AERODYNAMICS AT TEDDINGTON

THE current scope of the work of the National Physical Laboratory at Teddington was once again on show during the laboratory's Open Days last week. Some 4,000 visitors, it was estimated, inspected the 200 exhibits and discussed with the staff a variety of research topics.

The main interests of the aerodynamics division, largest of the specialized departments, were illustrated in a selection of well presented displays. These came under the four main headings of boundary layers and shear flows; aerodynamic design of swept wings for high cruising speeds; hypersonic flow research; and work on the use of slender wings for supersonic aircraft.

A set of oil-flow photographs on the wall of a laboratory in High-speed Laboratory B, and a model in the 25in × 20in transonic tunnel nearby, indicated that under the second of these headings the division had an active interest in the M-wing. The test programme on this model, with and without a nacelle, had in fact only recently begun: no detailed interpretation of the photographs had been made and significant results were not expected for about three months. The present phase was concerned with measuring lift, drag and pitching moment, and with investigating the flow pattern optically and by oil-film techniques. This will be followed by the measurement of rolling and pitching derivatives in a major study of oscillatory effects.

The cranked plan-form of the M-wing has recently attracted much attention from designers of supersonic aircraft, and is a feature of the Mach 1.2 airliner project designed by the Armstrong Whitworth company. Several advantages over the conventional straight swept-back wing are claimed for it: structural problems may be easier; the engines can be installed conveniently in the kink; and the shape of the nacelles may be designed to influence favourably the flow over the whole wing, so reducing wing and nacelle drag. The changes in the position of the centre of pressure with aircraft speed or altitude may well be less for the M plan-form, and this would ease stability problems. During landing and take-off the wingtips are farther from the ground in the case of the M-wing and therefore the aircraft undercarriage can be shorter and lighter.

In the hypersonic field the N.P.L. facilities include one main shock-tube of 16in working section diameter and two smaller tubes, with an 8in "hot-shot" tunnel and a larger shock-tube now under construction. Since our report and illustration of the main shock-tube on the occasion of last year's Open Day, the design has been changed from straight-through type with plain divergent nozzle to reflection type using a convergent - divergent nozzle. A 10 cu ft extension to the tube has been added to effect a reduction in final pressure, and general development over the past year has been directed toward making the tube and its instrumentation more robust and easier to operate.

M-wing half-model, current subject of testing in the 25in × 20in transonic tunnel at the National Physical Laboratory

Investigations so far conducted with this tube have shown that it can produce "hot" hypersonic flow with a duration of 100 to 200 microseconds with stagnation temperatures of the order of 4,000 deg K. Shorter flow durations are obtainable up to 6,500 deg K. As the stagnation temperature is raised above this figure an electric-arc hot-shot becomes more attractive than the shock-tube, but the latter, with its "cleaner" flow, should remain useful for shock Mach numbers less than ten, i.e., in the stagnation temperature range from 1,500 to 6,500 deg K.

Work on the M-wing and in the shock-tube laboratory were only two of the many aspects of current N.P.L. activity on view. Among other items displayed were the results of investigations into tangential blowing for boundary-layer control; results of heat-transfer and surface-friction measurements in separated regions in supersonic flow; and the development of a remotely controlled probe in the exploration of three-dimensional vortex flow over wings. In the compressor house next to High-speed Laboratory B was installed the new 4,750 h.p. centrifugal compressor, used for supplying compressed air to the high speed wind tunnels, and a number of new vacuum pumps.

GANNET AEW CARRIER TRIALS

IN our issue of August 29 last we published preliminary details of the Fairey Gannet AEW.3, the prototype of which had made its first flight nine days previously. Adopted as the future standard early-warning aeroplane of the Royal Navy, this latest mark of Gannet is completely redesigned; powered by a Bristol Siddeley Double Mamba engine of increased rating, it has an entirely new fuselage and tail unit and can carry an exceedingly powerful radar equipment to extend the range of surveillance of carrier task-forces.

This mark of Gannet has been designed to operate from the smallest aircraft carrier. Deck-landing trials took place in the English Channel last month and were completely satisfactory. The aircraft concerned was XL 451 (the prototype was XJ 440 and production machines started at XL 449). Three pilots were involved in the trials: Roy Morris of Fairey Aviation, and Cdr. C. E. Price and Lt-Cdr. T. C. Evans from Boscombe Down. Observers were H. J. M. Lawrence of Fairey Aviation (ex-849 AEW Sqn.), C. O. Clark and Lt. P. J. Oldridge.