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INTRODUCTION

Section 1 of this manual provides the operating limitations, the significance of such limitations, instrument markings, color coding, and basic placards necessary for safe operation of the airplane, its engines and systems. The limitations in this section have been approved by the Federal Aviation Administration (FAA).

WARNINGS, **CAUTIONS**, and NOTES are used throughout this manual to emphasize important operating information.

WARNING

OPERATING PROCEDURES, PRACTICES, ETC., WHICH MAY RESULT IN PERSONAL INJURY OR LOSS OF LIFE IF NOT CAREFULLY FOLLOWED.

CAUTION

OPERATING PROCEDURES, PRACTICES, ETC., WHICH IF NOT STRICTLY OBSERVED MAY RESULT IN DAMAGE TO EQUIPMENT.

NOTE

An operating procedure, condition, etc., which is essential to emphasize.

REDUCED POWER TAKEOFF OPERATIONS

When operating in accordance with Section 4, Part I (Reduced Power Takeoff Operations) the following limitations apply:

1. The engine torque used for a takeoff may not be less than 90% of the torque shown by the appropriate power setting chart for the actual ambient conditions.

2. The use of reduced power for takeoff is not permitted when the runway is contaminated with water, ice, slush, or snow.

3. As a condition to the use of reduced power procedures, operators must establish a periodic check system or engine condition monitoring system to ensure that the engines are capable of producing normal takeoff thrust for the actual ambient temperature.

4. Air Carrier or Air Taxi commercial operators must have prior approval of the cognizant FAA inspector prior to conducting reduced power takeoff operations.

5. The minimum crew for reduced power takeoff operations is two pilots.

POWER PLANT

Two Garrett TPE331-12UA/-12UAR/-12UHR-701G engines, rated at 1,100 shaft horsepower (820 kw) takeoff power and 1,000 shaft horsepower (746 kw) maximum continuous power, are equipped with 106 inch (269 cm) diameter McCauley full feathering, reversible, constant speed, four bladed propellers.

NOTE

The TPE331-12UAR-701G and TPE331-12UHR-701G models incorporate provisions for Reserve Power.

PROPELLERS

The propeller hub model designation is 4HFR34C652(X).
The blade model designation is (X)-L106LA-0.
Propeller blade angles, measured at the 30-inch (76 cm) propeller blade station are:

	McCauley Propeller Assembly Number	
	D-5928	D-6933
Feathered	$88.9^{O} \pm 0.5^{O}$	$88.5^{O} \pm 0.5^{O}$
Flight Idle	$15.0^{O} \pm 0.2^{O}$	$15.0^{O} \pm 0.2^{O}$
Start Locks	$9.0^{O} \pm 0.5^{O}$	$6.0^{O} \pm 0.5^{O}$
Full Reverse	$-5.0^{O} \pm 0.5^{O}$	$-5.0^{O} \pm 0.5^{O}$

PROPELLER REVERSING

Full reverse operations (landing roll out, taxi, and ramp operations) are limited to speeds below 90 knots.

WARNING

- **PROPELLER REVERSING IN FLIGHT IS PROHIBITED.**
- **DO NOT RETARD POWER LEVERS AFT OF THE FLIGHT IDLE GATE IN FLIGHT. SUCH POSITIONING MAY LEAD TO LOSS OF AIRPLANE CONTROL OR MAY RESULT IN AN ENGINE OVERSPEED CONDITION AND CONSEQUENT LOSS OF ENGINE POWER.**

FUELS

Use aviation fuels conforming to AiResearch Installation Manual IM5117 (Jet A, Jet A-1, Jet B, JP-1, JP-4, JP-5, and JP-8). Grade 100LL aviation gasoline may be used at a rate not to exceed 250 U.S. gallons (950 liters) per 100 hours of operation, with the total use limited to 7,000 U.S. gallons (26500 liters) per engine overhaul period. Jet fuel and aviation gasoline may be mixed in any proportion. If 25% or more aviation gasoline is used, add one U.S. quart (one liter) of MIL-L-6082 specification grade 1065 or 1100 piston engine oil per 100 U.S. gallons (380 liters) of aviation gasoline to provide fuel pump lubrication.

NOTE

The amount of aviation gasoline used must be recorded in the Engine Log Book.

Icing inhibitor MIL-I-27686E fuel additive, or equivalent, is approved not to exceed 0.15% by volume.

The usable fuel quantity is 648 U.S. gallons (2453 liters).

Maximum fuel imbalance for takeoff, landing, and normal flight is 200 pounds (90 kg).

Boost pumps must be on for all flight operations outside the no boost pumps required envelope of Figure 1-1.

Takeoff with fuel transfer pump caution light(s) illuminated is prohibited.

FUEL BOOST PUMP AVAILABILITY REQUIREMENTS

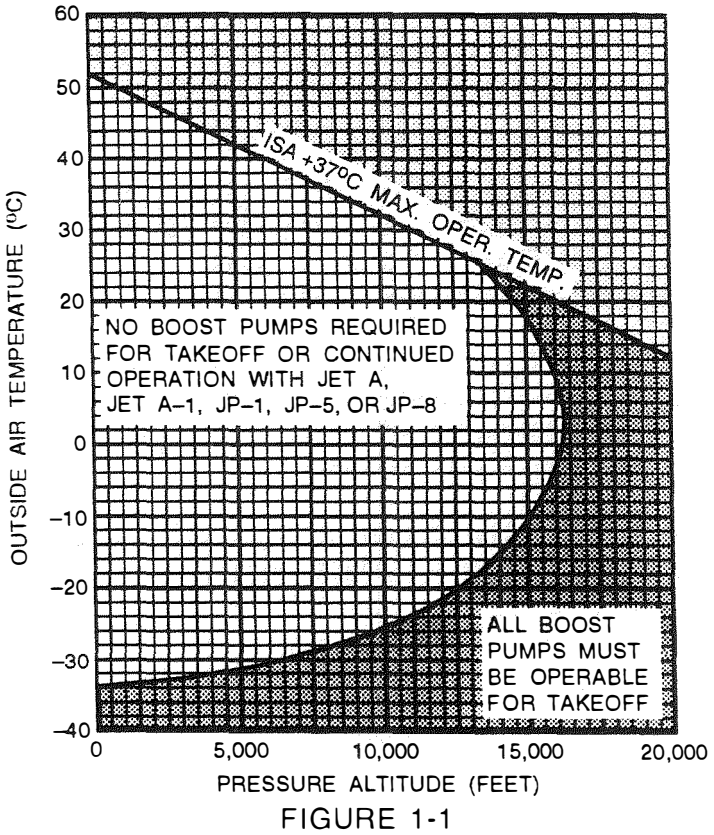


FIGURE 1-1

OIL

Mixing oil types or brands is prohibited. Refer to Maintenance Manual for Oil Change Procedures. Engine/propeller system total oil quantity is 7.1 U.S. quarts (6.8 liters). Oil specification is MIL-L-23699B (Type II). Refer to Garrett AiResearch Specification EMS53110 Type II for a current list of approved oils.

ENGINE OPERATION WITH CONTINUOUS ALCOHOL-WATER INJECTION (CAWI)

Time Limit ..... 5 Minutes
Maximum Torque 110%
Maximum EGT ..... 650°C
Minimum Outside Air Temperature for CAWI Operation ..... –6°C
Maximum Dry Torque Permitted Prior to Activating the CAWI System 80%

WARNING

ENGINE OVER TORQUE MAY OCCUR IF THE DRY POWER IS SET TO GREATER THAN 80% PRIOR TO ACTIVATING THE CAWI SYSTEM.

NOTE

- The CAWI system may not be used with an inoperative SRL computer or temperature limiter.
- If the use of the CAWI system is planned for both a normal "wet" takeoff and for single engine approach climb performance credit, care must be taken to turn off the CAWI at or below 1,000 feet above the surface following takeoff.
- The CAWI system may be used for single engine approach go around when the scheduled maximum landing weight is determined from Figure 4G-3 and a gauge marked with a red triangle is installed. See page 1-11 Note (10).
- If the use of the CAWI system is required to meet the single engine approach climb requirements and the CAWI system is not used for the preceding takeoff, a functional check of the CAWI system must be made prior to takeoff.
- The use of the CAWI system to meet the approach climb requirements is limited to two pilot operations.

ALCOHOL-WATER MIXTURE COMPOSITION AND RELATED DATA

Maximum Usable AWI Fluid Quantity .....14 U.S. Gallons (53 liters)
Minimum AWI Fluid Quantity for Wet Takeoff is as indicated on the gauge/dipstick.

NOTE

- If CAWI performance credit is planned for both the takeoff and approach climb, the AWI tank must be full for dispatch.
- If CAWI performance is planned for only the approach climb, the AWI tank must be filled to at least the red triangle on the CAWI quantity gauge.
- The minimum AWI fluid quantity provides for continued wet takeoff after recognizing engine failure at V_1, a wet power single engine climb at V_2 to 500 feet above the runway and acceleration to V_{YSE} at 500 feet. This quantity is nominally 10 U.S. gallons (38 liters) plus 2 U.S. gallons (7.6 liters) unusable.

WARNING

IF AN ENGINE FAILURE OCCURS ON TAKEOFF AND CAWI IS USED, THERE MAY BE INSUFFICIENT ALCOHOL WATER QUANTITY REMAINING TO SUCCESSFULLY COMPLETE THE SINGLE ENGINE MISSED APPROACH CLIMB PROFILE.

NOTE

The minimum AWI fluid quantity for the single engine approach climb profile is 5.2 U.S. gallons plus 2 U.S. gallons unusable. The maneuver is assumed to start with wet takeoff power set, landing gear retracted, flaps set at 1/4, and at the climb speed obtained from Figure 4G-4. At 400 feet above the surface the flaps are retracted while accelerating to V_{YSE} where power is reduced to MCP.

The CAWI system may not be operated if the AWI fluid has been exposed to ambient temperatures below –24°C within the preceding one hour.

Mixture Composition By Percent of Volume	Specific Gravity	Approximate Freeze Point
Methanol 40% (plus 6%, minus 2%) Water 60% (plus 2%, minus 6%)	See Garrett Maintenance Manual Section 72-00-00	–31°C (–24°F)

Methyl Alcohol (Methanol) having a minimum purity of 99.8 weight percentage and nonvolatile content of less than 0.001 weight percentage shall be used.

ALCOHOL-WATER MIXTURE COMPOSITION AND RELATED DATA

Water shall conform to the following requirements: It shall be treated by a demineralization process or shall be distilled if necessary to ensure conformation (Material Specification - EMS 53123).

	Minimum	Maximum
Total Solids, PPM	— — —	10
pH	6.0	8.0
Chlorides, PPM	— — —	1
Sulfates, PPM	— — —	1
Sodium, PPM	— — —	1

ENGINE OPERATION WITH RESERVE POWER (RES PWR)

Maximum Torque 100%
Maximum EGT .....650°C
Maximum RPM 100%

CAUTION

- RESERVE POWER IS LIMITED TO SINGLE ENGINE EMERGENCY OPERATIONS:
  1. DURING ENROUTE CLIMB AFTER A CAWI TAKEOFF, TO MEET MAXIMUM TAKEOFF WEIGHT REQUIREMENTS.
  2. DURING ENROUTE DRIFTDOWN PROCEDURES (SEE PAGES 6A-5 THRU 6A-7).
  3. EXCEPT WHEN AUTHORIZED FOR PILOT TRAINING OR FLIGHT TEST (SEE PAGE 6C-13).
- RESERVE POWER MUST NOT BE USED WITH AN INOPERATIVE SRL COMPUTER.

NOTE

Takeoffs requiring reserve power to meet maximum takeoff weight requirements are limited to two pilot operations.

The following engine record keeping rules apply to reserve power usage:

1. Record (log) fifty minutes time in service for each minute of reserve power operation in which the EGT exceeds 630°C.
2. Four cycles must be added to the engine records for each reserve power operation in which the EGT exceeds 630°C. (A cycle consists of one start-stop sequence that includes flight; ground running is not included.)

TEMPERATURE LIMITS – ALL ALTITUDES

Minimum Ambient Temperature
For Engine Ground Starting ..... –40°C
For Engine Operation ..... –54°C

NOTE

Successful engine starts may not be possible if the fuel has cold soaked at temperatures below –40°C.

Maximum Ambient Temperature ..... ISA +37°C
(See International Standard Atmosphere Chart, Section 4)

SINGLE RED LINE COMPUTER (SRL)

Operation of the airplane with the SRL inoperative is prohibited except as stipulated in Section 3A, ABNORMAL PROCEDURES, and Supplement 1, TAKEOFF WITH SRL OFF/INOPERATIVE.

Takeoff with SRL off/inoperative is limited to two pilot operations.

MAXIMUM RECOMMENDED STARTING CURRENT

Due to the possibility of excessively high current surge during engine start, it is recommended that the maximum starting current from an external power source be limited to 1,000 amperes.

ENGINE STARTER DUTY CYCLES

Start Attempt	*Allowable Starter ON Time	Starter OFF Time
1	30 seconds	60 seconds
2	30 seconds	60 seconds
3	30 seconds	15 minutes

*The specified starter ON times assume no ignition of fuel but do include engine clearing time. Starter ON time may be extended if ignition of fuel occurs, but procedures listed under Battery Start in Sections 2 and 3A should be observed.

INOPERATIVE EQUIPMENT (Per U.S.A. FAA Operating Rules)

Takeoff with inoperative equipment is permitted only when the airplane is operated in accordance with an approved Minimum Equipment List (MEL).

GENERATORS

Maximum continuous load for each generator ..... 300 amps

NOTE

- When the generator is turned on following battery engine starts, the indicated load on the generator initially will exceed 300 amps while the batteries are being recharged. The duration at more than 300 amps shall not exceed two minutes.

- When the operating generator is used to assist in battery starting, its ammeter will peg high at the beginning of the start sequence and will decrease as the starting engine accelerates.

BATTERY OVERHEAT WARNING SYSTEM

1. Battery temperature warning sensor setting is 150^{O}F, plus or minus 3^{O}F.

2. Takeoff after a battery overheat warning (red light) illuminates is prohibited until the cause of the overheat warning is corrected.

TEMPERATURE LIMITER (Fuel Bypass Valve Open)

Maximum altitude for prolonged operation is 15,000 feet.

RPM with the bypass valve open must be maintained between 99 and 101% or between 96 and 98%.

TEMPERATURE LIMITER INOPERATIVE

Do not take off with either fuel bypass valve failed in the open position.

Takeoffs with a temperature limiter inoperative (fuel bypass valve in the closed position) are limited to two pilot operations and must be conducted as authorized by an approved Minimum Equipment List (MEL).

FIRE EXTINGUISHER SYSTEM

The fire extinguisher system is required equipment. If the system does not test satisfactorily (see Section 2), takeoff is prohibited.

AIRSTART ENVELOPE

Maximum Pressure Altitude for Airstarts
- With Boost Pumps Operating ..... 20,000 FEET
- Without Boost Pumps Operating ..... 12,000 FEET

Airspeed Limits for Airstart ..... 100 TO 180 KIAS

REQUIRED ENGINE CHECKS

A. The NTS system must be checked:

1. Operationally before the first flight of the day.
2. At intervals not to exceed 250 flight hours in accordance with instructions in Garrett Maintenance Manual, 72-00-00.

B. The SRL Computer and Temperature Limiter System should be checked operationally:

1. At intervals not to exceed 50 flight hours.
2. Prior to any flight when manual engine start has been necessary.
3. When there is any indication of SRL computer malfunction.
4. After any engine fuel control or SRL computer maintenance or adjustment.

C. The overspeed governors and the propeller unfeathering pumps should be checked operationally:

1. At intervals not to exceed 200 flight hours.
2. Prior to any flight for which intentional air starts are planned.
3. When there is any indication of malfunction.

REQUIRED MISCELLANEOUS SYSTEMS CHECKS

A. The Stall Avoidance System (SAS) must be checked operationally before the first flight of the day in accordance with the procedure in Section 2.

B. The Reserve Power System (if installed) must be checked operationally in accordance with the procedure in Section 2 prior to any flight when takeoff performance is predicated on its use.

POWER SETTINGS AND OPERATING LIMITS FOR TPE331-12UA/-12UAR/-12UHR-701G TURBOPROP ENGINES WITH REVERSING PROPELLERS

POWER SETTING	TIME	MAX TORQUE (%)	MAX EGT (°C)	RPM[1] (%)	OIL PRESS. (PSI)	FUEL PRESS. (PSI)	OIL TEMP (°C)
TAKEOFF (DRY)	5 MIN.	110[2]	650[3]	100[4]	70–120	20–80	55–110
TAKEOFF (WET)	5 MIN.	110[5]	650[3]	100[4]	70–120	20–80	55–110
MAXIMUM CONT.		100	650[3]	100	70–120[6]	20–80	55–110
RES PWR (MCP)[9]		100	650	100[10]	70-120	20-80	55-110
FLIGHT IDLE				96–100	70–120[6]	20–80	55–110
GROUND IDLE				70 or 97[7]	40–120	15–80	–40 TO 127
STARTING			770				–40 MIN.
REVERSE HIGH				95.5–97	70–120	20–80	55–110
REVERSE LOW				75 MIN.	70–120	15–80	–40 TO 127
SHUTDOWN	3 MIN.[8]						

(1) Avoid operation between 18% and 28% RPM except for transients occurring during engine start and shutdown. 96% is the minimum RPM during flight. At 100% RPM, propeller speed is 1591 RPM.

(2) Static takeoff power should be limited to 107% dry torque to preclude overtorque condition occurring due to ram effects during takeoff. (100% equals 3,301 ft.-lbs.).

(3) 650°C to 675°C, reduce power. 675°C to 685°C for less than 20 seconds, reduce power. 675°C to 685°C for more than 20 seconds, conduct power check. 685°C to 687°C for up to 5 seconds, conduct power check. 685°C to 687°C for more than 5 seconds or in excess of 687°C, remove engine.

(4) 101% to 101.5% for 5 minutes, 101.5% to 105.5% for 30 seconds. If RPM time limits are exceeded, conduct power checks to determine satisfactory engine performance. Record time in excess of time limits in engine log book. 105.5% to 106% for 5 seconds. If 5 second time limit or 106% is exceeded, remove engine.

(5) Static takeoff power should be limited to 107% wet torque to preclude overtorque condition occurring due to ram effects during takeoff.

(6) Above 23,000 feet, minimum oil pressure is 50 psi.

(7) Typical engine speeds for low and high RPM speed lever position.

(8) Three minute cooldown period prior to stopping engines. Descent, approach, landing roll, and taxi times are included if power during those phases does not exceed 20% torque. If reverse power is used and exceeds 20% power (stabilized) the 3 minute cooling period commences at engine power reduction.

(9) For TPE331-12UAR-701G and TPE331-12UHR-701G engines only. Reserve Power is limited to single engine emergency operations.

(10) Limited to operation at 100% RPM.

FIGURE 1-2

INSTRUMENT MARKINGS

INSTRUMENT	RED RADIAL (MIN.)	YELLOW ARC	WHITE ARC	GREEN ARC OR SECTOR	YELLOW ARC OR SECTOR	RED RADIAL (MAX.)	RED ARC	RED SYMBOL	BLUE RADIAL
Airspeed Indicator (KIAS)	91(1)		90 to 165 (2)			246(3)			137 (4)
EGT (°C)				0 to 650		650		770(5)	
Torquemeter (% Torque)				0 to 100	100 to 110	110			
Tachometer (%RPM)				96 to 100		101	18 to 28		
Fuel Pressure (psi)	15(6)	15 to 20		20 to 80		80			
Oil Pressure (psi)	40(6)	40 to70(6)		50 to 70(7) 70 to 120		120			
Oil Temperature (°C)	–40	–40 to 55		55 to 110	110 to 127(8)	127			
Oxygen Pressure (psi)			0 to 300	1600 to 1850			1850 to 2000		
Deice Pressure (psi)	10	10 to 12		12 to 19	19 to 21	21			
Suction (in. Hg.)	4.4			4.4 to 4.8		5.5			
Hydraulic Pressure (psi)		1400 to 1700		1700 to 2100	2100 to 2300	2300			
Cabin Differential Pressure (psi)				0 to 7.0	7.0 to 7.25	7.25			
Prop Deice Ammeter (amps)				25 to 32					
Pitot Heat Ammeter (amps)				3.5 to 15					
CAWI Quantity	0			(9)	(9)			Triangle (10)	
Generator Ammeter (amps)						300			

(1) V_{MCA}
(2) V_{SO} at maximum landing weight to V_{FE}.
(3) Maximum allowable Airspeed Indicator: Cross hatched needle moves to indicate V_{MO} / M_{MO} for aircraft operating altitude.
(4) V_{YSE}
(5) Red Dot or Diamond. Used during start as limit EGT (1 second).
(6) At 70 – 72% RPM.
(7) Above 23,000 feet, minimum oil pressure is 50 psi.
(8) Ground operation only.
(9) The green sector indicates the quantity is safe for takeoff, nominally 10 to 14 U.S. gal. The yellow sector indicates less than the minimum quantity for a wet takeoff. See page 1-5.
(10) Only aircraft equipped per ECP 651 or modified by SB CC7-82-002:
The red triangle indicates sufficient AWI fluid to complete a single engine approach climb profile, 5.2 U.S. gal. See page 1-5.

FIGURE 1-3

AIRSPEED LIMITS

SPEED	(1) KIAS	REMARKS
V_A Maneuvering Speed	185	Maximum speed at which individual application of full available aerodynamic control will not overstress the aircraft at 16,500 pounds (7485 kg) gross weight. This speed decreases approximately 7 KIAS per 1000 pounds (450 kg) reduction in weight.
V_{FE} Flaps Extended Speed		Maximum speed for extending the flaps or operating with the flaps extended.
	215	1/4 Flaps (9^O)
	180	1/2 Flaps (18^O)
	165	Full Flaps (36^O)
V_{Lo} Landing Gear Operating Speed	175	Maximum speed for operating the landing gear with the normal or emergency systems.
V_{LE} Landing Gear Extended Speed	175	Maximum speed with gear extended.
V_{MCA} Minimum Control Airspeed	91	Minimum control speed in flight in the following configuration: Gear up and flaps at 1/4, takeoff power on the operating engine, windmilling propeller on the inoperative engine with NTS operative, no more than 5^O bank into good engine.

(1) KIAS is based on normal static system position error; an additional adjustment should be made for any known instrument error.

AIRSPEED LIMITS (Continued)

SPEED	(1) KIAS	REMARKS
V_{MO} Maximum Operating Speed	246	This speed applies from sea level through 17,800 feet. At pressure altitudes above 17,800 feet use the following table or maximum allowable airspeed indicator to remain below the M_{MO} limit. ALTITUDE (FT) / AIRSPEED (KIAS) 18,000 / 245 20,000 / 235 23,000 / 221 25,000 / 212 V_{MO}/M_{MO} must not be exceeded deliberately.
M_{MO} Maximum Operating Mach Number	0.52	

(1) KIAS is based on normal static system position error; an additional adjustment should be made for any known instrument error.

ALTITUDE LIMIT

Maximum Operating Pressure Altitude ..... 25,000 FEET

CABIN PRESSURIZATION

Maximum Normal Cabin Differential Pressure ..... 7.0 psi
Safety valve is set at 7.25 psi.
Cabin must be depressurized during takeoff and landing.

TIRE GROUND SPEED LIMITS

Main Wheel Tires
- Goodyear Aerospace P/N 196K08-6 or 196K08-9 ..... 165 Knots
- B.F. Goodrich P/N 028-335-1 ..... 165 Knots
- Aviator P/N 028-335-3 ..... 165 Knots

Nose Wheel Tires (With Chines)
- B.F. Goodrich P/N 031-613 and P/N 031-613-4 ..... 183 Knots
- Goodyear Aerospace P/N 184F03-2 ..... 183 Knots

NOTE

The above stated tires are the only approved tires.

APPROVED BRAKES

Aircraft Braking Systems (ABS) Dual Rotor Brakes, P/N 5011640.

NOSE WHEEL STEERING

(For airplanes prior to S/N DC-843 NOT modified by Service Bulletin CC7-32-003 or CC7-32-003R)

1. Check the nose wheel steering prior to each takeoff using the procedures in the Normal Procedures section of this manual, page 2-35.
2. The use of nose wheel steering for takeoff and landing is prohibited. Prior to each takeoff, turn the nose wheel arm switch to "OFF", and do not turn to "ON" until after landing and the airplane has slowed to taxi speed.
3. Use of nose wheel steering is prohibited when there has been a hydraulic system failure.
4. Use of nose wheel steering is prohibited when the arming valve has failed to test properly.
5. Nose Wheel Steering must be on and operating during single engine taxi operations.

NOSE WHEEL STEERING
(For S/N DC-843 through DC-868 and airplanes modified in accordance with Service Bulletin CC7-32-003)

1. Check the nose wheel steering prior to each takeoff using the procedures in the Normal Procedures section of this manual (page 2-35). Use of nose wheel steering for takeoff or landing is prohibited if the system fails to test properly.

2. Use of nose wheel steering is prohibited following failure of the hydraulic system. Turn the Nose Gear Steering switch to "OFF".

3. Nose Wheel Steering must be on and operating during single engine taxi operations.

4. When ambient air temperature is $-12^{O}C$ ($10^{O}F$) or colder, the use of nose wheel steering for takeoff and landing is prohibited. Prior to each takeoff, turn the nose wheel arm switch to "OFF", and do not turn "ON" until after landing and the airplane has slowed to taxi speed.

NOSE WHEEL STEERING
(For S/N DC-869 and subsequent and airplanes modified in accordance with Service Bulletin CC7-32-003R) (For airplanes modified by Fairchild ECP 698 [S/N DC-884 and subsequent] and airplanes modified in accordance with Service Bulletin CC7-32-008)

1. Check the nose wheel steering prior to each takeoff using the procedures in the Normal Procedures section of this manual (page 2-35). Use of nose wheel steering for takeoff or landing is prohibited if the system fails to test properly.

2. Use of nose wheel steering is prohibited following failure of the hydraulic system. Turn the Nose Gear Steering switch to "OFF".

3. Nose Wheel Steering must be on and operating during single engine taxi operations.

MANEUVERING LOAD FACTORS

Flaps Up ..... Plus 3.02g to Minus 1.21g
Flaps Down ..... Plus 2.00g to Zero g

MAXIMUM FUSELAGE BENDING MOMENTS

Cargo and passengers must be distributed to ensure that the maximum bending moments in the following table are not exceeded.

PAYLOAD LOCATION	REFERENCE F.S.	MAX. WT.	MAXIMUM MOMENT (IN.-LB./1,000)	MAXIMUM MOMENT (kg-m)
FWD. OF FRONT SPAR	274 in. (6960 mm)	2,825 LBS. (1281.4 kg)	359.8	4145
AFT OF REAR SPAR	310 in. (7870 mm)	3,138 LBS. (1423.4 kg)	352.6	4062

NOTE

See Section 5 for bending moment calculation instructions.

CONVERTIBLE INTERIOR

The SA227-DC interior is designed to permit conversion from a 19-passenger arrangement to full or partial cargo configurations. Seats may be removed, and the structural bulkhead(s) may be removed, or relocated to any of several locations shown in Section 5.

NOTE

Seating configuration changes are classified as aircraft alterations that require the aircraft to be returned to service in accordance with the applicable regulations.

CARGO (EXPEDITER CONFIGURATION)

Loose rigid packages retained by the cargo nets must be limited to 70 pounds each. Heavier items must be secured by additional means. See instructions in Section 5.

CENTER OF GRAVITY LIMITS

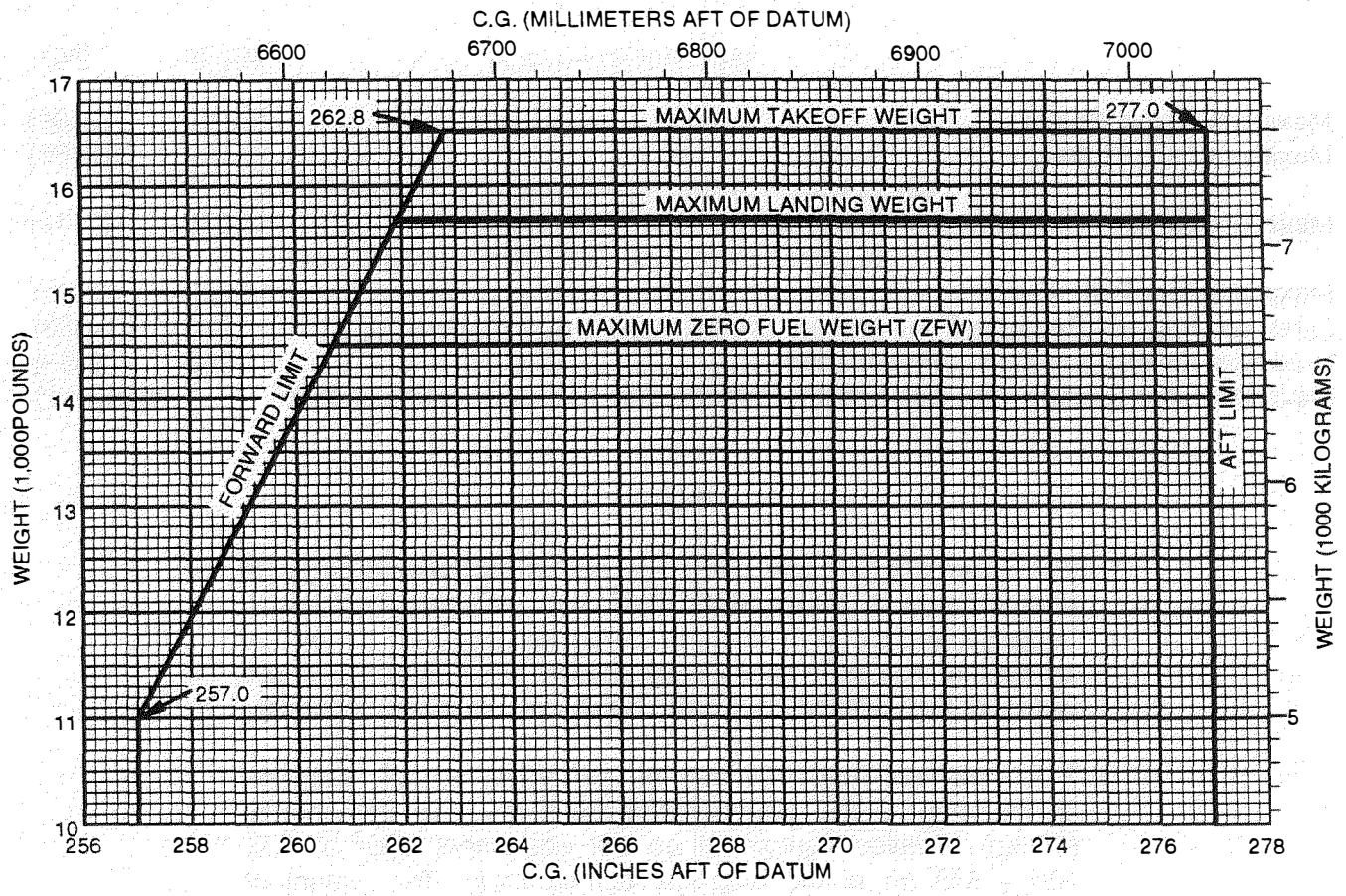


FIGURE 1-4

NOTE

- At all weights 11,000 pounds (4990 kg) and lower, the approved c.g. range is 257.0 inches (6528 mm) to 277.0 inches (7036 mm) aft of datum.
- Both the zero fuel weight (ZFW) and c.g., and the takeoff weight and c.g. must be within the above envelope.
- AWI fluid must be included in the ZFW.
- See Section 5 for loading instructions. The detailed procedures of Section 5 may be used to assure that the airplane remains within approved weight and c.g. limits.
- Landing gear retraction will not shift c.g. outside the approved envelope.

MAXIMUM WEIGHTS

	Pounds	(kg)
Maximum Ramp Weight	16,600	(7530)
Maximum Takeoff Weight	16,500	(7485)
(or as limited by the operating weight requirements)		
Maximum Landing Weight	15,675	(7110)
(or as limited by the operating weight requirements)		
Maximum Zero Fuel Weight	14,500	(6580)
Maximum Forward Baggage Compartment Load (baggage and equipment)	800	(363)
Maximum Aft Baggage Compartment Load	850	(386)
Maximum Floor Loading (all cargo and passenger areas)	150 pounds/ft^2	(732kg/m^2)

NOTE

- The maximum load that can be carried in the forward baggage compartment is 800 pounds (363 kg), including equipment, baggage, and cargo. The compartment is placarded to show the amount of baggage and cargo allowed after subtracting the weight of the installed equipment (varies with customer options).

- The maximum load that can be carried in the aft baggage compartment is 850 pounds (386 kg) plus up to 100 pounds (45 kg) installed equipment on the equipment shelf at F.S. 530 – 548 aft of the baggage compartment. The weight of equipment installed in the baggage compartment, such as the optional lavatory and its fluid, or air conditioner components, is subtracted from the 850 pound maximum allowable. The compartment is placarded to show the amount of baggage and cargo allowed after subtracting the weight of this installed equipment.

OPERATING WEIGHTS

1. The maximum takeoff weight may not exceed the lower of the following:

   (a) The weight at which the single engine takeoff and en route climb requirements are met, Figure 4C-2 (Dry, Bleed Air On), 4D-2 (Dry, Bleed Air Off), 4E-3 (Wet), or 4E-4 (Wet with Reserve Power).

   (b) The weight at which the accelerate-stop distance (Figure 4C-4, 4D-4, 4E-6, 4J-3 or 4J-7) equals the available runway length, including stopway if available.

   (c) The weight at which the single engine takeoff distance (Figure 4C-5, 4D-5, 4E-7, 4J-4 or 4J-8) equals the available runway length, including clearway if available.

   (d.) The weight at which the takeoff run distance (Figure 4C-6, 4D-6, 4E-8, 4J-5 or 4J-9) equals the available runway length, excluding clearway.

2. The maximum landing weight may not exceed the lower of the following:

   (a) The weight at which the single engine approach climb requirement is met (Figure 4G-1, 4G-2 or 4G-3).

   (b) The weight at which the landing distance (Figure 4G-4) equals the landing runway length.

NOTE

The operating rules may require the use of factored landing distances in determining the minimum runway lengths required. The distances shown in Figures 4G-4 are not factored.

MINIMUM CREW

The minimum crew is one pilot.

An FAA approved hand held (or automated) checklist is required for all single pilot operations.

Cockpit instrument/avionics arrangement must be approved per SA227-DC Type Certificate Data Sheet A18SW.

MAXIMUM PASSENGER SEATING CONFIGURATION

The maximum number of passenger seats permitted is 19.

KINDS OF OPERATION/EQUIPMENT LIST

This is a commuter category airplane approved for operation in Day/Night, VFR/IFR and icing conditions.

Ingestion of slush, excessive quantities of water, or ice shedding from spinners, propellers, and/or engine intakes may interrupt air flowing to the combustion chambers and cause engine flameout. Specific operating instructions for use of the continuous ignition system are in the form of procedures, notes, and warnings in Sections 2, 3, and 3A and must be followed.

The following equipment must be installed and operable for each approved type of operation, as indicated.

NOTE

The following systems and equipment list does not include all equipment required by the FAR Part 91 and 135 Operating Requirements. It also does not include components obviously required for the airplane to be airworthy such as wings, empennage, engines, etc.

VFR – Day:

1. Airspeed Indicator for each required pilot
2. Sensitive Altimeter (adjustable for barometric pressure) for each required pilot
3. Magnetic Direction Indicator
4. Tachometers (2)
5. Torquemeters (2)
6. Exhaust Gas Temperature Indicators (2)
7. Oil Pressure Indicators (2)
8. Oil Temperature Indicators (2)
9. Fuel Pressure Indicators (2)
10. Stall Avoidance System (SAS)
11. Landing Gear Position Indicator
12. Approved Seat Belt for each occupied seat. Shoulder harness for each occupied pilot seat
13. Crew Oxygen System
14. Oxygen Mask and Smoke Goggles for each crew member
15. OAT Indicator
16. SRL Computers (2) (except as permitted by AFM Supplement 1)
17. NTS Systems (2)
18. Airplane Flight Manual
19. Handheld Checklist (For single pilot operations)
20. Airspeed and Torque Indicator Memory Markers (For single pilot operations)
21. Standby Instrument Power System

KINDS OF OPERATION/EQUIPMENT LIST (continued)

VFR – Night:

1. All equipment required for VFR – Day
2. Anti-Collision Light System
3. Position Lights
4. Instrument Light System
5. One landing light or two recognition lights and one taxi light
6. Adequate electrical energy to operate all electrical and radio equipment

IFR:

1. All equipment required for VFR – Day (if for IFR – Day) and all equipment required for VFR – Night (if for IFR – Night)
2. Generators (2)
3. Two-way radio and navigation equipment appropriate for ground facilities to be used
4. Standby Bank and Pitch Indicator
5. Gyroscope Rate of Turn Indicator* for each required pilot
6. Slip-Skid Indicator for each required pilot
7. Clock with sweep second hand or equivalent digital presentation for each required pilot.
8. Gyro Bank and Pitch Indicator (Artificial Horizon) for each required pilot.
9. Gyro Direction Indicator for each required pilot.

* Not required if Standby Bank and Pitch Indicator is usable through 360^{O} of pitch and roll.

ICING CONDITIONS (In Visible Moisture and OAT Below $+5^{O}C$)

The following equipment must be ON, operative, and utilized in accordance with the operating procedures sections of this manual:

1. Engine/Propeller Anti-Ice Systems
2. Pitot Heat/SAS Heat
3. Windshield Heat (High)
4. Wing/Empennage Deice Boots (as required)
5. Continuous Ignition System

NOTE

IOAT may be as much as $10^{O}C$ higher than actual OAT during high speed, high altitude flight due to compressibility and temperature probe system errors. See Section 4 to determine OAT during flight.

PLACARDS

ABOVE LEFT SIDE CONSOLE

OPERATING LIMITATIONS

THE MARKINGS AND PLACARDS INSTALLED IN THIS AIRPLANE CONTAIN OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN THE COMMUTER CATEGORY. OTHER OPERATING LIMITATIONS WHICH MUST BE COMPLIED WITH WHEN OPERATING THIS AIRPLANE IN THIS CATEGORY ARE CONTAINED IN THE AIRPLANE FLIGHT MANUAL.

NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED.

MANEUVERING SPEED AT 16,500 POUNDS	185 KIAS
MINIMUM CONTROL SPEED	91 KIAS
MAXIMUM FLAP EXTENSION SPEEDS.. FULL FLAP	165 KIAS
1/2 FLAP	180 KIAS
1/4 FLAP	215 KIAS
MAXIMUM LANDING GEAR OPERATING SPEED	175 KIAS

APPROVED KINDS OF OPERATION

DAY/NIGHT, VFR/IFR, AND ICING CONDITIONS.
SEE AFM FOR KINDS OF OPERATION EQUIPMENT LIST.

PLACARDS (continued)

NEAR AIRSPEED INDICATORS:

DO NOT STALL AIRCRAFT WITH SAS INOPERATIVE

ON COMPASS FAIRING:

CAUTION.....READ STANDBY COMPASS
WITH WINDSHIELD HEAT.....OFF

BELOW STATIC SELECTOR:

CAUTION
SEE AFM FOR ALTERNATE
STATIC SOURCE ERROR

NEAR NAV/STROBE LIGHT SWITCH:

TURN OFF STROBE LIGHTS WHEN TAXIING IN VICINITY OF OTHER AIRCRAFT, OR DURING FLIGHT THROUGH CLOUD, FOG OR HAZE.

NEAR FUEL QUANTITY INDICATORS:

USABLE FUEL
2171 LBS. L/R

NEAR PILOTS' OXYGEN OUTLETS:

NO SMOKING WHEN OXYGEN IS
IN USE.

PLACARDS (Continued)

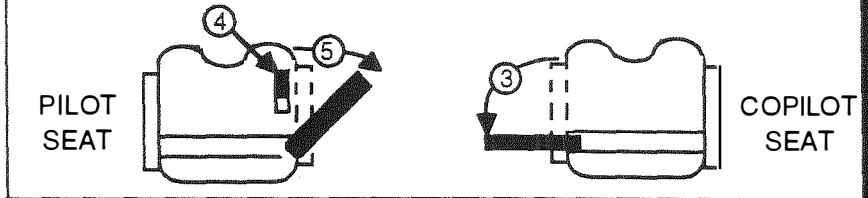
NEAR CABIN PRESSURE CONTROLLER:

DEPRESSURIZE CABIN
PRIOR TO T.O. AND LANDING

NEAR LANDING GEAR EMERGENCY RELEASE LEVER:

LANDING GEAR EMERGENCY EXTENSION

1. AIRSPEED ..... 175 KIAS MAX.
2. LANDING GEAR HANDLE ..... DOWN
3. EMERGENCY RELEASE LEVER ..... ROTATE AFT
4. HAND PUMP ENGAGE VALVE ..... PULL PIP PIN
   ROTATE VALVE HANDLE
   90° FORWARD
5. EMERGENCY HAND PUMP ..... PUMP AS REQUIRED
   a. GEAR INDICATOR ..... ALL DOWN AND LOCKED
   b. HYDRAULIC PRESSURE GAUGE ..... 500 TO 800 PSI



AIRWORTHINESS

The AIRFRAME AIRWORTHINESS LIMITATIONS MANUAL, ST-UN-M003, contains overhaul times, replacement times, and special inspections required for continued airworthiness.

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INTRODUCTION

This section presents the recommended procedures for normal operations. Procedures identified by an asterisk are those recommended to be accomplished by a copilot during two pilot operations. These procedures have been FAA approved.

PREFLIGHT WALK-AROUND INSPECTION

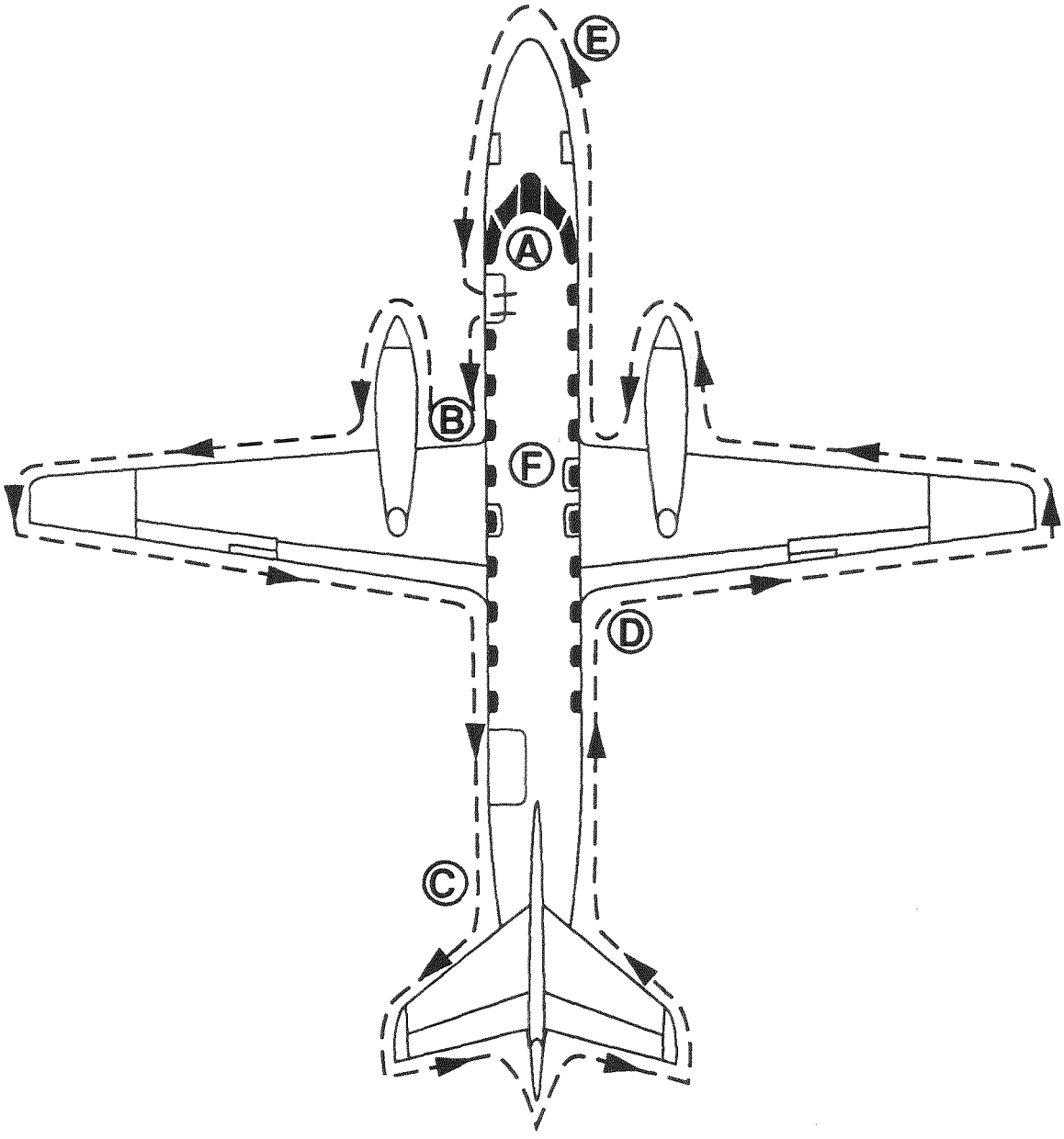


FIGURE 2-1

NORMAL PROCEDURES

FAA APPROVED: AUG 23/91
Revised: JUN 19/92

PREFLIGHT

A. COCKPIT

1. Landing Gear Handle ..... DOWN
2. Landing Gear Hand Pump Valve Handle ..... AFT/PIP PIN INSTALLED
3. GPU/Battery Switches ..... ON
4. Landing Gear Position Indicator ..... PRESS-TO-TEST/DIMMER SET
5. Control Lock ..... AS REQUIRED
6. Control Surface Trim ..... NEUTRAL
7. Parking Brake ..... AS REQUIRED
8. GPU/Battery Switches ..... AS REQUIRED

B. LEFT WING

1. Lower Antennas and Anti-Collision Light ..... CONDITION
2. Fuel Sumps ..... DRAIN
3. Leading Edge Ram Air Scoop ..... CLEAR
4. Gear Doors (first flight of day) ..... OPEN
5. Landing Gear, Brakes, Tires, and Wheelwell ..... CONDITION
6. Generator Voltmeter and Control Circuit Breakers ..... IN
7. Gear Doors ..... CLOSED
8. Tie Downs and Chocks ..... REMOVE
9. Cowling and Doors ..... SECURE
10. Fire Extinguisher Bottle Pressure ..... CHECK
11. Oil Cooler Inlet ..... CLEAR/CONDITION
12. Engine Inlet and Sensors ..... CLEAR/CONDITION
13. Propeller and Propeller Deice Boots ..... FREE ROTATION/CONDITION
14. Oil Filter Bypass Indicator/Engine Oil Quantity/Filler Cap ..... CHECK AND SECURE
15. Hydraulic Reservoir Sight Glasses ..... CHECK
16. Wing Ice Detector Light ..... CHECK
17. Fuel Sump ..... DRAIN
18. Wing Deice Boots ..... CONDITION
19. Fuel Vent ..... CLEAR
20. Landing and Recognition Lights and Shield ..... CHECK
21. Navigation Lights ..... CHECK
22. Aileron and Tab ..... CONDITION
23. Wing Fuel Cap ..... SECURE
24. Flaps ..... CONDITION
25. Exhaust ..... CLEAR
26. CAWI Tank Filler Cap ..... SECURE

PREFLIGHT (continued)

C. TAIL SECTION

1. Cargo Door ..... SECURE
2. Static Sources ..... CLEAR
3. Deice Boots ..... CONDITION
4. Stabilizer Setting ..... CHECK IN AGREEMENT WITH COCKPIT INDICATOR
5. Control Surfaces and Rudder Tab ..... CONDITION
6. Navigation Lights ..... CHECK
7. Upper Antennas and Anti-Collision Light ..... CONDITION
8. Tie Down ..... REMOVE
9. Oxygen Bottle Thermal Relief Disc ..... CONDITION

D. RIGHT WING

1. Exhaust ..... CLEAR
2. Flaps ..... CONDITION
3. Wing Fuel Cap ..... SECURE
4. Aileron and Tab ..... CONDITION
5. Navigation Lights ..... CHECK
6. Landing and Recognition Lights and Shield ..... CHECK
7. Fuel Vent ..... CLEAR
8. Wing Deice Boots ..... CONDITION
9. Wing Ice Detector Light ..... CHECK
10. Fuel Sump ..... DRAIN
11. Tie Downs and Chocks ..... REMOVE
12. Fire Extinguisher Bottle Pressure ..... CHECK
13. Oil Cooler Inlet ..... CLEAR/CONDITION
14. Engine Inlet and Sensors ..... CLEAR/CONDITION
15. Propeller and Propeller Deice Boots ..... FREE ROTATION/CONDITION
16. Oil Filter Bypass Indicator/Engine Oil Quantity/Filler Cap ..... CHECK AND SECURE
17. Cowling and Doors ..... SECURE
18. Gear Doors (first flight of day) ..... OPEN
19. Landing Gear, Brakes, Tires, and Wheelwell ..... CONDITION
20. Generator Voltmeter and Control Circuit Breakers ..... IN
21. Gear Doors ..... CLOSED
22. Leading Edge Ram Air Scoop ..... CLEAR
23. Fuel Sumps ..... DRAIN

PREFLIGHT (continued)

E. NOSE SECTION

1. Outside Air Temperature Sensor ..... CLEAR
2. Static Sources ..... CLEAR
3. Baggage Doors ..... SECURE
4. SAS Vanes ..... CHECK
5. Pitot Tubes ..... CLEAR
6. Windshield Wipers ..... CONDITION
7. Nose Gear, Tires, Wheelwell, and Gear Doors ..... CONDITION

F. CABIN

1. Entrance Lights ..... AS DESIRED
2. Cabin Door ..... LOCKED (VISUALLY CHECK LATCH INDICATORS)
3. Cargo and Baggage ..... SECURE
4. Emergency Exits ..... SECURE

COCKPIT SET-UP

GENERAL

1. Weight and Center of Gravity ..... COMPUTED WITHIN LIMITS
2. Performance Data ..... DETERMINED

NOTE

For Reduced Power Takeoff Operations, determine both computed reduced power and maximum takeoff power torques.

3. Battery Switches/GPU ..... AS REQUIRED
*4. No Smoking – Fasten Belts Switch ..... ON

PILOT'S CONSOLE

1. Left Essential Bus Tie Switch ..... ON
2. Bus Transfer Switches ..... LEFT BUS
3. All Circuit Breakers ..... IN
4. Cabin Pressure Selector Lever ..... AUTO
5. Cabin Pressure Manual Control Knob ..... CLOCKWISE
6. Auto/Cont Ignition Switches ..... AUTO
7. Starter Test Switch ..... CENTERED
8. Speed Switch Select Switches ..... AUTO
9. Start Mode Switch ..... AS REQUIRED
10. Unfeather Test Switch ..... CENTERED
11. Nose Wheel Steering Arm Switch ..... OFF
12. Battery Voltages ..... CHECK
13. SRL – Δ P/P Power Switches ..... NORMAL
14. Temp Limiter Test Switch ..... CENTERED
15. Light Control Knobs ..... AS REQUIRED

COCKPIT SET-UP (continued)

INSTRUMENT PANEL

1. Static Selector ..... NORMAL
*2. Cockpit Conditioned Air Controls (pilot and copilot) ..... AS REQUIRED
3. Cabin Altitude and Rate Indicators and Controls ..... CHECKED/SET
4. All Rocker Switches (except battery switches) ..... OFF
5. Pitch Trim ..... COMPARE WITH POSITION NOTED DURING PREFLIGHT
6. Fuel Counter ..... ZEROED
*7. Temperature Controls ..... AS REQUIRED
*8. Cabin Pressure Dump Switch ..... NORMAL
*9. Bleed Air Switches ..... OFF
*10. Fresh Air Fan Switch. ..... OFF
*11. Windshield Defog Switch (if installed) ..... OFF

*COPILOT'S CONSOLE

1. Passenger Oxygen ..... OFF
2. Cargo Door Secondary Warning ..... CHECKED
(SEE PAGE 2-39)
3. Light Control Knobs ..... AS REQUIRED
4. All Circuit Breakers ..... IN
5. Nonessential Bus Tie Switch ..... ON
6. Right Essential Bus Tie Switch ..... ON

PEDESTAL

1. Light Control Knobs ..... AS REQUIRED
2. Aileron Trim ..... NEUTRAL
3. Rudder Trim ..... NEUTRAL
4. Parking Brake ..... SET

NOTE

Set the parking brake by pulling the parking brake control knob out before applying pressure to the brake pedals. Hold parking brake control knob out while applying firm brake pressure. Release brake pedal pressure before releasing parking brake control knob. The knob will stay out indicating that parking brakes are set.

COCKPIT SET-UP (continued)

PEDESTAL (continued)

5. SAS Servo Switch ..... ON
6. Fuel and Hydraulic Shutoff Switches ..... OPEN
7. Fuel Boost Switches ..... OFF
8. Engine Stop and Feather Controls ..... IN
9. Trim Select Switch ..... PILOT
10. Flap Control ..... UP
11. CAWI/RES PWR Switch (if installed) ..... OFF

OR

Water Injection Switch (if installed) ..... OFF

12. Control Lock ..... OFF/CONTROLS CHECKED FREE
13. Speed Levers ..... LOW RPM/FRICTION SET
14. Power Levers ..... (1) CHECK FLIGHT IDLE GATE
(SEE PAGE 2-22)
(2) SET LEVERS APPROXIMATELY 1/4 INCH (7mm) FORWARD OF GROUND IDLE
(3) FRICTION SET
15. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING

BEFORE STARTING ENGINES

1. Parking Brake ..... SET
2. Standby Instruments Power Switch ..... ARM

NOTE

Verify standby attitude indicator and pilot's (copilot's on C-26B) airspeed indicator and altimeter are lighted and powered.

3. GPU/Battery Switches ..... CHECKED/ON
4. Interior Lights ..... AS REQUIRED
*5. Oxygen Pressure ..... CHECK
6. Fuel Quantity ..... CHECK (200 # MAX IMBALANCE)
7. Reserve Power (if installed) ..... CHECK
(SEE PAGE 2-37)
8. SAS ADV Circuit (first flight of day) ..... CHECK
(SEE PAGE 2-27)
9. Boost Pumps ..... CHECK/OFF
10. Battery Temperature Indicator ..... TEST
(SEE PAGE 2-30)
11. Crossflow Switch ..... CLOSED

BEFORE STARTING ENGINES (continued)

12. Annunciator Panel Lights ..... TEST

NOTE

Also verify illumination of the following miscellaneous annunciators:

1. Both fire warning lights
2. Both fuel and hydraulic shutoff valve position lights
3. Crossflow valve light
4. Both engine fuel bypass lights
5. Both oil cooler inlet duct heat cycle lights
6. Passenger oxygen flow light
7. Landing gear position indicator lights

13. Fire Extinguisher System ..... TEST
(SEE PAGE 2-38)

STARTING ENGINES (GPU)

CAUTION

- USE ONLY NEGATIVELY GROUNDED POWER SOURCES.
- DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM A GROUND POWER SOURCE BE LIMITED TO 1,000 AMPERES.

RIGHT ENGINE (RECOMMENDED FIRST)

*1. Propeller ..... UNFEATHERED/CLEAR
(SEE PAGE 2-22)
2. Engine Start Button ..... PRESS AND HOLD

NOTE

At approximately 8 – 10% RPM, the fuel valve will open and the IGN light will illuminate. Observe ignition of fuel as indicated by rising EGT and illumination of IGN light. Release start button when EGT rises.

See CAUTION and NOTES on next page

STARTING ENGINES (GPU) (continued)

RIGHT ENGINE (continued)

CAUTION

IF EGT RISE IS NOT OBTAINED WITHIN 10 SECONDS AFTER REACHING 10% RPM, OR BEFORE ATTAINING 20% RPM, PRESS STOP BUTTON AND PULL ENGINE STOP AND FEATHER CONTROL. CLEAR ENGINE FOR 10 SECONDS WITH STARTER TEST SWITCH. DO NOT ALLOW ENGINE TO OPERATE IN THE 18% TO 28% RPM RANGE DURING START OR CLEARING OPERATIONS EXCEPT DURING COMBUSTION-ASSISTED ACCELERATION THROUGH THAT RANGE.

NOTE

- If no fuel flow or ignition is observed and combustion is not obtained, it is permissible to attempt engine start using MANUAL GROUND START procedures. See page 3A-11.

- The engine is equipped with a start fuel enrichment system that is automatically actuated during a normal start when:

  1. The speed switch select switch is in "AUTO" position,

  2. The EGT is less than 695^{o}C and not increasing at a rate higher than 1^{o}C/sec,

  3. The RPM is between 10% and 60%,

  AND

  4. The SRL – Δ P/P power switch is in "NORMAL."

- Pressing the start button will override the automatic function and increase starting fuel flow provided the engine RPM is between 10% and 60%.

See NOTE next page

STARTING ENGINES (GPU) (continued)

RIGHT ENGINE (continued)

NOTE

- Whenever an engine ground start is required soon after engine shutdown while residual EGT is above 200°C, the following procedure is recommended:

- Prior to pressing the start button, hold the starter test switch until RPM is 15%. Then press the start button only long enough to provide fuel and ignition and to ensure light-off. Release the starter test switch after light-off is obtained and continue with the normal start procedure.

3. EGT ..... MONITOR (770°C MAX)

CAUTION

IF RPM STOPS INCREASING AND EGT IS APPROACHING THE START LIMIT AND RISING RAPIDLY, IMMEDIATELY PRESS THE STOP BUTTON AND PULL ENGINE STOP AND FEATHER CONTROL. EXCEEDING THE START EGT LIMIT MAY SERIOUSLY DAMAGE THE ENGINE.

4. RPM and EGT ..... STABILIZED
5. Fuel and Oil Pressure ..... YELLOW OR GREEN ARCS
*6. Bleed Air Switch (right engine) ..... AS REQUIRED

NOTE

Check for absence of air flow through the open cooling air "eyeballs" prior to turning on either bleed air system.

LEFT ENGINE
(For airplanes prior to S/N DC-884 NOT modified by Service Bulletin CC7-24-002)

7. Repeat Steps 1 Through 5 For Left Engine
8. Bleed Air Switch (left engine) ..... AS REQUIRED

NOTE

Verify operation of each bleed air system by selectively operating right and left systems, both low and high.

STARTING ENGINES (GPU) (continued)

LEFT ENGINE (continued)

9. GPU ..... OFF/DISCONNECTED/ANNUNCIATOR CHECKED OUT
10. Generators ..... ON

NOTE

Check generator voltages between 29 – 29.5 and even load sharing.

11. Battery Disconnects and Current Limiters ..... CHECK
(SEE PAGES 2-21 AND 2-30)

LEFT ENGINE
(For S/N DC-884 and subsquent, and airplanes modified in accordance with Service Bulletin CC7-24-002)

7. Repeat Steps 1 Through 5 For Left Engine
8. Bleed Air Switch (left engine) ..... AS REQUIRED

NOTE

Verify operation of each bleed air system by selectively operating right and left systems, both low and high.

9. GPU ..... OFF/DISCONNECTED/ANNUNCIATOR CHECKED OUT
10. Generators ..... ON/CHECK VOLTS AND AMPS

NOTE

- Check generator voltages between 29 – 29.5 and even load sharing.
- If the generator switch is reset and ON, generator voltage is observed, GEN FAIL annunciator light is OFF, and the ammeter reads zero, the respective 400 ampere current limiter is open. The faulty current limiter should be replaced prior to flight.

11. Battery Disconnects ..... CHECK (SEE PAGE 2-30)

NOTE

The current limiter check is no longer required.

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STARTING ENGINES (BATTERY)

Follow Starting Engines (GPU) procedures steps 1 through 8, 10 and 11, except as modified by the following notes:

NOTE

- The series mode is recommended for use during the first start of the day and for other battery starts when engines have cooled to near ambient temperatures since last being operated.
- If either battery temperature is above 120^{0}F (amber caution light illuminated), do not make a battery start. Either obtain a GPU or wait until the batteries have cooled.
- Both torque indicators will display erroneous indications during battery starts when the starter is engaged and bus voltage is low.
- The inoperative engine RPM indicator is sensitive to bus voltage variations prior to normal engine operation and may reflect spurious fluctuations before engine starts when operating various aircraft systems.
- Generator for first engine should be turned on after first engine start. Second engine should be started in parallel mode with assistance from the operating generator after ammeter drops to 150 amps. If desired, stresses on the assisting generator due to initial high current demands may be reduced using the start procedure on page 6C-1.

BEFORE TAXI

*1. Temperature Controls ..... AS REQUIRED
*2. Inverter (Check No. 2, then No. 1) ..... CHECK/ON
*3. Boost Pumps ..... ON
4. FDR/CVR (if installed) ..... CHECK
(SEE PAGE 2-24)
5. Windshield Heat ..... LOW
6. Battery Temperature Indicator ..... CHECK/NOTE TEMPERATURES
7. Nose Wheel Steering ..... ARMED
8. Stabilizer Trim System ..... CHECK ALL FUNCTIONS
(SEE PAGE 2-31)
9. SAS (first flight of day) ..... CHECK
(SEE PAGE 2-26)
*10. Avionics Master Switch ..... ON
11. Overspeed Governors (periodically) ..... CHECK
(SEE PAGE 2-32)
12. Single Red Line Computer/Temp Limiter (periodically) ..... CHECK
(SEE PAGE 2-33)
13. Propeller Start Locks ..... RELEASE
(SEE PAGE 2-22)
14. Exterior and Interior Lights ..... AS REQUIRED

TAXI

1. Parking Brake ..... RELEASE

NOTE

Apply pressure to the brake pedals while pushing the parking brake control full forward to ensure complete release of the wheel brakes.

2. Brakes ..... CHECK
3. Nose Wheel Steering System ..... TEST (SEE PAGE 2-35)
4. Controls ..... FREE
*5. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING
*6. CAWI System ..... CHECK
(SEE PAGE 2-36)
7. Fuel Quantity ..... CHECK (200 # MAX IMBALANCE)
*8. Fuel Crossflow Valve ..... CHECK CLOSED
9. Engine Instruments ..... CHECK IN GREEN
*10. Suction, Deice, and Hydraulic Pressure ..... CHECK

BEFORE TAKEOFF

1. Takeoff Data ..... CONFIRM/MARKERS SET
*2. Flaps/Trim ..... SET FOR TAKEOFF
3. Flight Instruments ..... SET AND CHECK
*4. Navigation Equipment ..... AS REQUIRED
5. NTS (First flight of day) ..... CHECK
(SEE PAGE 2-34)
6. Reserve Power System (if installed) ..... CHECK
(SEE PAGE 2-37)
7. Ice Protection Systems ..... CHECK
(SEE PAGE 2-45)
8. Ignition Switches ..... AUTO OR CONT
(SEE PAGES 2-25, 2-45, 2-48 AND 2-49)

NOTE

Use continuous ignition for takeoff on a wet or snow/slush covered runway to ensure immediate relight in the event that engine combustion is interrupted by ingested water, slush, or snow during the ground roll.

9. Annunciator Panel ..... CHECK

TAKEOFF

*1. Transponder ..... ON
2. Exterior Lights ..... AS REQUIRED
*3. Bleed Air Switches ..... AS REQUIRED
*4. Speed Levers ..... HIGH RPM

NOTE

Verify SRL OFF annunciator lights extinguish when RPM is advanced above 80%.

WARNING

IF FLIGHT IS ATTEMPTED WITH THE SPEED LEVERS SET AT LOW RPM, DIVERGENT POWER OSCILLATIONS ARE LIKELY TO OCCUR AS THE TEMPERATURE LIMITING RANGE IS REACHED.

5. Engine Speed ..... CHECK 96% TO 97.5%

TAKEOFF (continued)

6. Power Levers ..... SET COMPUTED TAKEOFF POWER. DO NOT EXCEED 650°C EGT OR 107% TORQUE

NOTE

- Advance power levers smoothly to takeoff power at a moderate rate. Advancing the power levers too rapidly will cause excessive RPM overshoot which may activate the overspeed governor and result in low torque and/or power surges.
- If more power is required during a reduced power takeoff (engine failure, windshear encounter, etc.), torque can be increased to maximum takeoff power torque.

For CAWI Takeoff:

a. Set approximately 60% torque
b. CAWI/RES PWR Switch (if installed) ..... CAWI

OR

Water Injection Switch (if Installed) ..... CONTINUOUS

c. CAWI Pump Lights ..... CHECK ON
d. Torquemeters ..... CHECK SYMMETRICAL INCREASE

CAUTION

DO NOT ALLOW TORQUE TO EXCEED 110% DURING TAKEOFF.

NOTE

During takeoff the blue fuel bypass lights may illuminate with no action required. However, in climb and cruise the power levers should be retarded to extinguish the lights.

7. Engine Speed ..... CHECK 100% TO 101% RPM

CAUTION

IF RPM IS ALLOWED TO DECREASE TO BELOW 99% WITH THE TEMPERATURE LIMITING SYSTEM OPERATING, ENGINE POWER SURGES MAY OCCUR WHEN THE SRL COMPUTER TRANSITIONS BACK AND FORTH BETWEEN ITS SPEED/ TEMPERATURE SCHEDULES.

TAKEOFF (continued)

8. Brakes ..... RELEASE

NOTE

Normal authority nose wheel steering is available throughout the takeoff roll as desired by activating the NWS power lever button. The green NWS light will extinguish whenever nose wheel steering is disengaged.

9. Landing Gear (after lift-off) ..... UP
10. Flaps ..... UP

NOTE

Initiate flap retraction at or above V_2 +5 KIAS and clear of obstacles.

CLIMB

*1. CAWI/RES PWR Switch (if installed) ..... OFF

OR

Water Injection Switch (if installed) ..... OFF

NOTE

When the CAWI/RES PWR or Water Injection switch is turned off, engine torque will decrease by as much as 35%.

*2. Bleed Air Switches ..... AS DESIRED
3. Climb Power ..... SET

NOTE

If climb at 97% RPM is desired, reduce EGT to 600^{O}C or less before retarding speed lever. Advance power lever to desired climb power (not to exceed 650^{O}C EGT or 100% torque).

CLIMB (CONTINUED)

*4. Propeller Synchrophaser Switch (if installed) ..... CLIMB & CRUISE
5. Ice Protection Systems/Ignition Switches ..... AS REQUIRED
6. Cabin Pressure Scheduling ..... CHECK
*7. Cabin Signs ..... AS REQUIRED
8. Ammeters ..... CHECK
9. Annunciator Panel ..... CHECK
10. Exterior Lights ..... AS REQUIRED

CRUISE

*1. Bleed Air Switches ..... AS DESIRED
(SEE PAGE 6B-4)
2. Cruise Power ..... SET

NOTE

Reduce EGT to 600°C or less before retarding speed lever. With cruise RPM set, advance power lever to desired cruise power (not to exceed 650°C EGT).

3. Cabin Pressurization ..... AS DESIRED

DESCENT

1. Altimeters ..... SET
2. Cabin Pressurization ..... SET

NOTE

Set cabin altitude and rate controls to ensure zero cabin differential at touchdown.

*3. Cabin Signs ..... AS REQUIRED
4. Fuel Quantity/Balance ..... CHECK (200 # MAX IMBALANCE)
5. Fuel Crossflow Valve ..... CLOSED
6. Ice Protection Systems/Ignition Switches ..... AS REQUIRED
7. Exterior Lights ..... AS REQUIRED

BEFORE LANDING

1. Landing Data ..... CONFIRM/MARKERS SET
2. Exterior and Interior Lights ..... AS REQUIRED
*3. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING
4. Speed Levers ..... HIGH RPM
5. Landing Gear, Hydraulic Pressure, and Indicators ..... DOWN/CHECK
6. Nose Wheel Steering ..... CHECK

NOTE

Press the NWS power lever button momentarily to check that the NWS light comes on, verifying normal system operation prior to touchdown.

7. Flaps ..... AS REQUIRED
8. Ice Protection Systems/Ignition Switches ..... AS REQUIRED

NOTE

Use continuous ignition for landing on a wet or snow/slush covered runway to ensure immediate relight in the event that engine combustion is interrupted by ingested water, slush, or snow during the ground roll.

BALKED LANDING

NOTE

When required for obstacle clearance, this procedure is used to obtain the climb performance depicted in Section 4G.

1. Power Levers ..... 650^{O}C EGT OR 110% TORQUE (WHICHEVER OCCURS FIRST)
2. Climb Speed ..... ATTAIN (SEE FIGURE 4G-5)
3. Landing Gear (positive rate of climb) ..... UP
4. Flaps ..... RETRACT TO 1/2
5. Airspeed ..... ACCELERATE TO 125 KIAS
6. Flaps ..... UP

LANDING

The landing distances in Section 4G are based on using the maximum performance techniques/ procedures contained in Section 4A.

When stopping distance is not critical, power may be carried into the landing flare and the power levers retarded to flight idle at or just prior to touchdown.

WARNING

THE POWER LEVERS MUST NOT BE RETARDED BELOW FLIGHT IDLE IN THE AIR.

After touchdown, the power levers should be moved to the ground idle position. Brakes, nose wheel steering, and reverse power may be used as required.

NOTE

Normal authority nose wheel steering is available throughout the landing roll by activating the power lever NWS button if the nose gear steering switch is in the ARMED position.

CAUTION

- DO NOT USE FULL REVERSE ABOVE 90 KNOTS. REDUCE AIRSPEED 1 KNOT FOR EACH $1^{O}F$ ABOVE $90^{O}F$ PRIOR TO USING MAXIMUM REVERSE POWER.
- ATTEMPTED REVERSE WITH THE SPEED LEVERS AFT OF THE HIGH RPM POSITION MAY RESULT IN ENGINE OVER TEMPERATURE.

AFTER LANDING

1. Power Levers ..... GROUND IDLE
*2. Speed Levers ..... LOW RPM

CAUTION

- DO NOT RETARD SPEED LEVERS WHILE POWER LEVERS ARE AFT OF GROUND IDLE.

- IF THE NOSE GEAR STEERING SWITCH IS IN THE ARMED POSITION DO NOT RETARD THE SPEED LEVERS TO THE FULL AFT (LOW RPM) POSITION UNTIL A NORMAL TAXI SPEED IS REACHED, BECAUSE NOSE WHEEL STEERING WOULD BE ACTUATED IMMEDIATELY WHEN THE RIGHT ENGINE SPEED LEVER IS PLACED IN THE FULL AFT POSITION, AND THE POSSIBILITY OF AN UNWANTED STEERING COMMAND EXISTS. IF REDUCTION OF ENGINE NOISE IS DESIRED PRIOR TO REACHING NORMAL TAXI SPEED, THE SPEED LEVERS CAN BE RETARDED TO A POSITION APPROXIMATELY 1/2 INCH (13mm) FORWARD OF THE AFT LOW RPM STOP. THIS WILL RESULT IN DESIRED REDUCTION OF ENGINE RPM AND YET PRECLUDE ACTUATION OF THE NWS SWITCH. STEERING THROUGH THE NWS POWER LEVER BUTTON REMAINS ACTIVE.

3. Flaps ..... UP
4. Ice Protection Systems ..... OFF
5. Ignition Switches ..... AUTO
*6. Transponder ..... OFF
7. Exterior and Interior Lights ..... AS DESIRED
*8. Stabilizer, Aileron, and Rudder Trim ..... NEUTRAL
*9. Boost Pumps ..... OFF

STOPPING ENGINES

1. Parking Brake ..... SET
*2. Bleed Air Switches ..... OFF
*3. Avionics ..... OFF
*4. Inverter Switch ..... OFF
5. Generator Switches ..... OFF
6. Engine Stop Buttons ..... PRESS AND HOLD

NOTE

- Allow the engines to cool below 20% torque for at least three minutes. (This may include descent, approach, landing, and taxi time if power does not exceed 20% torque).

- If taxiing was above ground idle RPM, a one minute cooling period at ground idle prior to engine shutdown is recommended.

- Press the Engine Stop Button a minimum of five seconds. RPM will increase approximately 5% with actuation of the stop circuit as the fuel is purged into the combustor, and then decay as the manifold fuel is depleted. If this increase in RPM does not occur, the purge system has failed or the engine RPM has not reached 96% since the engine was started.

7. Power Levers ..... REVERSE AT APPROXIMATELY 50% RPM
(HOLD TO BELOW 10% RPM TO PLACE PROPELLER BLADES ON START LOCKS)
8. Nose Wheel Steering Arm Switch ..... OFF
9. Exterior and Interior Lights ..... AS REQUIRED
10. Battery Switches/GPU ..... AS REQUIRED
11. Standby Instrument Power Switch ..... OFF
12. Control Lock, Chocks, Parking Brake, and Pitot Covers ..... AS REQUIRED

NOTE

- Wheel chocks, rather than the parking brake, should be used after the brakes have been used extensively enough to make the discs and pucks hot.

- Hand rotation of the propeller through 12 to 16 blades in the normal direction of rotation, within 5 minutes after shutdown, will help expel residual heat from the engine, enhance the fuel nozzle life, and also will reduce air seal drag on the internal parts of the engine, if a restart is anticipated within 45 minutes.

SYSTEM CHECKS AND OPERATION

NIGHT OR INSTRUMENT FLIGHT

1. External Lights ..... CHECK
2. Internal Lights ..... CHECK
3. Flight Instruments ..... CHECK
4. Generator Volts and Amps ..... CHECK

NOTE

The green lights on the annunciator panel, the blue fuel bypass lights, the green duct heat cycle lights, and the green passenger oxygen light are dimmed by the annunciator dim switch.

CURRENT LIMITER CHECK

Either of the following checks (3a. or 3b.) will verify the status of the current limiters. Use of the pitch trim systems provides visual and aural proof of continuity while use of the annunciator panel is a quicker and quieter method.

1. Battery Switches ..... OFF
2. Generator Switch (either engine) ..... OFF

3a. Pitch Trim ..... ACTUATE BOTH PILOT SWITCHES, NOTE STABILIZER MOVEMENT. ACTUATE BOTH COPILOT SWITCHES, NOTE STABILIZER MOVEMENT.

OR

3b. Annunciator Panel ..... .PRESS-TO-TEST. NOTE THAT ALL ANNUNCIATOR LIGHTS (EXCEPT BATTERY FAULT) ILLUMINATE.

4. Battery and Generator Switches ..... ON

CAUTION

IF EITHER THE PILOT OR COPILOT TRIM SYSTEMS WILL NOT OPERATE THE STABILIZER, OR IF ANNUNCIATOR PANEL LIGHTS DO NOT ILLUMINATE DURING THIS TEST, A CURRENT LIMITER HAS FAILED.

SYSTEM CHECKS AND OPERATION (continued)

FLIGHT IDLE GATE CHECK

1. Advance both power levers beyond flight idle.
2. Retard both power levers and ensure that neither power lever will travel beyond the flight idle gate without lifting the release knob on each power lever.

BEFORE START PROPELLER UNFEATHERING

1. Power lever ..... REVERSE
2. Unfeather Test Switch ..... SELECT L OR R
3. Unfeather Test Switch ..... MOVE TO OFF WHEN BLADES REACH REVERSE PITCH
4. Power Lever ..... GROUND IDLE

PROPELLER START LOCK RELEASE

Place power levers into reverse with engines running to release propeller blades from start locks.

NOTE

- Typically, if the power levers are retarded rapidly, a sharp drop in oil pressure will be indicated and the beta lights will be extinguished while the propeller blades are being driven toward reverse. Holding the power levers in full reverse until oil pressures return to normal, torque indications rise, and beta lights reilluminate will ensure start locks release.

- Start locks can be released by use of partial reverse power. However, power levers must be moved aft of ground idle far enough to cause a definite increase in torque and then moved forward of ground idle far enough to check that torque is high enough to indicate that start locks have released.

- Slow movement of power levers into reverse range may not cause the beta lights to blink.

SYSTEM CHECKS AND OPERATION (continued)

ANNUNCIATOR PANEL LIGHTS

An integrated warning (red), caution (amber), and advisory (green) light panel, centrally located on the instrument panel, provides annunciations to the crew for necessary systems operations and significant systems malfunctions.

The functions of the annunciator panel green lights are shown in the following table. The green annunciators are dimmed by the Annunciator Dim Switch. See the Emergency and Abnormal Procedures sections for functions of the red and amber lights. Spare positions are indicated by a line across the lights.

LIGHT ILLUMINATED	INDICATES THAT
L or R INTAKE HT	a. Corresponding engine intake heat bleed air valve is not closed when engine and prop heat switch is on. b. Corresponding engine intake heat bleed air valve closed when engine and prop heat switch is off and valve test switch is pressed.
L or R W/S HT	a. If windshield heat switch is low, heat is being applied to both windshields when both lights are on and to neither windshield when only one light is on. b. If windshield heat switch is high, heat is being applied to windshield corresponding to illuminated light.
AWI NO 1 or NO 2 PUMP ON	Corresponding pump output pressure is within prescribed limits.
SAS DEICE	Indicates that the SAS vanes are receiving electrical power for deicing.
NWS	a. Light ON: Nose wheel steering system is armed and engaged. b. Arming is not annunciated separately. c. Light OFF: Nose wheel steering system is not engaged.

SYSTEM CHECKS AND OPERATION (continued)

FLIGHT DATA RECORDER/COCKPIT VOICE RECORDER (FDR/CVR)

If these systems are installed, the following checks should be accomplished prior to engine start:

1. DC Power ..... ON
2. AC Power ..... ON
3. FDR PWR FAIL Light ..... CHECK ON/THEN OFF

NOTE

- The FDR self-test begins when DC power is applied and requires approximately one minute. The FDR PWR FAIL light may cycle on and off during the self-test, but must be off at the completion of the test.

- Failure of the light to extinguish at the end of self-test or subsequent re-illumination indicates loss of 28 VDC FDR power, loss of 26 VAC heading system power or a discrepancy in the FDR internal altitude transducer. When inverters are OFF, the FDR PWR FAIL light will illuminate due to loss of 26 VAC heading system power.

4. CVR Test Button ..... PRESS AND HOLD FIVE SECONDS MINIMUM
5. CVR Meter ..... CHECK POINTER IN GREEN BAND

NOTE

Additional assurance of proper CVR operation may be obtained by inserting a headphone plug into the jack on the CVR control panel and listening to the test tone and four cycle clicks. Whenever a headset is plugged into the CVR control panel, a composite playback of all four channels will be heard in the headset (with a 1/4 second delay).

SYSTEMS CHECKS AND OPERATION (continued)

CONTINUOUS IGNITION SYSTEM

The continuous ignition system is provided for use during periods when excessive water, slush, or ice ingestion might interrupt the flow of air to the engine combustion chambers and cause engine flameout. The system includes operating modes which energize the engine igniters either manually or automatically to allow the engine to relight as soon as air flow is restored following a flameout. A lever-lock switch independently controls the ignition mode selection for each engine. The ignition modes provided by each switch position are as follows:

AUTO/CONT IGNITION switch

AUTO: Ignition is automatically supplied to the engine whenever the engine power output is disrupted, such as following flameout when the negative torque sensing (NTS) system is activated. This mode should be selected for all normal operations including flight in heavy rain and severe turbulence. Ignition during automatic or manual engine start is not affected by the selection of this mode.

NOTE

When in the AUTO mode, it is normal for the ignition system to be activated by an in-flight engine shutdown using the preplanned shutdown procedure (Abnormal Procedures, Section 3A), as indicated by illumination of the respective engine's ignition light. The ignition system senses NTS system oil pressure and may remain energized for as long as approximately 30 seconds after the propeller is feathered. The reverse will occur during airstarts. The ignition system might not be energized during an in-flight engine shutdown procedure (Emergency Procedures, Section 3), because immediate stop and feather action of the engine and propeller could preclude activation of the NTS system. If negative torque is sensed when stopping engines on the ground (for example, when a tailwind exists), the igniters might be activated.

CONT: Ignition is supplied to the engine continuously. This mode should be used during takeoff and landing whenever standing water or slush is present, during flight in known icing conditions, in extremely heavy rain, and before selecting engine and prop heat following inadvertent icing encounters. Do not initiate engine starts with CONT selected.

OFF: Ignition is supplied to the engine only during the automatic or manual start cycle. This mode is provided to deactivate the ignition system following engine failure or fire, or if the pressure switch should stick in its ignition-on position.

An amber light, adjacent to each EGT indicator, is provided for each engine to indicate that power is being supplied to the igniters. Power for the system is provided via a five ampere circuit breaker marked (L or R) CONT IGN.

SYSTEM CHECKS AND OPERATION (continued)

STALL AVOIDANCE SYSTEM (SAS)

The stall avoidance system provides stall warning, stall indication, and nose down control input prior to reaching an actual aerodynamic stall. Stall warning is provided by two stick shakers, one mounted on each control column. Stall indication is provided by two stall horns and four red stall lights. Nose down control input is provided by a stick pusher which applies a 65 pound forward control force.

Two angle of attack sensing vanes and transmitters, one located on each side of the nose, provide signal inputs to two separate SAS computers. The computers then provide power outputs to activate the stick shakers, stall horns, their respective stall lights and single stick pusher servo. Both computers also provide output signals to the SAS indicator on the glareshield. Both SAS computers must agree on the stalling angle of attack to activate the single stick pusher, but they will independently activate the stick shakers, stall horns and their respective stall lights.

The following are provided in the cockpit: a test switch for each SAS computer, two "G" switch test switches with a servo monitor test in the NO. 1 "G" switch test switch position (all mounted overhead), and a single SAS indicator on the glareshield including a left-right select switch and two green "advancement" (ADV) lights (all for preflight SAS checks). In addition, duplicate stall lights are mounted on the instrument glareshield at the pilot and copilot positions; each is labeled L STALL and R STALL. Two amber SAS FAIL annunciator lights, one amber SAS SERVO FAIL annunciator light, (for automatic annunciation of system malfunctions), and a SAS DEICE annunciator light are provided. Each control column incorporates a stick shaker mounted on the forward side of the column.

A SAS servo switch and two control wheel mounted master disconnect (MA DISC) buttons (pilot and copilot) are provided to momentarily disengage the pusher servo in the event of a SAS pusher malfunction. Either disconnect button interrupts power to the pusher as long as the button is held depressed. These master disconnect buttons also interrupt power to the pitch trim system and will disengage the autopilot (if installed) when either button is pressed.

The SAS computers incorporate an advancement circuit to activate the stick shakers, stall warning horns, glareshield stall lights, and stick pusher at a lower angle of attack (higher airspeed) at high power settings. Each power lever, when advanced beyond approximately 1/2 travel, activates the advancement circuit in its respective SAS computer. With either advancement circuit activated, both stick shakers and the respective warning horn and glareshield stall lights will activate at a lower angle of attack. However, both SAS computer advancement circuits must be on (both power levers beyond 1/2 travel) to get stick pusher activation at the lower angle of attack. Advancement circuit annunciation during the SAS Preflight Check (see page 2-27) is provided by two green ADV lights located on the SAS indicator housing.

The pilot and copilot glareshield stall light modules (L STALL/R STALL) also serve as switches to cancel unwanted stall warning (stick shakers), stall indication (stall horns/lights), and/or stick pusher inputs. Pressing either light switch once removes power entirely from the respective SAS computer, rendering those respective warning and stick pusher outputs inoperative. Pressing the light switch a second time restores power to that SAS computer thus its stall warning (stick shaker), stall indication (stall horn/light), and stick pusher inputs. The pilot's stall light module controls the left SAS computer and the copilot's stall light module controls the right SAS computer.

SYSTEM CHECKS AND OPERATION (continued)

STALL AVOIDANCE SYSTEM (SAS) (continued)

The following system checks are applicable to the stall avoidance system:

NOTE

- If either vane is moved up (by hand, by wind gust, or by any other method) so that the needle on the SAS indicator is at less than 1.0 V_S, the respective SAS FAIL light will come on steady.
- To prevent damage to some flight instruments, hold elevator control firmly during these checks.

During the Before Starting Engines check, the SAS advancement circuits will be checked as follows: (first flight of day only)

1. Power Levers .....ADVANCE TO MORE THAN 1/2 TRAVEL
2. SAS Test Switches (L and R Individually) .....HOLD IN STALL POSITION MOMENTARILY
3. SAS Indicator ADV Lights (L and R Individually) .....CHECK ON

NOTE

It is only necessary to hold the SAS test switches long enough to verify illumination of the ADV lights.

4. Power Levers .....RETARD TO GROUND IDLE

During the Before Taxi check, the SAS will be checked as follows: (first flight of day only)

NOTE

Select the left or right SAS, as appropriate, at the SAS indicator when checking the left or right systems individually.

1. Flaps .....UP
2. SAS Servo Switch .....OFF
3. SAS SERVO FAIL Light .....CHECK ON
4. Both SAS Test Switches .....HOLD IN STALL POSITION AND CHECK:
   a. Both stick shakers activate
   b. Both L STALL and R STALL lights illuminate
   c. Both stall horns sound
   d. Pusher does not activate
   e. SAS FAIL lights do not illuminate
   f. SAS needle is aligned with right side of stall band
5. Both SAS Test Switches .....RELEASE
6. SAS Servo Switch .....ON
7. SAS SERVO FAIL Light .....CHECK OFF

SYSTEM CHECKS AND OPERATION (continued)

STALL AVOIDANCE SYSTEM (SAS) (continued)

8. Pilot's Stall Light Module (on glareshield) ..... PRESS MOMENTARILY
9. L SAS FAIL Light ..... CHECK ON
10. L SAS Indicator Needle ..... ALIGNED WITH RIGHT SIDE OF STALL BAND
11. Both SAS Test Switches ..... HOLD IN STALL POSITION AND CHECK:
    a. Both stick shakers activate
    b. Both R STALL lights illuminate
    c. Both stall horns sound
    d. Pusher does not activate
    e. L SAS FAIL (only) light remains on
12. Both SAS Test Switches ..... RELEASE
13. Pilot's Stall Light Module (on glareshield) ..... PRESS MOMENTARILY
14. L SAS FAIL Light ..... CHECK OFF
15. Copilot's Stall Light Module (on glareshield) ..... PRESS MOMENTARILY
16. R SAS FAIL Light ..... CHECK ON
17. R SAS Indicator Needle ..... ALIGNED WITH RIGHT SIDE OF STALL BAND
18. Both SAS Test Switches ..... HOLD IN STALL POSITION AND CHECK SAME ITEMS IN 11 a. THRU e., EXCEPT:
    b. Both L STALL lights illuminate
    e. R SAS FAIL (only) light remains on
19. Both SAS Test Switches ..... RELEASE
20. Copilot's Stall Light Module (on glareshield) ..... PRESS MOMENTARILY
21. R SAS FAIL Light ..... CHECK OFF
22. L SAS Test Switch ..... HOLD IN STALL POSITION AND CHECK:
    a. Both stick shakers activate
    b. Both L STALL lights Illuminate
    c. Both stall horns sound
    d. Pusher does not activate
    e. SAS FAIL lights do not illuminate
    f. SAS indicator needle is aligned with right side of stall band
23. L SAS Test Switch ..... RELEASE
24. R SAS Test Switch ..... HOLD IN STALL POSITION AND CHECK SAME ITEMS IN 22a. THRU f., EXCEPT:
    b. Both R STALL lights Illuminate
25. R SAS Test Switch ..... RELEASE

SYSTEM CHECKS AND OPERATION (continued)

STALL AVOIDANCE SYSTEM (SAS) (continued)

26. Both SAS Test Switches ..... HOLD IN STALL POSITION AND CHECK:
    a. Both stick shakers activate
    b. Both L STALL and R STALL lights illuminate
    c. Both stall horns sound
    d. Pusher activates
    e. Pusher disengages momentarily when either P or CP MA DISC is depressed
    f. Pusher disengages momentarily when either NO. 1 or NO. 2 "G" switch test switches are actuated
    g. SAS FAIL lights do not illuminate
    h. SAS SERVO FAIL light illuminates momentarily whenever pusher disengages
    i. SAS indicator needle is aligned with right side of stall band (L or R selected)
27. L SAS Test Switch ..... HOLD IN CRUISE POSITION AND CHECK:
    a. Flaps up
    b. Pusher does not activate
    c. SAS FAIL lights do not illuminate
    d. SAS indicator needle aligned at 1.3 V_S (plus or minus .05 V_S)
    e. When flaps are lowered, check that SAS needle moves from 1.3 V_S to approximately 1.2 V_S
28. L SAS Test Switch ..... RELEASE
29. R SAS Test Switch ..... HOLD IN CRUISE POSITION AND CHECK SAME ITEMS IN 27 a. THRU e.
30. R SAS Test Switch ..... RELEASE

NOTE

In cruise test, the following will occur:

- Flaps up, pointer needle will be positioned on 1.3 V_S.
- Flaps between up and one-quarter, pointer needle will move up slightly.
- Flaps between one-quarter and one-half, pointer needle will move up more.
- Flaps between one-half and full down, pointer needle will move to approximately 1.2 V_S position.

31. Flaps ..... SET AS REQUIRED
32. SERVO Monitor Test (NO. 1 "G" Switch Test Switch) ..... HOLD IN SERVO MON POSITION CHECK THAT SAS SERVO FAIL LIGHT ILLUMINATES

SYSTEM CHECKS AND OPERATION (continued)

BATTERY DISCONNECT SYSTEM CHECK

With both battery switches off, the battery disconnect system is checked by the following procedure:

1. Left Battery Switch ..... ON
2. R BAT DISC Light ..... ON
3. Right Battery Switch ..... ON
4. R BAT DISC Light ..... OFF
5. Left Battery Switch ..... OFF
6. L BAT DISC Light ..... ON
7. Left Battery Switch ..... ON

BATTERY TEMPERATURE INDICATOR

Battery Temperature Indicating System

A battery temperature indicator is located on the instrument panel. The indicator face has an expanded scale to show the pilot when battery temperatures are abnormally high [in the 100^{O} to 190^{O}F (38^{O} to 88^{O}C) range]. An amber caution light is incorporated in the instrument to alert the crew when either battery temperature is above 120^{O}F (plus or minus 3^{O}F) and a red light in the instrument warns the pilot that the battery temperature is above 150^{O}F (plus or minus 3^{O}F). The indicator needles will remain off scale low until battery temperatures are above 100^{O}F (38^{O}C).

Battery Temp Test Button

Pressing the test button adjacent to the indicator provides an integrity check of the battery temperature probe and indicator functions. Satisfactory functioning is indicated when the pointers are driven to the top of the scale in approximately five seconds, the amber light illuminates as the pointers pass approximately 120^{O}F, and the red light illuminates as the needles pass approximately 150^{O}F. The rate of travel may vary, depending upon ambient battery temperatures. Should one pointer lag the other, or should it fail to travel full scale during test, a fault in the system is indicated and maintenance action will be required.

Range Extend Button

When pressed, this button adds 50^{O}F (28^{O}C) to the existing temperature indications of the batteries. Thus, an indicated temperature of 130^{O}F would tell the pilot that the actual temperature in the battery is 80^{O}F. This feature of the battery temperature indicating system is useful for making battery maintenance and pilot operating decisions. It is recommended that battery temperature rise logs be kept for battery starts. A mental note of battery temperatures approximately five minutes after engine start will establish the rise due to post start recharging. As batteries approach the need for deep cycle, the temperature rise per engine start will become greater. Knowing the temperature rise expected during a battery start will help the pilot decide whether the batteries can tolerate another battery start, if he should obtain an auxiliary power unit, or if he should delay the start until the batteries have cooled to a lower temperature.

SYSTEM CHECKS AND OPERATION (continued)

STABILIZER TRIM SYSTEM

The pilot and copilot double element trim control switches independently control individual jackscrew actuators when selected by the trim selector switch. A pilot auxiliary trim switch is included in the copilot trim system and will override the copilot trim control switches.

All takeoffs should be made with the stabilizer trimmed within the takeoff band marked on the trim indicator. When the airplane is loaded to a forward center of gravity configuration, the stabilizer should be trimmed to the nose up end of the takeoff band; for aft center of gravity configurations, the stabilizer should be trimmed to the nose down end of the takeoff band. If the stabilizer is trimmed out of the takeoff band while the airplane is on the ground, and the power levers are advanced to takeoff power, an aural out-of-trim warning will sound.

The trim system also incorporates an aural trim-in-motion system. This system provides an aural tone at any time electrical power is applied to either trim actuator.

During the Before Taxi Check, the stabilizer trim system is checked by the following procedure. The procedure verifies normal operation of all switches and indications in the stabilizer trim circuitry. It is necessary to operate each trim system only long enough to ensure that the stabilizer travels in the proper direction and that the sonalert sounds. Operating the trim systems from stop to stop prior to each flight requires excessive time and exposes the trim system motors to unnecessary use.

1. Pitch Trim Indicator ..... COMPARE WITH STABILIZER SETTING NOTED DURING PREFLIGHT
2. Trim Select Switch ..... PILOT
3. Individual Pilot Trim Switches ..... ACTUATE BOTH DIRECTIONS/CHECK FOR NO STABILIZER MOVEMENT AND AURAL TRIM SIGNAL ON ONE SWITCH ONLY

WARNING

OPERATION OF THE TRIM SYSTEM SHOULD OCCUR ONLY BY MOVEMENT OF PAIRS OF SWITCHES. ANY MOVEMENT OF THE STABILIZER WHILE ACTUATING ONLY ONE SWITCH ON THE CONTROL WHEELS INDICATES A MALFUNCTION. FLIGHT SHOULD NOT BE INITIATED WITH ANY MALFUNCTION OF EITHER THE PILOT'S SYSTEM OR THE COPILOT'S SYSTEM.

SYSTEM CHECKS AND OPERATION (Continued)

STABILIZER TRIM SYSTEM (continued)

4. Both Pilot Trim Switches ..... ACTUATE BOTH DIRECTIONS/NOTE STABILIZER MOVEMENT AND AURAL TRIM SIGNAL
5. Trim Select Switch ..... OFF
6. Pilot Trim Switches, Auxiliary Trim Switch, and Copilot Trim Switches .....ACTUATE BOTH DIRECTIONS/CHECK FOR NO STABILIZER MOVEMENT AND NO AURAL TRIM SIGNAL
7. Trim Select Switch ..... COPILOT
8. Individual Copilot Trim Switches .....ACTUATE BOTH DIRECTIONS/CHECK FOR NO STABILIZER MOVEMENT AND AURAL TRIM SIGNAL ON ONE SWITCH ONLY
9. Both Copilot Trim Switches ..... ACTUATE BOTH DIRECTIONS/NOTE STABILIZER MOVEMENT AND AURAL TRIM SIGNAL
10. Auxiliary Trim Switch ..... ACTUATE BOTH DIRECTIONS/NOTE STABILIZER MOVEMENT AND AURAL TRIM SIGNAL
11. Trim Select Switch ..... PILOT
12. Stabilizer Trim ..... SET FOR TAKEOFF

OVERSPEED GOVERNOR

This check should be made (1) at intervals not to exceed 200 flight hours; (2) prior to any flight during which intentional airstarts are planned; (3) when there is any indication of overspeed governor malfunction; and (4) after any engine control system maintenance or adjustment.

During the Before Taxi check and before releasing the start locks, the overspeed governors may be checked as follows:

1. Brakes ..... SET
2. Speed Levers ..... HIGH
3. Power Levers .....ADVANCE UNTIL FURTHER MOTION CAUSES NO INCREASE IN FUEL FLOW OR RPM (RPM SHOULD BE 103% TO 105%)
4. Speed Levers ..... LOW RPM

CAUTION

- DO NOT ALLOW RPM TO EXCEED 106%.
- FAILURE OF THE START LOCKS DURING AN OVERSPEED GOVERNOR CHECK CAN RESULT IN A SUDDEN FORWARD "JUMP" OF THE AIRCRAFT. BEFORE PREFORMING OVERSPEED GOVERNOR CHECKS, THE PILOT SHOULD VERIFY THAT THE AREAS BEHIND AND AHEAD OF THE AIRCRAFT ARE CLEAR.

SYSTEM CHECKS AND OPERATION (continued)

SINGLE RED LINE COMPUTER/TEMP LIMITER

The single red line computer is checked during each application of high RPM and power. During takeoff checks observe the following:

1. As engine speed passes 80% RPM, check that the SRL OFF annunciator lights go out and that EGT's jump sharply.

2. Whenever power levers reach temp limiting position, check that temp limiting is indicated by illumination of both fuel bypass lights, and even EGT's, torques, and fuel flows.

NOTE

- Failure of an SRL OFF light to go out or other indications of SRL computer or temp limiting failure require discontinuance of the takeoff and subsequent troubleshooting.

- See page 3A-16 for inflight operating procedures with SRL/Temp Limiter Inoperative.

The following SRL/Temp Limiter checks are required (1) at intervals not to exceed 50 flight hours; (2) prior to any flight when manual engine start has been necessary; (3) when there is any indication of SRL/Temp Limiter malfunction; and (4) after any engine fuel control or SRL computer maintenance or adjustment.

WARNING

DO NOT TEST TEMP LIMITER IN FLIGHT. AT HIGH ALTITUDES FLAME OUT MAY RESULT.

Proper operation of the temp limiter and SRL circuits is assured by the following test: During the SRL test, the EGT difference between SRL ON and OFF for one engine is compared with EGT difference between SRL ON and OFF for the opposite engine.

1. Speed Levers ..... HIGH
2. Left Power Lever ..... ADVANCE TO 99.5% TO 100.5% RPM WITH PROPELLER ON START LOCKS
3. EGT ..... STABILIZE AND NOTE VALUE
4. Left SRL – Δ P/P Power Switch ..... Δ P/P OFF/NOTE A SLIGHT EGT INCREASE

SYSTEM CHECKS AND OPERATION (continued)

SINGLE RED LINE COMPUTER/TEMP LIMITER (continued)

If no increase is noted, system must be checked and corrected before further flight.

5. Left SRL – Δ P/P Power Switch ..... NORMAL
6. Left SRL – Δ P/P Power Switch ..... SRL OFF/NOTE CHANGE IN EGT VALUE/ L SRL OFF LIGHT ILLUMINATED

NOTE

- The change in EGT between engines SRL OFF and ON must not exceed 10°C.

Example:

Left Engine EGT		Right Engine EGT
400°C	SRL ON	395°C
330°C	SRL OFF	320°C
70°C	5°C Difference	75°C

- If 10°C difference is exceeded, the SRL System must be checked and corrected before further flight or operations must be conducted in accordance with Supplement 1.

7. Left SRL – Δ P/P Power Switch ..... NORMAL (L SRL OFF LIGHT EXTINGUISHED)
8. Temp Limiter Test Switch ..... L (NOTE RISE IN ENGINE EGT, DECREASE IN RPM, FUEL FLOW, AND ILLUMINATION OF FUEL BYPASS OPEN LIGHT)
9. Temp Limiter Test Switch ..... RELEASE (NOTE DECREASE IN EGT, RISE IN RPM, FUEL FLOW, AND FUEL BYPASS OPEN LIGHT OUT)
10. Left Power Lever ..... .GROUND IDLE
11. Repeat Steps 1 through 10 for right engine.
12. Speed Levers ..... LOW RPM

NOTE

If the temp limiter fails, pull the temp limiter circuit breaker. Operate the engine in accordance with the rules outlined in "TEMPERATURE LIMITER MALFUNCTIONS." (Section 3A, Abnormal Procedures.)

NTS SYSTEM

1. First Flight of Day – Check propeller govemor reset function by setting speed lever low and advancing power lever slowly. Note maximum stabilized RPM does not exceed 94.5%. RPM in excess of 94.5% indicates either improper propeller governor low setting or NTS system malfunction.

2. Every 250 Flight Hours – See Garrett Maintenance Manual 72-00-00, page 518A, NTS Trip System Check.

SYSTEM CHECKS AND OPERATION (continued)

VARIABLE AUTHORITY NOSE WHEEL STEERING SYSTEM

During Taxi

1. Nose Wheel Steering Arm Switch ..... ARMED
2. NWS Light ..... CHECK ON
   WITH RIGHT SPEED LEVER LOW
   NOTE STEERING AVAILABLE
3. Right Speed Lever ..... FORWARD OF LOW RPM
4. NWS Light ..... OFF
5. Nose Wheel Steering ..... NOTE INOPERATIVE
6. NWS Power Lever Button(s) ..... PRESS INDIVIDUALLY,
   NOTE STEERING AVAILABLE
   NWS LIGHT ON
7. NWS Power Lever Button(s) ..... RELEASE,
   NWS LIGHT OFF
   NOTE STEERING INOPERATIVE
8. Right Speed Lever ..... LOW RPM,
   NWS LIGHT ON,
   STEERING AVAILABLE
9. Test Switch ..... L,
   NOTE NWS LIGHT OFF,
   NWS FAIL LIGHT FLASHING
10. Nose Wheel Steering. ..... NOTE AUTO-DISENGAGEMENT
    AND REVERSION TO CASTER MODE
11. Test Switch ..... OFF
    NOTE NWS LIGHT ON,
    CHECK NORMAL STEERING
12. Repeat Steps 9 Through 11 for Right Test.
13. Nose Wheel Steering Arm Switch ..... VALVE TEST
    NOTE NWS LIGHT ON,
    NWS FAIL LIGHT OUT
14. Nose Wheel Steering ..... NOTE REVERSION TO CASTER MODE
15. Nose Wheel Steering Arm Switch ..... ARMED

NOTE

The green NWS light must extinguish each time nose wheel steering is deactivated by either the right speed lever switch, the test switch, the arm switch or release of the NWS power lever button(s).

SYSTEM CHECKS AND OPERATION (continued)

CONTINUOUS ALCOHOL-WATER INJECTION (CAWI) SYSTEM

The CAWI system is installed to provide increased power during takeoff operations at high weights and/or in hot weather at high altitudes. When the CAWI system is to be used during takeoff, perform the following Before Takeoff check;

1. AWI Quantity Gauge ..... CHECK

NOTE

Minimum CAWI fluid quantity, as indicated on the gauge, provides for Wet Takeoff and acceleration to V_{YSE} at 500 feet.

2. AWI Pump Test Switch ..... HOLD IN NO. 1 POSITION
3. AWI No 1 Pump Light ..... CHECK ON
4. AWI No 2 Pump Light ..... CHECK OFF

NOTE

- Illumination of the light corresponding to the pump test switch position indicates satisfactory pump pressure.
- Illumination of the opposite pump on light indicates a faulty check valve.
- The average flow rate of CAWI fluid to each engine is 2.4 U.S. gallons (9.1 liters) per minute.
- When operating on single engine during a continued wet takeoff, both CAWI pumps will continue to operate.

5. Repeat Steps 2 through 4 for No. 2 Pump.

SYSTEM CHECKS AND OPERATION (continued)

RESERVE POWER (RES PWR) SYSTEM (if installed)

The Reserve Power System provides increased maximum continuous power for emergency use during single engine operation. It is used to improve performance during a wet power takeoff that is continued after engine failure, and it may also be used during single engine en route driftdown, single engine approach climb, or any other single engine emergency encountered. Although reserve power is an alternate maximum continuous rating, it is not used for normal operations because it shortens the time between overhaul (TBO). When reserve power is used, additional time in service and engine cycles must be logged as specified in the Limitations Section. Annunciation of system operation is provided by a white light module located on the main instrument panel labeled RES PWR. A single, pedestal mounted lever-lock switch shares its position with the CAWI function.

Whenever takeoff performance based upon reserve power is used, the system should be checked as follows: Also see the Before Starting Engines (page 2-7) and Before Takeoff (page 2-12) checks.

BEFORE STARTING ENGINES

1. CAWI/RES PWR Switch ..... RES PWR
2. RES PWR Light ..... ON
3. Both EGT Indications ..... NOTE APPROXIMATE 20°C DROP

NOTE

During cold weather operations, the outside air temperature might be cold enough to preclude an EGT indication drop because the needle is resting on its instrument stop.

4. CAWI/RES PWR Switch ..... OFF

BEFORE TAKEOFF

1. Speed Levers ..... HIGH
2. CAWI/RES PWR Switch ..... RES PWR, CHECK:
   a. Both EGTs drop approximately 20°C
   b. Both torques increase slightly
   c. Both fuel flows increase slightly
   d. Reserve Power light (white) illuminates
3. CAWI/RES PWR Switch ..... OFF

NOTE

Use of Reserve Power imposes certain time and cycle penalties on the engines. See Limitations Section, page 1-6.

SYSTEM CHECKS AND OPERATION (continued)

ENGINE FIRE DETECTION AND EXTINGUISHING SYSTEM

The engine fire detection, extinguisher control, and the primary system test features are mounted centrally on the pilot's instrument panel. They consist of a red fire warning light for each engine; an amber empty light to indicate the condition of each extinguishing agent bottle; a green O.K. light to determine the status of each bottle cartridge; an extinguishing agent discharge switch incorporated into each annunciation cluster; and a system test button which permits preflight check of the annunciator bulbs and of electrical continuity to the bottle cartridges. Testing the fire detection system also illuminates the red L ENG FIRE and R ENG FIRE lights on the main annunciator panel. The annunciator/switch bulbs can be replaced by pulling the switch frames outward and exposing the bulbs.

NOTE

Pull both fire extinguisher circuit breakers prior to replacing bulbs in the fire extinguisher switches. Otherwise accidental discharge of the agent may occur when the switch is reinstalled in its housing.

Four fire detectors are located forward of the firewall in each engine nacelle. The detectors are heat sensitive, normally open switches which close when reaching their trigger points. Three of the detectors operate at approximately 450°F (232°C) and the other operates at approximately 600°F (316°C). When any switch closes, the red FIRE light illuminates. If the fire extinguisher switch guard is lifted and the switch is depressed, the agent is discharged from the respective bottle. The amber E light will illuminate and stay on, indicating that the bottle is empty. When engine area temperatures decrease to below the triggering temperature of the detectors, the switches will return to their open positions and the red FIRE lights should go out. Failure of either FIRE light to illuminate during annunciator panel tests indicates electrical discontinuity in the detector circuit of the appropriate engine nacelle and must be corrected prior to flight.

A fire extinguisher bottle is mounted aft of the firewall on the right side of each engine. The extinguishing agent is approximately 2.5 pounds (1.1 kg) of Halon 1301 in each bottle. The agent is propelled to critical areas of the engine by nitrogen at a pressure of approximately 600 psi (4137 kPa). Each bottle is equipped with a pressure gauge which is visible through a port in the engine nacelle. When the appropriate fire extinguisher switch on the instrument panel is pressed, an explosive cartridge at the base of the bottle fires and releases the agent. Each bottle serves its respective engine and there is no crossflow capability. Proper nitrogen pressure is shown in the following table.

FIRE EXTINGUISHER BOTTLE PRESSURE

Bottle Temperature °F (°C)	−40 (−40)	−20 (−29)	0 (−18)	+20 (−7)	+40 (4)	+60 (16)	+80 (27)	+100 (38)	+120 (49)
Bottle Pressure Range (PSI)	292 to 370	320 to 400	355 to 437	396 to 486	449 to 540	518 to 618	593 to 702	670 to 784	755 to 855

SYSTEM CHECKS AND OPERATION (continued)

CARGO DOOR SECONDARY WARNING AND TEST SYSTEM

A red DOOR UNSAFE light and a green SWITCHES NORMAL light are located at the forward end of the copilot's side panel. The adjacent spring-loaded test switch will cause the bulbs in both lights to illuminate when it is held in the LAMP TEST position. If the switch is held aft in the SWITCH TEST position, the SWITCHES NORMAL light will illuminate if all the following exist:

1. The cargo door latches have been withdrawn to the door open position.
2. All cargo door switches have extended to their relaxed (door open) positions.
3. The cargo door handle is not in the fully closed position.

The DOOR UNSAFE light will be illuminated whenever DC power is available to the system and either of the following conditions exists:

1. The cargo door handle is not in its fully closed position.
2. Any cargo door latch switch has not been compressed to its door closed position by its respective latch.

DC power to this system can be supplied from either the left essential bus (landing gear position circuit breaker) or from the auxiliary lights arming circuit. A test jack adjacent to the TEST switch is provided for troubleshooting the cargo door latching system.

During preflight the Cargo Door Secondary Warning and Test System should be checked as follows:

CARGO DOOR CLOSED AND LOCKED

1. DOOR SAFE and CARGO DOOR Annunciators ..... CHECK OFF
2. Test Switch ..... LAMP TEST/
   VERIFY DOOR UNSAFE & SWITCHES NORMAL LIGHTS ON
3. Test Switch ..... SWITCH TEST/
   VERIFY DOOR UNSAFE & SWITCHES NORMAL LIGHTS OUT

CARGO DOOR OPEN

1. DOOR UNSAFE and CARGO DOOR Annunciators ..... CHECK ON
2. Test Switch ..... SWITCH TEST/
   VERIFY SWITCHES NORMAL LIGHT ILLUMINATES

OXYGEN SYSTEM

Oxygen is supplied to a mask hose receptacle provided at each seat. Oxygen from the regulator at the bottle is supplied directly to the pilot and copilot oxygen mask hose receptacles which are located below the cockpit side windows. The pilot and copilot masks are diluter demand type with a normal or 100% flow selector. Passenger oxygen is either supplied to plug-in receptacles at each seat, or to overhead drop-out masks.

Either one or two supply bottles are located aft of the aft baggage compartment bulkhead. The standard bottle has a capacity of 49 cubic feet (1387 liters). Two optional installations are available. One provides a capacity of 115 cubic feet (3257 liters) in a single bottle. The other provides a total capacity of 179 cubic feet (5069 liters) by using a 115 cubic foot bottle plus a 64 cubic foot (1812 liters) bottle. Each oxygen supply bottle has a regulator which includes a manually operated shut-off valve.

Oxygen from the bottle(s) is plumbed directly to the pilot's and copilot's mask hose receptacles and to a passenger oxygen toggle control which may be located on the copilot's instrument panel or below the copilot's side window. The toggle control must be in the ON position in order for oxygen to flow through the continuous flow mask provided for each passenger. When the crew diluter demand masks are plugged in, oxygen is available to the crew, regardless of the position of the passenger oxygen toggle control.

NOTE

- Oxygen will not flow to any of the mask hose receptacles if the manually operated valve at the supply bottle(s) is in the OFF position.
- Figure 2-2 shows the oxygen duration available for the plug-in system, while Figure 2-3 shows the duration for the drop-out masks system. Both figures are for a system pressure of 1850 psi (12800 kPa) and bottle temperature of 70^{O}F (21^{O}C) (fully serviced).
- Oxygen system indicated pressure will vary with supply bottle temperature. See Figure 2-4.
- Figure 2-5 provides correction factors to be used when the various systems are partially serviced.

OXYGEN SYSTEM (continued)

PLUG-IN PASSENGER OXYGEN MASKS

If a passenger mask is plugged into a cabin receptacle and the toggle control is ON, oxygen will flow through the mask and receptacle until the mask hose is unplugged or the toggle control is turned OFF.

To use oxygen:

1. No Smoking Sign ..... ON
2. Oxygen Mask Hoses ..... CONNECTED
3. Passenger Oxygen Toggle Control ..... ON
4. Oxygen Masks ..... DON

See Figure 2-2 for oxygen duration.

DROP-OUT PASSENGER OXYGEN MASKS

Passenger oxygen mask deployment and oxygen flow from the supply bottle to the passengers' oxygen mask flow valves is controlled by a passenger oxygen toggle control located below the copilot's side window. When this control is turned ON, oxygen pressure causes the overhead oxygen mask compartment doors in the cabin to open. The masks will drop out and be suspended by lanyards. Each lanyard is attached to a flow valve in the mask compartment. When any mask is pulled further to be placed over the passenger's face, the lanyard opens its flow valve and oxygen flows to the mask. The passengers' masks are constant flow type. Oxygen will continue to flow through these masks until each flow valve is turned off manually or the passenger oxygen toggle control is turned off.

NOTE

Turning the passenger oxygen toggle control ON will cause passenger oxygen masks to deploy.

To use passenger oxygen:

1. No Smoking Sign ..... ON
2. Passenger Oxygen Toggle Control ..... ON
3. Oxygen Masks ..... PULL DOWN AND DON

See Figure 2-3 for oxygen duration.

OXYGEN SYSTEM (continued)

OXYGEN DURATION TABLES – PLUG-IN PASSENGER MASKS

NOTE

- Tables assume fully serviced bottle(s), constant flow passenger masks, and diluter demand crew masks. See Figures 2-4 and 2-5 for correction factor to use when system is partially serviced.
- Duration shown is in addition to a two hour supply for two pilots using 100% oxygen when above 20,000 feet, and normal flow oxygen when at or below 20,000 feet cabin pressure altitude. Passengers use continuous flow.

PLUG-IN – 49 CUBIC FOOT (1387 LITERS) SYSTEM

NUMBER OF PASSENGERS	HOURS DURATION AT CABIN PRESSURE ALTITUDE (FEET)							
	15,000		20,000		25,000		31,000	
	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS
4	38	0.63	54	0.91	39	0.66	55	0.92
6	25	0.42	36	0.61	26	0.44	37	0.61
8	19	0.31	27	0.45	20	0.33	28	0.46
10	15	0.25	22	0.36	16	0.26	22	0.37
12	12	0.21	18	0.30	13	0.22	18	0.31
14	11	0.18	16	0.26	11	0.19	16	0.26
16	9	0.16	14	0.23	10	0.16	14	0.23
18	8	0.14	12	0.20	9	0.15	12	0.20
19	8	0.13	12	0.19	8	0.14	12	0.19

PLUG-IN – 115 CUBIC FOOT (3257 LITERS) SYSTEM

NUMBER OF PASSENGERS	HOURS DURATION AT CABIN PRESSURE ALTITUDE (FEET)							
	15,000		20,000		25,000		31,000	
	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS
4	158	2.64	179	2.98	158	2.64	186	3.09
6	109	1.81	119	1.99	109	1.81	124	2.06
8	83	1.38	90	1.50	83	1.38	93	1.55
10	65	1.09	72	1.20	65	1.09	74	1.24
12	54	0.90	59	0.99	54	0.90	62	1.03
14	46	0.76	51	0.85	46	0.76	53	0.88
16	40	0.66	46	0.76	40	0.66	46	0.77
18	35	0.59	40	0.66	35	0.59	41	0.69
19	34	0.56	38	0.63	34	0.56	39	0.65

PLUG-IN – 179 CUBIC FOOT (5069 LITERS) SYSTEM

NUMBER OF PASSENGERS	HOURS DURATION AT CABIN PRESSURE ALTITUDE (FEET)							
	15,000		20,000		25,000		31,000	
	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS
4	274	4.57	298	4.97	287	4.78	310	5.17
6	183	3.05	199	3.32	191	3.19	207	3.45
8	137	2.29	149	2.49	143	2.39	155	2.59
10	110	1.83	119	1.99	115	1.91	124	2.07
12	92	1.52	99	1.66	96	1.59	103	1.72
14	79	1.31	85	1.42	82	1.37	89	1.48
16	69	1.14	75	1.24	72	1.20	78	1.29
18	61	1.02	67	1.11	64	1.06	69	1.15
19	58	0.96	83	1.05	61	1.01	65	1.03

FIGURE 2-2

OXYGEN SYSTEM (continued)

OXYGEN DURATION TABLES – DROP-OUT PASSENGER MASKS

NOTE

- Tables assume fully serviced bottle(s), constant flow passenger masks, and diluter demand crew masks. See Figures 2-4 and 2-5 for correction factor to use when system is partially serviced.
- Duration shown is in addition to a two hour supply for two pilots using 100% oxygen when above 20,000 feet, and normal flow oxygen when at or below 20,000 feet cabin pressure altitude. Passengers use continuous flow.

DROP-OUT – 49 CUBIC (1387 LITERS) FOOT SYSTEM

NUMBER OF PASSENGERS	HOURS DURATION AT CABIN PRESSURE ALTITUDE (FEET)							
	15,000		20,000		25,000		31,000	
	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS
4	38	0.63	54	0.90	39	0.64	54	0.89
6	25	0.42	36	0.60	26	0.43	36	0.59
8	19	0.32	27	0.45	19	0.32	27	0.45
10	15	0.25	22	0.36	15	0.26	21	0.36
12	13	0.21	18	0.30	13	0.21	18	0.30
14	11	0.18	15	0.26	11	0.18	15	0.25
16	10	0.16	14	0.22	10	0.16	13	0.22
18	8	0.14	12	0.20	9	0.14	12	0.20
19	8	0.13	11	0.19	8	0.14	11	0.19

DROP-OUT – 115 CUBIC FOOT (3257 LITERS) SYSTEM

NUMBER OF PASSENGERS	HOURS DURATION AT CABIN PRESSURE ALTITUDE (FEET)							
	15,000		20,000		25,000		31,000	
	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS
4	155	2.59	173	2.88	160	2.66	177	2.94
6	104	1.73	115	1.92	106	1.77	118	1.96
8	78	1.29	86	1.44	80	1.33	88	1.47
10	62	1.04	69	1.15	64	1.06	71	1.18
12	52	0.86	58	0.96	53	0.89	59	0.98
14	44	0.74	49	0.82	45	0.76	50	0.84
16	39	0.65	43	0.72	40	0.66	44	0.74
18	35	0.58	38	0.64	35	0.59	39	0.65
19	33	0.55	36	0.61	34	0.56	37	0.62

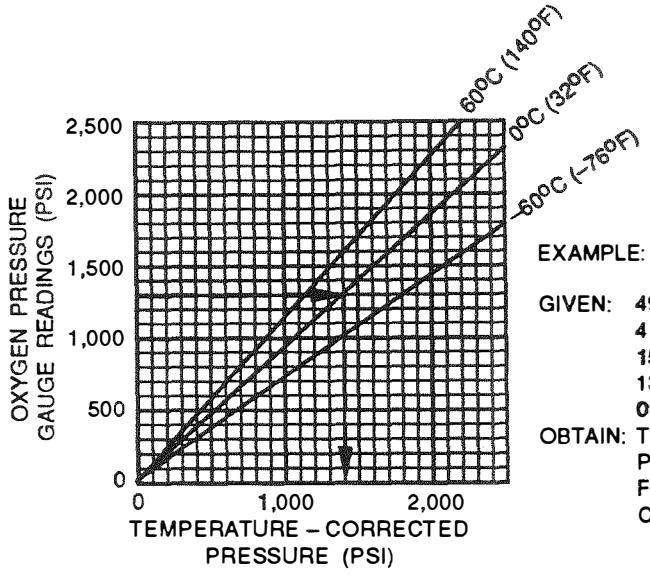
DROP-OUT – 179 CUBIC FOOT (5069 LITERS) SYSTEM

NUMBER OF PASSENGERS	HOURS DURATION AT CABIN PRESSURE ALTITUDE (FEET)							
	15,000		20,000		25,000		31,000	
	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS	MIN.	HOURS
4	268	4.47	287	4.79	275	4.59	295	4.91
6	179	2.98	192	3.19	192	3.19	196	3.27
8	134	2.23	144	2.39	144	2.39	147	2.45
10	107	1.79	115	1.92	115	1.92	118	1.96
12	89	1.49	96	1.60	96	1.60	98	1.64
14	77	1.28	82	1.37	82	1.37	84	1.40
16	67	1.12	72	1.20	72	1.20	74	1.23
18	60	0.99	64	1.06	64	1.06	65	1.09
19	56	0.94	60	1.01	60	1.01	62	1.03

FIGURE 2-3

OXYGEN SYSTEM (continued)

OXYGEN PRESSURE CORRECTION FOR BOTTLE TEMPERATURE



EXAMPLE:

GIVEN: 49 CU. FT. SYSTEM WITH PLUG-IN MASKS
4 PASSENGERS
15,000 FEET CABIN ALTITUDE
1300 PSI GAUGE READING
0°C OXYGEN BOTTLE TEMPERATURE

OBTAIN: TEMPERATURE CORRECTED PRESSURE = 1400 PSI (FIG. 2–4)
PARTIAL CHARGE CORRECTION FACTOR = 0.35 (FIG. 2–5)
FULL CHARGE DURATION = 0.63 HOURS (FIG. 2–2)
CORRECTED DURATION = 0.35 x 0.63 = 0.22 HOURS

FIGURE 2-4

OXYGEN DURATION CORRECTION FOR PARTIALLY CHARGED OXYGEN BOTTLE(S)

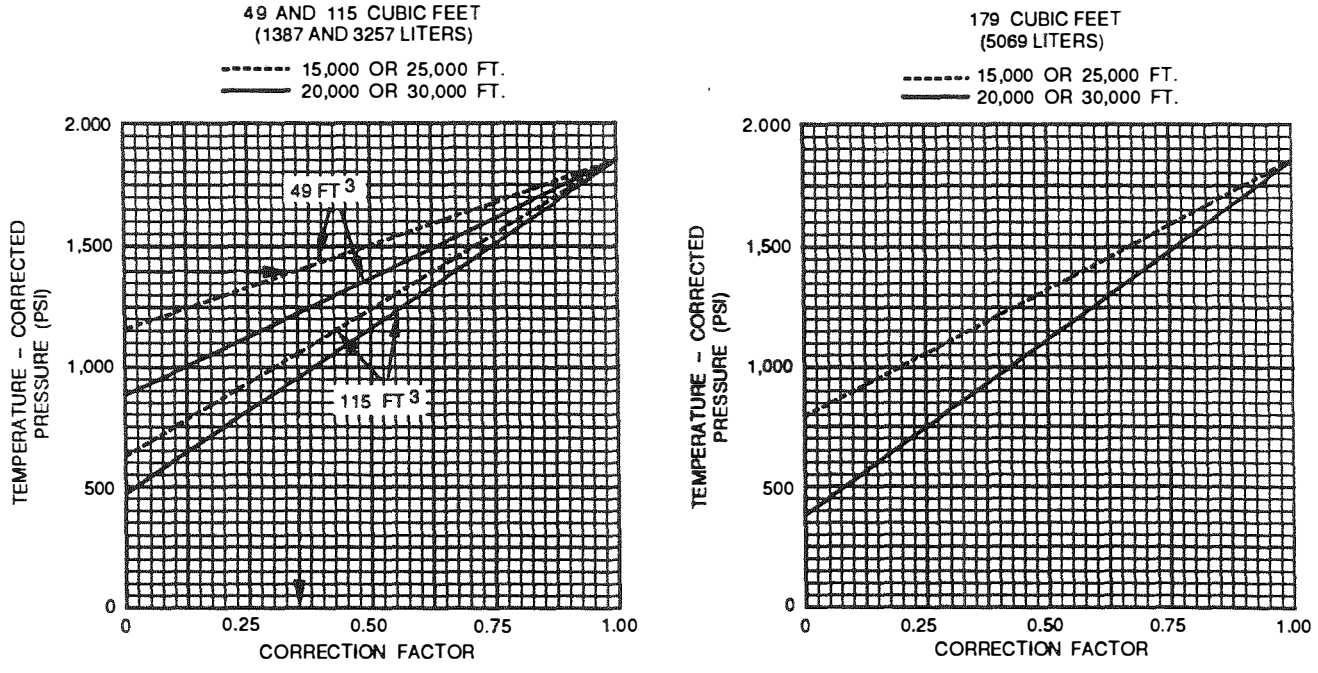


FIGURE 2-5

OPERATIONS IN ICING CONDITIONS

The METRO 23 SA227-DC is certified for operations in icing conditions. With the exception of the wing deice boots, all ice protection systems on the aircraft are anti-ice systems that require activation prior to entering icing conditions (visible moisture and OAT below 5^{0}C.)

NOTE

IOAT may be as much as 10^{0}C higher than actual OAT during high speed, high altitude flight due to compressibility and temperature probe system errors. See Section 4 to determine OAT during flight.

PREFLIGHT CHECKS

When icing conditions are anticipated during flight, accomplish the following Ice Protection Systems checks before takeoff.

CONTINUOUS IGNITION SYSTEM

1. Ignition Switches ..... CONT
2. Ignition Lights ..... CHECK ON
3. Ignition Switches ..... AS REQUIRED

DEICE BOOTS

1. Deice Boots Switch ..... AUTO
2. Deice Pressure ..... CHECK 12 TO 19 PSI

NOTE

Visually check wing boot operation and observe deice pressure fluctuation as tail boots actuate. Allow one full cycle of the timer (approximately three minutes).

3. Deice Boots Switch ..... OFF

PITOT & SAS HEAT

1. Pitot Heat Switches ..... PITOT & SAS HEAT

CAUTION

EXTENDED GROUND OPERATION WILL DAMAGE THE PITOT & SAS HEATING ELEMENTS.

PREFLIGHT CHECKS (continued)

PITOT & SAS HEAT (continued)

2. Pitot Heat Loadmeter (L & R) ..... CHECK IN GREEN
3. SAS DEICE Annunciator ..... CHECK ON

NOTE

Selecting PITOT & SAS HEAT on either pitot heat switch will activate the respective SAS vane and pitot heaters, but both switches must be in the PITOT & SAS position to illuminate the SAS DEICE annunciator.

4. Pitot Heat Switches ..... AS REQUIRED

ENGINE AND PROPELLER HEAT

1. Speed Levers ..... LOW RPM
2. Power Levers ..... GROUND IDLE
3. Heat Switches ..... ENGINE & PROP HEAT

CAUTION

- DO NOT OPERATE EITHER THE PROPELLER DEICE BOOTS OR THE OIL COOLER DUCT HEAT WHEN THE PROPELLERS ARE STATIC.

- RESTRICT GROUND OPERATION OF ENGINE INTAKE HEAT TO A MAXIMUM OF TEN SECONDS WHEN OAT IS ABOVE $+5^{O}C$.

NOTE

EGT will increase and torque will decrease slightly when engine intake heat is activated.

4. L/R INTAKE HT Annunciators ..... CHECK ON
5. Heat Switches ..... PROP & DUCT
6. Eng Intake Heat Test Buttons ..... PRESS MOMENTARILY/ CHECK INTAKE HT LIGHTS ILLUMINATE

NOTE

Whenever engine intake heat is tumed off, the bleed air valve position should be verified by pressing the test buttons. Illumination of the respective INTAKE HT annunciator indicates the valve is closed.

PREFLIGHT CHECKS (continued)

ENGINE AND PROPELLER HEAT (continued)

7. L/R INTAKE HT Annunciators ..... CHECK OFF
8. Propeller Deice Loadmeter ..... CHECK IN GREEN BAND

NOTE

Monitor the loadmeter in both L & R position for at least one minute. A small momentary deflection approximately every 30 seconds indicates proper system operation.

9. Duct Heat Lights & Generator Loads ..... CHECK INTERMITTENT ILLUMINATION AND INCREASED LOADS
10. Heat Switches ..... AS REQUIRED

WINDSHIELD HEAT

1. Windshield Heat Switch ..... CHECK HIGH/SET LOW
2. L/R W/S HT Annunciators ..... CHECK ON (OR CYCLING)

FLIGHT IN ICING CONDITIONS (In visible moisture and OAT below +5^{O}C)

Ice will accumulate in low pressure areas (such as the engine inlets) before it is visible to the pilot on the windshield wipers and wing leading edges. The following anti-ice systems should be used continuously anytime visible moisture (rain, fog, clouds, snow, ice pellets, etc) is encountered and the OAT is below 5^{O}C.

NOTE

If actual ice is encountered before the anti-ice systems are activated, refer to Inadvertent Icing Encounter in Section 3A.

PITOT & SAS VANE HEAT

1. Pitot Heat Switches ..... PITOT & SAS HEAT
2. Pitot Heat Loadmeter ..... CHECK L & R
3. SAS DEICE Annunciator ..... CHECK ON

FLIGHT IN ICING CONDITIONS (In visible moisture and OAT below +5°C) (continued)

WINDSHIELD HEAT

1. Windshield Heat Switch ..... LOW OR HIGH (AS REQUIRED)
2. W/S HEAT Annunciators ..... CHECK ON (OR CYCLING)

IGNITION

1. Ignition Switches ..... CONT
2. IGN Lights ..... CHECK ON

ENGINE & PROPELLER HEAT

1. Heat Switches ..... ENGINE & PROP HEAT

NOTE

- It is recommended that continuous ignition be activated before activating Engine Heat.
- EGT will increase slightly and torque will decrease slightly when Engine Heat is activated.

2. L/R INTAKE HT Annunciators ..... CHECK ON
3. Propeller Deice Loadmeter ..... CHECK L & R
4. DUCT HT CYCL Lights ..... MONITOR

NOTE

The Generator Loadmeters will increase up to 30 amps each time an oil cooler duct anti-ice boot cycles on.

5. Deice Boots Switch ..... MANUAL/AS REQUIRED

CAUTION

- ALLOW 1/2 TO 1 INCH (13 TO 25MM) OF ICE TO ACCUMULATE BEFORE ACTIVATING THE DEICE BOOTS.
- WHEN USING THE AUTOMATIC DEICE BOOT SYSTEM, ICE ACCUMULATION MUST BE SUCH THAT 1/2 TO 1 INCH (13 TO 25MM) OF ICE ACCUMULATES BETWEEN EACH AUTOMATIC CYCLE OF THE BOOTS (APPROX EVERY 3 MINUTES).

DEPARTING ICING CONDITIONS

1. Deice Boots Switch ..... OFF
2. ENGINE & PROP HEAT Switches ..... OFF

NOTE

Whenever engine intake heat is turned off, the bleed air valve position should be verified by pressing the test buttons. Illumination of the respective INTAKE HT annunciator indicates the valve is closed.

3. Ignition Switches ..... AUTO

WARNING

ENGINE HEAT AND CONTINUOUS IGNITION MUST BE USED AFTER LEAVING ICING CONDITIONS UNTIL THE PILOT IS CONFIDENT THAT ANY RESIDUAL ICE ON THE PROPELLERS, SPINNERS, INTAKE LIPS, OR INTAKE THROATS WILL NOT BE SHED AND INGESTED INTO THE ENGINES.

4. Pitot Heat Switches ..... AS REQUIRED

WARNING

WHENEVER THERE ARE ICE ACCUMULATIONS ON THE FLYING SURFACES OF THE AIRPLANE, THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN DURING APPROACH AND LANDING:

1. **WITH WET POWER OPERATION INCREASE V_{MCA} BY 11 KIAS.**

   WITH DRY POWER OPERATION INCREASE V_{MCA} BY 9 KIAS.

2. **USE THE LANDING APPROACH SPEEDS SHOWN IN FIGURE 4H-6.**

3. **LIMIT LANDING APPROACH ANGLE TO A MAXIMUM OF 3 DEGREES IN ORDER NOT TO REQUIRE HIGH ROTATION RATES DURING LANDING FLARE.**

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INTRODUCTION

Section 3 of this manual covers emergencies that might occur during ground or flight operation and the recommended procedures for correcting the situations. The emergency situations covered are placed in the order of most serious first, i.e., Fires, Engine Failure, etc. The immediate action items, which must be performed first, are in bold capital letters with the remaining steps (clean up procedures) following. Expanded procedures are covered in this section. Procedures identified by an asterisk are those recommended to be accomplished by the copilot during two pilot operations. The emergency procedures in this section have been FAA approved.

NOTE

- Overcoming emergencies successfully depends upon the pilot's sound judgement and thorough knowledge of the aircraft systems and equipment.

- In case of emergency:

  1. Maintain aircraft control.
  2. Analyze the situation. Then take proper action to correct it.
  3. If the difficulty has occurred during flight, land as soon as conditions permit.

ANNUNCIATOR PANEL

The functions of the annunciator panel red lights are shown in the following table.

LIGHT ILLUMINATED	INDICATES THAT
L or R ENG FIRE	Corresponding engine fire detector has sensed excessive temperature within the nacelle. Corresponding warning light in extinguishing agent discharge switch should also illuminate. See page 3-3.
L or R WING OVHT	a. Steady light: There is a bleed air leak in the corresponding wheelwell or cabin conditioned air duct. See page 3-14. b. Flashing light: There is a bleed air leak or excessively hot wire in the corresponding wing leading edge. See page 3-14.
L or R OIL PRESS(URE)	Corresponding engine oil pressure is less than 40 psi (276 kPa).
L or R HYDR PRESS	Output from corresponding hydraulic pump is less than approximately 1,650 psi (11380 kPa). See page 3-18.
CABIN ALT(ITUDE)	Cabin altitude is above 9,500 feet. See page 3-15.
GEAR DOOR (POSITION)	At least one of the main landing gear doors is not closed securely when on the ground. Do not take off.
CABIN or CARGO DOOR	Corresponding door is not closed securely. See page 3-17.
BAT(TERY) FAULT	A fault has been detected in the battery feeder circuit. Both batteries will disconnect. See page 3A-7.

ENGINE FIRE ON GROUND

1. ENGINE STOP AND FEATHER CONTROL (affected engine) ..... PULL
2. ENGINE STOP BUTTON (affected engine) ..... PRESS
3. FUEL SHUTOFF SWITCH (affected engine) ..... CLOSED
4. HYDRAULIC SHUTOFF SWITCH (affected engine) ..... CLOSED
5. FIRE EXTINGUISHER SWITCH (affected engine) ..... PRESS
6. Generator Switch (affected engine) ..... OFF

NOTE

Use of start test with respective generator switch ON may cause a battery fault and subsequent loss of ability to motor the engine.

7. Starter Test Switch (affected engine) ..... ENGAGE
8. Fuel Boost Pump Switch (affected engine) ..... OFF
9. Auto/Cont Ignition Switch (affected engine) ..... OFF
10. Affected Engine ..... MOTOR UNTIL ENGINE IS CLEARED

ENGINE FIRE IN FLIGHT

1. ENGINE STOP AND FEATHER CONTROL (affected engine) ..... PULL
2. FUEL SHUTOFF SWITCH (affected engine) ..... CLOSED
3. HYDRAULIC SHUTOFF SWITCH (affected engine) ..... CLOSED
4. FIRE EXTINGUISHER SWITCH (affected engine) ..... PRESS
5. Fuel Boost Pump Switch (affected engine) ..... OFF
6. Generator Switch (affected engine) ..... OFF
*7. Bleed Air Switch (affected engine) ..... OFF
8. Auto/Cont Ignition Switch (affected engine) ..... OFF
9. Power Levers ..... AS REQUIRED

NOTE

The SAS advancement circuit is active only when both power levers are advanced.

*10. Bleed Air (operating engine) ..... AS REQUIRED

NOTE

If the max continuous power limit is not being developed and bleed air is on, increased power may be obtained by selecting bleed air off.

11. Trim ..... AS REQUIRED
12. Generator (operating engine) ..... 300 AMPS MAXIMUM
*13. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING
14. Reserve Power (if installed) ..... AS REQUIRED

ENGINE FAILURE DURING TAKEOFF – TAKEOFF ABORTED

1. **POWER LEVERS** ..... **GROUND IDLE**

NOTE

Retard power levers to ground idle as directional control permits. Retarding the power lever of the operating engine from flight idle to ground idle will cause the airplane to yaw toward the operating engine.

2. **BRAKES** ..... **AS REQUIRED**
3. Nose Wheel Steering ..... AS REQUIRED
4. Reverse Thrust (operating engine) ..... AS REQUIRED

CAUTION

REVERSE THRUST ON THE OPERATING ENGINE WILL CAUSE A YAWING MOMENT TOWARD THE OPERATING ENGINE WHICH IS PROPORTIONAL TO THE AMOUNT OF REVERSE THRUST APPLIED. ON WET OR ICY RUNWAYS, IT IS POSSIBLE TO APPLY MORE ASYMMETRIC REVERSE THRUST THAN CAN BE COUNTERACTED BY OPPOSITE BRAKE, RUDDER, AND NOSE WHEEL STEERING.

5. Engine Stop and Feather Control (failed engine) ..... PULL
6. Engine Clean Up Procedure (failed engine)
   a. Fuel shutoff switch ..... CLOSED
   b. Hydraulic shutoff switch ..... CLOSED
   c. Fuel boost pump switch ..... OFF
   d. Generator switch ..... OFF
   *e. Bleed air switch ..... OFF
   f. Auto/cont ignition switch ..... OFF
7. CAWI/RES PWR Switch (If Installed) ..... OFF

   OR

   Water Injection Switch (If Installed) ..... OFF

ENGINE FAILURE DURING TAKEOFF – TAKEOFF CONTINUED AT OR ABOVE V_1 (DRY OR WET POWER)

1. TAKEOFF POWER SETTING ..... CHECK

NOTE

Commanding high propeller blade angle by keeping the power lever of the inoperative engine well forward will reduce windmilling propeller drag in the event that NTS failure accompanies engine failure.

2. V_R SPEED ..... ROTATE
(CLIMB AT V_2 SPEED)

***3. LANDING GEAR (after lift-off) ..... UP**

WARNING

IF THE ENGINE FAILURE IS ACCOMPANIED BY A LEFT ESSENTIAL BUS FAILURE (AS INDICATED BY LOSS OF POWER TO THE GEAR POSITION INDICATOR) THE LANDING GEAR WILL NOT RETRACT UNTIL THE LANDING GEAR CONTROL ESSENTIAL BUS POWER TRANSFER IS MOVED TO THE RIGHT BUS POSITION.

***4. ENGINE STOP AND FEATHER CONTROL (failed engine) ..... PULL**
5. FLAPS (at acceleration altitude and V_2 +5 KIAS) ..... UP
6. MAX CONTINUOUS POWER (at V_{YSE}) ..... SET
(CLIMB AT V_{YSE})
(SEE FIG 4F-1 OR 4F-2)

NOTE

- During continued takeoff with wet power, use of CAWI may be continued during climb at V_{YSE}. However, the 5 minute limit for wet power should not be exceeded.
- If bleed air is on and max continuous power limit is not being achieved, increased power may be obtained by turning bleed air off.

7. Engine Clean Up Procedure (failed engine)
   a. Fuel shutoff switch ..... CLOSED
   b. Hydraulic shutoff switch ..... CLOSED
   c. Fuel boost pump switch ..... OFF
   d. Generator switch ..... OFF
   *e. Bleed air switch ..... OFF
   f. Auto/cont ignition switch ..... OFF
8. Trim ..... AS REQUIRED
9. Generator (operating engine) ..... 300 AMPS MAXIMUM
*10. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING
11. CAWI/RES PWR Switch (If installed) ..... AS REQUIRED

OR

Water Injection Switch (If installed) ..... AS REQUIRED

ENGINE FAILURE DURING TAKEOFF – TAKEOFF CONTINUED AT OR ABOVE V_1 (WET WITH RESERVE POWER)

1. **TAKEOFF POWER SETTING** ..... **CHECK**

NOTE

Commanding high propeller blade angle by keeping the power lever of the inoperative engine well forward will reduce windmilling propeller drag in the event that NTS failure accompanies engine failure.

2. **V_R SPEED** ..... **ROTATE**
   (CLIMB AT V_2 SPEED)
*3. **LANDING GEAR (after lift-off)** ..... **UP**

WARNING

IF THE ENGINE FAILURE IS ACCOMPANIED BY A LEFT ESSENTIAL BUS FAILURE (AS INDICATED BY LOSS OF POWER TO THE GEAR POSITION INDICATOR) THE LANDING GEAR WILL NOT RETRACT UNTIL THE LANDING GEAR CONTROL ESSENTIAL BUS POWER TRANSFER IS MOVED TO THE RIGHT BUS POSITION.

*4. **ENGINE STOP AND FEATHER CONTROL (failed engine)** ..... **PULL**
5. **FLAPS (at acceleration altitude and V_2 +5 KIAS)** ..... **UP**
6. **CAWI/RES PWR SWITCH (at V_{YSE})** ..... **RES PWR**

NOTE

During continued takeoff with wet power, use of CAWI may be continued during climb at V_{YSE}. However, the 5 minute limit for wet power should not be exceeded.

7. **RESERVE POWER TORQUE (at V_{YSE})** ..... **SET**
   (CLIMB AT V_{YSE})
   (SEE FIG 4E-2)

NOTE

Use of Reserve Power imposes certain time and cycle penalties on the engines. (See page 1-6.)

8. Engine Clean Up Procedure (failed engine)
   a. Fuel shutoff switch ..... CLOSED
   b. Hydraulic shutoff switch ..... CLOSED
   c. Fuel boost pump switch ..... OFF
   d. Generator switch ..... OFF
   e. Auto/cont ignition switch ..... OFF
9. Trim ..... AS REQUIRED
10. Generator (operating engine) ..... 300 AMPS MAXIMUM
*11. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING
12. CAWI/RES PWR Switch ..... AS REQUIRED

ENGINE FAILURE DURING FLIGHT

1. **ENGINE STOP AND FEATHER CONTROL (failed engine) ..... PULL**
2. Engine Clean Up Procedure (failed engine)
   - a. Fuel shutoff switch ..... CLOSED
   - b. Hydraulic shutoff switch ..... CLOSED
   - c. Fuel boost pump switch ..... OFF
   - d. Generator switch ..... OFF
   - *e. Bleed air switch ..... OFF
   - f. Auto/cont ignition switch ..... OFF
3. Power Levers ..... AS REQUIRED
*4. Bleed Air (operating engine) ..... AS REQUIRED

NOTE

- If the max continuous power limit is not being developed and bleed air is on, increased power may be obtained by selecting bleed air off.

- Enhanced performance may be obtained by selecting Reserve Power (if installed). Ensure RPM is at 100%. Certain limitations apply to its use (see page 1-6). En route single engine driftdown performance is presented in Manufacturer's Data (see page 6A-5).

5. Trim ..... AS REQUIRED
6. Generator (operating engine) ..... 300 AMPS MAXIMUM
*7. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING
8. Reserve Power (if installed) ..... AS REQUIRED

AIRSTART

CAUTION

IF AN ENGINE HAS BEEN SHUT DOWN BECAUSE OF AN OBVIOUS FAILURE, AS INDICATED BY THE ENGINE INSTRUMENTS OR EXCESSIVE VIBRATION, AN AIRSTART SHOULD NOT BE ATTEMPTED. AIRSTART FOLLOWING INTENTIONAL ENGINE SHUTDOWN IS COVERED IN SECTION 3A, ABNORMAL PROCEDURES.

INFLIGHT RELIGHT

CAUTION

- THIS PROCEDURE IS INTENDED FOR USE DURING FLIGHT ONLY.
- ATTEMPTED USE OF THIS PROCEDURE WHILE ON THE GROUND WITH LIMITED AIRFLOW THROUGH THE ENGINE COULD RESULT IN ENGINE OVER-TEMPERATURES.
- THIS PROCEDURE IS INTENDED FOR USE ONLY WHEN THE REASON FOR THE INADVERTENT FLAMEOUT IS KNOWN WITH CERTAINTY AND WHEN THE PILOT IS CERTAIN THAT A RELIGHT WILL NOT AGGRAVATE THE CONDITION.

1. Power Lever ..... APPROXIMATELY 1/4 INCH (6 mm) FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
2. Speed Lever ..... APPROXIMATELY 97% RPM
3. Airspeed ..... BETWEEN 180 AND 100 KIAS
4. Engine Start Button ..... PRESS

NOTE

- Press the start button in only long enough to obtain ignition and fuel flow and subsequent light-off.
- If RPM has decayed below 10%, the start button will have to be held in while the unfeathering pump drives the propeller blades to finer pitch and RPM increases to above 10%. Ignition, fuel flow, and light-off should then occur.
- Engine relight will not occur if the SRL computer speed switch function has failed or if the SRL– Δ P/P switch is in the OFF position.

5. EGT ..... MONITOR (770^{O}C MAX)
6. RPM ..... STABILIZED
7. SRL OFF Light ..... CHECK OFF
8. Power ..... RESET AS REQUIRED

NOTE

Engine relight should be expected to occur automatically if the Auto/Cont Ignition Switch is in AUTO and fuel is available at the igniters.

SINGLE ENGINE LANDING

SINGLE ENGINE DESCENT

1. Altimeters ..... SET
2. Cabin Pressurization ..... SET

NOTE

Set cabin altitude and rate controls to insure zero cabin differential at touchdown.

*3. Cabin Signs ..... AS REQUIRED
4. Fuel Quantity/Balance ..... CHECK

NOTE

If excess fuel imbalance is indicated by fuel quantity gauge and/or aileron trim position, balance fuel by utilizing the fuel crossflow.

5. Fuel Crossflow Valve ..... CLOSED
6. Electrical Load ..... TURN OFF NONESSENTIAL ITEMS
7. Ice Protection Systems/Ignition Switches ..... AS REQUIRED
8. Exterior Lights ..... AS REQUIRED

SINGLE ENGINE BEFORE LANDING

1. Landing Data ..... CONFIRM/MARKERS SET

NOTE

Compute landing distance by adding 66% to two engine landing distance shown in Figure 4G-4.

2. Exterior and Interior Lights ..... AS REQUIRED
3. Speed Lever (operating engine) ..... HIGH
4. Flaps ..... 1/4 (UNTIL LANDING IS ASSURED)

NOTE

Flaps should be set at 1/4 until landing is assured. 1/4 flap approach speed is approximately 10 KIAS greater than full flap approach speed. After landing is assured, full flaps should be lowered and the aircraft slowed to the two engine approach speed shown in Figure 4G-4.

5. Landing Gear, Hydraulic Pressure, and Indicators ..... DOWN/CHECK

SINGLE ENGINE LANDING (continued)

SINGLE ENGINE BEFORE LANDING (continued)

6. Nose Wheel Steering ..... CHECK

NOTE

Press the NWS power lever button momentarily to check that the NWS light comes on, verifying normal system operation prior to touchdown.

7. Ice Protection Systems/Ignition Switches/Bleed Air Switch ..... AS REQUIRED

NOTE

Turn engine anti-ice and/or bleed air off as required to achieve single engine go-around performance (Figure 4G-1, 4G-2 or 4G-3).

AFTER TOUCHDOWN

1. Brakes ..... AS REQUIRED
2. Nose Wheel Steering ..... AS REQUIRED
3. Power Levers ..... GROUND IDLE

NOTE

Retard power levers to ground idle as directional control permits. Retarding the power lever of the operating engine from flight idle to ground idle will cause the airplane to yaw toward the operating engine.

4. Reverse Thrust ..... AS REQUIRED

CAUTION

REVERSE THRUST ON THE OPERATING ENGINE WILL CAUSE A YAWING MOMENT TOWARD THE OPERATING ENGINE WHICH IS PROPORTIONAL TO THE AMOUNT OF REVERSE THRUST APPLIED. ON WET OR ICY RUNWAYS, IT IS POSSIBLE TO APPLY MORE ASYMMETRIC REVERSE THRUST THAN CAN BE COUNTERACTED BY OPPOSITE BRAKE, RUDDER, AND NOSE WHEEL STEERING.

SINGLE ENGINE GO-AROUND

CAUTION

- THE FOLLOWING PROCEDURE ASSUMES THAT THE SINGLE ENGINE GO-AROUND BEGINS WITH GEAR DOWN, FLAPS NO MORE THAN 1/4 DOWN, AND AIRSPEED AT OR HIGHER THAN APPROACH SPEED.
- PERFORMANCE AND CONTROL LIMITATIONS WITH GREATER THAN 1/4 FLAPS AND/OR GEAR DOWN MAY PRECLUDE SUCCESSFUL SINGLE ENGINE GO-AROUND.
- MAXIMUM LANDING WEIGHT DETERMINED IN ACCORDANCE WITH FIGURE 4G-1, 4G-2 OR 4G-3 INSURES A SINGLE ENGINE CLIMB GRADIENT OF AT LEAST 2.1% WITH FLAPS 1/4, GEAR UP, AND TAKEOFF POWER AT A SPEED DETERMINED FROM FIGURE 4G-4.

1. CAWI/RES PWR Switch (if installed) ..... AS REQUIRED
2. Power ..... TAKEOFF (DRY OR WET) OR AS REQUIRED

NOTE

Operation with takeoff power is limited to five minutes.

3. Landing Gear ..... UP

NOTE

Climb at two engine (full flap) approach speed.

4. Flaps (Clear of Obstacles and Approach Speed +5 KIAS) ..... UP
5. Airspeed ..... V_{YSE} (SEE FIGURE 4F-1 OR 4F-2)

NOTE

V_{YSE} is approximately 18 KIAS greater than approach speed.

6. CAWI/RES PWR Switch (if installed) ..... AS REQUIRED
7. Max Continuous Power (Climb at V_{YSE}) ..... SET

ENGINE CONTROL MALFUNCTION

Upon indication of improper operation of a fuel control or propeller control, it is recommended that the affected engine be shut down and a single engine landing accomplished.

BATTERY TEMPERATURE CAUTION/WARNING LIGHTS ON

NOTE

- The amber caution light illuminates if either battery temperature reaches 120°.
- The red warning light illuminates if either battery temperature reaches 150°.

AMBER CAUTION LIGHT ILLUMINATES

1. Before Engine Start ..... DO NOT MAKE BATTERY START

NOTE

Either obtain GPU or wait until the batteries have cooled.

2. After Engine Start ..... MONITOR BATTERY TEMPERATURE INDICATOR AND GENERATOR LOADS
3. Temperature Increasing to 140°F ..... DO NOT TAKE OFF
4. Temperature Increasing Above 140°F ..... AFFECTED BATTERY SWITCH OFF
5. In Flight ..... MONITOR BATTERY TEMPERATURE INDICATOR AND GENERATOR LOADS/AFFECTED BATTERY SWITCH OFF IF REQUIRED

RED WARNING LIGHT ILLUMINATES (Any Phase Of Operations)

1. Affected Battery Switch ..... OFF
2. BAT DISC Light (affected battery) ..... CHECK ON
3. Battery Temperature Indicator ..... MONITOR CLOSELY

WARNING

- **WHEN ON GROUND, SHUT DOWN ENGINES AND INSPECT AFFECTED BATTERY AS SOON AS POSSIBLE.**
- **WHEN IN FLIGHT AND BATTERY TEMPERATURE(S) CONTINUE TO RISE AFTER DISCONNECT, LAND AS SOON AS PRACTICABLE AND INSPECT BATTERY.**
- **TAKEOFF AFTER A BATTERY TEMPERATURE WARNING (RED LIGHT) ILLUMINATES IS PROHIBITED UNTIL THE CAUSE OF THE OVERHEAT WARNING IS CORRECTED.**

NOTE

A battery temperature red warning light caused by a thermal runaway may sometimes be verified by observing sustained and excessively high generator loads when the affected battery switch is on.

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DOUBLE GENERATOR FAILURE

1. Both Generator Switches ..... OFF
2. Electrical Load ..... REDUCE
3. Generator and Start Control Circuit Breakers ..... CHECK
4. Left Generator Switch ..... RESET/VOLTAGE CHECKED

If generator voltage is within 27.5 to 29.6 volts:

5. Left Generator Switch ..... ON

If left generator will not go on line, tum it OFF and try the right generator.

NOTE

If one of the two generators can be put on line, consideration should be given to continuing the flight with a single generator rather than risking a second double generator failure.

6. Right Generator Switch ..... RESET/VOLTAGE CHECKED

If generator voltage is within 27.5 to 29.6 volts:

7. Right Generator Switch ..... ON

NOTE

- If neither generator voltage is within limits, it is acceptable to put a single generator on line.
- If neither generator can be put on line, all electrical systems (except auxiliary air conditioning systems) will be functional on battery power. However, electrical loads should be quickly reduced to the minimum for existing flight conditions to prolong battery life.

WARNING

WHEN IN FLIGHT ON BATTERY POWER ALONE, LAND AS SOON AS PRACTICABLE TO PRECLUDE COMPLETE ELECTRICAL FAILURE.

TOTAL ELECTRICAL FAILURE

1. Entrance Light Switch ..... AS REQUIRED

NOTE

The pilot's overhead and entrance door flood lights are battery powered when the entrance light switch is in its ON position.

2. Standby Instrument Power Switch ..... VERIFY ARMED/STBY POWER LIGHT ON
3. Standby Attitude Indicator, Airspeed Indicator & Altimeter ..... VERIFY POWERED & LIGHTED
4. Avionics Aux Power Switches (if installed) ..... ON
5. Both Battery and Both Generator Switches ..... OFF
6. Battery Switches (Individually) ..... RESET/ON
7. Generator Switches (Individually) ..... RESET/ON

If total electrical failure occurred as a result of lightning strike or static discharge, the aircraft should be thoroughly inspected for evidence of lightning damage. See the SA227 Maintenance Manual, Chapter 05 and the TPE 331 Maintenance Manual, Chapter 72.

SMOKE IN AIRCRAFT

1. CREW OXYGEN MASKS ..... DON
***2. PASSENGER OXYGEN CONTROL ..... ON**
3. PASSENGER OXYGEN MASKS ..... DON
4. If Smoke Or Fire From Electrical Source:
   - *a. Smoke or fire from essential bus:
     - (1) Bus Tie Switch ..... OFF
     - (2) Bus transfer switches ..... OPPOSITE ESSENTIAL BUS
   - *b. Smoke or fire from nonessential bus
     - (1) Bus tie switch ..... OFF
5. If Smoke From Bleed Air Source:
   - *a. Bleed air switches ..... TURN OFF ONE SOURCE. IF SMOKE CONTINUES, TURN BACK ON ANDTURN OTHER SOURCE OFF. IF UNSUCCESSFUL, TURN OFF BOTH SOURCES.

NOTE

It is unlikely that both bleed air systems would malfunction simultaneously. However, if they should, closing both bleed air valves would prevent more smoke from entering the cockpit and cabin. But the outflow valve would then close in order to retain cabin differential pressure and the existing smoke would be trapped until depressurizing procedures are begun.

6. If Smoke In Rear of Aircraft ..... USE MANUAL PRESSURIZATION AND SELECT FULL DECREASE. WHEN PRESSURE DIFFERENTIAL IS ZERO, ACTIVATE CABIN DUMP SWITCH

SMOKE IN AIRCRAFT (continued)

*7. If Smoke Is In Cockpit ..... ACTIVATE CABIN DUMP SWITCH
8. Emergency Descent ..... AS REQUIRED
9. Airspeed ..... 175 KIAS MAXIMUM
10. Landing Gear ..... DOWN
*11. Fresh Air Fan ..... OVERRIDE

NOTE

- If failure occurs in the pneumatic or electrical system of the bleed air control valve, the engine may have to be shut down to stop the flow of bleed air.
- If an engine must be shut down to prevent bleed air from entering the cockpit and cabin, the landing gear should be retracted to ensure adequate single engine performance.
- Whether or not smoke has dissipated, if it cannot be visibly verified that the fire has been extinguished following fire suppression and/or smoke evacuation procedures, land immediately at the nearest suitable airport.

WHEELWELL AND WING OVERHEAT WARNING LIGHT ON

STEADY LIGHT (indicates wheelwell or air conditioning duct overheat)

*1. Bleed Air Switch (affected side) ..... OFF
2. Landing Gear ..... DOWN

NOTE

If the warning light goes out, retract the landing gear. If the light remains out, continue flight with the bleed air OFF on the affected side. If the warning light reilluminates, extend the landing gear.

CAUTION

IF THE WARNING LIGHT DOES NOT EXTINGUISH WITHIN THREE MINUTES, THE AFFECTED ENGINE SHOULD BE SHUT DOWN AND THE LANDING GEAR RETRACTED UNTIL ARRIVING AT A SUITABLE LANDING FIELD.

FLASHING LIGHT (indicates a wing leading edge bleed air line failure or an overheated generator wire)

*1. Bleed Air Switch (affected side) ..... OFF
2. Generator Switch (affected side) ..... OFF

CAUTION

IF THE WARNING LIGHT DOES NOT EXTINGUISH WITHIN THREE MINUTES, THE AFFECTED ENGINE SHOULD BE SHUT DOWN.

CABIN PRESSURIZATION MALFUNCTIONS

LOW CABIN PRESSURE

The cabin altitude warning light illuminates when the cabin pressure is equivalent to a pressure altitude between 9,500 feet and 10,000 feet. Check cabin altitude, differential pressure and controller setting, cabin dump switch, and CAWI/water injection switch. If the cabin pressurization controller is not providing proper cabin pressure, change to manual operation. If the desired cabin altitude or differential pressure still cannot be attained, an excessive leak exists and it may be necessary to descend or use oxygen.

HIGH CABIN PRESSURE

If the cabin differential pressure exceeds the normal limit of 7.0 psi (48.3 kPa), the cabin pressurization controller may have failed and allowed the outflow valve to close. Open the manual control valve approximately 1/2 turn; select MANUAL position on the cabin pressure selector, and regulate pressure manually. If manual control is ineffective, the safety valve should relieve excess cabin pressure at 7.25 psi (50 kPa). Prior to landing, the cabin pressure differential must be eliminated by use of the manual control or the following alternate procedure:

1. Altitude ..... BELOW 12,000 FEET
*2. Bleed Air Switches ..... OFF
3. Allow cabin to depressurize to less than 1 psi differential.
*4. Cabin Dump Switch ..... DUMP

NOTE

If cabin pressure is dumped when a significant cabin pressure differential exists, the resulting sensation may be alarming and uncomfortable to passengers. Consequently, use of the dump valve should normally be restricted to situations where cabin pressure differential is less than 1 psi or when other methods of pressure differential control are ineffective.

*5. Bleed Air Switches ..... ON
6. Proceed unpressurized to airport. Air conditioning will be available.

CABIN PRESSURIZATION MALFUNCTIONS (continued)

EXCESSIVE RATE OF PRESSURIZATION

If an excessive rate of pressurization is experienced and it cannot be controlled by the rate knob on the cabin pressurization controller or by the manual control knob, the following steps should be accomplished:

*1. Bleed Air Switches ..... OFF

If Step 1 eliminates the excessive rate of pressurization, determine the source of the malfunction by turning the bleed air controls on individually. If the malfunction was caused by one of the bleed air control valves, leave the malfunctioning side off and continue pressurized flight using bleed air from one engine.

If the pressure surge does not decrease:

*2. Cabin Dump Switch ..... DUMP

NOTE

If cabin pressure is dumped when a significant cabin pressure differential exists, the resulting sensation may be alarming and uncomfortable to passengers. Consequently, use of the dump valve should normally be restricted to situations where cabin pressure differential is less than 1 psi or when other methods of pressure differential control are ineffective.

EMERGENCY DESCENT PROCEDURE

If cabin pressure is lost while at high altitude, execute the following procedure:

1. CREW OXYGEN MASKS ..... DON
***2. PASSENGER OXYGEN CONTROL ..... ON**
3. PASSENGER OXYGEN MASKS ..... DON
4. Speed Levers ..... HIGH RPM
5. Power Levers ..... FLIGHT IDLE
6. Airspeed ..... 175 KIAS MAXIMUM
7. Landing Gear ..... DOWN
8. Flaps ..... ONE-HALF
9. Altitude ..... AS REQUIRED

NOTE

- A pitch attitude of approximately 11 degrees nose down will allow the airplane to stabilize very close to the gear limit speed of 175 KIAS in the 1/2 flaps configuration.

- This procedure results in a descent from 25,000 feet to 15,000 feet within three minutes when initiated from cruise power and airspeed.

CARGO OR CABIN DOOR WARNING LIGHT ON

An illuminated CABIN DOOR or CARGO DOOR red warning light indicates that the affected door is not closed securely and may not be safe for flight. All door latches must extend fully and engage the door latch switches in order to extinguish the door warning lights. In addition, the cargo door handle must be in its fully closed position for that warning light to go out. Maladjusted door latch switches may cause nuisance illumination of either of the door warning lights. This problem typically occurs when the cabin differential pressure reaches approximately 5 psi during climbs. Reducing cabin differential pressure to less than approximately 4 psi will allow the pressure vessel to deflate, the door latch to seat the switch, and the warning light to go out.

EITHER DOOR WARNING LIGHT ON

(DURING GROUND OPERATIONS)

Do not take off.

(INITIAL PART OF TAKEOFF ROLL)

Takeoff ..... ABORT

(FINAL PART OF TAKEOFF ROLL)

1. Takeoff ..... CONTINUE
*2. Bleed Air Switches ..... OFF
3. Crew and Passengers ..... KEEP CLEAR OF AFFECTED DOOR
4. Land as soon as practicable.

(DURING FLIGHT)

1. Seat Belt Signs ..... ON
2. Crew and Passengers ..... KEEP CLEAR OF AFFECTED DOOR
3. Cabin Differential Pressure ..... REDUCE UNTIL WARNING LIGHT GOES OUT
4. Descent ..... AS REQUIRED
5. Land as soon as practicable.

HYDRAULIC SYSTEM FAILURE

In case of hydraulic system failure:

1. Prepare for emergency extension of the landing gear.
2. Prepare for landing with existing wing flaps configuration.
3. Ensure that the nose wheel steering arm switch is turned off and remains off.

WARNING

IN THE EVENT OF A HYDRAULIC SYSTEM MALFUNCTION, THE NOSE WHEEL STEERING SYSTEM MUST NOT BE ARMED. STEER WITH BRAKES, POWER, AND RUDDER.

MANUAL GEAR RELEASE SYSTEM

An emergency hand pump and a cable operated manual release system are provided to extend the landing gear in the event of a hydraulic system failure. A stand pipe system in the hydraulic reservoir provides a supply of fluid for hand pump operation. The manual release system also permits free fall gear extension in the event that all hydraulic fluid is lost.

PARTIAL FLAP LANDINGS

There are no provisions to extend or retract the flaps following a hydraulic system failure. Landing approach should be made at approximately 1.3 V_{S1} for the existing configuration.

APPROACH SPEEDS (KIAS)

	WEIGHT (1,000 POUNDS)												
	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0
1/2 FLAPS	103	105	107	108	110	111	113	114	116	118	119	121	122
1/4 FLAPS	108	110	112	113	115	116	118	120	121	123	125	127	128
NO FLAPS	110	112	114	116	118	120	122	124	126	128	130	132	134

Compute flaps up landing distances by adding 72 % to the landing distance shown in Figure 4G-4.

LANDING GEAR EMERGENCY EXTENSION

1. Airspeed ..... 175 KIAS MAXIMUM
2. Landing Gear Handle ..... DOWN
*3. Emergency Release Lever ..... ROTATE AFT
*4. Hand Pump Valve Handle ..... PULL PIP PIN/ROTATE VALVE HANDLE 90° FORWARD
*5. Emergency Hand Pump ..... PUMP AS REQUIRED
Gear indicator ..... ALL DOWN AND LOCKED

NOTE

- Strong resistance to pump handle motion gives sufficient pressure (500 to 800 psi) to insure gear security in addition to the mechanical downlocks.
- If manual extension is used because of a failure in the landing gear electrical control system, the hydraulic pressure gauge will continue to indicate approximately 2,000 psi system pressure. In this case, the pressure to the gear down actuators can be detected only by the effort required to move the emergency hand pump.
- If a failure at the bottom of the hydraulic pack allows depletion of all hydraulic fluid, the emergency hand pump will not provide pressure. Nevertheless, Step 3 above will allow the landing gear to free fall to a safe, down and locked position.
- Hydraulic pressure to the nose wheel steering system will not be available following landing gear emergency extension required by either hydraulic failures or gear position selector valve electrical failures. Do not arm nose wheel steering.

If the gear does not extend, the following additional procedure may allow the gear to extend.

NOTE

Extending the landing gear in this manner requires that the airplane be slowed to a minimum safe airspeed. Therefore, this procedure must be performed at high enough altitude to ensure safe flight operation.

1. Retract the gear.

NOTE

If the landing gear will not retract, check that the hand pump valve handle and the emergency release lever have been returned to their normal positions.

LANDING GEAR EMERGENCY EXTENSION (continued)

2. Use full flaps and slow the aircraft to just above flight idle stall speed.

3. Place the landing gear handle in the down position.

4. If the gear fails to extend, repeat the above procedure. If the gear still will not extend, repeat the above procedure using the emergency gear release lever instead of the landing gear handle. (Steps 3, 4, and 5 in Landing Gear Emergency Extension.)

GEAR UP LANDINGS

NOTE

- If either main gear will not extend, land with all three gear up if possible. If the nose gear will not extend, land on the mains.

- Ensure that passengers are thoroughly briefed regarding bracing position and evacuation procedure.

- Depressurize airplane and consider removal and secure stowage of escape hatches prior to landing. Expect the entrance door to operate normally with the exception that it will not open fully after landings with the nose or left main gear retracted.

- Historically, airplanes of this class have received more airframe damage from gear up landings on sod than from landings on smooth, paved surfaces.

- Propeller blades contacting the surface while turning under power tend to disintegrate and throw shrapnel which may puncture the fuselage. Blades contacting the surface when feathered, or nearly feathered, will bend slightly and wear away but most likely will not shatter and will aid in holding the wings and nacelles off the runway.

- The pilot may choose to feather one propeller early and save the other engine for last minute glide path corrections. During approaches with one main gear up and one down, it is recommended that the propeller on the gear up side be feathered first. When a propeller is feathered with flight idle power set, drag will be reduced and gliding distances increased slightly.

GEAR UP LANDINGS (continued)

LANDING WITH ALL THREE GEAR UP:

1. Use full flaps.
2. Approach the runway at normal approach speed plus 5 to 10 KIAS.
3. Do not feather propellers until landing on the runway is assured.
4. Shut off electrical power just prior to touchdown (this is to allow use of the pitch trim system until touchdown). Leave batteries on during night landings to permit use of landing lights.
5. Allow aircraft to touch down in a relatively flat attitude and on centerline. Use rudder for directional control.

LANDING WITH NOSE GEAR UP:

1. Use normal approach technique and flap configuration.
2. Feather propellers and shut off electrical power after the mains have touched the runway. Leave batteries on during night landings to permit use of landing lights.
3. Hold the nose of the aircraft off the runway as long as practical, but not so long that pitch control is lost. Put nose on runway gently rather than letting it drop to the runway.

LANDING WITH NOSE GEAR AND ONE MAIN GEAR EXTENDED:

1. Attempt to retract all three gear and use procedure for landing with all gear up. Check the position of the emergency gear release lever, the hand pump valve handle and the landing gear control circuit breaker. Transfer the landing gear control to the other essential bus using the transfer switch.
2. If possible, select the runway with the fewest obstructions and flattest terrain on the side of the unextended gear.
3. Feather propellers after landing on the runway is assured.
4. Shut off electrical power just prior to touchdown (this is to allow use of the pitch trim system until touchdown). Leave batteries on during night landings to permit use of landing and taxi lights.
5. Hold the wing with the unextended landing gear off the runway as long as possible. Use brakes and rudder for aircraft directional control. Expect the aircraft to tum into the low wing.

STABILIZER TRIM MALFUNCTIONS

STABILIZER TRIM SYSTEM RUNAWAY

The application of electrical power to the stabilizer trim actuators is indicated by an aural signal. If the signal occurs in flight when the trim system is not being operated, the following procedure should be initiated immediately:

1. **MASTER DISCONNECT BUTTON ..... PRESS AND HOLD**
2. **TRIM SELECTOR ..... OFF (CENTER POSITION)**
3. Master Disconnect Button ..... RELEASE
4. Trim Selector ..... OPPOSITE POSITION FROM WHERE MALFUNCTION OCCURRED
5. Retrim as required.

PILOT'S TRIM SYSTEM INOPERATIVE

1. Trim Selector ..... COPILOT
2. Pilot's Auxiliary Trim Switch or Copilot's Trim Switches ..... TRIM AS REQUIRED

COPILOT'S TRIM SYSTEM INOPERATIVE

1. Trim Selector ..... PILOT
2. Pilot's Trim Switches ..... TRIM AS REQUIRED

STABILIZER TRIM MALFUNCTIONS (continued)

BOTH PILOT'S AND COPILOT'S TRIM SYSTEMS INOPERATIVE

1. Trim Selector ..... OFF (CENTERED)
2. Airspeed ..... AS REQUIRED TO MAINTAIN LOW ELEVATOR FORCES
3. SAS Servo Switch ..... OFF

NOTE

- If the trim system fails in an extreme nose down trim position, do not extend flaps unless required for landing because of the subsequent high pull force required to maintain level flight.
- If the trim system fails in an extreme nose up trim position, flap extension (below V_{FE}) will reduce the push force required to maintain level flight.

4. Flaps (on landing approach) ..... AS REQUIRED

NOTE

Flap extension decreases push force requirements.

5. Landing Gear ..... DOWN WHEN DESIRED

NOTE

Gear extension increases push force requirements slightly.

STABILIZER TRIM MALFUNCTIONS (continued)

GO-AROUND WITH STABILIZER TRIM INOPERATIVE

WARNING

VERY HIGH PUSH FORCES WILL BE REQUIRED IF THE FLAPS ARE RETRACTED WITH THE STABILIZER TRIM IN THE EXTREME NOSE UP POSITION. IF A GO-AROUND OR BALKED LANDING IS REQUIRED WHEN THE STABILIZER TRIM IS STUCK IN AN EXTREME NOSE UP POSITION, DO NOT RETRACT THE FLAPS IMMEDIATELY.

1. Power ..... AS REQUIRED

NOTE

Application of power increases push force requirements.

2. Flaps ..... RETRACT IN INCREMENTS

NOTE

Flap retraction increases push force requirements.

3. Airspeed ..... AS REQUIRED TO MAINTAIN LOW STICK FORCES
4. Landing Gear ..... RETRACT WHEN FEASIBLE

STALL AVOIDANCE SYSTEM (SAS) MALFUNCTION – NOSE DOWN (INADVERTENT PUSH)

In the event of a nose down (inadvertent push) SAS malfunction the following procedure should be initiated:

1. **MASTER DISCONNECT BUTTON ..... PRESS & HOLD**
2. **SAS SERVO SWITCH ..... OFF**
3. Master Disconnect Button ..... RELEASE

WARNING

PULL FORCES REQUIRED TO OVERPOWER THE STICK PUSHER MAY EXCEED 60 POUNDS.

See Caution next page

STALL AVOIDANCE SYSTEM (SAS) MALFUNCTION – NOSE DOWN (INADVERTENT PUSH) (continued)

CAUTION

WITH THE SAS SERVO TURNED OFF, THE STICK PUSHER WILL BE INOPERATIVE. STALL WARNING WILL STILL BE PROVIDED BY ACTIVATION OF THE STICK SHAKERS 5 TO 10 KNOTS ABOVE STALL SPEED. ANGLE OF ATTACK SHOULD BE IMMEDIATELY REDUCED TO PROVIDE AN ADEQUATE MARGIN ABOVE STALL SPEED. IF ANGLE OF ATTACK IS INADVERTENTLY ALLOWED TO INCREASE, STALL RECOVERY SHOULD BE INITIATED AT THE FIRST NATURAL OR SAS INDICATION OF STALL (GLARESHIELD STALL LIGHT AND/OR STALL HORN).

EMERGENCY EXITS

There are two emergency exits on the right side of the center cabin and one emergency exit on the left side. To open the emergency exits:

1. Cabin ..... DEPRESSURIZE
2. Release Handle ..... PULL

NOTE

Pull hatch inward, rotate, extend through opening, and discard outside the airplane when on the ground. Ensure that the hatch is clear of the exit route from the airplane.

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INTRODUCTION

The Abnormal Procedures section is an extension of the Emergency Procedures section and covers situations of a less serious nature. Procedures identified by an asterisk are those recommended to be accomplished by a copilot during two pilot operations. These procedures have been FAA approved.

ANNUNCIATOR PANEL

The functions of the annunciator panel amber lights are shown in the following table.

LIGHT ILLUMINATED	INDICATES THAT
L or R BETA	Corresponding prop pitch control oil pressure is sufficient to command reverse operation.
L or R CHIP DET	Magnetic plug in corresponding engine has detected foreign object in oil. See page 3A-9.
L or R XFER PUMP	Corresponding hopper tank fuel level is low. See page 3A-3.
L or R BAT DISC	Corresponding battery switch is not on or that there has been a feeder circuit fault. See page 3A-6.
L or R AC BUS	a. Both lights on: The selected inverter has failed. See page 3A-7. b. One light on: The 115V bus tie has failed. Reset circuit breaker.
L or R GEN(ERATOR) FAIL	Corresponding generator switch is not on or that the generator has failed. See page 3A-7.
LOW SUCTION	There is insufficient output from the suction regulator.
GPU PLUG IN	The ground power unit is plugged into the aircraft. Do not attempt to put generators on line and do not taxi.

ANNUNCIATOR PANEL (continued)

LIGHT ILLUMINATED	INDICATES THAT
L or R SRL OFF	Corresponding engine RPM is less than 80% when SRL power switch is normal or that the SRL computer has failed. See page 3A-17.
NWS FAIL	Flashing light indicates that the NWS system has detected an electrical fault and has automatically disengaged the NWS system. Steering reverts to caster mode.
L or R SAS FAIL	a. SAS computer has failed or lost power. See page 3A-5. b. On the ground, the respective SAS vane may be blown full up. (Check SAS indicator needle.) c. Either pilot or copilot stall light module has been pressed, removing power from the respective SAS computer. See page 3A-4.
SAS SERVO (FAIL)	a. Power is not available to the SAS servo (check SAS servo switch) or SAS servo has failed. See page 3A-5. b. Proper indication during a servo monitor (SERVO MON) test (after an approximate two second delay) c. Proper indication during a NO. 1 or NO. 2 g switch test.
L or R FUEL FILTER	Indicates corresponding fuel filter is being bypassed due to filter blockage.

FUEL SYSTEM MALFUNCTIONS

BOOST PUMP FAILURE

In the event of a boost pump failure, as indicated by low fuel pressure, the auxiliary boost pumps should be selected. See Figure 1-1 for no boost pumps required flight envelope.

FUEL TRANSFER PUMP CAUTION LIGHT ON

The fuel pump caution lights illuminate when fuel quantity in the respective hopper tank is less than approximately 70 pounds (32 kg). The light switches are actuated by a float located in each hopper tank. Nuisance caution lights may occur following refueling if a float switch sticks in its low quantity position. The false indication often will correct itself during taxi. Takeoff with fuel transfer pump caution light(s) illuminated is prohibited.

With the boost pumps and transfer pumps operating, the XFER PUMP annunciator light will illuminate when the wing tank is empty and the hopper tank fuel is below approximately 70 pounds.

With the boost pumps and/or transfer pumps not operating, fuel will gravity feed from the wing tank into the hopper tank and the XFER PUMP annunciator will illuminate when the wing tank fuel level reaches the hopper tank float switch level (approximately 600 – 700 pounds of fuel remaining in that wing). Without a boost pump operating, approximately 75 pounds of the indicated fuel is unusable.

In the event that a XFER PUMP annunciator illuminates with a boost pump ON, the other boost pump in that tank should be turned on.

CAUTION

WITH TRANSFER PUMPS OPERATIVE AND LESS THAN 70 POUNDS OF FUEL IN THE AFFECTED TANK, THE TRANSFER PUMP CAUTION LIGHT SERVES AS A LOW FUEL WARNING. A LANDING SHOULD BE MADE AS SOON AS PRACTICABLE.

NOTE

Whenever selecting or switching boost pumps, the same pump (Main or Auxiliary) should be used on both sides to insure that subsequent failure of an essential bus will cause loss of boost pump pressure to only one engine.

OPERATION WITH FUEL IMBALANCE

Takeoff with a fuel imbalance up to 200 pounds (90 kg) is permitted using the normal performance data contained in Section 4. During takeoff and initial climb, aileron trim and/or control wheel force in the direction of the light wing will be required. The wheel force requirement increases with increased imbalance and decreases with increased airspeed.

STALL AVOIDANCE SYSTEM (SAS) MALFUNCTIONS

CAUTION

WITH EITHER SAS COMPUTER OR THE SAS SERVO TURNED OFF (OR INOPERATIVE), THE STICK PUSHER WILL BE INOPERATIVE. STALL WARNING WILL STILL BE PROVIDED BY ACTIVATION OF THE STICK SHAKERS 5 TO 10 KNOTS ABOVE STALL SPEED. ANGLE OF ATTACK SHOULD BE IMMEDIATELY REDUCED TO PROVIDE AN ADEQUATE MARGIN ABOVE STALL SPEED. IF ANGLE OF ATTACK IS INADVERTENTLY ALLOWED TO INCREASE, STALL RECOVERY SHOULD BE INITIATED AT THE FIRST NATURAL OR SAS INDICATION OF STALL (GLARESHIELD STALL LIGHT AND/OR STALL HORN).

STICK SHAKER AT SPEEDS WELL IN EXCESS OF NORMAL STALL WARNING SPEEDS (INADVERTENT STALL WARNING)

If the stick shakers activate in unaccelerated flight at speeds well in excess of normal stall warning speed, possible damage to a SAS vane or a system malfunction is indicated.

1. Stall Light Module (either SAS) ..... PRESS OFF
   - If stick shakers continue to shake, proceed with step 2.
2. Stall Light Module (operating SAS) ..... PRESS OFF
   - If stick shakers stop shaking, proceed with step 3.
3. Stall Light Module (first SAS disabled) ..... PRESS ON

NOTE

- Pressing either stall light module will remove power immediately from the respective SAS computer and render the SAS pusher servo inoperative. The pilot's stall light module controls the left SAS computer and the copilot's stall light module controls the right SAS computer.

- Both stall warning stick shakers and the stall horns and glareshield STALL lights for the operating SAS computer will still be operational. The stick pusher will not operate with either SAS computer turned off.

STALL AVOIDANCE SYSTEM (SAS) MALFUNCTIONS (continued)

SAS SERVO FAIL LIGHT ON IN FLIGHT

* SAS SERVO Switch ..... OFF (SAS FAIL LIGHT WILL REMAIN ON)

NOTE

The stall warning stick shakers, stall horns and glareshield STALL lights will still be operational.

SAS FAIL LIGHT ON IN FLIGHT

1. Stall Light Module (for affected SAS) ..... PRESS
2. SAS Indicator Select Switch ..... SELECT OPERATING SAS

NOTE

- Pressing either stall light module will remove power immediately from the respective SAS computer and render the SAS pusher servo inoperative. The pilot's stall light module controls the left SAS computer and the copilot's stall light module controls the right SAS computer.

- Both stall warning stick shakers and the stall horns and glareshield STALL lights for the operating SAS computer will still be operational. The stick pusher will not operate with either SAS computer turned off.

ELECTRICAL SYSTEM MALFUNCTIONS (See Section 3 for Total Electrical Failure)

EXCESSIVE AMMETER INDICATION

If an excessive load occurs, as indicated by an excessive ammeter indication, the malfunctioning circuit should be identified and turned off.

1. Battery Switches ..... OFF
   a. If overload condition still exists, turn battery switches ON and continue to Step 2.
   b. If overload condition ceases, a battery circuit malfunction exists and the malfunctioning circuit must remain disconnected from the DC electrical bus.
      (1) Isolate the malfunctioning circuit by turning the battery switches ON individually. Leave the switch for the malfunctioning circuit OFF.

If Step 1 did not correct the excessive ammeter indication:

2. Nonessential Bus Tie Switch ..... OFF
   a. If overload condition still exits, turn the nonessential bus switch ON and continue to Step 3.
   b. If overload condition ceases, pull all circuit breakers on the nonessential bus and turn the bus tie switch ON. Reset circuit breakers until the malfunctioning circuit is identified. Pull circuit breaker for malfunctioning circuit and do not reset. See Note following Step 3.

If Step 2 did not correct the excessive ammeter indication:

3. Left and Right Essential Bus Tie Switches ..... REPEAT THE SAME PROCEDURE FOR EACH ESSENTIAL BUS UNTIL SOURCE OF THE PROBLEM IS FOUND AND MALFUNCTIONING CIRCUIT IS ISOLATED

NOTE

It may be preferable to leave the malfunctioning bus off in flight and to troubleshoot the difficulty after landing.

BATTERY FAULT LIGHT ON

NOTE

A fault in either battery feeder circuit will cause both battery relays to disconnect automatically from the aircraft electrical system. Both battery relays will remain open until either battery switch is moved to RESET, then ON.

1. Both Battery Switches ..... OFF
2. Left Battery Switch ..... RESET/ON

If no fault exists in the left feeder circuit, the battery fault light will remain off. In this case, leave the left battery switch ON and proceed to Step 3.

ELECTRICAL SYSTEM MALFUNCTIONS (continued)

BATTERY FAULT LIGHT ON (continued)

If a fault exists in the left circuit, the battery will automatically disconnect and the light will come back on. In this case, move the left battery switch to RESET (to reset the detector circuit), then OFF and proceed to Step 3.

3. Right Battery Switch ..... ON

If no fault exists in the right feeder circuit, the battery fault light will remain off. In this case, leave the right battery switch ON.

If a fault exists in the right circuit, both batteries will automatically disconnect and the light will come back on. In this case, move the right battery switch to RESET (to reset the detector circuit), then OFF and turn the left battery back on.

NOTE

- Either generator switch, when positioned to RESET, then ON will also reset the battery fault detection circuit.
- All electrically operated components can be operated normally on power from the generators when the battery switches are off.

GENERATOR INOPERATIVE – FAIL LIGHT ILLUMINATED

1. Generator Switch ..... OFF/RESET/ON

If the generator will not reset:

2. Generator Switch ..... OFF

CAUTION

DO NOT EXCEED LIMIT LOAD ON OPERATING GENERATOR.

CIRCUIT BREAKER TRIPPED

1. Circuit Breaker ..... PUSH TO RESET

CAUTION

IF CIRCUIT BREAKER TRIPS AGAIN, DO NOT RESET.

INVERTER INOPERATIVE – AC BUS LIGHTS ILLUMINATED

*1. Select other inverter.

ELECTRICAL SYSTEM MALFUNCTIONS (continued)

LEFT ESSENTIAL BUS FAILURE

1. Standby Instrument Power Switch ..... VERIFY ARMED/STBY PWR LIGHT ON
2. Left Essential Bus Tie Switch ..... OFF
3. Bus Transfer Switches ..... RIGHT BUS

Failure of the left essential bus will activate the standby instrument power system which will automatically power and light the following:

A. Standby attitude indicator
B. Pilot's (Copilot's on some installations) airspeed indicator
C. Pilot's (Copilot's on some installations) altimeter

The following items automatically switch to the opposite essential bus:

A. Engine instruments
B. Ignition
C. Fire detection/extinguisher
D. CAWI Pump

Activating the bus transfer switches will restore power to the following systems:

A. Fuel crossflow
B. Windshield heat
C. Landing gear control and indication
D. Deice boots
E. Cabin pressure dump valve
F. Engine intake heat

The following items can be operated by the right essential bus:

A. Pitch trim (select copilot's system)
B. AC power (select inverter #2)
C. Left boost pump (select AUX)

The following items (on the affected side) can not be powered following an essential bus failure:

A. Prop deice & duct heat
B. Pitot heat
C. SAS
D. SRL & temp limiter
E. Fuel & hyd shutoffs

RIGHT ESSENTIAL BUS FAILURE

1. Right Essential Bus Tie Switch ..... OFF
2. Bus Transfer Switches ..... LEFT BUS

The following items automatically switch to the opposite essential bus:

A. Engine instruments
B. Ignition
C. Fire detection/extinguisher
D. CAWI Pump
E. Mach/airspeed warning

The following items can be operated by the left essential bus:

A. Pitch trim (select pilot's system)
B. AC power (select inverter #1)
C. Right boost pump (select AUX)

ELECTRICAL SYSTEM MALFUNCTIONS (continued)

RIGHT ESSENTIAL BUS FAILURE (continued)

The following items (on the affected side) can not be powered following an essential bus failure:

A. Prop deice & duct heat
B. Pitot heat
C. SAS
D. SRL & temp limiter
E. Fuel & hyd shutoffs

NONESSENTIAL BUS FAILURE

1. Nonessential Bus Tie Switch ..... OFF

The following systems can not be powered following a nonessential bus failure:

A. Flaps
B. NWS
C. All exterior lights

CHIP LIGHT ON PRIOR TO TAKEOFF

If the chip light illuminates prior to takeoff, the flight should be aborted and the cause of the warning determined.

CHIP LIGHT ON DURING FLIGHT

If the chip light illuminates and engine operation appears to be normal, continue to the first intended landing and determine cause. The affected engine and instruments should be monitored closely during flight.

If the chip light illuminates and engine operation does not appear to be normal, the affected engine should be shut down (ENGINE FAILURE DURING FLIGHT) and a single engine landing accomplished.

INADVERTENT ICING ENCOUNTER

If icing is encountered with the ice protection systems off, the following procedure should be followed:

1. Auto/Cont Ignition Switches ..... CONT
2. Left Engine Heat Switch ..... ENGINE & PROP HEAT

NOTE

- Determine that first engine operates satisfactorily before selecting engine and prop heat for second engine.
- EGT will increase slightly and torque will decrease when engine and propeller heat is selected. Power lever adjustment may be required.

INADVERTENT ICING ENCOUNTER (continued)

3. Pitot/SAS Heat Switches ..... PITOT AND SAS
4. Windshield Heat Switch ..... HIGH
5. Deice Boots Switch ..... AS REQUIRED
6. Right Engine Heat Switch ..... ENGINE & PROP HEAT

WARNING

ENGINE HEAT AND THE CONTINUOUS IGNITION SYSTEM, IN THE AUTO MODE, MUST BE USED AFTER LEAVING ICING CONDITIONS UNTIL THE PILOT IS CONFIDENT THAT ANY RESIDUAL ICE ON PROPELLERS, SPINNERS, INTAKE LIPS, OR INTAKE THROATS WILL NOT BE SHED INTO THE ENGINES.

INSTRUMENT STATIC PRESSURE MALFUNCTION (PILOT'S INSTRUMENTS)

If the pilot's static pressure instruments malfunction, select ALTERNATE position on the static source selector valve. The pilot's instruments will be vented to the forward baggage compartment. See Section 4 of this manual for corrected airspeed and altimeter readings when operating on the alternate source.

CAUTION

- DO NOT DUMP PRESSURIZATION WHEN USING THE ALTERNATE STATIC PRESSURE SOURCE.
- THE ALTERNATE STATIC SOURCE ALTITUDE AND AIRSPEED CORRECTIONS SHOWN IN SECTION 4 OF THIS MANUAL ARE NOT VALID IF THE DUMP VALVE IS OPEN.

NOTE

The copilot's static pressure instruments are not connected to the alternate static pressure source.

LANDING GEAR SQUAT SWITCH MALFUNCTION

A squat switch on the left main landing gear controls power to the landing gear control solenoid-operated down lock plunger. Should the squat switch malfunction after takeoff, the down lock plunger would remain in its extended position and lock the control lever in its down position. If it is necessary to retract the gear when the plunger is extended, move the override release lever down and counter-clockwise and then move the landing gear control lever to its up position.

NOSE WHEEL STEERING MALFUNCTION

Fault protection is provided by circuitry which automatically deactivates the nose wheel steering if an electrical malfunction occurs. The nose wheel is then free to caster. Rudder, differential braking, and/or differential power can be used for steering.

If the system fails to test correctly, the arm switch should be placed in the OFF position and steering accomplished by rudder, differential braking, and/or differential power.

In the event of a flashing NWS FAIL light, an unwanted steering deflection, and/or a park light illuminated when the park button is not depressed, the following procedure should be followed:

NOTE

It is normal for the park light to remain illuminated, but vary in intensity, during the transition from park mode to normal mode.

1. Directional Control ..... MAINTAIN WITH RUDDER, BRAKES, AND/OR POWER
2. Nose Wheel Steering Arm Switch ..... OFF

NOTE

If the nose wheel steering arm switch is in the ARMED position while an engine is being started, the system may sense a low voltage condition and disengage the NWS system, causing a flashing NWS FAIL light. If this occurs on the ground before takeoff, the nose wheel steering arm switch should be cycled to OFF and back to ARMED to reset the system.

MANUAL GROUND START PROCEDURES

Certain malfunctions in the engine starting system can prevent a normal, automatic engine ground start. An example is failure of the 10% and 60% speed functions in the SRL computer. In this case, other SRL functions could remain operative; however, an automatic start would not be obtained because fuel and ignition sequencing controlled by the 10% and 60% speed functions would be inoperative. A manual start can be accomplished using the appropriate speed switch select switch located on the pilot's side console. These switches enable the pilot to bypass the normally automatic engine speed functions. The manual ground start procedure using these switches is the same as for a normal ground start except for the denoted changes as indicated by the small letter "a" and double asterisks.

Start fuel enrichment, which is normally an automatic function, must be accomplished manually by pressing the start button during a manual engine start when the SRL – Δ P/P power switch is off.

NOTE

After accomplishing a manual ground start, all SRL system checks must be accomplished satisfactorily prior to flight, see page 2-33.

MANUAL GROUND START PROCEDURES (continued)

STARTING ENGINES (GPU)

CAUTION

- USE ONLY NEGATIVELY GROUNDED POWER SOURCES.
- DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM A GROUND POWER SOURCE BE LIMITED TO 1,000 AMPERES.

RIGHT ENGINE (RECOMMENDED FIRST)

*1. Propeller ..... UNFEATHERED/CLEAR
(SEE PAGE 2-22)
2. Engine Start Button ..... PRESS AND HOLD
3. Speed Switch Select Switch ..... MANUAL AT 10% RPM

NOTE

Observe ignition of fuel as indicated by rising EGT and illumination of IGN light. Use start button as required to provide fuel enrichment between 10% and 60% RPM.

CAUTION

IF EGT RISE IS NOT OBTAINED WITHIN 10 SECONDS AFTER SELECTING MANUAL SPEED SWITCH CONTROL, OR BEFORE ATTAINING 20% RPM, PRESS STOP BUTTON AND PULL ENGINE STOP AND FEATHER CONTROL. CLEAR ENGINE FOR 10 SECONDS WITH STARTER TEST SWITCH. DO NOT ALLOW ENGINE TO OPERATE IN THE 18% TO 28% RPM RANGE DURING START OR CLEARING OPERATIONS EXCEPT DURING COMBUSTION ASSISTED ACCELERATION THROUGH THAT RANGE.

NOTE

During a manual start, while the SRL – Δ P/P power switch is in SRL OFF position, start fuel enrichment can be obtained only by pressing the start button. When using the start button to manually provide start fuel enrichment, attempt to maintain normal engine acceleration and an EGT of approximately 650^{0}C.

MANUAL GROUND START PROCEDURES (continued)

RIGHT ENGINE (continued)

4. EGT ..... MONITOR (770°C MAX)

CAUTION

IF RPM STOPS INCREASING AND EGT IS APPROACHING THE START LIMIT AND RISING RAPIDLY, IMMEDIATELY PRESS THE STOP BUTTON AND PULL ENGINE STOP AND FEATHER CONTROL. EXCEEDING THE START EGT LIMIT MAY SERIOUSLY DAMAGE THE ENGINE.

5. RPM and EGT ..... STABILIZED
6. Fuel and Oil Pressure ..... YELLOW OR GREEN ARCS
*7. Bleed Air Switch (right engine) ..... AS REQUIRED

NOTE

Check for absence of air flow through the open cooling air "eyeballs" prior to turning on either bleed air system.

8. Speed Switch Select Switch ..... AUTO

LEFT ENGINE – Manual Start (If Required)

9. Repeat Steps 1 Through 6 and 8 For Left Engine.
*10. Bleed Air Switch (left engine) ..... AS REQUIRED

NOTE

Verify operation of each bleed air system by selectively operating right and left systems, both low and high.

11. GPU ..... OFF/DISCONNECTED/ANNUNCIATOR CHECKED OUT

MANUAL GROUND START PROCEDURES (continued)

LEFT ENGINE – Manual Start (If Required) (continued)

12. Generators ..... RESET/VOLTAGES CHECKED/ON

NOTE

Check generator voltages between 29 – 29.5 and even load sharing.

13. Battery Disconnects and Current Limiters ..... CHECK
(SEE PAGES 2-21 AND 2-30)

BATTERY START

Follow Starting Engines (GPU) procedures steps 1 through 10, 12 and 13 except as modified by the following notes:

NOTE

- The series mode is recommended for use during the first start of the day and for other battery starts when engines have cooled to near ambient temperatures since last being operated.
- If either battery temperature is above 120°F (amber caution light illuminated), do not make a battery start. Either obtain a GPU or wait until the batteries have cooled.
- Both torque indicators will display erroneous indications during battery starts when the starter is engaged and bus voltage is low.
- The inoperative engine RPM indicator is sensitive to bus voltage variations prior to normal engine operation and may reflect spurious fluctuations before engine starts when operating various aircraft systems.
- Generator for first engine should be turned on after first engine start. Second engine should be started in parallel mode with assistance from the operating generator after ammeter drops to 150 amps. If desired, stresses on the assisting generator due to initial high current demands may be reduced using the start procedure on page 6C-1.

TEMPERATURE LIMITER MALFUNCTIONS

OPERATIONS WITH THE TEMPERATURE LIMITER INOPERATIVE

An inoperative temperature limiter circuit results in loss of automatic temperature control. When the temperature limiter becomes inoperative the pilot must use caution in power management. The EGT indication lags actual engine performance. The following procedures should be followed when the temperature limiter is inoperative.

1. Do not advance power lever rapidly beyond 50% travel.

2. Set power lever carefully above 50% power to allow for EGT indication lag. Adjust power by making small power lever position changes and allowing adequate time for EGT lag.

3. Changes in airspeed, temperature and/or altitude will produce changes in EGT. Monitor EGT when operating the engine near the EGT limit.

OPERATIONS WITH TEMPERATURE LIMITER INOPERATIVE (FUEL BYPASS VALVE FAILED OPEN)

Failure of the fuel bypass valve in the open, or near open position, will allow fuel to be bypassed at all times with possible low power being developed at intermediate power lever positions. A valve stuck in a partially open position would be detected during the application of power for takeoff or during flight at less than 650^{O}C EGT due to the requirement for excessively split power levers at even EGT's.

CAUTION

- TAKEOFF WITH A FUEL BYPASS VALVE FAILED IN THE OPEN POSITION IS NOT APPROVED.

- MAXIMUM ALTITUDE FOR PROLONGED OPERATION WITH A FUEL BYPASS VALVE FAILED OPEN IS 15,000 FEET.

Failure in the open position while in flight might cause so much reduced fuel flow at the nozzles that, at power lever settings near flight idle, the NTS system would activate. This potential difficulty could be confirmed by retarding the power lever for the suspect engine to flight idle while flying at speeds near final approach speed. If negative torquing occurs, the pilot has the options of landing with asymmetric power levers in order to maintain even power, or of shutting down the engine with the failed fuel bypass valve and making a single engine landing.

1. Temperature Limiter Circuit Breaker ..... PULL

TEMPERATURE LIMITER MALFUNCTIONS (continued)

OPERATIONS WITH TEMPERATURE LIMITER INOPERATIVE (FUEL BYPASS VALVE FAILED CLOSED)

Takeoff and initial climb operations are conducted with power set to appropriate torque values determined from the engine power setting charts in Section 4. Therefore, a fuel bypass failure may not be detected during normal operations until cruise power is set with EGT at 650°C. If fuel bypass malfunctions are suspected after conducting the temp limiter check on page 2-34, the following ground check will verify the status of the temperature limiting systems.

1. Speed Lever ..... HIGH RPM
2. Power Lever ..... SET TO OBTAIN 350 PPH FUEL FLOW
3. Temp Limiter Test Switch ..... HOLD L THEN R.
   NOTE THAT RESPECTIVE FUEL BYPASS LIGHTS ILLUMINATE AND THAT FUEL FLOW FOR EACH ENGINE DROPS TO APPROXIMATELY 260 PPH

NOTE

- It is permissible to conduct this check one engine at a time.
- Failure of either engine to bypass approximately 90 PPH or failure of either fuel bypass light to illuminate during this check indicates a malfunction of the fuel bypass/temp limiter system.
- If dry power takeoff operations are required with a fuel bypass valve failed at its closed position, use normal takeoff, climb, and cruise procedures taking care to not exceed 650°C EGT.

CAUTION

ENGINE OVER-TEMPERATURE AND CONSEQUENT ENGINE DAMAGE MAY OCCUR WITH IMPROPER POWER LEVER MANAGEMENT WHEN THE FUEL BYPASS VALVE HAS FAILED IN THE CLOSED POSITION.

SRL COMPUTER FAILURE

A failure of the SRL system may be indicated by one or more of the following:

1. Illumination of an SRL OFF light with RPM above 80% which indicates loss of power to the system, loss of signal to the computer, loss of computer output signal or that the difference between compensated EGT and SRL value is less than 15°C.
2. A sudden change in EGT of 20°C or more with no corresponding change in other engine parameters.

SRL COMPUTER FAILURE (continued)

3. An erratic or fluctuating EGT indication.

4. SRL OFF light not illuminated with engine speed below 80% RPM.

5. SRL – Δ P/P power switch in the SRL OFF position.

NOTE

The SRL inoperative EGT charts in Figures 3A-1 and 3A-2, and Figures 3A-1A and 3A-2A are provided only for maximum continuous power at 100% RPM and for cruise power at 97% RPM. Cruise with SRL inoperative is limited to between 96% and 98% or at 100% RPM.

When operating with the SRL computer inoperative:

1. Temperature Limiter Circuit Breaker ..... PULL
   The temperature limiter circuit will be inoperative; therefore, all the cautions listed under the heading TEMPERATURE LIMITER MALFUNCTIONS apply and must be followed. Pull the temperature limiter circuit breaker; place the SRL – Δ P/P power switch in the SRL OFF position.

2. Engine Power ..... SET
   The maximum allowable EGT will vary with altitude, airspeed, and temperature. The pilot must operate the engine within the maximum EGT limits by obtaining the limiting EGT from Figures 3A-1 and 3A-2, or 3A-1A and 3A-2A in this section and adjusting engine power accordingly. An alternative method of ensuring proper power on the engine which has suffered SRL failure is to match its torque with that of the engine with operable SRL system.

   After landing at the next scheduled destination, the SRL system must be repaired before further flight or operations must be conducted in accordance with Supplement 1.

SIMULATED SRL COMPUTER FAILURE

Failure of the SRL computer may be simulated in flight as follows:

1. Adjust the power lever to extinguish the fuel BYPASS OPEN light.

2. Place the SRL – Δ P/P power switch in the SRL OFF position.

3. Manually control engine temperature to the appropriate limits from Figures 3A-1 and 3A-2, or 3A-1A and 3A-2A.

CAUTION

ENGINE OVER-TEMPERATURE CAN RESULT FROM TURNING THE SRL OFF WITH THE FUEL BYPASS OPEN LIGHT ON.

SRL COMPUTER FAILURE (continued)

EGT LIMIT WITH SRL INOPERATIVE
100% RPM – MAXIMUM CONTINUOUS POWER, –7/–8 SRL COMPUTER

NOTE

- Indicated outside air temperature (IOAT) as shown in table includes compressibility and position errors.
- Airspeeds shown are provided to permit interpolation of EGT's. Do not exceed V_{MO}.
- Applicable to all bleed air and anti-ice conditions.

EXAMPLE:
Given: Altitude = 15,000 Feet
Airspeed = 199 KIAS (200 KCAS)
IOAT = –6°C
Obtain: Maximum EGT = 576°C

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS) 98/100 IOAT	98/100 EGT	149/150 IOAT	149/150 EGT	199/200 IOAT	199/200 EGT	248/250 IOAT	248/250 EGT
SEA LEVEL	–30	–15	–14.1	550	–12.9	541	–11.3	530	–9.2	516
	–20	–5	–4.0	572	–2.8	563	–1.2	551	1.0	537
	–10	5	6.0	589	7.2	587	9.0	575	11.2	560
	0	15	16.0	594	17.3	596	19.1	596	21.4	586
	10	25	26.1	605	27.4	604	29.3	604	31.6	606
	20	35	36.1	615	37.5	615	39.4	614	41.9	614
	30	45	46.1	627	47.6	626	49.5	626	52.1	625
	37	52	53.2	635	54.6	634	56.7	634	59.3	633
5,000	–30	–25	–23.8	577	–22.5	576	–20.7	567	–18.3	549
	–20	–15	–13.8	580	–12.4	579	–10.5	578	–8.0	570
	–10	–5	–3.8	584	–2.3	583	–0.3	581	2.2	579
	0	5	6.3	588	7.8	586	9.8	585	12.5	582
	10	15	16.3	594	17.9	593	20.0	593	22.8	592
	20	25	26.4	605	28.0	604	30.2	603	33.0	603
	30	35	36.4	616	38.1	615	40.4	614	43.3	613
	37	42	43.5	623	45.2	623	47.5	622	50.6	621
10,000	–30	–35	–33.6	573	–32.0	572	–29.9	570	–27.2	567
	–20	–25	–23.5	577	–21.9	575	–19.7	573	–16.9	571
	–10	–15	–13.5	580	–11.8	579	–9.5	576	–6.6	574
	0	–5	–3.4	584	–1.7	582	0.7	580	3.8	577
	10	5	6.6	587	8.4	586	10.9	584	14.1	581
	20	15	16.7	594	18.5	593	21.1	592	24.4	591
	30	25	26.7	605	28.6	604	31.3	603	34.7	602
	37	32	33.8	612	35.8	612	38.5	611	42.0	609

NOTE

For use on aircraft with –7 or –8 SRL computers.

FIGURE 3A-1

SRL COMPUTER FAILURE (continued)

EGT LIMIT WITH SRL INOPERATIVE
100% RPM – MAXIMUM CONTINUOUS POWER, –7/–8 SRL COMPUTERS (continued)

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS)							
			98/100		149/150		199/200		248/250	
			IOAT	EGT	IOAT	EGT	IOAT	EGT	IOAT	EGT
15,000	–30	–45	–43.3	569	–41.5	568	–39.0	566	–35.9	564
	–20	–35	–33.2	573	–31.4	571	–28.8	568	–25.5	566
	–10	–25	–23.2	576	–21.2	574	–18.5	572	–15.2	569
	0	–15	–13.1	580	–11.1	578	–8.3	575	–4.8	572
	10	–5	–3.0	583	–0.9	581	2.0	579	5.6	575
	20	5	7.0	587	9.2	585	12.2	582	16.0	579
	30	15	17.1	594	19.3	593	22.4	592	26.4	591
	37	22	24.2	601	26.5	600	29.7	599	33.8	598
20,000	–30	–55	–52.9	567	–50.9	566	–48.0	564	–44.4	561
	–20	–45	–42.9	569	–40.7	567	–37.7	565	–34.0	563
	–10	–35	–32.8	572	–30.5	570	–27.4	567	–23.5	565
	0	–25	–22.7	576	–20.3	573	–17.1	570	–13.0	567
	10	–15	–12.6	579	–10.2	577	–6.8	574	–2.6	569
	20	–5	–2.6	583	0.0	580	3.5	577	7.9	573
	30	5	7.5	587	10.2	584	13.8	581	18.4	578
	37	13	14.6	590	17.3	589	21.1	588	25.8	586
25,000	–30	–64	–62.5	566	–60.1	565	–56.8	563	–52.7	560
	–20	–54	–52.4	566	–49.9	565	–46.9	562	–42.1	559
	–10	–44	–42.4	568	–39.7	566	–36.1	564	–31.5	561
	0	–34	–32.3	571	–29.5	569	–25.7	566	–21.0	563
	10	–24	–22.2	575	–19.3	572	–15.3	568	–10.4	565
	20	–14	–12.1	578	–9.1	576	–4.9	572	0.2	566
	30	–4	–2.0	582	1.2	579	5.4	575	10.7	570
	37	2	5.1	585	8.4	582	12.8	578	18.3	573
30,000	–30	–74	–72.1	566	–69.2	564	–65.4	561	–60.6	557
	–20	–64	–62.0	566	–59.0	564	–54.9	561	–49.9	557
	–10	–54	–51.8	565	–48.7	563	–44.4	561	–39.2	557
	0	–44	–41.7	567	–38.4	565	–34.0	562	–28.5	558
	10	–34	–31.6	570	–28.2	567	–23.5	564	–17.8	560
	20	–24	–21.5	574	–17.9	571	–13.1	566	–7.1	562
	30	–14	–11.4	578	–7.6	574	–2.6	569	3.6	564
	37	–1	–4.3	580	–0.4	577	4.8	571	11.3	565

NOTE

For use on aircraft with –7 or –8 SRL computers.

FIGURE 3A-1 (continued)

SRL COMPUTER FAILURE (continued)

EGT LIMIT WITH SRL INOPERATIVE
97% RPM – CRUISE POWER, –7/–8 SRL COMPUTERS

NOTE

- Indicated outside air temperature (IOAT) as shown in table includes compressibility and position errors.
- Airspeeds shown are provided to permit interpolation of EGT's. Do not exceed V_{MO}.
- Applicable to all bleed air and anti-ice conditions.

EXAMPLE:
Given: Altitude = 15,000 Feet
Airspeed = 199 KIAS (200 KCAS)
IOAT = –6°C
Obtain: Maximum EGT = 556°C

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS) 98/100 IOAT	98/100 EGT	149/150 IOAT	149/150 EGT	199/200 IOAT	199/200 EGT	248/250 IOAT	248/250 EGT
SEA LEVEL	–30	–15	–14.1	534	–12.9	525	–11.3	513	–9.2	500
	–20	–5	–4.0	561	–2.8	551	–1.2	538	1.0	522
	–10	5	6.0	572	7.2	572	9.0	566	11.2	553
	0	15	16.0	580	17.3	580	19.1	579	21.4	581
	10	25	26.1	591	27.4	590	29.3	590	31.6	589
	20	35	36.1	602	37.5	601	39.4	601	41.9	600
	30	45	46.1	614	47.6	613	49.5	612	52.1	611
	37	52	53.2	623	54.6	622	56.7	621	59.3	620
5,000	–30	–25	–23.8	557	–22.5	556	–20.7	551	–18.3	532
	–20	–15	–13.8	560	–12.4	559	–10.5	557	–8.0	555
	–10	–5	–3.8	563	–2.3	562	–0.3	560	2.2	558
	0	5	6.3	569	7.8	569	9.8	568	12.5	567
	10	15	16.3	580	17.9	580	20.0	579	22.8	578
	20	25	26.4	591	28.0	590	30.2	589	33.0	588
	30	35	36.4	602	38.1	602	40.4	601	43.3	599
	37	42	43.5	610	45.2	610	47.5	609	50.6	608
10,000	–30	–35	–33.6	553	–32.0	551	–29.9	549	–27.2	547
	–20	–25	–23.5	556	–21.9	555	–19.7	553	–16.9	550
	–10	–15	–13.5	560	–11.8	558	–9.5	556	–6.6	553
	0	–5	–3.4	563	–1.7	562	0.7	559	3.8	556
	10	5	6.6	569	8.4	569	10.9	568	14.1	567
	20	15	16.7	580	18.5	579	21.1	578	24.4	577
	30	25	26.7	591	28.6	590	31.3	589	34.7	588
	37	32	33.8	599	35.8	598	38.5	597	42.0	595

NOTE

For use on aircraft with –7 or –8 SRL computers.

FIGURE 3A-2

SRL COMPUTER FAILURE *(continued)*

EGT LIMIT WITH SRL INOPERATIVE
97% RPM – CRUISE POWER, –7/–8 SRL COMPUTER (continued)

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS) 98/100 IOAT	98/100 EGT	149/150 IOAT	149/150 EGT	199/200 IOAT	199/200 EGT	248/250 IOAT	248/250 EGT
15,000	–30	–45	–43.3	549	–41.5	547	–39.0	545	–35.9	541
	–20	–35	–33.2	552	–31.4	551	–28.8	548	–25.5	545
	–10	–25	–23.2	556	–21.2	554	–18.5	551	–15.2	548
	0	–15	–13.1	559	–11.1	557	–8.3	555	–4.8	550
	10	–5	–3.0	563	–0.9	561	2.0	559	5.6	555
	20	5	7.0	569	9.2	569	12.2	567	16.0	566
	30	15	17.1	580	19.3	579	22.4	578	26.4	576
	37	22	24.2	588	26.5	587	29.7	585	33.8	584
20,000	–30	–55	–52.9	545	–50.9	543	–48.0	541	–44.4	538
	–20	–45	–42.9	548	–40.7	546	–37.7	543	–34.0	540
	–10	–35	–32.8	552	–30.5	549	–27.4	546	–23.5	542
	0	–25	–22.7	555	–20.3	553	–17.1	550	–13.0	545
	10	–15	–12.6	559	–10.2	556	–6.8	553	–2.6	549
	20	–5	–2.6	562	0.0	560	3.5	556	7.9	554
	30	5	7.5	569	10.2	568	13.8	567	18.4	564
	37	13	14.6	577	17.3	576	21.1	574	25.8	572
25,000	–30	–64	–62.5	545	–60.1	543	–56.8	540	–52.7	537
	–20	–54	–52.4	545	–49.9	542	–46.9	539	–42.1	536
	–10	–44	–42.4	548	–39.7	545	–36.1	541	–31.5	538
	0	–34	–32.3	551	–29.5	548	–25.7	544	–21.0	540
	10	–24	–22.2	554	–19.3	552	–15.3	548	–10.4	542
	20	–14	–12.1	558	–9.1	555	–4.9	551	0.2	545
	30	–4	–2.0	562	1.2	559	5.4	555	10.7	552
	37	2	5.1	566	8.4	564	12.8	562	18.3	559
30,000	–30	–74	–72.1	544	–69.2	541	–65.4	538	–60.6	534
	–20	–64	–62.0	544	–59.0	541	–54.9	538	–49.9	534
	–10	–54	–51.8	543	–48.7	541	–44.4	538	–39.2	534
	0	–44	–41.7	547	–38.4	543	–34.0	539	–28.5	535
	10	–34	–31.6	550	–28.2	546	–23.5	542	–17.8	537
	20	–24	–21.5	554	–17.9	550	–13.1	545	–7.1	539
	30	–14	–11.4	557	–7.6	554	–2.6	548	3.6	541
	37	–1	–4.3	560	–0.4	556	4.8	551	11.3	546

NOTE

For use on aircraft with –7 or –8 SRL computers.

FIGURE 3A-2 (continued)

SRL COMPUTER FAILURE (continued)

EGT LIMIT WITH SRL INOPERATIVE
100% RPM – MAXIMUM CONTINUOUS POWER, –10 SRL COMPUTER

NOTE

- Indicated outside air temperature (IOAT) as shown in table includes compressibility and position errors.
- Airspeeds shown are provided to permit interpolation of EGT's. Do not exceed V_{MO}.
- Applicable to all bleed air and anti-ice conditions.

EXAMPLE:
Given: Altitude = 15,000 Feet
Airspeed = 199 KIAS (200 KCAS)
IOAT = –6°C
Obtain: Maximum EGT = 586°C

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS) 98/100 IOAT	98/100 EGT	149/150 IOAT	149/150 EGT	199/200 IOAT	199/200 EGT	248/250 IOAT	248/250 EGT
SEA LEVEL	–30	–15	–14.1	556	–12.9	548	–11.3	537	–9.2	524
	–20	–5	–4.0	583	–2.8	574	–1.2	563	1.0	550
	–10	5	6.0	603	7.2	602	9.0	591	11.2	577
	0	15	16.0	609	17.3	611	19.1	610	21.4	600
	10	25	26.1	618	27.4	617	29.3	616	31.6	617
	20	35	36.1	626	37.5	625	39.4	624	41.9	623
	30	45	46.1	635	47.6	634	49.5	633	52.1	632
	37	52	53.2	641	54.6	640	56.7	639	59.3	638
5,000	–30	–25	–23.8	579	–22.5	579	–20.7	571	–18.3	553
	–20	–15	–13.8	585	–12.4	585	–10.5	586	–8.0	578
	–10	–5	–3.8	593	–2.3	593	–0.3	592	2.2	592
	0	5	6.3	601	7.8	601	9.8	600	12.5	598
	10	15	16.3	609	17.9	609	20.0	608	22.8	607
	20	25	26.4	618	28.0	617	30.2	616	33.0	615
	30	35	36.4	626	38.1	625	40.4	624	43.3	623
	37	42	43.5	632	45.2	631	47.5	630	50.6	629
10,000	–30	–35	–33.6	572	–32.0	571	–29.9	570	–27.2	569
	–20	–25	–23.5	577	–21.9	577	–19.7	576	–16.9	574
	–10	–15	–13.5	585	–11.8	584	–9.5	583	–6.6	582
	0	–5	–3.4	593	–1.7	592	0.7	591	3.8	589
	10	5	6.6	601	8.4	600	10.9	599	14.1	597
	20	15	16.7	609	18.5	608	21.1	607	24.4	606
	30	25	26.7	618	28.6	617	31.3	615	34.7	614
	37	32	33.8	623	35.8	622	38.5	621	42.0	619

NOTE

For use on aircraft with –10 SRL computers.

FIGURE 3A-1A

SRL COMPUTER FAILURE (continued)

EGT LIMIT WITH SRL INOPERATIVE
100% RPM – MAXIMUM CONTINUOUS POWER –10 SRL COMPUTER (continued)

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS) 98/100 IOAT	98/100 EGT	149/150 IOAT	149/150 EGT	199/200 IOAT	199/200 EGT	248/250 IOAT	248/250 EGT
15,000	–30	–45	–43.3	569	–41.5	568	–39.0	567	–35.9	565
	–20	–35	–33.2	572	–31.4	571	–28.8	570	–25.5	568
	–10	–25	–23.2	577	–21.2	576	–18.5	575	–15.2	573
	0	–15	–13.1	585	–11.1	584	–8.3	582	–4.8	580
	10	–5	–3.0	593	–0.9	592	2.0	590	5.6	588
	20	5	7.0	601	9.2	600	12.2	598	16.0	596
	30	15	17.1	609	19.3	608	22.4	607	26.4	605
	37	22	24.2	615	26.5	614	29.7	612	33.8	610
20,000	–29	–54	–52.5	566	–50.8	565	–48.4	564	–45.5	561
	–20	–45	–42.9	569	–40.7	568	–37.7	566	–34.0	564
	–10	–35	–32.8	572	–30.5	570	–27.4	569	–23.5	566
	0	–25	–22.7	577	–20.3	575	–17.1	574	–13.0	571
	10	–15	–12.6	585	–10.2	583	–6.8	581	–2.6	579
	20	–5	–2.6	593	0.0	591	3.5	589	7.9	587
	30	5	7.5	601	10.2	599	13.8	597	18.4	595
	37	13	14.6	606	17.3	605	21.1	603	25.8	601
25,000	–19	–54	–52.2	566	–50.1	564	–47.2	563	–43.7	560
	–10	–44	–42.4	568	–39.7	567	–36.1	565	–31.5	562
	0	–34	–32.3	571	–29.5	570	–25.7	568	–21.0	565
	10	–24	–22.2	576	–19.3	575	–15.3	572	–10.4	569
	20	–14	–12.1	584	–9.1	583	–4.9	580	0.2	577
	30	–4	–2.0	592	1.2	591	5.4	588	10.7	585
	37	2	5.1	598	8.4	596	12.8	594	18.3	590
30,000	–9	–54	–50.7	565	–47.7	563	–43.4	561	–38.1	557
	0	–44	–41.7	568	–38.4	566	–34.0	563	–28.5	560
	10	–34	–31.6	571	–28.2	569	–23.5	566	–17.8	562
	20	–24	–21.5	576	–17.9	574	–13.1	571	–7.1	567
	30	–14	–11.4	584	–7.6	582	–2.6	578	3.6	574
	37	–1	–4.3	589	–0.4	587	4.8	584	11.3	579

NOTE

For use on aircraft with –10 SRL computers.

FIGURE 3A-1A (continued)

SRL COMPUTER FAILURE (continued)

EGT LIMIT WITH SRL INOPERATIVE
97% RPM – CRUISE POWER, –10 SRL COMPUTER

NOTE

- Indicated outside air temperature (IOAT) as shown in table includes compressibility and position errors.
- Airspeeds shown are provided to permit interpolation of EGT's. Do not exceed V_{MO}.
- Applicable to all bleed air and anti-ice conditions.

EXAMPLE:
Given: Altitude = 15,000 Feet
Airspeed = 199 KIAS (200 KCAS)
IOAT = –6°C
Obtain: Maximum EGT = 555°C

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS) 98/100 IOAT	98/100 EGT	149/150 IOAT	149/150 EGT	199/200 IOAT	199/200 EGT	248/250 IOAT	248/250 EGT
SEA LEVEL	–30	–15	–14.1	525	–12.9	516	–11.3	506	–9.2	494
	–20	–5	–4.0	551	–2.8	542	–1.2	530	1.0	516
	–10	5	6.0	570	7.2	568	9.0	556	11.2	542
	0	15	16.0	576	17.3	577	19.1	576	21.4	575
	10	25	26.1	583	27.4	583	29.3	582	31.6	581
	20	35	36.1	592	37.5	591	39.4	590	41.9	589
	30	45	46.1	601	47.6	600	49.5	599	52.1	598
	37	52	53.2	607	54.6	606	56.7	605	59.3	604
5,000	–30	–25	–23.8	555	–22.5	554	–20.7	543	–18.3	526
	–20	–15	–13.8	557	–12.4	556	–10.5	556	–8.0	551
	–10	–5	–3.8	560	–2.3	559	–0.3	558	2.2	558
	0	5	6.3	567	7.8	567	9.8	566	12.5	564
	10	15	16.3	575	17.9	575	20.0	574	22.8	572
	20	25	26.4	583	28.0	583	30.2	581	33.0	580
	30	35	36.4	592	38.1	591	40.4	590	43.3	588
	37	42	43.5	598	45.2	597	47.5	596	50.6	594
10,000	–30	–35	–33.6	551	–32.0	550	–29.9	549	–27.2	548
	–20	–25	–23.5	554	–21.9	553	–19.7	552	–16.9	550
	–10	–15	–13.5	557	–11.8	556	–9.5	555	–6.6	553
	0	–5	–3.4	560	–1.7	559	0.7	558	3.8	556
	10	5	6.6	567	8.4	566	10.9	565	14.1	563
	20	15	16.7	575	18.5	574	21.1	573	24.4	571
	30	25	26.7	583	28.6	583	31.3	581	34.7	579
	37	32	33.8	589	35.8	588	38.5	587	42.0	585

NOTE

For use on aircraft with –10 SRL computers.

FIGURE 3A-2A

SRL COMPUTER FAILURE (continued)

EGT LIMIT WITH SRL INOPERATIVE
97% RPM – CRUISE POWER, –10 SRL COMPUTER (continued)

ALTITUDE (FEET)	Δ ISA (°C)	OAT (°C)	INDICATED/CALIBRATED AIRSPEED (KNOTS) 98/100 IOAT	98/100 EGT	149/150 IOAT	149/150 EGT	199/200 IOAT	199/200 EGT	248/250 IOAT	248/250 EGT
	–30	–45	–43.3	548	–41.5	547	–39.0	546	–35.9	544
	–20	–35	–33.2	551	–31.4	550	–28.8	549	–25.5	547
	–10	–25	–23.2	554	–21.2	553	–18.5	551	–15.2	549
15,000	0	–15	–13.1	557	–11.1	556	–8.3	554	–4.8	552
	10	–5	–3.0	560	–0.9	559	2.0	557	5.6	555
	20	5	7.0	567	9.2	566	12.2	564	16.0	562
	30	15	17.1	575	19.3	574	22.4	572	26.4	570
	37	22	24.2	581	26.5	580	29.7	578	33.8	576
	–29	–54	–52.5	546	–50.8	545	–48.4	543	–45.5	541
	–20	–45	–42.9	548	–40.7	547	–37.7	545	–34.0	543
	–10	–35	–32.8	551	–30.5	550	–27.4	548	–23.5	545
20,000	0	–25	–22.7	554	–20.3	552	–17.1	550	–13.0	548
	10	–15	–12.6	557	–10.2	555	–6.8	553	–2.6	551
	20	–5	–2.6	559	0.0	558	3.5	556	7.9	553
	30	5	7.5	567	10.2	566	13.8	564	18.4	561
	37	13	14.6	573	17.3	571	21.1	569	25.8	566
	–19	–54	–52.2	545	–50.1	544	–47.2	542	–43.7	539
	–10	–44	–42.4	548	–39.7	546	–36.1	544	–31.5	541
	0	–34	–32.3	551	–29.5	549	–25.7	547	–21.0	544
25,000	10	–24	–22.2	553	–19.3	552	–15.3	549	–10.4	546
	20	–14	–12.1	556	–9.1	555	–4.9	552	0.2	549
	30	–4	–2.0	559	1.2	557	5.4	555	10.7	552
	37	2	5.1	564	8.4	563	12.8	560	18.3	556
	–9	–54	–50.7	545	–47.7	543	–43.4	540	–38.1	537
	0	–44	–41.7	547	–38.4	545	–34.0	542	–28.5	539
30,000	10	–34	–31.6	550	–28.2	548	–23.5	545	–17.8	541
	20	–24	–21.6	553	–17.9	551	–13.1	548	–7.1	544
	30	–14	–11.4	556	–7.6	554	–2.6	551	3.6	546
	37	–1	–4.3	558	–0.4	556	4.8	552	11.3	548

NOTE

For use on aircraft with –10 SRL computers.

FIGURE 3A-2A (continued)

PREPLANNED ENGINE SHUTDOWN/AIRSTART

Intentional engine shutdowns and airstarts may be required during crew training and following maintenance or adjustment of the engine or propeller controls. Stresses due to temperature gradients within the engine can be reduced and engine life prolonged by using the following procedure:

WARNING

IN THE EVENT OF AN ACTUAL ENGINE FAILURE OR ENGINE FIRE, IMPLEMENT THE APPROPRIATE EMERGENCY PROCEDURE AS STATED IN SECTION 3 OF THIS MANUAL.

PREPARATION FOR ENGINE SHUTDOWN

*1. Bleed Air Switch (selected engine) ..... OFF
*2. Propeller Synchrophaser Switch (if installed) ..... TAKEOFF & LANDING
3. Power Lever (selected engine) ..... APPROXIMATELY 1/4 INCH (6 mm) FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
4. Speed Levers ..... 97% RPM

Allow the selected engine to cool and stabilize at low power while accomplishing steps 5, 6 and 7 as applicable. Observe torque and EGT limits on the operating engine.

5. Generators (S/N DC-884 and subsequent, and airplanes modified IAW SB CC7-24-002) ..... CHECK AMPS

NOTE

- If the generator switch is ON, the GEN FAIL annunciator light is OFF, and the ammeter reads zero, the respective 400 amp current limiter is open.
- An open current limiter will not prevent an engine restart, but an intentional engine shutdown with an open current limiter is not recommended unless an engine malfunction has been detected.
- If a failed current limiter is found, the generator on that side should be turned OFF.

6. Generator Switch (selected engine) ..... OFF
7. Current Limiters (S/N DC-883 and earlier without SB CC7-24-002) ..... CHECK

(SEE PAGE 2-21)

CAUTION

IF A CURRENT LIMITER HAS FAILED, AN AIRSTART MAY NOT BE POSSIBLE. DO NOT CONTINUE WITH A PREPLANNED ENGINE SHUTDOWN.

PREPLANNED ENGINE SHUTDOWN/AIRSTART (continued)

ENGINE SHUTDOWN

NOTE

In order to maintain consistency in training and in reaction patterns, this procedure follows the sequence of actions specified in the ENGINE FAILURE DURING FLIGHT procedure contained in Section 3 of this manual. However, certain actions are expanded to permit symmetrical cooling of rotating parts of the engine and to allow extended observation of the functions of engine and propeller components such as the manual fuel shutoff valve, negative torque sensing system, and feathering valve.

1. Engine Stop and Feather Control (selected engine) ..... PULL

   Pull the control out only to the point where the fuel shutoff valve shuts off the fuel, as indicated by fuel flow dropping to zero. Leave the control in that position for one minute or until RPM decays to approximately 30%. Frequently, RPM will remain above 30% at the end of one minute. Then pull the control full aft to open the feather valve and allow the propeller to feather.

CAUTION

- DO NOT ALLOW ENGINE TO WINDMILL DURING RPM DECAY LONGER THAN ONE MINUTE.
- DO NOT PERMIT THE INOPERATIVE ENGINE TO WINDMILL IN THE 18% TO 28% RPM RANGE.

2. Engine Clean Up (selected engine) ..... AS REQUIRED
   a. Fuel shutoff switch
   b. Hydraulic shutoff switch
   c. Fuel boost pump switch
   d. Generator switch
   *e. Bleed air switch
3. Power Lever (operating engine) ..... AS REQUIRED
4. Trim ..... AS REQUIRED
5. Generator (operating engine) .....300 AMPS MAXIMUM
6. Engine Stop and Feather Control .....FORWARD
7. Unfeather Test Switch (selected engine) ..... AS REQUIRED

Depending upon airspeed and ambient temperature during RPM decay, residual EGT may be above 200°C when the propeller feathers and stops rotation. If the EGT is above 200°C, use the unfeather test switch intermittently to keep the propeller windmilling slowly (up to approximately 10% RPM) until the EGT stabilizes at or below 200°C.

PREPLANNED ENGINE SHUTDOWN/AIRSTART (continued)

ENGINE SHUTDOWN (continued)

NOTE

- Above approximately 7% windmilling RPM, sufficient oil pressure may be generated to sustain the unfeathering cycle thus increasing RPM toward the 18% to 28% RPM range. Prevent such increases in RPM by pulling the engine stop and feather control full aft and resetting it forward when the propeller feathers.

- Repeated momentary use of the unfeather test switch to cause very slow rotation of the feathered propeller will eventually cause all the oil to be pumped from the oil tank, through the propeller dome, and into the nose case. At very slow rotation speeds, the scavenge pumps will not be able to return the oil from the nose case to the oil tank. Avoid exhausting the oil tank by ensuring that the propeller windmills at no less than 5% RPM. Prior to final feathering when EGT is less than 200^{0}C, allow windmilling RPM to reach approximately 15% to ensure sufficient oil scavenging to provide a source of oil for unfeathering.

- If the supply of oil from the oil tank to the unfeathering pump is exhausted inadvertently, it can be replenished by using the starter test switch to cause rotation and scavenge pump operation. However, since the electrical load on the starter while turning a feathered propeller in flight is unknown and variable, this procedure should not be attempted without realizing that damage to the starter may occur. Observe the starter duty cycle limitations.

- A feathered propeller should not rotate backward at speeds above 115 KIAS. If backward rotation occurs, either increase airspeed or use momentary activation of unfeather pump (engine stop and feather control – forward) to stop backward rotation.

PREPLANNED ENGINE SHUTDOWN/AIRSTART (continued)

PREPARATION FOR IMMEDIATE AIRSTART

NOTE

Prepositioning controls and switches as follows will shorten the time required to restart the engine should an immediate airstart be required.

*1. Speed Lever ..... 97% RPM

NOTE

The 97% RPM speed lever position can be attained either by setting this value prior to shutdown or by setting the operating engine speed at 97% RPM and aligning both speed levers.

2. Power Lever ..... APPROXIMATELY 1/4 INCH (6 mm) FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
*3. Engine Stop and Feather Control ..... FORWARD
4. Fuel Shutoff Switch ..... OPEN
5. Hydraulic Shutoff Switch ..... OPEN
6. Fuel Boost Pump Switch ..... ON
7. Generator Switch ..... OFF
*8. Bleed Air Switch ..... OFF
9. Auto/Cont Ignition Switch ..... AUTO

AIRSTART

CAUTION

IF AN ENGINE HAS BEEN SHUT DOWN BECAUSE OF AN OBVIOUS FAILURE, AS INDICATED BY THE ENGINE INSTRUMENTS OR EXCESSIVE VIBRATION, AN AIRSTART SHOULD NOT BE ATTEMPTED.

NOTE

- Satisfactory airstarts have been demonstrated up to 20,000 feet pressure altitude with the fuel boost pumps operating and up to 12,000 feet pressure altitude without the boost pumps operating.

- When airstarting an engine at low airspeeds (100 to 110 KIAS) significant yaw and roll into the starting engine will occur as the engine approaches its on-speed condition. The yaw and roll are barely noticeable during airstarts at speeds above 150 KIAS.

PREPLANNED ENGINE SHUTDOWN/AIRSTART (continued)

AIRSTART (continued)

*1.	Speed Lever	97% RPM
2.	Power Lever	APPROXIMATELY 1/4 INCH (6 mm) FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
3.	EGT	BELOW 200°C (IF FEASIBLE)
4.	RPM	10% OR LESS
5.	Altitude	20,000 FEET MAXIMUM
6.	Airspeed	100 KIAS TO 180 KIAS
*7.	Engine Stop and Feather Control	FORWARD
8.	Fuel Shutoff Switch	OPEN
9.	Hydraulic Shutoff Switch	OPEN
10.	Fuel Boost Pump Switch	ON
11.	Generator Switch	OFF
*12.	Bleed Air Switch	OFF
13.	Auto/Cont Ignition Switch	AUTO
14.	Engine Start Button	PRESS AND HOLD UNTIL LIGHT OFF

NOTE

During airstarts following prolonged feathered flight at cold outside air temperatures (oil temperature cooled to below +25°C), increased starting fuel may be required. Depress the start button as required to maintain normal EGT and engine acceleration during airstarts of cold-soaked engines.

*15.	Propeller	OBSERVE UNFEATHERING
16.	Fuel Flow	SHOULD START BY 10% RPM
17.	EGT	SHOULD INCREASE AT 10% TO 20% RPM. IF NOT INCREASING BY 25% RPM, ABORT AIRSTART BY PULLING ENGINE STOP AND FEATHER CONTROL
18.	Fuel and Oil Pressure	GREEN ARC
19.	Generator Switch	RESET/ON
*20.	Bleed Air Switch	ON

NOTE

If the engine fails to accelerate within the 18% to 28% RPM range, feather the propeller by pulling the engine stop and feather control full aft. Use the unfeather test switch as in ENGINE SHUTDOWN step 7 to keep the propeller rotating for a minimum of 5 minutes. Attempt a second airstart. If this airstart is unsuccessful, a single engine landing should be planned since further airstart attempts could damage the engine.

PREPLANNED ENGINE SHUTDOWN/AIRSTART (continued)

AIRSTART PROCEDURE WITH SRL COMPUTER INOPERATIVE

Two three-position speed switch select switches, located on the left cockpit console, are provided to permit airstarts with the SRL computer inoperative. These switches bypass the normally automatic engine speed functions controlled by the SRL computer that are required during start. The switch positions are AUTO, OFF, and MANUAL. The airstart procedure with SRL computer inoperative is the same as the normal airstart procedure except for the denoted changes below as indicated by the small letter "a" and double asterisks.

*1. Speed Lever ..... 97% RPM
2. Power Lever ..... APPROXIMATELY 1/4 INCH (6 mm) FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
3. EGT ..... BELOW 200°C (IF FEASIBLE)
4. RPM ..... 10% OR LESS
5. Altitude ..... 20,000 FEET MAXIMUM
6. Airspeed ..... 100 KIAS TO 180 KIAS
*7. Engine Stop and Feather Control ..... FORWARD
8. Fuel Shutoff Switch ..... OPEN
9. Hydraulic Shutoff Switch ..... OPEN
10. Fuel Boost Pump Switch ..... ON
11. Generator Switch ..... OFF
*12. Bleed Air Switch ..... OFF
**a. Speed switch select switch ..... MANUAL
13. Auto/Cont Ignition Switch ..... AUTO
14. Engine Start Button ..... PRESS MOMENTARILY
*15. Propeller ..... OBSERVE UNFEATHERING
16. Fuel Flow ..... SHOULD START BY 10% RPM
17. EGT ..... SHOULD INCREASE AT 10% TO 20% RPM. IF NOT INCREASING BY 25% RPM, ABORT AIRSTART BY PULLING ENGINE STOP AND FEATHER CONTROL
18. Engine Start Button ..... OBSERVE EGT AND RPM ACCELERATION. USE START BUTTON AS REQUIRED TO PROVIDE FUEL ENRICHMENT BETWEEN 10% AND 60% RPM

NOTE

During airstarts following prolonged feathered flight at cold outside air temperatures (oil temperature cooled to below +25°C), increased starting fuel may be required. Depress the start button as required to maintain normal EGT and engine acceleration during airstarts of cold-soaked engines.

19. Fuel and Oil Pressure ..... GREEN ARC
**a. Speed switch select switch ..... AUTO/CHECK IGNITION LIGHT GOES OUT
20. Generator Switch ..... RESET/ON
*21. Bleed Air Switch ..... ON

PREPLANNED ENGINE SHUTDOWN/AIRSTART (continued)

AIRSTART PROCEDURE WITH SRL COMPUTER INOPERATIVE

Two three-position speed switch select switches, located on the left cockpit console, are provided to permit airstarts with the SRL computer inoperative. These switches bypass the normally automatic engine speed functions controlled by the SRL computer that are required during start. The switch positions are AUTO, OFF, and MANUAL. The airstart procedure with SRL computer inoperative is the same as the normal airstart procedure except for the denoted changes below as indicated by the small letter "a" and double asterisks.

*1. Speed Lever ..... 97% RPM
2. Power Lever ..... APPROXIMATELY 1/4 INCH (6 mm) FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
3. EGT ..... BELOW 200°C (IF FEASIBLE)
4. RPM ..... 10% OR LESS
5. Altitude ..... 20,000 FEET MAXIMUM
6. Airspeed ..... 100 KIAS TO 180 KIAS
*7. Engine Stop and Feather Control ..... FORWARD
8. Fuel Shutoff Switch ..... OPEN
9. Hydraulic Shutoff Switch ..... OPEN
10. Fuel Boost Pump Switch ..... ON
11. Generator Switch ..... OFF
*12. Bleed Air Switch ..... OFF
**a. Speed switch select switch ..... MANUAL
13. Auto/Cont Ignition Switch ..... AUTO
14. Engine Start Button ..... PRESS MOMENTARILY
*15. Propeller ..... OBSERVE UNFEATHERING
16. Fuel Flow ..... SHOULD START BY 10% RPM
17. EGT ..... SHOULD INCREASE AT 10% TO 20% RPM. IF NOT INCREASING BY 25% RPM, ABORT AIRSTART BY PULLING ENGINE STOP AND FEATHER CONTROL
18. Engine Start Button ..... OBSERVE EGT AND RPM ACCELERATION. USE START BUTTON AS REQUIRED TO PROVIDE FUEL ENRICHMENT BETWEEN 10% AND 60% RPM

NOTE

During airstarts following prolonged feathered flight at cold outside air temperatures (oil temperature cooled to below +25°C), increased starting fuel may be required. Depress the start button as required to maintain normal EGT and engine acceleration during airstarts of cold-soaked engines.

19. Fuel and Oil Pressure ..... GREEN ARC
**a. Speed switch select switch ..... AUTO/CHECK IGNITION LIGHT GOES OUT
20. Generator Switch ..... RESET/ON
*21. Bleed Air Switch ..... ON

PREPLANNED ENGINE SHUTDOWN/AIRSTART (continued)

ABORTED AIRSTART (DUE TO NO COMBUSTION)

1. Engine Stop and Feather Control ..... PULL
2. Altitude ..... REDUCE BEFORE ATTEMPTING ANOTHER START

PRESSURIZATION/AIR CONDITIONING SYSTEM MALFUNCTIONS

COLD AIR

Warm or hot air flowing from cold air outlets could be caused by an air cooling turbine failure or by a malfunctioning water separator anti-icing modulator valve. If warm air exits from cold air outlets, isolate the source of the malfunction by turning off bleed air from the engine on the side of the aircraft which is producing the warm air.

CONDITIONED AIR

If the automatic temperature controller fails to respond to commanded temperature changes, switch to manual control of the hot air mixing valves. Modulate travel of the valves by selecting colder or warmer temperatures with two to three-second pulses. Although the mixing valves will travel from full hot to full cold in approximately eight seconds, several minutes may be required before the conditioned air temperature stabilizes following manual changes to the position of the mixing valve.

UNPRESSURIZED FLIGHT

1. Cabin Dump Switch ..... DUMP
*2. Bleed Air Switches ..... AS DESIRED

WARNING

WHEN THE AIRPLANE IS UNPRESSURIZED, THE PASSENGER ENTRANCE DOOR SAFETY LOCK WILL NOT BE ENGAGED, AND IT WILL BE POSSIBLE TO OPEN THE DOOR IN FLIGHT.

HIGH OIL TEMPERATURE

Elevated oil temperatures (in the caution range) on the ground are common with high ambient temperatures. If the maximum oil temperature limit is exceeded, do not takeoff.

In flight, high oil temperature can be an indication of low oil quantity or impending engine failure. If the oil temperature exceeds the maximum limit in flight, reduce power on the affected engine. If the oil temperature remains out of limits and there are any other indications of pending engine failure, the engine should be shutdown.

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PART A – INTRODUCTION

CONTENTS

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INTRODUCTION

This section has been sub-divided into tabbed parts in order to assist the operator in solving his performance problems, particularly those associated with takeoff and landing distances and permissible operating weights. The performance information in this section has been FAA Approved.

Part B provides standard reference data which affect all weights.

Parts C, D, and E show takeoff performance data separated into three parts by power setting to be used.

Part F provides data regarding en route climb performance.

Part G provides data for landing performance determination.

Part H provides data to be considered when encumbered by ice accumulations on unprotected surfaces of the airplane.

Part I provides FAA approved procedures for reduced power takeoffs. Air Carrier or Air Taxi commercial operators must have prior approval of the cognizant FAA inspector to use these procedures.

Part J provides additional takeoff performance with alternate speed schedules.

Typically, sufficient information is provided on each chart to acquaint the user with the conditions and procedures upon which the data are based. Examples and chase-around arrows are provided when appropriate. Note that reference lines are provided on the charts when weight, slope, or wind affect the answers obtained from the charts. The wind and slope reference lines are always at zero. In most cases, the weight reference line is at the maximum takeoff or landing weight. However, on Figures 4C-5 thru 4C-7, 4C-9, 4D-5 thru 4D-7, 4D-9, 4E-7 thru 4E-9, 4E-11, 4J-3 thru 4J-5, and 4J-7 thru 4J-9 the reference lines are at 13,000 pounds in order to present all of the required information on a single page.

All performance information in this section that is dependent upon engine power includes the effects of temperature, altitude, engine accessory loads, and installation losses. OAT's noted in performance charts are true temperatures (indicated OAT's corrected for the ram rise and position error given in Figure 4B-2). IOAT's obtained when parked or taxiing may not be accurate, particularly when operating from surfaces which have strong radiation characteristics. Wind effect lines on takeoff and landing distance charts account for 150% of reported tailwinds and 50% of reported headwinds. Therefore, those charts may be entered using reported headwind or tailwind velocity.

The generator loads shown in Associated Conditions tables are total loads being used by aircraft systems. Performance degradations due to generator loads have been included in appropriate figures and are assumed to be shared equally when both engines are operating and by the operating engine when one has failed. The effects of reduced power due to bleed air extraction for operation of pressurization and anti-ice systems have been included where applicable. The operating status of the bleed air systems is noted on the appropriate charts. The charts presented in the Bleed Air "ON" subsection are based on Bleed Air "Low" and a correction to the chart for Bleed Air "High" is given on each chart when appropriate. The Takeoff Power Check Charts may be used to verify minimum engine power output equivalent to that used in preparation of the performance charts. The torque setting on the Takeoff Power Check Charts must be available without exceeding the 650^{o}C EGT limit.

OPERATING WEIGHT LIMITATIONS

The Operating Weight Limitations from Section 1 are repeated below:

1. The maximum takeoff weight may not exceed the lower of the following:

   (a.) The weight at which the single engine takeoff and en route climb requirements are met, Figure 4C-2 (Dry, Bleed Air On), 4D-2 (Dry, Bleed Air Off), or 4E-3 (Wet) or 4E-4 (Wet with Reserve Power).

   (b.) The weight at which the accelerate-stop distance (Figure 4C-4, 4D-4, 4E-6, 4J-3 or 4J-7) equals the available runway length, including stopway if available.

   (c.) The weight at which the single engine takeoff distance (Figure 4C-5, 4D-5, 4E-7, 4J-4 or 4J-8) equals the available runway length, including clearway if available.

   (d.) The weight at which the takeoff run distance (Figure 4C-6, 4D-6, 4E-8, 4J-5 or 4J-9) equals the available runway length, excluding clearway.

2. The maximum landing weight may not exceed the lower of the following:

   (a.) The weight at which the single engine approach climb requirement is met (Figure 4G-1, 4G-2 or 4G-3).

   (b.) The weight at which the landing distance (Figure 4G-4) equals the landing runway length.

NOTE

- The operating rules may require the use of factored landing distances in determining the minimum runway lengths required. The distances shown in Figure 4G-4 are not factored.
- Do not exceed performance weight limitations shown in this section nor structural weight limitations shown in Section 1 and repeated below:

Max Ramp Weight ..... 16,600 pounds (7530 kg)
Max Takeoff Weight..... 16,500 pounds (7485 kg)
Max Landing Weight ..... 15,675 pounds (7110 kg)

TWO PILOT OPERATIONS

The following flight operations require two pilots:

A. Takeoffs with a temperature limiter or single red line (SRL) computer inoperative.

B. Reduced power takeoffs and takeoffs which require use of reserve power to meet maximum takeoff weight limitations.

C. Flights planned to land at destinations that require use of CAWI to meet the single engine approach climb requirements. (Figure 4G-3).

DEFINITIONS

PRESSURE ALTITUDE	Altitude determined with the altimeter set at 29.92 inches Hg (1013.2 millibars). Assumes no instrument error.
PRESSURE HEIGHT	Altitude above the takeoff surface based upon a pressure altimeter reading.
ISA	International Standard Atmosphere (15^{O}C at sea level with approximately 2^{O}C per 1,000 feet lapse rate).
IOAT	Indicated outside air temperature. Assumes no instrument error.
KIAS	Indicated airspeed in knots. Assumes no instrument error.
KCAS	Calibrated airspeed in knots. Indicated airspeed corrected for position error.
KTAS	True airspeed in knots.
EGT	Exhaust Gas Temperature. The single red line (SRL) computer is assumed to be operating except as noted on the charts.
DRY POWER	Normal engine power without alcohol water injection.
WET POWER	Engine power with alcohol water injection.
TAKEOFF POWER	Defined as torque obtained from the appropriate Takeoff Power Check Chart at 100% RPM, with EGT not exceeding 650^{O}C and torque not exceeding 110% (3,631 foot-pounds, 4923.0 Nm).
MAXIMUM CONTINUOUS POWER	Defined as the power available at 650^{O}C EGT or 100% torque (3,301 foot-pounds, 4475.6 Nm), whichever occurs first, at 100% RPM and without CAWI.
RESERVE POWER	An increased maximum continuous power that is only used for emergency situations; it is equivalent to operation at 670^{O}C EGT.

DEFINITIONS (continued)

CLEARWAY	An area beyond the runway, at least 500 feet wide, centrally located about the extended centerline of the runway, and under the control of the airport authorities, which is free of objects penetrating a plane that slopes 1.25% upward from the end of the runway. However, threshold lights may protrude above the plane if their height above the end of the runway is 26 inches or less and if they are located to each side of the runway.
STOPWAY	An area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway with surface characteristics of a smooth hard surface runway, able to support the airplane during an aborted takeoff, without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff.
TAKEOFF RUN	The horizontal distance along the takeoff path from the start of the takeoff to a point equidistant between the point at which V_{LOF} is reached and the point at which the airplane is 35 feet above the surface.
TAKEOFF WEIGHT	Aircraft gross weight at brake release when beginning takeoff roll.
V_{MCA}	Minimum control speed in flight. Assumes one engine in negative torque sensing (NTS) mode and the other engine at takeoff power.
V_{SO}	Stall speed in the landing configuration.
V_{S1}	Stall speed in a specified configuration.
V_1	Takeoff Decision Speed in knots. V_1 is the airspeed on the ground at which, as a result of engine failure or other reasons, the pilot is assumed to have made a decision to continue or discontinue the takeoff.
V_R	Rotate speed. Rotation is initiated at speeds scheduled in this section.
V_2	Takeoff safety speed at 35 foot height with one engine inoperative.
V_{50}	Takeoff speed at 50 foot height with both engines operating.
NET CLIMB GRADIENT	Demonstrated climb gradient minus 0.8%.
SINGLE ENGINE SERVICE CEILING	Maximum altitude at which a specific rate of climb or gradient of climb can be maintained.

TECHNIQUE

The takeoff and landing performance presented in this section is based on flight tests which were conducted as follows. The user should obtain equal performance by following the same procedures.

ENGINE POWER SETTINGS

Before brakes were released for takeoff performance tests, engine power was set to the torque values determined from the appropriate Takeoff Power Check Chart (Dry – Bleed Air On or Off, Wet or Wet with Reserve Power). Those check charts are provided in Parts C, D, or E respectively. Note that when torque limited, static torque was set at 107% to avoid exceeding torque limits during the takeoff roll. Power settings were not changed after brake release until after either achieving 500 feet for continued takeoff, or V_1 for aborted takeoffs. Torque increases due to ram rise, up to the torque limit, were accepted.

DISTANCE TO ACCELERATE TO V_1 AND STOP

Prior to brake release, takeoff power was set according to the appropriate Takeoff Power Check Chart. When power was stabilized, the brakes were released and the aircraft was allowed to accelerate. The engine failure, which occurred just prior to V_1, was recognized at the takeoff decision speed, V_1, and the power levers were retarded to flight idle. Maximum braking was then applied and the power levers were retarded to ground idle. Nose wheel steering was not used to assist in directional control but may be used as desired. Reverse power was not used; however, shorter distances should be obtained by use of reverse power as directional control permits.

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT

Prior to brake release, takeoff power was set according to the appropriate Takeoff Power Check Chart. When power was stabilized, the brakes were released and the aircraft was allowed to accelerate. The engine failure was recognized at V_1 and acceleration on the ground was continued to V_R. At V_R, the aircraft was rotated at a normal rotation rate (approximately 3^0 per second) and an accelerating climb was continued to 35 foot height. The landing gear was retracted after the aircraft was clear of the ground. Nose wheel steering was not used during the takeoff roll but may be used as desired. Primary controls were used to control direction and wings level attitude after takeoff. Trim and engine power settings were not changed during this phase.

TECHNIQUE (continued)

SECOND SEGMENT CLIMB AND ACCELERATION

During the single engine, continued takeoff tests, the propeller on the failed engine was allowed to windmill in the NTS mode and the wings were held level until after reaching 500 feet above the runway. (A 500 foot pressure altitude increment was used to assure at least a 400 foot tapeline height under the worst conditions.) The acceleration distances at 500 feet are conservatively based on windmilling drag continuing to be present until after the flaps were retracted. Feathering the propeller on the inoperative engine as soon as feasible should result in higher climb gradients and shorter distances than presented in the following charts. Also, the use of up to 5^{o} bank into the good engine should improve performance. Flaps were not retracted until reaching V_2 plus 5 KIAS during the level flight acceleration to V_{YSE}. Aircraft trim was adjusted as required during this phase. Engine power remained as set prior to brake release until achieving V_{YSE}. Then MCP (or Reserve Power Torque, as appropriate) was set. Note that when torque limited at takeoff, ram rise during the 500 foot acceleration phase might increase set power to above the torque limit. In such cases, the power lever(s) should be adjusted to stay within maximum takeoff power limits.

THIRD SEGMENT CLIMB

The V_{YSE} climb with MCP (or Reserve Power, as appropriate) was continued to the end of the takeoff path at 1500 feet above the runway. Up to 5^{o} bank into the good engine was used to reduce drag and control forces.

TWO ENGINE LANDING DISTANCE OVER 50 FOOT HEIGHT

Power was set to maintain a stabilized 3^{o} approach at the approach speed equal to 1.3 V_{SO} with gear and flaps down. At 50 feet above the runway, the power was reduced to flight idle and the aircraft was landed with minimum flare. After touchdown, both power levers were retarded to ground idle and maximum braking was used until the aircraft came to a complete stop. Reverse power was not used. Shorter landing distances may be obtained by using reverse power.

PART B – STANDARD REFERENCE DATA

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TAKEOFF NOISE LEVELS

Takeoff noise level measured in accordance with FAR 36 subpart F is 80.9 dB(A).

NOTE

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

FUEL VENTING AND EXHAUST EMISSIONS

This airplane complies with SFAR 27, "Fuel Venting and Exhaust Emissions Requirements for Turbine Engine Powered Airplanes", which is equivalent to FAR PART 34, effective September 10, 1990.

WIND COMPONENT CHART

EXAMPLE:

GIVEN: WIND VELOCITY = 25 KNOTS
AT 40° OFF RUNWAY HEADING
OBTAIN: HEADWIND COMPONENT = 19 KNOTS
CROSSWIND COMPONENT = 16 KNOTS

NOTE

DEMONSTRATED CROSSWIND COMPONENT IS 20 KNOTS.

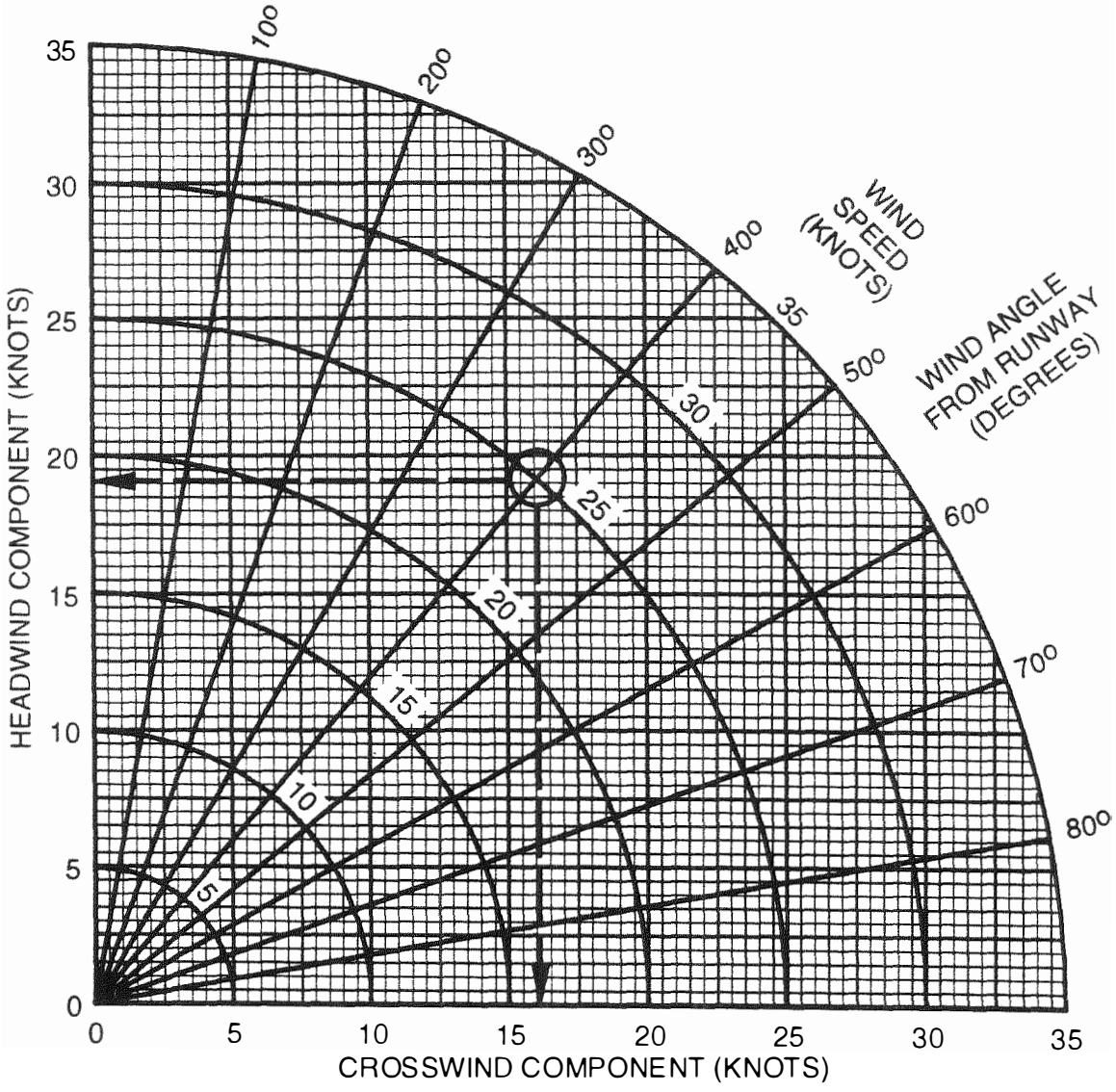


FIGURE 4B-1

COMPRESSIBILITY AND POSITION ERROR CORRECTION TO INDICATED OUTSIDE AIR TEMPERATURE (IOAT)

TEMPERATURE PROBE RECOVERY FACTOR .65
ASSUMES ZERO TEMPERATURE INDICATOR ERROR

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 181 KIAS
PRESSURE ALTITUDE = 15,000 FEET
IOAT = – 10°C

OBTAIN: ΔT = – 4.5°C
OAT = IOAT + ΔT
= – 10 + (– 4.5)
= – 14.5°C

NOTE

- TEMPERATURE RISE IS SHOWN FOR STANDARD DAY AMBIENT TEMPERATURES. FOR AMBIENT TEMPERATURES WITHIN ±40°C OF STANDARD, THE TEMPERATURE RISE MAY VARY BY AS MUCH AS ±2.5°C FROM THAT SHOWN.
- IOAT NOTED WHEN PARKED OR TAXIING MAY NOT BE ACCURATE.

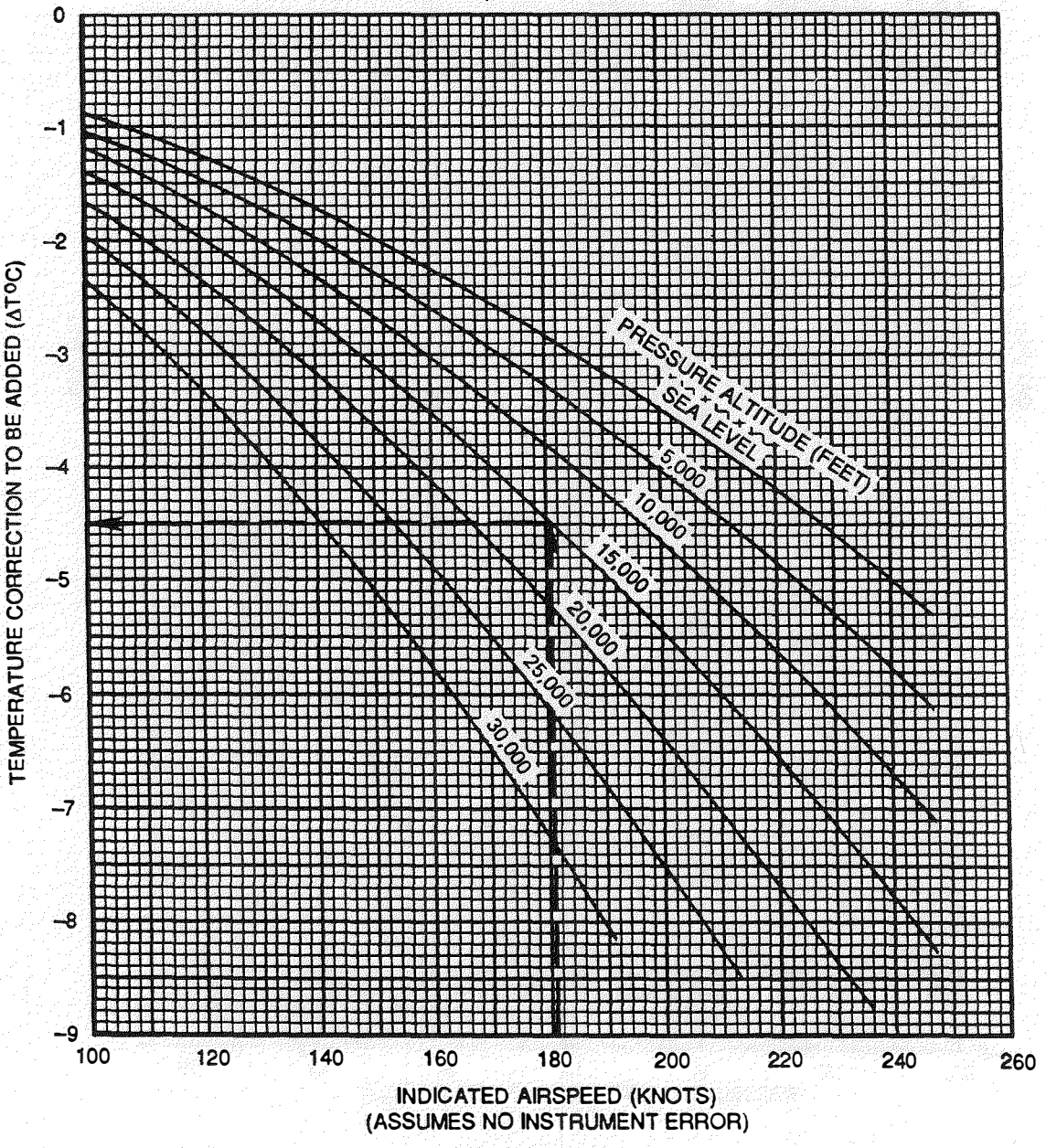


FIGURE 4B-2

RELATIONSHIP OF OUTSIDE AIR TEMPERATURE TO ISA TEMPERATURE

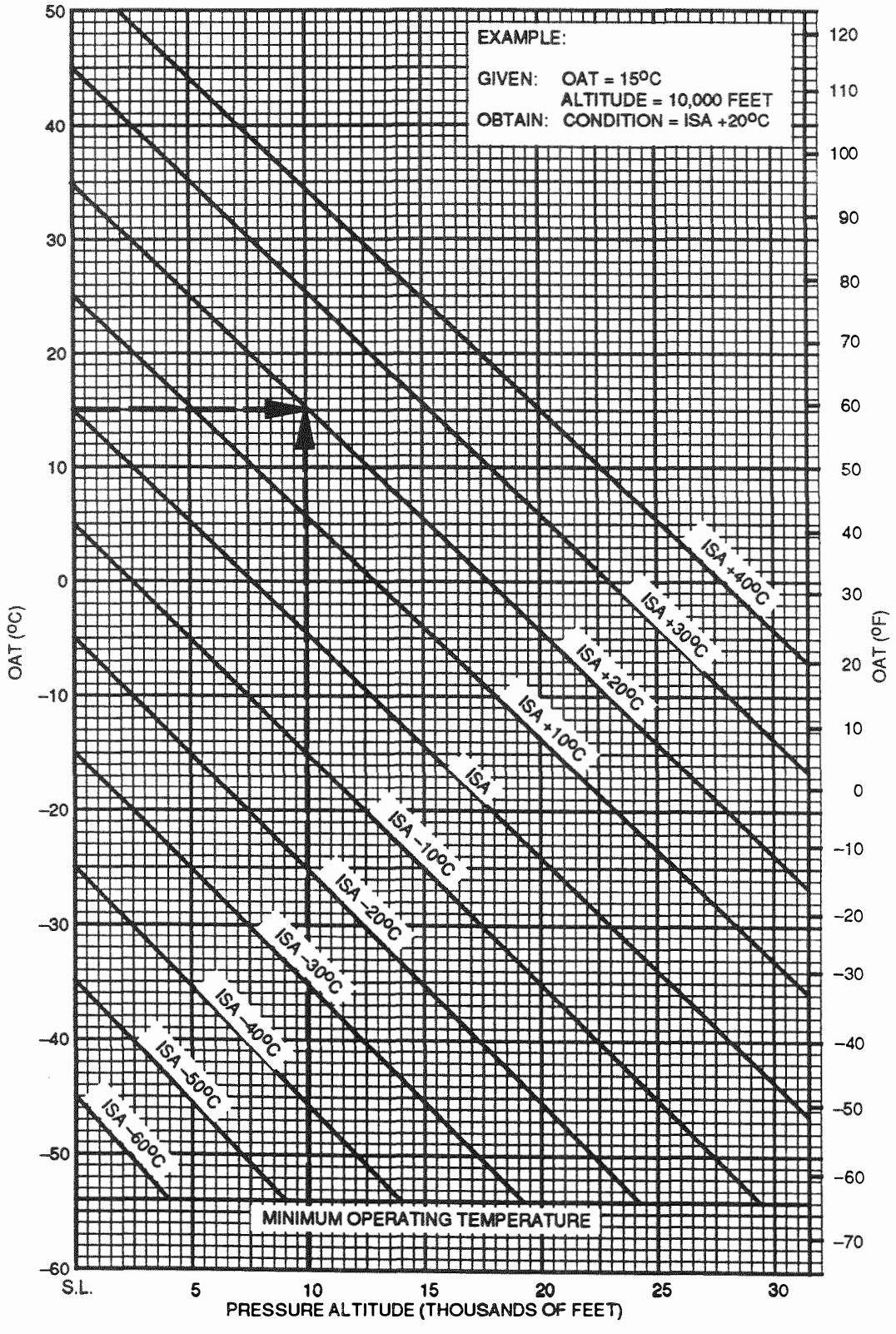


FIGURE 4B-3

AIRSPEED CALIBRATION – NORMAL SYSTEM
GEAR UP, FLAPS UP

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 125 KIAS
GROSS WEIGHT = 16,000 POUNDS (7260 kg)
OBTAIN: CALIBRATED AIRSPEED = 126 KCAS

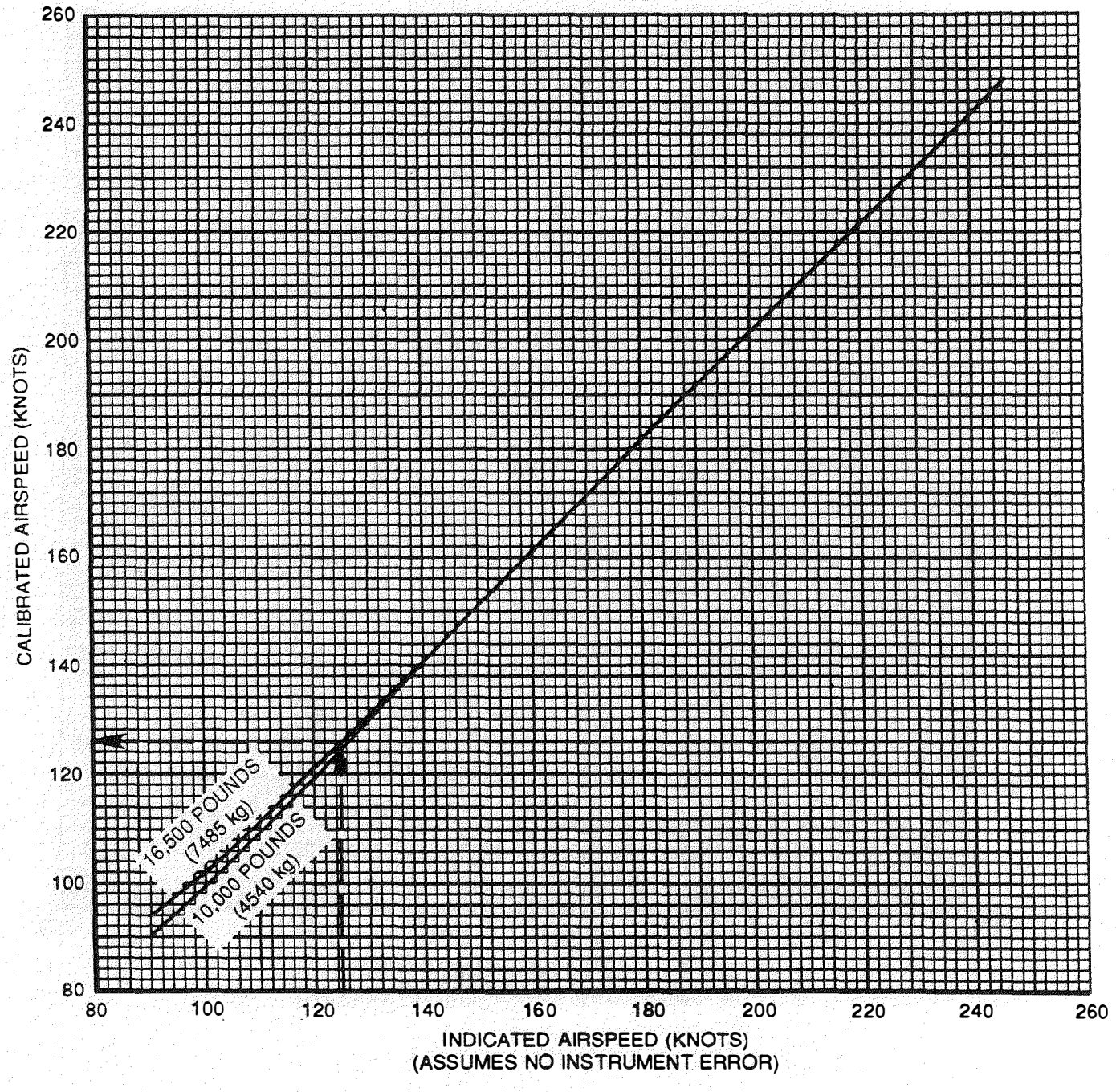


FIGURE 4B-4

AIRSPEED CALIBRATION – NORMAL SYSTEM
GEAR UP, FLAPS 1/4

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 145 KIAS
GROSS WEIGHT = ALL WEIGHTS
OBTAIN: CALIBRATED AIRSPEED = 146 KCAS

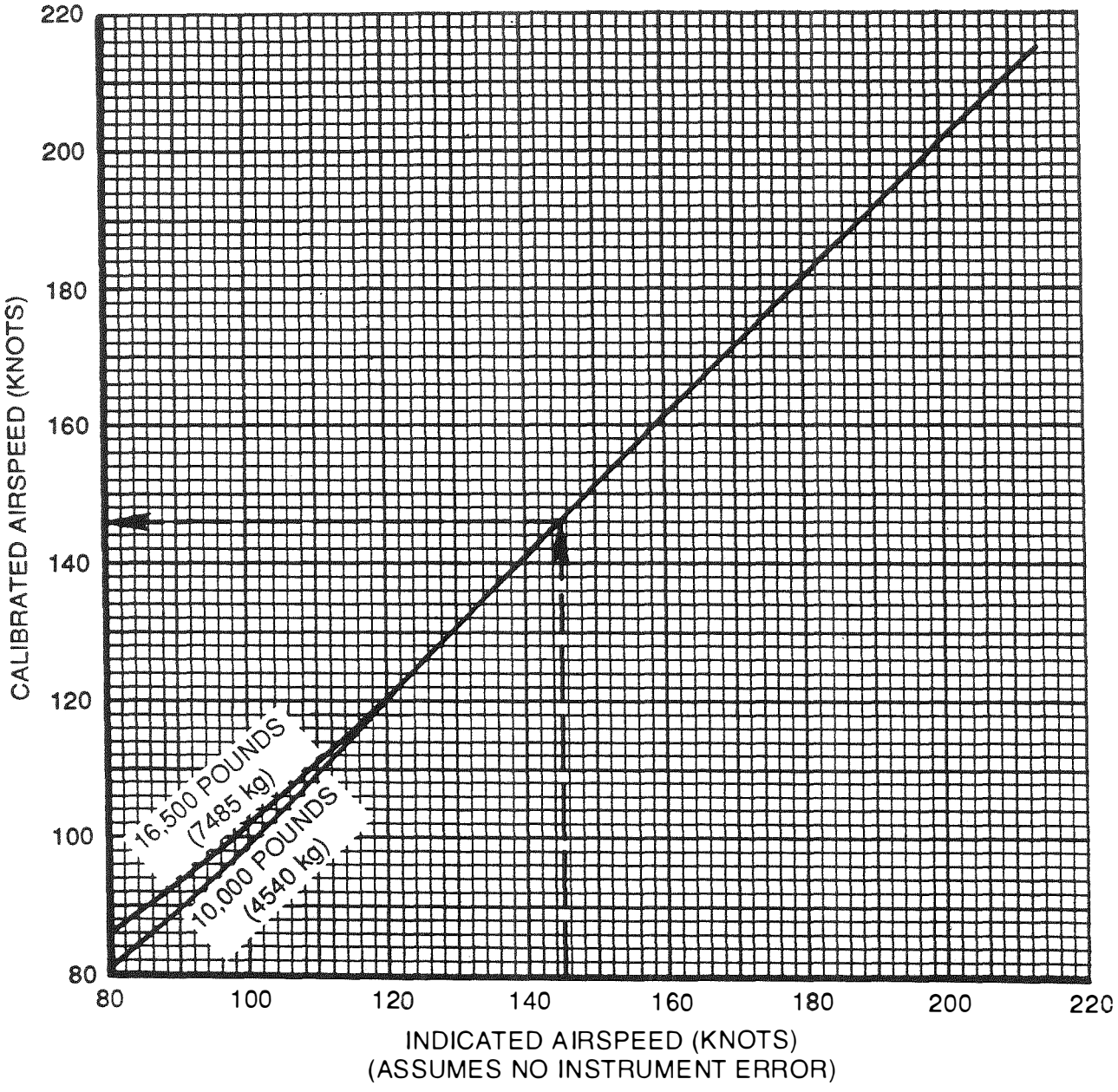


FIGURE 4B-5

AIRSPEED CALIBRATION – NORMAL SYSTEM

GEAR DOWN, FLAPS 1/4

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 158 KIAS
GROSS WEIGHT = ALL WEIGHTS

OBTAIN: CALIBRATED AIRSPEED = 159 KCAS

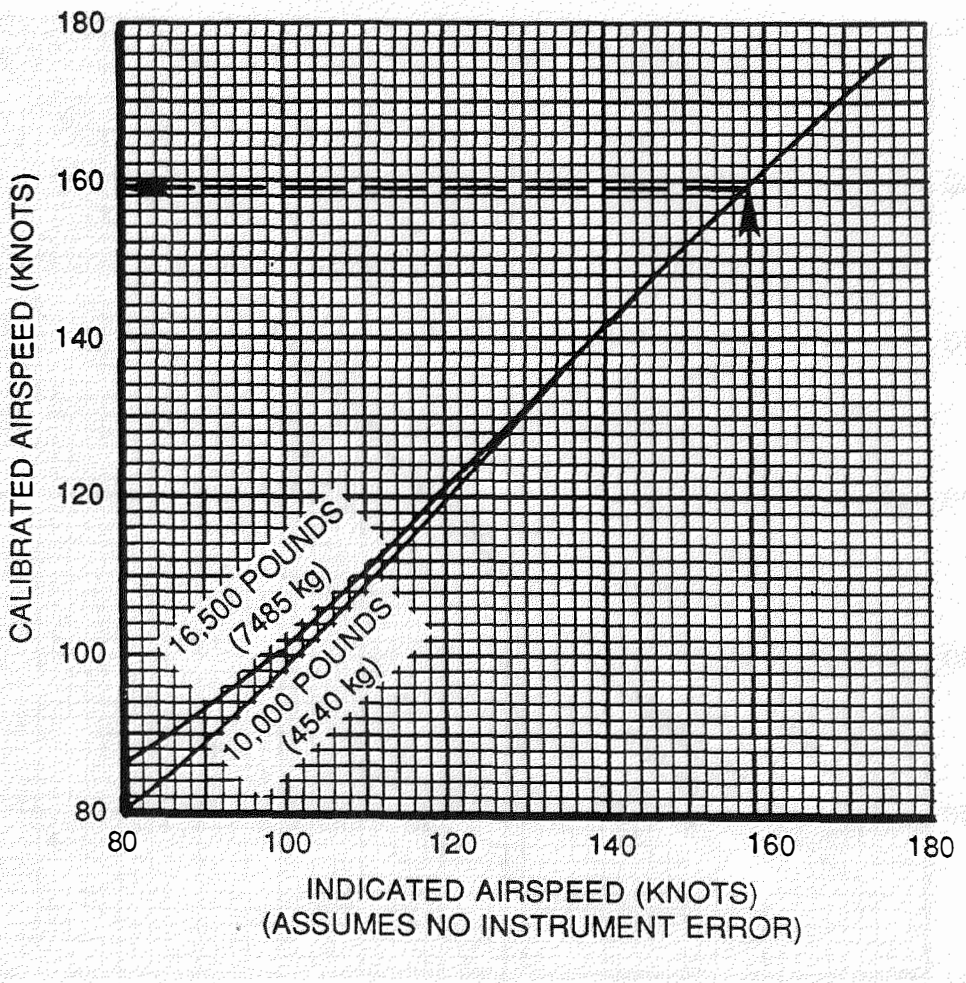


FIGURE 4B-6

AIRSPEED CALIBRATION – NORMAL SYSTEM
GEAR DOWN, FLAPS 1/2

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 120 KIAS
GROSS WEIGHT = 16,000 POUNDS (7260 kg)
OBTAIN: CALIBRATED AIRSPEED = 120 KCAS

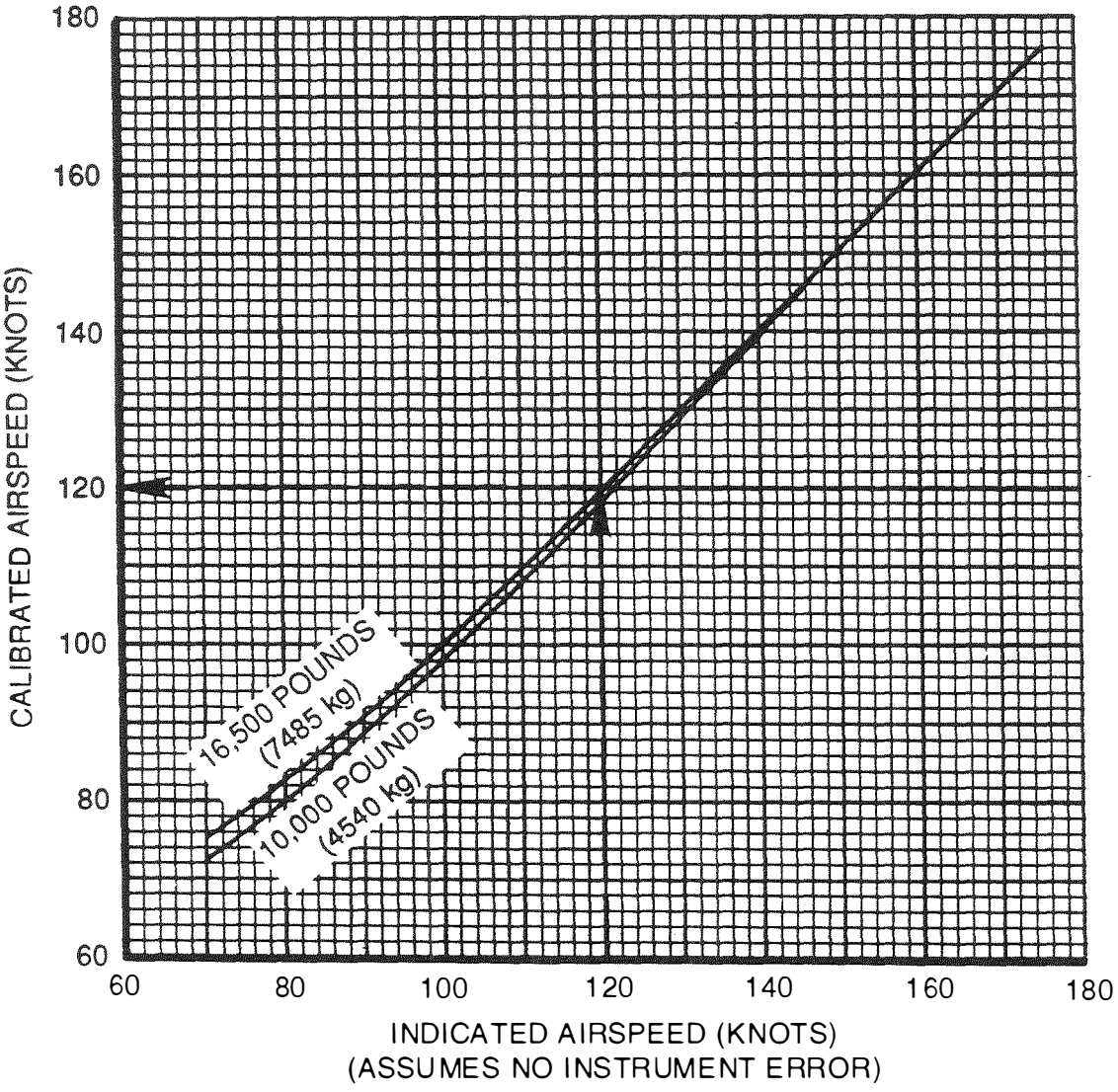


FIGURE 4B-7

AIRSPEED CALIBRATION – NORMAL SYSTEM
GEAR DOWN, FLAPS DOWN

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 108 KIAS
GROSS WEIGHT = 10,000 POUNDS (4540 kg)
OBTAIN: CALIBRATED AIRSPEED = 106 KCAS

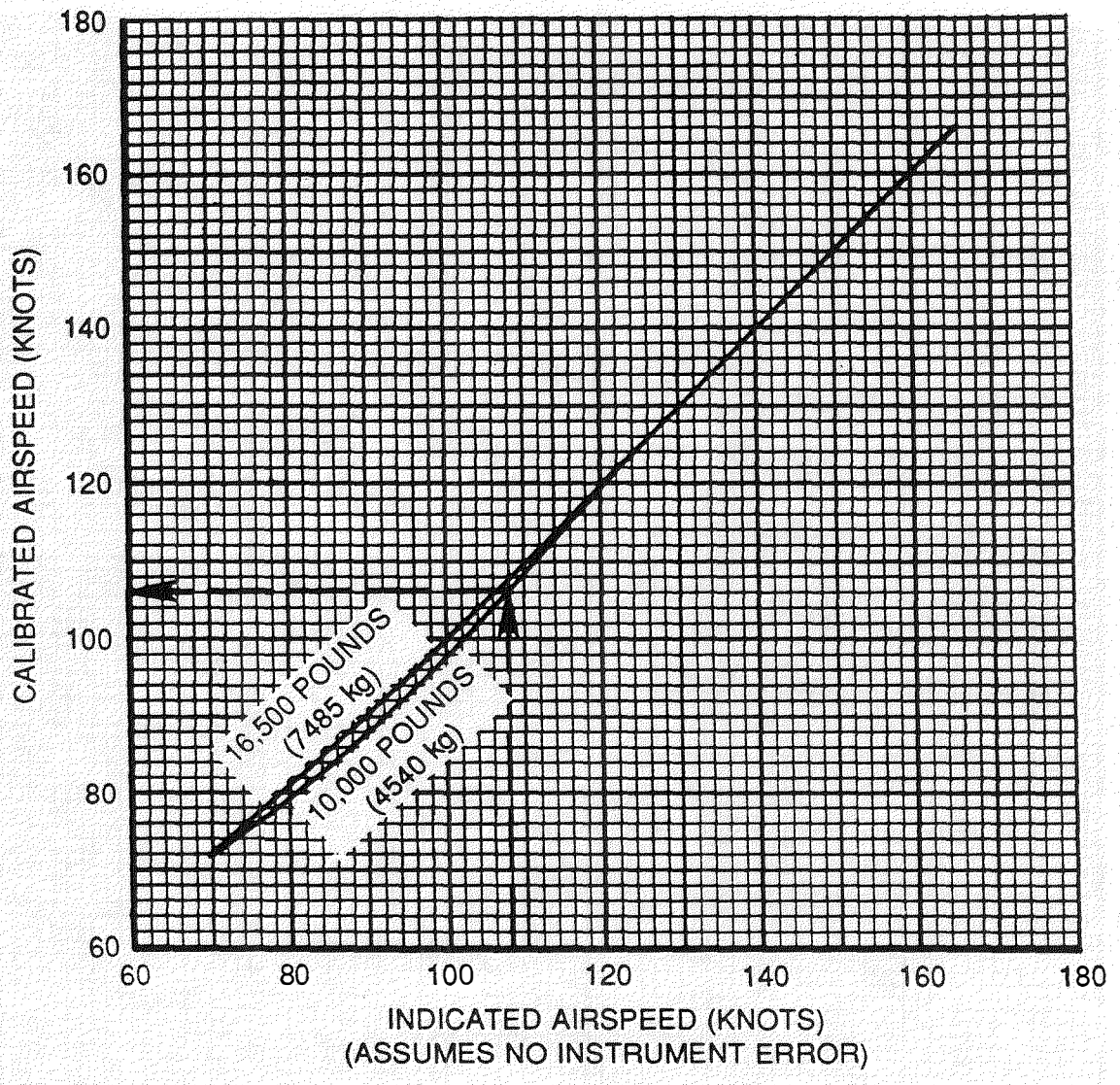


FIGURE 4B-8

AIRSPEED CALIBRATION – FOR GROUND OPERATION – NORMAL SYSTEM

GEAR DOWN, FLAPS 1/4

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 80 KIAS
GROSS WEIGHT = ALL WEIGHTS
OBTAIN: CALIBRATED AIRSPEED = 79 KCAS

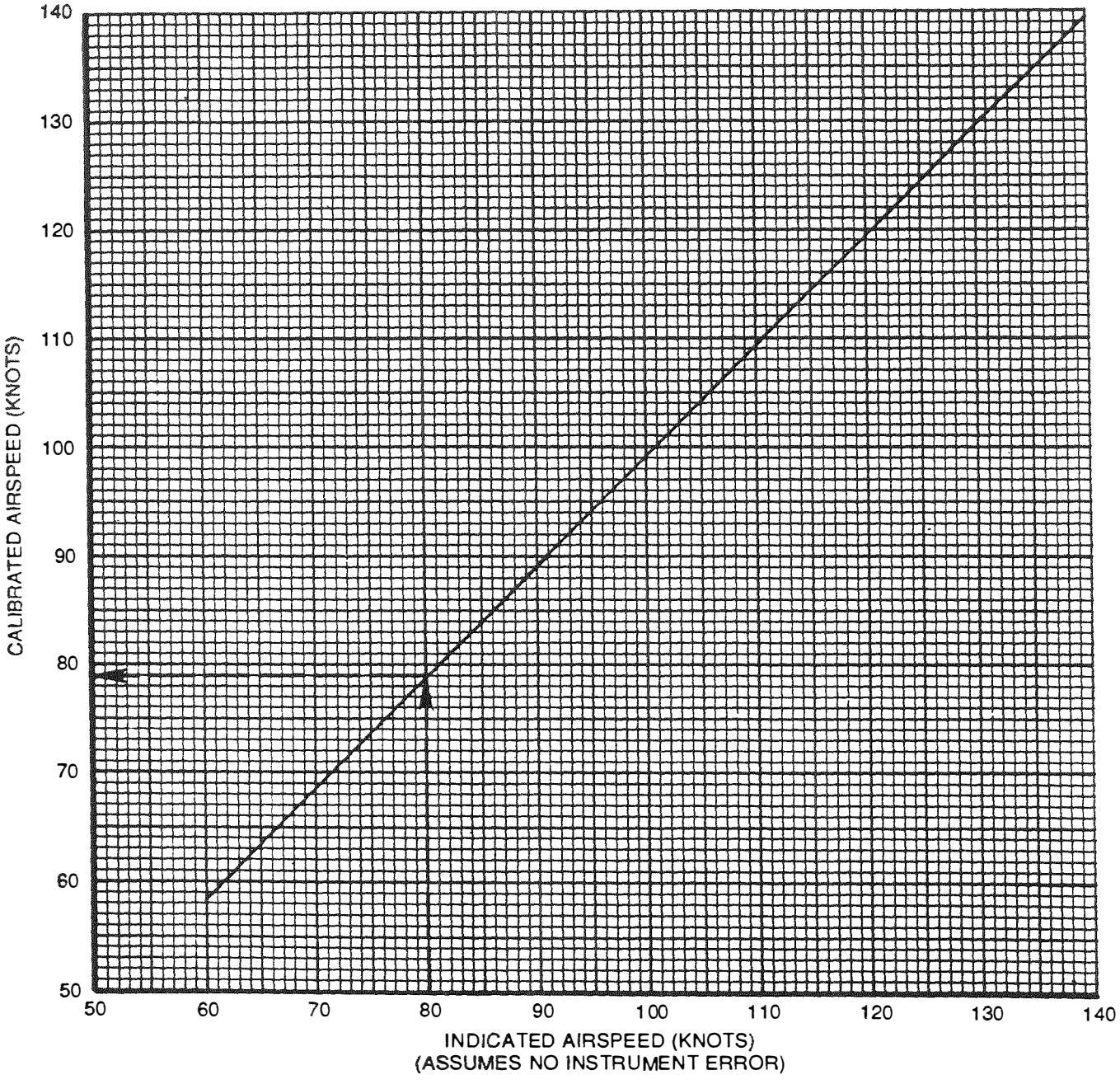


FIGURE 4B-9

ALTIMETER CORRECTION – NORMAL SYSTEM

GEAR UP OR DOWN, FLAPS UP

The altimeter correction is less than minus 30 feet throughout the normal operating range of airspeeds and altitudes.

GEAR UP OR DOWN, FLAPS 1/4

The altimeter correction is less than minus 30 feet throughout the normal operating range of airspeeds and for altitudes from sea level to 20,000 feet.

GEAR DOWN, FLAPS 1/2

The altimeter correction is less than minus 30 feet throughout the normal operating range of airspeeds and for altitudes from sea level to 10,000 feet.

GEAR DOWN, FLAPS DOWN

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 124 KNOTS
INDICATED ALTITUDE = 5,000 FEET
GROSS WEIGHT = 12,000 POUNDS (5440 kg)
OBTAIN: CORRECTED ALTITUDE =
(5,000 – 29) = 4,971 FEET

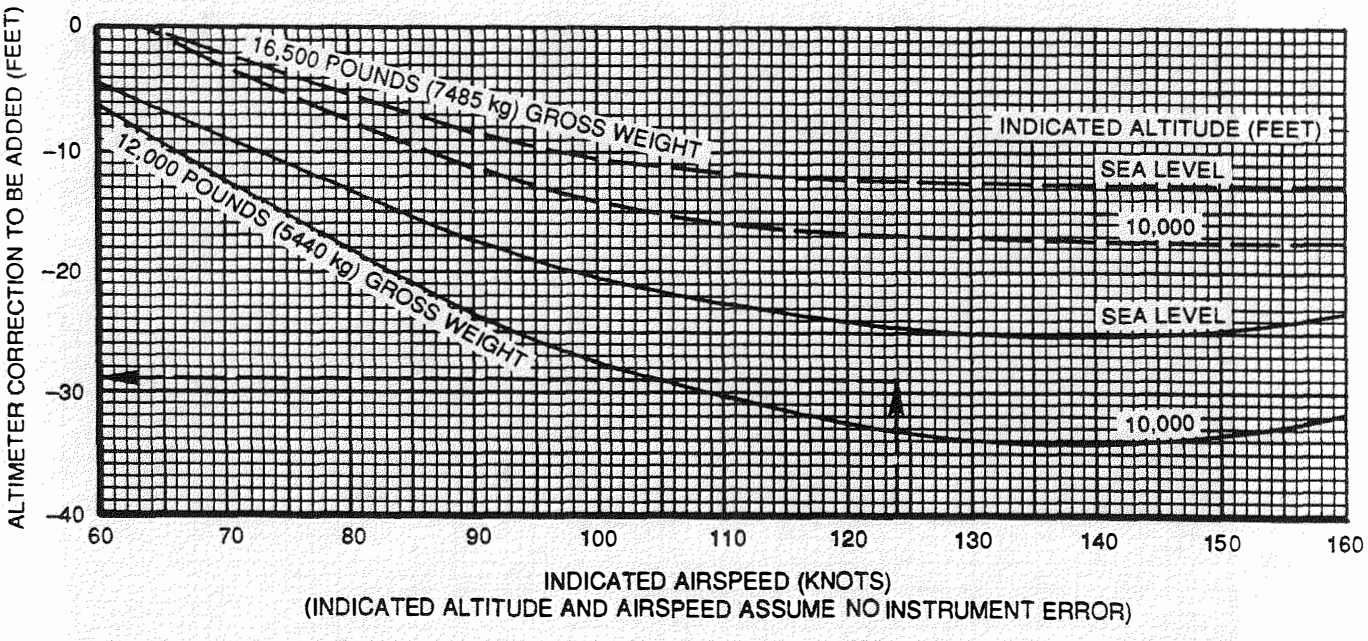


FIGURE 4B-10

AIRSPEED CALIBRATION – ALTERNATE SYSTEM

GEAR UP, FLAPS UP

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 172 KIAS
OBTAIN: CALIBRATED AIRSPEED = 170 KCAS

CAUTION

- DO NOT DUMP PRESSURIZATION WHEN USING THE ALTERNATE STATIC SOURCE.
- THE AIRSPEED CORRECTION GIVEN IS NOT VALID IF THE DUMP VALVE IS OPEN.

NOTE

THE COPILOT'S STATIC PRESSURE INSTRUMENTS ARE NOT CONNECTED TO THE ALTERNATE STATIC SOURCE.

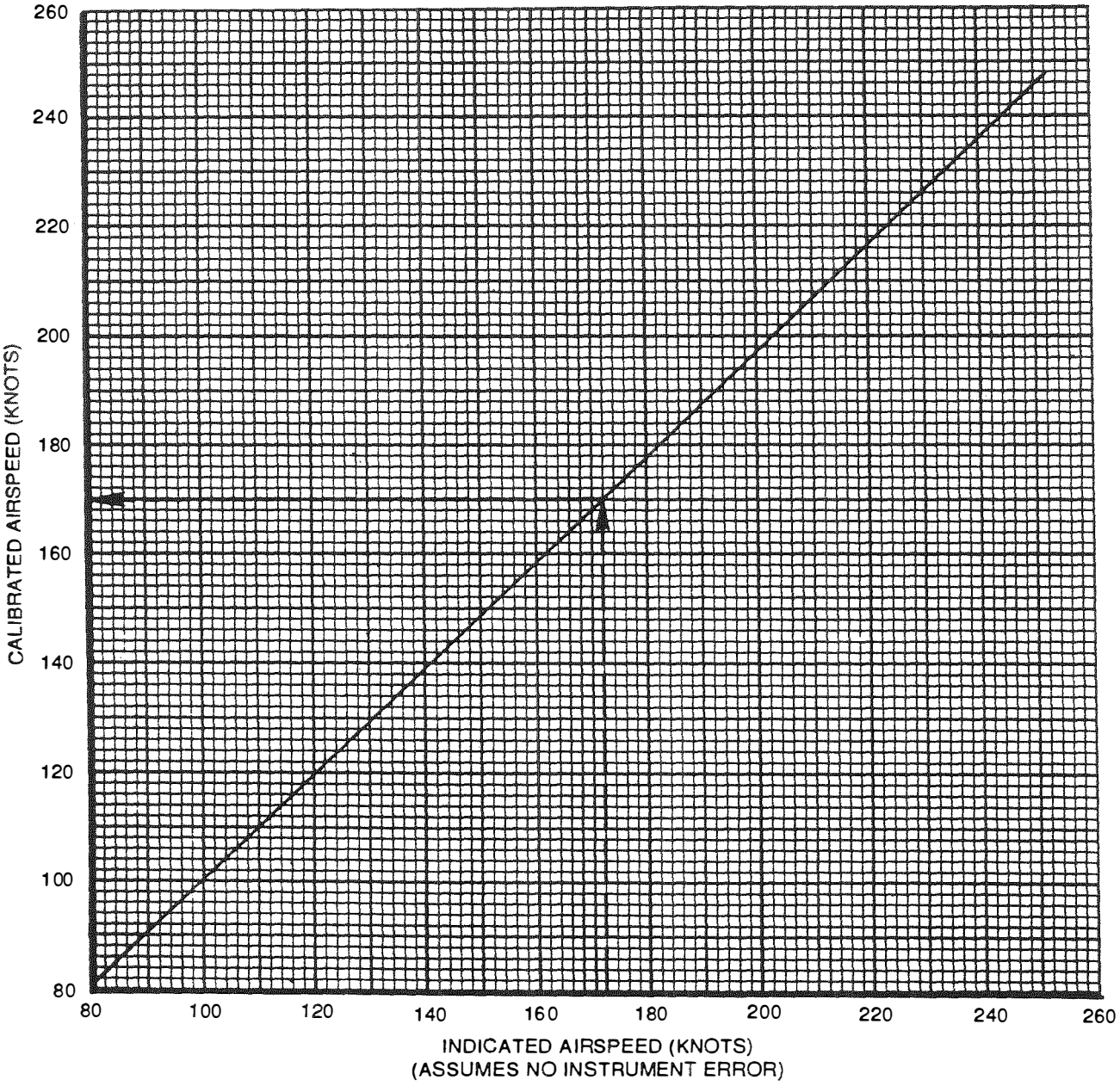


FIGURE 4B-11

AIRSPEED CALIBRATION – ALTERNATE SYSTEM

GEAR DOWN, FLAPS 1/2 OR DOWN

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 114 KIAS
OBTAIN: CALIBRATED AIRSPEED = 116 KCAS

CAUTION

- DO NOT DUMP PRESSURIZATION WHEN USING THE ALTERNATE STATIC SOURCE.
- THE AIRSPEED CORRECTION GIVEN IS NOT VALID IF THE DUMP VALVE IS OPEN.

NOTE

THE COPILOT'S STATIC PRESSURE INSTRUMENTS ARE NOT CONNECTED TO THE ALTERNATE STATIC SOURCE.

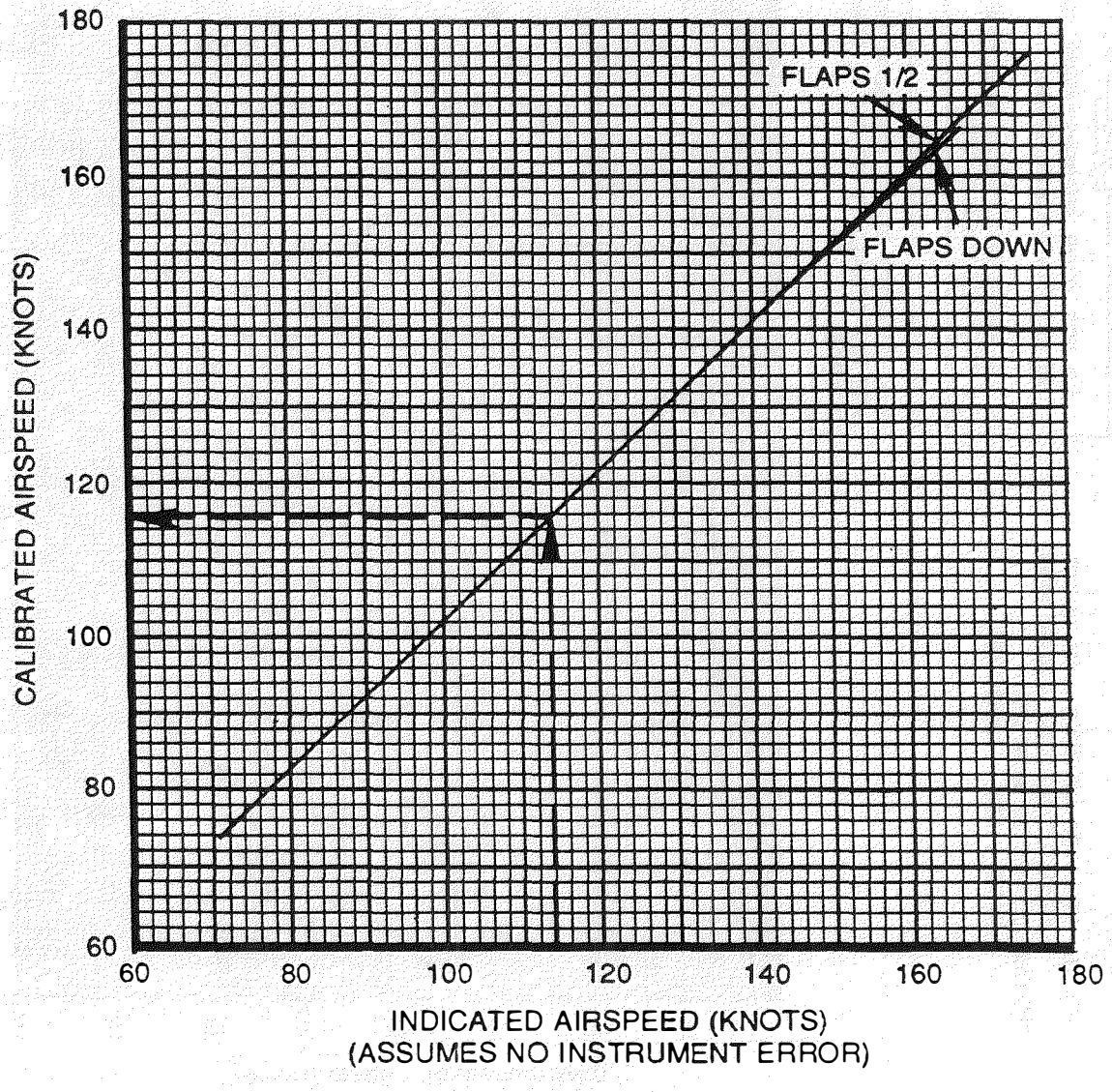


FIGURE 4B-12

ALTIMETER CORRECTION – ALTERNATE SYSTEM
GEAR UP, FLAPS UP

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 165 KNOTS
INDICATED ALTITUDE = 20,000 FEET
OBTAIN: CORRECTED ALTITUDE =
(20,000 – 120) = 19,880 FEET

CAUTION

- DO NOT DUMP PRESSURIZATION WHEN USING THE ALTERNATE STATIC SOURCE.
- THE AIRSPEED CORRECTION GIVEN IS NOT VALID IF THE DUMP VALVE IS OPEN.

NOTE

THE COPILOT'S STATIC PRESSURE INSTRUMENTS ARE NOT CONNECTED TO THE ALTERNATE STATIC SOURCE.

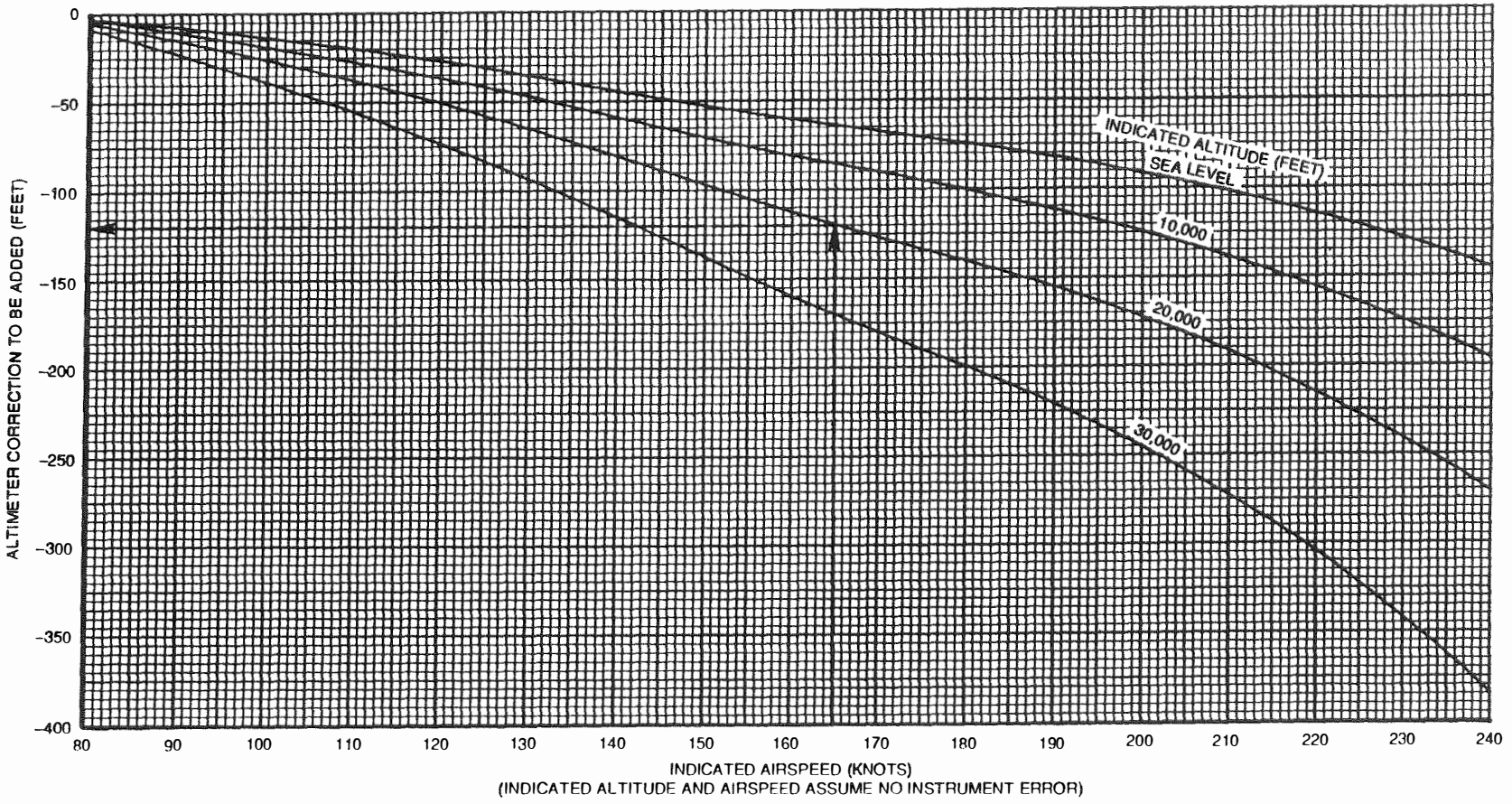


FIGURE 4B-13

ALTIMETER CORRECTION – ALTERNATE SYSTEM

CAUTION

- DO NOT DUMP PRESSURIZATION WHEN USING THE ALTERNATE STATIC SOURCE.
- THE ALTIMETER CORRECTION GIVEN IS NOT VALID IF THE DUMP VALVE IS OPEN.

NOTE

The copilot's static pressure instruments are not connected to the alternate static source.

GEAR DOWN, FLAPS 1/2

The altimeter correction varies from plus 30 feet at 80 KIAS to minus 10 feet at 180 KIAS for altitudes from sea level to 10,000 feet.

GEAR DOWN, FLAPS DOWN

EXAMPLE:

GIVEN: INDICATED AIRSPEED = 142 KNOTS
INDICATED ALTITUDE = 10,000 FEET
OBTAIN: CORRECTED ALTITUDE =
(10,000 – 35) = 9,965 FEET

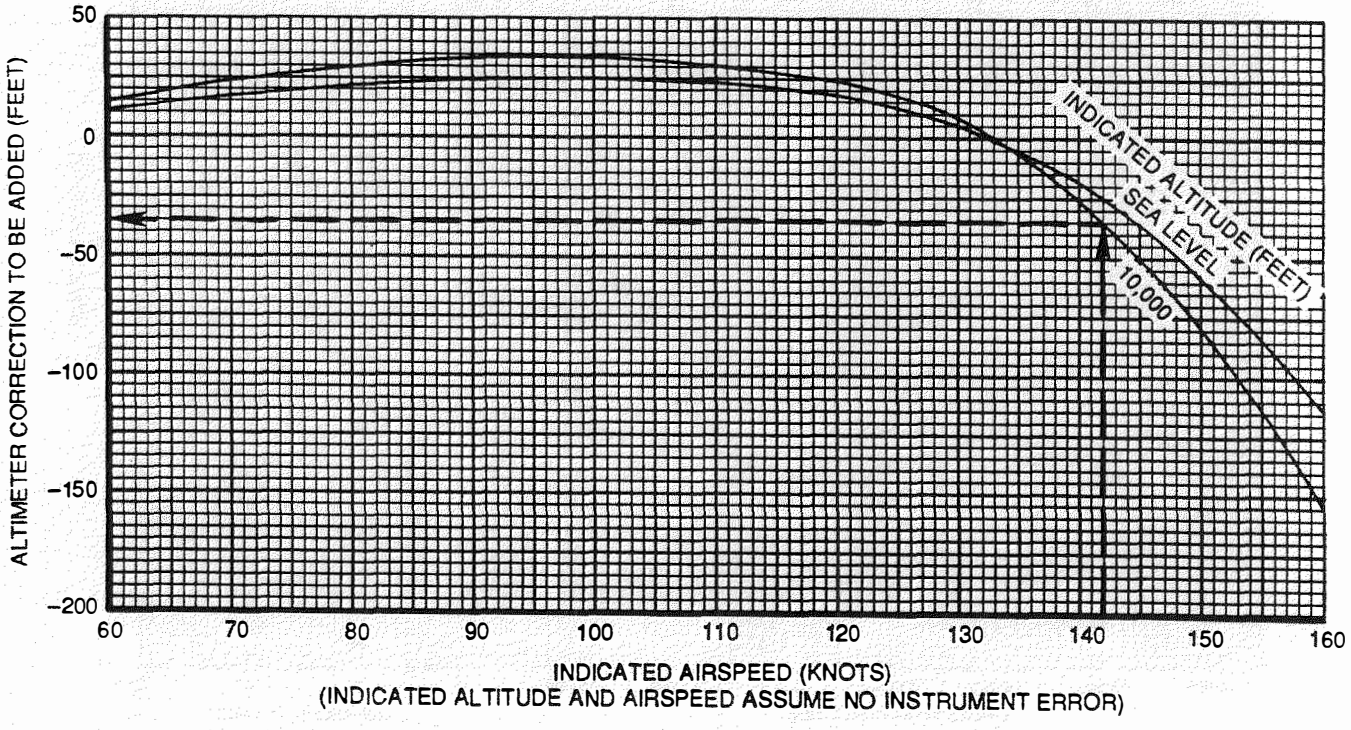


FIGURE 4B-14

ZERO THRUST STALL SPEEDS

EXAMPLE:

GIVEN: GROSS WEIGHT = 14,000 POUNDS (6350 kg)
FLAPS = 1/4
BANK ANGLE = 20°
OBTAIN: STALL SPEED = 96 KIAS

NOTE

- SPEEDS ARE BASED ON TESTS WITH BOTH PROPELLERS FEATHERED AND DEICE BOOTS DEFLATED.
- SAS STALL BARRIER DEVICES (LIGHTS, HORNS, AND STICK PUSHER) ARE SET TO ACTIVATE WITH FLIGHT IDLE POWER AT THE ZERO THRUST STALL SPEEDS WITH A ± 2 KIAS TOLERANCE.
- PROPELLERS TURNING AERODYNAMIC STALL SPEEDS ARE A MINIMUM OF 2 KIAS LESS THAN THE SAS STALL BARRIER ACTIVATION SPEEDS FOR ALL FLIGHT CONDITIONS AND CONFIGURATIONS.
- THE CENTER OF GRAVITY IS THE MOST FORWARD ALLOWABLE AT EACH WEIGHT.
- THE GEAR IS UP OR DOWN FOR FLAPS UP AND 1/4.
- THE GEAR IS DOWN FOR FLAPS 1/2 AND DOWN.
- MAXIMUM ALTITUDE LOSS DURING RECOVERY FROM FLIGHT IDLE POWER STALL PER FAR 23.201 IS APPROXIMATELY 500 FEET.
- MAXIMUM NOSE DOWN PITCH ATTITUDE CHANGE AND ALTITUDE LOSS DURING RECOVERY FROM SINGLE ENGINE, POWER ON STALLS PER FAR 23.205 ARE APPROXIMATELY 20° AND 200 FEET, RESPECTIVELY.

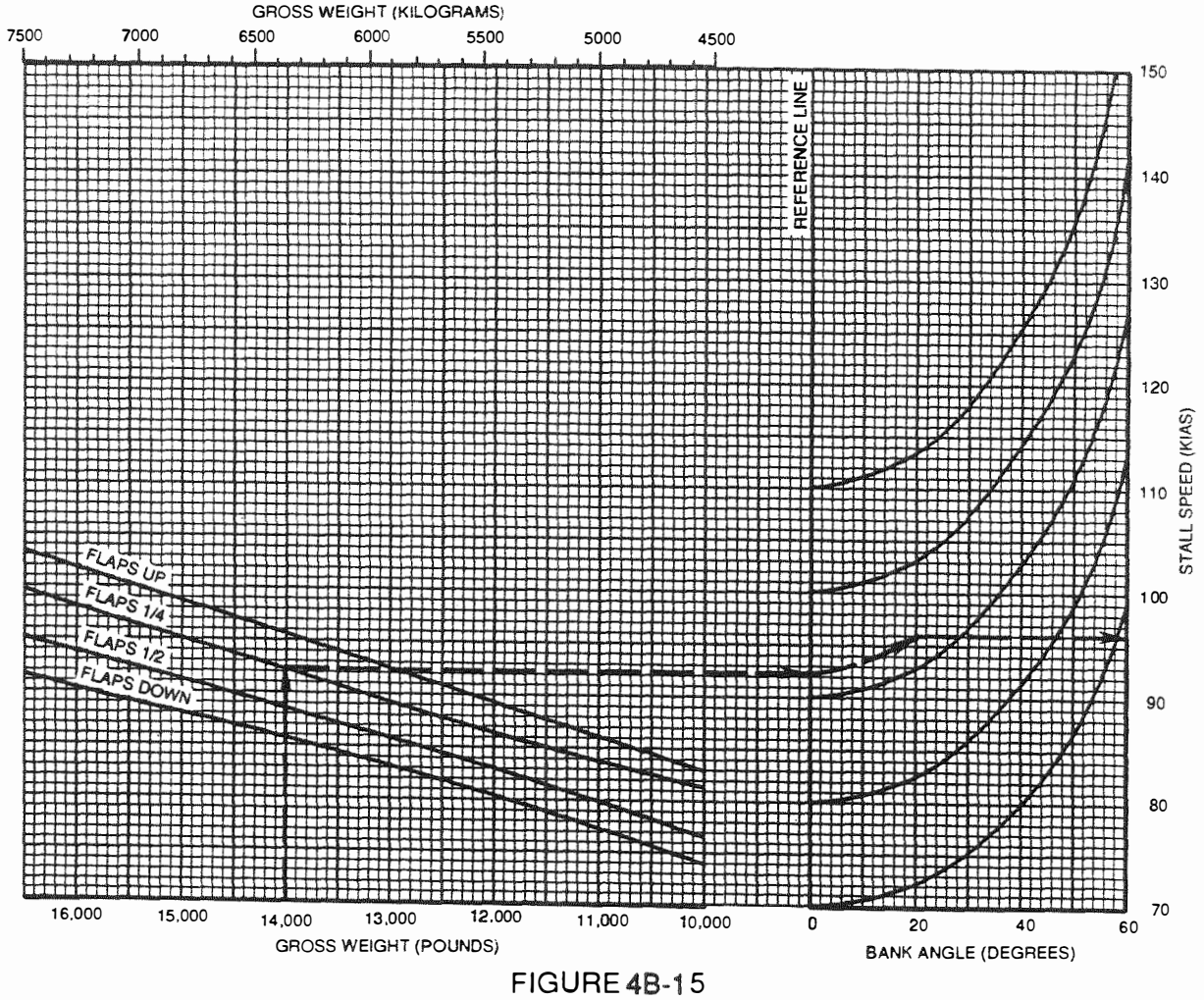


FIGURE 4B-15

TURNS IN THE FLIGHT PATH

Turns with up to 15 degrees of bank can be made in the takeoff flight path once the airplane is more than 50 feet above the runway surface. Information sufficient to allow for the effects of a turn on the second segment climb and segment acceleration distance are presented below and in Figures 4B-16 and 4B-17.

Air Carrier or Air Taxi commercial operators must have prior approval of the cognizant FAA inspector prior to using turning flight path procedures.

The second segment climb gradient from Figures 4C-8, 4D-8 or 4E-10 must be reduced by the amounts shown in the following table:

ANGLE OF BANK (DEGREES)	5	10	15
GRADIENT REDUCTION (PERCENT GRADIENT)	--0.04	–0.15	–0.35

The second segment acceleration distances from Figures 4C-9, 4D-9 and 4E-11 must be increased by the horizontal distance of the turning segment.

The Radius of Turn, Figure 4B-16, for various bank angles is calculated at the V_2 speeds appropriate to the airport altitude, temperature and airplane gross weight with flaps at the 1/4 position and landing gear retracted.

The following example illustrates the use of Figures 4B-16 and 4B-17.

Given:

Takeoff Power	Dry, Bleed Air Off
Airport Altitude	2,000 feet
Airport Outside Air Temperature	$20^{o}C$
Aircraft Weight	15,000 pounds
Turn Bank Angle	10 degrees
Change of Heading	60 degrees
Wind	15 knots at 330 degrees
Aircraft Heading	050
Altitude of Turn	2,500 feet

Find:

Radius of Turn, Horizontal Distance traveled during turn, Time of Turn and Flight Path allowing for wind.

TURNS IN THE FLIGHT PATH (continued)

METHODS OF USING CHARTS

1. V_2 Speed

   From Figure 4D-3, V_2 is found to be 116 KIAS.

2. Radius of Turn

   Enter Figure 4B-16 with a OAT of 20°C at an altitude of 2,500 feet, to a V_2 speed of 116 KIAS and then a bank angle of ten degrees.
   The resulting radius of turn is 7,550 feet.

3. Horizontal Distance Covered during Turn

   The horizontal distance traveled in the turn is calculated from the following formula:

   $$\text{Distance Traveled} = 2 \times \pi \times \text{Turn Radius} \times \frac{\text{Angle of Turn (degrees)}}{360}$$

   $$\text{Distance Traveled} = 2 \times 3.14 \times 7{,}550 \times \frac{60}{360} = 7{,}902 \text{ feet.}$$

4. Time in Turn

   Knowing the horizontal distance and the true airspeed in the turn, the time is the horizontal distance divided by the true airspeed. For this example, the V_2 speed is 116 KCAS (no position error) at 15,000 pounds. The true airspeed becomes:

   $$\text{True Airspeed} = \frac{116}{0.9472} = 122.5 \text{ KTAS}$$

   where Root Sigma = 0.9472 at 2,500 feet and 20°C.

   $$\text{Time in Turn} = \frac{7902}{(122.5 \times 1.6878)} = 38.2 \text{ seconds}$$

5. Flight Path Allowing for Wind

   The effect of wind on turning is shown in Figure 4B-17. In this example, the wind is 15 knots from 330 degrees. Due to the wind, the horizontal point at the completion of the turn is displaced from point B to point C.

   The actual displacement is equal to 15 x 1.6878 x 38.2 = 967 feet.

   Therefore, point C is displaced 967 feet from point B and parallel to the wind direction.

   NOTE

   The factor 1.6878 is the conversion from knots to feet/second.

RADIUS OF TURN
FLAPS 1/4, GEAR UP
SPEED V_2

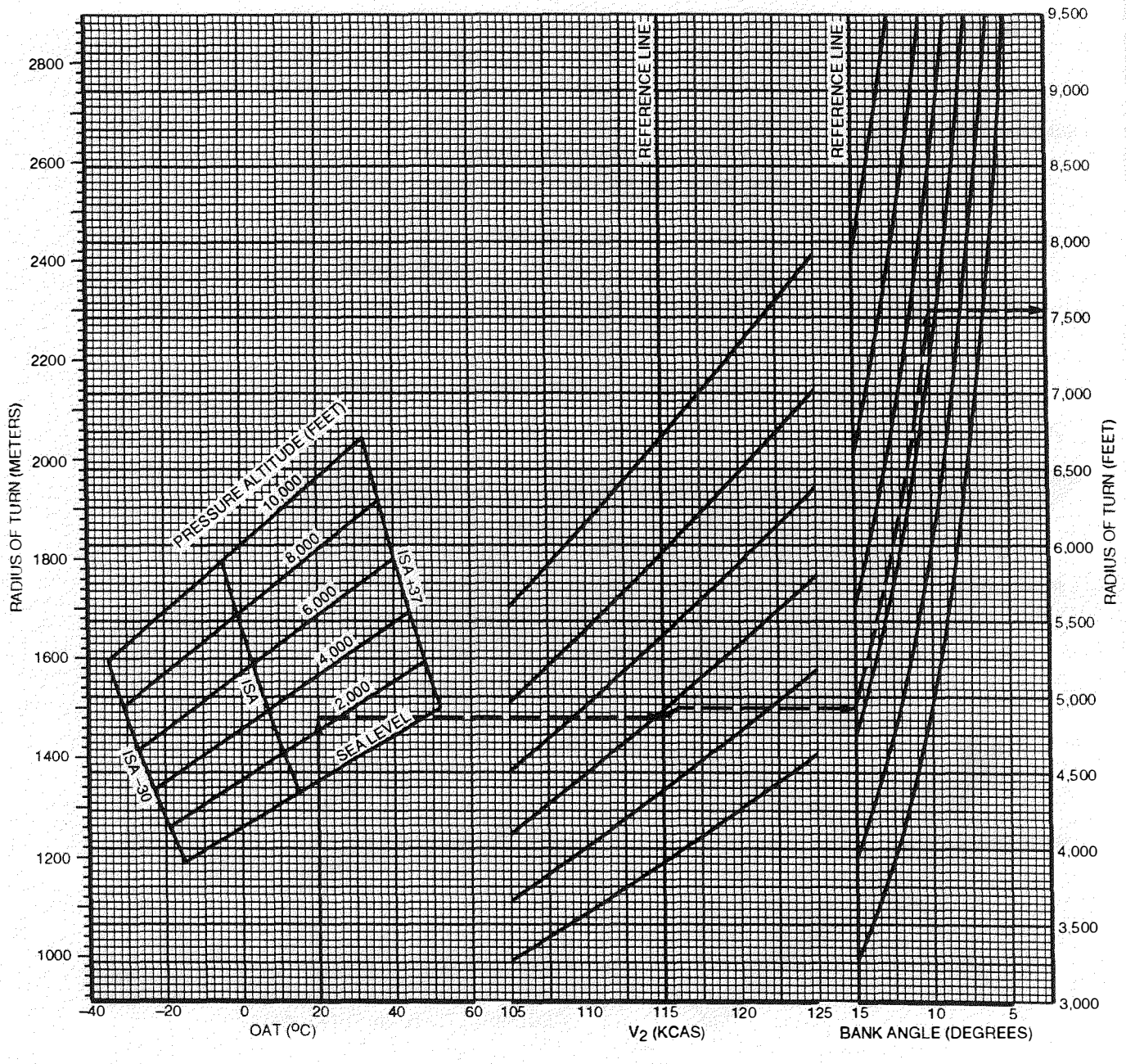
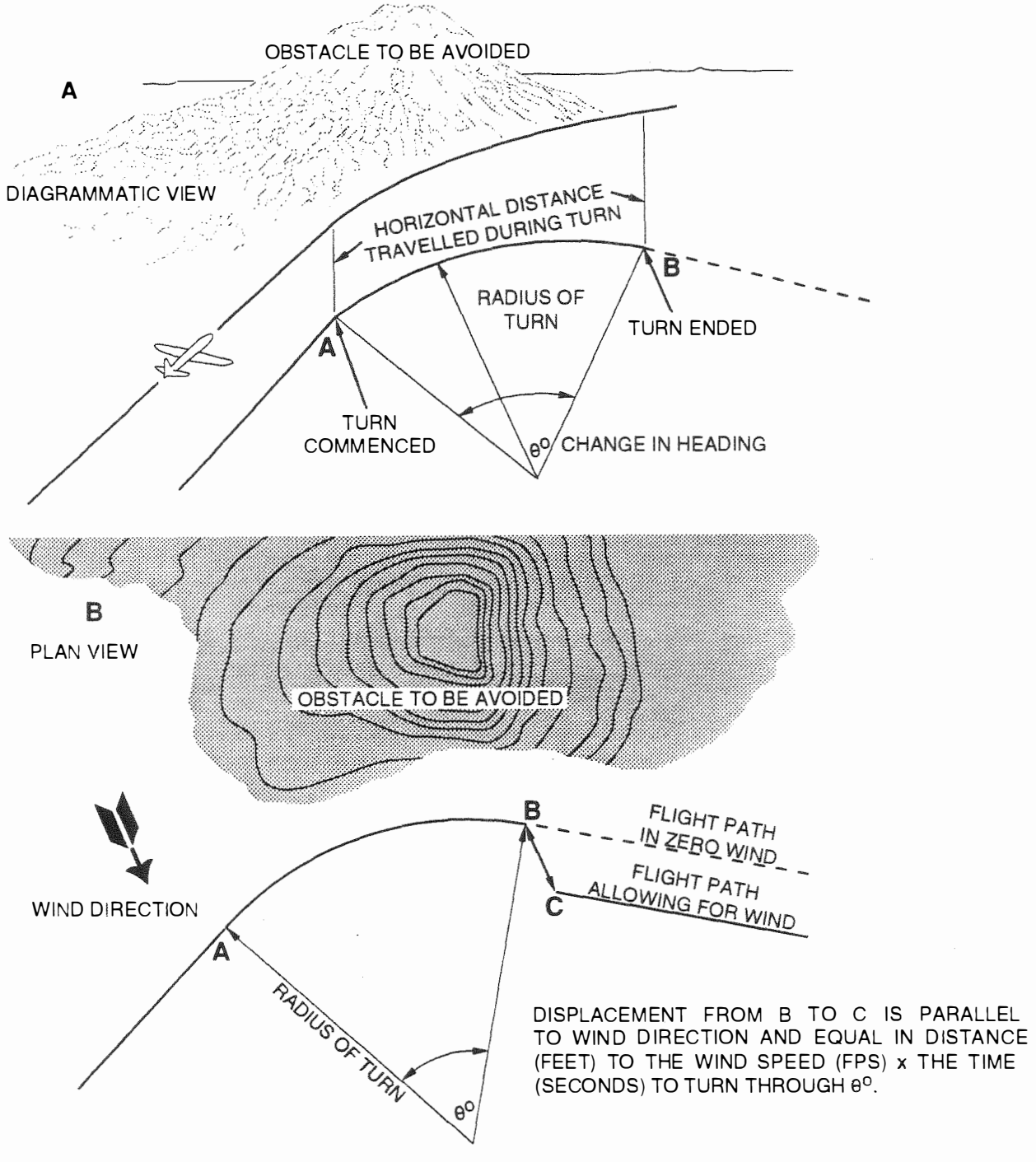


FIGURE 4B-16

TURN DIAGRAM



DISPLACEMENT FROM B TO C IS PARALLEL TO WIND DIRECTION AND EQUAL IN DISTANCE (FEET) TO THE WIND SPEED (FPS) x THE TIME (SECONDS) TO TURN THROUGH θ°.

FIGURE 4B-17

PART C – TAKEOFF PERFORMANCE
DRY, BLEED AIR ON

CONTENTS

ITEM	PAGE
Takeoff Power Check Chart	4C-1
Maximum Takeoff Weight Limitation Chart	4C-3
Takeoff Speed Schedules	4C-4
Distance to Accelerate to V_1 and Stop	4C-11
Single Engine Takeoff Distance to 35 Foot Height	4C-12
Single Engine Takeoff Run Distance	4C-13
Takeoff Flight Path Distance to 1500 Foot Height	4C-14
First Segment Climb Height and Distance	4C-17
Second Segment Climb Gradient	4C-19
Second Segment Acceleration Distance	4C-20
Third Segment Climb Gradient	4C-22
Two Engine Rate of Climb At V_{50}	4C-23

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TAKEOFF POWER CHECK CHART – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER .....TAKEOFF (DRY)
RPM 100%
MAX ALLOWABLE EGT ....650°C
GEN LOAD.....300 AMPS
BLEED AIR ....LOW (SEE NOTE)
ENG ANTI-ICE .....SEE GRAPH
SPEED .....0 TO 50 KIAS

EXAMPLE:

GIVEN: OAT = 0°C
PRESSURE ALTITUDE = 2,000 FEET
ENGINE ANTI-ICE SYSTEM – OFF
BLEED AIR – LOW
OBTAIN: ENGINE TORQUE = 100.0 PERCENT

NOTE

- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- REDUCE ENGINE TORQUE BY 2 PERCENT WITH BLEED AIR HIGH.

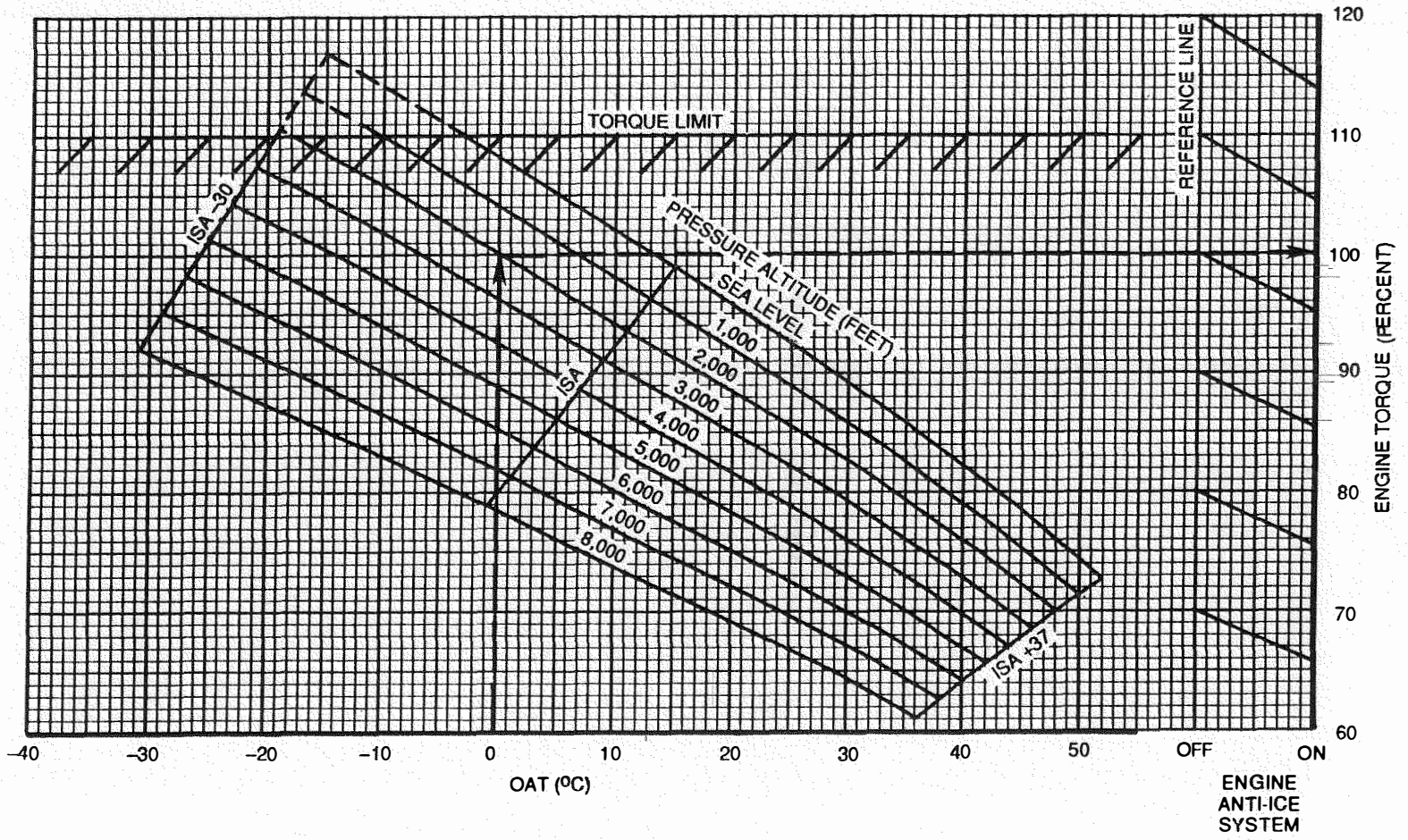


FIGURE 4C-1
PERFORMANCE

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MAXIMUM TAKEOFF WEIGHT LIMITATION CHART – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
GEAR ..... DOWN (TAKEOFF)
UP (SECOND AND THIRD SEGMENT)
FLAPS ..... 1/4 (TAKEOFF)
UP (ENROUTE)

NOTE

- REDUCE TAKEOFF WEIGHT BY 590 POUNDS (270 kg) WITH ENGINE ANTI-ICE ON.
- REDUCE TAKEOFF WEIGHT BY 440 POUNDS (200 KG) WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- THIS WEIGHT IS THE MAXIMUM AT WHICH TAKEOFF CAN BE CONTINUED AFTER AN ENGINE FAILURE IS RECOGNIZED AT OR ABOVE V_1.

EXAMPLE:

GIVEN: OAT = 11°C
PRESSURE ALTITUDE = 2,900 FEET
BLEED AIR – LOW
OBTAIN: TAKEOFF WEIGHT = 15,550 POUNDS (7055 kg)

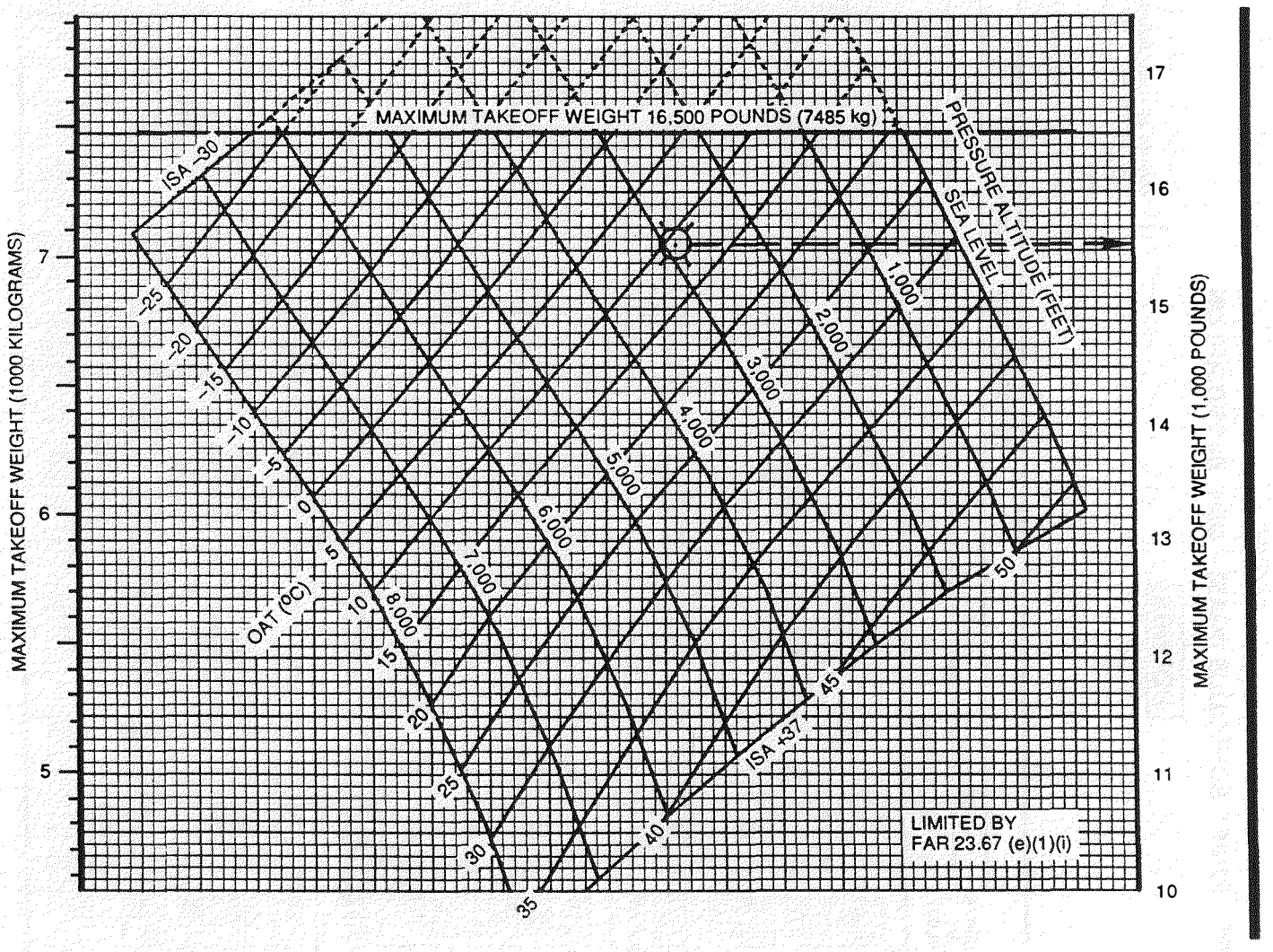


FIGURE 4C-2

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR ON

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4C-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																											
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}
S.L.	16500	116	116	121	131	117	117	121	131	118	118	121	131	119	119	121	130	120	120	121	130	121	121	121	130				
	16000	114	114	120	130	115	115	120	129	115	115	120	129	116	116	120	129	117	117	120	129	118	118	120	128				
	15500	111	111	118	128	112	112	118	128	113	113	118	128	114	114	118	127	115	115	118	127	116	116	118	127	118	118	118	125
	15000	108	108	116	127	110	110	116	127	110	110	116	126	111	111	116	126	113	113	116	126	114	114	116	125	116	116	116	124
	14500	106	106	114	126	107	107	114	125	108	108	114	125	109	109	114	125	110	110	114	124	111	111	114	124	114	114	114	123
	14000	103	103	113	124	104	104	113	124	105	105	113	124	106	106	113	123	107	107	113	123	109	109	113	123	111	111	113	122
	13500	102	102	113	125	102	102	112	123	103	103	111	123	104	104	111	122	105	105	111	122	106	106	111	121	109	109	111	120
	13000	101	101	113	126	101	101	111	123	101	101	110	122	101	101	110	121	102	102	109	120	103	103	109	120	106	106	109	119
	12500	102	102	116	128	101	101	113	125	101	101	112	124	100	100	110	122	101	101	109	120	102	102	109	120	105	105	109	119
	12000	103	103	117	131	102	102	115	128	101	101	113	126	100	100	111	123	100	100	110	121	101	101	109	120	104	104	109	119
	11500	104	104	119	133	103	103	117	130	102	102	115	128	101	101	113	126	100	100	111	123	100	100	110	121	103	103	109	120
	11000	103	103	120	134	103	103	119	132	103	103	117	130	102	102	115	128	101	101	113	125	100	100	111	122	103	103	109	120
	10500	103	103	122	136	103	103	120	134	103	103	119	133	103	103	117	130	102	102	115	128	101	101	112	125	101	101	109	121
	10000	103	103	124	139	103	103	122	136	103	103	121	135	103	103	119	133	103	103	117	130	101	101	114	127	101	101	110	121
1000	16500	116	116	121	131	118	118	121	131	119	118	121	130	119	119	121	130	121	121	121	130								
	16000	114	114	120	130	115	115	120	129	116	116	120	129	117	117	120	129	118	118	120	128								
	15500	111	112	118	128	113	113	118	128	114	114	118	128	115	115	118	127	116	116	118	127	117	117	118	127				
	15000	109	109	116	127	110	110	116	126	111	111	116	126	112	112	116	126	113	113	116	126	115	115	116	125				
	14500	106	106	114	126	108	108	114	125	109	109	114	125	110	110	114	124	111	111	114	124	112	112	114	124	115	115	114	123
	14000	103	104	113	124	105	105	113	124	106	106	113	123	107	107	113	123	108	108	113	123	110	110	113	122	112	112	113	122
	13500	102	102	112	124	103	102	111	123	103	103	111	122	104	104	111	122	106	106	111	121	107	107	111	121	110	110	111	120
	13000	101	101	112	125	101	101	111	122	101	101	110	121	102	102	109	121	103	103	109	120	104	104	109	120	107	107	109	119
	12500	102	102	115	127	101	101	112	124	100	100	110	122	101	100	109	121	102	101	109	120	103	103	109	120	106	106	109	119
	12000	102	103	117	130	101	101	114	126	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	11500	103	103	119	132	102	102	116	128	101	101	114	126	101	100	111	123	100	100	110	121	101	101	109	120	104	104	109	119
	11000	104	104	120	134	103	103	118	131	102	102	116	128	101	101	113	126	100	100	111	123	101	100	110	121	103	104	109	120
	10500	103	103	121	136	103	103	119	133	103	103	118	131	102	102	115	128	101	101	113	125	100	100	111	123	103	103	109	120
	10000	103	103	123	138	103	103	121	135	103	103	119	133	103	103	117	131	102	102	115	128	101	101	113	125	102	102	110	121
2000	16500	117	117	121	131	118	118	121	130	119	119	121	130	120	120	121	130												
	16000	114	114	120	129	116	116	120	129	117	117	120	129	118	118	120	128	119	119	120	128								
	15500	112	112	118	128	113	113	118	128	114	114	118	127	116	116	118	127	117	117	118	127								
	15000	109	109	116	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125				
	14500	106	106	114	125	108	108	114	125	109	109	114	125	111	111	114	124	112	112	114	124	113	113	114	124				
	14000	104	104	113	124	106	106	113	124	107	107	113	123	108	108	113	123	109	109	113	123	110	110	113	122	113	113	113	121
	13500	101	101	111	123	103	103	111	122	104	104	111	122	105	105	111	122	107	107	111	121	108	108	111	121	111	111	111	120
	13000	101	101	112	124	101	101	110	121	102	102	109	121	103	103	109	120	104	104	109	120	105	105	109	120	108	108	109	119
	12500	102	102	114	127	100	100	110	122	100	100	109	121	101	101	109	120	103	103	109	120	104	104	109	119	107	107	109	118
	12000	102	102	116	129	101	101	112	124	100	100	110	122	100	100	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	11500	103	103	118	131	101	101	114	126	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	11000	104	104	120	134	102	102	116	129	101	101	114	126	100	100	111	124	100	100	110	122	101	101	109	121	104	104	109	120
	10500	103	103	121	135	103	103	118	131	102	102	116	129	101	101	113	126	100	100	111	123	100	100	110	121	104	104	109	120
	10000	103	103	122	137	103	103	120	133	103	103	118	131	102	102	116	128	101	101	113	126	100	100	111	123	103	103	110	120

FIGURE 4C-3

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR ON

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4C-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																													
		-30				-10				0				10				20				30				50							
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}				
3000	16500	117	117	121	131	119	119	121	130	120	120	121	130																		
	16000	115	115	120	129	117	117	120	129	118	118	120	128	119	119	120	128														
	15500	112	112	118	128	114	114	118	127	115	115	118	127	116	116	118	127	117	117	118	126										
	15000	110	110	116	127	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125										
	14500	107	107	114	125	109	109	114	125	110	110	114	124	111	111	114	124	112	112	114	124	114	114	114	123						
	14000	105	105	113	124	107	107	113	123	108	108	113	123	109	109	113	123	110	110	113	122	111	111	113	122						
	13500	102	102	111	123	104	104	111	122	105	105	111	122	106	106	111	121	107	107	111	121	109	109	111	121	111	111	111	120		
	13000	100	100	110	122	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	120	106	106	109	119	109	109	109	116		
	12500	101	100	112	124	100	100	109	121	101	101	109	120	102	102	109	120	103	103	109	119	105	105	109	119	108	108	109	118		
	12000	101	102	114	127	100	100	110	122	100	100	109	121	101	101	109	120	103	103	109	120	104	104	109	119	107	107	109	119		
	11500	102	102	116	129	101	101	112	124	100	100	110	122	101	100	109	121	102	102	109	120	103	103	109	120	106	106	109	119		
	11000	103	103	118	132	101	101	114	127	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119		
	10500	103	104	120	134	102	102	116	129	101	101	114	126	101	100	112	124	100	100	110	122	101	101	109	121	105	105	109	120		
	10000	103	103	121	136	103	103	118	132	102	102	116	129	101	101	114	126	101	100	112	124	100	100	110	122	104	104	110	120		
4000	16500	118	118	121	130	120	120	121	130	121	121	121	130																		
	16000	116	116	120	129	117	117	120	129	118	118	120	128																		
	15500	113	113	118	128	115	115	118	127	116	116	118	127	117	117	118	126														
	15000	111	111	116	126	113	113	116	126	114	114	116	125	115	115	116	125														
	14500	108	108	114	125	110	110	114	124	111	111	114	124	112	112	114	124	113	113	114	123										
	14000	105	105	113	124	108	108	113	123	109	109	113	123	110	110	113	122	111	111	113	122	112	112	113	122						
	13500	103	103	111	122	105	105	111	122	106	106	111	121	107	107	111	121	108	108	111	121	109	109	111	120						
	13000	100	100	109	121	102	102	109	120	103	103	109	120	105	105	109	120	106	106	109	119	107	107	109	119	110	110	109	118		
	12500	100	100	110	122	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	119	106	106	109	119	108	108	109	118		
	12000	101	101	112	125	100	100	109	121	101	101	109	120	102	102	109	120	104	104	109	120	105	105	109	119	108	108	109	116		
	11500	102	102	114	127	100	100	111	122	100	100	109	121	101	101	109	120	103	103	109	120	104	104	109	120	107	107	109	119		
	11000	103	103	117	130	101	101	112	125	100	100	110	122	100	100	109	121	102	102	109	120	103	103	109	120	106	106	109	119		
	10500	103	103	119	132	102	102	114	127	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119		
	10000	103	103	120	134	102	102	117	130	101	101	114	127	101	101	112	124	100	100	110	122	101	101	110	121	104	104	110	120		
5000	16500	119	119	121	130	121	121	121	130																						
	16000	116	116	120	129	118	118	120	128																						
	15500	114	114	118	127	116	116	118	127	117	117	118	127																		
	15000	112	111	116	126	114	113	116	125	114	114	116	125	115	115	116	125														
	14500	109	109	114	125	111	111	114	124	112	112	114	124	113	113	114	123														
	14000	106	106	113	123	108	108	113	123	109	109	113	122	111	111	113	122	112	112	113	122										
	13500	104	104	111	122	106	106	111	121	107	107	111	121	108	108	111	121	109	109	111	120	110	110	111	120						
	13000	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	107	107	109	119	108	108	109	119						
	12500	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	109	109	109	116		
	12000	100	100	110	123	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	119	108	108	109	119	109	109	109	116		
	11500	101	101	113	125	100	100	110	121	101	101	109	120	102	102	109	120	104	104	109	120	105	105	109	119	108	108	109	116		
	11000	102	102	115	127	100	100	111	123	101	100	110	121	101	101	109	121	103	103	109	120	104	104	109	120	107	107	109	119		
	10500	102	103	117	130	101	101	113	125	100	100	111	123	101	101	110	121	102	102	109	121	103	103	109	120	106	106	109	119		
	10000	103	103	119	133	102	102	115	127	101	101	112	125	100	100	111	122	101	101	110	121	102	102	110	121	105	106	110	120		

FIGURE 4C-3 (continued)

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TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR ON

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4C-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																													
		-30				-10				0				10				20				30				50							
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}				
6000	16500	120	120	121	130	121	121	121	129																						
	16000	117	117	120	129	119	119	120	128																						
	15500	115	115	118	127	117	117	118	127																						
	15000	112	112	116	126	114	114	116	125	115	115	116	125																		
	14500	110	110	114	124	112	112	114	124	113	113	114	123	114	114	114	123														
	14000	107	107	113	123	109	109	113	122	110	110	113	122	111	111	113	122														
	13500	105	105	111	122	107	107	111	121	108	108	111	121	109	109	111	121	110	110	111	120										
	13000	102	102	109	121	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119										
	12500	100	100	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118						
	12000	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	107	107	109	119						
	11500	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	119	106	106	109	119	109	109	109	118		
	11000	101	101	113	125	100	100	110	121	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	119	108	108	109	119		
	10500	102	102	115	128	100	100	111	123	100	100	110	121	101	101	109	121	103	103	109	120	104	104	109	120	107	107	109	119		
	10000	103	103	117	130	101	101	113	125	100	100	111	123	101	101	110	121	102	102	110	121	103	103	110	120	108	108	110	119		
7000	16500	120	120	121	130																										
	16000	118	118	120	128	120	120	120	128																						
	15500	116	116	118	127	117	117	118	126																						
	15000	113	113	116	126	115	115	116	125																						
	14500	111	111	114	124	113	113	114	124	114	114	114	123																		
	14000	108	108	113	123	110	110	113	122	111	111	113	122																		
	13500	106	106	111	122	108	108	111	121	109	109	111	121	110	110	111	120														
	13000	103	103	109	120	105	105	109	120	106	106	109	119	107	107	109	119	108	108	109	119										
	12500	101	101	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118										
	12000	101	101	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118						
	11500	100	100	110	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	107	107	109	119						
	11000	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	105	105	109	120	106	106	109	119	109	109	109	118		
	10500	101	101	113	126	100	100	110	121	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	120	108	108	109	119		
	10000	102	102	115	128	100	100	111	123	100	100	110	121	101	101	110	121	103	103	110	120	104	104	110	120	107	107	110	119		
8000	16500	121	121	121	130																										
	16000	119	119	120	128																										
	15500	116	116	118	127	118	118	118	126																						
	15000	114	114	116	125	116	116	116	125																						
	14500	112	112	114	124	113	113	114	123																						
	14000	109	109	113	123	111	111	113	122	112	112	113	122																		
	13500	107	107	111	121	108	108	111	121	109	109	111	120																		
	13000	104	104	109	120	106	106	109	119	107	107	109	119	108	108	109	119														
	12500	102	102	109	120	105	105	109	119	106	106	109	119	107	107	109	118	108	108	109	118										
	12000	102	102	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	119										
	11500	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119						
	11000	100	100	110	122	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	107	107	109	119						
	10500	100	100	111	123	101	101	109	121	102	102	109	121	103	103	109	120	105	105	109	120	106	106	109	119						
	10000	101	101	113	126	100	100	110	122	101	101	110	121	102	102	110	121	104	104	110	120	105	105	110	120	108	108	110	119		

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR ON

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4C-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C)																									
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	7487	116	116	121	131	117	117	121	131	118	118	121	131	119	119	121	130	120	120	121	130	121	121	121	130				
	7200	113	113	119	129	114	114	119	129	115	115	119	129	116	116	119	129	117	117	119	128	118	118	119	128				
	7000	111	111	118	128	112	112	118	128	113	113	118	128	114	114	118	127	115	115	118	127	116	116	118	127	118	118	118	125
	6800	108	108	116	127	110	110	116	127	110	110	116	126	111	111	116	126	112	112	116	126	114	114	116	125	116	116	116	124
	6600	106	106	115	126	107	107	115	125	108	108	115	125	109	109	115	125	110	110	115	125	111	111	115	124	114	114	115	123
	6400	104	104	113	125	105	105	113	124	106	106	113	124	107	107	113	124	108	108	113	123	109	109	113	123	112	112	113	122
	6200	103	103	113	125	103	103	112	124	103	103	112	123	104	104	112	123	106	106	112	122	107	107	112	122	110	110	112	121
	6000	101	101	113	125	101	101	112	123	102	102	111	122	102	102	110	122	103	103	110	121	105	105	110	121	108	108	110	120
	5800	101	101	114	127	101	101	112	124	101	101	111	123	101	101	110	121	101	101	109	120	103	103	109	120	106	106	109	119
	5600	102	102	116	129	101	101	114	126	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	5400	103	103	118	131	102	102	115	128	101	101	114	126	101	101	112	124	100	100	110	122	101	101	109	120	104	104	109	119
	5200	104	104	119	133	103	103	117	130	102	102	115	128	101	101	113	126	100	100	111	123	100	100	110	121	103	103	109	120
	5000	103	103	120	134	103	103	119	132	103	103	117	130	102	102	115	128	101	101	113	125	100	100	111	122	103	103	109	120
	4800	103	103	122	136	103	103	120	134	103	103	119	132	102	102	117	130	102	102	114	127	101	101	112	124	102	102	109	121
	4600	103	103	123	138	103	103	121	136	103	103	120	134	103	103	119	132	102	102	116	129	101	101	114	126	101	101	110	121
1000	7487	116	116	121	131	118	118	121	131	119	119	121	130	120	120	121	130	121	121	121	130								
	7200	113	113	119	129	115	115	119	129	115	115	119	129	116	116	119	128	118	118	119	128	119	119	119	128				
	7000	111	111	118	128	112	112	118	128	113	113	118	127	114	114	118	127	115	115	118	127	117	117	118	126				
	6800	109	109	116	127	110	110	116	126	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	117	117	116	124
	6600	106	106	115	126	108	108	115	125	109	109	115	125	110	110	115	125	111	111	115	124	112	112	115	124	115	115	115	123
	6400	104	104	113	124	106	106	113	124	107	107	113	124	108	108	113	123	109	109	113	123	110	110	113	123	113	113	113	122
	6200	102	103	113	124	103	103	112	123	104	104	112	123	105	105	112	122	107	107	112	122	108	108	112	121	111	111	112	121
	6000	101	101	112	124	102	101	111	123	102	102	110	122	103	103	110	121	104	104	110	121	105	106	110	120	108	108	110	119
	5800	101	101	113	126	101	101	111	123	101	101	110	121	101	101	109	121	102	102	109	120	104	104	109	120	107	107	109	119
	5600	102	102	115	128	101	101	112	125	100	100	111	123	100	100	109	121	101	101	109	120	103	103	109	120	106	106	109	119
	5400	103	103	117	130	101	101	114	127	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	5200	103	103	119	132	102	102	116	129	101	101	114	126	101	100	112	124	100	100	110	121	101	101	109	121	104	104	109	119
	5000	104	104	120	134	103	103	117	131	102	102	115	128	101	101	113	126	100	100	111	123	101	100	110	121	104	104	109	120
	4800	103	103	121	136	103	103	119	133	103	103	117	130	102	102	115	128	101	101	113	125	100	100	111	122	103	103	109	120
	4600	103	103	122	137	103	103	120	134	103	103	119	132	102	102	117	130	102	102	115	127	101	101	112	124	102	102	110	121
2000	7487	117	117	121	131	118	118	121	130	119	119	121	130	120	120	121	130												
	7200	113	113	119	129	115	115	119	129	116	116	119	128	117	117	119	128	118	118	119	128								
	7000	111	111	118	128	113	113	118	127	114	114	118	127	115	115	118	127	116	116	118	126								
	6800	109	109	118	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	118	125				
	6600	107	107	115	126	109	109	115	125	110	110	115	125	111	111	115	124	112	112	115	124	113	113	115	124				
	6400	104	104	113	124	106	106	113	124	107	107	113	123	109	109	113	123	110	110	113	123	111	111	113	122	113	113	113	121
	6200	102	102	112	123	104	104	112	123	105	105	112	122	106	106	112	122	107	107	112	122	109	109	112	121	111	111	112	120
	6000	101	101	112	124	102	102	110	122	103	103	110	121	104	104	110	121	105	105	110	120	106	106	110	120	109	109	110	119
	5800	101	101	113	125	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	105	105	109	119	107	107	109	119
	5600	102	102	115	127	100	100	111	123	100	100	109	121	101	101	109	120	102	102	109	120	104	104	109	119	107	107	109	119
	5400	102	102	116	129	101	101	112	125	100	100	110	122	100	100	109	121	101	101	109	120	103	103	109	120	106	106	109	119
	5200	103	103	118	132	102	102	114	127	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	5000	104	104	120	134	102	102	116	129	101	101	114	126	100	100	111	123	100	100	110	121	101	101	109	121	104	104	109	120
	4800	103	103	121	135	103	103	118	131	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	121	104	104	109	120
	4600	103	103	122	137	103	103	119	133	103	103	117	131	102	102	115	128	101	101	113	125	100	100	111	122	103	103	110	120

FIGURE 4C-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR ON

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4C-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
3000	7487	117	117	121	131	119	119	121	130	120	120	121	130																
	7200	114	114	119	129	116	116	119	128	117	117	119	128	118	118	119	128												
	7000	112	112	118	128	114	114	118	127	115	115	118	127	116	116	118	127	117	117	118	126								
	6800	110	110	116	127	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125								
	6600	108	107	115	125	110	110	115	125	111	111	115	124	112	112	115	124	113	113	115	124	114	114	115	123				
	6400	105	105	113	124	107	107	113	124	108	108	113	123	109	109	113	123	111	111	113	123	112	112	113	122				
	6200	103	103	112	123	105	105	112	122	106	106	112	122	107	107	112	122	108	108	112	121	109	109	112	121	112	112	112	120
	6000	101	101	111	123	103	103	110	121	104	104	110	121	105	105	110	121	106	106	110	120	107	107	110	120	110	110	110	119
	5800	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	108	108	109	118
	5600	101	101	113	125	100	100	110	121	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	119	107	107	109	118
	5400	102	102	115	128	100	100	111	123	100	100	109	121	101	101	109	120	102	102	109	120	104	104	109	120	107	107	109	119
	5200	102	103	117	130	101	101	112	125	100	100	110	122	101	100	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	5000	103	103	118	132	101	101	114	127	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	4800	103	104	120	134	102	102	116	129	101	101	114	126	101	100	111	124	100	100	110	122	101	101	109	121	105	105	109	120
	4600	103	103	121	135	103	103	118	131	102	102	115	128	101	101	113	126	100	100	111	123	101	100	110	121	104	104	110	120
4000	7487	118	118	121	131	120	120	121	130	121	121	121	130																
	7200	115	115	119	129	117	117	119	128	118	118	119	128																
	7000	113	113	118	128	115	115	118	127	116	116	118	127	117	117	118	126												
	6800	111	111	116	126	113	113	116	126	114	114	116	125	115	115	116	125												
	6600	108	108	115	125	110	110	115	124	111	111	115	124	112	112	115	124	113	113	115	124								
	6400	106	106	113	124	108	108	113	123	109	109	113	123	110	110	113	123	111	111	113	122	112	112	113	122				
	6200	104	104	112	123	106	106	112	122	107	107	112	122	108	108	112	121	109	109	112	121	110	110	112	121				
	6000	101	101	110	122	104	104	110	121	105	105	110	121	106	106	110	120	107	107	110	120	108	108	110	120	111	111	110	119
	5800	100	100	110	122	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	109	109	109	118
	5600	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	108	108	109	118
	5400	101	101	113	125	100	100	110	121	101	101	109	120	102	102	109	120	103	103	109	120	105	105	109	119	108	108	109	118
	5200	102	102	115	127	100	100	111	123	100	100	109	121	101	101	109	120	102	102	109	120	104	104	109	120	107	107	109	119
	5000	102	102	116	129	101	101	112	125	100	100	110	122	100	100	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	4800	103	103	118	132	101	101	114	127	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	106	106	109	119
	4600	103	103	120	134	102	102	116	129	101	101	114	126	100	100	112	124	100	100	110	122	101	101	110	121	105	105	110	120
5000	7487	119	119	121	130	121	121	121	130																				
	7200	116	116	119	129	118	118	119	128	119	119	119	128																
	7000	114	114	118	127	116	116	118	127	117	117	118	126																
	6800	111	111	116	126	113	113	116	125	114	114	116	125	115	115	116	125												
	6600	109	109	115	125	111	111	115	124	112	112	115	124	113	113	115	124												
	6400	107	107	113	124	109	109	113	123	110	110	113	123	111	111	113	122	112	112	113	122								
	6200	105	105	112	122	107	107	112	122	108	108	112	122	109	109	112	121	110	110	112	121								
	6000	102	102	110	121	104	104	110	121	106	106	110	120	107	107	110	120	108	108	110	120	109	109	110	119				
	5800	101	100	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	5600	100	100	109	121	102	101	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	109	109	109	118
	5400	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	106	109	119	108	108	109	118
	5200	101	101	113	125	100	100	110	121	101	101	109	120	102	102	109	120	104	104	109	120	105	105	109	119	108	108	109	118
	5000	102	102	115	127	100	100	111	123	101	100	110	121	101	101	109	121	103	103	109	120	104	104	109	120	107	107	109	119
	4800	102	102	116	130	101	101	112	125	100	100	110	122	101	101	109	121	102	102	109	121	103	103	109	120	106	106	109	119
	4600	103	103	118	132	101	101	114	127	101	101	112	124	100	100	110	122	101	101	110	121	102	102	110	121	106	106	110	120

FIGURE 4C-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR ON

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4C-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C)																									
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}
6000	7487	120	120	121	130	121	121	121	129																				
	7200	117	117	119	128	118	118	119	128																				
	7000	114	114	118	127	116	116	118	126																				
	6800	112	112	116	126	114	114	116	125	115	115	116	125																
	6600	110	110	115	125	112	112	115	124	113	113	115	124	114	114	115	123												
	6400	108	108	113	123	110	110	113	123	111	111	113	122	112	112	113	122												
	6200	106	106	112	122	108	108	112	122	109	109	112	121	110	110	112	121	111	111	112	121								
	6000	103	103	110	121	105	105	110	120	106	106	110	120	107	107	110	120	109	109	110	119								
	5800	101	101	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119	108	108	109	118				
	5600	100	100	109	120	102	102	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118				
	5400	100	100	110	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	109	109	109	118
	5200	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	119	106	106	109	119	109	109	109	118
	5000	101	101	113	125	100	100	110	121	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	119	108	108	109	119
	4800	102	102	115	127	100	100	111	123	100	100	110	121	102	102	109	121	103	103	109	120	104	104	109	120	107	107	109	119
	4600	102	102	117	130	101	101	112	125	100	100	111	122	101	101	110	121	102	102	110	121	103	103	110	120	107	107	110	119
7000	7487	120	120	121	130																								
	7200	117	117	119	128	119	119	119	127																				
	7000	115	115	118	127	117	117	118	126																				
	6800	113	113	116	126	115	115	116	125																				
	6600	111	111	115	124	113	113	115	124	114	114	115	123																
	6400	109	109	113	123	111	111	113	123	112	112	113	122																
	6200	106	106	112	122	108	108	112	121	109	109	112	121	110	110	112	121												
	6000	104	104	110	121	106	106	110	120	107	107	110	120	108	108	110	120												
	5800	102	102	109	120	104	104	109	120	105	106	109	119	107	107	109	119	108	108	109	119								
	5600	101	101	109	120	103	103	109	120	104	104	109	119	106	106	109	119	107	107	109	119								
	5400	101	100	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	5200	100	100	110	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	107	107	109	119				
	5000	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	105	105	109	120	106	106	109	119	109	109	109	118
	4800	101	101	113	125	101	100	110	121	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	120	108	108	109	119
	4600	102	102	115	127	100	100	111	123	101	100	110	121	102	102	110	121	103	103	110	120	104	104	110	120	107	107	110	119
8000	7487	121	121	121	130																								
	7200	118	118	119	128																								
	7000	116	116	118	127	118	118	118	126																				
	6800	114	114	116	125	116	116	116	125																				
	6600	112	112	115	124	114	114	115	124																				
	6400	110	110	113	123	111	111	113	122	112	112	113	122																
	6200	107	107	112	122	109	109	112	121	110	110	112	121																
	6000	105	105	110	120	107	107	110	120	108	108	110	120	109	109	110	119												
	5800	103	103	109	120	105	105	109	119	106	106	109	119	107	107	109	119												
	5600	102	102	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118								
	5400	101	101	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119								
	5200	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	5000	100	100	110	122	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	107	107	109	119				
	4800	100	100	111	123	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	120	106	106	109	119				
	4600	101	101	113	125	100	100	110	121	101	101	110	121	103	103	110	120	104	104	110	120	105	105	110	120	108	108	110	119

FIGURE 4C-3 (continued)

DISTANCE TO ACCELERATE TO V_1 AND STOP – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4C-3)
NOSE WHEEL STEERING ... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
BLEED AIR – LOW
OBTAIN: V_1 SPEED = 113 KIAS
ACCELERATE - STOP DISTANCE = 4,500 FEET (1370 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 1.5 PERCENT WITH ENGINE ANTI-ICE ON.
- INCREASE ACCELERATE - STOP DISTANCE BY 1.0 PERCENT WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

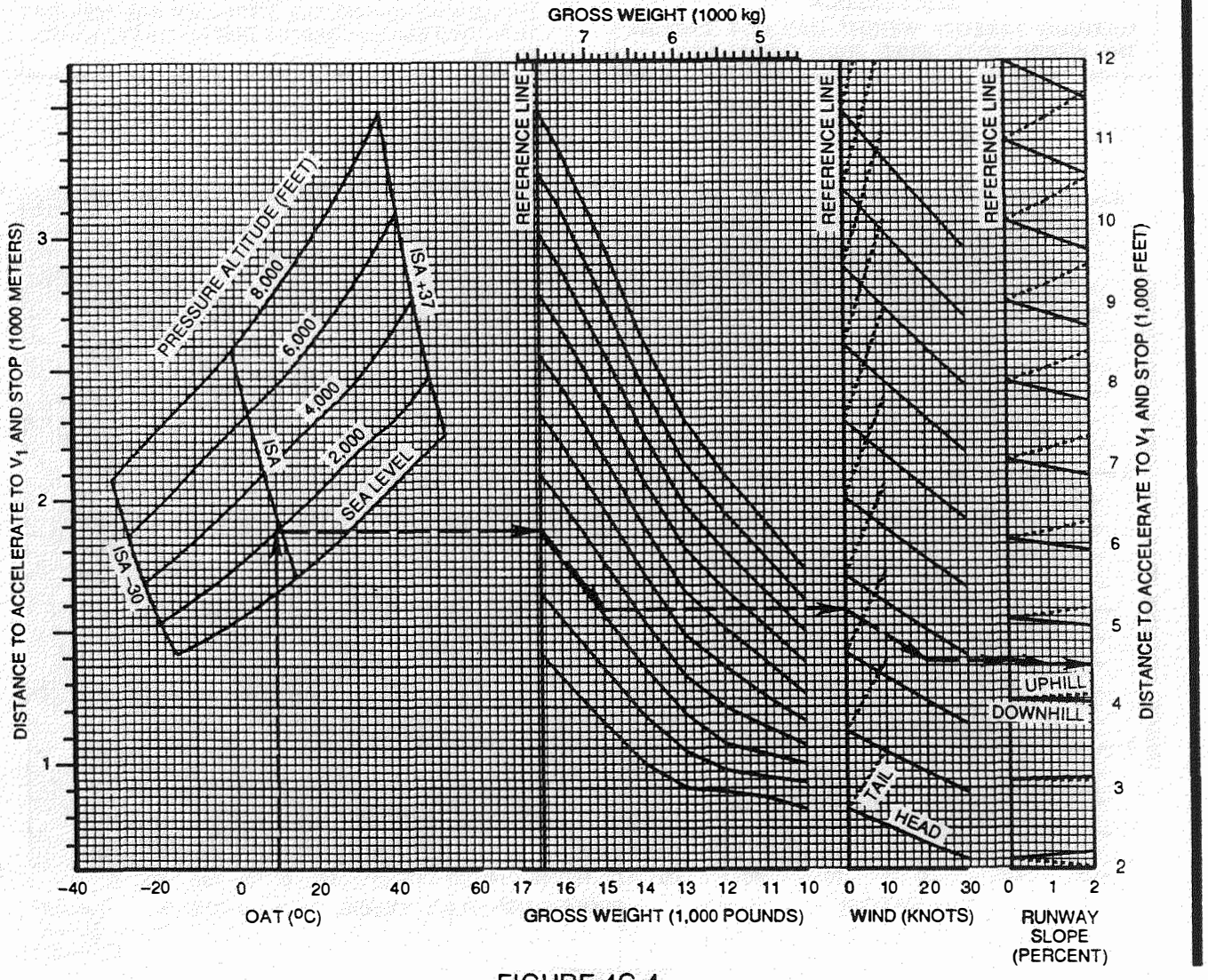


FIGURE 4C-4

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4C-3
V_R SPEED ..... FIGURE 4C-3
V_2 SPEED ..... FIGURE 4C-3
FLAPS 1/4
NOSE WHEEL STEERING ... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
BLEED AIR – LOW
OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 4,325 FEET (1320 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2.

NOTE

- INCREASE TAKEOFF DISTANCE BY 5.9 PERCENT WITH ENGINE ANTI-ICE ON.
- INCREASE TAKEOFF DISTANCE BY 3.3 PERCENT WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

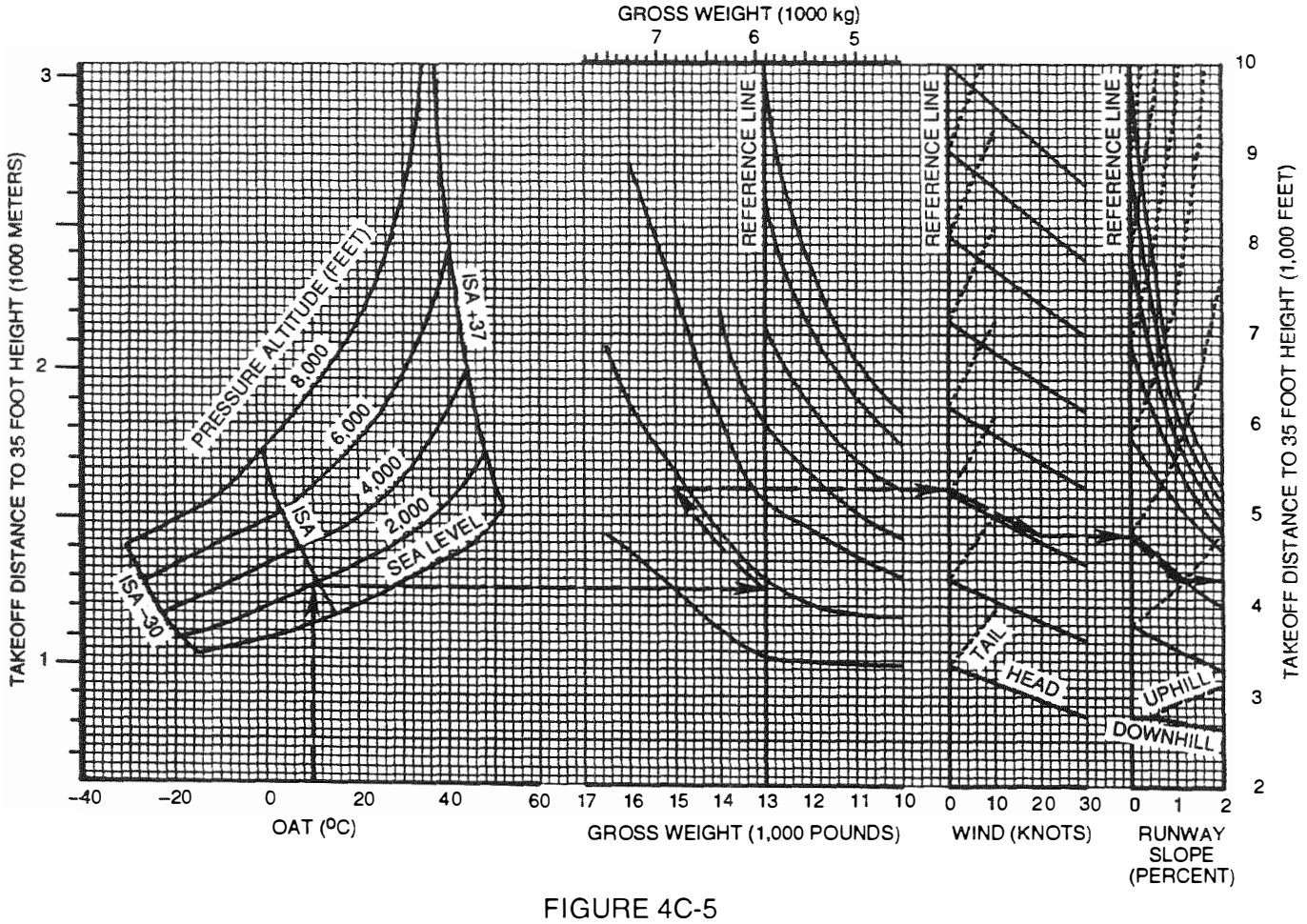


FIGURE 4C-5

SINGLE ENGINE TAKEOFF RUN DISTANCE – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	LOW (SEE NOTE)
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4C-3
V_R SPEED	FIGURE 4C-3
V_2 SPEED	FIGURE 4C-3
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
BLEED AIR – LOW

OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 3,780 FEET (1150 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2.

NOTE

- INCREASE TAKEOFF DISTANCE BY 4.1 PERCENT WITH ENGINE ANTI-ICE ON.
- INCREASE TAKEOFF DISTANCE BY 2.9 PERCENT WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

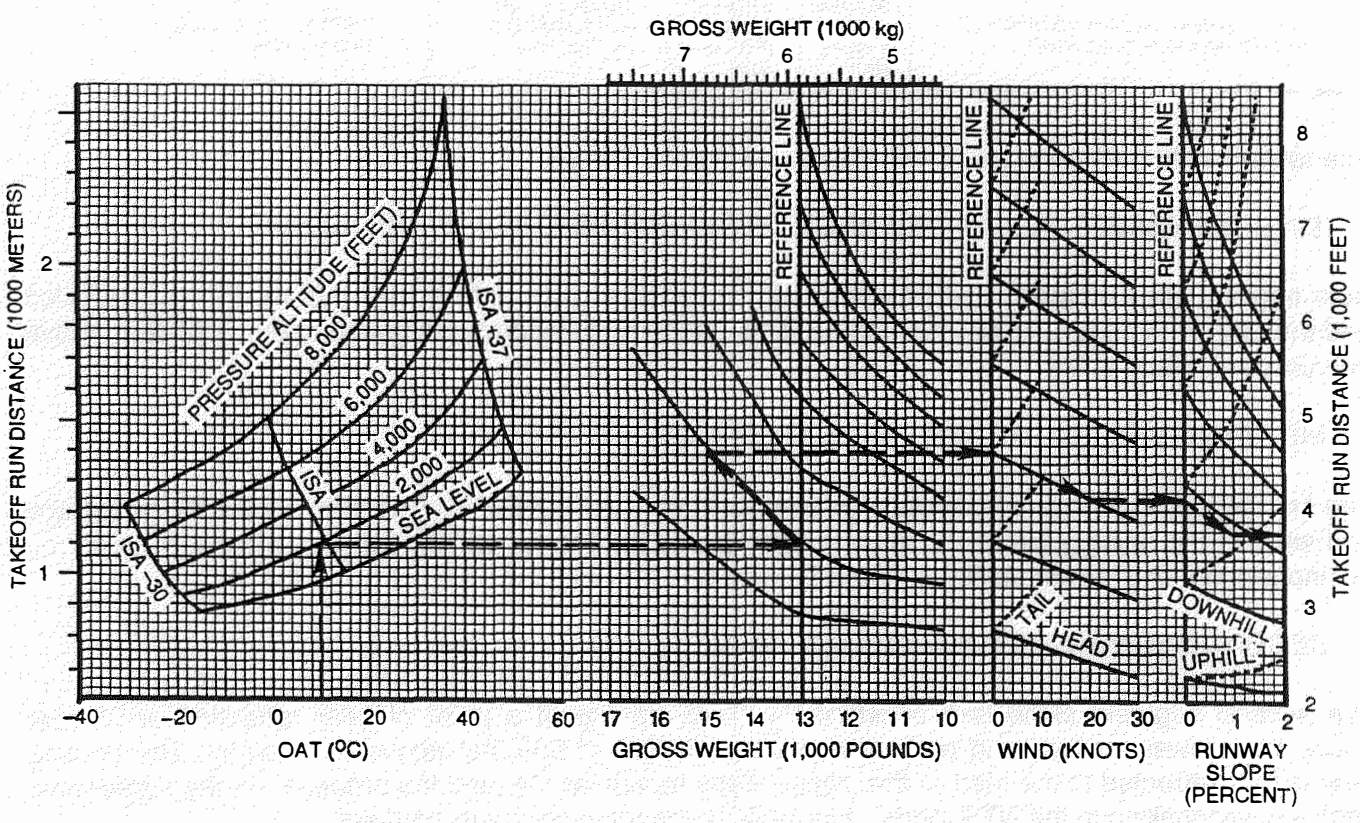
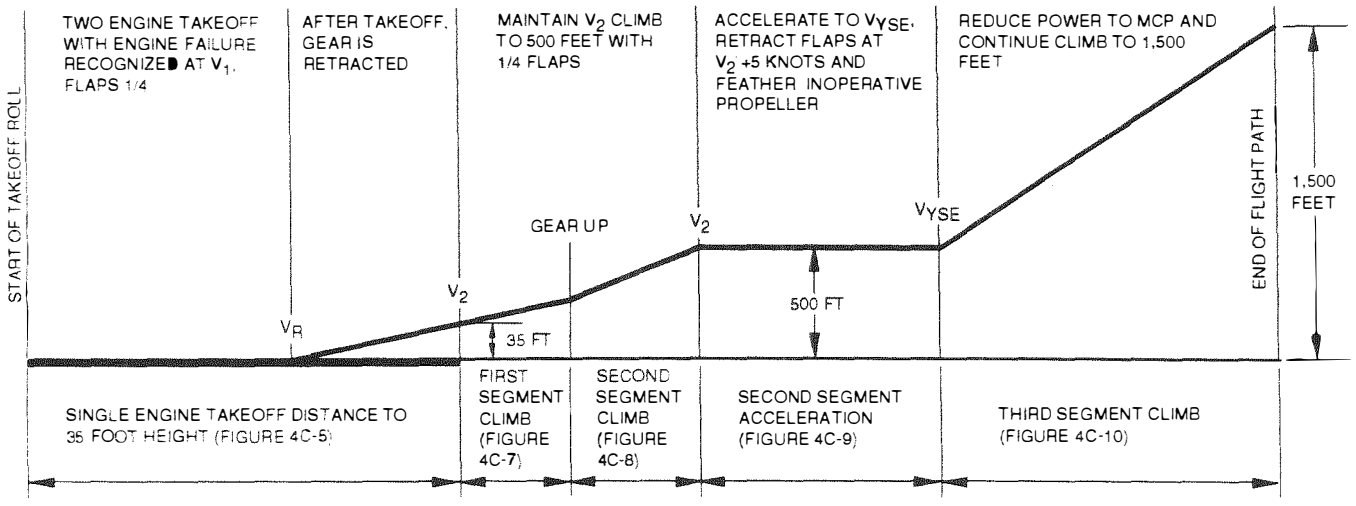


FIGURE 4C-6

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR ON

An estimate of the horizontal distance required to clear an obstacle up to 1,500 feet above the runway, or the required climb gradient to clear an obstacle along the takeoff flight path, may be obtained by using Figures 4C-5 and 4C-7 through 4C-10. The takeoff flight path is as follows:



The takeoff flight path consists of five phases defined as follows:

1. SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT (FIGURE 4C-5).

Both engines are assumed to operate normally to speed V_1 where one engine is recognized as failed and the takeoff is continued on one engine. This phase ends when the airplane reaches 35 feet above the runway surface at V_2.

2. FIRST SEGMENT CLIMB HEIGHT AND DISTANCE (FIGURE 4C-7)

The first segment climb is a constant V_2 climb starting at a height of 35 feet above the runway surface and ends at the point at which the landing gear is fully retracted, with flaps at 1/4 and the propeller on the inoperative engine windmilling in the NTS mode.

3. SECOND SEGMENT CLIMB (FIGURES 4C-8).

The second segment climb is a constant V_2 climb starting at a point of gear retraction or 35 feet above the runway surface and ends at a pressure height of 500 feet above the runway. The landing gear is fully retracted at the start of this phase, flaps remain at 1/4, and the propeller on the inoperative engine is windmilling in the NTS mode. Figure 4C-8 presents net climb gradient.

4. SECOND SEGMENT ACCELERATION (FIGURE 4C-9).

This phase is an acceleration at 500 feet pressure height from V_2 to V_{YSE}. The flaps are retracted at V_2 +5 knots, the propeller on the inoperative engine is feathered, and takeoff power is maintained until V_{YSE} is obtained.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR ON (continued)

5. THIRD SEGMENT CLIMB (FIGURE 4C-10).

The third segment climb is at V_{YSE} with maximum continuous power set. It starts at 500 feet, pressure height, and is completed at 1500 feet above the runway surface. Figure 4C-10 presents net climb gradient.

The following are two examples to illustrate the use of the flight path data charts.

EXAMPLE 1 – CLOSE-IN OBSTACLE CLEARANCE

Given: Airport OAT = 10°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (downhill)
Bleed Air – Low
Engine Anti-ice off
Obstacle Height above the Approach End of Runway = 350 feet (107 meters)
Obstacle Distance from Brake Release = 20,700 feet (6310 m)

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4C-5) = 4,325 feet (1320 meters).

2. The obstacle height correction for runway slope is 4,325 x 1.0/100 = 43 feet.

3. Obstacle horizontal distance from the 35 foot height point equals the total obstacle distance minus the distance to 35 feet height. 20,700 – 4,325 = 16,375 feet (4990 meters).

4. First Segment Climb Height and Distance (Figure 4D-7) obtain 545 feet to climb 18 feet.

5. Obstacle horizontal distance from the end of the first segment is 16,375 – 545 = 15,830 feet (4825 meters).

6. Second Segment Climb Gradient (Figure 4C-8) = 3.2 percent.

7. The required second segment climb gradient to clear the obstacle by 35 feet is computed as follows: Incremental height required is the obstacle height minus the first segment climb height (350 + 43 – 18 = 375 feet). The required gradient is then:

$$\frac{\text{incremental height}}{\text{obstacle horizontal distance}} \times 100 = \frac{375}{15{,}830} \times 100 = 2.4 \text{ percent.}$$

Since the required gradient is less than the actual gradient, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR ON (continued)

EXAMPLE 2 – DISTANT OBSTACLE CLEARANCE

Given: Airport OAT = 10°C
Airport Pressure Altitude = 2000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (downhill)
Bleed Air – Low
Engine Anti-ice off
Obstacle Height above the Approach End of Runway = 700 feet (213 meters)
Obstacle Distance from Brake Release = 46,600 feet (14205 meters)

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4C-5) = 4,325 feet (1320 meters).

2. The obstacle height correction for runway slope is 4,325 x 1.0/100 = 43 feet.

3. First Segment Climb Height and Distance (Figure 4C-7) obtain 545 feet to climb 18 feet.

4. Second Segment Climb Gradient (Figure 4C-8) = 3.2 percent.

5. Second Segment Distance to climb to 500 feet, pressure height, is computed as follows: Incremental height = 500 + 43 – 18 = 525 feet. Second segment distance = (525 feet/3.2 percent) x 100 = 16,406 feet (5000 meters).

   NOTE

   When there is a large difference between the standard OAT and airport OAT, the 500 foot pressure height should be corrected to actual height as follows:

   $$\text{Actual height} = \frac{Ta}{Ts} \times 500$$

   Ta = Mid altitude actual absolute temperature (°K)
   Ts = Mid altitude standard absolute temperature (°K)

6. Second Segment Acceleration Distance (Figure 4C-9) = 4,950 feet (1510 meters) to accelerate from V_2 to V_{YSE} at 500 feet.

7. Obstacle horizontal distance from the end of the second segment is 46,600 – 4,325 – 545 – 16,406 – 4,950 = 20,374 feet (6210 meters).

8. Final Segment Climb Gradient (Figure 4C-10) = 3.8 percent

9. The required third segment climb gradient to clear the obstacle by 35 feet is computed as follows: Incremental height required is the obstacle height minus 500 feet (700 – 500) = 200 feet. The required gradient is then:

   $$\frac{\text{incremental height}}{\text{obstacle horizontal distance}} \times 100 = \frac{200}{20{,}374} \times 100 = 0.98 \text{ percent}$$

   Since the required gradient is less than the actual gradient, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

FIRST SEGMENT CLIMB HEIGHT AND DISTANCE – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	LOW OR HIGH
ENG ANTI-ICE	ON OR OFF
CLIMB SPEED	V_2 (FIGURE 4C-3)
GEAR	IN TRANSIT
FLAPS	1/4

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 KG)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
BLEED AIR = LOW

OBTAIN: V_2 CLIMB SPEED = 116 KIAS
FIRST SEGMENT CLIMB HEIGHT =
18 FEET ABOVE THE 35 FOOT POINT
FIRST SEGMENT CLIMB DISTANCE = 545 FEET (165 m)

NOTE

MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

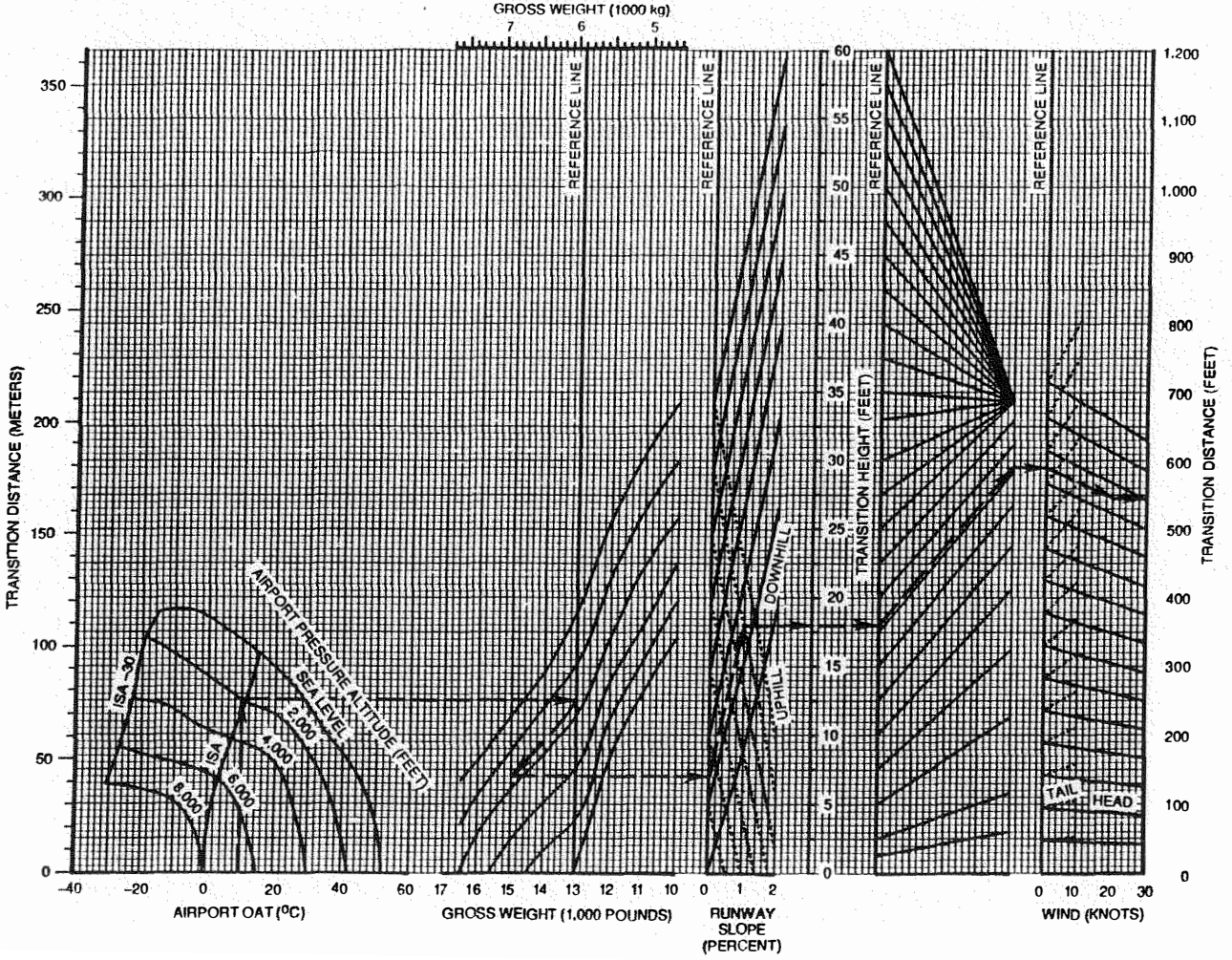


FIGURE 4C-7

PERFORMANCE

FAA APPROVED: AUG 23/91
Revised: JUN 23/93

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

SECOND SEGMENT CLIMB GRADIENT – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... V_2 (FIGURE 4C-3)
GEAR ..... UP
FLAPS 1/4

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
BLEED AIR – LOW

OBTAIN: V_2 CLIMB SPEED = 116 KIAS
SECOND SEGMENT CLIMB GRADIENT = 3.2 PERCENT

NOTE

- REDUCE CLIMB GRADIENT BY 0.7 PERCENT GRADIENT WITH ENGINE ANTI-ICE ON.
- REDUCE CLIMB GRADIENT BY 0.4 PERCENT GRADIENT WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

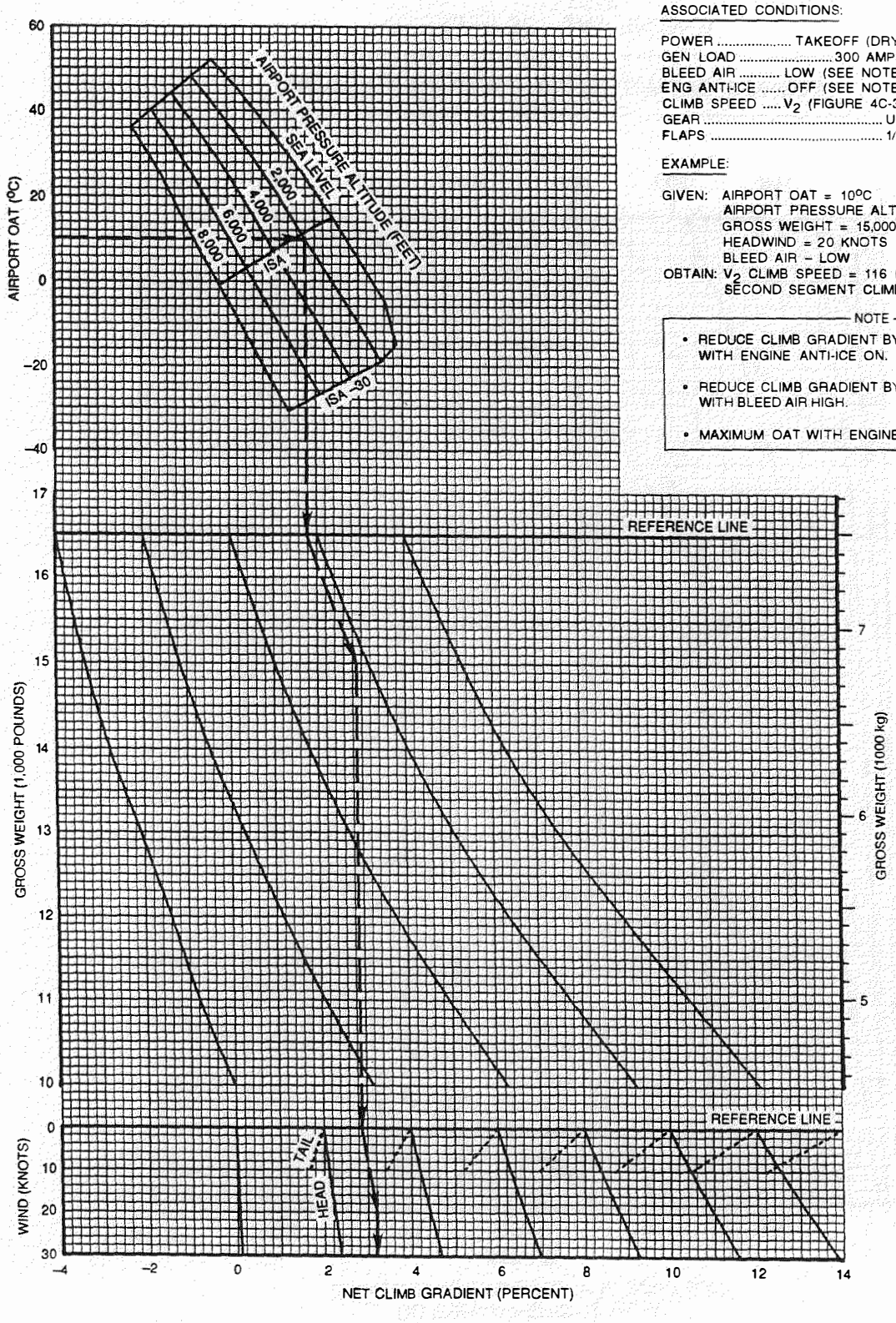


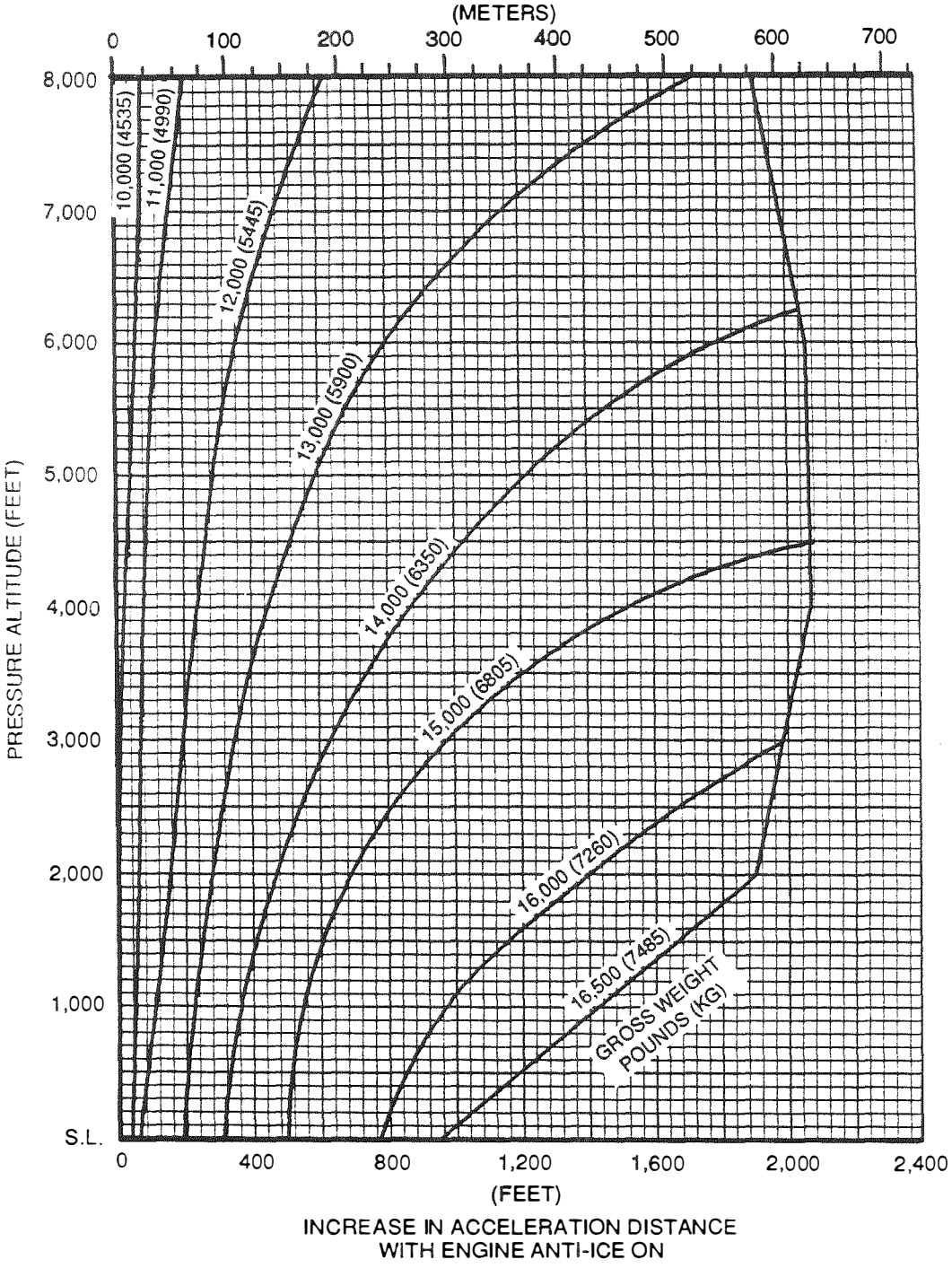
FIGURE 4C-8

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
SECOND SEGMENT ACCELERATION DISTANCE – DRY, BLEED AIR ON

ENGINE ANTI-ICE EFFECTS

NOTE

MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.



INCREASE IN ACCELERATION DISTANCE
WITH ENGINE ANTI-ICE ON

FIGURE 4C-9

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

SECOND SEGMENT ACCELERATION DISTANCE – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE GRAPH)
ACCELERATE TO V_{YSE} ..... FIGURE 4F-1
GEAR ..... UP
FLAPS ..... 1/4 (SEE NOTE)

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
BLEED AIR – LOW

OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS
SECOND SEGMENT ACCELERATION DISTANCE = 4,950 FEET (1510 m)

NOTE

- ACCELERATE TO THE LESSER OF V_2 +5 KIAS OR V_{YSE} PRIOR TO RAISING FLAPS.
- INCREASE ACCELERATION DISTANCE BY 640 FEET (195 m) WITH BLEED AIR HIGH.

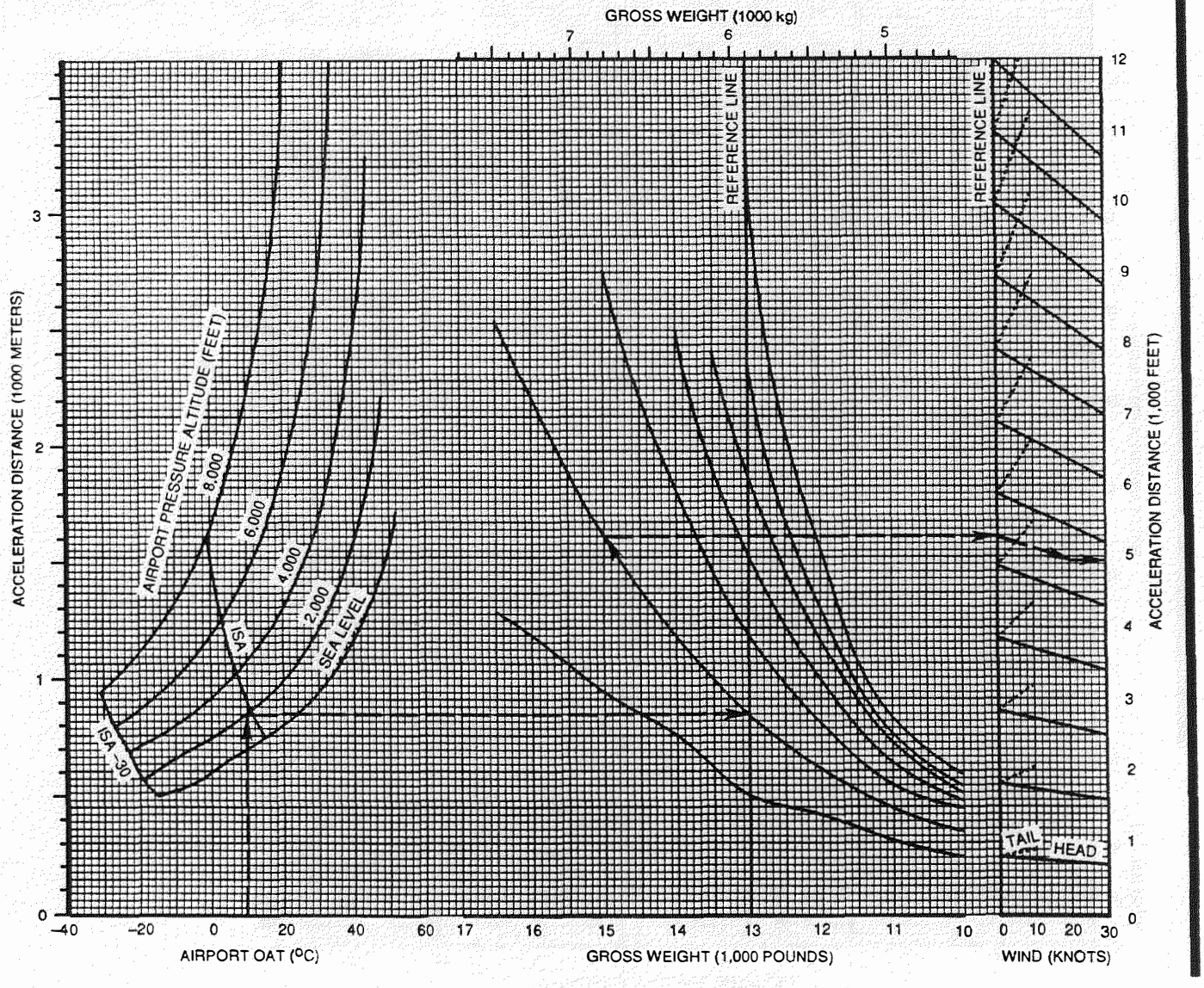


FIGURE 4C-9 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

THIRD SEGMENT CLIMB GRADIENT – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... V_{YSE} (FIGURE 4F-1)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
BLEED AIR – LOW

OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS
THIRD SEGMENT CLIMB GRADIENT = 3.8 PERCENT

NOTE

- REDUCE CLIMB GRADIENT BY 0.9 PERCENT GRADIENT WITH ENGINE ANTI-ICE ON.
- REDUCE CLIMB GRADIENT BY 0.4 PERCENT GRADIENT WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

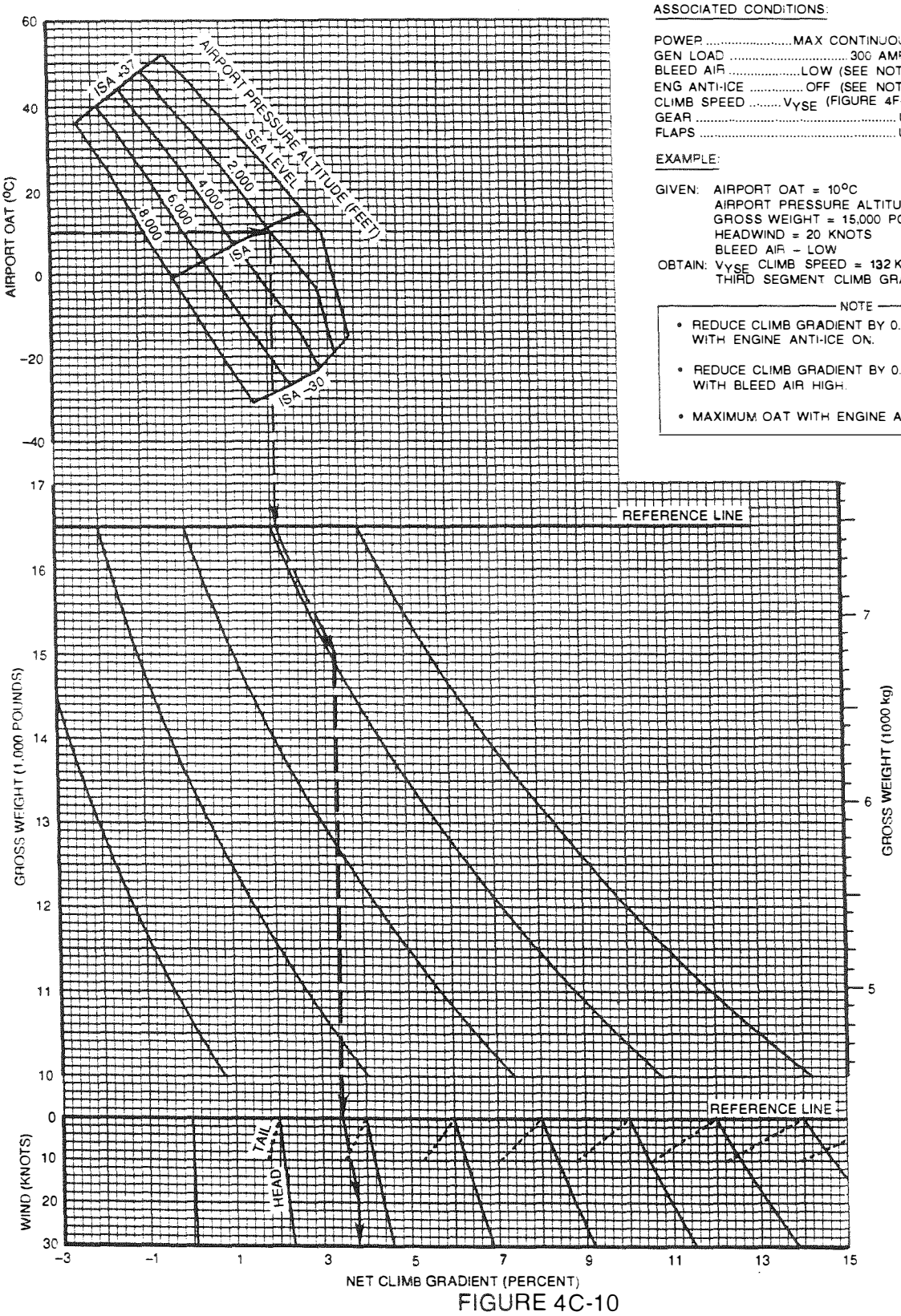


FIGURE 4C-10

TWO ENGINE RATE OF CLIMB AT V_{50} – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... V_{50} (FIGURE 4C-3)
GEAR ..... UP
FLAPS 1/4

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 14,500 POUNDS (6580 kg)
BLEED AIR – LOW
OBTAIN: V_{50} CLIMB SPEED = 124 KIAS
RATE OF CLIMB = 2,425 FEET PER MINUTE

NOTE

- REDUCE RATE OF CLIMB BY 255 FEET PER MINUTE WITH ENGINE ANTI-ICE ON.
- REDUCE RATE OF CLIMB BY 115 FEET PER MINUTE WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

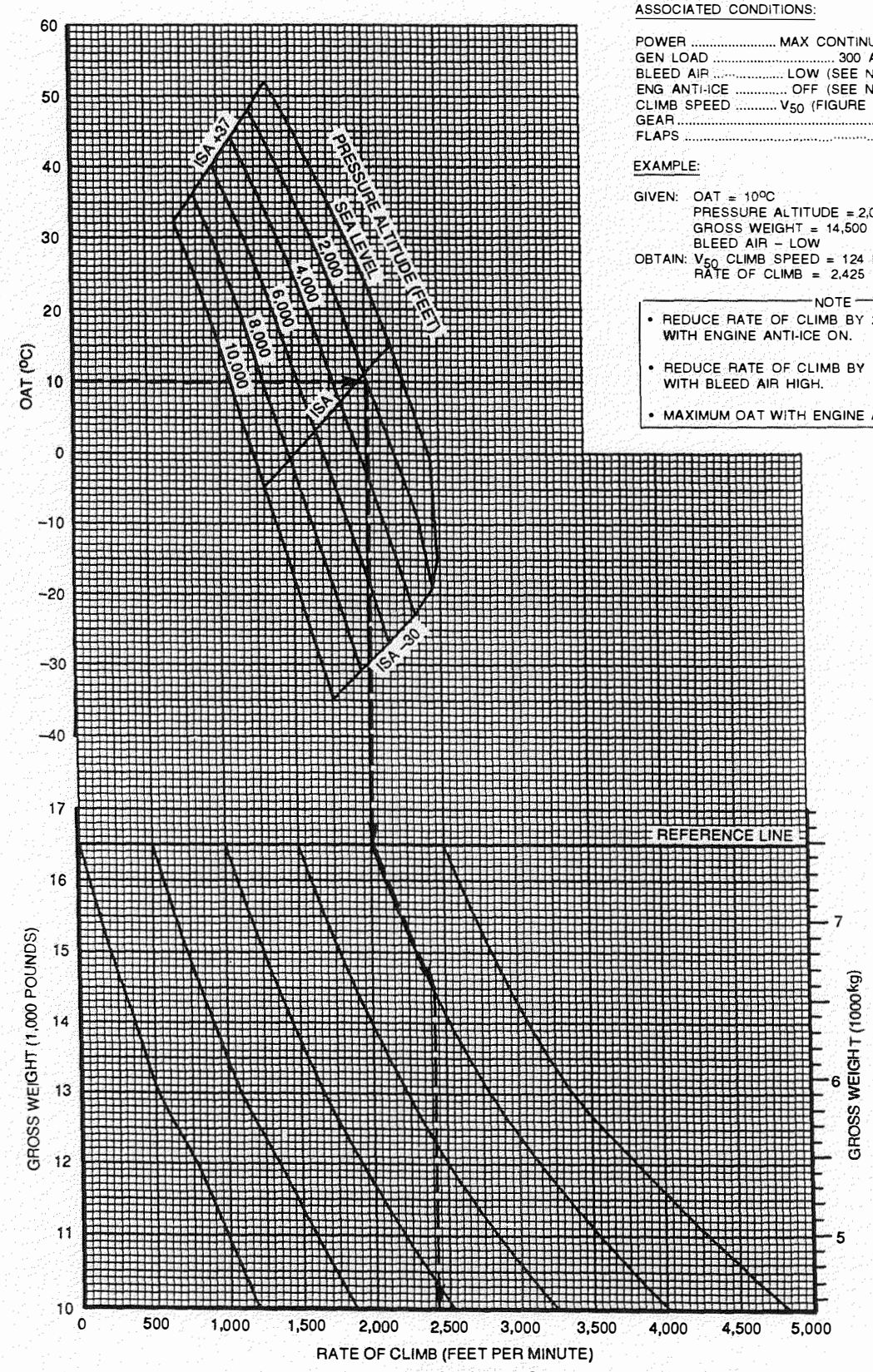


FIGURE 4C-11

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PART D – TAKEOFF PERFORMANCE
DRY, BLEED AIR OFF

CONTENTS

ITEM	PAGE
Takeoff Power Check Chart	4D-1
Maximum Takeoff Weight Limitation Chart	4D-3
Takeoff Speed Schedules	4D-4
Distance to Accelerate to V_1 and Stop	4D-12
Single Engine Takeoff Distance to 35 Foot Height	4D-13
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Third Segment Climb Gradient	4D-22
Two Engine Rate of Climb At V_{50}	4D-23

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TAKEOFF POWER CHECK CHART – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
RPM 100%
MAX ALLOWABLE EGT ..... 650°C
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... SEE GRAPH
SPEED ..... 0 TO 50 KIAS

EXAMPLE:

GIVEN: OAT = -5°C
PRESSURE ALTITUDE = 4,000 FEET
ENGINE ANTI-ICE SYSTEM – ON
OBTAIN: ENGINE TORQUE = 95.8 PERCENT

NOTE

MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

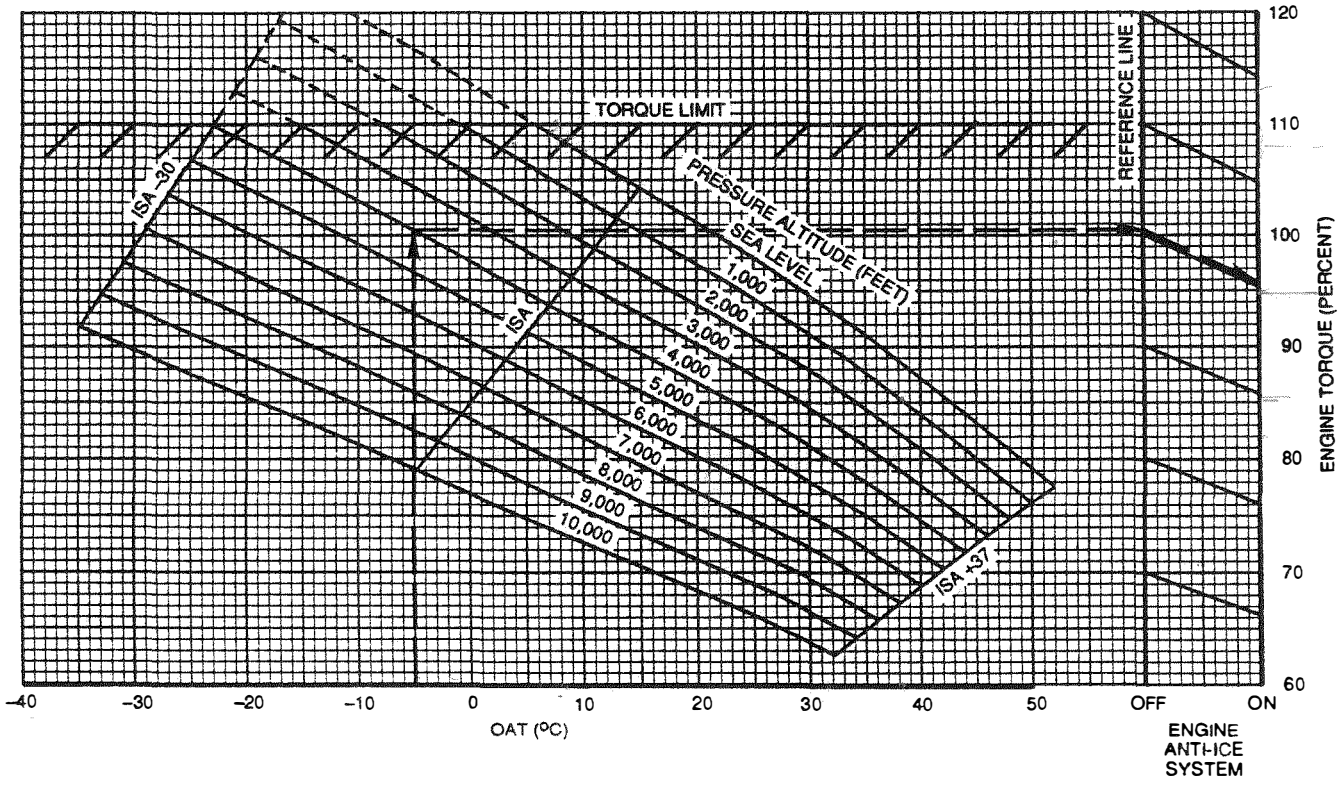


FIGURE 4D-1

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MAXIMUM TAKEOFF WEIGHT LIMITATION CHART – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
GEAR ..... DOWN (TAKEOFF)
UP (SECOND AND THIRD SEGMENT)
FLAPS ..... 1/4 (TAKEOFF)
UP (ENROUTE)

NOTE

- REDUCE TAKEOFF WEIGHT BY 615 POUNDS (280 kg) WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- THIS WEIGHT IS THE MAXIMUM AT WHICH TAKEOFF CAN BE CONTINUED AFTER AN ENGINE FAILURE IS RECOGNIZED AT OR ABOVE V_1.

EXAMPLE:

GIVEN: OAT = 16°C
PRESSURE ALTITUDE = 2,900 FEET
OBTAIN: TAKEOFF WEIGHT = 15,610 POUNDS (7080 kg)

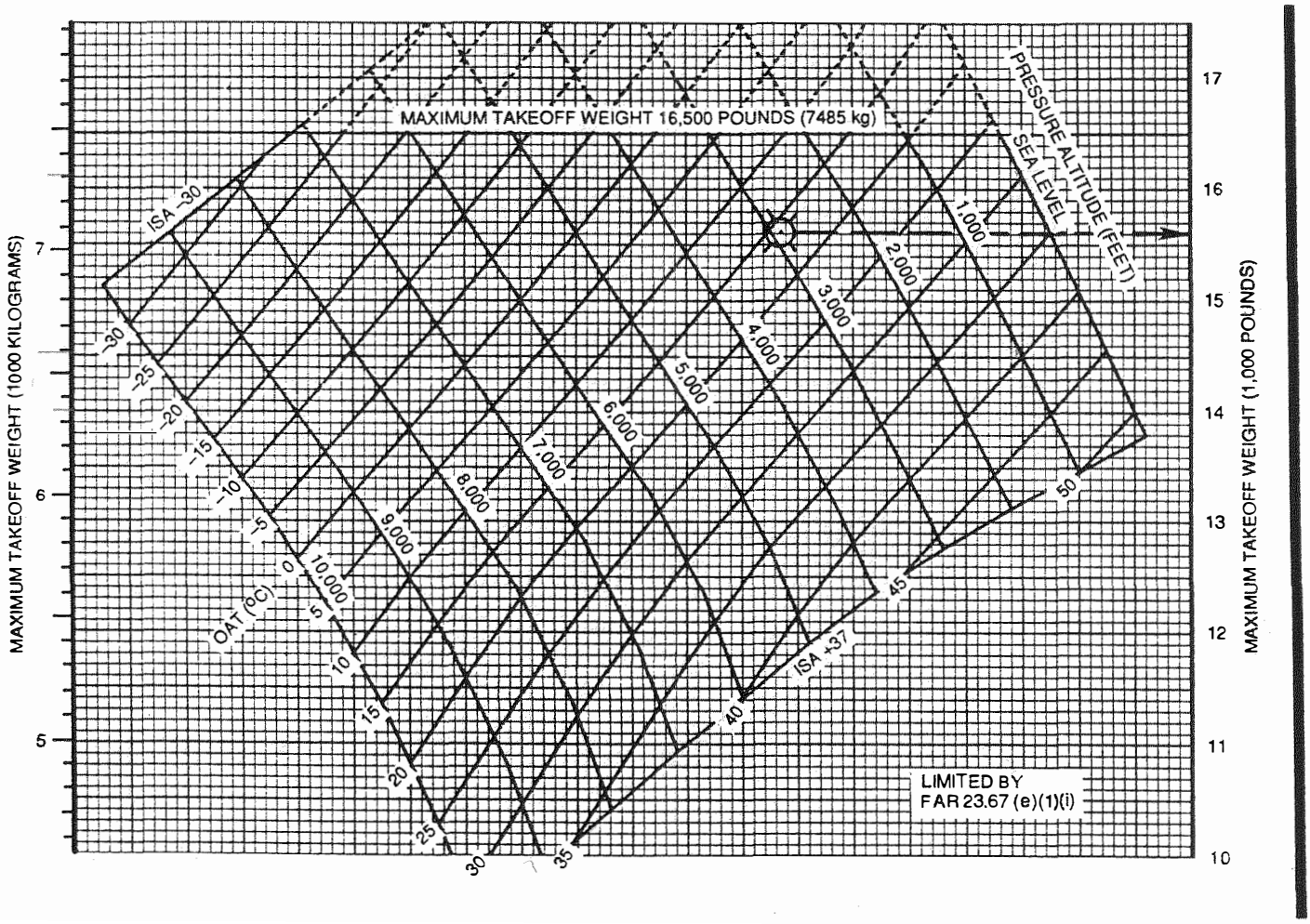


FIGURE 4D-2

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																									
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	16500	116	116	121	131	117	117	121	131	118	118	121	131	118	118	121	130	119	119	121	130	120	120	121	130				
	16000	114	114	120	130	115	115	120	129	115	115	120	129	116	116	120	129	117	117	120	129	118	118	120	128	120	120	120	127
	15500	111	111	118	128	112	112	118	128	113	113	118	128	113	113	118	128	114	114	118	127	116	116	118	127	118	118	118	126
	15000	109	109	116	127	110	110	116	127	110	110	116	126	111	111	116	126	112	112	116	126	113	113	116	126	116	116	116	125
	14500	106	106	114	126	107	107	114	125	108	108	114	125	108	108	114	125	109	109	114	125	111	111	114	124	113	113	114	123
	14000	103	103	113	124	104	104	113	124	105	105	113	124	106	106	113	124	107	107	113	123	108	108	113	123	111	111	113	122
	13500	102	102	113	125	102	102	112	123	102	102	111	123	103	103	111	122	104	104	111	122	105	105	111	121	108	108	111	121
	13000	101	101	113	126	101	101	111	123	101	101	111	122	101	101	110	121	101	101	109	121	103	103	109	120	106	106	109	119
	12500	102	102	115	128	101	101	113	125	101	101	112	124	100	100	111	122	100	100	109	121	101	101	109	120	104	104	109	119
	12000	103	103	117	130	102	102	115	128	101	101	114	126	101	101	112	124	100	100	110	122	101	101	109	121	103	103	109	120
	11500	104	104	119	133	103	103	117	130	102	102	116	129	101	101	114	127	101	101	112	124	100	100	110	122	103	103	109	120
	11000	103	103	120	135	103	103	119	132	103	103	118	131	102	102	116	129	101	101	114	126	100	100	112	124	102	102	109	120
	10500	103	103	122	136	103	103	120	134	103	103	119	133	103	103	118	131	102	102	116	129	101	101	113	126	101	101	110	121
	10000	103	103	123	139	103	103	122	136	103	103	121	135	103	103	120	134	103	103	118	131	102	102	116	129	100	100	110	122
1000	16500	117	117	121	131	118	118	121	131	118	118	121	130	119	119	121	130	120	120	121	130								
	16000	114	114	120	130	115	115	120	129	116	116	120	129	117	117	120	129	118	118	120	129	119	119	120	128				
	15500	112	112	118	128	113	113	118	128	113	113	118	128	114	114	118	127	115	115	118	127	116	116	118	127				
	15000	109	109	116	127	110	110	116	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	116	116	116	124
	14500	106	106	114	126	108	108	114	125	108	108	114	125	109	109	114	125	110	110	114	124	111	111	114	124	114	114	114	123
	14000	104	104	113	124	105	105	113	124	106	106	113	124	107	107	113	123	108	108	113	123	109	109	113	123	112	112	113	122
	13500	102	102	112	124	102	102	111	123	103	103	111	122	104	104	111	122	105	105	111	122	106	106	111	121	109	109	111	120
	13000	101	101	112	124	101	101	111	122	101	101	110	121	101	101	109	121	102	102	109	120	104	104	109	120	106	106	109	119
	12500	102	102	114	127	101	101	112	124	100	100	111	123	100	100	109	121	101	101	109	120	102	102	109	120	105	105	109	119
	12000	102	102	116	129	101	101	114	126	101	101	112	125	100	100	111	123	100	100	109	121	101	101	109	120	104	104	109	119
	11500	103	103	118	132	102	102	116	129	102	102	114	127	101	101	112	125	100	100	110	122	101	101	109	121	103	104	109	120
	11000	103	103	120	134	103	103	118	131	102	102	116	129	102	102	114	127	101	101	112	124	100	100	110	122	103	103	109	120
	10500	103	103	121	135	103	103	119	133	103	103	118	132	102	102	116	129	101	101	114	127	101	100	112	124	102	102	109	121
	10000	103	103	123	138	103	103	121	135	103	103	120	134	103	103	118	132	102	102	116	129	101	101	114	126	101	101	110	121
2000	16500	117	117	121	131	118	118	121	131	119	119	121	130	120	120	121	130	121	121	121	130								
	16000	115	115	120	129	116	116	120	129	116	116	120	129	117	117	120	129	118	118	120	128								
	15500	112	112	118	128	113	113	118	128	114	114	118	127	115	115	118	127	116	116	118	127	117	117	118	126				
	15000	110	110	116	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125				
	14500	107	107	114	125	108	108	114	125	109	109	114	125	110	110	114	124	111	111	114	124	112	112	114	124	115	115	114	123
	14000	104	104	113	124	105	105	113	124	106	106	113	123	108	108	113	123	109	109	113	123	110	110	113	122	112	112	113	122
	13500	102	102	111	123	103	103	111	122	104	104	111	122	105	105	111	122	106	106	111	121	107	107	111	121	110	110	111	120
	13000	101	101	111	123	101	101	110	122	101	101	109	121	102	102	109	120	103	103	109	120	105	105	109	120	107	107	109	119
	12500	101	101	113	126	100	100	111	123	100	100	110	121	101	101	109	120	102	102	109	120	103	103	109	120	106	106	109	119
	12000	102	102	115	128	101	101	113	125	100	100	111	123	100	100	109	121	101	101	109	120	102	102	109	120	105	105	109	119
	11500	103	103	117	130	102	102	115	127	101	101	113	125	100	100	111	123	100	100	109	121	101	101	109	120	104	104	109	120
	11000	103	103	119	133	102	102	117	130	102	102	115	127	101	101	113	125	100	100	111	122	100	100	109	121	104	104	109	120
	10500	103	103	120	134	103	103	119	132	102	102	117	130	102	102	115	127	101	101	112	125	100	100	110	122	103	103	109	120
	10000	103	103	122	136	103	103	120	134	103	103	119	132	102	102	117	130	102	102	115	127	101	101	112	124	102	102	110	121

FIGURE 4D-3

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																									
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
3000	16500	117	117	121	131	119	119	121	130	120	119	121	130	120	120	121	130												
	16000	115	115	120	129	116	116	120	129	117	117	120	129	118	118	120	128	119	119	120	128								
	15500	112	112	118	128	114	114	118	128	115	115	118	127	116	116	118	127	117	117	118	127								
	15000	110	110	116	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125				
	14500	107	107	114	125	109	109	114	125	110	110	114	124	111	111	114	124	112	112	114	124	113	113	114	123				
	14000	105	105	113	124	106	106	113	123	107	107	113	123	108	108	113	123	109	109	113	122	110	110	113	122	113	113	113	121
	13500	102	102	111	123	104	104	111	122	105	105	111	122	106	106	111	121	107	107	111	121	108	108	111	121	111	111	111	120
	13000	100	101	111	123	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	108	108	109	119
	12500	101	101	112	124	100	100	110	121	101	100	109	120	102	102	109	120	103	103	109	120	104	104	109	119	107	107	109	118
	12000	102	102	114	127	101	100	111	123	100	100	110	121	101	101	109	120	102	102	109	120	103	103	109	120	106	106	109	119
	11500	102	102	116	129	101	101	113	125	100	100	111	123	100	100	110	121	101	101	109	120	102	102	109	120	105	105	109	119
	11000	103	103	118	132	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	121	101	101	109	121	105	105	109	120
	10500	103	103	120	134	103	103	117	130	102	102	115	128	101	101	113	125	100	100	111	123	101	100	109	121	104	104	109	120
	10000	103	103	121	136	103	103	119	133	103	103	117	130	102	102	115	128	101	101	113	125	100	100	111	123	103	103	110	121
4000	16500	118	118	121	131	119	119	121	130	120	120	121	130																
	16000	115	115	120	129	117	117	120	129	118	118	120	128	119	119	120	128												
	15500	113	113	118	128	115	115	118	127	116	116	118	127	116	116	118	127												
	15000	110	110	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125								
	14500	108	108	114	125	110	110	114	124	111	111	114	124	112	112	114	124	113	113	114	124	114	114	114	123				
	14000	105	105	113	124	107	107	113	123	108	108	113	123	109	109	113	122	110	110	113	122	111	111	113	122				
	13500	102	102	111	123	104	104	111	122	106	106	111	121	107	107	111	121	108	108	111	121	109	109	111	121	111	111	111	120
	13000	100	100	110	122	102	102	109	121	103	103	109	120	104	104	109	120	105	105	109	120	106	106	109	119	109	109	109	118
	12500	100	100	111	123	100	100	109	121	101	101	109	120	103	103	109	120	104	104	109	119	105	105	109	119	108	108	109	118
	12000	101	101	113	126	100	100	110	122	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	107	107	109	119
	11500	102	102	115	128	101	101	111	124	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	11000	103	103	117	131	101	101	113	126	100	100	111	123	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	10500	104	104	120	133	102	102	115	128	101	101	113	126	100	100	111	123	100	100	110	122	101	101	109	121	105	105	109	120
	10000	103	103	121	135	103	103	118	131	102	102	115	128	101	101	113	126	100	100	111	123	100	100	110	122	104	104	110	120
5000	16500	118	118	121	130	120	120	121	130																				
	16000	116	116	120	129	118	118	120	128	119	119	120	128																
	15500	114	114	118	128	115	115	118	127	116	116	118	127	117	117	118	126												
	15000	111	111	116	126	113	113	116	126	114	114	116	125	115	115	116	125												
	14500	109	108	114	125	110	110	114	124	111	111	114	124	112	112	114	124	113	113	114	123								
	14000	106	106	113	123	108	108	113	123	109	109	113	123	110	110	113	122	111	111	113	122	112	112	113	122				
	13500	103	103	111	122	105	105	111	122	106	106	111	121	107	107	111	121	108	108	111	121	110	109	111	120				
	13000	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	120	106	106	109	119	107	107	109	119	110	110	109	118
	12500	100	100	110	122	101	101	109	120	102	102	109	120	103	103	109	119	105	104	109	119	106	106	109	119	108	108	109	118
	12000	101	100	111	124	101	100	109	121	101	101	109	120	103	103	109	120	104	104	109	120	105	105	109	119	108	108	109	118
	11500	101	101	114	126	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	107	107	109	119
	11000	102	102	116	128	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	10500	103	103	118	131	101	101	114	126	101	100	112	124	100	100	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	10000	103	103	120	134	102	102	116	129	101	101	114	126	100	100	112	124	100	100	110	122	101	101	110	121	105	104	110	120

FIGURE 4D-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
6000	16500	119	119	121	130	121	121	121	130																				
	16000	117	117	120	129	118	118	120	128																				
	15500	114	114	118	127	116	116	118	127	117	117	118	127																
	15000	112	112	116	126	114	114	116	125	115	115	116	125	116	116	116	125												
	14500	109	109	114	125	111	111	114	124	112	112	114	124	113	113	114	123												
	14000	107	107	113	123	109	109	113	123	110	110	113	122	111	111	113	122	112	112	113	122								
	13500	104	104	111	122	106	106	111	121	107	107	111	121	108	108	111	121	109	109	111	120	110	110	111	120				
	13000	101	101	109	121	104	104	109	120	105	105	109	120	106	106	109	119	107	107	109	119	108	108	109	118				
	12500	100	100	109	120	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	109	109	109	118
	12000	100	100	110	122	101	101	109	120	102	102	109	120	104	104	109	120	105	105	109	119	106	106	109	119	108	108	109	118
	11500	100	100	112	124	100	100	109	121	101	101	109	120	103	103	109	120	104	104	109	120	105	105	109	119	108	108	109	118
	11000	101	101	114	126	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	107	107	109	119
	10500	102	102	116	129	101	101	112	124	100	100	110	122	101	101	110	121	102	102	109	121	103	103	109	120	106	106	109	119
	10000	103	103	118	132	101	101	114	127	100	100	112	124	100	100	110	122	101	101	110	121	102	102	110	121	105	105	110	120
7000	16500	120	120	121	130	121	121	121	129																				
	16000	117	118	120	129	119	119	120	128																				
	15500	115	115	118	127	117	117	118	127																				
	15000	113	113	116	126	114	114	116	125	115	115	116	125																
	14500	110	110	114	124	112	112	114	124	113	113	114	124																
	14000	108	108	113	123	110	110	113	122	110	110	113	122	111	111	113	122												
	13500	105	105	111	122	107	107	111	121	108	108	111	121	109	109	111	120	110	110	111	120								
	13000	102	102	109	120	104	104	109	120	105	105	109	119	107	106	109	119	107	107	109	119								
	12500	101	101	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118				
	12000	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	107	106	109	119				
	11500	100	100	110	122	101	101	109	120	102	102	109	120	104	104	109	120	105	105	109	119	106	106	109	119	109	109	109	118
	11000	101	101	112	124	101	100	109	121	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	108	108	109	119
	10500	101	101	114	127	100	100	110	122	101	100	110	121	102	102	109	121	103	103	109	120	104	104	109	120	107	107	109	119
	10000	102	102	116	129	101	101	112	124	100	100	110	122	101	101	110	121	102	102	110	121	103	103	110	120	106	106	110	119
8000	16500	120	120	121	130																								
	16000	118	118	120	128	120	120	120	128																				
	15500	116	116	118	127	118	118	118	126																				
	15000	113	113	116	125	115	115	116	125																				
	14500	111	111	114	124	113	113	114	124	114	114	114	123																
	14000	108	108	113	123	110	110	113	122	111	111	113	122																
	13500	106	106	111	121	108	108	111	121	109	109	111	121	110	110	111	120												
	13000	103	103	109	120	105	105	109	119	106	106	109	119	107	107	109	119	108	108	109	119								
	12500	102	102	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118								
	12000	101	101	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118				
	11500	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	107	107	109	119				
	11000	100	100	110	122	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	120	106	106	109	119	109	109	109	118
	10500	101	101	112	125	100	100	109	121	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	120	108	108	109	119
	10000	102	102	114	127	100	100	111	123	100	100	110	121	101	101	110	121	103	103	110	120	104	104	110	120	107	107	110	119

FIGURE 4D-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -30 V_1	-30 V_R	-30 V_2	-30 V_{50}	-10 V_1	-10 V_R	-10 V_2	-10 V_{50}	0 V_1	0 V_R	0 V_2	0 V_{50}	10 V_1	10 V_R	10 V_2	10 V_{50}	20 V_1	20 V_R	20 V_2	20 V_{50}	30 V_1	30 V_R	30 V_2	30 V_{50}	50 V_1	50 V_R	50 V_2	50 V_{50}
9000	16500	121	121	121	130																								
	16000	119	119	120	128																								
	15500	117	117	118	127																								
	15000	114	114	116	125	116	116	116	125																				
	14500	112	112	114	124	114	114	114	123																				
	14000	109	109	113	122	111	111	113	122	112	112	113	122																
	13500	107	107	111	121	109	109	111	121	110	110	111	120																
	13000	104	104	109	120	106	106	109	119	107	107	109	119	108	108	109	119												
	12500	103	103	109	120	105	105	109	119	106	106	109	119	107	107	109	119	108	108	109	118								
	12000	102	102	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	119								
	11500	101	101	109	120	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	11000	100	100	110	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	107	107	109	119				
	10500	100	100	111	123	101	101	109	121	102	102	109	120	103	103	109	120	105	105	109	120	106	106	109	119				
	10000	101	101	113	125	100	100	110	122	101	101	110	121	102	102	110	121	104	104	110	120	105	105	110	120	108	108	110	119
10000	16500	122	122	121	129																								
	16000	120	120	120	128																								
	15500	117	117	118	126																								
	15000	115	115	116	125																								
	14500	113	113	114	124	114	114	114	123																				
	14000	110	110	113	122	112	112	113	122																				
	13500	108	108	111	121	109	109	111	120	110	110	111	120																
	13000	105	105	109	120	107	107	109	119	108	108	109	119																
	12500	104	104	109	119	106	106	109	119	107	107	109	119	107	107	109	118												
	12000	103	103	109	120	105	105	109	119	106	106	109	119	107	107	109	119												
	11500	102	102	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119								
	11000	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	10500	100	100	110	122	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	106	106	110	120				
	10000	100	100	111	123	101	101	110	121	102	102	110	121	103	103	110	120	105	105	110	120	106	106	110	120				

FIGURE 4D-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C)																									
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	7487	116	116	121	131	117	117	121	131	118	118	121	131	118	118	121	130	119	119	121	130	120	120	121	130				
	7200	113	113	119	129	114	114	119	129	115	115	119	129	115	115	119	129	116	116	119	128	117	117	119	128	120	120	119	127
	7000	111	111	118	128	112	112	118	128	112	112	118	128	113	113	118	127	114	114	118	127	115	115	118	127	118	118	118	126
	6800	109	109	116	127	110	110	116	127	110	110	116	126	111	111	116	126	112	112	116	126	113	113	116	126	116	116	116	125
	6600	106	106	115	126	107	107	115	125	108	108	115	125	109	109	115	125	110	110	115	125	111	111	115	124	114	114	115	124
	6400	104	104	113	125	105	105	113	124	105	105	113	124	106	106	113	124	107	107	113	124	109	109	113	123	111	111	113	122
	6200	102	102	113	125	103	103	112	124	103	103	112	123	104	104	112	123	105	105	112	122	106	106	112	122	109	109	112	121
	6000	101	101	113	125	101	101	112	123	101	101	111	123	102	102	110	122	103	103	110	121	104	104	110	121	107	107	110	120
	5800	101	101	114	127	101	101	112	124	101	101	111	123	101	101	110	122	101	101	109	121	102	102	109	120	105	105	109	119
	5600	102	102	116	129	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	121	101	101	109	120	104	104	109	119
	5400	103	103	118	131	102	102	115	128	102	102	114	127	101	101	113	125	100	100	111	123	101	101	109	121	103	103	109	120
	5200	104	104	119	133	103	103	117	130	102	102	116	129	102	102	114	127	101	101	112	124	100	100	110	122	102	102	109	120
	5000	103	103	120	134	103	103	119	132	103	103	118	131	102	102	116	129	101	101	114	126	100	100	111	124	102	102	109	120
	4800	103	103	122	136	103	103	120	134	103	103	119	133	103	103	118	131	102	102	116	128	101	101	113	126	101	101	110	121
	4600	103	103	123	138	103	103	121	136	103	103	120	135	103	103	119	133	103	103	117	131	102	102	115	128	101	101	110	122
1000	7487	117	117	121	131	118	118	121	131	118	118	121	130	119	119	121	130	120	120	121	130								
	7200	113	114	119	129	114	115	119	129	115	115	119	129	116	116	119	128	117	117	119	128	118	118	119	128				
	7000	111	111	118	128	112	112	118	128	113	113	118	128	114	114	118	127	115	115	118	127	116	116	118	127	118	118	118	125
	6800	109	109	116	127	110	110	116	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	116	116	116	124
	6600	107	107	115	126	108	108	115	125	108	108	115	125	109	109	115	125	111	111	115	124	112	112	115	124	114	114	115	123
	6400	104	104	113	124	105	105	113	124	106	106	113	124	107	107	113	124	108	108	113	123	109	109	113	123	112	112	113	122
	6200	102	103	113	124	103	103	112	123	104	104	112	123	105	105	112	122	106	106	112	122	107	107	112	122	110	110	112	121
	6000	101	101	112	124	101	101	111	123	102	102	110	122	103	102	110	121	104	104	110	121	105	105	110	121	108	108	110	120
	5800	101	101	113	126	101	101	111	123	101	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	5600	102	102	115	128	101	101	113	125	101	100	111	123	100	100	110	121	101	101	109	120	102	102	109	120	105	105	109	119
	5400	102	103	117	130	102	102	114	127	101	101	113	125	100	100	111	123	100	100	110	121	101	101	109	120	104	104	109	119
	5200	103	103	118	132	102	102	116	129	102	102	114	127	101	101	112	125	100	100	111	122	101	101	109	121	103	103	109	120
	5000	103	103	120	134	103	103	118	131	102	102	116	129	101	102	114	127	101	101	112	124	100	100	110	122	103	103	109	120
	4800	103	103	121	135	103	103	119	133	103	103	118	131	102	102	116	129	101	101	114	126	101	100	112	124	102	102	109	121
	4600	103	103	122	137	103	103	120	135	103	103	119	133	103	103	118	131	102	102	116	129	101	101	113	126	101	101	110	121
2000	7487	117	117	121	131	118	118	121	131	119	119	121	130	120	120	121	130	121	121	121	130								
	7200	114	114	119	129	115	115	119	129	116	116	119	128	117	117	119	128	118	118	119	128								
	7000	112	112	118	128	113	113	118	128	114	114	118	127	115	115	118	127	116	116	118	127	117	117	118	126				
	6800	110	110	118	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125				
	6600	107	107	115	125	108	108	115	125	109	109	115	125	110	110	115	125	111	111	115	124	112	112	115	124	115	115	115	123
	6400	105	105	113	124	106	106	113	124	107	107	113	124	108	108	113	123	109	109	113	123	110	110	113	123	113	113	113	122
	6200	103	103	112	123	104	104	112	123	105	105	112	122	106	106	112	122	107	107	112	122	108	108	112	121	111	111	112	121
	6000	101	101	111	123	102	102	110	122	102	102	110	121	103	103	110	121	105	105	110	121	106	106	110	120	108	108	110	119
	5800	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	107	107	109	119
	5600	101	101	114	126	101	101	111	124	100	100	110	122	101	101	109	120	102	102	109	120	103	103	109	120	106	106	109	119
	5400	102	102	116	128	101	101	113	125	100	100	111	123	100	100	110	121	101	101	109	120	102	102	109	120	105	105	109	119
	5200	103	103	117	130	102	102	115	127	101	101	113	125	100	100	111	123	100	100	109	121	101	101	109	120	104	104	109	120
	5000	103	103	119	133	102	102	117	130	102	102	115	127	101	101	112	125	100	100	110	122	100	100	109	121	104	104	109	120
	4800	103	103	120	134	103	103	118	132	102	102	116	129	101	101	114	127	101	101	112	124	100	100	110	122	103	103	109	120
	4600	103	103	121	136	103	103	120	134	103	103	118	132	102	102	116	129	101	101	114	127	100	100	112	124	102	102	110	121

FIGURE 4D-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
3000	7487	117	117	121	131	119	119	121	130	120	120	121	130	120	121	121	130												
	7200	114	114	119	129	116	116	119	129	117	117	119	128	118	117	119	128	118	118	119	128								
	7000	112	112	118	128	113	113	118	127	114	114	118	127	115	115	118	127	116	116	118	126								
	6800	110	110	116	127	111	111	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125				
	6600	108	107	115	125	109	109	115	125	110	110	115	125	111	111	115	124	112	112	115	124	113	113	115	124				
	6400	105	105	113	124	107	107	113	124	108	108	113	123	109	109	113	123	110	110	113	123	111	111	113	122	113	113	113	122
	6200	103	103	112	123	104	104	112	123	106	106	112	122	107	107	112	122	108	108	112	122	109	109	112	121	111	111	112	120
	6000	101	101	111	123	102	102	110	121	103	103	110	121	104	104	110	121	105	105	110	120	107	107	110	120	109	109	110	119
	5800	100	101	112	123	101	101	109	121	101	101	109	120	102	102	109	120	104	104	109	120	105	105	109	119	107	107	109	119
	5600	101	101	113	125	100	100	110	122	101	100	109	121	101	101	109	120	103	103	109	120	104	104	109	119	107	107	109	119
	5400	102	102	115	127	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	5200	102	102	116	129	101	101	113	126	101	100	111	123	100	100	110	121	101	101	109	121	102	102	109	120	105	105	109	119
	5000	103	103	118	132	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	121	101	101	109	121	105	105	109	120
	4800	103	103	120	134	102	103	117	130	102	102	115	127	101	101	112	125	100	100	111	123	101	100	109	121	104	104	109	120
	4600	103	103	121	135	103	103	118	132	102	102	117	130	102	101	114	127	101	101	112	124	100	100	110	122	103	103	110	120
4000	7487	118	118	121	131	119	119	121	130	120	120	121	130																
	7200	115	115	119	129	116	116	119	128	117	117	119	128	118	118	119	128												
	7000	112	112	118	128	114	114	118	127	115	115	118	127	116	116	118	126												
	6800	110	110	116	126	112	112	116	126	113	113	116	126	114	114	116	125	115	115	116	125								
	6600	108	108	115	125	110	110	115	125	111	111	115	124	112	112	115	124	113	113	115	124	114	114	115	123				
	6400	106	106	113	124	108	108	113	123	109	109	113	123	110	110	113	123	111	111	113	123	112	112	113	122				
	6200	103	103	112	123	105	105	112	122	106	106	112	122	107	107	112	122	108	108	112	121	110	110	112	121	112	112	112	120
	6000	101	101	110	122	103	103	110	121	104	104	110	121	105	105	110	120	106	106	110	120	107	107	110	120	110	110	110	119
	5800	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	106	106	109	119	108	108	109	118
	5600	100	100	112	124	100	100	109	121	101	101	109	120	102	102	109	120	103	103	109	120	105	105	109	119	107	107	109	118
	5400	101	101	114	126	100	100	110	122	100	100	109	121	101	101	109	120	103	103	109	120	104	104	109	119	107	107	109	119
	5200	102	102	116	128	101	101	112	124	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	5000	103	103	117	131	101	101	113	126	100	100	111	123	100	100	110	121	101	101	109	121	102	102	109	120	105	105	109	119
	4800	104	104	119	133	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	121	101	101	109	121	105	105	109	120
	4600	103	103	120	134	103	103	117	130	102	102	115	127	101	101	113	125	100	100	111	123	101	101	110	121	104	104	110	120
5000	7487	118	118	121	130	120	120	121	130																				
	7200	115	115	119	129	117	117	119	128	118	118	119	128																
	7000	113	113	118	127	115	115	118	127	116	116	118	127	117	117	118	126												
	6800	111	111	116	126	113	113	116	126	114	114	116	125	115	115	116	125												
	6600	109	109	115	125	111	111	115	124	112	112	115	124	113	113	115	124	114	114	115	123								
	6400	106	106	113	124	109	108	113	123	109	109	113	123	110	110	113	123	111	111	113	122								
	6200	104	104	112	123	106	106	112	122	107	107	112	122	108	108	112	121	109	109	112	121	110	110	112	121				
	6000	102	102	110	122	104	104	110	121	105	105	110	121	106	106	110	120	107	107	110	120	108	108	110	120				
	5800	100	100	110	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	109	109	109	118
	5600	100	100	110	122	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	108	108	109	118
	5400	101	100	112	124	101	100	109	121	101	101	109	120	102	102	109	120	104	104	109	120	105	105	109	119	108	108	109	118
	5200	101	101	114	126	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	107	107	109	119
	5000	102	102	116	128	101	100	112	124	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	106	106	109	119
	4800	103	103	117	131	101	101	113	126	101	100	111	123	100	100	110	122	101	101	109	121	102	102	109	120	106	106	109	119
	4600	103	103	119	133	102	102	115	128	101	101	113	125	100	100	111	123	101	100	110	122	102	101	110	121	105	105	110	120

FIGURE 4D-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
6000	7487	119	119	121	130	121	121	121	130																				
	7200	116	116	119	128	118	118	119	128																				
	7000	114	114	118	127	116	116	118	127	117	117	118	126																
	6800	112	112	116	126	114	114	116	125	115	115	116	125	116	116	116	125												
	6600	110	110	115	125	112	112	115	124	112	112	115	124	113	113	115	124												
	6400	107	107	113	124	109	109	113	123	110	110	113	123	111	111	113	122	112	112	113	122								
	6200	105	105	112	122	107	107	112	122	108	108	112	121	109	109	112	121	110	110	112	121								
	6000	103	103	110	121	105	105	110	121	106	106	110	120	107	107	110	120	108	108	110	120	109	109	110	119				
	5800	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	5600	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	109	109	109	118
	5400	100	100	110	122	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	119	106	106	109	119	108	108	109	118
	5200	101	101	112	124	100	100	109	121	101	101	109	120	103	103	109	120	104	104	109	120	105	105	109	119	108	108	109	118
	5000	101	101	114	126	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120	107	107	109	119
	4800	102	102	116	128	100	100	112	124	100	100	110	122	101	101	109	121	102	102	109	120	103	103	109	120	107	107	109	119
	4600	103	103	117	131	101	101	113	126	100	100	111	123	100	100	110	122	101	101	110	121	102	102	110	121	106	106	110	119
7000	7487	120	120	121	130	121	121	121	129																				
	7200	117	117	119	128	119	119	119	128																				
	7000	115	115	118	127	117	117	118	126																				
	6800	113	113	116	126	114	114	116	125	115	115	116	125																
	6600	110	110	115	124	112	112	115	124	113	113	115	124																
	6400	108	108	113	123	110	110	113	123	111	111	113	122	112	112	113	122												
	6200	106	106	112	122	108	108	112	122	109	109	112	121	110	110	112	121	111	111	112	121								
	6000	104	104	110	121	106	106	110	120	107	107	110	120	108	108	110	120	109	109	110	119								
	5800	102	102	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119	108	108	109	118				
	5600	101	101	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	118				
	5400	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	109	109	109	118
	5200	100	100	110	122	101	101	109	120	102	102	109	120	103	103	109	120	105	105	109	119	106	106	109	119	109	109	109	118
	5000	101	101	112	124	101	100	109	121	101	101	109	120	103	103	109	120	104	104	109	120	105	105	109	119	108	108	109	119
	4800	101	101	114	126	100	100	110	122	101	101	109	121	102	102	109	121	103	103	109	120	104	104	109	120	107	107	109	119
	4600	102	102	116	129	101	100	112	124	100	100	110	122	101	101	110	121	102	102	110	121	103	103	110	120	107	106	110	119
8000	7487	121	121	121	130																								
	7200	118	118	119	128	119	119	119	127																				
	7000	116	116	118	127	117	117	118	126																				
	6800	113	113	116	125	115	115	116	125																				
	6600	111	111	115	124	113	113	115	124	114	114	115	123																
	6400	109	109	113	123	111	111	113	122	112	112	113	122																
	6200	107	107	112	122	109	109	112	121	110	110	112	121	111	111	112	121												
	6000	105	105	110	121	106	106	110	120	107	107	110	120	108	108	110	119												
	5800	103	103	109	120	105	105	109	119	106	106	109	119	107	107	109	119	108	108	109	119								
	5600	102	102	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	119								
	5400	101	101	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119	107	107	109	119				
	5200	100	100	109	121	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119	106	106	109	119				
	5000	100	100	110	122	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	120	106	106	109	119	109	109	109	118
	4800	101	101	112	124	100	100	109	121	102	102	109	121	103	103	109	120	104	104	109	120	105	105	109	120	108	108	109	119
	4600	101	101	114	126	100	100	110	122	101	101	110	121	102	102	110	121	103	103	110	120	104	104	110	120	107	107	110	119

FIGURE 4D-3 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
9000	7487	121	121	121	130																								
	7200	118	118	119	128																								
	7000	116	116	118	126																								
	6800	114	114	116	125	116	116	116	125																				
	6600	112	112	115	124	114	114	115	123																				
	6400	110	110	113	123	112	112	113	122																				
	6200	108	108	112	122	109	110	112	121	110	110	112	121																
	6000	105	105	110	120	107	107	110	120	108	108	110	120	109	109	110	119												
	5800	104	104	109	120	106	106	109	119	107	106	109	119	107	107	109	119												
	5600	103	102	109	120	105	104	109	119	105	106	109	119	106	106	109	119	107	107	109	118								
	5400	102	102	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119								
	5200	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	5000	100	100	110	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119	107	107	109	119				
	4800	100	100	111	123	101	101	109	121	102	102	109	120	104	104	109	120	105	105	109	120	106	106	109	119				
	4600	101	101	112	124	101	101	110	121	102	102	110	121	103	103	110	120	104	104	110	120	105	105	110	120	108	108	110	119
10000	7487	122	122	121	129																								
	7200	119	119	119	128																								
	7000	117	117	118	126																								
	6800	115	115	116	125																								
	6600	113	113	115	124	115	115	115	123																				
	6400	111	111	113	123	112	112	113	122																				
	6200	108	108	112	121	110	110	112	121	111	111	112	121																
	6000	106	106	110	120	108	108	110	120	109	109	110	119																
	5800	104	104	109	119	106	106	109	119	107	107	109	119																
	5600	103	103	109	120	105	105	109	119	106	106	109	119	107	107	109	118												
	5400	103	103	109	120	105	105	109	119	106	106	109	119	107	107	109	119												
	5200	102	102	109	120	104	104	109	120	105	105	109	119	106	106	109	119	107	107	109	119								
	5000	101	101	109	121	103	103	109	120	104	104	109	120	105	105	109	119	106	106	109	119								
	4800	100	100	110	121	102	102	109	120	103	103	109	120	105	105	109	120	106	106	109	119	107	107	109	119				
	4600	100	100	111	123	101	101	110	121	103	103	110	120	104	104	110	120	105	105	110	120	106	106	110	119				

FIGURE 4D-3 (continued)

DISTANCE TO ACCELERATE TO V_1 AND STOP – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4D-3)
NOSE WHEEL STEERING .... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 113 KIAS
ACCELERATE - STOP DISTANCE = 4,360 FEET (1330 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 1.2 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

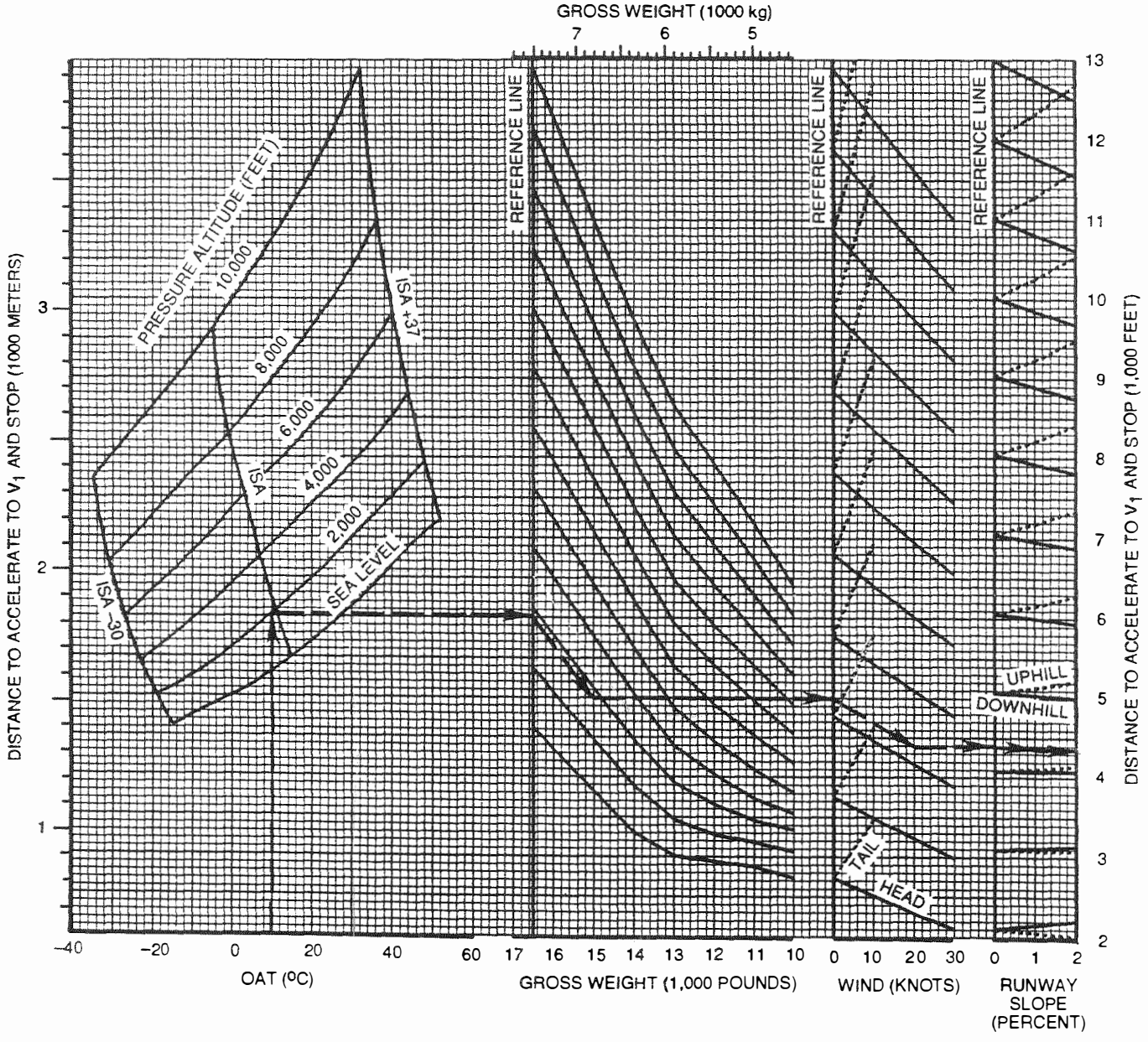


FIGURE 4D-4

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4D-3
V_R SPEED ..... FIGURE 4D-3
V_2 SPEED ..... FIGURE 4D-3
FLAPS..... 1/4
NOSE WHEEL STEERING ... ON OR OFF

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2.

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 4,200 FEET (1280 m)

NOTE

- INCREASE TAKEOFF DISTANCE BY 4.9 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

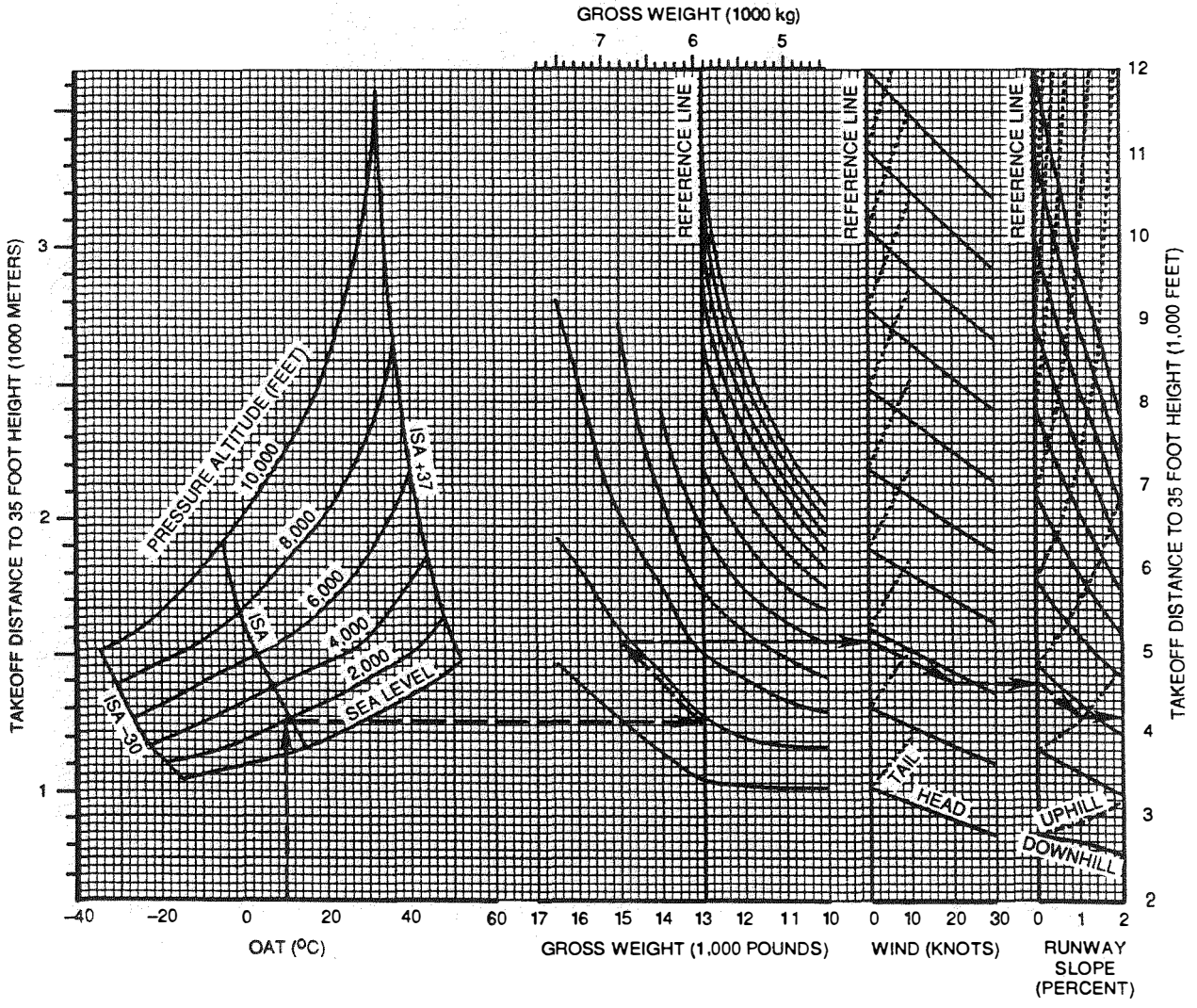


FIGURE 4D-5

SINGLE ENGINE TAKEOFF RUN DISTANCE – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4D-3
V_R SPEED ..... FIGURE 4D-3
V_2 SPEED ..... FIGURE 4D-3
FLAPS 1/4
NOSE WHEEL STEERING ... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 3,750 FEET (1145 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2.

NOTE

- INCREASE TAKEOFF DISTANCE BY 3.6 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

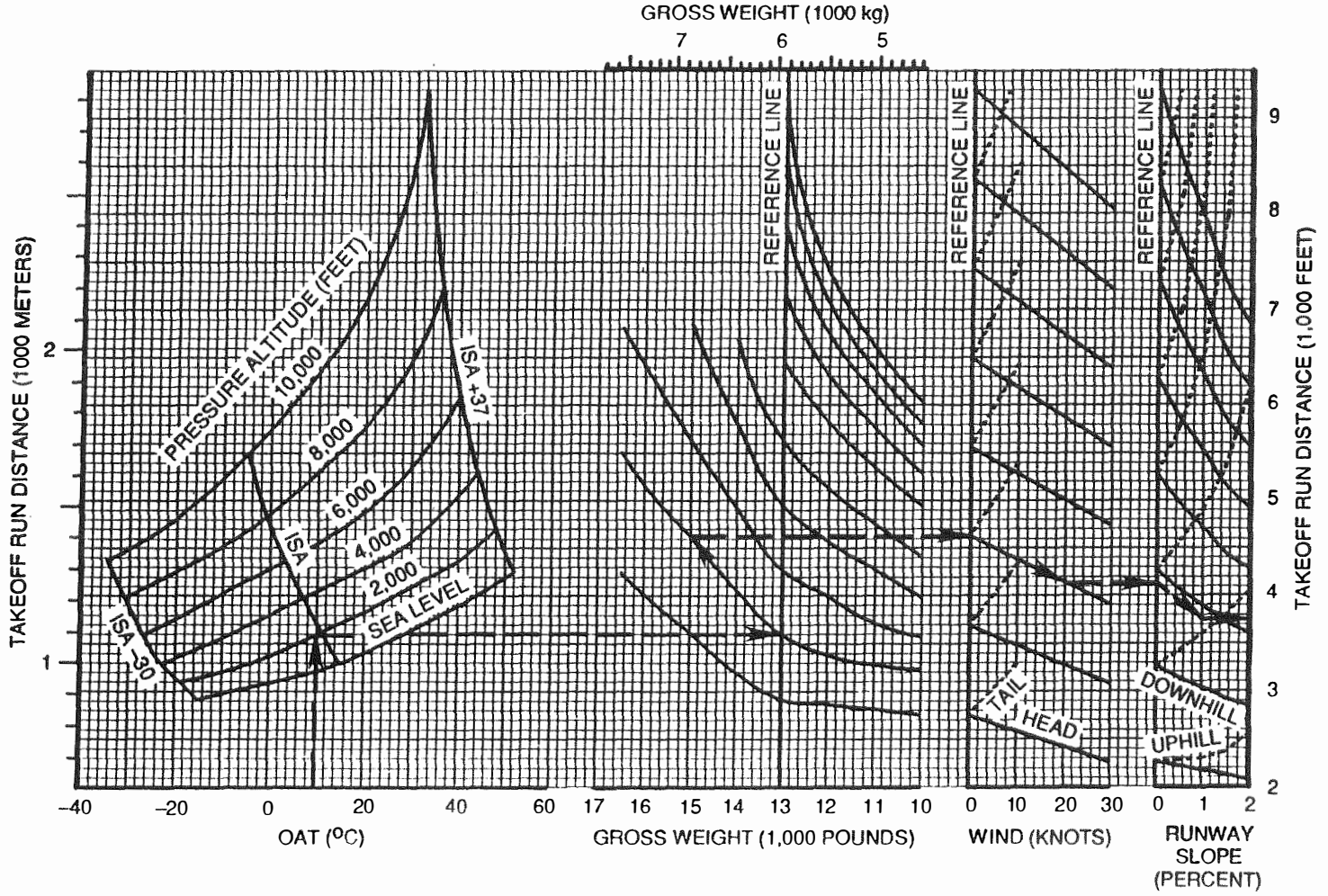
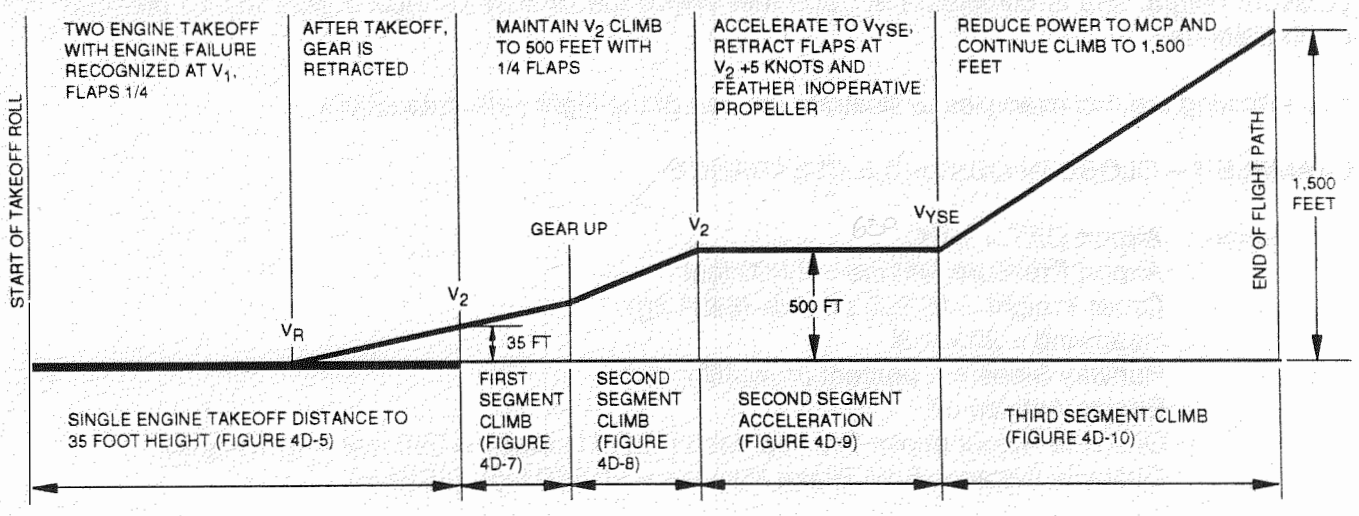


FIGURE 4D-6
PERFORMANCE

FAA APPROVED: AUG 23/91
Revised: MAR 29/94

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR OFF

An estimate of the horizontal distance required to clear an obstacle up to 1,500 feet above the runway, or the required climb gradient to clear an obstacle along the takeoff flight path, may be obtained by using Figures 4D-5 and 4D-7 through 4D-10. The takeoff flight path is as follows:



The takeoff flight path consists of five phases defined as follows:

1. SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT (FIGURE 4D-5).

Both engines are assumed to operate normally to speed V_1 where one engine is recognized as failed and the takeoff is continued on one engine. This phase ends when the airplane reaches 35 feet above the runway surface at V_2.

2. FIRST SEGMENT CLIMB HEIGHT AND DISTANCE (FIGURE 4D-7)

The first segment climb is a constant V_2 climb starting at a height of 35 feet above the runway surface and ends at the point at which the landing gear is fully retracted, with flaps at 1/4 and the propeller on the inoperative engine windmilling in the NTS mode.

3. SECOND SEGMENT CLIMB (FIGURES 4D-8).

The second segment climb is a constant V_2 climb starting at a point of gear retraction or 35 feet above the runway surface and ends at a pressure height of 500 feet above the runway. The landing gear is fully retracted at the start of this phase, flaps remain at 1/4, and the propeller on the inoperative engine is windmilling in the NTS mode. Figure 4D-8 presents net climb gradient.

4. SECOND SEGMENT ACCELERATION (FIGURE 4D-9).

This phase is an acceleration at 500 feet pressure height from V_2 to V_{YSE}. The flaps are retracted at V_2 +5 knots, the propeller on the inoperative engine is feathered, and takeoff power is maintained until V_{YSE} is obtained.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR OFF (continued)

5. THIRD SEGMENT CLIMB (FIGURE 4D-10).

The third segment climb is at V_{YSE} with maximum continuous power set. It starts at 500 feet, pressure height, and is completed at 1500 feet above the runway surface. Figure 4D-10 presents net climb gradient.

The following are two examples to illustrate the use of the flight path data charts.

EXAMPLE 1 – CLOSE-IN OBSTACLE CLEARANCE

Given: Airport OAT = 10°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (downhill)
Engine Anti-ice off
Obstacle Height above the Approach End of Runway = 350 feet (107 meters)
Obstacle Distance from Brake Release = 20,700 feet (6310 m)

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4D-5) = 4,200 feet (1280 meters).

2. The obstacle height correction for runway slope is 4,200 x 1.0/100 = 42 feet.

3. Obstacle horizontal distance from the 35 foot height point equals the total obstacle distance minus the distance to 35 feet height. 20,700 – 4,200 = 16,500 feet (5030 meters).

4. First Segment Climb Height and Distance (Figure 4D-7) obtain 560 feet to climb 19 feet.

5. Obstacle horizontal distance from the end of the first segment is 16,500 – 560 = 15,940 feet (4860 meters).

6. Second Segment Climb Gradient (Figure 4D-8) = 3.75 percent.

7. The required second segment climb gradient to clear the obstacle by 35 feet is computed as follows: Incremental height required is the obstacle height minus the first segment climb height (350 + 42 – 19 = 373 feet). The required gradient is then:

$$\frac{\text{incremental height}}{\text{obstacle horizontal distance}} \times 100 = \frac{373}{15{,}940} \times 100 = 2.3 \text{ percent.}$$

Since the required gradient is less than the actual gradient, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR OFF (continued)

EXAMPLE 2 – DISTANT OBSTACLE CLEARANCE

Given: Airport OAT = 10°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (downhill)
Engine Anti-ice off
Obstacle Height above the Approach End of Runway = 700 feet (213 meters)
Obstacle Distance from Brake Release = 46,600 feet (14205 meters)

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4D-5) = 4,200 feet (1280 meters).

2. The obstacle height correction for runway slope is 4,200 x 1.0/100 = 42 feet.

3. First Segment Climb Height and Distance (Figure 4D-7) obtain 560 feet to climb 19 feet.

4. Second Segment Climb Gradient (Figure 4D-8) = 3.75 percent.

5. Second Segment Distance to climb to 500 feet, pressure height, is computed as follows: Incremental height = 500 + 42 – 19 = 523 feet. Second segment distance = (523 feet/3.75 percent) x 100 = 13,947 feet (4250 meters).

NOTE

When there is a large difference between the standard OAT and airport OAT, the 500 foot pressure height should be corrected to actual height as follows:

$$\text{Actual height} = \frac{Ta}{Ts} \times 500$$

Ta = Mid altitude actual absolute temperature (°K)
Ts = Mid altitude standard absolute temperature (°K)

6. Second Segment Acceleration Distance (Figure 4D-9) = 4,625 feet (1410 meters) to accelerate from V_2 to V_{YSE} at 500 feet.

7. Obstacle horizontal distance from the end of the second segment is 46,600 – 4,200 – 560 – 13,947 – 4,625 = 23,268 feet (7090 meters).

8. Final Segment Climb Gradient (Figure 4D-10) = 4.3 percent

9. The required third segment climb gradient to clear the obstacle by 35 feet is computed as follows: Incremental height required is the obstacle height minus 500 feet (700 – 500) = 200 feet. The required gradient is then:

$$\frac{\text{incremental height}}{\text{obstacle horizontal distance}} \times 100 = \frac{200}{23{,}268} \times 100 = 0.9 \text{ percent}$$

Since the required gradient is less than the actual gradient, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

FIRST SEGMENT CLIMB HEIGHT AND DISTANCE – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	ON OR OFF
CLIMB SPEED	V_2 (FIGURE 4D-3)
GEAR	IN TRANSIT
FLAPS	1/4

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 KG)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_2 CLIMB SPEED = 116 KIAS
FIRST SEGMENT CLIMB HEIGHT =
19 FEET ABOVE THE 35 FOOT POINT
FIRST SEGMENT CLIMB DISTANCE = 560 FEET (170 m)

NOTE

MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

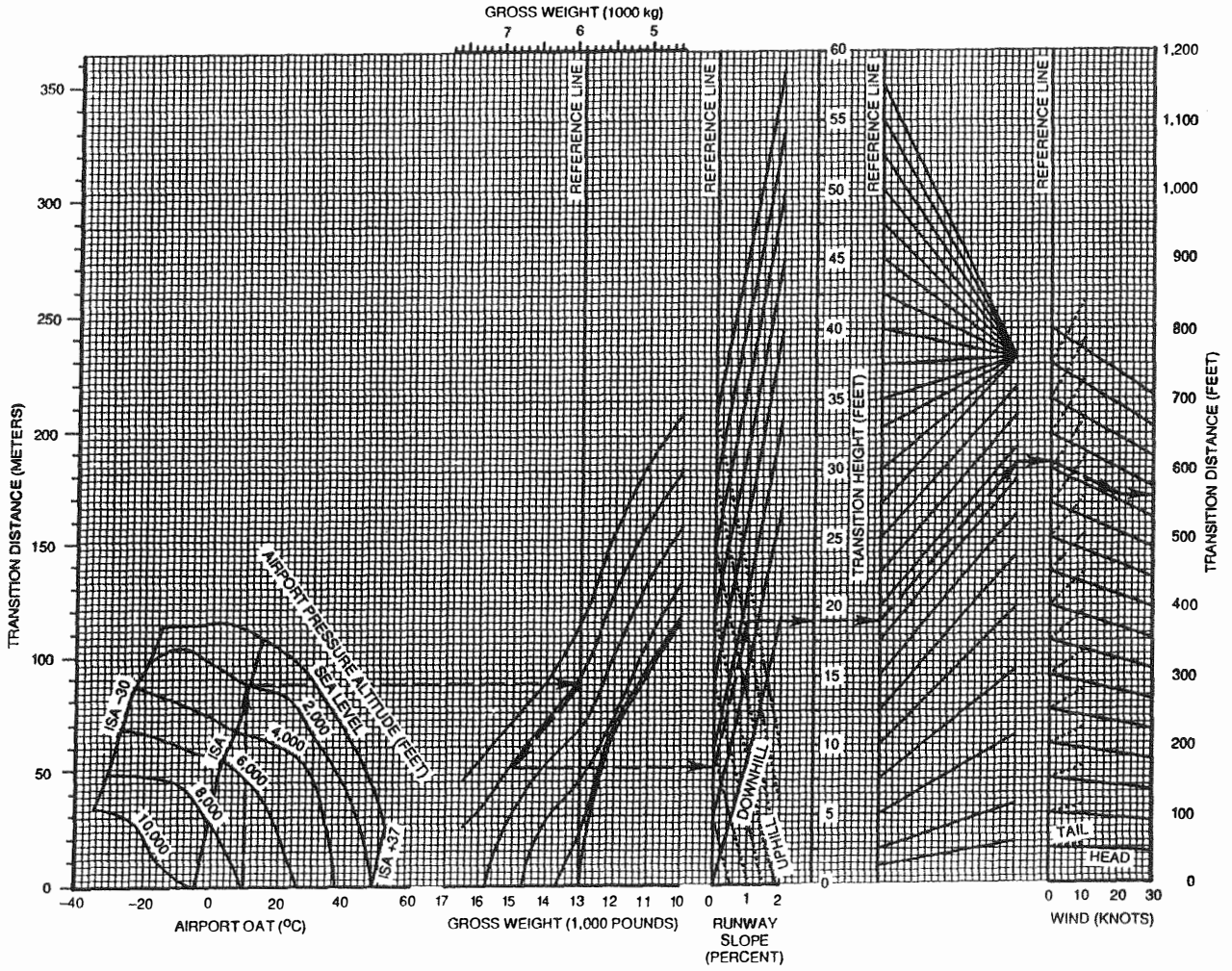


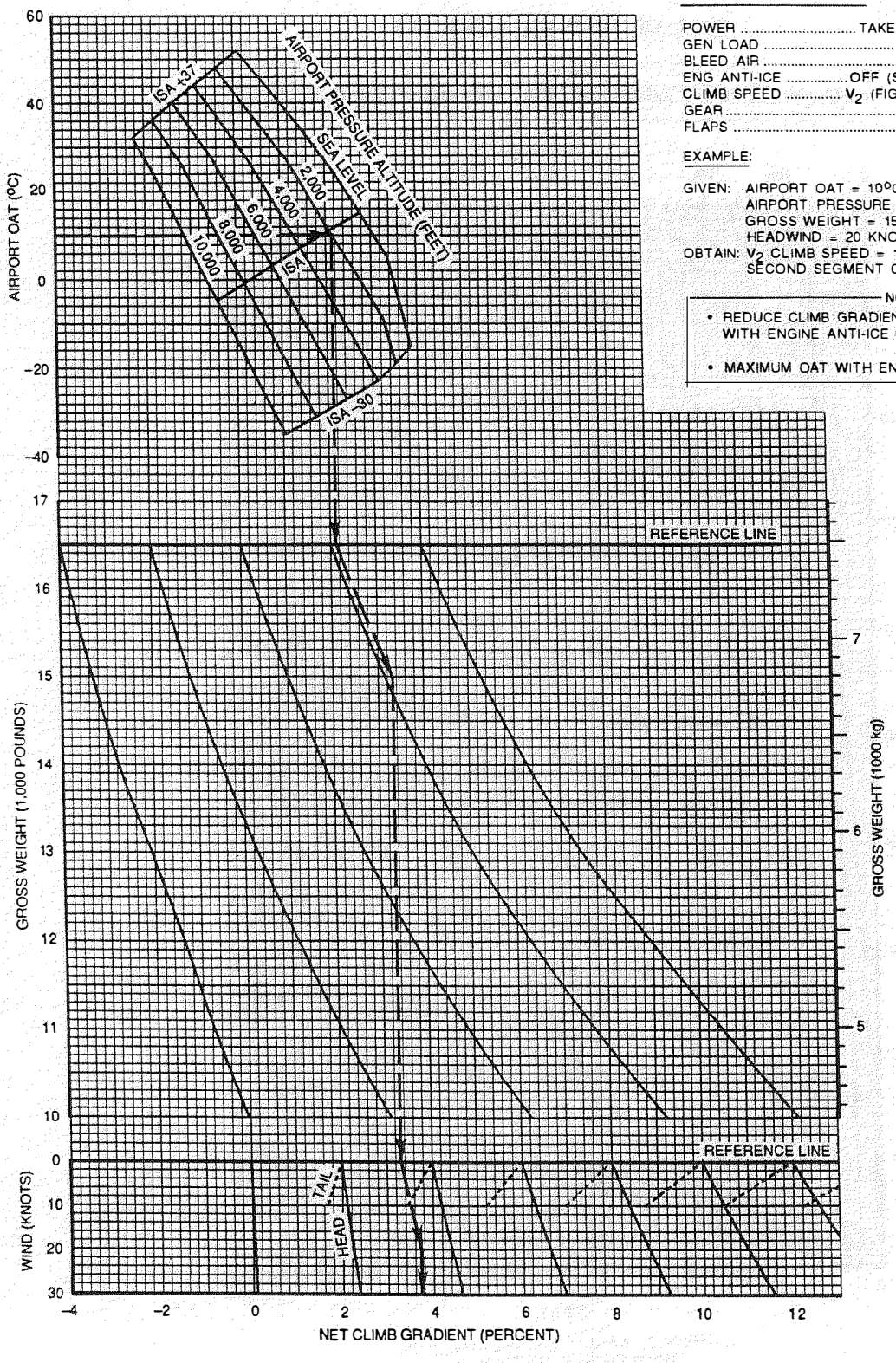
FIGURE 4D-7

PERFORMANCE

FAA APPROVED: AUG 23/91
Revised: JUN 23/93

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

SECOND SEGMENT CLIMB GRADIENT – DRY, BLEED AIR OFF



ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
CLIMB SPEED	V_2 (FIGURE 4D-3)
GEAR	UP
FLAPS	1/4

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS

OBTAIN: V_2 CLIMB SPEED = 116 KIAS
SECOND SEGMENT CLIMB GRADIENT = 3.75 PERCENT

NOTE

- REDUCE CLIMB GRADIENT BY 0.7 PERCENT GRADIENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4D-8

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
SECOND SEGMENT ACCELERATION DISTANCE – DRY, BLEED AIR OFF

ENGINE ANTI-ICE EFFECTS

NOTE
MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

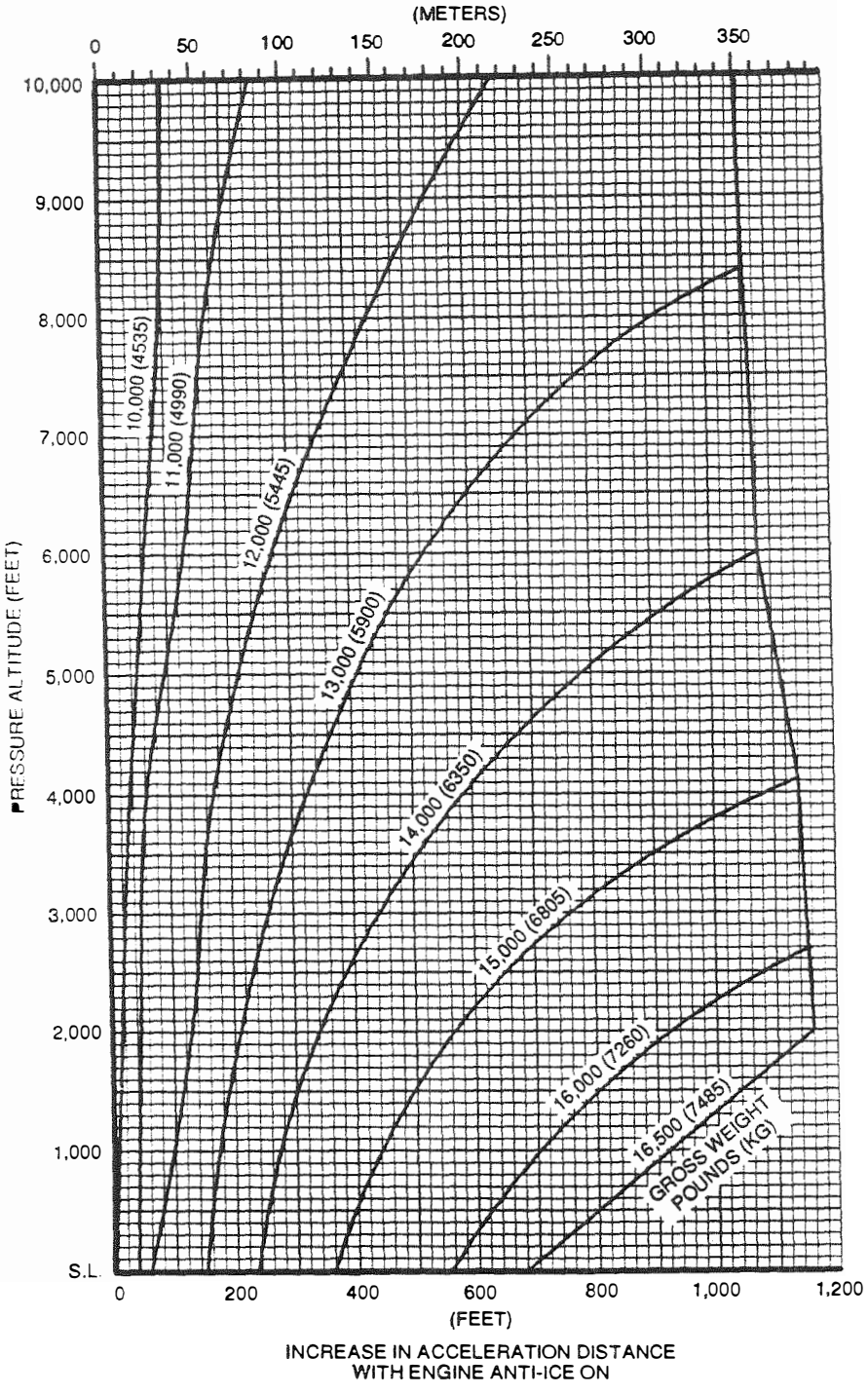


FIGURE 4D-9

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

SECOND SEGMENT ACCELERATION DISTANCE – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE GRAPH)
ACCELERATE TO V_{YSE} ..... FIGURE 4F-2
GEAR ..... UP
FLAPS ..... 1/4 (SEE NOTE)

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS
SECOND SEGMENT ACCELERATION DISTANCE = 4,625 FEET (1410 m)

NOTE

ACCELERATE TO THE LESSER OF V_2 +5 KIAS OR V_{YSE} PRIOR TO RAISING FLAPS.

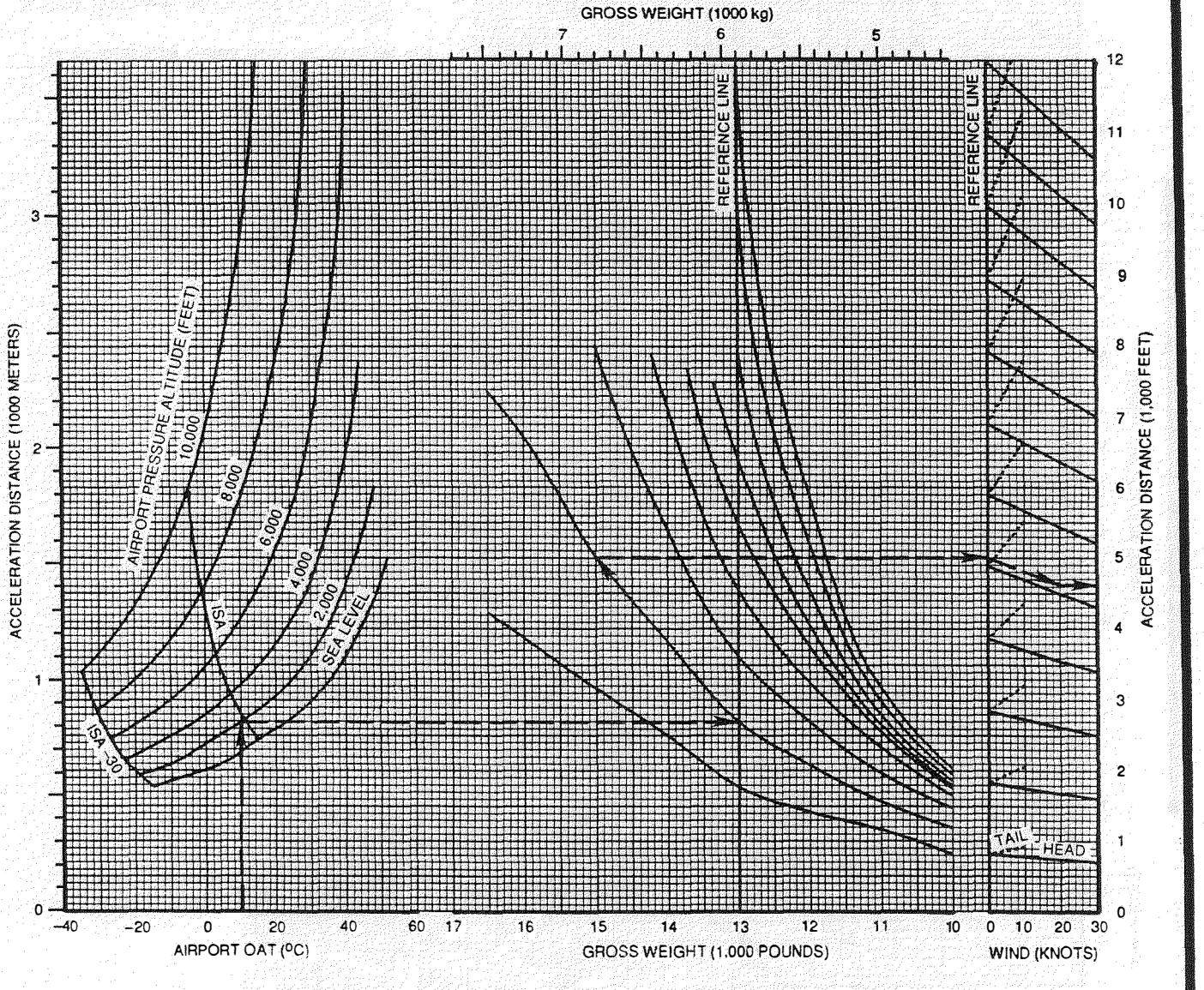
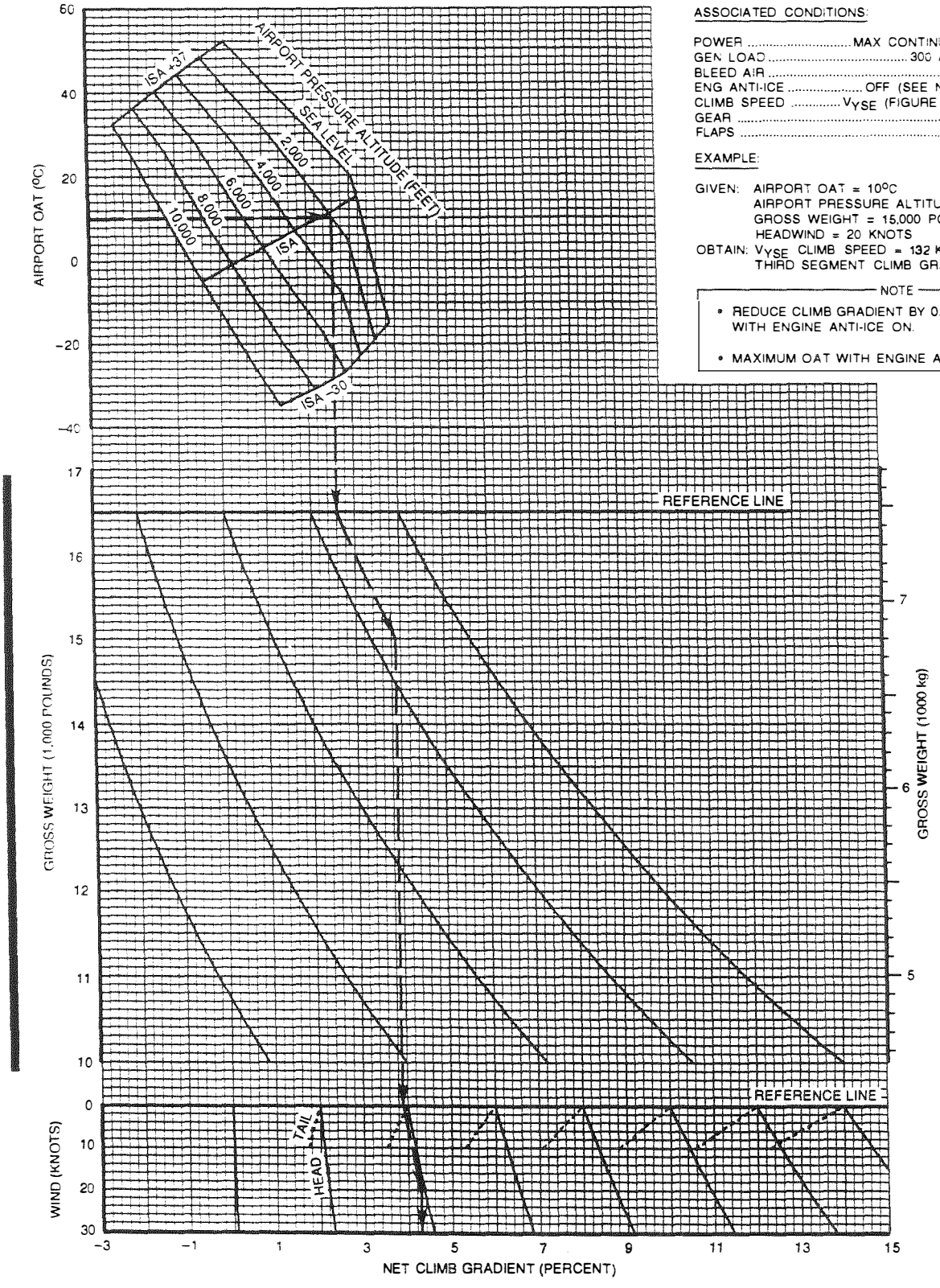


FIGURE 4D-9 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

THIRD SEGMENT CLIMB GRADIENT – DRY, BLEED AIR OFF



ASSOCIATED CONDITIONS:

POWER	MAX CONTINUOUS
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
CLIMB SPEED	V_{YSE} (FIGURE 4F-2)
GEAR	UP
FLAPS	UP

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS

OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS
THIRD SEGMENT CLIMB GRADIENT = 4.3 PERCENT

NOTE

- REDUCE CLIMB GRADIENT BY 0.8 PERCENT GRADIENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C

FIGURE 4D-10

TWO ENGINE RATE OF CLIMB AT V_{50} – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE .....OFF (SEE NOTE)
CLIMB SPEED ..... V_{50} (FIGURE 4D-3)
GEAR ..... UP
FLAPS 1/4

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 4,000 FEET
GROSS WEIGHT = 14,500 POUNDS (6580 kg)
OBTAIN: V_{50} CLIMB SPEED = 124 KIAS
RATE OF CLIMB = 2,310 FEET PER MINUTE

NOTE

- REDUCE RATE OF CLIMB BY 220 FEET PER MINUTE WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

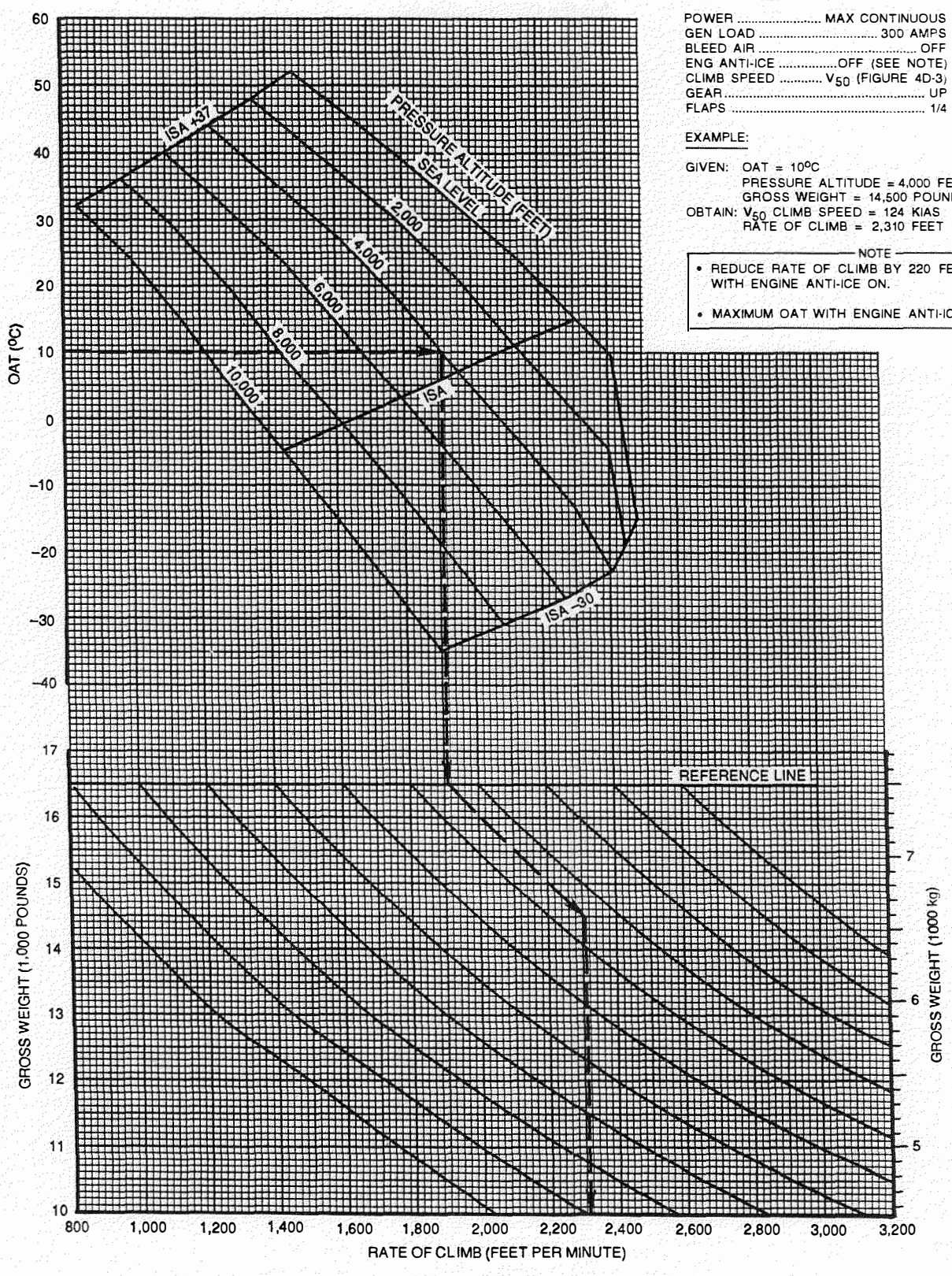


FIGURE 4D-11

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PART E – TAKEOFF PERFORMANCE
WET

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Two Engine Rate of Climb At V_{50}	4E-26

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TAKEOFF POWER CHECK CHART – WET

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
RPM 100%
MAX ALLOWABLE EGT ..... 650°C
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... SEE GRAPH
SPEED ..... 0 TO 50 KIAS

EXAMPLE:

GIVEN: OAT = 27°C
PRESSURE ALTITUDE = 5,000 FEET
ENGINE ANTI-ICE SYSTEM – OFF
OBTAIN: ENGINE TORQUE = 104.3 PERCENT

NOTE

- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- MINIMUM OAT FOR WET POWER OPERATION IS –6°C.

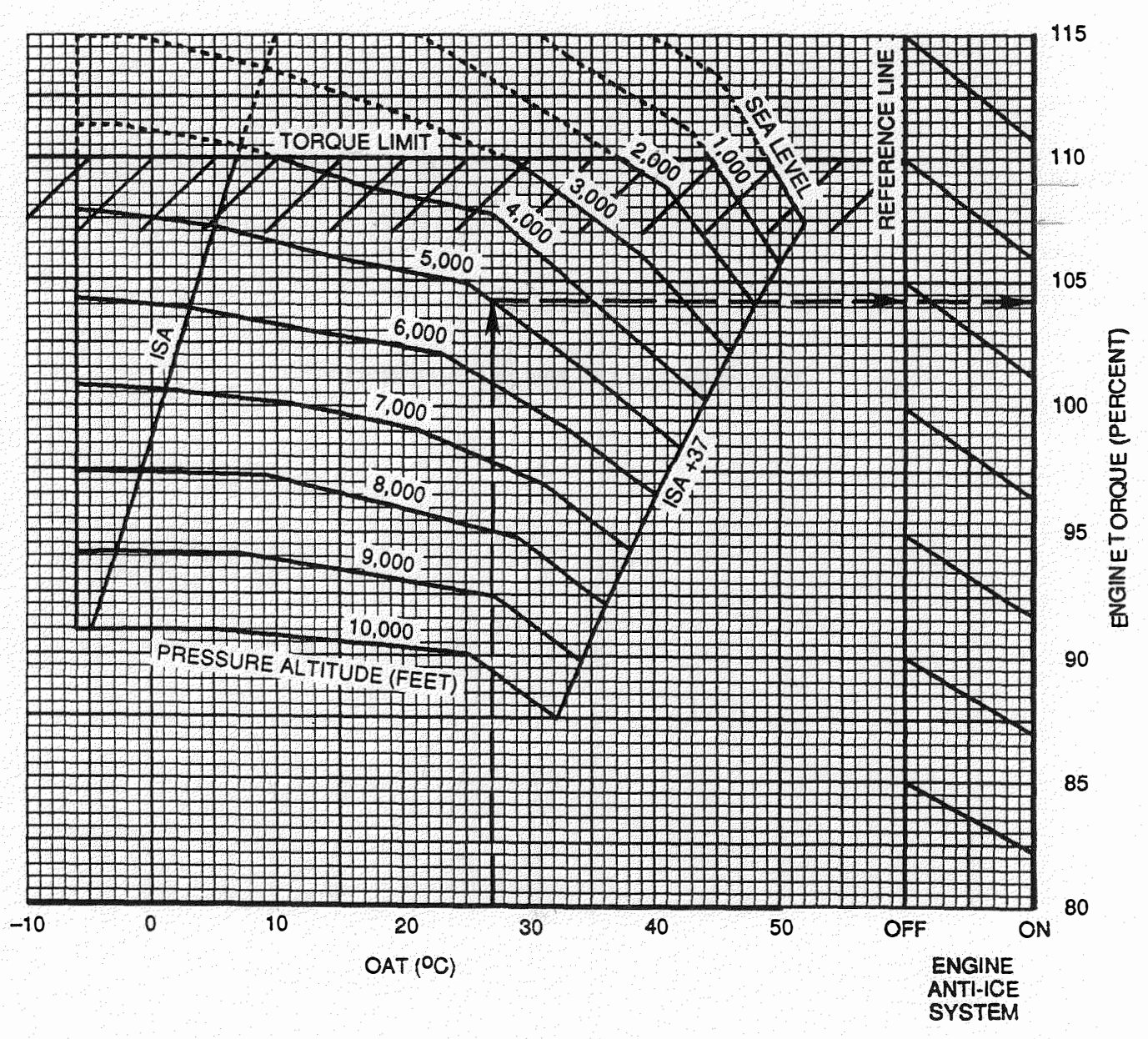


FIGURE 4E-1

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RESERVE POWER CHECK CHART

ASSOCIATED CONDITIONS:

POWER ..... MAX. CONT. (RES. PWR.)
RPM 100%
MAX ALLOWABLE EGT ..... 650°C
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... SEE GRAPH
SPEED ..... V_{YSE} (FIGURE 4F-2)

EXAMPLE:

GIVEN: OAT = 27°C
PRESSURE ALTITUDE = 5,500 FEET
ENGINE ANTI-ICE SYSTEM – OFF
OBTAIN: ENGINE TORQUE = 83.2 PERCENT

NOTE

- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- ADD 500 FEET TO THE AIRPORT PRESSURE ALTITUDE FOR THE START OF THE THIRD SEGMENT CLIMB BEFORE ENTERING CHART.

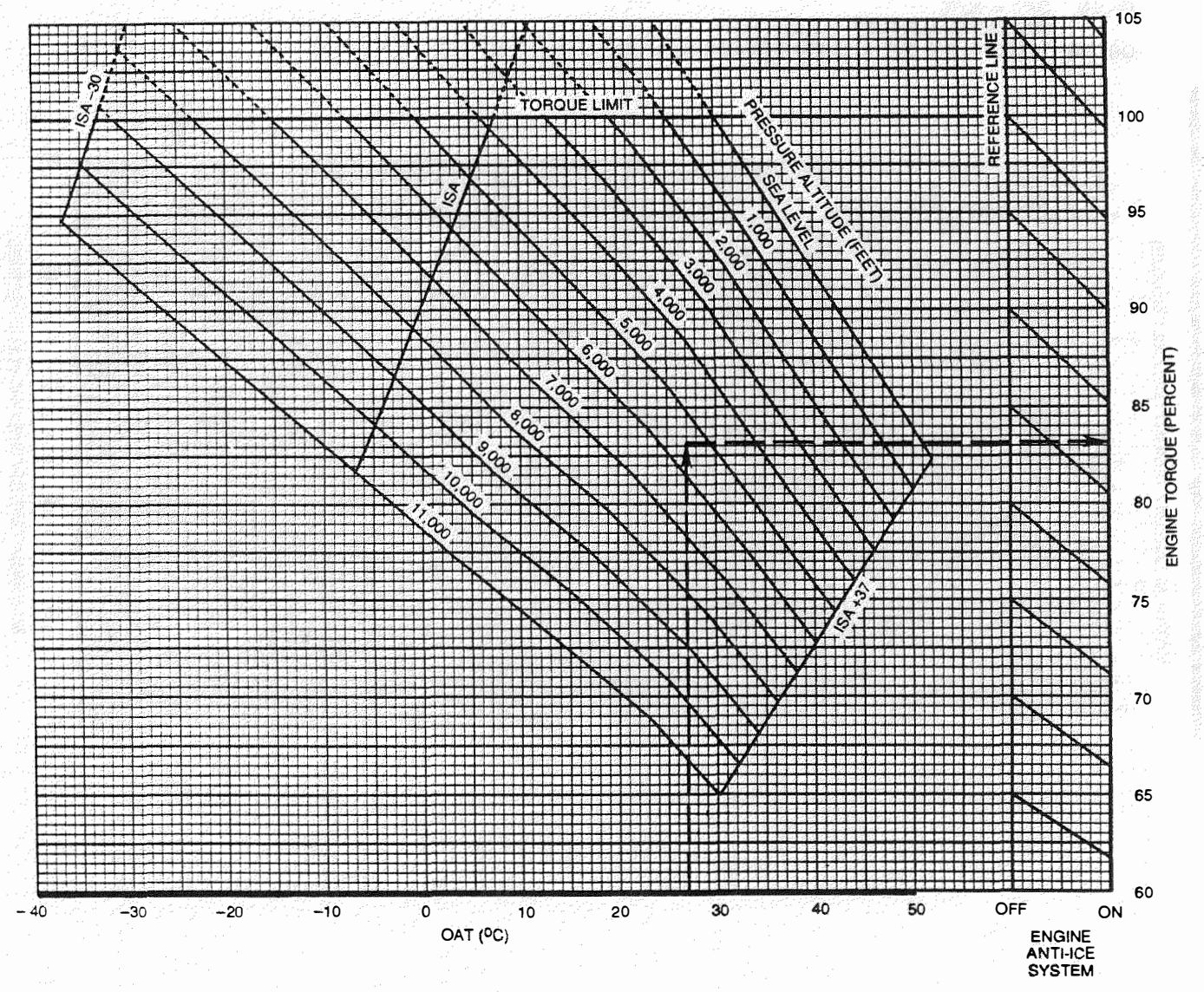


FIGURE 4E-2

MAXIMUM TAKEOFF WEIGHT LIMITATION CHART – WET

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
GEAR ..... DOWN (TAKEOFF)
UP (SECOND AND THIRD SEGMENT)
FLAPS ..... 1/4 (TAKEOFF)
UP (ENROUTE)

NOTE

- REDUCE TAKEOFF WEIGHT BY 345 POUNDS (155 kg) WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- THIS WEIGHT IS THE MAXIMUM AT WHICH TAKEOFF CAN BE CONTINUED AFTER AN ENGINE FAILURE IS RECOGNIZED AT OR ABOVE V_1.

EXAMPLE:

GIVEN: OAT = 32°C
PRESSURE ALTITUDE = 5,500 FEET
OBTAIN: TAKEOFF WEIGHT = 14,900 POUNDS (6760 kg)

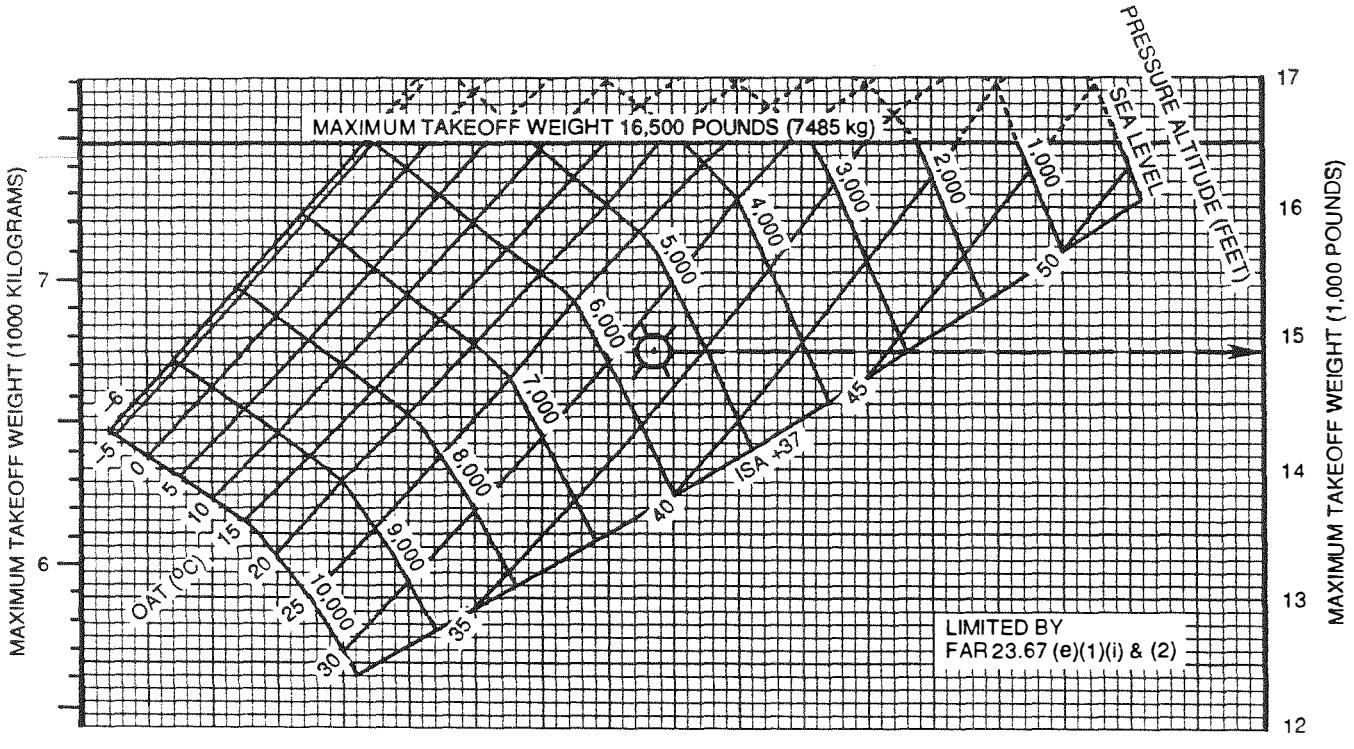


FIGURE 4E-3

MAXIMUM TAKEOFF WEIGHT LIMITATION CHART – WET WITH RESERVE POWER

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
GEAR ..... DOWN (TAKEOFF)
UP (SECOND AND THIRD SEGMENT)
FLAPS ..... 1/4 (TAKEOFF)
UP (ENROUTE)

NOTE

- REDUCE TAKEOFF WEIGHT BY 345 POUNDS (155 kg) WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- THIS WEIGHT IS THE MAXIMUM AT WHICH TAKEOFF CAN BE CONTINUED AFTER AN ENGINE FAILURE IS RECOGNIZED AT OR ABOVE V_1.

EXAMPLE:

GIVEN: OAT = 32°C
PRESSURE ALTITUDE = 5,500 FEET
OBTAIN: TAKEOFF WEIGHT = 15,120 POUNDS (6860 kg)

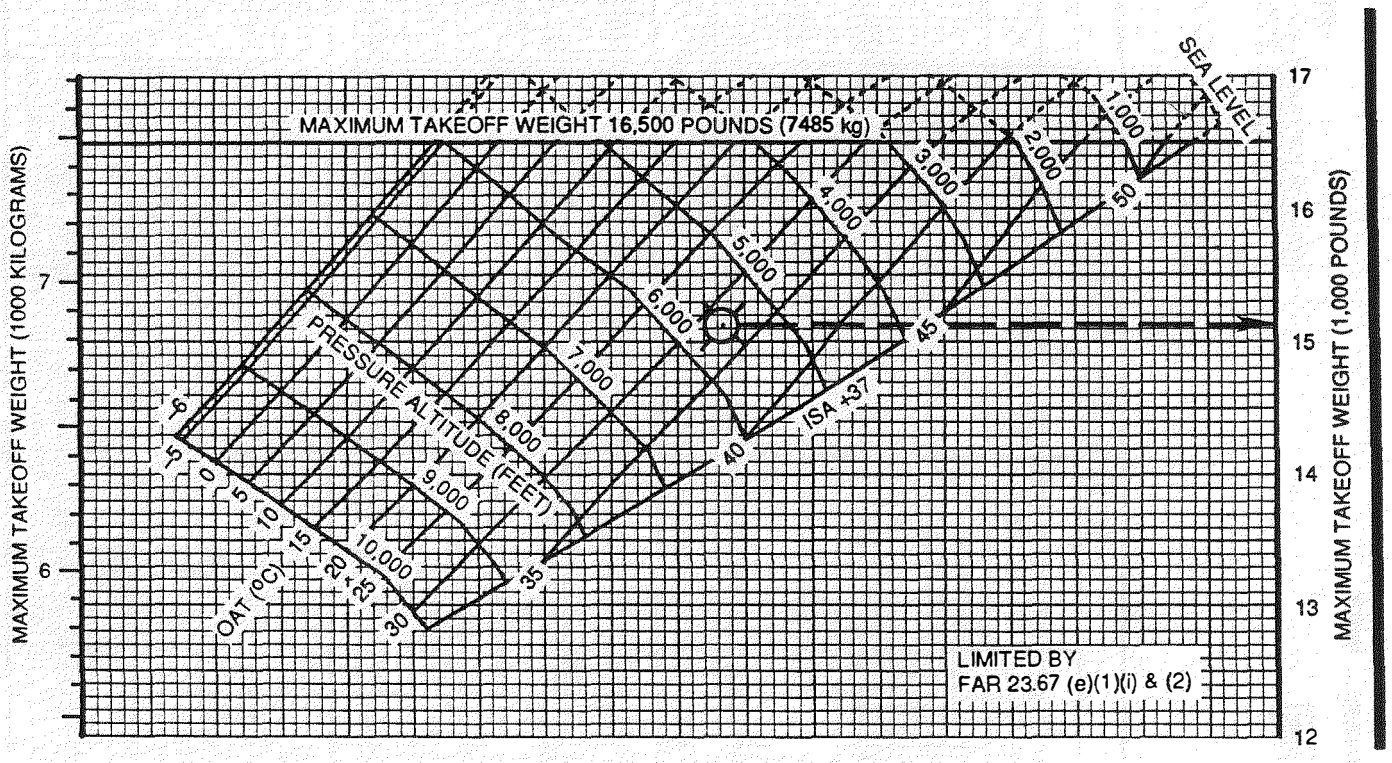


FIGURE 4E-4

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																									
		-6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	16500	117	117	121	131	118	118	121	131	118	118	121	131	118	118	121	130	119	119	121	130	119	119	121	130	120	120	121	130
	16000	115	115	120	129	115	115	120	129	116	116	120	129	116	116	120	129	117	117	120	129	117	117	120	129	118	118	120	129
	15500	112	112	118	128	113	113	118	128	113	113	118	128	114	114	118	128	114	114	118	127	115	115	118	127	115	115	118	127
	15000	110	110	116	127	110	110	116	127	111	111	116	126	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126
	14500	107	107	114	125	108	108	114	125	108	108	114	125	109	109	114	125	109	109	114	125	110	110	114	124	110	110	114	124
	14000	104	104	113	124	105	105	113	124	105	105	113	124	106	106	113	123	107	107	113	123	107	107	113	123	108	108	113	123
	13500	102	102	112	123	102	102	111	123	103	103	111	122	103	103	111	122	104	104	111	122	104	104	111	122	105	105	111	122
	13000	101	101	111	123	101	101	111	123	101	101	110	122	101	101	109	121	101	101	109	121	102	102	109	121	103	103	109	120
	12500	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	100	109	120	101	101	109	120
	12000	102	102	115	127	101	101	114	126	101	101	113	125	101	101	112	124	100	100	110	122	100	100	110	122	100	100	109	121
	11500	102	102	117	130	102	102	116	129	102	102	115	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122
	11000	103	103	118	132	103	103	118	131	102	102	117	130	102	102	115	128	102	102	114	127	101	101	113	126	101	101	112	124
	10500	103	103	120	134	103	103	119	133	103	103	119	132	103	103	118	131	102	102	116	129	102	102	115	128	101	101	114	126
	10000	103	103	121	136	103	103	121	135	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129
1000	16500	118	118	121	131	118	118	121	131	118	118	121	130	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130
	16000	115	115	120	129	116	116	120	129	116	116	120	129	117	117	120	129	117	117	120	129	117	117	120	129	118	118	120	128
	15500	113	113	118	128	113	113	118	128	114	114	118	128	114	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127
	15000	110	110	116	126	111	111	116	126	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	125
	14500	108	108	114	125	108	108	114	125	109	109	114	125	109	109	114	125	110	110	114	124	110	110	114	124	111	111	114	124
	14000	105	105	113	124	105	105	113	124	106	106	113	124	107	107	113	123	107	107	113	123	108	108	113	123	108	109	113	123
	13500	103	102	111	123	103	103	111	122	103	103	111	122	104	104	111	122	105	105	111	122	105	105	111	122	106	106	111	121
	13000	101	101	110	122	101	101	110	122	101	101	109	121	101	101	109	121	102	102	109	120	102	102	109	120	103	103	109	120
	12500	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	100	109	120	101	101	109	120	102	102	109	120
	12000	101	101	114	126	101	101	113	125	101	101	112	124	100	100	110	122	100	100	110	121	100	100	109	121	101	101	109	120
	11500	102	102	115	128	102	102	115	127	101	101	113	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	109	121
	11000	103	103	117	131	102	103	117	130	102	102	115	128	102	102	114	127	101	101	113	126	101	101	112	124	100	100	111	122
	10500	103	103	119	133	103	103	119	132	103	103	118	131	102	102	116	129	102	102	115	128	101	101	114	127	101	101	112	125
	10000	103	103	121	135	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129	102	102	114	127
2000	16500	118	118	121	131	118	118	121	130	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130	121	121	121	130
	16000	116	116	120	129	116	116	120	129	117	117	120	129	117	117	120	129	117	117	120	129	118	118	120	128	119	119	120	128
	15500	113	113	118	128	114	114	118	128	114	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127	116	116	118	127
	15000	111	111	116	126	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125
	14500	108	108	114	125	109	109	114	125	109	109	114	125	110	110	114	124	110	110	114	124	111	111	114	124	112	112	114	124
	14000	106	106	113	124	106	106	113	123	107	107	113	123	107	107	113	123	108	108	113	123	108	108	113	123	109	109	113	123
	13500	103	103	111	122	103	103	111	122	104	104	111	122	105	105	111	122	105	105	111	122	106	106	111	121	107	107	111	121
	13000	101	101	110	121	101	101	109	121	101	101	109	121	102	102	109	121	103	103	109	120	103	103	109	120	104	104	109	120
	12500	100	100	111	123	100	100	110	122	100	100	109	121	100	100	109	120	101	101	109	120	102	102	109	120	103	103	109	120
	12000	101	101	112	125	101	101	112	124	100	100	111	122	100	100	110	121	100	100	109	121	101	101	109	120	102	102	109	120
	11500	102	102	114	127	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	121	100	100	110	122	101	101	109	121
	11000	102	102	116	129	102	102	116	128	102	102	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	121
	10500	103	103	118	132	103	103	118	131	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	100	100	111	123
	10000	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129	102	102	115	128	101	101	113	125

FIGURE 4E-5

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
3000	16500	116	119	121	130	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130	121	121	121	130				
	16000	116	116	120	129	116	116	120	129	117	117	120	129	117	117	120	129	118	118	120	128	118	118	120	128	119	119	120	128
	15500	114	114	118	128	114	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127	116	116	118	127	117	117	118	127
	15000	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125	115	115	116	125
	14500	109	109	114	125	109	109	114	125	110	110	114	124	110	110	114	124	111	111	114	124	111	111	114	124	112	112	114	124
	14000	106	106	113	123	107	106	113	123	107	107	113	123	108	108	113	123	108	108	113	123	109	109	113	123	110	110	113	122
	13500	103	103	111	122	104	104	111	122	105	104	111	122	105	105	111	122	106	106	111	121	106	106	111	121	107	107	111	121
	13000	101	101	109	121	101	101	109	121	102	102	109	120	103	102	109	120	103	103	109	120	104	104	109	120	105	105	109	120
	12500	100	100	110	122	100	100	109	121	100	100	109	120	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120
	12000	101	100	111	123	100	100	111	123	100	100	110	121	100	100	109	121	101	101	109	120	102	102	109	120	103	103	109	120
	11500	101	101	113	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	121	102	102	109	120
	11000	102	102	115	128	102	102	114	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122	101	101	109	121
	10500	103	103	117	131	102	102	117	130	102	102	115	128	101	101	114	127	101	101	113	125	100	100	111	123	100	100	110	122
	10000	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129	102	102	115	128	101	101	113	126	100	100	112	124
4000	16500	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130	121	121	121	130								
	16000	117	117	120	129	117	117	120	129	117	117	120	129	118	118	120	128	118	118	120	128	119	119	120	128				
	15500	114	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127	116	116	118	127	117	117	118	127				
	15000	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125	114	114	116	125	115	115	116	125
	14500	109	109	114	125	110	110	114	125	110	110	114	124	111	111	114	124	111	111	114	124	112	112	114	124	113	113	114	124
	14000	107	107	113	123	107	107	113	123	108	108	113	123	108	108	113	123	109	109	113	123	110	110	113	122	110	110	113	122
	13500	104	104	111	122	104	104	111	122	105	105	111	122	106	106	111	121	106	106	111	121	107	107	111	121	108	108	111	121
	13000	101	101	109	121	102	102	109	121	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	120	105	105	109	119
	12500	100	100	109	121	100	100	109	120	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	119
	12000	100	100	110	122	100	100	110	122	100	100	109	121	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120
	11500	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	121	101	101	109	120	102	102	109	120
	11000	101	101	114	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	101	101	108	121
	10500	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	100	100	111	124	100	100	110	122	100	100	109	121
	10000	103	103	118	132	103	103	117	131	102	102	116	129	102	102	115	128	101	101	113	126	101	101	112	124	100	100	110	122
5000	16500	120	119	121	130	120	120	121	130	120	120	121	130																
	16000	117	117	120	129	117	117	120	129	118	118	120	128	118	118	120	128												
	15500	115	115	118	127	115	115	118	127	116	116	118	127	116	116	118	127	117	117	118	127								
	15000	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125	114	114	116	125	115	115	116	125				
	14500	110	110	114	124	110	110	114	124	111	111	114	124	111	111	114	124	112	112	114	124	113	113	114	124	113	113	114	123
	14000	107	107	113	123	108	108	113	123	108	108	113	123	109	109	113	123	110	110	113	122	110	110	113	122	111	111	113	122
	13500	105	105	111	122	105	105	111	122	106	106	111	121	106	106	111	121	107	107	111	121	108	108	111	121	109	109	111	121
	13000	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120	105	105	109	120	105	105	109	119	106	106	109	119
	12500	101	101	109	120	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	119	105	105	109	119
	12000	100	100	109	121	100	100	109	121	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120
	11500	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	121	101	101	109	120	102	102	109	120	103	103	109	120
	11000	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	101	100	109	121	101	101	109	121	102	102	109	120
	10500	102	102	115	127	101	101	114	126	101	101	113	125	100	100	111	123	100	100	110	122	100	100	110	121	101	101	109	121
	10000	102	102	117	130	102	102	116	129	102	102	115	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	121

FIGURE 4E-5 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE ANO ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLIO, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -8				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
6000	16500	120	120	121	130	120	120	121	130																				
	16000	118	118	120	128	118	118	120	128	119	119	120	128																
	15500	115	115	118	127	116	116	118	127	116	116	118	127	117	117	118	127	117	117	118	126								
	15000	113	113	116	126	113	113	116	126	114	114	116	125	114	114	116	125	115	115	116	125								
	14500	111	111	114	124	111	111	114	124	112	112	114	124	112	112	114	124	113	113	114	124	113	113	114	123				
	14000	108	108	113	123	109	109	113	123	109	109	113	123	110	110	113	122	110	110	113	122	111	111	113	122	112	112	113	122
	13500	106	106	111	121	106	106	111	121	107	107	111	121	107	107	111	121	108	108	111	121	108	108	111	121	109	109	111	120
	13000	103	103	109	120	103	103	109	120	104	104	109	120	105	105	109	120	105	105	109	120	106	106	109	119	107	107	109	119
	12500	102	102	109	120	102	102	109	120	103	103	109	120	103	103	109	119	104	104	109	119	105	105	109	119	105	105	109	119
	12000	101	101	109	120	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119
	11500	100	100	110	121	100	100	109	121	101	101	109	121	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	120
	11000	100	100	111	123	100	100	110	122	100	100	110	121	100	100	109	121	101	101	109	121	102	102	109	120	103	103	109	120
	10500	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	110	121	101	101	109	121	102	102	109	121
	10000	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121
7000	16500	121	121	121	130																								
	16000	118	118	120	128																								
	15500	116	116	118	127	116	116	118	127	117	117	118	127																
	15000	114	114	116	125	114	114	116	125	115	115	116	125	115	115	116	125												
	14500	111	111	114	124	112	112	114	124	112	112	114	124	113	113	114	124	113	113	114	123								
	14000	109	109	113	123	109	109	113	123	110	110	113	122	110	110	113	122	111	111	113	122	111	111	113	122				
	13500	106	106	111	121	107	107	111	121	107	107	111	121	108	108	111	121	108	108	111	121	109	109	111	120				
	13000	104	104	109	120	104	104	109	120	105	105	109	120	105	105	109	119	106	106	109	119	107	107	109	119				
	12500	102	102	109	120	103	103	109	120	103	103	109	119	104	104	109	119	105	105	109	119	105	105	109	119				
	12000	101	101	109	120	102	102	109	120	103	102	109	120	103	103	109	120	104	104	109	120	105	105	109	119				
	11500	101	100	109	121	101	101	109	121	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120				
	11000	100	100	110	122	100	100	109	121	101	101	109	121	101	101	109	121	102	102	109	120	103	103	109	120				
	10500	100	100	111	124	100	100	111	123	100	100	110	122	101	100	109	121	101	101	109	121	102	102	109	121				
	10000	101	101	113	126	101	101	113	125	100	100	112	124	100	100	111	123	100	100	110	122	101	101	110	121				
8000	16500	121	121	121	129																								
	16000	119	119	120	128																								
	15500	117	117	118	127																								
	15000	114	114	116	125	115	115	116	125	115	115	116	125																
	14500	112	112	114	124	112	112	114	124	113	113	114	123	113	113	114	123												
	14000	110	110	113	122	110	110	113	122	110	110	113	122	111	111	113	122	111	111	113	122								
	13500	107	107	111	121	107	107	111	121	108	108	111	121	108	108	111	121	109	109	111	120	110	110	111	120				
	13000	105	105	109	120	105	105	109	120	105	105	109	119	106	106	109	119	106	106	109	119	107	107	109	119				
	12500	103	103	109	120	104	104	109	119	104	104	109	119	105	105	109	119	105	105	109	119	106	106	109	119				
	12000	102	102	109	120	103	103	109	120	103	103	108	120	104	104	109	119	104	104	109	119	105	105	109	119				
	11500	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	104	104	109	119				
	11000	100	100	109	121	101	101	109	121	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120				
	10500	100	100	110	122	100	100	110	122	100	100	109	121	101	101	109	121	102	102	109	121	103	103	109	120				
	10000	100	100	112	124	100	100	111	123	100	100	110	122	100	100	110	121	101	101	110	121	101	101	110	121				

FIGURE 4E-5 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																											
		-6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
9000	16500	122	122	121	129																								
	16000	120	120	120	126																								
	15500	117	117	118	126																								
	15000	115	115	116	125																								
	14500	113	113	114	124	113	113	114	123	113	113	114	123																
	14000	110	110	113	122	111	111	113	122	111	111	113	122	111	112	113	122												
	13500	108	108	111	121	108	108	111	121	109	109	111	121	109	109	111	120	110	110	111	120								
	13000	105	105	109	120	106	106	109	119	106	106	109	119	107	107	109	119	107	107	109	119	108	108	109	119				
	12500	104	104	109	119	104	104	109	119	105	105	109	119	105	105	109	119	106	106	109	119	107	107	109	119				
	12000	103	103	109	120	103	103	109	120	104	104	109	119	104	105	109	119	105	105	109	119	106	106	109	119				
	11500	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120	104	104	109	120	105	105	109	119				
	11000	101	101	109	121	102	102	109	120	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120				
	10500	101	100	110	121	101	101	109	121	101	101	108	121	102	102	109	121	102	102	109	120	103	103	109	120				
	10000	100	100	111	123	100	100	110	122	100	100	110	121	101	101	110	121	101	101	110	121	102	102	110	121				
10000	16500	122	122	121	129																								
	16000	120	120	120	128																								
	15500	118	118	118	126																								
	15000	116	116	116	125																								
	14500	113	113	114	123																								
	14000	111	111	113	122	111	111	113	122	112	112	113	122																
	13500	109	109	111	121	109	109	111	120	109	109	111	120	110	110	111	120												
	13000	106	106	109	119	106	106	109	119	107	107	109	119	107	107	109	119	108	108	109	119								
	12500	105	105	109	119	105	105	109	119	105	105	109	119	106	106	109	119	107	107	109	119	107	107	109	118				
	12000	104	104	109	119	104	104	109	119	105	105	109	119	105	105	109	119	106	106	109	119	107	107	109	119				
	11500	103	103	109	120	103	103	109	120	104	104	109	120	104	104	109	119	105	105	109	119	106	106	109	119				
	11000	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	104	104	109	120	105	105	109	119				
	10500	101	101	109	121	101	101	109	121	102	102	109	121	103	103	109	120	103	103	109	120	104	104	109	120				
	10000	100	100	110	121	100	100	110	121	101	101	110	121	102	102	110	121	102	102	110	121	103	103	110	120				

FIGURE 4E-5 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -8				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}
S.L.	7487	117	117	121	131	118	118	121	131	118	118	121	131	118	118	121	130	119	119	121	130	119	119	121	130	120	120	121	130
	7200	114	114	119	129	114	114	119	129	115	115	119	129	115	115	119	129	116	116	119	128	116	116	119	128	117	117	119	128
	7000	112	112	118	128	112	112	118	128	113	113	118	128	113	113	118	127	114	114	118	127	114	114	118	127	115	115	118	127
	6800	110	110	116	127	110	110	116	127	111	111	116	126	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126
	6600	107	107	115	125	108	108	115	125	108	108	115	125	109	109	115	125	109	109	115	125	110	110	115	125	111	111	115	124
	6400	105	105	113	124	105	105	113	124	106	106	113	124	107	107	113	124	107	107	113	124	108	108	113	123	108	108	115	123
	6200	103	103	112	123	103	103	112	123	104	104	112	123	104	104	112	123	105	105	112	122	105	105	112	122	106	106	112	122
	6000	101	101	111	123	101	101	111	123	102	102	110	122	102	102	110	122	102	102	110	121	103	103	110	121	104	104	110	121
	5800	101	101	112	124	101	101	111	123	100	100	110	122	100	100	110	121	101	101	109	121	101	101	109	120	102	102	109	120
	5600	101	101	113	126	101	101	113	125	101	101	111	124	100	100	110	122	100	100	110	121	100	100	109	121	101	101	109	120
	5400	102	102	115	128	102	102	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121
	5200	102	102	117	130	102	102	116	129	102	102	115	127	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122
	5000	103	103	118	132	103	103	118	131	102	102	117	130	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124
	4800	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	130	102	102	116	129	102	102	115	128	101	101	113	126
	4600	103	103	121	135	103	103	120	135	103	103	120	134	104	103	119	132	103	103	118	131	102	102	117	130	102	102	115	128
1000	7487	118	118	121	131	118	118	121	131	118	118	121	130	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130
	7200	115	115	119	129	115	115	119	129	115	115	119	129	116	116	119	128	116	116	119	128	117	117	119	128	118	118	119	128
	7000	112	112	118	128	113	113	118	128	113	113	118	127	114	114	118	127	114	114	118	127	115	115	118	127	115	115	118	127
	6800	110	110	116	126	111	111	116	126	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	125
	6600	108	108	115	125	108	108	115	125	109	109	115	125	109	109	115	125	110	110	115	125	110	110	115	124	111	111	115	124
	6400	106	106	113	124	106	106	113	124	107	107	113	124	107	107	113	124	108	108	113	123	108	108	113	123	109	109	113	123
	6200	103	103	112	123	104	104	112	123	104	104	112	123	105	105	112	122	105	105	112	122	106	106	112	122	107	107	112	122
	6000	101	101	111	122	102	102	110	122	102	102	110	122	103	102	110	121	103	103	110	121	104	104	110	121	104	105	110	121
	5800	101	101	111	123	101	100	110	122	101	100	110	121	101	101	109	121	101	101	109	120	102	102	109	120	103	103	109	120
	5600	101	101	112	124	101	101	112	124	100	100	110	122	100	100	110	121	100	100	109	121	101	101	109	120	102	102	109	120
	5400	101	101	114	126	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	120
	5200	102	102	116	128	102	102	115	128	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	109	121
	5000	103	103	117	131	102	102	117	130	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124	100	100	111	122
	4800	103	103	119	133	103	103	118	132	103	103	117	130	102	102	116	129	102	102	115	128	101	101	114	126	101	101	112	124
	4600	103	103	120	134	103	103	120	134	103	103	119	132	103	103	118	131	102	102	117	130	102	102	116	129	101	101	114	126
2000	7487	118	118	121	131	118	118	121	130	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130	121	121	121	130
	7200	115	115	119	129	115	115	119	129	116	116	119	128	116	116	119	128	117	117	119	128	117	117	119	128	118	118	119	128
	7000	113	113	118	128	113	113	118	127	114	114	118	127	114	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127
	6800	111	111	116	126	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125
	6600	108	108	115	125	109	109	115	125	109	109	115	125	110	110	115	125	110	110	115	124	111	111	115	124	112	112	115	124
	6400	106	106	113	124	107	107	113	124	107	107	113	124	108	108	113	123	108	108	113	123	109	109	113	123	110	110	113	123
	6200	104	104	112	123	104	104	112	123	105	105	112	122	105	105	112	122	106	106	112	122	107	107	112	122	107	107	112	122
	6000	102	102	110	122	102	102	110	122	102	102	110	121	103	103	110	121	104	104	110	121	104	104	110	121	105	105	110	120
	5800	100	100	110	122	100	100	110	121	101	101	109	121	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120
	5600	100	100	111	123	100	100	111	122	100	100	110	121	100	100	109	121	101	101	109	120	101	101	109	120	102	102	109	120
	5400	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	121	101	101	109	120
	5200	102	102	114	127	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	110	121	101	101	109	121
	5000	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	121
	4800	103	103	118	131	103	103	117	131	102	102	116	129	102	102	115	128	101	101	114	126	101	101	112	125	100	100	111	123
	4600	103	103	119	133	103	103	119	133	103	103	118	131	102	102	117	130	102	102	116	128	102	102	114	127	101	101	112	125

FIGURE 4E-5 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
3000	7487	119	119	121	130	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130	121	121	121	130				
	7200	116	116	119	129	116	116	119	128	116	116	119	128	117	117	119	128	117	117	119	128	118	118	119	128	119	119	119	128
	7000	113	113	118	127	114	114	118	127	114	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127	117	117	118	126
	6800	111	111	116	126	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125	115	115	116	125
	6600	109	109	115	125	109	109	115	125	110	110	115	125	110	110	115	124	111	111	115	124	112	112	115	124	112	113	115	124
	6400	107	107	113	124	107	107	113	124	108	108	113	123	108	108	113	123	109	109	113	123	109	109	113	123	110	110	113	123
	6200	104	104	112	123	105	105	112	122	105	105	112	122	106	106	112	122	107	107	112	122	107	107	112	122	108	108	112	121
	6000	102	102	110	121	102	102	110	121	103	103	110	121	104	104	110	121	104	104	110	121	105	105	110	120	106	106	110	120
	5800	101	101	110	121	101	101	109	121	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120
	5600	100	100	110	122	100	100	110	121	100	100	109	121	101	101	109	120	101	101	109	120	102	102	109	120	103	103	109	120
	5400	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	121	101	101	109	120	102	102	109	120
	5200	101	101	113	126	101	101	113	125	100	100	111	123	100	100	110	122	100	100	110	121	101	101	109	121	101	101	109	120
	5000	102	102	115	128	102	101	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	101	101	109	121
	4800	102	103	117	130	102	102	116	129	102	102	115	128	101	101	114	126	101	101	113	125	100	100	111	123	100	100	110	122
	4600	103	103	119	132	103	103	118	131	102	102	117	130	102	102	116	128	101	101	114	127	101	101	113	125	100	100	111	123
4000	7487	119	119	121	130	119	119	121	130	120	120	121	130	120	120	121	130	121	121	121	130								
	7200	116	116	119	128	116	116	119	128	117	117	119	128	117	117	119	128	118	118	119	128	118	118	119	128				
	7000	114	114	118	127	114	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127	116	116	118	126				
	6800	112	112	116	126	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125	114	114	116	125	115	115	116	125
	6600	110	110	115	125	110	110	115	125	110	110	115	124	111	111	115	124	112	112	115	124	112	112	115	124	113	113	115	124
	6400	107	107	113	124	108	108	113	123	108	108	113	123	109	109	113	123	109	109	113	123	110	110	113	123	111	111	113	122
	6200	105	105	112	122	105	105	112	122	106	106	112	122	107	107	112	122	107	107	112	122	108	108	112	121	109	109	112	121
	6000	103	103	110	121	103	103	110	121	104	104	110	121	104	104	110	121	105	105	110	121	106	106	110	120	107	107	110	120
	5800	101	101	109	121	101	101	109	120	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120	105	105	109	119
	5600	100	100	109	121	100	100	109	121	101	101	109	120	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	119
	5400	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	120	101	101	109	120	102	102	109	120	103	103	109	120
	5200	101	101	112	124	100	100	111	124	100	100	110	122	100	100	110	121	101	101	109	121	101	101	109	120	102	102	109	120
	5000	101	101	114	126	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	101	101	109	121
	4800	102	102	116	129	102	102	115	128	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	109	121
	4600	103	103	118	131	102	102	117	130	102	102	116	128	101	101	114	127	101	101	113	125	100	100	111	123	100	100	110	122
5000	7487	120	119	121	130	120	120	121	130	120	120	121	130																
	7200	117	117	119	128	117	117	119	128	117	117	119	128	118	118	119	128	118	118	119	128								
	7000	115	114	118	127	115	115	118	127	115	115	118	127	116	116	118	127	116	116	118	126	117	117	118	126				
	6800	112	112	116	126	113	113	116	126	113	113	116	126	114	114	116	125	114	114	116	125	115	115	116	125				
	6600	110	110	115	125	111	111	115	124	111	111	115	124	112	112	115	124	112	112	115	124	113	113	115	124	114	114	115	124
	6400	108	108	113	123	108	108	113	123	109	109	113	123	109	109	113	123	110	110	113	123	111	111	113	123	112	111	113	122
	6200	106	106	112	122	106	106	112	122	107	107	112	122	107	107	112	122	108	108	112	121	109	109	112	121	109	109	112	121
	6000	103	103	110	121	104	104	110	121	104	104	110	121	105	105	110	121	106	106	110	120	108	106	110	120	107	107	110	120
	5800	102	101	109	120	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120	105	105	109	119	105	105	109	119
	5600	101	100	109	121	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	119	104	105	109	118
	5400	100	100	110	121	100	100	109	121	101	101	109	120	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	120
	5200	100	100	111	123	100	100	110	122	100	100	110	121	101	101	109	120	101	101	109	120	102	102	109	120	103	103	109	120
	5000	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	121	101	100	109	121	101	101	109	121	102	102	109	120
	4800	101	102	114	127	101	101	114	126	101	101	112	124	100	100	111	123	100	100	110	122	101	101	110	121	101	101	109	121
	4600	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	101	100	112	124	100	100	110	122	100	100	109	121

FIGURE 4E-5 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}	V_1	V_R	V_2	V_{SO}
6000	7487	120	120	121	130	120	120	121	130																				
	7200	117	117	119	128	117	117	119	128	118	118	119	128	118	118	119	128												
	7000	115	115	118	127	115	115	118	127	116	116	118	127	116	116	118	126	117	117	118	126								
	6800	113	113	116	126	113	113	116	126	114	114	116	125	114	114	116	125	115	115	116	125								
	6600	111	111	115	124	111	111	115	124	112	112	115	124	112	112	115	124	113	113	115	124	114	114	115	124				
	6400	109	109	113	123	109	109	113	123	110	110	113	123	110	110	113	123	111	111	113	122	111	111	113	122	112	112	113	122
	6200	106	106	112	122	107	107	112	122	107	107	112	122	108	108	112	121	109	109	112	121	109	109	112	121	110	110	112	121
	6000	104	104	110	121	105	105	110	121	105	105	110	120	106	106	110	120	106	106	110	120	107	107	110	120	108	108	110	120
	5800	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120	105	105	109	119	105	105	109	119	106	106	109	119
	5600	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	119	104	104	109	119	105	105	109	119
	5400	100	100	109	121	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	104	104	109	119
	5200	100	100	110	121	100	100	109	121	101	101	109	121	101	101	109	120	102	102	109	120	103	103	109	120	104	104	109	120
	5000	100	100	111	123	100	100	110	122	100	100	110	121	100	100	109	121	101	101	109	121	102	102	109	120	103	103	109	120
	4800	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	110	121	101	101	109	121	102	102	109	120
	4600	102	102	115	127	101	101	114	126	101	101	112	125	100	100	111	124	100	100	110	122	100	100	110	121	101	101	109	121
7000	7487	121	121	121	130																								
	7200	118	118	119	128	118	118	119	128																				
	7000	116	116	118	127	116	116	118	126	117	117	118	126																
	6800	114	114	116	125	114	114	116	125	115	115	116	125	115	115	116	125												
	6600	112	112	115	124	112	112	115	124	112	112	115	124	113	113	115	124	113	113	115	124								
	6400	109	109	113	123	110	110	113	123	110	110	113	123	111	111	113	123	111	111	113	122	112	112	113	122				
	6200	107	107	112	122	108	108	112	122	108	108	112	121	109	109	112	121	109	109	112	121	110	110	112	121				
	6000	105	105	110	120	105	105	110	120	106	106	110	120	106	106	110	120	107	107	110	120	108	108	110	120				
	5800	103	103	109	120	104	104	109	120	104	104	109	120	105	105	109	119	105	105	109	119	106	106	109	119				
	5600	102	102	109	120	102	103	109	120	103	103	109	120	104	104	109	119	104	104	109	119	105	105	109	119				
	5400	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	104	104	109	119				
	5200	101	100	109	121	101	101	109	121	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120				
	5000	100	100	110	122	100	100	109	121	101	101	109	121	101	101	109	121	102	102	109	120	103	103	109	120				
	4800	100	100	111	123	100	100	111	122	100	100	110	122	101	100	109	121	101	101	109	121	102	102	109	120				
	4600	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	110	121	101	101	110	121				
8000	7487	121	121	121	129																								
	7200	119	119	119	128																								
	7000	118	118	118	126																								
	6800	114	114	116	125	115	115	116	125	115	115	116	125																
	6600	112	112	115	124	113	113	115	124	113	113	115	124	113	113	115	124												
	6400	110	110	113	123	110	110	113	123	111	111	113	122	111	111	113	122	112	112	113	122								
	6200	108	108	112	121	108	108	112	121	109	109	112	121	109	109	112	121	110	110	112	121	110	110	112	121				
	6000	106	106	110	120	106	106	110	120	107	107	110	120	107	107	110	120	108	108	110	120	108	108	110	120				
	5800	104	104	109	120	104	104	109	120	105	105	109	119	105	105	109	119	106	106	109	119	107	107	109	119				
	5600	103	103	109	120	103	103	109	120	104	104	109	119	104	104	109	119	105	105	109	119	106	106	109	119				
	5400	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120	104	104	109	119	105	105	109	119				
	5200	101	101	109	120	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	104	104	109	119				
	5000	100	100	109	121	101	101	109	121	101	101	109	121	102	102	109	120	103	103	109	120	104	104	109	120				
	4800	100	100	110	122	100	100	110	121	101	101	109	121	101	101	109	121	102	102	109	121	103	103	109	120				
	4600	100	100	111	124	100	100	111	123	100	100	110	122	100	100	110	121	101	101	110	121	102	102	110	121				

FIGURE 4E-5 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
9000	7487	122	122	121	129																								
	7200	119	119	119	127																								
	7000	117	117	118	126																								
	6800	115	115	116	125																								
	6600	113	113	115	124	113	113	115	124	114	114	115	123																
	6400	111	111	113	122	111	111	113	122	112	112	113	122	112	112	113	122												
	6200	109	109	112	121	109	109	112	121	109	109	112	121	110	110	112	121	110	110	112	121								
	6000	106	106	110	120	107	107	110	120	107	107	110	120	108	108	110	120	108	108	110	120	109	109	110	119				
	5800	105	105	109	119	105	105	109	119	106	106	109	119	106	106	109	119	107	107	109	119	107	107	109	119				
	5600	104	104	109	119	104	104	109	119	105	105	109	119	105	105	109	119	106	106	109	119	106	106	109	119				
	5400	103	103	109	120	103	103	109	120	104	104	109	120	104	104	109	119	105	105	109	119	106	106	109	119				
	5200	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120	104	104	109	120	105	105	109	119				
	5000	101	101	109	121	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	104	104	109	120				
	4800	101	100	109	121	101	101	109	121	101	101	109	121	102	102	109	121	103	103	109	120	104	103	109	120				
	4600	100	100	110	122	100	100	110	122	101	100	110	121	101	101	110	121	102	102	110	121	103	103	110	120				
10000	7487	122	122	121	129																								
	7200	120	120	119	127																								
	7000	118	118	118	126																								
	6800	116	116	116	125																								
	6600	114	114	115	123																								
	6400	111	111	113	122	112	112	113	122																				
	6200	109	109	112	121	110	110	112	121	110	110	112	121	111	111	112	121												
	6000	107	107	110	120	107	107	110	120	108	108	110	120	108	108	110	120	109	109	110	119								
	5800	105	105	109	119	106	106	109	119	106	106	109	119	107	107	109	119	107	107	109	119	108	108	109	118				
	5600	104	104	109	119	105	105	109	119	105	105	109	119	106	106	109	119	106	106	109	119	107	107	109	118				
	5400	104	104	109	120	104	104	109	119	105	105	109	119	105	105	109	119	106	106	109	119	106	106	109	119				
	5200	103	103	109	120	103	103	109	120	104	104	109	120	104	104	109	120	105	105	109	119	106	106	109	119				
	5000	102	102	109	120	102	102	109	120	103	103	109	120	104	104	109	120	104	104	109	120	105	105	109	119				
	4800	101	101	109	121	102	102	109	121	102	102	109	120	103	103	109	120	103	103	109	120	104	104	109	120				
	4600	100	100	110	121	101	101	110	121	101	101	110	121	102	102	110	121	103	103	110	120	103	103	110	120				

FIGURE 4E-5 (continued)

DISTANCE TO ACCELERATE TO V_1 AND STOP – WET

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4E-5)
NOSE WHEEL STEERING .... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 112 KIAS
ACCELERATE - STOP DISTANCE = 4,220 FEET (1285 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 0.7 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

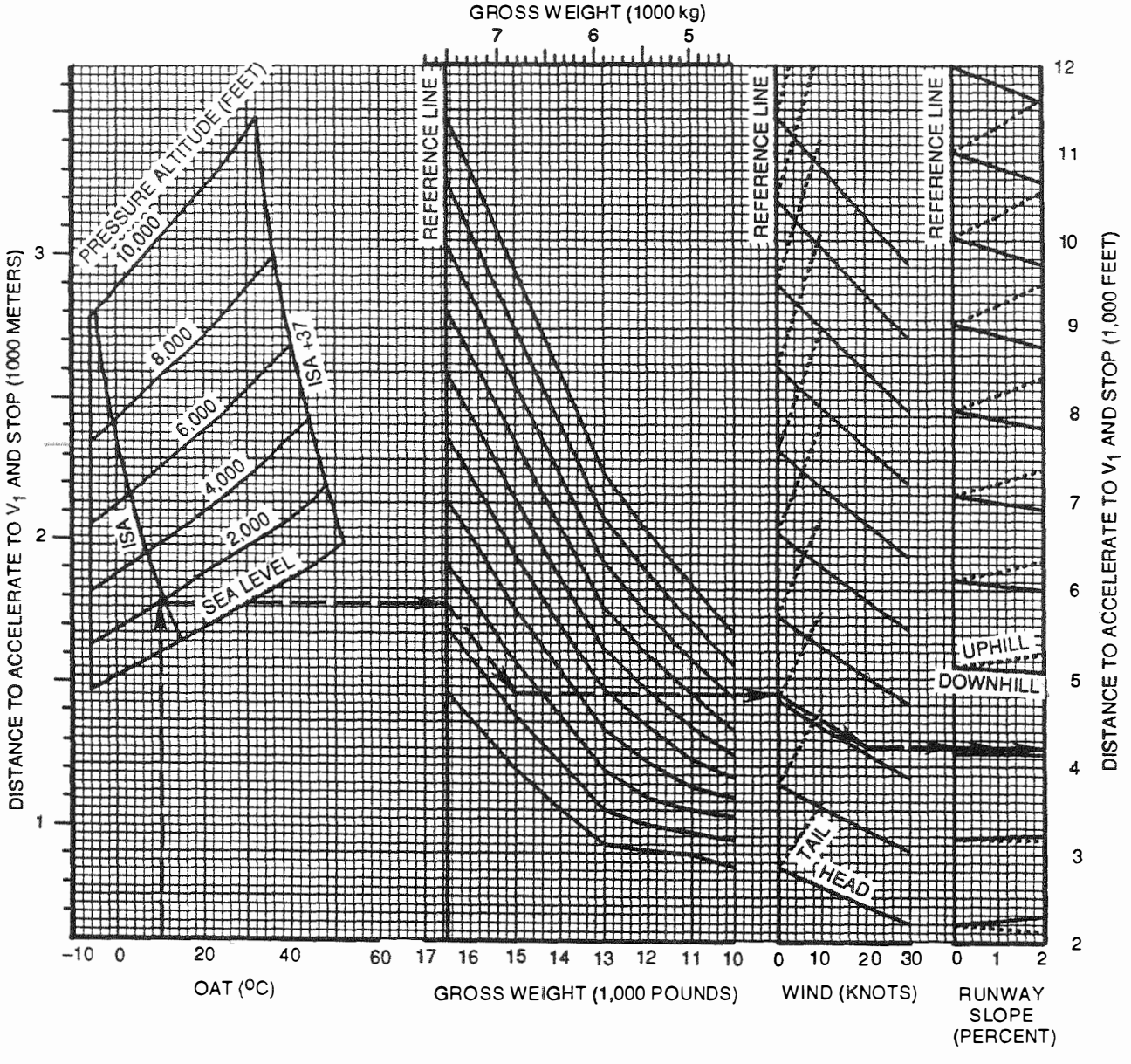


FIGURE 4E-6

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – WET

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4E-5
V_R SPEED	FIGURE 4E-5
V_2 SPEED	FIGURE 4E-5
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4.

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)

OBTAIN: V_1 SPEED = 112 KIAS
V_R SPEED = 112 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 4,950 FEET (1510 m)

NOTE

- INCREASE TAKEOFF DISTANCE BY 2.4 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

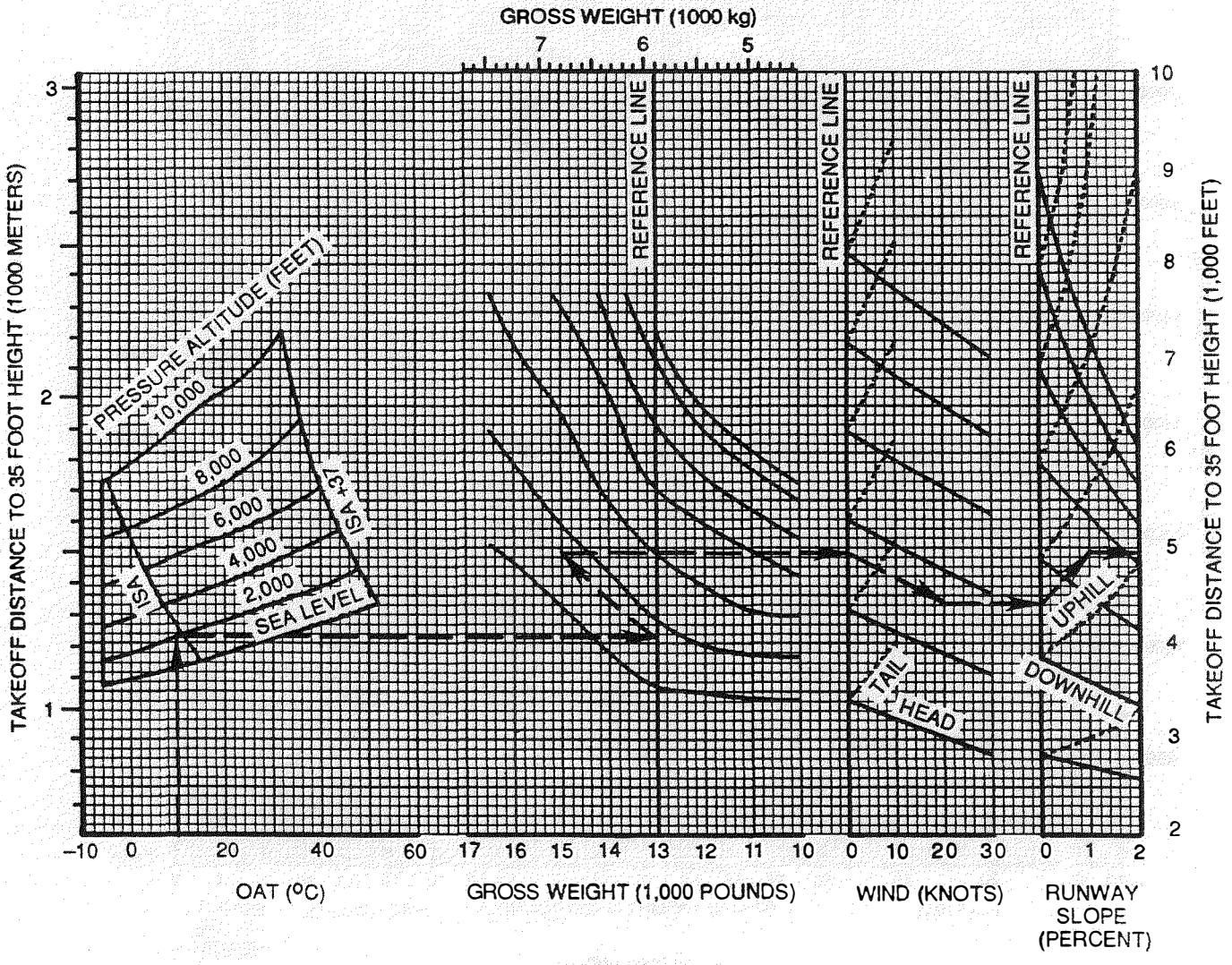


FIGURE 4E-7
PERFORMANCE

SINGLE ENGINE TAKEOFF RUN DISTANCE – WET

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4E-5
V_R SPEED	FIGURE 4E-5
V_2 SPEED	FIGURE 4E-5
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4.

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)

OBTAIN: V_1 SPEED = 112 KIAS
V_R SPEED = 112 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 4,400 FEET (1340 m)

NOTE

- INCREASE TAKEOFF DISTANCE BY 1.8 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

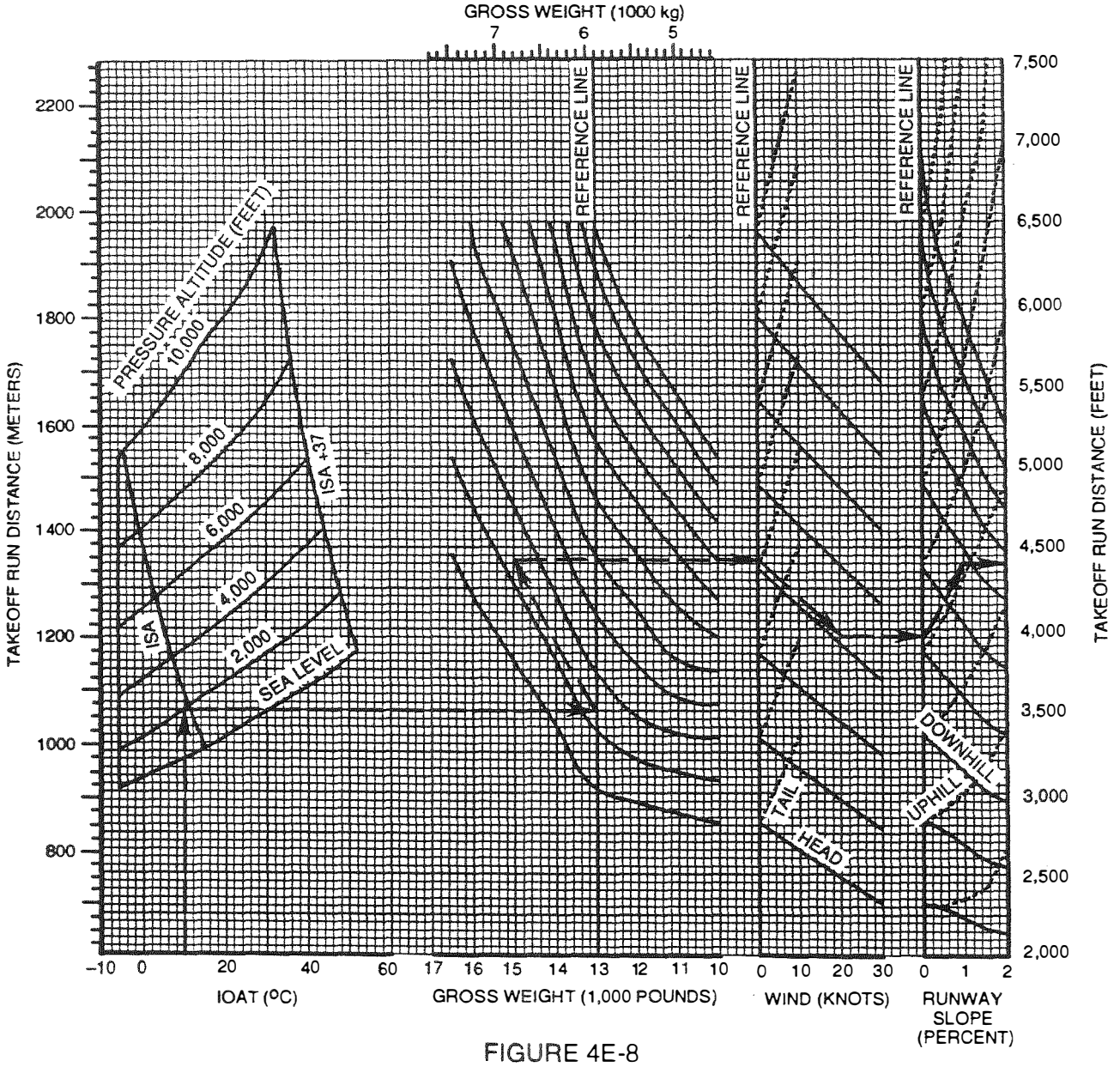


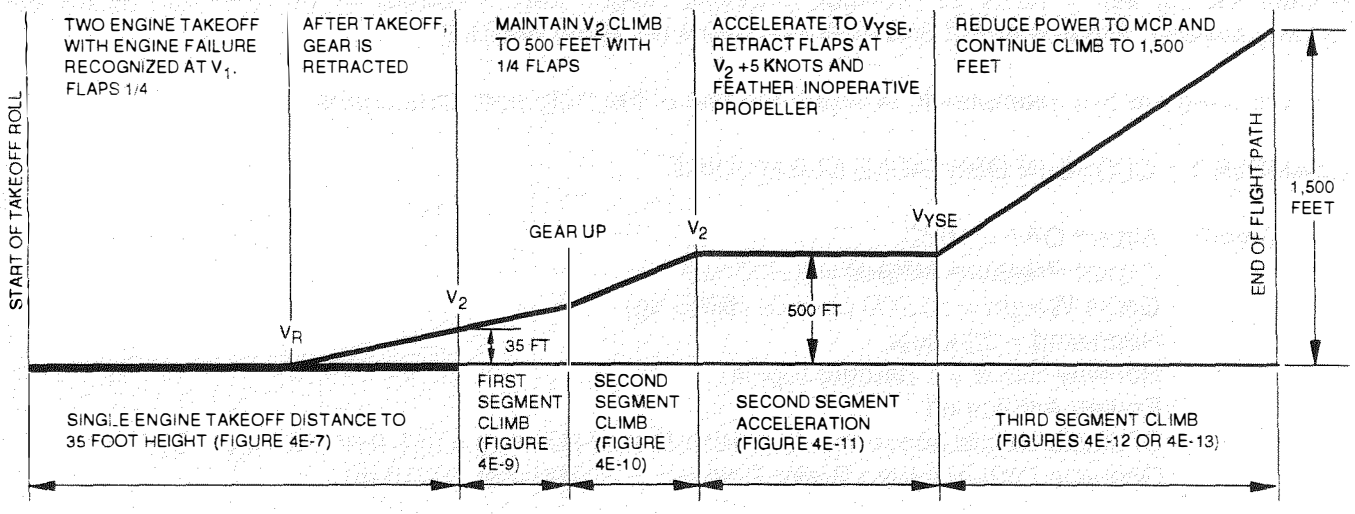
FIGURE 4E-8

PERFORMANCE

FAA APPROVED: DEC 31/91
Revised: MAR 29/94

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – WET

An estimate of the horizontal distance required to clear an obstacle up to 1,500 feet above the runway, or the required climb gradient to clear an obstacle along the takeoff flight path, may be obtained by using Figures 4E-7 and 4E-9 through 4E-13. The takeoff flight path is as follows:



The takeoff flight path consists of five phases defined as follows:

1. SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT (FIGURE 4E-7).

Both engines are assumed to operate normally to speed V_1 where one engine is recognized as failed and the takeoff is continued on one engine. This phase ends when the airplane reaches 35 feet above the runway surface at V_2.

2. FIRST SEGMENT CLIMB HEIGHT AND DISTANCE (FIGURE 4E-9)

The first segment climb is a constant V_2 climb starting at a height of 35 feet above the runway surface and ends at the point at which the landing gear is fully retracted, with flaps at 1/4 and the propeller on the inoperative engine windmilling in the NTS mode.

3. SECOND SEGMENT CLIMB (FIGURES 4E-10).

The second segment climb is a constant V_2 climb starting at a point of gear retraction or 35 feet above the runway surface and ends at a pressure height of 500 feet above the runway. The landing gear is fully retracted at the start of this phase, flaps remain at 1/4, and the propeller on the inoperative engine is windmilling in the NTS mode. Figure 4E-10 presents net climb gradient.

4. SECOND SEGMENT ACCELERATION (FIGURE 4E-11).

This phase is an acceleration at 500 feet pressure height from V_2 to V_{YSE}. The flaps are retracted at V_2 +5 knots, the propeller on the inoperative engine is feathered, and takeoff power is maintained until V_{YSE} is obtained.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – WET (continued)

5. THIRD SEGMENT CLIMB (FIGURES 4E-12 or 4E-13).

The third segment climb is at V_{YSE} with maximum continuous power (Figure 4E-12) or reserve power (Figure 4E-13) set. It starts at 500 feet, pressure height, and is completed at 1500 feet above the runway surface. Figures 4E-12 and 4E-13 presents net climb gradient.

The following are two examples to illustrate the use of the flight path data charts.

EXAMPLE 1 – CLOSE-IN OBSTACLE CLEARANCE

Given: Airport OAT = 10°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (uphill)
Engine Anti-ice off
Obstacle Height above the Approach End of Runway = 350 feet (107 meters)
Obstacle Distance from Brake Release = 20,700 feet (6310 m)

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4E-7) = 4,950 feet (1510 meters).

2. The obstacle height correction for runway slope is 4,950 x 1.0/100 = 50 feet.

3. Obstacle horizontal distance from the 35 foot height point equals the total obstacle distance minus the distance to 35 feet height. 20,700 – 4,950 = 15,750 feet (4800 meters).

4. First Segment Climb Height and Distance (Figure 4E-9) obtain 70 feet to climb 2 feet.

5. Obstacle horizontal distance from the end of the first segment is 15,750 – 70 = 15,680 feet (4780 meters).

6. Second Segment Climb Gradient (Figure 4E-10) = 4.3 percent.

7. The required second segment climb gradient to clear the obstacle by 35 feet is computed as follows: Incremental height required is the obstacle height minus the first segment climb height (350 – 50 – 2 = 298 feet). The required gradient is then:

$$\frac{\text{incremental height}}{\text{obstacle horizontal distance}} \times 100 = \frac{298}{15{,}680} \times 100 = 1.9 \text{ percent.}$$

Since the required gradient is less than the actual gradient, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – WET (continued)

EXAMPLE 2 – DISTANT OBSTACLE CLEARANCE

Given: Airport OAT = 10°C
Airport Pressure Altitude = 2000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (uphill)
Engine Anti-ice off
Obstacle Height above the Approach End of Runway = 700 feet (213 meters)
Obstacle Distance from Brake Release = 46,600 feet (14205 meters)

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4E-7) = 4,950 feet (1510 meters).
2. The obstacle height correction for runway slope is 4,950 X 1.0/100 = 50 feet.
3. First Segment Climb Height and Distance (Figure 4E-9) obtain 70 feet to climb 2 feet.
4. Second Segment Climb Gradient (Figure 4E-10) = 4.3 percent.
5. Second Segment Distance to climb to 500 feet, pressure height, is computed as follows: Incremental height = 500 – 50 – 2 = 448 feet. Second segment distance = (448 feet/4.3 percent) x 100 = 10,419 feet (3175 meters).

NOTE

When there is a large difference between the standard OAT and airport OAT, the 500 foot pressure height should be corrected to actual height as follows:

$$\text{Actual height} = \frac{Ta}{Ts} \times 500$$

Ta = Mid altitude actual absolute temperature (°K)
Ts = Mid altitude standard absolute temperature (°K)

6. Second Segment Acceleration Distance (Figure 4E-11) = 3,750 feet (1145 meters) to accelerate from V_2 to V_{YSE} at 500 feet.
7. Obstacle horizontal distance from the end of the second segment is 46,600 – 4,950 – 70 – 10,419 – 3,750 = 27,411 feet (8355 meters).
8. Final Segment Climb Gradient without reserve power (Figure 4E-12) = 4.3 percent or with reserve power (Figure 4E-13) = 4.5 percent.
9. The required third segment climb gradient to clear the obstacle by 35 feet is computed as follows: Incremental height required is the obstacle height minus 500 feet (700 – 500) = 200 feet. The required gradient is then:

$$\frac{\text{incremental height}}{\text{obstacle horizontal distance}} \times 100 = \frac{200}{27{,}411} \times 100 = 0.73 \text{ percent}$$

Since the required gradient is less than the actual gradient, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

FIRST SEGMENT CLIMB HEIGHT AND DISTANCE – WET

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	ON OR OFF
CLIMB SPEED	V_2 (FIGURE 4E-5)
GEAR	IN TRANSIT
FLAPS	1/4

NOTE

MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 KG)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)

OBTAIN: V_2 CLIMB SPEED = 116 KIAS
FIRST SEGMENT CLIMB HEIGHT =
1.6 FEET ABOVE THE 35 FOOT POINT
FIRST SEGMENT CLIMB DISTANCE = 70 FEET (20 m)

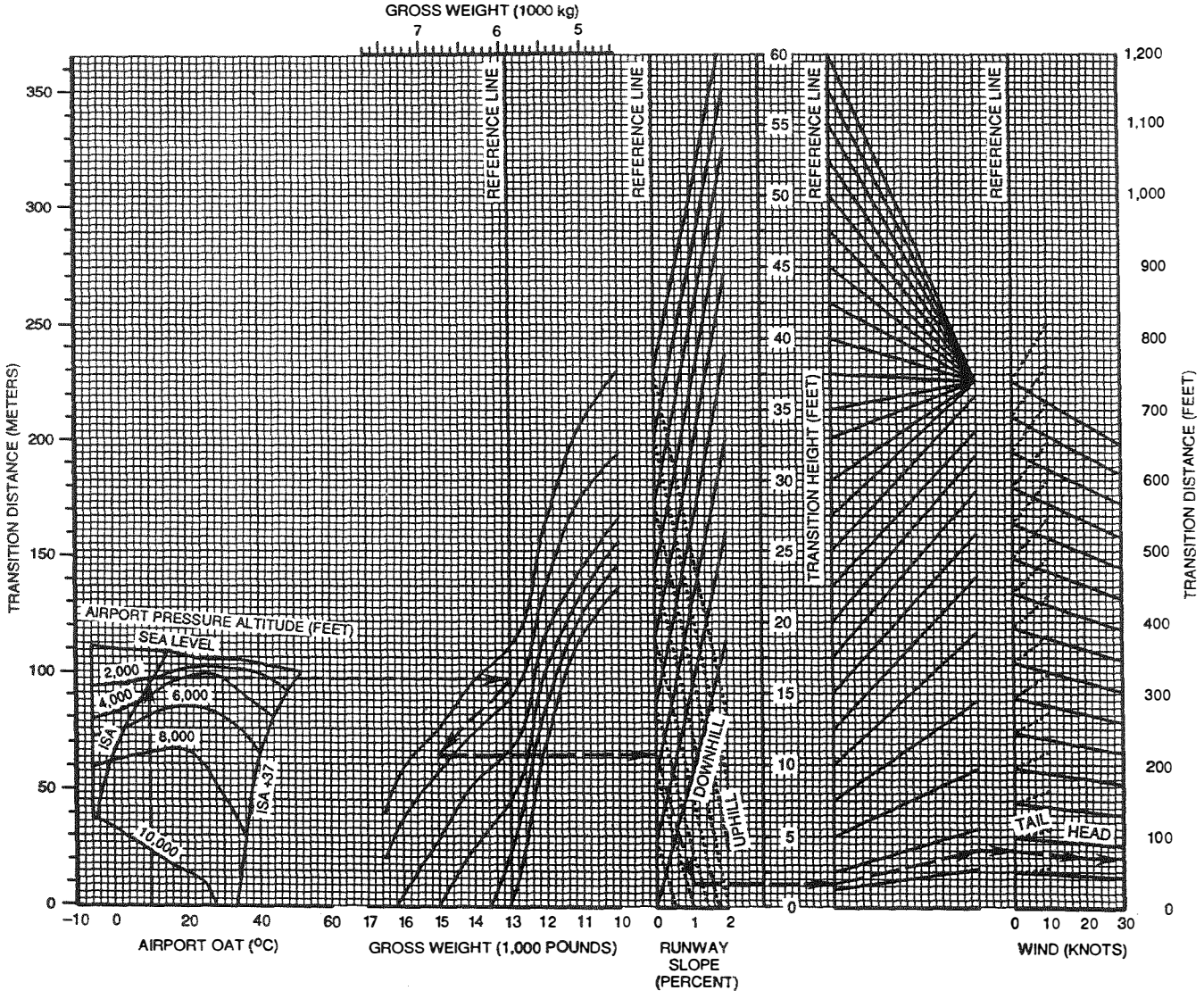


FIGURE 4E-9

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

SECOND SEGMENT CLIMB GRADIENT – WET

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
CLIMB SPEED	V_2 (FIGURE 4E-5)
GEAR	UP
FLAPS	1/4

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS

OBTAIN: V_2 CLIMB SPEED = 116 KIAS
SECOND SEGMENT CLIMB GRADIENT = 4.3 PERCENT

NOTE

- REDUCE CLIMB GRADIENT BY 0.35 PERCENT GRADIENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

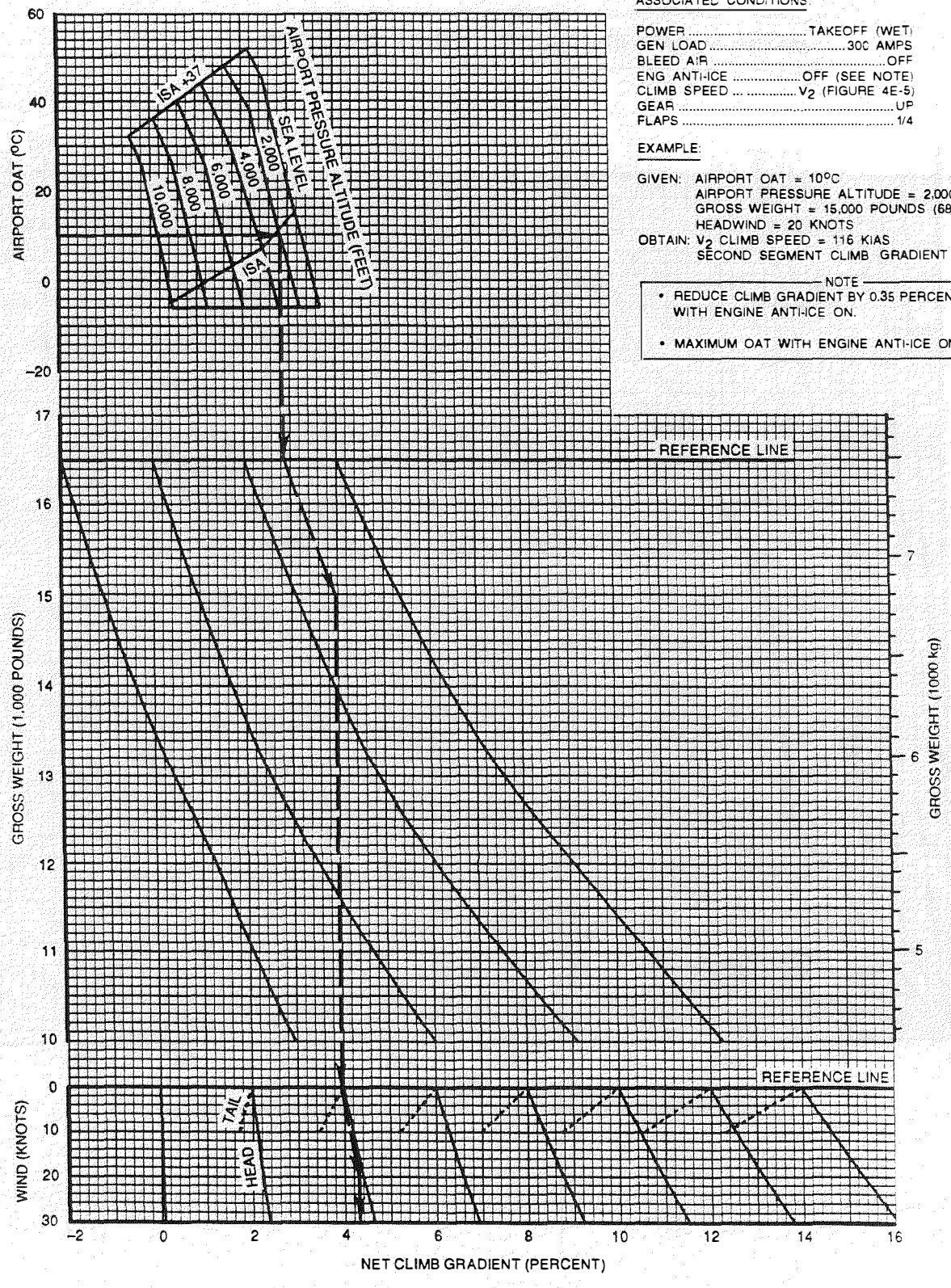
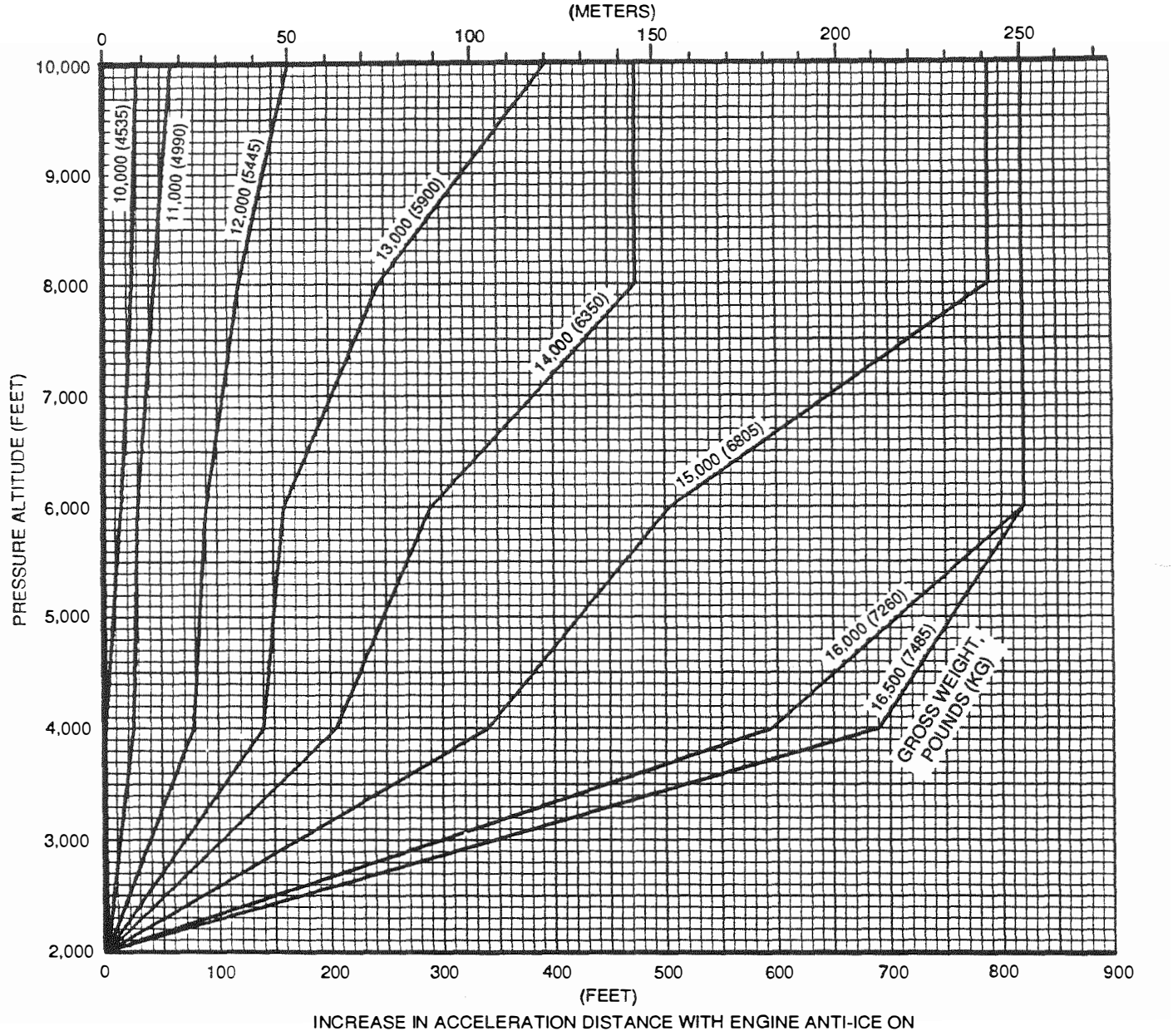


FIGURE 4E-10

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
SECOND SEGMENT ACCELERATION DISTANCE – WET

NOTE
MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.



INCREASE IN ACCELERATION DISTANCE WITH ENGINE ANTI-ICE ON

FIGURE 4E-11

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

SECOND SEGMENT ACCELERATION DISTANCE – WET

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE GRAPH)
ACCELERATE TO V_{YSE} ..... FIGURE 4F-2
GEAR ..... UP
FLAPS ..... 1/4 (SEE NOTE)

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS

OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS
SECOND SEGMENT ACCELERATION DISTANCE = 3,750 FEET (1145 m)

NOTE

ACCELERATE TO THE LESSER OF V_2 +5 KIAS OR V_{YSE} PRIOR TO RAISING FLAPS.

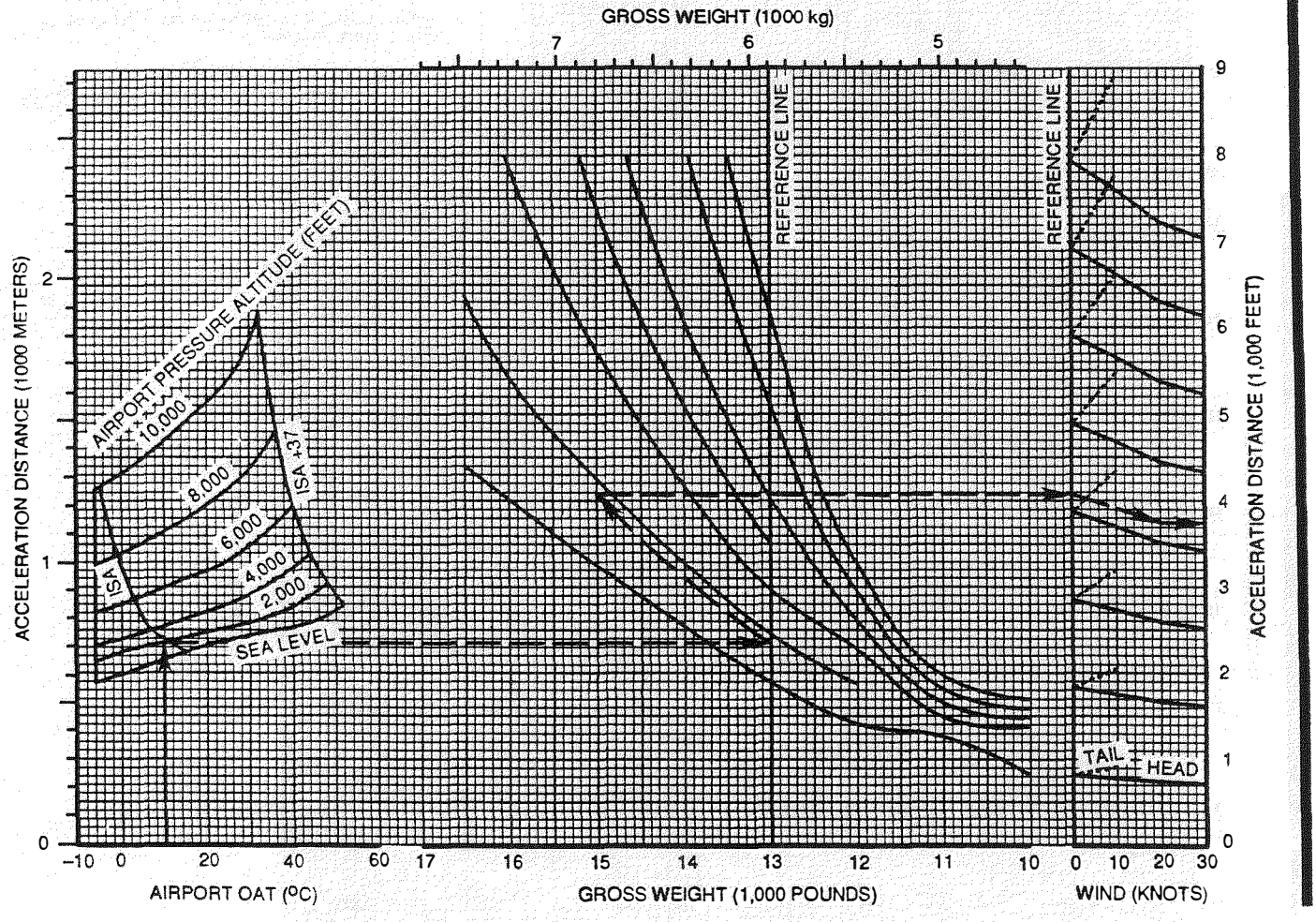
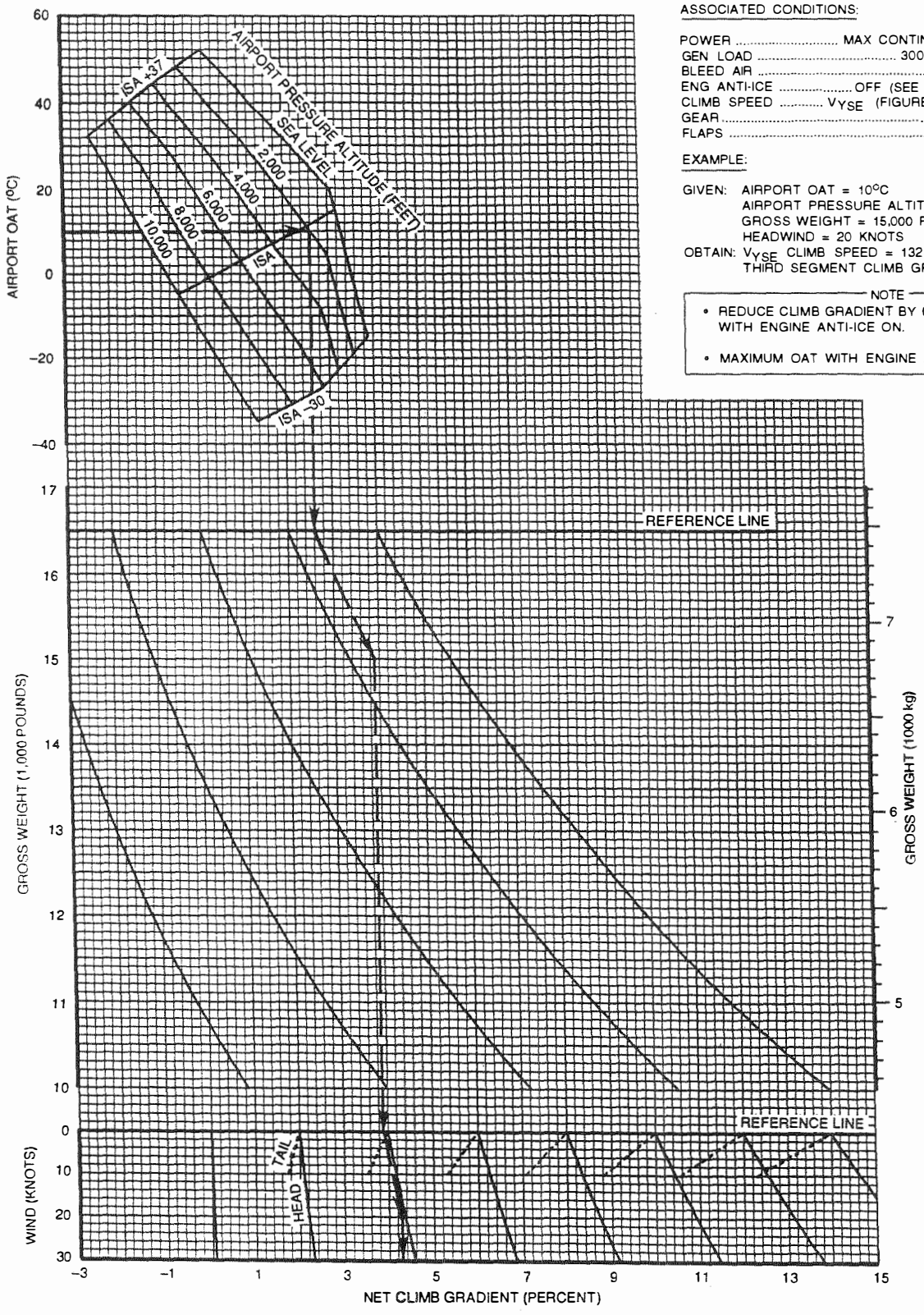


FIGURE 4E-11 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

THIRD SEGMENT CLIMB GRADIENT – MCP



ASSOCIATED CONDITIONS:

POWER	MAX CONTINUOUS
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
CLIMB SPEED	V_{YSE} (FIGURE 4F-2)
GEAR	UP
FLAPS	UP

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS

OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS
THIRD SEGMENT CLIMB GRADIENT = 4.3 PERCENT

NOTE

- REDUCE CLIMB GRADIENT BY 0.8 PERCENT GRADIENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4E-12

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

THIRD SEGMENT CLIMB GRADIENT – RESERVE POWER, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... MAX. CONT. (RES. PWR.)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... V_{YSE} (FIGURE 4E-2)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: AIRPORT OAT = 10°C
AIRPORT PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS

OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS
THIRD SEGMENT CLIMB GRADIENT = 4.5 PERCENT

NOTE

- REDUCE CLIMB GRADIENT BY 0.7 PERCENT GRADIENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

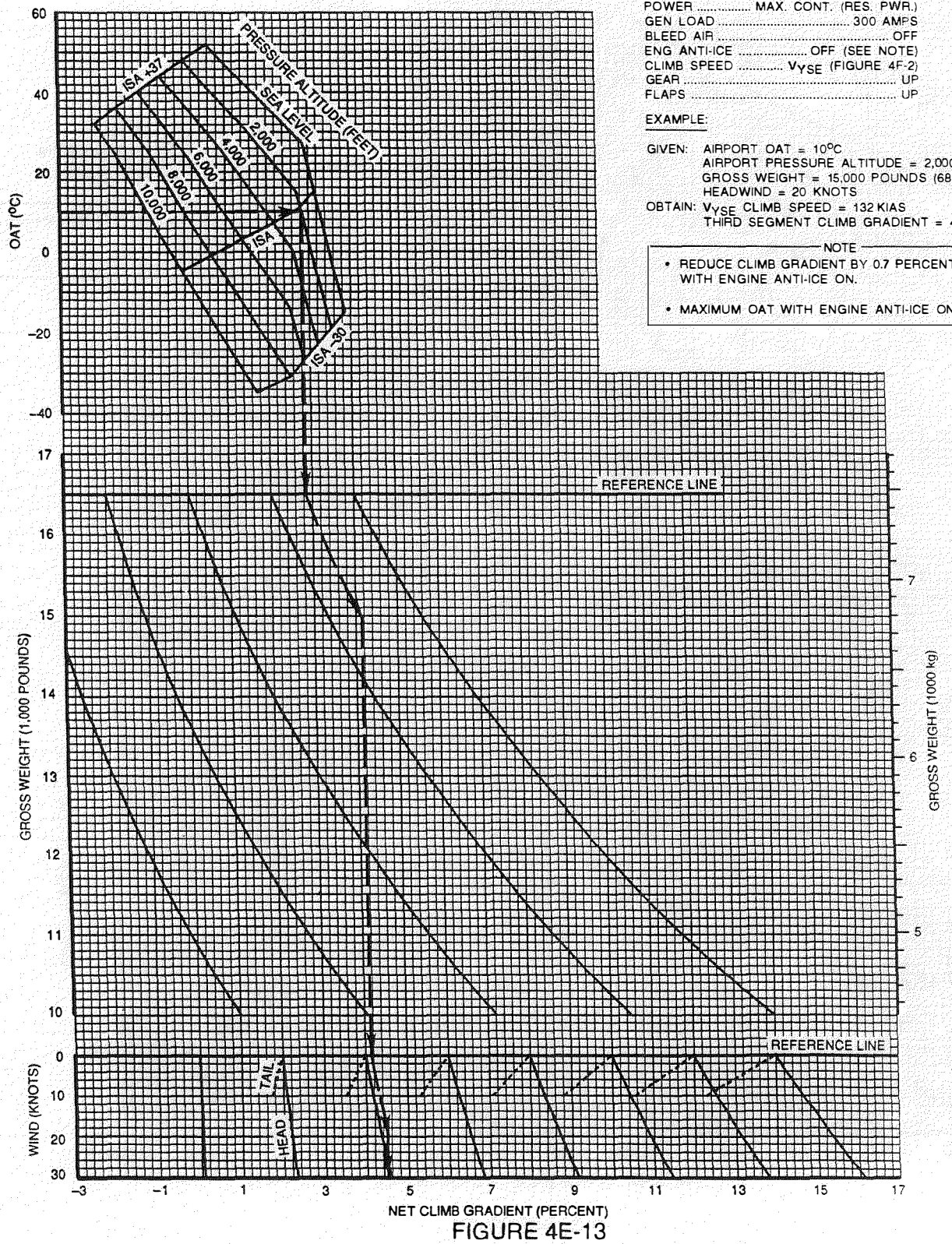


FIGURE 4E-13

TWO ENGINE RATE OF CLIMB AT V_{50} – WET

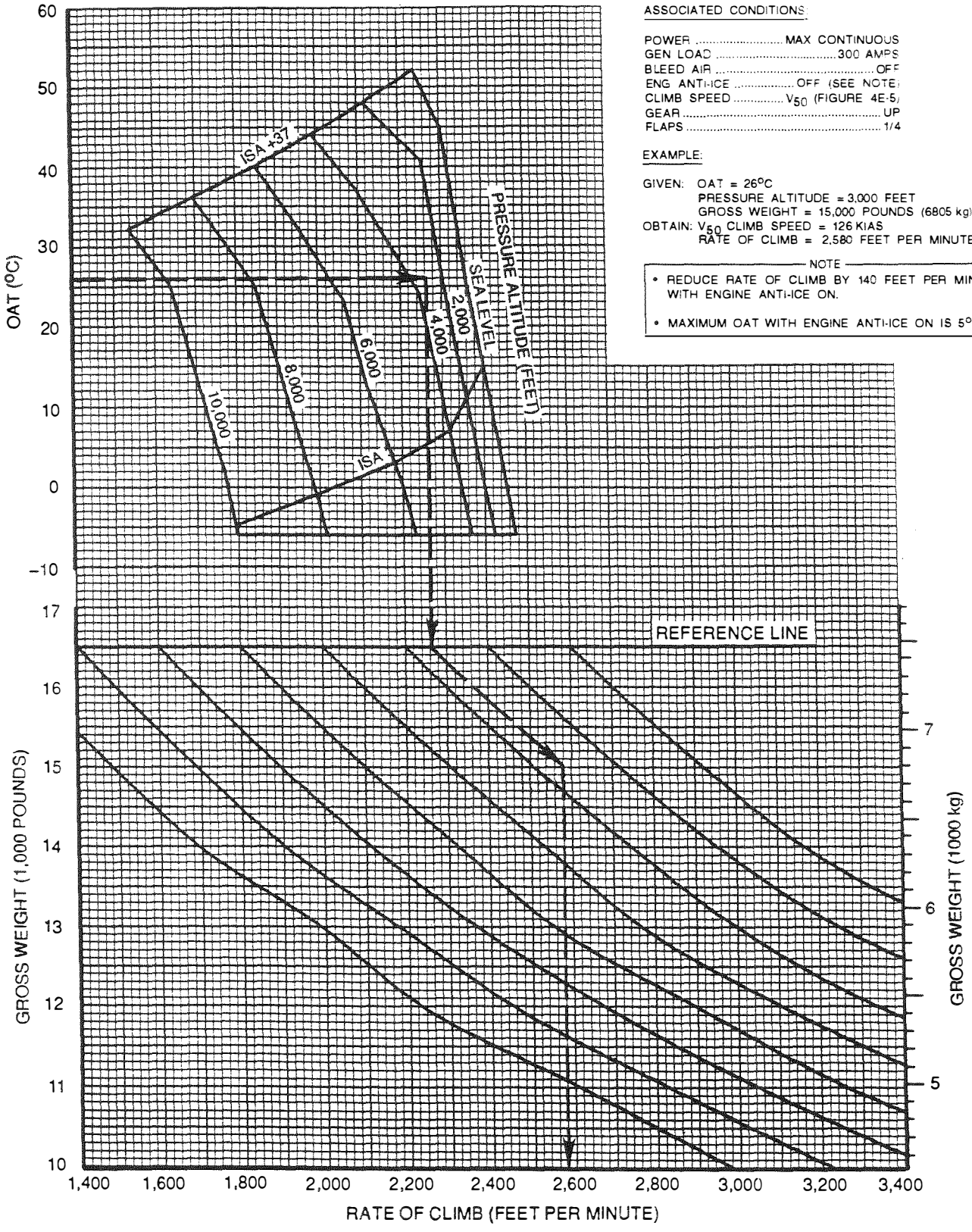


FIGURE 4E-14

PART F – EN ROUTE CLIMB PERFORMANCE

CONTENTS

ITEM	PAGE
Single Engine Best Rate of Climb	
MCP, Bleed Air On	4F-2
MCP, Bleed Air Off	4F-3
Single Engine Service Ceiling – 50 FPM	
MCP, Bleed Air On	4F-4
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Two Engine Best Rate of Climb	
Bleed Air On	4F-6
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Single Engine Service Ceiling – 1.1% Gradient	
MCP, Bleed Air On	4F-8
MCP, Bleed Air Off	4F-9

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SINGLE ENGINE BEST RATE OF CLIMB – MCP, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... SEE V_{YSE} SCHEDULE
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

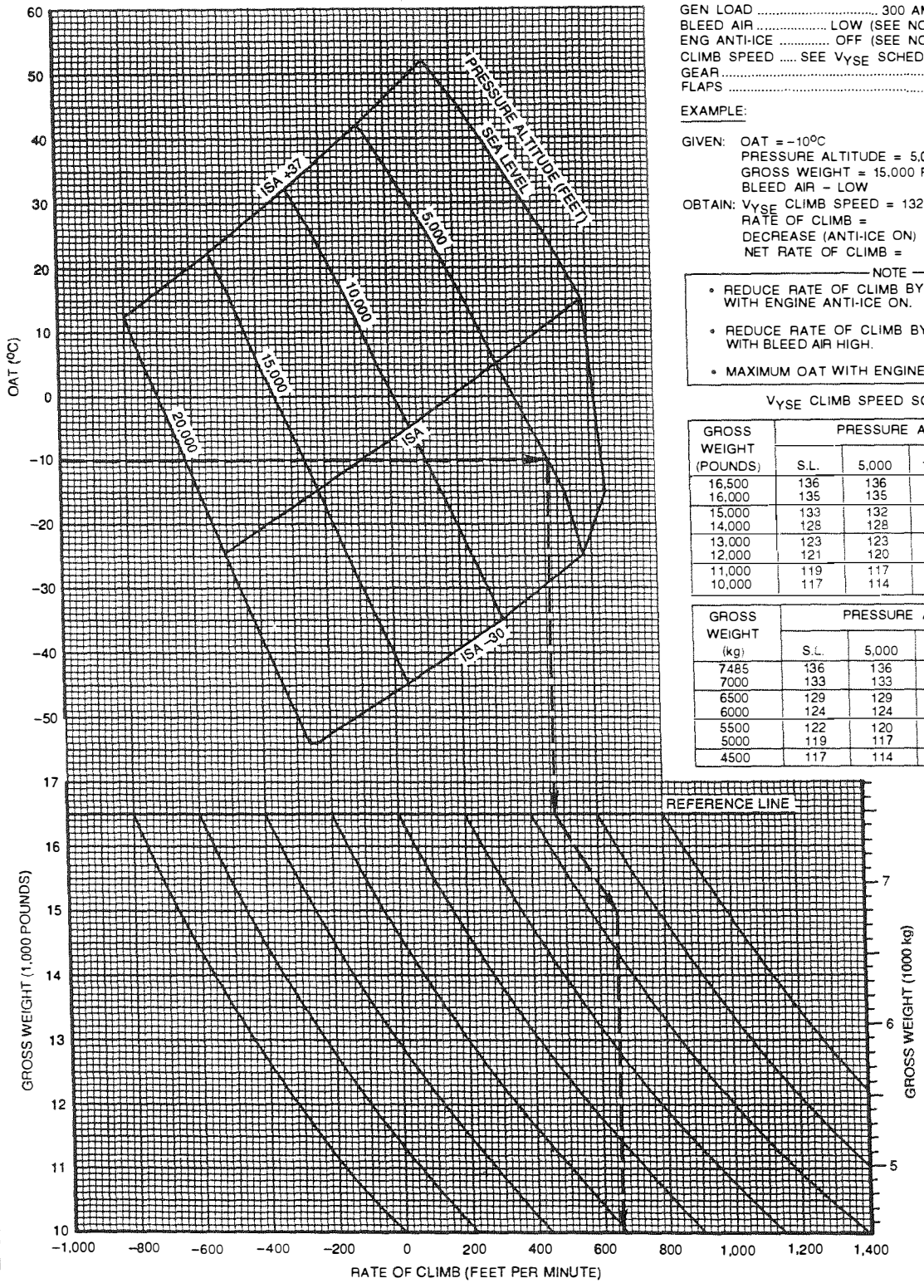
GIVEN: OAT = –10°C
PRESSURE ALTITUDE = 5,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
BLEED AIR – LOW

OBTAIN: V_{YSE} CLIMB SPEED = 132 KIAS

RATE OF CLIMB =	655 FEET PER MINUTE
DECREASE (ANTI-ICE ON) =	–100 FEET PER MINUTE
NET RATE OF CLIMB =	555 FEET PER MINUTE

NOTE

- REDUCE RATE OF CLIMB BY 100 FEET PER MINUTE WITH ENGINE ANTI-ICE ON.
- REDUCE RATE OF CLIMB BY 60 FEET PER MINUTE WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.



V_{YSE} CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)	PRESSURE ALTITUDE (FEET) S.L.	5,000	10,000	15,000	20,000
16,500	136	136	136	136	136
16,000	135	135	135	135	135
15,000	133	132	132	132	132
14,000	128	128	128	128	128
13,000	123	123	123	123	123
12,000	121	120	118	118	118
11,000	119	117	115	113	111
10,000	117	114	111	109	107

GROSS WEIGHT (kg)	PRESSURE ALTITUDE (FEET) S.L.	5,000	10,000	15,000	20,000
7485	136	136	136	136	136
7000	133	133	133	133	133
6500	129	129	129	129	129
6000	124	124	124	124	124
5500	122	120	118	118	118
5000	119	117	115	113	111
4500	117	114	111	109	106

FIGURE 4F-1

SINGLE ENGINE BEST RATE OF CLIMB – MCP, BLEED AIR OFF

ASSOCIATED CONDITIONS:

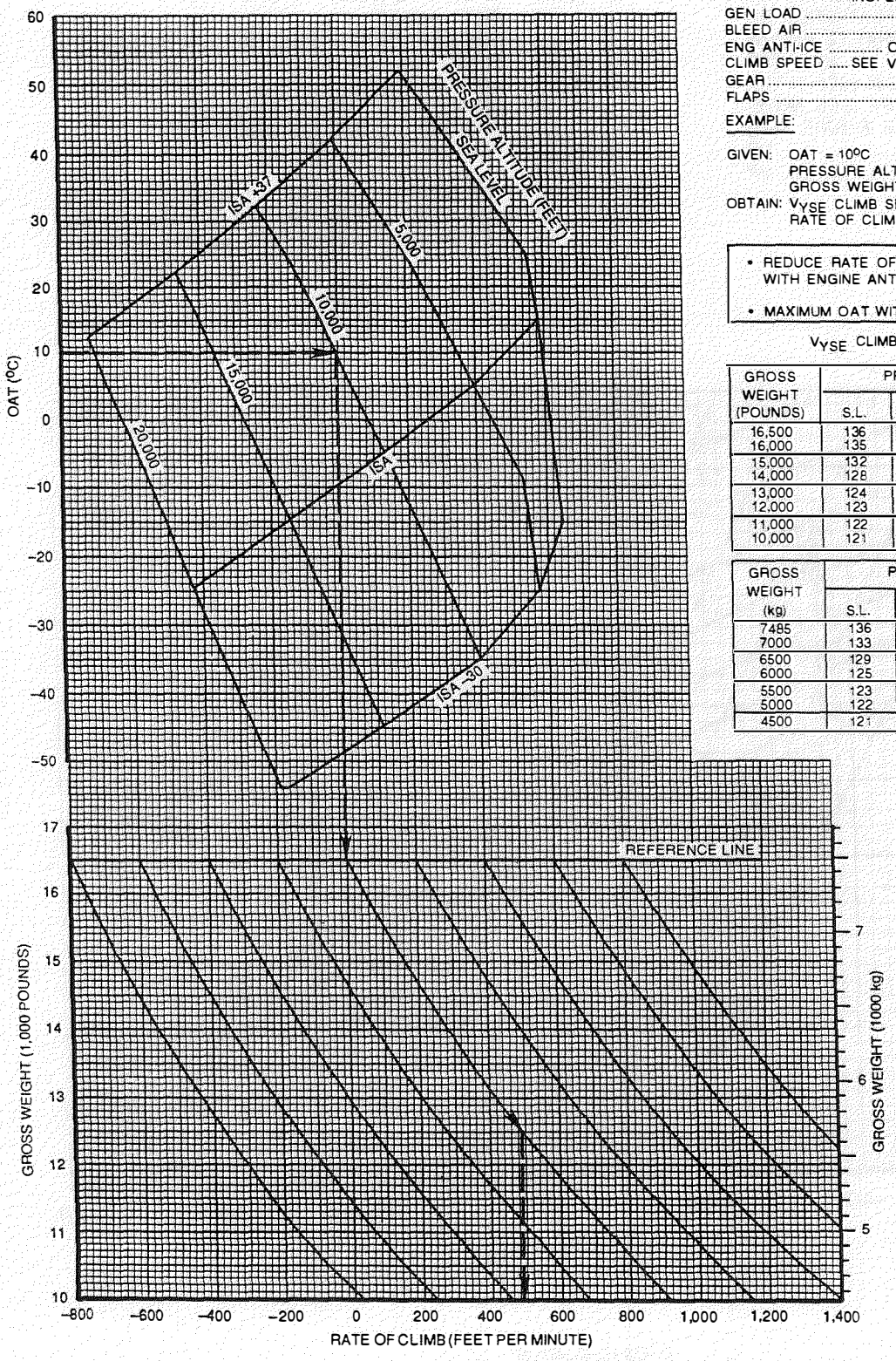
POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... SEE V_{YSE} SCHEDULE
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 10,000 FEET
GROSS WEIGHT = 12,500 POUNDS (5670 kg)
OBTAIN: V_{YSE} CLIMB SPEED = 121 KIAS
RATE OF CLIMB = 490 FEET PER MINUTE

NOTE

- REDUCE RATE OF CLIMB BY 90 FEET PER MINUTE WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.



V_{YSE} CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)	PRESSURE ALTITUDE (FEET)				
	S.L.	5,000	10,000	15,000	20,000
16,500	136	136	136	136	136
16,000	135	135	135	135	135
15,000	132	132	132	132	132
14,000	128	128	128	128	128
13,000	124	123	123	123	123
12,000	123	121	119	118	118
11,000	122	119	118	114	112
10,000	121	117	113	111	108

GROSS WEIGHT (kg)	PRESSURE ALTITUDE (FEET)				
	S.L.	5,000	10,000	15,000	20,000
7485	136	136	136	136	136
7000	133	133	133	133	133
6500	129	129	129	129	129
6000	125	124	124	124	124
5500	123	121	119	118	118
5000	122	119	116	114	112
4500	121	117	113	110	107

FIGURE 4F-2

SINGLE ENGINE SERVICE CEILING – MCP, BLEED AIR ON

ALTITUDE TO MAINTAIN 50 FPM RATE OF CLIMB

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ... V_{YSE} (SEE FIGURE 4F-1)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: CRUISE ALTITUDE = 20,000 FEET
OAT = –36°C
GROSS WEIGHT = 14,000 POUNDS (6350 kg)
BLEED AIR – LOW
ANTI-ICE – OFF

OBTAIN: SINGLE ENGINE SERVICE CEILING (ASSUMING STANDARD LAPSE RATE) = 16,700 FEET

NOTE

- INCREASE GROSS WEIGHT BY 650 POUNDS (295 kg) PRIOR TO ENTERING CHART WITH ENGINE ANTI-ICE ON.
- INCREASE GROSS WEIGHT BY 370 POUNDS (170 kg) PRIOR TO ENTERING CHART WITH BLEED AIR HIGH.

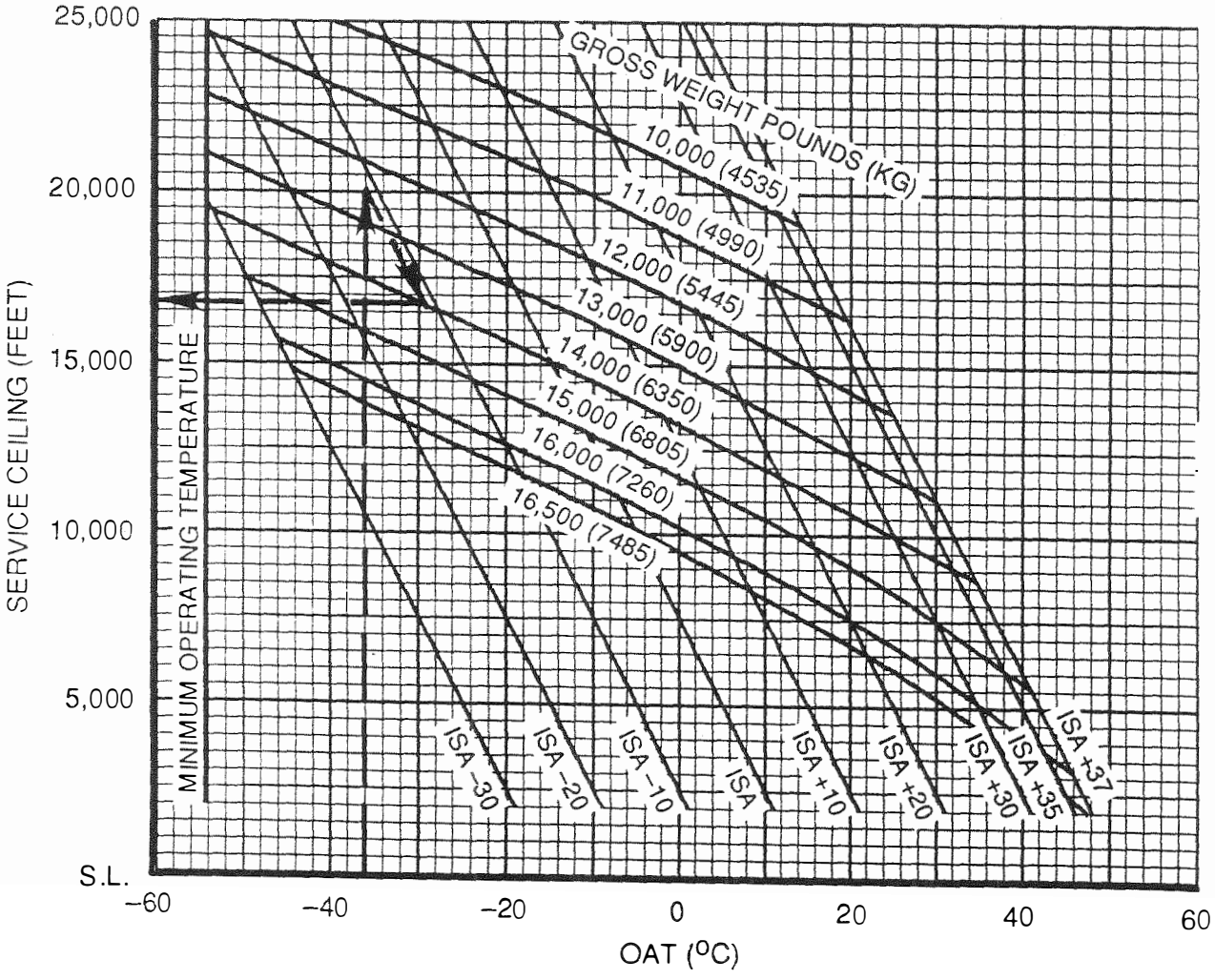


FIGURE 4F-3

PERFORMANCE

FAA APPROVED: AUG 23/91
Revised: NOV 12/96

SINGLE ENGINE SERVICE CEILING – MCP, BLEED AIR OFF

ALTITUDE TO MAINTAIN 50 FPM RATE OF CLIMB

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ... V_{YSE} (SEE FIGURE 4F-2)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: CRUISE ALTITUDE = 20,000 FEET
OAT = –36°C
GROSS WEIGHT = 14,000 POUNDS (6350 kg)
ANTI-ICE – OFF

OBTAIN: SINGLE ENGINE SERVICE CEILING (ASSUMING STANDARD LAPSE RATE) = 18,200 FEET

NOTE

INCREASE GROSS WEIGHT BY 610 POUNDS (275 kg) PRIOR TO ENTERING CHART WITH ENGINE ANTI-ICE ON.

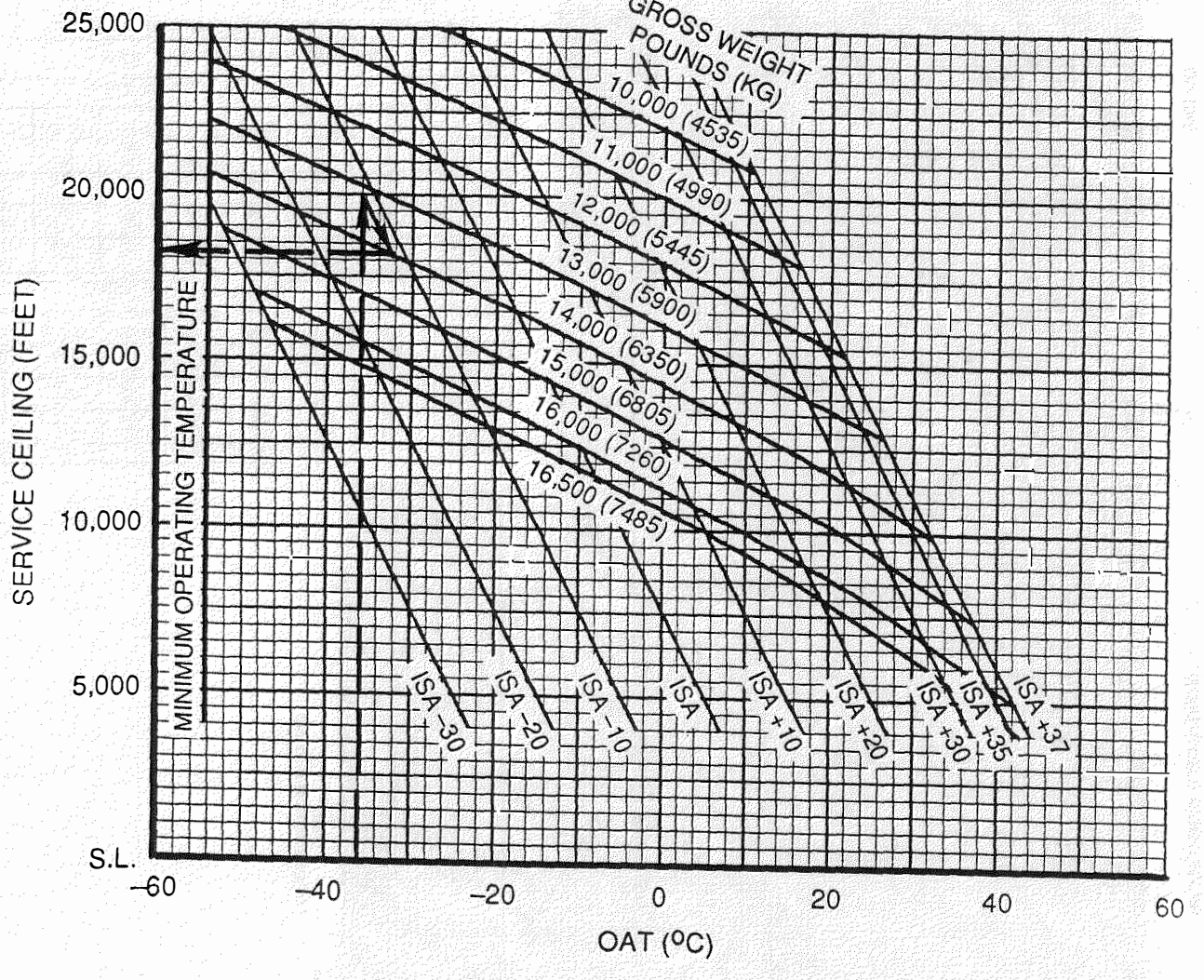


FIGURE 4F-4

TWO ENGINE BEST RATE OF CLIMB – BLEED AIR ON

NOTE

THE ENGINE ANTI-ICE EFFECT IS ONLY A POWER EFFECT ASSOCIATED WITH INCREASED BLEED AIR RATE AND DOES NOT INCLUDE THE EFFECT OF ANY ICE ACCUMULATION ON THE AIRCRAFT. REFER TO PART H OF SECTION 4 FOR PERFORMANCE WITH ICE ACCUMULATIONS.

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED .... SEE V_Y SCHEDULE
GEAR ..... UP
FLAPS ..... UP

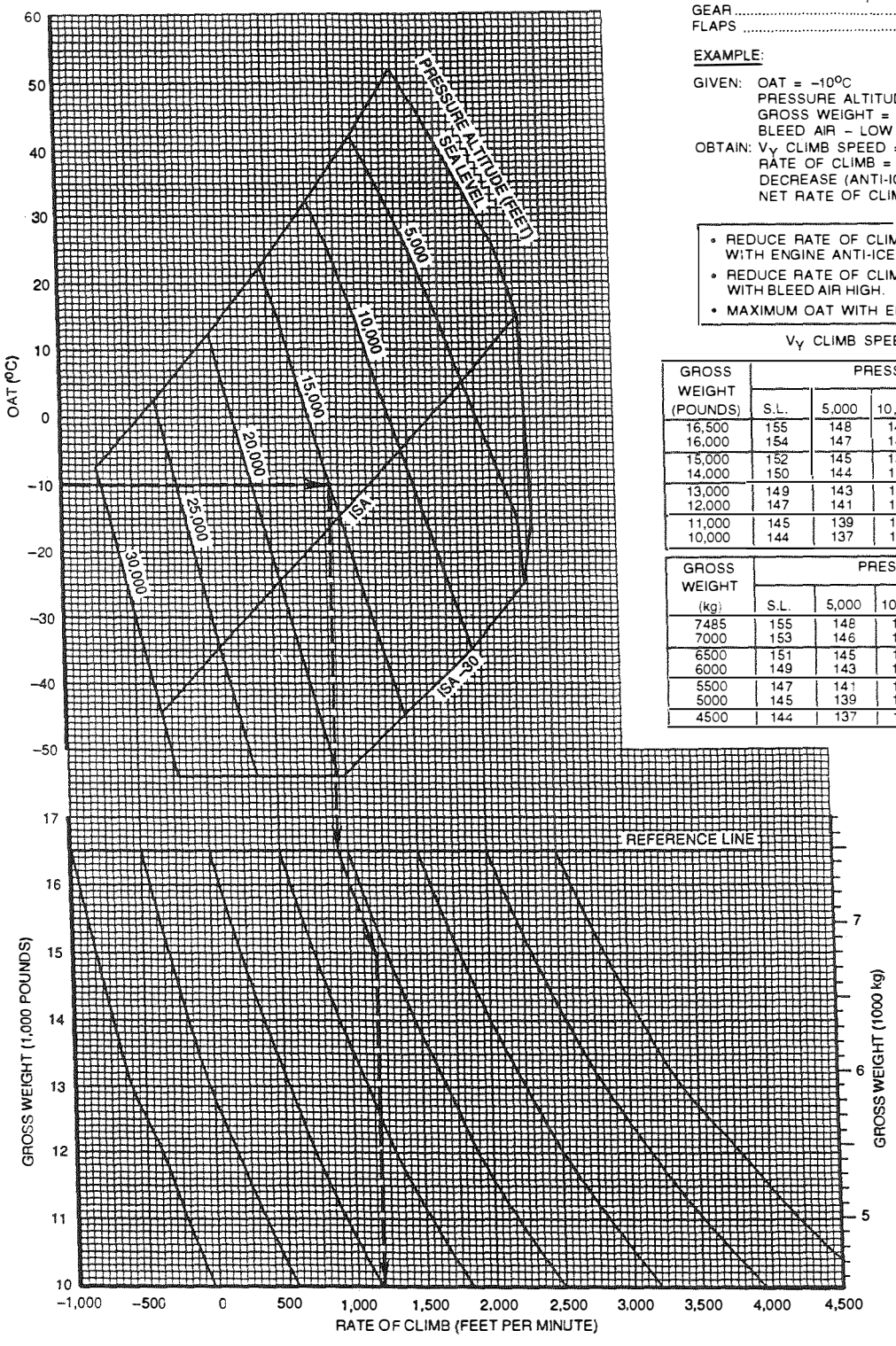
EXAMPLE:

GIVEN: OAT = –10°C
PRESSURE ALTITUDE = 15,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
BLEED AIR – LOW

OBTAIN: V_Y CLIMB SPEED = 133 KIAS
RATE OF CLIMB = 1,190 FEET PER MINUTE
DECREASE (ANTI-ICE ON) = –250 FEET PER MINUTE
NET RATE OF CLIMB = 940 FEET PER MINUTE

NOTE

- REDUCE RATE OF CLIMB BY 250 FEET PER MINUTE WITH ENGINE ANTI-ICE ON.
- REDUCE RATE OF CLIMB BY 125 FEET PER MINUTE WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.



V_Y CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)	PRESSURE ALTITUDE (FEET) S.L.	5,000	10,000	15,000	20,000	25,000	30,000
16,500	155	148	141	136	136	136	136
16,000	154	147	140	135	135	135	135
15,000	152	145	139	133	132	132	132
14,000	150	144	137	131	128	128	128
13,000	149	143	136	129	123	123	123
12,000	147	141	134	128	122	118	118
11,000	145	139	132	126	120	115	112
10,000	144	137	131	124	117	113	109

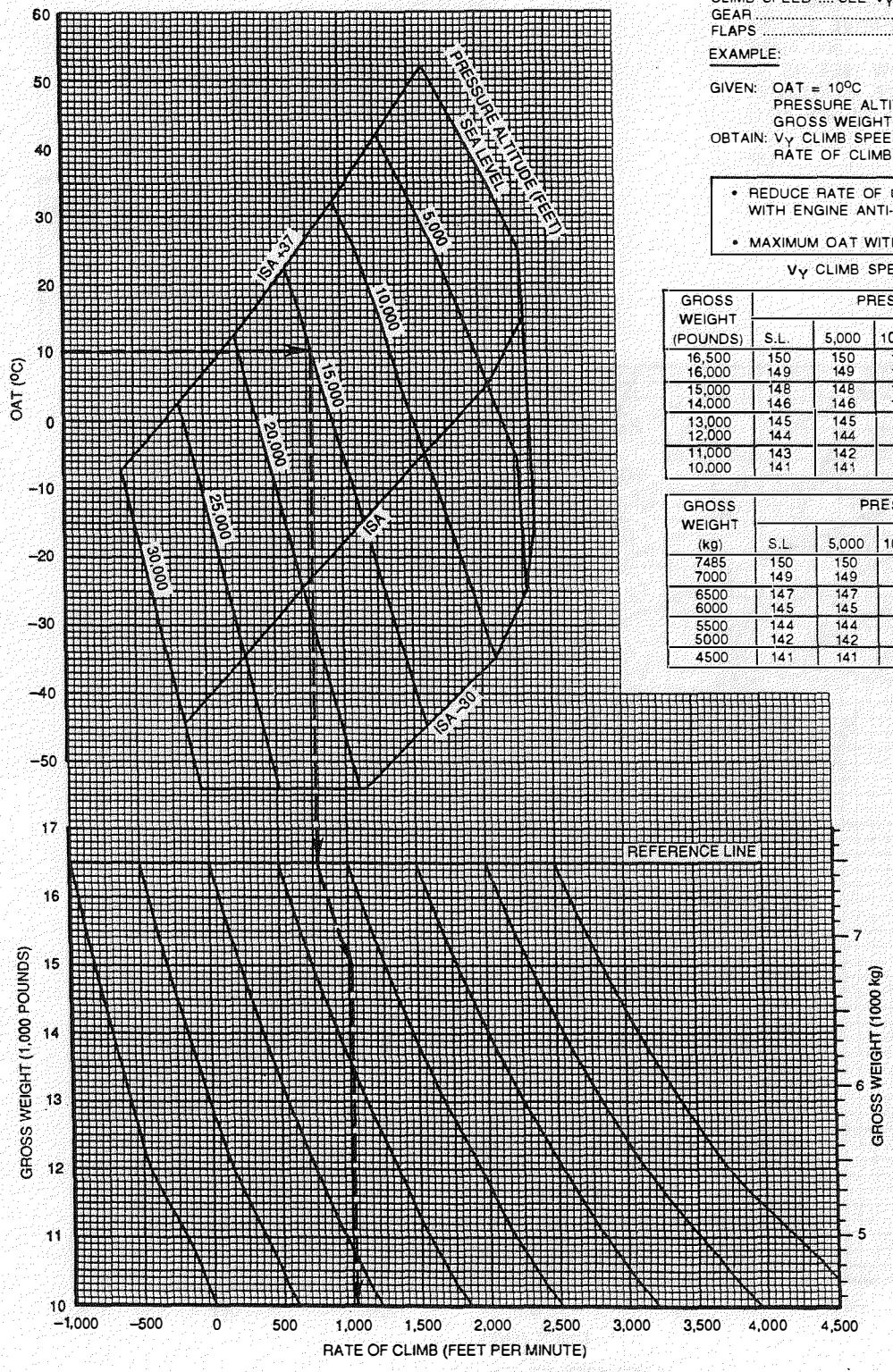
GROSS WEIGHT (kg)	PRESSURE ALTITUDE (FEET) S.L.	5,000	10,000	15,000	20,000	25,000	30,000
7485	155	148	141	136	136	136	136
7000	153	146	139	134	133	133	133
6500	151	145	138	132	129	129	129
6000	149	143	136	130	124	124	124
5500	147	141	134	128	122	118	118
5000	145	139	132	126	120	115	112
4500	144	137	130	124	117	112	109

FIGURE 4F-5

TWO ENGINE BEST RATE OF CLIMB – BLEED AIR OFF

NOTE

THE ENGINE ANTI-ICE EFFECT IS ONLY A POWER EFFECT ASSOCIATED WITH INCREASED BLEED AIR RATE AND DOES NOT INCLUDE THE EFFECT OF ANY ICE ACCUMULATION ON THE AIRCRAFT. REFER TO PART H OF SECTION 4 FOR PERFORMANCE WITH ICE ACCUMULATIONS.



ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED .... SEE V_Y SCHEDULE
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 15,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
OBTAIN: V_Y CLIMB SPEED = 137 KIAS
RATE OF CLIMB = 1,025 FEET PER MINUTE

NOTE

- REDUCE RATE OF CLIMB BY 240 FEET PER MINUTE WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

V_Y CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)	PRESSURE ALTITUDE (FEET)						
	S.L.	5,000	10,000	15,000	20,000	25,000	30,000
16,500	150	150	143	140	137	136	136
16,000	149	149	142	139	136	135	135
15,000	148	148	141	136	133	132	132
14,000	146	146	140	134	130	128	128
13,000	145	145	139	132	128	125	124
12,000	144	144	137	131	126	123	120
11,000	143	142	136	129	124	121	117
10,000	141	141	134	128	122	118	113

GROSS WEIGHT (kg)	PRESSURE ALTITUDE (FEET)						
	S.L.	5,000	10,000	15,000	20,000	25,000	30,000
7485	150	150	143	140	137	136	136
7000	149	149	142	137	134	133	133
6500	147	147	140	135	131	129	129
6000	145	145	139	133	128	126	124
5500	144	144	138	131	126	123	121
5000	142	142	136	129	124	121	117
4500	141	141	134	128	121	118	113

FIGURE 4F-6

SINGLE ENGINE SERVICE CEILING – MCP, BLEED AIR ON

ALTITUDE TO MAINTAIN 1.1% GRADIENT OF CLIMB

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ... V_{YSE} (SEE FIGURE 4F-1)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: CRUISE ALTITUDE = 20,000 FEET
OAT = --36°C
GROSS WEIGHT = 14,000 POUNDS (6350 kg)
BLEED AIR – LOW
ANTI-ICE – OFF

OBTAIN: SINGLE ENGINE SERVICE CEILING (ASSUMING STANDARD LAPSE RATE) = 14,800 FEET

NOTE

- INCREASE GROSS WEIGHT BY 715 POUNDS (325 kg) PRIOR TO ENTERING CHART WITH ENGINE ANTI-ICE ON.
- INCREASE GROSS WEIGHT BY 370 POUNDS (170 kg) PRIOR TO ENTERING CHART WITH BLEED AIR HIGH.

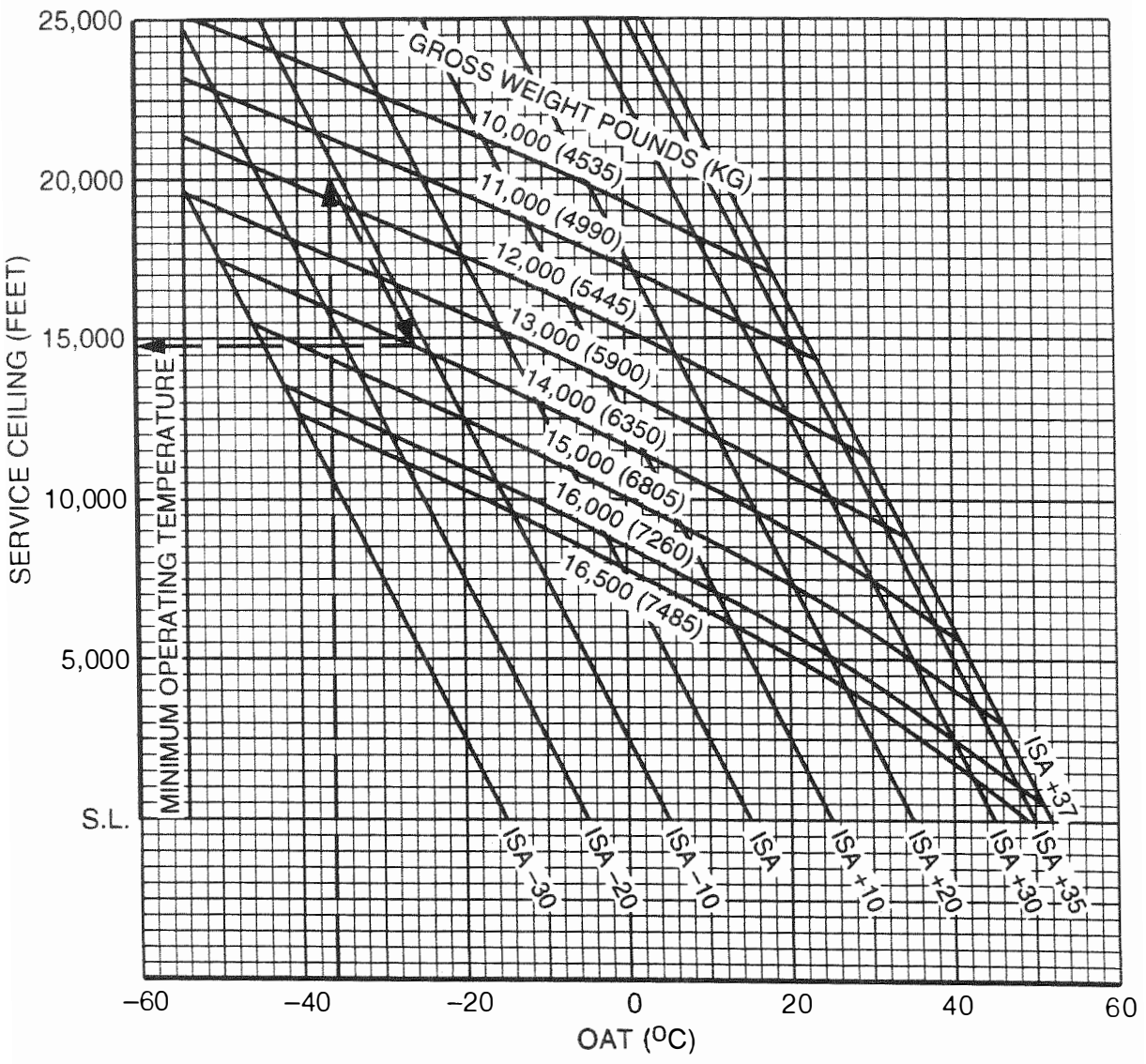


FIGURE 4F-7

SINGLE ENGINE SERVICE CEILING – MCP, BLEED AIR OFF

ALTITUDE TO MAINTAIN 1.1% GRADIENT OF CLIMB

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ... V_{YSE} (SEE FIGURE 4F-2)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: CRUISE ALTITUDE = 20,000 FEET
OAT = –36°C
GROSS WEIGHT = 14,000 POUNDS (6350 kg)
ANTI-ICE – OFF
OBTAIN: SINGLE ENGINE SERVICE CEILING (ASSUMING STANDARD LAPSE RATE)
= 16,100 FEET

NOTE

INCREASE GROSS WEIGHT BY 670 POUNDS (305 kg) PRIOR TO ENTERING CHART WITH ENGINE ANTI-ICE ON.

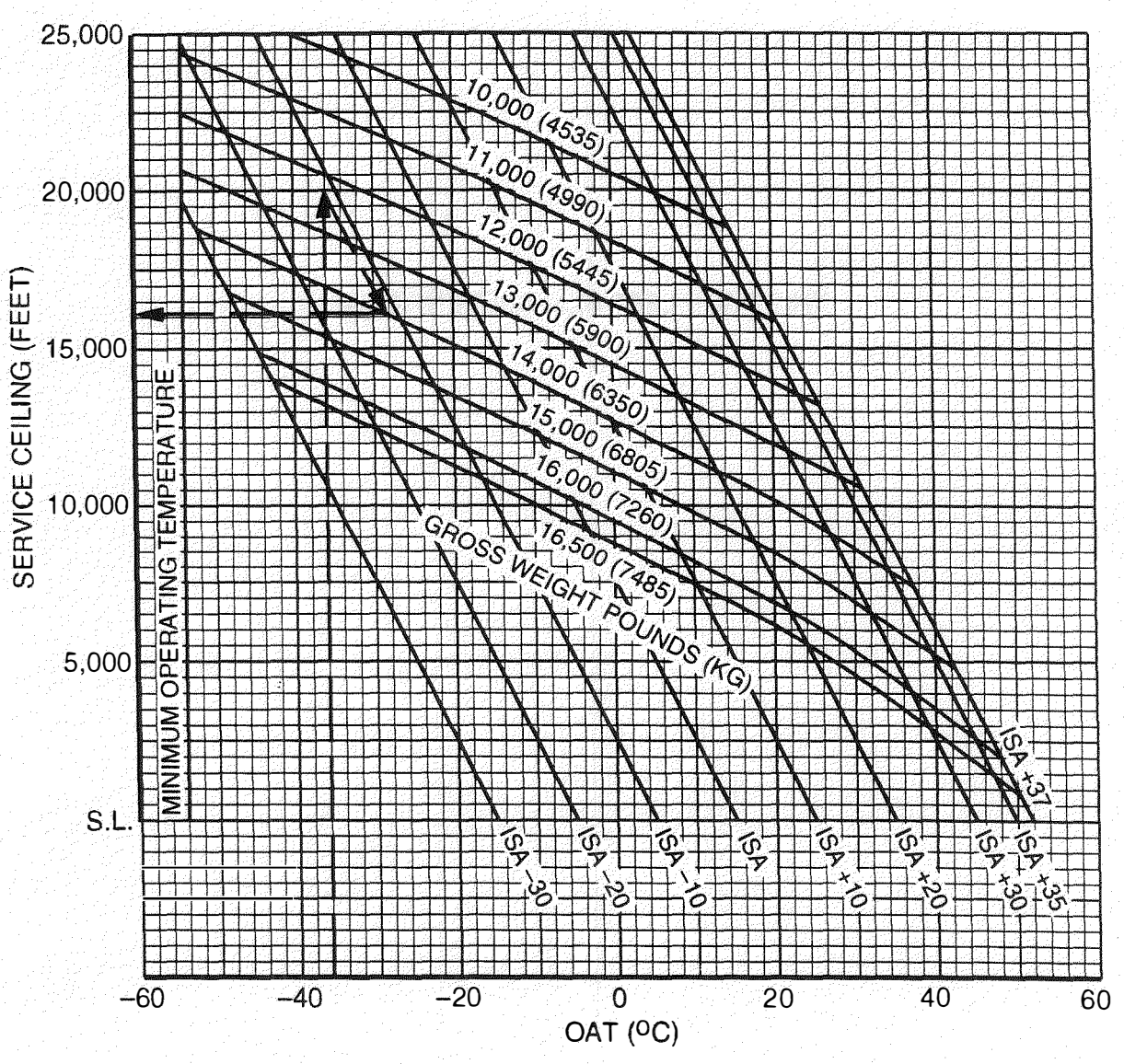


FIGURE 4F-8

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LIST OF REVISIONS

Revisions to the Airplane Flight Manual provide current information applicable to operation of the SA227-DC aircraft. Revised pages should be inserted into the manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when current revisions are incorporated.

Revision Number	Revised Pages	Description of Revision	FAA Approved Signature	Date
1	Title page, 0-iii, 0-iv, 0-vi, 0-ix, 1-i, 1-5, 1-6, 1-9 thru 1-11, 1-17, 1-19, 1-25, 1-26, 2-i, 2-ii, 2-3, 2-7, 2-12, 2-14 thru 2-17, 2-19, 2-20, 2-23, 2-36 thru 2-38, 3-i, 3-4 thru 3-8, 3-11, 4D-i and 4D-24	Added CAWI and Reserve Power information, removed placard "CAWI DEACTIVATED" from list of placards, corrected placard for NAV/STROBE light switch. Corrected Figure reference numbers, added Notes on cooling engines, changed power setting for Single Engine Go-around. Removed "FOR DC-784B ONLY" from title page.	M M Owsley	Nov. 15, 1991
2	0-iii thru 0-vii, 0-ix, 1-1, 1-2, 1-6, 1-9, 1-19, 2-12, 2-24, 2-34, 2-37, 2-38, 3-6 thru 3-8, 3A-21, 4-i, 4A-1 thru 4A-3, 4A-5, 4A-6, 4D-i, 4D-24, 4E-i, 4E-ii, 4E-1 thru 4E-26	Added Wet Performance Section, made changes to reflect wet power, changed reserve power procedures, changed FDR and CVR procedures in Normal Procedures section and made editorial changes.	M M Owsley	Dec. 31, 1991
3	0-iii, 0-v, 0-ix, 1-2, 1-8 and 3A-17	Added McCauley Propeller Assembly Numbers, changed propeller blade angles, relocated Warning about reversing propellers, corrected editorial error, and changed SRL Computer Failure section.	M M Owsley	April 29, 1992
4	0-iii thru 0-v, 0-viii, 0-ix, 1-1, 1-6 thru 1-8, 1-19, 1-21, 1-23, 2-i, 2-1, 2-2, 2-5 thru 2-11, 3-24, 3A-i, 3A-4 thru 3A-14 4A-i, 4A-2 and 4I-1	Changed procedures to permit single pilot operation.	M M Owsley	June 19, 1992

A black bar in the margin of a revised page shows the current change.

LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA Approved Signature	Date
5	0-iii thru 0-viii, 0-x, 1-i, 1-3 thru 1-5, 1-10, 1-11, 1-16, 1-19, 3-i, 3-9 thru 3-12, 3-18, 4A-2, 4C-12, 4C-13, 4C-17, 4D-13, 4D-14, 4E-15, 4E-16, 4E-21, 4G-i, 4G-2 thru 4G-6, 4H-4, 4H-5, and 4I-2	Revised Res Pwr in Limitations Section, changed CAWI info, added information about convertible interior, Max. Landing Weight Limitation Chart – Wet, and corrected editorial errors.	Michele M Owsley	9-29-92
6	0-iii thru 0-vii, 0-x, 1-8, 2-i, 2-3 thru 2-20, 2-36, 3-i, 3-1, 3-2, 3-7 thru 3-15, 3-17, 3-18, 3-21, 3-22, 3-24, 3A-i, 3A-1 thru 3A-28, 4C-1, 4D-1 and 4E-1	Changed generator load, speed for Takeoff Power Check Charts and revised the single pilot procedures.	Michele M Owsley	7-28-92
7	0-iii, 0-v, 0-x, 1-i, 1-2, 1-10, 1-11, 1-14, 3A-i, 3A-ii, 3A-16 thru 3A-21D	Added new engine designation for –10 SRL computer, new tire, new EGT limit with SRL inoperative power tables and changed Figure reference numbers.	Richard L Vaughn	3/18/93
8	0-iii, 0-x and 1-15	Changed Nose Wheel Steering Limitations.	Ronald L Fuller	4/2/93

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA Approved Signature	Date
9	0-iii thru 0-viii, 0-x, 1-4, 1-7, 1-8, 1-18, 2-3 thru 2-5, 2-7, 2-8, 2-12 thru 2-15, 2-23 thru 2-26, 2-29, 2-30, 2-32 thru 2-34, 2-37 thru 2-40, 2-45, 2-48, 3-5, 3-7, 3-8, 3-11, 3-12, 3-14, 3-25, 3A-ii, 3A-3 thru 3A-6, 3A-15, 3A-26, 3A-28, 4-i, 4A-1, 4A-2, 4C-3, 4C-11 thru 4C-13, 4C-17, 4C-19 thru 4C-23, 4D-3, 4D-12 thru 4D-14, 4D-18 thru 4D-23, 4E-4, 4E-5, 4E-14 thru 4E-16, 4E-20 thru 4E-26, 4F-i, 4F-2, 4F-3, 4F-6, 4F-7, 4G-2 thru 4G-6, 4H-3 thru 4H-8 and 4I-1	Changed Battery Overheat Warning System, oil filter bypass indicator, added info about annunciator panel dimming, testing the fire detection system, battery disconnect system check, unpressurized flight and high oil temperature. Changed Note on FDR PWR FAIL light, fresh air fan setting for smoke in aircraft, and SAS malfunction – nose down. Added metric tick marks to performance charts. Corrected editorial errors.	Richard L Vaughn	6/23/93
10	0-iii, 0-iv, 0-vii, 0-viii, 0-xi, 2-26, 4G-5, 4H-5 thru 4H-8	Changed Figures 4H-3 thru 4H-6 and corrected metric tick marks on Figure 4G-4 and corrected editorial error on page 2-26.	[signature]	8/9/93
11	0-iii thru 0-v, 0-xi, 1-15, 2-35 and 3A-11	Changed Nose Wheel Steering Limitations, modified During Taxi section on page 2-35, and changed NOTE on page 3A-11.	Ronald L Gillis	9/1/93
12	0-iii, 0-v thru 0-viii, 0-xi, 1-19, 4-i, 4A-1, 4A-2, 4C-14 thru 4C-16, 4D-15 thru 4D-17, 4E-17 thru 4E-19, 4G-2, 4G-3, 4J-i thru 4J-26	Changed Maximum Landing Weight Limitations Charts, revised Takeoff Flight Path Distance to 1500 Feet examples, add Part J Supplemental Takeoff Performance section and changed pages to reflect the new Part J.	Michele M Owsley	9-10-93

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA Approved Signature	Date
13	0-ii, thru 0-viii, 0-xii, 1-8, 1-11, 1-15, 2-ii, 2-13, 2-17, 2-21, 2-32, 2-34, 2-39, 2-45 thru 2-49, 3-2, 3-5, 3-6, 3-18, 3A-1, 3A-2, 4A-3, 4A-6, 4B-1, 4C-12, 4C-13, 4D-13, 4D-14, 4E-15, 4E-16, 4J-2 and 4J-3	Changed Note about use of generators, changed Instrument Markings for EGT, added item 4 to Nose Wheel Steering (S/N CC-843 and up or modified IAW SB CC7-32-003), added Notes about use of continuous ignition, added checks for Cargo Door Secondary Warning and Test System, changed Operations in Icing Conditions section, changed Partial Flaps Landings and added Approach Speed Table, changed Annunciator Panel lights, added definition for Stopway and changed definitions for Clearway and Takeoff Run and corrected editoral errors, and corrected Figure 4J-1.	M M Owsley	3.29.94
14	0-iii, 0-v, 0-xii, 1-i, 1-14, 1-15 and 3A-11	Changed Nose Wheel Steering Limitations and split Note on page 3A-11.	M M Owsley	8.10.94
15	0-iii, 0-xii, 1-i, 1-20 thru 1-24. Deleted pages 1-25 thru 1-28	Deleted Kinds of Operation, changed Kinds of Operation Equipment List, moved text to different pages and deleted 4 pages from Limitations Section.	Gladys E. Esparza	8-26-94
16	0-iii, thru 0-v, 0-viii, 0-xii, 1-15, 2-i, 2-10, 2-11, 2-11a, 2-11b, 2-17 thru 2-19, 2-25 2-34, 2-45, 2-49 3-i, 3-12a, 3-12b, 3A-22 and 4H-7	Provided for revised DC power distribution system, added Double Generator Failure to Section 3 replaced Figure 4H-5 and speed schedule on page 4H-7 and corrected editorial errors.	M M Owsley	3.28.95
17	0-iii, 0-vii, o-xii and 4G-5	Replaced Figure 4G-4.	M M Owsley	3.26.95
18	0-iii, 0-iv, 0-xiv 1-i, 1-ii, 1-15, 2-8 and 2-35	Changed NWS info and added Landing gear position indicator lights to page 2-8.	M M Owsley	3.4.96

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA Approved Signature	Date
19	0-iii, thru 0-xvi, 4-i, 4A-3, 4A-4, 4B-i, 4B-17 thru 4B-20, 4C-14 thru 4C-16, 4D-15 thru 4D-17, 4E-17 thru 4E-19, 4G-5, 4J-i, 4K-i thru 4K-36	Added definition for Pressure Height to Part 4A, added Turns in the Flight Path to Part 4B, changed Flight Path info in Sections 4C, 4D and 4E, corrected editorial errors, added to Note on Figure 4G-4 and added Part 4K. Added four (4) pages each to Sections 0 and 4B.	Richard L Vaughn	7/31/95
20	Cover, 0-iii thru 0-vi, 0-xv, 1-i, 1-9 thru 1-9B, 2-i, 2-ii, 2-14, 2-24, 2-25, 2-34 thru 2-34B, 2-48, 2-49, 3-i, 3-ii, 3-4 thru 3-7, 3-11 thru 3-12B, 3A-i, 3A-ii, 3A-10 thru 3A-14	Corrected Area Code on Cover, expanded *NTS System Check* information in Section 1. Added to NOTE about *Power Levers,* revised NOTE for *FDR PWR FAIL Light*, changed *AUTO/CONT* procedures for *Icing Conditions* and added *Emergency Locator Transmitter (ELT)* to *System Checks and Operation* added *Feather Valve and Fuel Shutoff Functional Checks,* expanded *NTS System* section and added *Supplementary NTS Check Procedure.* Added procedures for *Uncommanded Engine Acceleration* and *No Response to Power Lever Movement* to Section 3, made editorial corrections on page 3-12B, changed *Manual Ground Start Procedures* to accommodate SB CC7-80-001 and SB CC7-24-002 in Section 3A. Added eight pages 1-9A, 1-9B, 2-34A, 2-34B, 3-6A, 3-6B, 3A-13A and 3A-13B.	PENDING	
21	0-iii, 0-v, 0-vi, 0-xv, 1-2, 4A-4, 4F-i, 4F-4, 4F-5, 4F-8 thru 4F-10	Added to **WARNING** for *Propeller Reversing*, added Definition for *Single Engine Service Ceiling*, changed existing *Single Engine Service Ceiling* charts to reflect *50 FPM* and added two *Single Engine Service Ceiling* charts for *1.1% Gradient of Climb.* Added two pages 4F-9 and 4F-10.	Richard L Vaughn	11/12/96

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA Approved Signature	Date

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PART G – APPROACH AND LANDING PERFORMANCE

CONTENTS

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Maximum Landing Weight Limitation Chart
Bleed Air On 4G-2
Bleed Air Off 4G-3
Wet 4G-4
Two Engine Landing Distance Over 50 Foot Height 4G-5
Balked Landing Rate of Climb – Bleed Air On 4G-6

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MAXIMUM LANDING WEIGHT LIMITATION CHART – BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEEDS .... SEE LANDING APPROACH SPEEDS (FIGURE 4G-4)
GEAR ..... UP (APPROACH AND APPROACH CLIMB)
FLAPS ..... 1/4 (APPROACH AND APPROACH CLIMB)

EXAMPLE :

GIVEN: OAT = 3°C
PRESSURE ALTITUDE = 7,600 FEET
BLEED AIR – LOW
OBTAIN: MAX LANDING WEIGHT = 14,415 POUNDS (6540 kg)

NOTE

- REDUCE MAXIMUM LANDING WEIGHT BY 565 POUNDS (255 kg) WITH ENGINE ANTI-ICE ON.
- REDUCE MAXIMUM LANDING WEIGHT BY 245 POUNDS (110 kg) WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- THIS WEIGHT RESULTS IN A MAXIMUM LANDING WEIGHT AT WHICH A CLIMB GRADIENT EQUAL TO OR GREATER THAN 2.1% CAN BE MAINTAINED IN THE CONFIGURATION STATED ABOVE WITH ONE ENGINE INOPERATIVE.

FIGURE 4G-1

PERFORMANCE

MAXIMUM LANDING WEIGHT LIMITATION CHART – BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEEDS ..... SEE LANDING APPROACH SPEEDS (FIGURE 4G-4)
GEAR ..... UP (APPROACH AND APPROACH CLIMB)
FLAPS ..... 1/4 (APPROACH AND APPROACH CLIMB)

EXAMPLE:

GIVEN: OAT = 3°C
PRESSURE ALTITUDE = 6,600 FEET
OBTAIN: MAX LANDING WEIGHT = 15,510 POUNDS (7035 kg)

NOTE

- REDUCE MAXIMUM LANDING WEIGHT BY 495 POUNDS (225 kg) WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- THIS WEIGHT RESULTS IN A MAXIMUM LANDING WEIGHT AT WHICH A CLIMB GRADIENT EQUAL TO OR GREATER THAN 2.1% CAN BE MAINTAINED IN THE CONFIGURATION STATED ABOVE WITH ONE ENGINE INOPERATIVE.

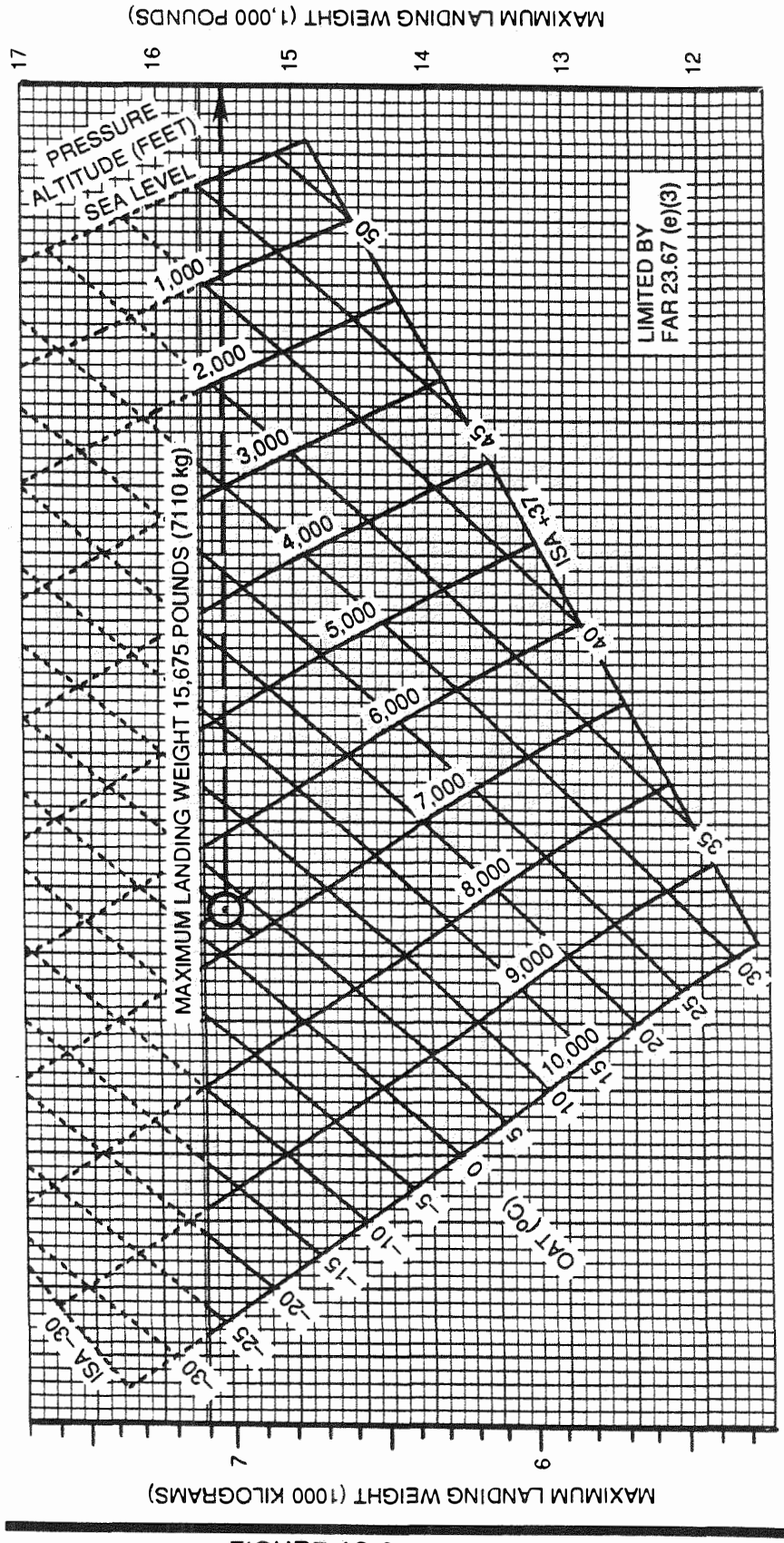


FIGURE 4G-2

MAXIMUM LANDING WEIGHT LIMITATION CHART – WET

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEEDS .... SEE LANDING APPROACH SPEEDS (FIGURE 4G-4)
GEAR ..... UP (APPROACH AND APPROACH CLIMB)
FLAPS ..... 1/4 (APPROACH AND APPROACH CLIMB)

EXAMPLE:

GIVEN: OAT = 12°C
PRESSURE ALTITUDE = 7,600 FEET
OBTAIN: MAX LANDING WEIGHT = 15,590 POUNDS (7070 kg)

NOTE

- REDUCE MAXIMUM LANDING WEIGHT BY 290 POUNDS (130 kg) WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- THIS WEIGHT RESULTS IN A MAXIMUM LANDING WEIGHT AT WHICH A CLIMB GRADIENT EQUAL TO OR GREATER THAN 2.1% CAN BE MAINTAINED IN THE CONFIGURATION STATED ABOVE WITH ONE ENGINE INOPERATIVE.

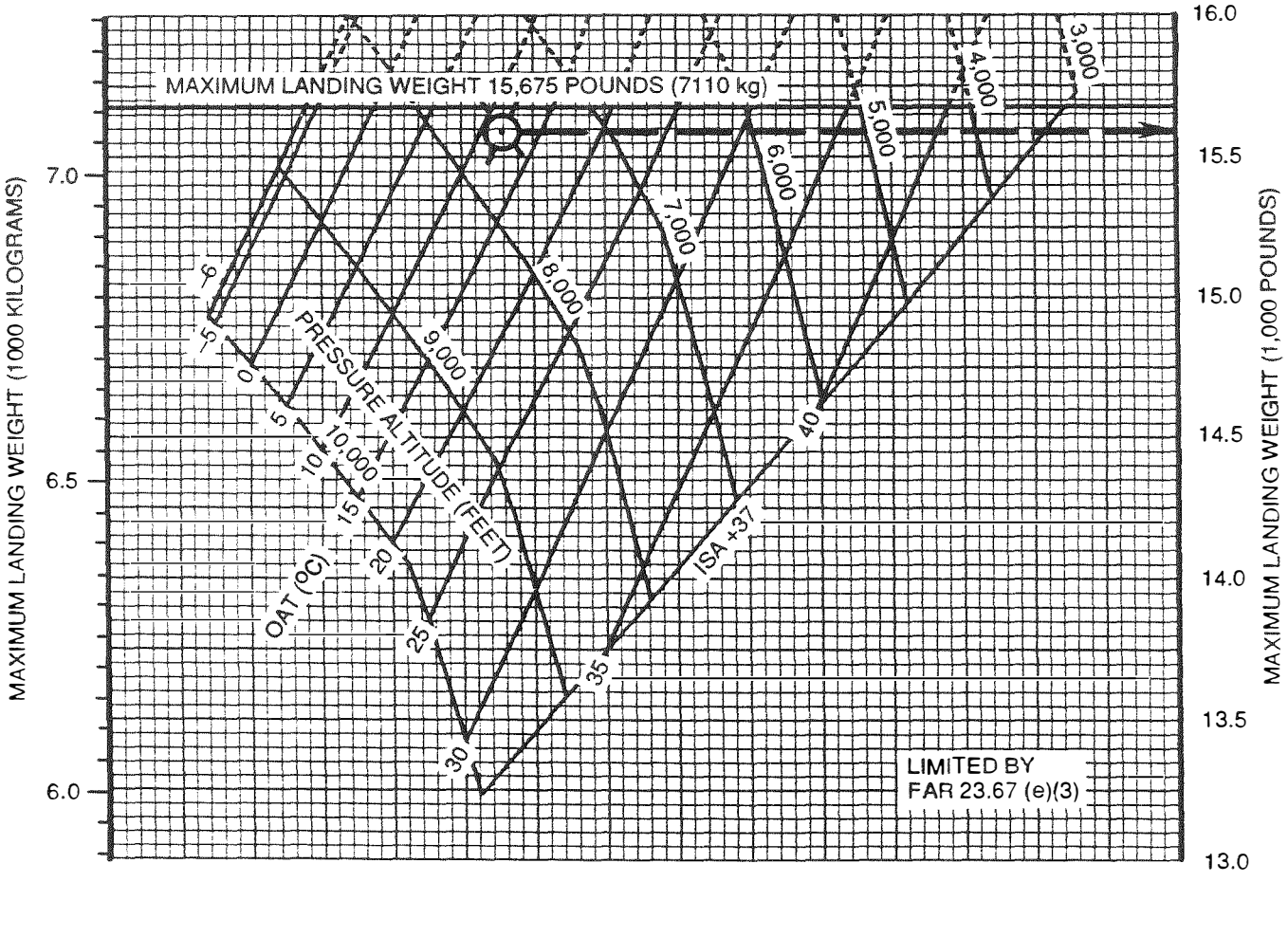


FIGURE 4G-3

TWO ENGINE LANDING DISTANCE OVER 50 FOOT HEIGHT

ASSOCIATED CONDITIONS:

APPROACH SPEED ..... SEE CHART
POWER ..... 3° GLIDE PATH
POWER AS REQUIRED
GEN LOAD ..... AS REQUIRED
BLEED AIR ..... AS REQUIRED
ENG ANTI-ICE ..... OFF
RUNWAY ..... DRY, LEVEL,
HARD SURFACE
GEAR ..... DOWN
FLAPS ..... DOWN
BRAKING ..... HEAVY DURING ROLLOUT
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 18°C
PRESSURE ALTITUDE = 7,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 15 KNOTS
OBTAIN: APPROACH SPEED = 115 KIAS
LANDING DISTANCE = 3,270 FEET (997 m)

NOTE

- LANDING GROUND ROLL IS 78% OF LANDING DISTANCE.
- IF APPLICABLE, SEE OPERATING RULES FOR FACTORS TO OBTAIN REQUIRED FIELD LENGTH.
- THE OPERATING RULES FACTORS DO NOT APPLY IF THIS CHART IS USED TO DETERMINE SINGLE ENGINE, OR FLAPS UP EMERGENCY LANDING DISTANCES (REFERENCE PAGE 3-9 OR 3-18).

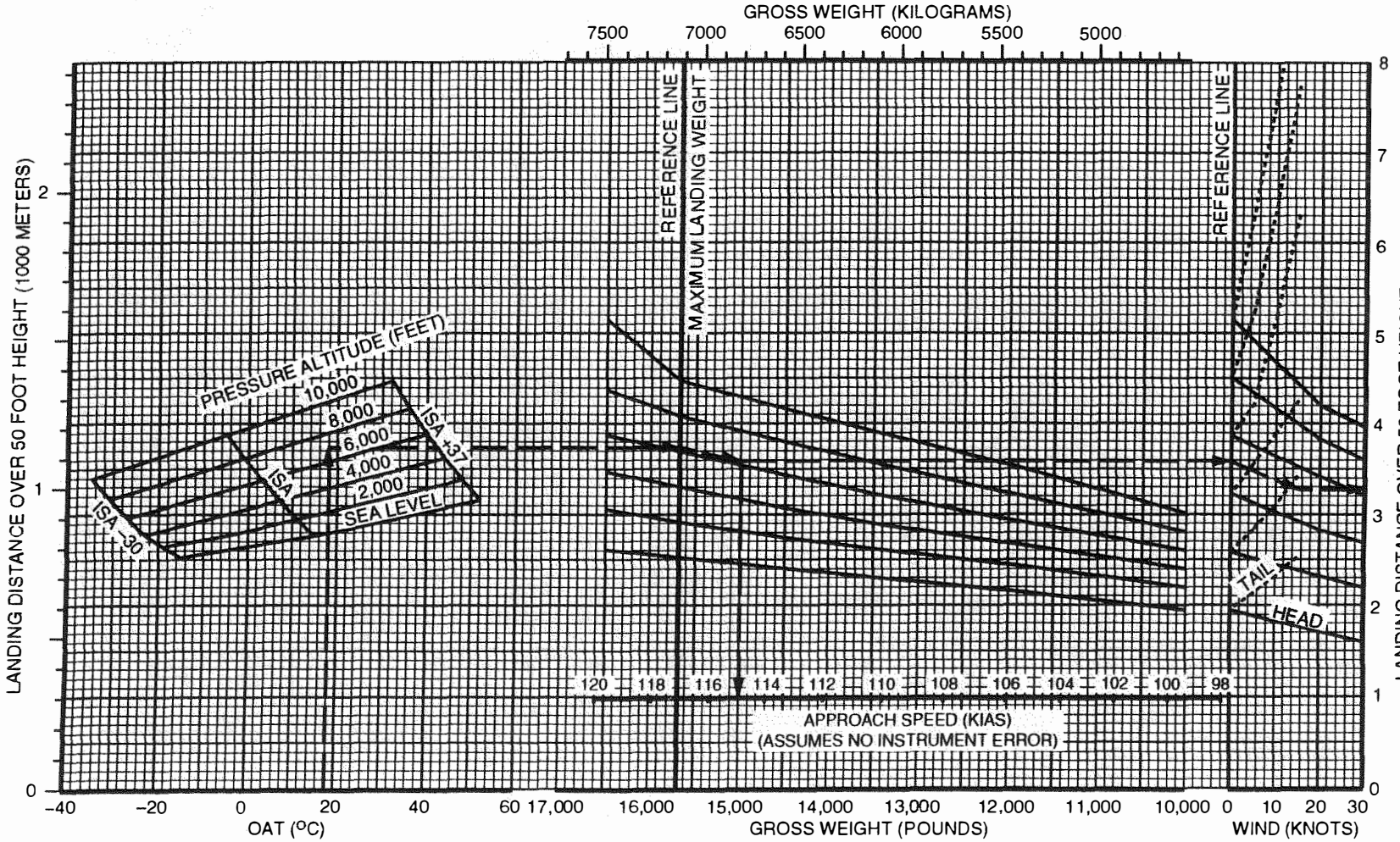
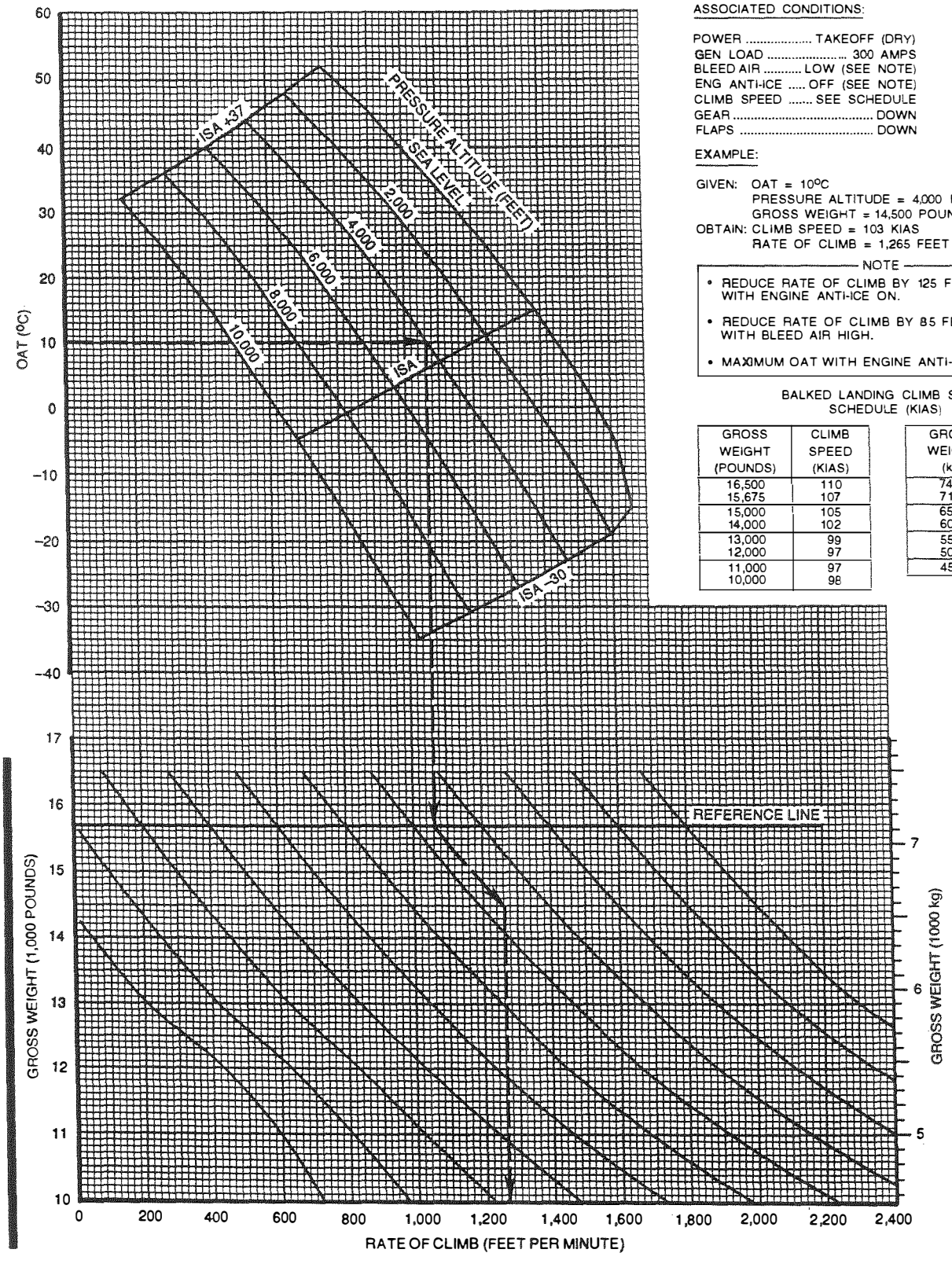


FIGURE 4G-4
PERFORMANCE

BALKED LANDING RATE OF CLIMB – BLEED AIR ON



ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... SEE SCHEDULE
GEAR ..... DOWN
FLAPS ..... DOWN

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 4,000 FEET
GROSS WEIGHT = 14,500 POUNDS (6580 kg)
OBTAIN: CLIMB SPEED = 103 KIAS
RATE OF CLIMB = 1,265 FEET PER MINUTE

NOTE

- REDUCE RATE OF CLIMB BY 125 FEET PER MINUTE WITH ENGINE ANTI-ICE ON.
- REDUCE RATE OF CLIMB BY 85 FEET PER MINUTE WITH BLEED AIR HIGH.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

BALKED LANDING CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)	CLIMB SPEED (KIAS)
16,500	110
15,675	107
15,000	105
14,000	102
13,000	99
12,000	97
11,000	97
10,000	98

GROSS WEIGHT (kg)	CLIMB SPEED (KIAS)
7485	110
7110	107
6500	103
6000	100
5500	97
5000	97
4500	98

FIGURE 4G-5

PART H – PERFORMANCE WHEN ENCUMBERED BY ICE ACCUMULATIONS

CONTENTS

ITEM	PAGE
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EFFECTS OF ICE ACCUMULATIONS

Flight test data was obtained for the SA227-DC in dry air with simulated ice shapes installed on the unprotected leading edges of the inboard wing sections, vertical stabilizer, and landing lights. The shapes represented the ice predicted to form on unprotected aerodynamic surfaces while holding for 45 minutes in continuous maximum (stratiform) or intermittent maximum (cumuliform) clouds containing supercooled droplets. Minor changes occurred in flight characteristics and significant changes occured in performance of the aircraft following accumulation of ice on its unprotected surfaces. The following are based on the results of those flight tests:

1. Ice shapes caused light, continuous airplane vibration throughout the speed range of the airplane as well as heavier, intermittent vibration similar to that encountered when flying in light turbulence.

2. Ice shapes caused the stall avoidance system warning horn and pusher speeds to be slightly higher than normal. However, using the landing approach speeds shown in Figure 4H-6 will provide sufficient maneuvering margin to preclude inadvertent stall warning horn or pusher actuation during landing.

3. The increased drag caused by ice shapes caused cruise, enroute single engine climb, and all-engine balked landing climb performance to be reduced.

PROCEDURES WHEN ENCUMBERED BY ICE

Both unshed ice accumulations and bleed air extraction to operate engine anti-icing or environmental control systems contribute to loss of performance when operating in icing conditions. The flight test results indicate that the encumbered performance shown in Figures 4H-1 through 4H-6 and the following procedures are appropriate.

1. When planning flights into known icing conditions, be aware of the potential performance reductions caused by requirements to extract bleed air for engine anti-icing and by accumulations of ice on unprotected parts of the aircraft.

2. Use high RPM to improve ice shedding characteristics of the propellers.

3. Consider unpressurized flight with bleed air switches off when experiencing performance degradations caused by flight in icing conditions.

4. Unless the pilot can determine that there are no ice accumulations on the unprotected surfaces of the aircraft, use the landing approach speeds shown in Figure 4H-6. This figure includes increased approach speeds and shows the landing distances resulting from that increase in approach speeds.

NOTE

If ambient temperature at the destination airport is $8^{O}C$ ($47^{O}F$), or warmer, retention of accumulated ice in the traffic pattern is considered to be unlikely and neither increased approach speeds nor Figures 4H-3 through 4H-6 apply.

WEIGHT TO ACHIEVE 1.2% SINGLE ENGINE CLIMB GRADIENT
WHEN ENCUMBERED BY ICE ACCUMULATIONS
DRY, BLEED AIR ON, ANTI-ICE ON

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... HIGH
ENG ANTI-ICE ..... ON
CLIMB SPEED ..... V_{YSE} (FIGURE 4H-2)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN : OAT = –3°C
PRESSURE ALTITUDE = 6,600 FEET
OBTAIN : WEIGHT TO ACHIEVE 1.2% CLIMB GRADIENT = 13,200 POUNDS (5985 kg)
V_{YSE} CLIMB SPEED = 126 KIAS

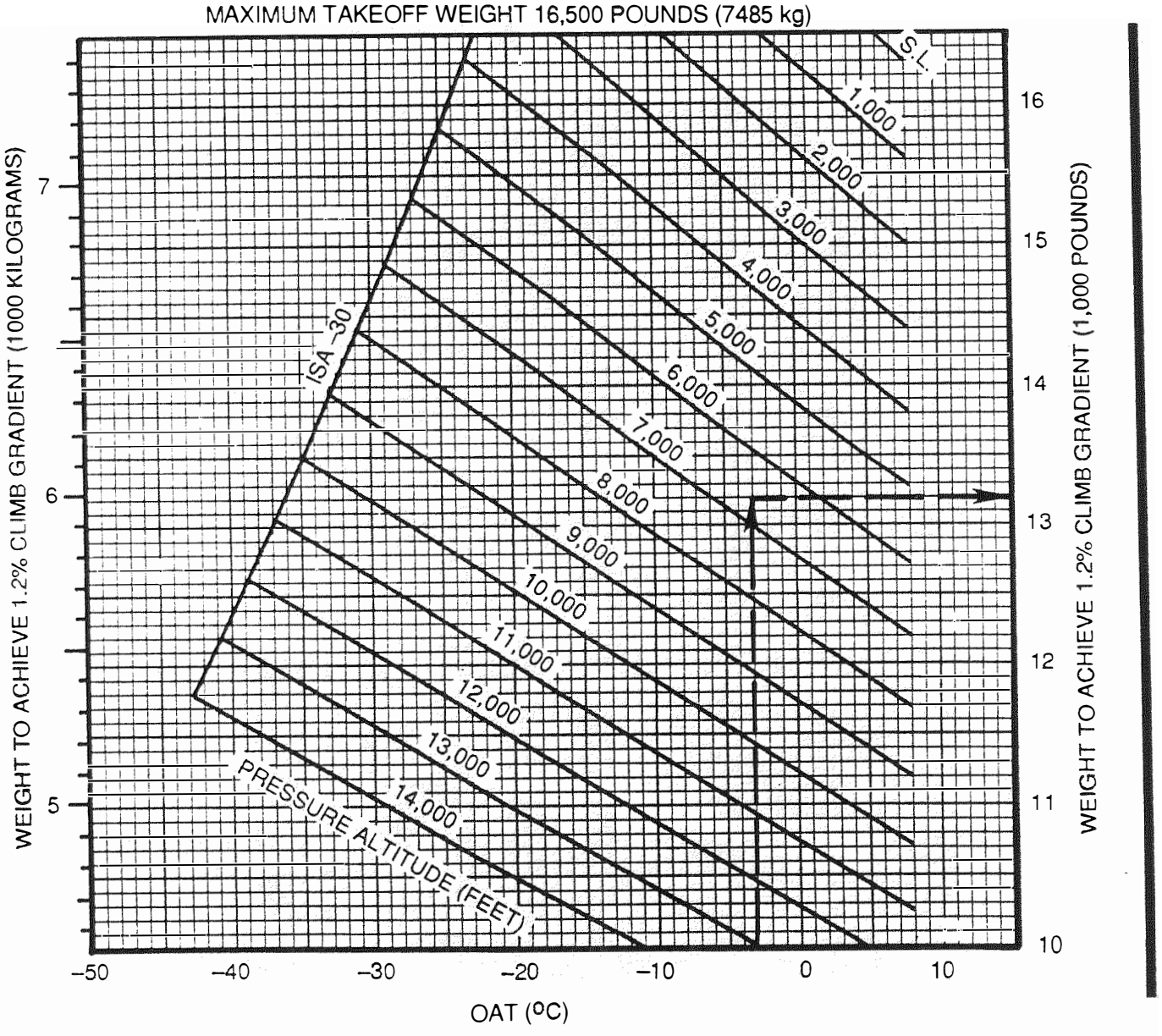


FIGURE 4H-1

SINGLE ENGINE RATE OF CLIMB
WHEN ENCUMBERED BY ICE ACCUMULATIONS
DRY, BLEED AIR ON, ANTI-ICE ON

ASSOCIATED CONDITIONS

POWER ..... MAX CONTINUOUS
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... HIGH
ENG ANTI-ICE ..... ON
CLIMB SPEED ..... SEE SCHEDULE
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: OAT = -5°C
PRESSURE ALTITUDE = 5,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
OBTAIN: CLIMB SPEED = 132 KIAS
RATE OF CLIMB = 155 FEET PER MINUTE

NOTE
OBTAIN OAT FROM IOAT (FIGURE 4B-2).

V_{YSE} CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)	PRESSURE ALTITUDE (FEET)				
	S.L.	5,000	10,000	15,000	20,000
16,500 16,000	136 135	136 135	136 135	136 135	136 135
15,000 14,000	133 128	132 128	132 128	132 128	132 128
13,000 12,000	123 121	123 120	123 118	123 118	123 118
11,000 10,000	119 117	117 114	115 111	113 109	111 107

GROSS WEIGHT (kg)	PRESSURE ALTITUDE (FEET)				
	S.L.	5,000	10,000	15,000	20,000
7485 7000	136 133	136 133	136 133	136 133	136 133
6500 6000	129 124	129 124	129 124	129 124	129 124
5500 5000	122 119	120 117	118 115	118 113	118 111
4500	117	114	111	109	106

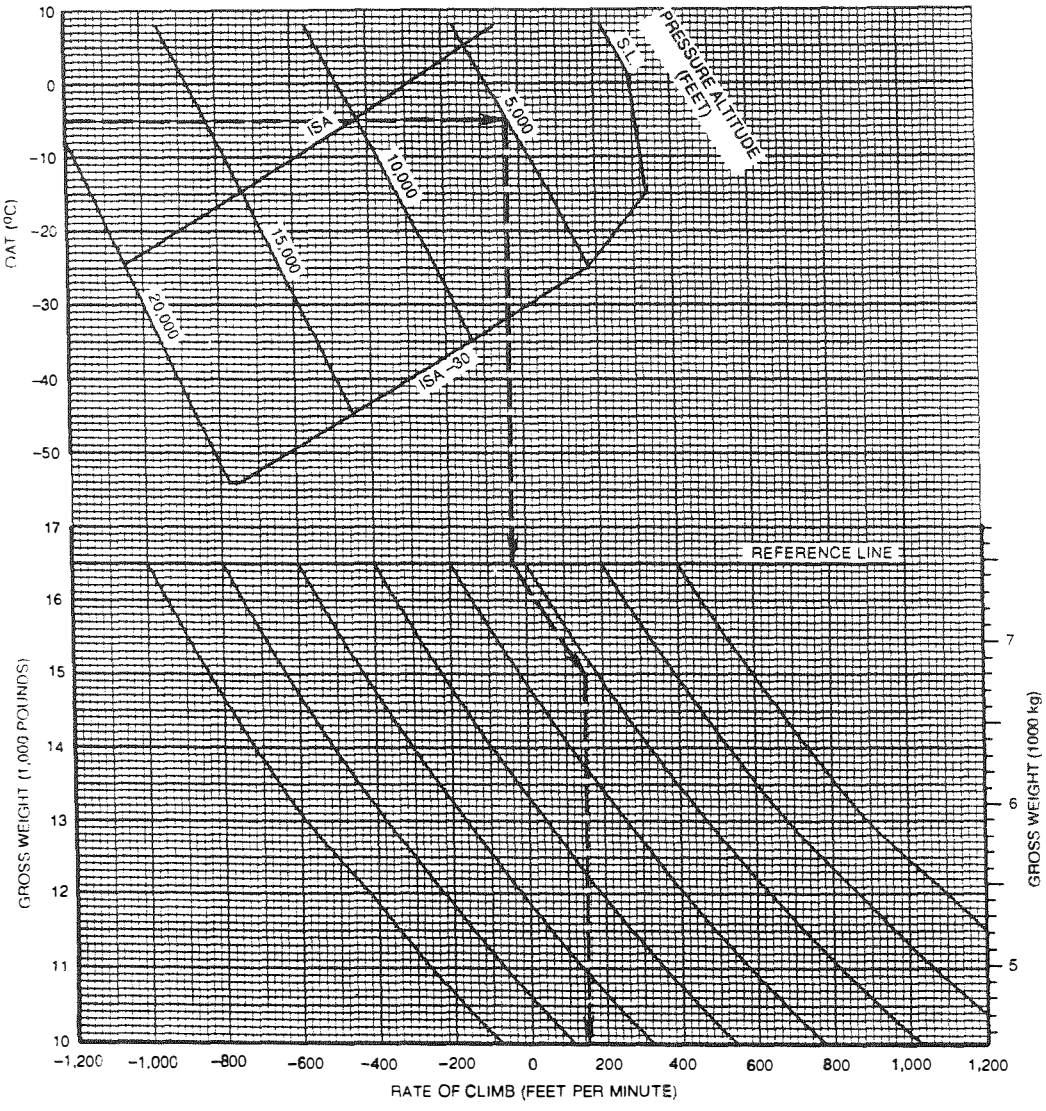


FIGURE 4H-2

WEIGHT TO ACHIEVE 3.3% BALKED LANDING CLIMB GRADIENT

WHEN ENCUMBERED BY ICE ACCUMULATIONS

DRY, BLEED AIR ON, ANTI-ICE ON

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	HIGH
ENG ANTI-ICE	ON
CLIMB SPEEDS	SEE FIGURE 4H-5
GEAR	DOWN
FLAPS	DOWN

EXAMPLE:

GIVEN: OAT = 5°C
PRESSURE ALTITUDE = 8,000 FEET

OBTAIN: GROSS WEIGHT = 15,590 POUNDS (7070 kg)
CLIMB SPEED = 112 KIAS

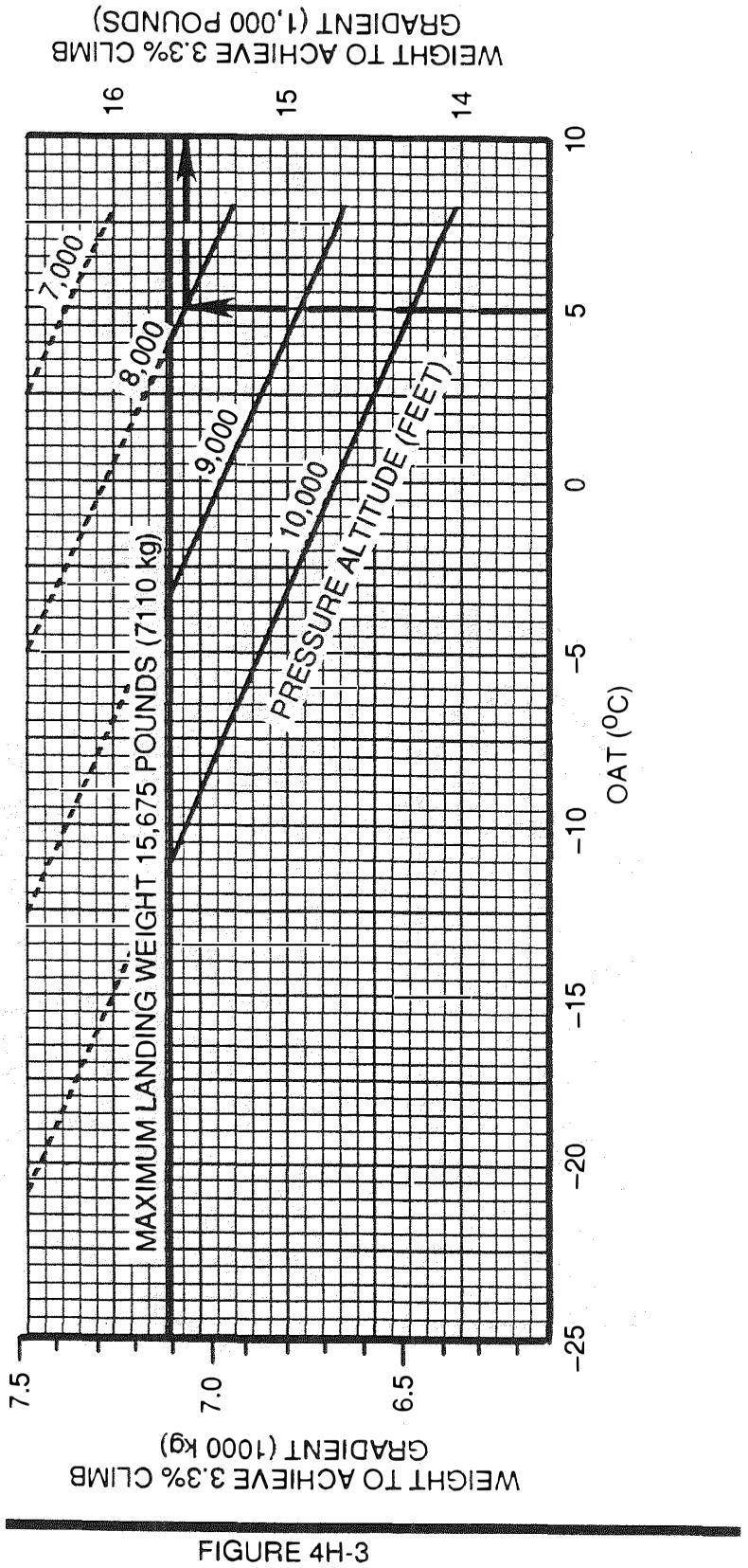


FIGURE 4H-3

WEIGHT TO ACHIEVE 2.1% SINGLE ENGINE APPROACH CLIMB GRADIENT
WHEN ENCUMBERED BY ICE ACCUMULATIONS
DRY, BLEED AIR ON, ANTI-ICE ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
PROPELLER ..... FEATHERED ON INOPERATIVE ENGINE
GEN LOAD ..... 300 AMPS
BLEED AIR ..... HIGH
ENG ANTI-ICE ..... ON
CLIMB SPEEDS ..... SEE SCHEDULE
GEAR ..... UP (APPROACH AND APPROACH CLIMB)
FLAPS ..... 1/4 (APPROACH AND APPROACH CLIMB)

EXAMPLE:

GIVEN: OAT = −5°C
PRESSURE ALTITUDE = 6,000 FEET
OBTAIN: GROSS WEIGHT = 12,770 POUNDS (5790 kg)
CLIMB SPEED = 123 KIAS

NOTE

THIS WEIGHT RESULTS IN A MAXIMUM LANDING WEIGHT AT WHICH A CLIMB GRADIENT EQUAL TO OR GREATER THAN 2.1% CAN BE MAINTAINED IN THE CONFIGURATION STATED ABOVE WITH ONE ENGINE INOPERATIVE.

SINGLE ENGINE APPROACH CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)							
16,500	15,675	15,000	14,000	13,000	12,000	11,000	10,000
137	134	131	128	124	121	117	112

GROSS WEIGHT (kg)						
7485	7110	6500	6000	5500	5000	4500
137	134	129	125	121	117	112

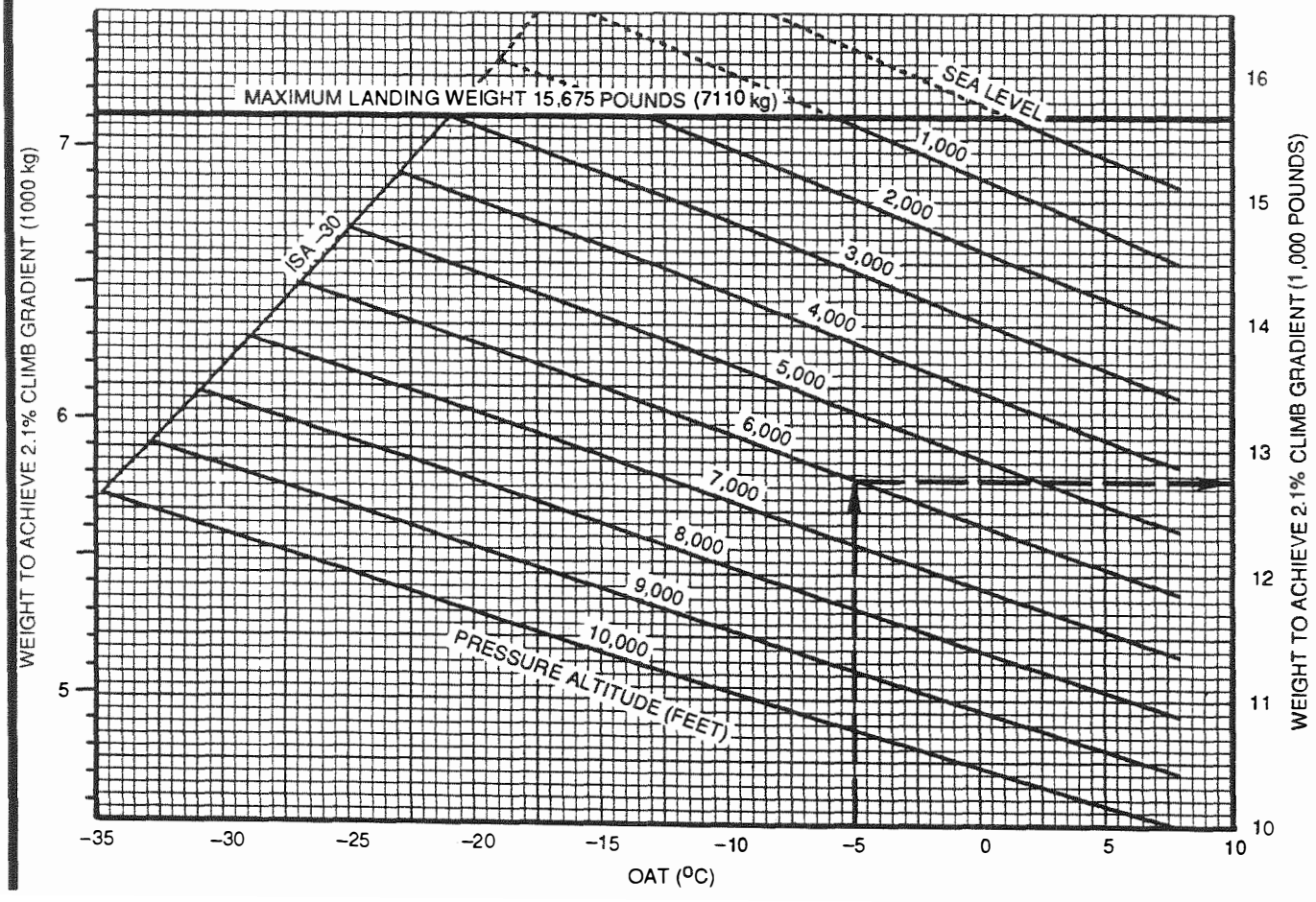


FIGURE 4H-4

BALKED LANDING RATE OF CLIMB
WHEN ENCUMBERED BY ICE ACCUMULATIONS
DRY, BLEED AIR ON, ANTI-ICE ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... HIGH
ENG ANTI-ICE..... ON
CLIMB SPEED..... SEE SCHEDULE
GEAR.....DOWN
FLAPS.....DOWN

EXAMPLE:

GIVEN: OAT = −5°C
PRESSURE ALTITUDE = 6,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
OBTAIN: CLIMB SPEED = 110 KIAS
RATE OF CLIMB = 890 FEET PER MINUTE

BALKED LANDING CLIMB SPEED SCHEDULE (KIAS)

GROSS WEIGHT (POUNDS)							
16,500	15,675	15,000	14,000	13,000	12,000	11,000	10,000
115	112	110	107	106	106	106	107

GROSS WEIGHT (kg)						
7485	7110	6500	6000	5500	5000	4500
115	112	108	106	106	106	107

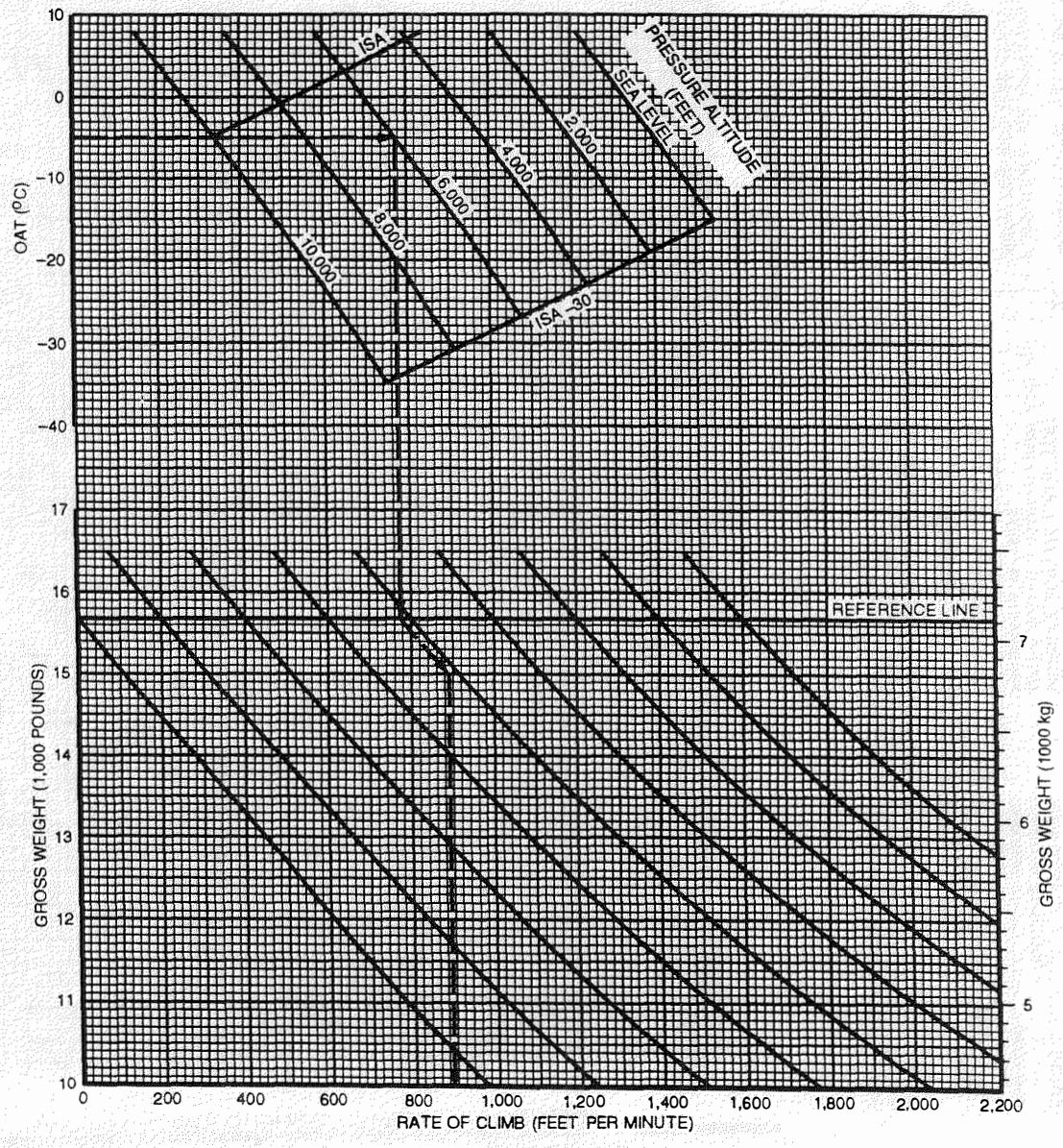


FIGURE 4H-5

TWO ENGINE LANDING DISTANCE OVER 50 FOOT HEIGHT
WHEN ENCUMBERED BY ICE ACCUMULATIONS

ASSOCIATED CONDITIONS:

APPROACH SPEED ..... SEE CHART
POWER ..... 3° GLIDE PATH
POWER AS REQUIRED
GEN LOAD ..... AS REQUIRED
BLEED AIR ..... AS REQUIRED
ENG ANTI-ICE ..... ON
RUNWAY ..... DRY, LEVEL,
HARD SURFACE
GEAR ..... DOWN
FLAPS ..... DOWN
BRAKING ..... HEAVY DURING ROLLOUT
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 0°C
PRESSURE ALTITUDE = 6,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 15 KNOTS
OBTAIN: APPROACH SPEED = 120 KIAS
LANDING DISTANCE = 3,150 FEET (960 m)

WARNING

DOWNWIND LANDINGS PROHIBITED AT GROSS WEIGHTS ABOVE THE TAILWIND LIMIT LINE.

NOTE

- LANDING GROUND ROLL IS 77% OF LANDING DISTANCE.
- IF APPLICABLE, SEE OPERATING RULES FOR FACTORS TO OBTAIN REQUIRED FIELD LENGTH.
- IF AMBIENT TEMPERATURE AT THE DESTINATION AIRPORT IS 8°C (47°F), OR WARMER, RETENTION OF ACCUMULATED ICE IS CONSIDERED UNLIKELY.

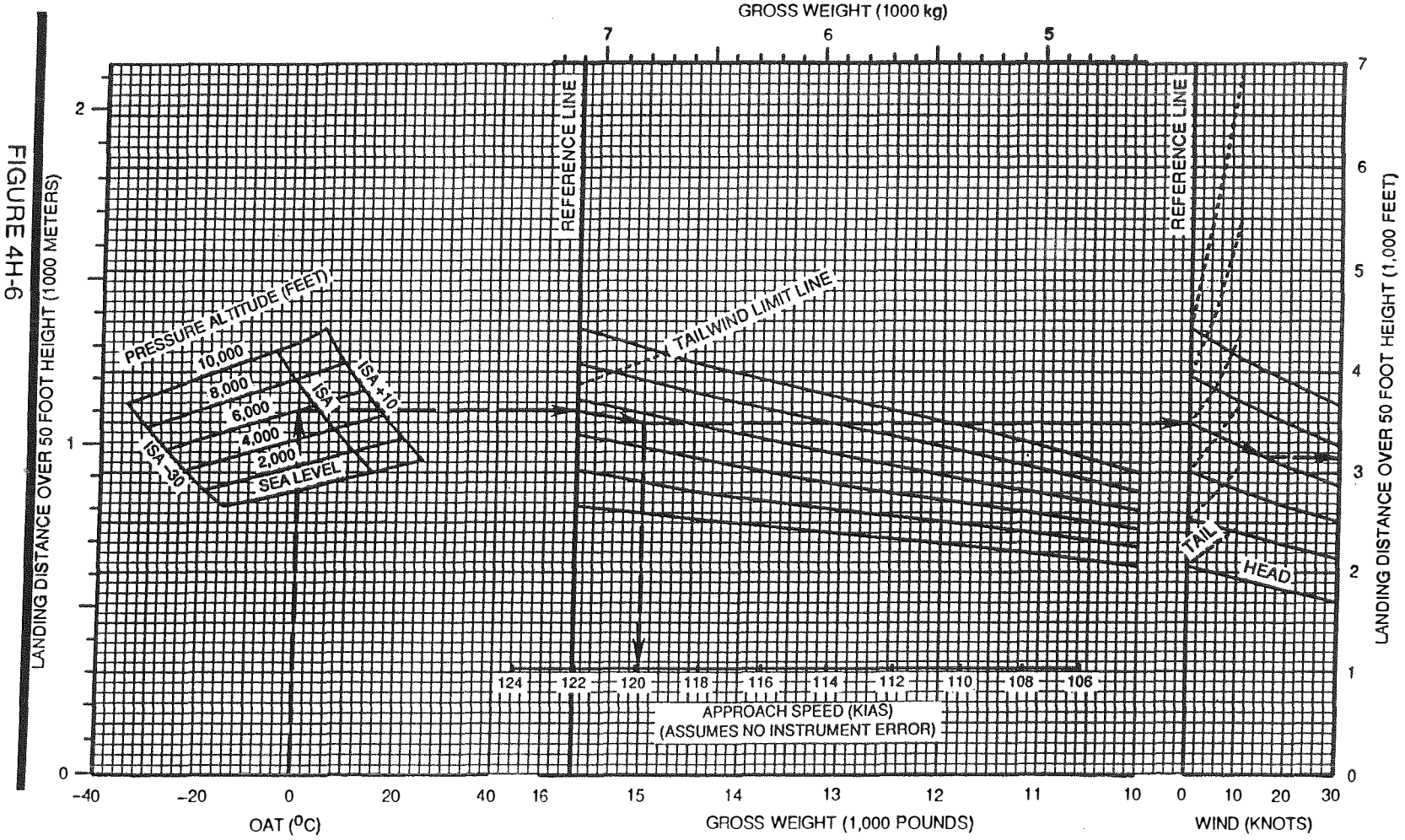


FIGURE 4H-6

PERFORMANCE

FAA APPROVED: AUG 23/91
Revised: AUG 09/93

PART I – REDUCED POWER TAKEOFF OPERATIONS

CONTENTS

ITEM	PAGE
Introduction	4I-1
Worksheet – Reduced Power Takeoff	4I-3
Example 1	4I-4
Example 2	4I-6
Example 3	4I-8

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INTRODUCTION

Part I provides for the use of reduced engine power for takeoff by employing the Assumed Temperature Method (ATM). This technique allows takeoff with less than the maximum available engine power in those cases where excess climb performance and runway length are available. The amount of power to be set for the reduced power takeoff is determined by assuming an air temperature, higher than the actual temperature, at which adequate performance is available.

The limitations applicable to reduced power operations are repeated below from Section 1.

1. The engine torque used for a takeoff may not be less than 90% of the torque shown by the appropriate power setting chart for the actual ambient conditions.

2. The use of reduced power for takeoff is not permitted when the runway is contaminated with water, ice, slush, or snow.

3. As a condition to the use of reduced power procedures, operators must establish a periodic check system or engine condition monitoring system to ensure that the engines are capable of producing normal takeoff thrust for the actual ambient temperature.

4. Air Carrier or Air Taxi commercial operators must have prior approval of the cognizant FAA inspector prior to conducting reduced power takeoff operations.

5. The minimum crew for reduced power takeoff operations is two pilots.

The correct engine torque to be set for reduced power takeoff is determined from the performance section using the technique illustrated by the filled-in work sheets on Figures 4I-2, 4I-3, and 4I-4.

For any given set of conditions, the procedure involves:

1. Determination of the highest OAT at which the performance requirements will allow takeoff; this becomes the assumed temperature.

2. Finding the torque to be used. This is the higher of the torque for a 10% power reduction at the actual OAT or the torque for the assumed temperature.

NOTE

Determine both computed reduced power and maximum takeoff power torques. Set computed reduced power torque for takeoff. If more power is required during takeoff (engine failure, windshear encounter, etc.), torque can be increased to maximum takeoff power torque.

3. Selection of the takeoff speeds for the actual OAT and takeoff weight conditions.

Use the procedure outlined by the form presented on Figure 4I-1 of this part, together with the performance data listed below, to establish the minimum safe power setting for takeoff and the associated scheduled speeds. The procedure is illustrated by three examples on pages 4I-4, 4I-6, and 4I-8.

INTRODUCTION (continued)

Applicable Performance Data

Takeoff Power Check Chart
- Dry, Bleed Air On ..... Figure 4C-1
- Dry, Bleed Air Off ..... Figure 4D-1
- Wet ..... Figure 4E-1

Takeoff Speeds V_1, V_R, V_2, and V_{50}
- Dry, Bleed Air On ..... Figure 4C-3
- Dry, Bleed Air Off ..... Figure 4D-3
- Wet ..... Figure 4E-3

Maximum Takeoff Weight Limitation Chart
- Dry, Bleed Air On ..... Figure 4C-2
- Dry, Bleed Air Off ..... Figure 4D-2
- Wet ..... Figure 4E-2

Distance to Accelerate to V_1 and Stop
- Dry, Bleed Air On ..... Figure 4C-4
- Dry, Bleed Air Off ..... Figure 4D-4
- Wet ..... Figure 4E-4

Single Engine Takeoff Distance to 35 Foot Height
- Dry, Bleed Air On ..... Figure 4C-5
- Dry, Bleed Air Off ..... Figure 4D-5
- Wet ..... Figure 4E-5

WORKSHEET
REDUCED POWER TAKEOFF
ASSUMED TEMPERATURE METHOD (ATM)

(1)	ACTUAL PRESSURE ALTITUDE			FT.
(2)	ACTUAL OAT			°C
(3)	RUNWAY LENGTH, SLOPE, AND WIND	FT.	%	KTS.
(4)	GROSS WEIGHT			LBS.

(5) MAX. OAT FOR GROSS WEIGHT (4), _____ POWER

(a)	MAXIMUM TAKEOFF WEIGHT LIMITATION CHART	FIG.	°C
(b)	DISTANCE TO ACCEL TO V_1 AND STOP CHART	FIG.	°C
(c)	SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT CHART	FIG.	°C

NOTE

WHEN (5a), (5b), AND (5c) RESULT IN MAX. OAT's WARMER THAN THE ISA +37 BOUNDARY IN THE FIGURES, THE ASSUMED TEMPERATURE IS THE MAXIMUM TEMPERATURE APPROVED FOR THE ALTITUDE (ISA+37°C).

IF EITHER (5a), (5b), OR (5c) IS LOWER THAN ACTUAL OAT (2), THE GROSS WEIGHT MUST BE REDUCED OR A DIFFERENT POWER CONDITION USED.

(6)	ASSUMED TEMPERATURE [LOWER OF (5a), (5b), OR (5c)] , OR MAXIMUM ALLOWABLE	°C

(7) TORQUE. FROM TAKEOFF POWER CHECK CHART, FIGURE: _____

(a)	FOR OAT (2)	%
(b)	TORQUE FOR (a) – [(a) DIVIDED BY 10]	%
(c)	FOR ASSUMED TEMPERATURE (6)	%
(d)	COMPUTED TORQUE, USE HIGHER OF (b) OR (c)	%

(8) TAKEOFF SPEEDS, FIGURE: _____

(a)	V_1 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS
(b)	V_R FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS
(c)	V_2 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS
(d)	V_{50} FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS

FIGURE 4I-1

REDUCED POWER TAKEOFF (continued)

EXAMPLE 1

Given Conditions:

Engine Power Setting for Takeoff – Dry, Bleed Air Off
Airport Altitude: 1,000 Feet Press. Alt.
Airport OAT: 20°C
Runway Length: 5,500 Feet
Runway Slope: Level
Airport Wind: Zero
Desired Takeoff Weight: 14,000 Lbs.

- Dry takeoff power with bleed air off is desired, so Figure 4D-2, Maximum Takeoff Weight Limitation Chart, is used to determine (5a).
- Figure 4D-4, Distance to Accelerate to V_1 and Stop, is used with given runway length to determine (5b).
- Figure 4D-5, Single Engine Takeoff Distance to 35 Foot Height, is used with given runway length to determine (5c).
- Figure 4D-1, Takeoff Power Check Chart – Dry, Bleed Air Off, is used to determine (7a) and (7c).
- The torque for the actual OAT, when reduced by 10% (7b) is higher than that for the assumed temperature (7c), so the higher torque is used for the Computed Torque, (7d).
- Takeoff speeds are determined from Figure 4D-3.

EXAMPLE 1 (continued)

WORKSHEET
REDUCED POWER TAKEOFF
ASSUMED TEMPERATURE METHOD (ATM)

(1)	ACTUAL PRESSURE ALTITUDE			*1,000* FT.
(2)	ACTUAL OAT			*20* °C
(3)	RUNWAY LENGTH, SLOPE, AND WIND	*5,500* FT.	*0* %	*0* KTS.
(4)	GROSS WEIGHT			*14,000* LBS.

(5) MAX. OAT FOR GROSS WEIGHT (4), ***DRY, BLEED AIR OFF*** POWER

(a)	MAXIMUM TAKEOFF WEIGHT LIMITATION CHART	FIG. *4D-2*	*45* °C
(b)	DISTANCE TO ACCEL TO V_1 AND STOP CHART	FIG. *4D-4*	*46* °C
(c)	SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT CHART	FIG. *4D-5*	*44* °C

NOTE

WHEN (5a), (5b), AND (5c) RESULT IN MAX. OAT's WARMER THAN THE ISA +37 BOUNDARY IN THE FIGURES, THE ASSUMED TEMPERATURE IS THE MAXIMUM TEMPERATURE APPROVED FOR THE ALTITUDE (ISA+37°C).

IF EITHER (5a), (5b), OR (5c) IS LOWER THAN ACTUAL OAT (2), THE GROSS WEIGHT MUST BE REDUCED OR A DIFFERENT POWER CONDITION USED.

(6) ASSUMED TEMPERATURE [LOWER OF (5a), (5b), OR (5c)] , OR MAXIMUM ALLOWABLE ..... *44* °C

(7) TORQUE. FROM TAKEOFF POWER CHECK CHART, FIGURE: ***4D-1***

(a)	FOR OAT (2)	*97.2* %
(b)	TORQUE FOR (a) – [(a) DIVIDED BY 10]	*87.5* %
(c)	FOR ASSUMED TEMPERATURE (6)	*81.0* %
(d)	COMPUTED TORQUE, USE HIGHER OF (b) OR (c)	*87.5* %

(8) TAKEOFF SPEEDS, FIGURE: ***4D-3***

(a)	V_1 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*108* KIAS
(b)	V_R FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*108* KIAS
(c)	V_2 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*113* KIAS
(d)	V_{50} FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*123* KIAS

FIGURE 4I-2

REDUCED POWER TAKEOFF (continued)

EXAMPLE 2

Given Conditions:

Engine Power Setting for Takeoff – Dry, Bleed Air Off
Airport Altitude: 3,000 Feet Press. Alt.
Airport OAT: 20°C
Runway Length: 8,000 Feet
Aunway Slope: Level
Airport Wind: No Wind
Desired Takeoff Weight: 15,000 Lbs.

- (5b) results in a Max. OAT greater than ISA +37°C, so the maximum allowable temperature of ISA +37°C is entered. The lower temperature of 22°C from (5a) is entered in (6).

- The Computed Torque, (7d) is limited by the assumed temperature (7c).

EXAMPLE 2 (continued)

WORKSHEET
REDUCED POWER TAKEOFF
ASSUMED TEMPERATURE METHOD (ATM)

(1)	ACTUAL PRESSURE ALTITUDE			*3,000* FT.
(2)	ACTUAL OAT			*20* °C
(3)	RUNWAY LENGTH, SLOPE, AND WIND	*8,000* FT.	*0* %	*0* KTS.
(4)	GROSS WEIGHT			*15,000* LBS.

(5) MAX. OAT FOR GROSS WEIGHT (4), *Dry, Bleed Air Off*

(a)	MAXIMUM TAKEOFF WEIGHT LIMITATION CHART	FIG. *4D-2*	*22* °C
(b)	DISTANCE TO ACCEL TO V_1 AND STOP CHART	FIG. *4D-4*	*ISA +37* °C
(c)	SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT CHART	FIG. *4D-5*	*44* °C

NOTE

WHEN (5a), (5b), AND (5c) RESULT IN MAX. OAT's WARMER THAN THE ISA +37 BOUNDARY IN THE FIGURES, THE ASSUMED TEMPERATURE IS THE MAXIMUM TEMPERATURE APPROVED FOR THE ALTITUDE (ISA+37°C).

IF EITHER (5a), (5b), OR (5c) IS LOWER THAN ACTUAL OAT (2), THE GROSS WEIGHT MUST BE REDUCED OR A DIFFERENT POWER CONDITION USED.

(6) ASSUMED TEMPERATURE [LOWER OF (5a), (5b), OR (5c)] , OR MAXIMUM ALLOWABLE ..... *22* °C

(7) TORQUE, FROM TAKEOFF POWER CHECK CHART, FIGURE: *4D-1*

(a)	FOR OAT (2)	*90.1* %
(b)	TORQUE FOR (a) – [(a) DIVIDED BY 10]	*81.1* %
(c)	FOR ASSUMED TEMPERATURE (6)	*89.0* %
(d)	COMPUTED TORQUE, USE HIGHER OF (b) OR (c)	*89.0* %

(8) TAKEOFF SPEEDS, FIGURE: *4D-3*

(a)	V_1 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*114* KIAS
(b)	V_R FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*114* KIAS
(c)	V_2 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*116* KIAS
(d)	V_{50} FOR ALTITUDE (1), OAT (2), WEIGHT (4)	*125* KIAS

FIGURE 4I-3

REDUCED POWER TAKEOFF (continued)

EXAMPLE 3

Given Conditions:

Engine Power Setting for Takeoff – Dry, Bleed Air Off
Airport Altitude: 2,000 Feet Press. Alt.
Airport OAT: 35^{O}C
Runway Length: 10,000 Feet
Runway Slope: Level
Airport Wind: 5 Knots Headwind
Desired Takeoff Weight: 15,000 Lbs.

- In this example (5a) results in a Max. OAT less than the actual airport OAT.
- Gross weight must be reduced.

EXAMPLE 3 (continued)

WORKSHEET
REDUCED POWER TAKEOFF
ASSUMED TEMPERATURE METHOD (ATM)

(1)	ACTUAL PRESSURE ALTITUDE			*2,000* FT.
(2)	ACTUAL OAT			*35* °C
(3)	RUNWAY LENGTH, SLOPE, AND WIND	*10,000* FT.	*0* %	*5* KTS.
(4)	GROSS WEIGHT			*15,000* LBS.

(5) MAX. OAT FOR GROSS WEIGHT (4), *DRY, BLEED AIR OFF* POWER

(a)	MAXIMUM TAKEOFF WEIGHT LIMITATION CHART	FIG. *4D-2*	*29* °C
(b)	DISTANCE TO ACCEL TO V_1 AND STOP CHART	FIG. *4D-4*	*ISA +37* °C
(c)	SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT CHART	FIG. *4D-5*	*ISA +37* °C

NOTE

WHEN (5a), (5b), AND (5c) RESULT IN MAX. OAT's WARMER THAN THE ISA +37 BOUNDARY IN THE FIGURES, THE ASSUMED TEMPERATURE IS THE MAXIMUM TEMPERATURE APPROVED FOR THE ALTITUDE (ISA+37°C).

➡ IF EITHER (5a), (5b), OR (5c) IS LOWER THAN ACTUAL OAT (2), THE GROSS WEIGHT MUST BE REDUCED OR A DIFFERENT POWER CONDITION USED.

(6)	ASSUMED TEMPERATURE [LOWER OF (5a), (5b), OR (5c)] , OR MAXIMUM ALLOWABLE	°C
(7)	TORQUE, FROM TAKEOFF POWER CHECK CHART, FIGURE: _____	
(a)	FOR OAT (2)	%
(b)	TORQUE FOR (a) – [(a) DIVIDED BY 10]	%
(c)	FOR ASSUMED TEMPERATURE (6)	%
(d)	COMPUTED TORQUE, USE HIGHER OF (b) OR (c)	%
(8)	TAKEOFF SPEEDS, FIGURE: _____	
(a)	V_1 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS
(b)	V_R FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS
(c)	V_2 FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS
(d)	V_{50} FOR ALTITUDE (1), OAT (2), WEIGHT (4)	KIAS

FIGURE 4I-4

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PART J – SUPPLEMENTAL TAKEOFF PERFORMANCE

CONTENTS

ITEM	PAGE
Discussion	4J-2
Takeoff Speed Schedules – Dry, Bleed Air Off	4J-4
Distance to Accelerate to V_1 and Stop – Dry, Bleed Air Off	4J-12
Single Engine Takeoff Distance to 35 Foot Height – Dry, Bleed Air Off	4J-13
Single Engine Takeoff Run Distance – Dry, Bleed Air Off	4J-15
Takeoff Speed Schedules – Wet	4J-16
Distance to Accelerate to V_1 and Stop – Wet	4J-24
Single Engine Takeoff Distance to 35 Foot Height – Wet	4J-25
Single Engine Takeoff Run Distance – Wet	4J-26

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DISCUSSION

Part J includes additional takeoff performance charts for DRY, Bleed Air OFF and WET power based on alternate takeoff speeds. It also provides a means of determining the optimum V_1 for a given set of takeoff conditions.

The takeoff charts in Parts D and E are based on V_1's equal to V_R for most conditions so that single engine takeoff distance to 35 foot height will be equal to or slightly longer than the accelerate to V_1 and stop distance when winds are calm and the runway is level. The charts in Part J are based on V_1's equal to the minimum allowable V_1 (V_1 equal to the larger of 1.1 V_{S1} or 1.1 V_{MC}). This will produce the shortest accelerate to V_1 and stop distance at the expense of the single engine takeoff distance to 35 foot height.

The following example is a method to balance V_1 for specific conditions with the performance charts from Section 4 Parts D, and J:

Conditions

- Runway Length = 4,000 feet
- Clearway = 500 feet
- Stopway = 250 feet
- Airport OAT = 10°C
- Airport Pressure Altitude = 2,000 feet
- Gross Weight = 15,000 pounds
- Headwind = 20 knots
- Runway Slope = 1 percent (downhill)
- Power = Takeoff (DRY)
- Bleed Air = OFF

The Take Off Distance Available (TODA) is equal to the runway length plus allowable clearway. For this example the TODA is equal to 4,500 feet. The Accelerate Stop Distance Available (ASDA) is equal to the runway length plus allowable stopway so that the ASDA is equal to 4,250 feet. The Take Off Run Available (TORA) is equal to the runway length or 4,000 feet for this example.

The actual aircraft performance for the above example is as follows:

	Part D	Part J
Single Engine Takeoff Distance to 35 Feet	4,200 feet	4,900 feet
Accelerate to V_1 and Stop Distance	4,360 feet	3,900 feet
Single Engine Takeoff Run Distance	3,750 feet	4,380 feet
Takeoff Decision Speed, V_1	113 KIAS	107 KIAS

For this example, a decision speed between 110.6 to 111.6 satisfies all requirements.

- Accelerate Stop – V_1 must be 111.6 KIAS or less
- Takeoff Run – V_1 must be 110.6 KIAS or more
- Single Engine Takeoff – V_1 must be 110.4 KIAS or more

To obtain the maximum allowable takeoff weight for these conditions, the gross weight could be increased and the above procedure repeated until a balanced V_1 is obtained.

RUNWAY BALANCING EXAMPLE

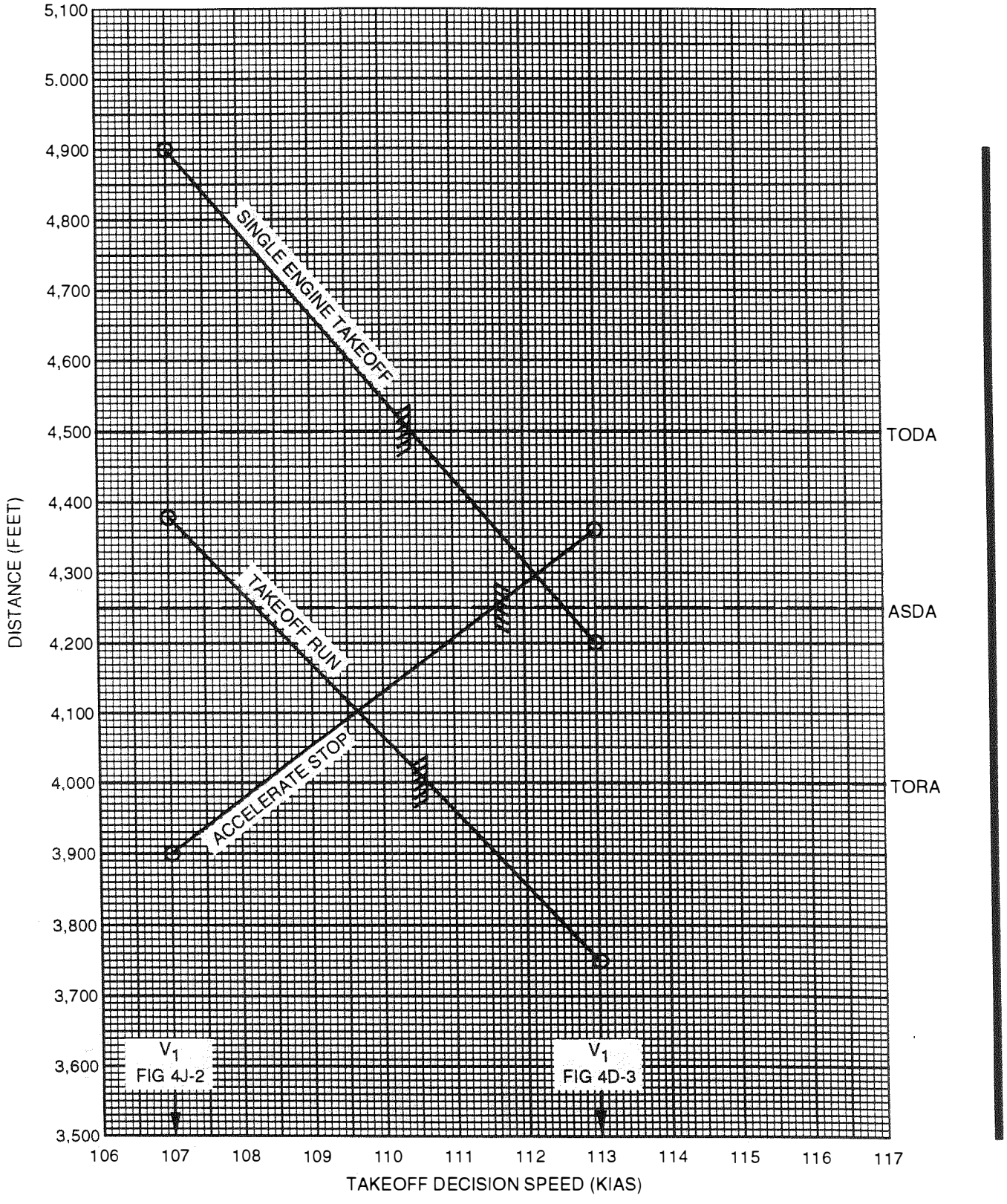


FIGURE 4J-1

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																											
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	16500	112	116	121	131	112	117	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	120	121	130				
	16000	110	114	120	130	110	115	120	129	110	115	120	129	110	116	120	129	110	117	120	129	110	118	120	128	110	120	120	127
	15500	109	111	118	128	109	112	118	128	109	113	118	128	109	113	118	128	109	114	118	127	109	116	118	127	109	118	118	126
	15000	107	109	116	127	107	110	116	127	107	110	116	126	107	111	116	126	107	112	116	126	107	113	116	126	107	116	116	125
	14500	106	106	114	126	106	107	114	125	106	108	114	125	106	108	114	125	106	109	114	125	106	111	114	124	106	113	114	123
	14000	103	103	113	124	104	104	113	124	104	105	113	124	104	106	113	124	104	107	113	123	104	108	113	123	104	111	113	122
	13500	102	102	113	125	102	102	112	123	102	102	111	123	102	103	111	122	102	104	111	122	102	105	111	121	102	108	111	121
	13000	101	101	113	126	101	101	111	123	101	101	111	122	101	101	110	121	101	101	109	121	101	103	109	120	101	106	109	119
	12500	102	102	115	128	101	101	113	125	101	101	112	124	100	100	111	122	100	100	109	121	100	101	109	120	100	104	109	119
	12000	103	103	117	130	102	102	115	128	101	101	114	126	101	101	112	124	100	100	110	122	100	101	109	121	100	103	109	120
	11500	104	104	119	133	103	103	117	130	102	102	116	129	101	101	114	127	101	101	112	124	100	100	110	122	100	103	109	120
	11000	103	103	120	135	103	103	119	132	103	103	118	131	102	102	116	129	101	101	114	126	100	100	112	124	100	102	109	120
	10500	103	103	122	136	103	103	120	134	103	103	119	133	103	103	118	131	102	102	116	129	101	101	113	126	100	101	110	121
	10000	103	103	123	139	103	103	122	136	103	103	121	135	103	103	120	134	103	103	118	131	102	102	116	129	100	100	110	122
1000	16500	112	117	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	120	121	130								
	16000	110	114	120	130	110	115	120	129	110	116	120	129	110	117	120	129	110	118	120	129	110	119	120	128				
	15500	109	112	118	128	109	113	118	128	109	113	118	128	109	114	118	127	109	115	118	127	109	116	118	127				
	15000	107	109	116	127	107	110	116	127	107	111	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	116	116	124
	14500	106	106	114	126	106	108	114	125	106	108	114	125	106	109	114	125	106	110	114	124	106	111	114	124	106	114	114	123
	14000	104	104	113	124	104	105	113	124	104	106	113	124	104	107	113	123	104	108	113	123	104	109	113	123	104	112	113	122
	13500	102	102	112	124	102	102	111	123	102	103	111	122	102	104	111	122	102	105	111	122	102	106	111	121	102	109	111	120
	13000	101	101	112	124	101	101	111	122	101	101	110	121	101	101	109	121	101	102	109	120	101	104	109	120	101	106	109	119
	12500	102	102	114	127	101	101	112	124	100	100	111	123	100	100	109	121	100	101	109	120	100	102	109	120	100	105	109	119
	12000	102	102	116	129	101	101	114	126	101	101	112	125	100	100	111	123	100	100	109	121	100	101	109	120	100	104	109	119
	11500	103	103	118	132	102	102	116	129	102	102	114	127	101	101	112	125	100	100	110	122	100	101	109	121	100	104	109	120
	11000	103	103	120	134	103	103	118	131	102	102	116	129	102	102	114	127	101	101	112	124	100	100	110	122	100	103	109	120
	10500	103	103	121	135	103	103	119	133	103	103	118	132	102	102	116	129	101	101	114	127	100	100	112	124	100	102	109	121
	10000	103	103	123	138	103	103	121	135	103	103	120	134	103	103	118	132	102	102	116	129	101	101	114	126	100	101	110	121
2000	16500	112	117	121	131	112	118	121	131	112	119	121	130	112	120	121	130	112	121	121	130								
	16000	110	115	120	129	110	116	120	129	110	116	120	129	110	117	120	129	110	118	120	128								
	15500	109	112	118	128	109	113	118	128	109	114	118	127	109	115	118	127	109	116	118	127	109	117	118	126				
	15000	107	110	116	127	107	111	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	115	116	125				
	14500	106	107	114	125	106	108	114	125	106	109	114	125	106	110	114	124	106	111	114	124	106	112	114	124	106	115	114	123
	14000	104	104	113	124	104	105	113	124	104	106	113	123	104	108	113	123	104	109	113	123	104	110	113	122	104	112	113	122
	13500	102	102	111	123	102	103	111	122	102	104	111	122	102	105	111	122	102	106	111	121	102	107	111	121	102	110	111	120
	13000	101	101	111	123	101	101	110	122	101	101	109	121	101	102	109	120	101	103	109	120	101	105	109	120	101	107	109	119
	12500	101	101	113	126	100	100	111	123	100	100	110	121	100	101	109	120	100	102	109	120	100	103	109	120	100	106	109	119
	12000	102	102	115	128	101	101	113	125	100	100	111	123	100	100	109	121	100	101	109	120	100	102	109	120	100	105	109	119
	11500	103	103	117	130	102	102	115	127	101	101	113	125	100	100	111	123	100	100	109	121	100	101	109	120	100	104	109	120
	11000	103	103	119	133	102	102	117	130	102	102	115	127	101	101	113	125	100	100	111	122	100	100	109	121	100	104	109	120
	10500	103	103	120	134	103	103	119	132	102	102	117	130	102	102	115	127	101	101	112	125	100	100	110	122	100	103	109	120
	10000	103	103	122	136	103	103	120	134	103	103	119	132	102	102	117	130	102	102	115	127	101	101	112	124	100	102	110	121

FIGURE 4J-2

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -30 V_1	-30 V_R	-30 V_2	-30 V_{50}	-10 V_1	-10 V_R	-10 V_2	-10 V_{50}	0 V_1	0 V_R	0 V_2	0 V_{50}	10 V_1	10 V_R	10 V_2	10 V_{50}	20 V_1	20 V_R	20 V_2	20 V_{50}	30 V_1	30 V_R	30 V_2	30 V_{50}	50 V_1	50 V_R	50 V_2	50 V_{50}
3000	16500	112	117	121	131	112	119	121	130	112	119	121	130	112	120	121	130												
	16000	110	115	120	129	110	116	120	129	110	117	120	129	110	118	120	128	110	119	120	128								
	15500	109	112	118	128	109	114	118	128	109	115	118	127	109	116	118	127	109	117	119	127								
	15000	107	110	116	127	107	111	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	115	116	125				
	14500	106	107	114	125	106	109	114	125	106	110	114	124	106	111	114	124	106	112	114	124	106	113	114	123				
	14000	104	105	113	124	104	106	113	123	104	107	113	123	104	108	113	123	104	109	113	122	104	110	113	122	104	113	113	121
	13500	102	102	111	123	102	104	111	122	102	105	111	122	102	106	111	121	102	107	111	121	102	108	111	121	102	111	111	120
	13000	101	101	111	123	101	101	109	121	101	102	109	120	101	103	109	120	101	104	109	120	101	105	109	119	101	108	109	119
	12500	101	101	112	124	100	100	110	121	100	100	109	120	100	102	109	120	100	103	109	120	100	104	109	119	100	107	109	118
	12000	102	102	114	127	100	100	111	123	100	100	110	121	100	101	109	120	100	102	109	120	100	103	109	120	100	106	109	119
	11500	102	102	116	129	101	101	113	125	100	100	111	123	100	100	110	121	100	101	109	120	100	102	109	120	100	105	109	119
	11000	103	103	118	132	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	121	100	101	109	121	100	105	109	120
	10500	103	103	120	134	103	103	117	130	102	102	115	128	101	101	113	125	100	100	111	123	100	100	109	121	100	104	109	120
	10000	103	103	121	136	103	103	119	133	103	103	117	130	102	102	115	128	101	101	113	125	100	100	111	123	100	103	110	121
4000	16500	112	118	121	131	112	119	121	130	112	120	121	130																
	16000	110	115	120	129	110	117	120	129	110	118	120	128	110	119	120	128												
	15500	109	113	118	128	109	115	118	127	109	116	118	127	109	116	118	127												
	15000	107	110	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	115	116	125								
	14500	106	108	114	125	106	110	114	124	106	111	114	124	106	112	114	124	106	113	114	124	106	114	114	123				
	14000	104	105	113	124	104	107	113	123	104	108	113	123	104	109	113	122	104	110	113	122	104	111	113	122				
	13500	102	102	111	123	102	104	111	122	102	106	111	121	102	107	111	121	102	108	111	121	102	109	111	121	102	111	111	120
	13000	100	100	110	122	101	102	109	121	101	103	109	120	101	104	109	120	101	105	109	120	101	106	109	119	101	109	109	118
	12500	100	100	111	123	100	100	109	121	100	101	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	108	109	118
	12000	101	101	113	126	100	100	110	122	100	100	109	121	100	102	109	120	100	103	109	120	100	104	109	119	100	107	109	119
	11500	102	102	115	128	101	101	111	124	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	106	109	119
	11000	103	103	117	131	101	101	113	126	100	100	111	123	100	100	110	122	100	101	109	121	100	102	109	120	100	105	109	119
	10500	104	104	120	133	102	102	115	128	101	101	113	126	100	100	111	123	100	100	110	122	100	101	109	121	100	105	109	120
	10000	103	103	121	135	103	103	118	131	102	102	115	128	101	101	113	126	100	100	111	123	100	100	110	122	100	104	110	120
5000	16500	112	118	121	130	112	120	121	130																				
	16000	110	116	120	129	110	118	120	128	110	119	120	128																
	15500	109	114	118	128	109	115	118	127	109	116	118	127	109	117	118	126												
	15000	107	111	116	126	107	113	116	126	107	114	116	125	107	115	116	125												
	14500	106	108	114	125	106	110	114	124	106	111	114	124	106	112	114	124	106	113	114	123								
	14000	104	106	113	123	104	108	113	123	104	109	113	123	104	110	113	122	104	111	113	122	104	112	113	122				
	13500	102	103	111	122	102	105	111	122	102	106	111	121	102	107	111	121	102	108	111	121	102	109	111	120				
	13000	101	101	109	121	101	103	109	120	101	104	109	120	101	105	109	120	101	106	109	119	101	107	109	119	101	110	109	118
	12500	100	100	110	122	100	101	109	120	100	102	109	120	100	103	109	119	100	104	109	119	100	106	109	119	100	108	109	118
	12000	100	100	111	124	100	100	109	121	100	101	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	108	109	118
	11500	101	101	114	126	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	104	109	120	100	107	109	119
	11000	102	102	116	128	101	101	112	124	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	106	109	119
	10500	103	103	118	131	101	101	114	126	100	100	112	124	100	100	110	122	100	101	109	121	100	102	109	120	100	105	109	119
	10000	103	103	120	134	102	102	116	129	101	101	114	126	100	100	112	124	100	100	110	122	100	101	110	121	100	104	110	120

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -30 V_1	-30 V_R	-30 V_2	-30 V_{50}	-10 V_1	-10 V_R	-10 V_2	-10 V_{50}	0 V_1	0 V_R	0 V_2	0 V_{50}	10 V_1	10 V_R	10 V_2	10 V_{50}	20 V_1	20 V_R	20 V_2	20 V_{50}	30 V_1	30 V_R	30 V_2	30 V_{50}	50 V_1	50 V_R	50 V_2	50 V_{50}
6000	16500	112	119	121	130	112	121	121	130																				
	16000	110	117	120	129	110	118	120	128																				
	15500	109	114	118	127	109	116	118	127	109	117	118	127																
	15000	107	112	116	126	107	114	116	125	107	115	116	125	107	116	116	125												
	14500	106	109	114	125	106	111	114	124	106	112	114	124	106	113	114	123												
	14000	104	107	113	123	104	109	113	123	104	110	113	122	104	111	113	122	104	112	113	122								
	13500	102	104	111	122	102	106	111	121	102	107	111	121	102	108	111	121	102	109	111	120	102	110	111	120				
	13000	101	101	109	121	101	104	109	120	101	105	109	120	101	106	109	119	101	107	109	119	101	108	109	119				
	12500	100	100	109	120	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	109	109	118
	12000	100	100	110	122	100	101	109	120	100	102	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	108	109	118
	11500	100	100	112	124	100	100	109	121	100	101	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	108	109	118
	11000	101	101	114	126	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	104	109	120	100	107	109	119
	10500	102	102	116	129	101	101	112	124	100	100	110	122	100	101	110	121	100	102	109	121	100	103	109	120	100	106	109	119
	10000	103	103	118	132	101	101	114	127	100	100	112	124	100	100	110	122	100	101	110	121	100	102	110	121	100	105	110	120
7000	16500	112	120	121	130	112	121	121	129																				
	16000	110	118	120	129	110	119	120	128																				
	15500	109	115	118	127	109	117	118	127																				
	15000	107	113	116	126	107	114	116	125	107	115	116	125																
	14500	106	110	114	124	106	112	114	124	106	113	114	124																
	14000	104	108	113	123	104	110	113	122	104	110	113	122	104	111	113	122												
	13500	102	105	111	122	102	107	111	121	102	108	111	121	102	109	111	120	102	110	111	120								
	13000	101	102	109	120	101	104	109	120	101	105	109	119	101	106	109	119	101	107	109	119								
	12500	100	101	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	107	109	118				
	12000	100	100	109	121	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	109	109	118
	11500	100	100	110	122	100	101	109	120	100	102	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	108	109	119
	11000	101	101	112	124	100	100	109	121	100	101	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	107	109	119
	10500	101	101	114	127	100	100	110	122	100	100	110	121	100	102	109	121	100	102	109	120	100	104	109	120	100	107	109	119
	10000	102	102	116	129	101	101	112	124	100	100	110	122	100	101	110	121	100	102	110	121	100	103	110	120	100	106	110	119
8000	16500	112	120	121	130																								
	16000	110	118	120	128	110	120	120	128																				
	15500	109	116	118	127	109	118	118	126																				
	15000	107	113	116	125	107	115	116	125																				
	14500	106	111	114	124	106	113	114	124	106	114	114	123																
	14000	104	108	113	123	104	110	113	122	104	111	113	122																
	13500	102	106	111	121	102	108	111	121	102	109	111	121	102	110	111	120												
	13000	101	103	109	120	101	105	109	119	101	106	109	119	101	107	109	119	101	108	109	119								
	12500	100	102	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	107	109	118								
	12000	100	101	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	107	109	119				
	11500	100	100	109	121	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	109	109	118
	11000	100	100	110	122	100	101	109	121	100	102	109	120	100	104	109	120	100	105	109	120	100	105	109	120	100	108	109	119
	10500	101	101	112	125	100	100	109	121	100	101	109	121	100	103	109	120	100	104	109	120	100	104	110	120	100	107	110	119
	10000	102	102	114	127	100	100	111	123	100	100	110	121	100	101	110	121	100	103	110	120								

FIGURE 4J-2 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -30 V_1	-30 V_R	-30 V_2	-30 V_{50}	-10 V_1	-10 V_R	-10 V_2	-10 V_{50}	0 V_1	0 V_R	0 V_2	0 V_{50}	10 V_1	10 V_R	10 V_2	10 V_{50}	20 V_1	20 V_R	20 V_2	20 V_{50}	30 V_1	30 V_R	30 V_2	30 V_{50}	50 V_1	50 V_R	50 V_2	50 V_{50}
9000	16500	112	121	121	130																								
	16000	110	119	120	128																								
	15500	109	117	118	127																								
	15000	107	114	116	125	107	116	116	125																				
	14500	106	112	114	124	106	114	114	123																				
	14000	104	109	113	122	104	111	113	122	104	112	113	122																
	13500	102	107	111	121	102	109	111	121	102	110	111	120																
	13000	101	104	109	120	101	106	109	119	101	107	109	119	101	108	109	119												
	12500	100	103	109	120	100	105	109	119	100	106	109	119	100	107	109	119	100	108	109	118								
	12000	100	102	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	107	109	119								
	11500	100	101	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	107	109	119				
	11000	100	100	110	121	100	102	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	107	109	119				
	10500	100	100	111	123	100	101	109	121	100	102	109	120	100	103	109	120	100	105	109	120	100	106	109	119				
	10000	101	101	113	125	100	100	110	122	100	101	110	121	100	102	110	121	100	104	110	120	100	105	110	120	100	108	110	119
10000	16500	112	122	121	129																								
	16000	110	120	120	128																								
	15500	109	117	118	126																								
	15000	107	115	116	125																								
	14500	106	113	114	124	106	114	114	123																				
	14000	104	110	113	122	104	112	113	122																				
	13500	102	108	111	121	102	109	111	120	102	110	111	120																
	13000	101	105	109	120	101	107	109	119	101	108	109	119																
	12500	100	104	109	119	100	106	109	119	100	107	109	119	100	107	109	118												
	12000	100	103	109	120	100	105	109	119	100	106	109	119	100	107	109	119												
	11500	100	102	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	107	109	119								
	11000	100	101	109	121	100	103	109	120	100	104	109	120	100	105	109	119	100	106	109	119								
	10500	100	100	110	122	100	102	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	107	109	119				
	10000	100	100	111	123	100	101	110	121	100	102	110	121	100	103	110	120	100	105	110	120	100	106	110	120				

FIGURE 4J-2 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	7487	112	116	121	131	112	117	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	120	121	130				
	7200	110	113	119	129	110	114	119	129	110	115	119	129	110	115	119	129	110	116	119	128	110	117	119	128	110	120	119	127
	7000	108	111	118	128	108	112	118	128	108	112	118	128	108	113	118	127	108	114	118	127	108	115	118	127	108	118	118	126
	6800	107	109	116	127	107	110	116	127	107	110	116	126	107	111	116	126	107	112	116	126	107	113	116	126	107	116	116	125
	6600	106	106	115	126	106	107	115	125	106	108	115	125	106	109	115	125	106	110	115	125	106	111	115	124	106	114	115	124
	6400	104	104	113	125	104	105	113	124	104	105	113	124	104	106	113	124	104	107	113	124	104	109	113	123	104	111	113	122
	6200	102	102	113	125	103	103	112	124	103	103	112	123	103	104	112	123	103	105	112	122	103	106	112	122	103	109	112	121
	6000	101	101	113	125	101	101	112	123	101	101	111	123	101	102	110	122	101	103	110	121	101	104	110	121	101	107	110	120
	5800	101	101	114	127	101	101	112	124	101	101	111	123	100	101	110	122	100	101	109	121	100	102	109	120	100	105	109	119
	5600	102	102	116	129	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	121	100	101	109	120	100	104	109	119
	5400	103	103	118	131	102	102	115	128	102	102	114	127	101	101	113	125	100	100	111	123	100	101	109	121	100	103	109	120
	5200	104	104	119	133	103	103	117	130	102	102	116	129	102	102	114	127	101	101	112	124	100	100	110	122	100	102	109	120
	5000	103	103	120	134	103	103	119	132	103	103	118	131	102	102	116	129	101	101	114	126	100	100	111	124	100	102	109	120
	4800	103	103	122	136	103	103	120	134	103	103	119	133	103	103	118	131	102	102	116	128	101	101	113	126	100	101	110	121
	4600	103	103	123	138	103	103	121	136	103	103	120	135	103	103	119	133	103	103	117	131	102	102	115	128	100	101	110	122
1000	7487	112	117	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	120	121	130								
	7200	110	114	119	129	110	115	119	129	110	115	119	129	110	116	119	128	110	117	119	128	110	118	119	128				
	7000	108	111	118	128	108	112	118	128	108	113	118	128	108	114	118	127	108	115	118	127	108	116	118	127	108	118	118	125
	6800	107	109	116	127	107	110	116	127	107	111	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	116	116	124
	6600	106	107	115	126	106	108	115	125	106	108	115	125	106	109	115	125	106	111	115	124	106	112	115	124	106	114	115	123
	6400	104	104	113	124	104	105	113	124	104	106	113	124	104	107	113	124	104	108	113	123	104	109	113	123	104	112	113	122
	6200	103	103	113	124	103	103	112	123	103	104	112	123	103	105	112	122	103	106	112	122	103	107	112	122	103	110	112	121
	6000	101	101	112	124	101	101	111	123	101	102	110	122	101	102	110	121	101	104	110	121	101	105	110	121	101	108	110	120
	5800	101	101	113	126	101	101	111	123	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	106	109	119
	5600	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	121	100	101	109	120	100	102	109	120	100	105	109	119
	5400	103	103	117	130	102	102	114	127	101	101	113	125	100	100	111	123	100	100	110	121	100	101	109	120	100	104	109	119
	5200	103	103	118	132	102	102	116	129	102	102	114	127	101	101	112	125	100	100	111	122	100	101	109	121	100	103	109	120
	5000	103	103	120	134	103	103	118	131	102	102	116	129	102	102	114	127	101	101	112	124	100	100	110	122	100	103	109	120
	4800	103	103	121	135	103	103	119	133	103	103	118	131	102	102	116	129	101	101	114	126	100	100	112	124	100	102	109	121
	4600	103	103	122	137	103	103	120	135	103	103	119	133	103	103	118	131	102	102	116	129	101	101	113	126	100	101	110	121
2000	7487	112	117	121	131	112	118	121	131	112	119	121	130	112	120	121	130	112	121	121	130								
	7200	110	114	119	129	110	115	119	129	110	116	119	128	110	117	119	128	110	118	119	128								
	7000	108	112	118	128	108	113	118	128	108	114	118	127	108	115	118	127	108	116	118	127	108	117	118	126				
	6800	107	110	116	127	107	111	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	115	116	125				
	6600	106	107	115	125	106	108	115	125	106	109	115	125	106	110	115	125	106	111	115	124	106	112	115	124	106	115	115	123
	6400	104	105	113	124	104	106	113	124	104	107	113	124	104	108	113	123	104	109	113	123	104	110	113	123	104	113	113	122
	6200	103	103	112	123	103	104	112	123	103	105	112	122	103	106	112	122	103	107	112	122	103	108	112	121	103	111	112	121
	6000	101	101	111	123	101	102	110	122	101	102	110	121	101	103	110	121	101	105	110	121	101	106	110	120	101	108	110	119
	5800	101	101	112	124	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	104	109	120	100	107	109	119
	5600	101	101	114	126	101	101	111	124	100	100	110	122	100	101	109	120	100	102	109	120	100	103	109	120	100	106	109	119
	5400	102	102	116	128	101	101	113	125	100	100	111	123	100	100	110	121	100	101	109	120	100	102	109	120	100	105	109	119
	5200	103	103	117	130	102	102	115	127	101	101	113	125	100	100	111	123	100	100	109	121	100	101	109	120	100	104	109	120
	5000	103	103	119	133	102	102	117	130	102	102	115	127	101	101	112	125	100	100	110	122	100	100	109	121	100	104	109	120
	4800	103	103	120	134	103	103	118	132	102	102	116	129	101	101	114	127	101	101	112	124	100	100	110	122	100	103	109	120
	4600	103	103	121	136	103	103	120	134	103	103	118	132	102	102	116	129	101	101	114	127	100	100	112	124	100	102	110	121

FIGURE 4J-2 (continued)

PERFORMANCE

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C)																											
		-30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
3000	7487	112	117	121	131	112	119	121	130	112	120	121	130	112	121	121	130												
	7200	110	114	119	129	110	116	119	129	110	117	119	128	110	117	119	128	110	118	119	128								
	7000	108	112	118	128	108	113	118	127	108	114	118	127	108	115	118	127	108	116	118	126								
	6800	107	110	116	127	107	111	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	115	116	125				
	6600	106	107	115	125	106	109	115	125	106	110	115	125	106	111	115	124	106	112	115	124	106	113	115	124				
	6400	104	105	113	124	104	107	113	124	104	108	113	123	104	109	113	123	104	110	113	123	104	111	113	122	104	113	113	122
	6200	103	103	112	123	103	104	112	123	103	106	112	122	103	107	112	122	103	108	112	122	103	109	112	121	103	111	112	120
	6000	101	101	111	123	101	102	110	121	101	103	110	121	101	104	110	121	101	105	110	120	101	107	110	120	101	109	110	119
	5800	101	101	112	123	100	101	109	121	100	101	109	120	100	102	109	120	100	104	109	120	100	105	109	119	100	107	109	119
	5600	101	101	113	125	100	100	110	122	100	100	109	121	100	101	109	120	100	103	109	120	100	104	109	119	100	107	109	119
	5400	102	102	115	127	101	101	112	124	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	106	109	119
	5200	102	102	116	129	101	101	113	126	100	100	111	123	100	100	110	121	100	101	109	121	100	102	109	120	100	105	109	119
	5000	103	103	118	132	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	121	100	101	109	121	100	105	109	120
	4800	103	103	120	134	103	103	117	130	102	102	115	127	101	101	112	125	100	100	111	123	100	100	109	121	100	104	109	120
	4600	103	103	121	135	103	103	118	132	102	102	117	130	101	101	114	127	101	101	112	124	100	100	110	122	100	103	110	120
4000	7487	112	118	121	131	112	119	121	130	112	120	121	130																
	7200	110	115	119	129	110	116	119	128	110	117	119	128	110	118	119	128												
	7000	108	112	118	128	108	114	118	127	108	115	118	127	108	116	118	126												
	6800	107	110	116	126	107	112	116	126	107	113	116	126	107	114	116	125	107	115	116	125								
	6600	106	108	115	125	106	110	115	125	106	111	115	124	106	112	115	124	106	113	115	124	106	114	115	123				
	6400	104	106	113	124	104	108	113	123	104	109	113	123	104	110	113	123	104	111	113	123	104	112	113	122				
	6200	103	103	112	123	103	105	112	122	103	106	112	122	103	107	112	122	103	108	112	121	103	110	112	121	103	112	112	120
	6000	101	101	110	122	101	103	110	121	101	104	110	121	101	105	110	120	101	106	110	120	101	107	110	120	101	110	110	119
	5800	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	104	109	120	100	106	109	119	100	108	109	118
	5600	100	100	112	124	100	100	109	121	100	101	109	120	100	102	109	120	100	103	109	120	100	105	109	119	100	107	109	118
	5400	101	101	114	126	100	100	110	122	100	100	109	121	100	101	109	120	100	103	109	120	100	104	109	119	100	107	109	119
	5200	102	102	116	128	101	101	112	124	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	106	109	119
	5000	103	103	117	131	101	101	113	126	100	100	111	123	100	100	110	122	100	101	109	121	100	102	109	120	100	106	109	119
	4800	104	104	119	133	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	122	100	101	109	121	100	105	109	119
	4600	103	103	120	134	103	103	117	130	102	102	115	127	101	101	113	125	100	100	111	123	100	101	110	121	100	104	110	120
5000	7487	112	118	121	130	112	120	121	130																				
	7200	110	115	119	129	110	117	119	128	110	118	119	128																
	7000	108	113	118	127	108	115	118	127	108	116	118	127	108	117	118	126												
	6800	107	111	116	126	107	113	116	126	107	114	116	125	107	115	116	125												
	6600	106	109	115	125	106	111	115	124	106	112	115	124	106	113	115	124	106	114	115	123								
	6400	104	106	113	124	104	108	113	123	104	109	113	123	104	110	113	123	104	111	113	122								
	6200	103	104	112	123	103	106	112	122	103	107	112	122	103	108	112	121	103	109	112	121	103	110	112	121				
	6000	101	102	110	122	101	104	110	121	101	105	110	121	101	106	110	120	101	107	110	120	101	108	110	120				
	5800	100	100	110	121	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	119	100	106	109	119	100	109	109	118
	5600	100	100	110	122	100	101	109	120	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	108	109	118
	5400	100	100	112	124	100	100	109	121	100	101	109	120	100	102	109	120	100	104	109	120	100	105	109	119	100	108	109	119
	5200	101	101	114	126	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	104	109	120	100	107	109	119
	5000	102	102	116	128	100	100	112	124	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	106	109	119
	4800	103	103	117	131	101	101	113	126	100	100	111	123	100	100	110	122	100	101	109	121	100	102	109	120	100	106	109	119
	4600	103	103	119	133	102	102	115	128	101	101	113	125	100	100	111	123	100	100	110	122	100	101	110	121	100	105	110	120

FIGURE 4J-2 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -30 V_1	-30 V_R	-30 V_2	-30 V_{50}	-10 V_1	-10 V_R	-10 V_2	-10 V_{50}	0 V_1	0 V_R	0 V_2	0 V_{50}	10 V_1	10 V_R	10 V_2	10 V_{50}	20 V_1	20 V_R	20 V_2	20 V_{50}	30 V_1	30 V_R	30 V_2	30 V_{50}	50 V_1	50 V_R	50 V_2	50 V_{50}
6000	7487	112	119	121	130	112	121	121	130																				
	7200	110	116	119	128	110	118	119	128																				
	7000	108	114	118	127	108	116	118	127	108	117	118	126																
	6800	107	112	116	126	107	114	116	125	107	115	116	125	107	116	116	125												
	6600	106	110	115	125	106	112	115	124	106	112	115	124	106	113	115	124												
	6400	104	107	113	124	104	109	113	123	104	110	113	123	104	111	113	122	104	112	113	122								
	6200	103	105	112	122	103	107	112	122	103	108	112	121	103	109	112	121	103	110	112	121								
	6000	101	103	110	121	101	105	110	121	101	106	110	120	101	107	110	120	101	108	110	120	101	109	110	119				
	5800	100	101	109	121	100	103	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	107	109	119				
	5600	100	100	109	121	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	109	109	118
	5400	100	100	110	122	100	101	109	120	100	102	109	120	100	103	109	120	100	104	109	119	100	106	109	119	100	108	109	118
	5200	101	101	112	124	100	100	109	121	100	101	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	108	109	118
	5000	101	101	114	126	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	104	109	120	100	107	109	119
	4800	102	102	116	128	100	100	112	124	100	100	110	122	100	101	109	121	100	102	109	120	100	103	109	120	100	107	109	119
	4600	103	103	117	131	101	101	113	126	100	100	111	123	100	100	110	122	100	101	110	121	100	102	110	121	100	106	110	119
7000	7487	112	120	121	130	112	121	121	129																				
	7200	110	117	119	128	110	119	119	128																				
	7000	108	115	118	127	108	117	118	126																				
	6800	107	113	116	126	107	114	116	125	107	115	116	125																
	6600	106	110	115	124	106	112	115	124	106	113	115	124																
	6400	104	108	113	123	104	110	113	123	104	111	115	122	104	112	113	122												
	6200	103	106	112	122	103	108	112	122	103	109	112	121	103	110	112	121	103	111	112	121								
	6000	101	104	110	121	101	106	110	120	101	107	110	120	101	108	110	120	101	109	110	119								
	5800	100	102	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	107	109	119	100	108	109	118				
	5600	100	101	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	107	109	118				
	5400	100	100	109	121	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	109	109	118
	5200	100	100	110	122	100	101	109	120	100	102	109	120	100	103	109	120	100	105	109	119	100	106	109	119	100	109	109	118
	5000	101	101	112	124	100	100	109	121	100	101	109	120	100	102	109	120	100	104	109	120	100	105	109	119	100	108	109	119
	4800	101	101	114	126	100	100	110	122	100	101	109	121	100	102	109	121	100	103	109	120	100	104	109	120	100	107	109	119
	4600	102	102	116	129	100	100	112	124	100	100	110	122	100	101	110	121	100	102	110	121	100	103	110	120	100	106	110	119
8000	7487	112	121	121	130																								
	7200	110	118	119	128	110	119	119	127																				
	7000	108	116	118	127	108	117	118	126																				
	6800	107	113	116	125	107	115	116	125																				
	6600	106	111	115	124	106	113	115	124	106	114	115	123																
	6400	104	109	113	123	104	111	113	122	104	112	113	122																
	6200	103	107	112	122	103	109	112	121	103	110	112	121	103	111	112	121												
	6000	101	105	110	121	101	106	110	120	101	107	110	120	101	108	110	119												
	5800	100	103	109	120	100	105	109	119	100	106	109	119	100	107	109	119	100	108	109	119								
	5600	100	102	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	107	109	119								
	5400	100	101	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119	100	107	109	119				
	5200	100	100	109	121	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	106	109	119				
	5000	100	100	110	122	100	101	109	121	100	102	109	120	100	104	109	120	100	105	109	120	100	106	109	119	100	109	109	118
	4800	101	101	112	124	100	100	109	121	100	102	109	121	100	103	109	120	100	104	109	120	100	105	109	120	100	108	109	119
	4600	101	101	114	126	100	100	110	122	100	101	110	121	100	102	110	121	100	103	110	120	100	104	110	120	100	107	110	119

FIGURE 4J-2 (continued)

PERFORMANCE

FAA APPROVED: SEP 10/93

TAKEOFF SPEED SCHEDULE (KIAS) – DRY, BLEED AIR OFF

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4D-2 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -30				-10				0				10				20				30				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
9000	7487	112	121	121	130																								
	7200	110	118	119	128																								
	7000	108	116	118	126																								
	6800	107	114	116	125	107	116	116	125																				
	6600	106	112	115	124	106	114	115	123																				
	6400	104	110	113	123	104	112	113	122																				
	6200	103	108	112	122	103	110	112	121	103	110	112	121																
	6000	101	105	110	120	101	107	110	120	101	108	110	120	101	109	110	119												
	5800	100	104	109	120	100	106	109	119	100	106	109	119	100	107	109	119	100	107	109	118								
	5600	100	102	109	120	100	104	109	119	100	106	109	119	100	106	109	119	100	107	109	119								
	5400	100	102	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	107	109	119								
	5200	100	101	109	121	100	103	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	107	109	119				
	5000	100	100	110	121	100	102	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	107	109	119				
	4800	100	100	111	123	100	101	109	121	100	102	109	120	100	104	109	120	100	105	109	120	100	106	109	119				
	4600	101	101	112	124	100	101	110	121	100	102	110	121	100	103	110	120	100	104	110	120	100	105	110	120	100	108	110	119
10000	7487	112	122	121	129																								
	7200	110	119	119	128																								
	7000	108	117	118	126																								
	6800	107	115	116	125																								
	6600	106	113	115	124	106	115	115	123																				
	6400	104	111	113	123	104	112	113	122																				
	6200	103	108	112	121	103	110	112	121	103	111	112	121																
	6000	101	106	110	120	101	108	110	120	101	109	110	119																
	5800	100	104	109	119	100	106	109	119	100	107	109	119																
	5600	100	103	109	120	100	105	109	119	100	106	109	119	100	107	109	118												
	5400	100	103	109	120	100	105	109	119	100	106	109	119	100	107	109	119												
	5200	100	102	109	120	100	104	109	120	100	105	109	119	100	106	109	119	100	107	109	119								
	5000	100	101	109	121	100	103	109	120	100	104	109	120	100	105	109	119	100	106	109	119								
	4800	100	100	110	121	100	102	109	120	100	103	109	120	100	105	109	120	100	106	109	119	100	107	109	119				
	4600	100	100	111	123	100	101	110	121	100	103	110	120	100	104	110	120	100	105	110	120	100	106	110	119				

FIGURE 4J-2 (continued)

DISTANCE TO ACCELERATE TO V_1 AND STOP – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4J-2)
NOSE WHEEL STEERING ... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 107 KIAS
ACCELERATE - STOP DISTANCE = 3,900 FEET (1190 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 1.0 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

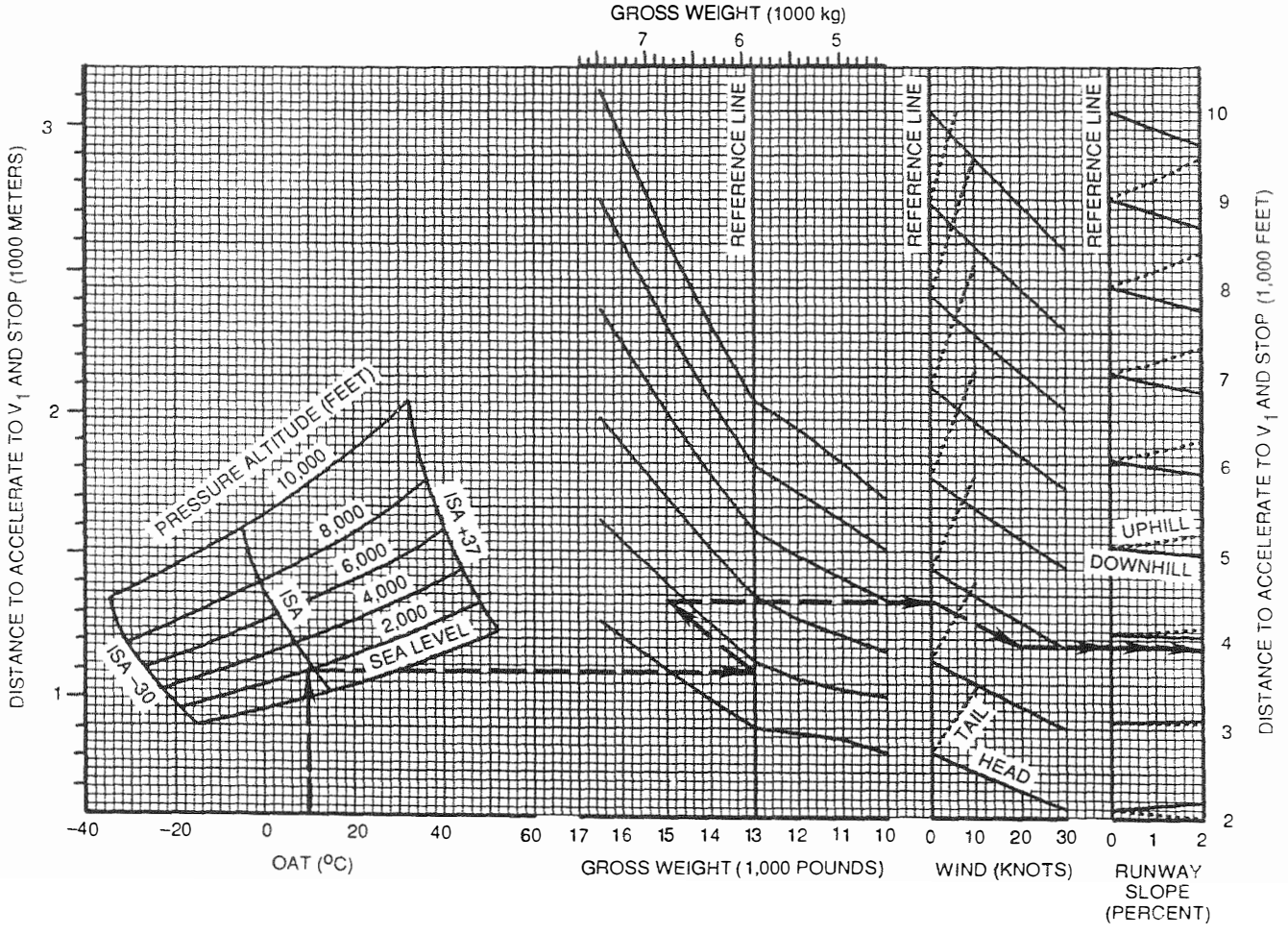


FIGURE 4J-3

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4J-2
V_R SPEED	FIGURE 4J-2
V_2 SPEED	FIGURE 4J-2
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 107 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 4,900 FEET (1495 m)

NOTE

- INCREASE TAKEOFF DISTANCE BY 5.2 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2.

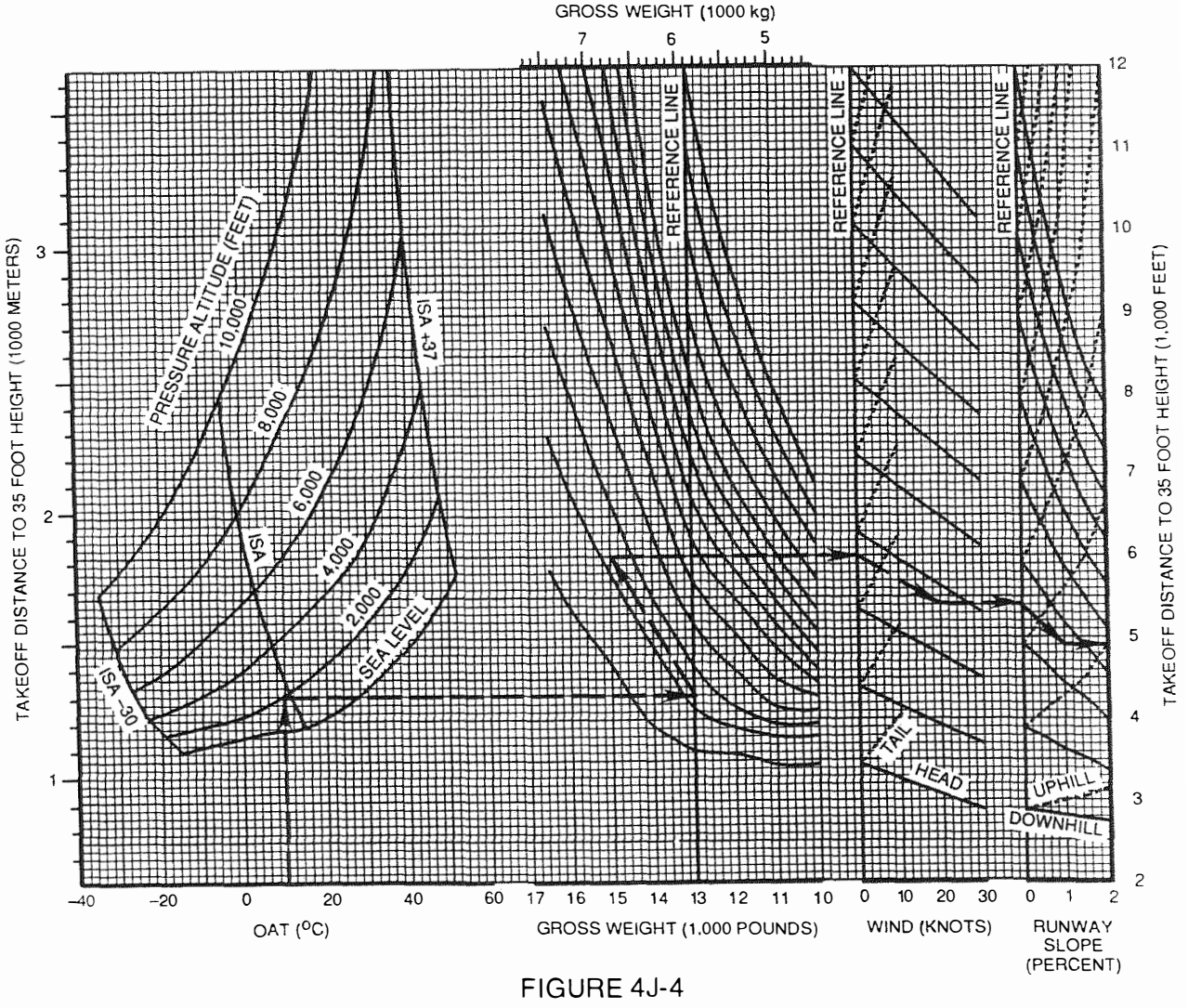


FIGURE 4J-4

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SINGLE ENGINE TAKEOFF RUN DISTANCE – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4J-2
V_R SPEED	FIGURE 4J-2
V_2 SPEED	FIGURE 4J-2
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 107 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 4,380 FEET (1335 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2.

NOTE

- INCREASE TAKEOFF DISTANCE BY 3.9 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

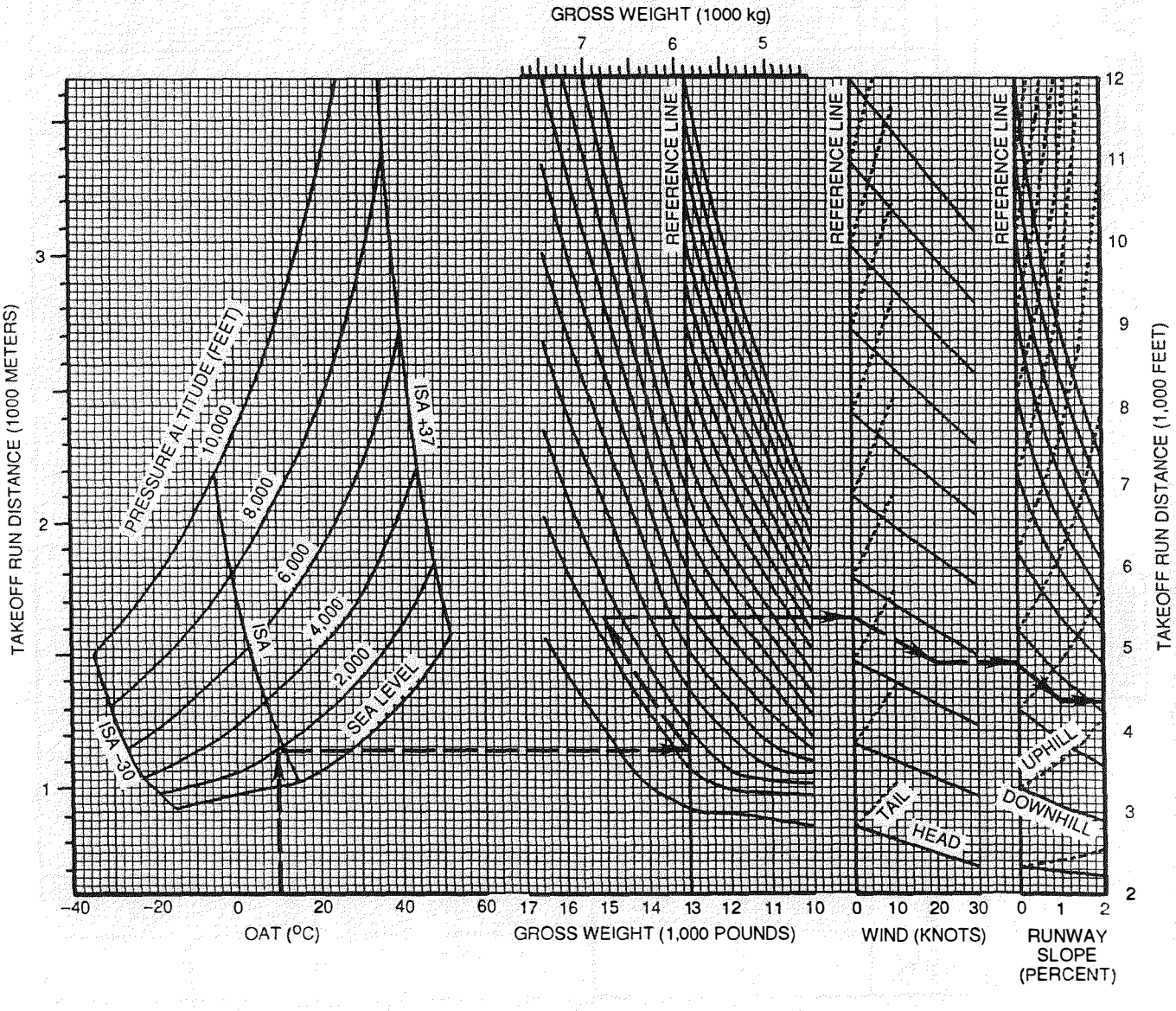


FIGURE 4J-5

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																									
		-6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	16500	112	117	121	131	112	118	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	119	121	130	112	120	121	130
	16000	110	115	120	129	110	115	120	129	110	116	120	129	110	116	120	129	110	117	120	129	110	117	120	129	110	118	120	129
	15500	109	112	118	128	109	113	118	128	109	113	118	128	109	114	118	128	109	114	118	127	109	115	118	127	109	115	118	127
	15000	107	110	116	127	107	110	116	127	107	111	116	126	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126
	14500	106	107	114	125	106	108	114	125	106	108	114	125	106	109	114	125	106	109	114	125	106	110	114	124	106	110	114	124
	14000	104	104	113	124	104	105	113	124	104	105	113	124	104	106	113	123	104	107	113	123	104	107	113	123	104	108	113	123
	13500	102	102	112	123	102	102	111	123	102	103	111	122	102	103	111	122	102	104	111	122	102	104	111	122	102	105	111	122
	13000	101	101	111	123	101	101	111	123	101	101	110	122	101	101	109	121	101	101	109	121	101	102	109	121	101	103	109	120
	12500	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	100	109	120	100	101	109	120
	12000	102	102	115	127	101	101	114	126	101	101	113	125	101	101	112	124	100	100	110	122	100	100	110	122	100	100	109	121
	11500	102	102	117	130	102	102	116	129	102	102	115	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122
	11000	103	103	118	132	103	103	118	131	102	102	117	130	102	102	115	128	102	102	114	127	101	101	113	126	101	101	112	124
	10500	103	103	120	134	103	103	119	133	103	103	119	132	103	103	118	131	102	102	116	129	102	102	115	128	101	101	114	126
	10000	103	103	121	136	103	103	121	135	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129
1000	16500	112	118	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130
	16000	110	115	120	129	110	116	120	129	110	116	120	129	110	117	120	129	110	117	120	129	110	117	120	129	110	118	120	128
	15500	109	113	118	128	109	113	118	128	109	114	118	128	109	114	118	127	109	115	118	127	109	115	118	127	109	116	118	127
	15000	107	110	116	126	107	111	116	126	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	125
	14500	106	108	114	125	106	108	114	125	106	109	114	125	106	109	114	125	106	110	114	124	106	110	114	124	106	111	114	124
	14000	104	105	113	124	104	105	113	124	104	106	113	124	104	107	113	123	104	107	113	123	104	108	113	123	104	109	113	123
	13500	102	102	111	123	102	103	111	122	102	103	111	122	102	104	111	122	102	105	111	122	102	105	111	122	102	106	111	121
	13000	101	101	110	122	101	101	110	122	101	101	109	121	101	101	109	121	101	102	109	120	101	102	109	120	101	103	109	120
	12500	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	100	109	120	100	101	109	120	100	102	109	120
	12000	101	101	114	126	101	101	113	125	101	101	112	124	100	100	110	122	100	100	110	121	100	100	109	121	100	101	109	120
	11500	102	102	115	128	102	102	115	127	101	101	113	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	109	121
	11000	103	103	117	131	103	103	117	130	102	102	115	128	102	102	114	127	101	101	113	126	101	101	112	124	100	100	111	122
	10500	103	103	119	133	103	103	119	132	103	103	118	131	102	102	116	129	102	102	115	128	101	101	114	127	101	101	112	125
	10000	103	103	121	135	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129	102	102	114	127
2000	16500	112	118	121	131	112	118	121	130	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130	112	121	121	130
	16000	110	116	120	129	110	116	120	129	110	117	120	129	110	117	120	129	110	117	120	129	110	118	120	128	110	119	120	128
	15500	109	113	118	128	109	114	118	128	109	114	118	127	109	115	118	127	109	115	118	127	109	116	118	127	109	116	118	127
	15000	107	111	116	126	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125
	14500	106	108	114	125	106	109	114	125	106	109	114	125	106	110	114	124	106	110	114	124	106	111	114	124	106	112	114	124
	14000	104	106	113	124	104	106	113	123	104	107	113	123	104	107	113	123	104	108	113	123	104	108	113	123	104	109	113	123
	13500	102	103	111	122	102	103	111	122	102	104	111	122	102	105	111	122	102	105	111	122	102	106	111	121	102	107	111	121
	13000	101	101	110	121	101	101	109	121	101	101	109	121	101	102	109	121	101	103	109	120	101	103	109	120	101	104	109	120
	12500	100	100	111	123	100	100	110	122	100	100	109	121	100	100	109	120	100	101	109	120	100	102	109	120	100	103	109	120
	12000	101	101	112	125	101	101	112	124	100	100	111	122	100	100	110	121	100	100	109	120	100	101	109	120	100	102	109	120
	11500	102	102	114	127	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	110	121	100	101	109	121
	11000	102	102	116	129	102	102	116	128	102	102	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	121
	10500	103	103	118	132	103	103	118	131	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	100	100	111	123
	10000	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129	102	102	115	128	101	101	113	125

FIGURE 4J-6

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C) -6 V_1	-6 V_R	-6 V_2	-6 V_{50}	0 V_1	0 V_R	0 V_2	0 V_{50}	10 V_1	10 V_R	10 V_2	10 V_{50}	20 V_1	20 V_R	20 V_2	20 V_{50}	30 V_1	30 V_R	30 V_2	30 V_{50}	40 V_1	40 V_R	40 V_2	40 V_{50}	50 V_1	50 V_R	50 V_2	50 V_{50}
3000	16500	112	119	121	130	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130	112	121	121	130				
	16000	110	116	120	129	110	116	120	129	110	117	120	129	110	117	120	129	110	118	120	128	110	118	120	128	110	119	120	128
	15500	109	114	118	128	109	114	118	127	109	115	118	127	109	115	118	127	109	116	118	127	109	116	118	127	109	117	118	127
	15000	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125	107	115	116	125
	14500	106	109	114	125	106	109	114	125	106	110	114	124	106	110	114	124	106	111	114	124	106	111	114	124	106	112	114	124
	14000	104	106	113	123	104	106	113	123	104	107	113	123	104	108	113	123	104	108	113	123	104	109	113	123	104	110	113	122
	13500	102	103	111	122	102	104	111	122	102	104	111	122	102	105	111	122	102	106	111	121	102	106	111	121	102	107	111	121
	13000	101	101	109	121	101	101	109	121	101	102	109	120	101	102	109	120	101	103	109	120	101	104	109	120	101	105	109	120
	12500	100	100	110	122	100	100	109	121	100	100	109	120	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120
	12000	100	100	111	123	100	100	111	123	100	100	110	121	100	100	109	121	100	101	109	120	100	102	109	120	100	103	109	120
	11500	101	101	113	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	121	100	102	109	120
	11000	102	102	115	128	102	102	114	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122	100	101	109	121
	10500	103	103	117	131	102	102	117	130	102	102	115	128	101	101	114	127	101	101	113	125	100	100	111	123	100	100	110	122
	10000	103	103	119	133	103	103	118	132	103	103	117	131	102	102	116	129	102	102	115	128	101	101	113	126	100	100	112	124
4000	16500	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130	112	121	121	130								
	16000	110	117	120	129	110	117	120	129	110	117	120	129	110	118	120	128	110	118	120	128	110	119	120	128				
	15500	109	114	118	127	109	115	118	127	109	115	118	127	109	116	118	127	109	116	119	127	109	117	118	127				
	15000	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125	107	114	116	125	107	115	116	125
	14500	106	109	114	125	106	110	114	125	106	110	114	124	106	111	114	124	106	111	114	124	106	112	114	124	106	113	114	124
	14000	104	107	113	123	104	107	113	123	104	108	113	123	104	108	113	123	104	109	113	123	104	110	113	122	104	110	113	122
	13500	102	104	111	122	102	104	111	122	102	105	111	122	102	106	111	121	102	106	111	121	102	107	111	121	102	108	111	121
	13000	101	101	109	121	101	102	109	121	101	102	109	120	101	103	109	120	101	104	109	120	101	105	109	120	101	105	109	119
	12500	100	100	109	121	100	100	109	121	100	101	109	120	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	119
	12000	100	100	110	122	100	100	110	122	100	100	109	121	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120
	11500	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	120	100	101	109	120	100	102	109	120
	11000	101	101	114	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	121
	10500	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	100	100	111	124	100	100	110	122	100	100	109	121
	10000	103	103	118	132	103	103	117	131	102	102	116	129	102	102	115	128	101	101	113	126	101	101	112	124	100	100	110	122
5000	16500	112	119	121	130	112	120	121	130	112	120	121	130																
	16000	110	117	120	129	110	117	120	129	110	118	120	128	110	118	120	128												
	15500	109	115	118	127	109	115	118	127	109	116	118	127	109	116	118	127	109	117	118	127								
	15000	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125	107	114	116	125	107	115	116	125				
	14500	106	110	114	124	106	110	114	124	106	111	114	124	106	111	114	124	106	112	114	124	106	113	114	124	106	113	114	123
	14000	104	107	113	123	104	108	113	123	104	108	113	123	104	109	113	123	104	110	113	122	104	110	113	122	104	111	113	122
	13500	102	105	111	122	102	105	111	122	102	106	111	121	102	106	111	121	102	107	111	121	102	108	111	121	102	109	111	121
	13000	101	102	109	120	101	103	109	120	101	103	109	120	101	104	109	120	101	105	109	120	101	105	109	119	101	106	109	119
	12500	100	101	109	120	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	119	100	105	109	119
	12000	100	100	109	121	100	100	109	121	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120
	11500	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	121	100	101	109	120	100	102	109	120	100	103	109	120
	11000	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	121	100	102	109	120
	10500	102	102	115	127	101	101	114	126	101	101	113	125	100	100	111	123	100	100	110	122	100	100	110	121	100	101	109	121
	10000	102	102	117	130	102	102	116	129	102	102	115	127	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	121

FIGURE 4J-6 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

OUTSIDE AIR TEMPERATURE (°C)

PRESS ALT (FT)	GROSS WT (LBS)	-6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
6000	16500	112	120	121	130	112	120	121	130	110	119	120	128	108	117	118	127	106	115	116	125	104	113	114	123	102	112	113	122
	16000	110	118	120	128	110	118	120	128	109	116	118	127	107	115	116	125	105	113	114	123	103	111	112	121	101	109	111	120
	15500	109	116	118	127	109	116	118	127	107	114	116	125	105	113	114	123	103	111	112	121	101	109	110	119	100	107	109	119
	15000	107	113	116	126	107	113	116	126	107	114	116	125	107	114	116	125	104	111	113	122	102	109	111	120	100	107	109	119
	14500	106	111	114	124	106	111	114	124	106	112	114	124	106	112	114	124	106	113	114	123	106	113	114	123	104	111	113	122
	14000	104	108	113	123	104	109	113	123	104	109	113	123	104	110	113	122	104	110	113	122	104	111	113	122	104	111	112	122
	13500	102	106	111	121	102	106	111	121	102	107	111	121	102	107	111	121	102	108	111	121	102	108	111	121	102	108	109	120
	13000	101	103	109	120	101	103	109	120	101	104	109	120	101	105	109	120	101	105	109	120	101	106	109	119	101	107	109	119
	12500	100	102	109	120	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	105	109	119
	12000	100	101	109	120	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	105	109	119
	11500	100	100	110	121	100	100	109	121	100	101	109	121	100	101	109	120	100	102	109	120	100	103	109	120	100	104	109	120
	11000	100	100	111	123	100	100	110	122	100	100	110	122	100	100	109	121	100	101	109	121	100	102	109	120	100	103	109	120
	10500	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	110	122	100	101	109	121	100	102	109	121
	10000	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121
7000	16500	112	121	121	130																								
	16000	110	118	120	128																								
	15500	109	116	118	127	109	116	118	127	109	117	118	127																
	15000	107	114	116	125	107	114	116	125	107	115	116	125	107	115	116	125												
	14500	106	111	114	124	106	112	114	124	106	112	114	124	106	113	114	124	106	113	114	123								
	14000	104	109	113	123	104	109	113	123	104	110	113	122	104	110	113	122	104	111	113	122	104	111	113	122				
	13500	102	106	111	121	102	106	111	121	102	107	111	121	102	108	111	121	102	108	111	121	102	109	111	120				
	13000	101	104	109	120	101	104	109	120	101	105	109	120	101	105	109	120	101	106	109	119	101	107	109	119				
	12500	100	102	109	120	100	103	109	120	100	103	109	119	100	104	109	119	100	105	109	119	100	105	109	119				
	12000	100	101	109	120	100	101	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	120				
	11500	100	100	109	121	100	100	109	121	100	101	109	121	100	101	109	121	100	102	109	120	100	103	109	120				
	11000	100	100	110	122	100	100	110	122	100	100	109	121	100	100	109	121	100	101	109	121	100	102	109	120				
	10500	100	100	110	122	100	100	110	122	100	100	109	121	100	100	109	121	100	101	109	121	100	103	109	120				
	10000	100	100	112	124	100	100	111	123	100	100	110	122	100	100	110	121	100	100	110	121	100	101	110	121				
8000	16500	112	121	121	129																								
	16000	110	119	120	128																								
	15500	109	117	118	127																								
	15000	107	114	116	125	107	115	116	125																				
	14500	106	112	114	124	106	112	114	124	106	113	114	123																
	14000	104	110	113	122	104	110	113	122	104	111	113	122																
	13500	102	107	111	121	102	108	111	121	102	108	111	121																
	13000	101	105	109	120	101	105	109	119	101	106	109	119																
	12500	100	103	109	120	100	103	109	120	100	104	109	119																
	12000	100	102	109	120	100	102	109	120	100	103	109	120																
	11500	100	101	109	120	100	102	109	120	100	102	109	120																
	11000	100	100	109	121	100	101	109	121	100	102	109	120																
	10500	100	100	110	122	100	100	109	121	100	101	109	120																
	10000	100	100	112	124	100	100	111	123	100	100	110	122																

FIGURE 4J-6 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

POUNDS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (LBS)	OUTSIDE AIR TEMPERATURE (°C)																									
		-6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
9000	16500	112	122	121	129																						
	16000	110	120	120	128																						
	15500	109	117	118	126																						
	15000	107	115	116	125																						
	14500	106	113	114	124	106	113	114	123	106	113	114	123														
	14000	104	110	113	122	104	111	113	122	104	111	113	122	104	112	113	122										
	13500	102	108	111	121	102	108	111	121	102	109	111	121	102	109	111	120	102	110	111	120						
	13000	101	105	109	120	101	106	109	119	101	106	109	119	101	107	109	119	101	107	109	119	101	108	109	119		
	12500	100	104	109	119	100	104	109	119	100	105	109	119	100	105	109	119	100	106	109	119	100	107	109	119		
	12000	100	103	109	120	100	103	109	120	100	104	109	119	100	105	109	119	100	105	109	119	100	106	109	119		
	11500	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120	100	104	109	120	100	105	109	119		
	11000	100	101	109	121	100	102	109	120	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120		
	10500	100	100	110	121	100	101	109	121	100	101	109	121	100	102	109	121	100	102	109	120	100	103	109	120		
	10000	100	100	111	123	100	100	110	122	100	100	110	121	100	101	110	121	100	101	110	121	100	102	110	121		
10000	16500	112	122	121	129																						
	16000	110	120	120	128																						
	15500	109	118	118	126																						
	15000	107	116	116	125																						
	14500	106	113	114	123																						
	14000	104	111	113	122	104	111	113	122	104	112	113	122														
	13500	102	109	111	121	102	109	111	120	102	109	111	120	102	110	111	120										
	13000	101	106	109	119	101	106	109	119	101	107	109	119	101	107	109	119	101	108	109	119						
	12500	100	105	109	119	100	105	109	119	100	105	109	119	100	106	109	119	100	107	109	119	100	107	109	118		
	12000	100	104	109	119	100	104	109	119	100	105	109	119	100	105	109	119	100	106	109	119	100	107	109	119		
	11500	100	103	109	120	100	103	109	120	100	104	109	120	100	104	109	119	100	105	109	119	100	106	109	119		
	11000	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	120	100	105	109	119		
	10500	100	101	109	121	100	101	109	121	100	102	109	121	100	103	109	120	100	103	109	120	100	104	109	120		
	10000	100	100	110	121	100	100	110	121	100	101	110	121	100	102	110	121	100	102	110	121	100	103	110	120		

FIGURE 4J-6 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
S.L.	7487	112	117	121	131	112	118	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	119	121	130	112	120	121	130
	7200	110	114	119	129	110	114	119	129	110	115	119	129	110	115	119	129	110	116	119	128	110	116	119	128	110	117	119	128
	7000	108	112	118	128	108	112	118	128	108	113	118	128	108	113	118	127	108	114	118	127	108	114	118	127	108	115	118	127
	6800	107	110	116	127	107	110	116	127	107	111	116	126	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126
	6600	106	107	115	125	106	108	115	125	106	108	115	125	106	109	115	125	106	109	115	125	106	110	115	125	106	111	115	124
	6400	104	105	113	124	104	105	113	124	104	106	113	124	104	107	113	124	104	107	113	124	104	108	113	123	104	106	113	123
	6200	103	103	112	123	103	103	112	123	103	104	112	123	103	104	112	123	103	105	112	122	103	105	112	122	103	106	112	122
	6000	101	101	111	123	101	101	111	123	101	102	110	122	101	102	110	122	101	102	110	121	101	103	110	121	101	104	110	121
	5800	101	101	112	124	101	101	111	123	100	100	110	122	100	100	110	121	100	101	109	121	100	101	109	120	100	102	109	120
	5600	101	101	113	126	101	101	113	125	101	101	111	124	100	100	110	122	100	100	110	121	100	100	109	121	100	101	109	120
	5400	102	102	115	128	102	102	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121
	5200	102	102	117	130	102	102	116	129	102	102	115	127	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122
	5000	103	103	118	132	103	103	118	131	102	102	117	130	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124
	4800	103	103	120	134	103	103	119	133	103	103	118	132	103	103	117	130	102	102	116	129	102	102	115	128	101	101	113	126
	4600	103	103	121	135	103	103	120	135	103	103	120	134	103	103	119	132	103	103	118	131	102	102	117	130	102	102	115	128
1000	7487	112	118	121	131	112	118	121	131	112	118	121	130	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130
	7200	110	115	119	129	110	115	119	129	110	115	119	129	110	116	119	128	110	116	119	128	110	117	119	128	110	118	119	128
	7000	108	112	118	128	108	113	118	128	108	113	118	127	108	114	118	127	108	114	118	127	108	115	118	127	108	115	118	127
	6800	107	110	116	126	107	111	116	126	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	125
	6600	106	108	115	125	106	108	115	125	106	109	115	125	106	109	115	125	106	110	115	125	106	110	115	124	106	111	115	124
	6400	104	106	113	124	104	106	113	124	104	107	113	124	104	107	113	124	104	108	113	123	104	108	113	123	104	109	113	123
	6200	103	103	112	123	103	104	112	123	103	104	112	123	103	105	112	122	103	105	112	122	103	106	112	122	103	107	112	122
	6000	101	101	111	122	101	102	110	122	101	102	110	122	101	102	110	121	101	103	110	121	101	104	110	121	101	105	110	121
	5800	101	101	111	123	100	100	110	122	100	100	110	121	100	101	109	121	100	101	109	120	100	102	109	120	100	103	109	120
	5600	101	101	112	124	101	101	112	124	100	100	110	122	100	100	110	121	100	100	109	121	100	101	109	120	100	102	109	120
	5400	101	101	114	126	101	101	113	126	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	120
	5200	102	102	116	128	102	102	115	128	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	109	121
	5000	103	103	117	131	102	102	117	130	102	102	115	128	101	101	114	127	101	101	112	124	100	100	111	123	100	100	111	122
	4800	103	103	119	133	103	103	118	132	103	103	117	130	102	102	116	129	102	102	115	128	101	101	114	126	101	101	112	124
	4600	103	103	120	134	103	103	120	134	103	103	119	132	103	103	118	131	102	102	117	130	102	102	116	129	101	101	114	126
2000	7487	112	118	121	131	112	118	121	130	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130	112	121	121	130
	7200	110	115	119	129	110	115	119	129	110	116	119	128	110	116	119	128	110	117	119	128	110	117	119	128	110	118	119	128
	7000	108	113	118	128	108	113	118	127	108	114	118	127	108	114	118	127	108	115	118	127	108	115	118	127	108	116	118	127
	6800	107	111	116	126	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125
	6600	106	108	115	125	106	109	115	125	106	109	115	125	106	110	115	125	106	110	115	124	106	111	115	124	106	112	115	124
	6400	104	106	113	124	104	107	113	124	104	107	113	124	104	108	113	123	104	108	113	123	104	109	113	123	104	110	113	123
	6200	103	104	112	123	103	104	112	123	103	105	112	122	103	105	112	122	103	106	112	122	103	107	112	122	103	107	112	122
	6000	101	102	110	122	101	102	110	122	101	102	110	121	101	103	110	121	101	104	110	121	101	104	110	121	101	105	110	120
	5800	100	100	110	122	100	100	110	121	100	101	109	121	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120
	5600	100	100	111	123	100	100	111	122	100	100	110	121	100	100	109	121	100	101	109	120	100	101	109	120	100	102	109	120
	5400	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	121	100	102	109	120
	5200	102	102	114	127	101	101	114	126	101	101	112	125	100	100	111	123	100	100	110	122	100	100	110	121	100	101	109	121
	5000	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	121
	4800	103	103	118	131	103	103	117	131	102	102	116	129	102	102	115	128	101	101	114	126	101	101	112	125	100	100	111	123
	4600	103	103	119	133	103	103	119	133	103	103	118	131	102	102	117	130	102	102	116	128	102	102	114	127	101	101	112	125

FIGURE 4J-6 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C) -6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
3000	7487	112	119	121	130	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130	112	121	121	130				
	7200	110	116	119	129	110	116	119	128	110	116	119	128	110	117	119	128	110	117	119	128	110	118	119	128	110	119	119	128
	7000	108	113	118	127	108	114	118	127	108	114	118	127	108	115	118	127	108	115	118	127	108	116	118	127	108	117	118	126
	6800	107	111	116	126	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125	107	115	116	125
	6600	106	109	115	125	106	109	115	125	106	110	115	125	106	110	115	124	106	111	115	124	106	112	115	124	106	113	115	124
	6400	104	107	113	124	104	107	113	124	104	108	113	123	104	108	113	123	104	109	113	123	104	109	113	123	104	110	113	123
	6200	103	104	112	123	103	105	112	122	103	105	112	122	103	106	112	122	103	107	112	122	103	107	112	122	103	108	112	121
	6000	101	102	110	121	101	102	110	121	101	103	110	121	101	104	110	121	101	104	110	121	101	105	110	120	101	106	110	120
	5800	100	101	110	121	100	101	109	121	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120
	5600	100	100	110	122	100	100	110	121	100	100	109	121	100	101	109	120	100	101	109	120	100	102	109	120	100	103	109	120
	5400	101	101	112	124	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	121	100	101	109	120	100	102	109	120
	5200	101	101	113	126	101	101	113	125	100	100	111	123	100	100	110	122	100	100	110	121	100	101	109	121	100	101	109	120
	5000	102	102	115	128	101	101	114	127	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	101	109	121
	4800	103	103	117	130	102	102	116	129	102	102	115	128	101	101	114	126	101	101	113	125	100	100	111	123	100	100	110	122
	4600	103	103	119	132	103	103	118	131	102	102	117	130	102	102	116	128	101	101	114	127	101	101	113	125	100	100	111	123
4000	7487	112	119	121	130	112	119	121	130	112	120	121	130	112	120	121	130	112	121	121	130								
	7200	110	116	119	128	110	116	119	128	110	117	119	128	110	117	119	128	110	118	119	128	110	118	119	128				
	7000	108	114	118	127	108	114	118	127	108	115	118	127	108	115	118	127	108	116	118	127	108	116	118	126				
	6800	107	112	116	126	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125	107	114	116	125	107	115	116	125
	6600	106	110	115	125	106	110	115	125	106	110	115	124	106	111	115	124	106	112	115	124	106	112	115	124	106	113	115	124
	6400	104	107	113	124	104	108	113	123	104	108	113	123	104	109	113	123	104	109	113	123	104	110	113	123	104	111	113	122
	6200	103	105	112	122	103	105	112	122	103	106	112	122	103	107	112	122	103	107	112	122	103	108	112	121	103	109	112	121
	6000	101	103	110	121	101	103	110	121	101	104	110	121	101	104	110	121	101	105	110	121	101	106	110	120	101	107	110	120
	5800	100	101	109	121	100	101	109	120	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120	100	105	109	119
	5600	100	100	109	121	100	100	109	121	100	101	109	120	100	101	109	120	100	102	109	120	100	103	109	120	100	104	109	119
	5400	100	100	111	123	100	100	110	122	100	100	109	121	100	101	109	121	100	101	109	120	100	102	109	120	100	103	109	120
	5200	101	101	112	124	100	100	111	124	100	100	110	122	100	100	110	121	100	101	109	121	100	101	109	120	100	102	109	120
	5000	101	101	114	126	101	101	113	126	101	101	112	124	100	100	111	123	100	100	109	122	100	100	109	121	100	101	109	121
	4800	102	102	116	129	102	102	115	128	101	101	114	126	101	101	112	125	100	100	110	122	100	100	110	122	100	100	109	121
	4600	103	103	118	131	102	102	117	130	102	102	116	128	101	101	114	127	101	101	113	125	100	100	111	123	100	100	110	122
5000	7487	112	119	121	130	112	120	121	130	112	120	121	130																
	7200	110	117	119	128	110	117	119	128	110	117	119	128	110	118	119	128	110	118	119	128								
	7000	108	114	118	127	108	115	118	127	108	115	118	127	108	116	118	127	108	116	118	126	108	117	118	126				
	6800	107	112	116	126	107	113	116	126	107	113	116	126	107	114	116	125	107	114	116	125	107	115	116	125				
	6600	106	110	115	125	106	111	115	124	106	111	115	124	106	112	115	124	106	112	115	124	106	113	115	124	106	114	115	124
	6400	104	108	113	123	104	108	113	123	104	109	113	123	104	109	113	123	104	110	113	123	104	111	113	123	104	111	113	122
	6200	103	106	112	122	103	106	112	122	103	107	112	122	103	107	112	122	103	108	112	121	103	109	112	121	103	109	112	121
	6000	101	103	110	121	101	104	110	121	101	104	110	121	101	105	110	121	101	106	110	120	101	106	110	120	101	107	110	120
	5800	100	101	109	120	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	105	109	119
	5600	100	100	109	121	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	119				
	5400	100	100	110	121	100	100	109	121	100	101	109	120	100	101	109	120	100	102	109	120	100	103	109	120	100	104	109	120
	5200	100	100	111	123	100	100	110	122	100	100	110	121	100	101	109	121	100	102	109	120	100	102	109	120	100	103	109	120
	5000	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	121	100	100	109	121	100	101	109	121	100	102	109	120
	4800	102	102	114	127	101	101	114	126	101	101	112	124	100	100	111	123	100	100	110	122	100	101	110	121	100	101	109	121
	4600	102	102	116	129	102	102	115	128	101	101	114	127	101	101	113	125	100	100	112	124	100	100	110	122	100	100	109	121

FIGURE 4J-6 (continued)

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C)																									
		-6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
6000	7487	112	120	121	130	112	120	121	130																		
	7200	110	117	119	128	110	117	119	128	110	118	119	128	110	118	119	128										
	7000	108	115	118	127	108	115	118	127	108	116	118	127	108	116	118	126	108	117	119	126						
	6800	107	113	116	126	107	113	116	126	107	114	116	125	107	114	116	125	107	115	116	125						
	6600	106	111	115	124	106	111	115	124	106	112	115	124	106	112	115	124	106	113	115	124	106	114	115	124				
	6400	104	109	113	123	104	109	113	123	104	110	113	123	104	110	113	123	104	111	113	122	104	111	113	122	104	112	113	122
	6200	103	106	112	122	103	107	112	122	103	107	112	122	103	108	112	121	103	109	112	121	103	109	112	121	103	110	112	121
	6000	101	104	110	121	101	105	110	121	101	105	110	120	101	106	110	120	101	106	110	120	101	107	110	120	101	108	110	120
	5800	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120	100	105	109	119	100	105	109	119	100	106	109	119
	5600	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	119	100	104	109	119	100	105	109	119
	5400	100	100	109	121	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	119
	5200	100	100	110	121	100	100	109	121	100	101	109	121	100	101	109	120	100	102	109	120	100	103	109	120	100	104	109	120
	5000	100	100	111	123	100	100	110	122	100	100	110	121	100	100	109	121	100	101	109	121	100	102	109	120	100	103	109	120
	4800	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	110	121	100	101	109	121	100	102	109	120
	4600	102	102	115	127	101	101	114	126	101	101	112	125	100	100	111	124	100	100	110	122	100	100	110	121	100	101	109	121
7000	7487	112	121	121	130																						
	7200	110	118	119	128	110	118	119	128																		
	7000	108	116	118	127	108	116	118	126	108	117	118	126														
	6800	107	114	116	125	107	114	116	125	107	115	116	125	107	115	116	125										
	6600	106	112	115	124	106	112	115	124	106	112	115	124	106	113	115	124	106	113	115	124						
	6400	104	109	113	123	104	110	113	123	104	110	113	123	104	111	113	123	104	111	113	122	104	112	113	122				
	6200	103	107	112	122	103	108	112	122	103	108	112	121	103	109	112	121	103	109	112	121	103	110	112	121				
	6000	101	105	110	120	101	105	110	120	101	106	110	120	101	106	110	120	101	107	110	120	101	108	110	120				
	5800	100	103	109	120	100	104	109	120	100	104	109	120	100	105	109	119	100	105	109	119	100	106	109	119				
	5600	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	119	100	104	109	119	100	105	109	119				
	5400	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	119				
	5200	100	100	109	121	100	101	109	121	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120				
	5000	100	100	110	122	100	100	109	121	100	101	109	121	100	101	109	120	100	102	109	120	100	103	109	120				
	4800	100	100	111	123	100	100	111	122	100	100	110	122	100	100	109	121	100	101	109	121	100	102	109	120				
	4600	101	101	113	125	101	101	112	124	100	100	111	123	100	100	110	122	100	100	110	121	100	101	110	121				
8000	7487	112	121	121	129																						
	7200	110	119	119	128																						
	7000	108	116	118	126																						
	6800	107	114	116	125	107	115	116	125	107	115	116	125														
	6600	106	112	115	124	106	113	115	124	106	113	115	124	106	113	115	124										
	6400	104	110	113	123	104	110	113	123	104	111	113	122	104	111	113	122	104	112	113	122						
	6200	103	108	112	121	103	108	112	121	103	109	112	121	103	109	112	121	103	110	112	121	103	110	112	121				
	6000	101	106	110	120	101	106	110	120	101	107	110	120	101	107	110	120	101	108	110	120	101	108	110	120				
	5800	100	104	109	120	100	104	109	120	100	105	109	119	100	105	109	119	100	106	109	119	100	107	109	119				
	5600	100	103	109	120	100	103	109	120	100	104	109	119	100	104	109	119	100	105	109	119	100	106	109	119				
	5400	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120	100	104	109	119	100	105	109	119				
	5200	100	101	109	120	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	119				
	5000	100	100	109	121	100	101	109	121	100	101	109	121	100	102	109	120	100	103	109	120	100	104	109	120				
	4800	100	100	110	122	100	100	110	121	100	101	109	121	100	101	109	121	100	102	109	121	100	103	109	120				
	4600	100	100	111	124	100	100	111	123	100	100	110	122	100	100	110	121	100	101	110	121	100	102	110	121				

FIGURE 4J-6 (continued)

PERFORMANCE

FAA APPROVED: SEP 10/93

TAKEOFF SPEED SCHEDULE (KIAS) – WET

KILOGRAMS

CAUTION

- TAKEOFF IN TEMPERATURE AND ALTITUDE CONDITIONS SHOWN TO THE RIGHT OF AND ABOVE THE SOLID, STEPPED LINE IS NOT APPROVED. THE SPEEDS IN THAT AREA OF THE CHART ARE PROVIDED FOR INTERPOLATION ONLY.
- REFER TO FIGURE 4E-3 OR 4E-4 FOR MAXIMUM PERMISSIBLE TAKEOFF WEIGHTS.

PRESS ALT (FT)	GROSS WT (KG)	OUTSIDE AIR TEMPERATURE (°C)																											
		-6				0				10				20				30				40				50			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
9000	7487	112	122	121	129																								
	7200	110	119	119	127																								
	7000	108	117	118	126																								
	6800	107	115	116	125																								
	6600	106	113	115	124	106	113	115	124	106	114	115	123																
	6400	104	111	113	122	104	111	113	122	104	112	113	122	104	112	113	122												
	6200	103	109	112	121	103	109	112	121	103	109	112	121	103	110	112	121	103	110	112	121								
	6000	101	106	110	120	101	107	110	120	101	107	110	120	101	108	110	120	101	108	110	120	101	109	110	119				
	5800	100	105	109	119	100	105	109	119	100	106	109	119	100	106	109	119	100	107	109	119	100	107	109	119				
	5600	100	104	109	119	100	104	109	119	100	105	109	119	100	105	109	119	100	106	109	119	100	106	109	119				
	5400	100	103	109	120	100	103	109	120	100	104	109	120	100	104	109	119	100	105	109	119	100	106	109	119				
	5200	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120	100	104	109	120	100	105	109	119				
	5000	100	101	109	121	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	120				
	4800	100	100	109	121	100	101	109	121	100	101	109	121	100	102	109	121	100	103	109	120	100	103	109	120				
	4600	100	100	110	122	100	100	110	122	100	100	110	121	100	101	110	121	100	102	110	121	100	103	110	120				
10000	7487	112	122	121	129																								
	7200	110	120	119	127																								
	7000	108	118	118	126																								
	6800	107	116	116	125																								
	6600	106	114	115	123																								
	6400	104	111	113	122	104	112	113	122																				
	6200	103	109	112	121	103	110	112	121	103	110	112	121	103	111	112	121												
	6000	101	107	110	120	101	107	110	120	101	108	110	120	101	108	110	120	101	109	110	119								
	5800	100	105	109	119	100	106	109	119	100	106	109	119	100	107	109	119	100	107	109	119	100	108	109	118				
	5600	100	104	109	119	100	105	109	119	100	105	109	119	100	106	109	119	100	106	109	119	100	107	109	118				
	5400	100	104	109	120	100	104	109	119	100	105	109	119	100	105	109	119	100	106	109	119	100	106	109	119				
	5200	100	103	109	120	100	103	109	120	100	104	109	120	100	104	109	120	100	105	109	119	100	106	109	119				
	5000	100	102	109	120	100	102	109	120	100	103	109	120	100	104	109	120	100	104	109	120	100	105	109	119				
	4800	100	101	109	121	100	102	109	121	100	102	109	120	100	103	109	120	100	103	109	120	100	104	109	120				
	4600	100	100	110	121	100	101	110	121	100	101	110	121	100	102	110	121	100	103	110	120	100	103	110	120				

DISTANCE TO ACCELERATE TO V_1 AND STOP – WET

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4J-6)
NOSE WHEEL STEERING ... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 107 KIAS
ACCELERATE - STOP DISTANCE = 3,800 FEET (1160 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 0.4 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

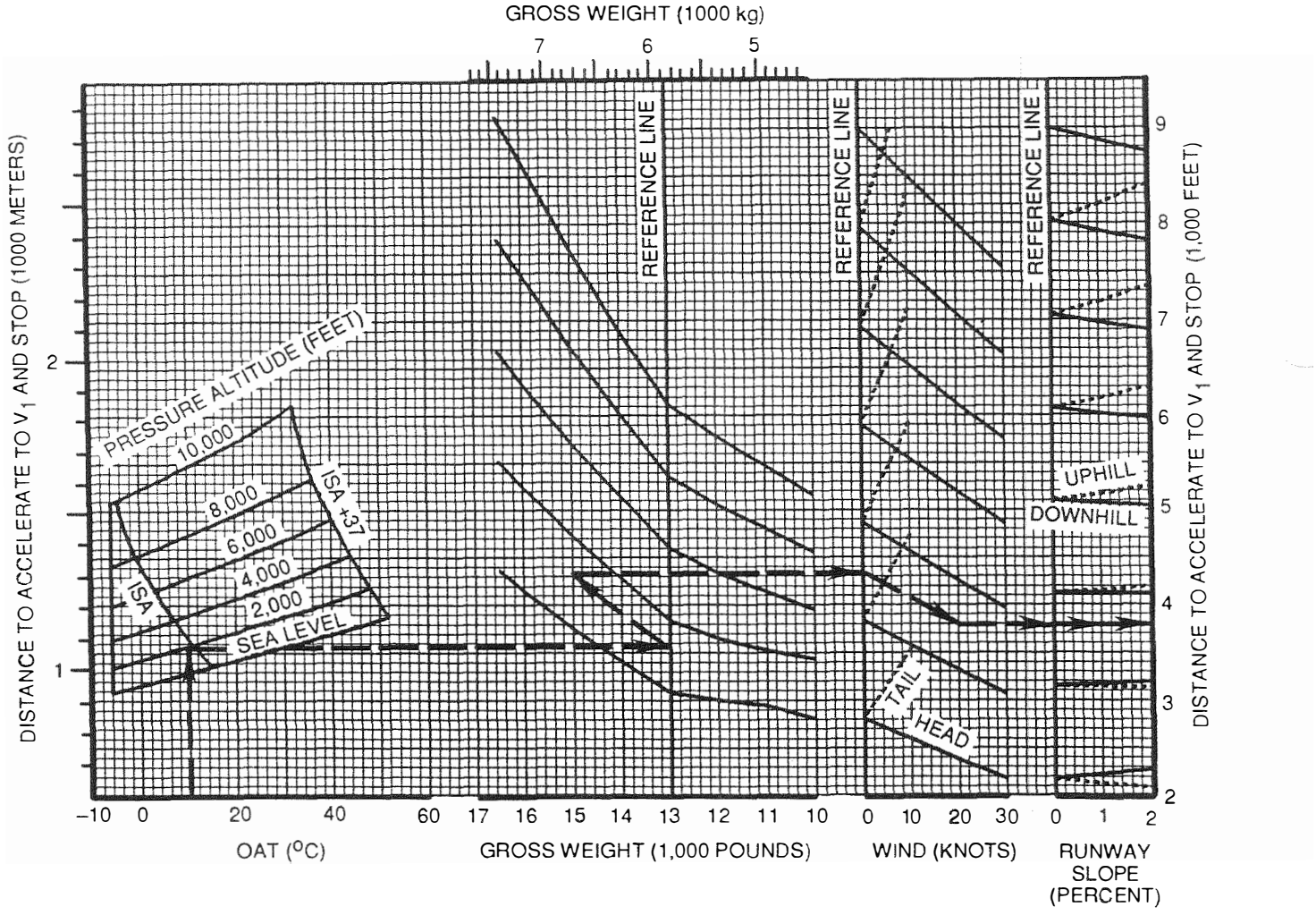


FIGURE 4J-7

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – WET

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4J-6
V_R SPEED ..... FIGURE 4J-6
V_2 SPEED ..... FIGURE 4J-6
FLAPS 1/4
NOSE WHEEL STEERING ... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 107 KIAS
V_R SPEED = 112 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 4,650 FEET (1415 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4.

NOTE

- INCREASE TAKEOFF DISTANCE BY 2.8 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

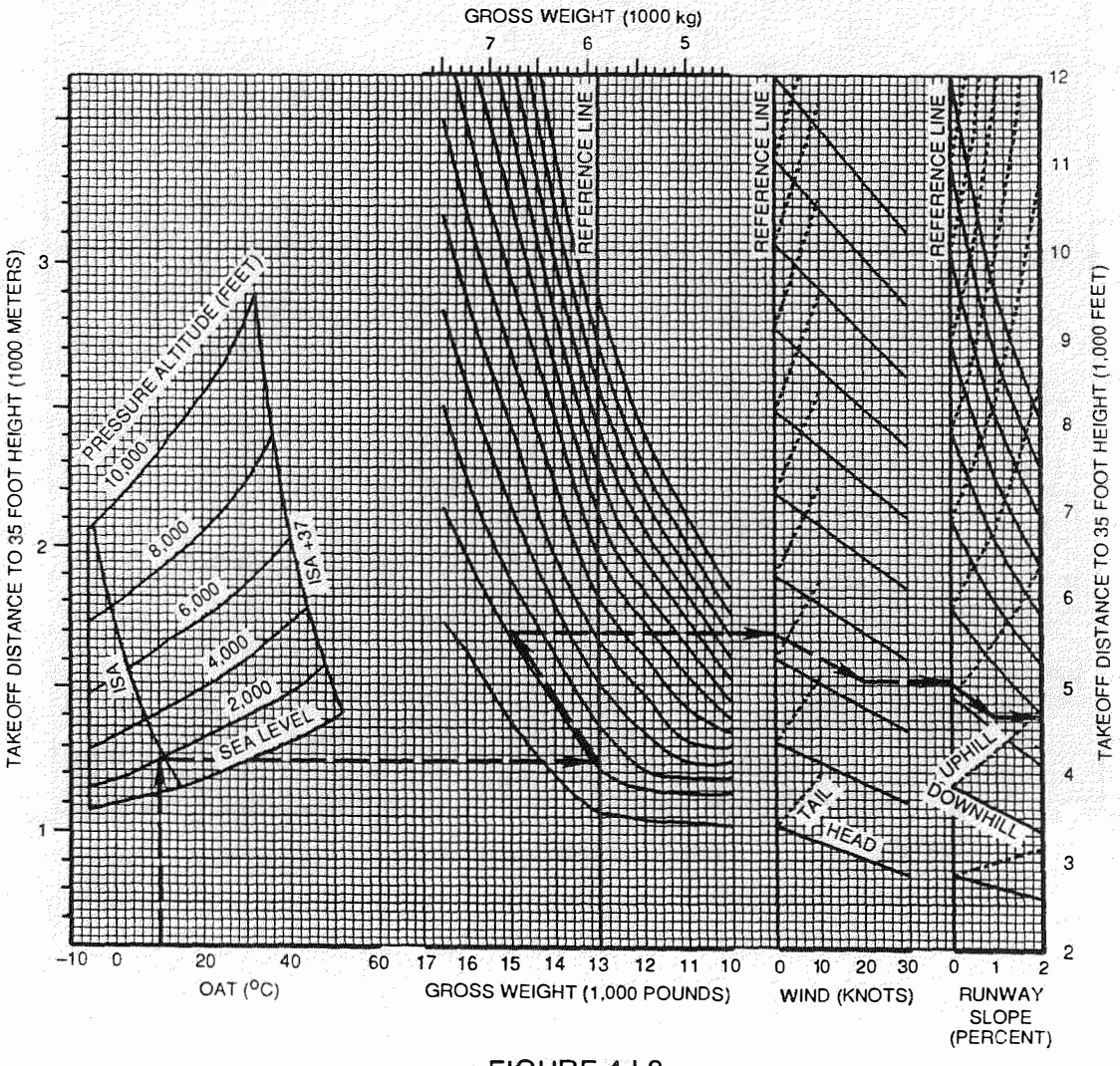


FIGURE 4J-8

SINGLE ENGINE TAKEOFF RUN DISTANCE – WET

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4J-6
V_R SPEED	FIGURE 4J-6
V_2 SPEED	FIGURE 4J-6
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 107 KIAS
V_R SPEED = 112 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 4,150 FEET (1265 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4.

NOTE

- INCREASE TAKEOFF DISTANCE BY 2.3 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

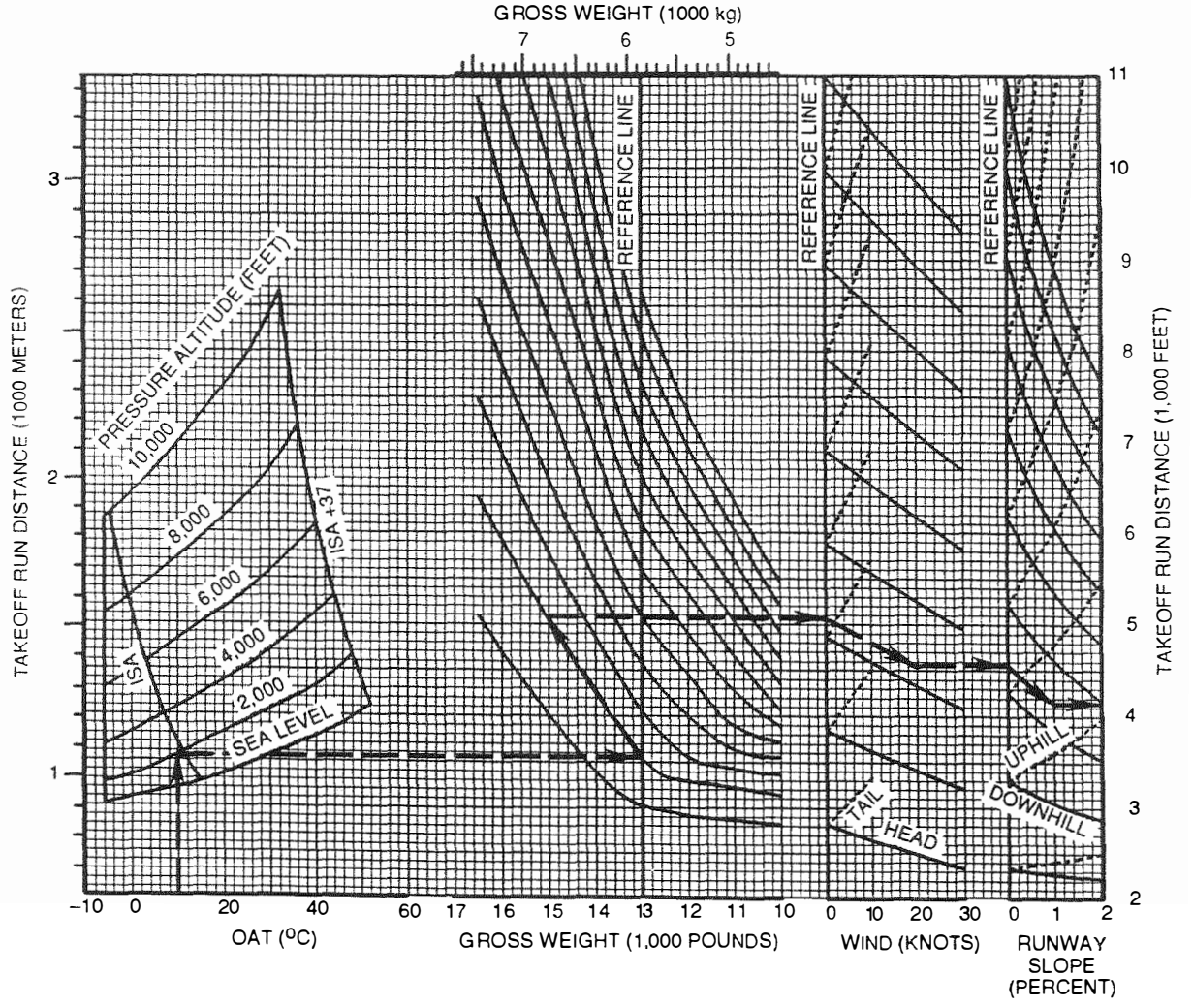


FIGURE 4J-9

PART K – SUPPLEMENTAL TAKEOFF FLIGHT PATH PERFORMANCE

CONTENTS

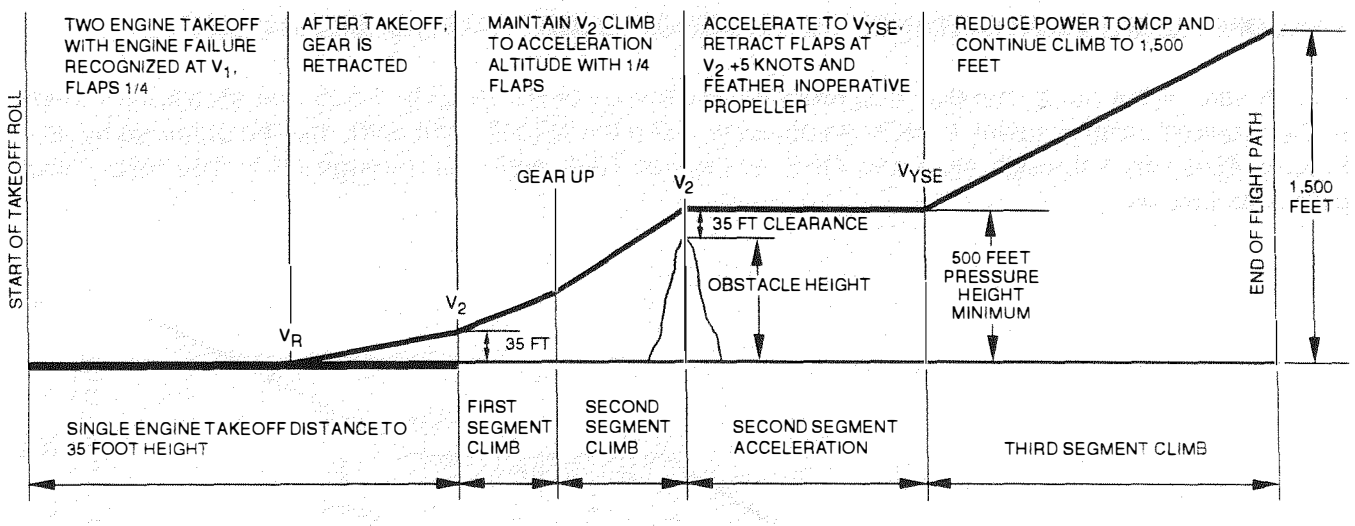
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DISCUSSION

Part 4K includes additional takeoff flight path charts with the ability to vary the acceleration altitude when computing obstacle clearance up to 1500 feet. These supplemental charts are to be used with the Dry, Bleed Air Off and Wet runway charts in Parts 4D, 4E and 4J. The takeoff flight path is as follows:



The takeoff flight path consists of five phases defined as follows:

1. SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT.

Both engines are assumed to operate normally to V_1 where one engine is recognized as failed and the takeoff is continued on one engine. This phase ends when the airplane reaches 35 feet above the runway surface.

2. FIRST SEGMENT CLIMB.

The first segment climb is a constant V_2 climb starting at a height of 35 feet above the runway surface and ends at the point at which the landing gear is fully retracted, with flaps at 1/4 and the propeller on the inoperative engine windmilling in the NTS mode.

3. SECOND SEGMENT CLIMB.

The second segment climb is a constant V_2 climb starting at a point of gear retraction or 35 feet above the runway surface and ends at start of the desired acceleration altitude. The landing gear is fully retracted at the start of this phase, flaps remain at 1/4, and the propeller on the inoperative engine is windmilling in the NTS mode.

4. SECOND SEGMENT ACCELERATION.

This phase is an acceleration at the desired acceleration altitude from V_2 to V_{YSE}. The flaps are retracted at V_2 +5 knots, the propeller on the inoperative engine is feathered, and takeoff power is maintained until V_{YSE} is obtained.

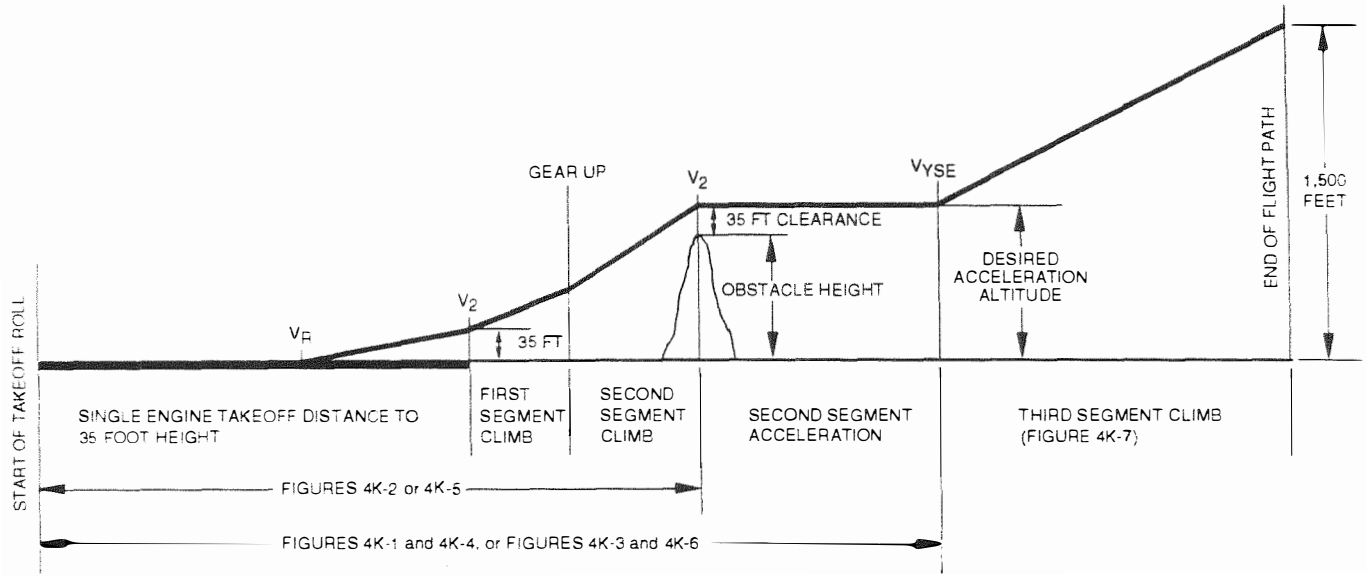
DISCUSSION (continued)

5. THIRD SEGMENT CLIMB.

The third segment climb is at V_{YSE} with maximum continuous power set. It starts at the end of the acceleration segment and ends at 1500 feet above the runway surface.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR OFF

An estimate of the horizontal distance required to clear an obstacle up to 1,500 feet above the runway, or the required climb gradient to clear an obstacle along the takeoff flight path, may be obtained by using Figures 4D-5, 4K-1 through 4K-3 and 4K-7, or Figures 4J-4, and 4K-4 through 4K-7. The takeoff flight path is as follows:



The takeoff flight path can be computed with the following charts:

1. SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT (FIGURE 4D-5 or 4J-4).

Both engines are assumed to operate normally to V_1 where one engine is recognized as failed and the takeoff is continued on one engine. This phase ends when the airplane reaches 35 feet above the runway surface.

2. TAKEOFF FLIGHT PATH TIME TO V_{YSE} (FIGURE 4K-1 or 4K-4).

The takeoff flight path time is the time from the start of the takeoff roll to when V_{YSE} is obtained at the end of the acceleration altitude. These charts include the time for the single engine takeoff distance to 35 foot height, the first segment climb until gear retraction is complete, second segment climb to the desired acceleration altitude, and the second segment acceleration to V_{YSE} at the acceleration altitude. All the performance, except the single engine takeoff, is net performance.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR OFF (continued)

3. TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE (FIGURE 4H-2 or 4K-5).

These charts show the horizontal distance from the start of the takeoff roll to the start of the acceleration altitude. They include the distance for the single engine takeoff to 35 foot height, the first segment climb until gear retraction is complete, second segment climb to the desired acceleration altitude. All the performance, except the single engine takeoff, is net performance.

4. TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} (FIGURE 4K-3 or 4K-6).

The takeoff flight path distance is the horizontal distance from the start of the takeoff roll to when V_{YSE} is obtained at the end of the acceleration altitude. These charts include the distance for the single engine takeoff to 35 foot height, the first segment climb until gear retraction is complete, second segment climb to the desired acceleration altitude, and the second segment acceleration to V_{YSE} at the acceleration altitude. All the performance, except the single engine takeoff, is net performance.

5. THIRD SEGMENT CLIMB GRADIENT (FIGURE 4K-7).

The third segment climb gradient is presented as net climb gradient.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR OFF (continued)

The following are two examples to illustrate the use of the flight path data charts.

EXAMPLE 1

Given: Airport OAT = 20°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (downhill)
Obstacle Height above the Approach End of Runway = 700 Geometric feet (215 m)
Obstacle Distance from Brake Release = 46,600 feet (14205 m)
Part 4D takeoff speeds

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4D-5) = 4,550 feet (1385 m).

2. The height correction for runway slope is 4,550 x 1.0/100 = 45 feet.

3. Obtain obstacle height above the end of takeoff distance is 700 + 45 = 745 feet (225 m).

4. Determine the desired acceleration altitude to clear the obstacle with a 35 foot clearance.

   745 + 35 = 780 Geometric feet (240 m)

   Pressure height is computed as follows:

   $$\text{Pressure height} = \frac{\text{Standard Absolute Temperature (mid height)}}{\text{Actual Absolute Temperature (mid height)}} \times \text{Geometric height}$$

   Assume –2°C per 1,000 feet temperature lapse rate

   $$\frac{10.3 + 273.2}{19.2 + 273.2} \times 780 = 756 \text{ feet pressure height}$$

5. Determine if the 5 minute takeoff power engine limitation will not be exceeded for a single engine takeoff, climb to (2,000 + 756) 2,756 feet pressure height and accelerate to V_{YSE} at 780 geometric feet above the runway surface from Figure 4K-1.
   Total Time is 192 seconds or 3.2 minutes. The 5 minute rating will not be exceeded.

6. Determine if the obstacle will be cleared with 35 feet of clearance from Figure 4K-2 with a desired acceleration pressure height of 756 feet.
   29,600 feet required, obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – DRY, BLEED AIR OFF (continued)

EXAMPLE 2

Given: Airport OAT = 20°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Wind = Calm
Runway Slope = 0 percent (level)
Obstacle Height above the Approach End of Runway = 1,300 Geometric feet (395 m)
Obstacle Distance from Brake Release = 64,500 feet (19660 m)
Part 4J takeoff speeds

Obtain:

1. Since the runway is level there is no slope correction to the obstacle height.

2. From Figure 4K-4, the highest acceleration altitude allowable is 1,130 feet (pressure height) without exceeding the 5 minute rating.

3. Determine the total distance to V_{YSE} from Figure 4K-6 with an acceleration altitude of 1,130 feet (pressure height). 59,750 feet required (Brake release to V_{YSE}).

4. Determine the required third segment climb gradient to clear the obstacle with 35 feet of obstacle clearance.

$$\text{Required gradient} = \frac{(\text{Obstacle height} - \text{Acceleration height})}{(\text{Obstacle distance} - \text{Distance to } V_{YSE})} \times 100$$

Since the heights must be geometric heights, the acceleration altitude must be converted to geometric height.

Geometric height is computed as follows:

$$\text{Geometric height} = \frac{\text{Actual Absolute Temperature (mid height)}}{\text{Standard Absolute Temperature (mid height)}} \times \text{Pressure height}$$

$$\frac{18.9 + 273.2}{9.9 + 273.2} \times 1{,}130 = 1{,}166 \text{ feet geometric height}$$

$$\text{Required gradient} = \frac{(1{,}300 + 35 - 1{,}166)}{(64{,}500 - 59{,}750)} \times 100 = 3.57 \text{ percent}$$

5. Determine the actual third segment climb gradient from Figure 4K-7. Enter Figure 4K-7 with the average pressure altitude of the climb, (2,000 + 1,300/2) 2,650 feet. The actual climb gradient is 3.80 percent, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

TAKEOFF FLIGHT PATH TIME TO V_{YSE} – DRY, BLEED AIR OFF
PART 4D TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER..... TAKEOFF (DRY)
GEN LOAD.....300 AMPS
BLEED AIR .....OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY .....DRY, HARD SURFACE
V_1 SPEED..... FIGURE 4D-3
V_R SPEED ..... FIGURE 4D-3
V_2 SPEED..... FIGURE 4D-3
V_{YSE} SPEED ..... FIGURE 4F-2
FLAPS 1/4
NOSE WHEEL STEERING.....ON OR OFF

EXAMPLE:

GIVEN: OAT = 20°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 756 FEET (230 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: TAKEOFF PATH TIME = 192 SECONDS

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-1

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH TIME TO V_{YSE} – DRY, BLEED AIR OFF
PART 4D TAKEOFF SPEEDS

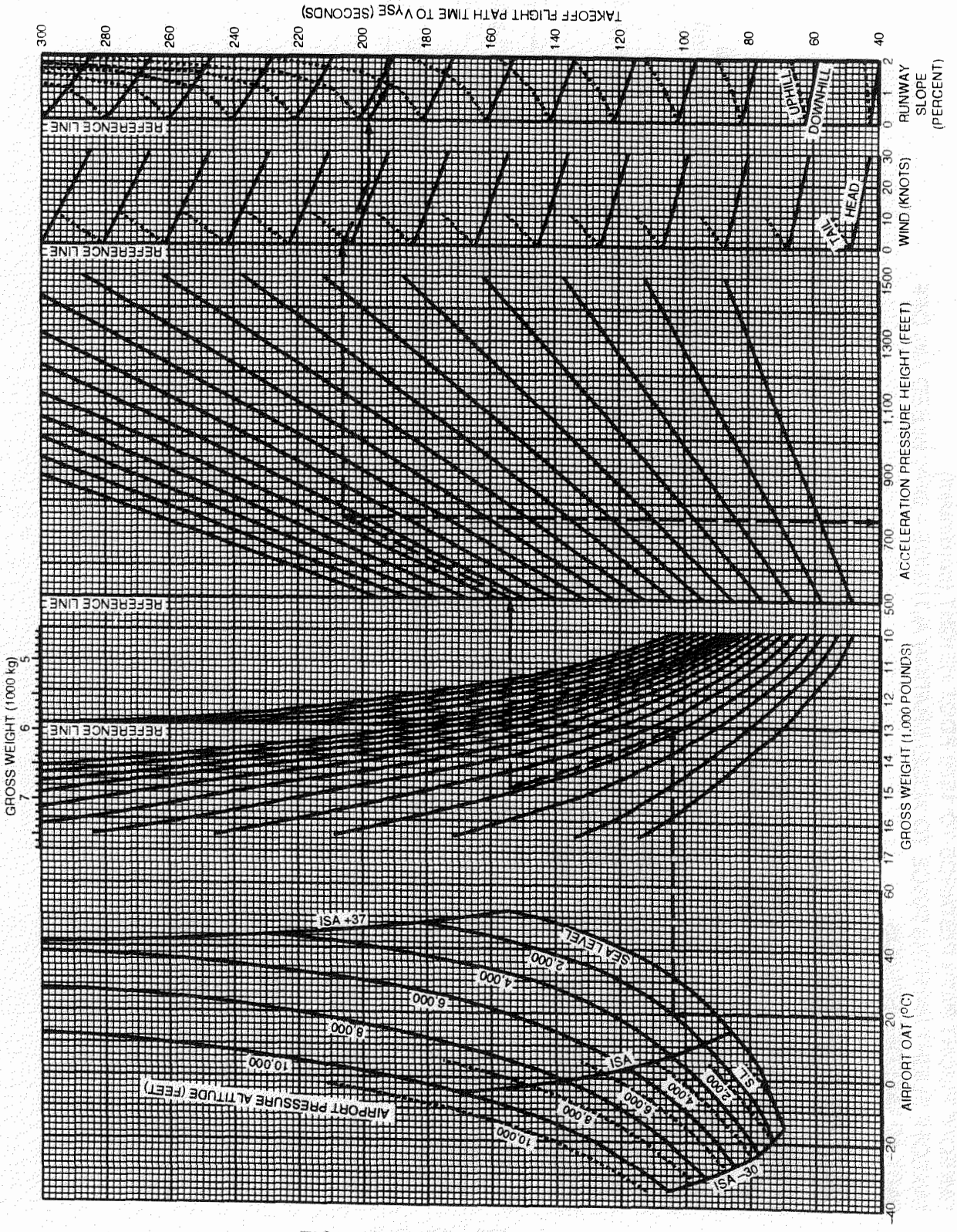


FIGURE 4K-1 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – DRY, BLEED AIR OFF
PART 4D TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4D-3
V_R SPEED ..... FIGURE 4D-3
V_2 SPEED ..... FIGURE 4D-3
V_{YSE} SPEED ..... FIGURE 4F-2
FLAPS 1/4
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 20°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 756 FEET (230 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: TAKEOFF PATH DISTANCE = 29,600 FEET (9020 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-2

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – DRY, BLEED AIR OFF
PART 4D TAKEOFF SPEEDS

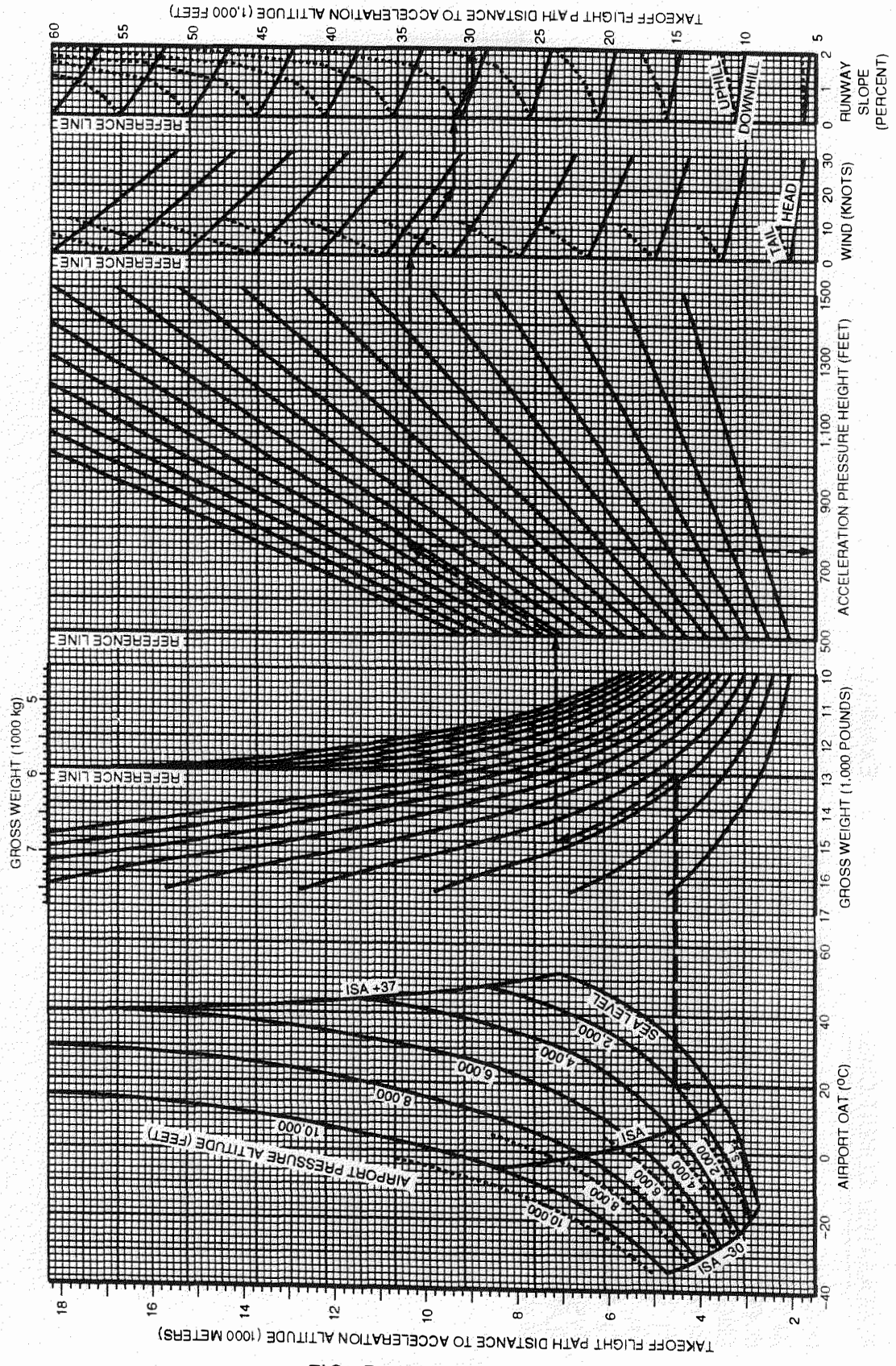


FIGURE 4K-2 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – DRY, BLEED AIR OFF
PART 4D TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER..... TAKEOFF (DRY)
GEN LOAD.....300 AMPS
BLEED AIR .....OFF
ENG ANTI-ICE..... OFF (SEE NOTE)
RUNWAY .....DRY, HARD SURFACE
V_1 SPEED..... FIGURE 4D-3
V_R SPEED ..... FIGURE 4D-3
V_2 SPEED..... FIGURE 4D-3
V_{YSE} SPEED .....FIGURE 4F-2
FLAPS.....1/4
NOSE WHEEL STEERING..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 20°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 669 FEET (200 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: TAKEOFF PATH DISTANCE = 32,750 FEET (9980 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-3

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – DRY, BLEED AIR OFF
PART 4D TAKEOFF SPEEDS

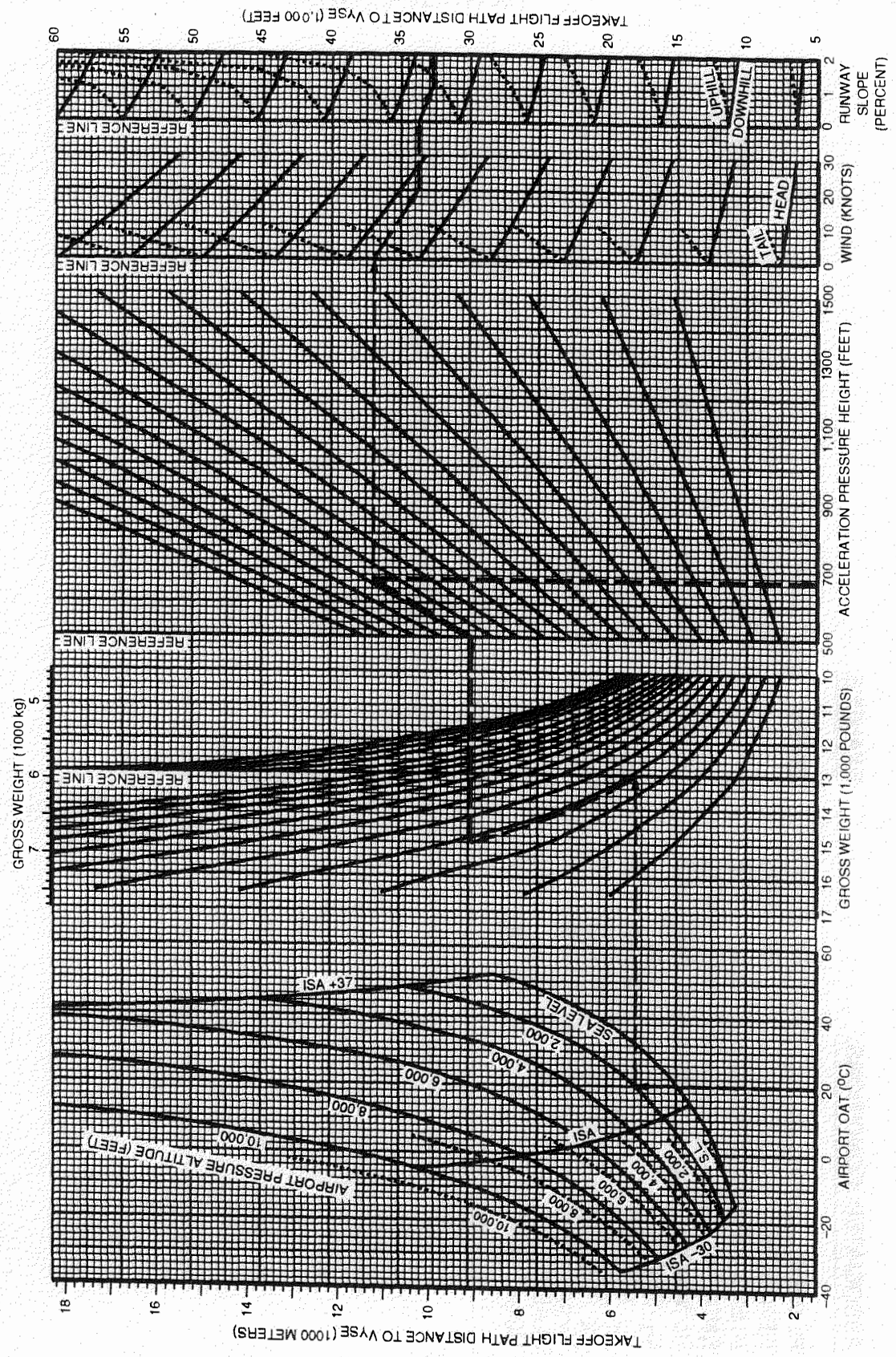


FIGURE 4K-3 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH TIME TO V_{YSE} – DRY, BLEED AIR OFF
PART 4J TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4J-2
V_R SPEED	FIGURE 4J-2
V_2 SPEED	FIGURE 4J-2
V_{YSE} SPEED	FIGURE 4F-2
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 20°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 669 FEET (200 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: TAKEOFF PATH TIME = 184 SECONDS

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-4

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

TAKEOFF FLIGHT PATH TIME TO V_{YSE} – DRY, BLEED AIR OFF

PART 4J TAKEOFF SPEEDS

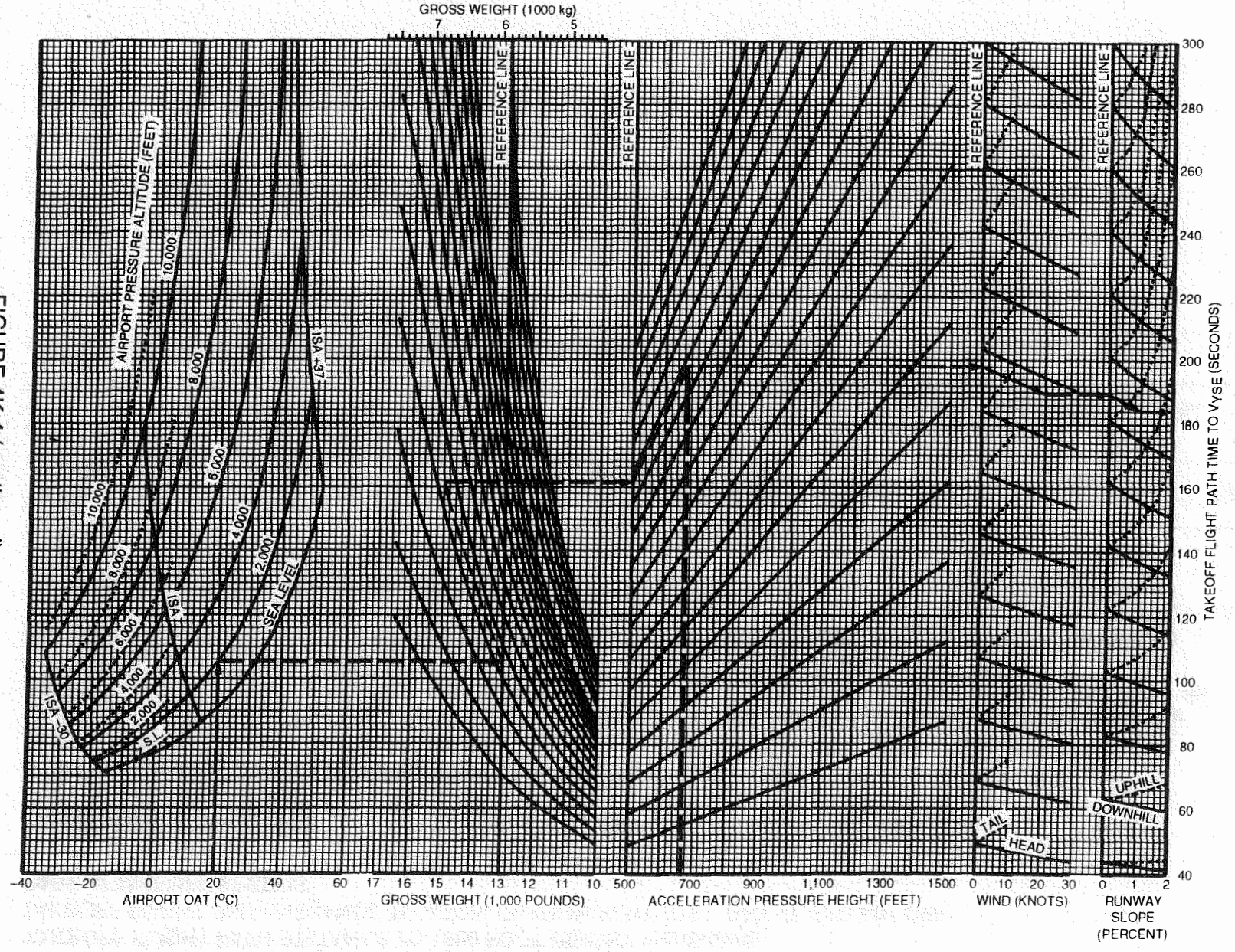


FIGURE 4K-4 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – DRY, BLEED AIR OFF
PART 4J TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4J-2
V_R SPEED	FIGURE 4J-2
V_2 SPEED	FIGURE 4J-2
V_{YSE} SPEED	FIGURE 4F-2
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 20°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 669 FEET (200 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: TAKEOFF PATH DISTANCE = 27,250 FEET (8305 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-5

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – DRY, BLEED AIR OFF
PART 4J TAKEOFF SPEEDS

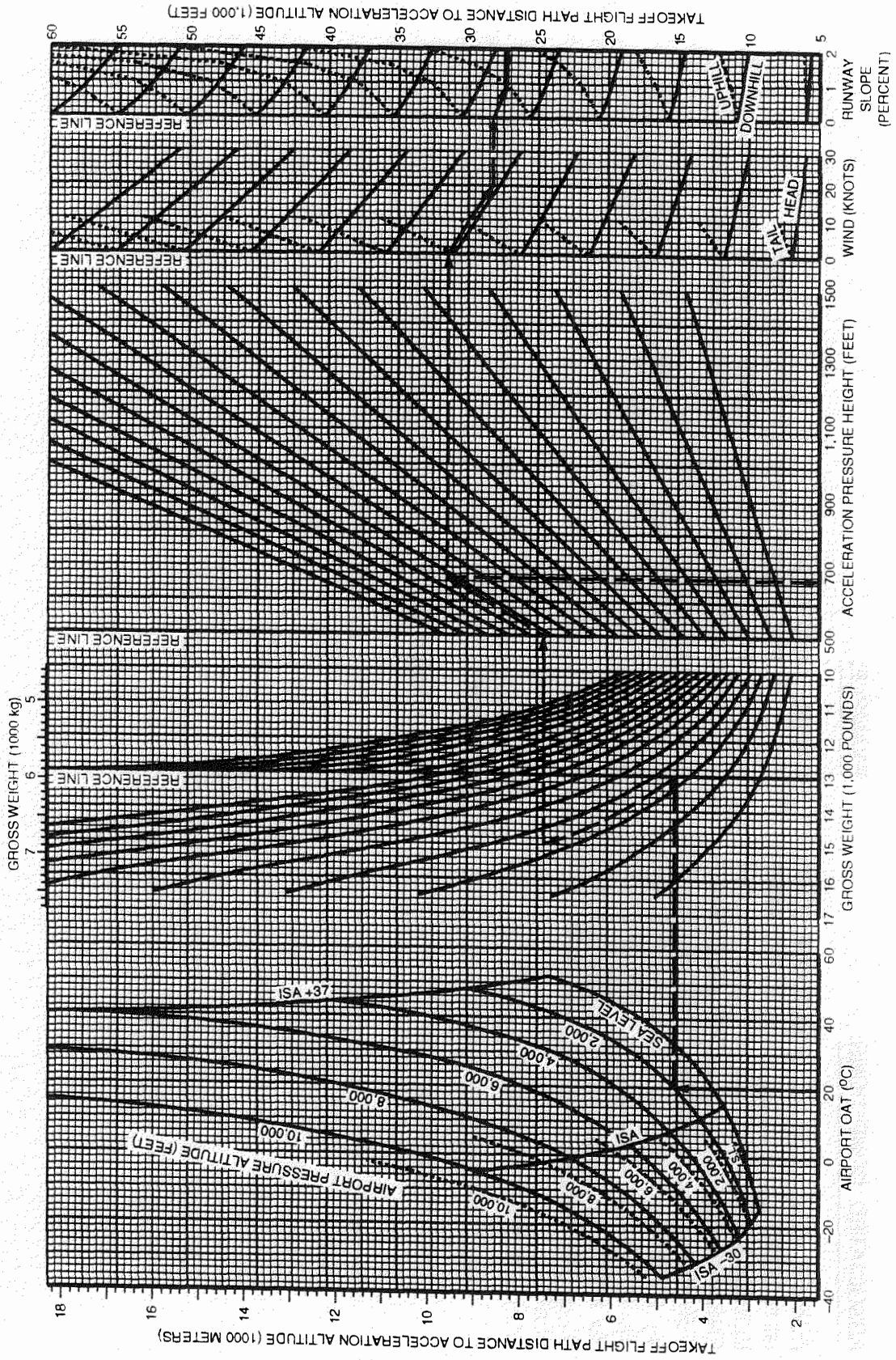


FIGURE 4K-5 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – DRY, BLEED AIR OFF
PART 4J TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4J-2
V_R SPEED ..... FIGURE 4J-2
V_2 SPEED ..... FIGURE 4J-2
V_{YSE} SPEED ..... FIGURE 4F-2
FLAPS 1/4
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 20°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 669 FEET (200 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: TAKEOFF PATH DISTANCE = 33,250 FEET (10135 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-6

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – DRY, BLEED AIR OFF
PART 4J TAKEOFF SPEEDS

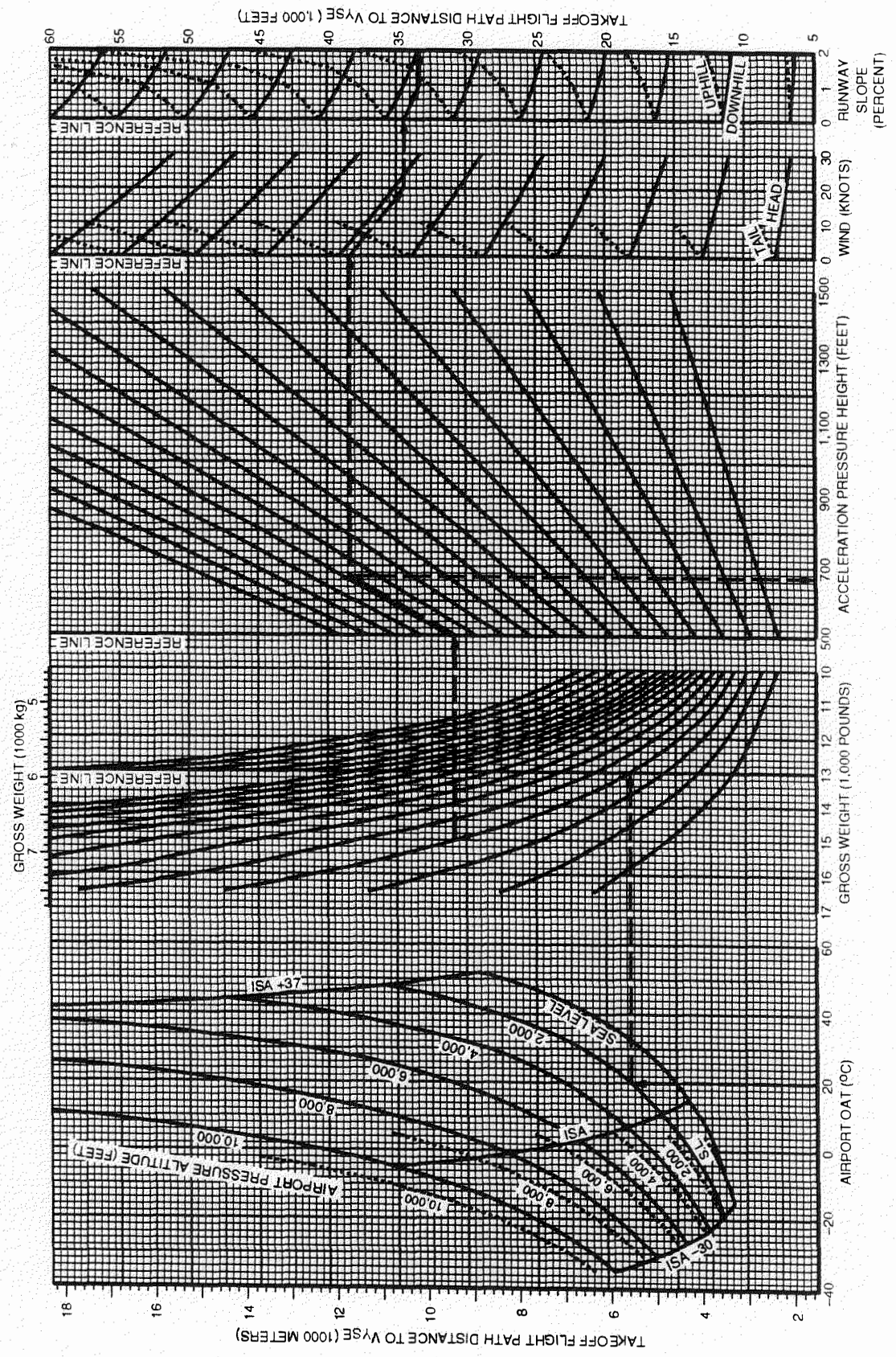


FIGURE 4K-6 (continued)

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

THIRD SEGMENT CLIMB GRADIENT – DRY, BLEED AIR OFF

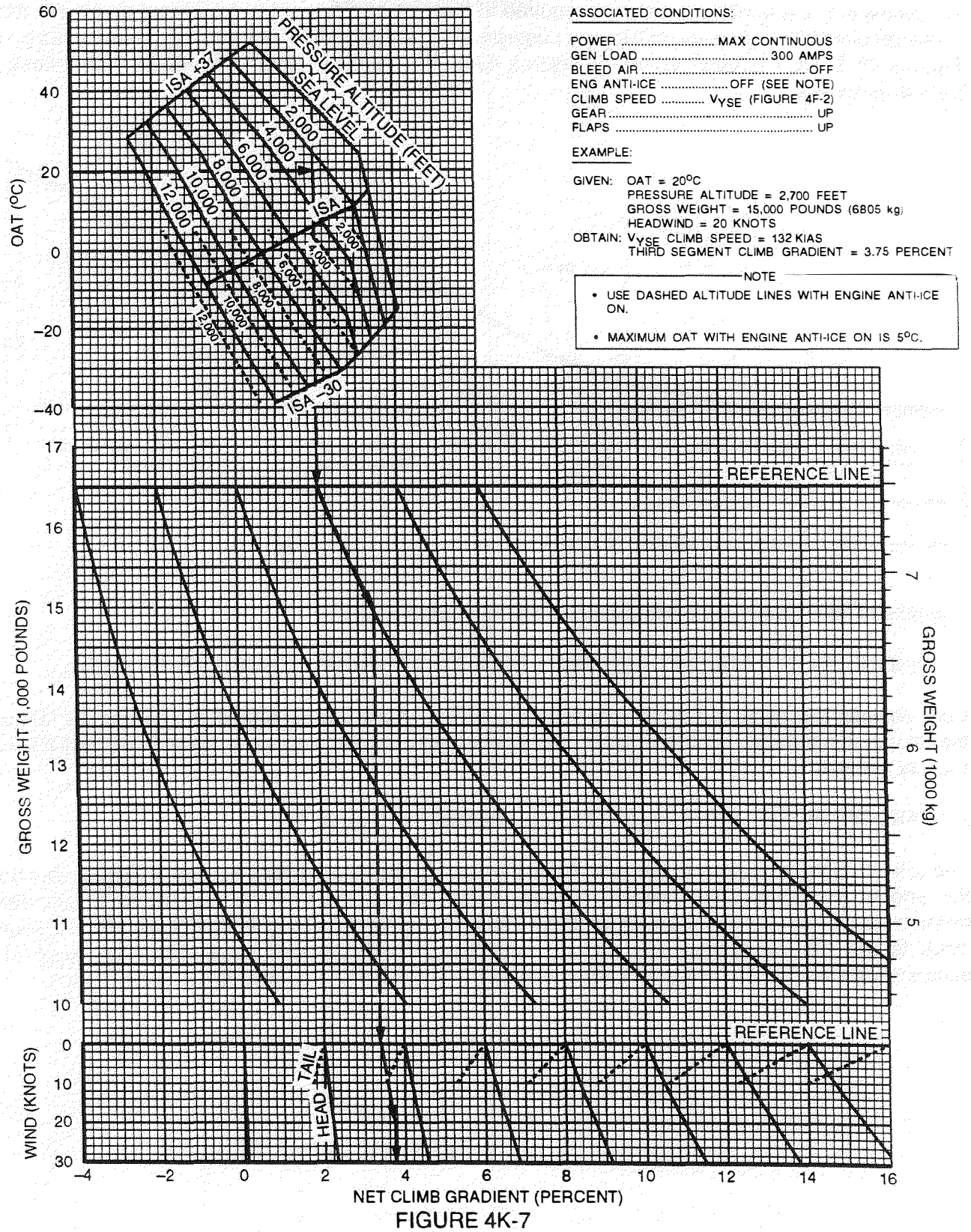
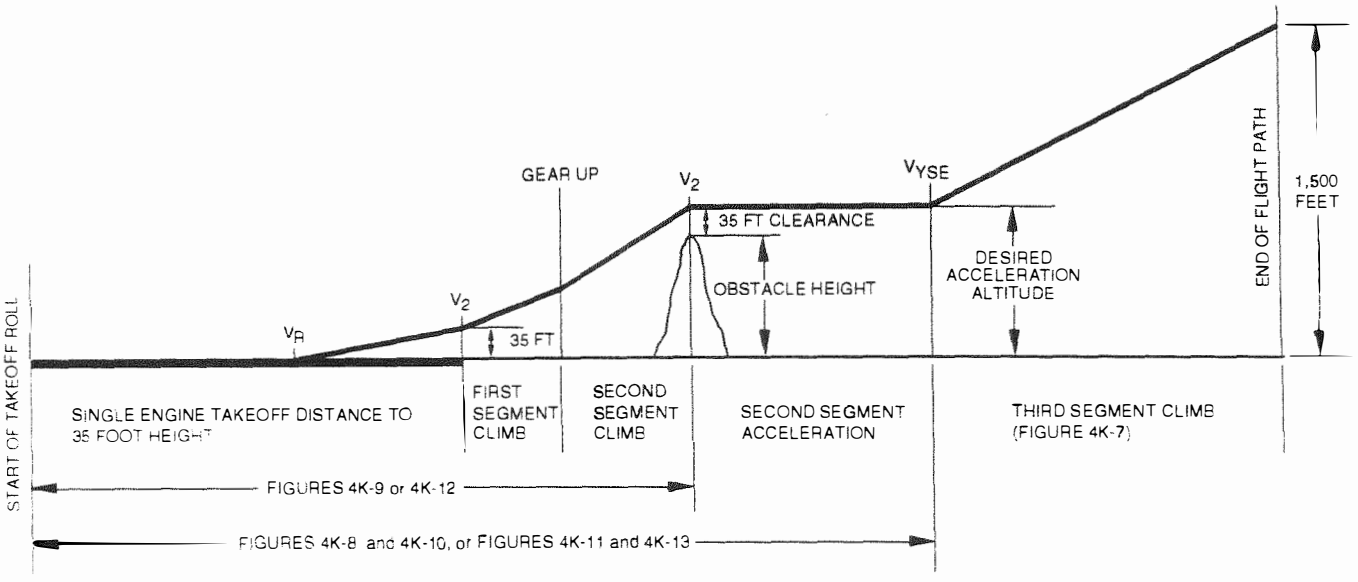


FIGURE 4K-7

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – WET

An estimate of the horizontal distance required to clear an obstacle up to 1,500 feet above the runway, or the required climb gradient to clear an obstacle along the takeoff flight path, may be obtained by using Figures 4E-7, 4K-7 through 4K-10, or Figures 4J-8, 4K-7 and 4K-11 through 4K-13. The takeoff flight path is as follows:



The takeoff flight path can be computed with the following charts:

1. SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT (FIGURE 4E-7 or 4J-8).

Both engines are assumed to operate normally to V_1 where one engine is recognized as failed and the takeoff is continued on one engine. This phase ends when the airplane reaches 35 feet above the runway surface.

2. TAKEOFF FLIGHT PATH TIME TO V_{YSE} (FIGURE 4K-8 or 4K-11).

The takeoff flight path time is the time from the start of the takeoff roll to when V_{YSE} is obtained at the end of the acceleration altitude. These charts include the time for the single engine takeoff distance to 35 foot height, the first segment climb until gear retraction is complete, second segment climb to the desired acceleration altitude, and the second segment acceleration to V_{YSE} at the acceleration altitude. All the performance, except the single engine takeoff, is net performance.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – WET (continued)

3. TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE (FIGURE 4K-9 or 4K-12).

These charts show the horizontal distance from the start of the takeoff roll to the start of the acceleration altitude. They include the distance for the single engine takeoff to 35 foot height, the first segment climb until gear retraction is complete, second segment climb to the desired acceleration altitude. All the performance, except the single engine takeoff, is net performance.

4. TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} (FIGURE 4K-10 or 4K-13).

The takeoff flight path distance is the horizontal distance from the start of the takeoff roll to when V_{YSE} is obtained at the end of the acceleration altitude. These charts include the distance for the single engine takeoff to 35 foot height, the first segment climb until gear retraction is complete, second segment climb to the desired acceleration altitude, and the second segment acceleration to V_{YSE} at the acceleration altitude. All the performance, except the single engine takeoff, is net performance.

5. THIRD SEGMENT CLIMB GRADIENT (FIGURE 4K-7).

The third segment climb gradient is presented as net climb gradient.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – WET (continued)

The following are two examples to illustrate the use of the flight path data charts.

EXAMPLE 1

Given: Airport OAT = 30°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Headwind = 20 knots
Runway Slope = 1 percent (uphill)
Obstacle Height above the Approach End of Runway = 700 Geometric feet (215 m)
Obstacle Distance from Brake Release = 46,600 feet (14205 m)
Part 4E takeoff speeds

Obtain:

1. Single Engine Takeoff Distance to 35 Foot Height (Figure 4E-7) = 5,650 feet (1720 m).

2. The height correction for runway slope is 5,650 x 1.0/100 = 56 feet.

3. Obtain obstacle height above the end of takeoff distance is 700 – 56 = 644 feet (195 m).

4. Determine the desired acceleration altitude to clear the obstacle with a 35 foot clearance.

   644 + 35 = 679 Geometric feet (205 m)

   Pressure height is computed as follows:

   $$\text{Pressure height} = \frac{\text{Standard Absolute Temperature (mid height)}}{\text{Actual Absolute Temperature (mid height)}} \times \text{Geometric height}$$

   Assume –2°C per 1,000 feet temperature lapse rate

   $$\frac{10.4 + 273.2}{29.3 + 273.2} \times 679 = 637 \text{ feet pressure height}$$

5. Determine if there is sufficient CAWI to conduct a single engine takeoff, climb to (2,000 + 637) 2,637 feet pressure height and accelerate to V_{YSE} at 679 geometric feet above the runway surface from Figure 4K-8. Total CAWI required is 8.1 gallons (30.7 liters) [14 gallons (53 liters) usable is available].

6. Determine if the obstacle will be cleared with 35 feet of clearance from Figure 4K-9 with a desired acceleration pressure height of 637 feet.
   24,000 feet required, obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT – WET (continued)

EXAMPLE 2

Given: Airport OAT = 30°C
Airport Pressure Altitude = 2,000 feet
Gross Weight = 15,000 pounds (6805 kg)
Wind = Calm
Runway Slope = 0 percent (level)
Obstacle Height above the Approach End of Runway = 1400 Geometric feet (425 m).
Obstacle Distance from Brake Release = 64,500 feet (19660 m)
Part 4E takeoff speeds

Obtain:

1. Since the runway is level there is no slope correction to the obstacle height.

2. From Figure 4K-8, the highest acceleration altitude allowable is 1,270 feet (pressure height) without exceeding 14 gallons (53 liters) of CAWI.

3. Determine if the total distance to V_{YSE} from Figure 4K-10 with an acceleration altitude of 1,270 feet (pressure height). 58,250 feet required (Brake release to V_{YSE}).

4. Determine the required third segment climb gradient to clear the obstacle with 35 feet of obstacle clearance.

$$\text{Required gradient} = \frac{(\text{Obstacle height} - \text{Acceleration height})}{(\text{Obstacle distance} - \text{Distance to } V_{YSE})} \times 100$$

Since the heights must be geometric heights, the acceleration altitude must be converted to geometric height.

Geometric height is computed as follows:

$$\text{Geometric height} = \frac{\text{Actual Absolute Temperature (mid height)}}{\text{Standard Absolute Temperature (mid height)}} \times \text{Pressure height}$$

$$\frac{28.7 + 273.2}{9.8 + 273.2} \times 1270 = 1355 \text{ feet geometric height}$$

$$\text{Required gradient} = \frac{(1{,}400 + 35 - 1{,}355)}{(64{,}500 - 58{,}250)} \times 100 = 1.28 \text{ percent}$$

5. Determine the actual third segment climb gradient from Figure 4K-7. Enter Figure 4K-7 with the average pressure altitude of the climb, (2,000 + 1,400/2) 2,700 feet. The actual climb gradient is 3.75 percent, the obstacle will be cleared.

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
CAWI REQUIRED FOR TAKEOFF PATH TO V_{YSE}
PART 4E TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4E-5
V_R SPEED	FIGURE 4E-5
V_2 SPEED	FIGURE 4E-5
V_{YSE} SPEED	FIGURE 4F-2
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 30°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 637 FEET (195 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)
OBTAIN: CAWI REQUIRED = 8.1 GALLONS (30.7 LITERS)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-8

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

CAWI REQUIRED FOR TAKEOFF PATH TO V_{YSE}

PART 4E TAKEOFF SPEEDS

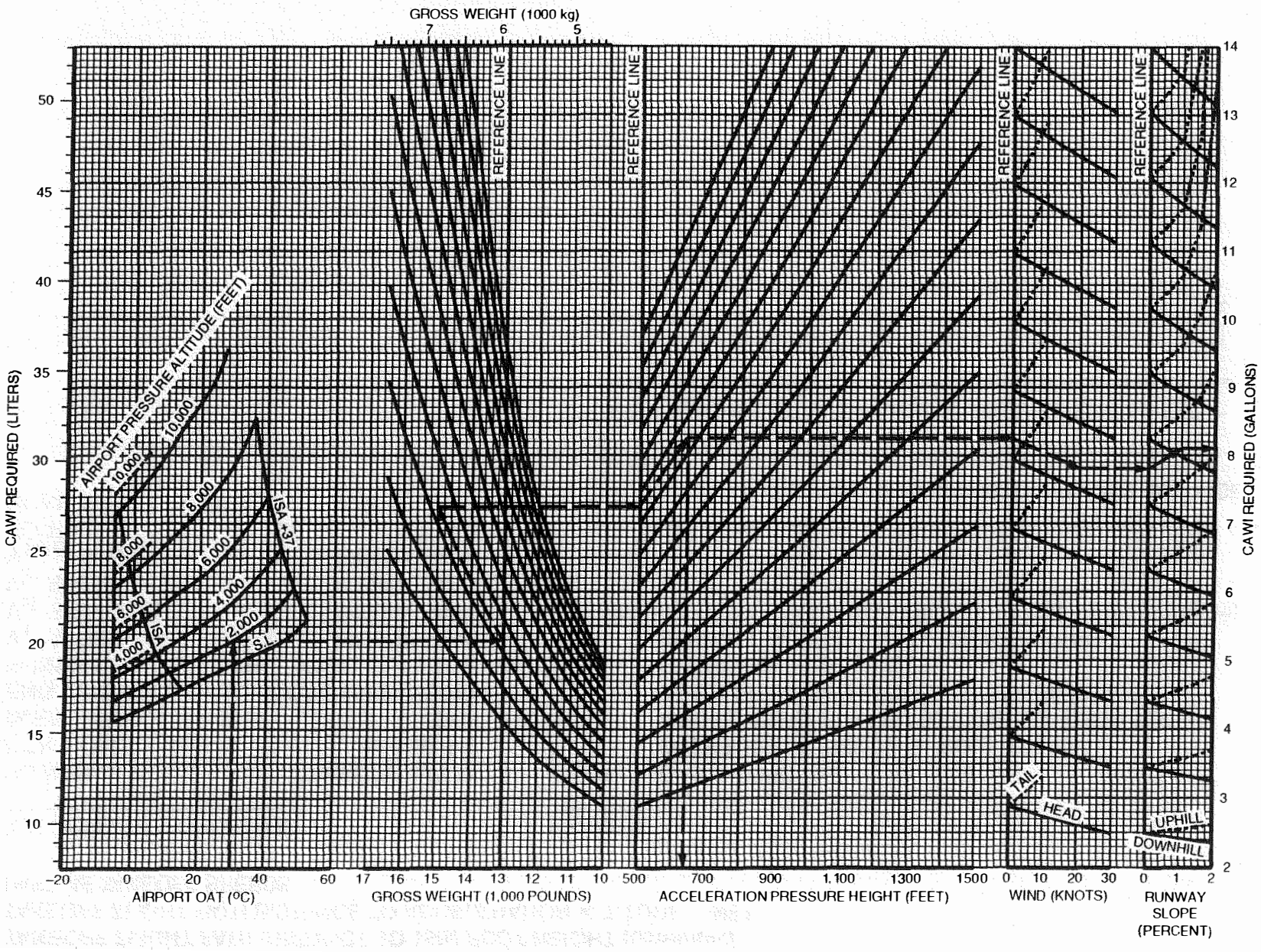


FIGURE 4K-8 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – WET
PART 4E TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4E-5
V_R SPEED ..... FIGURE 4E-5
V_2 SPEED ..... FIGURE 4E-5
V_{YSE} SPEED ..... FIGURE 4F-2
FLAPS 1/4
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 30°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 637 FEET (195 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)
OBTAIN: TAKEOFF PATH DISTANCE = 24,000 FEET (7315 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-9

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – WET
PART 4E TAKEOFF SPEEDS

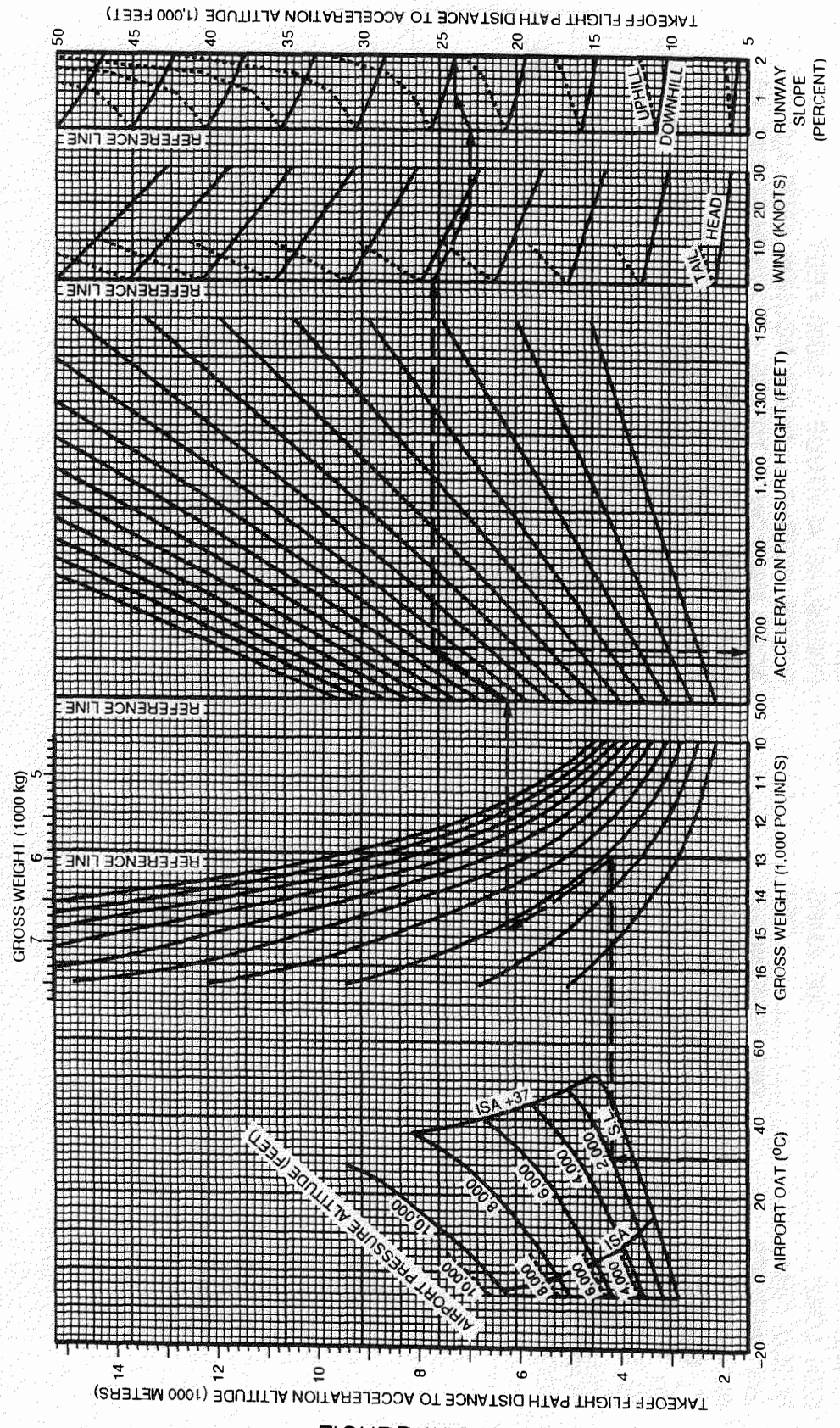


FIGURE 4K-9 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – WET
PART 4E TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4E-5
V_R SPEED ..... FIGURE 4E-5
V_2 SPEED ..... FIGURE 4E-5
V_{YSE} SPEED ..... FIGURE 4F-2
FLAPS 1/4
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 30°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 1,270 FEET (385 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)
OBTAIN: TAKEOFF PATH DISTANCE = 24,000 FEET (7315 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-10

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TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – WET
PART 4E TAKEOFF SPEEDS

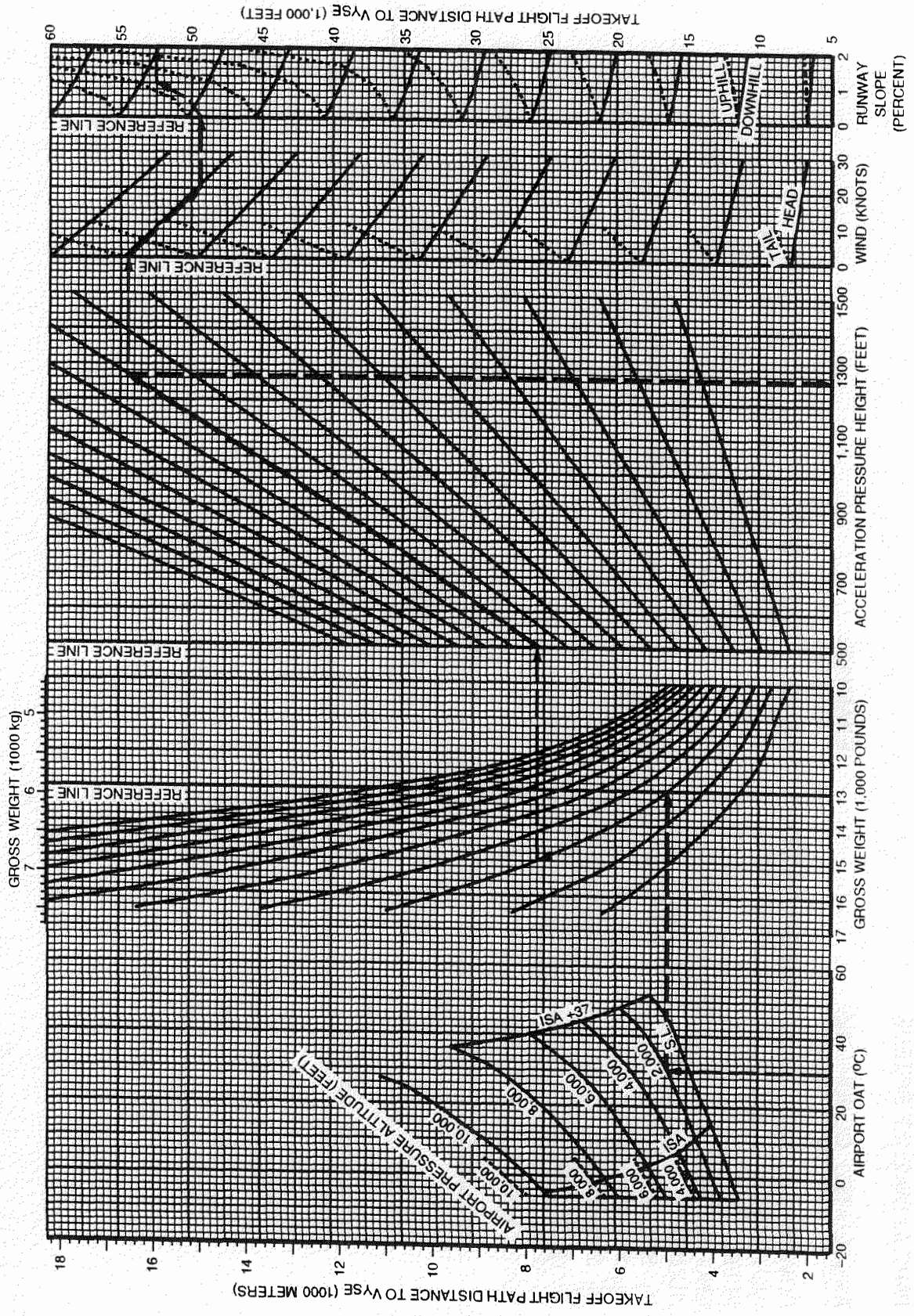


FIGURE 4K-10 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

CAWI REQUIRED FOR TAKEOFF PATH TO V_{YSE}
PART 4J TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	DRY, HARD SURFACE
V_1 SPEED	FIGURE 4J-6
V_R SPEED	FIGURE 4J-6
V_2 SPEED	FIGURE 4J-6
V_{YSE} SPEED	FIGURE 4F-2
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 30°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 637 FEET (195 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)

OBTAIN: CAWI REQUIRED = 8.55 GALLONS (32.4 LITERS)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-11

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

CAWI REQUIRED FOR TAKEOFF PATH TO V_{YSE}

PART 4J TAKEOFF SPEEDS

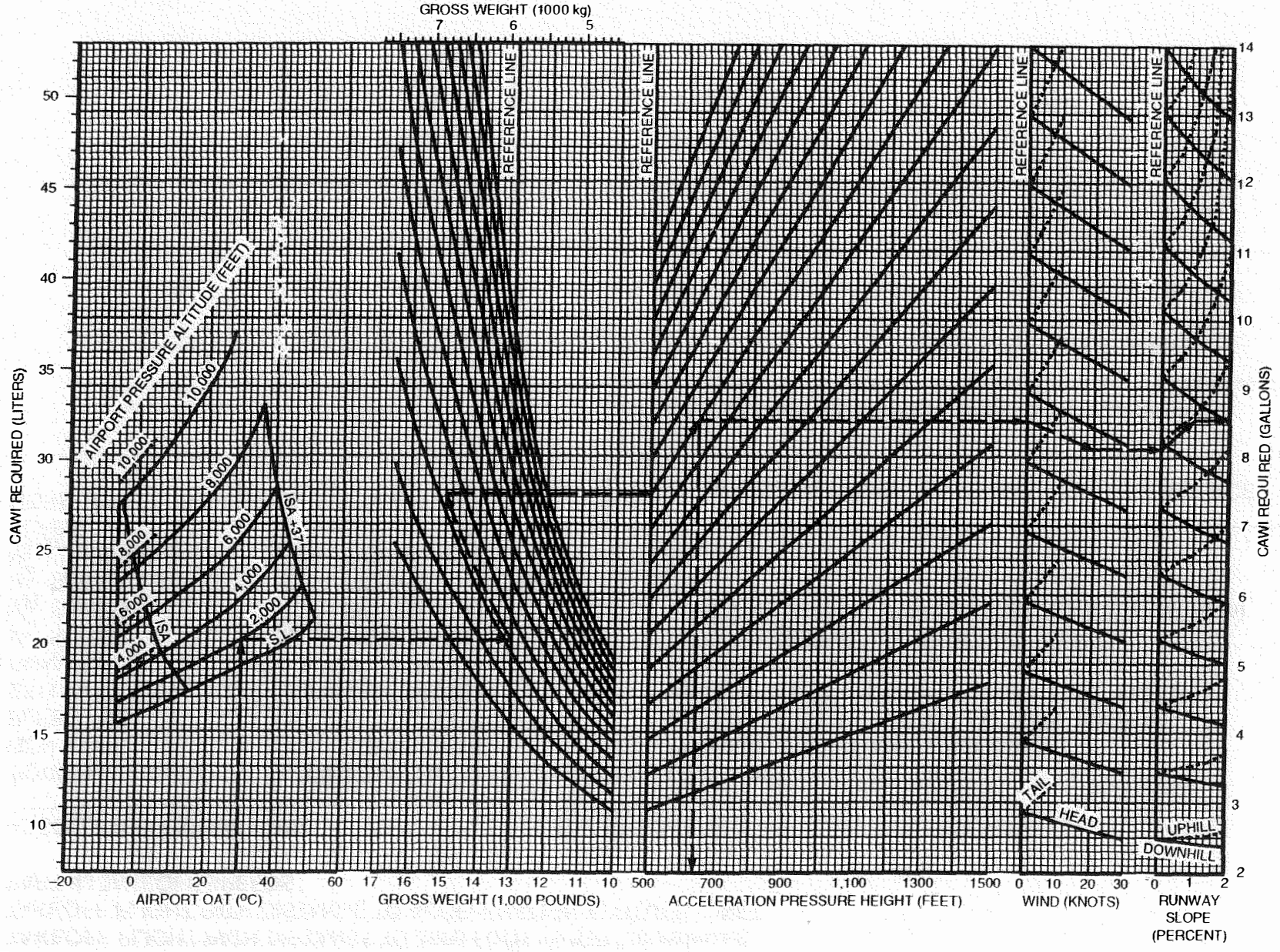


FIGURE 4K-11 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – WET
PART 4J TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4J-6
V_R SPEED ..... FIGURE 4J-6
V_2 SPEED ..... FIGURE 4J-6
V_{YSE} SPEED ..... FIGURE 4F-2
FLAPS 1/4
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 30°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 637 FEET (195 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)
OBTAIN: TAKEOFF PATH DISTANCE = 25,750 FEET (7850 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-12

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO ACCELERATION ALTITUDE – WET
PART 4J TAKEOFF SPEEDS

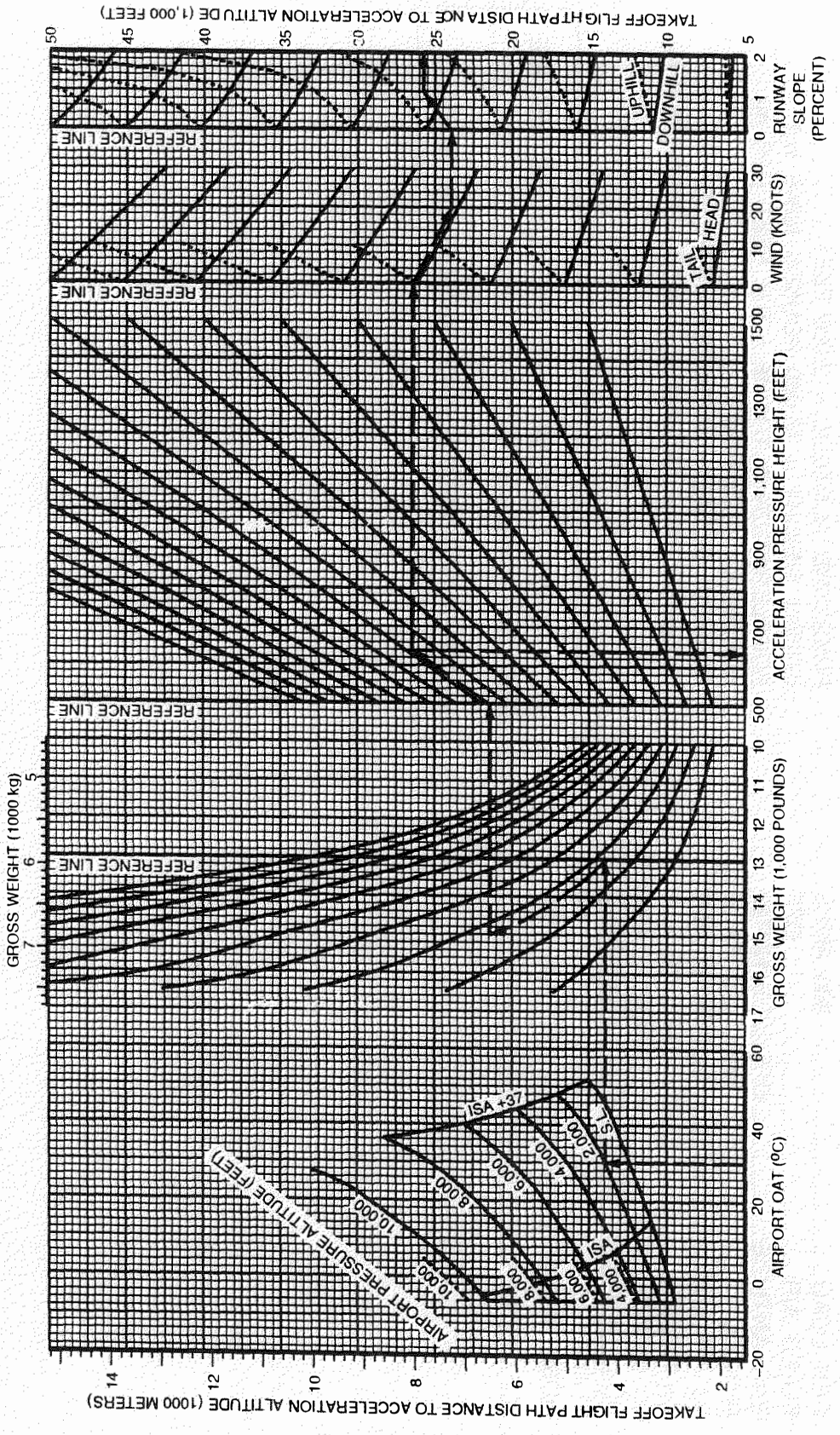


FIGURE 4K-12 (continued)

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)
TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – WET
PART 4J TAKEOFF SPEEDS

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... DRY, HARD SURFACE
V_1 SPEED ..... FIGURE 4J-6
V_R SPEED ..... FIGURE 4J-6
V_2 SPEED ..... FIGURE 4J-6
V_{YSE} SPEED ..... FIGURE 4F-2
FLAPS 1/4
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 30°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
ACCELERATION ALTITUDE = 637 FEET (195 m)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)
OBTAIN: TAKEOFF PATH DISTANCE = 29,500 FEET (8990 m)

NOTE

- USE DASHED ALTITUDE LINES WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

FIGURE 4K-13

TAKEOFF FLIGHT PATH DISTANCE TO 1500 FOOT HEIGHT (continued)

TAKEOFF FLIGHT PATH DISTANCE TO V_{YSE} – WET

PART 4J TAKEOFF SPEEDS

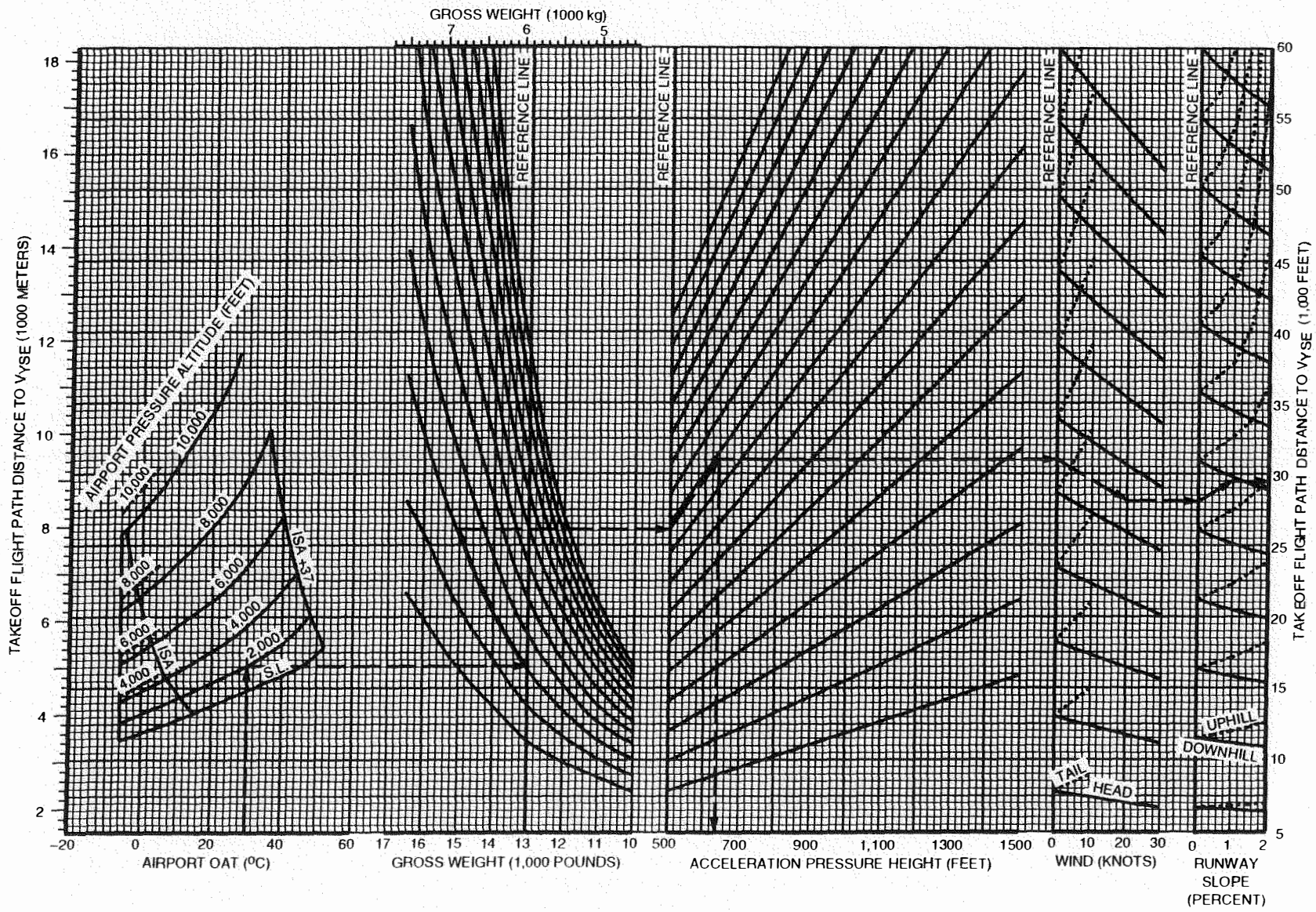


FIGURE 4K-13 (continued)

PERFORMANCE

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FAA APPROVED AIRPLANE FLIGHT MANUAL

LIST OF EFFECTIVE PAGES

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5-26	AUG 23/91	5-59	AUG 23/91
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LIST OF REVISIONS

Revisions to the Airplane Flight Manual provide current information applicable to operation of the SA227-DC. Revised pages should be inserted into the manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when current revisions are incorporated.

Revision Number	Revised Pages	Description of Revision	Date of Revision
1	5-iii, 5-v, 5-2, 5-3, and 5-49	Corrected AWI information.	NOV 15/91
2	5-iii, 5-v, 5-2, and 5-3	Changed weight and F.S. of drainable but unusable fuel and changed Figure 5-2.	DEC 31/91
3	5-iii, 5-v, 5-2, 5-3, 5-13, 5-27, 5-28, and 5-60	Added avionics equipment to the Equipment List and corrected editorial errors.	APR 24/92
4	5-iii, 5-v, 5-51 and 5-53	Added new engine designation for –10 SRL computer and new tire.	MAR 18/93
5	5-iii, 5-v, 5-11, 5-14, 5-35, 5-36, 5-38, 5-40, 5-42, 5-43, 5-47, and 5-49	Corrected weight and balance calculation example, CAWI fliud moment table and editorial errors.	JUN 23/93
6	5-iii, 5-v and 5-53	Added ABS Nose Wheel to Equipment List.	NOV 17/93
7	5-iii, 5-v, 5-7, 5-9, 5-21, 5-29 thru 5-31, 5-44, 5-45, 5-47 and 5-56	Changed Expediter Configuration data, corrected editorial errors and deleted "FAA APPROVED AIRPLANE FLIGHT MANUAL" from List of Effective Pages.	JUL 18/95
8	5-iii, 5-v, 5-58 and 5-60	Added light weight Inverter and deleted manufacturer's part number for ELT.	JUL 19/95

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LIST OF REVISIONS

Revision Number	Revised Pages	Description of Revision	Date of Revision

A black bar in the margin of a revised page shows the current change.

INTRODUCTION

This section has been prepared to assist the user in the methods and limitations that must be considered when loading the SA227-DC aircraft.

DEFINITIONS

BASIC EMPTY WEIGHT

The weight of the aircraft fully equipped, including unusable fuel, full oil, full hydraulic fluid, full brake fluid, and full oxygen. Excludes the weight of CAWI fluid, operating fuel, crew and passenger supplies, and personnel or cargo. See Figure 5-1.

RAMP WEIGHT

The weight of the aircraft loaded and ready to start engines.

TAKEOFF WEIGHT

The weight of the aircraft at brake release for takeoff.

FUSELAGE STATION (F.S.)

The distance, in inches from the fuselage reference datum (F.S. 0.00) which is located 28.94 inches (735 mm) aft of the tip of the radome. See Figure 5-31.

MANUFACTURER'S WEIGHT AND BALANCE DATA

Fairchild Aircraft Model SA227-DC, S/N _____, R/N _____, was weighed at the factory this date. The weight includes full hydraulic fluid, full brake fluid, full engine oil, full oxygen, empty CAWI tank, and undrainable fuel and AWI fluid. Fuselage station 0.00 is 28.94 inches aft of the tip of the radome.

	WEIGHT	X	ARM	=	MOMENT
Nose Jack Pad	_____		68.35		_____
Left Jack Pad	_____		306.50		_____
Right Jack Pad	_____		306.50		_____
* Weight & Moment	_____				_____
Center of Gravity Arm			_____		

* Enter this weight and moment on Figure 5-2 for "AS WEIGHED AT FACTORY".

NOTE

To determine Basic Empty Weight of this aircraft, add the following weights of drainable but unusable fluids.

- Fuel: 27 pounds (12 kg) at F.S. 282.
- AWI: 16 pounds (7 kg) at F.S. 298

_____
Inspection Department

_____
Date

FIGURE 5-1
WEIGHT AND BALANCE

WEIGHT AND BALANCE RECORD

(CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING WEIGHT AND BALANCE)

AIRPLANE MODEL	SERIAL NUMBER	PAGE NUMBER

DATE	ITEM NO. IN	ITEM NO. OUT	DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE ADDED (+) WT. (LBS)	ADDED (+) ARM (IN.)	ADDED (+) MOMENT /1,000	REMOVED (–) WT. (LBS)	REMOVED (–) ARM (IN.)	REMOVED (–) MOMENT /1,000	RUNNING BASIC EMPTY WEIGHT WT. (LBS)	RUNNING BASIC EMPTY WEIGHT MOMENT /1,000
			AS WEIGHED AT FACTORY								
	X		Fuel per NOTE Page 5-2 / Delivery Weight	27	282	7.6					
	X		AWI per NOTE Page 5-2 / Delivery Weight	16	298	4.8					

FIGURE 5-2
WEIGHT AND BALANCE

WEIGHT AND BALANCE RECORD

(CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING WEIGHT AND BALANCE)

AIRPLANE MODEL	SERIAL NUMBER	PAGE NUMBER

DATE	ITEM NO. IN	ITEM NO. OUT	DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE ADDED (+) WT. (LBS)	ADDED (+) ARM (IN.)	ADDED (+) MOMENT /1,000	REMOVED (–) WT. (LBS)	REMOVED (–) ARM (IN.)	REMOVED (–) MOMENT /1,000	RUNNING BASIC EMPTY WEIGHT WT. (LBS)	RUNNING BASIC EMPTY WEIGHT MOMENT /1,000

FIGURE 5-2 (continued)

WEIGHING INSTRUCTIONS

JACKSTAND METHOD

This method requires the use of electronic load cells and support jacks.

Attach the jacking adapter to the wing at the rear spar just inboard of the nacelles. The nose jack point is located on the lower forward nose on the left hand side. With the load cells in place on the jacks and zeroed, raise the airplane until the gear is clear of the floor. The gear should be down and locked during weighing. Level the airplane laterally by placing a level across the leveling points on the aft door frames of the nose baggage compartment. Accomplish longitudinal leveling by placing a level on the marked area of the wheelwell cover in the nose baggage compartment.

Record the load cell values on the weighing form. Complete the weighing form, Figure 5-3, to calculate the aircraft weight and balance.

PLATFORM METHOD

In this case, the airplane is supported on platform scales placed under the wheels. The only precaution is to ensure that the airplane is longitudinally level when the scale readings are taken. The airplane may be leveled by increasing or decreasing the oleo strut pressure of the nose gear.

Record the scale readings on the weighing form, Figure 5-3, and calculate the airplane weight and balance.

WEIGHING FORM

JACKSTAND METHOD

Jack	Scale Reading (Pounds	–	Tare (Pounds)	=	Net Weight (Pounds)	X	Arm (Inches)	=	Moment (In-Lbs)
Nose	_____		_____		_____		68.35		_____
Left	_____		_____		_____		306.50		_____
Right	_____		_____		_____		306.50		_____
TOTALS					_____				_____

PLATFORM METHOD

Gear	Scale Reading (Pounds	–	Tare (Pounds)	=	Net Weight (Pounds)	X	Arm (Inches)	=	Moment (In-Lbs)
Nose	_____		_____		_____		64.10		_____
Left	_____		_____		_____		293.69		_____
Right	_____		_____		_____		293.69		_____
TOTALS					_____				_____

AIRCRAFT LOADING FORMULAE:

$$\text{CENTER OF GRAVITY ARM} = \frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}}$$

$$\text{C.G. IN \% MAC} = \frac{\text{C.G. ARM} - 250.93}{72.33} \times 100$$

FIGURE 5-3

WEIGHT AND BALANCE

AIRCRAFT LOADING FEATURES

The SA227-DC is a convertible passenger aircraft that can be adapted to carry passengers and/or cargo. Movable bulkheads permit use of the passenger compartment area for cargo loading through a 53 inch by 51.25 inch (135 cm by 130 cm) cargo door. The fuselage interior can be configured to accommodate nineteen passengers and a nominal cargo load; fewer than nineteen passengers and a proportionately larger cargo load; or a full load of cargo and no passengers. See Figure 5-5.

The maximum approved seating capacity of the aircraft is 21, including two crew seats.

To convert the cabin to carry additional cargo, passenger seats can be removed from the floor tracks and the movable bulkhead repositioned allowing for additional cargo space. Alternate locations are provided for the movable bulkhead which provides visual isolation of the passenger and cargo compartments. Fittings are provided for its installation at 30 inch (76 cm) increments as far forward as the aft emergency escape hatch. This enables conversion between passenger and cargo loading with passenger loading through the forward door and cargo through the aft door. The cabin flooring is designed for uniformly distributed loading of 150 pounds per square foot (732 kg per sq m). The clamshell cargo door permits loading and unloading of the aircraft from truck bed level.

The EXPEDITER is a SA227-DC specifically configured to carry only cargo. The interior is equipped with removable cargo nets located at fuselage stations 170, 224, 275, 351, 411, and 492. Passenger seating is eliminated, and an auxiliary aft facing seat is located on the right side at fuselage station 144. There is an escape hatch installed, on the right side of the fuselage, at the first window loacation.

NOTE

When carrying cargo, free and unobstructed access must be provided to an exit on each side of the airplane. If an impenetrable cargo barrier is installed forward of fuselage station 274, an additional emergency exit must be installed in the right side of the fuselage.

THREE VIEW

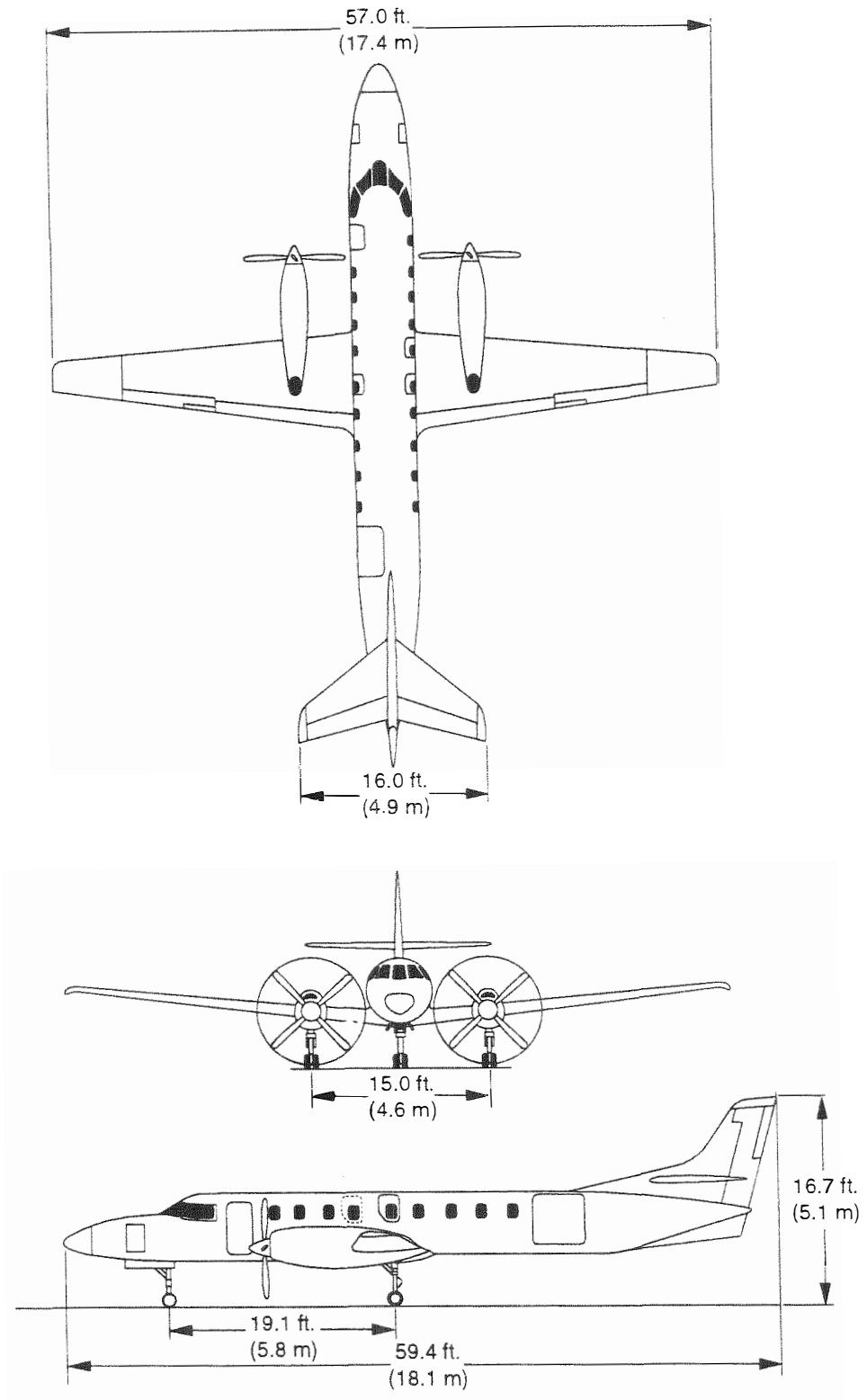
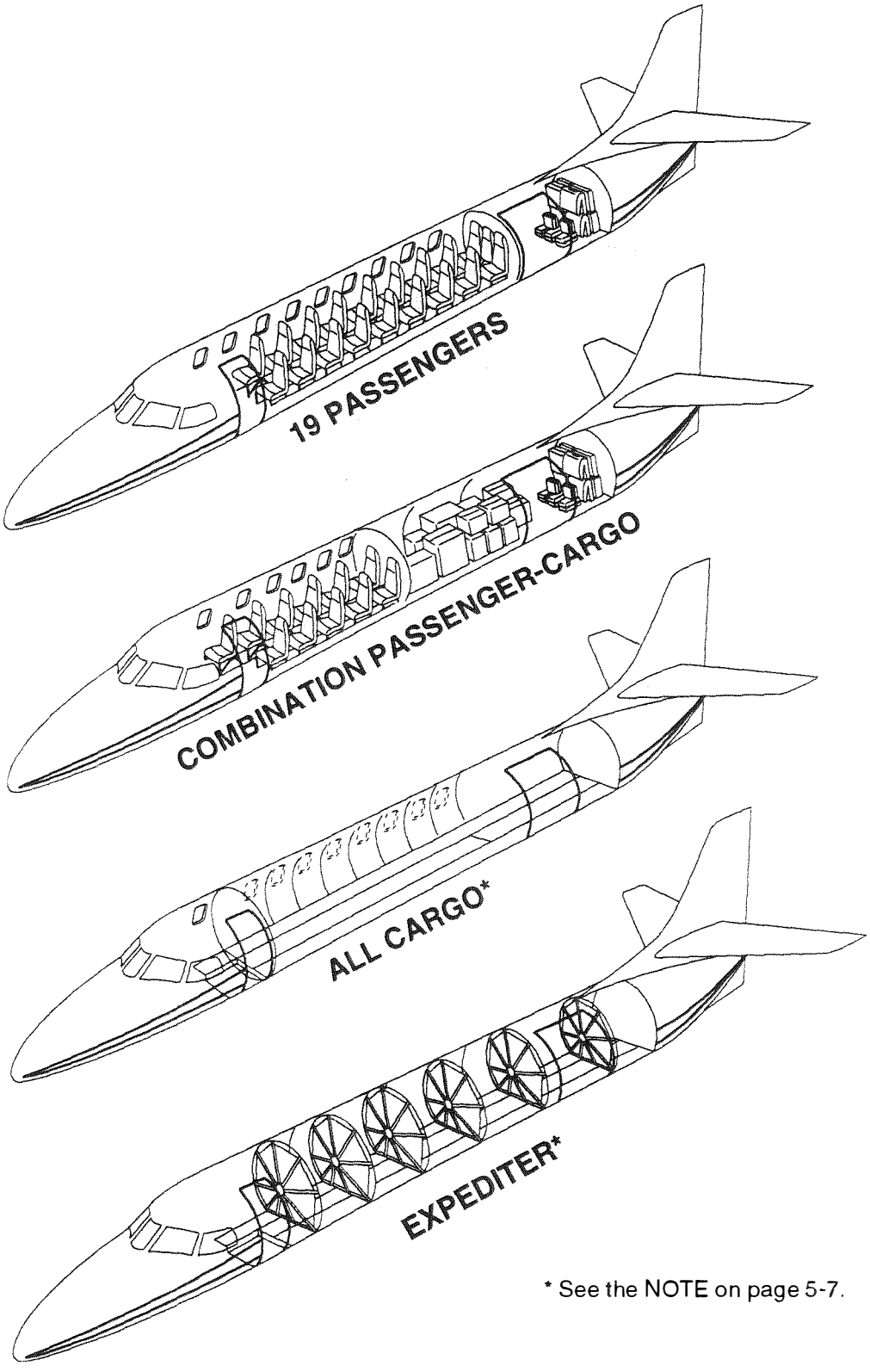


FIGURE 5-4

WEIGHT AND BALANCE

GENERAL ARRANGEMENTS



* See the NOTE on page 5-7.

FIGURE 5-5

CARGO DOOR

DESCRIPTION AND OPERATION

A clamshell cargo door is located on the left aft section of the fuselage between stations 438 and 491. The door is 53 inches by 51.25 inches in size (135 cm by 130 cm), weighs approximately 75 pounds (34 kg), and is hinged at the top. The door is opened manually outward and upward to 83 degrees. The cargo door is equipped with a pair of gas springs attached at the front and rear edges. As the door is unlocked, the gas springs apply an upward (opening) force to lift the door to the fully-open position. The gas springs also provide damping to prevent the cargo door from opening too fast or too far. A restraining lanyard is provided to assist in operating the door. The lanyard should be held during opening to provide a means of closing the door. The cargo door may be opened from the inside or the outside by interconnected handles. The outside handle, in the closed position, is recessed into the door frame and may be locked to provide security.

CARGO DOOR FUNCTIONAL ITEMS

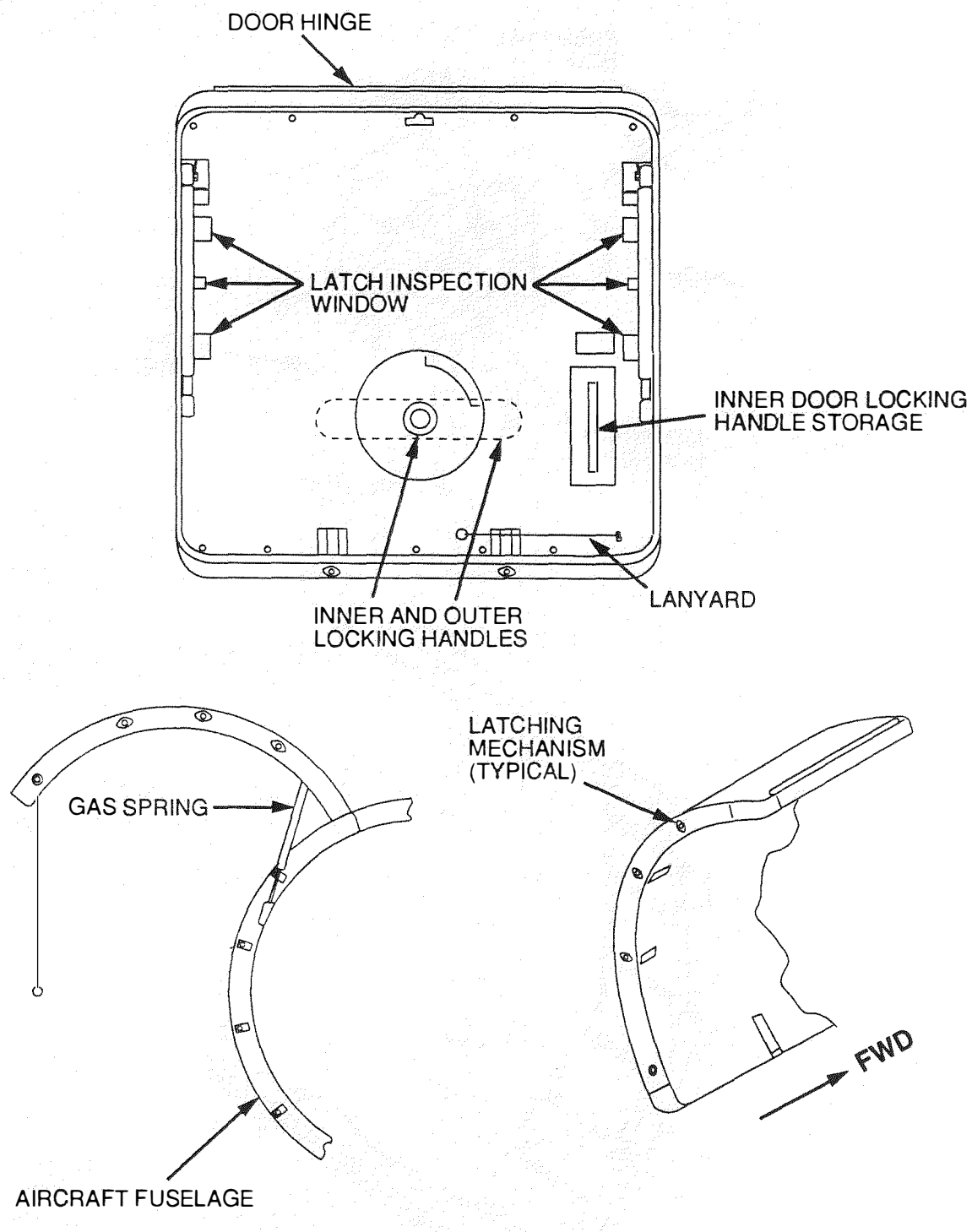
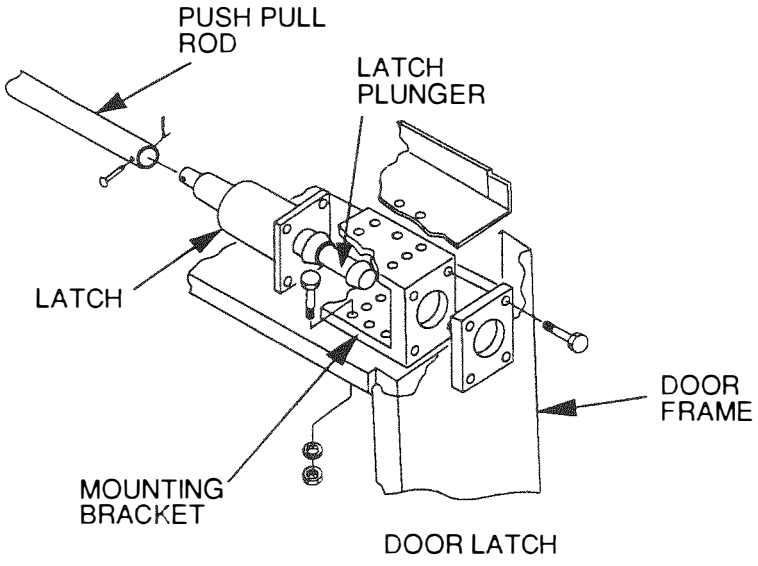


FIGURE 5-6

WEIGHT AND BALANCE

CARGO DOOR LATCHING MECHANISM



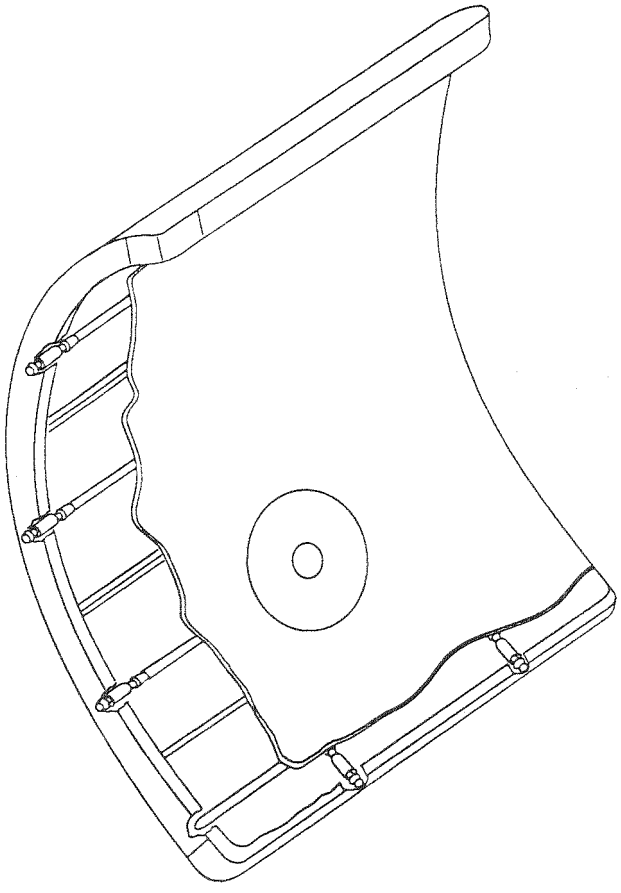


FIGURE 5-7

LOADING INSTRUCTIONS

WEIGHT AND BALANCE

Proper loading of the SA227-DC requires a combination of payload and fuel load which will not exceed ramp weight, takeoff weight, and center of gravity limitations listed in Section 1.

To determine the moment due to payload, refer to the appropriate moment table for the existing cabin configuration, or calculate the moment by multiplying the payload weight (pounds) by the fuselage station of the payload center of gravity (inches) and divide the result by 1,000. To simplify data presentation and calculations, moments are divided by 1,000 in all moment tables.

All cabin and cargo compartment configurations provided by Fairchild Aircraft have been approved by FAA.

Cabin diagrams, weight and balance calculation forms, and payload moment tables are included in this section for various interior configurations of the SA227-DC. Fuselage stations, in inches, are included on the weight and balance calculation forms so that moments may be computed directly if desired. The SA227-DC interior configurations are not restricted to only those shown in this manual. As indicated in Figure 5-5, there is no minimum number of passenger seats required. For configurations not specifically provided for in this section, determine the payload moment arm by reference to Figure 5-31 and compute the weight and center of gravity using the general procedure detailed in subsequent pages.

Figure 5-32 is a passenger weight table that is provided as a convenience in determining the total weight of passengers with average weights ranging from 150 to 200 pounds (68 to 91 kg).

To determine the moment due to fuel load, see Figure 5-33. The weight of the fuel is assumed to be 6.7 pounds per U.S. gallon. When the CAWI tank contains fluid, the weight and moment must be corrected as indicated in Figure 5-34.

LOADING INSTRUCTIONS (continued)

CONFIGURATION OPTIONS AND LOAD LIMITS

Standard Baggage Compartments

The maximum load that can be carried in the forward baggage compartment is 800 pounds (363 kg), including equipment, baggage, and cargo. The compartment is placarded to show the amount of baggage and cargo allowed after subtracting the weight of the installed avionics equipment (varies with customer options).

The maximum load that can be carried in the aft baggage compartment is 850 pounds (363 kg) plus up to 100 pounds (45 kg) installed equipment on the equipment shelf at F.S. 530 – 548 aft of the baggage compartment. The weight of equipment installed in the baggage compartment, such as the optional lavatory and its fluid, air conditioner components, or any other equipment installed aft of F.S. 530 which is not located on the equipment shelf, is subtracted from the 850 pound maximum allowable. The compartment is placarded to show the amount of baggage and cargo allowed after subtracting the weight of this installed equipment.

The maximum floor loading for all cargo and passenger areas is 150 pounds per square foot (732 kg per sq m).

Aft Baggage Compartment With Second Structural Bulkhead

If the aircraft has two structural bulkheads installed (one at F.S. 437 and one at F.S. 467) the maximum load for the aft baggage compartment (F.S. 437 to F.S. 530) is 850 pounds (386 kg). With this configuration the aft baggage compartment is divided into two zones. (Zone A is from F.S. 437 to F.S. 467, Zone B is from F.S. 467 to F.S. 530). The maximum load to be placed in either Zone A or Zone B is 500 pounds (227 kg) with no more than 350 pounds (159 kg) placed in the opposite compartment. Each structural bulkhead is approved to retain up to 500 pounds of baggage in the event of an emergency landing. If the structural bulkhead at F.S. 467 is removed, or not installed, then all baggage or cargo weight above 500 pounds must be secured by an acceptable means. The 500 pounds of loose baggage must be stowed directly behind the structural bulkhead at F.S. 437 and the balance of the load, up to 350 pounds, must be secured utilizing the cargo floor tie down rings.

Movable Structural Bulkhead

A movable structural bulkhead weighing 37 pounds (17 kg) may be located in seven different positions within the aircraft, or removed entirely. The standard location at F.S. 437 permits carrying 19 passengers. Alternate locations and the corresponding moment changes are shown in Figure 5-8. When installed, the movable structural bulkhead is approved to retain up to 500 pounds (227 kg) of baggage in the event of an emergency landing. When cargo other than passenger baggage, such as high density industrial equipment, is carried in the cargo compartment, it should be secured by the cargo net furnished with each aircraft, or by other acceptable means. The P/N 27-90150 cargo net is structurally satisfactory to secure a total of 540 pounds (245 kg) of high density cargo utilizing the floor tie down fittings. If these items are not secured, they may shift during flight in turbulent conditions and cause damage to the cargo compartment liner and/or an undesirable shift of C.G. Without the movable structural bulkhead all cargo and baggage, regardless of size or weight, must be secured.

LOADING INSTRUCTIONS (continued)

CONFIGURATION OPTIONS AND LOAD LIMITS (continued)

Movable Structural Bulkhead (continued)

When the bulkhead is moved forward to convert passenger space to cargo space, the capacity of the aft baggage compartment may be increased by 530 pounds (240 kg) for each set of seats removed in rows 10, 9, or 8. If rows 7 through 1 are to be converted to cargo space, only 360 additional pounds (164 kg) of cargo may be added for each additional row of seats. Caution should be exercised to maintain the cargo center of gravity toward the center of the aircraft (F.S. 274 to 309), to avoid exceeding the bending moment load limit.

MOMENT CHANGE TABLE

37 POUND MOVABLE STRUCTURAL BULKHEAD

F.S.	MOMENT CHANGE (in.-lb./1,000)
167**	–10.0
317	–4.4
347	--3.3
377	–2.2
407	–1.1
437*	0.0
467**	1.1

* STANDARD LOCATION
** SPECIAL OPTION

FIGURE 5-8

Aft Baggage Compartment with Two Cargo Nets

An optional installation of two high-strength cargo nets (P/N 27-13884-3), as illustrated by Figure 5-25, provides a total aft baggage/cargo capacity of 1,350 pounds (612 kg). In this configuration, the structural bulkhead is installed at F.S. 407, and one net is installed at F.S. 411. The resulting Zone A1 is approved to restrain 750 pounds (340 kg) of baggage/cargo. A floor plug is provided to raise the aisle floor aft of the structural bulkhead. A second cargo net is installed at F.S. 492 to define Zone B1 and is approved to restrain 600 pounds (272 kg).

Passenger High-Back Seat Removal

Passenger seats can be removed from the floor tracks to make room for additional cargo. Some aircraft are configured with 3 seats in row 10, while others have only 2 seats in the last row. The tables in Figure 5-9 provide the weight and moment changes that result from removing rows of seats. The first table pertains to aircraft with 2 seats in row 10, while the second table is for aircraft with 3 seats in row 10. The third table is provided to facilitate weight and moment calculations if the center seat is reinstalled in the seat row immediately ahead of the movable structural bulkhead after moving the bulkhead forward.

PASSENGER HIGH-BACK, BUCKET SEAT REMOVAL MOMENT CHANGE TABLES

INFLUENCE OF REMOVING HIGH-BACK, BUCKET SEATS,
AND THE ACCUMULATED EFFECT,
WORKING FORWARD FROM THE LAST ROW

SEAT ROW	NUMBER OF SEATS IN ROW	SEAT* C.G. (F.S.)	WEIGHT** CHANGE (POUNDS)	MOMENT CHANGE (IN.-LB./1,000)	CUMULATIVE Δ WT. (POUNDS)	CUMULATIVE Δ MOMENT (IN.-LB./1,000)
10	2	425	26.2	–11.14	–26	–11.1
9	2	395	26.2	–10.35	–52	–21.5
8	2	365	26.2	–9.56	–79	–31.1
7	2	334	26.2	–8.75	–105	–39.8
6	2	303	26.2	–7.94	–131	–47.7
5	2	272	26.2	–7.13	–157	–54.9
4	2	242	26.2	–6.34	–183	–61.2
3	2	213	26.2	–5.58	–210	–66.8
2	2	184	26.2	–4.82	–236	–71.6
1	1	154	13.1	–2.02	–249	–73.6

SEAT ROW	NUMBER OF SEATS IN ROW	SEAT* C.G. (F.S.)	WEIGHT** CHANGE (POUNDS)	MOMENT CHANGE (IN.-LB./1,000)	CUMULATIVE Δ WT. (POUNDS)	CUMULATIVE Δ MOMENT (IN.-LB./1,000)
10	3	425	39.3	–16.70	–39	–16.7
9	2	395	26.2	–10.35	–66	–27.1
8	2	365	26.2	–9.56	–92	–36.6
7	2	334	26.2	–8.75	–118	–45.4
6	2	303	26.2	–7.94	–144	–53.3
5	2	272	26.2	–7.13	–170	–60.4
4	2	242	26.2	–6.34	–197	–66.8
3	2	213	26.2	–5.58	–223	–72.4
2	2	184	26.2	–4.82	–249	–77.2
1	1	154	13.1	–2.02	–262	–79.2

* THE C.G. OF AN EMPTY HIGH-BACK, BUCKET SEAT IS 6 INCHES AFT OF THE C.G. OF AN OCCUPIED SEAT. FOR EXAMPLE: THE EMPTY SEATS IN ROW 10 BALANCE AT F.S. 425 AS SHOWN IN THE TABLE; BUT THE MOMENT ARM FOR OCCUPIED ROW 10 SEATS IS 6 INCHES FURTHER FORWARD AT F.S. 419 (REF. FIGURE 5–21).

** A SINGLE SEAT WEIGHS 13.1 POUNDS.

FIGURE 5-9

PASSENGER HIGH-BACK, BUCKET SEAT REMOVAL MOMENT CHANGE TABLES (continued)

INFLUENCE OF ADDING HIGH-BACK CENTER SEAT

SEAT ROW	SEAT C.G. (F.S.)	WEIGHT CHANGE (POUNDS)	MOMENT CHANGE (IN.-LB./1,000)
10	425	13.1	+5.6
9	395	13.1	+5.2
8	365	13.1	+4.8
7	334	13.1	+4.4
6	303	13.1	+4.0

EXAMPLE: Compute the adjustments to weight and moment of removing three seats from row 10 and reinstalling the center seat in row 9.

1. From the second table in Figure 5-9, find the weight and moment change due to removing 3 row 10 seats to be –39.3 pounds and –16.7 in.-lb./1,000.
2. From the above table, find the weight and moment change due to adding a center seat to row 9 to be +13.1 lbs. and +5.2 in.-lb./1,000.
3. Compute the net adjustments by combining the changes in steps 1 and 2.

   Net weight change = –39.3 + 13.1 = –26.2 lbs.
   Net moment change = –16.7 + 5.2 = –11.5 in.-lb./1,000
4. Enter the adjustments in block (d) of the appropriate Weight and Balance Calculation Form. See Figure 5-20 for example.

FIGURE 5-9 (continued)

LOADING INSTRUCTIONS (continued)

CONFIGURATION OPTIONS AND LOAD LIMITS (continued)

Deluxe Passenger Seat Removal

The deluxe passenger seats can be removed from the floor and wall fittings. The tables in Figures 5-9A and 5-9B provide weight and moment changes that result from removing rows of these seats. The tables in Figures 5-9A and 5-9B are used in the same manner as those in Figure 5-9.

DELUXE PASSENGER SEAT REMOVAL MOMENT CHANGE TABLES

INFLUENCE OF REMOVING DELUXE PASSENGER SEATS,
AND THE ACCUMULATED EFFECT,
WORKING FORWARD FROM THE LAST ROW

SEAT ROW	NUMBER OF SEATS IN ROW	SEAT* C.G. (F.S.)	WEIGHT** CHANGE (POUNDS)	MOMENT CHANGE (IN.-LB./1,000)	CUMULATIVE Δ WT. (POUNDS)	CUMULATIVE Δ MOMENT (IN.-LB./1,000)
10	3	419	42.75	–17.912	–42.75	–17.912
9	2	389	40.75	–15.852	–83.50	–33.764
8	2	359	40.75	–14.629	–124.25	–48.393
7	2	328	40.75	–13.366	–165.00	–61.759
6	2	297	40.75	–12.103	–205.75	–73.862
5	2	266	40.75	–10.840	–246.50	–84.702
4	2	236	40.75	–9.617	–287.25	–94.319
3	2	207	40.75	–8.435	–328.00	–102.754
2	2	178	40.75	–7.254	–368.75	–110.008
1	0					

* THE C.G. OF AN EMPTY DELUXE PASSENGER SEAT IS 3 INCHES AFT OF THE C.G. OF AN OCCUPIED SEAT. FOR EXAMPLE: THE EMPTY SEATS IN ROW 10 BALANCE AT F.S. 419 AS SHOWN IN THE TABLE; BUT THE MOMENT ARM FOR OCCUPIED ROW 10 SEATS IS 3 INCHES FURTHER FORWARD AT F.S. 416.

** A SINGLE SEAT WEIGHS 20.375 POUNDS. THE 3-SEAT BENCH AT ROW 10 WEIGHS 42.75 POUNDS

FIGURE 5-9A

DELUXE PASSENGER SEAT AND CLUB ARRANGEMENT

SEAT REMOVAL MOMENT CHANGE TABLES

INFLUENCE OF REMOVING PASSENGER SEATS,
AND THE ACCUMULATED EFFECT,
WORKING FORWARD FROM THE LAST ROW

SEAT ROW	NUMBER OF SEATS IN ROW	SEAT C.G. (F.S.)	WEIGHT** CHANGE (POUNDS)	MOMENT CHANGE (IN.-LB./1,000)	CUMULATIVE Δ WT. (POUNDS)	CUMULATIVE Δ MOMENT (IN.-LB./1,000)
8	2	394	60.75	–23.935	–60.75	–23.935
7	2	330	60.75	–20.048	–121.50	–43.983
6	2	297	40.75	–12.103	–162.25	–56.086
5	2	266	40.75	–10.840	–203.00	–66.926
4	2	236	40.75	–9.617	–243.75	–76.543
3	2	207	40.75	–8.435	–284.50	–84.978
2	2	178	40.75	–7.254	–325.25	–92.232
1	0					

** A SINGLE SEAT IN ROWS 1 THROUGH 6 WEIGHS 20.375 POUNDS.

A SINGLE SEAT IN ROWS 7 AND 8 WEIGHS 30.375 POUNDS.

FIGURE 5-9B

LOADING INSTRUCTIONS (continued)

CONFIGURATION OPTIONS AND LOAD LIMITS (continued)

Optional Modular Toilet

An optional modular toilet, that is part of the structural bulkhead, may be located at five different locations. If the modular toilet is located at any position other than between F.S. 437 and 467, an adjustment to the moment must be made as shown in Figure 5-10.

MOMENT CHANGE TABLE

	MOMENT CHANGE (IN.-LB./1,000)	
BETWEEN F.S. – F.S.	CHEMICAL TOILET	ELECTRIC FLUSH
317 – 347	–12.0	–12.8
347 – 377	–9.0	–9.6
377 – 407	–6.0	–6.4
407 – 437	–3.0	–3.2
437 – 467	0.0	0.0

FIGURE 5-10

Optional Fixed Position Toilet

An optional fixed position toilet can be installed with a non-structural bulkhead which contains a door to provide access to the toilet compartment. This toilet is located at F.S. 459. If it is removed, an adjustment to the moment must be made as shown in Figure 5-11. With this installation the structural bulkhead is installed at F.S. 467.

MOMENT CHANGE TABLE

	MOMENT CHANGE (IN.-LB./1,000)	
BETWEEN F.S. – F.S.	CHEMICAL TOILET	ELECTRIC FLUSH
437 – 467	–16	–17

FIGURE 5-11

LOADING INSTRUCTIONS (continued)

CONFIGURATION OPTIONS AND LOAD LIMITS (continued)

EXPEDITER CONFIGURATION

Six nets are provided to restrain cargo; they may be installed at fuselage stations 170, 224, 275, 351, 411, and 492. For purposes of discussion, the main cargo compartment has been designated as follows:

ZONE NO.	FUSELAGE STATION	CENTROID	*MAXIMUM LOAD	
			(LBS.)	(kg)
1	170 – 224	197	1150	520
2	224 – 275	249.5	1150	520
3	275 – 351	313	1150	520
4	351 – 411	381	1150	520
5	411 – 492	451.5	1150	520
6 (AFT)	492– 530	510	600	270

* The maximum weight of any one rigid package (metal, wood, etc) loaded directly aft of a cargo net is 70 pounds (32 kg).

The lengths of the cargo zones were established to expedite loading, unloading, and restraint of typical small (70 pounds maximum) packages customarily air-freighted by this class of aircraft. When any cargo zone is loaded with packages bulky enough to keep them from shifting about during takeoff or flight in turbulence, the vertical cargo nets at each end of the zone will ensure center of gravity control.

WARNING

INADEQUATE RESTRAINT OF CARGO CAN RESULT IN CENTER OF GRAVITY SHIFTS BEYOND C.G. LIMITS, CARGO TIEDOWNS AND/OR NETS MUST BE USED, IN ADDITION TO THE VERTICAL CARGO NETS, WHENEVER A POSSIBILITY EXISTS THAT THE LOAD IN ANY ZONE MAY TUMBLE, SLIDE, OR FLOAT TOWARD EITHER END OF THE ZONE.

Prevent possible damage to the contents or movement of loose, small packages in a partially filled cargo zone by use of cargo restraining nets fastened to the cargo zone net floor fittings. Restrain items heavier than 70 pounds to ensure that they will neither shift and cause c.g. control problems nor damage to package contents.

Figures 5-17 and 5-18 are provided for calculating bending moments when the aircraft is in the EXPEDITER configuration and each cargo zone is loaded uniformly. See example in Figure 5-19. Figures 5-29 and 5-30 are provided for calculating weight and balance problems for the EXPEDITER.

See Notes on next page

LOADING INSTRUCTIONS (continued)

EXPEDITER CONFIGURATION (continued)

NOTE

- The payload fuselage stations shown on the forms and tables in the figures referenced may be used only when individual cargo zones are loaded with parcels weighing 70 pounds (32 kg) or less and when those parcels are distributed uniformly throughout the cargo zone.
- When a cargo zone is not filled with small packages, the weight moment arm of that payload must be used when calculating either aircraft bending moments or weight and c.g. limitations.

CARGO SIZE LIMITATIONS

Because of physical obstructions, the size of the cargo to be loaded must be considered. Two cargo size limitation illustrations have been prepared to determine if a specific load can be easily moved into the fuselage (See Figure 5-12). Both illustrations are computed for maximum loading with the cargo door in the full open position (83 degrees). To use either chart it is necessary to measure the width, length, and height of the item to be loaded.

Loading at the various stations of the aircraft is restricted by the fuselage and flooring structure. Use of shoring materials may be required, depending upon the density and rigidity of the load.

FLOOR FITTINGS

After the cargo is properly positioned within the allowable parameters and the aircraft balance is obtained, use the floor fittings and tiedown devices to properly restrain each piece of cargo to prevent undesired movement during flight.

The aircraft cargo compartment is equipped with Davis cargo tiedown rings each of which has an allowable load limit of 3,000 pounds (1360 kg) vertically or 2,500 pounds (1134 kg) around any element of a 45 degree cone with the apex at the ring attachment fitting. Each tiedown ring forward of F.S. 520 will restrain a maximum weight of 171 pounds (76 kg) subjected to a 9g horizontal acceleration. The tiedown rings at and aft of F.S. 520 are limited by floor strength to restraining a weight of 104 pounds (47 kg) each.

In the passenger compartment, cargo is secured by tiedown rings inserted in the seat tracks. ANCRA P/N 40340-10 single stud fittings are supplied, as loose equipment, for this purpose. These fittings should be spaced at least 30 inches (76 cm) apart. When placed at the minimum spacing of 30 inches, the one-g allowable loads for these fittings are 1,200 pounds (544 kg) up, 1,200 pounds forward, and 400 pounds (181 kg) inboard.

MAXIMUM CONTAINER DIMENSIONS

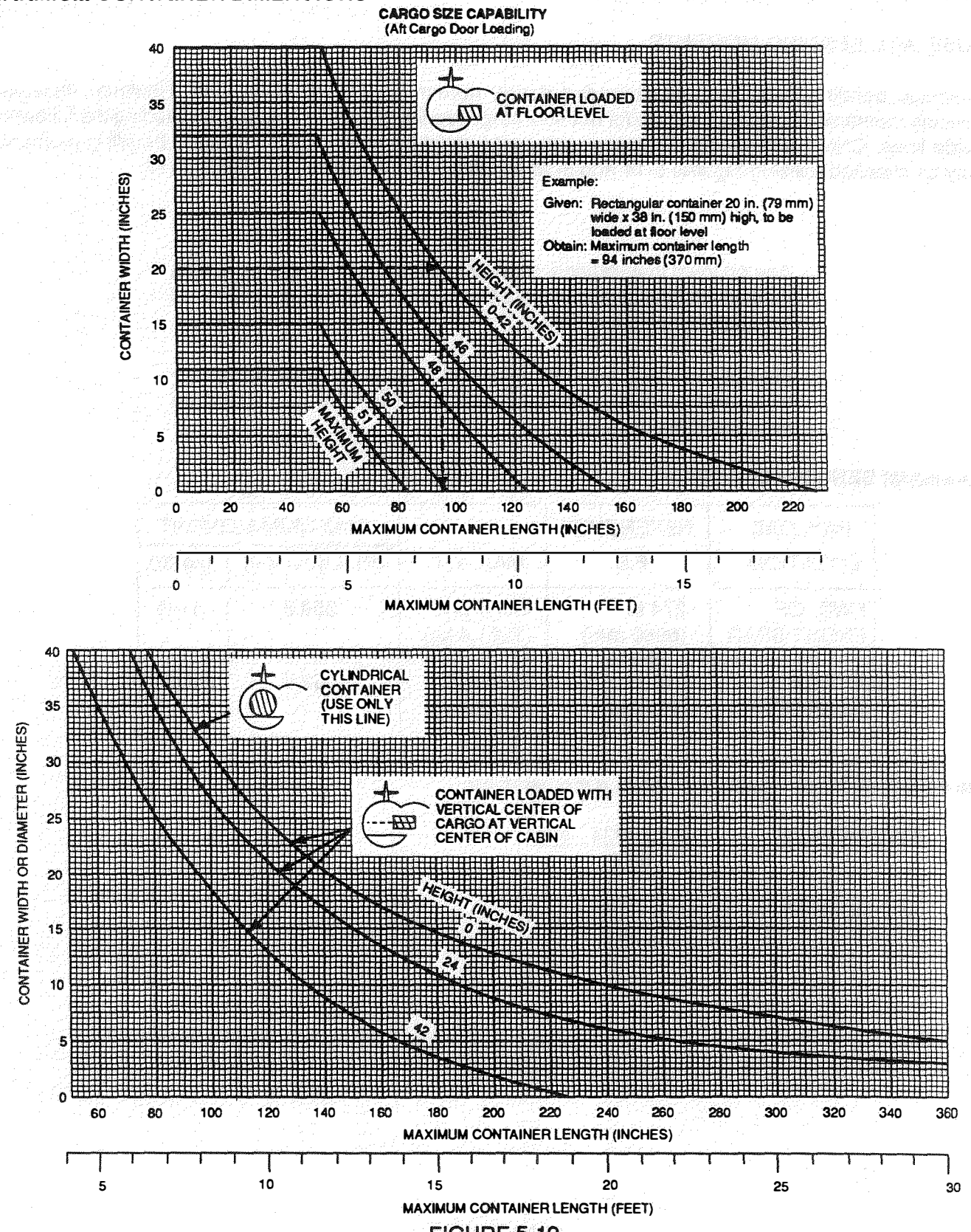


FIGURE 5-12

LOADING INSTRUCTIONS (continued)

FUSELAGE BENDING MOMENTS

Fuselage bending limits are not exceeded during normal passenger operations. However, fuselage bending moments should be checked for unusual cargo loadings to protect against exceeding the following guide lines. Crew, passengers, baggage, and cargo must be considered. Fuselage bending moments may be checked utilizing Figures 5-14 and 5-15 as shown in the example in Figure 5-16.

NOTE

- Any optional installations, such as avionics, toilets, bars, closets, movable bulkhead, etc., must be accounted for in the calculation of fuselage bending moments.
- Figures 5-17 and 5-18 are provided for calculating bending moments when the aircraft is in the EXPEDITER configuration. See example in Figure 5-19.

MAXIMUM BENDING MOMENTS

PAYLOAD LOCATION	REFERENCE F.S.	MAX. WT.	MAXIMUM MOMENT (IN.-LB./1,000)	MAXIMUM MOMENT (kg-m)
FWD. OF FRONT SPAR	274 in. (6960 mm)	2,825 LBS. (1281.4 kg)	359.8	4145
AFT OF REAR SPAR	310 in. (7870 mm)	3,138 LBS. (1423.4 kg)	352.6	4062

The equations for computing the bending moments are:

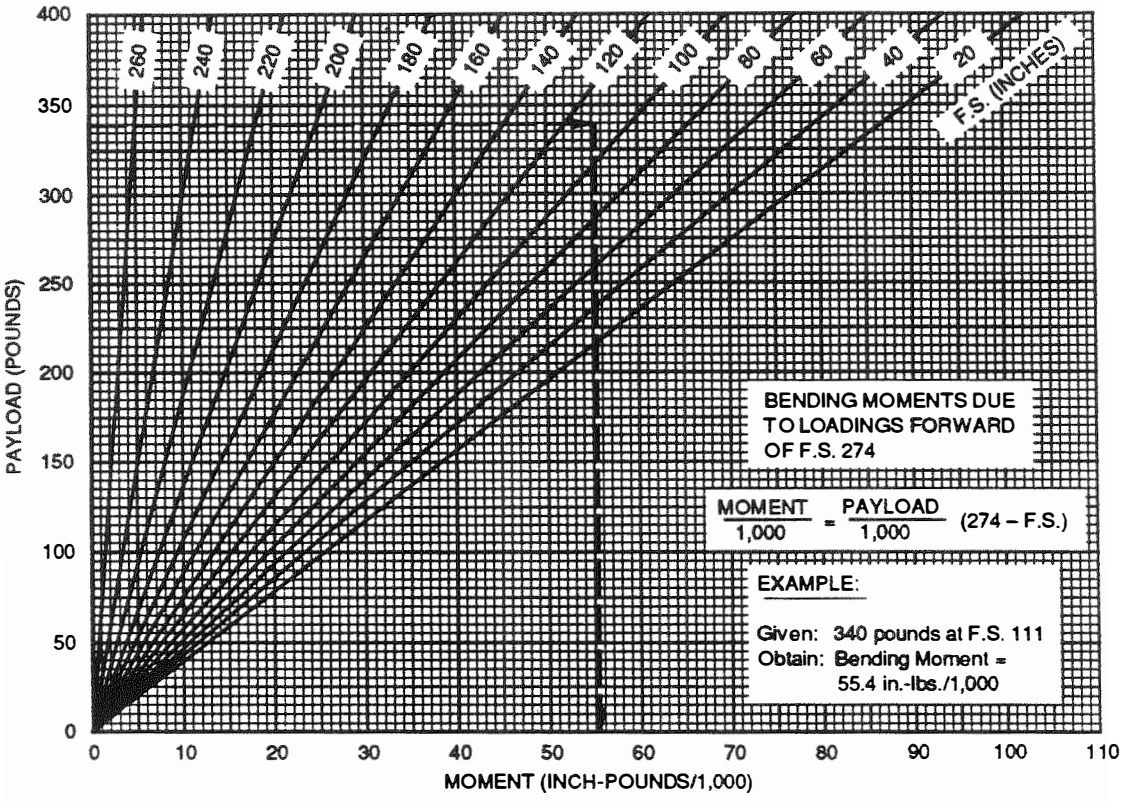
$$\text{FWD MOMENT} = \frac{\text{LOAD X (274 - F.S.)}}{1000}$$

$$\text{AFT MOMENT} = \frac{\text{LOAD X (F.S. - 310.)}}{1000}$$

FIGURE 5-13

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FUSELAGE BENDING MOMENT CHARTS



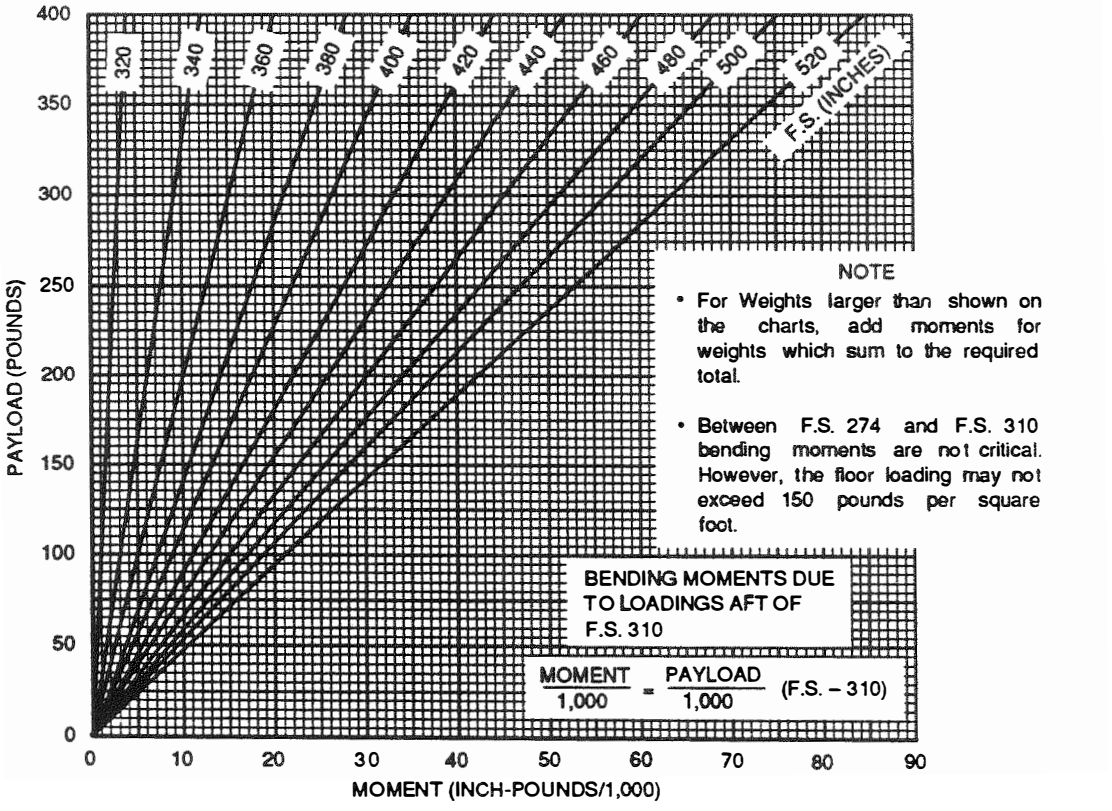


FIGURE 5-14

FUSELAGE BENDING MOMENT WORK SHEET

BENDING MOMENTS FOR LOADINGS FORWARD OF F.S. 274

F.S.	ITEM	WEIGHT (POUNDS)	BENDING MOMENT * (IN.-LB./1,000)
	TOTAL		
	MAXIMUM ALLOWABLE	2,825	359.8

BENDING MOMENTS FOR LOADINGS AFT OF F.S. 310

F.S.	ITEM	WEIGHT (POUNDS)	BENDING MOMENT * (IN.-LB./1,000)
	TOTAL		
	MAXIMUM ALLOWABLE	3,138	352.6

• FROM FIGURE 5-14

FIGURE 5-15

FUSELAGE BENDING MOMENTS (HIGH-BACK SEATS)

BENDING MOMENTS FOR LOADINGS FORWARD OF F.S. 274

F.S.	ITEM	WEIGHT (POUNDS)	BENDING MOMENT * (IN.-LB./1,000)
42	*BAGGAGE*	*144*	*33.4*
58	*AVIONICS*	*150*	*32.4*
111	*CREW*	*340*	*55.5*
178	*ROW 2 SEATS*	*340*	*32.7*
207	*ROW 3 SEATS*	*340*	*22.8*
236	*ROW 4 SEAT*	*170*	*6.5*
266	*ROW 5 SEATS*	*340*	*2.8*
	TOTAL	*1,824*	*186.1*
	MAXIMUM ALLOWABLE	2,825	359.8

BENDING MOMENTS FOR LOADINGS AFT OF F.S. 310

F.S.	ITEM	WEIGHT (POUNDS)	BENDING MOMENT * (IN.-LB./1,000)
328	*ROW 7 SEAT*	*170*	*3.1*
359	*ROW 8 SEAT*	*170*	*8.4*
389	*ROW 9 SEATS*	*340*	*27.0*
395	*1 SEAT ADDED TO ROW 9*	*13*	*1.1*
407	*MOVABLE BULKHEAD*	*37*	*3.6*
425	*3 SEATS REMOVED FROM ROW 10*	*–39*	*–4.5*
437	*MOVABLE BULKHEAD REMOVED*		
	FROM STATION 437	*–37*	*–4.7*
460	*CARGO*	*931*	*140.0*
	TOTAL	*1,585*	*174.0*
	MAXIMUM ALLOWABLE	3,138	352.6

• FROM FIGURE 5-14

FIGURE 5-16

FUSELAGE BENDING MOMENTS WORK SHEET (EXPEDITER CONFIGURATION)

NOTE

THE FORMS ON THIS PAGE MAY BE USED TO CALCULATE FUSELAGE BENDING MOMENTS DIRECTLY, OR THE FIRST AND LAST COLUMNS MAY BE COMPLETED USING FIGURE 5-18.

BENDING MOMENT FOR LOADING FORWARD OF F.S. 274

F.S. (IN.)	LOAD	WEIGHT (POUNDS)	WEIGHT / 1,000	Δ ARM (274 – F.S.)	BENDING MOMENT (IN.-LBS./1,000)
42	Forward Baggage			232	
111	Crew Seats			163	
144	Seat			130	
197	Cargo Zone 1			77	
249	0.98 x Zone 2 Load			25	
	TOTAL WEIGHT			TOTAL MOMENT	
	MUST NOT EXCEED	2825		MUST NOT EXCEED	359.8

BENDING MOMENT FOR LOADING AFT OF F.S. 310

F.S. (IN.)	LOAD	WEIGHT (POUNDS)	WEIGHT / 1,000	Δ ARM (F.S. – 310)	BENDING MOMENT (IN.-LBS./1.000)
330.5	0.54 x Zone 3 Load			20.5	
381	Cargo Zone 4			70	
451.5	Cargo Zone 5			141.5	
510	Cargo Zone 6			200	
	TOTAL WEIGHT			TOTAL MOMENT	
	MUST NOT EXCEED	3138		MUST NOT EXCEED	352.6

FIGURE 5-17

FUSELAGE BENDING MOMENTS TABLE (inch pounds/1,000) (EXPEDITER CONFIGURATION)

LOAD WEIGHT (POUNDS)		50	100	170	200	400	600	800	1000	1150
FORWARD OF FRONT SPAR (F.S. 274)										
F.S. 42:	Forward Baggage	11.6	23.2	–	46.4	92.8				
F.S. 111:	Crew Seats	8.2	16.3	27.7	32.6	65.2				
F.S. 144:	Seat	6.5	13.0	22.1	26.0	52.0				
F.S. 197:	Cargo Zone 1	3.8	7.7	–	15.4	30.8	46.2	61.6	77.0	88.6
F.S. 249:(1)	0.98 x Zone 2 Load	1.2	2.4	–	4.9	9.8	14.7	19.6	24.5	
AFT OF REAR SPAR (F.S. 310)										
F.S. 330.5:(2)	0.54 x Zone 3 Load	0.5	1.1	–	2.2	4.4	6.6			
F.S. 381:	Cargo Zone 4	3.5	7.0	–	14.0	28.0	42.0	56.0	70.0	80.5
F.S. 451.5:	Cargo Zone 5	7.1	14.2	–	28.3	56.6	84.9	113.2	141.5	162.7
F.S. 510:	Cargo Zone 6	10.0	20.0	–	40.0	80.0	120.0			

(1) 98% of cargo zone 2 is forward of the front spar; the centroid of this area is F.S. 249; maximum bending moment = 28.2 in.-lbs./1,000.

(2) 54% of cargo zone 3 is aft of the rear spar; the centroid of this area is F.S. 330.5; maximum bending moment = 12.7 in.-lbs./1,000.

FIGURE 5-18

FUSELAGE BENDING MOMENTS WORK SHEET (EXPEDITER CONFIGURATION)

NOTE

THE FORMS ON THIS PAGE MAY BE USED TO CALCULATE FUSELAGE BENDING MOMENTS DIRECTLY, OR THE FIRST AND LAST COLUMNS MAY BE COMPLETED USING FIGURE 5-18.

BENDING MOMENT FOR LOADING FORWARD OF F.S. 274

F.S. (IN.)	LOAD	WEIGHT (POUNDS)	WEIGHT / 1,000	Δ ARM (274 – F.S.)	BENDING MOMENT (IN.-LBS./1,000)
42	Forward Baggage	–	–	232	–
111	Crew Seats	***340***	***.340***	163	***55.4***
144	Seat	***200***	***.200***	130	***26.0***
197	Cargo Zone 1	***400***	***.400***	77	***30.8***
249	0.98 x Zone 2 Load	***900***	***.900***	25	***22.5***
	TOTAL WEIGHT	***1840***		TOTAL MOMENT	***134.7***
	MUST NOT EXCEED	2825		MUST NOT EXCEED	359.8

BENDING MOMENT FOR LOADING AFT OF F.S. 310

F.S. (IN.)	LOAD	WEIGHT (POUNDS)	WEIGHT / 1,000	Δ ARM (F.S. – 310)	BENDING MOMENT (IN.-LBS./1,000)
330.5	0.54 x Zone 3 Load	***600***	***.600***	20.5	***12.3***
381	Cargo Zone 4	***1000***	***1.000***	70	***70.0***
451.5	Cargo Zone 5	–	–	141.5	–
510	Cargo Zone 6	***200***	***.200***	200	***40.0***
	TOTAL WEIGHT	***1800***		TOTAL MOMENT	***122.3***
	MUST NOT EXCEED	3138		MUST NOT EXCEED	352.6

FIGURE 5-19

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WEIGHT AND BALANCE CALCULATION

1. Select proper weight and balance form and payload moment table. Distribute payload in appropriate compartments and compute the weight and moment for each station utilized.

NOTE

Ensure that the appropriate payload moment table and weight and balance calculation form are selected for the existing cabin configuration; otherwise, refer to Figure 5-31 for the correct moment arm.

2. Add basic empty weight and moment to the total payload weight and moment to obtain zero fuel weight and moment. The result must fall within the weight and moment envelope, Figure 5-35.

3. Compute the maximum allowable takeoff fuel load by subtracting the zero fuel weight from the maximum takeoff weight (see Limitations section).

4. Determine moment of the actual fuel load from the fuel moment table, Figure 5-33.

5. Compute the takeoff weight and moment by adding the actual fuel weight and moment to the zero fuel weight and moment. The results must not exceed the maximum takeoff weight and must fall within the weight and moment envelope, Figure 5-35.

NOTE

- Up to 100 pounds (45 kg) additional fuel may be added, as appropriate, for fuel consumption prior to takeoff.
- Landing gear retraction will not shift the center for gravity beyond limits.

6. Check to ensure that fuselage bending moment limits are not exceeded.

EXAMPLE OF LOADING CALCULATION

Given:

Standard 19 place cabin with high-back, bucket seats
Basic Empty Weight ..... 8,880 pounds*
Empty Aircraft Moment 2,295.0 inch-pounds/1,000*
Crew Members ..... 2 @ 170 pounds each
Passengers ..... 12 @ 170 pounds each
Baggage ..... 325 pounds
Cargo ..... 750 pounds
Fuel ..... Maximum Allowable
CAWI Tank ..... Full
*Includes structural bulkhead installed at F.S. 437 with 3 seats in row 10.

Complete the calculation of airplane weight and moment as shown on Figure 5-20 as follows:

1. Enter the known items on the form - crew weight, basic empty weight, and moments.

2. Additional cargo space is required; therefore, three seats are removed from row 10 and the structural bulkhead is moved from F.S. 437 to F.S. 407. The center seat removed from row 10 will be reinstalled in row 9. Refer to Figures 5-8 and 5-9 and adjust the airplane empty weight and moment for these changes. Enter these adjustments on lines (c), (d), and (e) on Figure 5-20.

3. Six suitcases at 24 pounds each (144 pounds) will be loaded in the forward baggage compartment. The remaining load of 931 pounds will be loaded aft. The capacity of the expanded aft baggage compartment is 1,380 pounds (850 plus 530).

4. The center of gravity of the aft baggage and cargo load falls at F.S. 460. This situation is not covered by the moment table, Figure 5-31, therefore, it is calculated.

$$\text{Cargo Moment} = \frac{460 \times 931}{1{,}000} = 428.3 \text{ inch-pounds/1,000}$$

5. The cargo/baggage items are entered on the weight and balance calculation form.

6. The form is completed using the payload moment table, Figure 5-32C, and the fuel moment data, Figure 5-33.

7. Check the zero fuel and takeoff conditions using the weight and moment envelope, Figure 5-35. The C.G. is acceptable.

8. Using Figures 5-14 and 5-15, evaluate the fuselage bending moments, as illustrated in Figure 5-16.

WEIGHT AND BALANCE CALCULATION EXAMPLE

STANDARD 19 PLACE CABIN WITH HIGH-BACK, BUCKET SEATS

		PAYLOAD (POUNDS)	MOMENT (IN.-LB./1,000)	
F.S. 42: Forward Baggage		*144*	*6.0*	
F.S. 111: Crew Seats		*340*	*37.7*	
High-Back, Bucket Seats	F.S. 148: Row 1 Seat or F.S. 144: Coat Closet			
	F.S. 178: Row 2 Seats	*340*	*60.5*	
	F.S. 207: Row 3 Seats	*340*	*70.4*	
	F.S. 236: Row 4 Seats	*170*	*40.1*	
	F.S. 266: Row 5 Seats	*340*	*90.4*	
	F.S. 297: Row 6 Seats	*170*	*50.5*	
	F.S. 328: Row 7 Seats	*170*	*55.8*	
	F.S. 359: Row 8 Seats	*170*	*61.0*	
	F.S. 389: Row 9 Seats	*340*	*132.3*	
	F.S. 419: Row 10 Seats			
F.S. 460: CARGO AND BAGGAGE		*931*	*428.3*	
F.S. 475: Baggage				
	TOTAL PAYLOAD AND MOMENT	*3,455*	*1,033.0*	(a)

BASIC EMPTY WEIGHT & MOMENT	*8,880*	*2,295.0*	(b) (FROM WT. & BAL. RECORD)
ADJUSTMENT FOR BULKHEAD	*0*	*–1.1*	(c) ***(MOVED FROM F.S. 437 TO F.S. 407)***
OTHER ADJUSTMENTS	*–26*	*–11.5*	(d) ***(3 SEATS REMOVED FROM ROW 10, CENTER SEAT MOVED TO ROW 9)***
ADJUSTED EMPTY WT & MOMENT	*8,854*	*2,282.4*	(e)

EMPTY WT & MOM, EXISTING CONFIGURATION	*8,854*	*2,282.4*	(e)
CAWI FLUID WT & MOMENT	*111*	*33.0*	(f)
ZERO FUEL WT & MOMENT (a) + (e) + (f)	*12,420*	*3,348.4*	(g)*

MAX. ALLOWABLE FUEL *4,080*

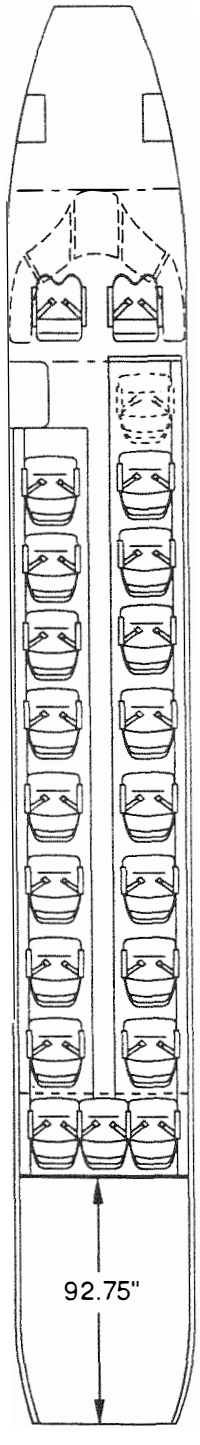
ACTUAL FUEL WEIGHT & MOMENT	*4,000*	*1,126.8*	(h)
TAKEOFF WEIGHT & MOMENT (g) + (h)	*16,420*	*4,475.2*	(i)•
LESS CAWI FLUID CONSUMED	*–111*	*–33.0*	(f)
FLIGHT WT & MOM, W/CAWI FLUID CONSUMED (i) – (f)	*16,309*	*4,442.2*	*

* THIS WEIGHT AND MOMENT MUST BE WITHIN THE WEIGHT-MOMENT ENVELOPE (FIGURE 5–35).

FIGURE 5-20

WEIGHT AND BALANCE

STANDARD 19 PLACE CABIN
WITH HIGH-BACK, BUCKET SEATS



F.S. 42: Forward Baggage

F.S. 111: Crew Seats

F.S. 148: Row 1 Seat or F.S. 144: Coat Closet

Row 2 Seat (Left) F.S. 179 — F.S. 177: Row 2 Seat (Right) – Average (L & R) F.S. 178*

Row 3 Seat (Left) F.S. 208 — F.S. 206: Row 3 Seat (Right) – Average (L & R) F.S. 207*

Row 4 Seat (Left) F.S. 237 — F.S. 235: Row 4 Seat (Right) – Average (L & R) F.S. 236*

F.S. 266: Row 5 Seats

F.S. 297: Row 6 Seats

F.S. 328: Row 7 Seats

F.S. 359: Row 8 Seats

F.S. 389: Row 9 Seats

F.S. 407

F.S. 419: Row 10 Seats

F.S. 437

F.S. 468.5
Aft baggage

123.0"

92.75"

F.S. 475: Aft Baggage

F.S. 530

* When left and right Row 2, 3, or 4 seats are occupied use the average F.S. numbers above to compute weight and balance.

FIGURE 5-21

WEIGHT AND BALANCE CALCULATION FORM
STANDARD 19 PLACE CABIN WITH HIGH-BACK, BUCKET SEATS

		PAYLOAD (POUNDS)	MOMENT (IN.-LB./1,000)
F.S. 42: Forward Baggage			
F.S. 111: Crew Seats			
High-Back, Bucket Seats	F.S. 148: Row 1 Seat or F.S. 144: Coat Closet		
	F.S. 178: Row 2 Seats		
	F.S. 207: Row 3 Seats		
	F.S. 236: Row 4 Seats		
	F.S. 266: Row 5 Seats		
	F.S. 297: Row 6 Seats		
	F.S. 328: Row 7 Seats		
	F.S. 359: Row 8 Seats		
	F.S. 389: Row 9 Seats		
	F.S. 419: Row 10 Seats		
F.S. 475: Baggage			
	TOTAL PAYLOAD AND MOMENT		(a)

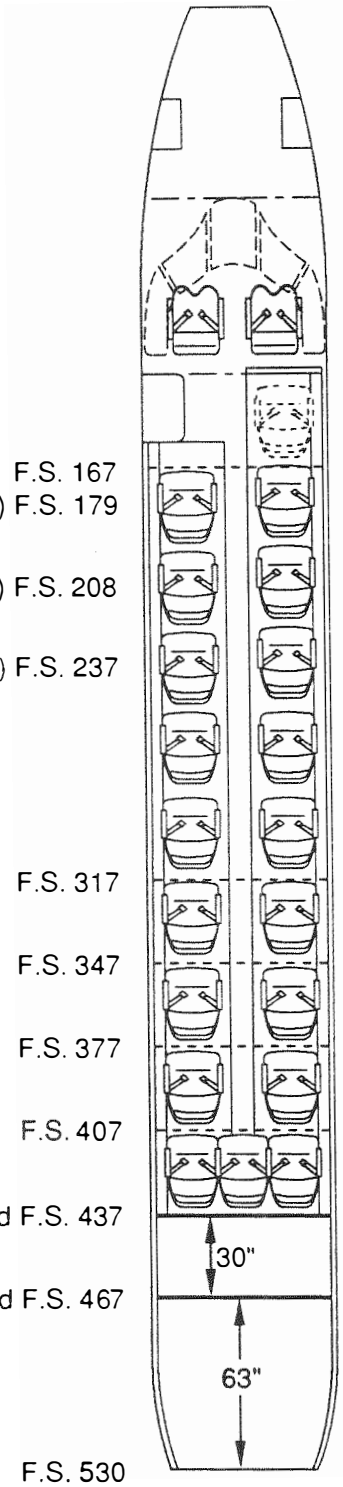
BASIC EMPTY WEIGHT & MOMENT			(b) (FROM WT. & BAL. RECORD)
ADJUSTMENT FOR BULKHEAD			(c)
OTHER ADJUSTMENTS			(d)
ADJUSTED EMPTY WT & MOMENT			(e)

EMPTY WT & MOM, EXISTING CONFIGURATION			(e)
CAWI FLUID WT & MOMENT			(f)
ZERO FUEL WT & MOMENT (a) + (e) + (f)			(g)*
MAX. ALLOWABLE FUEL			
ACTUAL FUEL WEIGHT & MOMENT			(h)
TAKEOFF WEIGHT & MOMENT (g) + (h)			(i)•
LESS CAWI FLUID CONSUMED			(f)
FLIGHT WT & MOM, W/CAWI FLUID CONSUMED (i) – (f)			•

* THIS WEIGHT AND MOMENT MUST BE WITHIN THE WEIGHT-MOMENT ENVELOPE (FIGURE 5–35).

FIGURE 5-22

OPTIONAL 19 PLACE CABIN
WITH SECOND STRUCTURAL BULKHEAD IN THE AFT BAGGAGE COMPARTMENT
HIGH-BACK BUCKET SEATS



F.S. 42: Forward Baggage

F.S. 111: Crew Seats

F.S. 148: Row 1 Seat or F.S. 144: Coat Closet

F.S. 167
Row 2 Seat (Left) F.S. 179

F.S. 177: Row 2 Seat (Right) – Average (L & R) F.S. 178*

Row 3 Seat (Left) F.S. 208

F.S. 206: Row 3 Seat (Right) – Average (L & R) F.S. 207*

Row 4 Seat (Left) F.S. 237

F.S. 235: Row 4 Seat (Right) – Average (L & R) F.S. 236*

F.S. 266: Row 5 Seats

F.S. 297: Row 6 Seats

F.S. 317

F.S. 328: Row 7 Seats

F.S. 347

F.S. 359: Row 8 Seats

F.S. 377

F.S. 389: Row 9 Seats

F.S. 407

F.S. 419: Row 10 Seats

Structural Bulkhead F.S. 437

F.S. 452: Aft Baggage – Zone A

Structural Bulkhead F.S. 467

F.S. 498: Aft Baggage – Zone B

F.S. 530

* When left and right Row 2, 3, or 4 seats are occupied use the average F.S. numbers above to compute weight and balance.

FIGURE 5-23

WEIGHT AND BALANCE CALCULATION FORM
OPTIONAL 19 PLACE CABIN
WITH SECOND STRUCTURAL BULKHEAD IN THE AFT BAGGAGE COMPARTMENT
HIGH-BACK, BUCKET SEATS

		PAYLOAD (POUNDS)	MOMENT (IN.-LB./1,000)	
F.S. 42: Forward Baggage				
F.S. 111: Crew Seats				
High-Back, Bucket Seats	F.S. 148: Row 1 Seat or F.S. 144: Coat Closet			
	F.S. 178: Row 2 Seats			
	F.S. 207: Row 3 Seats			
	F.S. 236: Row 4 Seats			
	F.S. 266: Row 5 Seats			
	F.S. 297: Row 6 Seats			
	F.S. 328: Row 7 Seats			
	F.S. 359: Row 8 Seats			
	F.S. 389: Row 9 Seats			
	F.S. 419: Row 10 Seats			
F.S. 452: Baggage – Zone A				
F.S. 498: Baggage – Zone B				
	TOTAL PAYLOAD AND MOMENT			(a)

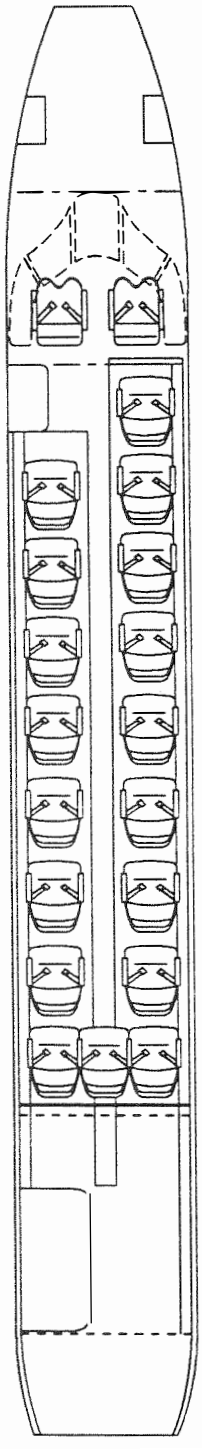
BASIC EMPTY WEIGHT & MOMENT			(b) (FROM WT. & BAL. RECORD)
ADJUSTMENT FOR BULKHEAD			(c)
OTHER ADJUSTMENTS			(d)
ADJUSTED EMPTY WT & MOMENT			(e)

EMPTY WT & MOM, EXISTING CONFIGURATION			(e)
CAWI FLUID WT & MOMENT			(f)
ZERO FUEL WT & MOMENT (a) + (e) + (f)			(g)*
MAX. ALLOWABLE FUEL			
ACTUAL FUEL WEIGHT & MOMENT			(h)
TAKEOFF WEIGHT & MOMENT (g) + (h)			(i)•
LESS CAWI FLUID CONSUMED			(f)
FLIGHT WT & MOM, W/CAWI FLUID CONSUMED (i) – (f)			*

* THIS WEIGHT AND MOMENT MUST BE WITHIN THE WEIGHT-MOMENT ENVELOPE (FIGURE 5–35).

FIGURE 5–24

OPTIONAL 17 OR 18 PLACE CABIN
WITH HIGH-BACK, BUCKET SEATS AND 1,350 POUND CAPACITY AFT BAGGAGE COMPARTMENT



F.S. 42: Forward Baggage

F.S. 111: Crew Seats

F.S. 148: Row 1 Seat or F.S. 144: Coat Closet

Row 2 Seat (Left) F.S. 179

F.S. 177: Row 2 Seat (Right) – Average (L & R) F.S. 178*

Row 3 Seat (Left) F.S. 208

F.S. 206: Row 3 Seat (Right) – Average (L & R) F.S. 207*

Row 4 Seat (Left) F.S. 237

F.S. 235: Row 4 Seat (Right) – Average (L & R) F.S. 236*

F.S. 266: Row 5 Seats

F.S. 297: Row 6 Seats

F.S. 328: Row 7 Seats

F.S. 359: Row 8 Seats

F.S. 389: Row 9 Seats

Fwd Cargo Net F.S. 411

F.S. 407: Structural Bulkhead

F.S. 451: Aft Baggage (Zone A1, Fwd) (750 Lbs. Maximum)

AFT Cargo Net F.S. 492

F.S. 510: Aft Baggage (Zone B1, Aft) (600 Lbs. Maximum)

F.S. 530

* When left and right Row 2, 3, or 4 seats are occupied use the average F.S. numbers above to compute weight and balance.

FIGURE 5-25

WEIGHT AND BALANCE CALCULATION FORM
OPTIONAL 17 OR 18 PLACE CABIN
WITH HIGH-BACK, BUCKET SEATS AND 1,350 POUND
CAPACITY AFT BAGGAGE COMPARTMENT

		PAYLOAD (POUNDS)	MOMENT (IN.-LB./1,000)	
F.S. 42: Forward Baggage				
F.S. 111: Crew Seats				
High-Back, Bucket Seats	F.S. 148: Row 1 Seat or F.S. 144: Coat Closet			
	F.S. 178: Row 2 Seats			
	F.S. 207: Row 3 Seats			
	F.S. 236: Row 4 Seats			
	F.S. 266: Row 5 Seats			
	F.S. 297: Row 6 Seats			
	F.S. 328: Row 7 Seats			
	F.S. 359: Row 8 Seats			
	F.S. 389: Row 9 Seats			
F.S. 451: Baggage – Zone A1				
F.S. 510: Baggage – Zone B1				
	TOTAL PAYLOAD AND MOMENT			(a)

BASIC EMPTY WEIGHT & MOMENT			(b) (FROM WT. & BAL. RECORD)
ADJUSTMENT FOR BULKHEAD			(c)
OTHER ADJUSTMENTS			(d)
ADJUSTED EMPTY WT & MOMENT			(e)

EMPTY WT & MOM, EXISTING CONFIGURATION			(e)
CAWI FLUID WT & MOMENT			(f)
ZERO FUEL WT & MOMENT (a) + (e) + (f)			(g)*

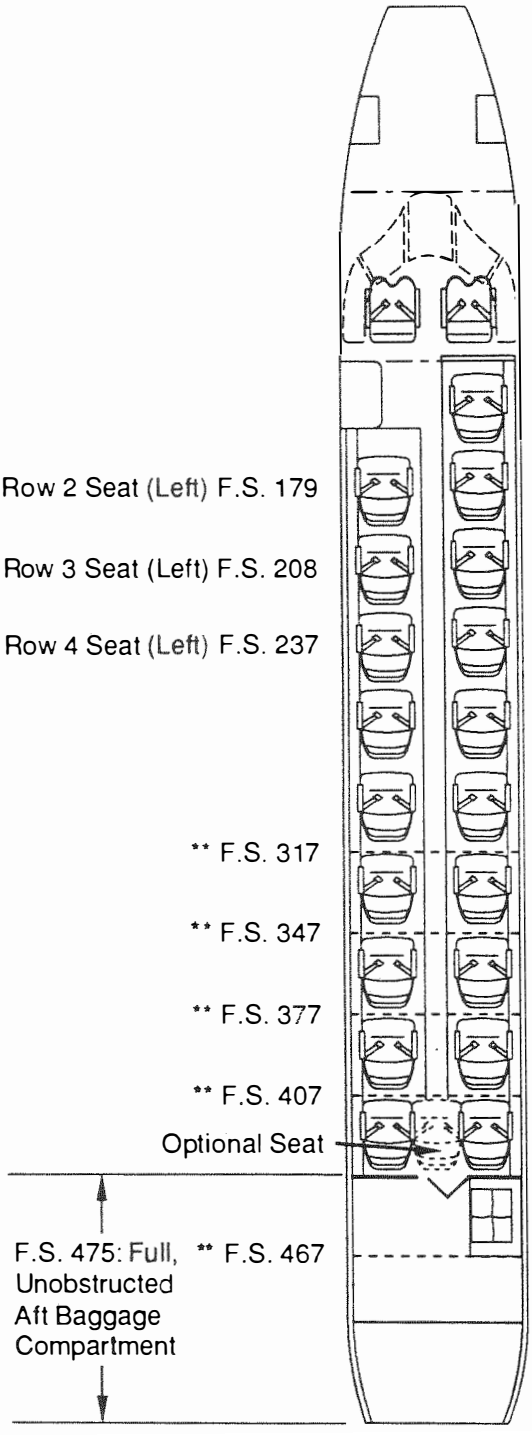
MAX. ALLOWABLE FUEL

ACTUAL FUEL WEIGHT & MOMENT			(h)
TAKEOFF WEIGHT & MOMENT (g) + (h)			(i)*
LESS CAWI FLUID CONSUMED			(f)
FLIGHT WT & MOM, W/CAWI FLUID CONSUMED (i) – (f)			*

* THIS WEIGHT AND MOMENT MUST BE WITHIN THE WEIGHT-MOMENT ENVELOPE (FIGURE 5–35).

FIGURE 5-26

OPTIONAL 19 PLACE CABIN
WITH A CARGO NET IN AFT BAGGAGE COMPARTMENT
HIGH-BACK, BUCKET SEATS



* When left and right Row 2, 3 or 4 seats are occupied use the average F.S. numbers above to compute weight and balance.
** Optional Structural Bulkhead location.

FIGURE 5-27

WEIGHT AND BALANCE CALCULATION FORM
OPTIONAL 19 PLACE CABIN
WITH A CARGO NET IN AFT BAGGAGE COMPARTMENT
HIGH-BACK, BUCKET SEATS

		PAYLOAD (POUNDS)	MOMENT (IN.-LB./1,000)
F.S. 42: Forward Baggage			
F.S. 111: Crew Seats			
High-Back, Bucket Seats	F.S. 148: Row 1 Seat or F.S. 144: Coat Closet		
	F.S. 178: Row 2 Seats		
	F.S. 207: Row 3 Seats		
	F.S. 236: Row 4 Seats		
	F.S. 266: Row 5 Seats		
	F.S. 297: Row 6 Seats		
	F.S. 328: Row 7 Seats		
	F.S. 359: Row 8 Seats		
	F.S. 389: Row 9 Seats		
	F.S. 419: Row 10 Seats		
F.S. 450: Optional Toilet			
F.S. 475: Full Aft Baggage Compartment			
F.S. 479: Aft Baggage (Zone A3, Fwd)			
F.S. 510: Aft Baggage (Zone B3, Aft)			
TOTAL PAYLOAD AND MOMENT			(a)

BASIC EMPTY WEIGHT & MOMENT			(b) (FROM WT. & BAL. RECORD)
ADJUSTMENT FOR BULKHEAD			(c)
OTHER ADJUSTMENTS			(d)
ADJUSTED EMPTY WT & MOMENT			(e)

EMPTY WT & MOM, EXISTING CONFIGURATION			(e)
CAWI FLUID WT & MOMENT			(f)
ZERO FUEL WT & MOMENT (a) + (e) + (f)			(g)*

MAX. ALLOWABLE FUEL

ACTUAL FUEL WEIGHT & MOMENT			(h)
TAKEOFF WEIGHT & MOMENT (g) + (h)			(i)*
LESS CAWI FLUID CONSUMED			(f)
FLIGHT WT & MOM, W/CAWI FLUID CONSUMED (i) – (f)			*

* THIS WEIGHT AND MOMENT MUST BE WITHIN THE WEIGHT-MOMENT ENVELOPE (FIGURE 5–35).

FIGURE 5-28

EXPEDITER CONFIGURATION

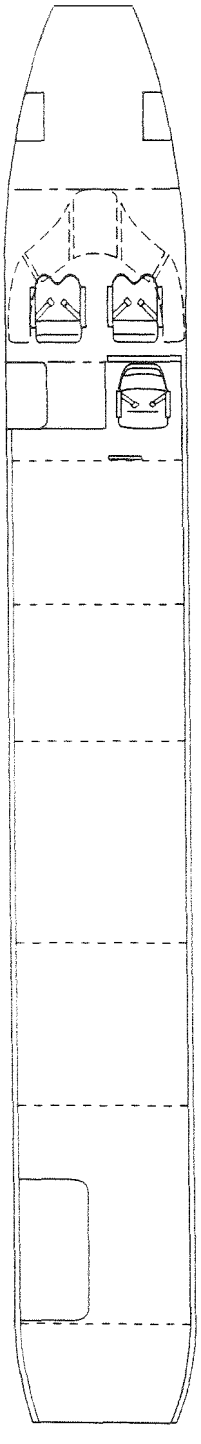


FIGURE 5-29

WEIGHT AND BALANCE

PAYLOAD MOMENT TABLE
EXPEDITER CONFIGURATION

MOMENTS LISTED ARE IN.-LBS./1,000 FOR WEIGHTS LOCATED AS SHOWN.

PAYLOAD WEIGHTS (POUNDS)		50	100	170	200	400	600	800	1000	1150
F.S. 42:	Forward Baggage	2.1	4.2	7.1	8.4	16.8				
F.S. 111:	Crew Seats	5.6	11.1	18.9	22.2	44.4				
F.S. 144:	Seat	7.2	14.4	24.5	28.8					
F.S. 197:	Cargo Zone 1	9.9	19.7		39.4	78.8	118.2	157.6	197.0	226.6
F.S. 249.5:	Cargo Zone 2	12.5	24.9		49.9	99.8	149.7	199.6	249.5	286.5
F.S. 313:	Cargo Zone 3	15.7	31.3		62.8	125.2	187.8	250.4	313.0	359.9
F.S. 381:	Cargo Zone 4	19.0	38.1		76.2	152.4	228.6	304.8	381.0	438.2
F.S. 451.5:	Cargo Zone 5	22.6	45.2		90.3	180.6	270.9	361.2	451.5	519.2
F.S. 510:	Cargo Zone 6	25.5	51.0		102.0	204.0	306.0			

EXPEDITER WEIGHT AND BALANCE CALCULATION FORM

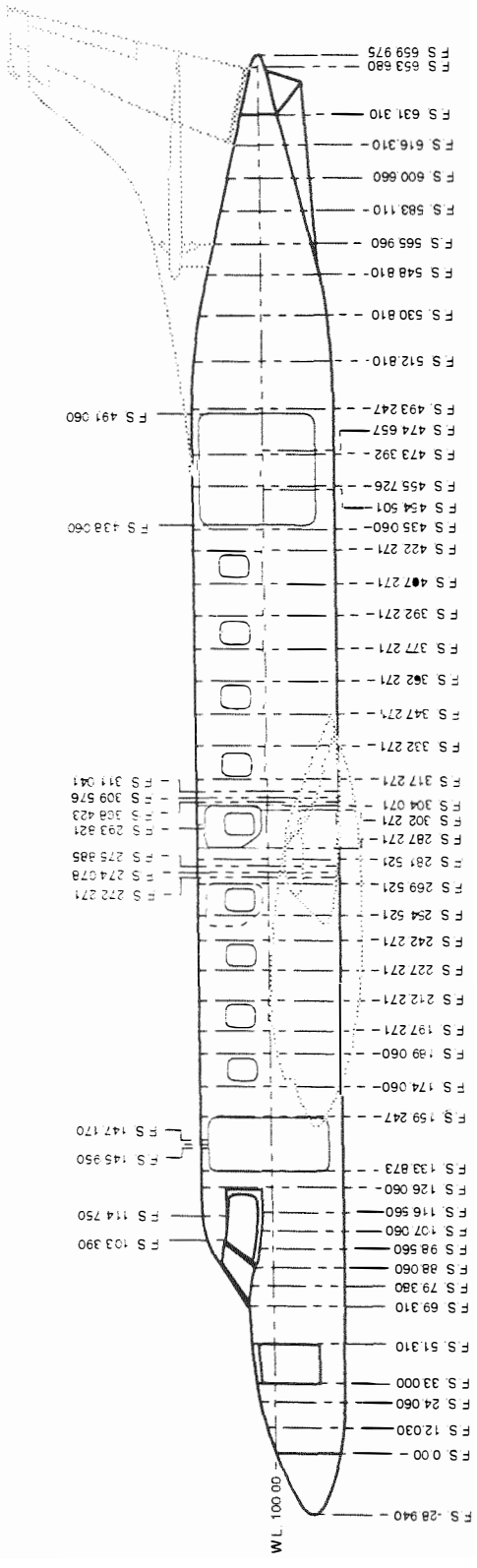
		PAYLOAD (POUNDS)	MOMENT (IN.-LBS./1,000)
F.S. 42:	Forward Baggage		
F.S. 111:	Seats		
F.S. 144:	Seat		
F.S. 197:	Cargo Zone 1		
F.S. 249.5:	Cargo Zone 2		
F.S. 313:	Cargo Zone 3		
F.S. 381:	Cargo Zone 4		
F.S. 451.5:	Cargo Zone 5		
F.S. 510:	Cargo Zone 6		
	TOTAL PAYLOAD AND MOMENT			(a)

BASIC EMPTY WT. & MOM			(b) (FROM WT. & BAL. RECORD)
ADJUSTMENTS			(c)
ADJUSTED EMPTY WT. & MOM			(d)

EMPTY WT. & MOM, EXISTING CONFIGURATION			(d)
AWI FLUID WT. & MOMENT			(e)
ZERO FUEL WT. & MOMENT (a) + (d) + (e)			(f)*
MAX. ALLOWABLE FUEL			
ACTUAL FUEL WT. & MOMENT			(g)
TAKEOFF WT. & MOMENT (f) + (g)			(h)*
LESS AWI FLUID CONSUMED			(e)
FLIGHT WT. & MOM, W/AWI FLUID CONSUMED (h) – (e)			*

* THIS WEIGHT AND MOMENT MUST BE WITHIN THE WEIGHT - MOMENT ENVELOPE (FIGURE 5-35)

FIGURE 5-30
WEIGHT AND BALANCE



FUSELAGE STATION DIAGRAM
(inches from Datum)

NOTE:
Nose Gear Station = 64.10"
Main Gear Station = 293.69"

FIGURE 5-31

PASSENGER WEIGHT TABLE

NO. OF PASSENGERS	PASSENGER WEIGHT (POUNDS)										
	150	155	160	165	170	175	180	185	190	195	200
1	150	155	160	165	170	175	180	185	190	195	200
2	300	310	320	330	340	350	360	370	380	390	400
3	450	465	480	495	510	525	540	555	570	585	600
4	600	620	640	660	680	700	720	740	760	780	800
5	750	775	800	825	850	875	900	925	950	975	1,000
6	900	930	960	990	1,020	1,050	1.080	1,110	1,140	1,170	1,200
7	1,050	1,085	1,120	1,155	1,190	1,225	1,260	1,295	1,330	1,365	1,400
8	1,200	1,240	1,280	1,320	1,360	1,400	1,440	1,480	1,520	1,560	1,600
9	1,350	1,395	1,440	1,485	1,530	1,575	1,620	1,665	1,710	1,755	1,800
10	1,500	1,550	1,600	1,650	1,700	1,750	1,800	1,850	1,900	1,950	2,000
11	1,650	1,705	1,760	1,815	1,870	1,925	1,980	2,035	2,090	2,145	2,200
12	1,800	1,860	1,920	1,980	2,040	2,100	2,160	2,220	2,280	2,340	2,400
13	1,950	2,015	2,080	2,145	2,210	2,275	2,340	2,405	2,470	2,535	2,600
14	2,100	2,170	2,240	2,310	2,380	2,450	2,520	2,590	2,660	2,730	2,800
15	2,250	2,325	2,400	2,475	2,550	2,625	2,700	2,775	2,850	2,925	3,000
16	2,400	2,480	2,560	2,640	2,720	2,800	2,880	2,960	3,040	3,120	3,200
17	2,550	2,635	2,720	2,805	2,890	2,975	3,060	3,145	3,230	3,315	3,400
18	2,700	2,790	2,880	2,970	3,060	3,150	3,240	3,330	3,420	3,510	3,600
19	2,850	2,945	3,040	3,135	3,230	3,375	3,420	3,515	3,610	3,705	3,800
20	3,000	3,100	3,200	3,300	3,400	3,500	3,600	3,700	3,800	3,900	4,000

FIGURE 5–32A

PAYLOAD MOMENT TABLE
AFT BAGGAGE COMPARTMENT

Moments listed are inch-pounds / 1,000 for weights located as shown.

Payload Weight (Pounds)	20	40	60	80	100	150	200	300	400	500	600	700	800	850
F.S. 475: (STANDARD)	19.5	19.0	28.5	38.0	47.5	71.2	95.0	142.5	190.0	237.5	285.0	332.5	380.0	403.8
F.S. 452: (ZONE A)	9.04	18.1	27.1	36.2	45.2	67.8	90.4	135.6	180.8	226.0	271.2	316.4	361.6	384.2
F.S. 498: (ZONE B)	10.0	19.9	29.9	39.8	49.8	74.7	99.6	149.4	199.2	249.0	298.8	348.6	398.4	423.3
F.S. 451: (ZONE A1)	9.0	18.0	27.1	36.1	45.1	67.6	90.2	135.3	180.4	225.5	270.6	315.7		
F.S. 510: (ZONE B1)	10.2	20.4	30.6	40.8	51.0	76.5	102.0	153.0	204.0	255.0	306.0			
F.S. 479: (ZONE A3)	9.6	19.2	28.7	38.3	47.9	71.9	95.8	143.7	191.6	239.5	287.4			
F.S. 510: (ZONE B3)	10.2	20.4	30.6	40.8	51.0	76.5	102.0	153.0	204.0	255.0	306.0			

FIGURE 5-32B

PAYLOAD MOMENT TABLE

Moments listed are inch-pounds /1,000 for weights located as shown.

STANDARD 19 PLACE CABIN
WITH HIGH-BACK, BUCKET SEATS

PAYLOAD WEIGHT (POUNDS)		40	60	80	100	135	170*	200	270	300	340	400
F.S. 42: Forward Baggage		1.7	2.5	3.4	4.2	5.7	7.1	8.4	11.8	12.6	14.3	16.8
F.S. 111: Crew Seats		4.4	6.7	8.9	11.1	15.0	18.9	22.2	30.0	33.3	37.7	44.4
F.S. 144: Coat Closet		5.8										
High-Back, Bucket Seats	F.S. 148: Row 1 Seats	5.9	8.9	11.8	14.8	20.0	25.2	29.6	40.0	44.4	50.3	59.2
	F.S. 178: Row 2 Seats	7.1	10.7	14.2	17.8	24.0	30.3	35.6	48.1	53.4	60.5	71.2
	F.S. 207: Row 3 Seats	8.3	12.4	16.6	20.7	28.0	35.2	41.4	55.9	62.1	70.4	82.8
	F.S. 236: Row 4 Seats	9.4	14.2	18.9	23.6	31.9	40.1	47.2	63.7	70.8	80.2	94.4
	F.S. 266: Row 5 Seats	10.6	16.0	21.3	26.6	35.9	45.2	53.2	71.8	79.8	90.4	106.4
	F.S. 297: Row 6 Seats	11.9	17.8	23.8	29.7	40.1	50.5	59.4	80.2	89.1	101.0	118.8
	F.S. 328: Row 7 Seats	13.1	19.7	26.2	32.8	44.3	55.8	65.6	88.6	98.4	111.5	131.2
	F.S. 359: Row 8 Seats	14.4	21.5	28.7	35.9	48.5	61.0	71.8	96.9	107.7	122.1	143.6
	F.S. 389: Row 9 Seats	15.6	23.3	31.1	38.9	52.5	66.1	77.8	105.0	116.7	132.3	155.6
	F.S. 419: Row 10 Seats	16.8	25.1	33.5	41.9	56.6	71.2	83.8	113.1	125.7	142.5	167.6
Aft Baggage		(SEE TABLE, FIGURE 5–32B)										

* Nominal passenger weight.

For weights other than those listed, either interpolate or add moments for weights which sum to the required total.

FIGURE 5-32C

FUEL MOMENT TABLE

USABLE FUEL		FUEL ARM* (INCHES)	MOMENT (IN.-LBS./1,000)
POUNDS	HORIZONTAL U.S. GALLONS @ 6.7 LBS./GAL.		
200	29.8	293.6	58.7
400	59.7	293.0	117.2
600	89.6	292.3	175.4
800	119.4	291.4	233.1
1,000	149.2	290.5	290.5
1,200	179.1	289.6	347.5
1,400	209.0	288.7	404.2
1,600	238.8	287.8	460.5
1,800	268.6	287.0	516.6
2,000	298.5	286.3	572.6
2,200	328.4	285.6	628.3
2,400	358.2	285.0	684.0
2,600	388.0	284.4	739.4
2,800	417.9	283.9	794.9
3,000	447.8	283.5	850.5
3,200	477.6	283.0	905.6
3,400	507.5	282.6	960.8
3,600	537.3	282.3	1,016.3
3,800	567.2	282.0	1,071.6
4,000	597.0	281.7	1,126.8
4,200	626.9	281.4	1,181.9
4,342 **	648.0	281.3	1,221.4
4,400	648.0 @ 6.8	281.3	1,237.7
4,600	648.0 @ 7.1	281.3	1,294.0

* HORIZONTAL ARM IS A FUNCTION OF THE FUEL VOLUME.
** FULL FUEL @ 6.7 POUNDS PER U.S. GALLON.

FIGURE 5–33

CAWI FLUID MOMENT TABLE

(Weight = 7.9 Lb./U.S. Gal., Arm = 298.0 Inches)

GAUGE MARKING	U.S. GALLONS*	WEIGHT (POUNDS)	MOMENT (IN.-LBS./1,000)
(Red Triangle)	7.2	57	16.9
MTO	12	95	28.3
Full	14	111	33.0

* These quantities do not include two gallons unusable, which is part of the basic empty weight of the airplane, but do include an allowance for the airplane being parked on a 2^{O} slope. That allowance amounts to two gallons when the airplane is level.

FIGURE 5–34

WEIGHT AND MOMENT ENVELOPE (GEAR DOWN)

EXAMPLE:

GIVEN: WEIGHT = 15,500 POUNDS
MOMENT = 4,200 IN.-LBS./1,000
OBTAIN: C.G. = 271 INCHES AFT OF DATUM

NOTE
LANDING GEAR RETRACTION WILL NOT SHIFT C.G. BEYOND LIMITS

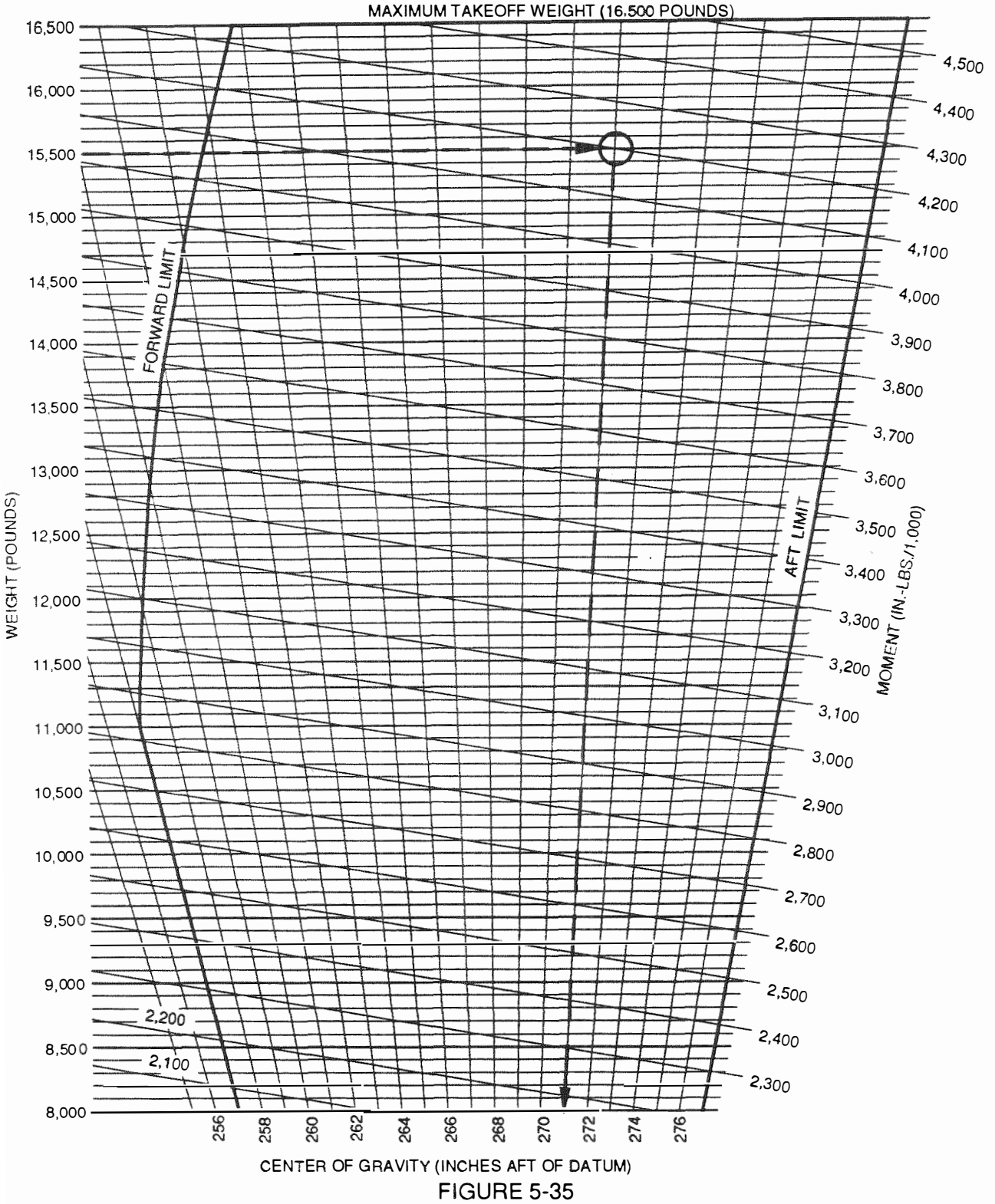


FIGURE 5-35

EQUIPMENT LIST
AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	ENGINES AND ENGINE ACCESSORIES			
2	Engine, Garrett TPE331-12UA/-12UAR/-12UHR -701G		810	197
4	Engine Mount (Side)		22	190
2	Engine Mount (Lower)		5	192
4	Engine Mount (Rear)		2	214
2	Oil Cooler		15	219
2	Fire Extinguisher Bottle (Charged)		16	228
2	Starter-Generator		62	197
2	Mounting Pad (Starter Gen)		2	190
2	Engine Driven Hydraulic Pump		13	193
2	CAWI Pumps		7	297
2	CAWI Tanks		7	298
2	Torque Signal Conditioner, AiResearch		2	539
2	SRL Auto-Start Computer, AiResearch		7	538
2	Δ P/P Transducer		4	248
2	Torque and Temp Limiter, AiResearch		3	539

EQUIPMENT LIST
AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	PROPELLERS & PROPELLER ACCESSORIES			
2	Propeller Installation, McCauley		320	170
2	Spinner and Bulkhead Assembly, McCauley		16	167
2	Propeller Unfeathering Pump		5	202
1	Propeller Synchrophaser		2	201
2	Prop Tach Generator		2	191

EQUIPMENT LIST

AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	LANDING GEAR AND FLAP			
4	Main Wheel (18 x 5.5 Type VII Tubeless), Goodyear Aerospace		38	294
4	Brake Assembly, Aircraft Braking Systems (ABS), P/N 5011640 or P/N 5011640-1		94	294
4	Tire–Main (19.5 x 6.75-8, Tubeless 10 P.R.), B.F. Goodrich		59	294
4	Tire–Main (19.5 x 6.75-8, Tubeless 10 P.R.), Aviator		59	294
4	Tire–Main (19.5 x 6.75-8, Tubeless 10 P.R.), Goodyear Aerospace		66	294
2	Nose Wheel (18 x 4.4 Tubeless), B.F. Goodrich		22	64
2	Nose Wheel (18 x 4.4 Tubeless), Aircraft Braking Systems (ABS)		18	64
2	Tire–Nose (18 x 4.4 10 P.R. Chine Tubeless), B.F. Goodrich		28	64
2	Tire–Nose (18 x 4.4 10 P.R. Chine Tubeless), Goodyear Aerospace		24	64
4	Actuator, Main Landing Gear		16	281
2	Actuator, Nose Landing Gear		8	52
1	Hydraulic Steering Unit, Airight		9	62

EQUIPMENT LIST
AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	LANDING GEAR AND FLAP (continued)			
1	Hand Pump, Hydraulic		2	105
1	Reservoir, Airight		17	228
2	Actuator, Wing Flap		5	310
4	Master Brake Cylinder		3	66
2	Flap Lock Valve Assembly		2	269
1	Sight Glass, Airight		1	230
2	Engine Driven Pump Shutoff Valve		2	228
1	Hydraulic Accumulator, Airight		3	228
2	Parking Brake Valve		1	66
1	Flap Controller, Calco		2	69

EQUIPMENT LIST
AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	SURFACE DEICING AND MISCELLANEOUS SYSTEMS			
2	Wing Deice Boot (Left and Right), B.F. Goodrich		18	257
2	Wing Deice Boot (Tip), B.F. Goodrich		7	266
2	Wing Deice Boot (Inboard) (Left and Right), B.F. Goodrich		7	257
2	Horizontal Stabilizer Deice Boot, B.F. Goodrich		9	583
1	Surface Deice Timer, B.F. Goodrich		1	69
1	Distributor Valve, Bendix		2	255
1	Pressure Regulator Valve, Bendix		2	262
1	Vacuum Regulator Valve		1	257
1	Vacuum Warning Unit		1	262
2	Pitot Tube		2	4
1	Oxygen Cylinder Assembly, Steel, Fully Charged			
	49 cu. ft.		21	540
	115 cu. ft.		45	540
	115 & 64 cu. ft.		72	540

EQUIPMENT LIST
AIRPLANE S/N _____

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Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	SURFACE DEICING AND MISCELLANEOUS SYSTEMS (continued)			
1	Oxygen Cylinder Assembly, Composite, Fully Charged			
	50 cu. ft.		13	540
	115 cu. ft.		28	540
	115 & 77 cu. ft.		48	540
2	Refrigeration Unit, AiResearch		27	260
2	Water Separator, AiResearch,		4	262
2	Control Valve, Hot Air, Barber Coleman		1	260
1	Blower Recirculating Air, Janitrol		5	55
1	Outflow Valve		3	629
1	Safety Valve		2	73
1	Pressurization Controller		3	86
2	Solenoid Valve, AiResearch		2	248
2	Solenoid Valve, AiResearch		2	230
1	Expediter Cargo Net		5	170
1	Expediter Cargo Net		5	224
1	Expediter Cargo Net		5	275
1	Expediter Cargo Net		5	351
1	Expediter Cargo Net		5	411
1	Expediter Cargo Net		5	492

EQUIPMENT LIST
AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	INSTRUMENTS AND INDICATORS			
2	Ammeter		1	95
1	Magnetic Compass		1	93
1	SAS Indicator		1	80
2	Air Speed Indicator		1	87
2	Altimeter		3	87
2	Vertical Velocity		3	87
1	Turn & Slip, Pilot		2	87
1	Turn & Slip, Copilot		2	87
1	Gyro Horizon, Pilot		3	86
1	Gyro Horizon, Copilot		3	86
1	Directional Gyro, Pilot		4	86
1	Directional Gyro, Copilot		4	86
2	EGT		3	87
2	Percent Torque		2	87
2	Percent RPM		2	87
2	Fuel Flow		2	87
1	Fuel Quantity		2	87
1	Annunciator Panel Assembly		2	87

EQUIPMENT LIST
AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	ELECTRICAL			
2	Battery		111	267
1	Fault Panel, Lear-Siegler		1	117
2	Voltage Regulator		6	117
2	Inverter, KGS		15	540
2	Inverter, Avionics Instruments		8	540
1	Inverter Control		3	540
1	Horizontal Stabilizer Actuator		13	565
2	Electrical Windshield		48	88
2	Windshield Wiper Motor Assembly		4	79
1	Windshield Defog Blower		2	79
4	Fuel Boost Pump		18	292
1	Torque Motor Servo, Stick Pusher		3	250
1	SAS Computer Unit No. 1, Conrac		3	167
1	SAS Computer Unit No. 2, Conrac		3	181
1	SAS Transducer, Conrac		2	5
1	Flap Position Transmitter		1	320

EQUIPMENT LIST
AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	ELECTRICAL (continued)			
2	Ice Light		5	247
2	Landing Lights		10	264
1	Nose Taxi Light		1	52

EQUIPMENT LIST

AIRPLANE S/N _____

The weights shown in this list are to the nearest pound and the arms to the nearest inch.

Items with a total weight of less than one pound have been omitted from the list.

QTY. REQ.	ITEM	MARK IF INSTALLED (X)	TOTAL WEIGHT (POUNDS)	MOMENT ARM (INCHES)
	AVIONICS			
1	Sundstrand 965-0440-002 Air Data Computer		2	536
2	Sundstrand 965-0476-088 GPWS Computer		8	538
2	Clark H10-30 Boom Headset		2	126
2	Electro Voice 602T Hand Microphones		2	105
1	RT-1284A R/T Unit AN/APX-100 (V)		10	135
1	ELT		5	557
1	Loral Flight Data Recorder S703-1000-00		29	558
1	Accelerometer Magmeter 5690-1		2	287
1	FDR Signal Interface Box 27-82795-001		2	557
2	Inertia "G" Switch 3L0-453/3		1	257/261
1	B & D Cockpit Voice Recorder 89090-003211		15	557
1	B & D Control Unit CVR 25000-0C311		1	85
1	Fairchild Loral CVR 93-A100		24	557
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6A-18	NOV 12/96	6A-39	MAY 02/95
6A-19	NOV 12/96	6A-40	MAY 02/95

SECTION 6B

PAGE	DATE	PAGE	DATE
6B-1	DEC 31/91	6B-7	MAR 28/95
6B-2	DEC 31/91	6B-7a	MAR 28/95
6B-3	DEC 31/91	6B-7b	MAR 28/95
6B-4	JUN 23/93	6B-8	JUN 19/92
6B-5	DEC 31/91	6B-9	DEC 31/91
6B-6	DEC 31/91	6B-10	DEC 31/91

LIST OF EFFECTIVE PAGES (continued)

SECTION 6B (continued)

PAGE	DATE	PAGE	DATE
6B-11	DEC 31/91	6B-32	MAR 04/96
6B-12	DEC 31/91	6B-33	DEC 31/91
6B-13	DEC 31/91	6B-34	MAR 04/96
6B-14	DEC 31/91	6B-35	JUN 19/92
6B-15	DEC 31/91	6B-36	JUN 19/92
6B-16	DEC 31/91	6B-37	JUN 19/92
6B-17	DEC 31/91	6B-38	JUN 19/92
6B-18	DEC 31/91	6B-39	JUN 19/92
6B-19	DEC 31/91	6B-40	JUN 19/92
6B-20	DEC 31/91	6B-41	MAR 29/94
6B-21	JUN 23/93	6B-42	DEC 31/91
6B-22	JUN 23/93	6B-43	MAR 04/96
6B-23	JUN 23/93	6B-44	DEC 31/91
6B-24	DEC 31/91	6B-45	MAR 18/93
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6B-27	APR 24/92	6B-48	DEC 31/91
6B-28	DEC 31/91	6B-49	JUN 23/93
6B-29	DEC 31/91	6B-50	DEC 31/91
6B-30	JUN 23/93	6B-51	JUN 23/93
6B-31	MAR 04/96	6B-52	DEC 31/91

SECTION 6C

PAGE	DATE	PAGE	DATE
6C-1	DEC 31/91	6C-9	MAR 29/94
6C-2	JUN 23/93	6C-10	JUN 23/93
6C-3	DEC 31/91	6C-11	DEC 31/91
6C-4	JUN 23/93	6C-12	DEC 31/91
6C-5	DEC 31/91	6C-13	DEC 31/91
6C-6	DEC 31/91	6C-14	JUN 23/93
6C-7	DEC 31/91	6C-15	JUN 23/93
6C-8	DEC 31/91	6C-16	DEC 31/91

LIST OF REVISIONS

Revisions to the Airplane Flight Manual provide current information applicable to operation of the SA227-DC. Revised pages should be inserted into the manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when current revisions are incorporated.

Revision Number	Revised Pages	Description of Revision	Date of Revision
1	6-vii, 6-viii, 6-ix, 6A-9 thru 6A-24, 6A-29 thru 6A-33, 6B-7, 6B-8, 6B-26, 6B-27 and 6C-4	Changed Specific Range, charts for Fuel Flow, Specific Range, and Cruise Speeds, tables for Cruise Speeds at Maximum Cruise Power – Knots, Range Profile charts, deleted info about external power switch, corrected DC Distribution Schematic, Hydraulic System Schematic and corrected Variable Authority Nose Wheel Steering Tests section.	APR 24/92
2	6-ii, 6-iii, 6-vii thru 6-ix, 6B-8 6B-35 thru 6B-40	Added brake and parking brake information and Standby Instrument power system.	JUN 19/92
3	6-vii thru 6-ix, 6B-45 and 6C-14	Added new engine designation for –10 SRL Computer and identified engines with provisions for reserve power and changed Note for Approved Engine Oils..	MAR 18/93
4	6-v, 6-vii thru 6-ix, 6B-4, 6B-21 thru 6B-23, 6B-30, 6B-31, 6B-49, 6B-51, 6C-2, 6C-4, 6C-9, 6C-10 6C-14 and 6C-15	Corrected Fuel System drawings, Jet Transfer Pump Sytem information, Variable Authority Nose Wheel Steering Test, FDR operation description, landing gear warning system, deleted overspeed governor check, corrected list of approved oils and corrected editorial error.	JUN 23/93
5	6-vii thru 9-ix, 6B-32 and 6B-34	Changed information about NWS FAIL light for Variable Authority Nose Wheel Steering and changed normal steering operations for Variable Authority Nose Wheel Steering and Tiller Nose Wheel Steering.	SEP 01/93
6	6-vii thru 6-ix, 6B-34 6B-41 and 6C-9	Changed information about NWS FAIL light for Tiller Nose Wheel Steering and changed Note for Operations with Standing Water, Slush, or Wet Snow on the Runway and corrected editorial error	MAR 29/94

A black bar in the margin of a revised page shows the current change.

LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	Date of Revision
7	6-vii, 6-viii, 6x, 6B-7 6B-7a and 6B-7b	Provided for revised DC power distribution system.	MAR 28/95
8	6-i, 6-vii, 6-viii, 6-x, 6A-34 thru 6A-40	Added Single Engine Fuel Flow and Cruise Speed Tables and added pages 6A-35 thru 6A-40.	MAY 02/95
9	6-vii, 6-viii, 6-x, 6B-31, 6B-32, 6B-34 and 6B-43	Corrected Main Landing Gear drawing, added change to Variable Authority NWS and Tiller NWS systems for aircraft modified by ECP 698 or S.B. CC7-32-008, replaced Pitot Static Systems drawing.	MAR 04/96
10	6-iii thru 6-v, 6-vii, 6-viii, 6-x, 6B-39 thru 6B-42, 6B-51, 6C-8, 6C-8A and 6C-8B	Added Section "*No Response to Power Lever Movement*" to *Ice and Rain Protection*. Revised *Engine Flameouts During Adverse Weather*, added *Emergency Locator Transmitter (ELT)* to section 6B, added *Uncommanded Engine Acceleration* to *Pilot's Operating Tips*. Added pages 6C-8A and 6C-8B.	PENDING
11	6-i, 6-vii, 6-viii, 6-x, 6A-3 thru 6A-7, 6A-9 thru 6A-24	Added *Single Engine Drift Down* charts to provide *1.1 Percent Gradient of Climb* data, increased *Fuel Flow, Specific Range, and Cruise Speed* charts and *Cruise Speeds at Maximum Cruise Power – Knots* tables to 31,000 feet. Added two pages 6A-6A and 6A-6B.	NOV 12/96

A black bar in the margin of a revised page shows the current change.

INTRODUCTION

This section of your AFM is presented in three parts. Each part has its own series of page and figure numbers.

Part 6A contains additional performance data and information which is provided for the user's convenience. These data include mission planning material and specialized performance data such as drift-down charts.

Part 6B provides short descriptions of selected systems and components of this aircraft.

Part 6C provides pilot operating tips. Conversion tables for commonly used measuring units are located at the end of this part.

ENGINE POWER CHECK CHART – MAXIMUM CONTINUOUS POWER – 200 KCAS

ASSOCIATED CONDITIONS:

RPM	100%
MAX ALLOWABLE EGT	650 C
GEN LOAD	150 AMPS
BLEED AIR	LOW
ENG ANTI-ICE	OFF
SPEED	198 KIAS
GEAR	UP
FLAPS	UP

EXAMPLE:

GIVEN: IOAT = 5°C
PRESSURE ALTITUDE = 10,000 FEET
OBTAIN: ENGINE TORQUE = 78.8 PERCENT

NOTE

INDICATED OAT IS USED TO ENTER THIS CHART.



FIGURE 6A-1

MANUFACTURER'S DATA

TIME, DISTANCE, AND FUEL TO CLIMB

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW
ENG ANTI-ICE ..... OFF
CLIMB SPEED ..... V_Y (FIGURE 4F-5)
GEAR ..... UP
FLAPS ..... UP
WIND ..... CALM

EXAMPLE:

GIVEN: T.O. PRESSURE ALTITUDE = 5,000 FEET
T.O. WEIGHT = 14,000 POUNDS
CRUISE PRESSURE ALTITUDE = 24,000 FEET
TEMPERATURE = ISA +10°C

OBTAIN: TIME = (18.4 – 2.2) = 16.2 MINUTES
DISTANCE = (53 – 5) = 48 NAUTICAL MILES
FUEL = (229 – 33) = 196 POUNDS

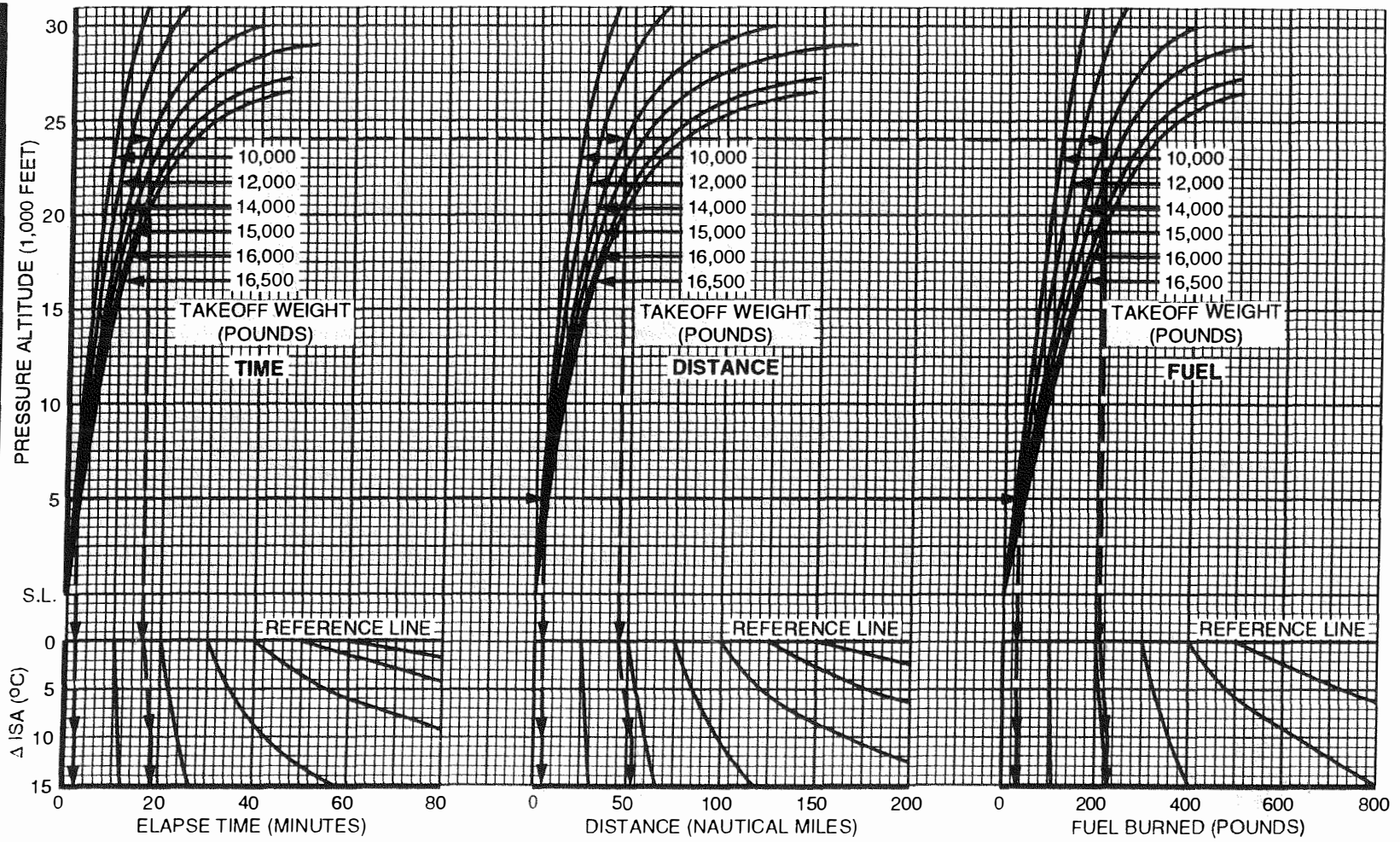


FIGURE 6A-2
MANUFACTURER'S DATA

TWO ENGINE SERVICE CEILING – BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... MAX CONTINUOUS
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (SEE NOTE)
ENG ANTI-ICE ..... OFF (SEE NOTE)
CLIMB SPEED ..... V_Y (FIGURE 4F-5)
GEAR ..... UP
FLAPS ..... UP

EXAMPLE:

GIVEN: OAT AT 24,000 FEET = –11°C
GROSS WEIGHT = 16,000 POUNDS
BLEED AIR – LOW
ENGINE ANTI-ICE – OFF

OBTAIN: TWO ENGINE SERVICE CEILING
(ASSUMING STANDARD LAPSE RATE)
= 22,950 FEET
CLIMB SPEED = 135 KIAS

NOTE

- DECREASE SERVICE CEILING BY 400 FEET WITH ENGINE ANTI-ICE ON.
- DECREASE SERVICE CEILING BY 300 FEET WITH BLEED AIR HIGH.

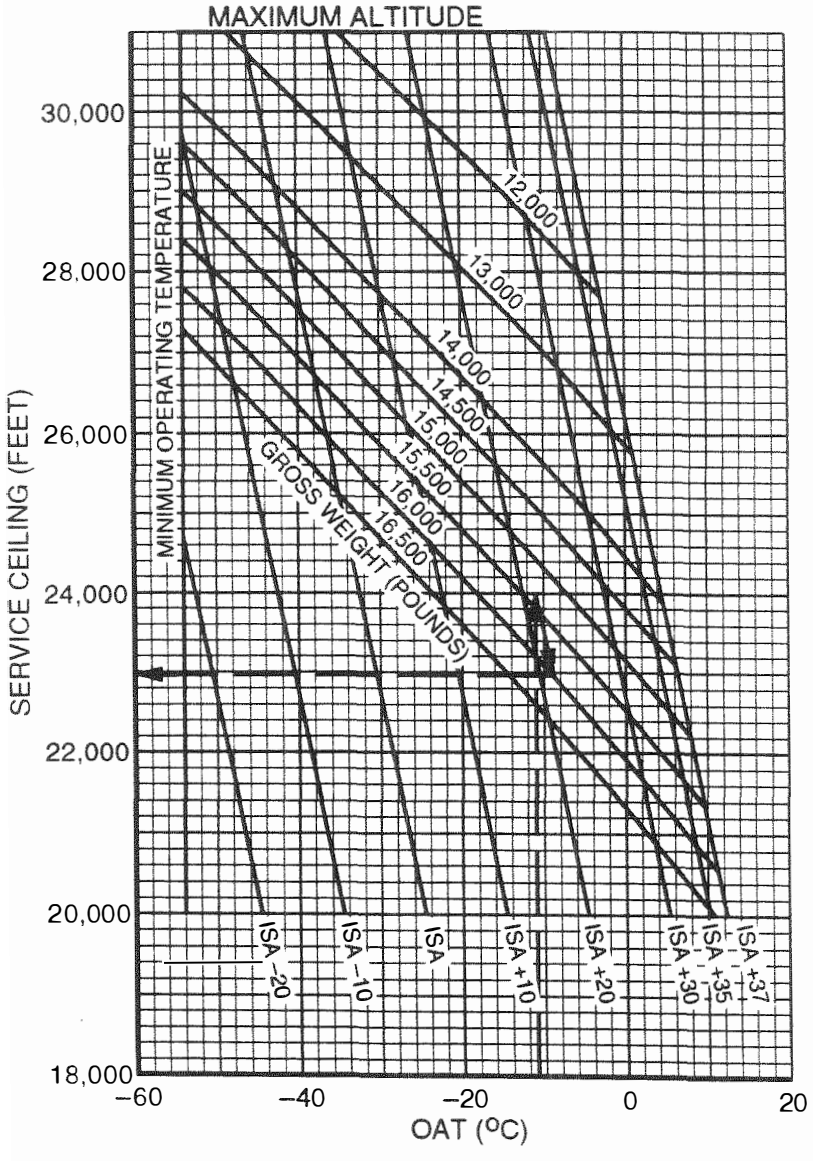
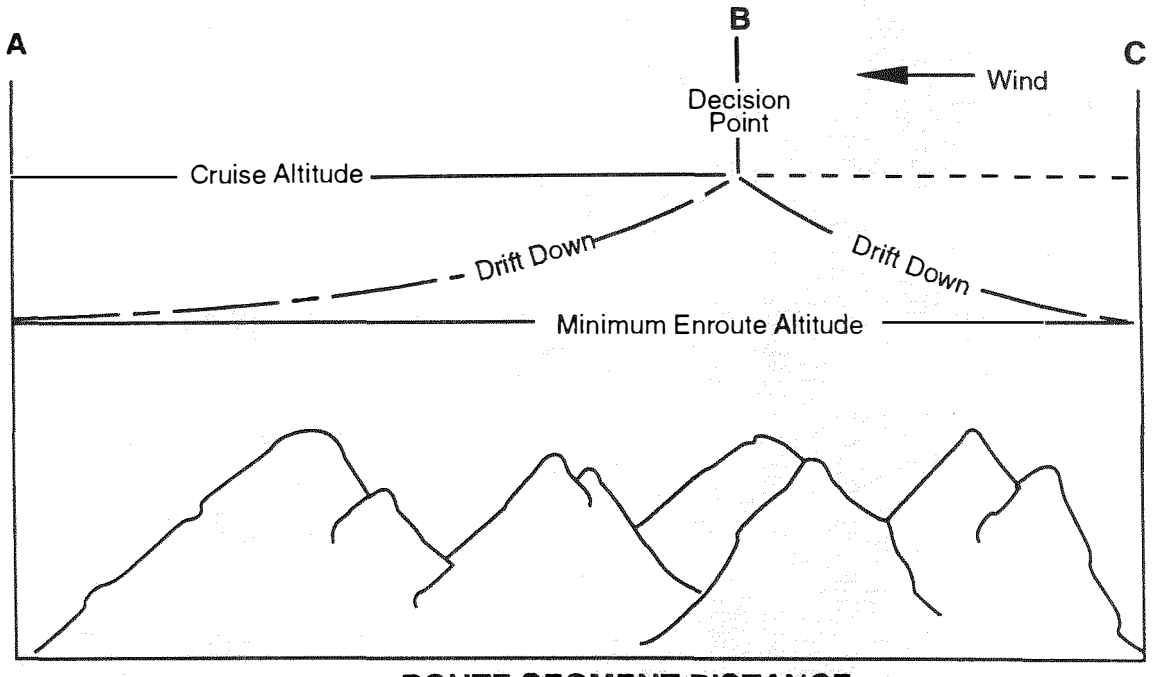


FIGURE 6A-3

SINGLE ENGINE DRIFT DOWN PERFORMANCE

Operations over some mountainous areas require minimum enroute altitudes which are higher than the airplane's single engine service ceiling. In those cases an added margin of safety may be obtained by cruising at an altitude higher than the minimum enroute altitude so as to allow drift down to the single engine service ceiling in the event single engine operation becomes necessary. Drift down cruise during single engine operation then could result in reaching the end of the route segment at an altitude equal to or higher than the minimum enroute altitude.

The problem is illustrated below:



Refer to Figures 6A-4, 6A-4A or 6A-4B to determine the minimum cruise altitude which will allow safe drift down in the event of engine failure while flying from point A to point C. Whether one should continue to point C or return to point A depends upon whether the decision point B has been reached. The effect of a headwind is to move the decision point closer to the destination end of the route segment. A tailwind will move the decision point closer to the origin of the route segment. This effect can be determined from Figure 6A-5.

SINGLE ENGINE DRIFT DOWN PERFORMANCE – BLEED AIR ON OR OFF

50 FPM RATE OF CLIMB

EXAMPLE:

GIVEN: OAT = –16°C AT 22,000 FEET ALTITUDE
MEA = 20,000 FEET
GROSS WEIGHT = 12,000 POUNDS
BLEED AIR OFF
MEA SEGMENT DISTANCE = 48 NM
WIND = 0 KNOTS

OBTAIN: ALTITUDE FOR 50 FPM CEILING FROM FIGURE 4F-4 IS Hp = 19,300 FEET.
ENTER CHART WITH 50 FPM CEILING AND REFERENCE LINE INTERSECTION.
FOLLOW GUIDE LINE TO MEA, CONTINUE ALONG GUIDE LINE A DISTANCE EQUAL TO 1/2 THE MEA SEGMENT DISTANCE.
REQUIRED ALTITUDE FOR DRIFT DOWN IS 21,300 FEET.

SEE FIGURE 6A-5 FOR WIND EFFECT

NOTE

FOR 50 FPM SINGLE ENGINE SERVICE CEILING, USE SINGLE ENGINE SERVICE CEILING – BLEED AIR ON, OR SINGLE ENGINE SERVICE CEILING BLEED AIR OFF (FIGURE 4F-3 OR 4F-4, RESPECTIVELY).

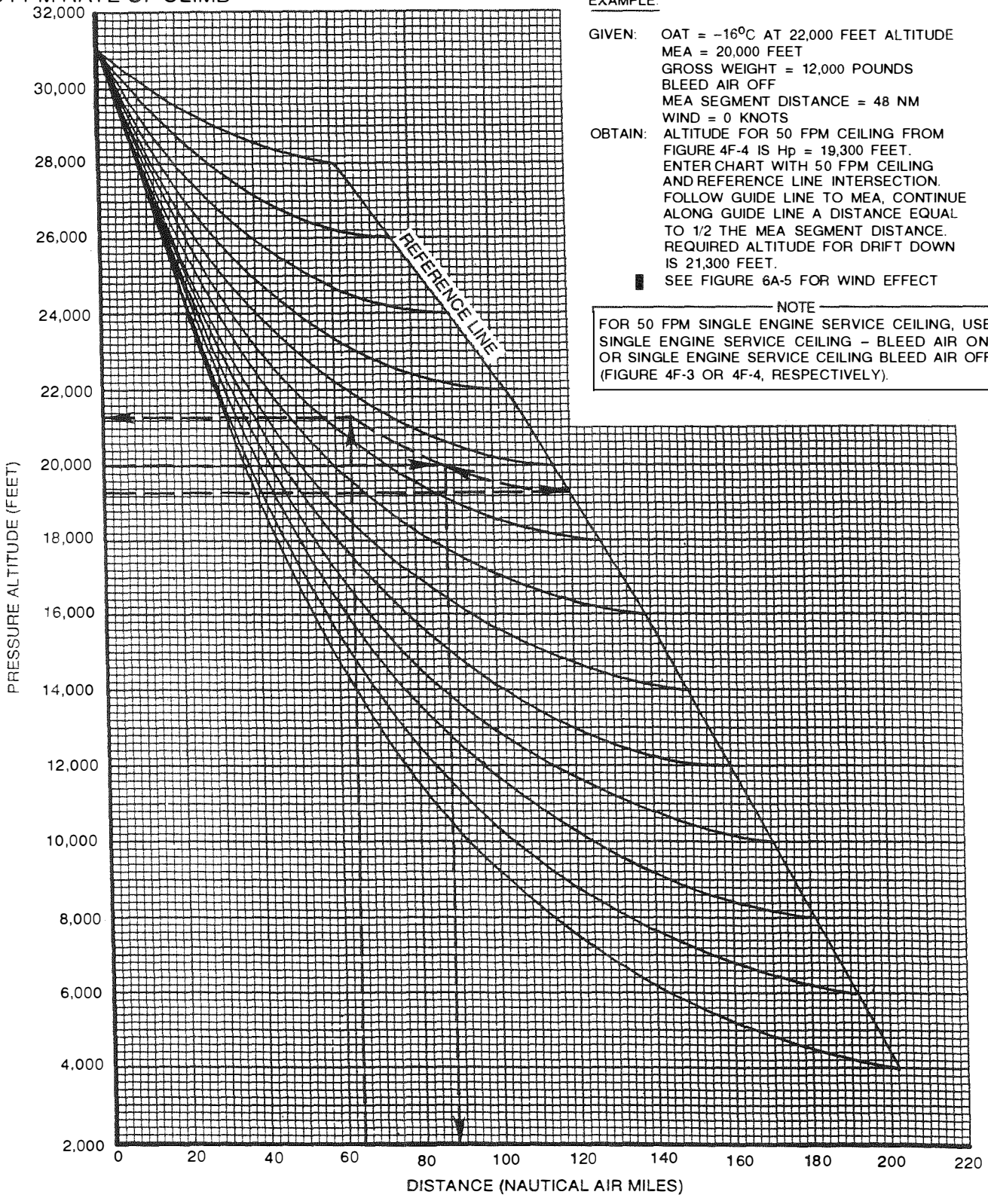


FIGURE 6A-4

SINGLE ENGINE DRIFT DOWN PERFORMANCE – BLEED AIR ON
1.1 PERCENT GRADIENT OF CLIMB

EXAMPLE:

SEE EXAMPLE ON FIGURE 6A-4

NOTE

FOR 1.1 PERCENT GRADIENT OF CLIMB SINGLE ENGINE SERVICE CEILING, USE SINGLE ENGINE SERVICE CEILING – BLEED AIR ON (FIGURE 4F-7).

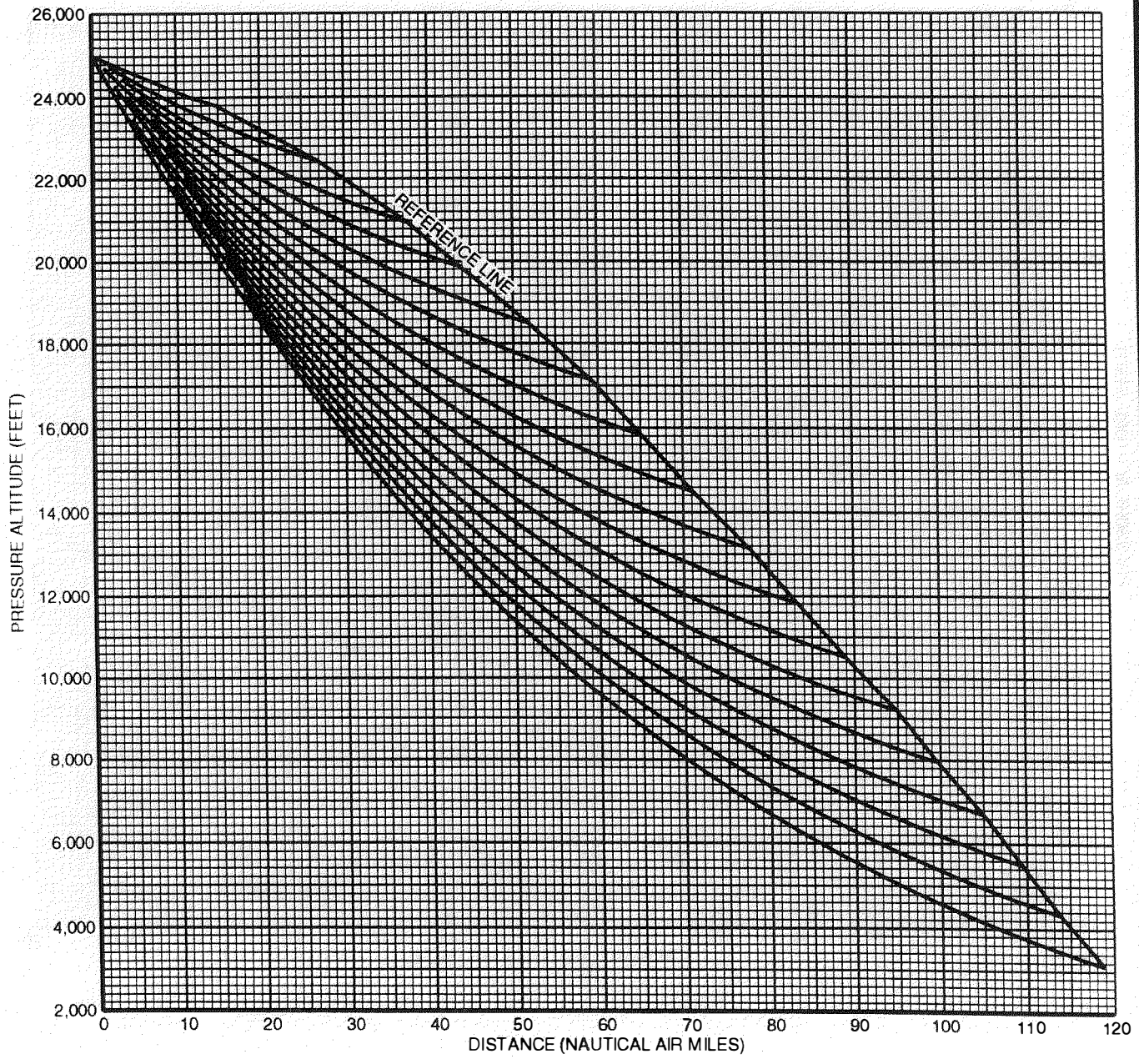


FIGURE 6A-4A

SINGLE ENGINE DRIFT DOWN PERFORMANCE – BLEED AIR OFF

1.1 PERCENT GRADIENT OF CLIMB

EXAMPLE:

SEE EXAMPLE ON FIGURE 6A-4

NOTE

FOR 1.1 PERCENT GRADIENT OF CLIMB SINGLE ENGINE SERVICE CEILING, USE SINGLE ENGINE SERVICE CEILING – BLEED AIR OFF (FIGURE 4F-8).

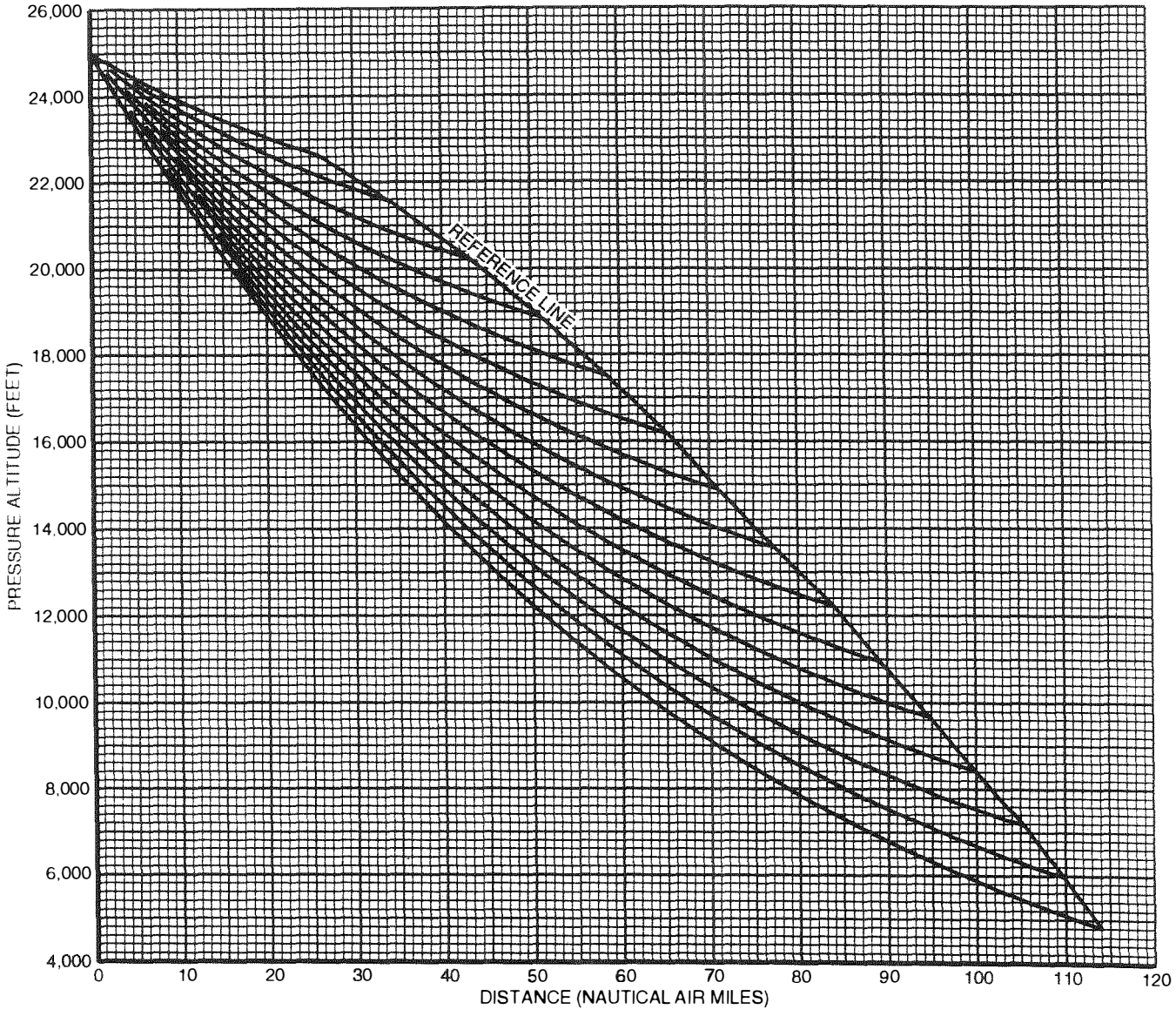


FIGURE 6A-4B

SINGLE ENGINE DRIFT DOWN PERFORMANCE – DECISION POINT

EXAMPLE: (CONTINUED FROM FIGURE 6A-4 WITH 70 KNOT HEADWIND)

MEA SEGMENT = 48 NM
AVERAGE ALTITUDE = (21,300 + 20,000)/2 = 20,650 FEET
SINGLE ENGINE CLIMB SPEED (FIGURE 4F-2) = 118 KIAS
EST. OAT AT AVERAGE ALTITUDE = −15°C
TRUE AIRSPEED = 163 KNOTS
FROM CHART F_D = 0.715
DISTANCE TO THE DECISION POINT = 0.715 x 48 = 34.3 NM

NOTE

DISTANCE TO THE DECISION POINT (NO-RETURN POINT) IS EQUAL TO THE SEGMENT LENGTH MULTIPLIED BY THE DECISION FACTOR (F_D).

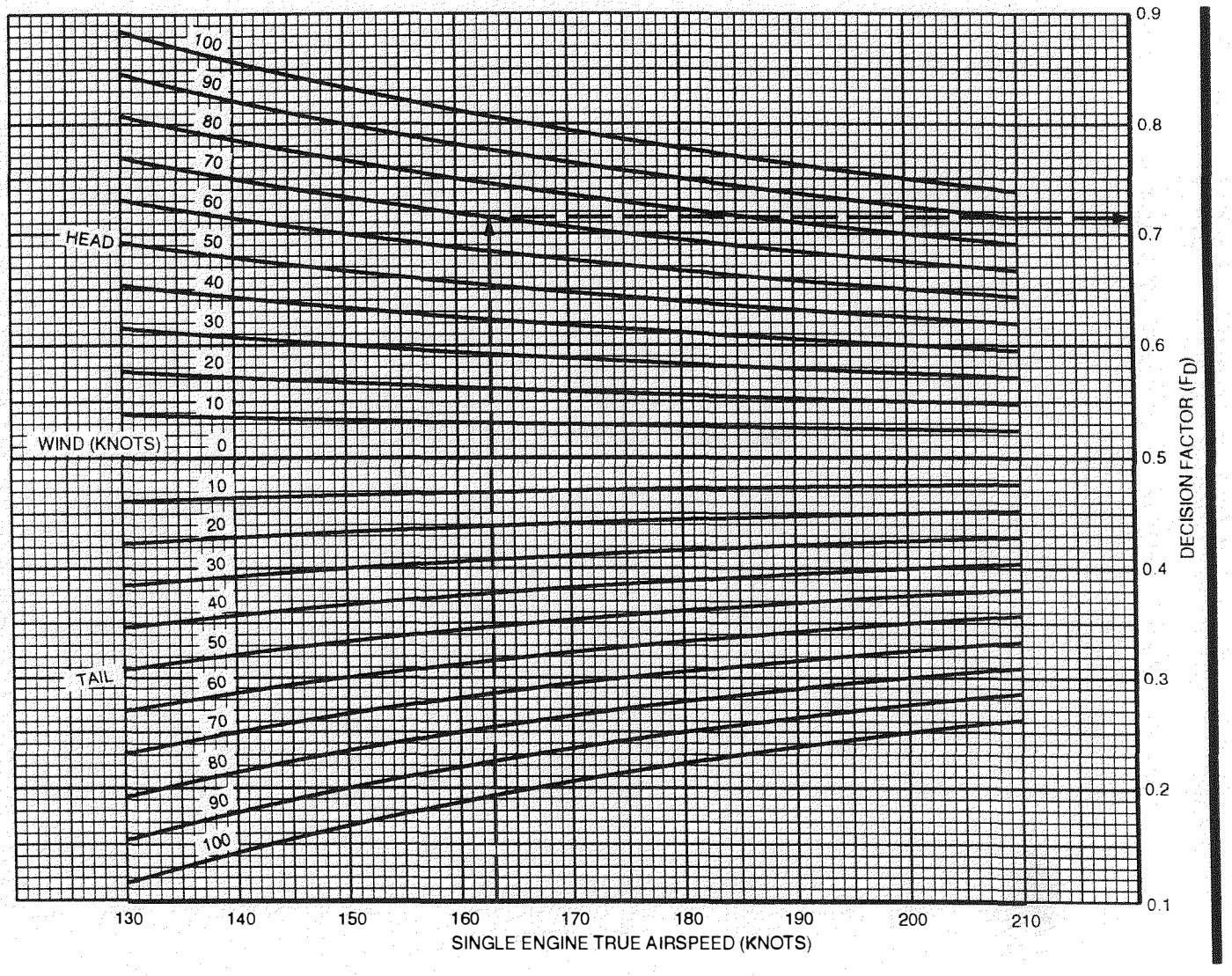


FIGURE 6A-5

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SPECIFIC RANGE

ASSOCIATED CONDITIONS:

POWER	97% RPM
GEN LOAD	200 AMPS
BLEED AIR	LOW
ENG ANTI-ICE	OFF
GEAR	UP
FLAPS	UP
TEMPERATURE	ISA OR ISA +15°C (AS NOTED)
GROSS WEIGHT	AS NOTED ON CHARTS

EXAMPLE:

GIVEN: ISA
PRESSURE ALTITUDE = 15,000 FEET
AVERAGE GROSS WEIGHT = 14,000 POUNDS
MAXIMUM CRUISE POWER (650°C EGT)

OBTAIN: SPECIFIC RANGE = .373 NAUTICAL MILE/POUND (FIGURE 6A-12)
FUEL FLOW = 790 POUNDS/HOUR
TRUE AIRSPEED = 295 KTAS

USEFUL EQUATIONS:

$$\text{FUEL FLOW} = \frac{\text{TAS}}{\text{SPECIFIC RANGE}}$$

WITH NO WIND:

$$\text{FUEL} = \frac{\text{DISTANCE}}{\text{SPECIFIC RANGE}}$$

$$\text{TIME} = \frac{\text{DISTANCE}}{\text{TAS}}$$

$$\text{RANGE} = \text{FUEL} \times \text{SPECIFIC RANGE}$$

WITH WIND (TAILWIND +, HEADWIND –):

$$\text{TIME} = \frac{\text{DISTANCE}}{\text{TAS} + \text{WIND}}$$

$$\text{FUEL} = \text{TIME} \times \text{FUEL FLOW}$$

$$\text{RANGE} = \frac{\text{FUEL}}{\text{FUEL FLOW}} \times \text{TAS} + \text{WIND}$$

MEASUREMENT UNITS:

FUEL	POUNDS
TIME	HOURS
FUEL FLOW	POUNDS/HOUR
DISTANCE AND RANGE	NAUTICAL MILES
SPECIFIC RANGE	NAUTICAL MILES/HOUR
TAS AND WIND	NAUTICAL MILES/HOUR

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
10,000 POUNDS, ISA, 97% RPM

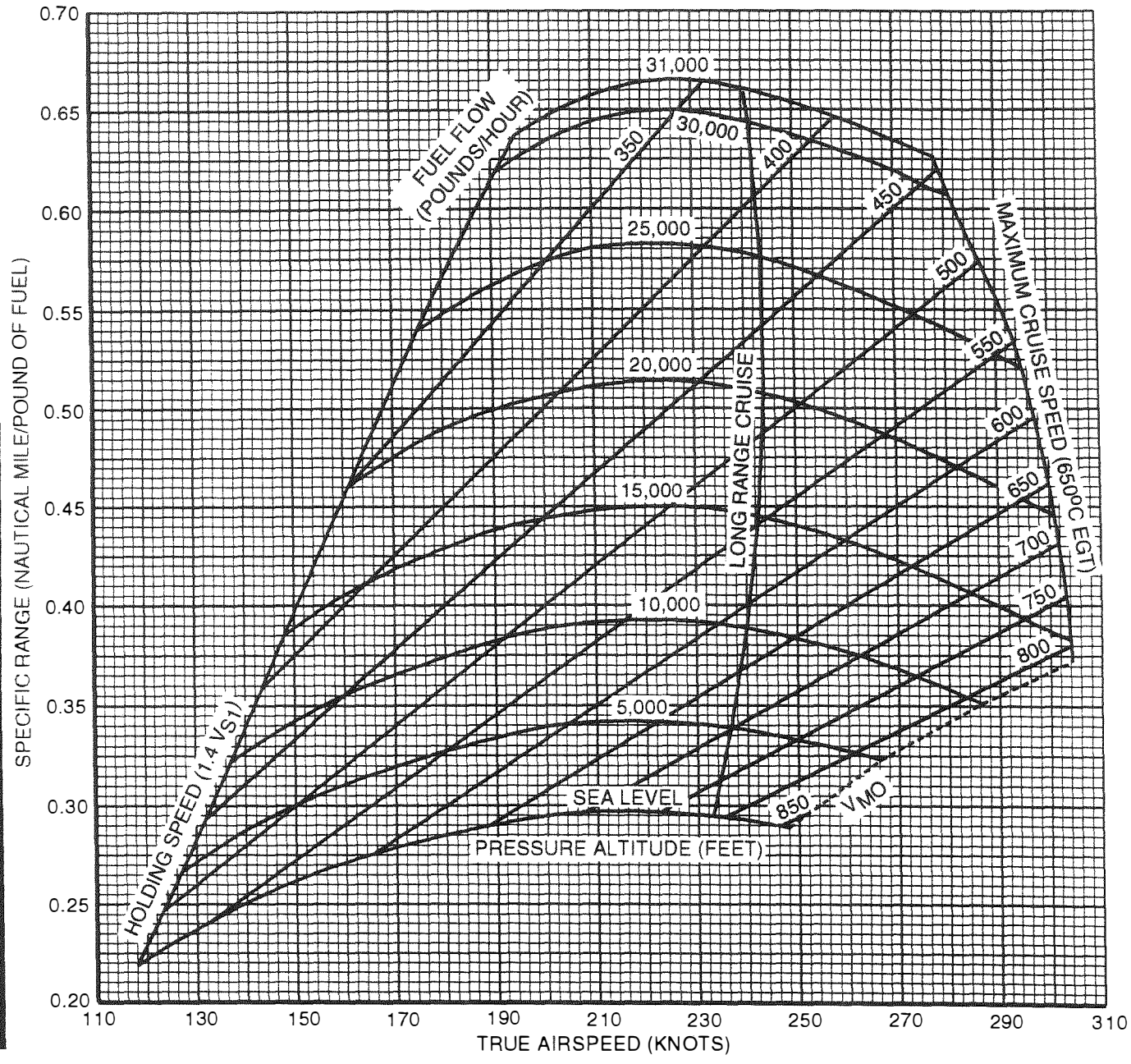


FIGURE 6A-6

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
10,000 POUNDS, ISA +15°C, 97% RPM

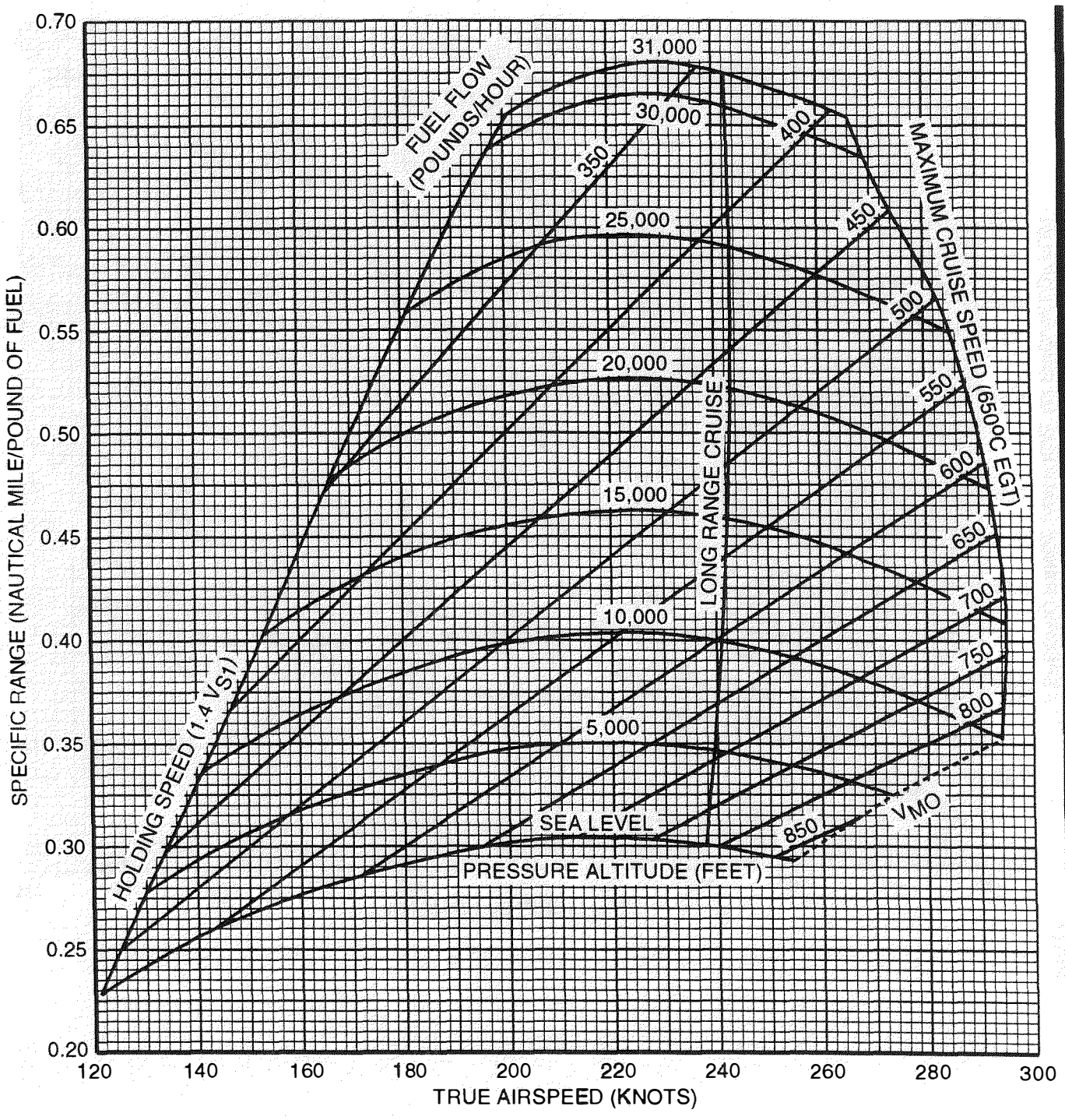


FIGURE 6A-7

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
12,000 POUNDS, ISA, 97% RPM

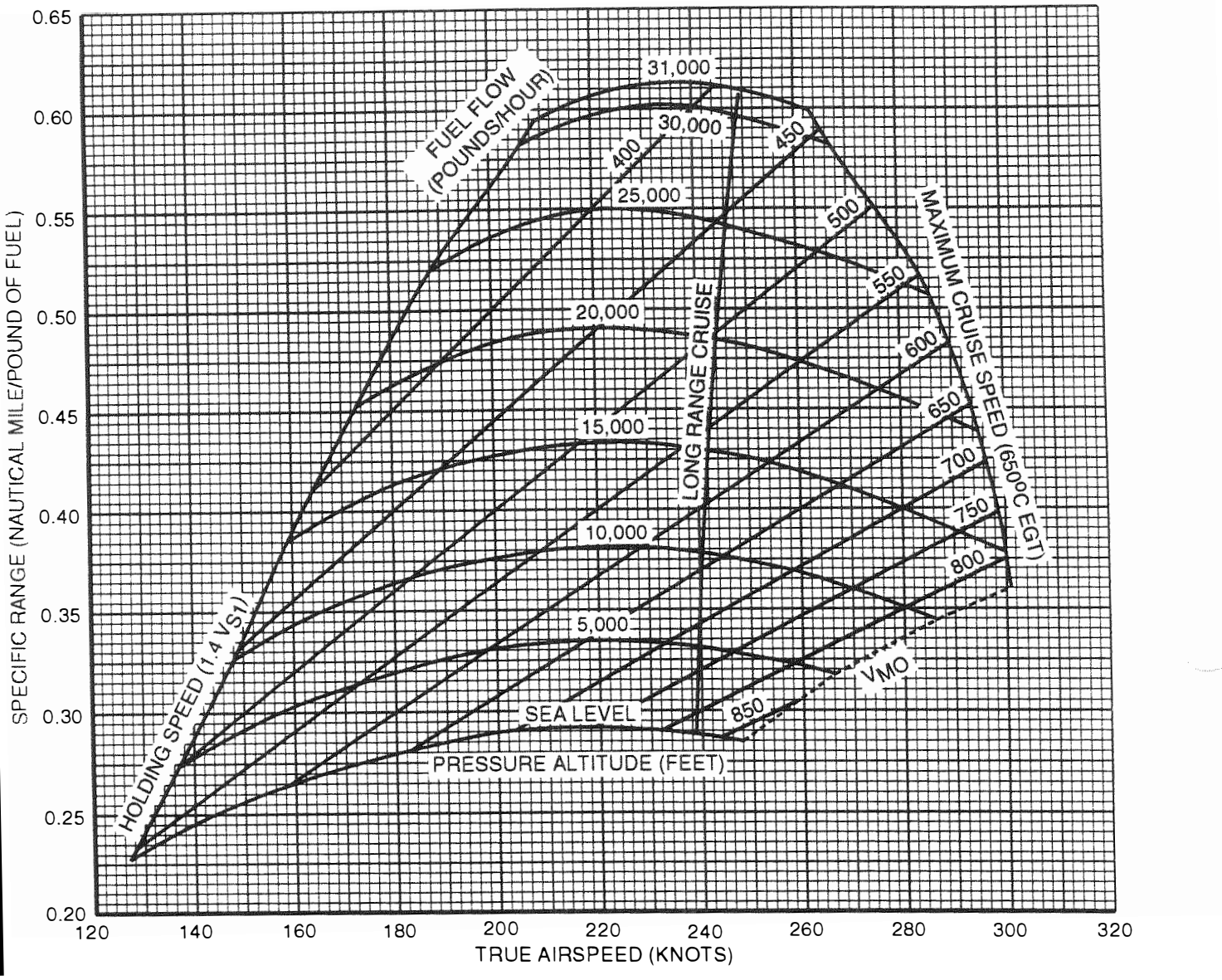


FIGURE 6A-8

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
12,000 POUNDS, ISA +15^{0}C, 97% RPM

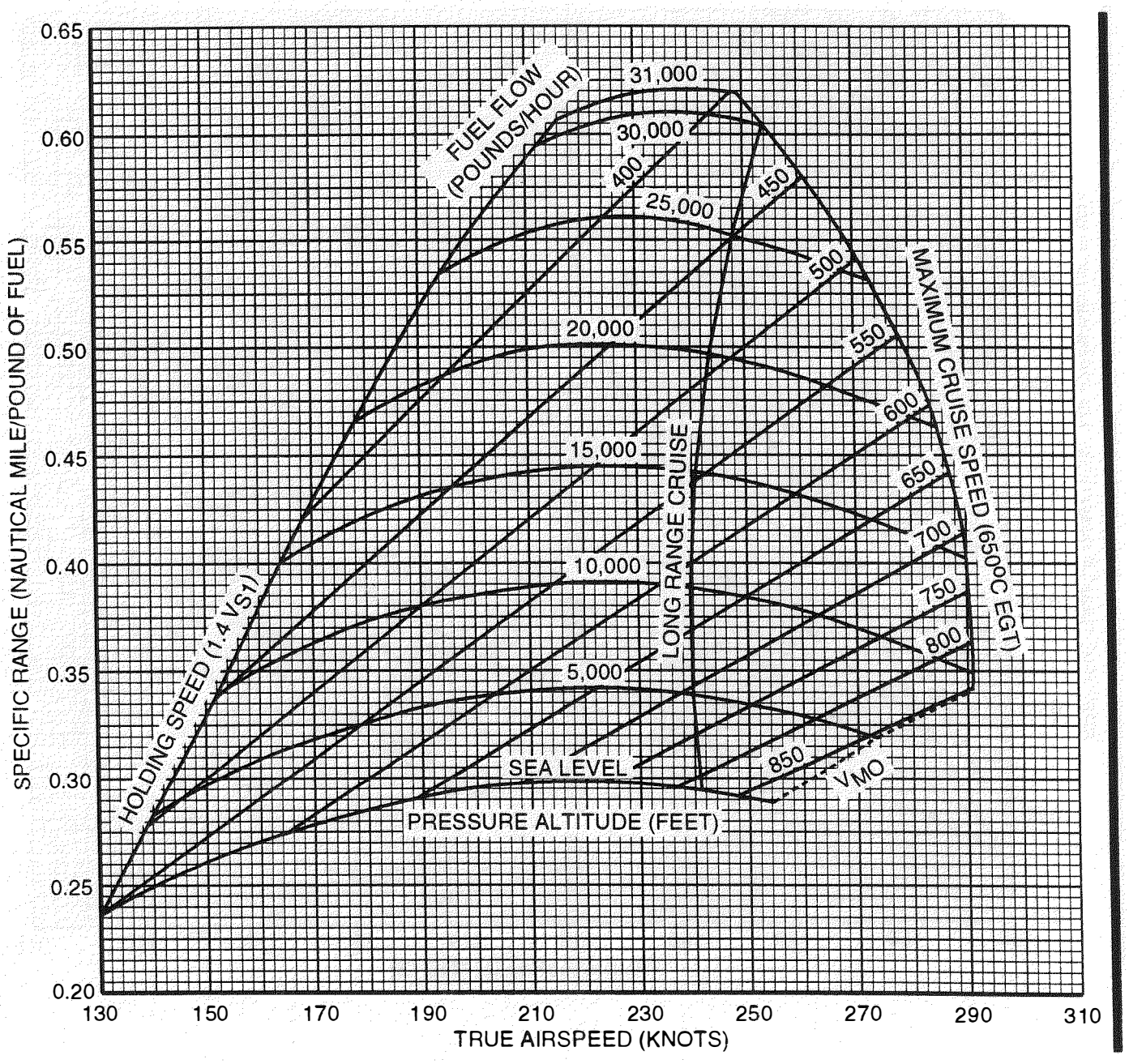


FIGURE 6A-9

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
13,000 POUNDS, ISA, 97% RPM

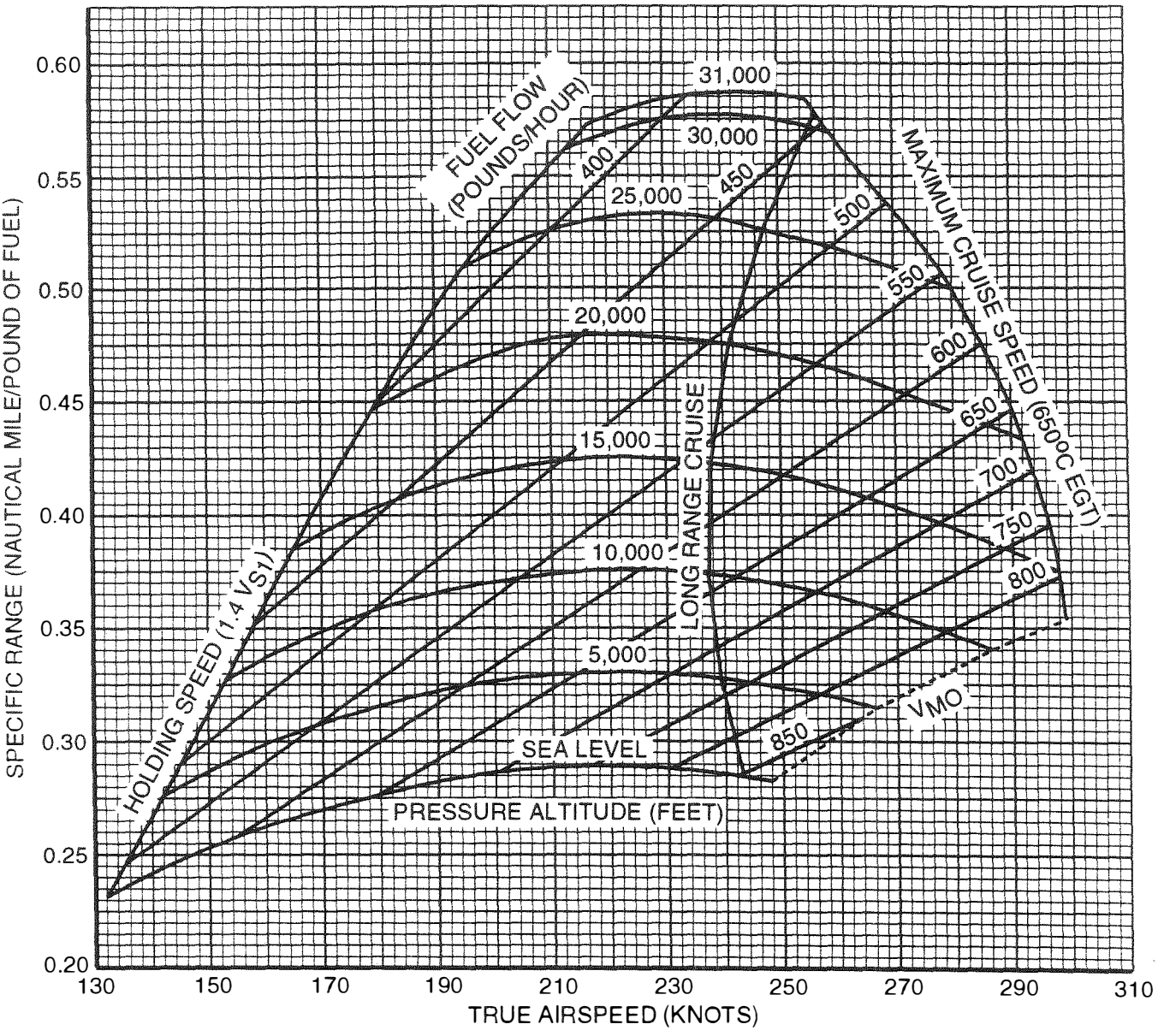


FIGURE 6A-10

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
13,000 POUNDS, ISA +15°C, 97% RPM

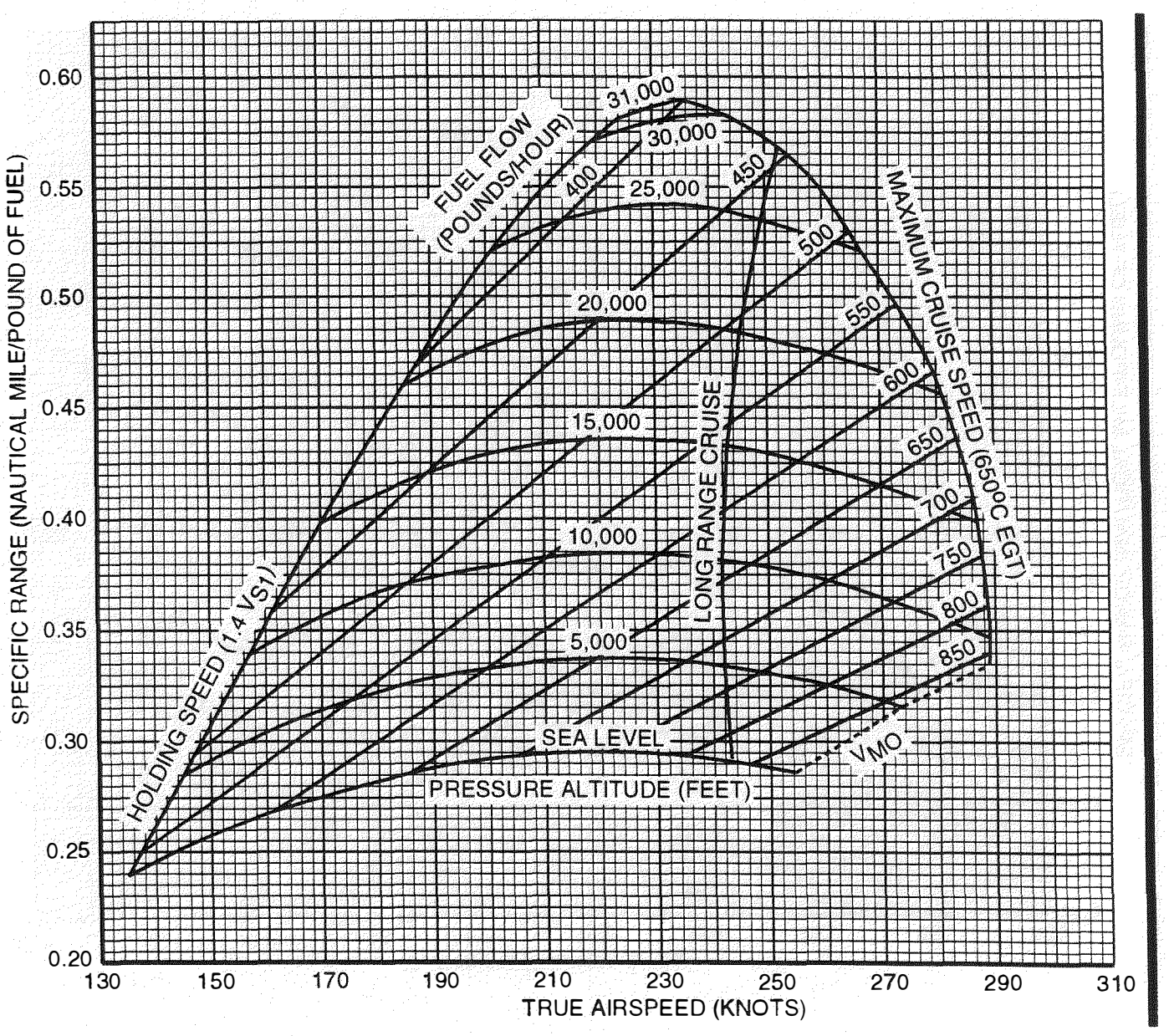


FIGURE 6A-11

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
14,000 POUNDS, ISA, 97% RPM

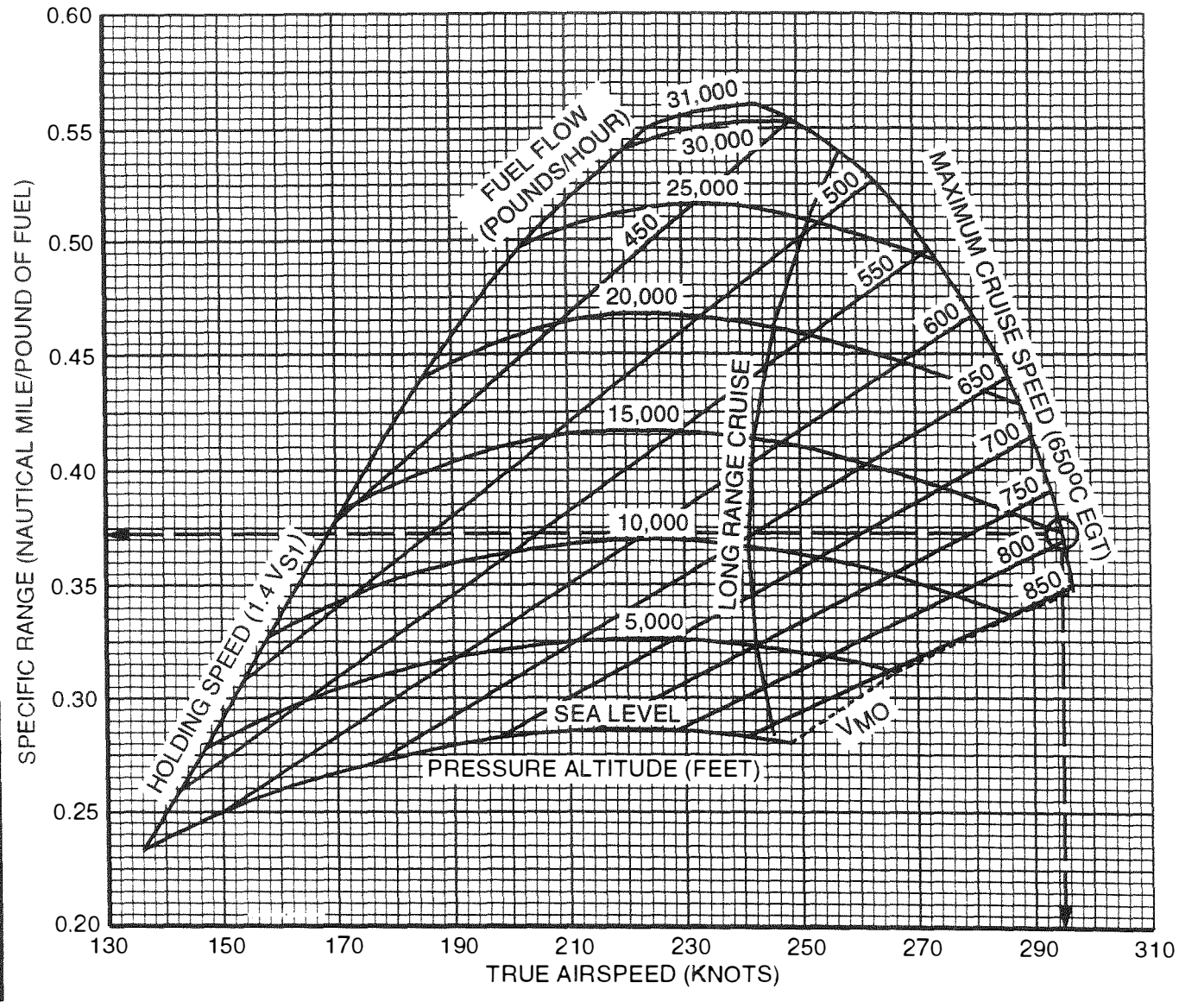


FIGURE 6A-12

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
14,000 POUNDS, ISA +15°C, 97% RPM

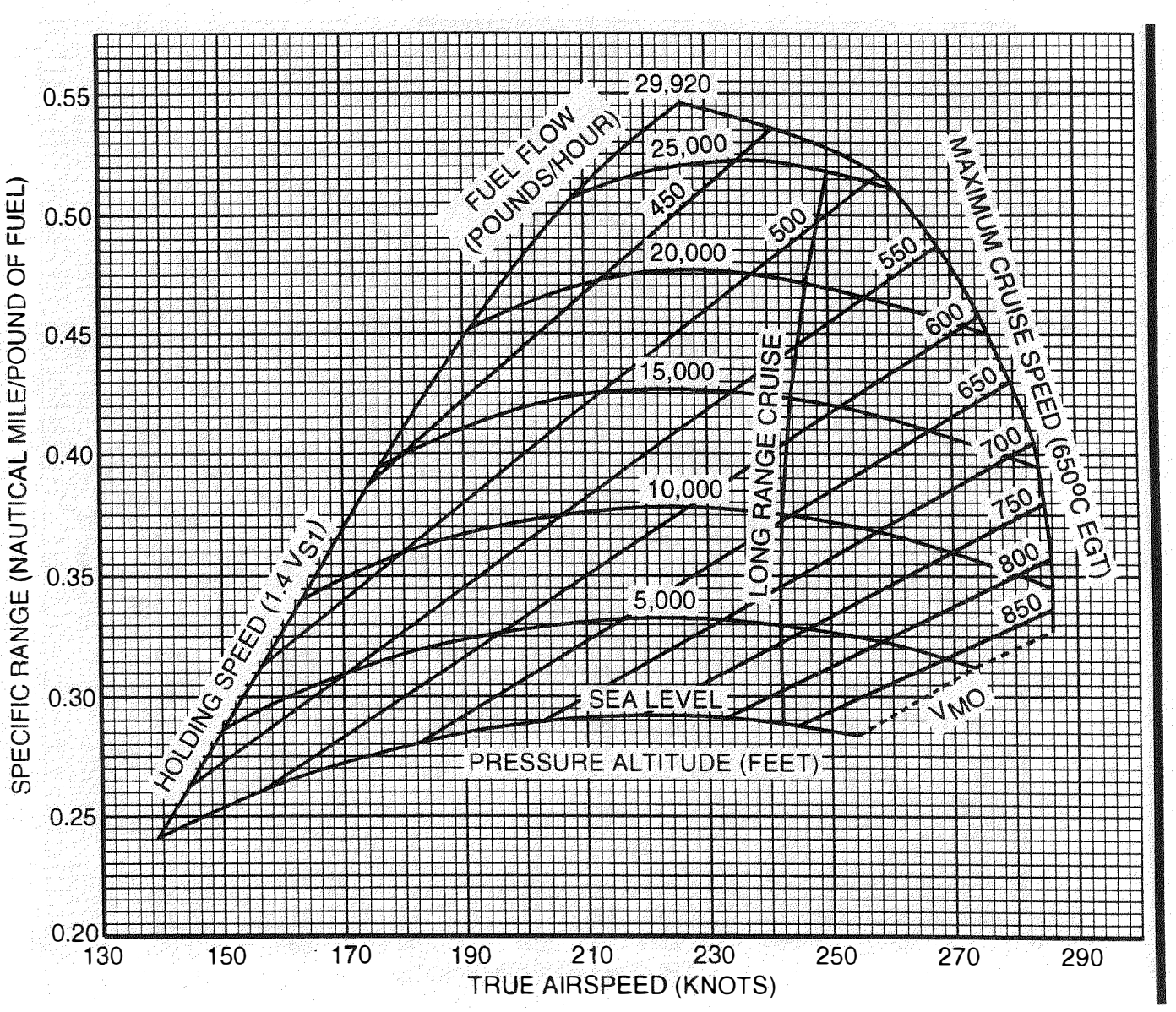


FIGURE 6A-13

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
15,000 POUNDS, ISA, 97% RPM

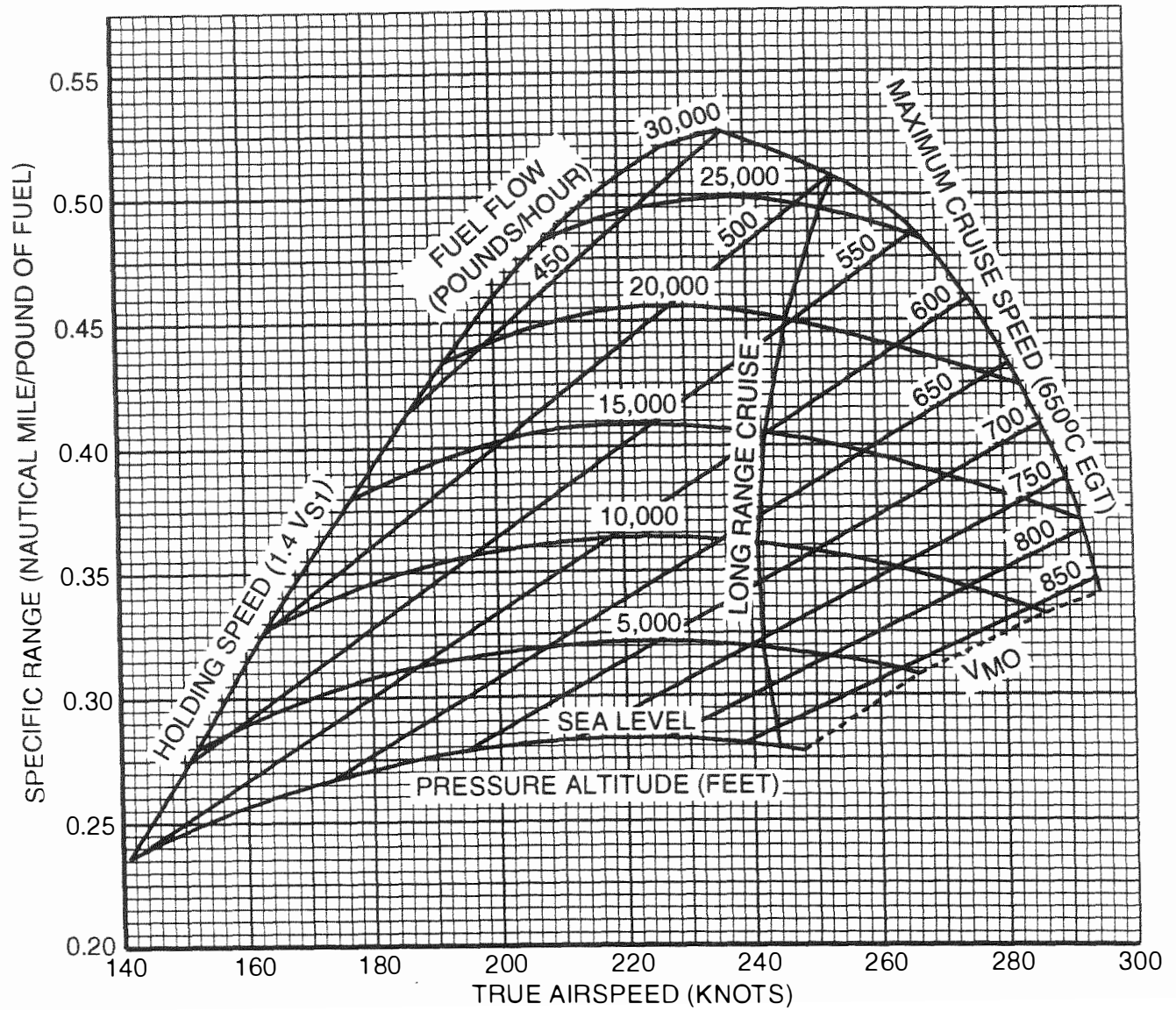


FIGURE 6A-14

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
15,000 POUNDS, ISA +15°C, 97% RPM

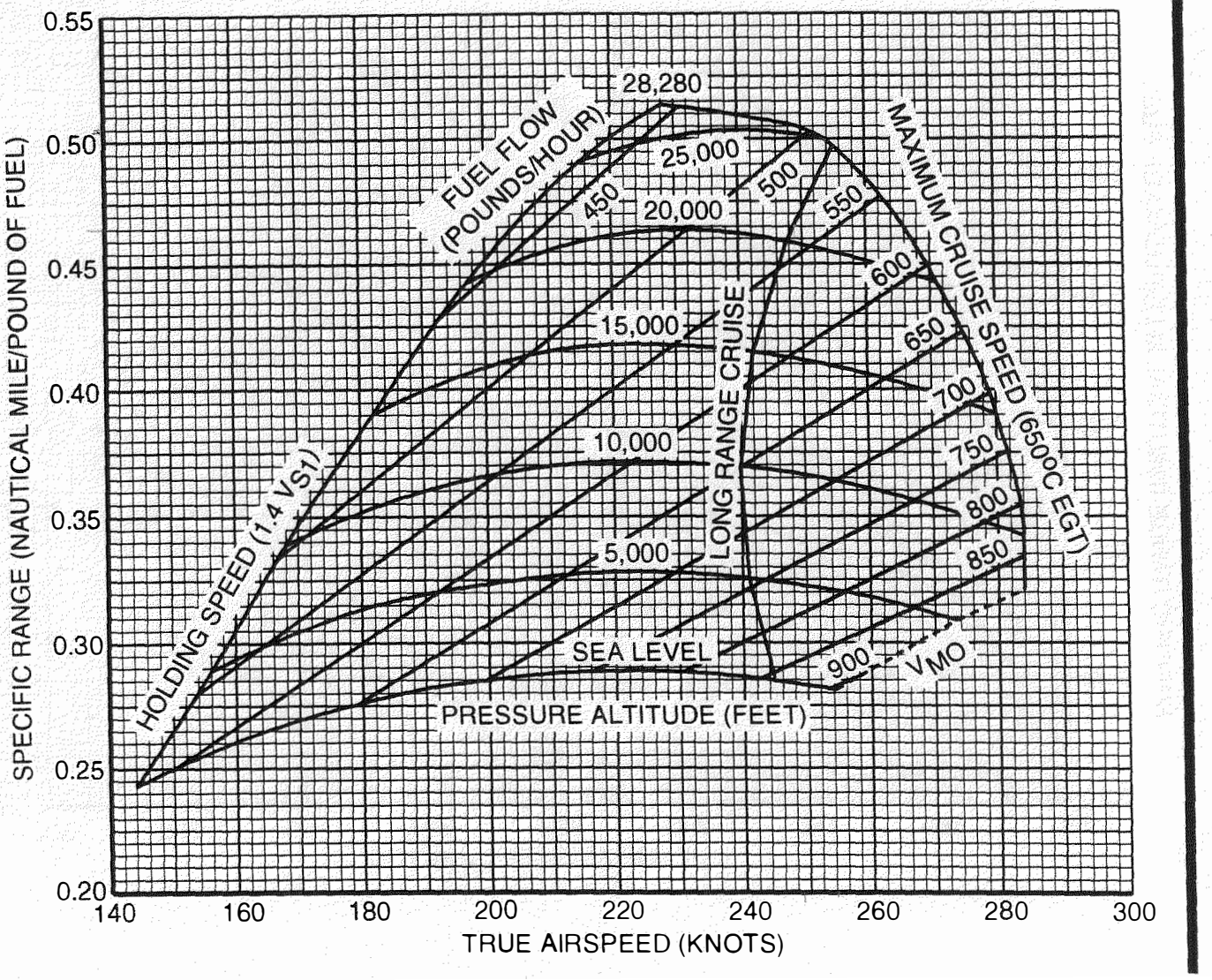


FIGURE 6A-15

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
16,000 POUNDS, ISA, 97% RPM

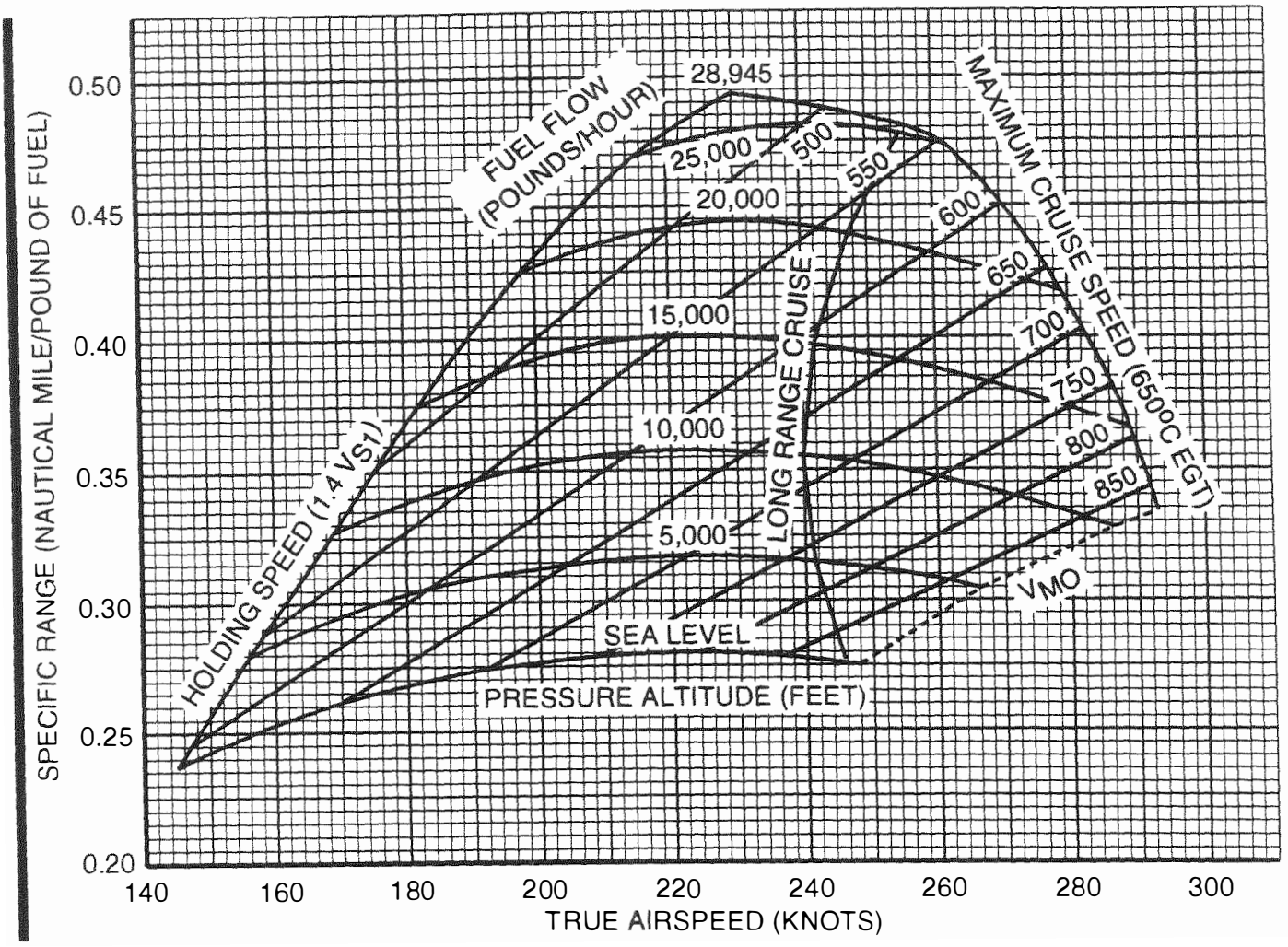


FIGURE 6A-16

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
16,000 POUNDS, ISA +15°C, 97% RPM

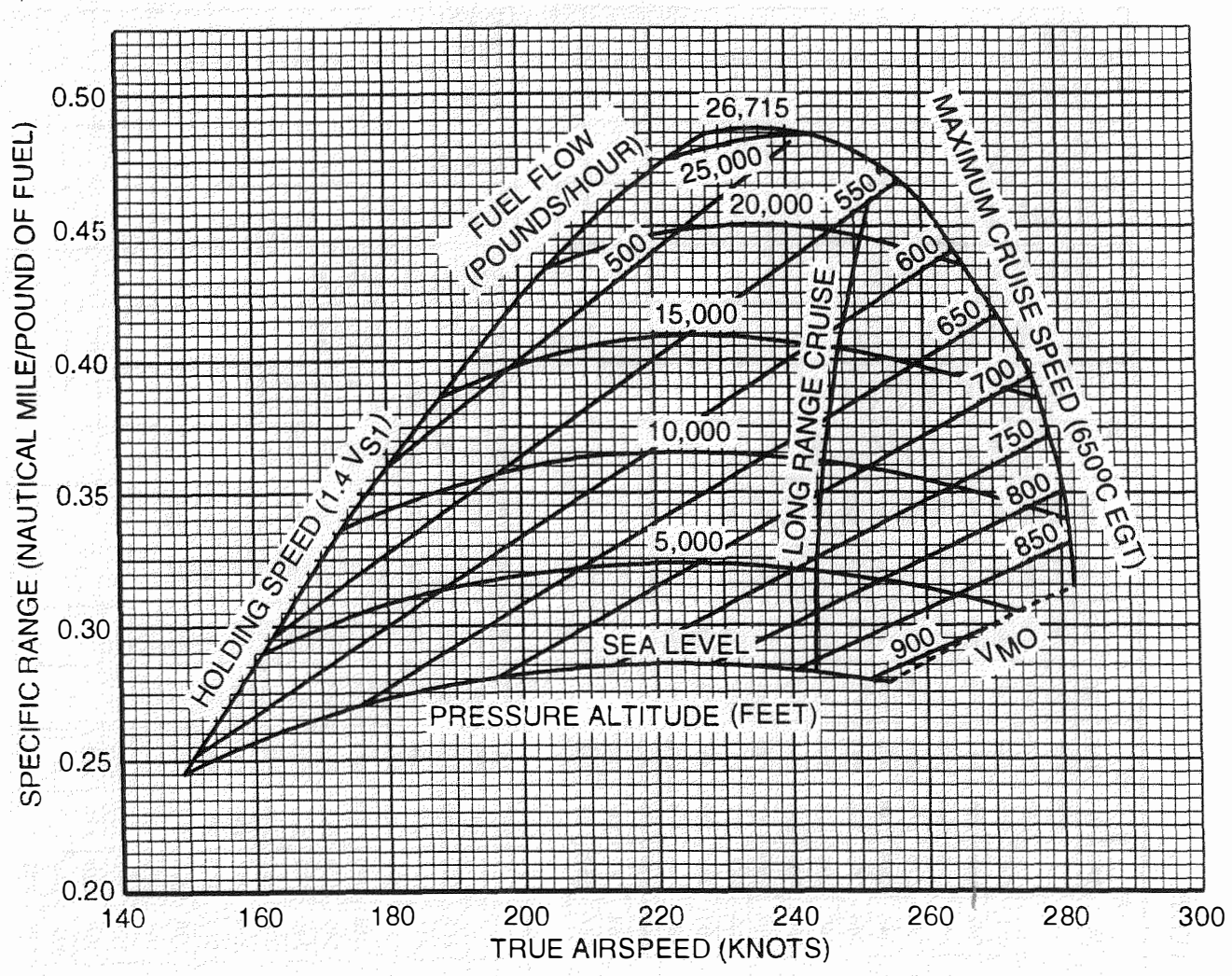


FIGURE 6A-17

CRUISE SPEEDS AT MAXIMUM CRUISE POWER – KNOTS

10,000 AND 12,000 POUNDS

97% RPM, EGT = 650°C, BLEED AIR LOW

10,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS
SEA LEVEL									246	237	246	241	246	246	246	250	246	254	246	259	246	263
2,000									246	245	246	250	246	255	246	259	246	263	246	268	244	270
4,000							246	249	246	254	246	259	246	264	246	268	246	273	246	277		
6,000							246	259	246	264	246	269	246	273	246	278	246	283	235	274		
8,000					246	263	246	268	246	273	246	279	246	284	246	288	235	280				
10,000					246	273	246	278	246	284	246	289	246	294	235	286	224	278				
12,000					246	283	246	289	246	294	246	300	235	292	224	283	213	274				
14,000			246	288	246	294	246	300	244	303	235	297	224	289	213	280						
16,000			246	299	246	305	242	306	233	300	223	294	213	285	202	276						
18,000	245	303	245	309	239	308	230	303	221	297	212	290	201	282								
20,000	236	303	236	309	227	304	218	299	209	293	200	286	190	276								
22,000	226	303	223	306	215	300	206	294	197	288	188	280	178	270								
24,000	217	303	211	301	202	295	193	289	184	281	175	273										
26,000	207	302	198	295	189	289	180	281	171	273	162	264										
28,000	193	294	184	287	175	280	167	272	158	263												
30,000	179	286	170	278	162	270	153	262	145	252												
31,000	172	281	163	273	155	265	147	256	138	246												

12,000 POUNDS

SEA LEVEL									246	237	246	241	246	246	246	250	246	254	246	259	246	263
2,000									246	245	246	250	246	255	246	259	246	263	246	268	241	267
4,000							246	249	246	254	246	259	246	264	246	268	246	273	243	274		
6,000							246	259	246	264	246	269	246	273	246	278	243	280	232	271		
8,000					246	263	246	268	246	273	246	279	246	284	243	285	232	277				
10,000					246	273	246	278	246	284	246	289	244	291	232	282	221	273				
12,000					246	283	246	289	246	294	243	296	232	288	220	278	209	269				
14,000			246	288	246	294	246	300	241	299	231	292	220	284	208	274						
16,000			246	299	246	305	238	302	229	295	219	288	208	279	197	269						
18,000	245	303	245	309	236	304	226	297	216	291	207	284	196	274								
20,000	236	303	232	305	222	299	213	292	204	285	194	277	183	267								
22,000	226	303	219	299	209	293	200	286	190	279	181	270	170	259								
24,000	215	300	205	293	196	286	186	279	177	270	167	261										
26,000	201	293	191	285	181	277	172	269	163	260	154	250										
28,000	185	283	176	275	167	267	158	258	149	248												
30,000	170	272	161	263	152	255	142	243	132	230												
31,000	163	266	154	258	144	247	135	236														

FIGURE 6A-18

MANUFACTURER'S DATA
ISSUED: DEC 31/91
Revised: NOV 12/96

CRUISE SPEEDS AT MAXIMUM CRUISE POWER – KNOTS

13,000 AND 14,000 POUNDS

97% RPM, EGT = 650°C, BLEED AIR LOW

13,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS
SEA LEVEL									246	237	246	241	246	246	246	250	246	254	246	259	246	263
2,000									246	245	246	250	246	255	246	259	246	263	246	268	240	265
4,000							246	249	246	254	246	259	246	264	246	268	246	273	241	272		
6,000							246	259	246	264	246	269	246	273	246	278	242	278	230	268		
8,000					246	263	246	268	246	273	246	279	246	284	241	283	230	274				
10,000					246	273	246	278	246	284	246	289	242	289	230	280	218	270				
12,000					246	283	246	289	246	294	241	294	230	285	218	275	206	265				
14,000			246	288	246	294	246	300	239	297	229	290	218	281	206	270						
16,000			246	299	246	305	236	299	226	293	216	285	205	276	193	265						
18,000	245	303	243	307	233	301	223	294	213	287	204	280	193	270								
20,000	236	303	230	302	220	295	210	288	200	281	190	272	179	262								
22,000	225	302	216	296	206	289	196	281	187	273	177	265	166	253								
24,000	211	295	201	288	192	281	182	273	173	264	163	254										
26,000	197	287	187	279	177	271	168	263	158	253	148	241										
28,000	181	276	172	269	162	259	153	250	141	236												
30,000	165	265	156	256	146	244	134	229														
31,000	158	259	148	248	136	234																

14,000 POUNDS

SEA LEVEL									246	237	246	241	246	246	246	250	246	254	246	259	246	263
2,000									246	245	246	250	246	255	246	259	246	263	246	268	238	263
4,000							246	249	246	254	246	259	246	264	246	268	246	273	239	270		
6,000							246	259	246	264	246	269	246	273	246	278	240	276	228	266		
8,000					246	263	246	268	246	273	246	279	246	284	240	281	228	272				
10,000					246	273	246	278	246	284	246	289	240	287	228	277	216	267				
12,000					246	283	246	289	246	294	239	292	228	282	215	272	203	262				
14,000			246	288	246	294	246	300	237	294	226	287	215	278	203	267						
16,000			246	299	244	302	234	296	224	289	214	282	202	272	190	260						
18,000	245	303	241	304	231	298	221	291	210	283	200	275	189	265								
20,000	236	303	227	298	217	291	207	284	197	276	187	268	176	257								
22,000	223	298	212	291	203	284	193	276	183	268	173	259	162	247								
24,000	208	291	198	283	188	275	178	267	169	258	158	247										
26,000	193	282	183	273	173	265	163	256	153	245	139	227										
28,000	177	270	167	262	157	252	146	239														
30,000	160	257	150	246																		
31,000	152	249	138	232																		

FIGURE 6A-19

MANUFACTURER'S DATA

MANUFACTURER'S DATA
ISSUED: DEC 31/91
Revised: NOV 12/96

CRUISE SPEEDS AT MAXIMUM CRUISE POWER – KNOTS

15,000 AND 16,000 POUNDS

97% RPM, EGT = 650°C, BLEED AIR LOW

15,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS	IAS	TAS
SEA LEVEL									246	237	246	241	246	246	246	250	246	254	246	259	246	263
2,000									246	245	246	250	246	255	246	259	246	263	246	268	236	261
4,000							246	249	246	254	246	259	246	264	246	268	246	273	237	267		
6,000							246	259	246	264	246	269	246	273	246	278	238	273	225	263		
8,000					246	263	246	268	246	273	246	279	246	284	238	278	226	269				
10,000					246	273	246	278	246	284	246	289	238	284	225	274	213	264				
12,000					246	283	246	289	246	294	237	289	225	279	212	269	200	258				
14,000			246	288	246	294	245	298	234	291	224	284	212	274	199	263						
16,000			246	299	242	300	231	293	221	286	211	278	199	267	187	256						
18,000	245	303	238	301	228	294	218	287	207	279	197	271	186	260								
20,000	235	301	224	294	214	287	203	280	193	271	183	262	172	251								
22,000	219	294	209	287	199	279	189	271	179	262	169	253	157	239								
24,000	204	286	194	278	184	270	174	261	164	251	153	238										
26,000	188	276	178	267	168	258	158	247	145	232												
28,000	172	263	161	253	150	242																
30,000	154	247																				
31,000																						

16,000 POUNDS

SEA LEVEL									246	237	246	241	246	246	246	250	246	254	246	259	246	262
2,000									246	245	246	250	246	255	246	259	246	263	246	268	234	258
4,000							246	249	246	254	246	259	246	264	246	268	246	273	235	265		
6,000							246	259	246	264	246	269	246	273	246	278	236	271	223	260		
8,000					246	263	246	268	246	273	246	279	246	284	235	276	223	266				
10,000					246	273	246	278	246	284	246	289	236	281	223	271	210	260				
12,000					246	283	246	289	246	294	235	286	222	276	209	265	197	254				
14,000			246	288	246	294	243	295	232	288	221	280	209	270	196	258						
16,000			246	299	239	297	229	290	218	282	207	273	196	263	183	251						
18,000	245	303	236	297	225	290	214	283	203	274	193	266	182	255								
20,000	231	297	220	290	210	283	200	275	190	266	179	257	167	245								
22,000	216	289	205	282	195	274	185	266	175	256	164	245	150	229								
24,000	200	280	190	272	180	264	169	254	158	242	141	220										
26,000	184	270	174	261	162	249	151	237														
28,000	166	255	155	243																		
30,000																						
31,000																						

FIGURE 6A-20

MANUFACTURER'S DATA
ISSUED: DEC 31/91
Revised: NOV 12/96

TIME, DISTANCE, AND FUEL TO DESCEND
1000 FPM DESCENT RATE

ASSOCIATED CONDITIONS:

POWER	AS REQUIRED
RPM	97%
GEN LOAD	200 AMPS
BLEED AIR	ON OR OFF
ENG ANTI-ICE	ON OR OFF
SPEED	SEE SPEED SCHEDULE
GEAR	UP
FLAPS	UP
WIND	CALM

EXAMPLE:

GIVEN: AMBIENT TEMPERATURE = ISA +10°C
GROSS WEIGHT = 14,000 POUNDS
BEGIN DESCENT AT 28,000 FEET
END DESCENT AT 5,000 FEET

OBTAIN: TIME = (28 –5) = 23 MINUTES
DISTANCE = (119 –18) = 101 NAUTICAL MILES
FUEL = (225 –45) = 180 POUNDS

DESCENT SPEED SCHEDULE	
ALTITUDE (FT)	KIAS
30,000	190
28,000	200
↓	↓
S.L.	200

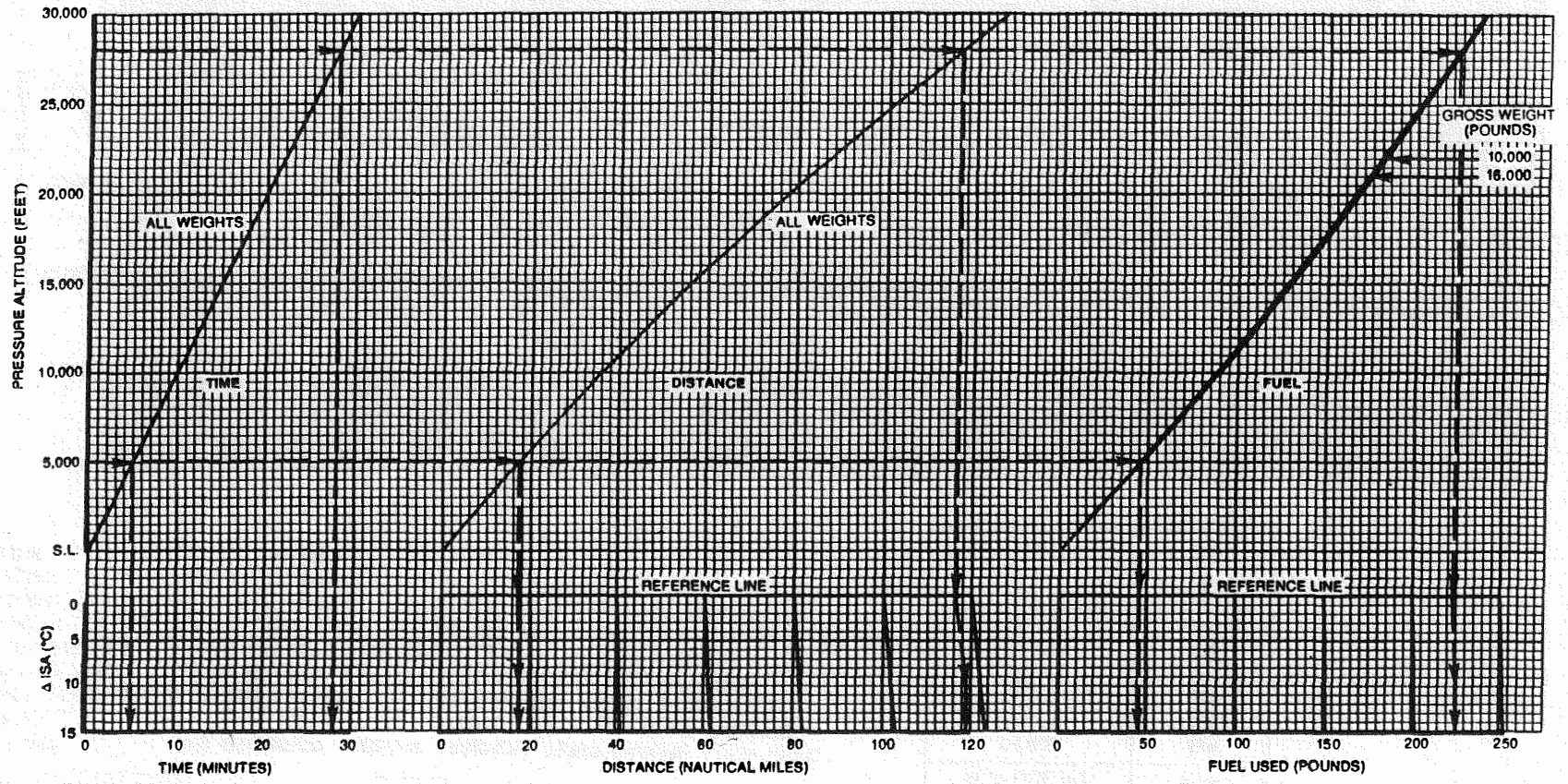


FIGURE 6A-21

TIME, DISTANCE, AND FUEL TO DESCEND
2500 FPM DESCENT RATE

ASSOCIATED CONDITIONS:

POWER ..... AS REQUIRED
RPM 97%
GEN LOAD ..... 200 AMPS
BLEED AIR ..... ON OR OFF
ENG ANTI-ICE ..... ON OR OFF
SPEED ..... V_{MO} SCHEDULE
GEAR ..... UP
FLAPS ..... UP
WIND ..... CALM

EXAMPLE:

GIVEN: AMBIENT TEMPERATURE = ISA +10°C
GROSS WEIGHT = 14,000 POUNDS
BEGIN DESCENT AT 28,000 FEET
END DESCENT AT 5,000 FEET
OBTAIN: TIME = (11 –2) = 9 MINUTES
DISTANCE = (56 –9) = 47 NAUTICAL MILES
FUEL = (80 –17) = 63 POUNDS

V_{MO}/M_{MO} SPEED SCHEDULE

ALTITUDE (FT)	KIAS
31,000	186
29,000	194
26,000	208
23,000	221
20,000	235
17,800	246
↓	↓
S.L.	246

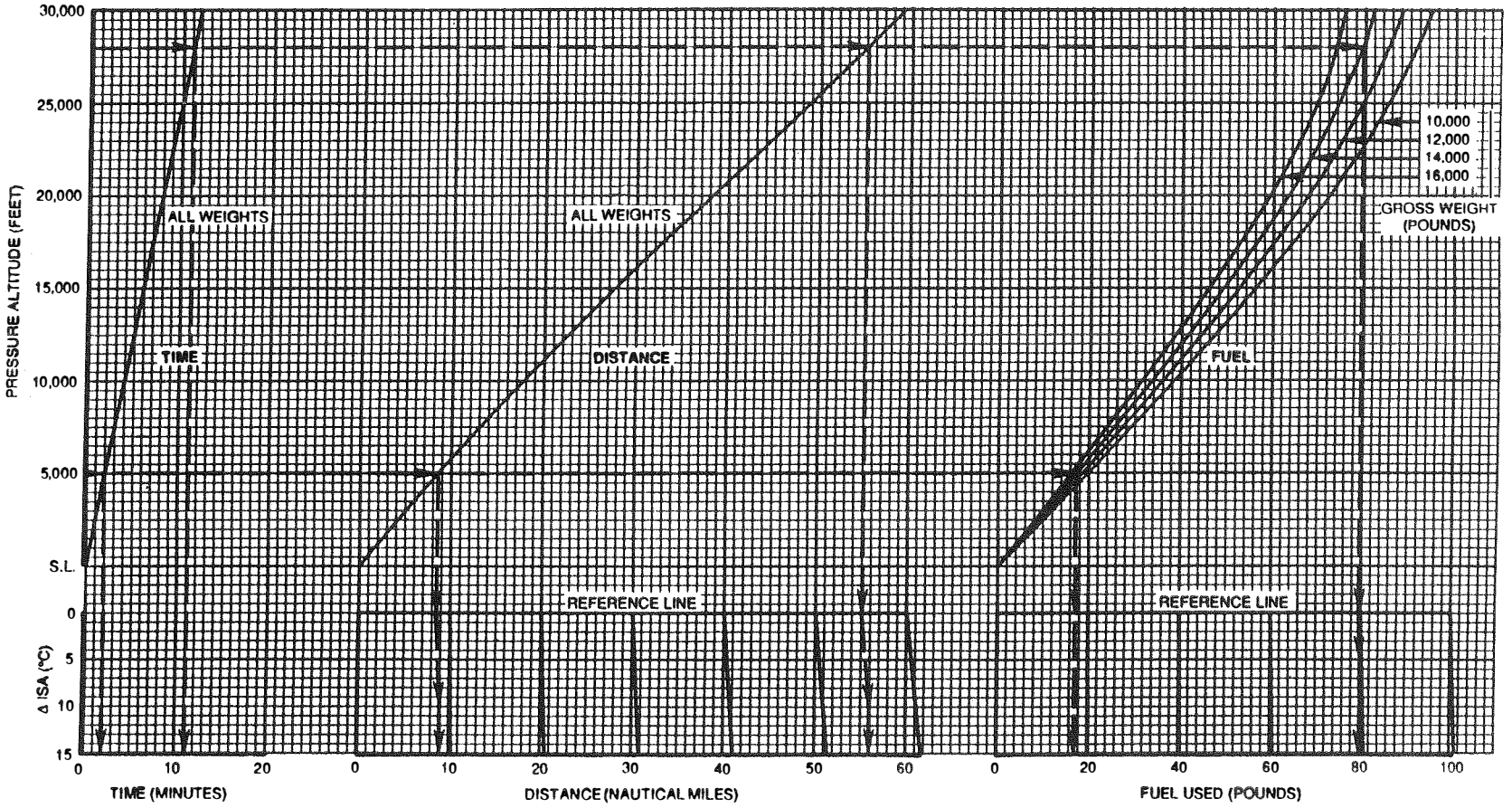


FIGURE 6A-22
MANUFACTURER'S DATA

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RANGE PROFILE

Associated Conditions:

Engine Power and Atmospheric Conditions	As Noted on Chart
Maximum Cruise	97% RPM and 650° EGT
Long Range Cruise	97% RPM, Power for 99% Best Range
Fuel Flow	Figure 6A-6 Through Figure 6A-17
Generator Load	200 AMPS
Bleed Air	LOW
Engine Anti-Ice	OFF
Flaps	UP
Gear	UP
Takeoff Gross Weight at Brake Release	16,500 Pounds
Wind	Calm

RANGE PROFILE (continued)

NOTE

Range Includes:

- 150 pound fuel allowance for start engines, taxi, takeoff and acceleration to climb speed.
- V_Y climb at MCP, sea level to cruise altitude.
- 2,500 feet per minute descent to 10,000 feet.
- Reserve fuel for 45 minutes at normal cruise speed at the lesser of 10,000 feet or cruise altitude (Figure 6A-6 through 6A-17).
- 2,500 feet per minute descent to sea level (Figure 6A-22).
- 50 pound fuel allowance for approach and landing.

Example:

Given: Usable Fuel = 3,000 pounds
Takeoff Gross Weight = 16,500 pounds
Ambient Temperature = ISA +15^{O}C
Cruise Altitude = 15,000 feet
Cruise Power = Long Range Cruise

Obtain: Range = 987 Nautical Miles (Figure 6A-26)

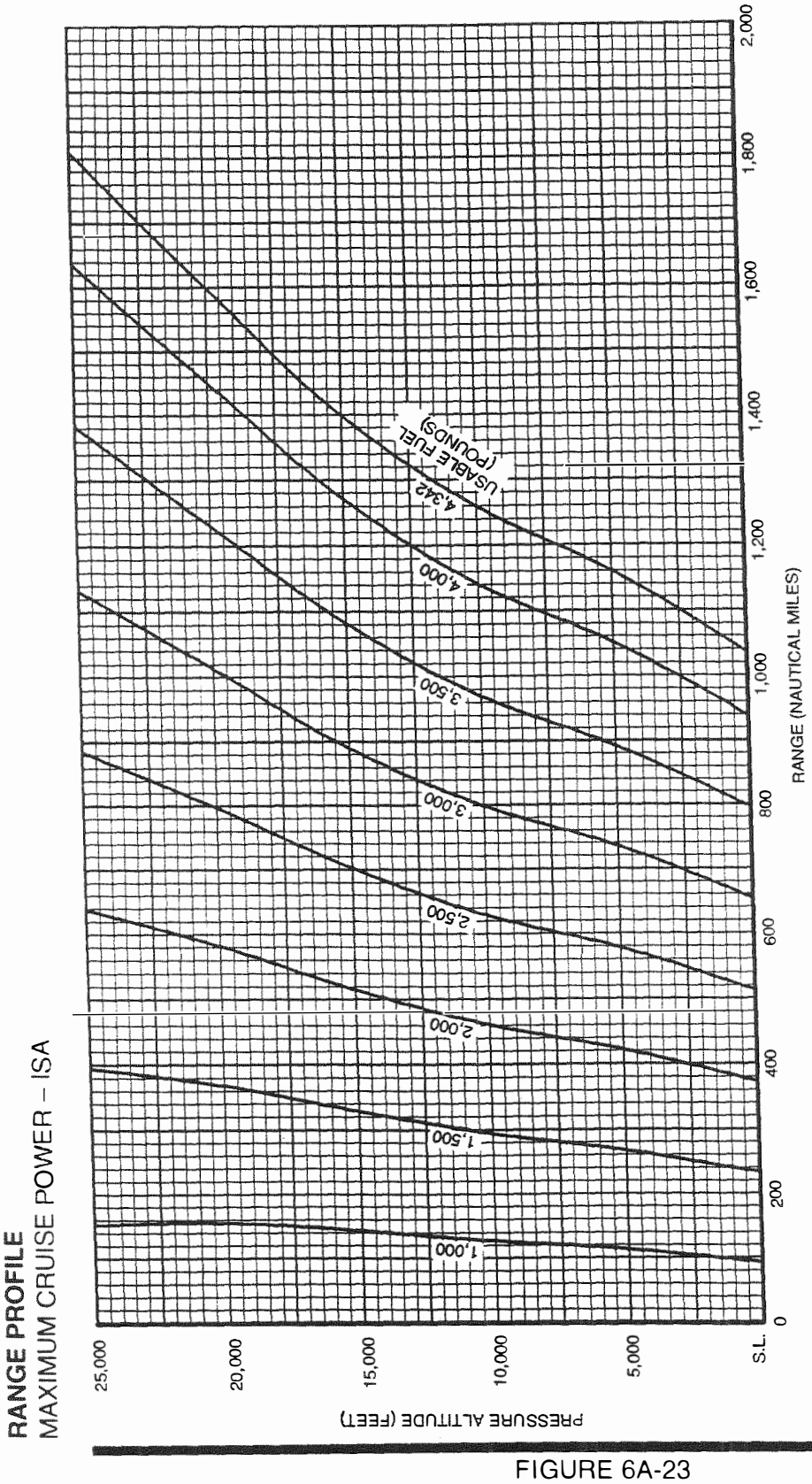

RANGE PROFILE
MAXIMUM CRUISE POWER – ISA
PRESSURE ALTITUDE (FEET)
25,000
20,000
15,000
10,000
5,000
S.L.
RANGE (NAUTICAL MILES)
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
USABLE FUEL (POUNDS)
4,342
4,000
3,500
3,000
2,500
2,000
1,500
1,000

FIGURE 6A-23

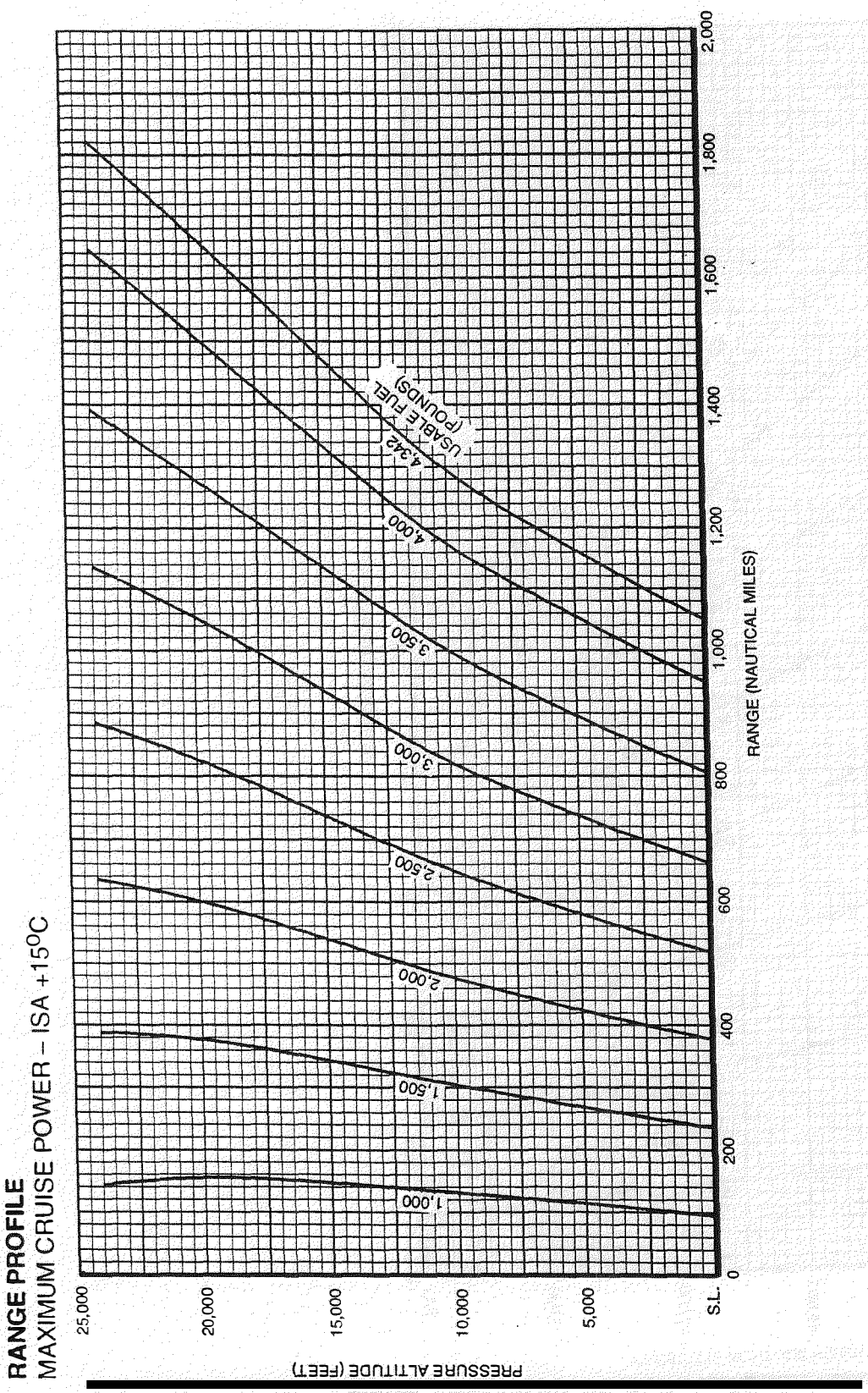

RANGE PROFILE
MAXIMUM CRUISE POWER – ISA +15°C
USABLE FUEL (POUNDS)
4,342
4,000
3,500
3,000
2,500
2,000
1,500
1,000
RANGE (NAUTICAL MILES)
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
PRESSURE ALTITUDE (FEET)
25,000
20,000
15,000
10,000
5,000
S.L.

FIGURE 6A-24

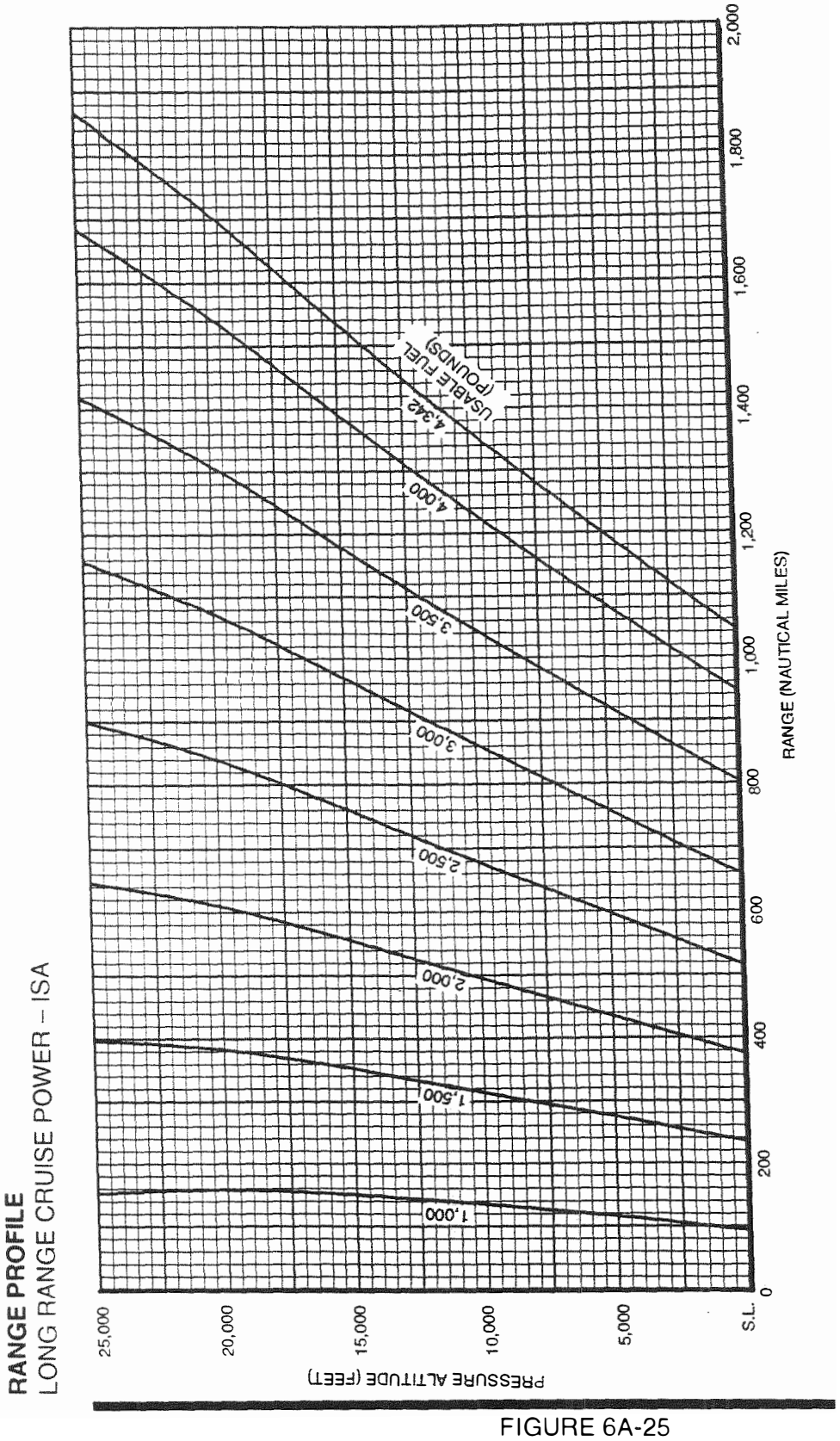

RANGE PROFILE
LONG RANGE CRUISE POWER – ISA
USABLE FUEL (POUNDS)
4,342
4,000
3,500
3,000
2,500
2,000
1,500
1,000
RANGE (NAUTICAL MILES)
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
PRESSURE ALTITUDE (FEET)
25,000
20,000
15,000
10,000
5,000
S.L.

FIGURE 6A-25

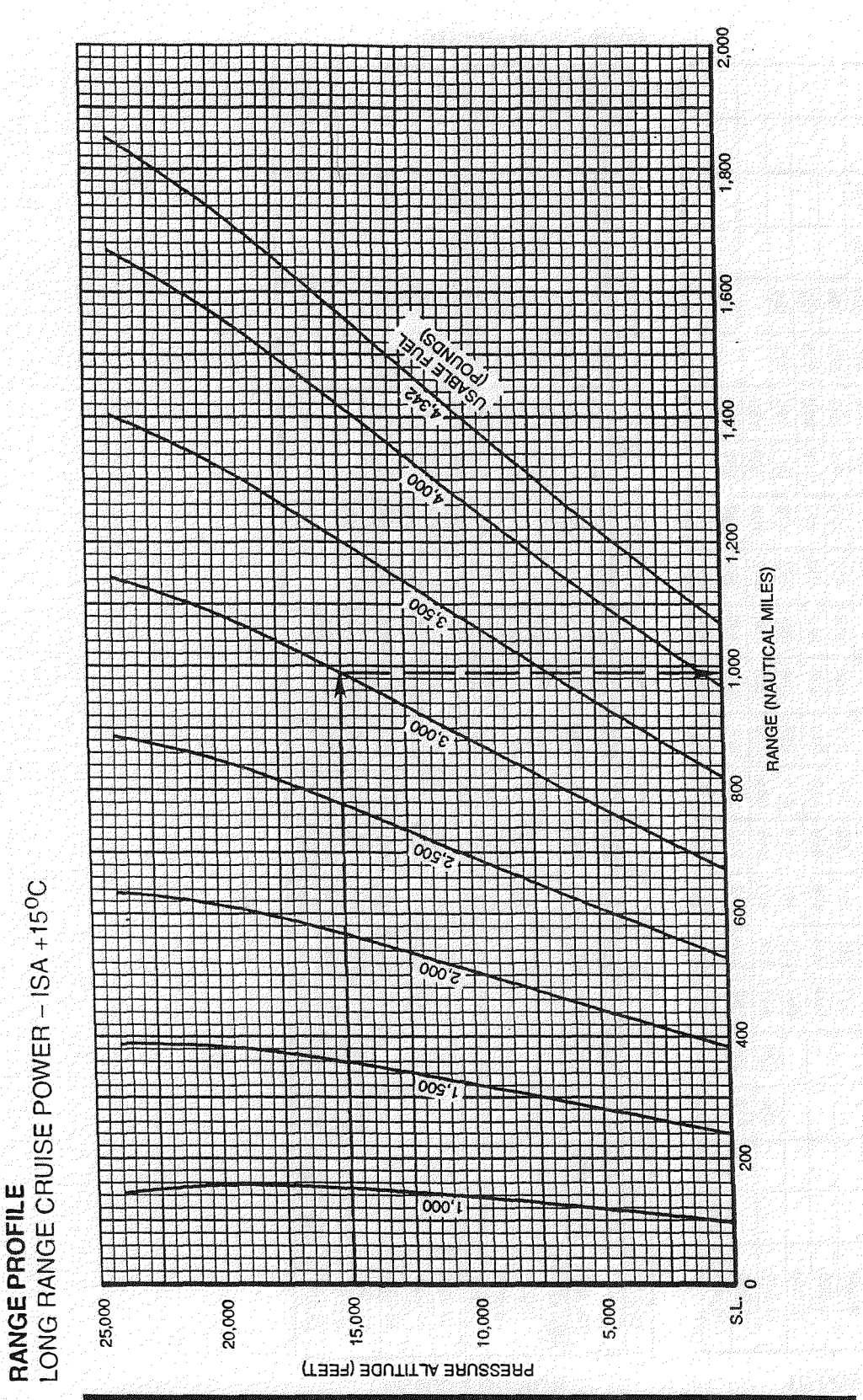

RANGE PROFILE
LONG RANGE CRUISE POWER – ISA +15°C
USABLE FUEL (POUNDS)
4,342
4,000
3,500
3,000
2,500
2,000
1,500
1,000
RANGE (NAUTICAL MILES)
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
PRESSURE ALTITUDE (FEET)
S.L.
5,000
10,000
15,000
20,000
25,000

FIGURE 6A-26

SINGLE ENGINE FUEL FLOW AND CRUISE SPEEDS AT MAXIMUM CRUISE POWER

10,000 AND 12,000 POUNDS

97% RPM, EGT = 650°C, GEN LOAD = 200 AMPS, BLEED AIR LOW

10,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS
SEA LEVEL									556	210	562	212	571	215	558	213	523	207	491	201	460	193
2,000							460	193	557	215	563	217	553	217	517	211	485	205	455	198		
4,000							552	218	558	220	543	219	512	215	479	209	449	203	421	196		
6,000							553	223	532	221	503	217	473	213	443	206	415	200	389	192		
8,000					545	225	519	223	491	219	464	215	438	210	409	203	383	196				
10,000					504	223	478	220	453	217	428	212	403	207	378	200	353	192				
12,000					464	221	441	218	417	214	394	209	372	203	347	195	325	186				
14,000			450	221	427	218	405	215	384	210	362	205	342	199	320	189						
16,000			413	218	392	215	372	210	352	205	332	199	313	192	293	180						
18,000	398	217	378	214	359	210	340	205	322	199	304	192	287	183								

12,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS
SEA LEVEL									557	207	563	210	571	212	558	209	523	203	490	196	459	188
2,000							459	188	558	212	563	214	552	213	516	207	484	200	454	193		
4,000							553	215	558	217	543	216	511	211	479	204	448	197	420	189		
6,000							554	220	531	217	502	213	473	208	442	200	414	192	388	183		
8,000					545	222	518	218	490	214	463	210	437	204	408	196	382	187				
10,000					503	219	477	215	452	211	427	206	402	199	377	190	352	179				
12,000					463	216	439	211	416	206	392	200	370	193	346	181	323	165				
14,000			448	215	425	211	403	206	382	200	361	193	340	183								
16,000			411	210	390	206	370	200	350	192	330	182										
18,000	396	209	375	204	356	198	338	190														

FIGURE 6A-27

MANUFACTURER'S DATA
ISSUED: DEC 31/91
Revised: MAY 02/95

SINGLE ENGINE FUEL FLOW AND CRUISE SPEEDS AT MAXIMUM CRUISE POWER

13,000 AND 14,000 POUNDS

97% RPM, EGT = 650°C, GEN LOAD = 200 AMPS, BLEED AIR LOW

13,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									557	206	563	208	571	210	557	207	522	201	490	193	458	184
2,000							458	184	558	211	563	213	552	211	516	204	484	197	454	189		
4,000							553	213	559	215	542	214	511	208	478	201	448	193	420	184		
6,000							554	218	530	215	501	210	472	205	442	197	414	188	388	177		
8,000					545	220	517	216	489	211	462	206	436	200	408	191	381	180				
10,000					502	216	476	212	451	207	426	201	402	194	376	183	351	167				
12,000					462	212	438	207	415	201	392	194	370	185								
14,000			447	211	424	207	402	201	381	193	359	184										
16,000			410	205	388	199	368	191														
18,000	395	203	374	196																		

14,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS TS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									557	204	563	206	572	208	557	205	522	198	489	190	458	180
2,000							458	180	558	209	564	211	552	209	515	202	483	194	453	185		
4,000							553	211	559	213	542	211	511	205	478	198	447	189	419	178		
6,000							554	216	529	212	500	207	471	201	441	192	413	181	387	167		
8,000					544	217	516	213	489	208	461	202	436	195	407	184	381	170				
10,000					501	213	476	208	450	203	425	196	401	187								
12,000					461	208	437	202	414	195	390	186										
14,000			446	207	423	201	401	194														
16,000			408	199	387	191																
18,000	393	195																				

FIGURE 6A-28

MANUFACTURER'S DATA

MANUFACTURER'S DATA
ISSUED: MAY 02/95

SINGLE ENGINE FUEL FLOW AND CRUISE SPEEDS AT MAXIMUM CRUISE POWER

15,000 AND 16,000 POUNDS

97% RPM, EGT = 650°C, GEN LOAD = 200 AMPS, BLEED AIR LOW

15,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									558	202	564	204	572	206	556	203	521	195	489	186	457	175
2,000							457	175	559	207	564	208	551	206	515	198	483	190	452	180		
4,000							554	209	559	211	541	208	510	202	477	193	446	183	418	170		
6,000							554	213	529	209	499	204	471	196	440	186	412	173				
8,000					543	214	515	210	488	204	461	197	435	189	406	175						
10,000					500	209	474	204	449	197	424	189										
12,000					460	203	436	196	412	187												
14,000			444	201	421	194																
16,000																						
18,000																						

16,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									558	200	564	202	573	204	556	200	521	191	488	181	457	168
2,000							457	168	559	204	565	206	550	203	514	195	482	185	452	173		
4,000							554	206	560	208	540	205	509	198	477	188	446	176				
6,000							554	211	528	206	498	199	470	191	440	178						
8,000					542	211	514	206	486	199	460	191	434	181								
10,000					499	205	473	199	448	190												
12,000					458	197																
14,000			443	194																		
16,000																						
18,000																						

FIGURE 6A-29

SINGLE ENGINE FUEL FLOW AND CRUISE SPEEDS AT MAXIMUM CONTINUOUS POWER

10,000 AND 12,000 POUNDS

100% RPM, EGT = 650°C, GEN LOAD = 200 AMPS, BLEED AIR LOW

10,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									564	210	569	213	574	215	583	217	572	215	541	210	512	203
2,000							512	203	564	215	570	218	576	220	559	218	530	213	501	207		
4,000							561	218	565	221	568	223	541	220	518	217	491	211	464	205		
6,000							561	224	553	224	526	221	502	218	479	214	454	209	429	202		
8,000					560	227	536	225	511	222	486	219	462	215	442	212	419	206				
10,000					519	225	495	223	471	220	448	216	427	213	408	208	387	202				
12,000					478	223	455	220	434	217	413	213	393	209	375	204	356	197				
14,000			462	223	440	220	419	217	399	213	379	209	361	204	345	199						
16,000			424	219	403	216	384	213	366	209	348	204	331	198	316	191						
18,000	409	218	388	215	369	212	352	208	335	203	318	197	302	189								

12,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									564	208	570	210	575	212	584	214	571	212	541	206	511	199
2,000							511	199	564	213	570	215	576	217	558	215	530	209	500	203		
4,000							561	215	565	218	568	219	540	216	517	212	490	206	463	199		
6,000							562	221	552	220	525	217	500	213	477	209	453	202	428	194		
8,000					560	223	535	221	510	218	485	214	460	209	441	205	418	198				
10,000					518	221	493	218	470	214	447	210	426	205	406	200	385	191				
12,000					477	217	454	214	432	210	411	205	391	199	373	192	354	181				
14,000			461	217	438	213	417	209	397	204	377	198	359	191	342	182						
16,000			422	212	401	207	382	202	363	196	345	188										
18,000	406	210	386	205	367	199	349	193														

FIGURE 6A-30

MANUFACTURER'S DATA

MANUFACTURER'S DATA
ISSUED: MAY 02/95

SINGLE ENGINE FUEL FLOW AND CRUISE SPEEDS AT MAXIMUM CONTINUOUS POWER

13,000 AND 14,000 POUNDS

100% RPM, EGT = 650°C, GEN LOAD = 200 AMPS, BLEED AIR LOW

13,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									564	206	570	208	575	211	584	212	571	210	540	203	511	196
2,000							511	196	565	211	570	213	577	215	558	213	529	207	500	200		
4,000							562	214	565	216	567	217	540	213	516	209	490	203	463	195		
6,000							562	219	551	218	524	214	500	210	477	205	452	198	428	189		
8,000					560	221	534	218	509	215	484	211	459	205	440	200	417	192				
10,000					517	218	492	215	469	211	446	206	425	200	405	194	384	183				
12,000					476	214	453	210	431	205	410	199	390	192	372	183						
14,000			459	213	437	208	416	204	396	198	376	190										
16,000			421	207	400	201	381	195														
18,000	405	204	384	198	365	190																

14,000 POUNDS

OAT °C	−50		−40		−30		−20		−10		0		10		20		30		40		50	
PR. ALT.	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS	F F PPH	TAS KTS
SEA LEVEL									565	205	570	207	576	209	584	210	570	207	540	200	510	192
2,000							510	192	565	209	571	211	577	213	557	210	528	204	499	196		
4,000							562	212	566	214	567	215	539	211	515	206	489	199	462	190		
6,000							563	217	551	216	524	211	499	207	476	201	452	193	427	183		
8,000					560	219	533	216	508	212	483	207	458	201	439	195	416	185				
10,000					516	215	492	211	468	206	445	201	424	194	404	186						
12,000					475	210	452	205	430	199	409	192										
14,000			458	208	435	203	414	197	394	189												
16,000			419	200	398	193																
18,000	403	196																				

FIGURE 6A-31

SINGLE ENGINE FUEL FLOW AND CRUISE SPEEDS AT MAXIMUM CONTINUOUS POWER

15,000 AND 16,000 POUNDS

100% RPM, EGT = 650°C, GEN LOAD = 200 AMPS, BLEED AIR LOW

15,000 POUNDS

OAT °C	–50		–40		–30		–20		–10		0		10		20		30		40		50	
PR. ALT.	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS
SEA LEVEL									565	203	571	205	576	207	585	208	570	205	539	197	510	188
2,000							510	188	565	207	571	209	577	211	556	207	528	200	499	192		
4,000							563	209	566	212	566	212	538	208	514	203	488	195	462	185		
6,000							563	214	550	213	523	208	498	203	475	197	451	187	426	174		
8,000					559	216	533	212	507	208	482	202	457	195	438	188						
10,000					515	211	490	207	467	201	444	194	422	186								
12,000					473	205	450	199	429	192												
14,000			456	203	434	196																
16,000																						
18,000																						

16,000 POUNDS

OAT °C	–50		–40		–30		–20		–10		0		10		20		30		40		50	
PR. ALT.	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS	FF PPH	TAS KTS
SEA LEVEL									565	201	571	202	577	204	585	206	569	202	538	193	509	183
2,000							509	183	566	205	572	207	577	208	555	204	527	196	498	187		
4,000							563	207	567	209	565	209	537	204	513	198	487	189	460	177		
6,000							564	211	549	209	522	204	497	198	474	190	449	179				
8,000					558	213	531	209	506	203	481	197	456	188								
10,000					514	207	489	202	465	195												
12,000					472	199	449	192														
14,000			455	195																		
16,000																						
18,000																						

FIGURE 6A-32

MANUFACTURER'S DATA

MANUFACTURER'S DATA
ISSUED: MAY 02/95

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ENVIRONMENTAL CONTROL SYSTEM

The air conditioning system supplies cold air and conditioned air to the cabin and cockpit. Two independent systems are provided. Bleed air is supplied by each engine to drive cooling turbines which provide cool air for the aircraft. Hot bleed air is routed to the center section of the aircraft and mixed with cold bleed air to provide conditioned air. Either bleed air system may be operated on the ground when the respective engine is operating. Ducts within the fuselage distribute the air to the passengers and crew. An automatic temperature control system senses and regulates the temperature within the aircraft. Fresh air is supplied by a blower and motor assembly located in the nose baggage compartment.

The aircraft cabin is pressurized. The pressurization system automatically compensates for increasing aircraft altitude by maintaining cabin altitude at selected elevation whenever possible. The cabin altitude will remain at sea level, when selected, until aircraft altitude reaches approximately 16,800 feet pressure altitude. The pressurization system provides automatic overpressurization and negative pressure relief. Cabin pressure can be dumped manually in emergency situations.

The air conditioning system, the pressurization control system and the fresh air system comprise the environmental control system (ECS).

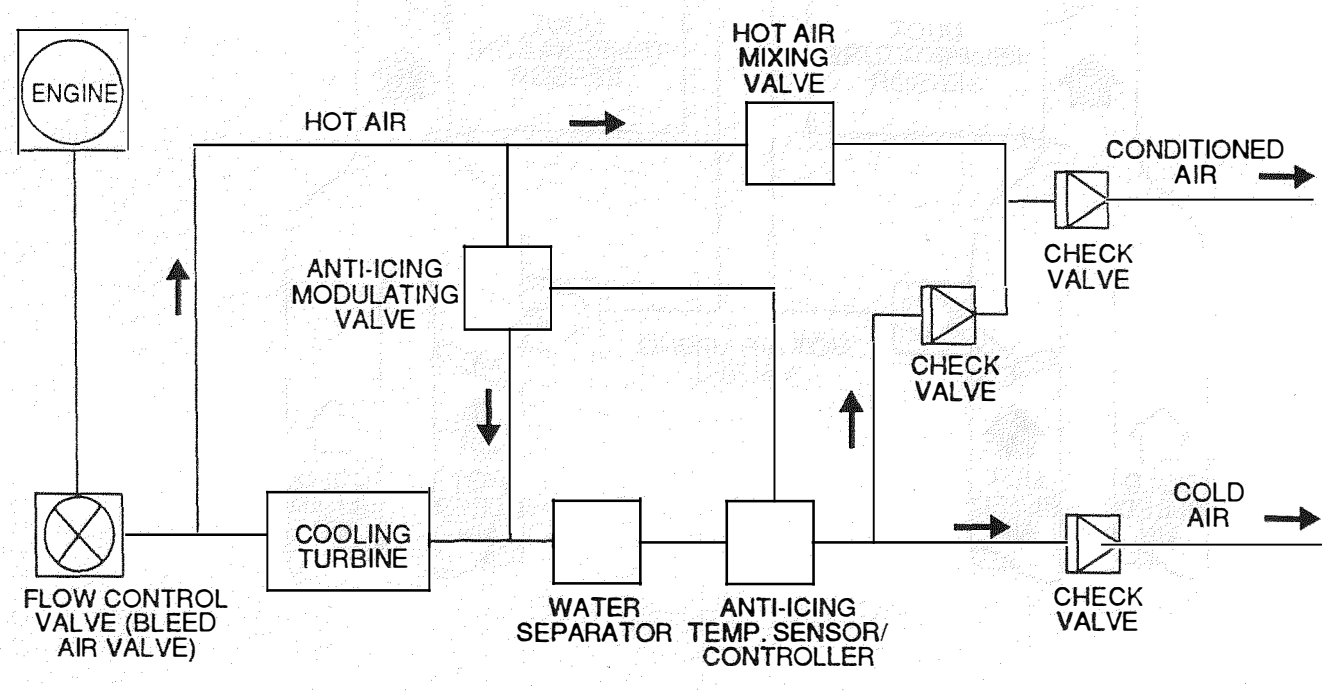


FIGURE 6B-1

TEMPERATURE CONTROL UNIT

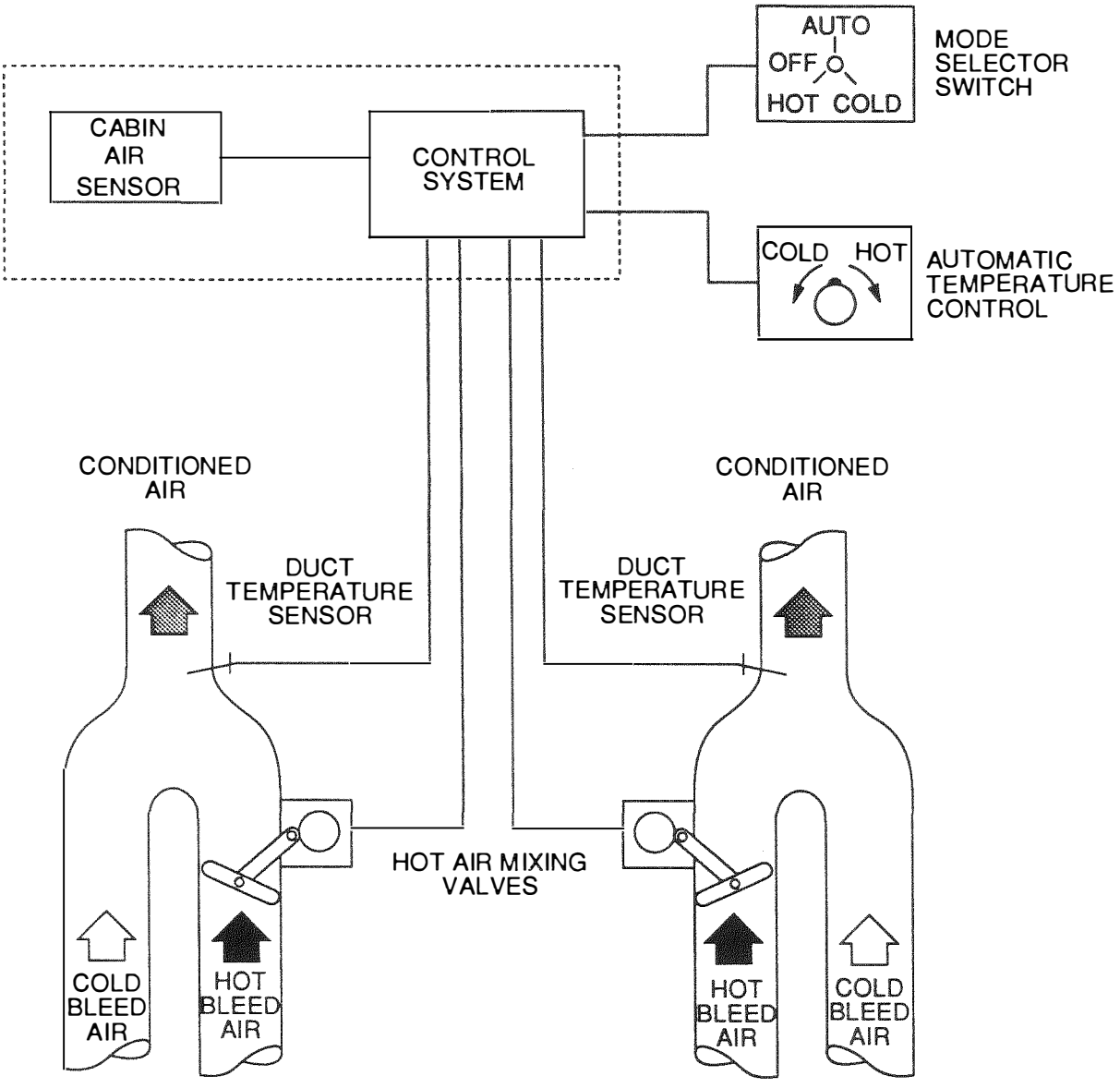


FIGURE 6B-2

ENVIRONMENTAL CONTROL SYSTEM (continued)

TEMPERATURE CONTROL

The electrically powered temperature control system is used to maintain the cabin temperature at pilot-selected levels. The system may be operated in either of two modes, automatic or manual. In the automatic mode, the pilot selects a desired cabin temperature. The temperature control system will monitor the cabin temperature and adjust the temperature of the conditioned air introduced into the cabin. In the manual mode, the pilot controls the temperature of conditioned air supplied to the cabin. The principal system components are as shown in Figure 6B-2.

HEATING SYSTEM

Bleed air supplied by the engines, mixed with cold air from the cooling turbines, is used for heating the cockpit and cabin. The amount of engine bleed air introduced into the conditioned air ducts is controlled by two hot air mixing valves. These mixing valves are positioned electrically. Signals controlling the valve positioning come from the temperature control system.

COOLING SYSTEM

An air cooling turbine is installed near the nacelle in each wing leading edge. Cold, non-conditioned air from each cooling turbine enters the cabin and is ducted fore and aft to cold air outlets at crew and passenger stations. A cold air dump valve is located in the cold air ducting under the floor on each side of the aircraft, aft of the wing. The dump valves allow the cold air to be ducted to the cabin and cockpit cold air outlets (dump valve closed) or to flow rearward through ducts which terminate in the tail cone and dump a major portion of the cold air near the outflow valve (dump valve open). The cold air dump valves are mechanically controlled flapper valves which can be modulated between full open and full closed by push-pull cables. The cable controls are located on the floor at the entrance to the cockpit, behind the copilot's seat.

MOISTURE AND CONTAMINANT CONTROL SYSTEM

Moisture and other contaminants are removed from engine supplied bleed air before the air enters the cabin. The cooling turbine output air, depending upon ambient conditions, will usually be below freezing in temperature and contain some percentage of water. A water separator is installed downstream of the cooling turbine to remove water from the air. Since the air exiting the turbine is below freezing, some of the water in the air will begin to freeze, usually inside the water separator. If continued freezing is allowed, the water separator will eventually become blocked. A deicing system is installed to prevent blocking of the water separator.

The deicing system consists of a slave valve that controls the introduction of hot bleed air into the cold air duct and a master valve that controls the operation of the slave valve. The master valve senses the outlet air temperature at the water separator. The master valve will control the slave valve as necessary to prevent freezing of the water separator.

ENVIRONMENTAL CONTROL SYSTEM (continued)

BLEED AIR AND CONTROL

Air is extracted from a pad on the left hand side of each engine case for use in the environmental control system, surface deice system, and vacuum system. Part of the surface deice system provides pressure for the inflatable door seals. Before passing through the firewall, the bleed air is routed to a heat exchanger. The heat exchanger lowers the temperature of the bleed air approximately 100°F (38°C), thereby increasing the service life of the ECS components. Bleed air for use in the engine anti-icing system is routed and controlled through separate lines and valves.

A flow control valve is used to regulate the bleed air flow. Since the extraction of bleed air will cause a loss in engine power, the amount of air extracted must be carefully regulated. The flow control valve is calibrated to extract a preset amount of bleed air from the engine under all operating and ambient conditions. The three-position, HIGH-LOW-OFF bleed air switches control the amount of flow to the ECS. The "HIGH" position provides the equivalent of the model SA227-AC "ON" flow. The "LOW" position provides approximately 2/3 the flow of "HIGH". The Time to Climb and Cruise performance in this Manufacturer's Data section is based upon the LOW position. When the switch is moved to the OFF position, the flow control valve will close to stop bleed air flow to the ECS. The bleed air supplied to the engine anti-icing and vacuum systems is not controlled or affected by the flow control valve.

FRESH AIR SYSTEM

A blower motor and associated distribution plumbing supply fresh air to the cockpit. The blower is located under the nose baggage compartment left hand floorboard. A check valve prevents the escape of cabin pressurization in flight.

A switch actuated by the nose gear during retraction serves as a safety interlock to prevent operation of the fresh air fan in flight. An override position of the fresh air fan switch allows this interlock to be defeated in case the fan is needed in flight. The fan should not be operated with the cabin pressurized.

FRESH AIR BLOWER AND CHECK VALVE

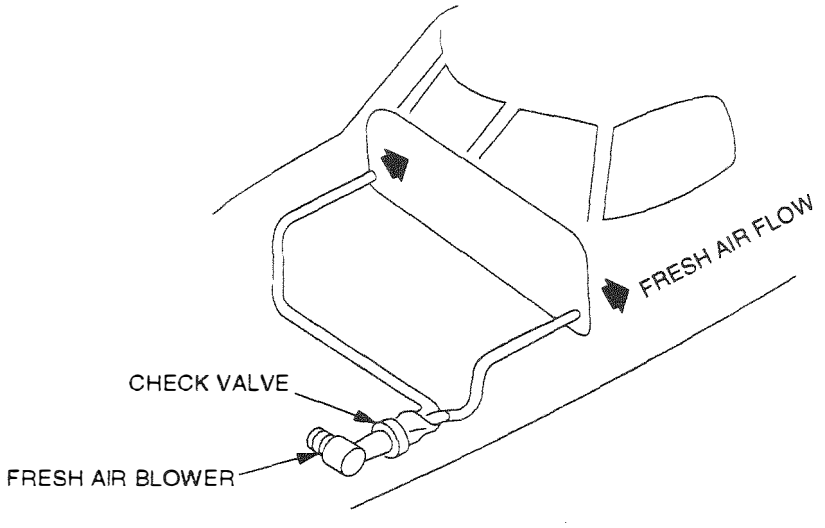


FIGURE 6B-3

ENVIRONMENTAL CONTROL SYSTEM (continued)

PRESSURIZATION SYSTEM

The pressurization system, within the limits available, maintains the cabin of the aircraft at any selected pressure altitude equal to or lower than the aircraft altitude. In normal operation, the system controls the increase or decrease in cabin pressure and the rate at which these changes in pressure take place. Safety features prevent the cabin from exceeding the maximum pressurization limit and from maintaining a negative pressure (cabin pressure less than ambient pressure). A safety dump valve is used to manually dump cabin pressure. The entire fuselage, with the exception of the nose baggage compartment, is pressurized. The outflow valve, which controls air leaving the fuselage, is located on the aft pressure bulkhead. The emergency dump valve is located on the forward pressure bulkhead. Normal airflow through the aircraft is rearward and out the outflow valve. With the emergency dump valve open, the air-flow is forward.

PRESSURIZED VESSEL

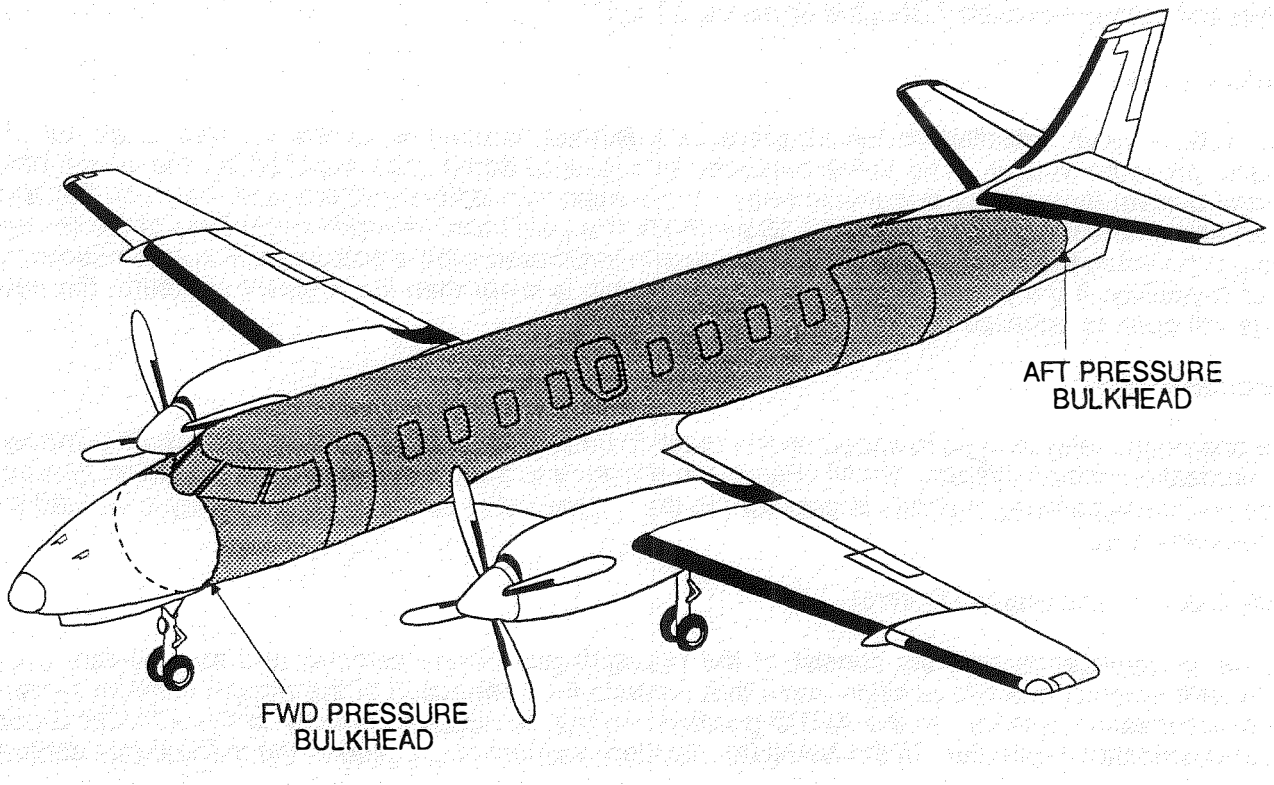


FIGURE 6B-4

ENVIRONMENTAL CONTROL SYSTEM (continued)

PRESSURIZATION SYSTEM COMPONENTS

Cabin Altitude Warning

The cabin altitude warning system is used to inform the pilot that cabin altitude has exceeded approximately 10,000 feet. Above this altitude supplemental oxygen will be required. Illumination of the cabin altitude warning light usually indicates a problem with the pressurization system.

Dump Valve

The pressurization dump valve can be used to quickly depressurize the cabin should a malfunction of the pressurization system occur. The dump valve, located on the left hand side of the forward pressure bulkhead, is connected to a static source, the vacuum system , and the dump valve electrical circuitry. Power is supplied to open the valve when the aircraft is on the ground. After takeoff, with the dump switch in NORMAL, the valve will close. Vacuum is supplied to the valve causing the valve to close slowly, thus preventing a pressure bump immediately after takeoff. Electrical power for the valve may be obtained from either essential bus by using the transfer switch. The dump valve also contains intemal overpressurization relief that will cause the valve to open should the pressure differential between the cabin and ambient exceed 7.30, plus or minus .10 psi.

Outflow Valve

The outflow valve, installed on the aft pressure bulkhead, is used to control the flow of air out of the aircraft pressure vessel. The valve responds to pressure commands supplied by the pressurization control system through the pneumatic relay. If the maximum differential pressure between the aircraft cabin and ambient pressure exceeds 7.15 psi (49.3 kPa), the valve will open regardless of the command being supplied by the pressure control system. Also incorporated into the outflow valve is automatic vacuum relief capability. If the pressure within the aircraft cabin is lower than the ambient pressure, the outflow valve will open to equalize the pressure.

Pneumatic Relay

The pneumatic relay is used to speed up the reaction time of the outflow valve to commands given by the pressurization control system. Small changes in pressure to the control connection of the relay produce large but corresponding changes in pressure to the outflow valve connection. The relay is located in the aft fuselage area.

Mode Selector and Manual Control

Manual pressurization controls consist of the pressurization mode selector and manual rate control. The mode selector is a two position valve that controls the connection of the aircraft vacuum system to the pressurization system. In the AUTO position, vacuum is supplied directly to the ATMOS 3 port of the pressurization controller. In the MANUAL position, vacuum is supplied to the manual rate control.

The manual pressurization rate control is a needle valve that controls the amount of vacuum supplied to the outflow valve (through the pneumatic relay). Opening the valve (turning counterclockwise) supplies more vacuum to cause the outflow valve to open and decrease cabin pressure. Closing the valve (turning clockwise) supplies less vacuum to cause the outflow valve to close and increase cabin pressure. In comparison to the pressurization controller, the manual rate control provides very coarse adjustment. When using the manual system, small adjustments must be made with the manual rate control knob and adequate time must be allowed for them to take effect. Opening the manual rate control with the aircraft pressurized can produce a very rapid depressurization that may be uncomfortable for passengers.

ELECTRICAL SYSTEMS

The aircraft is equipped with a DC and an AC power system. The DC power distribution system is a segmented, three bus system consisting of two essential buses and one nonessential bus. Each bus may be selectively disabled and is over voltage and overload protected. Redundant circuitry is provided to ensure the operation of all essential and emergency electrical and electronic systems.

The 115 VAC and 26 VAC buses provide power for AC equipment. Either of two AC inverters powers those buses.

DC POWER DISTRIBUTION

As shown in Figure 6B-5a or 6B-5b, the battery bus forms the central distribution point for power. Each battery is connected, through a battery relay, to the battery bus relay and then to the battery bus itself. A 150 amp circuit breaker supplies power to the nonessential bus. Power to each bus is controlled by a bus tie switch. Each generator supplies power to the battery bus through a 400 amp current limiter. Power supplied to each bus is distributed to the various circuit breakers by smaller bus bars.

SIMPLIFIED DC DISTRIBUTION SCHEMATIC
(Airplanes prior to S/N DC-884 NOT modified by Service Bulletin CC7-24-002)

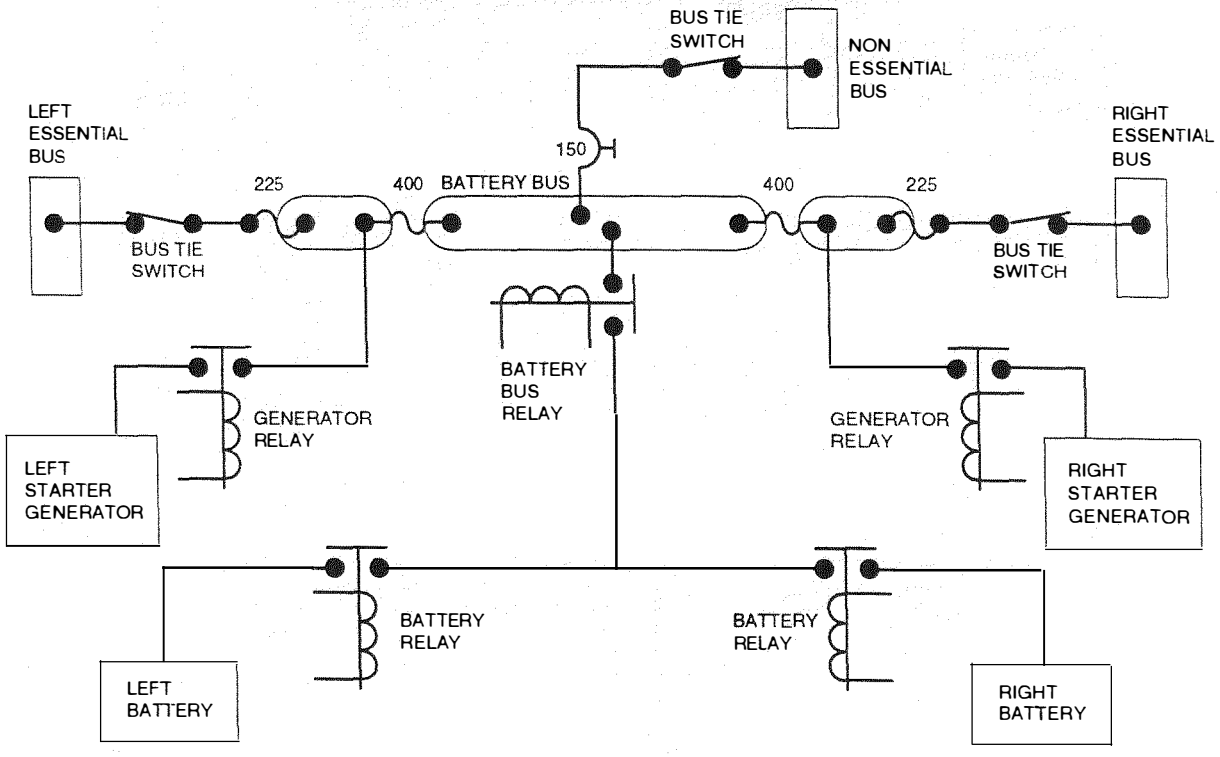


FIGURE 6B-5a

ELECTRICAL SYSTEMS (continued)

BUS TRANSFER

Nine essential items (normally switched to the left essential bus) may be transferred from one essential bus to the other. The transferrable items are:

1. Pilot's tum and slip indicator (if installed)
2. Fuel crossflow.
3. Windshield heat (pilot's)
4. Landing gear control
5. Landing gear position
6. Surface deice boots
7. Cabin pressure dump
8. L intake heat
9. R intake heat

STANDBY INSTRUMENT POWER SYSTEM

A standby instrument power system is installed to automatically transfer power and lighting for the standby attitude indicator and the pilot's airspeed indicator and altimeter (copilot's on some installations) directly to the aircraft's batteries in the event of a loss of left essential DC power.

NOTE

Leaving the standby instrument power switch in the armed position after shutting off the batteries when leaving the aircraft will deplete the aircraft batteries.

DC POWER SOURCES

Batteries

Two 24 volt, nickel-cadmium batteries are installed in the aircraft. They are located, one in each wing, inboard of the nacelles. Each battery is rated at 24 ampere hours at the 5-hour rate, at 80°F (27°C).

Generators

The primary power for the aircraft DC system is supplied by two engine-driven starter-generators. The generators are rated at 300 amperes continuous operation. The generators will deliver power to the DC system at all engine speeds at and above ground idle.

Extemal Power Supply

A ground power unit receptacle normally is located inboard of the right wing flap. The receptacle location may differ, depending upon customer option. This receptacle may be used to supply auxiliary DC power during routine servicing and engine starts. Power from the ground power unit is connected directly to the aircraft bus system. Extemal power is not connected to the aircraft bus system until either battery switch is turned on.

ELECTRICAL SYSTEMS (continued)

AC POWER DISTRIBUTION

Either of two DC powered 350 volt-amp static inverters provides AC power for the aircraft. Inverter operation is pilot selectable. In case of inverter failure, the pilot must select the other inverter.

Operation

The two inverters are controlled by a switch installed on the copilot's switch panel. Power for No. 1 inverter comes from the left essential bus and power for No. 2 inverter comes from the right essential bus. When an inverter is selected, power from the one amp inverter control circuit breaker is used to close the inverter power relay. The inverter relay powers the respective inverter and the AC switching relay. The inverter output is both 115 volts and 26 volts and is fed to the AC buses.

The AC distribution system is shown in Figure 6B-6. Bus tie circuit breakers between both the 26 volt and the 115 volt buses allow AC power to flow to all buses.

NOTE

The inverter switch is designed to permit operation of only one inverter at a time.

SIMPLIFIED AC DISTRIBUTION SCHEMATIC

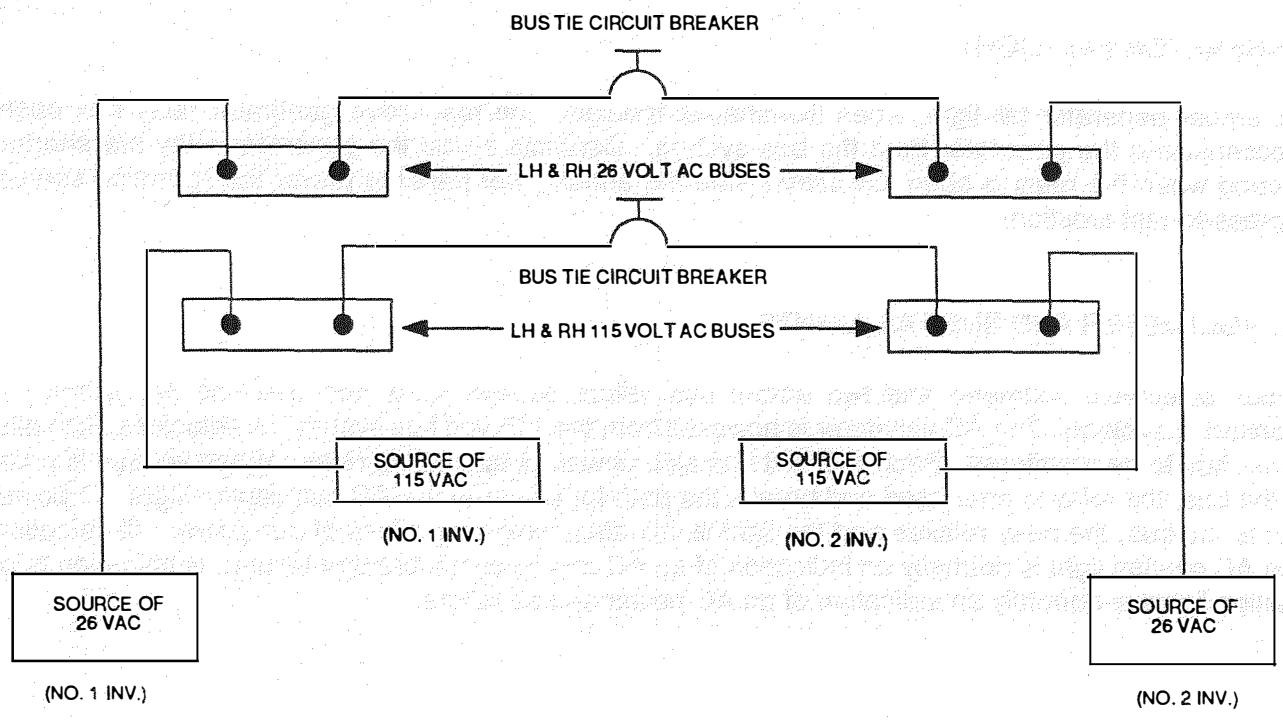


FIGURE 6B-6

WARNING AND MONITORING SYSTEMS

The pilot is informed of the condition and operational status of the various sources of electrical power. Each system will be discussed separately.

BATTERY TEMPERATURE INDICATOR

Refer to NORMAL PROCEDURES section for description and operation of this system.

BATTERY DISCONNECT LIGHT

An amber battery disconnect light, when illuminated, indicates the respective battery relay has opened and disconnected the battery from the bus system. The circuit consists of contacts inside the battery relay which are shorted to ground when the relay is open. The disconnect light function is turned off during the engine start cycle.

BATTERY FAULT LIGHT

The red battery fault light illuminates when the fault protection panel senses a battery fault and disconnects the batteries. The circuit consists of a relay inside the fault control panel which provides power to illuminate the fault light.

GENERATOR FAIL LIGHT

An amber generator fail light, when illuminated, indicates the respective generator relay has opened, disconnecting the generator from the bus system. Contacts inside the generator relay are shorted to ground when the relay is open. Circuitry inside the annunciator panel to power the light also serves as a press-to-test function.

AC VOLTMETER AND BUS FAIL LIGHTS

A bus selectable voltmeter and two amber bus failure caution lights comprise the AC warning and monitoring systems. The AC voltmeter is powered from the 115 volt bus system. A selector switch allows either bus to be monitored. Each 115 volt bus also powers a bus failure relay. When voltage is present at the bus, the relay is energized and breaks the path for power to the AC bus caution light. If power is lost to the bus, the relay relaxes and the light illuminates, indicating a loss of bus power. Illumination of one AC caution light is normally an indication of an AC bus tie circuit breaker failure. Illumination of both caution lights is normally an indication of an AC power source failure.

WARNING AND MONITORING SYSTEMS (continued)

GENERATOR AMMETER

Two ammeters are installed in the left side console to indicate the respective generator's output. Each meter is powered by a shunt installed in the negative side of the respective generator.

VOLTMETER AND SELECTOR SWITCH (See Figure 6B-7)

A voltmeter and selector switch are used to monitor any one of six sources listed below. Each source providing a signal to the voltmeter contains a circuit breaker for protection. The functions of each switch position are as follows:

1. L or R battery position: Monitors the battery voltage of the battery side of the battery relay. In order to obtain an accurate reading, the battery switch should be moved to OFF to isolate the battery from the bus. If a reading is taken with the battery switch ON, the indicated battery voltage will be approximately equal to bus voltage.

2. L or R GEN position: Monitors the generator voltage of the generator side of the generator relay. In order to obtain an accurate reading, the generator switch should be moved to the OFF position, isolating the generator from the bus. If a reading is taken with the generator switch ON, the indicated generator voltage will be approximately equal to bus voltage.

3. BUS position: Monitors the voltage at the battery bus in the electrical panel behind the pilot's seat. This voltage will be the average of the voltages applied to the bus. For example, with one battery switch on and no generators operating, the bus and battery voltage will be approximately equal.

4. GPU position: Monitors the voltage output of a GPU connected to the aircraft. Voltage upstream of the battery bus relay is monitored. After the battery switch is moved to ON, this voltage will be approximately equal to bus voltage.

NOTE

To avoid battery drain after shutdown, the voltmeter selector should be placed in the DC bus position.

WARNING AND MONITORING SYSTEM (continued)

VOLTMETER AND SELECTOR SWITCH CIRCUIT

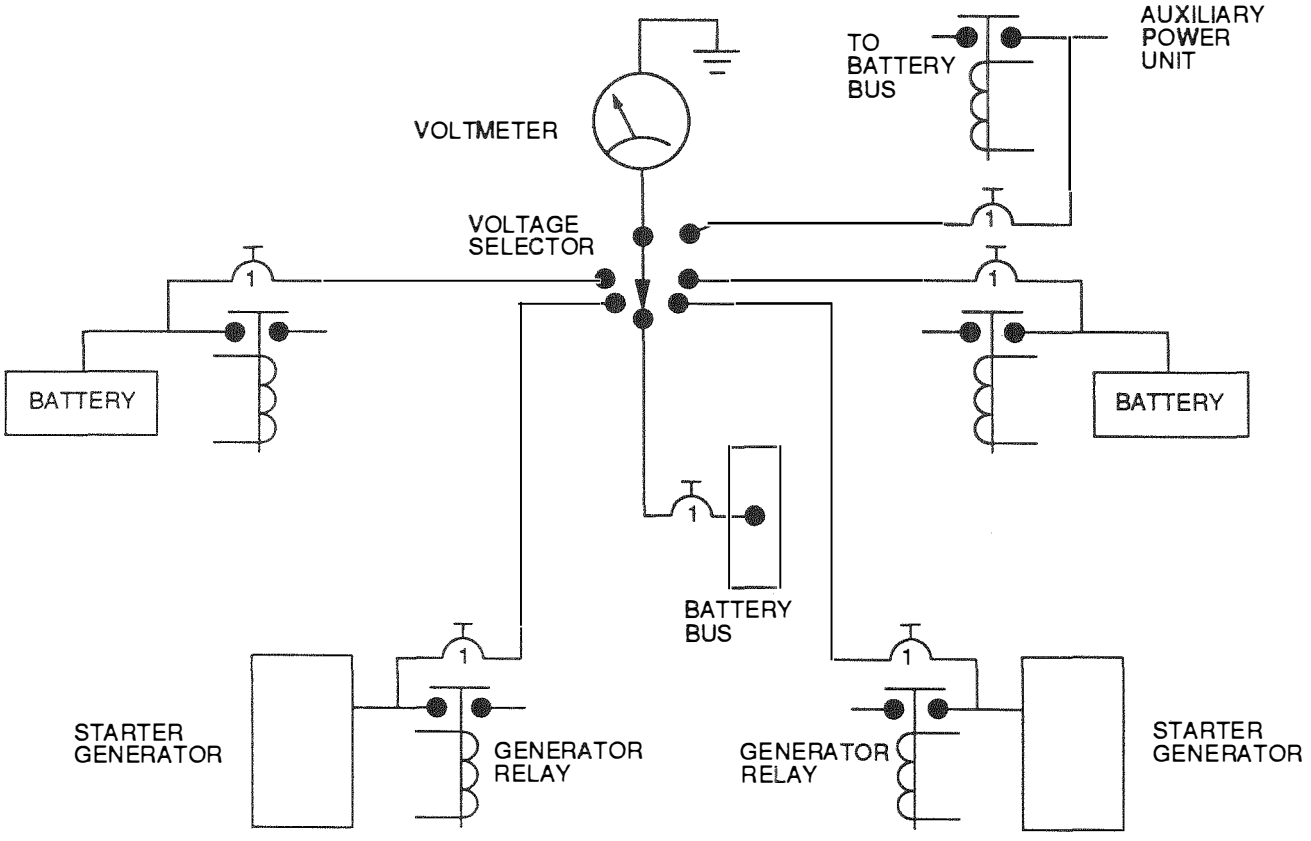


FIGURE 6B-7

PASSENGER ENTRANCE DOOR

The passenger entrance door is located on the left side forward of the prop plane and is of the air stair type. The latch mechanism is capable of being operated from inside or outside of the aircraft and is equipped with a key operated locking device. A warning light located on the instrument panel indicates the status of the door latches. The door is equipped with door closers which are operated by gas springs.

The latch mechanism should be kept clean. Lubricants that leave an oily or greasy coating should not be used because they tend to cause an accumulation of dirt and other contaminants. Refer to the Maintenance Manual for procedures for inspection, cleaning, installation, adjustment, and servicing.

CAUTION

ENSURE THAT THE BAYONET LATCHES ARE COMPLETELY RETRACTED INTO THE DOOR BEFORE ATTEMPTING TO CLOSE THE DOOR. ATTEMPTING TO CLOSE THE DOOR WITH A LATCH EXTENDED CAN DAMAGE THE LATCH AND DOOR FRAME. THIS DAMAGE, IN TURN, MAY MAKE IT IMPOSSIBLE TO EXTEND THE LATCHES PROPERLY INTO THE DOOR FRAME OR IT MAY CAUSE THE DOOR TO BE IMPOSSIBLE TO OPEN BY NORMAL PROCEDURE AFTER IT HAS BEEN CLOSED.

EMERGENCY EXITS

Three emergency exits incorporating normal cabin windows are provided. Each exit provides a 20 by 28 inch (508 by 711mm) opening. Two are located on the right side of the fuselage over the wing and one is located on the left side of the aircraft over the wing. The placards and handles are illuminated by fluorescent materials for operation in total darkness.

EQUIPMENT AND FURNISHINGS

FLIGHT COMPARTMENT

The flight compartment is equipped with dual flight controls, instruments, and electrical control panels conveniently located for crew accessibility. Upholstered seats are provided for the pilot and copilot. Each seat is mounted on parallel tracks bolted to the compartment floor. The seats are adjustable vertically and longitudinally and are removable (See Figure 6B-8). Depressing a button under the inboard armrest releases a locking mechanism and allows the armrest to be lowered. The outboard armrests rotate upward and are stowed vertically. They must be lifted vertically to unlock them prior to rotating them to the horizontal position. The flight compartment is sound dampened and insulated with flame-resistant material.

PILOT'S SEAT

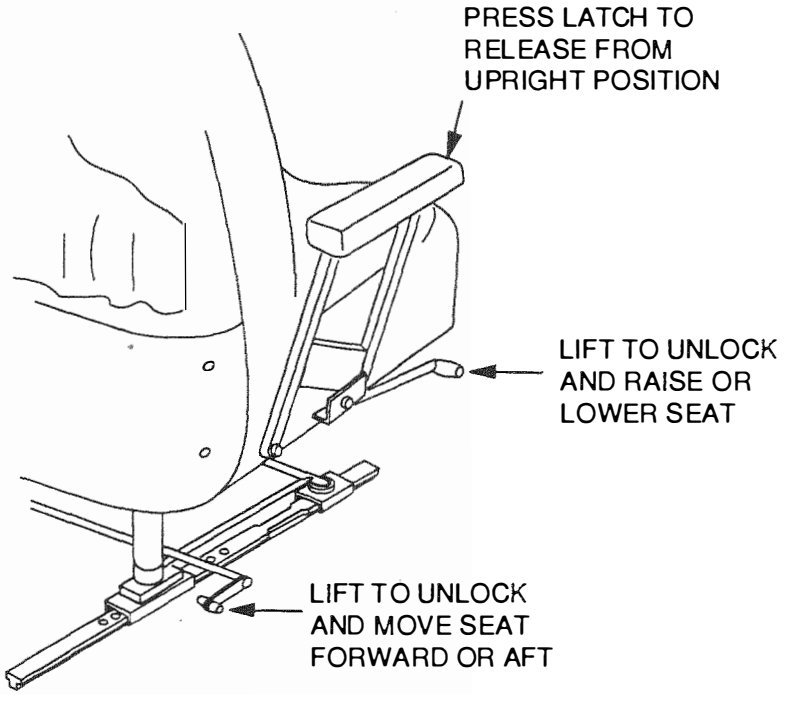


FIGURE 6B-8

EQUIPMENT AND FURNISHINGS (continued)

PASSENGER COMPARTMENT

The passenger compartment typically is equipped with 19 passenger seats. The seats are installed in two rows with a center aisle. To provide space for cargo, the seats may be removed. A movable bulkhead provides visual isolation of the passenger and cargo compartments. Fittings are provided for its installation at each seat station as far forward as the aft emergency escape hatch. This enables conversion between passenger and cargo loading at 30-inch (762 mm) increments, with passenger loading through the forward door and cargo through the aft door. The cabin flooring is designed for uniformly distributed loading of 150 pounds per square foot (732 kg per square meter). A cargo tiedown net is provided as loose equipment. A shelf is installed just aft of the rear cargo compartment. This shelf is designed to carry additional remote-mounted avionics equipment as well as a number of the standard equipment items.

Passenger Advisory Lights

The passenger advisory lights consist of FASTEN SEAT BELT – NO SMOKING signs located on the bulkheads at the forward end of the cabin. The lighting for the signs is controlled by a switch on the copilot's switch panel. A passenger alerting chime, which sounds when the switch is repositioned, is available as an option along with the avionics equipment.

INTERIOR ARRANGEMENT

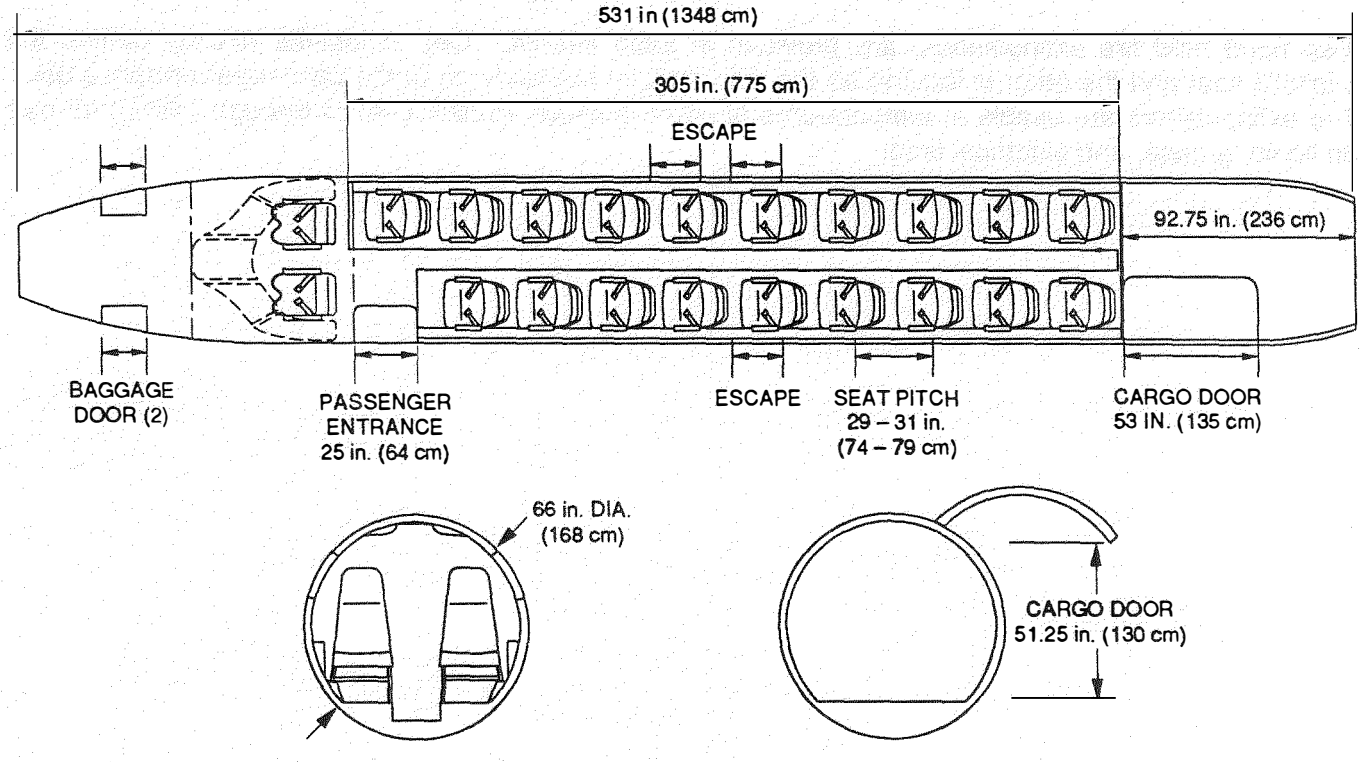


FIGURE 6B-9

FIRE DETECTION AND PROTECTION

ENGINE FIRE DETECTION AND EXTINGUISHING SYSTEM

Refer to NORMAL PROCEDURES section for description and operation of this system.

WING OVERHEAT WARNING SYSTEM

A wing overheat warning system is provided. Red L WING OVHT and R WING OVHT warning lights are located on the annunciator panel. The lights, when flashing, indicate an overheating condition in the wing leading edge cavity due to a bleed air leak or an electrical problem. Should the light come on steady, a bleed air leak in the wheelwell or air conditioning duct overheat is indicated. Refer to EMERGENCY PROCEDURES section for procedures to be followed in the event the lights illuminate.

TEST SWITCH

The test switch for the wing overheat warning system is the same test switch used to test all annunciator panel lights.

HAND HELD FIRE EXTINGUISHER

Two hand held fire extinguishers are provided in each aircraft. One is located directly behind the copilot's seat and the other is located on the side wall, immediately aft of the passenger entrance door. The extinguishers are usable at temperatures of –40°F through +120°F (–40°C through +49°C) for use on liquid, grease, and electrical fires.

FLIGHT CONTROLS

The flight controls are manually and electrically controlled from the pilot's or copilot's position by conventional means. The flight controls consist of ailerons with a trimmable balance tab on each aileron, the rudder with trim tab, a horizontal stabilizer which is electrically operated, elevators, and electrically controlled/hydraulically operated wing flaps.

AILERONS

The aileron control system is interconnected to dual control wheels for operation by either pilot. Cables are attached to a chain and sprocket segment at each control wheel. The cables are routed through the control column, then beneath the cabin center aisle floor, and connect to the aileron bow tie and bellcrank shaft which passes through the pressure vessel at a bearing seal. The shaft turns the main bellcrank which actuates push-pull rods which are routed to the ailerons. The push-pull rods are attached to a series of bellcranks mounted along the rear spar. Each aileron is attached to the wing at three brackets. An adjusta le push-pull rod, connected to a swing link at each outboard bellcrank, actuates the aileron.

Aileron Trim Tabs

The aileron trim tabs are controlled by a trim tab wheel on the control pedestal through a cable system which actuates the trim actuators mounted on the rear wing spars. The actuators move push-pull rods through the ailerons to the tabs. The actuators also provide servo action during aileron movement.

RUDDER

The rudder is controlled by the pilot's or copilot's rudder pedals which are interconnected by push-pull rods. Bellcranks actuate the rudder cables from the cockpit to the rudder bow tie which is located forward of the aft pressure bulkhead. The rudder torque tube is attached to the bow tie and extends vertically through the pressure vessel. The torque tube is sealed internally by an aluminum plug. The fuselage cut out is sealed by an O-ring assembly.

Rudder Trim Tab

The rudder trim tab is actuated by a cable and chain operated actuator mounted in the vertical stabilizer. By turning the rudder trim control wheel located on the control pedestal, cable movement rotates a sprocket which actuates push-pull rods through the rudder to the tab, deflecting it in the desired direction.

FLIGHT CONTROLS (continued)

ELEVATOR

The elevator is actuated by an arm mounted on the interconnecting torque tube between the two control columns. A push-pull rod is connected between the arm and walking beam located centrally under the cockpit floor. Cables are routed around the walking beam and through a pulley arrangement to the aft fuselage section, then to a bellcrank installed in the vertical stabilizer. Two bellcrank push pull rods actuate the elevator. The elevator is aerodynamically balanced with set back hinges and statically balanced with lead weights.

HORIZONTAL STABILIZER

The horizontal stabilizer is electrically positioned to provide pitch trim. Electric motors actuate interconnected jackscrews to provide a dual, fail-safe trim system. Mechanical stops for the jackscrews are built into the actuator. Electrical limit switches for the motors are mounted inside the vertical stabilizer. A dual switch on each pilot wheel controls separate circuits to each motor. A trim selector/kill switch is mounted on the center pedestal. A pitch trim indicator gives the pilot visual reference of trim position. Trim-in-motion sonalerts are provided to indicate pitch trim actuation and alert the crew in the event of a pitch trim runaway.

TRIM CONTROLS

A master pitch trim switch is located on the pedestal. The center position of the switch is the OFF position. In the pilot (left) position, the pilot has trim control, in the copilot (right) position the copilot has control. This switch prevents the pilot and copilot from trimming the aircraft simultaneously.

Pilot and Copilot Pitch Trim Control Switches

The pilot and copilot pitch trim control switches, located on the control wheels, have double toggle actuators. Both halves of the switch must be operated simultaneously to provide trim operation.

Pilot's Auxiliary Pitch Trim Switch

A pilot's auxiliary pitch trim switch is located on the pedestal. It is incorporated to facilitate single pilot operation should a malfunction occur in the pilot's trim control circuitry. This allows the pilot to trim the horizontal stabilizer without having to reach across to the copilot's trim switches on the copilot's control wheel.

Position Indicating System

A pitch trim indicator is located on the instrument panel. An out-of-trim sonalert system is also provided. The sonalert is inoperative until the power levers are advanced for takeoff. If during takeoff roll an out-of-trim condition exists, the out-of-trim sonalert will sound a warning. When the aircraft is airborne the sonalert is disabled.

FLIGHT CONTROLS (continued)

WING FLAPS

The wing flaps, controlled by a flap selector located on the right side of the control pedestal, are electrically actuated and hydraulically operated. A flap position indicator is located on the instrument panel. The flaps may be lowered or raised in increments from 0 to 36 degrees. The flaps are interconnected for positive, symmetrical operation should hydraulic actuation be lost on one side. There are no emergency provisions to extend or retract the flaps in the event of complete electrical or hydraulic system failure.

GUST LOCK SYSTEM

An internal, cable operated gust lock system is provided to lock the ailerons and rudder in the neutral position. The gust lock control lever is located forward of the power levers on the control pedestal. When the gust lock is engaged, the power levers are locked in the retarded position. This prevents application of power for takeoff. A gust lock belt is used to secure the control column in its nose up position.

The gust lock control lever actuates a cable which is routed to lock pins at the aileron bow tie and the rudder bow tie. Cable movement actuates these spring-loaded pins into lock pin holes when the flight controls are in neutral and holds the controls in the neutral or streamlined position until the gust lock is released. The lock pins are mounted in spring-loaded housings to prevent engagement of the pins in the event of gust lock cable failure.

MASTER DISCONNECT BUTTONS

A red master disconnect (MA DISC) button is located on the outboard horn of each control wheel. When either master disconnect button is pressed momentarily, any installed autopilot will be disengaged and remain disengaged until reengaged at the autopilot control head. Pressing either button will also interrupt power to the SAS servo and to the pitch trim system. Power remains interrupted to those systems only as long as the button is held in its depressed position. That function of the master disconnect buttons allows either pilot to respond immediately to potential pitch trim runaway or inadvertent stick pusher actuation.

STALL AVOIDANCE SYSTEM

A redundant stall avoidance system (SAS) is incorporated in the aircraft to warn the pilot of an impending stall by use of two stick shakers, aurally and visually, two sets of stall lights, two stall horns, and by instrument indication. The system also provides for actual stall avoidance by means of a stick pusher which applies a forward force of approximately 65 pounds (290 Newtons) to the elevator control. The SAS is armed at lift-off. The stick shakers activate at about seven knots above stall speed and the stall lights, stall horns and stick pusher are automatically engaged approximately one knot before the actual stall. The system can be overridden manually by the pilot.

FUEL SYSTEM

The fuel system includes left and right integral wing fuel tanks with a total usable capacity of 648 U.S. gallons. Each wing tank contains an integral hopper tank that serves as a fuel sump for the boost pumps. Two boost pump actuated jet transfer pumps are provided in each wing tank to maintain the hopper tanks at full capacity. With the jet transfer pumps operative, the usable full capacity per tank is 324 gallons (2,171 pounds at 6.7 pounds per gallon). The zero point on the fuel quantity gauge is adjusted to allow for 13.4 pounds (6 kg) of unusable fuel. With the transfer pump operative, the fuel quantity gauge readings represent the total usable fuel available in pounds. A crossflow valve provides for fuel balancing between tanks when required. An amber annunciator light illuminates when the fuel crossflow switch is placed in the OPEN position. The annunciator senses crossflow valve position and illuminates whenever the valve is not fully closed. See Figure 6B-10 for metric capacities.

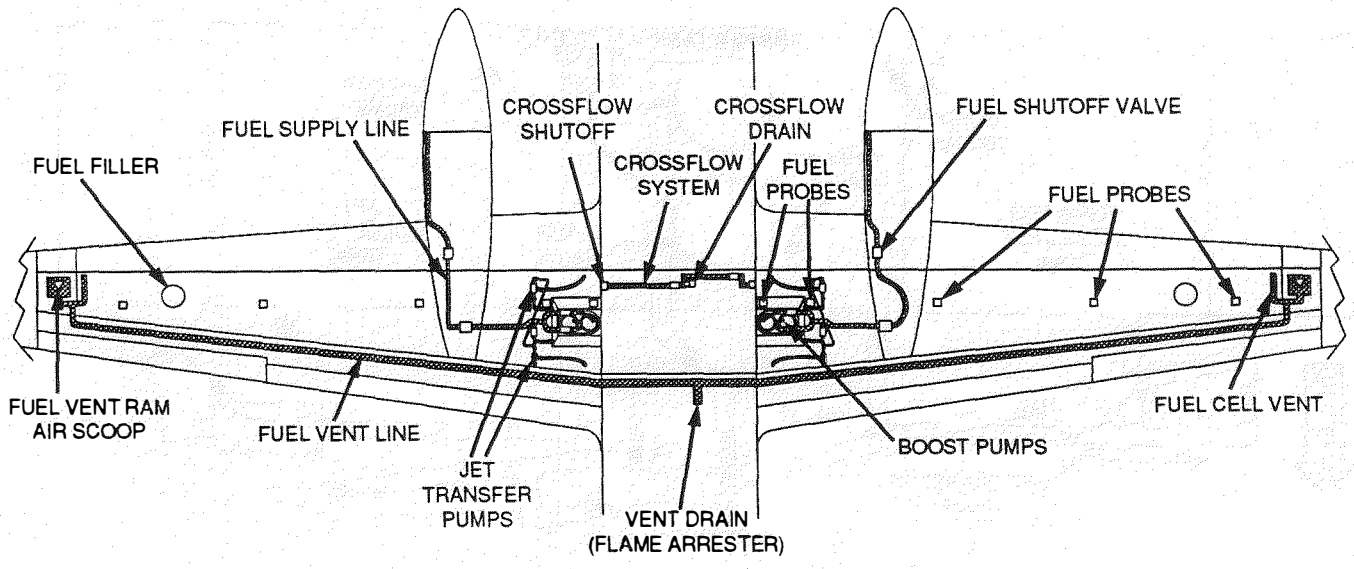
FUEL STORAGE

Fuel for each engine is stored in two integral fuel tanks, one located in each wing. Each tank serves as an independent fuel system for its respective engine. The tanks are interconnected by a crossflow line to balance the fuel quantity or to provide either engine with all of the fuel on board. Two gravity filled collector tanks in each wing tank, coupled with jet transfer pump action, supply a hopper tank with fuel, ensuring boost pump submergence in all flight attitudes.

Two sump drain valves are located just outboard of wing stations 27, forward of the boost pump access panels. Another drain is located on the outboard side of each nacelle. The valves are used to drain accumulated water from the tank or may be used to drain residual fuel when defueling the tank.

A flush-mounted vent is located on the lower surface of the wing inboard of each wing tip. A vent balance line tees into the vent system and is routed along the entire length of the wing behind the rear spar.

FUEL SYSTEM

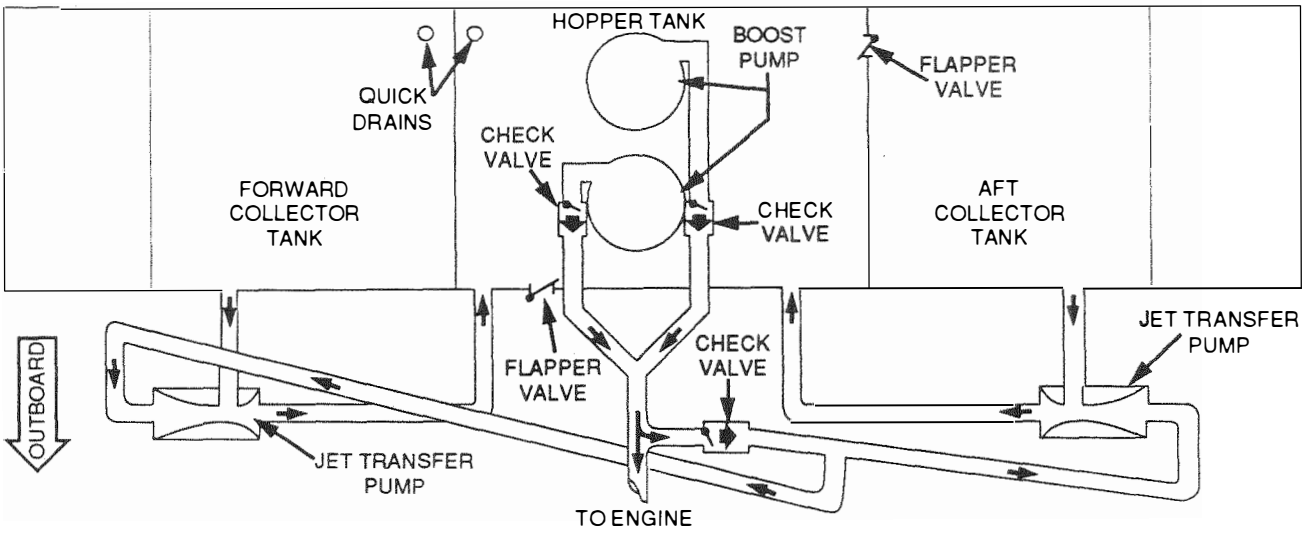


FUEL QUANTITIES

ITEM	U.S. GALLONS	POUNDS	LITERS	KILOGRAMS
TOTAL USABLE	648	4,342	2453	1970
USABLE PER SIDE	324	2,171	1226	985
UNUSABLE PER SIDE BOOST PUMP ON BOOST PUMP OFF	 2 13	 13 88	 8 49	 6 40
XFER PUMP LIGHT ON BOOST PUMP ON BOOST PUMP OFF	 9 to 12 89 to 105	 65 to 75 600 to 700	 36 to 43 338 to 396	 30 to 36 281 to 327

FIGURE 6B-10

JET TRANSFER PUMP SYSTEM



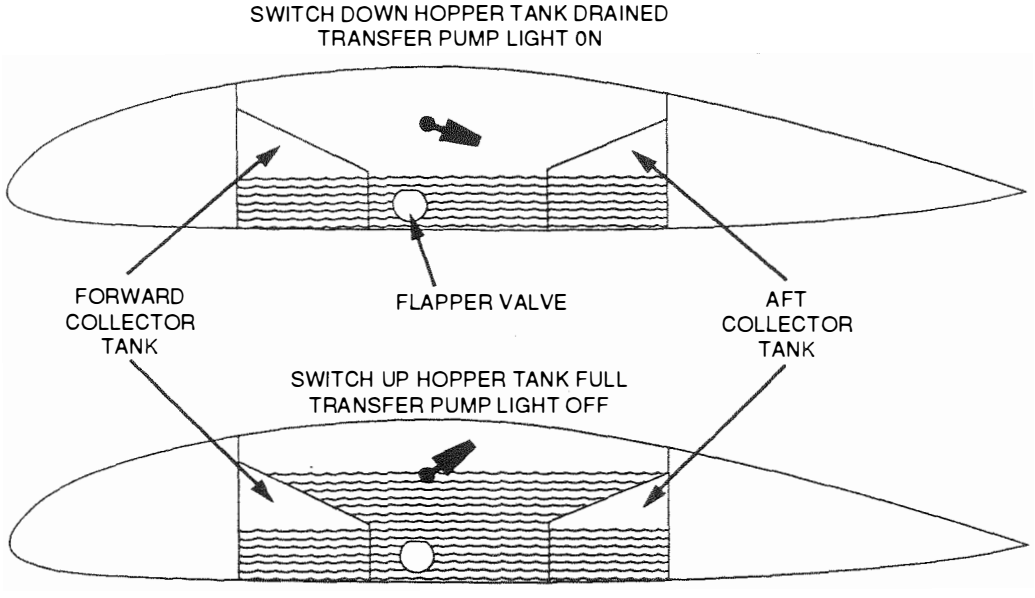


FIGURE 6B-11

FUEL SYSTEM (Continued)

JET TRANSFER PUMP SYSTEM

A schematic of the jet transfer pump system is shown in Figure 6B-11. The system is provided to transfer fuel from the collector tanks to the hopper tank in each wing. The hopper tank and two (Forward & Aft) collector tanks are at the most inboard section of each wing tank. The hopper tank contains the boost pumps and feeds the engine driven fuel pump. The collector tanks both gravity feed from the wing tank and trap fuel during maneuvering flight. Two jet transfer pumps are located in the main fuel tank outboard of the collector tanks and use boost pump flow to transfer fuel from the collector tanks to the hopper tank. The jet transfer pump system can fill the hopper tank 1.5 times as fast as the engine driven pump can drain it.

A flapper valve in the hopper tank allows fuel to gravity feed from the wing tank. A float switch located in the hopper tank activates the respective amber XFER PUMP annunciator light whenever the fuel level in the hopper tank is below the equivalent of approximately 70 pounds. With the boost pumps off and fuel gravity feeding the hopper tank, this occurs with about 600 to 700 pounds of fuel in the wing tank. With the boost & transfer pumps operating and scavenging the collector tanks, the light will illuminate with approximately 70 pounds of usable fuel remaining (all of which would be in the hopper tank).

With the jet transfer system operating, the unusable fuel quantity is 2 gallons (13 pounds) per side. The fuel quantity indicating system is calibrated to exclude this unusable fuel from the fuel gauge readings. Without an operational jet transfer system, an additional 11 gallons (75 pounds) of unusable fuel would be trapped in the collector tanks. This unusable fuel would be shown on the fuel gauges.

During normal operation with the respective boost pump on, illumination of a L or R XFER PUMP annunciator light indicates that the jet transfer pumps are not maintaining the hopper tank at full capacity. Since the jet transfer pumps operate by use of boost pump flow, the first action when a XFER PUMP caution light illuminates is to select the other boost pump for that tank. If that does not extinguish the light, the transfer pump system can be assumed to be inoperative and the unusable fuel in that tank would be increased 75 pounds.

The XFER PUMP annunciator light will be illuminated with less than 600 to 700 pounds of fuel per tank with boost pumps off, and with less than 65 to 75 pounds of fuel per tank with boost pumps on. When the caution light illuminates with less than 70 pounds of fuel available, a landing should be made as soon as practicable or, if fuel is available in the opposite tank, the crossflow valve should be opened.

BOOST PUMPS

Two submerged boost pumps are installed in the hopper tank of each wing. The pumps are connected through check valves to a common supply line. See Figure 6B-11. Boost pump pressure is tapped off the supply line for use in the jet transfer pump system. A fuel shutoff valve installed in each nacelle can be used to stop fuel flow to the engine. A fuel pressure transmitter senses interstage pressure of the engine driven fuel pump. When the engine is not operating, the fuel pressure gauge will indicate boost pump pressure. After the engine is operating the fuel pressure displayed will be a combination of engine driven pump pressure and boost pump pressure.

Each essential bus provides power for two pumps, one in each wing. This is a safety feature should either bus be inoperative. The two pumps within each wing are designated main and auxiliary. These designations are for purposes of identification only as the pumps are identical. A three position switch (MAIN-OFF-AUX) is installed in the center pedestal for each pair of pumps.

FUEL SYSTEM (continued)

FUEL SHUTOFF VALVE

A lever lock toggle switch on the center pedestal in the cockpit controls a fuel shutoff valve for each engine. The shutoff valve is located in the upper left hand comer of the wheelwell along the left hand keelson and the main wing spar.

The shutoff valve is motor operated and controlled by the two position (OPEN-CLOSED) toggle switch. Limit switches are incorporated in the valve to de-energize the motor when the gate reaches the full open or closed position. The position of the valve is annunciated on a sub-annunciator panel when the valve has not reached its intended position.

FUEL CROSSFLOW

The fuel crossflow system provides the capability of maintaining proper fuel balance between integral wing tanks. The system consists of a two inch line that interconnects the wing tanks, a crossflow valve for permitting fuel flow between the tanks, and a fuel drain for quick defueling of the aircraft. The cross-flow line is located in the center section aft of the main wing spar and is accessible through panels in the wing center section. The motor actuated crossflow valve is controlled by a combination light and switch located on the instrument panel. The light illuminates when the switch is actuated to open the valve and remains on until the switch is reactuated to the closed position. In addition, crossflow valve position is annunciated by a light on the sub-annunciator panel. This light illuminates whenever the valve is not in its closed position.

FUEL QUANTITY SYSTEM

The fuel quantity system is comprised of two capacitance fuel gauge systems, one for each integral wing tank. Each system includes five tank sensors, and a low level caution light (XFER PUMP) on the annunciator panel. The fuel quantity system uses the difference in capacitance between fuel and air to measure the amount of fuel in the tanks. As the tank is filled, more of the probes are covered by fuel with a resultant change in capacitance. The dual indicator, which houses a bridge circuit, an amplifier, and servo motor, converts the tank sensor capacitance into a dial presentation of measured fuel quantity in hundreds of pounds. The low level caution light is activated by a float switch in each hopper tank.

Since the density (and therefore weight) of the fuel changes with temperature, the fuel quantity system, without compensation, would only be accurate in a narrow temperature range. To prevent this occurrence, the most inboard fuel probe has a temperature sensitive compensator section. The output of the compensator is used by the indicator to provide an accurate display of fuel weight regardless of temperature.

A push-to-test button near the quantity indicator is used to test each system. When the button is depressed, the indicator needles should move to the 12 o'clock position. When the button is released, the needles should return to the correct fuel quantity indication. This procedure tests all the electrical and mechanical functions within the indicator.

FUEL SYSTEM (continued)

MAGNA-STICKS

Magna-sticks are optional, direct-reading, mechanical fuel level indicators. One is mounted on the fuel cell access plate on the bottom of the wing, just inboard of each nacelle. They provide visual indications of the usable fuel quantity in the respective tank if the tank contains between approximately 30 and 155 U.S. gallons. A doughnut shaped float is free to slide up and down a fixed tube and draw with it a calibrated indicator stick to show the level of fuel in the tank. The indicator stick is normally held fixed inside the tube by locking tabs at the base of the stick. A quarter turn of the base unlocks the stick and allows it to drop down to its indicating position. Magnets draw the indicator stick to the level of the float when the stick is unlocked.

The indicator stick is graduated to show fuel quantity in U.S. gallons. The internal geometry of the fuel tank and the dihedral of the wing affect the spacing of the quantity marks on the stick and limit the useful range of this indicating system. With less than approximately 25 gallons in the tank, the float may rest on structure inside the tank. With more than approximately 160 gallons aboard, the float will be at the top of the tube and no longer floating on top of the fuel. Therefore, Magna-sticks are useful when fuel tanks are less than half full but have at least 30 gallons in them.

Accurate readings are obtainable only when the airplane is on a reasonably level ramp because the Magna-stick indications depend upon the level of the fuel in the tank. Avoid inaccurate readings caused by binding of the indicator stick in its bushing by tapping the bottom surface of the wing around the Magna-stick housing before taking readings. Accurate determination of usable fuel in a tank (within plus or minus two gallons) is obtained by using the plane of the bottom surface of the wing and access plate to read the graduations on the indicator stick.

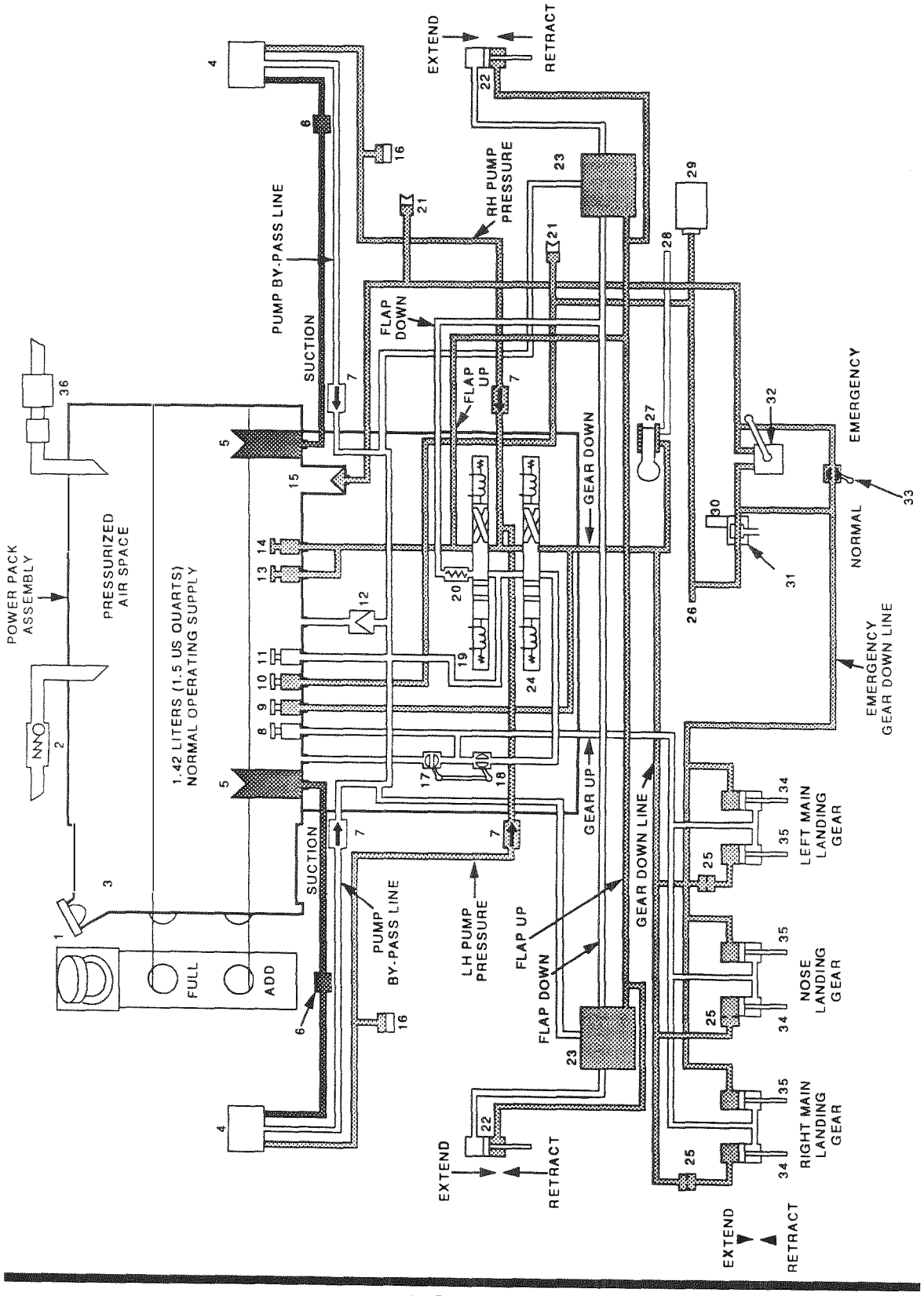

HYDRAULIC SYSTEM SCHEMATIC
POWER PACK ASSEMBLY
PRESSURIZED AIR SPACE
1.42 LITERS (1.5 US QUARTS) NORMAL OPERATING SUPPLY
FULL
ADD
SUCTION
PUMP BY-PASS LINE
LH PUMP PRESSURE
RH PUMP PRESSURE
FLAP UP
FLAP DOWN
GEAR UP
GEAR DOWN
GEAR DOWN LINE
EMERGENCY
NORMAL
EMERGENCY GEAR DOWN LINE
EXTEND
RETRACT
LEFT MAIN LANDING GEAR
NOSE LANDING GEAR
RIGHT MAIN LANDING GEAR

FIGURE 6B-12

HYDRAULIC SYSTEM SCHEMATIC

1. FLUID FILLER & SCREEN
2. PRESSURIZATION RELIEF VALVE
3. HYDRAULIC FLUID RESERVOIR
4. ENGINE DRIVEN HYDRAULIC PUMP
5. PUMP SUCTION STANDPIPE
6. SHUTOFF VALVE
7. ENGINE DRIVEN PUMP CHECK VALVE
8. GEAR UP THERMAL RELIEF VALVE
9. GEAR DOWN THERMAL RELIEF VALVE
10. SYSTEM RELIEF VALVE
11. FILTER RELIEF VALVE ASSEMBLY
12. SYSTEM RETURN FILTER
13. FLAP UP THERMAL RELIEF VALVE
14. FLAP UP SUCTION CHECK VALVE
15. HAND PUMP SUCTION SUMP
16. PRESSURE WARNING SWITCH (I)
17. GEAR BYPASS VALVE
18. GEAR SHUTOFF VALVE
19. FLAP POSITION SELECTOR VALVE
20. FLAP DOWN RESTRICTOR (A)
21. EXTERNAL CONNECTION
22. FLAP ACTUATING CYLINDERS
23. FLAP LOCK VALVE
24. GEAR SELECTOR VALVE
25. GEAR DOWN RESTRICTOR VALVE
26. POWER BRAKE PRESSURE
27. NOSE GEAR STEERING
28. POWER BRAKE RETURN
29. ACCUMULATOR
30. TRANSDUCER
31. SHUTTLE VALVE (I)
32. EMERGENCY HAND PUMP (A)
33. NORMAL/EMERGENCY SELECTOR VALVE (I)
34. GEAR UP/NORMAL GEAR DOWN CYLINDER
35. GEAR UP/EMERGENCY GEAR DOWN CYLINDER
36. PRESSURE REGULATOR

NOTE

COMPONENTS DESIGNATED (A) COMPRISE THE AUXILIARY SYSTEM. COMPONENTS DESIGNATED (I) COMPRISE THE INDICATING SYSTEM. ALL OTHER COMPONENTS COMPRISE THE NORMAL SYSTEM.

FIGURE 6B-12 (continued)

MANUFACTURER'S DATA

HYDRAULIC SYSTEM

The aircraft hydraulic system is a closed center system that provides pressure for normal operation of the landing gear, wing flaps, and nose wheel steering. Major system components are a power pack, two engine driven pumps, two shutoff valves, an accumulator, associated lines, pressure transmitters, lights, and an emergency landing gear down hand pump. A pressure gauge in the instrument panel indicates main or emergency system pressure. System quantity is indicated by a sight gauge system located on the outboard side of the left nacelle. The system is serviced with MIL-H-83282 (Brayco) fluid through pressure quick disconnects located forward of the left main gear doors. Gravity servicing can be accomplished through the power pack reservoir filler cap accessible from the outboard side of the left nacelle.

Hydraulic pressure is tapped off the nose landing gear down line to power the nose wheel steering actuator.

HYDRAULIC POWER PACK

The hydraulic power pack, located in the left hand nacelle, stores fluid and controls pressure provided by the engine driven pumps. Two selector valves in the bottom of the pack control operation of the gear and flaps. The upper portion of the pack is used to store fluid for normal system use. The engine driven pumps are supplied from standpipes which reserve the last quart of fluid for emergency hand pump operation. A shutoff valve is installed in the supply line to each engine driven pump.

MAIN HYDRAULIC SYSTEM OPERATION

Either engine driven hydraulic pump is capable of delivering 5 gpm (19 liters per minute) at 2,000 psi (13790 kPa). When gear or flap selection is made with cockpit controls, a solenoid actuated pilot valve on the power pack directs hydraulic fluid to the gear or flap actuators. Fluid from the return side of the actuators is routed through the opposite side of the selector valve and through a filter to the reservoir. Limit switches actuated by the landing gear retraction mechanism open the circuit to the selector valve, permitting the spring loaded valve to return to the neutral position. The uplock mechanism mechanically locks the landing gear in the up position. With landing gear extended, the selector valve stays in the gear down position and pressure is continuously exerted on the actuators until the engines are shut down and the battery switches are turned off. Normal gear extension or retraction time is five to seven seconds. With one pump inoperative the gear travel times remain about the same (within one second).

ACCUMULATOR

An accumulator is installed near the left side of the hydraulic pack to dampen pressure fluctuations within the system.

HYDRAULIC SYSTEM (continued)

AUXILIARY SYSTEM

The auxiliary system consists of a hand pump, a system selector valve, and a manual hydraulic pressure dump system. The system selector valve, located adjacent to the hand pump, is a two position manually controlled valve. With the selector valve in the EMER GEAR position, the valve is closed and hand pump pressure is directed to the right hand nose gear actuator and the main gear inboard actuators. With the selector valve in the NORM GEAR position, the valve is open. The manual hydraulic pressure dump system consists of two valves in the power pack that shut off flow from the landing gear selector valve and dump fluid from the retract end of the gear actuators to the reservoir. The system is controlled by a lever located adjacent to the copilot's inboard seat track.

WARNING LIGHTS

Two red warning lights on the annunciator panel and a pressure gauge on the instrument panel are used to monitor the hydraulic system. Each warning light is controlled by a pressure switch on the output side of each engine driven pump. The pressure gauge is connected to a shuttle valve. The shuttle valve allows the gauge to display main system pressure or auxiliary system pressure, whichever is greater.

EXCESSIVE HYDRAULIC PRESSURE INDICATIONS

Indicated hydraulic pressure above the normal operating range of 1700 to 2100 psi might be caused by:

- An indicating system malfunction,
- A malfunctioning hydraulic pump, or
- A blocked return line.

In either of the first two cases, the pilot cannot clear the difficulty. Hydraulic system pressure relief valves should prevent a malfunctioning pump from over-pressurizing system plumbing during the remainder of the flight. The difficulty and its duration should be reported to a maintenance organization.

A common occurrence of high indicated hydraulic pressure follows attempts to retract the landing gear with the hydraulic hand pump engage valve rotated to its forward position. In this case, retract pressure exists in all landing gear actuators and lines and emergency extension fluid is trapped between the emergency extension actuators and the hand pump selector valve and pressure indicator. Neither full retraction of the landing gear nor elimination of the excessive hydraulic pressure will occur until the hand pump valve has been returned to its normal position.

HYDRAULIC FLUID SHUTOFF VALVES

Two lever lock toggle switches on the center pedestal control the motor operated hydraulic fluid shutoff valves located in each nacelle aft of the firewall. The hydraulic fluid shutoff valve lights are on the lower left and right of the sub annunciator panel. These lights will illuminate any time the valves are moving from the open to closed or closed to open positions. The lights are "in transit lights" only and do not reflect the precise position of the hydraulic shutoff valves.

LANDING GEAR SYSTEM

Landing gear extension and retraction is electrically controlled and hydraulically actuated. The landing gear handle, located on the cockpit pedestal, is used to direct 28.5 VDC electrical power from the left essential bus to the landing gear selector valve located in the left nacelle over the wing. The selector valve, when actuated, directs hydraulic pressure to the landing gear actuators for either retraction or extension of the gear, as selected. Two actuators are installed on each gear. Both actuators are used for gear retraction. Main hydraulic system pressure is directed to the left actuator on the nose gear and to the outboard actuators on the main gear during normal gear extension. During emergency extension of the gear, auxiliary hydraulic pressure is supplied to the right actuator on the nose gear and to the inboard actuators on the main gear.

As each gear is fully retracted, it engages a mechanical uplock hook. When the last of the three gear fully retracts, the electrical power is shut off to the selector valve. The selector valve moves to the closed (OFF) position, and the actuator lines are ported to retum.

As each gear moves to the fully extended (DOWN) position, its dual drag strut unfolds and the drag strut joints (or elbows) move to an overcenter position. This overcenter position of the extended drag strut is locked by the mechanical interference between a bellcrank and roller strut. Normal hydraulic pressure is applied to the down side of the primary system actuator on each gear until the selector valve closes due to shutdown of both engines (causing loss of normal hydraulic pressure) or the electrical power is shut off. When the emergency hand pump is used, hydraulic pressure is applied to the down side of the auxiliary system actuator on each gear. Emergency hand pump pressure is not routed through the normal selector valve.

The aircraft has the capability of free fall extension of the landing gear. The free fall can be supplemented by hand pumped hydraulic pressure in the event the gear does not lock down.

LANDING GEAR WARNING SYSTEM

The landing gear warning sonalert will sound if:

a. Any landing gear down and locked switch is not made,
b. And either power lever is at the flight idle gate,
c. Or if the flaps are more than half way down, regardless of power lever position.

The micro switches at the flight idle gate are adjusted to sound the sonalert at the gate and through power lever travel approximately 1/8 inch (3mm) forward of the gate. That range corresponds to the range of flight idle power. Therefore, descents at flight idle power may be conducted in the clean configuration without the gear warning sounding by merely advancing the power levers slightly.

If the landing gear warning is generated because the wing flaps are more than half way down and any gear is not down and locked, the warning cannot be silenced by advancing the power levers.

MAIN LANDING GEAR

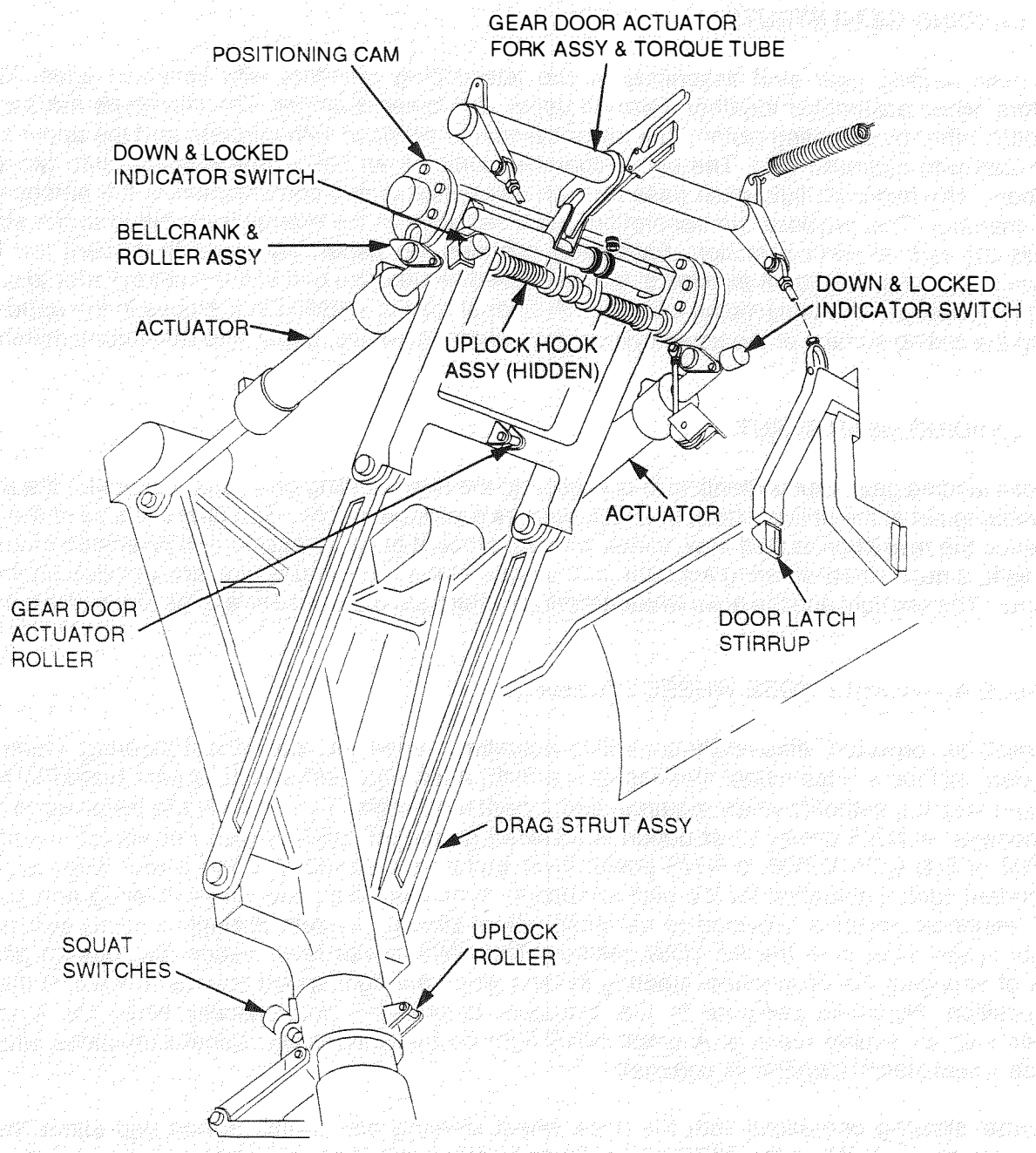


FIGURE 6B-13

LANDING GEAR SYSTEM (continued)

MAIN LANDING GEAR STRUTS

Each main landing gear strut essentially is two telescoping cylinders with enclosed ends. The two cylinders, when assembled together, form an upper and lower chamber. The chambers are separated from each other by a floating piston. The lower cylinder is serviced with nitrogen and the upper cylinder is serviced with hydraulic fluid. The upper chamber contains an orifice that divides it into two smaller chambers. The hydraulic fluid must pass through this orifice during compression of the nitrogen in the lower chamber. This provides the absorption and dissipation of the energy transmitted to the strut and controls the rate of vertical motion. Each strut contains the necessary seals to prevent the loss of nitrogen and hydraulic fluid. A packing gland is installed at the open end of the outer cylinder to seal the sliding joint between the telescoping cylinders. A scraper also is installed in a groove in the upper jacket to keep the sliding surface of the lower cylinder free of dirt, mud, ice, snow, and other contaminants.

NOSE LANDING GEAR STRUT

The nose landing gear strut is identical in operation to the main landing gear strut, except for the addition of a metering pin at the orifice which, in effect, creates a variable orifice. The effective size of the orifice, and hence the restriction to fluid flow, varies with the amount of compression and extension of the strut. A taxi light, a nose wheel steering actuator, and a nose wheel centering device are installed on the nose gear strut. The taxi light and the nose wheel steering system are discussed in later sections of this manual.

VARIABLE AUTHORITY NOSE WHEEL STEERING

A hydraulically powered, electrically controlled actuator is used for nose wheel steering. Controls for the system include a nose wheel steering arm switch, a left-right test switch, a park button to provide increased steering authority when required, and a park mode light. The controls are installed on the left hand console. A NWS power lever button is installed on the left power lever. For aircraft modified by ECP 698 or S.B CC7-32-008, a NWS power lever button is installed on each power lever to provide independent control actuation for the pilot or copilot. Whenever the nose wheel steering arm switch is armed, electrical power is provided to the nose wheel steering system through a micro switch when the right speed lever is at the full LOW position. The NWS power lever button provides an alternate means of engaging the nose wheel steering system when the right speed lever is forward of the LOW RPM position. Hydraulic pressure to the actuators is provided automatically when the system is engaged with an engine running. A green NWS light on the annunciator panel illuminates whenever the nose wheel steering system is engaged.

For normal steering operations with the nose wheel steering arm switch armed and either the right speed lever at low RPM or the NWS power lever button depressed, the rudder pedals are moved to steer the airplane. Steady illumination of the green NWS light indicates that the system is armed and engaged. Arming is not separately annunciated. Steering is available only when the NWS light is illuminated and hydraulic pressure is available. The direction of the aircraft while in motion should respond to rudder pedal deflection. Normal nose wheel deflection is approximately 12 degrees either side of neutral. If more steering authority is required, the park button may be depressed and held. This increases the maximum nose wheel deflection from 12 degrees to approximately 63 degrees left or right. An electrical delay prevents abrupt transition to or from the park mode by gradually varying the gain (authority) of the nose wheel steering amplifier. The park mode light will vary in intensity as an indication of this gain change.

NOSE LANDING GEAR

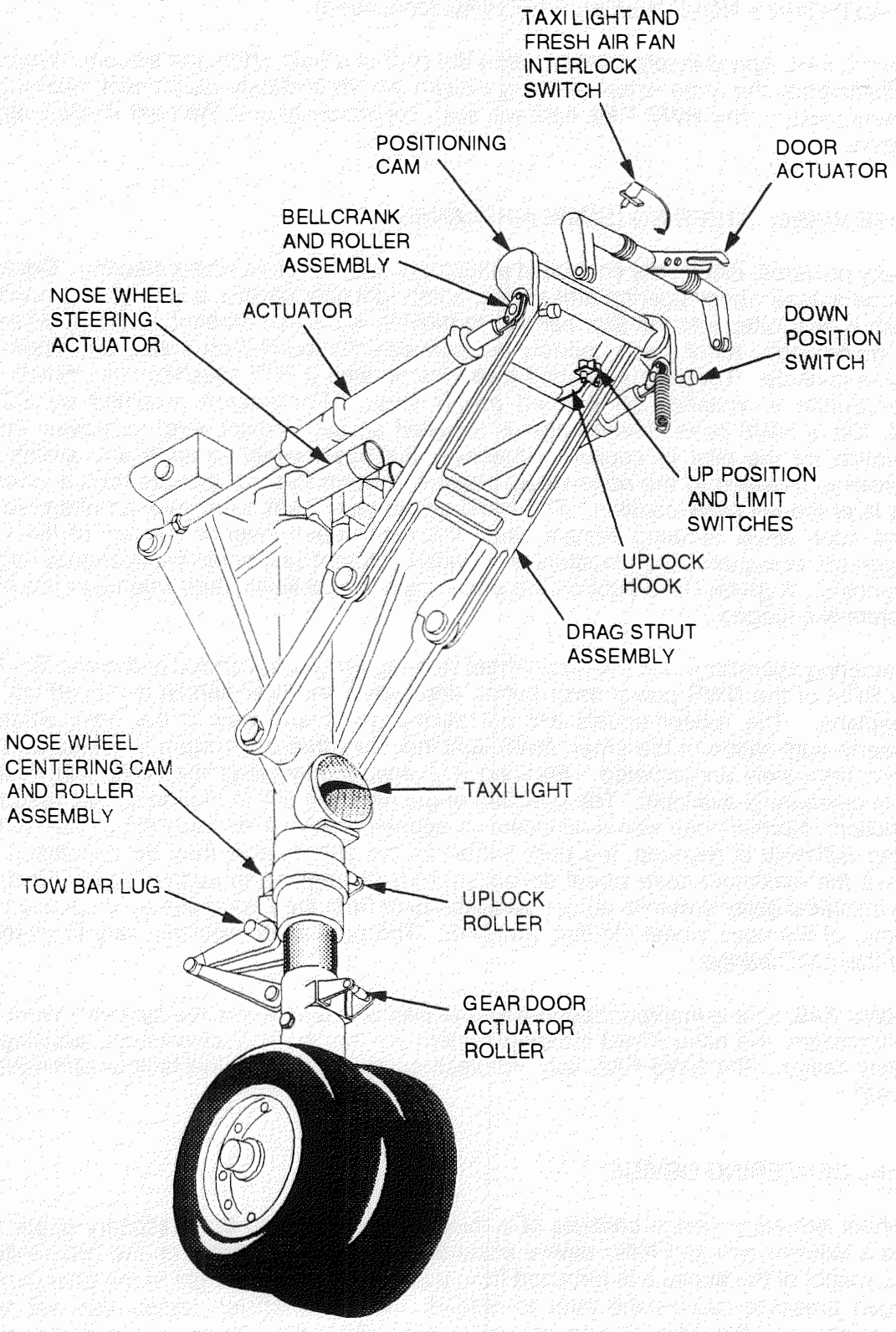


FIGURE 6B-14

LANDING GEAR SYSTEM (continued)

VARIABLE AUTHORITY NOSE WHEEL STEERING (continued)

An amber NWS FAIL light is incorporated to alert the pilot of a fault within the system. When the NWS FAIL light illuminates, the nose wheel steering system will immediately disconnect, allowing the nose wheel to freely caster. The NWS FAIL light will flash continuously until the fault is eliminated and the system is reset.

TILLER NOSE WHEEL STEERING (SOME AIRPLANES)

A hydraulically powered, electrically controlled actuator is used for nose wheel steering. Controls for the system include a nose wheel steering arm switch, a left-right tiller handle, a left-right test switch, a park button (which is integrated into the tiller handle) to provide increased steering authority when required, and a park mode light. All of these controls are conveniently located on a side arm shelf above the pilot's left side console. The side arm shelf also incorporates a PTT (push-to-talk) switch. An NWS power lever button is installed on the left power lever. For aircraft modified by ECP 698 or S.B CC7-32-008, a NWS power lever button is installed on each power lever to provide independent control actuation for the pilot or copilot. Whenever the nose wheel steering arm switch is armed, electrical power is provided to the nose wheel steering system through a micro switch when the right speed lever is at the full LOW position. The NWS power lever button provides an alternate means of engaging the nose wheel steering system when the right speed lever is forward of the LOW RPM position. Hydraulic pressure to the actuators is provided automatically when the system is engaged with an engine running. A green NWS light on the annunciator panel illuminates whenever the nose wheel steering system is engaged.

For normal steering operations with the nose wheel steering arm switch armed and either the right speed lever at low RPM or the NWS power lever button depressed, the tiller handle is moved left or right to steer the airplane. The rudder pedals are not connected in any way to the nose wheel steering system. Steady illumination of the green NWS light indicates that the system is armed and engaged. Arming is not separately annunciated. Steering is available only when the NWS light is illuminated and hydraulic pressure is available. The direction of the aircraft while in motion should respond to tiller handle deflection. Normal nose wheel deflection is approximately 12 degrees either side of neutral. If more steering authority is required, the park button on the tiller handle may be depressed and held. This increases the maximum nose wheel deflection from 12 degrees to approximately 63 degrees left or right. An electrical delay prevents abrupt transition to or from the park mode by gradually varying the gain (authority) of the nose wheel steering amplifier. The park mode light will vary in intensity as an indication of this gain change.

An amber NWS FAIL light is incorporated to alert the pilot of a fault within the system. When the NWS FAIL light illuminates, the nose wheel steering system will immediately disconnect, allowing the nose wheel to freely caster. The NWS FAIL light will flash continuously until the fault is eliminated and the system is reset.

NOSE WHEEL CENTERING DEVICE

The nose wheel centering device consists of a fixed cam attached to the stationary upper section of the strut and a follower arm and roller device attached to the scissors between the two sections of the strut. As the weight of the airplane is removed from the nose gear, the weight of the gear plus the force of the nitrogen pressure causes the strut to extend. These extension forces also are transmitted through the scissors to the follower arm and roller assembly which tracks to the center of the cam and thereby moves the steerable gear to the centered position.

LANDING GEAR SYSTEM (continued)

EMERGENCY EXTENSION OF LANDING GEAR

Both DC electrical power and hydraulic pressure (approximately 250 psi minimum) are required for normal extension of the landing gear. Electrical circuitry for landing gear control and position indication can be switched to either essential bus via one of the nine bus transfer switches located on the pilot's console. Normally, the left essential bus is selected. If a failure of left essential bus power occurs, the circuitry should be switched to the right essential bus. Loss of electrical power from both essential buses or loss of hydraulic pressure will require emergency extension of the gear.

The landing gear emergency extension system includes provisions for manual release of the mechanical uplocks, manual repositioning of valves to bypass the gear selector valve, and a hydraulic hand pump. Stand pipes in the hydraulic reservoir reserve approximately one quart of hydraulic fluid for hand pump operation if a loss of normal system hydraulic fluid occurs. The EMERGENCY PROCEDURES section contains the procedures for emergency extension of the landing gear.

When the emergency release lever, located on the cockpit floor to the left of the copilot's seat, is moved counterclockwise to its stop (approximately 90°), cables release the mechanical uplock on each gear and reposition two gear bypass valves located underneath the forward side of the hydraulic reservoir. The repositioning of these two valves allows the fluid trapped in the "up" lines of the actuators used for normal retraction to bypass the gear selector valve and return to the reservoir. The gear then free falls. The gear weight plus the force of the airstream move the gear to the down and locked position. After the gear has been allowed to free fall, hydraulic fluid via the hand pump is used to apply additional force. The hand pump, located on the cockpit floor adjacent to the pilot's seat, is blocked by an emergency gear valve lever. When this valve lever is rotated approximately 90° counterclockwise, the hand pump by-pass line is closed and the hand pump handle is free. The hand pump can then be actuated to provide hydraulic pressure to the down side of the auxiliary actuator at each landing gear.

A shuttle valve is installed between an engine driven pump pressure line and an emergency hand pump pressure line. The valve is moved by hydraulic pressure to direct the higher of the two pressures via electrical signal from a pressure transducer to the hydraulic pressure gauge located on the copilot's instrument panel. If normal hydraulic pressure has been lost, the hydraulic pressure gauge will indicate hand pump pressure.

BRAKES

Hydraulic pressure for the wheel brake system is generated by depressing the top of the pilot's or copilot's rudder pedals. Braking force is transmitted to the respective wheel brakes via brake hydraulic lines. A brake system hydraulic reservoir and the brake master cylinders are mounted in the nose baggage compartment. The brake hydraulic system is completely independent of the main hydraulic system used for landing gear and wing flap actuation.

PARKING BRAKE

To set the parking brake, push the button in the center of the knob and pull the parking brake control to its fully extended (aft) position. Release the button and hold the knob fully out while applying pressure to either set of brake pedals. Release the brake pedals and then release the parking brake knob (which will stay in its fully extended position).

To release the parking brake, apply pressure to the brake pedals while pushing the parking brake control full forward. Brake pressure will release when the brake pedals are released.

ICE AND RAIN PROTECTION

The following equipment is provided to permit flight operations in adverse weather.

Pneumatic deice boots on wing and horizontal tail leading edges.
Electrically heated windshields for the pilot and copilot.
Electrically operated windshield wipers for the pilot and copilot.
Electrically anti-iced pitot heads and SAS vanes.
Engine inlets anti-iced by bleed air and engine oil heat.
Electrically anti-iced oil cooler duct lips.
Electrically deiced propeller blades.
Oil-to-fuel heat exchangers.
Flush-mounted fuel tank vents.
Ice free static sources.

SURFACE DEICE SYSTEM (WING AND TAIL BOOTS)

Deice boots are installed along each wing and on the horizontal stabilizers. A .010 inch ply of conductive neoprene is provided on the surface to dissipate static electric charges. The boots are lightweight construction and are provided with only one inflation port so that all tubes in any individual section are inflated simultaneously.

DEICE BOOT OPERATION

The deice boot system is served by one distributor valve located in the forward center wing section, right side. The distributor valve functions to apply pressure or vacuum to the deice boots in a sequence selected by the electronic timer.

ICE AND RAIN PROTECTION (continued)

DEICE BOOT OPERATION (continued)

When boots are cycled through by the electric timer they are sequenced as follows:

1. All wing boots are inflated from tip to tip. This phase lasts six seconds.

2. All empennage boots are inflated for a period of four seconds, the wing boots deflating at this time.

3. System rests for 170 seconds, making the overall single cycle time three minutes.

The control switch, located on the pilot's switch panel is a three-way, center-off switch. By placing the switch forward in the AUTO position, the boots will be cycled automatically by the electronic timer on the preceding schedule.

When the control switch is placed in the spring-loaded aft, or MANUAL position, electrical power is directed to both solenoids on the distributor valve, bypassing the electronic timer, and causing all boots to inflate simultaneously. Boots will remain inflated as long as the switch is held in this position. When the switch is released, boots will deflate and again be held flat by vacuum.

Electrical power for the system is supplied from the left or right essential buses, as selected. The transfer switch is normally switched to the left essential bus.

WINDSHIELD HEAT

The windshield panels installed in front of the pilot and copilot are electrically heated. With the control switch in the LOW position, power is supplied by the left essential bus to actuate a relay that places the heating elements of the windshields in series. Power for the heating elements is also furnished by the left essential bus. The sensing elements in the windshield are referenced only to their respective temperature controls. Each temperature control operates a separate control relay. Power applied by the temperature control to operate these relays is also applied to the windshield cycle lights located on the annunciator panel. Since it is possible for one panel to reach temperature cutoff before the other, it is also possible for cycle indication to be limited to one light, the other remaining on.

With the control switch in the HIGH position, power is supplied to the left windshield from the left essential bus and to the right windshield from the right essential bus. Each windshield is cycled independently through the individual temperature controls.

A bus transfer switch is provided to transfer the pilot's windshield heat from the left essential bus to the right essential bus in the event a left essential bus failure occurs. Windshield temperature will be maintained from 90°F to 100°F in either HIGH or LOW position; however, current draw will be approximately one half in LOW.

ICE AND RAIN PROTECTION (continued)

WINDSHIELD WIPER SYSTEM

The windshield wiper system is an electro-mechanical system. Electrical power is supplied by the left essential bus for the pilot's wiper and by the right essential bus for the copilot's wiper, each through its own circuit breaker. A single rocker type double pole-double throw switch with FAST-PARK-SLOW positions provides single switch operation for both pilot and copilot wipers.

The system is activated by moving the rocker type control switch to the FAST or SLOW position. The wiper will run at a maximum speed of approximately 200 strokes per minute when operated on wet glass. By placing the control switch in the SLOW position, the wiper system operates at approximately one-half of the FAST speed. When the control switch is placed in the PARK position, the wiper blades will move automatically to their parked position.

CAUTION

OPERATING THE WINDSHIELD WIPERS ON DRY WINDSHIELDS MAY SCRATCH THE WINDSHIELD SURFACES.

NOTE

The life and serviceability of the windshield wiper system will be improved by restricting use of the wipers to airspeeds below approximately 125 KIAS. Use of the wipers at higher speeds overloads the windshield wiper motors. Furthermore, at high speeds, the wipers tend to stand away from the glass and are relatively ineffective at keeping the windshields clear of precipitation.

PITOT AND SAS ANTI-ICE

Each of the pitot tubes is electrically heated for anti-icing. Each pitot heater receives 28.5 VDC electrical power from its respective left or right essential bus. Two individual switches labeled PITOT & SAS HEAT and PITOT HEAT, are located on the pilot's switch panel.

NOTE

Either pitot heat switch, when moved to the PITOT & SAS HEAT position, will control the respective SAS vane heater element. The PITOT HEAT position of either switch will apply power to only the individual pitot heater.

A loadmeter is located on the left console with a left-right selector switch for checking either the left or right pitot heat circuits, as selected. A green SAS HEAT light on the annunciator panel will illuminate when power is applied to both of the SAS vane heat relays.

ICE AND RAIN PROTECTION (continued)

ENGINE INLET ANTI-ICE

The engine inlets are anti-iced using compressor bleed air which is extracted from a pad on the right side of the engine and routed to an anti-ice valve. From the valve, the air is routed to the engine intake throat and the nose cowl inlet lip.

The anti-ice valve incorporates limit switches to determine valve position. Two three position switches, installed in the cockpit, are used to control power to the valves. When the respective switch is placed in the ENGINE & PROP HEAT position, the anti-icing valve opens and causes the INTAKE HEAT light to illuminate. When the switch is placed in the OFF posi ion, the valve closes and the light will extinguish. When the engine intake heat test button is pressed, the annunciator light will illuminate if the valve is closed. If the annunciator light does not illuminate with the button pressed, the valve is stuck open or partially open.

The leading edge of the oil cooler inlet scoop is heated electrically when the switch is in either the ENGINE & PROP HEAT or PROP & DUCT HEAT position. The heating element on each duct cycles independently when inlet lip temperatures reach preset temperatures. Duct heat cycling is indicated by the indicator lights forward of the tri-meter on the pilot's side console and by fluctuating generator loads.

PROPELLER DEICE SYSTEM

The propeller deice system consists of electrically heated boots bonded to each propeller blade, a slip ring and brush-block assembly (to transfer electrical power to the heating elements), a separate timer for each propeller, an ammeter, a control switch, and the necessary circuit breakers and wiring to complete the system.

To reduce the electrical power requirement, current is cycled to the heating elements on opposing pairs of blades on each propeller. By heating opposing pairs of boots simultaneously on either propeller, rather than simultaneously heating all boots, current draw is held to a low value and rotational balance is maintained during deicing. The timer successively delivers current via the slip ring and brush-block to one pair and then the other pair of boots on the respective propeller. The timing interval is approximately 34 seconds. The timer does not have a "home" position. Heating may begin on either pair of blades, depending on the timer position when the switch was turned off after previous use.

The use of heat at the ice adhesion surface reduces the grip of the ice which is then removed by the centrifugal effect of propeller rotation and the blast of the airstream. The thickness or weight of the ice build-up and the outside air temperature will vary the time required for complete deicing. The system may be used continuously while in flight if needed. When selected, engine and nacelle inlet anti-ice as well as oil cooler duct heat are also activated as these systems are controlled by the same switches on the pilot's switch panel. Electrical power is supplied to the left and right propeller deice systems from the respective 28.5 VDC left and right essential buses.

ICE AND RAIN PROTECTION (continued)

FUEL ANTI-ICING

Fuel anti-icing is accomplished automatically by a temperature controlled anti-icing valve within the high pressure fuel pump portion of the fuel control. Fuel is metered automatically, when the engine RPM is above 60%, to an oil-fuel heat exchanger mounted on the upper left side of each engine. The fuel is heated by hot scavenged oil flowing through the oil-fuel heat exchanger to maintain the fuel temperature above freezing conditions. The flow of fuel to the temperature controlled anti-icing valve is locked out during the start sequence from 0% to 60% engine RPM. The lockout is accomplished by actuating an anti-ice lockout solenoid valve mounted on the fuel control. The anti-ice lockout solenoid valve is actuated to the closed position when the start button is depressed and is actuated to the open position when the 60% engine RPM speed switch opens.

AIRPLANE LIGHTING SYSTEMS

The lighting system is divided generally into three groups; exterior lighting, interior cabin lighting, and cockpit lighting. The cockpit lighting is divided further into those lights powered from the essential buses and those powered from the nonessential bus.

All exterior lighting is powered from the nonessential DC bus. The exterior lighting consists of a standard set of navigation lights, two anti-collision lights, two ice detection lights, two landing lights, two recognition lights, and a taxi light.

All normal cabin lighting is powered from the nonessential DC bus with the exception of the entrance lights, which are powered from the battery side of the left battery relay. The entrance lights include two flood lights above the entrance door and the pilot's overhead flood light. The intensity of the pilot's flood light is controlled normally by its rheostat in the cockpit. However, when it is turned on by use of the entrance lights switch, the overhead flood light illuminates at its maximum intensity.

The edge lighted panel lights in the cockpit are powered by 5 VDC which is obtained from four 5 VDC power supplies connected to the essential buses. The pilot's flight instrument lights and panels are powered from the left essential bus. The copilot's flight instrument lights and panels are powered from the right essential bus.

The remaining cockpit lights are powered from the nonessential bus.

CARGO COMPARTMENT LIGHTING

Compartment lighting is available in the forward baggage compartment and the rear cargo compartment by activation of light switches in the respective compartments. If the airplane primary electrical system is on, lighting is available in these two compartments by selecting the compartment lights switches on. A time delay relay is incorporated in the light circuits to provide electrical power from the right battery for five minutes after primary electrical system is turned off. If more than five minutes time is needed, the auxiliary light system can be recycled for additional use of lights. Momentarily turning on either battery switch, or activating the system by use of the button in the left side of the nose baggage compartment, will reset the auxiliary light system.

AIRPLANE LIGHTING SYSTEMS (continued)

LIGHTING SYSTEM – EXTERIOR

Navigation and Strobe Lights

The airplane is equipped with six navigation lights consisting of two green lights on the right wingtip, two red lights on the left wingtip, and two white lights on the tailcone. These lights are powered from the non-essential bus through a three-position switch located on the pilot's switch panel.

Three white strobe lights mounted one on each wingtip and the third in the tailcone provide additional anti-collision lighting. They are controlled by the same rocker switch that controls the navigation lights. When the forward, NAV & STROBE, position of the switch is selected, the strobe lights operate in conjunction with the navigation lights. The center, OFF, position turns off the navigation and striobe lights. The aft, NAV, position illuminates only the navigation lights.

Taxi Light

The taxi light circuitry consists of a 250 watt lamp assembly mounted on the nose landing gear, a relay located in the nose baggage compartment, and a microswitch in the nose wheelwell.

The taxi light operates on 28.5 VDC supplied by the nonessential bus through a 15 amp circuit breaker. Any time the taxi light switch located on the pilot's switch panel is selected to the ON position, ground will be provided to the relay. Energizing the relay causes current to flow from the nonessential bus, across the relay contacts to the taxi light. The nose landing gear must not be in the up position for the relay to close and the light to illuminate.

NOTE

- It is good practice to ensure the taxi light switch is in the OFF position except when in actual use. Should a malfunction occur and the light be ON when the nose landing gear is retracted, the light is powerful enough to cause heat damage within the nose landing gear wheelwell. However, the microswitch in the nose wheelwell will tum the light out when the landing gear is fully retracted.

- If the taxi light is used during takeoff in hazy or foggy weather, it may produce a disconcerting beam of light as the nose gear retracts after takeoff.

AIRPLANE LIGHTING SYSTEMS (continued)

LIGHTING SYSTEM – EXTERIOR (continued)

Landing and Recognition Lights

A landing and recognition light assembly is mounted in the leading edge of each wing outboard of the fuel cells. Each of these light assemblies contains one landing light and one recognition light. These four lights are controlled by a three position switch located on the pilot's switch panel. The three switch positions are identified as LDG & RECOG, OFF, or RECOG. If the LDG & RECOG position of the switch is selected, both landing lights and both recognition lights are illuminated. The selection of RECOG switch position illuminates only the two recognition lights.

The landing and recognition light assemblies receive 28.5 VDC power through the nonessential bus and are protected by four 15 amp circuit breakers.

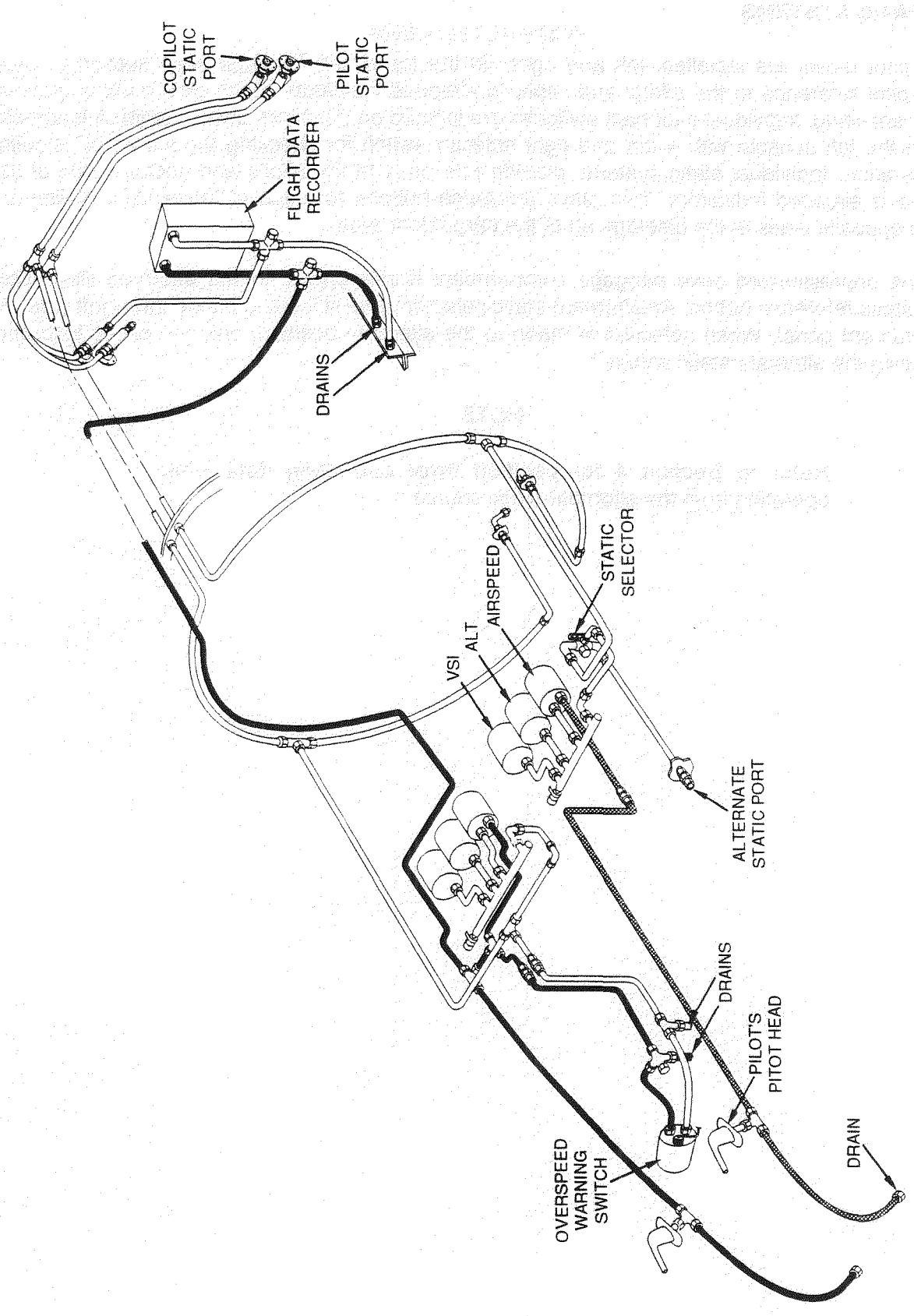
Wing Ice Lights

The wing ice detection light circuitry consists of a 50 watt sealed beam light assembly located in the outboard side of each engine nacelle at the wing leading edge and the light control switch located on the pilot's switch panel.

The wing ice lights receive power from the nonessential DC bus through a five amp circuit breaker.

Anti-Collision Lights

The anti-collision lights consist of two pulsating beacons with clear lenses. One beacon is mounted on the tip of the vertical stabilizer; the other is mounted on the bottom centerline of the wing. The anti-collision lights are controlled by a single, three-position switch located on the pilot's switch panel, in the cluster with other exterior light switches. When the forward, BOTH BCN, position of the switch is selected, both beacons flash in unison. The center, OFF, position turns both beacons off. The aft, TOP BCN, position illuminates only the beacon on the vertical stabilizer. The latter switch position is useful during ground maintenance activities and when taxiing on, or operating from, highly reflective surfaces such as snow-covered or concrete ramps and runways. The anti-collision light circuit is protected by a ten amp circuit breaker on the nonessential DC bus.



PITOT STATIC SYSTEMS

FIGURE 6B-15

PITOT STATIC SYSTEMS

Separate pitot masts are installed, left and right, on the top of the fuselage nose section to provide individual pitot reference to the pilot's and copilot's airspeed indicators. Each pitot mast is electrically heated for anti-icing. Individual pitot heat switches are located on the pilot's switch panel. A loadmeter is located on the left console with a left and right selector switch for checking the individual circuits for proper operation. Individual static systems provide reference to the pilot's and copilot's rate-of-climb, altimeter, and airspeed indicators. Two static reference buttons for each of these static systems are located on opposite sides of the fuselage aft of the cargo door area.

Air from the unpressurized nose baggage compartment is referenced for the alternate static source through a static reference button. An alternate static selector valve is located on the lower left side of the pilot's instrument panel. When selection is made to the alternate position, only the pilot's instruments will be utilizing the alternate static source.

NOTE

Refer to Section 4 for position error correction data when operating from the alternate static source.

POWER PLANT

The SA227-DC is equipped with two Garrett TPE331-12UA-701G, TPE331-12UAR-701G, or TPE331-12UHR-701G single-shaft turboprop engines rated at 1,000 shaft horsepower maximum continuous power, and 1,100 shaft horsepower for takeoff power. At 100% engine RPM, the propeller rotates at 1,591 RPM. The TPE331-12UAR-701G and TPE331-12UHR-701G models include provisions for Reserve Power.

The major components of the engine power section consist of a two stage centrifugal compressor, an annular reverse-flow combustion chamber, and a hree stage axial flow turbine. During operation, ram air enters the upper air scoop and is directed into the center of the first stage compressor where the air is compressed and directed to the second stage compressor. After second stage compression, the air is directed into the plenum surrounding the combustion chamber and then into the combustion chamber. Fuel is sprayed into the combustion chamber, mixed with the compressed air, and ignited. As the mixture ignites, it expands with a great increase in temperature and pressure. The air exits the combustion chamber and is directed to the first axial flow turbine. As the air flows through the axial flow turbine blades, the tur ine wheel is rotated and the air velocity decreases. This process is repeated over the remaining two turbine wheels extracting most of the heat and energy from the air and converting it to rotating mechanical energy. This energy is used to drive the centrifugal compressors, the reduction gears, the propeller, and various engine components. Labyrinth seals situated between the various turbine and compressor wheels prevent back flow of hot gasses from one stage to another.

PROPELLER AND CONTROL

The McCauley propellers on the SA227-DC are oil operated, constant speed, full feathering, and reversible. The propeller governing system consists of engine oil pressure, a feathering spring, and propeller blade counterweights. The engine oil is pressurized by the propeller governor and directed into the propeller dome through a passageway called a beta tube. Oil pressure acts against one side of the piston inside the propeller dome to cause the blades to move from high pitch toward low pitch and, when needed, into reverse. Forces of the feathering spring and counterweights act in the opposite direction to move the blades from low pitch to high pitch. The opposing forces are balanced to keep the engine and propeller turning at the speeds selected by the speed lever. The propeller blades are driven toward feather if the NTS system ports some of the governing oil to the gear case, and they are driven all the way to feather if all of the oil is dumped through the beta tube to the gear case by use of the stop and feather control.

Because the TPE331 engine has a single shaft, it is necessary to have the propeller blades in low pitch position for starting to reduce high drag loads due to air resistance. To allow for this, a pair of centrifugal-mechanical start locks have been installed in each propeller dome. During normal engine shutdown, the propeller blades are placed into reverse pitch as the engine decelerates so that the start locks can engage. During start, the locks are held extended by a shear load placed on them by the propeller blades. Reverse position must again be selected to release the start locks. If the start locks were not engaged during shutdown, refer to NORMAL PROCEDURES for the procedure Before Start Propeller Unfeathering.

POWER PLANT (continued)

ENGINE CONTROLS

The engine controls consist of power levers, speed levers, negative torque sensing systems, single red line computers, and temperature limiting systems.

POWER LEVERS

The power lever controls engine operation in beta and propeller governing ranges. Beta range is used only during ground operations and occurs when the power lever is positioned between flight idle and reverse. When operating in beta range, propeller blade angles are hydraulically selected. Engine speed is controlled by a fuel metering device called the underspeed governor which is part of the fuel control.

Propeller governing range is used during all flight operations and occurs when the power lever is positioned between flight idle and takeoff. When operating in propeller governing range, the power lever assumes the function of a fuel throttle and regulates the amount of fuel metered to the engine for producing desired power.

During landing flare, the power levers are positioned in flight idle to establish predictable thrust and drag and to allow the airplane to settle to the runway at an established rate of descent.

SPEED LEVERS

The speed levers are placarded Low RPM and High RPM. These levers set the speed governors. When the power lever is in beta range, engine speed is controlled by the underspeed governor which limits speed between 70% and 96% to 97.5% RPM. The speed lever can reset the underspeed governor anywhere within this range. When the power lever is in propeller governing mode, engine speed is controlled by the propeller governor. The speed lever can be used to set the propeller governor anywhere within the normal range of 96% to 100% RPM when in the propeller governing mode of operation.

PROPELLER SYNCHROPHASING (If Installed)

Automatic propeller synchrophasing is provided through a toggle switch located forward of the speed levers. The syncrophaser automatically matches the speed of the two propellers and sets a phase angle relationship between the propellers. The difference between propeller speeds can be no greater than 1.4% RPM in order for the synchrophaser to operate. There is no "master" propeller. When the synchrophaser is turned on initially, an increase in RPM of up to 0.7% may be observed on each tachometer.

If the synchrophaser is on and one propeller is subsequently feathered, the RPM of the operating engine will not decrease more than 1.4% before reverting to unsynchronized mode of operation. A similar reversion will occur if the speed of the two propellers differ more than 1.4% RPM. A noticeable audible change in sound level will accompany the reversion to unsynchronized operation. To prevent undesirable RPM excursions, the propeller RPM should be matched closely by use of the speed levers before engaging the synchrophaser.

POWER PLANT (continued)

NEGATIVE TORQUE SENSING (NTS) SYSTEM

The negative torque sensing system operates automatically and requires no cockpit controls. Negative torque occurs whenever the propeller tends to drive the engine rather than when the engine drives the propeller. When negative torque is sensed, propeller pitch will automatically increase toward feather and thus reduce the drag of the windmilling propeller.

SINGLE RED LINE (SRL) COMPUTER

The single red line computer receives information from various sources and computes a single red line temperature that constantly corrects itself for changing flight conditions. This ed line is used to prevent exceeding maximum engine temperatures. Its inputs are: compressor and inlet temperature, exhaust gas temperature, airspeed, and altitude.

TEMPERATURE LIMITER SYSTEM

The temperature limiter system consists of a temperature limiter control box installed aft of the cargo compartment and a fuel bypass valve installed on the engine. A maximum computed EGT value (approximately 650°C) is set in the control box. If engine temperature begins to exceed this preset value, the control box supplies a signal to open the fuel bypass valve and reduce EGT. A blue fuel BY-PASS OPEN light located near each EGT indicator illuminates while the signal is being supplied to the valve. The temperature limiter receives signals from the SRL computer; therefore, loss of the SRL system may cause the temperature limiter to close the fuel bypass and could result in an engine over-temperature condition. During takeoff, the blue bypass light may illuminate with no action required, but in climb and cruise, power levers should be retarded until the lights extinguish. This action should prevent an engine over-temperature condition should the SRL system fail.

The temp limiter and the fuel bypass light illumination operate according to the following logic:

1. SRL OFF light illuminated below 80% RPM ..... NORMAL OPERATION
2. SRL OFF light extinguishes as engine passes through 80% RPM ..... NORMAL OPERATION
3. Bypass light is illuminated at 650°C EGT ..... NORMAL OPERATION
   (FUEL IS BEING BYPASSED TO LIMIT ENGINE TEMPERATURE)
4. Bypass light illuminated in flight at 650°C EGT ..... NORMAL OPERATION
   (RETARD POWER LEVER UNTIL LIGHT IS EXTINGUISHED)

ENGINE INDICATING SYSTEMS

TORQUE INDICATOR

A torque indicator for each engine is located on the instrument panel. The torque indicator receives its voltage inputs from a torque signal conditioner for the respective engine. The torque signal conditioner detects strain gauge torque output at the engine gear box.

The torque signal conditioner requires 22 to 32 VDC to operate accurately. Therefore, whenever aircraft bus voltage drops below 22 VDC, as during battery starts, the output from the torque signal conditioners decreases and causes the torque indicators to indicate erroneously. As bus voltage builds up during engine battery starts, indicated torque will gradually decrease until starter drop-out occurs at approximately 60% RPM. Then bus voltage returns to normal and the torque indicators present factual information.

RPM INDICATOR

One RPM indicator for each engine is located on the instrument panel. The RPM indicator is operated by 28.5 VDC with power normally supplied to the left engine indicator from the left essential bus and from the right essential bus for the right engine indicator.

FUEL FLOW INDICATOR

The temperature compensated fuel flow indicating system consists of a fuel flow transducer and an indicator located on the instrument panel. The transducer converts fuel flow to an electrical signal which is displayed on the fuel flow indicator. The indicator is calibrated in pounds per hour.

FUEL PRESSURE INDICATOR

Each engine is equipped with a fuel pressure indicating system. The system consists of a dual indicator located on the instrument panel and a pressure transducer located aft of the firewall at the top of each engine nacelle.

OIL PRESSURE INDICATOR

Each engine has an oil pressure transducer and an oil pressure indicator. The pressure transducer is located near the oil tank.

OIL PRESSURE WARNING

Each engine is equipped with an oil pressure switch and a low oil pressure warning light located on the annunciator panel. The pressure switch is located close to and is supplied from the line feeding the oil pressure transducer. The pressure switches are set to close when oil pressure is less than 40 psi (276 kPa).

ENGINE INDICATING SYSTEMS (continued)

OIL TEMPERATURE INDICATOR

Each engine is equipped with an oil temperature bulb and an oil temperature indicator. The oil temperature bulb is a standard resistance type bulb installed in the oil temperature port on the center rear face of the reduction gear housing.

CHIP DETECTOR

The forward lower housing of the reduction gear case on each engine is fitted with a magnetic plug having an insulated electrical stud. This stud is connected to a chip detector light located on the annunciator panel. Any metal particles attracted by the magnet will cause the light for the respective engine to illuminate.

ENGINE OIL SYSTEM

The engine oil system provides lubrication and cooling of engine parts and accessories, control of the propeller, and operation of the negative torque sensing system. The basic components of the system are the oil storage tank, oil cooler air scoop, oil cooler, oil pressure transmitter, oil pressure gauge, and the necessary plumbing to supply oil as needed. Total oil system capacity (engine and prop) is 7.1 U.S. quarts (6.8 liters).

Engine oil is contained in a 3.8 U.S. quart (3.6 liter) tank located on the left side of each engine on the firewall section. An access door is provided on each nacelle for inspecting the oil quantity sight gauge.

Oil flows from the oil tank to the engine driven oil pump which provides lubrication for engine bearings and gears. After pressurized oil leaves the oil pump, it is routed through an oil filter. If the filter becomes clogged, the oil will bypass the filter. Scavenge pumps return the oil to the tank by way of the oil cooler. During engine starting, an oil vent valve allows gear case air to enter the oil pumps to decrease starting loads. As engine speed increases, the vent valve closes and the oil pump will return to normal operation allowing oil pressure to be generated.

FUEL CONTROL SYSTEM

The major components of the engine fuel system are the high-pressure boost pump assembly, fuel control, fuel solenoid valve, fuel flow divider, primary nozzles, secondary nozzles, and manifold assemblies. Prior to starting, the electrical components in the aircraft system are energized and fuel is directed to the engine mounted fuel pump through a filter to the high pressure pump. The high pressure pump out-put is directed to the fuel control. The fuel control then meters fuel flow to the fuel solenoid valve. The fuel solenoid valve opens at approximately 10% RPM and permits fuel to enter the flow divider where it is routed to the primary and secondary nozzles and manifold for combustion.

ENGINE START SYSTEM

The start system consists of two starter-generators, two nickel-cadmium batteries, associated relays, switches, circuit breakers, and wiring necessary to furnish power to the start system.

STARTER-GENERATORS

The starter-generators are mounted on the lower right side of each engine. When the start cycle is completed, the unit is switched to the generator mode to provide DC power when selected.

BATTERIES

The two nickel-cadmium batteries that power the start system are rated at 24 ampere hours each at the five hour rate. The batteries are mounted, one in each wing, between the nacelle and fuselage.

SERIES-PARALLEL START MODE SELECTOR SWITCH

The start mode selector switch on the pilot's console allows engine starts on battery power to be made with the batteries in series or in parallel, as required. If a GPU or an engine generator is on the line, the engine start will be in the parallel mode, regardless of start mode selector switch position. With battery power only and with the switch in series position, automatic switching to series at 10% RPM is obtained. As RPM passes approximately 60%, the batteries automatically switch back to parallel. With the switch in parallel position, or if other power is on line, the series-parallel relay is disabled and the batteries remain in parallel during the start sequence. The series mode is recommended for use during the first battery start of the day and for all other battery starts when engines have cooled to near ambient temperatures since last being operated.

COCKPIT VOICE RECORDER

The CVR is capable of recording 30 minutes of four channels of data on an endless magnetic tape. At the end of 30 minutes, previously recorded material is erased and overwritten with new material. Sounds detected by the area microphone are recorded on one channel. A second channel records all incoming signals from the sources selected on the pilot's audio control panel. A third channel is dedicated to the copilot's audio control panel in a like manner. All radio and intercom transmissions made by either pilot will also be recorded by their respective channels. The fourth channel is dedicated to recording public address announcements made by either pilot, provided that a public address system is installed in the aircraft.

The CVR control panel is mounted on the main instrument panel and includes a TEST button, a test meter, a headphone jack, and an ERASE button. The area microphone is located on the glare shield. There is no ON/OFF switch and the recorder runs whenever DC Essential power is available.

COCKPIT VOICE RECORDER (continued)

The TEST buton, when pressed and held a minimum of five seconds, initiates a built-in test. Each of the four recording channels is checked, a test tone is generated and recorded on each channel, and the test meter needle is driven to the green band. Failure of the needle to remain in the green band indicates a fault in the CVR. If a headset is plugged into the CVR control panel, the test tone can be heard during the built-in test. Whenever a headset is plugged into the CVR control panel, a composite playback of the inputs being received and recorded on all four channels will be heard in the headphone (with a 1/4 second delay).

The ERASE button, when pressed and held three seconds, will erase all information on the magnetic tape. This feature is operable only when the landing gear weight-on-wheels switch is in the ground position.

The CVR recording unit is mounted aft of the cargo compartment. It is contained in a crash and fire resistant case. Some installations include an underwater locator beacon mounted on the recorder case. A "g" switch is installed to cut power to the unit in the event of a crash to stop recording and prevent erasure of previously recorded data.

FLIGHT DATA RECORDER

The flight data recorder (FDR) stores approximately twenty-five hours of flight information in solid state memory. There are no controls or switches associated with the FDR, and its operation is completely automatic. The FDR operates when Right or Left Essential DC power is available.

A built-in self-test which requires approximately one minute is initiated each time power is supplied to the recorder. The FDR PWR FAIL light on the main instrument panel may cycle on and off during the self-test, but must be off at the end of the test. Failure of the light to go out (or subsequent re-illumination) indicates loss of the 28 VDC FDR power, loss of 26 VAC heading system power or discrepancies detected during self-test of the FDR internal altitude transducer. Two subsequent successful self-tests are required to extinguish the FDR PWR FAIL light if illumination was caused by the self-test detecting discrepant altitude data.

The FDR PWR FAIL light remains illuminated when the inverters are OFF due to loss of 26 VAC heading excitation.

The FDR installation includes an underwater locator beacon and a "G" switch to cut power and prevent overwriting previously recorded data following a crash impact.

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PILOT'S OPERATING TIPS

USE OF BOOST PUMPS DURING ENGINE GROUND STARTS

During engine start, the electrical power available to the boost pumps is below normal voltage. Operation at low voltage may decrease boost pump motor life. Therefore, it is recommended that the boost pumps be operated during engine ground start only when necessary. The boost pump check made during the engine start procedure normally provides sufficient initial fuel pressure for engine start with the boost pump off. However, accumulation of vapor in the fuel line, such as occurs when the aircraft is defueled and then refueled or when the fuel is exceptionally hot, may require use of the boost pump for engine start. With the boost pump off, excessive vapor in the fuel line will be indicated by a decay in engine acceleration between approximately 30% RPM and 60% RPM. Normal acceleration of engine RPM can be restored by turning the boost pump on.

CROSS GENERATOR STARTS

When starting an engine with the assistance of the opposite generator, stresses on the assisting generator due to initial high current demands may be reduced by use of the following procedure:

1. Battery Switches ..... ON
2. Assisting Generator and Engine ..... ON/OPERATION NORMAL
3. Ammeter Load ..... LESS THAN 150 AMPS
4. Assisting Generator ..... OFF
5. Start Button ..... PRESS AND HOLD
6. RPM ..... 10% TO 12%
7. Observe ignition. Release start button when EGT rises.
8. Assisting Generator ..... RESET/ON
9. Continue normal battery start sequence.

EFFECT OF AMBIENT TEMPERATURE ON STARTING TIME

The time required for an engine to accelerate from 10% to 71% RPM during starting varies with ambient temperature from approximately 50 seconds at 10°C to 80 seconds at either plus 50°C or minus 50°C. These times are based on a normally charged battery or an adequate ground power unit.

PILOT'S OPERATING TIPS (continued)

POWER LEVER MANAGEMENT DURING ENGINE START

Normal procedures call for setting power levers approximately 1/4 inch (6mm) forward of ground idle prior to starting engines on the ground. When the engine controls are properly rigged, that power lever setting ensures that the propeller blades remain on the start locks, the engines come on speed at about 75% RPM, and the pilot has no power lever manipulation to do during the start. However, after considerable use and/or field adjustments, rigging tolerances might become stacked to permit one or more of the following adverse conditions to occur when engine starts are made with the power levers set at approximately 1/4 inch (6mm) forward of ground idle. The possibilities are:

a. Propeller blade angles might be at less than that called for when on the start locks.

b. Slow, warm starts might result when relatively small reverse blade angles exist during start.

c. Excessive wear of the locking ring inside the propeller dome might occur when the locking pins drag slowly out of the ring.

d. The propeller blades might come off the start locks and preclude successful preflight checks of overspeed governors, fuel bypass systems, and/or the SRL – Δ P/P systems.

Provided that the power controls are not grossly misrigged, the following procedure will ensure that minimum blade angles exist throughout the engine start cycle. Consequently, minimum blade resistance will allow relatively cool starts with rapid acceleration, and the blades will stay on the start locks and permit subsequent preflight checks. The disadvantage of the procedure is that engine RPM will be about 90% at the on speed condition if the power lever is not retarded prior to the end of the start cycle.

a. Following the flight idle gate check, leave the power levers at the flight idle gate instead of setting them at approximately 1/4 inch (6mm) forward of ground idle.

b. If on-the-locks checks are required, retard the power lever to regulate RPM at about 75% as the engine approaches 70% RPM.

c. If on-the-locks checks are not required, retard the power lever to ground idle as the engine approaches 70% RPM.

PILOT'S OPERATING TIPS (continued)

PROPELLER START LOCK RELEASE

Propeller start locks are released by the procedure in NORMAL PROCEDURES. Positive assurance that the start locks have released may be gained during taxi. Slowly advance one power lever from ground idle to a positive thrust position. Note aircraft acceleration and turning tendency. Retard power lever smoothly and repeat for opposite engine. If a positive thrust effect is not noted, repeat the procedure for releasing start locks. Always monitor torque when setting power during rolling takeoffs. Failure of torque to rise above approximately 20% indicates the possibility that the associated propeller is still on the start locks.

LOW OIL PRESSURE ANNUNCIATIONS

The low oil pressure warning light on the annunciator panel is operated by an oil pressure sensing switch which operates at approximately 40 psi. The switch is located centrally, aft of the gear case. It is common for the low pressure warning light to blink when taxiing in and out of reverse, particularly if engine oil temperature is above 110^{O}C.

BETA LIGHT OPERATION

Taxi: High pressure beta switches accompany installation of McCauley Propellers. Beta pressure decreases as oil temperature increases. Therefore, it is possible (and permissible) for the beta lights to be out at engine speeds between 70% and 97% RPM during taxi and ground operation if engine oil temperature is above 110^{O}C. However, when operating in the beta mode at oil temperatures below 110^{O}C, the beta lights should be on if engine RPM is 90% or more.

Failure of a beta light to illuminate when oil temperature is below 110^{O}C and operating in the beta range (power lever at ground idle and speed lever at, or above, 90% RPM) indicates a possible internal oil leak in the beta control system. In that case, reverse thrust should not be used during landing roll or takeoff abort because the associated propeller might not reverse properly. Lack of beta light illumination could also indicate other malfunctions within the propeller control system.

In Flight: The beta lights should not be illuminated during normal flight operations. If a beta light illuminates during flight at normal operating airspeeds and power settings, an electrical wiring malfunction is indicated. No flight safety nor handling characteristics issue is associated with this case. If a beta light illuminates during takeoff or during flight at very low true airspeeds with maximum power set, an out-of-tolerance beta pressure switch malfunction is indicated. Again, no flight safety nor handling characteristics issue is associated with this case. Illumination of a beta light when at flight idle power and very low true airspeed, as during approach to a stall, might indicate improper flight idle blade angle settings or that flight idle power is set too low. Provided that engine power remains symmetrical throughout the maneuver and that there is no difficulty in controlling the aircraft laterally and directionally, there is no safety of flight problem. However, if asymmetric power is evident, approach and landing should be planned with power above flight idle. If power asymmetry is severe, the pilot should consider shutting down (Preplanned Engine Shutdown Procedure) the engine which has low flight idle power and conducting a single engine landing.

PILOT'S OPERATING TIPS (continued)

VARIABLE AUTHORITY NOSE WHEEL STEERING TESTS

When the variable authority nose wheel steering test switch is held to either the left or right position, a steering signal is sent to the actuator to tum in that direction. The fault detection circuit immediately senses this signal as a fault and cancels the signal, stops the steering servo, and causes the NWS FAIL light on the annunciator panel to blink. The nose wheel steering will remain disabled and the annunciator light will blink until the test switch is released to its neutral position.

Hold the L/R test switch in the test position only long enough to verify NWS disconnect. When activated, the switch will deflect the nose wheel slightly before disconnecting the NWS. Depending on the amount of deflection, aircraft speed, taxiway slope, etc., the aircraft may drift toward the side selected until the test switch is released.

SETTING TAKEOFF AND CLIMB POWER

The takeoff distance and takeoff climb performance charts show the performance of this aircraft provided the torque required by the ENGINE POWER SETTING charts is set prior to brake release. There is one exception: when atmospheric conditions permit obtaining 110% torque, static torque must be limited to 107% to avoid over-torquing the engines during the latter part of the takeoff roll when ram rises cause set power to increase.

NOTE

Single engine performance is based on the operating engine being capable of producing the static power shown in the ENGINE POWER SETTING charts. V_{MCA} is based on the operating engine producing 110% torque. The pilot should not hesitate to use any additional power available (up to 650^{O}C EGT or limiting torque) if extra power is required during single engine emergencies.

It is important that the pilot set speed lever friction prior to takeoff roll. If friction is loose enough, the speed lever(s) might vibrate to a lower RPM setting which would cause the SRL computer(s) to operate on the inappropriate temperature correction schedule.

PILOT'S OPERATING TIPS (continued)

TAKEOFF RPM

The takeoff and climb performance of the aircraft and the maximum weight at which that performance can be obtained depend upon the power produced by the engine(s). That power is directly related to torque and RPM. The torque to set for takeoff is determined from the engine power setting charts in Section 4. Those torque values are the values required when the RPM is 100%. Less than 100% RPM, or less than chart torque at brake release, means less than "charted" power is set and that less than "charted" performance will be obtained.

When the power levers are set for takeoff, the stabilized RPM indicated in the cockpit can be influenced by several factors. Some of them are:

1. Adjustment of prop governor-high (PGH).
2. The position of the speed levers. PGH can't do its job if the speed levers aren't full forward or if the linkage between the speed levers and the prop governors is maladjusted.
3. Engine oil temperature. High oil temperature will cause the RPM at PGH to be lower than when oil temperature is in the 70 to 75 degree range normally seen during flight. As a rule for every 3°C oil temperature higher than 70° C, you should decrease the nominal value of the stabilized RPM 0.1%.
4. Wind direction and velocity. Static PGH checks on the ground with a strong tailwind will produce low RPM.
5. Accuracy of the tach generator and tachometer. When the RPM's are aurally synched in flight but there is a split in indicated RPM, the split is probably caused by indication error.

Engine oil temperature during prolonged ground operations, particularly during the summer season, can easily exceed 100° C. It is not uncommon to not be able to achieve 100% RPM at speed levers high at such high oil temperatures. However, most commonly during takeoff roll, the oil cools down rapidly and RPM increases to at least 100% (due both to the cooler oil and to the increased velocity of the relative wind).

In summary, there is an operational requirement to have PGH set to achieve 100% to 101% RPM for takeoff. The factors mentioned above affect PGH readings. Therefore PGH must be fine tuned in consideration of these factors to ensure that at least 100% RPM is available for takeoff.

PILOT'S OPERATING TIPS (continued)

SRL COMPUTER SCHEDULES AND SETTING CRUISE POWER

Indicated EGT in the cockpit is the sum of compensated EGT plus a variable correction. The variable correction is dependent upon engine speed and is applied only when the SRL computer is powered and engine speed is above 80% RPM (SRL annunciator lights out). Furthermore, two distinct correction schedules are used: one schedule when engine speed is between 99% and 101.5% RPM, and the other when engine speed is between 95.5% and approximately 98% RPM. When engine speed is changed from takeoff and climb setting (100% RPM) to cruise setting (97% RPM), a noticeable, rapid increase in indicated EGT occurs at the time the SRL computer transitions from the high RPM schedule to the low RPM schedule. Illumination of the fuel bypass lights and torque fluctuation may accompany the transition between the two schedules.

To reduce the apparent abruptness and magnitude of the transition, retard the power levers to less than approximately 580°C EGT before decreasing RPM in flight. Then reset the power levers to desired cruise EGT. Cruise performance charts are based on 650°C and 97% RPM. Precise setting of RPM and EGT is required to obtain that performance. But if 650°C EGT is set, and turbulence or flight control manipulations load the propellers enough to cause RPM to decrease, the EGT will increase and cause the fuel bypass lights to illuminate. Similarly, if RPM is set slightly above 97% and the propellers are unloaded, RPM might increase sufficiently above 98% to cause the SRL computer to transition to the high RPM temperature schedule with associated EGT excursion. Avoid operating with RPM set in the range that allows transitioning between the two temperature schedules. Your passengers will not enjoy the power excursion that may result from improperly set RPM.

REVERSE TAXI OPERATIONS

At maximum ramp weight the speed levers may have to be placed in high RPM and power levers in full reverse to begin initial movement of the airplane. Reverse taxi speed should be controlled primarily with the power levers. Wheel brakes should not be used to stop the aircraft unless absolutely necessary, particularly when stopping from a relatively fast reverse taxi speed and/or with the center of gravity near the aft limit. If wheel brakes are used under these conditions, the weight on the nose wheels will be substantially reduced. Nose tire scrubbing and undesired turns caused by a castering nose gear or uneven braking may result.

The nose wheel steering park button should be used only when negotiating backing turns over 20 degrees. Use of the park button for straight backing or turns of less than 20° will result in overly sensitive response of the nose wheel steering system to rudder pedal inputs.

All reverse taxi operations should be conducted at the minimum speed required to accomplish the desired ground maneuver. As with all ground operations, care should be taken to prevent excessive propeller air blast on personnel or equipment directly in front of the airplane during reverse taxi operation. Use of reverse at slow speeds when on taxiways or ramps that are not clean will result in prop blade erosion and nicks from loose gravel or other debris.

PILOT'S OPERATING TIPS (continued)

CABIN PRESSURE CONTROLLER OPERATION

The cabin pressure controller operates to keep the cabin pressure at the pressure altitude selected on the controller. It is important to realize that the controller recognizes only standard day altitudes. Thus, if the controller is set to pressurize 100 feet above field elevation on a day when the altimeter setting is well above 29.92 in. Hg. (1013.2 millibars), the airplane will be several hundred feet in the air after takeoff with bleed air ON before pressurization begins. Similarly, with the same controller setting during landing approach to the same airport, the air lane will be depressurized well above touchdown and the crew and passengers will experience pressure build-up at a rate equal to the rate of descent during the landing approach. Selecting a cabin altitude slightly below field elevation on high pressure days will eliminate the high rate of pressure increase during final approach.

Conversely, if it is a day with an altimeter setting well below 29.92 in. Hg. (1013.2 millibars), the selected cabin altitude should be higher than field elevation to avoid an objectionable pressurization bump immediately after lift-off with bleed air on and to avoid touchdown with the airplane still pressurized.

During takeoff the bleed air may be turned off. Therefore, the pilot should set the cabin altitude after considering the altimeter setting and the altitude where he predicts he will be when he turns the bleed air switches on, or CAWI switch off, after takeoff. Turning the bleed air switches on one at a time before reaching the altitude where pressurization will begin should prevent the "bump" associated with sudden pressurization.

With sea level selected on the cabin pressure controller, the cabin will maintain that altitude until the aircraft exceeds 16,800 feet pressure altitude.

COCKPIT LIGHTING

The cockpit is equipped with DC lighting. The integrally lighted instruments and the edge-lighted panels are also DC powered.

Spare bulbs are stored behind the pilot's seat. The 327 bulbs are used in press-to-test lights, the 334 bulbs are used in glareshield lights, the 328 bulbs are used in post lights and the standby magnetic compass, and the 6839 bulbs are used in the landing gear position indicator, crossflow valve switch position light, oil cooler duct heat lights, and the fuel, hydraulic, and crossflow valve position lights.

NOTE

Bulbs must be verified for the correct type prior to replacement of burned out bulbs.

PILOT'S OPERATING TIPS (continued)

ENGINE FLAMEOUTS

If air or fuel flowing to the combustion chambers is interrupted, any turbine engine is apt to flame out. Although every potential cause of such interruptions cannot be predicted, it is known with certainty that ingestion of large quantities of slush or ice have caused TPE331 engines to flame out. Flameouts due to slush ingestion have occurred during both takeoff and landing rolls. Flameouts in flight have occurred when large amounts of ice shed from prop spinners, when sheets of ice inside the intake throats slid back after engine and prop heat was selected, and after the airplane was flown into air warm enough to loosen the accumulation of ice in the throats. Some of these flameouts occurred after leaving icing conditions when visible precipitation or moisture no longer existed in the vicinity of the airplane. In every reported case of flameout due to ice or slush ingestion, the continuous ignition system was not operating. Fairchild Aircraft has received no reports of sustained flameouts on SA227 aircraft when the continuous ignition systems were operating in accordance with AFM procedures.

The continuous ignition systems were developed and installed to provide a source of ignition to ensure immediate relight if either air or fuel flowing to the combustion chambers is interrupted temporarily. Those systems can do their job properly only when operated in the sequence shown in the procedures sections of the AFM.

PILOT'S OPERATING TIPS (continued)

OPERATIONS WITH STANDING WATER, SLUSH, OR WET SNOW ON THE RUNWAY

Standing water, slush, and wet snow all appear to affect aircraft takeoff and landing performance in the same way. During takeoff, acceleration is reduced by the impingement of spray on the aircraft. At some speed, during the acceleration, the wheels will start to hydroplane. When the nose wheel hydroplanes, it becomes relatively ineffective for steering. This effect will be especially noticeable during crosswind conditions; however, rudder effectiveness should be sufficient to control the airplane. When the nose wheel hydroplanes, the amount of extra drag appears to be reduced since the spray pattern narrows with a resulting reduction of impingement on the aircraft, and therefore, hydroplaning is not a completely adverse condition for takeoff. During landing, the problems encountered are obviously those of reduced brake and steering effectiveness. Once started, hydroplaning is likely to continue well below the speed at which it would start during takeoff. However, ground idle drag should promptly decelerate the aircraft through the hydroplaning speed range. Heavy use of reverse thrust should be reserved for emergency stopping situations. The cloud of spray produced may obstruct forward visibility and result in engine ingestion sufficient to cause flameout.

Exact data on the changes in aircraft performance caused by runway coverings are not available. The amount of performance deterioration is a function of both runway conditions and aircraft configuration. It is recommended that current FAA Advisory Circular guidelines concerning performance with water, slush, or snow on the runway be followed.

For takeoff, the required runway length should be increased by at least 30% for depths of up to 1/2 inch of standing water, slush, and/or wet snow. When the depth of the covering extends over an appreciable part of the runway and exceeds 1/2 inch, takeoff should not be attempted. For landing, a minimum of 30% additional runway should be allowed for wet or slippery runway.

NOTE

Use continuous ignition for takeoff or landing on a wet or snow/slush covered runway to ensure immediate relight in the event that engine combustion is interrupted by ingested water, slush, or snow during the ground roll.

PILOT'S OPERATING TIPS (continued)

NOISE CONTROL

Many people object to the sounds of aviation. Therefore, out of consideration for the public and to avoid possible legal restrictions, every effort should be made to minimize the noise impact of each flight. Appropriate use of Minimum Normal Operating Power (MNOP) and the following procedures will lessen the noise perceived by both those on the ground and the passengers aboard your aircraft.

NOTE

MNOP is defined as:

97% RPM and 100% torque or 650°C EGT, whichever is encountered first. It is equivalent to maximum cruise power.

Takeoff and Climb

1. Maintain takeoff power and V_2 +5 until obstacles are cleared, then retract flaps and accelerate to V_Y.
2. Reduce power to MNOP and continue climb at V_Y until reaching 2,000 feet AGL.
3. Continue climb with MNOP set or increase power to MCP if required or desired to obtain better climb performance.

Enroute

1. Avoid unnecessary flight at low altitudes over noise sensitive areas.
2. Maintain at least 2,000 feet AGL when flying at high power.

Approach

1. Delay resetting RPM from cruise to 100% until after gear and one-half flaps are down.
2. Conditions permitting, delay RPM increase until after flaps are full down.

PILOT'S OPERATING TIPS (continued)

INTENTIONAL ONE ENGINE INOPERATIVE SPEED (V_{SSE})

The intentional one engine inoperative speed (V_{SSE}) is the speed above which an engine may be intentionally and suddenly flamed out for pilot training purposes and must not be confused with the demonstrated minimum control speed (V_{MCA}). V_{SSE} is to be used as the starting speed when training pilots to recognize the low speed, single engine, handling qualities and performance of the SA227-DC. After ensuring proficiency in controlling the airplane at V_{SSE}, it is permissible to slow down with one engine inoperative toward V_{MCA} to further increase the trainee's awareness, proficiency, and confidence.

Several factors must be considered prior to intentionally rendering an engine inoperative in flight by either pulling the engine stop and feather control part way out, or stopping fuel flow by shutting it off at the firewall with the fuel shutoff switch. Pertinent factors are terrain proximity, gross weight, airspeed, gear and flap configuration, pilot proficiency, and the necessity for flaming out the engine.

NOTE

Retarding a power lever to the flight idle stop to simulate a failed engine at low airspeed will provide approximately the same control and performance problems as will rendering an engine inoperative intentionally. Power lever chops do not adversely affect the engine. With the failed engine at flight idle power, it is readily available to be used to recover from excessive loss of airspeed, altitude, control, or possible difficulties with the operating engine.

WARNING

FAIRCHILD AIRCRAFT RECOMMENDS THAT THE INHERENT SAFETY MARGINS OF SIMULATING ENGINE FAILURE, RATHER THAN ACTUALLY RENDERING AN ENGINE INOPERATIVE, BE USED DURING PILOT TRANSITION AND CHECK OUT.

PILOT'S OPERATING TIPS (continued)

INTENTIONAL ONE ENGINE INOPERATIVE SPEED (V_{SSE}) (continued)

If it is deemed necessary to intentionally render an engine inoperative during initial climbout for pilot training or check out, the following conditions define the circumstances under which the chosen V_{SSE} is valid. Check Takeoff Weight Limitation Charts in Section 4 for conditions more critical than those shown.

Prior To Intentional Engine Failure

Airport Density Altitude	5,000 FEET MAXIMUM
Minimum Altitude	100 FEET ABOVE GROUND
Both Engines	TAKEOFF POWER (ENGINE ANTI-ICE OFF)
Landing Gear	RETRACTING OR RETRACTED
Wing Flaps	NO MORE THAN 1/4
Gross Weight	14,000 POUNDS MAXIMUM
Bleed Air	ON OR OFF
Airspeed (V_{SSE})	115 KIAS MINIMUM

NOTE

- The right engine is the critical engine and will create the more challenging directional control problem if it is rendered inoperative.
- Commanding high propeller blade angle by keeping the power lever of the failed engine well forward will reduce windmilling propeller drag in the event that NTS failure accompanies intentional engine failure.

INTENTIONAL ONE ENGINE INOPERATIVE SPEED IS

115 KIAS

PILOT'S OPERATING TIPS (continued)

INTENTIONAL ONE ENGINE INOPERATIVE SPEED (V_{SSE}) (continued)

After Intentional Engine Failure

Operating Engine ..... TAKEOFF POWER
Landing Gear ..... RETRACTED
Wing Flaps ..... RETRACTED
Engine Stop and Feather Control (Failed Engine) ..... PULLED
Bleed Air ..... OFF
Airspeed ..... V_{YSE}

WARNING

AT HIGH GROSS WEIGHT AND AT HIGH DENSITY ALTITUDES, ALTITUDE MUST BE SACRIFICED TO ACCELERATE FROM V_{MCA} to V_{YSE}.

CAUTION

- REPEATED INTENTIONAL FLAMEOUTS WHEN OPERATING AT HIGH ENGINE POWER WILL EXPOSE THE ENGINE TO UNNECESSARY AND EXCESSIVE THERMAL SHOCKS AND WILL LIKELY REDUCE ENGINE LIFE.

- DO NOT ALLOW THE ENGINE TO WINDMILL IN THE 18% TO 28% RPM RESTRICTED RANGE.

NOTE

- To demonstrate Reserve Power operation, set operating engine to MCP and position CAWI/RES PWR switch to RES PWR. The net torque increase is approximately 4%, when EGT is stabilized at approximately 650°C. Observe maximum torque and EGT limitations. It is advisable to minimize the exposure time with RES PWR on in a training environment due to the significant time and cycles penalty imposed. (See page 1-6)

- Provided that the aircraft is not lower than 1,000 feet above the ground and that it is light enough to maintain regulatory terrain clearance and to remain above stall warning speed, it is permissible to slow from V_{SSE} to V_{MCA}. Remember the minimum airspeed for an airstart is 100 KIAS.

- If gross weight and performance permit, additional training experience can be gained at speeds close to final approach speed by extending the landing gear and flaps to demonstrate the significantly increased controllability problem when at high single engine power in the landing configuration.

APPROVED ENGINE OILS

Approved engine oils as listed in Garrett Installation Manual IM-5117 are:

Mobil Jet Oil II
Exxon (Enco/Esso) Turbo Oil 2380
Castrol 5000
Aeroshell/Royco Turbine Oil 500
Aeroshell/Royco Turbine Oil 560
Mobil 254

AiResearch Specification EMS53110 Type II is equivalent to Military Specification MIL-L-23699B.

NOTE

Do not mix types or brands of oil.

CONVERSION TABLES

DISTANCE

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
1	3	10	33	100	328	1,000	3,281
2	7	20	66	200	656	2,000	6,562
3	10	30	98	300	984	3,000	9,843
4	13	40	131	400	1,312	4,000	13,123
5	16	50	164	500	1,640	5,000	16,405
6	20	60	197	600	1,969	6,000	19,686
7	23	70	230	700	2,297	7,000	22,967
8	26	80	263	800	2,625	8,000	26,248
9	30	90	295	900	2,953		

TEMPERATURE

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
–40	–40.0	–24	–11.2	–8	17.6	8	46.4	24	75.2	40	104.0
–39	–38.2	–23	–9.4	–7	19.4	9	48.2	25	77.0	41	105.8
–38	–36.4	–22	–7.6	–6	21.2	10	50.0	26	78.8	42	107.6
–37	–34.6	–21	–5.8	–5	23.0	11	51.8	27	80.6	43	109.4
–36	–32.8	–20	–4.0	–4	24.8	12	53.6	28	82.4	44	111.2
–35	–31.0	–19	–2.2	–3	26.6	13	55.4	29	84.2	45	113.0
–34	–29.2	–18	–0.4	–2	28.4	14	57.2	30	86.0	46	114.8
–33	–27.4	–17	1.4	–1	30.2	15	59.0	31	87.8	47	116.6
–32	–25.6	–16	3.2	0	32.0	16	60.8	32	89.6	48	118.4
–31	–23.8	–15	5.0	1	33.8	17	62.6	33	91.4	49	120.2
–30	–22.0	–14	6.8	2	35.6	18	64.4	34	93.2	50	122.0
–29	–20.2	–13	8.6	3	37.4	19	66.2	35	95.0	51	123.8
–28	–18.4	–12	10.4	4	39.2	20	68.0	36	96.8	52	125.6
–27	–16.6	–11	12.2	5	41.0	21	69.8	37	98.6	53	127.4
–26	–14.8	–10	14.0	6	42.8	22	71.6	38	100.4	54	129.2
–25	–13.0	–9	15.8	7	44.6	23	73.4	39	102.2	55	131.0

WEIGHT

Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.	Kgs.	Lbs.
1	2	10	22	100	221	1,000	2,205
2	4	20	44	200	441	2,000	4,409
3	7	30	66	300	661	3,000	6,614
4	9	40	88	400	882	4,000	8,818
5	11	50	110	500	1,102	5,000	11,023
6	13	60	132	600	1,323	6,000	13,228
7	15	70	154	700	1,543	7,000	15,434
8	18	80	176	800	1,764	7,484	16,500
9	20	90	198	900	1,984	8,000	17,637

CONVERSION TABLES

PRESSURE

Milli-bars	0	1	2	3	4	5	6	7	8	9
	INCHES HG									
910	26.87	26.90	26.93	26.96	26.99	27.02	27.05	27.08	27.11	27.14
920	27.17	27.20	27.23	27.26	27.29	27.32	27.34	27.37	27.40	27.43
930	27.46	27.49	27.52	27.55	27.58	27.61	27.64	27.67	27.70	27.73
940	27.76	27.79	27.82	27.85	27.88	27.91	27.94	27.96	27.99	28.02
950	28.05	28.08	28.11	28.14	28.17	28.20	28.23	28.26	28.29	28.32
960	28.35	28.38	28.41	28.44	28.47	28.50	28.53	28.56	28.58	28.61
970	28.64	28.67	28.70	28.73	28.76	28.79	28.82	28.85	28.88	28.91
980	28.94	28.97	29.00	29.03	29.06	29.09	29.12	29.15	29.18	29.21
990	29.23	29.26	29.29	29.32	29.35	29.38	29.41	29.44	29.47	29.50
1000	29.53	29.56	29.59	29.62	29.65	29.68	29.71	29.74	29.77	29.80
1010	29.83	29.85	29.88	29.91	29.94	29.97	30.00	30.03	30.06	30.09
1020	30.12	30.15	30.18	30.21	30.24	30.27	30.30	30.33	30.36	30.39
1030	30.42	30.45	30.47	30.50	30.53	30.56	30.59	30.62	30.65	30.68
1040	30.71	30.74	30.77	30.80	30.83	30.86	30.89	30.92	30.95	30.98
1050	31.01	31.04	31.07	31.10	31.12	31.15	31.18	31.21	31.24	31.27

TURBINE FUEL

Lbs.	Gal.	Liters	Lbs.	Gal.	Liters	Lbs.	Gal.	Liters
10	1.5	5.7	100	15	57	1,000	150	567
20	3.0	11.3	200	30	113	2,000	300	1,134
30	4.5	17.0	300	45	170	3,000	449	1,701
40	6.0	22.7	400	60	227	4,000	599	2,268
50	7.5	28.4	500	75	284	5,000	749	2,835
60	9.0	34.0	600	90	340			
70	10.5	39.7	700	105	397			
80	12.0	45.4	800	120	454			
90	13.5	51.0	900	135	510			

NOTE

Fuel conversions are approximate and will vary with fuel temperature. The quantities are based on 6.6763 pounds per U.S. gallon, and 3.785 liters per U.S. gallon.

INTRODUCTION

Section 7 of this manual contains supplements necessary for the safe operation of optional or new components that may be installed on the basic aircraft. Each supplement will normally cover a single system, device, or piece of equipment. Systems consisting of several components may have supplements for each component or the system as a whole depending on the scope of the change or addition.

Some supplements may apply only to a specific, or limited number of, aircraft. Others may be applicable to all SA227-DC aircraft, but only if specific operators choose to take advantage of the optional equipment or information. The List of Supplements includes all currently available supplements which are prepared by Fairchild Aircraft and cannot include those supplements prepared by vendors for use with their optional equipment (e.g., an autopilot).

It is the responsibility of the SA227-DC operator to ensure that appropriate supplements are filed with his basic AFM. Supplements which do not apply to your aircraft should not be included with the AFM.

Pages in this section that are FAA approved are so identified.

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LIST OF SUPPLEMENTS

Suppl. No.	Description	Date
1	Takeoff with SRL Off/Inoperative (Applies to Aircraft with –10 SRL Computers)	JUN 19/92 Revised: MAY 24/93
2	C-26B Configuration (C-26B Aircraft Only)	DEC 06/91 Revised: JAN 26/96
3	C-26B Surveillance Configuration (C-26B Aircraft Only)	JUN 16/94 Revised: JAN 12/96
4	Aircraft Braking Systems (ABS) Anti-skid/Power Brake System (If installed in accordance with Fairchild Aircraft drawing number 27-85211)	JUL 22/94 Revised: NOV 27/96
5	Minimum CAWI Fluid Quantity for Single Engine Takeoff with Continuous Alcohol-Water Injection (If installed in accordance with ECP 692, drawing number 27-82195, or Service Bulletin CC7-82-004)	MAY 15/95
6	Trim-in-Motion Tone Generator and Overspeed Warning System (If installed per ECP 705, or kit drawing 27K82818)	JUN 06/96
7	Alternate Static System with Collins EFIS-84 (If installed in accordance with Fairchild Aircraft drawing number 27-88759 Rev A)	MAR 26/96
8	Pitot Heat Warning System (If installed in accordance with Fairchild Aircraft Drawing number 27-14063-13)	OCT 04/96

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SA227-DC

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

SA227-DC

TAKEOFF WITH SRL OFF /INOPERATIVE
APPLIES TO AIRCRAFT WITH –10 SRL COMPUTERS

Registration No._____

Serial No._____

This supplement must be attached to the FAA Approved Airplane Flight Manual when takeoff and flight operations are conducted with either, or both, of the Single Red Line (SRL) systems inoperative. The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA Approved by: Michele M Owsley
Michele M. Owsley
Manager, Airplane Certification Office
Federal Aviation Administration
Ft. Worth, Texas 76193-0100

Date: June 19, 1992

LIST OF REVISIONS

Revisions to the Airplane Flight Manual provide current information applicable to operation of the SA227-DC aircraft. Revised pages should be inserted in the manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when all current revisions are incorporated.

Revision Number	Revised Pages	Description of Revision	FAA Approved Signature	Date
1	ALL	Changed procedures in Before Starting Engines to include use of Takeoff Power Check Chart, changed Note under Power Levers in Takeoff – Dry and changed supplement to apply to –10 SRL computers.	Richard L Vaughn	5/24/93

A black bar in the margin of a revised page shows the current change.

INTRODUCTION

This supplement presents information relative to operation of the Garrett TPE331-12UHR-701G engine with the Single Red Line (SRL) system inoperative. The performance contained in the basic flight manual is applicable. However, limiting takeoff and landing performance is determined by entering the charts at actual outside air temperature (OAT) plus 5°C. When power is limited by ambient conditions, takeoff torque is set using care to avoid exceeding maximum allowed SRL INOP EGT. Maximum EGT will vary with the OAT. The placard shown in this supplement must be installed prior to takeoff operations with an SRL system inoperative.

SECTION 1 . . . . . .LIMITATIONS

ENGINE OPERATION WITH CONTINUOUS ALCOHOL WATER INJECTION (CAWI)

Takeoff with CAWI is prohibited when either SRL system is inoperative.

ENGINE OPERATION WITH RESERVE POWER (RES PWR)

Reserve Power must not be used with an inoperative SRL or Temp Limiter.

SINGLE RED LINE COMPUTER (SRL)

Takeoff operations with either or both SRL systems inoperative is permitted when the airplane is operated in accordance with this supplement and in accordance with an approved MEL. That MEL must refer to this supplement for takeoff and continued flight operations with SRL system(s) inoperative.

For SRL inoperative operations, takeoff with BOTH cabin bleed air and engine anti-ice ON is prohibited. (Either one may be used during takeoff, provided the other one is OFF).

OPERATING WEIGHTS

The maximum operating weights listed in the LIMITATIONS section of the basic flight manual or applicable supplement, must be determined by entering the appropriate performance charts with the actual outside air temperature plus 5°C.

MINIMUM CREW

The minimum crew is two pilots.

SECTION 1 . . . . . .LIMITATIONS (continued)

PLACARDS

To be installed aft of the compass fairing for operations with SRL system(s) inoperative.

SRL INOP EGT LIMITS

–10 SRL COMPUTER
FOR DRY POWER TAKEOFF OR GO - AROUND AT 100% RPM :

OAT (°C)	OAT (°F)	EGT (°C)
50	122	628
40	104	620
30	86	611
20	68	603
10	50	595
0	32	587
–10	14	579
–20	–4	572
–30	–22	565
–40	–40	559

WHEN EGT LIMITED, ENTER AFM PERFORMANCE CHARTS AT OAT +5°C

FOR MCP AT V_{YSE} :

IOAT (°C)	EGT (°C)
50	637
40	627
30	619
20	610
10	602
0	594
–10	586
–20	578
–30	572
–40	569

NOTE

Because of the need to allow for a number of variables, the SRL INOP EGT LIMITS for takeoff power are lower than those scheduled for MCP AT V_{YSE}.

SECTION 2 . . . . . .NORMAL PROCEDURES

This supplement does not change normal procedures of the basic AFM. Section 3A of this supplement provides abnormal procedures to be followed when an SRL system has been found inoperative.

SECTION 3 . . . . . .EMERGENCY PROCEDURES

In any takeoff or go-around situation requiring takeoff power when both SRL systems are inoperative, set the placarded SRL INOP LIMIT EGT for the existing OAT or 110% torque, whichever is encountered first.

In any climb situation requiring maximum continuous power (MCP) when both SRL systems are inoperative, set the EGT value from the bottom table of the cockpit placard (page 4) or 100% torque, whichever is encountered first.

If only one SRL system is inoperative, proper power setting of the engine with the inoperative SRL can be obtained by matching the torque of the engine with the inoperative SRL to that of the engine with the operative SRL. It is important to monitor engine indications to ensure that SRL INOP LIMIT EGT is not exceeded.

CAUTION

TEMPERATURE LIMITER PROTECTION IS NOT AVAILABLE WHEN THE SRL SYSTEM IS INOPERATIVE. SET POWER LEVERS CAREFULLY WHEN ABOVE 50% POWER TO ALLOW FOR EGT INDICATION LAG. IMPROPER POWER MANAGEMENT CAN RESULT IN ENGINE OVER TEMPERATURE CONDITIONS.

SECTION 3A . . . . . .ABNORMAL PROCEDURES

FLIGHT OPERATIONS WITH SRL SYSTEM(S) INOPERATIVE

PREFLIGHT

Use procedure in Section 2, basic manual.

BEFORE STARTING ENGINES

Use procedure in Section 2, basic manual with following exceptions:

- SRL – Δ P/P Power Switch (affected engine) ..... SRL OFF
- Temperature Limiter Circuit Breaker (affected engine) ..... PULL
- Use actual OAT + 5°C to determine maximum allowable takeoff weight and the takeoff torque to be used on both engines.
- Use actual OAT to determine the maximum takeoff power torque from the applicable AFM Takeoff Power Check Chart and the maximum allowable SRL INOP EGT on the engine(s) with inoperative SRL for takeoff and initial climb or go-around operations from Figure 1 or the cockpit placard.

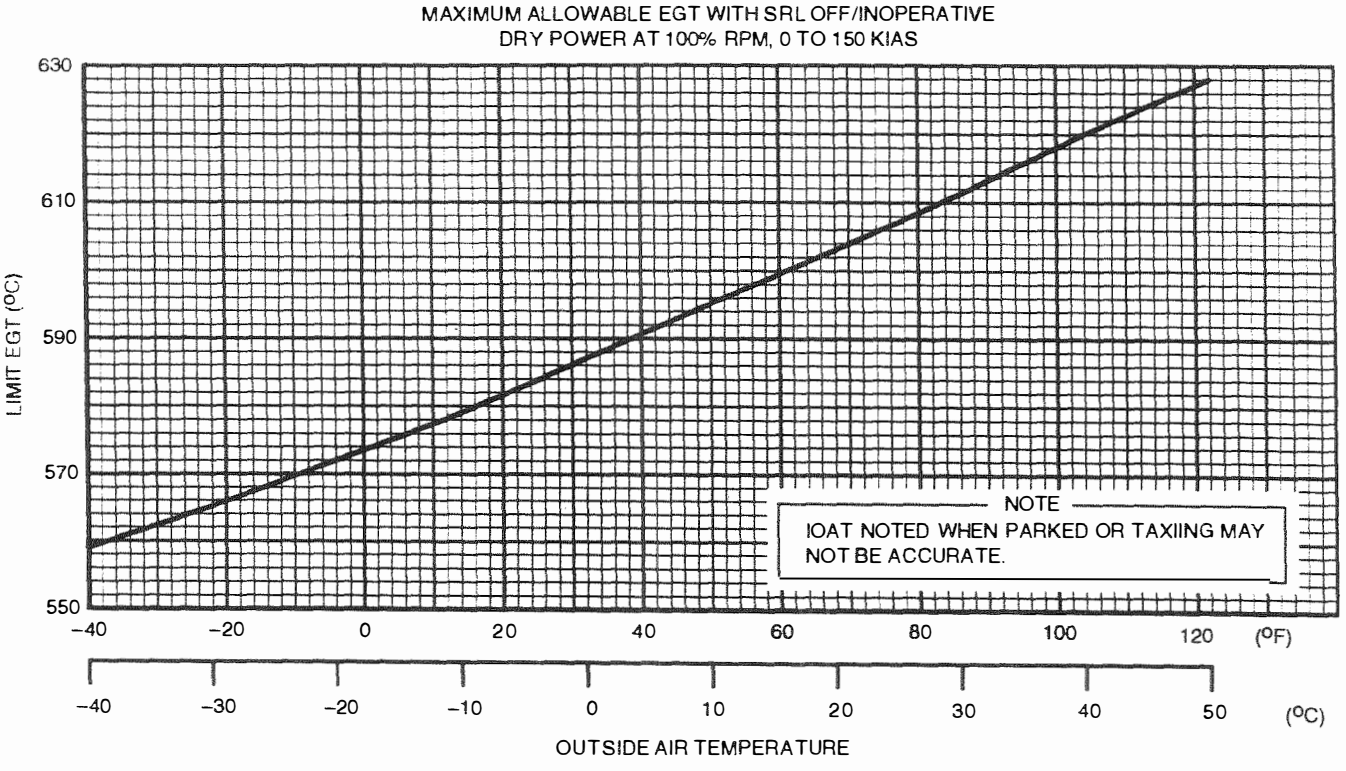


FIGURE 1

SECTION 3A . . . . . .ABNORMAL PROCEDURES (continued)

BATTERY OR GPU START

Use appropriate Manual Ground Start Procedure in Section 3A, basic manual. The note on page 3A-11 is not applicable when operating in accordance with this supplement.

BEFORE TAXI

Use procedure in Section 2, basic manual. Omit step 14, Single Red Line Computer /Temp Limiter Check, which is not applicable when operating in accordance with this supplement.

TAXI

Use procedure in Section 2, basic manual.

BEFORE TAKEOFF

Use procedure in Section 2, basic manual.

TAKEOFF – (DRY) (Use of CAWI is not authorized)

*1. Transponder ..... ON
2. Exterior Lights ..... AS REQUIRED
*3. Bleed Air Switches ..... AS REQUIRED

NOTE

Takeoff with both bleed air on and engine anti-ice on is not authorized when either SRL system is inoperative.

*4. Speed Levers ..... HIGH RPM

NOTE

Both SRL OFF lights will be illuminated if both SRL systems are inoperative. The SRL OFF light for an engine with operative SRL system should go out when RPM increases beyond 80%.

WARNING

IF FLIGHT IS ATTEMPTED WITH THE SPEED LEVERS SET AT LOW RPM, DIVERGENT POWER OSCILLATIONS ARE LIKELY TO OCCUR IF THE TEMPERATURE LIMITING RANGE IS REACHED.

SECTION 3A . . . . . .ABNORMAL PROCEDURES (continued)

TAKEOFF – (DRY) (Use of CAWI is not authorized) (continued)

5. Engine Speed .....CHECK 96% TO 97.5%
6. Power Levers .....SET COMPUTED TAKEOFF POWER. DO NOT EXCEED LIMIT EGT OR 107% TORQUE

NOTE

- Advance power levers smoothly to takeoff power at a moderate rate. Advancing the power levers too rapidly will cause excessive RPM overshoot which may activate the overspeed governor and result in low torque and/or power surges.

- For Reduced Power Takeoff Operations. determine both computed reduced power and maximum takeoff power torques. Set computed reduced power torque for takeoff. If more power is required during takeoff (engine failure, windshear encounter, etc.), torque can be increased to maximum takeoff power torque without exceeding SRL INOP EGT limits

CAUTION

- TEMPERATURE LIMITER PROTECTION IS NOT AVAILABLE WHEN THE SRL SYSTEM IS INOPERATIVE. IMPROPER POWER MANAGEMENT CAN RESULT IN ENGINE OVER TEMPERATURE CONDITIONS.

- DO NOT ALLOW TORQUE TO EXCEED 110% DURING TAKEOFF.

7. Engine Speed .....CHECK 100% TO 101% RPM
8. Brakes .....RELEASE

NOTE

Normal authority nose wheel steering is available throughout the takeoff roll as desired by activating the NWS power lever button. The green NWS light will extinguish whenever nose wheel steering is disengaged.

9. Landing Gear (after liftoff) .....UP
10. Flaps .....UP

NOTE

Initiate flap retraction at or above V_2 +5 KIAS and clear of obstacles.

SECTION 3A . . . . . .ABNORMAL PROCEDURES (continued)

CLIMB

1. Climb Speed ..... ATTAIN
2. Bleed Air Switches ..... AS DESIRED
3. Climb Power ..... NOT TO EXCEED LIMIT EGT OR 100% TORQUE

NOTE

Reduce EGT 50°C or more before reducing RPM of engine(s) operating with SRL system inoperative. Set RPM to 97% or 100%. Advance power lever to desired EGT that does not exceed limit EGT per Section 3A of basic manual.**

*4. Propeller Synchrophaser Switch (if installed) ..... CLIMB & CRUISE
5. Ice Protection Systems/Ignition Switches ..... AS REQUIRED
6. Cabin Pressure Scheduling ..... CHECK
*7. Cabin Signs ..... AS REQUIRED
8. Ammeters ..... CHECK
9. Annunciator Panel ..... CHECK
10. Exterior Lights ..... AS REQUIRED

** For simplicity, the cockpit placard shows the true temperature limits, while the limit EGT schedule in Section 3A observes the torque limit. Therefore, Section 3A sometimes gives a limit significantly lower than the cockpit placard.

SECTION 3A . . . . . .ABNORMAL PROCEDURES (continued)

CRUISE

*1. Bleed Air Switches ..... AS DESIRED
2. Cruise Power ..... SET (97% RPM, LIMIT EGT MAX)
(SEE TABLE, SECTION 3A, BASIC MANUAL)

NOTE

Reduce EGT 50°C or more before reducing RPM of engine(s) operating with the SRL system inoperative. Set RPM (97% or 100%). Advance power lever to desired EGT that does not exceed limit EGT per Section 3A of basic manual.

3. Cabin Pressurization ..... AS DESIRED

DESCENT

Use procedure in Section 2, basic manual.

NOTE

- Determine the torque for the expected surface conditions from the Takeoff Power Check Charts. That torque will provide the initial power setting to be used during balked landing or go-around prior to stabilization of EGT indication(s).

- Determine the maximum allowable SRL INOP EGT for the expected surface conditions (placard or Figure 1). That is the limit EGT to be used on the engine(s) with inoperative SRL during balked landing or go-around.

BEFORE LANDING

Use procedure in Section 2, basic manual.

BALKED LANDING

NOTE

When required for obstacle clearance, this procedure is used to obtain the climb performance depicted in the basic manual.

1. Power Levers ..... LIMIT EGT OR 110% TORQUE
(WHICHEVER OCCURS FIRST)

SECTION 3A . . . . . .ABNORMAL PROCEDURES (continued)

BALKED LANDING (continued)

NOTE

Set expected torque from the Takeoff Power Check Charts initially. Then adjust power lever(s) to SRL INOP EGT limit.

CAUTION

TEMPERATURE LIMITER PROTECTION IS NOT AVAILABLE WHEN THE SRL SYSTEM IS INOPERATIVE. SET POWER LEVERS CAREFULLY WHEN ABOVE 50% POWER TO ALLOW FOR EGT INDICATION LAG. IMPROPER POWER MANAGEMENT CAN RESULT IN ENGINE OVER TEMPERATURE CONDITIONS.

2. Climb Speed ..... ATTAIN (SEE FIGURE 4G-5)
3. Landing Gear (positive rate of climb) ..... UP
4. Flaps ..... RETRACT TO 1/2
5. Airspeed ..... ACCELERATE TO 125 KIAS
6. Flaps ..... UP

LANDING

Use procedure in Section 2, basic manual.

AFTER LANDING

Use procedure in Section 2, basic manual.

STOPPING ENGINES

Use procedure in Section 2, basic manual.

SECTION 4 . . . . . .PERFORMANCE

Use airport ambient air temperature plus $5^{o}C$ for "OAT" when using the performance charts to determine:

- Takeoff torque,
- The maximum takeoff weight as limited by single engine climb requirements,
- Accelerate-stop and takeoff distances,
- Single engine takeoff flight path climb performance,
- Landing weight as limited by balked landing climb performance,
- Balked landing rate of climb.

SECTION 5 . . . . . .WEIGHT AND BALANCE

No change.

SECTION 6 . . . . . .MANUFACTURER'S DATA

No change.

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

SA227-AC/BC/CC/DC

OPERATION IN AUSTRALIA

NARROW RUNWAYS

Registration No._____

Serial No._____

This supplement must be attached to the FAA approved Airplane Flight Manual when flight operations are conducted on runways less than 30 metres wide, in Australia. The information contained in this document supplements or supersedes the basic manual only in those areas listed. The data contained in this supplement is based upon the FAA standards and recommendations contained in Advisory Circular (AC) 150/5300–13 "Airport Design" dtd 29 September 1989 incorporating changes 1 thru 3. This document provides runway width standards for operations conducted during reduced visibility conditions. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

CAA Approved by: _____

Date: 22 FEB 1995

SA227 METRO SERIES

SECTION 1 . . . . . .LIMITATIONS

Minimum Runway Width ..... 23 METRES

If the Approved Flight Manual contains approval for operation on unpaved runways the aircraft may be operated on runways consisting of a paved section 18 metres wide centrally located within an unpaved section at least 23 metres wide. In this case the applicable runway performance requirements are those published for paved runways.

SECTION 2 . . . . . .NORMAL PROCEDURES

No Change.

SECTION 3 . . . . . .EMERGENCY PROCEDURES

No. Change.

SECTION 3A . . . . . .ABNORMAL PROCEDURES

No Change.

SECTION 4 . . . . . .PERFORMANCE

No Change.

SECTION 5 . . . . . .WEIGHT AND BALANCE

No change.

SECTION 6 . . . . . .MANUFACTURER'S DATA

No Change.

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

SA227-DC

OPERATION IN AUSTRALIA

SUPPLEMENTAL PERFORMANCE DATA FOR OPERATIONS ON UNPAVED RUNWAYS

Registration No._____

Serial No._____

This supplement provides performance data approved by the Australian CAA for use by airplanes operating in Australia. This supplement may be attached to the applicable FAA approved Airplane Flight Manual when operating on unpaved runways. The information contained in this document supplements or supersedes the basic manual only in those areas listed. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

CAA Approved by: _____ DELEGATE

Date: 11 JANUARY 1995.

LIST OF REVISIONS

Revisions to the Airplane Flight Manual provide current information applicable to operation of the SA227-DC aircraft. Revised pages should be inserted in the manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when all current revisions are incorporated.

Revision Number	Revised Pages	Description of Revision	Signature	Date
1	ALL	Changed operations on "short dry grass or gravel runway surfaces" to "unpaved runways", added Paved Runway with Unpaved Stopway information and corrected editorial errors.		
2	ALL	Added anti-skid brakes data and added four pages to the Supplement.		
3	ALL	Added *Takeoff (Unpaved Runway Operations)* to Section 2 and added two pages to the Supplement.		

A black bar in the margin of a revised page shows the curent change.

INTRODUCTION

This supplement provides takeoff and landing performance for aircraft operations on unpaved runways.

SECTION 1 . . . . . .LIMITATIONS

OPERATING WEIGHTS

1. The maximum takeoff weight may not exceed the lower of the following:

   (a) The weight at which the single engine takeoff and en route climb requirements are met, (Figure 4C-2, 4D-2, 4E-3 or 4E-4 in the basic AFM).

   (b) The weight at which the accelerate-stop distance (Figure 1, 2, 5, 6, 9 or 10 in this supplement) equals the available runway length, including stopway if available.

   (c) The weight at which the single engine takeoff distance (Figure 3, 7 or 11 in this supplement) equals the available runway length, including clearway if available.

   (d) The weight at which the takeoff run distance (Figure 4, 8 or 12 in this supplement) equals the available runway length, excluding clearway.

2. The maximum landing weight may not exceed the lower of the following:

   (a) The weight at which the single engine approach climb requirement is met (Figure 4G-1, 4G-2 or 4G-3 in the basic AFM).

   b. The weight at which the landing distance (Figure 13 or 14 in this supplement) equals the landing runway length.

ALCOHOL-WATER MIXTURE COMPOSITION AND RELATED DATA

NOTE

If takeoff operations are conducted with CAWI quantity gauge 27-19144 installed (AFM Supplement 5), increase CAWI Required for Single Engine Takeoff to V_{YSE}, Figure 1 of Supplement 5, by 0.25 gallons (0.95 liter) when operating on unpaved runways.

SECTION 2 . . . . . .NORMAL PROCEDURES

TAKEOFF (UNPAVED RUNWAY OPERATIONS)

*1. Transponder ..... ON
2. Exterior Lights ..... AS REQUIRED
*3. Bleed Air Switches ..... AS REQUIRED
*4. Speed Levers ..... HIGH RPM

NOTE

Verify SRL OFF annunciator lights extinguish when RPM is advanced above 80%.

WARNING

IF FLIGHT IS ATTEMPTED WITH THE SPEED LEVERS SET AT LOW RPM, DIVERGENT POWER OSCILLATIONS ARE LIKELY TO OCCUR AS THE TEMPERATURE LIMITING RANGE IS REACHED.

5. Engine Speed ..... CHECK 96% TO 97.5%
PRIOR TO RUNWAY ALIGNMENT

NOTE

- Constant forward momentum is to be maintained throughout the turn and initial runway alignment.
- Power is to be applied immediately upon alignment.

6. Power Levers ..... SET COMPUTED TAKEOFF POWER
AND CONFIRMED WITHIN 5 SECONDS OF APPLICATION
DO NOT EXCEED 650^{O}C EGT OR 107% TORQUE

NOTE

- Advance power levers smoothly to takeoff power at a moderate rate. Advancing the power levers too rapidly will cause excessive RPM overshoot which may activate the overspeed governor and result in low torque and/or power surges.
- If more power is required during a reduced power takeoff (engine failure, windshear encounter, etc.), torque can be increased to maximum takeoff power torque.

SECTION 2 . . . . . .NORMAL PROCEDURES (continued)

TAKEOFF (UNPAVED RUNWAY OPERATIONS) (continued)

For CAWI Takeoff:

a. Set approximately 60% torque
b. CAWI/RES PWR Switch (if installed) ..... CAWI

OR

Water Injection Switch (if Installed) ..... CONTINUOUS

c. CAWI Pump Lights ..... CHECK ON
d. Torquemeters ..... CHECK SYMMETRICAL INCREASE

CAUTION

DO NOT ALLOW TORQUE TO EXCEED 110% DURING TAKEOFF.

NOTE

During takeoff the blue fuel bypass lights may illuminate with no action required. However, in climb and cruise the power levers should be retarded to extinguish the lights.

7. Engine Speed ..... CHECK 100% TO 101% RPM

CAUTION

IF RPM IS ALLOWED TO DECREASE TO BELOW 99% WITH THE TEMPERATURE LIMITING SYSTEM OPERATING, ENGINE POWER SURGES MAY OCCUR WHEN THE SRL COMPUTER TRANSITIONS BACK AND FORTH BETWEEN ITS SPEED/TEMPERATURE SCHEDULES.

8. Brakes ..... RELEASE

NOTE

Normal authority nose wheel steering is available throughout the takeoff roll as desired by activating the NWS power lever button. The green NWS light will extinguish whenever nose wheel steering is disengaged.

9. Landing Gear (after lift-off) ..... UP
10. Flaps ..... UP

NOTE

Initiate flap retraction at or above V_2 +5 KIAS and clear of obstacles.

SECTION 3 . . . . . .EMERGENCY PROCEDURES

No change.

SECTION 3A . . . . . .ABNORMAL PROCEDURES

No change.

SECTION 4 . . . . . .PERFORMANCE

The following AFM (Basic AFM or Supplement 4) performance charts are superseded and replaced by the corresponding charts in this AFM Supplement when the aircraft is operated on unpaved runways.

CHART	AFM OR SUP 4	SUPPLEMENT
TAKEOFF PERFORMANCE – DRY, BLEED AIR ON		
Distance to Accelerate to V_1 and Stop		
Manual Brakes	Fig. 4C-4	Fig. 1
Anti-skid Brakes	Fig. 1 Sup 4	Fig. 2
Single Engine Takeoff Distance to 35 Foot Height	Fig. 4C-5	Fig. 3
Single Engine Takeoff Run Distance	Fig. 4C-6	Fig. 4
TAKEOFF PERFORMANCE – DRY, BLEED AIR OFF		
Distance to Accelerate to V_1 and Stop		
Manual Brakes	Fig. 4D-4	Fig. 5
Anti-skid Brakes	Fig. 2 Sup 4	Fig. 6
Single Engine Takeoff Distance to 35 Foot Height	Fig. 4D-5	Fig. 7
Single Engine Takeoff Run Distance	Fig. 4D-6	Fig. 8
TAKEOFF PERFORMANCE – WET		
Distance to Accelerate to V_1 and Stop		
Manual Brakes	Fig. 4E-6	Fig. 9
Anti-skid Brakes	Fig. 3 Sup 4	Fig. 10
Single Engine Takeoff Distance to 35 Foot Height	Fig. 4E-7	Fig. 11
Single Engine Takeoff Run Distance	Fig. 4E-8	Fig. 12
LANDING PERFORMANCE		
Two Engine Landing Distance Over 50 Foot Height		
Manual Brakes	Fig. 4G-4	Fig. 13
Anti-skid Brakes	Fig. 4 Sup 4	Fig. 14

PAVED RUNWAY WITH UNPAVED STOPWAY

If the aircraft is operated on a paved runway with a unpaved stopway, credit for only 75% of the stopway distance can be used to determine accelerate/stop distance with the paved runway charts in the basic AFM.

DISTANCE TO ACCELERATE TO V_1 AND STOP – DRY, BLEED AIR ON

MANUAL BRAKES

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (ONLY)
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... UNPAVED SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4C-3)
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 113 KIAS
ACCELERATE - STOP DISTANCE = 5,260 FEET (1605 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2 IN BASIC AFM.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 1.7 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

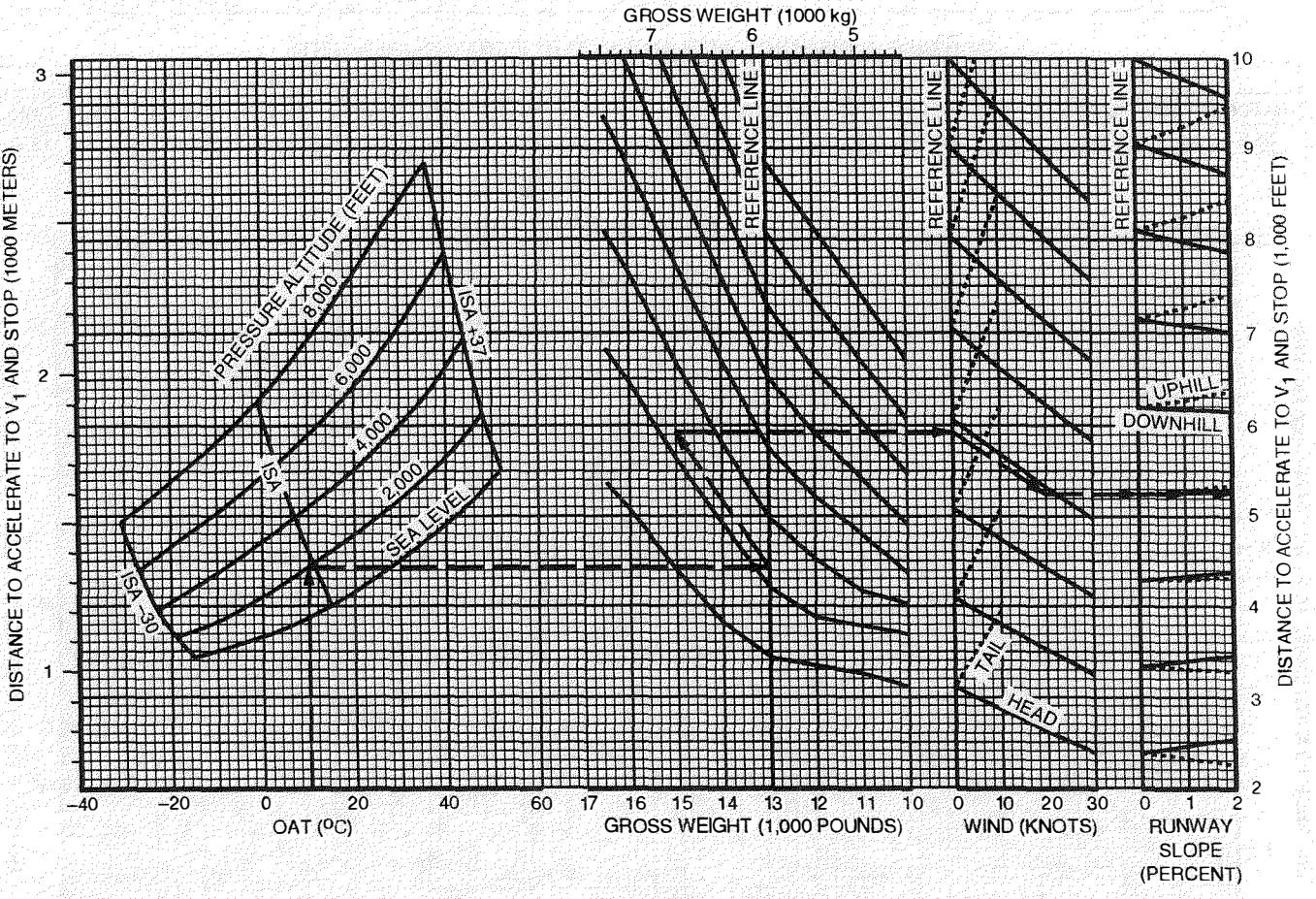


FIGURE 1

DISTANCE TO ACCELERATE TO V_1 AND STOP – DRY, BLEED AIR ON
ANTI-SKID BRAKES INSTALLED

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (ONLY)
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... UNPAVED SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4C-3)
ANTI-SKID ..... ON (SEE TABLE)
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
BLEED AIR – LOW

OBTAIN: V_1 SPEED = 113 KIAS
ACCELERATE - STOP DISTANCE = 4,625 FEET (1410 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2 IN BASIC AFM.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 1.9 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

INCREASE IN DISTANCE WITH ANTI-SKID INOPERATIVE (PERCENT)

WEIGHT (POUNDS)							
10,000	11,000	12,000	13,000	14,000	15,000	16,000	16,500
70.3	59.7	50.0	40.9	23.5	24.6	16.7	12.8

WEIGHT (KILOGRAMS)						
4500	5000	5500	6000	6500	7000	7485
70.0	59.2	48.7	38.9	29.9	21.2	12.8

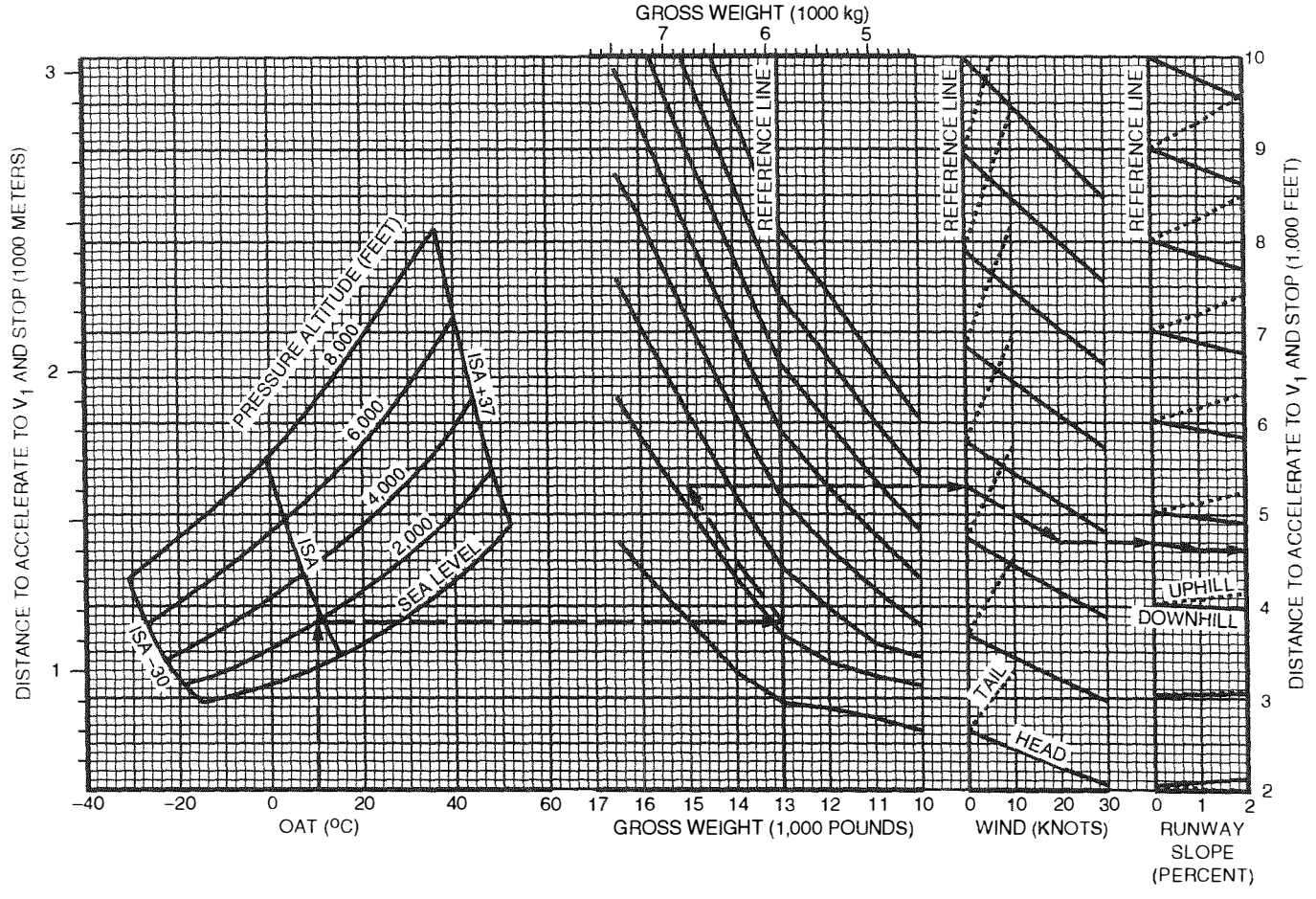


FIGURE 2

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	LOW (ONLY)
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	UNPAVED SURFACE
V_1 SPEED	FIGURE 4C-3
V_R SPEED	FIGURE 4C-3
V_2 SPEED	FIGURE 4C-3
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2 IN BASIC AFM.

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 4,610 FEET (1405 m)

NOTE

- INCREASE TAKEOFF DISTANCE BY 5.8 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

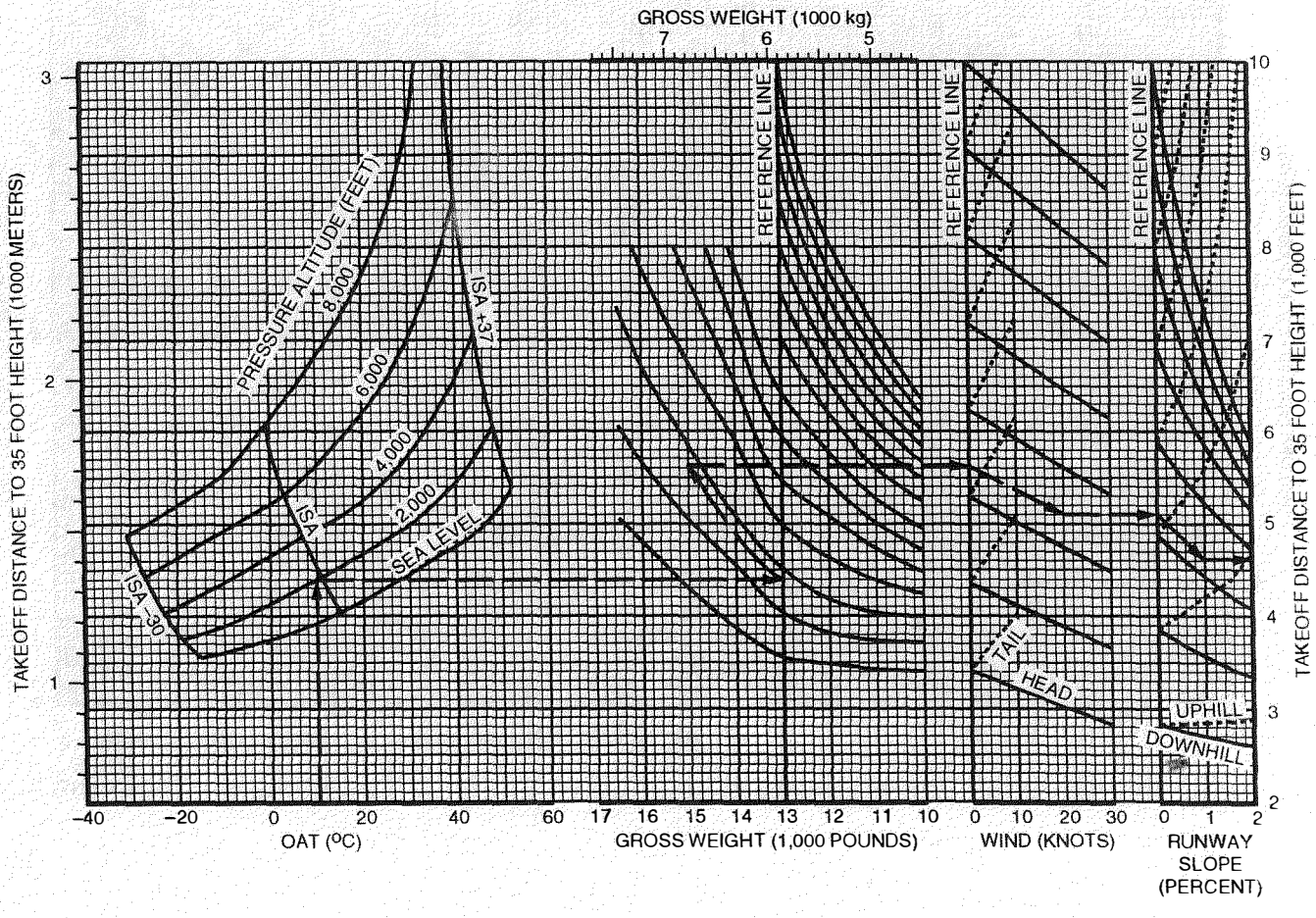


FIGURE 3

SINGLE ENGINE TAKEOFF RUN DISTANCE – DRY, BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... LOW (ONLY)
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... UNPAVED SURFACE
V_1 SPEED ..... FIGURE 4C-3
V_R SPEED ..... FIGURE 4C-3
V_2 SPEED ..... FIGURE 4C-3
FLAPS 1/4
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 4,025 FEET (1225 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2 IN BASIC AFM.

NOTE

- INCREASE TAKEOFF DISTANCE BY 4.2 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

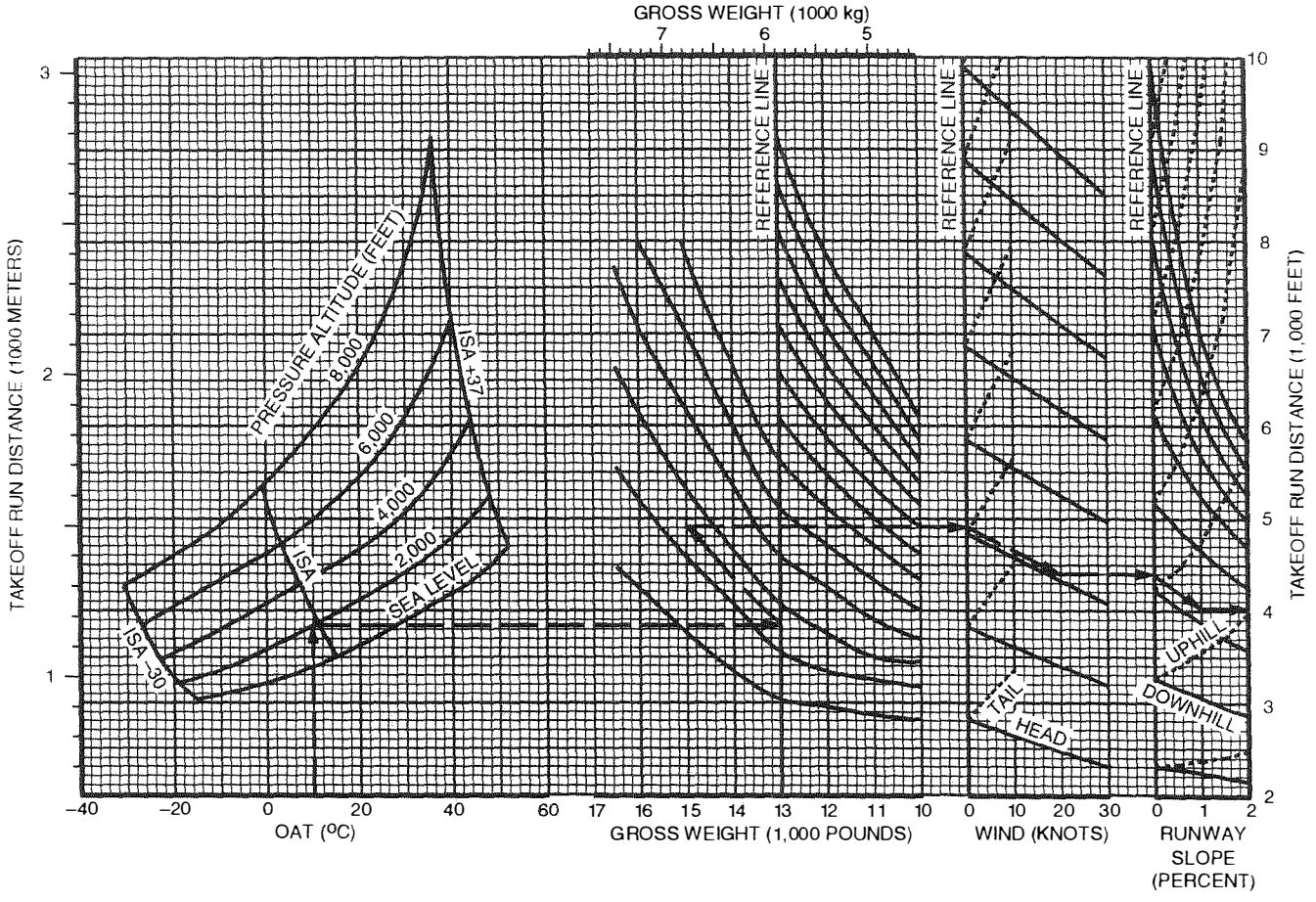


FIGURE 4

DISTANCE TO ACCELERATE TO V_1 AND STOP – DRY, BLEED AIR OFF

MANUAL BRAKES

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... UNPAVED SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4D-3)
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 113 KIAS
ACCELERATE - STOP DISTANCE = 5,110 FEET (1560 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2 IN BASIC AFM.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 1.4 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

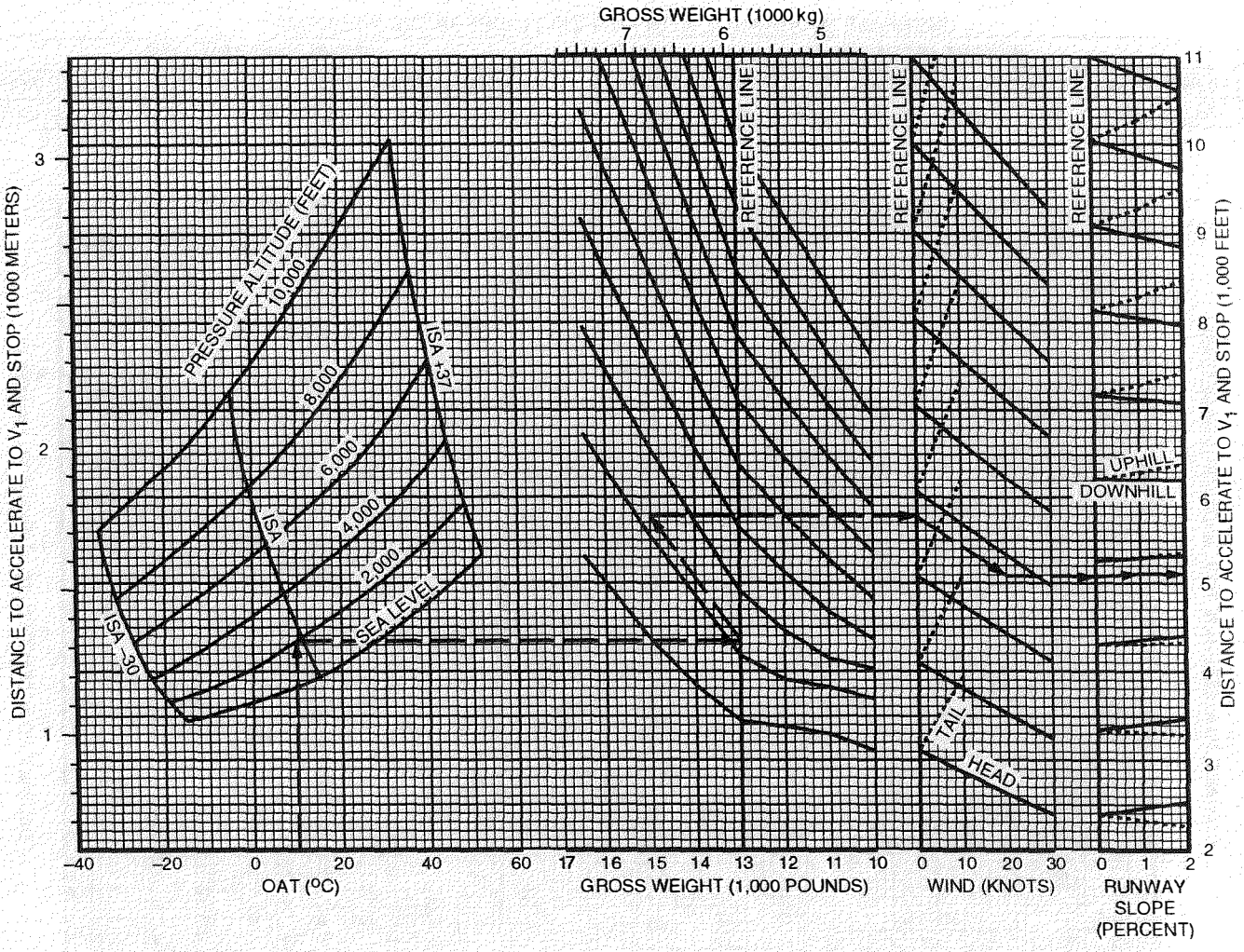


FIGURE 5

DISTANCE TO ACCELERATE TO V_1 AND STOP – DRY, BLEED AIR OFF
ANTI-SKID BRAKES INSTALLED

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (DRY)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... UNPAVED SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4C-3)
ANTI-SKID ..... ON (SEE TABLE)
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 113 KIAS
ACCELERATE - STOP DISTANCE = 4,510 FEET (1375 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4C-2 IN BASIC AFM.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 1.5 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

INCREASE IN DISTANCE WITH ANTI-SKID INOPERATIVE (PERCENT)

WEIGHT (POUNDS)							
10,000	11,000	12,000	13,000	14,000	15,000	16,000	16,500
70.3	59.7	50.0	40.9	23.5	24.6	16.7	12.8

WEIGHT (KILOGRAMS)						
4500	5000	5500	6000	6500	7000	7485
70.0	59.2	48.7	38.9	29.9	21.2	12.8

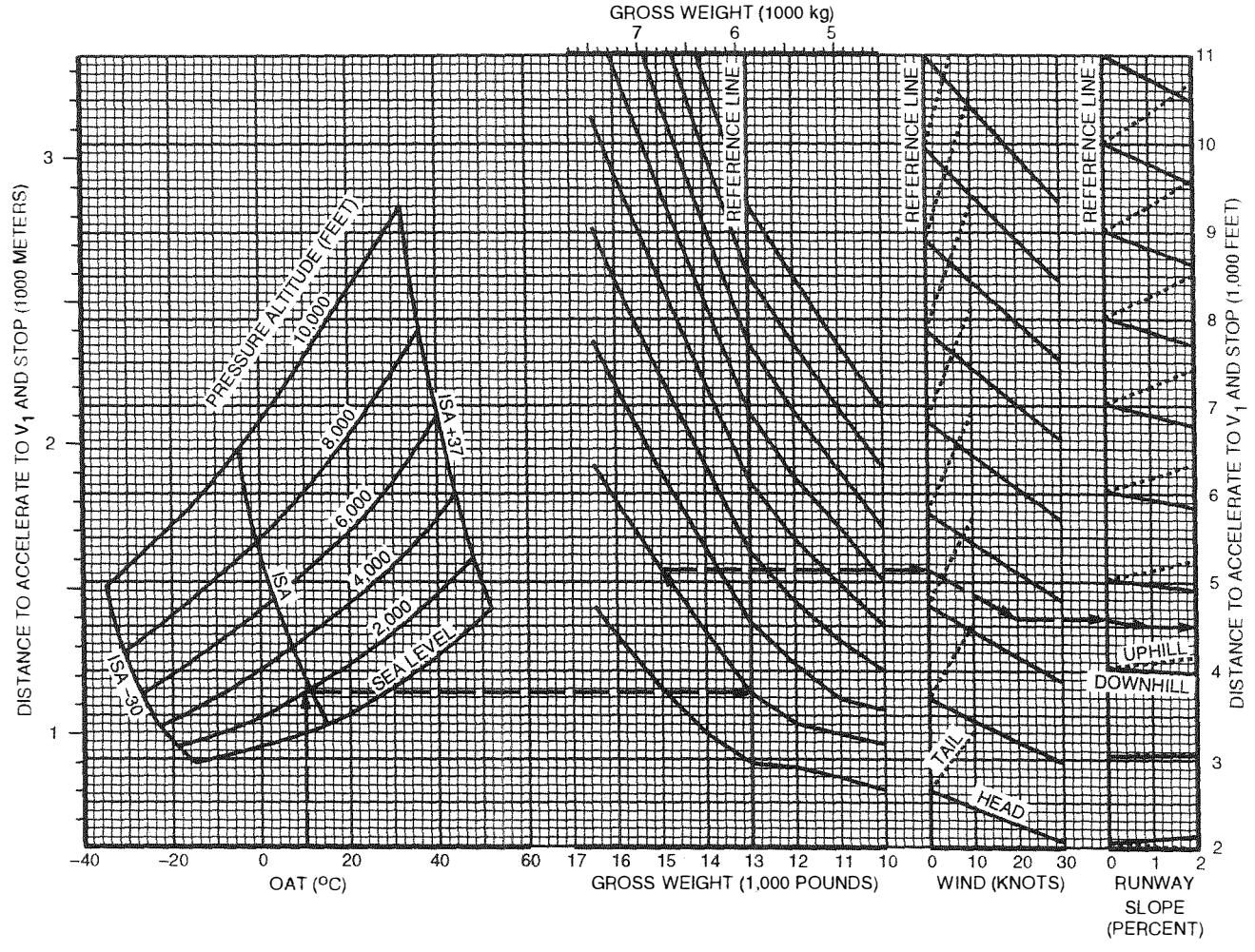


FIGURE 6

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	UNPAVED SURFACE
V_1 SPEED	FIGURE 4D-3
V_R SPEED	FIGURE 4D-3
V_2 SPEED	FIGURE 4D-3
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2 IN BASIC AFM.

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 4,500 FEET (1370 m)

NOTE

- INCREASE TAKEOFF DISTANCE BY 4.8 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

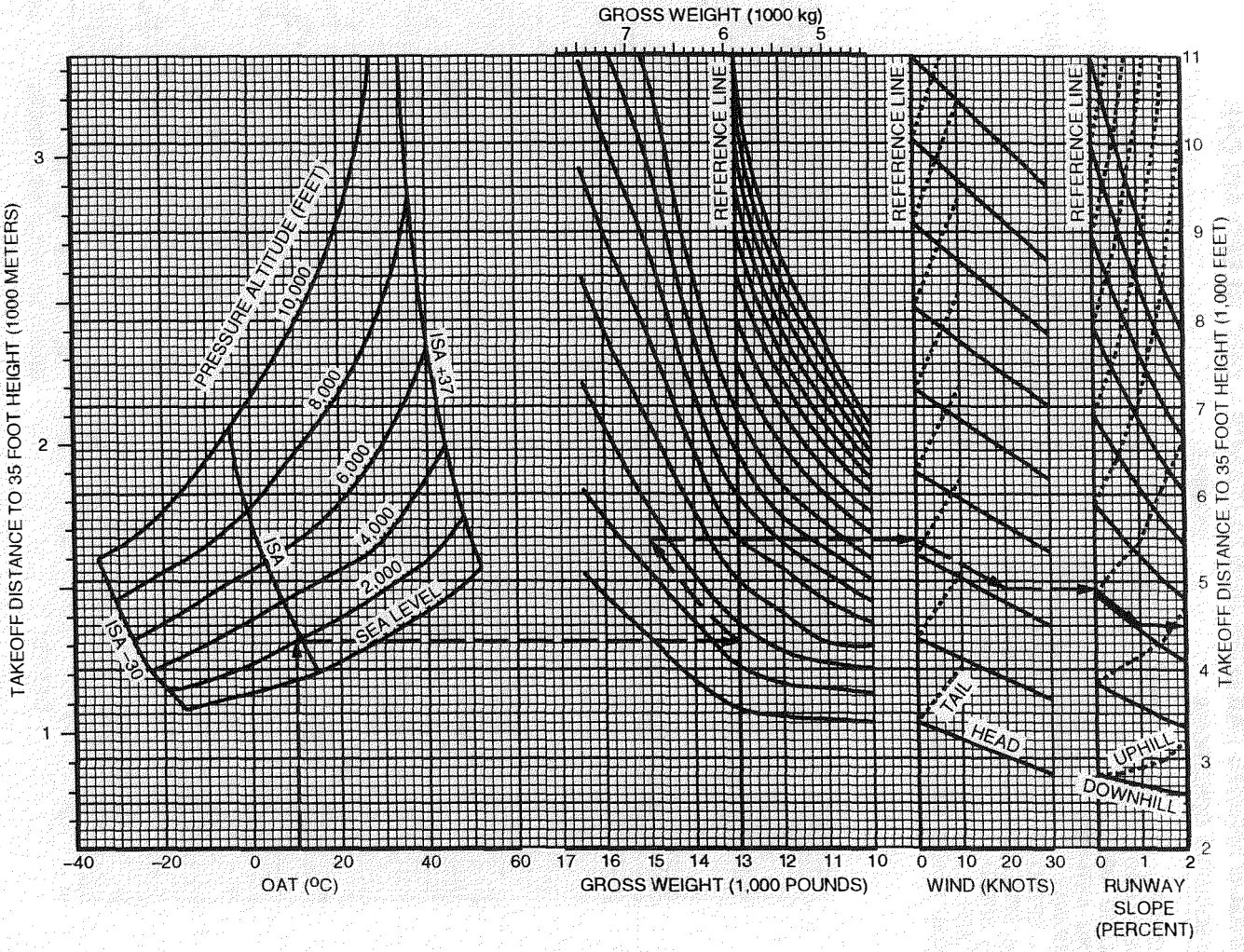


FIGURE 7

SINGLE ENGINE TAKEOFF RUN DISTANCE – DRY, BLEED AIR OFF

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (DRY)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	UNPAVED SURFACE
V_1 SPEED	FIGURE 4D-3
V_R SPEED	FIGURE 4D-3
V_2 SPEED	FIGURE 4D-3
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)

OBTAIN: V_1 SPEED = 113 KIAS
V_R SPEED = 113 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 3,980 FEET (1215 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4D-2 IN BASIC AFM.

NOTE

- INCREASE TAKEOFF DISTANCE BY 3.7 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

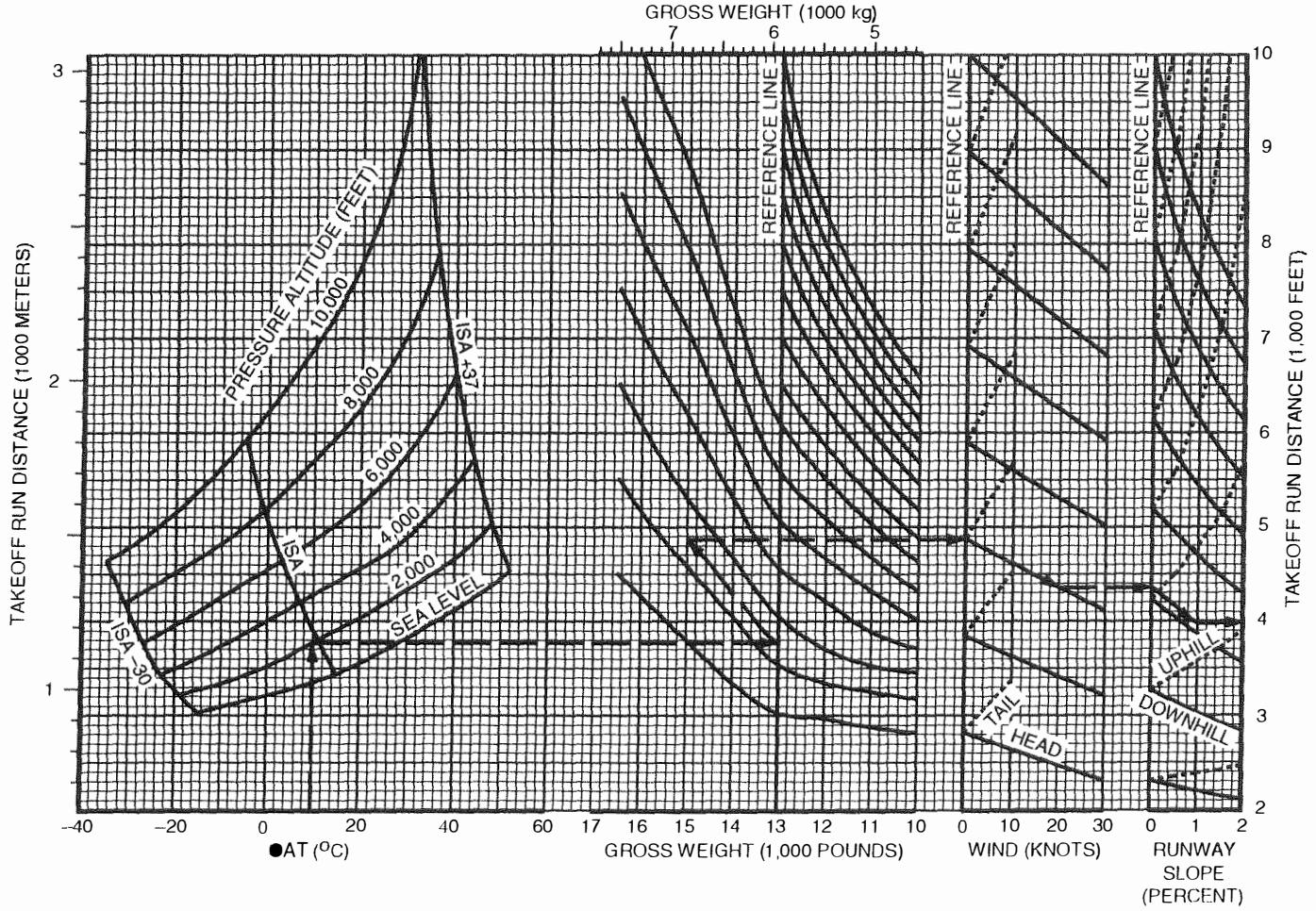


FIGURE 8

DISTANCE TO ACCELERATE TO V_1 AND STOP – WET
MANUAL BRAKES

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... UNPAVED SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4E-5)
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 112 KIAS
ACCELERATE - STOP DISTANCE = 4,820 FEET (1470 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4 IN BASIC AFM.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 0.7 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

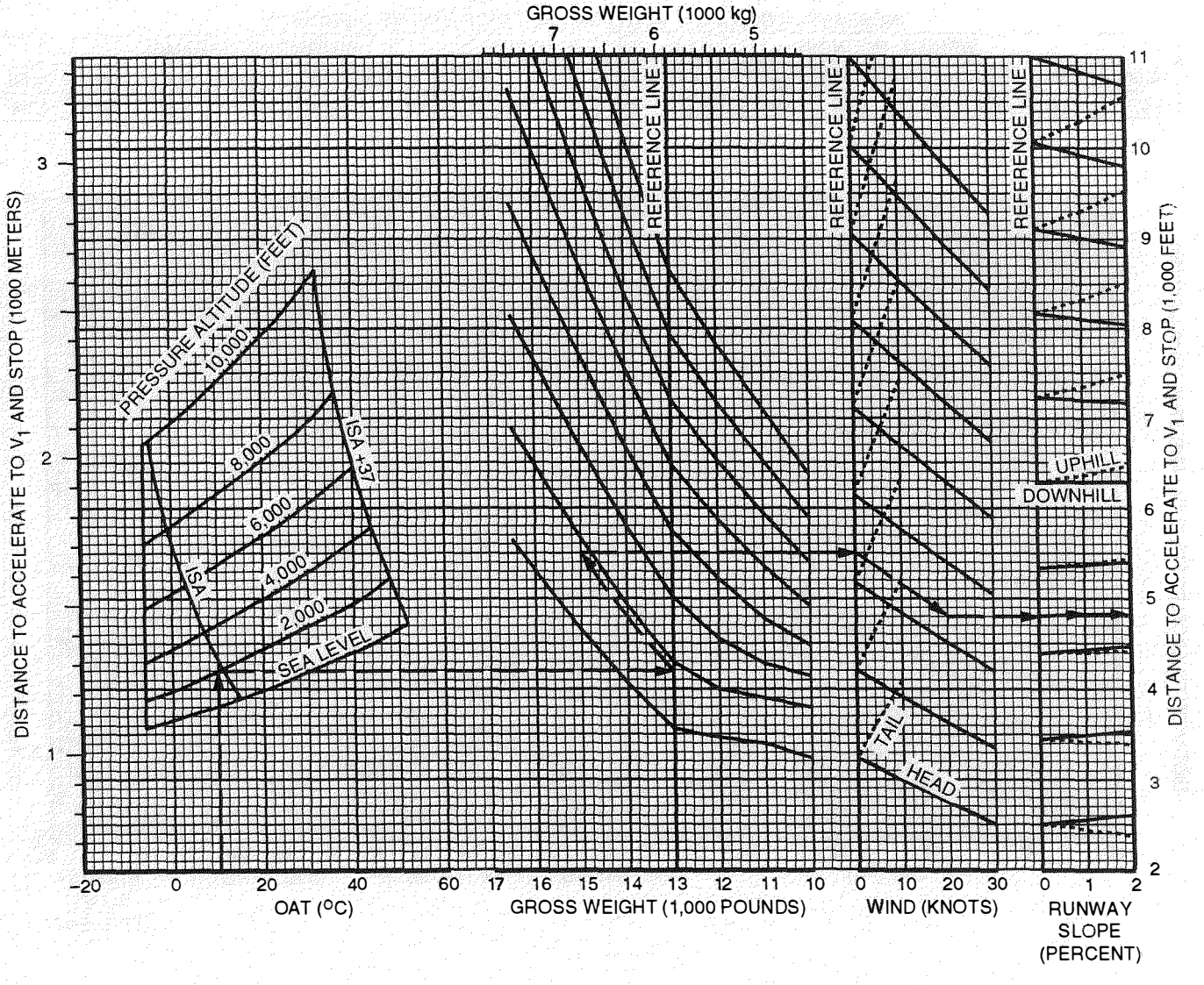


FIGURE 9

DISTANCE TO ACCELERATE TO V_1 AND STOP – WET
ANTI-SKID BRAKES INSTALLED

ASSOCIATED CONDITIONS:

POWER ..... TAKEOFF (WET)
GEN LOAD ..... 300 AMPS
BLEED AIR ..... OFF
ENG ANTI-ICE ..... OFF (SEE NOTE)
RUNWAY ..... UNPAVED SURFACE
FLAPS 1/4
DECISION SPEED ..... V_1 (FIGURE 4E-5)
ANTI-SKID ..... ON (SEE TABLE)
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (DOWNHILL)
OBTAIN: V_1 SPEED = 113 KIAS
ACCELERATE - STOP DISTANCE = 4,175 FEET (1270 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4 IN BASIC AFM.

NOTE

- INCREASE ACCELERATE - STOP DISTANCE BY 0.8 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

INCREASE IN DISTANCE WITH ANTI-SKID INOPERATIVE (PERCENT)

WEIGHT (POUNDS)							
10,000	11,000	12,000	13,000	14,000	15,000	16,000	16,500
70.0	59.5	49.7	40.7	32.3	24.4	16.2	12.4

WEIGHT (KILOGRAMS)						
4500	5000	5500	6000	6500	7000	7485
70.8	59.1	48.7	38.9	29.5	20.8	12.4

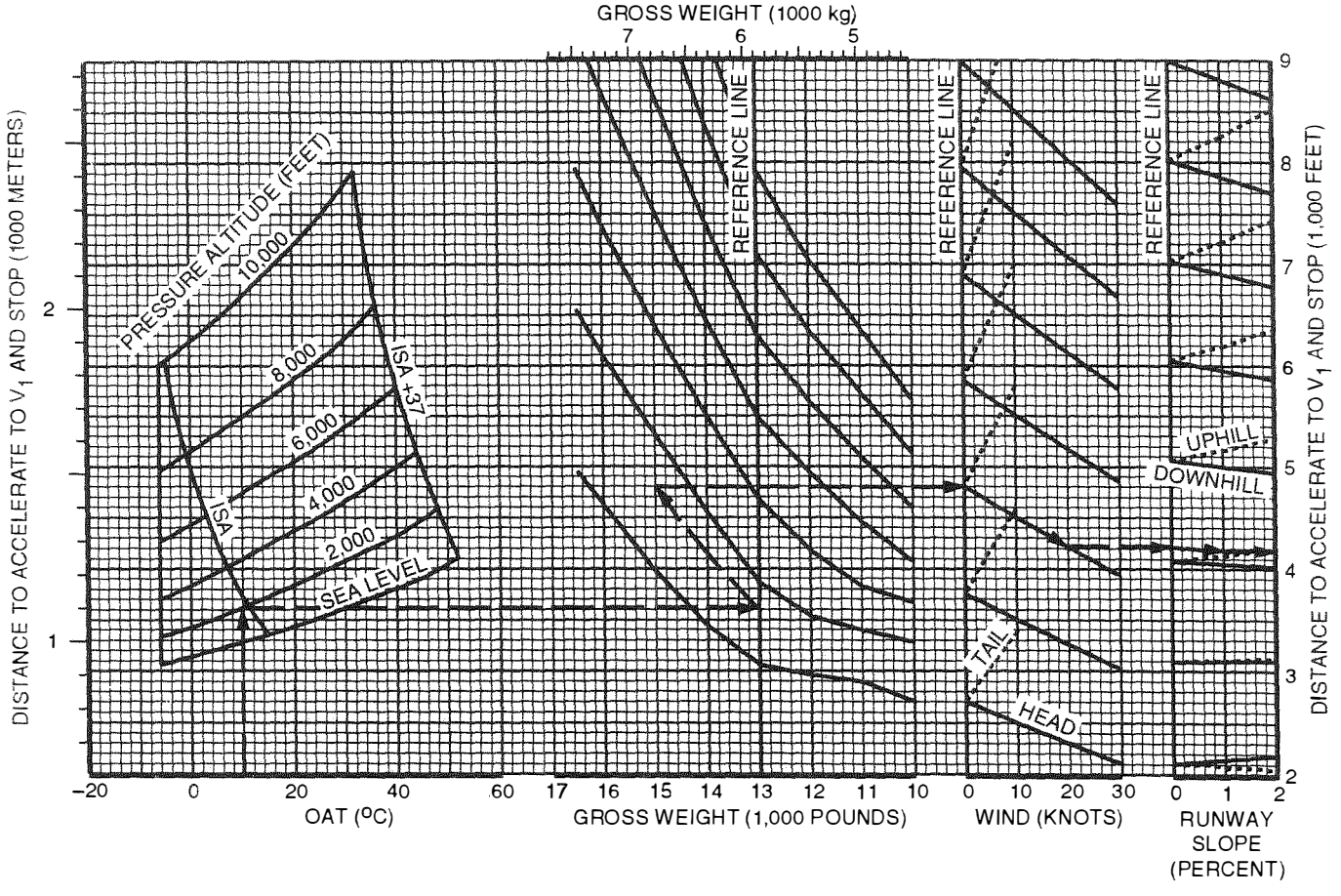


FIGURE 10

SINGLE ENGINE TAKEOFF DISTANCE TO 35 FOOT HEIGHT – WET

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	UNPAVED SURFACE
V_1 SPEED	FIGURE 4E-5
V_R SPEED	FIGURE 4E-5
V_2 SPEED	FIGURE 4E-5
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4 IN BASIC AFM.

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)

OBTAIN: V_1 SPEED = 112 KIAS
V_R SPEED = 112 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF DISTANCE = 5,300 FEET (1615 m)

NOTE

- INCREASE TAKEOFF DISTANCE BY 2.4 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.
- FOR TAKEOFF FIELD LENGTH DETERMINATION, SINGLE ENGINE TAKEOFF DISTANCES ARE LONGER THAN TWO ENGINE TAKEOFF DISTANCES FACTORED BY 1.15.

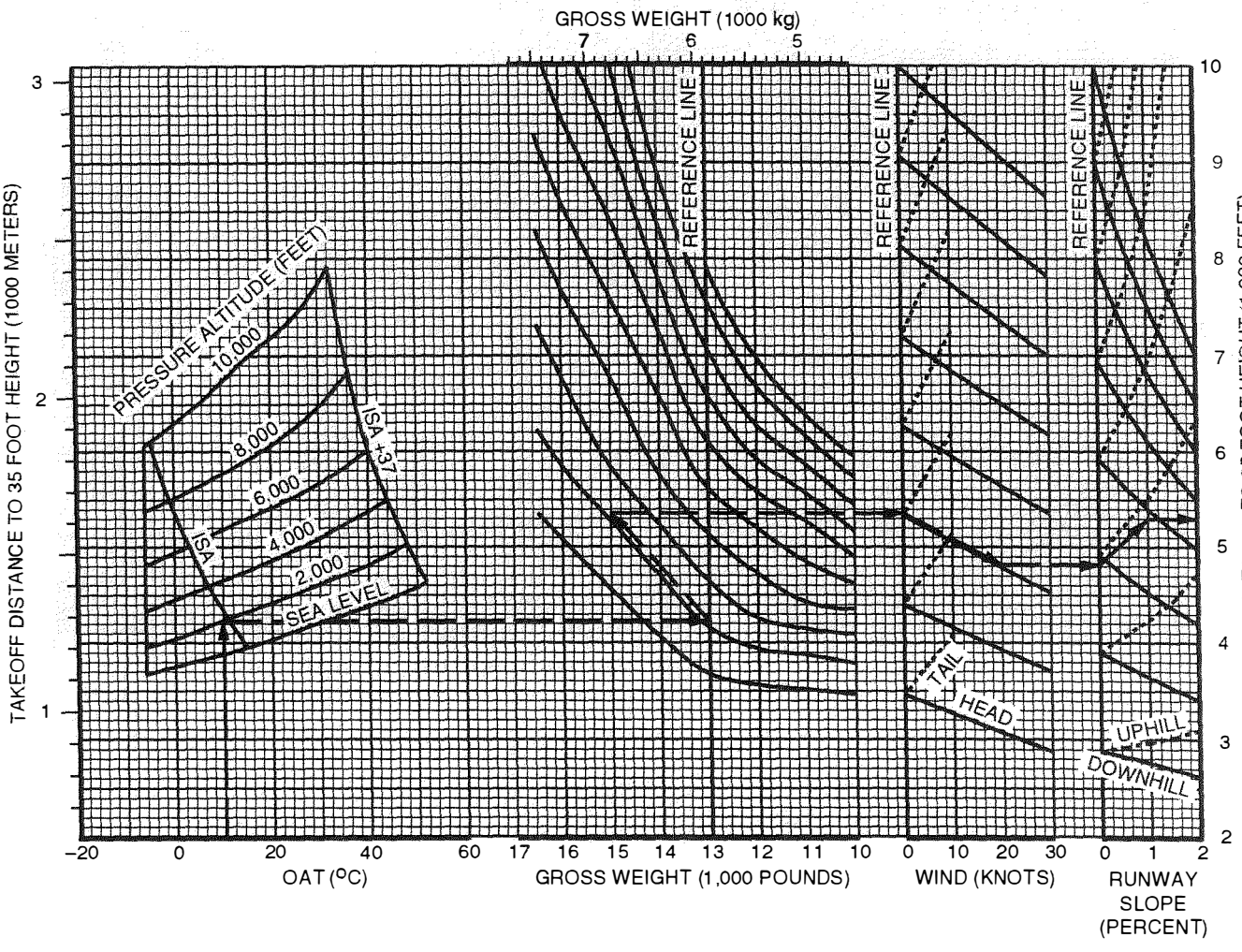


FIGURE 11

SINGLE ENGINE TAKEOFF RUN DISTANCE – WET

ASSOCIATED CONDITIONS:

POWER	TAKEOFF (WET)
GEN LOAD	300 AMPS
BLEED AIR	OFF
ENG ANTI-ICE	OFF (SEE NOTE)
RUNWAY	UNPAVED SURFACE
V_1 SPEED	FIGURE 4E-5
V_R SPEED	FIGURE 4E-5
V_2 SPEED	FIGURE 4E-5
FLAPS	1/4
NOSE WHEEL STEERING	ON OR OFF

EXAMPLE:

GIVEN: OAT = 10°C
PRESSURE ALTITUDE = 2,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 20 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)

OBTAIN: V_1 SPEED = 112 KIAS
V_R SPEED = 112 KIAS
V_2 SPEED = 116 KIAS
TAKEOFF RUN = 4,600 FEET (1400 m)

WARNING

MAXIMUM TAKEOFF WEIGHT MAY NOT EXCEED THE WEIGHT DETERMINED FROM FIGURE 4E-3 OR 4E-4 IN BASIC AFM.

NOTE

- INCREASE TAKEOFF DISTANCE BY 1.8 PERCENT WITH ENGINE ANTI-ICE ON.
- MAXIMUM OAT WITH ENGINE ANTI-ICE ON IS 5°C.

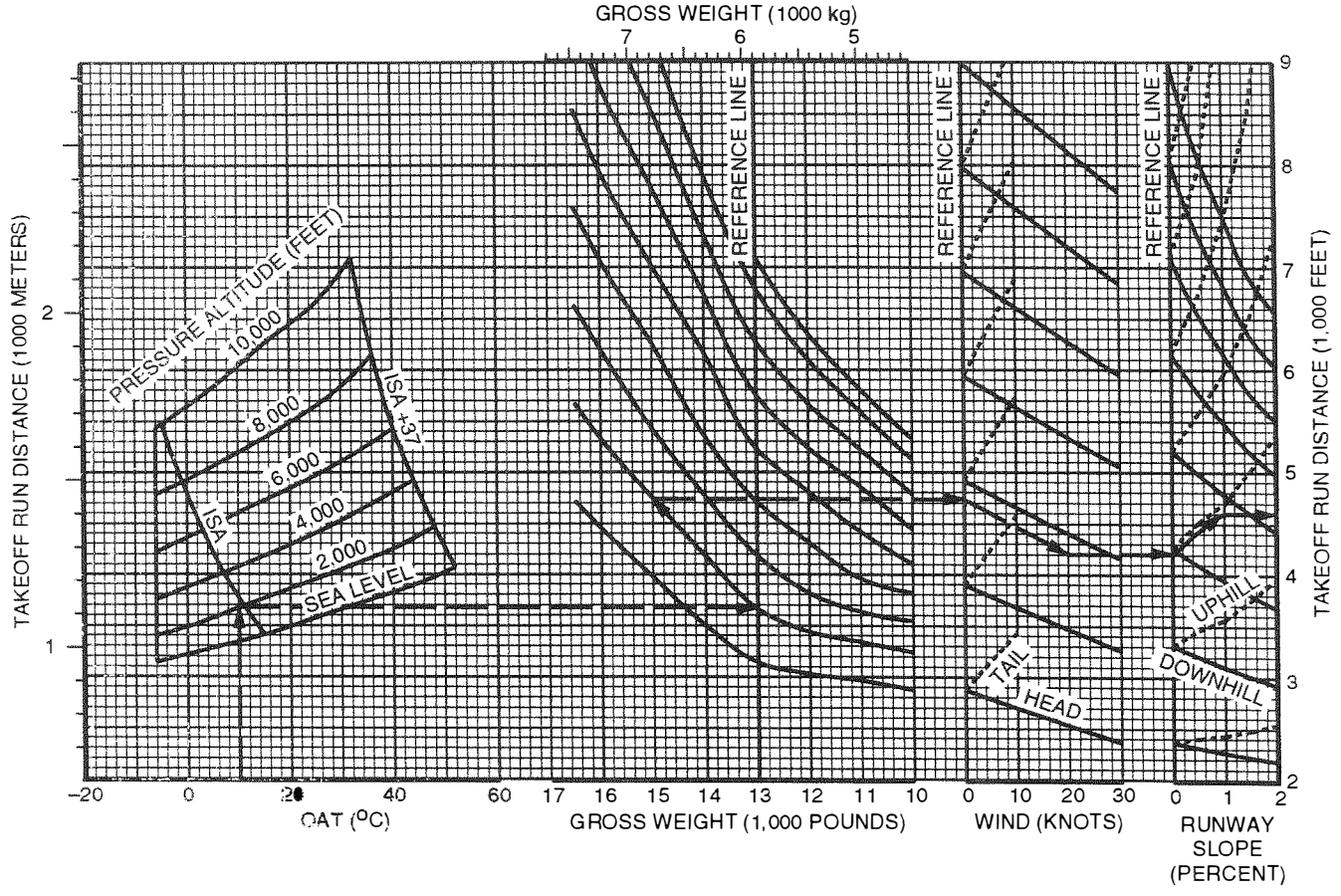


FIGURE 12

TWO ENGINE LANDING DISTANCE OVER 50 FOOT HEIGHT
MANUAL BRAKES

ASSOCIATED CONDITIONS:

APPROACH SPEED ..... SEE CHART
POWER ..... 3° GLIDE PATH
POWER AS REQUIRED
GEN LOAD ..... AS REQUIRED
BLEED AIR ..... AS REQUIRED
ENG ANTI-ICE ..... OFF
RUNWAY ..... UNPAVED SURFACE
GEAR ..... DOWN
FLAPS ..... DOWN
BRAKING ..... HEAVY DURING ROLLOUT
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 18°C
PRESSURE ALTITUDE = 7,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 15 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)
OBTAIN: APPROACH SPEED = 115 KIAS
REQUIRED RUNWAY DISTANCE = 5,500 FEET (1675 m)

NOTE
- LANDING GROUND ROLL IS 78% OF LANDING DISTANCE.
- LANDING DISTANCE FACTORED BY 1.68.

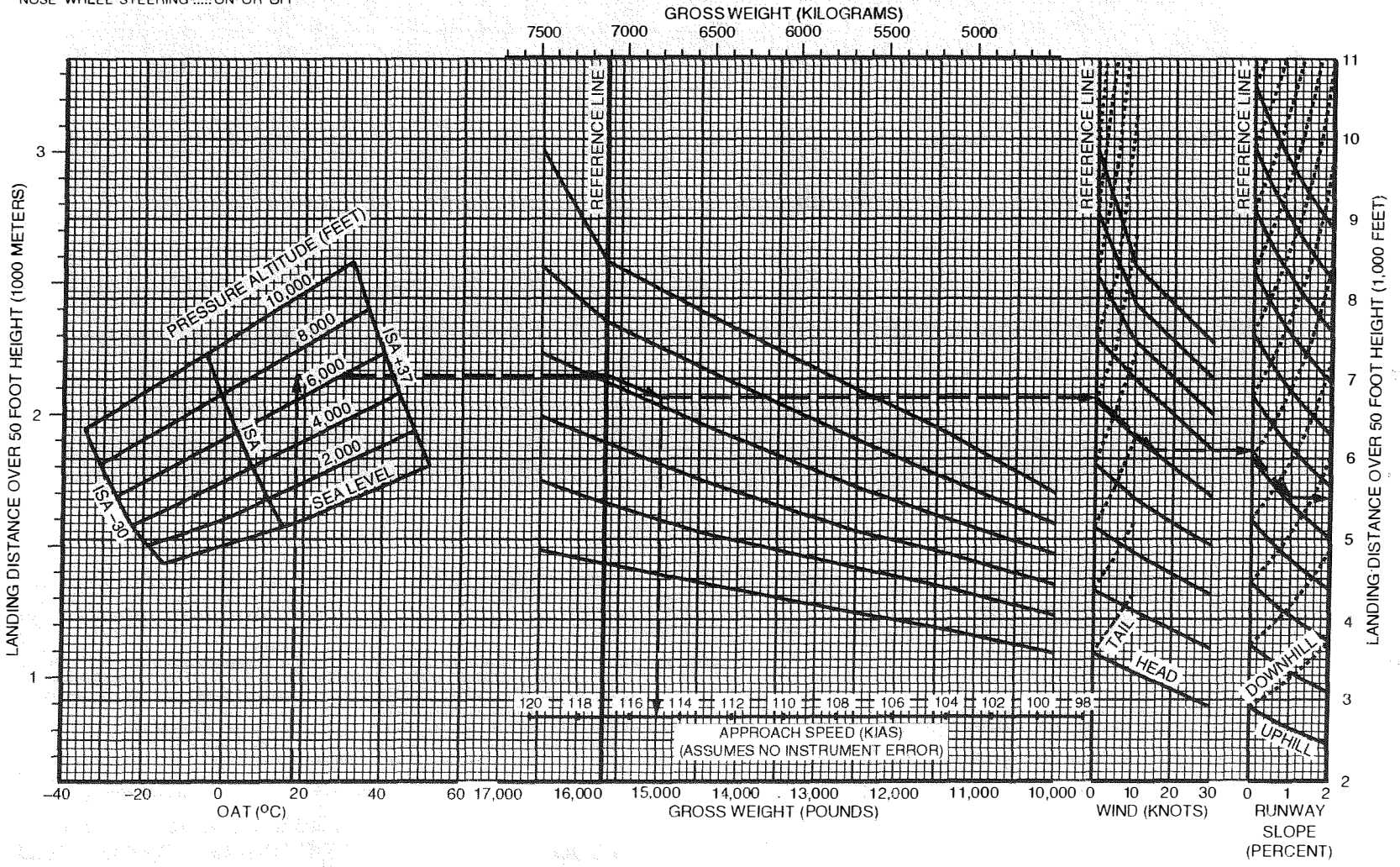


FIGURE 13

TWO ENGINE LANDING DISTANCE OVER 50 FOOT HEIGHT
ANTI-SKID BRAKES INSTALLED

ASSOCIATED CONDITIONS:

APPROACH SPEED ..... SEE CHART
POWER ..... 3° GLIDE PATH
POWER AS REQUIRED
GEN LOAD ..... AS REQUIRED
BLEED AIR ..... AS REQUIRED
ENG ANTI-ICE ..... OFF
RUNWAY ..... UNPAVED SURFACE
GEAR ..... DOWN
FLAPS ..... DOWN
BRAKING ..... HEAVY DURING ROLLOUT
ANTI-SKID ..... ON (SEE TABLE)
NOSE WHEEL STEERING ..... ON OR OFF

EXAMPLE:

GIVEN: OAT = 18°C
PRESSURE ALTITUDE = 7,000 FEET
GROSS WEIGHT = 15,000 POUNDS (6805 kg)
HEADWIND = 15 KNOTS
RUNWAY SLOPE = 1 PERCENT (UPHILL)
OBTAIN: APPROACH SPEED = 115 KIAS
REQUIRED RUNWAY DISTANCE = 5,250 FEET (1600 m)

NOTE

- LANDING GROUND ROLL IS 76% OF LANDING DISTANCE.
- LANDING DISTANCE FACTORED BY 1.68.

INCREASE IN DISTANCE WITH ANTI-SKID INOPERATIVE (PERCENT)

WEIGHT (POUNDS)						
10,000	11,000	12,000	13,000	14,000	15,000	15,675
57.6	49.3	40.0	30.4	20.4	10.3	3.4

WEIGHT (KILOGRAMS)					
4500	5000	5500	6000	6500	7110
58.0	49.0	38.9	28.0	17.0	3.4

FIGURE 14

SECTION 5 . . . . . .WEIGHT AND BALANCE

No change.

SECTION 6 . . . . . .MANUFACTURER'S DATA

No change.

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