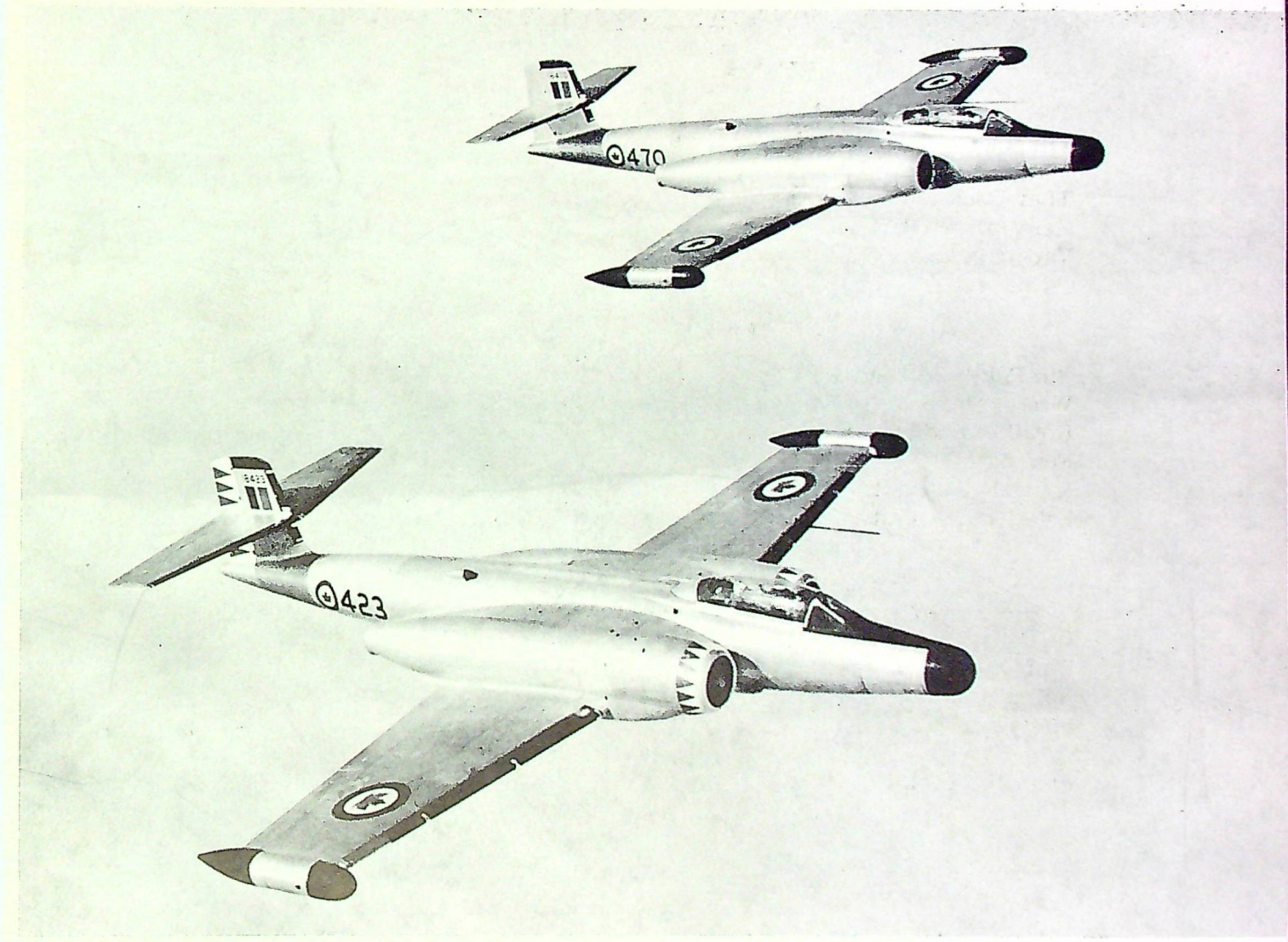
The CROUNDEL

Vol. 8, No. 3
APRIL 1956



ROYAL CANADIAN AIR FORCE

THE Roundel

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

Vol. 8, No. 3

APRIL 1956

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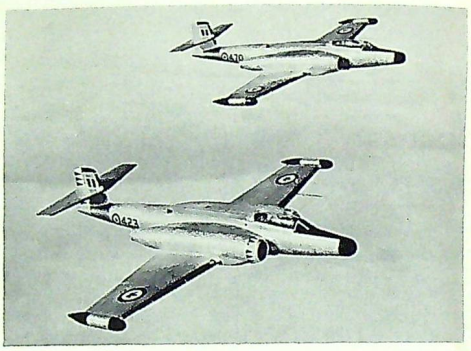
This Month's Cover



Two CF-100s of No. 423 Squadron, equipped with rocket-pods, flying over R.C.A.F. Station St. Hubert.

EDITORIAL OFFICES:
R.C.A.F., Victoria Island, Ottawa, Ont.

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

SGT. SHATTERPROOF DRAWS A VEIL

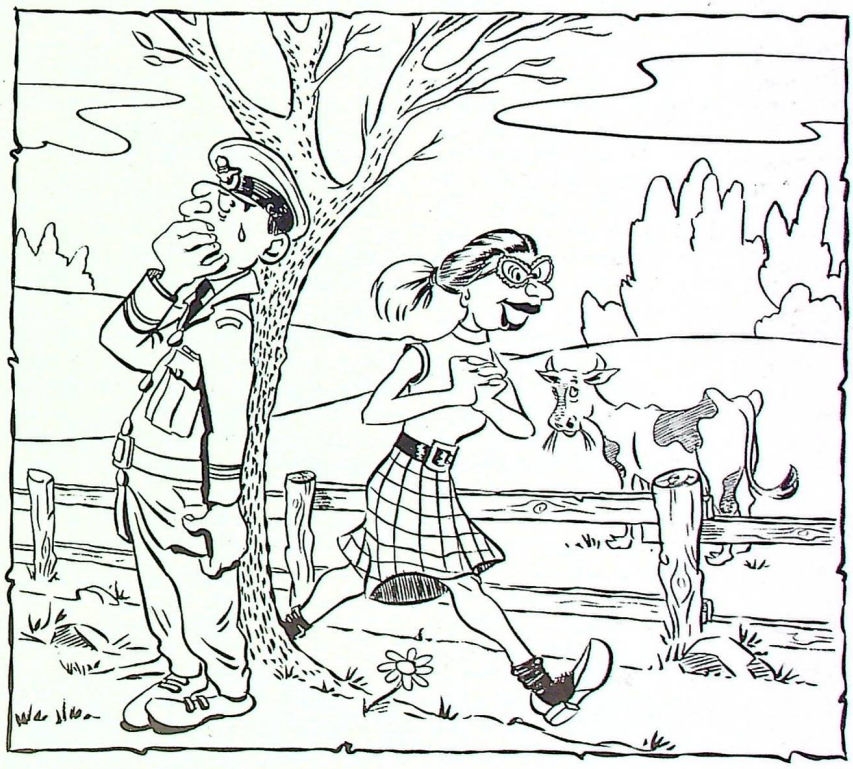
Sir:

Let none look to me this year for leadership of the calibre which men have come to expect from me. Though the course I steer is no less sure than it has been heretofore, my number two man is now flying beneath the hood. For this, Sir, is 1956, "When February's days are twenty-nine" and when even the stoutest bachelor goes about his occasions with the gait of a startled fawn.

The coming of Spring to our Station is, in the ordinary course of events, the signal for a release of that innocent libido which winter's stern elements have kept deep within the subconsciousness of the boys (and girls) in the field. When the first blades of grass come up to attention around the edge of the parade ground, not even the cuckoo is so quick to respond as the hunting-born of Flight Lieutenant Oglebody's M.G. outside the nursing-sisters' quarters. Flying Officer Backflip, our Recreation Officer, sheds his clothes like a muscular butterfly emerging from its chrysalis and churns up and down the still-frigid waters of the swimming-pool beneath the ardent glances of our female personnel. In the Photographic Section, Corporal Aperture tunes up his camera in readiness for the summer's crop of cheesecake; while Padre Airlift, humming to himself as he makes his rounds, switches from "Lead, kindly light, amid the encircling gloom" to the more encouraging strains of "Onward, Christian soldiers!" In brief, to our Station as to the outer world, Spring usually brings a burgeoning of the spirit and an uplifting of the heart.

This year, however, it brings only fear and suspicion. What bachelor is unaware, as the 1956 mating-season approaches, that a gift incautiously accepted, a mere social sentiment too warmly expressed, may well commit him inextricably to the maelstrom of matrimony? In eyes where he ordinarily expects to discern nothing more menacing than the humble adoration that is his due, he now detects a feral and a predatory gleam. The birthday-gift of a cigarette-lighter may conceal life-long chains; a proferred cookie may write "Finis" to his freedom. Worse still, his married friends join the conspiracy against him. No longer dare he seek refuge from the mess diet by dining at their houses: too well he knows that some unmated tigress will be eyeing him hungrily across the Sunday joint.

Thus it arises, Sir, that the blooming of the early crocuses at the back of "A" hangar has brought no gaiety to the crews. Flight Lieutenant Oglebody's M.G. has not yet spluttered forth from the aircraft packing-case in which it hi-

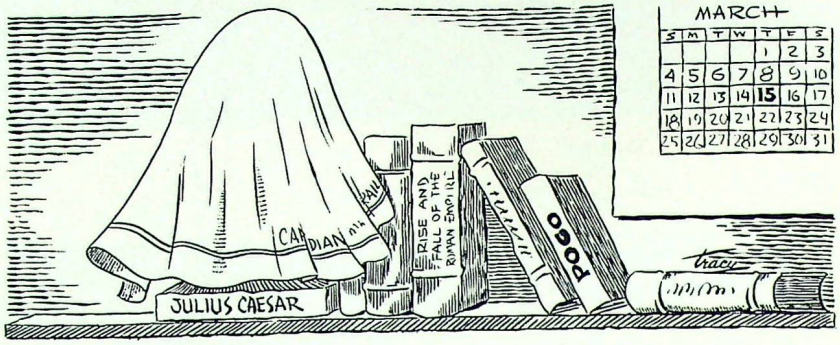


bernates beside the incinerator. The lens of Corporal Aperture's camera remains uncaressed by the polishing-cloth; and Flying Officer Backflip has been advised by the C.O. that he must refrain from trying to disguise his physique by slouching around the Station in a great-coat three sizes too big for him. As for Padre Airlift, he now walks the wards of the hospital to the accompaniment of the Dead March from "Saul".

At this point, Sir, I do not doubt but that you are asking yourself a question. "I fully appreciate", you are saying, "the old gladiator's concern for our bachelors' welfare, but I fail to see the connection between Leap Year and the sombre warning with which he opens his letter. Who is this 'number two man' of whom he speaks? Can it be that gifted young airman, L.A.C. Bladder?"

No, it is not L.A.C. Bladder. (L.A.C. Bladder, I fear, has gone over to the enemy's camp. Intellectual colossus though the boy is, he does not represent the quintessence of masculine appeal in the eyes of the Sex. He is therefore devoting all his leisure to the task of crossing our airwomen's paths as they prowl the Station, in the hope that one of them, crazed by the excitement of the chase, will inadvertently snap him up.) The number two man to whom I refer is none other than Julius Caesar.

Before we reach out to dial the number of the Psychiatric Branch, Sir, let me explain. As you are aware, I am not infrequently called upon to resolve problems upon whose solution the whole structure of our Air Force depends. Though the fact is not generally known, I do not resolve them entirely unaided. It is my practice on such occasions to repair to my room and commune awhile in silence with the busts of Julius Caesar and Napoleon which stand upon two brackets on the wall. Mind calls to mind across the centuries, and — well, Sir, the



R.C.A.F. ensign still flutters bravely above the battlefield of Service policies.

But alas, even the greatest of us has his Achilles' Heel! In Caesar's case, it was the Sex. As he approached middle age, his conscience began to prick him, and he decided to reform. Unfortunately, it was later than he thought; the habits of a lifetime were too strong for him to overcome. He therefore did the next best thing, and reformed the calendar. He decreed that the year, instead of containing 365¼ days, should thenceforth consist of 365, with an additional day thrown in every fourth year.

Had he left matters there, no great harm would have been done. But he did not. Blithely saying to the Senate "Demus puellis fractionem" ("Let's give the girls a break"), he ordered that the extra day should be celebrated as a holiday during which the Vestal Virgins could, so to speak, descend from their pedestals without being frowned upon by the Censors. It was a disastrous move. Though the young ladies were only too ready to get down, they exhibited, as time progressed, an increasing reluctance to climb back on. Some of them, indeed, so far abused their newly granted privileges as to hustle into matrimony those bachelors who had generously assisted them to enjoy their day off. By the reign of Nero, it is said, the situation had deteriorated to such an extent that, for every Christian whom the soldiers flushed from the catacombs, they also dragged out (each Leap Year) two bachelors seeking refuge from a fate more dreadful than the arena.

It is because of the events just related, Sir, that my bust of Caesar spends every fourth year beneath a veil. I would spare so great a man the humiliation of witnessing the sorry pass to which he has reduced the manhood of our Station. Throughout 1956 I must draw my inspiration from Napoleon alone. Even Caesar, with a dish-towel over his head, is operationally negligible.

Sgt. Shatterproof

IN DARKEST OTTAWA

Classified waste is now burned at "B" Building. Personnel and waste will be picked up at the Guard House at 0900 hours each Thursday. (*Extract from notice circulated at A.F.H.Q.*)

TRENCHARD: 1873-1956

(On 21 February 1956 the Royal Air Force paid final tribute at Westminster Abbey to its "father", Marshal of the Royal Air Force The Viscount Trenchard, who had died at his home in London, England, on 10 February. On behalf of the Royal Canadian Air Force, the Chief of the Air Staff sent a message of sympathy, in which he said:

"His purposeful life and devotion in the service of his country will be long remembered. The Royal Air Force and the Air Forces of the Commonwealth are a memorial that will perpetually attest to his vision, determination of purpose, and undaunted spirit".

THE life of Marshal of the Royal Air Force The Viscount Trenchard, G.C.B., O.M., G.C.V.O., D.S.O., D.C.L., LL.D., is in large measure the history of Britain's Air Force through a period of almost 20 years — two vitally important decades that saw the emergence of the new air arm and its rise to independent status. Lord Trenchard was, more than any other man, the creator of the Royal Air Force, and for a quarter of a century after he retired from the Service, he continued to champion its cause, fighting to keep the R.A.F. "one and indivisible". The spirit which he instilled into the Royal Flying Corps and the Royal Air Force, first as an instructor, then as an organizer and a commander in the field, and finally as Chief of the Air Staff, has permeated the other Air Forces of the British Commonwealth, while the doctrines of strategic air power which he set forth have made their influence felt throughout the world.

The son of an army officer, Hugh Montague Trenchard followed his father's profession and saw service in India, South Africa, and Nigeria, where his gallantry won him the D.S.O. On his return to England, he was attracted to the newly-formed Royal Flying Corps and entered the Sopwith school at Brooklands. Despite defective vision in one eye and the fact that he was almost over the age limit, he mastered the new art within a week and, on 13 August 1912, qualified for the Royal Aero Club pilot's certificate. He was then posted to the Central Flying School at Upavon as an instructor, and a year later became assistant to the commandant of the school. When the Great War broke out in 1914, Major Trenchard was sent to Farnborough to build up the new squadrons required for the expansion of the Royal Flying Corps. Later he took command of No. 1 Wing in the field, subsequently becoming commanding officer of the R.F.C. in France.

At the end of 1917, Major-General Sir Hugh Trenchard returned to Britain to become the first Chief of the Air Staff in the Air Council which was constituted on 2 January 1918. Two months later he resigned from this post and returned to France to take command, in June 1918, of the Independent Air Force, the first strategic air force in history.

In January 1919, when the war was over, Major-General Trenchard again became Chief of the Air Staff, and through the next eleven years devoted himself to reconstructing the R.A.F. upon a sound, permanent basis, and to preserving its unity against the assaults of those who sought to dismember the new Service. To provide it with a *corps d'élite* of officers and airmen trained *ab initio* in the Service, he founded the R.A.F. Cadet College at Cranwell, the Staff College at Andover, and an apprentice school at Halton. Through these years, by his "singleness of purpose and faith in the men he commanded", he led the way in moulding the doctrines and the traditions of Britain's air service. On 1 January 1927 he became Marshal of the Royal Air Force, the first serving officer to attain that rank.

At the end of 1929, Sir Hugh Trenchard relinquished the post of Chief of the Air Staff, and in the New Year's honours list for 1930 he was elevated to the peerage as Baron Trenchard of Wolfeton. Appointed Commissioner of the Metropolitan Police Force in 1931, Lord Trenchard again displayed his outstanding organizing ability, rebuilding the force from the ground up, and making it thoroughly efficient and modern. On his retirement from this post he was created a Viscount in 1936. In the House of Lords through the next 20 years he was ever ready to uphold the air force he had created and the principles of air power he had expounded. Many honours came to him during his life; the one he prized most highly was his appointment to the select company of the Order of Merit in 1951.

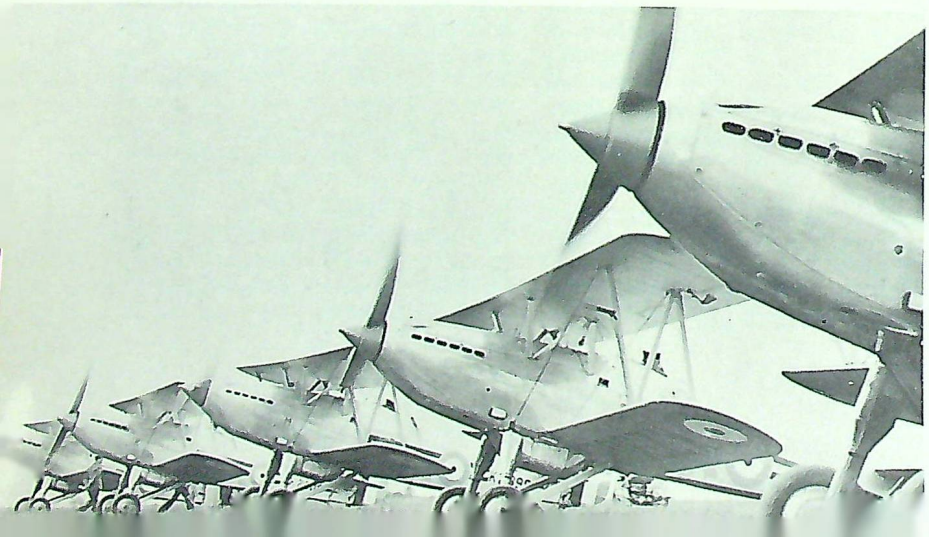
To this brief sketch of a long and distinguished career in the service of his country, may be added, as part of the R.C.A.F.'s tribute, that we remember with pride the keen interest that Lord Trenchard expressed, while he was Chief of the Air Staff, in the new air service that was being formed in Canada in the years after the Great War. He was instrumental in securing for the C.A.F. the right to fly the light blue ensign, and in a letter to the Inspector-General of the C.A.F. he wrote: "I shall never forget the good work that Canadian pilots and observers carried out under me in France, and I am very glad to think that they and their successors use the Royal Air Force ensign, the underlying idea of which is the target used to mark all British machines in France, and in connection with which so many gallant airmen fought their last fight."

PIN-POINTS IN THE PAST

The group-photograph, for which we are indebted to Wing Commander G. E. Creighton (retired), shows the officers of No. 1 Wing, Canadian Air Force, at Shoreham, England, in the autumn of 1919. The Wing, consisting of No. 81 Squadron, R.A.F. (also known as No. 1 Fighter Squadron, C.A.F.), and No. 123 Squadron, R.A.F. (No. 2 Day-Bombing Squadron, C.A.F.), was at that time under the command of Lt.-Col. R. Leckie, D.S.O., D.S.C., D.F.C. (Air Marshal, R.C.A.F., retired).

Standing (left to right): Lt. G. R. Howsam, M.C. (No. 81 Sqn. Air Vice-Marshal, ret'd.); Lt. J. E. C. Hammond (No. 81 Sqn.); Capt. J. D. de Pencier (No. 81 Sqn.: deceased); Lt. C. E. Creighton (No. 123 Sqn.); Capt. C. F. Falkenberg, D.F.C. (No. 81 Sqn.: Wing Commander, ret'd.); Lt. L. L. Brown, D.F.C. (No. 123 Sqn.); Capt. W. E. Windover (No. 123 Sqn.; dec.); Capt. W. F. Taylor (Medical Officer); Lt. S. C. Rose (No. 123 Sqn.). Seated (left to right): Lt. R. D. Chisholm (No. 123 Sqn.); Lt. Knight (R.A.F.); Capt. H. M. Ireland, D.F.C. (No. 123 Sqn.); Lt.-Col. R. Leckie; Lt. H. L. Holland, M.C. (No. 123 Sqn.; dec.); Lt. A. G. C. Dann (No 123 Sqn.); Lt. E. A. Siegrist (No. 123 Sqn.).

Students of military dress will note the variety of uniforms shown in the photograph. They represent the Canadian Army, Royal Flying Corps, Royal Naval Air Service, and two versions of the Royal Air Force dress.



Our second photograph shows the five Hawker *Furies* of "C" Flight of No. 1 Fighter Squadron (R.A.F.) which visited eastern Canada in June and July 1934 to participate in the Toronto centennial celebrations and to make a good-will tour of cities in Ontario and Quebec. On 14 July 1934 the R.A.F. *Furies* and some R.C.A.F. *Siskins* presented a combined display at Ottawa which attracted 25,000 spectators. The proceeds of the display went to the R.C.A.F. Benevolent Fund.

The Party Line

THE COMPTROLLER DIVISION AT A.F.H.Q.

By Wing Commander H. G. Marriott

(Not long ago Air Force Headquarters was reorganized to include a Comptroller Division. The formation of such a Division represents a major change in Headquarters organization, and is an entirely new departure for the armed forces of Canada. It has not, however, entailed the assumption of new responsibilities: rather it has been achieved by the regrouping of activities and personnel which already existed, to a large degree, in other Divisions. The present article shows us how the resultant improved co-ordination makes itself felt in every field of Air Force endeavour.

The author of the article is unusually qualified to write on the subject of Service management. After going to England in 1936 to join the R.A.F., he was trained as a pilot and served on light bombers until the outbreak of the war, when he was sent to France with the Advanced Air Striking Force. In 1941 he was posted to the R.A.F. school at Port Albert, Ont., for a specialist navigation course. Thence he went to No. 33 Air Navigation School (R.A.F.), Mount Hope, Ont., where he served first as an instructor, then as Chief Ground Instructor, and finally as Chief Instructor. Returning to the U.K., he flew a tour of operations with the 2nd Tactical Air Force in Belgium and Germany. In 1945 he transferred to the R.C.A.F. and was appointed as C.O. of the Composite Training School, Toronto. During the following year he attended two U.S.A.A.F. courses in management: the Applied Personnel Management Instructors' Course and the Military Management Course for senior U.S.A.A.F. officers. In 1947 he formed the School of Service Management at Trenton, of which he continued as O.C. until posted to the Staff College course in 1949. After graduation, he served, successively, as Staff Officer Postings and Careers (North-West Air Command), Senior Air Staff Officer (No. 12 Group), and Senior Personnel Staff Officer (No. 12 Group). He was then employed for two years at A.F.H.Q. in the Directorate of Organization and Establishment before being sent on the Manpower Management Course at the George Washington University. He now holds the position of Director of Management Engineering in the Comptroller Division. — Editor.)

THE R.C.A.F. IS A BUSINESS

THE Air Force is Big Business. Reckoned in terms of expenditures and personnel employed, the R.C.A.F. is one of the largest businesses in the country. It differs from ordinary commerce or industry only in that it cannot show any profit or loss in dollars and cents. This does not mean, however, that it cannot show a profit. Far from it. The difference lies in the form in which this profit is expressed. Webster's Dictionary defines the word "profit" as meaning, among other things, "valuable results" or "useful consequences". If we accept those definitions, it is quite possible to measure Air Force activity in terms of profit or loss. Our profit or loss will be expressed in terms of training and operational preparedness in relation to the money and manpower expended. We can therefore, assess the relative efficiency of our Service in the same terms.

There are four very good reasons why each of us in the Service should be personally concerned with the efficiency of the R.C.A.F. as a whole:

- We are all volunteers in the R.C.A.F. primarily in order to take part in the defence of Canada and ensure a continuation of our Canadian way of life.
- Any excess or unnecessary manpower drain has an adverse effect on the economy of our country as a whole and, indirectly, on our own standard of living.
- As individuals, we get personal satisfaction from making a useful contribution to the functioning of an efficient organization.
- As taxpayers, we are helping to pay the costs of our own Service, and the waste of any funds means proportionately more money out of our own pockets.

If we are to achieve or sustain efficiency, we must be prepared to learn from our own experiences and from the experience of businesses of comparable size. One of the lessons that large business enterprises have learned during recent years is that, in addition to the operating divisions, a controller is essential to the smooth and efficient functioning of the organization.

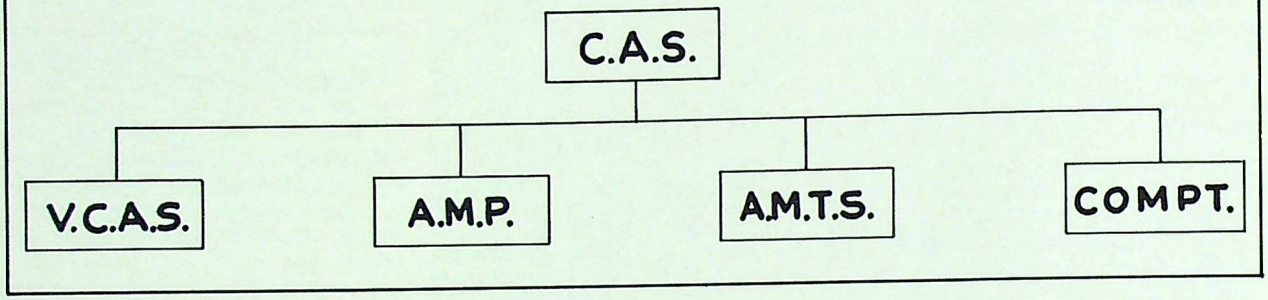
WHAT IS A CONTROLLER?

The word "controller" has, in various forms, been in existence for a long time. Of those forms only two now remain: "controller" and "comptroller". The two words are synonymous, and their use depends upon the personal preferences of the individuals concerned.

Apparently human nature has not changed one iota throughout the years. It would appear that very few people have ever trusted anyone else to spend their money for them. The word "controller" was originally spelled "counter-roller", and it was used to describe an individual who kept a counter-roll so that he could check on the treasurer or person in charge of accounts. The Oxford Dictionary records its use in this sense as early as 1292.

In modern terminology the meaning is very similar, except that now the controller is charged with checking up on the use not only of money, but of all resources. Also, instead of being a check on the treasurer, the controller is a check on the operators, i.e. on those who use or commit the resources. You might say that the controller is the watch-dog, the fire-alarm, the thermometer of the business. He is responsible for ensuring that proposed programmes are within the capabilities of our resources.

FIG 1.



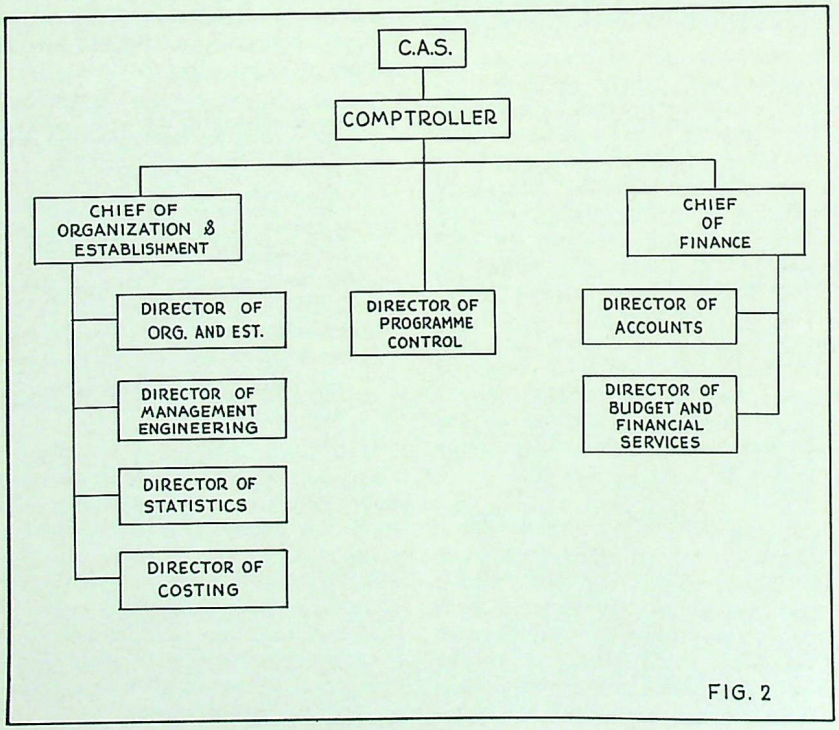


FIG. 2

THE CONTROLLER'S FUNCTIONS

Possibly the best way to describe what a controller does is to quote the concept of the function of controllership as approved by the Controllers' Institute of America, Inc., in September 1949.

1. To establish, coordinate and maintain, through authorized management, an integrated plan for the control of operations. Such a plan would provide, to the extent required in the business, cost standards, expense budgets, sales forecasts, profit planning, and programs for capital investment and financing, together with the necessary procedures to effectuate the plan.
2. To measure performance against approved operating plans and standards, and to report and interpret the results of operations to all levels of management. This function includes the design, installation and maintenance of accounting and cost systems and records, the determination of accounting policy and the compilation of statistical records as required.
3. To measure and report on the validity of the objectives of the business and on the effectiveness of its policies, organization structure and procedures, in attaining those objectives.

This includes consultation with all segments of management responsible for policy or action concerning any phase of the operation of the business as it relates to the performance of this function.

4. To report to government agencies, as required, and to supervise all matters relating to taxes.
5. To interpret and report on the effect of external influences on the attainment of the objectives of the business. This function includes the continuous appraisal of economics and social forces and of governmental influences as they affect the operations of the business.
6. To provide protection for the assets of the business. This function includes establishing and maintaining adequate internal control and auditing, and assuring proper insurance coverage.

The foregoing terms of reference were, of course, written in generalized form to suit almost any commercial undertaking. For use by government agencies they would require minor modification. They do, however, give a reasonably clear idea of just what a controller's functions are and why his position is essential to the efficient conduct of the business.

What is even more important than what a controller *does* is what he does *not* do. He does not — and I wish to repeat this — he does *not* establish the objectives of the business. The operating divisions establish the objectives. All the controller does is to assess the feasibility of the various objectives in terms of resources. He assesses and reports on the relative cost of various programmes, and he measures and reports the progress towards planned objectives.

So much for the controller in business. Now let us look at the Comptroller in the R.C.A.F.

THE COMPTROLLER IN THE R.C.A.F.

The Comptroller's terms of reference are as follows:

- He co-ordinates general Service policy and planning within A.F.H.Q. and ensures that proposed policies and programmes make efficient use of R.C.A.F. resources.
- He directs the preparation of the R.C.A.F. budget and the rank structure submission and assists in their support before higher authority.
- He provides for the efficient organization, allotment, and management of manpower and equipment resources and facilities.
- He provides for the measurement of progress toward programme objectives in the fields of operations, personnel, materiel, and construction.
- He ensures that R.C.A.F. activities do not exceed financial, major equipment, mobile equipment, or personnel ceilings.
- He determines the general accounting policies, principles, procedures, and systems, including internal audit.
- He provides financial services, including the administration of funds.
- He provides full statistical and costing services, and he co-ordinates R.C.A.F. air standardization activities.

The foregoing terms of reference were drawn up to overcome recognized deficiencies in our previous organization. Although they were written without reference to those approved by the Controllers' Institute, it is amazing how closely they parallel them. This is further proof that we in the Air Force encounter much the same difficulties and problems as large business enterprises, despite the fact that we are unable to assess our profits in terms of dollars and cents.

The Comptroller in the R.C.A.F., like the controller in business, *does not* determine policy or establish objectives. This is done by the operating Divisions. The Comptroller merely assesses and reports, and provides a service to the other Divisions. It is true that the information provided by the Comptroller will have a direct effect on the decisions that are eventually made and the policies that are eventually determined upon, but the Comptroller himself does not make those decisions or determine those policies. Rather, the Comptroller provides the information which enables the operators better to evaluate their own programmes and to set their own objectives. This leads to better planning, which in turn results in better control.

After a policy or programme (based on factual information provided by the Comptroller) has been accepted, the Comptroller sets up an organization so that the policy or programme may be carried into execution by the agency concerned. By means of statistics and records the Comptroller checks on the progress of the programme and reports this progress to the various operators so that *they* can take what corrective action *they* deem to be necessary should the programme not be progressing according to plan.

ORGANIZATION OF THE COMPTROLLER DIVISION

Let us now take a look at the new Comptroller Division and see what its composition is, where the components came from (and why), and how it functions in carrying out its terms of reference.

From Fig. 1 it will be seen that we now have a four-pronged organization in A.F.H.Q., with the Comptroller functioning as an Air Member on the same level as V.C.A.S., A.M.P., and A.M.T.S. His responsibilities are those outlined earlier in this article. To assist him in carrying out these duties, he has a Chief of Organization and Management, a Chief of Finance, and a Director of Programme Control (see Fig. 1).

Chief of Organization and Management

The Chief of Organization and Management has under him four Directorates:

the Directorate of Organization and Establishment,
the Directorate of Management Engineering,
the Directorate of Statistics, and
the Directorate of Costing.

The Directorate of Organization and Establishment carries on with predominantly the same function as it had when it was under C. Plans I. Its main responsibilities are as follows:

to set up the organization considered, in the light of previous experience, to be the best suited for carrying out any programme;

to authorize an establishment of personnel, M.E., and major equipment, calculated to be sufficient to complete the programme efficiently;

to maintain a control over established personnel, major equipment, and M.E. vehicles, in order to ensure that the R.C.A.F. remains within authorized ceilings; and

to calculate and record personnel, M.E., and major equipment requirements for additional programmes, and to prepare the rank structure submission to cover future activities.

The Directorate of Management Engineering is a new Directorate formed to assist R.C.A.F. formations in establishing or maintaining good management practices. In general terms, its responsibilities are:

to conduct research on latest management trends throughout the world, study their application to the R.C.A.F., and disseminate this information to all R.C.A.F. personnel concerned;

to carry out studies of present R.C.A.F. practices, and recommend changes which will result in increased efficiency, greater output, or reduction in resources required;

to supply specialist assistance to subordinate formations so that these formations may carry out their own management engineering studies; and

to train suitably qualified personnel for eventual employment in Command Headquarters and possibly even on stations.

The Director of Statistics is responsible for the determination of the form which returns and reports should take, and the frequency of submission. His Directorate acts as a central statistical service to receive all inter-divisional and external enquiries for statistical information. When fully operative, the Directorate will be charged with the responsibility for initiating information, for the collation of that information, and for the dissemination of pertinent information to the Divisions and Directorates which make use of it.

It is visualized that there will eventually be a Statistics Section in each C.H.Q. and a Statistics Officer or N.C.O. at each unit or station. If and when this situation comes about, the unit Stats. Officer will be charged with the responsibility of consolidating all returns from the unit. The C.H.Q. Stats. Section will sieve off and distribute to the user Branches information pertinent to that Branch. Information from units will be consolidated by the C.H.Q. Stats. Section and forwarded to A.F.H.Q. Here it will be amalgamated into central statistical records and pertinent information distributed to interested Directorates.

Under this system, units and Commands will be absolved from the responsibility of completing a large number of individual returns (with the exception of information concerning operational readiness). The required information will be collected, consolidated, and forwarded through the Stats. channel. The net result will be a definite reduction of the duplication now existing in records and returns, and a reduction in work-load for unit, C.H.Q., and A.F.H.Q. staffs. When the organization is in full operation, personnel (at any level in the Air Force) who require additional information will make their requests to their Stats. Section. If the Stats. personnel cannot supply it from their existing consolidated returns, they will arrange for its collection.

The Directorate of Costing originated with a nucleus that existed under the Director of Accounts and Finance. Because its functions were intimately associated with the responsibilities of the Comptroller, and since it works in close collaboration with D. Stats., it was decided to move it from D.A.F., enlarge its responsibilities, and place it with D. Stats. under the Chief of Organization and Management.

The Directorate of Costing fills a very important rôle in the Comptroller Division. It is this Directorate which provides accurate information on the costs of past programmes and estimates of the cost of proposed projects, policy changes, or amendments to regulations. Our Air Members are thus enabled to make definite decisions regarding policy, procedures, or practices, with the assurance that approved programmes will fall within our authorized financial and personnel ceilings.

Chief of Finance

The Chief of Finance carries out functions which are essentially the same as were those of D.A.F. There have been a few minor changes, but none that will have any major effect on the average member of the R.C.A.F. For this reason it is not proposed to enlarge on them here.

Director of Programme Control

The Directorate of Programme Control is the key directorate in the new organization. This Directorate ties in the activities of the other Directorates in the Division, and, in effect, acts as the control.

Its major responsibilities are:

- to screen requirements before their inclusion in the annual estimates,
- to screen requirements presented for approval subsequent to the preparation of the annual estimates,
- to analyse the financial implications of all programmes,
- to ensure that all programmes are in proper proportion and to recommend priority allocation of funds,
- to measure and report the progress toward programmed objectives, and
- to assist in the removal of impediments in achievement of programmed objectives.

One and two of the above functions are designed to ensure that requirements for which a submission has been made are, in fact, in the best interests of the Service as a whole and that they are in line with current policy and proposed future programmes. It would be useless, for example, to carry out a large programme of construction for recreational facilities at Station Moose Pelvis if, in the immediate future, the operational staff planned to reduce operations at Moose Pelvis and to concentrate them elsewhere. Similarly, much money would be wasted if a requirement

called for new barrack blocks or a new chapel at a station that was going to be closed down.

The Directorate's control is by no means limited to new construction. It also includes a control over purchases of major equipment and M.E., and it ensures that personnel and training requirements are in line with future needs.

D. Prog. C. also has the responsibility of checking and reporting on any programme that gets out of proper proportion. Such a brake is, of course, vital to the efficient use of the resources available to us under strict financial and manpower ceilings.

Finally, it is the responsibility of D. Prog. C. to co-ordinate the activities of the Comptroller Division and to see that all pertinent information is laid before Air Members so that realistic policies may be determined or corrective action taken where necessary.

CONCLUSION

The establishment of a Comptroller Division in A.F.H.Q. is a concrete attempt to achieve better control and co-ordination of R.C.A.F. activities than has been possible in the past. This reorganization is in line with, and the result of, experience gained both in the R.C.A.F. and in commercial and industrial firms of comparable size. The Comptroller is not an arbitrator: his function is to provide the operators with information and with the tools of control. The actual decisions which result in effective control are provided by the operators themselves. The Comptroller is a part of top management, but only in so far as he provides advice, guidance, and assistance to those charged with determining policy and programme. The Comptroller himself—let us repeat again—does *not* establish the objectives or set the policy.

It is hoped that, when the Comptroller Division is functioning fully, the information provided will allow the operators to make a better evaluation of objectives. This in turn will lead to better control. The net result, it may be confidently anticipated, will be a general increase in the efficiency of the R.C.A.F. and a greater profit as expressed in "valuable results" or "useful consequences".

★ ★ ★

FIRST ESKIMO CURLERS?

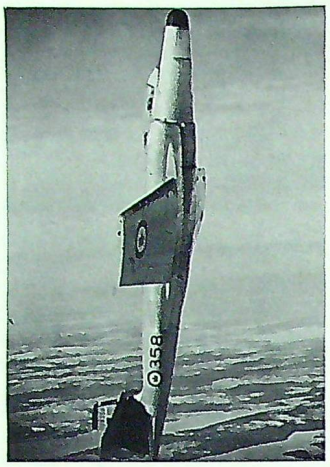
The 1956 Manitoba Provincial Bonspiel offered a unique attraction this year with the entry of an Eskimo rink "skipped" by a member of the R.C.A.F.

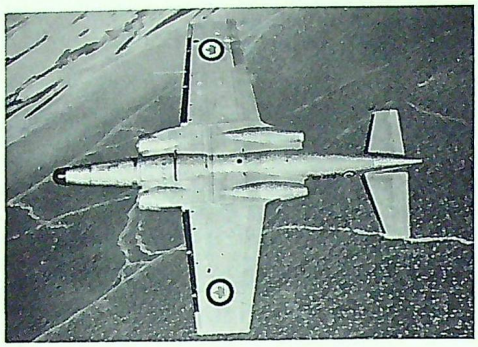
Flt. Sgt. W. Beaton, of R.C.A.F. Unit Fort Churchill, formed a rink with three Eskimos from the Churchill area, and, after a few months' practice, decided to enter the provincial rock-and-broom championship. Flt. Sgt. Beaton said the Eskimos took to the game very quickly.

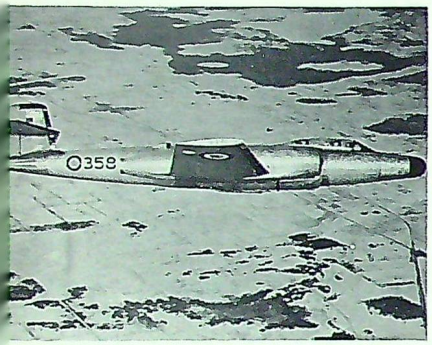
Shown in our photograph are (l. to r.): C. Gordon, W. Adams, Flt. Sgt. Beaton, and T. Adams.

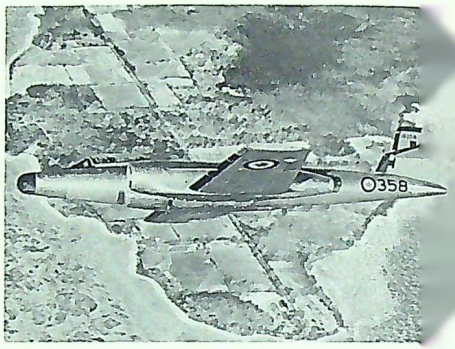
★ ★ ★

ROLL OFF THE TOP









This striking series of photographs, showing one of Central Flying School's CF-100s performing a roll off the top of a loop, was taken by L.A.C. Herron from the back seat an accompanying T-33.

FIRST SPIN RECOVERY

MORNING dew sparkled in the rays of the early sun on the grass runway of the Royal Flying Corps aerodrome at Thetford, Norfolk, England, one brisk day in January 1916.

Lieutenants D. M. Wynne and Harold E. Hartney watched Wynne's student pilot lazily circle the field on his solo flight in a Maurice Farman "long-horn". The aeroplane, new then, was a box-kite, with its controls in front on outriggers, and was powered by a French *Renault* 80-horse-power air-cooled engine.

Suddenly the two older pilots gasped. The student's wing-tip went up. The aeroplane nosed over and went into a spin. On the ground the men waited in dread for the inevitable crash, for in those early days of aviation there was no known method of recovery: a spin meant death.

But, as Hartney himself records the moments that followed:

"We saw him go into that usually fatal spin, pull out of it smoothly, go into another on the other side, pull out of that, and repeat the performance several times. When he landed, the instructor said:

" 'What the hell are you trying to do — kill yourself? How did you get out of that first spin and all the others?'

"His reply was a classic: 'Put my controls in neutral, trusted in the Lord, and slowly pulled out of it!'

"And that was the solution of spinning thereafter."

(*Ward Lauren, in "Skyline": U.S.A.*)

THEY TOOK TO THE WOODS

COLD-WEATHER TESTS AT COLD LAKE

(The writer of the narrative contained in this article may not be able to say, like Thoreau, "I went to the woods because I wished to live deliberately", but at least he resembled the schoolmaster of Maine in that he found himself called upon "to front the essential facts of life."—Editor.)

A BLEAK and uninhabited area, previously swept by forest fire and practically devoid of small game, served as the temporary home of nine aircrew and three observers last winter in the R.C.A.F.'s latest cold-weather tests.

The objects of the tests were:

- to determine whether or not aircrew, wearing the clothing and using the equipment that is available to them in an emergency, can survive for ten days;
- to analyse the effects of such a trial on the subjects' physical condition;
- to explore the possibility of cutting down the bulk and weight of survival kits, either by eliminating certain articles or by combining the function of two or more items; and
- to test various pieces of clothing and equipment which were submitted for cold-weather trials by the Institute of Aviation Medicine, the Directorate of Air Equipment (Engineering), and the Directorate of Inter-Service Development.

The nine subjects, brought in from different Commands, were considered to be average representative members of the R.C.A.F.'s aircrew personnel. Three of them were normally engaged in flying jets, the remaining six came from units using piston-engined aircraft. All wore the clothing and used the equipment that would have been available to actual *bona fide* survivors.

For a few of the men, who had no previous experience of living in the bush and no formal survival training, the ten-day period was quite an ordeal. Left to their own devices, they were forced to learn woodcraft by trial and error. They found out the hard way that enough firewood and kindling should be kept in the shelter during the night to ensure a supply of dry wood for the morning fire; and after a few miserable nights they learned to shake the sleeping-bags for several minutes so that the down would fluff up and provide adequate insulation. They were, however, free of the psychological stresses which accompany "real" survival. They were uninjured, they knew that immediate assistance was available in emergency, and (most important of all!) they knew they would be "rescued" in ten days' time. The best of all tests of survival equipment is, of course, its use in actual emergency, but to depend entirely on such methods of evaluation would be a somewhat slow (and drastic) way of going about things.

During the test period many

The six-man team in front of its lean-to.

Three well-shaved survivors start the test.

items of equipment were evaluated, including three types of flying suits, a variety of headgear, parkas, thermo-boots, and snowshoes made of wood and also of magnesium. The test subjects tried to arrange to be in their sleeping bags when a different flying-suit arrived. They could then ponder, in comparative comfort, the quickest method of coping with the new suit's zippers, thus eliminating a few seconds of chilly fumbling. The three fighter personnel were issued with Inland Winter Survival Kit Seat-Packs, and a package of optional equipment was also available to them if the mandatory items proved insufficient. The optional equipment was not to be opened before the sixth day.

The group of six were given the Basic Aircraft Kit and the Six-Man Survival Kit. In addition to mandatory items of survival equipment, parachutes were provided for every man.

Each subject was issued with two cans of rations to be used according to the instructions contained in the can. These two cans contained eight days' rations, which, taking into account a fast on the first and last days, would cover the full ten-day period. The subjects were advised that they could supplement their rations with any game they were capable of obtaining. They could not, however, use the fish-net because of a restriction imposed by the Department of Game and Fisheries. While all the subjects were undoubtedly hungry (the average loss of weight was 11 lbs.), no undue complaints were recorded and no extreme discomfort was suffered. They all returned to full duty within 24 hours.

* * *

The nine men were taken in two *Otters* to the test area — a desolate lake approximately 25 miles northwest of Cold Lake. When the aircraft had landed on the ice, one of them taxied around the lake's perimeter, discharging the three fighter aircrew and their equipment at predetermined points, from which the men made their way through the deep snow to find spots which offered the best possible shelter and easily obtainable firewood. Meanwhile, the second *Otter* took the six other men to the site of their camp. Each of the four test sites was virtually isolated from the others, with no communication permitted between them.

The Senior Medical Officer of Station Cold Lake checked up on the men on the fourth day, and the observers visited the test sites twice a day. No attempt was made, however, to help or advise, nor was any news transmitted from one site to another. The subjects were not told the temperature, but that information was hardly necessary: the cracking and booming of the ice were sufficiently eloquent. As a matter of record, the observers were disappointed that the temperature only went down to 30° below zero, with an average of 10°F. for the ten-day period. Their disappointment, however, was not shared by the subjects of the tests. The test-period had been set at ten days as representing the length of time over which an unproductive search would normally be carried out.

Before the trials, all the subjects had been issued with a notebook and a pencil. They were requested to keep a daily diary of their activities, symptoms, and thoughts, which they were to put into narrative form at a later date. Space limitations preclude the publication of more than one of the narratives, but we feel that it gives a better idea of what the survivors were up against than could be conveyed by any second-hand report. The narrative we have selected was written by one of the three "solo" testees.

* * *

"When I first received information regarding the trials, I was under the impression that I would be attending the Winter Bush and Arctic Survival Course at R.C.A.F. Station Edmonton. I was particularly interested in getting this course because I considered myself most inexperienced in bush lore. I am neither an avid fisherman nor a hunter.

"When the first signal arrived, about a week later, I began to realize that this was not going to be the standard survival course; but it wasn't until after I'd arrived at Station Edmonton and been briefed by Flying Officer Soper, the Project Officer, and his staff, that I knew

what was intended and what was required of me. It was a bit of a shock — a shock which was in no way mitigated by the information that I would not even have all the items that I normally carried while flying. The item that I felt I needed most was the Survival Booklet (C.A.P. 361), but even this was to be denied me.

"Somewhat subdued, I realized that this would indeed be a very interesting experience. Though I expected to suffer some discomfort, I considered myself fortunate to be one of the trial-group because I would certainly learn a thing or two.

"Flying Officer Soper told us that we were to report at the assembly point at 0900 hrs., on January 23rd. When, shortly after assembly, we learned that the operation was to be delayed for twenty-four hours on account of high winds and an unserviceable aeroplane, I confess that I felt I had been granted a stay of execution!

"The next day, at about 0900 hrs., we loaded the equipment on board a *Dakota* and an hour later we were airborne and on our way to Station Cold Lake. En route we were issued the normal aircrew lunch: two meat sandwiches, two cookies, one apple, and tomato juice served in paper cups. Knowing that this was going to be my last substantial meal for some time, I consumed it all with the exception of the apple, which I stuffed into my jacket pocket.

"On arrival at Cold Lake, we three fighter-boys and our baggage were quickly transferred to an *Otter* aircraft, and, accompanied by Flying Officer Soper and Sqn. Ldr. Tourgis, the administrative adviser, we took off for our final destinations. A short flight, and we were landing on a lake. We threw off some base-camp equipment, taxied what appeared a short distance, and stopped. I recall Flying Officer Soper saying "O.K. Joe — over there some place in those pines. We'll see you." Out Joe hopped with what appeared to be a pitiful amount of gear — and that was the last I saw of Flying Officer Arsenault until we were picked up on February 3rd.

"By this time my heart was beginning to thump fairly rapidly. Who'd be next — Tom or I? The engine roared; we taxied on for a few seconds, then stopped again. "O.K., Sir. Squadron Leader Tourgis will accompany you to where you'll select your camp site. Then he'll return to base-camp." Out I scrambled with Sqn. Ldr. Tourgis behind me, out on to the frozen lake, carrying one parachute and one seat pack (mandatory items), and one package of optional equipment.

"The snow was deep, and I was gasping for breath by the time I'd walked the 200 yards to the shore. The thought struck me — with some force — that I wouldn't be able to move very far under these conditions.

"Even though I had planned, as well as my lack of knowledge permitted, what I would do first and what equipment and methods I would employ, I approached my task with some uncertainty. Spotting a dead spruce tree, however, I swept the snow off the trunk, laid down my kit, and looked around for a likely spot to build a shelter.

"Two stout spruce-trees, about ten feet apart, offered a site for my lean-to. I told Sqn. Ldr. Tourgis that this was where I planned to stay, and I set about the erection of the shelter. He then left me to my own devices — and I felt relieved and less self-conscious!

"After selecting the spot for the shelter, I scraped the snow away with my mukluks, and started on the construction of a lean-to. The main upright supports, as already mentioned, were two spruce trees, and the main cross-support was a dead poplar tree about three inches in diameter. This beam was fastened to the trees by parachute cord. The main roof-supports were spruce branches which I broke to the re-

Flt.-Lt. Stockdale (left) checks up on a lone survivor.

Fishing through the ice.

quired length. My first intention was to make a brush shelter, but I soon realized that I had neither time nor materials to complete it before nightfall. Therefore, I covered the framework with my parachute.

"At about 1500 hrs. I ate the apple which I had saved from my box-lunch, then carried on with necessary chores until 1630 hrs., when Flying Officer Stockdale arrived with a photographer to record my progress.

"After they had left, I sat down and made the first entry in my daily diary. The rest of the evening was spent in tending the fire and collecting my thoughts. I retired at about 1900 hrs. but didn't fall asleep until sometime after 2030 hrs., when Flying Officer Soper made a visit to my camp.

"My night-attire, that first night, was the combination underwear which I was wearing, a pair of socks, and nylon gloves. My sleep was fitful; I was, naturally, somewhat restless and trying to adjust myself to my new environment.

"At 0630 hrs. I was wide awake, shivering in my sleeping-bag. I lay there until 0800 hrs., flexing my toes and fingers, tossing and turning, trying to get warm and to distract my mind from the physical discomfort.

"I would like to say that I leapt out of bed, full of vim, vigour, and vitality; but I'm afraid the actual picture was rather different. Not being used to crawling out of a sleeping-bag in low temperatures, I was awkward and stiff with cold. After what seemed hours, I was finally encased in my flying-suit (the X3), which seemed to be made of blue ice. Surprisingly enough, though, and to my vast relief, it was only a few seconds before I was quite warm.

"My next task was to start a fire. Not having had the foresight on the previous evening to prepare and dry some kindling, it took me some time to achieve even a feeble flame. This I gradually coaxed into a good-sized blaze, my spirits rising with the leaping flames; and, as I fed the fire, I planned my day. . .

"My first task was to dry my bed-roll. This I did by spreading the plastic cover of the bed-roll beside the fire and draping the bed-roll over a few propped-up sticks.

"Next, I turned my attention to improving my shelter by adding more parachute fabric. This done, I constructed ground/air signals clear of the shore-line and bordering reeds. I first tramped the two 'L's in the snow and filled in the design with dead willow. The height of each letter was approximately 15 ft., with about 8 ft. between them.

"My heat-reflector (for reflecting the heat of my fire into the lean-to) was made of green spruce approximately 1½" in diameter. I was limited to this size because the largest cutting-tool I had was a hunting-knife. The uprights of the reflector were bound with parachute cord and wire strapping from the bed-roll.

"At 1530 hrs. I sat down to rest and smoke a cigarette in front of the fire. To my amazement, I found that during the past twenty-four hours I had only smoked about six cigarettes. I was very tired, and I had a headache. I had not eaten since the previous day, but, oddly enough, I didn't feel particularly famished — possibly because I'd kept busy — and the best part of the meal which I ate at 1700 hours (3 gum squares and one third of a piece of shortbread) was the coffee. Until then I had been drinking melted lake-ice, which had a swampy taste, flavoured with wood-ash and smoke. The delightful aroma and taste of coffee were the highlights of my experiences throughout my stay in the woods.

"By the time I had finished my supper, my headache was quite severe. I smoked a couple more cigarettes, and retired at 1910 hours. A visit from one of the observers, about an hour and a half later, completed my second day in camp.

"By January 26th life seemed to have fallen more or less into a routine. Having fought with myself to get up, I dressed, started a fire, but only to lie awake, tossing and turning, until long after the observers' visit. It was while I lay awake that night that I got my only real craving for food. I longed particularly

for chicken noodle soup. So strong, indeed, was my desire for it that I could see, smell, and almost taste it. My salivary glands were stimulated to such an extent that I was practically drooling.

"When I awoke next morning, however, I was unusually cheerful and full of energy. I not only completed the routine tasks, but I even enjoyed doing them. In addition, I built a wind-break from the remainder of my parachute. Why I hadn't thought of making one before, I'll never understand: it made me so much more comfortable while sitting by the fire. I retired that night feeling that I'd had a very good day.

"Light snow fell during the greater part of the 30th., forcing me to sit in the doorway of my shelter, as I didn't want to get my clothes damp. As a result, the time passed slowly. I read about five pages of my pocket magazine—and that was my only reading throughout the trial.

"On the 31st I broke into my supplementary equipment and took out the hatchet. The hatchet was a new toy. It created a new interest for me, and I wasted a lot of energy by hacking away at larger trees. It wasn't entirely wasted, though, for I provided myself with heavier pieces of fire-wood which enabled me to stoke the fire less frequently. The afternoon brought a light fall of snow, and I employed my time by making a sketch of the surrounding trees and the lake. I have no artistic ability — in fact, I cannot remember when I had last done anything similar — but the hour spent both cheered me and gave me a sense of accomplishment.

"February 1st was highlighted by two events. In the morning, Flying Officer Stockdale and a photographer spent some fifteen minutes at my camp taking pictures; and later, my feet got really cold. I took off my duffles and socks, and sat beside the fire for two hours, drying them.

"I had a new tool to use on February 2nd; 'The Woodsman's Pal'. It was, I found, much better balanced than the normal hatchet, and I enjoyed working with it. My spirits, too, were uplifted by the realization that the trial would end the next day. Ever since Monday, I had been counting: three more days, two days, and now only one day, and all this unnatural discomfort would be over.

"On the last morning I was up at 0745 hours. Hardly had I got my fire going, when I heard the pick-up 'plane overhead. I hurriedly ate my last two gum squares, swallowed a quick drink, and started to break camp. In my excitement I knocked my sleeping-hood into the fire and burnt a small hole in it.

"By 0830 hours the *Otter* was just off-shore by my camp. Flying Officer Soper and two others helped me complete the striking of my camp, bundled me and my equipment on board, and we moved on to pick up Flying Officer Koch.

"Five minutes later we were off—bound for a tooth-brush, bath, clean clothing, and food."

"The forest primeval".

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

What's the score?

("Continuing our tour of the Commonwealth," writes Sgt. Shatterproof, "this month we take a quick dash up the Persian Gulf, then coast southward along the shores of the Dark Continent and round the Cape of Good Hope." As a matter of fact, the old wardog writes quite a lot more than that; but since most of it concerns a missionary uncle of his who came to a very depressing end during the spring fertility rites of the M'pwapwas, we think it as well to proceed directly to his questions. His answers appear on page 32. — Editor.)

1. Aden, a Crown colony at the southernmost tip of Arabia, also gives its name to the adjoining protectorate. The combined population of both is less than a million, and the total area is about one fifth greater than that of the United Kingdom. The town of Aden:

   (a) Stands in the crater of an extinct volcano.
   (b) Is perched on top of a high plateau.
   (c) Is supposed by some to occupy the site of the Garden of Eden.
   (d) Is considered by anthropologists to have been the centre of the Middle East's jinn-bottling industry.

2. Other British colonies and protectorates in Arabia are Kuwait, Bahrein, and Oman. Bahrein, a small group of islands half-way up the Persian Gulf, is famous for its oil refineries; while Kuwait:

   (a) Is the H.Q. of the Arab Legion.
   (b) Was the former stronghold of Haroun al-Rashid's Arabian Knights.
   (c) Has the best harbour in the Gulf.
   (d) Is the reputed birthplace of Sinbad the Sailor.

3. Somaliland, a British protectorate on the east coast of Africa, administered until 1894 by the British resident at Aden as a dependency of India. From 1901 to 1920 its history is chiefly that of:

   (a) Settlement by British farmers.
   (b) Skirmishes along the border of Italian Somaliland.
   (c) The growth of Mau Mau.
   (d) Campaigns against the "Mad Mullah", Mohammed bin Abdulla Hassan.

4. Kenya, a British colony and protectorate about 2½ times the size of the United Kingdom and with a population of some 6,000,000, was practically unknown up to the beginning of this century. Its native inhabitants belong predominantly to the Masai and the Kikuyu tribes. The former, a handsome and warlike people, are noted for their:

   (a) Practice of hunting lions with no weapons but rather poorly-tempered spears.
   (b) Legal system.
   (c) Exploitation of wealthy white men on safari.
   (d) Respect for the Sex.

5. The protectorate of Uganda, which adjoins Kenya and occupies roughly the same area as the U.K., first became known to white men with the visit of Speke and Grant in 1862. Christian missionaries began to arrive about fifteen years later, and, after six or seven years of comparative success, experienced (with their converts) a period of somewhat rough handling. In 1892 the territory's religious problems culminated in the:

   (a) General adoption of Islam.
   (b) Outbreak of war betwen the native adherents of Protestantism and Roman Catholicism.
   (c) Summary execution of all missionaries.
   (d) Conversion of King Mwanga to Buddhism.

6. The territory of Tanganyika, immediately to the south of Kenya and Uganda, is administered by Great Britain under the trusteeship of the United Nations. Nearly four times as large as the U.K., it has a population of about 8,000,000. Its first white visitor (in 1856) was:

   (a) The Englishman who, at a place called Ujiji, presumed that he was meeting a famous missionary.
   (b) The famous missionary who was met.
   (c) A British explorer who is chiefly remembered for his frank translation of the "Arabian Nights".
   (d) Sir Samuel Baker.

7. The islands of Zanzibar and Pemba, with a total population of 270,000, constitute a British protectorate lying off the coast of Tanganyika. Pemba is one of the world's most beautiful islands, and near it is an islet where, according to one legend, Captain Kidd's treasure is buried. Zanzibar, which is ruled by a sultan and which rigidly follows the Moorish (Afro-Arabic) tradition, was:

   (a) Formerly the greatest slave-market in the world.
   (b) Used as a submarine-base by the Germans during the First World War.
   (c) A Carthaginian settlement in the fourth century B.C.
   (d) Captured by the French during the Napoleonic Wars.

8. South of Tanganyika lies the Federation of Rhodesia and Nyasaland, which came into being in 1953. Slightly larger than the independent Commonwealth country of South Africa, it has approximately half the latter's population. N. Rhodesia and Nyasaland are British protectorates, while S. Rhodesia is a self-governing colony. Most of N. Rhodesia consists of:

   (a) Swamp-land, uninhabitable because of the tsetse fly.
   (b) High tableland, thinly forested.
   (c) Dense jungle, uninhabitable because of hostile pygmies.
   (d) Rich farm-land.

9. S. Rhodesia, comprising the two provinces of Mashonaland and Matabeleland, is of great archaeological interest. In it:

   (a) Are ruins, of utterly unknown origin, perhaps dating from the 6th century A.D.
   (b) Was discovered the jawbone of Eoshatterproof Erectus.
   (c) Have been found the petrified remains of Viking ships that sailed up the Zambesi.
   (d) Indications exist of ancient Greek settlements on the banks of the Limpopo.

10. The administrative headquarters of the British protectorate of Bechuanaland (four times as large as the U.K.) are at Mafeking. This town was gallantly defended during the Boer War by the founder of:

    (a) The Oxford Group.
    (b) The Boy Scout movement.
    (c) The Rhodes Scholarships.
    (d) The Diamond Corporation, Ltd.

11. A little way south-west of the small British protectorate of Swaziland lies the British colony of Basutoland, with a population of about half a million. The Basuto, an intelligent and brave people, are among the few native tribes that ever defeated the Zulu nation in battle. In the Second World War, the Basuto did *not:*

    (a) Voluntarily furnish 10,000 men for service with the African Auxiliary Corps in the Middle East.
    (b) Raise a fund for the purchase of a Spitfire squadron.
    (c) Carry supplies for the Fifth Army in Italy.
    (d) Form a large percentage of Wingate's "Chindits" in Burma.

12. The Union of South Africa, an independent Commonwealth country with a population of almost 13½ million, consists of what were (immediately prior to its formation in 1910) four British colonies: Cape Province, Natal (with Zululand), the Orange Free State, and the Transvaal. Its legislative capital is Cape Town. Sir Henry Rider Haggard received his knighthood for:

    (a) His novels about S. Africa ("Allan Quartermain", "King Solomon's Mines", etc.)
    (b) His services to agriculture in England.
    (c) His work on the Zulus ("Cetewayo and his neighbours").
    (d) His studies of the Salvation Army's settlements in the U.S.A.

13. The Cape of Good Hope was first rounded in 1486 by Bartholomeu Diaz, of Portugal. For many years a Dutch settlement, the Cape passed into British hands in 1814. The Transvaal, on the other hand, was almost unknown territory before the advent of the Boers (Dutch settlers), who trekked there from the Cape in 1836. The discovery of the Witwatersrand goldfields in 1886 led to an influx of "uitlanders" (outlanders), and the resultant friction came to a climax in the notorious raid led by:

    (a) "Oom" Paul Kruger.
    (b) Dr. Jameson.
    (c) Cecil Rhodes.
    (d) Winston Churchill.

14. The territory later known as the Orange Free State was first settled by the Boers in 1828. During the Boer War, it:

    (a) Remained neutral.
    (b) Fought with Natal and the Transvaal against the British.
    (c) Sided with the Transvaal and invaded Natal.
    (d) Joined Natal in invading the Cape and the Transvaal.

15. Natal (supposedly named "Terra Natalis" by Vasco da Gama when he sailed along its coast on Christmas Day, 1497) was first settled by the British in 1835. With the exception of a three-year period under the Boers, it remained a British Colony until it became merged in the Union of S. Africa. During the Boer War, a fierce battle was fought in Natal at:

    (a) Glencoe.
    (b) Bannockburn.
    (c) Killiecrankie.
    (d) Durban.

16. South-West Africa, about two thirds the size of the Union of S. Africa, has a population of only 430,000. A comparatively barren land, it is administered by S. Africa under a mandate of the former League of Nations. From 1881 until the First World War, it belonged to:

    (a) Spain.
    (b) Portugal.
    (c) Great Britain.
    (d) Germany.

17. One of the most colourful aspects of South Africa as a whole is the rise and fall of the great Zulu (or Amazulu) nation. The word Amazulu means "Sky-People". Their rise began in the first years of the 19th century, under a native Napoleon who, at the time of his murder in 1828, had practically become master of South Africa from the Cape to what is now N. Rhodesia. His name was:

    (a) Umslopogas.
    (b) Chaka.
    (c) Prempeh.
    (d) Lobengula.

18. The Zulu regiments, superbly trained and disciplined, were known as "impis". There were serious uprisings of this warlike people as recently as 1906 and 1907, but their power really ended with the annexation of Zululand to Natal, in 1897, after the British had defeated and captured King Cetewayo. The Zulu soldier's chief weapon was a stabbing-spear, known as:

    (a) A boma.
    (b) An assegai.
    (c) A springbok.
    (d) A mamba.

19. Found only in South Africa is the:

    (a) Tsetse fly.
    (b) Okapi.
    (c) Bald iggle.
    (d) Hyaena Dog.

20. A commando leader in the Boer War, author of a powerful attack on the British ("A Century of Wrong"), Rhodes Memorial lecturer at Oxford in 1929, recipient of the Order of Merit from King George VI, chancellor of Cambridge University in 1948, and opponent of the policy of extreme racial segregation, was:

    (a) Louis Botha.
    (b) James Barry Hertzog.
    (c) Daniel François Malan.
    (d) Jan Christian Smuts.

★ ★ ★

Royal Canadian Air Cadets

By Arthur Macdonald, Air Cadet League of Canada

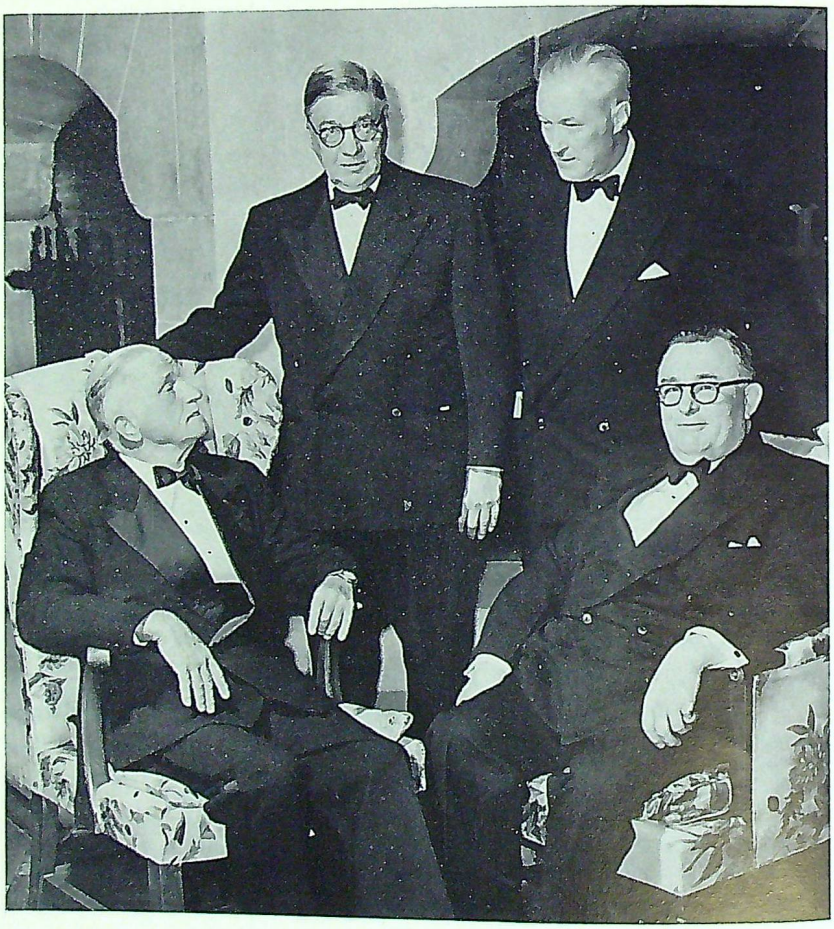
ANNUAL MEETING: 1956

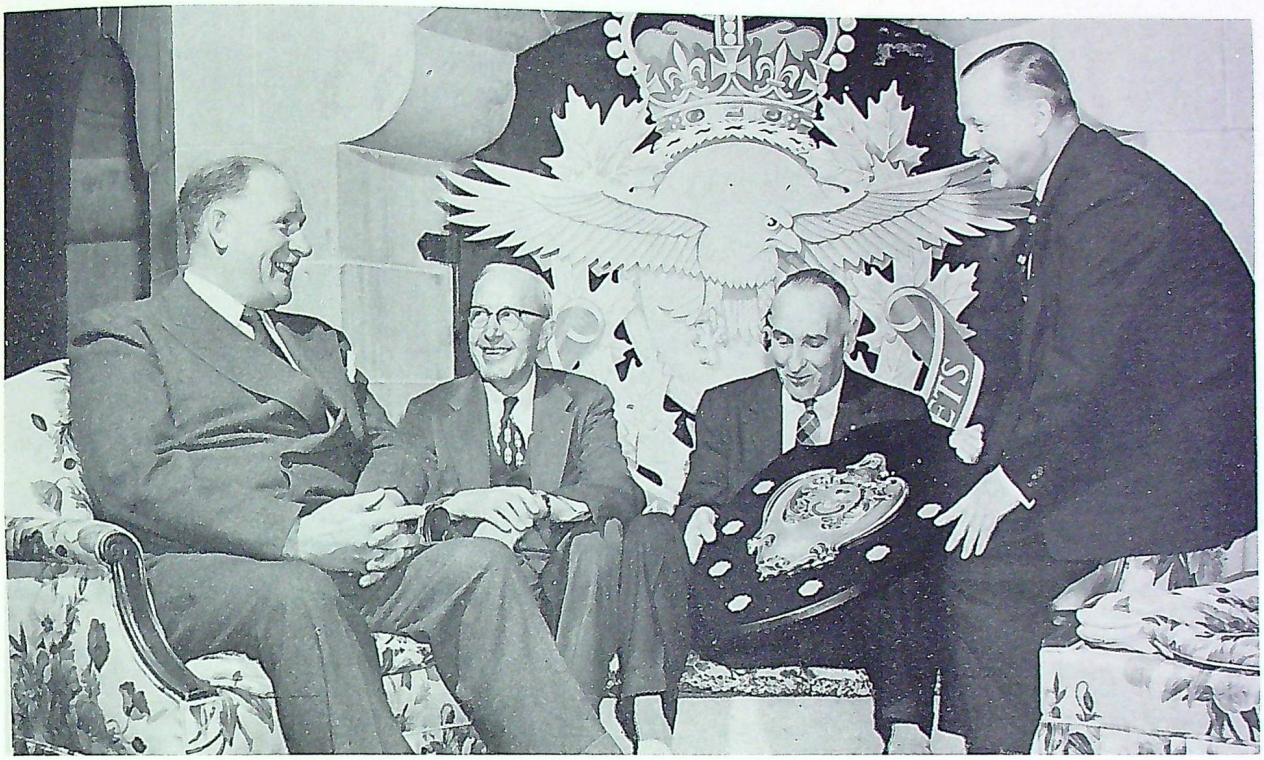
HELD at the Seigniory Club, Quebec, in mid-February, the fifteenth annual meeting of the Air Cadet League was voted the most successful gathering of its kind since the end of the war. Close to one hundred League delegates from across Canada were in attendance, along with top-ranking R.C.A.F. personnel, representatives of various aviation organizations, and observers from the United States and overseas.

The meeting featured two general sessions and a full afternoon devoted to panel discussions. The following panels were convened: provincial chairmen, provincial secretaries, local sponsoring committee chairmen (one from each province), national executive committee, and publicity representatives. Recommendations from the panels were brought forward for consideration and action by the general meeting on the following morning.

The meeting elected Eric M. Duggan, of Edmonton, as President of the League for 1956, to succeed George A. D. Will, of Nanton. An R.C.A.F. Wing Commander during the war, Mr. Duggan has been active with the League since 1945 and has held the positions of provincial chairman, member of the national executive committee, and national vice-president of the League. Other officers named for the coming year are: honorary president, C. Douglas Taylor, Montreal; honorary secretary, D. Alex Rose, Toronto; honorary treasurer, R. Scott Misener, Port Colborne; vice-president, J. G. LeDroit, Montreal; special consultant, Air Marshal Robert Leckie; honorary member of the executive, Air Marshal W. A. Curtis. Serving with the above on the national executive committee are: A. R. Smith, Calgary; J. A. deRosenroll, Moose Jaw; E. Vopni, Winnipeg; D.

L. to r.: General C. A. Spaatz, former Chief of Staff, U.S.A.F.; Senator the Hon. C. G. Power; E. Duggan; Hon. R. O. Campney.





First appearance of the Westman Trophy, a new award for the most proficient squadron in Ontario. L. to r. : Dr. G. A. Westman, donor of trophy; Executive Committee Member D. Roden; Ontario Provincial Chairman J. B. Smith; League Director A. R. Cousins.

Roden, Toronto; W. H. Collie, Montreal; R. A. Lambert, Fredericton; and G. Mulholland, of Summerside.

In reporting on 1955 developments, retiring president George Will stated that the number of cadets in training had increased by more than 2,000 during recent months. He reported a total strength of more than 21,000 Air Cadets in 269 active squadrons, sixteen of which were opened during the past year. The meeting set a target of 22,500 cadets in training by the end of 1956.

The special activities programme for Air Cadets also came under careful review, and approval was given to the following projects for 1956:

- Summer camps at R.C.A.F. Stations for 5,000 cadets.
- A seven-week Senior Leaders' Course for 100 cadets, to be held at Camp Borden.
- A seven-week course for 100 cadet drill-instructors, also at Camp Borden.
- Exchange-visit trips to the United States, United Kingdom, and Europe, for 58 cadets.
- Flying scholarships for 250 cadets under R.C.A.F. sponsorship, with plans being made for the League to raise an additional 150 scholarships from other sources.

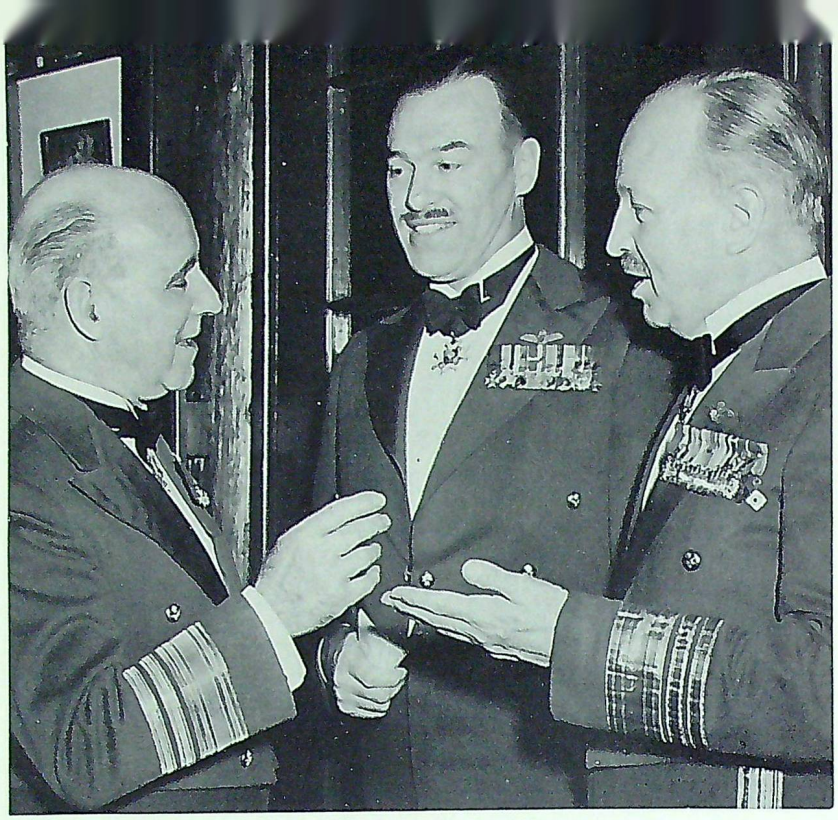
The Annual Dinner held on the evening of Februay 15th proved to be an impressive affair. Principal speaker at the dinner was Senator the Honorable C. G. Power, wartime Minister of National Defence for Air and the man who is generally credited with being the founder of the Air Cadet movement in Canada.

Senator Power told of the early stages in the development of the League and described as "remarkable" the progress which has been made since 1941. He stated that, in his opinion, the League has prevailed because of the courage and energy of public-spirited civilians and the wisdom of the R.C.A.F. officers who have supported it.

Other special guests who spoke briefly after the dinner were Defence Minister Ralph Campney; former U.S.A.F. Chief of Staff, General Carl A. Spaatz; and General Lucas V. Beau, of the U.S. Civil Air Patrol.

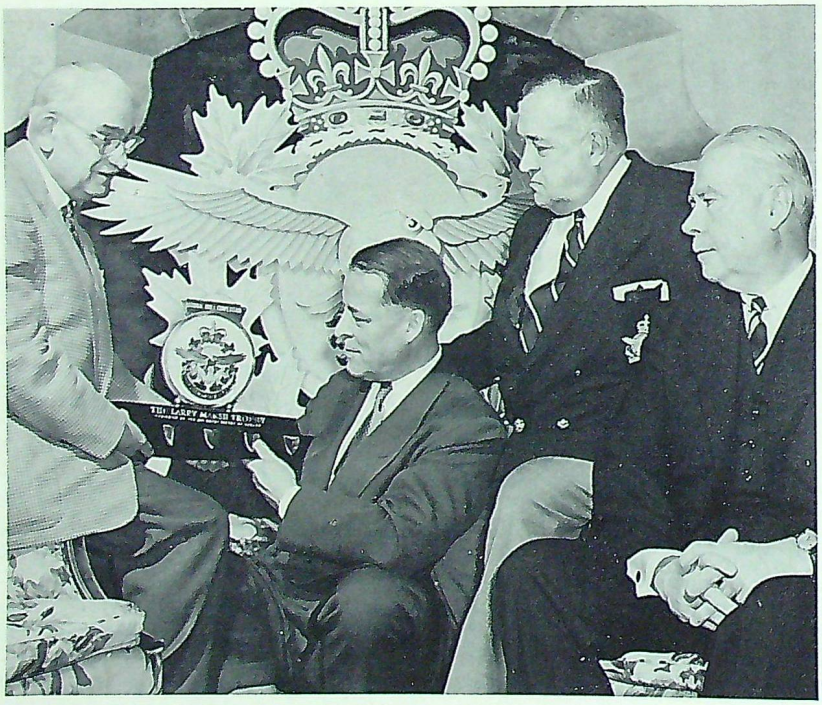
V. R. Clerihue, of Vancouver, who has been active with the League since its formation in 1941, was named Air Cadet "Man of the Year" and awarded a special R.C.A.F. scroll by Air Marshal C. R. Slemon in recognition of fifteen years of outstanding service to the movement.

A highlight of the dinner was the exceptional coverage provided by press, radio, and television. The proceedings resulted in two thirty-minute broadcasts, a television news feature, and a good volume of national and local newspaper copy. In addition, final shooting was completed on the Air Cadet film now being produced by the League.



Three Chiefs on the Air Staff at the Seigniory Club. Left to right: Air Marshal R. Leckie, C.B., D.S.O., D.S.C., D.F.C.; Air Marshal C.R. Slemon, C.B., C.B.E.; and Air Marshal W. A. Curtis, C.B., C.B.E., D.S.C., E.D.

The Marsh Trophy (awarded to winners of National Drill Trophy) is admired by (l. to r.): Quebec Sec'y L. Bouchard, League Vice-President J. G. Le Droit, René Gauthier, and Executive Committee Member W. Collie.



SANG FROID

The trickiest question on examination papers for Royal Australian Air Force trainees reads: "What is the first thing you would do if you were piloting an aircraft and the Queen of England fell out of the back seat?"

Every answer revealed the utmost concern at such a happening. Some trainees said they would "try to catch her before she landed"; others that they would "report by radio and remain in the area as a guide to position."

The correct answer: "Adjust trim tabs to make allowance for the loss of a passenger."

(*"Montreal Star"*.)

Feminine Gen

From L.A.W. S. Buckley, of R.C.A.F. Station St. Johns, we have received the following reflections on the subject of motor-cars. The only non-controversial fact about them, she finds, is that they all have a —

COMMON DENOMINATOR

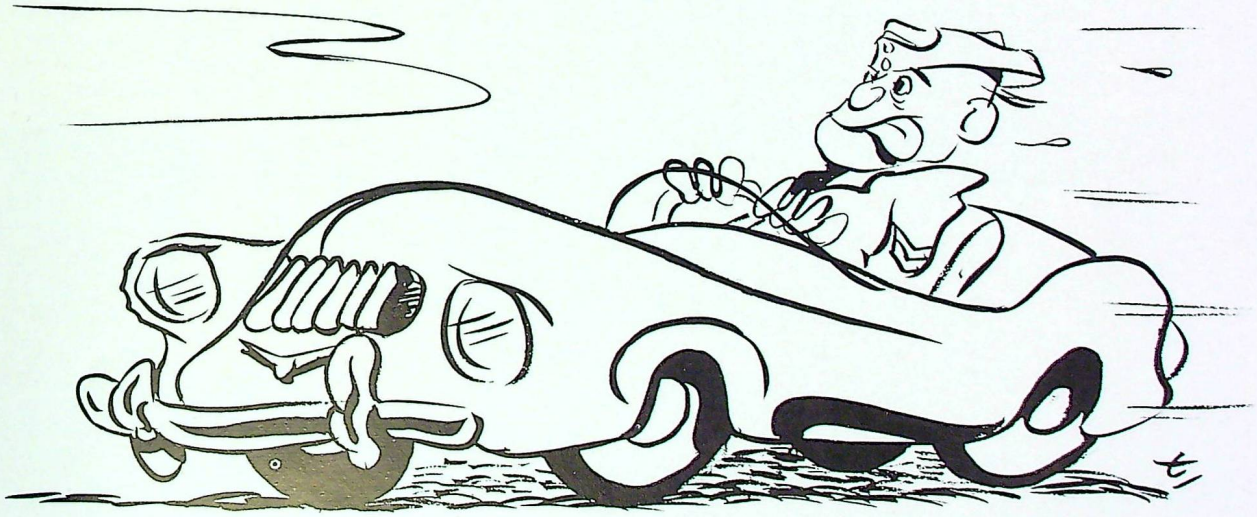
Having a typically feminine mind, I find myself constantly baffled by the mysteries of this machine age, particularly where the horseless carriage is concerned.

My colleagues in the Section are all males; and, as such, they divide the working-day into two parts. During the one, they carry out their allotted tasks, during the other they talk about automobiles. After listening to their conversation for more than three months, I know no more about cars than when I began.

My boss drives a snappy number which he parks right outside my window. I don't know what make it is, but its colour is pink — passionate pink. My sergeant's car is a cool-looking job dating back to the late 'forties. The best description of its colour would be "hopeless blue". The boy who works beside me has recently traded his little English car in for something large and American — a transaction that involved several weeks of hair-pulling and fingernail-biting. The fourth lad in our group is "seriously considering" the purchase of a car, and this earth-shaking step is good for at least ten hours' debate each week. Those seem to be the only hard facts I've been able to deduce from their conversation and my own observation.

Just down the road outside the Station there is a place known as "Fair-Deal Sam's". Here, I gather, if you want a big car instead of your small one, Sam has just the deal for you. You merely give him your little car, an old washing-machine, and a few used razor blades, and Sam will present you with a genuine 1927 Cadillac convertible. If you care to throw in your wife's 1905 treadle sewing-machine, Sam (being a soft-hearted fellow of whom everyone takes advantage) will give you an engine to go with the car. I may be wrong about the odd detail, but I'm pretty sure I've got the general picture straight. It doesn't matter, moreover, what the year or model of your little car may be: it is known to connoisseurs such as Sam simply as a "drug on the market" or a "roller-skate".

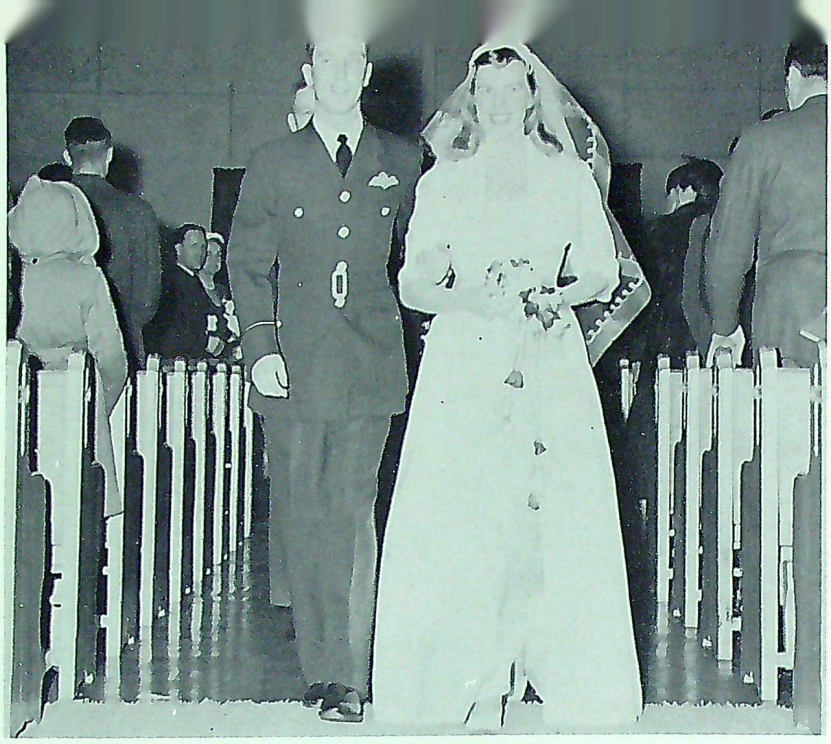
The trading of a big car for a newer model is, of course, a rather more involved procedure. The minimum time in which it can be accomplished is about two weeks. At first, Sam and you cannot see eye to eye. He maintains that you are stubborn; in your opinion, he is. Finally, you stalk out of his office while he shouts after you that, at the price you want to pay, he might as well give you the car and have done with it. After a few days, however, having been unable to find another sucker, he calls you



and tells you that he can't see an Air Force friend driving around in an antiquated wreck any longer. Eventually, in return for your old car and a signed promise of fifty dollars a month for the next five years, you become the proud owner of a brand-new second-hand lemon.

Little though I understand the processes of the male mind when it is dealing with cars in their broader and more general aspect, I am at an even greater loss when I try to follow discussions about parts, accessories, and so forth. Why a detergent should be better than plain honest soap as a substitute for oil, baffles me completely. Nor can I see why a car needs chains: when I suggested to our sergeant that surely it would be enough to leave it locked, he merely withered me with a glance.

I guess I'll remain like most women and notice only the colour and style of the car — and the man driving it. Experience has taught me, however, that all automobiles have one common denominator. When you're out driving with your boy-friend along a quiet country lane on a moonlit summer night — no matter what the make, year, or horse-power of his car, it always seems to run out of gas.



Flying Officer and Mrs. A. J. Weekes

PARANURSE BECOMES BRIDE

On 11 February, in a colourful ceremony at R.C.A.F. Station Whitehorse, Flying Officer Marion Macdonald became the bride of Flying Officer A. J. Weekes, a pilot of No. 408 Squadron. Flying Officer Macdonald was given in marriage by the Commanding Officer, Wing Cdr. F. H. Pearce, A.F.C., and the ceremony was performed by Flt. Lt. H. G. Hedley-Smith, the Protestant padre. Flying Officer P. L. Rhodes officiated as best man. Formerly a para-rescue nursing-sister with the R.C.A.F.'s search and rescue organization, Mrs. Weekes is well-known both in Canada and the States for her work in that capacity. She has made some fifty parachute jumps.

AFTER THE CONFERENCE

It would be dangerous and unrealistic to assume that real peace has been achieved merely because four men have smiled into forty — or four hundred — cameras at Geneva. It is, therefore, no time to relax or to weaken our defences, physical or moral. But it is a time for imagination, as well as caution; for seizing and making the most of every opportunity that may lead to a better state of affairs than this poor world has known since 1914. (*Hon. L. B. Pearson*)

R.C.A.F. Association

THE SIXTH ANNUAL CONVENTION OF THE R.C.A.F. ASSOCIATION WILL BE HELD AT WINDSOR, ONT., ON 17, 18, AND 19 MAY

Interest in this year's Annual Convention, the first to be held outside Ottawa, is running high. Reports indicate that there is keen competition among members of all Wings for the privilege of being named as Convention delegates

No 412 (Windsor) Wing has a very active Convention Committee under the chairmanship of Jack Burnet. The three-day convention has been carefully planned, and the host Wing promises never a dull moment.

NATIONAL PRESIDENT ACTIVE

Air Vice-Marshal K. M. Guthrie, C.B., C.B.E., National President, braved the below-zero weather and visited the following western Wings during the latter part of February: Lloydminster, Prince Albert, Regina, Moose Jaw, Brandon, Winnipeg, and the Lakehead. In a preliminary report he advises that the Wings were enthusiastic and expressed their intention to increase their membership.

Air Vice-Marshal Guthrie also attended the annual meeting of the Air Cadet League of Canada at the Seigniory Club on February 14th and 15th.

MEMORIAL TO A VETERAN FLIER

While walking through the cemetery at Granby, Quebec, last year, R. E. Meyer, past-president of No. 300 Wing, noticed the grave of an airman: Captain Christmas Evans, a First World War R.F.C. pilot from Wales. The inscription told him that Captain Evans had been killed in a flying accident in 1929, but there was no sign of the propeller that was said to mark the grave.

Through the efforts of Mr. Meyer and his R.C.A.F.A. colleagues in Granby, the permanent memorial shown in these pages was erected. Captain Evans' only son, Elwyn, who was an air gunner with the R.A.F. in the Second World War, came over from Wales to attend the unveiling.

A great deal of credit is due Mr. Meyer for his work in completing this memorial.

No. 300 Wing's memorial to Captain C. Evans

No. 312 Wing's Charter Night Ball. Front row (l. to r.): J. O. Tremblay, Mrs. J. O. Tremblay, Mrs. J. C. Houle, J. C. Houle, Mrs. Jean Sicotte, F. Ouellet, J. C. Gray, (Sec'y, National H.Q.), Mrs. F. Ouellet, J. Sicotte, Ian Angus, Second row (l. to r.): Mrs. J. P. Aube, Mrs. H. Monahan, Mrs. G. Sullivan, Mrs. W. Stroud, Miss Thérèse Danis, J. Tardif, Mrs. C. E. S. Brown, Mrs. Ian Augus, Mrs.W. A. Bishop, W. A. Bishop. Third row (l. to r.): J. P. Aube, H. Monahan, G. Sullivan, W. Stroud, M. Courteau, Mrs. M. Courteau, Canon C. E. S. Bown, Mrs. J. Kinsey, George St. Onge. (Studio Genest photograph.)

WING NEWS

No. 306 (Maple Leaf) Wing, Montreal

Mrs. Truus Janssen, who worked with the Dutch underground during the Second World War, is credited with saving the lives and liberty of scores of Canadian fliers. In all, it is stated, 346 pilots passed through her hands. "Aunt Truus", as she was known to Allied airmen, is now visiting her brother in New Brunswick.

Mr. Craig Harrison, president of No. 306, has been in contact with Mrs. Janssen, and (at the time of writing) she has agreed to visit Montreal and attend a Wing meeting on March 16th. The Wing proposes to make Mrs. Janssen an Honorary Life Member of the Association.

No. 302 (City of Quebec) Wing

The subject of the dinner-meeting of No. 302 Wing's executive during the week-end of Feb. 4th was the *Bon Voyage* programme. No. 302 Wing handles practically three-quarters of the personnel proceeding to units overseas, and for that reason it is more concerned than any of our other Wings with this project. The members of the Wing are very enthusiastic about continuing the work, but expect the actual out-of-pocket expense to come from National H.Q. It should be mentioned that members of No. 302 have in the past provided many amenities from personal funds.

No. 312 (La Tuque) Wing

On Saturday night February 4th, the annual Charter Anniversary Ball was held in the Club. The R.C.A.F. Central Band supplied the music, and more than 150 couples enjoyed themselves until the wee small hours. On Sunday afternoon, at 4.30 p.m., the Mayor of La Tuque and members of the Council tendered a civic reception to members of the Wing and their guests. This evidenced the position of prominence enjoyed by the R.C.A.F. Association representatives in La Tuque. At 8.30 p.m. a band concert was presented by the R.C.A.F. Central Band under the direction of Flt.-Lt. L. D. Corcoran.

Wing President William Bishop and all members of this relatively

new Wing are to be congratulated on the splendid arrangements which made this anniversary so successful.

No. 406 (North Bay) Wing

Air Vice-Marshal G. E. Brookes, C.B., O.B.E., Grand President of the Association, was the guest of honour at the "Roundel Club" night sponsored by No. 406 Wing. This function was a combined dance and floor-show. Group Captain H. C. Ledoux, D.F.C., C.O. of R.C.A.F. Station North Bay, together with Station officers and their wives, attended as guests of the Wing. Music was supplied by No. 1 Training Command Band, and about 100 couples attended. A buffet supper was served at midnight.

No. 437 Wing, Toronto

Air Vice-Marshal G. E. Brookes, with assistance from George Penfold, Arthur Leonard, and Terence Simpson, has completed the preliminary work on the formation of a new Wing of the Association in Toronto. The new Wing will be No. 437, and its name will be decided upon at the next meeting.

Initial signed-up members number 42, and it is planned to put a ceiling of 150 on the membership. When this figure is reached, two new Wings will be formed, leaving No. 437 with fifty members, and with each of the new Wings taking fifty of the remaining members as their respective nuclei.

No. 438 (Algonquin) Wing, Pembroke

Through the efforts of Frank Lynch, a new Wing of the Association has been formed at Pembroke. Thirty-two members have been secured, and the initial meeting was held on March 7th. Flt.-Lt. R. J. Palmer, of National H.Q., attended.

Mr. Lynch reports that plans are under way for the formation of an Air Cadet Squadron to be sponsored by the new Wing.

MEMBERS-AT-LARGE

Members-at-large of the R.C.A.F. Association in Portage La Prairie, Manitoba, responded quickly to the call for new members. Basil Rowley, J. F. Garland, and H. A. Carmichael (the original three members) each enrolled two new members.

These nine members of the R.C.A.F. Association form the sponsoring committee of No. 575 (Portage Terrier) Squadron, Royal Canadian Air Cadets. It is believed that this is the only air cadet sponsoring committee composed solely of R.C.A.F. Association members-at-large.

A REMINDER
Royal Canadian Air Force Association Constitution and By-Laws

Effective 1 April 1955, By-law 13B is amended as follows:

An annual fee of $3.00 shall be payable by every regular and serving member of the Association, or by a Wing or Group recommending a person for honorary membership, provided that, on first joining, the fee shall be only $2.00 in addition to the enrolment fee.

Approved by Secretary of State, Ottawa, Ontario, 21 January 1955.

No. 313 (City of Montreal) Wing's Charter Night Dinner. Facing camera (l. to r.): Wing Cdr. E. J. I. Gauthier, C.O. No. 438 Sqn.; M. Bielecki, No. 310 Wing, R.C.A.F.A.; Group Capt. F. C. Carling-Kelly, A.F.C., A.F.H.Q.; H. Hutchings, Quebec Group representative; Air Vice-Marshal L. E. Wray, O.B.E., A.F.C.; L. E. Fulton, Wing pres.; Air Vice-Marshal M. M. Hendrick, O.B.E.; G. R. Ellis, pres. of Quebec Group; Air Cdre. C. L. Annis, O.B.E.; G. Harrison, pres. of No. 306 Wing; Miss E. I. Fraser, Wing sec'y.

HELICOPTERS

THEIR HISTORY, DEVELOPMENT, AND FUTURE

PART ONE

By Flying Officer P. H. Christensen

(The Author of this article served in the R.C.A.F. from 1941 to 1945 as an A.E. Tech., three of these years being spent overseas with No. 6 Group. After the war he graduated from the University of British Columbia and rejoined the Air Force in October 1951. Having graduated later from the R.C.A.F.'s Aeronautical Engineering School, he served as O.C. servicing and repair at R.C.A.F. Station Sea Island. He was, at the time of writing the present article, filling the position of helicopter project engineer at A.F.H.Q..—Editor.)

INTRODUCTION

COMPARATIVELY recently the R.C.A.F. has accepted into service the Piasecki H-21A tandem-rotor helicopter (search and rescue) and the Sikorsky S-55 single-rotor helicopter (commercial transport). In addition, some R.C.A.F. personnel are familiar with the operation and maintenance problems of the Sikorsky S-51 and the Bell 47G. With delivery of the H-21A and S-55, the helicopter activities of the Air Force have been greatly increased; and it is expected that the Piasecki H-21B and Sikorsky H-34A military transports will also be brought into use very shortly.

In this article the writer proposes to deal with some of the history of the helicopter's development and to give a brief description of vertical-lift machines in general. Consideration will be given to the design of helicopters and to the more pertinent problems associated with their operation; and the helicopter rotor system will be discussed in some detail. In conclusion, a fair amount of space will be devoted to speculation as to what the future may bring.

HISTORY

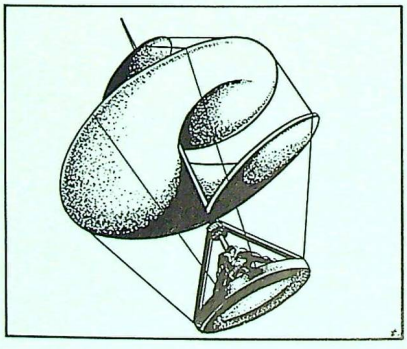
In recapitulating the history of the helicopter, it would be a monumental task to consider each and every type that has been proposed or constructed. Only the most interesting or significant types, therefore, have been selected for the following survey.

While much time and effort has been expended by many forward-looking men in developing the theory and in the production of working-models and full-scale models of the helicopter, the first person actually to envisage the possibility of such a machine was Leonardo da Vinci (See Fig. 1).

The first relatively successful attempt at making a workable full-scale model took place in what was then Austria-Hungary during the First World War. Here, in 1916, the Austrian Daimler Motor Company, Vienna, used a high-speed electric motor to power a captive helicopter. It is interesting to note that the chief problem was then, as it still is today, that of finding an effective light-weight rotor system which will absorb the full power from the engine. It proved difficult for this aircraft to carry a telephone, a machine-gun, and one operator with a parachute.

More satisfactory was the helicopter designed by Henry Berliner in 1922 (see Fig. 2). It appeared much the same as a conventional triplane with rudder and elevators, but it used the dual rotor or lateral arrangement of lifting rotors. Lateral control was obtained by the use of three movable fins under each of the propellers and a rear propeller on top of the fuselage. This helicopter-aeroplane obtained forward thrust by inclination of the entire aircraft. The rear propeller on top of the fuselage inclined the axis of the aeroplane so that the lifting propellers could impart a forward component of thrust. The importance of the Berliner helicopter is that it achieved vertical flight and complete freedom of movement. Its ability to glide on its tri-wings was an important factor in its safety.

Fig. 1. da Vinci's conception.



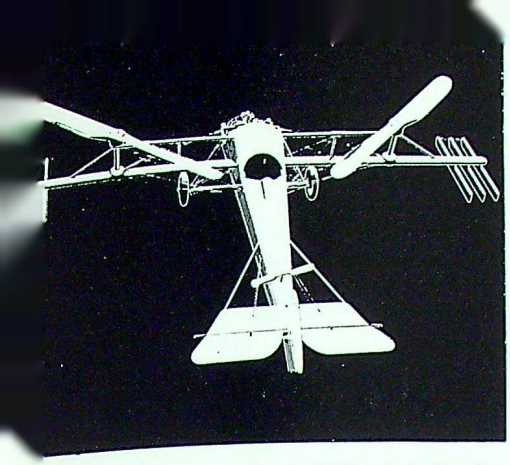


Fig. 2. Berliner's helicopter.

The Pescara helicopter, which made several flights, is noteworthy because it carried two six-bladed biplane-type airscrews, 21 feet in diameter (see Fig. 3).

The De Bothezat machine (Fig. 4) was first flown in October 1922. This aircraft had an empty weight of 3,400 pounds, and a useful load of 1,000 pounds. None the less, no provision was made to carry men or materials other than the pilot. It had four lifting airscrews with four blades on each. The blades were extremely wide, being approximately five feet towards the tip. Because the aircraft had four points of suspension, it had moderately satisfactory control and stability.

The Damblanc helicopter was never flown, but it had an interesting design. It utilized the dual rotors, or lateral arrangement, and it overcame many of the disadvantages inherent in that type of configuration. However, it was damaged during ground trials and was never successfully flown.

The Oehmichen helicopter (Fig. 5) is shown here to indicate the degree of original thought and development that went into early designs. The main structure of the helicopter was in the form of a large cross with unequal arms. The longer axis was the longitudinal one and defined the direction of forward flight. The lifting propellers were placed at the four terminals of the arms of the cross. The two longitudinal lifting propellers were about 25 feet in diameter, and the two lateral 21 feet. All rotors were turned at about 150 r.p.m. by tubular shafting from a 9-cylinder engine of 120 h.p.

La Cierva was the first man to experiment with the autogyro (see Fig. 6). As far back as 1928 he successfully utilized the wind-milling characteristics of a rotating wing to provide lift for his aircraft, while a forward-thrust component was imported by means of a conventional aircraft engine and propeller. His autogyro weighed about 1,100 pounds (loaded) and obtained a forward velocity of approximately 35 miles per hour. The rotational speed of the lifting rotor was in the neighbourhood of 140 r.p.m., and it had a span of 26 feet.

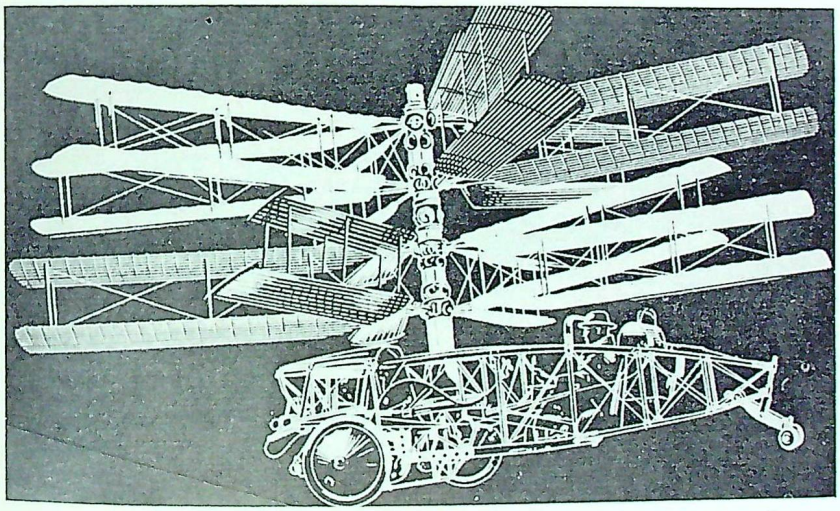


Fig. 3. The Pescara helicopter.

As early as 1908, Louis Breguet had experimented with what he called a "gyroplane". This was, in effect, a coaxial rotor system helicopter (see Fig. 7). In it he provided for flexible blades and automatic incidence control. Later, in 1937, he proposed a gyroplane with an all-up weight of 35,000 pounds —which is the weight of helicopters that are only just now going into production. He referred to it as the gyroplane of the future.

Mention should also be made of the "cyclogyro". Designed by Strandgren, it employed, for lift and propulsion alike, a pair of paddle-wheels equipped with aerodynamic brakes and revolving on a transverse axis. Each wheel consisted of a number of equidistant blades arranged around the horizontal axis of rotation and parallel to it. Each blade was designed to feather about an axis parallel to its span as it turned about the general axis of rotation. A system of controls permitted feathering or change of incidence of the blades in order to conform to the desired flight condition. The machine had no wings, no propeller, and no control surfaces other than its two wheels with their associated controls. It could fly vertically and horizontally, forward or backward, at any speed between zero and maximum.

DEFINITIONS

In general, a helicopter may be defined as a type of aircraft in which the rigid wings are replaced by one or more rotating lifting-surfaces. A helicopter owes its existence to the fact that it has important advantages in its ability to achieve vertical ascent and descent

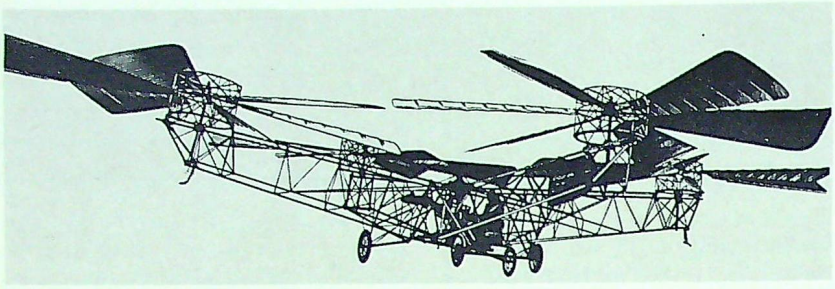


Fig. 4. The De Bothezat machine.

for take-off and landing, that it is capable of hovering motionless while in the air, and that it can fly at very low speeds. In this regard it must be remembered that a helicopter is most efficient when used over short distances to carry heavy loads. The forward velocity of a true helicopter should be of secondary importance.

The differences and relative merits of helicopters, autogyros, convertiplanes, and gyroplanes, are frequently discussed. An autogyro differs from a helicopter in that its forward velocity is obtained through the use of a conventional propeller acting on the air to give a forward thrust component. A true autogyro does not have any power applied to its main rotor while in flight. The action of the air on the blades is used to rotate the rotor system. Thus it may be seen that an autogyro is incapable of true hovering and must keep moving forward to maintain its rotors' r.p.m.; otherwise it will descend. There is, therefore, little to be gained from the design of an autogyro unless a requirement exists for the particular merits of such type of aircraft.

A helicopter, on the other hand, is a vertical-lift aircraft, and its engines are geared directly to the lifting rotors. Since development work was first begun on vertical-lift machines, many designs have been constructed and (with varying degrees of success) flown, while many more have been proposed. The merits of such types as convertiplanes, gyroplanes, coleopters and cyclogyros, will not be discussed in detail in this article.

HELICOPTER DESIGN

In the evolution of the helicopter there have been six rotor system configurations which have received extensive attention. This has led to a divergence from the concentrated investigation needed to develop the principles of helicopter theory. In fixed-wing aircraft, design has concentrated on one configuration, the monoplane design. Certainly there have been some changes — from high-wing, to mid-wing, to low-wing — dictated by the particular requirement for the aircraft, but all concentration has been on the monoplane configuration. The result of this fixed-wing concentration is that industry is now thoroughly conversant with many of the principles of its design. With helicopters, on the other hand, there appears to be much contradiction on the use of one or more of the various configurations now being produced. These apparent contradictions will be answered, however, when it becomes clear that the advantages and disadvantages of each type of design must be considered and accepted when it is necessary to have one machine capable of performing several different functions.

The commonly accepted rotor systems are listed below, with some of their more obvious advantages and disadvantages. An appreciation of the operational rôle in which any particular helicopter is employed will serve to emphasize each of the points considered, whether as *pro* or *con*.

Type 1: Single Rotor and Tail Rotor (Fig. 8)

For small helicopters (7,000 pounds and less) the tail rotor has the following advantages:

Comparatively small torque correction is required.

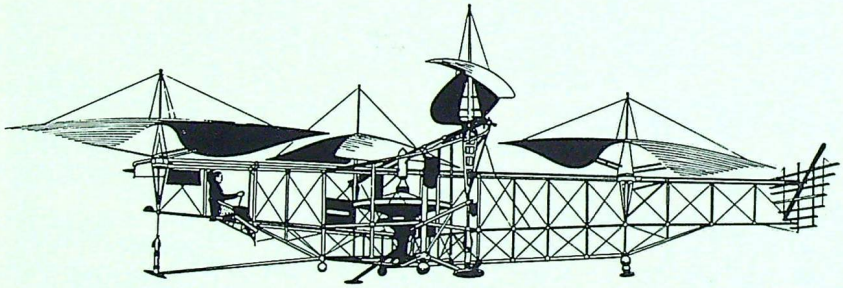


Fig. 5. Oehmichen's helicopter.

The control system is simple.

Transmission troubles are kept to a minimum.

Good manoeuvrability and performance.

Low cost of production.

Disadvantages:

The long tail arm presents a stowage problem.

There is danger of objects striking the tail rotor.

Valuable power that could be utilized for lifting is lost. This disadvantage becomes more pronounced and may absorb as much as 12 to 15% of the total engine power as the gross weight increases and the transmissions become more complex.

Close control over centre of gravity must be maintained.

Fig. 6. La Cierva's autogyro.

Type 2: Dual Rotor Lateral Arrangement (Fig. 9)

To overcome the shortcomings of the single-rotor configuration in helicopters of a gross weight of 6,000 pounds and more, the side-by-side arrangement may be used.

Advantages:

- Utilizes full engine power for lift.
- Good lateral control.
- Short length.
- Small induced loss in forward flight.
- Pylons contribute to lift at high forward speeds.

Disadvantages:

- High frontal area and parasite drag.
- High structural weight.
- A complex transmission.
- Only fair longitudinal stability.
- Longitudinal travel of centre of gravity is limited.
- Rotors have to be synchronized if they overlap.

Type 3: Tandem Rotors (Fig. 10)

In the design of large helicopters, the tandem-rotor arrangement is preferred.

Advantages:

- It has good longitudinal stability.
- Efficient structural properties.
- Small frontal area.
- Short span.
- Simplified structural design.
- Centre of gravity is not critical.

Disadvantages:

- It has a complex transmission initially, but, as the gross weight increases, the complexity becomes equal to, or more favourable than, that of other configurations.
- Only fair lateral stability.
- Rotors have to be synchronized if they overlap.
- There is a small induced loss in forward flight.

Type 4: Synchropter Type (Fig. 11)

For the medium-weight class of helicopter, the synchropter type of overlapping intermeshing rotors might be valuable.

Advantages:

- Short fuselage.
- Small frontal area.
- Good control and manoeuvrability for hovering.
- Simplified transmission.
- Excellent lifting qualities.

Disadvantages:

- Rotors must intermesh.
- Gear failure would be dangerous.
- There is limited ground-clearance at the blade tips.
- The solidity is limited by clearance required between rotors.
- Induced drag might be higher.
- Aerodynamic problems arise as forward speed increases.

Type 5: Coaxial Rotors (Fig. 12)

By superimposing two rotor axes, a compact design may be obtained that deserves attention.

Advantages:

- The rotors need not be synchronized.
- Excellent manoeuvrability.
- Good ground clearances.
- Good lifting qualities.

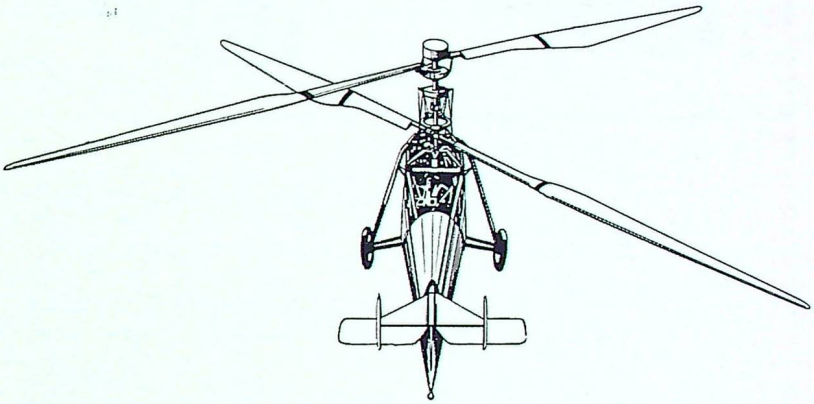
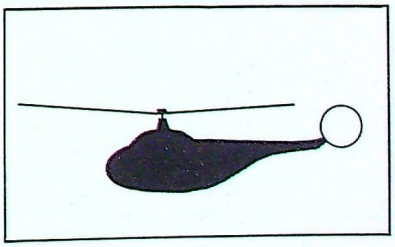


Fig. 7. The gyroplane.

Disadvantages:

- Complex control systems.
- Excessive overall height.
- Stability problems about all axes.
- Interference between rotors affects efficiency.
- Flapping blades require excessive clearance.

Fig. 8



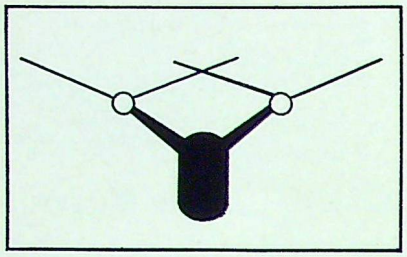


Fig. 9

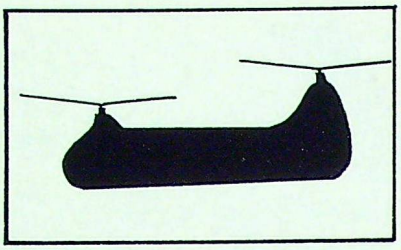


Fig. 10

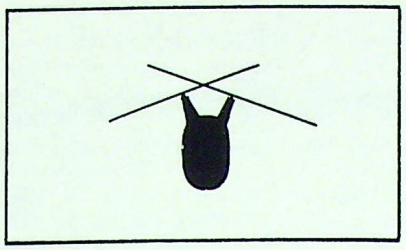


Fig. 11

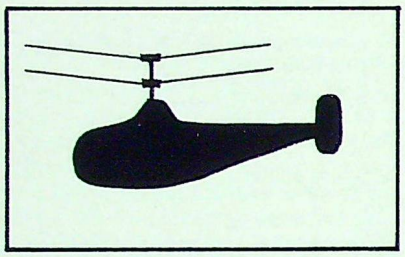


Fig. 12

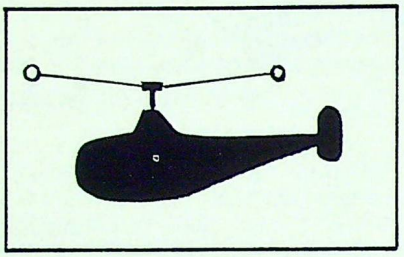


Fig. 13

Type 6: Jet Reaction Rotors (Fig. 13)

For higher speeds it may be necessary or expedient to employ jet propulsion to power the rotors.

Advantages:

No torque correction.
No transmission.
Simplified controls.
Compact low-drag design.

Disadvantages:

Low efficiency of propulsion.
High fuel consumption.
Short range.
Many thermodynamic engineering problems yet to be solved.
Blade-stall as forward speeds increase.

(To be continued)

VAPOUR TRAILS: 2

By Flying Officer D. G. Turner

(Last month's instalment of Flying Officer Turner's series told us of the preliminary stages of his enlistment in the R.C.A.F. in 1951. The author now describes a few of his more gruelling experiences at the Personnel Selection Unit, R.C.A.F. Station London. — Editor.)

THE selection centre at London is a trysting-place where the Air Force and its volunteers meet officially and either embark on a five-year partnership or say good-bye. A further grading process decides who are to become pilots, observers, or groundcrew officers.

I found that this separation of the wheat from the chaff was made in barracks on the edge of the London airport. They exuded the combined atmospheres of a Trappist monastery and a house of correction. Although I and my forty or so fellow candidates had not yet been canonized as officers, we were given certain privileges of the officer caste; but I soon discovered that, to offset this benevolence, we

were governed by an iron discipline savouring of life in the French Foreign Legion. We were known as "Flight Cadets".

The eight-week selection course was an experience which, outside the class-room, closely followed the traditions of the Spanish Inquisition. One of the earlier tortures was a sudden summons to give a twenty-minute talk about oneself to the rest of the class. Taken completely unaware, I lost my nerve and started out by announcing in a broken voice that I was an orphan. The class immediately sat up and took notice — for what in this world is sadder than an orphan? The remainder of my address was delivered with all the pathos of a low-grade soap opera, and before I had finished I began to fear that the class would take up a collection to buy me some warm winter woollies.

For me, however, the worst torture was the daily drill and physical training parade. We cadets took turns in commanding these parades, under the guidance of a corporal. I have an extremely poor memory for the sequence of steps which go to make up drill manoeuvres, Virginia Reels, and the like; and, in my anxiety to overcome this deficiency, I practised at night, marching around and muttering commands to myself. Despite the queer looks directed at me, I persevered; and before long I could (and often did) recite and demonstrate whole chapters of the drill manual in my sleep.

On the day when it was to be my turn to take command of the parade, I was out of bed a full hour before reveille, rehearsing my lines in the wash-room. Finally, my big moment arrived. I marched smartly out to the front, puffed out my tiny chest, and opened my mouth to bawl the first command.

I shut it again quickly when I realized I had forgotten what to say. Sucking in a mighty breath, I opened my mouth a second time, hoping that the words would come to my lips from force of habit. They didn't. This display of noiseless mouthwork was giving me the appearance of a landed trout, and the squad was delighted. They grinned and nudged each other delightedly.

"Well, say something," said the Corporal pitilessly, "— even if it's only 'good-morning'!"

His encouragement produced no results. I remained mute.

"O.K.", the corporal hissed in my ear. "I'll tell you what to say, but say it good and loud. — Now, bring 'em to attention."

"Squad —" I screamed, in a way that implied there was more to follow. But, as it turned out, there wasn't. At the sound of my own voice I stood shocked and speechless. So did the squad. While I was practising in the wash-room, my voice had possessed a masterful and vibrant quality, but out here on the parade ground it had the fine tones of a choirboy calling for help from the organ-loft.

"Come on, come on!" snapped the corporal nastily. "Don't stand there like a dummy!"

"Attention!" I trilled.

The squad obliged with a general shuffle to the upright position.

"No, no," sneered the corporal. "'Not *attention*. — AAAA - ten - SHUN!"

I leaped like a performing seal.

"Now stand them at ease and bring 'em to attention properly", he ordered; and I did so for the next half-hour, until finally he became disgusted and sent me back to the ranks. But even here I wasn't safe. I forgot my number, which made things difficult when the even numbers were required to take a pace forward and the odd numbers to stand still. I paced when I should have stood. The man next to me thought that he had made the mistake, and we both stepped back together. This led others into doubt, and soon the squad was performing a sort of Highland Fling while the unhappy corporal stood before us exhibiting every symptom of an epileptic fit.

Later I was called upon to take command of the squad again for the physical training session. The exercise was one in which the squad had to leap from the position of attention to a point eighteen inches in the air, simultaneously swinging their arms out sideways. I kept time by calling "ONE-two, ONE-two", while the troupe leaped and swung like a parade of berserk windshield-wipers, but I was unable to get the word "Halt" out at the right moment. When I wanted them to stop, they were either halfway up in the air or just coming down for the bounce. Gradually the flaps grew weaker and weaker and eventually there was only a vague heaving motion in time to my counting. I lost quite a few friends that day.

Also among the less pleasant episodes of my P.S.U. days was my interview with a psychiatrist. I realize that, in this enlightened era, a visit to a psychiatrist no longer carries with it a stigma. It does not necessarily mean that you've lost your marbles, nor does it signify that the Air Force considers you a trifle unhinged because you want to work for it. It is an honest endeavour to fit square pegs into round holes. Unfortunately, however, it is my cross in life to be more than normally self-conscious. To a psychiatrist this may be a clue to something noble in my nature, or it may betray the fact that I am a cretin. Be that as it may, the airing of my inhibitions to a total stranger makes me feel as if I were imperfectly buttoned up.

The psychiatrist looked up as I entered his office.

"So *you're* candidate twenty-six?"

Nodding in apprehensive agreement, I seated myself before the desk and fixed my face in what I hoped was an intelligent smile. We

stared at each other for a full two minutes until I experienced the hysterical sensation that I was going cross-eyed. The specialist looked concerned and enquired sympathetically if I felt alright. I was convinced that he had already placed me as a manic depressive and was wondering if I was armed and whether he could beat me to the door.

Suddenly I realized that he was scrutinizing my hands. I recalled that a psychiatrist attaches considerable importance to what the subject does with his hands. Frantically I tried to remember what I normally did with them when I was sitting doing nothing, but the memory escaped me. None of the occupations I could think of for them seemed to reflect a normal mentality, so I clasped them together and placed them on the desk before me.

"Tell me about yourself", said the psychiatrist.

I told him my name.

He snorted with humorous impatience. "Well, go on, go on! Tell me about your parents. — You did have parents?"

I felt like saying "No"; but, reflecting that a stroke of his pen could commit me to an institution, I thought better of it and gave him a brief run-down on the family tree.

"Got a girl friend?" he persisted.

I admitted that I didn't have one on me at the moment — "but", I added, "I've had plenty in the past." Lest he think me a prey to an Oedipus complex or something worse, I proceeded to elaborate in a way I thought would set his mind at rest.

"Go on", he urged in a shocked voice, feverishly scribbling in an exercise book. "What about when you were a child?"

By the time the interview ended, the psychiatrist's notes must have filled several pages; but at last he closed the book with a sigh and said: "Well, that's all. — And the best of luck."

The only bridge now left to cross was the examination by the civilian eye specialist in London. Presenting myself at his office, I introduced myself to the lady receptionist.

"Oh yes", she said. "Come round here and I'll put some drops in your eyes."

Presently, seated in the corner, I watched the room and its occupant gradually disappear into a haze and I felt the pupils of my eyes swelling. Just when I was wondering if I had been drugged and what I would do when I awoke in the receptionist's arms, the eye-doctor swam into view and led me into his sanctum.

I am unable to describe the doctor since I never saw him clearly. All I remember is a large white shape crowned by a shaving mirror with a hole in it. "Now, let's see", he said.

Wishing fervently that I could, I submitted while he fitted me with a gadget made of a pair of horse-blinkers and an old-time telescope. Then he asked me if I could see a little red cross.

Little red cross, indeed! What I saw was a horrendous great red cross so awe-inspiring in size that I instinctively backed away from it.

"Not so good", said the specialist a little crossly, as if he thought I wasn't trying. Then he juggled with apparatus and a lettered chart appeared. I tried desperately to read it for him, but he stopped me.

"You", he accused, "have hypermetropia. — But", he went on before I could scream, "they *may* let you fly if it's not *too* bad . . ."

Thus encouraged, I groped my way back to the station.

On the following day we were sent in one by one to see the Commanding Officer and learn the results of our course. My own interview was quite brief. The C.O. looked up from a mountain of papers and said:

"Pilot."

Some hours later, while I was still going around in a condition of stunned disbelief, the C.O. gave us his farewell address. We were now, he told us about to become real officers in Her Majesty's Royal Canadian Air Force, which meant (among other things) that we would no longer be able to eat on the street and that we must carefully vet beforehand any girls whom we proposed to introduce into the Mess.

Thus exhorted, I was shortly afterwards conveyed to Centralia, some thirty miles away, and my flying career began in earnest.

(To be continued)

Letter to the Editor

Dear Sir:

In the November issue of "The Roundel" there appeared an article written by Flt.-Lt. C. J. Foote, entitled "Today's Airwomen". In it was stated: "If an airwoman is going home on leave (in Canada), she is entitled to railway transportation at reduced cost once per year."

On authority of Q.R. (Air), para. 209.50, personnel may be reimbursed for a portion of the cost of coach-class railway transportation, D.N.D. rates, rather than, as suggested in this article, obtain rail transportation at a reduced cost.

L.A.C. D.E.P. Bates,
R.C.A.F. Station Trenton.

(*L.A.C. Bates is quite correct. Flt.-Lt. Foote was merely stating the net result to the airwoman's pocket.—Editor.*)

Answers to "What's the Score?"

1: (a)	2: (c)	3: (d)	4: (a)
5: (b)	6: (c)	7: (a)	8: (b)
9: (a)	10: (b)	11: (d)	12: (b)
13: (b)	14: (c)	15: (a)	16: (d)
17: (b)	18: (b)	19: (d)	20: (d)

THE R.C.A.F. BENEVOLENT FUND

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

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

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

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