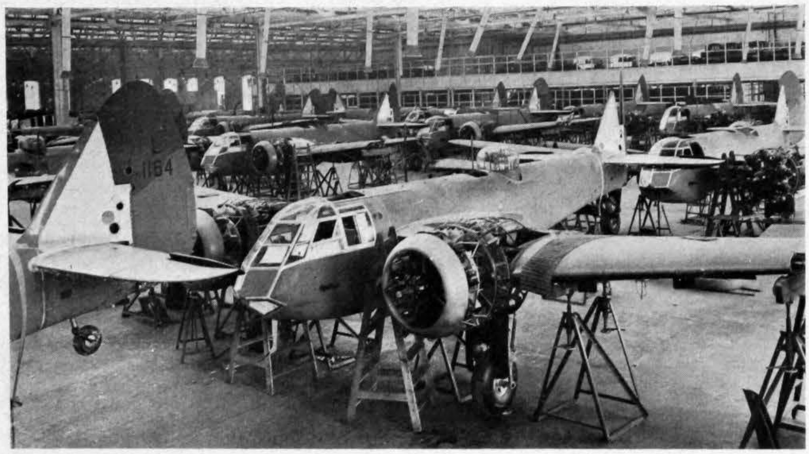
Engineering Jubilee at Bristol

To-day is the fiftieth anniversary of the founding of The British and Colonial Aeroplane Company by Sir George White, Bt., with a capital of £25,000. The products of that firm and its successors have been prominent in the history of aviation and of this country ; the first recorded military heavier-than-air flight was made by a "Boxkite," while in the Great War the "Scout" and, particularly, the two-seater "Fighter" earned fame, both being designs of Capt. F. S. Barnwell. After the war the firm was named The Bristol Aeroplane Company, and in 1920 it acquired the Cosmos Engineering Company, builders of air-cooled radial engines. The use of direct air cooling predicates very complete control of the air flow if satisfactory net thrust is to be realised. An early



example of this theme is seen ABOVE on the Type 72 racing monoplane, with a ducted spinner and full cowling for the 436 h.p. "Jupiter" IV; the stub exhausts protrude through the cowling. The fin and rudder have a profile that was to remain recognisable until the "Buckingham" and "Brigand" displayed fins in each slipstream. The 72 was never cured of aileron reversal attributable to inadequate wing stiffness. Another single-seat monoplane, but with a fixed undercarriage, the Type 138, twice broke the heavier-than-air altitude record in the years immediately before the last war ; it was powered by a highly supercharged "Pegasus" engine, other versions of which saw extensive civilian service. With the same cylinder dimensions but a smaller overall diameter, the "Mercury" was intended for military use, but two were used in a light transport for Lord Rothermere, the Type 142 "Britain First," which proved itself some 50 m.p.h. faster than the fighters of the R.A.F. The bomber that stemmed from this origin, the "Blenheim," is seen LEFT, in production in its Mark I form ; notice the close cowling of the engines.

The "Blenheim," used principally as the Mark IV with extended nose for the navigator/bomb-aimer, was supplanted by the even faster "Beaufort" torpedo-bomber with twin fourteen-cylinder sleeve-valve "Taurus" engines, from which evolved the "Beaufighter," with a pair of "Hercules" engines. This machine remained for year after year the most heavily-armed fighter in service, having a fixed gun complement of four 20mm cannon, to reload which was the duty of a second crew member behind the wing, and six rifle-calibre Browning guns. The airframe afforded an excellent gun platform, allowing kills to be made at such a range as not to imperil the machine, while the disposable load could include bombs, rockets, or a torpedo. A.I. (Airborne Interception) radar was carried in the night-fighter role, while the high fuel economy and relative immunity to damage of the air-cooled engines allowed successful patrols across the Bay of Biscay. The machine RIGHT is the last of over 3000 built at Weston-super-Mare

After the war, radically new products were undertaken. Single- and tandem-rotor helicopters were built, for which poppet-valve radials and small gas turbine engines were purchased. By far the biggest project undertaken, however, was the "Brabazon," designed to carry passengers across the Atlantic non-stop in luxury ; grossing 290,000 lb, it is still the largest landplane ever built in this country. The prototype, seen LEFT, had eight "Centaurus" engines driving four contra-props through individual transmissions ; however, the firm had always striven for engines of the largest power and consequently had diverted much of its effort to turbine power plant. The first such project, the "Theseus," followed the Bristol tradition of emphasising fuel economy to the extent of being designed for a heat exchanger. For the "Brabazon" there was developed the "Proteus," which takes after the piston engines not only in offering high power and long life, but also in being comparatively short and fat ; two are seen installed in an Avro "Lincoln" flying test bed LEFT.

Before a "Proteus"-powered "Brabazon" had been completed the company diverted its efforts to the four-engined "Britannia," which in transatlantic service grosses 180,000 lb ; however, before the development of even this smaller machine was completed piston-engined airliners had been developed to perform scheduled non-stop transatlantic flights. The shorter, earlier versions, used on the Empire routes, were the first turbine machines to enter many latitudes in commercial service, and it fell to them to show that the standards of ice toleration established from experience in the northern hemisphere were inadequate. Six international airlines use the "Britannia," which is the only British airliner ever to be in service all round the world ; at present utilisation is over 3,000,000 miles a month of revenue flying. This machine introduced the bogie undercarriage to commercial service (RIGHT), and to meet United States requirements the bogie was modified to tolerate pivot turns. Derivatives of the "Britannia" include the Canadair "Argus" with Turbo-Compound engines and the CL-44 and Short "Britannic" with compound turbines.

After the war, there was commenced the manufacture of a version of the B.M.W. 327/80 with the 1971 c.c. in-line water-cooled poppet-valve engine and a fixed head coupe body. A special body built by Farina inspired the highly aerodynamic "401," built on aircraft principles in light alloy, seen LEFT. Still with the same sized engine, the speed went up to over 100 m.p.h. in the "403," while for Frazer-Nash competition cars up to 140 h.p. was made available. To-day, however, the cars are available only with coach-built bodies ; the engine has been bored out to displace 2216 c.c. Another change is that the rear axle is located laterally by a Watts linkage instead of an "A" bracket in order to give some choice of roll centre height, but otherwise the B.M.W. layout is retained, there still being an open propeller shaft. Distinctive details of the design are a free-wheel in the first ratio of the four-speed transmission and a built-in chassis lubrication system.

Another new product is guided weapons. To provide an expendable air-breathing engine, Bristol, with co-operation from Boeing, developed a supersonic ramjet, the "Thor," two of which power the "Bloodhound" long-range anti-aircraft weapon. This missile is virtually a supersonic unmanned aeroplane, manœuvring in the twist-and-steer manner by moving the monoplane wings; however, it is confined to point defence by a semi-active guidance system. The four solid-propellant boosters seen on the example at RIGHT are also Bristol products, while Bristol Aerojet, Ltd., are building both solid- and liquid-fuelled rockets. The construction of free-turbine engines led naturally to compounds, and the "Olympus," which followed the example of the "Pegasus" in achieving heavier-than-air altitude records, is the only British compound engine yet to see service. A compound propeller-turbine, the "Orion," was discontinued on the grounds that the expense of developing it was not warranted (so that heavy military turbo-prop transports are now being provided with separate engines for boundary layer control) but ducted fans of closely related thermodynamics are now in course of construction. Unusually, a small engine is also offered to-day ; the "Orpheus" turbojet originated from the high-pressure line of the "Orion." An interesting machine at present progressing towards its first flight is the stainless steel Type 188 supersonic research aircraft ; this, however, does not have Bristol power plant and is severely thrust limited.

It has been observed, not least by Bristol, that the optimum design of a high performance aeroplane requires integration of the airframe and engines. Nevertheless, the firm itself has disintegrated : The Bristol Aeroplane Company, Ltd., is to-day a holding company with a half interest in Bristol Siddeley Engines, Ltd., which includes Bristol Cars, Ltd., and a 20 per cent interest in Bristol Aircraft, Ltd., which as well as fixed wing aerodynes makes plastic bodies for cars and motor-cycles.