MINISTÉRIO DA AERONÁUTICA
DEPARTAMENTO DE PESQUISAS E DESENVOLVIMENTO
CENTRO TÉCNICO AEROESPACIAL

TYPE CERTIFICATE DATA SHEET Nº EM-8212-02

Type Certificate Holder:

ALLISON ENGINE COMPANY
P.O. Box 420
Indianapolis, Indiana 46206-0420
USA

EM-8212-02
Sheet 01
ALLISON
250-C20B, 250-C20F, 250-C20R, 250-C20R/1, 250-C20R/2, 250-C20R/4, 250-C20W
June 1999

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 8212, 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.

I - MODELS 250-C20B, 250-C20F, 250-C20R, 250-C20R/1, 250-C20R/2, 250-C20R/4

TYPE Free turbine turboshaft, axial centrifugal compressor, 2 stage gas producer & 2 stage power turbine, single combustion chamber

RATINGS See Note 4

	250-C20B	250-C20F	250-C20R, 250-C20R/1, 250-C20R/2, 250-C20R/4
Maximum continuous at sea level, shp	420	--	450
Gas producer, rpm (est.)	53 000	51 790	50 537
Output shaft, rpm	6 016	--	--
Measured gas temp.	810°C(1 490°F)	--	773°C(1 423°F)

		250-C20B	250-C20F	250-C20R, 250-C20R/1, 250-C20R/2, 250-C20R/4
	Takeoff: 5 min. at sea level, shp	420	--	450
	Gas producer, rpm (est.)	53 000	51 790	50 537
	Output shaft, rpm	6 016	--	--
	Measured gas temp.	810°C(1 490°F)	--	773°C(1 423°F)
	Takeoff (augmented) at sea level, 35°C (95°F) ambient temperature, shp, 5 min.	420	--	#
	Output shaft, rpm	6 016	--	#
	Measured gas temp. (See Note 13)	810°C(1 490°F)	--	#
	30 minute power at sea level, shp	420	--	450
	Gas producer, rpm (est.)	53 000	51 790	50 537
	Output shaft, rpm	6 016	--	--
	Measured gas temp.	810°C(1 490°F)	--	--
SHAFT RATIO		5.53:1	--	--
OUTPUT SHAFT		Internal Spline	--	--
CONTROL SYSTEM	Bendix gas producer fuel control:	DP-N2	--	--
	Bendix power turbine governor:	AL-AA1	--	--
	Chandler Evan fuel control system:	MC-40	#	#
	Bendix ambient temp compensator:	#	#	#
	Bendix pneumatic accumulator:	See Note 10	--	#

FUEL TYPE MIL-T-5624, Grade JP-4 or JP-5; Aviation Turbine Fuels per ASTM D1655, Jet A or A-1 (or Allison Spec. EMS-64) or Jet B; MIL-T-83133, Grade JP-8; JP-1 or Diesel Nº 1 fuel conforming to ASTM D-1655, Jet A; Arctic Diesel Fuel DF-A (W-F-800B) conforming to ASTM D-1655, Jet A or Jet A1; (for other fuel and limitations see Note 9)

		250-C20B	250-C20F	250-C20R, 250-C20R/1, 250-C20R/2, 250-C20R/4
FUEL PUMP		Sundstrand Models 024918 or 5002395 except 250-C10D or TRW Model 386500 except 250-C10D or Pesco Model 024731	Sundstrand Models 024918 or 5002395 or TRW Model 386500	Sundstrand Models 024918 or 5001294 or TRW Model 386500, except 250-C20R/2 P/N 23053265 engine incorporates CECO Model MFP 262
OIL, LUBRICATION	MIL-L-7808F or MIL-L-23699 and subsequent revisions			
IGNITION SYSTEM (See Note 12)	Capacitor discharge low tension exciter type. Simmonds Precision (GLA) P/N 41820, P/N 43754, or P/N 49522 Bendix-Scintilla P/N 10-369950-2, P/N 10-374440-1 or P/N 10-387150-1 Champion spark igniter P/N FHE 161, or CH 34168, AC P/N 5611588. (Type YB 63-1) or AC P/N 5611071 (Type YB 63) or Auburn P/N 0270486			
AUTO REIGNITION CONTROL (Optional - See Note 14)		P/N 6892079 or P/N 6877142	#	#
COMPRESSOR BLEED VALVE		Allison P/N 6875120 or 6889815 or 6896348 or 6894115	--	Allison P/N 23039173 P/N 23038951
TEMPERATURE LIMITS		See Note 1	--	--
PRESSURE LIMITS		See Note 2	--	--
PRINCIPAL DIMENSIONS	Length overall, in:	40.81	--	40.86
	Width, in:	19.01	--	20.76
	Height, in:	23.20	--	23.20

		250-C20B	250-C20F	250-C20R; 250-C20R/1; 250-C20R/2; 250-C20R/4
WEIGHT (dry), lb	Includes basic engine, fuel pump and filter, ignition and fuel control system,	158	--	#; #; #; #
	With nº1 turbine wheel internal energy absorbing ring	161	--	173; 173; 169; 169
CENTER OF GRAVITY LOCATIONS	Aft of side mount pad centerline, in:	5.48	--	4.88; 4.72; 4.66; 4.66
	Above side mount pad centerline, in (below):	0.88	--	0.60; 0.75; 0.75; 0.75
	Right of engine centerline, in (left)	0.0	--	0.05; 0.01; 0.18; 0.18

" -- " Same as preceding model " # " Does Not Apply

II - MODEL 250-C20W

TYPE Free turbine turboshaft, axial centrifugal compressor, 2 stage gas producer & 2 stage power turbine, single combustion chamber

RATINGS See Note 4	250-C20W
Maximum continuous at sea level, shp	420
Gas producer, rpm (est.)	51 790
Output shaft, rpm	6 016
Measured gas temp.	810°C(1 490°F)
Takeoff 5 min. at sea level, shp	420
Gas producer, rpm (est.)	51 790
Output shaft, rpm	6 016
Measured gas temp.	810°C(1 490°F)
Takeoff (augmented) at sea level, 35°C (95°F) ambient temperature, shp, 5 min.	#
Output shaft, rpm	#

	Measured gas temp. (See Note 13)	# 250-C20W
	30 minute power at sea level, shp	420
	Gas producer, rpm (est.)	51 790
	Output shaft, rpm	6 016
	Measured gas temp.	810°C(1 490°F)
SHAFT RATIO		5.53:1
OUTPUT SHAFT		Internal Spline
CONTROL SYSTEM	Bendix gas producer fuel control:	DP-N2
	Bendix power turbine governor:	AL-AA1
	Chandler Evan fuel control system:	#
	Bendix ambient temp compensator:	#
	Bendix pneumatic accumulator:	See Note 10
FUEL TYPE	MIL-T-5624, Grade JP-4 or JP-5; Aviation Turbine Fuels per ASTM D1655, Jet A or A-1 (or Allison Spec. EMS-64) or Jet B; MIL-T-83133, Grade JP-8; JP-1 or Diesel Nº1 fuel conforming to ASTM D-1655, Jet A; Arctic Diesel Fuel DF-A (W-F-800B) conforming to ASTM D-1655, Jet A or Jet A1; (for other fuel and limitations See Note 9)	
FUEL PUMP		Sundstrand Models 024918 or 5002395 or TRW Model 386500
OIL, LUBRICATION	MIL-L-7808F or MIL-L-23699 and subsequent revisions	
IGNITION SYSTEM (See Note 12)	Capacitor discharge Low tension exciter type. Simmonds Precision (GLA) P/N 41820, P/N 43754, or P/N 49522 Bendix-Scintilla P/N 10-369950-2, P/N 10-374440-1 or P/N 10-387150-1 Champion spark igniter P/N FHE 161, or CH 34168, AC P/N 5611588. (Type YB 63-1) or AC P/N 5611071 (Type YB 63) or Auburn P/N 0270486	

		250-C20W
AUTO REIGNITION CONTROL (Optional - See Note 14)		#
COMPRESSOR BLEED VALVE		Allison P/N 23036665
TEMPERATURE LIMITS		See Note 1
PRESSURE LIMITS		See Note 2
PRINCIPAL DIMENSIONS	Length overall, in:	40.76
	Width, in:	18.78
	Height, in:	22.60
WEIGHT (dry), lb.	Includes basic engine, fuel pump and filter, ignition and fuel control system,	#
	With Nº1 turbine wheel internal energy absorbing ring	162
CENTER OF GRAVITY LOCATIONS	Aft of side mount pad centerline, in:	5.31
	Above side mount pad centerline, in (below):	0.77
	Right of engine centerline, in (left)	0.08

" -- " Same as preceding model " # " Does Not Apply

DATA PERTINENT TO ALL MODELS

IMPORT REQUIREMENTS Each engine imported separately and/or spare parts must be accompanied by an export airworthiness approval issued by FAA (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.

CERTIFICATION BASIS

Part 13 of the Civil Air Regulations effective June 15, 1956, as amended by 13-1, 13-2 and 13-3, and Exemption No. 219A from CAR 13.211, Regulatory Docket 1337 issued August 6, 1962, and amended May 12, 1980

	Application	Issued TC
250-C20F	04 May 1982	07 Oct. 1982
250-C20B	24 July 1986	11 Nov. 1992
250-C20R/1	09 Jan. 1986	11 Nov. 1992
250-C20R/2	14 Aug. 1991	11 Nov. 1992
250-C20W	23 Dec. 1993	10 July 1994
250-C20R	07 Nov. 1994	22 March 1995
250-C20R/4	14 Nov. 1995	27 Dec. 1995

PRODUCTION BASIS Production Certificate No. 310

NOTES

NOTE 1 Maximum permissible temperatures:

	250-C20B	250-C20F	250-C20R; -20R/1; -C20R/2; -C20R/4	250-C20W
Measured gas temperatures				
Takeoff and 30 minutes power:	810°C (1 490°F)	--	--	--
Maximum continuous:	810°C (1 490°F)	--	--	--
Maximum transient (not to exceed 6 seconds)	810°C(1 490°F) to 843°C(1 550°F)	--	810°C(1 490°F) to 899°C(1 650°F)	810°C(1 490°F) to 843°C(1 550°F)
Maximum transient (from 6 not to exceed 12 seconds)	810°C(1 490°F) to 899°C(1 650°F)	--	--	--

NOTE 1 (cont.) Starting
Ten seconds maximum at 890°C(1490°F) to 927°C (1700°F) for Models 250-C20B, 250-C20F, 250-C20R, 250-C20R/1,2,4, 250-C20W. For all engine models, the maximum allowable temperature during starting, 927°C (1700°F), is limited to a momentary peak of one second maximum.

Oil inlet temperatures
Minus 54°C(-65°F) to 107°C(225°F) for all models for MIL-L-7808F type oil. Minus 40°C(-40°F) to 107°C(225°F) for all models using MIL-L-23699 type oil.

NOTE 2 Fuel inlet and oil pressure limits:

Fuel:

(Applicable to MIL-T-5624 and ASTM-D1655 Jet A or A-1 fuels), minimum at fuel connection to engine: Not less than ambient pressure minus 9 in Hg at sea level; ambient minus 5.5 in Hg at 6 000 ft.; ambient minus 3.3 in. Hg at 10 000 ft; ambient minus 0.8 in Hg at 15 000 ft; ambient plus 1.5 in Hg at 20 000 ft altitude, and ambient plus 3.0 in Hg at 25 000 ft. Maximum pressure 25 psig No fuel inlet depression permitted with MIL-G-5572 fuel. Fuel pressure requirement is different for Model 250-C20R/2 P/N 23053265 engine (P/N 23053267 Installation Assembly). See Installation Design Manual.

Oil:

Model 250-C20 Series: Operating oil gauge pressure at 48 014 rpm (94.2%) gas producer speed and above: 115 to 130 psig all models except -C20R, -C20R/1,2,4 which is 120-130 psig 40 011; rpm (78.5%) to 48 014 rpm (94.2%) gas producer speed: 90 to 130 psig Below 40 011 rpm gas producer speed 50 to 130 psig. Oil pump inlet pressure 5 in Hg absolute minimum (250-C20R series, a 10% aeration by volume permitted in oil from primed pump and lower pressure limit declines at the rate of 2 psig per 1 000 feet at altitudes above 5 000 feet, to a maximum reduction of 20 psig).

NOTE 3 The following accessory drive mounting provisions are available:

	Direction * of Rotation	Speed Ratio to Turbine	Max. Torque		Max. Overhang
			Continuous in.lb	Static in.lb	Moment in.lb
Driven by Gas Producer Turbine					
Tachometer	CC	0.0824	7	50	4

NOTE 3 (cont.)

Starter-Generator	C	0.2361	**	550	94
Driven by Power Turbine					
Tachometer	CC	0.1262	7	50	4
Power Take-off	C	0.1807	4 608 (C20B; F; W) *** 4 800 *** (-C20R; R/1; R/2; R/4)	8 000	100

* - C - Clockwise viewing drive pad; CC- Counterclockwise

** - The maximum generator load is 150 amperes (9.3 hp)

*** - The sum of the torque extracted in any combination from the front and rear power output drives shall not exceed the torque values specified in Note 7.

The values given in the above table represent the 30 minute limited maximum total torque (Maximum Continuous for -C20S).

NOTE 4 The engine ratings, unless otherwise specified, are based on static sea level standard conditions. Compressor inlet air (dry) 59°F, 29.92 in Hg. Compressor inlet bell attached to provide suitable air approach conditions. No external accessory load and no air bleed. Measured rated gas temperature as indicated by average of the 4 gas temperature thermocouples. Certain models are intended for military uses only. The power ratings for these models have been redesignated by the military, but are equivalent to the ratings listed herein.

NOTE 5 External air bleed may not exceed 4.5 percent for all models.

NOTE 6 Engine equipment, which is aircraft mounted, includes two water injection nozzles for the 250-C20B (Optional), 250-C20F (Optional), and the electronic power turbine overspeed (N2) protection system for the Model 250-C20R & C20R/1.

NOTE 7 The maximum allowable torque limits as measured by the torquemeter for below standard inlet air temperature and/or ram conditions are as follows:

Models 250-C20B, -C20F and -C20W:
430 ft.lb for 16 seconds
384 ft.lb for takeoff, 30 min. power, and maximum continuous power

NOTE 7 (cont.) Model 250-C20R & C20R/1,2,4:
490 ft.lb for 16 seconds, 400 ft.lb for takeoff, 30 min. power, and maximum continuous power.

NOTE 8 The maximum output shaft speed limit for momentary transients (up to 15 seconds) is from 113 percent at idle to 105 percent at takeoff for the 250-C20B, -C20F, -C20R, -C20R/1,2,4, -C20W. The maximum output shaft speed limit for sustained periods is from 108 percent at idle to 103 percent at takeoff for all other models. Gas producer speeds are permissible up to 102 percent for sustained periods and up to 106 percent for seconds for the 250-C20B, -C20F, -C20R and -C20R/1,2,4 and -C20W. 100 percent output shaft speed is defined as 6 016 rpm, and 100 percent gas producer speed is defined as 50 970 rpm for 250-C20 series.

NOTE 9 Emergency use of aviation gasoline MIL-G-5572, grade 115/145 and lower, is limited to the amount of fuel required to operate the engine for not over 6 hours during any overhaul period except that a mixture consisting of 1/3 by volume of aviation gasoline MIL-G-5572, grade 80/87, and 2/3 by volume of MIL-T-5624, grade JP-5, or aviation turbine fuels ASTM-D1655 Jet A or A-1 or Allison Spec. EMS-64 may be used for unrestricted periods of time. Fuels containing Tri-Cresyl-Phosphate additives shall not be used. A mixture consisting of 1/3 by volume of aviation gasoline MIL-G-5572, grade 100/130, with a maximum of 2.0 ml/gal lead content and 2/3 by volume of MIL-T-5624, grade JP-5, or aviation turbine fuels ASTM-01655 Jet A or A-1 or Allison spec. EMS-64 may be used for not over 300 hours during any overhaul period. It is not necessary to purge the unused fuel from the system before refueling with different type fuels. No fuel control adjustment is required when switching these fuel types. Anti-icing additives conforming to MIL-I-27686 are approved for use in fuels in amounts not to exceed 0.15 percent by volume. Shell anti-static additive is approved for use at a concentration that will not exceed fuel conductivity of 300 picomhos per meter.

NOTE 10 A pneumatic accumulator(s) mounted on the engine fire shield must be selected from sizes supplied by the engine manufacturer for compatibility with the rotor system of the particular model helicopter in which the engine is to be installed, for Bendix systems. For the 250-C20R, P/N 23059597, the required pneumatic accumulators are supplied and installed for compatibility of the rotor system and the Bendix system for use on Tridair 206L series conversions (twin). For the 250-C20R/2 P/N 23053265, the required pneumatic accumulators are supplied and installed for compatibility of the rotor system and the Bendix system for use on MDHC 500 Series helicopter.

NOTE 11 Model 250-C20B is similar to Model 250-C20 except for increased performance. Provisions for water-alcohol injection are optional with the Model 250-C20B.

Model 250-C20F is similar to Model 250-C20B except the gearbox housing incorporates a front mounting pad and is adapted for use in the Aerospatiale AS 355 Helicopter.

NOTE 11 (cont.) Model 250-C20R/1 is similar to the 250-C20B except for increased performance, a new compressor, and addition of an electronic power turbine (N2) overspeed protection system, and incorporates an on-speed Nº1 wheel internal energy absorbing ring.

Model 250-C20R is similar to the 250-C20R/1 except the gearbox housing incorporates a front mounting pad and is adopted for use in the Aerospace AS 355 Helicopter.

Model 250-C20R/2 is similar to the 250-C20R/1 except the electronic power turbine (N2) overspeed protection system is not included.

Model 250-C20R/4 is similar to the 250-C20R/2 except the gear meshing frequency between the torquemeter gear and the power takeoff gear is changed from 5 000 Hz to 6 000 Hz with no change in output speed.

Model 250-C20W is similar to the 225-C10A with the exception that the accessory gearbox spare accessory pad drive has been deleted. The 250-C20W performance rating is the same as the 250-C20F.

NOTE 12 All engines produced under this type certificate have single ignition systems. Exemption No. 219B (from CAR 13.211), dated December 10, 1991, permits the type certification of the engines on this type certificate data sheet with single ignition for use in all rotorcraft, regardless of whether the rotorcraft is certificated under Part 6 or Part 7 of the CAR, or Part 27 or Part 29 of the FAR, and regardless of whether the rotorcraft is designated as Category A or Category B.

NOTE 13 Operation with water-alcohol injection is limited to ambient temperatures above 4.5°C (40°F). The augmented takeoff rating is based on a water-alcohol flow rate of 1.25 gpm delivered to the injection nozzles at a pressure differential of 50 psi across each nozzle. The water-alcohol solution, nozzle location and system installation must be in accordance with the FAA approved Installation Design Manual requirements.

NOTE 14 The optional Auto Reignition Control Kits are approved for use only with the Simmonds Precision (GLA) P/N 43754 or 49522 or Bendix P/N 10-387150-1 ignition exciters. The P/N 6877740 Kit is adapted for use in the Bell Model 206A-1 Helicopter, the P/N 6877138 Kit is adapted for use in the Bell Model 206A Helicopter, the P/N 6877142 Kit is adapted for use on the Bell Model 206B Helicopter, or the Model 206B Jet Ranger III Helicopter, and the P/N 6892079 Kit is adapted for use on the Bell Model 206L Helicopter.

NOTE 15 Life limits established for critical rotating components are published in the corresponding Allison Engine Company Operation and Maintenance Manual. Distributor Information Letters (DIL) 190 and 202 establish acceptable crack limits suitable for return to service of first stage and second stage turbine wheels, respectively, in time continued (repair) engines. Cracks in these wheels are not allowed in overhauled engines.

NOTE 16 A magnetic oil drain plug (chip detector) indicator lamp is an installation requirement for 250-C20 series engines.

NOTE 17 Engines produced under this type certificate, except the Models 250-C20R & C20R/1,2,4, are approved for operation with unprotected inlets having been tested in accordance with Group I and Group II Foreign Object Ingestion Criteria of FAA Advisory Circular AC 33-1B. The models 250-C20R & C20R/1,2,4 are approved for operation with unprotected inlets having been tested in accordance with Foreign Object Ingestion Criteria of FAR 33-10, Section 33.77 with the exception that Advisory Circular 20-73 criteria of 60-second delay, instead of 2-minutes, was used in actuating the anti-icing system.

NOTE 18 A 3 to 25 micron absolute external scavenge oil filter is an installation requirement for the Model 250-C20R & C20R/1,2,4 and Model 250-C20W engines.

NOTE 19 An optional on-speed Nº1 turbine wheel internal energy absorbing ring is available for retrofit of the Model 250-C20B and -C20F engines.

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