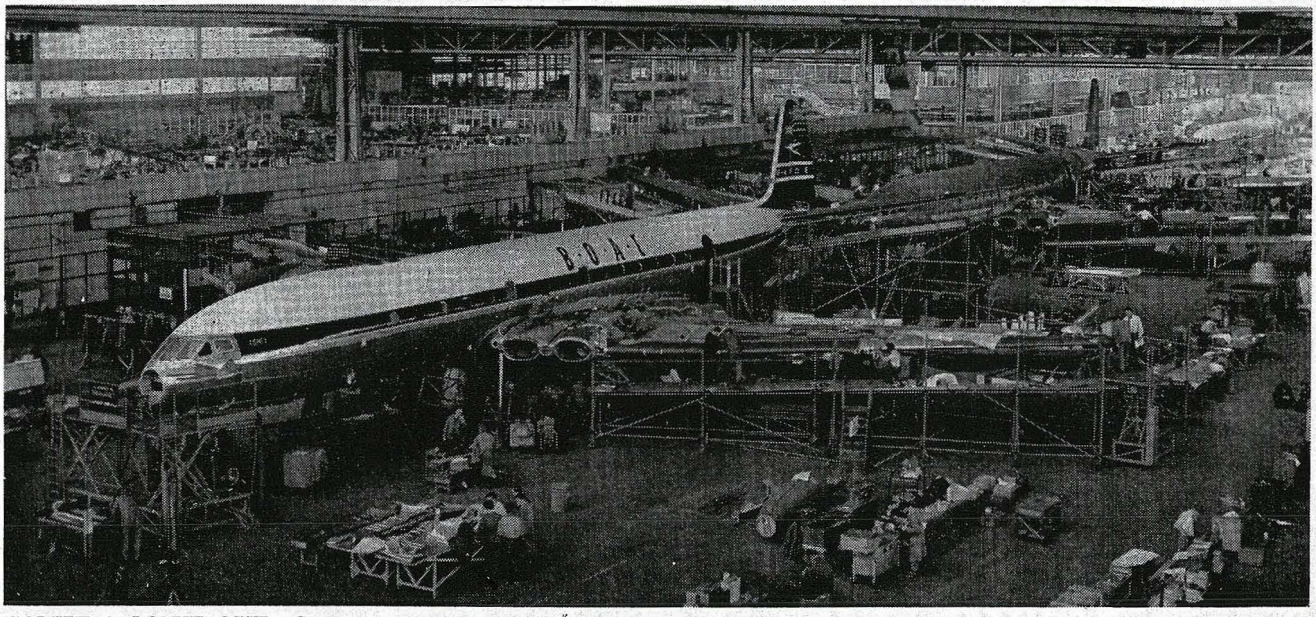


COMET 4s MOVE OUT. Comet production lines at de Havilland's Hatfield and Chester plants are in full stride. Above, the sixth aircraft, G-APDE, nears completion at Chester. An early start to Comet service on the North Atlantic is expected.

Route Trials Begin for DH's Comet 4s

For Group Captain John Cunningham the operation was routine. Another Atlantic crossing in de Havilland's Comet jet airliner; old hat for a chief test pilot who has lived with the world's first commercial jet for almost a decade now.

In the official record book, however, it went as another first opposite the names Comet and Cunningham—the first crossing of the Atlantic by a production jet commercial airliner.

The return flight between Hatfield and New York was made early in August in Comet G-APDA, the first of 19 Comet 4s destined for service this fall with British Overseas Airways Corporation.

Last month's inauguration of the Comet 4 on the Atlantic route was carried out under normal airline rules with the full reserves of fuel. The aircraft operated non-stop from New York to Hatfield, covering the 3,500 statute miles in six hours and 16 minutes from take-off to overhead. Speed averaged 558 mph.

On arrival at Hatfield, G-APDA still had sufficient reserves of fuel for diversion several hundred miles had that been necessary.

The Comet in BOAC colors has become a familiar sight at North American airports over the past few months. At the end of July, BOAC crews concluded an extensive series of development and training flights with Comet 2E aircraft. During the program, the airline's crews logged 3,725 hours of air time on flights from London to Beirut and to North America.

Top Speed

On one of its Gander to London flights, BOAC's Comet 2E, aided by tail winds, covered the 2,400 miles in four hours and 22 minutes. Average speed was 537 mph, and at one stage the aircraft's ground speed reached 750 mph, one of the highest speeds ever reached by a civil airliner.

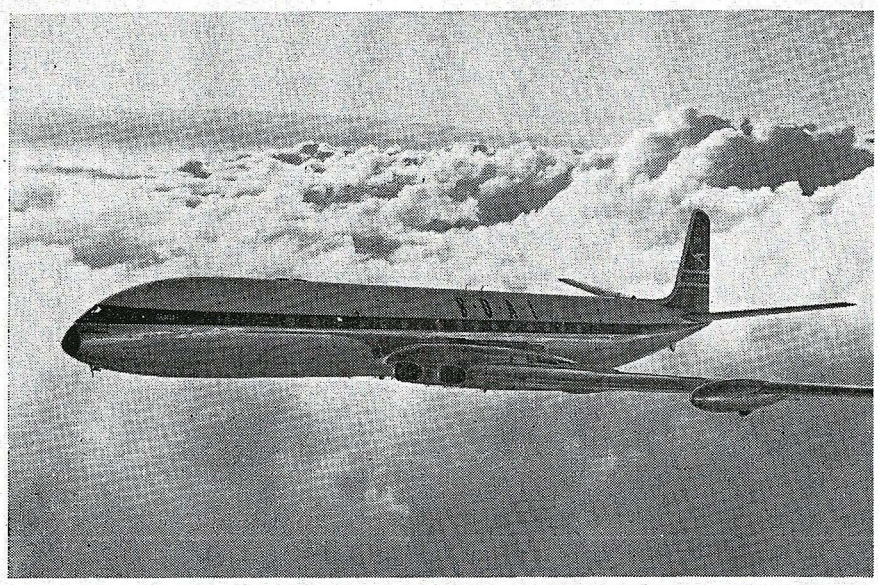
Just about the time BOAC wrapped up its highly satisfactory Comet 2E trials, the U.K. Air Registration Board authorized a life of 1,000 hours between overhauls for the Rolls-Royce Avon RA.29 engines which power the Comet 4s. This high initial overhaul life is unprecedented—and further extensions can reasonably be expected when the engines enter regular passenger-carrying service.

When will that be? Regular passenger-carrying service, that is!

BOAC has not made it official, but before the end of the year is regarded as a certainty, with well before the end of the year receiving favorable consideration in the light of experience to date.

HISTORIC FLIGHT. De Havilland's first commercial production Comet 4 takes off from New York's Idlewild Airport for non-stop return flight to Hatfield, England.

news from Britain



AERODYNAMIC BEAUTY of the de Havilland Comet 4 is apparent in this above-the-clouds shot. Deliveries of a 67-passenger version to BOAC begin this year.

Comet Has 50,000 Hours

By Oliver Stewart

Successful flights by the new de Havilland Comet 4 at the end of April and the beginning of May resurrected the old controversy about whether de Havilland have been right in sticking to the name "Comet." There are some who argue that, because of the accidents to the Mark 1, a new name should have been given to what is, after all, a new aeroplane.

Personally I agree with the de Havilland decision. I believe that they are right to keep to the original name. It is a sign of their determination to overcome by sheer merit of the aircraft all doubts and criticisms.

The first of the Comet 4 flights was on April 27. The pilot in charge was, of course, John Cunningham.

Nineteen Comets with Roll-Royce Avon R A 29 engines are being built for BOAC, with deliveries to begin at the end of the year. The 4 takes up to 76 passengers, but BOAC arrangements include a mixed class version with 24 first-class and 43 tourist seats.

In all discussions of the relative qualities of the Comet 4 and the other jet air liners which will be its operating contemporaries, it should be borne in mind that more than 50,000 hours of flying have gone into the development of the 4. It is by far the most completely studied jet air liner in existence.

An entirely new strike technique is at the root of the Blackburn NA 39, which made its first flight successfully from the long runway at the Royal Aircraft Establishment station at Bedford.

At first it may seem strange that the newest military aircraft to be built in Britain should be transonic and not fully supersonic. The point is that the NA 39, powered by two de Havilland Gyron Junior turbojets, can go supersonic for brief periods at low level. It is in fact designed expressly for high speed, low level attack—the form of attack which most experienced officers say is the most difficult to counter.

Achievement of speeds around Mach 1 with a big load and a good range when flying not much above tree-top height is a special problem. The aircraft must fly in turbulent air and be able to penetrate it without too much loss of speed and without overstressing the structure. The wing loading must be high, yet the aircraft must be able to operate from carrier decks and from normal length runways.

Boundary layer control—or more precisely a form of energized circulation—will give the NA 39 good field performance as well as the attack capabilities which have been outlined. It is a particularly interesting machine; a reminder that all advances in military aircraft are not necessarily absolute advances in speed and rate of climb.

S. F. Cody is believed by a great many people to have been the first man to fly in England. But he was not the first Englishman to fly for at the time he was still an American citizen.

It has always been believed that he made that first flight in May, 1908. But now, as a consequence of a good deal of research among old documents, Dr. George Gardner, Director of the Royal Aircraft Establishment, and Mr. Charles Gibbs-Smith, the aviation historian, say that Cody did not make anything that can be described as a "flight" until October, 1908.

If that be so, then the late Sir Alliott Verdon-Roe might have claimed to be not only the first Englishman to fly, but also the first man to fly in England. His towed flights at Brooklands and his first short powered flights were made in June, 1908.

Of course, there are disputes about whether Roe flew or not which hinge on what is meant by the word "flight." However, Roe had good witnesses and, as he was using an aeroplane which was a scaled up version of his highly successful model, there is no reason to doubt his own statements that he did achieve short, level flights.

Lord Brabazon was without question the first Briton to make an **officially observed** flight in England and he is universally given credit for that feat. But A.V. Roe's efforts should not be discounted. He was a personal friend of mine and I dislike the attempts that are sometimes made to belittle his 1908 work at Brooklands.

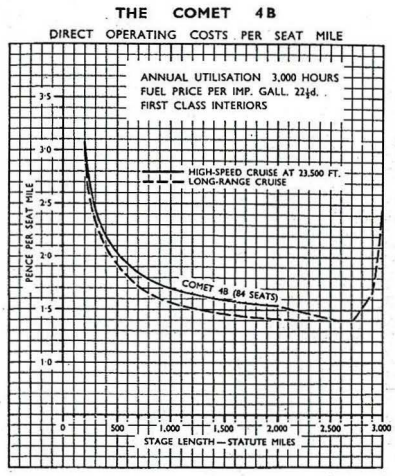
Defense Policy

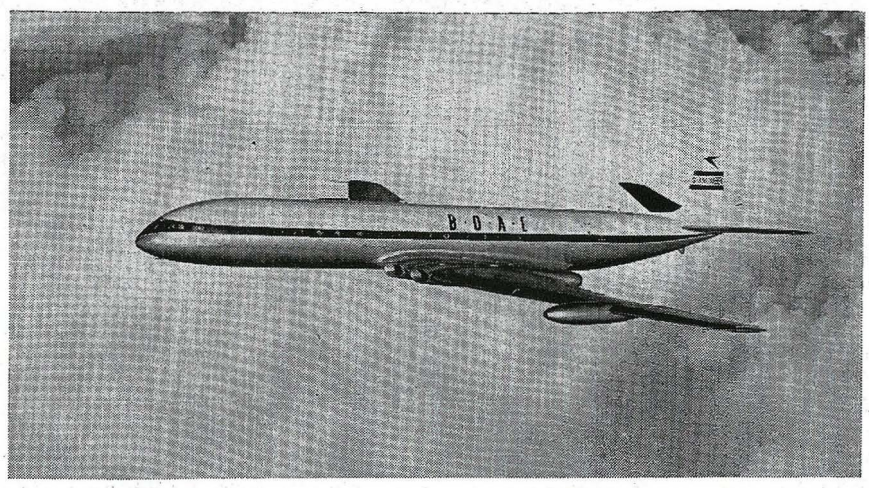
There have been some second thoughts about the government's defence policy, largely as a result of a statement made by Mr. E. C. Bowyer, Director of the Society of British Aircraft Constructors.

He pointed out that the defense White Paper had not in fact said that no more manned aircraft would be ordered for the Royal Air Force. It merely made references to the future of manned fighters and did not specify that the RAF would give them up by any definite date.

In fact the time scale for the transfer of emphasis from manned aircraft to missiles for interception and attack was not indicated in any way. Further, the need for full military transport facilities to reach as far into the future as can be foreseen were acknowledged.

In spite of these reassuring statements, there is still anxiety about the amount of government money that will be available in the future for research and development. This is the thing that worries the British aircraft industry most. For its future, and the future of its export market will depend upon the amount of research possible and the energy with which it is pursued.





NEW COMET. The 4B was developed from the Mark 3 machine shown here. It has the wing nacelle tanks removed and is 38 in. longer. New 4B will take 99 tourist passengers. Low operating costs claimed are shown by graph at left.

Economy jets are here

A development of the Comet 4A is announced by the de Havilland Enterprise. Designated the 4B, this is claimed to provide a 15 per cent improvement in the seat-mile cost of the Comet.

In fact, de Havilland claim that with the development of the 4B they have established, without doubt, the superiority of the pure jet over propeller-turbine airliners in regard to operational economy.

The Comet 4B will replace the 4A (which had been ordered by Capital Airlines) as a short and medium stage aircraft. It shows a 10 per cent increase in seating capacity. The purchase price has been reduced following quantity manufacturing economies.

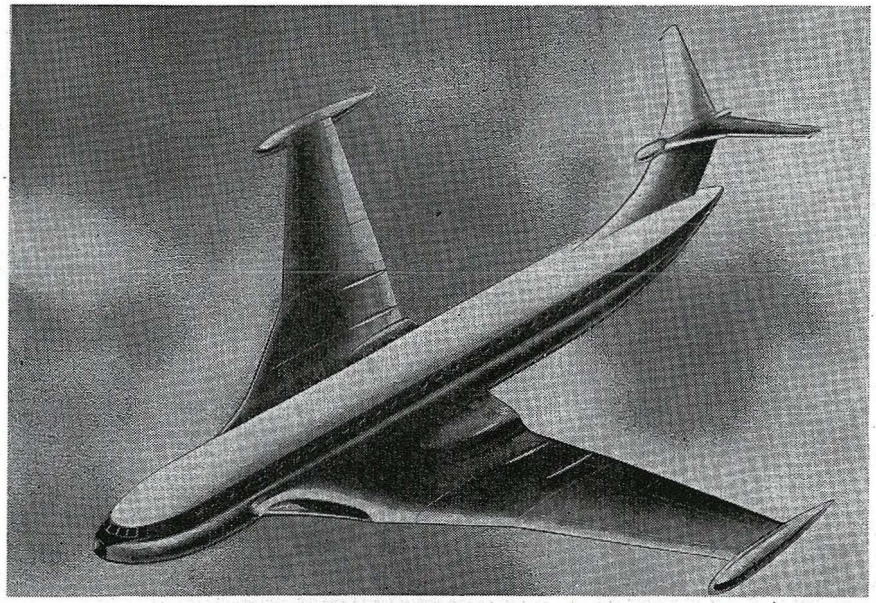
Extension of the fuselage by 38 in. and rearrangement of the seating makes it possible to accommodate up to 99 passengers in the tourist class configuration. The wing nacelle tanks have been removed from the 4B. Resulting improved lift and reduced drag have reduced landing speed and fuel consumption.

Maximum zero-fuel weight of the aircraft has been increased by 2,500 lb. to 98,500 lb. All-up weight is the same.

With maximum first class seating the cost per seat-mile has been reduced to about twopence, or just over two cents, on a representative 500 mile stage. As may be seen from the graph shown, the cost is reduced to 1.4 pence, or well under two cents, on the longer stages. The costs remain remarkably competitive on the stages below 500 miles. The graph is based on fuel prices and labor rates in Europe.

In order to reduce turn-round time and so take full advantage of the Comet's high speed, two further modifications have been made available. An auxiliary power unit, which also provides power for the electrical circuits and cabin air conditioning on the ground, and integral passenger stairs.

With these items the Comet becomes virtually independent of ground assistance at stops where refuelling is not required. The duration of stops can thereby be reduced to a matter of minutes.



BRITISH JET LINER. Artist's conception of the jet transport being developed by Handley Page from their Victor bomber. Civil version (announced in "Aviation intelligence" in the May issue) will carry 122 passengers over Atlantic. Claim is an operating cost of just over one cent a passenger mile. Powered by four Rolls Royce Conways it will cruise at 600 mph. Designed for up to 172 passengers.

* * *

Supersonic Transport

Sir Frederick Handley Page, chairman of Handley Page Ltd., referred recently to the combined project for a supersonic transport aircraft undertaken by his and other British companies.

He said the traveling public had to decide whether the appeal of supersonic flight could be reconciled to the extra cost. Airliners traveling at up to twice the speed of sound were envisaged. But operating costs of such aircraft might be 50 per cent greater than for subsonic jetliners.

Sir Frederick said present-day transports were likely to be greatly improved by application of boundary layer control. Results would include advances in speed and range without greatly increasing aircraft size and weight. Handley Page research had shown that a long-range swept-wing aircraft exploiting laminar-flow techniques could be as fast and lighter than conventional counterparts.

Aviation News Digest

De Havilland has announced a program for a new world jet liner, to be known as the Comet IV, for world air route operation; and offer of an improved Comet II for medium intercontinental operators.

BOAC has ordered 20 of these Comet IV's for trans-Atlantic, far-east and South African services.

The Comet IV will be a projection of the existing Comet III. It will be fitted with the new RA .29 Rolls-Royce engines which show a 9% improvement in specific fuel consumption over the older Avons and give a 500 lb. increase in take-off thrust.

The aircraft will incorporate structural design improvements resulting from the Comet research investigations at Farnborough; it will carry 58 passengers on stage lengths of 2,870 miles against 50 mph headwinds. This aircraft will make London-New York jet liner services an economic possibility, it's claimed.

The aircraft supersedes the Comet III and will be of interest to others who ordered the Comet III (Pan American World Airways). Because flight trials have already started on the Comet III it's expected Comet IV deliveries will start in 1958.

Comet II's will be operated by the RAF as high altitude transports. They will be modified to meet the findings of the Farnsborough Comet research.

* * *

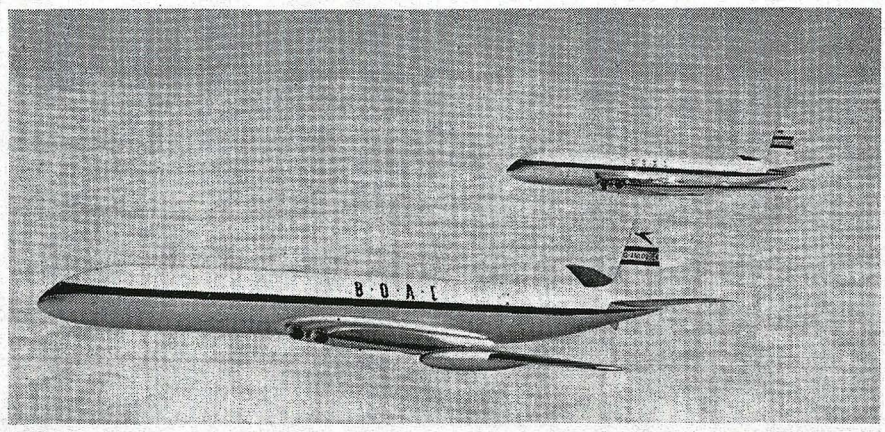
De Havilland Aircraft of Canada Ltd., Toronto, delivered the first six DHC-3 Otters (U. S. Army designation U-1) to the U. S. Army on March 14—part of an order for 90.

* * *

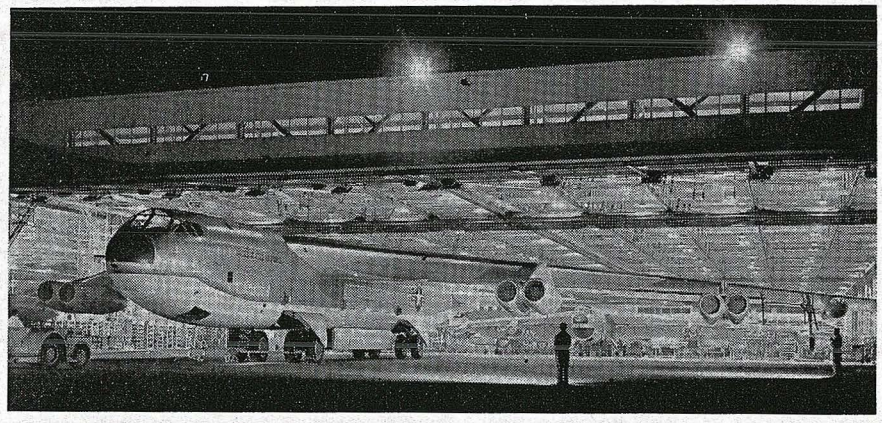
Canadian SKF Co., Toronto, recently opened a new 12,000 sq. ft. warehouse and office building in Montreal West. One of its outstanding features is the glass and iluminum tower-shaped corner entrance.

* * *

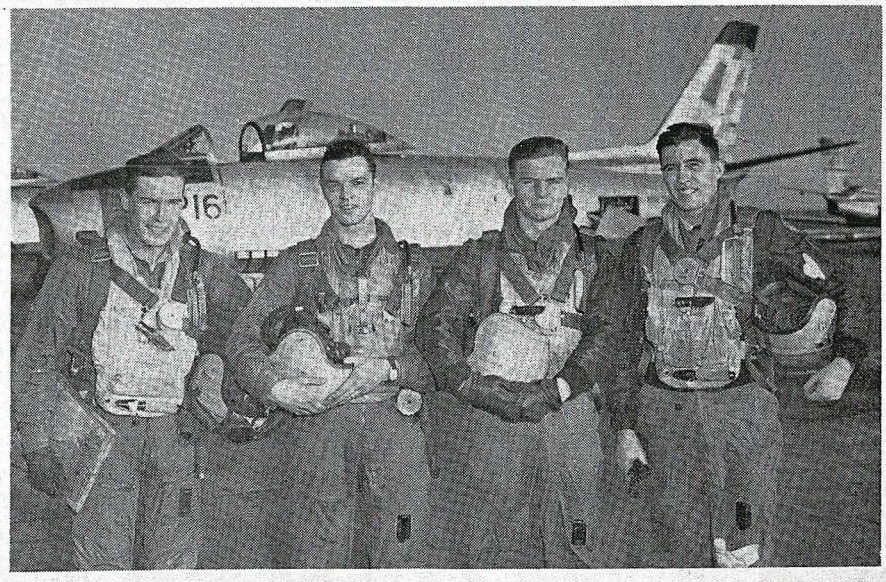
Decca Navigator Canada Ltd., Toronto, announce the order for establishment of a sixth Decca navigator transmitter chain in Europe—this time in Sweden.



De Havilland Comet III and Comet II to fly in modified form.



B-52 STRATOFORTRESSES roll night and day at Boeing's Seattle and Wichita plants. These eight-jet 600 mph heavy bombers have a 6,000 mile range, are destined for global service with the USAF's Strategic Air Command.



RCAF pilots arriving at Marville, France, with their Canadian-built Orenda Sabres: part of the general transfer of our forces from the former base at North Luffenham, England.

By Victor Koby

Comet rebirth

British Overseas Airways Corp. has reaffirmed its faith in Britain's air industry. With both feet firmly planted on British soil the airline has instructed de Havilland to continue with Comet production.

The aviation world looks with expectancy to the rebirth of Britain's most brilliant postwar achievement, the Comet jet airliner.

Few counted upon the success of the Comet investigation. The task seemed almost hopeless. There were too many missing pieces to the puzzle. The result is a tribute to the determination, months of hard work and scientific research. It is no job of whitewashing. The following quotation is evidence of the honest and unbiased British investigation:

". . . . in concluding on the likelihood of the cause one has to take the thing as a whole. One has to take the tank evidence and say that shows fatigue is possible, although . . . not necessarily probable. One has then to look at the other half of the matter, namely, all other possible causes. If in the process of eliminating you become completely confident that you have eliminated every other possible cause, then you are driven to say that possible fatigue rises to the most probable cause."

Safety must rule

A campaign has been launched by U. S. private pilots attacking Canada's Department of Transport for refusing single-engine land planes permission for over-water flights. Canada is the only free country refusing this permission.

Cases under consideration concerned trans-Atlantic flight. Our air regulations "do not permit flights in single-engine land planes beyond gliding distance from shore."

The DOT is being accused of denying freedom of the air; of threatening the development of aviation anywhere. In fact, states one U. S. magazine, "Lindbergh's flight could not have taken place with that kind of thinking."

In principle we support the DOT in the interest of safety. But we suggest a second look at the regulation with a view to easing it. It is no longer foolhardy to fly with one engine over water—Otters, Beavers and Sabres do so daily all over the world.

We urge the regulation be amended incorporating operational safeguards for over-water flight. These would not lessen single-engine risk but would provide for a greater margin of safety generally. Typical safeguards would be: filing of a flight plan, large fuel margin, full ditching and emergency equipment including radio, radio-equipped aircraft, pilot with commercial license and full instrument rating.

We support the DOT in principle because the record shows that for every two flying hours spent by the RCAF on genuine mercy or rescue missions, another goes in tracking down some plucky but foolhardy flier who soars off into the wild blue yonder of Canada's Northland with little or no conception of the vast distances of our northern wilderness.

The search for Maple Leaf hockey star Bill Barilko, missing since Aug. 28, 1951, cost $250,000 exclusive of RCAF pay and allowances. In use were three RCAF Lancasters, four Dakotas, one Norseman, one helicopter.

Canada's aviation must be safe. Let's do it without stopping progress.

Air Freight power

There's new power in Canada's commercial aviation. The opportunity to participate in the DEW-line airlift has spurred Canada's Class A operators to acquire more than 60 multi-engine transports.

Free enterprise has created a transport supply pool for the military to fall back on in times of emergency. The U. S. military has now accepted the vital role commercial carriers can play in air logistics.

With Ottawa's support this should be the beginning of the comeback of Canada's charter air freight industry.

To one man, Bob Redmayne, general manager of the Air Industries and Transport Association of Canada, goes much of the credit for making it all possible in rallying the industry.

London Letter

By OLIVER STEWART

After the Harvard

With the completion of the last Harvard to be built at Fort William the question of the training sequence to be adopted in the future reappears. Existing policy for the RAF is to retain piston-engined aircraft for the elementary period and then to take the pupil straight to the jet-driven de Havilland Vampire Trainer. But staff officers in some NATO countries believe that the time has come to abandon piston-engine training for service pilots.

This change in staff opinion is behind the French Government's order for 100 Fouga 170 light jet trainers. This order will set production going and will help in persuading other countries to adopt the all-jet training sequence. Italy, especially, is known to favor this sequence and she might become a customer for the Fouga. There seems to be a case here for a clear statement of policy on the part of the RAF, the RCAF and other Dominion air forces. There seems little doubt that the all-jet sequence can be satisfactory.

Helicoptors or else

Hard words were said in Parliament when the Air Estimates were under discussion on the state of development in the Commonwealth of helicopters. It was remarked that the United States constructors were far ahead of all others in this field and it was argued that more money be made available for experimental and research work with rotating wing machines.

Probably this was the outcome of the known views of the British European Airways Corporation. Peter Masefield, BEA's Chief Executive, has more than once stated that he is looking for a helicopter to seat 30 or 40 people and that he wants it soon. He has gone so far as to add that unless British designers and constructors move more quickly he will feel that it will be necessary to spend dollars in the purchase of U. S. machines.

Jet helicopters

Among the companies which are trying to meet BEA's helicopter requirements is Fairey and an indication that some progress is being made with their new Rotodyne was given at the end of March when it was announced that the jet-driven Gyrodyne had made its maiden flight. The jet Gyrodyne is derived from the piston-engined Gyrodyne that once held the official world helicopter speed record. Its rotor, however, instead of being driven through gears as in the original machine, is driven by small jet units at the blade tips. These receive compressed air pumped to them along the hollow blades by the engine.

The Fairey conception, then, is nearer a convertiplane than a pure helicopter and the Rotodyne will have stubb wings as well as ordinary airscrews to help in giving good cruising performance. The Napier Eland turboprop is the type of engine specified for the Rotodyne.

Other British helicopters make slow progress. The small Saunders-Roe Skeeter has had some set-backs but is now showing excellent capabilities. The twin-engined, twin-rotor Bristol 173 is under development and might interest BEA. But the extremely original and interesting triple rotor Air Horse originated by the Cierva company received a check which may prove fatal when it crashed some two years ago.

Other helicopters

France may yet steal a lead in helicopters. Recent performance figures obtained by the Sud Ouest Djinn are unexpectedly good. This aircraft, which was demonstrated at the Paris Salon last year, has a rotor driven by compressed air forced out by a gas turbine along the hollow blades to nozzles at the tips. Unlike the Gyrodyne these nozzles are not burners, the compressed air simply blowing the rotor round. The method gives quieter operation than that using burners and, as the class height record proves, it also gives good climbing performance.

The question is whether France will do what she often does; that is create these brilliant ideas, but fail to follow them up to the stages of full development. Much the same question must be asked by the Hurel-Dubois 32 transport aircraft.

Aspect Ratio

This machine has an exceptionally high aspect ratio and the thin wings are strut braced, the struts being of aerofoil section and laid at a comparatively flat angle so that they contribute to the total lift. At the F. G. Miles aerodrome at Shoreham, on the South Coast of England, the Hurel-Dubois prototype commercial machine was demonstrated by Max Fischl. It proved capable of taking off from the grass surface in about 250 yards with a nearly full load and of landing with a run of less than 150 yards.

Twenty-four Hurel-Dubois aircraft have been ordered in France and it is likely that this order also — like that for the Fouga trainers—has been placed partly in the hope that it will aid the French industry to obtain a footing in the export markets.

Comets and the future

The fatal accident to a de Havilland Comet off the southern coast of Italy in April brought the number of unexplained accidents to three and this was enough to give the Minister of Transport and Civil Aviation warrant for suspending the Comet's Certificate of Airworthiness. The first unexplained accident was near Calcutta, when the aircraft disintegrated causing the death of all on board, and the second was near the Island of Elba, with a like result.

The three accidents have in common the fact that the aircraft was near the end of its climb to cruising height in each case and that there was virtual disintegration of the whole machine. Possible explanations increase in number. There is the theory that the kerosene in the tanks can form an explosive mixture if the aircraft takes off from a hot aerodrome and climbs rapidly; there is the theory that explosive decompression takes place; there is the theory that the aircraft meets air turbulence sufficiently severe to break it; there is the turbine disc failure theory and there is the theory of fuselage resonance with air turbulence.

Turbulence seemed likely in only one case; that at Calcutta. In the other cases the aircraft was in clear air. But little is known as yet of clear air turbulence or of how severe it can be. Meanwhile the fact that three quarters of the Elba crash wreckage has been recovered by the Royal Navy gives hope that the real cause will be found. At the time of writing there is no conclusive evidence that engine failure and the bursting of a turbine disc had anything to do with the crash.

Speed record puzzle

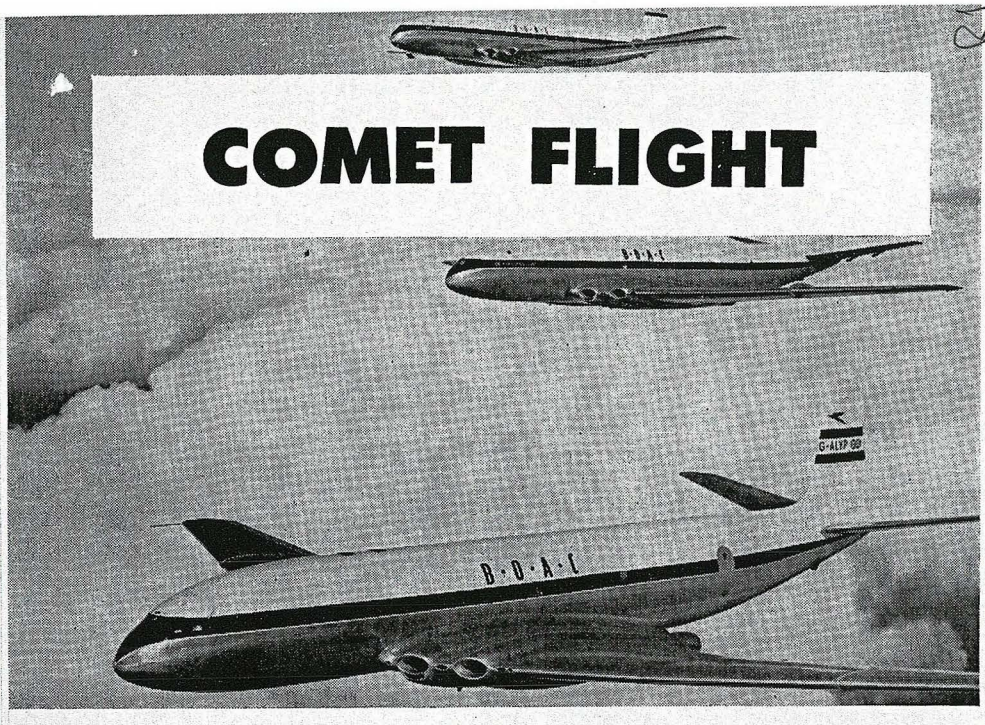
The official attribution by the **Fédération Aéronautique Internationale** of the world absolute speed record to Colonel Everest with the Super Sabre seemed so puzzling that I telephoned to the Paris headquarters of the FAI and asked how it came about. The reply was that the one per cent margin over the previous record had not been made clear in the **Code Sportif** (the official rule book) and that as Everest's figure was better than Commander Verdin's (although not one per cent better) it was decided that the record should go to Everest.

But a meeting of the committee concerned with records in Paris subsequently decided that, to obtain a world absolute speed record, there must in future be that one per cent margin no matter whether the record is set on the three kilometre or the fifteen kilometre or any other base.

Clifford Salton

The appointment of Clifford Salton as a director and vice-president of Prenco Progress and Engineering Corporation Limited in Toronto is announced. Mr. Salton has been associated with Prenco since 1948.

COMET FLIGHT



FLIGHT IN THE COMET IS A NOVEL EXPERIENCE FOR PILOT AND PASSENGER. COCKPIT SIMPLICITY AND EFFORTLESS CONTROL HIGHLIGHT FEATURES

By RONALD A KEITH

HATFIELD, ENGLAND — From a pilot's viewpoint, the D-H Comet is the sort of aircraft you might dream about but would hardly expect to come true. It has simplicity, remarkable handling ease, and an almost-silent, effortless vibrationless flight. You can cut any one of the four engines on take-off and scarcely notice the difference. Despite this jet airliner's unique high-altitude and high-speed performance, it flies the circuit and landing approach quite normally.

These were impressions retained by the writer after a brief flight in the Comet with de Havilland's chief test pilot, John "Cats-Eye" Cunningham.

During most of the flight the writer rode in the cockpit where the noise level was so low to be almost imperceptible. Throughout the passenger cabin, however, while never as disturbing as the noise-and-vibration of a piston airliner, the sound level was somewhat higher than anticipated.

Our impression was that in the forward section of the passenger compartment there was just a muffled roar, no noticeable vibration. In the last two rows of seats and gents' washroom, however, the "blowtorch" effect was at least as loud as the noise in a four-engined piston airliner.

We were advised that this extreme variation in sound level was occasioned by the backwash cones from the inboard tailpipes hitting the rear fuselage. (In the Comet II, the inboard engines will be angled outward a few degrees to diminish this effect.)

Another unusual feature of the highly important sound factor should be mentioned. At certain engine speeds, lower than cruising revs., the power plants gave off a high-pitched scream. (Apparently this is impeller noise.) This was most noticeable in the small compartment between the cockpit and the passenger cabin.

Most revolutionary operational feature of the Comet on the ground concerns the extreme simplicity of preflight cockpit checks. Most of the cockpit check is completed on the ramp before the engines are started, thus saving fuel.

The fact that the controls of the Comet are hydraulically operated naturally raises the hydraulic check to first-rate importance. The Comet has three hydraulic systems: 1. The primary system, driven by the outboard engines; 2. The secondary system, running off the inboard engines; 3. An emergency system with an electrically driven pump.

The three systems are checked, then double-checked, before take-off.

At the end of the live runway, the cockpit check is measured in seconds. You taxi directly into take-off position, set the brakes, and advance the throttles to take-off power. Then it's simply a matter of flicking your glance across the panel to ensure that you are getting the required revs from each of the four engines and that the jet pipe temperatures are not excessive. Meantime, the flight engineer checks the fuel flow metres. Then you simply release the brakes and you're off.

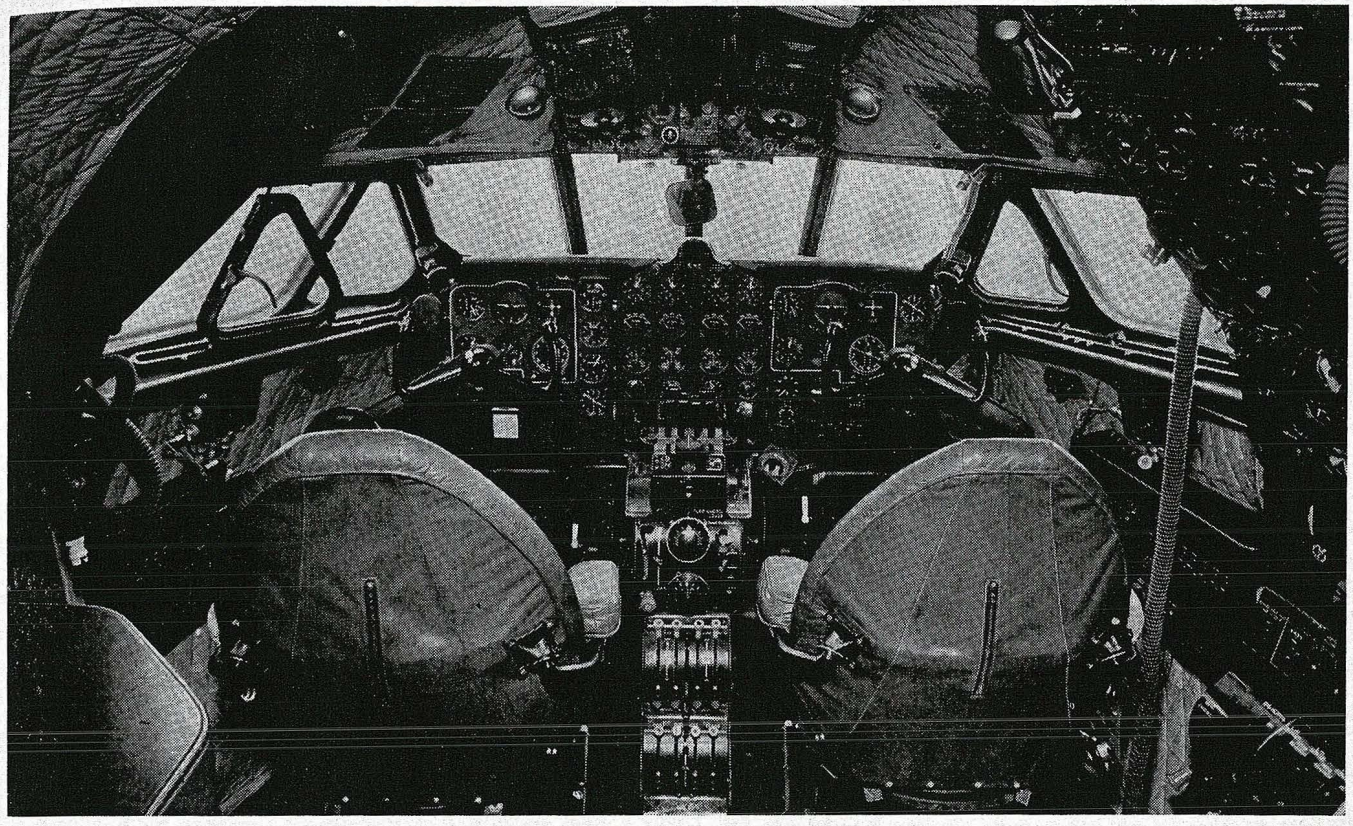
The acceleration was quite rapid and we were off the runway and climbing promptly. Passing over the airport boundary, Cunningham calmly and deliberately closed the port outboard throttle with his feet off the the rudder. There was a barely perceptible swerve and the Comet continued its climb virtually undisturbed.

Flies Like Link Trainer

Most noticeable flying feature, aside from absence of vibration, is the feel, or, more accurately, lack of feel, in the controls. Because they are hydraulically operated, the controls are exceptionally light, especially at low speeds, while even at cruising, the Comet feels more like a Link trainer than a heavy aircraft. Cunningham says the novelty of this feature soon passes and you get accustomed to hydraulic flying.

There has been uninformed talk about 200-knot approach speeds for jet airliners. Actually, the Comet stalling speed is in the 75-knot region. The initial approach is made at 120 mph, comparable with the Constellation, and you come in over the fence at 105 knots. It is advisable to keep a fair degree of power on during the approach for quicker response in case of a balked landing. The actual landing is quite normal in all repects.

Some conception of the cockpit simplicity can be gained from study of the illustration on the opposite page. It can be seen that the panel layout is much less complicated than in the corresponding piston airliner. The flight panels, outlined in white, are conventional, except for the Mach meter which registers the airspeed in relation to the speed of sound. The blank at the bottom of the pilot's in-



ABOVE: The Comet cockpit layout, as described in the accompanying article, is much simpler than the piston airliner.

strument panel is for the Zero Reader which did not happen to be installed in this particular Comet.

The central or engine panel, as can be seen, has four rows of instruments. They are, top to bottom: tachometers; jet pipe temperature indicators; oil pressure and temperature dials; and rear bearing temperature indicators.

Principal items on the throttle quadrant, top to bottom are: brake parking lever; throttles; flap selector lever; air brake; automatic pilot control box; flap indicator and emergency lever; high pressure fuel cocks; low pressure fuel cocks. Elevator and aileron trims are conventionally located.

The Comet in which we flew had been fitted with seats and upholstery to British Overseas Airways specifications. This was the layout on which BOAC had standardized for the first 14 Comets. It allows a 45-inch seat pitch and accommodates 36 passengers. Twenty-eight of the passengers occupy forward-facing seats in pairs in the main cabin with a 17-inch-wide aisle. The remaining eight occupy facing seats in the forward compartment. (An alternative plan accommodates 36 in the main cabin and eight in the forward compartment.)

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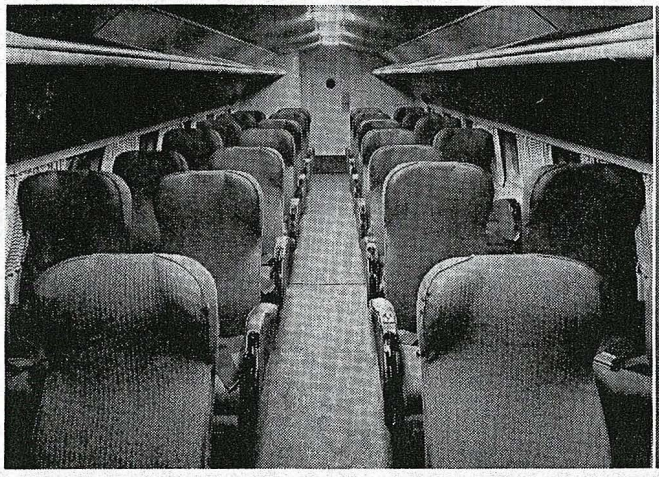


In this BOAC layout, the main cabin seats 28 passengers, aisle width is 17 inches.

Eight passengers occupy a forward compartment with facing seats, removable tables.

COMET AIRLINER STARTING SHAKEDOWN FLIGHT TRIALS

By Floyd S. Chalmers

LONDON — We went out to the de Havilland plant the morning after the Comet's amazing six-hour hop to Castle Benito, Libya and back, an aerial triumph that made headlines the world over. Workmen were busy stripping the world's first jet airliner of engines and instruments for examination.

The Comet is a neat looking job. It will seat 36 passengers. Its normal cruising speed is 500 mph, but to achieve maximum fuel economy at that speed it must fly at 40,000 feet. Obviously this is no plane for short distances. Flying to Africa it took roughly half an hour, or around 150 miles, to reach that height.

Questions To Be Answered

This first Comet will be kept flying under all sorts of conditions for the next year to work out many problems. What is the weather like at 40,000 feet? What happens to pressurization (which has to be two and a half times the pressurization of the ordinary transAtlantic airliner)? What happens when one runs into headwinds of 150 mph, which are frequent at that height? Is it better to make a quick ascent to the top level or to take it slowly? What is the best speed at which to fly?

In addition to these and a thousand other technical questions that must be answered, de Havilland has to determine from actual experience the answer to the key question of the optimum range of the Comet. Obviously, it is uneconomical for the shorter hops for which Canada's Avro jetliner is designed. But is it a 2,000-mile machine or a 3,000-mile machine or something in between? If it is a 2,000-mile machine then it is not for North Atlantic flights; at 3,000 miles it might tackle London to Gander nonstop, cutting out one stop.

At the de Havilland plant a second Comet was nearing completion. It also is for test flying. But work is well advanced on the first four planes ordered by BOAC.

There was a good deal of venturesome courage in the placing of the order by BOAC for 14 of these airliners. De Havilland itself financed the design and development. The British Government ordered the first two to be built. BOAC bought the next 14 off the drawing board. But with a guarantee as to cost, date of delivery and performance. When these have been delivered any one else may buy them.

To a layman the time between conception and first commercial flight of an airliner seems incredibly long. It is three years since de Havilland began to blueprint the Comet. It will be another three years before the first completed planes will be delivered to BOAC. Even at that de Havilland is certain that it will be years ahead of any other jet airliner of comparable range. That it is guessing right seems to be indicated by the enquiries flooding in from the world's airlines.

For Many Countries

De Havilland also is making the Dove (for short range commercial flying), the Mosquito (still the best night fighter), and the Chipmunk. The latter is the training machine designed in toto by a Canadian design team. It is being made in Canada for export to dollar countries, in Britain for sterling countries.

How dependent a large part of the world is on the British aircraft industry was indicated forcefully by the work in progress on the floor when I was at the Hatfield plant. Planes were being readied for shipment to Sweden, Norway, Switzerland, France, the UK, South Africa, India and two other countries which prefer to remain unnamed. The Dove alone has already been delivered to 31 different countries and one a day is coming off the production line.

Note—As guests of the British Board of Trade, a group of six business paper publishers and editors has been touring factories in the United Kingdom. Floyd S. Chalmers, vice-president and general manager of the Maclean-Hunter Publishing Company and R. Eric Crawford, editor of Canadian Machinery, members of this group, have sent special reports to Canadian Aviation, herewith.

—The Editor

WILL THEY PASS UP PRESTWICK?

By R. Eric Crawford

PRESTWICK — Scotland is up in arms; there is said to be a plot on foot to bypass Prestwick Airport on transatlantic flights and come down at London Airport (Heathrow) direct. The Scots fear that they will lose that part of the business — and prestige — just as has happened with shipping. Cunard and White Star, they tell me, no longer dock at Glasgow; it's all Southampton. Scotland will become a province of England.

Building of the runway for the Brabazon at Bristol suggests an alternate landing field there, and adds fuel to the fire of suspicion that London is trying to hog everything.

One advantage Prestwick will long enjoy; it is the most fog-free spot, the year round, in Great Britain. Our flight landed there in beautiful sunshine. Ten minutes after taking off we were in clouds right up to the 9,000-ft. flying level and had to come in at London on GCA. We were number five on the stack and had to circle over London nearly 50 minutes, which could be a problem at the end of a transatlantic flight. We came down in a downpour.

U. S. planes are not allowed to use GCA — perhaps because they haven't yet proved it was invented in U. S. — so have to cruise aloft till they find a hole in the clouds. There were two hanging around aloft when we landed.

TIME twist

By Victor Koby

After a tragic parental history de Havilland's Comet III girdled the globe in December to sell airlines and the public on the potentialities of medium range jet airliner suitable to all but non-stop trans-Atlantic route stages.

It is today the only competitive jet airliner in existence presaging the Comet IV which will go into service with BOAC in 1959.

This proved too much for Time magazine. Here, the editors thought, was an opportunity to launch a tirade against the British aircraft industry. So the magazine which prides itself on the facts took the opportunity to throw facts to the four winds. (December 19 issue).

"The troubles of British aircraft," it said, "are due primarily to inefficient planning, limited resources, inadequate research and development . . ."

"U. S. planemakers," the magazine went on, "usually test every part of a new plane in metallurgical laboratories, wind tunnels, etc., before it flies. But British designers, partly because of a shortage of facilities, build a complete plane, skimp on preflight tests."

This masterpiece of logic continued in the same vein ending with a grudging paragraph, "Britain has had some successes."

While few would doubt there are some major shortcomings to the British aircraft industry, Time glossed over some uncomfortable facts: U. S. jet engine development started with the British Whittle engine; the Curtiss-Wright J65 is manufactured under Armstrong Siddeley Sapphire license; the Pratt & Whitney J48 is manufactured under Rolls-Royce Tay license.

On the aircraft side the Martin B-57 is produced under English Electric Canberra license. Two U. S. airlines have purchased the turboprop Viscount in quantity (Capitol and Continental). Also, until the Comet disaster and U. S. planemakers decided to build jet airliners, Pan American had taken options on Comets.

National comparison is invidious. But Time stepped forward fearlessly to tell the reader the British aircraft had a postwar record of failures whereas the U. S. industry represented success itself.

But Time omitted mention of U. S. aircraft industry troubles with the F-100 and failures at the expense of the taxpayer which have been mistakes or failures common to the aircraft industry and governments everywhere. Time made no reference to the Convair XC-99; Lockheed XR-60; the Hughes H-4 flying boat; Lockheed XFV-1 and Convair XFY-1. In Time magazine's terms they were all failures.

In actual fact some were government mistakes, others ahead of their time but were weak in power plants. All could have been successes if it was deemed worth while—the same is true of British aircraft which Time designated Rube Goldberg nightmares.

Ottawa's challenge

The future of Canadian aviation in 1956 rests on the Federal Government's willingness to assume a new measure of responsibility towards both the industry and carriers because of growth.

For 1955 was a crucial year—a year which marked a turning point for Canada's air carriers.

The Distant Early Warning Line airlift turned small charter operators into large operators and it has turned large operators into even larger ones in terms of multi-engine aircraft owned and bank balances.

There has been a new growth which has resulted in mergers to produce three major Canadian air carriers which now stand ready to seek their maximum growth potential in air transport.

The government must, if it upholds free enterprise, do everything to aid this growth. The policy of no competition on domestic passenger routes must be gradually changed or Canada's air transport industry will be stifled to death just at the point of full maturity.

For the manufacturing industry the government has an even more pressing responsibility. Most of Canada's aircraft industry today was created by the government to make the armed forces independent of foreign industries in the event of an emergency.

During the Korean War period those industries proved their worth. Now it rests upon the government to keep these industries alive—not necessarily with large volume orders, rather with development contracts.

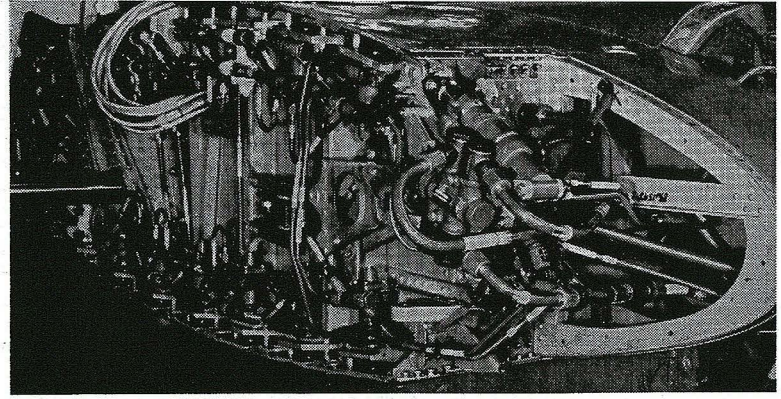
The only way Canada's aircraft and avionics industry is going to stay alive in the competitive race for faster and more deadly weapons and modern transports is to build up engineering and design staffs.

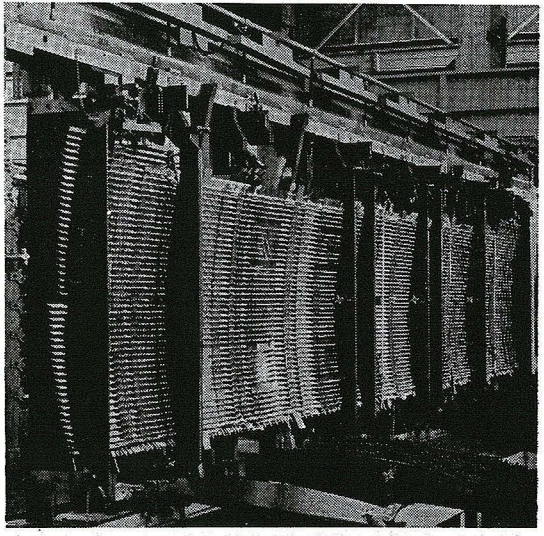
The British and U. S. Governments realize this and provide development contracts which lead to civil jet airliners, supersonic fighters and top jet engines.

Defense Production Minister Howe recently urged the Canadian aircraft industry to build new air freighters. But without an economic market in Canada and without military orders the development of such aircraft would financially ruin most companies.

Only more government support can provide the answer as it has in the case of only one aircraft in Canada today—Avro Aircraft's CF-105.

Jan 1956





NAVY'S GRUMMAN. Taking shape at Canadian Car and Foundry Co.'s Fort William plant are wing assemblies for the Royal Canadian Navy's new CS2F-1 sub-killers. Left above illustrates the detail involved in the wing production program. View is of cables, hydraulic lines and wing-fold joint fittings on the root end of the centre section. Right, drilling and riveting corrugations to the outer skin.

F-104A Flies

Lockheed's F-104A made its first flight recently at Edwards air force base. Powered by General Electric's new J79 engine, the craft is the production model of the AF's newest supersonic fighter.

* * *

707-Olympus

Installation of the Bristol Olympus in Boeing's 707 was discussed recently in England by officials of the two firms. The British engine is said to have about the same specific fuel consumption for equivalent power as the J75, yet it weighs considerably less. Another major factor, the Olympus could be made available for installations in the first production 707s.

* * *

Soviet Extension

The way for entry of Russian civil aviation into Southern Asia is said by Soviet press reports to have been prepared by the visits of Communist leaders to India, Burma and Afghanistan. The pilot of the plane which carried the Soviet leaders is said to regard the 14,000-mile trip as an important survey operation over territory never visited before by a Russian civil aircraft. The flight was made in the Reds' latest twin-engine transport, the IL-14P. Luxury type models of the craft were presented as gifts to leaders of the states visited.

* * *

Comet Endurance

A de Havilland Comet 2 recently went 15,000 hours of simulated flight in a test tank at Hatfield before it suffered a wing component failure. Fuselage of the craft remained intact. The test hours logged are three times the guaranteed life required by RAF Transport Command. In earlier test a Comet 1 is said to have suffered minor fatigue failures near the wing bays at 5,000 hours.

* * *

Atomic Seaplane

A U. S. Navy contract for research and development of an auxiliary power system for a high priority atom-powered seaplane capable of flying non-stop around the world has been awarded to the Garrett Corporation. Navy officials are optimistic that the proposed craft could become the first atom-powered plane.

ENHEAT CS2F-1 COMPONENTS. N. A. Hesler, president and general manager of Enheat Aircraft, division of Enamel and Heating Products Ltd., Amherst, N.S., hands over release notes on the first CS2F-1 tail plane unit completed by the company. Enheat is turning out the units under sub-contract from de Havilland Aircraft of Canada which is building the Grummans for the Royal Canadian Navy. More units have been made since this picture.

Altitude Testing

Rolls-Royce has announced plans for construction of a high-altitude testing facility to simulate conditions under which aircraft engines must be expected to operate in the new era. Expenditure of just over $10 millions has been authorized for the project. Work on the buildings has already begun on a 13½-acre extension of the RR Aero Division's Research and Development Establishment at Derby.

* * *

Aussie 'Copters

Two firms, Trans-Australian Airlines and Australian National Airways, have been authorized to import Australia's first commercial helicopters. TAA will import a light Hiller 12C; ANA will buy a heavier Bristol Sycamore.

* * *

Sabre Simulators

The RCAF has taken delivery of the first of five Canadair Sabre Mk. 6 flight simulators from Redifon Ltd. The units are installed in a 36-ft. 13-ton trailer. Operating cost is $8 an hour compared with the Air Force's estimate of $445 an hour for operating the aircraft itself. The RCAF already has three mobile Sabre Mk. 5 simulators in Europe and two static Mk. 5 units at Chatham, N.B.

Bristol 187

Bristol Aeroplane Company officials say the firm's projected 187 long-range turboprop airliner will be capable of operating at full load, the year round from every Class 1 airport in the world. To be powered by BE-25 engines, it is scheduled for service in 1959-60 and is designed for greater range and speed than previous models. It is billed as an entirely new conception. All up weight is to be some 200,000 pounds, passenger capacity 130, cruise speed 500 mph, capable of flying London to San Francisco non-stop, economical for operation on 1,000 mile stages

* * *

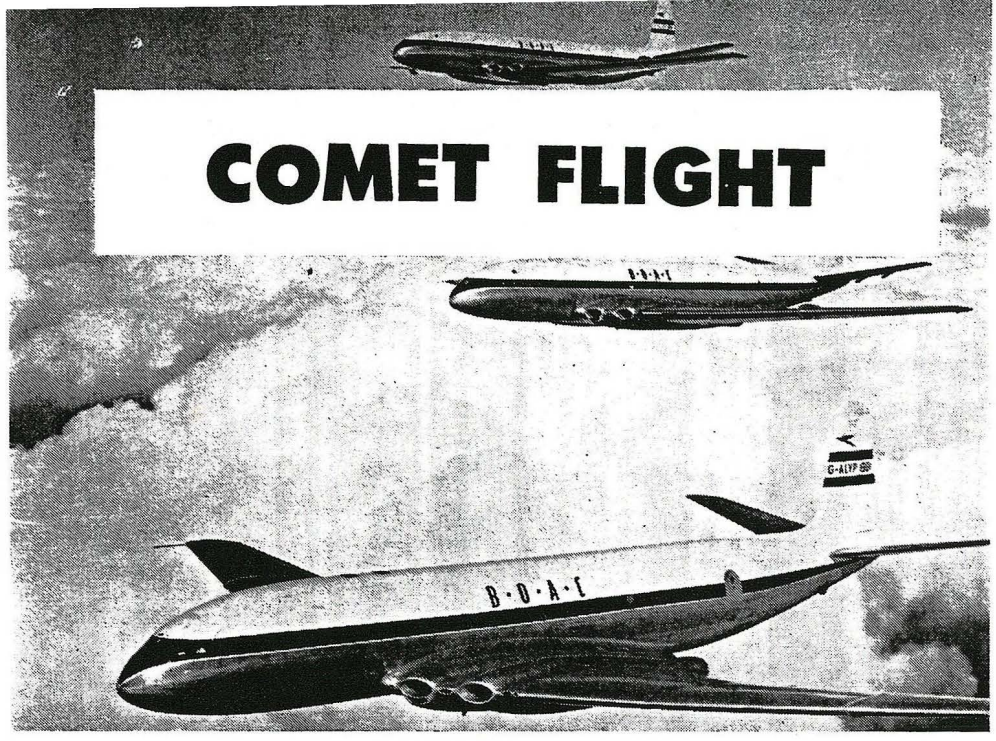
Flying Sun

The Sun Oil Company recently announced formation of an Aviation Department. Manager of the department will be Raymond Higgins, who has been the company's chief pilot since 1946.

* * *

Irish Vampires

An order has been placed by the Irish Air Corps for de Havilland Vampire trainer jets. Delivery is scheduled for this summer. The order raises the number of air forces using Vampire trainers to 20.



COMET FLIGHT

FLIGHT IN THE COMET IS A NOVEL EXPERIENCE FOR PILOT AND PASSENGER. COCKPIT SIMPLICITY AND EFFORTLESS CONTROL HIGHLIGHT FEATURES

By RONALD A KEITH

HATFIELD, ENGLAND — From a pilot's viewpoint, the D-H Comet is the sort of aircraft you might dream about but would hardly expect to come true. It has simplicity, remarkable handling ease, and an almost-silent, effortless vibrationless flight. You can cut any one of the four engines on take-off and scarcely notice the difference. Despite this jet airliner's unique high-altitude and high-speed performance, it flies the circuit and landing approach quite normally.

These were impressions retained by the writer after a brief flight in the Comet with de Havilland's chief test pilot, John "Cats-Eye" Cunningham.

During most of the flight the writer rode in the cockpit where the noise level was so low to be almost imperceptible. Throughout the passenger cabin, however, while never as disturbing as the noise-and-vibration of a piston airliner, the sound level was somewhat higher than anticipated.

Our impression was that in the forward section of the passenger compartment there was just a muffled roar, no noticeable vibration. In the last two rows of seats and gents' washroom, however, the "blowtorch" effect was at least as loud as the noise in a four-engined piston airliner.

We were advised that this extreme variation in sound level was occasioned by the backwash cones from the inboard tailpipes hitting the rear fuselage. (In the Comet II, the inboard engines will be angled outward a few degrees to diminish this effect.)

Another unusual feature of the highly important sound factor should be mentioned. At certain engine speeds, lower than cruising revs., the power plants gave off a high-pitched scream. (Apparently this is impeller noise.) This was most noticeable in the small compartment between the cockpit and the passenger cabin.

Most revolutionary operational feature of the Comet on the ground concerns the extreme simplicity of preflight cockpit checks. Most of the cockpit check is completed on the ramp before the engines are started, thus saving fuel.

The fact that the controls of the Comet are hydraulically operated naturally raises the hydraulic check to first-rate importance. The Comet has three hydraulic systems: 1. The primary system, driven by the outboard engines; 2. The secondary system, running off the inboard engines; 3. An emergency system with an electrically driven pump.

The three systems are checked, then double-checked, before take-off.

At the end of the live runway, the cockpit check is measured in seconds. You taxi directly into take-off position, set the brakes, and advance the throttles to take-off power. Then it's simply a matter of flicking your glance across the panel to ensure that you are getting the required revs from each of the four engines and that the jet pipe temperatures are not excessive. Meantime, the flight engineer checks the fuel flow metres. Then you simply release the brakes and you're off.

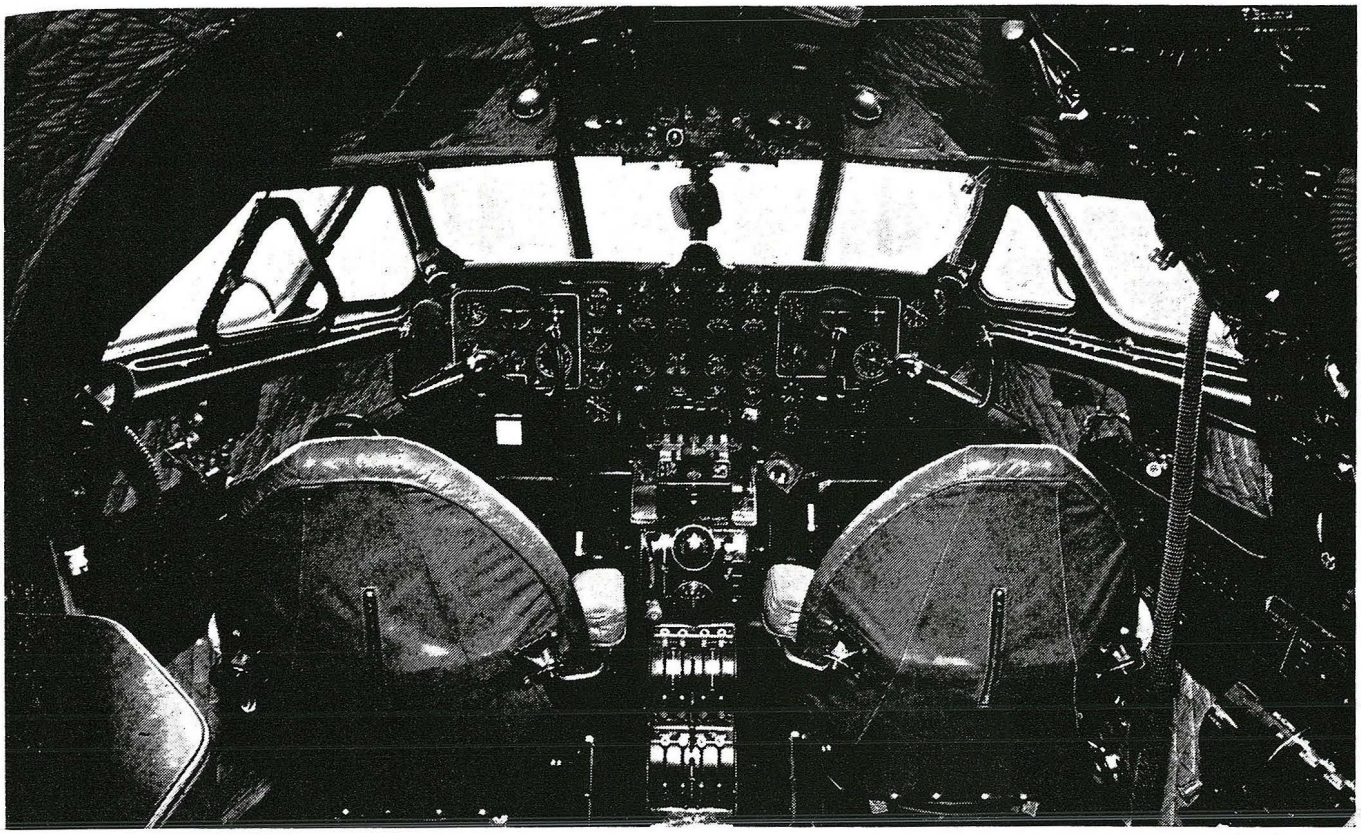
The acceleration was quite rapid and we were off the runway and climbing promptly. Passing over the airport boundary, Cunningham calmly and deliberately closed the port outboard throttle with his feet off the the rudder. There was a barely perceptible swerve and the Comet continued its climb virtually undisturbed.

Flies Like Link Trainer

Most noticeable flying feature, aside from absence of vibration, is the feel, or, more accurately, lack of feel, in the controls. Because they are hydraulically operated, the controls are exceptionally light, especially at low speeds, while even at cruising, the Comet feels more like a Link trainer than a heavy aircraft. Cunningham says the novelty of this feature soon passes and you get accustomed to hydraulic flying.

There has been uninformed talk about 200-knot approach speeds for jet airliners. Actually, the Comet stalling speed is in the 75-knot region. The initial approach is made at 120 mph, comparable with the Constellation, and you come in over the fence at 105 knots. It is advisable to keep a fair degree of power on during the approach for quicker response in case of a balked landing. The actual landing is quite normal in all repects.

Some conception of the cockpit simplicity can be gained from study of the illustration on the opposite page. It can be seen that the panel layout is much less complicated than in the corresponding piston airliner. The flight panels, outlined in white, are conventional, except for the Mach meter which registers the airspeed in relation to the speed of sound. The blank at the bottom of the pilot's in-



ABOVE: The Comet cockpit layout, as described in the accompanying article, is much simpler than the piston airliner.

strument panel is for the Zero Reader which did not happen to be installed in this particular Comet.

The central or engine panel, as can be seen, has four rows of instruments. They are, top to bottom: tachometers; jet pipe temperature indicators; oil pressure and temperature dials; and rear bearing temperature indicators.

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New trend seen at Farnborough

Ottawa to L.A. by Cessna 170

Canadian Aviation

November, 1956 25c

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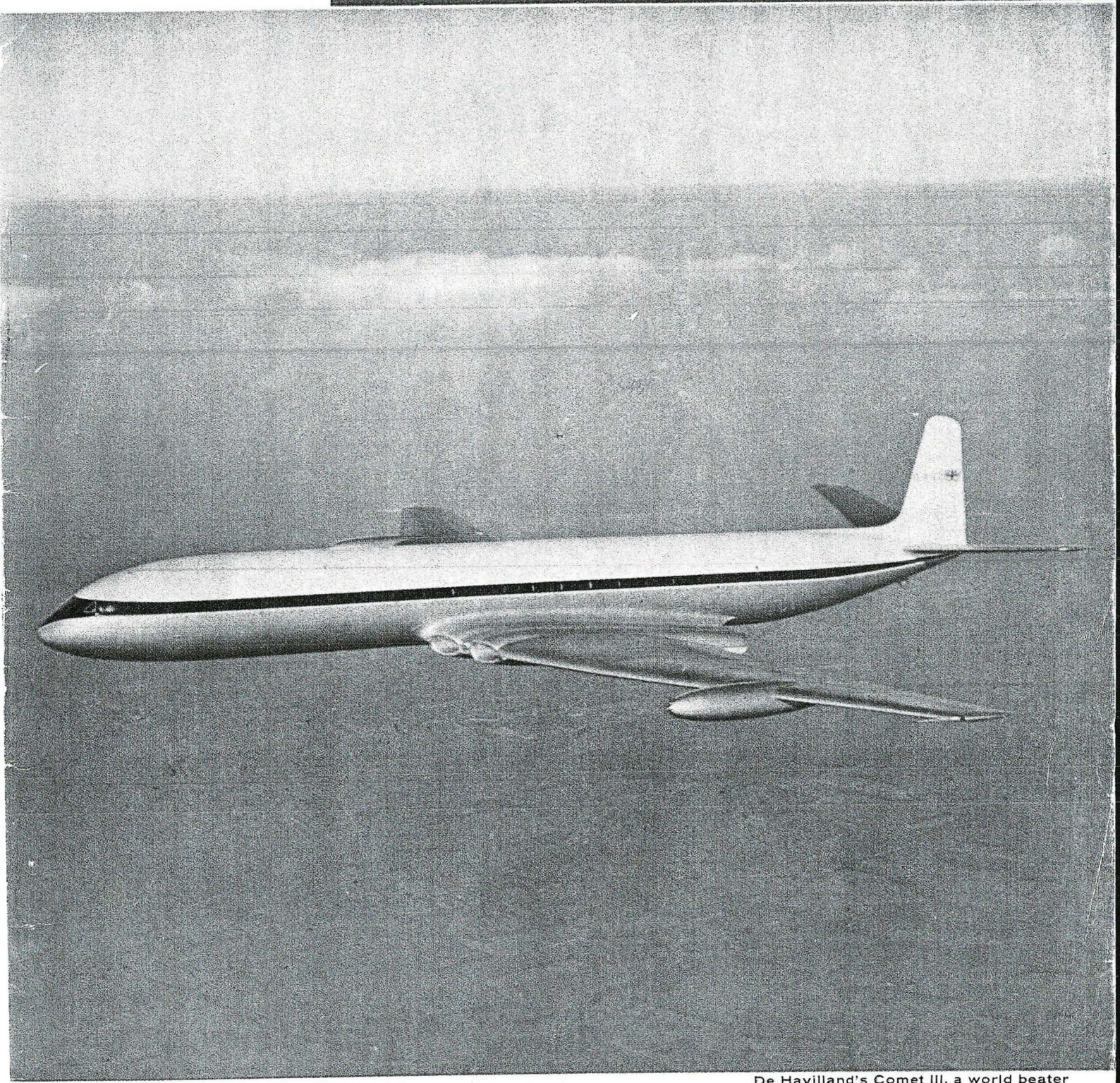
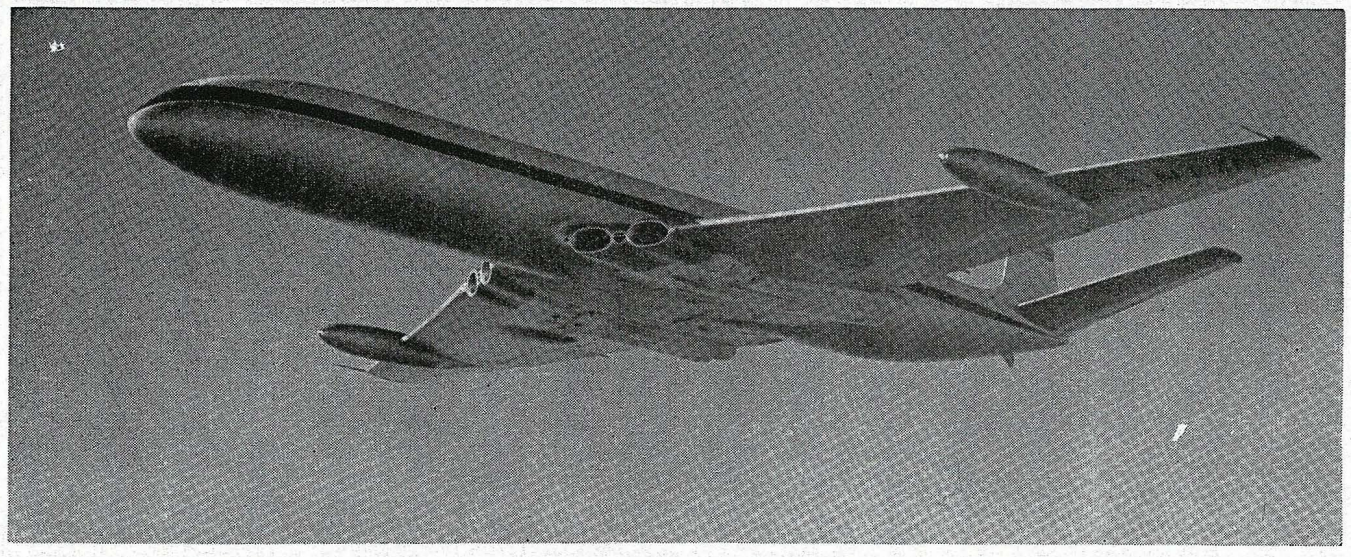


De Havilland's Comet III, a world beater

Wings of Britain

What future for UK industry?



de Havilland's Comet returns

Capital's $53 million order rocked airline world but sparked new confidence in first jet airliner

By Victor Koby

One of the brightest facets of Britain's aviation industry is de Havilland's revival of the Comets after the death dealing blow of disaster. So successful has the revival been that more U. S. airlines are expected to follow Capital in ordering the proven Comet IV.

Only slightly before Farnborough, J. H. Carmichael, Capital Airlines president, shook the airline world with his $53,000,000 order for 10 Comet 4As and four Comet 4s with delivery starting in the last half of 1958 — well ahead of the introduction of U. S. jetliners.

What 4A is. Because of the increasing demand for larger capacity on high density short and medium stage routes the Comet 4A was proposed to meet Capital's particular requirement for a competitive airframe.

The new aircraft is a development of the trunk-route Comet 4 and shares with it the background of design development and flying experience now extending over 7 years. The more important design changes which distinguish the Comet 4A from the Comet 4 — which remains available for the longer-stage routes — are as follows:

- The fuselage has been lengthened by 40 inches. This enables more than 70 people to be carried in a first-class, two abreast configuration and up to 92 people in a tourist class.
- The wing span has been reduced from 115 feet to 108 feet and this coupled with some structural reinforcement of the rear fuselage and tail enables a higher cruising speed to be obtained at lower altitudes. An unusual degree of operational flexibility is claimed together with low direct operating costs over the short and medium stages.

Jet Operations. In order to achieve competitive economy on the short and medium stages with the Comet 4A a special operating technique is employed. Basically this may be summarized as follows: by cruising at a lower altitude the true air speed is increased relative to the limiting mach number.

This increase in speed goes far to compensate for the increased fuel consumption due to the reduced cruising altitude. In addition both the rate of climb and descent are increased, resulting in the maximum possible distance for high-speed level cruise so that the block time is still further reduced.

This operating procedure enables the Comet 4A to cruise at an air speed which varies between 545 m.p.h., according to the ambient temperature, when flying at 23,500 feet. Because of the resulting improvement in block time the Comet 4A achieves better operating economy on stage lengths of 500 statute miles or less. At the upper end of the scale the high-speed cruise procedure shows advantages up to some 2,000 statute miles: for stage lengths above this figure the long-range technique should be used.

Similarly the Comet 4A can, if the need arises, be operated using the normal long-range technique but its longest practical stage length will be somewhat less than that of the Comet 4. The Comet 4 therefore shows to better advantage in its intended role as a world airliner for the main trunk routes, while the Comet 4A with its unusual degree of operational flexibility is the more suitable for the short and medium-stage operation.

The Comet 4A provides seating for up to 92 passengers. Many other variations of cabin layout are possible to meet individual requirements. The maximum payload for the 70-seat version is 19,070 lb. and that for the 92-

seat arrangement is 22,690 lb. With these payloads the Comet 4A, using the high-speed procedure, is capable of maximum stage lengths, in still air with full fuel reserves, of 2,040 statute miles and 1,880 statute miles respectively.

▸ **Engine Development.** As a result of test-bed running of the RA. 29 engine the Rolls Royce Co. is able to confirm the estimated performance data which has been used to calculate the performance of the Comet 4A. Furthermore, Rolls Royce has indicated that an improvement in engine specific consumption may be made available on early production engines; pending further tests however, no credit has been taken for this possible improvement in estimating the aircraft's performance.

The cruising r.p.m. required for operation of the Comet 4A are well below the cruising rating of the RA. 29 even when cruising at the normal operating speed, and this, it's hoped, will have a beneficial effect on the engine overhaul life which Rolls Royce estimates will reach 1,500 hours within three years after the first commercial operation.

The RA. 29 engine will also have a considerable measure of flight experience behind it before the introduction of the aircraft into service. Some 10,000 hours of high utilization flying in the Comet 3 and in the Comet 2 aircraft specially adapted for the purpose, will have been built up under airline conditions.

Metal Fatigue

The structural design of the Comet has been based on recently acquired knowledge of metal fatigue, certain aspects of which were unknown to the world's aircraft engineers until they were brought to light by the Comet accidents of 1954.

Throughout, says de Havilland, the aim has been to employ a new formula of detail design to every component of the airframe to insure a high resistance to fatigue as well as adequate static strength — a much easier requirement to meet. The objective has been to achieve a minimum safe fatigue life well in excess of the useful operational life of the aircraft.

In the fuselage the use of 19 s.w.g.-section skins fulfills the design requirements for the pressure cabin, giving a maximum level of nominal stress of 22% of the ultimate. In addition, however, by carefully grading and reinforcing the structure in the vicinity of the windows, doors and other cut-outs in the fuselage the stress level at these positions — which are the normal sources of fatigue — is further reduced to the point where fatigue cracks are unlikely to form during the operational life of the aircraft, and that if they should occur they would propagate so slowly that they would in no sense be dangerous.

▸ **New Tests:** Tests on components of the Comet fuselage have shown that factors of over six on the life of the aircraft are achieved with no cracking and a further factor of six after cracks have occurred. This fact demonstrates that if the aircraft started its life with a crack near a cut-out, and if the crack was not repaired, the aircraft would still have a life of six times its normal service life.

Throughout the program, says de Havilland, test work proceeded hand-in-hand with the design work and indeed this will continue until the stage is reached where a complete Comet 4 airframe is tested in the water tank at Hatfield.

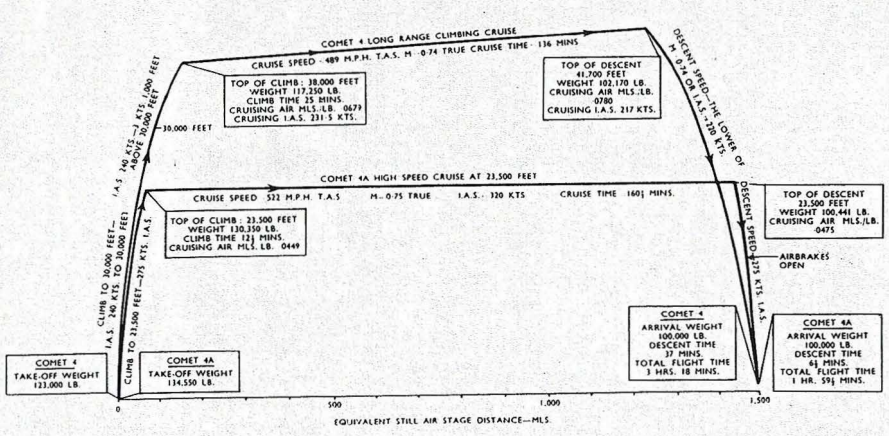
Already the number of individual tests completed runs into many hundreds, one of the latest and most significant being the test of a 29 foot long fuselage section with specimens of every type of cut-out included. This specimen has successfully undergone 85,000 reversals of pressure in the water tank, without a failure of any sort.

CAPITAL COMET. Capital Airlines President J. H. Carmichael's announcement that the carrier had placed a $53,000,000 order for 14 de Havilland Comet airliners advanced the target date for introduction of jet transports in the United States by almost a year. Delivery on the order is scheduled to begin in the latter part of 1958.

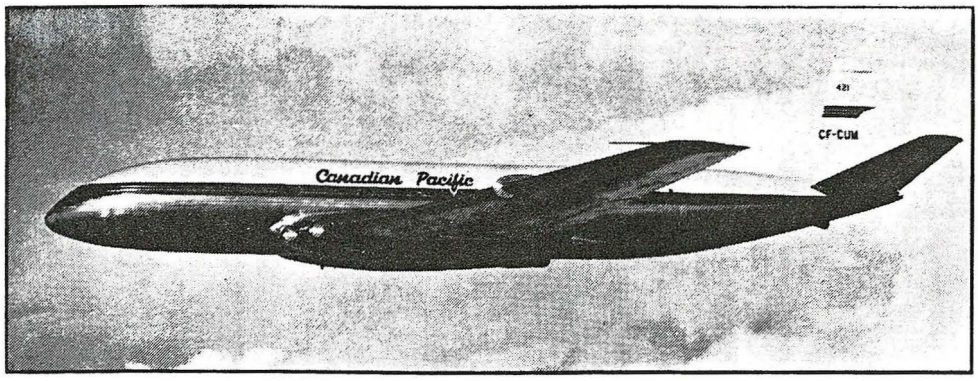
On the basis of each reversal representing a three-hour flight and with the scatter factor of six applied, this represents more than 42,000 hours (or some 14 years) of airline flying. Other large specimens currently undergoing pressure tests under water are a fuselage centre section to which wing loads are applied, and a nose section with canopy. The former is at an early stage of its program and has achieved some 30,000 reversals, while the latter has achieved more than 100,000 reversals.

▸ **Construction.** The Redux method of bonding metal to metal is used extensively in the Comet 4 and 4A, as in the earlier versions and mainly for stringers in the fuselage and in the wings. Experience has shown that the Redux process has excellent properties and indeed its use in the design of the latest Comets would have been more extensive but for the risk of overloading this section of the production capacity. The problem has been to some extent eased by the recently developed process of machining skins from the solid which provides an alternative to built-up Reduxed laminae.

The design of the wing structure of the Comet 4 and 4A remains basically similar to that of the earlier versions and the only significant change is that naturally-aged copper-based light alloys have been used in the tension booms and bottom skin in order to improve the fatigue life. The wing structure and its components, both large and small, have been exhaustively tested both for static strength and fatigue life, with entirely satisfactory results.



SHORT STAGE. The chart above compares operations of the Comet 4 and Comet 4A on a 1,500 mile stage distance.



One of CPA's Comet 1A's, CF-CUM, is shown flying over England in 1952. This was a sister aircraft to CF-CUN, the machine that crashed.

New light on the crash of Comet CF-CUN

MARCH 3, 1953, was a black day for both Canadian Pacific Airlines and The de Havilland Aircraft Co. In the pre-dawn darkness of that day a new CPA Comet, CF-CUN, "Empress of Hawaii", crashed and burned off the end of a runway at Karachi, Pakistan, apparently after failing to become airborne on take-off.

The Comet, a 1A, was the first to be taken over by CPA and was en-route to its new operating base at Sydney, Australia. The accident dashed CPA's hopes of pioneering in the jet transport field. Not only was a valuable aircraft lost, but also several of the company's top operational personnel who together comprised CPA's only aircrew with any commercial jet airliner training.

Placing the Blame: The report on the investigation said that the prescribed take-off technique had not been followed. The nose of the Empress of Hawaii had been lifted too high during the take-off run, resulting in a partially stalled condition and excessive drag.

"This did not permit normal acceleration and prevented the aircraft from becoming airborne within the prescribed distance. The pilot, who had only limited experience in Comet aircraft, elected to take off at night at maximum permissible weight for the prevailing conditions. These circumstances require strict adherence to the prescribed take-off technique, which was not followed."

This report was not universally accepted, pilots' organizations in particular taking strong exception to the verdict of "pilot error". The fact that a BOAC Comet had crashed under similar circumstances — fortunately without loss of life — at Rome about two months prior to the CPA accident, tended to strengthen the pilots' arguments. Gradually, however, the case faded from public memory and was finally overshadowed entirely by the Comet fatigue failure accidents which resulted in the complete withdrawal from service of this pioneer airliner.

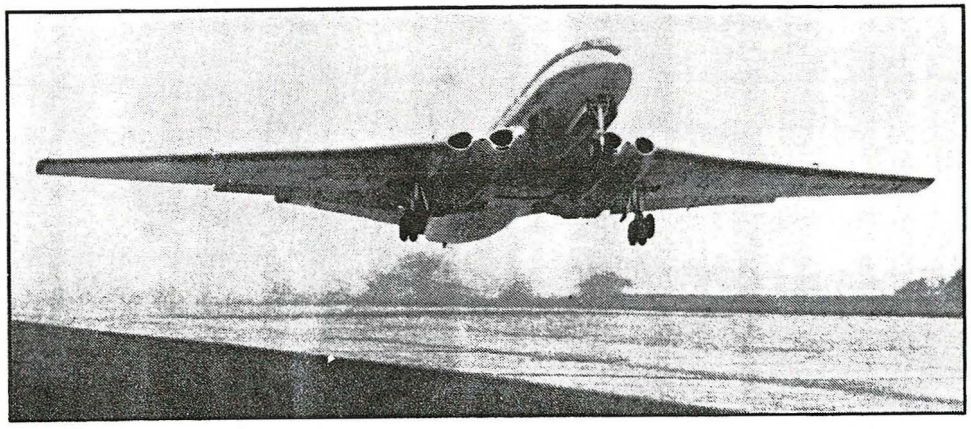
Six Years Later: But it now appears that behind the scenes the fight by the pilots' organizations has for more than six years continued unabated, and not without results. In recent weeks a joint statement throwing new light on both the Rome and the Karachi accidents has been issued by the International Federation of Air Line Pilots' Associations and The de Havilland Aircraft Co.

In essence, the statement indicates that while, technically, the verdict of "pilot error" was probably correct, in actual fact the margin for such error was much smaller than had been originally thought.

The full text of the IFALPA/DH statement follows:

FROM AN early stage in the flight testing of the Comet 1 aircraft, it had been realized by The de Havilland Aircraft Company that, in common with most jet aircraft then flying a large increase in drag and consequent reduced rate of acceleration resulted from a high nose-up attitude during the take-off run, and for some time before this accident all Comet pilots, including the crew of the aircraft involved in this accident, had been taught a technique, adherence to which ensured that the aircraft did not get into this high-drag condition. The technique was described in the Flight Manual in use at the time of this accident as follows:—

(Continued on page 65)



Droop snoot leading edge and extension of upper lip of intakes enabled later Comets to take off safely even with tail bumper dragging.

turbine power next year. If Canadair does get the nod, enough interest may be generated in the 540 that the airliner will become a bread and butter item for the big Montreal aircraft firm. Other interested air lines include a number of South American companies, as well as PWA in Canada.

COMET REPORT

(Continued from page 41)

At all weights and centre of gravity positions the nose-wheel should be raised at a speed of 80 to 85 knots IAS. Having raised the nose-wheel, it is important that the control column be returned forwards without delay to bring the nose-wheel very lightly in contact with the ground, thus avoiding the poor acceleration associated with an unnecessarily nose-high attitude.

When, and not before, the scheduled unstick speed is achieved, the aeroplane should be unstuck by a firm, controlled rearward movement of the control column. Immediately the aeroplane has left the ground the control column should be moved forwards again to check the vertical movement away from the ground and any tendency to pitch nose up; after which climb-away is initiated by a gentle backward movement of the control column when the airspeed indicator reads about 4 knots above the scheduled unstick speed.

A further extensive series of special tests was carried out after the Pakistan enquiry, which confirmed the accuracy of the scheduled performance figures provided the prescribed technique was followed, but revealed a hitherto unrecognized feature that the stalling speed near the ground was higher than the corresponding figure in free air and that this disparity increased as the aircraft weight increased. The safety margin at the highest take-off weights was thus found to be smaller than that indicated by the certification flight trials.

It was found that, at the weight at which the accident occurred, the scheduled unstick speed (122.5 knots EAS) was 5½ knots above the ground stalling speed. However, the Flight Manual technique called for unstick procedure to be initiated at the scheduled speed, and in this technique the speed of the aeroplane rose by a further 3½ knots during the time in which the aeroplane was rocking up to its unstick attitude. The total effective margin was therefore 9 knots at the instant of unstick.

While The de Havilland Company have throughout been satisfied that the techniques which they taught satisfactorily avoided any difficulties inherent in the somewhat narrow margin of speeds, they recognize that the aeroplane had a smaller margin for departures from its prescribed technique than contemporary piston-engined aircraft. They point out, on the other hand, that no practicable increase in unstick speed would have safeguarded the aeroplane, when operating at high weights, against the consequences of departure from the proper technique in lifting the nose early in the take-off run.

This experience of jet aircraft has also been recognized internationally in recent months by proposals for the introduction of new take-off specifications. These state that the elevator control movement to initiate unstick shall not be made at a speed lower than 1.1 times the minimum speed at which the aeroplane can be made to lift off the ground and continue the take-off, without displaying any hazardous characteristics (except that, for aeroplanes where the minimum speed is limited by landing-gear geometry or elevator effectiveness, the factor may be reduced to 1.05).

Although The de Havilland Company were satisfied that, if the recommended take-off drill was followed, the aircraft was perfectly safe on take-off, they decided that, to ensure a much wider margin for error, a modification to the leading edges of the wings of Comet aircraft should be installed. This modification has been incorporated in the Comet IA's which are now flying on military duties and also to all variations of the Comet 2 in service with the RAF.

The Comet 4 now in service has been demonstrated at all weights to be incapable of being stalled even with the tail-bumper in contact with the ground, and to suffer no prolongation of take-off distance when taken off in this attitude.

Coming Events

June 23-25—Aviation Distributors & Manufacturers Assoc. Meeting, St. Francis Hotel, San Francisco, Calif.

July 12—Vancouver International Air Show, Vancouver Airport.

August 8-16—International Aviation & Air Industries Fair, New York Coliseum.

August 15-16 — Grand Western COPA Fly-in, Rocky Mountain House, Alberta.

September 7-13 — 1959 SBAC Flying Display & Exhibition, Farnborough, England.

September 10 — Canadian International Air Show, Exhibition Park, Toronto.

September 12 — IATA Annual General Meeting, Copenhagen, Denmark.

October 5-7—7th Anglo-American Aeronautical Conference, Hotel Astor, New York City.

October 6-8 — Annual Meeting, National Business Aircraft Assoc., Hotel Leamington, Minneapolis, Minn.

October 7-9—IRE Canadian Convention & Exposition, Automotive Bldg., Exhibition Park, Toronto.

October 16 — COPA Annual Convention, St. Jovite, P.Q.

October 26-28—AITA Annual Meeting, Queen Elizabeth Hotel, Montreal.

December 17 — IAS Wright Brothers Lecture, Smithsonian Institution, National History Bldg. Auditorium, Washington, D.C.

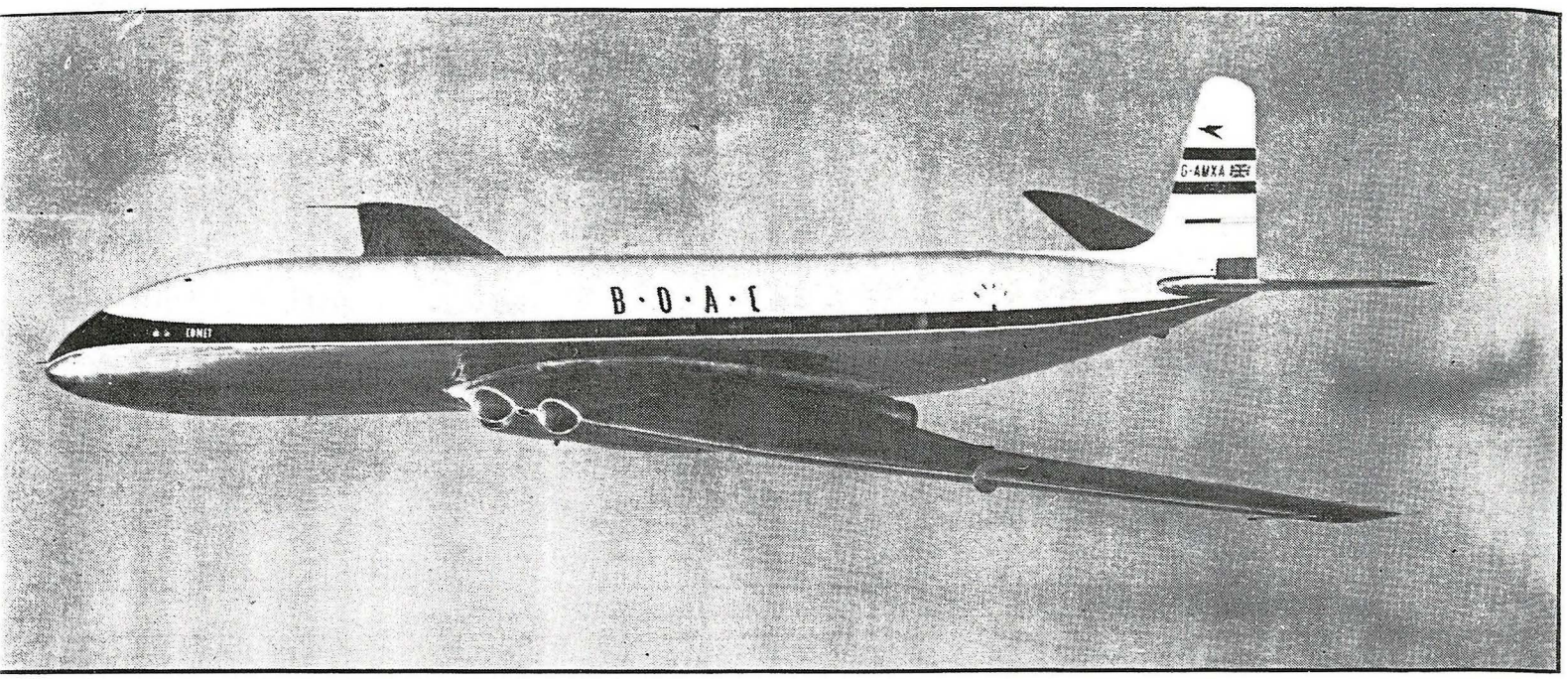
ROTAIRE LIMITED

(Continued from page 38)

copters Ltd., a new subsidiary of Autair Ltd. Pilot and manager of the new company is Vic Pieper (rhymes with sleeper). The company has acquired a heliport site along the Hamilton waterfront, with an office to go with it. At the present time, Pieper is operating a single Bell 47H.

First in Canada: Hamilton Helicopters has been granted a Class 3 charter which makes it the first helicopter company in Canada to offer a point-to-point passenger service. Initially, the company is flying air express and air freight between Hamilton and Malton Airport. This service will operate on a twice per day schedule. Both TCA and American Airlines have expressed interest in the scheme. It has been suggested that a special radio frequency be set up to enable the Hamilton firm to radio ahead information such as parcel weights and passenger baggage to save time at Malton.

Rotaire Ltd., from its new base of operations at Hamilton, will continue to contribute to the success of the helicopter in Canada. Says Art Limmert on this score: "A lot of people once thought the helicopter was going to be an over-night smash hit. This hasn't proved out. But I do sincerely believe that the field is expanding here, and will continue to expand. The helicopter has a long way yet to go before the possibilities are exhausted."



PRELUDE TO THE FUTURE

Some Facts about the Comet

By JAMES HAY STEVENS

Though prepared before the Comet crash at Elba, this article has not been altered in any way as a result. We believe the unfortunate series of Comet accidents will in the long run probably have little effect on the future of this airliner.—Editor.

THE COMET and its commercial possibilities makes one of today's most controversial aviation subjects. Despite the fact that it was not only the first pure-jet airliner to go into service but the very first operational gas turbine transport airplane, it has been the subject of much, and continued criticism. These attacks have come not only from the U.S.—where sour grapes could be expected to be having an effect — but also from authorities within the U.K.

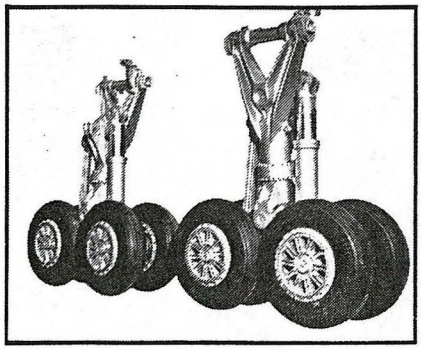
Admittedly, the margin for profit caused by the high fuel consumption of turbojet engines is small*, but the attractions of Comet travel have proved so great that BOAC Comets are still running almost to capacity after nearly eighteen months during which the sales value of sheer novelty might have been expected to wear off. Further faith in the Comet has been shown by BOAC in the ordering of the Series 2 and the Series 3.

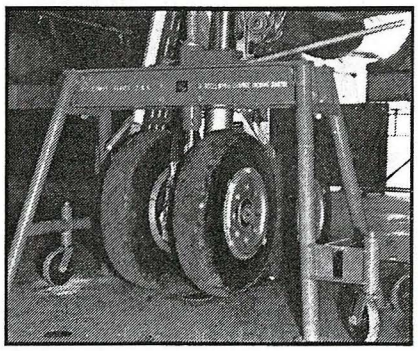
BOAC has said that the Comet has given far less trouble and been much more reliable than any other new type going into service—Air France and UAT enthusiastically confirm this. This is due in part to the simplicity and dependability of the turbojets, DH Ghosts in the Series 1, and in part to the very careful design for maintenance put into the airplane by de Havilland.

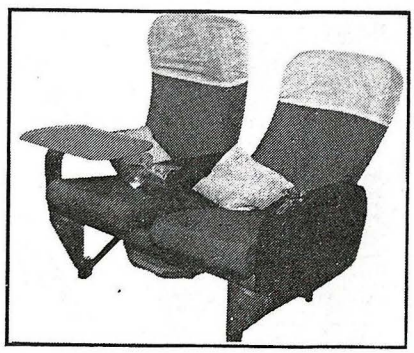
The Comet as a Design: Unfortunately, although the Comet is now in regular use with several customers — BOAC, the RCAF, Air France and Union Maritime de Transport (UAT) —the company does not favour general disclosure of the engineering design

**It is not so much the m.p.g., as the high proportion of reserves for low-level diversion that is the trouble.*

Top is the first production Comet 2. Below, L, the complete bogie undercarriage; centre, gantry used to lift main undercarriage to change wheels; R, new lightweight seat designed for Comet by DH and mentioned in article.







in detail, nor does it vouchsafe performance data in the accepted sense.

The Comet owes its origin to the Brabazon Committee of 1943, which was set up to plan Great Britain's post-war airline fleet at a time when the Allied agreement had relegated all transport production to the U.S. De Havilland was entrusted with the Brabazon 4, a pure jet project to be capable of flying the Atlantic with six passengers and 1,000 lb. of mail. Before the present layout was decided upon, a Vampire-like twin-boom design with three Goblins in the rear of the fuselage, a tailless type, several conventional and even one canard design were investigated.

No End to It: The tailless formula was that most favoured at first and the DH 108 was built to investigate its possibilities. This proved that although reduced drag gained 50 mph., the low lift coefficient and awkward landing technique put it out of court. At about the same time the six passenger scheme was dropped in favor of a more practical forty-seater—an important change since the airplane was to be ordered off the drawing board.

To keep down drag at high Mach numbers the final Comet design was given a 25 deg. wing sweep (on the quarter chord line) and a symmetrical airfoil only 11 per cent thick. It is important here to point out a curious anomaly in Comet performance. Although it covers the ground very rapidly, it is not a fast airplane!

The Comet is cruised at a TAS of about 425 kts. at a height of between 30,000 and 40,000 ft., which represents only 210 to 240 kts. IAS. In fact the *indicated* air speed of the Series 1 seldom exceeds 230 kts. under any conditions, which means that airframe loads are very reasonable. In terms of Mach number, the cruising speed is between .70 and .75 which is not excessive and the combination of sweepback and thin wing have effectively delayed compressibility effects.

The Take-Off Story: However, one original design feature adopted to improve high-speed behaviour and performance has given considerable trouble. The German high-speed research revealed by the end of the War was impressively ahead of that of the Allies. A particular feature was the use of thin symmetrical low-drag airfoils, one of which was adopted for the Comet — which, C. T. Wilkins, DH Assistant Chief Designer, told me must be making Hitler's ghost laugh.

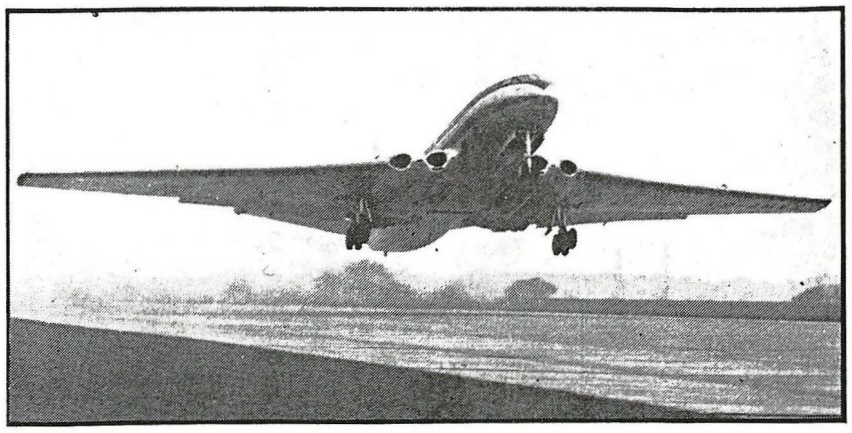
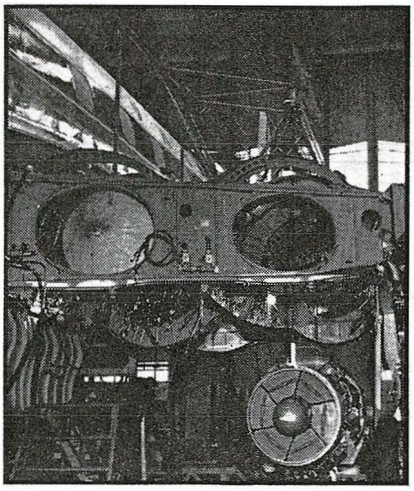


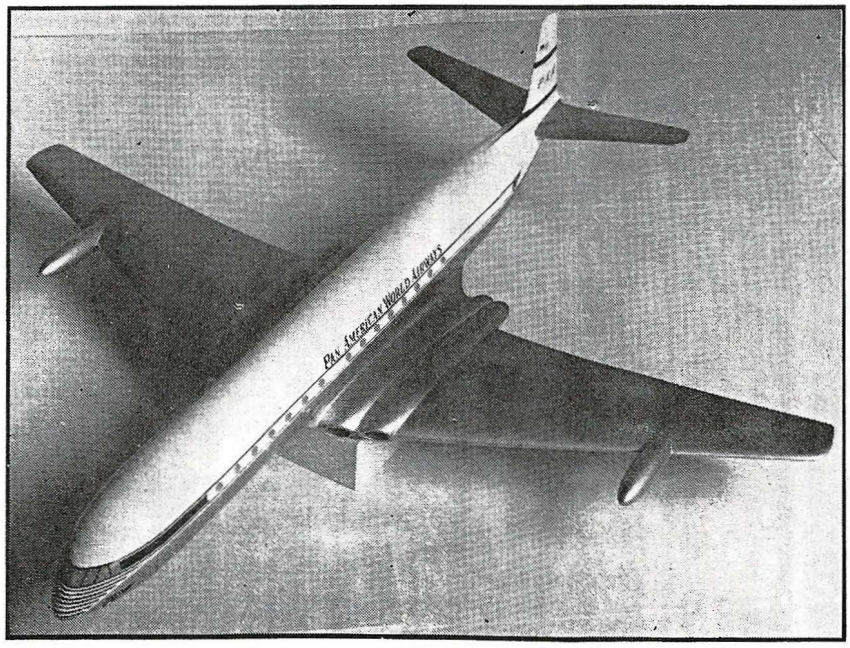
Photo shows how new droop snoot allows Comet take-off at full incidence. Note tail bumper is as low as main wheels. Below is shown method of lowering Avon from its mounting in a Comet 2. Same type of gantry is used in de Havilland factory, as well as by BOAC.



Below is a model of the Comet 3, showing the proboscis wing tanks and the filled-in trailing edge, which increases wing area slightly.

Symmetrical airfoils have very poor C_L at high incidence and it is this which led to the Comet take-off accidents at Rome and Karachi. If the nose is lifted too high the wing remains stalled no matter how fast the airplane is travelling. With the proper take-off drill this is not dangerous, but the correct drill necessitates holding the take-off angle very precisely within 1½ degrees of the optimum position. The necessity for such precision was obviously undesirable and de Havilland set to work to overcome the trouble at source — meanwhile resisting pressure to install take-off angle indicators, etc.

R. E. Bishop and C. T. Wilkins realized that the fault lay with the symmetrical airfoil; an appalling modification prospect! They decided that any alteration must be effected ahead of the front spar, on the de-



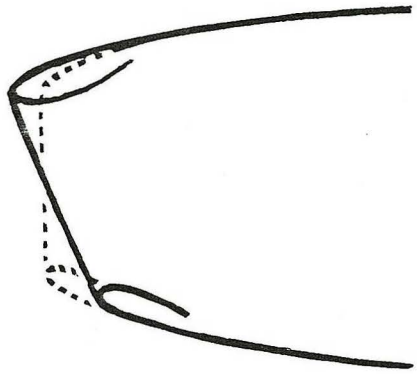


Fig. 2, at right shows Comet 2 engine intake lip change, old shape being shown by dotted line. Fig. 1, above, shows "droop-snoot" leading edge, standard on all Comet 2's, and available in modification kit form for earlier series. With this modification, Comets can take off at angles of attack steep enough to drag tail bumper.

tachable leading-edge section, a secondary structure. A "dewdrop" addition was evolved which doubled the leading-edge radius, Fig. 1, so stabilizing the stagnation point and allowing the wing to reach higher angles of attack without stalling. Tested on the Comet I prototype the new leading edge was found to be completely successful and it has reduced the stall by 6 or 7 kts. and at the same time added 2,000 or 3,000 lb. to the payload. It is also a gain without loss, since there is no measurable increase in drag or reduction in cruising speed.

This leading edge is being made available as a conversion kit for all Comet operators.

Modified intakes: There is a curious by-product of the change to the wing. The Comet 2, which, to increase its range, is fitted with axial-flow Rolls-Royce Avons, ran into trouble as a result of the increased angle of attack. The centrifugal Ghost is unaffected by wing incidence and consequent changes of airflow into the intake, but axials are very sensitive to such alterations. Uneven flow into an intake can set up asymmetric blade stall in about the fourth compressor stage and this may lead to resonance and even blade failure. To avoid this risk, the Comet 2 intakes (Fig. 2) have had their lower lips curtailed and the upper ones extended by six inches — giving a result akin to the snout of the Sabre.

The structure of the Comet is in general a development of current practice. A very bold step was taken, however, with the use of Redux bonding for the attachment of skin stiffeners. The advantages of this were several: lightness because of the continuous joints possible and the thinner more stable V sections that replace the usual Z and L stiffeners: improved sealing for the pressure cabin and the all-important integral wing tanks: simple and rapid production with reduced manhours.

COMET DATA

Series	1	1A	2	3
Span		— 115 ft. 0 in. —		
Length	93 ft. 0 in.	93 ft. 0 in.	96 ft. 0 in.	111 ft. 6 in.
Height		— 28 ft. 5 in. —		
Tail span	42 ft. 8 in.	42 ft. 8 in.	42 ft. 8 in.	47 ft. 5 in.
Wing area, gross	2,015 sq. ft.	2,015 sq. ft.	2,015 sq. ft.	——
Engines	Ghost 50	Ghost 50 (M/W)	Avon RA9	Avon RA16
Capacity	5,000 lb. s.t.	5,000 lb. s.t	7,000 lb. s.t.	10,000 lb. s.t.
Payload	12,500 lb.	12,670 lb.	13,500 lb.	17,365-20,000 lb.
Gross weight	105,000 lb.	115,000 lb	120,000 lb.	145,000 lb.
Seating	36	44	44	58-76 (coach)
Cruise	460 m.p.h.	460 m.p.h.	480 m.p.h.	500 m.p.h.
Stage	— 1,500-1,750 miles —		2,000 miles	2,500 miles

riding in the comet

TRAVELLING by Comet is an experience. Much has been written about jet travel, so this is just a note on the main impressions.

The flight plan, Fig. 3, is very different from that of any piston-engined airliner. The emphasis is upon climbing rapidly to the stratosphere, after which there is a gentle climb with reduction in load, followed by a steep letdown — usually with inner engines throttled and outers at fairly high rpm.

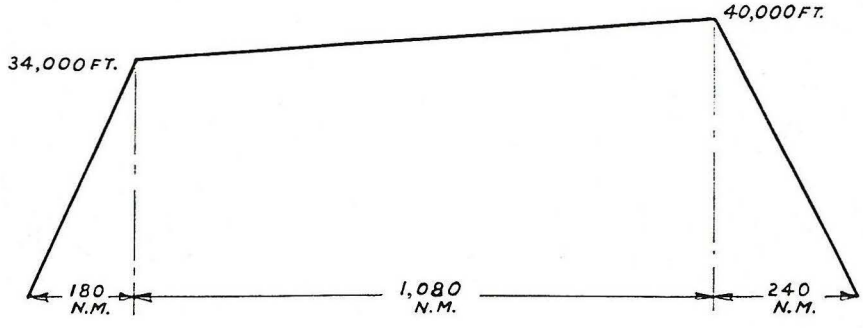
When starting, the pilot calls the tower, giving an estimated time to take-off and only when the tower gives him clearance on this estimate does he start his engines. Idling and taxiing uses a great deal of fuel, equivalent to one passenger and baggage in ten minutes.

As a passenger, one scarcely notices the starting of the engines above the sound of the starter motors and the inverters, and as one after another engine cuts in there is no noticeable change in the sound or the very faint high-frequency vibration. The Comet is taxied out fast, lined up on the runway and revved up on the brakes to full power. With release of the brakes there is a surge forward and acceleration is quite rapid to take-off speed— the bogey undercarriage making a rapid pit-a-pat vibration on the runway segments.

After unsticking, there is the normal holding down to safety speed, then it is allowed to build up to the optimum climb value and the thousand feet a minute ascent to the tropopause is begun — unless ATC requires a delayed climb. Low level flight has, of course, a drastic effect on fuel consumption.

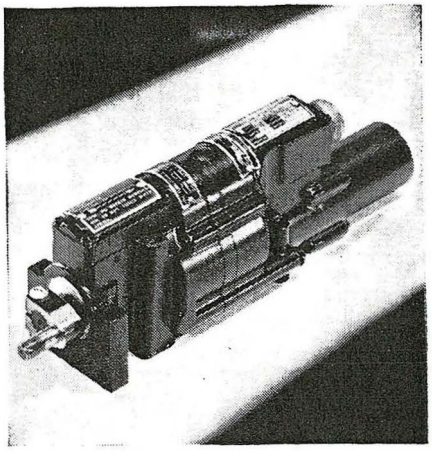
[illegible] page 54

Fig. 3: Comet 1 flight plan for stage of 1,500 nautical miles. In cruising flight, incidence is quite high, about 3°, giving the gentle climb to 40,000 ft. as weight falls with fuel consumption.



Trim Trol®

has been around
(and still is!)



Trim Trol was developed in 1947 to actuate trim tabs in the prototype Grumman Albatross. This actuator proved as rugged as the new amphibian, functioned perfectly despite prolonged exposure to salt water. Soon afterward, McDonnell selected Trim Trol for the original Banshee. It has been used in every model of the series.

The same basic model continues to satisfy all demands, although aircraft design has changed radically. Trim Trol is now specified equipment in the Chance-Vought Cutlass, the Douglas Skyknight and A3D.

Meeting the requirements of MIL-A-8064 (USAF), it weighs 3½ lb., has ultimate static capacity of 2000 lb. in., and produces 300 lb. in. operating torque through 160 degrees.

The story of Trim Trol is only one example of Airborne's pioneering in the actuator field. As the evolution of aircraft design poses new problems, look to Airborne for the solutions. For more information on Trim Trol, and other actuators, see our literature in the I.A.S. Catalog.

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COMING EVENTS

February 22-23—Third Annual Texas Agricultural Aviation Conference and Short Course on Pest Control, College Station, Texas.

March 3—AITA Standards Coordination Committee, Chateau Laurier, Ottawa.

March 15-19—National Association of Corrosion Engineers' 10th Annual Conference and Exhibition, Kansas City.

April 12-13—AITA Semi-Annual Meeting, Empress Hotel, Victoria.

May 5-7—Welding & Allied Industry Exposition, Memorial Auditorium, Buffalo, N.Y.

May 5-7—Third International Aviation Trade Show, sponsored by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 12-14—Engineering Institute of Canada, annual meeting, Quebec, P.Q.

May 17-18—RCAF Association Annual Convention, Ottawa.

May 17-20—Basic Materials Exposition, & Conference, International Amphitheatre, Chicago.

May 31-June 11—Canadian International Trade Fair, Toronto.

June 12—National Air Show, Toronto.

June 21-23—Midyear Meeting, Aviation Distributors & Manufacturers Association, Stanley Hotel, Estes Park, Colorado.

June 21-24—IAS Annual Summer Meeting, IAS Building, Los Angeles.

August 9-11—IAS Sponsored Turbine-Powered Air Transportation Meeting, Seattle, Washington.

managed by M. J. Wadsworth, a senior member of Vickers technical staff. Purpose of this special office is to assist TCA in the introduction to its routes of the Viscount later this year. The first of TCA's fleet of 15 Viscounts is due for delivery in August or September.

In addition to Mr. Wadsworth, the Montreal office will have two service engineers.

A $100,000 stock of spares is being established at TCA's Winnipeg overhaul base so as to give the air line an "over-the-counter" spares service, particularly of heavy items which would otherwise take some time to ship from Britain.

NRC in 1953

The National Research Council's annual review of its activities says that during 1953, the Council's Division of Mechanical Engineering:

- Successfully operated a high speed wind tunnel through the trans-sonic speed range.
- Established a flight research section at Uplands.
- Developed a turbojet engine reheat system.
- Tested jet engines under simulated icing conditions.
- Studied the possibility of using cheap bunker "C" fuel oil in gas turbines.
- Carried out experimental work designed to improve performance of aircraft gas turbines including afterburners.
- Used spark photographic technique to study specialized use of liquid sprays in cooling turbine blades operated under extreme conditions.
- Developed a potentiometric method that is better than the usual colorimetric method for the determination of mercaptan sulphur in jet fuels.
- Established permissible limits for contamination of aircraft gasoline with jet fuels.
- Studied storage stability of aircraft fuels.
- Flight tested the CF-100 equipped with icing protection; and developed an automatic recorder to measure icing in civil transports.
- Developed a simple theory of swept wing deformation and applied mathematical methods of analysis to determine modes and frequency of vibration in swept wings; tested wings and spars for fatigue life; investigated aircraft cockpit canopy life; completed development of equipment for testing high pressure hydraulic hose.
- Developed automatic de-icing controls, flight test instruments, and rate-of-icing meters.
- Designed a variable nozzle for jet engines fitted with reheat.

COMET

(Continued from page 14)

What do You Hear: The Comet is well soundproofed and it is only at take-off, when the Ghosts are giving their aggregate 20,000 lb. static thrust that engine noise really penetrates to the cabin. Noise is roughly proportional to thrust and when cruising at 40,000 ft. the net thrust is only 1,300 lb. per engine, which produces little more than a sound of rushing air. Incidentally, under those conditions the engines are consuming some 2½ tons of fuel an hour. *Aft* of the jet pipes, noise is very fierce and there is little encouragement to stay in the toilet or vestibule. In this area also there are high-frequency vibrations caused by the efflux noise which require the structure to be specially stiffened.

In temperate climates the Comet is usually above the weather, although occasionally cu-nim reaches above 40,000 ft. and has to be avoided. At the tropopause there is almost always turbulence, which comes queerly from a bright blue sky, and is caused by a temperature inversion.

The pilot has to select his cruise height primarily by temperature and it is usually better to fly high (and cold) into a head wind than descend to avoid it. The passenger, who surprisingly finds little difference in the

appearance of the ground from 40,000 ft. compared with 20,000 ft., apart from the vast area to be seen—if the clouds permit—finds the Comet amazingly smooth and peaceful. Pressurization is excellent and heating and air conditioning, despite the completely dry outside air, are near perfection. If he is lucky the passenger may see a sister Comet laying a contrail, but he cannot see if his own ship is making one.

Going Down: The descent is steep by piston-engined standards. A stand-off or diversion is best held at 40,000 ft. but a delayed let-down in thousand foot stages is reasonably economical—in fact it is better unless holding is done above 25,000 ft. because of the reduction in fuel consumption with each drop.

During the let down the pilot uses the perforated air brakes that lift out of the upper and lower wing surfaces. These brakes allow a descent of 3,000 ft./min. without any speed build-up. The deceleration when they are extended and acceleration as they are retracted is very marked. There is also quite noticeable buffeting when the brakes are in use.

Because of its high fuel consumption, the Comet lands light—at take-off for maximum range, fuel represents nearly 50% of the gross weight. Captain A. M. A. Majendie, formerly of BOAC, has said that the Comet is easier to fly and simpler to handle than any piston-engined airliner. In particular, the low landing weight makes this operation a pleasant one.

The Rest of the Series: So far, I have been dealing with the Comet I as she is to be met in service on the routes of BOAC, UAT, and Air France, or with the RCAF. This is the early, and more or less tryout version. It is the Comet 2, and even more the Series 3, that is really going to put the jet airliner on the air route map.

For all the talk of the rival merits of the turboprop, there is no wavering in the de Havilland faith in the pure jet. The need for extra power and improved fuel economy to increase range and payload have necessitated changing from centrifugal to axial engines. The Series 2 has the Avon RA9, the Series 3 the RA16 of 10,000 lb. st. th. The next stage, according to Frank Lloyd, Comet Sales Manager, will almost certainly be the Rolls-Royce Conway by-pass turbojet.

Briefly the Comets can be summarized as follows:—

The Series 1A has Ghosts with water methanol injection to restore power above the critical ICAN+15 (113 deg. F.). The fuel capacity has been increased from 6,000 to 7,000 Imp. gals. and there are eight extra seats. This is the version supplied to Air France, UAT, and the RCAF.

The Series 2 has an extra three feet of fuselage ahead of the wing and the axial-flow engines. This is the second stage workhorse for jet flying the airways. Extra power gives slightly faster cruising and the increased range makes possible the South Atlantic crossing.

The Series 3 has been largely redesigned, with an extra 18 feet 6 inches in the fuselage. The wing area has been slightly increased by filling in the kink in the trailing edge. Proboscis tanks on the wings give an increase in fuel capacity to 8,000 Imp. gals. The wing section has a fully modified leading edge with the concavity in the lower surface more completely faired than in the modified Series 1 and 2 wings. The tail pipes of the jets are slightly lengthened. Oval windows provide lighter and stronger sealing than earlier rectangular ones—cabin differential is better than the original 8,000 ft. at 40,000 ft.

The prototype Comet 3 is well ahead in the Hatfield experimental shop and is scheduled to fly before midsummer.

latest news

IN ADDITION to the main changes in the Comet, there have been various small modifications to reduce structure and equipment weights. For instance, there is a new undercarriage forging that is stronger and lighter. Dunlop Maxaret brakes and new suction-tread tires have overcome the braking problem—in particular the non-skid properties are expected to cope completely with icy runways. Frank Lloyd expects that after full trials it will be found that landing distance will be reduced by 30%.

De Havilland test pilots are regularly using braking parachutes at Hatfield. The company wants to standardize on these for emergency braking on short runways or after a late touchdown. The anticipated crosswind weather-cocking has not materialized, since there is sufficient thrust from the jets to keep the chutes straight. There is, however, the fact that should a swing start the engines are too close-set to give a correcting moment on an icy runway.

When calling on C. T. Wilkins, I was impressed by a twin seat resting on a parcel scale registering 41 lb. This seat (Fig. 4) proved to be the newest DH effort to save weight. The production version is expected to weigh about 45 lb., certainly under 50 lb., which compares with 95 lb. for the present seats. It is stressed to 9g and under test the fastening pips held, failure occurring by buckling of the diagonal bracing struts—an important feature since it prevents the "dominoing" that occurs if a rear seat pulls away from the floor.

Novel features of this seat include a litter box and table stowage under the bench. The dividing arm rest collapses downward at a touch, which is more convenient than removing it. The seat strap buckles stow under the central armrest, leaving the seat free, which is not only more convenient to everyone, but obviates the unfortunate incident, rare but recurrent, of heavy passengers rupturing a rectum by sitting hard on the buckle. The seat back is arranged to fold forward at a push to save head injuries to the passenger behind. Standard 37½ inch rail mounting, with one inch pitch adjustment, is used.

Three Lines: Comet production lines are now in existence at Hatfield and Chester and at Short Brothers & Harland Ltd. at Belfast. In the middle of January there were fourteen on the line at Hatfield, with three on test—number 37 fuselage was being assembled. At Chester there were three and at Belfast two airplanes in the later stages of assembly, with flights expected in the late summer. At the same date a total of 66 Comets had been sold, with negotiations in hand bringing the figure up to a hundred.

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AIR LINE TRENDS

Inauguration

On August 4, CPA made the inaugural flight of its new Toronto-Rouyn-Noranda service, which is an extension of the service it has been operating between Montreal and Rouyn-Noranda via Val d'Or. The flights are being operated on a single round trip daily basis, with the point of origin being Montreal and the turnaround point being Toronto. The service will also touch at Earlton, Ontario, when the airport there is ready for use.

The DC-3 will leave Montreal at 8 am (all times EST) arriving at Val d'Or at 9:50 am; leave Val d'Or at 10:05 am, arriving at Rouyn-Noranda at 10:35 am; leave Rouyn-Noranda at 10:55 am, arriving at Toronto at 1:15 pm. Departure for the return trip will be made from Toronto at 1:45 pm, arriving at Rouyn-Noranda at 4:15 pm; leave Rouyn-Noranda at 4:30 pm, arriving at Val d'Or at 5:00 pm; leave Val d'Or at 5:15 pm, arriving at Montreal at 7:05 pm.

Turboprops for TCA

The next major step TCA takes in increasing its fleet of aircraft will probably involve the purchase of turboprop powered airliners, President G. R. McGregor told newsmen while on a recent tour of TCA-served points in western Canada. He mentioned the Bristol 175 (Britannia), and the Vickers Viscount specifically, though he intimated that there was little hope of getting these aircraft for some time to come by saying that it would be highly acceptable if British production could keep pace with their remarkable designing skills.

Colonial & Eastern

The board of directors of Colonial Airlines recently voted to accept the bid of Eastern Air Lines to buy all of Colonial's assets by an exchange of stock in the ratio of two Eastern for every three Colonial. This means that Colonial will be getting approximately $8,000,000 for listed assets which at the end of 1951 were valued at only $3,755,996.

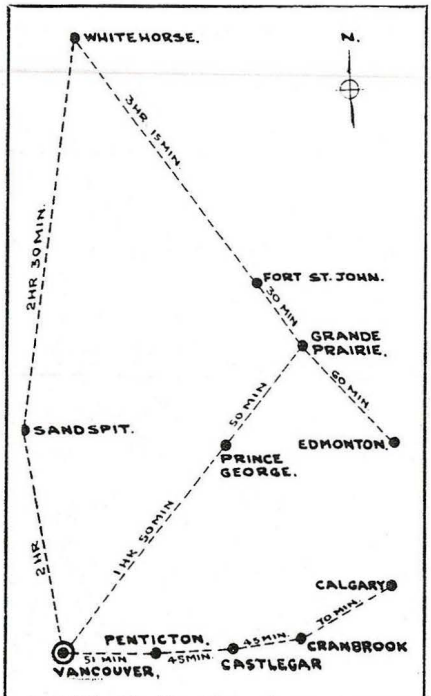
The sale is still subject to the approval of the CAB and the stockholders of both companies. An earlier proposed merger of Colonial and National Airlines was practically sponsored by the CAB, but the stockholders of Colonial gave it the thumbs down. Shortly after this plan was defeated, the company was put up on the block and an invitation was sent to ten other air lines to make bids. Eastern's was accepted as being the most favorable.

Approval of the sale by the stockholders of Colonial is almost certain because a committee of stockholders (which was largely responsible for the defeat of the National deal) has already voiced its approval publicly. Colonial stockholders are to meet to vote on the move this month. It is expected that Eastern stockholders will hold a similar meeting a short time later.

Rising Comet

There's lots of news about Comet operation coming out of BOAC's London headquarters these days, and so far it is all good.

From the time the Comet first flew, right up till the moment it took off on its initial flight in regular service between the U.K. and South Africa, every aviation prophet existent has felt compelled to make the gloomy prediction that operating costs would be so high that a jet airliner service couldn't possibly make money with types of aircraft presently available. As recently as the beginning of August, Admiral



FLIGHT PLAN: The above diagram shows the CPA routes eventually to be served by the new Convair 240's being bought by the air line. Delivery is expected by January of next year.

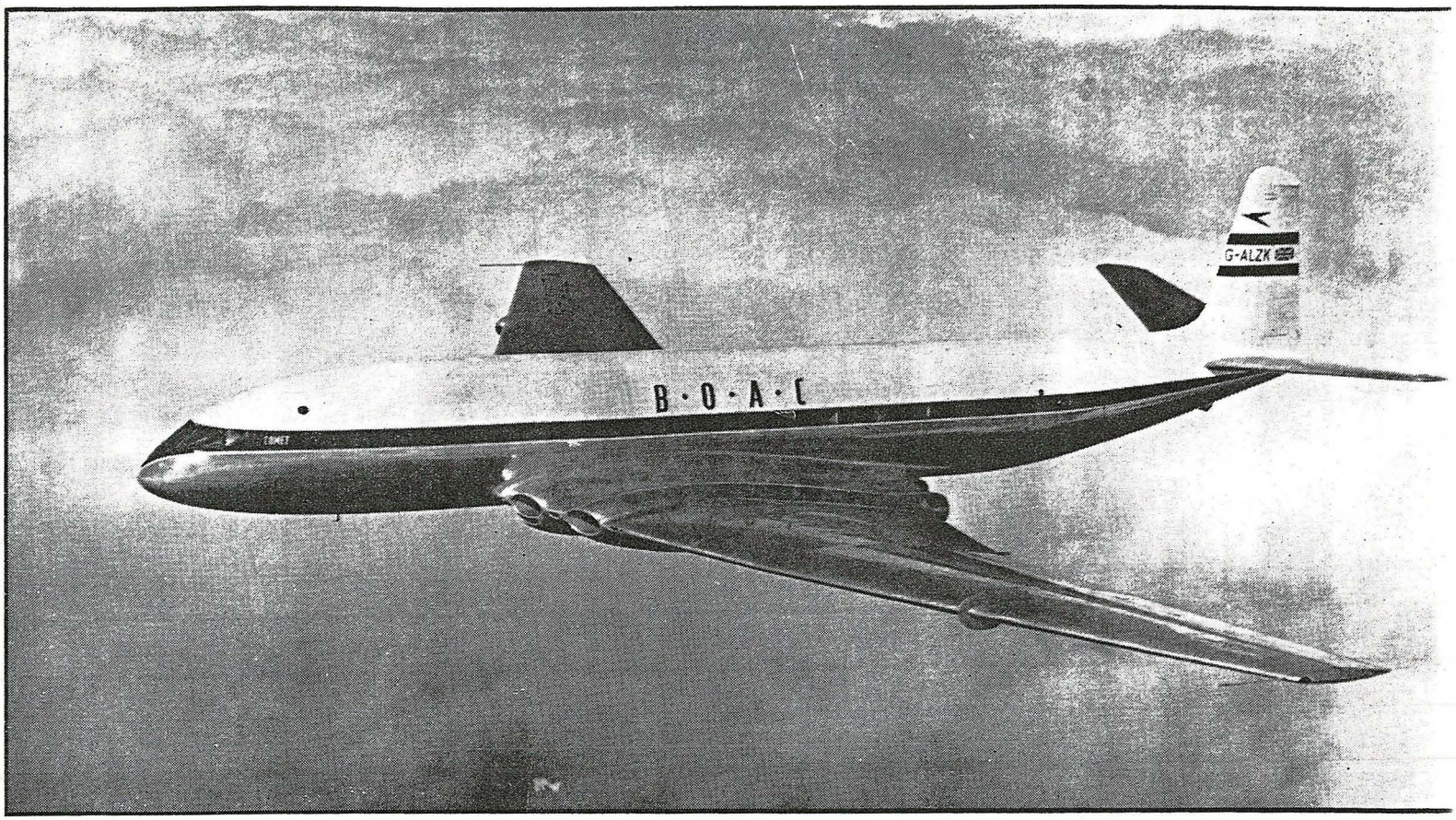
De Witt C. Ramsey, USN (Retd.), president of the Aircraft Industries Association of America, did a little whistling in the wind and came up with the encouraging-to-Americans opinion that the present situation "simply boils down to the fact that the British are way ahead of us—in what is now, and will remain for some time, a losing game."

He explained this statement by saying that it is costing BOAC "twice as much to operate their Comet . . . than they can possibly earn with it—unless they see fit to double their prices." His conclusion: That it is silly for operators to buy jet transports until the engine manufacturers have developed a jet power plant that will give a plane/mile operating cost comparable to the present achievement of reciprocating engine transports.

But the edge had been taken off Admiral Ramsey's statement even before he made it. Just the day previous. BOAC Chairman Sir Miles Thomas had announced that the Comet service from London to Johannesburg had made a profit from the word "go". In the first month of operation (May), this service showed a profit of over $8,000; this when there was only one flight a week operating . . . now there are three. Said Sir. Miles: "Very encouraging. This $8,000 is only a beginning. It is small. But not many air services show a profit right away. Some people said the jet would lose money because of high fuel consumption. This is their answer."

And from a man even more intimately connected with the technical details of jet airliner operation, BOAC Captain A. M. A. Majendie (one of the two pilots who planned the introduction of the Comet into service and flew the early trials) comes word that he has never found it necessary to modify early expectations about jet operation, except in minor details to the jet's advantage. Captain Majendie says that the turbojet airliner has proved simpler to operate than piston-engine types, and that where scope for improvements exists, it lies not with the airliner at all, but outside it—with meteorological services and ground and and traffic procedures. Said he: "I would be very loath to have to return to a piston-engined type."

Last month BOAC started once weekly Comet service between London and Colombo, Ceylon, and return. In



WITH GHOSTS THAT FLY

The Comets Are Coming

If I had the wings of a Comet,
Far, far, far away would I fly,
I would fly to the land of Mahomet,
*And buy me a harem, and die.**

THE YEAR 1952 will see the introduction of de Havilland Series I Comets into service with Canadian Pacific Airlines and the RCAF, although only the latter will be operating its jet transports from bases within the Dominion's boundaries. CPA has had its Comets on order since December of 1949, but the RCAF, which will be the first military service anywhere in the world to operate jet transports, made public its decision to acquire two of the aircraft only late in November.

Now, more than two years the first flight of the prototype Comet on July 27, 1949, de Havilland has orders or indications of intention to buy, for 29 Series I machines. Series I, incidentally, are those models powered by the de Havilland Ghost. The Series II aircraft will have four Rolls-Royce Avons, giving them a somewhat increased range.

Firm Orders: Companies and governments having placed firm orders with the de Havilland Enterprise are—besides CPA and the RCAF — British Overseas Airways Corporation (14), the British Ministry of Supply, (2), Air France (3), and Union Aéromaritime de Transport (3). In South America, the Brazilian air line, Panair do Brasil, has indicated that it intends to buy two. An American firm, Overseas National Airways, also wanted recently to buy two Series I Comets for non-scheduled operation in the U.S. However, difficulties in obtaining an American C of A for an aircraft which still lacks a British certificate, plus the reported reluctance of de Havilland to introduce Series I models into the U.S. (the same reports indicated that the company wishes to make its bid for U.S. customers with the Series II), have eliminated the possibilities of a sale in the U.S. for the time being.

Though definite routes for all their Comets have yet to be announced by BOAC and Air France, it would appear that once all the aircraft currently on order get into operation, they will be flying in most parts of the world.

BOAC, it would seem, will first operate Comets on its London-Rome-Cairo service. It is also reported to be contemplating the New York-Bermuda run as a fertile route for the jets. This air line has had a Comet on loan since April 2 of 1951 and has been engaged in flying it over various routes, thus gaining considerable operating experience under a variety of conditions and simultaneously carrying out crew training. By October 12, 445 hours had been logged by BOAC in this manner. These represented in part eleven overseas flights which covered 80,000 miles. One of the more recent ones was the 7,748 miles from London to Singapore via Cairo, Karachi, and Bangkok, which took 19 hours 8 minutes of flying time. Even with 5 hours 27 minutes having been spent on the ground at various stops, the total elapsed time en route from departure point to destination was only 24 hours 35 minutes. Another lengthy proving flight was one from

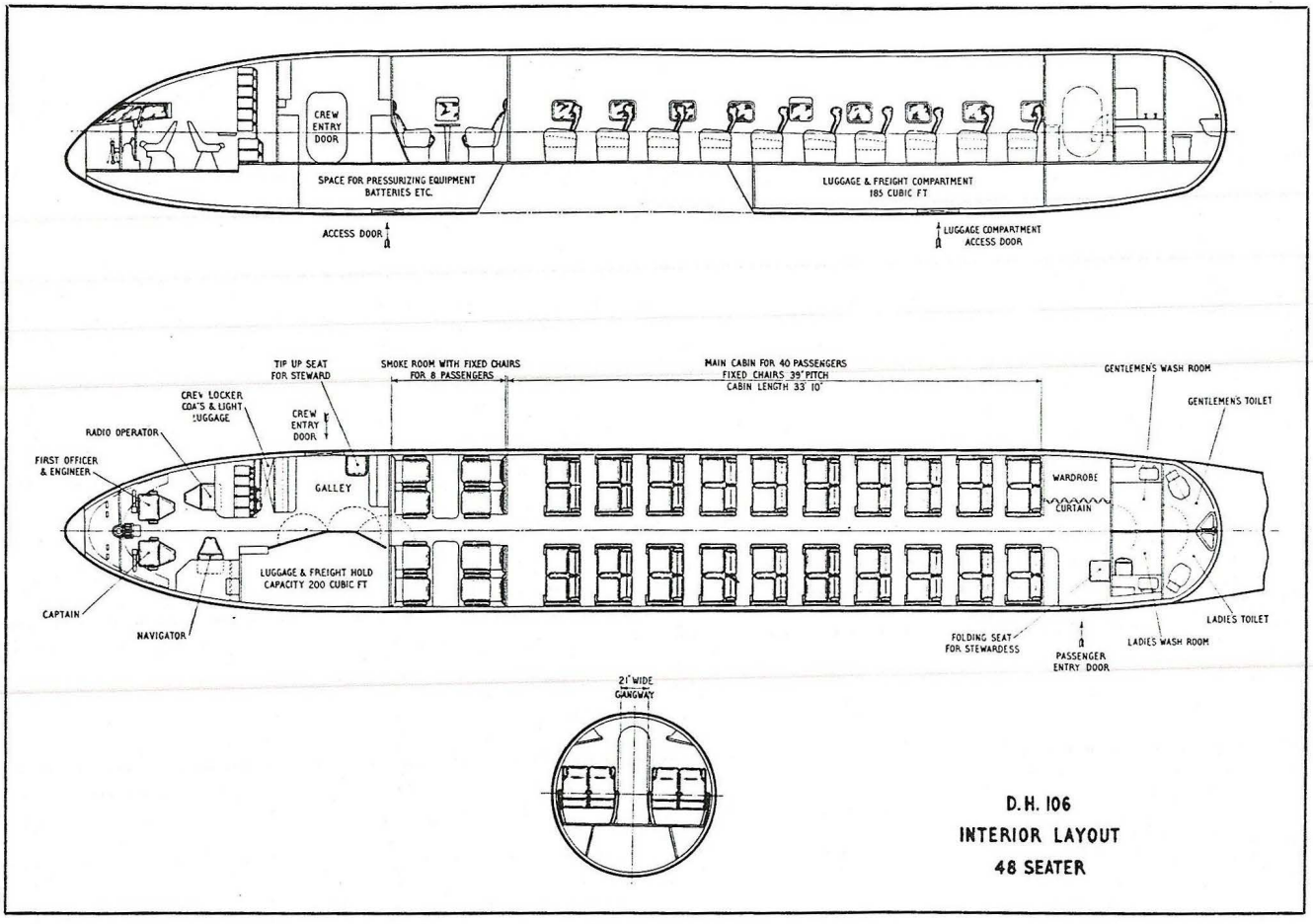
Courtesy The de Havilland Gazette

London to Johannesburg in South Africa, with stops at Cairo and Entebbe, Uganda. This 6,212 mile flight took only 17 hours 33 minutes, including the time spent on the ground at the two stops. BOAC's Comets will carry 36 passengers.

Military Use: The RCAF, of course, will probably fly its two machines on any route which they can handle, as is usually done in the case of military air transport operations. This service has also stated that it intends to use the Comets in high level interception exercises to test Canada's air defences from time to time. The thought behind this is that a four jet transport can simulate an attack by a jet bomber much more realistically than a transport powered by reciprocating engines, or a jet fighter trying to act like a jet bomber.

CPA, which first planned to use its aircraft on its Vancouver-Hong Kong service, has now changed its mind. This air line's latest scheme is to use the jets in the South Pacific, in conjunction with the DC-6Bs which it has purchased. The Comets will not be based in Canada, because the Vancouver-Honolulu stage is an awkward 2,800 statute miles—too big a stride for the Series I model, though the Series II is expected to be able to make it easily, albeit with an uneconomical payload.

As a result, the DC-6Bs will fly passengers from Vancouver to Honolulu. Here they will board a Comet and fly to Australia via Canton Island and Fiji, landing at Sydney, on one flight a week. An alternate flight each week will be via Canton Island, Fiji, and Auckland, N.Z. At certain times of the year, all flights will be via Auckland. There will thus be two return trips a week from Sydney to Honolulu. The one via Auckland will cover a total of 5,600 miles, while the direct flight will be 400 miles less. The various stage lengths are follows: Sydney-Fiji, 2,000; Fiji-Canton, 1,270; Canton-Honolulu, 1,900; Sydney-Auckland, 1,350; Auckland-Fiji, 1,320.



north to south

AT THE RECENT AITA convention, CPA President Grant McConachie took part in a symposium on jet transports and at that time brought out many interesting points about his company's Comet operation. Commenting on the decision not to use jets on the Vancouver-Tokyo-Hong Kong service as had originally been planned, he explained that the reversal was the result of their reaching the conclusion that the weather was too consistently below limits at the points in the Aleutians were it would be necessary to refuel. With the present range of jets, it was impossible to avoid refueling in the Aleutians, so that until such time as they could be safely by-passed, the route was an impractical one.

Mr. McConachie noted that to use a Comet between Vancouver and Honolulu would require a refueling stop at San Francisco. When such possible conditions as a seventy knot headwind and engine-out operation were taken into consideration, it was found that even with the Series II Comet it would have been found necessary to limit the number of possengers to an uneconomical eighteen (a full complement of passengers in CPA's Comets is 48).

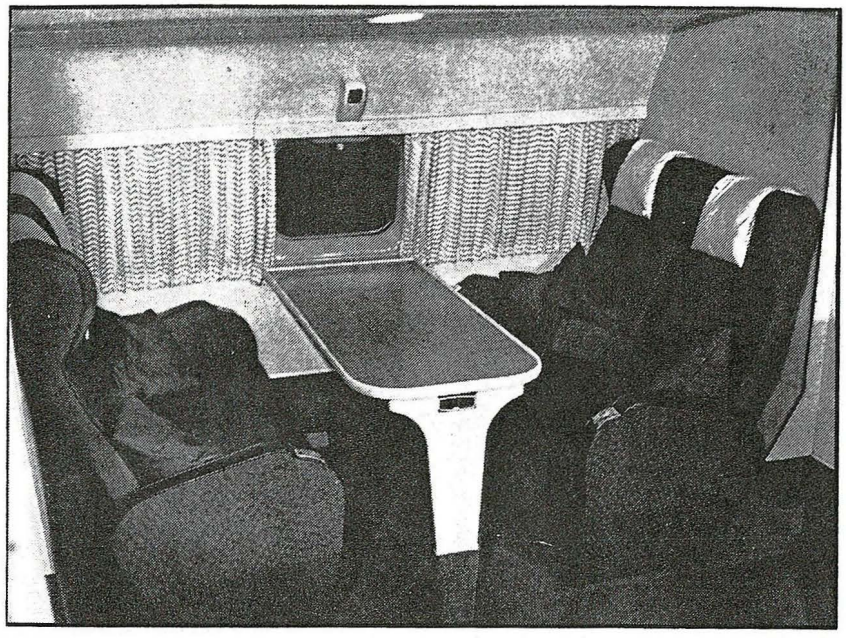
The weather was good from Honolulu to Sydney. At Honolulu, if a diversion were necessary, the alternate was just 200 miles away, and the diversion would be made at such a distance out that it would make no appreciable difference in the distance that had to be flown. At Canton Island there was

no alternate, but no trouble was expected on this account because the airport had never been closed at any time. The airport at Fiji was an excellent one, though high temperatures were prevalent and high winds likely to be encountered at certain times of the year. Trouble from the latter was to be avoided by routing the flights through Auckland during the appropriate seasons of the year. As to the high temperatures, water injection would assure constant thrust. In any case, it was pointed out that the flights were being planned so that departures from points where heat was a critical favor would be made after sundown, in the cool of the day.

No Stacking: Weather at the Australian terminal of Sydney was practically always better than the best ever obtained anywhere in Canada, but in any case, there were several good alternates within easy distance. Stacking was not expected to be encountered by the Comets anywhere on the route except with the one possible exception of Sydney, where arrangements had already been made to stack at 20,000 feet over the ocean, separate from the conventional types of aircraft. The stacking was to be close enough to the terminal so that as soon as clearance was obtained, the aircraft could barrel right in.

Summing up, Mr. McConachie said that under their new plan the aircraft would be based in Australia, and fly through good weather to Honolulu and back. Flight times one way would amount to 12 hours 30 minutes, as compared with the Stratocruiser's 21 hours. This, he pointed out, was quite an advantage, since the distances involved made it necessary for the Stratocruisers to stop as many times as the jet. By using a DC-6B on direct flights between Vancouver and Honolulu, instead of a Comet making the same trip via San Francisco (where it would have to stop to refuel) the elapsed time between the two points was lessened. Apart from the other considerations already noted, this would naturally indicate that CPA's decision to use the DC-6Bs on this stage was a wise one.

Mr. McConachie also explained that fuel reserves were expected to be ample for all the stages of the journey which would be made by the Comets, as the maximum fuel that they expected to use on any one stage was about 4,000 imperial gallons, slightly more than

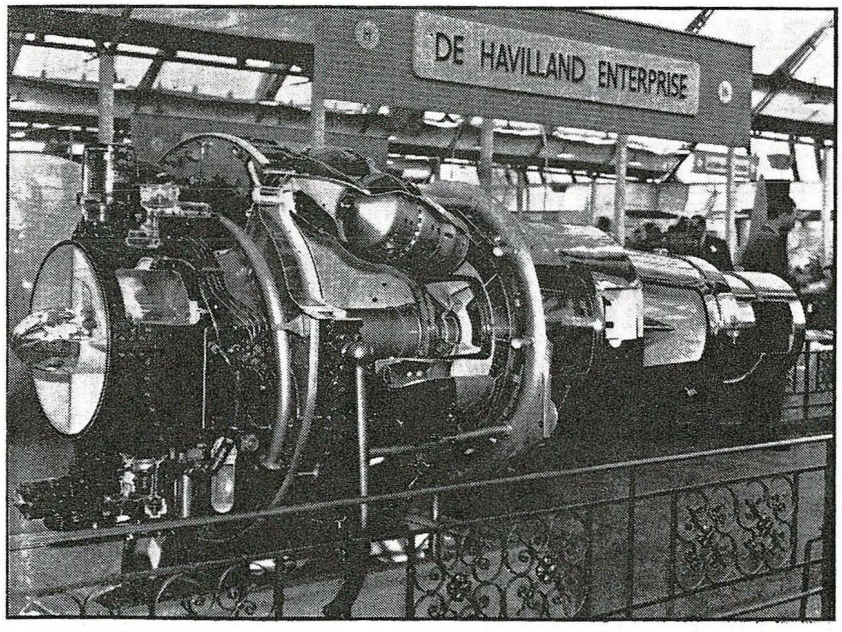


A CORNER IN THE COMET.

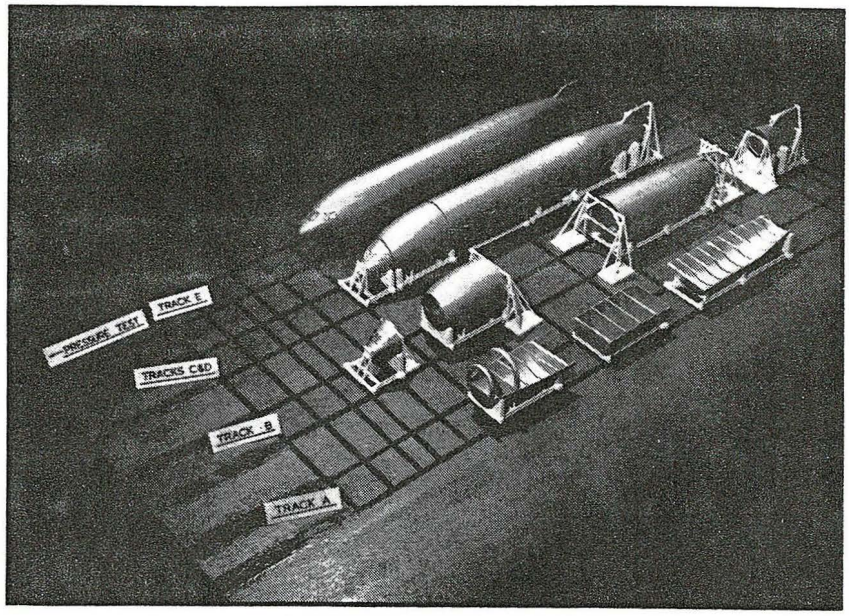
half the maximum of 7,000 imperial gallons that the Comet could carry (this gives a still-air range of 3,500 statute miles.)

Operating Costs: His comments on the expected costs of Comet operation were interesting. Fuel costs were going to be higher, he felt certain, but this would be offset by less flying time between A and B, which would consequently cut down the operating costs (those other than fuel). During the first 200 miles of a flight in a jet aircraft a fantastic $300 worth of fuel was used. Mr. McConachie admitted that this figure seemed very high, but pointed out that after the first 200 miles, cruising altitude had been attained and the fuel cost came down to 30 cents a mile, which was lower than the comparative figure for Stratocruisers. "So, if we get long enough flights we can amortize that original $300 in fuel and our fuel prices come down into a reasonable range."

Some of the things that CPA had been learning about jet airplanes included finding out that radio servicing was cut in half per hour (and at the same time the aircraft was going twice as many miles per hour), instruments were lasting longer because of lack of vibration. It was expected that time between airframe overhauls would be greater and that crews would be able to fly many more passenger miles per



A POWERFUL GHOST.



FUSELAGE ASSEMBLY PROCEDURE.

month with no additional fatigue. Taking all these things into consideration, CPA had broken costs down to a per seat mile figure for a 2,000 mile flight and had found this to be 2.06 cents on the Comet, even when allowing 30 cents per gallon for kerosene fuel—a figure which Mr. McConachie considered extremely high.

income and outgo

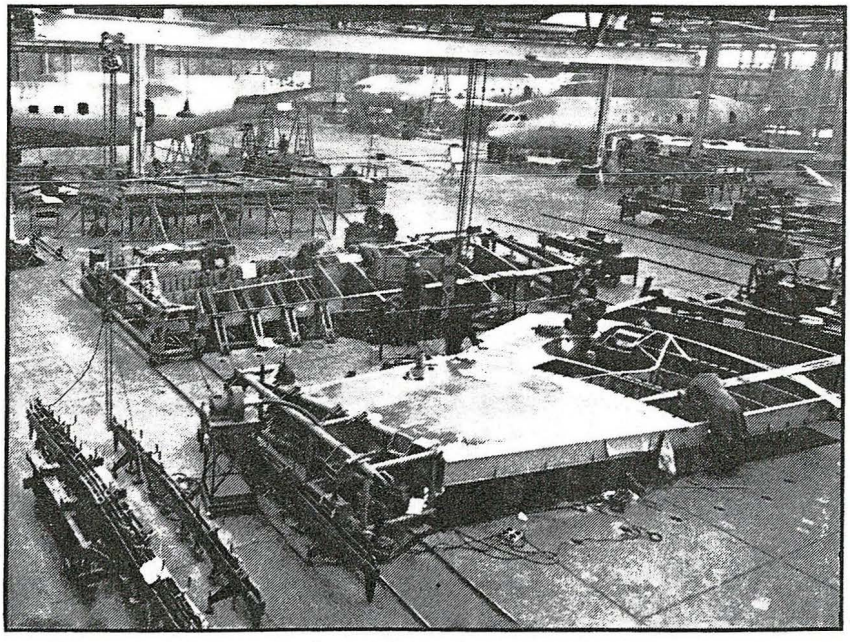
"ANOTHER factor that you have to consider as well—on overseas flying particularly—is that cost is one item and revenue is another. Most of these routes are seasonable routes. You are heavily loaded one way and you are going back with a comparatively light load. This was particularly apparent on the Australian service. At the present time, everybody from England was going to Australia for the winter, thus giving full loads. However, on return flights, CPA was averaging a load factor of something less than 10%.

"Now, if we have a superior service, people that are coming up will ride that superior service and possibly we can average a 40% load factor back up when the other fellow is averaging ten." Mr. McConachie said that another thing that had to be considered was that people flew only to get from A to B in a hurry and not because they liked flying particularly.

"This whole industry has been built up on speed and the more speed we can give them with the same safety and the same comfort, the better product we have. If you have a better product you should be assured of better patronage and for that reason you should look at revenue as well as cost." In any case, CPA felt that as far as costs were concerned the Comet would hold its own with most of the airplanes now flying.

Aircraft Tug: One other point which Mr. McConachie brought up during the AITA symposium concerned CPA's approach to the problem of avoiding the consumption of too much fuel before take-off. The air line has worked out a unique solution to what appeared to be a big problem by having made what is literally the aviation equivalent of a tugboat. This consists of a tractor which is fitted with a power pack having sufficient power to operate all the aircraft's ancillary equipment (radio, starters, air conditioning, etc.) The tractor, which will be connected with the pilot cockpit by telephone, will tow the aircraft out to the end of the runway, at which point the engines will be started just before take-off. The most obvious advantage of this neat arrangement will be found at airports where the aircraft sometimes have to taxi up to two miles to point of take-off and then at congested times have to hold their position for as much as half an hour before clearance can be obtained. Naturally, with jet engines this could consume a lot of fuel. The procedure will also do away with the possibility of causing any unpleasantness when starting engines on the ramp (i.e., long flames from a wet start, heat, blast effect when the engines are run up to start the aircraft rolling).

Another company which is buying Comets is the French shipping concern Chargeurs Réunis, which is making the purchase on behalf of its air line subsidiary, Union Aéromaritime de Transport. Three Series I Comets are involved, but an option is also held for Series II Comets. Delivery of the aircraft is expected to be made in the autumn of this year and they will be used on scheduled services linking Paris with Casablanca, Dakar, the Ivory Coast, French West Africa, the Cameroons, and the Middle Congo. The machines will also be used on the route to French Indo-China. The French Comets will be fitted to carry 44 passengers.



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chosen, but delay in their delivery means that first flights of the SR-45 are unlikely to be made before the autumn of 1950.

Meanwhile an order for prototypes of the Bristol 175 Medium Range (Empire) type aircraft has been agreed and if a production order is given before the end of this year, this type is expected to be in operational service by 1954. According to the Ministry of Supply, it will be superior to the Constellation 249 in maximum payload, still-air range and normal cruising speed. The Constellation of course is in service now, but whether the Bristol 175 M.R.E. will be superior to the Constellation—or its replacement—of 1954 remains to be seen.

DH-106 Progressing

By that time the D.H. 106 Comet may be ready. The de Havilland Company is gaining much experience—as well as records—in its preparation and research for the D.H. 106. The height record with the Vampire and D.H. Ghost of 4,400 lb. static thrust, which is being developed for the D.H. 106, was quickly followed by the new international speed record set up by the Goblin-powered D.H. 108 on the 12th April. The speed of 605.230 m.p.h. for the 100 Km. closed circuit is only 45 m.p.h. less for a 5-cornered circuit than the world's record for a straight flight.

The D.H. 106 which was built as an experimental type for research into problems of control with swept-back wings and high speed flight in connection with the development of the D.H. 106 is still on the secret list.

Incidentally, de Havillands has recently made an offer to holders of the preferred shares of Airspeed Ltd. to acquire them on the basis of one D.H. £1 ordinary share for every four 5s. Preferred shares of Airspeed. De Havilland already controls the Airspeed Company.

Airspeeds have completed the intial static pressure tests on the second Ambassador prototype which has now been moved from the experimental shops to the flight hangar for final assembly. The second prototype is expected to fly late in June or early in July. It is stressed for an all-up weight of 52,500 lb. compared with 45,000 lb. at which the first prototype is being flown. The first Ambassador has been dived at its maximum speed of 320 m.p.h.

Two interesting developments on the civil side during April were the opening of Airways Training Ltd. to air crew and ground engineers from all over the world and the demonstration of new type of airfield approach lighting at Farnborough.

Airways Training

Airways Training was set up by BOAC and BEAC to train ex-RAF crews to the high civil standards exacted by the Corporations. During its first 18 months at Aldermaston, 1066 Captains and First Officers passed through the school, 561 First and Second Class Navigation Licenses were obtained, 248 Radio Officers and 493 pilots (Radio Telephony) were licensed, 112 air crew were given Radar courses, 106 Radio engineers were trained on Radio and Radar and 642 Engineering Maintenance Licenses were gained.

Now that the needs of the Corporations have slackened off, Aldermaston, which is the most comprehensively equipped modern civil aviation training centre in the world is offering to train air and ground crews for other operators or indivdual students of all countries.

The fleet consists of three Dakotas, three Vikings, four Ansons and a Dove so that flying training is on a wide scale and aircraft are specially equipped with the latest radio and radar blind flying and approach aids. Instruction on the latter is integrated with work on Link trainers, one of which is equipped with Radar attachment for synthetic instruction in Babs-Rebecca approaches.

Approach Lighting

The new type of airfield approach lighting, which has been developed at the RAE Farnborough under Mr. E. S. Calvert, is considered an improvement over any other system previously devised and is to be installed at London Airport.

Briefly, the system consists of bars of lights placed horizontally across the approach area at intervals of 600 ft., with a central line of lights 100 ft. apart leadng straight to the runway. As the pilot approaches the runway the bars of light provide him with an artificial horizon, which is invaluable to pilots approaching to land. This horizon enables him to gauge the altitude of the aeroplane to the ground and the central lights guide him to the runway.

With this new system of lights day-

A TRAILBLAZER

Comet in the Sky

The recent news that Canadian Pacific Air Lines has ordered two de Havilland Comets came as a surprise, albeit a pleasant one, to most of the aviation industry in Canada. There had been a hint from Standard Oil of B.C. that such a move was in the offing but beyond this, nothing.

It is significant of a current trend that Canada should not only be the first to build and fly a short range, all-jet airliner, but should also be the first in the world to put the first all-jet airliner of any type into commercial operation. It is an indication of the increasingly important part that Canada is playing in world aviation.

The purchase of the CPA Comets was negotiated by Grant McConachie, president of the Canadian firm, and according to announcements from both CPA and The de Havilland Enterprise, negotiations are under way for additional Comets at a later date. Delivery of the first two, both of which are the 48-seat version, is expected some time in the 1952-53 period.

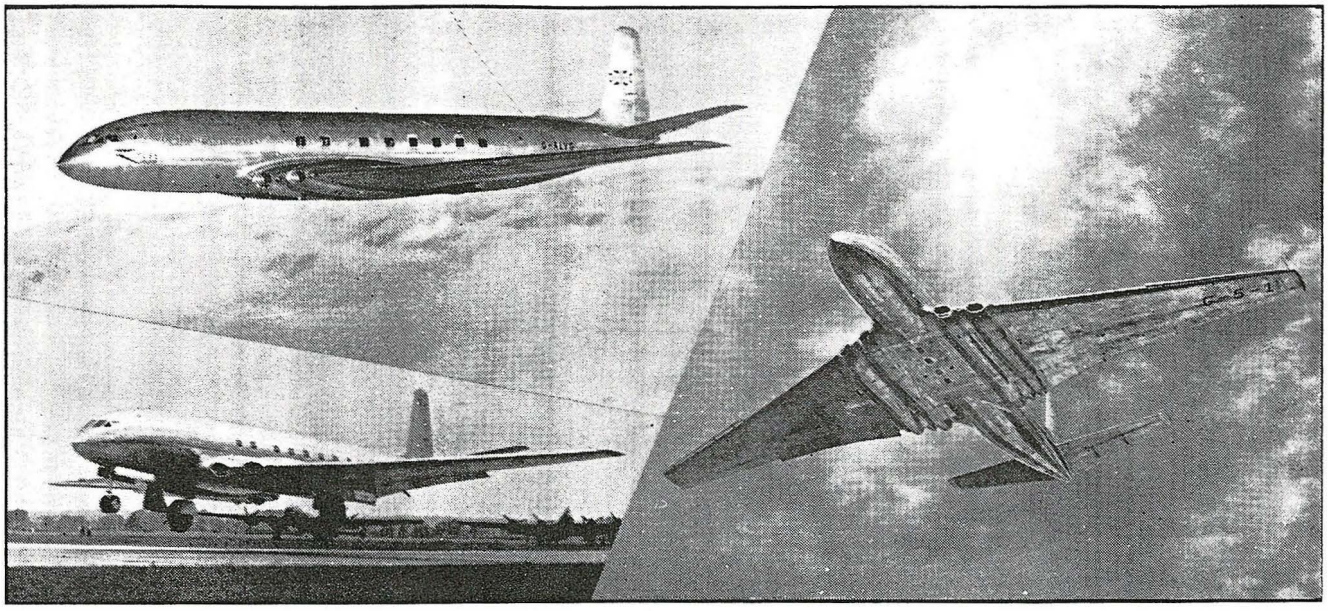
The official CPA announcement quotes the cruising speed of the Comet as being nearly 500 miles an hour and the maximum range, more than 4,200 miles. The cruising speed of the Comet is, sure enough, 490 miles an hour, but the range figure tends to be a little on the optimistic side.

According to de Havilland statements, the 48-seat version, with a payload capacity of 14,000 lb., and allowing for a 50 mph headwind, can operate a Stage Length of 1,750 miles plus 200 miles diversion. It might be pointed out that these figures are based on requirements that would be imposed by working from 2,000 yard runways, in standard atmosphere, which would limit the take-off weight to 101,000 pounds. Although originally intended for comparatively long ranges, the aircraft is said to be economical down to Stage Lengths of less than 1,000 miles.

The 36-seat version, which somehow seems more in line with Pacific requirements, has an all-up weight of 105,000 lb. and a capacity payload of 12,000 lb. With this payload, operating in standard atmosphere with no wind, the Comet's Still Air Range (without allowances) is 3,540 statute miles. However, the Practical Range, allowing for ground running, taxi-ing, take-off, climb and descent, navigational errors, airframe and engine variation and deterioration, is 2,645 miles. On completion of this distance, the aircraft still has sufficient fuel left for 30 minutes of circuits and stand-off, also for approach and taxi-ing in after landing.

This Practical Range of 2,645 miles with a 12,000 lb. payload actually represents a Stage Length of 2,140, plus 200 miles diversion allowance, all against a headwind of 50 mph.

CPA estimates that the Comets will



be able to fly from Vancouver to Tokyo in ten hours with two stops. On the east bound leg, when the prevailing winds are favorable, Vancouver will be within eight hours of Tokyo.

Actually the Comets will go beyond Tokyo to Hong Kong, the Vancouver to Hong Kong distance being 6,800 statute miles. De Havilland says that the Comet will make this journey in seventeen hours of flying time plus three one hour stops. These stops are to be at Anchorage, in Alaska, Shemya (or Semichi) in the Aleutians, and Tokyo. If traffic conditions warrant, each aircraft will make three return trips a week from Vancouver to Tokyo and Hong Kong.

Longer Runways

As has already been noted, a 2,000 yard (6,000 ft.) runway is required for a take-off weight of 101,000 pounds in standard atmosphere; the 36-seat Comet has a take-off weight of 105,000 pounds and calls for runway lengths of 2,175 yards (6,525 ft). Please note that these are not take-off or landing distances.

CPA says that the Comets will not need any longer runways than those now in use on the trans-Pacific routes, but the foregoing de Havilland figures would tend to contradict this. According to the Canada Air Pilot, Vancouver has runways of 3,875 feet, 5,007 feet, and 5,170 feet. No figures are available on the other airports on the route, but it is to be presumed that they will have runways at least as long and probably longer than at Vancouver. However, since this city is the base of CPA's operations, it has to be able to handle the aircraft.

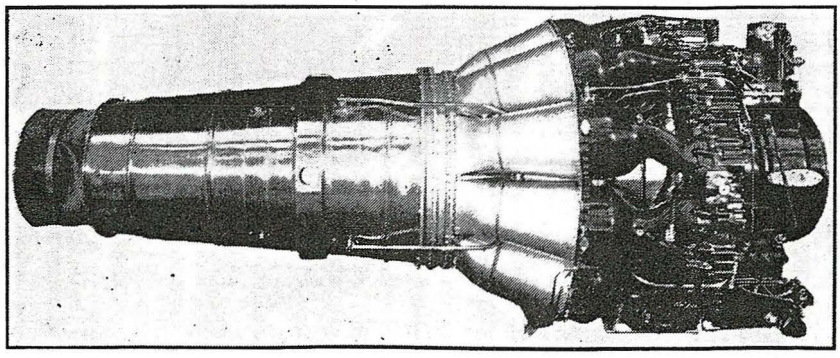
The de Havilland figures so far released are based entirely on the close to 125 hours and 100 flights that had been performed in the first four months of handling trials and performance measurement that followed the first flight on July 27. Commenting on this, de Havilland says: "Although a considerable amount of development will be built into the aircraft which are expected to go into service . . . in 1952-53, the de Havilland Aircraft and Engine Companies feel that such great importance attaches to a realistic understanding of the aircraft that instead of publishing today estimates of the future capabilities, it is more satisfactory to issue a statement based on the performance achieved by the first aircraft in its first few weeks of flight. . .

". . . The development work which is being conducted, in addition to rockets (the de Havilland Sprite, for assisted take-offs), is expected to yield increases in the thrust of the Ghost engine for take-off and emergency climb, a decrease in specific consumption for cruising, an increase in the all-up weight of the aircraft and an increase in the internal fuel capacity The builders are anxious not to mislead operators but these developments are confidently expected to produce a material improvement in the range, payload, and other aspects of capability while the Comet is still in the early stages of its operational career."

Cheaper Operation

More recently de Havilland has released a statement concerning the economic side of operating a Comet. The company claims that compared with the most modern air liners of the same class at present in world service the Comet may be expected to be about 20% cheaper per ton-mile of payload, and to accomplish at least half as many more ton-miles in the year.

The 20% figure is based on a typical Stage Length of 1,500 to 2,000 statute miles and a utilization of 3,000 hours



THE DE HAVILLAND GHOST.

a year. The method employed for costing is that established as standard procedure by the SBAC, but the cost of paraffin fuel has been reckoned at 34.5 cents (Canadian funds) per Imperial gallon, and that for piston engine fuel at 43.4 cents. The first cost of the Comet is taken at $1,381,000*. No provision has yet been made in the SBAC formula for figures covering the cost of maintenance of turbine engines, so de Havilland has made an assessment based on its own knowledge and experience. This assessment yields a cost per hour slightly less than that of piston engines in comparable aircraft. There is, of course, no propeller maintenance with which to contend.

Allowances Made

Says de Havilland: "The company has made its allowances for stand-off, final circuits, etc., on a comparable time-margin basis to those for piston-engined air liners, and the allowance for diversion to alternative airports is of course on a distance basis for both types.

"Travelling a greater distance in the hour with a given payload makes the cost per ton-mile less. It also enables the aircraft to accomplish more ton-miles in the year—more than half as many again—so the higher profit per ton-mile is made on many more ton-miles. Speed thus yields a multiple economy. In these calculations the 1,500-2,000 mile Stage Length has been taken as being typical. Investigation of lower Stage Lengths bears out the opinion which was expressed before the Comet flew, namely that it would be economical on stages down to 1,000 miles and less.

Lessons Unexpected

"To many this is without doubt one of the unexpected lessons of jet transport which the Comet will demonstrate in air line practice as it has done in test-performance analysis . . . The de Havilland Companies are eager to emphasize that all the figures used in these cost calculations are based upon the performance of the Comet as it is today . . . "

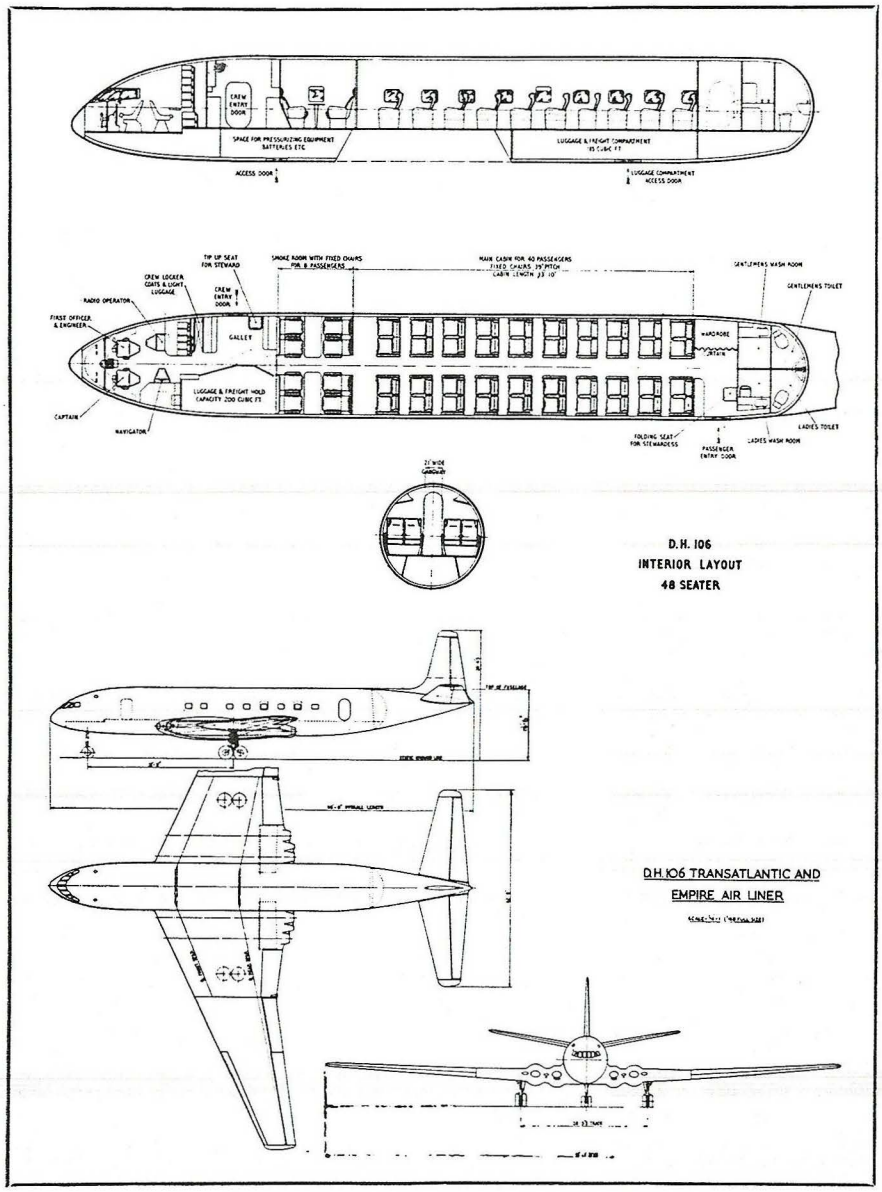
Because high flying is necessary to economy in jet-propelled transportation, it was necessary for the main body of the liner to be pressurized to a greater degree than previously, and the air to be conditioned as to temperature and humidity. The cabin pressurization system is designed for a maximum working differential pressure of 8.25 lb./sq./in., to give a maximum cabin altitude of 8,000 ft. when the aircraft is flying at 40,000 feet. The cabin is heated and humidified to provide comfortable atmosphere at this height, with a change in cabin air every three minutes.

The pressurizing and heating functions are accomplished with simplicity with the jet engines providing both the pressure and the heat, eliminating the need for complicated compressors, combustion heaters, etc. Refrigeration equipment is included for short-period use when approaching and leaving tropical stations.

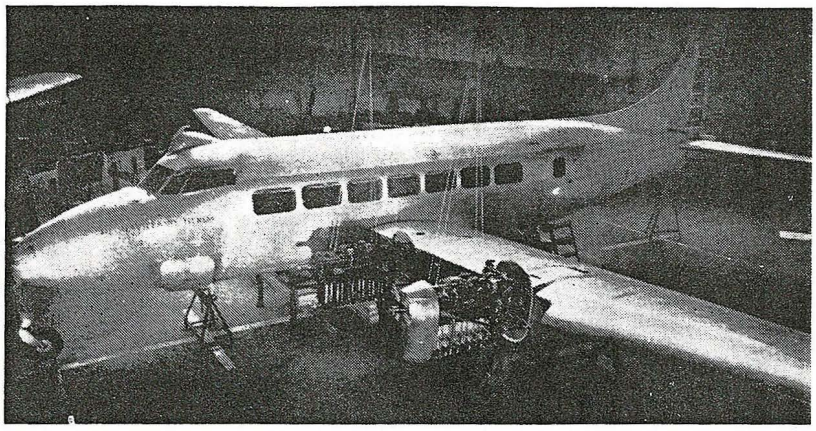
There is nothing particularly revolutionary in the appearance of the Comet and de Havilland considers the design merely as a logical step rather than a daring stride. Its high speed has not been attained at the sacrifice of slow flying ability, and in fact, the wing loading is moderate, being less than some conventional propeller driven airliners now in popular use.

Power is by four de Havilland Ghost DGT3 turbo-jet engines, each of which develops 5,000 lb. static thrust for take-off at 10,250 rpm. The Ghost is similar in general layout to the Goblin, which develops over 3,500 lb., static thrust in its latest version. Despite the great increase in power in the Ghost, it is only 53 inches in diameter, just three inches more than the Goblin.

The engines used in the Comet are of the direct entry type with a central



All prices mentioned are based on an exchange rate of $3.07 Canadian per pound sterling.



A NEW BIRD

Question: What's bigger than a Dove, has more power, and can carry more? To most people the answer could be anything from a crow to an eagle, but as far as The de Havilland Aircraft Company is concerned, it's a Heron. The de Havilland Heron is a four-engined, fourteen-seventeen seater transport designed to replace the pre-war DH-86.

The first aircraft is already in an advanced state of construction and the company intends to put the model into immediate production on a straight commercial basis with a price of approximately $108,000 in Canadian funds, plus the cost of radio (not necessarily the price in Canada).

The Heron, which is really a large Dove and in fact uses many Dove components (wings, cockpit, main fuselage, empenage units, control surfaces and many internal parts) is intended for use by feeder services . . . particularly those which must operate in and out of small airfields with primitive facilities. To meet this requirement the Heron has been designed to give a take-off capability comparable with the Dragon Rapide, and a greater degree of simplicity has been afforded than in the Dove. The Heron has a fixed undercarriage, unsupercharged and ungeared engines (Gipsy Queen 30), non-feathering propellers and no hydraulics. For use on longer stage lengths a version with retractable undercarriage is offered.

The fixed undercart Heron can fly fourteen passengers plus baggage (all-up weight of 12,500 lbs., capacity payload 3,240 lbs.) about 400 miles under still air conditions. This gives a practical stage length of 150 miles. Recommended cruising speed on this version is 160 mph (60% take-off power at 8,000 feet).

intake, though they may be obtained with bifurcated intake such as is used with the Goblin in the Vampire installation. The Ghost, like the Goblin, is a centrifugal compressor type engine with a single sided impeller. De Havilland expects that with a little more development the Ghost will give a longer overhaul period than piston engines, with much less and simpler daily maintenance. Since the Comet has the short undercarriage that is typical of jets, practically all engine servicing can be made at shoulder height without the use of steps or platforms. De Havilland claims that a Ghost has been changed in an hour with no difficulty whatever.

The engines are almost completely buried within the relatively thin wing of the Comet, naturally adding much to the aircraft's general cleanness of line. The direct entry of air to the compressor, already mentioned, results in good fire prevention and anti-icing of the engine bay, an absence of pressurized cowling, and a simple and light installation.

Provision for the installation of two de Havilland Sprite rockets (one on each wing, between the engine nacelles, see photos) has also been made because jet aircraft are sensitive to air temperature and pressure and the rockets will do much to maintain the airplane's capabilities in severe tropical conditions.

The Sprite is what is known as the "cold" variety of rocket. This type has the advantages of great simplicity and safety. It had a considerable background of successful operational use with the Luftwaffe in the war, notably on the long range flying boats and land planes co-operating with subs.

Each Sprite gives a total impulse of 55,000 lb. sec. The thrust "die away" (arbitrarily quoted as from 5,000 lb. at nine seconds to 3,000 lb. at twelve seconds) is adjustable. That is, the firing of the rockets is almost completely controlled, and for the passenger the result is an additional acceleration of only 0.1g.

According to CPA, Grant McConachie flew the Comet for four hours and was mightily impressed. Pilots of the Canadian air line are to be trained to fly the new airliners in England, so that they may be put into service as soon as they are delivered. There'll be a lot of interested and jealous air line eyes on CPA when that day comes.

surfaces have been redesigned for better performance. The wing, of course, is now all-metal, and tapered; it is braced externally by a single lift strut only. The addition of a dorsal fin gives the vertical fin of the 170 the same characteristic appearance of that of the 195, and may, in fact, even be the same fin. No additional fin area is necessary on the float plane.

The ailerons have been redesigned and are more sensitive than on the 1948 model. Additionally, the elevator control system has been modified to reduce control loads on landings. The latter was a frequent complaint against earlier models of the 170.

Longer Range

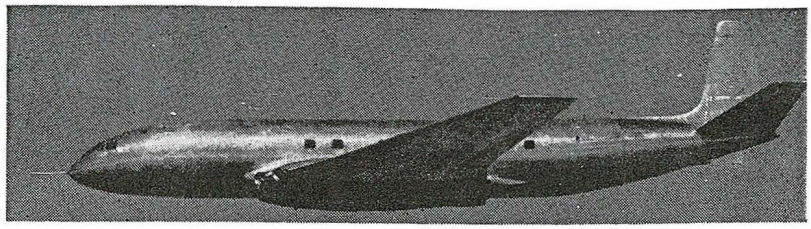
The 1949 model also has slightly greater fuel capacity, with tankage of 42 American gallons being available. A gravity fuel system eliminates the need for the fuel pump which was used on the 1948 Cessna 170. Power is by the popular Continental C-145. The aircraft we flew, incidentally, was fitted with a McCauley Met-L-Prop.

The addition of floats to this aircraft does not apparently cut down its passenger carrying ability to any extent. There were four of us, three members of the *Aircraft and Airport* Staff, and Jack Sanderson of Central Aircraft, Cessna distributor. The human flesh aboard totalled near 700 pounds. The wind was about 10 mph in strength so it can be well imagined that the surface of the water by no stretch of the imagination could even be called choppy.

Quick Take-off

Despite the heavy load and mediocre seaplane conditions, the 170 was able to get off the surface in 25 seconds. This figure incidentally, could doubtless be lowered by an experienced seaplane pilot. We had not flown a floatplane before.

All Cessna aircraft are now licensed for use on floats, but we are inclined to think that the 170, by nature of its size and price range, should prove a particular favorite. It looks good and feels good, and its load-carrying ability is not penalized excessively by the floats. It looks as if Cessna has another winner.



THE COMET

By S. C. Willson, Editor, The Monetary Times
Associate Publication, Aircraft and Airport

LONDON, ENGLAND—The de Havilland 106 Comet is one of the wonders of Britain shown to the Canadian technical press party of which the writer was a member, who were guests of the British Government for a recent three week tour of industrial plants.

The group spent most of the day at the de Havilland Aircraft's gigantic plant at Hatfield, a few miles outside London. Our schedule called for us to see the Comet, but the day before we were due, she had left on a test flight to Castle Benito, Libya, and we did not expect to find her at Hatfield. But there she was, large as life, back from an aerial triumph, and engineers and aeronautical scientists were swarming all over her, stripping her engines and removing dozens of special instruments that registered her achievements on the epochal flight that were headlines in the day's papers.

Our party . . . none of us was an aeronautical expert, so de Havilland's secrets were reasonably safe . . . was allowed aboard and we saw the interior of the great ship, including the circuits of oxygen vessels used for pressurization of the cabin on the flight, much of which was at 40,000 feet.

Powered by four de Havilland Ghost jet engines, the DH 106 is intended for British Commonwealth long distance routes, and for intercontinental services. The designers claim that while this aircraft has high speed, it has not been secured at the sacrifice of slow flying ability. The DH 106 cruises at high speed well above the weather, but can descend, approach airports and land exactly as today's aircraft do. No extra long runways are needed for the DH 106, which can use normal airports on all the main intercontinental routes.

Officials at the plant told us that the Comet which flew to Africa has been three years in production so far. The elapsed time between actual start of construction and the first commercial flight is six years. The Comet we saw will not be ready for commercial operation until 1952. The work remaining to be done includes the manufacturer's development work, operator's trials, handling technique at airports, etc. One of the greatest problems in connection with building a ship like the Comet is pressurization, which has to be roughly three times that of the Constellation.

Right at this moment de Havilland has orders for eighteen Comets. Two are being built now, work on four more has started. Two have been ordered for the Ministry of Supply, fourteen for BOAC and BSAA, and two for CPA.

De Havilland officials said that they are spreading the price over many more than they have orders for at present. The de Havilland Company itself actually financed the design and development of the Comet.

The Canadian party was welcomed by Captain Peter de Havilland, son of Sir Geoffrey, founder of the company. In the tour of the plant, we were shown assembly operations on Doves, Vampires, and Chipmunks. De Havilland has just started construction of Chipmunks in sizeable lots. Orders for Doves represented twelve different countries.

The party was entertained at lunch in the de Havilland guest house some two and a half miles from the plant. The house is the original Bleak House.

AIR LINE TRENDS

QCA Traffic Up

Queen Charlotte Airlines have been experiencing exceptional increases in both passenger and freight carried. It is estimated that this year's traffic figures will show an increase of over 200% when compared to those of the previous year. The Alcan project is largely responsible for this situation, since proper service of the huge Aluminum development has required the inauguration of daily flights direct from Vancouver. To augment its present large fleet, QCA has purchased one more Norseman and one Canso. Present plans call for the addition of two more Cansos in the spring.

Trans-Atlantic Tourists

Considerable confusion still existed following the close of the IATA Seventh Annual General Meeting at London, England, as to when and if tourist fares would be introduced by trans-Atlantic air carriers in 1952. The answer will not be resolved until the IATA Traffic Conference (which is the body officially charged with setting rates acceptable to all IATA members) meets in Nice on November 20.

Meanwhile, fed up with the continued failure of the member air lines to reach agreement on the trans-Atlantic tourist fares, Pan American World Airways (an IATA member) member rebelled and announced that the other air lines could continue to squabble about the fares, it, PAA, intended to inaugurate low-fare tourist-class service across the North Atlantic in 1952 at a fare level of $250 or less between London and New York. This announcement will undoubtedly rattle the other air lines considerably, since PAA is one of the biggest, if not the biggest, trans-Atlantic carrier. It is certain that even if no agreement is reached within the framework of the IATA, the other carriers will be forced by PAA's action to go along with the gag and inaugurate similar services. Fears have already been expressed that PAA's tactics may weaken the IATA considerably.

Although it was expected that a definite announcement of the exact starting date of the trans-Atlantic fares, and the amount of the fares themselves, would be forthcoming following the London meeting, instead the best that the IATA could say was that . . . "a controlled experiment" in mass air transportation would begin sometime in 1952 with the institution of tourist service across the North Atlantic and from London to Johannesburg. The amount of the fares was equally vague, with a figure of "approximately one third below the $395 basic one-way North Atlantic rate from London to New York."

Pan American claims that at a previous meeting the air lines agreed on a price somewhere between $225 and $250, and that now nobody wanted to go below $275. What's more, it was originally agreed to start the service in the spring of 1952. Now the others are talking about the fall of 1952.

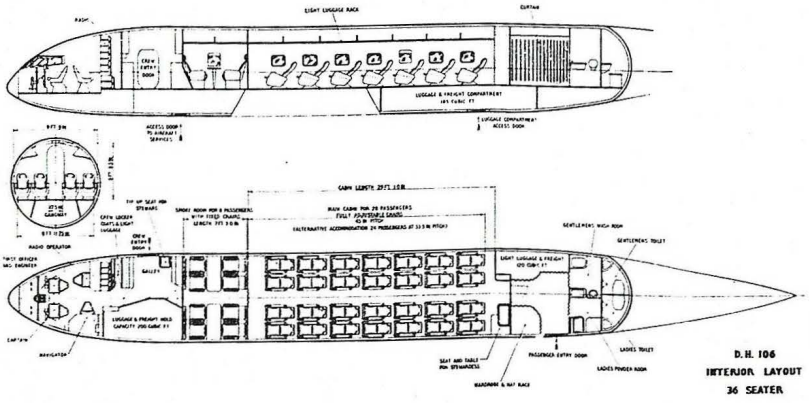
The IATA is extremely conservative in making any claims for the practicability of Atlantic tourist fares. It uses such expressions as "decision to hazard tourist fares", and "experiment". Pan American, on the other hand, scoffs at what it apparently considers shilly-shallying on the part of its fellow IATA members, and points to its own experience between New York and Puerto Rico, and New York to Buenos Aires and around South America. In the first case PAA says that a year after it inaugurated two classes of service, the total volume of air traffic beween the two points had increased threefold, and the first class service showed a marked gain rather than a decrease.

In the case of the South American service, PAA says that it became so popular that it is now considered to be a major reason why 77 per cent of the total traffic between the U.S. and South America goes by air.

Cross Border Travel

Visitors entering Canada from the U.S. and Canadians returning from the U.S. made increasing use of air travel during the first six months of 1951 as, compared to the corresponding period of 1950, according to the Dominion Bureau of Statistics. The Bureau notes that visitors entering from the U.S. by plane rose from 66,908 to 75,202; by bus to 140,648 from 139,308; by boat to 48,945 from 46,378. Rail travel, still remained by far the most popular mode of transportation, and increased from 192,403 to 200,516. Canadians re-

COMET INTERIOR: Pictures at top show the de Havilland Comet's main passenger compartment seating 28 and the eight-seat compartment (right) which is just behind the crew section. Drawing below shows the 36-seat layout. Table shown above may be detached and folded for stowage. BOAC is now operating a Comet on loan from de Havilland in order to gain experience with the type. CPA has two on order. First Comets are powered with de Havilland Ghosts but later marks will have Avons.



tion methods and fire extinguishing and for fire testing of jet engines a special fire tunnel has been built on the airfield. Not only does Rolls-Royce build superb engines but it takes infinite care to see that they perform satisfactorily and that every detail of each type of engine is as perfect as it can be. There is no resting on laurels already won.

Constant experiment, development and testing has given Great Britain its lead in jet propulsion and so long as work such as that done by Rolls-Royce is continued, British jet engines will continue to be the finest of their kind, and to be in demand in other countries.

October Exports

Belgium is the latest country to acquire a license for building the Rolls-Royce Derwent. Monthly export figures for the British Aircraft Industry for October, although slightly less than those for September ($6,409,797 compared with $7,041,517) were still good and the total for the first ten months of 1949 was still running about three million dollars above the Industry's target of $101,310,000 for the whole year. The October export total included 75 airplanes to the value of $2,695,800; 175 engines valued at $1,698,560; accessories at $1,984,687, and 1,206 rubber tires at $30,750.

New Construction Method

Meanwhile the Fairey Aviation Company has announced preliminary details of a new method of aircraft construction which is being used on the latest Fairey type — the Fairey 17 anti-submarine aeroplane powered by an Armstrong Siddeley Double Mamba prop-jet.

The new method reverses the usual procedure of making the structure and then putting on the skin. Instead, the Fairey method is to shape the outside skin of the airplane in accurately shaped "envelope" jigs before any of the inside structure is fitted. Main advantages claimed for the new method are an unusual degree of accuracy in construction, with the elimination of even minor building errors and hence, complete interchangeability of parts from the prototype stage. By closely integrated collaboration between various sections of the aircraft and jig design staffs, the development of a prototype aircraft can be governed from the start with a view to the eventual production line.

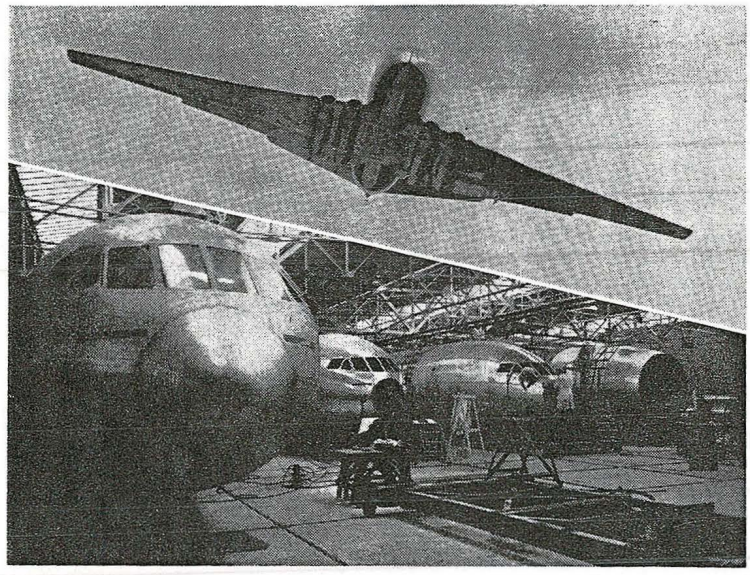
The basic principle involves the use of standardized jig fittings designed for flexibility of employment and production jigs can be erected as soon as the basic geometry of the prototype aircraft has been determined. The new method should mean a major saving in development and production effort and increased rate of production.

New Ground Equipment

Two new items of aircraft ground equipment now in use are the Murex Ground Power Unit and the Tyne aircraft refueller.

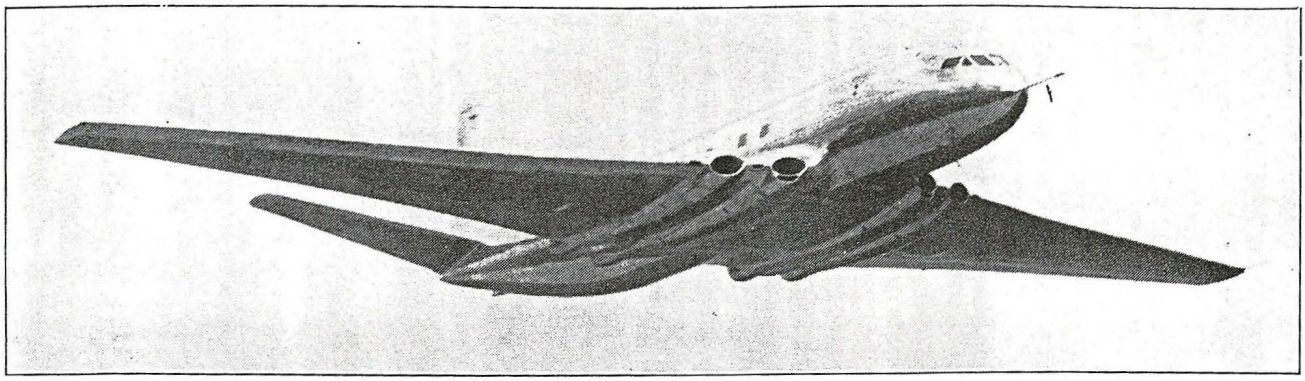
Built by Murex Welding Processes Ltd., of Waltham Cross, Herts., the Murex Ground Power Unit has been designed to supply electrical current for servicing and starting piston, turbo-jet and turbo-prop engines. It has been used with the de Havilland Comet ever since the Comet made its first flight. The Murex unit has an engine-driven generator and the standard unit supplies a continuous current of 600 amperes at 28.5 volts for servicing and pre-flight checks and a peak current of approximately 1,200 amperes for engine starting periods. Other capacities are available. The unit is mounted in a low trailer and is being supplied to BOAC and other air lines. During recent tests at London Airport a single strater was used successfully for the Boeing Stratocruiser.

The Tyne aircraft refueller is built by Thompson Brothers (Bilston) Ltd., of Bilston, Staffs., which has specialized in aircraft refuellers since before the war. The Tyne is an eight-wheeled 4,000 gallon tanker of chassisless construction and is 7 ft. 6 in. wide and 9 ft. 11 in. in height. With its load of 4,000 gallons of fuel it weighs nearly 26 tons. It contains a double set of pumping, metering and filtering units, each unit capable of delivering 1[illegible] gallons of fuel per minute to ai[illegible] Delivery of fuel can be determi[illegible] two 3-in. Smith S.30 meters whic[illegible] a set-stop totalizer and zeroising[illegible] calibrated in Imperial gallons, U.S. gallons or litres. The prototype Tyne refueller has been acquired by the Shell-B.P. Aviation Service.



COMET CAPERS: The top photograph gives an unusual view of the de Havillar Comet. The lower photograph shows that production of Comets is well under wa Initial flight testing has progressed at a rapid pace and has involved long distan flights, blind landings, etc. At one stage of the testing the Comet actua travelled at a constant speed of 590 mph TAS, for a period of one hour. It v visit North America next year.

•**BOAC's** application to operate an international scheduled service between London, England; Prestwick, Scotland; Shannon, Ireland; Gander, Newfoundland; and Montreal, Quebec, has been approved by the ATB, provided cabotage shall not be exercised in Canada.



A World Beater

The de Havilland Comet

After being kept a secret for three years by the maintenance of a military-like security, the de Havilland Comet emerged from its assembly shed on July 25 and two days later made its first full flight. This first flight of the Comet is especially interesting because it brings out into the open an aircraft which must inevitably be compared with Avro Canada's C-102.

This comparison is inevitable, not because the two transports are competitive, but because they are respectively, the first and second all-jet commercial air transports in the world. The Comet is intended to carry up to 36 passengers on comparatively long world routes at speeds approaching 500 mph. On the other hand, the C-102 is designed to carry fifty passengers over short internal routes at a cruising speed of 430 mph. Each aircraft complements the other; together they represent the first clear-cut step in the design of modern air transport since the first of the Douglas DC series appeared on the scene.

The accompanying photographs show that there is nothing particularly unorthodox about the configuration of the Comet, despite some of the speculation that preceded its appearence. It is a low-wing monoplane with relatively thin wings with moderate wing loading and moderate sweepback. Certain details apparent in the photographs are only transitory. The mass balances on the control surfaces have been fitted as a precautionary measure; the single-wheel undercarriage legs will later be replaced by bogies.

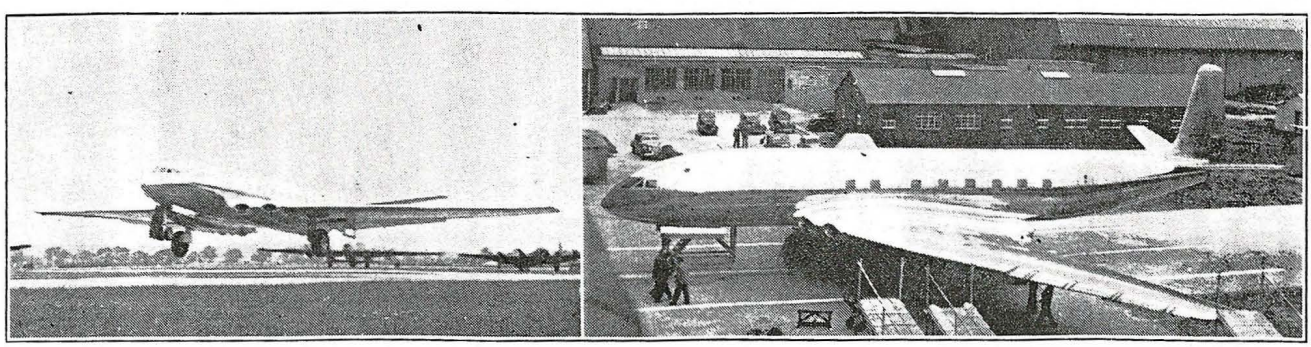
The Comet represents a fine degree of aerodynamic cleanness. Its four de Havilland Ghost engines are almost completely buried in the wings — an excellent forward step in aircraft design. The engines, which produce 5,000 pounds of thrust, are of the type that powered the modified Vampire which holds the world's altitude record.

The attainment of speed has not been made at the sacrifice of slow-flying ability. The wing loading is actually less than that of some conventional airliners at present in service, and the stalling speed is calculated to be correspondingly moderate. Few details of size or construction of the Comet have actually been announced as yet.

The first full flight (a couple of short hops had been made in the course of the taxiing trials) was under the command of Chief Test Pilot John Cunningham and lasted 31 minutes. During this time the Comet was climbed to 10,000 feet and was tried out over a range of low and medium speeds.

According to a statement released by de Havilland at the time of the first flight: "The purpose of this project, which was conceived by the de Havilland Aircraft and Engine Companies toward the end of the war, is to take a step forward in commercial efficiency, comfort, and convenience by utilizing the special qualities of jet propulsion. On main-line stages a briefer and smoother flight is envisaged for a competitive cost. . . .

"It is on this basis of commercial competitiveness and this basis alone, that the de Havilland Companies and the operating corporations (BOAC and BSAA, which have already ordered a total of fourteen Comets, 'off the board') were interested in jet propulsion for public travel and transport. The advance in travelling speed alone, that is to say, without the prospect of superior commercial economy, would not be attractive in the present state of world affairs — except from the point of view of possible military value, but that was not contemplated in the conception of the Comet. It is a business proposition."



AIR LINE TRENDS

Comets in Service

An event that was predestined with the first running of Sir Frank Whittle's first gas turbine will take place on May 2 when a BOAC de Havilland Comet takes off on its maiden scheduled passenger flight from London to Johannesburg. This flight will be the beginning of the world's first turbojet commercial air line service.

The Comet is due to leave London Airport at 2 p.m. on the 6,724 mile journey along the so-called "Springbok" route. First northbound Comet service will be on Monday, May 5.

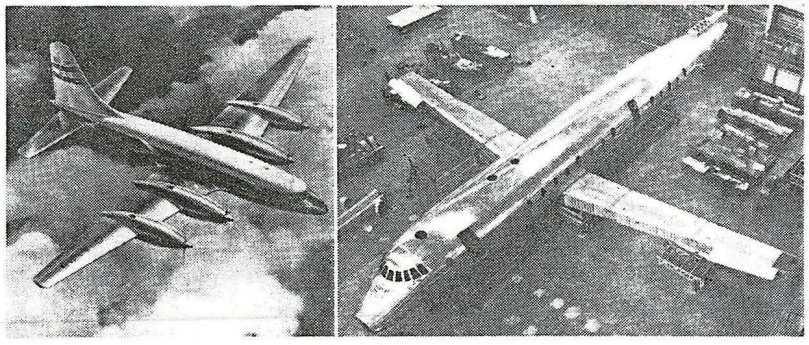
Stops will be made at Rome, Beirut (Lebanon), and these points in Africa: Khartoum (Anglo-Egyptian Sudan), Entebbe (Uganda), and Livingstone (Northern Rhodesia).

Entire elapsed time between London and Johannesburg is scheduled at 23 hours, 40 minutes, but actual flying time will amount to only 18 hours, 40 mins. The return trip will require an additional 15 minutes. BOAC expects to speed up these times when formalities at transit points are accelerated. The Corporation also anticipates routing the Comet through Cairo, Egypt, instead of Beirut, thus reducing the total distance by 450 miles.

One Comet service per week will be operated through May, leaving London on Fridays and Johannesburg on Mondays. In June the frequency will be increased to three weekly, subject to delivery of new aircraft. BOAC's Hermes services, which now fly thrice weekly between London and Johannesburg on the west side of Africa, will be withdrawn progressively as the Comet frequencies increase. South African Airways, BOAC's partner on the Springbok route, will continue to fly its London-Johannesburg services along Africa's east coast.

BOAC's Springbok Comet will be fitted to carry 36 passengers, along with cargo and mail. There will be four operational crew—pilot, co-pilot, navigator, and radio operator—plus a steward and a stewardess.

BOAC has a total of 20 Comets on order from the de Havilland Enterprise. Nine of these are powered by de Havilland Ghosts, while the final eleven will have Rolls-Royce Avons, which will increase the Comet's range considerably. The Avon Comets are planned for use on trans-Atlantic routes in about two years.



RULE BRITANNIA: First flight of the prototype Bristol 175 Britannia airliner is slated for this summer. Powered by four Bristol Proteus turboprops, it has an all-up weight of 140,000 lbs. and can carry a payload of 25,000 lbs. for a still air range of 4,000 miles at a mean cruising speed of 360 mph. at 30,000 ft. Max. still air range with standard tankage and 12,000 lb. payload is 5,600 miles.

TCA Adds Seats

The seating capacity of TCA's North Stars is to be increased from 40 seats to 48, following approval by the DoT of necessary modifications. The program on the entire domestic fleet of 17 North Stars will be carried out at TCA's maintenance base at Winnipeg during 1952. The aircraft will go into service as they are completed.

To make room for the extra seats without reduction in leg room, the cloakroom and washrooms are to be rearranged. It is understood that the men's lavatory will be moved from its present position just aft of the flight deck to the rear of the aircraft, opposite the ladies' lavatory. To make room for the men's lavatory, the ladies' powder room (or whatever you call it) will be eliminated entirely. The men's washroom, now opposite the men's lavatory in its present position aft of the flight deck, will also be eliminated.

Change of Plan

CPA, which recently applied to the ATB for a license to extend its Montreal-Rouyn/Noranda service to Sudbury and thence to Toronto, has now asked that its application be amended by deleting Sudbury and substituting Earlton, Ontario.

CPA apparently feels that the airport facilities now being built near Sudbury have not sufficiently advanced to indicate the nature of the service for which they will be suitable, and the time at which the airport will be available.

Earlton is a small field located about 100 miles almost directly north of North Bay, Ontario, and a near equal distance southwest of Rouyn. It is in the immediate vicinity of New Liskeard, Cobalt, and Haileybury. A hearing on CPA's amended application was scheduled for April 30.

Meanwhile TCA would like to fit Sudbury into a proposed service running between Montreal and Sault Ste. Marie via North Bay.

More Service

A 27% increase in scheduled air service over TCA routes from coast to coast became effective on April 27. The additional service includes a fifth transcontinental flight in each direction, and increased flight frequencies on many intercity routes. They will be operated during the heavy seasonal travel period.

TCA will also extend North Star service to the Maritimes and Newfoundland for the first time, supplementing present DC-3 services in that area. This extended service will emanate from Montreal, touching Moncton, and Sydney and terminating at Torbay. Halifax will not get North Star service because the airport at Eastern Passage cannot handle such large aircraft. However, surveys of other possible airport sites near Halifax are currently being made by the DoT, and it is probable that a suitable airport will be built within the foreseeable future.

Switcheroo

In a surprise move, Branch T. Dykes was recently elected president of Colonial Airlines, Inc. Mr. Dykes has been vice-president in charge of operations & maintenance for Colonial since 1941.

The election was a surprise because

AIR LINE TRENDS

Comet Crash

Loss of CPA's first Comet 1A will mean an indefinite delay in the inauguration of jet airliner service on the Hawaii-Australia leg of the Canadian air line's South Pacific route. Apart from the destruction of the valuable aircraft on which the inception of the new service depended, CPA also has to find replacements for the five aircrew killed. Not only were these men among the company's most experienced personnel, they were also the only CPA aircrew with any commercial jet airliner training.

The Comet, CF-CUN, crashed and burned at Karachi, Pakistan, while making its take-off run on the third leg of its ferry flight from London to its operating base at Sydney, Australia. Killed in the crash were the five CPA aircrew, five de Havilland technical personnel, and Smiths Instruments' technical representative. (See "Names in the news".)

The aircraft left London on March 2 and flew directly to Beirut, Syria, a distance of 2,360 statute miles. After refueling at Beirut, it carried on to Karachi, 2,080 miles, where a normal landing was made at 3:25 pm local time. The Comet was then refuelled with some 7,000 gallons of turbo fuel, maximum capacity, and take-off on the Karachi-Djarkarta leg (1,615 miles) was scheduled for the pre-dawn hours of Tuesday, March 3. From Djarkarta, which is in Java, the flight was to continue on to Darwin in Northern Australia (1,730 miles) and thence to Sydney (1,840 miles).

The crew and passengers boarded the "Empress of Hawaii"—as it was to be christened at a formal ceremony in Honolulu on March 14—on Tuesday morning as planned and the pre-take-off operations were normal. Eyewitness reports say that the take-off also proceeded normally at first, but that the aircraft ostensibly failed to become airborne, running off the end of the runway through a fence, over a culvert, and finally into a ditch where it came to rest, bursting into flames. Because it was still dark, no witness was able to describe in detail what had taken place.

While there is some indication (marks on the runway where the tail-skid had apparently dragged) that this accident was similar to the non-fatal BOAC Comet accident at Rome some months ago, it will be some time before the official investigation is complete and the accident's cause definitely known.

TCA Surplus

A net surplus of $807,879 after payment of taxes was reported by TCA in its annual report for 1952. Unlike past years, the report does not separate overseas and North American services.

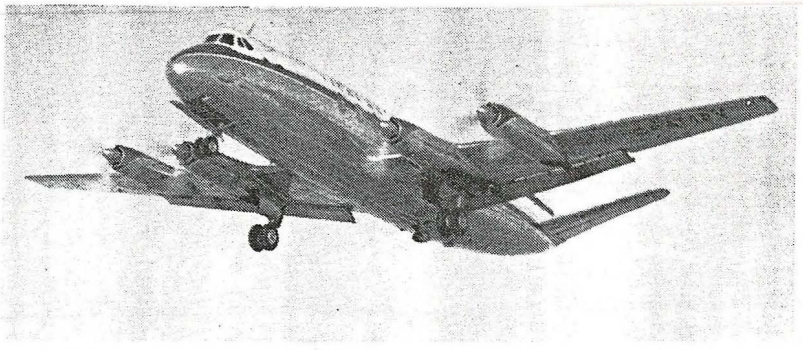
The report, signed by President G. R. McGregor, showed income tax payments of $1,200,000 on gross earnings of $2,007,879. This is the first year that TCA has been required to pay income taxes. The 1952 surplus was down from $3,890,957 in 1951, although operating revenues were 15% higher at $55,057,708 than in the previous year.

On the other hand, operating expenses for the year were up by 22% to $52,744,741 due primarily to the direct cost associated with the increased mileage flown, increased traffic carried, and increased payroll expenses, which TCA says alone amounted to $5,000,000. Due in great measure to "the loyalty and efficient efforts" of the company's 6,200 employees, the cost of providing each unit of air transportation continued to decrease, Mr. McGregor said.

The percentage rise in expenses was also affected in 1952 by exceptional items resulting from the fleet expansion program. Capital expenditure for which TCA is committed over the next two and a half years approximates $35,000,000, against which progress payments of $5,600,000 have already been made.

The statement showed also an increase of 20% in volume of passenger transportation while air cargo and air express volume increased by 30% and mail volume by 8%. On system routes TCA carried 1,132,518 passengers—the first time it has carried more than 1,000,000 passengers in one year—flew 5,643,920 ton miles of aircargo, and 1,398,507 ton miles of air express. Mail ton miles increased to 4,843,052.

VISCOUNT IN CANADA: Shown in Montreal and taking off for Winnipeg (via Toronto) is the Vickers Viscount 700 prototype, now undergoing cold weather trials in Western Canada. While in Canada, the Viscount is being operated by a Vickers crew, working in close collaboration with TCA technical and operational personnel. TCA has 15 Viscount 724's on order, a model almost identical to type shown here. Other Viscount 700 series aircraft are already in service with BEA and Air France.



CPA All-Cargo Hearing

The ATB is expected to hand down a decision this month on CPA's application for a license to operate a Mon-