

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E2EU	TCDS NUMBER E2EU REVISION: 16* DATE: March 23, 2007 ROLLS-ROYCE Deutschland Ltd & Co KG MODELS: SPEY		
	506-14	511-14W	555-15H
506-14A	511-8	555-15N	
506-14D	511-8/Mod 2970	555-15P	
511-14	555-15		

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E2EU) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets 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 (TC) HOLDER: Rolls-Royce Deutschland Ltd & Co KG
 Postfach 1536
 D-15827 Dahlewitz
 Germany
 (formerly known as Rolls-Royce plc, Derby England)

I. MODELS (SPEY)	506-14 / 506-14A / 506-14D	555-15N/ 555-15	555-15P / 555-15H	511-14 / 511-14W / 511-8/ 511-8/Mod 2970
TYPE Turbojet (by pass)	Twin spool, 16 stage axial compressor 4 stage turbine, tube-annular combustor with 10 flame tubes	--	--	Twin spool, 17 stage axial compressor --
RATINGS (See Notes 1, 2 and 4)				
Max. cont. static thrust at sea level, (lbs)	9,990	9,470	9,520	10,940
Takeoff static thrust at sea level, (5 min, See Note 15) (lbs)	10,410 for 506-14, 506-14A and 506-14D	9,850	9,900	11,400
FUEL CONTROL (See NOTE 10)	Lucas CASC 105	CASC 133	CASC 211	CASC 112 for 511-14 CASC 145 for 511-14W CASC 116 or 146 for 511-8
Fuel	Lucas CASC 167 for 506-14A See NOTE 9	--	--	--
Oil Capacity	14.4 US pints Integral Tank 10.8 US pints usable	--	--	--
Oil Types	Refer to RR Operating Instructions for model.	--	--	--
PRINCIPAL DIMENTIONS				
Length (in) (From front of nose cone to rear of exhaust cone bullet)	109.988	102.32 (-15) 105.34 (-15N)	-- (-15H) -- (-15P)	114.565
Max. diameter (in) (Encircling dia. Excluding accessories)	39.700	--	--	--

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LEGEND: "--" INDICATES "SAME AS PRECEDING MODEL"
 "---" NOT APPLICABLE
 NOTICE: ALL PAGES ARE REFORMATTED. SIGNIFICANT CHANGES, IF ANY, ARE BLACK-LINED IN THE LEFT MARGIN.

I. MODELS (CONT.) (SPEY)	506-14, 506-14A, 506-14D	555-15	555-15N	555-15H	555-15P	511-14, 511-14W, 511-8, 511-8 Mod 2970
WEIGHT, dry (lbs) – including fuel system, oil system, oil tank and filters, anti-icing system, accessory drives, igniter plugs and EGT thermocouples and harness	2,297	2,222	2,238	2,247	2,257	2,483 for 511-8 2,487 for 511-14 2,506 for 511-14W
CENTER OF GRAVITY, IN. Rearward of front suspension Centerline	20.2	18.2	18.4	17.9	18.1	19.3 for 511-14 19.1 for 511-14W 19.2 for 511-8
IGNITION SYSTEM (See NOTE 10)	Igniters Lodge LF 114-2 or AC AR 114	--	--	--	--	Igniter Boxes NB 38 or AEI C83/TS/1 for 511-14 & - 14W Rotax NB 34 for 511- 8
	Igniter Boxes Rotax NB 38 or AEI C34/TS.2	Igniter Boxes AEI C120TS/1 or 119TS/1	--	--	--	--
NOTES	1 thru 16	--	--	--	--	--

CERTIFICATION BASIS

CAR 10/FAR 21.29 and British Civil Airworthiness Requirements, Section C, Issue 5 except for Spey 555-15, 555-15H, 555-15N, and 555-15P which comply with Issue 6 of BCAR. (The BCAR Section C is equivalent to US CAR Part 13 effective June 15, 1956, as amended by 13-1 through 13-5, Section C, Issue 6 is equivalent to FAR 33-1).

Type Certificate No. E2EU date of application February 21, 1964, issued March 6, 1964. Amended to include 506-14 and 506-14AW on February 26, 1965; 506-14B, 510-14 and 510-14 and delete 505-5 and 506-14AW October 15, 1965; to include 511-14 on August 30, 1966, 511-8 and delete 506-14B on June 1, 1967; to include 506-14C on March 11, 1968, 555-15 on December 20, 1968, 506-14A on June 24, 1969, 506-14D on April 19, 1971, 511-14W on May 11, 1973, and delete 510-14 on December 17, 1974; to include 511-8/Mod 2970 on December 17, 1974; to include 555-15H on March 3, 1980; to include 555-15N and 555-15P on October 26, 1981; to delete 506-14C on June 10, 1985.

The aviation authority for Germany, Luftfahrt-Bundesamt, type certificated this engine. The FAA validated this product under U.S. Type Certificate Number E2EU. Effective September 28, 2003, the European Aviation Safety Agency (EASA) began oversight of this product on behalf of Germany.

IMPORT REQUIREMENTS

To be considered eligible for installation on U.S. registered aircraft, each new engine to be exported to the United States with Luftfahrt-Bundesamt (Germany) 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 E2EU, is in a condition for safe operation and has undergone a final operational check.

Additional guidance is contained in FAA Advisory Circular 21-23, "Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products Imported into the United States."

NOTES

I. MODELS (SPEY)	506-14, 506-14D	506-14A	555-15N, 555-15	555-15P, 555-15H	511-8, 511-8/ Mod 2970, 511-14	511-14W
NOTE 1.	Rotor Speed Limitations					
Low Pressure (LP) Rotor, % rpm						
Takeoff, dry (5 min.**)	107.2/9,000	107.8/9,050	108.5/9,106	109.5/9,190	106.6/8,950	--
Takeoff, wet (5 min.)	---	--	--	--	--	106.6/8,950
Maximum continuous	107.2/9,000	107.8/9,050	108.5/9,106	--	106.6/8,950	--
Reverse thrust (30 sec.)	105.5/8,855	106.0/8,900	(See Note 4)	--	106.6/8,950	--
*Overspeed (20 sec. Max.)	110.2/9,250	113.5/9,528	115.5/9,694	--	110.0/9,230	--
High Pressure (HP) Rotor, % rpm						
Takeoff, dry (5 min.**)	99.7/12,450	98.9/12,350	101.0/12,257	102.5/12,439	100.1/12,500	--
Takeoff, wet (5 min.)	---	--	--	--	--	101.0/12,600
Maximum continuous	97.3/12,150	97.0/12,109	98.5/11,954	--	98.1/12,250	--
Reverse thrust (30 sec.)	94.5/11,800	94.5/11,800	(See Note 4)	--	100.1/12,500	--
*Overspeed (20 sec. Max.)	102.7/12,820	103.2/12,880	104.5/12,682	105.5/12,803	103.1/12,870	104.0/12,983
(Maximum permissible engine operating speeds for the engine rotors are as above, in which 100% HP = 12,136 rpm, and 100% LP = 8,393 rpm for Spey 555-15, -15N, -15H, and -15P; for all other models, 100% HP = 12,484 rpm and 100% LP = 8,393 rpm).						
*If these limits are exceeded the engine requires inspection in accordance with the Rolls-Royce Maintenance Manual.						
**See NOTE 15.						

NOTE 2.

Temperature Limitations (°C)

Turbine gas temperature (mean of 10 thermocouples in exhaust cone with automatic compensation for intake temperature) (All 506-14A, 506-14D, 511-14W, 511-14, 511-8, 555-15, 555-15N, 555-15H, and 555-15P engines incorporate approved trimmer resistors).

	506-14	506-14A	506-14D	555-15N 555-15	555-15P 555-15H	511-14	511-14W	511-8	511-8/ Mod 2970**
Takeoff, dry (5 min.***)	615	600	570	520	565	580	--	585	--
*Max. for acceleration (2 min.)	---	---	--	---	---	---	590	---	595***
Takeoff, wet (5 min.)	575	560	550	490	520	540	--	--	--
Max. continuous	615	600	570	---	---	580	--	--	--
Max. for reverse thrust on ground (30 sec. Limit)	575	560	--	490	520	540	--	--	--
Max. for ground idling	615	590	570	540	570	570	--	--	--
Max. for starting & reights	630	620	585	540	585	595	--	610	615***
T.G.T. Overtemp (20 sec. Limit)	100	--	--	--	--	--	--	--	--
Oil inlet (cont.) (15 min. operation)	120	--	--	--	--	--	--	--	--
Fuel at HP pump inlet (cont.) (15 min. operation)	90	--	--	--	--	--	--	--	--
	110	--	--	--	--	--	--	--	--

*Total combined time must not exceed 5 minutes

** See NOTE 12

*** See NOTE 15

NOTE 3.

Fuel and Oil Pressure Limits

Fuel Pressure: Measured at inlet to engine main pump. Minimum for operation: 12 p.s.i.a. or 6 p.s.i. above fuel tank pressure, whichever is lower, but not less than 2 p.s.i.g. Minimum for starting, Ground: 10 p.s.i.a. (Refer to RR HK31257, Issue 4).

Oil Pressure: Normal 30 to 55 p.s.i.g. with minimum in flight of 25 p.s.i.g. at appropriate maximum continuous r.p.m. for 506 and 555 series, and 35 to 55 p.s.i.g. with minimum in flight of 30 p.s.i.g. for the 511-14 and -14W, 40 to 55 p.s.i.g. with a minimum in flight of 35 for the 511-8.

NOTE 4.

The ratings are based on standard conditions 59°F and 29.92" Hg Barometer, with no air bleed or power offtake, pw/po = .01 with turbine gas temperature within limits.

Engine to be fitted with jet piper Part No. J88926 (or approved equivalent).

Final nozzle J88931, test bed intake flare REP 23224. Test results are corrected to a fuel calorific value of 18550 BTU/lb.

Thrust reverser unit Spey TR 504-14B for 506 series and TR 504-14C for 511-14 series. The 511-8 is fitted with a thrust reverser manufactured by ROHR. No thrust reverser is fitted to the Spey 555-15 series.

NOTE 5.

DRIVE	ACCESSORY DRIVE PROVISIONS				Maximum Overhang (lb - in)
	Rotation	Speed Ratio To Turbine	TORQUE (lb - in)		
			Max. Cont.	Instantaneous	
Fuel Pump: Type GD: 111 (506-14 series) 119 (511-14, -14W; 511-8) 114 (555-15 series)	CC	0.2504	500	760	132
Fuel Control: Type CASC: 105 (506-14 series) 112 (511-14) 116 or 146 (511-8) 133 (555-15, -15N) 211 (555-15H, 15P)	CC	.4780	10	260	120
Backing Pump: Type BP 230/6	CC	.4263	30	568	30.6
H..P. Tacho KGA 2302	CC	.3364	7	50.0	3.2
L.P. Tacho KGA 2302	CC	.5004 XLP	7	50.0	3.2
CSD Plessey Type 220 (including starter)	CW	.3727	1270	7200	1300
Sundstrand Type 20-AG-DO-2 for 555-15 series	CW	.5088	659	5620	283.5
Starter AiResearch ATSV 100-1 for 555-15 series; 100-3 for 511-8	CW	1.0398	-	2981	153.4
Alternator 976J-118-6 or 976J-119-6	CC	6000 rpm constant	380	6000	488
Bendix 28B 153-76 for 511-8	CC	.8005	500	2310	250
Westinghouse 6QM 20D for 555-15 series	CC	8000 rpm constant	248	2000	262.7
Generator Bendix 30E 20-41A for 511-8	CW	.6707	250	2310	220
Hydraulic Pump: 61698-L8	CW	.2639	730	3170	115.0
61699-R8	CC	.2639	730	3170	115.0
Kellog AP-10V-60 for 511-8	CC	.2614	732	3000	140
Kellog AP-6V-35 & AP-1V-19 for 555-15 series	CC	.2615	461	1400	36.4
	CW	.2445	176	500	11.5
NOTES: CW = clockwise CC = counter-clockwise					

NOTE 6.

These engines meet FAA requirements for icing protection, for adequate turbine disc integrity, for rotor blade containment and do not require external armoring.

NOTE 7.

Compressor air bleed may be used in accordance with RR instructions such that the operating limitations are not exceeded up to maximum of 3.1% of the no bleed mass flow for HP bleed and 3.5% for the LP bleed for the 506-14, and 506-14D. 2.7% HP bleed and 3.3% LP bleed for 506-14A. 2.45% HP bleed and 3.65% LP bleed for the 511 series.

NOTE 7. (continued) For the Spey 555-15 series, the maximum air bleed flows are given by the following nondimensional values:

	$\frac{M_7 T_1}{P_1}$	$\frac{M_{12} T_1}{P_1}$	$\frac{M_T T_1}{P_1}$
Takeoff	6.45	7.4	13.85
Max. Cont. and below	6.25	6.9	13.15

Where T_1 = Total temperature at engine intake – °K
 P_1 = Total pressure at engine intake – p.s.i.a
 M_7 = Stage 7 bleed mass flow – lbs./sec.
 M_{12} = Stage 12 and anti-icing bleed mass flow – lbs./sec.
 M_T = Stage 7, stage 12 and anti-icing bleed mass flow – lbs./sec.

NOTE 8. The maximum allowable thrust for below standard and/or ram conditions for 5 minutes at T0 conditions, 10,500 lbs., for 555 series; 11,200 lbs. for the 506 series; 12,100 lbs. for the 511 series. The maximum thrust for both T0 and max. continuous conditions is automatically limited by the compressor delivery pressure limiter as shown in RR Performance Brochures.

NOTE 9. Approved fuels and fuel additives are given in Rolls-Royce Operating Instructions for each model:

506-14, 506-14D	506-14A	511-14	511-14W	555-15, 555-15N, 555-15H, 555-15P	511-8
F-Sp3-B	F-Sp3W-B	F-Sp4-Bk	F-Sp4W-B	F-Sp2-F	F-Sp4-G

NOTE 10. Type numbers quoted for fuel control, igniters and igniter boxes are the basic standard. Later approved type numbers are quoted in the relevant RR Maintenance and Overhaul Manuals.

NOTE 11. The above models incorporate the following general characteristics:

	<u>MODEL</u>	<u>RR RATING NUMBER</u>	<u>CHARACTERISTICS</u>
SPEY	505-5	RB 163-1	Basic model for use in Trident. Approved March 6, 1964; withdrawn October 15, 1965, owing to non-applicability for US operators.
	506-14	RB 163-2	Variant for installation in BAC 1-11 aircraft with appropriate installation features, and a higher rating. Added February 26, 1965.
	506-14A	RB 163-2	As 506-14AW but with water injection features deleted. Added June 24, 1969.
	506-14B	RB 163-2	As 506-14, but with higher T0 limitations and 3% increased hot day thrust. Added October 15, 1965, and deleted on June 1, 1967, as model withdrawn.
	506-14C	RB 163-2	As 506-14, but with higher TO limitations and approximately 1-1/2% increased TO thrust. Added March 11, 1968, and deleted June 10, 1985.
	506-14AW	RB 163-2W	Variant with water injection for BAC 1-11 200 series approved February 26, 1965, withdrawn October 15, 1965, owing to non-applicability for US operators.
	510-14	RB 163-25	Variant for BAC 1-11 400 series aircraft. Extra stage on LP compressor and 5.5% higher ratings than 506-14 engine. Added October 15, 1965, and deleted December 17, 1974.
	511-14	RB 163-25	Variant for FAC 1-11 400 series with higher TO rating. Otherwise mechanically as 510-14. Added August 30, 1966.
	511-8	RB 163-25	Variant of the Spey RB 163-25 for installation in the Grumman Gulfstream II aircraft, and with installation changes to suit this aircraft. Added on June 1, 1967.
	555-15	RB 183	Variant of the Spey 506-14AW, but de-rated and with various lightening features. No water injection system and with installation features to suit the Fokker F-28 aircraft. Added December 20, 1968.
	506-14D	RB 163-2	As 506-14 but featuring trimmed TGT limitations. Added April 19, 1971.
	511-14W	RB 163-25W	As 511-14 with water injection features. Added May 11, 1973.
	511-8/Mod 2970	RB 163-25	Same as 511-8 except for higher temp turbine blades (Mod 2970). Added December 17, 1974.

NOTE 11. (continued)

555-15H	RB 183	Variant of Spey 555-15. Higher takeoff and maximum continuous limitations. Added March 3, 1980.
555-15N	RB183	As 555-15 but with redesigned exhaust mixer for improved silencing. Added October 26, 1981.
555-15P	RB 183	As 555-15H but with redesigned exhaust mixer for improved silencing. Added October 26, 1981.

NOTE 12.

T.G.T. limits of 595°C for 2 minutes acceleration and 615°C for 20 second overtemperature apply only to Spey Mk.511-8 engines of Modification No. 2970 standard or approved equivalent. For Spey Mk.511-8 engines incorporating Modification No. 2970 or the approved equivalent, the engine Data Plate shall be marked in accordance with Rolls-Royce Service Bulletin Sp. 77-43.

NOTE 13.

Life-limited parts are identified in the Spey Overhaul Manual, Section 5-10.

NOTE 14.

The following engines comply with the applicable exhaust emission and fuel venting requirements of SFAR 27-5 and 40 CFR 87:

- a. MK555/mod 6122, mod 6123
- b. MK 511-8/mod 6121
- c. Certain Spey engines are exempted from 40 CFR 87.21 by exemption number 4040A, dated February 7, 1985.
- d. Certain model MK555-15 engines are exempted from 40 CFR 87.21 by exemption number 3913, dated January 25, 1984.

NOTE 15.

For the Spey 555 series engines only, the take-off rating and its associated operating limitations may be used for up to 10 minutes in the event of engine out contingency, but their use is otherwise limited to not more than 5 minutes.

NOTE 16.

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 Luftfahrt-Bundesamt (Germany) or CAA (UK). 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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