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Monthly AES Happenings

JULY 1971

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Editor's Note: The lateness of this issue is due to the many problems incurred in the move to our new Headquarters Building.

ME/MO

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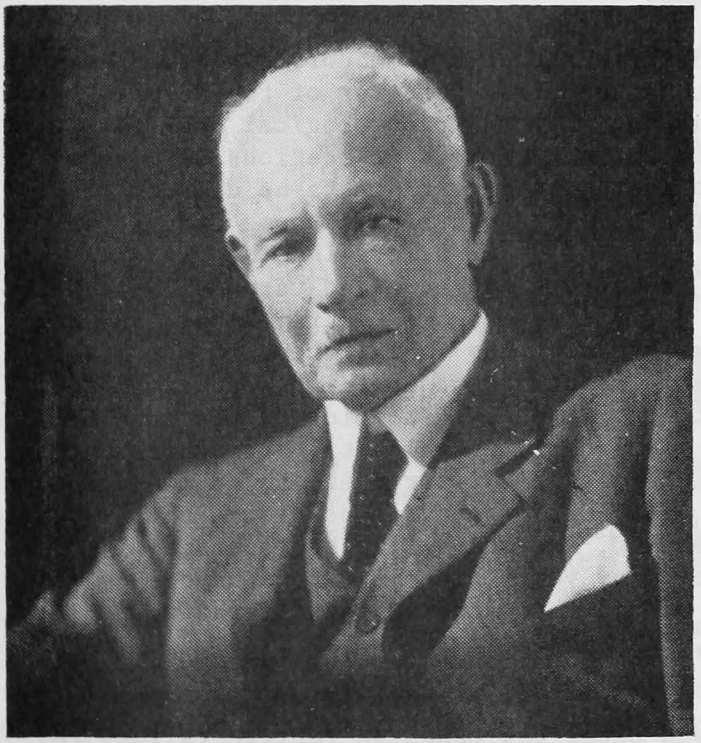
SIR FREDERIC STUPART - 1857-1940



This is the sixth in a continuing series of biographies of the early Directors of the Atmospheric Environment Service written by A.J. Connor

Sir Frederic Stupart, F.R.S.C., was the third Director of the Meteorological Service of Canada, and sixth Superintendent of the Magnetic Observatory at Toronto. He was born at Aurora, a village about twenty-five miles north of Toronto on October 24th, 1857, the son of a retired British naval captain.

He became a member of the staff of the Magnetic Observatory at Toronto when only fifteen years of age. While a student at Upper Canada College, he appears to have assumed some duties as a computer without pay, eventually becoming a permanent employee.

Since the Meteorological Service of Canada was not inaugurated till 1871 and the United States Weather Bureau was authorized by the Washington Government in 1870 to commence the regular issue of weather probabilities under the direction of the War Department, it happened that Sir Frederic's term of office as a Canadian civil servant parallelled almost from the beginning the history of official meteorology on the North American continent.

When Sir Frederic's meteorological career began in 1872, Professor Kingston, the first Director of the Meteorological Service, was arranging for the exchange of meteorological data between the two countries and was slowly building a network of stations in Canada, and although he was not ready to issue weather forecasts he decided to have daily weather maps made in Toronto. It appears that young Stupart was assigned the task of plotting the data and he acquired, in time, facility in constructing maps. Probably Professors Kingston and Carpmael were his mentors in those days and he had for his associates Bertram Webber and Hugh Payne, along with whom he was active in the installation of new observing stations. The first published forecasts of Canadian weather in September 1876, for the 1500-mile stretch from Lake Superior to the Nova Scotian coast, were made by Stupart and from that time until his retirement in 1929, he continued an active forecaster, at first for every third month and after 1900 in alternate months. The early weather maps are in the Library at Toronto and looking over them now, one marvels at the courage of the pioneer forecasters whose horizon for many years did not extend beyond Fort Garry (now Winnipeg) to the west not beyond the Canadian Pacific railway which skirted north of the Great Lakes, or the Intercolonial railway which ran through Montreal and Quebec.

Even after the Canadian Pacific railway telegraphs had reached Pacific tidewater, there was little or no warning of the great outbursts of polar air and the meteorology of the great northlands was still largely a mystery. Medicine Hat in the extreme southeast corner of Alberta was for long the most north-westerly station on the weather map and for this reason this station became known over the whole North American continent from the frequent repetition of such words as "another cold wave is moving southeastward from Medicine Hat".

To determine the real origin of North American cold-waves, Sir Frederic, even before he became Director upon the death of Mr. Carpmael in 1894, set himself to increase the number of observing posts, enlisting the help of the Hudson's Bay Company, the missionaries, and the Northwest Mounted Police. Gradually equipment reached a few points in the vast northlands and by mail, once or oftener each year, data reached Toronto. After forecast-assistants had entered this late information on the daily weather maps, he extended isobars and isotherms beyond the original telegraphic horizon and slowly gained sufficient knowledge of the mechanism of the Mackenzie river cold-waves to make useful assumptions regarding their severity and probable extent as indicated by their first appearance along the existing telegraph circuits. In northeastern Canada he gained first-hand knowledge of the weather when in 1884 he was a member of the Hudson strait expedition. This was the first official attempt to determine the meteorology of this region with a view to the determination of its possibilities as a shipping route to England. He was stationed for a time at Stupart's Bay and upon his return to resume his duties as a forecaster, made some attempt to correlate the weather of the years 1884 to 1886 in the strait with the simultaneous weather maps of the St. Lawrence region.

The gap, without stations, of more than seven hundred miles between Ungava Bay and Quebec City was too great to be bridged even by supposition of assumptions. With the closing of these stations there remained only the infrequently seen observations from the Moravian missionaries on the Labrador coast, the Greenland observations, and the observations on the west coast of Hudson Bay to cover studies of this northeastern region. The extension of the telegraph circuits to Prince Albert, Battleford, Edmonton, Barkerville, and Dawson City together with the observations by mail from the Mackenzie river valley, had disclosed to him the lower Mackenzie valley as an apparent source-region of the western cold-waves.

The manuscript weather maps in the Library, as amended by additional data from reports received by mail and the attempts to extend the isobars beyond the telegraphic horizon, indicate implicitly that the polar archipelago was considered to be the practically permanent abode of an anti-cyclonic system. It is evident that readings which indicated seriously falling pressure in that region were regarded with disfavour or suspicion of error. Perhaps the extraordinarily cold winters of Hudson strait in the year of that expedition had implanted in his mind the idea that Baffin Island and Ellesmere Island were somehow the source of the major outbursts of polar air. Many years had to elapse before observations were again made in this region and the abnormal character of the expedition's winter could be recognized.

The recurrent droughts of the prairies, the extraordinary variability of the weather of southern Alberta, and the great variation between the mean temperatures of mild and severe winters in the northwest, particularly engaged his attention. He attributed the distinctive character

of remarkably cold or mild winters to the mean course (whether along a northern or a southern route) of cyclonic systems moving on to the continent from the Pacific ocean. After a period of various speculations regarding the underlying cause of this change of route, he finally favoured the idea that a notable change in the temperature of north Pacific waters must be a prior event. He entrusted to Mr. Patterson the investigation of this question. This led to the design by Mr. Patterson of a thermograph to be placed in the water-intake of Canadian Pacific steamers on the route from Vancouver to Japan. That the analysis of these data over several years by Mr. Patterson for the Fifth Pan-Pacific Congress yielded a negative result was plainly a great disappointment to Sir Frederic.

As a forecaster, Sir Frederic Stupart rejoiced in his later years in the ever-widening meteorological horizon afforded by the extension of wired and wireless telegraphs not only to the far north but also to the ships on the Pacific ocean. When finally, investigation of the meteorology of the free air by means of sounding balloons and kites was begun by Mr. Patterson in the second decade of this century, he could look back upon forty years of very considerable upbuilding of the Canadian Meteorological Service since he had joined it as a boy of fifteen.

Devoted as Sir Frederic was to the construction of a weather service over Canada which, although larger than Europe, had extremely limited communications, he took a great interest in all developments in Britain and, to a lesser degree, in other European services. Shortly after becoming Director in 1894, he was invited to attend the international conference at Paris and was there appointed to the committee on radiation and insolation. This led to the installation of actinometers at Toronto for numerous observations, but he appears to have been dissatisfied with the type of instrument and let the inquiry lapse. The pyrheliometer later devised by Angström was installed at Toronto to his satisfaction.

While on the committee for cloud observations, he reported on observations with theodolites along a base-line of 1650 metres three times a day, commencing in July 1896. He was reappointed to this commission in September 1896 and published results of observations on cloud-heights and velocities at Toronto during the years 1896 and 1897 in a publication issued from Ottawa in 1901. During his attendance at the Innsbruck conference in September 1905, he was elected to serve on the solar commission and in 1907 was chosen a member of the principal international meteorological commission.

Upon appointment to the committee for the Reseau Mondial, he increased his efforts to have stations installed at intervals in far northern Canada. The absence of a settled population over great stretches of the Canadian northlands presented insuperable difficulties. Also, as Superintendent of the magnetic observatory, he was elected to the committee on terrestrial magnetism and atmospheric electricity in 1907 and endeavored to have the Canadian government establish a magnetic observatory in the

region of Hudson strait. This did not meet with governmental favour because of the great expense of maintenance in that region, but one was established at Meanook in northern Alberta. For this commission also he turned over to Mr. Patterson the task of devising a recording apparatus for measuring atmospheric electricity.

At the meeting of the international meteorological commission at Berlin in September 1910, besides taking part in the discussions of the solar and Reseau Mondial committees, he appears to have compared notes with Walter Davis of Argentina on the most feasible methods of commencing aerological observations in their two countries. Mr. Patterson, who had joined the Canadian service in December 1909, was preparing during that year, preliminary arrangements for registering balloon and kite ascents in Canada, which were later commenced at Agincourt, Woodstock, and Goderich in Ontario, and at Calgary in Alberta.

Sir Frederic's experience with the construction and maintenance of a far-flung telegraphic reseau was of assistance to his colleagues in Europe and his initiation of a daily northern hemisphere map in Toronto led to his nomination to a special commission for the improvement of the study of atmospheric conditions in the north polar basin. These maps on a polar projection were made from cabled messages from Japan, the Asiatic coast, a few stations in Siberia, Russia in Europe, and a sprinkling of messages from Scandinavia, Germany, the Low Countries, France and Spain, as well as from the British Isles, Iceland, the Azores, Bermuda, Greenland, the West Indies, Honolulu, and occasionally other islands in the Pacific ocean. There were besides, of course, Alaskan stations, the Canadian and United States network, and a few reports from Mexico and Cuba. The expense for cables was rather high and experience soon showed that the expected improvement in the forecasting horizon for the British Columbia coast was not very materially increased. By comparison with the data received several weeks later from Japanese ships which had traversed the northern Pacific, it was evident that the true complexity of the synoptic situation in that area could not be guessed from stations on the continents and the islands alone. Daily reports from ships would be a necessity. About the time that this conclusion was reached, the outbreak of war put a stop to the receipt of cabled messages.

After peace was established, and wireless messages could be received from ships on both oceans, Sir Frederic enthusiastically returned to the idea of a northern hemisphere map. He soon reduced this to a map of Alaska, Canada, United States, the West Indies, Bermuda, and Honolulu, together with ship reports from the Atlantic and the Pacific. The intention was to preserve these maps by temporary bindings and to fill in at a subsequent date the isobars from published daily maps of Europe and Asia. A very few maps were so constructed for special days. From these maps Stupart was led to an hypothesis, previously mentioned, from which finally arose the work of Mr. Patterson on North Pacific ocean temperatures.

Most of Sir Frederic's career was devoted to the multifarious and fatiguing details arising from the steady expansion of the Canadian service, involving considerable travelling between the Atlantic and the Pacific when he was not actively engaged in forecasting. In spite of this pressure of executive duties, he found time to publish many articles on his work. His earliest work was the editing of the meteorological data obtained during the expedition to Hudson Straits in the years 1884 to 1886.

He was long a member of the Royal Society of Canada, of the Royal Canadian Institute, the Royal Astronomical Society, and the American Meteorological Association, and was made an honorary fellow of the Royal Meteorological Society in 1932. He took a particular interest in the Navy League of Canada, St. George's Society, and other patriotic organizations and was an active assistant in the lay-work of St. Alban's Cathedral in Toronto.

Sir Frederic Stupart was knighted in June 1916 in recognition of his long and faithful service in the Civil Service of Canada. He died in Toronto in October 1940.

THE DAY THE FREDERICTON RAILWAY BRIDGE WENT OUT

by J. N. Clarey

One of the most important natural events each year in rural New Brunswick is the spring breakup of its rivers, the most significant of which is the Saint John River and its tributaries. About mid-April each year, the slow but sure melting of the snowpack begins to swell the streams and finally breaks the ice cover. This may happen in a patchy fashion when the river rise is slow with many short stretches of water opening up; at other times following a period of above normal temperatures or heavy rain, or both, the river will rapidly fill its banks and flush its winter ice within a few days.

Up until a very few years ago, the anxiety of such times was very familiar to Fredericton residents, with the main thought being "will the ice take out the bridge this time". For a few days the adults of the generation would root for the bridge and the children for the ice. Finally the waters would subside and all thoughts would turn to other seasonal interests such as the black salmon in the Miramichi.

This event is so significant in New Brunswick that a continuous record of its occurrence has been kept at Fredericton since 1825. These

records are also complete with freeze-up dates. This is the longest known freeze-up/break-up record for any river in North America.

The significance of this phenomenon has been highlighted many times over the past century and a half with ice jams and flooding that often caused extensive property damage. However, the farmers on the intervale land, long accustomed and prepared for the spring, welcome the deposit of sediment which over the centuries has been building their land into an area of the most productive market gardening land in the country.

The most dramatic spring break-up on record was in mid-March 1936 when the Saint John River rose to 29.3 feet above its normal level at Fredericton. This record high river level at Fredericton was caused by an ice jam just down river opposite the CDA Research Station. At the height of the flooding on the 19th, the river was rising at one foot per hour, with the swirling water carrying river ice into Fredericton as far back as Brunswick Street (four city blocks up parallel to the River). At 9:00 p.m. that evening, a sudden surge of water against the jam caused it to move slightly and then hold. At the same time there was a creaking and tearing of timbers as the complete railway bridge across the Saint John River at Fredericton was torn loose from its piers and settled onto the ice. This bridge had withstood many a spring freshet since its construction in 1886. The ice jam at the Research Station held and maintained high water in Fredericton until the 23rd when it let go suddenly, again causing extensive property damage as the water receded, carrying much of the ice with it. The total estimate of the damage from the flood and ice damage at Fredericton was $2,000,000.00.

There were two main meteorological factors that caused the flash flooding of March 1936:

(a) On March 11th the daily mean temperatures in central New Brunswick rose to the high 40's and low 50's and stayed there for the next 12 days. In fact it was so unseasonably warm at Fredericton that daily maximum temperature records were established on the 17th, 18th and 19th with readings of 60, 64 and 59 degrees. These are records established during 100 years of observations. Daily high minimum temperature readings were also established on the 18th, 19th and 20th with readings of 40, 41 and 38 degrees. The mean daily maximum temperature over the central New Brunswick area during the nine-day period previous to the bridge being destroyed was 50.0 degrees, 13.4 degrees above the normal for the same period. A comparison with similar results can be shown with the mean daily and the mean minimum temperatures as well.

(b) Heavy rain was also reported during the start of the warm period. A total of 3 inches was measured at Fredericton, the

bulk of it being reported early in the period March 12th and 13th. Amounts of up to 6.88 inches were reported during the same period at one station within 40 miles of Fredericton.

The construction of the multi-million dollar Mactaquac Power Dam less than 15 miles up river from the Fredericton railway bridge has practically nullified the chance of the railway bridge being threatened again. The warmer water coming out of the dam retards freeze-up for several miles down the river below the dam, and influences the thickness of the ice in the river almost down to Fredericton. With the controlled flow through the dam, break-up usually results in a slow rotting away of the ice. Even if there is an unusually long warm period like the one in 1936, this, to some extent, is forecast in advance and the New Brunswick Electric Power Commission will begin lowering the headpond, which will start to gradually break the ice out before the flood from runoff begins.

Although the Fredericton railway bridge is probably safe for all time to come there are many other bridges in the Province, as well as people living on the intervale land, constantly facing the threat of ice jams and flash flooding. This fact was brought into better realism a year ago last February 4th when, as a result of record breaking temperatures and rainfall during a short period of time, flash flooding of most streams and rivers in the southern half of New Brunswick occurred. This resulted in the loss or damage of 118 bridges. Property damage and loss of livestock resulting from the flooding was estimated at $3,000,000.00.

At the present time very little can be done to control the effects of these whims of nature. However, growing public confidence in our improving temperature and quantitative precipitation forecasts does allow some time to prepare for these critical periods, thus making them easier to bear.

LETTER OF APPRECIATION

To: PMB, WMB, CMB, OMB, QMB, AMB

From: ADMA

Subject: METEOROLOGICAL BRIEFINGS FOR THE LONDON-VICTORIA AIR RACE JULY 1971

The following is quoted from a letter of appreciation received from Mr. W.P. Paris, Secretary-General, Royal Canadian Flying Club Association and member of the Race Technical Consultative Committee:

"I would ask that your good offices be used to congratulate your Officers in the field for the excellent briefing services they gave to the London-Victoria Air Race recently concluded in the latter city.

It can be noted with pride by the briefers and other meteorological personnel involved, that not one complaint regarding their work was heard from the 110 competitors and crew members taking part in the Race.

That the event was the undisputed success that it was can in a large part be credited to the Meteorological Organization, without the services of which Race planning would not have been possible".

2. Would you please convey the above message along with my personal commendation for a job well done to all staff who contributed directly or indirectly in providing weather service in connection with the London-Victoria Air Race.

J. R. H. Noble
Assistant Deputy Minister
Atmospheric Environment Service

cc - OIC Weather Offices Goose, Gander,
Sydney, Halifax, Quebec City, Ottawa,
Sault Ste Marie, Thunder Bay, Winnipeg,
Regina, Calgary, Victoria.

CANADIAN PARTICIPATES IN WMO TECHNICAL ASSISTANCE TO DEVELOPING COUNTRIES

George W. Robertson of the Agrometeorology Section, Plant Research Institute, Canada Department of Agriculture, has recently completed (12 April 1971) a two-year tour in the Philippines where he participated in a WMO/UNDP Meteorological Training and Research Project in Manila. This project was carried out in cooperation with the Philippines Weather Bureau and the Department of Meteorology of the University of the Philippines. The main objective of the project was to establish a Department of Meteorology for graduate students at the University and an Institute of Meteorological Research and Technical Training within the Weather Bureau. Mr.

Robertson's part in the program was in the areas of climatology and agricultural meteorology. He was considered as a visiting professor at the University where he took part in the lecture program as well as supervised the theses of graduate students. Syllabi, outlines and notes were prepared for courses in Climatology and Agrometeorology. In total some 120 hours of lectures were presented to 26 students enrolled in these courses. He also supervised the research projects of four graduate students, one of whom completed his research and thesis before the end of the two-year assignment.

He also assisted with in-service training and research programs undertaken by the Institute of Meteorology. Among some of the research projects were: The establishment of a National Solar Radiation Center including a National Radiation Network and a monthly National Radiation Report; a Micrometeorological research program including a mobile laboratory and facilities for measuring wind and temperature profiles up to 100 m.

He participated in a number of seminars and in-service training courses involving groups such as: professional staff of the Weather Bureau and University; Government officials interested in soil and water conservation; medical doctors and technicians involved in malaria eradication; senior staff training in EDP techniques; and agrometeorological technicians.

One of the intangible accomplishments was his catalytic actions which encouraged communication and cooperation between staff members of the Weather Bureau and staff members of various agricultural establishments and agencies such as the Agricultural College at Los Bãnos and the International Rice Research Institute.

Part of the Project was to establish a library within the Institute. Many friends and colleagues particularly in the Agricultural Meteorological Group of the A.M.S. helped by donating over 300 reprints of scientific articles and technical bulletins which were deposited in the library.

The Project issued a series of technical reports to which Mr. Robertson contributed four numbers:

- Rainfall and soil water variability with reference to land use planning. No. 1.
- Extra-terrestrial radiation and daylength tables of daily values for the Philippines. No. 3.
- Development of simplified agroclimatic procedures for assessing temperature effects (on crop development). No. 5.
- Solar radiation data for 11 years at Los Bãnos, Philippines in relation to bright sunshine. No. 6.

While in the Philippines, Mr. Robertson received an invitation to present a key note paper at a Symposium on the topic of "Plant Response to Climatic Factors" held at the University of Uppsala, Sweden in September 1970. This was sponsored jointly by UNESCO/FAO/WMO and the Swedish Government. He presented a paper on "The Development of Simplified Agroclimatic Procedures for Assessing Temperature Effects (on Crop Development)."

Following the completion of his tour in the Philippines Mr. Robertson undertook a 6-week assignment for the FAO/UNESCO/WMO Interagency Group for Agricultural Biometeorology. This involved a fact finding tour to Malaysia, Singapore and Indonesia and the preparation of a feasibility study preparatory to a proposed more comprehensive agroclimatic survey and study of the South-East Asian Archipelogo.

Prior to undertaking these assignments, Mr. Robertson attended a UNESCO training course in Paris for U.N. experts and spent several days at WMO Headquarters in Geneva and FAO Headquarters in Rome for special briefings.

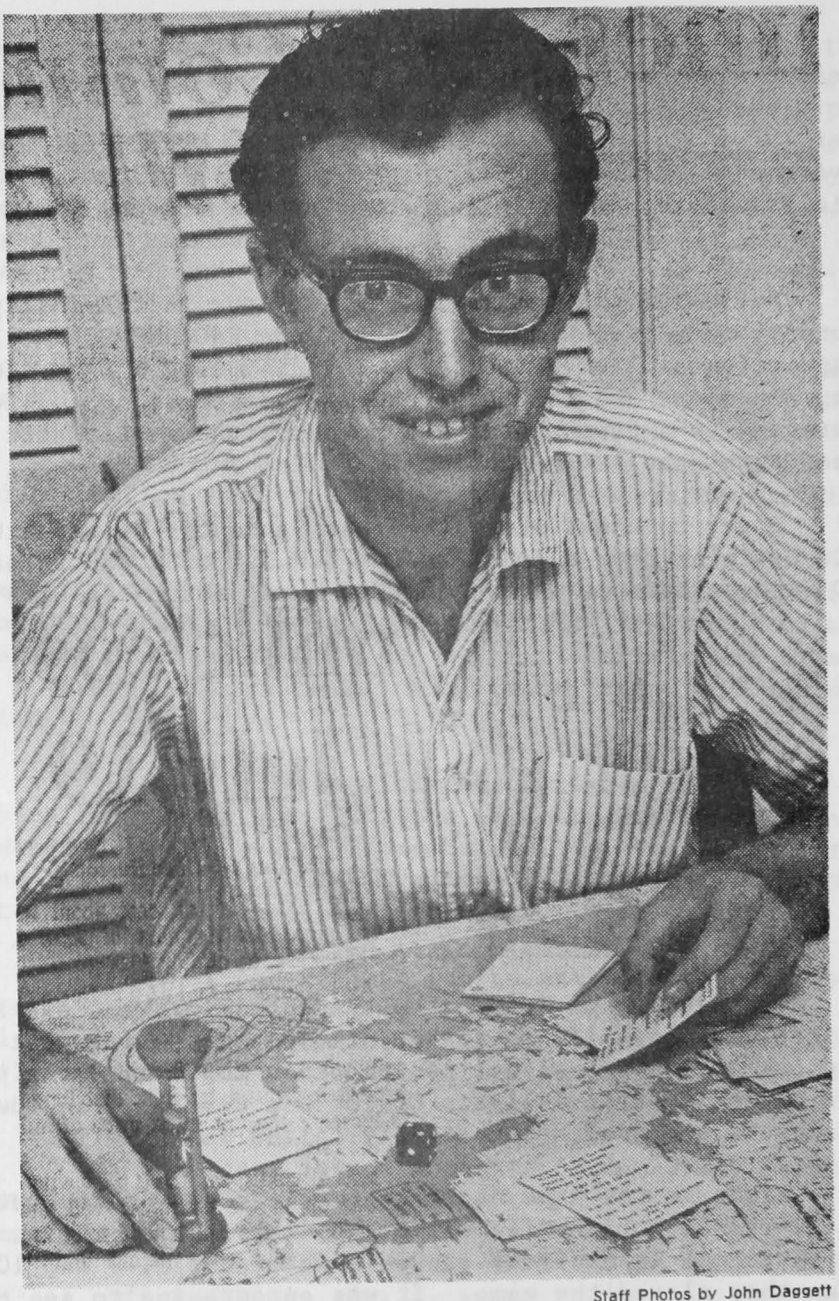
GAME CALLED WEATHERWITS

Invented by R. G. Lawford

The problem of increasing the public's awareness relative to the services and capabilities of the Atmospheric Environment Service has been tackled in many ways. As his contribution to solving the problem, R.G. Lawford of the Central Analysis Office has developed an educational game for teenagers and adults tentatively called WEATHERWITS.

Although the game has not gone into production yet, some groups have expressed interest in using and distributing the game. At the Riverdale High School in Montreal students in Grades 8, 9 and 10 expressed enthusiasm as they played the game. It was encouraging to see that the students from Grade 9 who were studying Meteorology did best at the game. The Protestant School Board of Greater Montreal felt that the game could be incorporated into the curriculum to teach climatology and meteorology to high school students. Besides its potential market in the educational field, the game should appeal to the Canadian public who are always affected by the vicissitudes of the weather.

The game itself is played on a map of Canada. Each of the players is located at one of the seven weather offices throughout the country.



Staff Photos by John Daggett

Rick Lawford with the new weather forecasting game that he devised.

Each office has a deck of 12 weather cards. A weather card contains information about the month, pressure, wind, air mass stability and sky cover during the morning. Based on this information each forecaster has to choose from a list of 36 events, the three he feels are most likely to occur within the next 6-12 hours. These events have been chosen to reflect the effects

of meteorology on life in each locality. Events range from "Rain and high winds maroon 5 fishing vessels at sea" at Halifax, and "fair weather allows Eskimos to go fishing at Frobisher Bay" to "Chinook brings sudden warming to southwestern Alberta" at Edmonton. Sand running through an hourglass is used to indicate the 3 minute time-interval would-be forecasters have to make their predictions.

Upon completing their forecasts the players throw a dice to determine which event actually took place. The letter on the back of the weather card and a small table of values are used in determining the actual event. When a player makes a correct forecast he scores between 5 and 30 points depending on the severity of the weather. If he failed to make a correct forecast he then checks the "list of bust forecasts". If his forecast has been based on inaccurate meteorological reasoning and as a result appears on the black list, the forecaster is transferred to Frobisher Bay (no geographical discrimination intended). In general the above combination of chance and skill means that a player's chance of getting a correct forecast for any particular turn lies between 0.1 and 0.55.

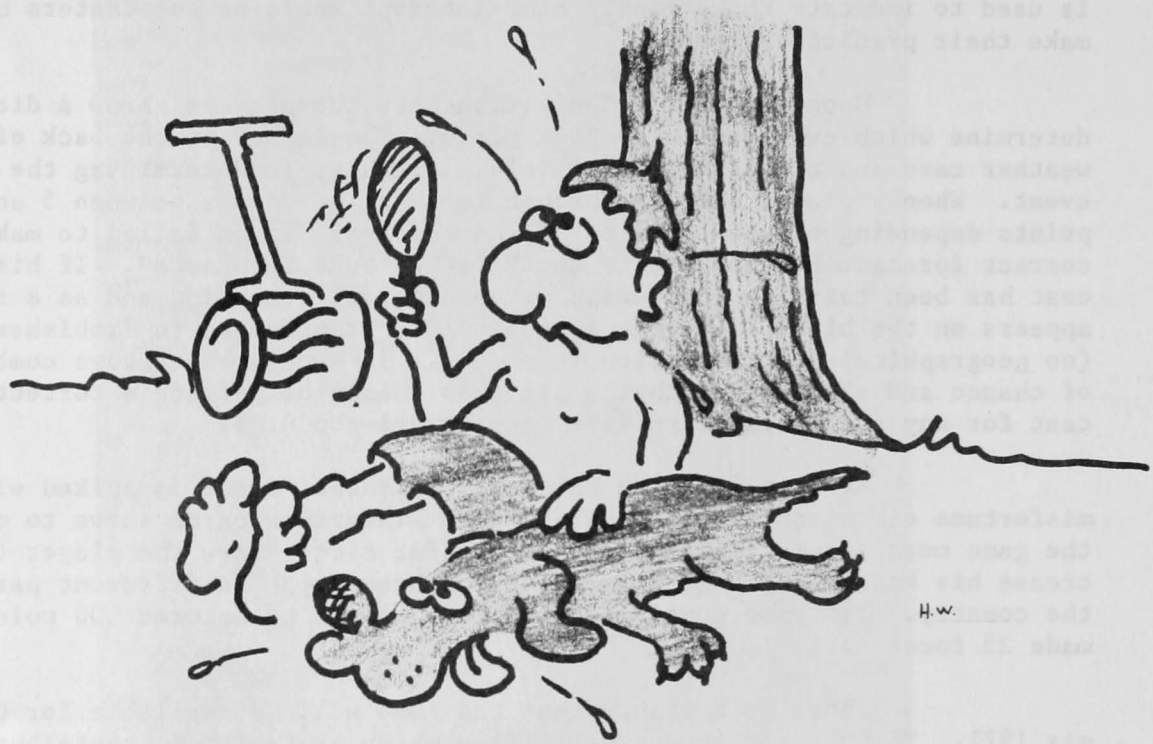
At each location the deck of weather cards is spiked with misfortune cards and transfer cards. The misfortune cards serve to make the game more interesting while the transfer cards allow the player to increase his knowledge about climatology and geography in different parts of the country. The game continues until one player has scored 100 points or made 25 forecasts.

There is a chance that the game will be available for Christmas 1971. If not, its invention still remains as Lawford's contribution to our Centennial Celebration.

AES HISTORICAL ARCHIVES

Two graduate students are being employed during the summer of 1971 to review the correspondence files of the Service and other documents in an attempt to identify and catalogue those items of importance to the history of the Service. By the end of July, about 55,000 official exchanges of correspondence had been examined and 1,600 items had been extracted, catalogued and filed in chronological order. During August the researchers will examine and catalogue the available remaining papers, ledgers and registers from the organization of the Service to the mid-1930's.

L'HUMIDITÉ



CATALOGUE OF WEATHER DATA ON MICROFILM

A punch card file has been prepared and a manuscript catalogue tabulated listing by station all hourly weather and upper air data on microfilm. Work is underway on a similar catalogue for synoptic data. These catalogues will be made available when the work is complete.

IFYGL WORKSHOP - 1971

A second IFYGL International Workshop was held at McMaster University, Hamilton, Ontario, on July 7-9, 1971. Since the first such

meeting the National Oceanographic and Atmospheric Administration has been named the United States lead agency for the Field Year and has established an IFYGL project office. Major agenda items at the Workshop were the announcement of new United States Plans and the coordination of interdisciplinary operational schedules. Mr. T.L. Richards, Superintendent of the Hydrometeorology Section, was co-chairman of the Workshop. The Field Year commences in April 1972.

MAN'S IMPACT ON CLIMATE

Dr. R.E. Munn of Toronto and Dr. R.W. Stewart of Vancouver, were among 35 scientists who spent three weeks in early July on an island near Stockholm writing a book "Man's Impact on Climate". The book is now being printed and will appear in both hard and soft cover in early September (MIT Press). It is an integrated account rather than a collection of essays, and no indication will be given as to the authorship of individual sections. The scientific content was approved in plenary sessions without concern for literary style.

Whether a book can be written by a committee will depend upon the skill of the technical editors who remained behind revising the manuscript that had been written by such people as Junge, Flohn and Müller of Germany; Budyko of the Soviet Union; Yamamoto of Japan; Thomson, Manabe, London and Kellogg of the United States; Van Mieghem and Nicolet of Belgium; and Bricard of France. The participants await publication of the book with interest, but with some apprehension, hoping that the sense of important phrases or sentences will not be changed.

Man is certainly modifying the climate locally and even regionally. The global effects are difficult to assess, however, because of the various feedback mechanisms. Previous discussions of climate change had largely ignored the oceans, and Dr. R.W. Stewart's contribution to the workshop was outstanding. Considerable concern was expressed about attempts to melt the arctic ice pack, either deliberately by aircraft dusting or inadvertently by river diversions (increasing the salinity of the Arctic Ocean). In particular, Professor Budyko of Leningrad felt that the ice pack is particularly sensitive to man-made changes (the arctic was ice-free over most of geological time). In this and other areas (e.g. stratospheric pollution by SST), the importance of considering the dynamics of the general circulation was emphasized. The effects of man-made changes may appear at different latitudes or longitudes than the initial region of surface change.

The climatic general-circulation models developed at Princeton

University were considered to be promising tools but the cost is staggering. One simulation of 100 years of climate, using 5-minute time steps, requires about $100,000 of computer time.

LA FIN D'UN REVE

par Dr. S. Froeschl

Après six mois de préparation, de négotiations et après avoir accumulé environ $4,000 de frais pour des modifications au Cherokee-180 loué de Wondel Aviation, il semblait que nous rencontrions les normes de sécurité du Ministère des Transports. Nous étions donc prêts à partir pour Londres en vue de participer au rallye Londres-Victoria.

Alcide et moi-même avons fait un décollage plutôt lent à Dorval étant donné le poids de l'équipement auxiliaire, mais à 11.37 TU samedi le 26 juin nous étions en route pour Goose-Bay ou nous avons atterris à 1803 TU après un vol direct sans incident et tel que prévu.

Malheureusement les derniers détails du chargement ayant été complétés à la hâte le samedi matin, nous avions oublié de faire vérifier l'équipement d'urgence, inspection requise pour les monomoteurs qui traversent l'Atlantique. Comme il n'y avait pas de représentant de la section des Règlements de l'air autorisé à Goose-Bay pour faire cette inspection, il nous fallait revenir à Moncton avec perte d'une journée complète et un risque réel de détérioration des conditions atmosphériques sur le détroit de Davis. En dépit de la collaboration et de la bonne volonté des représentants du Ministère des Transports aussi bien à Montréal qu'à Goose-Bay, notre problème devenait presqu'insoluble.

Toutefois dimanche matin, avec des conditions atmosphériques assez favorables au Groenland et en Islande, nous étions prêts à décoller pour St-Pierre et Miquelon avec l'intention de bifurquer vers le Groenland. Comme cette solution constituait une violation flagrante des règlements de l'air particulièrement grave pour des employés de la fonction publique, après réflexion, nous avons opté pour une retour à Montréal.

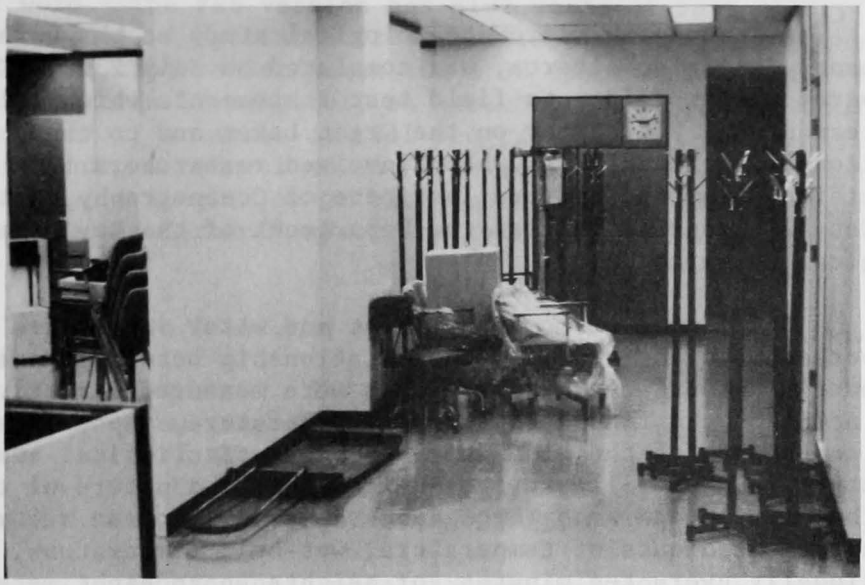
C'était la fin d'un rêve mais une expérience intéressante tout de même étant donné nombre d'autres incidents qu'il serait trop long de raconter.

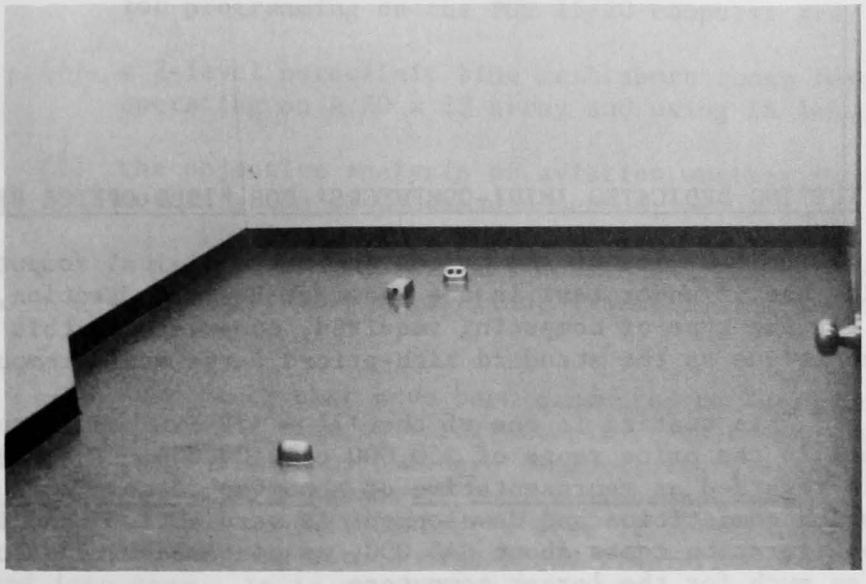
MOVING THE MET
OR
CHAOS UNLIMITED

Dr. Herbert Holt, an American psychiatric consultant for many large corporations, says:

"Moving to new offices is a frightening experience. Employees used to their offices and their neighbours, and their entire working environment, are alarmed when their living world is altered due to a move".

Dr. Holt, who has helped move such giants as Time-Life, CBS and Sperry-Rand, went on to explain that staff very often will feel as though the large corporation is "paternalistic" toward the employee and the feeling of insecurity that is generated by a move is usually manifested in the less adventurous members of staff.





THE SUFFIELD MICROMETEOROLOGICAL STUDY: 1971

A three-week micrometeorological study at the Defence Research Establishment, Suffield, Alberta, was completed on July 23rd. The purpose of the program was twofold: to field test instruments which will be used in the International Field Year on the Great Lakes and to carry out a larger investigation of surface fluxes which involved researchers from the University of British Columbia, Bedford Institute of Oceanography, National Aeronautical Establishment as well as the Department of the Environment (Micrometeorological Research Unit).

The fluxes of momentum, heat and water vapour are of fundamental importance to any study of the relationship between the atmosphere and the underlying surface. These fluxes were measured directly in several ways. In addition the fine structure of temperature, vapour pressure and the three components of the wind were recorded. Statistical analysis of the fine-structure records will provide insight into the nature of the turbulence which is the flux mechanism. Throughout the experiment an automatic data logger recorded gradients of temperature, wet-bulb temperature, and wind speed continually every ten minutes for heights up to eight meters. With these data and the independent flux estimates it will be possible to assess existing gradient-flux relationships.

The close cooperation which was established between the various groups during this experiment will continue during the analysis stage and will furnish ample opportunity to compare the performance of various instruments which measured the same variable.

TESTING DEDICATED 'MIDI-COMPUTERS' FOR FIELD OFFICE USE

Suitability of low priced dedicated digital computers for Field Office use is under test in the Forecast Research Section, and results show that for the type of computing required, computers in this class are in the same league as the standard high-priced large scale computers.

This testing is one of the '71 - '72 FRS projects and refers to computers in the price range of $50,000 to $100,000. The FRS PDP15/20 computer is regarded as representative of a number of computers in this class in which competition and development is very active, and in a minimum initial configuration costs about $45,000, as compared with prices 10 to 100 times as much for the larger computers.

The PDP 15/20 is an 18 bit machine with the ability to do 200,000 integer additions and subtractions per second. With attachable

floating-point hardware it permits 60,000 multiplications per second for a 36 bit word. The FRS version has 8192 words of fast memory (expandible to 131,012 words), 4 special addressable tape drives, a 300 character-per-second paper tape reader/punch and a 30 cps teletype printer. It comes with standard Fortran IV compiler, an assembler, a conversational language, program-editor, a master-control program, a complete operating system allowing input-output control as in large scale computers through simple Fortran programming, a single job or batch mode for the master control system, and a foreground-background capability by the use of a priority interrupt feature.

The following operations were programmed successfully on the FRS PDP 15/20:

(1) A sorting program to interrogate paper tape from an ASC II perforator and identify, decode, order, list and plot aviation weather reports (central processing time on PDP 15/20 is 6.9 sec/100 stations; on CDC 6500 is 9.6 sec/100 stations);

(2) A barotropic model to forecast 500 mb heights on a 12 x 13 array using 24 1-hour time steps and 1 meter tolerance for the relaxations (central processing time on both PDP 15/20 and UNIVAC 1108 is 7 sec.);

(3) A contouring program to obtain field representations of any meteorological quantities that have been evaluated on a regular array of grid points (central processing time on both PDP 15/20 and UNIVAC 1108 is less than 5 sec.). Also planned for programming on the PDP 15/20 computer are:

(4) a 2-level baroclinic fine mesh short range forecast model operating on a 20 x 25 array and using 18 1-hour time steps;

(5) the objective analysis of aviation weather reports using a modification of Cressman's method; and

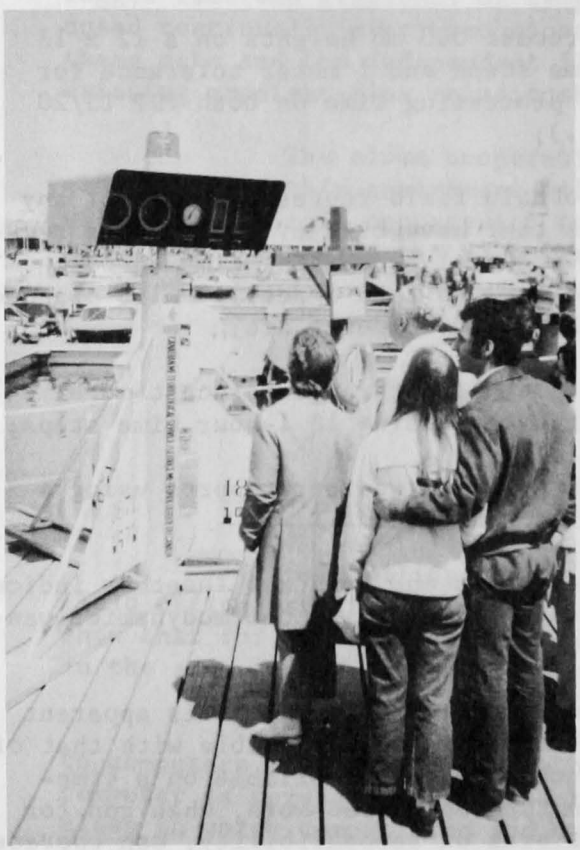
(6) a program to generate diagnostic and forecast 'weather indices' from physically significant kinematic and thermodynamic quantities.

From tests that have been conducted to date, it is apparent that central processing time on 'midi' computers is comparable with that of more powerful large computers that are commercially available on a time-sharing basis, and that programs of the type described here, when run for regions the size of a weather central's area of responsibility, can operate quickly enough to keep up with a high speed line printer once the data have been read into core. It is considered feasible to use the minimum configuration that is currently on site at Forecast Research Section to run the above

series of programs with interruptions as required to print required output from the programs. It is planned to commence real-time testing of the preliminary set of programs described above in the autumn of this year. Additional core storage, high speed line printers, CRT displays, disc storage, etc., are available at extra costs.

MET DISPLAY AT ONTARIO PLACE

by P. Connors



Transportable 'Met' display at Ontario Place located at the entrance to the Marina.

Indicates - wind speed - wind direction - barometric pressure - temperature and humidity.

The sensing elements are situated on the tower at the end of the sea wall.

Work of art

WORKMEN ERECTING a 110 foot steel sculpture by Ron Baird outside the new Atmospheric Environment Service Building in Downsview. York University student Carole Thompson stopped to watch. The sculpture is symbolic of meteorologists carrying weather-measuring instruments. *Staff photo*

WEATHER OFFICE VISITORS

School is out!! - Holiday time again!! One can hear the parental groans over the joyous ones of school children heralding the onset of the summer vacation and additional family problems of how to keep the children occupied and out of mischief during the summer months.

To the staff of Weather Offices and Weather Stations the closing of the schools has the opposite effect and a glance at the blank pages of the Office's appointment book will produce many a sigh of relief

and a smile, as school children form the largest group of visitors to these offices.

During the last few years there has been an increasing interest in Meteorology, in both elementary and secondary schools, where it is now studied quite extensively as part of the geography syllabus. The growing popularity of 'field trips' as part of the educational program has resulted in increased attention being focussed on Weather Offices and Weather Stations, whose staff, as a consequence, are called upon to provide an increasingly popular service of conducted tours and talks on the operation of their station.

The total number of visitors is quite impressive and when averaged over a year for all Weather Offices, approximates 100 per month per Weather Office. When consideration is given to the fact that the limited space of a Weather Office and the instrument enclosure often necessitates the organizing of large groups into smaller parties for a conducted tour of some 30-45 minutes duration, the involvement of Atmospheric Environment staff is quite appreciable. The enthusiasm, zeal and effort that is exerted to ensure the overall success of these tours is reflected in their growing popularity and the number of school teachers who return each year with a different batch of pupils.

Weather Office staff are also commended for their additional faculty of being flexible in their tour presentations, adapted to the varying degree of comprehension of their audiences, which ranges from the Grade 1's, who stand wide-eyed as an aircraft moves across the ramp, to the observant Grade 7's - "Sir, your clock is wrong" and the Grade 13's - "Why does the temperature lapse rate become isothermal at the tropopause?".

The number of visitors reaches a peak during the final months of the school year and to illustrate the extent to which this service is provided, the four Weather Offices who reported the greatest number of visitors during the period from March 1 to June 30, 1971, have been listed, with bracketed values giving the peak number in a month:

Montreal A	-	1,754	(816 in June)
London A	-	1,310	(680 in April)
Windsor A	-	1,200	(446 in June)
Edmonton Int'l A	-	871	(335 in March).

PERSONNEL

The following have accepted positions as a result of recent competitions:

Competition 71-MET-CC-10 - Meteorology (MT) 4
Duty Forecaster
METOC Centre
Halifax, N.S.
- B. A. Hammond

Competition 71-MET-CC-13 - Meteorology (MT) 7
Scientific Support Officer
Pacific Regional Hqts.
Vancouver, B.C.
- D.G. Schaefer

Competition 71-MET-CC-22 - Meteorology (MT) 6
Officer-in-Charge
22 NRWC North Bay
- D.A.R. Mettam

The following transfers took place:

H.A. Austin - To CFB Cold Lake
From CFB Gimli

C. Battson - To CFB Chatham
From CFB Cold Lake

B.A. Hammond - To MFWC Halifax
From CFB Greenwood

K.H. Jones - To MFWC Halifax
From W.O. Goose Bay

A.J. Keck - To W.O. Winnipeg
From CFB Gimli

A.P. Leganchuk - To W.O. Goose Bay
From W.O. Churchill

J.F. McKee - To 22 NRWC North Bay
From CFB Trenton

C.J. Stead - To CFHQ Ottawa
From Canadian Forces, Europe

D.G. Tesch - To Canadian Forces, Europe
From CFB Gimli

B.W. Veale - To MFWC Halifax
From 22 NRWC North Bay

Miss N.B. Waller - To MFWC Halifax
From W.O. Toronto

M.Sc. Graduates - 1971:

J.D. Steenbergen)
C. Charette) - To Arctic W.C. Edmonton
From University of Alberta

FOREIGN STUDENTS-IN-TRAINING ON CANADIAN METEOROLOGICAL PROGRAMS

Name	Country	Program	Termination Date
Jorge G. de las Alas	Philippines	Numerical Weather Prediction at McGill	May, 1973
Gabison	Isreal	M.Sc. at McGill (Can. Bilateral Assistance Program)	long-term
Mohamed Iljas	Indonesia	WMO Fellowship (Eng., Adv. Met., Operations, Seismology, Upper Air Observing, contact training)	April 7, '72
Chander Porsaua	Guyana	M.Sc. at McGill	June, 1973
Kong Sin Tan	Singapore	M.Sc. at U. of T. (Colombo Plan Scholarship)	June, 1972
A. Kanagasundram	Malaysia	Colombo Plan (course in supervision and management for supervisors of met. stations/fcst. offices)	4 months

Name	Country	Program	Termination Date
Sa'ai Bin Othman	Malaysia	Colombo Plan (course in supervision and management for supervisors of met. stations/fcst. offices)	4 months
Miss Soh Mei Ha	Malaysia	Radiosonde/Rawinsonde Operation	6 months

TRIVIA

Teletype Notes

NOTE WG
AVIATION FCSTR
IN REFERENCE TO FA WG1 051730Z, LO 75 S INOUDCDJOUAC...WHERE IS IT?
THANK YOU.
CONFUSED BRFR AT QR REGINA 051753

MS
141
CONFUSED BRFR REGINA
INOUDCDJOUAC IS ANGLO SAXON WORD FOR PT HARRISON
MET WG

SA 160 131639
XR S 131639 E5⊕1/2TAR+ 2725G38 CB10
DECODES INTO VISIBILITY AT XR 1/2 MILE IN HEAVY TAR

Atlantic ferry pilots meet to recall war role

By JOSEPH MacSWEEN
of Canadian Press

It was a heart-catching viation version of that well-own saying: "Old soldiers ever die . . ."

Men of the Royal Air Force erry Command, famed for econd World War exploits, erformed a stirring march-ast yesterday at Montreal nternational Airport as the nal act in their 25th anniver-ary reunion.

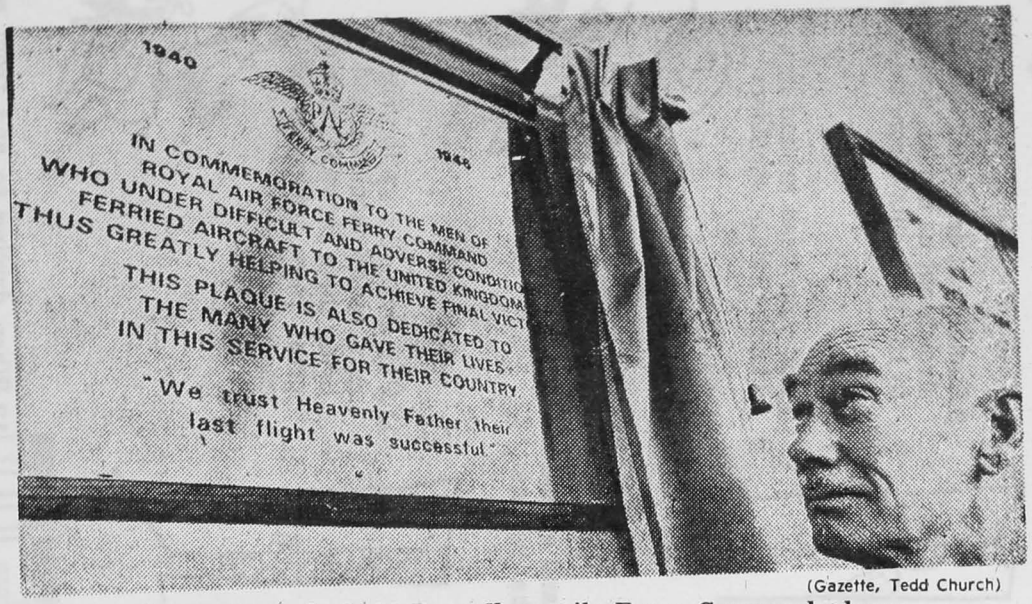
A plaque was unveiled at a ace of honor in the airport rminal and two Ferry Com-and widows placed wreaths eneath it in perhaps the most ouching episode of a reunion ll of memories sweet and ad, plus plenty of hoopla and bald humor.

'GRAND AFFAIR'

"It has been a grand affair," aid white-haired Reg Avey, hose thatch was sandy-color-d when he flew 30 Atlantic erry missions in the days of erring-do.

Retired Group Capt. Geof-ey McDougall, who unveiled he plaque and took the salute n the march-past, stressed he national diversity of the ircrews who delivered bomb-rs across the Atlantic at a esperate phase of the war hen Hitler bestrode Europe.

They included British ioneer airmen, Canadian bush pilots and ground personnel, American barnstormers and airline pilots, RAF and RCAF flyers, Dutch, Norwegian, Polish, New Zealand, and Australian pilots.



(Gazette, Tedd Church)

Group Capt. G. S. McDougall unveils Ferry Command plaque

"Birds of a feather flock together," said Gerry LaGrave, who was superintendent of maintenance at Dorval when the giant airport — now known as the international terminus — was created by the needs of Ferry Command.

Mrs. Molly Buchanan, widow of Flt. Lt. Stewart Buchanan, placed a wreath in honor of servicemen who lost their lives. She reported proudly her husband, son of Wing Cmdr. Frank Buchanan, came from a family with three generations in the service of aviation.

Mrs. J. E. Joe Weaver, whose husband was a radio operator, placed a wreath in honor of civilians who died in Ferry Command which eventually expended its routes to virtually every part of the world. Both women are from Montreal.

A Canadian Legion color party led the airmen and the suburban St. Laurent Pipe Band provided marching music and laments for the unique occasion on the huge main concourse of the airport terminal.

"This is the most emotional experience I've had in 25 years," said Air Commodore G. J. (Taffy) Powell, who flew from his home in the south of France to address a banquet Saturday night

The retired air commodore, pioneer of Atlantic flights, spoke of the days when aircrews snatched sleep aboard parked railway cars at Gander, Nfld., and "the eternal snow, the eternal poker games." He was Ferry Commands senior air officer.

CALLED HOME

He had been scheduled to unveil the plaque but was called back to Britain on urgent business before Sunday's ceremony, when chaplains of the Protestant and Roman Catholic faith dedicated the plaque to the "glory of God and the memory of noble men." The plaque reads:

"In commemoration to the men of the Royal Air Force Ferry Command who under difficult and adverse conditions ferried aircraft to the United Kingdom, thus greatly helping to achieve final victory.

"This plaque is also dedicated to the many who gave their lives in the service of their country.

"'We trust Heavenly Father their last flight was successful.'"

Like many other pilots, Powell spoke Saturday night of a man once universally and affectionally known as "Mr. MacFog," though now better known as Dr. P. D. McTaggart-Cowan, executive director of the Science Council of Canada who tackled the oil pollution disaster in Nova Scotia's Chedabucto Bay.

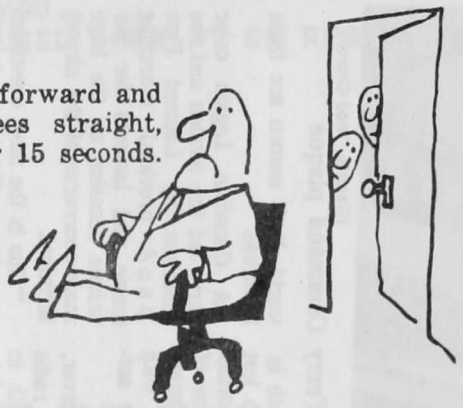
Powell said many thanks were due to Canada by Ferry Command but notably for "the exclusive use of MacFog."

BY EXERCISES

breath).

2. When you stand up, do not touch the chair's arm rests; let your legs do the work. Sit down same way.

3. Extend legs forward and upward, knees straight, and hold for 15 seconds.

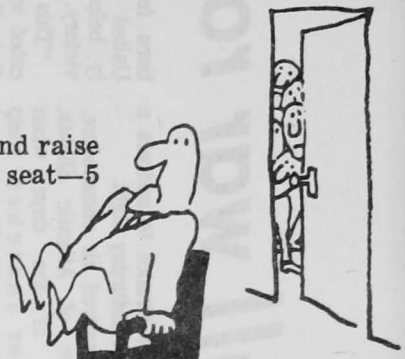


4. Cross legs and rotate ankle, then flex and extend it. Curl toes, force heel downward. Change legs.

5. Contract and relax hips—tighten them up and release—15 times.

6. Still sitting at desk, place hands at chest, elbows up, and force elbows backward in quick movements—stick out your chest. Do this 15 times.

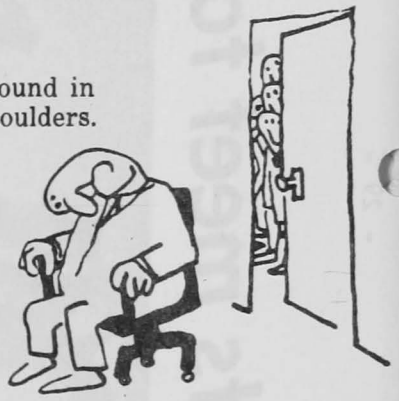
7. In same starting position as #6, alternate twisting upper torso, one elbow back, the other forward and vice versa—15 times.



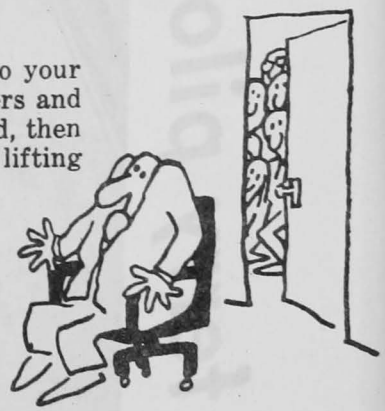
8. Grasp arm rests and raise entire body off seat—5 times.

9. Standing at desk, tuck thumbs under the desk rim; stretch out as though doing floor push-ups. Do 8 to 10 "push-outs" from this position.

10. Roll your head around in a large circle on shoulders.



11. Pull shoulders up to your ears, round shoulders and bring them forward, then press them back, lifting chest up.



12. When driving to and from work, pull in your abdomen at every red light. Hold until light changes (do not hold breath), then relax until the next red light. Take several deep breaths.