

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E30NE	TCDS NUMBER E30NE	
	REVISION: 3	
	DATE: March 23, 2007	
	ROLLS-ROYCE plc	
	MODELS:	
	RB211-524G2-19	RB211-524G2-T-19
	RB211-524G3-19	RB211-524G3-T-19
	RB211-524H-36	RB211-524H-T-36
	RB211-524H2-19	RB211-524H2-T-19

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E30NE) 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 plc
 Derby, England

I. MODELS	RB211-524G2-19/ 524G2-T-19	RB211-524G3-19/ 524G3-T-19	RB211-524H- 36/524H-T-36	RB211- 524H2-19/ 524H2-T-19	
TYPE	High by-pass turbofan (by-pass ratio of 4.3:1) , axial flow, three-rotor. Single-stage low pressure fan driven by three-stage turbine. Seven-stage intermediate pressure compressor driven by single stage turbine. Six-stage high pressure compressor driven by single turbine. Annular combustion chamber.				
RATINGS (See NOTE 1)					
Maximum continuous Thrust, pounds net at sea level static Equivalent bare engine thrust*	47,230 ISA+10°C 48,160	-- --	-- --	-- --	
Takeoff (5 minutes, see NOTE 18) Thrust, net pounds at sea level static Equivalent bare engine thrust*	56,870 (1) 58,000	--(2) --	59,450(3) 60,600	-- --	
	1. ISA+15°C up to sea level, varying linearly to ISA+10°C at 5,000 ft; ISA+10°C at and above 5,000 ft. 2. Same as (1) except that up to +2.9% thrust is available at ISA+21.2°C between 0.1 and 0.4 mach at 600 ft. 3. ISA+15°C up to 1,400 ft., varying linearly to +8°C between 1,400 ft. and 3,300 ft.; ISA+8°C between 3,300 and 5,700 ft.; ISA+11.7°C above 5,700 ft.				
	*The equivalent bare engine thrust (lbf) is derived from the rated thrust by excluding the losses of the propulsion fan duct and thrust reverser and jet pipe washed by the fan stream.				
PRINCIPAL DIMENSIONS, inches					
Length From front flange case to rear of INA	187.35 in.	--	--	--	
Radius, maximum	57.5 in.	--	--	--	
CENTER OF GRAVITY, inches					
Aft front suspension centerline	34.9 in.	--	--	--	
Below centerline	1.4 in.	--	--	--	
Port from engine centerline	1.3 in.	--	--	--	

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LEGEND: "--" INDICATES "SAME AS PRECEDING MODEL"
"--" NOT APPLICABLE

I. MODELS	RB211-524G2-19/ 524G2-T-19	RB211-524G3-19/ 524G3-T-19	RB211-524H-36/ 524H-T-36	RB211-524H2-19/ 524H2-T-19	
WEIGHT (LBS)	12,731/ 12,540	--/ --	--/ --	12,764/ 12,573	
Dry powerplant weight less intake, intake systems, cowl doors, and cowl door support structure.					
ENGINE PARTICULARS BUILD STANDARD RR Drawing Introduction Sheet (DIS)	2110/ 2186	2116/ 2187	2082/ 2189	2118/ 2188	

FUELS	
APPROVED FUELS	See relevant Engine Operating Instructions for approved fuels.

OILS					
APPROVED OILS	See relevant Engine Operating Instructions for approved oils.				
OIL CAPACITY (U.S. pints)					
Nominal total system capacity	87.2	--	--	--	
Nominal oil tank capacity	56.9	--	--	--	
Minimum usable oil (including effect of attitude)	47.5	--	--	--	

COMPONENTS	RB211-524G2-19/ 524G2-T-19	RB211-524G3-19/ 524G3-T-19	RB211-524H-36/ 524H-T-36	RB211-524H2-19/ 524H2-T-19	
ELECTRONIC FULL AUTHORITY FUEL CONTROL					
Fuel control	Lucas FAFC 2000	--	--	--	
Fuel pump and governor	Lucas PAG 100	--	--	--	
Fuel metering unit	Lucas FMU 600	--	--	--	
IGNITION SYSTEM					
Ignition system plugs	Smiths 2701 RIG-1	--	--	--	
Ignition system units	Simmons 44760	--	--	--	
EQUIPMENT	For identification of equipment approved for use on these engines, refer to Chapter 1 of appropriate Rolls-Royce Drawing Introduction Sheet (DIS).				

CERTIFICATION BASIS FAR 21.29 and FAR 33 effective February 1, 1965, as amended by FAR 33-1 through 33-11. Pursuant to FAR 21.29(a)(1)(ii), the Type Certificate was issued in validation of the British Civil Aviation Authority (BCAR) Certification Standards Section C, Issue 13 (JAR-E Change 6), which were found to provide a level of safety equivalent to that provided by FAR 33, Amendment 33-11.

MODEL	APPLICATION DATE	ISSUED/REVISED	DELETED
RB211-524G-19	AUG 28, 1986	JUN 08, 1988	MAY 20, 1998
RB211-524G2-19	JAN 23, 1989	FEB 28, 1989	
RB211-524G3-19	MAY 09, 1989	AUG 14, 1989	
RB211-524H-36	AUG 09, 1989	OCT 06, 1989	
RB211-524H2-19	SEP 19, 1989	JAN 23, 1990	
RB211-524G2-T-19	NOV 04, 1996	OCT 02, 1997	
RB211-524G3-T-19	NOV 04, 1996	OCT 02, 1997	
RB211-524H-T-36	NOV 04, 1996	OCT 02, 1997	
RB211-524H2-T-19	NOV 04, 1996	OCT 02, 1997	

The United Kingdom Civil Aviation Authority originally type certificated this engine. The FAA validated this product under U.S. Type Certificate Number E30NE. Effective September 28, 2003, the European Aviation Safety Agency (EASA) began oversight of this product on behalf of 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 Civil Aviation Authority of United Kingdom 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 E30NE, 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

NOTE 1. The engine ratings are based on static test stand operation under the following conditions:

- (1) Fan inlet air at 50°F and 29.92 in Hg.
- (2) No aircraft accessory loads or optional bleed air extraction.
- (3) 100% intake recovery corrected from the datum air intake system defined by Drawing JRH1794 or approved alternatives.
- (4) Engine exhaust system defined by Fan Thrust Reverser TR537 and Jet Pipe JP520.
- (5) Turbine gas temperature and rotor speed limitations are not exceeded.

NOTE 2. **MAXIMUM PERMISSIBLE ENGINE ROTOR SPEEDS (%)**

100% HP = 10,611 rpm / 100% IP = 7,000 rpm / 100% LP = 3,900 rpm.

Takeoff (5 minutes, see NOTE 18)

HP	99.2
IP	107.7
LP	110.5

Maximum continuous (unrestricted)

HP	97.1
IP	105.0
LP	109.5

Maximum overspeed (20 seconds)

HP	100.9 (for the -524G/H-T) 101.5 (all other models)
IP	109.5
LP	111.5

Maximum reverse thrust (40 seconds)

LP	91.0
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NOTE 3. **MAXIMUM PERMISSIBLE TEMPERATURES**

TURBINE GAS TEMPERATURE (TGT) °C

Below 50% N3 (no time restriction)	600
Above 50% N3 the following apply:	
Takeoff (5 minutes, see NOTE 18)	785
Maximum continuous (unrestricted)	733
Overtemperature (20 seconds)	805

OIL

Combined scavenge	
Minimum for starting	Minus 30°C
Minimum for opening up	Minus 10°C
Maximum for unrestricted use	171°C

NOTE 4.

FUEL AND OIL PRESSURE LIMITS

FUEL

MINIMUM FUEL PRESSURE

Between sea level and 45,00 feet, not less than 5 psig plus true fuel vapor pressure with zero vapor/liquid ratio. Measured at inlet to engine LP fuel pump.

OIL

Measured between secondary oil pump and internal gearbox scavenge oil return line.

Normal

Between ground idle and 70% HP rpm 35 - 150 psid
 Above 70% HP rpm 40 - 150 psid

Minimum to complete flight

Ground idle to 70% HP rpm 25 psid
 Above 70% HP rpm 35 psid

Large reductions in engine rpm to below 70% HP rpm may result in transient reductions in oil pressure below 25 psid. This is acceptable provided the oil pressure does not fall below 18 psid and recovers to at least 25 psid within 5 minutes of throttling back.

NOTE 5.

MAXIMUM PERMISSIBLE AIR BLEEDS

The engine bleed is automatically scheduled from the engine IP and HP ports by a switching valve in the aircraft ducting which selects from the appropriate port in response to a signal sensing HP compressor delivery pressure (P3.0).

RB211-524G-19/G2-19/G3-19/H2-19/G2-T-19/G3-T-19/H2-T-19

With valve controller 60B-40123-103, bleed air is extracted from the IP delivery port at engine power settings above that giving a P3.0 greater than 84 psig, plus or minus 3 psig, at sea level, and 84 psig, plus or minus 4 psig, at 30,000 feet altitude, then decreasing linearly with ambient pressure to 71 psig, plus or minus 3 psig, at 45,000 feet altitude.

RB211-524H-36/H-T-36

Switching occurs at P3.0 of 105 psig, plus or minus 5 psig, at altitudes below 27,000 feet, decreasing linearly to 75 psig, plus or minus 5 psig, at 43,000 feet.

At power settings below these switching pressures, bleed air is extracted from the HP bleed port.

The nose cowl anti-icing air bleed flow, which is approximately 1.5% compressor flow, is included in the maximum bleed flows quoted for IP and HP bleeds.

The compressor air bleeds are to be used in accordance with Rolls-Royce instructions and such that the operating limitations are not exceeded.

Unrestricted.

Maximum HP bleed, ground idle to changeover point (percent of gas generator compressor flow)

9.0 (524G2-19, 524G2-T-19, 524G3-19, 524G3-T-19, 524H2-19, 524H2-T-19)
 10.6 (524H036, 524H-T-36)

Maximum IP bleed (percent of gas generator compressor flow). Decreases linearly with increases in HP compressor delivery pressure such that the bleed is:

NOTE 5. Continued

At the changeover point	6.3
At max. continuous conditions	5.0
At max. takeoff conditions	3.4
Maximum LP bleed (% of fan flow)	
From ground idle to 93% HP rpm	0.6
At max. continuous	0.4
From max. continuous to maximum takeoff	0.6

NOTE 6. SHAFT POWER EXTRACTION LIMITATIONS

Accessory drive provisions (continuous power as listed may be extracted under all engine operating conditions)						
MODELS	DRIVE	ROTATION	SPEED RATIO TO HP ROTOR SPEED	TORQUE (pound - inches)		
				CONTINUOUS	MAXIMUM INSTANTANEOUS	OVERHANG (in.-lbs.)
ALL MODELS	STARTER	CCW	1.0036	15,300	19,320	800
	IDG	CCW	0.8524	190 HP	950 HP 5 secs	1,750
	HYDRAULIC PUMP (for each of two drives)	CCW	0.3842	1,450	7,250	400
		CW = CLOCKWISE CCW = COUNTERCLOCKWISE				

NOTE 7. Power settings, power check, and control of the engine output is to be based on integrated engine pressure ratio (IEPR). Pressure probes are included in the engine for this purpose. Maximum IEPR setting values relevant to each rating are contained in rating tables within the FAFC.

NOTE 8. Life-limited parts are identified in Time Limit Manual T-211(524)-7RR.

NOTE 9. This engine approval includes bare engine plus thrust reverser, engine mounting feet and links, core engine cowlings, and engine accessories, coolers, filters, harness, and instrumentation transmitters as defined in the appropriate RR DIS. Hydraulic pump, VSCF and IDG are aircraft supply.

NOTE 10. RB211 series manuals under BCAR requirements accepted as equivalent to FAR 33.4 and 33.5 requirements are:

MODEL RB211	OPERATING INSTRUCTIONS	MAINTENANCE MANUAL	INSTALLATION MANUAL	ENGINE MANUAL
524G2-19	F-211 (524G/H)-747	Boeing 747-400 D633U101-RR	EL2806 A (B747)	E211 (524)-7RR
524G3-19	F-211 (524G/H)-747	Boeing 747-400 D633U101-RR	EL2806 A (B747)	E211 (524)-7RR
524H-36	F-211 (524)-767	Boeing 767 D633T193	EL2812A (B767)	E211 (524)-7RR
524H2-19	F-211 (524G/H)-747	Boeing 747-400 D633U101-RR	EL2806 A (B747)	E211 (524)-7RR
524G2-T-19	F-211 (524G/H)-747	Boeing 747-400 D633U101-RR	EL2806 A (B747)	E211 (524)-7RR
524G3-T-19	F-211 (524G/H)-747	Boeing 747-400 D633U101-RR	EL2806 A (B747)	E211 (524)-7RR
524H-T-36	F-211 (524)-767	Boeing 767 D633T193	EL2812A (B767)	E211 (524)-7RR
524H2-T-19	F-211 (524G/H)-747	Boeing 747-400 D633U101-RR	EL2806 (B747)	E211 (524)-7RR

- NOTE 11. The RB211-524G/H engines comply with applicable exhaust emissions and fuel venting requirements of SFAR 27-5. The RB211-524G/H-t engines comply with SFAR 27-5 and recommendations of ICAO Annex 16, Vol. 2, Second Edition 1993.
- NOTE 12. These engines are fitted with a Digital Electronic Engine Fuel Control system in which the software meets the "critical" standard of RTCA DO-178A/ED12A.
- NOTE 13. In icing conditions, the engine may be operated satisfactorily at LP rotor speeds (N1) down to Low Idle. Minimum corresponding N1 at Low Idle for these engines is 24 percent.
- NOTE 14. These engines are fitted with an independent HP spool overspeed governor. Dispatch with this item unserviceable is not permitted.
- NOTE 15. These engines satisfy the certification basis as defined in this Data Sheet when operating with the FAFC in reversionary control mode.
- NOTE 16. VARIANTS
- The RB211-524G-19 was originally approved for installation in the B747-400 aircraft on June 8, 1988. This variant is no longer in service and was deleted from this TCDS at Revision 2.
- The RB211-524G2-19 is a variant of the existing RB211-524G-19, incorporating a new rating plug in the FAFC to provide increased thrust during climb.
- The RB211-524G3-19 is a variant of the existing RB211-524G-19, incorporating a new rating plug in the FAFC to provide and increase in thrust in part of the takeoff envelope.
- The RB211-524H-36 was originally approved for installation in the B767-300 aircraft on October 6, 1989. It is a variant of the existing RB211-524G engine series with performance and installation changes to suit the B767-300 aircraft.
- The RB211-524H2-19 is a variant of the RB211-524H-36, with performance and installation changes to suit the B747-400 aircraft.
- The RB211-524G2-T-19, -524G3-T-19, -524H2-T-19 and -524H-T-36 are variants of the RB211-524G2-19, -524G3-19, -524H2-19 and -524H-36 respectively and feature the RB211-TRENT-700 04 Moduel and accommodating modification (72-CO67) to provide improved engine performance and reliability.
- NOTE 17. The RB211-524G/H series engines have been approved to operate with certain faults present in the control system, based on satisfaction of FAR 33 requirements and appropriate FAR 25 control system reliability requirements.
- The following criteria exist as dispatch and maintenance requirements for the engine control system:
- Fault Level C: No dispatch allowed
- Fault Level C1: Dispatchable; maximum operating interval for Fault Level C1 fault/s is 150 operating hours.
- Fault Level C2: Dispatchable; maximum operating interval for Fault Level C2 fault/s is 560 operating hours.
- Fault Levels C, C1, and C2 constitute Rolls-Royce nomenclature. The airframe manufacturers may use different nomenclature in adapting these fault categories to the aircraft maintenance and display systems; however, the maximum operating intervals are restricted as shown above.
- A control system reliability monitoring program has been established with Rolls-Royce in compliance with the reporting requirements as outlined in the Engine and Propeller Directorate Policy letter dated 28 October 1993, for Time Limited Dispatch of engines fitted with FADEC Systems. Rolls-Royce will provide data reporting in accordance with Attachment 1, Paragraph 17, of the aforementioned policy letter, to the FAA Engine Certification Office, ANE-140, on a quarterly basis.

NOTE 18. 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 19. Service Information:

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 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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