COMANDO DA AERONÁUTICA
DEPARTAMENTO DE PESQUISAS E DESENVOLVIMENTO
CENTRO TÉCNICO AEROESPACIAL

TYPE CERTIFICATE DATA SHEET Nº EM-9803

EM-9803-03

Sheet 01

TURBOMECA

ARRIUS 2B1
ARRIUS 2F
ARRIUS 2B1A
ARRIUS 2B2

May 2005

Type Certificate Holder:

TURBOMECA S.A.
64511 Bordes Cedex
FRANCE

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 9803, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Brazilian Aeronautical Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other instructions.

MODELS ARRIUS 2B1, ARRIUS 2F, ARRIUS 2B1A, ARRIUS 2B2.

TYPE Twin spool (free turbine engine); turboshaft engine for helicopters; single stage centrifugal compressor; annular reverse flow combustion chamber; single gas generator turbine; single stage power turbine (free turbine); reduction gearbox.

RATINGS	kW (shp)	ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A without TU45 *	ARRIUS 2B1A with TU45 *	ARRIUS 2B2
(See Note 1)	Maximum continuous	408 (460)	322 (432)	408 (547)	309 (414)	432 (579)
	Take off	430 (556)	322 (432)	457 (613)	371 (498)	479 (642)
	Continuous OEI	430 (556)	#	457 (613)	371 (498)	485 (650)
	2 1/2 minute rating	430 (576)	#	491 (658)	526 (705)	#
	2 min OEI rating	#	#	#	#	554 (730)
*(See note 19)	30 sec OEI rating	#	#	#	#	557 (747)

Legend: "--" Same as preceding "#" Does not apply

FUEL / ADDITIVES	Refer to Installation Manual for approved fuel and additive specification. All models.				
FUEL CONTROL	Turbomeca full authority digital electronic control system with manual backup mode for the Arrius 2B1, Arrius 2B1A and Arrius 2B2. For the Arrius 2F the fuel control system is ensured by a hydromechanical control with manual mode.				
OIL, LUBRICATION / ADDITIVES	Refer to Installation Manual for approved oil specification. All models				
TEMPERATURE LIMITS	See Note 2				
PRESSURE LIMITS	See Note 5				
DRIVE SHAFT TYPE	Refer to Installation Manual. All models				
IGNITION	Low tension, high energy system including: - Twin output (one high energy generator) - 2 injectors - 2 ignitors All models				
		ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A	ARRIUS2B2
PRINCIPAL DIMENSIONS	Length, cm (in)	115.80 (45.6)	141.80 (55.8)	115.80(45.6)	115.80 (45.6)
	Width, cm (in)	51.80 (20.4)	67.40 (26.6)	51.80 (20.4)	51.80 (20.4)
	Height, cm (in)	69.00 (27.2)	48.90 (19.3)	69.00 (27.2)	69.00 (27.2)
WEIGHT (DRY)	Maximum / kg (lb) Refer to Installation Manual for definition of dry weight.	112 (246.9)	103.5 (228.1)	112 (246.9)	112 (246.9)
CENTER OF GRAVITY	Refer to Installation Manual All models				
AIR BLEED	See Note 10				

Legend: "--" Same as preceding "#" Does not apply

CERTIFICATION BASIS

The Certification Basis for the engine are those indicated in the RBHA 21.29 and in the RBHA 33, which endorses the FAR 33 effective 01 Feb. 1965 including Amendments 33-14.

Model	Application	Issued TC
ARRIUS 2B1	31 July 1997	02 September 1998
ARRIUS 2F	09 April 1997	19 May 1999
ARRIUS 2B1A	29 October 1999	13 November 2000
ARRIUS 2B2	24 January 2005	03 May 2005

IMPORT REQUIREMENTS

Each engine imported separately and/or spare parts must be accompanied by an export airworthiness approval issued by DGAC, attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and are in conformity with the CTA approved type design.

NOTES:

NOTE 1 Engine Ratings: Based on calibrated test rig with performance under the following conditions:

- Static, sea level standard conditions: 15°C, 101.3 kPa (59°F, 29.92 in.Hg).
- No airbleed, no accessory power extraction.
- Output shaft rotation speed: 5 898 rpm for ARRIUS 2B1 / 2B1A, 6252 rpm for ARRIUS 2B2 and 6 000 rpm for ARRIUS 2F.
- Heating value of fuel: 43 136 kJ/kg (18 550 BTU/lb).

The indicated ratings are minimum final test performance of production and overhaul engines in accordance with engine acceptance test specification Number 0.319.00.958.0 for ARRIUS 2B1 / 2B1A, 0.319.00.967.0 for ARRIUS 2B2 and 0.319.00.959.0 for ARRIUS 2F.

NOTE 2 Maximum Permissible Temperatures:

a) Exhaust Gas T45 °C (°F) (measured with 4 doubles thermocouples on gas generator turbine diffuser)

	ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A	ARRIUS 2B2
Maximum continuous rating	855 (1571)	830 (1526)	855 (1571)	879 (1614)
Takeoff rating	895 (1643)	870 (1598)	895 (1643)	897 (1646)
OEI continuous rating	895 (1643)	#	895 (1643)	942 (1728)
2 1/2 minute rating	945 (1733)	#	945 (1733)	#
2 min OEI rating	#	#	#	994 (1821)
30 sec OEI rating	#	#	#	1024 (1875)
Starting (unlimited)	810 (1490)	--	810 (1490)	819 (1506)
Starting (limited to ≤ 5 s)	895 (1643)	870 (1598)	895 (1643)	910 (1670)

Refer to Installation Manual or Maintenance Manual for required action if limits are exceeded.

b) Oil °C (°F) (measured at location defined in the Installation Manual):

Maximum operating 110 (230)
Minimum for starting: Between –50 (-58) and –30 (-22), according to oil specifications (refer to Installation Manual).
Minimum for power application: Between 0 (32) and 10 (50), according to oil specifications (refer to Installation Manual).

Refer to Installation Manual for further details.

c) Fuel °C (°F) (at engine inlet):

Maximum operating Maximum fuel temperatures are specified in the Installation Manual.
Minimum for starting The fuel temperature conditions for engines starting are specified in the Installation Manual.

Refer to Installation / Operation Manual for recommended additives.

NOTE 3 Permissible Engine Speeds:

a) Maximum gas generator speed N1, rpm (%)

	ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A	ARRIUS 2B2
Maximum continuous	53 406 (98.7)	53 846 (99.5)	53 406 (98.7)	53 564 (98.9)
Transient overspeed (5 s limit)	56 823 (105)	56 050 (103.6) (20 s)	56 823 (105)	55 187 (102)
Takeoff rating	54 706 (101.1)	54 658 (101)	54 706 (101.1)	54 105 (99.9)
OEI continuous rating	54 706 (101.1)	54 496 (100.7)	54 706 (101.1)	55 187 (102)
2 1/2 minute rating	56 113 (103.7)	55 308 (102.2)	56 113 (103.7)	#
2 min OEI rating	#	#	#	56 413 (104.2)
30 s OEI rating	#	#	#	57 081 (105.5)

Refer to Installation Manual for variation of these limits with ambient conditions.
Refer to Installation Manual or Maintenance Manual for required action if limits are exceeded.
100% = 54 117 rpm

b) Power Turbine Speeds N2, rpm (%)

Limit value authorized other than during starting and idle (FLIGHT mode).

	ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A	ARRIUS 2B2
For an unlimited duration				
- maximum	46 680 (106)	45 769 (104)	46 680 (106)	46 680 (106)
- minimum	41 396 (94)	40 488 (92)	41 396 (94)	41 396 (94)
In transient condition				
- maximum (20s)	47 560 (108)	48 410 (110)	47 560 (108)	47 560 (108)
- minimum (20s)	37 430 (85)	39 608 (90)	37 430 (85)	37 430 (85)

Refer to Installation Manual or Maintenance Manual for required action if limits are exceeded.
100% = 44 038 rpm for ARRIUS 2B1, 2B1A and 2B2
100% = 44 009 rpm for ARRIUS 2F

NOTE 4 Power Turbine Unit Torque Limits, N.m:

*See note 19	ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A without TU45 *	ARRIUS 2B1A with TU45 *	ARRIUS 2B2
Maximum Continuous	660	600	660	500	660
Take off	740	650	740	600	740
Transient (20s)	830	752	830	905	#
OEI continuous rating	740	#	740	600	740
2 1/2 minute rating	790	#	795	852	#
2 min OEI rating	#	#	#	#	905
30 sec OEI rating	#	#	#	#	905

NOTE 5 Fuel and Oil Pressure Limits, kPa (psi):

a) Fuel pressure

Minimum - Starting / Relight : Refer to Installation / Operating Manual
- Flight : Refer to Installation / Operating Manual
Maximum - Starting / Flight : Refer to Installation / Operating Manual

b) Oil pressure

Minimum flight	170 (24.7) for N1 ≥ 68%
Maximum starting	1 000 (145.0) for ARRIUS 2B1, 2B1A and 2B2, 1500 for ARRIUS 2F
Transient during starting (2min)	1 500 (217.6) for ARRIUS 2B1, 2B1A and 2B2
Maximum flight	1 000 (145.0)

NOTE 6 Accessory Drive Provisions:

Drive	Direction Rotation	Rotation Speed, rpm	Max. Torque in Overload N.m	Max. Static Overhang N.m	Shear Shaft Breaking Torque N.m	Max. Steady State Power kW (shp)
Starter/generator 2B1/2B1A/2B2	C	12 334	25	25	95	6 (4.5)
Starter/generator 2F	C	12 334	25	25	77	5.7 (4.2)

The rotation direction is indicated considering the power drive seen from the outside.
C: clockwise

NOTE 7 Air Intake Requirements:

- The Arrius engines have not been tested to evaluate the effects of foreign object ingestion. Foreign object ingestion characteristics of airframe air inlet and engine combination are to be evaluated prior to approval for the engine installation.
- The Arrius engines do not have anti-icing provisions. The ARRIUS 2B1, 2F, 2B1A and ARRIUS 2B2 (without any aircraft air inlet) meet the requirement of FAR 33.68(a)(b).

NOTE 8 Oil Systems: Refer to Installation Manual.

NOTE 9 Fuel Supply Requirements:
For fuel icing inhibitor additive, see Installation Manual

NOTE 10 Maximum Permissible Air Bleed:
(P3 air bleed from centrifugal compressor plenum)

	ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A	ARRIUS 2B2
- Maximum air mass flow: at take-off rating under standard sea level conditions: g/s (lb/s)	4.5% of engine inlet air mass flow	70.0 (0.15)	4.5 % of engine inlet air mass flow	4.5 % of engine inlet air mass flow

For further details, see Installation Manual.

NOTE 11 Engine Monitoring Transmitters: Refer to Installation Manual.

NOTE 12 Electrical Equipment: Refer to Installation Manual.

NOTE 13 Engine Fire Detector: fire detectors are provided on the engine: 2 for ARRIUS 2B1 / 2B1A / 2B2 and 3 for ARRIUS 2F.

NOTE 14 Life-limited components are listed in DGAC or EASA approved Airworthiness Limitations Chapter of the engine Maintenance Manual.

NOTE 15 Manuals required by RBHA/FAR 33.4 and 33.5

	ARRIUS 2B1	ARRIUS 2F	ARRIUS 2B1A	ARRIUS 2B2
Performance Number	X 319 L5 0052	X 319 L6 0029	X 319 L5 0032	X 319 N3 0022
Installation Number	X 319 L5 0012	X 319 L6 0012	X 319 L5 0012	X 319 N3 0012
Maintenance Number	X 319 L5 3012	X 319 L6 3002	X 319 L5 4512	X 319 N3 4512
Overhaul Number	X 319 L5 5002	X 319 L6 5002	X 319 L5 5002	X 319 N3 5002

NOTE 16 Overhaul of engines is not authorized unless the appropriate Overhaul Manual is available; otherwise rebuilt engines utilizing new engine tolerances may be provided by the manufacturer.

NOTE 17 FADEC box:

A. Installation conditions:
   The box shall be installed in the airframe outside the fire zone.
   Refer to Installation Manual for other installation conditions.
B. Lightning protection: refer to Installation Manual.
C. Electromagnetic interference: tests carried out are specified in the Installation Manual.
D. Software: the software has been developed and tested and the corresponding documentation developed according to the recommendations of documents RTCA DO 178A/EUROCAE ED-12A to level 1.

NOTE 18 The ARRIUS 2B1, 2B1A, 2B2 engines are restricted to twin-engine rotorcraft applications.

NOTE 19 TU45C is a major non-significant software modification which mainly increases Arrius 2B1A 2.5 minutes OEI Power rating and reduces the other power ratings. When modification TU45C is applied on Arrius 2B1A, it is identified as "Arrius 2B1A_1" on the engine identification plate.

GERALDO CURCIO NETO Ten Cel Av
Chefe da Divisão de Certificação de Aviação Civil
(Chief, Divisão de Certificação de Aviação Civil)

LUIZ ALBERTO C. MUNARETTO Cel Av
Diretor do Instituto de Fomento e Coordenação Industrial
(Director, Instituto de Fomento e Coordenação Industrial)