The CROUNDEL

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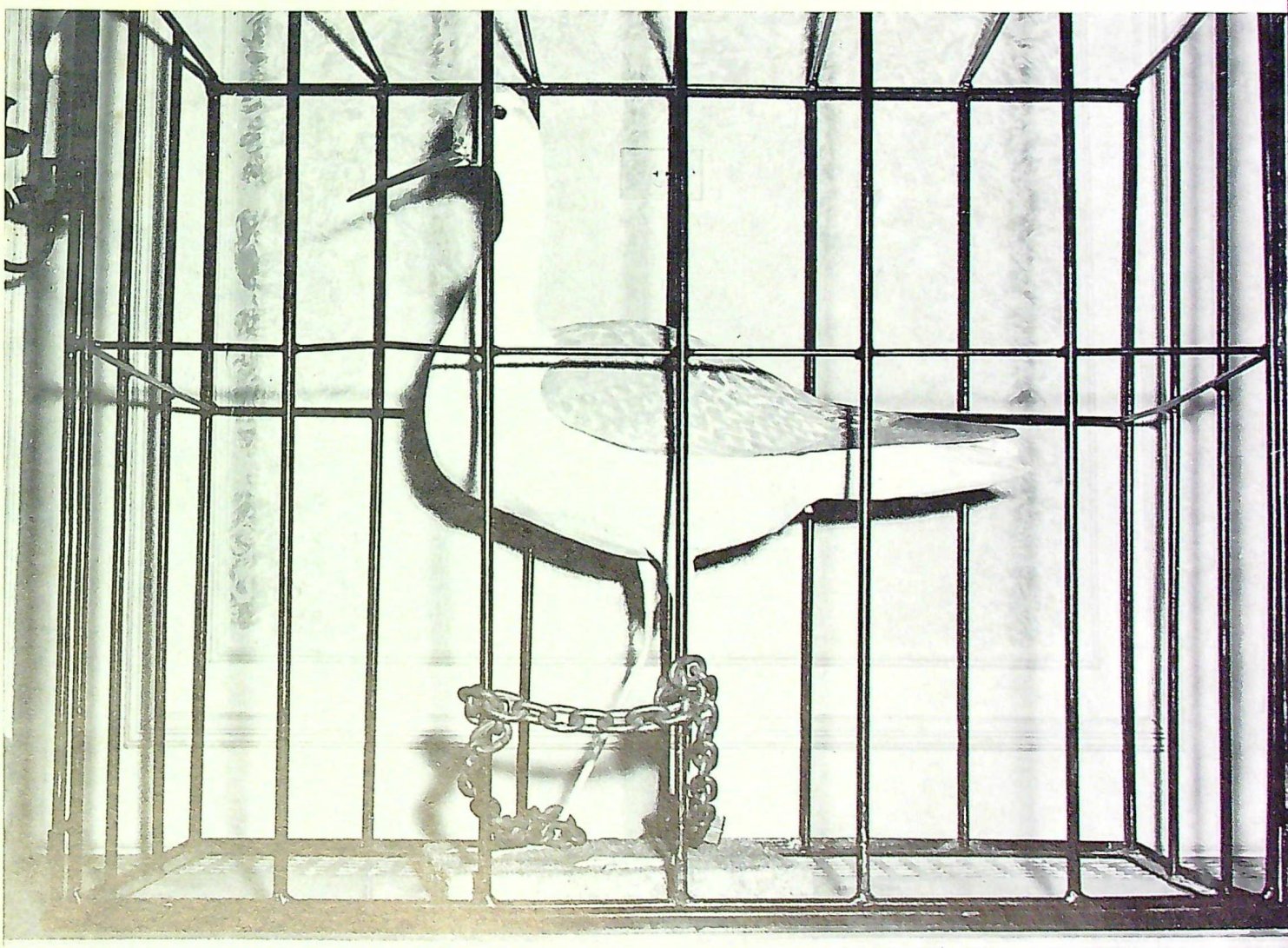
MARCH 1957



ROYAL CANADIAN AIR FORCE

THE Roundel

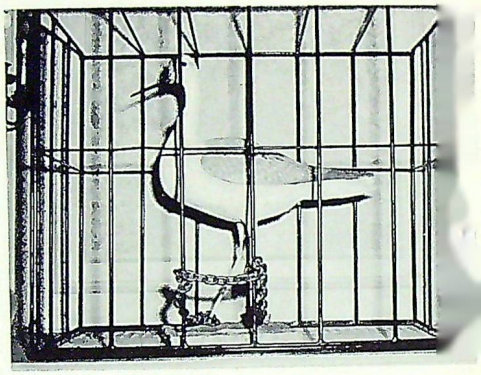
Issued on the authority of
THE CHIEF OF THE AIR STAFF
Royal Canadian Air Force

Vol. 9, No. 2

MARCH 1957

* * * CONTENTS * * *

This Month's Cover



The Honoured Twillick. (See page 3.)

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SGT. SHATTERPROOF IS DEEPLY MOVED

A WIND, of gale force and zero temperature, howled dismally across the desolation that is Victoria Island in February. Powdery snow, whipped up from where it had lain undisturbed since its fall, hissed its fury against the editorial windows. In short, gaiety was not the watchword of the day.

Though it was not yet eleven o'clock, all our lights were turned on, even to the goose-neck lamp that drooped above Hildegard's typewriter in the adjoining office. Hildegard herself, who is sensitive to atmosphere and was too depressed to work, sat cuddled up to the radiator beside her desk, cheering herself with selected passages from a work entitled "Bride of the Bull Ape". (Hildegard, by the way, has matured surprisingly since she was first introduced to the reader, rather more than eight years ago. At that time she had not yet graduated beyond "Woman of the Waterfront".)

In such circumstances, skin-diving was not among the topics most likely to appeal to me. As I read Corporal Clark's* article, I experienced no yearning whatsoever for the cool green depths he so highly recommends. The mere thought of them, in fact, set the tea-cup chattering against my teeth. I reached for the red pencil and was about to write HOLD TILL JUNE on the manuscript, when:

"So, Sir," thundered a well-known voice, "once again we have been dallying too long among the flesh-pots! Our stamina is sapped. Shaking like an aspen-leaf, we now sit with bloodless fingers clasped about the cup that can no longer warm us!"

Advancing upon me from the doorway, like some leviathan belched up from the Mindanao Deep, came Sgt. Shatterproof.

I explained the reason for my shudder, and gave him the manuscript to read for himself. When he had finished it, he blew his nose like a trumpeting elephant, swallowed hard, and stared into space. To my astonishment, I realized that the old Titan was deeply moved.

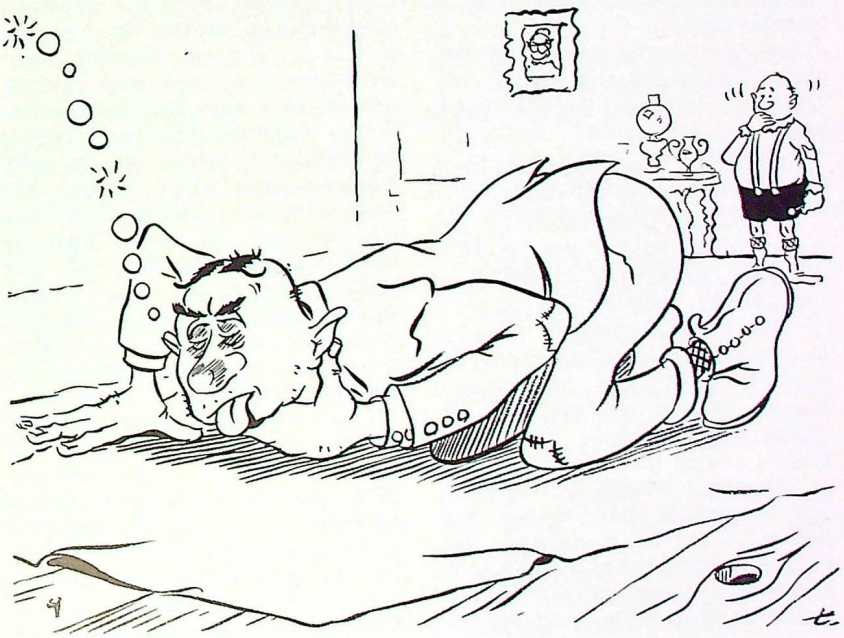
At last he said:

"Even now I can see him, after all these years, swinging up the little path that led to our front door, the pearls glittering in his cuffs and shirt-front—"

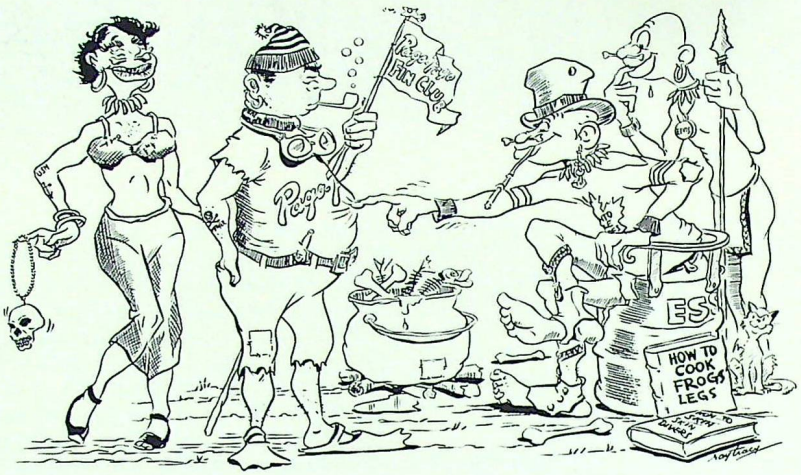
I raised my hand. "Before we go any further, Shatterproof," I said, "whom are we talking about? Corporal Clark?"

His gaze returned to me.

"No, Sir. I am speaking of my uncle Pago-Pago Shatterproof, the Pride of Papua. Well do I remember him coming to our house while I was still a little boy. It was his last visit to Canada. In my childish eyes, he stood for all the romance of the wine-dark seas and tropic isles of the South. Now and then, as he talked, he would suddenly double over and scream in Polynesian. It frightened me at first, particularly when his head touched his heels and he began to foam at the ears. But mother quickly soothed me, telling me that it was only Uncle Pago-Pago having an attack of the bends. There, Sir, was a diver!"



*See page 18.



He heaved a deep sigh.

"How", I asked suspiciously, "did your uncle happen to become a diver in the South Seas?"

He gave me an enigmatic smile.

"How, Sir, did I happen to become a sergeant in the Air Force?"

We left the matter there; and he continued:

"Never was a man better equipped by nature for his chosen profession than my uncle. His ears, which were set at right-angles to his head and which had been the source of some embarrassment to him at school, now came into their own. As he glided silently through the waving jungles of seaweed, gathering in the rich harvest of pearls fifty fathoms below the surface, he could hear the engine of the fishery-patrol boat long before it came within rifle-shot. And as for sharks — well, Sir, the sight of Uncle Pago-Pago coming at it head-on through the submarine gloom was too much for even the bravest hammer-head."

Impressed though I was by Uncle Pago-Pago's prowess, one point about Sgt. Shatterproof's recital puzzled me.

"You referred to your uncle, Sergeant, as the Pride of Papua. Unless I'm mistaken, though, Pago-Pago is in Samoa."

"Ah, Sir, I was coming to that. It is a rather unusual story."

Sgt. Shatterproof stared at the smoke which curled upwards from his pipe, as though in search of inspiration. Then:

"The matter stemmed from an unfortunate misunderstanding involving an island noblewoman named, in her own tongue, Little White Moon-Flower, but better known among the international set as Wharfside Annie. I will not go into the details of the matter. Suffice it to say that my uncle left Pago-Pago somewhat hastily, only a few feet ahead of a maddened stoker's clasp-knife. Thence he made his way to Papua, where he soon established himself in the practice of his profession with even greater success than before.

"All might have continued to go well but for the fatal fascination which my uncle, in common with all the male members of my family, seemed to exert on the Sex. One day, while cruising around at the thirty-fathom mark, he encountered a native maiden who was collecting sea-slugs of a variety highly esteemed by the local gastronomers as a side-dish to *missionary en casserole*. She was, if report be true, as dainty a lass as ever wore a wooden spike through her nasal cartilege. By the time they had surfaced, the young lady was head over heels in love with my uncle — nor, if the truth he told, was he himself entirely unmoved by the coquettish manner in which she shook the empty anchovy-tins that dangled from her little ears."

"But", went on Shatterproof sadly, "this idyll of the South Seas was destined to be of short duration. When the lovers finally went to the maiden's father, Chief Long Pig, and besought that they be permitted to become as one, he studied my uncle's robust physique with more than a passing interest. Then, leaning forward on his gasoline-can throne, he prodded my uncle reflectively in the meatier portions of his anatomy. Finally, apparently well satisfied with his prospective son-in-law, he displayed his filed teeth in a smile of consent."

Sgt. Shatterproof sighed again.

"It is better not to speculate", he resumed, "upon the events that followed. Suffice it to say that, at a banquet which was held a few evenings later, Uncle Pago-Pago did in fact become as one, not only with his *fiancée*, but also with all the members of her family and quite a number of guests. Nor has he ever left them. His head, reduced with loving care to the size of a grapefruit, still stands upon a shelf in Chief Long Pig's hut, where it is consulted by the elder statesmen of the tribe on all occasions of importance."

Here Sgt. Shatterproof rose and took his leave. When he reached the door, he half-turned, and added:

"Indeed, Sir, if Chief Long Pig's recent application for admission into the United Nations is accepted, it is not impossible that a Shatterproof may yet, indirectly, solve the problems that are baffling our world."

A TOAST TO THE TWILLICK

Sqn. Ldr. W. B. Walker accepts a Noggin from the hand of Flt. Lt. G. May. The chain of office about the Twillick-Master's neck is, of course, the same chain that appears on our front cover.

"WHAT", I asked, gesturing with the post-prandial, "is that queer-looking bird in the cage?"

The feast of reason and the flow of soul stopped abruptly. I became aware that every officer within earshot was regarding me with a very peculiar expression. It was the same expression that I had once seen on the face of an air vice-marshal when, during a mess dinner, a dyspeptic wing-commander had burped magnificently into his *bouillon*. Sweat gathered on the editorial forehead. Within ten minutes of entering a strange mess for the first time, I had obviously committed one of those solecisms for which, in years gone by, there could have been no atonement save on the field of honour.

Presently, having mastered his emotions:

"That", replied my host, who was also the Commanding Officer, "is the Honoured Twillick."

At these words, everybody raised their tankards:

"The Honoured Twillick!"

Recalling Odysseus' remark that a host's ways are good ways, I hastily followed suit:

"The Honoured Twillick!"

Harmony thus restored, the C.O. undertook to enlighten me on the subject of Twillicks. He was assisted in his task by an imaginative flight lieutenant, who, in addition to carrying out his normal duties as Chief Administrative Officer of No. 2416 Aircraft Control and Warning Squadron (Auxiliary), also holds the high office of Twillick-Master.

The Twillick, it seems, is more generally known among civilian ornithologists as *Totanus Melanoleucus*, or Greater Yellow-legs. It is most commonly found (though never surprised) wading thigh-deep around the edges of lakes, and it expresses its hopes and aspirations (fears it has none) in a flute-like tremolo whistling. Its paramount attribute is its wariness. "In all the annals of bird-watching", Flight Lieutenant May assured me, "there is not recorded a single occasion on which a Twillick has been caught with its pants down."

When I had been given time to digest that gratifying thought, Squadron Leader Walker took up the tale.

"Hence, partly, the choice of the Twillick as the charge on our squadron badge. The other reason, however, is even more cogent. The Twillick has a gimmick." He eyed me sharply, and hurried on: "No, I am not referring to any of those parlour-tricks of which you are thinking. The Twillick does not, like the Phoenix, rise up from the ashes of its own funeral pyre; nor, like certain other less polished birds, does it fly backwards or in ever-decreasing circles. The Twillick's gimmick is one for the knowledge of which we are indebted to the patient research of our squadron ornithologist. Take a glance at that badge over there on the wall."

I did so. I saw what I assumed to be a heraldic *Totanus Melanoleucus* standing on its dexter leg and holding a stone in its sinister claw.

"What do you suppose", asked the C.O., "that it does with that stone?"

I told him I preferred not to guess.

"At the first sign of danger, it drops it into the water with a loud *plop!* — thus alerting all the other birds in the vicinity. Pretty subtle, eh?"

"It is indeed," I agreed heartily, and raised my glass. "The Honoured Twillick!"

"The Honoured Twillick!"

"The Honoured Twillick!"

Sqn. Ldr. Walker relit his eternal

pipe and turned to Flt. Lt. May.

"We must not give our guest the impression, however, that the Honoured Twillick spends its whole life merely basking in the warmth of our admiration. We should explain to him, I think, the very active rôle that it plays in the squadron's life. You, as Twillick-Master. . ."

Of such nicety is the protocol and so delicate are the permissible variations of the Twillick Ritual that I dare not attempt to describe it in detail. I shall content myself here with sketching it only in its simplest form, ignoring all such fascinating considerations as whether the celebrant's index-finger should rest on the rim of the Noggin or be held rigid and tangential to its circumference. First, though, I must ask the reader to transport himself in imagination to the officers' mess of No. 2416 Squadron.

A formal mess dinner is nearing its end. The toast to the Queen has been drunk, the speeches have been made, and the tables cleared of all but their snow-white linen and glittering plate. An expectant hush has fallen upon the company.

Suddenly, from the head table, three raps of the C.O.'s gavel demand complete silence. All eyes turn to the doorway. Through it, wearing his chain and key of office, and bearing before him the Bird that none but he may touch, enters the Twillick-Master, closely followed by a steward who carries upon a tray the requisite number of egg-shaped Twillick-Noggins. The moment they appear, every member of the squadron leaps up and cries: "HEADS UP! ONE TWILLICK!" They remain standing until the Twillick lights on the table immediately in front of the C.O. The Twillick-Master then turns a tap concealed in the nether regions of the Twillick, and fills a Noggin with the liquid that gushes forth. This he takes over and hands to the Mess President, saying:

"Sir, is this the veritable Twillick-Nog?"

The P.M.C., having tasted it and found it worthy of the squadron's palate, nods his approbation.

"Verily, Twillick-Master, this is the true old brew."

The Twillick-Master proceeds with the Charging of the Noggins, which are passed round to all members of the squadron — and, very occasionally, to some guest whose services to humanity (or to No. 2416) have rendered him worthy of so signal an honour. When everyone has received his noggin, the C.O. rises and, after a few appropriate and manly words, says:

"Gentlemen, I propose a toast to the Twillick—"

Here the Vice-president springs to his feet. Breaking in upon the C.O.'s train of thought, he asks in a clarion voice:

"With full Highland honours, Sir?"

"Yes, gentlemen, I say with full Highland honours."

With that, all those who are entitled to do so, mount their chairs, place one foot on the table in such a manner that they stand facing the object of their toast, and cry:

"UP THE TWILLICK!"

The draining of the Noggins then brings the dinner to its close.

One or two points in Flt. Lt. May's description of the Ritual had aroused my curiosity.

"May one enquire", I said, "what are the constituents of Twillick-Nog?"

It was Sqn. Ldr. Walker who, after a brief hesitation, answered me:

"That, I am afraid, is a jealously guarded secret. In fact, the formula for Twillick-Nog is known only to myself. It is handed on down the ages from C.O. to C.O. Whenever a C.O. relinquishes his command, his last act is to closet himself with his successor behind locked doors, nor does he emerge until he has printed the formula indelibly on the new C.O.'s memory. After that, of course, he does away with himself."

To my second question, which was to enquire why so benign a fowl as the Honoured Twillick was kept chained in a wrought-iron cage, my host's reply was less explicit. "Experience has taught us", he said, "that there are within our Service those who belong to lesser squadrons without the law." And with that I had to be satisfied.

Later — much later — after I had thanked him and was bidding him good-night, I thoughtlessly expressed the hope that I might one day have the opportunity of tasting Twillick-Nog.

He smiled, and gently shook his head.

"An editor?" he said. "My dear chap!"

THE NORTH-WEST STAGING ROUTE

PART TWO

BY FLYING OFFICER S. G. FRENCH

Sam McGee's cabin, Whitehorse.

(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.—Editor.)

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.

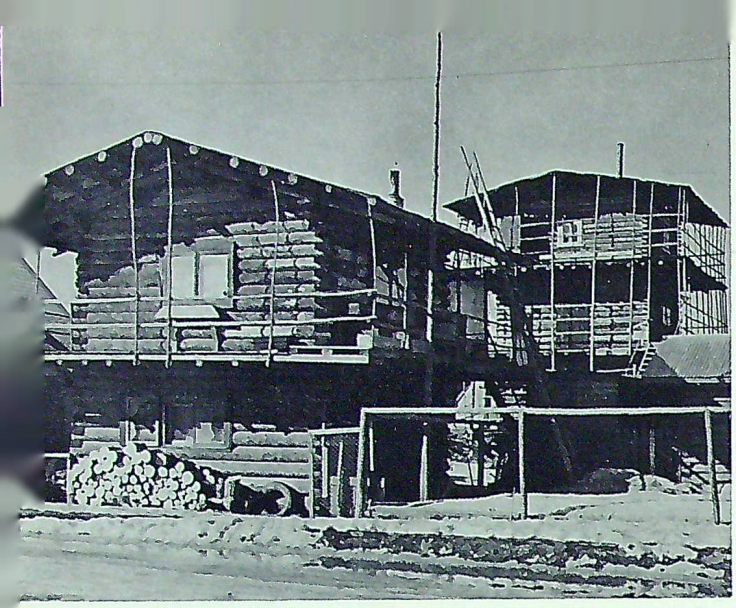
In April 1924, "Punch" Dickens was one of the handful of officers who had been granted permanent commissions in the R.C.A.F. when the Service was officially authorized on the first of that month. Later in the year he wrote a significant report on the value of aircraft for travel in the wilderness. In 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.

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.

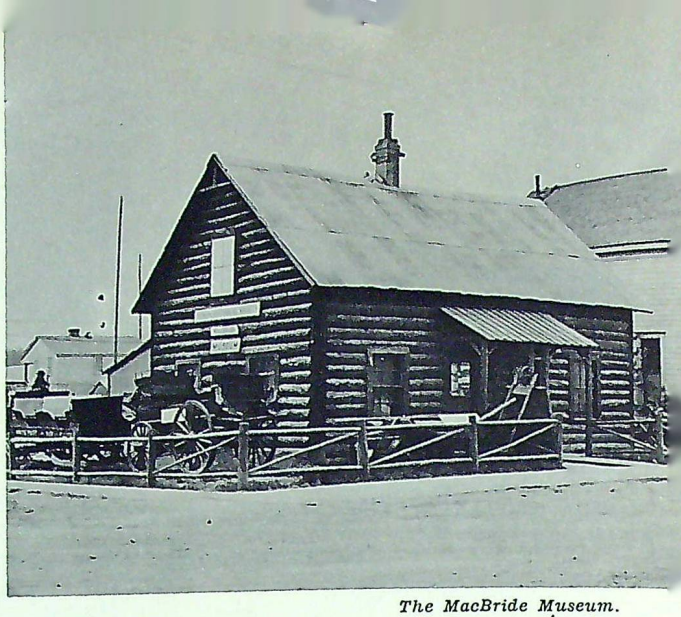
Three years later Brintnell took up the supplies for Great Bear Lake's first picnic — eighty cases of liquor (for 500 men). There was high revelry, and many were the games of strength and skill that livened the proceedings; but, to quote Brintnell's own words, "there was not one unkind word spoken, or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



Whitehorse sky-scrapers in process of erection.



The MacBride Museum.

deur 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 pioneeering 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, Skookum 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 gold-rush, 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 cut-off 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

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

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 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 grub-stake 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.

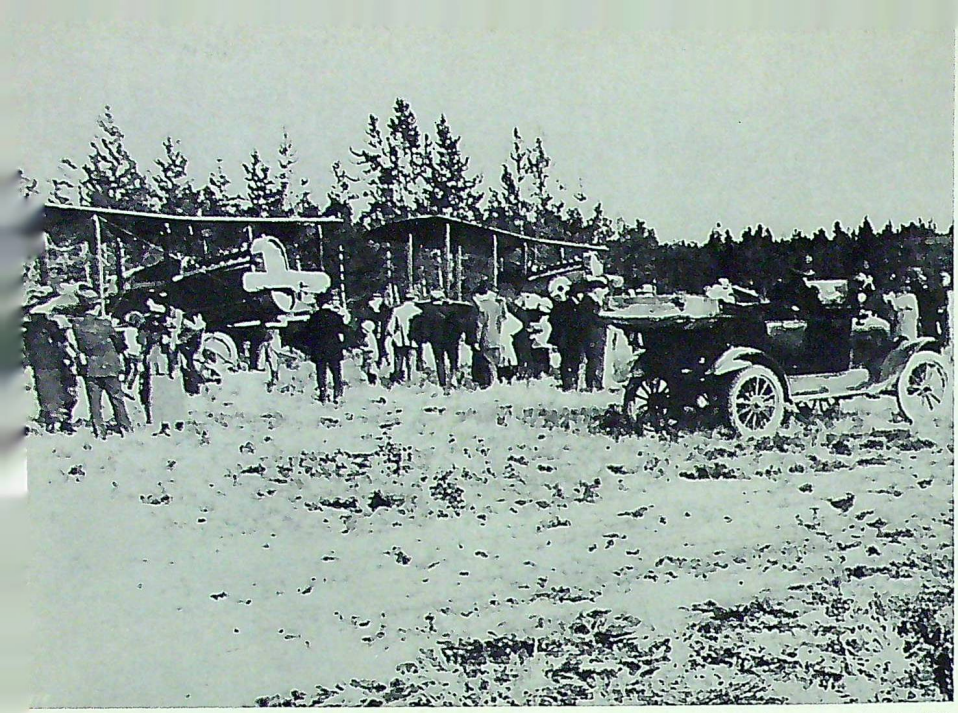
The holder hereof may gaze upon the mountain scenery, or may absorb the Italian summer, and, if specially desirous, may be permitted to watch the gleaming Northern Lights. If the passenger has but one lung, he will have permission to inhale the fresh air to capacity of said lung, but no more will be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



First aircraft to land at Whitehorse International Airport, August 1920.

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 supper-time, 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

Otter Falls.

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.

(To be continued)

DOUBLE WEDDING AT CLARESHOLM

THE Protestant Chapel at R.C.A.F. Station Claresholm recently witnessed a double wedding when Leading Airwomen Beverly Phillips and Erma Bingley became the brides of Leading Aircraftmen G. D. McNeil and E. T. Collins. Flight Lieutenant M. M. Bingham, the Protestant chaplain, officiated at the ceremony, and Miss Phillips and Miss Bingley were given in marriage by Flt. Lts. D. Horne and R. Williams, respectively. Our photograph shows (left to right): L.A.C. and Mrs. George McNeil, and Mrs. and L.A.C. Edwin Collins.

The Soviet Armed Forces and the Soviet State

BY WING COMMANDER JOHN GELLNER, D.F.C.,
Directing Staff, R.C.A.F. Staff College.

(In March of last year we published Wing Commander Gellner's "Partisans as a Weapon of War," which won first prize in the Royal Canadian Military Institute's essay competition of 1955. He was again awarded the prize in the 1956 competition; and, with the kind permission of the R.C.M.I., we are printing here the essay that won it.—Editor.)

INTRODUCTION

Lavrenti Beria, Soviet Minister of the Interior and head of the secret police, was arrested in the early summer of 1953; tried by a special board of the supreme court, with Marshal Koniev (then Commander-in-Chief of Ground Forces) presiding; and shot on 23rd December, 1953. Much has been written on this "fall of a Titan" — for such was Beria — but almost all commentators merely saw in it the result of internecine warfare among the heirs of Stalin, in which Beria was the loser.

In actual fact, the liquidation of Beria and the two-year "purge" of his henchmen has a much deeper meaning. It is a milestone in the history of Communist Russia comparable to the death of Lenin or the banishment of Trotsky or the liquidation of the Bolshevik "Old Guard", or possibly even to the passing of Stalin himself. It signifies the abandonment of total terror as a principle of government in the U.S.S.R., and the entry of the Soviet armed forces as an important power on to the Russian political scene. It is this latter aspect of the "Beria affair" that interests us here. A short explanation, however, is needed of the term "total terror".

As Stalin grew older, and as his personal power increased until it became absolute, he came to rely more and more on physical and mental coercion in his government of the Soviet Union. He obviously considered fear a better guarantee of obeisance than consent. The men who put the dread of the dictator into the heart of every Soviet citizen, the executive organs of the dictator's will, the administrators of his reign of terror, were Beria's police. As the terror became all-pervading, their derivative powers also became well-nigh absolute. A police "state within the state" took form, with its own territory (the vast areas of penal settlements in the Arctic and in the Asian provinces of Russia), its own finances, its own military forces of all arms.

It was this M.V.D. "state within the state" that was broken up in the summer of 1953, and with it the system of governing solely by coercion. The Soviet Army was the bludgeon used to smash the police empire, just as in 1937 Stalin used the police to tame the armed forces. The police empire was founded, as it were, on the graves of Marshal Tukhachevsky and more than 30,000 regular officers. With a kind of poetic justice, the Soviet armed forces are establishing themselves for the first time as a decisive factor in the government of the U.S.S.R. on the graves of Beria and of Beria's aides. To examine the present status of the armed forces in the Soviet Union and the circumstances that brought them their new eminence, is the aim of this essay.

THE ARMED FORCES AND THE PARTY

It is the problem of every revolutionary régime to defend itself without being destroyed by its defenders. The Great French Revolution was snuffed out by Napoleon Bonaparte, who would never have become a general but for the revolution. Hitler was much preoccupied with the possibility that one or other of the top *Reichswehr* officers might do to the Nazi state what Napoleon did to the French First Republic. While in the beginning he was forced to lean heavily on the army, he also made sure that the generals remained under control. For more than 38 years now the Soviet leaders have struggled with the same problem.

They started off, in 1917, with a truly revolutionary army, a volunteer militia drawn from the city proletariat (the Bolshevist "revolutionary class"), in which there was no rank distinction and the commanders were elected by the collective. It was soon found that the armed toilers were unable to defend the Soviet state, threatened as it was by the White counter-revolution and, somewhat half-heartedly, by Allied intervention. Under the leadership of Trotsky, the first Commissar of Defence, the Red Army was created on conventional lines. Its official birthday is the 23rd February, 1918. 48,000 former

Tsarist officers, excluded from bearing arms under the original system because they were *bourgeois*, were brought into the Service. Under their command the progressively more disciplined, if less socialist, Red Army won the Civil War. In fact, for the next twenty years every one of its commanders-in-chief was an ex-Tsarist officer of at least middle-class origin.

At the end of the Civil War the Soviet leaders were faced with armed forces which in structure and outlook did not differ too much from the Imperial forces. There was the distinct danger that professional *esprit de corps* would become a more effective cohesive force than devotion to the politico-social ideals of the Soviet State. A number of measures were taken, all designed to remove the potential danger that the regular armed forces, and particularly the professional officers' corps, constituted for the régime. The former Tsarist officiers were gradually discharged (but the few thousand who remained in the Service continued to hold most of the command and staff posts); officers' training was given to great numbers of young party members; the system of thorough political indoctrination and supervision through the military commissars was perfected; the regular army was reduced from some five million (at the height of the Civil War) to 560,000, and a militia was created of armed workers which initially outnumbered the regular army by three to one, and as late as 1934 (when, under the pressure of the threat of Hitler's Germany, the strength of the Regular Army was doubled) by two to one.

Successful as these and other measures must have been in checking any political aspirations that the leaders of the Soviet armed forces might have had, Stalin's fears were not allayed. It probably will never be known whether Marshal Tukhachevsky, the brilliant commander-in-chief, really contemplated a *coup d'état*. The weight of the available evidence is against it. There is, however, little doubt that eleven years (1922-1933) of close technical collaboration with the *Reichswehr* left their imprint on the minds of the top Soviet commanders. They must have been impressed with the social status of the German officer, and particularly with the great influence which the *Reichswehr* wielded during the Weimar Republic and the first years of Hitler's reign. The victory which the German armed forces apparently gained over the party militias, and which, after the "blood purge" of 1934, made the armed forces for a time the only "bearers of arms" (*Waffentraeger*) in Germany, undoubtedly made the Soviet generals think, burdened as they were with the armed hordes of the Red militia and beset by the vexatious interferences of their watchdogs, the military commissars. Hitler had to be subtle to get rid of the generals who were becoming too powerful: he forced von Fritsch to retire by having him falsely accused of homosexual offences, and Blomberg by first arranging and then exposing the Defence Minister's marriage to a lady of doubtful virtue. Stalin, already a despot, could afford to strike with savagery, to purge the armed forces in a single blood bath among the leaders who might become dangerous to the dictator, but also among all officers vaguely suspected of placing their loyalty to the flag above their loyalty to Stalin and his régime. Half of the officers' corps of the Soviet Army were massacred or imprisoned in the summer of 1937: three of five marshals, 13 of 15 army commanders, 211 of 406 regimental commanders, and approximately 30,000 other officers.

The shooting of Marshal Tukhachevsky and the blood-bath in the officers' corps assured the safety of the Stalinist régime (if it ever was threatened), but it also destroyed the fighting efficiency of the Soviet armed forces. The defeat of the regulars was made complete by a decree of 15th August, 1937, which made the unit military commissar co-equal with the commander in operational matters. In fact, it made the political officer the only commander, the surviving senior officers showing little inclination to risk their miraculously saved necks in a clash of opinions with their commissars. The result was the fiasco of the First Russo-Finnish War (1939-40), the conduct of which by the Russians clearly showed that military amateurs were in charge. It is believed that, in the opening stages of the war, the chief of the military commissars, the head of the Main Political Administration of the Army, Mekhlis, was actually, if not formally, in command. His tactical principle reputedly was to crush the defenders by mass infantry attack in the naive belief that the enemy "can't kill all." After the Finnish war, frantic efforts were made to restore the order that had been broken in 1937. Senior officers were brought from the gaols and labour camps straight to the command of troops or to important staff appointments — one of them was General Rokossovsky, later a marshal and one of the top military leaders of the Second World War. And on 12th August, 1940, the military commissars were abolished.

There was little time to undo the damage caused by the blood bath of 1937 and by three years of apathy and neglect under the reign of the commissars. Because of this unpreparedness of the armed forces whose structure he himself had shattered, Stalin did his utmost to delay the outbreak of the war with Germany, a conflict which he must have known was inevitable. This is why the Russians did not react to the deployment of the German forces behind the demarcation line,

and avoided giving provocation themselves by deploying for battle. This is why Stalin, when asked by Churchill why he had not heeded a specific British warning (given on 19th April, 1941) that the Germans would invade Russia shortly, shrugged and replied: "I thought I might gain another six months or so." The initial victories of the German forces (which inflicted some three million casualties in the first four months of the war and carried the war to the gates of Moscow and Leningrad) were still in part the result of Stalin's actions aimed at protecting the revolution against scheming generals.

Hitler was convinced that he was what the sycophants called him, "the greatest military commander of all time." Stalin made sure that victory in the "Great Fatherland War" was attributed solely to his own military genius, but only because this was a safeguard against his victorious generals gaining national stature and thus becoming dangerous to the régime. He exercised great influence on strategy, very much as Churchill did, and he took a hand in top-level operational planning as chairman of the *Stavka* (a general headquarters of between 12 and 14 of the most capable high-ranking officers); but while he prodded and advised and lent the weight of his absolute power, he left it to the experts to fight the battles.

He was tolerably well served. It is generally recognized that the top commanders, down to and including the corps commanders, were excellent. The officers commanding units, from battalion to division, have been criticized for a lack of initiative that made the great majority of them soulless executors of higher orders. It has been alleged that they were motivated by fear of forfeiting their lives in case of a setback after failing to carry out orders to the letter. This is at best a partial explanation — we will deal with this aspect of Soviet leadership when we examine the military competency of the Russian officer of today. Another reason undoubtedly was that, after the blood bath of 1937, and after heavy losses among regular officers in the Russo-Finnish and in the opening stages of the Second World War, there simply were not enough officers left who were qualified for command of bigger tactical units. The total requirement in the four war years was for at least three quarters of a million officers. Yet after the purge, only four years before the Germans attacked, there were only about 2,000 senior officers left in the Soviet Army. The company and platoon leaders were brave and zealous, but most of them had little training and thus little knowledge of their job. On the other hand, the regular officers' corps was, by and large, loyal — there were few defectors, the most notable being Lt.-Gen. Vlasov.

After the war Stalin showered his generals with rewards, but he also dispersed them (e.g. Marshal Zhukov, the actual commander-in-chief from early 1942 to the fall of Germany, was appointed to the command of the Odessa Military District), and he made sure that the regular armed forces were put again under strict Party control. This was exercised through two agencies working independently, the unit Deputy Commander for Political Affairs (*zampolit*) and his Political Section (*politchast*), and the unit Counter-Intelligence officer and his Special Section. Broadly speaking, the *zampolit* was in charge of indoctrination, the counter-intelligence officer in charge of coercion. Both had direct channels of communication that by-passed the unit commander and the military hierarchy: through the Main Political Administration to the Secretariat of the Central Committee of the Party on the one hand, to the administrative head of Beria's empire, the Minister of State Security, Abakumov, on the other. In practice, the competencies of the political and the police officers largely overlapped. Both, for instance, might censor the letter of a unit officer, the one to assess the writer's attitude toward the régime, the other to detect any traces of counter-revolutionary plotting. Needless to say, political and police officers kept one another under surveillance, apart from keeping a weather-eye on the unit personnel. They had very large and arbitrary powers. All ranks, including the unit commander, their theoretical superior, had good reason to fear them. There is no doubt about Stalin's success in bringing the armed forces quickly and firmly under his thumb after he had been forced to grant them a degree of freedom during the war years.

When the heirs of Stalin decided to destroy Beria and his police empire, they were faced with the formidable task of dealing with a man who commanded one-and-three-quarter million armed police agents and militiamen. There was only one force that could do the job — the Soviet Army. There are eye-witnesses' reports on how it performed this task with precision and despatch. It was the first time in Soviet history that the Army was called in to crush a segment of the Party. There is no conclusive evidence available yet concerning the coin in which the Army was paid for this service. There are, however, strong indications that the armed forces have gained a high degree of independence, and that their leaders have secured entry into the policy-making circle in the Soviet Government. There are still political officers in Soviet military units (they are now often referred to as "education officers"), and while unit counter-intelligence officers seem to have been abolished, there are undoubtedly enough concealed M.V.D. spies left among the

unit personnel; but in practice the commanders now also wield powers commensurate with those of their Western counterparts. In fact, *yedinonachalye*, the undivided authority of the commanding officer responsible only to his military superiors, has become a principle of Soviet military organization. This is a complete reversal of the policy of parallel (if not always equal) responsibility of the military commander and the political officer, which had been in force for 38 years, from the founding of the Red Army.

THE OFFICERS' CORPS

In a recent syndicated article Dorothy Thompson said bluntly: "Russia is not 'left'. It is right-reactionary in quite a new way. . ." The Soviet officers' corps is living evidence for the truth of this statement. In the preceding chapter we have followed the command organization of the Soviet armed forces from the beginning when the commanders were elected by collectives of armed toilers; through the era of the military commissars with authority equal in theory to that of the military commanders, but superior in practice; to the *zampolits* endowed with less authority but still quite powerful; to our own days in which the principle of *yedinonachalye* represents the return to the point where it all started, the command organization of the old Tsarist army. The Soviet officers' corps has gone through a similar evolutionary circle. There was no rank distinction during the first months after the Bolshevik revolution. Persons of *bourgeois* origin were barred from bearing arms. Then came the reintroduction of military grades and of military discipline. Tsarist officers, some of aristocratic, the rest of definitely middle-class *bourgeois* background, were recalled, but an attempt was made to ensure that, in future at least, the officers' corps would be proletarian in character by admitting only sons of workers and peasants to officer cadet training. Nevertheless, an officers' caste began to take place. It was smashed in the blood-bath of 1937, but formed again during the Second World War.

Today the Soviet officer belongs to a class that is separated by a wide social gulf from the other ranks, and which occupies also a very distinctive, elevated position in Soviet society as a whole. Epaulets, dress uniform, gold braid, and tinkling decorations have all come back. The pay scale shows that there is no equalitarian nonsense about the position of officers and men. A private draws about six dollars a month, less than one-fifteenth of the basic pay of a Canadian private. A major-general is paid 1,630 dollars a month or approximately one-third more than an officer of the same rank in the Canadian Forces. In the officers' class, emphasis is put on good manners and on "culture". Recently, the first products of the new system of officers' education, the alumni of the Suvorov and Nakhimov Schools (named after a Tsarist general and a Tsarist admiral), have been commissioned. The idea is that of the old Imperial cadet schools, only the period of training is longer, from age 8 or 9, for a period of 10 to 12 years (according to the Service selected). It is significant that sons of officers are given preference for admission to the cadet schools. Here again, things are back to where they were before the Bolshevik revolution.

The professional standards of the Soviet officers' corps were set by a very remarkable soldier, Marshal Shaposhnikov. He was a colonel on the Imperial General Staff at the time of the Bolshevik revolution. When the Tsarist officers were invited to join the Red Army, he became chief-of-staff to the commander-in-chief, another former colonel of the Imperial Army, S.S. Kamenev. From 1919 to 1921 he shaped the strategy that won the Civil War. After commanding in succession the three most important military districts, Leningrad, Moscow, and the Volga, he became Director of the Frunze Academy, the Soviet Army Staff College. There followed two more spells as Army Chief of Staff, the second during the crucial period from October 1941 to November 1942. Ill-health forced him to resign so exacting an appointment, but he remained in the harness (as head of the Historical Branch of the General Staff) until his death in 1945. To his pupils — and most of the present-day general officers of the Soviet Army learned their trade from him, among them the two men who have beeen at the top for the last 15 years, Marshals Zhukov and Vasilevsky — Shaposhnikov left the tradition of learning, of a deep preoccupation with military doctrine.

Shaposhnikov was himself a prolific writer; in his four-volume *Mozg Armiy* (The Brain of the Army) he demonstrated from the history of the Austro-Hungarian General Staff the tasks of the general staff officer. It was, and is, the principal Soviet staff college text book. In the Anglo-Saxon countries military theory has of late been very much neglected, and what little was published in recent years was mostly written by civilians like Liddell Hart. The Soviet literature in the same field is prodigious in quantity, and the authors are invariably active soldiers. In the West, a newspaper published for the troops is written for entertainment, in Russia for the furtherance of military education. Almost every issue of the Soviet Army daily *Krasnaya Zvezda* (Red Star) contains an article on military ideology, science, or art. An important branch of the General Staff, the Historical, occupies itslef with the development of military doctrine. A full general is usually at its head, and a number

of general officers are on its staff, including many of the young rising stars. The average Russian regular officer is deadly serious about his profession. To be a "scientific soldier" is his aim. In his single-minded absorption in his job he reminds one of the old Prussian officer.

While the Russian officer is generally credited with high professional qualifications, his abilities as a practical commander in the field are often doubted. The last war was probably not a fair test — we have dealt with this point earlier. There remains, however, the fact that the very nature of service under a dictatorial régime makes officials below the highest policy-making level reluctant to act without orders. This would be also true for the Russian officers if they were still threatened with retribution from outside the Service, as was the case in Stalin's times. Then, to give but one example, General Pavlov, who commanded the troops along the Russo-Polish border, was executed by Beria's police because he suffered the first stunning defeats of the 1941 campaign. It is not likely that something like that would happen today. The military machine is no longer controlled by a suspicious dictator and his sombre chief executioner, but by competent and rational military chiefs accustomed to use initiative and thus likely to demand that their subordinates do the same.

That the atmosphere has changed is quite apparent from recent Russian military writings. Before the death of Stalin, and to a certain degree until the replacement of Malenkov by the duumvirate of Krushchev and Bulganin, certain Party dogmas had to be accepted by all military writers. One of these dogmas was, for instance, that of the superiority of Soviet military science because only the latter emphasized, and showed the way to, the proper use of Stalin's "permanently operating factors" (mainly economic and moral). It followed that the *bourgeois* countries, with their emphasis on "temporary factors" (such as surprise), could never defeat the Soviet Union. Today this dogma, patently inconsistent with the realities of thermonuclear warfare, has been discarded. A thorough theoretical discussion of the effects on warfare of the new weapons of absolute destruction has been lately going on in the Soviet military periodicals, in which even the heretical statement has been made that the West is ahead of the Soviet Union in military preparedness. It is significant that no attempt is being made nowadays to make military theories fit the Lenin-Stalinist doctrine, as military writers had to do in the past. The competence of the Soviet commanders will undoubedly be enhanced by this freeing of their minds.

Marshal Vasilevsky stated at the 19th Party Congress (1953) that 86.4% of the Soviet officers are members and candidate members of the Communist Party or enrolled in the *Komsomol* (Young Communist League), and that this ratio is increasing year after year. This means little. During the Second World War, party memberships were dished out wholesale as rewards to deserving Servicemen, and, with the high-school and university students pretty well compelled to join the *Komsomol*, it is not surprising that the junior officers come from this official youth organization. There is no doubt that the officers' corps is absolutely loyal to the régime — not because the regular officers are fervent communists, but because they are patriotic and because their outlook is conservative just like that of regular officers everywhere else. They can be trusted to stand by the established order, particularly when it has given them a social standing and material advantages that set them far above the majority of their compatriots. It probably matters little to them what political label this established order carries.

THE RANK AND FILE

The Russian soldier of the Second World War was first-class: brave, tough, filled with simple and genuine love of his country. This last quality was perhaps the most important. The values for which he fought were *rodina* (native land) or *otechestvo* (fatherland), not the preservation of socialism or the communist ideal. Stalin expressed the feeling of the common soldier when he selected for the Russo-German conflict the name "Great Fatherland War".

The average Russian is rabidly nationalist. That is seemingly a paradox for a nation which, according to its leaders, has completed the building of socialism and is advancing toward the communist ideal in accordance with the Marxist creed which rejects nationalism. The explanation is again, as for other phenomena of Soviet society that we have discussed, that the U.S.S.R. is not a Marxist but a Russian country, Russian in the old tradition but in more modern and efficient form. What has happened is that the communist revolution has failed to make the Russians over into "Soviet men": instead, the Bolsheviks have been Russianized. Stalin may have started as a prophet of Marxism, but he ended up as another Peter the Great, another of those Russian leaders who from time to time in the past have administered a brutal kick to a lethargic Russia, hurling it forward, making it achieve a century's progress within a few years. It is obviously in the interest of the armed forces to keep alive among the Russian people this spirit of blind, intolerant nationalism. Yet, judging from recent statements, the Soviet military chiefs seem to be

worried about the morale of the Soviet forces. Two questions preoccupy them more than all else. Will the characteristics of the Russian soldier change now that the day is in sight when the city-dwellers will outnumber the peasants in the U.S.S.R.? Will the Russian soldier, motivated as he is primarily by his love for his native soil, be as good in a necessarily offensive war of the future as he was in the essentially defensive wars of the past?

One of the reasons that make Russian peasants good soldiers is that they are accustomed from childhood to endure hardships, so that military life does not seem particularly rigorous to them. In fact, the average peasant on Russia's collective farms still lives in such dismal poverty that life in an army barracks seems luxurious to him. That is why the other ranks in the regular cadres of the Soviet armed forces are practically all of peasant origin: to become a regular soldier is, for the peasant conscript, a definite step upwards in the social and economic scale. Consequently, competition is keen for enlistment in the regular forces. For the city-dwellers — the privileged citizens in the U.S.S.R., whether they are industrial or white-collar workers — there is little attraction in military life. Physically and morally they are much poorer material than the peasants. They made up 10% of the population in 1917, today they constitute 40% of it. The fact that they are coming into the Services in greater and greater numbers has forced the Russian Command to adopt measure after measure, very much as we ourselves do, to make military service more attractive. That the Soviet leaders are groping for a new source of morale, a new motivation for their rank and file, is quite apparent from recent military writings. Marshal Rotmistrov, for example, in an article published in "Red Star" of 24th March, 1955, stated that, because of the power of atomic and thermo-nuclear weapons, "surprise aggression might become a deciding condition for success." This being so, emphasis must no longer be placed on developing a burning desire to defend the native soil against foreign invaders, but an offensive spirit must be inculcated from the first. The Soviet military leaders obviously realize the dire results of a surprise attack with thermo-nuclear weapons; thus they do not want a future war to be another "Great Fatherland War", but rather a "Great War of Conquest."

CONCLUSION

The Soviet armed forces have only just begun to emerge as an important power on the Russian political scene. They are a conservative force that is likely to quicken the tempo with which the Soviet State is changing into a Russian Empire on traditional lines, much as the Party leaders may try to keep alive the embers of the revolution, and even though the régime continues to carry the communist label. The Soviet armed forces are undoubtedly growing stronger, in morale and efficiency if not in material strength, now that they are allowed to develop more freely and have become wielders of power instead of being simply tools. Consequently the might, not necessarily of the Communist State, but certainly of Imperialist Russia, is bound to grow. It is a moot question which of the two Russias, Communist or Imperialist, is the more dangerous.

GIFTS FOR HUNGARIAN TOTS

In a refugee hostel at Metz, Sergeant George Jackson, a scoutmaster of the Air Division Headquarters troop, helps Hungarian children to open gifts donated by the R.C.A.F. Protestant Chapel Guild.

BADGES OF THE R.C.A.F.: 2

This is the second in our series of illustrations of the badges of the R.C.A.F. Black-and-white reproductions of the badges may be obtained by writing to: Director of Public Relations, Air Force Headquarters, Ottawa, Ont. Glossy or matt prints are available in two sizes: 8" × 10" (50c.) and 11" × 4" ($1.00). Cheques or money orders (not cash) must be made payable to the Receiver General of Canada.

NO. 1 (FIGHTER) WING

(October 1954)

A stone arrow-head, point upwards in bend.

Pro Pace Armati
(Armed for peace)

The unit's device is both symbolic of the country of its origin and of its ambition to be in the forefront in its work. The motto indicates its rôle with the R.C.A.F. forces of N.A.T.O. in Europe

No. 1 Wing was formed at North Luffenham, England, on 1 November 1951. The first of its three *Sabre* squadrons, No. 410, arrived from Canada a fortnight later and was followed by No. 441 and No. 439 Squadrons in February and June 1952. The wing was relocated at Marville, France, early in 1955. In November 1956, No. 445, a CF-100 squadron, replaced No. 410 in the wing.

CENTRAL NAVIGATION SCHOOL

(September 1956)

In font of a terrestrial globe, a torch.

Scientia Ducit
(Knowledge guides)

The torch, symbolizing the light of learning passed from one generation to another, represents the unit's training function, and the terrestrial globe suggests its specific rôle as a navigation school.

During the war a Central Navigation School was formed at Rivers, Man., on 11 May 1942, by the amalgamation of Nos. 1 and 2 Air Navigation Schools. The school was disbanded on 15 September 1945, following the termination of hostilities in Europe and the Far East. In the post-war R.C.A.F. the Central Navigation School was formed at Summerside, P.E.I., on 1 August 1951, from the Specialist Training Wing of the Air Navigation School at that station. C.N.S. was relocated at Winnipeg in the summer of 1954.

NO. 444 SQUADRON

(November 1954)

A cobra, ready to strike.

Strike Swift, Strike Sure

The cobra and the motto alike suggest the speed, accuracy, and striking power of a fighter squadron.

Formed at St. Hubert on 1 March 1953, No. 444 Squadron bore the first new number (i.e. which had no war-time predecessor) in the post-war R.C.A.F. Six months later the squadron flew its *Sabres* overseas on "Leapfrog 4", and is now based at Baden-Soellingen with No. 4 (F.) Wing of 1 Air Division.

The Suggestion Box

The Chief of the Air Staff has written letters of thanks to the undermentioned personnel for original suggestions which have been officially adopted by the R.C.A.F.

Flying Officer R. K. Wolff, of Station Senneterre, proposed changes in the existing vector system which will contribute to the efficiency of fighter operations.

Flight Sergeant R. V. Pearson, of Station Rockcliffe, suggested a more complete method of labelling medical supplies.

Sergeant T. Thompson, of No. 4 (Fighter) Wing, designed a new type of shaft-assembly puller for use on the *Orenda* engine.

Flt. Sgt. A. H. Smith, of Station St. Hubert, suggested amendments to C.A.P. 179 (Postal and Message Addresses for the R.C.A.F.) which will cut down on the cost of commercial telegraph charges.

Corporal W. J. Vaudrey, of Station Foymount, drew up a new Assigned Pay Observation Form which presents a clearer picture of adjustments required, thus assisting in the conduct of internal audits and facilitating the work of ledger-keepers.

Corporal A. D. Beaupré, of Station St. Hubert, suggested a new method of setting call-letters on the C11C Jet Instrument Flight Trainer. Use of his method eliminates the employment of a mathematical formula and reduces the time required for the operation from several minutes to a few seconds.

Cpl. S. A. Panich, of Station St. Hubert, designed a new method of attaching blast tube to generator when fitting the nose-fairing of *Sabres V* and *VI*. Considerable time and money are saved by the use of his modifications.

Flt. Sgt. A. H. Smith.

Flt. Sgt. R. V. Pearson.

Sgt. T. Thompson.

Cpl. S. A. Panich.

Flying Officer R. K. Wolff.

Cpl. A. D. Beaupré.

The Aquateers of Canada

BY CORPORAL P. B. CLARK,
R.C.A.F. Station Camp Borden.

Cpl. Miles, ready for the depths.

EARLY last spring there sprang into existence the R.C.A.F.'s first skin-diving club. The club owed its formation to the enthusiasm of two members of the Munitions and Weapons Department of No. 2 Technical Training School, at Camp Borden — Flight Sergeant Jack Labrash and Leading Aircraftman Bill Woods. Together with Corporals Dick McKellar, Don Miles, Bob Henderson, and myself, they held the club's first official meeting on April 6th. Bob Henderson was elected president, Bill Woods secretary, and Don Miles director of water safety.

Equipment for the sport of skin-diving is expensive, but we managed to purchase two aqualungs of the DW type — a single-tank unit with a capacity for about one hour. It also has a constant 15-minute reserve, so that, when a diver's air supply ceases, he can obtain a further 300 lbs. pressure by pulling a lever. This gives him time to surface safely. We also purchased swim-fins, masks, snorkels, depth-gauges, and air-tank fillers. Then, after rigorous tests in Camp Borden's Bardia Pool, the Aquateers of Canada were in business.

* * *

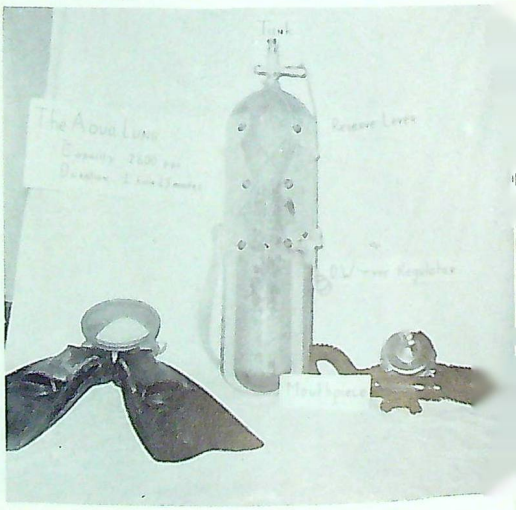
Before I go any further, a few words about skin-diving may not be out of place for the benefit of readers who are unfamiliar with this fascinating and thrilling sport.

Two basic pieces of equipment are needed: a dive-mask and swim-fins. The former permits the diver to see what lies — or moves —— in the curious world beneath the waters, the latter enable him to dive to considerable depths and to remain there. Once he has reached those depths, his endurance is, of course, limited by the capacity of his lungs. That is where the SCUBA (Self-Contained Underwater Breathing Apparatus) comes into the picture. This apparatus, weighing about 80 lbs., is the aqualung of the naval frog-man, using an air-regulator of the type developed by Cousteau and Gagnan. The name of Cousteau, by the way, is to the skin-diving fraternity what the name Wright is to the aviator. The snorkel, which is nothing more than a breathing-tube, enables its user to keep his face continuously beneath the surface of the water, but it naturally in no way extends his range or endurance at a depth of more than a few inches.

A skin-diver wearing only mask and fins — and perhaps a weighted belt to help overcome his natural buoyancy — is one of the faster forms of submarine life. Thus equipped, I have even found it possible to produce slight symptoms of black-out by performing a tight somersault under water. Indeed, the sensations of the skin-diver, as he swoops and turns in the depths, are very similar to those of the pilot engaged in aerobatics.

In cold waters the skin-diver often puts another skin on top of his own, in order to keep warm. It usually takes the form of a full-length rubber suit. Other items that may contribute to his enjoyment of, or safety in, his underwater environment include a depth-

The aqualung.



gauge, compass, watch, knife, and Res-Q-Pack (self-inflating life-jacket).

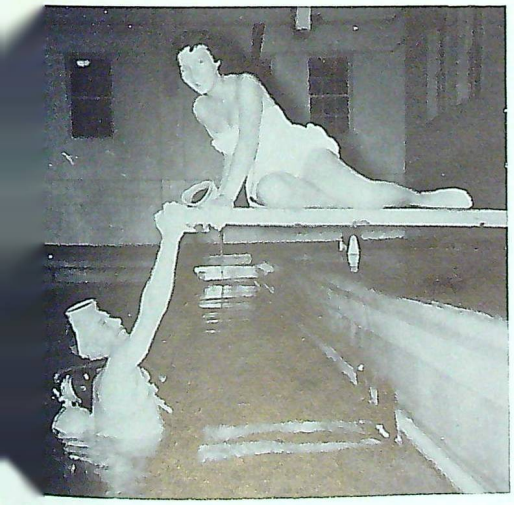
* * *

Our first major operation took place on June 10th at Innisfil Park on Lake Simcoe. Since the water was still fairly chilly, and since we had no diving-suits, we found an alternative use for those garments

Lieutenant E. Brewer holds rope attached to L.A.C. Woods during operations at Couchiching Park, Orillia.

Cpl. Clark turns on the air for a trial run at shallow end of Bardia Pool. Guests of club are Miss Myrtle Vardy (left) and Miss Anne Small.

L.A.C. Woods enjoys a breather—and how!



referred to in the Air Force as "Long Johns". The crowd that had gathered to watch us was duly impressed, and presently we found ourselves working off the dock in about twenty feet of water. After one dive, just as I surfaced, I heard a youngster remark in an astonished treble: "Those men are wearing their winter woollies!" This somehow struck me as so funny that I nearly drowned — since it's rather hard to laugh through a snorkel.

On the way home we found our mascot. He was dodging the Sunday evening traffic on the Queen's Highway, a baby raccoon only a few days old. Christened "Li'l Grundoon", he is still with us. He's very fond of the water, and he takes an extremely favourable view of clams.

We have always made a practice of taking our families along on our week-end outings; and I can assure the reader that a diving-club picnic combined with a family outing can be a very happy affair indeed.

Most of our activities have been confined to the Lake Simcoe area, but we are in a good position to cover Georgian Bay and the great resort area to the north of Toronto. We have retrieved quite a lot of expensive fishing-tackle, and in September, when we offered our services to the Lake Simcoe Patrol of the Ontario Provincial Police, we retrieved an outboard motor. It took us a mere ten minutes, though the harassed owner had been grappling for it all morning.

Salvage is, as might be expected, one of the chief practical uses to which skin-diving can be put. The diver, moving freely and rapidly, can search river and lake bottoms without the help of any more equipment than can be carried in the trunk of a car. It will be interesting, as the art develops, to see what can be done to recover some of the priceless articles lost on ships during the early period of Canada's history.

* * *

We feel that, though our first summer was pretty successful, we have barely even begun to explore the possibilities that are open to us. In the fall, the Army skin-diving club, "The Sub-mariners of Camp Borden", having suffered heavily from postings and transfers, joined our organization; and during the winter months we have been practising (in the Bardia Pool), building new equipment, training new divers, and making plans for the coming season's activities.

We now send a bi-monthly report to "The Skin-Diver," and we shall be delighted to correspond with clubs or individuals interested in the same field of sport. Needless to say, whatever knowledge and experience we have gained is at the full disposal of any R.C.A.F. groups that are contemplating the formation of skin-diving clubs of their own.

R.C.A.F. Association

The Seventh Annual Convention of the R.C.A.F. Association will be held in Saint John, New Brunswick, on June 6th, 7th, and 8th.

GRAND PRESIDENT'S VISITS

Air Vice-Marshal G. E. Brookes, C.B., O.B.E., accompanied by Flight Lieutenant M. E. Ferguson, recently attended a reorganizational meeting of No. 429 Wing, St. Thomas, Ont. The meeting was held at R.C.A.F. Station Aylmer, with the kind permission of Wing Commander A. H. Moody, the C.O. The following night, Air Vice-Marshal Brookes addressed a meeting of the Oxford County Air Force Veterans in Woodstock. It is hoped that this group will become a Wing of the Association in the very near future. On the next day, by invitation of Mr. Jack Welsh, a visit was paid to the Air Force Club of Brantford. The club was organized before the inception of the R.C.A.F. Association, and again it is our hope that it may become affiliated with the Association. On the occasion of this visit, Air Vice-Marshal Brookes addressed some 860 students at the collegiate institute on the subject of citizenship and the Air Cadet movement in Canada.

MEMBERSHIP DRIVE

The results of the Wing membership campaign, which has been in effect from 1 April 1956 to 31 January 1957, are as follows.

Group Prize

The Group prize, a suitably engraved gavel, was won by the Alberta Group.

Wing Prizes

First: No. 438 (Algonquin) Wing, Pembroke . . . 392% points. (A complete set of R.C.A.F.A. Standards.)

Second: No. 437 (York) Wing, Toronto . . . 323% points. (A cheque for $50.)

Third: No. 437 (Calgary) Wing . . . 117% points. (A cheque for $25.)

Hon. mention: No. 100 (Bluenose: Halifax), No. 422 (Leamington), No. 700 (Edmonton), No. 314 (Trois Rivières), No. 408 (Toronto), No. 424 (Cornwall), No. 200 (Summerside), No. 101 (Atlantic: Halifax).

The Chairman of this year's Membership Campaign, Mr. George Penfold, president of No. 437 Wing, is to be congratulated on a splendid job.

The total Wing membership increase to date is approximately 500 members. Our Wing membership renewals have so far averaged 82% for this year.

U.S.A.F. BLOOD-DONORS

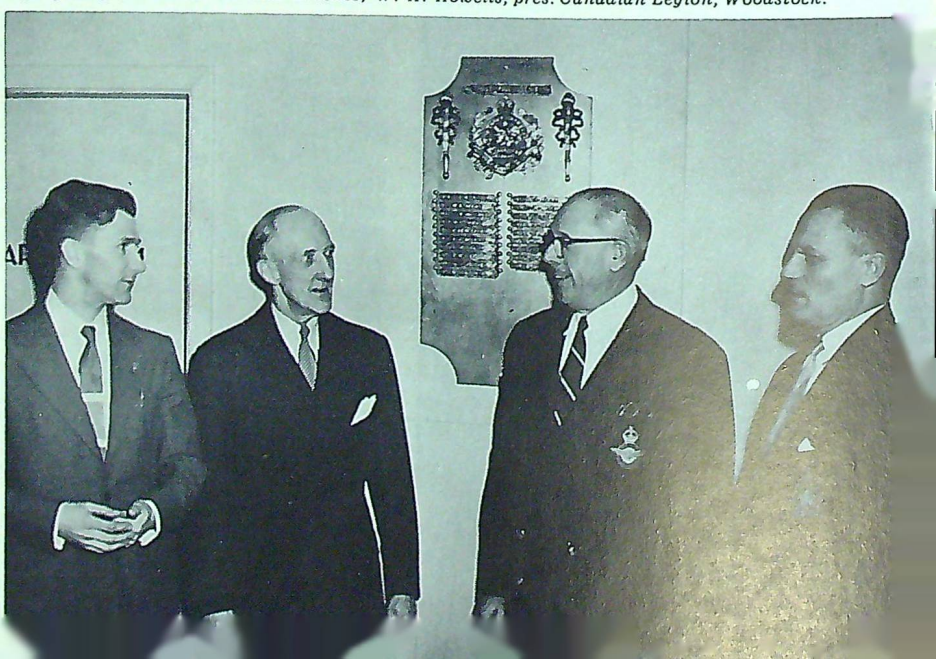
When former Flying Officer B. G. McDonald (No. 103 Squadron, R.C.A.F.) was recently taken by air from the Queen Mary Veterans' Hospital, Montreal, to Minneapolis for a delicate heart operation, fifteen airmen from the neighbouring Wold-Chamberlain Air Force Base contributed 20 pints of blood for him. The operation was successful, and Mr. McDonald, who has been very active in the Association since 1949, is now back in Queen Mary Hospital.

WING NEWS

No. 420 Wing

President W. Sutherland, of No. 420 (Oshawa) Wing, presented engraved tankards to the seven past-presidents. Those receiving tankards were N. Jenkin, G. Murdoch, C. Parkin, C. Moran, C. Halliday, K. Hawkshaw, and Mrs. E. Fraser on behalf of her late husband, Stanley Fraser.

Left to right: D. Ward; R. N. Ball, pres. of Woodstock Veterans' Group and ex-Royal Flying Corps; Air Vice-Marshal Brookes; W. H. Howells, pres. Canadian Legion, Woodstock.



No. 420 (Oshawa) Wing's 1957 executive. Front row (l. to r.): R. B. Field, sec'y; W. Sutherland, pres.; K. Hawkshaw, past-pres.; T. Cunningham, treas. Back row: 1st vice-pres. H. J. Humphries; directors F. Seedhouse, G. Murdoch, R. McCullough, W. D. Evans; 2nd vice-pres. J. Bird. ("Oshawa Times Gazette" photo.)

D.S.O., O.B.E., D.F.C. The Wing, which sponsored the Paul Bradley Air Cadet Memorial Scholarship (a money purse), has announced that this will be competed for and presented at the Quinte Secondary School

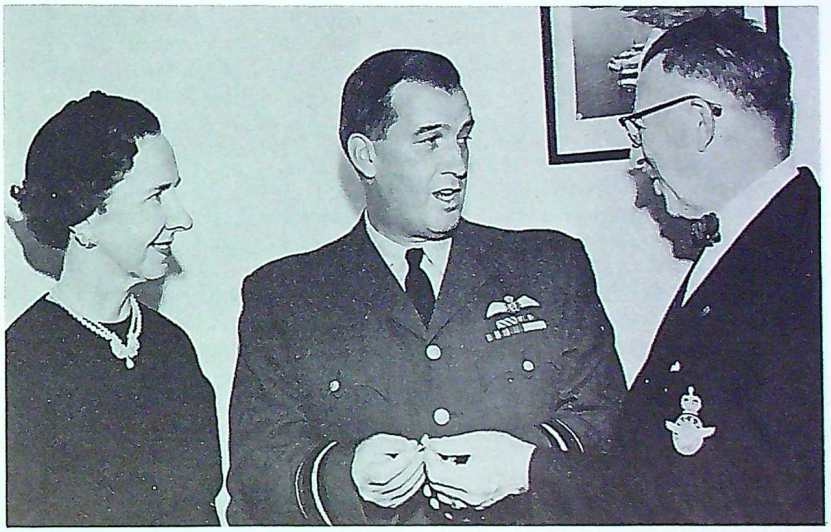
We would again remind all Wing members that the annual Wing dues of the Association are payable on April 1st. Continued receipt of "The Roundel" will be assured by prompt payment.

No. 430 Wing

The Annual Blue Ball of No. 420 (Warsaw) Wing, Toronto, was attended by 700 persons. It was the most successful of the Balls to date. Among the guests were Air Vice-Marshal and Mrs. F. G. Wait, and Wing Commander J. C. Mirabelli, A.F.C., C.O. of R.C.A.F. Station Toronto.

No. 418 Wing

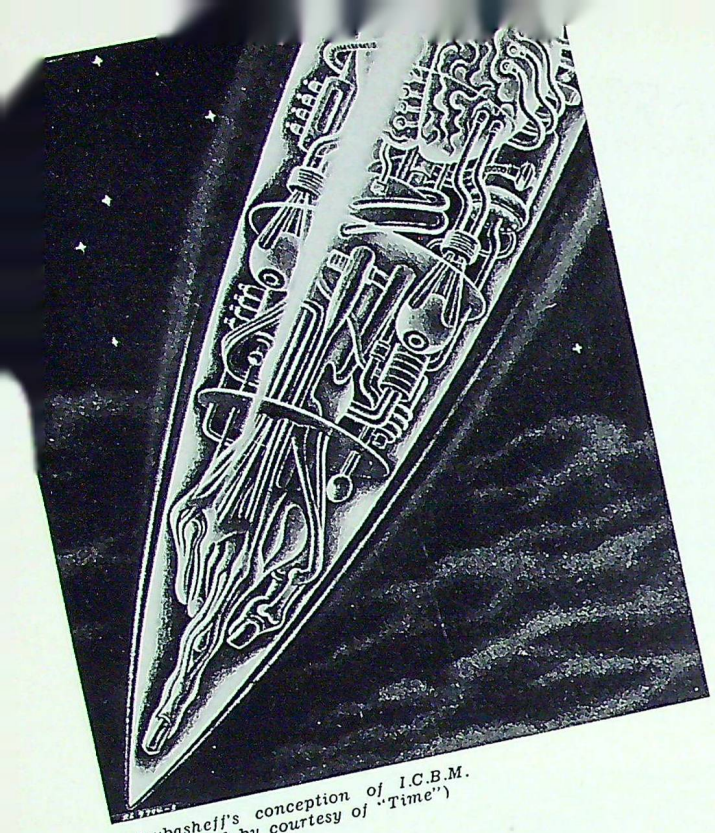
It is a pleasure to report that since the recent open meeting of the Belleville Wing, which was attended by the National President, a renewed interest is evident. At the meeting held at R.C.A.F. Station Trenton, more than 40 members heard a very interesting talk by Group Captain C. H. Mussells,



No. 101 (Atlantic: Halifax) Wing's President J. Murphy presents Air Vice-Marshal Kennedy with key to new club-rooms.

Left: Miss M. MacDonald, president of No. 100 (Bluenose) Wing.

Views expressed in "The Roundel" upon controversial subjects are the views of the writers expressing them. They do not necessarily reflect the official opinions of the Royal Canadian Air Force.



Artzybasheff's conception of I.C.B.M.
(Reprinted by courtesy of "Time")

The Nature of the Beast

BY SQUADRON LEADER G. B. WATERMAN,
Deputy Chief of Quality Control, A.M.C.H.Q.

(This is the second of Sqn. Ldr. Waterman's series of articles on ballistics missiles. The first, "Intercontinental Bogey-Man", was published in our issue for December 1956, and subsequent articles will appear sporadically. The writer was trained as a navigator during the war, and served first as an instructor in Canada and then overseas with No. 436 Squadron. After the war he left the Service and graduated as a Master of Applied Science from the University of Toronto in 1950. Having rejoined the R.C.A.F., he served in the Directorate of Inter-Service Development, whence he was transferred to Uplands as Chief Technical Officer. Appointed as C. Tech. O. of Central Experimental and Proving Establishment in 1953, he was transferred to his present job two years ago.—Editor.)

Beware the jabberwock . . .
and shun
The frumious bandersnatch.

(Lewis Carroll.)

THE MONSTER

"ALL we have now are the push-buttons."

Thus, in a remark which has since become famous, the late Senator Brian McMahon, then chairman of the United States Committee on Atomic Energy, reported on the state of push-button warfare after the ending of the Second World War. For several years thereafter his lack of confidence in technological advancement was justified. Progress in missiles, after the development of the V-2, was terribly slow. The technology required to produce higher-powered rocket-motors, reliable electronic gadgets, more sensitive instruments, and packaged war-heads, was just not available. Research programmes were lackadaisical, money for development was tight, and missiles which reached production were no satisfactory complement to interceptor aircraft. The intercontinental missile almost died before it had been properly weaned.

Then, in 1954, thanks to thermonuclear fusion, came the big bomb in a small package, and the whole aspect of defense was changed. No longer was a relative inaccuracy a deterrent for long-range missiles, since the megaton war-head (worth one million tons of T.N.T.) was a distinct possibility. The future of the I.C.B.M. (Intercontinental Ballistics Missile) was assured.

In the rather science-fictionish introduction to this subject ("Intercontinental Bogey-Man") it was stated that the I.C.B.M. will be the "ultimate weapon" of this century, and possibly of all time. To understand properly the terrible implications of this statement, we should be aware of the weapon's capabilities, its weaknesses, and above all, of its future possibilities. If we are to follow the advice of Lewis Carroll, and beware the jabberwock (which in modern guise would closely resemble the apparition painted by famous cover-artist Artzybasheff for "Time") we must

have better than a nodding acquaintance with the beast. In order to deflect the pointing finger of the thermo-nuclear monster, it is imperative that we understand our dangerous antagonist. This article will attempt to describe, without going into great detail, the nature of the intercontinental missile, and the state of its growth at the present time.

I.C.B.M. TYPES

Extremely long-range missiles can be classified either according to their range or to their trajectory or flight-path. Intermediate-range weapons (I.R.B.M.) are being developed to cover distances up to 1500 miles, while the intercontinental missiles will have ranges exceeding 5,000 miles. Both intermediate and longer-range missiles are again divided into air-breathers (winged missiles) or space-travellers (with true ballistics trajectories). For purposes of our discussion, it is not necessary to differentiate between I.R.B.M. and I.C.B.M., since their design principles are similar even if their ranges are different. The main demarcation in missile design depends on whether or not the vehicle flies above or below the stratosphere.

AIR-BREATHING MISSILES

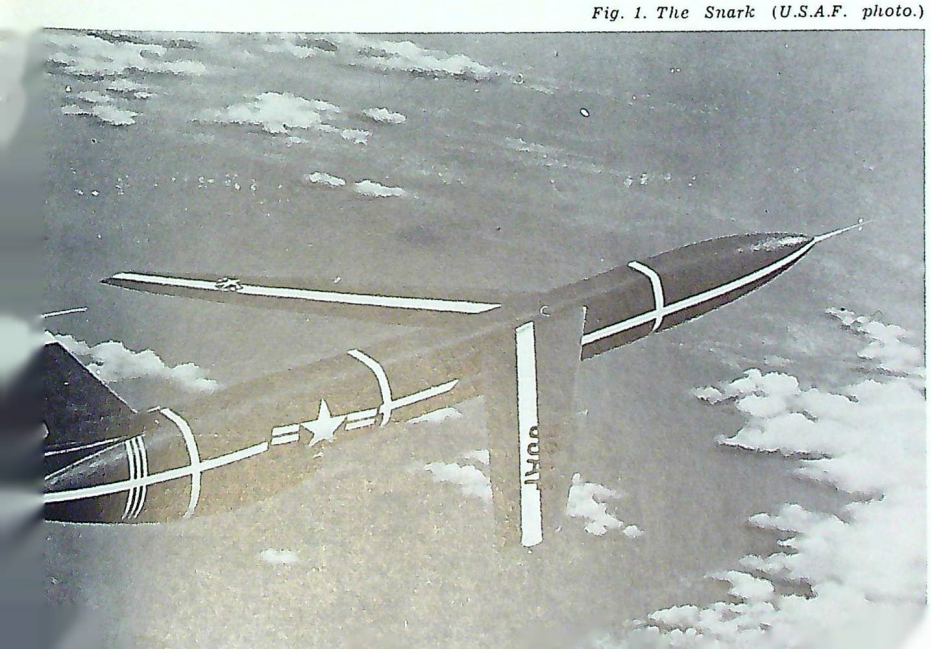
These missiles, typified by the North American *Navaho* and the Northrop *Snark*, have been designed to bridge the gap between conventional bombers (such as the B-52, B-58) and the true ballistics missiles. They are essentially unmanned, expendable bomber aircraft which can carry out one-way suicidal missions of destruction at altitudes of up to 90,000 feet and over ranges of up to 5,000 miles. Figure 1 is a photograph of the long-range missile, the *Snark*.

Because the missile is an aircraft, it has the normal aircraft appendages, including wings and a vertical stabilizer. It looks remarkably like a late-model fighter aircraft, except that no office has been supplied for a pilot. About forty-five feet in length, its vertical tail rises fifteen feet above the bottom of the fuselage. The engine is contained in the underslung protuberance at the rear of the fuselage. It is, altogether, an extremely streamlined vicious-looking aircraft.

The propulsion system of the *Snark* is quite conventional in that the motor is a high-performance gas turbine. The motors of the *Navaho*, which will follow *Snark*, are more radical, in that they are ram-jets, the simplest and yet the newest of all motors. The boosters for both missiles, used only for take-off and initial climb, will be high-thrust rocket-motors. In Fig. 1, the expendable boosters have been dropped and the *Snark* is flying by means of its turbo-jet.

The ram-jet motor will actually come into its own in the intercontinental missile, because no other aircraft application could be so well suited to its peculiar operating requirements of high velocity and altitude. Fig. 2 shows the relative areas of operating efficiency for reciprocating, turbine, and ram-jet engines. As can be readily seen, at the cruise-altitude of 70,000 to 90,000 feet, and at a speed of three times that of sound, there is no other engine which can give the performance of the ram-jet.

Fig. 1. The Snark (U.S.A.F. photo.)



Trajectory

For several reasons, but chiefly to save launcher costs and to enable the missile to traverse the heaviest atmospheric layers quickly, the missile will be fired vertically from a "zero-length" launcher. A few seconds after firing, it will be tilted gradually from the vertical into a trajectory similar to that shown in Fig. 3.

As previously stated, the most important difference between the winged missiles and the true I.C.B.M. is that the former, having atmospheric engines, must fly their entire flight-path inside the earth's atmosphere. This has several disadvantages, the greatest of which is speed, which will be limited to about March 3, (in the case of the *Navaho*) or approximately 2,000 m.p.h. at 75,000 feet. The missile will therefore be in flight for about three hours, giving the enemy more time for interception with his defensive missiles. The relatively slow speed does, however, simplify navigation and control problems.

When the missile reaches the

LONG-RANGE MISSILES				
Name	Maker	Type	Range	Engines
U.S.A.				
Atlas	Convair	I.C.B.M.	5000+	Liquid rocket
Jupiter	Chrysler	I.R.B.M.	1500+	Liquid rocket
Navaho	North American	I.C.B.M.	5000+	Ram-jets & liquid rocket
Snark	Northrop	I.C.B.M.	5000+	Turbo-jets & rockets
Thor	Douglas	I.R.B.M.	1500	?
Titan	Martin	I.C.B.M.	5000	Liquid rocket
U.K.				
?	A.V. Roe	I.C.B.M.	?	Atomic (?)
U.S.S.R.				
(Super-V2)	?	I.R.B.M.	?	?
(Super-A10)	?	I.C.B.M.	?	?

TABLE 1

zenith of its vertical flight, the ram-jets are ignited, and the missile noses into a shallow dive in order to pick up the speed necessary for the engine's efficient operation. At approximately three times the speed of sound, the vehicle has reached its optimum operating condition, and it levels out to fly a constant-speed flight-path. As the weight of fuel gradually decreases over the long distances, the missile will slowly gain altitude, so that, when its 5,000 mile journey is completed, it may be flying at high as 90,000 feet.

As the target approaches, the missile will probably take evasive action, performing complicated gyrations which will lessen the chances of successful interception by other missiles. When its computer indicates that the target has been reached, the missile will enter a high-velocity vertical dive, which will terminate only with the destruction of the target and/or the missile.

Guidance and Control

In theory, the navigation and control of the air-breathing missile are straightforward, since only relatively proven methods need be used; but the necessity for creating accurate operational systems which will operate without human guidance has posed the toughest problems yet faced by aeronautical and electronics engineers. The missile will be controlled in yaw, pitch, and roll, as would a conventional aircraft, but the non-expendable human pilot has been replaced by a rather more expensive electronic gadget which is required to make all the necessary decisions without human aid.

The brain of the missile is an electronic computer which sends signals to the muscles (servo-motors) so that they can actuate the flying-controls. The signals come from gyros which control lateral stability, from an airspeed indicator and an altimeter which control speed and height respectively, and from navigational equipment which decides missile location with respect to time. The navigation system will be inertial (where errors from a pre-computed flight path are measured by integrating accelerometers), and this will be continually monitored for accuracy by astral fixes.

During its long journey across the face of the globe, the missile will continually plot its position by sights taken on the stars, determine its error from the preconceived flight-plan, and take the requisite action to bring it back on course. If the planned course includes evasive action, or requires an approach to the target by a devious route, the missile will comply with the needs. In spite of any calculated changes of course, the vehicle will, because of the accuracy of the system, arrive within two miles of its destination.

If, for some reason, greater accuracy than two miles is required, the missile can seek its target as it approaches by one of several homing devices: radar television, heat-seeking, etc. Should the target be a large city or an extensive factory, the missile will use an infra-red seeker which enables it to "home" on the heat generated by its target. Normally, however, the two-mile-hit radius will be accurate enough.

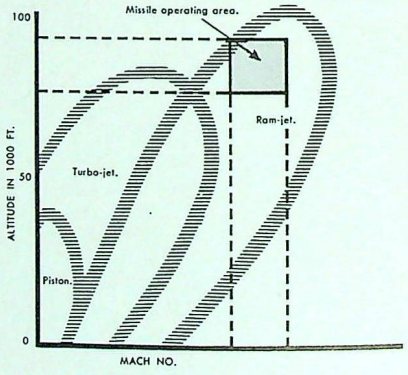
War-head

Being a fairly large aircraft, the missile can carry a war-head of any known type, but this will almost certainly be atomic or bacteriological. The few tons of destruction which are carried will then be capable of devastating hundreds of square miles of enemy territory, and of making them uninhabitable by humans for years to come.

Operational Factors

The air-breathing missile is relatively easy to design, and will

Fig. 2. Power plant performance curves.



therefore be ready before any other intercontinental missile. Its simplicity (again only relative) will mean that its reliability should be fairly high and its chances of successfully completing its mission excellent. Because its navigation and control are entirely internal, there will be no possibility of external jamming or misdirection of the vehicle. Its speed and altitude will be a disadvantage, however, since anti-missile missiles will be developed which can reach higher altitudes and possibly greater speeds.

THE BALLISTICS MISSILE

In the true ballistics missile, science fiction comes into its own, because this is a weapon and an aircraft which is straight out of Buck Rogers, 25th Century A.D. I.C.B.M. is, in effect, an artillery shell which flies like an aeroplane and is built like one — if one can imagine an artillery shell one hundred feet long and ten feet in diameter!

Fig. 4 is a rather crude attempt to illustrate the century's "ultimate weapon". Its size is gigantic, being sixteen times the height of a tall man. The largest part of its anatomy is its belly, which carries tons of liquid fuel and oxidizer to drive its huge rocket motors. Fuel pumps of tremendous capacity, driven by compressed helium, are capable of driving all of the liquid to the engines in a short period of five minutes. Near the top of the vehicle is the separable nose which contains the war-head and the guidance and control mechanisms. Fins at the bottom of the missile provide stability during the first minute of flight as the rocket travels up through the earth's atmosphere.

Trajectory

The flight path of the I.C.B.M. has been sketched in Fig. 5. Take-off is, of course, vertical, as was

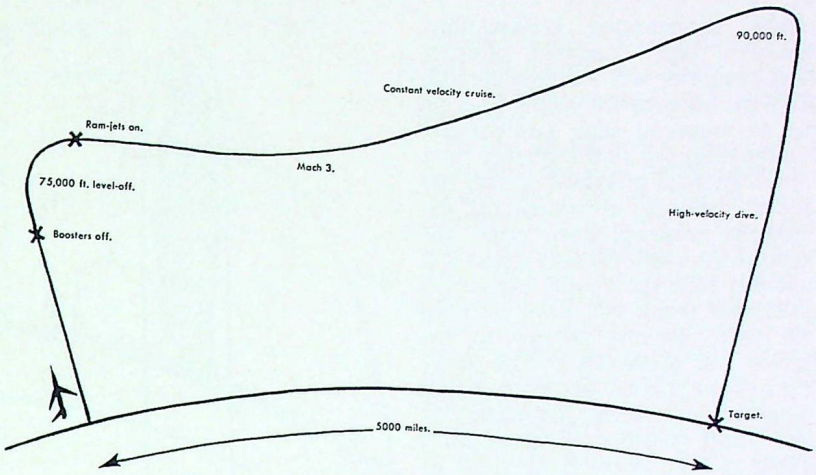


Fig. 3. Ram-jet missile trajectory.

that of its very small cousin the V-2. Soon after the missile leaves the ground, its trajectory is bent in the direction in which it will travel, until, as the fuel in its huge tanks is consumed, the I.C.B.M. is ready to assume the optimum ballistics path.

As the rocket reaches correct position, the motors are cut off, and the nose is separated from the now useless tail by means of explosive bolts. The nose, which contains the war-head and the control mechanisms, is now juggled into the correct trajectory by means of small jets on its periphery. Then the missile coasts higher and higher until, its upward momentum dissipated, it has reached a height between 600 and 1000 miles above the earth's surface.

When the upward motion of the nose is finally stopped, and as it starts its return journey to the earth, it will have a forward speed in the neighborhood of 6500 miles per hour. As it reaches the atmosphere, its absolute velocity will be well over 10,000 m.p.h and its re-entry into the atmosphere will be meteor-like. In the last few seconds of its short existence, the computer comprising its almost human brain will sum up the flight-path errors accumulated in the 5000-mile journey, and give corrective orders to the tail jets.

Just over thirty minutes after firing, the missile will have traversed one-fifth of the distance around the globe, having spent most of its journey far outside the earth's atmosphere, cruising through the vast darkness of space.

Guidance and Control

For control purposes, the flight of the missile can be divided into three phases. During its early flight, control will be by tail-fins and gimballed rocket-motors, that is, rockets which will change their own direction of thrust, causing similar changes in the missile's attitude. While the rocket slides silently through space, no control will be exerted, and a true ballistics path will be traced. During the last few seconds of flight, control of the nose will be by small gas-jets.

The I.C.B.M. will undoubtedly be controlled by an inertial guidance system, perhaps complemented by star-tracking devices. Integrating accelerometers will measure every force which affects the vehicle in

flight, determining accelerations, velocity, and estimated position. The computer will compare reckoned position with the flight plan set up on magnetic tape, and arrange course changes at the correct time.

The inertial guidance system has proven itself to be potentially extremely accurate even with the equipment available today, and it is possible that the missile carrying a hydrogen bomb will have no need for target-seeking devices to increase kill probability. The accuracy of the inertial system depends, however, on placing the missile at the right position in space, travelling in the correct direction at the right velocity, when the ballistical flight begins. For this reason, I.C.B.M. will be radar-controlled from the ground until after the nose has separated from the rocket motors and has been stabilized in its correct trajectory. Giant ground radars will track the missile while computers calculate the path changes necessary, and corrective signals will be radioed to the missile's brain.

Because of its tremendous velocity, the missile will not be able, or need, to take evasive action in the target area, nor will it be able to make drastic last-minute corrections to its flight path to ensure being "on target". Its ability to do so is not felt to present problems, because, if the missile begins its trajectory accurately, it is likely that the war-head will arrive within a circle of radius equal to one-thousandth of the target distance. The real problem in obtaining accuracy with I.C.B.M. will be in knowing the true location of the target. The position of the major land-masses with respect to each other has never been too accurately recorded.

War-head

The "useful load" carried by the ballistics weapon will not be very large because of the tremendous quantities of fuel and oxygen required to lift it into trajectory. For example, doubling the weight of war-head on an I.C.B.M. would probably mean increasing missile-weight ten times. The war-head, then, will be the most powerful and compact possible, either thermo-nuclear or bacteriological.

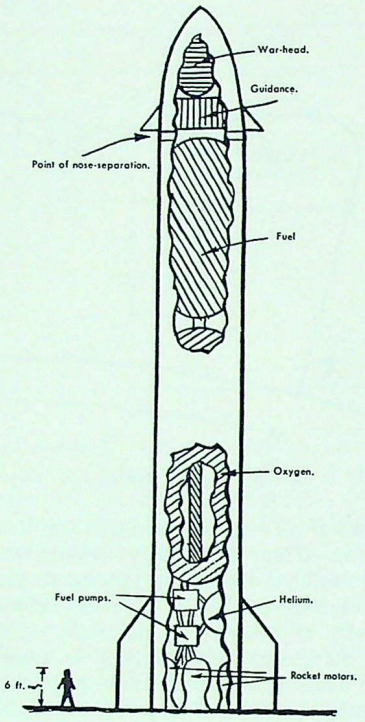


Fig. 4. Man and monster.

Operational Factors

Because of its tremendous velocity, the I.C.B.M. is well-nigh unstoppable, although experts do hold out hope of defence by anti-missile missiles. Accuracies will be good enough, because of the nature of the megaton war-head. The missile will, of course, be terribly costly and it will be about as mobile as a three-storey building. It will be tremendously difficult to maintain because of its great size and terrible complexity. Great numbers of highly trained technicians and much expensive test equipment will be required to ensure that the missile will be ready to fire when needed.

STATE OF THE ART

In the past few paragraphs we have briefly described the two planned types of intercontinental weapons, almost casually describing engines, trajectories, guidance systems, and war-heads which could hardly have been imagined ten years ago. Is this description realistic, or is it the dream of frustrated engineers who want to take the air away from the pilots? In other words, how soon can these things come to pass? It would be impossible in this article to discuss facts which are closely guarded military secrets, but there can be no harm in reviewing generally the state of the art of missilry in 1957.

Dr. John von Neumann, Chairman of the U. S. Ballistics Missiles Advisory Committee, has said that the development of the I.C.B.M. is infinitely more complex than was the development of the atomic bomb. The truth of this statement woud be self-evident to any engineer faced with the herculean task of producing the thousands of intricate parts which must each function perfectly so that I.C.B.M. can perform its rôle.

Ten years ago, I.C.B.M. was an impossibility. The major "breakthrough" in nuclear fusion was the spark which led to new developments in rocket motors, in "sophisticated" electronics, in thinking computers, in component reliability. This was, in effect, another technical revolution which, at great cost in money and manpower, is now daily accomplishing miracles. More scientific brains are now engaged in the race for I.C.B.M. than on any other technical project in the world.

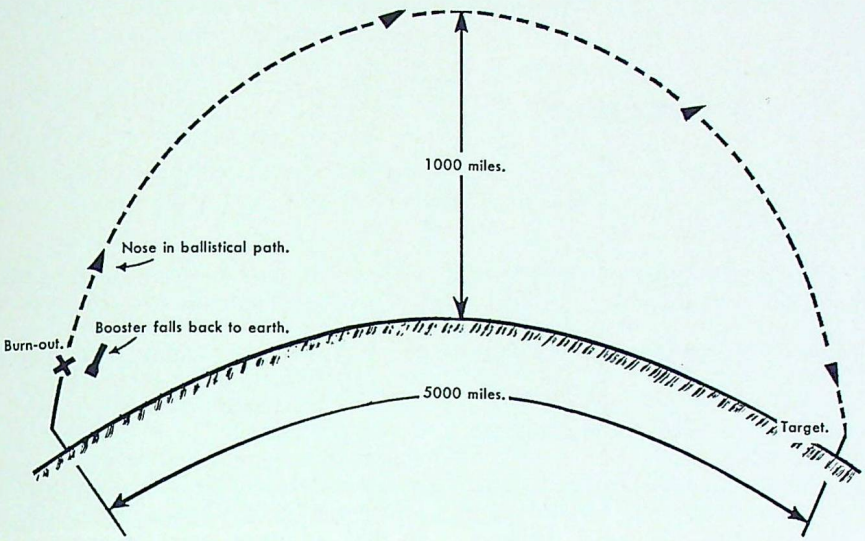


Fig. 5. I.C.B.M. trajectory.

Nothing about the I.C.B.M. programme is any longer technically impossible; that is, there is nothing that requires a major scientific "break-through". Rocket engines and ram-jets have reached a stage at which they are just about good enough. Thrust of 300,000 pounds-plus is already available in liquid rockets, and ram-jets have flown at 80,000 feet. Guidance systems have been partially proved, and inertial guidance, especially, appears ready for use. Reliability, always the bugbear in electronic systems, is increasing to acceptable levels. A hydrogen bomb has been dropped from an aircraft, indicating that the megaton war-head in the compact missile-size is no further away than the next corner. Tremendous problems, of course, still remain (such as skin-heating of I.C.B.M. on re-entry into the atmosphere), but these are being met head-on, and there is little doubt that they will be solved as fast as they arise.

What are the tangible results of all this increase in "know-how"? I think it can safely be said that no working model of a true I.C.B.M. (i.e. ballistics missile) exists today, but it can also be confidently predicted that this will not be a true statement two years from now. The U.S.A., Great Britain, and Russia are all working at top speed on I.C.B.M. development. (Table 1 lists the known projects of the three countries). It has been announced that the U. S. Army has already fired an advance version of *Jupiter* over a range of 3000 miles. The American missile-range off the coast of Florida is now being extended to reach 5000 miles into the Atlantic Ocean. A recent news report has stated that *Snark* will go into limited operational service next year.

No one knows which great power is winning the race for the monster missile. Many experts feel that the Russians may be ahead. In April 1955, General Benjamin W. Chidlow, U.S.A.F. Commander, Continental Air Defence Command, said: "An intercontinental ballistics missile is within the capability of the Soviet Union by drawing on the brains of its captured scientists and their protégés." Russian developments have probably been channelled along lines suggested by the German V-2 and the much advanced A-10, which was the vengeance-weapon designed to bomb the U.S.A. The U.S.A. has been trying to overcome the advantage gained by Russia, when the latter grabbed the top German missile-men at the end of the Second World War, by a design programme which involves rapid advancement of the state of the art by streamlining design procedure and organizations, and by taking calculated risks.

The proximity of the "age of the ultimate weapon" can best be judged by the fact that the U.S. Joint Chiefs of Staff have now allotted I.C.B.M. priority over every other weapon in the research and development field, with tremendous competition between the best companies in the U.S.A. to reach the goal. As Krushchev stated last April, this can only mean that successful completion of the design projects is right around the corner.

I think that Senator McMahon, if he could be with us today, would agree that we have progressed an awful lot further than the push-button.

Illinois police have ordered boys to stop shooting arrows at jet aircraft in the vicinity of Glenview Naval Air Station. (*"Air Force"*: *U.S.A.F.A.*)

Royal Canadian Air Cadets

BY DARRELL EAGLES

"THE AIR CADET STORY"

One of the most important League events of recent months was the release of the new professional motion picture (referred to in the last issue of "The Roundel"), "The Air Cadet Story", made possible through the generous assistance of A. V. Roe (Canada) Ltd. and Orenda Engines Ltd. This full-colour 16 mm. sound-film can be obtained by squadrons and sponsoring committees for $143, in French or English versions, from League Headquarters.

The film, which lasts for twenty minutes, takes the audience to a typical community squadron while training is in progress. A recruit takes the Air Cadet Pledge, is fitted with a uniform, and settles into his first year of Air Cadet training. The new experiences that go along with summer camp are vividly portrayed, including practical training, swimming after sports, life-saving practice, and the excitement of the long-awaited first flight in an aircraft.

Some of the top cadets from all over Canada are seen at Abbotsford as they receive expert instruction on the Senior Leaders' and Drill Instructors' Courses in subjects ranging from drill to leadership and public speaking.

The Scholarship Flying Training programme comes in for special attention, and one scene, showing a cadet on his first solo flight, is made even more impressive by the original music composed by Sgt. K. Campbell, of the R.C.A.F. Central Band.

A snappy drum solo accompanies the fast-stepping U. S. Civil Air Patrol drill-team in the scene covering the International Drill Competition, while the flash of white gloves against blue uniforms emphasizes the precision of the Canadian team's display.

Historic landmarks in London and Washington are featured in the Overseas Exchange sequence, and the film closes with an endorsement by Air Marshal C. R. Slemon, Chief of the Air Staff, in a scene photographed at the 15th Annual Dinner at the Seigniory Club.

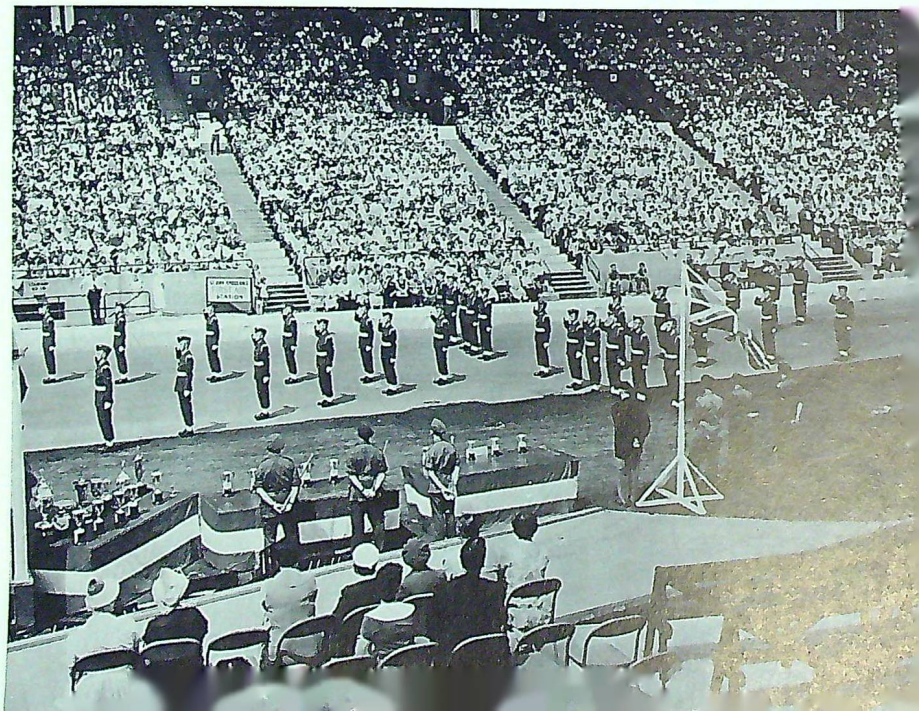
The film is directed toward cadets, prospective cadets, and, of course, all parents. Sponsoring groups, parent-teacher organizations, service clubs, R.C.A.F. Association and Legion branches, school boards, film councils, and all news media, will be given an opportunity to see just what is going on in the Air Cadet movement by screenings arranged through local squadrons all over Canada.

Squadrons and sponsoring committees who have as yet not ordered prints are urged to do so promptly, so that all these local prospective audiences can be told "The Air Cadet Story".

ORIGINAL CAMPAIGN

No. 608 (Belleville) Squadron's "Bolster Squadron Spirit" campaign, in the form of a local Air Cadet week, recently reached a successful conclusion. During the

Display of drill by cadets at Canadian National Exhibition.



Cadets on exchange visit to U.S.A.

week, No. 608 developed a few ideas which might well be adopted by other school squadrons across the country.

To identify the squadron more closely with the Quinte Secondary School, and to boost squadron morale and enthusiasm, it was decided, as a starter, to use cadets in uniform for various duties around the school. Each day began with the raising of the R.C.A.F. ensign while the rest of the school was engaged in opening exercises.

A display was set up in the front hall of the school, consisting of a complete layout of a survival kit, and a "pilot" completely outfitted for flying a jet aircraft. Photographs of aircraft were displayed, flanked by the Union Jack and the R.C.A.F. ensign against the background sheen of parachute silk. R.C.A.F. Station Trenton was very co-operative in the setting up of this dispaly, which provoked a great deal of favourable comment. Two cadets were in attendance by the display case all week. Others were posted at the main office for courier duties, and in the cafeteria for line-up supervision and the handling of meal tickets. Five N.C.O.s were employed as prefects. This last innovation, incidentally, was the start of an experiment, since the school had already been considering the institution of a prefect system. Each day's activities ended with the lowering of the flag.

Half-way through the week, an hour-long assembly was held before the whole school. The local radio station recorded the proceedings for a delayed broadcast and a reporter from the "Belleville Ontario Intelligence" wrote up an account for the evening edition. During the assembly, squadron organization was explained to the school by the C.O., and he introduced the squadron officers, civilian instructors, and N.C.O.s.

Mr. F. L. Reid, as chairman, outlined the rôle of the sponsoring committee; Flight Lieutenant L. Bishop, of R.C.A.F. Station Trenton, defined the part the R.C.A.F. plays in Air Cadet training, and Mr. D. Whitley, Vice-president of the Provincial Committee, after a few remarks on the job of the Air Cadet League, showed the new film, "The Air Cadet Story". The assembly seemed particularly impressed by the mass taking of the Air Cadet Pledge by the squadron cadets.

It was the opinion of everyone concerned that this assembly helped in identifying the squadron with the school, which, at latest report, already takes more pride in its cadets. The feeling carried over to the Cadet Dance, where it was obvious that the stock of those in uniform was higher than it was of those who were not! During the week, every cadet was invited to lunch by the girls in the Home Economics Department.

The semi-annual inspection also took place during the week. The squadron was inspected by Flt. Lt. Bishop, escorted by Flying Officer McNaughton, the Squadron Liaison Officer.

Squadron Leader E. A. Coughead, C.O. of the squadron, is enthusiastic about the results of the "Bolster Squadron Spirit Week". He states that first-year cadets are showing more keenness, many more enquiries are being received about summer camp, and N.C.O.s now carry themselves with a greater degree of pride and authority.

A Naval Air Observer Forty Years Ago

BY SQUADRON LEADER N. W. EMMOTT, D.F.C.

DESPITE consistent sniping by critics, the air observer has always held an important place in aerial warfare. While it is true that in peace-time his rôle has been played down, whenever the bullets begin to fly it becomes obvious that he has a task to perform which cannot be done properly by anyone else.

The first observers were military men who went aloft to reconnoitre enemy positions and gun emplacements, and to spot the fall of artillery shells so that the aim of the guns could be corrected. Naval aircraft also carried observers whose primary task also was reconnaissance and gun-laying.

One of the first Canadian specialized naval observers was Group Captain E. R. Owen, R.C.A.F. (retired), who now lives in Rockcliffe Park, Ottawa. He began his military career as a private, and later as an N.C.O., with the First Canadian Expeditionary Force in 1914, and, after service in France and Belgium, returned to England in 1916 for training as a Probationary Observer Officer, Royal Naval Air Service.

The Royal Navy's decision that observers were needed, particularly in anti-submarine reconnaissance and convoy escort, was based upon the fact that flying an aircraft, in those days when trimming-devices were still things of the future, was definitely a full-time job. Furthermore, the development of radio, which was strictly dot-and-dash, called for a specialized aircrew member who could send and receive Morse; and, in addition, the observer manned the rear gun. The main job of the observer over the last two decades, that of navigating the aircraft, was still left in the hands of the pilot, although the observer assisted by chart-reading and by getting bearings on land objects.

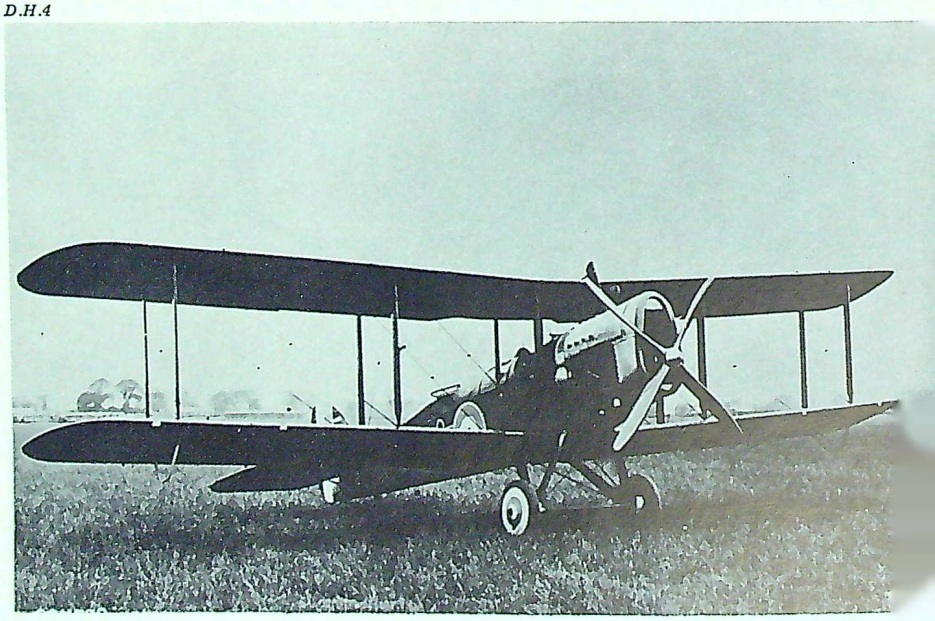
Most of the naval observers selected for the first entry in 1916 were chosen from men with active service in surface operations, and the selection was quite rigid. A strict physical and medical standard was insisted upon, and it was also deemed necessary that the applicant be able to climb ropes hand over hand. His ability to do so, it was generally supposed, gave some indication of his determination.

The Naval Observer's Course, which lasted for about seven months, was held at Eastchurch, on the Isle of Sheppey. The curriculum emphasized signalling in all its branches: Morse, Aldis lamp, semaphore, naval flags and signals. Eighteen words a minute were required in Morse. Instruction was also given in small arms, the Lewis gun, bombing, naval terms, drill, seamanship, and air photography.

Air exercises included reconnaissance for hidden gun-emplacements, spotting for naval gunnery, air firing, and bombing against targets ashore and afloat. The navigation portion, although limited, covered boxing the compass, chart-reading, mapping out patrol-patterns, and compensation for air-speed and drift. The aircraft used included such types as Maurice Farmans, Nieuports, D.H. 4s, B.E. 2Es, and Curtis J.N.4s.

Most of the instructors were naval warrant officers, specialists

D.H.4



B.E.2E.

in their training. At the end of the course, if the candidate was successful, he was graduated and commissioned as an observer, sub-lieutenant, R.N.

Observer Sub-Lieutenant Owen's first station was at Killingholme, in the north-east of England, where he flew patrols in Porte flying-boats, and whence he was later posted to R.N.A.S. Cattewater, Plymouth, which was equipped with Short seaplanes and flying-boats. The job here was mainly anti-submarine patrols, escorting convoys proceeding through the Channel from the Atlantic.

All charts used for this work were divided into squares, lettered and numbered in series, and the aircraft patrol would be directed by such series and search-patterns as were designated by naval headquarters. The observer's responsibilities on such patrols were many. All shipping had to be recorded and suspicious oil-slicks investigated—in fact everything, even floating wreckage, was noted down in the report which was made upon return to base for the use of the naval intelligence officer.

Communication between Service craft was made by Aldis lamp. Radio communication was limited to times of emergency or when contact had been made with enemy submarines; and such messages were forwarded in code to the aircraft's naval base.

Should contact be made with a submarine, the observer's duty was to challenge it with the identification signal flares of the day — or, of course, to identify it by the markings on its deck. If it was found to be an enemy, the bombing-height was set, drift compensated for, and at the right moment the toggles were pulled which removed the safety-pins and dropped the bombs. After such action the area was patrolled, surface flares were dropped, and contact made by radio with the naval base, which then directed any naval craft in the vicinity to proceed to the scene of action. The scenes of such actions were photographed with a four-by-five-inch plate-camera mounted on a modified Scarfe ring.

A very important responsibility of the observer was the care and safety of the code book, which was heavily weighted and was to be thrown overboard in the case of possible capture or wreck of the aircraft.

On shore, a naval observer carried out all naval station duties, as well as helping to service his aircraft and swing the compass. Compasses in those days, by the way, were mounted in horsehair.

The average flight for the float-biplanes used out of Cattewater was about three hours, with a maximum of perhaps six hours. Patrols were carried out, as today, at about 1500 feet or less, and as a rule flights were limited to ninety or a hundred miles from base.

The R.N.A.S. was taken over by the newly formed R.A.F. in April 1918, but most of the personnel stayed in navy blue until the war ended. It is notable, however, that those who changed to R.A.F. uniforms wore their rank insignia bars on the black band of their forage caps, on either side of the badge.

Without the work of the R.N.A.S. observers and pilots, it is very doubtful if the German submarine threat of 1917 and '18 could have been mastered.

Letters to the Editor

NOTICE TO LIBRARIANS

Dear Sir:

This unit's library has found that it has a number of duplicate books on its shelves, and, being pressed for space, has decided to relieve the congestion by giving the duplicates to other libraries which may be in need of books. Our dispensable books number about 400 and vary from non-fiction to mysteries, westerns, and just plain novels. Isolated units might be able to make very good use of them.

A list of the titles may be obtained by writing to the address given below.

Flt. Lt. L. H. C. Sanders,
Chairman, Library Committee,
C.J.A.T.C., Rivers, Man.

BOOK FOR EX-P.O.W.s

Dear Sir:

Many of your readers who were prisoners of war at Stalag Luft III and Stalag Luft VI during the Second World War may be interested in a new book, "No Flight From The Cage", recently published by Frederick Muller Ltd., London. The author, Cal Younger, ex-R.A.A.F., will be known to many ex-Air Force P.O.W.s.

The book, as may be judged from the title, is not an escape story, although the organization and background to many escapes are described. It is primarily a book about the day-to-day life in German P.O.W. camps. Many well-known characters, among them "Dixie" Dean, Ivan Quinn, Red Gordon, T. B. Millar, and Larry Slattery, are mentioned.

Flt. Lt. A. G. W. Miller,
No. 1 Air Division H.Q.

"PER ARDUA AD ASTRA"

(The following interesting excerpt is taken from an article by Wing Commander Norman Macmillan, O.B.E., M.C., A.F.C., and appeared originally on page 26 of the January 1957 issue of "Aeronautics".—Editor.)

It was the late Major-General Sir Frederick Sykes who started off the file about a motto for the Royal Flying Corps, which then had both a military and a naval wing. He was then a brevet major, temporary Lieutenant-Colonel, commanding the Military Wing at Farnborough. He got the War Office to approve the double-breasted 'maternity' jacket and folding cap of the R.F.C., got Brigadier-General (later Sir) David Henderson, the Director-General of Military Aeronautics in the War Office, to agree that a badge for pilots was necessary; together they drew upon a War Office blotting-pad the wings which the King later sanctioned, and which, with R.A.F. substituted for R.F.C. and with the St. Edward's Crown instead of the Tudor Crown, are still the pilot's brevet of the Royal Air Force 44 years later. Then Sykes asked his officers to put forward ideas for a motto.

The R.F.C. had grown out of the Royal Engineers, and the officers of both corps were still buddies. So the Sappers in the Flying Corps talked things over with the Sappers who were still Sappers. And it was a Sapper pure and simple, and a junior officer at that, Lieut. J. S. Yule, who first suggested *Per Ardua ad Astra* to his Sapper friend in the R.F.C., Lieut. J. N. Fletcher, who passed it on to Sykes, who passed it on the War Office.

It is not quite clear at this lapse of time whether Henderson at that moment was the Director of Military Training with responsibilities covering the whole of the Army, including the complete control of military aviation, or if the Military Aeronautics Directorate which was formed in 1913 (and of which he became the first Director) was then actually formed. All the accounts vary. Probably it is immaterial, and perhaps impossible now to establish. David Henderson and Major W. S. Brancker (later Air Vice-Marshal Sir Sefton Brancker, Director of Civil Aviation) were agreed that *Per Ardua ad Astra* was a jolly good motto. Then the paper battle began. The file went round and around. Official minutes were written by hand in solemn language. Virgil and eminent current Latin scholars were quoted to support one contention or another. Some scribes offered their scholastic credentials to support their views. The inevitable rival group came into existence, headed by no less a person than the Quartermaster-General, Major-General Sir John Cowans; it proposed *Altiora Petamus* (Let us seek higher things).

The Admiralty had to be called in. My Lords Commissioners "saw no objection to" *Per Ardua*. After all, the term fitted work at sea. The file then went to the S. of S. for War, Colonel E. B. Seely (later Lord Mottistone — why wasn't it Mottostone? — who used to help man the Isle of Wight lifeboat as a lifeboatman, and was once head of the Air League) who solemnly wrote into the file his, the ultimate, minute: "While disagreeing, with great respect, with the interpretation of *Ardua*, I think *Per Ardua ad Astra* is preferable," and the Royal assent was obtained.

When the R.F.C. and R.N.A.S. broke apart in 1914, the R.F.C. took the motto, the R.N.A.S. dropped it. In 1918, when the RA.F. was formed, again joining (temporarily) the two portions of Air Power, the R.A.F. adopted the motto from the R.F.C.

THE R.C.A.F. BENEVOLENT FUND

The Royal Canadian Air Force Benevolent Fund was established in order to assist serving and former members of the R.C.A.F. and their dependents in time of financial distress.

SERVING PERSONNEL can obtain full information from their units' Orderly Rooms.
FORMER MEMBERS can obtain it from:

- The local Benevolent Fund Committee.*
- Any Wing of the R.C.A.F. Association.
- Any District Office of D.V.A.
- Royal Canadian Air Force Benevolent Fund (Inc.), 424 Metcalfe St., Ottawa, Ont.

*This address is obtainable from any of the other three sources.