

ROUNDEL



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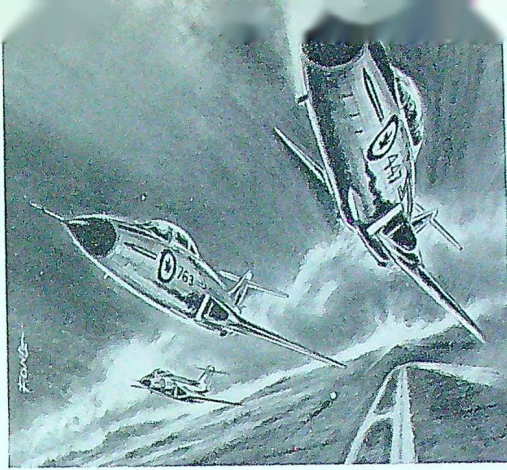
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COVER CAPTION

Looking towards the south entrance of the tunnel which burrows deep into Reservoir Hill near North Bay, Ont., new location of Northern NORAD Region HQ (see page 8).

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ON THE BREAK

ON 26 Sept. at RCAF Station North Bay, Ont., service and civilian dignitaries of two nations will gather to witness the official opening of Northern NORAD Region's unique underground headquarters. With the change-over from manual to SAGE operation, its combat centre assumes control of the largest territorial area of any of the eight regions into which North America has been divided for air defence purposes (see cut).

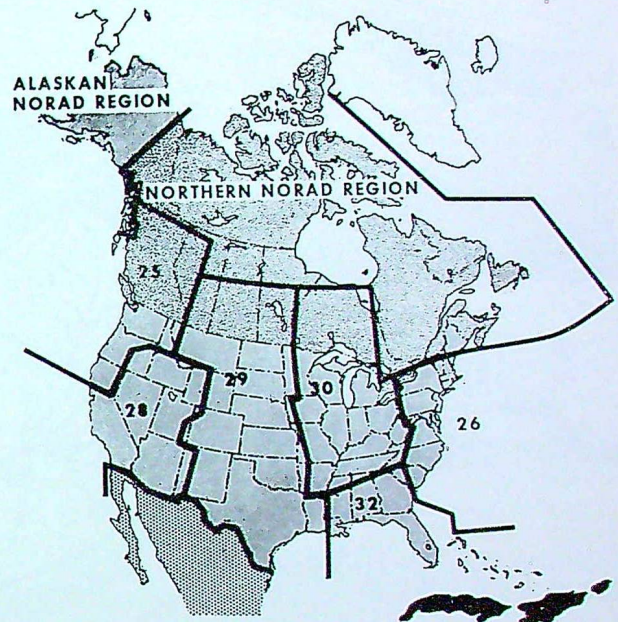
Completion of "the hole in the ground" at North Bay is one of many changes which have taken place throughout the air defence system in recent years. This is, therefore, an appropriate time to bring you up-to-date on what has been going on since last we devoted an issue to NORAD in June 1962.

Naturally, we begin such a review by looking at the broad picture — as seen by S/L "Moe" Morrison, the RCAF's senior representative in NORAD HQ's office of information (page 2). The North Bay story (page 8) and a quick tour of Pinetree today (page 14) should convince readers things are indeed changing in the air defence business.

THIS summer's total eclipse of the sun was studied by astronomers and physicists from various vantage points in Canada. Many of their observations are still being evaluated, among them those taken from an RCAF Yukon high over Great Slave Lake and a specially-equipped CF-100 over Thetford Mines, Que. Next month Dr. J. C. Arnell, scientific advisor to the CAS who was aboard the *Yukon*, will give *ROUNDEL* readers a description of the preparations for and execution of "Operation Eclipse."

We viewed the phenomenon at Churchill Research Range, trying to keep one eye on the sun and the other on instrument-laden rockets which went up for a closer look (page 20).

DURING World War II the RCAF operated 45 squadrons overseas. Most flew in the Afro-European theatre, but three were based in the Far East: Nos. 413, 435 and 436 Sqns. The latter two were transport units operating in India and Burma. Their histories have already appeared in *ROUNDEL* (Feb. '53 and March to July '62, respectively).

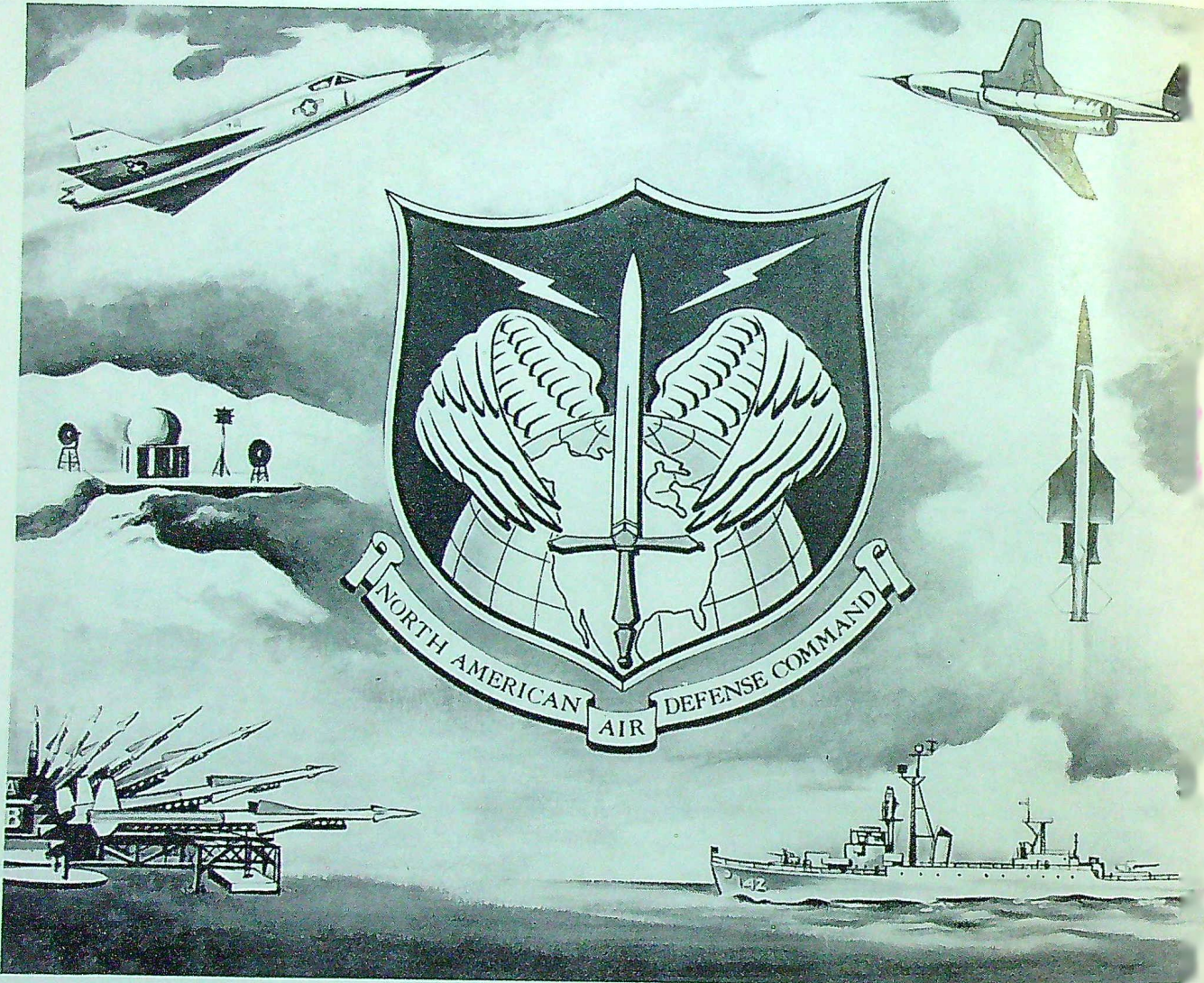


No. 413 spent almost three years in Ceylon, flying *Catalinas* on a wide variety of tasks. Beginning on page 22, F/O Hugh Halliday (whose last *ROUNDEL* by-line appeared on the Six Group story a few months ago) tells "The Tuskers' Tale" — a squadron history which began in northern Scotland in 1941 and ended early this year in eastern Canada.

ON the shores of the Pacific, in the shadow of the Coast Range, members of the RCAF Association will meet in Canada's most beautiful city this month for their 13th Annual Convention. For a preview of events in Vancouver see page 30.

At Paton S/L

NORAD - Only the Name's the Same



To defend North America from aerospace attack NORAD employs a variety of systems, some of which are illustrated above. Land, sea and airborne radar stations provide early warning and control facilities. Supersonic missiles and fighter interceptors stand ready to repulse invaders.

By SQUADRON LEADER L. C. MORRISON
Deputy Director for Public Affairs, NORAD HQ.

A STORY of evolution rather than revolution obscures the fascinating changes that have taken place in NORAD — the North American Air Defence Command — since its inception in 1957. As one officer who has been with the command for some years put it, "Only the name's the same!"

Although the transformation really isn't that great, tremendous strides have been made in the business of defending this continent. Even the basic mission of NORAD has gradually become accepted as "Defend North America against *aerospace* (instead of merely *air*) attack".

It is in the realm of defence against attack from intercontinental ballistic missiles (ICBMs) and in the steps being taken to plan a defence against orbiting space vehicles where most of the public interest lies. But great changes have also taken place in countering the threat from manned bombers, and more are contemplated.

THE CHANGING THREAT

Bare statistics fail to tell the whole story. The changing picture of the threat and what has been done to counter this must be considered.

When NORAD came into being in 1957 the ICBM was still in its infancy as a dependable weapons system and the orbiting space vehicle was regarded by many as belonging to the fiction books rather than to the roster of potential threats to this continent. The manned bomber in the hands of the United States Strategic Air Command provided the deterrent to war and the manned bomber in the hands of the Soviets provided the most likely delivery system for an attack.

Now, less than six years later, the picture has greatly changed. While the bomber remains the threat that could do the most damage if allowed to have free access to targets, the ICBM and sub-launched ballistic missile take increasing importance in any threat assessment, and furthermore, dictate changing tactics in preparing to wage a battle against the total threat.

What has NORAD done and what is NORAD planning to prepare for this changing picture?

Six years ago the air defence power of the continent was based largely on the non-nuclear capable, sub-

sonic interceptor backed up by the short range Nike Ajax surface-to-air missile, also non-nuclear capable. Command and control were exercised through a manual system and no system at all existed for the detection of ICBMs or for surveillance in space.

NEW DEFENSIVE SYSTEMS

Today NORAD's defensive weapons systems are supersonic fighters and medium range as well as improved short range surface-to-air missiles, deployed to give this much improved force a "punch" many times greater than before. The now familiar word SAGE (Semi-Automatic Ground Environment) has appeared on the scene and means that most of the information required by this quick-reacting force is processed in microseconds to provide commanders with the necessary facts to conduct successful air operations. The Ballistic Missile Early Warning System (BMEWS) has been developed to provide the continent with warning of impending missile attack and a further system, the Space Detection and Tracking System (SPADATS), has come into being to provide the "building blocks" for possible future operations in space.

All these changes took place slowly, and sometimes painfully, after much examination of alternatives and with little fanfare. Each change was the direct result of a changing estimate of the possible threat to the continent and of the best military estimate of how to combat it. The job of NORAD has always been complicated by having to be able to do an effective job today and move towards being in a position to do an effective job tomorrow in the light of constantly changing conditions.

The manned bomber has been and continues to be the principal threat to this continent. In the face of this threat the manned interceptor, the unmanned interceptor and the surface-to-air missile have been constantly improved. Even with fewer numbers of these weapons, NORAD is in a much better position to combat the bomber threat than ever before. This is due in part to the complete equipping of some regular squadrons with supersonic planes and others with Bomarc and the surface-to-air missile of the improved

Nike Hercules type.

Realistic testing and exercising of this equipment also has been a key factor in improving the performance.

IMPROVED SURVEILLANCE

Constant improvement of the surveillance network has been accomplished during the short time that NORAD has been in business. About 15% more prime radars exist now than in 1957. Gap fillers have more than doubled in number. Airborne early warning stations have moved to more strategic locations and been increased by about 30%. There are now more than double the number of picket ships than was the case six years ago. Only the off-shore "Texas Towers" have been eliminated from the system. From one station in 1957, this useful type of installation rose to three in all and, after performing good service for several years, were phased out recently and replaced by improved airborne equipment.

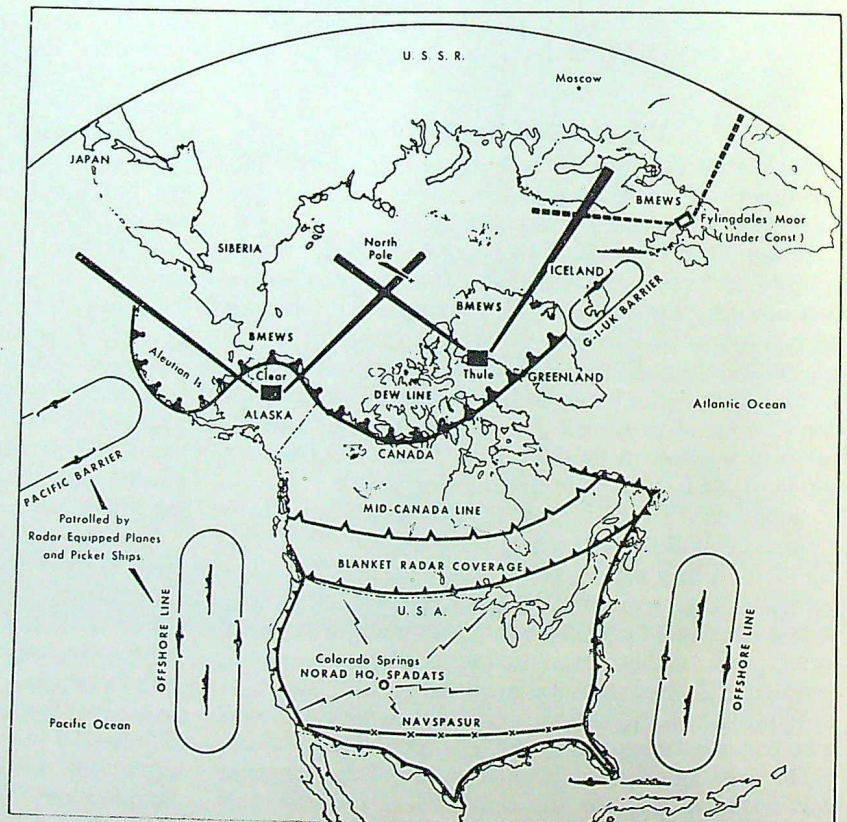
Since the inception of NORAD, the DEW (Distant Early Warning) Line has been extended both east and

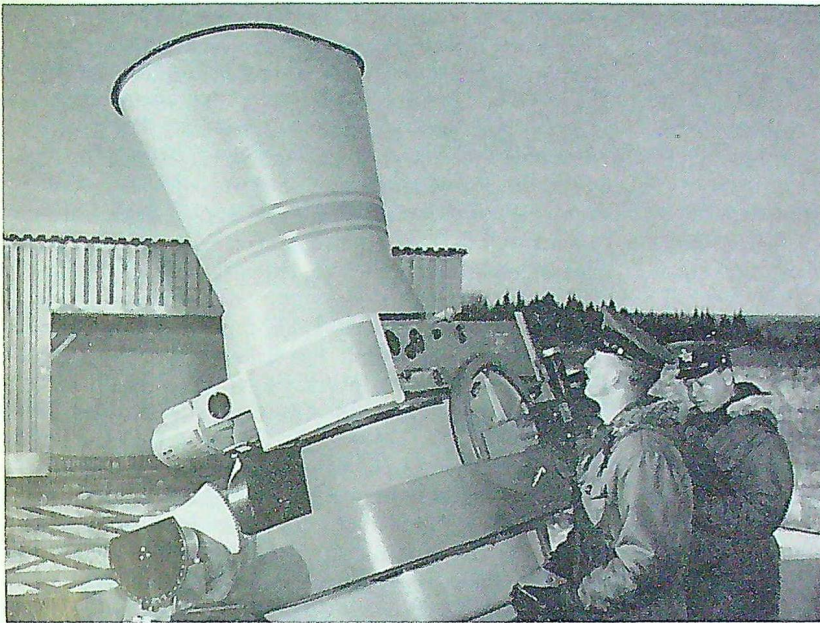
west with the addition of the Greenland-Iceland-United Kingdom Barrier, the Pacific Barrier, the Aleutian extension and the Greenland extension. This summer it was announced that 28 intermediate DEW Line installations would be phased out, but that the "line" will continue to provide acceptable early warning. The doppler system Mid-Canada Line also has come into operation since NORAD was formed, although it was virtually completed by 1957.

Completely new have been the additions to NORAD operational control of three more surveillance systems, two dealing with space and one with the detection of nuclear detonations.

On 30 Sept. '61 the first of three installations of the Ballistic Missile Early Warning System (BMEWS) came into operation at Thule, Greenland, with NORAD headquarters receiving its first information from that site through its control centre and display facility in Colorado Springs on the same date. The second BMEWS site, at Clear, Alaska, became operational on 30 Jun. '62 and a third and final one will be completed at Fylingdales Moor, England, this year.

NORAD's growth has seen the DEW Line extend westward through the Aleutians and eastward through Greenland, with airborne barriers over both Pacific and Atlantic Oceans. BMEWS provides early warning of ballistic missile attack. Blanket radar coverage of the Pinetree System over mid-continent has been strengthened. Space travellers are followed by USN's Space Surveillance System (NAVSPASUR) and USAF's Space Track System.





The RCAF keeps an eye on space. Here AC A. Dew and LAC K. Dodds work with a satellite tracking camera.

The BMEWS system provides NORAD with about 15 to 20 minutes warning of missile attack from the Eurasian land mass.

Also classed as a surveillance system is SPADATS — The Space Detection and Tracking System — which came under NORAD operational control late in 1960. This facility, with its headquarters in the NORAD combat operations centre, has the responsibility for detecting, tracking and cataloguing all man-made objects in space. Sensor stations situated around the world feed information into the centre in Colorado Springs where it is processed, analyzed and displayed for use by the NORAD commander in chief.

Main contributors to SPADATS are the United States Navy with its Space Surveillance System (SPASUR) stretching across the southern United States and the United States Air Force Air Defense Command with its "SPACETRACK" system controlling a number of sensors in various parts of the world. Other contributors include civilian scientific organizations contributing on a volunteer basis, such as the Canadian Defence Research Board's tracker unit at Prince Albert, Sask. The RCAF input into SPADATS is from a Baker-Nunn camera installation at RCAF Station Cold Lake.

Latest of NORAD's surveillance systems is the Bomb

Alarm System operated by the USAF ADC. This facility came into operation on 1 Sept. '62 and consists of a number of optical-thermal sensors scattered over the United States at strategic positions to instantly flash the message to NORAD that a nuclear detonation has taken place.

Recent NORAD changes of special interest to Canadians are largely grouped under what is called the CADIN (Continental Air Defence Integration North) plan, and are described in following articles in this issue.

Perhaps the most dramatic change to take place in the entire NORAD system was the introduction of the SAGE (Semi-Automatic Ground Environment) centres. The first SAGE sector (New York) became operational on 26 Jun. '58. Activation of the only Canadian SAGE at Northern NORAD Region headquarters, North Bay, completes the change-over from manual to semi-automatic control.

CHANGES YET TO COME

It isn't likely that NORAD's next six years will be any less subject to changes than the past six have been. In fact, all indications show that even more dramatic ones can be expected. While for obvious security reasons complete details of future planning cannot be

revealed, it is possible to predict some of the things that might occur. As was stated earlier, the changes made in NORAD are brought about by a changing threat evaluation and in keeping with the best military prediction of how to combat a threat that at the moment doesn't exist. Long lead-time on new equipment dictates this procedure.

In the weapons field there is an urgent need for a weapon to combat the ICBM: an anti-missile missile. This is already in the research and development stage. It cannot be predicted with certainty that the Nike Zeus or its later development, the Nike X, will ever be found in the NORAD inventory. But history has taught us that for every offensive weapon developed a counter has been found, so it seems likely that a means will be found to combat this threat. NORAD would be the prime users of such a weapon.

History has also taught us that man has always found a military capacity in each environment in which he has explored. This would lead one to believe that there will be military operations in space some day. It is up to NORAD to make the necessary plans to be able to

move into this field should the occasion arise.

The possibility of still another generation of manned interceptors being acquired is still with us. NORAD has a stated requirement for such an aircraft. This new plane would have a radius of action over 1,000 miles, it would have a top speed in the vicinity of 2,000 miles per hour and would be capable of operating well in excess of 70,000 feet. It would have a self-contained radar capability of much improved range, permitting operation independent of ground control. Such an aircraft is considered necessary to combat a growing threat from the "stand-off" bomber carrying an air-launched missile which can stay well away (500 to 1000 miles) from its intended target and still attack. This improved manned interceptor could be built today, using knowledge and skills already in the hands of the aircraft manufacturers.

As has been the case in the past, NORAD command and control systems may well show the most dramatic changes in the next period of NORAD history. Within the next two years it is expected that the nerve-centre of the whole organization, the combat operations


U.S. President J. F. Kennedy and General J. K. Gerhart, NORAD commander-in-chief, are briefed on current COC picture by A/V/M M. D. Lister, deputy chief of staff for operations.



Air Marshal C. R. Slemon, deputy commander-in-chief since NORAD's creation in 1957, was recently made an honorary citizen of Colorado Springs by former mayor W. C. Henderson.

centre (COC), will move into the heart of Cheyenne Mountain on the southern edge of Colorado Springs. This "hard-site" will provide the COC with a higher degree of protection from nuclear attack than has ever before been achieved. Thought is being given to the survivability of the NORAD sectors' command and control facilities. Work is proceeding now on a plan labelled Back-up Interceptor Control (BUIC). BUIC,

as the name implies, is a dispersed control system being built to be available to take over a section of the NORAD system in the event a SAGE centre is knocked out.

Whatever happens to NORAD in the future, we can be sure that every action will be taken to provide the maximum aerospace defence of this continent for as long as a threat exists. 

By 1965 Cheyenne Mountain, five miles south of Colorado Springs, will house NORAD's combat operations centre under hundreds of feet of granite. Access roads and tunnel entrances look like this. Inside the mountain work is proceeding on the "hard site" which will provide NORAD's nerve centre protection from nuclear attack.



A CAVALCADE of cars raises a plume of dust under the shoulder of Reservoir Hill near North Bay, Ont. The cars swing into a parking lot and their drivers accumulate in a little knot in the early morning sun. A few read morning papers like commuters across Canada, while

glass and aluminum doors, check briefly at the security desk and disperse to their diverse jobs.

And so starts a normal day in the only hardened SAGE installation in North America. This daily routine is relatively new but has been developing steadily since the head-

down into sectors. Each region commander is responsible to CINCNOAD for all aero-space activity within his designated area, and he and his staff are constantly monitoring activities within their region. The sector commanders are responsible for the detection, iden-

AIR DEFENCE GOES UNDERGROUND

BY SQUADRON LEADER K. G. ROBERTS, DFC
Director of Information, Northern NORAD Region

others gaze wistfully at vacationers fishing and sailing on Trout Lake a few hundred yards below them.

The soft drawl of the South blends with Canadian voices as newcomers greet friends and associates. The blue uniforms of the RCAF and USAF mix with the tans of the U.S. and Canadian Armies, while civilians in business suits and girls in bright summer dresses lend contrast to the group.

A bus appears. The group climbs aboard. The bus pulls away, skirts a wire security fence and plunges into a hole in the pre-Cambrian rock of the hill.

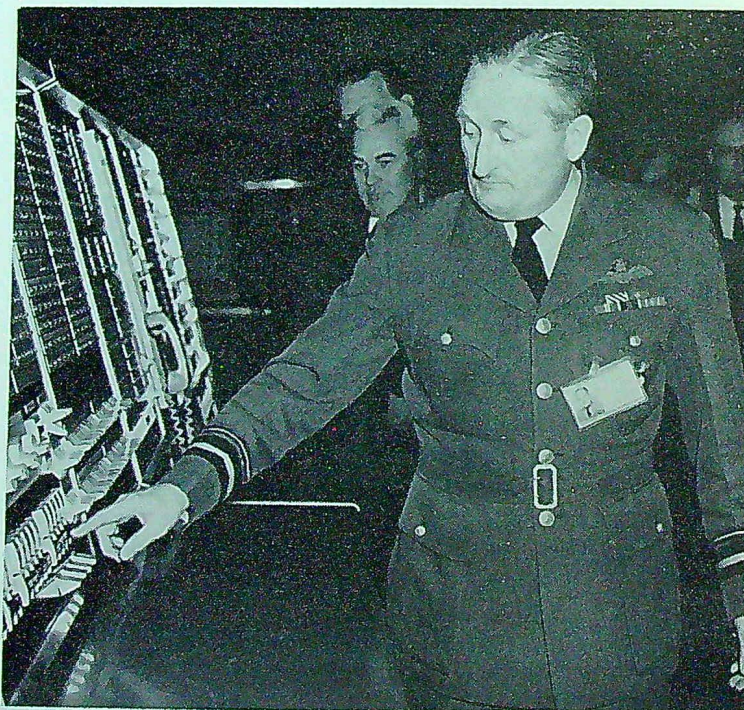
At a widening in the tunnel it pauses to let another transport take shift workers to the surface, then grinds on through the damp darkness towards the heart of the mountain. Bright lights appear ahead, and soon the bus pulls up to a modern office building. The passengers disembark and troop through the

quarters of Northern NORAD Region and the Ottawa NORAD Sector moved to North Bay this summer.

Northern NORAD Region (NNR) is one of eight regions into which the North American continent is divided for aero-space defence and these regions are, in turn, broken

tification, interception and the destruction of hostile aircraft within their geographical areas.

Originally NNR came into being in 1959 and its headquarters was established in the same building as ADCHQ in St. Hubert. At that time, the Air Officer Commanding Air Defence Command wore two



A/V/M J. B. Harvey, NNR commander, pushes control switch activating multi-million dollar SAGE computer system in "the hole" at North Bay.

hats, one as AOC of the RCAF ADC and one as NNR commander. This dual function lasted until August 1962, when the AOC ADC was relieved of the second responsibility, and A/V/M J. B. Harvey was appointed NNR commander.

At this time NNR was reorganized to include Goose, Bangor, Ottawa and Hudson Bay Sectors, in anticipation of the new system of ground control. Bangor Sector, with headquarters at Topsham Air Force Station near Brunswick, Maine, was transferred from the 26th NORAD region to NNR, and A/C F. R. Sharp became the first RCAF officer to command a NORAD sector.

Almost concurrent with this reorganization, the initial step was taken to move the headquarters and operations of NNR and the Ottawa Sector to the new hardened SAGE installation at North Bay.

On 15 Aug. '62 the first elements of two detachments were established in the cavern under Reservoir Hill near Trout Lake. Detachment

"A" was the advance party for Northern NORAD Region, and Detachment "B" was the advance party of the Ottawa NORAD Sector, which for years had been headquartered at Edgar, Ont. A/C M. E. Pollard, Ottawa Sector commander, was given the command of both detachments during the buildup

of the new air defence complex until the arrival of the NNR commander. The personnel of the two detachments, during this period, were responsible for a wide variety of administrative and technical work preparatory to the arrival of the two main headquarters. At the end of February, Col. T. H. Beeson of the USAF, deputy for operations for the region, was designated commander of NNR's Detachment "A" Unit with A/C Pollard retaining the command of Detachment "B" Unit.

The next phase of the move required a plan that would ensure a full and uninterrupted operational capability of both region and sector operations during their transfer to North Bay.

In May '63, the main body of the NNR Headquarters, under the command of A/V/M Harvey, moved to the new underground quarters leaving a small detach-

Brig. Gen. H. R. Thyng, NNR deputy commander, and his driver leave North Bay underground headquarters foyer.



A model of the underground SAGE Operations Centre is located at the entrance to the facility. It is used for briefings and to show newly-arrived personnel to locate their place of work.

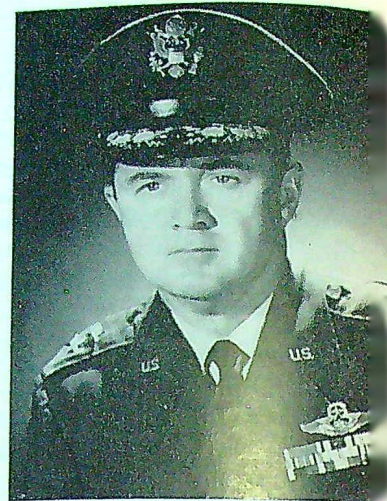


ment at St. Hubert with the operational responsibility for the region. Simultaneously the headquarters of the Ottawa Sector was moved to North Bay, leaving the sector's manual operation under a small detachment at Edgar.

The next step followed on 1 June when a manual combat centre for NNR was activated at North Bay for training and testing purposes, with St. Hubert still maintaining operational control. Two weeks later, the manual combat centre at North Bay assumed operational control with its interim manual system. By the beginning of July the combat centre at North Bay had proved itself capable of fulfilling its operational role. The COC at St. Hubert was deactivated and the manual combat centre at North Bay was on its own. About the same time, Brig. Gen. H. R. Thyng arrived from the United States to assume his position as NNR deputy commander.

Since then, both officers and airmen of NNR have been training with their new equipment in preparation for semi-automatic operation. During the same period, the Ottawa Sector has also been carrying on an intensive training program in the "hole in the ground". Meantime, Edgar has been carrying the operational responsibility for the Ottawa Sector.

The responsibility for implementing all aspects of the Combat Centre/Direction Centre: rock excavation, building construction, electronic equipment, procurement and installation, communication, support services and complete system testing was shared jointly by A/V/M W. W. Bean, AFHQ Air Member for Technical Services and Maj. Gen. C. H. Terhume, Commander of the USAF Electronic Systems Division in Bedford, Mass. At a North Bay ceremony on 26 Sept. '63, these two officers will formally hand over the completed



A/V/M W. W. Bean and Maj. Gen. C. H. Terhume were jointly responsible for the construction and installation phases of the Combat Centre/Direction Centre.

facility to A/V/M M. M. Hendrick, the AOC ADC.

This SAGE installation has a number of distinctions: it is the only SAGE Combat Centre/Direction Centre located outside the United States; it is the first one to be built underground; it covers the largest land mass in the NORAD system; and it is the only one to use an AN/FSQ-7 computer for both region and sector operations.

At first glance the interior of the underground facility is like any other modern business building. The offices are bright and air-conditioned, and the pastel walls and modern office furniture are restful and efficient. But there are no windows. A few feet beyond the walls of the offices are the grey, blast-sheared faces of rock, studded with bolts for added strength and sheathed in heavy wire mesh to keep debris from falling on people or equipment.

Basically, the installation is situated in two huge caverns, 400 feet long, 60 to 70 feet high, and about 45 feet wide. These are connected by three cross tunnels. Inside these

caverns has been built a three-storey, free standing structure. It was constructed with immensely strong steel framework, based on concrete piers keyed to the bedrock, and independent of the walls and roof of the chambers. This type of construction was selected to allow for future improvements to shock resistance in the installation with minimum disruption of existing facilities.

The exterior of the building looks slightly unorthodox since all the vital air-conditioning equipment for both computers and personnel, as well as water and sewage services, heating and lighting facilities, are located on the roof or hung on the outside walls. Since the caverns are not subject to climatic change, these utilities do not have to be housed inside the building in the normal way. Their exposed location has the added advantage of making them easily accessible for servicing and repair.

The section of the building in the first cavern is occupied by a variety of people and facilities. There are the offices of the telecommunication

section of the ADC Support Unit and the workshops and facilities of several civilian companies which are working on the project. Because the underground installation is designed to be completely self-sufficient under attack, there are a kitchen and dining room capable of feeding up to 400 people, a hospital and infirmary, a well-equipped canteen, large washrooms with showers, and emergency space for women workers to rest or sleep. Under "button up" conditions, both officers and men would be expected to sleep in cots at their places of work.

The part of the building in the second main cavern houses the bulk of the operational facilities. On the ground floor is the SAGE computer which covers about seven-eighths of an acre of floor space. At one end of the wing there are the two-storey Region Control Centre and the Ottawa Sector Direction Centre. On the second floor, in the "Blue Room", are the banks of consoles for regional control and for sector's surveillance, identification and weapons control functions. On the

same floor are the Regional National Survival attack warning office run by the Canadian Army and all the facilities for training and battle simulation to keep the systems well exercised.

In the first cross tunnel joining the two main caverns are the offices of the commander and deputy commander of NNR and their staff, and below them, the same facilities for the commander of the Ottawa Sector and his staff.

On the third floor of the next cross tunnel are the banks of consoles for the sector's weapons director, and under them on the next two floors are the computer's input and output area and the computer service area.

The third cross tunnel is predominantly occupied by communications equipment. Since the span of NNR's control embraces all of the Yukon, the Northwest Territories, Quebec, part of Ontario, part of Maine, the Maritime provinces, Newfoundland and Labrador, it requires extensive communications to tie the detection, tracking and weapons systems together. The communications fa-

cilities in this tunnel cover almost 14,000 square feet and are sufficient to service a city of more than 30,000 people.

These are owned, manned and serviced by the Bell Telephone Company, and they tie together four types of circuits used by Bell and other communications companies contributing to the SAGE communications. There are data circuits carrying radar information from remote radar sites to the SAGE computer, ground-to-air voice circuits over which a controller can give oral instructions to a manned interceptor, miscellaneous voice circuits used for administrative purposes and the teletype circuits connecting the North Bay SAGE with other key centres in the air defence system. A built-in power facility will allow these communications to operate for some hours should total power failure occur in the SAGE complex.

Running parallel to the two main caverns is a slightly smaller one blasted out of the rock to house the power plant and all the services and facilities to keep the main building and its sophisticated equipment operating. Dominating this third cavern is a bank of six giant diesel engines, each generating 750,000 watts, which supply the power for the installation. Ranged around them are transformers, water and sewage pumps, condensers, hot water tanks, compressors, boilers, and the tangle of pipes and valves that connect them to the main building.

Further along the cavern is the entrance to another cave which houses diesel fuel tanks to supply the engines under "button up" conditions. Across from it are the controls for a 200,000 gallon domestic water reservoir, and further on still is the entrance to a subterranean reservoir, containing nearly 5,000,000 gallons, which would be used for air-conditioning under emergency conditions if the supply

A/C M. E. Pollard
Ottawa sector commander



A/C F. R. Sharp
Bangor sector commander

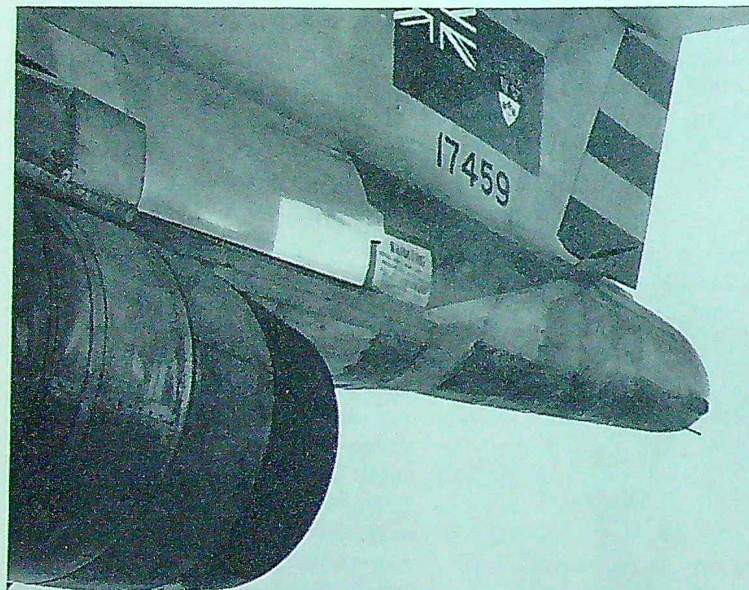
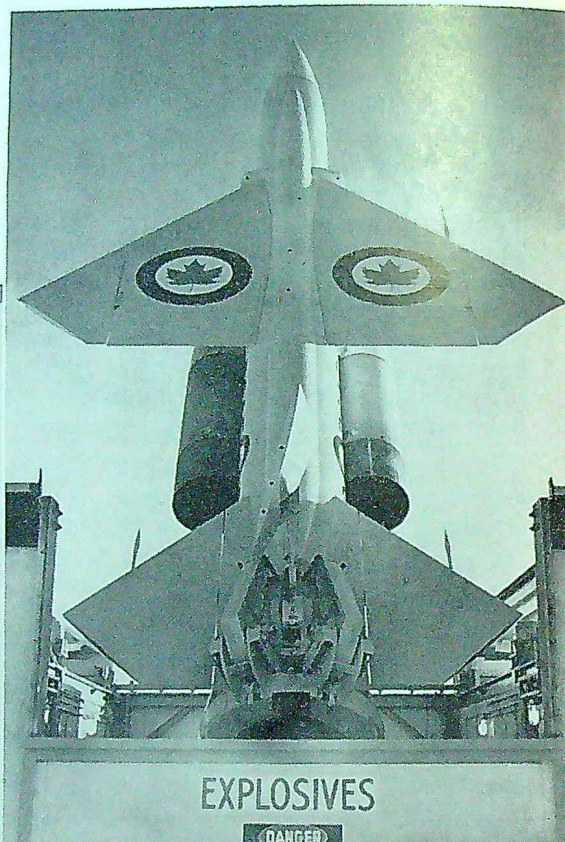


of cool water from Trout Lake became unavailable.

There are two access tunnels to this underground complex. The first, called the south tunnel, is about half-a-mile long and has been used almost exclusively up to the present. The second, called the north tunnel, is about one mile long and will ultimately become the main entrance. At present it is being paved for buses, and the building at its portal, near Station North Bay officers' mess, is rapidly nearing completion.

NORAD itself does not own radars or aircraft or missiles. All these facilities are provided by the component commands. The USAF ADC, the RCAF ADC, the US

RCAF ADC weapons systems under NNR operational control include Voodoos (four squadrons) and Bomarc (two squadrons).



Army ADC and the US Naval Forces CONAD are responsible for providing the trained and equipped forces for the operational control of the NORAD commander.

In the Northern NORAD Region, the RCAF's ADC provides the early warning and control radars. It contributes two Bomarc surface-to-air missile squadrons and four interceptor squadrons of *Voodoos*.* The USAF's ADC provides more ground radars as well as airborne radar coverage, plus squadrons of F-101 *Voodoos*, F-102 *Delta Daggers*, F-106 *Delta Darts*, F-89 *Scorpions* and *Bomarc*s. The US Army's ADC provides the surface-to-air Nike *Hercules* missiles for short range defence. With the operational control vested in one agency, these facilities provide the defence so necessary to combat the current high speed weapons that might be launched against North America.

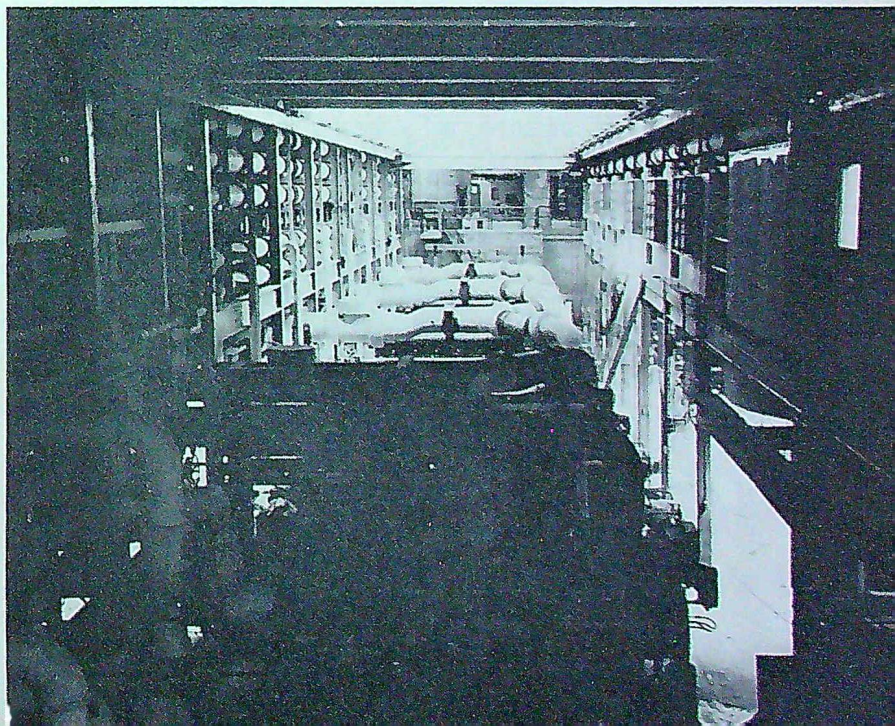
Just as the contributions to this sophisticated air defence system have come from a wide variety of civil and military agencies, so the credit must be spread to include them all. Scientists and engineers, military planners and operators, civilian contractors and industrialists, Canadians and Americans, have all left their indispensable marks on the system, and each can look with pride at an air defence complex that is unprecedented in forethought and effectiveness. (C)

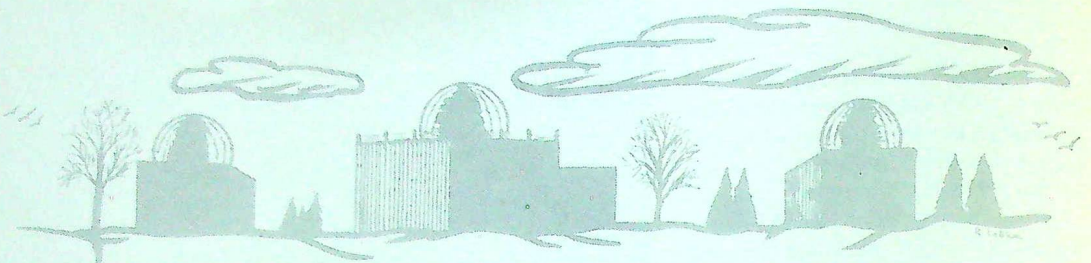
* The fifth RCAF *Voodoo* sqn. is operationally controlled by 25th NORAD Region HQ on the west coast.



Intercept director Lt. R. A. Martens, USAF, and I. D. technician Cpl. J. V. F. Soucy, RCAF, control actual intercept mission from Ottawa sector HQ.

Utilities machinery, such as this air conditioning equipment, is located outside the walls of the main building.





PINETREE TODAY

By FLIGHT LIEUTENANT G. H. LOWES
Air Defence Command HQ. Public Relations



RCAF Stn. Moosonee, Ont., is one of the new long-range radar stations which have expanded Pinetree's detection and control capability.

MORE than 10 years ago a new species of pine tree was added to the Canadian scene. A chain of aircraft control and warning radar stations, built in areas where these trees are indigenous, was appropriately named the Pinetree Line.

Like its coniferous counterpart, Pinetree has grown and changed its shape through the past decade. When NORAD was created in 1957 Pinetree became an integral part of its defensive system. In the last two years new radar stations have been built to extend the coverage farther north, more modern and powerful radar equipment has come into being, new communications systems have been completed, automation has replaced manual control and Canadian personnel have taken over the manning of 11 radar sites formerly under American control.

With the advent of near sonic and supersonic bombers, it was necessary to expand Pinetree's detection and control capability. Hence new long-range radar stations were constructed at Chibougamau, P.Q., and Moosonee, Ont. Across the expanse of the prairies, stations have been built at Gypsumville, Man.; Yorkton, Dana, and Alsask, Sask.; and Penhold, Alta. With the completion of these sites the area of Pinetree coverage ex-



Last of 11 Pinetree sites formerly operated by USAF personnel to be taken over by RCAF was Lowther, Ont. At the handover ceremony on 1 July '63: (l. to r.) Maj. Gen. B. J. Webster, USAF ADC chief of staff; A/V/M M. M. Hendrick, RCAF ADC air officer commanding; W/C I. D. Tenove, Lowther's new commanding officer.

tends almost as far north as the Mid-Canada Line from Labrador to the Rockies.

At the older Pinetree sites new long-range radars have been installed and new height finder radars have been added. Each site now has radar coverage in excess of 200 miles range and heights well above 50,000 feet.

The old manual system of control was not adequate to keep pace with improved radar coverage and the increased speeds of bomber and fighter aircraft. As in many cases in the past, necessity again mothered a new system: semi-automatic ground environment (SAGE). Ground environment, as the name implies, refers to the ground complex of radars, communications and control systems. Semi-automatic refers to the use of computers to provide answers, in micro-seconds, to a commander or a controller. However, the decision to use the answers provided remains with the human brain. Hence the computer control program is semi-automatic.

Under SAGE the former control exercised at the Pinetree site passes to SAGE Sector Direction Centre. A thumbnail description of SAGE Pinetree operations would be: radar returns from the station radars are

passed to a digital data transmitter at each site. This transmitter passes the information electronically to the computers of the SAGE Sector direction centre. At this centre each radar return is fed into the computer along with returns from neighbouring sites and in a matter of micro-seconds the commander has displayed the overall air battle picture in his area, which is updated every 15 seconds. Along with the visual display, he can obtain from the computer solutions on how to deal with each raid threat. But the decision to employ any given weapons system rests with him.

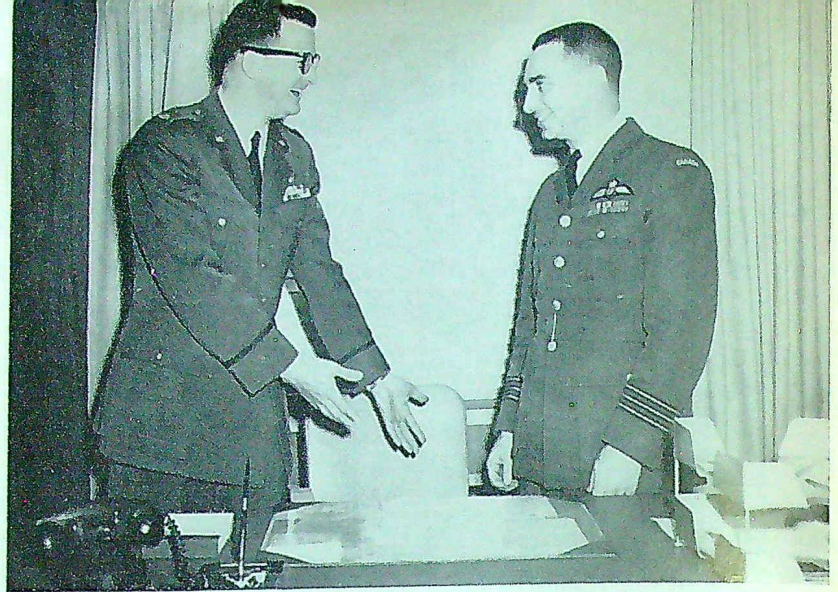
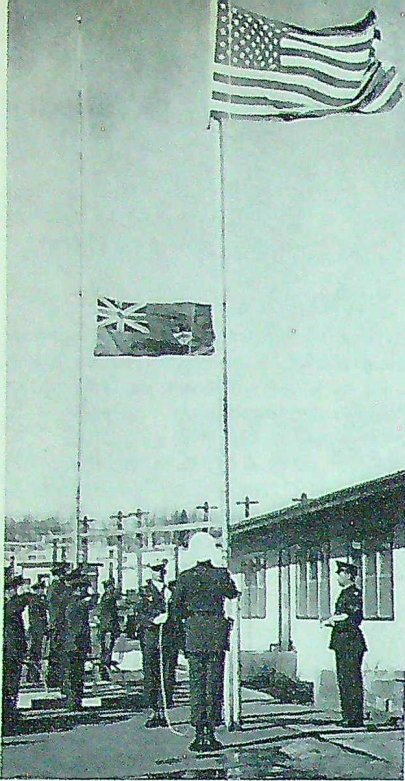
Under the old manual control system, each Pinetree site was responsible for the air battle within its area of radar coverage. Under SAGE, the area covered has increased more than tenfold and the time to take action has decreased over a hundredfold: while the speeds of the aircraft have increased twofold.

Equally startling changes have taken place in the realm of communications. The standard longline, teletype and VHF/UHF radio nets have been supplemented by microwave links and in some cases tropospheric scatter systems. For ground-to-air transmission, Time

Division Data Link (TDDL) is being used as each site becomes SAGE-operational. TDDL gives a one way ground-to-air signal guidance from the computer to the interceptors. The TDDL equipment is located at the ground-to-air transmitter (GATR) site at each station. The GATR site also has UHF facilities for voice communication between the aircraft and the ground if required.

The Pinetree Line has changed in still another area. Eleven sites that were originally built and operated by the USAF in Canada are now manned by RCAF personnel. The sites were taken over in exchange for 66 CF-101 *Voodoos*. The first station, Beausejour, Man., was handed over to the RCAF on 1 October '61. The last, Lowther, Ont., was handed over on 1 July '63. The other nine sites are located at Barrington, N.S.; Ramore, Pagwa, Armstrong, and Sioux Lookout in Ontario; Saskatoon Mountain, Alta.; Baldy Hughes, Puntzi Mountain and Kamloops in B.C. With the handover of these sites and the construction of new sites, the RCAF now mans the Pinetree Line from Gander, Nfld., to Holberg, B.C.

In addition to changes in loca-

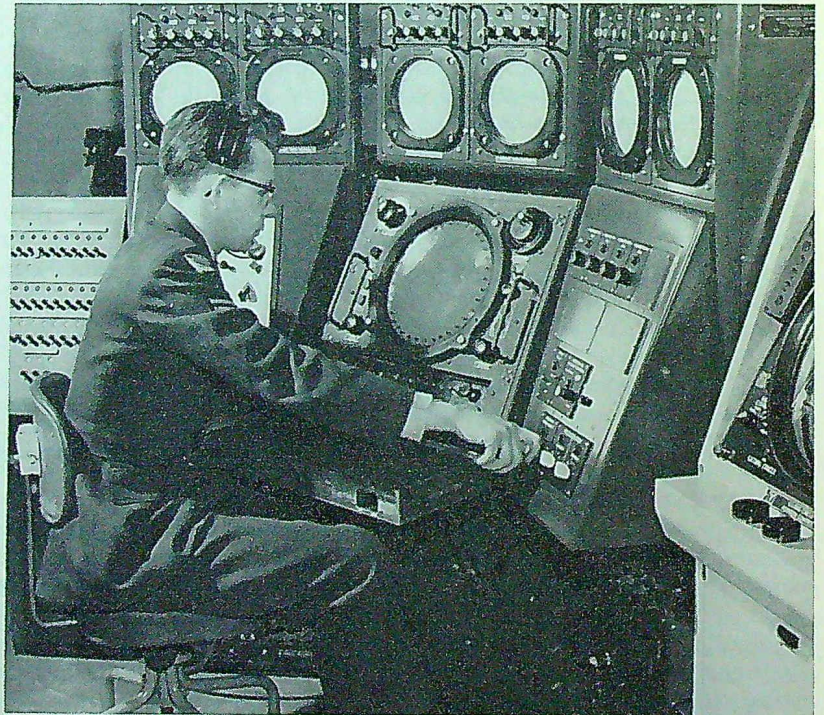


At Saskatoon Mountain, Alta., last March USAF and RCAF personnel participated in flag lowering and raising ceremony (left) prior to Maj. J. E. Williams turning the CO's chair over to W/C W. J. Hynds.

tions and equipment, changes in personnel have also taken place along the Pinetree Line. Most noticeable is the absence of women fighter control operators at the Pinetree stations. In fact there is a marked decrease in their male counterparts as well, as each station moves into SAGE, the controllers and fighter control operators in number sufficient to carry out manual control are no longer needed. But as the electronic brains take over, more technicians are needed to keep the computers operating at peak efficiency. At the Pinetree sites the overall strength of each station will be in the neighbourhood of 200. But with 39 stations now on the line, the overall strength of personnel deployed along it will remain about the same.

This has been a brief look at the Pinetree Line today. What its future will be, no one can say for sure — except that like all components of the air defence complex, it is continually changing to meet the ever-changing threat. ©

At recently-Saged RCAF Stn. Falconbridge, Sgt. R. C. Sinclair checks videos at the master control console in the data and maintenance control centre.



NORAD'S *Electronic Genius*

By FLIGHT LIEUTENANT
V. J. KEATING

GENIUSES now guard North America against air attack. Located at each of NORAD's SAGE Sectors, strategically situated throughout the United States and underground at North Bay, Ontario, these geniuses are not men but electronic brains called FSQ-7 Computers by the engineers who created them.

By the time the inventors had screwed in the last diode, inserted the final tube and stepped back to look at the conglomerate whole, they had constructed a 275-ton machine that fitted neatly into an area equivalent to 24 ranch-style houses. Each equipped with 58,000 vacuum tubes, 600,000 resistors and 170,000 diodes, the computers devour information fed into them by radar stations in their sectors, store bits of knowledge in their cavernous memories and display this information, upon request, to direction centre operators within seconds.

How are such machines able to process the millions of bits of information they receive and perform prodigious calculations in millionths of a second? One of the simplifying factors is that the FSQ-7 circuitry has been designed to use binary numbers rather than the more familiar digits of the decimal system.

In the decimal system there are 10 digits ranging in value from 0 to 9. In the binary system there are only two digits, 0 and 1. The advantage of the binary system lies in

the fact that many devices used in electronic circuitry have two markedly different operational states. For example, a switch may be on or off; a relay may be open or closed; a vacuum tube may be conducting current or it may be quiescent. This two-state nature of electronic components makes them ideal elements to handle the binary numbers.

Through this system of on-off switches, relays, tubes, etc., the computer is able to store data or perform calculations on it. Range information of a target, for example, is transmitted to the computer from the radar site as a series of pulses. The computer counts the pulses and assigns the proper binary number representing the range information. It can store the binary range number directly in its memory or it can cycle the number through its circuitry for further computation. On request, the computer will display the range number of an assigned target on the scope of a track operator. Since there is an equivalent decimal number for every binary number, the computer automatically makes the necessary conversion so that it displays the appropriate decimal number on the scope for the operator. Thus the computer's binary number 101 would be displayed as the common numeral 5 and the binary number 10110 would be displayed as 22, its decimal number equivalent.

Because of the high speed with which electronic components can operate, laborious computations can be completed in fractions of a second. Ingenious arrangements of circuitry allow the computer to employ variations of high-speed addition in all its computations so that it is unnecessary for the computer to know the processes of subtraction, multiplication and division normally used by a human calculator.

While the act of finding an erring component in a machine with approximately 900,000 tubes, diodes and resistors and over 1000 miles of wiring may appear at first glance like trying to grade the Sahara desert with a teaspoon, it is really not that difficult. The FSQ-7 Computers correct their own minor errors by rerouting the electrical current through another circuit, thus by-passing the difficulty. When a major malfunction occurs, the computers inform attendants by sounding a bell and typing out the nature of their difficulties on a teletype machine. The technicians are then able to locate the trouble spot quickly and replace ailing tubes or effect other necessary repairs.

The computers furnish solutions to the complicated problems of air defence with unfailing accuracy and supply a correct picture at the earliest possible moment to the sector commander for his evaluation and tactical decisions. Given the command, it can select the proper manned or unmanned interceptor for the weapon director and can react to his fire command by directing the interceptor to its target. Finally, if necessary, it can launch the interceptor's weapons to destroy the target. The retention of the human operators in the chain of command is what makes SAGE a semi-automatic system and, unlike many military systems, there is no intention of making it fully automatic. ©



To Dacca, East Pakistan, an RCAF *Yukon* from No. 4 OTU, Trenton, brought emergency supplies for cyclone-ravaged area. The 15,000-mile mercy flight served also as a training trip for two complete crews.

MERCY MISSION TRAINING FLIGHT

W/C R. K. Trumley, No. 4 OTU commanding officer, is welcomed at Dacca airport by Mr. Hassan Askari, East Pakistan minister for works, power and irrigation.

Photostory by
FLIGHT LIEUTENANT K. G. COLEMAN



AN RCAF *Yukon*, loaded with 12½ tons of Red Cross and other supplies for cyclone-stricken East Pakistan, left Trenton in June on a 15,000-mile training flight. The big transport carried four complete crews — two composed of students, two of instructors from Air Transport Command's Operational Training Unit.

Making en-route stops in France, Lebanon and India, the *Yukon* flew to Dacca, East Pakistan, with five tons of blankets for the victims of the tidal-wave and cyclone which hit the country in late May. In addition to the relief supplies, the

aircraft carried a ton of special cable oil and five tons of structural steel to replace power pylons built by Canada under the Colombo Plan, and destroyed by the cyclones.

Training provided by such flights is invaluable to the pilots, navigators, radio operators, flight engineers, and transportation technicians who will soon be on their own — flying mercy missions and transport operations for the United Nations in the Middle East and the Congo, for NATO in Europe, and for NORAD on Arctic re-supply missions.



Members of RCAF and PAF unload structural steel (left) and Red Cross supplies (right).



Small boats bring cargoes of wood down the Ganges River to Dacca, where it is sold for many purposes, including pulp-making.



Sgts. D. W. Fisher and J. F. Brogden enjoy local delicacy — Pakistan pineapples.

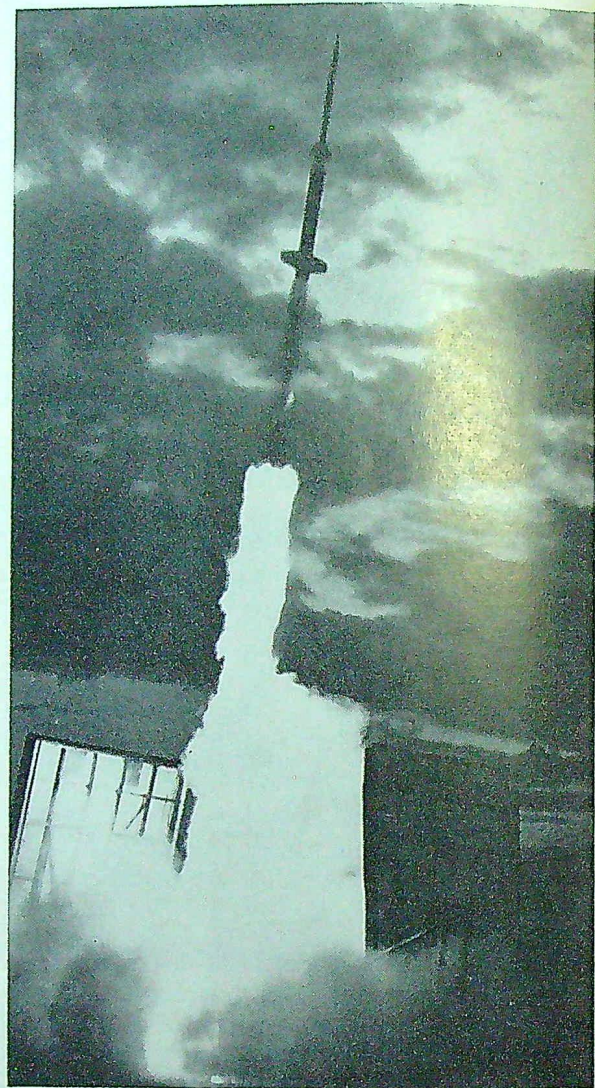
Bullock-drawn carts mingle with modern motor trucks in Dacca streets.





Auroral display over Fort Churchill.

HIGH PROBING



WHILE Indians harpooned white whales and icebergs floated in Hudson Bay, scientists and missilemen at nearby Churchill Research Range observed through the "eyes" of rockets changes in the earth's upper atmosphere during the sun's eclipse on 20 July.

Operation Probe High, which involved a series of eight launchings in two hours, was by far the most ambitious and technically complex program ever attempted at the Churchill range. At the eclipse's peak three rockets were fired 110 miles high within a three-minute period, and were simultaneously tracked by range telemetry and radar antennas. Carrying a payload into the ionosphere at the height of totality was a Canadian-designed and built Black Brant II A rocket. Six American Nike-Apaches and

one Aerobee were used as boosters for the other probes.

Primary objective of Operation Probe High was to study the effects of a solar eclipse on electron density, electron temperature and ionospheric absorption characteristics in the ultraviolet and x-ray regions of the spectrum. Each test vehicle was instrumented to make measure-

Eight rockets were fired from Churchill Research Range into the upper atmosphere during the total eclipse of the sun.

ments during its six to eight minute flight over Hudson Bay.

Two of the most interested spectators on the specially-constructed observation platform 1000 ft. away



Port Churchill, at the mouth of the Churchill River, is in centre foreground. Fort Churchill and the RCAF-controlled airfield, on the shore of Hudson Bay, can be seen 3½ miles away. Churchill Research Range launching site is 12 miles farther along the bay, at top left of picture.

from the launching pads were Emil Buss and Angus MacIver, both of whom have trapped in the area for over 30 years. In the words of Col. J. F. Flicek, USAF commander of the range, "they are truly explorers of another generation." Witnessing the event with them were the first group of newsmen to visit Fort Churchill since the research range, virtually destroyed by fire in 1961, resumed operation last November.

Initially constructed for rocket experiments during the International Geophysical Year, the range is now operated by the USAF's Office of Aerospace Research for a wide variety of American and Canadian users, including universities, governmental and private agencies. During the next 12 months about 70 high altitude rockets, including Black Brants, Javelins, Aerobees and Nike-Cajuns, will carry instru-

ments from here into the upper atmosphere for research purposes.

Supplying "housekeeping facilities" for those working at the range (two of whom are RCAF officers seconded to the USAF) is Fort Churchill, located 12 miles from the launching site. Currently commanded by Canadian Army Col. A. S. Galloway, Fort Churchill is the most unusual military station in Canada — having permanently established army, navy, airforce, DRB and DOT units within its boundaries.

Claiming the doubtful honour of being the coldest inhabited spot in Canada (because of the windchill factor), Fort Churchill is a natural location for the Canadian Armed Forces' Arctic warfare experimental and training establishment. Because it is beneath the path of greatest intensity of the aurora borealis

(northern lights), Churchill is also ideally situated for Defence Research Northern Laboratory's studies into this phenomenon.

Three and a half miles from the military base, at the mouth of the Churchill River, is Port Churchill, whose white population fluctuates from 500 in winter to 3,500 at the height of the two-month summer shipping season. Nearby are located both an Eskimo and an Indian village, built by the federal government, and inhabited by natives who no longer can support themselves in their natural habitat.

Thus within a few square miles live people of great divergency of interests. Some still depend on the sea and the permafrost for the bare necessities of life. Others look to the heavens, hoping to explain the mysteries of space by the latest in aerospace research techniques. ☺

THE TUSKERS' TALE

By

FLYING OFFICER H. A. HALLIDAY

Air Historical Section



NUMBER 413 Squadron was the most widely-travelled, and at one time the most widely-dispersed (with detachments located 5000 miles from the parent unit), of any RCAF squadron during World War II. Its main function, that of maritime reconnaissance, was commemorated in the motto, "Ad Vigilamus Undis" (We Watch Over the Waves), and its elephant's head emblem won for it the nickname "Tusker."

The life of No. 413 began officially on 1 July 1941 at Stranraer, an RAF base on the south-west coast of Scotland. Only the commanding officer, W/C V. H. McBratney, an RAF officer, was on hand that day. Oddly enough, this RCAF squadron was initially manned almost wholly by RAF personnel.*

*Provision had been made in the BCATP agreements for RAF personnel to serve in Canadian units until RCAF personnel became available.

On 18 Aug. '41 the first Canadians arrived: W/C R. G. Briese and F/Ls J. C. Scott (now G/C, rtd.) and L. H. Randall (now G/C). Wing Commander Briese took command the next day. As for Scott and Randall, their lives were to be interwoven with that of No. 413 Sqn. for the next three years.

The squadron's first accident occurred during night flying training on 23 August, when a *Catalina* crashed on take-off, killing five of its RAF crewmen. The deceased were buried at Stranraer during a heavy snowstorm.

Training continued through September, using lighted dinghies for flarepaths at night. On 1 Oct. '41 the squadron moved to Sullom Voe in the Shetland Islands and became operational on shipping escort patrols, scouting far out to sea and eastward to the Norwegian coast. On one of these flights F/L R. Thomas (RAF) sighted what was believed to be a *Fock-Wulf Kurier* patrol bomber, but the enemy aircraft escaped into cloud.

On 22 Oct. W/C Briese took off for a special reconnaissance operation around Tromso, Norway. The aircraft was never heard of again, and No. 413 had suffered its first operational casualties as well as losing its CO. Squadron Leader M.

Gibbs (RAF) took temporary command, and was succeeded in November by W/C J. D. Twigg.

The long flying boat patrols produced nothing in the way of epic encounters with the enemy. Flights meant 10-12 hour patrols, often in appalling weather, searching the ocean for shadows. Icing conditions over the North Sea turned these tedious excursions into dangerous trips. If a crew was forced to "ditch", its members could not hope to live for more than a few hours in the bitterly cold water.

Sometimes the monotony was broken by the impressive sight of British warships. On 31 Oct. one crew discovered and marked a minefield. Early in December F/L Thomas and his crew located and escorted back to base two *Blenheims* which had been damaged on a strike near Norway. Two days later, half-way round the globe, the fate of the world and of No. 413 was radically changed as Japanese dive-bombers attacked Pearl Harbour.

MOVE TO CEYLON

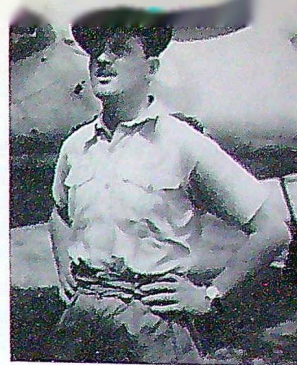
For a time No. 413 continued its patrols as before. A rapid series of Japanese victories, however, led to a decision by the British government to transfer forces to Asia. Number 413 was selected to go to Ceylon and preparations for the move began early in March 1942. Personnel first went to West Kirby, and on 17 March eight officers and 327 other ranks embarked on the "Nieuw Holland" at Liverpool. They



W/C J. L. Plant



S/Ls J. C. Scott and L. J. Birchall



W/C L. H. Randall

were to go the long way to Ceylon – around the southern tip of Africa. During the move, W/C J. L. Plant (now A/V/M, rtd.) took command from W/C Twigg, who subsequently went to No. 408 Sqn. and was killed on operations in 1944.

Meanwhile, four *Catalinas*, piloted by W/C Plant, S/L L. J. Birchall (now A/C), and F/Ls Thomas and O. G. Roberts, undertook the long trip via Gibraltar, Cairo, Basra, Aboukir, and Karachi. On 28 March F/L Thomas touched down and was moored at Koggala, Ceylon, followed by S/L Birchall on 2 April. If ever aircraft appeared in the nick of time, it was these two.

The military situation in the east in the spring of 1942 was critical. At Pearl Harbour, off Malaya, and in the Dutch East Indies, the Japanese had inflicted heavy casualties on Allied air, sea and ground forces. In a blitzkrieg whose scope, speed and successes dazzled even the Germans, the Japanese had swept over the Pacific. Singapore was gone, Burma going. The enemy was at the gates to India, the Bay of Bengal was open to his carriers, and Ceylon was threatened. Realizing this danger, the British rushed forces into the area. These included a fleet under Admiral Sir James Somerville, a handful of fighters, and No. 413 Sqn.

The aerial defences of the island were sparse indeed: 50 fighters, 14 *Blenheims*, a small number of *Fulmars* and *Albacores*, and no more than seven *Catalinas*. More-

over, the city of Colombo had no radar units, although the naval base at Trinconalee had a few. There were vague reports of Japanese fleet movements, and as a result Admiral Somerville was patrolling south of Ceylon, where he hoped to intercept the enemy. What forces were afoot, however, were unknown.

THE BIG TIP-OFF

The *Catalinas* had no sooner arrived than they were set to work. Flight Lieutenant Thomas made a patrol of more than seven hours on the night of 2/3 April, but saw nothing. Then, at 0052 hours on 4 April, S/L Birchall took off on a search for enemy shipping. He found it in the form of Vice-Admiral Nagumo's force of five aircraft carriers and supporting vessels. Even as *Zero* fighters peeled off to attack the *Catalina*, the radio operator got off a warning. Then 20 mm. and 7.7 mm. shells riddled the flying boat.

The message was picked up, garbled but still intelligible, and as a result the island's defences were alerted and the harbour of Colombo was cleared of major shipping. The next morning, when Japanese dive-bombers and fighters attacked, they were met by determined opposition.

At the same time, Admiral Somerville made a bitter but wise decision. Facing a vastly superior enemy force which could, if brought to battle, hammer his fleet into oblivion, he withdrew his ships by day, hoping to close on the enemy and

engage him with gunfire at night. While the British carrier pilots fretted, radar operators watched the Japanese aircraft on their scopes. Warned by Birchall's message, the admiral was able to save the British fleet, and thus deprived the Japanese of the most sought-after prize.

That night, 5 April, F/L Thomas (whose crew and airplane now constituted the whole of No. 413 in Ceylon) searched for the enemy fleet, knowing full well that if he located it he would almost certainly be shot down. On this occasion he saw no sign of the Japanese ships, which had faded away into the Bay of Bengal. The following day, F/L Roberts and W/C Plant arrived at Koggala after flying as far west of Ceylon as possible to avoid interception by *Zeros*.

Meanwhile, the Japanese forces were ranging about, sinking two cruisers and 100,000 tons of merchant shipping in the Bay of Bengal. On the 6th two small ports on the east coast of India were bombed. Still the exact location of the raiding fleet was unknown.

At this juncture, No. 413's *Catalinas* again stepped into the breach. Early on the morning of 9 April, F/L Thomas located the Japanese Fleet and radioed its position, speed and course. Again enemy fighters silenced the sentinel, and the *Catalina* crashed into the sea, killing all the crew. But the naval base at Trincomalee had been alerted, and when the Japanese attacked that day, they lost ten of their aircraft.

They then sank a British carrier, the "Hermes", and its escorting destroyer, after which Admiral Nagumo withdrew from the area.

In retrospect, although Nagumo seemed to have had things all his own way, he had failed in his prime mission. The main British fleet had refused to accept the role of the opponent who perishes in glorious and pointless defeat. It had not been brought to battle, and remained as a threat to the Japanese.

For more than a year it was presumed that S/L Birchall and his crew had been killed. In May 1943 it was learned that he was alive and a prisoner of the enemy. While in captivity he was awarded the DFC for his warning of the Japanese fleet and was also promoted to wing commander. His actions while a prisoner were no less courageous than was his flying. As Senior Allied Officer in the camps where he was held he worked, often at great personal risk, to obtain the best possible treatment for the men. This entailed defying enemy officers, and on one occasion it meant forcibly preventing a Japanese NCO from using sick prisoners for work. He accepted beatings and solitary confinement from his captors. At the same time he kept records of prisoners who died, and his secret diary later proved to be of great assistance in the prosecution of Japanese war criminals. In 1946 W/C Birchall was awarded the OBE for his courage and leadership in the enemy camps.

BACK TO ROUTINE

Although no one realized it, No. 413 had come through its most intense crisis. Enemy ships never again haunted the Bay of Bengal, and the Tuskers again carried on the routine of a flying boat squadron, hunting for shadows which seldom materialized.

The squadron began to take shape again in May 1942 as four



"The Corn Huskers", popular celebrities of RCAF-operated Ceylon radio station CORN: (l. to r.) LAC G. B. Smith, Cpl. N. Corbeil, LAC J. R. Chapman, LAC A. M. Carr. Announcer is LAC D. Miller.

more *Catalinas* arrived, flown by S/Ls Scott and Randall, F/L R. J. Furzman and WO D. S. Martin. The ground crews finally arrived on 29 May after weeks at sea. Few, if any, had any desire to sail again. On the last leg of the trip, from Bombay to Colombo, life had been made tolerable only by substituting RAF cooks for the ship's regular cooks. In July a *Catalina* was detached briefly to the Seychelle Islands, the first of many such detachments.

August was a month of tragedy, frustration and some measure of success. During an exercise with the navy, S/L Randall was almost shot down and his flight engineer was killed, when two *Fulmar* fighters opened fire on the *Catalina* by mistake. With rudder and aileron controls shot away and petrol and oil pouring from the tanks, Randall was able to limp back to Koggala and land safely.

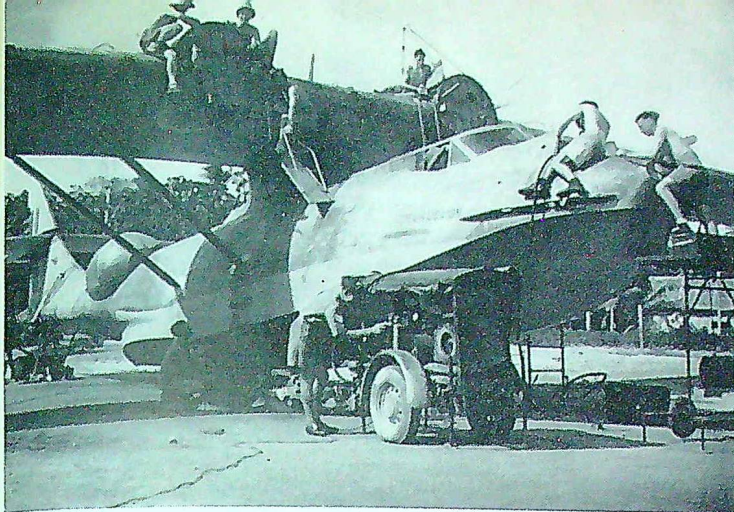
On the 26th a crew, captained by S/L J. N. Stacy, discovered three life boats with about 60 men from a torpedoed vessel. Supplies were dropped and the lifeboats escorted for 11 hours. A second *Catalina*, piloted by F/L O. G. Roberts, was sent to relieve the first and to direct a ship to rescue the men. While doing this, the crew spotted an

enemy submarine and attacked. The luck was with the enemy, however, for in two runs the depth charges refused to drop and the submarine escaped.

Then the monsoon season arrived — day after day of rain — and for diversions, the men began to publish a breezy newspaper, "Tropic Topics". They also established a "radio" station, C-O-R-N. It was merely a studio where shows were performed, and the results piped to the huts where speakers had been installed. The "Voice of Ceylon" carried only as far as these speakers. An advertisement in "Tropic Topics" invited people to visit the station "on the ground floor of the RCAF building", which was, in fact, a hut with one floor only. What the station lacked in paid talent, it made up in enthusiasm, and an orchestra, called the "Cornhuskers", was very popular. Sports were varied — cricket, football and softball — and the airmen established a Rota Mota or benefit club.

ORIENTAL ODDITIES

Life in the Orient had its peculiar features, such as saucer-sized scorpions and mosquito netting. Happily, the base was not in an area where malaria was present, and the only cases which developed



Tusker Sq. groundcrew gives *Catalina* major overhaul after it has returned from many hours of patrol over Indian Ocean.

followed a series of hunting expeditions. On leave, personnel discovered such things as Buddhist temples and railroads which made the Toonerville Trolley look like the Super Chief. On a train in India or Ceylon, they found no platform linking the cars. To eat, one got off the train at a stop and entered the dining car. After the meal it was necessary to wait for another stop to return to one's coach.

Above all else there was the heat — prickly, persistent, and stifling. Rain increased the humidity without dropping the temperature. There were few places to go, and only limited means of transportation to get there. Leave in Colombo was a welcome break, where haggling merchants, missing the pre-war tourists, welcomed the airmen. The key-word, however, was monotony.

OPERATIONAL INCIDENTS

For the aircrew, at least, the tedium was relieved by incidents on patrol and by duty on detached operations. In mid-October F/L Furzman and WO Martin located lifeboats of the SS "Martaban", which had been torpedoed and set on fire. Eventually, all personnel of the ship were rescued. The part played by the flying boat crews

won high praise from senior officers.

One of the most unusual operations undertaken by the Tuskers was carried out on the night of 20/21 Dec. '42. The Japanese at that time had a submarine base at Sabang, on the western tip of Sumatra. Allied headquarters decided that more should be known about the military installations. At the same time a scare should be given to the Japanese to keep them guessing, and boost Allied morale. Three flying boats, two from No. 205 Sq. and one from No. 413, were detailed for this hazardous assignment.

Wing Commander J. C. Scott, one of the original RCAF members of the squadron, had succeeded W/C Plant as CO, and he was assigned to attack Lho Nga aerodrome. Shortly after leaving Koggala, the "Cat" developed engine trouble, so he returned to base, transferred his crew to another aircraft and took off again.

Eight hours later they sighted land and dropped to 50 feet as they flew down the west coast of Sumatra. There were no lights and no signs of life. The enemy "aerodrome" turned out to be a waterlogged expanse of rice paddies, so W/C Scott headed for an alternate

target, the harbour at Koetaradja. From 800 feet he dropped six 250-lb. bombs and three tons of incendiaries. Swinging over another harbour, he checked for shipping, and then headed for home. There had been no fighters and no flak, although the other two aircraft had been peppered by light AA fire. Wing Commander Scott touched down in the mid-morning of 21 December, having been airborne for more than 17 hours. The reconnaissance proved to be of great military value, and he was subsequently awarded the DSO.

Operations from Koggala, however, were relatively few during the winter of 42-43, for the simple reason that most of the aircraft were on detached duties. At the end of December, two aircraft were at Koggala. Two more were undergoing repairs at Bangalore. One was at Mombassa, Kenya, and two, captained by F/Ls Furzman and Fielding, were at Bahreim in the Persian Gulf. Late in January '43, F/L G. H. Bayly and S/L Randall took their aircraft to Langaban, South Africa, where they remained until June.

Some detached crews found their strange bases downright terrifying. En route to Aden, F/L Roberts landed in the Seychelles Islands after dark. As he took off again, an ominous shape loomed up ahead. The flarepath led directly into a group of mountains. By using full power he was able to skirt the mountain sides with only 40 feet to spare.

As spring approached, several of the aircraft returned to Koggala, but detachments still took from one-third to one-half of the squadron's machines. However, work was available in Ceylon. Patrols from Koggala increased, and were flown as far as the Straits of Malacca.

BLAZING A TRAIL

Another special job was assigned



Near officers' mess at Koggala F/Os A. Shaw, D. Morrison and F/L W. Fink have lunch on the patio.

to the Tuskers that spring. Commercial air communications between Britain and Australia had been severed by the outbreak of war. By 1943 British Overseas Airways Corporation wanted to establish a route, with prior rights, for post-war use. Two specially modified *Catalinas*, stripped of armament and carrying extra tanks, were provided by the company, and crews from No. 413 opened the route between Ceylon and Australia.

The first of these flights was made by W/C Scott with a skeleton crew. He left Koggala on 3 May '43 and droned eastwards. There was radio silence at all times. After nearly 26 hours in the air they landed at Exmouth Gulf in Western Australia where they refuelled from an American destroyer. They then carried on to Perth, six hours flying time from the gulf. They were back in Koggala by the 12th. The feat was later repeated by F/L Furzman and by F/L P. A. S. Rumbold, who put down in the Coco Islands to pick up a sick man and flew him

to Perth.

In June S/L Randall was promoted and took command of the squadron from W/C Scott. Both officers, it will be recalled, had reported to No. 413 in August 1941. Wing Commander Randall had only recently returned from more than four months of detached duties in East and South Africa.

SUBMARINE OFFENSIVE

In July 1943 the first group of officers and men to be repatriated since the movement to Ceylon some 15 months before was celebrated by a round of farewell parties. But the work of the squadron went on, and increased in tempo as Japanese and German submarines stepped up their operations. On 1 Oct. '43 F/L S. V. Kembry located lifeboats and survivors from the SS "Banffshire" which had been torpedoed two days before. His crew reported the position of the boats, dropped supplies, and then directed a ship to the scene. Later in the month W/C Randall did similar work when the SS "Congello" was sunk. The submarine offensive also brought a dramatic touch to the history of No. 413, giving some Tuskers a chance to fire on the enemy.

On the evening of 3 Nov. F/O J. R. Gowans was providing air cover to a stragglng ship from a convoy when a contact was made on the radar. The aircraft homed on the blip, dropping to 500 feet. At first the crew saw only a fishing boat, but two minutes later they spotted an enemy submarine fully surfaced and travelling at 16 knots. Gowans swung round and came in on the U-boat's stern. Four depth charges dropped away. At that moment the sub altered course, but the D.C.'s straddled the stern.

The *Catalina* then flew along the starboard side of the sub. A 20 mm gun on the sub opened up, hitting the tail plane and smashing the rudder and elevators. The blister

gunner aimed for the flash, silencing the enemy gun. The sub then submerged to conning tower depth and headed south.

A message was sent out to the effect that the sub had been damaged, as well as the "Cat", and a reply came back saying that a *Liberator* was on its way. Despite the damage to his aircraft, F/O Gowans continued to track the sub until the moon went down and contact was lost. The *Liberator* did not arrive, so he finally set course for Cochin, in southern India, where he landed and refuelled before returning to Koggala. Flying Officer Gowans was eventually awarded the DFC for his skill in attacking the sub and in handling the damaged airplane.

Nearly two months later, on 27 Dec. '43, F/O S. J. Grandin (now S/L) dived on a submarine wake. As he levelled off at 50 feet the wake vanished, leaving a swirl in its place. Five depth charges were dropped just ahead of the swirl and in line with the wake which was now fading. The first four explosions churned up the water into white foam, but the plume of the last explosion was black. What appeared to be the bow of a sub rose from the water, then slipped under, leaving a patch of oil which gradually spread until it was several hundred yards wide. The Tuskers had racked up a "probably destroyed".

SEARCH AND RESCUE

Throughout 1944 the squadron continued its watch over the waves. Many a torpedoed sailor gave thanks for that vigilance, and a number of vessels under attack were undoubtedly saved by the intervention of the *Catalinas*, which forced the enemy subs to break off engagements.

Late in Dec. '43 F/L Kembry, operating from Kelai, had been instrumental in the rescue of survivors from the SS "Navarro". In Feb. '44

F/Ls Grandin and Fink directed a ship to lifeboats from the SS "Fort Buckingham". Flying Officer E. G. Gork dropped supplies to lifeboats from another torpedoed ship. He also escorted a tanker which had evaded two torpedoes, and on 29 Feb. an extensive search was carried out for an enemy submarine which had sunk the SS "Palma". At month's end two earthquakes rocked Koggala.

In April F/L A. Gelamn escorted another tanker which had been attacked by a submarine. The day afterwards he discovered 18 survivors from the SS "Sutley" and directed a ship to them. Flying Officer C. L. Emerson did similar work on two occasions in June.

The Tuskers set an all-time record in July 1944 when they flew more than 1000 hours. This was due to a search for the survivors of two ships which had been sunk in the Indian Ocean. Flying from Addu Atoll and Diego Garcia, No. 413 aircraft first located the rafts and life-boats. In a ten-day period 34 sorties were flown and ships directed to several groups of boats. At last, 207 persons were plucked from the sea, a major rescue which would have been impossible without the assistance of the *Catalinas*.

Not all the Tusker flying was air-sea rescue. In March S/L Bayly had flown a reconnaissance sortie, photographing the Cocos Islands. The aircraft covered some 3000 miles and was airborne for 27 hours. He was subsequently prominent in the rescue operations outlined above. For this, and for his attack on a U-boat in the spring of the previous year, he was awarded the DFC. Flight Lieutenants E. G. Gork and R. M. Smith had also been active in rescue operations, and were decorated with the AFC in Jan. 45.

TURN OF THE TIDE

By the spring of 1944 approximately one-half of the aircrew and

about 99 per cent of the ground crews were members of the RCAF. That March Air Chief Marshal Sir Richard Peirse, KCB, DSO, AFC, the air officer commanding for South-East Asia, presented the squadron with its crest.

The fortunes of war now favoured the Allies. No. 413 had undergone many changes in the last two years. All but 23 of the original groundcrew had been repatriated by the summer of 1944; among the aircrew, W/C Randall was one of the few remaining "originals". In September 1944 he was succeeded in command by W/C S. R. McMillan (now rtd). Two months later the squadron was informed that it was to leave Ceylon and return to Britain. Operations ceased on 3 December, and those persons with little "eastern time" were posted to Nos. 435 and 436 Sqns. The remainder embarked for England. No. 413 was placed on the establishment of Bomber Command, but VE Day came before the squadron could be reformed.

Thus ended 44 months of service, extending from the north Atlantic to the Bay of Bengal, and involving four continents — Europe, Africa, Asia, and Australia. The squadron's battle honours were Atlantic 1941-43, Ceylon 1942, and Eastern Waters 1942-44. Other war honours included one DSO, one OBE, five DFCs, two AFCs, and several Men-

tions in Despatches. The Tuskers had lost only three aircraft to enemy action, and one in a non-operational crash — a tribute to the skill of those who flew and those who serviced the aircraft in one of the most unsung fronts of the war.

POST-WAR OPERATIONS

The end of World War II did not mean the end of No. 413. Indeed, its postwar career closely resembled its wartime one.

In 1943 No. 13 Photographic Reconnaissance Squadron was formed at Rockcliffe, and through the use of far-flung detachments it carried out extensive mapping operations. In 1946 F/L J. F. Drake (now W/C Drake, AFC, CD), flying a *Canso*, rediscovered the Spicer Islands north of Hudson Bay, where they had been "lost" for nearly 50 years. The squadron was re-designated No. 413 in 1947. It formed part of No. 22 Photographic Wing, which came under No. 9 Transport Group, the immediate forerunner of Air Transport Command. The squadron's many detachments operated *Lancasters*, *Dakotas*, *Norsemen*, *Cansos*, and *Mitchells*.

In Jul. '48 a No. 413 Sqn. *Lancaster* crew discovered two islands, hitherto unknown, in Foxe Basin. The navigator was appalled at first, because the islands were not on his maps, and he believed that he had made an error in navigation. When

Post-war Tuskers moor *Canso* on northern Canadian lakeshore.



the full story became known, the islands (two and a half times the area of Prince Edward Island) were named Barnett and Tomkinson Islands, after the pilot and navigator of the *Lancaster*.

The wartime rescues of the Tuskers had their counterparts in the post-war years. In 1948 a U.S. Navy *Beechcraft* vanished in northern Manitoba. Two *Cansos* from No. 413 took part in the search, and one of them, piloted by F/L R. V. Virr (now S/L), searched for and discovered the five men who had been aboard. A map of the district was dropped to them with such accuracy that the container landed in the middle of their campfire. Flight Lieutenant Virr then landed on a nearby lake, picked up the men and flew them to The Pas. He was subsequently made a legionnaire in the American Legion of Merit.

Transport operations dominated the winter of 1949-50, and these continued into 1950, including airlifting of supplies to flood-stricken Winnipeg. *Cansos* of No. 413 pioneered the use of JATO (jet assisted take-off) for northern operations. During that year the unit participated in three successful searches. Then, on 1 Nov. '50, the Tuskers once more disbanded.

JET-AGE TUSKERS

Less than a year later, on 1 Aug. '51, No. 413 reformed at Bagotville, P.Q., this time as a fighter squadron flying *Vampires*. In December they converted to *Sabres*. For more than a year the crews engaged in training and exercises until they were ready to join the RCAF Air Division in Europe. On 7 Mar. '53 the three squadrons which were to constitute No. 3 (F) Wing (Nos. 413, 427, and 434) set out on "Leapfrog 3" which was to end at Zweibrucken, Germany.

The members of the squadron were acutely aware that the Iron Curtain was less than 30 minutes

away by jet. Frequently their *Sabres* flew to Rabat, Morocco, for gunnery practice. This paid off when their marksmanship contributed to No. 3 Wing's winning the Chadburn Trophy in 1953.

On 1 May '57 the squadron was disbanded in Europe and replaced by No. 440 Sqn. equipped with CF-100s. Simultaneously, No. 413 was reconstituted as an all-weather squadron at Bagotville, one of the nine CF-100 squadrons deployed for the defence of North America. It immediately made itself felt. Commanded by S/L C. Allison (now W/C), the Tuskers won the Steinhardt Trophy as the most efficient squadron in Air Defence Command in 1957-58 and won it again in 1958-59. With the phasing out of the *Canucks*, however, No. 413 was disbanded on 2 Jan. '62.

The Tusker squadron, whose aircraft touched every continent except South America, is no more. But if it is ever reformed its members may indeed look back on a proud heritage. ☉

When a British electric substation broke down, a robot dialed the telephone operator and released the recorded message: "There is a fault at this power station. Please send repairman."

Nobody had informed the robot that the operator's dial number had been changed from "O" to "100", however, so all day long a second robot at the other end kept instructing the first robot: "You no longer dial 'O' for operator. Please replace your receiver and dial '100'."

— *Business Automation*

Motorist: "How far it is to the next town?"

Farmer: "Two miles as a crow flies."

Motorist: "How far is it if the crow had to walk and roll a flat tire?"

PLACE YOUR ORDER NOW!

The 1963 edition of the AIR FORCE COLLEGE JOURNAL is due off the press in October. Price is \$1.00 a copy.

Subscriptions should be sent to The Editor, AIR FORCE COLLEGE JOURNAL, Air Force College, Armour Heights, Toronto 12, Ont. Payment may be sent with the subscription or on receipt of an invoice. Cheques, including exchange, should be made payable to the AIR FORCE COLLEGE JOURNAL.

Here is a partial list of articles included in this year's JOURNAL:

"Permanent Factors in American Foreign Policy" by Melvin Conant.

"Canada and the Pacific" by John Holmes.

"Submarine Environment" by Dr. G. R. Lindsey.

"Britain and the Nassau Agreement" by Alastair Buchan.

"Freedom, Law and Power" by Dr. W. T. Traynor.

"Australian Defence Problems" by A. L. Burns.

"South America" by John D. Harbron.

"Air Power in Guerilla Warfare" by A/C P. E. Warcup.

"Science and Government" by Dr. A. H. Zimmerman.

"Strategic Implications of the Sources of Energy" by Dr. E. B. Hurt.

"NATO after the Ottawa Meeting" by John Gellner.

A number of worthwhile books will be reviewed and the JOURNAL will contain the best of the essays submitted in the 1963 Essay Contest.

The Suggestion Box

The following individuals have received awards from the Suggestion Award Committee, Department of National Defence, for suggestions which have been officially adopted by the RCAF. Photographs of winners of \$100 or over appear below. Proper procedure for submitting suggestions is detailed in AFAO 99.00/01.



WO1 N. J. Matthews of AMCHQ suggested an R24 radar nose assembly handle remover and dolly which was adopted officially by the publication of EO 30-290-5A/8 dated 25 Sep. '62.



Cpl. B. C. Coles of Stn. Trenton suggested latch plates to replace cleat stops on Yukon aircraft passenger seats.



LAC R. J. Lebrun of Stn. Cold Lake suggested a jig for repairing afterburner shroud brackets which was adopted officially by the publication of EO 10B-10C-6A/24 dated 25 Jan. '63.

Other award winners:

S/L Z. Zikmund
F/L J. R. Carson
F/O G. E. Smith
WO2 A. Ceci
FS E. L. Heisler
FS H. L. Richardson
FS P. S. Murphy
FS F. J. Welland
FS H. I. Slater
FS A. A. Burge
FS M. J. Jukosky
Sgt. M. E. Reid
Sgt. H. W. Troy
Sgt. P. I. Graham
Sgt. D. W. Wilson
(2 awards)
Sgt. D. R. Randall
Sgt. R. M. McPhail
Sgt. M. D. Foote

Sgt. H. E. Decorby
Sgt. C. R. Burns
Sgt. W. L. Farrar
Sgt. J. A. R. Dessureault
Sgt. A. H. Waters
Sgt. G. Pentland
Sgt. R. E. Moyer
Sgt. D. W. Stead
Sgt. R. W. Rennie
Sgt. R. G. Smith
Sgt. R. Veitch
Cpl. C. C. Cook
Cpl. R. F. Smith
Cpl. D. E. Porter
Cpl. J. G. Poire
Cpl. J. L. Noiseux
Cpl. A. S. Perfitt
Cpl. J. Paul
Cpl. F. C. Gilroy
Cpl. D. A. Elder
Cpl. J. P. P. Laprade

Cpl. R. G. Wills
Cpl. L. R. Barr
Cpl. E. G. Sweet
Cpl. A. H. Navrot
LAC R. B. Horne
LAC D. F. Rossiter
LAC F. R. St Michael
LAC D. W. Hackett
LAC J. T. Dillon
LAC S. Carle
LAC W. Charing
LAC P. Brassard
LAC J. A. G. Laforest
LAC E. E. Leighton
LAC W. W. Swintak
LAC E. M. Purney
LAC J. E. Teesdale
LAC G. B. Belanger
Mr. S. J. Ostrowski
Mr. P. Bihuniak
Mr. W. G. Boon



RCAF ASSOCIATION

This section of ROUNDEL is prepared by Association Headquarters, 424 Metcalfe St., Ottawa, Ontario.

“THE VANCOUVER CONVENTION” **Bayshore Inn — September 26-27-28** **1963 Regular General Meeting**

EVERYTHING points to a wonderful Convention! The Vancouver Host Wing Committee is planning several innovations. The beautiful setting at the Bayshore Inn is in itself sufficient inducement for every one to attend. A special invitation is extended to members from wings and members at large to attend as fraternal delegates. For further information write to the National Office in Ottawa.

Here are just a few of the highlights:

PRESIDENT'S WELCOMING RECEPTION

OPENING CEREMONIES

With the Lieutenant Governor of British Columbia, Honourable G. R. Pearkes, VC, PC, CB, DSO, MC, taking the salute.

PARADE AND MEMORIAL SERVICE

Unveiling of a special RCAFA plaque in Stanley Park Memorial Gardens.

SPECIAL LUNCHEONS SPEAKERS

NORAD BRIEFING

ANNUAL DINNER AND BALL

The Minister of National Defence, Honourable Paul T. Hellyer, has been invited to be the guest speaker. The Minister has indicated that he is pleased to accept our invitation and will be on hand, barring some unforeseen commitment.

AWARDS PRESENTATION

RCAF “Wing of the Year” and “Member of the Year” Awards will be made by the Chief of the Air Staff, Air Marshal C. R. Dunlap, CBE, CD.

OVERSEAS REPORT

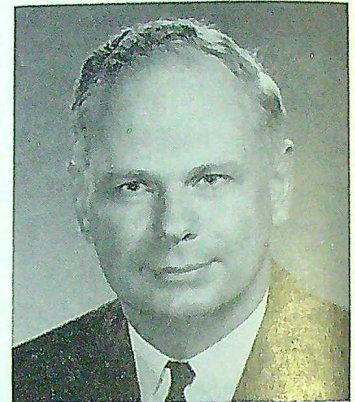
National President Phil Connell will give delegates a report on his July visit to No. 1 Air Division in Europe. During his trip he met the Queen at a Buckingham Palace garden party and personally extended the RCAFA's greetings.

GROUP AT HOMES

SIGHTSEEING TOURS

LADIES' PROGRAM

Special arrangements are being made to entertain delegates' wives.

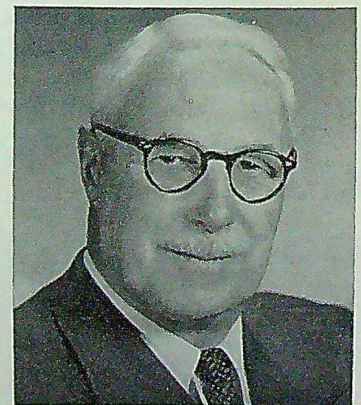


Paul T. Hellyer
Minister of National Defence



C. R. Dunlap
Air Marshal, Chief of the Air Staff

G. R. Pearkes
Lt. Governor of B.C.



Wings of the RCAFA: No. 433 (Renfrew) Wing



Mr. Don Bingham
Past-President No. 433 Wing

IN our last issue we gave you a brief review of the activities of the biggest wing in the RCAF Association. No. 700 (City of Edmonton) Wing is a giant and it does big things. It can accomplish big things because good planning has built it up to its commanding position. But No. 700 Wing was not always big. It grew from humble circumstances after it was granted its charter.

To bring RCAF Association activities into perspective let us review the activities of a wing which, although small in numbers, accomplishes big things. No. 433 (Renfrew) Wing has a membership of 59 regular, one honorary life and four honorary members and is one of the most active wings in the Ottawa Valley. Although Renfrew is a small community it has a diver-

sified population and the wing includes former RCAF, RAF, Fleet Air Arm, USAF and Royal Netherlands Air Force personnel. A further division is made by the various ethnic groups resident in the area. This happy and progressive group has done much to sponsor benevolent and community projects in the town and surrounding area, thus enhancing the prestige of the RCAFA in the Ottawa Valley.

Youth has always been an area of particular interest to the RCAF Association and No. 433 Wing is no exception. It has sponsored No. 653 Air Cadet Sqn. since September 1957. This has been a major project and has represented a considerable investment by the wing. Apart from providing the usual amenities, such as suitable quarters, No. 433 Wing also sponsors a father and son banquet, the expenses for a summer camp and the equipment for a bugle band.

In close association with the air cadet movement No. 433 Wing is endeavouring to obtain a tract of land suitable for a flying field. It is proposed to form a flying club serving the town and surrounding country which should generate considerable enthusiasm among the air cadets and stimulate a general interest in air matters in the area.

In preparation for Canada's centennial celebrations, No. 433 Wing is preparing to develop a section of land presented by the Town of Renfrew into a park along the Bonnehene River and a plan has already been submitted to the town council. Trees are being purchased to be planted in the town.

No. 433 aided and supported No. 438 (Pembroke) Wing in their first Old Tyme Fiddling and Step Dancing Contest which was a huge

success this spring. The wing cooperated with the Renfrew Highland Games Committee in staging a successful program which is to become an annual event. No. 433 also supported the Village of Portage du Fort in Quebec in its centennial celebrations in July.

Other community projects undertaken by 433 are: polio clinics, the "March of Dimes", sick and visiting committees, transportation for senior citizens, minor hockey and baseball leagues, St. John's Ambulance and the winter employment campaign.

No. 433 has taken steps to obtain permanent quarters. At present the wing occupies rented quarters which are also used by the air cadet squadron. Although extensive improvements to the amount of \$2,000 have been made to these premises in the past year, No. 433 purchased recently, for \$1,500, a parcel of land from the Town of Renfrew and construction plans are being formulated.

No. 433 is also very active in attending all commemorative parades throughout the year and joins with Renfrew branch of the Royal Canadian Legion in Remembrance Day ceremonies. The Battle of Britain parade is always a great annual event. Three members of the wing journeyed to England in September 1962 and attended the Battle of Britain parade in London.

All of these activities make for a happy and rewarding life. As always, these activities would be of little value if it were not for the ladies. The wives of wing members provide worthy support to all projects undertaken by the wing. A very pleasant note was struck recently when Mrs. R. Totten was elected wing president, the first lady president in Ontario. Finally, tribute must be paid to Mr. Donald Bingham, the past president, for all he has done to make No. 433 Wing a respected member of the RCAF Association.

Letters to the Editor

BENEVOLENT FUND

Dear Sir:

Reference your report on the RCAF Benevolent Fund (Jul.-Aug. '63), two typographical errors are brought to your attention, as they indicate our capital more than double the actual figure and the number of applications last year approximately half that actually received.

Specifically, our capital at the end of 1962 was \$3,711,527, not \$8,711,527. Also in 1962 our head office reviewed 2,026 applications, not 1,144 as stated in the article.

Mr. J. C. Carrothers,
Secretary-Manager,
RCAF Benevolent Fund.

(Mr. Carrothers has kindly written us a feature-length article on the fund, which we trust will set the record straight when it appears later this fall. — Editor.)

SERVICE INTEGRATION

Dear Sir:

Having read your fine edition describing in part our close association with the RCN (June '63), I cannot help but add a few personal comments.

Last January I was assigned to HMCS Terra Nova, which was proceeding to sea on a NATO exercise. Imagine my delight and surprise to find that my brother, a petty officer in the navy, was also temporarily assigned to the same ship. I was the technician on the equipment my brother operated. We even shared the same sleeping quarters and mess.

How about that for integration between "light blue" and "dark blue"?

Sgt. S. Guinchard,
RCAF Stn. Greenwood, N.S.

BALDY HUGHES REQUESTS

Dear Sir:

We noted with interest the excellent response that Station Chibougama received from its request printed in *ROUNDEL* for library books.

We are in a similar position in that we became an RCAF station on 1 March '63 and are now setting up our station library. If you could publish this letter we would certainly appreciate it and would be grateful for any donations of older or surplus books which other libraries may have.

F/O G. H. MacEwen,
RCAF Stn. Baldy Hughes,
Prince George, B.C.

KNIGHTS OF THE AIR

Dear Sir:

ROUNDEL's recognition of World War I combat flyers (No. 3 Naval Wing, Jul.-Aug. '63) is welcomed by those of us who wish we were young again to resume flying service.

In this age of nuclear science, super-bombs and space missiles, it has been said

man is becoming the slave rather than the master. That supposition is debatable. Flying challenges, including those of outer space for astronauts, will unquestionably continue to be met by recruits inspired by the proud records of their flying predecessors.

We must never forget the demonstrated courage, skill and sacrifices of our flyers who resolutely and loyally defied machine gun and anti-aircraft fire to win through. Memories of their glorious achievements must never be allowed to fade in the pages of history.

R. Barclay Shaw,
935 Cowichan St.,
Victoria, B.C.

BATTLE DEBATE

Dear Sir:

It was most interesting for me to see the photo of the *Fairey Battle* appearing in your Aircraft Album (April '63).

I was shot down while flying a *Battle* on 11 May 1940 from No. 218 RAF Sqn., then stationed at Auberive in France. I have read that on that particular day eight *Battles* set out and only one returned to base.

We used to call the *Battle* the "Flaming Coffin" and it so proved for a good many of my friends. My own aircraft went down on fire; this aircraft had no self-sealing gas tanks.

I wonder where you obtained the information that the *Battle* cruised at 210 mph. Our aircraft never flew at more than 165 mph. cruising and this was an average speed whether we carried our 1000 lbs. of bombs or not.

I did see a *Battle* at the Rolls Royce Experimental Works at Hucknall in 1939 that had a Merlin X 2000-odd HP engine installed (as was originally intended for the *Battle*) and that model was considerably faster.

H. M. Murray,
21 Dacre Crescent,
Swansea, Toronto.

(*Thetford's "Aircraft of the Royal Air Force" (1957) says the Battle cruised at 210 mph. at 13,000 ft. Possibly you operated at lower altitudes. — Editor.*)

INFORMATION WANTED

Dear Sir:

Since *ROUNDEL* has such a wide-spread following in the RCAF, I am writing for your assistance in obtaining information which is difficult to acquire any other way.

A history of No. 109 Communications Flt. and No. 137 Sqn. is in the process of being written but, unfortunately, there is very little information to be found in past records. It would be gratefully appreciated if former members of both units, aircrew and groundcrew, could help with names, dates, photos and interesting anecdotes. Please write to me at this

address:

F/L E. Nikodem,
109 Comm. Flt.
2 Wing RCAF,
CAPO 5052
Canadian Armed Forces, Europe

WINNIPEG HOSPITALITY

Dear Sir:

Recently the Rotary Club of Winnipeg sponsored the Young Australian League's party of 30 teenage boys and six adults during a two-day stop here at the half-way point of a four-month world trip.

We enlisted the aid of RCAF Winnipeg and they did a wonderful job. The two chaps basically responsible for the program were F/O J. D. Banks and F/L A. J. D. Hannah. They organized a tour, a luncheon, provided a swim and their teenage group invited the Australian lads to a dance.

It was a good show all around and Stn. Winnipeg deserves a boost for an excellent public relations job.

Dick Wilson,
352 Main St.,
Winnipeg, Man.

DUNNVILLE RE-UNION

Dear Sir:

The 18th annual No. 6 SFTS re-union will be held at the Dunnville, Ont., Golf and Country Club on Sept. 21. A visit to the station and a tape-recorded message from our former CO, A/C A. H. Hull, will highlight the program.

There are still many ex-members who are unaware of this annual get-together and we solicit *ROUNDEL's* help in bringing this event to their attention. Further details may be obtained from:

Frank Scholfield,
Secretary-Treasurer,
No. 6 SFTS Re-union Committee,
Box 1150, Dunnville, Ont.

Legend: a lie that has attained the dignity of age.

Sophistication: the ability to do almost anything without feeling guilty.

A passenger, booking on one of Delta Air Lines' services, a 40-minute flight from Tampa, Florida, was told by the agent: "Please check in 40 minutes before departure time." To which the passenger replied "What are we going to do — rehearse?"

The Aeroplane and Commercial
Aviation News.



Aircraft ALBUM:

Handley-Page Halifax

The famous "Hallybag" was designed to meet a pre-war Air Ministry specification which called for a bomber with two Vulture engines. While still on the drawing board, the design was changed to take four Merlins. *Halifaxes* entered service with the RAF in March 1941 and were used for bombing, mining, anti-submarine operations, transport and for towing gliders.

Virtually every RCAF bomber squadron used *Halifaxes* at some time in its career, beginning with No. 405 Sqn. on the 1,000-plane Cologne raid on the night of 30/31 May 1942. This was followed by Nos. 408 and 419 which became operational on *Halifaxes* in January 1943.

The *Halifax 2* with Merlin engines, eventually was replaced on operations over Germany by the Mark 3, with 1,650 h.p. Hercules XVI radials. The *Halifax 3* had a top speed of 280 m.p.h., a range of 1,985 miles with 7,000 lbs. of bombs or 1,030 miles with 13,000 lbs. of bombs. After VE Day all RCAF *Halifaxes* were withdrawn from service.

Roger Duhamel

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