DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E-296
Revision 4
BRISTOL
PROTEUS 756, 766

March 28, 2007

AIRCRAFT ENGINE SPECIFICATION

Engines of models described herein conforming with this specification and approved data on file with the Federal Aviation Agency, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft specifications and applicable portions of the Civil Air Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturers' manuals and other approved instructions.

Manufacturer	Bristol Aero-Engines, Ltd. Filton, Bristol, England	
Model	Proteus 756	Proteus 766
Type	12-stage axial and 1 stage centrifugal compressor 2-stage compressor turbine and 2-stage power turbine 8 combustion chambers 11.593:1 Propeller reduction gearing	
Rating		
Max. continuous at sea level; equivalent shaft hp, shaft hp, jet thrust, compressor rpm, power turbine rpm (See NOTES 7 and 8 for additional limits)	3800-3380-1090-11725-10665	3850-3420-1115-11500-10665
Takeoff (5 min.) at sea level, equivalent shaft hp, shaft hp, jet thrust, compressor rpm, power turbine rpm (See NOTE 8 for additional limits)	4060-3625-1130-11900-11593	4310-3840-1220-11775-11593
Propeller shaft type, SBAC No.	6	
Fuel control	Lucas 31/22AK combined control unit, Ultra BAP3 with Lucas GBB16/2AY and Plessey MB022MK7 fuel pumps,	- -
Fuel	Aviation Kerosene, JP-5 MIL-F-5624C or British D. Eng. R.D.2482. Issue 3, or Canadian 30.P.23B., or JP-4, MIL-F-5624C, British D. Eng.R.D.2486 or Canadian 30.P.22B, or British D.Eng.R.D.2488, or D.Eng.R.D.2494.	
Oil	Esso Aviation Turbo Oil 35 or British D.Eng.R.D.2487. Synthetic oil, or D.Eng.R.D.2479/1 Mineral oil.	- -
Principal dimensions:		
Length, Maximum overall, in.	110.2 (excluding jet nozzle and exhaust cone).	
Height, approximately, in.	51.3	
Width, approximately, in.	44.1	
C.G. location - Aft of front mount, in.	14.36	- -
Weight (dry), lbs.	2900.	- -
Ignition system	Two high tension BTHC7TS/1 coils and two Lodge L.B.100 ignition plugs.	- -
NOTES	1,2,3,4,5,6,7,8,9	1,2,3,4,5,6,7,8,9

"- -" indicates "same as preceding model."
"—" indicates "does not apply"

CERTIFICATION BASIS

Engine Type Certificate No. 296 issued November 1, 1957, under CAR Part 1C; added Model 766 September 18, 1958. Each individually imported engine must be accompanied by the pertinent Inspection and Test Certificate and clearly labeled as import in accordance with CAR Part 10.30.

The aviation authority for the United Kingdom, the UK Civil Aviation Authority (CAA), originally type certificated this engine. The FAA validated this product under U.S. Type Certificate Number E-296. Effective September 28, 2003, the European Aviation Safety Agency (EASA) began oversight of this product on behalf of the UK.

IMPORT REQUIREMENTS

To be considered eligible for installation on U.S. registered aircraft, each new engine to be exported to the United States with UK CAA or EASA airworthiness approval shall have a Joint Aviation Authorities (JAA) or EASA Form 1, Authorized Release Certificate. The JAA or EASA Form 1 should state that the engine conforms to the type design approved under the U.S. Type Certificate E-296, is in a condition for safe operation and has undergone a final operational check.

NOTE 1. Maximum permissible temperatures:
Turbine outlet (jet pipe) temperature,
Takeoff Model 756 1050°F (565°C) max. with no air bleed, for ambient of 113°F (45°C); Model 766, T.O. 1058°F (570°C) max.
Max continuous Model 756 1040°F (555°C) max. with no air bleed, for ambient of 113°F (45°C); Model 766, M.C. 1050°F (565°C) max.
Max. transients: (Starting) 1292 F(700°C), (acceleration) 1202°F (650°C).
The takeoff and max. continuous jet pipe limit temperatures are decreased with the lower ambient air temperatures and air bleed quantities per curve, Ref. ED6 of the flight manual. When jet pipes Nos. A107650 or A107826 are used, 3 thermocouples are used and the above limits apply. With 'B' skin jets in operation, the engines shall be controlled to a jet pipe temperature 50°F (10°C) lower than the appropriate limiting jet pipe temperature shown in the relevant curve.
Oil inlet temperature, 41° to 230°F (+5° to 110°C).
External engine component temperatures,
Fuel control units, 158°F (70°C) body temperature.
Zone air changes of approximately 12 per minute.

NOTE 2. Fuel and oil pressure limits:
Fuel, minimum at engine inlet, 1 psig, normal fuel pressure, 8 to 15 psig.
Oil pressure, 50 to 80 psig.

NOTE 3. The engine ratings are based on static sea level conditions as follows:
Compressor inlet air 59°F, 29.92 in.Hg.
Jet nozzle, 18 in. diameter circular, Part No. RL26094.
Jet pipe assembly, Part No. RL24775, with 11 thermocouples.
No external air bleed or accessory drive power for aircraft services.
Turbine gas temperatures of not more than 991°F (533°C) for T.O. and 968°F (520°C) for M.C. for Model 756 and 1008°F (542°C) for T.O. and 964°F (518°C) for M.C. for Model 766.
Equivalent shaft hp = $\frac{\text{jet thrust}}{2.6}$ + shaft hp

NOTE 4. The following aircraft accessory provisions are provided on the engine:

Drive	Rotation (facing drive) (C - clockwise) (CC - counter-clockwise)	Speed Ratio to Turbine	Continuous Torque (in. lb.)	Static Torque (in. lb.)	Maximum Overhang (in. lb.)
Power Turbine shaft					special
Alternator (74.5 hp)	CC	.97:1	430.	3600.	88 lb. wt.
Propeller governor	CC	.227:1	563.	2100.	140
Propeller tachometer	C	.431:1	1.	224.	11
Compressor Turbine shaft					
Starter	CC	2.75:1	600.	2520.	170
Fuel pump	CC	.290:1	176.	857.	40
Tachometer (2 drives) or signal generator	C	.250:1	2.5	198.	.95

NOTE 5. Maximum air bleed extraction for aircraft purposes is 7.7% from compressor, and 4.4% from turbines.

NOTE 6. Propellers to be used with this engine must have functioning characteristics which are compatible with the engine and its control system, such as the de Havilland PD.202/4N6/1 or 2.

NOTE 7. (a) For Model 756, shaft horsepower may be allowed to rise to 3820 shp for takeoff and to 3440 shp maximum continuous so long as gas temperature and rpm limits are not exceeded. The engine torque limiter will automatically operate at 750 psi torquemeter pressure (3820 shp) to control power output.

(b) For Model 766, shaft horsepower may be allowed to rise to 3982 shp for takeoff and to MC 3658 shp maximum continuous so long as gas temperature and rpm limits are not exceeded. The engine torque limiter will automatically operate from 780 to 815 psi torquemeter pressure (3980 shp) to control power output.

NOTE 8. (a) For Model 756, maximum compressor rpm is to be reduced when operating above 95°F (35°C) ambient air temperature. Takeoff rpm is reduced 10 rpm per 1.8°F (1°C) and maximum continuous rpm is reduced from 11725 to 11650 basically, with further varying reduction in rpm to compensate for increased air bleed for aircraft services per Chart Ref ED6 Table 1.

(b) For Model 766, takeoff compressor rpm is to be reduced when operating above 95°F (35°C) ambient air temperature, by 10 rpm per 1.8°F (1°C). An increase in maximum continuous rpm to 11650 is permitted at altitudes above 15,000 ft, with varying corrections to compensate for increased air bleed for aircraft services per Chart Ref. ED6.

NOTE 9. This engine meets CAA requirements for (a) adequate turbine disc integrity and rotor blade containment and does not require external armoring, and (b) operation in atmospheric icing conditions.

NOTE 10. Each of the documents listed below must state that it is approved by the European Aviation Safety Agency (EASA) or, for approvals made before September 28, 2003 by the United Kingdom Civil Aviation Authority. Any such documents including those approved under a delegated authority, are accepted by the FAA and are considered FAA approved.

1 Service bulletins,
2 • Structural repair manuals,
3 • Vendor manuals,
4 • Aircraft flight manuals, and
5 • Overhaul and maintenance manuals.
6 • Technical Variances

These approvals pertain to the type design only.

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