

DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION

E9EU Rolls-Royce ORPHEUS 810D Rev. 2 July 8, 2011
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NOTE 16. This type certificate is cancelled effective July 8, 2011 and is not valid for aircraft manufactured after this date. This cancellation also invalidates, and precludes issuance of, any U.S. Certificates of Airworthiness.

TYPE CERTIFICATE DATA SHEET NO. E9EU

Engines of models described herein conforming with this specification and approved data on file with the Federal Aviation Administration are rated as airworthy for use in certificated aircraft in accordance with pertinent aircraft specifications and applicable portions of the Federal Aviation Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder	Rolls-Royce, Limited Bristol, England	
Model	Bristol Orpheus Mark 810D	
Type	Turbo-jet	Seven stage axial compressor, can-annular combustion system with seven separate flame tubes, single stage turbine.
Rating	(Static thrust at sea level, lb.) (See Note 5.) Takeoff Maximum continuous	4850 4130
Fuel controls	Fuel pump Combined control unit Air fuel ratio control Hunter (sprayer)	Lucas type SCH.51754 Lucas type SCH.51755 Lucas type SCH.50458 Lucas type SCH. 76
Fuel		See Note 8.
Oil capacity	Oil tank capacity total "Full" usable capacity	23 Imp. pints (27.7 U.S. pints) 20.8 Imp. pints (25.0 U.S. pints) 16.5 Imp. pints (19.8 U.S. pints)
Oil		Castrol 98 Esso Turbo Oil 35 ENCO.35 Esso Extra Turbo Oil 274 ENCO.Extra 274 Aeroshell Turbine Oil 750
Principal Dimensions, ins.	Length (air intake to exhaust cone flange) (overall) Height Width	93.47 100.52 36.95 32.4
Weight (dry) lb.	Basic engine - including ignition units, igniters and anti-icing control valve, but not including starter generator, hydraulic pump, tachometer generator and jet pipe.	975 lb.

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Center of Gravity, ins.	Forward of mounting trunnion centre line	0.5 ( $\pm 0.25$ )
Ignition	(High Energy System)	Two Igniters, Smiths/K.L.G. type RH.375/1. Two H.E. Ignition Units, Rotax/B.T.H. type C28TS
Certification basis	FAR 21.29 FAR 33 effective February 1, 1965, including amendments 33-1 through 33-3 and exemption No. 959, issued March 13, 1969. Date of Application for Type Certificate: April 30, 1969 Type Certificate No E9EU issued: June 16, 1969.	

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 E9EU. Effective September 28, 2003, the European Aviation Safety Agency (EASA) began oversight of this product on behalf of the UK.

Special Numbers Eligible	OR130001, OR130002, OR130003, and OR130004, in accordance with exemption No. 959, issued March 13, 1969.	
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 E9EU, is in a condition for safe operation and has undergone a final operational check.	

NOTE 1.	Maximum permissible engine operating rotor speeds are:	
	Takeoff, RPM	10,000 (100.5%) (5 min. limit)
	Maximum continuous, RPM	9,500 (95.5%)
	Momentary overspeed, RPM	10,300 (103.5%) (20 sec. limit)

NOTE 2.	Maximum permissible temperatures are:	
	Jet pipe temperatures (Measured mean of 4 thermocouples located in the jet pipe in a plane 29" downstream of the exhaust cone rear flange)	
	Takeoff	725°C (5 min. limit)
	Maximum continuous	640°C
	Ground idling	675°C (15 min. limit)
		640°C (Unlimited)
	Starting	800°C
	Oil inlet temperature	115°C
	Fuel inlet temperature	50°C

NOTE 3.	Fuel and oil pressure limits:	
	Fuel pressure:	Maximum inlet pressure 40 psi
		Minimum inlet pressure 5 psi
		(warning switch not fitted)
	Oil pressure:	Maximum 65 psi
		Normal 45-60 psi (95.5% RPM)
		Minimum 25 psi

NOTE 4.	Maximum permissible air bleed extraction:	
	Bleed for engine deicing and aircraft services (compressor delivery casing):	
	Range of RPM at which bleed may be used - unlimited	
	Maximum air delivery (1% of no bleed mass flow) - 2%	

NOTE 5. The ratings are based on static test stand operation under the following conditions:

International Standard Atmospheric Conditions at Sea Level  
 All optional air bleeds closed  
 Aircraft service accessory drives unloaded  
 Test bed venturi intake to RR/BED drawing XP.5007/8/9/10  
 Test bed 20" diameter straight jet pipe having nozzle suitability trimmed  
 Jet pipe temperature measured by 4 thermocouples  
 100.5% indicated speed corresponding to 10,000 RPM

NOTE 6. These engines meet FAA requirements for operation in icing conditions.

NOTE 7. The following accessory drive provisions are incorporated:

Drive	* Rotation	Speed Ratio to Turbine Shaft	Torque (in. lb.)		Overhang (in. lb.)
			Continuous	Static	
Starter/generator	A.C.	0.871/1	550	6050	750
Hydraulic pump	C.	0.397/1	270	2600	100
Generator (tachometer)	C.	0.422/1	(Drive Shear 35/40)		3

\*Clockwise or anti-clockwise looking on the drive face of the accessory.

NOTE 8. The following fuels are eligible for this engine:

Aviation Turbine Fuel Specifications:  
 British D. Eng. R.D. 2494 or 2453  
 American ASTM.D.1655-66T. Jet A-1  
 British D. Eng. R.D. 2486 or 2454 or 2498  
 American ASTM.D.1655-66T. Jet B  
 MIL-J-5624G. Grades JP.4 and JP.5

NOTE 9. This engine has not been demonstrated to comply with FAA requirements for rotor disc integrity, blade containment, and bird and hail ingestion.

NOTE 10. Service life limited parts are shown in ARB approved Rolls-Royce Document PFG/JPLG/79603 with interpretation of cyclic life as defined in ARB letter reference BTL/ORP of March 7, 1969.

NOTE 11. Engines shall continue to be overhauled periodically by the Bristol Engine Division of Rolls-Royce in accordance with the Maintenance program that has been utilized for the engines since 1957.

NOTE 12. The only optional additives that may be used in approval fuels are as follows:

1. Anti-icing additives to Specification D.Eng. R.D. 2451 or MIL-I-27686D (including Phillips Anti-icing Additive PFA 55 MB, type 99.6/0.4) may be used in concentrations not exceeding 0.15% by volume in approved kerosene or wide cut fuels.
2. Anti-static additive Shell ASA.3 may be used in approved kerosene or wide cut fuels in concentration not exceeding 0.75 grammes per cubic metre in kerosene or 0.60 grammes per cubic metre in wide cut fuels.

NOTE 13. These engines are approved only for installation on the Lockheed Jetstar Model 329 airplane serial no. 1001 when that aircraft is certificated under Exemption No. 909, issued December 9, 1968.

- NOTE 14. Manuals
- Operating Instructions and Maintenance - Orpheus 803 Engine Operating and Servicing Instructions T.O. 2J-J80302-2 endorsed by Special Notice ref: TP.134/B.E.D. relating to Orpheus 810D applicability.
  - Overhaul - Orpheus 803 Engine Overhaul Instructions R.O. 2J-J80302-3  
Orpheus Component Salvage Manual  
Orpheus Repair Notes  
Orpheus Test Manual - Section 3, Note 50, Issue 2, and Section 5, Note 10, Issue 3.
  - Performance - Orpheus 810 Engine Performance Brochure TC 344.
  - Parts List - Orpheus 810D, Schedule D.I.S. B.181480.

NOTE 15. 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.

- Service bulletins,
- Structural repair manuals,
- Vendor manuals,
- Aircraft flight manuals, and
- Overhaul and maintenance manuals.
- Technical Variances

These approvals pertain to the type design only.

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