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TURBINE ENGINES OF THE WORLD

NK-8 Two-shaft turbofan. This engine which originally powered the Ilyushin 11-62 (4X 22,2731b NK-8-4) and the Tupolev Tu-154 (3X20,9501b NK-8-2), has subsequently been displaced in both aircraft by the Soloviev D-30 turbofan. NK-8-4 Two-stage fan and two-stage i-p compressor, six-stage h-p compressor, annular combustor, single-stage h-p turbine, two-stage 1-p turbine. Take-off 22,2731b; bypass ratio 105:1; core pressure ratio 10-8:1; length 201in; diameter 56-8in; weight 4,6291b.

NK-12 Single-shaft turboprop. This huge engine, driving eight-bladed contra-props, powers the Tupolev Tu-114 (4X14,795 e.h.p. NK-12MV), Antonov An-22 (4X14,795 e.h.p. NK-12MA), and Tupolev Tu-95 (4X12,000 e.h.p. NK-12M). NK-12MV Fourteen-stage compressor, annular combustor, live-stage turbine. Integral front-located gearbox. Take-off 14,795 e.h.p.; pressure ratio 130:1; mass flow 1431b/sec; length 236-2in; diameter 45-3in; weight 5,1801b.

NK-144 Augmented two-shaft turbofan. Power unit both of the Tupolev Tu-144 SST and Tupolev Backfire supersonic variable-geometry bomber, the NK-144 is designed for super-sonic cruise with reheat in operation. Since first publicised in the Tu-144 the turbofan augmented take-off thrust has been raised from 38,5001b to 44,0001b.
NK-144 Two-stage fan and three-stage i-p compressor, eleven-stage h-p compressor, annular combustor, single-stage h-p turbine, two-stage 1-p turbine, afterburner and variable nozzle. Take-off 28,6601b rising with reheat to 44,0001b; bypass ratio 1-0:1; pressure ratio 15:1; mass flow 5501b/sec; length 205in; diameter 59in; weight 6,2801b.

LOTAREV (USSR)

Vladimir A. Lotarev is "chief constructor" at the design bureau carrying the name of the late "general designer" Alexander G. Ivchenko. First engine to emerge under the authority of Lotarev is the D-36 commercial turbofan of 5-34:1 bypass ratio under development for the forthcoming Yakovlev Yak-42 trijet. Under the Russian system, where the design function appears to be frequently separated from the construction activity, the new engine with its D designation may well be of Soloviev origin. The 14,2001b D-36 has been under test since at least early 1973 and is currently scheduled to be test-flown under a Tupolev Tu-16 bomber. First flight of the Yak-42 is planned for 1976-77, with introduction into service with Aeroflot around 1980.

LUCAS AEROSPACE (United Kingdom)

Lucas Aerospace Ltd. Headquarters: Shirley, Solihull, War-wickshire. Tel: 021-744 8522.

Subsidiary of Joseph Lucas (Industries) Ltd with corporate activities covering manufacture of equipment for automobiles, aerospace, shipping and railways. Corporate assets £186 mil-lion, $435-3 million, and employees 70,000. 1972/73 corporate turnover up to £399-2 million, $934-3 million, of which £58-7 million, $137-4 million is related to aerospace equipment sales. Lucas Aerospace, with 14,000 employees and six major plants in Britain, and holdings in companies in Germany, France and Italy, is the largest company of its kind outside the USA, and the fourth largest aerospace company in the UK. The firm acquired the assets and goodwill of Rover Gas Tur-bines Ltd from British Leyland Motor Corp in December 1972 for a reported figure of £400,000, $936,200, and has subse-quently continued with the former activities of Rover in full. This operation, which was previously handled by Alvis British Leyland UK at Coventry, is being carried out by Lucas Aerospace Airframe Systems Division, being complementary to the Division's existing involvement in gas turbine APUs and starters. The other main product group at Lucas Aero-space, the Engine Systems Division, manufactures a wide range of gas-turbine engine-management systems and equipment, including the fan thrust-reverser for the Rolls-Royce RB.211. During its 1971/72 trading year, Lucas Aerospace moved from being a lossmaker (following the Rolls-Royce debacle) into a profit earner, and in 1972/73 sales rose by £10 million, $23-4 million. Current efforts are directed at increasing the com-pany's share of the international aerospace market by further acquisitions in Europe, and by expansion of facilities else-where in the world.

CT3201 Single-shaft turbojet. Originally designed by Rover Gas Turbines (under the designation TJ125), this small unit has been developed to power the MBLE Epervier battlefield

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reconnaissance drone. Since being taken over by Lucas, fuel system modifications have improved engine performance at altitude. Testing of the drone was completed by MBLE and the Belgian Army in June 1973, and the latter is expected to place an initial order for some 40 drones.
CT3201 Single-stage centrifugal compressor, annular reverse-flow combustor, single-stage radial-inflow turbine. Take-off 1141b; pressure ratio 3-9:1; mass flow 2-051b/sec; length 22in; width 10-6in; height 12-3in; weight 431b.

LYULKA (USSR)

This design bureau appears to specialise in military turbojets. Two of its current engines are the AL-5 and the AL-7, with ratings respectively of 10,1401b-11,0231b and 14,3301b/15,4301b.

MICROTURBO (France)

Microturbo SA. Headquarters: Chemin du Pont de Rupe, BP 2089, 31019 Toulouse Cedex. Tel: 161) 47-63-26.

Formed in 1960, Microturbo is capitalised at Fr3-6 million, £342,000. The company manufactures small gas-turbines in the 50 to 200 h.p. class and up to around 2201b thrust for propulsion and auxiliary duties. Other products include electrical and electronic control systems, and heat exchangers. Aerospace sales represent 80 per cent of the corporate total.

Cougar. Single-shaft turbojet. This small 1801b-thrust engine has been developed for drone applications and powers the Australian Government Aircraft Factories Turana target drone. Engine length is 27-8in and diameter 11-lin; weight is 641b.

Super Cougar. Single-shaft turbojet. Designed for light air-craft and RPVs, this 2701b thrust engine is derived from the earlier Cougar. No application has been announced. Engine length is 24-7in and diameter 11-lin; weight is 731b.

TRS 18 Single-shaft turbojet. Originally designed and de-veloped by Sermel (a competing company acquired in 1971), the 2021b-thrust TRS 18 is intended for light aircraft propul-sion. Known applications include the Bede BD-5J and Calif A.21J Sailplane. Engine length is 24-2in and diameter 12-5in; weight is 661b.

MITSUBISHI HEAVY INDUSTRIES (Japan)

Engine Works, Mitsubishi Heavy Industries Ltd. Head-quarters: Daiko Plant, Nagoya Aircraft Works, 1-1 Daiko-cho, Higashi-ku, Nagoya 455. Tel: Nagoya (052) 721-3111.

Public company engaged in heavy engineering, aircraft and aero-engine manufacture. Corporate assets Yen 2,031,000 million, £3,034 million, and employees 110,560. Corporate sales in 1972 up to Yen 1,113,000 million, £1,701 million of which aero-engine sales represented an extremely small proportion. Mitsubishi is in licensed production with the P&W JT8D-9 turbofan for the Kawasaki C-l twin-jet military transport, and the Detroit Diesel Allison T63-5 turboshaft for the Hughes/Kawasaki OH-6J helicopter. At the end of 1972 Mitsu-bishi extended its agreement with United Aircraft to include industrial and marine versions of P&W turbines.

MOTOREN- UND TURBINEN-UNION (West Germany)

Motoren- und Turbinen-Union Miinchen GmbH. Headquarters:
8 Munchen 50, Postfach 50 06 40. Tel: (0811) 14 89.
Public company owned jointly by Maschinenfabrik Augs-burg-Niirnberg AG and Daimler-Benz AG to undertake aero-engine activities of the parent companies. MAN AG is a leading German motor-vehicle, general-engineering and steel-construction company, with corporate sales in 1972/73 up to DM 2,350 million, £383 million (and owned 75 per cent by Gutehoffnungshiitte AV, large German industrial group with 1972/73 sales up to record DM 8,600 million, £1,401 million). Daimler-Benz is the largest German motor-vehicle manufac-turer, with 1972 corporate sales up at DM 13,800 million, £2,248 million. MTU Munchen sales in 1972 were DM 441 million, £71-8 million, 90 per cent of which represented aero-engine work. MTU Munchen employees 6,000.

MTU is significantly the larger of Germany's two aero-engine concerns, and has collaborative links with R-R, Turbo-Union, Snecma and Turbomeca in Europe, and GE, P&W, Allison and Solar in America. The company's sole indigenous design is its MTU 6022 turboshaft; all its major products are the results of licence agreements or joint ventures. The largest production activity at present concerns licensed-manu-facture of 448 General Electric J79-GE-17A turbojets for Ger-man Air Force F-4F Phantoms. This work is split 60 per cent by MTU and 40 per cent by GE. MTU also has a production contract for 50 J79-MTU-JlKs for GAF F-104G Starfighters. Production activity in support of European Consortium manu-