

AERO ENGINES 1968...

Douglas DC-8F, 4×JT3D-3B (18,000lb). Douglas DC-8-63 & 63F, 4×JT3D-7 (19,000lb). Lockheed L-200, 4×JT3D-8A (21,000lb). Lockheed L-300, 4×JT3D-5A (21,000lb). (JT3D-5A) Two-stage fan plus six-stage i.p. compressor (both driven by l.p. turbine), eight-stage h.p. compressor, annular combustor with eight flame tubes, single-stage h.p. turbine, three-stage l.p. turbine. Take-off 21,000lb; pressure ratio 16:1; length 167.5in; diameter 38.9in; weight 4,540lb.

JT4A Civil twin-spool turbojet. Commercial counterpart of J75 military turbojet.

Applications Boeing 707-220, 4×JT4A-3 (15,800lb). Boeing 707-320, 4×JT4A-9 (16,080lb) or JT4A-11 (17,500lb). Douglas DC-8-20 & 30, 4×JT4A-9 (16,080lb) or JT4A-11 (17,500lb).

(JT4A-11) Eight-stage l.p. compressor, seven-stage h.p. compressor, annular combustor with eight flame tubes, single-stage h.p. turbine, two-stage l.p. turbine. Take-off 17,500lb; mass flow 256lb/sec; pressure ratio 12.5:1; length 144.1in; diameter 43.0in; weight 5,100lb.

JT3C Civil twin-spool turbojet. Commercial counterpart of J57 turbojet, first American turbine engine to enter airline operation.

Applications Boeing 707-120 & -220, 4×JT3C-6 (13,500lb). Boeing 720, 4×JT3C-7 (12,000lb). Douglas DC-8-10, 4×JT3C-6 (13,500lb).

(JT3C-6) Nine-stage l.p. compressor, seven-stage h.p. compressor, annular combustor with eight flame tubes, single-stage h.p. turbine, two-stage l.p. turbine. Take-off 13,500lb; mass flow 200lb/sec; pressure ratio 13:1; length 167.5in; diameter 38.9in; weight 4,234lb.

J75 Military twin-spool augmented turbojet. Most powerful turbojet in the West to enter general military service.

Applications General Dynamics F-106A Delta Dart, 1×J75-P-17 (17,200lb or 24,500lb with afterburning). Lockheed WU/U-2A, 1×J75. Republic F-105D Thunderchief, 1×J75-P-19W (17,200lb or 26,500lb with afterburning and water injection).

(J75-P-19W) Eight-stage l.p. compressor, seven-stage h.p. compressor, annular combustor with eight flame tubes, single-stage h.p. turbine, two-stage l.p. turbine. Afterburner with variable convergent nozzle. Take-off 17,200lb or 26,500lb with afterburning plus water injection; mass flow 265lb/sec; pressure ratio 12:1; length with afterburner 259.3in; diameter 43.0in; weight 5,960lb.

J57 Military twin-spool augmented turbojet. Subject of largest-ever military turbine programme in the United States when more than 22,000 were built.

Applications Boeing B-52F & G, 8×J57-P-43WB (13,750lb with water injection). Boeing KC-135A, 4×J57-P-59W (11,200lb, or 13,750lb with water injection). Douglas A-3B Skywarrior, 2×J57-P-10 (10,000lb, or 12,400lb with water injection). General Dynamics F-102A Delta Dagger, 1×J57-P-23 (11,200lb, or 17,200lb with afterburner). Ling-Temco-Vought F-8C Crusader, 1×J57-P-16 (10,700lb, or 16,900lb with afterburner). Ling-Temco-Vought F-8D & E Crusader, 1×J57-P-20A (12,500lb, or 18,000lb with afterburner). Ling-Temco-Vought RF-8G Crusader, 1×J57-P-22 (10,200lb, or 16,000lb with afterburner). McDonnell F-101B & CF-101B Voodoo, 2×J57-P-53/55 (11,990lb, or 16,950lb with afterburner). McDonnell RF-101C Voodoo, 2×J57-P-13 (10,100lb, or 14,880lb with afterburner). North American F-100D Super Sabre, 1×J57-P-21A (11,700lb, or 16,950lb with afterburner).

ROLLS-ROYCE

(Aero Engine Division)

Derby

RB.213 Civil triple-shaft turbofan. Owing much to Trent and RB.193, this new engine is being developed primarily for the BAC One-Eleven 500.

A joint venture by Rolls-Royce and Allison, the TF-41 has been selected for the LTV A-7A bomber

RB.211 Civil triple-spool turbofan. Third of Rolls-Royce new triple spool low-s.f.c. turbofans to be designed, the RB.211 has been proposed for the McDonnell-Douglas DC-10, Lockheed L-1011 and BAC Two-Eleven airbus projects. If chosen for one or more of the American applications, UK Government financial support will be forthcoming. First engine run would be in September this year followed by FAA certification in January 1971. Triple spools permit quieter engine, of lighter, more simple design, and of higher pressure ratio. Competing engines are the twin-spool Pratt & Whitney JT18D and General Electric CF6/34; the RB.211 is notably cheaper than either.

Applications BAC Two-Eleven, 2×RB.211-06. Lockheed L-1011, 3×RB.211-06. McDonnell Douglas DC-10, 3×RB.211-10.

(RB.211) Single-stage fan, seven-stage i.p. compressor, six-stage h.p. compressor, annular combustor, single-stage h.p. and i.p. turbines, three-stage l.p. turbine. Take-off 33,260lb (up to ISA +17°C); b.p.r. 5:1; mass flow 1,207lb/sec; pressure ratio 27:1; length 113.6in; diameter 85.75in; weight 6,290lb.

RB.207 Civil triple-spool turbofan. Largest of Rolls-Royce triple-spool low-s.f.c. turbofans and chosen to power the twin-engined A-300 European airbus project. If a decision to proceed to construction of A-300 is taken in July this year, RB.207 development and manufacture will be shared between Rolls-Royce, Snecma and MAN Turbo in a £60 million engine programme. UK Government and Rolls-Royce will be responsible for 75 per cent of engine finance and workload, with remainder shared between the French and German companies. Engine first run is scheduled for late autumn, first flight in 1971, followed by certification and initial deliveries in 1972. Component testing is already well advanced.

(RB.207-03) Configuration similar to that of RB.211. Take-off 47,500lb; b.p.r. 5:1; pressure ratio 27:1; length 144.89in; diameter 104.8in; weight 8,584lb.

RB.203 Trent Civil triple-spool turbofan. The Trent first ran last month, and flight-cleared engines are scheduled to be delivered to Fairchild for the FH-288 this summer. Using the twin-spool RB.172/T.260 as its gas generator, the Trent is the first of the Rolls-Royce triple-spool engines to enter development. Conceived as a low-s.f.c. successor to the Spey for short-haul transports in the 1970s, the Trent does not embody the facility of the RB.207 and RB.211 to operate at reduced fan speed as a means of reducing noise on the approach, its b.p.r. being lower at 3:1. Development is company-financed.

Applications Fairchild FH-228, 2×RB.203-01 (9,730lb). Hawker Siddeley HS136, 2×RB.203.

(RB.203-01) Single-stage fan, four-stage i.p. compressor, five-stage h.p. compressor, annular combustor, single-stage h.p. turbine, single-stage i.p. turbine, two-stage l.p. turbine. Take-off 9,730lb; b.p.r. 3:1; mass flow 300lb/sec; pressure ratio 16:1; length 82.2in; diameter 38.7in; weight 1,751lb.

XV99-RA-1 Military twin-spool lift jet. Now scheduled to be on test, the XV99-RA-1 is the subject of a UK/USA governmental agreement for joint development of an advanced lift jet for V/STOL applications. Financed on a 50/50 basis, the engine is a collaborative design by Rolls-Royce and Allison, but reportedly making extensive use of the former's RB.189 third-generation lift-engine technology. Objectives include a thrust/weight ratio of at least 20:1 and a thrust/volume ratio in excess of 1,200lb/cu ft, the latter being considerably in advance of present lift-engine attainments. Thrust is understood to be in the region of 9,000lb. Four XV99-RA-1s are specified for the US/FRG AVS project, involving a novel installation with a pair of engines swinging-out on arms either side of the front fuselage. After transition, the units retract into the fuselage.

RB.172/T260 Adour Military twin-spool augmented turbofan. First run at Derby in May last year, the RB.172 is the subject of an Anglo/French governmental agreement for joint Rolls-Royce/Turbomeca development of an engine to power the Breguet/BAC Jaguar supersonic light strike/trainer aircraft. Rolls-Royce is responsible for the combustion system, turbines and afterburner, Turbomeca having authority for the fan, compressors and external wheelcase.

Applications Breguet/BAC Jaguar A, B. E. M & S, 2×RB.172/T260 (4,630lb or 6,750lb with afterburner).

(RB.172/T260) Two-stage fan, five-stage h.p. compressor, annular combustor, single-stage h.p. and l.p. turbines. Afterburner with variable convergent nozzle. Take-off 4,630lb basic or 6,750lb with afterburner; b.p.r. 1:1; pressure ratio 9.6:1; diameter 3.18in; weight 810lb.

RB.183-1 Spey Junior Civil twin-spool turbofan. A lighter, slightly simplified version of the RB.163 Spey, produced specifically to power the Fokker F.28 Fellowship. Originally de-rated to 8,650lb, has since been re-rated to full Spey-1 thrust of 9,850lb.

Application Fokker F.28 Fellowship, 2×Spey Junior Mk 555-15 (9,850lb).

(RB.183-1) Configuration similar to Spey-1. Take-off 9,850lb; weight 2,182lb.

