U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E24NE	TCDS NUMBER E24NE REVISION: 9* DATE: April 19, 2002 PRATT & WHITNEY MODELS: PW4050 PW4062 PW4158 PW4052 PW4062A PW4160 PW4056 PW4152 PW4460 PW4060 PW4156 PW4462 PW4060A PW4156A PW4650 PW4060C

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E24NE) 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: Pratt & Whitney Division
United Technologies Corporation
East Hartford, Connecticut 06108

TYPE

Axial airflow, dual-spool, turbofan, single-stage fan, 4-stage low-pressure compressor, 11-stage high pressure compressor, annular combustor, 2-stage high-pressure turbine, 4-stage low-pressure turbine.

RATINGS (See NOTE 5)

	STATIC THRUST AT SEA LEVEL, LBS	
MODEL	MAXIMUM CONTINUOUS	TAKEOFF, DRY 5 MINUTES (SEE NOTE 13 & 21)
PW4050	48,120*	50,000***
PW4052	49,820*	52,200***
PW4056	49,530*(B767)	56,750***
PW4056	47,970**(B747)	56,750***
PW4060	50,250*	60,000***
PW4060A	50,250*	61,570***
PW4152	49,200**	52,000*****
PW4156	49,580**	56,000**
PW4156A	49,200**	56,000***
PW4158	49,580**	58,000**
PW4160	49,600**	60,000**
PW4460	51,050**	60,000**
PW4062	50,250*	62,000**
PW4062A	47,970**	62,000**
PW4462	51,050**	62,000**
PW4060C	50,250*	60,000***
PW4650	48,700*	51,400****

* Flat-rated to 77°F/25°C
** Flat-rated to 86°F/30°C
*** Flat-rated to 92°F/33°C
**** Flat-rated to 95°F/35°C
***** Flat-rated to 108°F/42°C

LEGEND: "- -" INDICATES "SAME AS PRECEDING MODEL"
"---" NOT APPLICABLE
NOTE: SIGNIFICANT CHANGES ARE BLACK-LINED IN THE LEFT MARGIN.

COMPONENTS	For information regarding components, refer to the approved parts list.
PRINCIPAL DIMENSIONS (inches)	
Length	153.6
Nominal diameter	97.5
Maximum radial projection	52.8

WEIGHT (DRY)	9,420 POUNDS Weight of basic engine includes all essential accessories, but excludes starter, exhaust nozzle, and power source for the ignition system.

CENTER OF GRAVITY (IN)	PW4060/4052/4056/4050/4060A/4062 4062A//4060C	PW4152/4156/4156A/4158/4160 4460/4462/4650
Axial: Engine station	9.4 ± 1.0	- -
Vertical: Relative to engine	0.7 ± 0.5	0.8 ± 0.5
Lateral: Relative to centerline	0.1 ± 0.5	0.1 ± 0.5 left

FUEL	See NOTE 10
OIL	See NOTE 11

CERTIFICATION BASIS

FAR 33 effective February 1, 1965, as amended by 33-1 through 33-9, and Amendment 33-10 for FARs 33.7/.14/.23/.27/.77/.88/.90/.92/.94

Type Certificate Number E24NE

MODEL	APPLICATION	ISSUED
PW4056	OCT 26, 1983	JUL 09, 1986
PW4156	OCT 26, 1983	JUL 09, 1986
PW4152	APR 01, 1986	JUL 09, 1986
PW4052	JUL 09, 1987	OCT 13, 1987
PW4060	JUN 04, 1987	OCT 21, 1988
PW4160	JUN 04, 1987	OCT 21, 1988
PW4460	JUN 04, 1987	OCT 21, 1988
PW4158	JUL 23, 1987	APR 29, 1988
PW4050	FEB 24, 1989	OCT 12, 1989
PW4060A	JUN 26, 1989	MAR 30, 1990
PW4156A	MAR 02, 1990	AUG 06, 1991
PW4062	MAY 04, 1989	JAN 21, 1992
PW4462	MAY 04, 1989	JAN 21, 1992
PW4060C	JUL 22, 1992	SEP 24, 1992
PW4650	FEB 24, 1995	MAR 03, 1995
PW4062A	MARCH 22,2002	APRIL 19, 2002

PW4256: APPLICATION OCT 26, 1983 / ADDED JUL 09, 1989 / DELETED SEP 25, 1986

PRODUCTION BASIS (All Models)	Production Certificate Number 2

NOTES

NOTE 1.

	MAXIMUM PERMISSIBLE OPERATING SPEEDS FOR ENGINE ROTORS (ALSO SEE NOTE 16)		
	PW4050/PW4052/PW4152	PW4056/PW4060/PW4060A/W4060C/PW4156/ PW4156A/PW4158PW4160/ PW4460/PW4462/PW4650	PW4062 PW4062A
Low pressure rotor N1, RPM)	4,012	4,012	4,044
High pressure rotor N2, RPM)	10,300	10,450	10,450

NOTE 2.

MAXIMUM PERMISSIBLE TEMPERATURES

For in-flight starts which result in exceedance of the ground start limit, the maximum temperature and duration must be recorded for maintenance action, the PW4000 Maintenance Manual.

External engine component maximum limiting temperatures are specified in the Installation and Operating Manual, Section 4.3.

	MODELS: PW 4050	MODELS: PW 4052	MODELS: PW 4152	MODELS: PW 4056/4156/4156A/ 4158/4060/4060A/ 4160/4460/4062/ 4062A/4462/4060C	MODELS: PW 4650
Turbine exhaust gas temperature					
At takeoff (5 min. see NOTE 21)	625°C/1157°F	644°C/1191°F	644°C/1191°F	654°C/1209°F	650°C/1202°F
Max. continuous	600°C/1112°F	629°C/1164°F	619°C/1146°F	629°C/1164°F	625°C/1157°F
At start-up					
Ground	535°C/995°F	- -	- -	- -	- -
In-flight	625°C/1157°F	640°C/1184°F	640°C/1184°F	650°C/1202°F	650°C/1202°F
Oil outlet temperature					
Continuous operation	163°C/325°F	- -	- -	- -	- -
Transient operation*	177°C/350°F	- -	- -	- -	- -

*Transient operation above 163°C/325°F is limited to 20 minutes.

NOTE 3.

FUEL PRESSURE LIMITS: At inlet to engine system pump, not less than 5 psig above the true vapor pressure of the fuel and not greater than 70 psig with a vapor/liquid ratio of zero.

OIL PRESSURE LIMITS:
Minimum 70 psid

Temporary interruption of oil pressure associated with negative "G" operation is limited to 30 seconds maximum. Normal oil pressure will be restored rapidly once the negative "G" effect has been eliminated. There is no maximum oil pressure limit.

NOTE 4. MAXIMUM PERMISSIBLE AIR BLEED:

8TH STAGE BLEED	NORMAL	MAXIMUM
Idle to 40% Maximum Continuous	0.0	0.0
40% Maximum Continuous to Takeoff:	6.0	6.0

15TH STAGE BLEED

Idle to 40% Maximum Continuous	12.0	12.0
40% Maximum Continuous to Takeoff:	1.6	1.6

NOTE 5. The Sea Level Static Ratings are ideal and are based on ICAO Standard Atmosphere conditions, a Pratt & Whitney hardwall bellmouth inlet, no fan or compressor air bleed or load on accessory drives, an exhaust system having no internal pressure or external scrubbing losses, and fan duct and primary nozzle velocity coefficients equal to 1.0.

NOTE 6. The following accessory drive provisions are incorporated:

DRIVE	ROTATION	SPEED RATIO TO TURBINE SHAFT	TORQUE (lb-in) CONTINUOUS	TORQUE (lb-in) STATIC	TORQUE (lb-in) OVERLOAD	OVERHANG (in-lb)
High pressure rotor						
Starter	CCW	0.841:1	---	*	---	500
IDGS	CCW	0.841:1	**	12,620	**	2,000
Fluid power pump (R)	CCW	0.389:1	1,300	6,500	1,950***	400
Auxiliary fluid power pump	CCW	0.379:1	1,300	6,500	1,950***	400

LEGEND: CCW = counterclockwise

* Maximum starter torque = 910 lb-ft at zero rpm and 1,250 lb-ft maximum impact torque. Maximum allowable starter torque value is 1,498 lb-ft.

** maximum allowable continuous torque values are equivalent to 175 horsepower at any engine speed at or above sea level idle. The following overload conditions can be accommodated:

HORSEPOWER	DURATION TIME	RECURRING TIME
225	5 minutes	1,000 hours
225	5 seconds	1 hour
450	5 seconds	1,000 hours

*** Maximum allowable for 5-minute duration recurring at four hour intervals minimum.

NOTE 7. Power setting, power checks, and control of engine output in all operations are to be based upon Pratt & Whitney engine charts referring to either turbine discharge section gas pressure or low rotor speed. Pressure probes and a low rotor speed sensor are included in the engine assembly for this reason.

NOTE 8. For inflight operation during icing conditions, the minimum allowable fan speed (N1) is 20% (720 rpm).

NOTE 9. Lightning protection requirements and electromagnetic interference omitted by the electronic engine control system, including cables, are specified in the Installation and Operating Manual, Section 4.12.

NOTE 10. Fuel and fuel additives conforming to the latest applicable issue of FAA-approved Pratt & Whitney Turbojet Engine Service Bulletin No. 2016 may be used separately or mixed in any proportions without adversely affecting the engine operation or power output.

NOTE 11. The following oils are eligible: Oils conforming to Pratt & Whitney Turbojet Engine Service Bulletin No. 238, latest revision.

NOTE 12. Certain engine parts are life-limited. Limits are listed in Pratt & Whitney PW4000 Turbofan Engine Manuals, Part Nos. 50A443, 50A605 and 50A822, Time Limit Section.

NOTE 13. The engines meet the January 1, 1984, smoke and gaseous emission requirements of SFAR 27. The same requirements are now incorporated into Federal Aviation Regulation Part 34, effective September 10, 1990.

NOTE 14. The engines meet the January 1, 1975, fuel venting emission requirements of SFAR 27. The same requirements are now incorporated into Federal Aviation Regulation Part 34, effective September 10, 1990.

NOTE 15. The maximum permissible engine inlet distortion limit is specified in the Installation and Operating Manual, Section 4.4, Report PWA-6049.

NOTE 16. Limits regarding transient rotor shaft overspeed rpm and transient gas overtemperature and the number of overtemperature occurrences are specified in the Maintenance Documents, Part Nos. 50A444, 50A606, and 50A823.

NOTE 17. Information regarding approved fuel filter and oil filter replacement parts is in the PW4000 Series Illustrated Parts Catalogs, Part Nos. 50A445, 50A607, and 50A824.

NOTE 18. Requirements and limitations associated with automatic fuel system anti-icing are specified in the Installation and Operating Manual, section 4.5, Report PWA-6049.

NOTE 19. The PW4000 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. The following criteria exist as dispatch and maintenance requirements for the engine control system. These criteria are specified in Pratt & Whitney Report PWA-6139 and PWA-6139 Addendum, which defines the various configurations and maximum operating intervals as follows:

Fault Level A:	No dispatch allowed
Fault Level B:	Dispatchable; maximum operating interval for Fault level B fault(s) is 20 days.
Fault Level C:	Dispatchable; maximum operating interval for Fault level C is 1000 operating hours Review of EEC fault data from only the most recent flight leg is sufficient at the 1000 hour interval except for the following EEC part numbers: P&W P/N 50D791, 50D824, 51D037, 50D823, 51D319, 51D586.

Fault Levels A, B, and C constitute Pratt & Whitney nomenclature. 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.

A control system reliability monitoring program has been established with Pratt & Whitney in compliance with the reporting requirements as outlined in the Engine and Propeller Directorate Policy letter dated October 28, 1993, for Time Limited Dispatch of Engines fitted with FADEC Systems.

NOTE 20. Incorporation of Pratt & Whitney Service Bulletin PW4ENG 79-43 provides an alternative means of compliance with the requirements of FAR 33.71(c)(1).

NOTE 21. The normal 5 minute takeoff time limit may be extended to 10 minutes for engine out contingency.

NOTE 22. Engines in which Engineering Change Number EC92KK322G, H, I, J, and K were incorporated during manufacturer are designated by a (-3) on the Engine Data Plate.

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