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THE EFFECT OF TURBINE-POWERED CIVIL AIRCRAFT
ON THE DESIGN, CONSTRUCTION AND EQUIPMENT
OF LAND AERODROMES

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INTRODUCTION

Although it is too early to say which aerodromes in the world will need to be capable of accommodating turbo-jet or turbo-prop civil transport aircraft as a regular routine, the time is ripe for considering how the advent of such aircraft is likely to affect aerodrome design, construction and equipment. By attending carefully to such matters now, it may prove possible, on the one hand, to avoid costly mistakes when new aerodromes are being constructed or existing aerodromes improved and, on the other hand, to ensure that aerodromes are made ready in good time to accommodate turbo-prop and/or turbo-jet aircraft, as and when they are introduced into regular air transport operations.

Sufficient information has now been collected through military flying experience, supplemented by a limited amount of development flying by civil turbine-engined transport prototypes, to permit listing a number of turbine-engined aircraft performance, structural, engine and operational characteristics that may need to be taken into account in aerodrome design and equipment. Part I of this circular presents these characteristics and indicates in connection with each the general elements of aerodrome design and equipment likely to be affected.

More difficult is to determine what direct or indirect effect each factor is going to have on aerodrome characteristics and equipment, and having done so, to determine what action, if any, should be taken. To assist those seeking a solution of this latter problem, and also to stimulate thought on the subject, a commentary based on selected elements of aerodrome design, construction and equipment is presented in Part II of this circular. The possible effects of future changes in air traffic control technique upon aerodrome design are not covered because solutions to control problems introduced by turbine-engined aircraft have not yet been fully developed.

In preparing the contents of Part I, the Secretariat has drawn upon statements by experts in this specialized field, made at the IATA Turbine-

engined Aircraft Symposium (18 and 19 May 1950 - Asbury Park, New Jersey, U.S.A.) and, upon views presented in lectures, articles, etc. that have appeared in full or have been reported upon from time to time in the aeronautical and engineering press. It is not claimed that information thus collected and assembled is complete; nor are all the data guaranteed accurate at the time of printing: the fact that fresh evidence and data are being accumulated daily precludes completeness or accuracy. Those who are able to contribute additional information or suggestions are invited to communicate their views to ICAO Headquarters.

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PART I.- PERTINENT FACTORS

1.- AIRCRAFT PERFORMANCES

1.1.- Take-off distance and methods of accelerating take-off

Some manufacturers believe that requirements for main runway basic length in the case of turbine-engined airliners are dependent upon the landing distances, while others believe that the take-off distances are more likely to remain the limiting factor. Normally, in the operation of modern conventional civil transport aircraft, the accelerate-stop distance is the determining factor of the runway length; exceptions occur where the available take-off power of aircraft is appreciably higher than the minimum take-off power required by regulations.

Since turbine-engined airliners have to fly at greater altitudes than present day piston-engined airliners to achieve economic operation, their climb performances must allow for adequate margins at such high altitudes. The power and wing loading required for these climb performances appear at present to be such that, at sea level, under standard atmospheric conditions, turbine-engined aircraft automatically will have take-off characteristics that, in respect of required maximum runway length, are not much different from those of piston-engined aircraft.

There is no reason to believe that longitudinal runway slopes or wind speed will have any more effect on the take-off of turbine-powered aircraft