ARMSTRONG-WHITWORTH TAILLESS GLIDER

INFORMATION has just been released that an experimental glider of the 'Flying Wing' type, known as the A.W.52G., has been in operation since March 1945. It was designed and built in Messrs. Armstrong-Whitworth's works for experiment upon the behaviour of this kind of aircraft in those respects in which only full-scale tests give reliable data, particularly control and stability, without the more conventional tail surfaces. Experience gained upon this will be used possibly for the design of larger tailless machines of multi-engined and jet-propelled types. Flying has been carried out by Mr. C. Turner-Hughes, followed by Mr. E. G. Franklin, and the design was due to the firm's chief designer, Mr. J. Lloyd.

The general layout of the machine is a monoplane of broad 'Vee' plan form, the wings having a sweep back on the leading edges of 30°. The wing span is 53 ft. 4 in., and the chord is 12 ft. 4½ in. at the root, with a considerable taper to the tips. Rudders and fins are carried on the wing tips. It is probable that this glider could have been flown without rudders, but knowledge of their behaviour was needed for the design of a larger multi-engined aircraft, that would need them to correct yaw due to failure of one of the engines. The principal control is obtained by a combination of trailing edge flaps and tabs, modified by correctors, controllers, and spoilers, an arrangement of extremely novel type. The construction is of wood, and a smooth and non-varying profile form is obtained by making the skin of 'Plymax', which is plywood with light alloy sheet bonded together.

A test glide is made by towing the machine to about 12,000 ft. altitude and releasing it. The resulting glide to earth takes about twenty-five minutes, and most of the observations are taken by recording instruments and photographic records taken with specially designed cinematograph cameras.

It is probable that whatever the results work out to be for propeller-driven machines and to-day's speeds, wings with a pronounced sweepback will be a necessity with jet propulsion at supersonic speeds, to delay the onset of compressibility. The wing tips, being so far back, may conceivably be able to carry the directional control surfaces efficiently, and the drag and weight of the conventional tail and its supporting girder avoided. The absence of a tail may also help the closer grouping of multiple-jet power units nearer the centre line of the aircraft, which will reduce the offset pull due to the failure of one of them. The close grouping of the engines is limited nowadays by propeller diameter; but this trouble is avoided with jet propulsion.

TRANSFORMER OILS

A GENERAL discussion on transformer oil, organised by Mr. E. A. Evans, vice-president of the Institute of Petroleum, was held at the Institution of Electrical Engineers on April 9.

P. W. L. Gossling and A. C. Michie, in presenting the contribution of the British Electrical and Allied Industries Research Association to international research on transformer oils, pointed out that so long ago as 1926 the Advisory Committee of the International Electrotechnical Commission arranged that comparative tests on samples of identical oils should be carried out by the various standard national methods. So it was apparent in those days that a serious effort was being made to develop an international standard method for the examination of insulating oils. In 1930 the Committee appointed delegates to study the factors influencing the oxidation of oils, because it was clear that the methods of test were handicapped by insufficient knowledge of the subject.

The British Standard Specification 148 was a bold attempt to formulate the requirements of transformer oils for the British market. That specification has been subject to revision, but in principle it remains substantially as it originally stood. Of course it had critics. So, in 1935 the International Electrotechnical Commission submitted a questionnaire to the international committees inquiring for the principal causes of trouble in transformers. The British reply was that, prior to the introduction of B.S.148, breakdowns were mainly attributed to sludge; but since its introduction this type of breakdown had been practically eliminated. The replies from other countries indicated that sludge was the most troublesome.

About this time Class A oil, which is virtually a technical white oil, was beginning to lose some of its popularity, due to the alleged acid formation and the risk of corrosion. On the Continent of Europe this type of oil had never been really popular; but the different points of view cannot be wholly separated from the designs of the respective transformers. In Great Britain, varnished windings were much used, whereas in Switzerland bare cotton was exposed to the acid in the oil and was therefore subject to deterioration by generated acidic bodies.

During the last year or two, there have been murmurs about the transformer oil which was available. It was therefore considered prudent to make as complete an investigation as possible so that the post-war programme could be undertaken with the maximum of considered opinions.

J. Wood-Mallock presented a paper on "Some Developments in the Refining of Transformer Oils". He stated that sulphuric acid is still used in refining electrical oils. By increasing the treatment with the acid the tendency towards acid production on ageing increases; therefore it is well understood that if an oil is generously treated with sulphuric acid it will have a greater tendency towards acid formation, and possible corrosion. But, when liquid sulphur dioxide is used as a refining agent, an oil is produced with much reduced tendency towards acid formation. This seems to be true, even with an increase in solvent dosage. On the other hand, a reduction in sludging value is obtained by increasing the degree of acid treatment.

In this very well-reasoned paper Wood-Mallock produced evidence that by certain treatment the natural inhibitors are removed and that during refining pro-oxidants can be introduced. In fact, an oil containing 0·0014 per cent ash consisting principally of calcium sulphonate would give a sludge value many times that of an oil from which this material was absent. So refiners are faced with the difficulty of retaining the anti-oxidants and avoiding or removing the pro-oxidants. If it is difficult to evade these two problems, then it is natural to turn to anti-oxidants.

P. George and A. Robertson, of the Department of Colloid Science, Cambridge, gave "A Review of the Mechanism of the Oxidation of Liquid Hydrocarbons".