

		ARRIEL 1C1	ARRIEL 1C2	ARRIEL 1D	ARRIEL 1D1
shp (kW) / See Note 8	2-1/2 minute OEI	721 (538)	763 (569)	#	#
	30-minute OEI	705 (526)	738 (550)	#	#
	Continuous OEI	#	#	#	#
	Takeoff	705 (526)	738 (550)	684 (510)	712 (531)
	Maximum continuous	586 (437)	632 (471)	603 (450)	625 (466)
		ARRIEL 1E	ARRIEL 1E2	ARRIEL 1S	ARRIEL 1S1
shp (kW) / See Note 8	2-1/2 minute OEI	626 (467)	708 (528)	751 (560)	802 (598)
	30-minute OEI	626 (467)	708 (528)	730 (544)	788 (588)
	Continuous OEI	626 (467)	708 (528)	730 (544)	788 (588)
	Takeoff	626 (467)	708 (528)	701 (523)	725 (541)
	Maximum continuous	626 (467)	692 (516)	701 (523)	725 (541)
# Does not apply					
FUEL	See Note 15			For all models	
FUEL CONTROL	Turbomeca			For all models	
OIL	See Note 14			For all models	
TEMPERATURE LIMITS	See Note 2			For all models	
PRESSURE LIMITS	See Note 4			For all models	
		ARRIEL 1A	ARRIEL 1A2	ARRIEL 1B	ARRIEL 1C
PRINCIPAL DIMENSIONS	Length, in.	44.2	44.2	47.7	45.9
	Width, in.	16.2	16.2	17.3	16.2
	Height, in.	23.5	24.0	23.5	24.0

		ARRIEL 1C1	ARRIEL 1C2	ARRIEL 1D	ARRIEL 1D1
	Length, in.	45.9	45.9	49.4	47.3
	Width, in.	18.3	18.3	19.0	18.3
	Height, in.	24.0	24.0	24.0	24.1
		ARRIEL 1E	ARRIEL 1E2	ARRIEL 1S	ARRIEL 1S1
	Length, in.	46.7	46.7	60.3	60.3
	Width, in.	19.5	19.5	19.3	19.3
	Height, in.	27.4	27.4	30.9	30.9
CENTER OF GRAVITY	Refer to Installation Manual	For all models			
		ARRIEL 1A	ARRIEL 1A2	ARRIEL 1B	ARRIEL 1C
WEIGHT	Weight / Dry / Maximun / Pounds Refer to Engine Manual for definition of dry weight:	245	257	253	257
		ARRIEL 1E	ARRIEL 1E2	ARRIEL 1S	ARRIEL 1S1
	Weight / Dry / Maximun / Pounds Refer to Engine Manual for definition of dry weight:	276	276	280	286
		ARRIEL 1C1	ARRIEL 1C2	ARRIEL 1D	ARRIEL 1D1
	Weight / Dry / Maximun / Pounds Refer to Engine Manual for definition of dry weight:	262	262	272	269
DRIVE SHAFT TYPE	Refer to Installation Manual	For all models			

IGNITION	Low tension, high energy system, including: 2 high energy generators 2 injectors 2 ignitors	For all models																																							
STARTING	Starting unit with electrovalve. Drain valve. (See Note 7)	For all models																																							
IMPORT REQUIREMENTS	Each engine imported separately and/or spare parts must be accompanied by an Airworthiness Certificate for Export and/or an Airworthiness Approval Tag, respectively, issued by DIRECTION GENERALE DE L'AVIATION CIVILE (or a third country authority, in case of used engine imported from such country) 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. The CTA type design corresponds to the DIRECTION GENERALE DE L'AVIATION CIVILE approved type design, as stated in applicable CTA Report V33-003x-0, where "x" corresponds to each model.																																								
CERTIFICATION BASIS	RBHA 21.29 and 33 (Brazilian Requirements for Aeronautical Certification), which endorses the FAR Sections 21.29 and FAR 33 effective February 1, 1965, and Amendments 33-1 through 33-5.	<table border="0"> <thead> <tr> <th></th> <th style="text-align: center;">Application</th> <th style="text-align: center;">Issued TC</th> </tr> </thead> <tbody> <tr> <td>ARRIEL 1A</td> <td style="text-align: center;">24 May 1979</td> <td style="text-align: center;">17 March 1980</td> </tr> <tr> <td>ARRIEL 1A2</td> <td style="text-align: center;">28 Sep. 1983</td> <td style="text-align: center;">07 March 1985</td> </tr> <tr> <td>ARRIEL 1B</td> <td style="text-align: center;">13 Feb. 1980</td> <td style="text-align: center;">17 March 1980</td> </tr> <tr> <td>ARRIEL 1C</td> <td style="text-align: center;">28 Sep. 1983</td> <td style="text-align: center;">07 March 1985</td> </tr> <tr> <td>ARRIEL 1C1</td> <td style="text-align: center;">14 April 1987</td> <td style="text-align: center;">10 Feb. 1993</td> </tr> <tr> <td>ARRIEL 1C2</td> <td style="text-align: center;">11 Oct. 1991</td> <td style="text-align: center;">10 Feb. 1993</td> </tr> <tr> <td>ARRIEL 1D</td> <td style="text-align: center;">14 April 1987</td> <td style="text-align: center;">10 Feb. 1993</td> </tr> <tr> <td>ARRIEL 1D1</td> <td style="text-align: center;">21 Nov. 1989</td> <td style="text-align: center;">10 Feb. 1993</td> </tr> <tr> <td>ARRIEL 1E</td> <td style="text-align: center;">02 Dec. 1992</td> <td style="text-align: center;">10 Aug. 1993</td> </tr> <tr> <td>ARRIEL 1E2</td> <td style="text-align: center;">20 April 1994</td> <td style="text-align: center;">08 May 1995</td> </tr> <tr> <td>ARRIEL 1S</td> <td style="text-align: center;">01 July 1997</td> <td style="text-align: center;">17 June 1998</td> </tr> <tr> <td>ARRIEL 1S1</td> <td style="text-align: center;">01 July 1997</td> <td style="text-align: center;">17 June 1998</td> </tr> </tbody> </table>		Application	Issued TC	ARRIEL 1A	24 May 1979	17 March 1980	ARRIEL 1A2	28 Sep. 1983	07 March 1985	ARRIEL 1B	13 Feb. 1980	17 March 1980	ARRIEL 1C	28 Sep. 1983	07 March 1985	ARRIEL 1C1	14 April 1987	10 Feb. 1993	ARRIEL 1C2	11 Oct. 1991	10 Feb. 1993	ARRIEL 1D	14 April 1987	10 Feb. 1993	ARRIEL 1D1	21 Nov. 1989	10 Feb. 1993	ARRIEL 1E	02 Dec. 1992	10 Aug. 1993	ARRIEL 1E2	20 April 1994	08 May 1995	ARRIEL 1S	01 July 1997	17 June 1998	ARRIEL 1S1	01 July 1997	17 June 1998
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	Arriel 1S and 1S1 are additionally certified to FAR Section 33, Paragraphs 33.17(b), 33.67(a)(b) and 33.71(a)(b).																																								

PRODUCTION BASIS

ARRIEL 1B, 1S, 1S1: Production Certificate Number 5SW. Produced by Turbomeca Engine Corporation in the United States under license agreement from Turbomeca S.A., France.

ARRIEL 1B, 1S and 1S1: Engine modules, and parts thereof, produced by Turbomeca S.A., France, conforming to this type certificate are fully interchangeable with ARRIEL 1B, 1S and 1S1 engine modules, and parts thereof, produced under Production Certificate Number 5SW.

Engines manufactured under Production Certificate Number 5SW shall have the suffix "TEC" added to the engine serial number and shall be included in the required identification data as specified by FAR Section 45.

NOTES

NOTE 1 PERMISSIBLE ENGINE SPEEDS / rpm
MAXIMUM GAS GENERATOR SPEED

	ARRIEL 1A	ARRIEL 1A2	ARRIEL 1B	ARRIEL 1C
2-1/2 minute OEI rating	52 700	52 900	#	53 200
30-minute OEI rating	52 000	52 250	#	52 300
Continuous OEI	#	#	#	#
Takeoff rating	52 000	--	--	51 800
Maximum continuous rating	50 750	--	--	50 500
Transient (5 second limit)	54 650	--	--	--
Transient (20 second limit)	#	#	#	#

	ARRIEL 1C1	ARRIEL 1C2	ARRIEL 1D	ARRIEL 1D1
2-1/2 minute OEI rating	53 200	53 560	#	#
30-minute OEI rating	52 060	52 840	#	#
Continuous OEI	#	#	#	#
Takeoff rating	52 060	52 840	52 422	52 330
Maximum continuous rating	50 250	50 870	50 764	50 760
Transient (5 second limit)	54 650	55 685	54 650	55 685
Transient (20 second limit)	#	55 685 ⁽¹⁾	#	#
	ARRIEL 1E	ARRIEL 1E2	ARRIEL 1S	ARRIEL 1S1
2-1/2 minute OEI rating	52 888	53 509	53 517	--
30-minute OEI rating	52 629	52 835	52 631	52 257
Continuous OEI	53 257	--	52 631	53 257
Takeoff rating	52 111	52 835	52 110	--
Maximum continuous rating	51 800	51 955	52 110	--
Transient (5 second limit)	#	#	54 900	--
Transient (20 second limit)	55 685	--	54 900 ⁽¹⁾	--

For variation of these limits with outside air temperature (OAT), refer to Operation Manual or Installation Manual.

For required action if limits are exceeded, refer to Operation Manual or Maintenance Manual.

100% = 51 800 rpm: Arriel 1A/1A2/1B/1C/1C1/1C2/1D/1D1/1E/1E2

100% = 52 110 rpm: Arriel 1S/1S1

(1) For one engine inoperative (OEI)

PERMISSIBLE ENGINE SPEEDS (continued) / rpm
 MAXIMUM POWER SHAFT SPEED
 POWER SHAFT SPEEDS

	ARRIEL 1A	ARRIEL 1A2	ARRIEL 1B	ARRIEL 1C
Maximum stabilized	6 780	--	--	6 480
Maximum transient (5 sec)	7 200	--	--	--
Minimum transient (5 sec)	5 140	--	--	--
	ARRIEL 1C1	ARRIEL 1C2	ARRIEL 1D	ARRIEL 1D1
Maximum stabilized	6 480	--	--	--
Maximum transient (5 sec)	7 200	--	--	--
Minimum transient (5 sec)	5 140	--	--	--
	ARRIEL 1E	ARRIEL 1E2	ARRIEL 1S	ARRIEL 1S1
Maximum stabilized	6 480	--	6 542	--
Maximum transient (5 sec)	7 200	--	--	--
Minimum transient (5 sec)	5 140	--	--	--

If limits are exceeded, refer to Operation Manual or Maintenance Manual

100% = 5 976 rpm: Arriel 1A/1A2/1B/1C/1C1/1C2/1D/1D1

100% = 6 057 rpm: Arriel 1S

100% = 6 409 rpm: Arriel 1S1

100% = 6 000 rpm: Arriel 1E, 1E2

See Operation Manual

-- Same as preceding

NOTE 2 MAXIMUM PERMISSIBLE TEMPERATURE

A. EXHAUST GAS (t4°C)

Measured with 3 thermocouples on gas generator turbine diffuser

	ARRIEL 1A	ARRIEL 1A2	ARRIEL 1B	ARRIEL 1C
2-1/2 minute OEI rating	840	--	#	860
30-minute OEI rating	810	--	#	835
Takeoff rating	810	--	--	835
Maximum continuous rating	775	--	--	785
Starting	840	--	--	860
Transient (20 second limit)	#	#	#	#
	ARRIEL 1C1	ARRIEL 1C2	ARRIEL 1D	ARRIEL 1D1
2-1/2 minute OEI rating	865	885	--	--
30-minute OEI rating	845	--	--	--
Takeoff rating	845	--	--	--
Maximum continuous rating	775	--	795	--
Starting	865	--	--	--
Transient (20 second limit)	#	920	#	#
	ARRIEL 1E	ARRIEL 1E2	ARRIEL 1S	ARRIEL 1S1
2-1/2 minute OEI rating	885	--	--	--
30-minute OEI rating	845	--	--	868
Continuous OEI	845	--	--	868
Takeoff rating	845	--	--	--
Maximum continuous rating	845 ⁽¹⁾	--	--	845
Starting	865 ⁽²⁾	--	865	--
Transient (20 second limit)	920 ⁽³⁾	--	--	--

If limits are exceeded, refer to Operation Manual or Maintenance Manual for required action.

- (1) For two engine operation or one engine inoperative.
- (2) For one engine inoperative.
- (3) 5 second limit.

B. OIL / DEGREES CENTIGRADE / MEASURED AT ENGINE INLET
ARRIEL 1A / 1A2 / 1B

Maximum operating temperature: 110

Minimum for starting: Between -55 and -40, according to oil and fuel specifications. Refer to Operation Manual.

Minimum for power application: Between -10 and 0, according to oil specifications. Refer to Operation Manual.

MAXIMUM PERMISSIBLE TEMPERATURE (continued)

A. EXHAUST GAS (t4°C)

Measured with 3 thermocouples on gas generator turbine diffuser

ARRIEL 1C / 1C1 / 1C2 / 1D / 1D1

Maximum operating temperature: 115

Minimum for starting: Between -55 and -40, according to oil and fuel specifications. Refer to Operation Manual.

Minimum for power application: Between -10 and 0, according to oil specifications. Refer to Operation Manual.

ARRIEL 1S / 1S1 / 1E / 1E2

Maximum operating temperature: Refer to Installation Manual

Minimum for starting: Refer to Installation Manual

Minimum for power application: Refer to Installation Manual

B. FUEL / DEGREES CENTRIGRADE / MEASURED AT ENGINE INLET
ALL MODELS

Maximum operating temperature: 50

Minimum for starting: Between -55 and -40, according to oil and fuel specifications. Refer to Operation Manual of Installation Manual

Does Not Apply

-- Same as Preceding

NOTE 3 POWER TURBINE UNIT TORQUE LIMITS / PERCENT

	ARRIEL 1A	ARRIEL 1A2	ARRIEL 1B	ARRIEL 1C
Maximum stabilized	109.2	--	--	--
Maximum, 2-1/2 minutes OEI	109.2	--	--	115.4
Transient, 20 seconds	115.4	--	--	129.7
	ARRIEL 1C1	ARRIEL 1C2	ARRIEL 1D	ARRIEL 1D1
Maximum stabilized	111.1	--	109.2	--
Maximum, 2-1/2 minutes OEI	115.4	--	109.2	--
Transient, 20 seconds	129.7	--	120.0	--
	ARRIEL 1E	ARRIEL 1E2	ARRIEL 1S	ARRIEL 1S1
Maximum stabilized	114.0	--	104.6	103.7
Maximum, 2-1/2 minutes OEI	125.0	--	115.0	126.7
Transient, 20 seconds	140.3	--	155.0	148.3

FOR 1A / 1A2 / 1B / 1C / 1C1 / 1C2 / 1D / 1D1
100 percent corresponds to 76 mdaN

FOR 1S:
100 percent corresponds to 76.4 mdaN

FOR 1S1:
100 percent corresponds to 89.16 mdaN

FOR 1E / 1E2:
100 percent corresponds to 70.25 mdaN

NOTE 4 FUEL AND OIL PRESSURE LIMITS (psig)

- A. Fuel / Refer to Operation Manual or Installation Manual
- B. Oil / Measured at engine pump outlet, after filter

ARRIEL 1A / 1A2 / 1B
Maximum 130
If limit is exceeded, refer to Operation Manual or Maintenance Manual

Minimum: At Ng between 70 percent and 85 percent: 27.6
 at Ng more than 85 percent: 40.6

ARRIEL 1C / 1C1 / 1C2 / 1D / 1D1 / 1S / 1S1 / 1E / 1E2
Maximum: 72.5
If limit is exceeded, refer to Operation Manual or Maintenance Manual

Minimum: At Ng between 70 percent and 85 percent: 18.9
 At Ng more than 85 percent: 26.1

NOTE 5 MAXIMUM PERMISSIBLE P2 AIR BLEED FROM CENTRIFUGAL COMPRESSOR PLENUM

Maximum air mass flow: 0.22 lb/sec
 Power loss due to air bleed: Refer to Operation Manual or Performance Booklet

NOTE 6 AIR INTAKE REQUIREMENTS

The ARRIEL engines have not been tested to evaluate the affects of foreign object ingestion. Foreign object ingestion characteristics of airframe air inlet and engine combination are to be evaluated prior to approval of the engine installation.

The ARRIEL engines do not have anti-icing provisions and have not been tested to evaluate the effects of icing conditions. Anti-icing characteristics of airframe, air inlet, and engine combination are to be evaluated prior to approval of the engine installation.

The ARRIEL 1S and 1S1 engines meet the requirements of FAR 33.68(a)(b) when installed with Sikorsky S76A helicopter air intake Part Number 76302-07 001.

NOTE 7 ACCESSORY DRIVE PROVISIONS

ARRIEL 1A / 1A2 / 1B

Accessory / Drive	Direction of Rotation ⁽¹⁾	Nominal (rpm)	Max. Steady State Power (hp)	Max. Torque at Overload (in.lb)	Max. Stat.Overhung Moment Allowable For Accessories (in.lb)
Gas generator spool, compressor and turbine	CC ⁽²⁾	Ng=51 800 (100%)	#	#	#
Starter-generator/DC generator	C	Ng x .2147 = 11 126	10	370.0	222.0
Tachometer transmitter/gas generator	CC	Ng x .1621 = 8 401	0.2	4.5	8.85
Oil pump unit/internal	C	Ng x .0910 = 4 716	2.0	122.0	#
Fuel control unit/gas generator	CC	Ng x .0910 = 4 716	1.0	42.0	#
Free turbine (power turbine) spool	C ⁽²⁾	NgL = 41 586	#	#	#

Alternator/AC current generator	CC	NtL x .29293=12 182	18.0	300.0	133.0
Tachometer transmitter/free turbine	CC	NtL x .10138 = 4 216	0.2	4.5	8.85
Fuel control unit/internal/free turbine	C	NtL x .10138 = 4 216	#	14 600	354.00
Main output shaft drive	C ⁽²⁾	NtL x. 14428 = 6 000	682	1 150	177.00

ARRIEL 1C / 1C1 / 1C2 / 1D1 / 1D1

Accessory / Drive	Direction of Rotation ⁽¹⁾	Nominal (rpm)	Max. Steady State Power (hp)	Max. Torque at Overload (in.lb)	Max. Stat.Overhung Moment Allowable For Accessories (in.lb)
Gas generator spool, compressor and turbine	CC ⁽²⁾	Ng=51 800 (100%)	#	#	#
Starter-generator/DC generator	C	Ng x .2147 = 11 126	10	370.0	222.0
Tachometer transmitter/gas generator	CC	Ng x .1621 = 8 401	0.2	4.5	8.85
Oil pump unit/internal	C	Ng x .0910 = 4 716	2.0	122.0	#
Fuel control unit/gas generator	CC	Ng x .0910 = 4 716	1.0	42.0	#
Free turbine (power turbine) spool	C ⁽²⁾	NgL = 41 586	#	#	#
Alternator/AC current generator	CC ⁽³⁾	NtL x .29293=12 182	18.0	300.0	133.0
Tachometer transmitter/free turbine	CC	NtL x .10138 = 4 216	0.2	4.5	8.85
Fuel control unit/internal/free turbine	C	NtL x .10138 = 4 216	#	#	#
Main output shaft drive	C ⁽²⁾	NtL x. 14428 = 6 000	682	14 600	354.00

ARRIEL 1S / 1S1 / 1E / 1E2

Accessory / Drive	Direction of Rotation ⁽¹⁾	Nominal (rpm)	Max. Steady State Power (hp)	Max. Torque at Overload (in.lb)	Max. Stat.Overhung Moment Allowable For Accessories (in.lb)
Gas generator spool, compressor and turbine	CC ⁽²⁾	Ng=51 800 (100%)	#	#	#
Starter-generator/DC generator	C	Ng x .2147 = 11 188	10	442.0	222.0

Tachometer transmitter/gas generator	C	$Ng \times .2147 = 11\ 188$	0.2	4.5	8.85
Oil pump unit/internal	C	$Ng \times .0910 = 4\ 742$	2.0	122.0	#
Fuel control unit/gas generator	CC	$Ng \times .0910 = 4\ 742$	1.0	42.6	#
Free turbine (power turbine) spool	C ⁽²⁾	$NgL = 41\ 981^{(4)}$	#	#	#
Alternator/AC current generator	CC ⁽³⁾	$NtL \times .29293 = 12\ 297$	6.7	88.0	133.0
Tachometer transmitter/free turbine	CC	$NtL \times .29293 = 12\ 297$	0.2	4.5	8.85
Fuel control unit/internal/free turbine	C	$NtL \times .10138 = 4\ 256$	#	#	#
Main output shaft drive	C ⁽²⁾	$NtL \times 14428 = 6\ 057$	682	10 480	#

(1) REFERENCE FACING ENGINE ACCESSORY PAD

(2) REFERENCE AFT LOOKING FORWARD

(3) NOT INCLUDED WITH BASIC ENGINE

(4) CORRESPONDS TO 100% FOR 1S AND 94.5% FOR 1S1

C - CLOCKWISE

CC - COUNTER CLOCKWISE

- Does not apply

NOTE 8 ENGINE RATINGS

Engine ratings are based on calibrated test rig with performance under the following conditions:

Static, sea level standard conditions (15°C, 29.92" Hg)

No airbleed, no accessory power extraction

6 000 rpm output shaft drive speed

Heating value of fuel = 18 556 BTU/lb

The ratings given above are minimum final test performance of production and overhaul engines in accordance with engine acceptance test specification No. 0.292.00.940.0.

Use the exhaust pip specified below with calibrated test bed air intake No.6.202.81.719.0:

ARRIEL 1B: Exhaust pipe No. 0.292.80.721.0 or No. 0.292.80.738.0

ARRIEL 1A/1A2/1C: Exhaust pipe No. 0.292.80.753.0

ARRIEL 1C1 / 1C2 / 1D1: Exhaust pipe No. 0.292.80.818.0

ARRIEL 1D: Exhaust pipe No. 0.292.80.721.0

ARRIEL 1S/1S1/1E/1E2 : Exhaust pipe No. 0.292.80.885.0

NOTE 9 FUEL SUPPLY REQUIREMENTS

Fuel supplied to the engine inlet must be filtered to 18 microns absolute efficiency per MIL-F-5504 except for ARRIEL 1S and 1S1 which has a fuel filter supplied with the engine.

Fuel icing inhibitor additive is required when operating in ambient temperatures below 0°C (32°F), except for ARRIEL 1S, 1S1, 1E, and 1E2 where fuel icing inhibitor additive is required when operating in ambient temperatures below -10°C (14°F).

NOTE 10 OIL SYSTEM

Refer to Operation Manual or Installation Manual.

NOTE 11 ENGINE MONITORING TRANSMITTERS

Refer to Operation Manual or Installation Manual.

NOTE 12 ELECTRICAL EQUIPMENT

Refer to Operation Manual or Installation Manual.

NOTE 13 ENGINE FIRE DETECTOR

Six fire detectors are provided on the engine (except for ARRIEL 1S and 1S1 which has no fire detectors installed on the engine and ARRIEL 1E, 1E2 fitted with 1 fire detector).

NOTE 14 Refer to Operation Manual or Installation Manual for approved oil specifications.

NOTE 15 Refer to Operation Manual or Installation Manual for approved fuel and additive specification.

NOTE 16 Life-limited components are listed in DGAC-approved Chapter 5 of the engine Maintenance Manual.

NOTE 17 MANUALS REQUIRED BY FAR 33.5

	ARRIEL 1A	ARRIEL 1A2/B	ARRIEL 1C/1C1/1C2 1D/1D1	ARRIEL 1S/1S1	ARRIEL 1E/1E1
Performance Manual No.	#	--	X 292 BO 001	X 292 F9 900 9	X 292 G9 9009
Installation Manual No.	292 00 931	--	292 02 933 2	X 292 F9 001 2	X 292 G9 002
Operation Manual No.	292 00 936	--	292 02 935	#	#
Maintenance Manual No.	292 01 931	--	292 01 939	X 292 F9 300 2	X 292 G9 3002
Overhaul Manual No.	292 01 935	292 00 935-1	292 00 935-2	X 292 87 502 2 See Note 19	See Note 19

Does not apply

-- Same as preceding

NOTE 18 The ARRIEL 1A may be converted to ARRIEL 1A1 by incorporating Turbomeca Service Bulletin No. 71-292-0018.

NOTE 19 Overhaul of ARRIEL 1S1, 1E and 1E2 engines is not authorized unless the appropriate overhaul manual is available; otherwise, rebuilt engines utilizing new engine tolerances may be provided by the manufacturer.

LUIZ ALBERTO C. MUNARETTO – Ten.-Cel.-Av.

**Chefe da Divisão de Homologação Aeronáutica
(Chief, Divisão de Homologação Aeronáutica)**

Maj.-Brig.-do-Ar REGINALDO DOS SANTOS

**Diretor do Centro Técnico Aeroespacial
(Director, Centro Técnico Aeroespacial)**