	TCDS NUMBER E00070EN REVISION: 8
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET	DATE: May 14, 2014 GENERAL ELECTRIC COMPANY MODELS: CF34-10A16, CF34-10A18, CF34-10E2A1, CF34-10E5, CF34-10E5A1, CF34-10E6, CF34-10E6A1, CF34-10E7, CF34-10E7-B

Engines of models described herein conforming with this data sheet 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 manufacturers manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER: General Electric Company
GE AViation
1 Neumann Way
Cincinnati, OH 45215-6310

I. MODELS	CF34-10E2A1	CF34-10E5	CF34-10E5A1	CF34-10E6	CF34-10E6A1	CF34-10E7	CF34-10E7-B
TYPE	Dual rotor, axial flow, high bypass ratio turbofan with single stage fan, 3-stage low pressure compressor, 9-stage high pressure compressor, annular combustion chamber, single stage high pressure turbine, 4-stage low pressure turbine, a thrust reverser, aft core cowl, exhaust nozzle, starter, and a full authority digital engine control (FADEC).						
RATINGS (See NOTE 5) Sea level static thrust, lb							
Maximum takeoff (5 min.) (See NOTES 15 and 16)	16960	18820	18820	18820	18820	20360	- -
Normal takeoff (5 min.) (See NOTE 15 and 16)	16960	17390	18820	17390	18820	18820	- -
Maximum continuous	15110	17040	17040	17040	17040	17040	- -
Flat rate ambient temperature							
Takeoff	86ºF / 30 C	- -	- -	95ºF / 35 C	- -	86ºF / 30 C	- -
Maximum continuous	77ºF / 25 C	- -	- -	- -	- -	- -	- -

CONTROL SYSTEM COMPONENT							
Fuel Metering Unit	2043M10	- -	- -	- -	- -	- -	- -
Full Authority Digital Engine Control (FADEC)							
Hardware	2043M11	- -	- -	- -	- -	- -	- -
Software	2043M65	- -	- -	- -	- -	- -	- -
Configuration Plug							
Hardware	2162M48	- -	- -	- -	- -	- -	- -
Engine Rating	2041M41	- -	- -	- -	- -	- -	- -
Engine Configuration	2041M42	- -	- -	- -	- -	- -	- -
N1 Trim Setting	2041M43	- -	- -	- -	- -	- -	- -
Ignition System							
2 Ignition Exciters	9238M66	- -	- -	- -	- -	- -	- -
2 Ignition Plugs	1374M12	- -	- -	- -	- -	- -	- -
Fuel Pump	2043M12	- -	- -	- -	- -	- -	- -

PAGE	1	2	3	4	5	6	7	8	9	10	
REV.	8	6	6	8	8	6	7	7	8	8	

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

I. MODELS (continued)	CF34-10E2A1	CF34-10E5	CF34-10E5A1	CF34-10E6	CF34-10E6A1	CF34-10E7	CF34-10E7-B
FUEL	Fuel conforming to GE Jet Fuel Specification No. D50TF2 is applicable for all models. See GEK 112084, Operating Instructions, for specific fuels approved per the subject specifications.						
OIL	Oil conforming to GE Specification No. D50TF1 is applicable for all models. See GEK 112084, Operating Instructions, for specific oils approved per the subject specifications.						
PRINCIPAL DIMENSIONS AND MEASUREMENTS	(FAR 33 Propulsion System: see Installation Manual GEK 112083)	- -	- -	- -	- -	- -	- -
Length, inches	177.93	- -	- -	- -	- -	- -	- -
Maximum diameter, inches	73.38 x 86.59	- -	- -	- -	- -	- -	- -
Weight, pounds (includes residual fuel and oil)	5100	- -	- -	- -	- -	- -	- -
Center of Gravity Location, inches							
Engine Station	204.2	- -	- -	- -	- -	- -	- -
Butt Line	98.6	- -	- -	- -	- -	- -	- -
Water Line	104.4	- -	- -	- -	- -	- -	- -

II. MODELS	CF34-10A16	CF34-10A18
TYPE	Dual rotor, axial flow, high bypass ratio turbofan with single stage fan, 3-stage low pressure compressor, 9-stage high pressure compressor, annular combustion chamber, single stage high pressure turbine, 4-stage low pressure turbine, a thrust reverser, aft core cowl, exhaust nozzle, starter, and a full authority digital engine control (FADEC).	
RATINGS (See NOTE 5) Sea level static thrust, lb		
Maximum takeoff (5 min.) (See NOTES 15 and 16)	17640	19705
Normal takeoff (5 min.) (See NOTE 15 and 16)	17300	18460
Maximum continuous	16110	17660
Flat rate ambient temperature		
Takeoff	86ºF / 30 C	- -
Maximum continuous	77ºF / 25 C	- -
CONTROL SYSTEM COMPONENT		
Fuel Metering Unit	2044M33	- -
Full Authority Digital Engine Control (FADEC)		
Hardware	2043M11	- -
Software	2413M46	- -
Configuration Plug		
Hardware	2162M48	- -
Engine Rating	2041M41	- -
Engine Configuration	2041M42	- -
N1 Trim Setting	2041M43	- -
Ignition System		
2 Ignition Exciters	9238M66	- -
2 Ignition Plugs	1374M12	- -
Fuel Pump	2044M34	- -
FUEL	Fuel conforming to GE Jet Fuel Specification No. D50TF2 is applicable for all models. See GEK 112094, Operating Instructions, for specific fuels approved per the subject specifications.	
OIL	Oil conforming to GE Specification No. D50TF1 is applicable for all models. See GEK 112094, Operating Instructions, for specific oils approved per the subject specifications.	

PRINCIPAL DIMENSIONS AND MEASUREMENTS	(FAR 33 Propulsion System: see Installation Manual GEK 112093)	- -
Length, inches	158.6	- -
Maximum diameter, inches	79.313 x 71.534	- -
Weight, pounds (includes residual fuel and oil)	4925	- -
Center of Gravity Location, inches		
Engine Station	201.03	- -
Butt Line	102.43	- -
Water Line	97.84	- -

CERTIFICATION BASIS: (All 10E models)

(1) CF34-10E (All Models) -
14 Code of Federal Regulations (CFR), Part 33, effective February 1, 1965, as amended by amendments 33-1 through 33-20.
(2) All Engine models-
14 CFR Part 34, effective September 10, 1990, as amended by amendments 34-1 through 34-3. In addition, 40 CFR Part 87, effective December 19, 2005.
(3) Equivalent level of safety 8040-ELOS-04-NE-01 §33.83(c)(1) Vibration Test

Model	Date of Application	Type Certificate No. E00070EN Issued/Amended
CF34-10E5	February 9, 2001	December 22, 2004
CF34-10E5A1	February 9, 2001	December 22, 2004
CF34-10E6	February 9, 2001	December 22, 2004
CF34-10E6A1	February 9, 2001	December 22, 2004
CF34-10E2A1	January 2, 2006	July 20, 2006
CF34-10E7	January 2, 2006	July 20, 2006
CF34-10E7-B	June 4, 2007	June 16, 2008

CERTIFICATION BASIS: (All 10A models)

(1) 14 Code of Federal Regulations (CFR), Part 33, effective February 1, 1965, as amended by amendments 33-1 through 33-20.
(2) 14 CFR Part 34, effective September 10, 1990, as amended by amendments 34-1 through 34-4.
(3) Equivalent level of safety 8040-ELOS-10-NE-01 §33.83(c)(1) Vibration Test

Model	Date of Application	Type Certificate No. E00070EN Issued/Amended
CF34-10A16	January 25, 2006	July 22, 2010
CF34-10A18	January 25, 2006	July 22, 2010

The following models comply with 14 CFR part 34, amendment 5, effective December 31, 2012. See note 23, for detailed summary of the certification basis for fuel venting and exhaust emissions: CF34-10A16, CF34-10A18, CF34-10E2A1, CF34-10E5, CF34-10E5A1, CF34-10E6, CF34-10E6A1, CF34-10E7, CF34-10E7-B.

PRODUCTION CERTIFICATE	CF34-10E/10A Production Certificate No. PC108

NOTES

Notes 1 through 23 applicable to models as specified

NOTE 1. Maximum permissible engine operating speeds for the engine rotors are as follows:

	CF34-10E (all models)	CF34-10A (all models)
Low pressure rotor (N1), rpm		
Maximum takeoff	6325	6325
Normal takeoff	6325	6325
Maximum continuous	6325	6325
High pressure rotor (N2), rpm		
Maximum takeoff	18018	18018
Normal takeoff	18018	18018
Maximum continuous	18018	18018

Refer to GE Engine Manual GEK 112081(all 10E models), GEK112091(all 10A models), and other manual or inspection requirements when limits are exceeded.
100 percent N1 rotor speed is 5954.4 rpm, 100 percent N2 rotor speed is 17,160 rpm (all 10E/10A models).

NOTE 2.

(1) Indicated maximum permissible temperatures are listed below. In addition, the CF34-10E2A1 model incorporates an EGT shunt of 30°C at fan speeds above idle. Thus, for an indicated EGT of 1801°F (983°C), the measured EGT is 1747°F (953°C). All CF34-10E/10A series engines are certified with a takeoff EGT transient allowance. This allowance applies to normal and maximum takeoff EGT, up to 5.5 °C for 2 seconds, 4.4 °C for 5 seconds, 3.6 °C for 15 seconds and 2.4 °C for 30 seconds.

Indicated Exhaust Gas Temperature (EGT*), °F (°C)

	CF34-10E2A1	CF34-10E5	CF34-10E5A1	CF34-10E6	CF34-10E6A1	CF34-10E7	CF34-10E7-B
Maximum takeoff (5 min)	1801 (983)	- -	- -	- -	- -	- -	--
Normal takeoff (5 min)	1801 (983)	1733 (945)	1801 (983)	1737 (947)	1801 (983)	1729 (943)	--
Maximum continuous	1760 (960)	- -	- -	- -	- -	- -	--
At start-up, ground	1364 (740)	- -	- -	- -	- -	- -	--
At start-up, inflight	1607 (875)	- -	- -	- -	- -	- -	--

	CF34-10A16	CF34-10A18
Maximum takeoff (5 min)	1801 (983)	- -
Normal takeoff (5 min)	1744 (951)	1746 (952)
Maximum continuous	1760 (960)	- -
At start-up, ground	1364 (740)	- -
At start-up, inflight	1607 (875)	- -

*The exhaust gas temperature is measured by 9 probes, which are equally spaced and mounted in the second-stage low-pressure turbine vanes.

(2) Refer to GE Engine Manual GEK 112081 (CF34-10E all models), GEK 112091 (CF34-10A all models) for inspection requirements when limits are exceeded.

(3) Oil temperature limit (oil supply temperature measured in the oil tank), °F (°C)

MODELS	All 10E models	All 10A models
Continuous operation	311 (155)	- -

(4) Fuel inlet temperature (at pylon interface), °F (°C)

MODELS	All 10E models	All 10A models
Continuous operation	155 (68.3)	135 (57.2)

NOTE 3. FUEL AND OIL PRESSURE LIMITS

(1) Fuel: For all 10E models, at engine pump inlet: minimum pressure of 5 PSID above the true vapor pressure of the fuel with a vapor/liquid ratio of zero with aircraft boost operative. Operating range 5 PSIG to 50 PSIG. At engine motive flow discharge: minimum pressure of 150 PSIG at idle or above. Operating range is 150 PSIG to 1209 PSIG. See GE Installation Manual GEK 112083 for additional limits.

For all 10A models, at engine pump inlet: minimum pressure of 5 PSID above the true vapor pressure of the fuel with a vapor/liquid ratio of zero with aircraft boost operative. Operating range 5 PSIG to 50 PSIG. See GE Installation Manual GEK 112093 for additional limits.

(2) Oil: Minimum oil pressure limit is 25 psid. For oil temperatures less than –20C, the minimum oil pressure is 5 psid for the first two minutes following an engine start. After two minutes at idle or if the engine power is increased above idle, the minimum oil pressure is 25 psid. See GE Installation Manual GEK 112083 (10E all models), GEK112093 (10A all models) for additional limits.

NOTE 4. ACCESSORY DRIVE PROVISIONS

All 10E Models

Accessory	Location on AGB Axis	Speed (RPM)	HP (Rated)	Direction of Rotation facing AGB	Torque (lb-in) Static / Continuous / Overload	Max Acc. Wt. (lb)	Overhung Moment (lb-in)	Shear Torque (lb-in)
Lube & Scavenge Oil Pump	Axis-J Aft	8575	7	CCW	300 (1) /48 / NA	10.3	33	750-850
IDG	Axis-G Fwd	7928	74.8 (2)	CW	675 (1) / 595 / 1129 (5 min) (4) 1605 (5 sec) (4)	81.2 (6)	720 Maximum	3144-3648
Air Turbine Starter	Axis-D Fwd	12281	NA	CW	2112, 4200 (3) / NA / NA	27.7	113	6300-7500
Hydraulic Pump	Axis-F Fwd	5567	35	CW	573 (1) (5) / 392 / 670	13.9 dry	38.4	2004 maximum
Alternator	Axis-J Fwd	8575	4	CW	NA / NA / NA	3.0	2.6	NA
Fuel Pump	Axis-E Aft	7928	55	CW	150/240/NA	28.6	142	1400-1540

CW - Clockwise CCW - Counter Clockwise

Accesory Speeds are based on Core Speed: 17160 rpm

(1) -40° F SLS

(2) HP is constant over the operating range with slight variations due to changes in efficiency. HP extraction is 74.8 HP at 7898 rpm (pad speed) and 73.5 HP at 4618 rpm (pad speed). The 5 minute overload rating is 82.7 HP and the 5 second overload rating is 137.37

(3) 2112 in-lbs at 59°F SLS, 4200 in-lbs at -40° F SLS

(4) Overload at 4618 rpm (pad speed)

(5) 573 in-lbs at 626 rpm (pad speed)

(6) Includes oil and V band coupling

All CF34-10A Models

Accessory	Location on AGB Axis	Speed (RPM)	HP (Rated)	Direction of Rotation facing AGB	Torque (lb-in) Static / Continuous / Overload	Max Weight (lb)	Overhung Moment (lb-in)	Shear Torque (lb-in)
Lube & Scavenge Oil Pump	Axis-F, AFT	7982	6.2	CCW	33 / 47 (1) / 56	16.2	59.94	750-850
IDG	Axis-F, FWD	7982	76.7	CW	675 (2) / 610 (3) / 2184 (4)	80	610	3150-3650
Air Turbine Starter	Axis-C, FWD	12269	N/A	CW	NA / 3360 / NA	29.46	125.91	6300-7500
Hydraulic Pump	Axis-D, AFT	5593	38.0	CW	550 / 108 / 670	14.35	39.59	2000 Max
Alternator	Axis-G, FWD	8604	0.38	CCW	NA / 3.5 / 5.8	3.04	2.16	N/A
Fuel Pump	Axis-E, FWD	7888	26.3	CW	90 / 210 / 353	21	73.94	1400-1540

CW - Clockwise CCW - Counter Clockwise

Accessory Speeds are based on Core Speed: 17160 rpm
(1) Calculated at rated speed of 7982 rpm at 6 HP input.
(2) Cold start @ -40F and max ramp rate of 450 rpm/sec. Torque peaks at 500 rpm. Zero Torque at zero speed.
(3) Calculated at continuous operating point 76.5 HP and 7898 rpm
(4) 5 sec max at 160 HP and 4618 rpm

NOTE 5. Engine ratings are based on calibrated test stand performance, and performance calculations are based on accepted parameter correction methods documented in the production data folder. These calculations assume the following conditions:

1. Static sea level standard conditions of 59° F and 29.92 inches Hg.
2. No aircraft accessory loads or air extraction.
3. No anti-icing; no inlet distortion; no inlet screen losses; and 100% ram recovery.
4. Production engine inlet and production flight exhaust system

NOTE 6. Air Bleed Extraction - maximum customer air bleed extraction is as follows: Customer bleed air is available from either stage 5 or 9 (compressor discharge) of the compressor at all operating conditions at or above idle (No compressor bleed is permitted below idle). Customer bleed is scheduled to switch from stage 9 bleed at low power operation to stage 5 bleed at high power operation as described in GE Installation Manual GEK 112083 (CF34-10E all models) and GEK 112093 (CF34-10A all models).

Location	Maximum Demonstrated Bleed Air (% of Total Compressor Airflow)
	CF34-10E/10A (all models)
Compressor Stage 5	8.0
Compressor Stage 9 (Compressor Discharge)	12.0
Maximum Allowable Bleed	12.0

NOTE 7. Reserved

NOTE 8. The maximum permissible inlet distortion for these engines is specified in GE Installation Manual GEK 112083 (CF34-10E all models) and GEK 112093 (CF34-10A all models). Ground operational limits and procedures for operation in crosswind are specified in GE Specific Operating Instructions GEK 112084 (CF34-10E all models) and GEK 112094 (CF34-10A all models).

NOTE 9. For the CF34-10E/10A model series, the 14CFR Part 33 engine type design definition includes thrust reverser system, which is part of the nacelle system, and is identified as follows:

Engine Parts List	Thrust Reverser Parts List
CF34-10E2A1GXX	601E0001-5XX
CF34-10E5GXX	601E0001-5XX
CF34-10E5A1GXX	601E0001-5XX
CF34-10E6GXX	601E0001-5XX
CF34-10E6A1GXX	601E0001-5XX
CF34-10E7GXX	601E0001-5XX
CF34-10E7-BGXX	601E0001-5XX
CF34-10A16GXX	604C0010-5XX
CF34-10A18GXX	604C0010-5XX

The Engine Manual, GEK 1122081 (CF34-10E all models) and GEK 112091 (CF34-10A all models), defines the installation requirements for the engine GXX or –5XX indicates all parts list designations, for example G01, G02, -501, -502, etc.

NOTE 10. Life limits established for critical components and mandatory inspection requirements are specified in the Airworthiness Limitation Section of GE Engine Manual GEK 112081 (CF34-10E all models) and GEK 112091 (CF34-10A all models). Recommended maintenance inspection intervals are published in GE Engine Manual GEK 112081 (CF34-10E all models) and GEK 112091 (CF34-10A all models).

NOTE 11. “Reserved”

NOTE 12. The operating temperature limits for specific components and accessories specified in GE Installation Manual GEK 112083 (CF34-10E all models) and GEK 112093 (CF34-10A all models) must be observed when installing the engine.

NOTE 13. “Reserved”

NOTE 14. The following manuals are approved or accepted for the CF34-10E/10A model series:

	CF34-10E (all models)	CF34-10A (all models)
Operating Instructions	GEK 112084	GEK 112094
Installation Manual	GEK 112083	GEK 112093
Engine Manual	GEK 112081	GEK 112091

NOTE 15. This engine is equipped with an automatic power reserve function for takeoff operation with one engine inoperative. During takeoff, when the automatic power reserve function is activated, the engine control of the inoperative engine sends an input signal to the engine control of the operating engine. Upon receiving this signal, the engine thrust of the operating engine automatically increases from normal takeoff (NTO) or lower thrust to the corresponding, pre-determined maximum takeoff (MTO) thrust. Full MTO thrust is available to the pilot at any time by throttle selection.

The engine control system also incorporates schedules that assure a fully degraded engine, during operation at the NTO of lower thrust, will achieve the specified MTO thrust without exceeding the engine operating limits when the automatic power reserve function is activated.

NOTE 16. The time limit at the normal takeoff rating is five minutes and shall include any time accumulated above the normal takeoff rating for that takeoff. The 5-minute takeoff time limit may be extended to 10 minutes for one engine inoperative operation in multi-engine aircraft.

NOTE 17. TIME LIMITED DISPATCH CRITERIA

Criteria pertaining to the dispatch and maintenance requirements for the engine control systems are specified in the airworthiness section of the Engine Manual, GEK 112081 (CF34-10E all models) and GEK 112091 (CF34-10A all models), which defines the various configurations and maximum operating intervals.

NOTE 18. Overhaul of Engine Components is only authorized via approved Manuals. Engine components for which no approved or accepted Manual is available must be replaced with new ones or serviceable parts.

NOTE 19. Refer to Operating Instructions GEK 112084 (CF34-10E all models) and GEK 112094 (CF34-10A all models) for engine warm-up procedure.

NOTE 20. Refer to Operating Instructions GEK 112084 (CF34-10E all models) and GEK 112094 (CF34-10A all models) for thrust reverser operation.

NOTE 21. The above models incorporate the following characteristics:

Model	Characteristics
CF34-10E2A1	Basic Model
CF34-10E5	Basic Model
CF34-10E5A1	Basic Model
CF34-10E6	Basic Model
CF34-10E6A1	Basic Model
CF34-10E7	Basic Model
CF34-10E7-B	Basic Model
CF34-10A16	Basic Model
CF34-10A18	Basic Model

NOTE 22.

NOTE 23. The following emissions standards promulgated in 14 CFR Part 34, Amendment 5, effective December 31, 2012, and 40 CFR Part 87, effective July 18, 2012, have been complied with for: CF34-10A16, CF34-10A18, CF34-10E2A1, CF34-10E5, CF34-10E5A1, CF34-10E6, CF34-10E6A1, CF34-10E7, CF34-10E7-B.

Fuel Venting Emission Standards: 14 CFR §§ 34.10(a) and 34.11; in addition, 40 CFR §§ 87.10(a) and 87.11.

Smoke Number (SN) Emission Standards: 14 CFR §34.21(e)(2); in addition, 40 CFR § 87.23(c)(l).

Carbon Monoxide (CO) Emission Standards: 14 CFR § 34.21(d)(l)(ii); in addition, 40 CFR § 87.23(c)(l).

Hydrocarbons (HC) Emission Standards: 14 CFR § 34.21(d)(1)(i); in addition, 40 CFR § 87.23(c)(l).

Oxides of Nitrogen (NOx) Emission Standards: 14 CFR § 34.23(b)(l); in addition, 40 CFR § 87.23(c)(3).

In addition to the FAA's finding of compliance based on the certification requirements defined in this TCDS, the engine manufacturer has declared that the ICAO emissions standards identified in Annex 16, Volume II, Third Edition, Part Ill,

Chapter 2, Section 2.2.2 for SN, Section 2.3.2 for CO and HC, Section 2.3.2.e.3 for NOx (also known as CAEP/8), and Part II Chapter 2 for fuel venting have also been demonstrated.

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