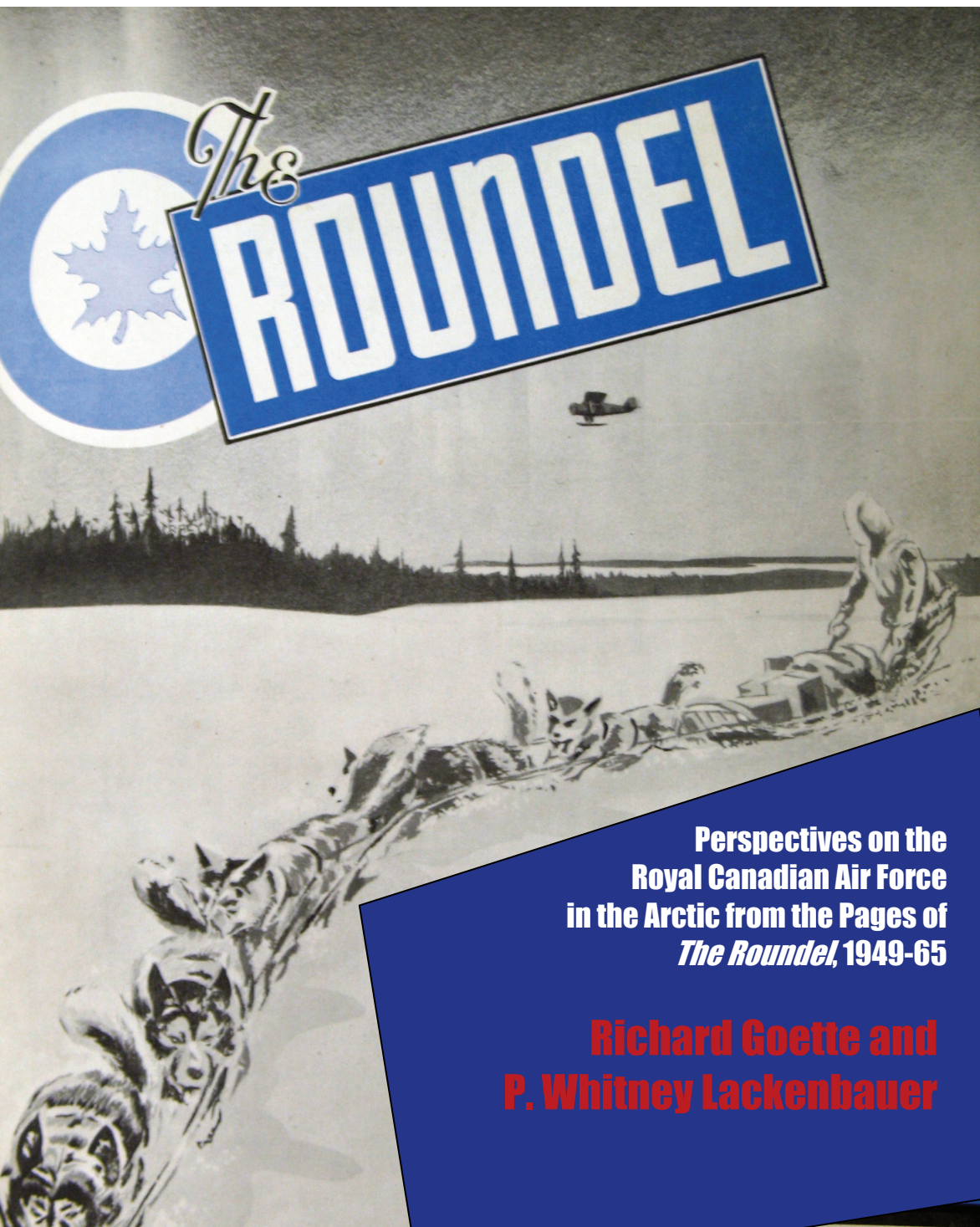


Northern Skytrails



The
ROUNDDEL

**Perspectives on the
Royal Canadian Air Force
in the Arctic from the Pages of
The Roundel, 1949-65**

**Richard Goette and
P. Whitney Lackenbauer**

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Richard Goette, Ph.D.

and

P. Whitney Lackenbauer, Ph.D.

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Acronyms

A/C	Aircraftman
A.D.C.C.	Air Defence Control Centre
A/V/M	Air Vice-Marshal
AFB	Air Force Base
AFC	Air Force Cross
AFHQ	Air Force Headquarters
A.M.C.H.Q.	Army Material Command Headquarters
A.T.C.	Air Transport Command
B.S.A. rifle	Birmingham Small Arms (Company) rifle
CAF	Canadian Armed Forces
CAS	Chief of the Air Staff
C.B.E.	Commander of the British Empire
CDR	Commander
C.E.P.E.	Central Experimental and Proving Establishment
C.G.A.O	Civil Government Air Operations
C.O.	Commanding Officer
Col.	Colonel
Cpl.	Corporal
D.C.L.	Defence Construction Limited
D.D.P.	Department of Defence Production
D.F.C.	Distinguished Flying Cross
D.F.M.	Distinguished Flying Medal
D.O.T.	Department of Transport
DEW Line	Distant Early Warning Line
DHH	Directorate of History and Heritage
DND	Department of National Defence
D.R.B.	Defence Research Board
F/L	Flight Lieutenant
Flt. Lt.	Flight Lieutenant
F/O	Flying Officer
G/C	Group Captain
Gen.	General
G.O.C.	General Officer Commanding
HF	high frequency
H.M.S.	His / Her Majesty's Ship
HQ	Headquarters
ICAO	International Civil Aviation Organization
ISR	intelligence, surveillance and reconnaissance
J.O.C	Joint Operations Centre
L.C.T.	Landing Craft Tanks
L.F.	low frequency

Lt. Col.	Lieutenant Colonel
Maj. Gen.	Major General
M.C.	Military Cross
MCL	Mid-Canada Line
MIDIZ	Mid-Canada Identification Zone
MRAF	Marshal of the Royal Air Force
MSF	Mobile Striking Force
LAC	Leading aircraftman
N.C.O.	Non-commissioned officer
NORAD	North American Air/Aerospace Defence Command
NRC	National Research Council
N.W.T.	Northwest Territories
O.C.	Officer Commanding
O.F.U.	Overseas Ferry Unit
OPS	Operations
P.O.L.	petrol, oil, lubricants
P.P.C.L.I.	Princess Patricia's Canadian Light Infantry
PX	Post Exchange
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RCMP	Royal Canadian Mounted Police
RFC	Royal Flying Corps
S/L	Squadron Leader
SAC	Strategic Air Command
SAR	Search and Rescue
S.E.G.	Systems Engineering Group
SGT	Sergeant
SHORAN	Short Range Aid to Navigation
SQN.	Squadron
Sqn. Ldr.	Squadron Leader
Stn.	Station
T.C.A.	Trans Canada Air Lines
UHF	ultra-high frequency
U.S.A.A.F.	United States Army Air Force
USAF	United States Air Force
VHF	very high frequency
VIP	very important person
W/C	Wing Commander
WO	Warrant Officer
WO2	Warrant Officer Second Class
W/T	Wireless Telegraphy
Y.M.C.A.	Young Men's Christian Association

Preface

Pioneers of the North

Wing Commander J. G. Showler, AFC*

Originally appeared in *The Roundel*, vol. 12, no. 4 (May 1960).

The Canadian Government has always used its air arm, the RCAF, as a principal means of northern development in peacetime. The air force, consequently, has acquired a good deal of experience in the Arctic and can truly be listed among the various organizations which have pioneered the north.

Air force activities in this region have been mainly in the fields of air transport, mapping and survey, ice reconnaissance and various other activities of an exploratory nature. Another aspect of the northern problem with which the service has had experience is survival on the ground. Because the air force is responsible for air search and rescue throughout all Canada and because RCAF aircrew are themselves possible candidates for a spell on the ground under adverse conditions, the service operates a school to teach survival methods.

Although the RCAF is a military organization its northern operations have been mainly unmilitary in nature. Even before the formation of the RCAF in 1924, the service engaged in aerial photography, survey, forest patrol and kindred duties. In pre-war days the air force fliers used the single-engined Vickers *Vedette* flying boats, Fairchild and Bellanca seaplanes, all of them very limited in performance by today's standards. Throughout the '20s and '30s a quarter of a million miles were photographed with amazing accuracy considering the primitive equipment used. Many of the techniques that made Canada a world leader in the art of aerial survey were developed and the foundation was laid for the great survey programs that were to follow.

The following description of service life in the north a quarter of a century ago is recalled by A/C R. C. Gordon, C.B.E. (ret.):

"A typical RCAF photographic detachment in 1934-35 consisted of two aircraft (Bellanca single-engine float planes), two pilots, two camera operator/aircraft

* W/C Showler is himself a true pioneer of the north. In recognition of the work of No. 408 Sqn. in the aerial survey of northern Canada, and his own as C.O. of this unit from 1954 until the job's completion, W/C Showler was awarded the McKee Trophy in 1957 for "the year's most distinguished contribution to the advancement of aviation." He is currently stationed at AFHQ as director of transport and reconnaissance operations. – Editor of the *Roundel*

mechanics, and a fifth man who, in the ordinary course of events, remained at the base to assist in servicing the aircraft and cooking for the detachment.

“The established procedure was for the detachment to commence work in the southern areas as soon as snow and ice had disappeared and, as the season advanced, move to the more northerly areas. This procedure was reversed in the fall of the year. No radio facilities were provided in the aircraft, nor, in remote locations, were they available even at the base. This circumstance made it essential that each detachment must operate two aircraft to guard against unserviceability, to be sure of flying out of remote locations, to communicate with headquarters, and to supply food for the detachment. Contact with headquarters had to be established at least once every two weeks.

“In addition to its service personnel, a detachment normally had a topographical survey representative allotted to it for the season by the Department of the Interior. The main work of this individual was to establish control points (by astronomical observations throughout the area to be photographed) to form a basis for the plotting of the photographs taken. To enable this representative to do his job, the detachment provided aerial transportation, assisted him in setting up his camp, and provided food for his requirements. The men supplied by the department for this type of work were rugged individuals. They enjoyed their work, seemed to have a great capacity for living among mosquitoes, and ate and slept comparatively little.

“The detachments were self-contained units. The commander was completely responsible for his detachment - its operations, its food (which in the N.W.T. had to be ordered in March to ensure that it would be available for pick-up at Waterways in June), its fuel, its equipment and personnel. In addition he functioned as an Accounts Officer.”

When the Second World War ended the air force took up where it had left off in producing the basic data for the mapping of the north country. The war had given the service new and immensely more efficient equipment with which to do the job. Cameras, which could take photographs sweeping from horizon to horizon, were carried in aircraft with increased range, speed and altitude. New navigation equipment, including radar, permitted accurate flying in the uncharted wilderness. With these tools and veterans of the war to operate and maintain them, Canada started the greatest program of aerial survey ever undertaken by any country.

Although the survey program was the largest single effort of the RCAF, it was by no means the only contribution of the service to the development of the north. In the '20s and '30s the air force used its single-engined float and ski planes to fly engineers to otherwise inaccessible parts of the north country. The service also located and described many possible landing areas there. Immediately following the war the air

force sent an expedition for five summers to plot the lines of magnetic declination accurately in the arctic islands as an aid to navigators, both airborne and marine. During this operation the position of the north magnetic pole was definitely established for the first time.

For many years the air force has aided arctic shipping by observing ice conditions from the air. As early as 1927, S/L T. A. Lawrence (A/V/M ret.) led an expedition to the shores of Hudson Strait. For a year, using aircraft on floats and skis, his party charted the movement of ice in the straits, providing the information needed to facilitate commercial shipping into Hudson Bay. The ice reconnaissance task of 1927 was the forerunner of the regular ice reconnaissance patrols of the post-war era which grew to a major job during the construction of the DEW Line. During that period of intense arctic shipping activity, four RCAF *Lancasters* were continually employed from early spring to late fall in reconnaissance of the arctic ice. This work is still carried on to a lesser degree by No. 408 Squadron which uses its ex-photo and SHORAN *Lancasters* in regular surveillance flight over the arctic islands and the polar basin. Ice observers are carried to plot ice conditions for long range forecasting of the northern shipping lanes.

Although the air force has completed its major survey tasks in the north, much aerial survey work continues. Commercial companies are carrying out a vertical photo program to provide more detail for larger scale maps, are making aerial magnetometer surveys, transporting prospectors and geologists, and doing ice reconnaissance for the annual resupply of the DEW Line.

Protection for these operations is provided by the air force search and rescue organization which maintains rescue co-ordination centers from St. John's to Vancouver. One way of increasing the chances of successful rescue of airmen forced down in the north is to train people in the art of survival. The air force has, therefore, established a school for this purpose. Although maintained chiefly for training RCAF aircrew, the school is attended by many others as well. Aircrew of the Canadian Navy, the U.S. Navy and USAF and RAF also attend. The RCMP send members of their instructional staff and the school is attended by Department of Transport personnel, Department of Northern Affairs officers and pilots of civil air companies, both Canadian and foreign.

Personnel from Air Transport Command regularly fly their aircraft to the northernmost part of Canada - 2,200 miles north of Ottawa and 450 miles from the pole. They represent the RCAF's principal operating organization in the north. ATC evolved from units that were formed during the war and now operates all over the world. Immediately following the war no time was lost in applying its new flying techniques to the Canadian north and ATC soon learned to operate north of the Arctic Circle. The fliers constantly pushed further north, first opening an air base at

Resolute Bay at 75°N, then pushing up to the fringe of the Arctic Islands at Mould Bay, Isachsen and Alert, the northernmost point on earth inhabited by man. The air force is still responsible for the job of re-supplying the weather stations on the fringe of the Arctic.

Heavy helicopter operations were another RCAF development in northern transportation. During the construction of the Mid-Canada Line across Labrador, northern Quebec and the northern prairie provinces the air force surveyed the area to find suitable lakes for ski-equipped *Dakotas* to land on the ice where cargo could be stockpiled for later lift to the sites of MCL installations by helicopters. This teaming of fixed wing and helicopter airlift, together with the helicopter freighting techniques that were evolved, gave Canada's future northern developers one more method of opening up inaccessible areas.

The air force is proud of the part it has played in partnership with other governmental agencies and commercial organizations. There is no doubt that this fine team will work together in the future to continue the development of the north.

Foreword

Colonel Kelvin P. Truss

Commanding Officer, Canadian Forces Aerospace Warfare Centre

The Arctic is undergoing what has been described as “unprecedented and disruptive change.”¹ Dramatic reductions in the ice cap, global competition for natural resources, and new technological possibilities are collectively changing the strategic landscape and the Arctic’s place in it. Consequently, it is unsurprising that the Arctic has attracted a good deal of focused attention in recent years, to the extent that one might wrongly conclude that the region has not been of strategic importance until now. Nothing could be further from the truth. The region’s potential has been recognised since the dawn of manned flight, and air power has been used in the Arctic for nearly a hundred years to project sovereignty and to provide for defence and security. The rate of development of Arctic air power varied from country to country, with the Soviet Union leading the way between the two World Wars. In 1937 Valerii Chkalov landed a converted Tupolev bomber at the North Pole, and in 1941 pilots Cherevichny and Akkuratov landed their aircraft on ice at the pole of relative inaccessibility—two clear examples of the use of air power for strategic effect.²

Arctic air power had played a significant role in the protagonists’ efforts to gain and maintain control of the sea lines of communication during the Second World War, and the Arctic assumed a new strategic importance soon after it ended. Not only was the shortest path between the Soviet and American major urban areas via the North Pole, making it the natural route for long-range nuclear bombers and later intercontinental ballistic missiles, but the Arctic Ocean’s ice cap made it an ideal operating theatre for nuclear submarines. This reality prompted US General Hap Arnold to declare in 1950 that “if there is a Third World War the strategic centre of it will be the North Pole.”³ The consequent collaboration between the US and Canada to defend the North led to the creation of the North American Air (now Aerospace) Defence Command (NORAD), a bi-national agreement that endures today. The creation of NORAD, however necessary, not surprisingly led to questions in some quarters about the implication of such an arrangement on the national sovereignty of the partner nations.

¹ Charles Emmerson and Glada Lahn, *Arctic Opening: Opportunity and Risk in the High North* (Chatham House, 2012), 8, <https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Energy%2C%20Environment%20and%20Development/0412arctic.pdf>.

² The Pole of Inaccessibility is located on the Arctic pack ice at a distance farthest from any land mass.

³ Charles Emmerson, *The Future History of the Arctic* (London: Public Affairs, 2010), 101.

After the Cold War the level of military activity, especially submarine activity, in the Arctic decreased significantly. As the threat from a disintegrating Soviet Union receded, attention moved away from trans-polar military threats. Air power planners concerned themselves less about anti-submarine warfare, long-range bombers, and long-range maritime patrol aircraft and instead focused on precision strike capabilities against land targets, close air support, and air interdiction. By the first decade of the 21st Century conflicts in places such as Afghanistan, Iraq, and the Balkans had shaped modern air power thinking at the expense of wider, strategic air power capabilities. A resurgent and increasingly militarily active Russia, and unprecedented and disruptive changes in the Arctic, are now forcing a rethink.

Fortunately, we have been here before and we have the opportunity now to learn from our past. That is why I am delighted to see the publication of this book. Notwithstanding the physical changes that are occurring, the Arctic will always be a harsh operating environment, but as *Northern Skytrails* shows, the RCAF has a good deal of experience to draw from in order to cope with the unique demands of the Far North. All of today's recognised air force roles and missions, from control of the air to air mobility to intelligence, surveillance and reconnaissance, have some provenance in the pages of past issues of *The Roundel* contained herein, providing a rich source of historical lessons. As well as providing historical insights into the application of air power though, *Northern Skytrails* highlights the broader issue of Canadian Arctic sovereignty, an issue that requires continued attention at the strategic level.

Trenton, Ontario

March 2017

Editors' Note

Leading From Above: The Royal Canadian Air Force, the Evolving Arctic Security Environment, and the Importance of History

P. Whitney Lackenbauer and Richard Goette

The Arctic is back on the Canadian radar. Political, commercial, and strategic interest abounds in a region in rapid transformation because of climate change and other forces of globalization. Melting ice and increasing accessibility portend more activity in the region, with dreams of new transarctic transit routes and of exploitable oil, gas, and minerals fueling a resource-hungry world. In this new age of Arctic anticipation, the region has catapulted to the top of the Canadian political agenda. External interest from other Arctic states and a growing throng of non-Arctic players promises to keep it there in the twenty-first century.⁴

Over the last decade, the Canadian Armed Forces (CAF) in general, and the Royal Canadian Air Force (RCAF) in specific, have been called upon to play a higher profile role in exercising sovereign control over Canada's Arctic.⁵ The RCAF Arctic Air Campaign Plan, released in 2012, notes that:

Canada's Northern regions will continue to grow in strategic importance in the years and decades to come. Security challenges will blend with a myriad of other key issues, within the context of an immense and extremely demanding operational theatre, to impose significant and far-reaching demands on the Canadian Forces.... As a consequence, the [RCAF] must strive to improve current capabilities to ensure that it continues to provide relevant and effective responses to real and potential challenges in Canada's Northern regions. Nowhere does the environment offer as many challenges in Canada's

⁴ This paragraph and other portions of this editors' note are drawn from P. Whitney Lackenbauer's guest editorial "Leading From Above: The Royal Canadian Air Force and the Evolving Arctic Security Environment" in *Airforce Magazine* (Winter 2014): 1-2. For an expanded discussion of recent political developments, see Franklyn Griffiths, Rob Huebert, and P. Whitney Lackenbauer, *Canada and the Changing Arctic: Sovereignty, Security and Stewardship* (Waterloo: Wilfrid Laurier University Press, 2011).

⁵ See P. Whitney Lackenbauer and Adam Lajeunesse, "The Canadian Armed Forces in the Arctic: Building Appropriate Capabilities," *Journal of Military and Strategic Studies*, 16/4 (March 2016): 7-66.

imperative to exercise sovereign control over its claimed territory as it does in the North. Not only does the climate offer significant challenges to people and equipment, but the general absence of supporting infrastructure and the vast tracts of sparsely inhabited land also combine to make Northern operations extremely challenging. Notwithstanding the above, the Air Force must maintain and enhance a credible presence to assist the Federal Government in the exercise of sovereign control over this area of Canada.⁶

This strategic document notes that the RCAF's contributions are nested within and support the federal government's broader Northern Strategy. "Historically, the RCAF has played a major role in the Arctic," the plan observes: "from mapping efforts in the early years, to present day support of RCAF Station Alert and Northern Sovereignty Operations." As the only military and, in many cases, government element with the "capacity to deliver immediate effect and presence" across the vast expanse of Canada's Arctic, the air force's contributions continue to deliver "a full range" of airpower effects across a broad spectrum of routine and contingency operations.⁷

The articles in this collection, selected from the pages of *The Roundel*, demonstrate that RCAF current contributions to defence, security, and nation-building in Canada's North perpetuate a long history of experience and "Arctic air-mindedness" (discussed in the introduction that follows). The first part of this collection, reproducing articles from the landmark "Northern Skytrails" series,⁸ documents efforts by the RCAF to support Canadian government efforts to explore and "open" northern regions before the Second World War. Functioning essentially as the "government flying service" during the interwar era, RCAF airmen were practically employed as "bush pilots in uniform"—far different than "traditional" kinetic air power missions such as bomber, fighter, air interdiction, and close air support readily associated with official air force roles. Nevertheless, the RCAF performed a vital service during the 1920s and 1930s in developing navigation aids and procedures, photographing and surveying the Arctic and Subarctic, and providing a military presence in the region—however modest and transient.¹⁰

⁶ Arctic Air Campaign Plan 2012, 2-3, released under Access to Information A-2014-01932.

⁷ Arctic Air Campaign Plan 2012, 5-6, 9.

⁸ Many of these stories were derived from Edward P. Wood's unpublished manuscript "The Royal Canadian Air Force in the Arctic and Sub-Arctic," which Lackenbauer and Peter Kikkert are transcribing and editing for publication. An original copy is on file at the Department of National Defence (DND), Directorate of History and Heritage (DHH) 2004/13.

⁹ W.A.B. Douglas, *The Creation of a National Air Force: The Official History of the Royal Canadian Air Force Volume II* (Toronto: University of Toronto Press and the Department of National Defence, 1986), Chapter s 2 and 3.

¹⁰ See also P. Whitney Lackenbauer and K.C. Eyre, *Unfurling the Air Force Ensign in the Canadian Arctic: The 1922 Eastern Arctic and 1927-28 Hudson Strait Expeditions*, Documents

When Second World War came in 1939, the RCAF's presence in Canada's north continued but with a new focus on supporting kinetic military operations. The Northwest became an active theatre of operations in 1942, when RCAF units deployed to Alaska to support their American allies during the Aleutian Island campaign. Furthermore, the building of the Northwest Staging Route through northern Canada and Alaska gave the Allies freedom of action to move aircraft from the "arsenal of democracy" in North America to sustain air power campaigns against the Axis in other theatres. Moreover, much like the British Commonwealth Air Training Plan in southern Canada, the Northwest Staging Route, Northeast Staging (or Crimson) Route, and other bases in the Canadian North provided the infrastructure basis for expanded military and civil activity after the war. Numerous articles from *The Roundel*, reproduced in this volume, highlight the important role of air power in "opening up" the Arctic in the post-war years.

The Arctic came into its own as a strategic theatre during the Cold War, forcing Canada to balance sovereignty concerns with continental defence imperatives. New geostrategic realities led the United States to push for access to Canada's far North to establish weather stations, airfields and eventually extensive radar networks—most famously the Distant Early Warning (DEW) Line across the seventieth parallel. With an accelerating tempo of air operations to support Canadian and bilateral defence efforts in the Arctic, the RCAF learned to deal with the unique and challenging operating conditions in the region.

As the articles that we have selected for this volume demonstrate, the RCAF's geostrategic and kinetic-focused objectives ranged from air defence, to signals intelligence, to contributions to the Mobile Striking Force (MSF), to the building and manning of radar outposts to keep a "long polar watch."¹¹ Air force operations in the Arctic also included non-kinetic, "peacetime" roles such as search-and-rescue (SAR), mercy flights (now known as humanitarian missions), and air transport missions to support development and sustainment efforts. These latter missions were essential, supporting not only the military (the RCAF, Royal Canadian Navy, and the Canadian Army colleagues, plus American partners) but whole-of-government partners (other government departments) and northern communities as well. They also revealed that the RCAF was and is not the *only* aviation actor in the Arctic. Canada's air force established a strong bond with allied air forces and commercial aviation organizations—relationships that remain important today.

The RCAF's activities in the Arctic during the early Cold War also generated

on Canadian Arctic Sovereignty and Security (DCASS) No. 3 (Calgary and Waterloo: Centre for Military and Strategic Studies/Centre on Foreign Policy and Federalism, 2015).

¹¹ Melvin Conat, *The Long Polar Watch: Canada and the Defence of North America* (Westport, Connecticut: Greenwood Press, 1974).

important lessons about the challenges of flying and conducting air operations in extreme climates. In many respects, the RCAF Arctic missions were “expeditionary domestic operations” (as they are currently described). Although they were domestic by nature, they were expeditionary in character in terms of the vast distances, general lack of infrastructure, and navigation and climate challenges due to the austere environment.¹² For these reasons, any station, operations, or deployment in the Arctic were highly dependent on air support. The air power characteristics of reach and speed allowed the RCAF to access remote regions, conduct operations, and sustain a presence there during the Cold War. This remains equally true today.

The articles in this volume are also filled with commentaries on the human dimensions of Northern operations and the military’s presence in the Arctic. Frequent attention is devoted to the importance of sustaining the well-being and morale of people living and operating in the Arctic, particularly RCAF personnel and their families. Important lessons about infrastructure needs, survival training and facilities, maintaining a sense of normalcy and modernity, amenities, entertainment, sustenance, benefits, generous pay, and leave were observed during the Cold War. Communicating and illustrating these social aspects of “Arctic air-mindedness” also served to educate southern Canadian readers about sovereignty, security, and daily life in the farthest reaches of the country.

The 2012 Arctic Air Campaign Plan suggests that “the RCAF must institutionalize an Arctic mindset that will increase awareness of Canada’s Northern heritage and promote aerospace operations in the Arctic Domain and lend credibility to Canada as an Arctic nation.”¹³ Although strategic documents emphasize that there is no conventional military threat to Canada’s North on the discernible horizon, deterrence remains a cornerstone of continental defence and the RCAF and its partner services still have important, supporting roles to play in environmental protection, disaster response, SAR, counter-intelligence operations, and general domain awareness.

These contributions fit within the government’s broader, integrated Northern Strategy. This guiding political vision is built around a coordinated and integrated “whole-of-government” approach to exercising sovereignty, promoting social and economic development, protecting the environment, and improving Northern

¹² On the concept of Canadian Arctic RCAF missions as “domestic expeditionary operations” see: Daniel Heidt and Richard Goette, “This is no ‘milk run’: An Historical and Contemporary Examination of Operation BOXTOP, 1956-2015,” in Whitney Lackenbauer and Adam Lajeunesse, eds., *Canadian Arctic Operations, 1945-2015: Historical and Contemporary Lessons Learned* (Fredericton: Gregg Centre, 2017); and Lieutenant-Colonel Darwin Ziprick, “Leveraging Air Mobility to Support Canadian Arctic Sovereignty” (unpublished Masters of Defence Studies Directed Research Project, Canadian Forces College, Toronto, 2014), 45.

¹³ Arctic Air Campaign Plan 2012, 13.

governance. In the case of defending Canada against external threats, providing aeronautical SAR, and conducting ISR (intelligence, surveillance and reconnaissance), the RCAF has primary responsibilities. In other cases, the Canadian military will be expected to support its government partners by “leading from behind”—or, in the case of the RCAF, by “leading from above.” Simply put, no other actor can respond with the same range and depth of capabilities, or surge in resources on the same scale, as the Canadian Armed Forces.¹⁴ Apart from highly localized events that can be dealt with by Canadian Rangers¹⁵ or other community-based stakeholders, responding to threats or hazards in the North almost always requires air assets. Accordingly, the RCAF must be equipped and prepared to deliver personnel and equipment when Northern communities need it most.

Unique environmental challenges continue to make Arctic operations particularly daunting. Severe weather conditions (cold winters and foggy summers), isolated communities, limited communications, and a lack of support infrastructure pose significant constraints. Even routine operations, such as patrolling, resupply, and transporting personnel to remote communities or stations, require specialized training and experience. The versatile *Twin Otters* of 440 squadron, which are vital to support Ranger training, liaison, and resupply, are a case in point given their ability to land in some of the most austere conditions imaginable. Furthermore, the military must bring in all of its own supplies to operate effectively in or near isolated Arctic communities so that it does not deplete limited local resources. Thus, when called upon to respond to unpredictable events, such as a downed aircraft or humanitarian assistance to a community in distress, deployments and operations must be self-sustaining and self-sufficient.

International relationships remain equally important. Canada’s Northern Strategy recognizes that regional stability and security depends upon constructive relationships with our circumpolar neighbours. International agreements, careful coordination, and joint exercises make sure that forces are interoperable to enforce laws and deter potential challenges to sovereign jurisdiction and rights. Our NORAD partnership with the United States—our “premier partner” in the circumpolar world¹⁶—is the most obvious example.

Given the uncertainties associated with a region in transformation, anticipating threats and opportunities in the Arctic requires new interpretive frameworks about

¹⁴ See Lackenbauer and Lajeunesse, “The Canadian Armed Forces in the Arctic.”

¹⁵ See P. Whitney Lackenbauer, *The Canadian Rangers: A Living History* (Vancouver: UBC Press, 2013) and Lackenbauer, *Vigilans: The 1st Canadian Ranger Patrol Group* (Yellowknife: 1st Canadian Ranger Patrol Group, 2015)

¹⁶ P. Whitney Lackenbauer and Rob Huebert, “Premier Partners: Canada, the United States and Arctic Security.” *Canadian Foreign Policy Journal* 20/3 (Fall 2014): 320-33.

the air force and air power across the defence-security-safety continuum.¹⁷ Nevertheless, the RCAF's enduring roles of defending Canada and our shared continent, while contributing to international peace and security, will not go away. Discerning ways to fuse RCAF objectives with broad nation-building and foreign policy also helps Canada realize its vision for the Arctic as "a stable, rules-based region with clearly defined boundaries, dynamic economic growth and trade, vibrant Northern communities, and healthy and productive ecosystems."¹⁸ In performing and supporting a wide range of safety and security tasks, the men and women serving in the RCAF remain critical enablers for Canada to realize its Arctic potential.

"No amount of contracted airlift and/or services can [better] symbolize the Canadian Government's reach and sovereignty than the presence of a RCAF aircraft with the Canadian roundel and uniformed troops," the 2012 Arctic Air Campaign Plan asserts.¹⁹ We hope that the articles that we have selected to reproduce in this volume not only shed light on the RCAF's long and proud history as contained in the pages of *The Roundel*, but also yield enduring lessons that remain relevant today.

In producing this volume, we would like to thank the exceptional young historian Corah Hodgson for her valuable assistance in transcribing and editing the articles for publication. Thanks also go to Cathy Murphy, Chief Librarian at the Canadian Forces College's Information Resource Centre, for making copies of *The Roundel* available. Furthermore, we are grateful to Ryan Dean, the managing editor of the DCASS series, for his careful editorial and layout work. Daniel Heidt, Peter Kikkert, and Adam Lajeunesse have all provided valuable feedback on the draft text. Finally, we are honoured to have the support of Air Force History and Heritage and the Canadian Forces Aerospace Warfare Centre in the dissemination of this volume. Our sincerest thanks go to Major W.A. (Bill) March for his guidance, ongoing support, and friendship.

Whitney Lackenbauer and Richard Goette
March 2017

¹⁷ Department of National Defence, Chief of Force Development, *Arctic Integrating Concept* (Ottawa, 2010), 6.

¹⁸ Canada, *Statement on Canada's Arctic Foreign Policy: Exercising Sovereignty and Promoting Canada's Northern Strategy Abroad* (Ottawa: Department of Foreign Affairs and International Trade, 2010).

¹⁹ Arctic Air Campaign Plan 2012, 8.

Introduction

The Roundel and Building RCAF Arctic “Air Mindedness” During the Early Cold War

Richard Goette¹

The Royal Canadian Air Force (RCAF) was heavily involved in flying in Canada’s Arctic during the early Cold War. With significant time and resources dedicated to military aviation in Canada’s north, it was important for the RCAF leadership to raise the profile and awareness of the Canadian Arctic—generating RCAF Arctic “air mindedness.” This goal was accomplished through articles and features in the service’s main publication, *The Roundel*, that dealt with Arctic and northern aviation-related issues of interest to Canadian airmen. Besides dealing with specific Arctic flying operations, Arctic “air minded” articles in *The Roundel* during the early Cold War also touched upon other vital issues, such as the ever-important concern of manning RCAF bases in the north, and the living and working conditions at these establishments.

Moreover, the new enemy in the Cold War was the Soviet Union, and the quickest way it could strike at North America’s war-making capacity and population centres was for its growing fleet of long-range strategic bombers armed with atomic weapons to attack via the Northern Approaches to the continent. Canada’s North was, indeed, a potential “Arctic Front” in a war with the Soviet Union.² Therefore, the strategic reasoning for Canada’s requirement to deploy forces to the Arctic was also an important facet of developing Arctic “air mindedness”—especially amongst

¹ This originally appeared as a chapter in *De-Icing Required: The Canadian Air Force’s Experience in the Arctic*, ed. P. Whitney Lackenbauer and Major W.A. March, *Sic Ad Astra: Canadian Aerospace Power Studies Series No.4* (Trenton: Canadian Forces Air Warfare Centre, 2012): 55-72. Reprinted with permission.

² The authors are referring to Canada’s Arctic as being a traditional front for defending Canadian sovereignty but the label also applies in the military context. Ken S. Coates, P. Whitney Lackenbauer, William R. Morrison, and Greg Poelzer, *Arctic Front: Defending Canada in the Far North* (Toronto: Thomas Allen Publishers, 2008). The best account of the growing threat of Soviet strategic bombers to North America and Canada-U.S. endeavours to counter it remains Joseph Jockel’s *No Boundaries Upstairs*. Joseph Jockel, *No Boundaries Upstairs: Canada, the United States and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987).

those RCAF personnel who were already stationed or may soon be stationed in Canada's north.

Indeed, after the Second World War the Canadian military in general (and the RCAF in particular) was required to reorient its “geographical” strategic thinking from the traditional east-west threats to also include the growing Soviet threat from the north.³ Typically, the RCAF had focused on military threats from Europe and Asia, and had mostly only concerned itself with Canada's north in terms of non-kinetic domestic operations such as aerial mapping and other aid to the civil power roles.⁴ With the growing Soviet strategic bomber threat in the early Cold War period, however, the RCAF began to pay much more attention to its “kinetic” role of defending the continent approaches from the north.⁵ This article argues that with this reorientation of the “geographical” strategic thinking towards the north in the early Cold War period, Canada's air force leadership actively sought to generate Arctic “air mindedness” in the pages of *The Roundel* to raise awareness within the RCAF of the need to operate and work in the Canadian Arctic.

In *High Flight*, historian Jonathan Vance discusses the *idea* of aviation – what he calls “air mindedness” – in the minds of Canadians. This phenomenon included the efforts by the “air lobby”—Canadians involved in flying—to raise awareness of aviation and its various uses to those who did not have a personal connection to aviation. According to Vance, these uses of aviation included but were not limited to: entertainment (i.e., barn storming and stunt flying), transportation (of people and cargo), civil service (such as mapping and forestry patrol), and the use of aviation in war (air power).⁶ Focusing on the latter three uses of aviation, this article contends that the “air mindedness” methodology can be applied by identifying the senior leadership of the RCAF as the “air lobby” that desired to raise awareness of the air force's presence and operations in Canada's Arctic amongst air force personnel.

The medium that Canada's air force brass utilized to generate Arctic “air mindedness” was the RCAF's service magazine, *The Roundel*. It was first introduced in November 1948, right on the heels of the Berlin Airlift Crisis and the subsequent “heating up” of the Cold War. *The Roundel* was published ten times a year and was widely distributed within the RCAF. Moreover, it was produced in large quantities so

³ James Eayrs, *In Defence of Canada Vol. III: Peacemaking and Deterrence* (Toronto: University of Toronto Press, 1972), 320-331.

⁴ See W.A.B. Douglas, *The Creation of a National Air Force: The Official History of the Royal Canadian Air Force Vol. II* (Toronto: University of Toronto Press and the Department of National Defence, 1986), Chapters 2-4.

⁵ See Joseph Jockel, *No Boundaries Upstairs: Canada, the United States and the Origins of North American Air Defence, 1945-1958*, (Vancouver: University of British Columbia Press, 1987).

⁶ Jonathan F. Vance, *High Flight: Aviation and the Canadian Imagination* (Toronto: Penguin Books, 2002), vii-viii.

that all Canadian air force personnel were expected to read it. The purpose of *The Roundel* was to avoid a narrow-minded specialist perspective amongst airmen in terms of their own trade or role in the service. Seeking a broader readership, the RCAF service magazine therefore had a more holistic approach, covering a variety of issues in short, readable articles that would appeal to individuals of every rank, community, and trade in Canada's air force. In the words of the Chief of the Air Staff (CAS) Air Marshal Wilfred Curtis in the inaugural issue, the air force brass hoped to encourage "extensive reading and discussion" of issues related to the RCAF in order to foster "a wider perspective which gives full meaning to its individual tasks."⁷ Material covered in the publication therefore varied from historical articles to pieces on current air power issues, but also photographs, cartoons and other illustrations, and also short tidbits of current news relating to the air force. Importantly, *The Roundel* also included the use of humour, in written form and also in Ray Tracy's excellent cartoons, as a means to entice readership. As a result, as Canadian aviation historian Larry Milberry has noted, during the early Cold War *The Roundel* became "to most serving members [of the RCAF] as much a part of the Air Force as flight sergeants or Harvards."⁸

All of these measures to entice readership of *The Roundel* – especially humour – proved to be an effective means to generate Arctic "air mindedness" within the RCAF. A cursory examination of issues from the late 1940s and 1950s shows reveals a bevy of articles that dealt with the Arctic and Canada's northern regions. Although these articles at first seemed to appear in the RCAF's service magazine haphazardly, there was a concerted effort by the RCAF leadership to ensure that Canadian air force personnel began to think more about the Arctic. Accordingly, this article analyzes features in *The Roundel* that focused on northern and Arctic-related matters, with particular attention to developing Arctic "air mindedness" as it relates to pre-1945 Canadian air force history in the north, Arctic Strategy, northern aerial operations, and the living and working conditions for RCAF personnel at these establishments during the early Cold War.

⁷ Air Marshal W.A. Curtis, Chief of the Air Staff, "A Message from the CAS," *The Roundel*, vol. 1, no.1 (November 1948), 1. I also discuss the importance of *The Roundel* and the *R.C.A.F. Staff College Journal* for the RCAF leadership in fostering RCAF air power and air defence discourse in my previous article for the 2008 Air Force Historical Workshop. Richard Goette, "Air Defence Leadership During the RCAF's 'Golden Years,'" in William March, ed., *Sic Itur Ad Astra: Canadian Aerospace Power Studies Vol. 1: Historical Aspects of Canadian Air Power Leadership* (Ottawa: Department of National Defence, 2009), 55-56.

⁸ Larry Milberry, *Sixty Years: The RCAF and CF Air Command 1924-1984* (Toronto: CANAV Books, 1984), 209.

Promoting Awareness of Canada's Air Force History in the North

If there was any question that the RCAF leadership was trying to encourage awareness of the North in the pages of *The Roundel*, the cover of the inaugural November 1948 issue of the RCAF's service magazine certainly put that notion to rest. Instead of showing a picture of a massive bomber or a high-powered fighter aircraft, the cover depicted a dogsled plying through the snow, with a ski-equipped RCAF aircraft flying overhead. This was quintessential imagery of Canada's northern flying.⁹

Included in this inaugural issue of *The Roundel* was an article by F/L E.P. Wood entitled "Northern Skytrails: The story of the work of the R.C.A.F. in Canada's Arctic and Sub-arctic."¹⁰ This piece was the first in a series of articles under the "Northern Skytrails" banner describing the early history of the RCAF and especially its experiences in Northern flying. The purpose of the series, the author explained, was "to give the reader a clear and factual conception of what is perhaps the more romantic, but also less publicized, aspect of the R.C.A.F.'s activities."¹¹ In other words, the motive behind the "Northern Skytrails" series was to promote Arctic "air mindedness" amongst RCAF personnel. Importantly, the rationale for this series came right from the top of the RCAF leadership; as F/L Wood explained, "the task of [the series'] publication was assigned by the Chief of the Air Staff to the Directorate of Intelligence (Air)."¹²

The first article in the "Northern Skytrails" series began with a brief early history of the RCAF, touching on such information as the Air Board, the Canadian Air Force, inter-war training, the formation of the RCAF itself in April 1924, Civil Government Air Operations, and the "militarization" of the air force before the outbreak of the Second World War. The purpose was to teach those who were unfamiliar with the RCAF's history up to that time and refresh the memory of those who were. The author's actual words delivered this message clearly, and used clever humour to grab the reader's attention: "it is thought, however, that before proceeding with the main theme, namely the breaking of our northern skytrails, the reader should be fully acquainted with the background of the Service which has none, and is

⁹ Reproduced as the cover to this DCASS volume.

¹⁰ F/L E.P. Wood, "Northern Skytrails: The Story of the Work of the R.C.A.F. in Canada's Arctic and Sub-arctic Part 1," *The Roundel*, vol. 1, no.1 (November 1948): 28-32. Reproduced as doc. 111 in this volume.

¹¹ *Ibid.*, 28.

¹² Interestingly, the author also notes that this series consisted 500 typewritten pages in total and that as a result, "much material has been omitted as having little interest except for the historian or the arctic specialist." *Ibid.* Wood's full manuscript is on file at DND, Directorate of History and Heritage (DHH), and will be published as future DCASS volume edited and introduced by Lackenbauer and Peter Kikkert.

still doing, so much to break them.”¹³ It was significant that the *first* historically-based article in *The Roundel*—one that outlined the history of the RCAF to date—was written in a Northern Canadian context.

This theme continued through the concluding article of the “Northern Skytrails” series. F/L Wood describes the RCAF’s endeavours in the North in the years since the end of the Second World War, including continuous photographic survey flights, search-and-rescue (SAR) work, supply flights by Air Transport Command (ATC), as well as Operations “Musk Ox” and “Investigator.” In concluding the series, Wood notes that the RCAF’s “efforts are turned northward again” and that the “Polar Concept was just as real... in 1922 as it is in our minds to-day.” He emphasizes that Canada needed to develop and protect its Arctic areas. Concurrently, he notes the importance of engaging with the Americans in guarding Canada’s north: “the job is so gigantic that in some instances the United States’ aid has been sought and received, but it is the policy of the Canadian government to replace American with Canadian personnel, when the latter are available.”¹⁴ Inherent in the effort of the RCAF to promote Arctic “air mindedness” amongst RCAF personnel during the early Cold War period was the important—and thorny—issue of collaborating with the United States on defence measures in the Arctic.¹⁵

Arctic Strategy

Besides pieces on the history of RCAF flying in the north, *The Roundel* also included articles that specifically dealt with the Arctic itself in order to foster interest in the region. Indeed, *The Roundel* was a medium to explain the strategic reasoning for Canada’s requirement to deploy forces to the Arctic to those RCAF personnel who were already stationed or may soon be stationed in Canada’s north. In choosing these articles, the editor of the RCAF service magazine included pieces by air force personnel on the staff of *The Roundel*, Air Force Headquarters, and the various RCAF

¹³ *Ibid.*

¹⁴ F/L E.P. Wood, “Northern Skytrails: The Story of the Work of the R.C.A.F. in Canada’s Arctic and Sub-arctic Part 11,” *The Roundel*, vol. 11, no.1 (September 1949): 9, reproduced as doc. 1-11 in this volume. For further information on early post-Second World War operations in Canada’s north, see the following: Hugh Halliday, “Recapturing the North: Exercises ‘Eskimo,’ ‘Polar Bear,’ and ‘Lemming,’ 1945,” *Canadian Military History*, vol. 6, no.2 (Spring 1997): 29-38; Hugh Halliday, “Exercise ‘Musk-Ox’: Asserting Sovereignty North of 60,” *Canadian Military History*, vol. 7, no.4 (Autumn 1998): 37-44.

¹⁵ For details on the issue of the United States and Canadian Arctic sovereignty during the Cold War, see Coates et al., *Arctic Front*, Chapters 2 and 3, and P. Whitney Lackenbauer and Peter Kikkert, “Sovereignty and Security: The Department of External Affairs, the United States, and Arctic Sovereignty, 1945-68,” in *In the National Interest: Canadian Foreign Policy and the Department of Foreign Affairs and International Trade, 1909-2009*, ed. Greg Donaghy and Michael Carroll (Calgary: University of Calgary Press, 2011), 101-20.

commands and units.¹⁶ He also spread his net widely and re-published articles dealing with Arctic themes from other publications.

For example, the April 1950 issue of *The Roundel* featured an article entitled “The Strategy of the Arctic” (doc. 3-1 in this volume) republished “in considerably shortened form” from the October 1949 issue of *International Affairs*, the journal of the Royal Institute of International Affairs in England.¹⁷ The piece was written by Group Captain (G/C) V.H. Patriarche, an RCAF officer with extensive civil and military service flying in Canada’s north and one of the senior RCAF staff members of the Northwest Staging Route during the Second World War. In the article, G/C Patriarche begins by noting that “the strategy of the Arctic must deal with political and economic problems as well as purely military ones.” He specifically outlined the sovereignty issue in relation of the Canadian Arctic with other nations; in particular, he mentioned that other countries’ arguments have little weight in comparison to Canada’s claims. However, his main emphasis was on the problem (and high cost) of transportation—especially sea-borne and land-borne—and how the air force therefore plays a crucial role in bringing supplies to the Arctic.

In terms of strictly military matters, G/C Patriarche notes that the Arctic “can be considered in two aspects: first, as a theatre of operations; and second, as a route of attack.” He plays down the former, largely due to the huge logistical difficulties, and puts more emphasis on the latter. However, he notes that there was a “lack of decisive targets” in the Arctic, and that the focus of operating in this theatre would be focused on interdicting potential enemy aircraft flying the Arctic air route with the objective of attacking vital targets further south. This strategic assessment of the Arctic would later support the air defence concept of “defence in depth”: that it was necessary to intercept and engage the enemy as far away from his target as possible.¹⁸

Lastly, G/C Patriarche downplays the importance of the Arctic as a theatre of operations—probably not to provoke the Soviet Union. Nonetheless, he hints at the possibility of the Soviet threat to North America in his closing paragraph:

We may take it, then, that the Arctic, *unless it becomes the only or the shortest route between the vital areas of two contending Powers*, is not likely to become the major theatre of military operations for some time

¹⁶ See, for example, the following from an airman with Air Transport Command H.Q.: W.O.2 R.B. Hampton, “Arctic Glimpses,” *The Roundel*, vol. 2, no.12 (November 1950): 38-42.

¹⁷ Group Captain V.H. Patriarche, “The Strategy of the Arctic,” *The Roundel*, vol. 2, no.6 (April 1950), doc. 3-1 in this volume.

¹⁸ See, for example, DHH 73/1501, *Nineteen Years of Air Defense*, NORAD Historical Reference Paper No. 11 (Colorado Springs: North American Air Defence Command, Ent Air Force Base, Colorado, 1965), 11-12.

to come. It fills, rather, a subsidiary role, although, depending on the circumstances of war, it could become a decidedly active area.¹⁹

Geostrategic concerns related to Canada's Arctic were therefore a frequent theme in issues of *The Roundel* during the Cold War. However, air defence was not the only strategic issue examined in its pages.

The April 1951 issue of *The Roundel* reprinted an article from Britain's "Everybody" Magazine written by retired Marshal of the Royal Air Force (MRAF) Viscount Hugh Trenchard. Addressing the Cold War context, this British air power legend warned of the traditional east-west strategic geographic thinking based on the Mercator Projection map (which showed the world on a flat surface). Trenchard stressed that, in the age of global reach provided by strategic air power, traditional perceptions amounted to a "Meginot Line Mentality." He cautioned "civilized powers" about ignoring threats from other – notably northern – orientations (see figure 1).²⁰

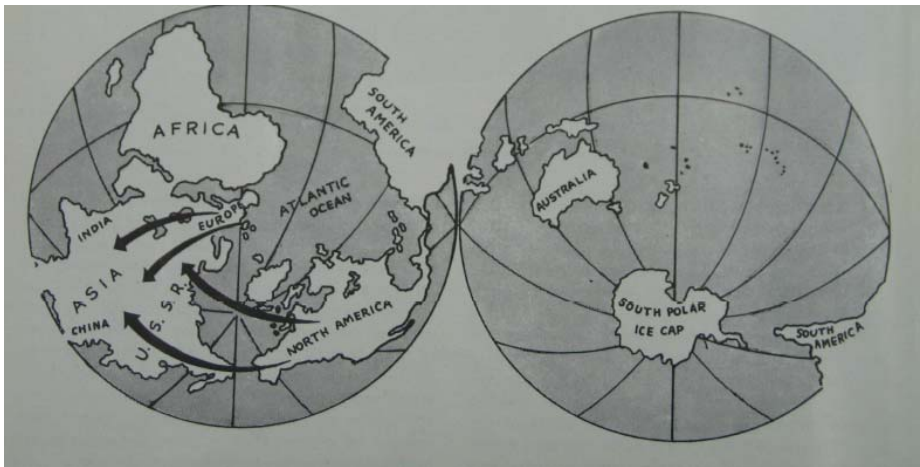


Figure 1: MRAF Trenchard's Air Power perspective map²¹

¹⁹ Patriarche, "The Strategy of the Arctic," 42. Emphasis added.

²⁰ Marshal of the R.A.F. The Viscount Trenchard, "Meginot Mentality," *The Roundel*, vol. 3, no.5 (April 1951): 37. For background on Trenchard's theories on strategic bombing see the following: Philip S. Meilinger, "Trenchard and 'Morale Bombing': The Evolution of Royal Air Force Doctrine Before World War II," *Journal of Military History*, vol. 60, no.2 (April 1996): 243-270; Phillip Meilinger, "Trenchard, Slessor and Royal Air Force Doctrine Before World War II," in Phillip S. Meilinger, ed., *The Paths of Heaven: The Evolution of Airpower Theory* (Montgomery: Air University Press, 1997), 41-78.

²¹ Trenchard, "Meginot Mentality," 38.

Alternatively, Trenchard stresses a more global strategic way of thinking. Instead of emphasizing air defence, it was no surprise that Britain's most famous strategic bombing theorist advocated for offensive use of the Arctic approaches by Western countries through a massive and quick build-up of their bomber forces. These strategic assets could then be utilized to either strike the Soviet Union in a time of war, or at least deter this Cold War adversary from launching their own atomic attack.²² Trenchard's overall theme was that of air power and geography, and he concludes with the following statement: "it is the greater range of aircraft and not the atom bomb that has changed warfare."²³ Therefore, even though Trenchard did not emphasize strategic air defence (which during the 1950s would be the main role of the RCAF) when highlighting the importance of the northern approaches, he fostered greater awareness of the Arctic amongst Canadian airmen.

Nonetheless, the RCAF's air defence mission was not ignored in *The Roundel* during the late-1940s and 1950s. Various articles specifically focused on the important role of the RCAF to protect the North American continent from Soviet strategic bomber attack. These included features on a variety of air defence issues and roles such as: the Ground Observer Corps (which consisted of civilian observers tasked to keep an eye on the sky for enemy aircraft); the job of Aircraft Control and Warning in the air force (many positions of which were filled by women in the RCAF); the Canada-U.S. North American Air Defence Command (NORAD); and RCAF stations and the Mid-Canada and Distant Early Warning (DEW) radar lines in the far north (docs. 6-1 to 6-4, 6-7 and 6-8).²⁴ Particular attention also was given

²² Ibid. Another British air power legend, MRAF Lord Arthur Tedder, made much the same conclusion regarding the importance of bombers in the Cold War era in an additional article from *Air Clues* that was reprinted in *The Roundel* in 1950. MRAF Lord Arthur Tedder, "Air Defence: An Address to the Royal Empire Society," *The Roundel*, vol. 2, no.9 (July-August 1950): 50-54.

²³ Trenchard also strongly recommended that air force planners should read Alexander Seversky's most recent book, "Air Power: Key to Survival," noting that it "is nearer to my own views on defence questions than anything I have heard or read, in this country or any other, about the future of world defence." *Ibid*, 38-39.

²⁴ Squadron Leader H.C.D. Upton, "The Ground Observer Corps," *The Roundel*, vol. 5, no.8 (September 1953): 10-13; "The Ground Observer Corps," *The Roundel*, vol. 9, no.10 (December 1957): 11-13; Squadron Leader J.E. Mahoney, "Aircraft Control and Warning in the R.C.A.F.," *The Roundel*, vol. 6, no.4 (April 1954): 4-10; Flight Lieutenant A.T. Paton, "NORAD: International Guardian," *The Roundel*, vol. 11, no.5, (June 1959): 2-9; "Canadians at Colorado Springs," *The Roundel*, vol. 11, no.5, (June 1959): 10-13; S/L L.J. Nevin, "Operation Deep Freeze," *The Roundel*, vol. 10, no.6 (August 1958): 20-23 (doc. 3-2 in this volume); F/O S.G. French, "The Mid-Canada Line," *The Roundel* [three parts], vol. 10, no.3 (April 1958): 2-5, 31, no.4 (May 1958): 10-15; and no.5 (June-July 1958): 12-18 (docs. 6-1 to 6-4 in this volume); S/L R. Wood, "Stand-by at Churchill," *The Roundel*, vol. 9, no.1 (January-February 1957): 12-13 (doc. 3-8 in this volume).

to updates on the development of RCAF all-weather interceptors that would operate in northern Canada in an air defence role such as the CF-100 *Canuck* and the CF-105 *Avro Arrow*.²⁵

In 1950, *The Roundel* also covered the RCAF's role in Exercise "Sweetbriar," a Canada-US joint and combined continental defence exercise to test operational capabilities in the Canadian Arctic and Alaska. Army forces were under the command of the Chief of the General Staff Lieutenant General Charles Foulkes, while air force units came under the CAS, Air Marshal Curtis. Sweetbriar, however, did not solely focus on air defence: it was a truly joint operation to evaluate interoperability for tactical air support and tactical and strategic airlift capabilities in conjunction with army forces. Therefore, in addition to the RCAF's *Vampire* and *Mustang* fighters and the USAF's F-80 *Shooting Star* interceptors, other aircraft, including Canadian B-24 *Mitchells*, Avro *Lancasters*, DC-4 *North Stars*, and DC-3 *Dakotas*, and American P-82 *Twin Mustangs*, A-26 *Invaders*, and C-54 *Skymasters*, were involved in Sweetbriar.²⁶ However, instead of publishing an analysis of the exercise (likely, it is suspected, to avoid such accounts coming under Soviet eyes), *The Roundel* ran excerpts from the diary of RCAF Sergeant D.J. Blain (doc. 3-3), who worked at the Canadian Joint Air Training Centre in Rivers, Manitoba, and was assigned to assist the official umpires for the combined exercise.²⁷ According to the editor, the purpose of publishing this account from a Non-Commissioned Officer's journal was for readers to have "a clerk's-eye view" and understand Sweetbriar "in a human and often amusing way."²⁸ Therefore, instead of intricate descriptions of the joint air force-army operations, the article described the daily accounts of a RCAF sergeant's role in the exercise. Again, the attempt here was to use humour and "human interest" accounts to educate the rest of the RCAF of the experiences, difficulties, and importance of the air force's operational responsibilities in the Arctic.²⁹ By giving this kind of an account "from the ranks," *The Roundel* hoped to appeal to a wide audience.

²⁵ A sampling includes: James Hay Stevens, "The Interceptor's Future," *The Roundel*, vol. 2, no.9 (July/August 1950): 58-62; "The CF-100," *The Roundel*, vol. 2, no.5 (March 1950): 3-4; Wing Commander H.R. Footitt, "File Analysis: AFHQ S60-3-63 The Avro CF-100," *The Roundel*, vol. 4, no.9 (October 1952): 15-21; "Avro Arrow," *The Roundel*, vol. 9, no.9 (November 1957): 25; "Arrow Pilot," *The Roundel*, vol. 10, no.5, (June-July 1958): 28.

²⁶ For more on Exercise Sweetbriar, see Milberry, *Sixty Years*, 215-216.

²⁷ Sergeant D.J. Blain, Canadian Joint Air Training Centre, "Sweetbriar Diary," *The Roundel*, vol. 3, no.10 (December 1950): 37-46 (doc. 3-3).

²⁸ Editor's Note, *Ibid.*, 37.

²⁹ *Ibid.*, 37-46. Indeed, one of the most prevalent themes in the article was not the joint and combined operations, but the many instances where RCAF aircraft had to be deployed on search-and-rescue missions to look for and drop supplies to survivors of aircraft that had crashed in the harsh conditions.

Non-kinetic air power operations undertaken by the RCAF in Canada's north were not limited to transport missions during Sweetbriar. Indeed, articles in *The Roundel* frequently highlighted other important roles. For example, an article in the December 1955 issue brought particular attention to RCAF Air Transport Command's Arctic operations (doc. 3-4). Written by ATC's Public Affairs Officer, F/L J.D. Harvey, the contribution outlined the various aircraft and squadrons engaged in Arctic operations. They included: re-supply of RCAF units, Canada-U.S. weather stations, Royal Canadian Mounted Police detachments, and Department of Transport weather and radio bases; photographic and navigational flights for the purposes of accurately mapping Canada's Arctic region; the government's SHORAN (short-range navigation) programme; preparing sites for and supplying the Mid-Canada Line; ice reconnaissance patrols; training flights; and even the transportation of students from the RCAF Staff College and the National Defence College for "staff rides" to bases in Canada's north.³⁰ Significantly, F/L Harvey was careful to highlight the strategic importance of ATC operations in the region:

The aircraft of Air Transport Command have been penetrating the Arctic Circle ever since the Command's early days as No. 9 (T[ransport]) Group, in 1947. Lately, however, the growing interest in Canada's Northland has added impetus to flights tracking 360 degrees. The northern shores of Canada remain uppermost in the minds of defence planning-teams when they discuss the most probable routes for bombers in the event of another war.³¹

By explicitly connecting these RCAF operations in the north to the strategic importance of the region, Harvey clearly showed that ATC was very much involved in and concerned about the Arctic.

The Roundel also included historical articles that provided essential context to contemporary air defence endeavours by outlining how the RCAF dealt with potential Axis aerial threats to Canada during the Second World War. For instance, in the May 1950 issue, Wing Commander (W/C) C.B. Limbrick, who was in charge of the air force's guided missile program under the Chief of Armament and Weapons at Air Force Headquarters (AFHQ), wrote an article entitled "Canada's Radar Outposts: A Little-known Chapter in the History of the R.C.A.F. during the Second

³⁰ F/L J.D. Harvey, "North of Fifty-Four: The Northern Operations of Air Transport Command," *The Roundel*, vol. 7, no.11 (December 1955): 3 (doc. 3-4). For another account of the RCAF's SHORAN programme in *The Roundel*, see: F/L. H.N. Astrof, "9-Year Job Ends," *The Roundel*, vol. 9, no.8 (October 1957): 15-16 (doc. 3-6).

³¹ Harvey, "North of Fifty-Four," 3.

World War.”³² The airman recalled how the air force in Canada’s remote regions—with all of the communications, climate, and transportation challenges—managed to establish 50 radar stations to warn of any Axis attack. By highlighting the important considerations that went into installing radar stations during the Second World War, Limbrick was therefore able to bring attention to the similar challenges faced by the RCAF of the 1950s in establishing an early warning system against Soviet attack. For example, with regard to the issue of where to site specific radar stations, he noted (with a touch of humour) the following:

One couldn’t go out and spot a radar at a site just because the fishing looked good or the local farmer had a couple of good-looking daughters. It was necessary not only to have height of land but also to have a combination of physical conditions and station-spacing which would provide suitable coverage and safety overlapping. Thus, while some sites were in nice civilized areas, the large majority were located in isolated and almost inaccessible places.³³

In another instance, W/C Limbrick highlighted the inherent dangers of accessing some of the distant radar stations, noting that “many of the units were so remote and desolate that merely to get on to them from the ship meant a brief scuffle with the Grim Reaper.”³⁴

Other relevant lessons from the RCAF’s Second World War radar post experiences included the requirement to “alleviate the tough conditions and to provide amenities.” This consisted of simple things such as the fostering of hobbies amongst radar personnel in remote locations, but also included a sustained effort by AFHQ to provide amenities such as personal furniture, reliable and regular mail service, and entertainment such as movie projectors and films. The RCAF brass also made provisions for newspapers and magazines, which included popular titles for reading but also the means “for the literary and artistic” to produce their own “unit” publications with unique and telling titles such as *The Isolationist*.³⁵ Organized recreation such as wood carving, sports, and hunting and fishing competitions also helped to relieve boredom. Significantly, the RCAF also provided alcohol to the isolated radar operators, and even ensured access to transportation for individuals for

³² Wing Commander C.B. Limbrick, “Canada’s Radar Outposts: A Little-known Chapter in the History of the R.C.A.F. during the Second World War,” *The Roundel*, vol. 2, no.7 (May 1950): 39-42. Limbrick was a radar operator during the Battle of Britain, after which he was one of the RCAF officers responsible for building and operating an early warning radar system along Canada’s east and west coast and the northern Prairie provinces, Ontario and Quebec.

³³ *Ibid.*, 40.

³⁴ *Ibid.*

³⁵ *Ibid.*, 42.

social gatherings and companionship. As Limbrick noted, “of course there were, here and there, hardy souls who made heroic journeys on Saturday nights by trail, boat or dog sled, to small villages or canning factories for an evening of dancing or romance. Indeed, if the locations were not so isolated, I imagine some of the boys would be back there now.”³⁶ Limbrick concluded that, thanks to the RCAF leadership’s “general determination to defeat the monotony,” morale remained high at these radar stations.

Although these Second World War radar chains were for the most part more southern than those established in Canada in the 1950s, they were also located in remote parts of the country. Therefore, the lessons on how the RCAF could deal with the inherent isolation and morale for personnel living at these sites were important for post-war air force planners. Significantly, the RCAF took into account these kinds of concerns when preparing for the construction and manning of early warning stations in the Arctic.

Operating and Living in the Arctic

Besides raising awareness amongst RCAF personnel of the strategic reasoning for operating and deploying to the Far North, another key facet of fostering Arctic “air mindedness” was addressing the issue of operating in the Arctic, and in particular the living and working conditions for air force personnel deployed to northern establishments. The perceived harshness of Canada’s North was a particular concern in certain articles in *The Roundel*, and authors sought to educate RCAF personnel about the advantages of a northern posting.

Page 14 of the first issue of *The Roundel* included a one-paragraph tidbit entitled “Our Genial North.” Addressing preconceived notions of the frigid temperatures of the Arctic, the short piece begins by noting that the world’s coldest spots were not within the Arctic Circle: the record went to Riverside, Wyoming, at minus 90° F., and the lowest temperature in Pt. Barrow, Alaska, was a comparatively balmy -56° F. Instead, the piece explains that the winter climate in the Arctic is “relatively dry” with little precipitation – what appeared to some outside visitors to be a blizzard was just previously fallen snow blown around by high winds prevalent in the region.³⁷

Along the same vein, G/C Patriarche’s previously-mentioned article on Arctic strategy dispels the myth of the Arctic as purely “a barren waste of snow and ice inhabited by polar bears, explorers and eskimos [sic].” Although noting that the weather can get nasty during the winter, “much of the land as far north as the tip of Greenland clears during the summer, vegetation and animal life thrive, and

³⁶ *Ibid.*

³⁷ “Our Genial North,” *The Roundel*, vol. 1, no.1 (November 1948): 14.

considerable open water is found.”³⁸ Furthermore, noting the almost continuous sunlight during the summer, Patriarche reveals that the spring thaw was quick and the summer was much warmer and longer than popularly understood. “Life for both men and animals” he concludes, “presents no great problem other than that of the ever-present mosquito.”³⁹

Such considerations did not dispel geography and the obvious isolation and remoteness of Northern operations. The psychological issue of operating in the High North away from home is a major theme of a 1950 *Roundel* article by RCAF Air Transport Command Warrant Officer Second Class (WO2) R.B. Hampton entitled “Arctic Glimpses.” Based on his own experiences while assigned to RCAF Station Resolute Bay, WO2 Hampton noted that the best way for air force personnel to counter feelings of desolation, loneliness, and depression – especially during the long periods of never-ending darkness during the winter months – was to establish “a regular Station routine” to take their minds off these drawbacks of Northern deployments and focus on the work that needed to be done.⁴⁰ This kept men busy, as did rest and recreation during time off. “Most evenings,” Hampton explained, “were spent in playing cards, darts, table hockey, or in reading or sleeping.”⁴¹

Depression was uncommon, according to the young RCAF airman. If any man showed any signs of it, he was allowed “to remain in his quarters until he felt in a better mood.” Recognizing the sensitivity of this depression issue and desiring to maintain productive and friendly relationships between these men deployed to an isolated location in the far North, Hampton notes that all personnel “were careful not to ‘rib’ him at such times.”⁴² WO2 Hampton concluded by debunking the popular notion of a deployment to northern units such as Resolute Bay as a bleak experience. For an airman, the key to deploying to the Arctic was to “honestly tr[an]sfer to preserve a healthy and cheerful attitude.” In particular, Hampton suggested that “the cultivation of a hobby or interest in the history and geography of the area helps to pass the time and can make the experience and educational and even a most pleasant one.” Moreover, Hampton reminds airmen in his closing sentence, “there is always the assurance that one’s tour of duty is only temporary!”⁴³

In fact, it was RCAF policy to ensure that deployments to the far North “were shorter, consisted of more transfers, less security of tenure, and less continuity of operation than other peacetime service appointments.” Given the isolation and

³⁸ Patriarche, “The Strategy of the Arctic,” 38.

³⁹ *Ibid.*, 39.

⁴⁰ Hampton, “Arctic Glimpses,” 39.

⁴¹ *Ibid.*, 40.

⁴² *Ibid.*, 42.

⁴³ *Ibid.*

harshness of the winter during Arctic deployments, the RCAF leadership genuinely sought to maintain some kind of normalcy for deployed air force personnel.⁴⁴ It was crucial to eliminate preconceived notions about the ruggedness of living in RCAF stations in the far north by providing airmen a sense of modernity in their accommodations and daily lives.⁴⁵ An appealing article from the August 1949 issue of *The Roundel* entitled “So You’re Going North?” addressed this very issue.⁴⁶ Written by Squadron Leader (S/L) D. Gooderham, it made excellent use of tongue-in-cheek humour. The goal was to eliminate “ignorance” amongst RCAF personnel “of all matters relating to the Canadian Arctic.” In particular, the RCAF brass instructed Gooderham “to provide Enlightenment, that those who are posted or who may be posted into the North may read and take comfort. Gen them up so that they neither take fear at anything nor overlook those things that may make their sojourn therein more pleasing.”⁴⁷ The author assumed this task with great enthusiasm, while promising to give as accurate an account of the Arctic as possible. In his own words: “Since I understand that most of the upper Brass can read, I cannot say just what I thought; but I can at least assure you that what I write below will in no way be coloured by any attempt to improve the picture.”⁴⁸

S/L Gooderham echoed the conclusions of WO2 Hampton by emphasizing that the first key to an Arctic posting was approaching it with a positive mental attitude:

If you come here with the idea that maybe it won’t be too bad and that it might even be interesting, you’ll probably find it just that, and possibly even better. If, on the other hand, you come up firmly convinced that you won’t like it, you will in all probability have a grim time for at least a part of your tour.⁴⁹

Much like other *Roundel* articles, Gooderham broached the issue of weather, disassociating the word “North” with the word “Cold.” Although he admits that winter winds make Arctic stations especially cold, he drew the analogy with Winnipeg - a relatively southern Canadian city known for its bitter winters. “There have, indeed, been occasions when [Arctic winters] approached the frigidity it frequently

⁴⁴ Goette, “Air Defence Leadership,” 57-58; DHH 74/649, “The Air Defence of Canada,” 97. Quote from former.

⁴⁵ For more on efforts by the Canadian government to bring greater modernity/modernism to locations in Canada’s north see P. Whitney Lackenbauer and Matthew Farish, “High Modernism in the Arctic: Planning Frobisher Bay and Inuvik,” *Journal of Historical Geography*, vol. 35, no.3 (July 2009): 517-544.

⁴⁶ S/L D. Gooderham, “So You’re Going North?,” *The Roundel*, vol. 1, no.10 (August 1949): 23-25 (doc.5-1).

⁴⁷ Ibid.

⁴⁸ Ibid.

⁴⁹ Ibid.

attains at the corner of Portage and Main [in Winnipeg],” Gooderham explained, but “fortunately, unlike you effete types down south, *we* do something about it when it gets really cold. We even go to the ridiculous extreme of covering our ears.”⁵⁰

On the topic of heat inside buildings on northern bases, Gooderham observed that “the occupants have to struggle through as best they can with temperatures of 68°” Fahrenheit. Covertly emphasizing modernity, he clarified that “these dull, uninteresting temperatures are attained without benefit of blubber lamps. Being fresh out of blubber lamps, the Air Force has had to resort to steam heat or oil-burning stoves.”⁵¹ Moreover, one could not wash oneself in the traditional Arctic practice of “sewing oneself into the red flannels and applying whale oil to the face... [because] some sluggard in Supply” failed to procure the whale oil, so the airmen had to make do with “water systems, boilers, showers, wash-basins, and washing machines.”⁵² His humour preyed upon popular misconceptions that equated Arctic life with the traditional survival practices of the Inuit which, while ingenious in their own right, seemed anachronistic in the modern world.



Figure 2: Ray Tracy’s humorous attempt to address myths about amenities in the Arctic⁵³

⁵⁰ Ibid.

⁵¹ Ibid., 24.

⁵² Ibid.

⁵³ Cartoon by Ray Tracy in *The Roundel*, vol. 1, no.10 (August 1949), 24.

Gooderham also touched on the psychological issue of the long periods of daylight during the summer and the extended stretches of darkness during the winter. In particular, he mentioned that the summer was more difficult for air force personnel than the winter because extended periods of daylight makes it difficult to sleep – a simple reality that tended to shorten tempers. Food, however, was no cause of worry. The RCAF officer reassured his air force brethren that “a combination of an expanded ration scale and top-flight cooks” meant that food was better at these bases than at RCAF stations further south.⁵⁴ Gooderham also pointed out that the worst part about being posted to the North was the separation from family. Married quarters were not available for the most northern bases. To compensate, airmen benefitted from a short tour of duty for northern postings (only six months compared to one or two years in more southern bases); fairly regular mail service and “radio messages for urgent occasions or when aircraft cannot get in”; and air drops of supplies when aircraft were unable to land. In the latter case, “the odd bottle of beer gets broken in the process, but there is usually enough for the Saturday night party.”⁵⁵

Along the same lines, opportunities for recreation also played heavily into Gooderham’s depiction of the “friendly Arctic” (to borrow Vilhjalmur Stefansson’s famous characterization).⁵⁶ When the weather was favourable this included fishing and hunting – activities that “many people would gladly pay much money” to do down south. Indoor activities were also popular, including movies, hobbies, crafts, music, sports equipment, and photographic equipment -- although it was up to the individual to make the most of these opportunities. After offering a few more suggestions for RCAF personnel who might deploy to the Arctic – including ensuring “that arrangements are made for adequate funds to be forwarded to your family” – Gooderham concluded that “it is not altogether impossible that you will return from the North alive and healthy. If your sanity has suffered a slight decline, you will no doubt immediately be recommended for a posting to AFHQ. Good luck to you.”⁵⁷ Clearly, being posted to Canada’s north was not as bad as some RCAF personnel thought it would be – provided of course they were educated on the experience by articles that fostered Arctic “air mindedness” such as this one in *The Roundel*.

Articles and features in *The Roundel* also helped develop Arctic “air mindedness” by emphasizing modernity and normalcy for postings to the region. For example, an article in the March 1950 issue discussed sustenance in case a crew had to face a forced landing in the Arctic. Titled “For the Arctic Gourmet,” this article used

⁵⁴ Gooderham, “So You’re Going North?” (doc. 5-1).

⁵⁵ *Ibid.*, 24-25.

⁵⁶ Vilhjalmur Stefansson, *The Friendly Arctic: The Story of Five Years in Polar Regions* (New York: Macmillan, 1922).

⁵⁷ Gooderham, “So You’re Going North?” (doc. 5-1).

humour – coupled with Ray Tracy’s clever cartoons - to outline a variety of edible plant and animal life available in Arctic climes (see doc. 4-4).⁵⁸

Another major theme was survival training for the northern climate. While some authors described the activities offered at the RCAF Survival Training school at Fort Nelson, British Columbia, others outlined tips for coping with the harsh climate at Northern bases or surviving if an airman had to ditch his aircraft in the Arctic region.⁵⁹ Features on RCAF bases located in more northerly parts of the countries such as Whitehorse and Goose Bay were common in *The Roundel* during this time period in “The Roundel Visits” series.⁶⁰ Other articles touched on efforts by the RCAF to enhance its Arctic operational capabilities, ranging from topics such as aircraft ski research at the National Research Council (NRC), to arming aircraft that operate in the Arctic, to name but a few.⁶¹

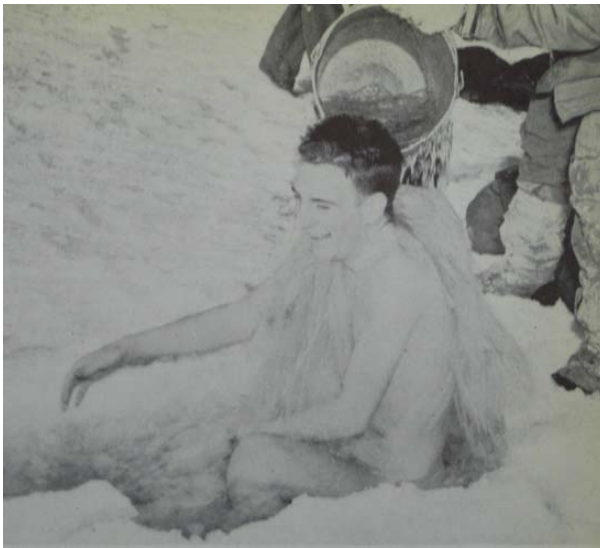


Figure 3: Arctic survival training⁶²

⁵⁸ R.V. Dodds, RCAF Director of Public Relations, “For the Arctic Gourmet,” *The Roundel*, vol. 2, no.5 (March 1950): 38-40 (doc. 4-4).

⁵⁹ F/L S.E. Alexander, “RCAF Survival Training School,” *The Roundel*, vol. 1, no.6 (April 1949): 9-11; F/O L.W.F. Beasleigh, “The Compleat Survivalist,” *The Roundel*, vol. 5, no.4 (April 1953): 40-42.

⁶⁰ See, for example, the following: F/L T.J. MacKinnon, “The Roundel Visits: RCAF Station, Whitehorse,” *The Roundel*, vol. 1, no.10 (August 1949): 28-33 and F/L M.M. Lee, “The Roundel Visits: RCAF Station, Goose Bay,” *The Roundel*, vol. 2, no.7 (May 1950): 17-27.

⁶¹ G.J. Klein, “Aircraft Ski Research at N.R.C.,” *The Roundel*, vol. 3, no.3 (February 1951): 30-35; S/L E.N. Henderson, “The Arctic Armourer,” *The Roundel*, vol. 4, no.2 (February 1952): 1-5 (doc. 4-2).

⁶² Beasleigh, “Compleat Survivalist,” 41.



Figure 4: Arming aircraft in frigid temperatures⁶³

Efforts to bring normalcy and modernity were not confined to RCAF personnel operating in the Arctic. One of the most important roles that the air force undertook in Canada's northern region was the Arctic re-supply strategic airlift missions that Air Transport Command undertook every spring. Starting in 1955, *The Roundel* began detailing operation "Spring Re-Supply" by describing efforts of the air force to bring upwards of 1.25 million pounds of food, fuel, equipment, and personnel ranging from "cooks, radio operators, mechanics, and meteorologists" from Canada and the United States to the five Canada-U.S. weather bases at various points in the Arctic archipelago (including Alert and Eureka).⁶⁴ The articles reiterated that the cargo included recreational supplies to help the personnel pass by long periods of time at these isolated bases. With pride, *The Roundel* also reported how ATC crews had become efficient at quickly landing on the thick ice, offloading, and then taking off again for another supply flight. Importantly, the Arctic re-supply articles also detailed how along with the supplies in one flight came a dentist to provide annual oral

⁶³ Cover of *The Roundel*, vol. 4, no.2, (February 1952).

⁶⁴ F/L J.D. Harvey, "Spring Re-Supply in the Arctic," *The Roundel*, vol. 7, no.8 (September 1955): 17-19; "Arctic Airlift," *The Roundel*, vol. 19, no.3 (April 1958): 20-21 (doc. 3-10); Corporal G.A. Walker and W.M. Noice, "Operation Re-Supply," *The Roundel*, vol. 11, no.5 (June 1959): 16-17 (doc. 3-7). Quote from first article, page 17.

hygienic care to personnel; as one article noted, “it was an interesting sight to watch the lines of patients anxiously awaiting his arrival.”⁶⁵

Efforts to bring southern Canadian normalcy and modernity to the North were not limited to RCAF personnel. They were also extended to the indigenous Inuit people of the Arctic. These endeavours included benevolence efforts such as providing mercy medical flights for those who were ill and dental care for individuals whose teeth were hurting.⁶⁶ They also consisted of efforts to bring the joy – and gifts – of the Holiday Season to the far North. These endeavours culminated in the mid-1950s with the famous “Operation Santa Claus,” which saw RCAF Air Transport Command air drop “something extra” to both RCAF personnel and Inuit communities at Christmastime.⁶⁷ All of these northern-related topics were covered in *The Roundel*, ensuring that RCAF personnel were conscious of what it took to live in the Arctic during a posting to the region and the positive contributions that their service made to Northern life.

Occasionally, small features in *The Roundel* gave tidbits of useful information to RCAF personnel on operating in the Arctic. For example, one feature brought to light the fact that de-icing one’s aircraft was an absolute necessity:

Figure 5: “Two little Eskimos eat strange fruit.” Inuit children receiving gifts as part of RCAF Air Transport Command’s annual Operation “Santa Claus”⁶⁸



⁶⁵ Ibid. Quote from Harvey, “Spring Re-Supply,” 18.

⁶⁶ “Mercy Flight,” *The Roundel*, vol. 9, no.8 (October 1957): 2 (doc. 3-9); Dr. P.E. Moore, Director, Indian Health Services, Department of National Health and Welfare, to Air Marshal Wilfred Curtis, Chief of the Air Staff, National Defence Headquarters, reproduced in “A Tribute to S.A.R.,” *The Roundel*, vol. 3, no.5 (April 1951): 47; [front cover], *The Roundel*, vol. 5, no.2 (February 1953).

⁶⁷ F/L J.D. Harvey, Director of Public Relations, “Operation Santa Claus,” *The Roundel*, vol. 6, no.2 (February 1954): 44-46; F/L J.D. Harvey, “Operation ‘Santa Claus,’” *The Roundel*, vol. 7, no.2 (February 1955): 16-20; See also F/L S.E. Alexander, “How Father Creesimiss Came to Cambridge Bay,” *The Roundel*, vol. 3, no.1 (December 1950): 34-35.

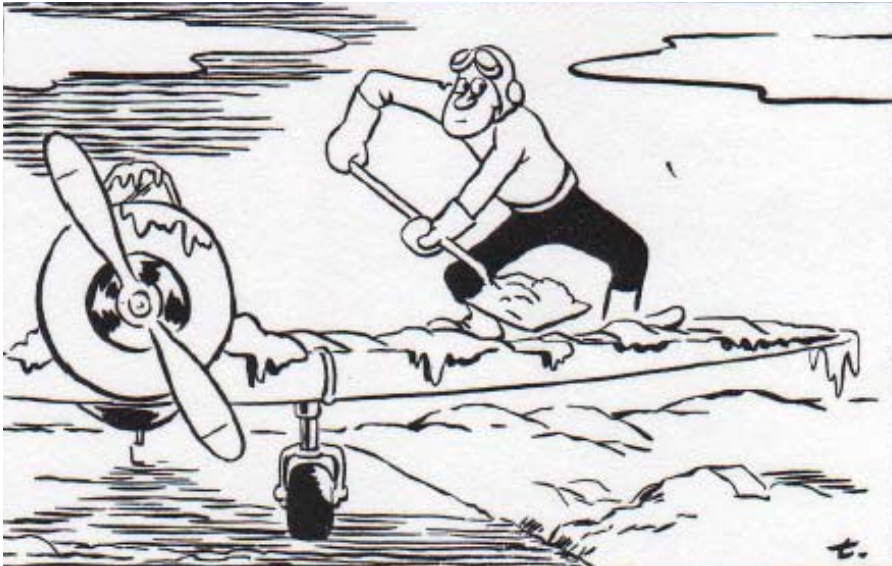
⁶⁸ Harvey, “Operation ‘Santa Claus,’” 16.

There is often a thin coat of ice under the fluffy blanket of snow which has accumulated on the wings of your plane. Don't depend on the snow blowing off during take-off, even the light kind, and check for ice. Falling snow sticks at temperatures above 10°F. It also forms a coat of ice between 32 and -10°F.⁶⁹

Another feature warned about the perils of guessing the depth of snow on the ground from the air.⁷⁰ One informative piece suggested that aircrew flying in snowy conditions where it was difficult to determine the distance to the ground should carry a pine tree (or "some object of known size") with them to drop on the ground for use as a point of reference for landing.⁷¹

The Roundel also reported on efforts by RCAF personnel working in the Arctic to make the best of their operating conditions through the use of creativity and humour. For instance, some clever airmen began a custom in the early 1950s to invest individuals who had crossed the Arctic Circle by air into the Order of Airborne Ice

Figure 6: De-Icing was definitely required while operating in the Arctic⁷²



⁶⁹ "Take it Off!," *The Roundel*, vol. 4, no.2 (February 1952): 32.

⁷⁰ "Snow-Depth Can't be Guessed," *The Roundel*, vol. 4, no.2 (February 1952): 1-5.

⁷¹ "Take it Off!," *The Roundel*, vol. 4, no.2 (February 1952): 32.

⁷² "Don't Forget Your Pine Tree," *The Roundel*, vol. 4, no.1 (January 1952): 35. This

⁷² Cartoon by Ray Tracy in "Take it Off!," 32.

Worm. Members of the order included such distinguished individuals as CAS Air Marshal Wilf Curtis and even the Duke of Edinburgh, who as official members received their own personalized Ice Worm Certificate.⁷³

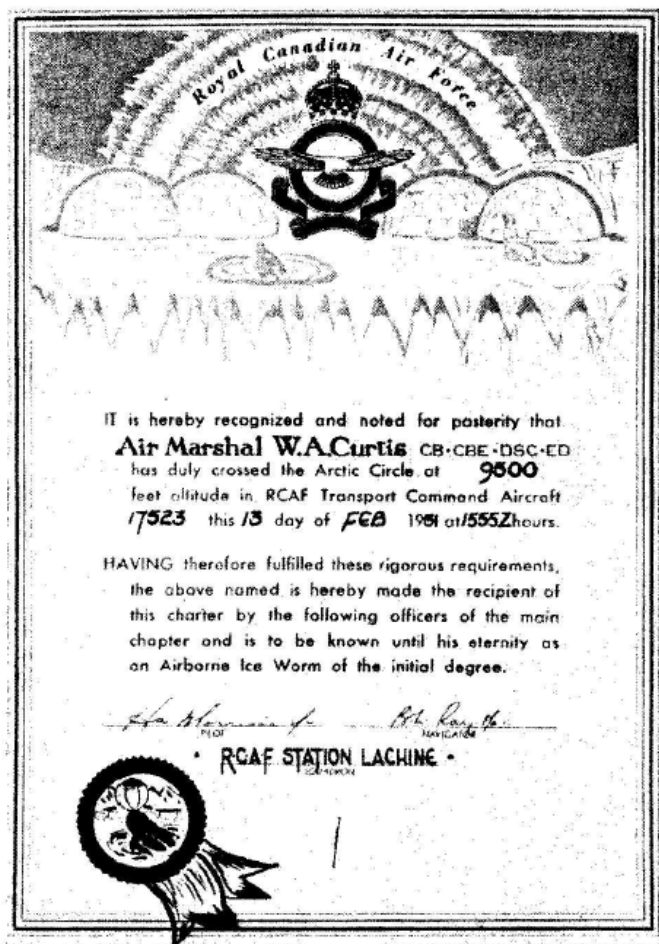


Figure 7: Air Marshal Curtis’s official certificate of Membership of the Order of the Airborne Ice Worm⁷⁴

⁷³ “Arctic Nature Note,” *The Roundel*, vol. 4, no.7 (July-August 1952): 46; “Ice-Worm Certificate,” *The Roundel*, vol. 7, no.1 (January 1955): 32. Although ice worm species exist, Canadian popular culture usually equates them with Robert Service’s “The Ballad of the Ice-Worm Cocktail,” wherein a fake ice worm made of spaghetti is the subject of a bar room wager, or the popular interwar folk song “When the Ice Worms Nest Again.” See Robert W. Service, *The Trail of ’98* (New York: Grosset & Dunlap, 209), and Edith Fowke, “When the Ice Worms Nest Again,” *The Canadian Encyclopedia*. Thanks to Whitney Lackenbauer for this explanation.

Other RCAF personnel employed their literary skills by writing poetry about their experiences on Northern Canadian postings. For example, Corporal W.F. Kervin at RCAF Station Whitehorse penned a humorous poem entitled “Baby, It’s Cold Inside.” Based on explicit restrictions against adjusting the thermostat, a sample verse read:

Do not touch the many switches,
Do not fool around with knobs,
Do not change the calibration –
Muffle up your frozen sobs!
Do not kick it, do not bash it,
Do not lift it from the floor.
Just be careful how you treat it
And it might warm up some more.⁷⁵

Additional short pieces consisted of expert reviews of books and manuals produced by the RCAF and the NRC on Arctic surveying and navigation (including publications by noted RCAF Arctic navigator W/C Keith Greenaway).⁷⁶ Others included announcements of honours for notable accomplishments by RCAF personnel during Arctic operations. For example, the August 1958 issue of *The Roundel* announced that the commanding officer of 408 Photographic Squadron, W/C J.G. Showler, had been awarded the 1957 Trans-Canada McKee Trophy for his unit’s Arctic survey missions using SHORAN.⁷⁷ Unfortunately, *The Roundel* also had the sad duty to report on fatal air accidents that occurred in RCAF Arctic operations, such as the dedication of a memorial cairn to seven RCAF airmen who lost their lives when their Lancaster crashed at Alert on Ellesmere Island in July 1950.⁷⁸ This piece was an unfortunate reminder of the difficulties of operating in Canada’s northern region. Along with the variety of features mentioned above, it contributed to developing Arctic “air mindedness” amongst RCAF personnel.

⁷⁴ “Ice-Worm Certificate,” 46.

⁷⁵ Corporal W.F. Kervin, “Baby, It’s Cold Inside,” *The Roundel*, vol. 4, no.4 (April 1952): 5. This poem was re-printed from the RCAF Station Whitehorse newsletter the “Knee Bird.”

⁷⁶ Svenn Orvig, Review of Moira Dunbar and Keith R. Greenaway, “Arctic Canada From the Air (Ottawa: Defence Research Board, 1956). Dr. Orvig was an Associate Professor in the Department of Geography at McGill University and the former Director of the Montreal Office of the Arctic Institute of North America. Greenaway, sadly, recently passed away after decades of service to his country. For a good account of his life, see: Colonel Morris Gates, “The Passing of an Icon: Brigadier-General Keith R. Greenaway, CM, CD (Ret) 1916-2010,” *Airforce Magazine*, vol. 34, no.1 (Spring 2010): 9-23.

⁷⁷ “W/C Showler Awarded McKee Trophy for Arctic Survey,” *The Roundel*, vol. 10, no.6 (August 1958): 31-32 (doc. 3-7). For more on this unfortunate accident, see the article by Rachel Lea Heide in this publication.

⁷⁸ “Dedication at Midnight,” *The Roundel*, vol. 5, no.10 (November 1953): 18.

Reflections on *The Roundel*

The RCAF leadership utilized the service's magazine *The Roundel* to reorient strategic geographical thinking of air force personnel and inculcate a sense of Arctic "air mindedness" during the early Cold War. Not only did *The Roundel* promote awareness of the strategic necessity for air force personnel to deploy to the Arctic, but articles addressed specific operations in Canada's north. By emphasizing normalcy and modernity, they also highlighted the surprisingly good living and working conditions at RCAF Arctic bases. Other features in *The Roundel* addressed issues such as tips for Arctic flying, survival in the harsh climate, while some RCAF personnel utilized their creative, writing, and humour skills to give a positive depiction of what may have otherwise been perceived as a dreary and depressing posting to an Arctic unit. In any event, having an outlet like *The Roundel* to examine issues relevant to the RCAF in Canada's north was something that the service's leadership and personnel could appreciate, and it went a long way towards the development of an Arctic "air mindedness" amongst all who regularly read the service publication. Moreover, the publication of Arctic-themed articles did not cease after the 1950s. *The Roundel* continued to foster Arctic "air mindedness" until it was discontinued in 1965.⁷⁹

⁷⁹ For example, the entire April 1960 issue of *The Roundel* was dedicated to the Arctic. "Special Arctic Issue." *The Roundel*, vol. 12, no.4 (May 1960).

Section 1

NORTHERN SKYTRAILS

The Story of the Work of the R.C.A.F. in Canada's Arctic and Sub-Arctic

by

FLT. LT. E. P. WOOD, D.F.C.

1-1. INTRODUCTION

Part 1 Vol. 1, No. 1 (November 1948)

“Will Canada remember that the Royal Canadian Air Force first removed the veil of secrecy from our treasure-laden Northland to mark the opening of an epoch-making period of development? Or that immeasurable wealth was conserved by aerial forest protection and that invaluable photographic and survey work was accomplished with greater dispatch than was hitherto dreamed possible?”

The above quotation is taken from an editorial in *Canadian Aviation*, March 1934. It was, very largely, in order to ensure that the R.C.A.F.'s northern saga *will* be remembered that the volume from which this series of articles is extracted has been prepared.

The task of its preparation was assigned by the Chief of the Air Staff to the Directorate of Intelligence (Air). Several months of research were necessary to dig out and correlate all the available data, but the time and effort expended have been well rewarded. The resultant volume contains about 500 typewritten sheets, some 200 of which read like the adventure stories of our childhood.

In serializing the original volume for publication in *The Roundel*, much material has been omitted as having little interest except for the historian or the arctic specialist. All that is sought in this and the ensuing articles is to give the reader a clear and factual conception of what is perhaps the more romantic, but also the less publicized, aspect of the R.C.A.F.'s activities.

It is thought desirable, however, that before proceeding with the main theme, namely the breaking of our northern skytrails, the reader should be fully acquainted with the background of the Service which has done, and is still doing, so much to break them. This first instalment, therefore, gives a very brief résumé of the

R.C.A.F.'s history, from its hesitant beginnings to its honoured and established position among the post-war Air Forces of to-day.

For the sake of those readers who may not be familiar with that history, the writer craves the indulgence of those (it is to be hoped) many who are.

1. THE R.C.A.F

The Air Board

The termination of the 1914-1918 war released a large number of Canadian pilots, many of whom, on their return home, sought to continue flying as a civil occupation. Small, and often 'hay-wire', flying enterprises made their appearance all over the country, and in the end a situation existed which called urgently for the establishment of regulations for the protection of the general public and the pilots themselves.

The Government therefore created an Air Board (June 1919), whose duty it was to guide and develop Canadian aviation along sane lines. One of the first tangible results of the Air Board's work was the publication of *Air Regulations, 1920*.

The C.A.F.

The Air Board, which included among its members the Ministers of Militia and Defence and Naval Service, gave its attention quite early to the constitution of a Canadian Air Force, which was finally approved by order-in-Council in February 1920.

The idea underlying the formation of the C.A.F. was to invite former officers and airmen of the R.A.F. to offer their services as members of the C.A.F. on the understanding that they would, in peacetime, not ordinarily be called upon for active duty for more than one month in any two years. The force was to be a militia non-permanent force, almost all the personnel were to be non-professional, and the professional personnel (negligible in number) were merely to form a nucleus at a training centre.

Reorganization of the Air Board

As the original Air Board had completed the preliminary organization work for which it had been appointed, it was decided to reorganize the Board to enable it to perform its dual duty of regulating civil aviation and administering the C.A.F.

The purposes of the new Board, which was reorganized in April 1920, were as follows:

1. The regulation of civil aviation, and its encouragement.

2. The conduct of civil government air operations (forestry protection, photographic surveys, fishery patrols, etc.).
3. The air defence of Canada, including the administration of the C.A.F.

C.A.F. Training (1920-1922)

Camp Borden was opened for training on October 1st, 1920, three weeks after the formation of No. 1 Wing.

No. 1 Wing comprised a school of special flying (Avro training aircraft), a flight of fighter scouts (SE5's and Camels), a flight of bombers (DH9A's), a ground instructional school, and equipment, victualling, medical and camp maintenance branches.

Training was carried out under the 28-day refresher scheme, using wartime equipment, until the end of March 1922. It was realized then, however, that the period of training was too short to keep men properly trained in Air Force duties, and that the expenditure was not really warranted. The granting of refresher courses to officers and airmen who had served in the war therefore ceased, the staff was reduced, and a number of surplus officers was sent to carry out flying operations for other government departments at various stations throughout the country.

Formation of the Dept. of National Defence

In 1922 the Government decided to centralize the control of the defence forces of the Dominion, and an Act of Parliament was passed constituting the "Department of National Defence" by the amalgamation of the Department of Militia and Defence, the Department of the Naval Service, and the Air Board under one minister. The Act came into effect on 1st January, 1923, and simultaneously the Militia Council and Air Board were dissolved.

On 29th June, 1922, an Order-in-Council had been passed approving a temporary organization for the C.A.F. to cover the transition period. Under this, the personnel of the operational branch of the Air Board, who were then civil servants engaged in flying operations for other government departments, were absorbed into the Air Force. The whole organization was placed under a Director of the Canadian Air Force, who was responsible to the Chief of Staff (Militia Service) for the control of aeronautics in all its phases, civil as well as military. This was the basis of organization when the National Defence Act came into force in January, 1923. A month later His Majesty the King approved the designation "The Royal Canadian Air Force."

Formation of R.C.A.F. on Permanent Basis

On 1st April, 1924, "The King's Regulations and Orders for the Royal Canadian Air Force," providing for an Active (Permanent and Non-Permanent) Force and a Reserve, became effective.

The Permanent Active Air Force was to consist of officers and airmen permanently embodied or employed for continuous service and available for general service. It was to be maintained for the instruction of the Non-Permanent Active Air Force—the latter to comprise such units or detachments and other formations as were from time to time named by the Governor-in-Council.

The Air Force, the strength of which was at this time 61 officers and 262 airmen, did not immediately engage in activities of an exclusively military nature. Bases were taken over from the Air Board at Vancouver, High River, Winnipeg, Ottawa, and Dartmouth, as well as numerous sub-bases. From these points flying operations were carried on as in the past, except that the personnel engaged in them were no longer civilians.

The establishment of the Air Force as a defence arm was begun under serious handicaps. In the first place, the demand for operational personnel by other government departments was unremitting. In the second, funds were grievously lacking. By degrees, however, primary flying instruction was augmented by courses in military flying and allied subjects, to which officers were posted as they could be spared. The central training establishment was at Camp Borden, and courses in flying and other Air Force duties were held there each summer for a new generation of pilots to replace the older war-trained personnel as necessary.

1927 Reorganization

In July 1927, owing to the increasing requirements for aerial work of all kinds, the following four separate branches of the air services were formed within the Dept. of National Defence:

1. *The Directorate of Civil Government Air Operations*
Responsible for control of all operations by government aircraft other than operations of a military nature.
2. *The Controller of Civil Aviation*
Responsible for administration of Air Regulations, etc.
3. *The Aeronautical Engineering Division*
Responsible for all technical matters for the air services.
4. *The Royal Canadian Air Force*

However, civil government work soon increased again to such an extent that it completely over-shadowed the training and organization of the R.C.A.F. for war. Added to this, in 1928 the growth of the flying club movement created a new

demand for pilots. By March 1929, out of a total of 131 officers and 590 airmen, approximately half was attached for duty with the other branches of the air services.

Civil Government Air Operations

Much of the work done by the Air Force for other civil government departments embraced the northern section of Canada and came to the knowledge of the public sparingly. By 1932, the Air Force counted as past history the Hudson Straits Expedition, which on its return in 1928 contributed greatly to the knowledge of the meteorological and navigational conditions prevailing in those perilous waters lying along the new grain route from the Prairie Provinces to Europe. It had also photographed approximately 470,000 square miles of the Dominion for mapping purposes, using cameras, equipment and methods specially developed in Canada for the purpose. An area of 140,000 square miles of forest lands was being patrolled annually for the detection and suppression of fires. Air mail routes had been surveyed and experimental flights made. Air Force aircraft were contributing to the efficiency of all government departments by transporting parties and officials into locations which heretofore had been inaccessible except by canoe and dog sled. The pilots of the force had covered the country from coast to coast and from the United States boundary to the southern shores of the Arctic Ocean, and had gained a vast amount of useful experience in operating aircraft under the difficult conditions found throughout Canada's uninhabited areas.

Relinquishment of Civil Operations

With the coming of the depression in 1932, and the consequent discharge of almost a third of the R.C.A.F., the Service side for the first time took precedence over civil operations.

Quite apart from the reduction in the financial appropriations, however, there was another reason for the decline in the R.C.A.F.'s extraneous commitments. Prior to the depression, several commercial firms and certain of the Provincial Governments had entered the field of air service operations. This fact, coupled with the Air Force's decreased strength, resulted eventually in the taking over by the commercial and government operators of the great majority of the work previously performed by the R.C.A.F. Therefore, in November 1932 the R.C.A.F. and the Directorate of Civil Government Air Operations were consolidated and, together with the Aeronautical Division, were placed under the Director, R.C.A.F., who thereupon assumed the new title of "Senior Air Officer."

1932-1935

The only development of any real note during these years was the belated formation of the Non-permanent Active Air Force. By 1935, N.P.A.A.F. squadrons had been formed at Vancouver, Toronto, Winnipeg, Montreal, Hamilton, and Regina. It might be noted that the name of the N.P.A.A.F. was not changed to "Auxiliary Active Air Force" until December 1938.

1935-1939

With the increasing political tension in Europe in 1935, a more rapid pace of development was forced. Expansion immediately created a demand for personnel qualified as instructors, and, with the partial exception of survey photography, all operations for other government departments were discontinued.

Construction of the training centre at Trenton, which had been carried on as a relief project during the depression, was speeded up in 1936. Early in that year the technical training and army co-operation schools were moved to Trenton from Camp Borden, and the flying training and air armament schools followed them in June 1937. Three new specialist schools were formed to give instruction in navigation and seaplane flying, wireless and storekeeping. At the same time, stations and bases on both coasts were further developed and improved.

During 1938 three Commands were formed—Western, Eastern, and Air Training Commands, located respectively at Vancouver, Halifax, and Toronto. In December of this year, too, the title of "Senior Air Officer" was changed to "Chief of the Air Staff." Its holder was now responsible directly to the Minister of National Defence for the control and administration of the R.C.A.F.

The effect of these changes was to place the Air Force on the same footing as the Navy and the Army, and all powers previously exercised by District Officers Commanding, Military Districts, in relation to the R.C.A.F. were transferred to the respective Air Commands.

1939 to the Present Day

The history of the R.C.A.F. during the recent war years is too well known, at least in its broader aspects, to warrant recapitulation here. The following facts and figures, however, may be of interest.

From its tiny force of 4,000 men at the outbreak of war, the R.C.A.F. expanded to over 206,000 by the end of 1943 and held fourth place among the Air Forces of the United Nations. It developed and administered the great British Commonwealth Air Training Plan which produced 131,553 trained airmen for the British and Dominion Air Forces. At home the R.C.A.F. put over forty squadrons into the field. These squadrons, in addition to guarding our coasts and sharing in the Aleutian

operations, played a very important part in Co-operation with Coastal Command and the British, Canadian, and American Navies in the hard-fought battle of the Atlantic.

Overseas, the R.C.A.F. contributed forty-eight squadrons for service with the several Commands of the R.A.F. Fourteen of these units formed a special R.C.A.F. Group (No. 6) in Bomber Command; fourteen others constituted four Wings in the Second Tactical Air Force. Other squadrons flew with Coastal Command over the North Sea, the Bay of Biscay and the Atlantic, fought with the Desert Air Force from Alamein to Treviso, patrolled over the Indian Ocean, and carried supplies to our armies in North-Western Europe and Burma.

In addition to the personnel of these units at home and abroad, great numbers of Canadians served in R.A.F. formations in every theatre of war. The R.C.A.F. suffered 18,463 casualties in killed, presumed dead, and missings [*sic*]. It won over 8,948 awards for gallantry.

With the end of the War, retraction naturally occurred. However, it was short-lived. The R.C.A.F., the strength of which stands now at approximately 13,000, is rapidly once more becoming a fully operational air force. Training, both ground and air, is in full swing. Air Transport Command is carrying out regular scheduled flights to and fro across the Atlantic and the length and breadth of Canada. Two squadrons are fully occupied in photographic survey, and R.C.A.F. aircraft are constantly busy with Magnetic Pole exploration, geodetic survey, magnetic airborne detector operations, and the like.

Eight Auxiliary Squadrons are now activated, and more are in process of formation, while almost 14,800 Air Cadets are receiving carefully organized training in 175 squadrons located in all parts of the country.

1-2. EARLY SUB-ARCTIC OPERATIONS

Part 2 Vol 1, No. 2 (December 1948)

Introduction

The purpose of this article is to give some slight general idea of the earliest years of the Air Force's sub-arctic* operations. Although, perhaps, it is not until we reach the year 1927 that our story takes on a more adventurous quality (with the Hudson Strait Expedition), none the less, if we pause to consider the comparative novelty of the work to those engaged upon it, their constant (and unrecorded) need for improvisation, and the limitations of both equipment and personnel, the period of 1920 to 1926 is not without interest.

* The limits of the arctic and sub-arctic regions, as shown on our map, are those laid down by Trewartha in 1937.

As has already been said in the first article of this series, the Civil Government Air Operations Directorate was made responsible, in 1920, for the supervision and conduct of federal interdepartmental air activities. These activities were highly diversified in their natures. They eventually included:

forest fire patrols	photography
reconnaissance	customs preventive service
fisheries patrols	treaty payment flights
rust control dusting	air mail investigations
aeroplane testing	experimental work
transportation of government personnel	

Between the years 1920 to 1931 inclusive, the C.G.A.O. Directorate was responsible for 54,638 hours of actual flying. By far the greatest portion of the work was done for the Department of the Interior, with totals of 24,408 hours for forest patrols, 15,783 hours for aerial photography and topographical surveys, and 1,068 hours for geodetic survey.

The forest areas patrolled for fire detection were surprisingly extensive. For several of the early years the patrolled territory covered about 34,000,000 acres annually, and in 1929 and 1930 this area had increased to no less than 92,000,000 acres.

High River

One of the first bases used for forest patrols was Morley, in Alberta, which began operations in September 1920. Early the following year the base was moved to a better site at High River, whence the aircraft patrolled and photographed over a “beat” that extended from the Canadian border to north of Edmonton.

Roberval

At the request of the Quebec government, a base was opened at Roberval, on the shores of Lake St. John, in July 1920. Forest protection and survey patrols were flown from this base through three seasons, ending with the freeze-up late in October 1922. Thereafter the work was taken over by a commercial company under contract with the provincial government. Surveys carried out by the CAF between 1920 and 1922 extended as far north as Mistassini, and included detached operations over the Natashquan River, opposite Anticosti Island, and in the St. Marguerite River area, north of Seven Islands.

Victoria Beach

This air base, on the southern shore of Lake Winnipeg, was established in 1921 at the request of the Department of the Interior for the purpose of protecting forest reserves in Manitoba. The territory covered included the whole area around Lakes Winnipeg and Winnipegosis, as far as the eastern boundary of the Province. Minor operations included photography on the Winnipeg River for the Water Powers Branch, and also the conveyance of survey parties and their supplies in the district east of Lake Winnipeg. Needless to say, air coverage swiftly became very popular with the District Forestry officer, who was thereby able to dispense with the services of a large number of canoe-borne personnel.

During the winter months the machines and personnel, together with those from Norway House and The Pas, were withdrawn to the city of Winnipeg, where facilities for the overhaul and conditioning of aircraft had been arranged. As soon as weather permitted, the operating stations were opened. The machines were sent by rail to Victoria Beach, erected there and flown to the other bases as required.

Operations continued from Victoria Beach until 1926, when the base was moved to Lac du Bonnet, some miles to the south-east.

Norway House and The Pas

Meanwhile, the success of the forest patrols in southern Manitoba had led to the establishment of two sub-bases farther north at Norway House and The Pas. Work from these bases began in 1922, extending fire protection into districts far remote from civilization. The next year, in addition to forest patrols, the base at The Pas performed an important photographic operation for the Topographical Survey Branch, with a member of the Branch acting as camera operator and navigator under decidedly difficult mechanical and meteorological conditions. In 1925 the location of the base at The Pas was shifted to nearby Cormorant Lake.

From Norway House—or rather, from the District Forester's Headquarters on nearby Forestry Island, whence the aircraft operated—the first forestry patrol of the 1923 season was carried out on June 14th. In all, twenty forest fires were located from the air and handled under direction of the District Ranger at Norway House. During the latter part of the season the Forestry Branch detailed a forest engineer to accompany the machine on patrol, and much valuable work was done in forest type sketching. The area thus mapped amounted to approximately 2,500 miles. The flying on forestry work from Norway House during the 1923 season totaled to almost 76 hours, excluding a minor task of establishing a cache of provisions at Cross Lake for a Geological Survey party.

Indian Affairs

Another duty of the Air Force in those days was to assist the Dept. of Indian Affairs. This work began in 1922, when 21 flights were made for Indian Agents paying treaty money on two agencies in Manitoba. A typical example of these flights is provided by the story of one carried out in July 1924.

The party, consisting of the Indian Agent, a doctor, the pilot and the mechanic, proceeded to Cross Lake from Norway House. While the Indian Agent was paying treaty money, the pilot and mechanic assisted the doctor in vaccinating the Indians. On the following day, the work having been completed, the party returned to Norway House. Caches of gasoline had been placed at Oxford House, God's Lake, and Island Lake, so that the round trip to these points could be made without returning to the base. On July 31 a flight was made to Oxford House and treaty money paid there; but while attempting to leave for God's Lake, engine trouble developed shortly after take-off and the flying boat was forced to land. Since the damage to the engine proved to be so serious that they could not proceed, the party carried out the remaining part of the journey by canoe rather than wait for a second aircraft to be brought from Norway House.

On October 20, a telegram was received at Victoria Beach from Air Headquarters in Ottawa, stating that diphtheria had broken out in the Norway House district and asking if a flight could be made to that area. All aircraft had been withdrawn from the northern base ten days previously owing to the approach of the freeze-up. Twenty minutes after receiving the telegram, an aircraft was on its way to Selkirk to procure the antitoxin, and another was standing by ready to transport it to Norway House. Delivery was made there, after a flight of 320 miles, within six hours of the receipt of the headquarters wire.

Churchill River Survey, 1924

The operation order for this ambitious project was drawn up by Air Force Headquarters in conjunction with the Topographical Survey Branch. It called for photographs to be taken over an area "from The Pas to Pukkatawagon, thence west, along the Churchill River to Reindeer River, thence northerly along the Reindeer River to Reindeer Lake." After photographing the whole of Reindeer Lake, a return flight was to be made to "the Churchill River, and thence westerly to the Stanley Mission, and from the Stanley Mission to Ile-à-la-Crosse." A direct course was then to be taken to Prince Albert, and the Saskatchewan River followed to The Pas.

The journey in all was to cover some 2,500 miles and approximately 1,500 photographs were to be taken, which would give a plottable area of 15,000 square miles. If possible, a Dominion land surveyor from the Topographical Survey was to be carried as navigator and to direct the taking of photographs.

The aircraft, a Vickers Viking flown by Squadron Leader B. D. Hobbs, D.S.O., D.F.C., left Victoria Beach at 4:20 in the afternoon of July 18th and arrived at The Pas at 8:10 the same evening, after a flight of 325 miles. On July 21 the survey party flew to Pukkatawagon, taking photographs along the way until clouds intervened. The next hop, two days later, was to Rabbit River on Reindeer Lake.

(The following account of the trip is a paraphrase of Squadron Leader Hobbs' report.)

On arrival at Reindeer Lake the next day, a few circuits made before landing showed that, while Reindeer Lake was a very large body of water, its formation as shown on the existing maps was entirely misleading. The first impression of all the members of the crew was that it would be very difficult on the next flight to decide on the actual shore line. The whole district is a mass of intricate waterways spreading in all directions, and the lake itself is dotted with islands and everywhere indented with deep bays.

From July 23, and until the morning of August 1, the aircraft operated on Reindeer Lake. Most of the work was carried out from Rabbit River, where fuel was available, but as the operation called for a network of photographs of the whole lake district, a flight was made on July 27 to the settlement of Du Brochet at the extreme north end of the lake.

Continued interference by weather while the party was in the Reindeer Lake district afforded its members an opportunity to study the country and its inhabitants, and several trips were made by canoe through the numerous rivers and lakes in the district. Food, of which there was no shortage, consisted mostly of bacon and canned goods, with bannock to replace bread. There was little meat available but plenty of fish. Moose meat was extremely scarce. The residents attributed this to the absence of flies that year: the moose were not driven to the water. Since the Indian does not leave his canoe, but always hunts by paddling in the waterways, little meat was obtained. The large herds, numbering thousands, of caribou and reindeer, which roam the district during the winter, had all moved north to their summer grazing grounds in the "barren lands" by the time of the party's arrival.

With the exception of a few white people in charge of Hudson Bay and Révillon Frères posts, and a few independent white trappers and traders, the inhabitants of the country were all Indians.

The effect of the seaplane on the Indians was very similar to that noticed in other parts of the country where operations had previously been carried out for the first time. They would run into their huts or wigwams when the aircraft was landing, and its take-off always seemed to be the signal for them to make an appearance dressed in the most brilliant colours. They would sit staring at the anchored machine for hours at a time; and when it moved slightly in the wind, they would all get up and move back, gradually creeping forward until it moved again.

From Rabbit River the Viking flew to Pelican Narrows where it was detained for a week by bad weather. On August 9, it got through to Stanley Mission, where further

difficulties caused another delay. On August 11 conditions were again favourable and the machine got away easily. The Churchill River was followed to Ile-à-la-Crosse, and the flight continued slightly past the lake to a point on the Beaver River. This portion of the flight was not included in the programme, but as conditions were good it was decided to cover it with photographs. The weather then became overcast and a return was made to Ile-à-la-Crosse. Thence the survey was continued to Prince Albert, down the Saskatchewan to The Pas, and so back to Victoria Beach on August 14. During the operation the party flew over 44 hours, covered 2810 miles and took about 1700 photographs.

The concluding sentences of Squadron Leader Hobb's report read as follows:

“. . . the operation was complicated by factors not stressed in this report, such as flying in directions which would put the sun behind us as much as possible, as well as getting weather clear of clouds and so avoiding the chance of camera trouble where such intricate apparatus is used. There was also the fact that we were over quite unknown country where landings had to be made on unfamiliar water, with the added difficulty of getting altitude quickly in spite of a heavy load, in order that we could start photographing as soon as possible. That these, and many other adverse conditions, were safely overcome on the first really long expedition for exploratory survey, gives assurance that . . . even longer journeys may be planned with every prospect of success . . . provided the necessary fuel depots can be laid. I also consider that the operation fulfilled all the requirements of the Topographical Survey of Canada, as shown in the operation order.”

The official Report of Civil Aviation for 1924, in describing this flight, commented: “It is certainly the greatest ever undertaken for aerial survey; and, when considered in the light of practical results, is one of the most brilliant achievements in the history of flying.”

Northern Manitoba and Hudson Bay Railway Survey

Another important aerial survey was that carried out in 1926 over Northern Manitoba and the Hudson Bay Railway. The programme laid down in the beginning of the season was oblique photography over 30,000 square miles in eastern Manitoba and western Ontario, approximately 20,000 square miles in northern Manitoba, and over the Hudson Bay Railway as far as Port Nelson. Good progress was made with these operations, but it was not possible to complete all of them because of time lost through bad weather. The aircraft (a Viking) gave practically no trouble, though the load carried on most of the flights made was within a few pounds of the maximum permissible, namely 5,800 pounds.

The Viking reached Cormorant Lake, on the Hudson's Bay line, on the 17th September, and from that date continued its photographic flights. With the aid of continuous favourable photographic weather, it covered the area of approximately 24,000 square miles by October 5. The base was then moved to Norway House.

Unfortunately, the weather changed and only one more photographic day was obtained before indications of the approaching freeze-up at Norway House forced a move southward to Winnipegosis on October 13. From there further photographic flights were made for two or three days, when cold weather and heavy snowfalls forced the abandonment of the operations, and a return was made to Lac du Bonnet and finally to the Red River at Winnipeg.

Aircraft Types and Personnel Compromises

Flying in the sub-arctic was carried out at first on H.S. 2L flying boats, with one or two large twin-engined F.3's for fire suppression work. In 1923, steps were taken to replace these obsolescent types by more modern aircraft, and Viking amphibian flying boats were introduced in the fall of that season. During 1924, all work was carried out with this new type.

In 1925, to decrease the cost of further patrols, Avro seaplanes of single float type, powered by 210 h.p. Viper engines, were added for fire detection purposes, the larger aircraft being held in reserve to transport fire-fighting crews and their equipment. In addition, all bases and aircraft were fitted with radio which provided adequate means of communication between the forest and Air Service headquarters at Winnipeg and the three operating bases at Victoria Beach, Norway House, and Cormorant Lake, and from them to aircraft in flight.

Even now, when flying in unsettled districts where engine or other failure may mean a forced landing many miles from civilization, it is necessary to carry an emergency outfit. The equipment cannot be reduced without risk. Twenty-five years ago, however, the officer in charge of any operation such as those few mentioned above, frequently had to make a choice between adequate emergency equipment and a full crew of four—pilot, navigator, photographer, and mechanic. Usually he chose the former, reducing his crew to three and training the mechanic to operate the camera. (The results, when we study the photographs taken, were surprisingly good.) As regards the navigator, Dominion land surveyors were customarily carried—not only in order to guide the aircraft over the maze of waterways from station to station and to make survey notes that would assist in the interpretation of the pictures, but to ensure the safety of the party in the event of their being stranded far beyond human habitation.

1-3. THE RCAF IN THE SUB-ARCTIC, 1927 TO 1939

Part 3 Vol. 1, No. 3 (January 1949)

Air Commodore A. D. Ross, G.C., C.B.E.

Air Commodore Ross's career in the RCAF began in February 1929 when he finished his *ab initio* Pilot's Course, received his wings, and was posted to RCAF Station, Jericho Beach, Vancouver, for a seaplane course. The course lasted for seven weeks. It included instruction and practice on an Avro 504N single-float seaplane, a DH Moth seaplane, and a Vickers Vedette flying boat.

"This course," observes the Air Commodore, "was of little use to one destined for northern flying operations. On its conclusion, I was transferred to Winnipeg Air Station, where I found myself detailed as OC Transport Flight. The Flight, which consisted of four Vickers Viking flying boats and one Fairchild FC2 seaplane (each aircraft manned by a pilot and a crewman) did not really operate as such at all. All aircraft worked independently on operations, detailed by the CO of Winnipeg Air Station, and my sole duty as Flight Commander was to prepare a report at the end of each year. Early in May I was sent to Lac du Bonnet Sub-station to take over my aircraft and crewman, and to receive instruction on the Viking."

At Lac du Bonnet he found to his delight that his crewman was to be LAC "Plugs" Cooper. Cooper had been a Sergeant in the RFC and RAF, and a Flight Sergeant in the RCAF. He had just rejoined the Service after two years with Western Canada Airways. Cooper was one of about the only six people in Canada who really knew how to get the best out of the Rolls-Royce Eagle IX engines which constituted the inadequate power plant of the Viking.

Ross's first operational task was (in company with other very junior officers) to build a corduroy road through the muskeg from the air station to the highway. At odd intervals he managed to acquire about three hours' dual and two hours' solo on the Viking.

Experience in those days was gathered quickly—and in the hard way. Early in June, Ross was instructed to pick up a Topographical Survey party and, as soon as ice conditions permitted, take them to Pukatawagan on the Churchill River, whence they were to carry out an extensive survey of Indian Reserves. Throughout the summer he worked with them, moving them from place to place and keeping them supplied.

Ministration to the party's needs, however, was only a part of his duty during the next six months. He had, in addition, to fulfil a variety of other functions—which are perhaps best described in the Air Commodore's own words . . .

"Following the trip to Pukatawagan, I returned to Cormorant Lake, where I was based until the end of November.

"During this period I carried out a considerable number of forestry patrols. It was a bad fire year, and from time to time it was necessary to use every available aircraft. I also made quite a few flights transporting Government officials all over Northern

Manitoba and Saskatchewan, and carrying equipment for photographic flights that were working in the Reindeer Lake, Granville Lake, Foster Lake, and Cree Lake areas.

“It was in July that I first tried my hand as a photographic pilot. The attempt came to a quick and untimely end, I had been detailed as temporary replacement for an injured pilot of a photographic flight operating in the area between Oxford and Split Lakes. The flight was using Vedette flying boats, in which was installed a doubtful batch of Lynx engines.

“On my return trip to base (at Thicket Portage on the Hudson Bay Rly.) at the end of my first day’s flying, I encountered a line squall and lost two grasshopper springs from the engine almost at the same moment. I quickly decided on a forced landing in the nearest bit of water, which happened to be a rather narrow stretch of the Nelson River. Owing to turbulent air and lack of power—and maybe skill—I found myself in the position of having to crash on the windward and rocky shore or else into the water. I chose the latter, close to the shore.

“Neither my crewman nor myself was seriously injured, but our emergency equipment and cameras were all submerged and we were unable to salvage them. To add to our discomfort, heavy rain commenced as soon as we got ashore, and it continued for almost seventy-two hours.

“Towards the end of this period a party of Indians appeared on the scene, gave us bush tea, and offered to take us out to the railway via canoe. They told us one portage we would have to traverse, only a mile in length—but they neglected to mention another one which was twelve miles long and led through heavy wet muskeg. As we ploughed through the latter, the ferocity of the mosquitos was matched only by the ferocity of our language and our feelings towards Indians in general. However, after we’d done about six miles of it, the weather broke and we saw aircraft looking for us. In due course we arrived back at base, somewhat sadder and wiser; and after a rest I returned to Cormorant Lake.

“During the summer and fall of this year I made six so-called ‘mercy flights’, on one occasion beating the stork to The Pas by twenty minutes.

“Some time in September we received word at Cormorant that Col. McAlpine, President of Dominion Explorers Ltd., was missing with his party on a flight between Baker Lake and Great Bear Lake, via Bathurst Inlet and Coronation Gulf. All available RCAF and civil aircraft began a search for the missing men. As the winter drew closer, the search became more intensive, and it became necessary to replenish the stocks of fuel used in the search. Two other pilots and I were therefore employed in flying gas and oil to Lac du Brochet and Fond du Lac, the bases for search operations. While returning from the last of these trips, almost at the end of October, I ran into a heavy snow storm and was forced to land on Sisipuk Lake, on the Churchill River. The storm held us there for two days, at the end of which time we had to break ice out to open water in order to take off.

“I might remark, in passing, that the latter series of flights marked the first occasion on which ‘Prestone’ was tested as an aero-engine coolant in Canada. It

proved quite satisfactory. In fact, without it the operations could not have been carried out, as continuous sub-freezing temperatures prevailed at that time of year.

“I remained at Cormorant Lake until the end of November, when I was detailed for employment with the Civil Aviation Branch as an airways engineer in charge of construction on the air route then being developed between Winnipeg and Regina.”

The beginning of April 1930 found Ross again posted to the job of OC Transport Flight for the year. But once more circumstances decreed that he was to spend a great deal of his time on forestry operations, among which was an inspection trip over a large part of Northern Manitoba and Saskatchewan with the Hon. John Bracken, then Provincial Premier. He also took the Topographical Survey party back into the Reindeer Lake area to finish the work they had started the year before.

Towards the end of June, Flt. Lt. A. L. Morfee, OC Cormorant Lake, fell sick, and Ross assumed command of the base.

July was an extremely busy month. Ross did 112 hours' flying and was able to spend only three nights and one day at Cormorant Lake coping with the administrative end of his duties. During this month he moved the supplies and equipment of a photo flight from Cormorant Lake to Stoney Rapids and later to Lake Athabaska, and thereafter kept the flight supplied, making several exploration trips to assist its operations. In between all these activities he somehow managed to sandwich a Treaty Flight, which he describes as follows:

“At Norway House I picked up an Indian Agent, his clerk, an R.C.M.P. Sergeant, and several thousand brand new one-dollar bills. We paid treaty and held court at Island Lake, God's Lake, Oxford House, and Split Lake. It was a most interesting experience, lasting a week. The benefits of civilization and Christianity upon the Indian were, I must confess, not too well evidenced by the number of criminal cases that were heard and the pagan rites that were practiced sometimes only an hour after a missionary had held church service. I had the doubtful honour of being offered by an Indian his daughter in exchange for a ride in my aeroplane or a gallon of gas (value \$6.00). While on this trip, I was given the name 'Pemi-tou-haugen-okinow' (Cree spelling doubtful), meaning 'Chief of the flying gasoline canoe'.

“Following this operation, and during August, I spent most of my time on forestry work, including two search-rescue flights. About this time we received our first Vancouver flying boat as a replacement for the tail-wagging, low-flying Varuna. This new aircraft proved ideal for the job, as it was able to carry large loads into and out of small lakes. None the less, the spectacle and odour of sixteen smoke-begrimed Indians sitting in the cabin chewing and spitting tobacco was not too good for the morale or the temper.”

With the return of Flt. Lt. Morfee to duty in September, Ross was relieved of his command and began the task of moving his survey parties and photo flights out of the country before freeze-up. While he was thus occupied, his old Viking decided one day that it had had enough. The bottom collapsed while he was landing at Cormorant Lake, and the aircraft sank immediately in twelve feet of water. Cpl.

Cooper, who was still his crewman and staunch stand-by, suffered a broken nose; Ross, as he expressed it, “was merely pained, grieved, and surprised.” This event virtually ended his flying for the season.

In the middle of October a three-day blizzard swept across the country. By Herculean efforts on everyone’s part two aircraft were dragged out of the water during the height of the storm, but the remainder were frozen in and had to remain there until the ice was thick enough for them to be hauled out on top of it. There were, however, compensations. Thousands of caribou, driven south by the storm, suddenly made their appearance in the district, and all personnel hunted and feasted royally for a while.

In December, Ross went on leave to Winnipeg. When he went back to duty again, it was no longer in the country to which he had become so attached, but in the more prosaic surroundings of Camp Borden.

Flt. Lt. D. Harding and Flt. Lt. R. K. Rose.

In July 1930 an extensive Treaty Flight was undertaken in two Bellanca seaplanes piloted by Flt. Lts. D. Harding and R. K. Rose. Fifteen stops were scheduled and a sum of \$25,000 was carried for distribution among the scattered Indian tribes of the far North. The main purpose of the flight was to visit the West Coast of Hudson Bay to draw up agreements with two unattached tribes, so that all the Indians in Northern Ontario would have treaties providing them with gratuities and annuities. A doctor was carried, as well as officials of the Dept. of Lands and Forests and the Dept. of Indian Affairs.

The latter Department also used the expedition to make an inspection reaching far into the Mackenzie River district. C. C. Parker, of the Department, travelled from Edmonton to the end of steel at Waterways, where he was picked up by the aeroplanes and flown up to Fort Good Hope. With him went Lt. Col. E. Forde, Acting Director of Signals at Ottawa, in order to inspect wireless stations in the arctic region.

Flt. Lt. F. J. Mawdesley and Flt. Sgt. H. J. Winny

Another flight that stirred popular imagination was that headed by Flt. Lt. F. J. Mawdesley. Flying a Fairchild seaplane, he left Ottawa on July 6th, 1930. With him, as pilot of a Vedette flying boat, went Acting Flt. Sgt. H. J. Winny. The two aircraft were bound on a trip through the barren lands of the Northwest Territories for the purpose of inspecting gasoline and supply caches and of opening up air routes in practically unknown areas. Corporal S. C. Dearaway, RCAF, was taken in the Vedette to carry out the important photographic work, while Mr. Colin S. McDonald, well-known surveyor and engineer, accompanied Flt. Lt. Mawdesley. Other airmen were carried for special duties.

This was primarily a survey flight intended to precede extensive air operations in the Far North. Strip maps were secured of little-known air routes around the Mackenzie Basin, the Great Slave and Great Bear Lakes, and in the wide stretch from Hudson Bay to the Mackenzie River. In addition, a check-up of gasoline and repair caches was made, some of which had been established in remote places by steamers and dog teams and—in certain cases—aeroplanes.

On leaving Ottawa, the flight proceeded to Aklavik via the Mackenzie River, then to Great Bear Lake and Coronation Gulf and on to Great Slave Lake. Following the Thelon River to Baker Lake and Chesterfield Inlet, it proceeded north to Cape Fullerton, Wager Inlet, and Repulse Bay. After the return to Chesterfield, it flew south to Churchill, arriving there on Sept. 21st.

By the time it reached Ottawa, the detachment had flown some 12,000 miles, a good proportion of which lay over unknown territory and unmapped routes. 31,000 photographs were taken during the flight.

1-4. The R.C.A.F. in the Sub-Arctic: 1927 to 1939 (Cont'd)

Part 4 Vol. 1, No. 4 (February 1949)

No. 3 General Purpose Detachment

On July 1st, 1931, two Bellanca Pacemaker seaplanes arrived at Fort Churchill for the purpose of carrying out photographic operations on the west coast of Hudson Bay and the lakes and inland waterways in an area bounded roughly by Maguse Lake, Kaminuriak Lake, Rankin Inlet, and Hudson Bay. With them came their crews: Flt. Lt. A. F. ("Sandy") MacDonald, O.C. of the Detachment; F/O P. B. Cox, pilot; Cpl. Lunney, rigger; LAC Green, fitter and camera operator; LAC Harvey, fitter and camera operator; and A. R. MacPherson, civilian cook.

As soon as ice conditions permitted, the Detachment flew North and landed at Mistake Bay, N.W.T., and a base was established on July 21st at Tavani in an abandoned fur-trading post. The Detachment was accompanied by a party of Land Surveyors.

The right angle oblique method of air photography employed by the Detachment was a new experiment. Hence little or no previous data was available with regard either to camera or flying technique. (The Detachment had devised its own camera mounts and worked out the required geometry while waiting at Fort Churchill for the ice to clear out of the Bay). None the less, excellent results were achieved, and by the time the operation was complete, numerous errors had been discovered in the existing Marine Mercator's Chart of Hudson Bay. In all, about 1200 photographic miles were flown.

Flying was done at an altitude of 5000 feet A.S.L., following the shorelines of lakes and rivers at a distance of half a mile from the near shore. In addition to aerial

photography, the Detachment did the usual assortment of odd jobs which always fall to the lot of anyone with an aeroplane in such regions. A substantial tonnage of freight was flown from Baker Lake to establish a new post at Beverley Lake for the North West Territories Department. The Detachment's arrival at Baker Lake was coincidental with that of Col. Lindbergh on his historic flight across the Barren Lands to Japan in a long-range Lockheed Sirius.

Weather conditions encountered were anything but pleasant for contact flying. Visibility below safe V.F.R. limits was all too frequent. Fog banks had an unpredictable habit of rolling in and blanketing the coastline with little or no warning. The Detachment aircraft were not radio-equipped, and in those days no radio navigation aids existed in the Territories. Under conditions of lowered visibility navigation was fairly difficult, since the magnetic compass was quite useless. Generally the pilot had to rely on sun diagrams—which were, of course, of no help when the sun was obscured. Navigation was for the most part a matter of map-reading from the somewhat vague maps available and reliance on that “sixth sense” with which Providence seems to have endowed children, alcoholics, and certain pilots.

None the less, the operation proceeded on the whole according to schedule and without any serious mishaps. Only two minor incidents (both of them on the humorous side) deserve mentioning here.

The first occurred on July 31st, when the Detachment arrived back at Tavani from an operation further down the coast to learn that one of the survey parties was a week overdue in arriving from the Barren Lands. With Eskimo observers in the plane, a two-day search was undertaken—and rendered none the pleasanter by numerous forced landings on glassy water caused by overheating of the Wright J6 engines, which had not been fitted with oil coolers. Then, when the survey party was finally located, its members were highly insulted by the fact that anyone had so much as dared to consider them lost!

The second incident was the forced landing of F/O Cox on August 3rd. While he was returning from a photographic flight, his engine began to lose power slowly and finally died completely. Thorough investigation revealed no indication whatsoever as to the cause of the failure, and F/O Cox's experience remained one of the unexplained mysteries of the North. It is more than probable, though, that a better understanding of what is now known about carburettor icing would have set at rest the baffled minds of the entire Detachment.

The Detachment was constantly reminded of the need for unremitting care. The Barren Lands afford little shelter, and winds of up to seventy miles per hour are not uncommon. The year previous to the Detachment's operation, a number of aircraft had been used by the mining exploration companies in the same area, and the wrecks of many of them were observed along the coast. Rumour had it that one aircraft had actually been lifted clean off the water in a gale and carried seven miles inland.

On August 5th, the Detachment flew the first official airmail flight from Chesterfield Inlet to Fort Churchill. The mail load included cachets forwarded for this specially authorized flight from almost every corner of the globe.

The photographic operation was completed on September 3rd, and two days later the Detachment flew down to Fort Churchill on its way to further work at Riding Mountain, Manitoba.

Air Commodore R. C. Gordon, C.B.E.

“My first experience with northern flying,” writes Air Commodore Gordon, “was at Cormorant Lake, from May until November 1932. During this period I was the officer commanding the Base, and the only pilot based there. I had under my command approximately twenty-five other ranks, engaged in servicing and repairing aircraft.

“In 1932, the Base at Cormorant Lake was used entirely as a servicing point for R.C.A.F. photographic and transport aircraft en route to the western Arctic, and as a repair depot for aircraft that could not be handled at Winnipeg. The Base itself consisted of one hangar with full repair shop facilities, slipway, messing and barracks accommodation. It was self-contained, with electric light and fire-fighting equipment, and supplies were brought in from The Pas or purchased in the small town of Cormorant about one mile distant.

“I found my job very interesting but somewhat lacking in excitement. Indeed, my one operation that year worthy of special description was the operation referred to as ‘Cosmic’, for which I was detailed to do the flying.

“‘Operation Cosmic’ was conducted to ascertain what effect northern latitudes had on the Cosmic Ray, both on the ground and in the air. The experiments made were under the direction of Dr. Milliken of the University of Southern California.

“To carry out this operation the RCAF supplied a single-engined supercharged Fairchild aircraft fitted with floats. The operation was to consist of one flight of one hour and fifteen minutes at an altitude of approximately 18,000 feet, to be immediately followed by another hour and fifteen minutes at as high an altitude as could be obtained with the aircraft in question. No oxygen equipment was supplied for the operation and, on contacting the Commanding Officer of Winnipeg Air Station in connection with this matter, a reply was received to ‘chew gum and swallow frequently’. To accustom me to flying at high altitudes without oxygen, practice flights were authorized for approximately ten hours in the air. Shortly after these trial flights were completed, Dr. Milliken arrived at Cormorant with his experimental gear. The equipment was automatically operated and required no maintenance in the air, so that the aircraft carried only myself and LAC Fortey, the engine mechanic.

“The morning after the instruments had been installed in the aircraft, I took off in CAVU weather with a westerly wind. I climbed the aircraft over the Base to an indicated height of 18,000 feet and flew on a westerly course of 270°.

“The above course was held until the hour and fifteen minutes had elapsed, and the aircraft was then climbed to an indicated altitude of 23,000 feet and placed on the reciprocal course. After about forty minutes LAC Fortey became ill and lay down on the floor, and about twenty minutes later I was seized with a severe headache which lasted until the following morning.

“The aircraft was flown on this course for the remainder of the hour and fifteen minutes specified, then throttled back for the descent. By this time a solid overcast had formed at about 10,000 feet and no opportunity had been obtained to check landmarks. On breaking out of the overcast at about 6,000 feet I attempted to locate our position, but without success.

“The terrain was unfamiliar and apparently uninhabited. Gasoline was running low and, as I was suffering considerable physical discomfort from the high altitude at which we had been flying, I decided to make a landing to conserve fuel. Having selected a lake, I was going in on my final approach when I sighted a settlement on an adjoining lake.

“This proved to be Oxford House Post on Oxford Lake. It was a bit of a shock to find myself so far east of my own Base, but on going over the flight logs that evening I realize that a strong wind of approximately 60 miles per hour had been blowing at the altitude at which we had been flying. Since our flight had been above clouds, we had not been able to check the wind.

“The aircraft was refuelled from the RCAF gasoline cache at Oxford House, moored for the night, and flown back to Cormorant Lake the following day. There I learned that a search was already under way by aircraft that were returning to Winnipeg from the Great Bear Lake district.”

* * *

During the summer season of 1934 Gordon commanded an RCAF Photographic Detachment. His description of this type of Detachment and its normal work fifteen years ago is not without interest in these later days.

“A typical RCAF photographic Detachment in 1934-35 consisted of two aircraft, two pilots, two camera operators/aircraft mechanics, and a fifth man who, in the ordinary course of events, remained at the Base to assist in servicing the aircraft and cooking for the Detachment. At that time the aircraft provided were Bellanca single-engined float planes.

“The established procedure was for the Detachment to commence work in the southern areas as soon as snow and ice had disappeared and, as the season advanced, move to the more northerly areas. This procedure was reversed in the fall of the year. No radio facilities were provided in the aircraft, nor, in remote locations, were they available even at the Base. This circumstance made it essential that each Detachment must operate two aircraft to guard against unserviceability, to be sure of flying out of

remote locations, to communicate with Headquarters, and to supply food for the Detachment. Contact with Headquarters had to be established at least once every two weeks.

“In addition to its Service personnel, a Detachment normally had a Topographical Survey representative allotted to it for the season by the Department of the interior. The main work of this individual was to establish control points (by astronomical observations throughout the area to be photographed) to form a basis for the plotting of the photographs taken. To enable this representative to do his job, the Detachment provided aerial transportation, assisted him in setting up his camp, and provided food for his requirements. The men supplied by the Department for this type of work were rugged individuals. They enjoyed their work, seemed to have a great capacity for living among mosquitoes, and ate and slept comparatively little.

“The Detachments were self-contained units. The Commander was completely responsible for his Detachment—its operations, its food (which in the N.W.T., had to be ordered in March to ensure that it would be available for pick-up at Waterways in June), its fuel, its equipment and personnel. In addition he functioned as an Accounts Officer.”

Gordon’s northern operations during the years 1934 and 1935 were conducted in the following regions:

God’s Lake,

the area between Great Slave Lake and Lake Athabaska,

Slemon Lake (named after Flt. Lieut.—now A/V/M—C. R. Slemon,
who established a gasoline cache there in 1927),

Cree Lake, and

Aklavik.

His account of the early part of the year’s work includes two incidents of the type which were almost routine experiences in those days. On the first occasion, after being forced down by engine trouble, he and his crew had to spend three days in the pouring rain on a diet of ship’s biscuit and whatever fish they could catch. On the second, a non-existent gasoline cache which was marked on their vague map almost led to disaster.

Speaking of the operations in the Aklavik region, he writes:

“Aklavik is located on the Delta at the mouth of the MacKenzie River and is the main centre of trading activity for the western Arctic. The terrain is flat and marshy with a small amount of timber growth. In 1935, the settlement consisted of approximately fifty whites. It was particularly active on the arrival of the first boat of the year from Fort Smith. This occasion heralded the beginning of the summer—which lasts for only a few short weeks of continuous daylight before the long spell of darkness returns. The arrival of the boat is a great occasion for the Eskimos, who swarm in with their schooners to obtain supplies for their summer operations.

“Two photographic operations were carried out from Aklavik. One was over the Reindeer Reserve north of Aklavik, and the other was across the Richardson and

MacKenzie mountains to the Porcupine River. The weather was perfect, and both operations were completed in four days. What with the fairly intensive flying and the hospitality of the Aklavik people, the personnel of the Detachment were left in a slightly worn condition.

“During a transportation flight in the Reindeer Reserve, I landed on a lake, and, while establishing camp, my crewman discovered an old abandoned cabin a short distance up the shore. This cabin was scarcely more than a hole in the tundra, surmounted by a wooden framework and covered by a badly weathered tarpaulin. Inside we found a human skeleton and portions of an old sporting magazine. No identification was ever established, either on the spot or through the R.C.M.P. at Aklavik.

“The trip across the Richardson and MacKenzie mountains was much more interesting than the monotonous flying over the Reindeer Reserve. After following the Rat River, we proceeded down the Bell River to the Porcupine. This route passes through rugged country with mountain peaks rising to a height of 8000 feet. This is the area in which the mad trapper, Johnston, had been eventually located and killed some years previously. From the air we could see the buildings of La Pèrre House, an old abandoned trading-post that had served as headquarters for the search. It was also along this route that an entire detachment of R.C.M.P. perished in the middle of winter in 1911 on a trip across the pass from Dawson City to MacPherson.”

1-5. THE RCAF IN THE SUB-ARCTIC: 1927-1939 (Continued)

Part 5 Vol. 1, No. 5 (March 1949)

Operation “R.C.M.P. Post”

“This operation,” continues Air Commodore Gordon, “which was carried out in 1936 in a Fairchild 51 single-engine floatplane, was believed to have been the longest single journey ever made by air in Canada at that time. The trip covered approximately 11,000 miles, starting from Ottawa on July 5th and returning on August 3rd. The passenger carried was Major General Sir James MacBrien, Commissioner of the Royal Canadian Mounted Police. I functioned as pilot and navigator, and Sgt. Pritchard (now Squadron Leader retired) was the engine mechanic. The flight was arranged in order that Sir James might inspect R.C.M.P. Detachments in the Prairie Provinces and the North West Territories. The route followed is outlined in the accompanying map, although numerous other stops were made for inspection of Detachments at points not noted on it.

“The flights that interested me most were those made over territory I had never seen before—Great Bear Lake to Cambridge Bay, Aklavik to Fort Yukon, Whitehorse and Simpson, and Reliance to Chesterfield Inlet and down to Churchill. On these particular flights, I was still using the 35-mile-to-the-inch map of the Territories plus

some strip maps taken in previous years by the RCAF. All prominent landmarks were viewed with considerable interest, and when landmarks did not show up at the time when they were anticipated some concern was experienced! The problem of refuelling the aircraft in isolated locations required considerable effort in rolling gasoline drums and using wobble-pumps. However, these problems were overcome by complete co-operation among passenger, crewman and pilot.

“The flight from Cameron Bay to Coppermine was started late in the evening owing to the prevalence of fog conditions at the latter place. The route flown was over almost barren, rocky, and marshy wastes. Very few accurately mapped landmarks were in evidence until we reached Coppermine River and Bloody Falls. These rapids received their name from the massacre of a group of Eskimos by Indians in the early history of the North. Our arrival at Coppermine was not any too soon, as the fog was just rolling in over the settlement.

“Our departure from Coppermine next day was marked by patches of fog which became unbroken after we had proceeded a short distance. This necessitated flying above the fog on a magnetic course for approximately seventy miles before the fog cleared away and we found ourselves over solid ice which had not yet broken up in Coronation Gulf. The situation was a bit alarming because a floatplane, in the event of a forced landing, is not designed for landing on ice. However, we were not confronted with such an exigency, and we reached Cambridge Bay without mishap. On our arrival there, we found the R.C.M.P. vessel “St. Roch” riding at anchor in full dress, awaiting Sir James’ inspection. Sufficient open water was available in the Bay for a landing, but I had doubts (needless, as it proved later) as to whether it would be enough for a takeoff.

“Our departure from Cambridge Bay was made in the evening. The return flight was carried out under ideal weather conditions until we neared our refuelling point at Coppermine. There we found that the fog had again settled down, making it necessary to continue on to Cameron Bay on Great Bear Lake. From Cambridge to Coppermine, we had an excellent opportunity to view the coast on the mainland. Most of it is low, with gradual sandy or gravel slopes, and with occasional outcroppings of rock rising in some instances for two or three hundred feet. There are some trading-posts along this stretch which are only operated at certain periods of the year. In addition, there are occasional Eskimo villages or camping grounds.

“We reached Cameron Bay at midnight after a four-hour flight. The Bay was like a millpond and, to complicate matters further, the high hills surrounding it were faultlessly reflected in the water. On the power approach for the landing, considerable concentration was necessary to determine which was ‘up’.

“After a stay at Aklavik, during which we visited the large reindeer herd on Richards Island, we went on to Fort Yukon and thence to Dawson. In 1936, Dawson City was very much a ghost town, with little mining activity. However, there were still people there who could show you the piano on which ‘the lady known as Lou’

danced in '98, and also the steam radiator on which 'Dangerous Dan' shed his life-blood.

"Our arrival at Whitehorse was marked by an unpleasantly exciting landing below the famous Whitehorse Rapids. The current here runs at approximately 12 knots, and landing with the current under slight wind conditions in the narrow channel really caused my feet to dance on the rudder bar. The surface of the water was like velvet, and what with the wind and the eddies, the aircraft seemed to be on dull skates. There were many moments when the wings of the Fairchild came terribly close to the river banks. The take-off was equally bad. Trying to get a single-engined aircraft turned downstream in such a current presents a problem. The first take-off attempt was a failure, but we managed to get airborne on the second, and proceeded on our way to Carcross.

"The trip from Carcross to Simpson via Lower Post, Yukon Territory, was undertaken with a certain amount of trepidation, as I had very little knowledge of the route. The distance involved was approximately 700 miles, with only one refuelling possibility, namely Lower Post. In addition, there was a mountain range at the eastern end before reaching the Mackenzie River at Simpson. However, we flew out of Carcross at 4 a.m. and landed at Lower Post at 7 a.m. Once clear of the mountains around Carcross and Teslin Lake, and after picking up the headwaters of the Liard River, the navigation problem became quite simple.

"The flight from Lower Post to Simpson was not so comfortable. Bad weather was encountered around Hell's Gate, and our flight along the canyon under low clouds was in pretty rough air. Shortly after reaching the Mackenzie valley, still following the Liard River, we ran into severe rain and a snow storm. Rather than fly through it, we landed on the Liard and flew on into Simpson after the storm had passed.

"The country east of Fort Reliance to Chesterfield Inlet and down the coast to Fort Churchill is practically all barren waste, with the exception of the area to the north of Reliance through the Thelon Game Reserve. I was using a strip map, made a few years earlier, which carried on through to Chesterfield; but once we got off the strip map, navigation was somewhat confusing on account of the great number of unmapped lakes and other waterways. It was along this route that the Hornby Expedition perished in 1926.

"While crossing a section of a game reserve about thirty miles east of Beverley Lake, we observed a herd of musk-ox. We flew low over it and managed to take some good photographs of the animals standing in their typical defensive formation.

"Our departure from Chesterfield Inlet was made as the fog off the Bay was beginning to roll in over the settlement—a normal occurrence at this time of year. The first part of our flight was over the top of the fog, which continued for some distance south. After breaking out into the clear, navigation consisted of merely following the coast line. A number of Eskimo villages were spotted along the coast, which was free of ice for some distance into the Bay. We saw many white whales in the bays along the coast and in the harbour at Churchill. Indeed, our landing at Churchill was

livened up considerably by their presence, as they kept surfacing in the landing area. However, they were particularly adept at keeping out of the way, and no casualties occurred.

“From Churchill we flew back to Ottawa via Ilford, Norway House, and Lac du Bonnet, rejoining our outward route at Winnipeg.”

Group Captain C. L. Trecarten, O.B.E.

After joining the RCAF in 1928, this officer received a seaplane conversion course at Vancouver and was then transferred to the newly formed Test Flight at RCAF Station, Ottawa. Here he was for some time employed on (among other duties) the testing of geodetic and photographic survey instruments. Finally, he was given a proper photographic course and, in 1934, appointed as O.C. No. 2 General Purpose Detachment at Lac du Bonnet.

The Detachment was primarily concerned with photographic and geodetic survey. The Bellanca aircraft used for the work were equipped with three rear-facing aerial cameras for oblique photography, and their operations covered an extensive area around Lake Nipigon. As the winter retreated north, the Detachment followed it. From Cameron Bay, on Great Bear Lake, a large territory was photographed between Great Bear Lake and the Yellowknife River, and a tie-in was made between Great Bear Lake and the MacKenzie River for the purpose of finding a suitable road-route which would enable water-borne supplies for Eldorado Mine to by-pass the rapids in the Great Bear River.

After finishing this operation, the Detachment was ordered into the Rocky Mountains between the North West Territories and the Yukon Territories to carry out photographic work around the head waters of the South Nahanni River. The reason behind this assignment had a somewhat romantic and legendary background which is interesting enough to warrant a brief digression from our main theme.

In 1906 two brothers by the name of McLeod were found murdered on the South Nahanni River in the vicinity of Dead Man's Valley. The circumstances surrounding their death were rather mysterious in that the whereabouts of an English mining engineer, who was known to have been with them, could not be ascertained. After many years of searching he was located in Vancouver, where he had deposited a considerable sum of placer gold with one of the barks. None the less, he was never apprehended, and it is thought that, when he discovered his whereabouts to be known, he went back into the Nahanni country. This fact, combined with the knowledge of the value of the gold deposited by him, immediately started a legend woven around the so-called Lost Placer Gold Mine of the McLeod brothers.

Many half-hearted attempts had been made to discover the mine, and in about 1932 considerable interest was revived in that area by certain prospectors who had been in there and returned with samples of gold and stories of the possibility of untold wealth. This, of course, resulted in a rush of prospectors eager to stake

claims—but, since most of these claims were staked in the winter by men who had been down in, many of the claim-stakers did not return over difficult terrain to work their claims. The revival of interest in the South Nahanni immediately brought to light various alleged mysterious disappearances of prospectors and trappers in the area and also the finding of the odd individual who had died in unusual circumstances. The bodies lacked heads. Although, as R.C.M.P. records show, the number of such cases was exceedingly small, the valley soon came to be popularly referred to as “Headless Valley.”

It is the writer's personal opinion that both the disappearances and the decapitations can be explained very simply. The disappearances can in all probability be attributed to the fact that there are in those regions certain hot springs (whence, no doubt, the old legend of the Lost Tropical Valley), the warm water from which naturally makes the ice very unsafe, so that unwary travelers who might blunder on to the dangerous patches would speedily and irrevocably vanish and be swept away beneath the ice. As for the headless bodies, the most logical explanation is perhaps the prevalence in those of that unpredictable and almost indestructible animal, the grizzly bear.

No. 2 General Purpose Detachment was, needless to say, concerned less with ghost-hunting than with the taking of photographs for mapping purposes. Vertical and oblique photographs were taken along the South Nahanni and along the Flat and Caribou Rivers, to tie in with previous survey work done by the RCAF along the Liard River up to the point where the South Nahanni flows into it.

The whole operation was conducted merely with the assistance of a sketch map prepared from information procured from Indians, trappers, and the odd government party who had made short overland traverses of some of the more easterly areas. Oddly enough, this map proved to be surprisingly accurate, and as the weather was fair enough to permit Mr. Fry (the Lands and Mines representative who accompanied the Detachment) to take adequate star observations, the work progressed satisfactorily. Subsequent plotting of the photographs enabled the Topographical Survey Branch to produce a reasonable map of that part of the world which will allow accurate definition of any mineral claims that may later be recorded.

It might be added as a note of interest that no major find of placer gold has been made as yet, although there is evidence that such exists. Group Captain Trecarten himself panned for gold on non-photographic days—and actually succeeded in obtaining a fair showing.

1-6. THE RCAF IN THE SUB-ARCTIC: 1927-1939 (Continued)

Part 6 Vol. 1, No. 6 (April 1949)

Group Captain S. W. Coleman

In August 1936 a Fairchild aircraft, with Flt. Lt. S. W. Coleman as pilot and LAC J. Fortey as crewman, left Winnipeg to deliver an engine to one of the aircraft carrying out photographic operations in the North West Territories. His mission accomplished, Coleman took off for Fort Reliance, his intended first stop on the return journey. Four days later, on August 21st, it was discovered that he had not reached his destination.

Search parties were immediately organized. Supply bases were established and thousands of gallons of gasoline were flown in. Six RCAF aircraft were withdrawn from photographic operations in the area to concentrate on the search. In addition, two commercial aircraft were chartered to assist. Mechanics were flown in to service the aircraft. Captain Hunter, the medical officer from Military District No. 13, Calgary, was made available in case his services should be required. Mr. Eric Fry, Topographical Surveys Branch, who was in the vicinity at the time, acted as navigator for the fliers and plotted routes to be flown. Squadron Leader L. F. Stevenson, who was Commanding Officer at Vancouver, was detailed to take charge of the search, making his Headquarters at Fort Reliance.

Day after day for nearly a month the search went on, without success. Then, on September 14th, came word of hope. An empty gasoline drum bearing a message from the missing men was found a mile north of Lac de Gras, some 75 miles southeast of Point Lake. The message, written by Coleman, stated that his aircraft carried enough gasoline for another hour's flight, and that he proposed to fly south for thirty-five minutes and then land. The searchers redoubled their efforts, but now the weatherman interfered. On the following day snow fell. All aircraft were grounded by high winds, and clouds made visibility poor.

However, the search was brought to a successful conclusion on September the 16th, when pilots Matt Berry of Canadian Airways and Marlowe Kennedy of MacKenzie Air Service located the aircraft in Point Lake, after thirty days of one of the most intensive searches in the history of Canadian Aviation. Coleman and Fortey, if one considers what they had been through, were in surprisingly good physical condition; and they were moved by air to hospital in Edmonton on September the 17th.

Flt. Lt. Coleman's own story, as told at the time, will best fill in the details which are missing from the foregoing bald narrative.

"After two hours' flying I believed, since there had been a north wind at take-off, that I was south of my track. I therefore headed west in the hope of picking up Great Slave Lake. At the end of three hours I realized I was lost and landed in a lake to consider the situation.

“There we left some empty gasoline drums and a note, enclosed in a tobacco tin, stating the time, the date, and our intended course. It was decided to fly south for one half-hour and then pick out a final stopping-place. Only an hour’s fuel remained, and south course was decided upon in view of the possibility of running into timber. Shortly after taking off, we saw a lake to our west. Several small clumps of timber were observed, so I carried on in the hope that the timber would improve. Then, since the fuel supply was dwindling fast, I landed and beached the aircraft. We set up camp and we made ourselves as comfortable as possible. Fortunately there was sufficient timber nearby, and with the aid of two struts from the aircraft we made tent poles.

“The next day we opened the emergency rations and portioned them out so that they would last us for three weeks. The rations proved to be of excellent quality and, while scanty, held out according to plan. After that we subsisted on two ground squirrels which we managed to snare, and a few berries. Although all our attempts at fishing proved unsuccessful, we were actually without food for only one week. Our greatest fortune was in being near timber, so that it was possible to keep fairly comfortable by means of a stove made from an empty gasoline drum.

“The chief factor that prevented our being found sooner was the continued bad weather. Only five of the entire thirty days were really suitable for effective search. The possibility of an early freeze-up was a discouraging aspect of our situation, but the whole-hearted work of the search parties fortunately made our fears groundless.”

* * *

The present instalment of “Northern Skytrails” concludes the chapter on the RCAF’s work in the sub-arctic from 1927 to 1939. The next chapter (a very brief one) will summarize commercial aviation in the same region and up to the same date. This will in turn be followed by an account of certain RCAF operations in the arctic prior to the outbreak of World War II.

The aim of the writer, throughout this series of articles, has been to create a general conception of our Service’s contribution to northern aviation rather than to give a detailed history of it. No mention has been made of the many other men whose work was just as valuable as that of the men whose names have appeared in these pages. Names have, in fact, been used as little more than pegs on which to hang descriptions of typical operations. Until 1939, the broad pattern of those operations remains approximately unchanged—with the exception of a few more or less dramatic episodes of which Group Captain Coleman’s experience is, fortunately, a particular rather than a typical example.

1.7. COMMERCIAL AVIATION IN NORTHERN CANADA: 1920-1939

Part 7 Vol. 1, No. 7 (May 1949)

Although the title of this chapter may not immediately suggest much of direct interest to the RCAF, two important facts should be remembered. First, many of the RCAF's best-known northern pioneers either began or terminated their flying careers as civilian pilots; and second, the earlier activities of the RCAF were intimately bound up with many aspects of civilian flying. It is, in fact, almost impossible to give a fair picture of the RCAF in the north without devoting a little time to the work of the "bush pilots" and the airline operators who were so often its friends and collaborators.

General History

Flying freight services had their inception along Canada's northern air routes; and in 1937 Dominion planes carried the world's record tonnage of 24,000,000 lbs. In 1939 the air freighters of Canada moved 19,000,000 lbs., as compared with 9,500,000 carried in the United States during the same year.

In 1930 what is now the British Commonwealth's greatest source of radium and uranium, second only in the world to the Belgian Congo deposit, was discovered in the far north of Great Bear Lake by plane. The aeroplane also played a prominent role in locating the richest mercury deposit in the British Empire in northern British Columbia. In 1931-32 the aeroplane developed many more new northern mining fields.

Air freight services to northern points commenced on a major scale in 1926 in the Red Lake district of Northern Ontario, and by 1933, though flying was still not fully accepted in the more populated southern districts of Canada, the aeroplane had become a commonplace factor in the northern regions of the Dominion.

Between 1920 and 1930 many companies operated airlines or used aircraft for exploration and freighting in northern Canada. Most of them were small organizations, one or two—like Canadian Airways—were considerable both in size and reputation. The majority of them, however, have since been absorbed into or superseded by Trans-Canada Air Lines (Canadian National Railways) and Canadian Pacific Air Lines (Canadian Pacific Railway Co.), which were formed in 1937 and 1939, respectively. To-day T.C.A., the only Canadian transcontinental air line permitted by law, has a record second to none throughout the world for efficiency and safety. Meanwhile, C.P.A. has been expanding rapidly and is now projecting regular scheduled flights across the Pacific to the Orient and the Antipodes.

The story of Canada's early commercial aviation contains many names that have become almost legendary in the North Country—"Wop" May, "Punch" Dickens, "Babe" Wollett, Grant McConachie, and a host of others. Some of their owners are dead; some, like C. H. Dickens (who is now, at 50, Sales Director for DeHavilland's

of Canada), have crowned their astonishing careers with a relatively conventional type of success. There is no space here, however, to describe much of their work in detail. We must limit ourselves to giving an account of one of the more eventful operations which took place in the very early days of commercial flying. It was carried out by an ex-commercial pilot who has spent most of his adult life in the RCAF.

Group Captain E. G. Fullerton, A.F.C.

This officer, who retired only recently with the rank of Group Captain, was a pilot in World War I. Leaving the Service, he decided to continue flying; and the winter of 1920-21 found him as pilot of one of two Junkers all-metal 6-passenger cabin monoplanes which the Imperial Oil Company had just purchased for operations in connection with their recently discovered oilfields near Fort Norman. From here the story continues in Fullerton's own words.

"The route which we had at first decided to follow for our initial flight was: via the Peace River to Fort Vermilion, across the source of the Hay River, along the river to Great Slave Lake, across the lake to the mouth of the Mackenzie River, and thence to Fort Simpson and Fort Norman. This route represented a total air distance from our base at Peace River of a little over 800 miles.

"Fairly reliable information was available to the effect that sufficient motorboat gasoline and oil would be obtainable at most of the trading posts along our route. We had found by practical experiment that our engines would function satisfactorily on such gasoline after we had reamed out the carburetor jets to a slightly larger aperture. We therefore arranged to take with us an extra set of prepared jets. Doubt existed, however, as to whether sufficient fuel would be obtainable at Great Slave Lake. We therefore decided to establish a fuel cache on the Upper Hay River, at a point where a small trading post was located.

"The fuel-carrying flight to Upper Hay River was carried out by both aeroplanes on March 22nd, 1921. The landing was made on the ice of the river. When we were unloading the gasoline, a few Indians began to assemble a short distance away. It was the first time they had ever seen an aeroplane and they obviously regarded us as evil spirits descending from the sky. It was rather amusing later to watch them examining our ski-tracks where the skis had first made contact with the snow, then pointing skywards with frequent grunts and awe-stricken gestures.

"After some light refreshment with the Factor of the Trading Post, we returned to Peace River, 190 miles away. I might mention, by the way, that when we were inspecting the aeroplanes afterwards, we noticed two small holes in one of the fuselages, near the tail. They closely resembled bullet holes, and were situated directly opposite one another. The only conclusion we could come to was that some Indian on the Upper Hay River had fired a parting shot at the sky-demon.

"We were now ready to attempt the flight to Norman. Our party was augmented by a guest-passenger in the person of Sgt. Thorne, of the R.C.M.P., whom we were

to take to Simpson. Sgt. Thorne, who had spent many years in the north, had only recently 'mushed' out from Simpson by dog-team, bringing with him an Eskimo prisoner. The personnel of our forthcoming flight to the north now consisted of Gorman (the other pilot), Waddell (the surveyor), crewmen Hill and Derbyshire, and Sgt. Thorne. Two days later, March 24th, at nine o'clock on a bright morning, 'Rene' and 'Vic' took off with ten days' rations from the aerodrome at Peace River.

"The weather held good for about the first hundred miles, then the clouds began to lower. Therefore instead of proceeding direct to our cache on the Upper Hay River, we turned east and landed at Fort Vermilion, where we put up at the Trading Post. Shortly afterwards the blizzard began, and continued for two days. At the Post we found that enough ordinary gasoline was available to fill our tanks to capacity, so we installed our larger jets.

"On the afternoon of March 27th we took off from Fort Vermilion for Great Slave Lake. Two hours and forty minutes later we were landing in thirty inches of snow on the ice at the mouth of the Hay River on Great Slave Lake.

"Once more we refueled at the Hudson's Bay Trading Post, and the following morning we took off for Fort Providence—our policy being to refuel at every trading post along the route where fuel was obtainable.

"At Providence we were again fortunate in the matter of fuel, but on taking off we encountered a slight difficulty. The snow was so deep we could not get up enough speed to get the aeroplane into the air. After two unsuccessful attempts we decided on a plan: all five of us would walk abreast in our snow shoes up and down the take-off stretch until we had packed the snow down to a surface that would give better support to the aeroplane skis. A number of local natives joined us in the task, and it was not long before we were ready to have another try. This time our efforts were successful and we headed for Simpson. Sgt. Thorne was chuckling to himself all the way in anticipation of his wife's surprise. Having no idea that he had got a lift by air, she would not be expecting him and his dog-team for at least another month.

"At Simpson we ran into real trouble. To land on the Mackenzie was out of the question, owing to the extremely rough state of the ice. However, a field on the edge of the settlement looked suitable apart from a few snow-drifts, so a landing was attempted. The 'Vic' landed safely, but the 'Rene' was not so fortunate. One ski suddenly broke through the heavy crust of the snow-drift, causing the aeroplane to swing around into the drift, smashing a ski and breaking the propeller. Neither Gorman nor any of the occupants of the aeroplane was injured.

"We were told that about a mile south of the settlement, the ice of a small subsidiary channel (or 'snye') of the Mackenzie was free from hummocks and would probably afford us better landing facilities than the field we had used. Having confirmed the information on foot, we decided to fly the 'Vic' light out of the field to the snye, where it could be refuelled and prepared for the final hop to the Norman oil well—250 miles farther north.

“We thought it best that the ‘Vic’ should continue to Norman alone, leaving two of the party behind at Simpson with the ‘Rene’. Having removed all possible load, and assisted by manhandling, I managed to taxi the ‘Vic’ to a far corner of the field and took off.

“On the flight from the field to the snye, the engine of the ‘Vic’ developed a pre-ignition knock—the result of using low-grade gasoline. The only remedy for this trouble was a top-overhaul, which meant further delay. As the engine of the ‘Rene’ had run much less time since its purchase than that of the ‘Vic’, and as the aircraft required only a propeller and a ski to make it ready for flight, it was decided to lend the ‘Rene’ the propeller and one ski from the ‘Vic’.

“The change-over of propeller and ski to the ‘Rene’ was accordingly made and the latter was flown ‘light’ from the field to the snye where the ‘Vic’ was parked. She was then loaded, and flown off by Gorman, accompanied by surveyor Waddell and mechanic Hill. Misfortune, however, again dogged her. She had hardly reached an altitude of more than 50 feet when, for some reason, she stalled and crashed on the ice. None of the occupants was injured beyond a severe shaking-up, and the only damage to the aeroplane was a broken propeller, a slightly damaged wing, and a wrecked undercarriage. By an amazing bit of luck the ski borrowed from the ‘Vic’ was practically undamaged, which meant that the ‘Vic’ could at least have her ski back and would then be minus only a propeller.

“The lack of ‘only a propeller’ at first appeared to us, however, to be an insurmountable difficulty. It was suggested that perhaps it would be possible to make one, but this suggestion was immediately pooh-poohed as being quite ridiculous. None the less, calm reflection revealed that the only alternative was to wait until navigation commenced in July, then send to our base at Peace River for a new propeller—which would not arrive at Simpson until some time in August. The almost preposterous idea of making a propeller was again reviewed, this time in a more practical light.

“Enough of the broken propeller was available for the pieces to be fitted together to serve as a pattern from which templates could be made. The Catholic Mission had a few oak sleigh boards, 10 feet long and 7 inches wide, which was just about the size we needed to make a laminated propeller, except that they were an inch too narrow. We solved this difficulty by fanning the boards. We further learned that moose-hide glue was also available, together with a number of large clamps. Father Docoux also informed me that we could have the use of the Mission work-shop. Finally, we were particularly fortunate in being able to secure the services of a Mr. Johnson, who was a skilled carpenter. Our mechanic, Bill Hill, was the leading light in the enterprise.

“Work began—slow, laborious, and infinitely careful. While it was going on, the ‘Rene’ was moved from the snye to a place of safety, and mechanic Derbyshire and I proceeded to give the engine of the ‘Vic’ a top-overhaul.

“It was now the 14th of April, and we were told that the ice usually went out of the Mackenzie during the last week of this month. Haste was, therefore, an essential, and we redoubled our efforts.

“Finally our day of days arrived, and the propeller was fitted to the engine. When we tested it for ‘track’, we found to our delight that it was out a little less than a quarter of an inch. We started the engine, warmed it up, and eventually opened the throttle full. The propeller behaved perfectly, both on the ground and during the test flight which lasted some twenty minutes. Hill and Johnson were acclaimed the heroes of the hour, and I still believe that the making of this propeller, in less than three weeks, is a feat which has never been duplicated before or since.

“It was now April 23rd, and to continue our flight to Fort Norman in the present circumstances, and with the break-up so close, would obviously have been the height of foolhardiness. Preparations therefore proceeded apace for a hasty departure to our home base at Peace River, and everything was in readiness by that evening for a take-off on the following morning.

“It was about five a.m. when we were aroused from our slumbers by an Eskimo who had come to tell us that the ice in the Mackenzie was beginning to break up. This disturbing news brought us all to our feet with a jump. In a few minutes we were showshoeing our way to the ‘Vic’—which, as previously stated, was parked on the snye about a mile from the village of Fort Simpson. We could distinctly hear the ominous rumbling and crashing of the breaking ice in the distance, and wondered whether we would arrive in time to rescue the ‘Vic’. Fortunately there still remained some 400 yards of smooth solid ice ahead of the aeroplane from which a take-off could be effected. Beyond this stretch there was more or less open water except for innumerable floating ice-cakes. Not a moment was to be lost, and with feverish haste we prepared to start the engine.

“In the present urgent circumstances, it was most essential that the water and oil should be heated before being put into the engine, to insure a positive starting. One of us quickly applied a match to the fire which had been laid the night before, while others got the aeroplane all ready to fly. The fierce fire under and around the cans heated the water and oil comparatively quickly, but by the time we had poured them into the engine our take-off runway had been reduced to barely 200 yards. It was now about 6.30 a.m.

“While I was giving the engine a brief preliminary run, a trapper by the name of Jack Cameron, who lived at Fort Simpson, came along to watch the proceedings and to enquire whether he could be of any assistance. As he knew the surrounding country extremely well, I asked him to accompany me to the nearby lake on which I proposed to land, as he would prove a useful guide back to Fort Simpson. He needed no second invitation.

“I opened the throttle wide and we roared down the runway—which had by now dwindled to a bare 100 yards, beyond which was open water dotted with ice-cakes. We shot off the end of the ice over the water, and I eased the control column gently

back. The aircraft threatened at first to settle down on to the water, and, in fact, the heels of the skis actually did make a gentle contact with the surface. But fortunately we eventually gathered sufficient speed and I was soon gaining height at a gratifying rate. That was about as close a call as one could expect to have and get away with. Jack Cameron thought it was great fun. The small nameless lake which was our destination could now be discerned on our left, and we headed straight for it. The 'Vic' settled gently on to the snow and came to rest.

"Our next step was the five-mile trek back to Fort Simpson to bring out the rest of the party and the equipment. Delayed by the deep snow and underbrush, we took about 3½ hours to get to Fort Simpson. Our trip included a rather thrilling crossing of the snye by leaping from one ice-cake to another, an exercise at which Jack Cameron was particularly adept.

"After a meal at Sgt. Thorne's, we hurried back to the 'Vic', carrying everything on our backs. The snye, which only a little earlier had been packed with ice, was now crossed by boat with the assistance of Jack Cameron. The last four miles were covered in not less than four hours. Twilight was falling when we at last reached the 'Vic', so we immediately made camp for the night, ate three partridges we had shot on the way from Simpson, and slept with untroubled minds.

"We took off at 8 a.m.—minus Derbyshire, whom we had left with the 'Rene'. Our fuel tanks were practically full, and we headed almost directly for Peace River. Apart from a threatened attack by a gigantic eagle, which made us sweat for the safety of our precious propeller, the trip itself was uneventful. However, as we went south, we noticed with consternation that the Spring had been there long before us. The snow became less and less, and as we got still nearer to our destination we saw that there was no longer any snow on the ground. We had planned to land on our aerodrome, but how were we to do that on skis? Even the lakes that we were now passing were open around the edges, and the remaining ice looked none too good. Eventually we decided that the best plan of action was to try a landing on Little Bear Lake, about 15 miles northwest of the town of Peace River. As we passed the lake on our way to drop a message on our own aerodrome, we noticed that the ice was blackish and that a number of ducks were swimming in open water all around its edges. This was not exactly reassuring, but we saw no alternative but to adhere to our plan.

"Arriving over the aerodrome (with an estimated 20 minutes' fuel left) we lost no time in throwing down the message to our cook-caretaker, who rushed out on to the aerodrome on hearing the noise of our approach. I then turned the 'Vic' towards Little Bear Lake. While dropping the message, we had been surprised to see a Junkers monoplane on the aerodrome, parked near the hangar; but we had no time to give it much thought just then.

"To our immense relief, the ice on Little Bear Lake held. While waiting for our wheels and gasoline to arrive from the base, we drained the fuel tanks to see just what

quantity of fuel was remaining. We did not expect to find very much, but the discovery of a bare half-gallon was something for which we were a little unprepared.

“We had hardly recovered from the shock when we heard the noise of a plane coming from the direction of Peace River. It proved to be the Junkers we had seen on the aerodrome. After circling over our heads, it came down and landed (on wheels) a little way off from us. The door opened, and out stepped the portly figure of J. L. Larsen, the New York agent from whom Imperial Oil had purchased ‘Vic’ and ‘Rene’. After a hearty exchange of greetings, Mr. Larsen informed us that he had flown up from New York a few days previously, partly with a view to seeing how we were getting along with our Junkers, and partly with an eye to further sales. On hearing that we were due back almost any day from our extended trip to the Mackenzie River, he had decided to wait in Peace River for our return. When we dropped the message, he was in the hangar talking to the caretaker. He had therefore brought with him the required wheels and gasoline.

“Both aeroplanes then took off for Peace River, and about ten minutes later were gliding down to a landing on our home aerodrome.”

1-8. THE RCAF IN THE ARCTIC

Part 8 Vol. 1, No. 8 (June 1949)¹

The reader is again asked to bear in mind that the limits of the arctic and sub-arctic are, for the purpose of these articles, those laid down by Trewartha in 1937. Thus, relatively little of the work described in previous chapters was carried out in the arctic of our definition. During the period that ended with the outbreak of World War II, the RCAF’s arctic operations consisted almost entirely of routine summer photographic work, conforming in general pattern to those sub-arctic operations already briefly described. Indeed, the only outstanding operation in exclusively arctic regions was the Hudson Strait expedition of 1927-28.

First, however, as a matter of interest, let us glance at what was said in 1922 by Squadron Leader R. A. Logan, who was sent out with the Canadian Government arctic patrol vessel to report on the possibility of aviation in the Arctic Archipelago. Certain parts of his report are curiously apt even today.

Excerpts from Squadron Leader R. A. Logan’s Report

“Much has been said of the possibility of future hordes of Slavs overrunning Europe. Aircraft operated from arctic or sub-arctic bases would swoop down and

¹ *Editors’ Note:* For additional short articles on the Hudson Strait Expedition, see “Pinpoints in the Past,” *The Roundel*, vol. 6, no. 11 (December 1954) and “Pinpoints in the Past,” *The Roundel*, vol. 7, no. 7 (July-August 1955).

leave trails of destruction throughout the rest of the world, but would be almost inaccessible to the aircraft of countries to which 'cold weather' flying was unfamiliar. Whether war with such a country as Russia might or might not ever come, should not affect the determination to develop flying in the Canadian arctic and sub-arctic regions. Canada, if she considers herself worthy to be called a nation, should have enough pride and spirit to take at least ordinary precautions and be prepared to defend herself in any emergency."

Squadron Leader Logan's report continues with detailed topographic and climatic descriptions, and then proceeds to discuss the uses to which aircraft might be put. Many of his suggestions have already been followed.

"Surveyors may be transported to otherwise inaccessible places or to places where their season of operation may be greatly extended by the reduction of time required for travel. The extent of grazing-ground capable of supporting animal life, such as musk-oxen, caribou or reindeer, may be found, as well as the number and location of existing herds and breeding grounds of these animals.

"In many ways the arctic is an ideal country for lighter-than-air craft. The sunlight is practically constant during a long season of the year, and this is one of the greatest factors in the operation of any type of airship, owing to the effect of sunlight and the expansion and contraction of the gas in the balloon. One great advantage of the airship over the aeroplane is that an airship is self-supporting independent of the engine. An airship can remain in the air for much longer periods than an aeroplane, and it can carry a fairly heavy load. Some of the disadvantages of airships are the bulky buildings required to house them and the number of men required to handle them in making landings, unless mooring masts are used. An airship is greatly affected by high winds, especially when near the ground, but it is possible that in such northern latitudes the high winds may exist only at a comparatively low altitude.

"When regular navigation is established through the Hudson Strait, it will be necessary to have one or more detachments to watch the movement of ice and report positions to the ships. The only practical way of doing this is by the use of aircraft, wireless, and photography.

"Meteorological reports should be sent south by wireless every few hours to aid in weather-forecasting in the more inhabited parts of the world; and while this may not require the actual use of aircraft, it will require the use of the wireless stations operated in conjunction with aircraft."

"The compass," the report continues, "is a very unreliable instrument in the Northern Archipelago, because many of the islands lie to the north of the North Magnetic Pole, and it is probable that in many cases the compass needle will point straight south. By using a gyroscopic compass, however, much of the difficulty of direction finding will be overcome.

"It is recommended that one method that might be employed on the survey would be to determine the geographical position of prominent objects 20 to 30 miles apart by astronomical observations, and have the intervening country located by aerial

photography. If wide-angle oblique aerial photographs were then taken at right angles to the line of flight, a great deal of territory could be explored.

“For any extensive aircraft operation a large amount of gasoline and lubrication oil will be required, and it would be a great advantage to have some source of local supply. Indications of such a supply have been found on Bathurst Island, where analysis shows oil shales yielding 140 gallons of oil to one ton of shale.”

Recommendations for clothing include the following:

“The clothing worn by all aircraft personnel should be as much as possible similar in every way to that worn by the natives of the islands, with such improvements as may be found advisable. The best material for all clothing is either caribou skin or seal skin tanned with the fur on; for, while woollen clothes are satisfactory to a certain extent, it is generally agreed that skin clothing is better.

“The foot-covering universally worn is made of seal skin sewn in such a manner that the boots, or “kamiks,” are absolutely waterproof. Socks are generally made of seal skin with the fur inside. Sewing on the “kamiks” is very carefully done, and all repairs to the boots are made by the Eskimo women. It will therefore be necessary to employ at least one Eskimo woman at each base for the purpose of looking after the repairs of boots and other skin garments . . . and it will be necessary for the personnel of an air station in the North to learn the language of the natives of the country—the Eskimos.”

The Hudson Strait Expedition

The Hudson Strait Expedition in 1927-28 was sent into the field to determine an absolute time limit for marine navigation, to test the use of aircraft as an aid to navigation, and to test the possibility of establishing air operational bases in the Hudson Strait.

On July 17th, 1927, the expedition, consisting of forty-four permanent personnel aboard the Canadian Government ice-breaker “Stanley,” and of non-permanent personnel such as construction men (together with all supplies and equipment) aboard the S. S. “Larch,” sailed from Halifax for Port Burwell. Port Burwell, known as Base A, was to be the first of three similar bases. Base B was to be located at Nottingham Island, and Base C (Headquarters) at Wakeham Bay.

Port Burwell was reached on 27th July 1927, and the “Moth” seaplane carried on the afterdeck of the “Stanley” was launched for the purpose of locating a suitable base.

It was decided to leave an investigation party at Burwell to explore the vicinity thoroughly for the most suitable base location. The officer in charge, his medical officer and two airmen, together with a motor-boat, supplies and equipment for two months, were left here to carry out the investigation, and the remainder of the expedition proceeded west towards Nottingham Island.

It took two weeks to complete unloading operations and to provide sufficient temporary accommodation for the use of personnel. Seven hundred tons is a close estimate of the amount of supplies and equipment unloaded during these two weeks, all of this material being towed one mile from the ships to the beach by the use of surf-boats and a scow. Crawler tractors were used to great advantage.

After leaving ashore the permanent personnel of this base together with their constructional staff, both ships proceeded to Wakeham Bay, where anchors were dropped on August 24th, 1927.

Unloading operations at Wakeham Bay were completed by September 11th, 1927, and after leaving ashore the permanent personnel and construction crew for this base, both ships went back to Port Burwell to establish the third and last Base, Base "A."

Routine patrols were carried out daily from each base (weather permitting), and also special patrols, on which aircraft from bases "C" and "A" were to rendezvous in certain areas between their respective bases. Floats gave place to skis around the end of November, and during the ensuing winter season three incidents occurred that might have ended disastrously.

The first of them happened when Flt. Lt. A. A. Leitch, M.C., D.F.C., was returning from Eric Cove at Cape Wolstenholme to Nottingham Island. Half way across to the Island, he ran into snow storms. He flew on through them for a time, but failing to sight land, he decided that it would be wiser to land on the ice floe and wait for clearer weather. A landing was effected safely, the oil was drained from the engine, and the crew made themselves as comfortable as possible. The following day brought clearer weather, and although land was not in sight, Flt. Lt. Leitch made a calculation of his error and decided to take off. Using the available engine heating unit carried in the emergency kit of the plane, the oil was heated and the engine started without trouble. Flying according to his calculations, Leitch was successful in picking up land, which proved to be the extreme northwest end of Nottingham Island. The aircraft arrived back at its base with about one quart of fuel in the tanks. The temperature at this time was approximately 15° below, but only a few minor frost bites were experienced by the personnel.

The second incident occurred when Squadron Leader T. A. Lawrence was proceeding from Wakeham Bay to Nottingham Island in early January. Heavy snow storms were encountered about twenty miles east of Digges Island, and the pilot turned back and landed at Sugluk Inlet to await better conditions. The following day another attempt to get through to Nottingham was made, but the weather was still too bad. It was then decided to go back to Wakeham Bay, but snow storms near Cape Weggs necessitated a landing in Deception Bay. Here the aircraft and crew were forced to remain for nine days, during which time typical arctic weather and storms prevailed. On the eighth day, while making ready to take off, a search aircraft arrived from Wakeham Bay. Lawrence's plane was dug out, and both aircraft returned to their base at Wakeham the following day.

The third and last incident was nearly a fatal one. F/O A. Lewis, on patrol from Port Burwell with a mechanic and native, became lost in a heavy snowfall on his return from Resolution Island. After picking up a point of land which he felt certain he recognized, Lewis took a course to bring him out at Port Burwell. After following this course until the fuel supply was exhausted, a forced landing was made on hummocky floe ice. The crew, fortunately, were unhurt; but although the machine had sustained only minor damages, it became necessary to abandon it. Lewis and his party, carrying their emergency kits, started east across the ice, and only after one full day's travel did they realize that they were actually on flow ice in the Atlantic Ocean off the Labrador Coast, and not in Ungava Bay, as they had at first estimated. They travelled westward for seven days, reaching the Labrador Coast after much privation. During this time their food supply became exhausted and they were forced to live on raw walrus shot by their native companion. The ice over which the party was forced to travel was very rough and highly rafted. Endless lanes of open water had to be crossed by means of the inflatable rubber raft carried as part of the emergency kit.

After reaching the land, the party travelled north along the Labrador Coast for four days. During this time they saw no signs of life of any description, human, animal, or bird; and having no fuel for their primus stove, they suffered greatly from cold as well as hunger. On the fifth day they were favoured by fortune and came in contact with an Eskimo hunter and his wife. Through their native companion they were able to make known their requirements and arrange for food (of a kind) and transportation by dog-team back to Burwell, at which point they arrived at midnight on the thirteenth day of absence from their base.

During the absence of Lewis and his party, three aircraft (one from each base) were engaged in searching for them. That particular period, however, was the coldest and stormiest part of the winter, and flying was utterly impossible on all but three of the thirteen days.

After the replacement of floats on the aircraft (about the end of June, 1928), operations were carried out until Aug. 3rd in accordance with previous original orders. By August 3rd, all ice had left the Strait and further aerial observations were unnecessary. Recommendations were then made to the leader of the expedition to have flying operations cancelled and to commence at once the conditioning of aircraft for the flight south to Ottawa, as it was the intention to fly all serviceable machines out from the area of operations. The condition of the aircraft proved inadequate, however, and they were eventually shipped home aboard the "Canadian Voyageur."

The only maps and charts available on this expedition were found to be very inaccurate. Some parts of the coast-line were not even recognizable. Countless islands existed which were not charted, and others, though charted, were incorrectly located. Compasses, too, were hopelessly misleading. The only way in which pilots were actually able to arrive at the proper courses to be followed on patrol, was by making careful observations while flying over the patrol route on days of good visibility, and

by flying from point to point within sight of each other and noting the compass readings.

Clothing presented no very serious problem, as the following experience shows. On February 19th, 1928, with a ground temperature of 30° below zero, there was occasion for a flight of 3 hours and 40 minutes' duration. During the greater part of this flight an altitude of 8,000 feet was maintained, where the temperature was approximately 56° below zero. None the less, the pilot was very comfortable. He was wearing silk underwear beneath medium weight wool, chamois leather breeches, flannel shirt, wool sweater, duffle socks, moccasins and sheepskin-lined flying boots, deer skin mitts with duffle interlining, leather and skin-lined helmet, fur-lined face mask, goggles, and outer Sidcot suit.

The general living conditions at all three bases were very much on a par. No direct sense of isolation was actually felt, since there were sufficient personnel largely to eliminate any feeling of monotony. There existed a hearty co-operation between all officers and men, and only once was a charge sheet required—within a few days of the completion of the expedition.

Nothing was lacking in variety of diet and fresh meats. Aquatic game existed in quantities—seal, white whale, walrus, and occasional fish. At Wakeham Bay land game was very scarce and the lack of fresh food was much more keenly felt. The RCMP member of this Base made a 21-day hunting trip to the south of Wakeham Bay, accompanied by one native and a dog team and with sufficient rations for about one month. When eventually they returned to base, they reported never having had occasion to take their rifles out of their cases.

For pastime, the personnel had sporting equipment, libraries, radio, and some of them had skis and snowshoes. A few had even brought golf clubs along with them, and strange as it may seem, this game could be indulged in for considerable periods of time during the winter months. The snow on the Bay ice at Wakeham for the greater part of the winter presented a hard wind-packed surface, and, with balls painted a dark colour, golfing was not at all impossible.

1-9: THE RCAF IN THE ARCTIC (continued)²

Part 9 Vol. 1, No. 9 (July 1949)

Narrative of F/O Lewis

“On the 17th of February 1928, at approximately 11 o’clock in the morning, I departed from Port Burwell on a regular ice-patrol, piloting a Fokker aircraft, with Flight Sergeant Terry as engineer, and a one-eyed Eskimo named Bobby. Our route lay directly across the Hudson Strait to Resolution Island, half-way up Frobisher Bay, and back across Grinnel Glacier and the Strait to our Base.

“Weather and visibility on the outward trip were reasonably good, but they deteriorated rapidly as we returned. After crossing Grinnel Glacier on Baffin Island, and having reached the Strait, we ran into heavy snow of blizzard and even hurricane proportions. I was forced to let down to within a few feet of the icepack, where accurate navigation became well nigh impossible. I was endeavouring to allow for at least 20° drift to port, but it was more guesswork than technique, for my chief problem was to keep right-side-up.

“By the time our fuel was almost exhausted, total darkness was approaching rapidly. Since the aircraft was fitted with a wireless transmitter (but no receiver), I tapped out a message to Base informing them that I was lost and about to forced-land on the icepack, and that I was unaware of my exact location. I then held the aircraft dead into wind and proceeded to look for a suitable place to land.

“At times we were so low, because of poor visibility, that I was obliged to dodge pinnacles. Suddenly I saw immediately below what appeared to be a stretch of clear, greenish ice. Fervently praying that it extended ahead at least a short distance, I cut the engine. The aircraft dropped like a stone almost vertically, and when we hit the ice, the wind stopped us immediately. The pinnacles were so numerous, however, that we could not avoid hitting one head-on, and the aircraft finished up with its tail in the air and its nose and skis buried in a deep snowdrift.

“None the less, we were down safely—although Terry told me that while I was making the landing Bobby tried to leap out of the cabin door, and that it was only by throwing him down on the floor and placing his heel on his neck that he was able to prevent him from so doing.

“It was now quite dark, and the immediate job was to build an igloo as quickly as possible to avoid freezing to death. Working fast, the three of us completed our first igloo in about half an hour. Our sleeping-bags and other emergency equipment had

² In the last installment of this series of articles brief mention was made of the trek of F/O A. Lewis and his two companions through the arctic wilderness after a forced landing on an icefloe. In this issue it is proposed to describe the little party’s experiences in greater detail. The account is taken from the longer narrative prepared by F/O Lewis himself—who incidentally, is now a Group Captain and, at the time of writing these lines, Commanding Officer of RCAF Station Trenton.

previously been taken out of the aircraft, and when we were comfortably inside we made some tea. We decided to consume our emergency rations only when it was absolutely necessary to maintain our strength. We took an inventory of them and set about organizing a method of rationing for the future. To do this, of course, it was first necessary to determine the maximum length of time the rations would have to last.

“Though we were not sure where we were, we knew we were out at sea and not on land. Since we had been flying towards Port Burwell from the Eastern tip of Baffin Island, I had no idea whether we were in the Atlantic Ocean or Ungava Bay.

“We finally decided that if we did not reach safety in fifteen days, the rations wouldn’t be of much use anyway; and we proceeded to divide up the six slabs of chocolate, the hard-tack biscuits, and the malted milk tablets, with mathematical precision. There appeared to be much more tea than we were likely to consume in fifteen days, and the kerosene, if used sparingly, seemed sufficient to outlast this period. In addition, we hoped to come across some living thing to shoot with our B.S.A. rifle.

“Now came the problem as to which way we should start to walk. If we were in the Atlantic, by walking east we would arrive nowhere and would eventually reach open water with our rations exhausted and no possible chance of surviving. If, on the other hand, we were in Ungava Bay, then by walking either east or west we would strike shore. In reconstructing the flight in my mind, I came to the conclusion that we must be in Ungava Bay, for, as already mentioned, I had been allowing at least 20° to correct for the north-west gale. With that decision firmly fixed in my mind, I decided that on the morrow we would walk east towards the Labrador mainland.

“During that first long night Terry and I, who were both Englishmen, talked on English country pubs, the shows we had seen, our motorcycles and their respective merits; and we vowed there and then that if we ever survived this ordeal we would spend our very next leave in England and toast our deliverance in nut-brown ale in some little pub buried in the heart of the English countryside.

“In the morning, we dug ourselves out of the igloo and made ready for our journey. The first thing to decide was the weight of equipment we were each physically able to carry. That was where Bobby came into the picture. He was a husky fellow, accustomed all his life to carrying big loads, and able to carry at least half as much again as either one of us without any fatigue whatsoever. In addition, despite his missing eye, he was a crack shot. With only fifty rounds of ammunition at our disposal, Bobby was going to be worth his weight in gold.

“Our next problem was to determine exactly what we should carry with us. The most important items were the rations, the sleeping-bags, the rubber life-raft and paddles (for we were sure to encounter many leads before we could reach shore), the B.S.A. rifle and 50 rounds of ammunition, the compass and eight-day clock dismantled from the aircraft, and such smaller items as clasp knives, fishing-line and hooks, snow-knife, matches, etc.

“By the time we set forth, the blizzard of the day before had been replaced by a strong gale, with overcast skies, poor visibility, and a temperature which felt like thirty or forty below zero.

“Though we could not have walked for more than about two hours that first day, one thing about the formation on the ice struck me as being very singular. I had anticipated that, if we were walking towards a shore, the ice-pinnacles should become smaller and the floes less rough. Yet the reverse was the case. The pinnacles were becoming taller and the floes almost impossible to negotiate. We were undoubtedly walking in the wrong direction, so I decided to call a halt at once, build an igloo, and reserve our energies until I had thought out this new situation.

“In less than half an hour we were comfortably drinking tea and consuming our meagre ration. Later I disclosed to Terry my fears that we were walking out to sea. He replied very simply that, if that was so, all we had to do was to walk in the opposite direction. We slept on that thought.

“The following day broke clear and cold. We were completely surrounded by tightly packed ice-pinnacles and could not immediately sight anything on the horizon, although, if we were really in the Atlantic, we could not possibly be beyond sight of the Labrador mountains. Climbing to the top of one of the pinnacles, I glanced to the west. There, clearly etched in the sky, were what appeared to be mountain peaks white with snow. A rough calculation convinced me that we must be 50 miles out in the Atlantic, and with renewed hope turned and began to retrace our steps in a westerly direction.

“During the first hour or so there was little change in the icepack. The going was slow. At times we were up to our waists in snow, and at others we were walking on clear, greenish sponge ice which gave beneath our weight and emitted a weird squeezing sound. Occasionally we were forced to scale jams of tightly packed ice-pinnacles to maintain our compass course and eliminate many extra miles of walking.

“Our stomachs and muscles were now beginning to feel the strain of insufficient food and too much exercise, but the greatest hardship of all was the complete absence of fresh water. We were forever parched for it. When floes and pinnacles were being formed, salt is precipitated on the ice and forms a thick crust on the outside. Even the snow in contact with ice becomes tainted.

“On the following day the temperature was comparatively mild, but it was snowing heavily, with a strong wind from the east and practically no visibility. After walking for three to four hours, we suddenly came to open water. It was a lead about twenty yards wide and much too long to consider walking around. It was at this point that the life-raft got its baptism.

“The crossing of the lead took so long that there was little time left for finding a drift suitable for an igloo. Stopping at a cluster of low pinnacles that provided an adequate wind-break, we scraped together what little snow there was on the surface and so formed a low enclosure about two feet high. There we huddled in our sleeping

bags, and made tea. Sleep was out of the question, for we were apprehensive as to whether we would ever awake.

“It was then I decided that this was an emergency warranting use of the brandy which was part of the emergency rations. Bobby wasn’t very interested, for he had never tasted liquor and had always been warned by the missionaries that it was devil’s brew. For my own part, I feel quite sure that had it not been for the hot tea and the frequent sips of brandy, we would not have survived to tell the tale. Throughout the night we sang and talked. Bobby kept muttering under his breath something about ‘Jesusee’. I am afraid we capitalized on his smattering of religion in order to keep up his spirits; for if Bobby had ever given up the ghost, it is doubtful if Terry and I could have survived with our more limited capabilities. Terry and I didn’t know many hymns, so we sang anything that came into our heads, telling Bobby they were hymns and thus getting him to hum them along with us.

“At the first sign of light we went on our way. We had only been walking about half an hour when to our intense joy the dark shadow of the mountains loomed right ahead of us. In the half-light we seemed to be only a short distance away from them, but this was an illusion. Nevertheless, during daylight hours the compass would no longer be necessary. In the distance, and slightly to our right, were two peaks towering up into the sky. We had brought our maps with us from the aircraft, and, on studying them, I found a spot designated as ‘Four Peaks’, approximately 80 miles down the Labrador coast from Port Burwell. If the two we could see were part of this group, we had drifted for quite a considerable distance south with the Labrador current. Theoretically, we should have allowed for this drift by walking at an angle towards the shore, but we decided to disregard it and to reach shore as quickly as possible.

“On we walked through the endless monotony—when suddenly, straight ahead of us, we saw a wide lead with literally hundreds of walrus swimming about in it. Right before our eyes was more fresh meat than we could have imagined in our wildest dreams.

“To shoot a walrus in the water is sheer waste of ammunition, for it will merely sink to the bottom. Our only chance was to wait until we could see one on solid ice. Finally, one huge fellow dragged himself up on the ice and began to roll. Bobby slowly cocked the B.S.A., took steady aim with his one eye, and fired. The walrus leapt several feet into the air and almost fell back into the water again. Although he was stunned by the shot in the head, he was still alive and breathing heavily. This fact did not deter Bobby. He cut a huge slab of flesh out of the poor creature’s side and ravenously devoured it. Terry and I, however, hungry though we were for fresh meat, drew the line at living flesh and decided to wait until it was frozen, when we could chop it into small squares and swallow them whole. This incident was probably the real turning point in our adventure, for it had been obvious for some time that the rations were grossly inadequate for the amount of energy we were expending.

“It took some little time to get organized again after all this excitement, but eventually we collected ourselves and prepared for our second voyage across a lead. When we were safely landed on the other side, Terry and I went into consultation over our course, leaving Bobby to pack up the raft. We then carried on with renewed vigour until dark, when we found an excellent drift at the base of a clump of small pinnacles, where we dug ourselves in for the night.

“After we were comfortably installed inside the igloo, I made a routine check of our equipment. To my consternation, the familiar bulk of our life-raft was missing. Bobby, we discovered, had deliberately left it behind so that he could carry its weight in walrus flesh. This reasoning was perfectly sound provided that we encountered no more leads, but I was convinced that they would become, if anything, more numerous as we neared shore. However, it was too late to turn back.

“Next morning we breakfasted on frozen walrus squares, biscuit, chocolate, and tea. Feeling like normal men again, we set out on our way.

“Though this day passed uneventfully enough, the one that ensued did not. We had been walking for about two hours when, sure enough, we came to a lead. It was impossible to determine how far it stretched in either direction, but, since we now had no raft, there was nothing for it but to walk north in the direction of the drift.

“After walking for about an hour, we decided to pry loose a pan of ice sufficiently large to support the weight of the three of us, and to use it to ferry across to the other side.

“After we had separated a fairly large pan from the main pack, Bobby took a flying leap on to the centre of it and kept it level while we in turn jumped on. The pan, under our combined weights, sank into the water at least three inches, and our feet, awash in ice-cold water, rapidly became numb. We crouched down as low as we could to prevent the pan from capsizing, and quickly paddled our way across the few feet that barred our way to deliverance. When we hit shore, Terry, in his hurry to get off, slipped and fell into the water. His immersion gave us some concern, but the water had not penetrated sufficiently to cause him any great discomfort. We bivouacked in the lee of an ice-ridge and there we remained until dawn, drinking tea and sipping brandy.

“At the first sign of light, we were off again. When at last we reached shore, there was nothing but bare rock and snow. But it was land, and any storms from now on would at least be known factors, and the ground was not likely to open up underneath us. Our first thought was to find a drift and build an igloo, since the urgency to continue our journey was lessened now that we were off the floes. When we were comfortably settled inside our sleeping-bags, drinking tea and eating our rations, we determined as accurately as possible our position on the coast. Taking the ‘Four Peaks’ as our datum-point, we decided that we must be approximately 90 miles down the coast from Port Burwell, somewhere between Nachvak and Nanuktok. By walking North for approximately twenty miles we should strike the inlet of Kamaktorvik.

“When we awoke and dug ourselves out of the igloo, the weather was clear and very cold, with a strong north-west wind. We set off towards the north on the second phase of our adventure. The going was infinitely rougher than we had anticipated, with the snow many feet deep and at times up to our waists. After about ten miles of most arduous walking, we called it a day, built an igloo, and drew up another plan of action. We decided that on the following day we would scale the mountain we were now on and obtain a more accurate fix of our position.

“I shall never forget climbing that mountain in the face of the wind, through deep snow-drifts, over dangerous crags, and up a long steep glacier lying in a valley of its own. When we arrived at a point almost abreast with the crest of the mountain, we caught the full force of the north-wester, which must have been of full-gale proportions. I lost my balance, slipped, and started to roll down the way we had just come. Over and over I rolled, down and down with increasing momentum, until suddenly I pulled up short and found myself buried in a deep drift. Climbing out, I beheld Terry within a few yards of me. He had been swept off his feet in exactly the same way. As we stood there talking, Bobby came tobogganing down on his bottom to help us, grinning from ear to ear. We recommenced the ascent of the glacier, this time taking full advantage of any protection that offered itself, and went on climbing until utter fatigue made further progress impossible.

“The next day we breasted the crest entirely, and there ahead of us we beheld a great wind-swept plateau, level as a billiard-table. Far beneath us we saw the frozen sea. We walked along the plateau for about two hours before halting and making a light repast of raw walrus and snow. Then we continued our pleasant stroll along the plateau until we reached the other extremity—when, lo and behold! a long wide inlet stretched away beneath us from the sea, disappearing among the mountains. To reach it, however, we had to descend a steep mountain side.

“We were unable to find a route where there was any possibility of walking. All we could do was to jump from crag to crag, gingerly wade through deep drifts, and circumnavigate the steep chasms with which the mountain-side abounded. When it appeared as if we had reached the half-way mark, we called a halt by a huge snow-drift. We consulted our maps in the igloo that night, and it became clear that the inlet beneath us must be Kamaktorvik. After crossing to the other side, we should be able to reach Eclipse Harbour approximately 25 or 30 miles away, where we knew definitely that there was a large Eskimo settlement.

“We were up at dawn. The second half of the descent proved easy to negotiate, and we set foot on the inlet without mishap.

“We continued across the inlet in single file, walking in absolute silence for at least two hours, when out of the deathly quiet I was startled by a deafening yapping of dogs. Behind me, almost at my heels, I beheld a dog-team and komatik (large Eskimo sled), and three Eskimos—a man, a woman, and a little Eskimo boy. Bobby and Terry had been picked up a few minutes before, and I was still plodding on in sublime ignorance, oblivious to our good fortune.

“Bobby was almost hysterical, jabbering away at top speed. It transpired that the Eskimos were from Eclipse Harbour, which could be made in one sleep with a little extra effort. After the excitement had abated somewhat, our new friends hauled out of their komatik some beautiful salmon-trout, off which they hacked splinters with an axe. Seldom had anything tasted so delicious. Then, still parched for fresh water, we proceeded inland under our hosts’ direction for about a mile to a frozen lake, at the edge of which a spring bubbled furiously beneath the snow.

“The Eskimos suggested we stay with them for our sleep. Without further ado, we soon constructed an igloo large enough for the six of us. When we had eaten our fill and the Eskimos’ pipes were in full blast (they were all inveterate smokers), we told our story to their amazed ears several times over, then fell into the deep sleep of exhaustion.

“We were awaked by the Eskimos, and when we crawled out of the igloo, a full moon was shining and the night was wonderfully clear. The Eskimos were resolved to reach their settlement at Eclipse Harbour without any more sleeps or building of igloos. That hectic komatik dash from moonlight to moonlight will forever stay in my memory (for it was moonlight again before we finally reached our destination). The unfortunate dogs took a terrific beating, tired almost beyond endurance, with bleeding paws and frothing mouths. If they as much as slowed down, an Eskimo would run ahead and hurl a heavy steel fox trap at the delinquents. So, to the tune of alternate yelling from the Eskimos and howling from the dogs, we made our way up the coast.

“All day long we travelled thus, with brief rests; and at last, when the moon was waning again, we came upon a village of igloos. Standing around awaiting the return of the hunters, were groups of Eskimo men and women. Bobby was shortly in his element. He was the lion of the hour, chattering like a machine-gun to all and sundry (especially the women) who crowded around him.

“Eventually we were introduced to the headman of the village. He took us in hand and gave Terry and me two wooden bunks in one (the most palatial) of the igloos—which were not nearly as comfortable on the inside as they appeared, to our trail-weary eyes, from the outside. The floors were inches deep in water from the melting snow, and the particular igloo in which we found ourselves was so hot that the Eskimos, male and female alike, were beginning to discard their clothing, while some were already in a state of complete nudity.

“After a meal that had upon us (in our weakened state) the effect of a seven-course banquet, we fell asleep with minds at last at rest; and the next morning, to the accompaniment of numerous farewells and promises to return and visit them with a ‘tingiok’ (aeroplane), we bade our friends good-bye. The little Eskimo boys ran ahead, apparently quite tireless, urging on the dogs and throwing the inevitable steel traps at the more obstinate ones. We travelled on, hour after hour, taking turns at riding and trotting, until the moonlight had given way to darkness, and darkness to dawn. Just before darkness set in again we stopped for about an hour to feed and rest

the dogs, then we were off once more into another night and another full moon—until finally, at about midnight, while the moon was still bright, our goal came into sight. Across a bay we could dimly make out the Hudson Bay Post and the faint outline of the old Moravian Mission building which was our home.

“All was deathly quiet, with not a soul astir, for we had long since been given up for lost. As we neared the base, the dogs set up a terrific howling and doubled their pace. Soon there were answering howls from other dogs at the Base, and a veritable bedlam ensued. When we were within hailing distance, Bobby produced the rifle and fired our entire stock of 49 rounds into the air. The sound of firing produced an immediate reaction. The doors opened and out rushed everyone in various stages of undress. Frank Coghill, the O/C of the Base, Doctor Kelly, Constable Montague of the R.C.M.P., Louis Paquette (who was later lost with Parker Cramer flying the Atlantic), Wilson of the Marconi Co., and Captain Bennet of the S/S “Canadian Raider” which had been wrecked the previous summer. Out dashed the cook, old Congdon, and Sgts. Kirkcaldy, Semple and Torrie, all in utter amazement at our return from the dead. It will forever be an unforgettable moment in my life, and one which cannot be adequately expressed in writing.

“An immediate party was decided upon, and we were practically carried into the dwelling. Terry and I, however, with our empty stomachs, decided to call it quits after one large brandy, and the following day we were placed on a liquid and fish diet and told that we were to remain in bed for observation. After two days in bed, a reaction set in and we found it impossible to get out of bed without help. During that week in bed, we were obliged to retain our straggly beards owing to the frost-bite scabs, and it was almost a month before we could have a proper shave. The brown scars remained for over a year, and even to this day one side of my face is extremely tender.

“Bobby all this while was being feted royally by his own family, and to enable them to do this they were issued with as many supplies from our stores as they wished. The two Eskimos who had brought us back home remained with us several days, taking part in the celebrations. When they were ready to return home, they were issued with as many stores as they could carry on the komatik and were promised still more if they cared to make a second trip . . .

“Three weeks later, when Terry and I were up and about again, we took another aircraft and flew over the route we had followed on our trip. On this particular occasion the weather conditions were perfect, with unlimited visibility in every direction. When we were halfway across the Strait we flew out into the Atlantic for about sixty miles, then south parallel to the Labrador coast (hoping, in vain, to catch a glimpse of our aeroplane), down to Eclipse Harbour, and over the Eskimo village at which we had been guests. Our emotions, as we gazed from above on the scenes we

had so recently viewed in such vastly different circumstances, can, I think, be more readily imagined than described.”³

1-10. WORLD WAR II

Part 10 Vol 1, No. 10 (August 1949)

The North-West Staging Route

In August 1940 a permanent Joint Board of Defence⁴ was formed by Ottawa and Washington to co-ordinate the plans of the United States and Canada. One of the first tasks with which the Joint Board was charged was the investigation of the situation concerning transport and communications across Canada's north-west from the United States.

Apart from a Canadian civilian company's rather small-scale operations between Edmonton and Whitehorse, and the equally small American service between Juneau and Fairbanks, transport was at that time possible only by two methods. The first was by steamship from the west coast of Canada and the United States direct to the ports on the Alaskan mainland; and the second was by steamship up the so-called inner passage from Vancouver to Skagway, thence by narrow gauge railway to Whitehorse, and from there by river-steamer down the Lewes and the Yukon Rivers, through Dawson City to Alaska. Both these routes were susceptible of possible attack by submarine, and furthermore, the Whitehorse-Dawson route was not open except during the five summer months.

The Joint Board therefore recommended that the Department of Transport's plans for building an airway between Edmonton and Whitehorse be carried out forthwith. The Canadian government decided that construction of the airway should be part of its contribution to the defence of the western hemisphere, and announced that it would undertake the whole expense of the project.

On February 3, 1941, contractors were given orders to begin construction of airfields at Fort Nelson and Watson Lake, the only two sites on the projected route where there were no airfields of any kind. At Grande Prairie, Fort St. John, and Whitehorse there were already usable airfields in operation which needed only to be extended and improved—a task that presented no great difficulties, since all three

³ *Original note to article:* This completes Ft. Lt. Wood's account of the RCAF in the arctic and sub-arctic up to the outbreak of World II. The next issue of "The Roundel" brings us into a period with which the majority of those now in the Service are much more familiar. Ft. Lt. Wood wishes to remind his readers once again that the eight preceding instalments do not pretend to be in any way an exhaustive study. They constitute merely a broad correlation of existing written records of a phase of the RCAF's history which has already, unfortunately, been forgotten by most of us.—Roundel Editor

⁴ *Editors' note:* The Permanent Joint Board on Defence (PJBD).

places were served either by road or railway. At Watson Lake and Fort Nelson the picture was very different. Fort Nelson lies 180 airmiles north-north-west of Fort St. John, across some of the most rugged country in the Canadian north-west. Northwards from Fort St John there existed about 60 miles of road, passable in winter or dry weather, and a further twenty miles of tractor trail; but beyond that the only means of transport was by dog team along the surfaces of frozen rivers. The alternative was to send supplies by an extremely circuitous route, in which everything would have to be carried by rail to Waterways, and thence by steamship down the Athabasca, Slave and McKenzie Rivers to Fort Simpson. Transhipped into barges at Fort Simpson, the material could be floated up the Liard and Ft. Nelson Rivers to Ft. Nelson itself. The late departure of ice on Great Slave Lake meant that this latter route would not be usable until July, and it was unlikely that more than two trips could be made in any one year. However, the urgency of the situation convinced the engineers they must use both routes.

On February 9, 1941, a trail-breaker and tractor train left the end of steel on the western section of the North Alberta Railroad at Dawson Creek and struck north to battle its way to Fort Nelson. Expert trail-blazers rode ahead, first on horses and later with dog team and sled, to mark the trail for the heavy bulldozers which followed. They picked a route which has now become part of the Alaska Highway. Behind this huge train travelled another train of sleighs and trucks carrying about 600 tons of freight and supplies. This material was taken as far as the Sikanni River crossing, and cached there to be taken on to Nelson later. Everything proceeded smoothly until the engineers ran into the earliest break-up on record in that region.

This caught everyone off guard. There were about 400 tons of freight sitting at the Sikanni River, which could not now be moved over the muskeg. But the problem was surmounted. Seaplanes, landing on the Sikanni, picked up the more urgently needed of the light freight and flew it to Fort Nelson. Other items, which were bulkier but equally urgent, were floated down the Sikanni to the Fort Nelson River and so to the airport site. The rest of the supplies were left at the river crossing to be picked up after the freeze-up.

In the meantime preliminary work on the airport site was pushed ahead and the runways were being laid out. A complete saw-mill was flown in and put into operation. Asphalt was freighted in along the water route via Waterways and Fort Simpson, and, in short, despite all difficulties, a usable runway was put in commission on September 1st, 1941, when it was promptly taken advantage of not only by Canadian aircraft but also by American military machines on their way to Alaska.

The difficulties in the construction of a base at Watson Lake were equally severe, but nevertheless an adequate runway was ready for use on September 2, 1941.

In the meantime, the work of extension and improvement on the fields at Grande Prairie, Fort St. John, and Whitehorse had been proceeding without particular incident; and the result of these combined efforts was that by the beginning of

September a complete airway, adequate for use in favourable weather, had been completed and was actually in operation.

The whole picture changed completely one Sunday morning in December 1941. The attack on Pearl Harbour, and the swiftness with which the Japanese endeavoured to take advantage of the surprise they had achieved, brought a desperate threat to the security of the western coast of this entire hemisphere. It was now that the wisdom and foresight of the men who had been responsible for pushing ahead with the North-West Staging Route became apparent. On December 9, 1941, the Department of Transport was able to announce that radio range facilities on the North-West Staging Route were now completed. This meant that weather would have little effect on the flow of traffic to and from Alaska. In the critical months of 1942, when the Japanese were threatening to extend their control to include the entire Aleutian chain and even the inner passage between Vancouver and the Alaskan panhandle, the North-West Staging Route remained as a virtually unassailable artery, sheltered behind the tremendous barrier of the mountains, and removed from attacks even by long-range aircraft.

It had, however, been originally designed for moderate-sized civilian operation, and not for the tremendous flow of military air traffic (ranging from the smallest single-engine fighters to the biggest bombers and transports ever built) which had to be taken over it from the beginning of 1942 onwards. In view of this fact, the United States government was anxious to make considerable extensions to existing facilities at each of the fields. Canada, who had already been participating in a war for more than two years and operating the largest aircrew training scheme in history, was not able to provide the manpower required for the job. The United States therefore freely undertook to do all the construction work required. Work went ahead on that basis, but with the important proviso that all *permanent* work carried out on the airfields should be regarded as an expense for which Canada would assume full responsibility. At the same time as it was extending the facilities along the North-West Staging Route, the United States government built the Alaska Highway and embarked upon construction of the famous Canol pipeline.

The immense programme undertaken by the United States on the three major north-west defence projects was pushed ahead with fantastic speed during 1942. The Alaska Highway, or rather the pioneer road on which the present Highway is based, was built in 7 months during the summer of that year. The runways at the main air bases of Grande Prairie, Fort St. John, Fort Nelson, Watson Lake, and Whitehorse were extended and paved with concrete. The intermediate fields at lonely spots like Smith River, Aishihik, and Snag, were constructed in between the main bases to provide a maximum safety of operations. The back of all this construction work was broken by the end of 1943. Meanwhile, the smashing defeat of the Japanese navy in the Battle of Midway and the eventual expulsion of Japanese troops from the Aleutian chain largely removed the dangers against which the north-west defence projects had been designed to insure.

In September 1942 the RCAF took over operation of the Staging Route. Previously, traffic control had been exercised by the Department of Transport, and the change to RCAF control was undertaken because the Route had become predominantly a military affair. At the end of 1943, the RCAF organized an airways traffic control centre in Edmonton, where a duty controller was established to maintain a complete check on the movements of all aircraft over more than 1,500 miles of the airway from the 49th parallel to the Alaskan boundary.

In June 1944, the RCAF's North-West Air Command was formed to take over complete operation of the Route. Many of its senior officers were men with long experience in northern flying. The Air Officer Commanding, Air Vice-Marshal T. A. Lawrence, C.B., had carried out surveys for the RCAF in the Eastern Arctic in 1927-28, and both the Chief Staff Officer and the Senior Air Staff Officer were veteran bush pilots. In addition, many of the pilots engaged in flying RCAF aircraft over the route had long civilian experience in bush flying.

North-West Air Command also operated a Communications Flight, equipped with smaller aircraft, whose duties included flying freight and passengers to any point in the north-west between the 49th parallel and the Arctic Ocean. Their activities were by no means confined exclusively to RCAF operations. On innumerable occasions they assisted various other departments of the Canadian government in conducting urgent business throughout northern Alberta, northern British Columbia, the Yukon Territories, and the Mackenzie valley. The Flight normally flew more than 100,000 miles a month over many thousands of square miles of territory. During 1944, it flew roughly 1,000,000 miles over the north-west.

In order to maintain the Air Force bases in the north, it was necessary to establish a large-scale trucking operation over the Alaska Highway between Dawson Creek and Snag. This freight trucking unit carried between 300 and 400 tons of food a month, as well as other supplies, to stations along the route. The freight carried during 1944 totalled to 5¼ million lbs.

The development of the Staging Route by joint Canadian-American effort is an achievement worthy of pride. It accomplished three great objectives. It made possible the safe delivery of aircraft to Russia; it served as a springboard for the final offensive against Japan; and it provided a vital link in trans-polar air routes. This last feature has great significance for the future.

North Atlantic Ferry Routes

After the passage of the Lend Lease Act in March 1941, the Americans began to deliver aircraft to Dorval airport for ferrying to Britain. This operation was carried out by the RAF Ferry Command, supplemented by RCAF personnel and civilian pilots. The route was from Dorval to Gander in Newfoundland, thence to Prestwick in Scotland.

The 2,100 mile non-stop route from Gander directly across the Atlantic to

Prestwick was considered by the Americans to have serious short-comings. It was thought that a great circle route farther to the north, via Labrador, Greenland, and Iceland, would afford better weather and make possible the ferrying of fighter type aircraft.

The advantages of being able to ferry short-range planes to England were manifest. Pressure on shipping would be relieved. The planes would no longer be liable to loss by submarine action, and there would be no need to disassemble and crate them at the factories and reassemble them in England. They could be delivered and be in combat in a matter of days.

The RAF already controlled the airfields in Iceland. There were good terminal facilities at Prestwick and, as an alternate to Prestwick, Stornoway in the Hebrides. Canada was planning for a base in Labrador. The great problem was Greenland.

The Danish-American Agreement of April 1941 for the common defence of Greenland and the North American continent made it possible for the United States to begin to build air bases in Greenland. Surveys of the Greenland area were ordered at once by the Army Air Forces. No site for an airfield could be found on the east coast, but the survey parties found two good sites elsewhere on the island. The first was at Narsarsuak, near the southern tip of the island, the second was at Sondrestromfjord on the north-west coast.

In July the United States sent its first troops to Greenland and Iceland, and the Canadians discovered an excellent site for an airfield in Labrador at Goose Bay. With appropriate fields in northeastern United States, the elements of the route were in hand.

Work on a landing field at Narsarsuak was begun in early July. In September, the Greenland and Iceland base commands were established. Construction began at Sondrestromfjord; the Canadians started work at Goose Bay; and the U.S. Army Air Forces ordered weather and communication detachments to points in Labrador, Baffin Island, and Greenland. The stations in Labrador and Baffin Island, three in number and known as the 'Crystal Stations', were admirably situated for the observation of arctic weather movements that swept over the route. Crystal I was at Fort Chimo, Crystal II was at the upper end of Frobisher Bay, and Crystal III was just off the north-east coast of Baffin Island. The other Air Force detachments were sent to Narsarsuak, Sondrestromfjord, and another base near Angmagssalik in north-eastern Greenland.

The route was known as the 'Bolero Ferry Route', and the first Bolero flight, consisting of eighteen B-17's, took off from Presque Isle for Goose Bay on June 23, 1942, and all arrived safely. They left Goose Bay for Narsarsuak three days later, but this time only half arrived at the destination. Of the remaining nine, six returned to Goose Bay and three made forced landings at various points on the Greenland coast. No one was injured and the crews were soon rescued. This mishap, which was attributed to the inexperience of the crews, poor forecasting, and inadequate communications, underlined the fact that the route was not yet ready for use.

These difficulties were not easily overcome. In mid-July, six P-38's and two B-17's were forced down on the Greenland ice-cap after losing their bearings during a flight from Sondrestromfjord to Reykjavik. No blame could be attached to route operations in the matter and, as in the earlier crashes, there was neither loss of life nor serious injury.

Notwithstanding the misfortunes which befell the first movement, the route soon settled down to efficient operation. With experience and additional equipment, the weather and communications services improved markedly; adequate base facilities became the rule; and the tactical crews, with a longer period of training, began to give a better account of themselves. The old confusion was gone. Experienced Command control officers briefed and dispatched the Bolero planes; Command pilots, navigators and radio operators flew in the lead bombers; and safe delivery over the route of Eighth Air Force planes became a routine matter.

The Aleutian Campaign

In June 1942, a Japanese Task Force came into the Aleutian area and operated north and south of the Aleutian chain, almost as far in as the mainland. They eventually struck at Dutch Harbour with carrier aircraft and did a great deal of damage. They were counter-attacked by American fighters and B-26's from Umnak Island, which lies about 75 miles west of Dutch Harbour. The total operation lasted three days, at the end of which time the Japanese Task Force withdrew and established permanent bases on Kiska and Attu. Kiska became their main operational base, while Attu was used more as a reinforcement and staging point for ships from the main Japanese Islands. The Japanese endeavoured to build landing strips on both of their islands. Neither of them, however, was completed at the time they were taken over by the American Forces. Float fighters, which were evidently brought by ship to Attu, were assembled there and flown to Kiska. Very few of them actually got to Kiska, as P-38's on strafing runs from Amchitka and Adak finished most of them off as soon as they were assembled. One force of about 20 Mitsubitsi bombers came over Attu from Paramushiro. They were intercepted by P-38's and only about 4 got back.

In June 1942 the Commanding General, U.S. Pacific Coast, asked Western Air Command for aerial support. A wing was formed and dispatched immediately under the command of Wing Commander Gordon McGregor. It included one Bolingbroke Squadron under Sqn. Ldr. C. A. Willis and one P-40 Squadron under Squadron Leader A. D. Nesbitt, D.F.C. They were dispatched to Yakutat; by the time they got there it was evident that there would be no action in that area for a long time. They were therefore sent on to Anchorage, only to find that the whole situation was stabilized. Thus, there was no combat activity for many months, until the Americans had completed a line of bases running right on down the islands to Kiska.

There was one incident in 1942 that is perhaps worthy of note. A flight of P-40's was based for a few months on Umnak Island, whence it proceeded to Adak, which

was at that time the last jumping-off point for Kiska. They made one strike at Kiska, during which Flight Lieutenant K. A. Boomer shot down a Japanese Zero. It was during the movement of the flight from Anchorage to Umnak that a group of seven aircraft, led by Wing Cdr. McGregor, was caught in bad weather and sea fog near Unimak Island. Five of the seven crashed into the shore mountains.

In January 1943, Wing Cdr. R. E. Morrow, D.F.C., recently returned from England, relieved Wing Cdr. McGregor.

About that time it was decided to withdraw the Bolinbrokes, as it was absolutely impossible to try to operate British aircraft so far away from Canadian or British supply sources. Finally, another P-40 squadron was brought up to replace them, and the two squadrons were enlarged to the point where it was possible to establish an additional flight. One squadron was based on Kodiak Island, one on Umnak Island, and the extra flight at Amchitka. The main headquarters were retained at Anchorage.

After the attacks on Dutch Harbour, the Americans began to push westward from Umnak, and construction troops moved into island after island, building air strips. The RCAF was right on their heels, and usually the aircraft followed within 48 hours after the first troops went in. The pattern of operations were armed reconnaissance of the islands, airstrip construction, then full occupation.

Wing Cdr. Morrow has written an account of his experiences during the Aleutian campaign, a few extracts from which are given below.

“The Aleutian islands are all of volcanic origin, and about four of them are active volcanoes. Some of the smaller islands are just barren peaks sticking out of the sea, while others have sloping shelves at sea level varying in size up to that at Umnak, where there is a shelf about 30 miles long by 10 miles wide. An important feature of this island is that it is composed wholly of volcanic ash, which is excellent for construction purposes. To make roads or runways, the ash is just dumped down and rolled flat, when it presents a dry finished surface closely resembling asphalt. The ash can be found anywhere. It is necessary only to cut off about 6 inches of topsoil with bulldozers and there it is, many feet deep and absolutely unadulterated.

“A good point about Umnak is that when either the Pacific or the Bering Sea side is closed in, the other is open. With fields on both sides, you can nearly always get in somewhere. There is plenty of game on the island. Caribou, fox, and rabbit abound. The fishing is good, too. The natives live on it pretty well, and every year there is a very heavy salmon run up the streams. Seal are plentiful, and the Pribilof Islands (about 100 miles north of the chain) are said to be the world’s greatest sealing grounds. The rare sea otter is also found here, though in smaller numbers than at Amchitka, where I could almost have walked ashore on their heads from a dinghy. Incidentally, the U.S. were really tough about hunting, which was probably a GOOD THING. The troops tried very hard to get hunting privileges, but the answer was a flat ‘NO’—unless they complied with peace-time rules which required \$100 for a license and a guide at \$25 a day. There wasn't much *official* hunting!

“Fierce little storms prevail along the length of the islands. The worst locality for

them is Adak. Sometimes three or four times a day, small, fast-moving fronts come across. They appear to move from west to east, skirting the north of the Pacific 'high' that lies off Southern Alaska most of the year.

"Amchitka Island is about 20 miles long and 1 mile wide. The Japs used float Zeros to strafe and bomb when we moved in, but nothing very serious happened. We operated from a 2,000 ft. strip that backed on a hill. The runway was formed by damming off a sea bay with a dike and dumping a strip of gravel in where the bay had been. On higher ground a bigger field was built of metal for B-25's, etc. It wasn't in use long before the Japs packed up. We lived here in rude huts, on 'C' rations, and we were generally pretty miserable. It was cold, rainy and windy all year round.

"We did dive bombing and strafing runs from here to Kiska, and the 38's went to Attu. There really was quite a lot of flak, since the area to be covered was so small. The Japs claimed a lot of kills in their reports, but there weren't many aeroplanes lost. Some days there would be perhaps 200 sorties made, yet the losses averaged only about one aeroplane in a week or ten days.

"It was off Amchitka, in May, that I made my historic leap and swim home, so I can tell you all about the water there. It's COLD! I lasted 45 minutes in a dinghy, but I was practically unconscious when the Yanks picked me out of the surf. A B-25 crew were dead in an hour a week before that after ditching. I don't think that at any time of the year a man would last in the Bering more than 1½ hours without an exposure suit of some kind. The temperature of my impromptu bath was about 34°.

"Aleutian weather offers no extremes of heat or cold, but it is almost always unpleasant, characterized by extremely high winds, fog and rain. Sometimes fog will clamp in an island for many days without any break. On the subject of wind velocities, I can quote 115 mph plus. I say 'plus' because the anemometer blew off at the 115 mark—and that was at sea level. We had to do more than picket the aeroplanes. Sometimes we put the wheels in a ditch. The Alaskan civilian boys had another stunt. They tied a piece of 2 x 4 on the wing to spoil lift.

"The general wood shortage is worth special note. When there just aren't any trees, life gets quite complicated. To mention merely one of many inconveniences, we found that animals chewed up all our wiring—which, lacking wood, we had to lay on the ground.

"On all islands routine defensive patrols were maintained. The U.S. Navy handled most of the anti-ship reconnaissance. A few B-24 raids were made to the Northern Jap Islands, but they were sporadic and didn't accomplish much.

"We ourselves were concerned mainly with Kiska and Attu—the usual routine: weather trips, dive bombing, low-level strafing, etc. Doubtless it didn't keep Hirohito awake at nights worrying, but it must have made life very unpleasant for his faithful boys on the receiving end.

"The Attu operation was carried out by a task force consisting of battle wagons, destroyers, carriers, landing craft and transports. The Army ran in air support from Adak and Kiska as well. Apart from the local operation (which I won't describe, as I

was not there) the only show of real interest occurred on the one day the Japs tried a bomber attack on the ships. The Army was running a continuous patrol of P-38's, flying a Catalina on long-range reconnaissance for early raid warning. The Catalina's radar picked up a force proceeding from Paramushiro, and it relayed the information by radio to the P-38's under a Colonel Watt, one of the nicest chaps up there. Attu was overcast, so Watt went on top, but unfortunately lost most of his flight in the climb up. I think there were 20 Japs, and they were intercepted without any ground control by four P-38's. Most of the Japs were shot down, but Watt failed to return. He was last heard on the radio well on his way to Japan with one engine on fire.

“Air transport was our big headache. We had no transport aircraft and had to rely on the U.S. Army. Air Vice-Marshal Stevenson did his level best and sent up aircraft when we were desperate, but, owing to unavoidable circumstances, it was often too little and too late. Certainly any RCAF force should have its own transport to use, abuse, and control.”

A Note on the Battle of the Atlantic

Although the battle of the Atlantic was not fought entirely in arctic waters, a good proportion of it was; and stations such as Gander and Goose Bay definitely come within the boundary of the sub-arctic.

It was from such stations that the war against the submarines was waged by means of RCAF bomber reconnaissance aircraft. These at first consisted of Bolingbrokes and Digbies, but were later exchanged for Hudsons, Venturas, Liberators, and Cansos.

The highlight in the convoy escort and arctic submarine war was the introduction of the Very Long-Range Liberator. Until this type of four-engined, long-distance aircraft was available, the range of our operational aircraft restricted the extent of our anti-submarine efforts. With its advent, Canada's Home War Establishment was no longer confined to its own front yard. Shepherding a convoy to mid-Atlantic, passing responsibility over to an aircraft from Britain, and then flying on to a British base was not an uncommon occurrence.

1-11: THE POST-WAR PICTURE

Part 11 Vol 1. No. 11 (September 1949)⁵

Photographic Survey

One of the most valuable services performed by the peacetime RCAF is Photo Survey work, which is helping steadily to push back Canada's frontiers and thus further the northward march of civilization.

1948 was the busiest photographic season since the Air Force began this type of work in 1924. Nos. 413 and 414 Squadrons, based at Rockcliffe, sent out a total of nine detachments, comprising 22 aircraft and about 250 air and groundcrew personnel. The first aircraft left the Rockcliffe base on April 20th—one of the earliest starts on record. At the season's end, the area photographed exceeded 900,000 sq. miles, as contrasted with the 1947 figure of 700,000.

The types of aerial photos taken by the RCAF today fall into two groups: vertical and tri-camera. Vertical photography, the original method, is used for mapping and for *detailed* exploration and analysis. Tri-camera photography is intended for *basic exploration*.

Specific examples of the two types are as follows:

Vertical

- Water power development (e.g., the Columbia River Valley project).
- Soil reclamation and irrigation projects, and land development for soldier settlement.
- Mineral exploration.
- Hydrographic survey for inland waterways.
- Forestry Service.
- Photographic coverage of flooded areas at flood height, for dyke projects.

Tri-camera

- Coverage of large areas where photos are needed immediately.
- Coverage in cases where large-scale maps are not required.
- General survey from which likely areas will be chosen for detail survey.

⁵ *In this issue we bring Flt. Lt. Wood's series of articles to a close. He writes: "Once again I would remind your readers how sketchy my narrative has, of necessity, been. I shall, however, be quite content if I have managed to give a reasonably correct impression of the general trend of the RCAF's northern activities. The last chapter, which I enclose herewith, carries the story on to within about eighteen months of the date of this letter..."* — Roundel Editor

In vertical photography only one camera is used. It takes a series of overlapping pictures (a line overlap) of the ground. In theory, the centre of each picture represents the ground directly below the aircraft at the time it was taken.

From tri-camera photos geologists can select areas for further investigation where ores or oil are likely to be found. Agricultural experts who understand photographic interpretation can tell where good farm lands are located. The cordage of forests can be estimated more accurately from the air than from the ground. Similarly, experts in other fields can obtain from tri-camera photographs information which will lead to the most economical use of the facilities available for vertical photography.

Housed at Rockcliffe is No. 1 Photo Establishment, one of the most modern air survey photographic laboratories possessed by any country. This unit processes all survey films and makes the necessary prints to be used by the various survey sections. During 1945 and 1946 approximately 3,320 reels (or 372,930 feet of film) were developed as the result of squadron operations. One printing room alone produces over 100,000 Service prints per month. This unit is also the centre for many other photographic processes of value to the RCAF.

The detachments sent out each summer may be stationed in airport buildings or under canvas, depending upon their location. In camps in out-of-the-way localities, as for example in the North West Territories, living conditions are rigorous. Firearms are carried and the men shoot most of their own requirements of fresh meat. They also, naturally, catch their own fish.

All operations are controlled from the 'Ops' Room at Rockcliffe. Detachments are shifted here and there to take advantage of the best weather conditions. Detachment commanders in the field, however, are given wide powers of discretion. All the work is recorded in the operations room as soon as it is signaled in by the detachments. When one operation is completed, the crews are told where to move for the next job.

The RCAF does not subscribe to competition with civil air lines for the easiest jobs. Instead, it accepts those assignments which would not make workable contracts. Hence the large proportion of northern survey accomplished by the Air Force crews. Even prior to governmental insistence on co-operation, mapping operations had been dove-tailed. The Army Signals and the Meteorological Service also benefit from the Air Force work, and these in turn assist the air survey detachments and other RCAF units.

One of the most interesting recent contributions to correcting the existing charts and maps was the re-discovery in 1946 of the Spicer Islands in Foxe Basin, north of Hudson Bay. These islands were reported in the ship's log of an American whaling vessel skippered by a Captain Spicer of Groton and New Bedford, Massachusetts, as follows:

"On the 7th August (1869) was beset. What I took to be water ahead turned out to be reefs and low-lying land, now called 'Spicer's Islands', hardly seen from the decks at high water."

Spicer's discovery is mentioned in a Department of Marine and Fisheries report entitled "An Expedition to Hudson Bay-1897." But when the American arctic explorer Donald MacMillan sailed over the supposed location in 1921, he found nothing. In 1946 the RCAF confirmed the existence of the islands and a dead reckoning position of latitude 68° 08' North and longitude 79°10' West was obtained.

Search and Rescue

The RCAF Search and Rescue organization stands ready at all times to carry out mercy flights in the Arctic; and it has many successful flights to its credit.

The job may be almost anything—from looking for a missing airliner down at sea to landing on a 'home-made' landing strip to bring out an Eskimo or missionary requiring immediate hospital attention. But behind all such operations is a carefully-planned organization, stretching from coast to coast, and co-ordinated and largely operated by the RCAF

Search and Rescue, however, is not designed to displace existing means of assistance to distressed persons. Though it may operate as a mercy organization within Canada whenever a life-and-death matter comes up that is too big for anyone else to handle, its primary responsibility is to carry out Canada's international commitments under ICAO [the International Civil Aviation Organization].

Control is carried out from five major co-ordination centres at Halifax, Trenton, Winnipeg, Edmonton, and Vancouver. Aircraft earmarked for mercy flights or search operations are stationed at Greenwood, Mingan, Trenton, Winnipeg, Edmonton, Ft. Nelson, Whitehorse, and Vancouver; and although planes at these points held for specific Search and Rescue work are allowed to carry out certain other duties, they are never allowed to undertake jobs which would prevent them from being instantly ready for their primary responsibility.

Recent additions to the list of primary facilities of the Air Force for Search and Rescue work include helicopters, as well as a group of 21 carefully trained airmen who recently finished an intensive course in para-rescue work near Jasper, Alta. These men, now stationed at Greenwood, Trenton, Edmonton, Whitehorse, and Vancouver, are available to parachute at any time from Air Force planes to aid persons in distress. All hand-picked volunteers, they were selected for their woods experience, physical ability to carry out arduous duties in the wilds, and general keenness and intelligence. So carefully have they been trained that any one of them could, if the occasion arose, deliver a baby.

Also ready for Search and Rescue work are the vessels and men of the RCAF Marine Section. Marine units are stationed at Dartmouth, Vancouver, and Trenton.

Nerve centres of the work are the major co-ordination centres, for from them are directed all operations by Search and Rescue. Huge charts in the operations room at each centre show the location of all Service and civilian aircraft known to be flying in

the area—and, where applicable, ocean-going shipping is also plotted. Ready for instant use are lists of all three Services' facilities (including Navy carrier planes, Army paratroops, etc.), bodies of men for search parties, vessels, and sources of civilian aid.

Supplies dropped by aircraft often play a big part in Search and Rescue work, and ingenious methods have been worked out, especially for marine operations. Most spectacular of these is the Lindholme gear, a series of five containers linked by rope and dropped from the bomb racks of a Lancaster without parachute. The centre pack contains a large rubber dinghy which inflates upon striking the water, bursting open the container. The other four containers, containing emergency supplies, float upon the surface, still linked by rope to the dinghy. The gear is dropped in such manner as to drift down wind upon the survivors, spread out in a wide line.

In the fall of 1947, at the difficult freeze-up time, word was received that Canon Turner, a Church of England clergyman at Moffet Inlet, had accidentally shot himself in the head. An Army parachute squad with an Army doctor was flown in and dropped to aid the wounded man, and, when a landing could be made on skis, he was flown out. Unfortunately Canon Turner died; but though the difficulties of the operation seemed insuperable at times, the members of the rescue crew surmounted them with a spirit and courage that is highly commendable.

Just before Christmas in 1947, on lonely Nottingham Island, one of the Department of Transport meteorologists developed a heart condition that was steadily becoming worse. 435 Squadron received the call, and two weeks after leaving, the rescue Norseman arrived back at Stevenson Field, Winnipeg, with the sick man aboard. This flight covered 3130 miles of forest, barren land, and the treacherous ice floes of Hudson Strait.

The detailed accounts of the above two incidents read like adventure stories: here they are merely mentioned as examples of work of the RCAF Search and Rescue organization. They are neither the most nor the least spectacular of many similar operations.

Air Transport Command

In 1943 transport work in the RCAF came under the direction of the Directorate of Air Transport Command controlled from Air Force Headquarters. Domestic mileage on Service routes amounted to 7,500 miles—combining to make a total route mileage of 11,596 miles. During the year a total of 6,079,753 pounds of urgent express was transported within Canada, Labrador and Newfoundland, as well as to the Yukon. Passenger traffic over the routes amounted to 18,238 passengers during the same period. In addition, nearly 500,000 pounds of Dominion of Canada mail was carried between Moncton and Goose Bay.

In February 1945 the Directorate was established as a Group. The Group was responsible for all transport duties including the carrying of freight to hinterland stations, ferrying of aircraft, aerial photographic survey, and the carrying of mail to

troops overseas. Special missions included mercy flights and the carrying of VIP's, as well as co-operating on combined Services exercises.

During 1947, No. 9 (T) Group flew 16,897 hours on transport operations, a total of over two million air transport miles. More than 23,000 passengers and over four million pounds of freight were carried. Fifty-five hundred hours were flown on photographic operations and special projects.

The inauguration of a new schedule of fast RCAF Air Transport flights, linking Canada from Coast to Coast, was announced by the Minister of National Defence on May 17th, 1948.

Operated by the newly-formed Air Transport Command, four-engine North Star aircraft were used on the main runs linking principal terminals from Goose Bay in Labrador to Whitehorse in the Yukon, while the servicing of intermediate terminals was taken care of by an interlocking feeder system utilizing twin-engine Dakota aircraft.

Main terminals for the scheduled runs are Montreal and Edmonton. The Eastern Division of North Star flights operates from Dorval aerodrome in two sections—one direct to Goose Bay, and the other on a twice-weekly schedule via Moncton and Dartmouth. The feeder service of the Eastern Division, operating Dakota aircraft, includes Ottawa, Trenton, and Toronto.

The fast North Stars fly twice weekly between Dorval and Whitehorse, and connect with the Western Division of feeder service operating into Winnipeg, Churchill, Baker Lake, Rivers, Regina, Calgary, and Vancouver, as well as various stations on the North-west Staging Route.

The new schedule is designed to facilitate the rapid movement of Service freight and personnel between various units and bases throughout the Dominion. In this way Air Transport Command does useful work while carrying on essential training. In the event of an emergency, Transport Command would supply units like Fighter Interceptor Squadrons, in addition to providing the planes and trained personnel for camping and servicing airborne troops.

Winter Experimental Establishment

The Winter Experimental Establishment was set up at Kapuskasing in the winter of 1943-44, and moved to Gimli in March 1944. The unit was subsequently transferred to Edmonton in October 1945, and to Namao, ten miles north of Edmonton, in 1946. In that year advanced bases at Fort Nelson and Churchill were located. The following year the Winter Experimental Establishment was based at Edmonton with advanced bases at Watson Lake and Churchill. The aircraft proceeded to these bases late in October and, except for a short break at the end of the year, remained there until the middle of March.

The aims of this Establishment are to provide guidance in the design of new equipment for use in cold weather and to rectify faults in current equipment which

limit the temperature at which it may be operated. The Establishment, which is an RCAF organization throughout, carries out tests not only for the RCAF, but also for the RCN, the U.K. Ministry of Supply, and the USAF.

The following aircraft and engines were tested with their associated equipment during 1947-48:

Aircraft	Engines
Lincoln II	Merlin 68A
	Merlin 621
Lancaster X	Merlin 224
North Star	Merlin 620
Dakota III	Twin Wasp R1830-92
Sea Fury X	Centaurus XVIII
Meteor IV	Derwent V
Firefly IV	Griffon 74
Mustang IV	Merlin V1650-7
Prentice	Gypsy Queen-32
Vampire I	Goblin II

Operations

The RCAF has, since the War, also been constantly engaged in Operations of various kinds other than Search and Rescue—magnetic survey operations, joint operations with the Army or Navy, reconnaissance operations, etc. It is not proposed to describe any of them at length, but brief mention may well be made of one of each of the three types referred to above.

Exercise Musk Ox

Musk Ox was a non-tactical exercise, the main objects of which were to study:

1. Army-Air Force co-operation.
2. Mobility of over-snow vehicles under a wide range of winter conditions, beginning on the Barren Lands and terminating in the spring in the northwestern bush country.
3. Methods of air supply, including the possibility of establishing temporary landing strips on the Barren Lands.
4. Certain technical research projects in Arctic warfare.

No. 1 Air Supply Unit, under No. 9 Transport Group Headquarters, was formed in November 1945, its function being to supply the Army Moving Force of Exercise Musk Ox with fuel, food, and replacement parts as required. The Unit, with its six Dakotas and three Norseman aircraft, was based at aerodromes within flying range of the Moving Force at all times. A total of 224 RCAF personnel of various trades and

ranks manned the Unit and supplemented the Army services by supplying chefs, M.T. personnel, hospital staff, and clerks.

The Main Base at Gimli, Man., was transferred to Churchill on January 6th, 1946, with Gimli remaining as a maintenance base. All flying operations were carried out from Churchill until the Gimli detachment moved to Yellowknife on February 14th. Two Dakotas and one Norseman were then stationed at Yellowknife to lay in gasoline caches for the Moving Force and provide alternate cover on the first leg of its journey. On March 21st, the Main Base was moved to Norman Wells. The task of supplying the Moving Force was completed on schedule and excellent co-operation was received from the Army. Gasoline consumption of the snowmobiles was approximately 75% greater than planned, which necessitated a greatly increased number of supply-dropping sorties. Hadrian gliders, towed by Dakota tugs, were employed with limited success on the last leg of the journey.

Maintenance crews at Churchill worked in an unheated hangar on 50 and 100 hour inspections, while daily inspections and minor repairs were performed in the open. With no hangars available at Yellowknife and Norman Wells, all maintenance and servicing was performed out of doors with the help of Dakota work tents heated by Herman Nelson heaters. One major inspection on a Dakota aircraft was carried out at Yellowknife and was completed in approximately one week.

The Norman Wells Base was evacuated on April 21st, 1946, and Yellowknife on April 29th, with the majority of personnel proceeding to Edmonton for leave and re-posting.

The Army Moving Force, which had set out from Churchill on February 15th, arrived in Edmonton on May 7th, two days behind schedule.

Operation Investigator

The purpose of Operation Investigator was to determine likely aircraft bases. The party, consisting of eleven personnel, left Edmonton at the end of June 1946, and proceeded to Aklavik via Yellowknife and Fort Norman. For the next two months they carried out a number of reconnaissance patrols, in two Norseman on floats and one Canso amphibian, over a large area of the Arctic Archipelago and along the mainland coast.

In the course of making their observations, they had several interesting encounters with natives. At Holman Island and Liverpool Bay they met Eskimos who had much to tell of their own experiences with Stefansson, and at Minto Inlet they found an unusual little community whose members, in addition to being of a decidedly superior type, appeared to be the only natives having any knowledge of the large copper deposits in that area. They came upon several curious relics of the white man's early venturings in the Arctic, and on one occasion they flew for twenty minutes over a herd of caribou which must have numbered several million.

While camping during a patrol around the north end of Banks Land, the pilot with whom the party was flying fell ill and felt that an immediate return should be made to base at Holman Island. They were very reluctant to do this, as they knew that strong gales were blowing to the south and they were afraid that conditions might be unsuitable for landing at Holman Island. However, as the pilot appeared to have appendicitis, it was decided to break camp and take off. On their arrival at Holman Island a gale of 60 miles an hour was blowing across the bay, which made it impossible to land in this narrow stretch of water. The pilot attempted to land in the lee of the cliff outside the bay. The landing was almost completed when one float caught the top of the surf. This punctured the float and allowed the wing to drop in the water. After some two hours' drifting far out at sea, where the waves were beginning to break over the aircraft, it was decided to take to the dinghy. The party attempted to battle towards shore at right angles to the waves. They kept this up for approximately an hour and a half and were gaining slightly, when the masts of the Holman Island Mission ship were sighted in the distance. A white rag, tied on to a paddle, caught the attention of one of the ship's Eskimo crew, and what might well have been disaster ended as nothing more serious than a good soaking.

Operation Polco

The aim of this Operation was to establish ground magnetic stations surrounding the general area of the North Magnetic Pole. This done, magnetic soundings were to be taken to ascertain the magnetic field of the earth at these locations. With the results obtained the exact location of the Pole and the strength of its magnetic field could be determined.

A single aircraft, RCAF Canso 11060, was used for the operation. The party consisted of four men of the Department of Mines and Resources and eight RCAF personnel. The group was joined during the later stages by a geographer and a botanist.

In locating the present position of the North Magnetic Pole, ten ground stations surrounding the general area were established. At each of these the horizontal and vertical angles of the compasses were determined. Along with this a new electronic instrument was used to measure the strength and fluctuating factors of the earth's magnetic field.

The party left Rockcliffe on July 18th, 1947, and proceeded to the Arctic via Churchill. Ground magnetic survey stations were established at Aberdeen Lake, Yellowknife, Cambridge Bay, Greely Haven on Victoria Island, Tasekyoak Lake on King William Island, Guillemard Inlet on Prince of Wales Island, Agnew River on Boothia Peninsula, Allen Lake on Prince of Wales Island, Point Lake on Mainland, and July Lake on Mainland.

The operation was completed on Sept. 6th, with a total of 190 hours' flying time.

Conclusion

By and large, it would seem that the very first thinking on Polar aviation problems did not differ greatly from the very latest views held to-day. In fact the Polar Concept was just as real in the mind of Sqn. Ldr. Logan in 1922 as it is in our minds to-day.

Between the time of Sqn. Ldr. Logan's expedition to Ellesmere Island in 1922 and the present there have been many faltering steps taken and many mistakes made—fortunately very few fatal ones—and the lessons learned from the mistakes have been of enormous value. Much knowledge has been gained on methods of survival by close association with trappers, Hudson Bay Company personnel, the RCMP and natives—sometimes also by bitter experience—and great progress has been made in maintenance technique, servicing facilities, and actual operating methods.

With the War's end, our efforts are turned northward again. It has become increasingly evident that our arctic areas must be developed and protected, and that it is our responsibility to do so. The job is so gigantic that in some instances the United States' aid has been sought and received, but it is the policy of the Canadian government to replace American with Canadian personnel, when the latter are available.

Numerous operations and exercises have been carried out by all three branches of the Service, and the task of photography and mapping is an annual one for the RCAF in the summer months. However, the more we learn the more we realize our need for ever greater knowledge of the Arctic—until now we are perhaps indeed reaching the stage where (as some Service wit has remarked) our motto might well be, not *Per Ardua ad Astra*, but *Per Ardua ad Arcticum*.

Section 2

OPENING THE NORTHERN FRONTIER: THE SECOND WORLD WAR

THE NORTH-WEST STAGING ROUTE

By Flying Officer S. G. French

(In the course of his summer's work with the R.C.A.F. last year, Flying Officer French's duties took him over a large part of the territory covered by the Canadian section of the North-West Staging Route. The name of this once-famous airway, though no longer heard as often as it used to be, was familiar to all Canadian ferry and fighter pilots operating in the north-west of this continent during the Second World War. In the present series of articles, the author gives his impressions of the route as it is today and relates his encounters with some of the people who were concerned with the making of it.—Roundel Editor.)

2-1. PART ONE

Vol. 9, No. 1 (January-February 1957)

*"The Northern Lights have seen queer sights,
But the queerest they ever did see—"*

"What, Sir, is the meaning of ... this?"

At the sound of that all-too-familiar voice, I stopped my chanting and looked up. Framed in the doorway of the editorial office of "The Roundel" stood Sgt. Shatterproof, staring with mingled astonishment and distaste at the assortment of articles I was attempting to stuff into a valise—geiger counter, cakes of pemmican, waterproof boxes of matches, collapsible rifle, axe, several pairs of Bishop's Jaegers, and other no less suggestive items of equipment.

"I go, Sergeant," I said sternly, "to the North. I go to recapture the spirit that fired the breasts of Robert Service and Jack London. Sloughing off the tinsel trappings of civilization, I go—"

“You go, Sir,” he interposed, “to visit some of the units along the North-West Staging Route. I know. The editor told me. That is the reason for my question. Why the impedimenta?” He gestured at the litter surrounding me. “You feel that the transport might break down somewhere in the trackless wilderness that lies between this office and the Union Station?”

“I am thinking,” I said, ignoring his humour, “of lands far from here. I am thinking...”

“Should you find yourself *in extremis* at any time during your travels, Sir, I can heartily recommend the cuisine at several of the cafés which abound today north of the sixtieth parallel. ‘Joe’s Ritz-Waldorf,’ for example, is justly famed for its *casserole de poulet sans culotte*, while at ‘The Three Jolly Bulldozers’ the *ragoût à la mitaine de mécanicien*—”

“You are acquainted with that part of the world, Shatterproof?”

He considered me thoughtfully for a few moments. Then:

“In person, Sir, no,” he admitted. “But you will find that the name I bear is one to conjure with in the North-West. Have you never heard of my uncle Six-Pan Shatterproof, the Titan of Telegraph Creek?”

I had not; but, needless to say, I very promptly did.

* * *

Safely aboard “The Canadian”, with my gear deposited in a roomette, I set out on a tour of the train. The tour was prompted by necessity as much as curiosity, for roomettes were evidently not designed for the accommodation of 220-pound pioneers plus their gear.

As I passed through the last car on my way to the observation dome, I came upon a mobile pub. The discovery cheered me somewhat. By nice scheduling, it should be possible to divide my time agreeably enough between the dome, the pre-prandial, and the table. Next day, however, I found that I had been wrong in my calculations. For some sadistic reason, while the train is crossing the prairies and its passengers are most in need of cheer, the bar is closed. I was thus forced, when we crossed the Ontario-Manitoba border, to ease myself back into my roomette and to break the seal of an item that I had planned to use only in the direst emergency. But, as I gazed through the window at the unbroken horizon and the drab buildings which, at rare intervals, added to the starkness of the scene, I felt that few emergencies could be much more dire than this.

I whiled away part of that phase of the journey by studying the literature I had brought with me on the subject of the North-West Staging Route. It was fascinating stuff, and the story it told began in the days when the old navigator first embarked on a quest that was to last for more than four hundred years – the quest for a short route to the fabled lands of Cathay and Zipangu, or, as we know them, China and Japan. I do not propose, though, to recapitulate it here. For the purpose of the narrative which follows, it is not necessary to take the reader farther into the past than the year 1935, when the civil aviation authorities were studying potential Great Circle air

routes from the heart of North America and Canada's position in relation to such routes. One such route was projected on paper from Chicago to the north-west through Alaska and Russia to Shanghai and China. It was also envisioned that such a route, in its initial stages, would give a direct connection from Central Canada to the Yukon which, up to this time, could only be reached by the Pacific Coast.

A survey of the paper projection was therefore made by A. D. McLean, then Superintendent of Airways in the Department of National Defence, in a Fairchild 71 aeroplane which was chartered from Canadian Airways and flown by C. H. (Punch) Dickens, one of the best known northern pilots of the day. Mr. McLean discovered that a practical route coincided almost precisely with the Great Circle projection and left no doubt that it was also the best route from the standpoint of weather and terrain, removed as it was from the effects of coastal precipitation and the deep snows in the coastal ranges. Further, it could be flown at an altitude not exceeding 4,000 ft. over its whole length. In fact, it lay entirely east of the main chain of the Rocky Mountains and only approached the Coastal Range at Whitehorse. A further check was made in 1936, with the object of deciding upon the best connection from the route to Vancouver, for it was realized that such a connection would undoubtedly be called for once an air mail service from Edmonton to the Yukon was finally established. Present-day service to the Orient departs from the Great Circle route in Alaska and goes via the Aleutians, an expedient dictated by political relationship with Russia.

In 1937 a contract for a weekly air-mail service between Edmonton and Whitehorse was let to United Air Transport, whose name was subsequently changed to Yukon Southern Air Transport. This service, which operated via Fort St. John, Fort Nelson, and Watson Lake, was extended a year later to give a direct connection via Fort St. John to Prince George and Vancouver. The traffic soon justified an increase in frequency, until finally, in 1940, a daily service was authorized.

The experience gained in the continuous operation of the route confirmed fully the most optimistic expectations, and a decision was made to construct a modern airway as soon as funds could be obtained to build the necessary aerodromes and install the radio ranges and other aids to air navigation. The survey was under way when Canada entered the war in September 1939. There was some question, at first, of withdrawing the parties from the field and setting them to work on the urgent task of locating and surveying the many aerodromes required for the British Commonwealth Air Training Plan, but it was decided to carry on and complete the survey of the North-West Airway (as it was then known). It was realized that, should the United States be drawn into the war, the Airway would immediately become of the highest strategic importance, as affording direct access from that country to Alaska.

On 18 December 1940, funds were released for the project, orders were placed for the necessary equipment, and contracts let for the execution of the work. Six weeks later, the actual work began when the huge diesel-driven trail-builder pulled out of

Dawson Creek on its journey of three hundred miles to Fort Nelson. Space does not permit of a detailed description of the amazing feats of construction that followed. It must be enough here to say that, by the end of the year, radio ranges were in operation, and, when the Americans entered the war, Canada was able officially to offer them the use of an airway with good airports and radio ranges at 200-mile intervals all the way from Edmonton to the Alaskan boundary.

Throughout the war the North-West Staging Route was the responsibility of the R.C.A.F.'s North-West Air Command. Every one of its stations was the scene of intense activity for twenty-four hours a day. Fighters, bomber, and transports came and went ceaselessly, some of them on ferry flights to Russia, some of them to meet the ever-present threat to the west coast from Japan. Nor, when eventually peace returned and the aircraft went home from Alaska and the Aleutians, did the Route cease to be of major value either to Canada or its war-time ally. Aircraft still drone their way over it, night and day, on scheduled flights that have ended forever the isolation of the North-West.

Seven of the ten aerodromes along the Route are operated by the Department of Transport and three by the R.C.A.F. At Edmonton, the starting-point, there is both a large R.C.A.F. base and a big civil airport. The Alaskan section of the Route, which is less than one fifth as long as the Canadian, is, of course, operated by the U.S. authorities.

* * *

The first thing I did on my arrival in Calgary was to 'phone two old-timers who had been associated with the Staging Route in its early days and who now worked with C.P.A. Since the line seemed to be remarkably busy, and since, each time I hung up the receiver, my nickel failed to return, I soon ran out of small change. Just then a man from the telephone company came along. He opened the box, pulled a piece of toilet-paper out of the coin-return slot, and down showered a stream of coins. This, he told me, was the manner in which many people supplemented their old age pensions.

Finding that both my men had been transferred to Vancouver, I went into an attractive little cellar-restaurant for a meal. During the course of it, I asked a pretty blonde who was sitting beside me what a stranger in the city might do while waiting for a train connection. She expressed a polite regret that I was not staying longer, and suggested that I might visit the zoo at St. George's Park. I therefore spent my brief stay in Calgary in letting the gibbons watch me in my cage.

The trainman of "The Dayliner", which took me on to Edmonton, cornered me on the platform at the rear of the train to tell me about the troubles he was having with his psychiatrist, and I had barely had a chance to locate my seat before we were in Edmonton. There I took a taxi to a well-known hotel where a bell-boy seized my bags and led me to the desk. My enquiry as to the price of a single room elicited a figure which was exactly the amount paid to me by the government for one day without rations and quarters. As I picked up my bags and walked out of the hotel

lobby, the silence of the spectators was oppressive. Prosperity, I perceived, had indeed hit the Albertan capital.

On the following morning I went to Tactical Air Command Headquarters to report to Group Captain H. G. Richards, O.B.E., the Air Officer Commanding, who briefed me thoroughly on what I needed to know before starting on my trip.

The maintenance of the North-West Staging Route, he told me, is essential for military and civil traffic, and for the defence of North America. It is possible that, of the six units now operated by the R.C.A.F., two more will be passed over to the Department of Transport before very long. At the present time the responsibility for the various units is allocated as follows:

- Edmonton (military and civil airports)
- Grande Prairie (D.O.T.)
- Fort St. John (D.O.T.)
- Beatton River (D.O.T.)
- Fort Nelson (R.C.A.F.)
- Smith River (D.O.T.)
- Watson Lake (R.C.A.F.)
- Teslin (D.O.T.)
- Whitehorse (R.C.A.F.)
- Aishihik (D.O.T.)
- Snag (D.O.T.)

Watson Lake, I gathered, is retained by the R.C.A.F. because it is used for summer camps and as a base for advanced air exercises, “and it’s a damned good fishing area, too!”

I had to spend three days in Edmonton before I could board the “sked-run” for Whitehorse, and I employed much of the time in visiting various libraries and in talking with several people who had had some connection with the Route. There is something about Edmonton that catches the imagination of anyone who is even remotely concerned with the history of Canadian pioneer flying. The city was the chief centre of early northern aviation, and many were the once famous bush pilots who trod its streets – “Con” Farrell, “Wop” May, “Punch” Dickins, E. G. Fullerton, Leigh Brintnell, Walter Gilbert, George Gorman, Andy Cruickshank, D. R. McLaren, Pat Burke, Grant McConachie, and numerous others. Such men as these it was who helped to make Canada, in the mid-thirties, the largest carrier of air freight of any nation in the world. (Russia, by the way, took over the lead some two or three years before the war.) Much of that freight was carried into – and out of – the far north-west, a region devoid of other means of transport.

On Saturday evening I found myself tired of reading and talking and I decided to blaze a quiet little trail of my own. Thus, I eventually found myself in one of Edmonton’s less “sophisticated” taverns, seated at a table at one end of the rather dingy room. Beside me was a jovial and sanguine old man, who now and then tilted

his kitchen-chair precariously against the wall. Presently, after eyeing me for a few moments, he said.

“Good day to you, my friend.”

I replied that it was.

“Are you a stranger in town?” he went on after a brief silence.

“Virtually.”

“What is your business?”

Seeing no reason to conceal it, I told him. His eyes sparkled even more brightly than before.

“I’m Wop May’s Uncle,” he said.

I too tilted my chair back, and we sat for a time side by side against the wall exchanging the odd pleasantry. Then my friend, who, like myself, had by this time broached another bottle, settled back and began to speak of bygone days.

“Well, friend, just after *the* war, Wop got a job with a travelling circus while it was in Edmonton. He was to fly over the city distributing hand-bills. So one day he said to me: ‘Uncle Tom, how’d you like to come up with me?’ Well, we went out to the circus grounds and Wop tied me into her real tight. She was called the ‘City of Edmonton’.

“We went up and flew all over the city with me throwing out those papers. In between throws I sat there out in the open air looking with a little misgiving at those two flimsy wings. When all of the advertisements had been circulated, so to speak, I tapped Wop on the shoulder. This was what he’d been waiting for. Up we zoomed, and he did all kinds of tricks – loops, figure-eights, the whole works. Then, all of a sudden, we started to dive. Down and down we went, faster and faster. Then, quick as anything, we leveled off and flew right under the High-Level Bridge which straddles the Saskatchewan River right in the heart of Edmonton. When we returned to the circus field we were met by the mayor, the councilors, and several policemen. Did they lay into Wop!”

A few years before the incident related to me by Uncle Tom, Wop, together with Roy Brown, another Canadian in the R.A.F., had been involved in an episode which had caused not only his fellow townsmen, but most of the world, to cheer. Having destroyed a German aircraft in a dog-fight over Germany, he was returning to his base in his *Camel* with his guns jammed. Suddenly he was attacked by the famous Baron Manfred von Richthofen in his scarlet Fokker. The Red Knight of Germany had left his circus of *Albatross* scouts and Fokker triplanes, to pursue the lonely *Camel*. Just as it looked as if Wop was going to be hit by Richthofen’s deadly fire, Roy Brown appeared on the latter’s tail and shot him through the heart.

Wop was soon forgiven for his exploit under the High-Level Bridge. In 1920, the Imperial Oil Co. bought two Junkers aircraft in New York for use in connection with its new development about fifty miles down river from Fort Norman. May and George Gorman went to pick them up, and on their arrival in Edmonton they were accorded a civic welcome.

May then left the job, and Imperial Oil hired another young bush-pilot, named Fullerton¹; and he and Gorman took off for Fort Norman. When, after several stops to refuel, they landed on the snow at Fort Simpson, 250 miles from their destination, Gorman's plane sank into the soft snow and smashed its propeller and one ski. Then followed one of those fascinating episodes in which the history of the north country abounds. Although it has little direct bearing on the North-West Staging Route, a brief account of it seems well worth giving here.

They were told that the ice on a small subsidiary channel (or snye) of the Mackenzie, about a mile away, would provide a better landing field than the one chosen. The undamaged aircraft (the *Vic*, as it was named) was flown out of the field to the snye, where it could be refueled for the final hop to Norman Wells. During the flight the *Vic* developed a pre-ignition knock as a result of using low-grade gasoline. The obvious remedy, an overhaul, would have meant further delay. Since the engine of the other aircraft (the *Rene*) had run fewer hours than that of the *Vic*, and as the aircraft required only a prop and ski to make it serviceable, it was decided to lend the *Rene* the prop and one ski from the *Vic*. The changeover made, the *Rene* took off. Unfortunately, it stalled and crashed, suffering a broken prop, damaged wing, and wrecked undercarriage. The borrowed ski, however, was undamaged; so it was returned to the *Vic*, thus leaving that aircraft minus only a propeller. But the word "only", at Fort Simpson, had somewhat drastic implications: it would take five months to obtain a replacement. After some discussion, therefore, Bill Hill, the mechanic, set about making a propeller out of some oak sled-boards, moose hide glue, and large clamps from the Catholic Mission. He was ably assisted in his incredible undertaking by a local carpenter named Johnson, who had been a cabinet-maker in England. The propeller was completed in a month, and, to the amazement of everyone but Hill and Johnson, it functioned perfectly on its test flight.

The end of April was approaching, and, with the break-up so close, it would have been sheer folly to attempt to continue the flight to Fort Norman. Accordingly, preparations were made for the return trip to Peace River. The members of the party were all peacefully sleeping when, at 5 a.m., an Eskimo awoke them with the news that the ice on the Mackenzie was breaking up. With the ominous rumbling of breaking ice spurring them on, they hurried out to the *Vic*. When they reached it, smooth solid ice stretched before the aircraft for 400 yards, but, by the time the engine was started, its extent had dwindled to 200. Beyond were only innumerable floating ice-cakes. None the less, a successful though nerve-racking take-off was made, and the *Vic* headed for a small nameless lake some five miles distant. After landing, the pilot trekked back to Fort Simpson through deep snow to bring out the rest of the party and the equipment; and finally they pitched camp for the night beside the aircraft.

¹ Group Captain E. G. Fullerton, A.F.C. (retired).

Next morning, leaving one man to stay with the *Rene*, they took off with full tanks. As they went further south, however, the snow beneath them became less and less, until at least none at all was visible. Landing on skis thus posed something of a problem, and, as they approached Peace River, they decided to try a landing on Little Bear Lake, about 15 miles north-west of the settlement. Since the ice on the lake was blackish and ducks were swimming all around its edges, the prospect was not an inviting one, but they had no alternative. First, however, they circled the Peace River landing-field in order to drop a note to the cook-caretaker requesting that wheels and gasoline be brought out to Little Bear Lake—and, much to their surprise, they saw a Junkers parked on the runway. Then, returning to the lake, they made a landing without mishap.

While awaiting the arrival of the wheels and gasoline, they drained their tanks in order to ascertain how much fuel was left, and they were considerably shaken to find not more than half a gallon. A few minutes later the Junkers which they had noticed earlier landed beside them. Its pilot was the New York agent from whom Imperial Oil had purchased the *Vic* and the *Rene*. With him were the requested fuel and wheels. Having heard that they were due back almost any day, he had been waiting for them at Peace River and happened to be in the hangar when they dropped their note.

* * *

I arose at 4.30 on Monday morning and took a taxi out to Namao to catch the “sked” at 7.00 o’clock. Several other human shapes were sitting around the waiting-room, wondering—as I too wondered—why on earth we had been told to be there at 5.45. Presently the parachutes were wheeled in. I, being rather tall, always have to spend some time opening the straps of a parachute harness to their full extent. On the present occasion, just as I had succeeded in adjusting them so that they fitted me if I stood in a semi-circular posture, a loud speaker bellowed: “The sked run to Whitehorse has been postponed until 1100 hours.”

The other sheep and I removed our harnesses and set out in various directions. I decided to go over to the officers’ mess and snooze in the lounge. On arrival there, I found the cushions still turned up in the chairs: even the staff had not yet appeared. I therefore made my way downstairs and played billiards with myself. Since I was not even yet felling quite up to par, we both lost.

After breakfast and a brief nap, I returned to the waiting-room, adjusted another harness, put it on, and was advised by the loud speaker that the flight had now been cancelled and would I “Please report here at 0545 hours tomorrow.”

For the next nineteen hours I found relief from boredom in learning what I could about R.C.A.F. Station Namao. It seems that, during the war, the Edmonton Airport speedily became a very important junction for air traffic. Trans-Canada Air Lines, Pan-American Air Lines, the R.C.A.F., and the U.S. Air Transport Command, were all using it. The congestion became too great for efficient control of traffic, and eventually it would have led to a tie-up which might have impeded the flow of aircraft to Russia and the Aleutians.

The U.S. Army Air Force therefore made arrangements with the Canadian Government to construct an aerodrome at Namao, eight miles north of Edmonton. With planning and supervision under the direction of the Department of Transport, work began in August 1943 and was completed early in November 1944. Approximately 2,500 acres of land were expropriated by the Canadian Government for the site. To transport building material and, later, aviation gasoline, coal, and heavy supplies, a spur line five miles long was built, connecting the Northern Alberta Railway with Namao. At a cost of \$7,000,000, which was repaid to the United States after the war by the Canadian Government, a modern aerodrome was constructed, to which the R.C.A.F. has, in recent years, added many new buildings, including messes, permanent married quarters, and an immense community recreation centre.

It was in a duly impressed frame of mind that, having adjusted a third harness, I finally boarded the C-119 *Packet* early the following morning.

2-2. PART TWO

Vol. 9, No. 2 (March 1957)²

Our aircraft was loaded with airmen, civilians, and supplies, all bound for various northern outposts. As it droned its way over the five hundred or so miles of more or less settled country that lie between Edmonton and Fort Nelson, where we were to stop for lunch, I could not help reflecting again how much the northernmost reaches of the land below me owed to those venturesome bush-pilots of not so many years ago. I have already referred to the work of a few of them, and this seems as good a place as any to mention two or three more examples of the sort of activities in which they were engaged.

In April 1924, "Punch" Dickens was one of the handful of officers who had been granted permanent commissions in the R.C.A.F. when the Service was officially authorized on the first of that month. Later in the year he wrote a significant report on the value of aircraft for travel in the wilderness. In 1929, after he had left the Air Force, he made a successful experiment in the delivery of airmail when, in his Fokker *Super-Universal*, he flew from Edmonton to Fort Smith, Fort Resolution, Hay River, Fort Simpson, and finally back to Edmonton. Also in 1929, flying for Western Canada Airways, he landed his 'plane at Aklavik in order to pick up a load of furs. The airlifting of that one load netted \$40,000 more profit on the furs than would have been made had they been brought out, in the usual way, by boat.

² *Part One brought the writer by train from Ottawa to Edmonton. So far he has traced for us the origins of the Route, shared a chance post-prandial with the uncle of "Wop" May, showed himself to the gibbons in the Calgary zoo, related a few episodes from the early days of bush-flying in the North-West, and wrestled with parachute-harnesses while waiting for the sked-run to forward him from Namao to Whitehorse. – Roundel Editor.*

The same year marked another notable contribution to the aerial development of Canada. In August, Leigh Brintnell flew a prospector named Gilbert LaBine from Winnipeg to The Pas, Fort McMurray, down the Mackenzie to Fort Simpson and Fort Norman, then up the Bear River and around the southern shore of Great Bear Lake. While flying around the lake, LaBine noticed spotted streaks of orange along the shore. The following summer he returned by air to stake claims and take samples. Subsequent tests revealed that he had discovered the world's richest lode of pitchblende, the ore of radium.

Three years later Brintnell took up the supplies for Great Bear Lake's first picnic – eighty cases of liquor (for 500 men). There was high revelry, and many were the games of strength and skill that livened the proceedings; but, to quote Brintnell's own words, "there was not one unkind word spoken, or one fight."

* * *

We had eaten lunch at Fort Nelson, and the C-119 was headed for Whitehorse. Even from 9500 feet I could get some idea of the grandeur of the North. Every once in a while our track would cross the Alaska Highway, a long, seemingly never-ending break in the terrain. It looked rather like a silver string tossed from an aircraft, and I was able later to appreciate the sentiments of the anonymous poet whose words grace the walls of several restaurants along the Highway:

*"Winding in and winding out
Leaves my mind in serious doubt
As to whether the loute who built this route
Was going to hell or coming out."*

We flew over an infinite number of rushing rivers and bejewelled lakes. The glacier-covered mountains were becoming more and more frequent, each one like the tear-stained face of an old Indian squaw. The north is rich in natural landing-fields, and the abundance of its lakes and rivers makes it ideal for pontoons in the summer and skis in the winter.

When we landed at R.C.A.F. Station Whitehorse I was met by Flying Officer Cairncross, the station's Ground Defence Officer, general all-round handyman, and acting Public Relations (and general information) Officer. He showed me to my quarters and orientated me in relation to the station, its personnel, and the city of Whitehorse. I paid my devoirs, dined well and not too unwisely, and set out for Whitehorse with a light step and a pioneering spirit.

There are few people, even in this generation, whose imaginations have not at some time been stirred by stories of the Yukon and the trail of '98. In August 1896, George Washington Carmack and two Indians, Shookum Jim (to whom credit is given for the actual discovery) and Tagish Charlie, found large deposits of placer gold on Bonanza Creek, a tributary of the Klondike River. News of the strike swiftly led to the Klondike goldrush, which in turn led to the rapid growth and development of the Yukon Territory and Whitehorse – and, of course, to the poems of Robert W.

Service. Thousands of men and women came from every corner of the world to join the rush, which rivalled that of California back in '49.

The airfield at Whitehorse sits on a plateau which overlooks the city from an impressive height. One can either walk down a very precipitous sand-cliff, or one can take a two-dollar taxi-ride along the Alaska Highway, which has a cutoff to Whitehorse. I did the latter. My first call was on the "Whitehorse Star", the local weekly newspaper. Its editor and owner, bearded Mr. Harry Boyle and his beautiful Chinese wife, met me in his office and outlined some of the possibilities open to me in Whitehorse. Mr. Boyle then assigned one of his small staff, Mrs. Furber, as my guide and mentor in the city.

Mrs. Furber proved to be as knowledgeable as she was charming. The first person that she took me to see was Mr. W. D. MacBride,* of the White Pass and Yukon Railway. Mr. MacBride is an old gentleman who has spent most of his life in the Yukon and who has devoted a vast amount of his time and money to the preservation of its past. He founded MacBride's Whitehorse Museum. He not only established it, he even bought the building and paid out of his own pocket for almost all the exhibits. The latter include items ranging in variety from an ancient Indian war-hatchet and three unpublished poems by Robert Service, written while he worked in the Whitehorse Bank of Commerce, to the first sleigh used on the northern Royal Mail run.

In his office at the depot, Mr. MacBride keeps an immense scrapbook, the size of a large desk-top. It is divided into sections, each one of which deals with one aspect of northern life. The book contains photographs, personal entries made by its curator, and newspaper clippings many of which are yellow and brittle with age. Mr. MacBride has a tremendous feeling for the past, a deep realization – somewhat rare today – of the importance of preserving records for posterity of the contemporary and the comparatively recent past. It will probably be several decades before Canada as a whole fully appreciates what he has done.

Mrs. Furber, in introducing me to him, mentioned that I was writing an article for "The Roundel", the official publication of the R.C.A.F.

"How do you do, son," said Mr. MacBride. "I hope that you're not another of those ignorant writers from 'outside' who come up here from the big magazines or to write a book and then go back and tell a bunch of lies about us."

I liked him immediately – and I trust that I have kept his not-too-subtle warning in mind! "Outside" is the word used by northerners to designate the entire world which lies outside the North, and it is always uttered in a rather compassionate tone. Not once did I meet anyone who was sorry to be "inside".

As we sat talking, I happened to glance out of the window. All of a sudden the Yukon River, with its old retired stern-wheelers, was hidden by what appeared to be a

* A two-part article by Mr. MacBride, "The Trails of '98", appeared in the March and April issues of "The Roundel" in 1950.

miniature train. Engine, coaches, and freight cars, all looked like scale-models of real rolling-stock. Mr. MacBride told me a little of the history of this railroad.

“Construction was begun,” he said, “in the spring of 1898. Men, horses, and material were landed at Skagway, in the Alaska Panhandle, on tidewater of the Pacific Ocean. From sea level at Skagway, this narrow-gauge railroad – it’s 36 inches – gradually was built to a summit of 2,885 feet in the first twenty-one miles. Its highest evolution was reached at Log Cabin, B.C., Mile-Post 33, at an altitude of 2,916 feet. The building of the railroad was attended by more than ordinary difficulties. The terrain was not only scenic, it was treacherous. It was a thousand miles from supply bases. There were no telegraph lines. There were no bulldozers or similar equipment. The building of the road was accomplished with axes, picks and shovels, horses, wheel and hand scrapers, and dynamite.

“Thirty-five thousand men worked on the road, all told. Most of them were anxious to reach the gold-fields, but they were working either because they didn’t care to start down-river until the opening of navigation, or because they required capital to furnish a grubstake for prospecting. On August 8th, 1898, fifteen hundred employees hoisted their picks and shovels on to their shoulders and departed on a gold-stampede to Atlin, B.C. It was necessary to replace not only the workers, but the picks and shovels as well.

“The line to Whitehorse was completed in June 1900. During its construction, a winter horse-drawn freight service, known as the ‘Red Line Transportation Company’, was operated from the various railheads to Carcross over the ice of Lake Bennett.”

Mr. MacBride then showed me the legend printed on the back of a pass which was issued to one Arthur Copeland in the winter of 1899, for a trip on the Red Line from Bennett to Carcross. It bore the signature of M. J. Heney, builder of the White Pass Railway. Here is a copy of it:

CONDITIONS

This pass is not transferable, and must be signed in ink or blood by the undersigned person, who, thereby accepting and using it, assumes all risks of damage to person and baggage. The holder must be ready to “mush” behind at the crack of the driver’s whip. “Dewar’s Crown Scotch” and Concha De Ragelias”, carried as side-arms, are subject to inspection, and may be tested by the officials of the road or their duly authorized representatives.

Passengers falling into the mud must first find themselves, and then remove the soil from their garments, as the Red Line Transportation Company does not own the country and the authorities are not giving it to cheechakos.

No passenger is allowed to make any remarks if the horses climb a tree, and each one must retain his seat if the sled drops through the ice, until

the bottom of the lake is reached, when all are expected to get out and walk ashore.

The holder hereof may gaze upon the mountain scenery, or may absorb the Italian summer, and, if specially desirous, may be permitted to watch the gleaming Northern Lights. If the passenger has but one lung, he will have permission to inhale the fresh air to capacity of said lung, but no more will be allowed.

I accept the above conditions.

(sgd.).....

Although the sun was still high in the sky, it was supper time, and Mr. MacBride was hungry. I told him that I hoped to see him on my way through Whitehorse after my little trip up north, and Mrs. Furber led me to the Whitehorse Inn. There, at the table next to us, sat a middle-aged, jovial-looking man who evidently enjoyed life thoroughly. I was told that his name was T. C. Richards, that he owned the Whitehorse Inn, and that he was a millionaire. The story goes, apparently, that he won the Inn on the roll of a pair of dice, back in the old wide-open days.

As the evening progressed, many people joined us at our table, some of them to stay, some to drift on to other tables and other diversions. Who most of them were, I don't know. Among them, however, were several, both men and women, who were – as one of our group expressed it – “just escaping from the pseudo-civilization outside.” Older men joined us, too, men who had come in the gold-rush days, men who had made fortunes only to lose them again.

Two such old-timers who joined us were Ollie Erikson and Stampede John, and the stories flew fast and furious. The waitress who brought us our overproof rum was a New Zealand girl who was hitch-hiking her way round the world.

The sun had dropped below the horizon at midnight. An hour and a half later, as I was climbing the hill toward the station, it was just beginning to reappear. The night air was invigorating, and already I found myself falling in love with this country and its people. Now, however, my need was sleep; for we were to leave for Aishihik early in the morning.

* * *

When I awoke, it was raining. After a hurried breakfast, I threw my flight bag into the trunk of the waiting car and climbed in beside the driver, L. A. C. Russ Skene. Then, after we had picked up Corporal “Shorty” Orr, the photographer, we drove off along the Alaska Highway. Through a country of mountains and glaciers we drove, past the junction of the Mayo Road (255 miles to Mayo and 353 to Dawson City), past Mendenhall Creek, past Champagne, where several Indians were attempting to re-civilize a few horses who had forgotten the feel of the saddle during the winter months which they had been allowed to spend ranging free in the mountains. As we twisted and turned, I spotted three moose in a little lake down in a

valley beside the road. The sight delighted me, and my pleasure lasted until we passed that spot on the return trip, when I saw that my three moose were standing in exactly the same place and in exactly the same postures. They were, of course, stumps.

The cut-off from the Highway to Aishihik is just past a small settlement with the fascinating name of Crack-R-Crik, but we had to continue a little further, to Canyon Creek, in order to 'phone the Aishihik control-tower and tell them that we were about to start down the station road. We were warned to drive carefully, as the road might be slippery, and we were also instructed to call again from the roadside 'phone about 20 miles in. I was very shortly to discover the reasons for such precautions.

We drove back to the cut-off and turned on to a single-lane dirt road. At the corner there were signs, one on each side, pointing to "R.C.A.F. Detachment Aishihik". The one on the left read "84 miles", the one on the right "72 miles"; but, although there seemed to be some doubt as to how far we would have to travel before lunch, there was no doubt that we could not turn back, for the forest through which this narrow route had been hacked grew right up to its edges.

All went well at first. The road was relatively flat, although the gumbo, made slippery by the rain, did not contribute to our mental comfort. Soon, however, we began to gain altitude; and, five miles from the Highway, at the foot of a grade aptly called "the 16%", the car refused to climb any further through the mud. The road at this point, as at most of the other steep inclines, had been cut out of the side of the mountain, and when I looked out of the window beside me, I stared straight down into the valley below. If I had opened the door and got out, I would have had to take a remarkably long step.

As often as the driver backed up and took a run at the slope, the car slid on the mud, which was as slippery as ice, and several times I could have sworn that my side of the car was hanging over the abyss. Cpl. Orr and I decided that, if we wanted to have dinner by suppertime, we had better get out and push. "Shorty", as his nickname implies, is as short as I am tall. We must have presented quite a spectacle as we strained and heaved at the back of the car, pushing ourselves ankle-deep down into the mud, our uniforms saturated by the rain and spattered by the skidding wheels. We finally reached the top after pushing for a distance of what the speedometer told us was four miles, but which we were subsequently informed was only two.

The remainder of the journey was very pleasant. At the 20-mile post, we once again 'phoned the tower. Fearing an accident because we had taken so long, they had already sent a power-truck out to search for us. It met us five miles further on at a beautiful little spot called Otter Falls. If the reader will take out his wallet and examine any of the five-dollar bills that he may find there, he too will be able to see Otter Falls. If he is a fisherman and prepared to travel far afield for his sport, he can stand upon that jutting rock to the right centre of the bill and haul in rainbow trout as fast as he can put his line in the water. Fish, I might add, are far from the only type of game in which that lovely country abounds. On the way in to Aishihik I saw a

soaring black hawk with a wing-spread of some six to eight feet, a score of different kinds of ducks, beaver, several herds of moose, a grizzly bear with three cubs, and a large bald-headed eagle perched on the top of a tall pine.

Not long after I saw the eagle, our little cavalcade reached its destination and came to a halt amid the red log buildings of R.C.A.F. Detachment Aishihik.

2-3. PART THREE

Vol 9, No. 3 (April 1957)

After lunch, the corporal who was second in command of the Detachment told me something of the unit's history.

Construction began in 1942, when bulldozers, pulling supply-sleighs, drove a makeshift road along the Aishihik River. At Jamieson's Village, an Indian encampment beside Otter Lake, it was decided to build a barge on the spot and to take the men and supplies the rest of the way by water, up the fifty-mile long Aishihik Lake. The barge was pulled by an inboard engine which, in turn, was powered by a 4 h.p. motor. The water-trail ended at a camp of Siwash Indians at the northern end of the lake; and a gravel airstrip was laid out on a flat expanse of land immediately above the camp. To start with, two log cabins were built right by the shore of the lake; then, later, the British Yukon Navigation Company, which was carrying out the preliminary construction work, put up the control tower, barracks, and a few other buildings – all out of logs. These were painted the rust-red colour they wear today. The two original log cabins were eventually moved up to the plain, where they now serve as "emergency married quarters", supplementing the two regular P.M.Q.s.

I asked the corporal how the average Service family took to such isolated locations and the long winter nights.

"Most of the Service families that I've met," he said, "enjoy the life very much. Of course, it requires a certain type of personality to be happy in the North. For those who are lucky enough to have it, though, this is a wonderful existence."

He went on to tell me that the R.C.A.F. only sends up families who have no children or whose children are under school-age. "But", he added thoughtfully, "the families without any always seem to acquire some fairly soon, and those with a few usually get more."

There is a regular film-run in the North. Each week, one film passes down the line, spending one night at each settlement. It is generally projected on to a home-made screen like the one at Aishihik – a strip of canvas, painted white and attached to the wall. Since our car had brought the film in with us from Canyon Creek, our night at Aishihik was also film-night.

Later, I went over to the small canteen where the movie was being shown. A number of Indians had, as usual, been invited in to see the picture; and, when it was over, I met Chief Isaac, his brother Ed, and their wives and children. I asked the

Chief if I might come down to his cabin and talk with him the next morning. He said that I would be welcome.

Chief Isaac, named after a sourdough of the gold-rush days, is 78 years old, and he has lived by Aishihik Lake all his life. In the winter he tends a trap-line, and in the summer he fishes for a living. I asked him when he had seen his first aeroplane. His eyes lit up as he replied:

“In 1929 we have cruel winter. Trapping poor, cold and snow so much they keep us all the time inside our cabins. I send one man by dog-sled to Whitehorse to ask for food. One or two weeks later comes wonderful buzzing in the air. Iron goose lands on skis in middle of snow-storm, and two M.P.s climb out...”

Unfortunately for my vision of gallant politicians risking their lives for their constituents, the Chief's next few sentences revealed the fact that “M.P.” was his term for “Mounty”.

Presently he went on to tell me about a certain winter day in 1951. It had been another cruel winter, and the Chief was sledding to Burwash Landing for supplies. Just as he was crossing Sekulmun Lake, a little west of Aishihik, a twin-engined aircraft flew low over his head through the blizzard. A short while later he heard a crash. The Chief proceeded in the direction of the sound, which had seemed to come from Sekulmun Mountain. There he found a fresh landslide, and at the foot of the slide lay ten dead wild sheep, which appeared either to have been tumbled by the avalanche or to have been hit by an aircraft. Seeing no other signs of a ‘plane, he hurried on to report to the R.C.M.P. Two policemen come to investigate, but they too found nothing. They told Chief Isaac about a C-54 which had been reported missing that day, while taking troops and their families home for Christmas – but, they added, a C-54 has four engines. To this day neither the C-54 nor the unidentified aircraft reported by the Chief has been found.

While on the subject of Indians, I should mention that nowadays the R.C.A.F. keeps a watchful eye on the Siwash tribe, supplying its members with medical assistance and, in emergencies, with food. The road over which we travelled, and over which most of the supplies reach these isolated people, is washed out every spring when the glaciers melt; and, during this period, much-needed supplies are flown in from Whitehorse.

* * *

When we drove out again towards the Alaska Highway, the rain had stopped and the trail had dried up enough to make the trip more enjoyable. As we skirted Aishihik Lake, I recalled the story of a rather irregular flight that “Packie” MacFarlane³ had told me about while I was in Edmonton. At one point early in the last war, he and Ted Holmes** were in Fairbanks, Alaska. They wished to take off for Anchorage, but

³ Released after the war as a group captain, R.C.A.F. War-time C.O. of one of the Staging Route units.

** Famous pre-war bush pilot. Released from R.C.A.F. as a squadron leader.

they had warned by the tower that the weather between the two points was poor. At length, since their mission was fairly urgent, they decided to go anyway.

They followed the railroad tracks which join the two towns, Ted flying and Packie poring over the map. Visibility was extremely bad, and the conversation was entirely one-sided:

“O.K. Ted. Turn left for mountain in two minutes...about fifteen miles and the tracks go through a narrow pass...better get some altitude...”

They arrived over Anchorage without any mishaps, although they had only enough fuel for a few more minutes of flight; then they called the tower asking for permission to land. The reply came back: “Proceed to Point One for landing.” With the fuel-gauge registering zero, Ted told the tower that this was an R.C.A.F. aircraft and that its pilots had no idea where Point One was. The tower called back and advised them that, if they didn’t know the secret code, they couldn’t land at Anchorage.

It was rather like saying “You can’t be sick here!” to someone in the middle of a bilious attack; so Packy and Ted landed, did their business, and spent the night in an American PX (Post Exchange store). In it they bought silk stockings, sugar, and various other items which were pretty scarce in Canada at that time, and took off again for home. Over Northway they were told to give the code-word if they wanted to learn what weather lay ahead, so perforce they flew on in ignorance and eventually forced-landed at Aishihik because of engine-trouble. They spent a few days working on the engine in bitterly cold weather, their only protection from the wind a rough canvas lean-to. Then they flew on down the Staging Route to Edmonton.

* * *

We had covered most of the road to the highway; we had passed Otter Falls, the 20-mile ‘phone, and the hill of our historic push. Only one obstacle remained: a culvert which was on the point of being washed away by the stream that raced through and around the pipe. We got out of the car, placed beams and old boards over the rapidly disappearing ground, and drove over. Just as the rear wheels cleared our bridge, the earth beneath it dropped into the water. When we returned down the Alaska Highway three days later, we were told that the wash-out on the Aishihik road had not yet been repaired. Such is isolation.

After lunch at Haines Junction, we stopped for a few minutes at the neighbouring experimental farm, which is one of two operated in the North by the Federal Government. Agricultural possibilities in the Yukon are, it seems, fairly good. Vegetables grow well, and many species of flowers can be cultivated. The experimental farms are developing varieties of grains which will mature in a very short growing-season, and they are also producing new breeds of cattle from such hardy strains as those of the Scottish Hebrides. At present, of course, all farm produce must be brought in from outside, a necessity which results in pretty exorbitant prices.

It was getting quite late when we started our drive around Lake Kluane. Completely surrounded by towering snow-peaked mountains, every detail of which is

mirrored in the green water below, Kluane is, to my mind, a far lovelier lake than any of those at the Rocky Mountain resorts. Mountain goats and Doll sheep abound on the encircling slopes: I saw many of them as we drove by.

All beds being spoken for at the Army Maintenance Camp at Destruction Bay, we passed the night at Burwash Landing, a settlement at the northern tip of the lake. Here there is a log-cabin pub. The proprietor, an eighty-six-year-old gentleman named Bert, sports a long flowing white beard which covers his knees. Bert came from the Old Country in 1896, answering the call of the gold-rush. While we enjoyed a drink together, I learned (listening carefully as the words made their way through his beard) that in the fall of 1927 he had been flown on a prospecting trip by Clyde Wann in the latter's *Queen of the Yukon*, the sister-ship of Lindbergh's *Spirit of St. Louis*.

The following morning we pressed rapidly on towards our destination, Snag. Snag's chief claim to distinction is that on 7 February 1947, its thermometers dropped to 83.4 degrees below zero – the lowest temperature ever officially recorded on the North American continent. The rust-coloured buildings of the R.C.A.F. detachment present much the same appearance as those at Aishihik, and an Indian camp squats near the airfield, beside the White River. In this camp may be seen the remains of Bill Blair's Trading Post, which attained its business peak some years ago. Bill married into the tribe and is now considered to be its chief. While he and I, together with two Indians, Copper Jack and Tom-Tom, were out in a boat hauling in their catches, I learned that Snag was a busy spot back in 1913. That was the year of the Chisana Gold Rush, during which Bill James found \$20,000 in one day's panning. Gold was discovered about sixty miles up the White River from Snag, and it brought thousands of fortune-seekers to the area. Starting from either Dawson City or Whitehorse, they followed the Yukon River to Stewart City, whence a long portage took them to the junction of the Donjek and White Rivers. From here they proceeded up the White, past Snag, to the gold-fields.

When Detachment Snag was first started, the "cats" followed part of the trail which had been blazed by the sourdoughs in 1913. These bulldozers hauled the supplies in, but the first cat to reach Snag was flown to a small unnamed lake about three miles north of the site. There it was reassembled, driven down, and work on the runways was begun. When these were cleared, steel for the towers was flown in – "in old *Daks*", as Bill Blair's beautiful young daughter called them. Rose added that "some of the equipment was so large that they often had to leave the doors open and part of the cargo sticking out during flight." She could not have been more than five when she saw "those mad flyers".

Talk of the extreme temperatures at Snag made me think of the part played in early northern flying by the groundcrew. They were, it seems to me, a bit like the linemen on a football team. Every game, they play their hearts out; but, in the newspaper write-ups, it is the backfielders of whom the public hears most. A

mechanic frequently accompanied the bush-pilot on his flights, but I wonder how often the word “intrepid” was applied to him.

Actually, he often worked longer hours than the flyer, and under shocking conditions. Seldom were there any hangars, and in winter the oil was drained from the engine upon landing. Before take-off, hours were spent in heating oil and keeping blow-torches playing, somewhat hazardously, on the engine. In the summer, if the plane was equipped with pontoons, the mechanic often worked for long periods half-submerged in the frigid northern waters. And, whether he was in water or on land, mosquitoes, bull-dogs, and black flies caroused unchecked upon his helpless body.

* * *

The return journey to Whitehorse was uneventful. Just before we got there, we took a little side-trip to Takhini Hotsprings, the only swimming-pool available to the personnel of the station. Here, in temperatures lower than forty below, airmen and airwomen sport merrily in the warm water.

Back in the city, I called again on Mr. MacBride and resumed my perusal of his priceless historical scrap-book. It would, as I have stated earlier, be impossible even to begin to do it justice here, but the reader may be interested in a few of my gleanings.

The high plateau on which the airport is situated, looking down upon the city bounded by the Yukon River and “Whiskey Flats”, was used as a frontier golf-course and village parade-ground in 1920. In August of that year word was received that four D.H.4 biplanes wished to land at Whitehorse. Volunteer citizens turned out to cut down trees and clear a landing area 1,675 feet long; and, when they had completed their task, the U.S. Army Air Service’s first Alaska Expedition, led by Captain (later General) St. Clair Street, flew from Long Island’s Mitchell Field to Nome, and back through Edmonton and Whitehorse.

From this time on many aircraft came and went from Whitehorse. In 1922 Prest arrived from Skagway *en route* to Siberia via Dawson City but he cracked up near Eagle, Alaska. Then, in the years around 1927, Clyde Wann’s *Queen of the Yukon I* and *II* were familiar sights; and in 1928 Klondike Airways operated a Fairchild in those northern regions.

In December 1930, Captain E. J. A. (Paddy) Burke was interred at Atlin. Beside Atlin Lake, at the foot of beautiful Cathedral Mountain. A veteran pilot of the First Great World War, he, together with his mechanic and a passenger, took off in October from Atlin to fly to Liard Post via Surprise, Gladys, and Teslin Lakes. They completed the trip successfully, but on their way back they were forced down by a blinding snow-storm, and the pontoons of their Junkers stuck in the ice. They left the aircraft in order to try to find a settlement. Forty days after the crash, the last twenty-three of them spent without food, Paddy Burke died from hunger. Emil Kaeling (the mechanic) and Robert Martin (the passenger) cached his body in a tree and continued on their way. Finally, fifty-eight days after the crash, the two survivors were found by Walsh and Wasson, two pilots who had spent two months flying ceaselessly back and forth over the suspected crash area. It was to Paddy Burke that

Kathleen Keats White dedicated her poem, “The Northland Speaks”, of which I quote two verses:

*Even at the last I gave diamonds of frost for his breath,
Exquisite crystals to garland the wings of his 'plane;
Blankets of pearl where they kept rendezvous with grim death,
Caught in the meshes of Fate and the strong hands of pain.
He who swept up from my waters as birds in their flight,
Or glided as gracefully as gulls on the crest of a wave,
Folded his wings now, at rest on the breast of the night,
Never his name shall depart from the North of the brave.*

It was in similar circumstances, a few years later, that another famous pilot, Les Cooke, was forced down not far north of Whitehorse. On that occasion, he maintained after his rescue that “the only thing that kept me alive was the ticks in the furs I was carrying.” Cooke, however, was also destined for a tragic end. In the early days of the war he took off from the airfield at Whitehorse with hoar-frost on his wings. Barely had he become airborne before one wing began to drop. Nothing he could do would bring it up again, and the aircraft swung into a diving turn and crashed in the middle of the city, where it instantly burst into flames.

In the early years of the Second World War, D.O.T. engineers made vast improvements to the field at Whitehorse. In 1941, before any hangars had been built, the aircraft had to be run 24 hours a day to keep their engines warm. After the attack on Pearl Harbour, thousands of United States troops and civilians came to construct the Alaska Highway. The rush was on; Whitehorse bulged at the seams, and transportation facilities were jammed. The tempo of construction was stepped up, and, by the end of 1941, the landing-strip had been given an asphalt surface 4500 feet long and 150 feet wide. From then till the end of the war, R.C.A.F. and U.S.A.F. construction crews built the airport up to its present size. It now has four large hangars, a concrete runway of 7200 feet, 6600 feet of parallel asphalt runway, 3400 feet of cross-runway, all rimmed and interconnected by taxi-strips and packing-aprons.

2-4. PART FOUR

Vol. 9, No. 4 (May 1957)

From Whitehorse we drove south towards Teslin, our next stop along the Staging Route. On the way, we turned off to visit Carcross, a small town whose present name is a somewhat colourless abbreviation of its original one, Caribou Crossing. There I hoped to have a chat with George Simmons, a bush-pilot who has spent twenty years

in the North and whose headquarters is an airstrip which he himself hewed out of the wilderness.

Although we learned, to my disappointment, that he had taken off for Skagway earlier that morning, the side-trip proved anything but unrewarding; for the vital old lady who serves as ticket-agent at the Carcross depot of the White Pass and Yukon Railway regaled me with several hair-raising stories of the past.

The most tragic of them concerned an American B-17 *Flying Fortress* which landed at Whitehorse one day in 1943 in order to carry out a few repairs. The work completed, the aircraft took off on a short test-flight, taking with it some eighteen R.C.A.F. personnel who had been invited to go along for a ride. Over Lake Bennett, beside which Carcross stands, one of the engines cut out and the 'plane crashed into the water. The pilot went down with his aircraft. Most of the others, who had managed to climb out on to the wings, clung there for the few moments until the 'plane sank, when those of them who could swim struck out for the shore. "But", as my old lady said, "very few people die from drowning in this country. Their hearts stop when they hit the icy water." Only seven people were saved – by boats which, having been dry-docked all winter, took a long time to reach the swimmers. A *Norseman* flew into Lake Bennett with doctors and supplies, landing on George Simmons' field. When it took off on the following morning, its wing hit the wind-tower and two more were killed. As my friend said: "The ironical thing about the whole incident was that a sand-bar was hidden under the water only a few feet in front of the wrecked aircraft, but the survivors didn't swim in that direction."

Leaving Carcross, we passed the night at Marsh Lake Lodge, a hunting and fishing lodge used extensively by those who can afford to pay fifty dollars a day. Mike Nolan, its guide and outfitter, is a veteran of the R.C.M.P. While we sat in the lounge of the two-storey log building, with the rain beating heavily upon the roof and the wind roaring around the chimney of the fireplace, Mike told us many tales of his day spent in the North as a Mountie. Among his stories was one concerning Pat Ivy, who flew with the R.C.A.F. on the Staging Route throughout the early war years and was later killed in Europe. When Aishihik was under construction, Pat flew in one day and pancaked his *Dakota* after taking the undercarriage off on the top of a bulldozer. "His entire load consisted of nails. You can find nails on the runway to this day – often when you least want to."

"In the final years of the war," Mike said, "when a quart of milk cost \$1.50 – so you can imagine what a quart of whisky cost – a few of the R.C.A.F. and U.S.A.A.F.⁴ boys decided to go into business. They built three 75-gallon stills in the hills surrounding Whitehorse. They got away with it for many months, too, bringing their moonshine down to the thirsty thousands through a system of metal pipes rather like miniature Canol Pipelines. It was my unhappy duty to have to locate these installations and put an end to their flourishing distilleries."

⁴ United States Army Air Forces – *Editors*

From Marsh Lake Lodge we drove on to Teslin, where I had an interesting conversation with Mrs. R. McCleery, the local postmistress. Her recently deceased husband, a member of the R.C.M.P., had made the original clearing at Teslin in 1940, some two years before the airport was actually built, in the hope of attracting aircraft to the little town. When construction began, the problem of bringing in supplies was solved in customary northern fashion. All materials came in on three stern-wheelers belonging to the White Pass and Yukon Company: the *Nisutlin*, the *Keno*, and the *Whitehorse*. The three vessels steamed down the Yukon River from Whitehorse, across Lake Laberge, and up the Teslin River. Each made one 240-mile trip a week, for two months. Bulldozers built a road from the wharf to the airport site, where construction crews went to work under the direction of D.O.T. Several months later, when a section of the Alaska Highway was begun at Teslin, American negro soldiers and their equipment were brought in by the same means.

* * *

From Teslin we proceeded south, through Seagull Creek, Rancheria, and Upper Liard River, to Watson Lake, our last stop in the Yukon before entering British Columbia. The name of Watson Lake will conjure up fond memories in the minds of many R.C.A.F. personnel. Situated on a peninsula which juts into the lake, and surrounded by tall pines, it is a place of rare beauty as well as a fisherman's paradise. The flight sergeant who commanded the Detachment introduced me to Vic Johnson, a civilian who has fulfilled various functions around Watson since 1938.

The story of the building of this lovely, but lonely, northern airport is a good example of the courage and ingenuity which characterizes the development of flying in Canada's North. "All the material", Vic told me, "was assembled at Vancouver in the spring of 1941. The means of transportation also had to be constructed in Vancouver. One stern-wheel river-steamer, three shallow-draft power boats (called 'tunnel-boats'),⁵ and twelve barges, were built. Then, dismantled for shipment, they were taken to the port of Wrangell, Alaska, on coastal steamers.

"Meanwhile, a sawmill was flown in to the site. Logs for the buildings were cut in the Liard Valley, and brought by land five miles to a landing across the lake from the peninsula. The logs were boomed across the water, and there dressed by the sawmill for later use.

"At Wrangell, the craft I spoke of were reassembled and employed to freight the supplies up the Stikine River to Telegraph Creek, in B.C. From Telegraph Creek, the boats and the freight had to be portaged 72 miles to Dease Lake, one of the gold-rush centres of 1898. A trail already existed between Telegraph Creek and Dease Lake, but much work had to be done by 'cats' to make it into a road. The bridges especially had to be strengthened."

⁵ A tunnel-boat has a shallow draft, and the propeller is positioned above the level of the bottom of the boat, thus being protected from submerged rocks. The water is "led" to the propeller through a "tunnel" built into the bottom.

I heard the rest of the story from Big Alex MacDonald, whom I met later at Lower Post. Big Alex, an immense Scot who still retains his burr after sixty years in the North, is now a trapper. At one time, during the Klondike Gold-Rush, he was so rich that he was able to afford a trip back to Europe, where he mixed with Royalty. Travelling in gold-inlaid coaches, however, and giving nuggets away to everyone he met, he soon lost his fortune. He returned to the North, where he was eventually to assist in the building of R.C.A.F. Detachment Watson Lake.

“From Dease Lake,” Big Alex told me, “supplies were transported down the Dease River into the Liard River at Lower Post, a famous old Hudson’s Bay trading-post. One of the river-boat pilots on the trip down the Dease was an Indian called ‘Captain Sandbar’. His real name was Ritchie, and he was skipper of a stern-wheeler which would haul two forty-ton barges of supplies. He owed his nickname to the fact that, at his previous job on the Fraser River, he always got stuck on the bars. He made a few successful trips down and up the Dease, and then his stern-wheeler hit a rock in the Two-Mile Rapids and sank.

“After this, the tunnel-boats pulled all of the freight on the Dease. They took two days to go down the rushing river, with its many rapids, and six days to make the return trip up it. The Cottonwood Rapids were so bad that a road had to be built around them for the freight, and a final 26-mile portage was necessary from Lower Post to Watson Lake. The road which was built for this portage was later to become a section of the Alaska Highway.”

To return to Vic Johnson at Watson Lake. He showed me Sandy’s Point, a point on the peninsula to which McConachie and Fields moved from Lower Post in 1938. There, Yukon Southern Airways set up a radio-station in a log cabin and another cabin for the pilots of their *Wacos*, *Norsemen*, *Junkers*, and *Howards*. I looked in at the war-time officers’ mess, long since locked up. Carved out in the log facing of the fireplace are hundreds of R.C.A.F. and U.S.A.A.F. pilots’ names. I recognized many of them, some as belonging to men who are now senior officers in the R.C.A.F., others as those of pilots who flew on to Europe or the Pacific, never to return.

Although control of the Staging Route was handed over to the R.C.A.F. in September 1942, the first commanding officers of the various units arrived in July. They were chosen with two qualities in mind. The first was diplomacy: they had to be capable of ensuring friendly co-operation with the American forces (including the Engineer Corps engaged in construction of the Highway). The second was implied in Ted Holmes’ remark to me in Edmonton: “Someone in Ottawa must have run his pencil down a list of R.C.A.F. pilots until he found six former bush-pilots. You’ll notice he didn’t get past ‘H’.” Wing Commander C.M.G. (Con) Farrell went to Edmonton, and Squadron Leaders J. F. Bythell to Grande Prairie, E. S. Holmes to Fort St. John, A.C. Heaven to Fort Nelson, G. W. du Temple to Watson Lake, and J. Hone to Whitehorse. In addition, Flight Lieutenant D. M. Shields, an experienced airways traffic control officer, was sent to Edmonton to direct the establishment of a general control over the Route.

Vic Johnson told me about one of the first things done by Sqn. Ldr. du Temple and his airmen. “They scrounged some wood and built a flat-bottomed boat. Then they went to a U.S. Army maintenance camp on the Alaska Highway and scrounged a washing-machine engine to propel it. In those early days, the men at the Staging Route units were often forced to eat their emergency rations for want of supplies. The fish they caught from their boat were sometimes actually necessary for survival.”

On my tour of the lake with Vic in the crash-and-rescue launch, he pointed out several spots where tragedies had occurred in the past. We saw the wreckage of a *Sea Fury*, two *Airacobras*, a *Dakota*, and a *Lincoln*. The *Dakota*, which belonged to the U.S.A.A.F., had forced-landed on a deserted bridge several miles west of Watson, killing the pilot and co-pilot. The two remaining members of the crew sat in sight (from the air) of the airport runway for eleven days while aircraft from No. 2 Air Observer School in Edmonton, as well as many others, searched for them. On the eleventh day, each of them with a broken leg, they began to crawl towards Watson Lake. For eight days they crawled through the waist-deep snow which buried that frigid and mountainous terrain, using sections of engine-cowlings as sleighs, and surviving on emergency rations. They were finally spotted by an R.C.M.P. constable who had followed their tracks in the snow. The two men crawled almost to the end of the runway.

From this incident came a realization of the necessity of training pararescue crews to operate throughout the North. No. 2 A.O.S. constantly received calls to search for lost crews, men who were not trained to take care of themselves in the wilderness. The American flyers especially, many of whom had never seen snow before, did not know how to cope with extreme cold, icing, and other conditions which were commonplace in northern bush-flying.

Eventually, a school to train pararescue personnel was organized in Edmonton, under North-West Air Command. The School was under the direction of Wing Commanders H. J. Winny and H. L. Watson, Flight Lieutenant S. Knapp, and Sergeant O. Hargraves. Volunteers were called for from the trades of Hospital Assistants (Male), Aeroengine Mechanics, Airframe Mechanics, and Electricians. Twelve of the hundreds of volunteers were chosen to take the first course which began in December 1944 and continued for fourteen weeks.

The course included such subjects as first aid, parachute theory, signals equipment, supply-dropping, bush lore, codes (W/T, helio, and lamp), and physical fitness. In addition, the students made twelve practice jumps and spent a week in the bush putting their woodcraft theory into practice.

Two courses were trained, providing the R.C.A.F. with twenty-seven pararescuers. The graduates were awarded a special emblem, to be worn on the sleeve, bearing a crown and parachute and the words “RESCUE – R.C.A.F.” A measure of the value derived from such training – quite apart from the number of pilots who owe their lives to pararescue – is the fact that the R.A.F. requested all details of the school and its training, with a view to adopting a similar procedure for use in the Far East.

* * *

After we had left the airport site at Watson, I stopped off at the Watson Lake Hotel to talk to Dal Dalzel, more commonly known to students of northern flying as “The Flying Trapper”, and famous for his ability to get into places where no one else would. Dal told me about the aircraft that were flown to the Russians during the War. Lockheed *Lightnings*, Douglas *Invaders*, and other types of tricycle fighters and bombers passed along the Staging Route on their way to Fairbanks. Fighters were usually escorted by a mother-ship, such as a *Liberator* or *Fortress*, and it was not uncommon for forty or fifty to pass through every day. “The Russians,” he said, “preferred the P-36 – *King Cobra* – because the location of the cannon in the crankshaft was ideal for anti-tank work.”

I had heard it said and seen it written that Russian women piloted the aircraft from Fairbanks. “Actually,” Dal said, “there were few if any women pilots. The women were mostly lieutenants who acted as mechanics and translators. The Russians had their own mess in Fairbanks, and used to ship over their own vodka. Occasionally, when they could be persuaded to visit the American PX, they made their purchases with a called-in issue of very large orange-coloured American bills – bills hoarded by them since the time of an American occupation which had taken place during a slight naval war between Russia and Japan.”

Dal knew a lot about Russian habits because, during the war, he had acted as a flying guide for the flights of aircraft destined for Europe. He told me of the time, early in the winter of 1944, when Molotov flew down the Staging Route to Edmonton. In Edmonton, the Russians asked the R.C.A.F. for six DC-3s and crews to fly them. Molotov’s departure-time was kept a big secret, and the crews waited for three days so that the element of surprise could be utilized. Since they would not tell which aircraft of the six Molotov would eventually use, five of the aircraft and their crews were, in actual fact, only decoys. While Molotov was in the city, the Russians requested that an entire H-building be given to him and his retinue. They also asked for a new car, a garage, and a new refrigerator; then, constantly surrounded by police guards, they proceeded to dismantle the car and the refrigerator, investigate their mechanical features, and put them back together.

Before 1939, Dal used to fly out of Telegraph Creek; after that, he operated from Sandy’s Point. In the winters of ‘39 and ‘40 he did a lot of aerial surveying for D.O.T. in his Curtiss *Robin*. He also carried out extensive aerial surveys for the Alaska Highway, and later “acted as a sky-guide and mother-protector for the flights of Russian aircraft.”

Mike Nolan, at Marsh Lake Lodge, had already related to me an anecdote about him. Late in 1945, an aircraft piloted by a Colonel Fox made a forced landing on what later became known as Fox Lake, between Teslin and Whitehorse. A twenty-mile road was bulldozed into the lake from the Alaska Highway. Engineers, engines, and food for the 17 passengers and three crewmen, were brought in. The weather was icy cold, and the frozen legs of meat were cut with a cross-cut saw. Dal was requested

to fly in with his *Norseman*. All arrangements went off smoothly, and Col. Fox's 'plane took off from the ice on wheels over a cleared runway of 1248 feet. Dal wished to be the first to report the success of the operation, but so did a U.S.A.A.F. lieutenant. A heated arrangement ensued, and the short 135-lb. lieutenant managed to get into the *Norseman*. The spectators, of whom Mike Nolan was one, started to make bets about who would give in first. Seemingly Dal did; for the aircraft began to take-off. The attempt, however, was unsuccessful. So were three more attempts. Finally the *Norseman* stopped, the door opened, and out stepped the lieutenant. "I", he stated ruefully, "must have made the load too heavy."

2-5. PART FIVE

Vol. 9, No. 5 (June 1957)

At Smith River, now operated entirely by the Department of Transport, I spoke to Little Louis, a prospector and trapper who was flown in a Fairchild into Lake Toobally in 1937. Little Louis told me that, "when the Smith River airport was built. All of the supplies, including the bulldozers and a sawmill, were flown into Toobally Lake, at the head of Smith River. At the turn of the century a tribe of Indians camped on this lake and, for reasons known only to themselves, called it "Tea-Boiling Lake". Eventually 'Tea-Boiling' became 'Toobally'. A rough camp was established there, but before any actual construction began, an aerial photograph showed a far better site further down the Smith River. The cats made a road down to the present site, and all the supplies were hauled down on sleighs. The sawmill was left at Toobally, and the logs were cut there and sent down the Smith River. When they unloaded the radio equipment at Toobally, it fell into the lake and would not work for a long time. There were Americans, D.O.T., and R.C.A.F. people here all this time, but I can't remember any of their names."

About fifteen miles straight east of the Smith River airport there is a valley with a curious name, the Million Dollar Valley. In 1943, three B-26s were winging their way north from Edmonton, when suddenly the pilot of the lead aircraft noticed that his fuel gauge registered zero. He radioed to the other two aircraft and told them to continue on to Whitehorse, as he was going to attempt a landing. They signaled back: "We aren't going on without you. We'll follow you down." The three aircraft landed in perfect V-formation, two of them with their wheels down, and the crews all climbed out without a scratch among them. Ironically, the lead aircraft was not out of fuel; the gauge registered zero because of a short-circuit in the wiring.

Smith River is only an hour or so by air south-west of the famous Nahanni Valley. The Nahanni Mountains, unexplored to this day, lie sixty-odd miles west of Fort Simpson at the junction of the Liard and Mackenzie Rivers. Not many years ago, it was still believed that somewhere among them lay a valley where prehistoric monsters still survived amid warm pools and tropical vegetation.

To this valley, so the stories run, have gone many fortune-seekers who never returned. Willie and Frank McLeod, for instance, were murdered there in 1906, later to be found by their brother Charlie with their heads missing. In 1928, Charlie and a prospecting party were flown in by Doc Oaks, but all they discovered was a desolate cabin and the skeleton of some still unidentified white man.

Wop May, Leigh Brintnell, and Dal Dalzel have, at one time or another, all flown into the Nahanni (or Dead Man's) Valley. Dal, who went there in 1936 to trap for furs, told me: "It's a vast country. Its rivers are walled in by high glacier-covered canyons. The valley, which is full of Sulphur hot-springs, is about ten miles long and five miles wide. It is completely surrounded by mountains, and the Nahanni River splits it down the centre. Because of the turbulence of the river and the high gorges surrounding it, it's almost impossible to gain access to it on the ground. This leaves only the air, but the mountain peaks are still unmapped, and some of them rise to a height of 10,000 feet or more."

It was in this vicinity that Leigh Brintnell discovered, surveyed, and photographed, the Nahanni Ice-Field. This is the largest known ice-field in North America, larger even than the Columbia Ice-Field in the Rockies.

Ted Holmes told me, after I returned to Edmonton, about a flight that he made with Major-General John Peter Mackenzie, the Canadian Army Inspector-General, in July 1944. Ted flew him to Dawson City to inspect the B.C. Mountain Rangers. This militia outfit consisted of sourdoughs and Indians, many of whom were over eighty years old. It was the first major inspection that they had led in their thirty years' existence, "and man, did they look proud, standing on the square with their six bicycles."

After inspecting a similar group at Aklavik, the General and Ted headed back toward Fort Nelson. North of the Nahanni ranges their Lockheed 10 was struck by a bolt of lightning. The lightning blew holes in one wing tip, and a hole in the tail end big enough to crawl through. Their radio was gone, and, of course, their compass. Flying by the disabled gyro and by clock, Ted allowed three degrees precession on the gyro every five minutes, and then cranked it back. After flying over (or around) the high mountains surrounding Dead Man's Valley, they arrived at a point five miles east of Nelson in the dark. "It was, needless to say, quite an experience."

* * *

On our drive from Smith River to R.C.A.F. Detachment Fort Nelson we crossed the second highest peak on the Alaska Highway, Steamboat Mountain. (The highest elevation is immediately north of the Snag cut-off, from which it is possible to see both Mount Logan and Mount McKinley.) The mountain actually does present the appearance of a steamboat, at least from a distance.

In the valley on the north side of Steamboat Mountain, there is a restaurant, about a hundred feet from which, right on the Alaska Highway, lay an R.C.A.F. Piasecki helicopter which had been hit by a down-draft when returning from the previous Air Force Day celebrations at Namao. In the valley on the south side of

Steamboat Mountain, there is another restaurant. About a hundred feet from this second restaurant, right on the Alaska Highway, lay a U.S.A.F. Piasecki which had been hit by a down-draft on its way to Alaska. This coincidence provided my mystical experience for the day.

Arriving at Fort Nelson, a detachment under Namao, I went and paid my respects to its officer commanding, Squadron Leader V. T. Woods, D.F.C. He suggested that my best sources of information would be Mr. and Mrs. Arthur F. George, owners and proprietors of the fur-trading post across the Nelson River at Old Fort Nelson. We therefore drove down to the river bank, gave our horn three long blasts and, all of a sudden, an engine sputtered on the other side. Soon the ferryman came into view and took us across the river.

From Mr. and Mrs. George I heard the story of the station's construction, and a remarkable story it was of difficulties met and overcome. Among others of the more humorous incidents in it was the episode of Old Macdonald, an Indian centenarian who helped to burn the brush off the runway. Scuttling here and there, gleefully lighting matches and setting fire to everything, the old chap was in his element – until suddenly the flames got out of control and his own camp was razed to the ground. Macdonald drew himself up, deeply offended. "Me work no more!" he said. Then, turning on his heel, he stalked off into the bush and was seen no more.

The work continued rapidly, so that Fort Nelson was fit for flying three months before Pearl Harbour. Where, only a year before, Yukon Southern had landed its aircraft on the river, a modern airport now stood. "It seemed like only a day," said Mrs. George, "since we had an old Allis-Chalmers cat here pulling a home-made log roller which packed the snow so that Yukon Southern's two Barkley-Grows might land. Then, on almost the next day, an American paymaster took off from here in a C-47, bound for the north carrying the pay for all the American troops. This 'plane never did arrive over Watson. A big search was conducted, but not a trace was found. Three years ago, ten years after the loss, some hunters were looking for big game on Steamboat Mountain, when a few bills – paper money – blew against the flanks of their horses. The C-47 had crashed without catching fire. There was a fortune scattered about the clearing. Oh, we have fun in the North!"

Before leaving Fort Nelson, I stopped in at the hospital. The hospital answers all distress calls from people in the area between Fort St. John and Whitehorse, and every day is a busy one for it. Ambulances, run by the Army, are stationed at strategic points along the Alaska Highway. Often emergency advice is given by 'phone or radio to isolated spots. All sorts of people are taken care of – Army and Air Force personnel and their dependents, civilians, tourists, Indians, trappers, prospectors, and patients from geological surveys and oil-drilling sites. The Indians are paid for by the Department of Indian Affairs. Civilians pay for their medical attention at Department of Veterans' Affairs rates. Pre-natal and post-natal clinics are provided for northern mothers. In cases of extreme emergency, air evacuation is made to

Edmonton or Vancouver Emergency operations, of which a fair number are performed, are varied out only in cases of extreme urgency.

Once, when Joe Chipezia, Chief of the Prophet River Indians, and his son Alec were out making a tour of their trap-line, Alec was attacked by a black bear while he slept. Joe scrambled out of his blankets and ran at the bear. In a rage, the bear threw Joe ten feet through the air. Joe landed beside his knife which he grabbed up, and returned to the fray. He stuck his left hand in the bear's mouth and proceeded to stab with his right hand. The S.M.O. told me that Joe required quite a bit of sewing.

A few years ago, the S.M.O. at Nelson and a nursing sister crossed the Fort Nelson River to deliver an Indian woman's baby. It was a stormy night, and the midwife and relatives were shouting and beating the outside of the tent to ward off evil spirits. They were apparently not very successful, for inside the tent complications developed. The doctor decided to take the mother back across the river in their canoe to the hospital. The violent storm and the rushing waters of the Nelson combined to overturn the canoe and its three (or four) passengers, but the doctor and the nurse somehow managed to swim with the canoe to shore while holding on to the mother. Minutes after reaching shore, a natural birth occurred, and soon a baby's cries joined the thunder's growls.

* * *

Leaving Fort Nelson, we set off for Beatton River, and were soon on the cut-off that leads from the Highway in to the airport. The cut-off is roughly of the same length and type as the one that connects the Highway to Aishihik; but there the resemblance ends. Gone, I found, were the dangerous hills, and the deep and precipitous slopes outside the car window. Game and fowl were less plentiful; trees were fuller and greater in variety; and the road was bordered with wild roses. Here and there the face of nature was scarred where men and their monstrous machines had driven side-roads in their search for oil.

At a point about sixty miles in, our road came to an abrupt end. The bridge across the Beatton River had been washed out that spring, and only its two ends remained. We abandoned our car, and a trapper – the only man for miles around – kindly rowed us across to the other side. There we were met by Mr. J. Sobolewski, D.O.T. official in charge of the airport, who drove us on to our destination. He knew that we were coming because we had 'phoned to the control tower from the Highway a few hours before.

As Mr. Sobolewski told me, the story of the building of Beatton River airport is not a particularly gripping one. Supplies were simply brought up the old pack-trail to Fort Nelson, and construction followed the usual pattern. From the point of view of metropolitan amenities, however, the former R.C.A.F. unit remains an exceedingly isolated spot.

This is as good a place as any at which to interrupt my narrative with a few words on communications along the Staging Route. Two days after Pearl Harbour, it was announced in Ottawa that radio range facilities along the North-West Staging Route

were completed and in operation. This meant that the Route was ready to be flown in any type of weather. In addition to this, at the end of 1943 the R.C.A.F. began to organize, in Edmonton, an airways traffic control centre. The centre was responsible for all air traffic between the 49th parallel and the Alaska boundary, a distance of more than 1,500 miles of airway. The programme cost well over five million dollars, half of which was spent on the provision of telephone and teletype landline circuits between Edmonton and Snag, and the other half on the construction of a number of alternative radio channels.

Built by men of the R.C.A.F. signals and construction branches, the landlines were equivalent to those required for a telephone circuit between Calgary and New York, a distance of approximately 2,400 miles. The flying controller in Edmonton can get in touch immediately with any control towers along the Staging Route. Similarly, the man in the tower at Snag may simply pick up his 'phone receiver, dial one digit, and talk to his counterpart at Edmonton, or Beaton River, or any other of the units on the route. Communication is also possible between aircraft in the air and any of the stations on the ground.

Alternative channels of communication were built in order that all exigencies might be provided for. Should, for example, the landline breakdown, powerful radio transmitters were available for use. Some of these transmitters ran to 10,000 watts. Backing up the first radio channel was another, of lower power. Behind this there were others, less powerful again, but still strong enough to ensure that the North-West Staging Route would never be without a channel of communication.

Early in 1944, it seemed that work on the communication system might have to stop. Important equipment for the repeater stations, which amplify messages as they flash along the landline, could not be found anywhere in North America. Manufacturers stated the desired equipment could not be delivered for nine months. Then, as often happens in war-time emergencies, it was learned that there was repeater equipment in North Africa which had been installed there during the fighting in 1942 and 1943, but which was no longer required. It was immediately rushed back across the Atlantic and installed on the Route.

To return to Beaton River. Before the reader rows back with me across to our waiting car, he may be interested by a curious belief that appears to be prevalent among the ladies of that region of Canada's northland. Stated with the decorum due to "The Roundel", it is this: that the drinking of beer from a clear glass bottle will almost certainly result in the drinker's becoming a mother.

And so, as Ezra Pound might have written:

*On and on and on and on,
On we drove to Fort St. John.*

2-6. PART SIX

Vol. 9, No. 6 (July-August 1957)

The entire city of Fort St. John owes its creation to flight. Around 1930, Stan MacMillan (later a Wing Commander in the R.C.A.F.), while carrying trappers and their dogs to various points in the north, landed at what was to become Fort St. John. (MacMillan will be remembered by many as the man who kept the world on edge through the winter of '24. Early in the season he crashed near the Arctic Circle, and it was not learned until the following spring that he had spent the intervening months with an Eskimo family in their igloo). Later, in 1932, when Grant McConachie risked his neck one night by landing on Pickell's field to pick up a man who had been badly injured in a sawmill, he discovered that this vicinity would be an ideal location for an airport. Charlie Lake was made an operations base for Yukon Southern, and "Red" Powell's house became a headquarters for the flyers. May, Kubichek, Coote, Sheldon Luck, Simmons, Elliott, Goldie, Patrie, were among those who helped to establish Fort St. John.

In 1942, the Joint Board decided that it would be a good idea to have an interior bomber-base somewhere on the Staging Route. Fort St. John was chosen as an excellent spot at which to build facilities for such aircraft as the B-29 to land, and hundreds of these bombers subsequently came through there. Today Fort St. John has a large and busy airport, and I spent two interesting days as the guest of the kindly D.O.T. men who operate it.

I obtained most of my information from two sources; from Mrs. M. L. Murray, a remarkable elderly lady who runs, single-handed, the "Alaska Highway News", and Mr. and Mrs. "Red" Powell, the doyens of the Yukon Southern flyers. Mrs. Murray told me about the exploits of the R.C.A.F., and the manner in which it nurtured this country by performing such "buckshee" services as snow-removal, by providing emergency medical care for civilians, and by flying in food for starving pioneers.

Mr. and Mrs. Powell related to me many tales of northern flying. They told me about Ernie Kubichek, who, while flying from their cabin at Charlie Lake, had his 'plane flip over on to its back while going through the narrow Liard Canyon, near Nelson Forks. He had no choice but to continue on in the same position.

Again, there was the night on which Don Patrie was flying into Charlie lake at Fort St. John with several passengers, including a game-inspector, a doctor, and a trapper from the Nahannie area. Fog was nestled down right on top of the waves. "Don dropped one flare", Mrs. Powell said, "and thought he detected water below. With one flare left, Don yelled to his passengers: 'I'm going down on this one. I'm sure I saw water.' Down he came, and landed. His water turned out to be just a pothole in a marsh. When the fog cleared the next day, Don saw that a take-off would be almost impossible. He unloaded the aircraft, and even drained the fuel tanks, leaving only enough gas for a few minutes' flight. He then took off, ran out of gas, and glided down to the Peace River."

I mentioned earlier that the R.C.A.F. took over the North-West Staging Route on 16 July 1942. The first officer commanding the Route was “Con” Farrell. Wing Cdr. (later Group Capt.) C. M. G. Farrell was the C.O. of R.C.A.F. Station Bella Bella, B.C., when he was called to the Staging Route. Apart from his pleasing personality and his qualities of leadership, he had an excellent record from the Great War, when he won the D.F.C. while serving with the R.A.F.

Con Farrell will long be remembered throughout the North. He it was who spent the Christmas on 1933 forced down on a nameless lake between Fort Good Hope and the Arctic Red River, with the temperature at seventy degrees below and no radio; who flew into the wilderness and rescued Andy Bahr, the Laplander, and his party of reindeer herdsman; who was himself rescued by another famous bush pilot, Matt Berry, after being marooned at Snare Lake for thirteen days with some trappers whom he had been flying out. He it was, too, who once flew two sickly and sickening pigs to Cameron Bay in order to cut down the price of pork.

A letter which appeared in the “Ottawa Journal” not many years ago gives some insight into Farrell’s character:

“Truly he was the Santa Claus of the North. No words of mine can describe this man with the heart and courage of a lion.

“...I recall when Con was determined to get the Christmas mail through. Flying-weather was fine when he left the home base at McMurray, Alta. As he proceeded down the Mackenzie River, stretching its weary 900-odd miles from Slave Lake to Aklavik, with settlements nestled approximately 150 miles apart on its winding and twisting shores, a fog developed...Undaunted, he pushed on from settlement to settlement, following the sprawling river...He arrived in Aklavik in time for Christmas, with a day to spare, and there the weather really closed in and held him for several days.

“I’ll wager there were none along the river who did not rise and toast his health for such a feat. He made it a real Christmas for all of us.”

* * *

In the early days of the Route, the problems of life were many and varied. For several months R.C.A.F. personnel suffered considerable financial hardship. The extra allowance of \$1.70 per day for officers and \$1.25 per day for other ranks was insufficient to defray expenses in an area influenced by U. S. wage scales, both Service and civilian. Prices rose to unprecedented heights, far beyond the reach of the comparatively small salaries of our own Service personnel. Bottles of whisky were known to sell for as high as one hundred dollars. Eventually, an adjustment was made and an increase in subsistence allowance granted, but it was somewhat slow in coming.

The supply of winter clothing did not arrive at any of the units until four months of the winter season had elapsed. Hangar facilities were not available; therefore all work on aircraft had to be done in the open, sometimes with bare hands. This difficulty was eventually overcome by borrowing Jeep heaters from the U.S.A.A.F.

and by the procurement of engine-tents.

Freight and personnel were moved to and fro by one Lockheed 10 (no. 7634) flying under the most difficult and hazardous conditions in all types of weather. The aircraft was not provided with de-icing equipment, and its radio equipment was far from satisfactory. The aircraft was flown by Squadron Leader Ted Holmes, officer commanding Fort St. John. When Ted first reported to his new detachment he had to sleep in a D.O.T. hut. There were so many tired men and so few beds that the hut was run on the "hot bunk" system: every man had eight hours to sleep, then he had to vacate the sheets and let the next man in.

Preferring to sleep in no. 7634, Holmes serviced, loaded, and flew it all by himself, carrying supplies up and down the Route. Once he had to transport a 4200-pound power-transformer from Fort St. John to Fort Nelson. This necessitated stripping the Lockheed of everything, including its radio and some instruments. In the period between 21 August 1942 and 28 February 1943, he flew a total of 488 hours, covered 65,092 miles, and moved 117,110 pounds of freight.

In January 1943, Wing Cdr. Farrell was replaced as C.O. of the Route by Wing Cdr. W. J. ("Packie") McFarlane. With an ever-swelling number of R.C.A.F. personnel being sent to the Route, and with the increasing complexity of its operation, its problems became more numerous than ever. At the Route's headquarters in Edmonton, work was hampered by a lack of facilities. Housing, as well as office and warehouse space, was at a premium in the suddenly bulging city. In order to meet its needs, the R.C.A.F. set up tents on the lawn in front of the civil Administration Building at the airport. These tents served for many months.

In the meantime, construction went on at the units. Airmen of No. 4 Construction and Maintenance Unit worked on the construction of such things as garages, coal compounds, and root houses. R.C.A.F. personnel even went into the woodcutting business, supplying fuel for R.C.A.F. and U.S.A.A.F. alike.

It would appear that a serious attempt was made to provide recreation and entertainment for the airmen at these isolated spots. C. Morton Devitt and A. M. Hall, both of the Y.M.C.A., guided the general plan. The Air Force set aside rooms, which were magnificently equipped with reading and recreational facilities. Equipment for such games as ping-pong, checkers, darts, horseshoes, and volleyball was sent to the detachments as quickly as possible. Softball was the favourite summer pastime for most. Packie told me when I was in Edmonton that "friendly games with the U.S. and other teams were weekly features at all stations. An R.C.A.F. league was organized, with a team entered from each unit, and a splendid silver trophy was provided for the competition. All was in a state of readiness, but unserviceability of aircraft prevented the paying of any League games."

Films were shown as regularly as conditions would permit. Many entertainers were flown up the Route, stopping at each unit to entertain the airmen of the U.S.A.A.F. and the R.C.A.F. Three such shows were: the R.C.A.F. Airmen Entertainment Group from A.F.H.Q., Capt. F. H. Armitage and his show "Dickens

and His Queer Folk”, and Mrs. Catherine Craig and party. All donations were gratefully received; although, as one ex-Staging Route airman told me, “some of those old who’s-who clubwomen who came “to entertain the boys’ were a bit much, bless their souls!”

As much of what I have already said would imply, those who preferred the more individualistic sports, such as hunting and fishing, were never at a loss for recreation – although it may be added that the hunters at Fort Nelson must have been rather frustrated during the first few months that followed Pearl Harbour. At that time, the only gun on the station was a .22 which belonged to Lorne Harlson, guide of the original survey parties. The libraries were the amenities most appreciated, for the winters seemed interminable, and their nights were long and cold.

The R.C.A.F. compiled a fine record of flying along the Route. In October 1942, No. 6 Communications Flight was organized at Edmonton, with Ted Holmes as its O.C. At its inception, Com. Flight suffered from a dearth of aircraft: No. 7634 and a few *Norsemen* scattered around the various units – all of them constantly on the go carrying supplies and people – made up its total strength. The Flight’s flying was not restricted to the Staging Route alone. Flights were made to such widely separated points as the Aleutian Islands, Fairbanks, Anchorage, and, when the Canol Pipeline was being built, to Norman Wells.

One day when Ted Holmes was winging his way down the Route, he was radioed to turn around and proceed to Fort Simpson in order to pick up a package from the Mounties. The parcel turned out to contain the first Japanese balloon to be found in Canada. Released from enemy submarines on the Pacific coast, these balloons were about fifty feet wide, made out of fibre paper, with a gondola below carrying explosives. Their purpose was to land in the forests, explode, and set fire to the gas – and, of course, to the forests. About forty of these were found throughout the war. A few were shot down by *Mustangs* while in the air. The balloons were largely failures; only a couple of fires were started. They occasioned only one fatality—and that not until after the war. An Oregon minister was strolling in the bush with several children, when they spotted an unusual-looking object dangling from a tree. One of the party, a young girl, ran forward and somehow or other caused it to explode. Thus did the costly Japanese balloons claim their lone human life.

Before many months had passed, more aircraft were required to meet the growing demand from the detachments for rations, equipment, and personnel. The Com. Flight was not large enough to take care of all the flying, and therefore, in April 1943, No. 165 (Transport) Squadron was formed. By June, three *Lodestars* and a *Dakota III*, together with the necessary aircrew and groundcrew, were at work on the Route. Hangar and office space for No. 165 Squadron was made by the erection, on a rough lumber floor of a large marquee behind the T.C.A. hangar.

Eventually, No. 165 changed over to Douglas DC-3 transport aircraft. Operating like a first-class commercial airline, the squadron never had a serious accident. Over ninety per cent of its trips were made within ten minutes of the scheduled time.

Except for one period of three weeks in the autumn of 1944, when record-breaking ground-fog conditions obscured almost the entire Route, they never cancelled a flight. Up to the end of 1944, more than 20,000 passengers and nearly 6,500,000 pounds of freight had been flown over a distance of approximately 1,750,000 miles. By 1945, most of the personnel flying with the squadron were men who had returned to Canada from operational duties overseas, and the majority of them were wearing either the D.F.M. or the D.F.C.

The Communications Flight did not cease to exist with the advent of No. 165 Squadron. It continued to operate with its smaller aircraft throughout the war, normally logging more than 100,000 miles a month over a vast territory in the North-West.

* * *

Before taking leave of Fort St. John, I feel that I should mention a story that is still told of Packie McFarlane and Ted Holmes — one which I am quite sure that neither of them will mind my repeating.

When, in January 1944, the Route passed from the control of No. 4 Training Command, Edmonton, to that of Western Air Command (N.W.A.C. was not formed until June), “Packie” McFarlane was a group captain and Ted Holmes a squadron leader. On those occasions when they happened to find themselves together at the end of the day’s work, long discussions of “shop” were apt to occur between them over the odd pre- (and, no doubt, post-) prandial. After the two old friends had brooded together for a time over the insuperable obstacles placed in their way by officialdom, the criminally inadequate comprehension displayed in Ottawa of their problems, and the general sorry pass to which the whole Air Force was rapidly coming, Packie would turn to Ted, eye him solemnly, and say:

“Ted, you’d be better off dead.”

“Yes, sir,” Ted would reply, “I would.”

This invariable ritual having been duly carried out, the evening would progress thenceforward along more jovial lines.

2-7. PART SEVEN

Vol. 9, No. 7 (September 1957)

Having bidden good-bye to Mrs. Murray, the Powells, and our Department of Transport friends, we set out on the fifty-mile drive to Dawson Creek, where a Staging Route detachment existed in years gone by. Soon we were crossing the Peace River Bridge, which I have been given to understand is the seventh largest suspension bridge in the world.

At Dawson Creek I visited the old barracks put up by the R.C.A.F. during the war. There it was my good fortune to run into Sergeant Robert Whyte, who was formerly Supply Sergeant at the station and now operates a farm in the vicinity and

drives the school bus. My talks with him, together with the information made available to me by ex-Squadron Leader Bob Maze during my stay in Edmonton, enabled me to piece together the following story.

One of the most distressing difficulties facing the R.C.A.F.'s detachments on the North-West Staging Route was the problem of supply. Neither the Alaska Highway nor the Staging Route was much use without motor vehicles and aircraft, and in 1942 these were not available in the quantity required. Some degree of hardship had, of course, been anticipated, but, by December of the year just mentioned, conditions were becoming intolerable.

Here are a few entries from the daily diaries kept by various units during this period.

“December 19th: Lockheed 7634 encountered severe icing conditions, and, on the south-bound trip, icing endangered the aircraft to such an extent that only superb piloting and a great deal of good luck prevented a crash and probably fatalities. It’s criminal that we should be asked to carry on northern flying without having aircraft properly equipped with de-icing and other winter equipment...Severe temperatures being experienced in the North and still no winter clothing for personnel. Someone has bungled badly.”

“December 21st: Contrary to all rules and regulations, we are issuing flying-boots to all personnel, with the sincere hope that this will alleviate to some extent suffering from the cold.”

“December 23rd: Sqn. Ldr. Guest arrived. He reported intense cold at Whitehorse, average temperature 40 below zero. Personnel in desperate need of clothing and money. Both of these items on way, but weather delaying. Living-conditions at Whitehorse deplorable. Our personnel are living in our barracks without plumbing or adequate heat, and to get their meals they must walk 1½ miles to the Contractor’s. Only one panel wagon available and it is kept running 24 hours a day – otherwise it would freeze solid.”

“December 25th: We opened the cartons supposedly containing some of our winter clothing, only to find it was just battledress. What a disappointment.”

* * *

It was at this time that Sqd. Ldr. R. M. Maze was brought to the Staging Route as Air-Rail Transportation Officer. He immediately set out with Sgt. Whyte on an experimental drive up the Highway. On this 2,500-mile seventeen-day trip they had twenty-two flat tires and they had to buy or scrounge a half-dozen new ones. “The drive”, Bob Maze told me, “was very interesting and, at times, quite exciting. I remember pulling into the Blueberry Mountain Maintenance Camp very late one night. We had had several flats and a few other such tribulations. We were very tired,

very hungry, and covered from head to toe with dust. When we walked into the tiny kitchen, the short and stubby bull-cook looked us up and down, and said: 'Just put the vegetables in the back door.'

"Almost all of the bridges at this time were of wood, hurriedly assembled and with only one lane. Just north of Watson we shot down the mountain-side towards one of them. As we drove on to it, our lights probing through the night fog, we suddenly spotted an Army truck speeding at us from the other direction. I don't know how we made it, but we did. Both sides of our car were scraped, the left by the truck, the right by the wooden rail of the bridge."

When Maze and Whyte returned to Edmonton after their trip, they set to work immediately to organize a Freight Transit Unit. By the autumn of 1943 a fleet of trucks was operating from the newly-built refrigerated warehouse at the end of steel to all the R.C.A.F. detachments on the Route. Each detachment had the necessary facilities for repairing the trucks, as well as competent Service mechanics to look after them. Major repairs were made in the large garage at Dawson Creek.

In 1944, several people in positions of authority complained that an Air Force debased itself by moving freight on the ground. To quiet these charges, someone figured out that an airman's daily food supply, packed for shipment, weighed roughly six pounds. To have flown this package from Edmonton to Whitehorse would have cost \$2.40 per man per day, but by rail and truck the cost of shipping the same package amounted to thirty-seven cents. The total poundage of freight carried during this year amounted to above five and one quarter million pounds.

The fleet of R.C.A.F. trucks delivered freight consisting of rations, construction material, heavy machinery, technical equipment, petroleum products, and many other commodities. A convoy carrying non-perishables normally took between seven and nine days to make the round trip from Dawson Creek to Whitehorse and back again. Perishable rations presented another problem. With these they made a non-stop trip to Whitehorse in about thirty-six to forty hours. This was done by flying relief drivers ahead from Dawson Creek to Fort Nelson and Watson Lake, locations which are respectively about one-third and two-thirds of the way along the road to Whitehorse.

Two examples will serve to demonstrate the ingenuity of the airmen who worked in the Freight Unit. Some sort of refrigeration for the trucks was necessary in the summer time, but it was soon discovered that the machinery of an ordinary mechanical refrigerator plant was too delicate for the bumpy Alaska Highway. The problem was solved by installing shelves inside the body of the truck and packing them with dry ice. During the winter months, with their extremely low temperatures, the problem was reversed: how to prevent the food from freezing. It was solved by connecting standard three-section radiators (such as might be used to heat an ordinary room) to the exhaust pipe.

I know from my own experiences that the driving must have been hazardous, especially in those early days when the Alaska Highway was far from completed. In

the summer, rain can make the road as slippery as ice, and the spring brings flash-floods from the melting snows on the mountain tops. It is quite possible to be driving comfortably along the Highway at one moment, and the next to see a deluge of icy water come rushing around a bend between the mountains to wash away the road, one's car, and oneself. Deaths from such causes are not too uncommon.

The winter months meant that the R.C.A.F. drivers were unable to gear down on the mountain sides lest they skid over the cliffs—and anyway, as Mr. Whyte explained, they needed as much speed as possible to get up the ice-covered hill which inevitably awaited them as soon as they had successfully reached the bottom of the previous one. The drivers always had one thing to look forward to, however. They used to stop for a swim at the hot springs near Smith River, even when the temperature was thirty-five below and the trees and the swimmers' hair were thick with hoar frost.

* * *

Leaving Dawson Creek, a town now famous as a hub of transportation, and driving on towards Grande Prairie, we passed through Pouce Coupé.

It was near Pouce Coupé, so the time-honoured story goes, that an R.C.M.P. constable, after tracking a killer for a month through the winter cold, at last found him frozen to death in the snow. Wishing to have proof of the success of his search, the constable cut off the man's head and put it in gunny-sack. Then he boarded a 'plane for his return to Edmonton. A short time after take-off, a superstitious passenger remarked on the unhappy fact that there were only thirteen persons aboard. Our hero, a fearful-looking giant of a man, gave him an encouraging grin. "Don't worry," he said; and, opening his gunny-sack, he let its contents roll down the aisle of the aircraft.

During the war, Pouce Coupé was a vital source of liquor for those "inside". Amongst the more prominent bootleggers of those days were (horrible to relate!) several R.C.A.F. personnel. Bob Maze told me about a tall and immense driver who one day walked into the garage at Dawson Creek to pick up his truck. The tunic of his battledress and his trouser pockets were bulging with what were obviously bottles. Unfortunately for many parched throats up the Route, he found himself confronted by Maze, who simply stared at him without uttering a word. Unabashed, the culprit returned his glance. "Just been to the hospital, Sir," he said.

My stay in Grande Prairie was a short one. The town itself lies on a broad, flat, and verdant plain. The skyline is broken only by grain elevators and the beacons at the airport. The Department of Transport took over the field from the R.C.A.F. in November 1950. Before the war regular flights had been established to and from Grande Prairie; bush pilots flew their aircraft off the level turf at the present site. During the thirties, the townspeople had proposed to build a school there, but the war put an end to such plans with the construction of the first Staging Route airport north of Edmonton.

On 1 January 1944, as I have stated earlier, the North-West Staging Route was

placed under the control of Western Air Command, with its headquarters remaining in Edmonton. Group Captain V. H. Patriarche, A.F.C., was placed in charge of it, with Wing Commander W. J. Winny, O.B.E., as second in command. A month later the Route was redesignated as No. 2 Wing, and the problems of accommodation, personnel, and equipment received increased attention from A.F.H.Q. The U.S. forces were the principal users of the Route, and the volume of traffic passing over it was considerable. The R.C.A.F. was responsible for the control, maintenance, and defence of the Route.

In May 1944, Secret Organization Order No. 193 was issued, establishing North-West Air Command. Many of its senior officers were men with experience in northern flying. The A.O.C., Air Vice-Marshal T. A. Lawrence, C.B., had conducted surveys for the R.C.A.F. up in Hudson Strait in 1927-28. Both the Chief Staff Officer and the Senior Air Staff Officer were veteran bush pilots, as were also, of course, many of the pilots engaged in flying R.C.A.F. aircraft over the Staging Route.

No. 2 Air Observer School, at Edmonton, having been disbanded early in '44, N.W.A.C. was able to take over its buildings to accommodate the great increase in personnel which was necessary to administer the Route. The facilities which the Command and Station Edmonton occupied, and the large hangar space which they then had, were in marked contrast to the pre-fabricated huts and tents still in use at the beginning of 1944. The R.C.A.F. continued to make improvements until the end of the war. Notable among such improvements was the expansion of the airways traffic control centre to four times its original size.

* * *

The question of financial responsibility was settled in 1944. On 1 August, the Right Honourable W. L. Mackenzie King presented to the House of Commons an exchange of notes between Canada and the U.S.A. concerning the defence installations which the U.S. had either built or improved upon in Canada. This is what the Prime Minister had to say:

“The Minister of Munitions and Supply (Mr. C. D. Howe) informed the House in February of the Government’s decision to reimburse the United States Government for permanent improvements which they had made to airfields on the North-West Staging Route and in the north-west generally. Then, in April, the Minister of Finance (Mr. Ilesley) stated that, as part of an understanding which he had reached with the Secretary of the Treasury of the United States in connection with the Hyde Park declaration, the Canadian Government would reimburse the United States Government for permanent improvements which they had made to other airfields in Canada and for the telephone line from Edmonton to the Alaska boundary, which was also built by the United States...

“It has been agreed that Canada will reimburse the United States to the extent of 76.8 million dollars. United States funds. This covers construction costs incurred by the United States Government of work of permanent value on the North-West Staging Route, the flight trips along the Alaska (Military) Highway, the flight strips

along the Mackenzie River, the airfields in north-eastern Canada, the airfield at Mingan, Quebec, the airfield at Goose Bay, Labrador, and the telephone line from Edmonton to the Alaska boundary. An additional 13.8 million dollars spent by the United States on these projects is not being repaid by Canada, since, while necessary for the prosecution of the war, it represents war-time expenditure for United States purposes and provides nothing of permanent value; for example, temporary barracks and other housing facilities. However, all these works, whether of permanent or non-permanent value, are relinquished to the Canadian Government.

“I should also point out that, in addition to reimbursing the United States for the outlays under reference, Canada has assumed substantial expenditures for the construction of war-time facilities which were originally made on the understanding that we would be reimbursed by the United States. Our expenditures under this head in Canadian funds will total 34.7 million dollars. Thus, including our reimbursements to the United States and the expenditures which we are making ourselves, the amount expressed in Canadian dollars which the Canadian Government is spending on the airfields and related projects mentioned in the exchange of notes is of the order of 120 million dollars.

“Honourable members will observe that all of the foregoing expenditures were incurred in connection with defence installations in north-western and north-eastern Canada. Both are vital areas in the joint defence plans of the United States and Canada. Through the Permanent Joint Board on Defence, far-reaching defence measures have been taken to close these back doors of the continent against attack by Germany and Japan. In concept and in execution the defence plans for these areas represent one of the most effective examples of co-operation among the United Nations. At the same time these facilities have become links in the offensive plans of the Allies. ‘Planes fly across the north-west to the Pacific theatre of war and across the north-east to Europe.

“In reaching this agreement for repayment for expenditures incurred for these defence facilities in north-western and north-eastern Canada and Labrador, it was believed that, as part of the Canadian contribution to the war, this country should take general responsibility for the provision of facilities in Canada and in Labrador required for the use of Canadian, United Kingdom, and United States forces. In the second place, it was thought that it was undesirable that any other country should have a financial investment in improvements of permanent value, such as civil aviation facilities, for peace-time use in this country.

“I am happy to say that our views on this subject were understood by the government of the United States, and the agreement which I have tabled is the result of this understanding.”

* * *

With my departure from Grande Prairie, my trip virtually came to its end. Between there and Ottawa only one episode occurred that is in any way deserving of mention— a haircut which I had in a small town just north of Edmonton.

Entering a seedy-looking building whose false front was adorned with the traditional blood-letters candy-cane, I found myself in a squalid snooker-room with one barber's chair evidently thrown in as an afterthought. I sat in this chair somewhat nervously, while the proprietor and part-time barber took his seat on a little stool beside me. He was so low that he could hardly reach my neck; but, since he seemed to be completely disinterested in the whole proceeding, it didn't matter anyway. When, eventually, I stumbled forth into the open air, my scalp resembled nothing so much as a mosaic of the Staging Route.

End

THE ALEUTIAN CAMPAIGN

By Flight Lieutenant F. J. Hatch, Air Historical Section

2-8. FIRST OF TWO PARTS

Vol. 15, No. 4 (May 1963)

The Aleutian campaign of 1942-43 marks the first time that units of the RCAF served under American operational command. This alone would make it worthy of our attention but there are, of course, other reasons for taking a backward glance at this rather obscure campaign which was conducted in an obscure part of the world.

Approximately 500 RCAF personnel served in the Aleutian theatre, 11 of whom received the United States Air Force Medal, one the OBE, one the DFC, four the AFC and two were mentioned in despatches. Eight others lie buried in the U.S. cemetery in Kiska, while the names of four who have no known graves are inscribed on the Commonwealth Air Memorial on Green Island in Ottawa.

Although such strange-sounding names as Naknek, Umnak, Adak or Amchitka may hold little meaning for most of us, for the members of the RCAF Aleutian expedition they will undoubtedly conjure up memories of the worst flying weather in the world, of a war that came in fits and starts, and of unfulfilled ambitions to meet Japanese Zeroes in air combat.

The story of the Aleutian campaign begins early in May 1942 when the tide of war was running strongly in Japan's favour. The Japanese High Command, having decided to "go for broke" in the North Pacific, assembled a tremendous striking force which, according to Mastake Okumiya and Jiro Horikoshi (co-authors of the book entitled "Zero"), included "350 vessels of all types, more than 1000 war planes, and more than 100,000 officers and men". Their double objective was to oust the Americans from Midway Island and then to strengthen Japan's position by establishing strong perimeter bases in the Aleutian Islands, which extend like the links of a giant chain about 1,200 miles westward from the Alaskan peninsula.

Unfortunately, from the Japanese point of view, before this formidable armada left its home waters American intelligence sources had alerted Washington as to its probable purpose and destination. Ottawa, too, was kept informed and it was at this point that the RCAF came into the picture.

The U.S. War Department had to bolster its Alaskan air defences immediately and suggested that Canada make plans to lend air assistance to the American forces in Alaska. This proposal did not come as a surprise because it had already been agreed that the defence of the northern United States, British Columbia and Alaska was a task in which both countries must share. To supply the required help fell within the scope of responsibility of Western Air Command. The Air Officer Commanding, A/V/M L. F. Stevenson, was juggling his meagre forces to see how this could be done without unduly weakening the air defences on Canada's west coast when, on 27 May, Maj. Gen. S. B. Buckner, commanding the Alaska Defence Command, sent him an urgent message requesting that one bomber squadron and one fighter squadron proceed immediately to Yakutat at the north end of the Alaskan panhandle.

As it happened, A/V/M Stevenson had already selected No. 8 (BR) Sqn., working out of RCAF Station Sea Island and No. 111 (F) Sqn., stationed at Patricia Bay, for possible service in Alaska and on 28 May they were warned for movement. At this time no one in No. 8 Sqn. was acquainted with the route to Alaska nor had any of its members even so much as seen an air navigation map of the area north of Prince Rupert. However, maps were soon found; on 2 June, 12 of the squadron's Bolingbrokes, led by S/L C. A. Willis, took off from Sea Island on the 1,000-mile flight north to Yakutat, staging through Annette Island and Juneau. They arrived at their destination the next day and on 4 June were joined by No. 111 Sqn., whose pilots had flown their Kittyhawks up the interior route through Prince George and Whitehorse.⁶ Some of the ground crews arrived by Stranraer the same day, while the main party followed by boat and rail.

Number 111 Sqn. was accompanied to Yakutat by W/C G. R. McGregor,⁷ a veteran of the Battle of Britain who had been brought back to Canada to assist in the development of fighter operations in Western Air Command. In view of his record and experience it is not surprising that he was appointed to head the force sent to Alaska. His small headquarters, which for lack of a better name was called "X Wing", served as the point of contact between the Alaska Defence Command and the RCAF. The Canadian government consented to the two squadrons being placed at the strategic disposal of the 11th American Air Force and taking their operational orders directly from its commander, Maj. Gen. W. O. Butler, on the understanding that questions of major importance would be cleared beforehand with McGregor.

⁶ At the time No. 111 was under command of S/L A. D. Nesbitt. On 13 June Nesbitt was appointed to command a two-squadron RCAF wing temporarily established at Annette Island, Alaska, to guard the approaches to Prince Rupert, B.C. Nesbitt was succeeded by S/L J. A. Kerwin, who like Nesbitt had flown in the Battle of Britain.

⁷ Now TCA President.

Somewhat ironically, one of the general's first orders was for the red centres on the top wing roundels of all RCAF aircraft to be painted out as he considered that there was a confusing similarity to the red identification disk carried on Japanese planes. Further changes in RCAF marking were made by painting a blue band 14 inches wide around the tail end of the fuselage.

On 5 June No. 8 and No. 111 Sqns. were ordered to deploy in defence of Elmendorf Field, near the thriving town of Anchorage. At the outset the two units made up about one fifth of the air strength of Alaska Defence Command⁸ and their presence at Anchorage enabled the Americans to move two of their own bomber squadrons and one of their fighter squadrons to Cold Bay and Omnak at the beginning of the Aleutian chain. The first DROs issued by S/L Willis at Elmendorf Field appeared on a single sheet size 8 x 10 on 9 June. They outlined the routine to be followed at the American base, confined all ranks to camp, ordered the carrying of personal weapons and emphasized the need to observe security regulations. The notice concerning mail, always an important item for those serving far from home, was probably the most studied item on the historic DRO. During its sojourn in Alaska the mail from home was to reach its members via A.P.O. 942, Seattle, Washington, and for quick delivery the use of U.S. airmail stamps was advised.

Meanwhile, a task force under Admiral Kakuji Kakuda opened the Aleutians-Midway offensive with a diversionary attack on the American base at Dutch Harbour which did a limited amount of damage but fooled no one. The main attack went in against Midway 24 hours later and in the great battle which followed American air power carried the day, repulsing the enemy with staggering losses. On 6 June, in a face-saving gesture, a Japanese naval force invaded uninhabited Kiska at the western end of the Aleutian Islands. A neighbouring island, Attu, was also occupied the day after and landing parties dug in with the intention of establishing permanent garrisons on these bleak fringes of American territory. Since Admiral Yamomoto had failed to take Midway, Kiska and Attu had a very limited strategic value for Japan although their seizure did allow the Japanese government "to conceal from the people the terrible losses at Midway".

It is doubtful if the Japanese ever considered using the Aleutians as a passageway to the mainland of North America. As Maj. Gen. Buckner said, "They might make it, but it would be their grandchildren who finally got there, and by that time they would all be American citizens anyway". Nevertheless the presence of the Japanese on far-away Attu and Kiska served to create in the minds of the Pacific coast inhabitants of Canada and the U.S. the impression that such an invasion was feasible. To dispel such fears the governments of the two countries had to maintain sizeable forces at home when they were badly needed elsewhere. Thus the main motive for clearing the

⁸ The air formation under Butler's command consisted of about 11 heavy bombers, 44 medium bombers and 98 fighters. Included in these figures are 14 *Bolingbrokes* and 19 *Kittyhawks* of X-Wing (RCAF).

Aleutians was to remove the apparent threat of invasion and thereby relieve more of the home forces for duty overseas.

No. 8 SQUADRON

After the Battle of Midway, Alaska Defence Command turned rapidly to the offensive. Men and materiel were pouring in through the Gulf of Alaska to construct a chain of island bases that would bring the Americans (and Canadians) within striking distance of Kiska and Attu. For the time being, the command's most vulnerable spot was its supply lines, there being still many elements of the Japanese Navy lurking about. To help in making the sea lanes safe for the convoys No. 8 Sqn. was assigned to patrol a given area in the Gulf of Alaska.⁹ Instructions from the 11th Air Force called for the squadron to have six of its 14 *Bolingbrokes* at readiness state at all times. Normally two aircraft, armed with 300-lb. depth charges, took off on routine patrol every day that weather permitted. In addition, when submarines were reported in the area a special detachment of two or three *Bolingbrokes* were temporarily based at Kodiak Island to supplement the American strike force located there.

The possibility of encountering Japanese aircraft in No. 8 Sqn's patrol area was rather remote but Alaska weather and terrain, characterized by constant dense fog and uncharted mountain ranges, more than made up for the absence of enemy fighters. Between Anchorage and the Gulf of Alaska there was a table of unsurveyed peaks rising in some places to 10,000 feet, leaving but one possible answer to an error in judgment. In his book "First Steps to Tokyo", F/O D. F. Griffin gives a graphic account of the hazards of flying in Alaska. He describes the Alaskan fog as "... of the worst kind, rising from the ground up, building itself into thick layers.... Where those layers of ground fog stop, the clouds commence." An additional peril was provided by the sudden squalls known locally as "williwaws" which swept down from the mountains with great force, sometimes reaching gale proportions within half an hour.

No. 8 Sqn. had its first encounter with Alaskan fog on its move from Yakutat to Anchorage. Ten *Bolingbrokes* took off with two U.S. Army transports following with the ground crews. Only three of the aircraft got through, one of which was flown by S/L Willis. The others returned to base or diverted to Seward.

When Japanese submarines penetrated the Bering Sea at the end of June a detachment of three *Bolingbrokes* was ordered to Nome – a town on Alaska's Bering Sea coast which at the beginning of the century had been the scene of a gold rush but in World War II was important as a staging point on the route over which pilots of the USSR ferried planes obtained on lend-lease from the U.S. For the next six months No. 8 Sqn. aircraft and ground personnel remained at this isolated base

⁹ The Canadian cruisers "Prince David", "Prince Henry" and "Prince Robert" and two Canadian corvettes were operating in Aleutian waters at this time.

keeping watch over Norton Sound. The one good feature about the field at Nome was that the low rolling tundra around it presented no serious flying hazard. Otherwise it was a most uninspiring place – gravel runways, no hangars and only canvas accommodation. Still, social life, if not abundant, was at least not absent. In their off-hours the Canadians amused themselves by visiting with the local inhabitants, conversing in wild gesticulations with the Russia flyers or panning the nearby streams for gold. (No strikes were reported.)

Although No. 8 Sqn.'s 14 *Bolingbrokes* were a valuable addition to the forces of Alaska Command, they stuck out like a sore thumb when it came to obtaining spare parts. For example, when the squadron received its first operational instructions from the 11th Air Force, "All aircraft to be bombed tip and stand by. Enemy contacted in position 57°N 170°W", it was discovered that the adapter rings on the *Bolingbrokes* didn't fit any of the bombs in use in Alaska. The maintenance crews, with American assistance, immediately took up the task of modifying the adapter rings until others could be flown in from Western Air Command. This was the story over and over again. Parts, for the Canadian-built aircraft, which of course couldn't be obtained from American stores, invariably arrived late, in insufficient quantity or of the wrong kind. Ground crews were forced to use their skill, training and ingenuity to the limit to keep the aircraft serviceable. Much of the work had to be done in the open or under canvas. Major overhauls and engine changes bordered on the impossible but somehow they were accomplished, though it meant working 18 hours a day, and the *Bolingbrokes* were kept flying.

Well before the end of the year the tactical situation in the Aleutians had passed the point where they were of very much use because Japanese submarines were now operating far beyond Bolingbroke range. Moreover, long range *Liberators* (B-24s) were being put at Butler's command while some of his fighter squadrons had been withdrawn for operations in the South Pacific. Taking into consideration the maintenance problems of the *Bolingbrokes* and the changed fighting conditions in Alaska, the American general asked that Canada replace No. 8 Sqn. with a fighter unit. As far as the RCAF was concerned the main problem was to find a fighter squadron properly equipped and trained for action. Again the question was handed to Western Air Command. After going into the matter thoroughly with Gen. John L. deWitt of U.S. Western Defence Command, A/V/M Stevenson agreed to pull back the *Bolingbrokes* and send No. 14 (F) Sqn. to Alaska.

Rumours, running far ahead of official channels, foretold that No. 8 would be back in Canada for Christmas. But the squadron remained in Alaska long enough to celebrate an announcement in the New Year's Honours List that two of its members, P/O W. O. Woods and WO2 T. Lindsay, had been awarded the Air Force Cross for their zeal and determination in carrying out their patrols, totalling 300 hours, under the very bad weather conditions prevalent in Alaska. Preparations for the move back to Vancouver began in late January; by early March the entire squadron was once again at Sea Island. It left behind a record unequalled by any other squadron in

Alaska inasmuch as none of its aircraft had been lost on patrol — a remarkable achievement when one considers the inadequacy of the existing (or non-existing) meteorological stations and radio communication facilities.

2-9. SECOND OF TWO PARTS

Vol. 15, No. 5 (June 1963)

No. 111 SQUADRON

During its first month in Alaska (June 1942) No. 111 Sqn. had been detailed to “fly flag pole” — in other words, to provide routine defence patrols for the Elmendorf area. This unenviable assignment came as a result of the Canadians having made the trip north without their *Kittyhawks* being equipped with long-range belly tanks, essential for dying between the widely separated bases along the Aleutian chain. The belly tanks were put on at Anchorage and shortly thereafter came the welcome announcement that a detachment of 12 RCAF *Kittyhawks*, 21 pilots and 60 ground crew was to be sent to Umnak, the most forward base in the Aleutians, to relieve an equivalent number of personnel in No. 11 Pursuit Sqn., USAAF.

Preparations for the 1,000--mile flight to Umnak, routed through Naknek and Cold Bay, were completed on 10 July but the anxious Canadians remained weather-bound until the 13th when the first section got away. It consisted of seven *Kittyhawks* and three U.S. transports carrying nine more pilots, the ground crew and a medical officer. On the last leg of this flight, from Cold Bay to Umnak, the RCAF experienced its most tragic mishap in the Aleutians.

What happened might be told in half a dozen words — a thick fog, a hidden cliff. The squadron commander, S/L J. W. Kerwin (a former member of No. 1 (F) Squadron in its Battle of Britain days) and four other pilots were killed. Only one *Kittyhawk*, that flown by P/O O.J. Eskil, and two transports carrying the nine pilots, 17 ground crew and the medical officer, got through. W/C G. R. McGregor, who had been flying ahead of the formation of six *Kittyhawks*, narrowly missed hitting a rocky ledge himself as he circled low on the edge of the fog bank, calling “all *Kittyhawk* aircraft”. Eskil was the only one of the six who answered. After trying vainly for half an hour to find the others, McGregor returned to Cold Bay to organize a search.

The loss of five experienced pilots was a hard blow, not only to the squadron but to the RCAF as a whole. To find replacements AFHQ had to take men from key positions in Canada. The over-all effect of the accident may be measured by the fact that RCAF Overseas HQ was asked to “send six experienced pilots to Canada to assist organization and training our fighter squadrons.”

At Umnak the 10 RCAF pilots, using aircraft loaned by the USAAF, were formed in “F” Flight and worked in close co-operation with the 11th Pursuit Sqn.,

commanded by Maj. John S. Chennault, son of Maj. Gen. Claire Chennault of Flying Tiger fame. But Umnak was still 500 miles from Kiska. The return trip was barely within the operational limits of the *Kittyhawks* and the pilots once again were committed to a routine of defensive patrols with an occasional stint of flying control duty thrown in. Fact blended with fiction when Col. D. F. Zanuck, the celebrated motion picture executive, arrived at Umnak to shoot scenes for a production film. The 111 Sqn. detachment gladly took time out to do an unrehearsed performance.

On 22 August No. 111 Detachment Personnel met their new commanding officer, S/L K. A. Boomer, who arrived from Anchorage in company with W/C McGregor. Boomer had already served two years overseas with No. 411 Sqn. (one of Canada's top fighter units in the United Kingdom) and had two enemy aircraft to his credit. Like everyone else at Umnak, Boomer was hoping for an opportunity to tangle with the Japanese Zeroes. About a month after his arrival he had the satisfaction of telling his detachment that an air attack was planned for Kiska; he had volunteered RCAF assistance and he and three other Canadians, F/O R. Lynch, F/O J. G. Gohl and P/O H. O. Gooding, were to fly with the American formation.

The fighters were to take oil from Fireplace, temporary base some 250 miles from Kiska. After at least two postponements because of the weather the attack went in on 25 September — a red-letter day, for the RCAF scored its only victory against the Japanese Air Force. At 1000 hours the force of nine *Liberators*, 12 *Airacobras* and 20 *Kittyhawks* arrived over Kiska with fighters leading the bombers and other fighters providing top cover. The RCAF fivers had been assigned to take out the anti-aircraft defences and in their enthusiasm for the task flew almost at deck level.

They had crossed the island on their first run and were returning to strafe the gun positions again when a flight of three Zero float-planes rose to meet the American fighters. After a brief display of aerobatics, an over-continent procedure sometimes indulged in by Japanese pilots, the leader came in with his cannon and machine guns trained on the tail of an American *Kittyhawk*. At that very moment, to quote Boomer's words, "I climbed to a stall practically, pulled up right under him. I just poured it into him from underneath. He flamed up and went down."

The other Canadians caught a glimpse of the Japanese pilot, who was not wearing a parachute, leap from his plunging aircraft just before it fell into the sea. In the meantime Maj. Chennault had downed another Zero. Other Americans were blasting away at a submarine surfaced in the harbour. The four Canadians joined in the attack but whether or not the submarine was sunk remained undetermined for the area was becoming too hot for anyone to take time out to assess the damage. Having expended their ammunition the fighters made rendezvous with the bombers and returned to base.

The Canadians were looking forward to more such encounters but spirits made jubilant by the success of the first Kiska mission were soon deflated by the news that the RCAF detachment was to return to Elmendorf as soon as possible. The reason, not immediately revealed, was in due time made known. General Butler had been

warned that he was to lose three of his fighter squadrons that were needed in the South Pacific theatre and he wanted No. 111 to replace one of them on defensive reconnaissance at Kodiak Island to protect the growing naval base there from a sneak attack. Before the Canadians left Umnak Major Chennault addressed the following letter to the CO of X1 Fighter Command at Seattle:

“It is with great regret that we see the departure of 111 Fighter Squadron, Royal Canadian Air Force. Their entire tour of duty here has been noted for the sincere cordiality, total co-operation and the frank and easy manner in which they mingled with our personnel stationed here.... We are proud to be brothers-in-arms with them.”

Until August 1943, when it returned to Canada, No. 111 maintained its headquarters at Fort Greeley on Kodiak Island. On 29 December Canadian morale was raised to a peak by the news that Boomer,¹⁰ Lynch, Gohl, and Gooding were awarded the U.S. Air Medal. The New Year's list brought more honours; Boomer received the DFC for his “unflagging zeal and devotion to duty” while McGregor, who in the words of General Butler had worked “heart and soul” to make the Aleutian operation a success, won the OBE.

About the same time, W/C Mc-Gregor was promoted to group captain and was transferred to RCAF Station Patricia Bay as CO. His successor as commander of the Aleutian Wing was W/C R. E. E. Morrow, DFC, another outstanding flyer who had led No. 402 Sqn. on fighter operations overseas for almost two years. The new commander was injured in an accident on 6 May which might have been far more serious had it not been for a certain amount of luck intermingled with considerable courage and determination. It happened when Morrow was forced to jump from a disabled plane just off Umnak Island. The tail plane of the aircraft struck him as he bailed out, paralyzing his lower limbs and knocking him unconscious. Fortunately the impact caused the parachute to open and the pilot came to before landing in the water. He managed to throw off his parachute harness and struggle into the dinghy, only to find that the rubber life boat stubbornly resisted his attempts to propel it landward. In spite of his injuries he abandoned the dinghy and swam for shore, encouraged by some American soldiers who had watched his descent and waded out through the surf to the rescue. Using an improvised stretcher, made from the perverse dinghy which ironically had drifted in behind Morrow as he swam, they carried him to a nearby unit where American doctors attended him. The incident did not end Morrow's Aleutian tour. After spending several weeks in a Vancouver hospital, he returned in July to head the Canadian Wing during the remaining two months of the campaign. In the meantime, while Morrow was recuperating in hospital, his place was temporarily taken by W/C P. B. Pitcher, another Battle of Britain pilot whose name

¹⁰ Boomer was killed on operations over Germany on 22 October '44 while serving with No. 418 (Intruder) Squadron.

added yet more lustre to the gallant band of airmen that Canada had despatched to the distant Aleutian Islands.

No. 14 SQUADRON

“When do we get into action?” These impatient words were recorded in the daily diary of No. 14 (F) Sqn. on 9 January 1943. There were plenty of rumours about an impending move but if the CO, S/L B. R. Walker (veteran of more than 50 fighter sorties with the RCAF Overseas), had learned anything about his squadron’s future during his visits to Western Air Command Headquarters, he was keeping it a closely guarded secret.

The suspense was finally broken on 5 Feb. when G/C McGregor briefed the squadron for their 2,500-mile flight to Umnak. On 11 Feb. 15 *Kittyhawks* took off from Sea Island and followed the coastal route to Alaska, encountering the usual bad flying weather that never fails to come to the Pacific Coast in winter. Minor accidents added to their trials and tribulations. At long last on 18 March the 15 aircraft appeared over the aerodrome at Unmak, which was indeed a welcome sight for the ground personnel who had been waiting there since 2 March, having made the journey to Alaska by boat.

The squadron was disappointed to find that Umnak was still far from the scene of enemy activity, but to everyone’s satisfaction it was soon learned that arrangements had been made for the two RCAF squadrons to maintain between them a flight of 12 pilots at a more forward base for operations against Kiska. No. 14 was to have the first go and was to be relieved by No. 111 in about a month’s time.

On 31 March S/L Walker and 11 of his pilots left by American air transport for Adak Island, about 250 miles from Kiska, where they were briefed on operations for the next day. Unfortunately bad weather set in and continued for two weeks. By the time it had improved the American engineers had a base ready at Amchitka, just 75 miles from Japanese-held Kiska. The Canadian flyers moved forward to Amchitka on 17 April and here they practically merged with elements of 11 and 18 Sqs. of the USAAF, procuring their every need from American stores and flying American aircraft. Each of the American squadrons operated three flights from Amchitka and the RCAF detachment formed “B” Flight of No. 11 Sqn. Although as a rule the Canadians flew together as a flight, they volunteered to fill in whenever and wherever the American units were short of pilots. They attacked aircraft and ships in Kiska harbour, radar installations, runways, anti-aircraft guns and the general camp area in an effort to persuade the Japanese that there was little to be gained by remaining in the inhospitable Aleutians.

No. 14 Sqn. made its debut in the Kiska offensive on 15 April when four of its pilots escorted an American formation of bombers. After the latter had dropped their bombs and had turned homeward the *Kittyhawks*, each carrying a 500-pound bomb beneath the fuselage, returned to dive-bomb enemy gun installations. The squadron

diary noted, “All pilots returned safely to base and enjoyed their mission, looking forward to good times to come.”

This time the Canadians were not to be disappointed. For the next four months, with responsibility alternating between the two squadrons, the RCAF detachment flew on offensive operations whenever the weather permitted. No. 14 Sqn. completed two tours at Amchitka, representing almost 400 hours of operational flying. From 17 April to 15 May its detachment recorded 14 missions comprising a total of 88 individual sorties; from 4 July to 12 August 16 missions (102 sorties) were chalked up. In the interval, from 15 May to 4 July, No. 111 Sqn. flew 274 hours on Kiska operations.

On 6 May, as No. 14's first tour was coming to an end, the personnel on Amchitka were thoroughly briefed for the big attack by air, land and sea on the Japanese stronghold at Attu. Although Canadians were allotted no part in the Attu phase they eagerly awaited the arrival of the next day. The attack didn't go in until the 11th and although Attu was considered to be the weaker of the two garrisons the assault turned into “a thoroughly nasty little campaign” to quote Col C. P. Stacey in his “Six Years of War”. After a final Banzai charge on 29 May the Japanese dead numbered 2,300 - almost five times the number of American casualties.

The fall of Attu marked the beginning of the end of Japanese occupation and the people on the west coast of Canada and the United States slept more easily than they had since June of 1942. Admiral Kogo's plans for a counter attack were discarded after serious second thoughts and the Japanese wisely decided to retreat from the Aleutians. By early August it was obvious to the pilots at Amchitka that the situation at Kiska had changed for the better. Anti-aircraft fire, which had always been conspicuous (though shockingly inaccurate), was noticeably absent on the third as the RCAF *Kittyhawks* plunged through a break in the overcast to bomb the camp. It was a week before the weather permitted No. 14 to operate over Kiska again and by this time there was no sign of life below.

It had not been expected that the Japanese would leave their fortification so quietly and for the past month an invasion force of 34,426 soldiers (5,300 of whom were Canadian) had been preparing to drive them out. The invasion was scheduled for 15 August. On the evening of the 14th the aircrew at Amchitka gathered in the mess to be briefed for their part in the attack; they were on alert the next morning at 0500 hours only to find that the weather had closed in. The invasion was carried out without their assistance, which as it turned out was not needed anyway. The attackers discovered that the foe had fled 15 days before under cover of a dense Aleutian fog.

For the Americans the fall of Kiska and Attu was but the signal for the beginning of bombing offensive against the Kuriles and the undertaking of other arduous tasks in the Pacific; for the Canadians it meant a return to the war in Europe. Both No. 111 and No. 14 Sqns. were due to move to the United Kingdom at the end of the year where they were to continue their careers under new numbers — 440 and 442 respectively. Actually No. 111 had been withdrawn without replacement on 10

August. After turning all but two of its aircraft over to No. 14 it ended its tour in the Pacific by embarking for Canada on a boat appropriately named the S.S. *Aleutian*. As soon as it was known that the Japanese had been driven out of the Aleutians the Canadian government indicated that No. 14 was to return to Western Command as soon as possible. At 1700 hours on 6 Sept. Gen. Butler issued his last order to the squadron when he instructed that it was to stand down from readiness and prepare to leave for Canada.

The curtain closed on a memorable last scene which is perhaps best described in the words of F/O Griffin:

“Maj. Gen. N. E. Ladd jumped into his command car and drove to the RCAF field at Unmak. He was carrying seven U.S. Air Force medals. There was a ‘pukka’ parade in the best RCAF tradition, with the United States Army band playing ‘The Star Spangled Banner’ and ‘God Save the King’. He pinned the medals on RCAF officers. The citations mentioned ‘Attacks pressed home in the face of enemy opposition, with a courage, skill and determination that reflects the highest credit on the force in which they serve.’”

As the members of the Canadian air expedition to the Aleutians made their way back to British Columbia, either along the coast by boat or over the rugged mountains by air, they were probably too pre-occupied with thoughts of their homecoming to dwell philosophically on the unique and close relationship that had been established with the American Air Force in the Aleutians. It is true of course that elsewhere, for example on both the Pacific and Atlantic seaboard, components of the American and Canadian military forces had worked together in close collaboration. But in these instances the units involved remained under the immediate direction of their parent commands — in the case of the RCAF this was Eastern Air Command and Western Air Command. It is also true that the RCAF had a wing of two squadrons based at Annette Island in Alaska, but again these units were operationally controlled by Western Air Command as their main function was to provide protection for the growing city of Prince Rupert.

Only in the Aleutians did the two air forces serve together under one command and nowhere else did they work together so intimately as in this remote theatre. In spite of the considerable differences that exist in organization, procedure, custom and tradition between the American and Canadian services, X-Wing had enjoyed the most satisfactory relations with all branches of the USAAF. It augured well for the future co-operation of the two forces in the defence of freedom. Thus the RCAF had done more than lend its support to a military operation; it had added a new dimension to Canadian-American defence relations. Herein lies the significance of the RCAF contribution to the Aleutian campaign.

SECTION 3

POSTWAR OPERATIONS

3-1. THE STRATEGY OF THE ARCTIC

By Group Captain V. H. Patriarche, O.B.E., A.F.C.*

Vol. 2, No. 6 (1950)

Wars begin long before the shooting starts.

In fact, as we have seen in very recent years, it is quite possible to achieve the aim of war without firing a shot. The transition from competition to open hostilities is gradual, and we must, therefore, consider strategy in all spheres, economic, political, and military. Modern war is very largely a problem of transportation; without it military operations degenerate into guerrilla conflict between people within walking distance of one another — a desirable but no longer attainable characteristic. The strategy of any region is thus largely determined by the problems of transportation to and in that area. Strategy must be determined by man-power limitations and measured by costing as much as by opinion on what is the “best thing to do.” In consequence, any geographical area must be considered in relation to the whole.

With these points in mind, it will be appreciated why consideration of the strategy of the Arctic must deal with political and economic problems as well as purely military ones; and why, too, the North can only be considered in relation to the much larger field of world affairs.

* The following article was first published in the October 1949 issue of “International Affairs”, the journal of the Royal Institute of International Affairs, England. It is reprinted here, in considerably shortened form, by the Institute’s permission. Group Captain Patriarche, who assumed his present duties as Director of Service Requirements in 1949, has had a varied career. Originally trained in the R.C.A.F., he spent the years between 1929 and 1939 with the Northern Aerial Minerals Exploration Co. and other commercial aviation organizations. In 1934 he became a member of the Auxiliary R.C.A.F., and the outbreak of war found him functioning as General Traffic Manager of Canadian Airways Ltd. Back in the Regular R.C.A.F., he was engaged in flying training for nearly four years before being posted to the North-West Staging Route as Commanding Officer and later as Chief Staff Officer when the Command was formed. Prior to appointment to his present position, he was serving as Chief Staff Officer to S.C.A.F.L.O., London, England.—Roundel Editor.

* * *

The term Arctic is generally considered to refer to that portion of the globe lying north of the Arctic Circle. Technically we must draw a line somewhere, and the Circle itself, although purely imaginary, forms a very convenient boundary. In fact, however, the Arctic is better defined by its climatic conditions, its vegetation and natural resources, and by its geographical accessibility. The region of Hudson Bay, for example, most of which lies well south of the Circle, actually takes its character from the Arctic in its climate, its vegetation, its animal life, and its problems of transportation. The British Isles, on the other hand, although they extend north of the lower limits of the Bay, could hardly be classed as Arctic territory.

Political, economic, and military problems are far more affected by matters of climate, population, and physical development, than by latitude; and when we use the term Arctic in discussing these matters, it is advisable to free ourselves from the rigid conception of its boundaries and to consider the more elastic definition which I have given.

The Arctic of the story books is generally regarded as a barren waste of snow and ice inhabited by polar bears, explorers, and eskimos. Actually, much of the land as far north as the tip of Greenland clears during the summer; vegetation and animal life thrive, and considerable open water is found. Owing to the continuous sunlight of the summer months, the spring thaw is very rapid and the summer much longer and warmer than is generally believed. Plant growth takes place more quickly than further south, and life for both men and animals presents no great problem other than that of the ever-present mosquito.

In the winter, the extremes of temperature and snowfall are no more severe than are found inland on the continental masses. Deep snow, thick ice, and extreme low temperatures of the order of 80° F. below zero are encountered both in Asia and North America below the Arctic Circle. While meteorological records are not extensive in the polar regions, those that do exist over a wide variety of places, and extending over many years, suggest that temperatures there will seldom go below minus 50°. Taking it all in all there are probably no greater difficulties inherent in living, working; or fighting in the Arctic than have already been overcome elsewhere on the globe.

In the north to a much greater degree than elsewhere, the whole course of events is conditioned by the economics of transport. The aim to be attained must justify the cost of moving the cargo. If the war can be won in the temperate zone at less cost, it should not be fought in the Arctic. The aeroplane has already brought many hitherto inaccessible areas into the orbit of trade, and as time goes on and other resources dwindle, we may well look to both polar regions for much that we now find nearer at hand. For some time to come, however, the north will not be a major factor in world economic affairs. It will be, rather, an area in which claims are being staked for the future—a political rather than military and economic matter.

* * *

The Polar Basin is bounded on one side by northern Canada, and on the other by the U.S.S.R., with smaller territories such as Alaska, the Scandinavian peninsula, and the islands such as Greenland and Iceland, also in the region. On the Canadian side, there are the islands of the Canadian Archipelago, extending to within less than ten degrees of the Pole. The Arctic Basin north of Eurasia is, on the other hand, mostly water, with a few large islands spread along the southern fringe.

Canada originally claimed the islands between her mainland and the Pole under the sector theory of sovereignty. This principle is not universally accepted but has not been actively challenged. Her influence has been strengthened by the establishment of police posts, medical facilities, weather stations, and transportation services. By developing trade and good administration in this area her action has resulted in no counter-claim being filed, and there are in fact no grounds that would sustain such a claim. In short, Canada is covered both ways, and now, I would say, sets more store by claims based on discovery, development and administration, than on the basis of the sector theory.

On the other side of the world, the Soviet Union has energetically developed its own territories, with great emphasis on the northern sea route which, by linking the great arctic rivers, provides a channel of commerce for the northern part of the mainland. Both countries are exploring the possibilities of their arctic regions, but for the next few years it may safely be said that each has so much to do that there is little likelihood of either having to look for new interests.

Other countries, notably the United States in the case of the Alaskan territory, are also developing the economic features of their northern property. Alaska has for years been a great producer of mineral wealth, and being compact and readily accessible by sea, has made great progress. Greenland, under Danish control, has not so far become of so much economic importance, though it is reasonable to expect that this vast island will in future become of much greater interest. Spitzbergen, long known as a base for northern exploration, presents an example of an old arctic economy. While not rich in resources it demonstrates in an interesting way the economic possibilities of exploration.

The northern arm of Europe, the Scandinavian peninsula, is somewhat different from the truly arctic regions. While much of the country lies well north of the Circle, it is readily accessible by sea and is properly associated with the temperate zone. The position economically is not that of a truly arctic area, and can hardly be considered on the same footing as those previously mentioned. The hardy, small nation of Iceland is a part of both worlds, the old and the new; but although it lies on the fringe of the Circle it is rather in the same position as northern Scandinavia — in the north but not of it. Politically alone, therefore, its place is with the temperate zone, whatever its military significance may come to be.

Thus, politically, the claims are well established, and it seems unlikely that great changes in the spheres of influence will occur, though new channels of trade will undoubtedly develop as time goes on.

* * *

The Arctic, in the military sense, can be considered in two aspects: first, as a theatre of operations; and second, as a route of attack. The successful prosecution of a war demands that force be brought to bear at some point where it will decisively affect the enemy. The long-drawn-out process of attrition, the gradual whittling away of defences and territory which have characterized most military operations of the past were means to an end. The end itself came only when one Power was able to grasp the reins of government and exert sovereign authority over another. When we consider the methods of doing this by use of the armed forces we are immediately faced with the problem of choosing our ultimate objectives; and these lie where they have always done, at the seat of authority and production in each nation. Thus, while there are always intermediate objectives, or obstacles to surmount along the way, they are incidental to the ultimate aim. This factor is the determining one in assessing the importance of any region as a possible theatre of war, and the Arctic contains none of these ultimate objectives.

A theatre of war implies the possibility of fighting in it. There is, of course, no reason why we cannot fight in the Arctic. But both naval and military operations are seriously limited by considerations of climate and terrain. Movement by sea within arctic waters is severely restricted and over most of the Polar Basin is prevented by ice. As we move away from the Pole it becomes possible to move seasonally, but not continuously.

Troop movement on snow and ice is practical, but here we come up against the problem of transport. To use sea-borne, or land-borne, transport is to depend on a supply system capable of being completely severed by the vagaries of climate. Not only is surface movement slow in these conditions but, in terms of effort per active soldier, it becomes enormously expensive. No large force can wisely be committed to an operation involving uncertainty of supply not merely for days but weeks. Nor can it wisely undertake operations where the striking force in comparison to the supporting services is unduly small.

There remains air supply. While this, too, is expensive, the north is an area in which the overall cost of surface transport has risen to meet the higher cost of air. It must, however, be emphasized that the air cost has not been reduced. It has merely been equalled by rising figures for the other means. The ability of the transport aeroplane to move with little regard to climate or terrain is its great virtue as an arctic vehicle. It is this feature which will determine, more than any other, the characteristics of military operations in the north, and it follows that such operations would become, due to the absence of primary objectives and the cost of air lift, highly mobile, very fluid and, in point of numbers engaged, relatively small.

The air striking force is also capable of operating in the Arctic quite effectively. Here again, however, the question of objective arises. Points of attack, such as principal cities and industrial areas, lie far to the south, and the north is a route to these objectives rather than a main theatre of battle. Should other forces become

engaged-in-the theatre, the air arm, in its supporting as well as its independent rôle, would of course be implicated. However, the governing factor is the lack of decisive targets, and operation of any kind in the north, even if it were conclusive in itself, would not offer the prospect of reaching a final decision.

In this respect the Arctic is like the great ocean areas. The possession of freedom of movement, and the ability to deny that freedom to an enemy, can be of major importance to the ultimate assault. As a theatre of battle, on the other hand, it is a means to an end rather than an end in itself. Victory in the north would not attain the aim of war. This principle inevitably conditions the strategical importance of the region.

* * *

Let us now consider the relation between the polar and other theatres of operation. As mentioned earlier, wars are only concluded when overwhelming pressure leads to the surrender of the enemy. This pressure must be ultimately applied to industrial areas, to the masses of the people, and to their government. It finds its geographical objectives, therefore, in the most heavily settled areas of any country, and its effectiveness is almost directly proportional to density of population. It is, in the final analysis, men, not machines or territory, who give life and initiative to a nation, and it is men who become either the victors or the vanquished. If we examine the globe, we find that within the entire arctic region there are no great or vital centres of population. As we go further south these become more numerous, and lie generally in the temperate zone. It is, consequently, in this part of the world that wars must be decided; and the theatres of operation are those regions normally separating the vital areas of two potentially hostile states.

In considering major strategy the advent of long-distance transportation has introduced the term "global war". With the careless use of the term has come the tendency to assume capabilities which transport does not yet possess. The last war, although it covered much of the world, was decided in relatively small areas of battle and each moved towards the vital zones of the states engaged. The supply routes were truly global, and without their control the battles could not have been fought. The battle areas, on the other hand, determined the routes of supply, and were themselves determined by those focal points against which the decisive thrusts had to be made.

In the case of air operations such as those of strategic bombing, the question of distance is an important one. The load which an aeroplane can carry is determined by the distance it has to fly. At maximum range the entire capacity of the aircraft may be taken up by fuel, and its striking power is at a minimum. As range is decreased, so the bomb load increases, and it follows that the shorter the range the more effective is the air force. Another factor enters this picture in the question of weight of attack. Over very long journeys the vehicle may be able to make only one trip per day. If the journey is halved, the number of possible trips to the target is roughly doubled. Thus, however we may increase the range of our aeroplanes and other vehicles, distance lends no enchantment to the strategist. A given man-power will always produce a

greater impact over a short distance than over a long one.

For this reason, and for the reason that the world is not divided into two mutually hostile hemispheres, but is rather a jig-saw puzzle of friendly and unfriendly stages, theatres of actual war are much smaller than the gigantic areas so attractive to the armchair strategist. It will be seen from the map that these potentially hostile regions do not, for the most part, “face one another across the North Pole.” They, and the supply routes joining them, tend to lie in the temperate zone, and it is in these areas that major strategy must be worked out.

We may take it, then, that the Arctic, unless it becomes the only or the shortest route between the vital areas of two contending Powers, is not likely to become the major theatre of military operations for some time to come. It fills, rather, a subsidiary role, although, depending on the circumstances of war, it could become a decidedly active area.

3-2. OPERATION DEEP FREEZE

By Squadron Leader L. J. Nevin,

Staff Officer Construction Engineering, Air Transport Command
Vol. 10, No. 6 (1958)

*There's a land where the mountains are nameless,
And the rivers all run God knows where;
There are lives that are erring and aimless,
And deaths that just hang by a hair;
There are hardships that nobody reckons;
There are valleys unpeopled and still;
There's a land—Oh, it beckons and beckons,
And I want to go back—and I will.*

*(“The Spell of the Yukon.”)**

Who, especially if he has ever spent any time in the Yukon, does not feel his pulse quicken to these stirring lines? So intimately associated with the feverish days of the Klondyke gold rush and the “Trail of ‘98”, this fascinating land has been immortalized by writers and poets such as Robert Service, Jack London and Rex Beach. Today, it is entering a new era of expansion which very likely will dwarf those romantic times of 60 years ago in terms of development and wealth.

After 17 years as a construction engineering officer in the R.C.A.F., I regard as my most rewarding experience—in terms of personal satisfaction, at least—a project in 1947 which I now refer to as “Operation Deep Freeze”. While this operation took

* From “Songs of a Sourdough”, by Robert W. Service; Wm. Briggs, publisher, Toronto, 1909.

place in the Yukon, the country from a construction engineer's point of view bore little resemblance to the spell-binding land of the poet's imagination. My description of it included such words as bleak, arid, desolate, grey, forbidding, sterile. It might be a poet's dream, but it was an engineer's nightmare.

NO EASY TASK

"Operation Deep Freeze" involved the construction of a small R.C.A.F. station, complete with permanent type buildings and services. A job of considerable proportions even in an easily accessible part of Canada, the completion of this project within the 11-month deadline presented a real challenge, considering all the logistic and climatic obstacles involved. Location of the site hundreds of miles from the source of materials and manpower, in an area of permafrost noted for long cold winters and short daylight working hours, were just some of the more obvious problems to be contended with.

At the outset, as project engineer, my first duties were to make a study of logistics (the Alaska Highway route was chosen for transportation of materials) and conduct a detailed survey of the site to assist the Construction Engineering staff at A.M.C.H.Q. in designing the building and services. Final specifications called for concrete footing and foundations, structural steel framing and an outside covering of prefabricated, insulated aluminum panels— designed to form a thermal barrier withstanding a temperature range from minus 60°F to plus 120°F.

The civilian tradesmen and labourers, recruited in places as far apart as Edmonton and Vancouver, all had one thing in common: they were a tough hard-bitten crew, but they *produced*. Production under the circumstances demanded qualities of exceptional fortitude and perseverance. (In a hard rock mine at 6000 feet below the surface it has been calculated that a miner's efficiency is down to 30%; if the same yardstick were used to assess a man's productivity in the open, when the mercury is 60 below zero, the loss of his efficiency undoubtedly would be greater.)

FAR FROM HOME

Take the case of a hypothetical construction labourer. He is away from home and civilization for a lengthy period. His knowledge of the bush or the Far North is less than rudimentary. His clothes were purchased mail-order and he has endeavoured to duplicate the outfit he would wear for a week-end of camping, hunting, or fishing down in Ontario. The food is adequate but lacks variety; fresh vegetables and fruits are non-existent and milk is of the powdered kind. The construction quarters lack many of the amenities of civilization. Insufficient heat in the quarters may have obliged him to sleep in his underwear, over which is at least one pair of pyjamas. In the grey dawn he hates to leave his bunk or sleeping bag—he may wonder when somebody will invent a sleeping bag that will double as working clothes. It is certain

he does not remove his sleeping attire, he just adds more layers of clothes and when he finally staggers to the job he resembles an onion or a deep-sea diver. Hampered by this outfit, his movements are slow and clumsy and his efficiency drops. Commonplace things like driving a nail in wood at 50 below is impossible; the wood is harder than the nail. Chopping frozen wood may result in the steel axe blade shattering without marking the wood. Manipulating small tools like wrenches or screw drivers while wearing even properly designed gloves or mitts, is like lacing one's shoes while wearing boxing gloves. (Bear in mind that if one handles frozen objects with his bare hands they will stick and freeze to the exposed flesh.) It is unwise to exert oneself to the extent that the breathing becomes rapid, as the lungs may become frozen from gulping in the extra volume of frigid air. In the Arctic, adequate clothing and the awareness of the hazard from the extreme cold may be a matter of life and death.

Everyday construction jobs, like obtaining sand or aggregate from a pit, become major undertakings. At 50 below zero most types of soil or materials are hard as concrete and it is almost impossible to make an impression on them with hand tools such as shovels or pick-axes. The ground or material has to be thawed with steam or burning wood, burning oil or gas, drilled and blasted, or chiseled out by compressed air-driven jack-hammers. Obtaining and transporting water for domestic use or mixing concrete is an operation in itself; it requires special tanks and extraordinary precautions to prevent it from turning into solid ice.

MID-WINTER JOB

It was freeze-up time before the final location of the buildings and utilities was determined. The main building would be 120 feet by 70 feet, and to set the footings on solid rock it was necessary to dig with jack-hammers through five feet of frozen overburden.

It was apparent that the sub-zero temperatures normal to the region were, to say the least, unsuitable for placing concrete, as it should be mixed, placed and cured at a minimum temperature of 60°F. We then anticipated by some years what is claimed to be a recent innovation—that is, constructing a canvas shelter or tent over the entire foundation area. We acquired sufficient oil-burning stoves and space heaters to maintain a temperature of plus 50°F and illuminated the interior by electricity from an auxiliary power unit.

The aggregate for the concrete was heated in the open by a Salamander; the water for the “mix” was also heated to the desired temperature. The form work and pouring of concrete proceeded smoothly. At 28 days after placing, the compressive strength of the concrete was 3,000 pounds per square inch. It could be considered a tribute to the designers in Ottawa, to the factory that fabricated them, and the cartage agents who transported them that the structural steel members fitted perfectly, as did the prefabricated aluminum panels. When the buildings were constructed we were not

short any steel or panels, and there were no leftovers.

The buildings, all of permanent type construction, were finished within the deadline and passed the final inspection with flying colours. Locating and constructing the necessary roads presented no problems other than those usually encountered in hilly country where there is combination of permafrost extending from the surface, swamp, muskeg and rock outcrop. Constructing the electrical distribution system included erecting masts and poles. As the ground in the building area was mostly granite outcrop, it was necessary to resort to drilling and blasting to set the poles.

WATER WORRIES

The provision of a continuous and adequate water supply for both domestic and firefighting purposes was the next important problem. In a permafrost region where swamps, lakes and rivers are a prominent feature of the landscape and the terrain apparently abounds with water, a year round supply may be a very difficult problem. The rivers and lakes may freeze to the bottom, while springs and shallow wells usually go dry during the winter. Obtaining water by deep wells from a dependable source presents a mechanical difficulty of drilling through the entire thickness of permafrost.

In relation to a possible adequate source of water, the building site was originally chosen for its proximity to a lake three-quarters of a mile away and at an elevation of 90 feet below it. The water was tested for potability and proved satisfactory. Soundings proved the lake to be quite shallow, even though it covered an area of 60 acres.

A.M.C.H.Q. forwarded a design for the water intake, pumphouse, water main and a 100,000 gallon water reservoir. The intake was located in the deepest part of the lake 500 feet from the edge nearest the pumphouse. Installation of this intake and the 500 feet of pipe presented a construction problem as there was one foot of ice on the lake, then water, next a layer of fine mud and under this the ground was permanently frozen. This frozen ground would require excavating to a depth of 12 feet. The problem was solved by dumping and bulldozing sufficient fill to construct a peninsula down the centre of the lake from pumphouse to the intake. It was relatively simple to excavate along the centre of this peninsula as we were working on dry solid ground.

I GO OUT ON A LIMB

The original design specified that the water main from pumphouse to reservoir was to be on the surface of the ground and enclosed in an insulated steam-heated conduit. In addition, it would entail constructing and maintaining a small steam generating plant. Considering the cost of the insulated conduit and the expense of providing and maintaining heat, I wondered if a less expensive design were possible.

I remembered Snag. There in the winter of 1947 the thermometer registered 81°F below zero, with the result that the water and sanitary services froze up. An airman, who evidently had not read text books on the subject, hooked up a series of 2½-inch canvas fire hose from the pumphouse to the buildings, ran the hose on the bare frozen ground and kept the water flowing. My present theory was to dispense with artificial insulation by burying the main to a depth of six feet; have the main on a continuous slope without any dips; next pump the reservoir full; then drain the line into the lake. The water storage tank was of such a capacity that it would only be necessary to pump water into it every sixth day.

I outlined the proposal to one of my superiors and, thanks to his judgement, A.M.C.H.Q. gave me the “green light” to construct ... water services to my own design.

The mercury was down to minus 40°F and we had almost completed laying the uninsulated main in the frozen trench when others connected with the project not only became skeptical about the feasibility of the uninsulated water main, but expressed themselves as certain that it would freeze up. It was only natural that I should start doubting the successful outcome, and, looking for reassurance, I confided my problem to engineer/physicist. He offered to study the problem and ten days later sent me a five-page treatise on the subject.

The essence of his study was that indubitably the line would freeze up solid. To put it mildly I was horrified, not only at botching the job, but at the possibility of causing embarrassment to my superior whom I had practically importuned into allowing me to depart from the original somewhat prodigal but proven design, and substitute what now appeared, even to me, as a feather-brained scheme.

SUCCESS!

Grasping at a straw, I took consolation at the thought that if the reservoir were initially filled and the line froze up while emptying itself, we would have a couple of days to thaw the line before the station would suffer a water shortage. Therefore, to permit the use of an electric thawing machine and before backfilling the main, we welded lengths of copper rod on it at intervals of 50 feet. These rods protruded to surface and in event of a freeze-up could be used to thaw the line by successive sections.

There did not seem any course left but to start the pump operating, and watch inexorable natural laws decide the outcome. The reservoir was filled without a hitch; we stopped the pump, opened the by-pass valve and drained the line back into the lake. We repeated the operation 36 hours afterwards and still no freezing of the system occurred. In the ten years since elapsed, the water service has been functioning perfectly.

The entire project was carried to a successful conclusion. That's it--in cold, impersonal, official language; but who shall list or sum up the price in human

endeavour and endurance? Armchair explorers glowingly speak of the challenge of bucking the frozen wastes; they should try driving an open, un- heated jeep at 60° below!

3-3. SWEETBRIAR DIARY

By Sgt. D. J. Blain

Canadian Joint Air Training Centre[†]

Vol. 3, No. 1 (1950)

8 January 1950.— It is not yet three weeks since the Medical Officer removed his stethoscope from my surfaces, gave it a mistrustful glance, then gazed at me with melancholy eyes. “You,” he said incredulously, “are fit for northern posting.” None the less, when I left Brandon at 1450 this afternoon, it was so cold that I had to refer to my fitness certificate to bolster my morale. I am on my way to Exercise Sweetbriar at last.

9 January.— Arriving in Edmonton at 0630 hours, I went directly to Station Edmonton in company with various other people who had entrained along the way. To judge from their appearance of rugged health, so similar to my own, they too were proceeding to Sweetbriar. My first official act on arriving at the Station was to ingest a hearty breakfast in the Sergeants’ Mess. I there made the acquaintance of a brother clerk, Sgt. K. J. Strader of No. 11 Supply Depot, Calgary, who is also bound for the Exercise.

At clothing stores I was issued with two very handsome turtle-neck sweaters. These, according to my fellow travellers, are “musts” in the white wilderness into which I am so bravely venturing. They are disappointing, however. They do not make me resemble either Clark Gable or an athlete. The only effect produced is that of a stout middle-aged sergeant wearing a navy blue turtle-neck sweater.

11 January.— At six o’clock this morning I fumbled my way to the Air Traffic Handling Unit where, amid much light and bustle, a North Star was being loaded for Whitehorse. With my usual luck, I was forty-fifth on the list of its forty-four passengers, and was therefore asked to possess myself in patience until other arrangements could be made for my transportation. I am to go by Dakota at 0700 hours to-morrow.

12 January.— No, to-morrow.

[†] *This diary does not pretend to be an analysis of Exercise Sweetbriar. It is simply, as its author expresses it, “a clerk’s eye” view. However, it sidelights the Exercise in a human and often amusing way, and seems to us well worthy of publication.*—ROUNDEL EDITOR.

13 January.— Despite the date, here I am in Whitehorse.

It was quite cold in the aircraft, but I was fortified both by my turtle-neck sweater and by the knowledge that I was fit to face anything. At 1315, as we approached Fort Nelson, we were informed by one of the crew that the figures on a frozen lake below us were members of the current Survival Course fishing through the ice for their lunch. Since the ground temperature at this point was -35° , I concluded that they were even fitter than I.

On the floor of one valley we saw an aircraft which appeared practically intact and which, we were informed by our crewman, had been there for over seven years.

On arrival at Whitehorse, we were immediately loaded on to a bus and rushed off to hospital, where we were vigorously punctured in each arm to insure our immunity to diphtheria and scarlet fever. I later found that this hospitality was extended to all comers and was no indication that our presence was unwelcome. Immediately afterwards we were taken to the Sweetbriar Mess for dinner. This is, at the present time, a joint mess for all ranks of Sweetbriar; and the food, service and accommodation are very fine. Thence I proceeded to the Sergeants' Mess in order to sample a beverage that had been highly recommended to me during my stay in Edmonton — Lemon Hart's Navy Rum. I know now that it is a distillate of some potency.

14 January.— Have been assigned to the Air Force Commander's staff to assist Sgt. Smith of Winnipeg in setting up the Sweetbriar Operations Room and Operations Orderly Room.

16 January. — Had a chat this morning with Sgt. Christianson of Rivers, who arrived last night in charge of the radar convoy which had driven from Dawson Creek. He told me that at one stage of the journey the temperature dropped to -72° , which had greatly hampered adjustments and repairs. For much of the time the convoy was enveloped in its own vapour trails and was forced to proceed at speeds of from twenty to thirty miles an hour.

Finished setting up Ops. Room and Ops. Orderly Room.

Three aircraft arrived from Edmonton this afternoon. On board the last one was Wing Cdr. Parks, Officer-in-charge of Transport Support Wing, and with him my old friend Flt. Sgt. J. V. Ranson of No. 435 Squadron who will be N.C.O. in charge of Transport Support Wing Orderly Room.

19 January.— Operations room now functioning. A strict security system is being developed, as Aggressor has commenced a full-scale espionage campaign. The first

stranger I challenged proved to be Col. T. W. Blackburn of the U.S.A.F., who was arriving to take up his duties as Senior Air Staff Officer for the Allied Air Forces. At lunch time a four-engine jet bomber (a U.S.A.F. B-45) arrived from Edmonton, having covered the 1008 air miles in 2 hours and 20 minutes. It was followed later in the day by a squadron of U.S.A.F. F-80's.

22 January.— Assigned to quarters in the Whitehorse Inn and removed my baggage there this afternoon. Some little space could be devoted to this Inn: it is a hostelry of some distinction.

24 January.— All American and Canadian Staff Officers have now arrived, and the Air Forces Commander's Headquarters is now fully manned. The R.C.A.F. Umpires, under the command of Wing Cdr. P. S. Turner, arrived last night and took up quarters in the Whitehorse Inn, and two North Stars came in this afternoon carrying more personnel for the Exercise.

23 January.— With Wing Cdr. Turner, I am to attend an Umpire training course given at Camp McCrae, seven miles from here. The course will commence on Feb. 1st. and will be given by the Americans. I am to attend in order that I shall have a background knowledge of the Umpire situation when the time comes to make up the necessary reports. Further advised that on D-1 (the day after the commencement of hostilities) I shall accompany the Chief Umpire to Donjek, Camp, 212 miles North of Whitehorse, where the Deputy Manoeuvre Commander will establish his Field Headquarters for the first phase of the Exercise.

26 January.— Very heavy snow all day, so that air activity has been very limited. Temperature 20° above zero at noon. This evening information was received that an American C-54 is down somewhere in this area. The aircraft was last heard from at 1330 hours, when it made radio contact with Snag en route to Great Falls, Montana. A report was received that flares had been sighted in the vicinity of Watson Lake and a ski-equipped Dakota was despatched to search the area.

27 January.— No word as yet as to the whereabouts of the missing C-54, and Canadian and American aeroplanes are carrying out a full-scale search. No trace was found of flares or any other signals in the Watson Lake area. It is rumoured that a message has been picked up this afternoon, but so garbled that no definition as to position or situation can be gathered from it. Weather at Whitehorse is overcast, with snow, but clear over the area of search.

29 January.— Air Commodore Costello arrived at 1800 hours last night to assume the direction of the search, and all Sweetbriar facilities are being directed to that operation. Four North Stars arrived from Edmonton to-day with personnel of the

Vampire squadron and maintenance personnel from Rivers.

30 January.— No report of the missing aircraft yet. The search is being pressed with fullest vigour and aircraft are constantly arriving and departing. This morning's rumour is that a message has been picked up which gives the latitude of the missing aeroplane. A Dakota of the U.S.A.F. searching a narrow valley was caught in a downdraft and piled into the side of the mountain, but the pilot crash-landed with such skill that no one was badly hurt. He then proceeded to make his way across six miles of very rugged terrain — sometimes through breast-deep snow to the Alaska Highway, where he was picked up by a passing truck and driven to Station Whitehorse. A ground party was at once despatched to bring out the crew and passengers, who will reach hospital late to-night. Of great interest among the visiting aircraft to day were two B-29's.

1 February.— Began Umpire training course. Camp McCrae is a U.S. military installation which has been rehabilitated for Sweetbriar. It consists of a collection of wooden buildings and Jamesway huts huddled at the foot of a range of high mountains, and the little huts, half-buried in snow, present a very desolate appearance indeed. The Umpire course is attended by about 150 R.C.A.F /U.S.A.F. and U.S. Army/Canadian Army officers and a small group of American N.C.O.'s. I appear to be the only Canadian N.C.O. present. The instructors are all officers of the American 5th Army and the U.S.A.F., and the syllabus of training covers the entire field of ground and air umpiring.

2 February.— Greatly impressed by the Aggressor campaigns and the care and planning which has gone into the creation of the Aggressor Forces as a training aid. The keynote of the Umpire course is realism — one captain stressed that the Exercise should be so realistic that the only thing lacking should be the “smell of blood and the screams of the wounded.”

Search is still being pressed on a very large scale, but no trace has been found of the missing aircraft to date.

4 February.— Umpires concluded course with a two-hour discussion and a written examination for which the pass mark was 75%. All R.C.A.F. Umpires passed with an average mark of well over 80%.

Attended the Whitehorse Winter Carnival this evening. It took place in a small wooden hall well filled with noise, smoke, smell, troops and civilians. The carnival spirit was generously displayed, but there was little in the way of entertainment other than one or two crown and anchor boards, a dice game, and a rather tired troupe of dancing girls dressed in costumes alleged to have been the vogue for entertainers in

the gold-rush days. No gold nuggets were thrown.

6 February.— During the afternoon General Stuart, the Deputy Manoeuvre Commander, visited the A.F.C.'s Headquarters, and in his honour a group of F-80's manoeuvred over the aerodrome. Their bright red and silver colouring made a very impressive picture against the back-drop of brilliantly blue sky and towering snow-clad mountains.

7 February.— Umpires departed on a two-day tour to Northway. An American C-47 engaged on the search is reported missing since 0900 hours this morning. Distress signals have been received from her all afternoon, and at the present time all that is known is that she is down somewhere between here and Aishihik.

8 February.— Missing C-47 was discovered this morning with all members of the party alive, though it is rumoured that five of them are slightly injured. The aircraft crashed high on the side of a mountain about forty-five miles north of here. Supplies have been dropped to the party and rescue operations are under way.

9 February.— Proceeded to Camp McCrae with Wing Cdr. Turner and Sqn. Ldr. Cameron to work on a Command Post Exercise (CPX) as a preliminary to Sweetbriar. Returned to Whitehorse Inn at 2000 hours. Ground party meeting with very heavy going in attempts to rescue occupants of crashed Dakota. Fuel and supplies were dropped to them again to-day.

10 February.— A para-rescue team has been dropped to assistance of personnel on crashed aircraft, and finally a helicopter has been sent in to bring them out.

11 February.— Completed preparations for move to Donjek tomorrow. Search for the missing C-54 is still under way.

12 February.— Left Whitehorse at 0830 hours, complete with bed roll, mess kit, a large and handsome wash basin, kit bag, portable type-writer, a box of stationery, and a parting blessing from my room-mates. Attitude of said room-mates left much to be desired, as they made it fairly obvious that this was a last farewell and I should never survive the rigours of life at a Field Headquarters in the Arctic. They were not alone in their doubts.

Wing Cdr. Turner, Sqn. Ldr. Cameron and I were the only Canadians in the party, the remainder being American officers and N.C.O.'s. Major Newland, U.S.A.F., the American Assistant Chief Air Umpire, and Technical Sergeant Gibson, also of the U.S.A.F. were the only other Air Force personnel present.

The morning was reasonably clear, and the road, with a surface of smooth and crystalline snow, was very good for travelling. The first stop was made at about eleven-thirty at a tiny settlement called Haines Junction, where the roads to Fairbanks and Haines meet. We lunched in a roadside cafe, very primitive but with quite a good kitchen. As we left, it was beginning to snow and a little later we ran into a howling blizzard which reduced our visibility and progress to practically nil. After an hour or so, however, we broke clear of the blizzard area, and early in the afternoon found ourselves skirting the shore of ice-covered Kluane Lake. At about three o'clock we reached Burwash and pulled up at a palatial establishment called "Joe's Air Port Inn" — presumably because it was located directly across the highway from the emergency landing-strip at Burwash. Although not in the same class as the Royal York, Joe's Inn provided good coffee and a notable display of calendar art in the dining room.

On debussing we were assigned to quarters in one of the wooden barracks, and the N.C.O.'s were shown to a wash-house well equipped with hot and cold showers, wash basins and laundry facilities. This, I thought, is exactly the type of pioneering I am cut out for — an opinion in which I was confirmed when the time came to eat. The food was even better than that served to us at Whitehorse.

Excellent office space was ready for use, and as soon as our convoy arrived late in the evening we were able to set up the Umpire Control Room.

13 February: D-Day.— This is the first day of hostilities, and so far all is very quiet, as the weather is bad over both Allied and Aggressor bases. The P.P.C.L.I.'s (Princess Patricia's Canadian Light Infantry) were on the move in the wee small hours of the morning and are advancing toward us up the highway, but at the present time they are still a considerable distance south of this point. Lt. Col. Erdin (the American Chief Air Umpire) and Lt. Col. Hellmann (the Chief Umpire) arrived late last night by staff car after a very rugged trip through the blizzard area earlier in the day. Another Canadian N.C.O., Sgt. Hacking of the Met. Section, arrived with Capt. McHenry, the American weather officer.

My duties are to maintain the Air Umpire's log of the Exercise under the direction of Sqn. Ldr. Cameron, to maintain a daily record of sorties flown, to transcribe the Air Umpire's Daily Summary, and to receive and file all Daily Reports and Mission Reports that are forwarded by the Unit Air Umpires and the Flying Umpires.

The Allies were able to fly a few missions to-day, but Aggressor Forces were grounded throughout the entire day by bad weather.

14 February: D-1.— Very little activity to record for some time, as weather prevented flying from bases on either side. The Aggressor Air Forces are hampered by ice fog

which forms over their bases during the night and does not disperse until late morning or early afternoon. The weather (this is a little more than halfway north in the combat area) has been very good for the first two days. Weather cleared at Whitehorse early in the forenoon and several missions were flown. Early in the afternoon a call was received from Aggressor at Ladd Field, Alaska, to say that Aggressor aircraft were able to get off and would make a strike against Allied troops moving north on the highway. The message also stated that the Aggressor aeroplanes would strafe the bridge over the Donjek River, which is practically on our front doorstep; so we shall have a front seat for this effort.

At about 1600 hours, four F-82's of the Aggressor Air Forces were overhead, and I went outside to watch their attack on the Donjek Bridge. It was carried out very impressively. The F-82's are twin Mustangs painted black for use as night fighters, which gives them an appearance of deadly efficiency. Air Commodore Costello and Brigadier General Stuart are now at Donjek. Air Commodore Costello is the Canadian Assistant Deputy Manoeuvre Commander for Air and the ranking Air Force officer on the exercise: his American counterpart is Colonel McCollum of the U.S.A.F.

The press are here in great numbers and are briefed twice daily by air and ground umpires as to the progress of the Exercise.

15 February: D-2.— Air activity is mounting on both sides, although the Aggressor Air Forces are still hampered by ice fog over their aerodromes.

Food here continues excellent, and my American friends are overwhelmed by it. Today we dined on chicken gumbo, which the cooks proudly boasted was made only from white meat and covered with cream sauce fit for a king. The cracked wheat rolls, hot from the oven and eaten with lashings of butter, beggar description.

As I went to my quarters at about midnight, I noticed that the temperature had reached the scheduled low of -48° .

16 February: D-3.— This morning the Army threw up a gun emplacement at the gateway to the camp and mounted a field gun to sweep the Donjek Bridge, which Aggressor must cross to push the P.P.C.L.I. southward down the highway. The field gun is painted white and the crew camouflaged in white coveralls and hoods. At noon the gun position was strafed by Aggressor aircraft, and Allied jets counter-attacked. I hurried out to see the excitement and take some snaps and was just in time to get caught in a spray of propaganda leaflets dropped by an F-82 which was flying so low that it practically knocked my cap off. While the F-82's strafed and the jets screamed and the Bren guns chattered, I took snapshots and absorbed battle atmosphere to such an extent that I finally wavered back to my log and charts with a touch of battle fatigue.

I have made friends with a huge snow-white husky who is the camp mascot. When I

first brought him tidbits from the table he received my advances indifferently, taking my contributions as no more than his due. Now, however, he regards me with a sort of disdainful favour and occasionally strides magnificently into the control room, where he sits by my chair, thumping his tail languidly on the floor, regarding me inquiringly out of his oblique jade-green eyes. On being informed there is nothing for him until dinner-time, he stretches out on the floor, has a short snooze, and later strides out as splendidly as he entered. When, a day or so ago, the Chief Umpire asked what my friend's position was, I felt constrained to inform him that he was there to umpire dog fights.

17 February: D-4.— In this “war,” as in all other wars, there are flashes of humour. It was planned that a number of prisoners-of-war should be taken and interrogated by the Allies. These prisoners were prepared and trained in their rôles before the Exercise commenced, and last night, in accordance with instructions, one of them set out to be captured. On approaching the Allied lines he was challenged by an Allied sentry. He failed to identify himself and continued to advance. When he ignored a second and a third challenge, the sentry grunted with exasperation, “Hell, you must be an officer! Go ahead!” In spite of this lack of cooperation, the would-be prisoner eventually managed to get himself captured and was brought here for interrogation. The official language of the Aggressor is Spanish, and the prisoner refused to answer any questions in English, saying in Spanish that he could only reply to questions put in that tongue. The interrogation was conducted very realistically, and for a long time the prisoner would only give the routine information required of him by International Law. Finally, however, skilful questioning and well-timed assumption of knowledge drew from him replies considered of great importance by Allied Intelligence.

I was told this morning that some time after the ground forces joined battle, the commander of the Cameron Force (P.P.C.L.I. and other Canadian Units) forced Aggressor out of his prepared position and took prisoner the Aggressor Commander and his staff. For purposes of the Exercise, the Commander and staff were returned to their forces and the “war” proceeded.

19 February: D-6.— During the past two days air activity has been very heavy. The ground actions are now being fought north of here in the vicinity of the Koidern River, and the Allied Forces have forced Aggressor north across the Koidern bridges and are pressing him hard as he withdraws toward the International Border.

As the tempo of the Exercise increases, the Umpire Control H.Q. is becoming an exceedingly busy place. Generals Chamberlain and Stuart, U.S.A.F. Manoeuvre Commanders, are constantly conferring with the Assistant Deputy Manoeuvre Commanders, while the Air Officer Commanding N.W.A.C. and the General

Officer Commanding Western Command are frequent visitors. Weather throughout the combat area continues good. Both Allied and Aggressor Air Forces are flying numerous missions, so that our Situation State Board shows a constantly changing picture of affairs. Aggressor Air Force, in spite of heavy loss, is living up to its name and is vigorously pressing both combat missions and strikes against Allied vehicles and personnel. The ground forces have suffered heavily in these attacks on both sides, as the nature of the terrain and the heavy snow prevents any wide deployment, so that most of the time they are concentrated on the highway and easily vulnerable from the air. Wing Cdr. Turner, Lt. Col. Erdin, and Sgt. Gibson have proceeded to Northway to-day to establish advanced H.Q. there, and Sqn. Ldr. Cameron, Major Newland and I are to follow them to-morrow.

Received a visit this afternoon from Sqn. Ldr. Skene, Air Umpire at Allied Forces H.Q., and Sqn. Ldr. Tilley, of Joint Operations Centre. Both establishments are leading a far more rugged existence in the field than we, but Sqn. Ldrs. Skene and Tilley appear to be bearing up under it very well. I have contracted a sore throat and went this morning in search of the camp's medical man. Upon inquiry I found that he is an Army corporal whose basic trade is carpenter. I could not see him at the moment, as he was performing a major operation on the General's stove.

20 February: D-7.— The morning was spent in dismantling the Control Centre and loading the equipment for transport to Northway, and after an early lunch we embussed at approximately 1415 hours. The weather was cold and brilliantly clear, so that every jagged peak and crest of the towering Donjek Range was outlined with dazzling clarity against the azure sky. As we stood waiting for the bus, an Auster buzzed its way north, looking like some brilliant insect against the snow-clad backdrop of the mountains.

Late in the afternoon we arrived at Camp O'Hara, an Army camp rehabilitated for Exercise Sweetbriar. The camp stands in a large clearing surrounded by a heavy growth of small northern pines and with high mountains all about it. The Army received us hospitably and gave us hot tea and coffee as well as pie and biscuits. From O'Hara we proceeded northward again until, just before sundown, we approached the International Border and found that we were also approaching the battle lines. At the border the traffic was being moved efficiently by the Provost Corps, and we were passed across the border into Alaska. Our American companions immediately exclaimed "Smell that air!" and "Look at that sun!" Since we were practically sealed in the bus, and since the sun was well-nigh set, I concluded they were indulging in a mild leg-pull.

After we had crossed the border I found with deep interest that we were in the midst of the Allied troops as they prepared to bivouac for the night. Although the

temperature was well below zero, it did not seem to bother the men; and they were hard at work digging circular pits in the deep snow in which to erect their tents. With or near every group was one soldier who had been detailed for sentry duty, and in one or two places I noticed machine-gun crews keeping a sharp eye on the evening sky. Passing through the bivouackers, we came upon a line of troops prone in the snow, on and beside the road, firing with rifles and machine guns at some target which we could not see. A short distance away, however, numerous flashes indicated that the fire was being returned and that we must now be close upon the Aggressor lines.

The sun was now sinking fast behind the mountains in the west, but before darkness fell I saw that the mountains receded far back from the highway and we were crossing wild and barren plains. Almost as soon as the sun vanished, darkness set in; and we drove for a long time with no sight of anything save the reflection of our lights on the snow-covered road. Then, far off across the plain, we saw the intermittent beam of a circling beacon flashing through the darkness from the control tower at Northway. At 1900 hours (Alaska time) we debussed before the one hangar on the aerodrome, which now housed the Deputy Manoeuvre Commander's Headquarters.

The hangar presented a strange sight and was filled with a continual rushing sound from the line of Herman Nelson heaters across the end of the building. Three-quarters of the floor space was occupied by hundreds of wooden double-decker bunks hastily nailed together to accommodate the troops who would end their campaign at Northway on Feb. 23rd. One end of the hangar was screened off to form a dining-hall. Here were no neatly set and clothed tables, no shining silverware and china. The tables were of unfinished lumber knocked together as hastily as the bunks. They stood breast-high, so that it was obvious that we were intended to eat standing and not to linger over our meals. The first meal served to us was palatable enough, but it suffered woefully in contrast with our princely fare at Donjek.

I found the Umpire Control Centre established on the second floor of the hangar in a large square room, well lighted but heated by a large oil stove which stank abominably.

21 February: D-8.— Much Allied Air activity to-day, particularly transport missions to re-supply the ground forces, and the Situation Board shows an ever-mounting tonnage of equipment, fuel and rations moved in this manner. Although the Allies have had air superiority throughout, they have never had air supremacy. Aggressor is fighting hard to the last, and the successful Allied transport missions become the more impressive when this factor is considered. The Aggressor Air Force is badly reduced by enemy action but is still striking hard where it can, and their aircraft passed overhead several times to-day on the way to and from Ladd Field, striking against advancing Allied forces. Aggressor is being driven back into this area, where

he will make a last stand. This is where the Exercise is scheduled to end the day after to-morrow.

22 February: D-9.— The end of our “war” is in sight. This morning the Umpire Control Centre was visited by the most distinguished group of observers to date, headed by the Hon. Brooke Claxton and Mr. Lawrence Steinhart, the United States Ambassador to Canada. The Chief of the Air Staff was accompanied by all Air Officers Commanding, Group Commanders, and several other high-ranking staff officers; while with the Chief of the General Staff were a number of G.O.C.’s and Dr. Solandt, the Director General of Defence Research. Col. Riggs, Commander of Aggressor ground forces, was present at a gathering of Umpires and Unit Commanders from both forces in the afternoon. Col. Riggs has every appearance of a battle-hardened veteran, and he caused some amusement by his obvious reluctance to give up various almost impregnable positions to the enemy as called for by the scenario of the Exercise.

Another very distinguished visitor was Sir Hubert Wilkins, who is engaged on Arctic research during the Exercise.

Word was received during the afternoon that the J.O.C. has been attacked and destroyed by Aggressor aircraft, and it was ruled to be out of action until the following morning.

It is now 0020 hours and I am about to repair to my palatial camp cot, secure in the knowledge that the war is practically over and that within a few hours I shall be back in the comparative civilization of Whitehorse.

23 February: D-10.— The “war” is over. Justice, as symbolized by the Allies, has prevailed, and the evil forces of Aggressor have met their just deserts. Hostilities in the final battle for Northway commenced early this morning. The Aggressor Air Force, now reduced to a mere two aeroplanes, was overhead early but briefly. The rattle of rifle and machine-gun fire and the crash of field pieces was heard from all sections of the aerodrome as the Allies pressed in on Aggressor, who was making this his last stand.

The Minister and his party arrived back at Northway at about 0900 hours, and shortly after that the aircraft carrying the airborne assault team flew over, dropping the paratroopers at previously agreed positions. Aggressor continued to resist, but by mid-morning it was plainly evident that his forces were hopelessly trapped; and at a few minutes after eleven a cluster of red flares was fired from the control tower, bringing to an end the first Joint Combined Canadian/American Army/Air Force Exercise.

The Umpire Control Centre was dismantled in record time, and by ten-thirty was as bare as the proverbial cupboard. In the midst of packing I was both startled and pleased to find General Stuart shaking my hand and thanking me for the work I had done. Evacuation commenced almost immediately after the flares ending hostilities were fired, and by one o'clock the Chief Umpire and the majority of his staff had departed. At noon a steady stream of troops of both forces began to flow into the hangar. Though the great majority of them were weary and unshaven, all appeared to be in good spirits and were reviewing the events of the past ten days critically, profanely, and with humour. At about one o'clock, six Dakotas arrived to transport troops back to Whitehorse, and Wing Cdr. Turner arranged for our transportation aboard one of them. We took off from Northway at 1430 hours and touched down at Whitehorse shortly before 1700 hours. Those of my companions in arms who had regarded my departure with such dire forebodings received me with exaggerated amazement and many hollow protestations of delight...

26 February.— Seated here in that fine old institution, the Sergeants' Mess, at R.C.A.F. Station Edmonton, a veteran among veterans, I am surveying the immediate past through a golden haze of well-being induced by a good dinner and a tot or two of Lamb's Navy. I am also regarding the future with a prophetic eye. I can see myself settling back comfortably in some other Mess, and I can hear myself beginning:

“Well, fellows, when I was on Sweetbriar back in '50...”

3-4. NORTH OF FIFTY-FOUR

The Northern Operations of Air Transport Command

By Flight Lieutenant J. D. Harvey, D.F.C.

Air Transport Command

Vol. 7, No. 11 (December 1955)

The aircraft of Air Transport Command have been penetrating the Arctic Circle ever since the Command's early days as No. 9 (T.) Group, in 1947. Lately, however, the growing interest in Canada's Northland has added impetus to flights tracking 360 degrees. The northern shores of Canada remain uppermost in the minds of defence planning-teams when they discuss the most probable routes for bombers in the event of another war.

A.T.C. bases at Resolute Bay (74°N.) and Frobisher Bay (64°N.) are among the most northerly bases operated by the R.C.A.F. Goose Bay, Lab., considered a far-northern base during the Second World War, has now become only a semi-northern station.

* * *

Leading A.T.C.'s parade of northern flights is No. 426 Squadron, based at Lachine, P.Q., which operates the only Canadian scheduled run as far north as the above mentioned latitudes. Twice-monthly flights to Resolute Bay, carrying supplies and personnel, are supplemented when necessary by special flights.

No. 426 Squadron also carries out many special operations throughout the year to the joint U.S.-Canadian weather stations, R.C.M.P. detachments, and Dept. of Transport weather and radio bases, scattered throughout the Arctic. Among these operations, of course, are the annual Christmas supply drops.

The spring and fall re-supply of the arctic bases, formerly carried out by No. 426 Squadron only, has been handed over to squadrons equipped with C-119 freight-carriers. Two A.T.C. squadrons, No. 435 at Edmonton and No. 436 at Lachine, now join forces on the job. In the spring and fall of 1955 the re-supply operations airlifted more than a million and a quarter pounds of all types of cargo.

During these flights, landings are made on ice-strips or crude runways scraped out on land. The spring-time landings are usually made on the sea-ice, while the autumn re-supply runs, when the ice is not thick enough, use the land-strips. Although such landings call for extreme care and skill, they are not considered unduly risky. Lately, however, landings have been made during the dark periods, with make-shift lighting usually provided by flarepots fashioned from tin cans. With this type of illumination, approaches and landings over high hills on to small runways make for extremely tricky flying.

In any summary of northern flying, No. 408 (Photographic) Squadron, based at Rockcliffe, Ont., should be given special mention. Much of our northern flying would be greatly curtailed without the excellent maps and charts which are now used as a matter of course, but which did not exist six or seven years ago. No. 408 has, in fact, opened up Northern Canada not only for the aviator but also for civilian business as well. Mining and forestry, to mention only two industries, have been enormously aided by the accurate maps produced from the thousands of aerial prints taken each summer by No. 408.

The squadron's shoran (short-range navigation) programme, which it began in 1949 and which has been carried out simultaneously with its photographic work, now needs but two more summers to finish its complete chain of shoran stations, and so lock the map firmly into world charts.

The past summer proved a big one for No. 408 in that it photographed the last remaining portion of Ellesmere Island which had escaped the camera's eye for more than thirty years. Each summer the *Lancasters*, *Cansos*, and *Otters* take to the field, operating small detachments wherever adequate landing facilities exist. Contouring and profile-recording, by means of radar, have recently been added to their work. No. 408 was responsible for photographing the entire Mid-Canada Line preparatory to the actual installation of the radar sites. It has also used *Dakota* aircraft, equipped both with wheels and skis, to make a comprehensive on-the-spot survey of the entire

Line, taking ground parties into the actual radar operating-sites for soil and topography checks, and conducting tests to determine the thickness of ice and snow. This winter, ski-equipped *Dakotas* will back up the main civilian airlift of Mid-Canada Line material.

The *Cansos* of No. 408, still droning dependably over the Northland, have now discontinued their former summer task of magnetic operations (tracing the North Magnetic Pole), but they continue to give support to shoredetic (coastal land) and shoran survey parties. The *Canso* air crew have visited more virgin territory than any other R.C.A.F. air crew during their many trips to remote areas of the North. Landing the big amphibians in the uncharted waters of the arctic islands takes no mean degree of skill.

The winter months find A.T.C.'s *Lancasters* on regular scheduled ice-reconnaissance patrols throughout the Arctic. Such flights demand navigation of a high order, and in this regard the R.C.A.F. has been largely self-sufficient. Constant use is made of the Twilight Computer and other devices designed by Wing Commander Keith Greenway three or four years ago.

Arctic flying in the R.C.A.F. owes much of its present efficiency to the in-line *Merlin* engine, whose unmistakable growls have brought reassurance to everyone living in those treeless regions. The *Merlins* of our *Lancasters* and *North Stars* have actually been started, without preheating of any kind, at temperatures as low as 45° below zero.

No. 412 Squadron, now based at Uplands, does not ignore the Arctic, although its flights into areas above the Circle are less frequent than those of the other squadrons mentioned. Training flights are carried out as far north as the Pole, with landings usually at Resolute Bay, Thule (Greenland), and Goose Bay or Coral Harbour. The scheduled *Dakota* flight to the R.C.A.F. unit at Fort Churchill has been deleted from the squadron's list of duties. Its chief tasks are, at present, the airlifting of "V.I.P.s" throughout the world and the taking of National Defence College and Staff College students on the tours which form part of their respective courses. Before the unfortunate grounding of the *Comets*, however, No. 412 Squadron carried out many northern flights in co-operation with Air Defence Command and its radar units across the Pinetree Chain.

No. 435 Squadron, based at Edmonton, carries out scheduled runs to Whitehorse, stopping at Fort Nelson. It also takes care of the winter support runs into Cambridge Bay, on Victoria Island, to supply the Winter Survival School. In addition, the squadron supports the Army units stationed in Western Canada throughout their many northern manoeuvres.

Over on the other side of the continent is Goose Bay, Labrador, another A.T.C.-controlled base. Although much of the flying is done by the U.S.A.F., which occupies half the base, the R.C.A.F. flies many hours on mercy missions and emergency flights of various kinds. For such purposes it uses a *Dakota* (on wheels and skis) and an *Otter* (on wheels, skis, and floats). Lately the Goose Bay flight has concentrated on those

mercy missions which are beyond the range of civilian operators in the area. Since the civilians have only single-engined aircraft, the R.C.A.F.'s *Dakota* takes care of the flights into Baffin Island and the Hudson Strait area.

Moving back towards the centre of the continent, we find another A.T.C. detachment at Fort Churchill. Equipped with *Otters*, this unit conducts searches, emergency evacuations, and limited tactical operations throughout the region. Operating over the barren lands north of Churchill, its aircraft roam as far afield as Baker Lake.

In the past year, helicopters of No. 108 Communications Flight have begun operations throughout the north. Quartered at Bagotville, P.Q., No. 108 has been training its pilots on H-19 and H-21 helicopters and has been charged with lifting the fuel supplies (delivered to lake-head sites by civilian contractors) to the actual radar sites of the Mid-Canada Line. The Flight has conducted two cross-country runs on the Mid-Canada Line, carrying scientists on their top-priority work. This winter, No. 108 will be busy airlifting construction men and materials into each site.

Not long ago the Flight began to make use of H-34 Sikorsky helicopters, the big brothers of the already proven S-55s. With more than thirty pilots, No. 108 is now the biggest helicopter operator in Canada, and the majority of its work is north of fifty-four.

Another A.T.C. unit, No. 1 Overseas Ferry Unit, crosses part of northern Canada during its "Random" operations across the Atlantic. Responsible for the delivery of jet fighters to No. 1 Air Division, No. 1 O.F.U. goes through Goose Bay, Greenland, and Iceland. Since its aircraft cross the 64th parallel of latitude, it is, in effect carrying out one of the R.C.A.F.'s most northerly single-seater fighter operations.

Also periodically engaged in northern flying is No. 4 Operational Training Unit, located at Trenton. Each course must participate in flights to Goose Bay, Whitehorse, and overseas - and, when time permits, it usually manages to cover Churchill and Resolute Bay as well.

3-5. R.C.A.F. AIR TRANSPORT COMMAND

Part Two: Photographic Survey[‡]

By Wing Commander R. I. Thomas, A.F.C.

Vol. 5, No. 11 (December 1953)

All air operations are, in effect, a form of air transport operations in the sense that the function of an aircraft, whether it be bomber, fighter, or transport, is to carry its load to the scene of operations. Photographic survey operations, however, have been closely linked to the normal conception of the air transport rôle from the earliest days of the R.C.A.F. The character of the first operations was, in fact, twofold: (a) to transport the surveyor and his equipment to his ground control base, and (b) to take the pictures from which the maps were later produced.

The first survey was made in 1921 by members of the old Air Board. It was carried out by a flying boat operating at 80 miles an hour at 5,000 feet, and resulted in a coverage of 580 square miles of northern Ontario by vertical photography. This operation proved the feasibility of air photography for mapping purposes and started the long series of operations which was to follow.

Many may wonder how the R.C.A.F. became involved in such a vast undertaking as the mapping of Canada. A serious mapping programme had been started in 1902, but it had soon become apparent that normal ground survey methods were too slow. After the First World War, the Department of the Interior* decided to develop aerial photogrammetry, and requested that the Air Board co-operate by providing the aircraft for their camera platforms.

After the success of the 1921 operations, the basic organization for the future was laid down. The task of carrying out the air operations was given to the Air Board (then to the R.C.A.F. when the latter was formed on 1 April, 1924), and that of developing equipment to the National Research Council. The Department of the Interior was made responsible for the actual map-making. Through the years, the

[‡] *Part One of A.T.C.'s story dealt with the history and operations of the Command in its purely transport role. Part Two sketches the photographic side of the picture. Its author, Wing Commander Thomas, joined the R.C.A.F. as an airframe mechanic in 1927, and two years later got his wings as an N.C.O. pilot. He was then engaged on forestry patrol work, treaty-party flying in Northern Ontario, and photographic survey operations; and was in charge of the R.C.A.F.'s Meteorological Flight at Fort Smith, N.W.T., in the winter of 1936-37. He was commissioned in 1939, and took part in coastal operations on the East and West Coasts during the war. Before his present appointment as Chief Administrative Officer at R.C.A.F. Station Rockcliffe, he served successively as Commanding Officer of No. 22 Photographic Wing and Senior Air Staff Officer at Air Transport Command. Parts of Wing Commander Thomas' article are reprinted from "Arctic," the journal of the Arctic Institute of North America.—Roundel Editor.*

* Later the Department of Mines and Resources, which was subsequently broken down into the Department of Resources and Development and the Department of Mines and Technical Surveys.

closest possible co-operation has existed between the R.C.A.F., the N.R.C., and the civil Government. This liaison has been an important factor in the development of Canada's photographic survey programme, now one of the most efficient of its kind in the world. In 32 years, the small coverage of 1921 grew to an all-time record of 911,500 square miles in 1948. At the present time, practically all the land mass of Canada has been photographed by the vertical or tri-camera method, and there are in the vaults at the R.C.A.F.'s Photographic Establishment, Rockcliffe, more than 3,000,000 negatives, indexed and readily available for any development work which may turn up.

From 1921 until the start of the Second World War, aerial survey operations formed an important part of the R.C.A.F.'s commitment, and, in addition, provided valuable training for aircrew and groundcrew in northern operations. Among the R.C.A.F.'s high-ranking officers who formerly took part in these operations are: Air Marshal C. R. Slemon, Air Vice-Marshal R. E. McBurney (ret.), Air Commodore L. E. Wray, Group Captain F. J. Mawdsley (ret.), and Wing Commander H. Winny (ret.), to mention but a few. Progress was slow, however, because of the poor performance of the aircraft available and the relatively narrow angle of the lenses used in the cameras. The maximum for one year was 109,000 square miles, and the total coverage which had been achieved by the end of 1939 was only 868,600 square miles.

In the early days, photography was carried out by detachments of two waterborne aircraft. Three types were used: the Vedette flying boat, with a cruising speed of 70 miles an hour and a service ceiling of 5,000 feet; and the Fairchild and Bellanca float 'plane, cruising at 85 miles an hour at 8,000 feet. These detachments usually consisted of two pilots (an officer in charge, and an N.C.O. pilot in charge of ground maintenance), two fitters (who were also the camera operators), and a rigger (who usually did the cooking as well). Normally, a surveyor was attached to the unit to carry out ground control and often, in the more remote regions, to act as navigator when the aircraft was flying the actual photographic lines.

At first, these detachments did their own transportation as well as the photographic flying. Caches with P.O.L. (petrol, oil, and lubricants) would be established in the operational area by tractor-train during the preceding winter. Then the detachment's equipment would be sent by rail to the railhead nearest the area and flown to the base camp, often 200 miles back in the wilderness. This seems a very short distance in terms of present-day flying, but, when using aircraft which could carry only 800 to 1,000 pounds at 72 to 85 miles an hour, it often took a week or more to establish base camp and begin photography.

The camp site, selected during the previous year, was located in the centre of the operational area. There were several reasons for this, but the prime reason was that it enabled the detachment to make its own weather forecasts, as no other forecasts were available for the greater (or sometimes, any) part of the area — and, where forecasts *were* available, telecommunications were either non-existent or too unreliable. It may be added that, under these conditions, detachment personnel developed many and

unique methods of weather prediction, some of them quite sound and some reminiscent of the sauerkraut-barrel school of meteorology.

The surveyor was a key man in the detachment. On photographic days, he would fly as navigator and sketch in ground detail on the vague maps then in use. In addition, he provided the camera operator with drift data and time intervals, and also told him when to start and stop lines. At night, when the skies were clear, he would take star shots to establish positions for ground control. As the operations expanded, and the need for more control developed, the surveyor's requirements led to the first purely transport operations in the R.C.A.F. With steadily increasing coverage, the surveyor was unable to keep up with the control requirements, and general-purpose detachments were formed to provide transportation for him and to supplement the transportation of the photographic detachments.

This type of operation continued until the outbreak of the Second World War.

* * *

With the outbreak of the war in 1939, the squadrons employed in photographic work were converted to bomber reconnaissance duties, and survey operations came to a standstill. However, in 1944, photographic operations were again requested of the R.C.A.F., and, as a result, No. 13 (Survey) Squadron — which was renamed No. 413 (Survey Transportation) Squadron in 1947 — was formed at Rockcliffe to undertake limited commitments. By 1945, the urgency for maps along the proposed Alcan Highway and in the Mackenzie Basin was so great that two squadrons were committed to photographic survey, with a third squadron being added later.

With the introduction of functional commands into the R.C.A.F., the control of photographic survey operations became a vexing problem, since the operational rôle of the survey squadrons did not fit into any existing command. However, early in 1946, control was vested in No. 9 (T.) Group (later to become Air Transport Command), which was able to provide the transport support required for post-war operations.

The organization set up at Rockcliffe to handle the tremendous commitments of photographic survey in 1949 and 1950 consisted of No. 22 Photographic Wing Headquarters, which co-ordinated all the work; three squadrons, Nos. 408 and 414 (Photographic) Squadrons, and No. 413 (Survey Transport) Squadrons; and No. 1 Photographic Establishment, which was responsible for processing the films. Under the latter unit, but operating as a separate entity, was No. 1 School of Photography, where photographic training for the R.C.A.F. was carried out. No. 22 Wing Headquarters maintained control in the field through a network of nine signals units, thus linking all advance bases direct with Rockcliffe, which has remained the centre of R.C.A.F. survey operations ever since.

On account of other R.C.A.F. commitments, several changes were made in the organization before the operational season of 1951. No. 22 Photographic Wing Headquarters went out of existence, and control of survey operations then came directly under Air Transport Command Headquarters. Nos. 413 and 414 Squadrons

(later to be re-formed as fighter squadrons) were disbanded, and the transport aircraft of No. 413 were absorbed by No. 408 Squadron. The School of Photography was also closed (to be re-opened at Camp Borden in 1952).

* * *

Today, two main types of photographic surveys are undertaken: vertical and tri-camera. In the former method, a single camera is used and accurate large-scale maps are produced from the resulting photographs.

Tri-camera photography, in which three cameras on a single mount are operated simultaneously, produces a fan of three photographs, giving coverage from horizon to horizon, through the vertical. Accuracy is sacrificed for coverage, but this method is approximately six times as rapid as vertical photography. (As a matter of fact, with the precise calibration now used it is possible to produce accurate 8-miles-to-the-inch maps from tri-camera photographs, and, where there is little relief in the terrain, 4-miles-to-the-inch maps of reasonable accuracy). All the National Topographic Series maps of northern Canada are being produced from tri-camera photographs.

When the aerial survey programme was started, only vertical photography was used. However, this was a slow process, and the speedier oblique photography was soon adopted. One camera, which would take a fan of three exposures, as close together as possible and covering a field of 180 degrees in front of the aircraft, was employed in this method. The plotting of these photographs was difficult and results were not too accurate, but many maps still in use were produced from such work.

The next step was to use three cameras, on a single mount, facing to the rear of the aircraft; and further developments led to the present-day tri-camera method.

Since 1945, the major part of the R.C.A.F.'s photographic survey programme has been carried out in the north. In 1948, when 911,500 square miles of northern Canada were photographed, operations were carried to the Arctic Islands for the first time. In that year, all of Baffin Island was photographed, in addition to large areas of Labrador, Ungava, the North-west Territories, and the Yukon. Operations were continued in the Arctic Islands during the following year. Photographs were taken off Victoria Island, King William Island, and parts of Somerset Island, Banks Island, the Boothia Peninsula, further areas of the Yukon and North-west Territories, Labrador, Ungava, and northern British Columbia.

In the following years, operations were expanded even further to result in what is now almost complete coverage of the whole of Canada by tri-camera photography. At the end of the 1953 season, only 5,648 square miles (on North Ellesmere Island) remained to be covered.

The types of aircraft used during these years' operations were: the Mitchell, Canso, Norseman, Anson, Dakota, and Lancaster.

No. 408 Squadron (now the only photographic squadron) flies Lancaster X aircraft equipped with cameras for both vertical and tri-camera photography. In addition, several of the aircraft are equipped with special instruments and wiring, developed by the National Research Council, for Shoran-controlled photography (see

“Shoran Survey” in “The Roundel” for May 1951). Shoran is a recent development in the survey field and was first proved in the 1950 operations. It involves the use of airborne radar equipment in conjunction with ground radar beacons spaced several hundred miles apart, and allows aerial photographs of the areas concerned to be positioned accurately.

The commitments for each season of aerial photography are decided by the Interdepartmental Committee on Air Surveys, and, as soon as the specific areas to be photographed have been determined, plans can be made. Bases are decided upon, and the flight lines are drawn up. The timing of the detachments being sent into the various areas is a major factor in planning. Because of the short season in the north, it is now left to the R.C.A.F. to decide when operations in a particular area are carried on. In the past, a great deal of good weather was lost by holding detachments in southern areas until a high priority commitment was completed. Now, detachments work in the south only until photography is possible in the north. The detachments go into the field any time after the snow has gone from southern areas and the ice on lakes has started to break away from the shores. This usually means that the first detachment leaves Rockcliffe between 25 April and 1 May. A detachment generally makes four moves in a season: the first from Rockcliffe to a southern base, then to the northern base when the area opens, and back to a southern base before returning to Rockcliffe. The season is normally over by the middle of October, but special commitments are sometimes received which extend the season on into December.

* * *

Many of the earlier problems encountered by the photographic crews have now been eliminated, or solved, by the use of long-range aircraft and the availability of northern aerodromes. The problem that still retains its formidable nature, and which determines the area that can be covered in a season, is the weather. The retreating winter season is followed closely northward, and the work is done on the heels of the melting snow and ice. In some areas convection cloud forms as the land warms, and it is not unusual to find only a few days during the entire season suitable for photographic operations. To obtain coverage of these areas, the R.C.A.F. must be on the spot, ready to fly 10 to 15 hours a day while conditions remain good — a feat made possible by the nearly continuous daylight of the summer months.

The normal day on a photographic detachment starts at about 3 a.m., when the duty crew checks the final weather forecast and prepares to make a flight to check the actual weather. The first aircraft is usually off by 5 a.m., and, if clear conditions are found, the other aircraft are called by radio and take to the air.

On the average flight, the aircraft climbs gradually to approximately 10,000 feet and the flight in search of clear areas is continued at that altitude. Since many flights prove fruitless, a great deal of oxygen is conserved by flying at this height. This is an important factor, as three high-pressure bottles of oxygen are required to replenish an aircraft's system after approximately 10 hours of use, and each of these bottles weighs 155 pounds. Any waste would soon cause a serious problem of re-supply, where all

supplies must be airlifted.

When a clear area is sighted, altitude is increased to 20,000 feet and the crew makes final preparations for photographic flying. Cameras are given a short test run, the solar navigator (an adaptation of the astro compass) is set up, and the aircraft is trimmed carefully for straight and level flying.

Once the area is reached, the navigator directs the pilot to the beginning of the first line to be attempted. The drift is checked carefully and the solar navigator started. Meanwhile, the camera operator checks the interval and drift on his viewfinder, and levels the camera. As the start of the line is approached, the navigator gives the order to start the camera.

On the line, the navigator is busy checking drift (every ten minutes at least) and making new settings on the solar navigator. In between times, he is trying to pick up pin-points, and also attempting to sketch in on his flight-line map any details which may help on the next line. This latter operation takes a good deal of experience, and the degree to which a navigator can learn to sketch generally measures his success at flight-line flying in the north, where maps are most inaccurate.

Very accurate flying is necessary on the pilot's part, as he must maintain the required altitude within plus or minus 50 feet and hold an extremely accurate course.

One of the major problems in the north is the maintenance of direction. The best magnetic compass becomes erratic in higher latitudes, and the vacuum-driven gyros do not stand up very well. The solar navigator is used to direct the pilot for straight flying, and the astro compass to supply settings for the gyro instruments.

Another major problem is servicing the aircraft at the more isolated bases. No hangars or other permanent facilities are available at such places as Norman Wells, Yellowknife, or Coral Harbour, and the work must be done in the open — rain, snow, or sun, as the case may be. Dust is another constant torment to the hard-worked ground crew. In spite of the limited facilities, remarkable records of serviceability are achieved.

Film exposed in the field by the photographic aircraft is shipped to No. 1 Photographic Establishment, at Rockcliffe, for processing. Possessing one of the world's finest and most modern aerial photographic laboratories, this establishment plays a vital part in the general photographic survey programme. After processing, the film is given an initial check for accuracy and quality, and each negative is numbered to allow instant identification. Possible gaps in the area covered, caused by camera failures or lack of forward overlap, are spotted at this stage.

The negatives are then printed and laid out in a mosaic, which shows if any lateral gaps exist as a result of errors in navigation. If there are any gaps, the detachment which flew the lines is notified, and prints of the mosaic are sent out to be used when the lines are re-flown.

All negatives taken for the government are stored at No. 1 Photographic Establishment, while an index of them is held at the National Air Photographic Library of the Department of Mines and Technical Surveys. The R.C.A.F. is not

responsible for map-making. The finished prints are turned over to the Department of Mines and Technical Surveys, or the Army Survey Establishment, for the compilation of maps.

* * *

By the end of the survey season of 1953, 2,522,720 square miles of vertical and 2,494,524 square miles of tri-camera photography had been completed by the R.C.A.F. That these figures add up to more than the accepted land mass of Canada is explained by the fact that vertical coverage duplicates the tri-camera, and some areas have been re-flown at a different scale. As tri-camera photography of the north is now practically complete, future efforts will be concentrated on vertical photography for detailed mapping, and the completion of Shoran control.

3-6. 9-YEAR JOB ENDS

Completion of the Shoran Programme

By Flight Lieutenant H. N. Astrof

Staff Officer Public Relations, Air Transport Command

Vol. 9, No. 8 (October 1957)

Basic aerial *survey* of more than 4 million miles of Canada's vast territory was recently completed only nine years after it began. The same survey, carried out by ground survey parties alone, would have taken several generations to finish.

Geodesists now have a framework of accurately known positions in relations to which the map of Canada can be drawn. Thousands of aerial photographs taken by the R.C.A.F. since 1921, and thousands more taken by commercial operators, when fitted to the lattice-work produced by the Shoran survey, will produce a more accurate picture of the country's face than has ever yet been drawn.

Teamed up on the Shoran programme, which employed airborne radar and temporary ground radar stations, were No. 408 (Photographic) Squadron, based at Rockcliffe and commanded by Wing Commander J. G. Showier, A.F.C., and the Geodetic Surveys Branch of the Department of Mines and Technical Surveys.

Shoran operations began in 1948 from a point just south of Winnipeg. The name Shoran is derived from the radar gear used in making the survey—Short Range Aid to Navigation. This equipment was originally developed during the Second World War for blind bombing purposes, and modifications made in it after the war enabled the earth's surface to be measured with extreme accuracy. An error of not more than 25 feet in a hundred miles was the maximum permitted in this year's operations.

Until 1956 the survey, which moved progressively northward, was carried out only during the summer months. In 1956 and 1957, however, the scene of operations was the Arctic, and the work was therefore done in the spring in order to beat the break-up. More than 400,000 square miles north of the 75th parallel were measured this year. During 1956 the survey disclosed the fact that the island on which the

Magnetic North Pole is situated was incorrectly located on all existing maps. On future maps and charts, Prince of Wales Island will appear three miles north-west of its present indicated position.

The tight schedule, and the distance between the area of operations and the Rockcliffe base, necessitated the closest planning. Since No. 408 Squadron was required to be self-sufficient in the field, main and sub-bases were selected a year ahead, as well as the sites upon which the temporary radar stations would be located. At the same *time*, tons of equipment, including aircraft spares, were pre-positioned either by sea or airlift.

For the 1957 programme, Thule Air Base in Greenland was selected to be the main base, and Resolute Bay, on Cornwallis Island, the forward. The Shoran survey was carried out by *Lancasters*, and, in order to meet the schedule and anticipate the spring break-up, their crews flew from 12 to 14 hours a day. Ski-equipped *Dakotas* provided the logistic support, transporting supplies and personnel between the bases and Shoran sites, and carrying out airdrops. *North Stars* and *Flying Boxcars* also supported the operation. Numerous hazards had to be met and dealt with—completely unreliable magnetic compasses, extreme cold, arctic fog, and “white-out” (a temporary condition in which the eyes of aircrew, after long exposure to snow, lose all perception of depth and horizons).

Temporary ground radar stations, each consisting of a 30-foot antenna, two tents lined with fibre glass against the cold, a well-stocked larder, and electricity to operate the radar equipment, were set *up* at various spots in the middle of nowhere; and teams of three men were left to man them. For periods of up to a month, their only contact with the outside world was their radio and the sight of an occasional aircraft passing overhead.

In-the-field reduction of the survey data was carried out at the main base by a group of experts from the Geodetic Branch. In charge of the party was Mr. Angus Hamilton, who has been field engineer of the project ever since the programme’s inception.

As an interesting footnote to this very brief account of a very large subject, we might add that the “father” of the whole Shoran programme was Mr. J. E. R. Ross, the Dominion Geodesist. Mr. Ross, who was due to retire in 1956, was granted an extension of his retirement date in order to enable to see his great programme through to its completion.

For the PHILOLOGIST

The R.C.A.F.’s commitments in the Far North would suggest that there exists in the Service a growing body of men who are fluent in the Eskimo languages. Such, however, is not the case. For the benefit of those who may be tempted to point the finger of scorn at the boy in the field for neglecting his educational opportunities, we are printing here a song composed some thirteen years ago by a blind Eskimo patient

at Chesterfield Hospital. It is taken from “Eskimo”, a magazine published by the Oblate Fathers at Fort Churchill.

Kanangnarmit anoreuyarsluni ikkiinarsluni unnuk manna, ayaiyayaya

The north wind is blowing, the night is very cold, ayaiyayaya.

Mayorautinidlunga tussalerpaklunga sivungagut pisuktunik inugnigl ayaiyayaya

I hear the people passing outside the entrance stairs, ayaiyayaya...

Itilerangamalu kisiani kolanut iglualuk iterpaklungali, ayaiyayaya...

When I come in, I go up to the big house main floor, ayaiyayaya...

Anilerangamalu Wisiani pamut torksomut anilerpaklungali, ayaiyayaya

When I go out, all I do is go as far as the entrance-way, ayaiyayaya...

Angunasuktullu tusutuinareaksak tusunarsarpakkaluarput igluligardjugmi owanili, ayaiyayaya...

How I wish I could join the hunters, instead of being here, ayaiyayaya.

Innartiksatuinareaksak kuviangipakkaluarpok, inulli pigarniartillugit owani nayagnili, ayaiyayaya...

Early to bed is far from fun while others stay up, but here at the Siste place, ayaiyayaya...

Isumalerpaklungalu k'anok tautulisareaksamnik owani, ayaiyayaya

All too often I wonder how I could ever see again, ayaiyayaya...

Pisiitorneralu isumalilerpaklugo pisik'artillugit owani, ayaiyayaya.

There is no song within me, I know, while all around me others sing; ayaiyayaya.

3-7. W/C SHOWLER AWARDED McKEE TROPHY FOR ARCTIC SURVEY

Vol. 10, No. 6 (August 1958)

For his general contribution to the successful and accurate mapping of the Arctic while commanding No. 408 (Photographic) Squadron, Wing Commander J. G. Showler has been awarded the Trans-Canada McKee Trophy for 1957.

The award of the trophy to Wing Cdr. Showler brings to eight the number of R.C.A.F. officers who, while serving in the regular force, have merited the award since its inception in 1927.

During 1957 408 Squadron completed an Arctic survey begun nine years previously. This operation was executed under extreme weather conditions and after months of precise planning to ensure that every piece of equipment was prepositioned by sea or aircraft.

The Short Range Aid to Navigation (SHORAN) device was used to conduct the survey. Developed during the Second World War as a navigational aid for pin-pointing blind bombing, the device was adapted for aerial survey in 1949 following two years of experimentation.

Essentially an electronic distance measuring device, SHORAN consists of both airborne and ground equipment. Through its use, points of unknown position can be established accurately. From 1948 to 1956 a lattice-work of known positions was built up and during 1957 the extreme northern Arctic islands were surveyed.

More than 100,000 pounds of equipment and over 250 personnel were airlifted to Thule and Resolute Bay during the 1957 SHORAN programme. *Dakotas* and *Lancasters* flew over 1700 hours during the operation and completely self-sustaining stations, each weighing 8000 pounds, were airlifted to preselected sites. Many of these sites were chosen by Wing Cdr. Showler by on-the-spot checking.

This completed the geodetic survey of the whole of Canada. Wing Cdr. Showler's vast northern experience, personal drive and enthusiasm, along with the ability to assess the capabilities of his men and equipment, were largely instrumental in the success of the 1957 Arctic programme.

In becoming the 30th recipient of the Trans-Canada Trophy, Wing Cdr. Showler joins a select group of pioneer flyers beginning with the inaugural winner, H. A. Oaks. Mr. Oaks, a pioneer bush pilot and founder of Western Canada Airways, won the award in 1927 for early flying endeavours which helped greatly in opening up the north country by air.

The trophy is presented each year for meritorious services in the advancement of Canadian aviation. Emphasis is placed on performance throughout the year rather than on a single brilliant exploit and special consideration is given to the application of aircraft and aviation equipment to new and useful purposes.

Squadron Leader J. H. Tudhope in 1930 was the first officer, while serving with the R.C.A.F., to win the award. Other R.C.A.F. winners were: Flt. Lt. E. G. Fullerton-1934; Group Captain Z. L. Leigh-1946; Flying Officer R. B. West-1948; Squadron Leader K. R. Greenaway-1952; Wing Cdr. J. S. Wright-1954 and Sqn. Ldr. R. T. Heaslip-1956.

3-8. STAND-BY AT CHURCHILL

By Squadron Leader R. Wood,

Staff Officer Public Relations, Training Command.[§]

Vol. 9, No. 1 (January-February 1957)

“OK., O.K.! Don’t flip!”

Muttering impatiently, Flying Officer Ron Dalphy shuffled down the corridor towards the insistent ’phone. It was 5 a.m., but even at Fort Churchill that’s an ungodly hour to be awakened from a sound sleep.

He lifted the receiver off the hook. At the other end of the line, a crisp voice said:

“This is Operations. I want to speak to Flying Officer LeBlanc. It’s urgent.”

“Yes, sir. I’ll get him.”

Now fully awake, Dalphy left the receiver dangling and hurried off to arouse his skipper.

Flying Officer D. LeBlanc and his six-man crew had left their base at Trenton a few days earlier. With their aircraft, *Dakota 414*, they had been assigned the task of standing-by at Fort Churchill for possible rescue operations in connection with DEW Line flights. The bad weather that had dogged them on their flight up was still with them—low ceilings and frontal systems that seemed to be lined up from Hudson Bay all the way to the Yukon.

The call was from Flight Lieutenant “Bounce” Weir, one of Canada’s best-known northern pilots, who was then serving at Churchill as Ops. Officer. A message had been received from the R.C.M.P. constable at Baker Lake requesting an airlift from Mallory Lake, some 400 miles N.N.W. of Churchill. An Eskimo, suffering from pneumonia, required immediate evacuation to a hospital. Also, the food situation in the settlement was critical.

LeBlanc alerted his crew. Then, after a short briefing and the usual weather-check, No. 414 was air-borne and on its way to Baker Lake, about 65 miles from its destination. In “marginal weather”, and fighting the headwinds that are almost traditional in that area, the *Dak* pressed on. It carried only one passenger on its outward trip, a ten-year-old Eskimo boy who was returning home to Baker Lake after a month or so of medical treatment at Churchill. Hunched at the end of a long row of bucket-seats, and dressed in blue jeans and a wind-breaker, the lonely little “Davy Crockett” looked strangely out of place. As the ’plane neared his home, he was induced by Corporals McLarty and Saunders, not without difficulty, to discard these inadequate garments in favour of the more appropriate jacket and pants of caribou skin.

[§] R.C.A.F. Communication and Rescue Units are established at various strategic points across Canada. The article which follows describes a not unusual interval in the lives of the six-man crew of *Dakota 414* during a ten-day stand-by for emergencies on the DEW Line. It is based on a log kept by Flying Officer R. Dalphy, the aircraft’s radio officer. — *Roundel Editor*

In summer, aircraft land at Baker Lake on the neighbouring gravel strip, but in winter the lake itself provides the best possible landing-area. When, on the present occasion, LeBlanc set his 'plane down on the ice, the temperature was about 26° below zero and a bitter wind was blowing. He kept the engines running in order to avoid any possibility of their freezing up while the supplies and passengers were taken on board; then, accompanied by Cpl. Dent of the R.C.M.P., a male nurse, and a native interpreter, he took off for Mallory Lake.

The settlement proved to be barely worthy of the name. It consisted merely of a cluster of five igloos joined together and buried deep in the snow. Some had cleared ice for windows. Three families lived there, using three of the igloos for sleeping and the other two for storage. There was not much to store, however; nor, as far as the visitors could see, did what little there was include any food.

The first shock came when, after questioning the natives, Cpl. Dent ascertained that the patient they had come for had died during the preceding week. It was not necessary to know the language to realize the grimness of the situation. The unfortunate natives' smiles of welcome could not hide the suffering they'd been through. Without exception, all of them showed the effects of malnutrition. Some had colds, others influenza — among them the elderly and grief-stricken wife of the dead man. Two of the women had pneumonia; and one of the children, a small boy, was running a fever and was obviously very ill indeed. Nevertheless, weak as they all were, the male Eskimos insisted in helping with unloading the bags of food.

Immediate evacuation of the two sick women and the child was imperative. Meanwhile, the nurse administered to those who were to be left behind. One of the mothers took her small baby from his papoose-pack and held him, stark naked, while he had a boil on his shoulder treated. It was the size of an olive; but despite both the pain and the cold, the little fellow chuckled with glee at the attention being given him. When the nurse had done all he could, the three evacuees were carefully bundled in warm clothing, taken on board the *Dak*, and flown back to the native hospital at Baker Lake.

But the day's work was not yet ended. Two other patients from the hospital required airlift to Fort Churchill. One of these was an Eskimo woman, 5 months pregnant, with a heart condition that had been aggravated by pneumonia.

During the long flight back to Churchill it became evident that she was in a critical condition, suffering great pain. The crew members tried to offer some comfort, but their inability to speak her language formed a barrier. Later, as the aircraft neared its destination, the co-pilot called the tower to inform the controller of the emergency. When the aircraft landed, Canadian Army doctors and an ambulance were waiting on the tarmac. Both patients were rushed to the military hospital, but, in spite of all that could be done, the woman died during the night.

Dakota 414 was to remain at Churchill seven more days. Three of these were spent on a 24-hour stand-by for a civilian aircraft reported overdue (it was reported later at Chesterfield Inlet). One more round trip was made to Baker Lake, this time

with a Canadian Army medical team on board, and five patients were brought back to Churchill. Even when the morning for departure arrived, the first leg of the flight turned out to be one of mercy. As they were about to take off, the names of six patients appeared on the manifest: two military, one civilian, and three Eskimo.

* * *

The sirens of the ambulances that had met the aircraft at Winnipeg faded in the distance. Back in the 'plane, Flying Officer Bill Eddles, the navigator, was busy stuffing dividers, computers, and the many other gadgets of his trade, into the bag that's never big enough. As he did so, his eye caught an entry made on a bit of paper some days earlier. It read: "Winnipeg to Churchill, track 011, distance 543 nautical miles, time four hours and 13 minutes." Scribbled at the bottom was a note: "Stand-by".

Grinning, Bill turned to Cpl. Saunders.

"Corporal, I've got news for you."

"What's that, sir?"

"Our stand-by 'touch' is over. Tomorrow we go back to work."

3-9. MERCY FLIGHT

Vol. 9, No. 8 (October 1957)

The situation looked somewhat bad for little Hadlagro, a 9-month old Indian child, when an R.C.A.F. Dakota, sent to Baker Lake to bring her back to hospital for an emergency throat-operation, was prevented by fog from landing on its return to Churchill.

With fuel running low, the aircraft headed for one of the Mid-Canada Line stations in northern Manitoba. By the time it reached its destination, night had fallen, and its pilot was faced with the problem of getting down on to an emergency airstrip intended for use only in daylight hours.

Under the direction of the unit's C.O., however, tomato-cans, filled with fuel oil and sawdust, were placed along the sides of the strip and ignited; and all available motor vehicles were lined up with their headlights shining.

The aircraft landed safely, and Hadlagro was rushed to the small station hospital, where Dr. P. D. Naidu, a native of India employed by the Bell Telephone Co., removed a large cyst from her throat.

3-10. ARCTIC AIRLIFT

Vol. 10, No. 3 (April 1958)

This month the R.C.A.F. conducted its semi-annual airlift of supplies to the far north, carrying everything from helicopters and bulldozers to radio tubes. The resupply of Department of Transport weather stations has been a standing commitment for some years, but the present operation and the one last fall were especially large due to the increased activity in the arctic during the International Geophysical Year.

The C119s of 435 and 436 Squadrons work out of Resolute Bay, making trips to such remote D.O.T. stations as Alert and Eureka on Ellesmere Island, Mould Bay on Prince Patrick Island and Isachsen on Ellef Ringnes Island. Needless to say, their arrival at these tiny outposts is heralded as the big event of the season.

Weather is the greatest hazard, just as it was in the days of the early explorers. This is the land where Franklin and many others died of hunger and exposure. Aircrews look down on the route of Captain G. S. Nares, R.N., who in 1875-76 sailed in H.M.S. "Alert" almost to the northern tip of Ellesmere Island. They fly over Cape Sabine, where in 1884 Lieutenant A. W. Greely and his U.S. Army group were marooned for weeks, existing on a diet of shrimps, boots, seal skin, moss and lichens. In 1948 a party of R.C.A.F. officers located the cairn erected by Commander R. E. Peary, U.S.N., during his bid for the North Pole over 40 years previously.

Every man concerned with the resupply operation is keen to complete the task in the shortest possible time. Maintenance personnel pounce on the aircraft as soon as engines are cut. The cold temperatures contribute to gas leaks, oleo legs going flat, blown oil tank and metal supports. Air movements personnel display great ingenuity in loading the C119s – particularly when confronted with such items as the H19 helicopter.

When the "flying boxcars" land at the airstrips, aircrews turn stevedores. Crewman and engineer jump out the aft doors and open the cam shell, navigator and radio officer run to untie the load, while pilot and first officer start pushing it out into the waiting arms of the weather station operators. A spontaneous competition between aircrews has developed, and last fall's "C119 Unloading Championship" was claimed by a crew of 435 Squadron who unloaded their aircraft in three and one half minutes – bettering by a few seconds the mark set previously by a 436 Squadron crew.

3-11. OPERATION RE-SUPPLY

Photostory By Corporals G. A. Walker And W. M. Noice

Vol. 11, No. 5 (June 1959)

Semi-Annual Arctic Airlift Has Become Routine For A.T.C.

Air Transport Command has again successfully completed spring re-supply of the Canadian and U.S. weather stations across the top of the world. C119 *Flying Boxcars* from Nos. 435 and 436 Squadrons, based respectively at Namao, Alta., and Downsview, Ont., carried, in a little over a week, a total of nearly one and a quarter million pounds of mixed freight.

Early in April aircraft and ground maintenance crews of the two squadrons converged on Resolute Bay, to set about the 24-hour-a-day task of re-stocking supplies after the long winter at such isolated bases as Isachsen, Mould Bay, Eureka and Alert.

In charge was Squadron Leader D. R. Miller, a member of 435 Squadron and a veteran of arctic flying, who was bossing his second re-supply operation within a year. Goods stored at Resolute from ships which arrived the previous summer and last minute items ferried in from Churchill, a railhead and jumping off point 965 miles south, were sorted and prepared for airlift by Flying Officer W. J. Forbes, officer in charge of air movements at Namao, and his crew of 18 airmen from both 435 and 436 Squadrons.

Timing reflected the urgency of the operation, which had to be completed before thawing rendered frozen landing strips unserviceable. The *Flying boxcars* flew as much as 16 hours a day each. This feat was accomplished through the use of two air crews and expert maintenance.

Working 12-hour shifts, the ground crews at Resolute serviced aircraft in less than an hour - refueling, re-oiling, checking minor defects and re-loading. Flying Officer W. H. Adams headed up the ground maintenance crew of 40 men from the two squadrons. At the destination unit, tractors and sleds were drawn up awaiting the C119's arrival and every available man pressed into the task of unloading as soon as the clamshell doors were opened and the ramp in place. Turnaround time averaged five minutes.

The Canadian Department of Transport and the United States Weather Bureau took advantage of these flights to change personnel. Replacements did not have long to chat with their predecessors before the aircraft headed back to Resolute for another load and another station.

3-12. AIR TRANSPORT IN THE ARCTIC

Vol. 12, No. 4 (May 1960)

RCAF interests in the far north have been entrusted, for some years now, chiefly to Air Transport Command. To the men and machines of ATC falls the task of providing the vital link between settled areas of Canada and the northern frontier.

As a matter of routine the ATC organization twice yearly engages in a mammoth airlift operation into rugged country under difficult conditions. On these occasions aircraft are flown long distances over a terrain devoid of landmarks and almost completely lacking in navigational aids, then landed either on ice strips or crude runways scraped out on land. Flying skill is taxed further by the need to land the heavily-laden transports on small runways following approaches over high hills. During hours of darkness flarepots, fashioned from tincans, provide makeshift illumination.

In addition to C-119s the venerable *Lancasters* and *North Stars* also operate in the far north, the former with No. 408 Squadron (see page 28) and the latter with No. 426 and No. 412 Squadrons and No. 4 Transport OTU, Number 426 Squadron fly *North Stars* to the Arctic on a regular weekly schedule (see map on page 22) plus additional flights on an, as required, basis.

Although No. 412 Squadron does not fly into the Arctic as frequently as other ATC squadrons it does not completely ignore the north. Training flights are carried out as far north as the Pole with landings at Resolute Bay, Thule (Greenland), Goose Bay or Coral Harbour.

Number 4 Transport OTU engages in northern flying as part of its regular curriculum. Each course must participate in flights to Goose Bay and Whitehorse as well as overseas and, when time permits, to Churchill and Resolute Bay as well.

3-13. "NO SWEAT" IN THE ARCTIC

By Flight Lieutenant V. W. Eldridge

Vol. 13, No. 3 (April 1961)

The route from Thule to Canada's Ellesmere Island has some of the most beautiful scenery in the world. This river of ice flows into Kane Basin.

Burning sands and equatorial heat for No. 426 (Transport) Squadron have meant extra arctic operations for its contemporaries in Canada. Since the Congo commitment began early last summer, northern domestic scheduled runs have been shared by Nos. 435 and 436 Sqns., based at Namao and Downsview, respectively.

Each Monday a C119 of No. 436 departs from Trenton on Service Flight 5/6, commonly known as "Iceburg". Stopping at Winnipeg, Churchill, Resolute Bay,

Thule and Alert, this S/F alone accounts for 200 extra flying hours a month for the “Elephant Squadron.”

Come with us on a typical “Iceberg” round trip. Our crew consists of F/L E. Cooke, F/L J. Camire, F/O J. Ridyard, F/O R. Lomheim, FS R. Nott, Cpl. W. Prokuda, LAC G. Williams and myself.

We flew from our Downsview base to Trenton Sunday afternoon so that the freight could be loaded for the first leg of our journey to Winnipeg Monday morning. More freight and passengers were taken on at Winnipeg, a stop was made overnight at Churchill, then away the C119 roared with a capacity load heading north of the Arctic Circle.

About half way between Churchill and Resolute we noticed a slight difference in the frequency reception of ground stations at Churchill, Resolute Bay, Goose Bay and Trenton. Experience has shown that when wishing to pass traffic to several stations operating on the same frequency, but some distance apart, to improve reception it is necessary to backtune to the ground station you wish to work.

Now began a series of weird atmospheric changes. Approximately every ten minutes when the frequency was tested the signal strength varied from one to four. It was necessary to change frequency several times within a few minutes to pass traffic. First Churchill would be loud and clear, when Churchill faded Resolute Bay could be heard, then Goose Bay kindly offered to pass traffic. On a later message a switch to DOT at Frobisher was necessary. A few minutes later Frobisher faded and we contacted Thule, Greenland, with good results. Still on the same USAF frequency, Guam could be heard talking to Honolulu about strength five. In fact, in the arctic island area, traffic can be passed a lot easier between east and west than between much closer points on the north and south circuit.

CROWDED RESOLUTE

On arrival at Resolute Bay six and a half hours later the OC, S/L B. Millikan, met the aircraft with a happy grin and said, “There is a message for you to return to Churchill for another load!” The Resolute Bay station looked like an international airport. There were oil drilling rigs, bearded engineers, scientists from the Defence Research Board and females! As soon as the *Boxcar* unloaded, about 50 eager passengers surrounded the aircraft. However, with the priority freight to be airlifted, only 28 could be carried south.

After refuelling the crew piled into an open truck and, with their parkas tight over their ears, drove to the RCAF mess hall. It was the meal hour and the combined mess was jammed to capacity. The dress was very casual. Most of the men were bearded civilians attired in bush clothes and looking every inch the prospectors, oil drillers or base metal experts that they were. There was the distinguished looking stock broker from Bay Street, Toronto. The English oil millionaire and one of Canada’s top base metal experts were casually mentioning rich finds or glowing prospects for Canada’s

arctic islands. Nearby airmen gasped as they heard conversations about deals involving hundreds of thousands of dollars. A girl strolled down the corridor of “never never land” – the officers quarters. One of the staff advised that she was Molly Beale, a civilian pilot. The quarters had been turned into sort of a hotel, as there was just no other accommodation available for the civilian visitors.

As the crew returned to their aircraft, a helicopter slipped in for a landing alongside the C119. It was carrying a young woman from the DOT ship *CD Howe*, anchored in the ice-filled bay. In fact three girls were brought ashore from the ship, all members of the Department of Northern Affairs. Yes, Resolute Bay had certainly changed for the better.

As the C119 roared off the runway and across the bay, a total of four ships could be seen riding at anchor. They were waiting for the ice to shift so that supplies could be landed.

COMMUNICATIONS PROBLEMS

There seem to be two extremes in communications in the Arctic, very good and blanko. During the good period the radio officer can maintain contact with half a dozen stations on as many frequencies. During the blackout period you are hard pressed to even pass position reports and this is done by the “buddy system” between aircraft. However, when there are no buddies in the air at the time, the radio officer is being pounded on the back every five minutes by an impatient pilot wanting the weather reports of destination and alternate stations, or a frustrated navigator demanding the met winds from zero to 20,000 feet!

The crew arrived back at Churchill and, after a crew rest, were airborne for Resolute Bay with another load. About three hours flying time from Resolute a message was received stating that the weather at our destination had dropped below limits. The weather for Thule, Greenland, was 300 feet and one mile visibility in fog. A decision was made to divert to a landing strip near a DEW Line radar station. The weather was closing in and other aircraft were heading for those aerodromes still open. The radar network was busy vectoring in anxious crews to the closest aerodrome. Our captain, F/L E. Cooke, located the gravel strip through the gathering murk and expertly landed the C119 without a bounce, despite the rough runway surface.

As usual, accommodation was a big problem but the CO managed to locate enough beds for crew and passengers. It was necessary to use the rooms of those personnel away on leave. This was certainly a lot better than using sleeping bags on the aircraft. The food at the radar station was the very best. The main meal consisted of steak and for desert there were a dozen different types of pastries to choose from.

The crew were confronted with the usual built-in problem of flight planning a trip further north from a DEW Line station, including the inevitable delay in obtaining weather reports. There were a number of crews waiting in the radio shack.

After waiting an hour the radio officer went out to the C119, started the auxiliary power unit and contacted Resolute Bay and Thule, direct. With this weather information now available the balance of the flight to Resolute was completed. It had been planned to continue the airlift to Thule, but the weather soured and this leg of the trip had to be delayed.

GREENLAND VISIT

Our plan was to depart Resolute for Thule at 6 a.m., but the wind howled at 60 mph most of the day. In addition, the Thule airbase was fogged in – a common occurrence during the summer months. It was necessary to wait at Resolute Bay three days before the wind abated. As soon as the wind dropped, the crew were rushed to the aircraft. It would mean missing a meal but that was the usual life when flying in the far north. You slept when tired and, as the mess hall was open round the clock, one could eat when hungry. With the 24 hours of daylight the work shifts went on accordingly.

We landed at Thule with the aid of Ground Controlled Approach, coming in under a 300 ft. ceiling. It was the first trip to Thule for F/O Ridyard and he exclaimed, “Man, if I had known that the runway was located between those hills I would have been kind of worried.” The veteran arctic flyers of the group laughed but secretly agreed.

The cloud lifted above limits and the *Boxcar* again headed for Resolute Bay. Radio reception this time was excellent. Reports from the Joint Canadian/American stations could be heard. Even the ice stations, located out in the Arctic Ocean, were reporting at their scheduled times. One ice station gave an electrifying report of a polar bear attacking their camp a few minutes before. The bear was finally killed 20 feet from the tent.

As the C119 landed at Resolute Bay eager, happy passengers gathered around the aircraft. As soon as it was refueled, we made a direct flight to Churchill. After obtaining a 12-hour crew rest, the flight to Winnipeg, Trenton and Toronto was completed. This meant another 18-hour work day subsisting on box lunches, but the return to summer was well worth it. Another routine operation was completed.

3-14. NORTH OF 74

Story by Squadron Leader R. M. Bowdery

Vol. 13, No. 10 (December 1961)

Each December RCAF aircraft fly over Canada's northern units to airdrop panniers of Christmas mail and supplies to snowbound Arctic weather stations.

The Christmas airdrop, called "Operation Santa Claus", is carried out by Air Transport Command during the full moon period and is, this year, scheduled to begin 20 December. Drops will be made at Isachsen, Alert, Mould Bay and Eureka. All of these stations are well north of 74° N. Latitude, and are under the velvet of total darkness from early December until early February.

The sound of aircraft engines sends the men at the weather stations into hurried activity. Previously prepared "torches," 45 gallon drums full of gasoline and old crankcase oil, are quickly lit and the lights of all available vehicles pinpoint the drop area. Panniers are pushed out of the rear of *Flying Boxcar* or *Hercules* aircraft and gently float to earth under the canopies of time-expired personnel chutes.

Following each drop the aircrew circle and search for the winking light from below which they hope will tell them "All OK. Thanks, Merry Christmas!" before they wheel up and away and head to the next drop zone on their Christmas list.

Men at the weather satellites eagerly anticipate the RCAF's arrival at other times of the year as well. Fall and spring airlifts by Transport Command squadrons bring in supplies to last the long months between.

Arctic Airlift 61, carried out by men and machines from No. 435 Sqn. was a typical fall re-supply operation. Over 758,000 pounds of food, freight and equipment were airlifted to Canada's northern weather stations from the USAF base at Thule and the RCAF air base at Resolute.

Two *Hercules* departed RCAF Station Namao, landing at Thule some five hours later. These big, work-hungry transports carried a complement of three full aircrews and a 27-man maintenance crew under F/L J. H. Oldham and FS L. J. Funk. A troop of 21 air movements men under F/O T. A. Robson and Sgt. R. G. Rogers accompanied the aircraft to assist in loading.

The first phase of the operation was performed from Thule AFB on the west coast of Greenland. Over 137 tons were carried between the US base and Alert. On the northern tip of Ellesmere Island, F/L C. N. Agar, skipper of one of the first trips into Alert, waved a perfunctory hand in a northerly direction and said, "There's nothing between us and Ivan but a lot of ice, snow and cold clear water." Alert is Canada's most northerly inhabited spot, lying a mere 450 miles from the North Pole. The nine flights into Alert, each averaging over 31,000 pounds payload, were completed in less than 48 hours.

The operation then moved to Resolute Bay, where the sudden increase in population had men sleeping in improvised quarters in the warehouse, the canteen and every other available nook and cranny. One tired soul was roused from a fitful

slumber on the pool table by S/L E. D. Stuart, Command padre, as he prepared to set up a Thursday morning church service.

“The boys didn’t worry too much about the tight accommodation,” wryly commented FS Funk. “Most of them were working a full 18 hour day and could have slept standing up.”

Air Transport Command’s motto “Versatile and Ready” was graphically illustrated when F/L Agar and F/L F. J. Fay, within a week of flying their aircraft to a field 450 miles from the North Pole, landed their C-130B at Nijili airport, four degrees below the equator*. Two *Flying Boxcars* were dispatched to Resolute to replace the *Hercules* which had been rerouted to the Congo.

The operation progressed despite poor weather at the satellites. Marginal weather at destination airfields means changed flight plans and delayed decisions. Under these conditions aircraft loaded and ready to go to one station might have to be unloaded and re-loaded with freight for another field which might suddenly clear. Eureka proved to be the base most plagued by weather. Other satellites were serviced in rapid order.

Mould Bay, some 375 miles distant on Melville Island, received 257,000 pounds in six C-130B and four C-119 trips; 209,000 pounds travelled the 275 miles to Isachsen on Ellef Ringnes Island in seven C-130B and four C-119 trips. The 26,000 pounds destined for Eureka were flown in as weather permitted, usually as partial loads on other flights. F/L F. B. Dimond set something of a record—four C-130B trips from Resolute to Isachsen in 12 hours, flying in nearly 72 tons of freight.

Return trips were usually empty; however, there was a requirement for retrograde airlift of 1500 empty 45-gallon oil drums and a D2 caterpillar tractor. C-130B loads of drums gradually increased from 250 towards the 300 mark as crews became more experienced at loading them in their aircraft. Again, F/L Dimond and his crew were “top dogs”, with a load of 323 oil drums on one trip.

Speaking of dogs, Corporal W. D. Carmichael doesn’t want to hear the word for a good long while. He and a group of friends made a fine catch of Arctic char, carefully cleaned and cached the wrapped fish in a snow drift near their barracks. On “D Day” (Departure Day) they found that most of the trout had been either eaten or severely mutilated by a band of marauding malemites from the local Eskimo village.

Last plane out of Resolute was a C-119 piloted by S/L W. J. Buchan, operation commander.

“That’s another one over”, he stated as he lifted his aircraft off the snow covered runway at Resolute and set course for Namao. “You know, it never ceases to amaze me how hard and cheerfully everyone works on these operations, Must be this sharp northern air.”

* Two *Flying Boxcars* from No. 436 Sqn. in Toronto had been ordered to the Congo for United Nations Air Transport Force Support. The *Hercules* out of Resolute has been re-routed to the Congo as back-up for the C-119s on their long flight.

Or perhaps it's a keen sense of pride in doing a worthwhile job and making sure that Air Transport Command is always "Versatile and Ready".

3-15. RECORD ARCTIC AIRLIFT

Vol. 14, No. 10 (December 1962)

Canadian children will be casting anxious eyes into the northern sky later this month, hoping to catch a glimpse of a white-bearded, red-suited gentleman aboard a toy-laden, reindeer-drawn sleigh. As in previous years, they will follow his progress southward by radio, as reports are flashed from DEW Line, Mid-Canada and Pinetree stations to the news media of the land.

Meantime, the RCAF's annual Christmas supply-drop to men at DOT's Arctic weather stations will be conducted by No. 435 Sqn. crews in *Hercules* aircraft – backed up, if necessary, by No. 436 Sqn. *Flying Boxcars*. No strangers to those high northern latitudes, the Namao-based airmen earlier this year completed Operation Boxtop Seven – establishing a record for RCAF airlifts which will be difficult to surpass.

Two *Hercules* flew 113 round trips from Thule, Greenland, to Alert, on the northern tip of Ellesmere Island, carrying 3,773,212 pounds of fuel, oil and supplies. A flight was made every three hours for two weeks except for one 12-hour period when the operation was postponed due to high winds at the USAF base at Thule.

Fifty-five RCAF personnel, including four complete aircrews, operated round-the-clock to move the record cargo to the gravel airstrip at Alert, the most northerly inhabited location in the world. Every one of the 113 flights was made with near-capacity loads of 35,000 pounds regardless of type of cargo. This airlift more than doubled the previous record load for similar operations.

3-16. TO THE TOP OF THE WORLD BY AIRSHIP

By Wing Commander K. R. Greenaway

Vol. 12, no. 4 (May 1960)

In 1958 I was senior navigator aboard the first airship to penetrate the Arctic in more than a quarter of a century. We made the 4700 nautical mile round-trip in a United States Navy ZPG-2, at no time exceeding an altitude of 2100 feet above sea level, to evaluate the use of lighter-than-air craft in supporting arctic research.

No airship had flown over the North American Arctic since the *Norge* travelled from Kings Bay, Spitzbergen, to Teller, Alaska, via the pole in May 1926. However, in July 1931 the *Graf Zeppelin*, with the late Dr. Hugo Eckener in command, flew over the Barents and Kara Seas north of the U.S.S.R.

Our departure point was the USN Air Development Centre, South Weymouth, Mass., and destination was Ice Island T-3, on which was located an I.G.Y. scientific research team. Our airship was of standard configuration, measuring 348 feet in overall length and 110 feet in height. Powered by two engines, the ZPG-2 could maintain an airspeed of 40-43 knots for 75 hours with a 14-man crew, provisions and survival equipment and about 4000 lbs (350 cu ft) of useful lift available for cargo. The still air range was 3000 nautical miles under these conditions.

ROUTES

Resolute Bay, Cornwallis Island, was selected as the northern base for the operation. Several factors had to be considered when choosing the route and planning the flight. For economical cruising an airship should be flown at low altitude on long range flights. When the airship climbed, the pressure ceiling of the ballonets was usually exceeded and helium had to be released; this reduced the lift capability and an increase in engine power was required to offset the loss in lift, accompanied by an adverse effect on range. Ideally, the engines should be used for forward motion only. Air temperatures were another factor to be considered. An increase in temperature caused the helium to expand and when the pressure limits of the ballonets were reached, helium was released and the subsequent loss in lift was offset by an increase in engine power.

An inland route via Fort Churchill was chosen because of its shorter distance and prevailing light winds, although a lower flight altitude could have been maintained on the coastal route. However, the inland route presented no altitude problem as a detailed inspection of topographical maps revealed that the route could be flown at 2000 feet or less, above mean sea level. The increase in air temperature over the land during the day was not considered sufficient to cause trouble. This, of course, was not the case as we found later.

PREPARATIONS

All unnecessary equipment was removed from the airship to reduce the weight, and several modifications were made to adapt the ship for high latitude operations. The gyro magnetic compass was modified to cut out magnetic slaving of the directional gyro so that the compass system could be used beyond Churchill where the magnetic heading became unreliable. An N-1 gyro compass system was also installed as a safety measure. The extra effort to install the second compass system paid off; shortly after leaving Churchill, the primary gyro compass failed and the N-1 was used to maintain direction for the remainder of the operation.

In order to use the sun for heading checks, regardless of its relative bearing, astro compass mounts were installed in four positions, two fore and two aft.

A development model of the APN-77, a doppler navigation system for helicopters, was installed to provide drift and ground-speed information when over the Arctic Ocean. Unfortunately, this equipment went unserviceable before reaching the area. Neither the APS-33 search radar, which was one of the primary navigation aids, nor the driftmeter, required modifying for use in northern latitudes.

During June and early July, a party from the Naval Air Development Unit visited Ottawa to arrange for the use of Churchill and Resolute Bay. Helium, mooring facilities, and ground handling personnel were required at both bases. Temporary masts were erected at Churchill and Resolute Bay; two flights were required to airlift the masts. Thirty men were needed at each site to assist in ground handling the airship, in addition to the seven key ground handling personnel flown in by the support aircraft. Ground handling personnel were provided by the US Army First Arctic Test Centre at Fort Churchill and the RCAF at Resolute Bay. Arrangements were made to use the limited helium supplies retained by the US Army at Churchill and the US Weather Bureau at Resolute Bay, if required.

Our airship flight crew consisted of four pilots, two navigators, two flight mechanics, two riggers, two electronic technicians, one radio man, and one electrician.

Two Canadian observers took part in the operation, namely, Commodore O.C.S. Robertson, RCN, Canadian Joint Staff, Washington, and Mr. N. Gray, Dept. of Mines and Technical Surveys. All observers took part in the arctic portion of the flight, but several of the group travelled to and from the area with the support group personnel in a *Constellation*.

SOUTH WEYMOUTH TO AKRON

We planned to fly all the way to Churchill under 2000 ft. above sea level by following the Hudson Valley to Albany, the Mohawk Valley to Lake Ontario, across the Rideau Lakes to the Ottawa River, up the Ottawa Valley to Earlton, and then direct to Churchill, a distance of about 1460 nautical miles. The flying time would be 36 hours under normal cruise conditions, and without a headwind.

The airship departed for Churchill at 2300 hrs. on 27 July, so as to take advantage of the lower night temperatures for the initial stage of the flight when the airship would be at maximum weight. Higher air temperatures and more widespread fog and cloud than had been forecast were encountered shortly after take-off. The possibility of navigating the Hudson Valley at the flight plan altitude of 1500 ft. was ruled out and the airship was diverted to Lakehurst Naval Air Station, the most favourable base. The ceiling at South Weymouth had dropped below minimum.

Favourable winds and slightly lower temperatures were forecast for 30 July and we took off at 0500 hrs. The flight up the Hudson and Mohawk valleys was made in daylight in good visibility at an altitude of 800 ft; at noon the airship passed over Kingston, Ontario, and headed for the Ottawa Valley. Again, high air temperatures

plagued the operation and helium had to be released frequently to keep within the pressure limits of the ballonets. Higher and higher power settings had to be used as the lift capability was reduced. This raised the fuel consumption beyond acceptable limits and made it impossible to reach Churchill. A decision was made to divert to Akron, Ohio, where the Goodyear Aviation Co. had suitable facilities. Cleveland was reached at dark, but severe thunderstorms along the south shore of Lake Erie throughout the night prevented mooring until 0900 hrs. the next morning. The night was spent over Lake Erie, a safe distance off shore.

At Akron the ship was lightened to the maximum extent commensurate with flight safety and crew fatigue. The crew complement was reduced by one pilot and four technicians, and about 1000 lbs. of equipment was unloaded. The two failures to reach Churchill clearly indicated that another attempt should not be made until surface temperatures along the route dropped from the mid-80's to the low-70's.

AKRON TO CHURCHILL

By 2 August the temperature had dropped, and with a forecast of favourable winds the airship departed Akron airport at 0130, 3 August, and headed across Lake Erie and western Ontario to Lake Huron. The Akron-Churchill flight was planned to take advantage of the lower temperatures over the water, by following Lake Huron to Sault Ste Marie and across Lake Superior to Lake Nipigon, and then direct to Churchill. Arrangements were made by the support group, waiting at Churchill, to refuel at Lakehead Airport if fuel consumption was again higher than predicted. In the afternoon, 15 hours after departing Akron, the airship was over Lake Superior abeam Lakehead Airport. Although the flight was proceeding as planned, it was decided to take advantage of the excellent weather at Lakehead Airport and take on extra fuel as an added precaution.

The airship landed on the runway and was refueled on the taxiway without mooring. A fuel truck with an extra long hose was used to refuel and the airship was kept in position by means of the engines assisted by about 25 ground handlers. The operation, which included taking on 1000 gallons of fuel, extra oil and two relief pilots, was accomplished in 40 minutes, much less time than that required to untangle the traffic jam on the roads leading to the airport caused by the airship's arrival.

After refuelling, the airship departed for Churchill via Lake Nipigon and Trout Lake, arriving at 0730 on the morning of 4 August, 32 hours after leaving Akron.

While circling the Churchill area, waiting for the ground handling crew to assemble, we saw a herd of at least 200 white whales, including many calves, in the mouth of the Churchill River and in the bay to the east of the river mouth. After our second pass over the river mouth at 50 ft. the whales became alarmed and headed for the open bay. The airship provided an excellent platform for observing their activities. By 0900 the mooring operation had been completed.

High winds delayed our departure for Resolute Bay for two days. Normally, local high winds would not have affected take-off; however, due to a deep ditch and rough ground near the mast, the airship could not be safely maneuvered. Several times during the delay gusts up to 50 m.p.h. were measured. Although the temporary mast was not designed to withstand winds over 30 m.p.h., it held the airship with no apparent difficulty. A crew remained aboard during the blow in case an emergency arose.

By the morning of 7 August, the winds had decreased to almost a calm and the enroute weather was favourable; nothing worse than a crosswind component was forecast. The flight plan distance via Roes Welcome Sound was 1080 nautical miles and the flying time was estimated to be about one day.

Take-off was made in fog. At 500 ft. the airship emerged on top and we set course for Roes Welcome Sound. In the vicinity of Marble Island the fog and cloud dissipated and the weather remained clear until we reached the Gulf of Boothia. Shortly after leaving Churchill, the primary compass system failed and the N-1 system, installed for such an emergency, was used for the remainder of the flight.

We noticed several polar bears on the pans of ice off Chesterfield Inlet. As soon as the airship approached, they became panic stricken, diving and swimming first in one direction and then the other. One bear dived into the water dragging a partially eaten seal.

Roe Isthmus was crossed in twilight and clear weather. On entering Committee Bay, fog covered the water area and the remainder of the flight was made at 800 ft. while flying between the fog bank and intermittent layers of stratus. The N-1 Gyro held a steady heading during the many hours when no sun sight was possible. It was fortunate that the primary direction system failed when in good weather over Hudson Bay and not while flying between layers in Prince Regent Inlet. Radar bearings from prominent landmarks were used to maintain track.

At Resolute Bay the ceiling was 300 ft. and the radar was used to assist the instrument approach. An excellent landing was made under adverse conditions at 0830 on 8 August, 24 hours after departing Churchill.

RESOLUTE BAY VIA T-3 TO CHURCHILL

The temporary mooring mast had been erected 300 yards to the west of the Resolute Bay runway. The RCAF personnel, on short notice, had done an excellent job of grading the mooring area and preparing a taxiway. In the process, however, the permafrost had been exposed and the surface was muddy and soft in spots.

Taxiing to the mast and the mooring was carried out without difficulty, but the problem of getting the airship, with maximum fuel load, back to the runway over the soft taxiway caused some concern. Several flights out of Resolute Bay had been planned, but in view of the poor condition of the taxiway, it was decided to make

only one 40-hour flight: crossing the Archipelago to T-3 at 79N 121W and then proceeding to Ellesmere Island before returning to Resolute Bay.

Light winds and clear skies were forecast for the next 36 hours for the western part of the Archipelago and along the route to T-3. Hence, only a 12-hour stop was planned and takeoff was set for 0900 local time. As had been expected, difficulty was experienced in getting the airship from the mast to the runway. At one point, even a forklift was used to help extract the starboard undercarriage from a soft spot in the taxiway. As a result, the take-off was delayed four hours.

On reaching an altitude of 500 ft. we set a westerly heading for the southwest tip of the Bathurst Island group. When off Cape Cockburn, we set course direct to Mackenzie King Island passing to the east of Byam Martin Island. This route was the shortest low altitude flight path across the Archipelago to T-3. Ideal weather prevailed, the winds were light and the visibility unlimited. No open water or leads were seen between Byam Martin Island and Mackenzie King Island. Six caribou were observed a short distance inland from the east coast of Mackenzie King Island.

Low stratus and fog covered most of the remainder of the route to T-3. Tops of the clouds and the fog varied between 300-800 ft. No icing was encountered when flying through the ragged tops of the layers as the air temperature was several degrees above freezing. The fog and clouds were broken sufficiently to permit drift observations and to make heading checks by using the reflection of the sun on open patches of water. The configuration of the airship prevented observing the sun direct when checking the heading. The final alteration of course was made with the aid of a radio compass bearing on the beacon at T-3. On reaching T-3, altitude was reduced to 200 ft. but visibility was poor and no attempt was made to unload the scientific gear; however, bags of mail were dropped.

After spending about an hour in the vicinity of T-3, we headed for Resolute Bay via Borden Island, the Findlay Group and the Bathurst Islands. By returning direct to Resolute Bay we had sufficient fuel to continue on to Churchill if the weather were favourable, thus avoiding the hazardous ground conditions at Resolute Bay. Stratus cloud and fog, topped at 500-800 ft., prevailed until reaching Borden Island where the skies became clear. We observed 12 caribou on Lougheed Island, and eight muskox and a polar bear inland from the head of May Inlet, Bathurst Island.

Seventeen hours after departing, the airship was again over Resolute Bay. After consultation with the meteorological officer by radio, we decided to proceed direct to Churchill as 36 hours fuel remained and the flight time to Churchill was estimated to be 27 hours in good weather. The flight crew, as well as the support personnel, were greatly relieved at not having to face a second landing at Resolute Bay with the possibility of encountering serious trouble taxing to and from the mast. Weather conditions were excellent along the return route, and on the evening of 10 August Churchill came in sight, 44 hours after the original departure from Resolute Bay.

CHURCHILL TO SOUTH WEYMOUTH

Radio reports received while approaching Churchill indicated that the favourable flight weather over Ontario would hold for another 36 hours. As a result, it was decided to depart for South Weymouth immediately after refuelling. The airship was held on the runway by the engines and ground handling personnel. Sufficient fuel for the flight to South Weymouth was pumped on board. I checked the weather charts and filed the flight plan during the refuelling.

At 2240 hrs. we cleared Churchill and set course for South Weymouth. Shortly after sunrise, the Severn River was crossed and at noon the airship passed over Cochrane, Ontario, causing considerable excitement. Nearly everyone in town was out in the streets. During the evening, several thunderstorms were circumnavigated north of Mattawa, Ontario, but otherwise the flight across Ontario and down the Ottawa River, across the Rideau Lakes to Lake Ontario, and down the Mohawk Valley and Hudson Valley, was uneventful. At 0825, 12 August we landed at South Weymouth, 32 hours after departing Churchill, and almost 78 hours of continuous flight after taking off from Resolute Bay on 8 August.

The operation demonstrated that a ZPG-2 airship can provide low altitude, slow speed, visual and photographic reconnaissance over a wide radius in the Arctic, and, in addition, it is an excellent platform for scientific investigations.

SECTION 4:

ARCTIC SURVIVAL

4-1. THIS IS THE ARCTIC

By Mr. R. A. J. Phillips And Mr. G. F. Parsons

Cartoons By Mr. W. Rudnicki

Department of Northern Affairs and National Resources

Vol. 12, No. 4 (May 1960)

So, you have been posted to the Arctic. If you feel slightly lost, don't worry: it's a natural reaction. The size of the country would intimidate a Texan and its remoteness makes Montrealers moan for their favourite night-clubs. Adjusting yourself to life in the north can be tough and it calls for the right approach.

You may be working at a DEW Line site, weather station, trading post, school or mine. You may be just touring. In any case, remember how lucky you are. You are the one in a hundred living in Canada who ever sees the most fabulous part of the country. Less than one in a thousand Canadians live in the Arctic now. You're about to have a unique experience, the kind you'll be recounting (with suitable exaggerations) to your grandchildren on long evenings by an atomic fireplace. You came north with certain ready-made ideas about the country. You thought the Arctic was rugged, and it is. But the Arctic has compensations for anyone with a normal share of curiosity who can learn to relax and enjoy it.

WHAT IS THE ARCTIC?

So many people have so many mixed-up ideas about the Arctic, that it is easiest to begin by saying what the Arctic is not. In the first place, it is not just the country north of the Arctic Circle. It is not a perpetually frozen waste where nothing grows. Even in winter, it is not buried under a blanket of snow yards deep. It is not always drab or colourless and it was never lifeless. It is not dark all winter and sunny all summer. The reason the people of the Arctic have lived here for thousands of years is not that they don't have enough sense to move somewhere else. They are here because they like it. Most important of all, the Arctic is not just a million square miles of worthless real estate.

In the first place, the Arctic Circle does not mark the edge of the Arctic. The Circle is simply a line on the map marking the southern limits of the area around the Pole where for at least one day each year the sun doesn't rise and for at least another day the sun doesn't set. In the Arctic in summer you can be sunburned or stung by a bee, or bitten by more mosquitoes than you ever saw in Kazabazua. You can go fishing or you can collect flowers, but you cannot collect poison ivy, thorns in your fingers, snakes or bathing beauties. You can be kept awake all night with the sun shining in your eyes or you can be philosophical about it and play baseball at midnight. The Arctic probably has more lakes than all the rest of the world put together, yet it is one of the largest deserts on earth. The annual snowfall in most parts of the Arctic is less than in Ottawa or Toronto. The Arctic has one third the rainfall of Ottawa and what's less surprising, about a tenth of Vancouver's rainfall.

WHAT, NO TREES?

A definition has nothing to do with time or sunless days or shadeless nights. The extent of the Arctic is marked by climate and by the fact that trees do not grow there. The real boundary of the Arctic is the treeline.

Beginning near the mouth of the Mackenzie River, the treeline runs southeast to Churchill, skirts the shores of Hudson Bay, loops northward across the Ungava region of Quebec and bends southward again along the Labrador coast. Where it crosses the MacKenzie, the treeline is far north of the Arctic Circle; at Churchill, it is hundreds of miles south. Usually, the edge of the growth is not marked by a sharp line. Going north, the traveller sees that the trees become more and more stunted and gradually disappear. Generally trees will not grow where the average temperature of the warmest month of the year is less than 50 degrees Fahrenheit. This means that the treeline is also a temperature line. A belt of land that borders the treeline on the south is called the sub-Arctic. This belt is several hundreds of miles wide. Really a transitional zone between the Arctic and the temperate regions, the sub-Arctic has many features of climate and geography similar to the Arctic.

Together, the Arctic and sub-Arctic make up what we call the North. If taken to mean the area of the Northwest Territories and the Yukon, the North covers a million and a half square miles or 40% of Canada. It's big enough to contain more than half of the United States. One island in it, Ellesmere, is almost the size of England and Scotland combined, although it's not quite so crowded. Ellesmere's population is about 60 - not counting walrus, muskoxen, or ice-worms. Baffin Island, largest in the Arctic archipelago, is about the size of Manitoba.

The distances are tremendous. At the Arctic Circle you are still 1,600 miles from the North Pole. From Alert, the world's northernmost settlement, to Churchill, on the edge of the treeline, is 1,700 miles. If you are in Aklavik and you have a friend in Fort Chimo don't plan to visit him next Sunday. Fort Chimo (still in the Arctic) is 2,000 miles away.

HOW COLD IS IT?

It would be too much to ask the most tender tenderfoot to believe that the Arctic is not cold in winter. It's chilly, of course, but the coldest place in Canada is a long way from the Arctic; it's at Snag in the southern Yukon. Canada's driest air is in the polar regions and that makes the temperatures seem a lot higher than they really are. But, when low temperatures are combined with high winds, don't depend on an extra suit of long underwear to meet the situation.

The average daily temperature in January at Resolute (latitude 74 degrees) is 29 degrees below zero. In Yellowknife, a banana-belt town 700 miles to the south, it's only three degrees milder. Winter in Aklavik is no colder than winter in Churchill, 600 miles further south. Average January temperature at Whitehorse, capital of the Yukon, is actually warmer than at Winnipeg, just 70 miles north of the U.S. border. The main difference between Arctic and southern winters is in length. Winter lasts for eight or nine months in the Arctic.

WHO LIVES IN IT?

If you haven't learned yet to love your own plot of tundra, you may answer: nobody, at least not by choice. But nothing could be farther from the truth. Indians live in the sub-Arctic, some 5,000 of them; and they are free to move south any time they choose. About 11,000 Eskimos live in the Arctic and they wouldn't live anywhere else.

More impressively, there are 14,000 people, neither Indian nor Eskimo, living in the Northwest Territories and the Yukon. Not many were born there, but more and more of them are becoming permanent residents by choice. Ask some of these "immigrants" to the North (from the RCMP constable patrolling a 1,000 mile Barrens beat to the Yellowknife housewife tending her hollyhocks) if they could be tempted back to the used-up air of southern cities. Surprisingly often, the answer is "no".

This doesn't mean that the new northerners have thrown aside all the luxuries of civilization in a "back to nature" movement. That isn't necessary now. Most of them have managed to take the essential paraphernalia for modern living with them, and a bit more. Citizens of towns like Yellowknife and Whitehorse live like southern suburbanites in neat frame houses with central heating, indoor plumbing and electric refrigerators. Many of them have cars. In the Fort Smith district, which has no highways to the outside world, there are about 550 registered motor vehicles and 800 motor vehicles are registered at Yellowknife. The North is not populated just by trappers and hunters. There are commercial fishermen, riverboat captains, truck drivers, miners, lumbermen, oilmen, stenographers, storekeepers, real estate agents, nurses, doctors and editors. They don't all venture into the high Arctic but even far above the treeline occupations are varied.

Even the Indians are beginning to turn from the traditional hunting and trapping economy. More and more they are working as miners, stevedores and construction workers, particularly in summer. The northern Indians feel at home in the forest and they seldom go above the treeline. On the other hand, the Eskimos don't like to be fenced in. Preferring the Barrens to balsam, they stay away from trees. In fact, there are only three places in the North where the two peoples regularly meet: Aklavik on the Mackenzie Delta and Churchill and Great Whale River on Hudson Bay.

The Eskimos are unique. No other race, having so little to work with, has accomplished so much. For thousands of years these remarkable people have managed to make a living, with only primitive implements, in a country where until recently we with all our technical skills could scarcely exist for a season. More than that, the Eskimos found time and energy to develop a civilization and a pattern of living which is now having its influence worlds away.

WHAT GOOD IS IT?

This question can be answered almost with one word - minerals. Nearly every known mineral (many of them much more important than gold) underlies the "barren" rocks. No part of the Arctic is written off as a major source of minerals and there may come a day when some of Canada's biggest mines will be among the igloos. And minerals aren't the whole story. Vast resources of water power are there to be harnessed. For example, the headwaters of the Yukon River are estimated to have a potential of four and a half million horsepower. That is more than a quarter of the maximum total output of all hydro-electric plants now operating in Canada.

What's to stop the North? Not climate, people who can live happily through Manitoba or Saskatchewan winters shouldn't be discouraged by climate in the Arctic. It's a curious fact that civilization has been expanding northward ever since the dawn of history. It began in North America in Mexico and Yucatan and in the Old World along the valleys of the Euphrates and the Nile. For thousands of years, civilization has been converging from both sides of the world toward a common centre. This centre is the Arctic.

4-2. THE ARCTIC ARMOURER

By Sqn. Ldr. E. N. Henderson

Vol. 4, No. 2 (February 1952)*

INTRODUCTION

HELLO! - So you're the new armourer—I mean, the new munitions and weapons technician—all set to begin work up here in the frozen north? Good. And it sure *is* frozen this morning. Thirty-eight below outside.

Since this is your first day, we'll just take you around and show you what sort of work you'll be doing. As we go, you'll pick up quite a few of the "do's" and "don'ts" about servicing aircraft armament at sub-zero temperatures...

I expect you've heard that cold-weather operations present quite a few problems to armament personnel. And you've heard rightly. All the same, you'll find that some of the difficulties are really only routine and aren't necessarily peculiar to cold weather conditions. But, of course, any difficulty is easier to overcome under normal working conditions than when you're working in the open at thirty-eight below, encumbered by heavy winter clothing. The sharp edge of a fellow's keenness is apt to become a bit blunted under such conditions, and the prime object is to get the job over with and go back inside where it's warm.

We've been tackling the cold-weather problem for several seasons now, and many of the difficulties have been overcome—usually the hard way. Some still remain, though; and new problems will certainly rear their ugly heads with the arrival of new and different equipment. Nevertheless, if you watch how the chaps here go about their work, and take the same precautions that they do, you'll find it a lot easier to carry out your duties efficiently.

First of all, let's take a look at what the well-dressed arctic armourer is wearing.

* This article originally appeared as a report by the R.C.A.F. Winter Experimental Establishment, Edmonton. Based on six winters' experience under the severest possible conditions at Fort Churchill, Man., and Watson Lake, Y.T., its official title was "Armament Problems in Loading and Arming Aircraft in Cold Weather." Sqn. Ldr. Henderson, who wrote it, enlisted in the R.C.A.F. in 1940 and was posted to England in July 1941. He served with No. 400 Squadron until August 1943, when he was posted as Operations Officer to No. 39 Wing H.Q. Released from the Service in July 1945, he rejoined in January 1946, served for nearly two years at A.F.H.Q., and, after taking the Pre-Specialist Course at Camp Borden, was sent to the Winter Experimental Establishment in October 1949. Since the end of 1951, he has been employed on technical armament staff duties at R.C.A.F. Station St. Hubert.—Roundel Editor.

CLOTHING

Working outside at a temperature like today's, a man needs to be dressed for the occasion. You've been issued with your B-25 kit? Fine. You'll need it!—So take care of it and use it properly.

I hope you're wearing some sort of long underwear. Most of the boys around here find that the bottoms of flannelette pajamas meet the purpose. And I see that you've got on your wool turtleneck sweater. Okay: now put on the type-C overall trousers and the parka jacket. You'll find that ski-cap affair is just the thing underneath your parka. And now the sheepskin-lined boots and the mitts—inner and outer. By the way, you'd better get yourself a pair of light wool or cotton anti-contact gloves to wear under those mitts. You'll see why when you start working.

You may think you're a pretty bulky object to climb around an aeroplane and load guns and rockets and bombs. I agree; you are. But you can do it all right, and, as the song says, "you'll get used to it."

Well, now that you're dressed, let's go outside to the arming point and get the fighters ready for air firing.

ARMING FIGHTER AIRCRAFT

Let's start off with an easy one—a 50 calibre Browning installation in the wing. The gun and ammunition tanks are pretty accessible in a wing gun installation. So here's a screwdriver. Get up on the wing and remove the panel.

Having trouble already? Quite a job climbing on an aeroplane in full winter kit, isn't it? You'd better let someone help you or you'll be all morning trying to get started.

Just a minute—don't try to walk on that wing. Oops! There you go! Try it on all fours. It's the only safe way to move about on the wing when you're wearing snow-boots.

Now that you've got the panels up, let's take a look at the guns.—Hold it! Don't take your gloves off. If you touch those metal parts with your bare hands you'll get a bad frost-burn—or, if your hands are damp, you'll leave a layer of skin on the gun. Yes, I know it's awkward trying to open the breech-cover with mitts on, but, as I said before, you'll get used to it! This is one of the times you need those anti-contact gloves I was telling you about. If you're wearing them, you can take off the heavy mitts for a few moments to work with small parts that need a fine Italian touch.

All right, just cock the gun once or twice. The breech block moves quite normally, doesn't it? You'll find that the gun functions properly, too. It's been lubricated for this temperature with a light film of mineral oil—hydraulic buffer R.C.A.F. 34A/150 mixed with a 50% volume of kerosene. We use it on all moving parts—and when I say a light film, I mean a light film. The best way to apply the stuff is to soak a piece of clean four-by-two in the oil, wring it out, and then rub it

lightly over the bearing surfaces. At sub-zero temperatures, 34A/150 becomes extremely viscous. To-day, for example, it would be stiffer than heavy syrup—and you can imagine how that would gum up the working parts! There's no better way of guaranteeing stoppages than by over-lubrication at low temperatures.

Speaking of lubricants, we've found that a mixture of 75% oil—that is, 34A/150—and 25% kerosene is satisfactory for temperatures down to -40°F, but below that it's necessary to use 50% kerosene. To-day, since it's only 2° off forty below we're using the 50/50 mixture. We also use this mixture in the oil buffers of the 50-calibre guns.

Here's the ammunition coming. As soon as you've finished your D.I. we'll load the aeroplane for firing. It'll probably take you about ten minutes to load this morning, but once you're familiar with the installation and used to working in that get-up, you'll probably be able to do the job in five minutes or even less. Incidentally, when you charge the gun, be careful that the ejected rounds are picked up before they get lost in the snow.

Everything accounted for? Good. Now we'll go over to one of the jet fighters with 20 mm. guns in the fuselage.

This won't be quite as easy to work on—or rather, work under. The only way to get at the gun installation is to lie down on your back underneath the fuselage. Not that that should be too much of a hardship: the horizontal position comes naturally to most of us.

The riggers have already taken off the gun bay panels, so let's get started.

In this type of installation, the ideal arming team is a Mutt and Jeff combination—provided the big fellow loads the tanks and the little one gets underneath to work on the guns. The combination doesn't work quite so well in reverse. Since you're about average size, you'll be able to do either job. By the way, look out for any kerosene that may have been spilled under the aircraft. It'll soak into your parka and stay there. It's bad stuff. Quite apart from the smell of it, kerosene doesn't evaporate like gasoline, and your clothes lose their insulating properties. So put that tarpaulin underneath the fuselage before you get down on your back. Try to keep the kerosene off your mitts as well.

Those 20 mm. guns, like the 50-calibre Brownings, are fully operative despite the temperature. We use the same lubricants here as we do for the Brownings. A point to remember about 20 mm. guns is that if you find it necessary to wash the links before belting the ammunition, be very careful when you lubricate them again. See that you apply only the lightest film of oil. Excessive lubrication of the links at low temperatures will result in stoppages caused by adhesion of the links to the rounds, which will naturally slow the action of the B.F.M.

Now that the guns are ready, suppose we start loading the tanks. You might notice first that we use 50-round belts instead of the usual 25-round. Why? The reason's simple. When it's below zero, the fewer belts to join the better. Remember, you can't take your gloves off, and the ammunition is just as cold as everything else

here.

The ammunition hatches aren't very big, are they? You have to be careful when you're wearing those great big mitts. If the belt slips as you're lowering it down the chute, the chap underneath will get the whole load on his head. Yes, I know the mitts feel like boxing gloves—but just wait until you try putting the securing-pins in the ammunition chute after you've connected the belt up with the rounds leading into the B.F.M.'s! See what they feel like *then*.

Not too easy, was it? Let's go inside and get warm while the rigger puts the panels back. The coffee ought to be ready now, and we can talk in comfort.

* * *

That last job took just over half an hour. Not bad, considering it's your first attempt under these conditions. You'll find that most 20 mm. installations of that sort require about twenty minutes for loading and arming even when you're pretty good at it. That's one of the reasons we recommended making up 50-round belts in the cold weather—despite the fact that you've got to be pretty careful when handling them.

There's a bombing operation coming up after lunch, so we may as well spend the rest of the morning at the bomb dump, seeing how the boys are getting on with the fuzing.

Here's the truck. Let's go.

PREPARATION FOR BOMBING

We had a pretty heavy snowfall here yesterday, and it's taken half the morning for the snow-plough to clear the bomb dump road so that the trucks can get in with the trolleys to pick up the bombs. That's one of the reasons why a planned bomb dump layout is important for northern field storage. Stockpiles should be arranged so that snow-ploughs can get through the dump and clear the road up to the stacks without blocking other stacks. This isn't as easy as it sounds, when you take into consideration space limitations and explosive storage regulations. A fan-shaped or wide semicircular layout works pretty well, provided that available space and other local conditions permit. As you can see, we've been using a block pattern layout here, and snow clearance is certainly a problem. Sometimes the boys get out early in the morning and spend two hours cleaning the snow off the stacks, then along comes the plough to clean the roads and covers them in again.

Here's the first trolley-load of bombs.

Take this key-wrench and start removing the plugs ready for fuzing.—What's the trouble? Tight, eh? Well, that's not surprising. Those bombs are recent arrivals from the X Depot and the exploder pockets and threads are protected with heavy grease or luting. It's pretty well solid now.

Watch out there!—You're unscrewing the entire base plate. Try again.—Now you've got the complete exploder pocket out. You'll have to separate the plug from

the exploder housing with a strap wrench.

All of which just goes to show that extra preparation is necessary during the warmer weather. The heavy grease and luting should be removed from all explosive stores, especially from the threaded portion, and replaced with a thin film of a light anti-freezing grease.

Now let's take a crack at the components. You won't be able to do much with those mitts on when you start trying to open fuze-containers and so forth. Better let someone else do that until you get some anti-contact gloves. Meanwhile, you can help the chaps who are putting on the tail unit. You'll have to be careful, though. The rivets that hold those spring clips on the tail get to be as brittle as icicles at this temperature...

Well, that took quite a while. We find that it usually requires from ten to fifteen minutes to fuze a bomb at sub-zero temperatures—about twice as long as the same operation takes at normal temperatures. However, it's done now; so let's go to the aircraft and get the load aboard.

LOADING THE BOMBS

This is the loading area—and here comes the aircraft. We'll load the bombs on while the aircrew go back to the mess for an early lunch. The truck towing the energizer is following the aircraft, so we can start right away. The energizer is a mobile electric power plant which serves two purposes in this part of the world. First, it's a source of power to run the winch drive motors, and secondly, we use it to start the aircraft engine. As soon as the aircraft starts, the bomb aimer will fire all the carriers as a last minute check before they're dropped to be placed on the bombs. After that, those two fellows over there will go inside with the bomb winch and electric drive motor and the cable from the energizer. And a wicked job it is – lugging that winch and a hundred feet of cable through a bomber fuselage.

Everything set? Careful you don't get your signals crossed with the boys inside when they drop the carriers! Now, let's get the trolley underneath into position. Come on, chaps! It takes more than three men to move this weight around in the snow.

Now on with the carriers. Don't take your mitts off. Let one of the lads with gloves position the fuzing unit and fit the fuzing wires.— Okay: hook the cable on and start hoisting.

Blast it! The winch drive motor has gone and seized up. Somebody made a mistake and brought one that wasn't winterized. Send the truck back and get the other—and make it snappy! It's too cold to stand around here doing nothing.

That's an example for you of what happens if your equipment isn't winterized. That winch motor won't budge with a load on at this temperature. For cold weather operations we lubricate these motors with ANG-25 grease—known to the R.C.A.F. as Grease, Low Temperature General, 34A/192.

—Ah, here we are! Let's get the job finished. I'm hungry as the devil—and I guess you are too. How's that other motor? Good. Another twenty minutes and we'll be through—just in time for the aircrew.

Then we can go and eat.

4-3. CAMPING AT CRYSTAL CITY

By Flight Lieutenant A. E. Paterson

Alberta Area [Public Relations Officer]

Vol. 16, No. 9 (November 1964)

Arctic survival depends on morale, resourcefulness and ingenuity. Ask any of last winter's 117 "survivors" from the post-graduate phase of the RCAF Survival Training School's winter bush course.

After one day of classroom briefing at RCAF Stn. Namao (covering methods of making fires in the Arctic, the igloo, fighter-trench and arctic-tent shelters, the use of snow saws and knives, the layer principle of wearing clothing, prevention and care of frostbite and cooking) students are flown with full arctic gear to Resolute Bay, 1550 miles northeast. There Eskimo instructors give practical instructions during a one-day stopover. Students practice testing snow for shelters, cutting snowblocks and assembling snow-houses (igloos). They are now ready for "Crystal City", the fastest growing community in the Arctic.

Located five miles from Resolute Bay, this survival school facility comprises a prefab hut for instructors and unfinished igloos for each four-men group of trainees. Within minutes of arriving at Crystal City the trainees begin the vital task of completing the snow-houses as they are to spend the first night in them. Each group then packs snow in the gaps between the snow-blocks (a process called 'chinking') to keep out the arctic wind, prepares food, makes snow benches to sleep on and prepares for the night ahead.

The men are divided into groups of two the next morning and, using the spiral construction method, they build igloos which are 'home' for the next four days and nights. This task can take one or two days, depending on the amount of available daylight. Eskimos can do the same in 40 to 45 minutes.

Students are taught that some type of shelter is essential, be it only temporary. Man must provide himself with dry, dead airspace for insulation against the cold. To this end, the students build fighter trenches and para-igloos. Fighter trenches are box-shaped holes in the snow with a triangular entrance that houses a sleeping bag and are roofed with snow-blocks. They are good emergency shelters but too cramped to permit much movement without dislodging frost on clothing or the sleeping bag. In time, the occupant becomes damp without any chance to dry out. The para-igloo is an arctic tent with a three-foot wall of snowblocks that is too cold for comfort, hence the rush to get an igloo built.

Instruction continues during these four days. Students practise laying out signals to attract aircraft and to provide information from ground-to-air, familiarization treks. The Survival School provides combat rations, slightly higher in calories than emergency ration packs as training conditions cause the expenditure of more energy than in a warmer environment. Fish are plentiful in most arctic lakes and students learn how to fish through four to eight-foot thick ice, using lines or nets of their own making, to supplement their rations. Hunting training is given also but, in conformity with arctic game preserve regulations it is strictly "practise only".

On the fifth day, the two-man teams erect arctic tents modified with sections of parachutes and walls of snow-blocks. They spend their last night sleeping in this paragloo, a chilling experience in an area where the greatest enemy is the penetrating cold and winds frequently gust to more than 40 miles per hour with the temperature possibly in the 50-below range.

After this long night, they return to Resolute Bay to write an examination and fly back to Namao where they are graduated from the Survival Training School, better equipped to meet the challenge of the Arctic should they be forced to bail-out or force-land in mid-winter.

NEW SURVIVAL HANDBOOK AVAILABLE

A pocket-size publication bearing the intriguing title "Down but not Out", available from the Queen's Printer or Canadian government bookshops, could be instrumental someday in saving your life.

This book was written by the RCAF Survival Training School Staff and illustrated by Mr. Y. Armengand and Cpl. C. Rousseau. It was produced primarily to assist downed RCAF aircrew but will be of interest to everyone who ventures into Canada's vast forests or arctic tundra. The 185-page manual, which sells for \$3.00, covers a wide range of subjects from the psychology of survival to the construction of shelters and the care of equipment. Numerous illustrations help explain the many ways in which a person can exist under survival conditions.

4-4. FOR THE ARCTIC GOURMET

By R. V. Dodds

Director of Public Relations, R.C.A.F.

Vol. 2, No. 5 (March 1950)

What is perhaps the world's most unusual cookbook has recently been prepared by the R.C.A.F.

The book is not too concerned with the tickling of fastidious palates. It's main purpose is to tell you how to cater for the inner man if you are forced down in the far north. Few Canadian housewives are likely to become enthused about serving a dish

of lousewort for their husband's suppers—in fact, even an advertising genius would have a tough time making Canadians lousewort-conscious. Nevertheless, as the manual points out, the “woolly lousewort, found in the tundra and growing five to eight inches tall, with pink or purple flowers, is the most tasty food plant in the north, the root being the edible portion.” That piece of information alone might someday save a flyer's life.

The following quotation gives an idea of the author's approach:

“All animals in the north are safe to eat — bats, lizards, newts, frogs, and even snakes, which taste like the white meat of chicken. Grubs found in the ground or in rotten wood make good food. So do grasshoppers, toasted on a stick. Pick off legs and wings before cooking. Do not eat caterpillars; some are poisonous. Meat is meat when you are hungry.”

The book covers about thirty edible forms of plant life found in the arctic and sub-arctic, giving a description of the plant as well as recommended ways of cooking. More than fifty different animals, birds and fish are also dealt with, and many hints are given on how to catch your northern dinner before you prepare it. Poisonous plants are described in detail, as well as those animals and items of sea-food which are (or may be in certain seasons) dangerous to eat.

The flyer is reminded that the north, despite all rumour to the contrary, is not and never was a land of plenty insofar as wild forms of food are concerned. Food is often hidden; and must be sought out. The man who has the “know-how,” however, need not feel discouraged.

The following are among the items covered by the new manual.

Seaweeds

Seaweeds should be on your menu whenever possible. Sea lettuce is a pale lettuce-green and has the appearance of a piece of crumpled tissue paper. Another species is purple. Both varieties are black and shiny when dry, and they can be used in the same way. It should be thoroughly washed and may be eaten raw, boiled with a little water to make a thick soup, or used as a thickening for soups and stews of meat or fish. When cool, it forms a jelly.

Dulse can be gathered along the shore between tide marks. It is a large red seaweed, shaped somewhat like a hand, with a palm and long fingerlike fronds. It should be washed, boiled, and used to thicken soups or dried and eaten raw.

Carrageen moss clings to stones and rocks under water. It has flat forked stems about two to twelve inches long, of a greenish purple-brown or reddish brown colour. Wash and dry in the sun. Can be used to thicken soup or steeped in boiling water to make a jelly.

Lichens

Lichens are low plants of various shape and colour. Found throughout northern Canada and the arctic, they are all edible. They grow either on rocks or in the soil,

and are best collected after rain. Reindeer Moss, which is very plentiful, grows in colonies on sandy soil, and is greyish in colour and profusely branched. It can sometimes be gathered from under the snow.

None of the lichens occurring in the north is poisonous, but most varieties contain an acid that is bitter and sometimes nauseous and may cause severe internal irritation if not first extracted by boiling or soaking in water. When the lichen is cooked, dry it until brittle, then powder by rubbing between the palm of the hands or by pounding with a stone. If the powdered lichen is soaked overnight it can be boiled to a jelly-like consistency and added to soup or stew.

Dandelion

The dandelion, which is a pest in the south, is a potential lifesaver in the polar regions. Both leaves and roots may be eaten raw, and the leaves make fine greens if cooked like spinach.

Sea Cucumbers

These queer looking animals have the shape of cucumbers. Throw away the insides and scrape away the slimy outer skin. Cut them up and cook in a stew or else fry.

Lemming

Lemming are stub-tailed mice that range throughout the arctic. In winter they nest on or near the ground, deep in snow drifts, and you have to dig for them. In summer, you can find them by overturning flat rocks. You can get them also by hitting them as they scuttle along their runways or by setting snares of very fine wire along the runways. Lemming are preyed upon, not only by hungry aircrew, but also by shrews, weasels, foxes, and owls.

Fish

All northern fish are edible, and all salt-water fish—except the shark— may be eaten raw. Fresh-water fish in the north may contain parasites that will make you sick, so cook them if possible.

Mussels

Most Polar mussels are edible. Avoid any that don't shut up tight when you touch them: They are either sick or dead and unfit for food. Avoid also the black mussel, about 2 inches long, that is attached to rocks by tough threads. This mussel sometimes becomes deadly poisonous in summer time and cooking does not destroy the poison.

* * *

These are but a very few of the items covered. The book ranges from arctic mice to polar bears and walrus, and, in the case of larger game, provides detailed advice on how to avoid becoming a meal for the animal.

The book forms part of the syllabus prepared for the R.C.A.F.'s School of Survival at Fort Nelson, B.C., which has trained more than 200 aircrew in the techniques of beating the northland. Primarily responsible for its contents are two R.C.A.F. officers with years of experience in the far north—Flight Lieutenant S. E. Alexander and Flying Officer R. J. Goodey. Both are former Mounties. Flt. Lt. Alexander is presently at Air Force Headquarters, Ottawa, doing the desk-work necessary in preparing instructional material in survival, but manages to get out now and again to keep his hand in. Flying Officer Goodey is in charge of the School itself.

Nothing in the manual is theoretical: it is all based on actual experience. Neither of the officers mentioned may be any great shakes when it comes to whipping up a chocolate cake, but when it is a matter of finding food in the far north, they are probably among Canada's best providers and cooks. Arctic authorities say that the cookery portion of the manual alone could have saved many lives in the Arctic during the last 100 years. It was—to quote only one case in point—mainly lack of knowledge of northern food sources that brought about the destruction of the Franklin Expedition nearly a hundred years ago.

A condensed version of the manual is included in the R.C.A.F.'s Directory of Hinterland Airdromes, several volumes of which have been completed, and which is available from the King's Printer to all northern flyers.

SECTION 5:

LIFE AT ISOLATED STATIONS

5-1. So You're Going North

Squadron Leader D. Gooderham, O.B.E.

Vol.1, No.10 (August 1949)

THEY TELL ME that darkest Africa was originally so named because of the complete ignorance concerning it which then prevailed throughout the civilized world. Nowadays, being an enlightened people, we learn all about it in our schools; and our ignorance seems to have been deftly switched to encompass all matters relating to the Canadian Arctic.

"This," our Upper Brass has said, "is a lamentable state of affairs." "You," one of them continued, pointing an ink-stained finger at the missing button on my parka, "are to provide Enlightenment, that those who are posted or who may be posted into the North may read and take comfort. Gen them up so that they neither take fear at anything nor overlook those things that may make their sojourn therein more pleasing."

Before I begin, however, let me forestall the character who is about to say "Phooey! Just a lot of propaganda!" The fact is, in the letter requiring me to produce this screed the following phrase appears: "those fortunate enough to be offered a northern experience." My immediate reactions to that would, I feel, have met with the approval of Sgt. Shatterproof himself. Since I understand that most of the upper Brass can read, I cannot say just what I thought; but I can at least assure you that what I write below will in no way be coloured by any attempt to improve the picture.

* * *

Now, it may be a cruel blow to some, but the fact remains that any similarity between life in the North and life on a Service Unit in the North is purely coincidental. The true sourdoughs of the North unquestionably consider us a bunch of sissies—which troubles us not at all. Our more or less comfortable mode of living enables us to do a better job of work. And there's still enough rough stuff left to throw out a challenge to anyone with a mind to prove himself.

Your first question will naturally be: how will I find life on a northern Air Force Unit? It's an old saying that life is what you make it, and nowhere is that statement more true than in the North. If you come here with the idea that maybe it won't be

too bad and that it might even be interesting, you'll probably find it just that, and possibly even better. If, on the other hand, you come up firmly convinced that you won't like it, you will in all probability have a grim time for at least a part of your tour. That's the mental attitude angle, of which more later. Meanwhile I propose dealing with a few of the physical conditions you will encounter, and which you as an individual cannot do anything to change either for better or for worse.

Firstly, there's our old friend the weather. If your ideas of the North are the same as mine were, the very word "NORTH" carries with it the word "COLD." It is a matter of record that the temperature in Canada's North does go pretty low. The North West Staging Route certainly has some fairly cold spots along it—notably Snag. The Beetle sites, however, though further north, do not experience such cold weather. Here at Kittigazuit, the farthest north of them all, the lack of low temperatures has even been rather embarrassing. Our friends in Edmonton and Winnipeg, having expended a good deal of sympathy on us, seemed to be quite hurt on learning that during a goodly portion of the past winter our temperatures were well above their own. Our lowest temperature here was 52° below, shortly before Christmas. After that it did not drop under 40° below. The other Beetles, Cambridge Bay and Sawmill Bay, have been somewhat colder than Kitty. The wind, it must be admitted, is sometimes very cold. There have, indeed, been occasions when it has approached the frigidity it frequently attains at the corner of Portage and Main. The North can be really tough! Fortunately, unlike you effete types down south, we do something about it when it gets really cold. We even go to the ridiculous extreme of covering our ears.

Those of you who do not work outside will want to know whether the buildings on northern Units will keep you warm. Well, the buildings range all the way from the steam-heated transient quarters in Fort Nelson (guaranteed to parboil anybody overnight) to the gelid atmosphere which prevails in our washroom at Kitty. The North West Passage, as they call it, is definitely no place for the faint of heart. A surprising number of the buildings fail to attain these interesting extremes, however, and the occupants have to struggle through as best they can with temperatures of 68°. Incidentally, these dull, uninteresting temperatures are attained without benefit of blubber lamps. Being fresh out of blubber lamps, the Air Force has had to resort to steam heat or oil-burning stoves. It is understood that this deplorable state of affairs arose through a slight variance of opinion as to whether blubber lamps fall within the jurisdiction of CE or Supply.

Supply have put over another fast one on poor old CE in the matter of washing in the Arctic. As is well known to one and all, the accepted northern technique calls for sewing oneself into the red flannels and applying whale oil to the face. Some sluggard in Supply neglected to lay on the whale oil, so CE has had to produce water systems, boilers, showers, wash-basins, and washing machines no doubt at great trouble and no mean expense.

Accommodation in general can best be described as satisfactory for the single man and, as almost everywhere in Canada, inadequate for the family man. On the Route, married quarters are to be had at Fort St. John, Fort Nelson, and Whitehorse; and they are being constructed at the other Route Units and at Beetle Units. There will be no empty quarters awaiting your selection any more than there are at southern Stations. Your wait will probably be about the same.

The matter of light is something that may or may not bother you. Indoors there is no problem: to the best of my knowledge all Air Force Units in the North have the same electrical facilities that you will find in the rest of Canada. Outdoors, the case is different. At Kitty we did not see the sun from December 4th to January 15th. All of us were surprised, though, to find that even on December 21st we had about five hours of good light plus two more of twilight. For a short period in the summer we see the sun twenty-four hours a day. Oddly enough, the long days appear to cause more distress than the short, which none of us minded too much. When it's constantly daylight one doesn't get to bed and tempers are apt to get on edge.

It is difficult to write on the food question without sounding like a recruiting officer. However, honesty requires me to state flatly that the food on the northern Unit is probably superior to that on the average southern Unit. On the Beetle Units it is superior to them all. This is not just chance. It results from a combination of an expanded ration scale and top-flight cooks.

Having touched briefly on some of the good points of the northern Units, I will proceed directly to one of the bad. In the minds of most of ... us here, it is THE bad point. I refer to separation from one's family. This will not affect everyone. As I stated earlier, most northern Units now have married quarters and are due to get more. Other Units (notably Beetle) at present have none. But if you aren't lucky enough to get married quarters (and with few exceptions you'll find none off the Station), and you have a wife and maybe kiddies, what then? No one has yet said anything to me that has made me personally feel any happier about the situation, so I have no intention of trying to convince you that you will like it either. Fortunately, the tour is relatively short. Beetle tours are set at six months for all airmen—subject, of course, to emergencies. Tours on the North West Staging Route are of one year's duration for single or separated men, and two years if married accommodation is available.

During your time 'in,' you will have fairly good mail service both ways, usually once a week on Beetle Units, and more than once a week on the Staging Route. On Beetle, we supplement this with radio messages for urgent occasions or when aircraft cannot get in. Those northern Units at which aircraft cannot land during the freeze-up and break-up periods, receive mail and supplies by air drop. The odd bottle of beer gets broken in the process, but there is usually enough for the Saturday night party.

This brings us around to the life *within* the camp. For you really are *in* camp: generally speaking, there's nothing outside it. During the summer, of course, there is

hunting and fishing that many people would gladly pay much money to get. But don't look off the camp for entertainment and interest. Even the more remote Units, such as Beetle, have movies, hooks, hobbycraft tools, radios, pianos, records, sports equipment, darkrooms, photographic equipment and so forth. Whether you avail yourself of them and keep alert and interested in your fellow men, or whether you lay on your sack and bind, is up to you. The North seems to have a way of proving a man. The standards here on which a man is judged are harsh. You are rated by what you are and do, not by what you look like and say.

To wind up, here are a few concrete suggestions that may help to make your stay 'in' more pleasant for you and easier on your family if you have to leave them behind. Take with you your camera, rifle, or whatever hobby-kits you normally use down south. If you play any musical instrument smaller than a harp, take it along too. Leave your correct mailing address with your family. And be sure to clean up any accounts problems before you go. Find out exactly where you stand and insure that arrangements are made for adequate funds to be forwarded to your family. All personnel on Beetle Units have recently been granted the privilege of having their pay put directly into a bank account. It isn't at all a bad idea, whether you are married or single. It may save you a lot of worry and a lot of signals.

A final thought. It is not altogether impossible that you will return from the North alive and healthy. If your sanity has suffered a slight decline, you will no doubt immediately be recommended for a posting to AFHQ. Good luck to you.

5-2. CHEECHAKO

By L.A.W. "Benny" Benson

R.C.A.F. Station Whitehorse

Vol. 6, No. 7 (July-August 1954)

TO WHITEHORSE!

Visions flashed across my mind of a lonesome wind-swept land, in which bunches of boys kept whooping it up in Malemute Saloons. The land of the Yukon — where every poke was filled with gold and every bar-room with brawls!

However, it was the land to which I was transferred, so I donned my cumbersome parka and heavy boots and climbed aboard the C-119 at

Edmonton. Then, for 967 miles I watched the barren and beautiful heights slide by beneath me, fascinated by the sight of the occasional tiny cabins snuggled on the shores of frozen lakes. What manner of men lived in them? Memories of Robert Service flitted thro' my mind, and I marvelled at the hardihood of the pioneers of whom he had sung.

I suppose I must have half-expected a dozen or so Eskimoes and a pack of huskies to meet me when we landed at Whitehorse. Instead, the airwoman disciplinarian corporal, Joan Chapman, was there, smiling a welcome and waiting to whisk me off

through the 30-below-zero night to the airwomen's warm barracks with their cozy double rooms. There I found an atmosphere of friendliness that surpassed that of any station I have ever been on.

The following week-end I made my first trek — four miles downhill — to town. There I received another surprise. Whitehorse is a town of vivid contrasts and contradictions. Side by side stand ancient frame buildings and modern cocktail lounges, log cabins and fine new stucco homes. On one corner of the main street there is a completely modern hotel, with tavern and cocktail lounge, and just down the street an inn with its bar still bearing the scars of miner's boots and of battles fought, years ago, over claims and women.

A new Federal building is under construction to house the Territorial Capital offices. Though the main streets have modern plumbing, residents on some of the side-streets must buy their water from a tank truck, at 50c. a barrel. The Armed Services Radio Station (CFWH) is run by Service and civilian volunteers, and provides wonderful opportunities for budding announcers and disc-jockeys. Shop-owners pride themselves in carrying goods that are presently in fashion in "outside" department stores. They also sell Yukon-made buckskin jackets and beautiful fur-trimmed mukluks. A specialty is jewelry made from gold nuggets, local jade and ivory, and the famous black diamonds (a species of quartz peculiar to the district).

There is no lack of colour for those interested in the rich legend of the country. If you're a Robert Service fan, you can visit Lake Laberge, the scene of "The Cremation of Sam McGee" — or even Sam McGee's cabin itself, in the city. A few miles away you can go and see Miles Canyon and Whitehorse Rapids (so called for the treacherous white water that boils between the rocky walls). Two hundred men lost their lives in this short stretch of the Yukon River during the summer of the mad stampede of '98. On the river-bank, below town, are the weather-beaten old sternwheelers which once carried thousands of gold-hungry men into the gold fields, and which now sedately ply the Yukon River between Whitehorse and the Dawson City, carrying tourists and freight. Near the depot of the Yukon and Whitepass narrow-gauge railway can be seen the original six-team cutter and wagon which transported mail and passengers over the raw wilderness road of fifty years ago. An Air Force bus now runs twice weekly to Takhini Hotsprings, where one may swim in the open-air pool at 30° below zero.

This, then, is the Land of the Midnight Sun, where, despite all the modern conveniences, one feels that the lusty timeless era of yesterday has not completely vanished. The spell of the Yukon still lingers, the "glamour" still falls upon all who come here. Maybe that's the reason why the airwomen of Whitehorse usually apply for at least one six-month extension of their tours.

In fact, maybe it's the reason why I'll apply for mine.

5-3. OPERATION “BULL MOOSE”

By LAC K. V. Hoy

R.C.A.F. Detachment, Watson Lake, Y.T.

Vol. 5, No. 2 (February 1953)

There was a time, I am told, when moose were both plentiful and easy to find in the land of the midnight sun. In these days, however, the hunter must be an amateur detective, a scientist, a navigator, a gunsmith, and a survival expert. Last fall I made my first and last moose-hunting expedition. On October 11th we left our happy little home at Watson Lake with cries of “Moose ho!” echoing from our lips. Our purpose was to return with a moose or to exhaust ourselves trying. We exhausted ourselves trying.

Word had been received that moose had been sighted at the “bomb range—a group of dilapidated buildings that had been used in previous years as a practice spot for bombing. The road to the range is a corduroy affair that was made for amphibious tanks only, not for a mere weapon-carrier such as ours. For two hours we ploughed along it without seeing a sign of any animal life whatsoever. However, just before we reached our destination, we saw fresh moose tracks, and once again the welkin rang with the cry of “Moose ho!”

We chose one of the least ruined of the buildings and set about making it temporarily habitable. It was no easy task. By the time we had arranged all our provisions and sleeping bags, night had fallen, and we were all tumbling over each other in the dark. The master-mind of the expedition, Cpl. Grieves, remedied the situation by making a fire in an empty gasoline can. Then we began to prepare the evening meal.

LAC Bonnier, who was elected as cook, produced a frying pan that was big enough to cook three-quarters of a moose in. As no name has ever been assigned to the dish he prepared, let's call it a goulash. The recipe was, as far as I remember, approximately as follows: two tins of corned beef, 1 tin of corn, ½ lb. of butter, and lots of patience. Helped out by smoke, burnt toast, and coffee strong enough to melt a spoon, the resultant meal would have made even a starving wolf think twice. None the less, we devoured it; and, after a final cigarette, we sought our sleeping bags.

Here, another problem confronted us. Cpl. Grieves, while he had omitted nothing in the way of food and first aid kits, had forgotten one sleeping bag. But again his ingenuity triumphed. By opening two sleeping bags fully and placing one on top of the other, he constructed a single vast bag capable of containing three men. Eventually, leaving our cook to enjoy the luxury of the single bag, the other three of us climbed into the communal sack. Our fire died out and we settled down to sleep.

But sleep did not come quickly. The local fauna seemed determined to deprive us of our well-earned rest. At about eleven o'clock an owl came and perched on top of the lookout tower, whence he began to issue an endless series of melancholy calls to his mate. We stood it as long as we could, until finally we were forced to intrude on

his love-life with a well-aimed oil-can. After this disturbance, we had not been asleep for more than half an hour when the lonesome howling of a coyote roused us once more, and we had to listen to his weird serenade until sheer exhaustion claimed us.

After a restless and uncomfortable night I awoke to find myself confronted by what will always remain one of the great mysteries of my life. Some time during the night, without any subsequent recollection on the part of either of us of having done so, LAC Bonnier, who was originally occupying the single bag, had changed places with me.

After a nauseating breakfast (cooked by myself) of chicken soup and toast and honey, we left our base at 0600 hours and split into two groups. LAC Bonnier and I followed the creek, while Cpl. Grieves and LAC Cleveland skirted the lake. We were to meet at the creek mouth at the south end of the lake at mid-day, to have lunch and compare notes. I have not even yet heard all the gruesome details of Grieves' and Cleveland's adventures that morning. All I know is what happened to Bonnier and myself.

Travelling on opposite sides of the creek, we found fresh moose tracks within a quarter of a mile of our starting-point. Following them eagerly, I threaded my way further into the bush to try to avoid the brush which grew close to the creek, only to find even more brush and jackpot after jackpot. Pushing even deeper into the bush, I encountered snow to the depth of five inches. Deciding that dense brush was better than ice-cold feet, I retraced my steps to the creek, where I picked up another fresh moose track and began blundering on with renewed anticipation.

About four miles from our starting-point, I saw Bonnier waving at me from across the creek. He obviously wanted me to come over and join him. I searched until I found a spot where the current was not so strong and prepared to wade across. It was a cold and dismal business. Losing one sock, and narrowly escaping being swept downstream by the current, I managed eventually to reach the other side, soaked up to the chest. There we managed to get a fire going, and after two hours I was dried out. We then resumed our journey together.

A mile further on, Bonnier slipped on a log and fell into a muskeg hole, spraining an ankle. It was then that we decided that the mouth of the creek was too far off to reach before dark. We about-turned and headed back to our point of departure. The going was even rougher than before: we had not eaten since six that morning, and Bonnier's ankle was beginning to swell. In about two hours we were back on the spot where we had built the fire; after another hour we were getting very tired and began to doubt if we could get back before dark. Nevertheless, we kept on, resting every half-hour. An hour or so before nightfall we heard the engine of the weapon-carrier...and before too long the daring moose-hunters were enjoying a peculiar meal of bologna, honey, and pears. Grieves and Cleveland, we found, had had no better luck than we. Weary and disappointed we started for home.

We had gone a mile or thereabouts, when we got stuck in a mud-hole and were unable to move either backwards or forwards. Since no purpose would have been

served by the four of us remaining there, Grieves and I prepared for the twenty-mile walk home, leaving Cleveland and the crippled Bonnier to be picked up later.

We left the truck at 1800 hours. I shall not attempt to describe in detail the misery of that forced march — hour after hour along a muddy road, with thousands of washouts to sidestep, and no moon to light our way. Suffice it to say that by the time we had reached the D.O.T. transmitter site, a full fifteen miles from where we had left the weapon-carrier, we were pretty well disgusted by the thought of anything even remotely resembling a Moose. At the transmitter site we rested — perhaps I should say “collapsed”— before continuing our trek. But the Fates had already relented. The reader can imagine our joy when LAC Kelly came driving up with a truck. We had told the boys at base that we would be back by 1600 hours that afternoon; and when we weren't, they had come to look for us. There was nothing that we could do that night about rescuing the rest of our unlucky safari; so we returned with Kelly and made arrangements for the “cat” to go and haul it out the next day.

On getting home, the first thing I did was take a shower. While doing so, I discovered to my consternation that my feet had a peculiar brown tinge to them. This I tried — but failed — to remove with a scrubbing-brush. I later learned that I was the victim of friction burns caused by excessive walking. From the shower I hustled to the mess hall, where I downed six eggs and two fish in less time than it takes to tell.

The “cat” left early next morning on its mission of mercy, to return in the afternoon with two more tired, cold, hungry, and utterly disillusioned hunters. I speak for all of us when I say that, henceforth, we are sticking to rabbits and grouse.

5-4. THE ROUNDEL VISITS R.C.A.F. STATION GOOSE BAY

By Flight Lieutenant W. M. Lee

Vol. 2, no. 7 (May 1950)

The corporal's wife tugged her little girl's scarf into place and settled back into the North Star's canvas seat with a worried frown on her face. Beside her, her husband shifted their elder daughter on to his other knee and glanced at his watch. Then he gave his wife a reassuring grin. “Ten minutes more,” he said into her ear. “Cheer up, darling. You're going to love it.” She smiled back at him and gave a little nod which quite failed to express any conviction. The Merlins droned monotonously on.

Presently a crewman appeared and gestured with his thumbs that they were going down...

When the Corporal's wife, her legs uncertain from long inactivity, stood on the Goose Bay aerodrome beside the aircraft, she saw a stretch of hangars, an agglomeration of motor vehicles, and scores of parka-clad figures, some of them bustling busily about their work, others obviously come to meet friends or simply

drawn by curiosity. A few minutes later she was in a large bus, the family luggage stacked around her, rumbling over the snow-covered road. Over to the right she could see a labyrinth of runways. To the left, beyond a foreground of sparse spruce trees, a range of white-capped mountains gleamed in the distance beneath scattered fluffy cumuli. While she was still gazing at this lovely sight, the bus turned off into a pretty residential area, with rows of spick and span, bright-looking houses. Outside one of them — a large two-storey affair painted white with green trimmings — the bus stopped, and the Corporal and his family disembarked and entered.

Inside, his wife flitted wide-eyed through the rooms, astonished at their size and at the completeness and taste with which mere males had equipped the place. Everything was there, from a refrigerator to a fly-swatter, from chesterfields to sink-plungers, from chintz curtains to pot-holders. This was to be her home for the next two years. Within an hour of her arrival, her forebodings had begun to evaporate, and as the hours lengthened into days, and the days into weeks...

Well, let's see what she found out.

* * *

The uninitiated are amazed at the popularity of this remote station of the R.C.A.F. Ninety-eight percent of married men in Maintenance Section — and a large majority of the single men too — ask to have their tour of duty extended. However, there's nothing surprising about it when one considers their reasons.

Although the housing problem is not completely solved, it is certainly better than at most stations. No more living in one-room-with-a-hot-plate for married personnel posted to Goose. In Spruce Park, a beautiful wooded area a mile from the Station, are ninety permanent houses having two to four bedrooms, hardwood floors, inlaid linoleum, continuous hot water, modern baths, and individual oil furnaces. With the addition of 52 temporary apartments and 43 emergency dwellings (the former type comparing favourably with \$80-a-month apartments back in "civilization"), a married airman or officer can normally expect to have his family join him within a few weeks of his arrival at the Station. Kiddies are especially pleased to come to Goose. It's closer to the North Pole and their good friend Mr. Claus.

The isolation of the Station has no effect on the education of children. On the base is a school, staffed by five qualified teachers, which can take care of children from Kindergarten to Grade XII. Buses pick the children up practically at their doorsteps, deliver them to school, and return them to their homes after classes. With 112 students now enrolled and expectations of upwards of 150 for next year, the present school is to be replaced by a modern six-room school-house completely equipped down to the last laboratory test tube. The school principal will have two additional teachers on his staff when he throws open the doors of the new Air Marshal Leckie school in Spruce Park next fall.

The recreation programme at Goose, although hampered by lack of space since the sports hangar burned down last year, still manages to fill many idle hours. A lively softball league operates during the summer and is matched by a five-team hockey

league in winter.

The recreation director, Mr. Bill Gordon, recently set up badminton courts in one of the hangars, and Flt. Sgt. Vezina of Sports Stores has a rugged body-building school in full swing. The outdoor sportsman (or sportswoman) is in his or her glory at Goose. While ski lodges in Ontario and Quebec were going bankrupt this winter for lack of snow, skiers at Goose Bay were slaloming and downhillling to their heart's content. Skis are supplied by sports stores and a special beginners' hill has been established close to the camp. A ski chalet, perched three-quarters of the way up a nearby mountain, is the focal point for experts who include in their ranks a surprising number of the Station's younger fry.

Snow-shoeing, hunting and fishing are other open-air sports rating high in popularity. Nearby woods abound in ptarmigan and arctic hare. Hunting parties, organized by various Station groups, usually return with a full bag and diminished waistslines. Lakes and rivers in the area teem with trout, salmon and rock cod. One N.C.O., Cpl. J. E. Pitre, of the Supply Section, recently spent 23 out of 26 days' leave fishing through an ice-hole in the bay in temperatures that dipped to 33° below zero and in winds of up to 40 m.p.h.

The Station library, although (since the big fire) it is not up to the standard that the librarian, Mrs. Margaret Hamilton, an ex-W.D., could wish for it, nevertheless contains a fair selection of books of all kinds as well as periodicals.

Goose Bay residents see the latest movies, often before they are shown generally in Canada, at reasonable prices in the "Astra Theatre" situated in the heart of the camp. The programme changes daily, with a special Saturday afternoon show for children. Cpl. W. R. Pearson, theatre manager and chief projectionist, has received several offers from civilian companies but has turned them all down. "Despite the higher pay, I wouldn't think of leaving my friends and career in the Air Force," he says.

The Station boasts the normal messes, clubs and hobby-shops. But the airmen feel that in the "Copa Cannibal Club" they have the best of its kind in the Air Force. "I've been in a lot of Service clubs in Canada and overseas," proclaims LAC E. D. Wiebe of Flying Control, "but our Copa is the tops."

Fresh bread is made daily for the entire camp by a large Army Service Corps bakery. Laundry is no problem, for in addition to home washing-machines there is a large modern laundry where in an emergency you can get a shirt laundered in two hours, although 48-hour service is normal. A cleaning and pressing establishment provides three-day dry cleaning. Sgt. R. H. Backman, N.C.O. in charge of the laundry, employs 21 civilians, mostly native Newfoundlanders, and three Servicemen, turning out an average of 20,000 clothing articles per week. Sgt. Backman is one of the few people in the Air Force certain of his next posting. It must be Whitehorse, since that is the only other R.C.A.F. Station boasting a laundry. However, he and his family have been at Goose for six years and have no desire to leave.

Once a year Goose Bay families are allowed free air transportation to Montreal or the Maritimes for leave. A surprising number elect to spend their leave period right at

Goose Bay or on camping expeditions in the area. "Why should we spend money in some crowded summer resort when we have this in our own backyards?" asks Sgt. R. V. Eisenhower, of the Signals Section, indicating the beautiful rolling hills in the distance.

There are no roads or railways into Goose Bay. Cut off from surface contact with the outside world at freeze-up in November, the camp depends entirely on the scheduled transport runs of No. 426 Transport Squadron, Montreal, for additional supplies and mail. Thrice weekly, residents cock their ears skyward, hear the familiar drone of the North Star, and mutter contentedly, "Ah, the Sked's in."

Just as in small towns the arrival of the 5 o'clock local promotes a gathering, so the landing of the Sked brings the non-working population of Goose down to the A.T.H.U. terminal. The North Stars carry an average of 25,000 lbs. of freight and 100 passengers into Goose Bay each week.

But most operating supplies for the Station are brought in during summer by water. Last year between May and November, 73 ships dropped anchor at the Goose Bay marine dock to unload millions of gallons of diesel, aircraft and vehicle fuel, thousands of tons of living-necessities and building material, plus the myriad bits-and-pieces required to operate a Station of this size.

Two large root cellars have been dug to store root vegetables for winter use. Green vegetables are brought in twice monthly by the Sked run, and large refrigerators keep meat fresh for the grocery store and the various messes. About the only things that housewives lack are such delicacies as stuffed olives and imported cheese.

The general store sells everything from toothpaste to toys and girdles. Run by Flying Officer L. E. Fallis, the Supply Officer, the store is constantly adding to its stock.

There is very little sickness at Goose Bay, colds being virtually non-existent in the crisp Labrador air. The 20-bed hospital, commanded by Wing Cdr. E. O. Campbell, houses expectant mothers more often than ailing Servicemen. The few male patients are usually victims of sports accidents, with skiing and hockey rating as top man-killers. One recent patient was the Station Warrant Officer, Flt. Sgt. W. M. Jessiman, who was pruned of a recalcitrant appendix. Patients, waiting glumly in the dental office, range from grizzled N.C.O.'s to cherubic school children.

Establishment of the hospital was a Godsend to the native Labradorians, who previously had to rely on a few widely scattered mission hospitals or fend for themselves. Mobile medical and dental facilities are available for emergency cases among the native Newfoundlanders. Medical Assistants, such as LAC E. E. Foreman and LAC D. C. Foley, are periodically called upon to fly into remote areas with Medical Officers and Nursing Sisters to render aid to wounded trappers or sick Eskimo children.

* * *

Situated on a sand plateau towering 80 feet above the surrounding muskeg and swamp, Goose Bay airport has been described as the gateway to the Eastern Arctic.

Less than 900 miles from Montreal, the Station is slightly north of the great circle route between Montreal and Prestwick, Scotland. But possibly it is in the light of present global-war strategy that Goose Bay acquires its greatest prominence. Some experts claim that one of the most likely aerial routes for an attack from Europe on the economic heart of North America is over Greenland. This theory throws the spotlight on Goose as a potential interceptor base, employing radar and fighter planes.

The site for this giant aerodrome was discovered by Mr. Eric S. Fry, of the Department of Mines and Resources, in July 1941. Mr. Fry first heard of the locality from Labrador inhabitants while scouring the Eastern Arctic in a Stranraer flying boat. He visited the Hamilton River area by boat, and after checking the terrain and soil carefully, lost no time in signalling Ottawa of his discovery. It had everything an airport needed — lots of room for runways, good year-round weather, sandy soil for easy excavation and drainage, and proximity to coastal waterways for supply.

Discovered by a Canadian, Goose Bay was built, developed and operated by Canadians. The story of the development of this base is one of the most fascinating in Canadian military annals, and to the men who planned and toiled to carve this great aerodrome out of the Labrador wilderness, Canada and the Allied Nations owe a debt of gratitude. The construction of Goose Bay broke all records for speed and ingenuity. The first planes landed only a few months after the site was selected, and a year later the airport was practically finished.

Virtually two camps were created, one to be occupied by Canadian military personnel and one by Americans, although both camps were, and still are, under the jurisdiction of the Canadian Government, with the R.C.A.F. acting as local landlords. During the war, bombing and reconnaissance squadrons flew out of Goose Bay on anti-submarine and convoy patrols, and air-sea rescue service was maintained throughout the war. But the main rôle of the base was that of a giant service station for aircraft of the British, American and Canadian transport commands. The thousands of aircraft that poured through Goose later flooded the skies over Germany.

To-day Goose Bay is basically a strategically located air transit point. Two concrete runways, recently extended to more than 8,000 and 9,500 feet respectively, are long enough to accommodate the largest modern air giants. A third, of 6,000 feet, is not maintained during winter. R.C.A.F. photographic squadrons, heading for summer-long excursions into the Arctic, refuel at the Station, and civilian airliners of many nations are familiar sights at Goose Bay. Trans-Canada Airlines has a regularly scheduled stop at Goose, while the others use it as a “weather alternate”.

Despite its northerly location, the Station is blessed with excellent year-round weather, icing and fog conditions being much less severe than on the coast. When weather does clamp in, an efficient Ground Controlled Approach system (operated by the U.S.A.F. and tied-in with the R.C.A.F. Flying Control) effectively guides aircraft to earth. T.C.A., in conjunction with the other airlines, operates a sumptuous hotel to accommodate passengers during stop-overs.

The American base on the opposite side of the field is completely self-sustained with the exception of certain services such as flying control, runway maintenance, and laundry and bakery facilities. Relations between Canadians and Americans could not be more cordial. Exchange visits for social and athletic events are common.

The Department of Transport has established another camp to provide meteorological data and radio service.

Civil Law in the area is administered by a Newfoundland Provincial Government magistrate and two Rangers. The Rangers, who expect to be absorbed into the R.C.M.P. soon, work closely with R.C.A.F. Service Police. "Law-breaking is rare at Goose Bay," says Sgt. R. J. Jordan, head of the S.P. section, "but when it does occur, we pool our resources with the Rangers to dispose of the case. There is never any friction over who has jurisdiction."

The R.C.A.F. Station itself is equipped with two aircraft, (a Dakota and a Norseman) for Search and Rescue operations. Both aircraft can be fitted with skis and the Norseman is particularly useful for getting in and out of small lakes on floats. The main purpose of the S. & R. Section, of course, is to be prepared to search for missing aircraft. A detailed search plan, worked out with the Americans, can be swung into action at a moment's notice. The ground rescue organization functions like a well-drilled football team, and practices are held to keep every member of the team up to scratch.

Under Flt. Lt. D. R. Cuthbertson, captain of the joint R.C.A.F. and Mines and Resources expedition to locate the Magnetic North Pole last year, the S. & R. Section piles up an amazing number of hours, mostly on mercy flights and supply flights to detachments. As the hub of Labrador, Goose Bay receives numerous calls from missionaries, isolated doctors and Service detachments to evacuate patients to properly equipped hospitals. Sometimes, however, the mercy flights are of a different nature. Recently Flt. Lt. Cuthbertson flew the Dakota up to Cape Dorset on Baffin Island for "Operation Horsemeat". Eskimoes in that area had reported that their dogs, starving from lack of food, were eating each other. In the Arctic, the dog is not merely man's best friend; he is an absolute necessity of life. So the Air Force picked up two tons of horsemeat, flew to Cape Dorset by way of Fort Chimo and Frobisher, and dropped it to the starving canines.

As an aid to ground search-parties engaged in locating crash victims, a number of emergency cabins have been located in the areas where crashes are most likely to occur before landings and after take-offs. The cabins are equipped with stoves, beds, first-aid kits and food so that they may serve as bases for the search parties or havens for the injured until proper medical attention arrives. One dog team and three snowmobiles facilitate travel into the bush.

Winters at Goose Bay are severe, temperatures of 20° and 30° below being the rule rather than the exception. Last year 165.4 inches of snow fell on the Station. But good clothing, high-calory food and the spirit of the men make these statistics of little account, and very few man-hours are lost to Old Man Winter. During summer it is

not uncommon for the mercury to climb into the mid-eighties. Summer also brings hordes of king-sized mosquitoes and black flies buzzing up from the swampland. Station aircraft every year spray the breeding grounds, and although headway is being made, the battle is not yet won. Government experts from Ottawa will continue their investigation of the problem this summer. The size of the mosquitoes at Goose is the subject of one of the best known “chestnuts” in the Air Force. It concerns the mosquito that landed at Goose Bay one afternoon during the war and into which an airman poured 100 gallons of gas before he discovered it wasn’t the aircraft variety.

The Mechanical Transport Section is even more important at this isolated station than at most other R.C.A.F. units. There are no private automobiles at Goose Bay, and consequently the responsibility for moving the 600-odd residents of the R.C.A.F. section devolves on the M.T. Section under Flying Officer G. S. Clark. Three large buses are in continuous use carrying Servicemen, their dependents, school children, and civilian employees to their places of business. Wives have to be brought in from their homes at Spruce Park to shop at the grocery or general store, children have to be taken to and from school, and employees must get to work in all kinds of weather.

Close to a hundred miles of road criss-cross the station, and it is the job of the Tractor Section, under W.O.2 E. Ferguson, to keep them cleared. Add to this the responsibility for keeping over three miles of runway in condition to receive air traffic, and you get an idea why “Fergy” has to keep his twenty-five men on three shifts, operating caterpillars, snow ploughs, and blowers. Visitors to the Station are sometimes startled by a huge three-eyed monster clanking out of the darkness. It turns out merely to be one of W.O.2 Ferguson’s giant caterpillars gobbling up a layer of new-fallen snow.

But these same visitors would be even more horrified if they dropped around to the Tractor Section the next morning around 10 o’clock. There, they would see the members of the Section sitting around nonchalantly having coffee with a hundred-pound Labrador black bear. “Bruno”, a year old, was caught by an Indian and turned over to W.O.2 Ferguson for a mascot. The bear roams around the Section, completely tame, but gets a little nasty if the boys forget to put his usual three lumps of sugar in his coffee.

Maintenance crews work around the clock, seven days a week, and are capable of making minor overhauls on almost every type of aircraft in the Service. Last year the Section, under Flt. Lt. D. T. Miller, handled close to 800 aircraft. One night in February, 22,000 gallons of gasoline were poured into the tanks of various transient aircraft.

* * *

No long-distance telephone service exists at Goose Bay. Communication with “civilization” is maintained by a radio teletype link to Halifax. All Service messages are passed in this manner, and when needed, the teletype acts in lieu of the long-distance telephone. Officer commanding the Signal Section is Flt. Lt. A. C. Bowes, who is also President of the R.C.A.F. Ski Club. Working under him are 25

Servicemen and six civilians.

Goose Bay residents are not ordinarily racked by indecision when tuning in their radios. For a great part of the year their kilocycling is limited entirely to CFGB, Goose Bay's own 250-watt transmitter. But do not start feeling sorry for them. The radio fare presented by CFGB is, in some respects, superior to that offered to Canadians generally. For instance, there are no plaintive queries into the state of the listener's liver, complexion, or smoking hack. De-commercialized popular programmes, such as "Fibber McGee and Molly" and "Twenty Questions", are supplied to the station in transcription form by the U.S. Armed Forces Radio Service. These are supplemented by recorded broadcasts of the better C.B.C. productions.

At present, radio performances using local talent are comparatively few, but according to Flt. Sgt. J. M. Metcalfe, Station Manager, CFGB is trying to extend this type of presentation. On Saturday mornings, teen-agers produce and announce a half-hour show of their own, and every Wednesday morning, Mrs. Fallis, wife of the Supply Officer, conducts the "Coffee-Hour," a quarter-hour interview with interesting camp personalities. Two civilian workers, Miss "Mickey" Monroe and Earl Campbell do a half-hour disc-jockey and record chatter programme on Thursday evenings. "Saturday Nite Juke-Box," a full hour's request programme, concentrates on western music. The CFGB studios are better equipped than some commercial stations. Thousands of recordings and transcriptions, ranging from Vaughn Monroe to Rise Stevens, cram the library. Technical operation and continuity for programmes is done by CFGB's three radio engineers, LAC's J. S. Greenwood, B. J. Lamble and R. G. Gruhl. The last-named has built up quite a following among the younger children with his reading of stories for young folk.

Last November a two-sheet, mimeographed paper made its appearance. Under Sqn. Ldr. A. G. Chalmers, editor-in-chief, this paper, named "The Gosling" in a station-wide contest, has grown into a 50-page weekly newspaper second to none in the Service. News and views of camp life, original submissions, and sports, recreation and fashion notes, fill "The Gosling's" pages.

When construction of the airport started, many natives migrated to Goose Bay, bringing their families and camping independently in the locality. To consolidate these workers into one community, the R.C.A.F. set aside an area on the Hamilton River, five miles south-east of the main Station; and building space is allotted to the workers. A settlement known as Happy Valley has sprung up, harbouring 500 men, women and children.

The Air Force exercises control over the inhabitants of Happy Valley by advising on certain health and sanitary standards and allocating lots for building homes. The community has its own school, operated by the Newfoundland Provincial Government, and its own Church. Flt. Lt. B. G. Stibbards, the Air Force padre, often performs weddings and baptisms for the natives. Recently a tragedy occurred in the Valley. One of the frame shacks burned to the ground with two infant children inside. Padre Stibbards organized a relief fund among Goose Bay residents and the

flood of clothing, food and money to help the stricken parents was an eloquent comment on the spirit of the community.

Ten miles of pipe carry chlorinated fresh drinking-water up to the Station from the Hamilton River. Heat is supplied to work-buildings through elevated steam pipes that hang over the station like a giant cobweb. On the Canadian side alone 80 miles of power line carry electrical power from two separate diesel-operated power plants. An efficient sewage system, an internal telephone net, and postal, customs, telegraph and banking facilities, complete this picture of a sub-arctic town.

Commanding Officer of the Station and “Mayor” of the community is Group Capt. J. A. Verner. Before coming to Labrador, he commanded repair depots at Vancouver and Saint John, N.B., and served in engineering capacities in Canada and overseas.

The Goose Bay military reserve covers 120 square miles, and control of this huge area has been vested in the R.C.A.F. commander by the Federal Government. In addition, Goose Bay acts as mother-station for detachments at Mingan on the St. Lawrence River, Fort Chimo on Ungava Bay, and has an R.C.A.F. liaison officer at Frobisher Bay.

“For the past few years,” says Group Capt. Verner, “our big task has been the consolidation of the various elements of Goose Bay into a permanent, strategically located Air Force base. The married-quarters building programme is one big step towards this consolidation. To get the most from our men and the equipment they use, we must make their lives at Goose not only bearable but happy. The overwhelmingly pro-Goose Bay attitude among our people would indicate that we are succeeding.”

* * *

By now, the Corporal’s wife has had an opportunity to acclimatize herself in the Goose Bay way-of-life. She should be ready with a few choice answers to those patronizing friends of hers back in “civilization” who write sympathetic letters beginning: “My, you poor dear, it must be dreadful living at that lonely Labrador outpost.”

On the other hand, perhaps she has adopted the more subtle attitude of many of her Goose Bay friends. “Let them feel sorry for us,” they reason. “The more people who think life is grim here, the better our chances of staying an extra year...”

5-5. STATIONS OF THE RCAF: GOOSE BAY

By Flight Lieutenant W. A. Browne

Vol 12, No. 10 (December 1960)

This month, as has been the case for several years past, “Operation Toydrop” takes place along the Labrador coast. RCAF Station Goose Bay’s Yuletide project, a

co-ordinated community venture, is a timely example of how things are done at the "Goose".

The parapdrop to the coastal missions at Nain, Davis Inlet and Makkovit is carried out by aircrews of station flight. Used toys donated by the children of air force families are restored and repaired by station fire hall personnel. Food and clothing are collected by both the Protestant Ladies' Guild and the Catholic Women's League. Para-rescue airmen pack each item carefully into cases provided by the supply section and attach the all-important parachutes to carry them safely on their way.

Located 820 air miles north east of Montreal at the mouth of the Hamilton River, RCAF Stn. Goose Bay daily services aircraft staging through to all corners of the world. During the process the station plays host to many important visitors. For example, while en route to the United Nations General Assembly recently the Rt. Hon. Harold MacMillan was greeted by Goose Bay's commanding officer, G/C W. H. Swetman, DSO, DFC, when the British prime minister's plane stopped for refuelling.

STAGING CENTRE

Early in the Second World War it became apparent that an airfield would be required in Labrador, as a staging point for trans-Atlantic transports and as a refuelling stop for the short-range fighters that were to be ferried to the European conflict. In June 1941 Mr. Eric Fry of the Department of Mines and Resources selected the high, flat, sandy plateau at the head of Hamilton Inlet as an area well suited for the construction of runways. In addition the site offered a fine deep sea harbour, which could be used jointly by supply ships and flying boats.

The first supply ships arrived at Goose Bay on 12 September 1941 and by December of that year the first twin-engined aircraft had made a landing on the newly constructed runway. The runways were gravelled in the spring of 1942 and the beginning of ferry operations was heralded in July, with the arrival and departure of 70 Lockheed *Lightning* fighters, which subsequently reached England through Greenland and Iceland. Operations continued throughout wartime in ever-increasing intensity. In the 12-month period ending September 1945 the airfield handled 24,000 aircraft.

After the war the actual flying commitment of the RCAF at Goose Bay changed but little, with search and rescue continuing to be the major role. A sharp reduction in military traffic was offset by the growing number of commercial flights over the Atlantic. With the advent of NATO and Canada's contribution of fighter squadrons, Goose Bay again became a staging post during Operations Random, Jump Moat and Silver Dozen, to name only a few. About this time construction was begun on the DEW Line which brought about the use of the expression "Gateway to the Eastern Arctic": for Goose Bay was, and still is, the major jumping off point for Frobisher Bay, Thule, and other isolated units in the far north. With the exploration of

Labrador as a mineral storehouse, it can be assumed that Goose Bay will play the major role as an airbase in the development of this rich, untried territory.

OPERATIONAL ROLE

The major contributor to operational traffic at Goose Bay today is the USAF, which uses the airfield primarily as a base to support Strategic Air Command operations. An all-weather fighter squadron is also stationed at Goose Bay to guard the continent's north eastern approaches.

The operational role of the RCAF is devoted to aerodrome control, aerodrome maintenance, search and rescue facilities and station defence.

In the modern Rapcon (Radar Approach Control) building is housed the very latest aircraft approach control system. RCAF personnel of Rapcon work closely with Department of Transport Area Control Centre to control all air traffic operating under Instrument Flight Rules, within a 100-mile radius of Goose Bay.

To ensure safe separation of arriving and departing aircraft, Rapcon provides positive control of each by the use of modern radar equipment, which is furnished and maintained by the USAF. The importance of a highly efficient Rapcon operation is indicated, when one considers the wide range in speed and altitude of modern aircraft. The fact that commercial carriers and military aircraft alike are guided with safe, effectual control, has earned Goose Bay the reputation of a controlling agency of some renown.

Another vital component in the safe regulation of air traffic is the control tower. This agency is responsible for the control of all take-offs and landings on the airfield proper, as well as of seaplanes using Terrington Basin. In addition the tower, through FM radio, controls the many snow removal vehicles in operation during winter months. Goose Bay receives an average of 170 inches of snow a year. The removal of snow from ten million square feet of runways and taxiways plus 42 miles of roadway is a tremendous task delegated to the MSE section.

SEARCH AND RESCUE

Probably one of Goose Bay's most interesting operational activities is the search, rescue and mercy service carried out by station flight personnel. Ready to go at any time, the organization is equipped with a ski-wheel version of the *Dakota* and a float or ski-wheel *Otter* aircraft. Although the normal operating area is within the 102,000 square-mile area of Labrador, rescue or mercy flights have been made to such widely scattered points as Frobisher Bay, Clyde River and Pangnirtung on Baffin Island, Grise Fiord on Ellesmere Island, Sugluk and Povungnituk on the mainland. A secondary function of Station Flight is the transportation of passengers and freight throughout Eastern Canada.

Para-rescue jumpers are an important part of the rescue standby group at Goose Bay. Included in the team is a para-medical specialist, trained to carry out emergency medical aid to any site requiring this service. Three land search parties of ten men each are available for ground search in the rugged hinterland. During the winter this group is equipped with snowmobiles to facilitate rapid transit to areas inaccessible by air. To round-out the rescue team are the two marine crashboats, manned by able crews, capable of meeting marine emergencies throughout the Hamilton Inlet, which extends eastward 120 miles to the Atlantic Ocean.

The continued success of the station in its operational role is ample proof of the ability of its airmen and airwomen in what are often referred to as the supporting sections. In addition to the RCAF technical and administrative services, the station is enhanced by the fine work performed by the Royal Canadian Dental Corps and Canadian Army Service Corps. Special mention must be made of the US Army who operate stevedoring and transport facilities at the marine docks, and of the USAF who co-operate fully in projects too numerous to mention in this article. Relationship between the RCAF and USAF is harmonious in all fields of endeavour; as a result combined operations are carried out with maximum efficiency and unity.

Friendly liaison exists with many civilian organizations including the Department of Transport, Shell Oil Company, Trans-Canada, Maritime Central, Eastern Provincial and Wheeler Airlines.

EXTRA-MURAL ACTIVITIES

The morale of an isolated unit is governed mainly by its recreational and social life. Goose Bay is fortunate in having both natural and man-made facilities close at hand. The station has a large recreation centre, an indoor swimming pool, artificial ice hockey and curling rinks as well as modern bowling alleys, theatre and hobby shop. A gigantic week-long inter-mess competition known as the "Winter Carnival" is held each February and features along with the usual winter sports, events such as snow sculpture, snowshoeing, beard growing and dog-team races.

The swimming pool is a consistent favourite and is in use an average of nine hours daily. Swimming instruction is available for young and old alike. Many members of the service and their dependents proudly boast that they learned to swim at the "Goose".

Another outstanding attraction is the baseball season, beginning with an elaborate parade complete with floats, sponsored in competition by the various messes. To climax the season a "Little World Series" is played by all-star teams representing the RCAF and USAF. Keen competition is shown in that each team has won the series once in the last two years.

A successful entrant in the 1960 Goose Bay Bonspiel was the Department of Transport rink, which went on to win in provincial competition, thereby earning the honour of representing Newfoundland in the Dominion Briar.

Commercial radio and television is non-existent in Labrador, but the CBC operate a radio station from studios provided by the RCAF. The USAF supplies equipment and studios for a TV station operated under CBC management. Both of these agencies are devoted to community service and their contribution to the recreational life is appreciated.

The station married quarters (Spruce Park) are governed by an elected body consisting of a mayor and community council who have met with considerable success in the advancement of children's recreation. Through the council the residents have helped financially many organizations including Scouts, Guides, ladies' groups and mission funds.

This has been a capsule review of Goose Bay—now the largest settlement in Labrador. Isolated though they may be, residents probably see more important visitors pass through their station in a year than do the personnel of almost any other Canadian base. Many people claim the “Goose” as their favourite station.

5-6. WORLD'S NORTHERNMOST CURLING CLUB

Vol. 8, No. 5 (June 1956)

From Cpl. Darrel Eagles, of Air Transport Command H.Q., whose excellent photographic work has more than once appeared in “The Roundel”, we have received an account of the R.C.A.F. curling club at Resolute Bay, nearly 600 miles north of the Arctic Circle.

While many Canadian sportsmen are enjoying a summer of swimming and basketball, the airmen of Resolute will be plying their besoms on the world's most northerly rink. For them, the curling season lasts about nine months. The rink is situated in an unheated Quonset hut, where the temperature is sometimes as low as 46° below zero during a game.

Play takes place every night during the “season”, and a bonspiel is held each month. Only once has a game been cancelled, and that was because weather conditions made it too dangerous to try to find the rink, although the latter is merely 250 feet from the main building. An 85-mile-an-hour wind and driving snow had reduced visibility to zero, and the men responsible for checking the power and heating plants could only venture out when guided by hand-lines.

The club was formed last December, under the guidance of the only two experienced curlers on the station, Cpl. D. Brien and Cpl. B. McQuarrie; and Cpl. J. Arsenault and L.A.C. P. Sullivan, both of whom are fire-fighters, patiently sprayed the gravel floor of the hut until a perfect surface was built up. The rink is 18 feet shorter than the official regulations of the game require.

The club has a mascot, but he is barred from the rink. When play is in progress he climbs on to a huge snowbank outside and jumps on to the roof of the hut, howling

piteously the while. This seemingly heartless treatment of a beloved mascot, however, becomes understandable when it is explained that Pogo is a large, healthy, and very normal husky pup...

5-7. CURLING ON THE DEW LINE

Vol. 12, no. 4 (May 1960)

Curling is no longer the exclusive prerogative of those of us in the sunny south. The roaring game has come into its own in the Arctic. At Cape Parry, on the DEW Line, five ardent curlers built the only curling rink on the Canadian sector of the Line and last March they held an enthusiastic, if bush-league, bonspiel.

Construction of the two-sheet curling rink was, in itself, something of an accomplishment. With construction material at a premium in the Arctic - and in that section of the DEW Line there isn't a sign of a tree - the men at the site resorted to the native method of construction.

Using blocks of snow cut from nearby drifts they started to erect a "building" and for support they found some timbers left over from construction days on the DEW Line. Electricity was provided by the use of cables from an old construction hut and the roof was a piece of old canvas tightly battened down over the snow blocks and timbers.

To make the ice for the curling rink, water had to be hauled from an ice-covered lake three miles from the camp. During this phase of the operation the local Eskimos thought the RCAF personnel had taken leave of their senses. To them, the Eskimos, it made no sense at all to haul water some distance simply to pour it all over the ground.

But, with the construction of the rink, the Eskimos became interested and formed a team of their own to compete with other Canadian and American teams at the site. The Cape Parry curlers should become quite adept at the sport. At least they will have lots of opportunity to practice during the 10-month arctic season.

5-8. FROZEN FOOTBALL

Vol. 16, No. 1 (January-February 1964)

Each year the Canadian football season comes to a frenzied climax with the playing of the Grey Cup game. Possibly less well known nationally, the second annual White Cup game was played the same day at Fort Churchill under "almost ideal weather and field conditions." The temperature was six degrees below zero, the wind gusted between 20 and 30 mph, resulting in a chill factor equivalent to -49°F. The field was covered with eight to ten inches of soft lumpy snow.

To prevent injuries and to keep warm, the players wore heavy parkas, wind pants and flying boots. In addition, the East wore distinguishing sweaters. After a slam bang 90 minutes of play, the game ended in a tie. The score was zero-zero. Colonel S. Galloway, the camp commander, presented the White Cup to the teams' captains: LAC F. Hiebert for the West and Cpl. W. Philips and LAC R. White for the East.

5-9. REFLECTIONS ON FORT CHURCHILL

By Flight Lieutenant H. R. R. Noble

Vol. 16, No. 4 (October 1964)

Probably not too many tears were shed throughout the service when, on 31 Mar. '64, the air force officially closed RCAF Unit Fort Churchill. And yet, for many of us who served there, that event did not erase fond memories of our stay at Canada's most northern port. Notwithstanding Churchill's formidable environment, there is a certain warmth of feeling and co-operation among the majority of residents which one is hard-pressed to find in the more sophisticated urban areas "outside".

Fort Churchill was Canada's most unusual military base from almost every aspect. Where else, for instance, could you have attended the marriage of a USAF (SAC) pilot to an American southern belle, and see an honour guard composed of members of the USAF, US Army, US Marine Corps, RCN, Canadian Army and RCAF? This was typical of the place which housed an amazing cross-section of military and civilian organizations from both sides of the border and frequent visitors from other countries.

Within a few square miles live English and French-speaking whites, treaty and non-treaty Indians (of the Chippewayen and Cree bands) and Eskimos. Standard PMQs on the military base compare most favorable with private homes in the town. Eskimos live in ranch-style bungalows in their government-sponsored subdivision while non-treaty Indians live in hovels made from discarded wooden boxes.

The country itself is also a land of contrasts. Despite the mosquitoes and black flies of early summer, it is a hunter's and angler's paradise; despite the beauty of the shimmering northern lights in winter, it is a nightmare of bitter cold, high winds and drifting snow that gets into every crack and crevice like sand in a desert. Permafrost and forest, sub-arctic tundra, muskeg and barrens are all to be found in the Churchill area.

It is estimated that about one thousand years ago Eskimos from the north and west, and Indians from the southeast arrived at the inhospitable shores of Hudson Bay. At that time, even as today, both races disliked, feared and distrusted each other. Their differences in means of livelihood, appearance, customs and language resulted in their using the tree line as a natural break between their respective domains. Today Churchill is one of only three places in Canada where Indians and Eskimos live side by side.

“Modern” man’s entry on the scene commenced in 1610 with Henry Hudson’s discovery of Hudson Bay and was followed in 1619 by the discovery of the mouth of the Churchill River by Jens Munck. He wintered there with his two vessels and, along with two other members of the expedition who managed to survive the winter and scurvy, returned to Denmark in June. In 1686 the river was explored by John Abraham on behalf of the Hudson Bay Company (and named after John Churchill, later the Duke of Marlborough). This exploration was followed in 1687 by the building of a fort which was destroyed by fire shortly after. Started in 1731 and finally completed in 1771, a new and quite elaborate fortification was built by the HBC at the mouth of the river on the west side, with a small battery of guns facing it from the opposite side to ensure control over the river mouth. The partially-destroyed fort, which still stands today, was approximately 320 feet square with 17-foot masonry walls and six, 10 and 20-pounder gun emplacements.

This fort had a rather unspectacular finish. As a result of the French decision to aid the Americans in the revolutionary war, La Perouse arrived there in 1782, with three ships and a force of 400 men. Explorer Samuel Hearne was in command with only 39 men and hence had to surrender. The French sacked the fort, took the furs as spoils of war and Hearne as a prisoner. Thus the fort built under such hardships and designed to withstand a long siege by the French fell without a single shot as a result of a mere lack of men. Hearne was later ransomed by the company and returned in 1784 to re-establish the post, however, it never returned to its former eminence and Churchill went into a twilight era of diminishing importance for more than 100 years.

Its modern position as a port began in 1926 when a commission under Sir Frederick Palmer recommended that Churchill replace Port Nelson as the modern terminus of the Hudson Bay Railroad. The railroad and the 2,500,000-bushel grain elevator both opened in the fall of 1931 and the port and harbour facilities in the summer of 1932.

Fort Churchill has been the site of scientific studies and explorations for many years, dating back to 1741 when Christopher Middleton wintered there with HMS “Furnace” and HMS “Discovery” while seeking a northwest passage.

The present-day base (named Fort Churchill in 1948 to distinguish it from the town), about three and a half miles southeast of Churchill on the shore of Hudson Bay, was originally built by the US Corps of Engineers in 1942 as part of an air route to the United Kingdom. In 1946 the camp was taken over by the Canadian Army as a joint services experimental, environment and training station.

RCAF Detachment, Joint Services Experimental Station, Churchill was formed on 1 Oct. ’46 to conduct cold-weather trials of service equipment. The RCAF took over from DOT responsibility for the maintenance and supervision of the airfield, hangar, control tower, air/ground/air communications and other facilities exclusive of the radio range and meteorology (all of which were returned to DOT earlier this year). In 1947 the RCAF was given the additional responsibility of providing airlift to

carry out the requirements of all US and Canadian forces based at Churchill. The following year the RCAF unit assumed control of the airfield at Baker Lake, NWT, relinquishing it but adding Coral Harbour in 1949. The summer of 1949 was a particularly busy one as No. 408 Sqn. used Churchill as a base for its historic aerial mapping of the north.

In 1952 RCAF Unit Fort Churchill (as it was then named) became part of Air Transport Command - a logical move as the airfield had become a major staging base for the increasing northern traffic. With its extensive meteorological, air traffic control, radio and radar navigational aids facilities, this was a welcome haven for both military and civilian crews returning from the Arctic, as the nearest similarly-equipped airfield is at Thule, Greenland. The RCAF operated a combined minor relay and communications centre (which processed about 10,000 messages a month for several units and services in Churchill and to the north). It also had an air/ground/air radio facility providing long-range communication to ATC aircraft as part of the Military Aeronautical Communications Service.

Central Experimental and Proving Establishment (CEPE) took advantage of the Churchill facilities to carry out cold-weather environmental testing of many new items purchased for the RCAF inventory. The majority of our new aircraft, including such diverse types as the *Tutor*, the *Yukon* and helicopters, have been subjected to the Churchill weather. As a result CEPE has devised modification methods for many of these aircraft so that they can cope with the Canadian winter. (One day I can recall seeing parked either in or out of the hangar a *Yukon*, a German F-104, a Royal Navy helicopter, an RCMP and an RCAF *Otter*, four US Army helicopters, a Canadian Army helicopter, a *Flying Boxcar* and a *North Star*.)

Even though RCAF Unit Fort Churchill is now closed, the RCAF is still represented in the area. Two technical officers (F/O J. G. Gallant and F/L P. E. Woods) are on staff of the Churchill Research Range – the USAF-operated rocket-launching site which over the past few years has played an important part in man’s probing of the upper atmosphere.* This summer negotiations were started between the US and Canadian governments with a view to choosing a new operator for the range. A likely successor to the USAF’s Office of Aerospace Research is Canada’s National Research Council. Next year DRB’s Northern Laboratories at Churchill, which has concentrated its scientific efforts on studies of the aurora borealis and providing support for the research range, will be closed down.

Along with the RCAF, the Canadian Army has also recently pulled out of Fort Churchill, turning over its “housekeeping chores” to the Department of Public Works. Eventually the camp will become the main base for the Department of Northern Affairs’ Eskimo program – encompassing educational and recreational facilities for Eskimos from all parts of northern Canada.

* See *The Roundel*, Sept. '63

Thus, the military occupation of Fort Churchill has given way to a new civilian era – again without a shot being fired in anger.

SECTION 6:

CANADA'S RADAR OUTPOSTS

THE MID-CANADA LINE **By Flying Officer S. G. French**

6-1. PART ONE

Vol. 10, No. 3 (April 1958)

AIR DEFENCE OF NORTH AMERICA

The purpose of the air defence of North America is to contribute to the deterrence of war. This is accomplished, for the most part, in two ways: (a) by protecting the main deterrent, namely, the atomic strike force based in the U.S.A.; and (b) by forcing an enemy to expend such great resources and effort in offensive preparations, before he dare risk an attack, that he will be discouraged from doing so.

The concept of air defence is based on two essential requirements: early warning of the impending attack, and destruction of the attackers. Early warning is necessary to give the strike force time to get airborne and preserve its counter-effectiveness before its bases are attacked, to alert and position the active air defence forces, and to provide warning for the civilian population.

The D.E.W., Mid-Canada, and Pinetree Lines are located to give maximum alert time and guidance to the strike force, civil defence, and to the active air defence forces. The land segment of the D.E.W. Line, located along the 70th parallel, will give a minimum of two hours' warning to the closest North American targets against a 600-knot bomber. This Line also alerts the entire system. The Mid-Canada Line will give a minimum of one hour's warning and, in addition, will serve to confirm the attack, indicate its direction, and provide the signal to send manned interceptors into the air under the control of the Pinetree system, located roughly along the 50th parallel.

Both the Mid-Canada and the Pinetree systems are for the detection of airborne objects; however, the Mid-Canada Line's facilities are more limited, having been designed to give early warning detection at a more economical figure than is possible with the conventional type of radar equipments. The largest portion of the cost of a system of the Mid-Canada Line type has been expended on buildings, power

installations, roads, re-supply and storage facilities, and transportation costs. Of the money spent on electronic equipment, by far the largest portion was for communications equipment. The Mid-Canada Line is designed so that it can be readily modified to meet the changing technological advances of the electronic field as more suitable devices are developed for defence.

The main difference between the Mid-Canada Line and the D.E.W. Line is that the latter is primarily an active radar system augmented for low coverage by passive radars, whereas the Mid-Canada Line uses only the passive type of radar. Operationally, the D.E.W. Line provides more data, giving azimuth and range, height, and speed, and may be used in a defensive role as G.C.I. stations. The Mid-Canada Line, on the other hand, is completely passive. It is a "fence" of semi-automatic electronic equipment running roughly 2,600 miles along the 55th parallel of latitude from Labrador to British Columbia.

EARLY PLANNING

Shortly after the Second World War, the Defence Research Board together with the R.C.A.F. demonstrated that a McGill Fence type of detection line could detect aircraft with a high degree of reliability. Early in 1951, Professor G. A. Woonton of McGill visited Washington, D.C., to discuss plans for increasing the effectiveness of radar warning in North America. At that meeting, the use of a McGill Fence, or doppler system, was proposed and discussed.

In the fall of 1951, D.R.B. began further studies into the principles of doppler. By January 1952, D.R.B. had decided to measure and demonstrate the effectiveness of doppler systems. Several systems were flight tested during the next eight months, from which D.R.B. prepared its final report and recommendations.

The Canadian and U.S. Governments, in February 1953, asked the Canada-U.S. Military Study Group (M.S.G.) "to study those aspects of the North American defence system in general, and the early warning system in particular, which are of mutual concern to the two countries." The two Governments had established the Canada-U.S. Scientific Advisory Team (C.U.S.S.A.T.)—a group of American and Canadian scientists whose purpose it was at that time to provide scientific advice to the M.S.G. The Air Defence Commanders of Canada and the U.S.A. were asked by M.S.G. to submit separate briefs. By July 1953, Air Defence Command had prepared a document entitled "Study – Air Defence of Canada—Requirements for Early Warning and Tracking." Both this report and that presented by American defence authorities attached first priority to the construction of an early warning line along the 55th parallel. Meanwhile, C.U.S.S.A.T. had been performing an analytical study of the same problem; their report supported the views expressed by the respective Air Defence Commanders.

On 8 October 1953, the M.S.G. recommended to the Governments of Canada and the U.S.A.: "That there be established at the earliest practicable date an Early

Warning Line located generally along the 55th parallel between Alaska and Newfoundland,” and outlined what the minimum operational requirements for this early warning line should be.

Less than one month later, on 3 November 1953, the Canadian Cabinet Defence Committee issued the following directions:

- (a) An early warning line should be established along the 55th parallel of latitude;
- (b) The Chiefs of Staff should instruct the Canadian section of the M.S.G. to urge the Study Group to complete the selection and specifications for equipment for the early warning line;
- (c) The R.C.A.F. in consultation with the U.S.A.F., should carry out a detailed survey of the proposed early warning line and the sites along it
- (d) Canada should undertake the planning and construction of the early warning line, without prejudice to a later decision on the division of costs.

Before the month was out, the Mid-Canada line had been approved in principle.

SPECIFIC PLANNING

In December 1953, the R.C.A.F. undertook to investigate the logistical and construction implications of the Mid-Canada Line. This project involved tractor train operations in western Canada, and confirmed the fact that an early warning “fence” along the 55th parallel was both possible and practical.

The reader, were he to travel along the length of this 20th Century fortification from east to west, would experience remarkable variations in topography, climate, and accessibility. In the Labrador-Ungava region he would discover high, north-south ridges of rock and rugged bushland surrounded by thousands of lakes. The climate is very severe, for most of its weather originates in the Arctic polar regions. Moving westward, he would pass through the sub-Arctic tundra of the south-west shore of Hudson Bay. It is right here, on the shore of Hudson Bay, that the muskeg begins—continuing through Manitoba, Saskatchewan, and into Alberta. Eventually, the country changes from flat muskeg to rolling, heavily wooded country—but the muskeg is there, nevertheless. It is not until he reaches the last few hundred miles of the Line that he escapes the treacherous muskeg. As he moves west into the area affected by the warm Pacific currents, the climate becomes more and more moderate.

During the winter of 1954-55, the R.C.A.F. prepared an official “Operational Requirement” for the Line. The most important of the requirements may be summarized as follows. The Line was to be designed in order to:

- (i) Provide detection of moving objects in the air.
- (ii) Have an extremely high degree of reliability.

- (iii) Indicate whether the object is inbound or outbound.
- (iv) Be capable of indicating the point of penetration within a specified radius.
- (v) Provide direct communication between the penetration reporter and the A.D.C.C.
- (vi) Have the capacity for transmitting Air Traffic Movements and Ground Observer Corps information.
- (vii) Give maximum possible immunity to E.C.M.
- (viii) Be economical in terms of construction and operation.
- (ix) Be in operation before January 1957.

Quite obviously, these specifications were and are still very demanding.

* * *

While the “Operational Requirement” was being prepared, the R.C.A.F. established the necessary organization to plan and implement the operation. A Steering Committee composed of representatives of various Government departments was organized for the purpose of providing policy direction. In the spring of 1954, at the direction of the Steering Committee, a Systems Engineering Group (S.E.G.) was established under Group Captain G. M. Fawcett to study and make recommendations by 1 June 1954. Grp. Capt. Fawcett was succeeded in October 1954 by Grp. Capt. E. C. Poole, who directed the activities of S.E.G. after that time. By April 1954 the S.E.G. consisted of the following staff:

- 3 R.C.A.F. construction engineering officers,
- 13 R.C.A.F. telecommunications officers,
- 2 R.C.A.F. operations officers,
- 1 R.C.A.F. supply officer,
- 10 industrial, electrical and civil engineers,
- 1 clerk from the Civil Service.

The U.S.A.F. was invited to participate to any degree it wished, and supplied five of its operations and telecommunications officers, who worked with the S.E.G. in the original planning phase but left before completion of the “Final Report”. The 10 civilian engineers, referred to above, came to the S.E.G. staff on contract between their parent companies and the Department of Defence Production. Much credit is due to the Canadian electronic industry for unselfishly supplying these to engineers on a short-term basis.

During the same spring period, topographical maps were produced of a 15-mile wide strip along the 55th parallel in preparation for the final physical siting. From aerial photographs taken especially for the job by Air Transport Command, the Canadian Army produced accurate contour maps on a top priority basis. From these maps the initial, but tentative sites were chosen. D.R.B., meanwhile, continued to

test and measure the capabilities and limitations of doppler systems by installing test links both in the Ottawa area and in South Ontario. D.R.B. and S.E.G. personnel worked very closely and were in daily contact with each other until a final decision was made on the type of equipment which ultimately would be used.

The S.E.G., in its investigations, considered four different possible systems for the Line and eventually recommended the adoption of the single doppler line (Mark II). Their study was not finished by the 1 June deadline; however, an interim report was submitted on that date. On 27 August 1954, the S.E.G. "Final Report" was presented through the Steering Committee to both Air Forces and their respective Governments.

In essence, what the S.E.G. recommended were detailed plans for a detection line across Canada from the Atlantic to Pacific roughly along the 55th parallel, making use wherever possible of existing radar or other detection devices. It was to be serviced by a high grade multi-channel communications network, completely integrated into the overall air defence system. The "Final Report" of the S.E.G. was approved by both Canadian and U.S. Governments in September 1954, and the planning stage gave way to the designing stage.

THE BIG PUSH BEGINS

In the fall of 1954 the Trans-Canada Telephone System was officially appointed Management Contractor for the construction of the Line. The members of this System are the Maritimes Telegraph and Telephone Company (of Nova Scotia and Prince Edward Island), the New Brunswick Telephone Co., the Bell Telephone Co. of Canada (in Quebec and Ontario), the Manitoba Telephone System, the Saskatchewan Government Telephones, the Alberta Government Telephones, and the British Columbia Telephone Co.

The Trans-Canada Telephone System is not incorporated, but is an association of the seven major Canadian Telephone Companies mentioned above for planning, operation, and division of revenues on long haul telephone traffic. The Government contract was with all seven members of the System, each of whom signed the contract and appointed the Bell Telephone Company of Canada, acting through its Special Contract Department, as Project Agent. The top resources of all members of the System were utilized by the Project Agent throughout the construction period.

The Trans-Canada Telephone System, through its Project Agent, was responsible for the overall supervision, co-ordination and timing of the entire project. The Project Agent had to work closely with the Design Authority (the R.C.A.F.'s S.E.G.) on organization and planning; and had to provide engineering, consultant advice, technical reports, costing information, and detailed drawings and specifications to meet the system's requirements established in the "Final Report". It had to develop a master time schedule and carry out siting and other field surveys at the request of Design Authority or as indicated by the requirements of the work. The Project Agent

also had to co-ordinate reports, arrange for special packing, storage and transportation of equipment, and arrange for tests of equipments, structures or systems as required. In short, the Bell had to turn over to the Government a complete and workable early warning Line in accordance with the overall design indicated by the Design Authority.

When it originally came into being in June 1953, the Special Contract Department of the Bell consisted of an Assistant General Manager with six people reporting to him. When the Mid-Canada Line contract was awarded to them, the Department was separated from the Telephone Toll Area and headed by a General Manager. The function of the Department had always been as a top level contractor in defence communications and associated construction for the Trans-Canada Telephone System and the Canadian Government.

The personnel who manned the Department were engineers and technicians who had been obtained on loan from other member companies in the System, and from Canadian industries such as Canadian Marconi, Northern Electric, Westinghouse, R.C.A. Victor, Rogers-Majestic, Canadian General Electric, Canadian Aviation Electronics, Standard Telephones and Cables, and Racey-McCallum.

The organization of the Special Contract Department was compact and functional. Reporting to the General Manager, Alexander George Lester, was a Chief Engineer, an Assistant General Manager and a Personnel Supervisor. The Chief Engineer had a series of division heads reporting to him. First there was the Siting Engineer, whose job it was to establish the locations of the various sites on the Line. Using helicopter, snowmobile, and foot, his men formed the vanguard of the project. Then there was the Buildings and Structures Engineer, who was responsible for planning and field supervision of construction for all outside structures, the equipment housings, the quarters for the construction crews, the ropeways that take the place of roads in mountainous terrain, and the transportation job that this work involved. Next, there was the Equipment Engineer who, together with his men, was concerned with the engineering and procurement of radio, carrier, and detection equipment. This involved the drawing up of detailed specifications and having sub-contractors work from these. Finally, there was the Transmission Engineer, who was responsible for design co-ordination and for the overall quality of the electronic job. One Transport Advisor worked closely with these men on a consulting basis, advising on transportation channels.

The Personnel Supervisor had the formidable task of caring for a constantly growing staff, drawn from many companies, and scattered over most of Canada. The Assistant General Manager, in addition to helping the General Manager in a number of his duties, had specific responsibility for planning and supervising the installation of equipment, for the training of personnel to do lineup, test and maintenance work and, through the Contracts and Accounts Supervisor, for all contractual and accounting work. To carry out his engineering and co-ordinating function, the Project Agent placed contracts for the services of engineers, consultants, etc., for

necessary engineering equipment and materials and, where applicable, for transportation. Contracts so placed were awarded as sub-contracts of the Management Contract, using the normal procedure of obtaining approval where necessary from the Department of Defence Production.

It was mentioned above that the Management Contractor was responsible for the training of installation and maintenance personnel. In the year 1653, Sister Marguerite Bourgeoys journeyed from France to Ville Marie, a tiny settlement on what is now the Island of Montreal, and there she established the Congregation of Notre Dame, a children's school. On this same site, in July 1955, the Bell Telephone Company established an electronic school for modern frontiersmen. This defence communications school provided a course covering the entire range of modern communications as used on this project. Training was in two stages, basic and advanced, each of approximately 12 weeks. (R.C.A.F. personnel of telecommunication trades are trained at Clinton. Instructors for the advanced courses at Clinton were trained at Bell's Montreal school, and at the Montreal-Orms town test line—a four-station line built for system test, evaluation and training.) As one romanticist put it, "An exciting 300 years of toil, progress and understanding lies between the A B C's of Marguerite Bourgeoys' school-house and the strange words 'polarization', 'tropospheric scatter', 'klystron', 'precision attenuators', and 'ultra-high frequency', which are now uttered daily on the same ground."

On 3 April 1956 the first installation crews were in the field, pleased to find that all the necessary electronic equipment had arrived and was ready for installation. This equipment had been manufactured by several Canadian firms, and, without exception, had been delivered for shipment to the sites on very rigid schedules.

6-2. PART TWO

Vol. 10, No. 4 (May 1958)

DETAILED DESIGN AND SPECIFICATION

The Mid-Canada Line's basic system had been envisioned in the study and report of the R.C.A.F.s Systems Engineering Group. The approval of their Final Report placed the S.E.G. in a design role. Its primary task was to produce a system specification for implementation by the Management Contractor and to approve the specifications for the components of the system. In the winter of 1954-55 the detailed engineering was started, and the preparation of specifications and drawings for buildings and equipments got underway. At the same time, base camps were established, and tractor trains and airlift started the supply of basic materials to caches and lake-heads.

The Mid-Canada Line, or McGill Fence, is an application of the doppler principle for the detection of aircraft. A transmitter and receiver are separated by

several miles, with their antennae directed toward one another. The transmitter sends out an unmodulated continuous-wave signal which arrives at the receiver by the normal process of propagation. In addition to the direct signal, the receiver also collects energy originating from the transmitter which has been scattered from fixed and moving objects in the beam. The phase of this scattered energy generally differs from the phase of the direct signal which is used for reference. A sufficiently rapid variation of this phase difference, such as would be caused by the rapid motion of the scattering object, can be detected as a beat frequency in the receiver output and used to actuate indicating devices.

* * *

The Line consists of a series of Detection Stations designed to be unattended, several Section Control Stations, a few designated "MIDIZ" Clearance Aerodromes, and a group of Communications Sites associated with the Main Line.

At the Detection Sites, the doppler equipment and the radio relay equipment are duplicated with automatic standby. Thus, operation is sustained in case of failure of the main equipment. These duplications ensure the time that a portion of the line is unserviceable will be kept to a minimum. In addition, it provides for alternate rearward communications in case of communication failure either on one of the rearward circuits or along the Line.

Integration of all air defence systems in North America is naturally a basic requirement. In fact, it is now possible for operational information from any of the three Lines—D.E.W., Mid-Canada or Pinetree—to be passed immediately from one to the other, to NORAD Headquarters at Colorado Springs or to any of its Air Defence subordinate headquarters.

Communication between the D.E.W. and Mid-Canada Lines and communication southward, is based on a new kind of microwave transmission known as "ionospheric" and "tropospheric scatter". Giant antennae, bearing a close resemblance to "flying saucers", gather in the tiny microwaves. Before the development of this new type of over-the-horizon transmission, microwave towers had to be fairly close together because the microwaves could not be made to follow the earth's curvature, bouncing out into space instead. The new installation has its antennae many times as far apart, because engineers found that, using sufficient power, the microwaves will bounce back to earth again in little pieces and the "flying saucers" can collect enough of these pieces to produce an effective signal, thus the name "scatter". The voice channels used in tropospheric scatter are of such good quality that it is possible for two people separated by 1000 miles to communicate as though they were in the same room.

In order to meet the identification specifications, the designing authorities tied the Line into the Department of Transport's A.M.I.S. (Air Movements Identification Service) net. The Line and the area it covers has been designated as "MIDIZ". Flight plans must be filed and clearance obtained for every aircraft that wishes to cross the Line. Aircraft operated from a point not in the A.M.I.S. net must land at one of the

Line's designated Clearance Aerodromes and obtain clearance before proceeding. The surveillance radars on the Line were positioned at points where traffic is very heavy. These radars permit the creators to track aircraft for identification purposes, as opposed to the general use of radar for detection.

The designers had to provide equipment which would enable most stations to be left unattended except for periodic checks and maintenance visits. They had to design so that the effects of jamming, and the opportunities to jam the system, were negligible. They had to make certain that birds and other airborne objects could be differentiated from aircraft by the different characteristics that they produce on the display equipment in the operation rooms. There is very little possibility a flock of birds would trigger that type of alarm which would summon interceptor forces into action.

Since most of the stations were to be left unattended, a fault alarm and supervisory control system had to be designed and incorporated into the Line. One of these systems is located at each Control Station and is capable of controlling a number of On/Off functions at each of several Detection Sites and also of reporting their condition. In addition, there is an annunciator at each Control Station which continuously monitors conditions at each of the Detection Sites and reports an On/Off indication.

Every Detection Site has a fault alarm indicator designed to annunciate the condition of many items and a master alarm which indicates if any one of the items is not functioning correctly. Even if a complete Detection Site failed to operate for one reason or another, no hole would result in the Line. The fact that double sensing lines have been employed ensures continuous detection coverage. Even if two adjacent stations failed, the staggered arrangement of the stations would reduce the hole to a minimum. There is only a slight statistical probability that two adjacent stations will fail contemporaneously.

* * *

By October 1954, the R.C.A.F. design authorities had determined siting requirements sufficiently to send the first siting teams, composed of propagation and construction engineers, into the field. Location of the Control Stations was to a large extent governed by logistic requirements. With the use of all available R.C.A.F. helicopters and the loan of six U.S.A.F. helicopters, siting engineers flew all along the Line during the summer of 1955, and by September of that year, Management Contractor and R.C.A.F. engineers, assisted by provincial land surveyors, had fixed all the sites across the country. Electronic path loss checks on certain doubtful paths followed, along with the necessary detailed field survey work.

As Design Authority, the R.C.A.F. produced the overall systems specification, and monitored the project to insure that the full intent of the specifications was carried out and that progress scheduling met the various completion dates that had been stipulated. The R.C.A.F. and the Management Contractor maintained a close liaison,

exchanging information and advice on all design matters in order to ensure that the intent of the Design Authority was fully carried out.

PROCUREMENT

Detailed engineering continued in the summer of 1955. Meanwhile, procurement problems hit their peak with the target date for deliveries being the winter tractor train and airlift operation. Equipment procurement, a good example of the complexity of the task, involved about 15 major suppliers and well over 70 smaller suppliers. Contemplate the immensity of the task of collating, packaging, and following through on literally thousands of items, emanating from plants scattered from Germany or Manchester to Los Angeles, so that they would arrive on the 55th parallel on schedule for assembling!

The work of procurement was done by the Project Agent through the Department of Defence Production. D.D.P. carried out its normal procurement function in connection with this contract. Its functions included calling tenders where possible, negotiating and awarding contracts, supervising production, and such special expediting as was required to ensure satisfactory completion of contracts to meet delivery schedules. It was responsible for placing certain engineering contracts, including the main management contract. The Department was also responsible for the procurement of equipment incidental to the operation of the project, and for placing the major installation contracts. It also procured general supplies such as fuel, barrack stores, etc., required throughout the construction period.

It was agreed that, where applicable, a clause would be placed in contracts negotiated by D.D.P. for this project to the effect that the Management Contractor would act as an agent of Her Majesty in respect of that contract and would be responsible to the D.D.P. for such scheduling, expediting, verification of invoices and progress claims, marshalling and transporting of materials, components and equipment as might be required in connection with the contract in relation to the overall project.

Before purchasing action was taken, the Management Contractor was consulted in the preparation of source lists where his knowledge of available sources of equipment, materials and services would be of benefit. On receipt of tenders he and the R.C.A.F.'s Design Authority assisted the D.D.P. in its assessment. On any procurement case, however small, if D.D.P. felt that a recommendation of the Management Contractor was questionable, the matter was invariably referred to National Defence for concurrence.

TRANSPORTATION

Over 200,000 tons of materials—tractors, vehicles, steel, lumber, construction materials, electronic equipment, camp gear, fuel, food, and men—had to be

transported to the Line. In a country, most of which is paralyzed for two months in the fall during the freeze up and for one month during the spring thaw, inter-timing of procurement, transportation, and construction was of vital importance.

The first step in the overall transportation planning — one of the tasks of the Project Agent — was to establish marshalling areas at ends-of-steel, or on major roads running north. One of the main aims of the planners was to keep down the tonnage moved through any one point, and reduce the ton-mileage for lateral movement along the Line. In the west, this was relatively easy with points such as Dawson Creek, Slave Lake, Anzac, The Pas, and Gillam being served by rail, and other settlements such as Fort Black and Lac Laronge located on substantial roads. In the east, possible marshalling areas were fewer — Moosonee, Timmins, Val d'Or, Montreal, Seven Islands and Knob Lake being the only ones available.

An integral element in the success of all supply operations was the communications system created especially for this purpose. This system contained a complete network of temporary radio communications connecting all sites. This network was tied in with the tractor trains when they were in operation during the winter months. A basic teletype network connected the various zone headquarters with Montreal, from which emanated the overall control.

Transportation from the sources of supply to the marshalling areas was generally performed in common carriers over established routes. Canada's railways run east and west, with only a few north-south feeders. The main problem that arose when dealing with these common carriers was that which evolved from the routing of "rush" and "special" cargoes over lines having normally thin schedules.

In the west, country roads and trails were extended giving access to most sites in B.C. and Alberta. Nearly 200 miles of construction roads were built in the fall of 1955. One of the transportation problems encountered in the west was that involving R.C.A.F. Station Stoney Mountain, Alberta. It seems that some of the equipment destined for this spot arrived only after having passed through Manitoba's Stoney Mountain Penitentiary!

Eastward, in Saskatchewan and Manitoba, a wide assortment of modes of transportation was employed. From marshalling areas such as those at Fort Black and Slave Lake, trans-shipment was made from railway and truck convoys to barges, boats, muskeg tractors, and float-planes or ski-planes, with helicopters generally called upon to make the final lifts into the sites. During the winter of 1955-56 about 11,000 tons of material were moved into this central area by tractor train. At their peak, these trains running out of Gillam, Man., and Moosonee, Ont., used over 400 sleds and over 40 heavy tractors. A piece of Masonite destined for northern Saskatchewan might go by rail to Meadow Lake, then by truck to Fort Black, by barge to a lakehead, and finally by helicopter to a site.

* * *

The Hudson Bay littoral consists of desolate muskeg on the west, and desolate sand on the east. The main route used to supply this area was the sea. In 1955,

17,000 tons were brought in from Montreal by ship. In 1956 the total was approximately 41,000 tons.

During the 1956 navigation season, there were 49 commercial freighters and tankers operating in and out of the Hudson Bay area, engaged in Government work connected with D.E.W. Line and Mid-Canada Line construction. Five Department of Transport ice- breakers and supply ships were engaged in assisting navigation in these waters as well as transporting large quantities of supplies to inaccessible spots. Some 40 smaller departmental craft assisted in landing the cargo in ship-to-shore operations at various points. All these operations were in addition to the regular grain shipping out of the Port of Churchill, which reached a new high record of 48 grain ships during the 1956 season.) A total of nearly 150 ships and smaller craft operated in these waters at one time.

The year 1956 not only saw more traffic in Hudson Bay than ever before, but the season was extended nearly six weeks beyond the accepted closing day of navigation, 15 October, when commercial insurance ceased on the commercial route to the Port of Churchill. The D.O.T.'s icebreaker "N.B. McLean", which every year patrols the Hudson Bay and Hudson Strait during navigation season, left Quebec City for her northern assignment on 26 June and did not return to her home port until exactly five months later on 26 November, after travelling some 13,000 miles.

Most of the shipping operated regularly in the Mid-Canada project was purchased by the Department of National Defence out of Mid-Canada funds and operated by D.O.T. personnel. Some of the L.C.M.'s and barges were obtained on loan from the U.S. Navy. Included in the craft engaged in ship-to-shore operations were two heavy L.C.T. landing craft of 600-ton capacity each, 14 L.C.M. medium landing craft of 35-ton capacity, ten 7-ton barges, four pontoon barges of 85-ton capacity, and two tugs engaged in towing "dumb" barges ranging in capacity from 50 to 500 tons. The two 600-ton L.C.T. landing craft had been acquired in the United Kingdom and had crossed the Atlantic under tow. After being converted in a Canadian shipyard, these two craft proceeded to the Hudson Bay early in the summer of 1956 and returned to the St. Lawrence River under their own power at the close of the season. All the other ship-to-shore craft were hauled up on shore for wintering at their various ports of operation. Two commercial cargo vessels, the "Eskimo" and the "Steve Ahern" also wintered in the Hudson Bay.

The large barges were towed to the area by the "N.B. McLean", "d'Iberville" and the "Sorel" early in the season. The smaller craft were carried on the decks of both D.O.T. and commercial ships. However, before any of the commercial ships could come near their respective destinations or the ship-to-shore flotilla start operations, the "Edward Cornwallis" had to place some 15 tons of special aids to navigation in these Hudson Bay waters, including anchor buoys, channel markers and radar reflectors.

The Bay is so shallow on its west side, 2,000-ton steamers have to stand off eight to ten miles. At Winisk a large breakwater and turning basin was built to

accommodate unloading. This was designed by Wing Commander J. D. Shannon of the R.C.A.F. and proved invaluable in the hazardous off-loading operations. Captain D. S. Scott, Northern Transportation Officer, D.O.T. Marine Services, was in charge of the whole operation; Captain H. S. Oldford was beachmaster at Winisk and Captain A. R. Lang filled the same function at Great Whale River. In the final stages of the year's undertaking, the "d'Iberville" and the "C.D. Howe" made special voyages with cargoes aggregating 1,635 tons before winter closed the water-ways. Their helicopters and special ship-to-shore landing gear proved invaluable in the quick despatch of their freight in the round-the-clock supply operations. The weather was so rough at times that for periods of several days it was impossible to have the landing craft alongside the cargo ships.

This operation of transferring cargo in rough seas was a very rugged undertaking and it was fortunate there were not more casualties. Some stevedoring was done by Eskimos, who were not good swimmers and invariably wore life jackets while on board ship or lighter.

AIR TRANSPORT

Although air transport was employed throughout the Line, in Northern Quebec and Labrador it was the prime vehicle of transport. The use of aircraft speeded the construction of the Line by many years.

Some 25,000 tons of material were airlifted by Commercial Air Carriers during this phase of development. The commercial airlift out of Knob Lake to the lakeheads across northern Quebec is a saga in itself, which for nearly two years employed most of the civilian-owned *Cansos* and ski-equipped *Dakotas* in Canada. During the winter of 1955-56, 135 Dorman diesel engines were airlifted from the United Kingdom to Mid-Canada Line sites in a joint civilian-R.C.A.F. operation which immeasurably expedited heavy construction.

Air Transport Command played an important role in the building of the project. Aerial photographs and radar contours resulting from A.T.C.'s operations enabled the Canadian Army to produce the contour maps vitally needed for preliminary siting. This Command also provided invaluable assistance in helicopter siting operations, the location of lakeheads in Quebec and Labrador, and with the airlift of over 400 tons of construction material into Great Whale River.

In the east, goods were taken by boat and train to Knob Lake, or by aircraft to Goose Bay, then by fixed-wing aircraft to lakeheads near the Detection Sites for transshipment. Finally, the helicopters lifted them to the hilltops where the sites were located. An allotment of tower steel, for example, would originate in Windsor, Ont., move by rail to Montreal, thence by ship to Seven Islands, up to Knob Lake on the railroad, by fixed-wing aircraft (*Canso* in the summer, ski-equipped *Dakota* in the

winter) to a lakehead, with the last lap made in a helicopter to a hilltop site for erection.*

6-3. PART THREE

Vol. 10, No. 5 (June-July 1958)

OPERATION WHIRLYBIRD

In the early planning phase of the Mid-Canada Line it was decided that, because of the nature of the terrain in which airlift of construction materials was required, the use of helicopters would be compulsory. Since no civilian operator then in existence possessed the means to supply and support sufficient helicopter strength for the operation, it was decided that the R.C.A.F. would have to fulfil this commitment. The result was the formation of the first unit in the R.C.A.F. to be equipped exclusively with rotary wing aircraft—108 Communications Flight.

R.C.A.F. Station Bagotville was selected as the base of operations for this new unit, officially born on 1 June 1954. Squadron Leader R. T. Heaslip, the most experienced helicopter pilot in the R.C.A.F. at the time, was appointed commanding officer. With him on the first day of operations were Flying Officer MacGregor, Warrant Officer II Shortt, and Sergeants Durham and Pugh. This advance party was charged with the task of setting up an organization for the acceptance and maintenance of the unit's aircraft, and for the extensive training programme that would be required in order to operate and maintain the soon-to-arrive helicopters.

Orders were placed for six *Sikorsky H-34s* and six *Piasecki H-21s* to be delivered by late 1955. Six *Piaseckis* of similar design from Search and Rescue Units across Canada were diverted to 108 Communications Flight for training purposes. During the first few months, Sqn. Ldr. Heaslip was the only pilot attached to the unit and on his shoulders, therefore, rested the job of ferrying the various training helicopters from Morton, Pennsylvania, and Bridgeport, Connecticut.

While the C.O. was doing this, a training programme designed to provide the unit with a nucleus of trained *S-55* pilots was in progress at Okanagan Helicopters in Vancouver. This company had been contracted to give conversion training to selected R.C.A.F. pilots who had completed basic training on *S-51* helicopters at the Light Aircraft School at C.J.A.T.C., Rivers, Manitoba. The first graduate from Okanagan joined the unit in November.

* In the final installment next month: the story of 108 Comm. Flight—first R.C.A.F. unit to be equipped exclusively with helicopters; construction and electronic installation along the Line; and a postscript on the operation as it stands today—an integral and functioning part of North America's air defence system.—Roundel Editor.

Ground crew airmen posted to 108 during the summer of 1954 had plenty of time on their collective hands, for there were no aircraft on strength. With typical airman devotion, we are told, they refused to spend all of their time fishing. They decided to assemble a *Harvard* for the Maintenance Flight of Bagotville. This aircraft had been out of service for 18 months, and appeared to be not only dismembered, but dispersed as well. It took about two months of labour and detective work to find all the parts and fit them together. A few months later, they had a hangar full of helicopters with only Sqn. Ldr. Heaslip to fly them.

As the year approached its demise, the unit increased both in air and ground manpower. On 10 December 1954, the first of many mercy flights was performed. Mr. Max Nebergall, a Piasecki Company pilot, Flying Officer Kirkwood, Sgt. Pugh, Bob Chesney, Piasecki technical representative, Nursing Sister Jeanette Cagne, and Mr. R. B. Less, a civilian bush pilot, were credited with evacuating a seriously ill Indian woman from a camp near Lake Manuan, 170 miles north of Bagotville, to a hospital at Roberval, Que.

The training continued: experimentation on lift loads in all types of weather, formation of a technical training school, cross-country flights, working in and out of confined areas, flight safety demonstrations, cold weather tests, parties (conditioning), hockey games (reconditioning), night flying, and survival expeditions.

In the latter part of May 1955, the *C-119s* were busy moving ground personnel and equipment to Knob Lake. On the last day of that month six *H-19s* (the Service designation for the *S-55*) left Bagotville for Knob Lake. June saw the beginning of the activities for which 108 Comm Flight was originally formed—the transportation of men and materials for the construction of the Mid-Canada Line.

* * *

The R.C.A.F.'s "hill and gully riders" began to prowl the ridges of Quebec and Labrador. Operation *Backlash Two*, the site proving, path testing, and site survey phase, began with six Sikorsky *H-19s* working out of R.C.A.F. Detachment Knob Lake. Three "choppers" were allotted to the site proving and radio path testing being done by R.C.A.F./S.E.G. and Bell Telephone Company engineers; while the other three carried personnel and materials to open the remote main bases while awaiting the Quebec provincial survey teams. Often the surveyors and their equipment were lowered to the ground from their hovering helicopter by mechanical hoist in areas where muskeg and/or bog prevented landing of the chopper.

As each site required at least two days to be surveyed, the waiting helicopters spent this time performing domestic transport. This was imperative because fixed-wing aircraft could not operate during the break-up period. However, some fishing expeditions were possible. Many large trout were caught and, as is to be expected, many larger ones got away.

The site proving and survey parties and helicopters slowly worked their way west through the James Bay region to Moosonee, where a new main base of operations was

set up under canvas. To expedite the operation, fuel caches had been established at a number of points by tractor train during the preceding winter.

The area on the west side of Hudson Bay was quite different from the Labrador-Quebec area. This new area was, as has been said before, almost entirely muskeg. Great care, therefore, had to be observed in the selection of landing areas. It became the practice to attempt the landing on various patches of caribou moss until one was found which could support a helicopter for a period of time. As the operation moved westward beyond Fort Severn another temporary camp, known as Camp Seven, was established.

Site proving was completed on 24 July 1955 and the two *H-19s* returned to Moosonee where they were joined by one of the helicopters on site survey when that phase was completed on 27 July. The three remaining machines of the site survey detachment flew on to Edmonton in readiness for future operations in that area.

During the period of work in the west in July, the *H-19s* were seldom unserviceable. The only major breakdown occurred at Winisk when a routine inspection disclosed metal in the oil filters. A new engine was flown to the site in a *Canso*. A ground crew was rushed from Moosonee in an *Otter*; and the helicopter was back in service within two days. All aircraft were flown for minor inspections to Winisk where, in less than one day, a hard-working ground crew, suffering most adverse conditions, would complete the job.

At the advent of September 1955, the unit had four detachments in the field. Two detachments of three *H-19s* each were employed in the propagation testing of sites. One of these worked out of Knob Lake, while the second was based at Grande Prairie, Alberta, once a port on the North-West Staging Route. The other two detachments were assisting in the fighting of forest fires from bases at Baie Comeau, Que., and Cochrane. Many of the unit's pilots and crewmen actually participated in the fighting of the fires.

Most of the latter part of 1955 was taken up in training and conversion. Thirty-four pilots had been brought to operational standard on the *H-19*, with 20 of these also qualified to fly either the *H-34* or the *H-21*. In December the unit transported one very distinguished V.I.P. to such points as Arvida, St. Honore, St. Felicien, and Mistassini. His name? Santa Claus.

* * *

No. 108 moved to Rockcliffe at the beginning of 1956. Soon the major job of supplying the sites began. Helicopters, pilots, and ground crews worked out of many bases including Winisk, Knob Lake, and Great Whale River. By May, operations on the western half of the Line had been stabilized on a full scale basis. Time was of the essence, and at one period the help of the R.C.N. was sought. The navy's helicopters were used very effectively in the Knob Lake and Great Whale areas.

One day Sqn. Ldr. Heaslip was called in the early hours of the morning to search the Uplands area for rockets that were discharged accidentally from a *CF-100*. Shortly after, Flying Officer Nicolson was despatched to Cornwall to pick up an injured

Seaway employee who had received serious head injuries. The injured man was flown to the Montreal Neurological Institute in a very dramatic life and death flight. The scene of many a gridiron battle, Molson Stadium, assumed a new function—a heliport was born. Several mercy flights were flown during this period, all done by pilots on relief rotation from the flight's main task in the North.

Novel tasks on the Line were almost as frequent as their more staid and routine counterparts. The need for sand at the Detection Sites in the Great River area gave rise to one of these tasks. The most suitable sand in the site areas was found and marked by helicopter survey. How could a helicopter transport sand? Very simple. A net with a tarpaulin lining was filled, picked up, taken to the hill, and then one end of the net was released.

Once, in October of 1956, a strange series of incidents was born when Helicopter 9639 was flown to Knob Lake from an outside site after temporary repairs. The aircraft had been out of service for several months, since it had crashed on its side just off the landing pad. It then started on the flight to Rockcliffe, with 9644 acting as "mother" ship. Near Baie Comeau, 9644 was forced into an emergency descent because of a supercharger failure. The remainder of the trip was carried out, after repairs, with the original lame duck mothering the mother. Once at Rockcliffe, one unsuccessful attempt was made to fly 9639 to Arnprior for major repairs. Then the decision was made to tow it the distance of 40 miles by mule. Flying Officer B. Croxton acted as mule-skinner on this two-day marathon. Needless to say, many an eyebrow was raised amongst the solid citizens of Ottawa and their neighbours on Highway 17.

February 1957 was a memorable and sad period for the members of 108 Comm Flight. With little left to do but routine day-to-day maintenance supply of the western sites, all ten *H-19s* were handed over to a civilian contractor, Okanagan Helicopter Company. In June 1958, with the transfer of nine *H-21s* to Spartan Air Services, 108 left the Mid-Canada Line project for good and became known as No. 5 O.T.U. Commanded now by Flt. Lieut. W. J. Kelly, the unit will train future helicopter pilots on Vertol *H-21* and Sikorsky *H-34* equipment.

CONSTRUCTION AND INSTALLATION

The summer of 1956 saw building construction in high gear with electronic installations nearing completion in the western sections. The project involved the erection of several hundred steel towers, approximately 16 million cubic feet of permanent buildings in over 250 buildings ranging from small survival huts to complex equipment and operations buildings, power plants, quarters, water treatment and sewage disposal plants, and large helicopter hangars.

One instrument in this phase was Air Materiel Command. To them goes the credit for much engineering and supply assistance, and for the superlative job done by one of their units in the fall, winter, and spring of 1954-55. It was No. 2

Construction and Maintenance Unit which performed the arduous task of constructing the original airstrip and erecting the construction camp during Great Whale River's most hostile months.

Construction of the Line, with the exception of the above, was done by a number of major civilian contractors, with the Bell field organization acting as project and site engineers, looking after transportation, and generally managing the job. Defence Construction (1951) Limited (D.C.L.) negotiated and awarded contracts for buildings and structures, calling for tenders where necessary.

D.C.L. appointed the Management Contractor as its agent with respect to field supervision of the contract. This covered complete direction of the job in the field both as to timing, quality of workmanship and overall co-ordination to meet design and all job requirements to the satisfaction of D.C.L. It also included the verification of progress claims of the contractors and recommending them to D.C.L. for payment.

D.C.L. organized a group at A.F.H.Q. to maintain direct liaison with its field representatives on the one hand and with the Project Agent's staff on the other. Its field representatives were located at a few key points along the Line from which they had access to all sites.

With a premium on time, especially field construction time, the use of prefabricated panels was a welcome necessity. Almost all Mid-Canada Line buildings are of steel panel construction, with structural steel wind-bracing, and concrete foundations and floors at the Main Stations. Most of the Detection Sites' buildings are set on creosoted wood sills or concrete posts.

Along the Line, soil conditions vary from clay bed 100 feet deep to muskeg, sand, permafrost, shale rock or solid granite. Foundation design problems were, therefore, multitudinous. The foundations themselves were very important, especially those used for the towers. The towers are guyed; and the rigidity requirements called for a maximum allowable sway at the 350-foot height of plus or minus six inches. The reader may imagine the problems encountered in this respect in Labrador, where winds up to 128 miles per hour have been registered.

The discovery of water fit to drink, water treatment plants, sewage disposal plants, all brought their own problems. At the western, muskeg-surrounded sites, the lack of water and its quality when obtained, have provided one of the most serious hardships. At one site the drinking water is drawn from a brown, dead-water lake, and tastes like pure chlorine. The same is true of many others where deep wells were dug without success. At one western site, the drinking water is still flown in by helicopter while its inhabitants obtain their washing water from a lake one mile away. The trip to this lake and return over muskeg requires two men, a power truck, a winch, many innocent young poplars, and five hours of back-breaking labour each week.

* * *

A typical Detection Site consists of a prefabricated building, 28 by 60 feet. The building is divided into three areas—power, technical, and living. One end of the

building houses three diesel electric generators, any one of which is designed to provide the power required. Should the operating plant fail, the next diesel will automatically start and supply the power. The third plant is provided for additional standby and ensures one standby during maintenance and overhaul. The buildings are heated by heat exchangers on the diesel exhaust system.

The central portion of the building houses the detection equipment, radio relay equipment, fault alarm equipment, and at those stations which require them, the LF Beacon, HF receiver, VHF and UHF transmitters and receivers and such other ancillary equipment as is required. The remaining end of the building is designed as a living area. This is complete with built-in cupboards, stove, refrigerators and sink, as well as bedroom and shower. A deep freeze refrigerator is built into the building.

Each Detection Site has at least one tower which supports the antennae. The towers are four feet square and vary in height from 25 to 350 feet, depending upon the height of the hill upon which they stand. A helicopter landing pad is built adjacent to the site. Oil storage tanks for the diesels are also located at the site. An emergency shelter complete with rations, heating, etc., is provided in the immediate vicinity of the technical buildings. In the eastern sections where weight was a vital factor in transportation, magnesium panel floors were used in these buildings. While each of the Detection Sites was designed to be essentially unmanned in operation, there are sufficient living quarters provided for visiting maintenance teams who may have lengthy stays imposed upon them either by unfavourable weather or aircraft unserviceabilities.

* * *

A typical Control Station consists of an operations building which houses the technical equipment, and administrative building, living quarters, mess hall and kitchen, food storage building, supply building, garage, a large and small hangar, a helicopter pad or air strip, fire hall, power house, heating plant, pump house, sewage disposal plant and a recreation/drill hall. Several of the sites contain special buildings serving special local functions, e.g., the locations that have radar towers, control towers at main stations, tropospheric scatter arrangements and so on.

The operations building has five main areas in addition to seven or eight rooms which include offices, record storage, wash rooms, air conditioning, etc. The five main areas are the operations room, the electronics repair and overhaul, the electronic equipment room, the telephone exchange room, and the electronic storage room. The operations room is the central control for the Detection Sites in the section adjacent to the Control Station.

Each Control Station has rearward communication to a designated A.D.C.C. consisting of a voice query circuit and a teletype-telling circuit. Alternate facilities are provided to the adjacent Control Station in case of failure of primary rearward communications. In addition to these operational circuits, each station is in communication with a designated D.O.T. Air Traffic Control Centre by voice circuit and a teletype circuit with the D.O.T. meteorological office. Administration teletype

circuit is also provided to the nearest R.C.A.F. communications unit. The Control Station local telephone service is supplied by an automatic dial system. Voice circuits are provided between Control Stations for operational and administrative purposes.

The electronic repair and overhaul area is a laboratory and workshop. Sub-assemblies and chassis which are replaced by maintenance personnel at the Detection Sites, are repaired and readjusted in this area. The electronic equipment room houses the technical equipment. The remote control of the technical facilities at the Detection Sites is controlled from this room, and it contains the fault alarm system which is monitoring some 30 items at each site.

By January 1957 the western half of the Line was ready for operation. In April four western Control Stations were manned by R.C.A.F. operators and, although the identification function was not complete, detection and operation commenced. Today the Line is fully operational from coast to coast.

THE LINE TODAY

The permanent organization for the operation and maintenance of the Mid-Canada Line is somewhat as follows. It is under the operational control of Air Defence Command, which has established a unit within its organization for this purpose. The C.O. of each Control Station is responsible to this unit at A.D.C.H.Q. R.C.A.F. personnel are responsible for the operation of the Line.

The maintenance of the Line has been allotted to two civilian firms, the Bell Telephone Company and Canadian Marconi. Marconi is responsible only for the Labrador-Quebec section of the Line. Many factors contributed to the Government's decision to employ civilians. One is that the R.C.A.F. strength establishment is too small to cope with the reasonably large staff required. Personnel would have been required, not only on the Line itself, but to provide extensive technical training facilities. This, it was decided, was neither economical nor necessary.

Service personnel on the Line are normally rotated every six months. The tour was shortened for some of the initial staffs to allow for future phased turn-over. The civilians' period of duty is from one year to 18 months, depending upon the location of the site, the individual's ability to adjust to his environment, and his personal desire to stay on.

Each Detection Site is to be manned with two civilian technicians for approximately one year. Then the maintenance of these sites, it is expected, will be carried out by visits every two weeks. These visits are only practical by helicopter in the eastern sections, although this method is planned throughout the Line. The design of the Detection Sites was influenced to a large extent to provide ease of maintenance. Each site is equipped with a complete set of spare sub-assemblies and panels for replacement in case of failure. Such replaced units will be transported to the Control Station for repair and readjustment and replaced by spare units from the Control Station.

Each Control Station requires approximately 100 personnel to provide all facilities other than operations and identification in the ops room, e.g. administration, housekeeping, recreation, medical, meteorological, helicopter operation and maintenance, control tower operation, teletype operation, etc. R.C.A.F. personnel man the operations room and perform the identification and early warning function.

The combined messes at each Control Station provide the personnel on the Line with certain essential off-hour outlets, as do the recreation/drill halls. The men at one western Control Station have a ball team entered in the local northern league. Appropriately enough, the name of this team is the "Bell-Aires". The drill hall at this station was the scene of the Line's first major social function, a dance attended by many of the North's dignitaries. Sqn. Ldr. V. A. Sutherland, commanding officer, and Mr. George Dunn, Bell plant superintendent, received the 600 guests at the door, and pinned northern corsages on the ladies. The dance was the talk of the Alaska Highway for weeks thereafter.

The Line could easily be renamed the "New Canadian Line". At one Control Station some 23 nationalities are represented by new Canadians. The skills these immigrants have brought from their homelands are doing much to produce a smoothly functioning chain. Most are holding jobs far below their capabilities as they adjust to their new lives. At one base, for example, an ex-Lt. Col. from the Royal Marines is in charge of despatching supplies to remote sites.

Mess life is enlivened by the intermingling of the nationalities. Many stations have organized as many as 25 separate recreational activities to amuse and educate the bachelor life, which must survive a year's isolation from the patter of tiny feet or female discussions. The Toastmaster Club organized at a base on the shores of Hudson's Bay to teach public speaking is one of the best attended and more fascinating hobbies.

Camera fiends abound and cameras have replaced cars as conversational pieces. Indoor golf, boxing and wrestling, stamp collecting, archery, trap shooting, camera clubs and all the outdoor sports are included in the recreational itinerary.

Although the normal tour of duty for civilians is one year, one station has already had a re-signing of 80 percent of its staff for an additional term—a recommendation that life on the Line, despite the isolation, has many advantages.

To visit the Line now that the construction debris has been cleared away, is to find surprises on all sides. No seeming bustle and clatter of equipment; only the softly humming electronic machines, with their flashing lights and low-keyed bells, make one aware of the 24-hour vigilance against an invasion which could endanger our very existence.

THE END

6-4. THE MID-CANADA LINE TODAY

By Flight Lieutenant T. H. Collins

Air Defence Command Public Information Officer

Vol. 12, no. 4 (May 1960)

The microwave towers and surrounding settlements of the Mid-Canada Line have been part of our northern landscape for the past three years. Roughly paralleling 55°N latitude, the MCL has long since become an integral portion of the early warning system for this continent's aerial defence.

What kind of people populate the MCL's main control stations? (Between these stations are automatic unmanned detection sites that are visited by maintenance crews on routine inspections and to repair defects in the equipment.) How do they occupy their time during the long cold winters and brief bright summers of the sub-arctic?

School teachers from Ontario, male nurses from Scotland and Australia, new Canadians from Europe - these are but a few contributors to the conglomeration of accents heard today at stations of the MCL. Such comparatively new arrivals rub shoulders with Indians and Eskimos, veteran bush pilots and missionaries who have called this part of Canada home for scores of years. Included in this heterogeneous group are air force personnel, responsible for the operation of the MCL and employees of Canadian Marconi and Canadian Aviation Electronics, in charge of housekeeping and maintenance.

A common theme has developed during these past three years - something that signifies the spirit all along the MCL. Spoken with any accent, it means: "We Canadians must stick together." Servicemen and civilians have one major objective - to keep the "line" operating efficiently 24 hours a day. But they have illustrated this togetherness in many other ways, as is usual with people on any frontier.

Typical of the men who supply and maintain the MCL is Campbell (Shorty) Ferguson, a helicopter pilot with Spartan Air Services. At 33, he already has eight years of arctic flying to his credit - experience which stands him in good stead ferrying technicians and equipment to the unmanned sites from Knob Lake in northern Quebec. Often he flies in temperatures 50° below zero and is forced to stay away from base overnight because of weather. To accommodate such unexpected guests, the sites are well heated and carry a stock of food that will sustain four men for at least a month.

"That is, if the bears don't get there first," explained Mr. Ferguson.

He said there have been cases where animals have broken into the buildings to get at the well-stocked larders. A mouse found its way into the freezer one day when the door was left open. It made good headway into a block of cheese before someone closed the door.

"It's the first dead mouse I have seen with a smile on its face," recalled Mr. Ferguson.

At the Knob Lake base every convenience is available. Plenty of good food, comfortable living quarters and recreational facilities are provided - all under the direction of camp supervisor Bob Gilbert, a former Quebec police officer. He said one man at the base thinks nothing of eating a dozen eggs for breakfast.

"Consumption of eggs is more than double that of bases further south," said Mr. Gilbert.

He added that from experience he has found that men working outside in the cold weather require 4,000 calories a day, compared to 3,600 for those working inside.

Further west, on the shores of Hudson Bay, is another MCL base similar to RCAF Station Knob Lake. Great Whale River is isolated except by air, and for a brief period in the summer when the ice leaves the bay and the supply ships make their annual visit.

This station for the casual visitor is one of the most interesting on the Mid-Canada Line. It is the most southerly point in Canada where Eskimos live. Now there are approximately 400 Eskimos and Indians living in the immediate area.

PROGRESS IN THE NORTH

Great Whale River started as an outpost of Little Whale River around 1820. Hunting for white whales and fur trapping were the chief attractions and occupations. The RCAF association with Great Whale River began in 1954 when the first supplies were unloaded for the construction of the MCL station. And the combination continues to flourish. Today, just outside the RCAF main gate the Department of Northern Affairs operates a four-room school. More than 100 Eskimo and Indian children attend and according to reports, their educational standard is on a par with children to the south.

Here, at least, the Eskimos no longer live in igloos. From scrap lumber gathered at their base they have built small one-room frame houses covered with canvas to keep out the bitter cold winds that blow off Hudson Bay, and heated by small stoves. Huge husky dogs are chained outside. They curl up into round balls and live all winter in the snow.

Besides handling the transportation for maintaining the unmanned sites, helicopters from Spartan Airways are often called on to carry out search and rescue operations.

Recently an Eskimo hunting party left Port Harrison, to the north of Great Whale, but failed to return. There were six men and 17 dogs in the party. An RCAF *Dakota* from Trenton spotted the men on an ice floe in Hudson Bay. They had no way of crossing the open water to the mainland.

With the *Dakota* flying cover, the helicopter landed on the ice floe and loaded the men, their equipment and 16 dogs aboard the plane. One dog, frightened by the

helicopters, excitedly evaded being rescued and was left behind along with three seals caught earlier by the hunters.

Despite cold weather, sickness is unusual on the MCL sites. But if a minor ailment develops, RCAF and civilian personnel call for the male nurse, Colin Neilson. An Australian by birth, for the past two and a half years he has been wearing a parka in northern Canada. His booming Australian accent is famous across the "line" and besides passing out pills he doesn't hesitate to take on the role of dentist.

"This is a wonderful country and I'll be here a long time yet," he said. "But I have enjoyed my holidays back home."

LADIES PRESENT

The Great Whale radar base is not entirely populated by men. At the simple four-room school some very pretty "southern" school teachers are busy teaching Eskimo and Indian children - with heavy emphasis on basic English. These women have adapted themselves to the climate, and it is not unusual to see them teaching school wearing Eskimo mukluks and heavy sweaters.

Miss Marjorie manual, a home economics teacher from Toronto, says the native children quickly learn to cook and the girls are natural seamstresses. Mr. and Mrs. M. J. Wiggins form a married team on the staff, teaching grades one to four. Mrs. Wiggins hails from Blackpool, England, but has quickly adapted herself to life in the northern climate.

The only white man who speaks the Eskimo language at Great Whale is Father Austan, O.M.I., a priest from Venice and a veteran in the Arctic. He is the unofficial interpreter at the base and is always welcomed by the natives of the nearby village.

On the opposite shore of Hudson Bay, south of Churchill, is RCAF Station Winisk, another isolated MCL base where the spirit of co-operation exists. Probably one of the best known men on the MCL is George (Mukluk) McCulloch, camp supervisor at Winisk. Featuring a broad Scottish brogue, he arrived in the North with a set of golf clubs in six inches of fresh snow. He was wearing a kilt. An immediate hit both at Great Whale, where he was stationed earlier, and at Winisk, the red-headed Scotsman soon proved he could play nearly any musical instrument. And he knew the words to a host of songs from many countries. An efficient organizer, and realizing that boredom is an enemy to be reckoned with at any isolated station, he was instrumental in organizing 25 different recreation clubs.

Bob Clements, another Scotsman, is still holding down his first Canadian job. He arrived at Winisk nearly three and a half years ago. His occupation - a male nurse. Besides caring for the medical needs of the civilian and air force personnel on the base, he is frequently called on to administer to the needs of the "Swampy Cree" Indians at the nearby village.

Some of Clements' cases are unusual. Last year he successfully delivered eight babies, despite his lack of previous experience in this specialized field.

HAPPY HUNTING GROUND

The swamps and muskeg around Winisk in the fall of the year provides an ideal gathering place for wild Canada geese. Believed to be the largest "flyaway" in North America, this is the rendezvous of millions of birds during September and October. They provide the Indians' winter food. Each family will shoot between three and five hundred birds. They are smoked, with feathers on, in tents and then two birds are tied neck to neck and slung over poles about 15 feet from the ground - too high for the husky dogs to reach - where they are soon frozen solid in nature's own deepfreeze.

The Indians make money trapping and hunting, but the family allowance cheques usually form the backbone of their income. And this doesn't go far at the Hudson Bay post, managed by Mike Pasko for the past three years. Fresh eggs are worth \$1.75 a dozen across the counter, bread is 35 cents a loaf and a pound of sugar retails for 18 cents.

RCAF and civilian personnel at the radar bases do their best to help the natives whenever possible. Helicopter pilots patrolling the MCL sites are in a position to spot big game far easier than the Indian with his slow-moving dog team.

This paid off for the Swampy Cree Indians at Winisk last Christmas. A helicopter pilot returning to base spotted three moose a few miles from the village. On the return flight he landed, picked up the Indian chief and flew him to a small frozen lake near where the moose were feeding. The end result was about 2,000 pounds of moose meat - a welcome Christmas present for the hungry Indian families. These people live along the 55th parallel. Civilian and service personnel, working side by side with natives and veterans of the north, have joined forces in opening this part of Canada and all its resources to those who will follow in the years to come.

6-5. **Cpl. L. L. Leroy and the author discuss the merits of . . .** **THE BIGGEST IGLOO IN THE ARCTIC**

By Flying Officer H. R. Noble

Vol. 13, No. 10 (December 1961)

A new landmark has appeared at RCAF Unit Fort Churchill. Looking like an enormous multi-coloured igloo and located alongside the main runway, the radome covers the Ground Approach Control Quadradar unit. This somewhat unorthodox structure is, nonetheless, an excellent example of the splendid co-operation which exists between the RCAF and the National Research Council.

For the uninitiated, quadradar is a short range (approximately 40 miles) radar unit which is used to locate an aircraft approaching an aerodrome, then display its position as a moving dot on something much like a TV screen. A man sitting in front

of this screen is in constant radio contact with the aircraft. He sees the moving dot representing the aircraft's position and also a line along which this dot must move if the aircraft is to execute a proper landing.

By the use of two displays, one showing the aircraft's position in azimuth (direction) and the other in elevation (height), he can tell the pilot to go up or down or from side to side, in order to execute a safe landing.

At Churchill the actual radar transmitter, receiver and antennae are located beside the runway, whereas the display and operator are generally located about a half a mile away. To cover this unit, protect it from the weather, and shelter the technicians who maintain it, this giant radome became a necessity.

RCAF Unit Fort Churchill received the first radome of this type ever built, probably because it is just about the coldest spot in North America, as far as the effects of cold weather on the human body are concerned. Churchill is unique in that it experiences fairly cold temperatures (although colder temperatures are experienced further north) and almost continuous high winds (not common further north). It is this wind that presents the problem. As an example, a temperature of 20°F above zero, with a 40 mile per hour wind, has the same effect on the human body as 20 degrees below zero and a five mile per hour wind. The equivalence is expressed by the "windchill factor", which combines wind and temperature to produce a discomfort index for northern climates. Churchill claims the doubtful distinction of having the highest average windchill factor on the continent.

Thus it should be readily evident that this cold, combined with almost continuous blowing snow, made the need for a shelter for quadradar operators imperative. In addition, it also was needed here because of the difficulties experienced in the maintenance of the equipment outside in this climate. Further, the quadradar is required to be continuously reliable and is in constant use by virtue of the abnormally bad flying weather experienced in this locale. Two other factors lending prominence to this unit, are the great distances from Churchill to the nearest fully-equipped aerodromes, combined with the fact that Churchill is the base of a refuelling squadron of the USAF Strategic Air Command.

The RCAF applied to National Research Council in 1955 for a suitable covering for the various quadradar antennae across Canada. For the technically minded reader, the original specification was that the radar range should not be reduced by more than 10% (the present design reduces it by only 2%), that the beam shift in azimuth would not exceed two-tenths of a degree and in elevation one tenth of a degree. The existing design is several times better than was required by the specifications.

NRC personnel were most interested in the RCAF request as they had been working in this field previously. The original work was done with stressed skin and rigid plastic radomes, but it became apparent that foam radomes were superior at the higher microwave frequencies. The work with foam commenced in 1957 and as a result of experiments conducted along these lines, it was decided to construct a radome of polystyrene foam (known as Dylite). It was made up of diamond-shaped

moulded panels with glued joins. Unfortunately, it was found to be both technically unacceptable and also very flammable.

As a result, the search was continued for a suitable material. Then the NRC struck upon polyurethane. Using this new material, another radome was constructed in the fall of 1959. It was again made of diamond-shaped panels, typically measuring 56 x 83 inches on the diagonals. The panels are moulded in a concave fashion to a 13-foot radius and are 3½ inches thick. The density of the foamed plastic is only six pounds per cubic foot and hence it is quite true to say that by far the largest part of the construction material is air, enclosed in the plastic as bubbles. In order to join the panels together, the edges, instead of being straight across, are hollowed out. Thus, when two panels are joined together, there is a cylindrical hole the entire length of the join.

The radome was assembled this way using special U-shaped pins to hold the panels together, then the joins were filled by a chemical mixture which is of the same density as the panels themselves. (It is very important that the density of the radome be the same all over, included the joins, or else false readings could be received by the radar.) This mixture bonded the panels together, whereupon the construction pins were removed and the resulting holes plugged with dowels, also of foam.

The result is a spherical radome, 26 feet across and 3½ inches thick. Several men can stand on it and it can be easily cut with a knife or a saw. It is extremely light and is practically perfect insulation against heat loss from inside. It is also fire retardant and has extremely good radar characteristics. It is painted red and white with special paint so as to be clearly visible from the air. This is necessary because of the radome's close proximity to the runway.

The radome was tested at Ottawa throughout the winter of 1959 and the summer of 1960 and then taken apart (sawed into diamond shaped panels and then the edges hollowed). It was reassembled in the hangar of RCAF Unit Fort Churchill in the fall of 1960 and then transported to its new location, dangling from the boom of a 50-foot crane. The whole reconstruction only required about four days by a team of four NRC personnel. Since its installation at this aerodrome, the radome has been undergoing testing and reports have been sent to AFHQ and AMCHQ on its performance. This unit has the first and only one in existence at the present time and it has proved to be a tremendous asset. From our testing of the radome at this unit, it has been found that its radar characteristics are excellent and that it fulfills our requirements in every possible way.

It is of interest to note that the air force intends to place an additional nine of these radomes at various RCAF units, and that the navy is also obtaining two. The United States forces have shown great interest in this design and it is fully anticipated that further models will be used in the USA. The whole project reflects the working together of government agencies, in this case the RCAF and National Research Council. For the safety of aircraft flying in the Arctic and for the personal comfort of

the quadradar technicians in the RCAF, the air force must take its hat off to National Research Council for a job truly well done.

6-6. Along the northern rim of the continent men and machines stand lonely vigil on THE DEW LINE

By Flight Lieutenant R. B. Wybou

Directorate of Control Environment Operations, AFHQ

Vol. 12, No. 4 (May 1960)

Shortly after the end of the Second World War, when international tension again became unpleasant reality, North American air defence planners had a long hard look at the Arctic. Since the shortest air routes from Eurasia were across the polar area, it was obvious this continent's first line of defence would be between Greenland and Alaska. Four-fifths of this vast and vital region is Canadian.

In 1952, at the Massachusetts Institute of Technology, the U.S. defence department initiated a study group of scientists to probe the evolution and further development of continental air defence. This group recommended prompt establishment of distant early warning lines plus airborne or seaborne extensions over both Pacific and Atlantic Oceans. The U.S. proposal for an experimental system was approved by Canada early in 1953 and the two countries set up a military study group (MSC) to work with industry on the crash program.

The Bell System undertook the tremendous task of installing and operating within a year a chain of experimental DEW stations in Alaska. This included testing new communication and detection equipment and evaluating the technical feasibility of the full-scale project. From the trials and related work it was concluded that a practical DEW Line could be built across the Arctic, despite rigorous climatic conditions and difficult supply routes. The Permanent Joint Board on Defence (PJBD) accordingly recommended that the Line be constructed.

The basic plan called for a chain of rotating and doppler radars from the northwestern tip of Alaska to the eastern shore of Baffin Island in Canada. Antennas and other exposed equipment were designed for temperatures ranging from -65° to 65°F, and for wind velocities up to 150 mph. On the other hand, indoor equipment design emphasized automatic operation, trouble-free performance and accessibility of components for maintenance.

Financed by the U.S. government, the DEW Line's construction along the 70th parallel coincided with that of the Mid-Canada Line, the "back up" fence of doppler radars financed by Canada 900 miles south. In December 1954 Western Electric Corporation was appointed construction contractor for the complete DEW Line system. Foundation Company of Canada in Montreal and Northern Construction Company in Vancouver were named construction sub-contractors for the eastern and western Canadian sections respectively.

The operational target date for the DEW Line was July 1957. This left only two full summers to complete construction. Before work could begin, however, a small army of trained people had to be hired and huge quantities of equipment and supplies obtained and shipped to the most remote parts of North America. Nearly every utensil, machine or product found in a home, medical clinic, machine shop or office had to be purchased, packed and transported several thousand miles into areas never before penetrated by man in any numbers. During the two years the Line was under construction some 109,000 purchases were made from over 3,000 companies.

MOUNTAINS OF MATERIAL

Here are a few examples of the construction material requirements: over 9,000 tons of insulated aluminum and steel panels for 57 garages and 16 hangars; 2,000 tons of reinforced steel and 28,500 tons of cement for foundations and other construction; material for the on-site assembly of more than 1,200 building units. Thirty quarter-million-gallon tanks and nearly 200 smaller tanks, none of less than 20,000 gallon capacity, accounted for 2,900 tons of steel. More than twice this quantity of steel was necessary for the erection of the 160 antennae towers ranging from 25 to 400 feet in height. To support the construction phase and to provide the Line with a year's supply of petroleum products nearly 50 million gallons of fuel and lubricating oils, in addition to aviation and automotive gasolines, had to be furnished.

Completion on schedule of the momentous construction task depended upon how soon material and personnel could be delivered to the arctic sites. Temporary airstrips, roads, camps and beach facilities had to be prepared before the arrival of the sealift planned for the summer of 1955. And, at those sites which were inaccessible to cargo vessels, all material, personnel and supplies had to be airlifted prior to the summer construction season.

Canada and the US agreed that USAF C-124 *Globemasters* would be used to transport the heavier items and that all other tonnages would be airlifted by commercial carriers. All Canadian air-cargo companies were utilized, with certain key carriers designated to co-ordinate operations in assigned areas. The eastern section of the Line became the responsibility of Maritime Central Airways, while Canadian Pacific Airlines and Associated Airways shared responsibility for the central section. (The latter company was replaced in October 1955 by Pacific Western Airlines.) The USAF and its selected commercial carriers operated in Alaska.

The Alaskan airlift presented comparatively few logistics problems, since existing airstrips at Point Barrow and Barter Island could handle the large aircraft. From these points supplies were transported to other sites using a proven method of overland caterpillar tractor sled trains. In Canada, where the major portion of the 3,000-mile Line is located, air operations were carried out under very different circumstances. There were no existing bases close to the scene of construction, very limited

navigational aids or communications facilities and no landing strips at any of the designated sites.

Main staging areas were established at Edmonton, Churchill, Mont Joli and advanced ones at Fort Nelson, Dawson Creek, Hay River, Norman Wells, Sawmill Bay, Yellowknife, Coral Harbour, Frobisher and Hall Lake. It was apparent from the start that ice strips, sufficient to support aircraft weighing up to 160,000 pounds loaded, were essential at each site. These had to be built and tested under the worst possible weather conditions during the winter of early 1955.

CUB TO GLOBEMASTER

After the approval of a strip location, advance parties were brought in to a site by a small ski-equipped plane. On subsequent trips the ski plane carried a small tractor, basic camp materials and supplies. Then, the advance party cleared an ice airstrip large enough for a wheeled plane carrying a bulldozer and additional supplies. Arrival of such heavier equipment permitted the airstrip to be enlarged so that bigger planes, with still heavier construction equipment and materials, could land.

In some instances, it was necessary to paradrop tractors so that snow drifts could be removed from the airstrips prior to the arrival of the larger aircraft. In other cases large tractors were dismantled, flown to the site and reassembled. Unfortunately, strong winds frequently nullified the labour of many days by drifting huge quantities of snow over the previously cleared ice strips, rendering them unfit for operations until they could be cleared again.

Due to geographical aspects in some instances, ice strips had to be located as much as 25 miles away from the sites, making it necessary to complete delivery by tractor train. Some of the precipitous Baffin Island sites were over 2,000 feet above sea level and at these locations it was necessary to build roads up the steep cliffs from the ice strip on the sea below. These and other problems such as lack of sufficient aircraft, mechanical failures, poor flying weather, etc. so delayed the winter and spring airlift in 1955 that freight accumulated at the staging areas and it was necessary to utilize the USAF *Globemaster* to assist the commercial carriers. Canadian commercial carriers continued to support the sites during the summer and fall. At some locations, the spring thaw washed away the ice strips and material was paradropped to keep construction going. At others, after surrounding waters were clear of ice, material was delivered by *Cansos*.

The cost of man's intrusion into the north was high in terms of human life, dollars and man hours. Fifteen men were killed, many were injured and 12 aircraft were wrecked. But, by the end of 1955, aircraft had made approximately 21,000 flights, flown approximately 45,000,000 ton-miles and delivered roughly 50,000 tons and 10,100 persons to the sites.

The real key to progress, from the excellent beginning provided by the 1955 spring airlift, was the sealift carrying thousands of tons of heavy items such as diesel

oil, gasoline, building components, hangars, garages, cement, steel towers, construction machinery, etc. While many hands were busy preparing for the staging and shipment of cargo, many others were engrossed with the problems of getting ships to the sites and their cargos ashore.

THE SEA LIFT

Early in July two great fleets - one from Seattle and one from Halifax - headed out and swung their bows northward, towards the mists and ice floes of the northern seas. The sealift had begun.

Each fleet had a complement of 60 ships, ice breakers, tugs, repair vessels, victory ships, landing ship tanks (LSTs) and other assorted landing craft. The convoys were as large as many which had sailed overseas during the Second World War. And although no hostile human enemy barred their paths, the natural hazards of relatively unchartered arctic waters with their treacherous ice-packs posed formidable obstacles.

For the personnel aboard the ships it was a dangerous and difficult mission. They were almost continuously buffeted and harassed by ice, fog and vicious storms. On the western end of the line, ice fields which normally blow offshore in summer, leaving the coast comparatively open, were brought down upon the heavily laden ships by perverse onshore winds and threatened to crush their hulls against the shore. In other places, navy demolition experts had to plunge into icy waters and place explosive charges on hidden rocks and reefs before cargoes could be landed. The Arctic Ocean took its toll. Three ships had to be towed out as two had lost rudders and propellers and one was stove-in by ice and its engine room flooded. Others were less seriously damaged.

Aircraft were flown daily on ice reconnaissance missions through some parts of the eastern end of the Line. Information about the ice pack location, area and density along with weather forecasts were made available to all units. Additional reconnaissance was obtained from the use of deck-berthed helicopters.

The sealift was a magnificent operation. Not only was all cargo delivered on schedule, but in spite of navigational hazards, almost all of it was delivered to the designated spots. In cases where certain sites simply couldn't be reached from the sea, their share of the material was left at nearby locations from which they could be hauled in by air or by cat-trains. Over 200,000 tons of cargo were landed on those northern beaches, an unloading job which required the combined efforts of several thousand men. Altogether, it represented an incredible mountain of material. If the oil drums alone had been laid end to end they would have stretched 180 miles.

The airlift and sealift were supplemented by the transportation of approximately six percent (15,000 tons) of the total cargo via barge transportation down the Mackenzie River system and by tractor or "cat-trains" for lateral supply on the western part of the Line.

A construction project in the Arctic, the size of the DEW Line, was an unprecedented undertaking which called for pioneering methods and techniques. When the brief summer season proved too short for all the work which had to be done, men and machines dug and hauled gravel, erected steel work and even poured concrete in the middle of the arctic winter. These engineering feats had, up until then, been considered impossible.

The 1956 transportation problem was much the same as that of 1955. While the 1956 tonnage was less (173,000 tons compared to 275,000 the preceding year), the type of material shifted from construction machinery and building material to highly complex electronic equipment, parts and other more delicate machinery.

The airlift tonnage for 1956 was about 40% greater than 1955 but was extended over a longer period and Canadian and Alaskan commercial carriers again carried the brunt of the load with the USAF *Globemaster* being used to transport “outsized” or special cargo. The 1956 airlift program contrasted sharply with that of 1955. The aircraft operators, benefiting from the previous year’s experience, were better able to marshal their resources. Navigational aids and communications facilities had been implemented and strengthened along the entire Line, ice and gravel landing strips were available at practically all sites and personnel were more experienced in the handling of material, both at staging areas and on the construction scene.

By the end of that second year aircraft had made approximately 30,500 flights, flown more than 58,000,000 ton-miles and delivered 70,500 tons of freight and 19,600 persons to the sites. In addition, 100,000 tons were transported by ship, barge and tractor train. Some 25,000 people had been directly involved in this project (approximately 7,500 of them actually on the Line in 1956).

As 1957 began the DEW Line was rapidly taking final physical shape. Hundreds of buildings (unique elevated units called modules) were assembled and equipped, huge outdoor antennae were erected and tested. Construction of the Line had cost over \$500 million and nearly 30 lives, but on 31 July 1957 it became officially operational - as scheduled 32 months before.

MANNING THE LINE

Prior to its completion it was decided that the manning and maintenance of the DEW Line would be carried out by a civilian contractor and Federal Electric Corporation was selected for the job. For management and operational purposes, the entire DEW Line is divided into six sectors, each supervised by a sector superintendent and staff located at six main stations. The sectors contain several auxiliary and intermediate sites, each with a station chief responsible for the local administration, operation, maintenance and security.

The nerve centres of the DEW Line system are its six main stations. A data center, located at each main station, is manned by military personnel who receive pertinent information from all sites in the sector. Penetrations of the DEW Line zone are

recorded and such early warning information as becomes available is reported directly to NORAD Headquarters. The military personnel at the data centers have operational control of the system and are responsible to NORAD through the designated operating commands.

Approximately 1,500 civilians are employed on the DEW Line, two thirds of them in Canada. Over 90% of the people on the Canadian portion of the Line are Canadian or British subjects, more than 10% of these being Eskimos. Civilian personnel earn an average of \$9,000 annually and are required to sign for an 18-month tour. Acceptable personnel can stay on for up to two extensions of 12 months; however, these periods of employment are broken by a compulsory leave and a re-assignment to another DEW Line station. Military personnel are posted for DEW Line duty for a 12-month period broken at the fourth and eighth month for a visit to ADC St. Hubert and a one-week leave.

Resupply of the DEW Line in the operational phase is still a monumental task, even though it involves considerably less tonnage of material than was required during the construction period. The re-supply is provided in much the same manner as the earlier operations with the exception that a much greater proportion of the total freight is shipped via the MacKenzie Route. The route now supplies the central section of the Line from the Boothia Peninsula in the east to just over the Alaskan boundary in the west.

A few weeks ago General L. S. Kuter, NORAD commander-in-chief, made an inspection tour of the Line. The electronic sentinels he saw on the northern rim of the continent are mute evidence that for almost three years this bold international enterprise has stood guard against an attack we hope will never come.

6-7. MANNING THE DEW LINE

By Flight Lieutenant T. G. Coughlin

Assistant Editor, THE ROUNDEL

Vol. 14, No. 5 (June 1962)

A three-mile road links Cape Parry on the DEW Line to the local Eskimo village. Going from one end of that road to the other is like going from the stone age to the 21st century. The Eskimos live and work as primitively as did their ancestors before them. In striking contrast, the DEW Line personnel have brought to this frozen frontier all the marvels of the electronic era. These two widely diverse groups have, however, one thing in common: they are both hunters. Eskimos go in pursuit of furred, finned or feathered creatures which inhabit the arctic areas; Dewliners hunt for "blips" of light which indicate that aircraft have entered their Distant Early Warning Identification Zone.

The surveillance, detection and reporting of these blips is the prime purpose in life for hundreds of personnel who live north of the Arctic Circle in some 60 sites

scattered across more than 3,000 miles of Canadian territory. In addition to the four Canadian segments of the DEW Line (called Pin, Cam, Fox and Dye), there are two American sectors in Alaska which, together with the four Canadian sectors, make up NORAD's first line of defence against surprise attack.

Togetherness is the keynote of the entire enterprise. At each site the Canadian red ensign and the American stars and stripes fly together as a symbol of the partnership formed by these two nations for their mutual defence. This international co-operation is exemplified in a unique partnership between military and civilian organizations. Western Electric built the DEW Line; Federal Electric maintain it; Transair and Nordair supply it; RCAF and USAF plus civilians from both countries man the line. On paper it looks complicated; in practice the system works extremely well. Each agency has an area of responsibility and these areas dovetail to form an efficient defence operation.

At each of the main sites along the Canadian section of the DEW Line there are seven military personnel, five RCAF and two USAF with the military commander being an RCAF squadron leader. Their job is the operational control of DEW Line equipment. To ensure that the equipment is operational, and remains so, is the task of Canadian and American civilians. Much of the outdoor work, such as driving vehicles, is done by local Eskimos who have proved quite adept at both driving and servicing the trucks and snowmobiles. Both USAF and RCAF personnel serve a one-year tour of duty with an occasional extension of several months being applied to a Canadian airman's tour because of the exigencies of the service. Civilians serve an 18-month tour of duty initially, then as many one-year tours as they desire. The Eskimos, of course, work at the sites indefinitely.

The eyes of the DEW Line, and its reason for being, are the radar scopes. Seated in darkened rooms, operators watch narrow bands of light relentlessly sweep around the scopes in cadence with rotating radar antennae housed inside huge plastic domes. The actual capability of the equipment is, of course, classified information. But, it can be said that even the presence of birds is known to those whose profession is the surveillance of Canada's northland. Birds can come and go as they please but no other air traveler has that privilege.

Every aircraft operating across or along the DEW Line must be identified. The majority of these aircraft are commercial aeroplanes which are quickly identified through their flight plans. Others, having failed to file flight plans, are identified by contacting various air traffic control agencies to the south. The identity of still others, such as aircraft wandering off course, can be established by voice contact with the aircrew. There are additional ways to reclassify aircraft from unknown to friendly. Speed is the keyword since the most crucial element in air defence is time. But, in spite of everything, there are always a few blips on the radar screen which cannot be positively identified. These are the ones that light up the combat operations centre board thousands of miles south at NORAD headquarters.

Cape Parry, most western site of the Canadian sector of the DEW Line, is a typical station. Located some 240 miles north of the Arctic Circle, the camp site is situated on a hill overlooking the all-important airstrip. As at the other units, the station personnel are RCAF, USAF and Federal Electric employees. Typical of the RCAF personnel who man the line is F/L R. J. Barnett, a fighter controller, who spent the first years of his air force career at the opposite end of the radar business. Flying as a jet pilot overseas, F/L Barnett in his *Sabre* created blips on radar scopes for other people to watch. For F/L Barnett and his colleagues along the line, the sites offer the maximum of comfort. Inside the buildings, or "trains" as they are called, it is hard to believe that you are north of the Arctic Circle. Individual bedrooms, tile floors, fluorescent lights, hot and cold running water, libraries and hi-fi music somehow seem incongruous, albeit highly appreciated, on the frontier.

For recreation there are the inevitable card games, dart board, pool table, beer call on Saturday and Sunday and movies three times a week. The fact remains, however, that all these amenities cannot make up for the separation from families. To alleviate this situation RCAF personnel are allowed a week's leave every three months. USAF and civilian personnel also get leave under different arrangements

In addition to its prime purpose of detection, the DEW Line has such secondary functions as assisting air traffic, by giving headings to steer and radar fixes; sending out weather information and, when necessary, assisting in search and rescue operations. In the latter field the RCAF military commanders have, for instance, diverted aircraft to pick up sick Eskimos and injured seamen. To civilian pilots, the DEW Line is a blessing. Before its inception aircrew who flew in the northland used mainly skill and daring to cross the featureless barren lands. Now, as a result of the DEW Line, they "home" from beacon to beacon along the 70th parallel of latitude; they can call the sites for information or assistance and, instead of landing on frozen tundra, they land on gravel strips equipped with landing lights. Having civilian aircraft constantly moving through their area is also a good thing for the DEW Line radar operators since it gives them additional practice in tracking. Another agreeable feature of the commercial air carrier operations is that for a brief period on each stopover attractive stewardesses can be seen in an otherwise all-male world.

Cambridge Bay is the metropolis of the central Arctic. In addition to the DEW Line site several government agencies have set up shop in the area. The Department of Northern Affairs has established an Eskimo townsite and they sell Eskimo products such as soap-stone carvings and parkas. The Department of Transport now operates the DEW Line airport and has substantial facilities, including a modern airline terminal. The ubiquitous RCMP have a detachment and, in keeping with the size of the settlement, the Hudson Bay Company has a large modern store containing most of the merchandise to be found in a southern Canadian supermarket.

The site itself is responsible for the central section of the DEW Line. Along with the main station, Cambridge has a number of auxiliary and intermediate sites which give overlapping electronic coverage over many miles. Cambridge also has the

dubious honour of being one of the coldest places in the Arctic with temperatures of minus 72°F being recorded. In the summer, however, the landscape around Cambridge is carpeted with a variety of grass and moss and more than 20 different types of flowers. But summer or winter the work at Cambridge never ceases. Canadian and American servicemen and civilians gather, assess, then forward information to Northern NORAD at St. Hubert and to NORAD Headquarters, Colorado Springs. During the long arctic nights when life seems a bit tedious they can always listen to their radio for amusement; Radio Moscow comes in loud in clear.

Among the many Eskimos employed at Cambridge is 33-year old Ross Koblogina. The DEW Line has brought about a radical change of life for Ross and his friends. Born and raised in Coppermine, NWT, Ross started his working life in traditional Eskimo fashion as a hunter. With his wife and three children he lived in a tent except when he was out on the trail. On these occasions Ross and his companions spent their nights in igloos. In February 1959 Ross was hired as a labourer for the DEW Line. He began driving vehicles but became so adept at servicing them that he was re-classified as semiskilled. Now, instead of depending on the luck of the hunt for his living Ross draws a monthly cheque. His family lives in a neat three-room, oil-heated frame house. For entertainment they can listen to the CBC's Northern Service Eskimo language radio broadcasts or to the station in Thule, Greenland. In the latter case, however, the broadcasts are not of much interest to Ross or his wife since the Eskimo dialect in Greenland is not readily understood by Eskimos in the Canadian Arctic.

Station Fox, located on a wind-blown piece of real estate adjacent to the equally wind-blown Hall Beach, would seem an unlikely place for people to visit. In actual fact, however, there is a steady stream of traffic coming and going from this DEW Line site. In addition to the airlift from the south which brings in weekly mail and the horizontal airlift which shuttles back and forth between the DEW Line sites, there are a number of other visitors. The Air Officer Commanding, Air Defence Command, or his representative, makes a quarterly visit to all the main sites. USAF and Federal Electric personnel arrive on a monthly inspection tour. National Defence College, the Imperial Defence College and Canadian and American joint chiefs of staff also visit Station Fox as they make their way along the Line on official tours. Owing to restricted accommodations at DEW Line sites overnight visitors pose something of a problem. Occasionally it is necessary for some DEW Line personnel to fly to auxiliary sites so that visitors can have their rooms for the night.

The main buildings at DEW Line sites are called "trains" but on the inside they resemble ships. The long narrow halls with rooms on each side look like passageways and passenger cabins. The illusion is further heightened by the public address system which is forever calling somebody for something. To at least one of the civilians employed at Fox, the ship-like atmosphere is made to order. Ray Bernier of Deschenes, Quebec, who is a civilian employed in the communications room, served five years as a radio operator on a merchant ship. Now he teletypes signals to the

various military headquarters. In the early 1950s Bernier got his first taste of the north when he served as a combined weather observer/radio officer for the DOT at Indian House Lake, about 120 miles from Fort Chimo. He liked the northland so decided to go all the way. In 1956 he worked on the construction phase of the Line then, after a few months of living in southern Canada, he returned to the DEW Line. He feels that Station Fox is something like his old ship because he sees the same faces every day and he works on shifts. But Station Fox has one great advantage over his merchant ship: it doesn't rock or roll.

It is a long way from the burning deserts of Texas to the frozen tundra of the Arctic but Capt. W. J. Coulombe of the USAF has made the trip. Assigned to the DEW Line in December 1961, Capt. Coulombe works as a controller in the data centre at Cape Dyer. On the occasions when he ventures outside into the biting arctic cold his thoughts turn to his days at Randolph Field at San Antonio, Texas, some thousands of miles and more than 100 degrees of temperature away.

Cape Dyer, at the eastern end of the DEW Line, is unique in several ways. It is the largest of the DEW Line sectors, having a frontage of some 900 nautical miles including the Baffin Island portion and the DW-east segment located in Greenland. Dyer can also lay claim to being the busiest sector. Not only are there heavy military penetrations of the area but there is also a substantial amount of commercial traffic including over-the-pole flights. One claim to fame, which Dyer would gladly relinquish, is the doubtful distinction of having the worst weather on the Line.

The most spectacular feature of this weather are the fierce winds of hurricane force that lash the headlands during the 10-month winter. Not infrequently the region experiences winds in excess of 100 knots and the majority of storms average 50 to 60 knot winds. Blowing snow associated with these strong winds reduces visibility to zero. These conditions combine to render the Cape Dyer area the most hazardous terminal of all the DEW Line sites.

The topography of Cape Dyer also provides a striking contrast to the other DEW Line sectors. Unlike the central and western arctic regions which have extremely flat and monotonous terrain, the Cape Dyer area is characterized by rugged mountains and deep gorges formed by the action of glaciers many years ago. The coastline is marked by abrupt and craggy capes, headlands of solid rock formations, and is indented by numerous fjords. In the immediate area, within 25 nautical miles westward the Penny Highlands, with their eternal ice-cap, reach altitudes in excess of 8,000 feet.

The Dye sector recently acquired operational control of the surveillance sites located in Greenland. Terrain in the area of the coastal sites is somewhat similar to that encountered in the Cape Dyer area. However, the inland stations are located on the Greenland ice-cap, at altitudes of 8,500 feet and the implications of this engineering feat can well be imagined.

Capt. Coulombe, F/L Barnett, and their military contemporaries, Ross Koblogina, Ray Bernier and their civilian colleagues are men with a mission. They are

doing a difficult, and sometimes, dangerous, job. But they are the men with the background and the skills needed for this vital task. As long as this need exists these men, or men like them, will continue to man the Line.

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