

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E5WE
ALLIEDSIGNAL INC.
Revision 1
(AiResearch)
TSE36-1

March 20, 1998

TYPE CERTIFICATE DATA SHEET NO. E5WE

The engine model described herein conforming with this data sheet (which is part of Type Certificate No. E5WE) and other approved data on file with the Federal Aviation Administration (FAA) meet the minimum standards for use in certified 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:	AlliedSignal Inc. 111 South 34th Street Phoenix, Arizona 85034	
Type	Single-shaft turboshaft engine with wet-sump gearbox, single-stage centrifugal compressor, single-stage radial inward-flow turbine, single-can combustor with torus transition chamber, and flanged exhaust duct.	
Model No.		<u>TSE36 - 1</u>
Ratings (see Note 3)		
Max. continuous shaft horsepower, hp		220
Output shaft speed, rpm		2929
Exhaust gas temperature (EGT), °F (°C)		1080 (582)
Takeoff (5 mins) shaft horsepower, hp		240
Output shaft speed, rpm		2929
Exhaust gas temperature (EGT), °F (°C)		1167 (630)
Fuel control and fuel pump assembly		AiResearch P/N 894451
Overspeed Governor		AiResearch P/N 109584 3
EGT Temperature Compensating Resistor (see Note 15)		AiResearch P/N 866157
Principal dimensions of basic engine		
Length, inches		35.90
Width, inches		27.87
Height, inches		21.79
C.G. location, inches aft of gearbox mount centerline		5.96
C.G. location, inches above engine rotor centerline		0.84
C.G. location, inches to the left of vertical centerline when looking into exhaust		0.04
Weight (dry), pounds (see Note 4)		178
	The basic engine comprises a wet-sump gearbox with an associated lubrication system; a compressor; a combustor-turbine section with exhaust duct and EGT thermocouple; and the following control components:	
	(a) Fuel-control unit and high-pressure pump	
	(b) Fuel-shutoff valve	
	(c) Fuel-flow-divider valve	
	(d) Fuel atomizer	
	(e) Overspeed governor	
	(f) Ignition coil, igniter lead, and igniter plug	
Ratio of output shaft to engine rotor		1:19.8019

Fuel ASTM D 1655-68, Types Jet A, *Jet B, and Jet A-1.*

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	MIL-T-5624G-1, Grades JP-4 and JP-5.* NATO equivalents of the above fuels are also approved. For emergency use only, use the following fuels: MIL-G-3056C, MIL-G-5572D, Grades 80/87, 100/130, and 115/145. Minimum fuel temperature corresponding to a kinematic viscosity of not more than 12 centistokes.
Oil	<u>MIL-L-23699A</u> : Aeroshell Turbine Oil 500, Enco/Esso 2380 Turbo Oil, Mobile Jet Oil II; <u>MIL-L-7808D</u> : Brayco 880 Conojet, British Petroleum Aero Turbine Oil 15, Caltex SATO 15, Continental Conojet, Sinclair Turbo S Oil 15, Texaco SATO 15; <u>MIL-L-7808E</u> : Hancock Airturb Syn Lube, Stauffer Jet I.
Certification Basis	FAR 33 dated February 1, 1965, and Amendments 1, 2, and 3. Type Certificate No. E5WE issued April 30, 1970. Date of application for Type Certificate February 8, 1968.
Production Basis	Production Certificate No. 413.

NOTE 1. Maximum Permissible Temperature

Exhaust gas temperature:

Maximum continuous, °F (°C)	1080 (582)
Takeoff (5 minutes), °F (°C)	1167 (630)

The above takeoff and maximum continuous exhaust gas temperatures are for U.S. Standard Atmosphere sea-level static conditions. To maintain constant turbine inlet temperature, exhaust gas temperature will vary as a function of ambient conditions. Consult the AiResearch Operating Instructions, IM-5118, for other than standard sea-level day conditions. During starting, the maximum exhaust gas temperature is not to exceed 1400°F (760°C) for more than one second.

Oil inlet temperature:

- 40°F (-40°C) to 205°F (95°C) for MIL-L-23699 type.
- 40°F (-40°C) to 175°F (79°C) for MIL-L-7808 type.

Ambient air temperature:

- Operating: -65°F (-54°C) to 130°F (54°C)
- Starting: -40°F (-40°C) to 130°F (54°C)

External engine components, surface temperature °F (°C):

Overspeed governor	160 (71)
Ignition lead	450 (232)
Ignition plug	450 (232)
Ignition coil	160 (71)
Thermocouple lead	450 (232)
Monopole pickup	400 (205)
Fuel atomizer	275 (135)
Fuel-shutoff valve	250 (121)
Fuel-control	200 (93)
Fuel lines	250 (121)
Tachometer cable drive	160 (71)
Engine zones, air temperature:	
Zone 1 (gear case and components)	250°F (121°C)
Zone 2 (inlet)	ambient inlet air
Zone 3 (diffuser housing section)	400°F (205°C)
Zone 4 (turbine section)	450°F (232°C)

NOTE 2. Pressure limits

Inlet air pressure	Sea level to 20,000 feet altitude
Inlet fuel pressure	30 psig max. at 100 % speed. Min. engine-pump inlet pressure is 5 psi above true vapor pressure of the fuel in use.
(at the engine-driven pump)	
Oil operating pressure	90 to 110 psig at 100 % speed 50 psig min. at 30,000 rpm

NOTE 3. The engine ratings are based on :

- Dynamometer operation at U.S. Standard Atmosphere, Sea level static conditions.
- Compressor inlet air (dry), 59°F (15°C)
- 29.92 in. Hg
- MIL-T-5624G-1, Grade JP-4 fuel with lower heating value of 18,400 btu per pound
- MIL-L-23699A type oil, MIL-L-7808 type oil
- No bleed-air extraction
- No external accessory loads
- Zero inlet loss
- Exhaust gas discharging to ambient-static pressure through the turbine exhaust diffuser furnished with the engine.
- Measured exhaust gas temperature is indicated by the exhaust gas temperature thermocouple.

NOTE 4. Engine accessories are:

- Output shaft adapter (15 lbs) (see NOTE 12)
- Torque sensor (3 lbs)
- Engine speed cable-drive assembly (1.5 lbs)
- An EGT compensating system (0.5 lbs)

These accessories increase engine weight to 198 lbs.

NOTE 5. Accessory drive provisions:

Nominal Use	Type of Drive	AND Drive	Rotation Facing Drive	Speed Ratio, Drive to	Maximum Torque (lb.-in.)			Gear Case Housing Overhung
	(one each)	Modifications	Pad and rpm	Engine Rotor	T _C	T _O	T _S	Moment (lb.-in.)
Engine Main Output Shaft	Internal Spline	Not AND Standard	CCW 2,929 rpm	0.05050	4,728	5,916	5,500	0
Tachometer * Generator	AND20005 Type XV-8	--	CW 4,193 rpm	0.07229	7	--	50	25
Tachometer-* Cable Drive	SAE AS54 Type I	--	CW 1,481 rpm	0.02553	2	3	7	5
Customer Accessory Pad	AND20001 Type XI-C	Rotation, RPM, and torque	CCW 12,021 rpm	0.20689	80	120	320	150

CW - clockwise
CCW - counterclockwise

T_C - continuous torque
T_O - torque overload
T_S - static torque

* If either the optional tachometer-generator speed-sensing unit or tachometer cable-drive adapter speed-sensing unit is used, it will be mounted directly to the AND pad and the overspeed governor will be mounted to the aft side, and be driven by the through-drive shaft of the speed sensing unit. If neither type speed-sensing units are used, the overspeed governor will be mounted directly to the AND pad.

NOTE 6. Up to 4 percent of the compressor nonbleed airflow is available for aircraft use and is available from an MS33649 type boss.

NOTE 7. The maximum allowable power, as sensed by the torque sensor, in pound-feet is:

Maximum torque overload	493
Normal rated takeoff	430
Maximum continuous torque	394

NOTE 8. The maximum allowable output shaft speed is 3075 rpm. The normal output shaft speed is 2929 rpm.

NOTE 9. MIL-I-267860 Fuel System Icing Inhibitor, or equivalent, is approved for use in fuels in amounts not to exceed 0.15 percent by volume.

- NOTE 10. This engine meets FAA requirements for adequate turbine-disc integrity and rotor-blade containment and does not require external armoring.
- NOTE 11. This engine meets FAA requirements for operation in icing conditions within the envelope defined in FAR 25 Appendix C.
- NOTE 12. Output shaft is bolted-flange type with clockwise rotation when viewed forward from the turbine exhaust.
- NOTE 13. Shell ASA-3 Anti-Static Additive, or equivalent, in amounts to bring the fuel up to 300 conductivity units is permissible except that in no event shall the additive exceed 1 ppm.
- NOTE 14. The basic engine does not include a fuel filter or filter deicing system.
- NOTE 15. EGT compensating resistor values are identified by specific dash numbers and are matched to each engine during production or overhaul acceptance test. Field replacement must be with a part with the original dash number.

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