

# RESEARCH

## *Annual Report of the National Physical Laboratory*

**E**STABLISHED in 1900, the National Physical Laboratory at Teddington has expanded to an extent which probably few people realise. There are 14 large buildings in grounds totalling some 50 acres, and the staff employed on research of all sorts exceeds 600.

From the Annual Report for 1933, issued by H.M. Stationery Office this week, price 13s. net, it is evident that work was carried on last year which will be of the greatest importance to science and industry in all their branches. The particular sphere in which FLIGHT readers may be expected to be interested, that relating to flying and all the other related sciences, is not dealt with as fully as in the special reports issued by the Aeronautical Research Committee, this being a general report on the work of the whole of the N.P.L., but a good deal can be gleaned from a perusal of the report.

### **New Wind Tunnels**

A new tunnel with a wind speed of 140 miles per hour was constructed and put into use in 1933, and a second, similar tunnel is under construction. These new tunnels are of the modern open-jet type, *i.e.*, the central, working section is not enclosed, but an object can be thrust from the surrounding still air into the centre of the wind-stream. The jet of high-velocity air is about 8 ft. across and an expenditure of energy at the rate of 400 horsepower is necessary to maintain it. The much higher air speed attainable in the new tunnels is of the greatest value in view of the continuously increasing speed of modern aircraft.

### **Spinning**

The "spin" has been the cause of many accidents in the past, owing to failure to recover. Adequate side force on the fin and rudder and the body of the aeroplane will stop the rolling motion of the wings. But, unfortunately, under spinning conditions the fin and rudder may become entirely inoperative owing to being "blanked out" by the tailplane. The subject is complicated by the action of

the centrifugal forces on the various parts of the machine, and the weight distribution may be such that these forces either help or hinder recovery from a spin. Further, what is a good weight distribution in one design of machine may be bad in a different type.

This difficult subject has been dealt with in a simplified manner for the assistance of aircraft designers. A special report has been published which explains in simple language the various factors governing the spin and gives a condensed collection of data on the subject. Largely as a result of the experimental work carried out at the laboratory, the subject is much better understood than was the case a few years ago, and it is seen that no very great difficulties should lie in the way of designing aeroplanes which are free from spinning troubles.

### **Landing of Aeroplanes**

Great strides have been made by the designers of modern aeroplanes in the reduction of head resistance, and the progress is represented by higher and higher top speeds. But this low resistance becomes a serious disadvantage in the process of landing the aeroplane. The pilot is compelled to approach the aerodrome at a fine angle to the horizontal and has to skim over the ground for a considerable distance before his speed is low enough to touch down; after this the use of wheel brakes enables him to pull up quickly. In order that landing may be carried out in a reasonably small space, especially when there are tail obstacles to be cleared at the edge of the aerodrome, it is necessary to fit some form of air brake, which will increase the head resistance of the machine whilst it is still in the air. Certain forms of projecting surfaces or flaps fitted to the wings have been tested on the model scale at the laboratory, and have been shown to fulfil practical requirements. Some of these flaps have the advantage that they increase the lift as well as the resistance, so that their use would enable the present lowest possible landing speed to be considerably reduced. Certain of these devices are shortly to be tried on the full scale.

## THE AVRO TYPE 641



**FOR COMFORT AND SOLIDITY:** Spectacular performance has not been sought in the design of this "Lynx"-engined Avro. The machine is a 4-5 seater with dual control, and is finished and upholstered in a style comparable with that of a high-class motor car.