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KB.318 If full-scale development continues as planned, first deliveries of this 600 s.h.p. turboprop designed for the general-aviation market will come in the 1980s. Rolls-Royce and Alfa Romeo share this project 65 per cent: 35 per cent having signed an agreement in 1976. A prototype is reported to have run last year and a demonstrator is being built.

RB.401 Sized to produce 5,5001b thrust, the RB.401 "Viper replacement" has potential application in the Rockwell Sabreliner 85, projected HS.125 designs and the US Navy VTX trainer. The two-shaft turbofan first ran in 5,1001b -06 demonstrator guise in late 1975 and in its definitive 5,5401b -07 production form in December 1977. A second -07 ran in October 1978, and 250hr running was planned on each type. Rated thrust has been demonstrated and s.f.c. has been reported as near the design figure. A joint R-R/Rockwell programme envisages 50hr of flying with a Sabreliner 85 equipped with one RB.401 and one CF700. Military derivatives are envisaged spanning the 4,2001b-6,3001b thrust bracket.

RB.410 (M45SD) The 10,0001b -02 has been under test since April 1975 as a low-key demonstrator project funded jointly by R-R, Dowty Rotol and the British Government. The geared variable-pitch two-shaft turbofan is based on a modified M45H core driving a Dowty Rotol v-p fan and is intended to prove the technology for ultra-quiet low-consumption engines, which would find application in the next generation of short-haul Stol transports.

RB.432 This two-shaft turbofan, projected as a 16,0001b-19,0001b Spey replacement, is aimed at the market for twin-engined 100/130-seat short-haul airliners, although military applications are also under study. Similar in con-figuration to the RB.401, the RB.432 has a three-stage 1-p turbine and also other changes to improve fuel economy. Detail design is now in progress following major component design definition. Possible applications for RB.432 include the Fokker F.29, and growth potential is sufficient to accommodate aircraft stretch to the 140/ 150-seat category.

Olympus 593 More than 100,000hr have now been flown by Olympus 593s in Concorde with a further 115,000hr, including 80,000hr in the aircraft, during development. The augmented two-shaft turbojet is said to be the most extensively tested engine ever to be awarded a Type Certificate by the airworthiness authorities, FAA clearance came in April 1978. Performance of production engines is reported to be much better than guaranteed, with take-off thrust and s.f.c. both showing three to four per cent im-provement. A 50,OOOkW version for industrial use is being developed.

Pegasus (F401) Two-shaft vectored thrust turbofan powering Harrier and AV-8A aircraft in RAF, US Marine Corps and Spanish Navy service now totals some 250,000hr. Current production version is the 21,5001b Pegasus 11 (known as the Pegasus Mk 103 in RAF service) in Harrier GR.3s being delivered up to 1984. In slightly modified form the engine is being built for the Royal Navy's Sea Harrier FRS.l in which application it is known as the Mk 104. The McDonnell Douglas YAV-8B, planned for USMC service, has a basically standard Pegasus 11 but features longer, more rectangular front nozzles. Rolls-Royce has spent more than £2 million on development of the Pegasus 11-35 with a new fan and h-p turbine. More than 350hr have been spent running a variant of the engine with plenum-chamber burning in the forward nozzles.

Viper Latest development in the Viper family is the Viper 632, designed specifically for use as a military engine in the trainer/light-attack role and rated at 4,0001b. The Viper 632 powers the Italian Macchi MB.339 trainer, a successor to the Viper-powered MB.326 which is in service with 12 operators in five continents.
Other marks of Viper 600:

series engines power the
British Aerospace HS.125-600, the Macchi MB.326K single-

209
seat operational trainer and close-support aircraft and the Jugoslav/Romanian Orao twin-engined strike aircraft Earlier marks of Viper are in production for a range of military aircraft. These include the Galeb and Jastreb the HAL HJT 16 Kiran, the British Aerospace Jet Provost/' Strikemaster and the Jindivik target drone.
Some 3,200 Vipers are in service worldwide in more than 2,200 aircraft. Almost 30 air forces and more than 260 corporate operators fly Viper-engined aircraft. Total flying time is more than 5,000,000hr.

Tyne Re-opening of the Transall C.160 line at Toulouse and other developments have created a resurgence o interest in this two-shaft turboprop. The engine has re-entered manufacture within a European consortium com-prising Rolls-Royce, Snecma, MTU and Fabrique Nationale. The new development of Dassault-Breguet Atlantic— the Nouvelle Generation—requires Tynes and about 50 examples are to be supplied for 20 Aeritalia G.222 military transports being supplied to Libya, following the US Government's veto of Allison T64 supplies for Libyan air-craft. Tynes for the G.222 will be assembled and tested by MTU under a sub-contract. More than 1,200 examples have been built.

Dart Very nearly 7,000 examples of this engine have now been ordered and accumulated flying time aboard more than 2,000 aircraft exceeds 90,000,000hr. In April last year the Dart celebrated 25 years in service, the first turboprop to achieve this distinction. It remains in production for Europe's most successful airliner, the Fokker F.27 Friend-ship, and the British Aerospace HS.748 of which, together, more than 1,000 examples have been sold. Dart powe rating ranges from 1,540 e.h.p. to 3,245 e.h.p.

Gem BS.360/RS.360 Orders for the 900 s.h.p. Gem -2 three-shaft turboshaft engine now stand at 650 giving the R-R Aero Division facility at Leavesden a full production run up until 1980. The Gem is the powerplant for the twin-engined Westland Lynx helicopter in service with the Royal Navy, British Army, Royal Netherlands Navy, French Navy and ordered for the German Navy. Other customers include Norway, Brazil, Argentina, Qatar and Denmark.
Production of the Gem -4 rated at 1,020 s.h.p. to power uprated Lynx on order for Norway and Holland began last year. Further growth to 1,120 s.h.p. is envisaged and even higher ratings are under study. Gem 41-1 was chosen

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