AERO ENGINES 1968...

(T53-L-13) Five-stage axial plus single-stage (single-sided) centrifugal compressor, annular reverse-flow combustor, two-stage compressor-turbine, two-stage power-turbine. Take-off 1,400 s.h.p., diameter 23.0in; weight 530lb.

T53 Military free-turbine turboprop engine. Propeller turbine version of T53 turboshaft.
Applications Grumman OV-1 Mohawk, 2×T53-L-3 (1,005 e.h.p.) or T53-L-7 (1,150 e.h.p.).
(T53-L-7) Similar configuration to T53-L-13 except for single-stage compressor-, power-turbines. Take-off 1,150 e.h.p.; military rating 1,046 e.h.p. and 0.66lb/e.h.p./hr; mass flow 10.7lb/sec; pressure ratio 6:1; length 58.4in; diameter 23.0in; weight 555lb.

MAN TURBO
Munich, West Germany

RB.193 Military vectored-thrust twin-spool turbofan. Rated at 10,000lb, is being developed as a joint project by MAN and Rolls-Royce under a £8 million contract from the West German Ministry of Defence. Sole application is VFW VAK-191B V/STOL fighter. Flight engines are scheduled to be delivered this year.

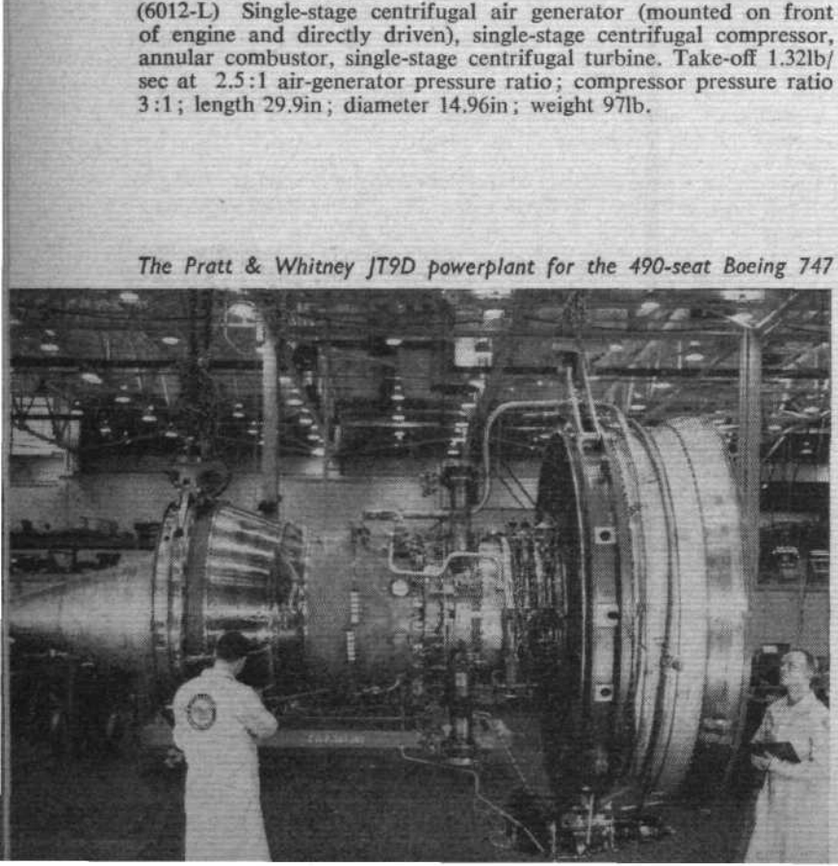
RB.153 Military twin-spool turbofan. Rated at 6,850lb, has been developed as a joint project by MAN and Rolls-Royce to power the erstwhile EWR-Sud VJ101D V/STOL fighter. Used in development of afterburner and thrust-vectoring systems.
(RB.153-61) Four-stage fan/l.p. compressor, twelve-stage h.p. compressor, cannular combustor, two-stage h.p. turbine, two-stage l.p. turbine. Take-off 6,850lb; pressure ratio 18:1; length 89in; diameter 29.5in; weight 1,430lb.

RB.145 Military lift/cruise single-shaft turbojet. Collaborative development by Rolls-Royce and MAN to power the EWR-Sud VJ101C V/STOL research aircraft. Comprises RB.108 lift jet with zero-stage compressor and has afterburner.
(RB.145) Nine-stage compressor, annular combustor, two-stage turbine. Close-coupled afterburner with simple variable convergent nozzle. Take-off 2,750lb basic, 3,650lb with afterburning; pressure ratio 5.7:1; length 50in; diameter 15.5in; weight 457lb.

6022 Civil and military single-shaft turboshaft. An exceptionally simple, low-power shaft turbine primarily for helicopter installations.
Applications Bölkow Bö 105, 1×Model 6022A2 (250 s.h.p.). Dornier Do132, 1×Model 6022.
(Model 6022A2) Single-stage centrifugal compressor. Annular combustor, single-stage axial turbine. Integral front-mounted gearbox. Take-off 250 s.h.p. to ISA+13°C; weight 187lb.

6012L Civil and military single-shaft air generator. Comprises a 6012A turboshaft with separate front-mounted single-stage compressor driven from the front of the engine. Sole application is the Dornier Do32 helicopter.
(6012-L) Single-stage centrifugal air generator (mounted on front of engine and directly driven), single-stage centrifugal compressor, annular combustor, single-stage centrifugal turbine. Take-off 1.32lb/sec at 2.5:1 air-generator pressure ratio; compressor pressure ratio 3:1; length 29.9in; diameter 14.96in; weight 97lb.

The Pratt & Whitney JT9D powerplant for the 490-seat Boeing 747



MICROTURBO
France

Eclair Single-shaft turbojet. Based on Microturbo APU technology, is an ultra-small turbojet for use in sailplanes and drones. Sole application is Fauvel AV.45-01 tailless self-launching sailplane.
(Eclair) Single-stage centrifugal compressor, annular reverse-flow combustor, single-stage turbine. Take-off 176lb; length 26.5in; diameter 12.3in; weight 77.1lb.

MIKULIN
USSR

AM-3M Civil single-shaft turbojet. Developed from early Mikulin M-209 military turbojet. Is notably the most powerful turbojet in commercial operation.
Applications Tupolev Tu-104A, 2×AM-3M (19,180lb). Tupolev Tu-104B, 2×AM-3M-500 (21,385lb).
(AM-3M-500) Eight-stage compressor, cannular combustor with fourteen flame tubes, two-stage turbine. Take-off 21,385lb; pressure ratio 6.4:1; length 210.03in; diameter 55.12in.

MOTOROLET
Czechoslovakia

M-701 Military single-shaft turbojet. Sole example of Czechoslovak turbojet, powers single-engined L-29 Delphin of which more than 1,000 have been built, and proposed for new twin-engined L-39 advanced military trainer/strike aircraft.
(M-701) Single-stage centrifugal compressor, can-type combustor with seven flame tubes, single-stage turbine. Take-off 1,962lb; mass flow 37.25lb/sec; pressure ratio 4.3:1; length 81.38in; width 35.28in; height 36.53in; weight 728lb.

PRATT & WHITNEY
(Pratt & Whitney Aircraft Division, United Aircraft Corporation), East Hartford, Connecticut, USA

STF300 Civil twin-spool turbofan. Project study for a 50,000 to 60,000lb turbofan to power second-generation Boeing 747s.

JT18D Civil twin-spool turbofan. Derivative of the JT9D scaled-down and optimised on 35,000lb thrust to power Douglas DC-10 and Lockheed L-1011 in competition with General Electric CF6/34 and Rolls-Royce RB.211.
(JT18D) Single-stage fan plus three-stage i.p. compressor (both driven by l.p. turbine), eleven-stage h.p. compressor, annular combustor, two-stage h.p. turbine, four-stage l.p. turbine. Take-off 35,000lb; b.p.r. 5:1; mass flow 1,181lb/sec; pressure ratio (overall) 24:1; length 116.0in; diameter 85.10in; weight 6,520lb.

ST9 Military turboshaft. Designed under contract to US Army Aviation Material Laboratories, and entering two-year demonstrator phase in competition with counterpart General Electric project. Rated at 1,500 s.h.p., the ST9 appears to have axial/centrifugal compressor, reverse-flow annular combustor, and multi-stage turbine.

JT9D Civil twin-spool turbofan. Being developed as a private venture to power the Boeing 747, the JT9D is notably the most powerful civil turbofan in existence. Design is based on advanced technology of JTF16 and of JTF14, losing P&W entry for the C-5A. Original JT9D-1 was up-rated to 42,000lb and will power the 747 during its initial flight testing in December this year. A further request by Boeing for increased thrust is met by the 43,500lb JT9D-3 flight testing of which in a modified Boeing B-52E will start in June. Certification of JT9D-3 is scheduled for March 1969 with production engines being delivered the following month. Price of JT9D-3 is $800,000 and production will reach 40 per month. Snecma, which is developing an alternative design of h.p. compressor, signified in June last year that it intends to exercise its option on a licence to manufacture the JT9D.
Applications Boeing 747, 747C, 747F and 747P, 4×JT9D-3 43,500lb). Lockheed L-500-114M and L-500-114Q, 4×JT9D-7 (45,500lb). Lockheed L-500-114P and L-500-114R, 4×JT9D (47,500lb).
(JT9D-3) Single-stage fan plus three-stage i.p. compressor (both driven by l.p. turbine), eleven-stage h.p. compressor, annular combustor, two-stage h.p. turbine, four-stage l.p. turbine. Take-off 43,500lb; b.p.r. 5:1; mass flow 1,600lb/sec; pressure ratio 24.5:1; length 128in; diameter 96in; weight 8,430lb.

JTF16B Military twin-spool augmented turbofan. First run in late autumn 1966 under USAF funding as one of two competing turbofans to power AMSA, the JTF16B is rated at approximately 10,000lb basic, rising to about 20,000lb with duct-burning. The engine is also concerned in P&W's development of a vectored-thrust cruise propulsion engine under USAF contract. Thrust vectoring is provided by means of an aft-hood exhaust deflector enabling the full augmented thrust to be deflected through 90°. Other potential applications include FX, VFAX and the US/FRG AVS, in which together with AMSA the competing General Electric engine is the GE1/10.