AERO ENGINES

A "Flight" Survey

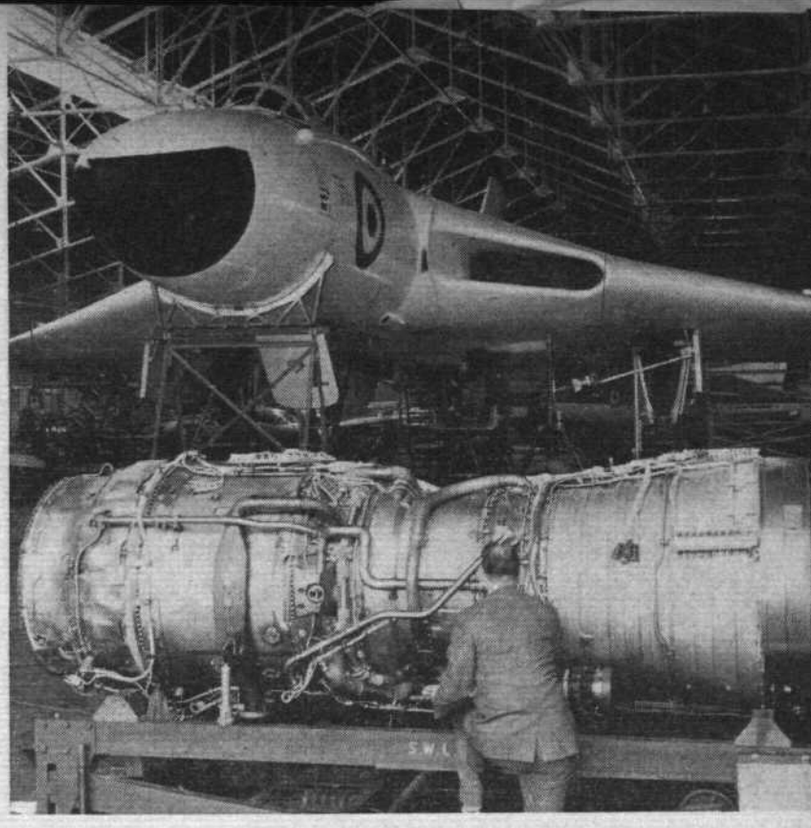
THE ADVENT OF SUPERSONIC TRANSPORTS, the big long-range subsonic transport, the Vietnam war, and major new equipment programmes for the American and British air forces has produced a state of overload in the aero engine industries of North America and Europe. This condition has also coincided with the initial stages of development of new concepts of turbine engine in the US and Britain. Thus the propulsion sector is at a high level of activity in both its production and technical departments.

The past 12 months have witnessed marked progress in the development of the quartet of SST engines. The Anglo-French Olympus turbojet has flown and is right on schedule; both the American Pratt & Whitney and General Electric engines have run in demonstrator form, the turbofan in particular having been shown to be of remarkably sophisticated design; and the Russian Kuznetsov turbofan, well in advance of the other three engines in its development, is presumably continuing apace. At the time of going to press the eagerly awaited decision between the competing US designs had yet to be announced.

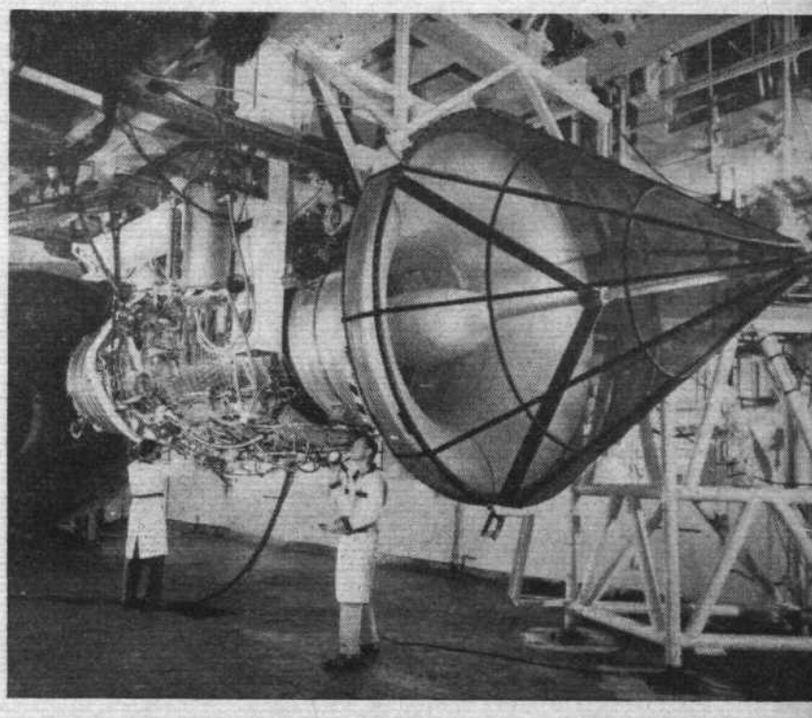
The advanced-technology engine, so-called because of its high pressure ratio, high turbine temperature and advanced material and structural design, introduces a completely new range of turbofans of diverse by-pass ratio and thrust rating. These products of GE, P&W and Rolls-Royce set a new standard in economy of operation and provide the very basis for the forthcoming long-range subsonic transport and airbus projects. The novel R-R triple-spool family of engines offers unique advantages especially with regard to low noise output.

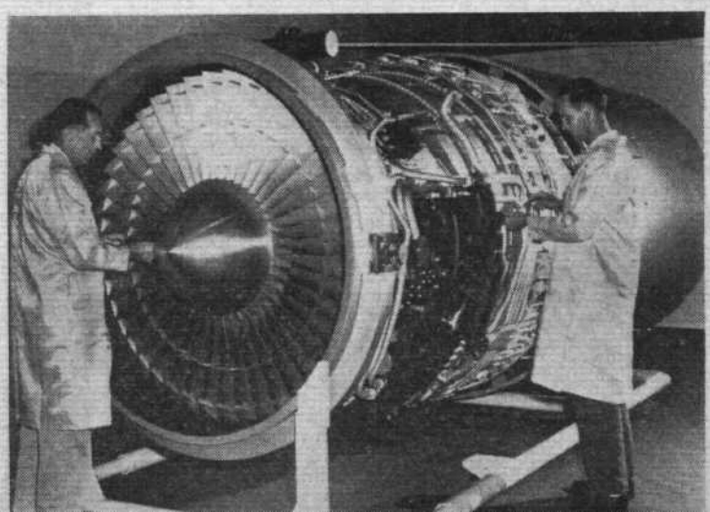
The Vietnam war has called for increased production of many American engines and has necessitated an all-out effort by the manufacturing sectors of such companies as P&W and Lycoming. This, coupled with the general high level of activity in the aero engine industry as a whole, has resulted in a general state of overload throughout the West. Extensive sub-contracting of US and British engine work has been resorted to of necessity, and second-line production of components is now spread widely throughout North America, Europe and the Far East.

Overall, the portents are that 1967 will be one of the most busy years for the aero engine industry since World War Two. Looking further ahead, it is likely also to be a critical year for the large new R-R/BSE group in that while the company's immediate future is one of widespread and considerable activity, the successors to the Spey (and, later, the Olympus 593) as the main revenue earners must be launched on their development phase. In contrast to the British engine industry, the US companies are in the test stage with no fewer than four new major engine projects having production potentials well into the 1970s.



Transatlantic trio: The Bristol Siddeley Olympus 593 afterburning turbojet and (pictured respectively below) the General Electric GE4 afterburning turbojet and the Pratt & Whitney JTF17A duct-burning turbofan are under development for the West's first generation of supersonic transports—the Olympus for Concorde, and the JTF17A and GE4 for the Boeing 2707 or Lockheed L-2000. Forming the background to the Olympus is its Vulcan test bed





Bristol Siddeley Olympus 593 single-shaft turbojet with afterburner. Seven-stage axial l-p compressor, seven-stage axial h-p compressor. Cannular straight-through-flow combustion system with eight flame tubes. Single-stage axial h-p turbine, single-stage axial l-p turbine. Air mass flow 450lb/sec. Rating, 35,080lb with afterburner, 32,800lb without. Weight, N.A. Diameter, 47.85in. (See also page 27)

General Electric GE4/J5 single-shaft turbojet with afterburner. Eight-stage axial compressor. Annular straight-through-flow combustion system. Axial turbine. Air mass flow, 620lb/sec. Rating, 63,200lb with afterburning. Weight, 10,500lb. Diameter, 74.2in. (See also page 32)

Pratt & Whitney JTF17A-21 ductburning twin-spool turbofan. Two-stage axial fan, six-stage axial compressor. Annular straight-through-flow combustion system. Single-stage axial h-p turbine, two-stage axial l-p turbine. Air mass flow, 687lb/sec and b.p.r. 1.3:1. Rating, 61,000lb with duct-burner, 38,300 without. Weight (approx.) 10,000lb. Diameter 61.5in. (See also page 33)