

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E00078NE	E00078NE REVISION: Original GENERAL ELECTRIC GEnx-1B54 GEnx-1B58 GEnx-1B64 GEnx -1B67 GEnx-1B70 March 31, 2008
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Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E00078NE) 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: General Electric Company
 GE Aviation
 1 Neumann Way
 Cincinnati, OH 45215-6310

I. MODELS	GEnx-1B54	GEnx-1B58	GEnx-1B64	GEnx-1B67	GEnx-1B70
TYPE	This engine is a dual rotor, axial flow, high bypass ratio turbofan. The 10-stage high pressure compressor is driven clockwise (Aft Looking Forward) by a 2-stage high pressure turbine. The single stage fan and 4-stage low pressure compressor are driven counterclockwise (Aft Looking Forward) by a 7-stage low pressure turbine. The engine control system includes a Full Authority Digital Engine Control (FADEC), which has an aircraft connection for digital communication. An engine monitoring unit (EMU) provides vibration level signals to the aircraft.				
RATINGS (See NOTE 5)					
Maximum continuous at sea level, static thrust, lb	56,300	56,300	61,500	61,500	66,500
fan speed, rpm	2,166	2,166	2,247	2,247	2,319
Takeoff (5 min. see NOTE 12) at sea level, static thrust, lb	57,400	61,000	67,000	69,400	72,300
fan speed, rpm	2,184	2,239	2,326	2,360	2,401
Flat rating ambient temperature					
Takeoff	86°F/30°C	--	--	--	--
Maximum Continuous	77°F/25°C	--	--	--	--

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REV.	0	0	0	0	0	0	0

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

I. MODELS (cont.)	GENx-1B54	GENx-1B58	GENx-1B64	GENx-1B67	GENx-1B70
COMPONENTS (GE P/Ns)					
Fuel Metering Unit	2122M20	--	--	--	--
Full Authority Digital Engine Control (FADEC) Hardware	2121M82	--	--	--	--
FADEC Software	2124M23	--	--	--	--
Configuration Box	2121M99	--	--	--	--
FADEC Rating Plug	2125M31P02	2125M31P08	2125M31P14	2125M31P20	2125M31P26
Fuel Pump	2122M22	--	--	--	--
IGNITION SYSTEM					
Two ignition exciters GE P/N	2121M94	--	--	--	--
Two igniter plugs GE P/N	1754M84	--	--	--	--
PRINCIPAL DIMENSIONS (in)					
Length (Fan spinner to nozzle centerbody)	194 in	--	--	--	--
Width (maximum envelope)	139 in	--	--	--	--
Height (maximum envelope)	137 in	--	--	--	--
WEIGHT (DRY) Includes basic engine, basic engine accessories, and optional equipment as listed in the manufacturer's engine specifications.	Engine 12,822 lbs	--	--	--	--
CENTER OF GRAVITY LOCATIONS (in) (Engine only)					
Station (axial)	217.03 \pm 0.5 in	--	--	--	--
Waterline	99.04 \pm 0.5 in	--	--	--	--
Buttline	100.55 \pm 0.5 in	--	--	--	--

	ALL
FUEL	See NOTE 7 for approved fuels.
OIL	Type 2 oils conforming to General Electric Specification D50TF1 or the latest revisions are authorized.

CERTIFICATION BASIS

GEnx-1B54, -1B58, -1B64, -1B67, and -1B70

- 14 CFR Part 33, effective February 1, 1965, as amended by 33-1 through 33-21 and amendment 33-23 section 33.76.

Fuel Venting and Exhaust Emissions Standards, 14 CFR Part 34, effective September 10, 1990, as amended by 34-1 through 34-3, in addition, 40 CFR Part 87, effective December 19, 2005.

- GEnx-1B Fan Blade Special Condition (33-006-SC)
- Equivalent Level of Safety (ELOS) Findings
 - ELOS No. 8040-ELOS-08-NE02 to 14 CFR §33.87(a) & (b)
 - ELOS No. 8040-ELOS-08-NE03 to 14 CFR §33.27(c)
 - ELOS No. 8040-ELOS-08-NE04 to 14 CFR §33.90
 - ELOS No. 8040-ELOS-08-NE05 to 14 CFR §33.77

TYPE CERTIFICATE E00078NE

MODELS	APPLICATION DATE	ISSUED/AMENDED
GEnx -1B54	Dec. 13, 2004	March 31, 2008
GEnx -1B58	May 24, 2005	March 31, 2008
GEnx -1B64	Dec. 13, 2004	March 31, 2008
GEnx -1B67	May 24, 2005	March 31, 2008
GEnx -1B70	Dec. 13, 2004	March 31, 2008

PRODUCTION BASIS

Production Certificate No. 108

NOTES

NOTE 1. **MAXIMUM PERMISSIBLE ENGINE ROTOR SPEEDS**

	GEnx-1B54, -1B58, -1B64, -1B67, -1B70	
Low pressure rotor (N1)	2,726 RPM	(106.5%)*
High pressure rotor (N2)	13,425 RPM	(118%)**

* Note: 100 percent N1 is 2,560 RPM

** Note: 100 percent N2 is 11,377 RPM

NOTE 2. **MAXIMUM PERMISSIBLE TEMPERATURES****Indicated turbine exhaust****gas temperature (T49) GENx-1B54, -1B58, -1B64, -1B67, -1B70**

(see NOTE 5)

Takeoff 5 minute (see NOTE 12) 1,895°F (1,035°C)

30 seconds Maximum Transient 1,904°F (1,040°C)

Maximum Continuous 1,841°F (1,005°C)

Ground starts (manual or auto) 1,379°F (750°C)

Inflight starts (manual or auto) 1,607°F (875°C)

Oil temperature limits

Continuous 320°F (160°C)

Transient (15 minutes) 350°F (177°C)

NOTE 3. **FUEL AND OIL PRESSURE LIMITS**FUEL PRESSURE LIMITS AT THE ENGINE PUMP INLET

The limit is from minimum fuel pressures of not less than the greater of true vapor pressure plus 5.0 psi or ambient plus 5.0 psi to a maximum of 70 psig.

OIL PRESSURE LIMITS

See Figure 8-1 of GENx Operating Instructions GEK112857 for definition of minimum and maximum oil pressures.

NOTE 4. GENx-1B ACCESSORY DRIVE CHARACTERISTICS

Accessory	Defined By	Rotation Facing Gearbox Pad)	Gear Ratio To Core Rotor	Drive Shaft (RPM)	Maximum Weight LB (KG)	Maximum Overhung Moment IN-LB (N•m)	Shear Torque IN-LB (N•m)	Continuous Pad Rating HP In flight Dual Engine	Overload [HP]
VFSG 1	ICNR - GE-BE059	CCW	1.1331	12,891.3	227.5 (103.2) WET	1,472 (166.3)	19,596-20,220 (2,214-2,285)	692 (total for both VFSG's)	See Comment A
VFSG 2	ICNR- GE-BE060	CCW	1.1331	12,891.3	227.5 (103.2) WET	1,472 (166.3)	19,596-20,220 (2,214-2,285)	692 (total for both VFSG's)	See Comment A
Hydraulic Pump	ICNR- GE-BE057	CCW	0.4438	5,049.1	30.3 (13.74) WET	140 (15.81) WET	2,625-3,715 (1,780-420)	See Comment B	85 [5 sec]
Core Turn	0.5 Square Drive/ Dwg-2305M71	CCW	0.6773	7,705.6	N. A.	N. A.	N. A.	N. A.	N. A.

Comments:

- A. 1021 HP fault: for 1 second, occurring 0.001 times per operating hour. [single Engine]
866 HP fault for 1 second, occurring 4.17 times per operating hour. [dual Engine]**
- B. 1150 lbs-inch constant torque to a max of 60HP for the gearbox design.**

NOTE 5. ENGINE RATINGS

Engine ratings are based on calibrated test stand performance under the following conditions:

1. Sea level static, standard pressure (14.696 psia), 59°F (15°C)
2. No customer bleed or customer horsepower extraction
3. Ideal inlet, 100% ram recovery
4. Production aircraft flight cowling
5. Production instrumentation

Fuel lower heating value of 18,400 BTU/lb

NOTE 6. **MAXIMUM PERMISSIBLE BLEED AIR EXTRACTION**

	Percent of W_{25}
GEnx-1B54, -1B58, -1B64, -1B67, &-1B70	Stage 7
	3.3 %

Any Power Setting

NOTE 7. **FUEL**

Approved fuels must conform to GE Specification D50TF2. Certain fuels such as those produced to PRC Specification RP3 meet the requirements of D50TF2 by means of the Specification. The engine will operate with a mixture of fuels or additives conforming to GE Specification D50TF2.

NOTE 8. **LIFE LIMITS**

Life limits established for critical rotating components for **GEnx-1B54/1B58/1B64/1B67/1B70** are published in Chapter 5 of the GEnx Engine Manual, GEK 112851.

NOTE 9. **THRUST SETTING PARAMETER**

Power setting, power checks, and control of engine thrust output in all operations are based on Fan Speed (N1). Speed sensors are included in the engine assembly for this purpose.

NOTE 10. **ICING CONDITIONS**

For ground operation in icing conditions, requirements, limitations, and notes are specified in GEnx Operating Instructions Manual GEK 112857.

NOTE 11. **NEGATIVE G OPERATION**

During "negative-G" operation only, it is permissible to operate below minimum oil pressure for a maximum of 15 seconds. See GEnx Operating Instructions, GEK 112857, Section 8 for **GEnx-1B54/1B58/1B64/1B67/1B70** definition of minimum oil pressure.

NOTE 12. **TAKEOFF TIME LIMIT**

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

NOTE 13. **TIME LIMITED DISPATCH CRITERIA**

Criteria pertaining to the dispatch and maintenance requirements for the engine control systems are specified in documents as follows: For the **GEnx-1B54/1B58/1B64/1B67/1B70** engine models: Time Limited Dispatch Summary Document GEK 112858 Rev. 2 and the Airworthiness Limitations Section of the GEnx Engine Manual, GEK 112851, which defines the various configurations and maximum operating intervals.

NOTE 14. **INSTRUCTIONS FOR CONTINUED AIRWORTHINESS**

Instructions for Continued Airworthiness are incomplete. The aircraft will be eligible for return to service when the ICA are complete and accepted. Criteria pertaining to the engine maintenance requirements for an Equivalent Level of Safety (ELOS) finding to §33.87 and §33.90 are specified in the Airworthiness Limitations Section of the GEnx Engine Manual, GEK 112851, which defines the various configurations and maximum operating intervals.

NOTE 15. **FAN BLADE REPAIR**

Structural repair of fan blade composite material in the root section of the fan blade up to the inner annulus flow path line is not permitted. Fan Blades with non-serviceable conditions existing on metallic components, erosion coating, or wear pads of the fan blade should be referred to General Electric for disposition.

NOTE 16. EMISSIONS

The engines meet the smoke and gaseous emission requirements of Part 34. The following engine models manufactured after December 31, 2007 comply with 14 CFR Part 34, Amendment 3, in addition, 40 CFR Part 87, effective December 19, 2005:

GENx1B54, 1B58, 1B64, 1B67, and 1B70.

Additionally, the engine manufacturer has declared that the ICAO emissions standards of Annex 16, Volume II, second edition, revision 5, (also known as CAEP/6) have also been demonstrated. This has not been verified by the FAA since the FAA finds compliance to the Code of Federal Regulations (CFR) and not ICAO standards. See the Certification Basis section of this TCDS for the emissions compliance statement.

NOTE 17. INDUCTION SYSTEM ICING

Demonstration of compliance to 14 CFR Part 33 Section 33.68, Induction System Icing, is installation specific to the Boeing B787-3, -8, and -9 airplane for the **GENx-1B54/1B58/1B64/1B67/1B70** model engines. Installation of these model engines on different airplane models or type will require a separate evaluation and finding of compliance to Section 33.68.

NOTE 18. BIRD INGESTION CAPABILITY

GE successfully conducted a 5.5-pound bird ingestion test that demonstrated additional bird ingestion capability for the **GENx-1B54/1B58/1B64/1B67/1B70** engine models in support of compliance to 14 CFR Part 33 amendment 33-23, Section 33.76, Bird Ingestion. Documentation of this test is in R2004AE437.

NOTE 19. AIRCRAFT MODELS

The **GENx-1B54/1B58/1B64/1B67/1B70** engine models are limited to installation on the Boeing B787-3, -8, and -9 model aircraft only with respect to the installed power response characteristics. Any significant bill-of-material changes that could significantly and adversely affect power response will have to be reassessed.

NOTE 20. EXTENDED TWIN ENGINE OPERATIONS (ETOPS)

The **GENx-1B54/1B58/1B64/1B67/1B70** engine models are not ETOPS eligible. They do not meet the requirements of 14 CFR Part 33 amendment 33-21, section 33.201.

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