

Better ATC Must Come Soon, Quesada Tells CAI-IAS Meeting

Delegates to meeting hear 20 papers on Aeromedicine, Aeroelasticity, Aircraft Actuating Systems, Propulsion, Environmental Testing, Materials and Flight Testing.

THE ACCELERATED search by the U.S. Airways Modernization Board for ways and means to prevent air collisions and speed air traffic, was described by the Board's chairman, Gen. Elwood R. Quesada, USAF (Rtd.), to delegates attending the 1958 joint meeting of the CAI and the IAS, held this year in Ottawa, Oct. 7-8.

Gen. Quesada, who is also newly appointed administrator of the recently established U.S. Federal Aviation Agency, spoke at the meeting dinner. He said that the Board is attempting to carry out its task in five ways.

Of premier importance in speeding up and making air traffic safer, was the transmission and processing of data from ground to air. As air travel recognized borders but not barriers, it was necessary to ease the load on the jammed radio frequencies now carrying air traffic information.

The General stated that "management of air traffic must change and keep in step with technical advances, or free enterprise will lag." He said that the government had not kept up with changes in aeronautics.

On Paper

TWENTY papers were presented at the two-day meeting, these being classified under seven general headings, including Aeromedicine (chairman, G/C W. R. Franks, Scientific Adviser, Inst. of Aviation Medicine, RCAF); Aeroelasticity (chairman, B. J. Kaganov, Asst. Chf. Eng., Research & Development, Canadair Ltd.); Aircraft Actuating Systems (chairman, D. R. Taylor, Dir., Engineering Products Div., Aviation Electric Ltd.); Propulsion (chairman, R. B. Sachs, Chf. Design Analysis Engineer, Orenda Engines Ltd.); Environmental Testing (chairman, G/C R. M. Aldwinckle, Dir., Instrument & Electrical Engineering, RCAF); Materials (chairman, R. Smallman-Tew, Chf. Metallurgist, Avro Aircraft Ltd.); Test Flying (chairman, E. L. Bunnell, Chf.

Test Pilot, Bristol Aircraft (Western) Ltd.).

Resumés of most of the papers given at the meeting follow.

Piloting Research Aircraft—Joseph Walker, National Advisory Committee for Aeronautics.

Historically, the pilot has been at the forefront of new developments in aircraft and flight testing, aiding in the design and suggesting improvements. Author sets out to show that, although the human pilot has his limitations, experience has revealed that each time a problem has arisen, improvement of design, additional airborne and ground aids, and greatly improved flight test procedure have resulted in solution of the problems. Recalling the immense increases in speed and altitude over the years with a man at the controls, it is concluded that piloted flight testing should be capable of assuring achievement of desired goals in the future.

Design and Application of Mach 4 Turbine Engines—M. A. Zipkin and R. E. Neitzel, General Electric Co.

The performance of turbine engines designed to power self-accelerating Mach 4 vehicles is considered in this paper. Engine performance requirements are related to the mission with particular attention paid to the acceleration of the vehicle. A straight Mach 4 turbojet engine is described, and the factors involved in the selection of the cycle are presented. A turbojet-ramjet engine (dual cycle), which would be based on an existing Mach 3 turbojet, is also described and then compared with the straight turbojet.

The Flutter of Low Aspect Ratio Wings—Walter P. Targoff and Richard P. White, Jr., Cornell Aeronautical Laboratory Inc.

Until recently, a dependable method for estimating the flutter characteristics of low-aspect-ratio wings has not been available for general use even in incompressible flow. Development work conducted by NACA has resulted in programs for use with the IBM 704 Digital Computer, for the determination of flutter characteristics of low-aspect-ratio wings in subsonic and supersonic flow. However, analysts not having an IBM 704 available, are still without a dependable method for estimating such flutter characteristics. In 1952, Lawrence and Gerber proposed an approximate method by which the surface pressures of a low-aspect-ratio wing with a straight trailing edge could be calculated with a reasonable amount of effort by reducing the two-variable integral equation of lifting surface theory to an integral equation of only one independent variable.

The Design of Training Equipment—Clifford P. Seitz, Grumman Aircraft Engineering Corp.

In the development of military skills . . . from decision making to knob twirling . . . training devices can make a significant contribution. It has been demonstrated on many occasions that training devices can save time and money, increase safety and improve the

level of training. To secure maximum improvement in training at the lowest cost, the right device must be used. Getting this device depends on defining the training problem, research and experience. Training may be thought of simply as helping others to learn a task or group of tasks. Learning takes place in steps: (1) Idea; (2) Trial; (3) Practice; (4) Integration; (5) Refresher.

Close Tolerance and Other Special Forgings—Wm. Morgan, Canadian Steel Improvement Ltd.

An outline of some of the problems associated with the production of close tolerance and other special forgings, with particular reference to the dimensional limitations and design restrictions imposed. There are a number of reasons why a demand exists for forgings in these categories. Basically, the aircraft manufacturer wishes to eliminate all possible machining operations, to conserve materials which, in certain instances, are decidedly expensive, to produce components having the optimum metallurgical characteristics so far as grain flow and structure is concerned, and consistent with the foregoing requirements to produce articles in which no deleterious skin effect exists.

Thermal Insulation Ceramic Coatings—Alan V. Levy, Marquardt Aircraft Co.

The development of advance performance aircraft and missile powerplants has resulted in a requirement for protection of metal components in the combustion area of the engines that extends ceramic material considerably beyond the range of their previous applications. Frit type ceramic enamels have had considerable use applied on components that contained hot combustion gases at temperatures below 1800°F. The shortcomings of this type of ceramic coatings were its temperature limitations and its inability to insulate as well as protect the base metal. Advanced powerplants require ceramic coatings that specially overcome the two shortcomings of the frit type. Two types of coatings have been developed that have successfully withstood temperatures of 3000°F. and above, markedly reduced the operating temperatures of the metal components upon which they were applied, and yet have withstood the severe mechanical vibration of powerplant operation.

Broad Outline of Aircraft Feel . . . Pilot's Appreciation—W. J. Potocki, Avro Aircraft Ltd.

Paper describes generally and discusses briefly, the various types of feel in aircraft, ranging from sample subsonic types to the recent high speed supersonic machines. The intention is to consolidate, from the pilot's point of view, the principles underlying the understanding of aircraft feel. As control of the modern aircraft is primarily a two axis (pitch and roll control, the discussion deals mainly with the elevator and aileron systems.

Powerplant Design Considerations for VTOL Jet Transports—Martin J. Saari, NACA.

The specific intention of this analysis is to

..... Britannias in Service

By C. A. WATT

ON SEPTEMBER 20, a CPA Bristol Britannia — the Empress of Santa Maria—took off from Tokyo airport carrying 67 passengers and a three-man supplement to its normal crew of eight. Eleven hours, forty minutes and no stops later when it touched down at Vancouver Airport, the turboprop airliner had set a new speed record for commercial transports on the North Pacific, bettering CPA's own previous record of 13 hrs. 33 mins.

Had the Vancouver tower been able to give clearance to the incoming captain (Fred Meilicke, of Vancouver) when he asked for it, CPA would have been able to chalk up 11 hrs. 26 mins. as its record for Britannia service on the 4700-mile route between Tokyo and Vancouver.

While all CPA North Pacific flights will not be this fast, the airline's flight operations personnel expect that during the coming winter months, the combination of increased jet-stream assistance and the long-range cruise capabilities of the Britannia, should allow a majority of the trips to be operated non-stop.

Pilots flying the route, however, are confident that the present record can be broken, though it will be quite an achievement, considering that the Empress of Santa Maria was travelling at an average speed of 418 mph. While flying at an average altitude of 27,000 feet, the aircraft was greatly assisted by jet streams whistling along at an average speed of 75 mph.

The principal method of achieving east-bound non-stop flight is to take the Britannia to the maximum altitude allowable, considering temperature and gross weight. After achieving a commencement cruising altitude of approximately 21,000 feet, the pilot then step-climbs the aircraft to a maximum of approximately 33,000 feet prior to descent at Vancouver.

Cold Bay (Aleutians) is the regular refuelling stop on west-bound flights. Anchorage and Fairbanks

are alternates for Britannia flights in both directions.

Average flying time from Tokyo to Vancouver this winter will be in the neighbourhood of 11 hrs. 45 mins. on non-stop flights, and approximately 12½ hours on one-stop operations. The Vancouver-Tokyo average will be approximately 15½ to 16 hours. Flying times between Hong Kong and Tokyo will range around the six-hour mark.

Thus it is readily seen that CPA provides the fastest passenger, cargo, and mail service between North America and the Orient, since the company is operating Britannias exclusively on the North Pacific route. Cargo-wise, for example, merchandise can be transported from Tokyo to Toronto in 32 hours, or Tokyo to New York in 37 hours.

"If the Canadian government approves CPA's application for main-line routes within Canada," says the company's cargo manager, T. W. Brown, "service to Eastern Canada and U.S. destinations will be even faster, since CPA will be able to offer a direct, one-carrier service right through from Tokyo to Montreal."

Orient-bound Britannias have a seating capacity of 88 (16 first class, 72 tourist) allowing for greater passenger comfort. With their cargo capacity of 829 cubic feet, the turboprops have an increased capacity of 45% over the DC-6B's previously in service on this route.

The airline set the stage for its Britannia operation on the North Pacific on June 1, when the first of CPA's six Britannias were put into service on the Polar Route between Vancouver and Amsterdam. On August 24, turboprop service was inaugurated between Vancouver and Tokyo. However, Canada's flag-carrier to the Orient was not able to extend Britannia service to Hong Kong until September 28, because the new airstrip at the Crown Colony, designed to accommodate the additional weight of large aircraft such as the Britannia, had not been completed.

(Continued on page 100)

(1) determine the effects of some of the general powerplant installation variables on VTOL transport performance, (2) indicate desirable lift engine design characteristics for VTOL transport applications, and (3) examine the unique operating requirements of the lifting turbojet engines for practical approaches toward reducing engine specific weight. The performance of the VTOL jet transport is compared with that of an equivalent conventional transport to provide a reference evaluation.

Functional Mock-Ups for Aircrew—M. G. Whillans, Defense Research Board.

Everyone admits the need to consider the human element in designing aircraft, and much attention is being given to human factors in specification and in design. In such matters as seat height, visibility from cockpits, placement of instruments, etc., there has been considerable work and consultation with experts, usually late in the design and fabrication process. However, there has been little professional pre-planning of the human element in such systems, and no or little attention to the main problem, i.e., will this man-machine combination do the job for which it has been designed?

The Aeroelastics of Tall Stacks—R. A. Boorne, Mount Allison University.

In the field of aeroelastics, the most important problem is that of aircraft flutter. There are, however, several other phenomena of technical interest which involve the interplay of aerodynamic, elastic and inertia forces, and, hence, come under the heading of aeroelastics. These include the singing of telephone wires, the vibration of smokestacks, wavestacks, television antennae, pipe lines, submarine periscopes and, more recently, the lateral vibration of missiles mounted for launching. Vibrations of this type are characterized by separation in the fluid flow, and are sustained by aerodynamic forces which are fundamentally different from those involved in classical flutter.

The Use of Models in Aeroelastic Analysis—J. A. McKillop, Avro Aircraft Ltd.

The influence of aeroelasticity on modern aircraft design is outlined together with the requirement for aeroelastic data which cannot be obtained from analysis. The development of experimental methods to supplement analytical work is reviewed, and some examples presented. The theory of aeroelastic model design is briefly treated, and the types of models required for different applications are discussed. Model construction, instrumentation and test techniques are presented, and some conclusions are derived regarding the role played by aeroelastic models in the design process.

The Ordnance Corps Enval Program—Howard M. Bunch, Southwest Research Institute.

Paper describes the U.S. Army Ordnance Enval System, a program designed to indicate the ability of Ordnance equipment to operate in severe ground environments through the use of numerical ratings. The program was initiated in 1951; the code name "Enval" is a contraction of the words "environment" and "analysis". The Enval system does not attempt to make a finite prediction of item reliability; rather it attempts to deduce only general performance capabilities from specific test results.

Environmental Simulation—C. A. Mills, Canadian Westinghouse Co. Ltd.

With the development of the art of simu-

(Continued on page 98)

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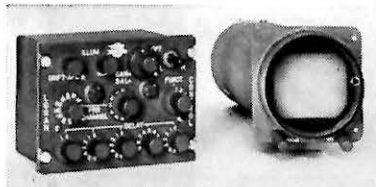
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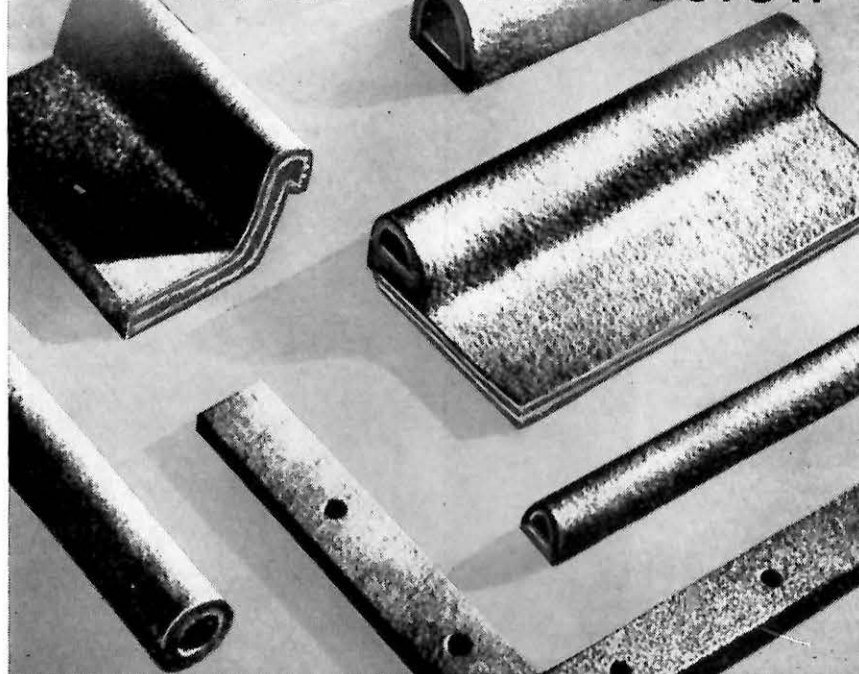
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barrels of alkylate per day. Alkylate is a component of aviation gasoline with a high octane rating. Handling and tankage facilities are also included in the project.

H. F. Wheaton, refinery manager, said that engineering work for the plant is under way now, and tenders for construction have been called. Award of a contract is expected in November, and construction crews will move onto the site by next May. At the present time jet fuels are made at the Winnipeg refinery. Imperial's Calgary refinery produces aviation gasoline for Alberta, Saskatchewan and northern areas.

50 Airports to Get ILS

The DoT has purchased 50 Instrument Landing System localizers for airports across Canada. The installations, costing \$1 million, are being made in line with the policy of the Department to modernize Canadian airways with the latest aids.

Of the 50 ILS localizers, 13 will be used to replace obsolete equipment; 22 will be used for airports presently not equipped with such facilities, and to fit additional runways at some of the busy airports. Fifteen will be used for installations in the future at airports where traffic density and other circumstances justify the cost. At the present time, there are 26 ILS installations at 20 airports across Canada.

Dealer Appointments

Unipak Aviation Corp. has announced the appointment of Canadian Airmotive, Hamilton, and Commander Aviation Ltd., Gananoque, Ont., as dealers in Canada for all Unipak lines. Additional Canadian appointments are pending.

CAI-IAS MEETING

(Continued from page 74)

lation one must be careful not to assume that the testing is always the final proof of the product quality. Where new equipment is designed for operation in an existing aircraft, or in a new aircraft somewhat similar to an existing one, then the simulation test can be set up in a manner such that the performances under actual and simulated environments are synonymous. Military specifications are based on this assumption. In new applications, and this is the more common problem these days, the simulated test is usually a target requirement which will be subject to modifications in the light of early flights. In this latter case, the final proof of the product quality is its performance under flight conditions as with the airframe itself. The testing prior to flight, however, will have