

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E00050EN	TCDS NUMBER E00050EN REVISION 6
	DATE: November 8, 2004
	ROLLS-ROYCE plc
	MODELS: RB211-TRENT 892-17 RB211-TRENT 875-17 RB211-TRENT 884-17 RB211-TRENT 884B-17 RB211-TRENT-892B-17 RB211-TRENT 877-17 RB211-TRENT 895-17

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E00050EN) 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-Trent 892-17	RB211-Trent 884-17	RB211-Trent 884B-17	RB211-Trent 877-17	RB211-Trent 875-17	RB211-Trent 892B-17	RB211-Trent 895-17
TYPE	High by-pass turbofan (by-pass ratio of 6.4:1 at a typical cruise thrust) axial flow, three-rotor. Single-stage low pressure fan driven by a five-stage turbine. Eight-stage intermediate pressure compressor driven by single stage turbine. Six-stage high pressure compressor driven by single stage turbine. Annular combustion chamber.						
RATINGS (See NOTE 1) Maximum continuous Thrust, pounds net at sea level static	77170(2)	70210(2)	70210(2)	70210(2)	62160(2)	77170(2)	77170(2)
Takeoff (5 minutes, see NOTE 19) Thrust, pounds net at sea level static	91450(1)	85430(1)	85430(1)	78910(3)	76580(1)	91450(4)(5)	92940(6)
Equivalent bare engine thrust, pounds*	92800	86700	86700	80110	77750	92800	94320
	<ol style="list-style-type: none"> 1. Flat rated to ISA + 15°C at all altitudes 2. Flat rated to ISA + 10°C at all altitudes. The 884B-17 maximum continuous thrust is the same as the 884-17 rating up to 12,000ft, then increases linearly to the 892-17 maximum continuous thrust at 25,000ft and above. 3. Flat rated ISA + 22.8°C between -2000 feet and 2000 feet varying linearly to ISA + 15°C at 5000 feet ISA + 15°C above 5000 feet. 4. Flat rated ISA + 15°C between -2000 feet and 2000 feet, then varying linearly to ISA + 4°C at 4550 feet, then varying linearly to ISA + 8°C at 6550 feet, then varying linearly to ISA + 15°C at 8000 feet. ISA + 15°C above 8000 feet. 5. The 892B-17 provides higher take-off thrust than the 892-17 at altitudes between 2000 feet and 8000 feet. The thrust increase varies with altitude, Mach number and ambient temperature and is limited to a maximum of 5.2%. 						

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Ratings (Cont'd)

6.	The 895-17 is flat rated as follows:
a)	Between -2000 ft and 457 ft, ISA +10°C
b)	Between 457 ft and 1500 ft, varies linearly between ISA 10°C and ISA +9°C
c)	Between 1500 ft and 2000 ft, varies linearly between ISA+9°C and ISA +10°C
d)	Between 2000 ft and 4000 ft, varies linearly between ISA +10°C and ISA +5°C
e)	Between 4000 ft and 6000 ft, ISA +5°C
f)	Between 6000 ft and 6550 ft, varies linearly between ISA +5°C and ISA +10°C
g)	Between 6550 ft and 10000 ft, ISA +10°C
h)	Between 10000 ft and 12000 ft, varies linearly between ISA +10°C and ISA +15°C
i)	At and above 12000 ft, ISA +15°C

*The Equivalent Bare Engine Take-off Thrust quoted above is derived from the approved Net Take-off Thrust by excluding the losses attributable to the cold convergent-divergent nozzle, by-pass duct flow and leakage and the afterbody.

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PRINCIPAL DIMENSIONS, inches							
Length	178	178	178	178	178	178	178
From front fan case flange to rear of tail bearing housing							
Radius, maximum	60	60	60	60	60	60	60
CENTER OF GRAVITY, inches							
Aft from powerplant station 100	27.4	27.4	27.4	27.4	27.4	27.4	27.4
Below centerline	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Starboard from engine centerline	0.1	0.1	0.1	0.1	0.1	0.1	0.1
WEIGHT Dry Basic Engine (lbs)	13400	13400	13400	13400	13400	13400	13400
ENGINE PARTICULARS BUILD STANDARD	2184	2151	2219	2158	2157	2185	2175
RR Drawing Introduction Sheet (DIS)	Issue 2	Issue 3	Issue 1	Issue 3	Issue 3	Issue 1	Issue 1

FUELS

APPROVED FUELS

See relevant Engine Operating Instructions for approved fuels.

APPROVED OILS

See relevant Engine Operating Instructions for approved oils.

OIL CAPACITY

Nominal total system capacity

93.9 U.S. pints	--	--	--	--	--	--
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Nominal oil tank capacity

49.2 U.S. pints	--	--	--	--	--	--
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Minimum usable oil (including effect of attitude)

32.5 U.S. pints	--	--	--	--	--	--
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OIL CAPACITY (Cont)	RB211-Trent 892-17	RB211-Trent 884-17	RB211-Trent 884B-17	RB211-Trent 877-17	RB211-Trent 875-17	RB211-Trent 892B-17	RB211-Trent 895-17
COMPONENTS							
ELECTRONIC FULL AUTHORITY FUEL CONTROL							
Fuel control, Lucas EEC	9000.07	9000.06AK1	9000.7	--	--	9000.07	--
Fuel pump, ArgoTech	721400-2	--	--	--	--	--	830800-1
Fuel metering unit Lucas FMU	800MK3	--	--	--	--	--	800MK4
IGNITION SYSTEM							
Ignition system plugs Champion	CH34698	--	--	--	--	--	CH34736
Ignition system units Simmonds	430081	--	--	--	--	--	430154
EQUIPMENT	For identification of equipment approved for use on these engines, refer to Rolls-Royce Report DNS12938.						

CERTIFICATION BASIS FAR 33 effective February 1, 1965, as amended by FAR 33-1 through 33-15. Pursuant to FAR 21.29(a)(1)(ii), the Type Certificate was issued in validation of the British Civil Aviation Authority Certification Standards JAR-E Change 8 plus OP E/91/1 which were found to provide a level of safety equivalent to that provided by FAR 33, Amendment 33-15.

<u>MODEL</u>	<u>APPLICATION DATE</u>	<u>ISSUED/REVISED</u>	<u>DELETED</u>
RB211 TRENT 877-17	JUL 22, 1992	JAN 30, 1995	
RB211 TRENT 884-17	JUL 22, 1992	JAN 30, 1995	
RB211 TRENT 875-17	OCT 22, 1992	JAN 30, 1995	
RB211 TRENT 890-17	JAN 19, 1994	JAN 30, 1995	FEB 28, 1997*
RB211 TRENT 892-17	OCT 10, 1996	MAR 03, 1997	
RB211 TRENT 892B-17	OCT 10, 1996	JUN 18, 1997	
RB211 TRENT 895-17	OCT 06, 1998	JUL 16, 1999	
RB211 TRENT 884B-17	AUG 13, 1999	SEPT 16, 2003	

*The Trent 890-17 engine was redesignated as the Trent 892-17

IMPORT REQUIREMENTS To be considered eligible for installation on United States-registered aircraft, each engine to be exported to the United States shall be accompanied by a certificate of airworthiness for export, or certifying statement endorsed by the exporting civil airworthiness authority, which contains the following language:

1. This engine conforms to its United States type design (Type Certificate Number E00050EN) and is in a condition for safe operation.
2. This engine has been subjected by the manufacturer to a final operational check and is in a proper state of airworthiness.

Reference FAR Section 21.500, which provides for the airworthiness acceptance of aircraft engines manufactured outside of the United States for which a U.S. type certificate has been issued.

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:

- A. (1) Fan inlet air at 59°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 Drawings ATF14670 and ATF14542 or approved alternatives.
 (4) Engine exhaust system defined by Primary Nozzle to 314W5510/1, Tail Plug to 314W5520/1, slave C-Ducts to RX75502.
 (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 = 3,300 rpm.

Takeoff (5 minutes, see NOTE 19)

HP		
	Pre-mod 72-B672	100.5
	Post-mod 72-B672	102.5
IP		105.0
LP		100.5

Maximum reverse thrust (33 seconds)

LP	80.5
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Maximum overspeed (20 second limit)

	HP	IP	LP
Pre-mod 72-B672	100.9	107	101.2
Post-mod 72-B672	102.8	107	101.2

NOTE 3. MAXIMUM PERMISSIBLE TEMPERATURES

TURBINE GAS TEMPERATURE (Indicated)

(TGT) °C

Starting	700	Momentary maximum during start or relight
Takeoff (5 minutes, see NOTE 19)	900	
Maximum continuous (unrestricted)	850	
Overtemperature (20 seconds)	920	

FUEL

At outlet from HP fuel pump	
Unrestricted	140°C
Max. during transient overshoots on reducing rpm (15 min. limit)	165°C

OIL

Combined scavenge	
Minimum for starting	-40°C
Minimum for opening up	50°C
Maximum for unrestricted use	191°C

NOTE 4. FUEL AND OIL PRESSURE LIMITS

FUEL

MINIMUM FUEL PRESSURE

Between sea level and 45,000 feet, not less than 5 psig plus true fuel vapor pressure, measured at inlet to engine LP fuel pump.

NOTE 4 (Cont.)	FUEL (continued)
	Maximum pressure at the engine inlet (measured at inlet of LP fuel pump)
	Continuous 60 psig
	Transient 70 psig
	Static 170 psig

OIL

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

Minimum acceptance for flight

Ground idle to 70% HP rpm	35 psid
At and above 95% HP rpm	60 psid

Minimum to complete flight

Ground idle to 70% HP rpm	25 psid
At and above 95% HP rpm	50 psid

NOTE 5. MAXIMUM PERMISSIBLE COMPRESSOR AIR BLEEDS

Air delivery for aircraft services, excluding powerplant anti-icing.

This air is automatically scheduled from the engine IP stage 8 and HP stage 6 compressor bleed ports via two valves in the aircraft ducting which select the appropriate supply in response to signals sensing the HP compressor delivery pressure (P30), IP delivery pressure (P25), altitude and corrected HP compressor speed. The switchover from the HP to the IP compressor delivery bleed port occurs whenever the following conditions are met:

1. P25 at the IPS check value is greater than 44 psig \pm 5 up to 22,000 feet.
2. Above 22,000 feet there are two bleed switchover levels, both varying as a function of altitude and corrected HP compressor speed. The upper and lower switch points vary linearly from 37.7 and 32.5 psig at 30,000 feet to 32.5 and 21 psig at 43,000 feet. Otherwise bleed air is extracted from the HP bleed port.

Maximum HP6 bleed (% gas generator compressor flow); This bleed decreases linearly between the values listed below for the 957°C turbine entry temperature (TET) (1192°C abnormal operation) and switchover points

- | | |
|------------------------------------|-------|
| 1. Normal Operation | |
| i. Low idle and up to 957°C TET | 11.5% |
| ii. At switchover point | 5.4% |
| 2. Abnormal (One engine operation) | |
| i. Low idle and up to 1192°C TET | 11.5% |
| ii. At switchover point | 7.3% |

Maximum IP8 bleed (% gas generator compressor flow); This bleed (IP8) decreases linearly between the values listed below for the maximum continuous and maximum takeoff points

- | | |
|---------------------------------------|------|
| 1. Normal Operation | |
| i. At switchover and up to max. cont. | 5.0% |
| ii. At maximum takeoff | 2.2% |
| 2. Abnormal (one engine operation) | |
| i. At switchover and up to max. cont. | 6.0% |
| ii. At maximum takeoff | 3.4% |

Maximum LP bleed (%) of fan flow)

Normal & Abnormal (one engine operation) 0.8%

Air delivery for powerplant anti-icing

Maximum HP3 bleed (%HPC inlet flow)

This bleed decreases linearly between the values listed below for the 777°C TET and takeoff points

- | | |
|--------------------------------|-------|
| I. At low idle and up to 777°C | 0.63% |
| ii. At takeoff | 0.57% |

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)		OVERHANG (in.-lbs)
				CONTINUOUS	MAXIMUM INSTANTANEOUS	
ALL MODELS	STARTER	CCW	0.9998 N3	SEE	BELOW	290
	IDG	CCW	0.8544 N3	2956	5000	1165
	HYDRAULIC PUMP	CCW	0.3916 N3	1500	1730	250
	VSCF	CCW	2.3495 N3	240	400	400
		CW = CLOCKWISE CCW = COUNTERCLOCKWISE				

Max Starter torque varies with air temperature as follows:-	
Air temperature °C	Max torque (lbs - in)
10	7440
-20	8640
-40	10800

NOTE 7. Power setting, power check, and control of the engine output are based on engine pressure ratio (EPR) targets calculated by the EEC. Pressure probes are included in the engine for measurement of EPR.

NOTE 8. Life-limited parts are identified in Time Limits Manual (See NOTE 10).

NOTE 9. This engine approval includes bare engine plus engine mounting feet, 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 JAA requirements accepted as equivalent to FAR 33.4 and 33.5 requirements are:

RB211-TRENT 800 SERIES	OPERATING INSTRUCTIONS	MAINTENANCE MANUAL	INSTALLATION MANUAL	ENGINE MANUAL	TIME LIMITS MANUAL
ALL MODELS	F-TRENT-777	D633W101-RRY	EL 2839	E-TRENT-2RR	T-TRENT-2RR

Service bulletins, structural repair manuals, vendor manuals, aircraft flight manuals, and overhaul and maintenance manuals which contain a statement that the document is CAA-approved are accepted by the FAA and are considered FAA-approved. These approvals pertain to the type design only.

NOTE 11. These engines meet the smoke and gaseous emission requirements of FAR 34.

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 20.9 percent airborne and 18 percent on the ground.

NOTE 14. These engines are fitted with an independent LP 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 EEC in reversionary control mode.

NOTE 16.

VARIANTS

RB211-Trent 892-17	Basic model.
RB211-Trent 884-17	Same as basic model except for decreased thrust ratings.
RB211-Trent 877-17	Same as basic model except for decreased thrust ratings.
RB211-Trent 875-17	Same as basic model except for decreased thrust ratings.
RB211-Trent 892B-17	Same as basic model except for increased takeoff thrust rating at altitudes between 2,000 feet and 8,000 feet.
RB211-Trent 895-17	Same as basic model but with increased takeoff thrust rating.
RB211 Trent 884B-17	Same as basic model except for decreased thrust ratings.

NOTE 17.

The RB211 Trent 800 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. Criteria pertaining to the dispatch and maintenance requirements for the engine control system are specified in Rolls-Royce plc report DNS 14049.

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.

NOTE 18.

These engines are approved for use with Boeing Thrust Reverser Part Number 315W5000-1/-2.

NOTE 19.

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.

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