Tupolev Tu-26 Rack-
fire B: two reheated
Kuznetsov NK-144
turbofans

(1,080kg). Bypass ratio 5-34:1. Single-stage fan followed by 13-stage axial compressor, annular combustor, single-stage H P turbine, single-stage IP turbine and three-stage LP turbine. Max rating 14,1101b(62-76kN) with s.f.c. of 0-381b/lb/hr. Cruise rating 3,5051b (15-6kN) at M 0-84, 26,000ft with s.f.c. of 0-661b/'lb/hr. Believed to have flown for first time in Yak-42 (three) prototype in 1975, and since used in An-72 (two) prototypes. Produc-tion thought to be underway for Yak-42 production.

Lyulka AI-21F-3. Single-shaft turbofan. Di-mensions and mass unknown. Pressure-ratio about 8:1, nine-stage compressor, annular combustor, two-stage turbine. Max rating (with reheat) 24,5001b(109kN), (dry) 18,0001b (80-lkN). Little is known about this engine, although current production for Su-15 (two) and Su-17 (one) makes it one of the major current Soviet programmes. The engine is believed to have first flown in an Su-15 in 1965 and could be the main engine of the Yak-36 Vtol fighter. Reports that it also powers the Su-19 (two) are unlikely to be true. The low pressure-ratio will only be able to sustain a turbofan configuration if the bypass ratio is very low.

Soloviev D-30-KP. Two-shaft turbofan. Length 224in(5-7m) Width 61 -4in(l -56m) Mass 5,0701b(2,300kg) plus 6601b(300kg) reverser. Bypass ratio 2-41:1. Pressure-ratio 20:1, three-stage fan/LP compressor and 11-stage HP compressor, canannular combustor, two-stage H P and four-stage LP turbine. Max rating 24,2501b(108kN). Mass flow 5931b/sec(269kg/ sec). Several versions of this engine are in pro-duction. The D-30-KU first powered 11-62M (four) in 1968 and is still in production, rated at 23,3501b(113kN). D-30-KP engines power 11-76 (four) and have been in production since 1971.

Soloviev D-2SV. Two-shaft turboshaft. Length (excluding gearbox) I07-8in(2-74tn), Width 42-8in(I-09m), Mass 2,9201b (1,325kg). Pres-sure-ratio 5-6:1, Nine-stage compressor, can-annular combustor, single-stage HP turbine and two-stage LP/power turbine. Max rating

5,500 s.h.p.(4,100kW). Four-stage reduction gearbox. First flown in 1957 in Mi-6 (two) and used in Mi-10 (two) flying crane. Production of both types is believed to have ceased, and a new engine of much larger power to have replaced it. Four examples of a 6,500 s.h.p. (5,330kW) version, D-25VF, powered the Mi-12 heavv-lift helicopter, which flew between 1968-1973.

Soloviev D-30-2. Two-shaft turbofan. Length 156-8in(3-98m), Width 41 -3m(l -05m), Mass 3,4171b(l,550kg). Bypass ratio 1:1. Pressure-ratio 17-4:1, four-stage fan/LP compressor and ten-stage HP compressor, canannular com-bustor, two-stage H P turbine and two-stage LP turbine. Max rating 15,0001b(66-5kN). Mass flow 2651b/sec(125kg/sec). Radically different to D-30-K series (above). First used in Tu-134A (two) in 1968 and still in produc-tion for this programme.

Tumansky R13-300. Turbojet. Dimensions, mass and configuration unknown. Max rating (with reheat) 14,5501b(64-7kN), (dry) 11,2401b (50-OkN). Reported to have been in production by 1956, but not used in MiG-21 (one) until early 1960s. Could be standard engine for export MiG-21, but production mainly given way to R-25.

Tumansky RU19-300. Single-shaft turbojet. Dimensions, mass and configuration unknown. Max rating l,9851b(8-8kN). Believed to be a Tumansky engine, and current production for An-26/30 (one), in which engine provides take-off augmentation. The gas-generator is used as an APU on many Soviet transport types, and the engine is in service powering the La-17 target drone (one). Production for An-24 started in 1968, and this engine could have also powered the single-engined Yak-30 trainer which was abandoned in about 1970.

Tumanksy R25. Turbojet. Dimensions, mass and configuration unknown. Max rating (with reheat) approx 16,500lb(73 -6kN), (dry) 9,0001b (40- lkN). Believed to be a derivative of R29-B and first flown in production MiG-21 (one) around 1970. Current powerplant for Soviet versions of this airframe, but production rate thought to be declining rapidly.

Tumansky R29-B. Turbofan. Dimensions, mass and configuration unknown. Max rating (with reheat) 25,3501b(112-8kN), dry 17,6351b (78 • 5kN). Export version of engine (an earlier model) is rated at 20,0001b(89 • OkN) with re-heat, and 15.0001b(66-7kN) dry. Very impor-tant current engine programme which has superseded short-lived Tumansky R27 which powered prototype MiG-23/27 in 1967. R29-B production began about 1970 and is currently estimated at between 500-800 units annually. Used in MiG-23 (one), MiG-27 (one) and Su-19 (two). If a newer turbofan engine has been developed for new Soviet projects this could supersede R29-B in Su-19.

Tumansky R31. Single-shaft turbojet. Dimen-sions and mass unknown. Pressure-ratio 7:1, Five-stage compressor, combustor layout un-known, single-stage turbine. Max rating (with reheat) 27,0101b(120-5kN), (dry) 20,5001b (91 -4kN). Latest version of engine reported to develop 30,8651b(137-5kN) with reheat. Only application is MiG-25 (two), in which it first flew around 1963. Production rate likely to be low.

Unknown engines in service
Tupolev Tu-22 Blinder has been in service since 1965 with two unidentified 27,0001b (120-5kN) reheated engines 15,0001b(66-8kN) dry turbojets). Rumours abound of a new Blinder variant with two Kuznetsov NK-144 engines, and although such a version seems to have flown it may only be a testbed.
Tupolev Tu-28 Fiddler was thought to have flown in 1957, and to have entered service around 1960, but identity of its two 24,2501b (108-2kN) reheated turbojets remains a mys-tery.
Powerplant of twin-engined Yak-26/28 Flashlight and variants has never been dis-covered. Types are virtually out of service with Soviet Air Force and engine was early-1950 technology.
Halo troopship helicopter could use two new turboshaft engines. Total power installed is reputed to be 25,000 s.h.p.(18,600kW), suggesting that the turboshaft core will be of similar size to the Kuznetsov NK-12 turbo-prop. All large turboshafts in the past have been produced by Soloviev.

Although the Tupolev Tu-22 Blinder has been in service for more than 15 years, its powerplants are still unidentified by Western observers