 1928, McNaughton had become convinced of the need for fundamental change. By the time the interdepartmental committee met to prepare Canada's position for Geneva, McNaughton's staff had completed an appreciation which concluded that a full-scale reorganization was needed. His principal aim was to reduce the unwieldy fifteen-division militia, which would be next to impossible to recruit or equip, to a more manageable size. The premise on which the outsize establishment had been based – the notion of a North American war and the consequent need for a large Canadian army to fight it – was untenable. As McNaughton noted: 'Provided Canada acts ethically and on the defensive, the United States must spurn the treaty of 1909 (which created the International Joint Commission), defy the League of Nations and forget the Peace of Paris (Kellog-Briand) in resorting to invasion – each and all impossible to conceive under existing world conditions.'

The militia staff foresaw two plausible contingencies: the protection of Canadian neutrality and the need to dispatch an expeditionary force. They were quite distinct, but had a common feature: 'The requirements of either situation call for the rapid mobilization and concentration of a force, not large, perhaps in comparison to the maximum possiblities of Canadian manpower, but equipped and organized on thoroughly modern lines.' McNaughton recommended, therefore, that the top-heavy militia establishment be slimmed down to a level of six infantry divisions with one of cavalry, a force which could be put in the field

relatively easily.[13] As Sir Maurice Hankey, the British Cabinet secretary, later observed, 'By this step the Government could take the credit for a large reduction in establishments, and the army would be the more efficient for the reduction.'[14]

McNaughton was also concerned that the air force not be weakened. In the preliminary discussions at Geneva, a proposal was made to freeze existing establishments or budgets as a basis for setting maximum force limits. This, of course, would have left the RCAF with no military capability at all. Another proposal would have restricted the practice of seconding military aviators to civil operations. While aimed at Germany's practice of masking its military aerial development with civilian flying, the effect on the RCAF would have been equally crippling. In the event, neither scheme won general acceptance.[15]

Concerned with preventing unreasonable limitations to its growth, the RCAF for the first time considered seriously the military organization it would need for national air defence. By December 1931 Air Force Headquarters had completed a preliminary review of its requirements,[16] and when Group Captain Gordon returned from his Imperial Defence College course in the spring of 1932 (he was the first Canadian airman to attend),[17] he was relieved of his operational duties to plan in more detail. By mid-July Squadron Leader G.V. Walsh, a member of Gordon's staff, had completed his initial appreciation of the 'Peace Organization and Establishment of the RCAF Considered Necessary to Meet Minimum Requirements for National Defence.'[18]

Walsh considered three contingencies for which the RCAF must plan: direct or home (coastal) defence, the maintenance of neutrality, and, as a lower priority, the provision of squadrons for any expeditionary force which might be raised. The air force's primary responsibility was to defend the integrity of Canada's coasts. This role required forces with both a patrolling and an offensive capability sufficient to detect and attack enemy coastal raiders and monitor ship traffic in Canadian territorial waters. The nature of the threat, which could be mounted with little or no warning, required forces in being; that is, permanent force squadrons in home bases on both the Atlantic and Pacific coasts.[19] As General McNaughton observed: 'The outbreak of hostilities, under present conditions, would today, possibly, and tomorrow probably, be signalised by an immediate attack by air. Indeed, such an attack might be made before a formal declaration of war had been made. It is conceivable that attempted air attack from an aircraft carrier might not be kept secret, but direct attack (by trans-oceanic flight) could easily be kept secret, as the destination of aircraft cannot be gauged as can that of a Naval or Military Force. Therefore, there would not be time for any Canadian Air Force to expand in sufficient time to meet an attack.'[20] The secondary requirements of an expeditionary force, which would have to be mobilized, could be met from non-permanent squadrons.

The specific tasks for coastal squadrons, Walsh noted, included protecting important localities and ports from air raids, intensive reconnaissance and anti-submarine patrols, co-operating with coastal defence artillery, and defending imperial air routes and convoys. Seven permanent squadrons would provide the minimum force level. Two group headquarters, at Halifax and Vancouver,

would each control a bomber and a flying-boat squadron. In addition, one army co-operation squadron operating from Ottawa would maintain contact with the latest RAF doctrine and equipment and provide a training cadre for non-permanent units in the event of mobilization. One fighter squadron, with a secondary bombing capability, stationed at Montreal, would be able quickly to reinforce Atlantic defences. A general purpose unit, convertible to either bombers or fighters, would be well placed at Winnipeg to assist on the west coast if needed. Two other group headquarters, at Montreal and Winnipeg, would complete the command structure, and a number of supply and equipment depots would cater to administrative needs.[21]

Walsh's numbers were repeatedly revised over the following years in response to changing events. But the revisions were not fundamental nor were Walsh's basic premises challenged. The primary role of the RCAF remained defined by its mission of home defence, dictated by rapid technological change which was producing ever faster aircraft able to fly further with increased payloads. As airpower developed, North America could no longer assume immunity from attack. Naval patrols could not ensure protection because of the speed and surprise with which air raids could be mounted; and, as McNaughton wrote, 'The Canadian navy as presently constituted is not an answer to any problem of Canadian defence.'[22]

General McNaughton's earlier views on the place of the RCAF in Canada's military establishment had undergone considerable change. Initially regarding the air force as simply an adjunct to the militia, McNaughton became its most influential promoter, believing that technologically advanced airpower ought to have a major impact on Canadian defence planning. His ideal permanent force was a small, well-trained, technically adept cadre capable of providing direction and leadership to reserves of manpower which could be mobilized when needed.[23] The RCAF matched that model.

McNaughton was in Geneva as a member of the Canadian delegation to the Disarmament Conference when he first received word of the 'big cut.' 'The Air Force, of course, is entirely shot to pieces ...' he was informed,[24] and it was no exaggeration. Not only would civil flying operations be virtually eliminated, there would be no possibility of achieving even the modest military aerial capability suggested by the air force staff. McNaughton hurried home from Europe and until the end of his tenure as chief of the general staff in 1935 maintained a continuous, if frustrating, effort to preserve as much as possible of his decimated defence structure. McNaughton had some considerable success in pressing forward with the airway system in conjunction with Ottawa's unemployment relief scheme. He also waged a continuing battle of memoranda as the militia and air force skirmished with the navy for funds sufficient to survive. Here he made fewer gains. Paradoxically, however, as funds declined, defence analyses became sharper, distilled to their bare essentials. And the RCAF found itself taking on the central responsibility for Canada's home defence.

It is difficult to assess in what proportion doctrine and economy were mixed in McNaughton's advocacy of the air force brief. He was more a pragmatist than theoretician, and there is little indication that he thought of airpower in the

abstract. The air force could, however, perform an invaluable and practical defence role when inadequate funding forced some extremely hard decisions. He made this clear to Prime Minister R.B. Bennett in June 1933 when he pointed out that further reductions would disband the navy, cripple the air force, and allow the militia only a meagre existence. Because 'the substantial reduction in funds called for could not be whitewashed across the whole three Services,' he stressed, 'having regard to efficiency it would be necessary to concentrate on the absolute essentials, i.e., the Militia Forces and the Air Force.' It would be prohibitively expensive to provide the ships required for an adequate fleet. Moreover, it was 'of the nature of naval forces that they cannot be rapidly expanded to meet emergencies and, in consequence, it seems to me that little purpose is served in maintaining a small nucleus.'[25] He went on:

> On the other hand Air Forces even in small numbers are a definite deterrent in narrow waters and on the high seas in the vicinity of the shore; they can be developed with considerable rapidity provided a nucleus of skilled personnel in a suitable training organization is in existence; pilots engaged in civil aviation can be quickly adapted to defence purposes; civil aircraft are not without value in defence, and any aircraft manufacturing facilities are equally available to meet military as well as civil requirements. That is, from a comparatively small current expenditure a considerable deterrent can be created in a relatively short time, and this is particularly the case in Canada where aviation plays a large part in the economic life of the country, a part which is increasing naturally at a rapid rate.[26]

'This being so,' McNaughton concluded, 'it appears to me that the most important element in defence which should be retained is the nucleus Air Force.'[27] It was a significant endorsement of the RCAF from the man who, by force of intellect and personality, dominated Ottawa's defence establishment.

If Bennett accepted McNaughton's logic, it was not made immediately apparent. The RCAF continued to refine its military functions and establishments on paper, but through 1935 expenditure remained at a level lower than that of 1931. The RCAF could neither reach the manpower limits established in the disarmament proposals nor obtain suitable military aircraft. The only service aircraft available in 1930 had been the Siskins and a few Atlas army co-operation machines. Between 1930 and 1935, 143 aircraft were written off because of age, crashes, or general debilitation. Eighty-two replacements were made, leaving a total of 174 in October 1935. Service aircraft comprised eight Siskins, fifteen Atlases, five converted Vancouver flying boats, and four Blackburn Shark torpedo bombers; there were also forty training and forty-five civil types. It was not much from which to fashion a fighting machine capable of carrying out its function as the first line of the country's defence.[28]

On his retirement in 1935, McNaughton wrote an indictment of Canada's defence position, cataloguing its realities and shortcomings, and returning to the theme of the need for a properly manned and equipped air force. In 'The Defence of Canada'[29] he reviewed the accelerating breakdown of international order

during the previous years: continuing Japanese aggression and withdrawal of that nation, a First World War ally, from the League of Nations; the rise of Hitler and Germany's pullout from the League; increasing arms expenditures; and the division of Europe into rival systems of armed alliances reminiscent of 1914. Yet 'the Defence estimates provided by parliament have been barely sufficient to keep the mechanism of defence in being.' McNaughton pointed out that the government's failure to maintain the establishment levels it had agreed upon for the Geneva discussions could cause political difficulty. 'Having accepted certain figures for limitation purposes, these figures at once became an "objective" which, at the first breath of danger, the public will recognize as a minimum standard for defence.'[30] However, not even the minimum permanent training cadres were in place. For the air force, personnel strength and expenditures between 1932 and 1935 had remained well below 30 per cent of the ceilings agreed to, despite the most urgent need for an improved system of air defence – urgent enough for action to be taken, if necessary, at the expense of the militia.

I fully appreciate [McNaughton continued] the responsibility I have assumed in not requesting greater provision for the Land Forces at this time, and I do so primarily because I believe that the most urgent requirement is to lay the basis of the Air Force organization which is essential to our defence of the Pacific Coast in the particular contingency which I regard as the most probable, namely the defence of our neutrality in a war in which the USA might be engaged with a Trans-Pacific Power. It seems that in this event we would be friendly with the USA and that our liabilities might be restricted to the enforcement, against the Japanese, of the Rules of Neutrality prescribed by the Treaty of 1872 and also by the Hague. Failure to do so will result in the occupation, by the United States, of the coast of British Columbia and of our islands in the Pacific, following the precedent established during the Great War when the Allied Powers took possession of parts of Greece, and also in consequence of the fact that it will be vital to the safety of the great cities on the Pacific Coast of the United States that no enemy submarine and aircraft bases be established within effective radius of action.

The requirements for Forces sufficient to discharge our obligations for the maintenance of our neutrality in the West are neither extensive nor very costly, and it seems to me that by their absence we are taking a risk to our future wholly disproportionate to the interests we have at stake.[31]

Among its other trenchant arguments, McNaughton's paper made clear that he had clarified his original conception of Canada's role in protecting its neutrality. Rather than attempting to hold the Pacific coast against both belligerents, Canadian efforts would be directed towards Japanese incursions only. It was becoming increasingly clear that Canada could do little to counter an aroused United States. He and the militia staff were probably influenced in this regard by the debate on the future of airpower which was taking place at the time in Washington, more particularly in the House of Representatives Committee on Military Affairs.[32]

Early in the 1920s, Brigadier General William Mitchell of the United States Army Air Corps had noted after a visit to Canada that 'The Canadian frontier

from Quebec to Camp Borden dominates our whole area contained in the North East States, Pennsylvania, West Virginia, Ohio, Indiana, and part of Illinois. Hostile aircraft, operating from this line, can render any cities or localities within the above area incapable of use.'[33] In 1935, in Congressional committee hearings regarding proposed legislation to extend the existing system of military airfields in the United States, several Air Corps officers again raised the issue of an attack from Canadian territory. They claimed that the United States could conceivably be subjected to air attack at any time. Even if Canada itself was not actively hostile, one officer emphasized, its neutrality would cause problems. 'Neutrality involves responsibilities as well as rights,' he told the committee, '... flying across Canadian territory would be a violation of Canadian neutrality, and if they did not take steps to carry out the laws of neutrality we would have to do so, I imagine.'[34]

Another officer pointed out that the Douglas Company was building a bomber able to carry a 2500-pound bomb load for 3000 miles at a speed of 225 mph. A hostile coalition of powers, he thought, would be able to establish temporary seaborne logistical bases on the North American continent to supply a fleet of long-range bombers in an attack on the continental United States. 'Fortunately or unfortunately,' he informed perhaps startled or bemused listeners, 'the Creator has given countless operating bases within a radius of action of this country in the vast number of sheltered water areas that are available deep in Canada and far removed from any sphere of action of ground forces.' From James Bay, Labrador, and Newfoundland, down to Bermuda and the Caribbean, small vessels carrying 2000 tons of supplies could establish 'floating railheads' which 'can furnish all the gasoline, all the bombs, oil, and ammunition, spare parts, all the food that is essential to take care of the operating personnel of 15 bombers, as well as the ground personnel for 30 missions, each one of which goes in 1,500 miles and comes back 1,500 miles.' The bombers 'could move from points in James Bay and along the Labrador coast simultaneously and concentrate over any place on the frontiers of this vital area and deliver attack in mass against whatever targets you want.'[35]

The only way to counter such a potential threat, the American officers concluded, was by using bombers against the enemy bases. In order to create this defensive capability, it was necessary to locate and construct more airfields in each of the threatened regions of the country, with sufficient intermediate stations to connect them. Brigadier General Charles Kilbourne, assistant chief of staff in the War Plans Division, was conscious of the sensitivity of the proposal. He wanted to locate one of the airfields in the Great Lakes area but, in order to avoid 'passing away from the century-old principle that our Canadian border needs no defence,' he thought that civilian fields could be constructed. 'I would have been very glad to put in the bill the Great Lakes area because of the Canadian situation,' Kilbourne added, 'but I could not put it in the bill. You will notice No. 7 in my bill is camouflaged. It is called "intermediate" stations for transcontinental flights, but it means the same thing.'[36]

Official reaction in Washington to the leaked testimony was swift and vehement. President Roosevelt, his secretary of state for war, and the State

Department immediately repudiated the suggestion that the United States viewed Canada in any way other than the best of 'good neighbors' or that any resort to force of arms was conceivable. The officers who testified, they made clear, did not set United States' policy, and in no way represented it. The committee had been irresponsible in making private views public. Apologies abounded, but the legislation itself passed the House in June and the Senate a month later, both unopposed, and received presidential approval in August.[37]

Canadian reaction was considerably more restrained. The Department of External Affairs obtained a copy of the hearings and asked the militia staff for comments. The reply was sympathetic to the American military viewpoint, accepting the need for staffs to plan for all contingencies, however unpalatable, and concluding that 'The United States is, in consequence, obliged to contemplate measures to protect itself from attack not by Canada but via Canada.' The staff reiterated that the combination of advancing technology and Canada's large and uninhabited coastline posed potential difficulties for American planners. Moreover, 'there is no record of their having uttered one syllable of hostility towards Canada.' 'No umbrage can properly be taken by Canada at these disclosures. Publicity has simply been given to the fact that is known to the world of Canada's impotence with regard to anti-air defence. Not only are our gates wide open but we have not even the semblance of a fence and our neighbour is, in consequence, obliged to provide against our lack of provision.'[38] The *Ottawa Evening Citizen* agreed, editorializing that the United States had to look to its own interests. If Canada was not doing its share it was because the government had 'virtually disbanded the Royal Canadian Air Force.' Canada could afford to ignore its responsibilities no longer 'unless the pretense of nationhood is to be completely abandoned.'[39]

The inescapable fact was that by the mid-1930s American aviation technology was rapidly closing the historic gap between military intentions and capabilities. By 1933 the B-9 and B-10 bombers, whose radically improved performance was derived through design improvements rather than simply increased power, were in operational service. The following year Colonel H.H. Arnold had led a squadron of B-10s on a flight from Washington to Alaska, stopping at Regina, Edmonton, Prince George, and Whitehorse en route. At the same time the United States Army circulated specifications for an even better aircraft. In 1935 Boeing had its experimental bomber ready. The four-engine XB-17, which the Air Corps tested in August in a spectacular flight from Seattle to Dayton, Ohio, flew 2100 miles at a record-breaking 232 mph. For the first time, it seemed to many aviation theorists, aircraft were coming into service which would be able to match strategic dreams with the means of carrying them out.[40]

Precisely how American airpower would affect Canada remained unclear, except that it would be impossible to mount a military defence against the United States. As the staff noted, the US Army was 'certain at first to be relatively inactive' in a war with Japan and therefore 'if any authentic cases of Japanese infringements, however minor, do occur it is quite probable that United States army authorities, chafing at their inactivity, will bring great pressure to bear on the government at Washington to permit them to take action themselves to

supplement alleged Canadian inadequacies ... As Canada is, for practical purposes, incapable of resisting such a United States invasion there would be no course open except the humiliating one of accepting the violation of its sovereign rights.' For this reason it was 'of paramount importance to ensure that the United States Administration is given no basis in fact which would allow it to cite Canadian laxity in enforcing neutrality as an excuse to invade Canada.'[41] When the chief of the general staff, Major-General E.C. Ashton, visited Washington in January 1938 for 'most secret' talks with his counterpart, Major General Malin Craig offered to extend the United States Army's responsibility to include Canada's coastline to Alaska. The United States could supply mobile artillery and aircraft provided there were suitable landing fields. Ashton declined Craig's offer and the compromise of sovereignty it entailed. He pointed out that neutrality remained a distinct option for Canada, not only in her own interests but 'in order to avoid any overt act which might affect Canadian neutrality and thereby react on the other portions of the British Empire.'[42]

Ashton's disclaimer notwithstanding, the notion of holding the ring against all comers to protect neutrality and sovereignty became increasingly untenable in the few years remaining before war. Lieutenant-Colonel M.A. Pope, then the secretary of the Joint Staff Committee, later recalled that there had been considerable doubt among members of the militia staff that Canada would be able to remain aloof from a United States–Japanese war. The United States would simply 'ride roughshod' over Canada 'and make use of our territories and facilities as it pleased them.' Moreover, he thought, 'they would be entirely justified in doing so.' McNaughton thought Canada would inevitably be involved on the American side within thirty days; Pope thought thirty hours was more accurate.[43]

Adjusting defence policy to conform to new continental airpower realities was only one part of the challenge facing Canadian planners. Equally important, as the staff pointed out, 'the Eastern and Western portions of Canada lie on the Great Circle routes from Europe and Eastern Asia to the United States' and 'the continued supposition that Canada is and will remain free from attack by a trans-oceanic power is becoming open to criticism.'[44] The senior air officer was more explicit:

> Air action against air-borne attack is a problem that is becoming more complex every day. We have been more fortunate that until the last few years the defence of our sea-borne trade, ports, industries and cities has been a comparatively simple problem compared with that facing us today. The advent and rapid development in the performance of aircraft has immeasurably added to and will continue to add to the complexities of the problem. We are by no means immune to air attack today. Very definitely, at the moment, attack by airships from an overseas base, or by aeroplanes launched from ships, is a probability. Direct attack by aeroplanes from an overseas base is also possible, and it will only be a short time before such will become probable ... if we recollect, the last war proved that aircraft development is considerably more rapid under war conditions, and we have every reason to consider that the same will hold good in any future war. Even if peace continues, records of today will be normal performance five or six years hence.[45]

An active air defence was no longer something for the future. Just as important, it provided a realistic, politically defensible rationale for the country's defence policy. The defence establishment had always been suspect on the grounds that it could be employed overseas in a war in which Canadian interests were touched only indirectly, if at all. But few could fault concern with protecting Canada's coasts, either against hostile assault or in defence of international obligations. Unlike the militia and RCN with their overseas links, the RCAF found itself with a direct defence role which was unassailable, strategically and politically.

This soon became apparent when Mackenzie King's Liberals returned to power in the fall of 1935. The new defence minister, Ian Mackenzie, was sympathetic to the militia staff's arguments about the deficiencies in Canada's defences, but he was unable at first to persuade his economy-minded colleagues.[46] Not until the following summer did the government create the Canadian Defence Committee, a Cabinet-level body to set and co-ordinate policy. The committee – the prime minister as chairman, and the ministers of finance, justice, and defence as members – first met on 26 August to hear detailed presentations from the three service chiefs. The evening before the meeting King briefed himself by reading McNaughton's farewell appreciation of Canada's defences, written over a year before. It disclosed, the prime minister confided to his diary, 'a complete lack of any real defence. I feel we must get aircraft equipment & look after our coasts – defend our neutrality, & be prepared to mobilize industry, and arrange for effective co-operation of Govt. departments.'[47]

The prime minister, however, had to perform an intricate juggling act in fashioning foreign and defence policies amid the many formidable restrictions imposed by political realities. Complicating customary difficulties, latent European antagonisms were smouldering dangerously. In October 1935 Italy invaded Ethiopia while the world stood by; next March Hitler occupied the Rhineland; in July 1936 civil war broke out in Spain. Direct Canadian involvement in overseas conflicts, which would inevitably provoke internal dissension, was most likely to come about through the country's historic ties with Great Britain. King had to tread warily, avoiding specific commitments to Britain which might require Canadian participation in a war not of its own choosing, while taking care not to antagonize those segments of public opinion which thought that the nation could not honourably avoid being actively involved in the world at the side of the mother country.[48] King's task was to locate the elusive point of balance between doing too little and too much. It was not easy. As his biographer has written: 'If Canada did become a belligerent it would need forces that were equipped and trained; the government would be held responsible if the country was unprepared ... Increased defence expenditures, however, might provoke a domestic crisis which would be as dangerous to the government as being unprepared if war came.'[49]

The Cabinet Defence Committee's first meeting confirmed King's worst fears. 'The impression left on my mind,' he wrote, 'was one of the complete inadequacy of everything in the way of defence.' He saw the need for 'changed methods of warfare, of having some coastal armament against raiders, chance attacks by sea and air,' but it was 'going to be extremely difficult to do anything

effective without a cost which this country cannot bear. We have been wise in placing our reliance mainly on policies which make for peace. The Military authorities rule out altogether, as useless, any attempt to protect ourselves against the US and were wise in confining their statements to the need of the security of Canada within itself, and defence of our own neutrality.' The prime minister took the question to the full Cabinet that same afternoon: 'Council generally accepted the view we must take action at once, & next step to get a practical scheme for consideration,' despite the minister of finance's 'protest against expense, as something Canada could not face.'[50]

King's views on defence, and more particularly on the air force, were no doubt reinforced by a talk he had with the British prime minister, Stanley Baldwin, during a London visit in October 1936. Baldwin 'thought that we should give attention mostly to air force; while Canada might be the last country to be attacked, the air force would be the most helpful of any in case of attack, and training of men for the air and plenty of air equipment was the essential of modern warfare. He did not seem to think the navy was the thing to be concerned about, nor did he speak at all of the army.'[51] King himself took the same tack when he spoke the next month with the popular Irish Quebecker, C.G. Power, minister of pensions and national health, who had an abiding suspicion that the Canadian military establishment would use any expansion to involve the country in messy European affairs.[52] King spoke again to his cautious and divided Cabinet colleagues at the end of November: 'Excepting Mackenzie, I myself presented, I think, the strongest case for immediate coast defence, taking the ground that as a Canadian citizen, I thought we owed it to our country to protect it in a mad world, at least to the extent of police service, both on sea and in the air, alike on the Atlantic and Pacific coasts. I stated it was humiliating to accept protection from Britain without sharing on the costs, or to rely on the United States without being willing to at least protect our neutrality. That we had no enemies, but owed it to ourselves and subsequent generations to lay foundations on which they would have to build.' King wrote afterwards that he 'got agreement on having Departmental Committee gather information re war supply materials, food transportation facilities, munitions, and facilities for producing such. I drafted this order pretty much in my own way this morning. I spoke very earnestly of the unsettled conditions of the world, and the danger of class struggle extending to Canada ...'[53]

While King was mobilizing his political troops, Colonel H.D.G. Crerar, Commander H.A.C. Lane, and Group Captain L.S. Breadner had been delegated to prepare 'an appreciation of Canada's future military liabilities, outlining the means and arrangements necessary to meet these contingencies, and suggesting the successive steps on the part of each service, which would meet the requirements of a balanced and co-ordinated programme of development.'[54] Their paper, which James Eayrs has termed 'among the key documents of Canadian history,'[55] was ready for submission to the government in early September 1936. The appreciation set out three possible areas in which Canada might find itself obliged to rely on its armed forces: direct defence, preservation of neutrality, and indirect defence through participation in a war abroad. Top

priority was given to home defence, and secondary responsibility assigned to an overseas commitment. The main concern was to devise a balanced force of all three services equipped with modern weapons and equipment, capable of being mobilized quickly and deployed to meet any contingency.

The tri-service Joint Staff Committee estimated the cost of rearmament at almost $200 million over a five-year period, with $65 million for the first year in addition to the usual militia vote of around $12 million. King and Mackenzie presented the case for dramatically increased expenditure to the Cabinet, the former arguing 'that we needed at least something that appeared like a protection of the gateway of Canada at the mouth of the St. Lawrence and something which might serve emergency purposes at harbours on the Pacific ... putting most of our expenditure into aircraft which could be available to move from one part of Canada to another, and some anti-aircraft guns at the coast.' Mackenzie recommended a sum of almost $57 million, but the minister of finance's preoccupation with reducing his deficit forced a compromise.[56] In the end, just over $34 million – the RCAF receiving one-third – was allotted in the main estimates. This was about triple the funds directed towards military aviation the year before.[57]

King and Mackenzie next faced the Liberal caucus and subsequently the House of Commons. In the House in mid-February 1937, Mackenzie attempted, with only indifferent success, to dispel any smug assumptions of comfortable isolation:

One of the hon. gentlemen spoke of the impossibility of attack by air. I wonder whether he recalls the great flight of General Balbo's squadron from Italy, over Montreal and on to Chicago, a few years ago. I wonder whether he saw in the press about ten days ago a description of the flight of a squadron of United States battle planes to Honolulu. I wonder whether he read a description which appeared in the press the other day of the manoeuvres at Singapore, with combined operations of the British fleet, the British air force and some other forces. I wonder whether my hon. friend has studied the bill passed by the United States in 1935, which bill particularly provided for the defence of that great republic against air attacks by nations three thousand miles and more distant ...

The hon. member for Vancouver North spoke of vessels making sporadic raids on our Canadian shores, and asked: Does that require any additional defence? Well, Mr. Speaker, the whole theory of National Defence today, with reference to coastal defence, deals with that specific problem, and it is for meeting these sporadic raiders or aircraft carriers that these estimates are compiled. If my hon. friend has read, as he probably has, the most recent pronouncement of those who are competent to make proper observations upon the subject, he would find that the entire conception of Canadian naval, military and aerial defence is based upon the action of sporadic raiders, or upon aircraft carriers. I want to tell my hon. friends this: We are prepared to build a hundred aeroplanes in the country. These, sir, are not necessarily finally localized in any portion of this dominion. They would be machines of high velocity, capable of being moved within a few hours for the defence of any portion of Canada – available for the protection of the great St. Lawrence river, available for the protection of Montreal, available for the protection of Quebec, available for the protection against any raid that might be made on the grain