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PERFORMANCE - GENERAL

REGULATORY COMPLIANCE

Information in this section is presented for the purpose of compliance with the appropriate performance criteria and certification requirements of FAR 23 and applicable special conditions.

STANDARD PERFORMANCE CONDITIONS

All performance in this manual is based on flight test data and the following conditions:

1. Thrust ratings include the installation, bleed air and accessory losses.
2. Full temperature accountability within the operational limits for which the airplane is certified.

NOTE

Should ambient air temperature or altitude be below the lowest temperature or altitude shown on the performance charts, use the performance at the lowest value shown.

3. Wing flap positions as follows:

	Flap Handle Position	Flap Deflection
a. Takeoff	UP and TO/APPR	0° and 15°
b. Enroute	UP	0°
c. Approach	TO/APPR	15°
d. Landing	LAND	35°
	GROUND FLAPS	60°

4. All takeoff and landing performance is based on a paved, dry runway.
5. The takeoff performance was obtained using the following procedures and conditions:

SINGLE ENGINE TAKEOFF - ACCELERATE GO

a. The power was set static to the setting corresponding to Figure 4-8, and then the brakes were released. Power was retrimmed at approximately 60 KIAS.
b. The pilot recognized engine failure at V_1.
c. The airplane continued to accelerate to V_R at which time positive rotation to +10 degrees nose up pitch attitude was made. Pitch attitude was adjusted as required to achieve V_2 upon reaching 35 feet AGL.
d. The landing gear was retracted when a positive climb rate was established.
e. V_2 was maintained from the 35-foot point above the runway to 1500 feet AGL.

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STANDARD PERFORMANCE CONDITIONS (Continued)

SINGLE ENGINE TAKEOFF - ACCELERATE STOP

a. The power was set static to the setting corresponding to Figure 4-8, and then the brakes were released. Power was retrimmed at approximately 60 KIAS.
b. The pilot recognized the necessity to stop because of engine failure or other reasons just prior to V_1.
c. Maximum pilot braking effort was started at V_1 and continued until the airplane came to a stop.
d. Both throttles were brought to idle.
e. Thrust Attenuators were automatically deployed at idle throttles.
f. Directional control was maintained through the rudder pedals and differential braking as required.
g. Antiskid was ON during all tests.
h. Speedbrakes and ground flaps were not used.

MULTI-ENGINE TAKEOFF

a. The power was set static to the setting corresponding to Figure 4-8, and then the brakes were released. Power was retrimmed at approximately 60 KIAS.
b. Positive rotation to +10 degrees was made at V_R accelerating to V_2 +12 and pitch adjusted as required to maintain V_2 +12 (V_{35}).
c. The landing gear was retracted when a positive climb rate was established.
d. V_2 +12 KIAS was maintained from the 35-foot point above the runway until the obstacle was cleared, at which time, the airplane was accelerated and the flaps were retracted.

6. The landing performance was obtained using the following procedures and conditions:

LANDING

a. Landing preceded by a steady three degree angle approach down to the 50-foot height point with airspeed at V_{REF} in the landing configuration.
b. Two engine thrust setting during approach was selected to maintain the three degree approach angle at V_{REF}.
c. Idle thrust was established at the 50-foot height point and throttles remained in that setting until the airplane had stopped.
d. Rotation to a landing attitude was accomplished at a normal rate.
e. Thrust attenuators were automatically deployed on main wheel contact.
f. Maximum wheel braking was initiated immediately on nose wheel contact and continued throughout the landing roll. Ground flaps were selected immediately after brake application.
g. The antiskid system was ON during all tests.
h. Speed brakes were disabled (i.e. no performance credit).

VARIABLE FACTORS AFFECTING PERFORMANCE

Details of variables affecting performance are given with tables to which they apply. Assumptions which relate to all performance calculations, unless otherwise stated, are:

- Cabin pressurization.
- Anti-ice off.
- Humidity corrections on thrust have been applied according to the applicable regulations.
- Winds, for which correction information is presented on the charts, are to be taken as the tower winds 32.8 feet (10 meters) above runway surface. Factors have been applied as prescribed in the applicable regulations. In the tables, negative represents tailwind and positive represents headwind.
- Gradient correction factors can be applied to gradients less than or equal to 2 percent downhill or 2 percent uphill. In the tables, negative represents downhill gradients and positive represents uphill gradients.

DEFINITIONS

Accelerate-Stop Distance: The distance required to accelerate to V_1, and abort the takeoff and come to a complete stop with maximum braking applied at V_1.

Airport Barometric Altitude: Indicated altitude with altimeter set to airport altimeter setting while at airport elevation.

Altitude: All altitudes used in this manual are pressure altitudes unless otherwise stated.

Anti-Ice Systems: The following systems comprise the anti-ice systems which affect performance in this section:

a. Windshield Bleed Air Anti-Ice.
b. Engine Anti-Ice.
c. Wing Anti-Ice.
d. Pylon Inlet Anti-ice.

Performance, when referred to ANTI-ICE ON, is based on all the above systems being operated at the same time.

Additionally, the pitot-static and angle-of-attack anti-ice systems are anti-ice systems which do not affect performance.

Calibrated Airspeed (KCAS): Indicated airspeed (knots) corrected for position error and assumes zero instrument error.

Climb Gradient: The ratio of the change in height during a portion of a climb, to the horizontal distance transversed in the same time interval.

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DEFINITIONS (Continued)

Deice Systems: The horizontal stabilizer, tail deice system is the only deice system.

Demonstrated Crosswind: The demonstrated crosswind velocity of 26 knots (measured at 32.8 feet (10 meters) above the runway surface) is the velocity of the crosswind component for which adequate control of the airplane during takeoff and landing was actually demonstrated during certification tests. This is not limiting.

Engine Cycle: Engine operating life limits are determined by mechanical and thermal stresses which occur during engine operation. It is therefore necessary to record flight cycles (both partial and full) in addition to operating hours. The total true cycles will be the sum of the number of full and partial cycles accrued during each flight and must be recorded in the airplane log book for each individual engine at the completion of each flight. Cycles will be computed as follows:

1. Full Cycle:
   a. Engine start, takeoff power setting, followed by engine shutdown, regardless of duration.
   b. In flight start.

2. Partial Cycle:
   a. A touch-and-go landing shall be recorded as 0.50 cycle.
   b. A full stop landing without engine shutdown shall be recorded as 0.50 cycle.
   c. Ground running: Idle to max continuous thrust shall be recorded as 0.50 cycle.

Engine Out Accelerate-Go Distance: The horizontal distance from brake release to the point at which the airplane attains a height of 35 feet above the runway surface, on a takeoff during which an engine is recognized to have failed at V_1 and the takeoff is continued.

Gross Climb Gradient: The climb gradient that the airplane can actually achieve with ideal ambient conditions (smooth air).

Gross Takeoff Flight Path: The takeoff flight path that the airplane can actually achieve under ideal conditions.

Indicated Airspeed (KIAS): Airspeed indicator readings (knots). Zero instrument error is assumed.

ISA: International Standard Atmosphere.

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DEFINITIONS (Continued)

Landing Distance: The distance from a point 50 feet above the runway surface to the point at which the airplane would come to a full stop on the runway.

Level Off Altitude: The barometric altitude at which second segment climb ends.

Mach Number: The ratio of true airspeed to the speed of sound.

Net Climb Gradient: The gross climb gradient reduced by 0.8% during the takeoff phase and 1.1% during enroute.

Net Takeoff Flight Path: Takeoff flight path used to determine obstacle clearance. Uses net climb gradients to climb to a height of 1500 feet above the runway surface.

OAT or TEMP: Outside Air Temperature or Ambient Air Temperature. The free air static temperature, obtained either from ground meteorological sources or from inflight temperature indications adjusted for instrument error and compressibility effects.

Position Correction: A correction applied to indicated airspeed or altitude to eliminate the effect of the location of the static pressure source on the instrument reading. No position corrections are required when using performance section charts in Section IV since all airspeeds and altitudes in this section are presented as "indicated" values except for stall speeds which are presented as "calibrated" values.

RAT: Ram Air Temperature. The indicated outside air temperature as read from the RAT display. This must be corrected for ram air temperature rise to obtain true outside air temperature.

Reference Zero: The point in the takeoff flight path at which the airplane is 35 feet above the takeoff surface and at the end of the takeoff distance required.

Takeoff Climb Increment (TCI): Altitude increment to be added to the airport barometric altitude to obtain level off altitude. This increment includes corrections for non-standard temperature.

Takeoff Field Length: The Takeoff Field Length given for each combination of gross weight, ambient temperature, altitude, wind and runway gradients is the greatest of the following:

a 115 percent of the two-engine horizontal takeoff distance from start to a height of 35 feet above runway surface.
b. Accelerate-stop distance.
c. The engine-out accelerate-go distance.

No specific identification is made on the charts as to which of these distances governs a specific case.

True Airspeed (KTAS): The airspeed (knots) of an airplane relative to undisturbed air.

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DEFINITIONS (Continued)

V_1: Takeoff Decision Speed. The distance to continue the takeoff to 35 feet will not exceed the scheduled takeoff field length if recognition occured at V_1 (accelerated-go). The distance to bring the airplane to a full stop (accelerated-stop) will not exceed the scheduled takeoff field length provided that the brakes are applied at V_1.

V_2: Takeoff Safety Speed. This climb speed is the actual speed at 35 feet above the runway surface as demonstrated in flight during takeoff with one engine inoperative.

V_{35}: This climb speed is the actual speed at 35 feet above the runway surface as demonstrated in flight during takeoff with both engines operating.

V_A: The maneuvering speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.

V_{APP}: The landing approach climb airspeed (1.3 V_{S1}) with the approach flap position, landing gear UP.

V_{ENR}: Single-engine enroute climb speed. Utilize the speed bug V_T for display of V_{ENR} on the PFD.

V_{FE}: Maximum flap extended speed. The highest speed permissible with wing flaps in a prescribed extended position.

V_{LE}: Maximum landing gear extended speed. The maximum speed at which an airplane can be safely flown with the landing gear extended.

V_{LO}: Maximum landing gear operating speed. The maximum speed at which the landing gear can be safely extended or retracted.

V_{MCA}: Minimum airspeed in the air at which directional control can be maintained, when one engine is suddenly made inoperative. V_{MCA} is a function of engine thrust which varies with altitude and temperature. The V_{MCA} presented was determined for maximum takeoff thrust.

Flaps 0° V_{MCA} = 89 KIAS
Flaps 15° V_{MCA} = 81 KIAS

V_{MCG}: Minimum airspeed on the ground at which directional control can be maintained, when one engine is suddenly made inoperative, using only aerodynamic controls. V_{MCG} is a function of both airplane weight and engine thrust which varies with altitude and temperature. The V_{MCG} presented was determined for maximum takeoff thrust.

V_{MCG} = 89 KIAS.

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DEFINITIONS (Continued)

V_{MO}/M_{MO}: Maximum operating limit speed.

V_R: The rotation speed is the speed at which rotation is initiated during takeoff to attain the V_2 climb speed at or before a height of 35 feet above runway surface has been reached.

V_{REF}: The airspeed equal to the landing 50-foot point speed (1.3 V_{SO}) with the landing flap position and landing gear extended.

V_{SO}: The stalling speed or the minimum steady flight speed in the landing configuration.

V_{S1}: The stalling speed or the minimum steady flight speed obtained in a specified configuration.

V_X: Best angle of climb speed (Multi-engine, flaps 15°) 124 KIAS.

V_Y: Best rate of climb speed (Multi-engine, flaps 15°) 191 KIAS.

Visible Moisture: Visible moisture includes, but is not limited to, the following conditions: fog with visibility less than one mile, wet snow and rain.

Wind: The wind velocities recorded as variables on the charts of this section are to be understood as the headwind or tailwind components of the actual winds at 32.8 feet (10 meters) above the runway surface (tower winds).

CONFIGURATIONS

	NUMBER OF OPERATING ENGINES	THRUST	FLAP SETTING (DEGREE)	GEAR
1st SEGMENT TAKEOFF CLIMB	1	TAKEOFF	UP, 0° OR 15°	DOWN
2nd SEGMENT TAKEOFF CLIMB	1	TAKEOFF	UP, 0° OR 15°	UP
3rd SEGMENT HORIZONTAL ACCELERATION	1	TAKEOFF (10 MINUTES MAXIMUM) THEN MAXIMUM CONTINUOUS SINGLE ENGINE THRUST	15° UP	UP
ENROUTE CLIMB	1	MAXIMUM CONTINUOUS SINGLE ENGINE THRUST	UP	UP
APPROACH CLIMB	1	TAKEOFF	15°	UP
LANDING CLIMB	2	TAKEOFF	35° OR LAND	DOWN

Figure 4-1

NOISE CHARACTERISTICS

CERTIFICATED NOISE LEVELS

The following noise levels were established using test data obtained and analyzed under procedures of 14 CFR Part 36, Amendment 18. This aircraft complies with 14 CFR Part 36, Stage 3 requirements.

NOISE REFERENCE	EPNdB
TAKEOFF	74.5
SIDELINE	88.8
APPROACH	91.4

Takeoff and sideline noise levels were obtained at a takeoff weight of 12,375 pounds with flaps 15° and climb speed of 126 KIAS. For takeoff, thrust was cut back from takeoff N_1 to 86.9% N_1 at 3133 feet AGL. Approach data was obtained at 11,500 pounds, landing gear down, flaps 35° and 120 KIAS.

No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

SUPPLEMENTAL ICAO ANNEX 16, CHAPTER 3 NOISE LEVEL INFORMATION

The ICAO Annex 16, Chapter 3, noise values are the same as those for 14 CFR Part 36, Amendment 18, and were obtained with the procedures used to establish compliance with 14 CFR Part 36, Amendment 18. The ICAO Annex 16, Chapter 3, noise levels were obtained by analysis of approved data used to demonstrate compliance with 14 CFR Part 36, Amendment 18, Noise Standards. This data is applicable only after approval of the Civil Aviation Approving Authority of the country of airplane registration, including approval of the equivalent procedures used to establish compliance with 14 CFR Part 36, Amendment 18.

SUPPLEMENTAL A-WEIGHTED NOISE LEVELS

The following A-weighted noise levels were established for 14 CFR Part 36 reference conditions used in CERTIFICATED NOISE LEVELS.

NOISE REFERENCE	dBA
TAKEOFF	62.7
SIDELINE	80.4
APPROACH	80.3

Takeoff and sideline noise levels were obtained at a takeoff weight of 12,375 pounds with flaps 15° and climb speed of 126 KIAS. For takeoff, thrust was cut back from takeoff N_1 to 86.9% N_1 at 3133 feet AGL. Approach data was obtained at 11,500 pounds, landing gear down, flaps 35° and 120 KIAS.