THE Roundel

VOL. 13, NO. 5

JUNE 1961

THE Roundel

Published on the authority of the Chief of the Air Staff, Royal Canadian Air Force

VOL. 13, NO. 5 JUNE 1961

ARTICLES

FEATURETTES

DEPARTMENTS

THE ROUNDEL is published ten times each year. Annual subscription rate is $2.00 in Canada, U.S.A. and Mexico, $3.25 elsewhere. Orders should be sent direct to the Queen's Printer, Ottawa, Ont. RCAF Association correspondence should be mailed to Ass'n Hdqts., 424 Metcalfe St. Ottawa, Ont.

Contributions and all other correspondence should be addressed to:

Editor, THE ROUNDEL,
RCAF Victoria Island,
Ottawa, Ont.

THIS MONTH'S COVER

Official Air Defence Command badge features a long-tailed jaeger, indicative of defending aircraft, and lightning rays representing radar and other electronics.

Authorized as Second Class Mail, Post Office Department, Ottawa.

On The Break

TEN YEARS ago this month the RCAF's Air Defence Command was born. This issue is THE ROUNDEL's contribution to the commemoration of that event.

The task of summarizing the history of ADC (page 2) was taken on by S/L Doug Harvey, who drafted his article while pinch-hitting as CO of RCAF Station Knob Lake on the Mid-Canada Line. Now, after four years of handling public relations at ADCHQ, Doug is looking forward to his new assignment — doing a similar job for No. 1 Air Division in Europe.

This month Course No. 100 completes operational training on CF-100s at Cold Lake and its graduates will take their places in squadrons across Canada and overseas. Aptly dubbed "The Centurions", these newest members of the air defence team were selected to tell the aircrew version of the ADC story and we think you'll enjoy the results (page 10). No. 3 OTU itself will be moving to a new home shortly, to make room at Cold Lake for the CF-104 OTU slated to start business there this fall.

Another of this month's contributors contemplating a move late this summer is S/L Dave Terrell. He's off to North Bay as a member of the advance party for the installation and testing of SAGE, the system which he describes in layman's language on page 21. Concerned with the planning and development of this project at AFHQ since its inception, Dave will stay on at North Bay to help operate the huge underground combat control centre.

Speaking of that big hole in the ground, ROUNDEL assistant editor F/L Tom Coughlin was down in it a few weeks ago. Wearing miner's clothing, complete with helmet and lamp, he seemed mighty impressed by the roar of subterranean explosions reverberating through the maze of rock corridors and the sight of steel girders soaring from floor level into the gloomy recesses of the cathedral-sized cavern. His "City in a Mountain" (page 24) is the result — a tribute not only to the workmen on site but to the RCAF's construction engineers who planned and are supervising the job.

Naturally, many other people have been involved in gathering material for this anniversary issue. The written word has been enhanced by pictures taken over the years by many different RCAF photographers, too numerous to mention by name even if we knew them. We trust they will accept our thanks for their help, not only with this but with every issue of THE ROUNDEL. In our opinion, photographers are the unsung heroes of journalism.

* * * * *

NEXT MONTH: another special issue, this one devoted to a fairly extensive look at the RCAF as a whole. It contains a review of the past year's activities we are confident you will want to keep as a handy reference.

A. T. Patton S/L

Editor

PERISCOPING THE PAST

By SQUADRON LEADER J. D. HARVEY, DFC
Air Defence Command SOPR

WHEN the Minister of National Defence rose in the House of Commons in December 1948 to outline an expanded Canadian defence program to meet "changing circumstances", he heralded the birth of the RCAF's Air Defence Command.

Air Defence Group, which had just been formed at Air Force Headquarters under G/C W. R. MacBrien, began to work in earnest. This was the body which wrote the air defence plans for the government's consideration, and then was responsible for the implementation of the approved program.

In November 1949 the year-old Air Defence Group moved to RCAF Station St. Hubert and occupied a temporary structure. All of the buildings, runways, institutes and facilities of the station were, of course, of Second World War vintage. Meanwhile, the first regular force air defence squadron had been formed in April of that year and was busy flying its *Vampire* jet aircraft. This was No. 410 Fighter Squadron, also based at St. Hubert. More squadrons were soon to follow as additional personnel and *Vampires* became available.

When the new group headquarters opened for business at St. Hubert, it had the following units under its control: No. 410 Squadron, No. 438 Reserve Squadron and No. 1 Air Control and Warning Unit, all at St. Hubert. Based at Chatham, N.B. was No. 421 Fighter Squadron, No. 1 Operational Training Unit and No. 2 Air Control and Warning Unit. The base at Greenwood, N.S., contained No. 3 Air Control and Warning Unit. Closer to home was No. 1 Radar and Communications Unit and No. 2401 Radar Squadron (Reserve) in Montreal.

Despite its humble beginnings, Air Defence Group was able to field a force of 18 *Vampire* jets to take part in the combined RCAF/Army Exercise "Sweet Briar" at Whitehorse. It also had the first post-war aerobatic team which won international fame in 1949. (Some of the *Vampire* pilots were S/L Kipp, F/Ls Laubman, Tew, Levesque, Shultz, F/Os Doyle, Lett, Bliss and Guerin.)

Although there was a shortage of equipment and modern facilities, operational exercises were the order of the day. In 1950 the group took part in three air defence tests. Pilots began going to the United States to take *Sabre* jet training and procurement was started on the CF-100 and F-86 programs. The prototype of the CF-100 was flown in 1949, al-

A baby cougar, mascot of No. 410 Sqn., peers out of the unit's badge at the *Vampire*, ADC's first operational jet which entered service with the Cougars in April 1949.

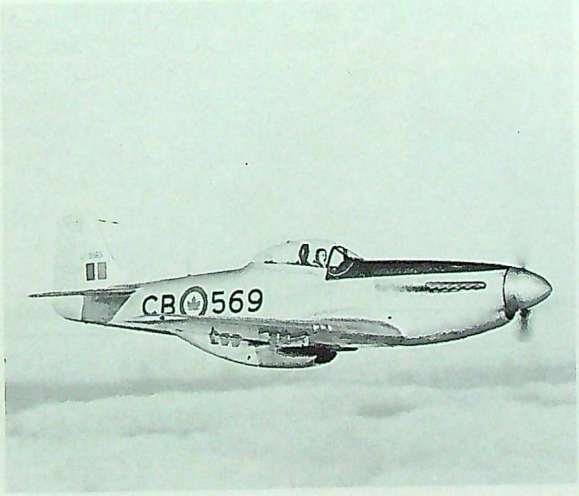
though it was powered by the smaller Avon engines, as the Orenda was still in the test stage.

Radar stations, at this time, were only in the planning stage; the mobile "AMES 11" convoy units, although only a little better than training equipment, constituted Canada's radar defences. Runway extension and hangar construction programs were being pushed at every base while other programs included the renovation of wartime facilities.

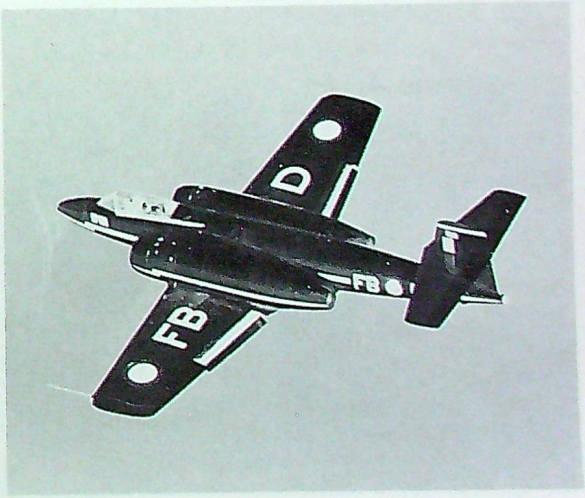
When the Korean War burst upon the world in June 1950 Canada, as a member of NATO since its formation in April 1949, accelerated its efforts for defence. Reserve components were brought under Air Defence Group — No. 411 Squadron, Toronto, being re-formed in October 1950 and equipped with *Vamps*. It was also in 1950 that the technical training units began operating. The first was formed at Vancouver and eight additional units were activated during the next three years.

In June 1951 the group was officially elevated to command status. Air Vice Marshal C. R. Dunlap was transferred from North West Air Command to the headquarters at St. Hubert and became the first air officer commanding. Group Captain MacBrien, who had formed the group in Ottawa and moved it to its home at St. Hubert in 1949, was appointed chief staff officer. He was subsequently promoted to air commodore in 1953 and appointed chief of staff of the 4th Allied Tactical Air Force in Trier, Germany.

Auxiliary squadrons were initially equipped with piston-driven *Mustangs*.



Avro's CF-100 prototype first flew in 1949 over Malton.



A/V/M C. R. Dunlap, CBE
First air officer commanding

A/V/M Dunlap inherited a small but growing command. The auxiliary air defence squadrons outnumbered the regular force units during this period and, indeed, this was their finest hour. Flying *Vampire* jets, although some units still used P-51 *Mustangs*, they took part in air exercises side by side with the three regular force squadrons, Nos. 421, 410, and 416. As 1951 progressed No. 421 Sqn. became the first RCAF peacetime squadron to be sent overseas when they transferred to an RAF base at Odiham, England. The unit did not take its *Vampires* but was supplied from RAF sources on arrival. During this period the long incubator programs of plans, personnel and money began to show in actual hardware. New regular force squadrons joined the line: Nos. 416, 441, 413, 439 and 430 were all brought into Air Defence Command as fighter squadrons. No. 410 Sqn. was the first to be equipped with *Sabre* jets with the arrival of its new craft on 19 May 1951.

Next followed the birth of the Ground Observer Corps, the renaming of No. 12 Group in Vancouver to No. 12 Air Defence Group, and the formation of the first of the NATO Division Wings. No. 410 Sqn. moved to North Luffenham, England, with its *Sabres* stowed aboard the Canadian carrier HMCS "Magnificent".

In August 1951 A/V/M A. L. James replaced A/V/M Dunlap as air officer commanding. He inherited what could be described as the "bulldozer" era of ADC. Everywhere shovels and cranes, hammers and graders were busy digging, erecting, paving and landscaping. As old wartime stations such as Bagotville and North Bay took on a new look, the sound of jet engines began to echo across the land. The first CF-100, initially flown in January 1950, was rapidly beginning to shake into its operational state, although much work was still necessary on the engines and armament systems. The *Sabre* held the spotlight as the front line machine while the *Vampire* was being relegated to auxiliary squadrons. Only No. 1 OTU at Chatham and some newly-formed squadrons were still to utilize this docile jet for some time.

A/V/M A. L. James, CBE
Second air officer commanding

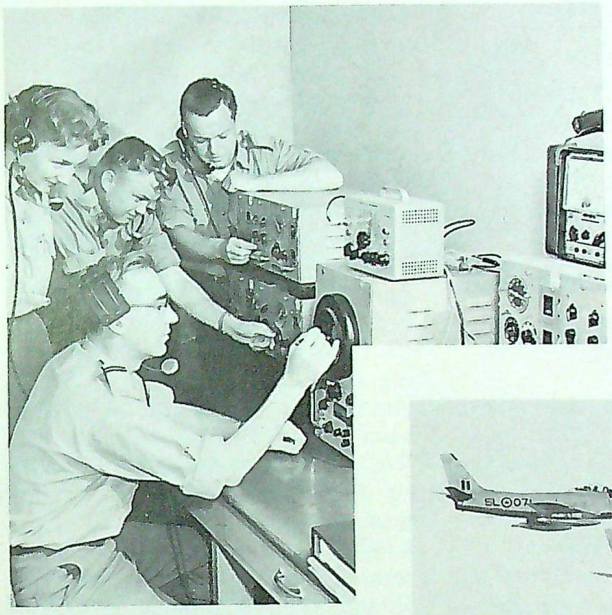
Sabres aboard HMCS Magnificent bound for England.

The auxiliary force was also building to a peak in this period. Wing headquarters had opened in Montreal, Toronto, Hamilton, Winnipeg, Saskatoon, Edmonton, Calgary and Vancouver. Auxiliary medical, intelligence, radar control and technical training units backed up the flying squadrons.

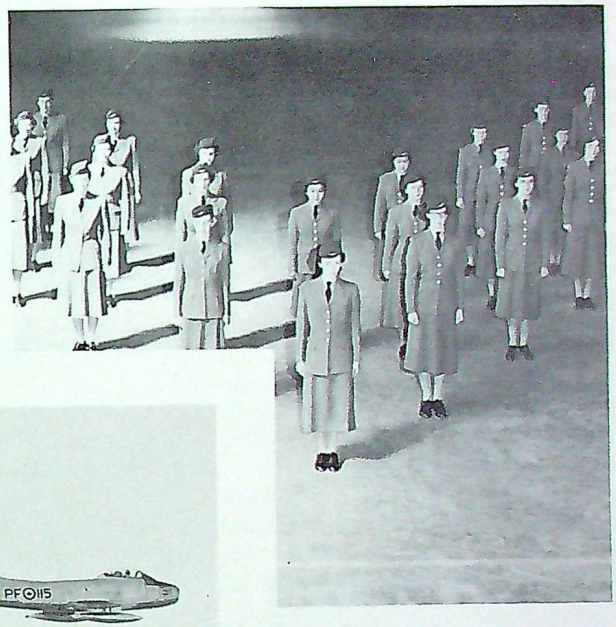
As the calendar unrolled into 1952 the plans of the previous three years bore increasing dividends. The Pinetree units, the first permanent radar stations of an early warning system network, were being rushed to completion. Lac St. Denis had the

AUXILIARY IN ACTION

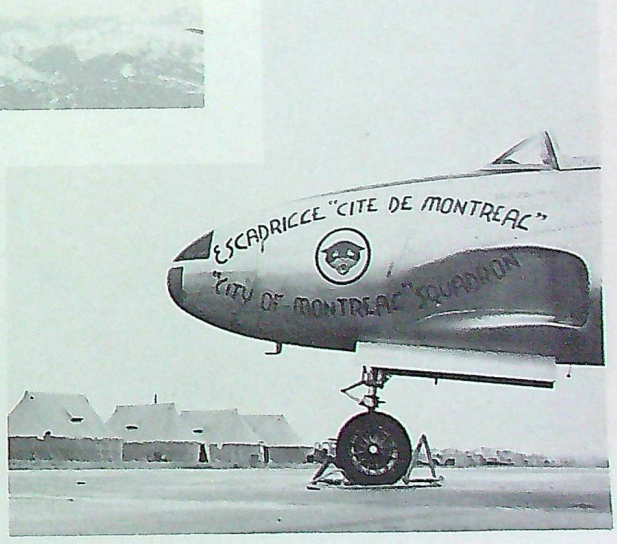
Reserve tradesmen and women with electronics instructor of No. 2451 AC & W Sqn., Windsor.



Toronto auxiliary airwomen's precision squad prepare for CNE drill display.



No. 438 Sqn. groundcrew service *Sabres* in Montreal.



Auxiliary summer camp at RCAF Stn. Chatham.

honour of being the first to open.

This was the year the CF-100, first and only completely Canadian all-weather fighter, was introduced to operational service. No. 3 OTU got underway at North Bay with a handful of machines and men and nothing much more than their initiative and desire. With no previous handbooks, technical journals or experience of groundcrew technicians to call upon, they had to "go it alone". Every step they took was original. It was from the work done by these initial CF-100 instructors that many of the interceptor tactics used today in our air defence system evolved.

Air Defence Command could now concentrate on its prime purpose of developing an all-weather interceptor ground and air team. The first of the CF-100 squadrons, No. 445, was formed on 1 April 1952 at North Bay. Composed of a mixture of OTU instructors and newly graduated crews, it moved later in 1953 to RCAF Station Uplands.

Generally, the RCAF continued its rapid expansion and the total enrollment had now reached some 46,000. Air Defence Command as we recognize it today had its beginnings during this period. The

A/V/M L. E. Wray, OBE, AFC
Third air officer commanding

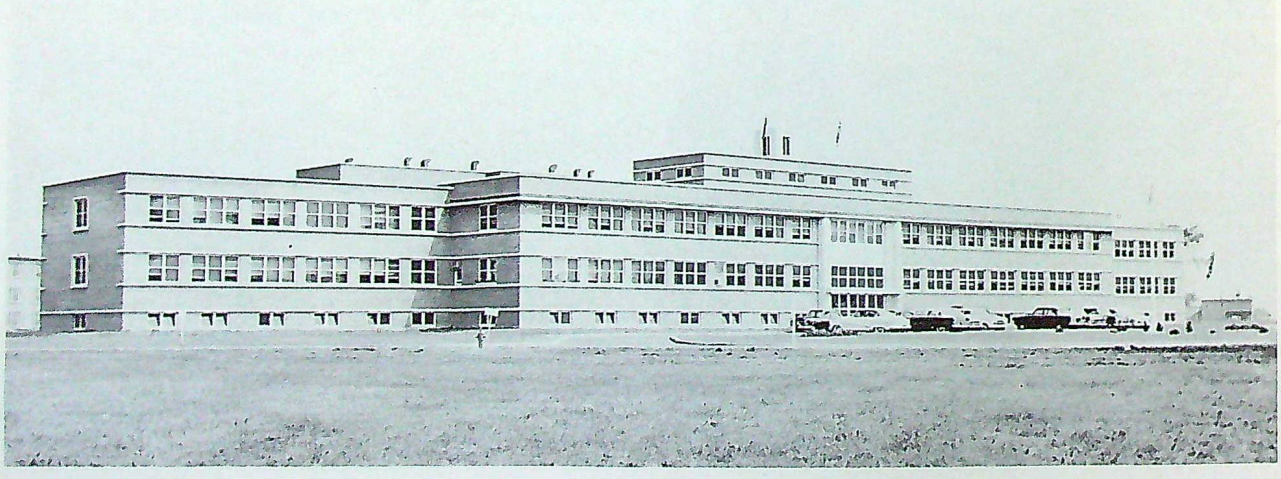
Pinetree system was taking shape and the team of radar operators, all-weather crews and their aircraft began to fulfill their assigned mission.

The next two years saw the formation of the nine home defence CF-100 squadrons, fully equipped and taking their part in the air defence of Canada. The complete Pinetree System became operational during 1954 as the nine squadrons began large-scale interceptor exercises. The budget reflected the reaching of an operational state, as RCAF expenditures showed their first decrease in several years. Personnel strength reached 51,000, a figure which has not been exceeded since that time.

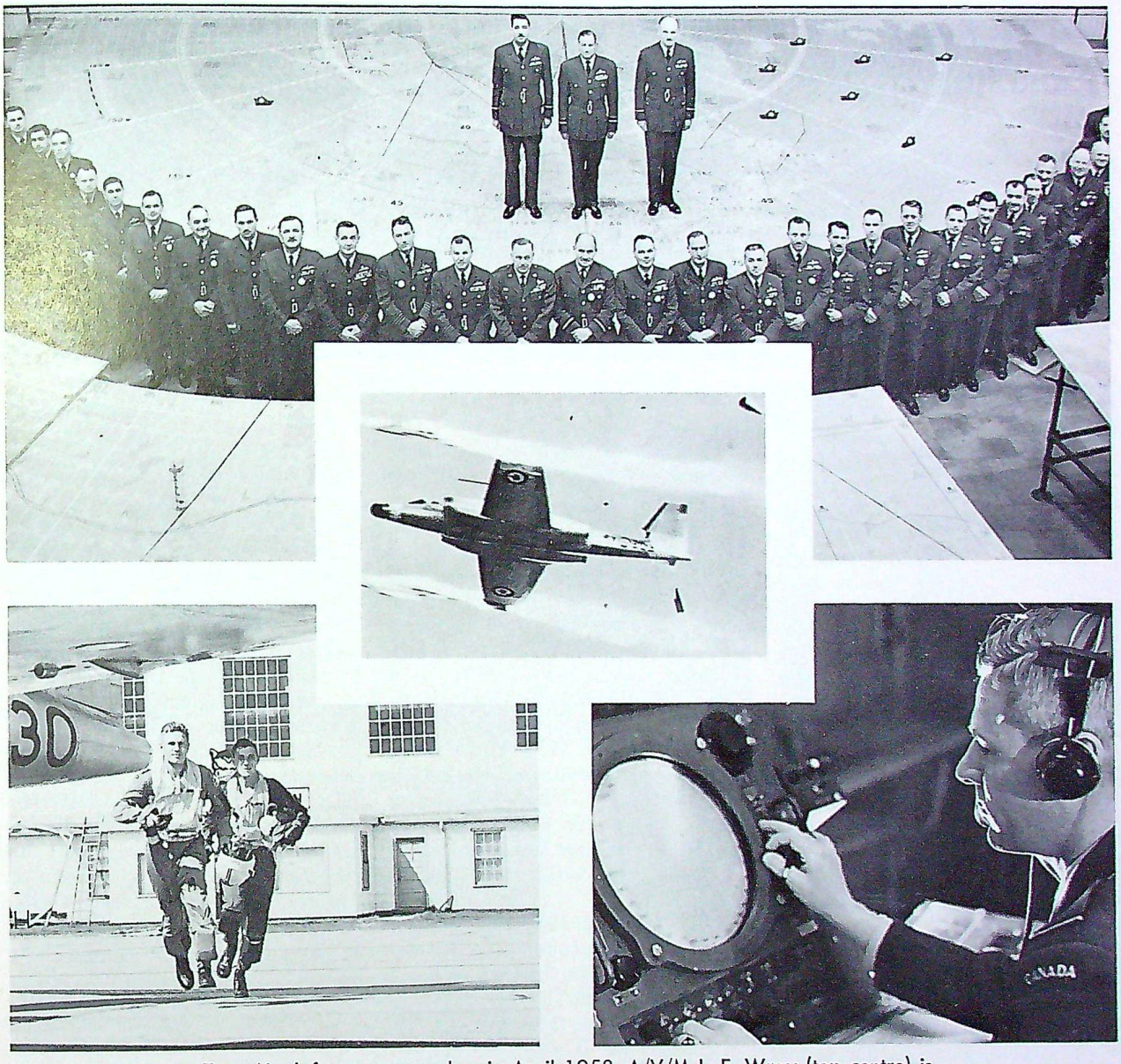
RCAF Station Cold Lake, with its huge armament range, became the home base of No. 3 OTU, which moved from North Bay in May 1955. The pattern was now set for the interceptor bases: St. Hubert, Bagotville, Uplands, North Bay and Comox, with OTUs at Chatham and Cold Lake. The ADC Headquarters had moved to its new quarters in the summer of 1954 as RCAF Station St. Hubert completed its expansion program.

A/V/M James retired from the air force in September 1954, handing over command to A/C C. L. Annis, who had been serving as chief staff officer. In January 1955 A/C Annis was succeeded as AOC by A/V/M L. E. Wray. The immediate years which followed under A/V/M Wray were used to weld the command into a fighting force. New air and ground equipment was ready and, except for the addition of the

Air Defence Command Headquarters, RCAF Stn. St. Hubert.



AIR DEFENCE TEAM OF THE '50s



Top: Air defence commanders in April 1958. A/V/M L. E. Wray (top centre) is flanked by his administrative and operations deputies, A/C E. M. Reyno and A/C D. A. R. Bradshaw.

Bottom: An alert crew scrambles, to be guided when airborne by the ground controller.

Mid-Canada and DEW Lines, the component parts needed only hardening and sharpening to make them into efficient tools.

In 1956 the NATO Air Division's role was changed. Once again this meant that Air Defence Command would be involved. Four *Sabre* squadrons were to change to CF-100 Mark IV aircraft and the training, formation and delivery of the squadrons was to be an ADC responsibility. ADC's first CF-100 squadron, No. 445, was chosen to lead the way to Europe in an operation called "Nimble Bat". As each squadron arrived in Europe, a *Sabre* squadron was disbanded and a new CF-100 squadron formed in Canada for home defence. The result was that the nine CF-100 squadrons remained for Air Defence Command and the 12-squadron Air Division was now composed of four CF-100 and eight F-86 units.

During these "build-up" years Canadian-American co-operation on matters of mutual air defence was increasing. Such gigantic projects as the early warning radar lines were planned and became reality under the auspices of the Permanent Joint Defence Board — an organization first created as a result of the Ogdensburg Agreement signed in August 1940.

In August 1957 the responsibilities of the two countries for the defence of the continent were again formally recognized when it was announced that Canada and the United States had agreed to the establishment of the North American Air Defence Command (NORAD). This placed operational control of the air defence forces of both under one integrated headquarters, responsible directly to the US Joint Chiefs of Staff and the Canadian Chiefs of Staff Committee. Appointed deputy to NORAD's commander-in-chief, USAF General E. E. Partridge,* was RCAF Air Marshal C. R. Slemon who still holds this post today in Colorado Springs.

* Succeeded in July 1959 by Gen. L. S. Kuter.

Gen. L. S. Kuter, Defence Minister D. S. Harkness, A/M C. R. Slemon.

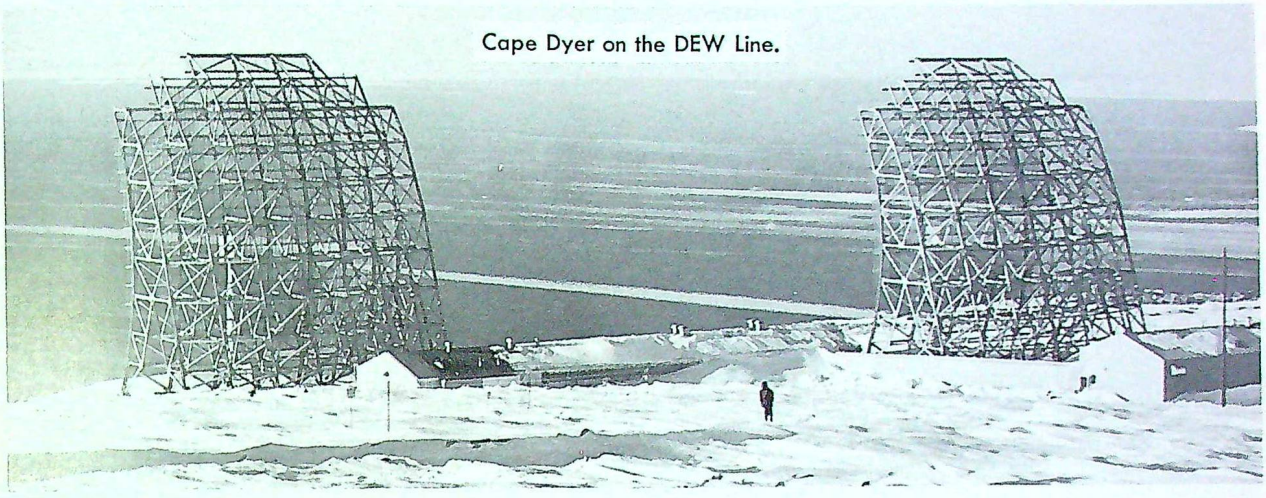
To manage this vast system, spread north to south from the polar ice cap to the Mexican border and east to west far out over the oceans, NORAD has divided the continent into regions, each of which is subdivided into divisions. The latter are further divided into sectors. Thus A/V/M MacBrien, who became AOC ADC in August 1958, also became regional commander of NORAD's northern region — with full control of the operations not only of the RCAF air defence units, but those of the USAF within the region's boundaries.

In September 1958 the decision was made to introduce the *Bomarc* guided missile into ADC. Two bases were to be established: one at North Bay, Ont., and the other at La Macaza, Que. It was also decided that, to strengthen the effectiveness of the Pinetree system, additional large radars and a number of gap filler stations were to be constructed across Canada. Finally, it was announced that a new combat control unit known as SAGE would be built underground at North Bay.*

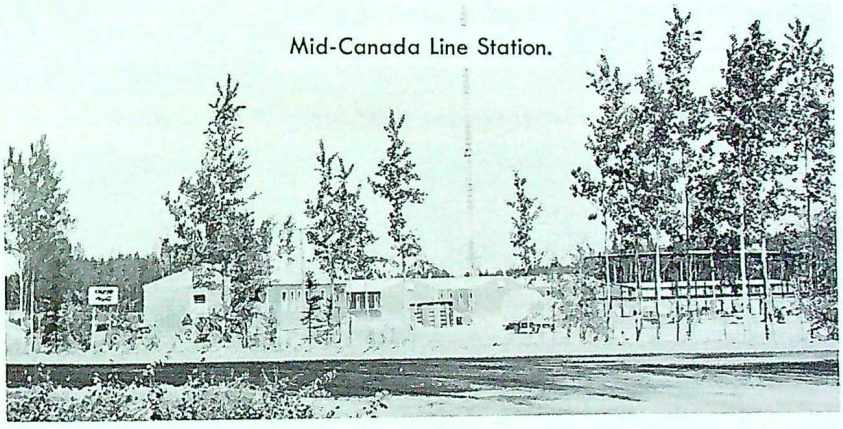
As the rumbling of heavy construction equipment was again heard throughout the land, the planned integration of US and Canadian personnel under NORAD continued. "Co-manning" became a common word as more and more RCAF officers and airmen took up their posts at various levels of the NORAD organization. The "new look" in ADC inevitably foreshadowed the demise of certain formations. Auxiliary flying units were given new roles and removed from ADC to Air Transport Command control. Disbandment of the 14 auxiliary AC & W squadrons is proceeding. Those elements of the Ground Observer Corps south of the 55th parallel were "stood down" in June 1960, although GObC posts north of this line continue to supplement the DEW and Mid-Canada Lines. Four

* Progress reports on the implementation of these decisions are contained elsewhere in this issue.

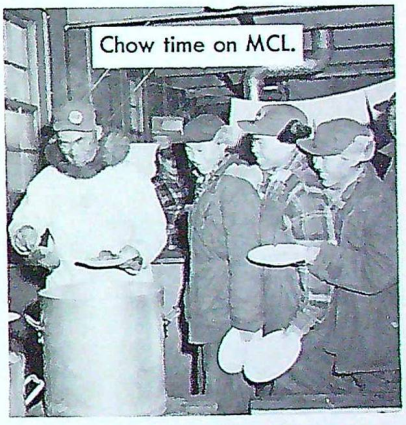
WARNING AND CONTROL FOR NORAD



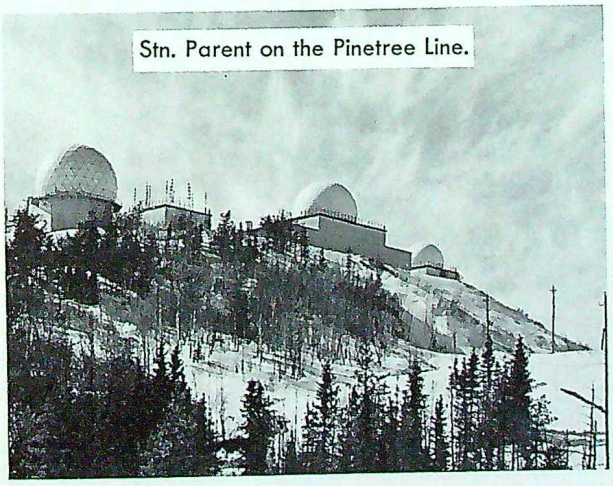
Cape Dyer on the DEW Line.



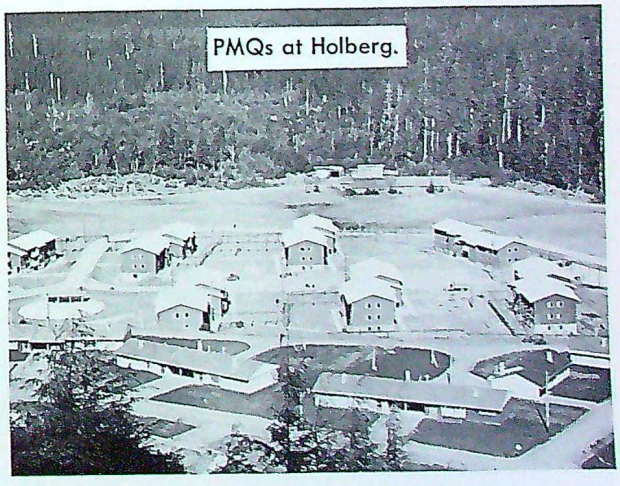
Mid-Canada Line Station.



Chow time on MCL.



Stn. Parent on the Pinetree Line.



PMQs at Holberg.

of the nine regular force CF-100 squadrons have been, or will be, disbanded during 1961.

Thus, as ADC this month celebrates its 10th birthday, it is in the midst of a transition period. While it carries out the operations of the day, it is deeply involved in a program of modernization of equipment and specialized training to meet the challenge of the aerospace age that is already with us.

AIR VICE MARSHAL W. R. MacBRIEN, OBE.

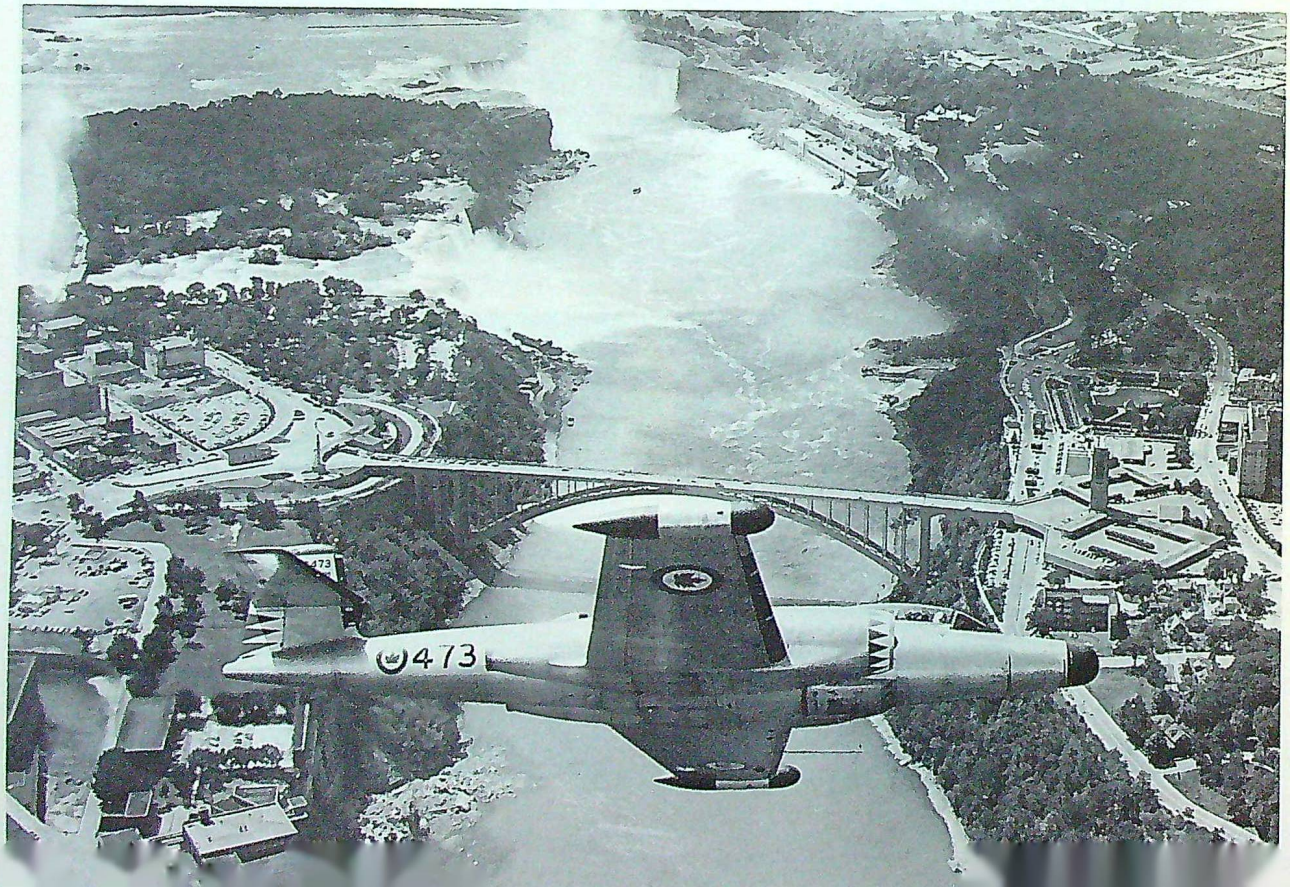
As Air Officer Commanding, Air Defence Command, and Commander, Northern NORAD Region, A/V/M MacBrien is eminently qualified to lead the RCAF's contribution into the aerospace defence age.

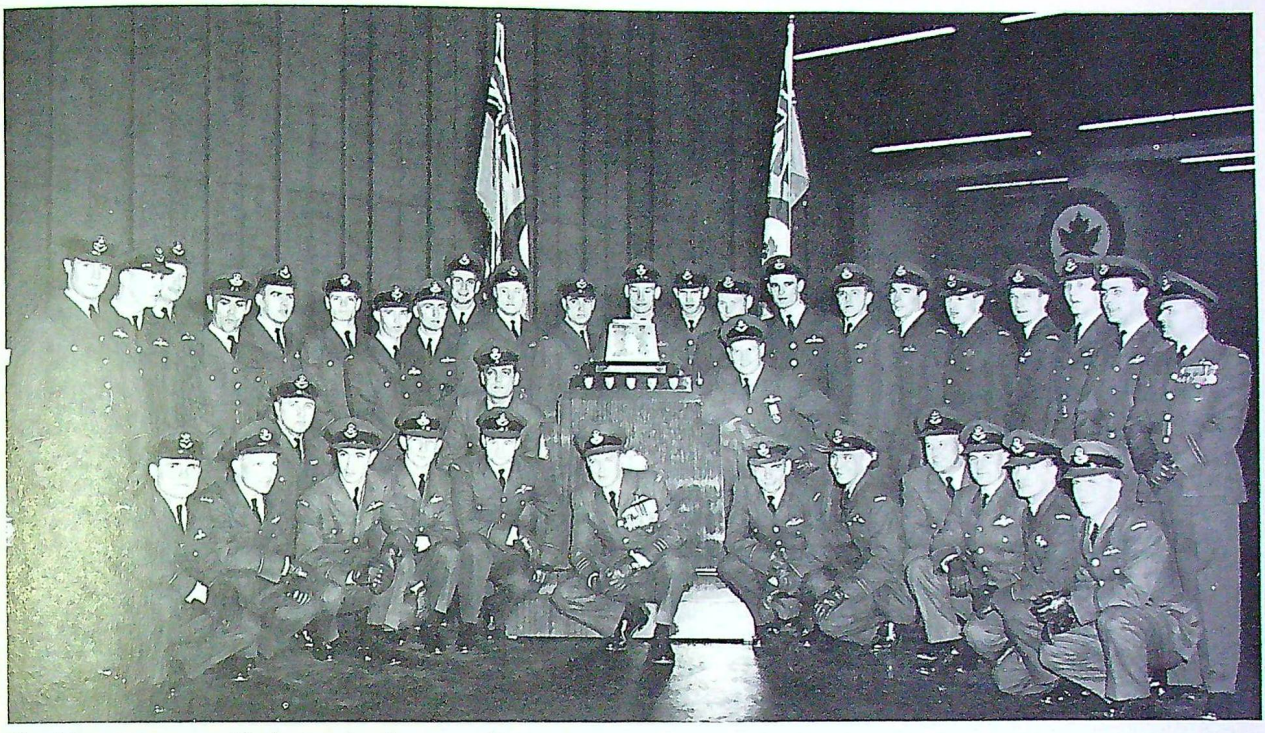
His present position follows a series of career appointments which have culminated in this most demanding task. He was the first and only commander ever to head a Canadian fighter sector in the Second World War, at the time of the greatest aerial successes of the Allied Airforces during and after the Normandy invasion.

He has been involved in air defence planning since its inception in Canada in 1946 and he commanded the first RCAF air defence formation, the Air Defence Group, when it was formed in 1949. His intimate knowledge of the air defence problems of North America has continued from that date. A graduate of the United States War College, he was the first air defence member of the directing staff of the National Defence College.

He took over his present position in August 1958.

CF-100 over the unmarked border at Niagara Falls.





The Alouettes pose with the trophy they won this year.

THE STEINHARDT TROPHY

THE most coveted prize in Air Defence Command is the Laurence A. Steinhardt Memorial Trophy, awarded each year to the most efficient all-weather interceptor squadron. No. 425 "Alouette" Squadron, based at St. Hubert, took the honours this year.

The trophy was donated by Mrs. A. A. Sherlock, the wife of a serving RCAF officer, in memory of her father the late Honorable Laurence A. Steinhardt who was killed in an aircraft accident in 1950 while serving his country as U.S. Ambassador to Canada.

A calculating machine is needed to judge the winner each year. Points are awarded for operational efficiency, serviceability, flight safety, interception rates and rocketry scores. Often only decimal points separate the winner from the eight runners-up.

First presented in 1956 for the performance during the year of 1955, the trophy has been awarded annually since that time. Only one squadron has succeeded in winning the award twice.

1955 No. 419 "Moose" North Bay
1956 No. 432 "Black Cougar" Bagotville
1957 No. 413 "Tusker" Bagotville
1958 No. 413 "Tusker" Bagotville
1959 No. 409 "Night Hawk" Comox
1960 No. 425 "Alouette" St. Hubert

Mrs. A. A. Sherlock and the Steinhardt Trophy.

PEACE IS OUR MISSION

By a CENTURION

(Member of Course 100, No. 3 OTU, RCAF Station Cold Lake)

"*Leopard Red Section Scramble . . . Leopard Red Section Scramble. Vector 360, maximum angles. Contact Cupid channel 21.*"

I FLICK the switches and press the buttons, and hear the two Orenda engines snap into life. A brief glance outside at the ground crew, a wave of the hand and the chocks are removed. The CF-100 rumbles forward and turns onto the runway. Throttles to maximum, a surge as we gather momentum, then smoothly we are airborne. The lights of Montreal disappear almost immediately in the low overcast and we are locked in a world of our own — a strange world of fluorescent instruments and green illuminated radar tubes. As our aircraft rushes forward, climbing to meet the unknown, our emotions are a complexity of reminiscence, nostalgia, adventure and excitement. Within the space of a second my mind flashes over the recent events which have led up to this moment . . .

✣ ✣ ✣

Four months ago I had boarded the CNR dayliner in Edmonton bound for Grand Centre, Alberta — a sprawling, frontier community on the Alberta-Saskatchewan border and the railhead into RCAF Station Cold Lake. I was headed for No. 3 All Weather (Fighter) Operational Training Unit, after one and a half years of basic aircrew instruction and a pair of brand-new pilot's wings to prove it.

We were greeted, at the end of a five-hour journey through a desolate-looking country, by our RCAF conducting officer. "Welcome, Centurions", he said. We soon learned that as members of Course No. 100, this monicker would stick with us throughout our 13-week stay at Cold Lake. We were driven the short distance to the station, which in the darkness looked gigantic, with well-lit and neatly-kept houses and buildings stretching away in all directions from the main gate. We were ushered to our new quarters, noting the "Centurion" motif already placed on each doorway. By midnight we were settled in and ready for bed, as it had been a long tiring journey to this oasis of the north.

At 0800 hrs. next morning we gathered in the lounge of the officers' mess and there I met some other members of my course. Three of the pilots I already knew quite well, having trained with them over the

last year and a half. Two others were older chaps, returning to flying duties after ground tours. Similarly, the navigators were a mixed group — half obviously "pipeline", the other half older and more experienced aircrew officers.

Then the Commanding Officer, G/C G. C. Ruttan, DSO, gave us a few words of welcome, both to his station and to the OTU itself. He was followed by the senior members of the OTU staff: S/L C. E. Waugh, officer commanding; S/L G. F. Hammond, chief flying instructor, and F/L J. H. Harrison, chief radar navigator instructor. They gave us a comprehensive rundown on our course, outlining the training syllabus, the do's and don'ts of the new station and the excellent record that the OTU has built up over the last nine years — a record they expected us to live up to, or even surpass.

WE SETTLE IN

Following this greeting, we were taken on a tour of the station, filled out the inevitable forms, had our pictures taken for posterity and, in the afternoon, we began our ground school courses proper. Monday evening there was a special party in the officers' mess lower lounge. We "Centurions" for this special occasion were presented with helmets resembling those of our Roman predecessors. These helmets were worn for the first portion of the party and discarded later for obvious reasons.

The ceremonies now over, hard work followed. The first week and a half were devoted exclusively to the academic side of the course; after this we took to the air for half days and to ground school for the other half. In the classrooms the subjects taught were aircraft engineering, armament systems, aviation medicine, intelligence and aircraft control and warning (GCI), together with a brush-up on the subjects that we had covered in our earlier courses. The aircraft engineering course was designed to give the aircrew a thorough knowledge of the CF-100 in all of its functions, from the ordinary to the emergency. The armament systems course investigated the mechanics, malfunctions and use of weapons systems.

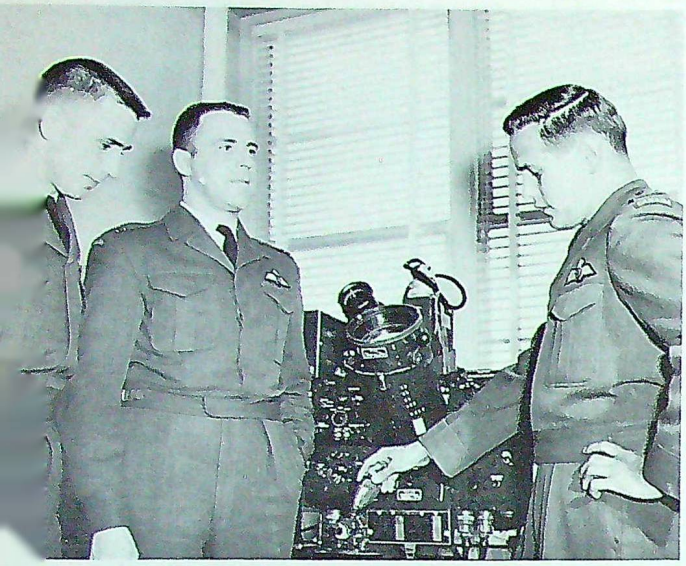
Just prior to the actual flying phase of our course we "crewed up". That is to say, the navigators and the pilots ended their courting and settled down to going steady for the next three years or so. This was the first hurdle of the course. Once we had become a crew we had to develop as a team. We had to learn not only to follow each other's instructions but to anticipate them.

The first seven weeks were called the conversion phase. During this period we not only converted to new equipment and techniques, but we as a crew converted from merely a new personal acquaintanceship to an efficiently co-ordinated team. There are many essential ingredients in this development but we came to realize that the most important are loyalty and confidence in the "better half". The "crew-air-baptism", in a dual-control CF-100 was an event we looked forward to with a certain feeling of anxiety. This was the moment we will remember and classify as the "cornerstone" of our crew work for years to come.

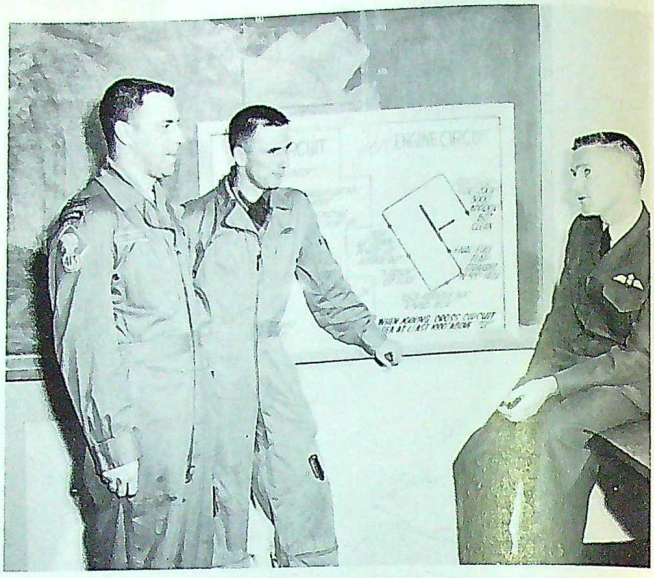
WE MOVE UP

Next we moved into the advanced flight. Before we could play with their aircraft (Mark 4As instead of the Mark 3s in conversion flight), we had to expiate for our future "crimes" in the "Chinese Torture Chamber" or flight simulator, but as we progressed we knew that mastery of its instruments was vital. What we learned in the simulator may stand us in good stead one day. So said "Big Brother", the instructor, who was always spying over our

Back row (l. to r.): F/Os G. Pare, C. Verge, R. Patching, J. Robitaille, G. Guerette, D. Karn, D. Becker. Front row: F/L C. Filiatrault, F/O I. Campbell, F/L A. Robb, F/Os B. Harwood, J. Fisher.



Student pilot F/O D. Karn and student navigator F/L C. Filiatrault learn intricacies of airborne radar equipment from instructor F/O L. Jokinen.



The Centurions receive instruction on CF-100 single engine circuit procedure from F/L W. Stewart, of the OTU staff.

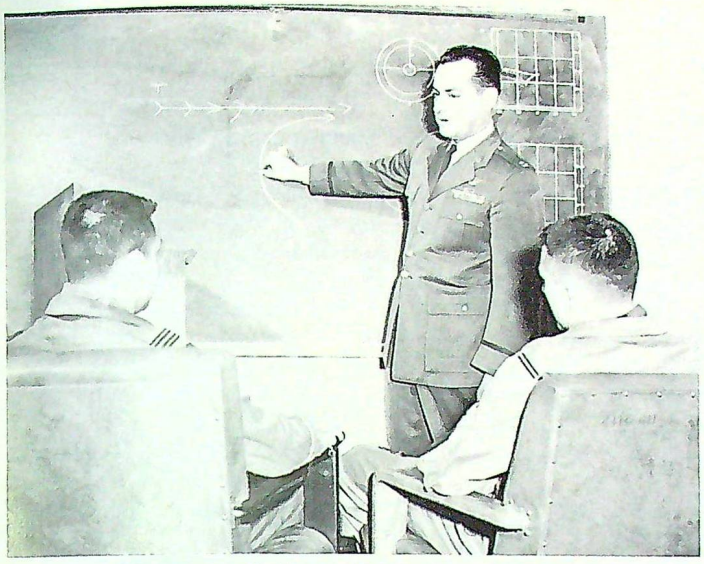
shoulders with a sadistic grin on his face. (Frankly, this simulator is an excellent and valuable piece of equipment to practice AI* work, procedures, and emergencies without leaving the ground. Mistakes here can be made without damage being done or anyone being hurt. In the flight simulator there are lots of red warning lights (enough to give you a sunburn), dials and other devices; still the main reliance is on human alertness to avoid trouble.) The simulator staff was critical at the slightest detail — even the interpretation of a phrase or word between crew members of long acquaintance often makes a big difference in effective flying. They told us, "He also serves who only watches and twitches".

After approximately a week of flying nothing but the simulator, we were given a real live Mark 4A and

* airborne interception

Ejection seat drill supervised by LAC R. Feltham.

In the decompression chamber for high altitude indoctrination, l. to r.: instructor Sgt. A. Skorey, F/O Karn and F/L Filiatrault.



All weather fighter tactics are explained to the crew by Capt. R. Jeffreys, USAF exchange instructor at Cold Lake.

Flight simulator control console briefing. L. to r.: radio nav. instructor F/O N. Chester, F/L Filiatrault, pilot instructor F/O R. Jensen, F/O Karn.

began actual air interception exercises. For the next fortnight we spent mornings in the air, afternoons in the simulator. Then until graduation all our trips were in CF-100s.

All through this stage we were nursed very closely. The staff as detectives, aided by their trusty tell-tale-cameras, sifted and weighed all the clues and details of each trip. The ever-striving for perfection in this flight can be compared to that done by a maestro "tuning in" his orchestra for a concert. Here the discordant notes are eliminated and missions with perfect harmony are achieved. Every exercise had to be completed to the satisfaction of the instructors, regardless of how many times they had to be reflown. Sometimes it seemed the all-weather CF-100 would have been more appropriately named the all-night fighter.

Here, too, we first came into contact with the third member of the air defence team — the GCI controller. Under the skilful guidance of officers at No. 42 Aircraft Control and Warning Squadron, one CF-100 acted as enemy target, the other the defending fighter.

The OTU took us as individuals, made us into a crew, converted us to new equipment, trained and polished us, all in a matter of 13 weeks. At last we were ready to take our places in the air defence system, a little older and much wiser . . .

✣ ✣ ✣

"*Cupid Control — this is Leopard Red Leader — on channel 21*".
"*Roger Red Leader — we have an unknown target for you at 150 miles, heading 180° at 40,000 ft. Maintain heading 360° level off at 40,000 ft. and report level.*
"*Cupid — Red Leader — level at 40,000 ft.*"
"*Roger Red Leader — you are on your displacement vector, your target is at 11 o'clock to you — range 100 miles — your attack vector will be 270 — the target will be crossing starboard to port, tracking 180°, level. Your next vector will be your attack vector for an identification pass*".
"*Roger, check.*"
"*Red Leader — this is your attack vector. Turn port onto 270. When steady your target will be at 45° starboard range 30 miles*".
"*Cupid — Red Leader steady 270 searching starboard.*"
"*Red Leader — your target now 45° starboard 25 miles*".
"*Roger Cupid. We have him in radar contact 45° starboard at 24 miles and will carry out an identification pass*".
"*Roger Red Leader — Cupid standing by*".

In a few seconds we pick out the target's flashing lights, close in and make our identification pass. A feeling of relief and contentment runs through us: relief when we find that the target is a friendly airliner, contentment with a job well done.

We wheel around and return to base with the knowledge that all is well and peace is still maintained. We hope that we shall never be called upon to make the supreme test of our skill, but if we do we are quite confident that out training will stand us in good stead.

PIPELINE FOR THE AIR DIVISION

"LEAPFROG" — "Random" — "Bechers Brook" — "Nimble Bat" and "Jump Moat" are operational names familiar to those concerned with ferrying Canadian-built *Sabre*, T-33 and CF-100 aircraft to Europe.

Not only has Air Defence Command had to build itself during the past ten years, but it has been the spawning ground for the RCAF's NATO Air Division. Beginning in 1952 with No. 439 Fighter Squadron based at Uplands, the move of over 1000 jets across the hazardous North Atlantic was a continuing success story.

Meantime, crews were being trained in Canada for the Air Division — on *Sabres* at No. 1 OTU, RCAF Station Chatham, and on CF-100s at No. 3 OTU, RCAF Station Cold Lake. In 1949, as a result of Canada's commitment to NATO, RCAF Station Chatham had been reopened. It became the home of No. 1 (F) OTU and No. 421 Red Indian Squadron, both units being equipped with *Vampires*. No. 421 Squadron became Canada's first contribution to NATO when it was transferred to England in 1951. Late in 1951 Chatham received its first T-33 aircraft and early in 1952 it began re-equipping with *Sabre* aircraft. To date more than 1,200 fighter pilots have gone through the school. To handle the requirement for trained section and squadron leaders the first Day Fighter Leaders' Qualification Course began in September 1957. The DFLQ course trains senior pilots in all phases of advanced fighter tactics.

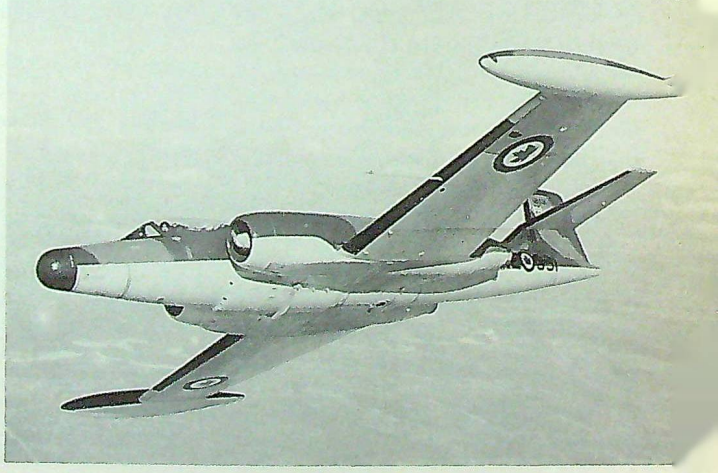
On 3 November 1952 an all-weather fighter school was started with the formation of No. 3 OTU at North Bay. With the buildup of all-weather squadrons in Air Defence Command the OTU was crowded out of its original home and moved to Cold Lake on 16 May 1955. The primary role of No. 3 AW (F) OTU is the training of all-weather fighter crews to meet the requirements of the CF-100 squadrons in Air Defence Command and in No. 1 Air Division in Europe. In addition, however, No. 3 OTU provides instructors' courses in all-weather operations and familiarization courses for AFS instructors.

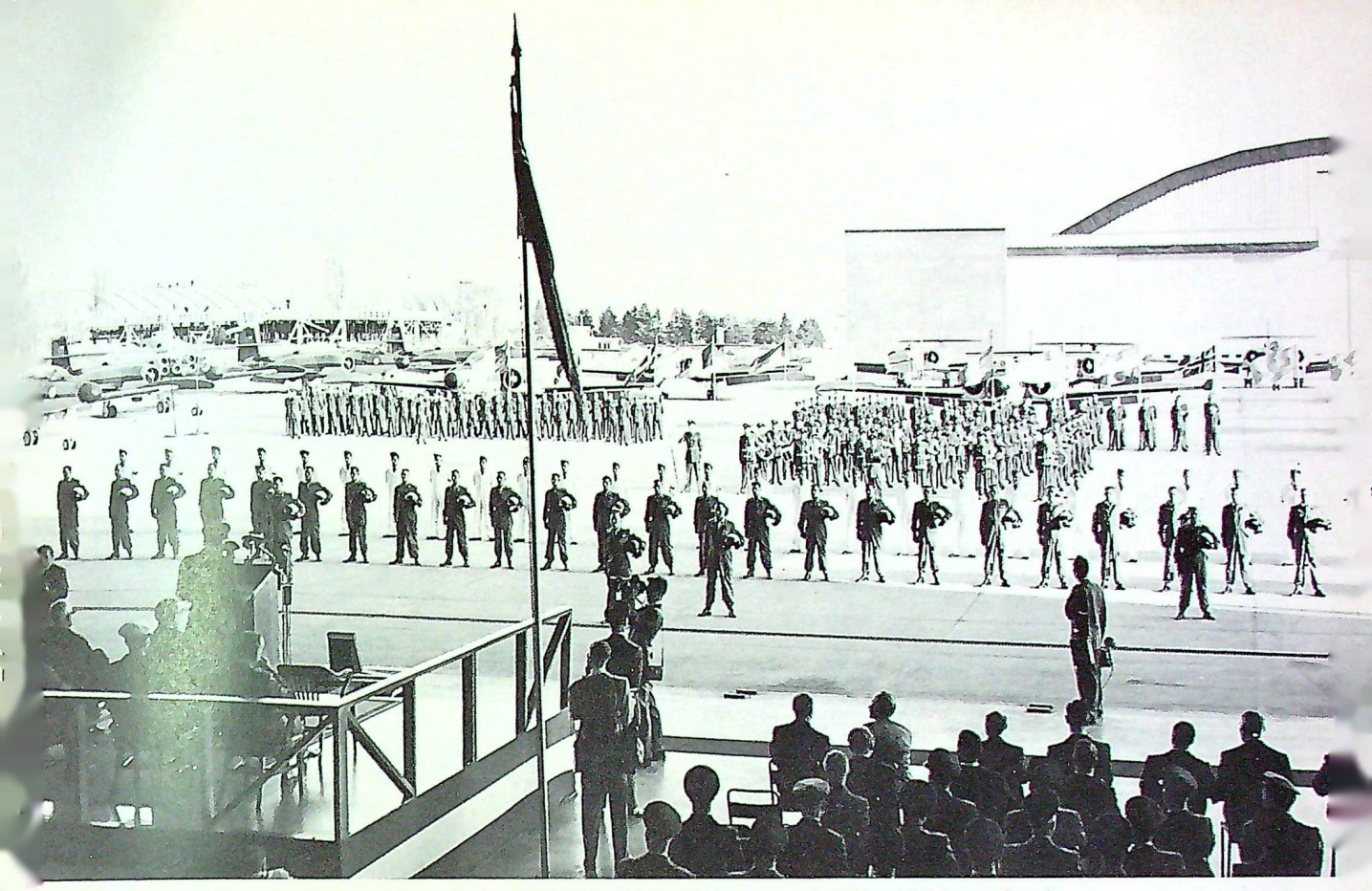
While 439 pioneered the route for the RCAF using bases at Goose Bay in Labrador, Bluie West 1 in Greenland, Keflavik in Iceland and Prestwick or Kinloss in Scotland, they were not the first Canadian squadron to serve overseas in peacetime. No. 421 *Vampire* Squadron and Nos. 410 and 441 *Sabre* Squadrons had previously gone by surface vessel. As the Air Division squadrons formed, trained and settled down into fighting units at Canadian bases and as the French and German airfields were made ready, the *Sabre* squadrons followed the North Atlantic air trail.

When the Air Division complement was complete and all 12 *Sabre* squadrons had arrived in Europe by August 1953 a need for a ferrying unit to supply spare aircraft or newer models was soon apparent. This unit, called the Overseas Ferry Unit,* was to make many Atlantic crossings

* THE ROUNDEL, VOL. 10 NO. 8, Oct. 58

In NATO dress, *Sabre* and CF-100 still serve in No. 1 Air Division squadrons.





Ceremonial send-off at RCAF Stn. Uplands was accorded No. 445 Sqn. in October 1956. This was first "Nimble Bat" operation.

during its relatively short history (it disbanded June 1957). In operations called "Randoms", since they were unscheduled and took place as new *Sabres* and T-33s rolled off the Canadair production lines, they ferried over 800 jet aircraft to Europe. Many of the *Sabres* were destined for Greece and Turkey under Canada's mutual aid program. As newer *Sabre* models were developed (through the Mark II to Mark VI) these were delivered to the squadrons. In addition the OFU made several reverse flights, bringing back Mark V *Sabres* which were released to RCAF Auxiliary Squadrons.

In the short period between the Leapfrog operations and the Randoms the RAF set up a "Bechers Brook" operation from St. Hubert which flew more than 370 *Sabres* to the United Kingdom. The name, of course, came from the famous water jump of the Grand National Steeple Chase.

When the decision was made to equip the Air Division with four CF-100 squadrons in 1956, an operation called "Nimble Bat" was organized in Air Defence Command. The four squadrons were to be placed at NATO's disposal as a result of a specific request for additional all-weather fighter support over Europe. Mark IV CF-100s, with tip tanks and camouflage paint, therefore began appearing in Canadian skies.

As the first all-weather squadron arrived in Europe one *Sabre* squadron was disbanded and reformed at Ottawa in a new all-weather role. This policy followed for Nimble Bat I, II, and III, moving No. 445 Squadron from Uplands to Marville, No. 423 from St. Hubert to Grostenquin, No. 440 from Bagotville to Zweibrucken and No. 419 from North Bay to Baden-Soellingen. The entire Nimble Operation took place between November 1956 to August 1957.

When the Belgian government purchased CF-100 Mark IV jets the task of moving these to Europe also fell upon Air Defence Command. In operations called "Jump Moat" and following the North Atlantic freeway ADC crews moved the Belgian contingent safely overseas.

The success of all North Atlantic ferry flights was due in no small measure to the co-operation and assistance of USAF personnel at Bluie West 1 and at Keflavik. American weather forecasters and USAF search and rescue personnel did much to smooth the way.

GROUND OBSERVER CORPS FLASHBACKS

Filter centre operations room at Three Rivers, P.Q.

No story of Air Defence Command can be complete without mention of the Ground Observer Corps. It is not intended here to give a detailed history of the Corps; however, the following anecdotes in themselves tell much of the GObC story.

Formed in Canada in 1951 with hardly more than an organization order approving its formation, the GObC under Wing Commander J. A. Wiseman and a small group of officers became a giant in a few short years. With approximately 50,000 civilian volunteers from every walk of life, the GObC on numerous occasions proved the truth of their slogan, "the eyes and ears of Air Defence Command".

In 1955 during Exercise "Cracker Jack" Canada was exposed to simulated enemy air attack. All available aircraft and air defence personnel were involved and the Strategic Air Command supplied the "enemy" raiders. The first warning of the approach of the attackers came from the GObC some three hours before the information was available from any other source. The enemy force congregated in the North-West Territories, feeling free from observation to set up their battle formations for the southbound strikes. While the jets were still being refuelled by tanker aircraft, GObC posts in the area flashed the word back to the communications net. The GObC was able to keep the force under almost constant visual observation and to supply track reports as they flew south toward the radar nets.

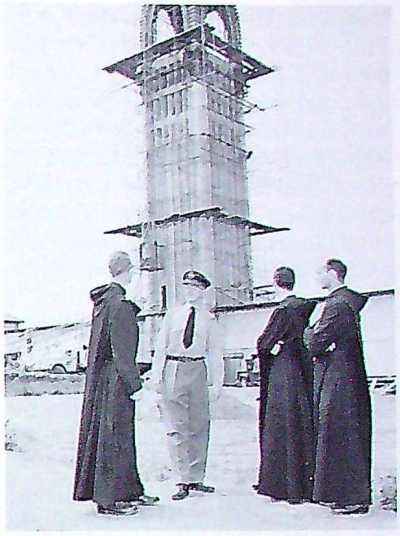
The Corps was not without its humorous side. Field officers whose job it was to make inspection visits, to give lectures and encourage recruiting, soon found this very true. Some hamlets, such as Iona in Cape Breton, with a total population of 100 had just that many GObC members — 100. Enthusiasm was always high and the GObC officer's visits were red letter days.

One officer recalls this incident during the question and answer period following his lecture. A lady who listened raptly to his address on radar and its low level characteristics appeared to be a disbeliever. She stood at the conclusion of the talk and asked, "You said that radar will not work near the ground"?

"Yes, madam, that is correct, radar cannot see around hills and buildings and is seldom reliable below a thousand feet," the speaker answered.

The lady retorted, "Well, you're wrong. I got a ticket for speeding last week and that was done by radar."

It is difficult to appreciate the keen-



Top left: A Dept. of Transport signal agent on the banks of the St. Lawrence.

Top centre: A forestry tower watchman in Nova Scotia.

Top right: Priests and GObC officer near Mission City, B.C.

Middle right: Teenagers set up their own backyard observation post at Chester, N.S.

Lower right: An Eskimo spotter at Churchill, Man., reports to RCAF officers.

ness and enthusiasm of the Corps. Long hours in rain, snow or heat manning observation posts around the clock meant little to these civilian volunteers. Once signed on, they were out to do their bit despite any odds. One family logged over 2000 observation hours. As an example of the speed of the reports, one filter centre received a long-distance telephone message which reported a pilot had been forced to bale out of his aircraft. Only one detail was lacking — where did the pilot land? Over the telephone line came the reply, "I don't know, sir. He's still coming down."

Reporting aircraft was not the only service rendered. Many search and rescue missions owe their successful conclusion to the GObC. Often the only report on the missing craft was from the field observer. Mercy missions and aid to aircraft in distress were other functions capably handled by the Corps. There were so many "trades" employed in the Corps that an enormous pool of talent was available and members continually surprised the RCAF with their ingenuity. Ham radio operators, for example, with their air defence affiliation could bring immediate relief to pleas for help. It didn't seem to matter that the individual was not paid for his work. He or she went about spotting aircraft no matter what their profession.

In the Maritimes one of the oldest members of the GObC was a medical doctor who one day appeared at a lady's home frantically pushing his team of horses to the limit. Since the lady was one of the doctor's maternity patients, she was naturally quite interested. Grinding to a halt, the doctor climbed out of his buggy and dashed to the door. He was met by the housewife. "My baby isn't due for a month yet", she exclaimed, a trifle perturbed. "Oh, I know," he said, rushing into the house, "but I've an aircraft flash message to report and want to use the phone."

Dedication was the watchword of all observers and, although often confused by the technical terms and reporting requirements, they persevered. One hastily appointed chief observer was given an aircraft flash message form and instructed on how to report aircraft movements over the telephone. He was also told, since it seemed a matter of concern, that the cost of all calls would be paid by the RCAF. Due to the rush, the instructor didn't have time to put through a test call and so complete the field training. The next day the newly-appointed observer spotted an aircraft which he felt should be reported. He picked up the telephone and correctly said, "Aircraft Flash". These are the magic words which put the caller directly in contact with the nearest filter centre. When the filter centre officer answered the phone he said, "Air Defence"; whereupon the new observer said, "Eighty cents? Why, that airforce officer told me it was free."

A small town in the east had only one hotel. It was here that the locals gathered to slake their thirst. Since the proprietor was a keen and intelligent person he was enrolled as the chief observer. He was a busy person particularly on Saturdays when his pub did such a roaring business that he could never be sure of hearing an aircraft when it passed over. He very smartly appointed the town's lone constable as a field observer and they arranged a code signal to keep the GObC in business. One blow on the pub door from the constable's billy meant "silence inside" and two blows meant "aircraft overhead."

A zealous housewife in the Maritimes was hard at her housework one sunny day, keeping one ear cocked for aircraft. Unknown to her a bulldozer began grinding away out of her sight. Attracted by the noise she rushed to the window to see an object moving across the sky. Without a second's hesitation she put through her "Aircraft Flash" and on replacing the telephone returned to the window in time to see a large crow alight in a nearby tree.

Since the Corps was officially stood down below the 55th parallel in June 1960, little national notice has been given to those Mounties, weathermen, lumberjacks, miners, rangers, Eskimos, Indians, trappers, fishermen, HBC factors, et al, who are still on the job in the vast northern expanses of Canada. North of the Mid-Canada Line these GObC volunteers continue to supply vital early warning information, carrying on the tradition built up over the previous nine years by the 50,000 pairs of eyes and ears of ADC.

EAST AND WEST MEET IN SPACE STUDIES

East and West have met! Not only that, but West, from the east, is now in the south, while East, also from the east but west of West, is in the north. And, for the next couple of months, both will be concerned with outer space.

Squadron Leaders D. W. East and R. B. West are in charge of RCAF personnel taking part in the second phase of Operation Lookout, a Defence Research Board experiment supported by the RCAF and conducted in association with the United States Advanced Research Project Agency. The operation is concerned with certain studies of missiles entering the earth's atmosphere near Ascension Island in the South Atlantic.

S/L East is working in Valcartier, P.Q., north of S/L West, who is based in the south, at Patrick Air Force Base in Florida.

WHAT IS SAGE?

By SQUADRON LEADER D. S. TERRELL
Directorate of Air Defence Requirements AFHQ

In order to understand what semi-automatic ground environment (SAGE) is, and why it is required, one should first know something of the aircraft control and warning (AC & W) system now in operation in Canada.

The AC & W system, popularly known as Pinetree, is composed of heavy search radars and associated height finding radars which provide early warning (EW) and ground control intercept (GCI) functions. In addition, there are control units known as air defence control centres (ADCCs) which supervise the operation of the EWs and GCIs but have no radars associated with them. Figure 1 shows the relationship of these units in the system. The EW and GCI stations use the same type radars, but differ in the roles they perform and the numbers of personnel required to perform these roles. A number of ADCCs report to the combat operations centre (COC) at Northern NORAD Headquarters, St. Hubert.

To see how the different formations carry out their tasks let us consider the case of an enemy aircraft penetrating Pinetree. The aircraft is first detected by an EW station where it is established as a track of a certain speed and direction. This information is passed to the parent GCI station where the flight characteristics are compared to known aircraft movements or flight plans. If the aircraft cannot be identified as friendly from available information, fighter interceptors are scrambled against the unknown aircraft. At this point the GCI passes the information on the unknown aircraft to its parent ADCC which monitors the scramble and gives assistance as required. The GCI controls the fighter until either the intercept is completed or the target passes out of that particular radar coverage. In the latter case, the fighter is passed to the adjacent GCI which completes the intercept.

The drawbacks to this system are numerous. The passage of information is by voice or teletype and is therefore slow and liable to inaccuracies. The intercept controller must talk to the interceptor by voice communications and must calculate the intercept computations himself. In addition, the GCIs can only control interceptors within the coverage

Fig. 1. Typical manual AC & W system.

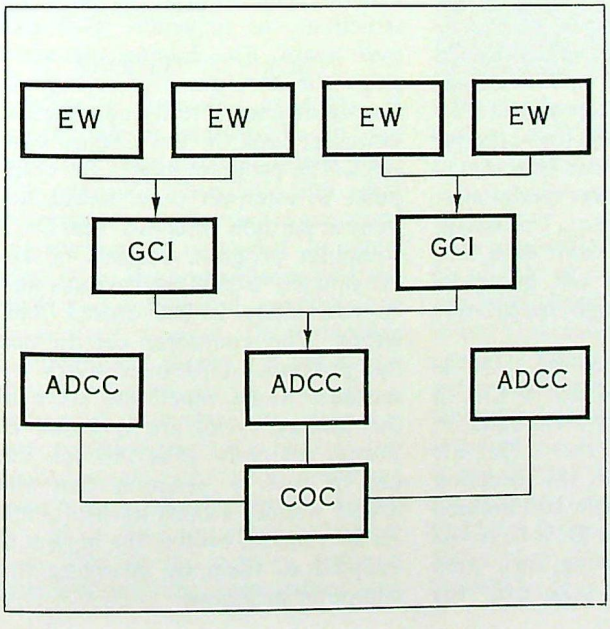
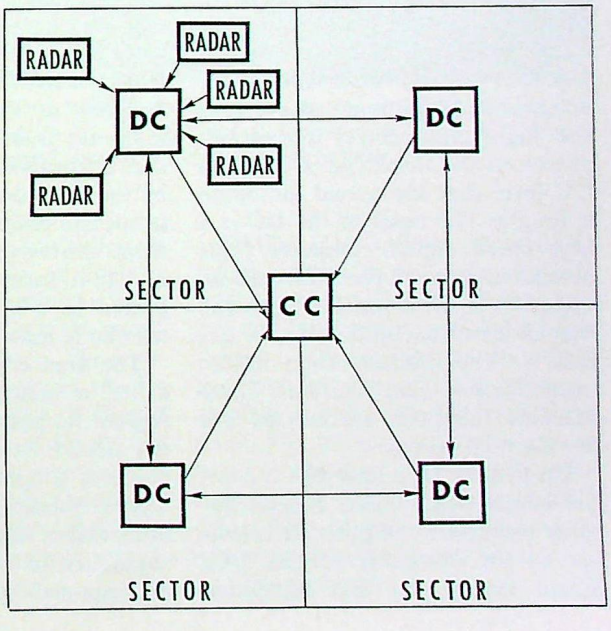
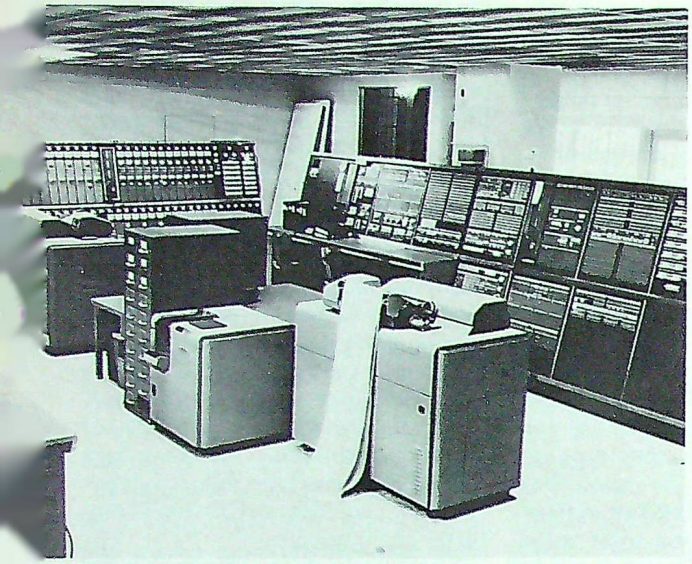
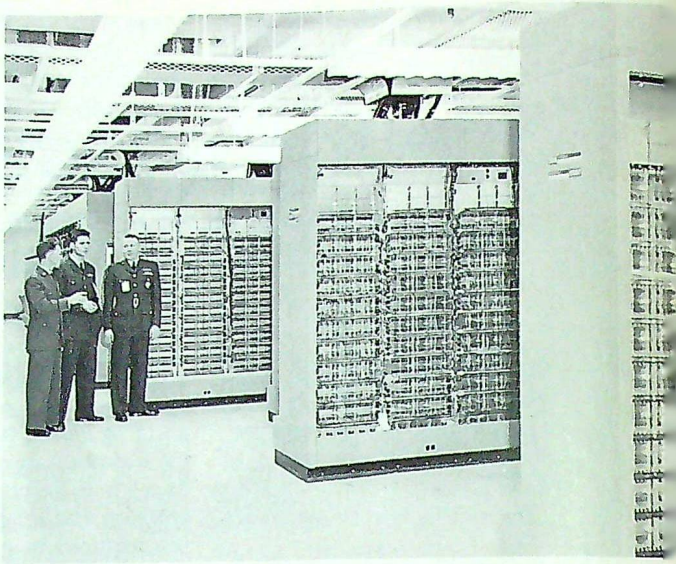


Fig. 2. Typical SAGE system, showing one region.





Maintenance console area in a SAGE direction centre.



Register banks in the computer's data storage area.

of their own radar, which in the era of supersonic aircraft is a great handicap. To overcome these deficiencies the SAGE system was devised.

AREA AUTOMATION

Figure 2 shows a typical SAGE system. Several radar stations are connected to a direction centre (DC). At the DC, information from these radars plus such other facilities as gap filler radars, Texas towers (or off-shore radar stations), picket ships and flight plan centres is received, processed and displayed. It is at the DC level that the actual air battle is fought. The heart of the DC is a high speed digital computer. This computer receives the information, organizes it, then presents it to the human operators who make the decisions. The machine then implements these human decisions. These machine functions are carried out at very high speeds.

Up to four DCs feed into a combat centre (CC) which houses another electronic computer. It is similar to the computer at the DCs except that it has less associated input and output channels and does not receive data directly from the radars. Both these computers are duplex machines. This means that one half the computer carries out the air defence role while the other half remains on standby or undergoing maintenance. Only a few seconds are required to switch from one half the computer to the other half since data are being continually fed from the active half to the storage facilities of the inactive half. To make the information from the radars into a form that can be accepted by the DC's computer, special electronic equipment is used. This equipment converts raw radar data into a digital form that can be transmitted at a very high speed over telephone lines.

The area controlled by a DC is called a sector and by a CC, a region. As previously mentioned, in the SAGE system, the actual air battle is fought from the direction centre. Should a single DC become inoperative, adjacent DCs have the capability of expanding their area of responsibility to take over the area of the inoperative DC and carry on the air battle.

COMPUTER PROGRAM

The DC's computer is called a stored program digital computer. A list of instructions that the computer is to follow is stored within the machine and it acts on these instructions, in sequence, over and over again. The human operators guide the program in carrying out the air defence role by appropriate switch actions on the display consoles. The program causes the computer to interpret these switch actions at periodic intervals. The DC's computer program consists of approximately 67,000 instructions and approximately 23,000 stored data words. The computer carries out the program steps once every 15 seconds. Some functions, such as the display cycle, are repeated at shorter intervals. It is through the use of such a program that the SAGE system attains its flexibility. As new tactics evolve, the system is adapted to them by changing the computer programs.

To store data received from such a variety of sources the computer utilizes three types of storage. Magnetic tape machines are used for slow speed access, a magnetic, rotating drum system for medium speed access and a magnetic core memory for high speed access. Arithmetic operations are carried out on data which have been placed in the magnetic core memory and are handled at very high speed. Two numbers, for example, can be added together in twelve millionths of a second.

Information which has been processed by the computer is presented to the system's human operators on a display console which incorporates a large display tube called a situation display and a smaller tube called a digital display. Aircraft movements, geographic data, etc., are presented on the situation display while statistical data are presented on the digital display. Each console has a number of switches which allow an operator to select the type of information he wishes to see. Other switches, mounted on side panels, allow an operator to either insert information into the computer or make requests for specific information to be displayed.

RCAF personnel have been training on SAGE for months at USAF installations. L. to r.: F/L T. Richardson, FS J. L. Fahie, MSgt. C. Ozbun and Capt. W. J. Vogel grouped around a situation display tube.

INTERCEPT TECHNIQUE

When a controller at a DC is conducting an intercept he first selects the target to be intercepted. The computer then tells him what interceptor or *Bomarc* squadrons can successfully carry out the intercept. Once the controller selects the desired squadron and scrambles the fighters or *Bomarc*, the computer automatically carries out the necessary computations to conclude a successful intercept. The computer then passes instructions back to the ground-to-air radio sites at the radar stations where they are transmitted to the interceptor by digital data link. In the case of manned interceptions, the instructions are also presented to the controller on his digital data display so that he can relay them to the pilot by voice radio if necessary. When the intercept has been completed, the computer automatically vectors the interceptor back to its base. It should be noted that the controller in SAGE is not limited by the coverage of a single radar since several radars are tied back to the DC and targets from all of them may be viewed simultaneously.

SAGE is a system. It involves many different types of equipments which are continually being improved. New programs for the computers are being written to reflect the introduction of such items as *Bomarc B* and Time Division Data Link. The designing of such a system was a challenging problem; the operation of it should prove equally interesting to the RCAF. It is a vital steppingstone to the technology of the space age.

CITY IN A MOUNTAIN

By FLIGHT LIEUTENANT T. G. COUGHLIN

A gantry crane in one of the main chambers.

OVERLOOKING picturesque Trout Lake on the outskirts of North Bay, Ontario, is an imposing granite outcropping known locally as Reservoir Hill. Deep inside this solid mass of rock, construction crews are creating one of the first underground defence installations in North America — the home of Canada's semi-automatic ground environment (SAGE) system.

On the surface a few unpretentious contractors' buildings give no clue to what's doing below. But close-by a half-million-ton pile of rocks, which is changing the contour of Reservoir Hill, bears mute testimony to the magnitude of work going on many hundreds of feet below the ground.

In the late fall of 1958 the RCAF began to prepare estimates for the construction of a SAGE facility in a "hardened" site. On 31 July 1959 diamond drills bit into the earth as hard rock miners began to excavate what has turned out to be one of the largest underground military installations in the world. Before work actually began, the air force's consulting engineers visited underground sites both in Canada and overseas. The mammoth generating plants at Kemano, B.C., and Chute-des-Passes, Que., proved to be a valuable source of information and indicated the feasibility of economical underground development. From Sweden came the "smooth wall" blasting technique which made its North American debut at the North Bay project. Also from Sweden came the "perfo sleeve rock technique" which, at North Bay, received its first extensive use on a project in Canada. In addition the USAF Office of Civil Engineering contributed essential data concerning protective construction requirements.

As the design work progressed, the SAGE facility was altered substantially until it was quite different from the original concept. The end result of all the research and devel-

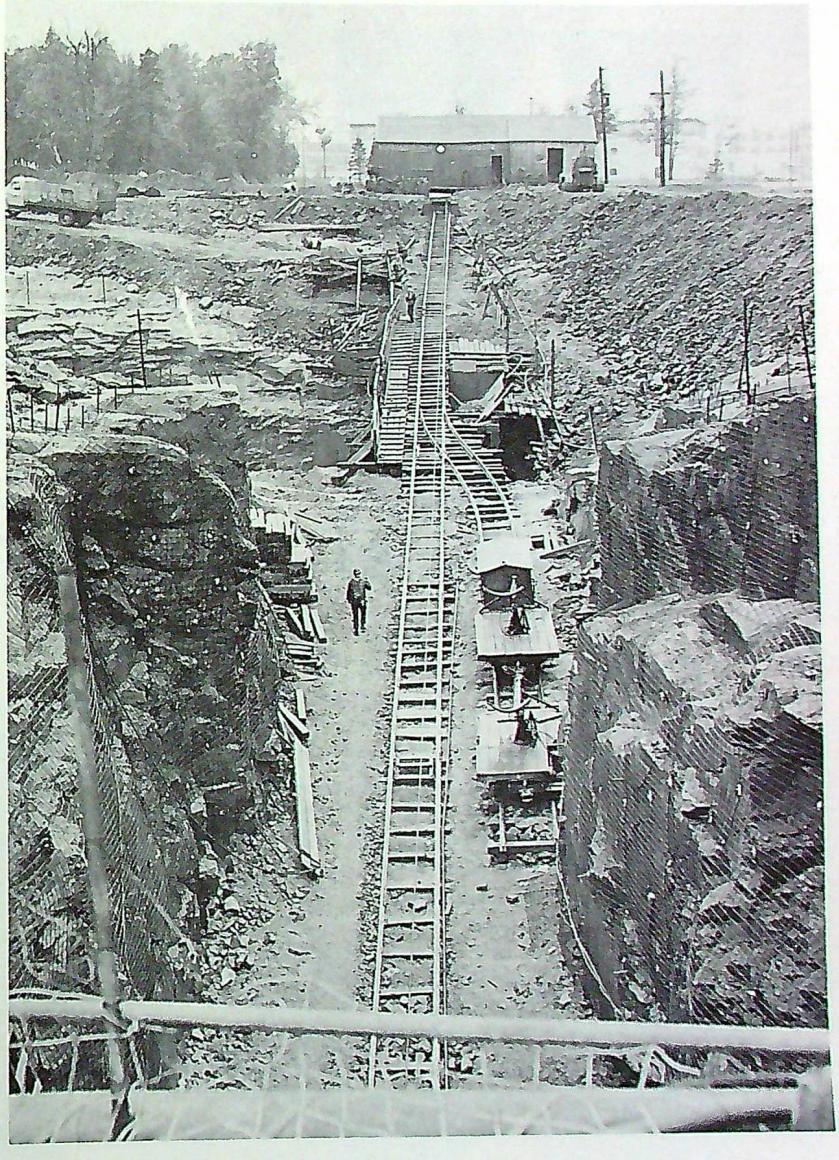
opment has produced not only an unique defence installation but also an unprecedented underground site. The project has also presented an unparalleled challenge and opportunity to the RCAF's Construction Engineering Branch which has the overall responsibility for the site. In the words of Air Commodore R. B. Whiting, MBE, chief of construction engineering, "in building this combat centre we are pioneering in the field of protective construction".

Blasting into Canada's Precambrian Shield proved to be a difficult task for the miners who numbered, at the peak period, more than 400 men. To date, 750 tons of explosive have been used in carving out cathedral-sized caverns and a labyrinth of subterranean passageways. Two tunnels were dug from the core of the underground site, one running to RCAF Station North Bay and the other to Reservoir Hill. One of the tunnels was built large enough and of sufficiently gentle slope to allow large mining vehicles to enter it and make their way into the interior of the mountain. Later, moving vans and tractor trailers will drive right into the heart of the SAGE site to unload electronic equipment and other supplies.

The tunnel leading to the air force station (north tunnel) passes under a number of farms. At one point during the construction a farmer, whose water supply suddenly failed, accused the contractor of "pulling the cork" out of his well, while another claimed that his chickens had stopped laying eggs because of blasting operations. But, in spite of these incidents, the crews moled their way through 33 feet of granite each day and completed the tunnel on schedule. When the project is finished the north tunnel will be travelled by means of an inclined railway operated by a mine hoist. The entrance, or north portal as it is called, comes out within the station area, and will be given additional security by having a guard house built over its entrance. This entrance will normally be the only means of access as the south tunnel will be locked and utilized only to bring in heavy equipment.

When excavation and construction is completed, the chambers will house a three-storey building. Within this completely modern communications and missile control centre RCAF personnel will, with radar, radio and digital computers, control the manned interceptors or missiles which can seek out and destroy the enemy. (See page 27) One chamber contains enormous diesel generators which can produce sufficient electricity to light a town of 3,000 population and to pump in tens of thousands of cubic feet of fresh air per hour. Another chamber is a vast

During excavation a railway removed rock from the north tunnel.



water reservoir holding almost five million gallons of water to be used for cooling the installation.

When the project is completed and the contractors' huts are torn down there will be little to indicate the throbbing activity which will be going on in the heart of Reservoir Hill. A slight haze drifting leisurely up through the trees will indicate, to those who know, that the diesels are running. Water gurgling down the hillside in an open pipe will resemble an ordinary drainage ditch but will, in fact, be water returning to Trout Lake after performing the vital task of cooling the vast complex of electronic equipment.

North Bay was selected for Canada's first SAGE site for a variety of reasons. It is a communications centre for the Bell Telephone, CNR, CPR and the RCAF. It is well equipped with transportation facilities, being served by three railways and several highways including the Trans-Canada route. It has a rock formation suitable for drilling and blasting and there is an ample water supply nearby. It is also conveniently close to an RCAF station equipped with permanent facilities. The objective was to obtain a protected installation by exploiting the best site available to the greatest possible degree within economic practicability. This has been done.

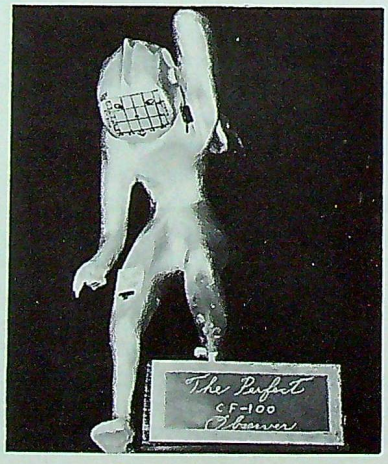
IDEAL AIRCREW

THE PERFECT "CF100" PILOT

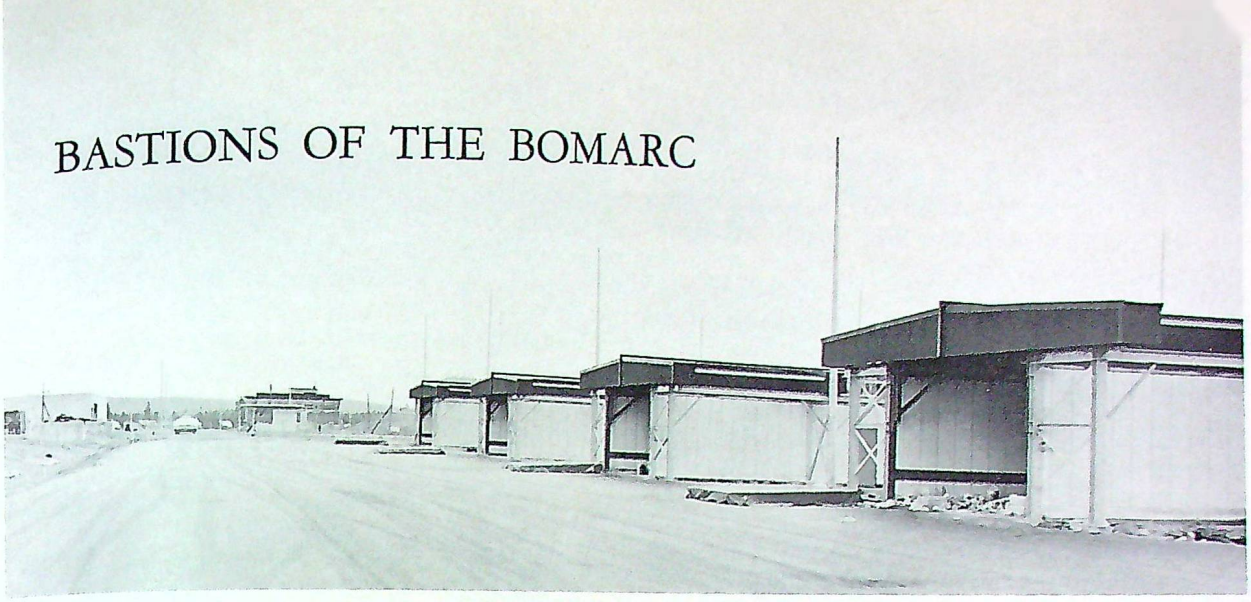
Pointed head to check flap jack
Single eye for manual rocket firing
Built-in headset to eliminate inner helmet
Jutting chin to prevent oxygen leak
Offset head to facilitate reaching blind
Thin upper body to ease "G" load
Curved spine to fit seat
Bucket-bottom for bucket seat
Indentation under right arm for hard hat
Short right forearm to reach cockpit lights
Long left arm to reach Yaw Damper trim
Strong right biceps to close HP cocks
Strong fingers left hand to check brake pucks
Hole in forefinger to check "press to test" lights
Bowlegged to reach seat "D" ring
Large left foot to kick tires on external.

THE PERFECT "CF100" OBSERVER

Too modest to remain up on pedestal
Permanent hunch back to suit occupation
Built-in headset to eliminate inner helmet
Built-in canopy cleaver for ejection
Right thigh flattened for knee pad
Ball joint pen built into index finger
Pencil built into right elbow for Emergency U/C lowering
Long left toe to operate mute switch from stirrups
Flat circular face to fit scope
Scope etched on face to continue on memory if radar fails
Extra eyes, high on side of head to visually check target break.



BASTIONS OF THE BOMARC



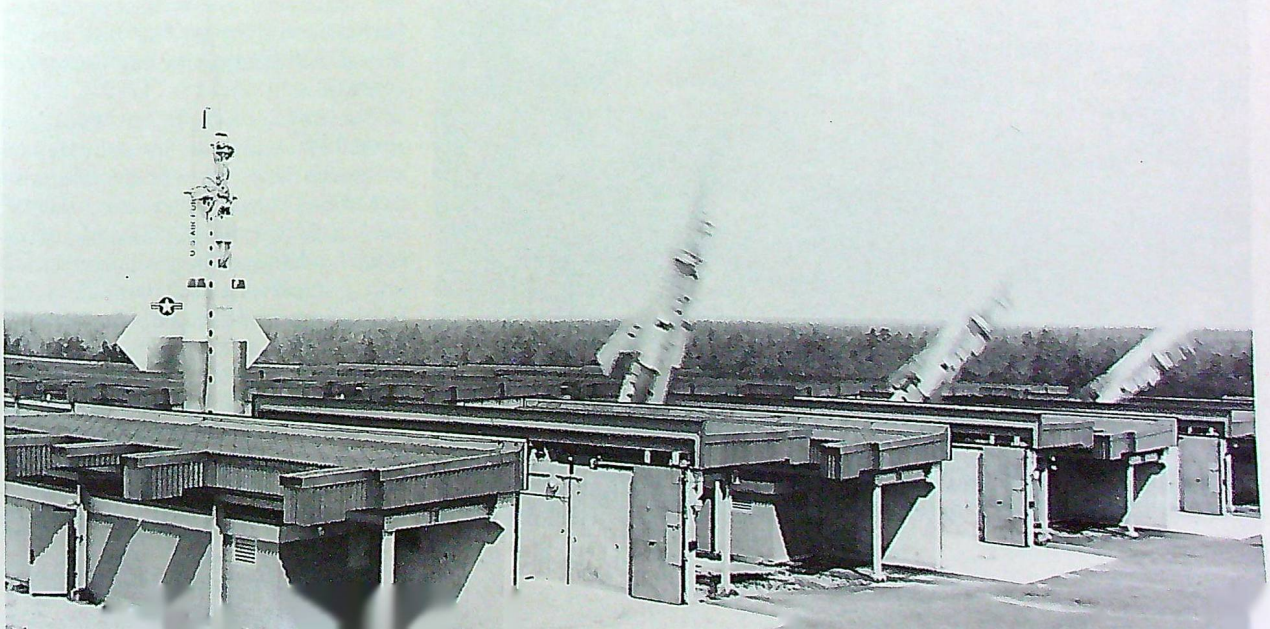
Bomarc shelters under construction at North Bay.

La macaza, Quebec, and North Bay, Ontario, besides both being located in the Precambrian Shield, now have something else in common. They are the locations of Canada's first missile bases.

Tourists motoring past the North Bay site might be mildly curious as to the identity and purpose of the establishment but it is unlikely that they would be impressed. What appears from a distance to be several rows of innocuous-looking warehouses or storage sheds will eventually house IM-99Bs, surface-to-air defensive weapons more commonly known as *Bomarcs*.

How all this came about is history — recent history. As early as 1946, however, RCAF personnel were attending the University of Michigan for courses relating to pilotless aircraft and guided missiles. Since that time, the RCAF has monitored various test and development programs in order to keep abreast of latest developments in the missile field. The knowledge so accumulated was put to practical use when Canada decided in 1958 to add *Bomarc* to

Four IM-99A *Bomarc* air defence interceptor missiles are shown coming up out of their shelters during a recent practice alert in the US. The *Bomarc Bs* at North Bay and La Macaza will appear similar to this except that their reaction time is much shorter, range and altitude much greater. An area of 500,000 sq. mi. can be defended by each base



its defensive inventory. After a comprehensive engineering program was carried out, the contractor moved onto the North Bay site in May 1960 and actual construction commenced.

SUPPORT AREA

There are two areas within the site, the support area and the launch area. A fence around the perimeter of the installation plus a guard house at the entrance provide security for the support area. A second fence and another guard house provide the additional security required for the launch area. The outer guard house is a building renovated from its former use as a remote transmitter site for RCAF Station North Bay. In its new role it will serve as a canteen for the personnel of the unit as well as a check point for all personnel and vehicles.

The composite building, besides housing offices and a standby diesel installation, will contain the squadron operational centre and control room. When that room is finished, seemingly endless rows of coloured lights will glow in predetermined pattern on a display board to indicate up-to-the-minute status of the unit's missiles. In the next room a vast array of telecommunications equipment and various computers will do their electronic best to acquire and pass status information to the SAGE computer and receive, identify, and pass pre-launch and fire-up information to the proper missiles. Another room in the composite building is the storage section. Here workmen are erecting long alleys of metal shelves and bins to contain the many thousands of parts and pieces which will be required to keep the *Bomarc* weapon system operational. Behind the parts department in a room the size of a small warehouse is the area where heavy equipment will be kept in storage.

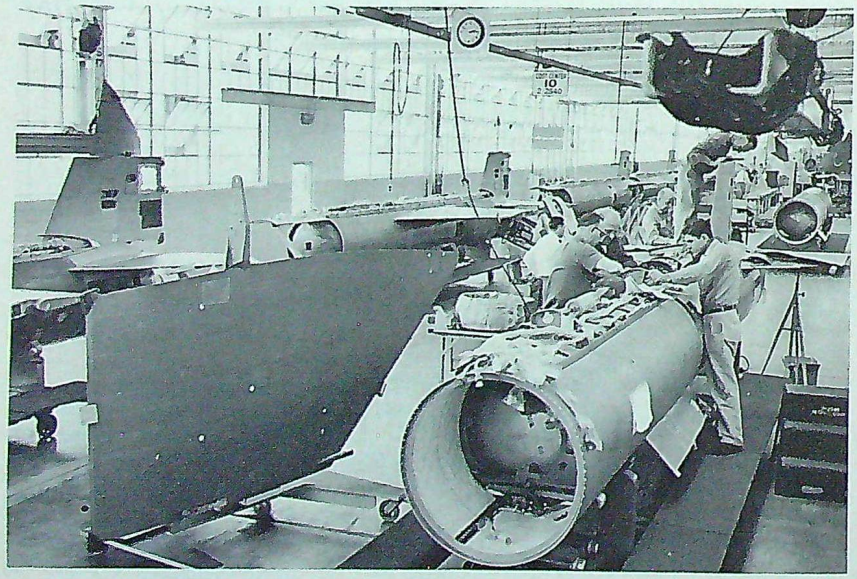
The assembly and maintenance building will be used to assemble the *Bomarc* missiles when they arrive in pieces from the factory and also for carrying out any major maintenance on the missiles. For these purposes, the building is equipped with six-ton gantry cranes.

LAUNCH AREA

In the launch area the shelters are rapidly nearing completion. These harmless looking buildings, 60 feet long and 36 feet wide, have roofs which will glide open smoothly under 3000 pounds of hydraulic pressure at the press of a button. Inside, the *Bomarc* missile will be raised to a vertical position in a few seconds and then will be ready to fire. Since it will not be feasible to actually test-fire the *Bomarc* a method to determine the serviceability of the sleeping monster has been devised. This will be done by an elaborate test program carried out periodically on each missile. The testers will drive up to each shelter, porcupine the *Bomarc* with a multitude of cables, then watch lights and dials react as each of the many parts checks-out. If there is a malfunction anywhere, the test will stop, the component will be changed and the test will start all over again. Only after all the sequences are functioning properly, according to the test equipment, will the missile be considered operational.

The *Bomarc* site at La Macaza is generally similar to its counterpart at North Bay but will be larger in size. Since there is no nearby RCAF station to handle the housekeeping role, La Macaza is a self-contained unit complete with barracks, mess halls, chapels, workshops and all the other facilities required to operate an air force establishment. The Quebec *Bomarc* site is not completely isolated, however. In addition to the usual road and rail facilities there is a nearby 6000 foot runway to handle air traffic requirements.

Boeing's Missile Production Centre in Seattle fabricates and assembles *Bomarc Bs*, except for engines. Wings are produced in Canada by Canadair. Missiles will be delivered to the RCAF in a partially assembled state. Ramjets and solid rocket boosters will be mated with the airframes and tested in assembly and maintenance shop on site before missiles are installed in their launchers. First production model rolled out last November and was shipped to Chanute AFB to be used in training both RCAF and USAF personnel.



Memorial service at Winnipeg cenotaph followed parade to Manitoba legislative building grounds. Training Command band led RCAF honour guard, air cadets of No. 200 Red River Sqn., and association delegates.

WINNIPEG NATIONAL CONVENTION REPORT

By SQUADRON LEADER A. T. PATON, DFC, Editor THE ROUNDEL

EVEN the weatherman co-operated in extending true western hospitality to the RCAF Association in Winnipeg last month. The 11th Annual Convention met under a mid-summer Manitoba sun and delegates from coast to coast responded to the warm welcome by conducting what has been hailed as one of their most successful national meetings.

Mayor Stephen Juba brought his city's greetings following the opening ceremonies in the Royal Alexandra Hotel on May 18.* Three hours later Premier Duff Roblin, himself an active member of the RCAFA's host wing (No. 500, City of Winnipeg), personally greeted delegates at a luncheon tendered by the province. In the meantime, a formal parade through city streets and a memorial service at the cenotaph had made Winnipeggers aware of the "Keystone Convention's" presence.

A/V/M H. M. Carscallen, DFC, AOC Training Command, whose headquarters are at nearby RCAF Stn. Winnipeg, delivered the keynote address. After briefing the delegates on the status of airforce training and problems affecting it today, he called upon the RCAFA to renew its efforts in support of the Canadian nation and the RCAF.

In reply, RCAFA national president Leonard N. Baldock said that the A/V/M's remarks paralleled to an amazing degree what had been discussed by the national executive council the previous evening.

Briefing on the state of the RCAF came next day from Air Marshal Hugh Campbell, CBE, chief of the air staff. He prefaced his remarks by commenting on some of the changes in aviation and space in the past 50-60 years, stating that in less than six decades the aeroplane "has proven its value in both civil and military operations and has provided a spring board of experience for man's leap into space."

A/M Campbell then reviewed the

*The city was host at luncheon next day.

1961 NATIONAL EXECUTIVE COUNCIL

Front row (l. to r.): A. J. T. Boyd, 4th vice-president; G. E. Penfold, 3rd vice-president; P. F. Connell, 1st vice-president; L. N. Baldock, national president; J. A. Cooper, 2nd vice-president; Miss E. Rowand, WD representative (national). Back row (l. to r.): G. A. Ault, QC, legal adviser; F. G. Michalak, president Quebec group; W. H. Caverley, president Ontario group; L. E. Fulton, representative Quebec group; G. M. Esdale, chairman; L. J. Schedlin, representative Ontario group; R. A. Watson, representative Maritime group; A. T. MacLellan, president Maritime group; Miss E. B. Halliday, WD representative (western); S. T. Coote, president Manitoba and NW Ontario group (succeeded 1 June by H. Ogden); Miss Anne O'Grady, WD representative (eastern); R. D. White, president Alberta group.

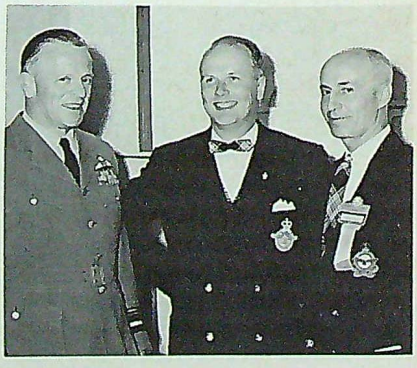
present-day tasks of the RCAF and what is being done to carry them out. This entailed a description of the extensive re-equipment program and brought out the fact that the RCAF is conducting a continuous program of testing, evaluating and developing to make equipment in all fields more effective.

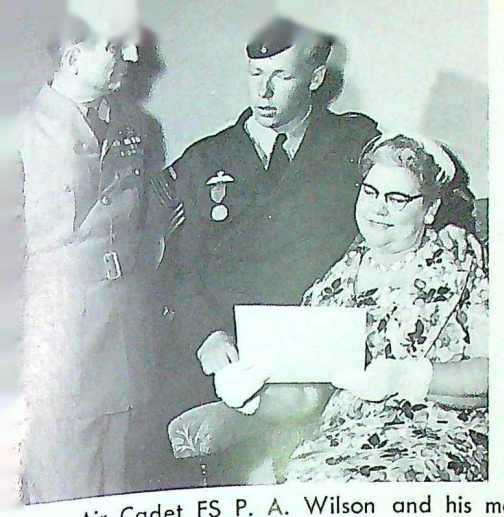
As we move forward into an era in which automaticity and complex technology play an increasingly important part, the CAS is convinced the RCAF has the skills and knowledge to adapt itself to future requirements, well aware that predominance in any field today is no guarantee of excellence tomorrow.

That evening, the Hon. D. S. Harkness, minister of national defence, addressed the convention's annual dinner on the broader subject of Canada's defence program and some problems associated therewith. Mr. Harkness stated at the outset of his speech that there is a real threat to the western world's security. This threat, which arises directly out of the avowed aim of communism to dominate the world, takes many forms and makes use of a wide variety of tactics: subversion, infiltration, virulent propaganda, terroristic threats of nuclear destruction, economic warfare, and every other device short of open military

Past presidents in attendance (l. to r.): A/V/Ms A. L. Morfee, G. E. Brookes, K. M. Guthrie, F. G. Wait (re-elected as grand president) and A/M W. A. Curtis (immediate past president).

A/V/M H. M. Carscallen, national president L. N. Baldock and convention convener H. M. Bell.





Air Cadet FS P. A. Wilson and his mother examine the certificate of commendation presented to him by A/M Hugh Campbell. The 18-year old cadet had previously received the Royal Canadian Humane Society's medal for saving a 12-year old girl from drowning in the Souris River near his home of Melita, Man.

Provincial groups vied for recognition, as illustrated by this scene at the reception desk in the Royal Alexandra Hotel. Later, "at homes" featured such costumes as sou'westers and bluenoses from the Maritimes, snowshoers' toques from Quebec, hardhats from Ontario, strawhats from Saskatchewan and full Indian regalia from Alberta.

conflict. While resorting currently to tactics and means short of war, Russia maintains her military strength at high pitch.

"The first and, to my mind, the most important aspect of Canada's defence program is membership in alliances that have a common aim: the maintenance of peace and the prevention of war," said the minister. He then explained why and how Canada contributes to the military strength of NATO, NORAD and, from time to time, forces that have been placed under UN control. In return for the collective security that has accrued to us from membership in international alliances, Mr. Harkness said we must be prepared to meet our commitments with well-trained, well-equipped forces that are flexible and mobile and by paying our share of the costs.

He concluded by reiterating the fact that Canada is doing its utmost in the UN and other Councils to find a solution to some of the world's problems. "Our statesmen are seeking for the key to disarmament with security. Until they find it, we can best serve the cause of the democratic nations by shouldering our share of the responsibility for preserving peace through strength."

The convention dealt with the following topics:

●Canada's Defence Policy — a statement of policy was issued, unanimously endorsing the defence policy of the Canadian government as reiterated by the minister of national defence in his address to the delegates, particularly the support of the government in NORAD, the NATO alliance and the United Nations.

●Communism—a special RCAFA committee was appointed to arrange programs, to be conducted in conjunction with other veteran's organizations, to express opposition to communism and stress our firm belief in democratic principles; to urge provincial departments of education to include a study of the communist threat in school curricula; to request all universities to guide students in the preservation of democracy; and to urge civic leaders to assist in alerting public consciousness to the dangers of communism.

●Foster Parent Plan—all wings were urged to actively support and participate in the foster parent plan for children in foreign lands. The national office was directed to provide liaison between wings and the various agencies engaged in this program.

●National Bursary Fund—the association resolved to institute a fund to assist in the advanced education of the children of those who served in Her Majesty's air forces, contributions from wings to be on a voluntary basis.

●RAF Escaping Society—financial support to this organization was recommended on a per capita basis and it was recommended that each group appoint a member to help the RAFES achieve its objective of re-establishing contact between Canadian evaders and their European helpers.

●Association Fiscal Year — the convention resolved to change the RCAFA fiscal year from 1 April-31 March to 1 August-31 July, to be effective 1 August 1963, and that in order to accomplish this changeover all wings will, on 1 April 1962, pay renewal dues for a period of 16 months (1 Apr. 62-31 Jul. 63). The renewal dues for this period will be $4.00 per member.

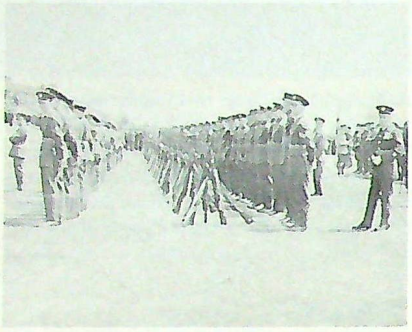
●Next Convention—having previously decided to change the annual meeting from May to September, the delegates agreed to hold the 12th annual convention in Halifax in September 1962.

Letters To The Editor

TRENTON TRAILERS

Dear Sir:

Several picture captions accompanying the Trenton story (Apr. 61) are, I believe, in error. For instance, the picture of the troops on parade on page 15 was taken, if



my memory serves me correctly, in the spring of 1937 in connection with the coronation of H. M. George VI.

The troops are at open order awaiting the commencement of the ceremonies. This particular group fired a "Feu de joie". The parade area is near a hill at the north outskirts of the town of Trenton and the public can be seen in the background watching the ceremony. The left markers are Sgts. "Blimp" Neale and Tommy Reid, both of whom retired as flight lieutenants. The supernumerary warrant officer is WO2 Vince who retired as a group captain. Somewhere in the first rank is LAC Barclay.

For your information, open necked tunics came into vogue in 1937 and by 1939 the majority of the airmen at least had an open necked tunic for their No. 1 blues.

The crashed aircraft shown on page 14 is a dual *Siskin* fighter with an Armstrong Siddeley 14 cylinder engine. Incidentally, *Wapiti* aircraft were two-seater day bombers, not fighters, and were generally known as "What-a-Pity".

W/C H. D. Barclay,
Air Materiel Command HQ.,
RCAF Station Rockcliffe.

Dear Sir:

I enjoyed immensely S/L Bowdery's article on RCAF Station Trenton (Apr. 61) but would like to point out one mistake:

The statement "it was soon discovered that no native Australian or New Zealand trees could survive a Canadian winter" is a slur on British Columbia. Native Australian eucalyptus or "gum" trees have thrived for a number of years in parks in Vancouver and Victoria.

F. D. Cooper,
548 Abercorn Ave.,
Montreal 16, P.Q.

TUSKERS RALLY

Dear Sir:

No. 413 Squadron, RCAF Station Bagotville, P.Q. will be hosts for a re-union this year to coincide with the squadron's 20th birthday. The dates of festivities will be as follows:

Friday 30 June P.M. — Stag
Saturday 1 July P.M. — Mixed Party
Sunday 2 July P.M. — Cocktails and Supper

Local accommodation will be arranged on request and all interested officers who are ex-members of 413 Sqn. are encouraged to write to the Officer Commanding as soon as possible for further information.

F/O P. R. Delong,
RCAF Stn. Bagotville, P.Q.

UNSEEN STATIC LINE

Dear Sir:

Re the comment on static lines (Letters, Mar. 61) which allegedly were not hooked up in the picture appearing in your Dec. 60 issue:

Belonging to No. 426 Sqn. at the time, I was one of the personnel in the picture taken in the *North Star* on that supply dropping trip. I wish to state there were static lines attached to the parachutes, but as they were connected to the floor with a D-ring on the opposite side you cannot see them in the photo.

I am pleased to say that all our drops were successful during this period.

Cpl. T. Currie,
Safety Equipment Tech.,
4 Wing RCAF,
CAPO 5056, CAFE.

SEE INSIDE FRONT COVER

Dear Sir:

With tongue in cheek, I would like to say that it was with extreme difficulty that I carried out your instructions to 14-year old Richard Day (Letters, Apr. 61) and located the cost of the annual subscription to this eminent journal. After treatment of the page with various fluids, I realized that the printer had used a truly new type of invisible ink!

F/L A. A. Jagoe,
RCAF Stn. St. Jean, P.Q.

(To err is human. But who says printers are human? — Editor.)

RCAF BENEVOLENT FUND

Re-elected at the annual meeting of the RCAF Benevolent Fund in Ottawa last month were Wing Commander D. Park Jamieson, left, of Sarnia, Chairman, and Air Vice Marshal F. S. McGill, of Montreal, President. Honorary President of the fund is Air Marshal Hugh L. Campbell, Chief of the Air Staff.

The 18th annual report of the fund disclosed that 2,378 applications for financial assistance had been reviewed in 1960 and that 1,306 grants and 915 loans, amounting to $186,-235 and $262,971 respectively, had been made. Established in 1934 as a trust, the Benevolent Fund provides financial aid to members and former members of the RCAF and their dependents who are in need of such assistance. During the Second World War, to ensure a continuing organization, the fund became a corporation with capital being derived from canteen funds. Since then however, the fund has been supported by contributions from air force messes, non-public station funds, private donors and the interest from investments.

ONE SOLUTION TO COMPLAINTS

Following protests about jet noise from the occupants of 78 houses near Copenhagen Airport, Kastrup, the Danish Government has arranged to purchase the houses and demolish them.

Aeroplane & Astronautics Magazine

The Neighbors Pay us a Visit

On their first official trip outside the U.S.A. since his election, President and Mrs. J. F. Kennedy were welcomed at R.C.A.F. Station Uplands last month for a two day Ottawa visit. Front row (L. to R.): Mrs. J. G. Diefenbaker, Mrs. Kennedy, Mrs. G. P. Vanier, President Kennedy, Governor General Vanier, Prime Minister Diefenbaker. An honour guard of R.C.A.F. recruits from the St. Jean manning depot can be seen in the background.

Roger Duhamel

The Queen's Printer — L'Imprimeur de la Reine

OTTAWA

ROYAL CANADIAN AIR FORCE