ATTACHMENT 1

POWERPLANT GROUP CHAIRMAN'S FACTUAL REPORT

ENG-11-IA-051

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION
TYPE CERTIFICATE DATA SHEET E17NE

	TCDS NUMBER E17NE REVISION: 13* DATE: October 10, 2003
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E17NE	PRATT & WHITNEY MODELS: PW2037 PW2240 PW2337 PW2037M PW2143 PW2040 PW2643 PW2043 PW2040D PW2037D F117-PW-100

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E17NE) 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
United Technologies Corporation
East Hartford, Connecticut 06108

I. MODELS	PW2037	PW2040	PW2037(M)	F117-PW-100	PW2240	PW2337
TYPE	Dual Rotor, axial flow high bypass turbofan, single stage fan, four stage low pressure compressor, twelve stage high pressure compressor, annular combustor, two stage high pressure turbine, five stage low pressure turbine.					
RATINGS (See NOTE 5, 18 and 22)						
Maximum continuous at sea level, static thrust, pounds	34,640	- -	- -	- -	- -	- -
Takeoff (5 min. at sea level, static thrust, pounds)	37,530	40,900	37,530	40,900	- -	37,530
COMPONENTS						
Fuel control						
Hamilton Standard	JFC-104	- -	- -	- -	- -	- -
Fuel pump						
Sundstrand	025769	- -	- -	- -	- -	- -
Electronic engine control						
Hamilton Standard	EEC 104	- -	- -	- -	- -	- -
Ignition system						
Simmonds exciter type	47649	- -	- -	- -	- -	- -
Two igniters: PWA P/N	IC709520	- -	- -	- -	- -	- -
EEC alternator						
Stator: Simmonds P/N	45100	- -	- -	46303	45100	- -
Alternate Simmonds P/N	---	---	---	46998	- -	- -
Rotor: Simmonds P/N	45099	- -	- -	46304	46038	- -
Alternate Simmonds P/N	46038	- -	- -	---	46304	---

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LEGEND: "- -" INDICATES "SAME AS PRECEDING MODEL"
"---" NOT APPLICABLE
NOTE: ALL PAGES ARE REFORMATTED. SIGNIFICANT CHANGES IF ANY, ARE BLACK-LINED IN THE LEFT MARGIN.

I. MODELS (Continued)	PW2043	PW2643	PW2143	PW2040D	PW2037D	
TYPE	Dual Rotor, axial flow high bypass turbofan, single stage fan, four stage low pressure compressor, twelve stage high pressure compressor, annular combustor, two stage high pressure turbine, five stage low pressure turbine.					
RATINGS (See NOTE 5, 18 and 22)						
Maximum continuous at sea level, static thrust, pounds	36,420	- -	- -	- -	- -	
Takeoff (5 min. at sea level, static thrust, pounds	43,000	- -	- -	40,900	37,530	
COMPONENTS						
Fuel control						
Hamilton Standard	JFC-104	- -	- -	- -	- -	
Fuel pump						
Sundstrand	025870	- -	- -	- -	- -	
Electronic engine control						
Hamilton Standard	EEC 104	- -	- -	- -	- -	
Ignition system						
Simmonds exciter type	47649	- -	- -	- -	- -	
Two igniters: PWA P/N	IC709520	- -	- -	- -	- -	
EEC alternator						
Stator: Simmonds P/N	45100	- -	- -	- -	- -	
Alternate Simmonds P/N	---	---	---	---	---	
Rotor: Simmonds P/N	45099	- -	- -	- -	- -	
Alternate Simmonds P/N	46038	- -	- -	- -	- -	

I. MODELS	PW2037	PW2040	PW2037(M)	F117-PW-100	PW2240	PW2337
COMPONENTS (Cont.)						
Fuel distribution valve						
ExCello P/N	505P044	- -	- -	- -	- -	- -
or P/N	516P636	- -	- -	- -	- -	- -
Sta. 2.5 bleed actuator						
Parker Hannifin P/N	3800047	- -	- -	- -	- -	- -
Stator vane actuator						
Parker Hannifin P/N	3800035	- -	- -	- -	- -	- -
14th stage bleed valve						
Parker Hannifin P/N	5830212	- -	- -	- -	- -	- -
PRINCIPAL DIMENSIONS (INCHES)						
	146.8	- -	- -	- -	- -	- -
Length	84.8	- -	- -	- -	- -	- -
Nominal diameter	54.7	- -	- -	- -	- -	- -
Maximum radial projection						
WEIGHT (DRY) (POUNDS):	7,300	- -	- -	7,220	7,300	- -
	Weight of basic engine, including all essential accessories necessary for engine operation, but excluding starter, exhaust nozzle, and power source for the ignition system.					
CENTER OF GRAVITY (INCHES)						
Aft front mount area centerline	21.5±1.0	- -	- -	22.2±1.0	21.2±1.0	- -
Below engine centerline	2.5±0.5	- -	- -	- -	2.9±0.5	- -
FUEL	SEE NOTE 10					
OIL	SEE NOTE 11					

I. MODELS (Continued)	PW2043	PW2643	PW2143	PW2040D	PW2037D	
COMPONENTS (Cont.)						
Fuel distribution valve						
ExCello P/N	505P044	- -	- -	- -	- -	
or P/N	516P636	- -	- -	- -	- -	
Sta. 2.5 bleed actuator						
Parker Hannifin P/N	3800047	- -	- -	- -	- -	
Stator vane actuator						
Parker Hannifin P/N	3800035	- -	- -	- -	- -	
14th stage bleed valve						
Parker Hannifin P/N	5830212	- -	- -	- -	- -	
PRINCIPAL DIMENSIONS (INCHES)						
	146.8	- -	- -	- -	- -	
Length	84.8	- -	- -	- -	- -	
Nominal diameter	54.7	- -	- -	- -	- -	
Maximum radial projection						
WEIGHT (DRY) (POUNDS):	7,300	- -	- -	- -	- -	
	Weight of basic engine, including all essential accessories necessary for engine operation, but excluding starter, exhaust nozzle, and power source for the ignition system.					
CENTER OF GRAVITY (INCHES)						
Aft front mount area centerline	21.5±1.0	- -	- -	- -	- -	
Below engine centerline	2.9±0.5	- -	- -	- -	- -	
FUEL	SEE NOTE 10					
OIL	SEE NOTE 11					

CERTIFICATION BASIS: FAR 33, effective February 1, 1965, as amended by 33-1/2/3/4/5/6/7/8 and 9, including Federal Aviation Administration Exemption Numbers ANE-82-001E and ANE-82-003E. Type Certificate E17NE was applied for, issued, and amended as follows:

	APPLICATION	ISSUED	AMENDED	WITHDRAWN
PW2037	DEC 22 1980	DEC 28 1983		
PW2037M	SEP 15 1987		SEP 21 1987	
PW2040	APR 21 1986		JAN 30 1987	
F117-PW-100	DEC 11 1985		DEC 08 1988	
PW2240	DEC 17 1991		FEB 25 1992	
PW2337	DEC 17 1991		FEB 25 1992	
PW2043	DEC 05, 1994		FEB 14, 1995	
PW2643	DEC 05, 1994		FEB 14, 1995	
PW2143	FEB 24, 1995		MAR 06, 1995	
PW2040D	APR 2, 2001		OCT 10, 2003	
PW2037D	APR 2, 2001		OCT 10, 2003	

PRODUCTION BASIS.
All models: Production Certificate Number 2

NOTES

I. MODELS	PW2037	PW2040	PW2037(M)	F117-PW-100	PW2240	PW2337
NOTE 1.	MAXIMUM PERMISSIBLE OPERATING SPEED FOR ENGINE ROTORS (See Note 16)					
Low pressure rotor (N1), RPM	4,575	- -	- -	- -	- -	- -
High pressure rotor (N2), RPM	12,250	12,360	- -	- -	- -	- -
High pressure rotor (N2), RPM (5 seconds - transient)	12,335	12,445	- -	- -	- -	- -
NOTE 2.	MAXIMUM PERMISSIBLE TEMPERATURES (See Note 16) DEGREES CENTIGRADE / FAHRENHEIT					
	External engine component maximum limiting temperatures are specified in the Installation and Operating Handbook.					
TURBINE EXHAUST TEMP (T4.9) (1) (See NOTE 22)	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F
Take-off (5 minutes)	645 / 1193	- -	- -	655 / 1211	- -	- -
Take-off (5 sec transient)	660 / 1220	- -	- -	670 / 1238	- -	- -
Maximum continuous	615 / 1139	- -	- -	625 / 1157	- -	- -
Maximum continuous (5 sec trans)	630 / 1166	- -	- -	640 / 1184	- -	- -
At start-up, ground (3)	545 / 1013	- -	- -	555 / 1031	- -	- -
At start-up, in-flight (2)	645 / 1193	- -	- -	655 / 1211	- -	- -
	(1) The maximum permissible exhaust gas temperatures (EGT) for Models PW2040 and PW2037(M) are indicated EGTs measured with the approved shunt resistors specified in the applicable engine manual. The actual EGT is 10^{o}C higher than the indicated value at takeoff.					
	(2) If during an in-flight start, the normal ground starting EGT limit is exceeded, maximum EGT and duration must be recorded. Maintenance action is required in accordance with Maintenance Manual Part Number 1A6230 for the PW2037, PW2037(M), PW2040, PW2240, and PW2337; 1B2413 for the F117-PW-100.					
	(3) Reference Maintenance Manual P/N 1A6230 for the PW2037, PW2037M, PW2040, PW2040M and PW2337, and IB2413 for the F117-PW-100, section 72-00-00 for the specific ground start maximum EGT versus time temperature limit curve.					
OIL OUTLET TEMP	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F
Continuous operation	163 / 325	- -	- -	- -	- -	- -
Transient operation (20 min)	177 / 350	- -	- -	- -	- -	- -
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 55 psig with a vapor/liquid ratio of zero.					
	OIL PRESSURE MINIMUM LIMITS					
Idle	70 psid	- -	- -	- -	- -	- -
Above idle	80 psid	- -	- -	- -	- -	- -
NOTE 4.	MAXIMUM PERMISSIBLE AIR BLEED / PERCENT OF PRIMARY ENGINE AIRFLOW					
10TH-STAGE HPC BLEED						
Idle to 30% maximum continuous						
Normal bleed	0.0%	- -	- -	- -	- -	- -
Maximum bleed (1)	9.0%	- -	- -	- -	- -	- -
Above 30% maximum continuous						
Normal bleed	6.0%	- -	- -	- -	- -	- -
Maximum bleed (1)	6.0% (3)	- -	- -	6.0%	6.0% (3)	- -
14TH-STAGE HPC BLEED						
Idle to 30% maximum continuous						
Normal bleed	12.0%	- -	- -	(4)	12.0%	- -
Maximum bleed	12.0% (2)	- -	- -	(4)	12.0% (2)	- -
Above 30% maximum continuous						
Normal bleed	0.0%	- -	- -	(4)	0.0%	- -
Maximum bleed (1)	13.0%	- -	- -	(4)	13.0%	

I. MODELS (Continued)	PW2043	PW2643	PW2143	PW2040D	PW2037D	
NOTE 1.	MAXIMUM PERMISSIBLE OPERATING SPEED FOR ENGINE ROTORS (See Note 16)					
Low pressure rotor (N1), RPM	4,575	- -	- -	- -	- -	
High pressure rotor (N2), RPM	12,360	- -	- -	- -	- -	
High pressure rotor (N2), RPM (5 seconds - transient)	12,445	- -	- -	- -	- -	
NOTE 2.	MAXIMUM PERMISSIBLE TEMPERATURES (See Note 16) DEGREES CENTIGRADE / FAHRENHEIT					
	External engine component maximum limiting temperatures are specified in the Installation and Operating Handbook.					
TURBINE EXHAUST TEMP (T4.9) (1)	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F
Take-off (5 minutes)	655 / 1211	- -	- -	- -	- -	
Take-off (5 sec transient)	670 / 1238	- -	- -	- -	- -	
Maximum continuous	625 / 1157	- -	- -	- -	- -	
Maximum continuous (5 sec trans)	640 / 1184	- -	- -	- -	- -	
At start-up, ground	495 / 923	- -	- -	- -	- -	
At start-up, in-flight (2)	655 / 1211	- -	- -	- -	- -	
	(1) The maximum permissible exhaust gas temperatures (EGT) for Models PW2040 and PW2037(M) are indicated EGTs measured with the approved shunt resistors specified in the applicable engine manual. The actual EGT is 10^{o}C higher than the indicated value at takeoff. (2) If during an inflight start, the normal ground starting EGT limit is exceeded, maximum EGT and duration must be recorded. Maintenance action is required in accordance with Maintenance Manual Part Number 1A6230 for the PW2037, PW2037(M), PW2040, PW2240, PW2043, PW2143, PW2643, PW2337, PW2040D and PW2037D, 1B2413 for the F117-PW-100.					
OIL OUTLET TEMP	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F	^{o}C / ^{o}F
Continuous operation	163 / 325	- -	- -	- -	- -	
Transient operation (20 min)	177 / 350	- -	- -	- -	- -	
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 55 psig with a vapor/liquid ratio of zero.					
	OIL PRESSURE MINIMUM LIMITS					
Idle	70 psid	- -	- -	- -	- -	
Above idle	80 psid	- -	- -	- -	- -	
NOTE 4.	MAXIMUM PERMISSIBLE AIR BLEED / PERCENT OF PRIMARY ENGINE AIRFLOW					
10TH-STAGE HPC BLEED						
Idle to 30% maximum continuous						
Normal bleed	0.0%	- -	- -	- -	- -	
Maximum bleed (1)	9.0%	- -	- -	- -	- -	
Above 30% maximum continuous						
Normal bleed	6.0%	- -	- -	- -	- -	
Maximum bleed (1)	6.0% (3)	- -	- -	- -	- -	
14TH-STAGE HPC BLEED						
Idle to 30% maximum continuous						
Normal bleed	12.0%	- -	- -	- -	- -	
Maximum bleed	12.0% (2)	- -	- -	- -	- -	
Above 30% maximum continuous						
Normal bleed	0.0%	- -	- -	- -	- -	
Maximum bleed (1)	13.0%	- -	- -	- -	- -	

NOTE 4. (Continued)

	PW2037	PW2040	PW2037(M)	F117-PW-100	PW2240	PW2337	PW2043 PW2143 PW2643 PW2040D PW2037D
	MAXIMUM PERMISSIBLE AIR BLEED / PERCENT OF PRIMARY ENGINE AIRFLOW						
17TH- STAGE HPC BLEED							
Idle to 30% maximum continuous							
Normal bleed	---	---	---	12.0%	---	---	--
Maximum bleed (1)	---	---	---	12.0% (5)	---	---	--
Above 30% maximum continuous							
Normal bleed	---	---	---	0.0%	---	---	--
Maximum bleed (1)	---	---	---	12.0%	---	---	--

(1) Usable only when required by malfunction and only until next landing.
(2) 13% allowable with 0% 10th-stage bleed.
(3) 9% allowable with 0% 14th-stage bleed.
(4) When primary source of aircraft system bleed air is from 10th-and 17th stage HPC bleeds as shown in the table, supplement bleed air may be extracted continuously from the 14th stage bleed up to 0/5% of primary engine airflow.
(5) When altitude less than 30,000 feet and corrected HPC speed (N2C2) less than 9,600 rpm, the 17th-stage maximum bleed amount equals 14%.

NOTE 5. Ratings are based on static test stand operation under the following conditions:

Compressor inlet air at 15^{o}C / 59^{o}F and 29.92 in. Hg. Engine air inlet TAM 168397, primary exhaust nozzle TAM 168399, fan exhaust nozzle TAM 168400, and exhaust cone TAM 168422.

No aircraft accessory loads or bleed air extraction.

Turbine outlet gas temperature limits and engine rotor speed limits not exceeded.

NOTE 6. ACCESSORY DRIVE PROVISIONS

	ROTATION (1)	**SPEED RATIO TO TURBINE SHAFT**	**TORQUE (lb-in)**			**OVERHANG (in-lb)**
			CONTINUOUS	**STATIC**	**OVERLOAD**	
High pressure rotor						
Starter	CCW	0.800:1	- -	(2)	- -	500
IDGS	CCW	0.728:1	(4)	12620	(4)	2000
Fluid power						
Pump (R)	CCW	0.315:1	1300	6500	1950	400
Pump (L) (3)	CCW	0.315:1	1300	6500	1950	400

(1) CW = Clockwise / CCW = Counterclockwise
(2) Maximum starter torque equals 970 lb.-ft. at zero rpm. Maximum allowable starter torque value is 2231 lb.-ft.
3) Applicable to Models F117-PW-100 / PW2240
4) Maximum allowable continuous torque values at any engine speed are equivalent to 175 horsepower. For an overload it is 225 horsepower.

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 engine pressure ratio or low rotor speeds. Pressure probes and 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 22% (1000 rpm).

NOTE 9. Lightning protection requirements and electromagnetic interference emitted by the Electronic Engine Control System (EECS), including cables, are specified in the Installation and Operating Handbook.

NOTE 10. Fuels and fuel additives conforming to the FAA-approved Pratt & Whitney Turbojet Engine Service Bulletin Number 2016, latest revision, may be used separately or mixed in any proportion without adversely affecting the operation or power output.

NOTE 11. The following oils are eligible: Oils conforming to Pratt & Whitney Turbojet Engines Service Bulletin Number 238, latest revision.

NOTE 12. Certain engine parts are life-limited. These limits are listed in the time limit sections of the following Pratt & Whitney Engine Manuals:

For the PW2037 / PW2037(M) / PW2040 / PW2337 / PW2043 / PW2643 / PW2143 / PW2040D / PW2037D
Engine Manual P/N 1A6231

For the F117-PW-100
Engine Manual P/N 1B2412

NOTE 13. All of these models meet fuel venting and exhaust emission requirements of 14 CFR Part 34, Amendment 3, dated February 3, 1999.

NOTE 14. The maximum permissible engine inlet distortion limits for these models are specified in the Installation and Operating Handbook. Inlet distortion on an installed engine must be determined by the method of measurement specified in the Installation and Operating Handbook or an equivalent method in order to verify that the installed engine is within the limits.

NOTE 15. Limits regarding transient rotor shaft overspeed and transient gas overtemperature and number of occurrences are specified in the following Pratt & Whitney Maintenance Manuals:

For the PW2037 / PW2037(M) / PW2040 / PW2240 / PW2337 / PW2043 / PW2643 / PW 2143 / PW2040D / PW2037D
Maintenance Manual P/N 1A6230

For the F117-PW-100
Maintenance Manual P/N 1B2413

NOTE 16. Information regarding approved fuel filter and oil filter replacement parts is specified in the following PW2000 Series Illustrated Parts Catalog (IPC):

For the PW2037 / PW2037(M) / PW2040 / PW2043 / PW2643 / PW2143 / PW2040D / PW2037D
IPC P/N 1A6232

For the PW2240 / PW2337
IPC P/N 1B6328

For the F117-PW-100
IPC P/N 1B2441

NOTE 17. CHARACTERISTICS

PW2037	Takeoff rating of 37, 530 pounds at and below 87^{O}F / 30^{O}C ambient temperature sea level static. Maximum continuous rating of 34,640 pounds at and below 77^{O}F / 25^{O}C ambient temperature sea level static.
PW2040	Basically same as PW2037, except takeoff rating of 40,900 pounds at and below 87^{O}F / 30^{O}C ambient temperature sea level static, and minor hardware changes.
PW2037(M)	Same as PW2040, except operated at PW2037 ratings via appropriate electronic engine control data entry plug.
F117-PW-100	Basically the same as PW2040, except addition of stage 17 cabin air bleed, a second hydraulic pump drive and external plumbing changes.
PW2240	Same as PW2040, except for a second hydraulic pump drive and external plumbing changes.
PW2337	Same as PW2037, except for external plumbing changes.
PW2043 PW2143 PW2643	Basically same as supercharged PW2040, except takeoff rating of 43,000 pounds at and below 87^{O}F/30^{O}C ambient temperature see level static and maximum continuous rating of 36,420 pounds at and below 77^{O}F/25^{O}C ambient temperature sea level static and minor hardware changes.
PW2040D	Same as PW2043, except operated at PW2040 ratings via appropriate electronic engine control data entry plug.
PW2037D	Same as PW2043, except operated at PW2037 ratings via appropriate electronic engine control data entry plug.

NOTE 18. The F117-PW-100 and PW2643 engine models are PW2000 derivative engine that will only be installed on non FAA certified military aircraft. The model will therefore not be operated and maintained in accordance with the Federal Aviation Regulations contained in CFR Title 14. Use of F117-PW-100, and PW2643 engines or engine parts in commercial service is prohibited unless specific prior FAA (Engine Certification Office, ANE-140) approval is granted.

NOTE 19. Pratt & Whitney document number FR-22024 (latest revision), titled "Configuration Management Accounting Report", is a cross reference list of commercial (PW2000 engine series) service bulletins and their military equivalent (F117 engine model). This document is updated monthly.

NOTE 20. Ground operation in icing condition requires adherence to procedures stated in Aircraft Flight Manual (AFM) for all engine models. These procedures include periodic speed run ups and/or inspections and de-icing procedures (reference applicable AFM for details).

NOTE 21. The 5 minute takeoff time limit may be extended to 10 minutes for one engine(s) inoperative or shutdown.

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