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unrelated to the former's 1,775 s.h.p. Makila. It would
be applicable to a future European tactical transport heli-
copter. Preliminary work now under way will lead to a
decision on launching full-scalei development.

Spey Two-shaft turbofan. There are four basic series of
this engine: the RB.163 and RB.183 civil versions, and the RB.168 and TF41 military variants. Over 3,000 RB.163s, 168s and 183s have been built, and total running time amounts to nearly 16 million hours. Corresponding figures for the TF41 are 1,300 units and 1 • 3 million hours. Produc-tion of all four continues, including collaborative! manu-facture of the TF41 with Allison. Following the signing of an £80 million licence agreement covering the RB.168-25R afterburning version of the Spey with China in December 1975, engines and parts are being supplied for this pro-gramme also. Engine hushkits for RB.163s and RB.183s powering the BAC One-Eleven, Fokker F.28 and Gruroman Gulfstream II are in production^ A proposed! development, the refanned Spey 67, was shelved several years ago and has been replaced by the RB.433 project of about the same thrust. A potential new application for the RB.163, the Gulfstream III, was shelved last year on account of unacceptably high launch costs.

Applications and projects: BAC One-Eleven 475 and 500 (2 X 12,5501b Spey RB.163 Mk 512-14DW); de Havilland Canada DHC-5 Buffalo Spey Augmentor Wing Research Aircraft (2 X Spey Mk 801 SF); Fokker-VFW F.28 Fellow-ship Mks 5000 and 6000 (2 X 9,6751b Spey RB.183 Mk 555-15H); Grumman Gulfstream II (2 X 11,4001b Spey RB.163 Mk 511-8); Hawker Siddeley Buccaneer S.2 and Mk 50 (2 X 11,1001b Spey RB.168-1A Mk 101); Hawker Siddeley HS.801 Nimrod MR.l, R.l and MR.2 (4 X 12,1601b Spey RB.168 Mk 250, Mk 850 in MR.2); Hawker Siddeley Trident Series 2E and 3B (3 X 11,9301b Spey RB.163 Mk 512.5W/ 20); McDonnell Douglas F-4K and F-4M Phantom II (2 X 20,5151b A/B Spey RB.168-25R Mk 201).
Spey RB.163 Mk 512-14DW Five-stage fan/l-p compressor, twelve-stage 1-p compressor, annular combustor, two-stage h-p and 1-p turbines. Take-off 11,5801b, bypass ratio 0-71:1, pressure ratio 21:1, mass flow 2081b/sec, length 109-6in, diameter (intake) 32-45in, weight 2,5741b.

Turmo Free-turbine two-shaft rurboshaft. Rolls-Royce par-ticipated with Turbomeca in the manufacture of 110 1,390 s.h.p. Turmo niC4 turboshafts (shared 27 per cent by value by R-R and 73 per cent by Turbomeca) to power Aero-spatiale/Westland SA.330 Puma helicopters for the Anglo-French helicopter programme. R-R is currently engaged in Turmo spares manufacture, repair and overhaul.

Tyne Two-shaft turboprop. Following completion in 1974 of the Atlantic order for several European navies, the Tyne continues in production as a marine power unit. More than 1,290 have been built for civil and military aircraft, with Snecma, MTU and Fabrique Nationale collaborating as a consortium for European applications. Production will recommence to supply the reopened Transall line. Total running time on all Tynes exceeds 9-6 million hours. Applications: BAC Vanguard 951 (4 X 4,785 s.h.p. Tyne RTy.l Mk 506); BAG Vanguard 952 (4 X 5,325 s.h.p. Tyne RTy.ll Mk 512); Canadair CL-44D-4 (4 X 5,500 s.h.p. Tyne RTy.12 Mk 515); Canadair CL-44J and CC.106 Yukon (4 X 5,730 s.h.p. Tyne RTy.12 Mk 515/10); Dassault-Breguet Atlantic (2 X 6,100 s.h.p. Tyne RTy.12 Mk 515); Short Belfast C.l (4 X 5,715 s.h.p. Tyne RTy.20 Mk 101); Transall C.160D (2 X 6,100 s.h.p. Tyne RTy.20 Mk 22).
Tyne RTy.20 Six-stage 1-p compressor, nine-stage h-p com-pressor, cannular combustor, single-stage h-p turbine, three-stage 1-p turbine, integral front-located gearbox. Take-off 5,855 s.h.p., pressure ratio 13-5:1, mass flow 46-51b/sec, length 108 -7in, diameter 43-2in, weight 2,2181b.

Viper 500 and 600 Single-shaft turbojet. After 25 years in production more than 4,340 Vipers have been built for 28 different aircraft types. Total running time to' date is 4-8 million hours. Although manufacture of the earlier Mks 11 and 500 continues, future sales are likely to be won

mainly by the more powerful Viper 600 series. A year ago R-R signed a licence-manufacturing agreement with Piaggio' for the Viper 600-43, which powers the Aermacchi MB.339. Fiat, as a partner with R-R on the Viper 600 for other applications, will manufacture certain parts for the Piaggio engines. Y Applications and projects: BAC Jet Provost 4 and 5 (1 X 2,5001b Viper 11 Mk 202); BAC 167 Strikemaster (I X 3,4101b Viper 20F-20 Mk 535); EMB.326 Xavante (1 X 3,4101b Viper 20 Mk 540); Hawker Siddeley Dominie T.l (2 X 3,0201b Viper Mk 301); Hawker Siddeley HS.125-400 (2 X 3,3601b Viper Mk 522); Hawker Siddeley HS.125-600 (2 X 3,7501b Viper Mk 601); Hindustan Aeronautics HJT- 16 Mk 1 Kiran (1 X 2,5001b Viper 11); Jugoslavia/Romania Orao (1 X 4,0001b Viper 632); Macchi MB.326G and GB (1 X 3,4101b Viper 20 Mk 540); Macchi MB.326K (1 X 4,0001b Viper Mk 632-43); Piaggio PD.808 (2 X 3,3301b Viper Mk 526); Soko Galeb 2 (1 X 3,0001b Viper 11); Soko J-l Jastreb (1 X 3,0001b Viper Mk 531); Soko Jastreb 5 (1 X 4,0001b Viper 600).

Viper 600 Eight-stage compressor, annular combustor, two-stage turbine. Take-off 3,7501b, pressure ratio 5-8:1, mass flow 58-41b/sec, length 85-2in, diameter 24-5in, weight 7601b.

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Public company owned equally by Rolls-Royce Ltd and Turbomeca SA. Engaged in management of joint pro-grammes, in particular the RB.172/T.260 Adour.

RB.172/T260 Adour Two-shaft augmented turbofan. Nearly 500 Adour-powered aircraft have been ordered by five countries for four applications: the Sepecat Jaguar, Fuji F-l and T-2, and the Hawker Siddeley Hawk. About 1,300 engines have been delivered, including some built by IHI under licence in Japan, and total running time is approxi-mately 300,000hr. Four versions of the turbofan are being delivered for these: aircraft. The main production version is the Mk 102, the standard powerplant for British and French Jaguars, which is assembled by R-R and Turbomeca from single-source components. This variant is rated at 5,1151b, rising with reheat to 7,3051b» An equivalent version is in production at IHI under the Japanese designation TF40-IHI-T801A. The third production variant is the non-afterburning Mk 151 for RAF Hawks, which entered service last year. As this variant of the Adour does not have a French application, Turbomeoa operates as a sub contractor to R-R, supplying components. The Mk 151 and its Mk 851 counterpart for export Hawks are rated at 5,2001b. The fourth production model is the uprated Mk 804/RT.172-26, which produces 5,3201b, rising with reheat to 8,0401b. Designed for the Jaguar International, the Mk 804 is to be introduced in RAF Jaguars by means of an upgrading programme which will begin this year to bring existing Mk 102 engines up to -26 standard (they will then be known as Mk 10.1s). This aeroplane has been bought by Oman and Kuwait. Testing of the RT172-56 was scheduled to have started last month. This is a more powerful but unreheated version of the -26, intended for more advanced Hawks. Basic rating is 5,5201b. Production deliveries are planned to begin in 1979. The -58 is the corresponding afterburning version of the -56 for later Jaguars, and will run for the first time in a few weeks' time.

Adour RB.172/RT.260 Mk 804 Two-stage fan, five-stage h-p compressor, annular combustor, single-stage h-p and 1-p turbines, close-coupled afterburner with variable con-vergent nozzle. Take-off 5,3201b basic rising with reheat to 8,0401b; bypass ratio 0-8:1, pressure ratio 11:1, length 114in, diameter (intake) 22in, weight 1,6901b.

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