# Comet Operations in the RCAF

**By R. J. CHILDERHOSE**

THE SUN-DRENCHED desert of concrete that is all tarmac at Ottawa's Uplands Airport had disappeared under the hordes of parked aerodynes.

Expensive items of sky-punching hardware imported from distant battles for the RCAF's annual display to the tax-groaning public. Bright-scoured Sabres from Chatham were there; sleek T-Birds and a passle of CF-100's; three hulking Argus giants stood alone and aloof. The hangar area was an ant-hill of activity as groundcrew sweated to get the birds refuelled, DI'd and serviceable. No time to gawk at the practice formations of fighters streaking overhead.

"Here she comes now!"

The ant-hill was motionless as all eyes swung to watch a single jet aircraft lift gracefully off the runway. No ultra-sonic, missile-toting fighter this one. In fact it wasn't even a recent addition to the RCAF's menagerie. It was a five-year-old Comet flown by 412 Transport Squadron, going up for a practice run. The smooth, clean lines and flashing highlights reflecting off the swept and silvered wings make dreamers out of the groundcrew and poets out of aviation writers.

**Bad Year for DH:** The RCAF took delivery of its two Comet 1 A's back in March, 1953. It was the year of the Black Fridays for de Havilland as a series of Comet disasters made headlines around the world and resulted in their being withdrawn from service with BOAC. In January 1954, following the Elba tragedy, the RCAF grounded its Comets while the costliest and most exhaustive investigation in aviation history was being made on the Comet fuselage. For two years Canada's jetliners stood shrouded and silent on a little-used corner of Uplands airfield.

Finally came the answer to the mystery of the disintegrating Comets. The story: high altitude operations with a high degree of pressurization, metal fatigue, a small leak, explosive decompression and structural failure. The Comets were flown back to England where extensive modifications were made to fuselage and leading edge at de Havilland's Hatfield plant. The two aircraft were again delivered to 412 Squadron in July 1957.

At the same time, a nucleus team of 412 groundcrew and flight crew were sent to Hatfield for intensive training. Head of the detachment was Flight Lieutenant Dean Broadfoot, who is now 412 Squadron's top Comet pilot. It was Dean who ferried back the first

**Undercarriage is of de Havilland's own design and manufacture. The main gear has four-wheel bogies while the nose gear has a dual wheel arrangement.**


**Starting of Comet 1A's four Ghost turbojets (5000 lb. th.) is accomplished with the aid of this large ground power unit, capable of 1200-1500 amps at 28 volts.**

**The front office, with Flight Lieutenant Dean Broadfoot in the captain's chair. At all times while airborne, flight crew members wear oxygen masks.**


of the two Comets in the autumn of last year. What with the Hatfield course and the training program that has been underway at Uplands since that time, five crews are presently "current on type". A Comet school for groundcrew is running full time within the squadron.

**Twice a Month:** Normal Comet operations in Canada were commenced on November 1, 1957. Although these operations include some VIP transporting in Canada and the U.S., the only scheduled run flown by the luxury liners is the bi-monthly Montreal to France run. Since a refueling stop is necessary at Gander, only a partial fuel load is taken on at the Dorval departure point.

On the Comet's flight deck are found the five crew members: pilot, first officer, navigator, radio officer and an NCO flight engineer. These five men are crowded together in the sombre black confines of the Comet's front office. Due to problems of pressurization and streamlining, the amount of window area seems somewhat limited. This exclusion of light, plus the unrelieved black motif followed in the interior decoration, is a bit depressing. Quite a contrast to the blue plush comfort afforded the 36 passengers behind.

Engine start requires an over-size ground power unit capable of 1200-1500 amps at 28 volts. The shriek of four Ghost turbines reverberates along the ramp as groundcrew hurry to get the big APU out of the way. Each of the de Havilland Ghost 50 engines is rated at 5000 lb. static thrust. These engines, the first turbojet to be approved for airliner use, have proven their reliability and in the RCAF are on a 100-hour maintenance cycle. Like all jets, once they have been fired up, they are ready to go flying.

**Conversation:** "Montreal tower, this is Air Force jet 5301, ready to taxi."

As the man's instructions come crackling back, the big Comet eases out of the line. The pilot tries the brakes once and then continues rolling. The hydraulic brakes on the Comet have recently been fitted with the Maxaret non-skid device. Both brakes and nose-wheel steering are operated by one of the aircraft's five hydraulic systems. Flaps and dive brakes are hydraulic, while the flight controls are hydraulically boosted. Any of three different systems may be utilized as an emergency system for this last.

Pre-take-off checks are attended to on the way out to the button. Usually the control tower has their clearance ready and fuel-wasting time is not lost at the end of the runway.

"Air Force 5301, you are cleared immediate take-off."

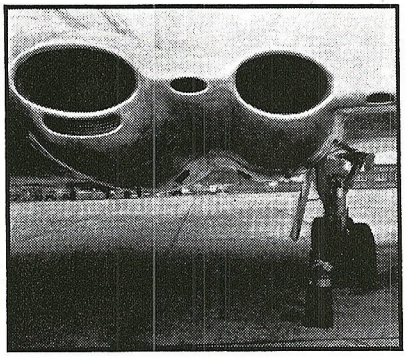
"Roger, zero-one is rolling."

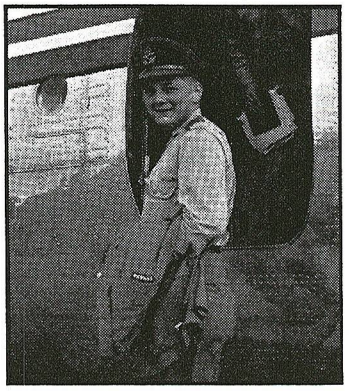
The tachometers on the panel coil themselves up to register 10,250 rpm's on each howling Ghost; tail-pipe temps steady at 690°C. Acceleration is smooth. Under ICAN conditions, at maximum take-off weight of 117,000 lb., with full fuel load of 6,950 Imp. gallons, the Comet unsticks at 115 knots. At 130 knots she lifts smoothly off the asphalt. Climb is initiated at 260 knots, dropping two knots for every 1000 feet of height. (More easily remembered as minus ten knots passing through the 5000-foot levels.)

**More Than One Difference:** A fabulous rate of climb is not the sole difference between piston transports and jetliners. Generally the Comet begins the cruise leg of the journey at about 32,000 feet, gradually easing up to 40,000 as fuel reserves are depleted. Unlike modern military fighters, the Comet flies on indicated airspeeds rather than on Mach number. Limiting Mach is .77 although under normal cruise conditions it seldom exceeds .71. At these altitudes pressurization becomes important, and the flight engi-

**For sheer beauty of line, the Comet will always be hard to beat. First delivered in 1953, the RCAF's two 1A's are now over five years old.**

**Comet pioneered "buried" engines in jet airliners. Though first Comets were powered with de Havilland Ghosts, later versions have more powerful R-R Avons.**





**Above, Flight Lieutenant Paul Major, a Comet pilot. F/L Major now has over 400 hours on type.**

**Flight Lieutenant Dean Broadfoot is commander of 412 (Transport) Squadron's Comet Flight.**

neer controls the 8.25 psi system.

Another large responsibility of the flight engineer is fuel management. The 7000 gallons carried by the Comet is divided between six wing tanks and a fuselage tank. Due to the sweep back of the wings, correct handling of fuel reserves is critical due to the shifting of the C of G. For this reason, the fuel is fed first from the outer wing tanks to move the C of G forward.

High altitude flying for an airliner means changes for other people on the flight deck too. The radio officer finds communications vastly improved; generally is in direct contact with an ATC centre at all times. On the trans-Atlantic hop, VHF contact is relinquished for a bare half-hour in the middle.

**Pressure Pattern:** Navigation has changed, too, in that silent upper world of fatal cold and roaring rivers of wind. An easier job in some respects, the navigator must now learn the art of pressure pattern flying. Those rivers of wind balanced against a favorable altitude for fuel consumption. The consideration of speed. Possibly the biggest factor of all, for though the magic speed compresses time and distance, it also magnifies his errors.

The same magic that shrinks the grey Atlantic into a pleasant morning's ride. Just recently a British Comet crossed from Gander to Shannon in an elapsed time of 4 hours and 12 minutes. It's a record that seems to be broken every month or so.

Letdowns at the No. 1 Fighter Wing end are of two types: the long gentle descent, and the plummeting jet penetration. The first is economical fuel-wise, and desirable from the passenger-comfort point of view. In the jet penetration letdown, the Comet descends at 4,000 fpm with the under-and-over dive brakes extended. Below 10,000 feet, the Comet suffers the fuel penalties of any jet operating at low level, but magnified four times.

**Gear Down:** In the landing circuit, the gear comes down at 150 knots. As with many British jets, gear lowering is accompanied by appropriately loud noises. Flaps are milked down at the pilot's pleasure, 60° of flap being the total issue. Approach is made fairly close in, at about 120 knots. Though fence speed is always calibrated to weight for each approach, at max landing weight of 80,000 lbs., it is 108 knots. When travelling light, fence speed can be reduced to 96 knots.

The scheduled stop-over at Marville is 24 hours. Hardly enough time to get in any sight-seeing, but the Comet crews look forward to the European junket anyway. Their total time away from Canada is three days.

Between trips across the Atlantic, the Comet crews are kept busy with the squadron's primary role of "transportation of high ranking officials of the Canadian government, armed services, and visiting dignitaries." A lesser-known role, but of equal importance, are the exercises flown with Air Defence Command and the calibration of

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ing" or "helicoptering", on one engine —in the latter case it is not even suffering the asymmetric power penalty of an airplane. It has been designed for a deadstick landing at 50 kts. over the hedge and Dr. Hislop thinks that while an autorotative descent would probably damage the aircraft it would only jolt the passengers.

## WHEATCROFT

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cial difficulties; probably for both airlines.

The maximum competitive capacity which could be permitted in 1959 without leading to a TCA deficit is approximately four daily transcontinental services. This allows no room for any increase in TCA capacity and might therefore be reduced to two daily in order to ease the TCA problem of disposing of aircraft already ordered.

If there is to be competition without major detrimental effects for TCA, it is impossible to see, in the initial years, any alternative to a system of rationing frequencies to the new carrier.

### Social Obligations and Subsidy Policy

Government policy has required TCA, and expects new carriers, to accept certain obligations to support unremunerative socially desirable services. It is recommended that this policy should be reconsidered because there is a strong case for believing that direct subsidy is preferable to internal cross-subsidization.

It is not suggested that it is wrong to subsidize the low traffic routes. On the contrary, there appears to be the strongest possible case for Government aid to local and regional air services in Canada.

A policy of direct subsidy would make possible a new approach to local and regional operations. Small carriers can almost certainly perform these at a lower cost than a major trunk-route airline. Hence TCA might be relieved of some of its unprofitable social services if the Government agreed to subsidize local carriers on these routes. An additional consideration is that the present financial difficulties of most of the small airlines appear to make some assistance essential for their survival. A review of the overall policy towards local and regional air services is required urgently.

Closely allied to the problem of unremunerative services is the power of the concept in Canadian transport policy that charging different rates per mile for apparently similar service is discriminatory. There is some evidence that this policy has led TCA, not only to higher fares than those warranted by costs on the major transcontinental routes, but also to lower fares than necessary on some of the low traffic routes.

An overzealous attempt to avoid apparent discrimination may lead to true discrimination, which is to allow charges to diverge materially from the cost of providing the service.

### Further Aspects of Competition

### "Incidental" Competition

THE MAIN part of this study relates to competition deliberately contrived for the purpose of securing specific benefits from the competitive stimulus. Other situations may arise in which competition results incidentally from policies adopted for other reasons. Examples of this may be the licensing of a carrier on certain domestic routes in order to improve the coverage of its existing international services; or granting a licence for a route between two separate parts of a carrier's existing network; or granting traffic rights on sectors presently flown without local traffic as part of a through route.

In any of these cases some of the considerations discussed in the main part of the study would need to be taken into account; in particular, the extent of the incidentally competitive capacity and its possible effect upon TCA's financial stability.

It would appear that, providing they are strictly limited, there is room on the transcontinental sectors for some new services providing incidental competition to TCA without major adverse consequences.

### Extra Peak Capacity

On routes with high seasonal traffic peaks it may be possible to grant limited licences to competing carriers to provide extra capacity at the peak periods. This kind of licence has worked successfully in the United Kingdom and should be considered for adoption in Canada.

### Non-scheduled Competition

Non-scheduled operations are presently prohibited over scheduled routes unless they have the concurrence of the licensed carrier or the specific approval of the Air Transport Board.

It is for consideration whether this general prohibition should now be withdrawn in order to allow non-scheduled operators more scope for developing new traffic.

## COMING EVENTS

**September 1-7**—1958 SBAC Flying Display & Exhibition, Farnborough, England.

**September 5-6**—Canadian International Air Show, Exhibition Park, Toronto.

**September 6-14**—First International Aviation Show, New York Coliseum, New York City.

**September 8-13**—First International Congress, International Council of the Aeronautical Sciences, Palace Hotel, Madrid, Spain.

**September 22-24**—1958 Convention, National Business Aircraft Assoc., Bellevue Stratford Hotel, Philadelphia, Pennsylvania.

**September 23**—11th IATA Technical Conference, French Riviera.

**September 29-October 3**—SAE National Aeronautic Meeting, Aeronautic Production Forum and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Calif.

**October 7-8**—CAI/IAS 1958 Joint Meeting, Chateau Laurier, Ottawa.

**October 8-10**—IRE 1958 Convention & Exposition, Automotive Bldg., Exhibition Park, Toronto.

**October 17-19**—COPA Annual Convention, St. Jovite, P.Q.

**October 22-24**—4th Annual Symposium in Aviation Medicine, sponsored by U. of California, Miramar Hotel, Santa Monica, Calif.

**October 27**—14th Annual General Meeting, IATA, New Delhi, India.

**October 28-29**—AGARD Eighth General Assembly, Copenhagen, Denmark.

**November 3-5**—AITA Annual General Meeting, Chateau Frontenac, Quebec City.

**November 18-20**—Annual Meeting Aviation Distributors & Manufacturers Assoc., Statler-Hilton Hotel, Dallas, Texas.

## RCAF COMETS

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Pinetree radar equipment. The particular value of the Comet in this regard lies in its 8-hour endurance capability.

What is the proposed future for Comets in the RCAF? So far there has been no official indication that any more will be added to 412's roster. However there is the interesting conjecture that 412 Squadron will be receiving the turboprop Canadair 540's to replace their present stock of aging Dakotas, Expeditors and North Stars. With the addition of, say, three Comet 4B's (four RR Avons at 10,000 lbs. thrust each), they'd have an interesting operation.