Aircraft Flight Manual

Merlin IIIB

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Following are sections covered in this manual and their basic contents. For amplified contents, see each section.

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GENERAL

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INTRODUCTION

Section 1 of this manual provides general information and specifications of interest to the pilot. The information is duplicated in some instances elsewhere in the manual.

GENERAL DESCRIPTION

The MERLIN IIIB is a twin turboprop aircraft manufactured by Swearingen Aircraft Corporation for use as an executive transport. The fuselage is a semimonocoque structure. An air conditioning and pressurization system conditions and pressurizes the cockpit, passenger cabin, and aft baggage compartment. The aircraft is equipped with an all-movable horizontal tail. The tricycle landing gear has steerable nose wheels. The internal configuration in the standard arrangement accommodates six to nine passengers and a crew of two.

This handbook contains all the information necessary for safe and efficient operation of the MERLIN IIIB aircraft. These instructions do not teach elementary flight principles, but are designed to provide the pilot with a general knowledge of the aircraft, its flight characteristics, and specific normal, abnormal, and emergency operating procedures. The pilot's flying experience is recognized, and basic instructions have been avoided. A thorough knowledge of current airworthiness directives, applicable FAR's, and advisory circulars is essential. The handbook should not be used for operational purposes unless it is maintained in a current status.

The owner is responsible for maintaining the airplane in an airworthy condition. The pilot will determine that the airplane is safe for flight and is responsible for operating the airplane in accordance with instrument markings, placards, operating limitations, the contents of this handbook, and current FAA regulations.

This handbook is arranged in a manner that is most useful to the pilot during ground and flight operations whether normal, abnormal, or emergency in character.

The pilot should study this handbook and be thoroughly familiar with the location of all applicable materials. A complete understanding of all data before attempting to operate this airplane is essential.

This handbook is sectionalized and tab indexed for quick reference. The Operating Limitations, Emergency, and Abnormal Procedures sections are located ahead of the Normal Procedures, Performance, and other sections to allow for easier access to information required during aircraft operation. The tab for the Emergency Section is color coded red to differentiate it from other sections to provide easy identification and location when necessary. Provision for expansion of this handbook is made by deliberately omitting paragraph numbers and pages noted as being intentionally left blank.

This handbook includes the material required to be furnished to the pilot by CAR Part 3. It also contains supplemental data supplied by the aircraft manufacturer.

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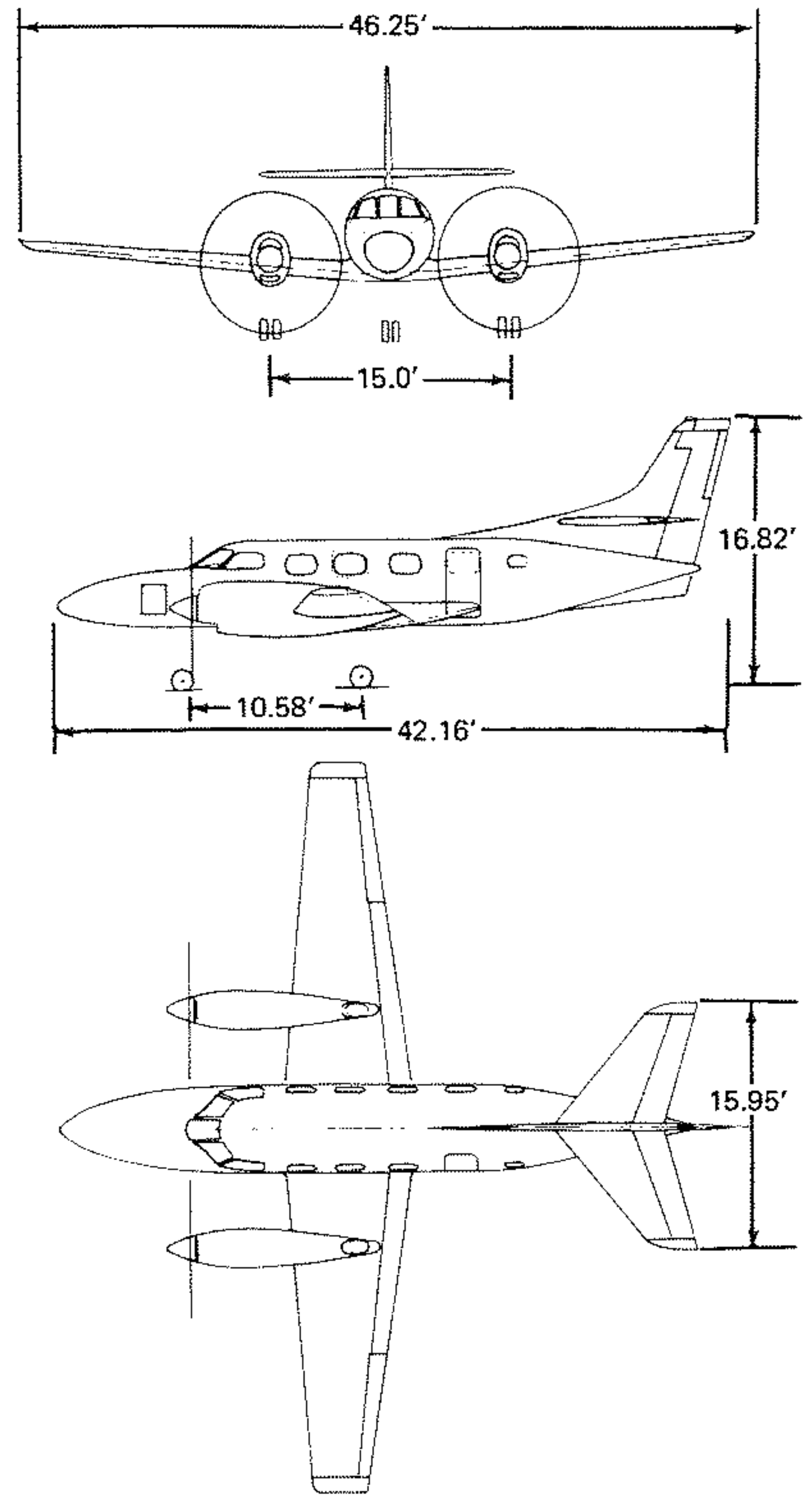
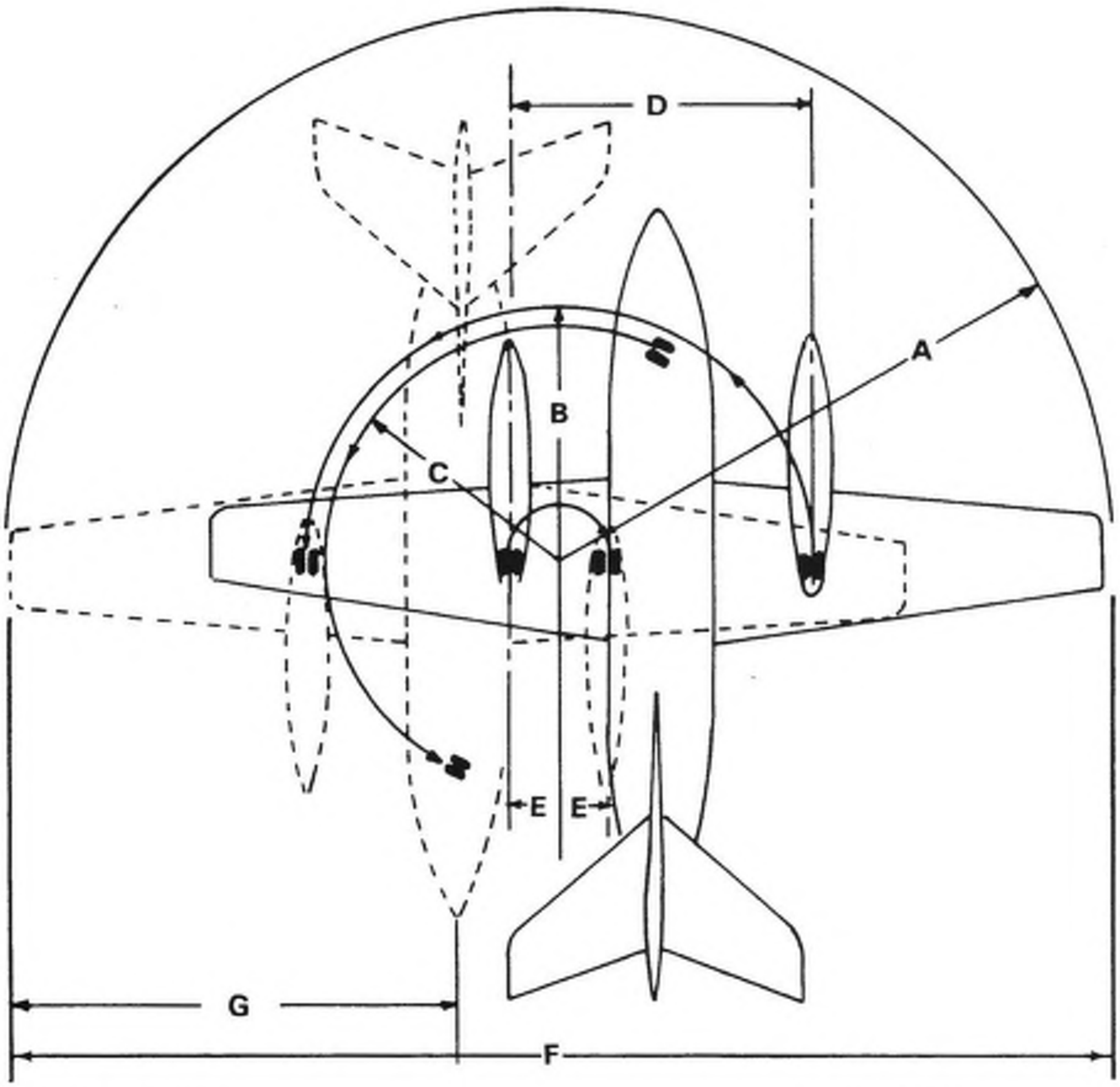


THREE VIEW
Figure I-1

CONDITIONS: Nose Wheel Steering Park Button Depressed
Nose Wheel 63 Degrees (Full Rudder Pedal Travel)



A.	Wing Tip Arc	341″	(28.4′)
B.	Outboard Main Gear Arc (Center to Center)	155″	(12.9′)
C.	Nose Gear Arc	143″	(11.9′)
D.	Main Gear Spread (Center to Center)	180″	(15.0′)
E.	Inboard Main Gear Arc (Center to Center)	25″	(2.1′)
F.	Minimum Diameter for 180° Turn	682″	(56.8′)
G.	Center Line of Aircraft to Wing Tip	276″	(23.0′)

TURNING RADIUS
Figure I-2

SPECIFICATIONS

ENGINE

Number of Engines	2
Manufacturer	AiResearch
Model Number	TPE331–10U–501G or –502G
Shaft Horsepower (SHP)	900 Continuous
Propeller Speed (% RPM)	100% For Takeoff 101% For 5 Minutes 106% For 5 Seconds
Dry Weight (pounds)	391
Engine Type	Fixed Shaft
Compressor Stages & Type	2 Stage, Centrifugal
Turbine Stages & Type	3 Stage, Axial Flow
Combustion Chamber Type	Annular

PROPELLERS

Number of Propellers	2
Manufacturer	Hartzell
Blade Model Number	LT10282AB + 2.5 or TL10282AB + 2.5
Number of Blades	4
Hub Model Number	HC–B4TN–5EL or HC–B4TN–5HL
Propeller Diameter (inches)	106
Propeller Type	Oil Operated, Full Feathering, Reversible, Constant Speed
Ground Clearance (inches approximately)	9"

FUEL

Fuel Capacity – Total (U.S. Gallons)	650
Usable Fuel – Total (U.S. Gallons)	648
Fuel Grade, Aviation	Jet A, Jet A–1, Jet B, JP–1, JP–4, JP–5, Aviation Gasoline
Maximum Fuel Imbalance Takeoff/Landing (pounds)	500

OIL

Capacity Each Engine (U.S. Quarts)	3.6
Specification	MIL–L–23699A (Type II)
Brands–Mixing of Types or Brands is Prohibited. Refer to AIRESEARCH SERVICE INFORMATION LETTER (S.I.L.) P331–2 for a current list of approved oils.	

MAXIMUM WEIGHTS

Ramp Weight (pounds)	12,600
Takeoff Weight (pounds)	12,500
Landing Weight (pounds)	12,500
Zero Fuel Weight (pounds)	10,500
Baggage Compartment (pounds)	
Forward	400
Aft	300
Coat Stowage/Lavatory	50

STANDARD AIRPLANE WEIGHTS

Standard Empty (pounds)	7,600
Maximum Useful Load Including Ramp Fuel (pounds)	5,000

SPECIFIC LOADINGS

Wing Loading (pounds per sq. ft.)	45
Power Loading (pounds per horsepower)	6.94

WING

Area (sq. ft.)	277.50
Span (feet)	46.25
Aspect Ratio	7.71
Mean Aerodynamic Chord (inches)	76.45
Angle of Incidence	
Root	+1°
Tip	−1°
Geometrical Twist	−2°
Dihedral	5.0°
Wing Flap, Double slotted (sq. ft.)	40.66
Aileron (sq. ft.)	14.12

HORIZONTAL TAIL

Tail Area (sq. ft.)	75.97
Elevator Area [aft of hinge line] (sq. ft.)	21.27
Airfoil Section	
Incidence	Variable
Dihedral	0.0°

VERTICAL TAIL

Total Area, Including Dorsal, Excluding Ventral (sq. ft.)	56.00
Rudder Area, Aft Of Hinge Line (sq. ft.)	19.28
Ventral Fin Area (sq. ft.)	5.48

DIMENSIONS

Overall Pressurized Fuselage Length (inches)	355
Usable Cockpit and Cabin Length (inches)	273
Cockpit Length (inches)	64
Cabin Length, Including Rear Compartment (inches)	209
Passenger Cabin (inches)	127
Rear Compartment (inches)	82
Cockpit Width (inches)	60
Cockpit Height At Center Line (inches)	54
Cabin Width (inches)	62
Cabin Height At Center Line [Dropped Aisle] (inches)	57
Nose Compartment Length (inches)	69
Front Avionics Compartment Length (inches)	33
Front Baggage Compartment Length (inches)	36
Rear Avionics Compartment Length [Aft Of Rear Compartment] (inches)	30

VOLUMES

Overall Pressurized Fuselage Volume (cu. ft.)	461
Usable Cockpit and Cabin Volume (cu. ft.)	411
Cockpit Volume (cu. ft.)	90
Cabin Volume, Including Rear Compartment (cu. ft.)	321
Passenger Cabin Volume (cu. ft.)	203
Rear Compartment Volume (cu. ft.)	118
Nose Compartment Volume (cu. ft.)	45
Total Avionics Compartment Volume (cu. ft.)	46
Front Avionics Compartment Volume (cu. ft.)	15
Rear Avionics Compartment Volume (cu. ft.)	31
Total Baggage Volume (cu. ft.)	105
Front Baggage (Nose) Volume (cu. ft.)	30
Rear Compartment Baggage Volume (cu. ft.)	75

PRESSURIZATION

The pressure vessel is designed to a maximum operational pressure differential of 7.0 psi. The aircraft is certificated for operation to an altitude of 31,000 feet.

DOORS

Main Cabin Entrance (inches—width X height)	25.5 x 53.75
Equipped With An Air Stair For Easy Entry/Exit From The Airplane	
Nose Baggage (inches—forward height X width X aft height)	22.5 x 18.5 x 24.75
There Is a Nose Baggage Door On Each Side Of The Airplane	

SYMBOLS, ABBREVIATIONS, AND TERMINOLOGY

The following are definitions of symbols, terms, and abbreviations used throughout this Handbook/Flight Manual. Many will be of operational significance to the pilot.

WARNINGS, CAUTIONS, and NOTES:

WARNING	Operating Procedures, Practices, etc., which will result in personal injury or loss of life if not carefully followed.
CAUTION	Operating Procedures, Practices, etc., which if not strictly observed will result in damage to equipment.
NOTE	An Operating Procedure, Condition, etc., which is essential to emphasize.

GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

CAS	Calibrated airspeed means the indicated speed of an aircraft, corrected for instrument and position error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
G	G is acceleration due to gravity.
IAS	Indicated airspeed is the speed of an aircraft as shown on the airspeed indicator when corrected for instrument error.
KCAS	Calibrated airspeed expressed in knots.
KIAS	Indicated airspeed expressed in knots.
TAS	True airspeed is the airspeed relative to undisturbed air which is the CAS corrected for altitude, temperature, and compressibility.
V_A	Maneuvering speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane. This speed can be used for turbulence penetration if no turbulence penetration speed is specified.
V_{FE}	Maximum Flap Extended speed is the maximum permissible speed with wing flaps in a specified extended position.
V_{LE}	Maximum Landing Gear Extended speed is the maximum speed that an aircraft can be safely flown with the landing gear down.
V_{LL}	Maximum Landing Light extension or extended speed is the maximum speed with the landing lights extending, extended, or retracting.
V_{LO}	Maximum Landing Gear Operating speed is the maximum speed that the landing gear can be extended or retracted.
V_{MCA}	Air Minimum Control Speed is the minimum flight speed at which the airplane is controllable with a bank of not more than 5° when one engine suddenly becomes inoperative and the remaining engine(s) is operating at take-off power.
V_{MO}/M_{MO}	Maximum Operating Limit Speed is the calibrated speed limit that may not be deliberately exceeded during normal flight. V is expressed in knots and M in Mach Number.

GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS (continued)

V_P	Hydroplaning speed is the speed at which a tire lifts off the pavement and rides on top of a layer of slush or water. The result is a loss of effective braking and/or steering.
V_R	Rotation speed for takeoff, in knots.
V_{SSE}	Intentional One Engine Inoperative Speed is a minimum speed selected by Swearingen Aviation for intentionally rendering one engine inoperative in flight for pilot training.
V_{S_1}	Stall Speed in knots for a specified configuration.
V_X	Best all engines angle of climb speed.
VY	Best all engines rate of climb speed.
$V_{X_{SE}}$	Best single engine angle of climb speed.
$V_{Y_{SE}}$	Best single engine rate of climb speed.
V_{50}	Takeoff speed at 50 foot height.

METEOROLOGICAL TERMINOLOGY

°C	Temperature in degrees Centigrade or Celsius.
°F	Temperature in degrees Fahrenheit.
IOAT	Indicated Outside Air Temperature is the temperature shown on the pilot's outside air temperature indicator, but is not adjusted for instrument error or temperature compressibility effects.
ISA	International Standard Atmosphere in which: (1) The air is a dry perfect gas. (2) Sea level temperature 15°C (59°F). (3) Sea level pressure 29.92 inches Hg. (1013.2 millibars). (4) Temperature gradient (lapse rate) from sea level to the altitude at which the temperature is −56.6°C (−70°F) is −1.98°C per 1000 feet.

METEOROLOGICAL TERMINOLOGY (continued)

OAT	Outside Air Temperature is the free air static temperature obtained either from in-flight temperature indications adjusted for instrument error and compressibility effects or meterological sources.
PRESSURE ALTITUDE	Altitude measured from standard sea level pressure (29.92 inches Hg.) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for instrument and position error.
TEMPERATURE COMPRESSIBILITY EFFECTS	An erroneous temperature indication caused by airflow over the temperature probe. Altitude and airspeed cause the error to vary.
WIND	The wind velocities recorded as variables on the charts of this manual are to be understood as the headwind or tailwind components of the reported winds.

ENGINE OPERATION TERMINOLOGY

EGT	Exhaust Gas Temperature measured aft of the last stage of the turbine.
ENGINE CYCLE	An operational sequence involving engine start, airplane takeoff, landing, and engine shutdown.
ET	Engine temperature.
FLAMEOUT	Unintentional loss of ignition flame.
FLAT RATED	Constant horsepower over a specific altitude range.
HOT START	An engine start, or attempted start, which results in excessive ET. It is caused by an excessive fuel to air ratio.
MCP	Maximum Continuous Power is the power developed at 100% RPM when at torque limit or ET limit. This is equivalent to takeoff power. Limits are 650°C ET or 100% torque, whichever occurs first.
NEGATIVE TORQUE	The turning force applied to the engine by the propeller. This occurs when an engine loses power in flight and the propeller turns due to wind resistance.

ENGINE OPERATION TERMINOLOGY (continued)

NTS	Negative Torque Sensing System automatically reduces drag against an inoperative engine by moving the propeller blades toward feather.
RPM	Revolutions Per Minute normally expressed as a percentage of maximum engine speed.
REVERSE THRUST	The thrust produced when the propeller blades are rotated past flat pitch.
SHP	Shaft Horsepower is the power delivered to the propeller shaft.
TOP	Takeoff Power. Limits are 650°C ET or 100% torque, whichever occurs first.
TORQUE	A measurement that is proportional to the power output of the engine.
WINDMILL	A propeller that is rotated by the airstream.

ENGINE CONTROLS AND INSTRUMENTS

BETA RANGE	An engine operational mode in which propeller blade pitch is controlled with the cockpit power lever.
OVERSPEED GOVERNOR	A flyweight operated fuel metering device housed in the fuel control unit.
POWER LEVER	The power lever regulates fuel flow in the normal flight regime and selects propeller blade angles on the ground in the Beta mode (flight idle through reverse).
PROPELLER GOVERNOR	Regulates engine/propeller RPM by increasing or decreasing the propeller pitch.
SPEED LEVER	The speed lever (sometimes called condition lever) controls RPM through the propeller governor in flight and through the underspeed governor during ground operation.
SRL	The Single Red Line System computes a single maximum ET value for all flight and engine conditions above 80% RPM.

ENGINE CONTROLS AND INSTRUMENTS (continued)

START LOCKS	A centrifugal/mechanical locking device on each propeller blade used to maintain the propeller at a specified pitch position during engine starting.
TACHOMETER	Indicates the speed of the engine in per cent (%) of maximum.
TORQUE INDICATOR	Shows engine power output in percent (%) of torque.

PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

AIRPLANE ACCELERATE/GO DISTANCE	The distance required to accelerate an airplane to a specified speed and assuming failure of an engine at the instant that speed is attained, continue takeoff on the remaining engine to a height of 50 feet.
ACCELERATE/STOP DISTANCE	The distance required to accelerate an airplane to a specified speed and, assuming failure of an engine at the instant that speed is attained to bring the airplane to a stop.
BALKED LANDING	A balked landing is an aborted landing (i.e., a go around in the landing configuration).
BALKED LANDING TRANSITION SPEED	The minimum speed at which a transition to a balked landing climb should be attempted from 50-foot obstacle height.
DEMONSTRATED CROSSWIND VELOCITY	An actual crosswind component used during certification in which the airplane could be adequately controlled during takeoff and landing.
MAXIMUM EFFECTIVE BRAKING	The maximum amount of braking pressure that can be applied to the toe brakes without locking the wheels.

WEIGHT AND BALANCE TERMINOLOGY

ARM	The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
BASIC EMPTY WEIGHT	The weight of the airplane as delivered from the factory including full oxygen, optional equipment (avionics, etc.), unusable fuel, and full operating fluids (oil, hydraulic, and brake).

WEIGHT AND BALANCE TERMINOLOGY (continued)

C.G. ARM	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
C.G. LIMITS	The extreme center of gravity locations within which the airplane must be operated at a given weight.
CENTER OF GRAVITY (C.G.)	The point at which an airplane would balance along the longitudinal axis. Its distance from the reference datum is determined by dividing the total weight of the airplane into the total moment. TOTAL MOMENT ÷ TOTAL WEIGHT = C.G. ARM
FUSELAGE STATION (F.S.)	The distance in inches from the fuselage reference datum.
JACK POINT	One of the points on the airplane designed to rest on a jack.
MAC	The Mean Aerodynamic Chord (average width from leading to trailing edge) of a wing is the chord of an imaginary airfoil which throughout the flight range will have the same force vectors as those of the wing.
MANUFACTURER'S EMPTY WEIGHT	The weight of the airplane as delivered from the factory, less optional equipment (avionics, etc.), all operating fluids (fuel, oil, hydraulic, and brake), personnel, and crew/passenger supplies.
MAXIMUM LANDING WEIGHT	Maximum weight approved for the landing touchdown.
MAXIMUM RAMP WEIGHT	Maximum weight approved for ground maneuver. (Includes weight of start, taxi, and run-up fuel).
MAXIMUM TAKEOFF WEIGHT	Maximum weight approved for the start of the takeoff run.
MAXIMUM ZERO FUEL WEIGHT	Maximum weight exclusive of usable fuel. All weight in excess of this weight must be usable fuel.
MOMENT	The product of the weight of an item multiplied by its arm. (Moments are usually reduced by a constant such as 10, 100, 1000 etc., to simplify balance of digits. Notation of the reduction factor is stated.)

WEIGHT AND BALANCE TERMINOLOGY (continued)

PAYLOAD	The weight of the occupants, cargo and baggage.
REFERENCE DATUM	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
RESIDUAL FUEL	The undrainable fuel remaining when the airplane is defueled in a specific attitude by the normal means and procedures specified for draining the tanks.
STANDARD EMPTY WEIGHT	The weight of the airplane as delivered from the factory including full oxygen, unusable fuel, full operating fluids, (oil, hydraulic, and brake), less optional equipment (avionics, etc.), personnel, and crew/passenger supplies.
TARE	The weight of the chocks, blocks, stands, etc., used when weighing an airplane included in the scale reading. TARE is subtracted from the scale reading to obtain the actual (net) airplane weight.
UNUSABLE FUEL	Fuel remaining after fuel burnoff tests have been completed according to governmental regulations.
USABLE FUEL	Fuel available for flight planning.
USEFUL LOAD	Weight of occupants, cargo, baggage, and usable fuel.

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LIMITATIONS

ITEM PAGE

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INTRODUCTION

Section 2 of this manual provides the operating limitations, 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).

AIRSPEED LIMITATIONS

SPEED	KNOTS CAS	KNOTS IAS (1)	REMARKS
V_A Maneuvering Speed	194	190	Maximum speed at which application of full available aerodynamic control will not overstress the airplane.
V_{FE} Flap Extension Speed			Maximum speed for extension of flaps.
	215	212	T.O. Flaps (9°)
	180	177	1/2 Flaps (18°)
	153	153	Full Flaps (36°)
V_{LO} Landing Gear Operating Speed	176	173	Normal or emergency.
V_{LE} Landing Gear Extended Speed	176	173	Maximum speed with gear extended.
V_{LL} Maximum Landing Light Extension Speed	150	147	Maximum speed for landing light extension.
V_{MCA} Air Minimum Control Speed	107	105	Air Minimum Control Speed is the minimum flight speed at which the airplane is controllable with a bank of not more than 5° when one engine suddenly becomes inoperative and the remaining engine(s) is operating at takeoff power.
V_{MO} Maximum Operating Speed	265	261	This speed applies from sea level through 24,000 feet. From 24,000 feet through 31,000 feet—decrease by 5 knots per 1,000 feet above 24,000 feet.

(1) Normal Static System

AIRSPEED LIMITATIONS (continued)

SPEED	KNOTS CAS	(1) KNOTS IAS	REMARKS
V_P Hydroplaning Speed			This speed can be determined by multiplying the square root of the tire pressure by 9. ($\sqrt{p} \times 9 = Vp$)
V_{S1} Stall Speed Clean	103	99	Conditions: Gear and flaps up, zero thrust, 12,500 pounds.
V_{SSE} Intentional One Engine Inoperative Speed	127	125	Intentional One Engine Inoperative Speed is a minimum speed selected by Swearingen Aviation for intentionally rendering one engine inoperative in flight for pilot training.
V_X Two Engine Best Angle of Climb Speed	107	105	V_X speed not to be used for 50 foot obstacle speed. Conditions for V_X and V_Y: Maximum continuous power, bleed air on, anti-ice as required, electrical load of 150 amperes per engine. V_Y varies with gross weight and altitude.
V_Y Two Engine Best Rate of Climb Speed	144	141	
V_{XSE} Single Engine Best Angle of Climb Speed	119	116	Conditions for V_{XSE} & V_{YSE}: Maximum continuous power on the operating engine, propeller feathered on the inoperative engine, bleed air off. Electrical load of 300 amperes, anti-ice required, gear and flaps up. See Figure V-14 for effects of gross weight and attitude.
V_{YSE} Single Engine Best Rate of Climb Speed	138	135	
Approach Speed, Gear and Flaps Down	116	115	Recommended speed at 12,500 pounds gross weight.
Maximum Demonstrated Crosswind	22	—	A landing at this component has been demonstrated.

ENGINE LIMITATIONS

Number of Engines	2
Engine Manufacturer	AiResearch Manufacturing Co.
Engine Model Number	TPE331-10U-501G or -511G or the TPE331-10U-502G or -512G

(1) Normal Static System

ENGINE LIMITATIONS (continued)

ENGINE LIMITS FOR AIRESEARCH TPE331-10U-501G OR -511G OR THE TPE331-10U-502G OR -512G TURBOPROP ENGINES WITH REVERSING PROPELLERS

Power Setting	Time Limit (min.)	Maximum Torque 100%=2972 (ft.-lbs.)	Maximum SRL (°C) ET	RPM (%) 100%=1591 (1)	Oil Pressure (psi)	Fuel Pressure (psi)	Oil Temp. (°C)
Takeoff	—	100(8)	650(6)	100(2)	70 to 120	20 to 80	55(4) to 110
Maximum cont.	—	100	650(6)	100	70(3) to 120	20 to 80	55(4) to 110
Flight idle	—	—	—	96 to 100	70(3) to 120	20 to 80	55(4) to 110
Ground idle	—	—	—	69 or 97(5)	40 to 120	15 to 80	-40 to 127
Starting	—	—	770	—	—	—	-40 minimum
Reverse high	—	—	—	95.5 to 97	70 to 120	20 to 80	55(4) to 110
Reverse low	—	—	—	75 minimum	70 to 120	15 to 80	-40 to 127
Shutdown	3 min.(7)	—	—	—	—	—	—

Figure II-1

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

(2) 101% for 5 minutes and 106% for 5 seconds is allowed.

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

(4) Operation from 22°C to 55°C allowed as a function of ambient temperature. See Figure II-2.

(5) Typical engine speeds for low and high speed lever positions.

(6) 675°C allowed for 20 seconds. If exceeded, conduct power check. 680°C allowed for up to 5 seconds with power checks, if 5 seconds is exceeded, remove engine for inspection.

(7) 3 minutes minimum at taxi conditions (taxi time included) before shutdown.

(8) Static takeoff power should be limited to 97% to preclude overtorque condition occurring due to ram effects during takeoff.

ENGINE STARTER DUTY CYCLES (Using battery or external power)

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 but do include engine clearing time. Starter ON Time may be extended if ignition occurs, but procedures listed under Battery Start in Section 4 should be observed.

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 1000 amperes.

CONTINUOUS IGNITION DUTY CYCLES

Continuous ignition should be used when taking off or landing with slush or water present on the runway or with heavy bird activity and in flight if in an area of significant rain activity; however, the following duty cycles should be observed:

Time On		Time Off
1 minute		1 minute
	or	
2 minutes		2 minutes
2 minutes		23 minutes
	or	
5 minutes		55 minutes

These limits should not be exceeded or life expectancy of the igniters will be reduced.

SINGLE RED LINE COMPUTER (SRL)

Operation of the airplane with the SRL inoperative is prohibited except as stipulated in Section 3A, ABNORMAL PROCEDURES.

PROPELLERS

Number of Propellers	2
Manufacturer	Hartzell Propeller, Inc.
Propeller Model Number	LT10282AB + 2.5 or TL10282AB + 2.5
Hub Model Number	HC-B4TN-5EL or HC-B4TN-5HL
Number of Blades	4
Diameter (inches)	106
Ground Clearance (inches-approximate)	9
Blade Angle (At 30 inch station):	
Feathered	+89.5 Degrees
Flight Idle	+13.5 Degrees
Start Locks	+2.0 Degrees
Full Reverse (Restricted Operation)	–2.0 Degrees (for TPE331-10U-501G or -511G) –6.0 Degrees (for TPE331-10U-502G or -512G)
Reverse Lockout	+2.0 Degrees

NOTE

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

- At intervals not to exceed 50 flight hours.
- Prior to any flight for which intentional air starts are planned.
- When there is any indication of malfunction.
- After engine control system maintenance or adjustment.

OIL

Mixing oil types or brands is prohibited. Refer to the Maintenance Manual for Oil Change Procedures. Oil quantity and specification are 3.6 quarts of MIL–L–23699A (type II). Refer to AiResearch Service Information Letter (S.I.L.) P331-2 for a current list of approved oils.

The minimum required oil temperature for fuel anti-ice protection is dependent upon the outside air temperature. At an outside air temperature of –20.5°C or warmer, the minimum required oil temperature is +22°C. For operation at temperatures colder than –20°C, refer to Figure II-2.

MINIMUM OIL TEMPERATURE REQUIRED
FOR FUEL ANTI-ICE PROTECTION

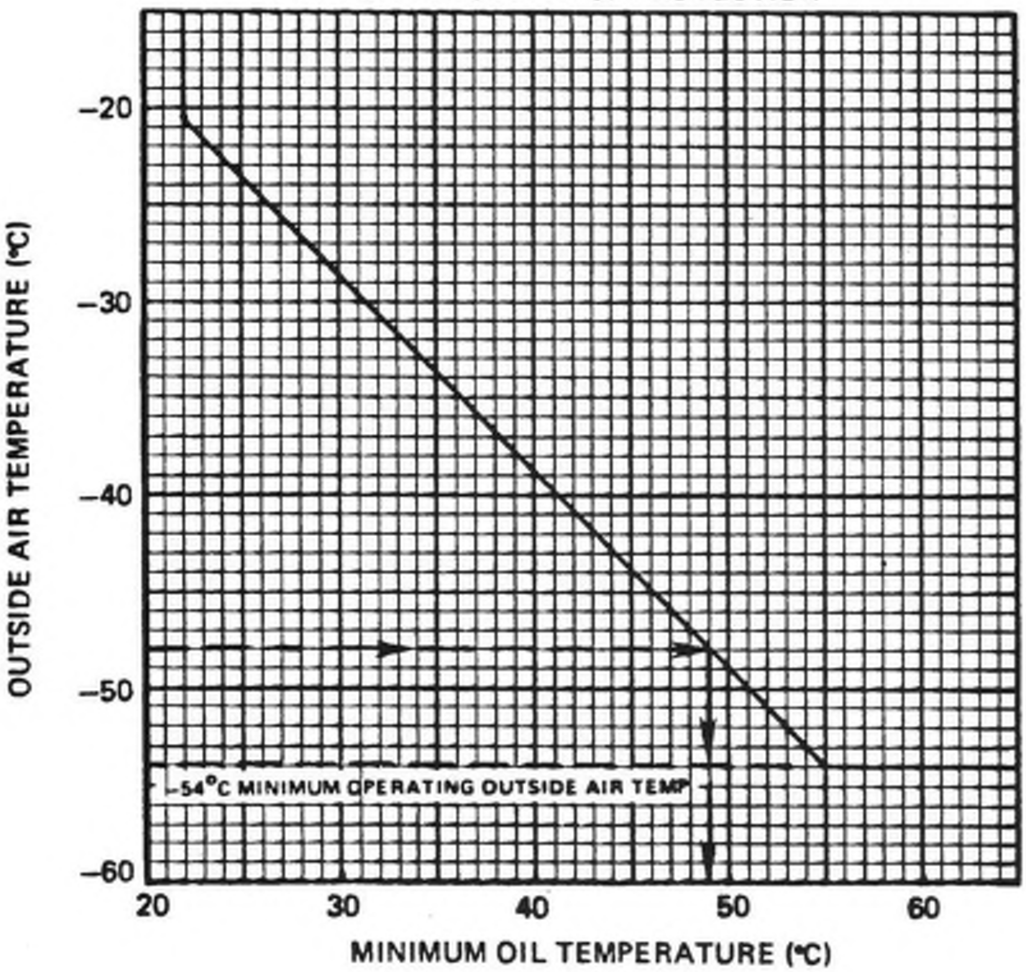


Figure II–2

FUELS

Use aviation fuels conforming to AiResearch Installation Manual IM 5117 (Jet A, Jet A-1, Jet B, JP-1, JP-4, and JP-5). Grade 80/87 aviation gasoline is permitted for emergency use not to exceed 1,000 gallons of aviation gasoline per engine for each 100 hours of engine operation. Grade 100LL aviation gasoline may be used at a rate not to exceed 250 gallons per 100 hours of operation, with the total use limited to 7,000 gallons 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 quart of MIL-L-6082 specification grade 1065 or 1100 piston engine oil per 100 gallons of aviation gasoline to provide fuel pump lubriation.

NOTE

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

See Temperature Limits (page 2-11) for fuel operating temperatures.

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

Maximum demonstrated fuel imbalance for takeoff and landing is 500 pounds.

NOTE

> With fuel imbalance in excess of 150 pounds see Section 3A, ABNORMAL PROCEDURES, for performance adjustment.

Boost pumps must be on for all flight operations outside the no boost pumps required envelope of Figure II-3.

FUEL BOOST PUMP AVAILABILITY REQUIREMENTS

NOTE

> - Two operable boost pumps per wing fuel tank are required for all operations with AvGas, JP-4, or Jet B fuel.
> - When using Jet A, Jet A-1, JP-1, or JP-5, takeoff and flight operations without boost pumps are permitted within the limitations indicated in figure II—3. For all other operations, all fuel boost pumps must be operable.

FUEL BOOST PUMP AVAILABILITY REQUIREMENTS (continued)

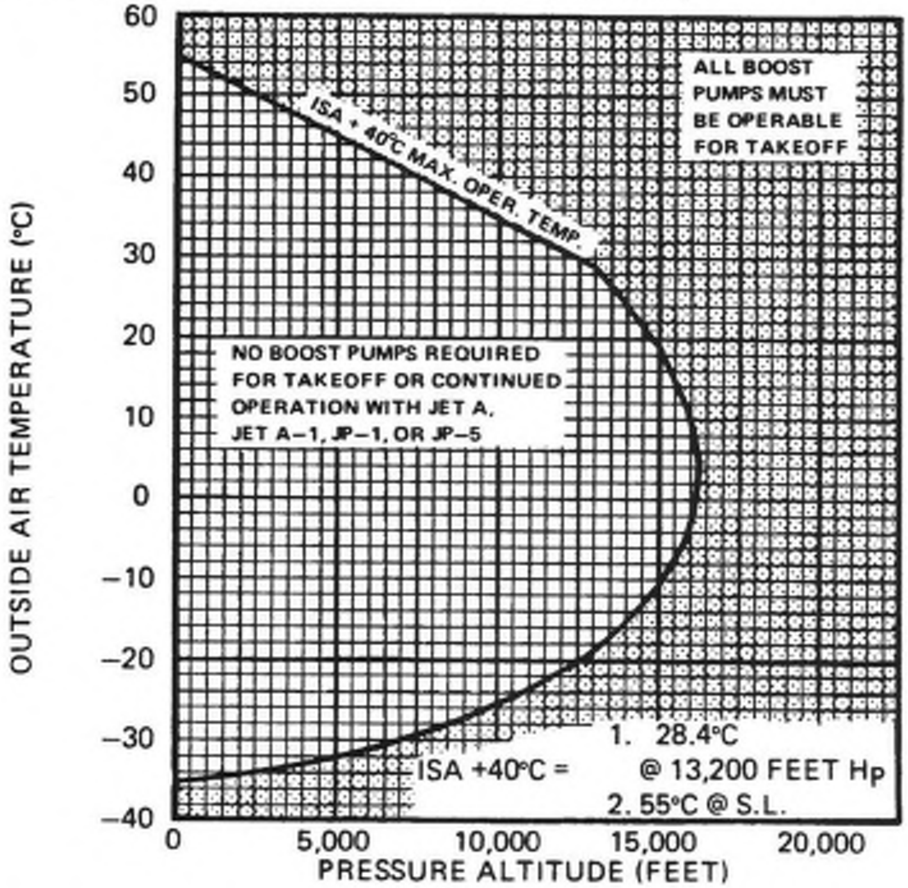


Figure II–3

MAXIMUM WEIGHTS

Maximum Ramp Weight	12,600 pounds
Maximum Takeoff Weight	12,500 pounds
Maximum Landing Weight	12,500 pounds
Maximum Landing Fuel Weight	1,740 pounds/side
Maximum Zero Fuel Weight	10,500 pounds
Maximum Forward Baggage Compartment Load (Baggage and Equipment)	600 pounds
Maximum Fuel Imbalance (For T.O. and Landing)	500 pounds
Maximum Aft Baggage Compartment Load	300 pounds
Maximum Floor Loading (all cargo and passenger areas)	150 pounds/ft^2

CENTER OF GRAVITY LIMITS

Forward Limit (landing gear down):

155.4 inches aft of datum (11% MAC) at 7,500 pounds
160.9 inches aft of datum (18.2% MAC) at 11,500 pounds
163.4 inches aft of datum (21.5% MAC) at 12,500 pounds

Aft Limit (landing gear down):

168.4 inches aft of datum (28% MAC) at all weights

CENTER OF GRAVITY LIMITS (continued)

> NOTE
>
> - Landing gear retraction will not shift the center of gravity beyond limits.
> - See Section 6 for loading instructions.

MANEUVERING LOAD FACTORS

plus 3.167g to minus 1.267g
plus 2.0g Flaps Extended

MINIMUM CREW

The minimum crew required is one pilot.

TYPES OF OPERATION / REQUIRED EQUIPMENT LIST

This is a normal category aircraft approved for Day/Night, VFR/IFR operation and icing conditions. The following equipment must be installed and operating for the approved types of operations to be valid. This equipment list does not apply to aircraft operated under Part 135 when a Master Minimum Equipment List (MMEL) developed by the FAA Flight Operations Evaluation Board (FOEB) exists.

VFR – Day:

1. Airspeed Indicator
2. Altimeter
3. Magnetic Direction Indicator
4. Tachometers (2)
5. Torquemeters (2)
6. Engine Temperature Indicators (2)
7. Oil Pressure Indicators (2)
8. Oil Temperature Indicators (2)
9. Fuel Quantity Indicators (2)
10. Fuel Pressure Indicators (2)
11. Stability Augmentation/Stall Avoidance System (SAS^2)
12. Yaw Damper
13. Landing Gear Position Indicator
14. Approved Seat Belt for Each Seat
15. Airplane Flight Manual
16. Oxygen System and Mask for One Crew Member
17. OAT Indicator
18. SRL Computer
19. NTS System

TYPES OF OPERATION / REQUIRED 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. Adequate electrical energy to operate all electric 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. Two-way radio and navigation equipment appropriate for ground facilities to be used
3. Rate of Turn Gyro
4. Turn and Bank Indicator
5. Sensitive Altimeter (Adjustable for Barometric Pressure)
6. Clock with sweep second hand
7. Generators (2)
8. Gyro Bank and Pitch Indicator (Artificial Horizon)
9. Gyro Direction Indicator
10. A power failure warning device to show the power available for gyroscopic instruments from each power source.

FLIGHT ABOVE 15,000 FEET

1. Oxygen system including a mask for one crew member.
2. Supplemental oxygen system including one mask for every ten passengers.

FLIGHT ABOVE 25,000 FEET

1. Supplemental oxygen system including a mask foe each occupant.

TYPES OF OPERATION/REQUIRED EQUIPMENT LIST (continued)

ICING CONDITIONS (In Visible Moisture and OAT Below +5°C)

WARNING

SEVERE ICING MAY RESULT FROM ENVIRONMENTAL CONDITIONS OUTSIDE OF THOSE FOR WHICH THE AIRPLANE IS CERTIFIED. FLIGHT IN FREEZING RAIN, FREEZING DRIZZLE, OR MIXED ICING CONDITIONS (SUPERCOOLED LIQUID WATER AND ICE CRYSTALS) MAY RESULT IN ICE BUILD-UP ON PROTECTED SURFACES EXCEEDING THE CAPABILITY OF THE ICE PROTECTION SYSTEM, OR MAY RESULT IN ICE FORMING AFT OF THE PROTECTED SURFACES. THIS ICE MAY NOT BE SHED USING THE ICE PROTECTION SYSTEMS, AND MAY SERIOUSLY DEGRADE THE PERFORMANCE AND CONTROLLABILITY OF THE AIRPLANE.

- DURING FLIGHT, SEVERE ICING CONDITIONS THAT EXCEED THOSE FOR WHICH THE AIRPLANE IS CERTIFIED SHALL BE DETERMINED BY THE FOLLOWING VISUAL CUES.

– UNUSUALLY EXTENSIVE ICE ACCRETED ON THE AIRFRAME IN AREAS NOT NORMALLY OBSERVED TO COLLECT ICE.

– ACCUMULATION OF ICE ON THE UPPER SURFACE OF THE WING AFT OF THE PROTECTED AREA.

– ACCUMULATION OF ICE ON THE PROPELLER SPINNER FARTHER AFT THAN NORMALLY OBSERVED.

- USE OF THE AUTOPILOT IS PROHIBITED .

- ALL ICING DETECTION LIGHTS MUST BE OPERATIVE PRIOR TO FLIGHT INTO ICING CONDITIONS AT NIGHT.

(Utilize per Operating Procedures sections of this manual):

1. Engine/Propeller Anti-Ice Systems
2. Pitot Heat/SAS[2] Heat
3. Windshield Heat (High)
4. Surface Boots
5. Continuous Ignition System with AUTO/CONT Feature

TYPES OF OPERATION/REQUIRED EQUIPMENT LIST (continued)

PNEUMATIC DEICING BOOTS SYSTEM (AD 2000-06-04)

Except for certain phases of flight where the AFM specifies that deicing boots should not be used (e.g. take-off, final approach, and landing), compliance with the following is required.

- Wing and Tail Leading Edge Pneumatic Deicing Boot System, if installed, must be activated:
  - At the first sign of ice formation anywhere on the aircraft, or upon annunciation from an ice detector system, whichever occurs first; and
  - The system must either be continued to be operated in the automatic cycling mode, if available; or the system must be manually cycled as needed to minimize the ice accretions on the airframe.
- The wing and tail leading edge pneumatic deicing boot system may be deactivated only after:
  - Leaving known or observed/detected icing that the flight crew has visually observed on the aircraft or was identified by the on-board sensors; and
  - After the airplane is determined to be clear of ice.

NOTE

The FAA recommends periodic treatment of deicing boots with approved ice release agents, such as ICEX\TM\, in accordance with the manufacturer's application instructions.

ALTITUDE LIMITS

Maximum Operating Pressure Altitude .... 31,000 FEET

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

TEMPERATURE LIMITS – ALL ALTITUDES

Minimum Ambient Temperature
For engine ground Starting .... $-40^{o}C$
For engine operation .... $-54^{o}C$
Maximum Ambient Temperature .... ISA $+40^{o}C$ (1)
(1) International Standard Atmosphere– See Section 5 for Chart.

NOTE

- Successful engine starts may not be possible if the fuel has cold soaked at temperatures below $-40^{o}C$.
- Refer to Figure 2–2 to determine minimum oil temperature required for fuel anti-ice protection.

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.

GENERATORS

Maximum continuous load (each generator) .... 300 amps

BATTERY OVERHEAT WARNING SYSTEM

1. Battery temperature sensor setting is $150^{o}F \pm 3^{o}F$.

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

NEGATIVE TORQUE SENSING (NTS) SYSTEM

If NTS does not test satisfactorily (test contained in Section 4), takeoff is prohibited.

PROPELLER REVERSING

Reversing operations are limited to speeds below 40 knots (roll-out, taxi, and ramp operations).

NOSE WHEEL STEERING

1. Use of the nose wheel steering is prohibited when there has been a hydraulic system failure.
2. Use of the nose wheel steering is prohibited when the arming valve has failed to test properly.

NOSE WHEEL STEERING – RESTRICTED USE

Restricted operation of the nose wheel steering below 10 knots for taxi operations only, in accordance with Fairchild Swearingen Service Bulletin SBA32-032, dated June 3, 1981. This limitation supersedes all other AFM/POH instructions concerning use of nose wheel steering.

Not applicable to those aircraft which have been modified in accordance with Fairchild Swearingen Service Bulletin 32-006.

INSTRUMENT MARKINGS

INSTRUMENT	RED RADIAL (MIN.)	YELLOW ARC	WHITE ARC	GREEN ARC	YELLOW ARC	RED RADIAL (MAX.)	DASHED RED RADIAL	RED ARC	RED DOT
Airspeed Indicator (knots) (9)	107 (1)		89 to 153	101.5 to 265		265			
Single Redline ET (°C)				200 to 650		650	770(2)		
Torquemeter (% Torque)				0 to 100		100			
Tachometer (% RPM)				96 to 100		101			
Fuel Pressure (psi)	15(3)	15 to 20		20 to 80		80			
Oil Pressure (psi)	40(3)	40 to 70(3)		50 to 70(4) 70 to 120		120			
Oil Temperature (°C)	–40	–40 to 55(5)		55 to 110	110 to 127(6)	127			
Oxygen Pressure (psi)(7)			0 to 300(7)	1500 to 1800(7)				1800 to 2000(7)	
Deicer Boot 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(8)	2300			
Cabin Differential Pressure (psi)				0 to 7.0	7.0 to 7.25	7.25			
Prop Deicer Ammeter (amps)				17 to 21					
Pitot Heat Ammeter (amps)				2.4 to 10					

(1) V_{MCA}
(2) Used during start as limit ET.
(3) At 69% RPM.
(4) Above 23,000 feet, minimum oil pressure is 50 psi.
(5) See Figure II–2 for minimum oil temperature for takeoff.
(6) Ground operation only.
(7) Markings shown are for a 22 cubic foot bottle.
(8) 3 minute limit during flight.
(9) Airspeed indicator markings reflect calibrated airspeeds.

PLACARDS

ON THE LEFT INSTRUMENT PANEL OR ABOVE LEFT SIDE CONSOLE:

OPERATING LIMITATIONS

THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS. NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED.

MAXIMUM OPERATING SPEED (SEA LEVEL TO 24,000 FT.) VMO .... 265 KTS
(DECREASED BY 5 KTS PER 1,000 FT. ABOVE 24,000 FT.)
MANEUVERING SPEED .... 194 KTS
MINIMUM CONTROL SPEED .... 107 KTS
MAXIMUM FLAP EXTENSION SPEED ....FULL FLAP .... 153 KTS
1/2 FLAP .... 180 KTS
1/4 FLAP .... 215 KTS
MAXIMUM LANDING GEAR SPEED .... 176 KTS
MAXIMUM LANDING LIGHT EXTENSION SPEED .... 150 KTS

APPROVED TYPES OF OPERATION

DAY/NIGHT, VFR/IFR, AND ICING CONDITIONS — SEE AFM FOR REQUIRED EQUIPMENT LIST.

RECOMMENDED SPEEDS

SINGLE ENGINE BEST RATE-OF-CLIMB, S.L. .... 138 KTS
TWIN ENGINE BEST RATE-OF-CLIMB, S.L. .... 144 KTS
TWIN ENGINE BEST ANGLE-OF-CLIMB, S.L. .... 107 KTS
APPROACH SPEED, FLAPS DOWN .... 116 KTS
MAXIMUM DEMONSTRATED CROSSWIND .... 22 KTS
(SPEEDS FOR OTHER CONDITIONS SHOWN IN AFM)

NOTE

The airspeeds on the above placard are calibrated airspeed (CAS).

PLACARDS (continued)

NEAR AIRSPEED INDICATORS:

DO NOT STALL AIRCRAFT WITH SAS[2] INOPERATIVE

DECREASE V_{MO} 5 KNOTS
PER 1,000 FT. ABOVE
24,000 FT.

ON COMPASS FAIRING:

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

BESIDE STATIC SELECTOR:

CAUTION
SEE AFM FOR
ALTERNATE
STATIC SOURCE
ERROR

NEAR PILOTS' OXYGEN OUTLETS:

NO SMOKING WHEN OXYGEN IS
IN USE. HOSE PLUG MUST BE
REMOVED TO STOP OXYGEN FLOW.
MASK IN SEAT BACK.

NEAR CABIN PRESSURE CONTROLLER:

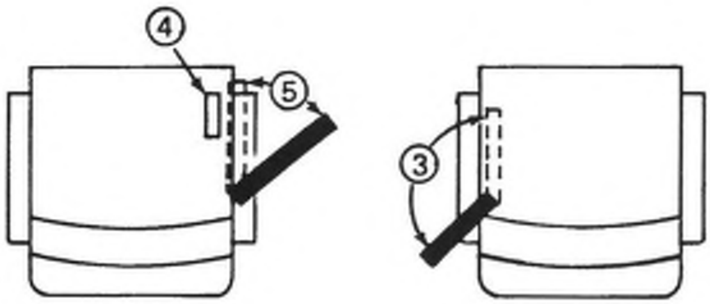
DEPRESSURIZE CABIN PRIOR TO T.O. & LANDING

PLACARDS (continued)

NEAR LANDING GEAR EMERGENCY RELEASE LEVER:

LANDING GEAR EMERGENCY EXTENSION

1. AIRSPEED .... 176 KTS 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 GAGE..... 500 TO 800 PSI



PILOT'S SEAT

COPILOT'S SEAT

NEAR NAV–NAV/STROBE LIGHTS SWITCH:

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

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

INTRODUCTION

Section 3 of this handbook covers emergencies that could possibly occur during ground or flight operation and the recommended procedures for correcting the situation. The emergency situations covered are placed in the order of the 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. The emergency procedures in this section have been FAA approved.

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. Starter Test Switch (affected engine) .... ENGAGE
7. Fuel Boost Pump Switch (affected engine) .... OFF
9. 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. Power Lever (operating engine) .... AS REQUIRED
9. Bleed Air (operating engine) .... AS REQUIRED

NOTE

If the 100% torque limit is not being developed and bleed air is on, increased power may be obtained by selecting bleed air off.

10. Trim .... AS REQUIRED
11. Generator (operating engine) .... 300 AMPS MAXIMUM
12. Propeller Synchrophaser Switch .... OFF

OUT-OF-TRIM WARNING

AURAL OUT-OF-TRIM WARNING .... ABORT TAKEOFF

ENGINE FAILURE DURING TAKEOFF – TAKEOFF ABORTED

1. **POWER LEVERS .... GROUND IDLE**
2. **BRAKES .... AS REQUIRED**
3. Nose Wheel Steering .... AS REQUIRED
4. Reverse Thrust (operating engine) .... AS REQUIRED (BELOW 40 KNOTS)

CAUTION

ON WET OR SLIPPERY SURFACES, USE CAUTION WHEN REVERSING ONLY ONE ENGINE.

ENGINE FAILURE DURING TAKEOFF – TAKEOFF ABORTED (continued)

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

ENGINE FAILURE DURING TAKEOFF – TAKEOFF CONTINUED AT OR ABOVE V_R

1. POWER LEVER (operating engine) .... SET TAKEOFF POWER

NOTE

- Retarding the power lever of the inoperative engine aft of the quadrant switch will disable the rudder bias system.
- 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.
- Set 650°C ET or 100% torque, whichever occurs first. If the 100% torque limit is not being developed and bleed air is ON, increased power may be obtained by selecting bleed air OFF.

***2. LANDING GEAR (after liftoff) .... RETRACT**

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.

***3. FLAPS .... RETRACT**
4. ENGINE STOP AND FEATHER CONTROL (failed engine) .... PULL
5. AIRSPEED .... SINGLE ENGINE BEST RATE CLIMB SPEED 135 KIAS (138 KCAS)

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
7. Power Lever (operating engine) .... AS REQUIRED
8. Trim .... AS REQUIRED
9. Generator (operating engine) .... 300 AMPS MAXIMUM
10. Propeller Synchrophaser .... OFF

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
3. Power Lever (operating engine) .... AS REQUIRED
4. Bleed Air (operating engine) .... AS REQUIRED

NOTE

If the 100% torque limit is not being developed and bleed air is on, increased power may be obtained by selecting bleed air off.

5. Trim .... AS REQUIRED
6. Generator (operating engine) .... 300 AMPS MAXIMUM

*7. Propeller Synchrophaser Switch (if instlled) .... TAKEOFF & LANDING

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.

SINGLE ENGINE LANDING

*1. No Smoking – Fasten Seat Belt Sign .... ON

2. Fuel Quantity .... CHECK WITHIN 500 LBS. DIFFERENTIAL

NOTE

If excess fuel imbalance is indicated on fuel quantity gauge, confirm by checking trim position as gauge may be incorrect. If excess imbalance exists, open fuel crossflow switch to balance fuel within tolerances.

SINGLE ENGINE LANDING

3. Fuel Crossflow Switch .... OPEN IF REQUIRED TO BALANCE, THEN/CLOSED
4. Cabin Differential Pressure .... ZERO
5. Electrical Load .... TURN OFF NONESSENTIAL ITEMS
6. Speed Lever (operating engine) .... HIGH
7. Flaps .... DO NOT EXTEND BEYOND 1/2 UNTIL LANDING IS ASSURED
8. Landing Gear .... EXTEND WHEN LANDING IS ASSURED
9. Nose Wheel Steering .... ARMED

NOTE

If nose wheel steering is inoperative see Section 5, Performance Section, page 5-25, for increased landing distance requirements.

10. Ignition Mode Switches .... AS REQUIRED

AFTER TOUCHDOWN

1. Brakes .... AS REQUIRED
2. Nose Wheel Steering .... AS REQUIRED
3. Reverse Thrust .... AS REQUIRED (BELOW 40 KNOTS)

CAUTION

ON WET OR SLIPPERY SURFACES, USE CAUTION WHEN REVERSING ONLY ONE ENGINE.

SINGLE ENGINE GO-AROUND

1. Power .... AS REQUIRED
2. Landing Gear .... RETRACT
3. Flaps .... RETRACT IN INCREMENTS
4. Airspeed .... SINGLE ENGINE BEST RATE OF CLIMB SPEED 135 KIAS (138 KCAS)

*5. Bleed Air Switch .... OFF

6. Engine Anti-Ice .... OFF UNLESS REQUIRED

ENGINE CONTROL MALFUNCTION

In the event there is an 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 OVERHEAT WARNING LIGHT ON DURING GROUND OPERATIONS

1. Battery Switch (affected side) .... OFF
2. Battery Disconnect .... NOTE DISCONNECT INDICATION FOR AFFECTED SIDE

WARNING

- **IF POSITIVE DISCONNECT IS NOT VERIFIED, SHUT DOWN ENGINES AND INSPECT BATTERY AS SOON AS POSSIBLE.**
- **TAKEOFF AFTER A BATTERY TEMPERATURE WARNING LIGHT ILLUMINATES IS PROHIBITED UNTIL THE CAUSE OF THE OVERHEAT WARNING IS CORRECTED.**

NOTE

- The battery overheat sensor triggers at $150^{\circ} \pm 3^{\circ}F$. After heat soaking in hot climatic conditions, the additional heat generated at the batteries during engine start and subsequent recharging may cause a nuisance warning light.
- A battery overheat warning light caused by thermal runaway may sometimes be verified by observing sustained and excessively high generator loads when the affected battery switch is on.
- Leaving the battery switch off for several minutes following a nuisance warning may allow the battery to cool enough to allow the warning light to extinguish.

BATTERY OVERHEAT WARNING LIGHT ON DURING FLIGHT

1. Battery Switch (affected side) .... OFF
2. Battery Disconnect .... NOTE DISCONNECT INDICATION FOR AFFECTED BATTERY AND LAND AS SOON AS PRACTICABLE

WARNING

IF POSITIVE DISCONNECT IS NOT VERIFIED, LAND AS SOON AS POSSIBLE.

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
5. Left Generator Switch .... ON
   If left generator will not go on line, turn 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
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.**

DOUBLE ENGINE FAILURE (RESTARTS/RELIGHTS UNSUCCESSFUL)

1. **AIRSPEED .... MAINTAIN BEST GLIDE AIRSPEED**

GLIDE AIRSPEED			
WEIGHT (POUNDS)	12,000	10,000	8,500
AIRSPEED (KIAS)	148	136	126

> NOTE
>
> - Best glide airspeed is approximately 1.5 V/V_S on the SAS indicator.
> - Glide ratio at best glide airspeed is approximately 10:1 (2NM/1,000 FT AGL).

2. **GEAR .... UP**
3. **FLAPS .... UP**
4. Complete Engine Failure During Flight Checklist
   Plan for emergency gear extension and a zero flap landing. If altitude above ground level (AGL) permits, unfeathering one engine may provide sufficient hydraulic pressure to operate the flaps.

TOTAL ELECTRICAL FAILURE

1. Entrance Light Switch ....ON (IF ILLUMINATION IS REQUIRED)

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

2. Both Battery and Both Generator Switches .... OFF
3. Battery Switches (individually) .... RESET/ON
4. 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 AIRPLANE

1. **CREW OXYGEN MASKS .... DON**
2. 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
      • Bus tie switch .... OFF
3. If Smoke from Bleed Air Source:
   • Bleed air switches .... TURN OFF ONE SOURCE. IF SMOKE CONTINUED, TURN BACK ON AND TURN 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 depressuring procedures are begun.

4. If Smoke in Rear of Airplane .... USE MANUAL PRESSURIZATION AND SELECT FULL DECREASE. WHEN PRESSURE DIFFERENTIAL IS ZERO ACTIVATE CABIN DUMP SWITCH.
5. If Smoke is in Cockpit .... ACTIVATE CABIN DUMP SWITCH
6. Emergency Descent .... AS REQUIRED
7. Airspeed .... 173 KIAS (176 KCAS) MAXIMUM
8. Landing Gear .... EXTEND
9. 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 eliminate 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 brake fire, wheelwell or air conditioning duct overheat)

***1. BLEED AIR SWITCH (affected side) .... OFF**
2. LANDING GEAR .... DOWN
Leave gear extended at least three (3) minutes to allow cooling of overheated brakes in order to preclude a brake/tire fire and tire explosion.
3. GENERATOR SWITCH (affected side) .... OFF

NOTE

If the warning light extinguishes, retract the landing gear after three (3) minutes cooling and continue flight with the bleed air OFF; the generator may be RESET/ON. If the light reilluminates **STEADY**, extend the gear. Expect performance degradation due to the drag of the gear. A diversion and precautionary landing may be necessary. If the light changes to a **FLASHING** mode complete the wheelwell wing overheat flashing items.

CAUTION

IF THE WARNING LIGHT DOES NOT EXTINGUISH WITHIN THREE MINUTES, THE AFFECTED ENGINE SHOULD BE SHUT DOWN. THE LANDING GEAR MAY HAVE TO BE RETRACTED TO SUSTAIN FLIGHT 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 PRESSURE MALFUNCTION

The cabin altitude warning light illuminates when the cabin pressure is equivalent to a pressure altitude between 10,000 feet and 12,000 feet. Check differential pressure and the controller setting. If the cabin pressurization is not providing proper cabin pressure, change to manual operation. If the desired differential pressure still cannot be attained, and excessive leak exists and it may be necessary to descend or use oxygen.

HIGH PRESSURE MALFUNCTION

If the cabin differential pressure exceeds the normal limit of 7 psi, the cabin pressurization controller may have failed and allowed the outflow to close. Open the manual control valve slightly, 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. 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.

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.

CABIN PRESSURIZATION MALFUNCTIONS (continued)

EXCESSIVE RATE OF PRESSURIZATION (continued)

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 PROCEDURES

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

1. **OXYGEN VALVE .... ON**
2. **PASSENGER AND CREW OXYGEN MASKS .... DON**
3. Speed Levers .... HIGH
4. Power Levers .... FLIGHT IDLE
5. Airspeed .... 173 KIAS (176 KCAS) MAXIMUM
6. Landing Gear .... DOWN
7. Flaps .... ONE-HALF
8. Altitude .... AS REQUIRED

CABIN DOOR WARNING LIGHT ON

PRIOR TO TAKEOFF

Takeoff should not be initiated.

IN FLIGHT

1. Depressurize airplane.
2. Descend as required.
3. Land as soon as practicable.

HYDRAULIC SYSTEM FAILURE

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.

HYDRAULIC SYSTEM FAILURE (continued)

There are no emergency provisions to extend or retract the flaps. Landing approach should be made at 1.3 V_{S1} for the existing airplane configuration. (For flaps up configuration, use 131 KIAS (134 KCAS) at 12,500 pounds gross weight and 6 KIAS less airspeed for each 1,000 pounds less gross weight.)

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

LANDING GEAR EMERGENCY EXTENSION

1. Airspeed .... 173 KIAS (176 KCAS) MAXIMUM
2. Landing Gear Handle .... DOWN
3. Emergency Release Lever .... ROTATE AFT
4. Hand Pump Valve Handle .... PULL PIP PIN/ROTATE VALVE HANDLE 90 DEGREES FORWARD
5. Emergency Hand Pump .... PUMP AS REQUIRED
   a. Gear indicator .... ALL DOWN AND LOCKED
   b. Hydraulic pressure gauge .... 500 PSI TO 800 PSI

> **NOTE**
>
> - 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 2000 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 hydraulic 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.

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 as to bracing position and evacuation procedure.
- Consider removal and secure stowage of escape hatches prior to landing. Expect the entrance door to operate normally. It will not open fully after landings with the nose or left 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.

Landing with All Three Gear up:

1. Use full flaps.
2. Approach the runway at 1.3 V_S plus 5 to 10 KIAS.
3. Do not feather propellers until landing on the runway is assured. Drag will be reduced and gliding distance increased after propellers are feathered.
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 center line. Use rudder for directional control.

GEAR UP LANDINGS (continued)

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 and One Main Extended:

1. Attempt to retract all three gear. 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. Drag will be reduced and gliding distance increased after propellers are feathered.

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 turn 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. **ELEVATOR CONTROL .... OVERPOWER TO MAINTAIN AIRPLANE CONTROL**
2. **TRIM SELECTOR .... OFF (CENTER POSITION)**
3. Trim Selector .... OPPOSITE POSITION FROM WHERE MALFUNCTION OCCURED
4. 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

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^2 Clutch Switch .... AS REQUIRED

NOTE

- Turning the SAS^2 clutch switch OFF will reduce required pull forces by approximately 20 pounds at approach speeds.
- 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

BOTH PILOT'S AND COPILOT'S TRIM SYSTEMS INOPERATIVE (continued)

> NOTE
>
> Flap extension decreases push force requirements.

5. Landing Gear .... DOWN WHEN DESIRED

> NOTE
>
> Gear extension increases push force requirements slightly.

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

STABILITY AUGMENTATION AND STALL AVOIDANCE (SAS^2) SYSTEM MALFUNCTIONS

SAS^2 Clutch Switch .... OFF

CAUTION

WITH THE SAS^2 DISENGAGED (OR INOPERATIVE) THE AIRPLANE WILL HAVE UNDESIRABLE STALL CHARACTERISTICS AT AFT CENTER OF GRAVITY LOADINGS. ADEQUATE MARGINS ABOVE THE STALL SPEED SHOULD BE MAINTAINED IN ALL OPERATIONS. ENSURE THAT TOUCHDOWN SPEED IS EQUAL TO OR GREATER THAN 1.1 V_{S_1}.

NOTE

- With SAS^2 clutch switch OFF, there will be no augmented stick forces. Very light elevator forces will be required to maneuver the airplane at airspeeds below approximately 135 KIAS, particularly when operating at aft c.g. loadings. Airspeed should be monitored closely.
- Fault light on flashing indicates a stopped servo or servo clutch disengagement.
- Fault light on steady in flight indicates computer power failure, or computer power failure with simultaneous servo, or clutch failure.
- With the fault light on, angle of attack and stall warning indications may be unreliable.

SAS^2 MALFUNCTION — NOSE DOWN

In the event of a nose down malfunction (no aural tone is heard) the following procedure should be initiated:

1. **ELEVATOR CONTROL .... OVERPOWER TO MAINTAIN AIRPLANE CONTROL**
2. **SAS^2 CLUTCH SWITCH .... OFF**
3. SAS^2 Circuit Breakers .... PULL

SAS[2] MALFUNCTION — NOSE DOWN (continued)

CAUTION

WITH THE SAS[2] DISENGAGED THE AIRPLANE WILL HAVE UNDESIRABLE STALL CHARACTERISTICS AT AFT CENTER OF GRAVITY LOADINGS. ADEQUATE MARGINS ABOVE THE STALL SPEED SHOULD BE MAINTAINED IN ALL OPERATIONS. ENSURE THAT TOUCHDOWN SPEED IS EQUAL TO OR GREATER THAN $1.1V_{S_1}$.

NOTE

With the SAS[2] inoperative, there will be no augmented stick forces. Very light elevator forces will be required to maneuver the airplane at airspeeds below approximately 135 KIAS, particularly when operating at aft c.g. loadings. Airspeed should be monitored closely.

AURAL STALL WARNING AT SPEEDS WELL IN EXCESS OF NORMAL STALL WARNING SPEEDS

When an aural stall warning occurs in unaccelerated flight at speeds well in excess of normal stall warning speed, possible damage to the angle of attack vane is indicated and an inadvertent nose down push may occur.

1. **SAS[2] CLUTCH SWITCH .... OFF**

To silence the stall warning horn:

2. Stall Warning Circuit Breaker .... PULL

CAUTION

WITH THE SAS[2] DISENGAGED THE AIRPLANE WILL HAVE UNDESIRABLE STALL CHARACTERISTICS AT AFT CENTER OF GRAVITY LOADINGS. ADEQUATE MARGINS ABOVE THE STALL SPEED SHOULD BE MAINTAINED IN ALL OPERATIONS. ENSURE THAT TOUCHDOWN SPEED IS EQUAL TO OR GREATER THAN $1.1\ V_{S_1}$.

AURAL STALL WARNING AT SPEEDS WELL IN EXCESS OF NORMAL STALL WARNING SPEEDS (continued)

> NOTE
>
> With the SAS[2] inoperative, there will be no augmented stick forces. Very light elevator forces will be required to maneuver the airplane at airspeeds below approximately 135 KIAS, particularly when operating at aft c.g. loadings. Airspeed should be monitored closely.

YAW DAMPER/RUDDER BIAS MALFUNCTIONS

POWER FAILURE

The yaw damper warning light, located on the annunciator panel, illuminates when a power failure occurs. If such a failure occurs, the yaw damper and rudder bias switches should be turned OFF and care should be taken to avoid extreme skidding or slipping turns.

> NOTE
>
> Maximum allowable 90 degree crosswind component for landing with yaw damper inoperative is 10 knots.

ELECTRICAL SERVO RUNAWAY

A runaway can occur when an erroneus electrical signal is transmitted to the yaw damper/rudder bias servo primary electrical clutch; however, the system is provided with a secondary mechanical clutch that prevents excessive rudder forces being generated. Approximately 65 pounds of rudder force is required to overcome maximum servo output. If a runaway occurs:

1. Rudder Pedals .... AS REQUIRED FOR COORDINATED FLIGHT
2. Yaw Damper and Rudder Bias Switches .... OFF
3. Avoid extreme skidding or slipping turns.

EMERGENCY EXIT

There is one emergency exit on the right side of the center cabin. The hatch is of the plug type and opens into the cabin. To open the emergency exit:

1. Cabin .... DEPRESSURIZE
2. Hatch Release Handles .... PULL TOGETHER, THEN INWARD

EMERGENCY EXIT (continued)

NOTE

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

NOSE WHEEL STEERING MALFUNCTION

Fault protection is provided by circuitry which automatically deactivates the nose wheel steering system if an electrical malfunction occurs. The nose gear then is free to caster and 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 with rudder, differential braking and/or differential power.

1. Flashing NOSE STEERING Light
   a. **NWS power lever button .... RELEASE**
   b. Directional control............................ MAINTAIN WITH RUDDER, BRAKES AND/OR POWER
   c. Nose wheel steering arm switch .... OFF
   d. Nose wheel steering circuit breaker .... PULL
2. Unwanted Steering Deflection
   a. **NWS power lever button .... RELEASE**
   b. Directional control............................ MAINTAIN WITH RUDDER, BRAKES AND/OR POWER
   c. Nose wheel steering arm switch .... OFF
   d. Nose wheel steering circuit breaker .... PULL
3. Park Light Illuminated When Park Button is Not Depressed
   a. **NWS power lever button .... RELEASE**
   b. Directional control............................ MAINTAIN WITH RUDDER, BRAKES AND/OR POWER
   c. Nose wheel steering arm switch .... OFF
   d. Nose wheel steering circuit breaker .... PULL

NOTE

It is normal for the park light to remain illuminated, but vary in intensity, during the 4 to 7 second transition time from park mode to normal mode.

On those aircraft which have been modified in accordance with Fairchild Swearingen Service Bulletin 32-037.

NOSE WHEEL STEERING ELECTRICAL MALFUNCTION

Fault protection is provided by circuitry which automatically deactivates the nose wheel steering system if an electrical malfunction occurs. The nose wheel is then free to caster and 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 with rudder, differential braking, and/or differential power.

In the event of a flashing NOSE STEERING light, an unwanted steering deflection, and/or park light illuminated when the PARK button is not depressed:

1. NWS Power Lever Button ....RELEASE
2. Right Speed Lever .... APPROXIMATELY 1/2 INCH FWD OF LOW
3. Directional Control .... MAINTAIN WITH RUDDER, BRAKES, AND/OR POWER
4. Nose Wheel Steering Arm Switch ....OFF
5. Nose Wheel Steering Circuit Breaker ....PULL

NOTE

It is normal for the park light to remain illuminated, but vary in intensity, during the 4 to 7 second transition time from park mode to normal mode.

NOSE WHEEL STEERING HYDRAULIC MALFUNCTION

An illuminated NOSE STEER FAIL amber annunciator light indicates that hydraulic pressure is being supplied to the nose wheel steering actuator but the pilot is not commanding a steering signal. Illumination of the NOSE STEER FAIL light should alert the pilot to potentially undesirable steering actuation and that corrective action may be required. Corrective action depends upon the operational phase.

NOSE STEER FAIL Light on –

(During ground operations):

1. NWS Power Lever Button . . . . PRESS AND HOLD

or:

2. Right Speed Lever . . . . LOW
3. NOSE STEER FAIL Light . . . . CHECK OUT
4. Directional Control . . . . MAINTAIN WITH NWS
5. Do Not Take Off.

(During Initial part of takeoff roll):

1. NWS Power Lever Button . . . . PRESS AND HOLD
2. NOSE STEER FAIL Light . . . . CHECK OUT
3. Directional Control . . . . MAINTAIN
4. Takeoff . . . . ABORT

(During final part of takeoff roll):

1. NWS Power Lever Button . . . . PRESS AND HOLD
2. NOSE STEER FAIL Light . . . . CHECK OUT
3. Directional Control . . . . MAINTAIN

Continue with Normal Takeoff Procedures.

(In flight with gear down):

1. NWS Power Lever Button . . . . PRESS AND HOLD
2. NOSE STEER FAIL Light . . . . CHECK OUT

NOTE

Conduct normal landing and rollout while keeping the power lever button depressed to avoid uncommanded steering actuation.

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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. These procedures have been FAA approved.

MANUAL GROUND START PROCEDURE

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 an asterisk.

Start fuel enrichment, which is normally an automatic function must be accomplished manually by depressing the start button during a manual engine start.

> NOTE
>
> After accomplishing a manual ground start, all SRL system pre-flight checks must be accomplished satisfactorily prior to flight.

BATTERY MANUAL START

1. Battery Switches .... ON
2. Annunciator Panel and Normal System Warning Lights .... PRESS-TO-TEST

> NOTE
>
> Annunciator press-to-test button must remain depressed until the WING OVHT warning lights start flashing.

3. Inverter (check No. 2, then No. 1) .... ON
4. Fuel Quantity .... CHECK (500 POUNDS MAXIMUM IMBALANCE)
5. Rudder Bias System .... TEST/OFF
   (SEE PAGE 4-18)

RIGHT ENGINE

6. SRL Fail Light .... CHECK ON
7. Boost Pumps .... CHECK/AS DESIRED
8. Propellers .... UNFEATHERED/CLEAR
(SEE PAGE 4-15)
9. NTS (first flight of day) .... CHECK
(SEE PAGE 4-19)
10. Start Mode Switch .... AS DESIRED
*a. Speed Switch Select Switch .... MANUAL
11. Engine Start Button .... DEPRESS AND HOLD
12. RPM .... 10% — 12%
*a. Speed Switch Select Switch (At 10% RPM).... MOVE TO 10% — 60% AND HOLD
13. Observe ignition as indicated by rising ET and illumination of IGN light. Release start button when ET rises. Depress start button to obtain start fuel enrichment as required.
*a. Speed Switch Select Switch .... RELEASE TO MANUAL ABOVE 60% RPM

CAUTION

IF IGNITION IS NOT OBTAINED WITHIN 10 SECONDS AFTER REACHING 10% RPM, AND PLACING THE SPEED SWITCH SELECT SWITCH TO 10% — 60%, OR BEFORE ATTAINING 20% RPM, PRESS STOP BUTTON AND PULL ENGINE STOP AND FEATHER CONTROL. CLEAR ENGINE FOR 10 SECONDS WITH STARTER TEST SWITCH.

NOTE

During a Manual Start while the speed switch select switch is being held in the "10% — 60%" position, start fuel enrichment can only be obtained by depressing the start button. When using the start button to manually provide start fuel enrichment, attempt to maintain normal engine acceleration and an ET of approximately 650 °C.

14. ET .... MONITOR (770°C MAXIMUM)
15. RPM .... STABILIZED AT 69% ± 1%
16. ET .... STABILIZED
*a. Speed Switch Select Switch .... AUTO
17. Fuel and Oil Pressure .... YELLOW OR GREEN ARCS
18. Generator .... RESET/ON
19. SRL Fail Light .... ABOVE 80% RPM — CHECK OFF
20. Bleed Air Switch (right engine).. ON

RIGHT ENGINE (continued)

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

21. Start Mode Switch .... PARALLEL

> NOTE
>
> After accomplishing a manual ground start, all SRL system pre-flight checks must be accomplished satisfactorily prior to flight.

LEFT ENGINE — MANUAL START IF REQUIRED

22. Repeat Steps 6 Through 19 For Left Engine.
23. Bleed Air Switch (left engine) .... ON

> NOTE
>
> Verify operation of each bleed air system by selectively operating right and left systems.

24. Temperature Controls .... AS REQUIRED
25. Cabin Pressure Dump Switch .... NORMAL
26. Boost Pumps .... ON

AUXILIARY POWER UNIT (APU) MANUAL START

> CAUTION
>
> • USE ONLY NEGATIVELY GROUNDED TYPE AUXILIARY POWER SOURCES.
>
> • DUE TO THE POSSIBILITY OF EXCESSIVELY HIGH CURRENT SURGE DURING ENGINE START, IT IS RECOMMENDED THAT THE MAXIMUM STARTING CURRENT FROM AN AUXILIARY POWER SOURCE BE LIMITED TO 1,000 AMPERES.

AUXILIARY POWER UNIT (APU) MANUAL START (continued)

1. Battery Switches .... OFF
2. APU .... ENGAGED/ON
3. Voltage Selection .... APU
4. Battery Switches .... ON
5. Annunciator Panel and Normal System Warning Lights .... PRESS-TO-TEST

NOTE

Annunciator press-to-test button must remain depressed until WING OVHT warning lights start flashing.

6. Inverter (check No. 2, then No. 1) .... ON
7. Fuel Quantity .... CHECK (500 POUNDS MAXIMUM IMBALANCE)
8. Rudder Bias System .... TEST/OFF (SEE PAGE 4-18)

RIGHT ENGINE

9. SRL Fail Light .... CHECK ON
10. Boost Pumps .... CHECK/AS DESIRED
11. Propellers .... UNFEATHERED/CLEAR (SEE PAGE 4-15)
12. NTS (first flight of day) .... CHECK (SEE PAGE 4-19)
13. Start Mode Switch .... PARALLEL
    *a. Speed Switch Select Switch .... MANUAL
14. Start Button .... DEPRESS AND HOLD
15. RPM .... 10% — 12%
    *a. Speed Switch Select Switch (At 10% RPM) ..... MOVE TO 10% — 60% AND HOLD
16. Observe ignition as indicated by rising ET and illumination of IGN light. Release start button when ET rises. Depress start button to obtain start fuel enrichment as required.
    *a. Speed Switch Select Switch .... RELEASE TO MANUAL ABOVE 60% RPM

CAUTION

IF IGNITION IS NOT OBTAINED WITHIN 10 SECONDS AFTER REACHING 10% RPM, AND PLACING THE SPEED SWITCH SELECT SWITCH TO 10% — 60%, OR BEFORE ATTAINING 20% RPM, PRESS STOP BUTTON AND PULL ENGINE STOP AND FEATHER CONTROL. CLEAR ENGINE FOR 10 SECONDS WITH STARTER TEST SWITCH.

RIGHT ENGINE (continued)

NOTE

During a manual start while the speed switch select switch is being held in the "10% — 60%" position, start fuel enrichment can only be obtained by depressing the start button. When using the start button to manually provide start fuel enrichment, attempt to maintain normal engine acceleration and an ET of approximately 670°C.

17. ET .... MONITOR (770°C MAXIMUM)
18. RPM .... STABILIZED AT 69% ± 1%
19. ET .... STABILIZED
    *a. Speed Switch Select Switch .... AUTO
20. Fuel and Oil Pressure .... YELLOW OR GREEN ARCS
21. SRL Fail Light .... ABOVE 80% RPM — CHECK OFF

NOTE

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

22. Bleed Air Switch (right engine).................... ON

NOTE

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

LEFT ENGINE — MANUAL START IF REQUIRED

23. Repeat Steps 9 Through 21 For Left Engine.
24. Bleed Air Switch (left engine) .... ON

NOTE

Verify operation of each bleed air system by selectively operating right and left systems.

25. Temperature Controls .... AS REQUIRED
26. Cabin Pressure Dump Switch .... NORMAL
27. Boost Pumps .... ON
28. APU .... OFF/DISENGAGED
29. Left and Right Generators .... RESET/CHECK GENERATOR VOLTAGE/ON
30. Voltage Selector .... BUS

BOOST PUMP FAILURE

In the event of a boost pump failure, as indicated by low fuel pressure, the auxiliary boost pump should be selected. See Figure II-3 for no boost pumps required flight envelope.

FUEL TRANSFER PUMP WARNING LIGHT ON (Also called Jet Pump)

In the event that a transfer pump warning light illuminates with more than 75 pounds of fuel remaining in the affected tank, the auxiliary boost pump should be turned on. If the light remains illuminated, use the higher unusable fuel quantity of 75 pounds. (Reference Section 7, Fuel System).

CAUTION

WITH TRANSFER PUMPS OPERATIVE AND LESS THAN 75 POUNDS OF FUEL IN THE AFFECTED TANK, THE TRANSFER PUMP WARNING LIGHT SERVES AS A LOW FUEL WARNING. A LANDING SHOULD BE MADE AS SOON AS PRACTICABLE.

OPERATION WITH FUEL IMBALANCE

Takeoff with a fuel imbalance up to 150 pounds is permitted using the normal performance data contained in Section 5. For takeoffs with fuel imbalance between 150 pounds and 500 pounds, 10 KIAS must be added to V_R and V_{50} takeoff speeds specified in Section 5. Because of the increased speed, the takeoff distance must be increased as shown in Section 5, page 5-22 and 5-23. Aileron trim and control wheel force requirements with fuel imbalance are dependent upon the total fuel loading and the airspeed. During takeoff and initial climb with a relatively heavy fuel load, full aileron trim and control wheel force in the direction of the light wing will be required for fuel imbalance over 300 pounds. The wheel force requirement increases with increased imbalance. For fuel imbalances between zero and 300 pounds, a proportionate amount of aileron trim should be preset prior to takeoff.

ELECTRICAL SYSTEM FAILURES

EXCESSIVE AMMETER INDICATION

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

EXCESSIVE AMMETER INDICATION (continued)

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 D.C. 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 exists, turn nonessential bus tie 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.

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 bus relays to disconnect automatically from the airplane electrical system. Both battery bus 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.

BATTERY FAULT LIGHT ON (continued)

If a fault does exist in the left circuit, 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 does exist in the right circuit, the light will come back on. In this case, move the right battery switch to RESET (to reset the fault detector circuit), then OFF.

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 300 AMPS LOAD ON OPERATING GENERATOR.

CIRCUIT BREAKER TRIPPED

1. Circuit Breaker .... PUSH TO RESET

CAUTION

IF CIRCUIT BREAKER TRIPS AGAIN, DO NOT RESET.

INVERTER INOPERATIVE

1. Select other inverter.

ELECTRICAL BUS FAILURE (indicated by loss of systems on the particular bus)

1. Left Essential Bus Failure:
   a. Left essential bus tie switch .... OFF
   b. Bus transfer switches .... RIGHT BUS
2. Right Essential Bus Failure:
   a. Right essential bus tie switch .... OFF
   b. Bus transfer switches .... LEFT BUS
3. Nonessential Bus Failure:
   a. Nonessential bus tie switch .... OFF

NOTE

With D.C. power failure, the torque indicator powered from the failed bus will indicate 100%, i.e., left essential bus failure – left torque indicator 100%.

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 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.

WEATHER CONDITIONS CONDUCIVE TO SEVERE IN-FLIGHT ICING:

- Visible rain at temperatures below 0 degrees Celsius ambient air temperature.
- Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:

Monitor the ambient air temperature. While severe icing may form at temperatures as cold as –18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues for identifying severe icing conditions are observed, accomplish the following:

- Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions. Avoid extended exposure to icing conditions more severe than those for which the airplane has been certified.
- Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.
- Do not engage the autopilot.
- If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.
- If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.
- Do not extend flaps during extended operation in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surfaces further aft on the wing than normal, possibly aft of the protected area.
- If the flaps are extended, do not retract them until the airframe is clear of ice.
- Report these weather conditions to Air Traffic Control.

INADVERTENT ICING ENCOUNTER

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

1. Ignition Mode Switches .... OVRD
2. Ignition Light .... CHECK ON
3. Engine and Propeller Anti-ice Switch (left engine) .... ON

> NOTE
>
> - Determine that the first engine operates satisfactorily before selecting engine and prop anti-ice for the second engine.
> - ET will increase and torque will decrease slightly when engine and propeller anti-ice is selected. Power lever adjustment may be required.

4. Pitot Heat/SAS^2 Heat .... ON
5. Windshield Heat Switch .... HIGH
6. Deice Boots Switch .... AUTO (AT THE FIRST SIGN OF ICE FORMATION ANYWHERE ON THE AIRCRAFT)
7. Engine and Propeller Anti-ice Switch (right engine) .... ON

> NOTE
>
> - Observe ignition duty cycles.
> - Excessive use of override mode will reduce igniter plug life.

> **WARNING**
>
> **ENGINE HEAT AND CONTINUOUS IGNITION, IN THE OVERRIDE MODE, MUST BE USED AFTER LEAVING ICING CONDITIONS UNTIL THE PILOT IS CONFIDENT THAT ANY SIGNIFICANT RESIDUAL ICE ON PROPELLERS, SPINNERS, OR INLET LIPS WILL NOT BE SHED INTO THE ENGINE INTAKES.**

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INSTRUMENT STATIC PRESSURE MALFUNCTION

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 5 of this manual for corrected airspeed and altimeter readings when operating on the alternate source.

NOTE

- The copilot's static pressure instruments are not connected to the alternate static pressure source.
- Do not dump pressurization when using the alternate static pressure source.
- The altitude and airspeed corrections shown in Section 5 of this manual are not valid if the dump valve is open.

TEMPERATURE LIMITER MALFUNCTIONS

OPERATIONS WITH THE TEMPERATURE LIMITER CIRCUIT 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 ET 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 slowly above 50% power to allow for valid ET indication lag. Adjust power by making small power lever position changes and allowing adequate time for ET lag.
3. Changes in airspeed, temperature and/or altitude will produce changes in ET. Monitor ET when operating the engine near the ET 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 SRL/TEMP LIMITER PREFLIGHT CHECKS (NORMAL OPERATING PROCEDURES).

CAUTION

TAKEOFF WITH A KNOWN FAILURE IN THE OPEN POSITION IS NOT APPROVED.

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

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

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

If takeoff operations are desired, the following procedures will be used when the temperature limiter(s) is inoperative (fuel bypass valve(s) closed): The ET indication may require up to 20 seconds to stabilize after the power levers are advanced to takeoff power; however, the response of the engine torque indications is essentially instantaneous, therefore engine-torque will be used to set takeoff power at the start of the takeoff roll.

1. A static power check will be made prior to takeoff at a suitable location on the airport where takeoff power can be maintained for approximately 20 seconds without interfering with other traffic.

NOTE

This power check is required even though atmospheric conditions result in reaching the 100% torque limit before the 650°C limit.

2. After ET stabilizes at 650°C, record the torque indication. Use this value of torque minus 3%, not to exceed 97%, to set power prior to brake release when initiating the takeoff roll.

3. See bleed air off takeoff distance charts in Section 5 for performance corrections to be applied when using this procedure.

The most probable indication that the fuel bypass valve has failed in its closed position would be high ET (more than 650°C) with failure of the fuel bypass light to illuminate at high power lever positions.

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. An SRL FAIL light ON indicates loss of power to the system, loss of signal to the computer, loss of computer output signal or that the difference between compensated ET and SRL value is less than 15°C.
2. A sudden change in ET of 20°C or more with no corresponding change in other engine parameters.
3. An erratic or fluctuating ET indication.
4. SRL Fail Light not illuminated with engine speed below 80% RPM.
5. SRL △ P/P switch in the SRL OFF position.

> NOTE
>
> SRL inoperative ET charts are only provided for 100% RPM maximum continuous power and 98% RPM. Cruise with SRL inoperative is limited to 98% or 100% RPM.

When operating with the SRL computer inoperative, the pilot must perform the following:

1. 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.
2. The maximum ET will vary with altitude, airspeed and temperature. The pilot must operate the engine within the maximum ET limits by obtaining the limiting ET from pages 3A-14 through 3A-17.
3. After landing at the next scheduled destination, repair the SRL system before further flight.

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 △P/P test switch in in the SRL OFF position.
3. Manually control engine temperature to the appropriate limits from pages 3A-14 through 3A-17.

> NOTE
>
> Engine over-temperature can result from turning the SRL OFF with the fuel bypass open light on.

ET LIMIT WITH SRL INOPERATIVE
100% RPM—MAXIMUM CONTINUOUS POWER

> **NOTE**
> Indicated outside air temperature (IOAT) as shown in table includes compressibility and position errors.

Example

Given: Altitude = 15,000 Feet
Airspeed = 196 KIAS (200 KCAS)
IOAT = —6°C

Obtain: Maximum ET = 546°C

ALTITUDE (Feet)	△ ISA °C	OAT °C	INDICATED/CALIBRATED AIRSPEED (Knots)							
			0		147/150		196/200		246/250	
			IOAT	ET	IOAT	ET	IOAT	ET	IOAT	ET
SEA LEVEL	—30	—15	OBTAIN OAT FROM TOWER	550	—12	548	—11	547	—9	546
	—20	—5		557	—2	555	—1	554	1	551
	—10	5		564	8	562	10	560	12	558
	0	15		571	19	569	20	567	22	564
	10	25		579	28	577	30	575	32	572
	20	35		588	38	586	40	584	42	581
	30	45		598	48	596	50	593	52	589
	40	55		608	58	605	60	602	62	598
5000	—30	—25		547	—21	544	—20	543	—18	538
	—20	—15		551	—11	549	—10	548	—8	544
	—10	—5		557	—1	554	1	552	3	550
	0	5		564	9	562	11	559	13	556
	10	15		571	19	568	21	566	23	562
	20	25		580	29	577	31	574	33	570
	30	35		589	39	586	41	582	44	578
	40	45		599	49	595	51	592	54	587
10000	—30	—35		544	—30	541	—29	539	—26	533
	—20	—25		547	—20	545	—18	543	—16	538
	—10	—15		552	—10	549	—8	546	—6	543
	0	—5		558	0	555	2	552	5	548
	10	5		564	10	561	12	559	15	555
	20	15		572	20	568	22	566	25	561
	30	25		580	30	577	32	574	35	569
	40	35		589	40	586	43	582	46	578

Figure IIIA – 1

ET LIMIT WITH SRL INOPERATIVE
100% RPM—MAXIMUM CONTINUOUS POWER (continued)

ALTITUDE (Feet)	Δ ISA °C	OAT °C	INDICATED/CALIBRATED AIRSPEED (knots)							
			0		147/150		196/200		246/250	
			IOAT	ET	IOAT	ET	IOAT	ET	IOAT	ET
15000	−30	−45	OBTAIN OAT FROM TOWER	—	−39	538	−37	535	−34	529
	−20	−35		—	−30	541	−27	538	−24	534
	−10	−25		—	−19	544	−17	541	−14	538
	0	−15		—	−9	548	−6	546	−3	542
	10	−5		—	1	555	4	552	7	548
	20	5		—	11	562	14	558	17	553
	30	15		—	21	568	24	566	27	561
	40	25		—	32	577	34	574	38	569
20000	−30	−55		—	−48	534	−46	531	−42	527
	−20	−45		—	−38	537	−35	534	−32	530
	−10	−35		—	−28	540	−25	536	−22	534
	0	−25		—	−18	544	−15	541	−11	538
	10	−15		—	−8	549	−4	546	−1	542
	20	−5		—	2	555	6	552	10	546
	30	5		—	12	561	16	558	20	553
	40	15		—	22	569	26	565	30	561
25000	−30	−64		—	−55	530	−52	527	−49	—
	−20	−54		—	−45	533	−42	531	−39	—
	−10	−44		—	−35	536	−32	533	−28	—
	0	−34		—	−25	540	−22	536	−18	—
	10	−24		—	−15	544	−12	541	−9	—
	20	−14		—	−5	549	−1	546	3	—
	30	−4		—	6	555	9	551	14	—
	40	5		—	15	561	19	557	23	—
30000	−30	−74		—	−64	525	−61	522	−56	—
	−20	−64		—	−54	529	−50	526	−46	—
	−10	−54		—	−43	532	−40	529	−35	—
	0	−44		—	−33	536	−29	532	−25	—
	10	−34		—	−23	540	−19	536	−14	—
	20	−24		—	−13	544	−9	540	−3	—
	30	−14		—	−3	548	2	544	6	—
	40	−4		—	8	554	12	549	18	—

Figure IIIA—1 (continued)

ET LIMIT WITH SRL INOPERATIVE
98% RPM — CRUISE POWER

NOTE

Indicated outside air temperature (IOAT) as shown in table includes compressibility and position errors.

Example:
Given: Altitude = 10,000 Feet
Airspeed = 196 KIAS (200 KCAS)
IOAT = —8°C

Obtain: Maximum ET = 535°C

ALTITUDE (Feet)	ΔISA °C	OAT °C	INDICATED/CALIBRATED AIRSPEED (Knots) 0 IOAT	0 ET	147/150 IOAT	147/150 ET	196/200 IOAT	196/200 ET	246/250 IOAT	246/250 ET
SEA LEVEL	—30	—15	OBTAIN OAT FROM TOWER	538	—12	537	—11	534	—9	532
	—20	—5		545	—2	544	—1	541	1	538
	—10	5		553	8	551	10	549	12	546
	0	15		562	18	560	20	558	22	555
	10	25		572	28	571	30	568	32	565
	20	35		582	39	579	40	578	42	574
	30	45		592	48	590	50	586	52	583
	40	55		602	58	598	60	595	62	591
5000	—30	—25		532	—21	530	—20	528	—18	525
	—20	—15		538	—11	536	—10	534	—8	533
	—10	—5		546	—1	543	1	542	3	539
	0	5		553	9	551	11	550	13	547
	10	15		562	19	560	21	558	23	555
	20	25		572	29	570	31	568	33	564
	30	35		583	39	580	41	576	44	573
	40	45		593	49	589	51	586	54	582
10000	—30	—35		528	—30	526	—29	523	—26	519
	—20	—25		533	—20	530	—18	528	—16	526
	—10	—15		540	—10	537	—8	535	—6	531
	0	—5		546	0	544	2	541	5	538
	10	5		554	10	552	12	549	15	545
	20	15		562	20	560	22	557	25	554
	30	25		573	30	570	32	567	35	562
	40	35		583	40	579	43	576	46	571

Figure IIIA—2

ET LIMIT WITH SRL INOPERATIVE
98% RPM – CRUISE POWER (continued)

ALTITUDE (Feet)	Δ ISA °C	OAT °C	INDICATED/CALIBRATED AIRSPEED (Knots) 0		147/150		196/200		246/250	
			IOAT	ET	IOAT	ET	IOAT	ET	IOAT	ET
15,000	–30	–45	OBTAIN OAT FROM TOWER	—	–39	523	–37	519	–34	514
	–20	–35		—	–30	526	–27	523	–24	518
	–10	–25		—	–19	532	–17	528	–14	522
	0	–15		—	–9	537	–6	534	–3	528
	10	–5		—	1	544	4	540	7	534
	20	5		—	11	531	14	548	17	542
	30	15		—	21	560	24	557	27	550
	40	25		—	32	570	34	566	38	559
20,000	–30	–55		—	–48	519	–46	516	–42	510
	–20	–45		—	–38	523	–35	519	–32	511
	–10	–35		—	–28	527	–25	522	–22	516
	0	–25		—	–18	532	–15	527	–11	521
	10	–15		—	–8	538	–4	532	–1	526
	20	–5		—	2	544	6	538	10	533
	30	-5		—	12	552	16	547	20	540
	40	15		—	22	560	26	556	30	548
25,000	–30	–64		—	–55	515	–52	513	–49	—
	–20	–54		—	–45	519	–42	516	–39	—
	–10	–44		—	–35	522	–32	519	–28	—
	0	–34		—	–25	526	–22	523	–18	—
	10	–24		—	–15	530	–12	529	–7	—
	20	–14		—	–5	536	–1	534	3	—
	30	–4		—	6	546	9	538	14	—
	40	5		—	15	554	19	546	23	—
30,000	–30	–74		—	–64	544	–61	508	–56	—
	–20	–64		—	–54	538	–50	512	–46	—
	–10	–54		—	–43	532	–40	514	–35	—
	0	–44		—	–33	526	–29	516	–25	—
	10	–34		—	–23	523	–19	521	–14	—
	20	–24		—	–13	519	–9	527	–3	—
	30	–14		—	–3	516	2	532	6	—
	40	–4		—	8	512	12	538	18	—

Figure IIIA–2 (continued)

PREPLANNED ENGINE SHUTDOWN IN FLIGHT

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 if the **ENGINE FAILURE DURING FLIGHT** procedure is expanded as follows:

> **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.**

REPARATION FOR ENGINE SHUTDOWN

1. Propeller Synchrophaser .... OFF
2. Power Lever (selected engine) .... APPROXIMATELY 1/4 INCH FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
3. Speed Levers .... 96% RPM

   Allow the selected engine to cool and stabilize at low power while accomplishing Step 4. Observe torque and ET limits on the operating engine.

PREPLANNED ENGINE SHUTDOWN IN FLIGHT (continued)

PREPARATION FOR ENGINE SHUTDOWN (continued)

4. Current Limiter Check

   a. Battery Switches .... OFF
   b. Generator (selected engine) .... OFF
   c. Stabilizer Trim .... ACTUATE BOTH PILOT SWITCHES
      NOTE STABILIZER MOVEMENT.
      ACTUATE BOTH COPILOT SWITCHES
      NOTE STABILIZER MOVEMENT.
   d. Battery Switches .... ON

CAUTION

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

For airplanes modified in accordance with Service Bulletin 226 24-034, substitute the following for the Current Limiter Check:

   e. Generators .... CHECK VOLTS AND AMPS

NOTE

- If generator voltage is observed with no current, the generator current limiter is open.
- An open current limiter will not prevent an engine restart, but an intentional engine shutdown 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.

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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 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 until RPM decays to approximately 30%. 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. (NORMALLY, RPM WILL DECAY TO 30% IN 25 TO 40 SECONDS).
- DO NOT PERMIT THE INOPERATIVE ENGINE TO WINDMILL IN THE 18% TO 28% RPM RANGE.

2. Engine Clean Up Procedure (selected 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
3. Power Lever (operating engine) .... AS REQUIRED
4. Trim .... AS REQUIRED
5. Generator (operating engine) .... 300 AMPS MAXIMUM
6. Propeller Synchrophaser .... OFF
7. Engine Stop and Feather Control .... FORWARD
8. Unfeather/NTS Test Switch (selected engine) .... AS REQUIRED

ENGINE SHUTDOWN (continued)

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

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/NTS 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 ET is less than 200°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.

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 .... 96% RPM (THE 96% RPM SPEED LEVER POSITION CAN BE ATTAINED EITHER BY SETTING THIS VALUE PRIOR TO SHUTDOWN OR BY SETTING THE OPERATING ENGINE SPEED AT 96% RPM AND ALIGNING BOTH SPEED LEVERS.)
2. Power Lever .... APPROXIMATELY 1/4 INCH 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

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 (continued)

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. At high altitudes (15,000 to 20,000 feet) some engine RPM roll back can be expected because of variation in fuel flow schedules demanded by the power levers at settings of 1/4 inch or less above the flight idle stop. This rollback is manifested by engine speed accelerating normally to the 96% RPM called for by the position of the speed lever, remaining there for 2 to 3 seconds, then rapidly decreasing 2 to 10% and immediately returning to a 96% on-speed condition.

- The rollback that may be experienced at high altitudes can be eliminated by prepositioning the power lever to 1/2 inch forward of the flight idle stop or at a position which results in a minimum fuel flow of 140 pounds/hour for the start. However, when airstarting an engine at lower airspeeds (100 to 120 KIAS) some degree of airplane yaw will be experienced with the power lever at this increased position as the engine accelerates to an on-speed condition. This yaw, although objectionable, is easily controlled with rudder and aileron. The yaw can be reduced or eliminated entirely by maintaining a higher airspeed (approximately 140 — 150 KIAS) during the start.

1. Speed Lever .... 96% RPM
2. Power Lever .... APPROXIMATELY 1/4 INCH FORWARD OF FLIGHT IDLE (UNTIL LANDING GEAR WARNING HORN IS SILENCED)
3. ET .... 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. Engine Start Button .... DEPRESS AND HOLD
14. Propeller .... OBSERVE UNFEATHERING
15. Fuel Flow .... SHOULD START AT 10% RPM

AIRSTART (continued)

16. ET .... SHOULD INCREASE AT 10% TO 20% RPM
IF NOT INCREASING BY 25% RPM,
ABORT AIRSTART BY PULLING ENGINE
STOP AND FEATHER CONTROL
17. Engine Start Button ....RELEASE WHEN ENGINE TEMPERATURE
STARTS TO RISE
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/NTS test switch as in ENGINE SHUTDOWN step 8., 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.

AIRSTART PROCEDURE WITH SRL COMPUTER INOPERATIVE

Two, three position 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, MANUAL, and 10—60%. 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 an asterisk (*).

1. Speed Lever .... 96% RPM
2. Power Lever .... APPROXIMATELY 1/4 INCH FORWARD OF FLIGHT IDLE
(UNTIL LANDING GEAR WARNING HORN IS SILENCED)
3. ET .... 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

AIRSTART PROCEDURE WITH SRL COMPUTER INOPERATIVE (continued)

12. Bleed Air Switch .... OFF
    *a. Speed Switch Select Switch .... MANUAL
13. Engine Start Button .... DEPRESS AND HOLD
14. Propeller .... OBSERVE UNFEATHERING
    *a. Speed Switch Select Switch (At 10% RPM) .... MOVE TO 10—60%
15. Fuel Flow .... SHOULD START AT 10% RPM IF NOT INCREASING BY 25% RPM, ABORT AIRSTART BY PULLING ENGINE STOP AND FEATHER CONTROL
16. ET .... SHOULD INDICATE LIGHT OFF AT 10% TO 20% RPM IF LIGHT OFF NOT INDICATED BY 25% RPM, ABORT START BY PRESSING STOP BUTTON AND PULLING ENGINE STOP AND FEATHER CONTROL
17. Engine Start Button .... RELEASE IMMEDIATELY WHEN ET STARTS TO RISE (BECAUSE SRL IS INOPERATIVE)
    *a. Speed Switch Select Switch .... ABOVE 60% RPM MOVE TO MANUAL
18. Fuel and Oil Pressure .... GREEN ARC
19. Generator Switch .... RESET/ON
20. Bleed Air Switch .... ON

ABORTED AIRSTART (DUE TO NO COMBUSTION)

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

TABLE OF CONTENTS
NORMAL PROCEDURES

TABLE OF CONTENTS (continued)
NORMAL PROCEDURES

INTRODUCTION

Section 4 of this manual outlines the recommended procedures for normal operations. Expanded procedures are covered in this section. These procedures have been FAA approved.

PREFLIGHT

A. COCKPIT

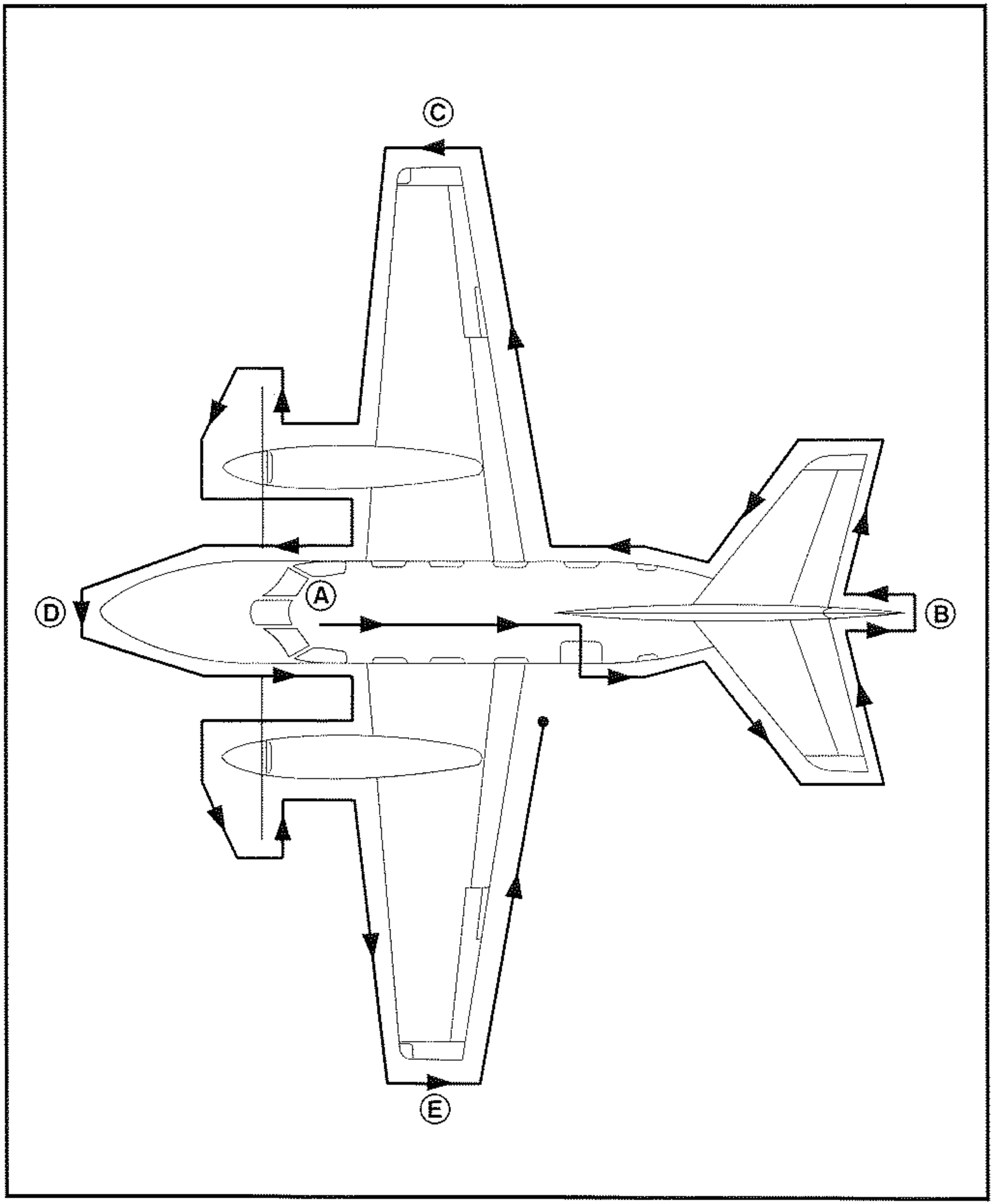
1. Wing Fuel Caps .... VISUALLY CHECK SECURE
2. Landing Gear Handle .... DOWN
3. Landing Gear Hand Pump Valve Handle .... AFT/PIP PIN INSTALLED
4. Battery Switches .... ON
5. Control Surface Trim .... NEUTRAL
6. Control Lock .... AS REQUIRED
7. Parking Brake .... AS REQUIRED
8. Battery Switches .... AS REQUIRED

B. TAIL SECTION

1. Cabin Door .... CONDITION
2. Static Sources .... CLEAR
3. Deice Boots .... CONDITION
4. Stabilizer Setting .... NOTE
5. Control Surfaces and Rudder Tab .... CONDITION
6. Navigation Lights .... CHECK
7. Upper Antennas .... CONDITION
8. Tie Down .... REMOVE

C. RIGHT WING

1. Flaps .... CONDITION
2. Exhaust .... CLEAR
3. Aileron .... CONDITION
4. Navigation Lights .... CHECK
5. Fuel Vent .... CLEAR
6. Deice Boots .... CONDITION
7. Wing Tank Fuel Cap .... CHECK
8. Wing Ice Light .... CHECK
9. Landing Gear, Brakes, Tires, Wheelwell, and Gear Doors .... CONDITION
10. Generator Voltmeter Circuit Breaker .... IN
11. Tie Downs and Chocks .... REMOVE
12. Fire Extinguisher Disc (when installed) .... CHECK
13. Oil Cooler Inlet .... CLEAR
14. Engine Inlet and Sensors .... CONDITION AND CLEAR
15. Propeller and Propeller Deicers .... FREE ROTATION AND CONDITION
16. Oil Filter Bypass Pop-Out Pin .... CHECK PIN FLUSH WITH SURFACE
17. Engine Oil Quantity and Filler Cap .... CHECK/SECURE
18. Cowling and Doors .... SECURE
19. Leading Edge Ram Air Scoop .... CLEAR
20. Fuel Tank Sumps .... DRAIN



PREFLIGHT WALK-AROUND INSPECTION
Figure IV–1

PREFLIGHT (continued)

D. NOSE SECTION

1. Outside Air Temperature Sensor .... CLEAR
2. Static Sources .... CLEAR
3. Pitot Covers .... REMOVE
4. Baggage Doors .... SECURE
5. Windshield Wipers .... CONDITION
6. Nose Gear, Tires, Wheelwell, and Gear Doors .... CONDITION
7. Oxygen Thermal Relief Disc .... CHECK
8. SAS^2 Vane .... CHECK

E. LEFT WING

1. Fuel Tank Sumps .... DRAIN
2. Lower Antennas .... CONDITION
3. Leading Edge Ram Air Scoop .... CLEAR
4. Landing Gear, Brakes, Tires, Wheelwell, and Gear Doors .... CONDITION
5. Generator Voltmeter Circuit Breaker .... IN
6. Tie Downs and Chocks .... REMOVE
7. Cowling and Doors .... SECURE
8. Fire Extinguisher Disc (when installed) .... CHECK
9. Oil Cooler Inlet .... CLEAR
10. Engine Inlet and Sensors .... CONDITION AND CLEAR
11. Propeller and Propeller Deicers .... CONDITION AND FREE ROTATION
12. Oil Filter Bypass Pop-Out Pin .... CHECK PIN FLUSH WITH SURFACE
13. Engine Oil Quantity and Filler Cap .... CHECK/SECURE
14. Hydraulic Reservoir Sight Glasses .... CHECK
15. Wing Ice Light .... CHECK
16. Deicer Boots .... CONDITION
17. Wing Tank Fuel Cap .... CHECK
18. Fuel Vent .... CLEAR
19. Navigation Lights .... CHECK
20. Aileron and Tab .... CONDITION
21. Flaps .... CONDITION
22. Exhaust .... CLEAR

BEFORE STARTING ENGINES

1. Exterior Preflight Inspection .... COMPLETED
2. Weight and Center of Gravity .... COMPUTED WITHIN LIMITS

CABIN

1. Cabin Door .... LOCKED
3. Cargo and Baggage .... SECURE
4. Emergency Exit .... SECURE

BEFORE STARTING ENGINES (continued)

COCKPIT

1. Battery Switches .... AS REQUIRED
2. Landing Gear Handle .... DOWN
3. No Smoking – Fasten Belts Switch .... ON

PILOT'S CONSOLE

1. LH Essential Bus Tie Switch .... ON
2. Ignition Mode Switches .... NORMAL
3. Essential Bus Transfer Switches .... LEFT
4. Speed Switch Select .... AUTO
5. Start Mode Switch .... AS REQUIRED
6. Cabin Pressure Selector .... AUTO
7. Cabin Pressure Manual Control .... CLOCKWISE
8. All Circuit Breakers .... IN
9. Lights .... AS REQUIRED
10. Starter Test Switch .... OFF
11. Unfeather /NTS Test Switch .... OFF
12. SRL Δ P/P Switch .... NORMAL

INSTRUMENT PANEL

1. Static Selector .... NORMAL
2. Cockpit Conditioned Air (Pilot and Copilot) .... AS REQUIRED
3. All Rocker Switches (Except Battery Switches) .... OFF
4. Pitch Trim .... COMPARE WITH POSITION NOTED DURING PREFLIGHT
5. Fuel Counter .... ZEROED
6. Temperature Controls .... AS REQUIRED
7. Cabin Pressure Dump Switch .... DUMP
8. Bleed Air Switches .... OFF
9. Cabin Altimeter/Rate .... FIELD ELEVATION/NORMAL
10. Fresh Air Fan .... OFF
11. Oxygen Cylinder Pressure .... CHECK
12. Passenger Oxygen Switch .... OFF

COPILOT'S CONSOLE

1. Lights .... AS REQUIRED
2. All Circuit Breakers .... IN
3. RH Essential Bus Tie Switch .... ON
4. Nonessential Bus Tie Switch .... ON

BEFORE STARTING ENGINES (continued)

PEDESTAL

1. Lights .... AS REQUIRED
2. Aileron Trim .... NEUTRAL
3. Rudder Trim .... NEUTRAL
4. Parking Brake .... SET
5. Yaw Damper/Rudder Bias Switches .... BOTH OFF
6. Auxiliary Trim Switch .... OFF
7. SAS^2 Clutch Switch .... OFF
8. Fuel and Hydraulic Shutoff Switches .... OPEN
9. Crossflow Switch .... CLOSED
10. Fuel Boost Switches .... OFF
11. Engine Stop and Feather Controls .... IN
12. Trim Select Switch .... OFF
13. Out-of-Trim Warning (first flight of day) .... CHECK
    a. Stabilizer trim .... NOT IN GREEN TAKEOFF BAND
    b. Power levers .... ADVANCE TO 50% TRAVEL
    c. Out-of-trim warning horn .... STEADY
    d. Stabilizer trim .... SET IN GREEN TAKEOFF BAND
    e. Out-of-trim warning horn .... SILENCED
14. Flaps Control .... NEUTRAL
15. Speed Levers .... LOW RPM
16. Power Levers .... (1) CHECK FLIGHT IDLE LOCK, (2) SET LEVERS APPROXIMATELY 1/4 INCH FORWARD OF GROUND IDLE
17. Propeller Synchrophaser Switch .... OFF
18. Control Lock .... OFF

BATTERY START

1. Battery Switches .... ON
2. Annunciator Panel and Normal System Warning Lights .... PRESS-TO-TEST

> NOTE
>
> Annunciator press-to-test button must remain pressed until the WING OVHT warning lights start flashing.

3. Inverter (Check No. 2, then No. 1) .... ON
4. Fuel Quantity .... CHECK (500 POUNDS MAXIMUM IMBALANCE)
5. Rudder Bias System .... TEST/OFF (SEE PAGE 4-18)

RIGHT ENGINE

6. SRL Fail Light .... CHECK ON
7. Boost Pumps .... CHECK/AS DESIRED
8. Propellers .... UNFEATHERED/CLEAR (SEE PAGE 4-15)

RIGHT ENGINE (continued)

9. NTS (first flight of day) .... CHECK (SEE PAGE 4-19)
10. Start Mode Switch .... AS DESIRED
11. Start Button .... PRESS AND HOLD
12. RPM .... 10% — 12%
13. Observe ignition of fuel as indicated by rising ET and illumination of IGN light. Release start button when ET rises.

CAUTION

IF IGNITION 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. IF NO FUEL FLOW OR IGNITION WAS INDICATED DURING FIRST START ATTEMPT, MAKE SECOND START BY MANUAL GROUND START PROCEDURE. SEE PAGE 3A-1.

NOTE

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

  a. The speed switch select switch is in "AUTO" position
  b. The ET is less than 695°C and not increasing at a rate higher than 1°C/sec,
  c. The RPM is between 10% and 60%,
     AND
  d. The SRL computer is in operating.

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

- During a manual start while the speed switch select switch is being held in the "10% – 60%" position, start fuel enrichment can only be obtained by depressing the start button. When using the start button to manually provide start fuel enrichment, attempt to maintain normal engine acceleration and an ET of approximately 670°C.

14. ET .... MONITOR (770°C MAXIMUM)
15. RPM .... STABILIZED AT 69% ±1%
16. ET .... STABILIZED

RIGHT ENGINE (continued)

17. Fuel and Oil Pressure. . . . . YELLOW OR GREEN ARCS
18. Generator . . . . RESET/ON
19. SRL Fail Light . . . . ABOVE 80% RPM – CHECK OFF
20. Bleed Air Switch (right engine) . . . . ON

NOTE

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

21. Start Mode Switch. . . . . PARALLEL

LEFT ENGINE

22. Repeat Steps 6 Through 19 For Left Engine.
23. Bleed Air Switch (left engine) . . . . ON

NOTE

Verify operation of each bleed air system by selectively operating right and left systems.

24. Temperature Controls . . . . AS REQUIRED
25. Cabin Pressure Dump Switch. . . . . NORMAL
26. Boost Pumps . . . . ON

AUXILIARY POWER UNIT (APU) START

CAUTION

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

1. Battery Switches . . . . OFF
2. APU . . . . ENGAGED/ON
3. Voltage Selector . . . . APU
4. Battery Switches . . . . ON
5. Annunciator Panel and Normal System Warning Lights. . . . . PRESS-TO-TEST

AUXILIARY POWER UNIT (APU) START (continued)

NOTE

Annunciator press-to-test button must remain depressed until the WING OVHT warning lights start flashing.

6. Inverter (check No. 2, then No. 1) .... ON
7. Fuel Quantity .... CHECK (500 POUNDS MAXIMUM IMBALANCE)
8. Rudder Bias System .... TEST/OFF (SEE PAGE 4-18)
9. SRL Fail Light .... CHECK ON

RIGHT ENGINE

10. Boost Pumps .... CHECK/AS DESIRED
11. Propellers .... UNFEATHERED/CLEAR (SEE PAGE 4-15)
12. NTS (first flight of day) .... CHECK (SEE PAGE 4-19)
13. Start Mode Switch .... PARALLEL
14. Start Button .... DEPRESS AND HOLD
15. RPM .... 10% – 12%
16. Observe ignition as indicated by rising ET and illumination of IGN light. Release start button when ET rises.

CAUTION

IF IGNITION 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. IF NO FUEL FLOW OR IGNITION WAS INDICATED DURING FIRST START ATTEMPT, MAKE SECOND START BY MANUAL GROUND START PROCEDURE. SEE PAGE 3A-1.

AUXILIARY POWER UNIT (APU) START (continued)

RIGHT ENGINE (continued)

NOTE

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

  a. The speed switch select switch is in "AUTO" position
  b. The ET is less than 695°C and not increasing at a rate higher than 1°C/sec,
  c. The RPM is between 10% and 60%,
  AND
  d. The SRL computer is in operating.

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

- During a manual start while the speed switch select switch is being held in the "10% – 60%" position, start fuel enrichment can only be obtained by depressing the start button. When using the start button to manually provide start fuel enrichment, attempt to maintain normal engine acceleration and an ET of approximately 670°C.

17. ET .... MONITOR (770°C MAXIMUM)
18. RPM .... STABILIZED AT 69% ± 1%
19. ET .... STABILIZED
20. Fuel and Oil Pressure .... YELLOW OR GREEN ARCS
21. SRL Fail Light .... ABOVE 80% RPM – CHECK OFF

NOTE

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

22. Bleed Air Switch (right engine) .... ON

AUXILIARY POWER UNIT (APU) START (continued)

LEFT ENGINE
(For airplanes NOT modified in accordance with Service Bulletin 226 24-034)

23. Repeat Steps 9 Through 21 For Left Engine.
24. Bleed Air Switch (left engine) .... ON

NOTE

Verify operation of each bleed air system by selectively operating right and left systems.

25. Temperature Controls .... AS REQUIRED
26. Cabin Pressure Dump Switch .... NORMAL
27. Boost Pumps .... ON
28. APU .... OFF/DISENGAGED
29. Generators .... RESET/CHECK GENERATOR VOLTAGE/ON
30. Voltage Selector .... BUS
31. Battery Disconnects and Current Limiters .... CHECK (SEE PAGES 4-19 AND 4-22)

AUXILIARY POWER UNIT (APU) START (continued)

LEFT ENGINE
(For airplanes modified in accordance with Service Bulletin 226 24-034)

23. Repeat Steps 9 Through 21 For Left Engine
24. Bleed Air Switch (left engine) .... ON

NOTE

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

25. Temperature Controls .... AS REQUIRED
26. Cabin Pressure Dump Switch .... NORMAL
27. Boost Pumps .... ON
28. APU .... OFF/DISCONNECTED
29. Generators .... ON/CHECK VOLTS AND AMPS

CAUTION

IF THE GENERATOR SWITCH IS RESET AND **ON**, GENERATOR VOLTAGE IS OBSERVED, **GEN FAIL** ANNUNCIATOR LIGHT IS NOT ILLUMINATED, AND THE AMMETER READS ZERO, THE RESPECTIVE 325 AMPERE CURRENT LIMITER IS OPEN. THE FAULTY CURRENT LIMITER SHOULD BE REPLACED PRIOR TO FLIGHT.

30. Voltage Selector .... BUS
31. Battery Disconnects .... CHECK (SEE PAGE 4-19)

BEFORE TAXI

*1. Generator Voltmeters and Ammeters .... CHECK (APPROXIMATELY 28.5 VOLTS AND EVEN LOAD SHARING)
2. Battery Disconnect System and Overheat Lights .... CHECK (SEE PAGE 4-19)
3. Battery Switches .... OFF (FIRST FLIGHT OF DAY)
4. Left Generator .... OFF (FIRST FLIGHT OF DAY)
5. Stabilizer Trim System .... CHECK ALL FUNCTIONS (SEE PAGE 4-22)
6. Battery Switches .... ON
7. Left Generator .... ON
8. SAS^2 .... CHECK ALL TEST FUNCTIONS (SEE PAGE 4-16)
9. Windshield Heat .... ON (LOW)
10. Avionics .... ON/AS REQUIRED
11. Overspeed Governors .... CHECK (SEE PAGE 4-19)
12. Single Red Line Computer/Temp. Limiter .... CHECK (SEE PAGE 4-20)
13. Propeller Start Locks .... RELEASE (SEE PAGE 4-15)
14. Exterior and Interior Lights .... AS REQUIRED
15. Environmental Control System .... AS REQUIRED

TAXI

1. Nose Wheel Steering Switch .... ARMED
2. Parking Brake .... RELEASE

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

3. Power Levers .... AS REQUIRED
4. Brakes .... CHECK
5. NWS Power Lever Button .... DEPRESS
6. Nose Wheel Steering System .... TEST (SEE PAGE 4-23)
7. Yaw Damper .... TEST/ON (SEE PAGE 4-23)

BEFORE TAKEOFF

1. Controls .... FREE
2. Stabilizer, Rudder, and Aileron Trim .... SET FOR TAKEOFF
3. Flaps .... SET FOR TAKEOFF
4. Propeller Synchrophaser .... OFF
5. Flight Instruments .... SET AND CHECK
6. Engine Instruments .... CHECK
7. Annunciator Panel .... CHECK
8. Vacuum and Deicer Pressure .... CHECK
9. Takeoff Power Setting, V_R, V_{50} Speeds .... CONFIRM
10. Ice Protection Systems .... CHECK/AS REQUIRED
11. Bleed Air Switches .... AS DESIRED
12. Pitot & SAS^2 Heat .... AS REQUIRED
13. Fuel Imbalance .... LESS THAN 500 POUNDS
14. Fuel Crossflow Valve .... CHECK CLOSED
15. Transponder .... SET
16. Interior/External Lights .... AS REQUIRED

NOTE

For flights at night or in Instrument Meteorological Conditions, consideration should be given to setting glareshield and overhead lights (which are powered from the Nonessential DC Bus) bright enough to provide emergency instrument lighting in the event of an Essential Bus failure during flight.

TAKEOFF

1. Speed Levers .... HIGH RPM
2. Engine Speed .... CHECK 96% — 97%
3. Ignition Mode Switches .... AS REQUIRED (SEE PAGE 4-15)
4. Power Levers .... 650°C ET OR 97% TORQUE (WHICHEVER OCCURS FIRST)

NOTE

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

5. Rudder Bias Switch .... ON
6. Engine Speed .... CHECK 100% RPM
7. Brakes .... RELEASE
8. NWS Power Lever Button .... DEPRESS/AS DESIRED
9. V_R Speed .... ROTATE
10. Landing Gear (after liftoff) .... RETRACT
11. Flaps .... UP

NOTE

Normal authority steering is available until deactivated by the landing gear squat switches at liftoff unless modified.

NOTE

On those aircraft which have been modified in accordance with Fairchild Swearingen Service Bulletin 32-037.

Normal authority steering is available until deactivated by landing gear retraction.

CLIMB

1. Climb Speed .... ATTAIN (SEE PAGE 5-15)

> NOTE
>
> Reduce ET to 600°C or less before retarding speed lever. Set RPM (96% to 100%). Advance power lever to desired ET that does not cause illumination of the FUEL BYPASS OPEN light.

2. Climb Power .... NOT TO EXCEED 650°C EGT OR 100% TORQUE
3. Rudder Bias Switch .... OFF
4. Propeller Synchrophaser .... ON/ADJUST AS NECESSARY
5. Ice Protection Systems .... AS REQUIRED
6. Bleed Air Switches .... AS DESIRED
7. Cabin Pressure Scheduling .... CHECK
8. No Smoking – Fasten Seat Belt Signs .... AS REQUIRED
9. Nose Wheel Steering Switch .... OFF
10. Ignition Mode Switches .... NORMAL OR AS REQUIRED

10,000 FEET .... CHECK AS FOLLOWS

1. Ammeters .... CHECK
2. Annunciator Panel .... CHECK

18,000 FEET .... SET ALTIMETER AT 29.92 Hg

25,000 FEET .... oxygen mask around collar

CRUISE

> NOTE
>
> Reduce ET to 600°C or less before retarding speed lever. Set RPM (96% to 100%). Advance power lever to desired ET that does not cause illumination of the FUEL BYPASS OPEN light.

1. Cruise Power .... SET (650°C ET, 96% TO 100% RPM)
2. Cabin Pressurization .... AS DESIRED

DESCENT

1. Power .... AS REQUIRED
2. Altimeters .... SET
3. Cabin Pressure Controller .... SET TO ENSURE ZERO CABIN AT TOUCHDOWN
4. Cabin Rate Control .... AS DESIRED
5. No Smoking – Fasten Seat Belt Signs .... AS REQUIRED
6. Fuel Quantity .... CHECK (500 POUNDS MAXIMUM IMBALANCE)
7. Fuel Crossflow Valve .... CHECK CLOSED
8. Ice Protection Equipment and Continuous Ignition .... AS REQUIRED

DESCENT (continued)

25,000 FEET .... REMOVE OXYGEN MASK FROM AROUND COLLAR (IF DESIRED)

18,000 FEET .... SET ALTIMETER TO DESTINATION OR LOCAL AREA

10,000 FEET .... SLOW TO 250 KIAS BEFORE FURTHER DESCENT

BEFORE LANDING

1. No Smoking – Fasten Seat Belt Signs .... ON
2. Propeller Synchrophaser .... OFF

> CAUTION
>
> ATTEMPTED REVERSE WITH THE SPEED LEVERS IN THE LOW RPM POSITION MAY RESULT IN AN ENGINE OVER-TEMPERATURE CONDITION.

3. Speed Levers .... HIGH RPM
4. Landing Gear .... DOWN
5. Flaps .... AS REQUIRED
6. Cabin Differential Pressure .... CHECK ZERO
7. Nose Wheel Steering Switch .... ARMED
8. Ignition Mode Switches .... AS REQUIRED
9. Fuel Crossflow Valve .... CHECK CLOSED

BALKED LANDING

1. Power Levers .... 650°C ET OR 100% TORQUE (WHICHEVER OCCURS FIRST)
2. Climb Speed .... 105 KIAS (107 KCAS)
3. Engine and Propeller Ice Switches .... AS REQUIRED
4. Rate of Climb .... ESTABLISH POSITIVE RATE OF CLIMB
5. Landing Gear .... RETRACT
6. Flaps .... RETRACT TO 1/2
7. Airspeed .... ACCELERATE TO 120 KIAS (123 KCAS)
8. Flaps .... RETRACT
9. Ignition Mode Switches .... NORMAL OR AS REQUIRED

LANDING

1. Power Levers .... FLIGHT IDLE
2. Power Levers (after touchdown) .... GROUND IDLE

> NOTE
>
> Check both BETA lights illuminated before moving power levers to reverse.

LANDING (continued)

3. Brakes .... AS REQUIRED
4. Nose Wheel Steering .... AS REQUIRED
5. Power Levers .... REVERSE (AS REQUIRED)

WARNING

DO NOT USE REVERSE ABOVE 40 KNOTS.

AFTER LANDING

1. Power Levers .... GROUND IDLE
2. Flaps .... UP
3. Speed Levers .... LOW RPM

CAUTION

- DO NOT RETARD SPEED LEVERS WHILE POWER LEVERS ARE AFT OF GROUND IDLE.
- DO NOT RETARD THE SPEED LEVERS TO THE FULL AFT (LOW RPM) POSITION UNTIL A NORMAL TAXI SPEED IS REACHED. BECAUSE NOSE WHEEL STEERING IS ACTUATED IMMEDIATELY WHEN THE RIGHT ENGINE SPEED LEVER IS PLACED IN THE FULL AFT POSITION, 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 (13 mm) 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 LEFT POWER LEVER THUMB BUTTON REMAINS ACTIVE.

4. Ignition Mode Switches .... NORMAL
5. Ice Protection Systems .... OFF
6. Stabilizer, Aileron, and Rudder Trim .... NEUTRAL

STOPPING ENGINES

1. Nose Wheel Steering Switch .... OFF
2. SAS[2] Clutch Switch .... OFF
3. Yaw Damper .... OFF
4. Avionics .... OFF
5. Cabin Pressure Dump Switch .... DUMP
6. Bleed Air Switches .... OFF
7. Generator Switches .... OFF
8. Engine Stop Buttons .... PRESS

STOPPING ENGINES (continued)

> NOTE
>
> Depress and hold the Engine Stop Button a minimum of 5 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.

9. Power Levers .... REVERSE (HOLD TO BELOW 10% RPM) TO PLACE PROPELLER BLADES ON START LOCKS)
10. Fuel Boost Switches .... OFF
11. Inverter Switch .... OFF
12. Exterior and Interior Lights .... OFF
13. Battery Switches .... OFF
14. Parking Brake, Control Lock, Chocks, Tie Down, 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 pads hot.

> NOTE
>
> The engines should be cooled prior to shutdown by operating them at low power for a maximum of three minutes. The power required for normal taxi operations is considered sufficient to satisfy this requirement. After engine shutdown, thermal distortion of the main rotor assembly may occur because of differential cooling of the rotor assembly components. If engine restarts are to be made within 10 to 45 minutes after shutdown, this distortion can be avoided by rotating the engine (in the normal direction of rotation) until the rotating group is 180 degrees from the shutdown position. This is to be accomplished approximately 10 minutes before restart.
>
> If the preceding procedure is not followed, stagnated acceleration may occur between 18 and 28 percent rpm accompanied by a rapid increase in ET. In extreme cases, engine rotating group damage could result.

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NIGHT OR INSTRUMENT FLIGHT (BEFORE TAKEOFF)

1. Exterior Lights .... CHECK
2. Interior Lights .... CHECK
3. Flight Instruments .... CHECK
4. Generator Voltmeters and Ammeters .... CHECK

NOTE

- Landing light maximum operating speed (V_{LL}) is 150 KCAS.
- During night flight in clouds, turn rotating beacon and strobe lights off.

BEFORE START PROPELLER UNFEATHERING

1. Left Beta Circuit Breaker (for either engine) .... PULL 1
2. Power Lever .... REVERSE 2
3. Unfeather/NTS Test Switch .... SELECT L OR R 3
4. Unfeather/NTS Test Switch .... MOVE TO OFF WHEN BLADES REACH REVERSE PITCH
5. Power Lever .... GROUND IDLE
6. Left Beta Circuit Breaker .... RESET

PROPELLER SYNCHROPHASER OPERATION

1. Turn knob clockwise to ON.

2. Select phasing by sound.

PROPELLER START LOCK RELEASE

Place POWER LEVERS into reverse momentarily with engines running to release propeller blades from start locks.

1. Power Lever Flight Idle Lock Check
   a. Advance both power levers beyond flight idle
   b. Retard both power levers and note that neither power lever will travel beyond the flight idle gate without lifting the release knob on each power lever.

CONTINUOUS IGNITION

Provisions for continuous engine ignition are provided for use during periods when excessive water, slush, or ice ingestion might cause engine flameout. A lever-lock switch independently controls the ignition mode selection for each engine. These models are available:

NORMAL: Ignition is only supplied to the engine during the automatic start cycle, between 10% and and 60% RPM. This mode is provided for use during normal operations.

CONTINUOUS IGNITION (continued)

AUTO/CONT: Ignition is supplied to the engine continuously as long as the main landing gear squat switches are in the ground position. This mode is provided for use during takeoff or landing on wet or slush covered runways when ingestion is possible. Ignition is automatically supplied to the engine in flight at approximately 90% RPM if a flameout should occur due to ingestion of ice or an excessive amount of water.

CONT: Ignition is supplied to the engine continuously as long as the main landing gear squat switches are in the ground position. This mode is provided for use during takeoff or landing on wet or slush covered runways when ingestion is possible.

OVRD: Ignition is supplied to the engine continuously regardless of landing gear squat switch position. This mode is provided for use in the event of inadvertent icing encounters during flight. See page 3A–10A.

NOTE

Excessive operation of this system in the CONT or OVRD mode will reduce ignitor plug life.

SYSTEMS CHECKS

STABILITY AUGMENTATION AND STALL AVOIDANCE (SAS^2) SYSTEM CHECK

NOTE

If the vane is moved up (by hand, by wind gust or any other method) so that the needle on the SAS^2 indicator is at less than 1.0 V_S the SAS fault light will come on steady.

During the Before Taxi check, the SAS^2 will be checked as follows:

CAUTION

ENSURE THAT THE CONTROL LOCK IS OFF PRIOR TO SAS^2 SYSTEM CHECKS.

1. Flaps .... UP
2. SAS^2 ARM Light .... ON
3. SAS^2 Clutch Switch .... OFF
4. SAS^2 FAULT Light .... CHECK FOR FLASHING LIGHT
5. SAS^2 Clutch Switch .... ON
6. SAS^2 FAULT Light .... CHECK LIGHT OFF
7. SAS^2 Test Switch .... HOLD IN STALL POSITION

STABILITY AUGMENTATION AND STALL AVOIDANCE (SAS^2) SYSTEM CHECKS (continued)

NOTE

To prevent damage to some flight instruments, hold elevator control during this check.

While holding the SAS^2 test switch in the STALL position, verify the following:

Depending on vane position, the indicator needle should descend to or start from high cruise and sweep toward STALL. Stability augmentation should be felt with increasing force (approximately 20 pounds) as the needle sweeps toward STALL. Just before the needle enters the cross hatch sector, the stall warning horn should sound. Just before the needle reaches STALL sector (1.02), the pusher should engage with 45 pounds additional forward force. As the needle passes 1.0 and enters the STALL sector, the SAS^2 FAULT light should come on steady. The needle should delay counterclockwise at the STALL sector for a few seconds and then return to the (approach) sector. As the needle returns, the SAS^2 FAULT light should go out and the stall warning horn and pusher should cease.

8. SAS^2 Test Switch .... HOLD IN CRUISE POSITION

While holding the SAS^2 Test Switch in CRUISE position, verify the following:

9. Elevator Control .... CHECK NO FORCE AUGMENTATION
10. SAS^2 Indicator .... POINTER ALIGNED AT 1.3 (± .05) V_S
11. Flaps .... LOWER FLAPS WHILE HOLDING SAS^2 TEST SWITCH IN CRUISE POSITION/NOTE POINTER ON SAS^2 INDICATOR MOVES FROM 1.3 V_S TO APPROXIMATELY 1.2 V_S

NOTE

In cruise test, the following will occur:

- Flaps up – Pointer needle will be positioned on 1.3 V_S.
- Flaps between TAKEOFF and one-half, pointer needle will jump up slightly.
- Flaps between one-half and three-fourths, pointer needle will jump up more.
- Flaps between three-fourths and full down, pointer needle will jump to 1.2 V_S position.

In flight, if a steady or flashing SAS^2 FAULT light is noted at any time with the SAS^2 clutch switch ON, the SAS^2 clutch switch should be turned OFF and the SAS^2 computer power circuit breaker should be pulled.

STABILITY AUGMENTATION AND STALL AVOIDANCE (SAS^2) SYSTEM CHECKS (continued)

During flight, the following SAS^2 operational check will be performed: (Reference copilot's airspeed indicator).

1. Below 180 KIAS, SAS^2 ARM Light . . . . ON

WARNING

IF THE SAS^2 ARM LIGHT HAS NOT EXTINGUISHED BY THE TIME THE AIRSPEED HAS INCREASED TO 190 KIAS THE SAS^2 CLUTCH SWITCH SHOULD BE TURNED OFF. THE SWITCH SHOULD BE TURNED ON FOR ALL OPERATIONS BELOW 180 KIAS.

2. Above 190 KIAS, SAS^2 ARM Light . . . . OFF

YAW DAMPER/RUDDER BIAS SYSTEM CHECK

The yaw damper/rudder bias system uses a single electro-mechanical servo with two modes of operation: The yaw damper mode and the rudder bias mode. The yaw damper mode of operation is controlled by a signal from the pilot's turn and bank indicator. This signal is processed by the yaw damper amplifier which controls the servo linked to the rudder control system. The rudder bias mode becomes activated by low engine torque pressure when the power levers are in the advanced position. The rudder bias system, which is the master system, provides a rudder force input of approximately 40 pounds to assist the pilot in the event of engine failure. A mechanical clutch in the drive linkage assures the pilot of override capability in the event of a system malfunction.

Before start rudder bias check:

1. Power Levers. . . . . FLIGHT IDLE
2. Yaw Damper Switch . . . . ON – CHECK YAW DAMPER LIGHT OFF
3. Rudder Bias Switch. . . . . ON – CHECK RUDDER BIAS LIGHT ON
4. Rudder Pedals . . . . NO FORCE
5. Left Power Lever. . . . . .ADVANCE
6. Left Rudder Pedal. . . . . .FORCE REARWARD, YAW DAMPER LIGHT ON
7. Left Power Lever. . . . . FLIGHT IDLE
8. Right Power Lever. . . . . .ADVANCE
9. Right Rudder Pedal. . . . . .FORCE REARWARD, YAW DAMPER LIGHT ON
10. Right Power Lever. . . . . FLIGHT IDLE
11. Rudder Pedals . . . . NO FORCE
12. Yaw Damper Switch . . . . OFF
13. Rudder Bias Switch. . . . . OFF

NOTE

Rudder bias system operation is not required for flight.

NEGATIVE TORQUE SENSING (NTS) SYSTEM – FIRST FLIGHT OF DAY

1. Annunciator NTS Lights . . . . PRESS-TO-TEST
2. Unfeather/NTS Test Switch . . . . R
3. R NTS Light . . . . ON

During right engine start, monitor the following NTS indications:

4. R NTS Light . . . . OFF AT STARTER ACTUATION
5. R NTS Light . . . . ON AT 15% – 30% RPM
6. Unfeather/NTS Test Switch . . . . OFF

Repeat steps 2 through 6 for left engine.

WARNING

TAKEOFF IS PROHIBITED IF NTS FAILS TO TEST PROPERLY.

NOTE

If either NTS light remains illuminated after engine start, check to see if the Unfeather/NTS Test Switch has been moved to OFF.

BATTERY DISCONNECT SYSTEM AND OVERHEAT LIGHTS CHECK

1. Annunciator BAT HOT Lights . . . . PRESS-TO-TEST
2. Left Battery Switch . . . . OFF
3. L BAT DISC Light . . . . ON
4. Right Battery Switch . . . . OFF
5. R BAT DISC Light . . . . ON
6. Left and Right Battery Switches . . . . ON
7. BAT DISC Lights . . . . OFF

OVERSPEED GOVERNOR CHECK

This check should be made (1) at intervals not to exceed 50 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, the overspeed governors may be checked as follows:

1. Brakes . . . . SET

OVERSPEED GOVERNOR CHECK (continued)

CAUTION

DO NOT ALLOW RPM TO EXCEED 106%.

2. Power Levers. . . . . ADVANCE UNTIL FURTHER MOTION CAUSES NO INCREASE IN FUEL FLOW OR RPM (RPM SHOULD BE 103% TO 106%)

CAUTION

FAILURE OF THE START LOCKS DURING AN OVERSPEED GOVERNOR CHECK CAN RESULT IN A SUDDEN FORWARD "JUMP" OF THE AIRCRAFT. BEFORE PERFORMING OVERSPEED GOVERNOR CHECKS, THE PILOT SHOULD VERIFY THAT THE AREAS BEHIND AND AHEAD OF THE AIRCRAFT ARE CLEAR.

SRL/TEMP LIMITER PREFLIGHT CHECKS

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 preflight test: During the SRL test, the ET difference between SRL ON and OFF for one engine is compared with ET difference between SRL ON and OFF for the opposite engine.

1. Left Power Lever. . . . . ADVANCE TO 100% ± 1/2% RPM WITH PROPELLER ON START LOCK
2. ET. . . . . STABILIZE AND NOTE VALUE
3. Left SRL△P/P Test Switch . . . . SRL OFF/NOTE CHANGE IN ET VALUE/LH SRL OFF LIGHT ILLUMINATED

SRL/TEMP LIMITER PREFLIGHT CHECKS (continued)

NOTE

- The change in ET between engines SRL OFF and ON must not exceed 10^{o}C.

Example:

	Left Engine		Right Engine
SRL ON	400^{o}		395^{o}
SRL OFF	330^{o}		320^{o}
	70^{o}	5^{o} Difference	75^{o}

- If 10^{o} difference is exceeded, the SRL System must be checked and corrected before further flight.

4. Left SRL Δ P/P Test Switch .... NORMAL (SRL OFF LIGHT EXTINGUISHED)
5. Left SRL Δ P/P Test Switch .... Δ P/P OFF/NOTE A SLIGHT ET INCREASE

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

6. Left SRL Δ P/P Test Switch .... NORMAL
7. Temp Limiter Test Switch .... L (NOTE DECREASE IN ENGINE ET, RPM, FUEL FLOW, AND ILLUMINATION OF FUEL BYPASS OPEN LIGHT)
8. Temp Limiter Test Switch .... RELEASE (NOTE INCREASE IN ET, RPM, FUEL FLOW, AND FUEL BYPASS OPEN LIGHT OUT)
9. Left Power .... GROUND IDLE
10. Repeat Steps 1 through 9 for R/H engine.

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.)

STABILIZER TRIM SYSTEM CHECK

During the Before Taxi check, the stabilizer trim system and current limiters (if applicable) are checked as follows:

1. Pitch Trim Indicator .... COMPARE WITH STABILIZER SETTING NOTED DURING PREFLIGHT
2. Battery switches .... OFF
3. Generator switch (either engine) .... OFF
4. Trim Select Switch .... PILOT
5. 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 DEPRESSING ONLY ONE SWITCH INDICATES A MALFUNCTION. FLIGHT SHOULD NOT BE INITIATED WITH ANY MALFUNCTION OF EITHER THE PILOT'S SYSTEM OR THE COPILOT'S SYSTEM.

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

CAUTION

IF EITHER THE PILOT OR COPILOT TRIM SYSTEMS WILL NOT OPERATE THE STABILIZER, A CURRENT LIMITER HAS FAILED.

NOTE

For airplanes modified by Service Bulletin 226 24-034, the CAUTION above should be ignored. Also steps 2, 3, 14 and 15 of the Stabilizer Trim System and Current Limiter Checks may be omitted.

YAW DAMPER SYSTEM

A yaw damper amplifier energized by AC voltage from a rate gyro in the pilot's turn and bank indicator activates a servo, mechanically linked to the rudder control system. A mechanical clutch in the drive linkage assures the pilot of override capability in the event of damper malfunction.

1. During Taxi Yaw Damper Check

   While taxiing the aircraft at low speeds, place the three position yaw damper switch in the spring loaded TEST position. The TEST position bypasses the landing gear squat switch and energizes the yaw damper system. Turn the aircraft by either nose wheel steering or brakes and note right rudder pedal deflection during left turns and left rudder pedal deflections during right turns. On completion of this check, place the yaw damper switch in the ON position. The system will now be energized immediately after the aircraft becomes airborne.

VARIABLE AUTHORITY NOSE WHEEL STEERING SYSTEM CHECKS

BEFORE EACH FLIGHT

1. Nose Wheel Steering Arm Switch .... ARMED
2. NOSE STEERING Light .... STEADY
3. NWS Power Lever Button .... DEPRESS
4. Test Switch L
5. Nose Wheel Steering .... NOTE LEFT TURN FOLLOWED BY AUTO DISENGAGEMENT
6. NOSE STEERING Light .... BLINKING
7. Test Switch .... OFF
8. Rudder Pedals .... CENTER
9. NOSE STEERING Light .... STEADY
10. Repeat Steps 4 through 8 for Right Test.
11. Nose Wheel Steering Arm Switch .... VALVE TEST
12. Nose Wheel Steering .... NOTE INOPERATIVE
13. Nose Wheel Steering Arm Switch .... ARMED
14. Park Button .... DEPRESS/NOTE LIGHT ACHIEVES FULL INTENSITY IN APPROXIMATELY 7 SECONDS
15. Park Button .... RELEASE/NOTE LIGHT FADES OUT IN APPROXIMATELY 7 SECONDS
16. NWS Power Lever Button .... RELEASE/NOTE NWS INOPERATIVE

NOTE

Application of a slight amount of opposite rudder during operation of the test switch will provide a positive check of the fault detection system with minimum deflection of the airplane nose.

On those aircraft which have been modified in accordance with Fairchild Swearingen Service Bulletin 32-037.

VARIABLE AUTHORITY NOSE WHEEL STEERING SYSTEM

During Taxi

1. Nose Wheel Steering Arm Switch .... ARMED
2. NOSE STEERING Light .... STEADY
3. Right Speed Lever .... FORWARD OF LOW RPM
4. NOSE WHEEL FAIL Light .... OUT
5. Nose Wheel Steering .... NOTE INOPERATIVE
6. NWS Power Lever Button .... PRESS, NOTE STEERING, THEN RELEASE
7. Right Speed Lever .... LOW RPM
8. Rudder Pedals .... CENTER OR OPPOSITE TO TEST SWITCH
9. Test Switch L
10. Nose Wheel Steering .... NOTE LEFT TURN FOLLOWED BY AUTO DISENGAGEMENT
11. NOSE STEERING Light .... BLINKING
12. Test Switch .... OFF
13. Rudder Pedals .... CENTER
14. NOSE STEERING Light .... STEADY
15. Repeat Steps 8 through 14 for Right Test.
16. Nose Wheel Steering Arm Switch .... VALVE TEST
17. Nose Wheel Steering .... NOTE INOPERATIVE
18. Nose Wheel Steering Arm Switch .... ARMED
19. Park Button .... PRESS/NOTE LIGHT ACHIEVES FULL INTENSITY IN APPROXIMATELY 7 SECONDS
20. Park Button .... RELEASE/NOTE LIGHT FADES OUT IN APPROXIMATELY 7 SECONDS

NOTE

The amber NOSE STEER FAIL annunciator light MUST blink dimly each time nose wheel steering is deactivated by either the right speed lever switch, the NWS power lever button, or the test switch.

Some combinations of rudder pedal displacement and test switch operation may cause the NOSE STEER FAIL light to flash in unison with the green NOSE STEERING light or at random during the functional checks above.

SYSTEM CHECKS (continued)

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

> **WARNING**
>
> - **ENGINE HEAT AND CONTINUOUS IGNITION, IN THE AUTO/CONT MODE, MUST BE USED AFTER LEAVING ICING CONDITIONS UNTIL THE PILOT IS CONFIDENT THAT ANY SIGNIFICANT RESIDUAL ICE ON PROPELLERS, SPINNERS, OR INLET LIPS WILL NOT BE SHED INTO THE ENGINE INTAKES.**
>
> - **UNLESS THE PILOT CAN DETERMINE THERE ARE NO ICE ACCUMULATIONS ON THE FLYING SURFACES OF THE AEROPLANE:**
>
>   1. **INCREASE V_{MCA} BY 3 KIAS**
>   2. **INCREASE LANDING APPROACH SPEEDS LISTED ON PAGE 5-65 BY 7 KIAS.**
>   3. **LIMIT LANDING APPROACH ANGLE TO A MAXIMUM OF THREE DEGREES IN ORDER NOT TO REQUIRE HIGH ROTATION RATES DURING LANDING FLARE.**

DEICER BOOTS (Before Takeoff Check)

1. Deicer Boots Switch .... AUTO
2. Deicing Pressure .... CHECK (12 – 19 PSI)

> NOTE
>
> Visually check wing boot operation and observe deicing pressure fluctuation as tail boots actuate. Allow one full cycle of the timer.

3. Deicer Boots Switch .... OFF

DEICER BOOTS (In Flight Operation)

1. Deice Boots Switch .... AUTO (AT THE FIRST SIGN OF ICE FORMATION ANYWHERE ON THE AIRCRAFT)
2. Deice Boots Switch .... OFF (AFTER THE AIRPLANE IS DETERMINED TO BE CLEAR OF ICE)

SYSTEM CHECKS (continued)

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

AUTO/CONT IGNITION SYSTEM (Before Takeoff Check)

1. Speed Lever .... HIGH
2. Power Lever .... GROUND IDLE
3. Ignition Mode Switch .... AUTO/CONT
4. Ignition Light .... ON
5. Auto Ignition Test Switch .... L OR R AS APPROPRIATE
6. Ignition Light .... OFF
7. Speed Lever .... LOW
8. Ignition Light .... ON (CHECK IGN LIGHT ILLUMINATES AT APPROXIMATELY 90% RPM)
9. Auto Ignition Test Switch .... RELEASE TO OFF (IGN LIGHT REMAINS ILLUMINATED)
10. Ignition Mode Switch .... NORM
11. Ignition Light .... OFF
12. Repeat Steps 1 Through 11 for Left Engine.

AUTO/CONT IGNITION SYSTEM (In Flight Operation)

1. Ignition Mode Switches .... AUTO/CONT (FOR FLIGHT IN ICING CONDITIONS AND HEAVY RAIN)
2. Ignition Mode Switches .... NORM (AFTER DEPARTING ICING CONDITIONS AND AIRFRAME ICE HAS SHED)

NOTE

Continuous ignition, in the AUTO/CONT mode, should be used during flight in icing conditions, extremely heavy rain, and after leaving icing conditions until the pilot is confident that any significant residual ice on propellers, spinners, or inlet lips will not be shed into the engine intakes.

ENGINE INLET AND PROPELLER ANTI-ICE (BEFORE TAKEOFF)

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

CAUTION

DO NOT OPERATE THE PROPELLER DEICERS WHEN THE PROPELLERS ARE STATIC.

3. Engine and Propeller Ice Switches . . . . ON
4. INTAKE HEAT ON Lights . . . . ON
5. Propeller Deice Loadmeter . . . . CHECK (17 – 21 AMPERES, L & R)

NOTE

To check the propeller deice automatic timers, monitor the loadmeter in each position for at least one minute. A small momentary needle deflection approximately every 30 seconds indicates proper system operation.

6. Engine and Propeller Ice Switches . . . . AS REQUIRED

NOTE

- The above check should be conducted at 69% RPM and idle fuel flow to avoid high bleed air temperatures.
- At outside air temperatures above 21°C, a maximum operating time limit of ten seconds should be observed.
- When engine intake heat systems are turned off, the switches should be moved to the TEST position. Illumination of the INTAKE HEAT ON lights on the annunciator panel indicates that the system is completely off.
- Engine and propeller anti-ice should be used continuously during icing conditions.
- The intake heat circuits are transferrable to either essential bus and are normally switched to the left essential bus. Each propeller heat circuit is connected to its corresponding essential bus and cannot be transferred to the other essential bus.
- ET will increase slightly when engine and prop anti-ice is selected.

ENGINE INLET AND PROPELLER ANTI-ICE (IN FLIGHT)

1. Engine and Propeller Ice Switches....................ON
2. Engine Intake Heat Lights....................CHECK ON
3. Propeller Deice Loadmeter....................CHECK L & R

PITOT AND SAS² TRANSMITTER HEAT (BEFORE TAKEOFF)

CAUTION

EXTENDED GROUND OPERATION WILL DAMAGE THE PITOT AND SAS² TRANSMITTER HEATING ELEMENTS. THE SAS² DEICE LIGHT WILL ILLUMINATE WHEN THE HEATERS ARE OPERATING PROPERLY. FAILURE OF THE LIGHT TO ILLUMINATE INDICATES FAILURE OF ONE OR MORE HEATED COMPONENTS.

NOTE

Either pitot heat switch, when moved to the PITOT & SAS HEAT position, will control the SAS² angle-of-attack transmitter heater element (vane). The PITOT HEAT position of either switch will only apply power to the individual pitot head heater.

1. Pitot Heat Switches....................PITOT & SAS HEAT
2. Pitot Heat Loadmeter....................CHECK (2.4 – 10 AMPS, L & R)
3. SAS DEICE Light....................ON
4. Pitot Heat Switches....................AS REQUIRED

PITOT AND SAS² TRANSMITTER HEAT (IN FLIGHT)

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

CABIN PRESSURIZATION

Engine bleed air is used to pressurize the cabin. The cabin differential is regulated to a maximum of 7.0 psi. To operate, proceed as follows:

1. Set flight altitude in cabin pressurization controller window.
2. Set rate as desired.

OXYGEN

A 22 cubic foot, 1800 psi oxygen bottle is installed in the forward part of the nose baggage compartment.

The pilot and copilot oxygen outlets are pressurized at all times. Oxygen is available to the pilots if their diluter demand masks are plugged into the outlets. Pressure to passengers' oxygen outlets is controlled by an ON-OFF toggle switch located on the copilot's instrument panel. Passenger oxygen masks normally are the continuous flow type and will allow oxygen to flow whenever plugged into the outlets if the ON-OFF toggle switch is ON.

OXYGEN SYSTEM DURATION

OXYGEN DURATION
22 CUBIC FOOT BOTTLE WITH ZEP REGULATOR

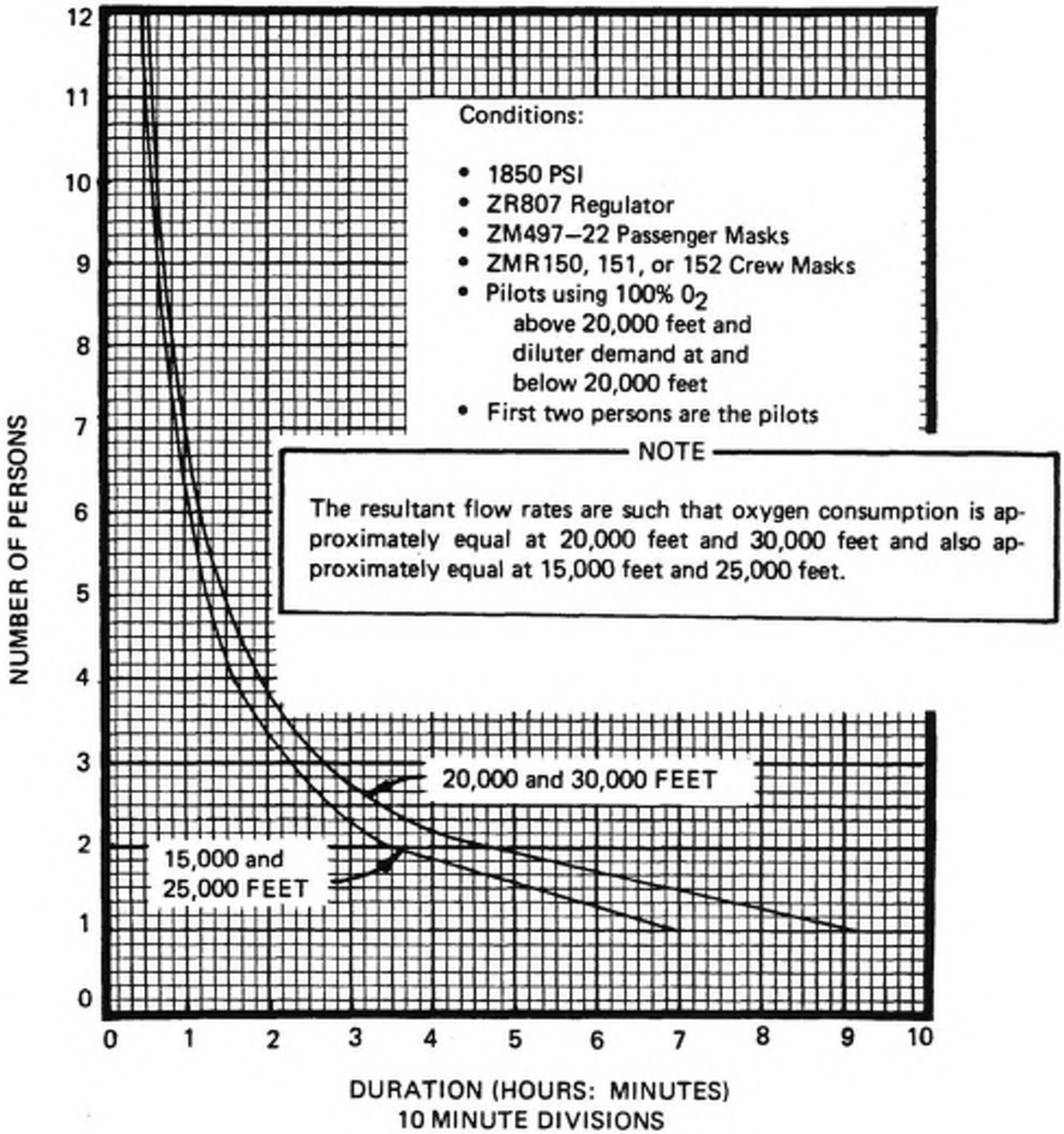


Figure IV–2

TABLE OF CONTENTS
PERFORMANCE

INTRODUCTION

In general, sufficient information is provided with each data chart to acquaint the operator with the conditions and procedures upon which the chart is based.

All performance information in this section that is dependent upon engine power includes the effects of temperature, altitude, engine accessory loads, and installation losses. All OAT's noted in performance charts are true temperatures, or indicated OAT corrected for the ram air rise and position error given in Figure V-2 (assumes zero instrument error). IOAT's obtained when parked or taxiing may not be accurate.

It is assumed that a total electrical load of 300 amperes is being used at all times. 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. Figure V-4, V-5, and V-6 may be used to verify minimum engine power output equivalent to that used in preparation of the performance charts.

A sample flight plan is contained at the end of the Performance Section.

The following performance data in this section has been FAA approved.

(1) Takeoff (Figures V-16, V-17, and V-18) and landing (Figure V-50) performance to 8,000 feet pressure altitude and associated speeds.

(2) Rates of climb for:
   a. Single engine enroute at V_{YSE}.
   b. Two engine normal climb at V_Y.
   c. Balked landing climb at 105 KIAS (107 KCAS).

(3) All airspeed position and altimeter corrections.

(4) OAT calibration.

(5) Stall and V_{MCA} speeds.

(6) Maximum demonstrated crosswind.

(7) Minimum installed power.

All other data in this section are manufacturer's data.

WIND COMPONENT CHART

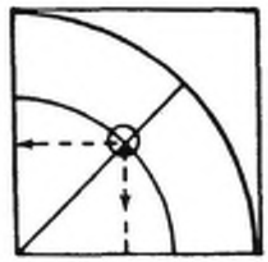
NOTE

Maximum demonstrated crosswind component is 22 Knots.

Example:

Given: Wind Velocity = 25 Knots at 40 degrees of runway heading

Obtain: Headwind Component = 19 Knots
Crosswind Component = 16 Knots



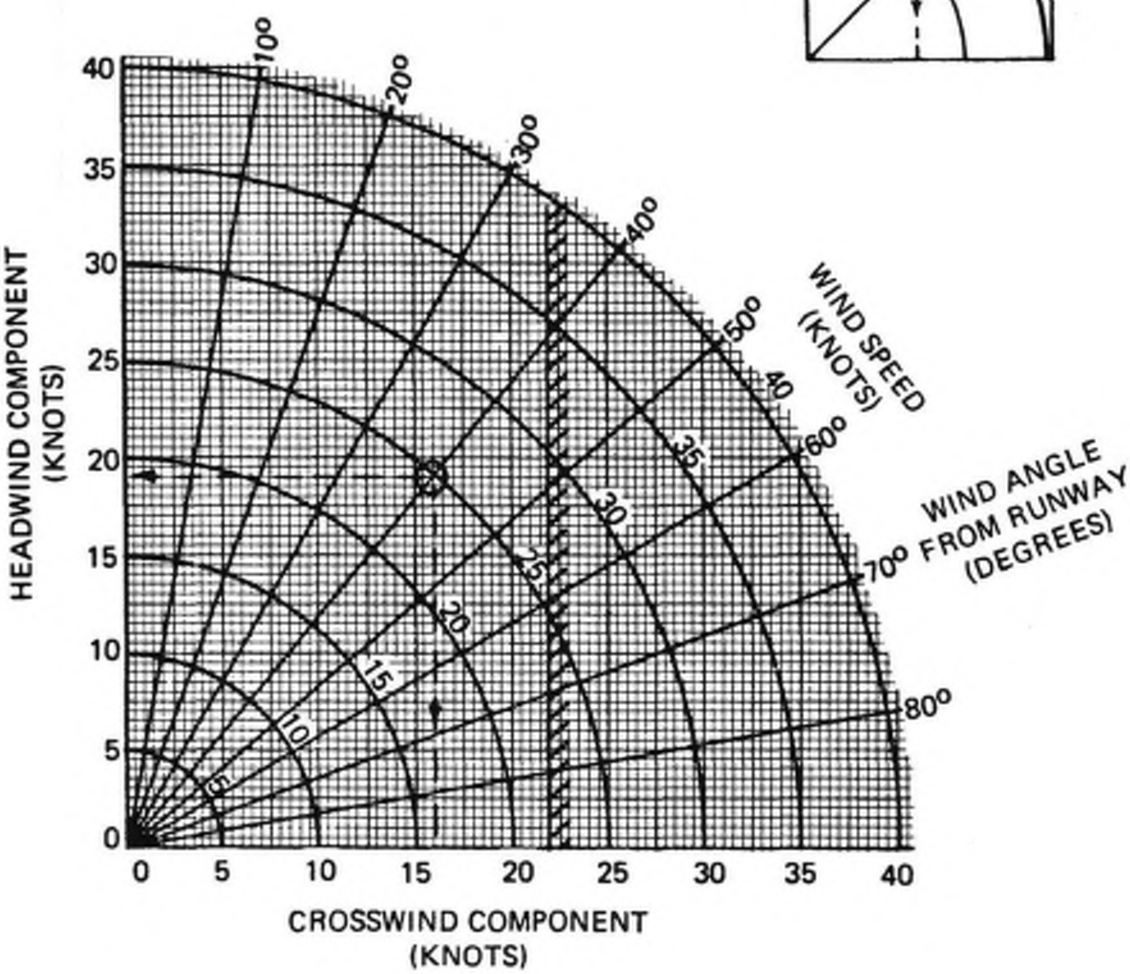


Figure V-1

RELATIONSHIP OF OUTSIDE AIR TEMPERATURE
TO ISA TEMPERATURE

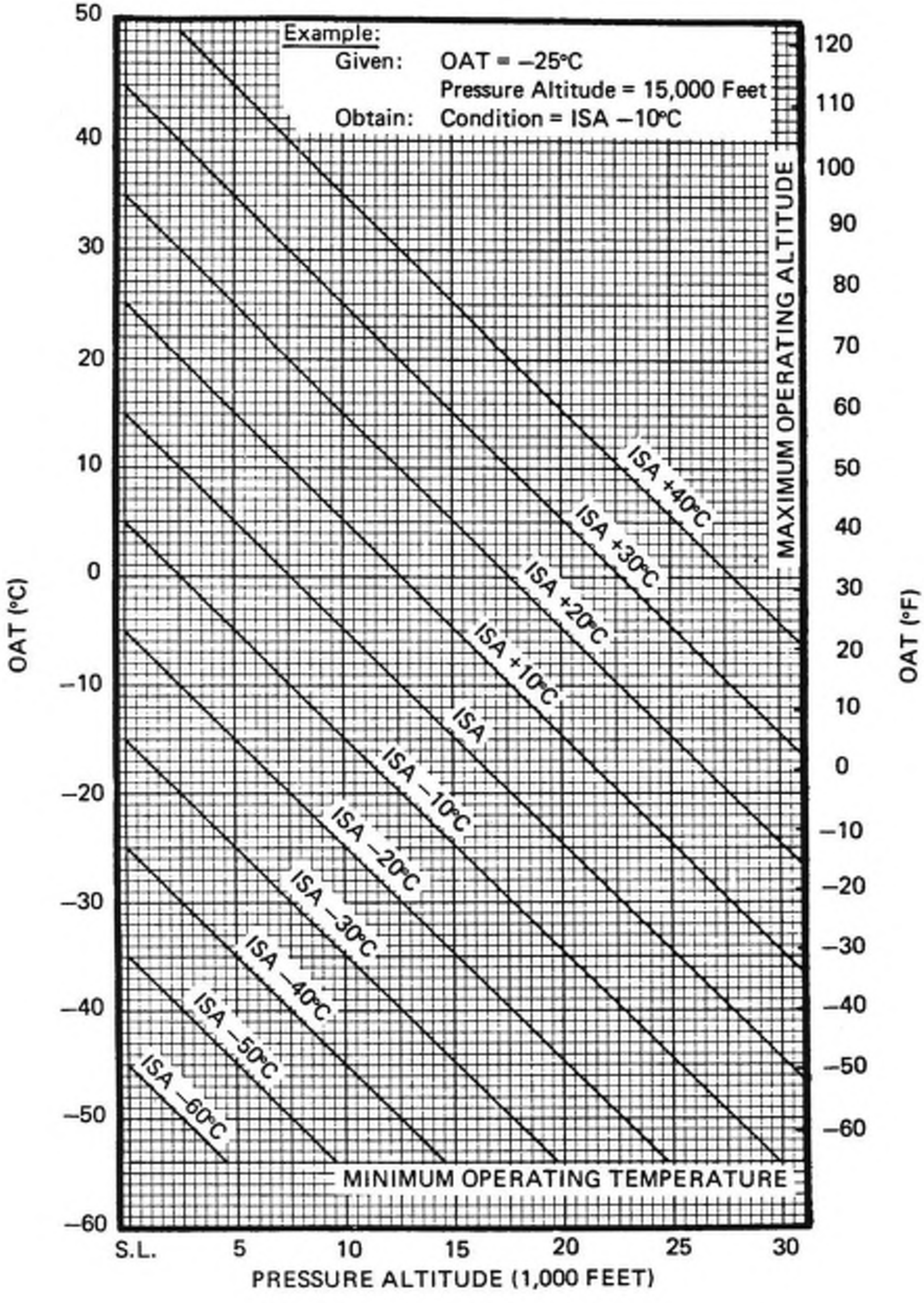
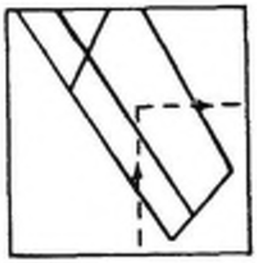


Figure V-3

TAKEOFF POWER CHECK CHART

ASSOCIATED CONDITIONS:

RPM 100%
SRL ET .... 650°C
INLET ANTI-ICE .... OFF
AIRSPEED .... ZERO
BLEED AIR .... ON



CAUTION

DO NOT OPERATE BOTH ENGINES AT FULL POWER SIMULTANEOUSLY. AIRPLANE MAY TEND TO SLIDE AT LIGHTER WEIGHTS.

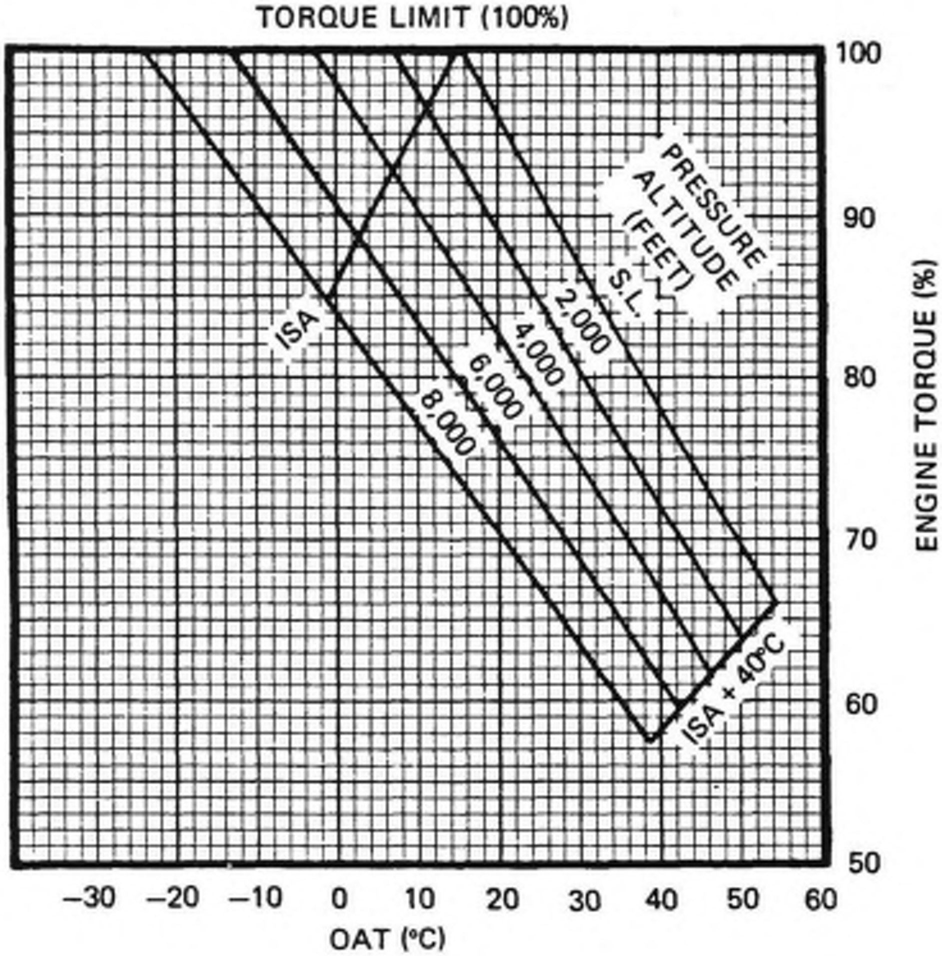


Figure V-5

AIRSPEED CALIBRATION – NORMAL SYSTEM

NOTE

- Indicated airspeed assumes zero instrument error.
- For flaps up or takeoff, gear is up or down.
- For flaps down, gear is down.

Example: FLAPS TAKEOFF POSITION
Given: Indicated airspeed = 200 KIAS
Find: Calibrated airspeed = 203 KCAS

FLAPS UP	KIAS	110	120	140	160	180	200	220	240	260
	KCAS	112	123	143	163	184	204	224	244	264

FLAPS T.O.	KIAS	100	120	140	160	180	200	212
	KCAS	102	122	143	163	183	203	215

FLAPS DOWN	KIAS	80	100	120	140	153
	KCAS	82	101	121	140	153

NOTE

This is in-flight calibration. The ground calibration error is zero up to 110 KIAS.

Figure V-7

AIRSPEED CALIBRATION – ALTERNATE SYSTEM

NOTE

- Zero instrument error.
- For flaps up, gear is up.
- For flaps down, gear is down.
- The copilot's static pressure instruments are not connected to the alternate static pressure source.
- Do not dump pressurization when using the alternate static pressure source.
- The airspeed calibration shown below is not valid if the dump valve is open.

Example: FLAPS DOWN
Given: Indicated airspeed = 100 KIAS
Find: Calibrated airspeed = 105 KCAS

FLAPS UP	KIAS	100	120	140	160	180	200	220	240	260
	KCAS	105	122	141	160	179	198	217	236	255

FLAPS DOWN	KIAS	80	100	120	140	151
	KCAS	87	105	123	142	153

Figure V-9

STALL SPEEDS – ZERO THRUST

NOTE

- Maximum altitude loss during power-off stall recovery is approximately 600 feet.
- Maximum nose down pitch attitude, and altitude loss during recovery from single-engine power-on stalls are approximately 10° and 820 feet, respectively.
- Landing gear is down.

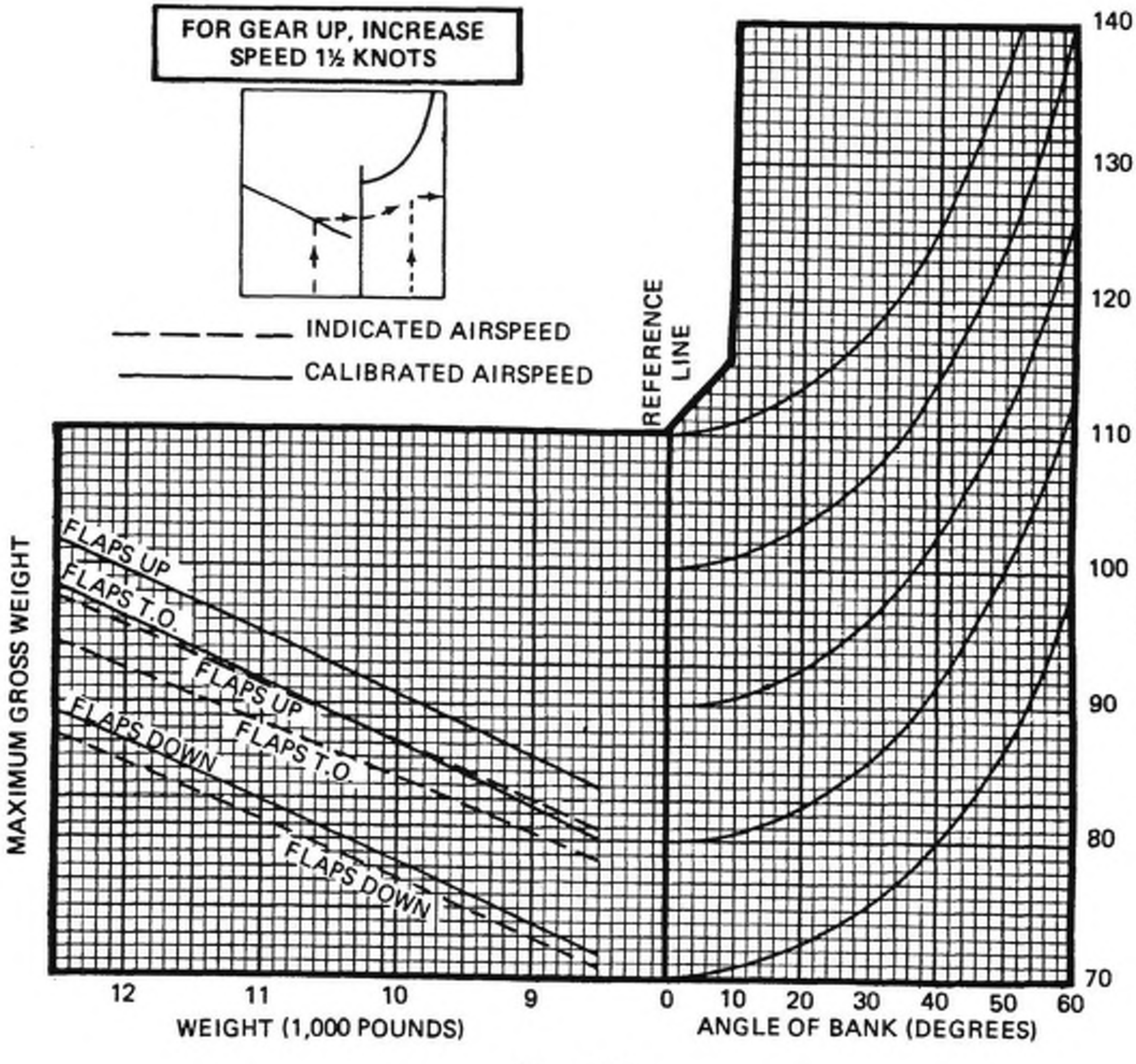


Figure V-11

CLIMB SPEEDS

TWO ENGINE BEST ANGLE (V_X) AND BEST RATE OF CLIMB (V_Y) SPEEDS

ASSOCIATED CONDITIONS:

POWER....................MAXIMUM CONTINUOUS
FLAPS....................UP
LANDING GEAR....................UP
ELECTRICAL LOAD....................300 AMPERES (TOTAL)
BLEED AIR....................ON
ANTI-ICE....................AS REQUIRED

TWO ENGINE BEST ANGLE OF CLIMB SPEEDS V_X
The two-engine best angle of climb speed, V_X, is limited by V_{MCA} (107 KCAS, 105 KIAS) at all altitudes from sea level through 12,000 feet on cold days. Use 105 KIAS for V_X at all gross weights.

TWO ENGINE BEST RATE OF CLIMB SPEEDS V_Y (KIAS)

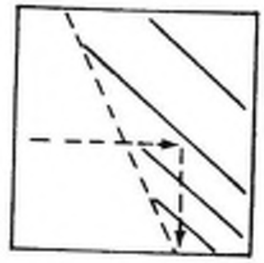
Pressure Altitude (Feet)	GROSS WEIGHT (Pounds)		
	8,500	10,500	12,500
S.L.	138	139	141
5,000	131	134	137
10,000	125	129	133
15,000	119	124	129
20,000	113	119	125
25,000	108	114	121

Figure V-13

MAXIMUM WEIGHT FOR CONTINUED TAKEOFF AFTER ENGINE FAILURE AT V_R

ASSOCIATED CONDITIONS:

POWER .... TAKEOFF
FLAPS .... TAKEOFF
LANDING GEAR .... DOWN
BLEED AIR .... OFF
ANTI-ICE .... OFF
SPEEDS .... V_R PER FIGURE V–12



NOTE

- This chart represents the capability to maintain altitude in the takeoff configuration at V_R with one engine inoperative, propeller in NTS mode, and no ground effect.
- To successfully complete a critical single-engine takeoff the landing gear must be retracted as soon as possible after liftoff. Maintain minimum obstacle clearance height until single-engine best rate-of-climb speed is attained.

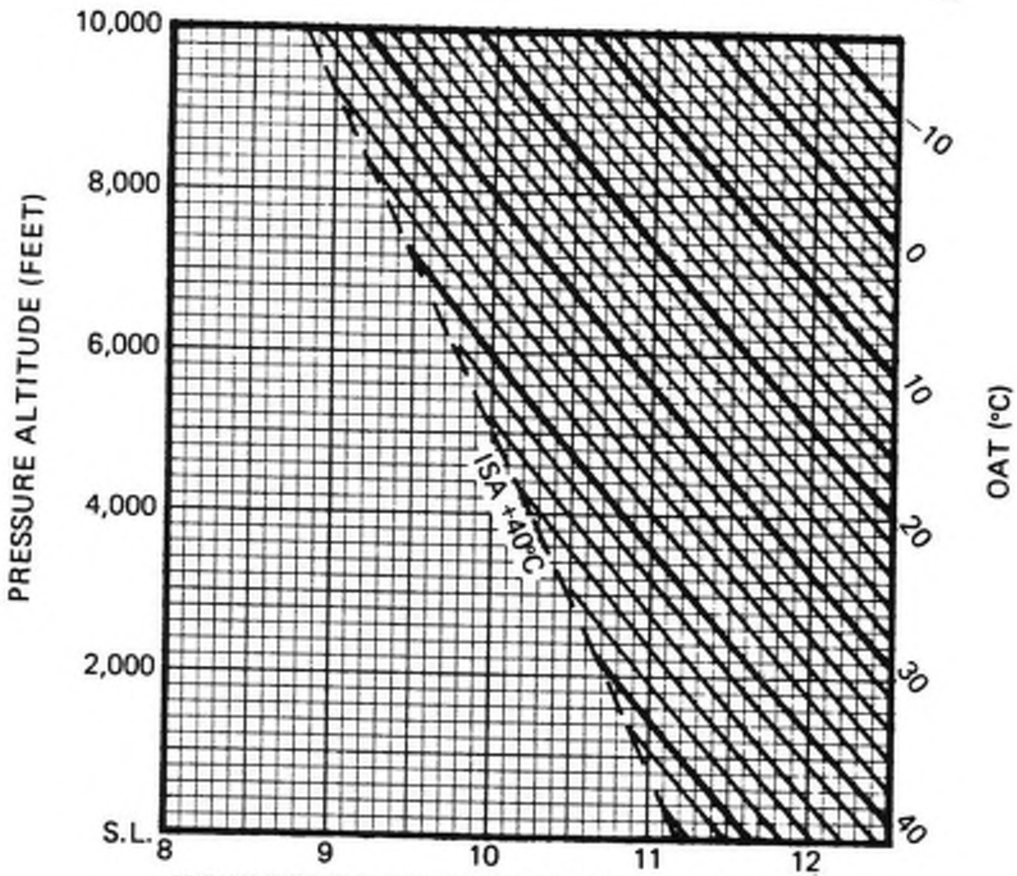


Figure V-15

TWO-ENGINE TAKEOFF DISTANCE – BLEED AIR ON

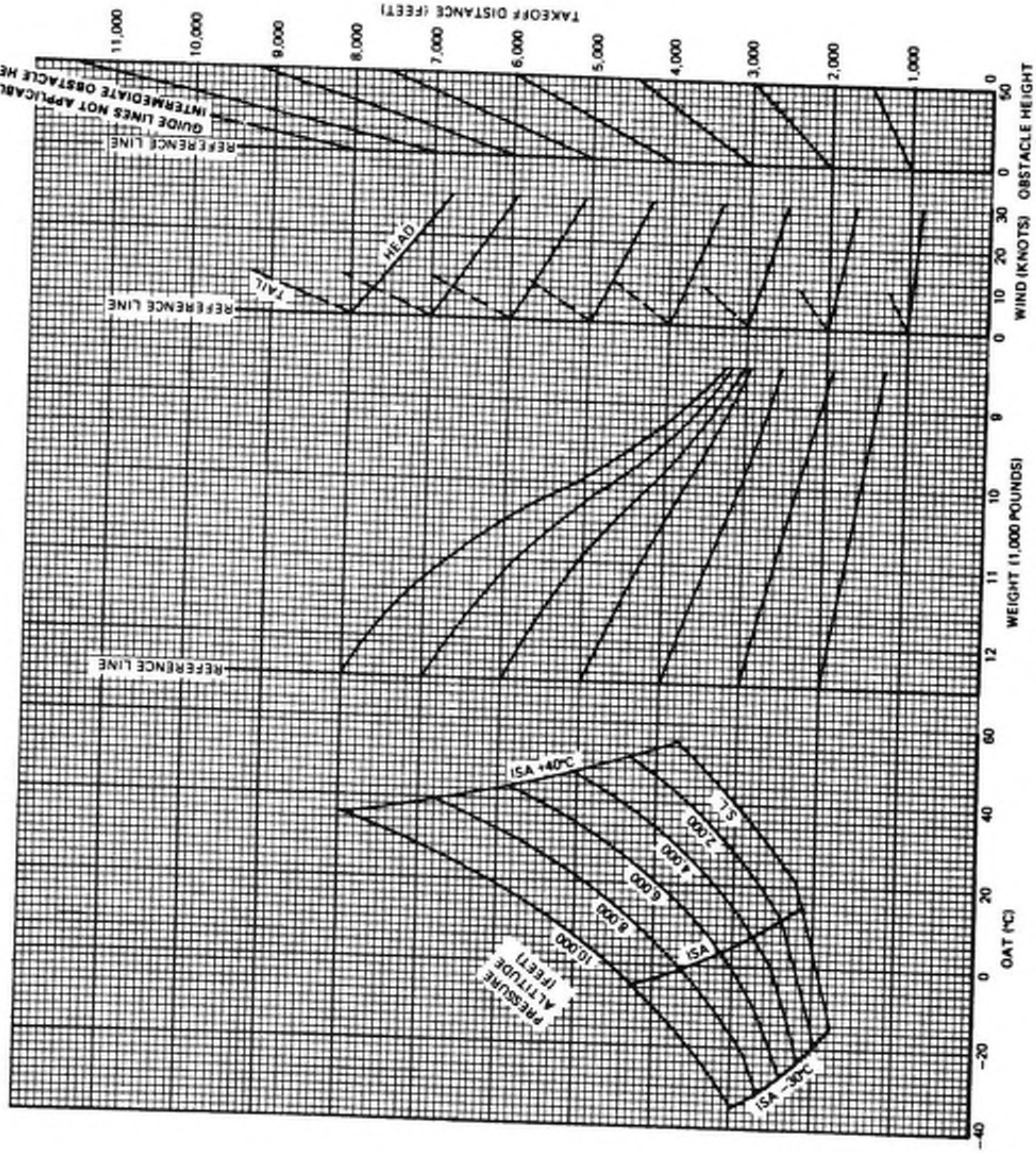
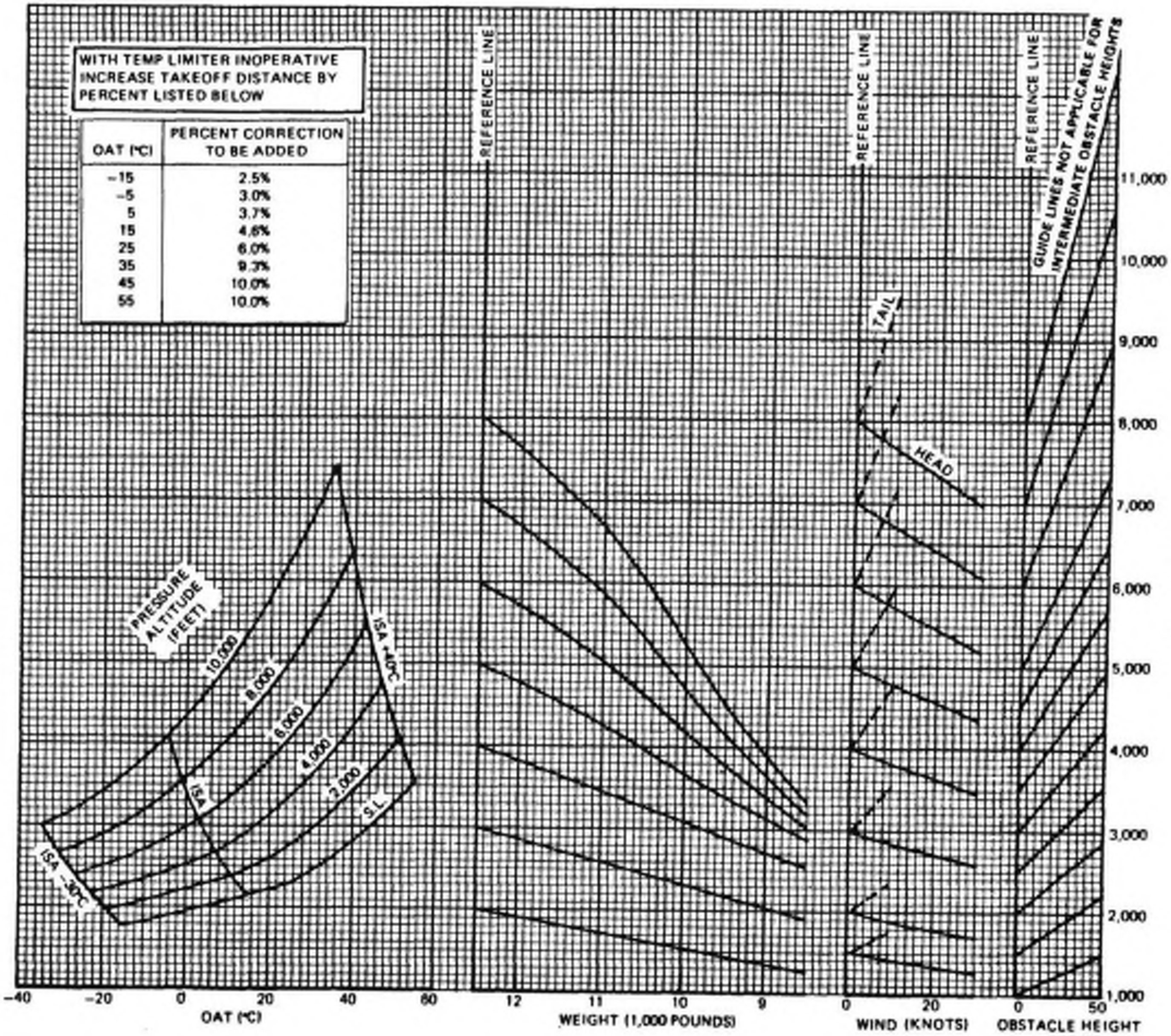


Figure V-16

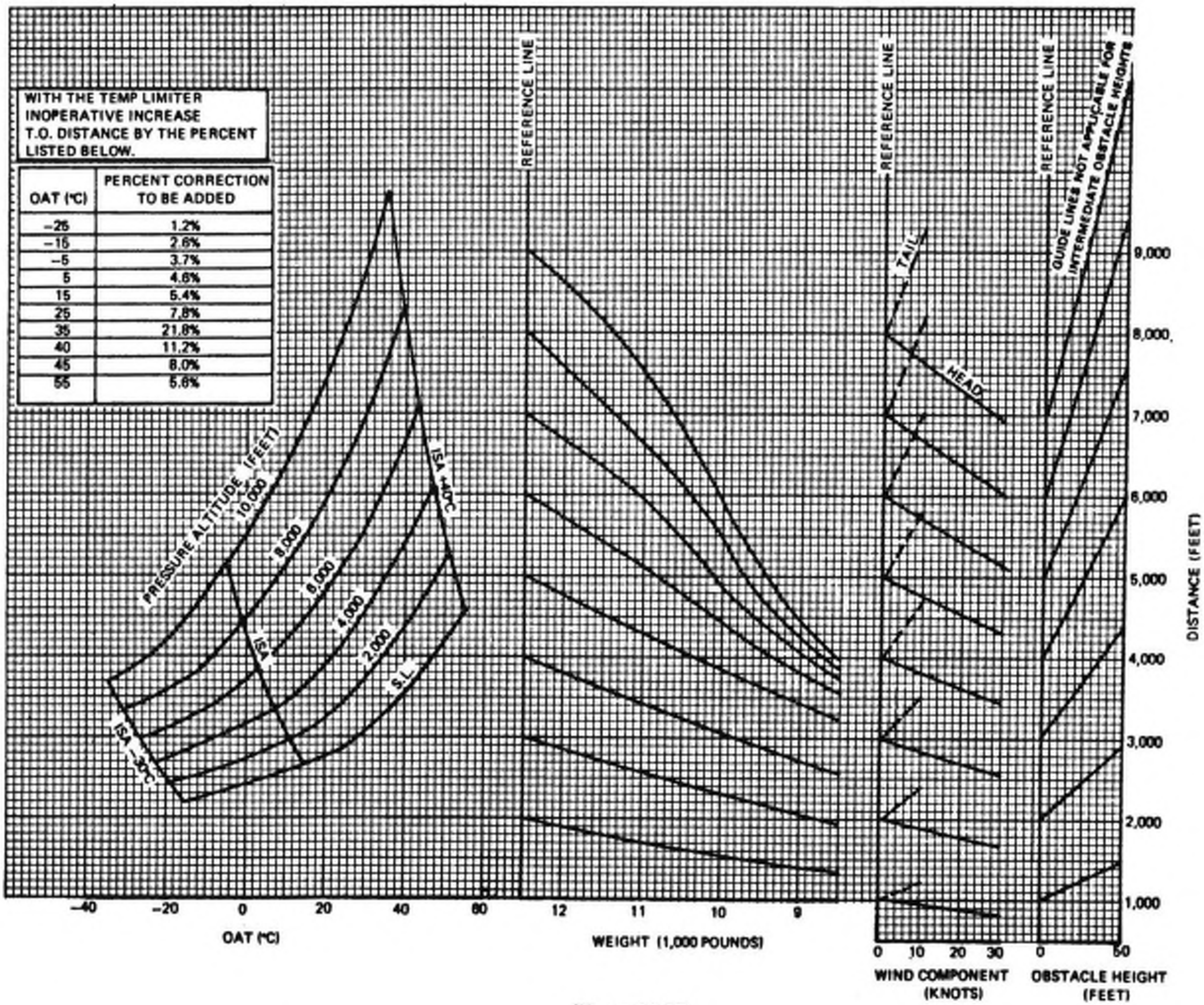
TWO-ENGINE TAKEOFF DISTANCE – BLEED AIR OFF



OAT (°C)	PERCENT CORRECTION TO BE ADDED
−15	2.5%
−5	3.0%
5	3.7%
15	4.6%
25	6.0%
35	9.3%
45	10.0%
55	10.0%

Figure V-17

TWO-ENGINE TAKEOFF DISTANCE WITH FUEL IMBALANCE (500 POUNDS MAXIMUM)



WITH THE TEMP LIMITER INOPERATIVE INCREASE T.O. DISTANCE BY THE PERCENT LISTED BELOW.

OAT (°C)	PERCENT CORRECTION TO BE ADDED
−25	1.2%
−15	2.6%
−5	3.7%
5	4.6%
15	5.4%
25	7.8%
35	21.8%
40	11.2%
45	8.0%
55	5.6%

Figure V-18

ACCELERATE-STOP DISTANCE – BLEED AIR ON

ENGINE FAILURE SPEED:
V_R FROM FIGURE V–12

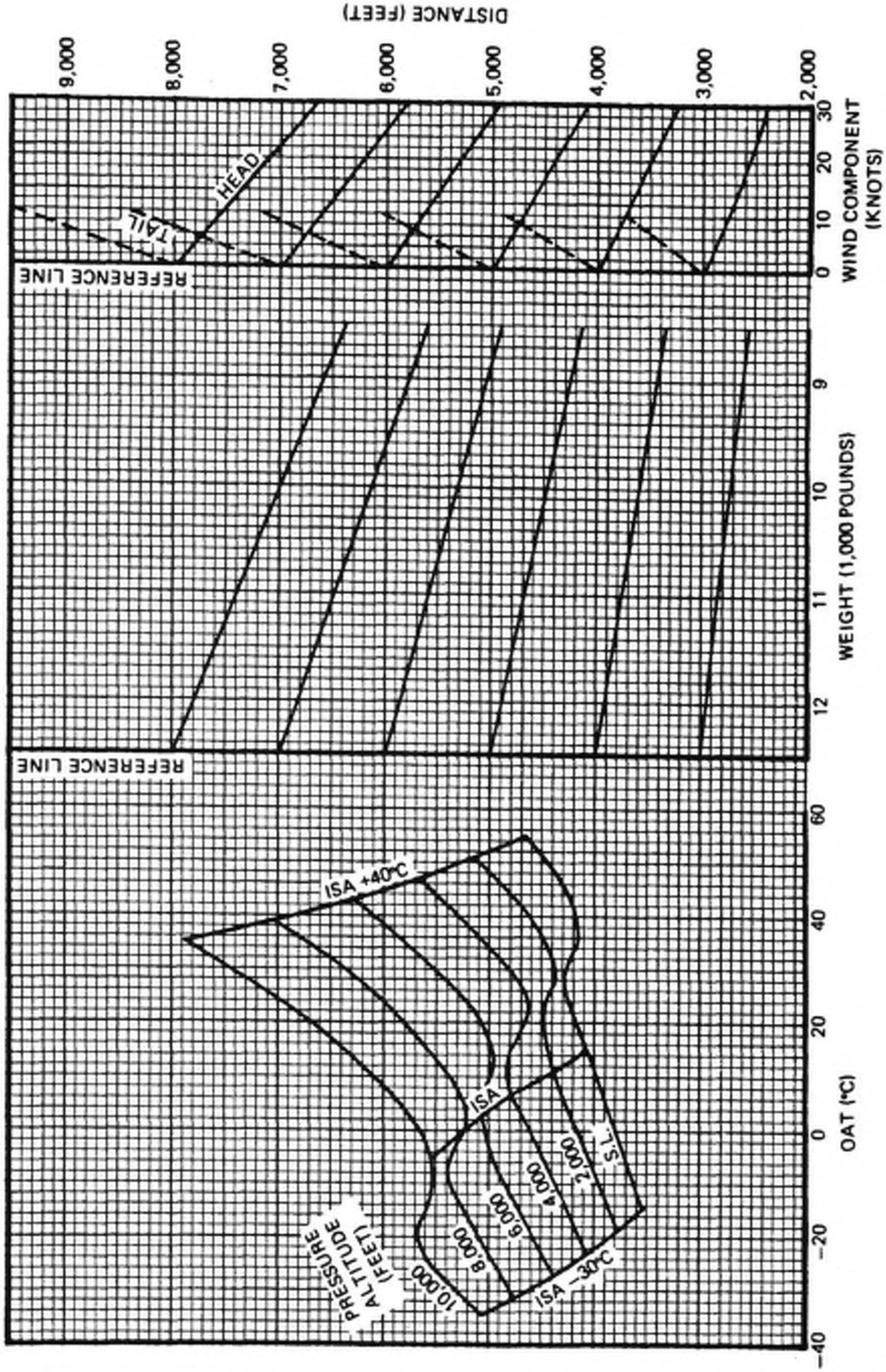


Figure V-19

ACCELERATE-GO DISTANCE (ENGINE FAILURE DURING TAKEOFF, TAKEOFF CONTINUED)

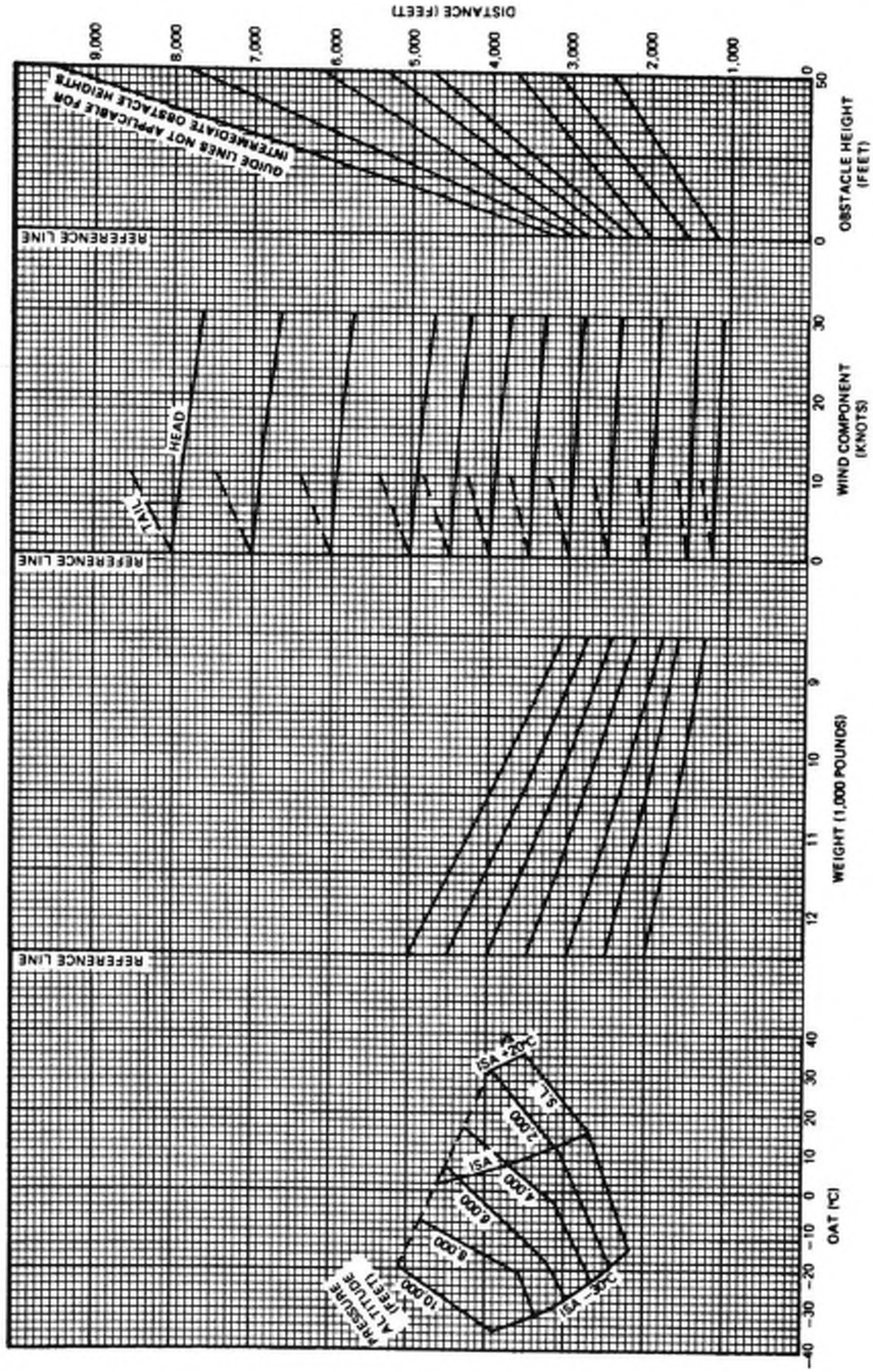
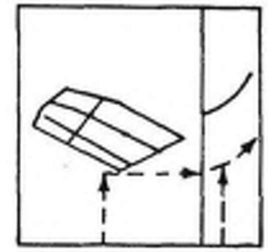


Figure V-20

TWO-ENGINE TAKEOFF CLIMB GRADIENT AT V_{50}

ASSOCIATED CONDITIONS:

POWER . . . . TAKEOFF
LANDING GEAR . . . . UP
FLAPS . . . . TAKEOFF
BLEED AIR . . . . ON
ANTI-ICE . . . . OFF
CLIMB SPEED . . . . V_{50} PER FIGURE V–12



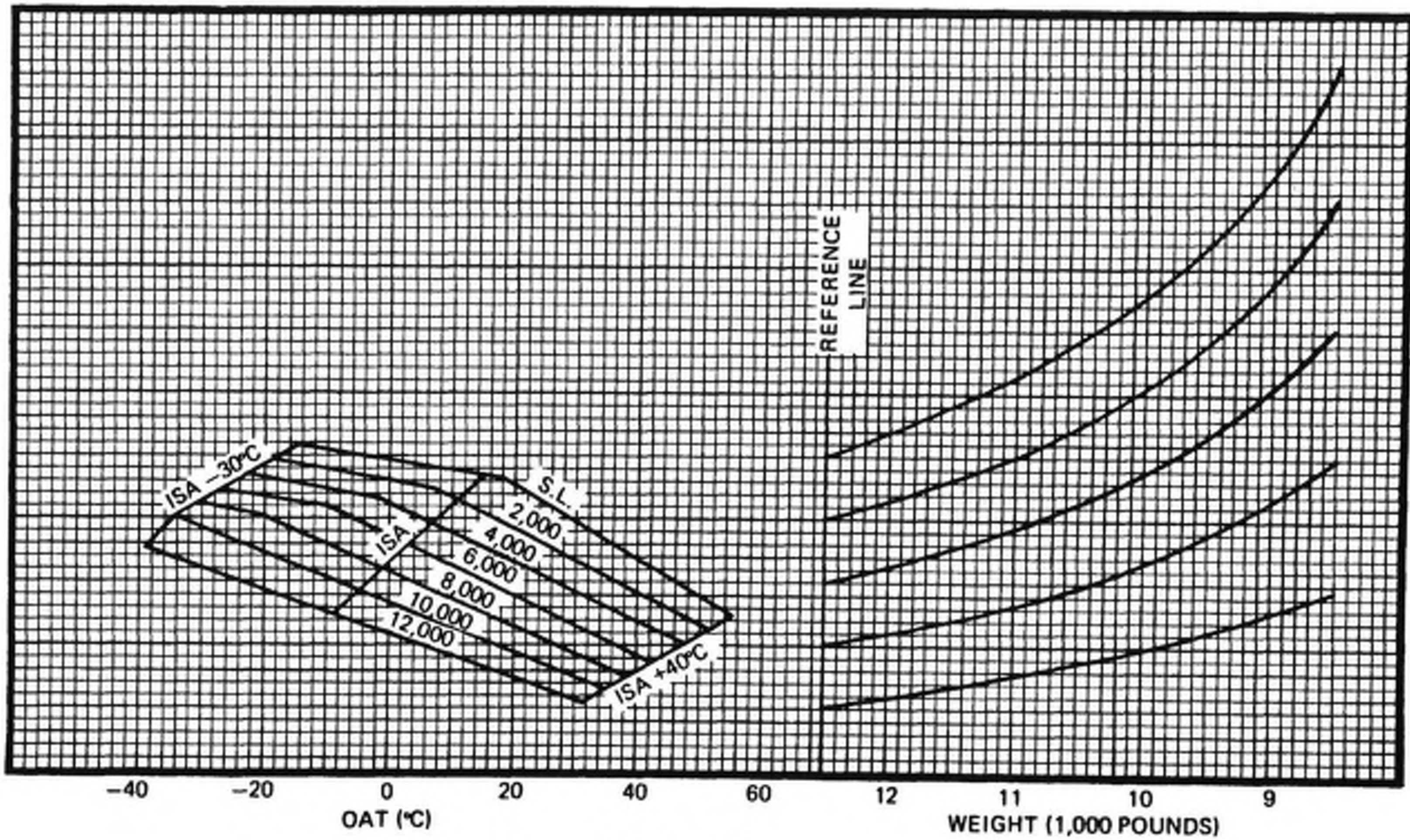


Figure V-22

RATE OF CLIMB – TWO ENGINE

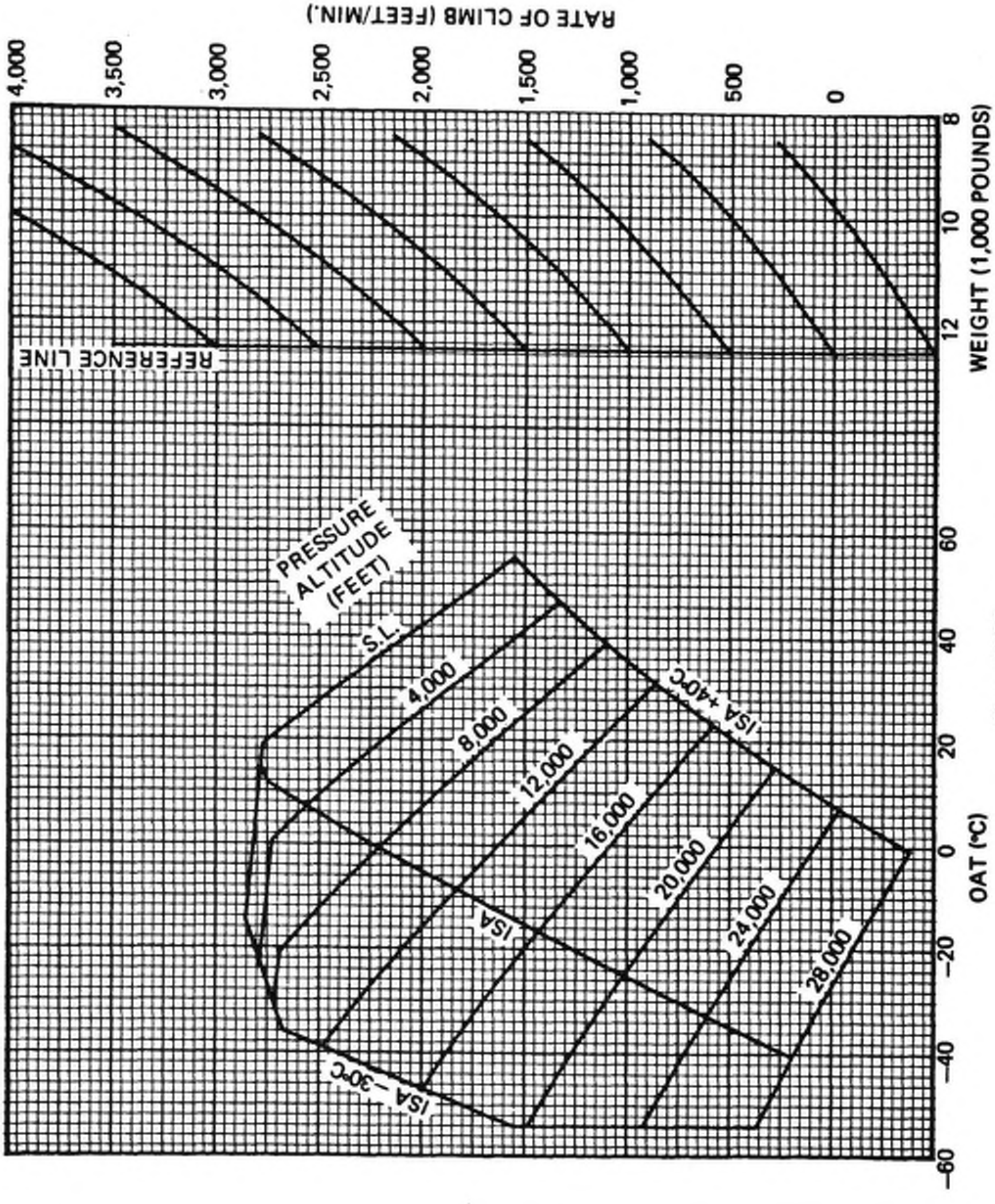


Figure V-23

RATE-OF-CLIMB — SINGLE ENGINE

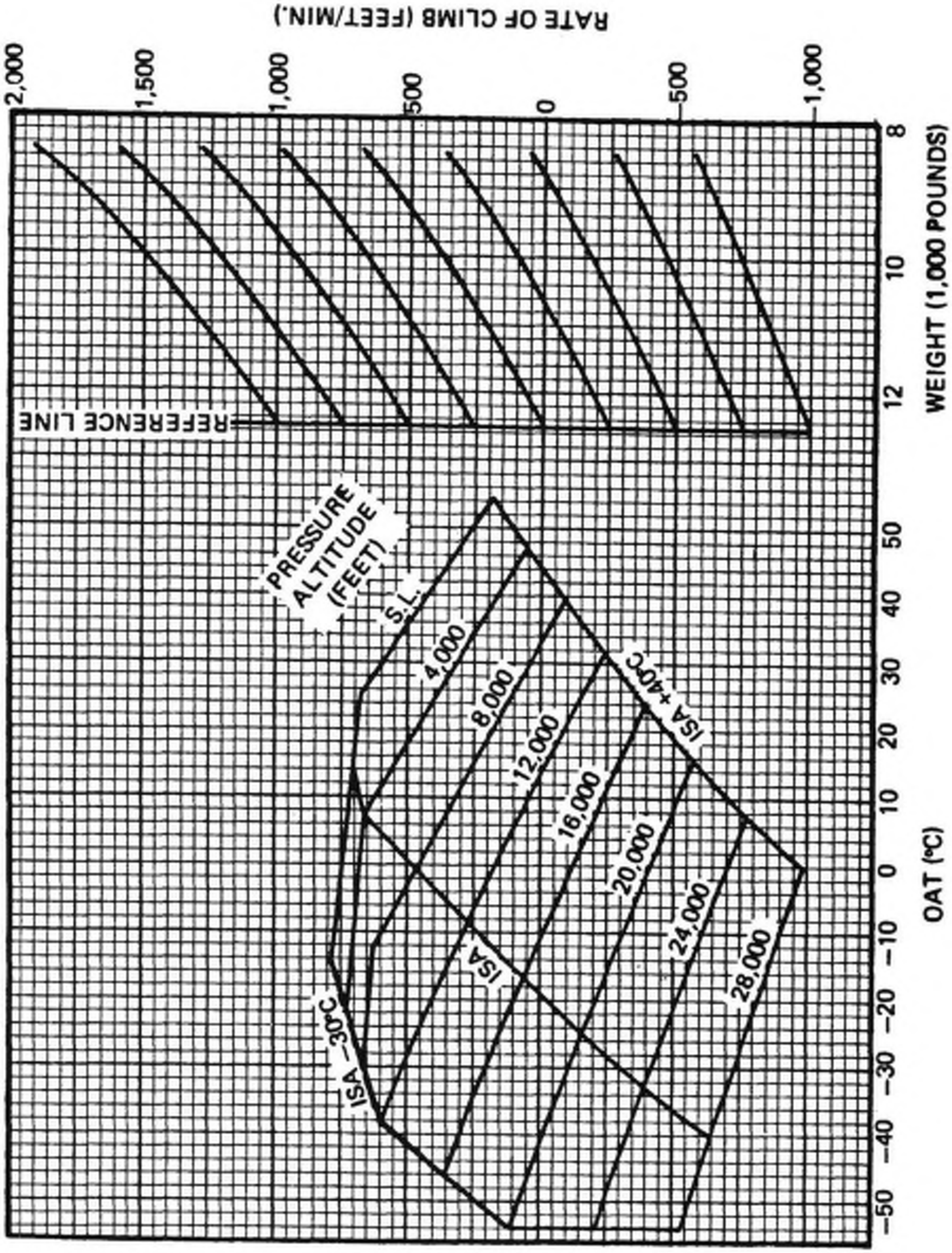


Figure V-24

TWO-ENGINE –SERVICE CEILING

ASSOCIATED CONDITIONS:

POWER........................MAXIMUM CONTINUOUS
FLAPS ....UP
LANDING GEAR...............................UP
BLEED AIR ....ON
ANTI-ICE ....OFF
(TWO-ENGINE BEST RATE-OF-CLIMB SPEED PER FIGURE 23).

NOTE

The two-engine service ceiling is the pressure altitude at which the airplane has the capability to climb at 100 feet/minute.

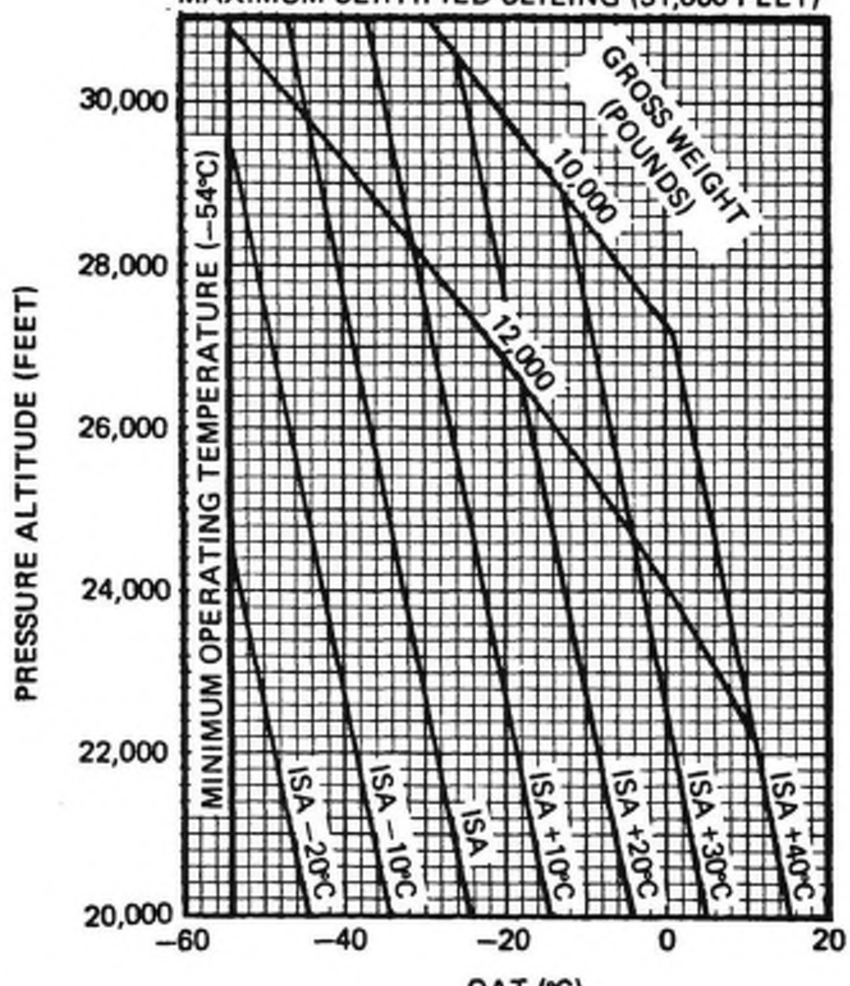


Figure V-26

SINGLE ENGINE SERVICE CEILING

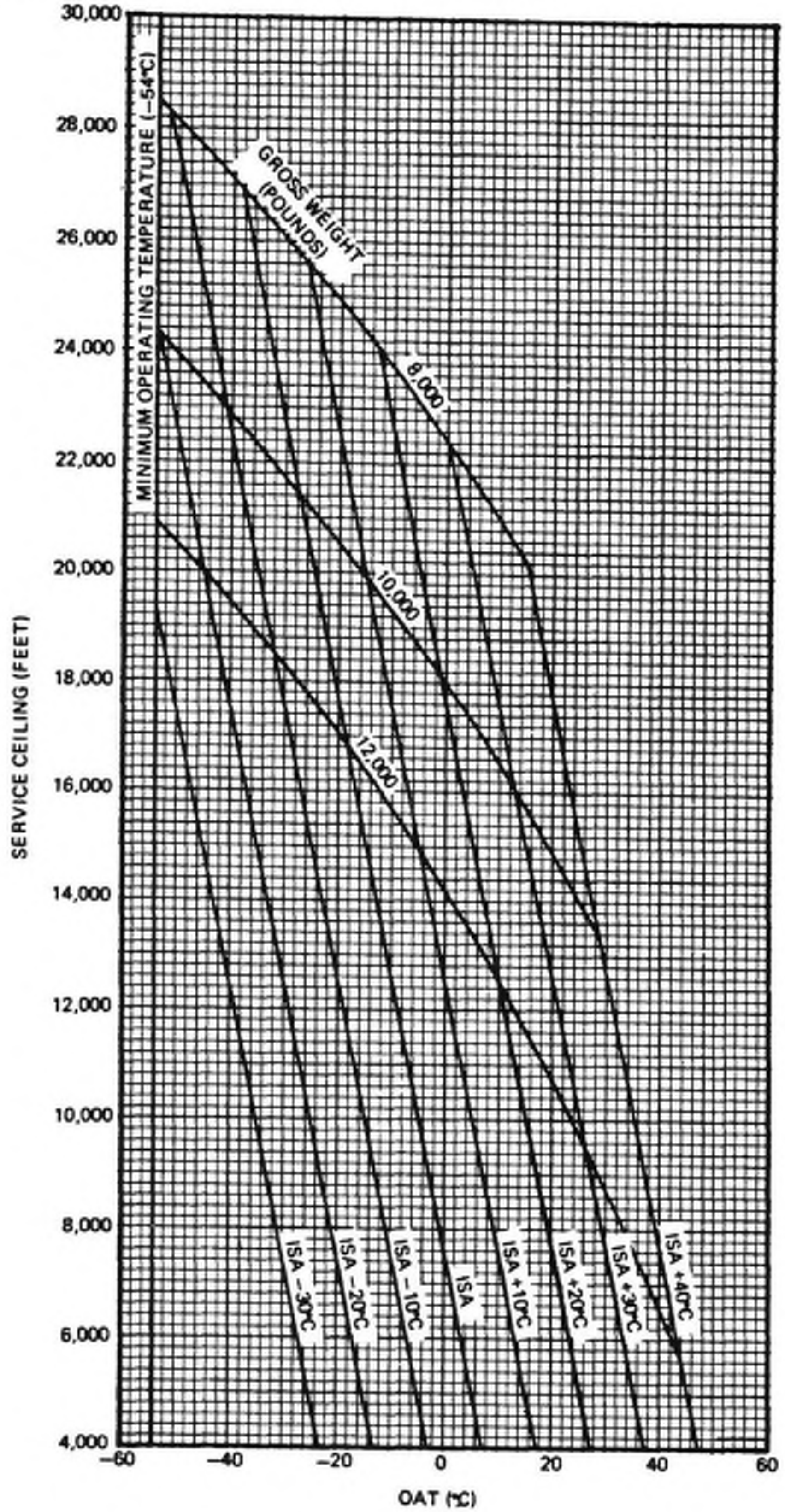
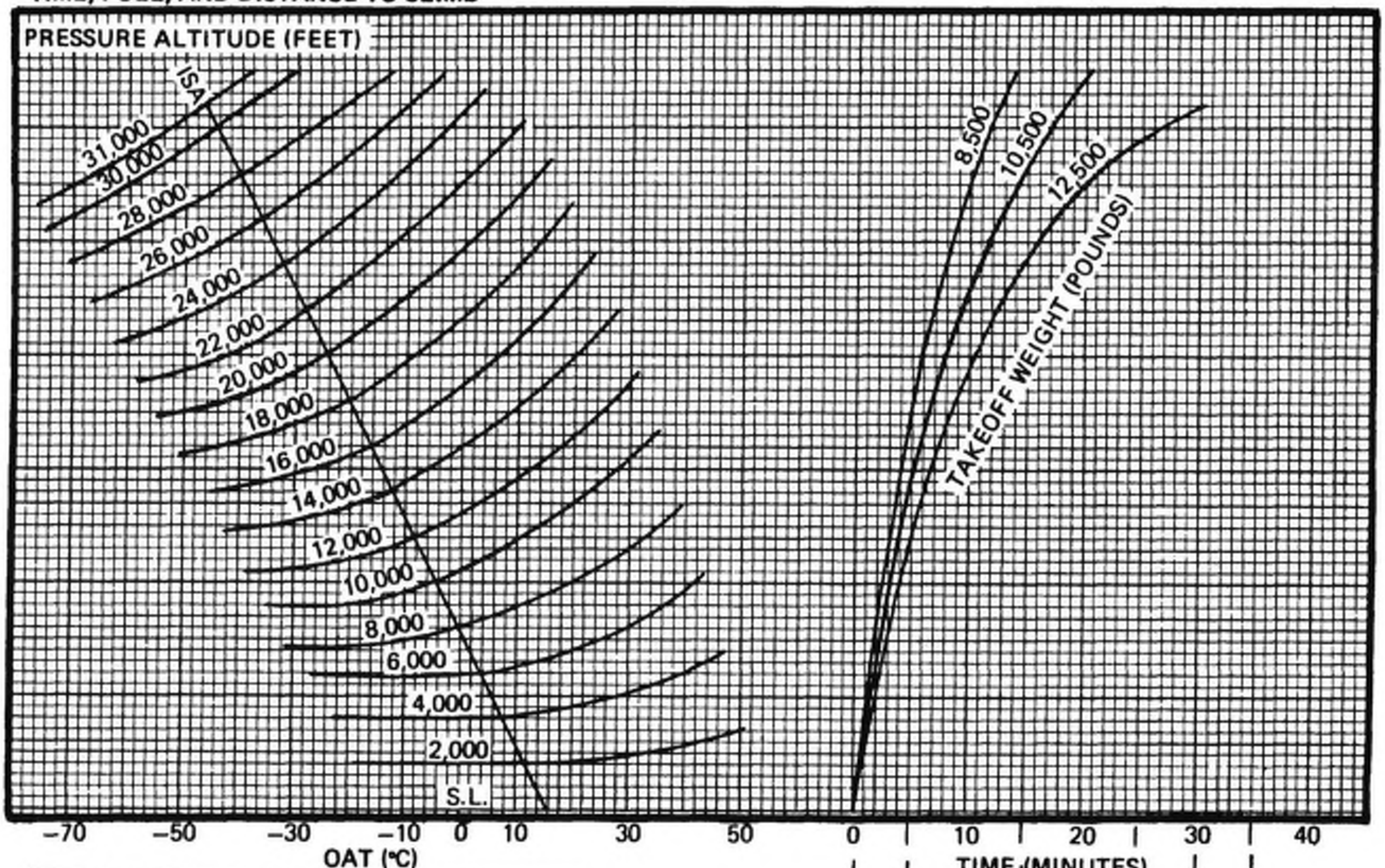


Figure V-27

TIME, FUEL, AND DISTANCE TO CLIMB



Altitude Feet	CLIMB SPEED – KNOTS, IAS		
	8,500	10,500	12,500
S.L.	138	139	141
5,000	131	134	137
10,000	125	129	133
15,000	119	124	129
20,000	113	120	125
25,000	108	115	121

Figure V-28

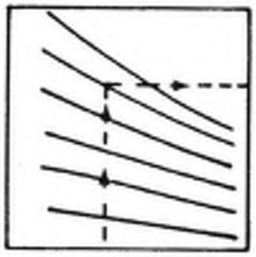
RANGE PROFILE – STANDARD DAY
LONG RANGE CRUISE POWER

ASSOCIATED CONDITIONS:

WEIGHT .... 12,500 POUNDS
FUEL .... AVIATION KEROSENE
RPM 98%
AIRSPEED .... FOR 99% MAXIMUM RANGE

—NOTE—

Range includes Start, Taxi, Climb, and Descent with 45 minutes reserve fuel at holding speed and power at 5,000 feet. Do not exceed service ceiling.



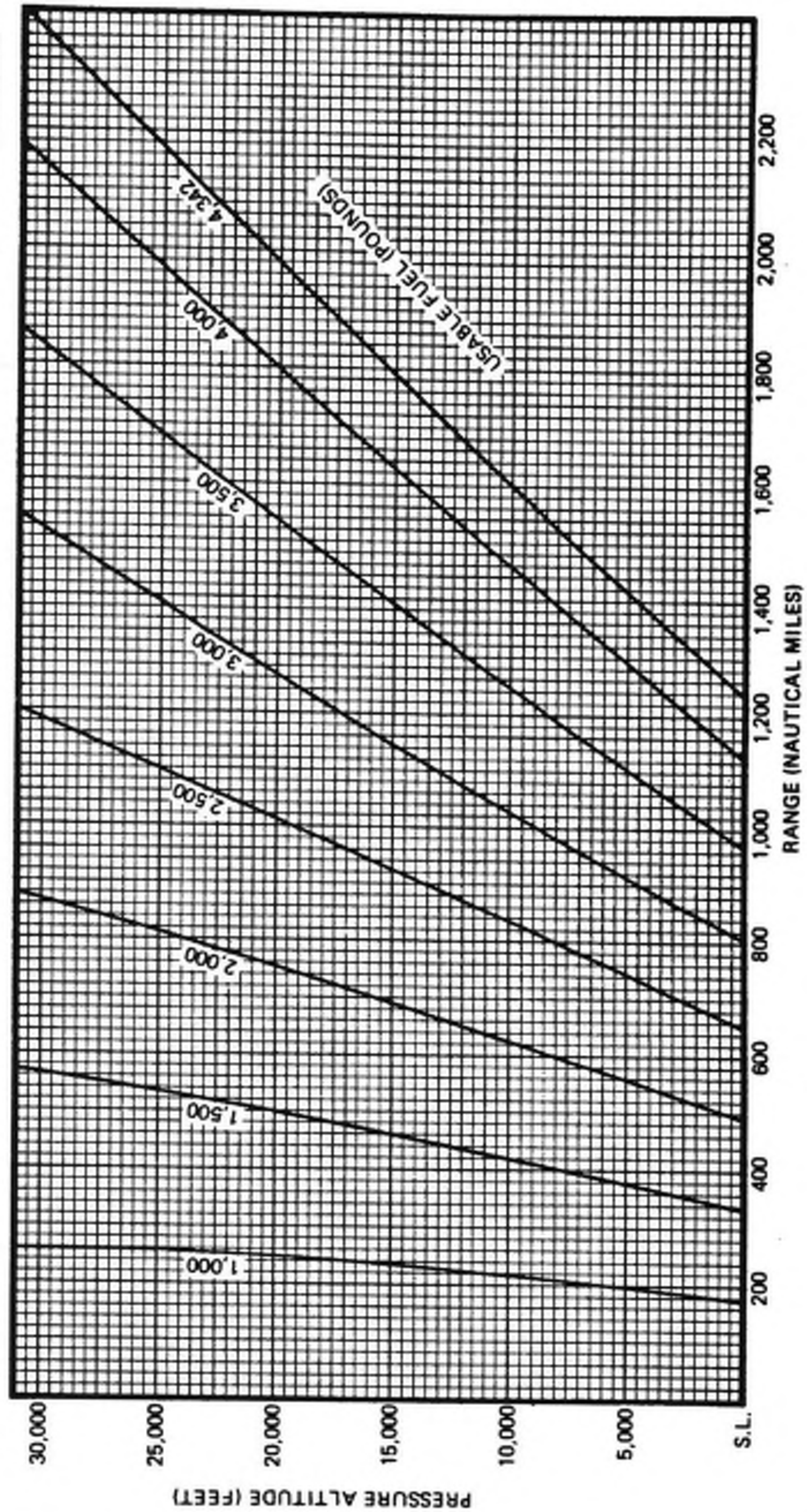


Figure V-29

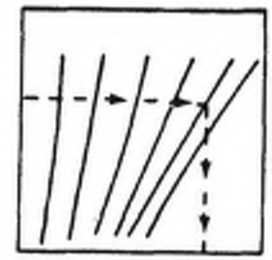
RANGE PROFILE – ISA +15°C
MAXIMUM CRUISE SPEED

ASSOCIATED CONDITIONS:

WEIGHT .... 12,500 POUNDS
FUEL .... AVIATION KEROSENE
RPM 98%
AIRSPEED .... FOR 99% MAXIMUM RANGE

NOTE

Range includes Start, Taxi, Climb, and Descent with 45 minutes reserve fuel at holding speed and power at 5,000 feet. Do not exceed service ceiling.



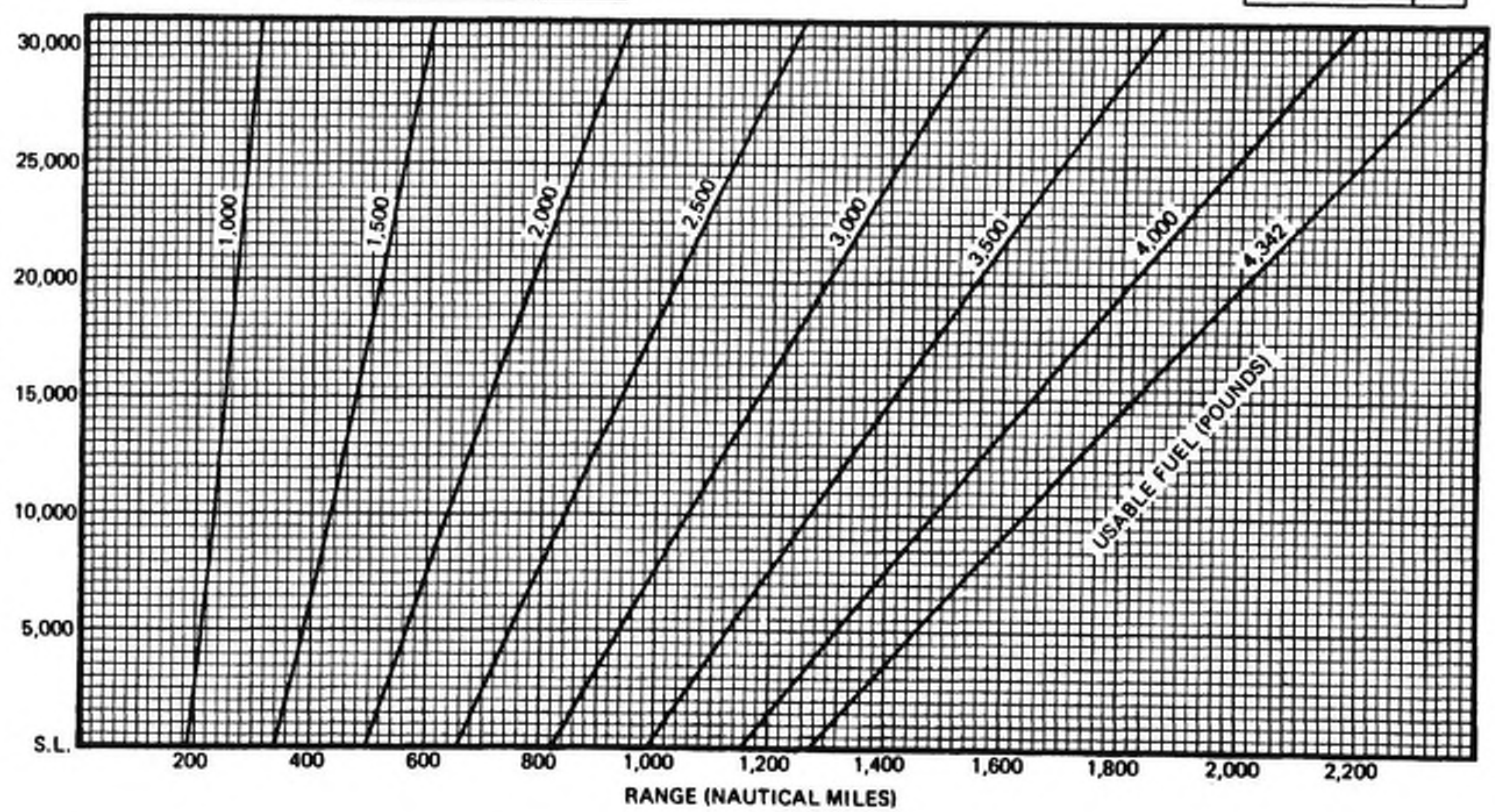


Figure V-31

ENDURANCE PROFILE – STANDARD DAY
LONG RANGE CRUISE AT 98% RPM

Conditions:
- Engine power and atmospheric conditions as noted on chart
- Electrical load of 100 amperes (total)
- Bleed air on
- Anti-ice off
- Flaps up
- Gear up
- 12,500 pound takeoff gross weight

NOTE

Endurance Includes:
- Reserve fuel for 45 minutes holding speed and power at 5,000 feet.
- Climb (per applicable Time, Fuel and Distance to climb chart, Figure V–28).
- Descent (per Figure V–48).

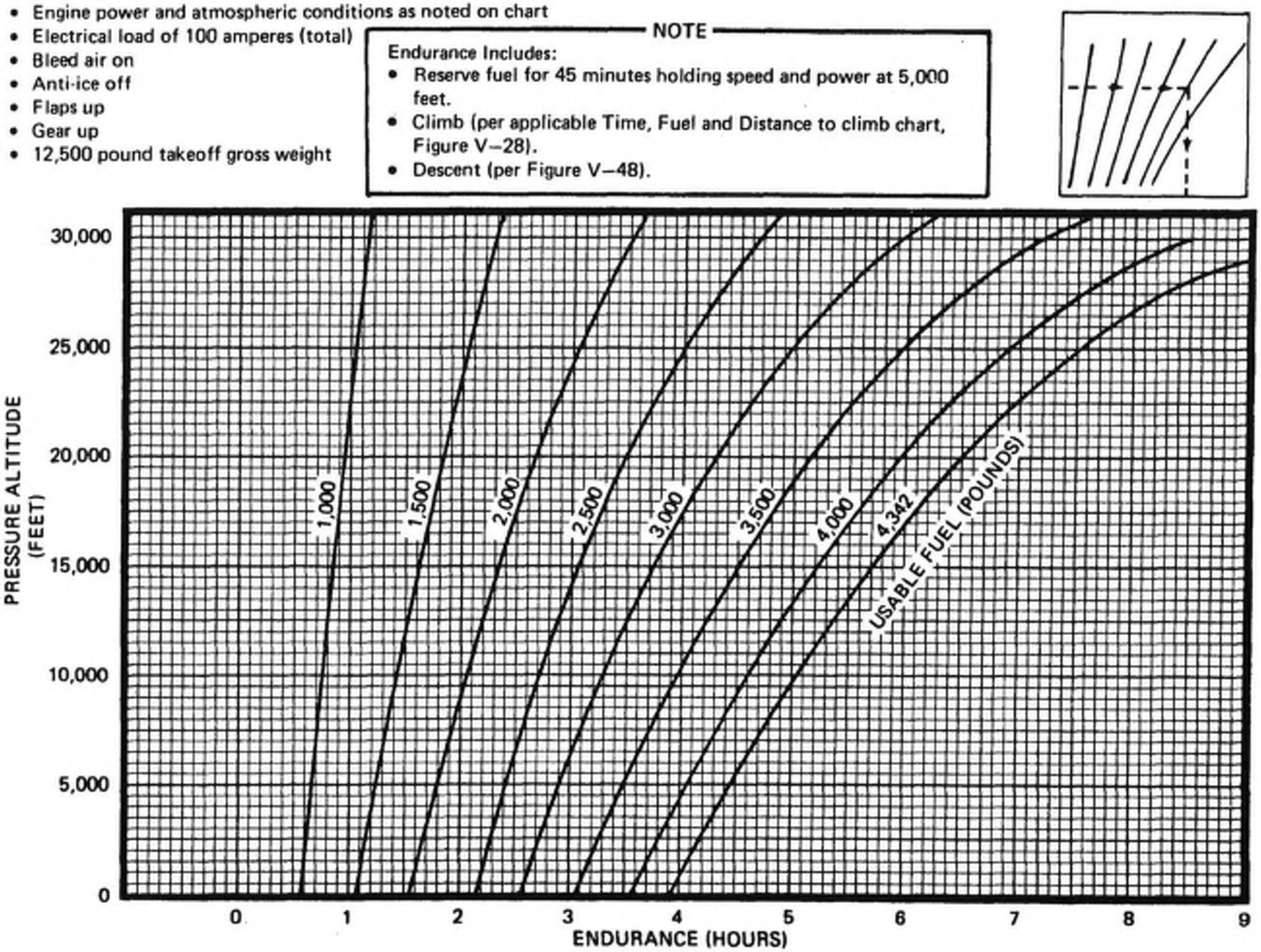


Figure V-33

HOLDING TIME

ASSOCIATED CONDITIONS:

WEIGHT .... 10,000 POUNDS
OAT .... ISA
RPM 98%
TORQUE/ET .... FOR LEVEL FLIGHT
SPEED .... 1.4 V_S
(SEE SPECIFIC RANGE CHARTS)
BLEED AIR .... ON
ANTI-ICE .... OFF

Examples:

1. Fuel Available	1,500 Pounds
Pressure Altitude	10,000 Feet
Holding Time	3 Hours 23 Minutes
2. Required Holding Time	1 + 30 Hours
Holding Altitude	5,000 Feet
Fuel Required	750 Pounds

Fuel Requirement Or Available (Pounds)	HOLDING TIME (HOURS: MINUTES) Pressure Altitude (Feet)						
	S.L.	5,000	10,000	15,000	20,000	25,000	30,000
250	0:27	0:31	0:34	0:38	0:41	0:45	0:45
500	0:55	1:02	1:08	1:16	1:22	1:29	1:31
750	1:23	1:34	1:42	1:54	2:03	2:14	2:16
1,000	1:51	2:05	2:16	2:32	2:45	2:59	3:02
1,250	2:19	2:36	2:49	3:10	3:26	3:44	3:47
1,500	2:47	3:08	3:23	3:48	4:07	4:29	4:33
1,750	3:14	3:39	3:57	4:27	4:48	5:14	5:18
2,000	3:42	4:11	4:31	5:05	5:30	5:58	6:04
2,250	4:10	4:42	5:05	5:43	6:11	6:43	6:49
2,500	4:38	5:13	5:39	6:21	6:52	7:28	7:35
2,750	5:06	5:45	6:13	6:59	7:33	8:13	8:20
3,000	5:33	6:16	6:47	7:37	8:15	8:58	9:06
Total Fuel Flow (pounds/hour)	540	480	440	395	365	335	330

Figure V-35

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS,
WEIGHT 10,000 POUNDS, ISA, 98% RPM

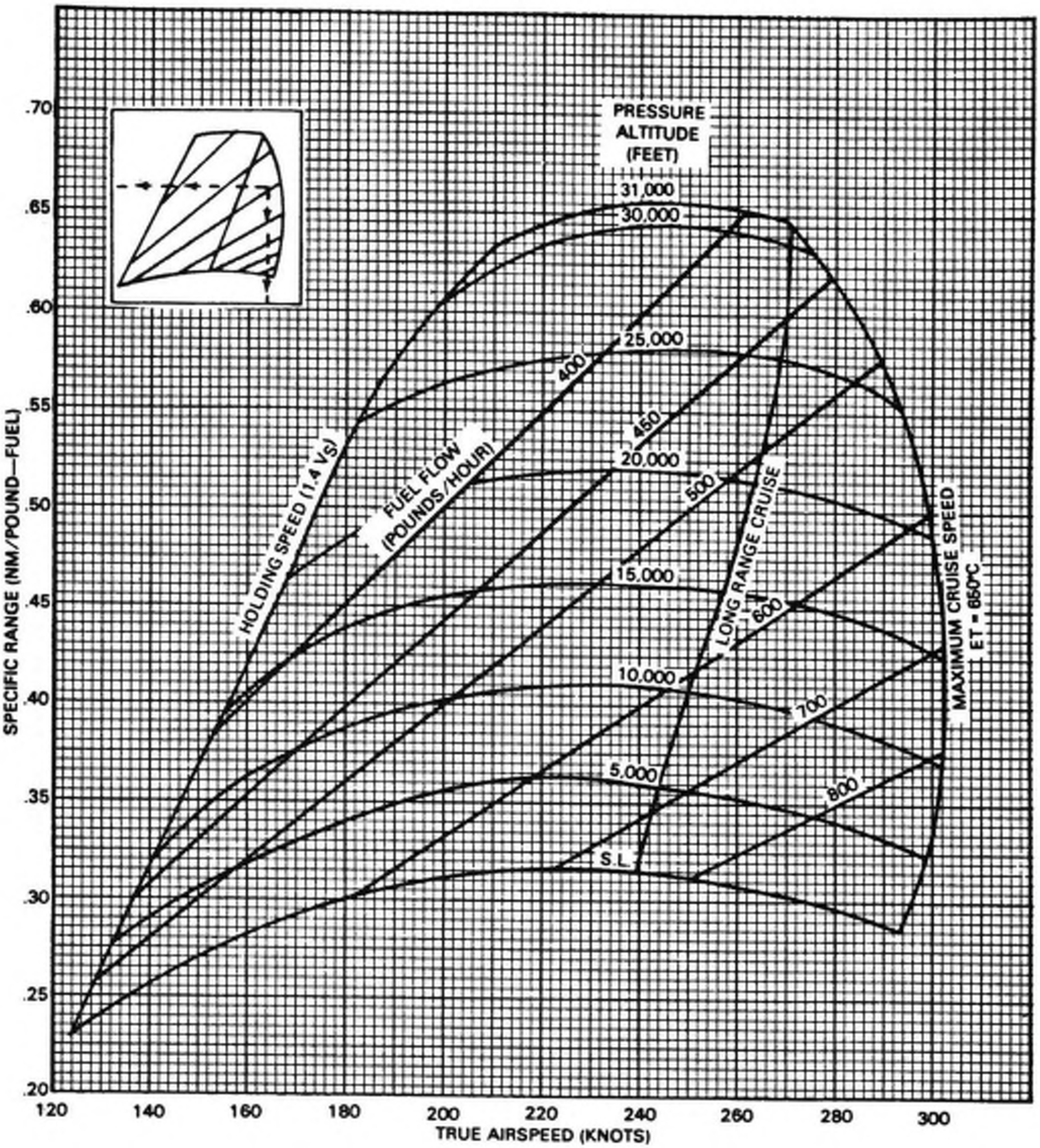


Figure V-37

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS
WEIGHT 8,000 POUNDS, ISA +15°C, 98% RPM

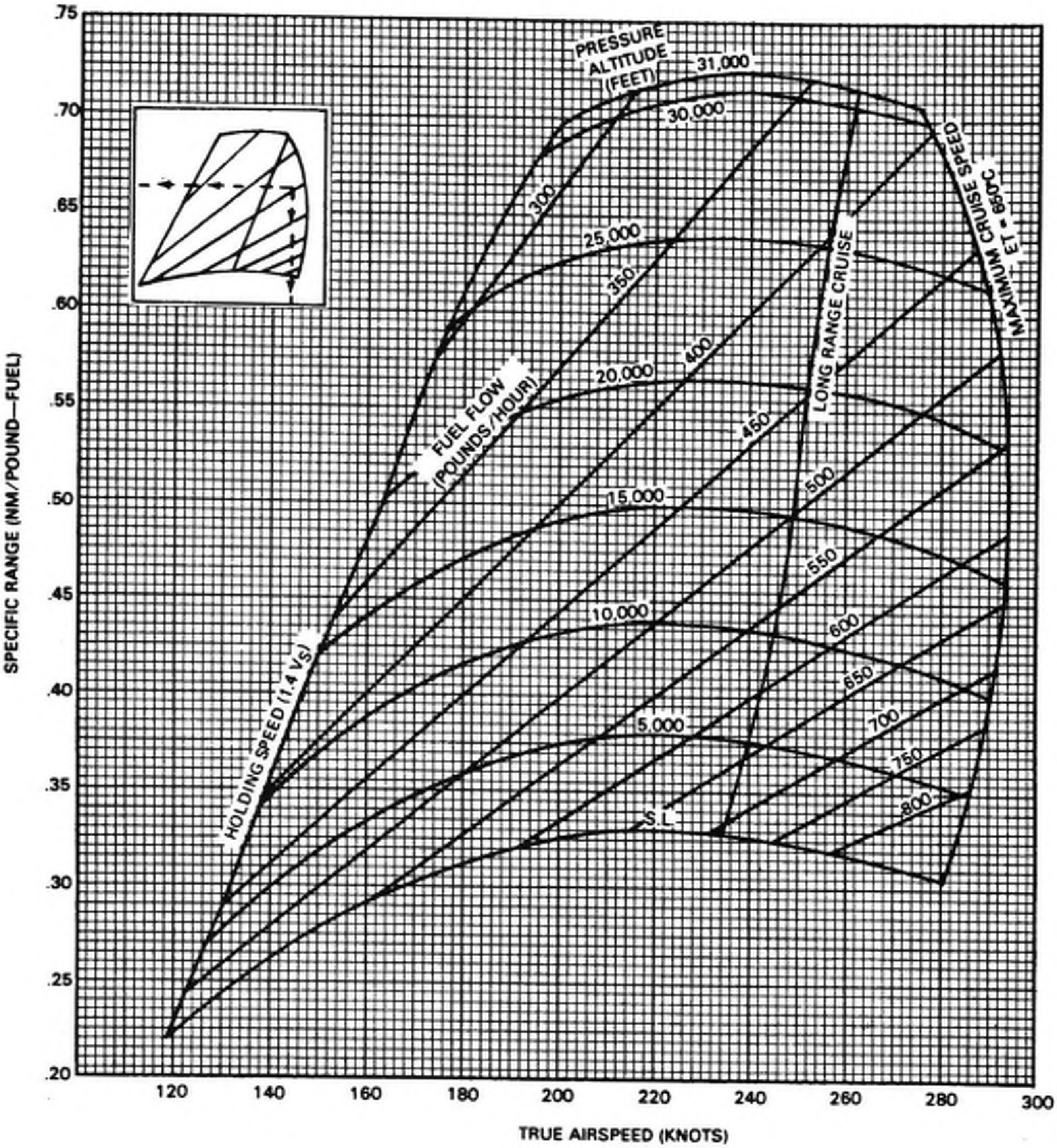


Figure V-39

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS, WEIGHT 12,000 POUNDS, ISA +15°C, 98% RPM

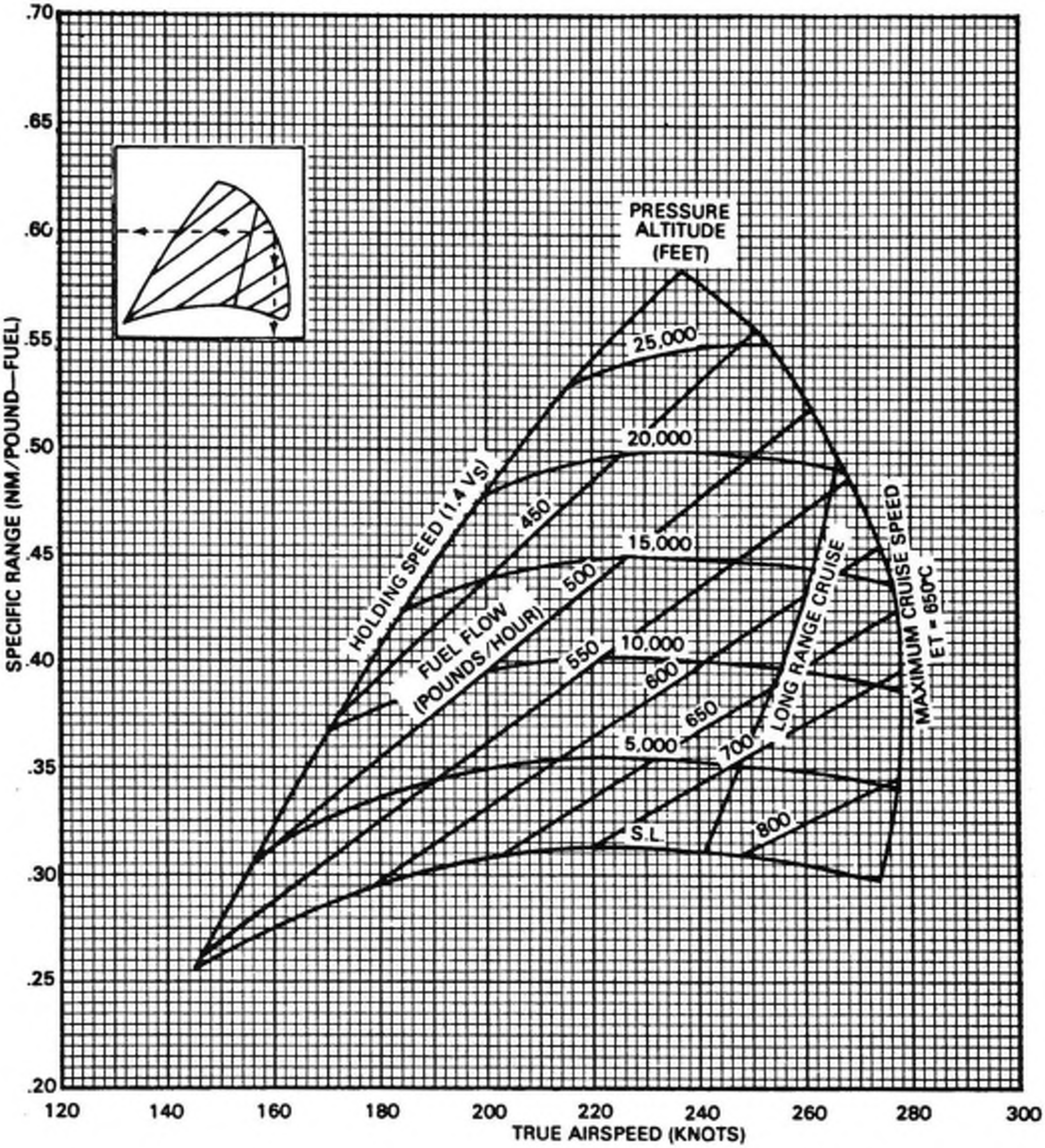


Figure V-41

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS,
WEIGHT 10,000 POUNDS, ISA, 96% RPM

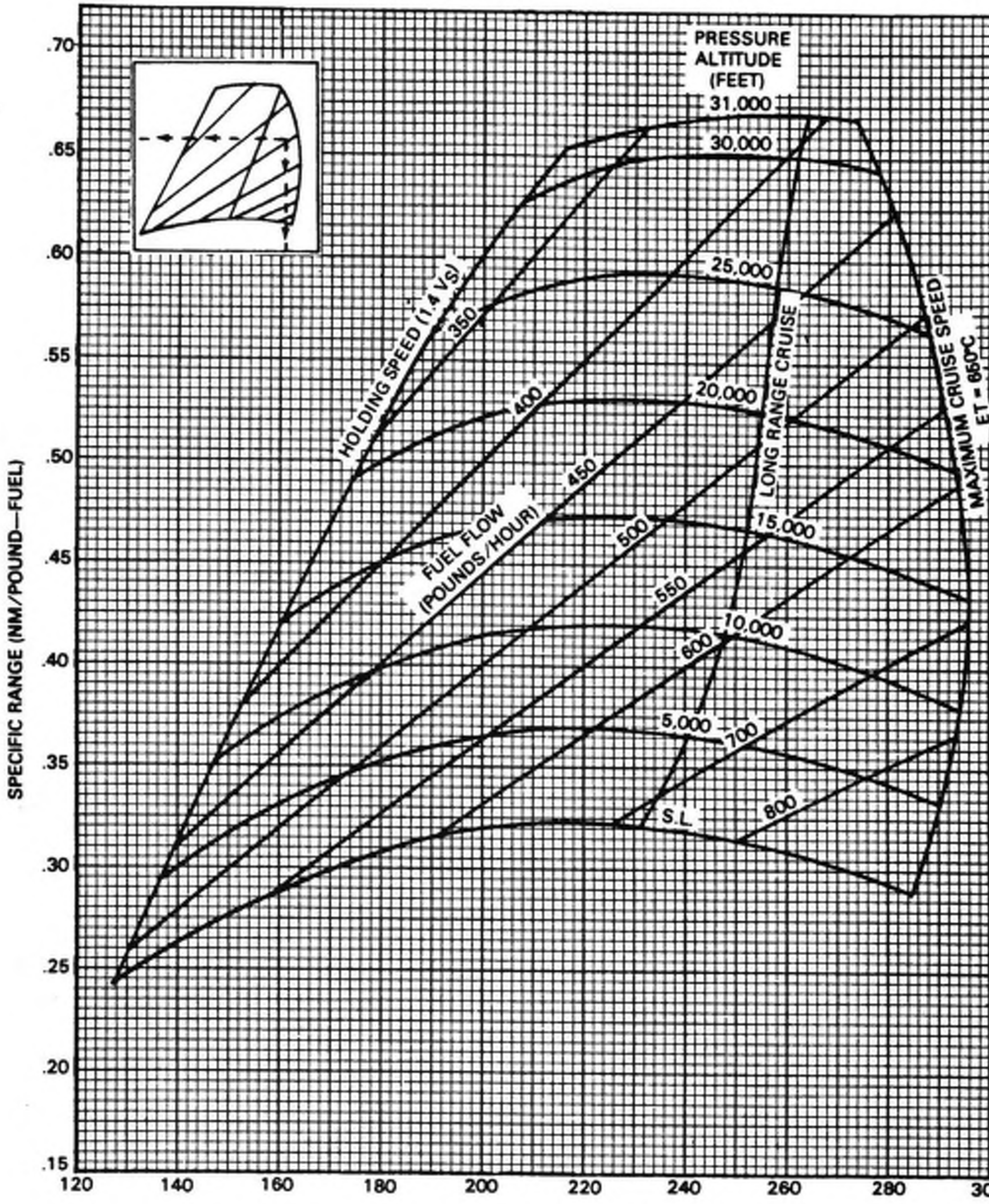


Figure V-43

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS,
WEIGHT 8,000 POUNDS, ISA +15°C, 96% RPM

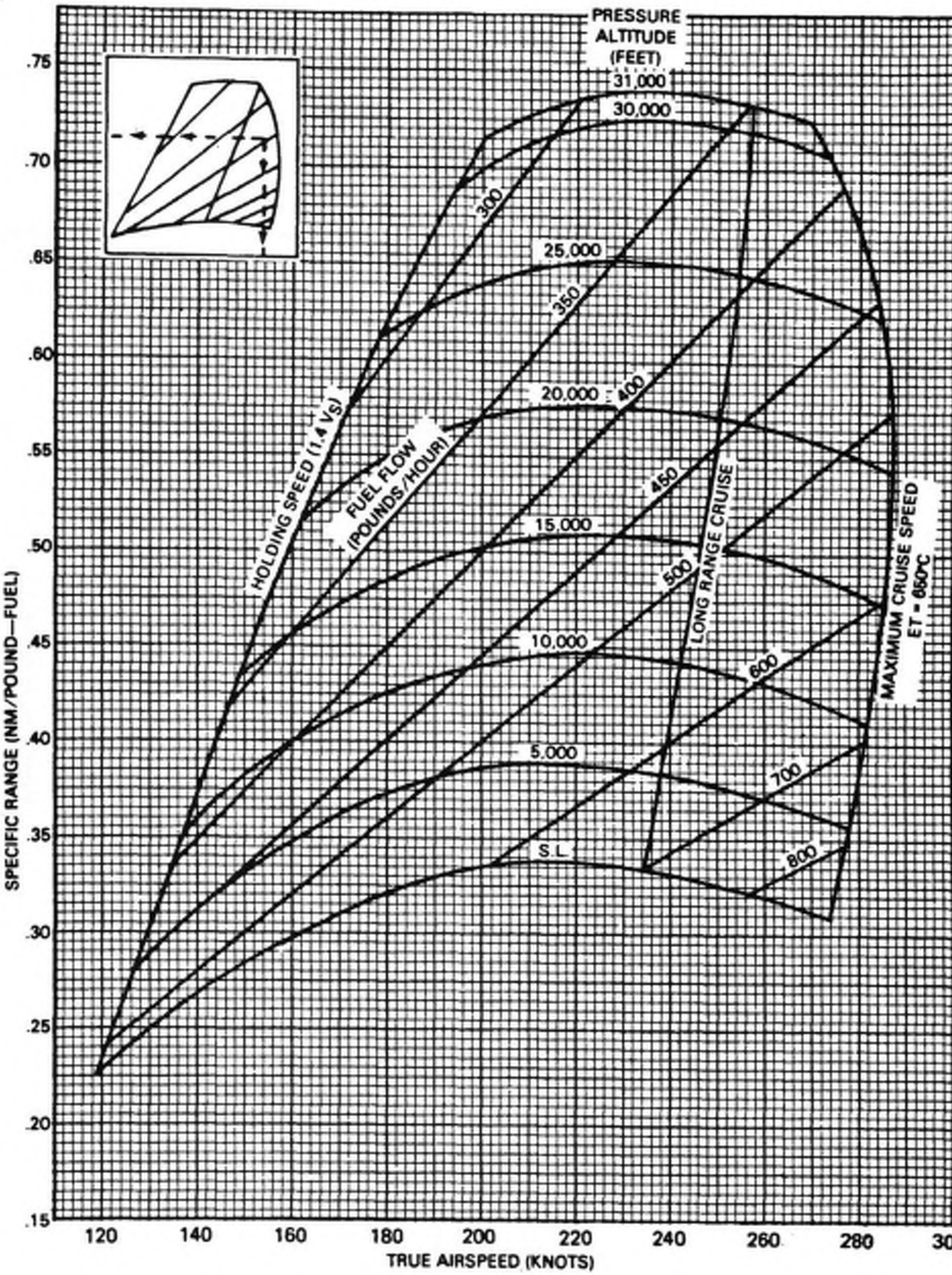


Figure V-45

FUEL FLOW, SPECIFIC RANGE, AND CRUISE SPEEDS,
WEIGHT 12,000 POUNDS, ISA +15°C, 96% RPM

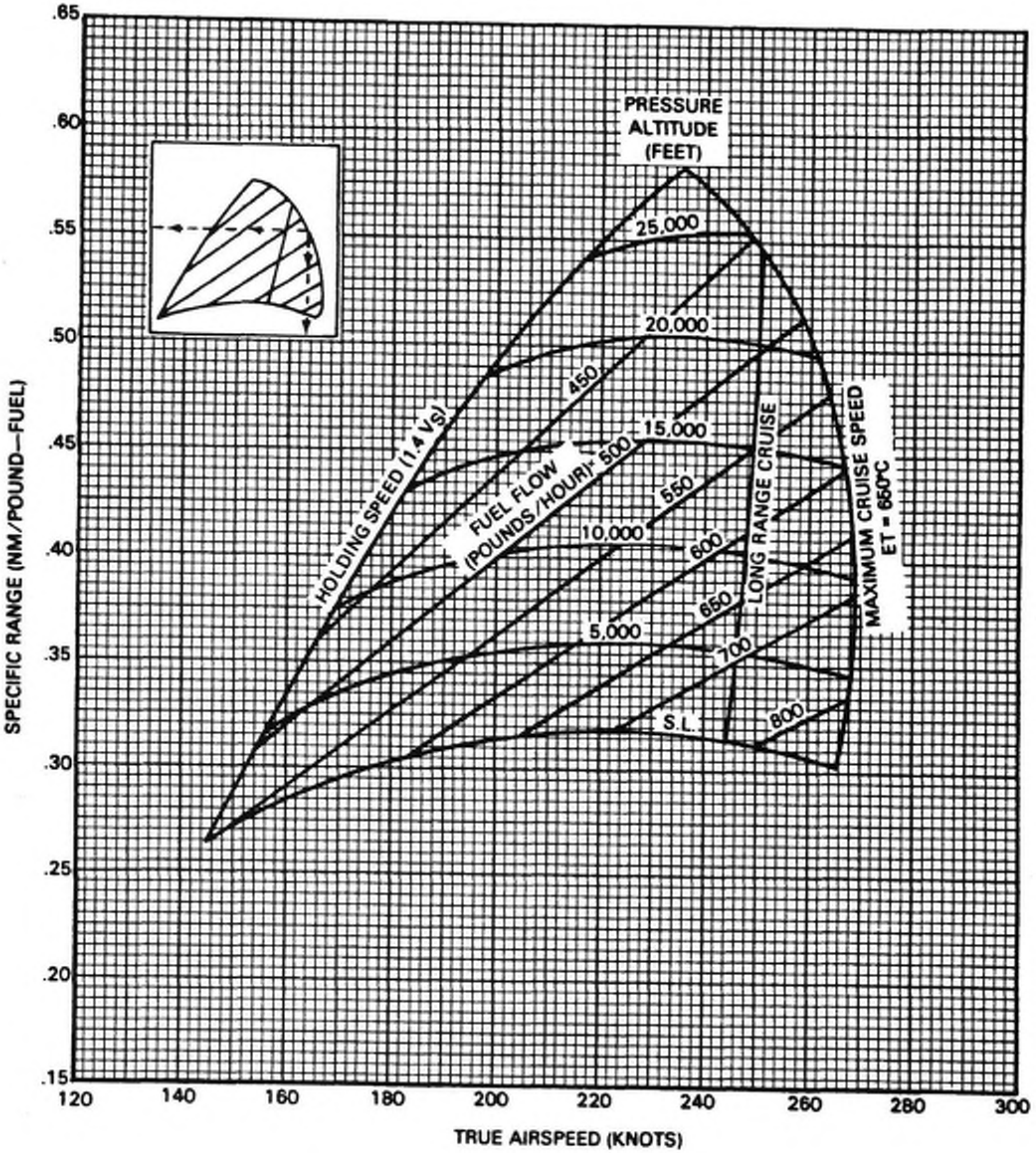


Figure V-47

TIME, FUEL, AND DISTANCE TO DESCEND

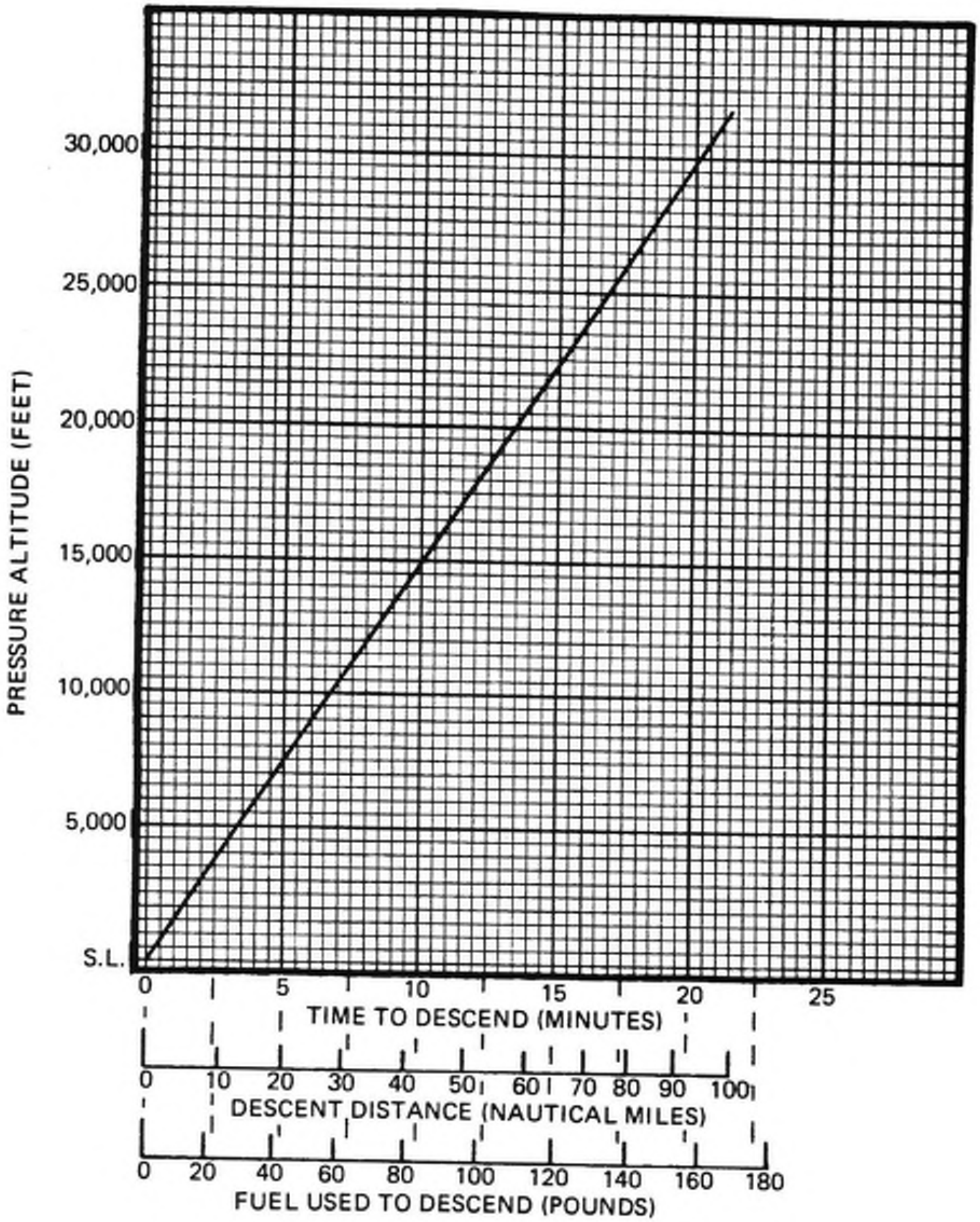


Figure V-48

RATE-OF-CLIMB – BALKED LANDING

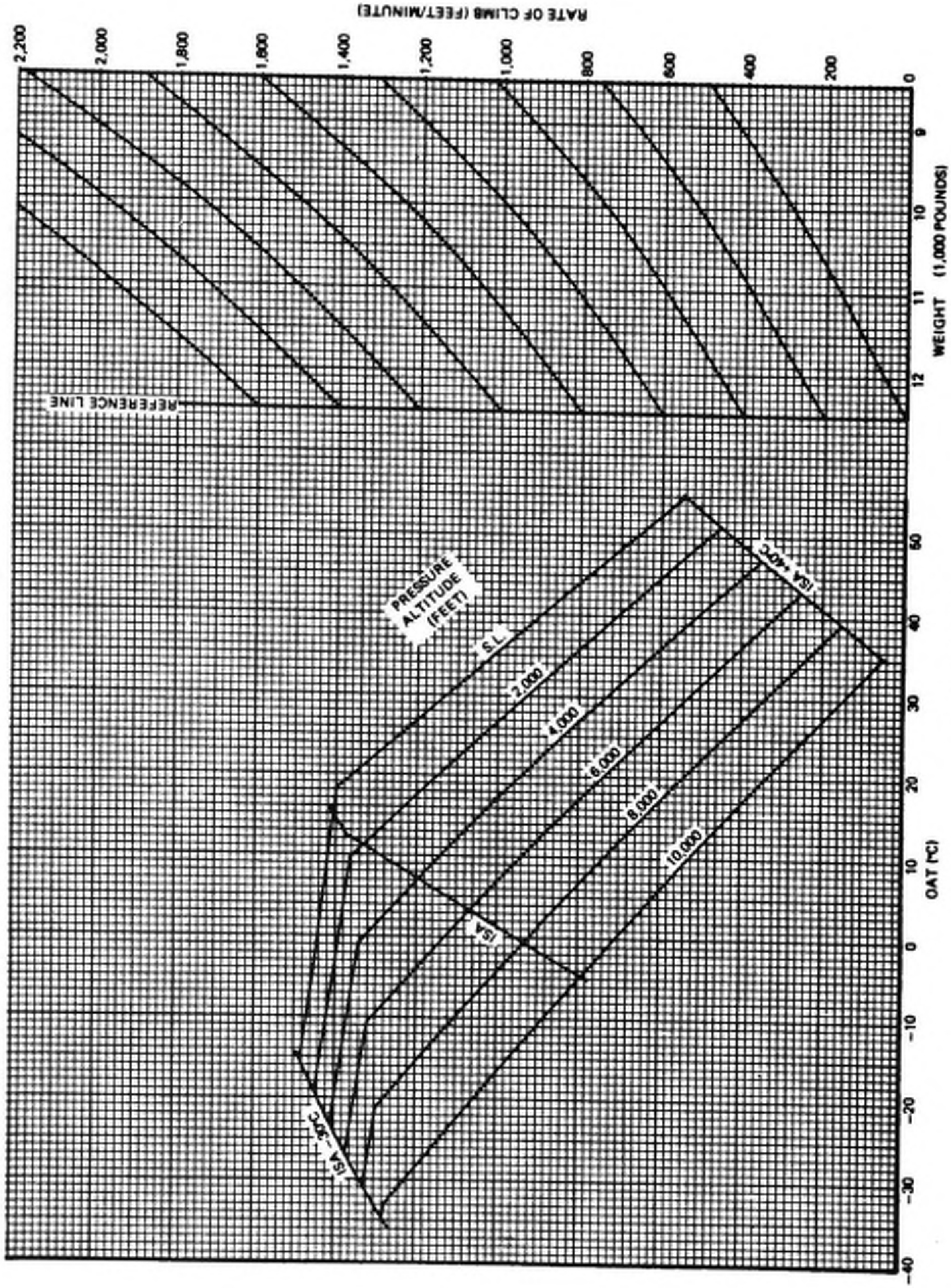


Figure V-49

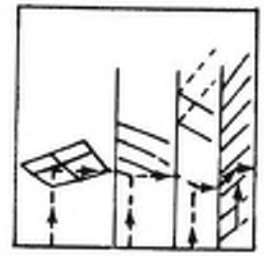
SINGLE ENGINE LANDING DISTANCE WITHOUT REVERSING OR ANTI-SKID BRAKES

ASSOCIATED CONDITIONS:

POWER .... FLIGHT IDLE
FLAPS .... DOWN
RUNWAY .... PAVED, LEVEL, DRY SURFACE
APPROACH SPEED .... 1.3 V_S AS TABULATED
BRAKING .... MAXIMUM
BLEED AIR .... ON/OFF
ANTI-ICE .... ON/OFF

WEIGHT (POUNDS)	SPEED AT 50 FEET* (KNOTS) (KCAS)	(KIAS)
12,500	116	115
11,500	110	109
10,500	105	104
9,500	99	97
8,500	93	91

*APPROACH AIRSPEED SHOULD NOT BE LESS THAN V_{MCA} UNTIL THE LANDING IS ASSURED.



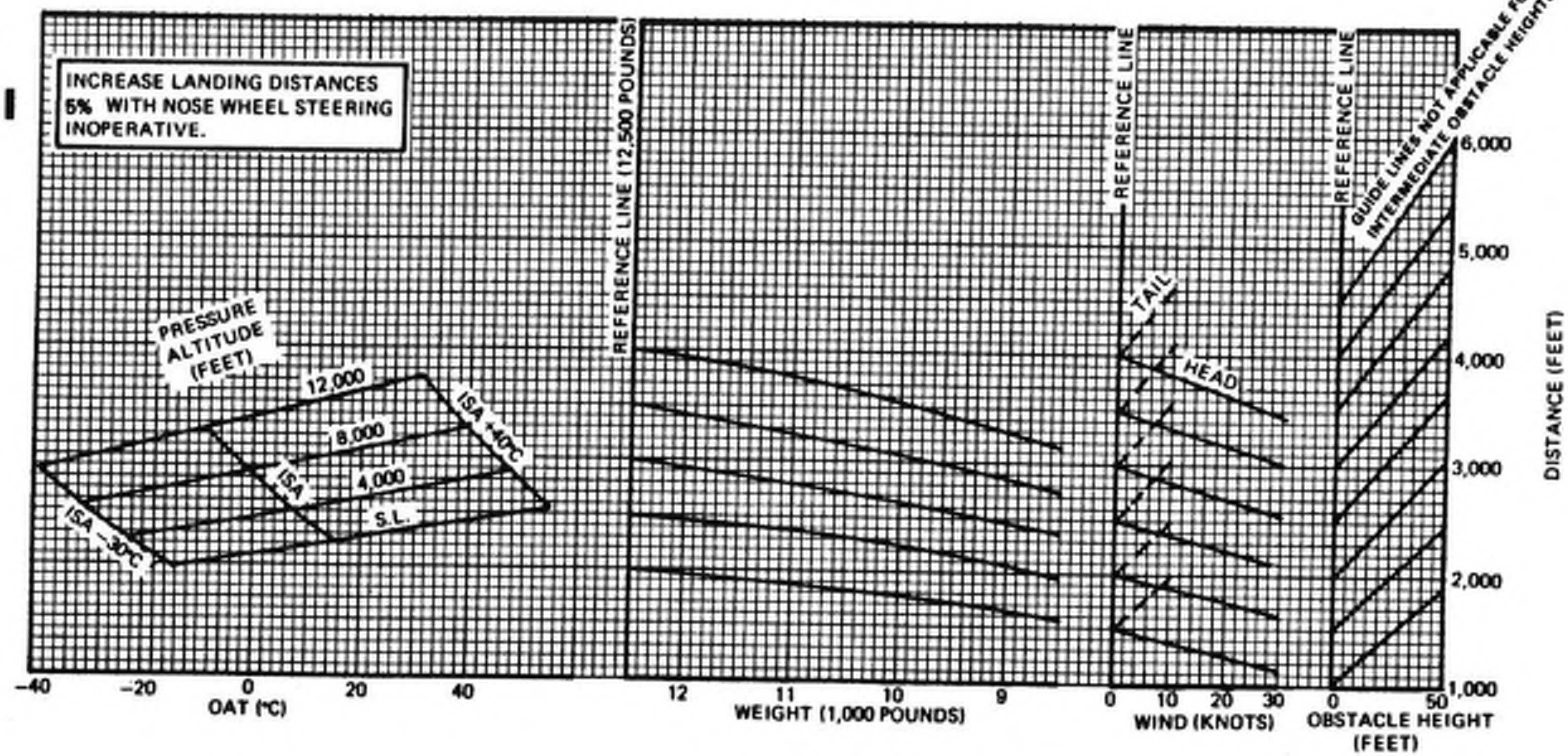


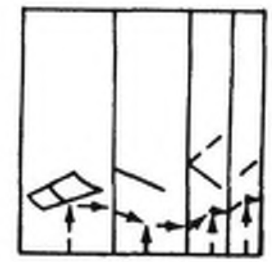
Figure V-50

TWO-ENGINE LANDING DISTANCE WITH FLAPS UP

ASSOCIATED CONDITIONS:

POWER .... FLIGHT IDLE, GROUND IDLE AFTER TOUCHDOWN
FLAPS .... UP
RUNWAY .... PAVED, LEVEL, DRY SURFACE
APPROACH SPEED .... 1.3 V_S, AS TABULATED
BRAKING .... MAXIMUM

WEIGHT (POUNDS)	SPEED AT 50 FEET (KCAS)	(KIAS)
12,500	132	130
11,500	126	123
10,500	121	119
9,500	115	113
8,500	109	107



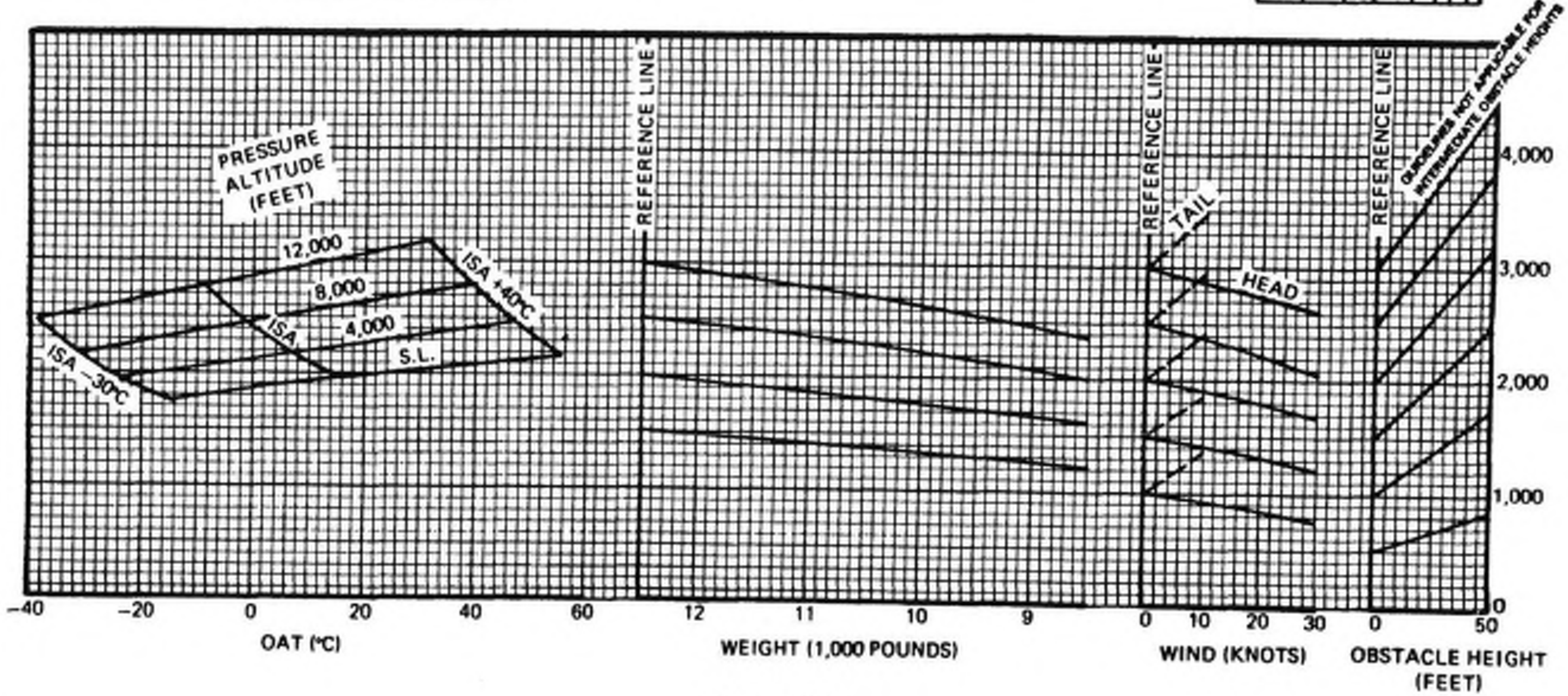


Figure V-52

SAMPLE FLIGHT

The following is an example of a typical flight using performance data in Section 5 and the weight and balance data in Section 6.

AIRPLANE CONFIGURATION C (Figure VI-13):

	Weight	Arm	Moment/1,000
Basic Operating Weight (Includes pilot, copilot & crew supplies)	8,550	157.47	1346.38
Passengers 4 @ 170 Pounds each	680		
Passenger Baggage 6 @ 20 Pounds each	120		
Fuel Load 485.07 Gallons	3,250		
Ramp Weight	12,600		
Takeoff Condition	12,500	164.56	2,056.94

GIVEN:

Departure Airport Data (Assumed):
Runway Length . . . . . . 8,000 Feet (Runway 7)
Temperature . . . . . . 21°C (ISA +10°C)
Pressure Altitude . . . . . . 2,000 Feet
Wind . . . . . . 110° at 25 Knots
Obstacles . . . . . . None

Cruise Conditions (Assumed):
Distance . . . . . . 900 Nautical Miles
Cruise Altitude . . . . . . 25,000 Feet
Temperature . . . . . . –20°C (ISA +15°C)
Wind . . . . . . 40 Knot Tailwind
Power . . . . . . Maximum Cruise Speed

Destination Airport Data (Assumed):
Runway Length . . . . . . 6,000 Feet
Temperature . . . . . . 9°C (ISA)
Pressure Altitude . . . . . . 3,000 Feet
Wind . . . . . . Calm
Landing Weight . . . . . . To Be Calculated
Obstacles . . . . . . None

SAMPLE FLIGHT (continued)

Rate-of-Climb – Single Engine (Figure V-24):

(1) Enter Figure V-24 at 21°C and proceed up to 2,000 feet altitude.

(2) Proceed horizontally right to weight reference line (intersects at 12,500 pounds).

(3) Continue horizontally right to rate-of-climb line and read rate-of-climb of 575 feet per minute.

(4) Note the single engine climb speed: 133 KIAS.

Time, Fuel, and Distance To Climb (Figure V-28):

(1) Enter Figure V-28 at 21°C and proceed up until intersecting the 2,000 foot line (this is Takeoff Temperature and Altitude).

(2) Proceed horizontally right until intersecting 12,500 pound weight line.

(3) Proceed down until intersecting distance line.

(4) Read all values: Time = .5 minutes; Fuel = 10 pounds; Distance = 2 nautical miles.

(5) Re-enter Figure V-28 at –20°C and proceed up until intersecting 25,000 foot line (this is Cruise Temperature and Altitude).

(6) Proceed horizontally right until intersecting 12,500 pound weight line.

(7) Proceed down until intersecting distance line.

(8) Read all values: Time = 20.5 minutes; Fuel = 230 pounds; Distance = 58 nautical miles.

(9) Now proceed as follows:

Subtract item number 4 values from item number 8 values:
EXAMPLE:

Time/Minutes	Fuel/Pounds	Distance/Nautical Miles
20.5	230	58
– .5	–10	–2
20.0	220	56

Time to climb to 25,000 feet is 20 minutes.
Fuel to climb to 25,000 feet is 220 pounds.
Distance traveled during climb is 56 nautical miles.

SAMPLE FLIGHT (continued)

Time to descend to 3,000 feet is 14.7 minutes.
Fuel to descend to 3,000 feet is 114 pounds.
Distance traveled during descent is 66 nautical miles.

Using data obtained from the charts and graphs for trip time and fuel consumption, incorporate the data given pertaining to cruise conditions and destination airport and that obtained from the weight and balance computations to determine the landing weight, landing distance, balked landing rate of climb, and holding time.

GIVEN:

Trip Distance (Assumed)	900 Nautical Miles
Wind	40 Knot Tailwind
Takeoff Fuel Load	3,150 Pounds
Takeoff Weight	12,500 Pounds

OBTAINED FROM CHARTS AND GRAPHS:

Two Engine Takeoff Ground Distance (Figure V-16)	2,400 Feet
Climb Fuel (Figure V-28)	220 Pounds
Time To Climb (Figure V-28)	20 Minutes
Distance Traveled During Climb (Figure V-28)	56 Nautical Miles
True Airspeed In Cruise (Figure V-41, see below)	254 Knots
Cruise Fuel Flow (Figure V-41, see below)	460 Pounds/Hour
Descent Fuel (Figure V-48)	114 Pounds
Time To Descend (Figure V-48)	14.7 Minutes
Distance Traveled During Descent (Figure V-48)	66 Nautical Miles

First, determine cruise distance as follows:

Trip Distance	900 nautical miles
Climb Distance	–56
	844
Descent Distance	–66
Cruise Distance	778 nautical miles

Second, determine cruise ground speed as follows:

25,000 Foot TAS	254 knots
Tail Wind	+40
Ground speed	294 knots

SAMPLE FLIGHT (continued)

(5) Continue horizontally right until intersecting the distance line (it is not necessary to follow the head wind or tail wind slope as the wind is calm).

(6) Read the landing ground distance of 1,550 feet.

(7) Return to the obstacle height reference line.

(8) Follow the sloping lines up the right to the 50 foot height scale, and read the total landing distance, 2,600 feet.

(9) Using the Figure V-51 schedule, note the correct landing approach speed: 107 KIAS.

Balked Landing – Rate of Climb (Figure V-49):

(1) Enter Figure V-49 at 9°C and proceed up to 3,000 feet altitude. (In this case, intersecting with the ISA line.)

(2) Proceed horizontally right until intersecting limit landing weight line.

(3) Follow the up sloping line until intersecting 10,950 pounds.

(4) Proceed horizontally right until intersecting rate of climb line and read the value of 1,580 feet per minute.

Holding Time (Figure V-35):

GIVEN:

Fuel Remaining at Destination	1,592 pounds
Holding Altitude	10,000 feet

FIND:

Holding time leaving 500 pounds of fuel for maneuvering and landing.

(1) Subtract 500 pounds from fuel remaining at destination:

1,592 pounds
–500
1,092 pounds

(2) Enter Figure V-35 at 1,000 pounds and proceed horizontally right until reaching the 10,000 foot pressure altitude column.

TABLE OF CONTENTS
WEIGHT AND BALANCE

FAA APPROVED FLIGHT MANUAL
REISSUE B
S/N T(B)–276 AND T(B)–292 AND SUBSEQUENT

LIST OF EFFECTIVE PAGES

SECTION 6

LOG OF REVISIONS

Revisions to the Pilot's Operating Handbook and Airplane Flight Manual provide current information applicable to operation of the SA226–T(B) airplane. Revised pages should be inserted in the flight manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when all current revisions are incorporated. The revised material on each page is identified by a vertical line in the margin.

NOTE

This is a non–FAA Approved section. This list of revisions is to insure that all revisions are incorporated in this section

Revision Number	Revised Pages	Description of Revision	Date of Revision
1	6-iii and 6-28	Added -502G Engine.	March 13, 1980
2	6-iii and 6-27	Change to Weight * Moment Envelope.	April 9, 1980
3	6-iii, 6-30 6-32, 6-33, and 6-35	Changes to Equipment List	October 27, 1980
4	6-iii and 6-6	Max. Capacity of Nose Baggage Compartment.	February 3, 1983
5	6-iii, 6-v, and 6-vi	Addition of Log of Revision pages.	November 15, 1983
6	6-iii, 6-v, 6-2 6-3 and 6-4	Corrected Nose and Wing Jack Pads Inches/Arm.	November 29, 2005

INTRODUCTION

Section 6 of this manual provides procedures for establishing the airplane's basic empty weight and moment; and procedures for determining the weight and balance for flight. For definitions of weight and balance terms, refer to Section 1. An equipment list of required and optional items is provided at the end of this section.

WEIGHING INSTRUCTIONS

Two methods are available for determining the weight and balance of the Merlin IIIB. The airplane may be weighed either on jackstands or on platform scales.

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 to calculate the aircraft weight and balance.

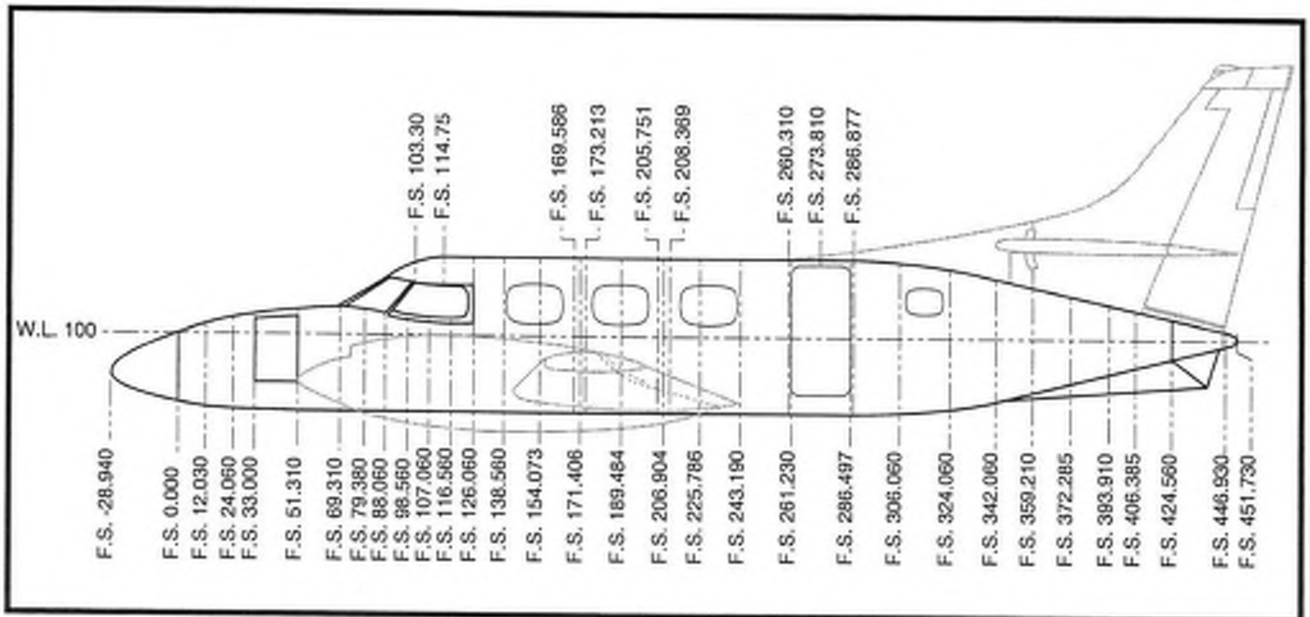
PLATFORM METHOD

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 and calculate the airplane weight and balance.

AIRPLANE WEIGHING FORM

SERIAL NUMBER________________ REGISTRATION NUMBER________________ Date________________



PLATFORM METHOD

Jack	Scale Reading (pounds)	–	Tare (pounds)	=	Net Weight (pounds)	x	Arm (inches)	=	Moment (in.-pounds)
Nose	______		______		______		64.10		______
Left	______		______		______		191.02		______
Right	______		______		______		191.02		______
TOTALS					______				______

$$\text{CENTER OF GRAVITY ARM} = \frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}}$$

$$\text{C.G. IN \% MAC} = \frac{\text{C.G. ARM} - 146.98}{76.45} \times 100$$

Figure VI–2

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.		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE						RUNNING BASIC EMPTY WEIGHT	
				ADDED (+)			REMOVED (-)				
	In	Out		Wt. (lb.)	Arm (In.)	Moment /1000	Wt. (lb.)	Arm (In.)	Moment /1000	Wt. (lb.)	Moment /1000
			AS DELIVERED								

Figure Vi–3

WEIGHT AND BALANCE CALCULATION (continued)

> NOTE
>
> Ensure that the appropriate payload moment table and weight and balance calculation form are selected for the existing cabin configuration.

2. Add empty weight and moment to the total payload weight and moment to obtain zero fuel weight and moment. The results must fall within the weight and moment envelope.

3. Compute the maximum allowable takeoff fuel load by subtracting the zero fuel weight from 12,500 pounds.

4. Determine moment of actual fuel load from the fuel moment chart or moment table.

5. Compute the takeoff weight and moment by adding the takeoff fuel weight and moment to the zero fuel weight and moment. The results must not exceed 12,500 pounds and must fall within the weight and moment envelope.

> NOTE
>
> - Up to 100 pounds additional fuel may be added, as appropriate, for fuel consumption prior to takeoff.
> - Landing gear retraction will not shift the center of gravity beyond limits.

WEIGHT COMPUTATION FORMS

ITEM	WEIGHT		ARM		MOMENT
	(pounds)	X	(inches aft of datum)	=	(inch pounds)
Airplane (Standard Empty Weight)					
Optional Equipment*					
Basic Empty Weight					

*Includes Avionics, etc.

ITEM	WEIGHT		ARM		MOMENT
	(pounds)	X	(inches aft of datum)	=	(inch pounds)
Airplane (Basic Empty Weight)					
Pilot					
Co-Pilot (If Applicable)					
Crew Supplies (Flight Case, etc.)					
Passenger Supplies (Books, Snacks, etc.)					
Basic Operating Weight					

Figure VI–5

WEIGHT AND BALANCE LOADING FORM
(FOR STANDARD CONFIGURATION OR CONFIGURATION A OR B)

ITEM	WEIGHT	ARM	MOMENT
(a) Basic Empty Weight	8,050	160.39	1,291.14
Pilot and Copilot (If Applicable)	340	111	37.74
Crew Supplies (Flight Case, etc.)	20	125	2.50
Forward Passenger Seats	340	151	51.34
Center Passenger Seats	340	201	68.34
Aft Passenger Seats	170	243	41.31
Toilet Bench Seat			
Coat Stowage Compartment			
Nose Baggage Compartment	150	42	6.30
Aft Baggage Compartment	25	324	8.10
AWI Fluid (gals.)			
Other Payload			
(b) ZERO FUEL WEIGHT AND MOMENT	9,453	159.66	1,509.31
(c) MAXIMUM ALLOWABLE FUEL [1] (469.7 gals.)	3,147	180.51	568.05
(d) RAMP WEIGHT AND MOMENT [2]	12,600	164.87	2,077.36
(e) START, TAXI, AND RUNUP FUEL(14.9 gals.)	100		19.10
(f) TAKEOFF WEIGHT AND MOMENT	12,500	164.66	2,058.26
(g) FUEL BURN TO DESTINATION (gals.)			
(h) ESTIMATED LANDING WEIGHT AND MOMENT			

Add all items in (a) to find ZERO FUEL WEIGHT AND MOMENT (b).
Add (b) to MAXIMUM ALLOWABLE FUEL (c), to find RAMP WEIGHT AND MOMENT (d).
Subtract START, TAXI, AND RUNUP FUEL (e) from (d) to find TAKEOFF WEIGHT AND MOMENT (f). Subtract FUEL BURN TO DESTINATION (d) from (f) to find ESTIMATED LANDING WEIGHT AND MOMENT (h).

[1] Less than maximum fuel can be entered here as desired to satisfy trip requirements.

[2] This is operating weight.

Figure VI–7

EXAMPLE OF WEIGHT AND BALANCE CALCULATION

GIVEN: (CONFIGURATION A – Figure VI–19)

ITEM		WEIGHT	ARM	MOMENT/1000	REF FIG/PAGE
Basic Operating Weight		8428	158.52	1336.01	SEE ITEM (1) BELOW
Passenger (7 @ 170 lbs.)		1190	-----	SEE BELOW	---------
Baggage		165	-----	SEE BELOW	---------
ASSUMED PAYLOAD DISTRUBUTION					
Passengers:					
Forward Seats	2	340	167	56.78	VI–19
Center Seats	2	340	202	68.68	VI–19
Aft Seats	2	340	237	80.58	VI–19
Toilet Bench Seat	1	170	274	46.58	VI–19
Baggage:					
Nose Compartment		150	42	6.30	VI–19
Aft Compartment		15	324	4.86	VI–19

FIND:

Zero Fuel Weight/Arm/Moment
Maximum Allowable Fuel
Ramp Weight/Arm/Moment
Takeoff Weight/Arm/Moment

SOLUTION:

Refer to page 6–14.

(1) Refer to page 6–9 for basic empty weight and add weight of crew and crew supplies (chart case, etc.) to obtain basic operating weight.

Figure VI–9

WEIGHT AND BALANCE LOADING FORM
(FOR STANDARD CONFIGURATION OR CONFIGURATION A OR B)

ITEM	WEIGHT	ARM	MOMENT
(a) Basic Operating Weight			
Forward Passenger Seats			
Center Passenger Seats			
Aft Passenger Seats			
Toilet Bench Seat			
Coat Stowage Compartment			
Nose Baggage Compartment			
Aft Baggage Compartment			
AWI Fluid (gals.)			
Other Payload			
(b) ZERO FUEL WEIGHT AND MOMENT			
(c) MAXIMUM ALLOWABLE FUEL (gals.)[1]			
(d) RAMP WEIGHT AND MOMENT[2]			
(e) START, TAXI, AND RUNUP FUEL (gals.)			
(f) TAKEOFF WEIGHT AND MOMENT			
(g) FUEL BURN TO DESTINATION (gals.)			
(h) ESTIMATED LANDING WEIGHT AND MOMENT			

Add all items in (a) to find ZERO FUEL WEIGHT AND MOMENT (b).
Add (b) to MAXIMUM ALLOWABLE FUEL (c), to find RAMP WEIGHT AND MOMENT (d).
Subtract START, TAXI, AND RUNUP FUEL (e) from (d) to find TAKEOFF WEIGHT AND MOMENT (f). Subtract FUEL BURN TO DESTINATION (d) from (f) to find ESTIMATED LANDING WEIGHT AND MOMENT (h).

[1] Less than maximum fuel can be entered here as desired to satisfy trip requirements.

[2] This is operating weight.

Figure VI–11

CONFIGURATION C OR D

ITEM	WEIGHT	ARM	MOMENT
(a) Basic Operating Weight	8550	157.47	1346.38
Forward Passenger Seats (Configuration C)	170	151.0	25.67
Center Passenger Seats (Configuration C)	170	201.0	34.17
Aft Passenger Seats (Configuration C)			
Toilet Bench Seat (Configuration C)			
Forward Couch Seat (Configuration C)	170	163.0	27.71
Center Couch Seat (Configuration C)	——		
Aft Couch Seat (Configuration C)	170	201.0	34.17
Coat Stowage Compartment			
Nose Baggage Compartment	60	42.0	2.52
Aft Baggage Compartment	60	324.0	19.44
AWI Fluid (gals.)			
Other Payload			
(b) ZERO FUEL WEIGHT AND MOMENT	9350	159.36	1490.06
(c) MAXIMUM ALLOWABLE FUEL (485.07 gals.) [1]	3250	180.30	585.98
(d) RAMP WEIGHT AND MOMENT [2]	12600	164.76	2076.04
(e) START, TAXI, AND RUNUP FUEL (gals.)	100		19.10
(f) TAKEOFF WEIGHT AND MOMENT	12500	164.56	2056.94
(g) FUEL BURN TO DESTINATION (gals.)			
(h) ESTIMATED LANDING WEIGHT AND MOMENT			

Add all items in (a) to find ZERO FUEL WEIGHT AND MOMENT (b).
Add (b) to MAXIMUM ALLOWABLE FUEL (c), to find RAMP WEIGHT AND MOMENT (d).
Subtract START, TAXI, AND RUNUP FUEL (e) from (d) to find TAKEOFF WEIGHT AND MOMENT (f). Subtract FUEL BURN TO DESTINATION (d) from (f) to find ESTIMATED LANDING WEIGHT AND MOMENT (h).

[1] Less than maximum fuel can be entered here as desired to satisfy trip requirements.

[2] This is operating weight.

Figure VI–13

OCCUPANT/GALLEY MOMENT TABLE

	CREW	PASSENGERS													BAR/GALLEY	
ARM	FLIGHT DECK 111	COUCH SEAT 148	FWD REAR-FACING 151	COUCH SEAT 163	COUCH SEAT 166	FWD FWD-FACING 167	COUCH SEAT 182	COUCH SEAT 184	CTR REAR-FACING 190	CTR FWD-FACING COUCH 201	CTR FWD-FACING 202	AFT FWD-FACING 237	AFT FWD-FACING 243	TOILET BENCH 274	FWD BAR/GALLEY 141	AFT BAR/GALLEY 257
WEIGHT POUNDS		MOMENT/1,000														
5															.71	1.29
10															1.41	2.57
20															2.82	5.14
30															4.23	7.71
40															5.64	10.28
100	11.10	14.80	15.00	16.30	16.60	16.70	18.20	18.40	19.00	20.10	20.20	23.70	24.30	27.40	14.10	25.70
110	12.21	16.28	16.50	17.93	18.26	18.37	20.02	20.24	20.90	22.11	22.22	26.07	26.73	30.14		
120	13.32	17.76	18.00	19.56	19.92	20.04	21.84	22.08	22.80	24.12	24.24	28.44	29.16	32.88		
130	14.43	19.24	19.50	21.19	21.58	21.71	23.66	23.92	24.70	26.13	26.26	30.81	31.59	35.62		
140	15.54	20.72	21.00	22.82	23.24	23.38	25.48	25.76	26.50	28.14	28.28	33.18	34.02	38.36		
150	16.65	22.20	22.50	24.45	24.90	25.05	27.30	27.60	28.50	30.15	30.30	35.55	36.45	41.10		
160	17.76	23.68	24.00	26.08	26.56	26.72	29.12	29.44	30.40	32.16	32.32	37.92	38.88	43.84		
170	18.87	25.16	25.50	27.71	28.22	28.39	30.94	31.28	32.30	34.17	34.34	40.29	41.31	46.58		
180	19.98	26.64	27.00	29.34	29.88	30.06	32.76	33.12	34.20	36.18	36.36	42.66	43.74	49.32		
190	21.09	28.12	28.50	30.97	31.54	31.73	34.58	34.96	36.10	38.19	38.38	45.03	46.17	52.06		
200	22.20	29.60	30.00	32.60	33.20	33.40	36.40	36.80	38.00	40.20	40.40	47.40	48.60	54.80		
210	23.31	31.08	31.50	34.23	34.86	35.07	38.22	38.64	39.90	42.21	42.42	49.77	51.03	57.54		
220	24.42	32.56	33.00	35.86	36.52	36.74	40.04	40.48	41.80	44.22	44.44	52.14	53.46	60.28		
230	25.53	34.04	34.50	37.49	38.18	38.41	41.86	42.32	43.70	46.23	46.46	54.51	55.89	63.02		
240	26.64	35.52	36.00	39.12	39.84	40.08	43.68	44.16	45.60	48.24	48.48	56.88	58.32	65.76		
250	27.75	37.00	37.50	40.75	41.50	41.75	45.50	46.00	47.50	50.25	50.50	59.25	60.75	68.50		
260	28.85	38.48	39.00	42.38	43.16	43.42	47.32	47.84	49.40	52.26	52.52	61.62	63.18	71.24		

Figure VI—15

FUSELAGE STATION DIAGRAM
(INCHES FROM DATUM)

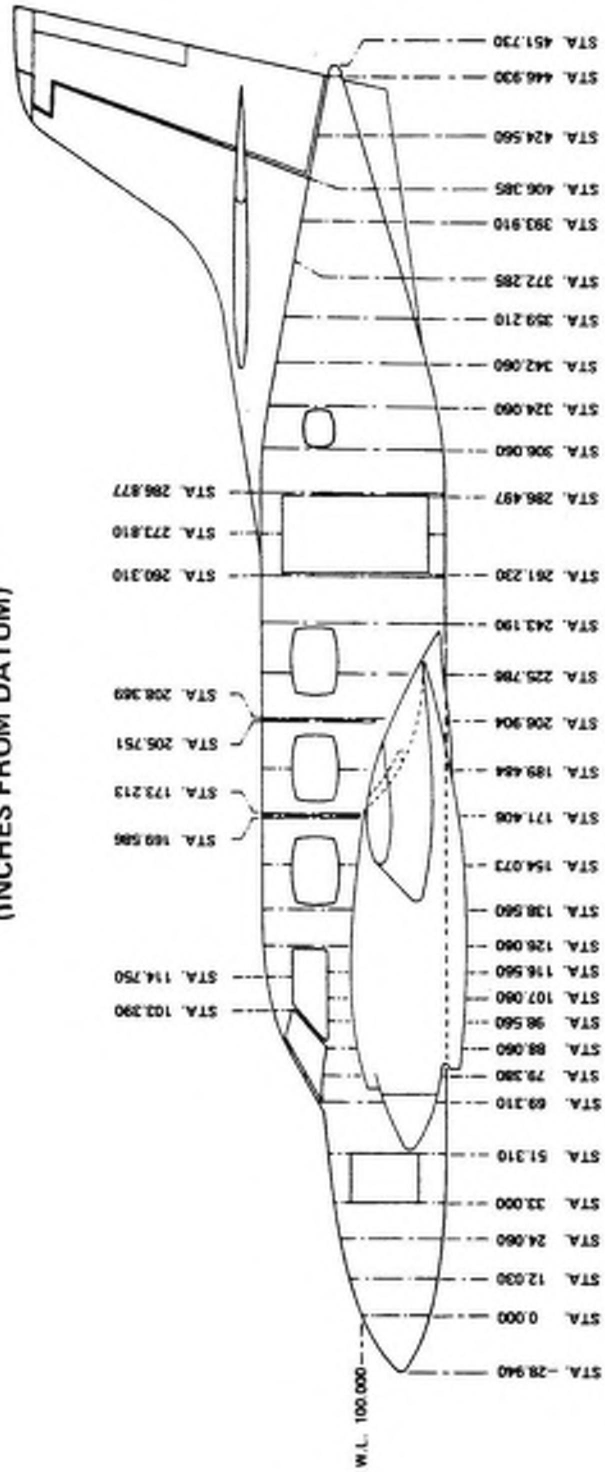


Figure VI–17

CONFIGURATION "A"
SIX FORWARD FACING PASSENGER SEATS

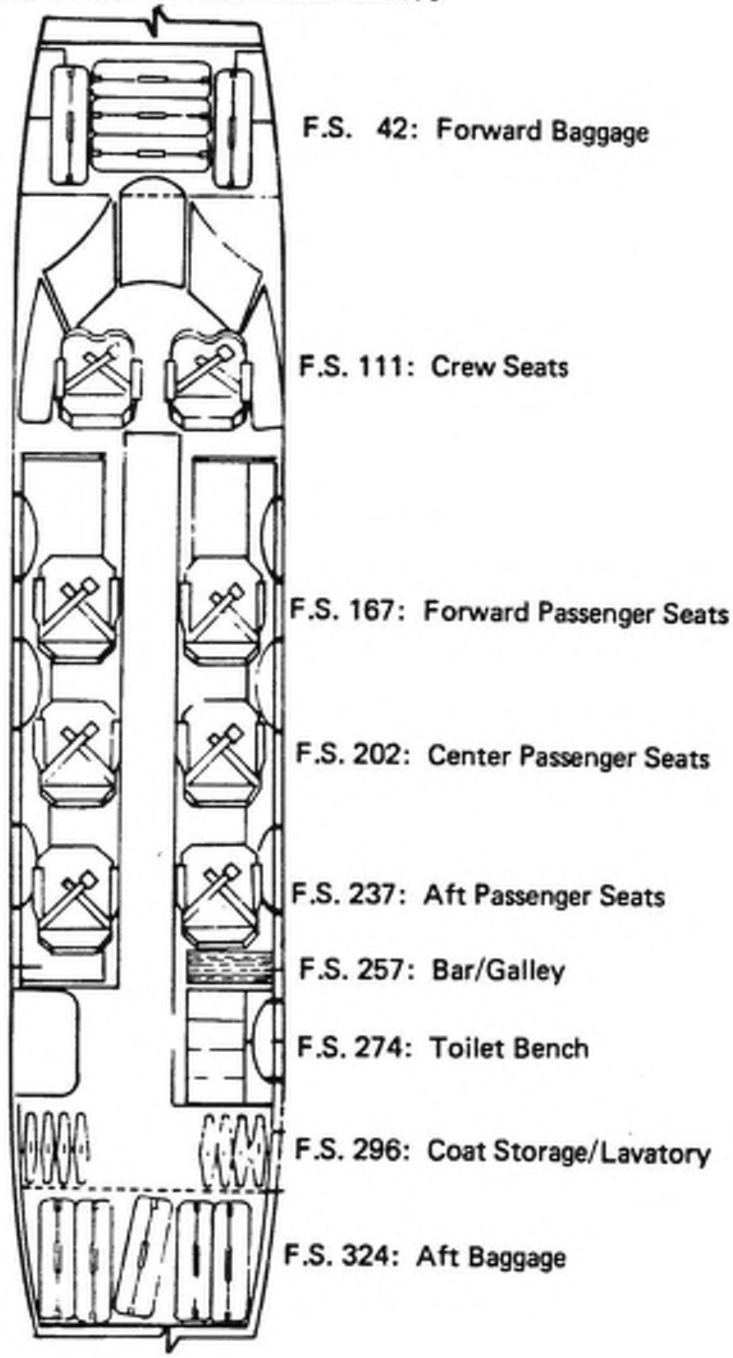


Figure VI—19

CONFIGURATION "C"
FOUR PASSENGER CHAIRS PLUS THREE-PLACE COUCH

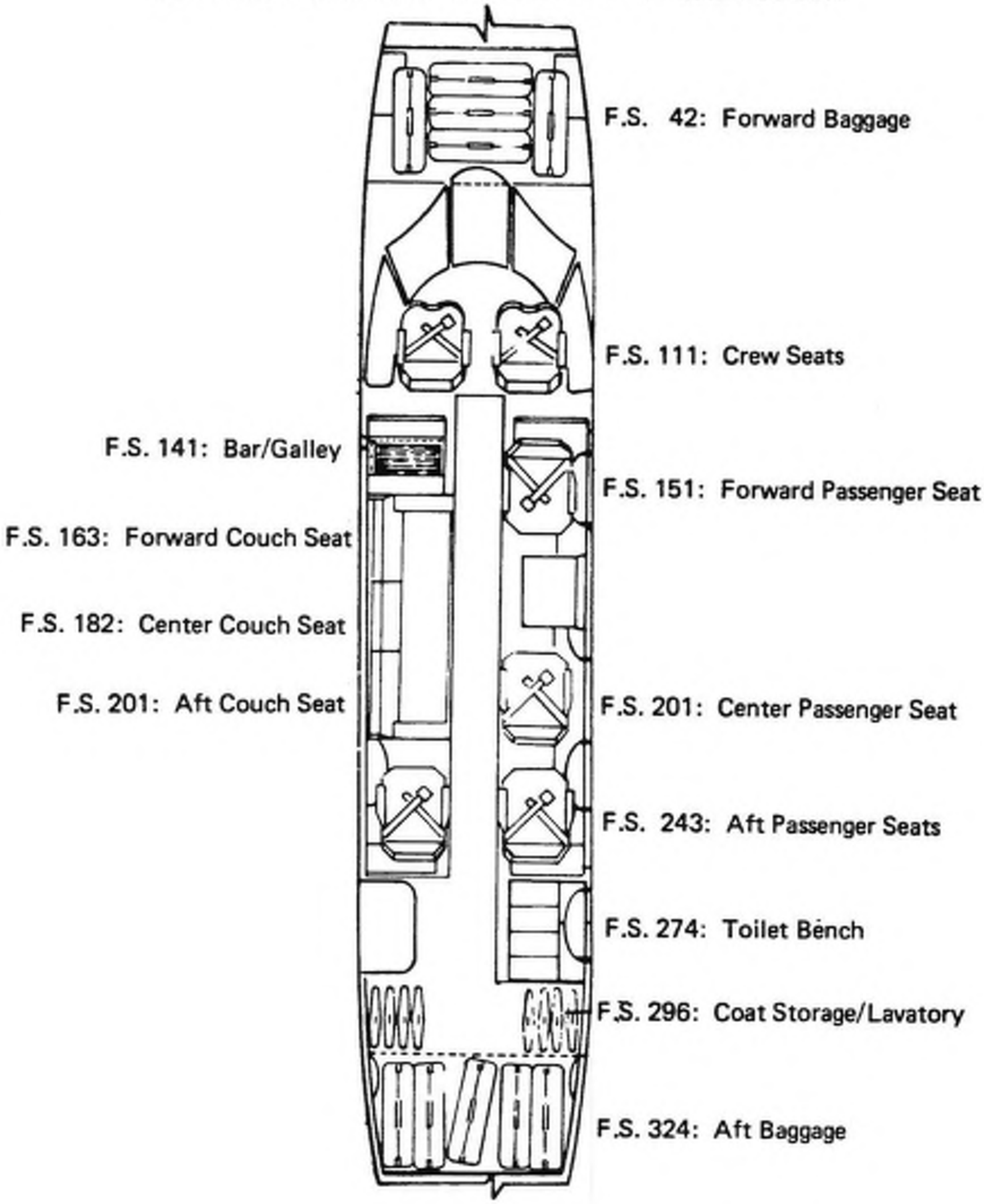
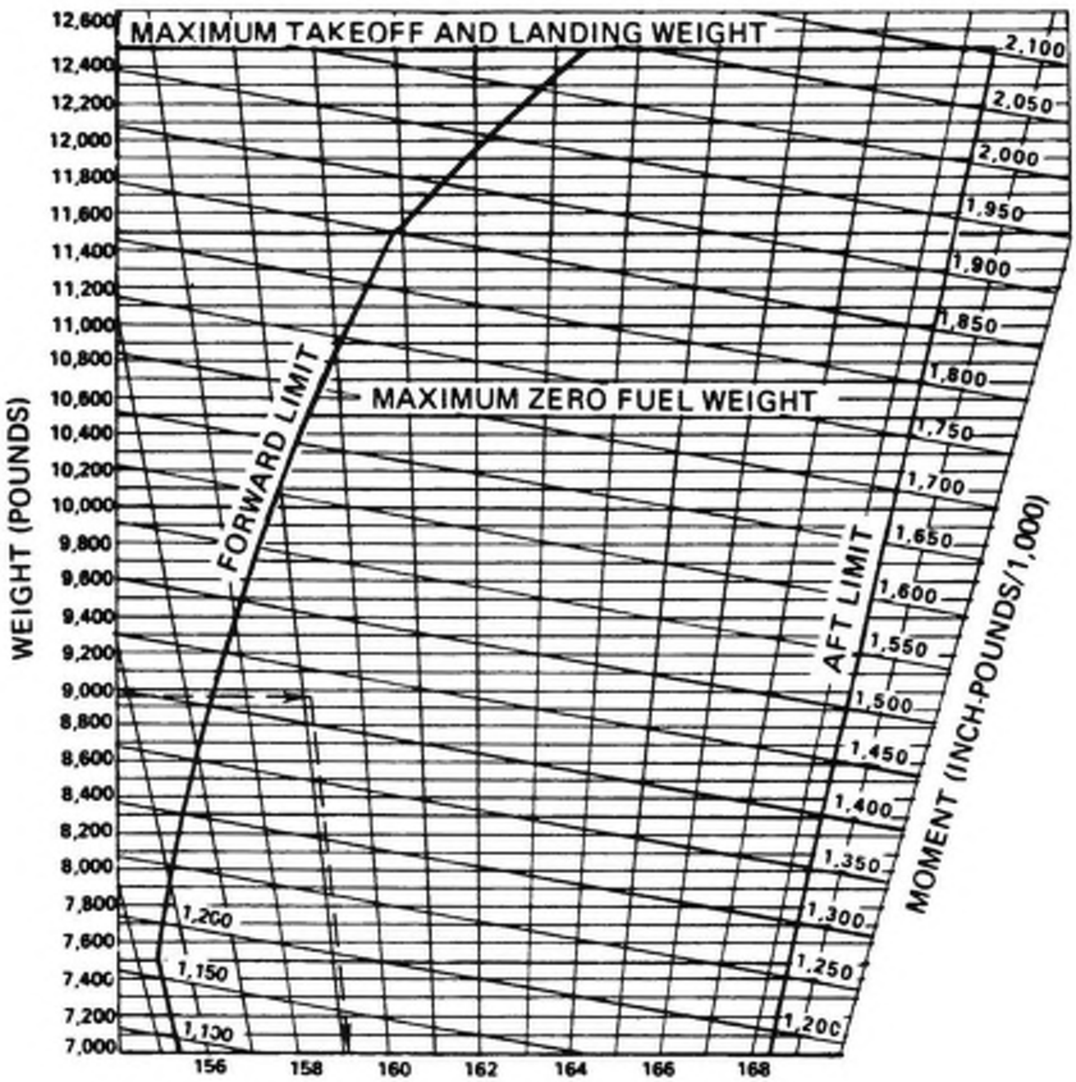


Figure VI–21

WEIGHT AND MOMENT ENVELOPE

GEAR DOWN



EXAMPLE

Given: Weight = 8,965 Pounds
Moment = 1,426 Inch-Pounds/1,000

Obtain: C.G. = 159.1 Inches Aft of Datum

NOTE

Landing gear retraction will not shift C.G. beyond limits.

Figure VI–23

AIRPLANE S/N______________

Qty. Req.	Item	Mark If Installed	Total Weight (pounds)	Moment Arm (inches)
	PROPELLERS AND PROPELLER ACCESSORIES			
2	Propeller & Hub Assembly 106" Diameter Hartzell P/N's HC-B4TN-5DL, -5EL or -5HL and LT10282AB+2.5		356	69
2	Spinner & Bulkhead Assembly Hartzell P/N D3434-4L or D3434-7P		24	70
1	Propeller Deice Kit B.F. Goodrich P/N 65-210-2		4	75
2	Unfeathering Pump, Weldon Tool P/N A4033-E		3	96
	LANDING GEAR AND FLAPS			
4	Wheel, Main			
	B.F. Goodrich P/N 3-1283 (Magnesium), or		31	191
	B.F. Goodrich P/N 3-1357 (Aluminum)		38	191
4	Brake Assembly, B.F. Goodrich P/N 2-1203 or 2-1203-1		66	191
4	Tire, Main B.F. Goodrich 19.5 x 6.75-8, 10 ply rating (Tubeless) P/N 021-335		47	191
1	Hydraulic Steering Unit Swearingen P/N 27-19087-1/-2		8	62

AIRPLANE S/N ______________

Qty. Req.	Item	Mark If Installed	Total Weight (pounds)	Moment Arm (inches)
	AIR CONDITIONING AND PRESSURIZATION			
2	Refrigeration Unit, AiResearch P/N 2200620-1		35	157
2	Mod-Valve, AiResearch P/N 979458-4		5	152
2	Water Separator, AiResearch P/N 85020-2		4	159
2	Actuator, Barber Colman P/N BYLB50437 or Swearingen 27-84086-253		3	151
1	Blower, Fresh Air, Janitrol P/N 30D40		5	55
1	Valve, Outflow, AiResearch P/N 103464-7		3	425
1	Valve, Safety, AiResearch P/N 103462-3		2	72
1	Controller, Pressurization, AiResearch P/N 102076-11		3	86
2	Flow Control Valve Assembly AiResearch P/N 392908-1-1		6	148
1	Cabin Temperature Control Barber Colman P/N HYLZ50434 or Swearingen 27-82453-11		1	221
	SURFACE DEICING			
1	Wing Deicer, (Left), B.F. Goodrich P/N 25S-5D5071-01		8	154
1	Wing Deicer (Right), B.F. Goodrich P/N 25S-5D5071-02		8	154
2	Horizontal Stabilizer Deicer, B.F. Goodrich P/N 25S-5D5071-03		8	376

AIRPLANE S/N____________

Qty. Req.	Item	Mark If Installed	Total Weight (pounds)	Moment Arm (inches)
	INSTRUMENTS AND INDICATORS (continued)			
2	Engine Temperature Indicator, Swearingen P/N 27-66004-17		2	87
2	Torque Indicator, Swearingen P/N 27-66108-1 or 27-66010-9		1	87
2	Oil Temperature, Swearingen P/N 27-66009-1		2	87
2	Fuel Pressure Transmitter, Edison P/N 418-03041 or 418-12044		2	118
2	Fuel Quantity System Indicator Plus 5 Consolidated Probes (PAA-574, PAB-575) Swearingen P/N 27-66007-1		4	156
	ELECTRICAL			
1	Servo, Horizontal Stabilizer Simmons P/N DL5040M2-4		13	358
2	Battery, Swearingen P/N 26-33330-7		107	—3
2	Regulator, Voltage In Nacelle, Lear Siegler P/N 51509-002		6	131
1	Battery Fault Panel, Lear Siegler P/N 50284-001		1	117
1	Rotating Beacon, Grimes P/N 40-0100-1		3	449
2	Inverter, Flite Tronic P/N PC-17-3		29	62
1	Electric Windshield (Left) Swearingen P/N 26-21126-5		24	88

AIRPLANE S/N______________

Qty. Req.	Item	Mark If Installed	Total Weight (pounds)	Moment Arm (inches)
	ELECTRICAL (continued)			
2	SRL Computer, AiResearch P/N 2101826-2 or 2101826-3		8	69
2	Temperature Limiter, AiResearch P/N 949596-1		3	69
1	SAS^2 Servo Yaw Damper, Swearingen (Bendix) P/N 27-44049-21		5	128
1	SAS^2 Capstan Assy, Yaw Damper Swearingen (Bendix) P/N 27-44049-19		2	128
	MISCELLANEOUS SYSTEMS			
2	Pitot Head P/N AN5812-1		2	63
1	Oxygen Cylinder Assembly Puritan-Bennett P/N ZC419		13	4
1	Power Brake Relay Valve Crane P/N 38-535		5	69
1	Anti-Skid Control Box Crane P/N 42-363		2	69
	FURNISHINGS Configurations — Standard A,B,C and D			
2	Crew Seats		60	111
1	Large Bar/Galley		15	141
1	4 Seat Couch (148-201)		55	148 166 184 201

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SYSTEMS DESCRIPTION

ITEM PAGE

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SYSTEMS DESCRIPTION (continued)

REISSUE B
S/N T(B)-276 AND T(B)-292 AND SUBSEQUENT

LIST OF EFFECTIVE PAGES

SECTION 7

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LOG OF REVISIONS

Revisions to the Pilot's Operating Handbook and Airplane Flight Manual provide current information applicable to operation of the SA226–T(B) airplane. Revised pages should be inserted in the flight manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when all current revisions are incorporated. The revised material on each page is identified by a vertical line in the margin.

NOTE

This is a non–FAA Approved section. This list of revisions is to insure that all revisions are incor– porated in this section

Revision Number	Revised Pages	Description of Revision	Date of Revision
1	7-v and 7-49	Added -502G Engine.	March 13, 1980
2	7-iv, 7-v, and 7-59	Reverse Taxi Operations.	April 16, 1980
3	7-v, 7-23 7-24, and 7-26	Note on Fuel Crossover Line; Fuel System & Fuel Storage changes and change to Jet Pump System.	June 3, 1980
4	7-iv, 7-v, and 7-59	Engine Ground Starts with High Residual ET.	October 24, 1980
5	7-iv, 7-v, 7-60 and 7-61	Engine Flameout due to ice shedding from prop spinners	February 25, 1981
6	7-v, 7-vii and 7-viii	Addition of Log Of Revisions pages.	November 15, 1983
7	7-iv, 7-v, 7-vii, 7-62, 7-63 and 7-64	Approved Engine Oils; Operations With Standing Water, Slush, or Wet Snow on the Runway and Noise Control.	November 30, 1984
8	7-ii, 7-v, 7-vii, 7-21, 7-22	Gust Lock Belt	January 1, 1986
9	7-iv, 7-v, 7-vii 7-8, 7-8a, 7-8b and 7-62	Changed info on DC Power Distribution, revised List of Approved Engine Oils, changed NOTE for Engine Oils, corrected Contents page and added pages 7-8a and 7-8b.	September 14, 1995

LOG OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	Date of Revision
10	7-ii, 7-v, 7-viii and 7-19	Expanded *Wing Overheat Warning System* to include the *Wheelwell.*	May 11, 1999
11	7-ii, 7-v, 7-viii, and 7-22	Added alternate rudder gust lock.	November 6, 2003

INTRODUCTION

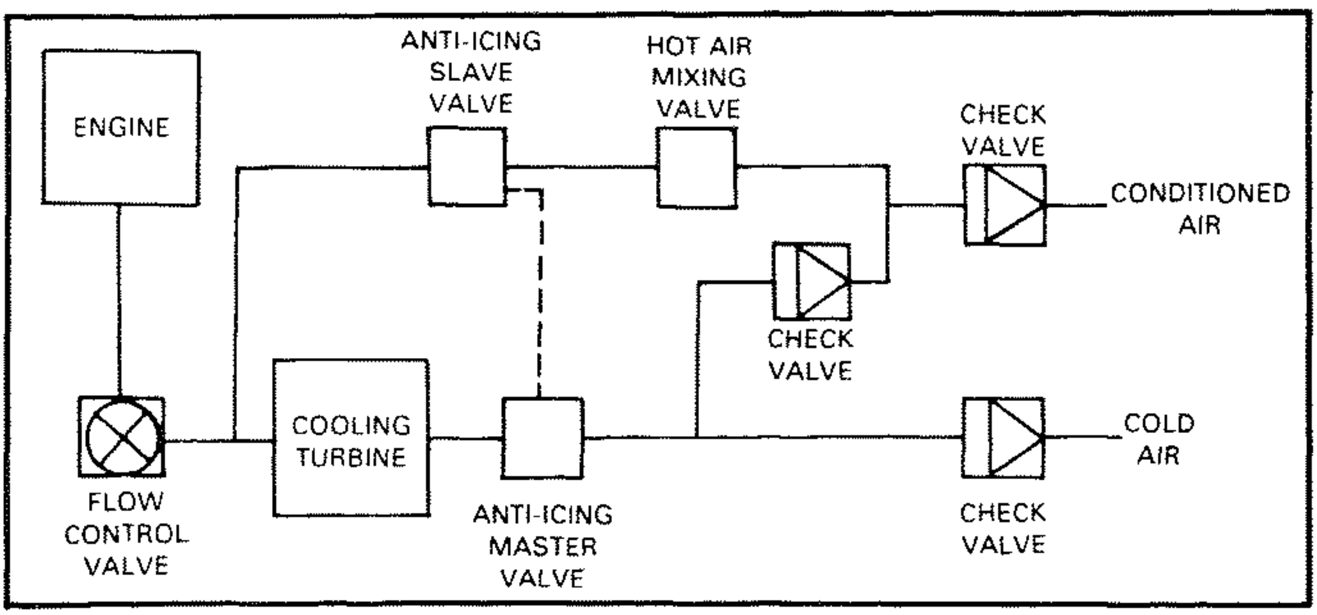
Section 7 of this manual provides descriptions and discusses the operation of the airplane systems. The pilot should become familiar with the general working principles of these systems to aid him in analyzing malfunctions and applying corrective measures as necessary.

ENVIRONMENTAL CONTROL SYSTEM

The air conditioning system supplies cold air, hot air, and fresh air to the cabin and cockpit. Two independent systems, each capable of complete air conditioning, 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 hot (tempered) air. Fresh air is supplied by a blower and motor assembly located in the nose baggage compartment. Either bleed air system may be operated on the ground when the respective engine is operating. Ducts within the fuselage distribute the airflow to the passengers and crew. An automatic temperature control system senses and regulates the temperature within the aircraft.

The aircraft cabin is pressurized to increase passenger comfort. The pressurization system automatically compensates for increasing aircraft altitude by maintaining cabin altitude as near to field elevation as possible. The cabin altitude will remain at sea level until aircraft altitude reaches approximately 16,800 feet pressure altitude. The pressurization system also provides for the emergency dumping of cabin pressurization, automatic overpressurization relief and negative pressure relief.

The heating/cooling air conditioning system, the pressurization control system and the fresh air system comprise the environmental control system (ECS).



ENVIRONMENTAL CONTROL SYSTEM
Figure VII-1

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 temperature level he wishes to maintain within the aircraft. The temperature control system will monitor the cabin temperature and the outside air temperature, and adjust the amount of conditioned air introduced into the cabin. In the manual mode, the pilot controls the amount of conditioned air supplied to the cabin. The principal system components are as shown in Figure VII-2.

HEATING SYSTEM

Bleed air supplied from the engines, mixed with cold air from the cooling turbines, is used for heating the cockpit and cabin. The flow of engine bleed air into the conditioned air ducts is controlled by two hot air mixing valves. These mixing valves are positioned electrically or pneumatically, depending upon the system. Signals controlling the valve positioning come from the temperature control system.

COOLING SYSTEM

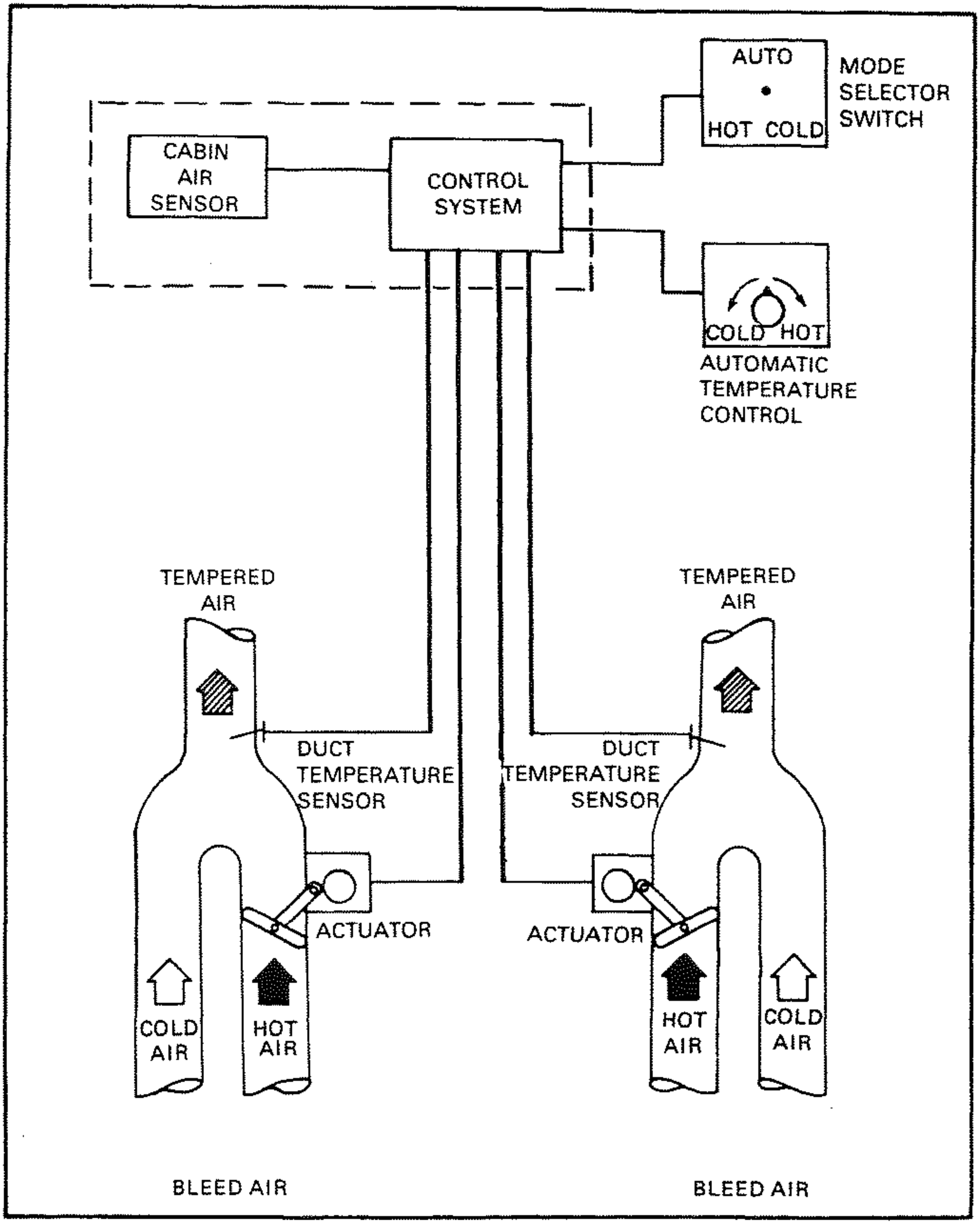
A cooling turbine is installed near the nacelle in each wing center section. Bleed air supplied by the flow control valve is used to drive the turbines. When cooled, this air is mixed with hot bleed air to regulate cabin temperature and to pressurize the airplane.

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 of the water separator. The master valve will control the slave valve as necessary to prevent freezing of the water separator.



TEMPERATURE CONTROL UNIT
Figure VII-2

BLEED AIR AND CONTROL

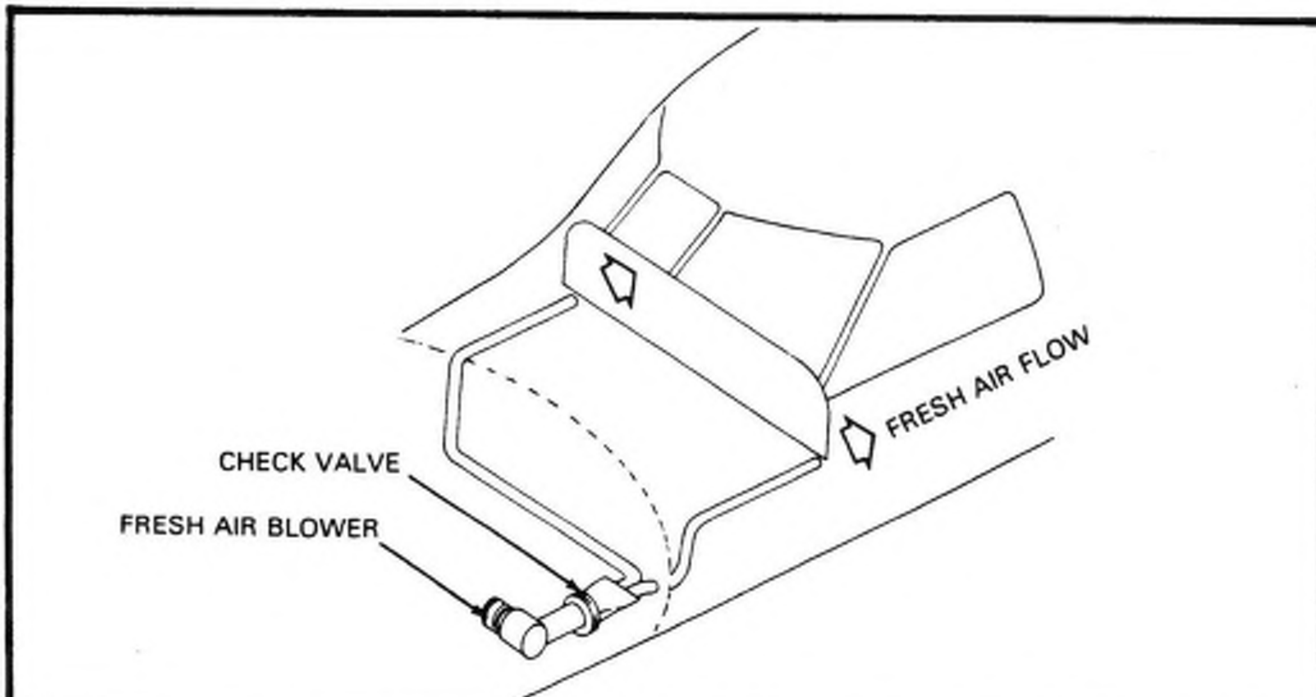
Air is extracted from a pad on the left hand side of each engine burner can for use in the environmental control system (ECS), airframe anti-icing system, and vacuum system. Part of the anti-icing system provides pressure for the inflatable door seals. Bleed air for use in the engine anti-icing system is routed and controlled through separate lines and valves. 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, thereby increasing the service life of the ECS components.

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. When the cockpit bleed air switch is moved to the OFF position, the flow control valve will close to stop bleed airflow to the ECS. The bleed air supplied to the airframe anti-icing and vacuum system is not controlled or affected by the flow control valve.

FRESH AIR SYSTEM

A blower motor and associated distribution plumbing supplies fresh air to the cockpit. The blower is located under the left hand nose baggage compartment floorboard. A check valve prevents the escape of cabin pressurization in flight.

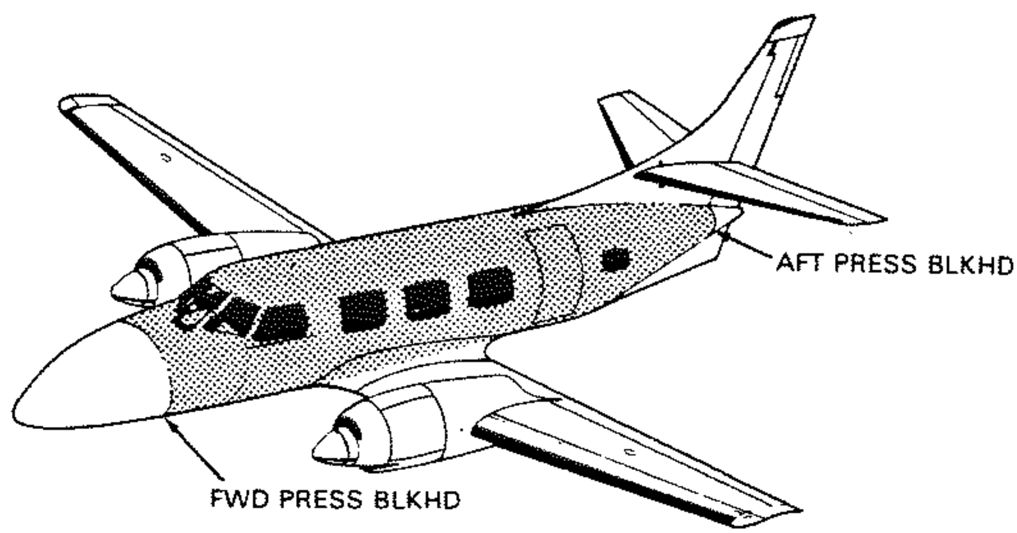
A switch actuated by the nose gear during retraction serves as a safety interlock to prevent operation of the fresh air fan in flight. An override position on the fresh air fan switch allows this interlock to be defeated in case the fan is needed in flight. The fan should not be operated with the cabin pressurized.



FRESH AIR BLOWER
AND CHECK VALVE
Figure VII-3

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 airflow is forward.



PRESSURED VOLUME
Figure VII-4

Cabin Altitude Warning

The cabin altitude warning system is used to inform the pilot that cabin altitude has exceeded approximately 11,000 feet. Above this altitude supplemental oxygen will be required. Illumination of the cabin altitude warning light usually indicates a problem with the pressurization system.

PRESSURIZATION SYSTEM COMPONENTS

Dump Valve

The pressurization dump valve is used to manually 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 bus by using the transfer switch. The dump valve also contains internal overpressurization relief that will cause the valve to open should the pressure differential between the cabin and ambient exceed 7.30 ± .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, 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 pressures.

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 will produce larger but corresponding changes in pressure to the outflow valve connection. The relay is located in the aft fuselage area at station 372.

Mode Selector and Manual Control

The pressurization controls consist of a pressurization mode selector and a 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.

PRESSURIZATION SYSTEM COMPONENTS

Mode Selector and Manual Control (continued)

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 counter-clockwise) will supply more vacuum to cause the outflow valve to open and decrease cabin pressure. Closing the valve (turning clockwise) will supply 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 for ground pressurization checkout, small adjustments must be made to the manual rate control , and adequate time must be allowed for their effect. Opening the manual rate control with the aircraft pressurized can produce a very rapid depressurization that may be uncomfortable for the passengers.

ELECTRICAL SYSTEMS

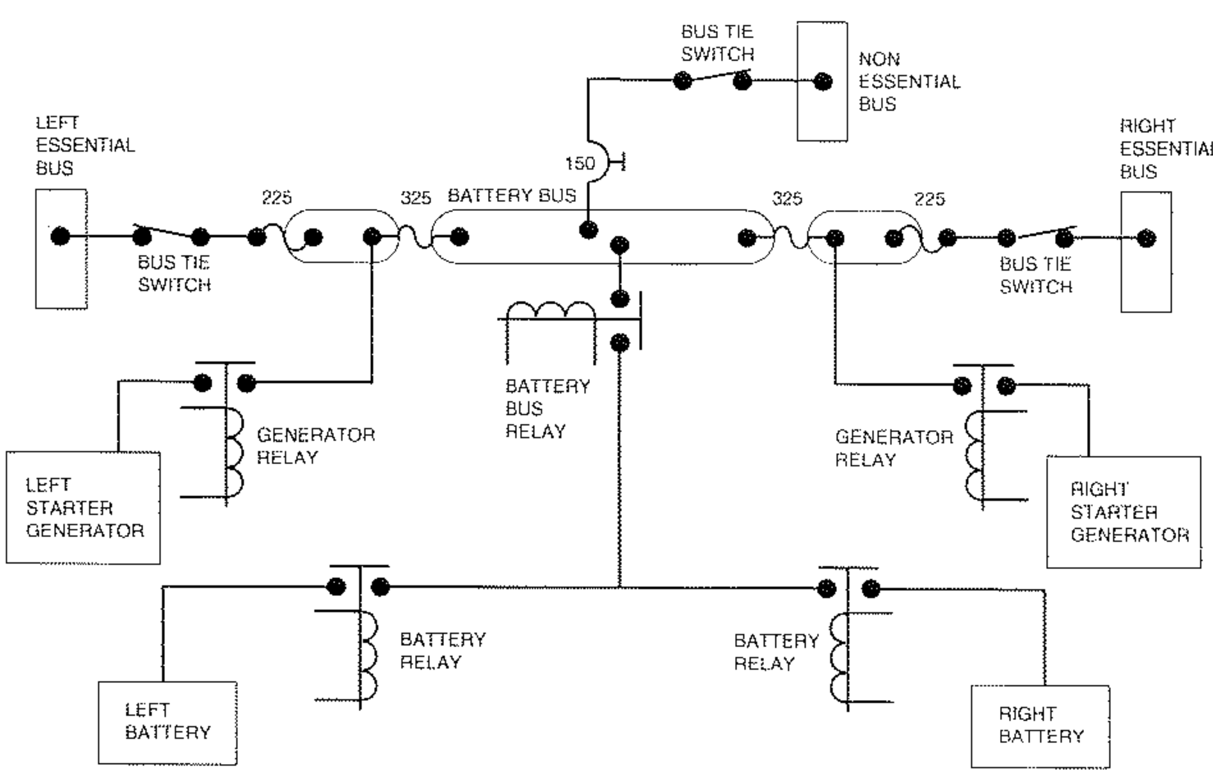
The aircraft is equipped with a DC and an AC power system. Overvoltage and overload protection are provided in addition to a segmented three bus system consisting of two essential buses and one nonessential bus. Each bus may be selectively disabled. Redundant circuitry is provided to insure the operation of all essential and emergency electrical and electronic systems.

115 VAC and 26 VAC buses provide to supply power for instrumentation. Dual AC inverters power the buses.

DC POWER DISTRIBUTION

As shown in Figure VII-5a or VII-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 325 amp circuit limiter. Power supplied to each bus is distributed to the various circuit breakers by smaller bus bars.

(Airplanes NOT modified in accordance with Service Bulletin 226 24-034)

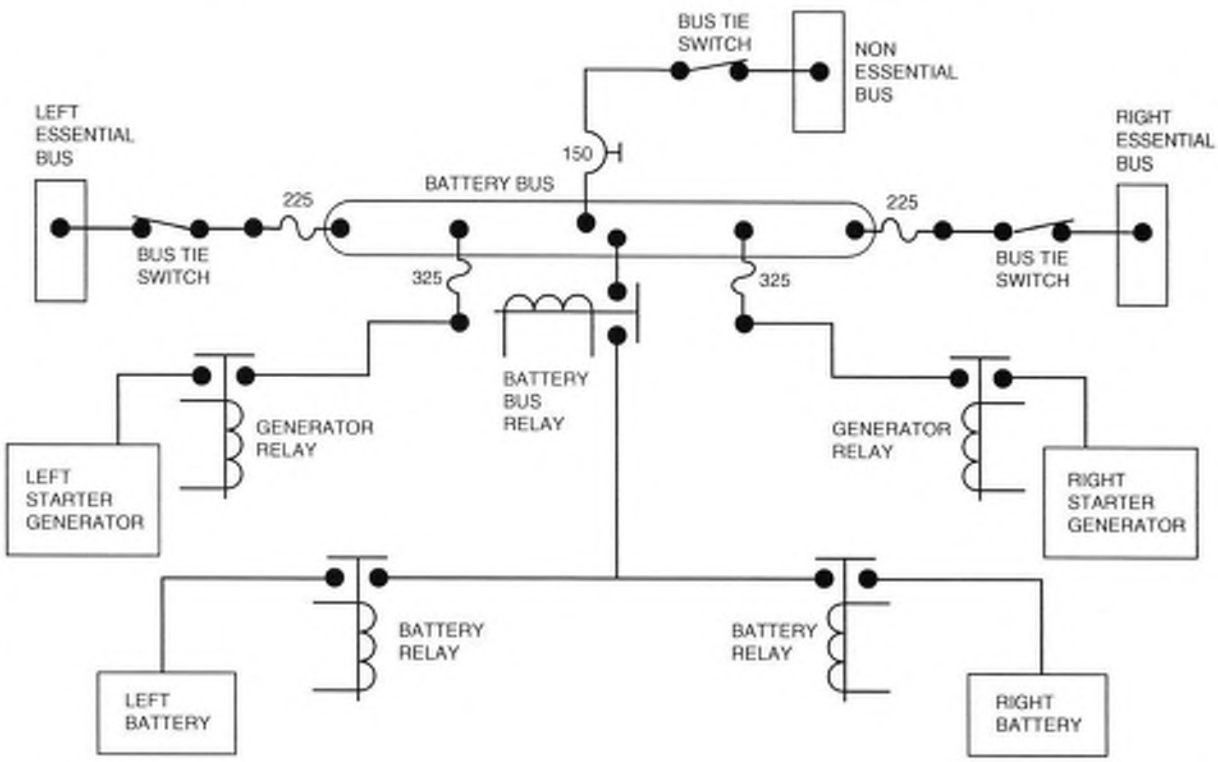


SIMPLIFIED DC BUS
SCHEMATIC
Figure VII-5a

ELECTRICAL SYSTEMS (continued)

DC POWER DISTRIBUTION (continued)

(Airplanes modified in accordance with Service Bulletin 226 24-034)



SIMPLIFIED DC BUS
SYSTEM
Figure VII-5b

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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. Turn and bank indicator (pilot's)
2. Fuel crossflow
3. Landing gear and wing flap position
4. Surface deice boots
5. LH intake heat
6. RH intake heat
7. Windshield heat (pilot's)
8. Cabin pressure dump
9. Landing gear control

DC POWER SOURCES

Batteries

Two 24 volt, nickle-cadmium, 20 cell batteries are installed in the nose of the airplane behind the radome. Each battery is rated at 25 ampere hours at the 5-hour rate.

Generators

The primary power for the aircraft DC bus system is supplied by two engine-driven starter-generators. The starter-generators are rated at 300 amperes continuous operation. The starter-generators will deliver power to the DC system at all engine speeds at and above ground idle.

External Power Supply

An auxiliary power unit receptacle is provided on the right hand side of the nose just aft of the radome. This receptacle may be used to supply auxiliary DC power during routine servicing and engine starts. Power from the auxiliary unit is connected directly to the aircraft bus system. Auxiliary power is not connected to the aircraft bus system until either battery switch is actuated.

External Power Switch

Some airplanes are equipped with an external power unit switch, normally located at the right end of the copilot's switch panel near the fresh air fan control switch. The purpose of the switch is to allow the pilot to monitor the output of the auxiliary power unit prior to introducing external power to the airplane. When the switch is OFF, the pilot can check the voltage of a connected APU on the airplane D.C. voltmeter. However, the output of the APU will not be connected to remaining airplane systems until a battery switch and the external power switch are moved to their on positions.

AC POWER DISTRIBUTION

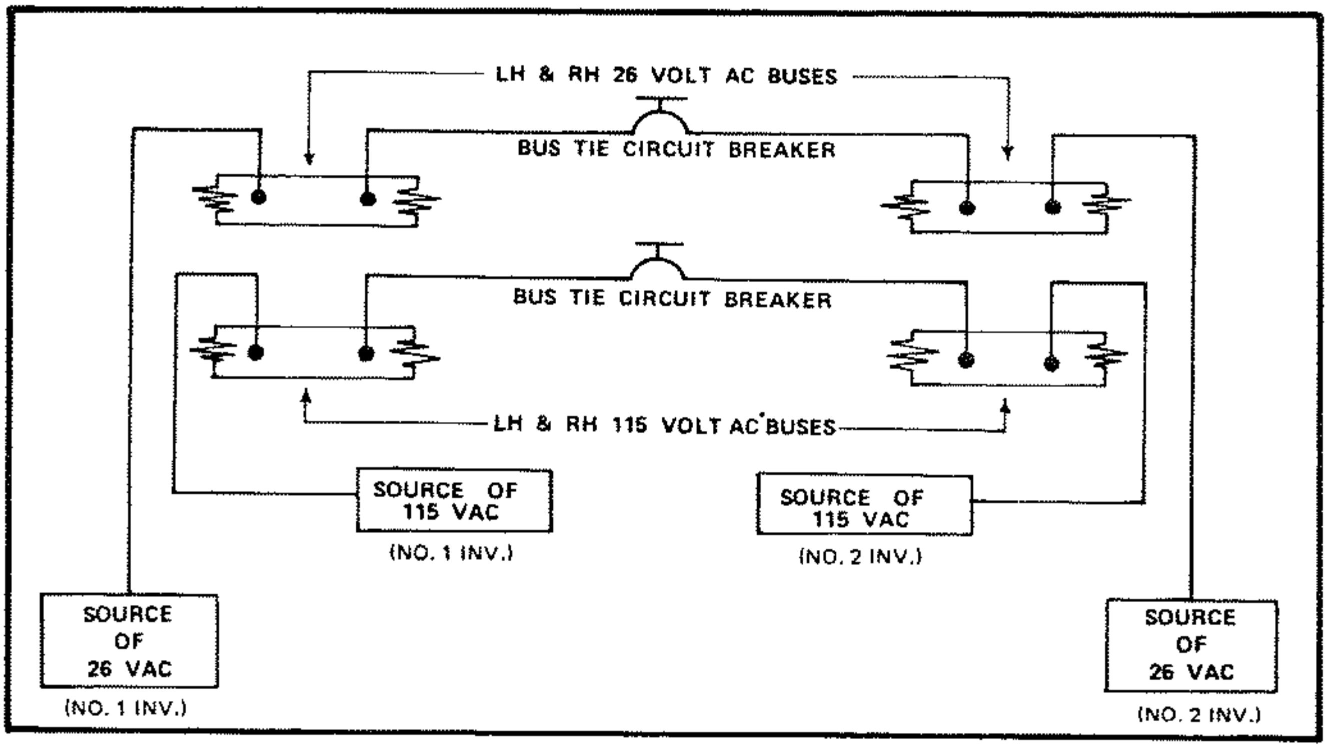
Two DC powered 600 volt-amp static inverters provide AC power for the aircraft. Either inverter's operation is pilot selectable. In case of inverter failure, the pilot must select the other inverter.

Operation

The two inverters, No. 1 and No. 2, are controlled by a switch installed on the copilot's switch panel. Power for each inverter comes from the left and right essential buses respectively. An inverter relay controls the application of DC power to each inverter. When the inverter switch is selected to an inverter, 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 output of the inverter is both 115 volts and 26 volts and is fed to the AC buses.

Merlin IIIB's use a bus system as shown in Figure VII-6 featuring bus tie circuit breakers between both the 26 volt and the 115 volt bus. Each bus is fed from its respective power source.

> **NOTE**
>
> It is only possible to supply power to the AC buses from only one of the inverters at a time.



SIMPLIFIED AC BUS
SYSTEM
Figure VII-6

WARNING AND MONITORING SYSTEMS

The pilot must be informed of the condition and operation of the various sources of electrical power to operate the aircraft safely. Each system will be discussed separately.

BATTERY OVERHEAT LIGHT

A battery overheat warning system monitors the temperature of the battery as an indication of the battery's charging rate. The overheat warning system is disconnected during start. (Due to the series start capability, the right battery overheat light would illuminate each time the batteries went into series.) A press-to-test function checks the lamp driver circuitry. The overtemp sensor and wiring are under continuous test during normal operation. Each red warning light is controlled by a temperature sensor installed in a cell link near the center of the battery. This sensor will operate the overheat warning light whenever the link reaches approximately 150°F (65.6°C), which may be indicative of high electrolyte temperature.

BATTERY DISCONNECT LIGHT

A 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 installed inside the battery relay itself which are shorted to ground when the relay is open. The disconnect light function is turned off during the start cycle.

BATTERY FAULT LIGHT

The red battery fault light illuminates when the fault protection panel senses a battery fault and disconnects the batteries (reference the applicable battery control section). The circuit consists of a relay inside the fault control panel which provides power to illuminate the fault light.

GENERATOR FAIL LIGHT

The generator fail light, when illuminated, indicates the respective generator relay has opened, disconnecting the generator from the bus system. The circuit consists of contacts installed inside the generator relay itself which 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

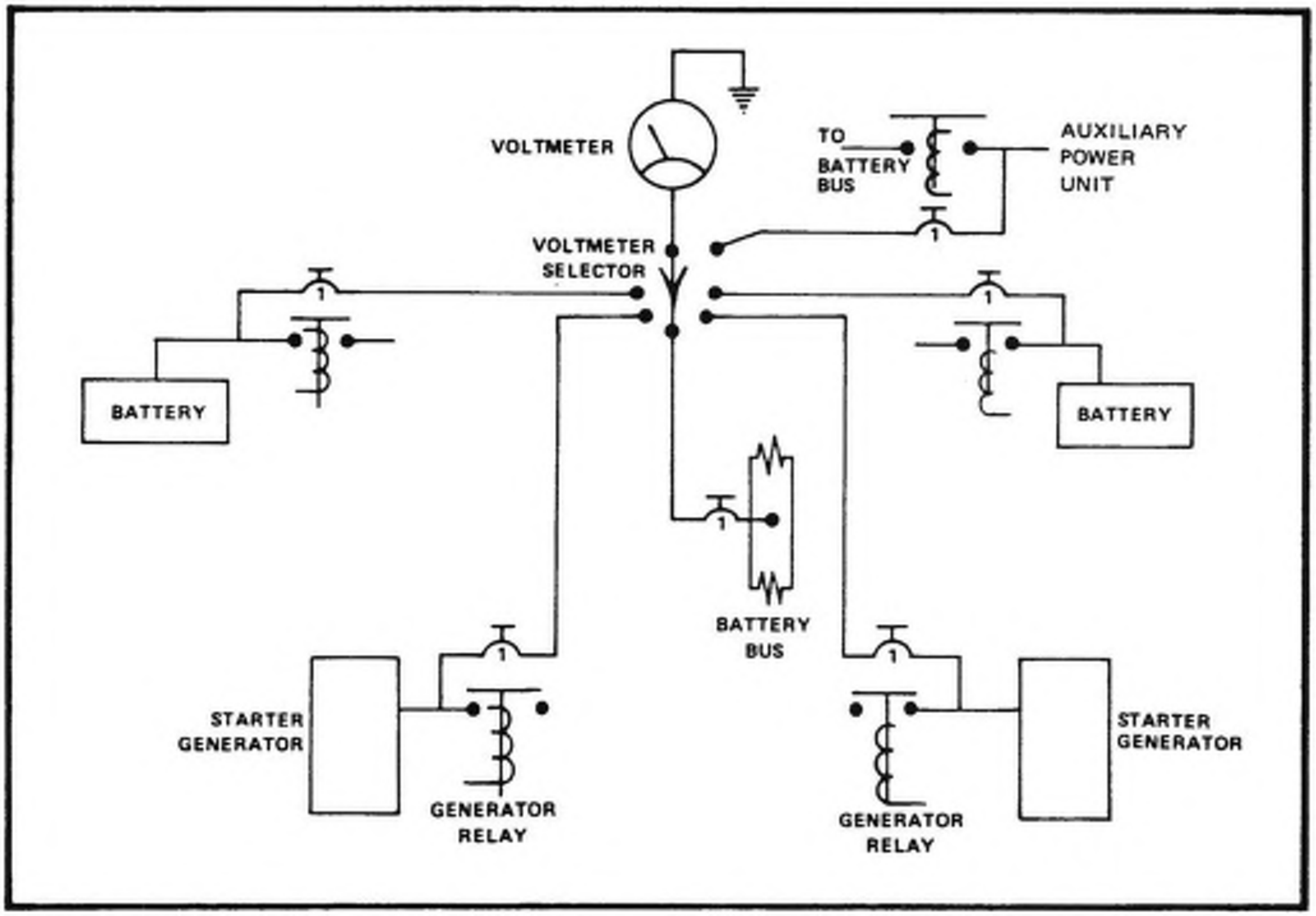
A bus selectable voltmeter and two bus failure warning lights comprise the AC warning and monitoring systems. The AC voltmeter is powered from the 115 volt bus system; a selector switch allows either bus to be monitored. Each 115 volt bus also powers a bus failure relay. When voltage is present at the bus, the relay is energized and breaks the path for power to the AC bus warning 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 warning light is usually an indication of an AC bus tie circuit breaker failure. Illumination of both warning lights is usually an indication of an AC power source failure.

GENERATOR AMMETER

Two 0 to 300 ammeters are installed in the left-hand 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

A voltmeter and selector switch are used to monitor any one of six sources. Each source providing a signal to the voltmeter contains a circuit breaker for protection. The functions of each switch position are as follows:



VOLTMETER AND SELECTOR SWITCH CIRCUIT
Figure VII-7

VOLTMETER AND SELECTOR SWITCH (continued)

1. LH or RH 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 battery voltage will be approximately equal to bus voltage.

2. LH or RH generator position: Monitors the generator voltage on 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 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. APU position: Monitors the voltage output of an APU 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.

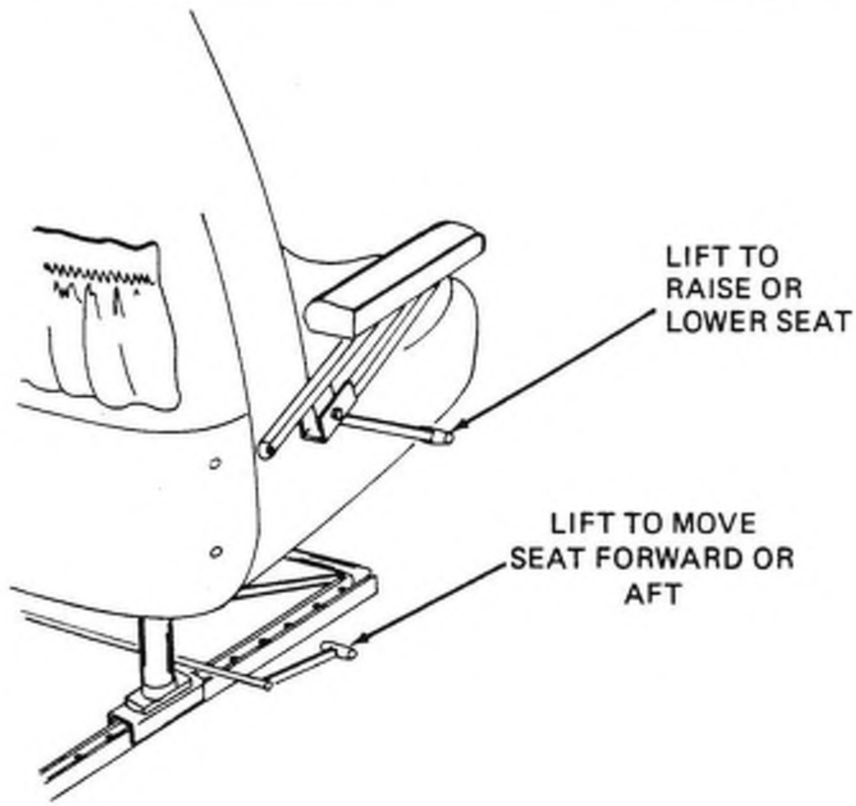
NOTE

To avoid battery drain after shutdown, the voltmeter selector should be placed in the DC bus position.

EQUIPMENT/FURNISHINGS

FLIGHT COMPARTMENT

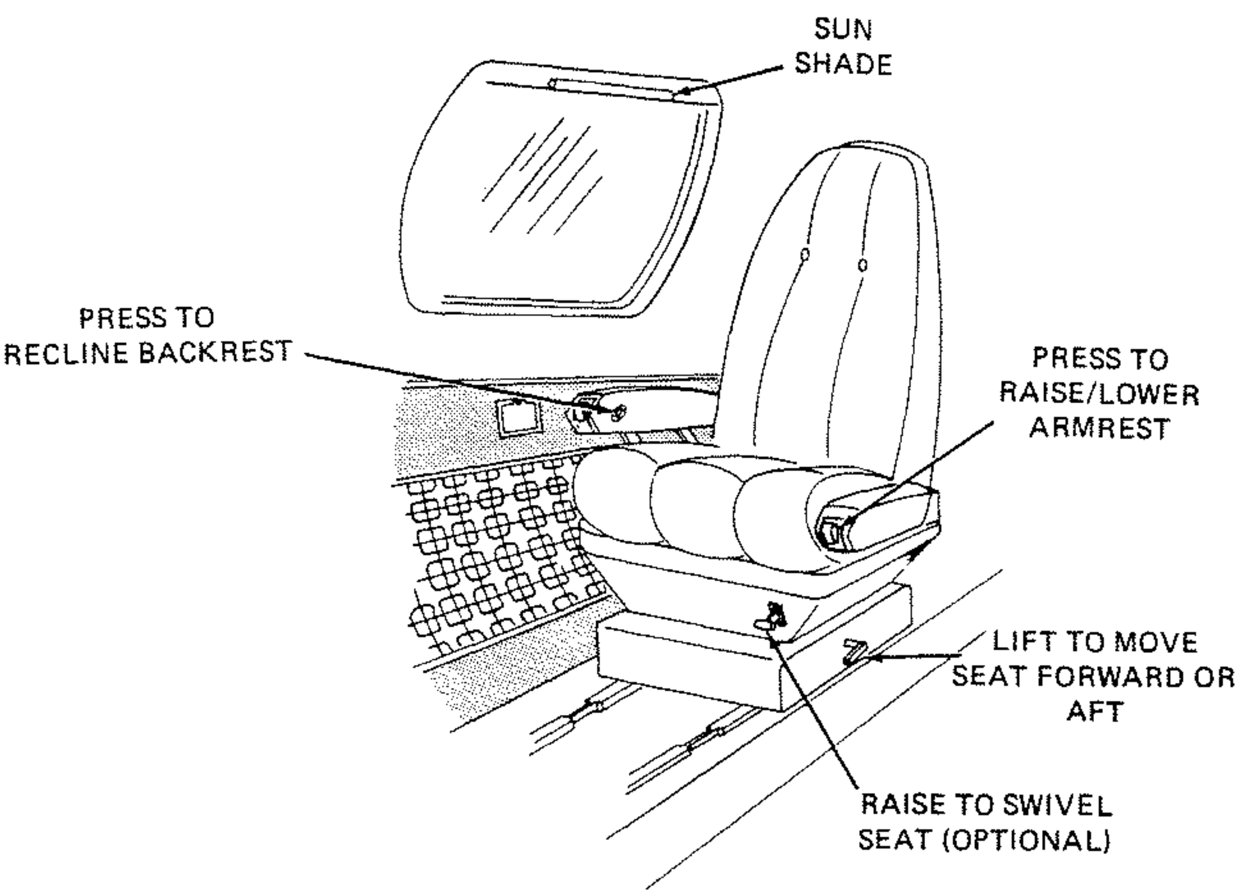
The flight compartment has accommodations for dual flight controls, instruments, and electrical control panels conveniently located for crew accessibility. Upholstered seats are provided for the pilot and copilot. Each seat is mounted on two parallel tracks bolted to the compartment floor. The seats are adjustable vertically and horizontally and are removable (see Figure VII-8). Depressing a button under the inboard armrest releases a locking mechanism and allows the inboard armrest to be lowered. The outboard armrests retract upward and are lifted vertically to unlock prior to lowering them to the horizontal position. The flight compartment is sound dampened and insulated with flame-resistant material. A bulkhead separates the flight compartment from the passenger area.



PILOT'S SEAT
Figure VII-8

PASSENGER COMPARTMENT

The passenger compartment accommodates six to nine passengers and extends from the bulkhead door at the flight compartment to the aft bulkhead. The standard configuration is with three chairs on each side of the cabin aisle (see Figure VI-18). The front seat on each side of the aisle is installed facing rearward to accommodate a card table built-in between the first and second seats. The card table is hinged at the cabin wall and may be removed and stowed. The second seat on each side of the aisle is mounted on tracks to provide fore and aft adjustment (see Figure VII-9). All passenger seats have reclining backs, folding armrests, and safety belts (swivel seats are at customer option). Ash trays are on the cabin walls. Pull down shades are provided on each cabin window for passenger comfort.



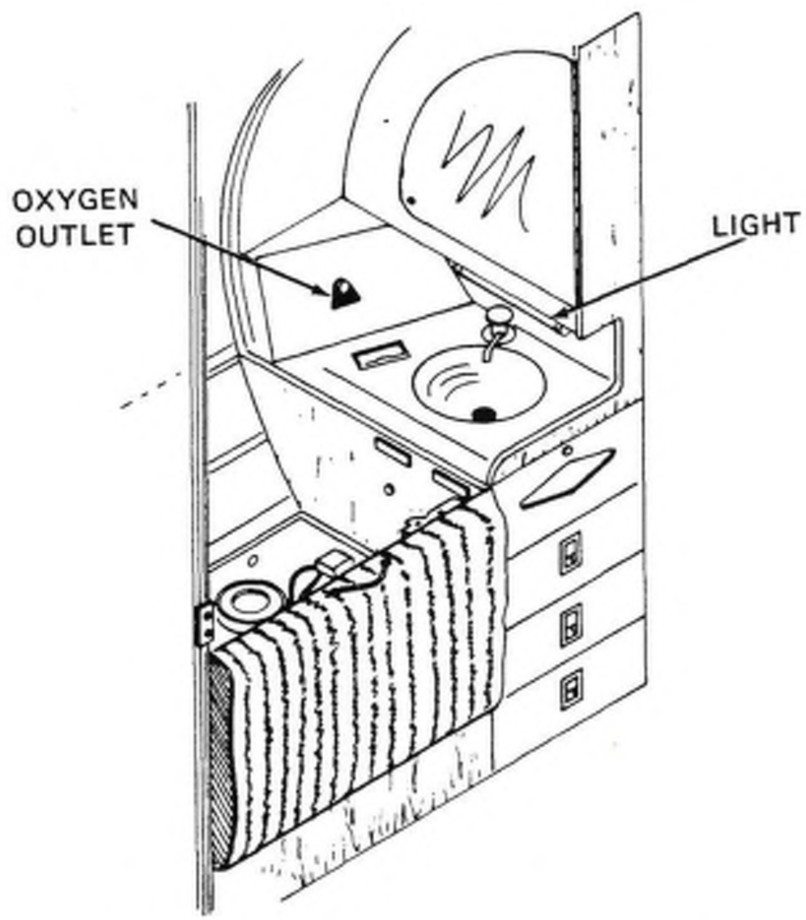
PASSENGER SEAT
Figure VII-9

Refreshment Bar/Galley

A refreshment bar/galley is provided on the left side of the passenger compartment immediately behind the flight deck and forward of the first seat (Standard Configuration). A stowage area is provided for refreshments, heated and cold beverages and glassware. Provisions are also included for ice and miscellaneous supplies. A waste container suitable for liquid or dry waste is attached to the refreshment bar.

Toilet Compartment

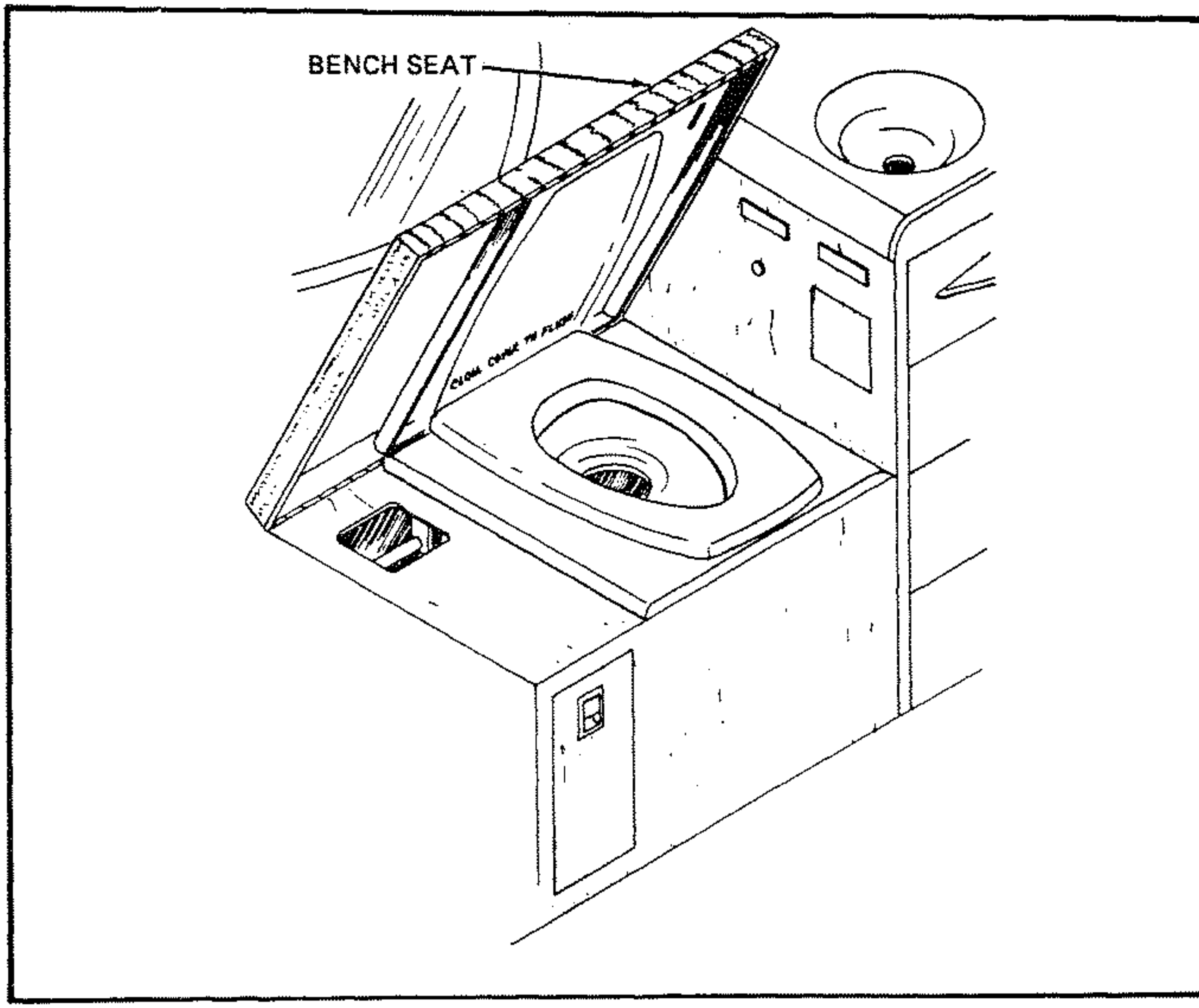
A toilet compartment is located on the right side of the cabin, opposite the cabin entrance door. A sink, water container, toilet supplies, stowage accommodations, and toilet are provided (see Figure VII-10).



TOILET COMPARTMENT
Figure VII-10

Toilet Compartment (continued)

The toilet is stowed from sight under an upholstered bench type seat hinged to the cabin wall. The facility is accessible by lifting and folding back the bench seat (see Figure VII-11). A standard chemical flushing unit is optional.



TOILET
Figure VII-11

Toilet Compartment (continued)

The waste container is removable. Excercise care in removing this unit. The following procedures are essential:

1. To gain access to waste container and flushing reservoir:
   a. Lift strap at rear of lip assembly to release the friction lock.
   b. Move hinge assembly forward to full open position and rest on retaining strap.
2. To remove waste container for service:
   a. Remove round cover from stowage bracket and snap into place over waste container opening.
   b. If waste container appears to be stuck, a steady pull will release bucket from firmly seated perimeter seal.
3. To install waste container:
   a. Press down firmly on container corners to assure proper placement of seal in groove.
   b. Before closing unit, ensure that the round cover opening has been removed and stowed on bracket provided.

Additional instructions for cleaning, servicing, and operation are provided in the Service Instruction Manual supplied with the toilet unit.

Baggage Compartment

The baggage stowage compartment is at the aft end of the cabin immediately behind the coat stowage area. Seventy-five cubic feet of space is provided for up to 300 pounds of baggage.

Carpeting

Passenger compartment floors are covered with snap-on carpeting. Carpeting is installed over one-quarter inch polyurethane (spongy, synthetic material) padding.

Passenger Warning Lights

The passenger warning lights consist of the FASTEN SEAT BELT—NO SMOKING sign located at the top of the cockpit bulkhead. The sign lighting is controlled by a switch on the copilot's switch panel.

FIRE DETECTION/PROTECTION

ENGINE FIRE DETECTOR SYSTEM

The electrically operated engine fire detector system consists of four detector units installed on each engine. A fire warning light for each system is located on the annunciator panel. In the event of fire in either engine, that engine's respective annunciator panel warning light will illuminate.

WHEELWELL AND WING OVERHEAT WARNING SYSTEM

A wheelwell and wing overheat warning system is provided. Red L WING OVHT and R WING OVHT warning lights are located on the annunciator panel. Two warning modes are incorporated, **STEADY** and **FLASHING**. A steady warning takes precedence over a flashing warning. It is the more critical of the two warnings. A steady illumination indicates an overheat condition in the wheelwell and/or the conditioned air duct. A wheelwell overheat can be caused by a bleed air leak, overheated brakes or a brake/tire fire. A flashing illumination indicates an overheated condition in the leading edge cavity caused by a bleed air leak or an electrical problem. Refer to EMERGENCY PROCEDURES section for procedures to be followed in the event the lights illuminate. The steady illumination Emergency Procedure addresses both modes.

TEST SWITCH

The test switch for both the engine fire detector system and the wheelwell and wing overheat warning system, is the same test switch used to test all annunciator panel lights.

FIRE EXTINGUISHER (OPTIONAL)

An optional fire extinguisher is installed on the RH side of each engine nacelle aft of the engine firewall. The extinguishing agent is freon FE1301 contained in an 86 cubic inch bottle. The container has a single outlet feeding three spray nozzles. The spray nozzles are located in the engine nacelle. The container is activated by 28.5 VDC through a switch located next to the annunciator panel. A 0 – 1500 psi gauge on each side of the container indicates internal pressure. Adjacent to the bottle location on the exterior of the nacelle is a thermal relief indicator which will blow out when the internal temperature of the container exceeds the maximum limit.

FLIGHT CONTROLS

The flight controls are manually and electrically controlled from the pilot's or copilot's position by conventional yokes and rudder pedals. The flight controls consist of ailerons, an aileron trim tab on the left aileron, rudder, and a rudder 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 beneath the center aisle cabin 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 or swing links which are routed to the ailerons along the wing trailing edge. 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 adjustable push-pull rod, connected to the swing link at each outboard bellcrank, actuates the aileron. The aileron bow tie is mounted on a common shaft with a rudder bow tie which interconnects the two control systems.

Aileron Trim Tabs

The aileron trim tab is located on the left aileron. It is controlled by a trim tab wheel at the pedestal through a cable system which actuates the trim actuators mounted on the rear wing spars. The actuators moves a push-pull rod through the aileron to the tab.

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 actuator mounted in the vertical stabilizer. By actuating the rudder trim control wheel located on the control pedestal, cable movement rotates a sprocket which actuates a push-pull rod through the rudder to the tab deflecting it in the desired direction.

ELEVATOR

The elevators are 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 a 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 segment installed in the vertical stabilizer. Two push-pull rods to the bellcrank actuate the elevators. The elevators are statically balanced with lead weights and aerodynamically balanced with set back hinges.

STALL WARNING

A stall warning and stick pusher system gives visual and aural warning of an imminent stall and, at the same time, transmits a signal to the stick pusher servo. The servo action can be overridden by pilot force on the control column.

HORIZONTAL STABILIZER

The horizontal stabilizer is electrically positioned to provide pitch trim. The unit pivots to change the angle of incidence. Motors actuate interconnected jackscrews to provide a fail safe trim which is controlled by switches from either pilot wheel. 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 a separate circuit to the motors. A selector-kill switch is mounted on the center pedestal. A trim indicator gives the pilot visual reference of trim. A trim-in-motion horn indicates trim actuation.

TRIM CONTROLS

A master trim switch is located on the pedestal. The center position of the switch is the OFF position. In the L position, the pilot has trim control, in the R position the copilot has control. This prevents both the pilot and copilot from trimming the aircraft simultaneously.

Pilot And Copilot Trim Control Switches

The pilot and copilot trim control switches, located on the control wheel, have double toggle actuators. Both halves of the switch must be operated simultaneously to provide trim operation.

Pilot's Auxiliary Trim

A pilot's auxiliary trim switch located on the pedestal 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 switch on the copilot's control wheel.

Aural Indicator System

The trim system incorporates an aural trim-in-motion indicator circuit to provide aural indication to the pilot and copilot that the trim system is being actuated. The pilot's system is completely separate from the copilot's system.

Position Indicating System

A pitch trim indicator is located on the instrument panel. An out-of-trim sonalert system is also incorporated. The sonalert is inoperative until the throttles are advanced for takeoff. If during takeoff roll an out-of-trim exists, the out-of-trim sonalert will sound a warning of the trim condition. When the aircraft is airborne the sonalert is disabled.

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 hydraulic failure.

GUST LOCK SYSTEM

An internal, cable operated gust lock system is provided to lock the flight controls 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.

The gust lock control lever actuates a cable which is routed to lock pins at the aileron bow tie, the rudder bow tie, and the elevator bellcrank and bracket. 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.

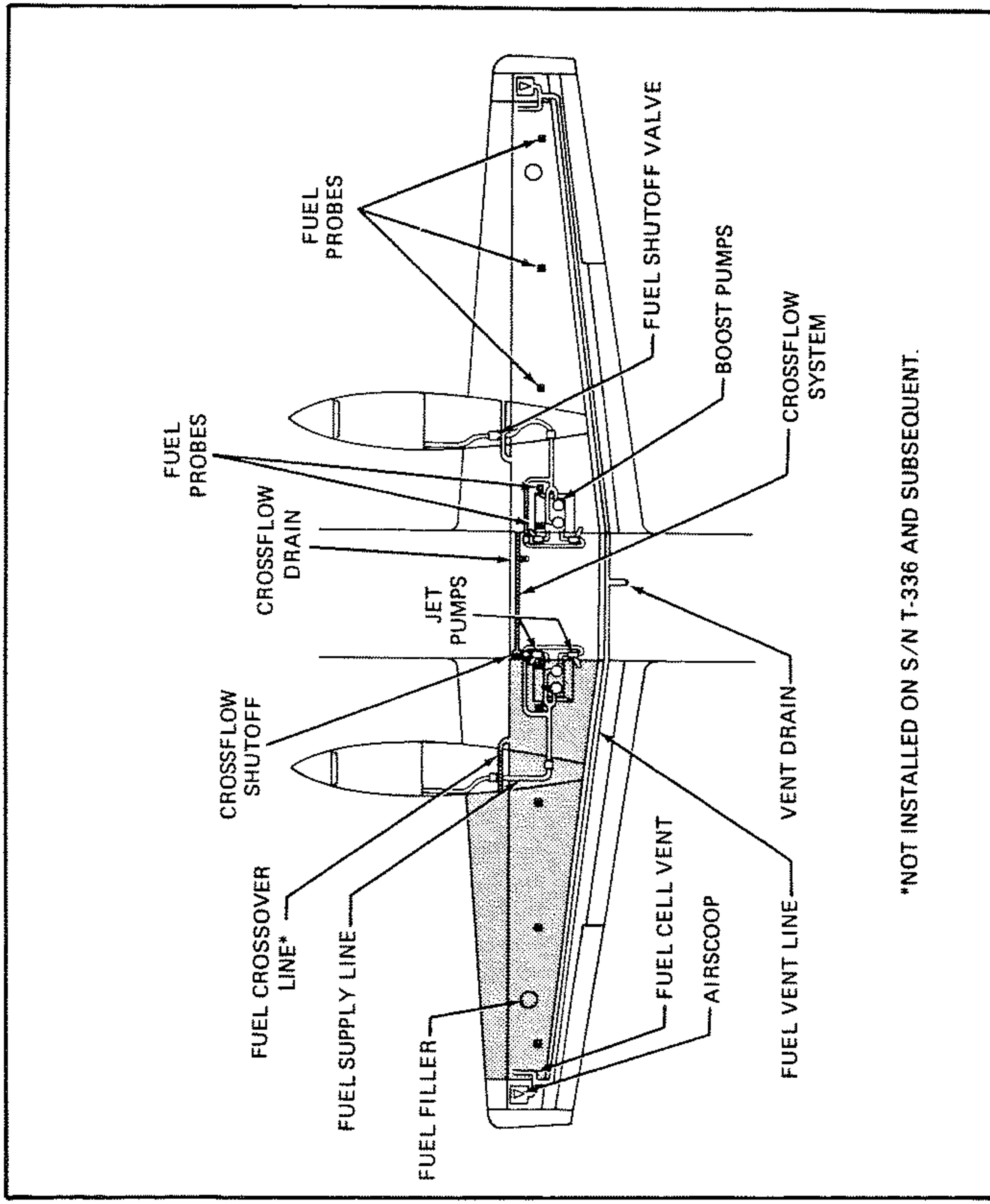
When Service Bulletin 226-27-041 has been complied with, the elevator portion of the cable-operated gust lock system is disabled. In that case, a gust lock belt is used to secure the control column in its nose up position. An alternate rudder gust lock, may be manufactured locally and installed, as described in Service Bulletin 226-27-066.

STALL AVOIDANCE AND STABILITY AUGMENTATION (SAS^2) SYSTEM

A Stall Avoidance System (SAS) is incorporated in the aircraft to warn the pilot of an impending stall aurally by use of a horn, and visually, by instrument indication. The system also provides for actual stall avoidance by means of a stick pusher which applies a forward force of approximately 60 pounds to the elevator control. The SAS system is armed at liftoff and disarmed at approximately 185 knots. The aural warning horn sounds at about 7 to 8 knots before the stick pusher is automatically engaged approximately one knot before the actual stall.

In addition to the Stall Avoidance, a Stability Augmentation System is installed. This is a low and gradually increasing forward force applied on the elevator control at about 180 knots. The forward force builds gradually to approximately 20 pounds as the airspeed decreases until the pointer (SAS^2 indicator) reaches 1.3. At 1.3 the force remains the same until pusher activation.

The combination of the Stability Augmentation and Stall Avoidance System is known as SAS^2. The system can be manually overridden by the pilot.



FUEL SYSTEM
Figure VII-12

FUEL SYSTEM

The fuel system includes left and right integral wing fuel tanks with a total usable capacity of 648 U.S. gallons. An amber annunciator light labeled CROSS FLOW SWITCH is installed in production aircraft S/N T-300 through T-396. The annunciator light illuminates when the fuel crossflow switch is placed in the OPEN position but does not necessarily indicate the postion of the cross-flow valve. Effective on S/N T-397 and up, this annunciator senses crossflow valve positions and illuminates whenever the valve is not fully closed. The crossflow valve provides for fuel balancing between tanks when required. 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 ae provided in each wing tank to maintain the hopper tanks at full capacity. With the transfer pumps operative, the usable full capacity per tank is 324 gallons (2171 pounds at 6.7 pounds per gallon). The zero point on the fuel quantity gauges is adjusted to allow for 13.0 pounds of unusable fuel (15.0 pounds on S/N T-336 and later). With the transfer pumps operative, the fuel quantity gauge readings represent the total usable fuel available in pounds.

FUEL STORAGE

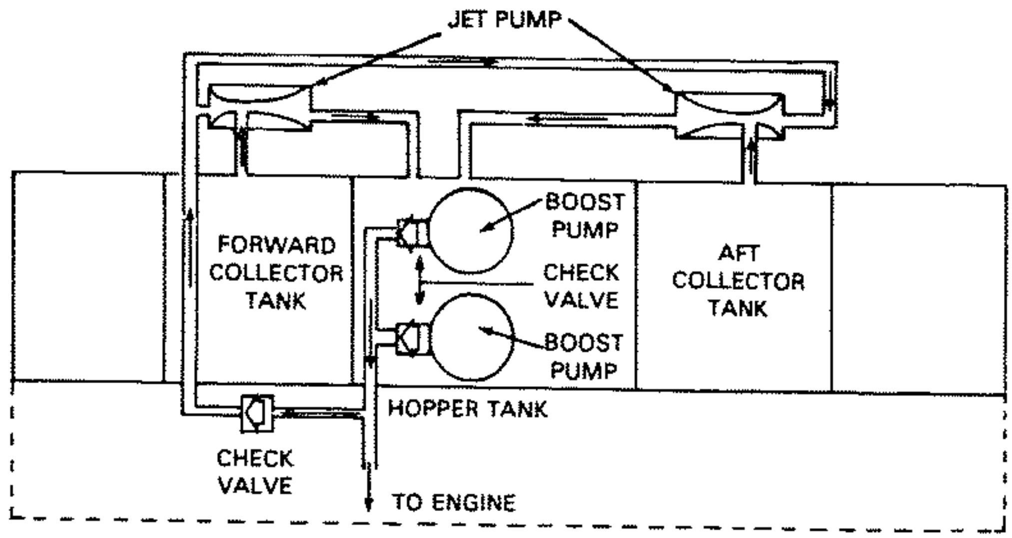
Fuel for each engine is stored in two integral fuel tanks, one located in each wing. Each tank serves as an independent fuel system for its respective engine. The tanks are interconnected by a crossflow line to balance the fuel quantity or to provide either engine with all of the fuel on board. Two gravity filled collector tanks in each wing tank, coupled with jet transfer pump action, supply a hopper tank with fuel, insuring boost pump submergence in all flight attitudes.

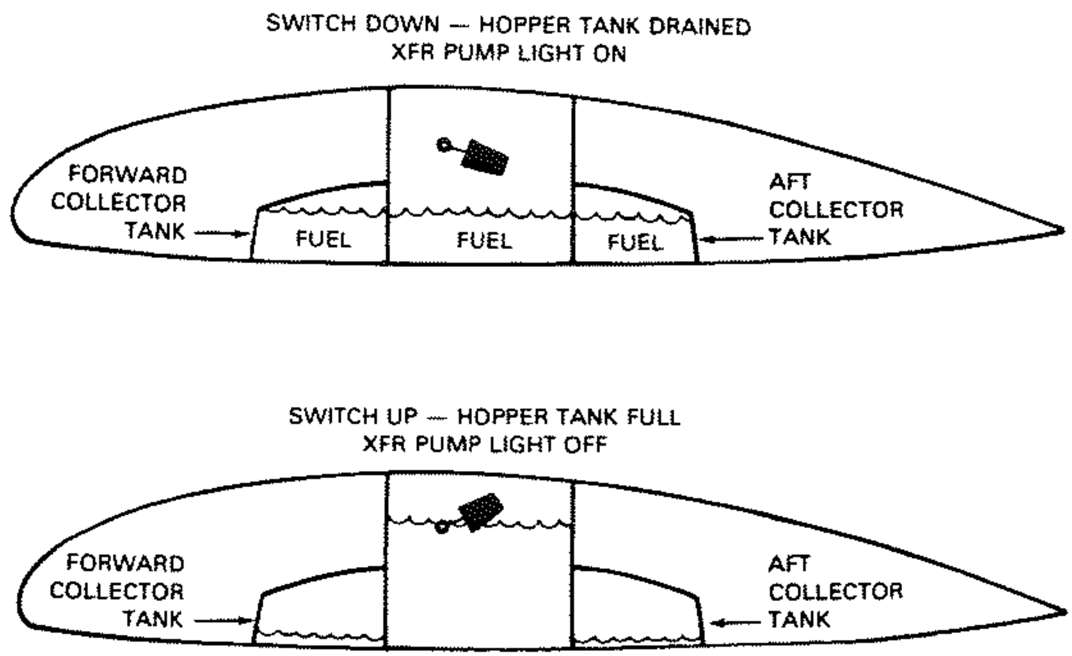
Two sump drain valves are located just outboard of wing station 27, forward of the boost pump access panel. On S/N T-336 and subsequent airplanes, another drain is located on the outboard side of each nacelle. The valves are used to drain accumulated water from the tank or may be used to drain residual fuel when defueling the tank.

A flush-mounted vent is located on the lower surface of the wing tip aft of the main spar. A vent balance line tees into the vent system and is routed along the entire length of the wing behind the rear spar.

JET PUMP SYSTEM

The jet pump system is used to lower the unusable fuel quantity from approximately thirteen gallons to two gallons. The system in each wing consists of two collector tanks, two jet pumps and a hopper tank. The two collector tanks and the hopper tank are the most inboard section of the fuel tank while the jet pumps are located in the dry center section immediately adjacent to the fuel tank. A float switch is installed in the hopper tank and is actuated by the level of fuel in the tank. Flapper valves in the hopper tank allow fuel flow into the tank but prevent reverse flow out of the tank.





SWITCH MOVEMENT SHOWN ROTATED 90° FOR CLARITY

JET PUMP SYSTEM
Figure VII-13

JET PUMP SYSTEM (continued)

Fuel pressure supplied by the operating boost pump is tapped off and supplied to the inlet side of each jet pump (see Figure VII-13). The suction side of each jet pump is connected to one of the collector tanks. The jet pump outlets empty into the hopper tank. Fuel flow through the jet pumps causes fuel to be drawn from the collector tanks and supplied to the hopper tank. The jet pump system has an efficiency factor of 1.5 or better (the jet pumps can fill the hopper tank 1.5 times as fast as the engine driven pumps drain the tank). A float switch in the hopper tank controls a XFR PUMP light on the annunciator panel. When the tank is full, the switch will be up and the light will be extinguished.

During normal operation the illumination of a left or right transfer pump warning light on the annunciator panel indicates that either one or both transfer pumps are inoperative and are incapable of maintaining the respective hopper tank at full capacity. Since the jet transfer pumps are operated by the boost pumps, the first action when a transfer pump warning light illuminates is to select the auxiliary boost pump. If this does not extinguish the warning light, the transfer pumps can be assumed to be inoperative and the unusable fuel for the affected tank will be 13.1 gallons (88 pounds at 6.7 pounds per gallon). On S/N T-336 and up, the unusable quantity is 14.9 gallons or 100 pounds. This corresponds to a fuel quantity gauge reading of 75 pounds. With transfer pumps inoperative, the flight should be adjusted to allow for the decreased usable fuel quantity.

The transfer pump warning lights will be illuminated during operation 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. With low fuel, the transfer pump warning lights will serve as low fuel warning lights. If a transfer pump warning light appears with less than 75 pounds of fuel, a landing should be made as soon as practicable or, if fuel is available in the opposite tank, the crossflow valve should be opened.

FUEL DISTRIBUTION

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 VII-13). Boost pump pressure is tapped off the supply line for use in the jet pump system. A fuel shutoff valve installed in each nacelle can be used to stop fuel flow to the engine. A fuel pressure transmitter is connected to the 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 low pressure 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 Shutoff Valve

A 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 corner of the wheelwell along the left hand keelson and the main 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.

Fuel Crossflow

The fuel crossflow system provides the aircraft with the capability of maintaining a fuel balance between integral wing tanks. The system consists of a two inch line that interconnects the wing tanks, a crossflow valve for regulating fuel flow from each tank, and a fuel drain for quick defueling of the aircraft. The line is located in the center section aft of the main spar and is accessible through panels in the wing center section.

The fuel crossflow valve is installed in the crossflow line that connects the wing tanks. It is located inboard of the left wing station 27, aft of the main spar, and accessible through panels in the wing center section. The gate-type valve is motor operated and controlled by a two-position switch on the control pedestal. Limit switches are incorporated in the valve to de-energize the motor when the gate reaches the fully open or fully 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, one fuel quantity indicator and a low level warning light (XFR PUMP) on the annunciator panel. The indicators, which house a bridge circuit, an amplifier, and servo motor, convert the tank sensor capacitance into a dial presentation of measured fuel quantity in hundreds of pounds. Test switches for each indicating system are mounted on the instrument panel. The low level warning light is activated by a float valve switch in each hopper tank.

The fuel quantity system uses the difference in capacitance between fuel and air to measure the amount of fuel in the tanks. Five capacitance sensing probes are located in each fuel tank. As the tank is filled, more of the probes are covered by fuel with a resultant change in capacitance. A cockpit installed indicator sums these changes in capacitance and displays them in pounds of fuel.

FUEL QUANTITY SYSTEM (continued)

Since the density (and therefore weight) of the fuel changes with temperature, the fuel quantity system, without compensation, would only by 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 each indicator is used to test each system. When the button is depressed, the indicator should move counterclockwise toward 0. If the button is released before the indicator needle reaches approximately the 5 o'clock position, the needle should return to the original fuel quantity indication. If the button is held until the needle is past the 5 o'clock position, the needle should continue in a counterclockwise direction until reaching the original fuel quantity. This procedure tests all the electrical and mechanical functions within the indicator.

FUEL QUANTITY SYSTEM—MECHANICAL

The fuel level indicator (magna-stick), a customer option for all aircraft, provides a means of mechanically obtaining the fuel quantity, in gallons, of each wing tank. The magna-stick is located on the underside of each wing tank just inboard of the wheelwells. A reading is taken by pushing up the lock tab, turning 90° in either direction, and allowing the indicating scale to drop down.

HYDRAULIC SYSTEM

The aircraft hydraulic system provides pressure to raise and lower the wing flaps and landing gear during normal operation, and to lower the landing gear by emergency means. Two variable displacement pumps, one driven by each engine, provide pressure for use in the main hydraulic system. A hand pump in the cockpit provides pressure for the auxiliary hydraulic system. A direct reading pressure gauge will show pressure in either the main or auxiliary system. Pressure distribution and control is accomplished by a hydraulic power pack. MIL-H-83282 hydraulic fluid is used.

HYDRAULIC POWER PACK

The hydraulic power pack, located in the left hand nacelle, stores fluid for use in the system 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 cylindrical portion of the pack is used to store fluid for use in the system. The hand pump is supplied from a sump in the fluid storage area; the engine driven pumps are supplied through standpipes. A shutoff valve is installed in the supply line to each engine driven pump.

MAIN HYDRAULIC SYSTEM

Main hydraulic pressure is tapped off the nose landing gear down line to power the nose steering actuator. On aircraft equipped with power brakes, main system hydraulic pressure is tapped off the nose landing gear down line to provide power to the brake system.

Operation

The engine driven hydraulic pumps deliver 2,000 psi to the hydraulic system. When gear or flap selection is made with cockpit switches, a solenoid actuated pilot valve on the power pack directs pump pressure 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 in 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 neutral position and trap the fluid. The uplock mechanism coupled with trapped fluid mechanically and hydraulically lock 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 engines are shut down and the battery switch turned off. Normal gear extension or retraction time is four to eight seconds. With one pump inoperative the time increases by two to three seconds.

In the event of failure of the main hydraulic system, fluid is drawn from the suction sump in the reservoir by actuating the emergency hand pump in the cockpit. A minimum of one quart of hydraulic fluid is available in the reservoir for exclusive use by the auxiliary system. The landing gear hand pump selector is rotated counterclockwise to the EMER GEAR position to divert fluid pressure to the down side of all gear right-hand actuators. A shuttle valve permits reading of auxiliary hydraulic pressure on the cockpit pressure indicator.

After releasing the uplocks with the landing gear emergency release lever and allowing the landing gear to free-fall to a down and locked condition, system pressure should be built up to 500 to 800 psi with the emergency hand pump. This hydraulic pressure provides additional assurance that the landing gear will remain in a positive down and locked condition for landing. A slow bleed-off of pressure may be noted after initially pumping up the pressure. The system pressure should be maintained above 500 psi through intermittent use of the hand pump. However should the pressure bleed to zero, the overcenter downlocks will hold the gear in the down and locked position.

With engine driven pump disabled, the shuttle valve located under the pilot's floorboards opens on the hand pump pressure side to display that pressure. The gauge pressure relief valve located under the pilot's floorboards serves to relieve any trapped pressure above normal system pressure. The low pressure switches located in the left wheelwell behind the firewall close at approximately 1,250 psi to illuminate low hydraulic pressure warning lights on the annunciator panel.

ACCUMULATOR

An accumulator is installed near the left side of the hydraulic pack to help smooth out pressure fluctuations within the system.

AUXILIARY SYSTEM

The auxiliary system consists of the 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 NORM GEAR position, the hand pump handle is blocked and pump outlet is connected to the inlet. With the selector valve in EMER GEAR position, the hand pump supplies pressure to lower the gear. The manual hydraulic pressure dump system is controlled by a handle located adjacent to the copilot's inboard seat track.

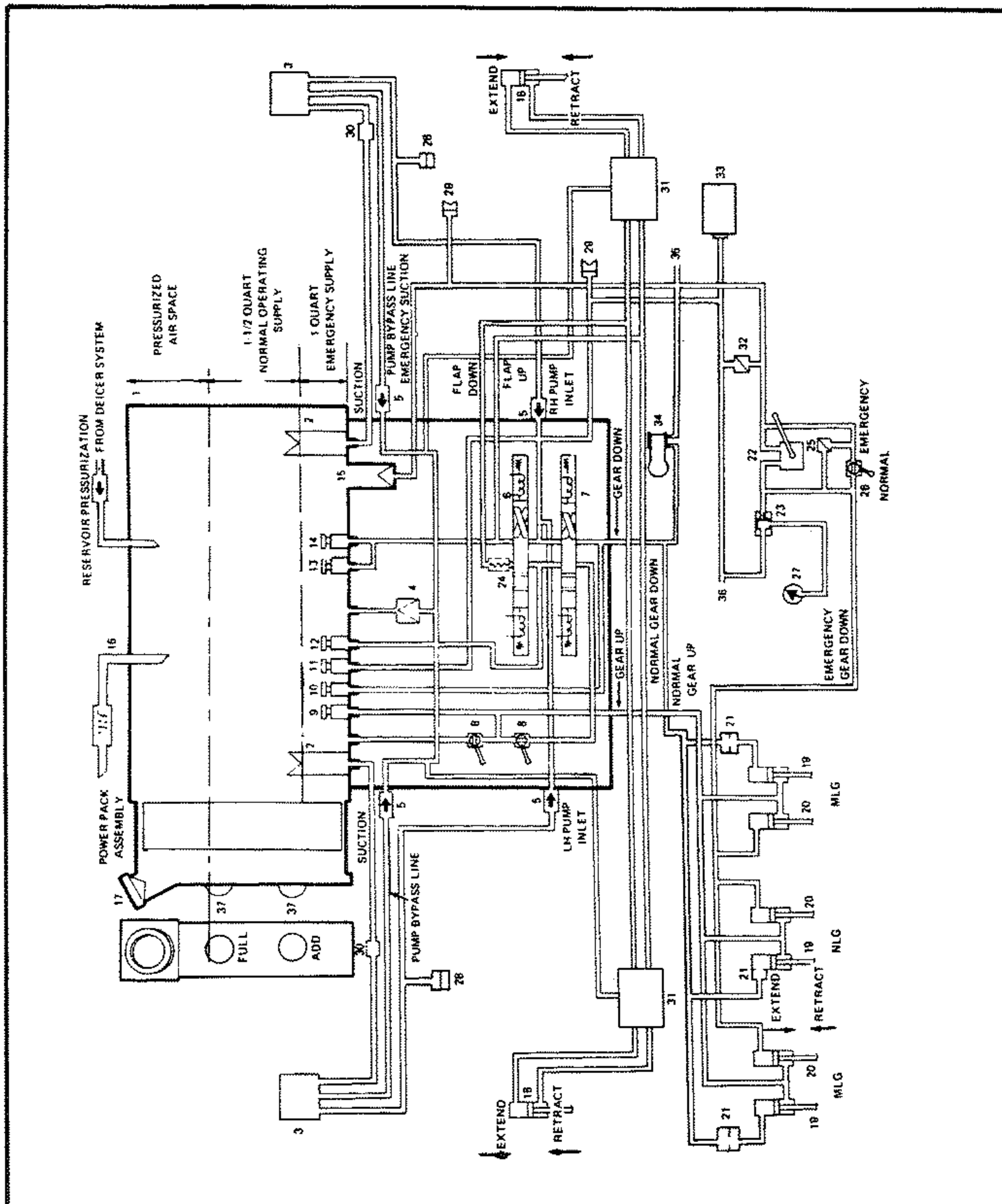
WARNING LIGHTS

Two warning lights on the annunciator panel and a direct reading pressure gauge 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.

1 HYDRAULIC FLUID RESERVOIR
2 PUMP SUCTION STANDPIPE
3 ENGINE DRIVEN HYDRAULIC PUMP
4 SYSTEM RETURN FILTER
5 ENGINE DRIVEN PUMP CHECK VALVE
6 FLAP POSITION SELECTOR VALVE
7 GEAR POSITION SELECTOR VALVE
8 GEAR BYPASS VALVE
9 GEAR UP THERMAL RELIEF VALVE
10 GEAR DOWN THERMAL RELIEF VALVE
11 SYSTEM RELIEF VALVE
12 FILTER RELIEF VALVE
13 FLAP UP THERMAL RELIEF VALVE
14 FLAP UP SUCTION CHECK VALVE
15 HAND PUMP SUCTION SUMP
16 PRESSURIZATION RELIEF VALVE
17 FLUID FILLER & SCREEN
18 FLAP ACTUATING CYLINDER
19 GEAR UP & NORMAL GEAR DOWN CYLINDER
20 GEAR UP & EMERGENCY GEAR DOWN CYLINDER
21 GEAR DOWN RESTRICTOR VALVE
22 EMERGENCY HAND PUMP (A)
23 SHUTTLE VALVE (I)
24 FLAP DOWN RESTRICTOR VALVE
25 HAND PUMP RELIEF VALVE (A)
26 LANDING GEAR SYSTEM SELECTOR VALVE (A)
27 PRESSURE GAUGE (I)
28 PRESSURE WARNING SWITCH (I)
29 EXTERNAL CONNECTION ASSEMBLY
30 SHUTOFF VALVE
31 FLAP CONTROL VALVE
32 PRESSURE RELIEF VALVE (I)
33 ACCUMULATOR
34 NOSE GEAR STEERING ACTUATOR
35 POWER BRAKE RETURN
36 POWER BRAKE PRESSURE SUPPLY
37 SIGHT GAUGES (1)

NOTE

Components designated (A) comprise the auxiliary system. Components designated (I) comprise the indicating system. All other components comprise the normal system.



HYDRAULIC SYSTEM SCHEMATIC
Figure VII-14

ICE AND RAIN PROTECTION

The airplane is supplied with electric deicing for the propellers, electrically heated pitot heads, electrically heated angle of attack vane, heated windshield panels for the pilot and copilot, pneumatic deicer boots with an automatic bleed air cycling system on wings and horizontal stabilizer, flush-mounted fuel vents, ice free static sources, and bleed air heated engine air intakes.

SURFACE DEICE SYSTEM (WING AND TAIL BOOTS)

Deicer boots are installed along each wing and on the horizontal stabilizers. A .010 ply of conductive neoprene is provided on the surface to dissipate static electric charges. The type 23S boots are lightweight construction and are provided with only one inflation port so that all tubes in any individual section are inflated simultaneously.

DEICER BOOT OPERATION

The deicer boot system is served by one distributor valve located in the forward center wing section, RH side. The distributor valve functions to apply pressure or vacuum to the deicer boots in a sequence selected by the electronic timer.

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 6 seconds.

2. All empennage boots are inflated for a period of 4 seconds, the wing boots deflating at this time.

3. System rests for 170 seconds, making the overall single cycle time 3 minutes.

The control switch, located on the pilot's switch panel is a three-way, center-off switch. Placing the switch forward in the AUTO position, boots will be automatically cycled by the electronic timer on the above 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 LH or RH 28.5 VDC essential buses, as selected. The transfer switch is normally switched to the LH 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 LH 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 LH essential bus. The sensing elements in each 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 cut off 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 LH essential bus and to the right windshield from the RH 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 LH essential bus to the RH essential bus in the event a LH 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.

PITOT AND SAS ANTI-ICE

Each of the pitot tubes, one on each side of the nose section near the aft end of the nose landing gear door, is electrically heated for anti-icing. Each pitot heater receives 28.5 VDC electrical power from its respective LH and RH essential bus. Two individual switches labeled PITOT & SAS 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 SAS angle-of-attack vane heater element. The PITOT HEAT position of either switch will only apply power to the individual pitot head heater.

A loadmeter is located on the LH console with a left-right selector switch for checking either the LH or RH pitot heat circuits, as selected.

The SAS^2 vane heat is also controlled by the pitot switches. Either switch, when moved to the PITOT & SAS HEAT position, will energize the SAS heat relay that supplies power to the SAS^2 vane heating element. A green SAS HEAT light on the annunciator panel will illuminate when power is applied to the SAS^2 heat relay.

ENGINE INLET ANTI-ICE

The engine inlets are anti-iced using compressor bleed air. Bleed air is extracted from a pad on the right hand side of the engine and routed to an anti-ice valve. From the valve the air is routed to the engine anti-ice systems and the nose cowl inlet lip.

The anti-ice valve incorporates limit switches to determine valve position. Two-three postion switches, ON, OFF, and TEST, installed in the cockpit are used to control power to the valves. When the respective switch is placed in the ON position, the anti-icing valve opens and causes the INTAKE HEAT light to illuminate. When the switch is placed in the OFF position, the valve closes and the light will extinguish. When the switch is placed in the spring-loaded TEST position, the annunciator light will illuminate if the valve is closed. If the annunciator light does not illuminate with the switch in the TEST position, the valve is stuck open or partially open.

The entire lower portion of the compressor air inlet is integral with the gear box and is kept free of ice accretion by heat transfer from the engine oil to the inlet surface.

WINDSHIELD WIPER SYSTEM

The windshield wiper system installation is an electro-mechanical system designed to aid visibility.

Electrical power is supplied by the LH essential bus for the pilot's system and by the RH essential bus for the copilot's system, 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 systems.

With electrical power on and the circuit breakers in, the system is activated by moving the rocker type control switch to the FAST position. The wiper will run at its maximum speed of approximately 250 strokes per minute when operated on wet glass. By placing the control switch in the SLOW position, the wiper system will operate at approximately one-half the speed of the FAST position. 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.

PROPELLER DEICE SYSTEM

The propeller deice system consists of two electrically heated heating elements bonded to each propeller blade, a slip ring assembly, 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 at timed intervals rather than continuously. Each propeller blade has two separate heating elements— one outer and one inner — mounted on the inboard area of each propeller blade. By heating all outer or all inner heating elements simultaneously on either propeller, rotational balance is maintained during the deicing, and current draw is held to approximately 17 — 21 amperes per propeller. The timer successively delivers current via the slip ring and brush-block to the outer heating elements and then the inner heating elements on the respective propeller. The timer does not have a "home" position. Heating may begin at any phase in the cycle depending on the timer position when the switch was turned off from 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 air stream. The thickness or weight of the ice build-up will vary the time required for complete deicing; however, the system may be used continuously while in flight if needed. When propeller deice is turned on, engine and nacelle inlet anti-ice are also activated as both systems are controlled by the same switches on the pilot's switch panel. Electrical power is supplied to the LH and RH propeller deice systems from the respective 28.5 VDC LH and RH essential buses.

ADDITIONAL ANTI-ICING FEATURES (NOT COCKPIT CONTROLLED)

Oil Cooler Inlet Scoop Anti-Icing

The leading edge of the external oil cooler inlet scoop is heated automatically for ice protection by hot scavenged engine oil. Scavenge oil pumped from the engine passes through the oil cooler inlet lip that forms the leading edge of the scoop. Heat transferred from the hot oil to the inlet lip keeps the inlet surface above freezing to prevent the formation of ice. The oil is then routed to the oil cooler before being returned to the oil tank. The scavenge oil is at its maximum temperature for anti-icing before being routed to the oil cooler.

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 LH 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 — 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.

Window Purge System

To prevent moisture and/or condensation from forming between the dual cockpit side windows and center windshield a window purge system has been installed.

Bleed air, tapped off the door seal inflation plumbing (18 psi), is routed to a water separator and filter assembly. A drain line from the water separator carries any accumulation of water to the lower fuselage drain; the water then drains overboard when the aircraft is not pressurized. The 18 psi air is also routed to a filter assembly.

The filtered air is then introduced between the panes of the windows. Exhaust holes in the inner pane of each window allows the air to escape into the cabin.

LANDING GEAR SYSTEM

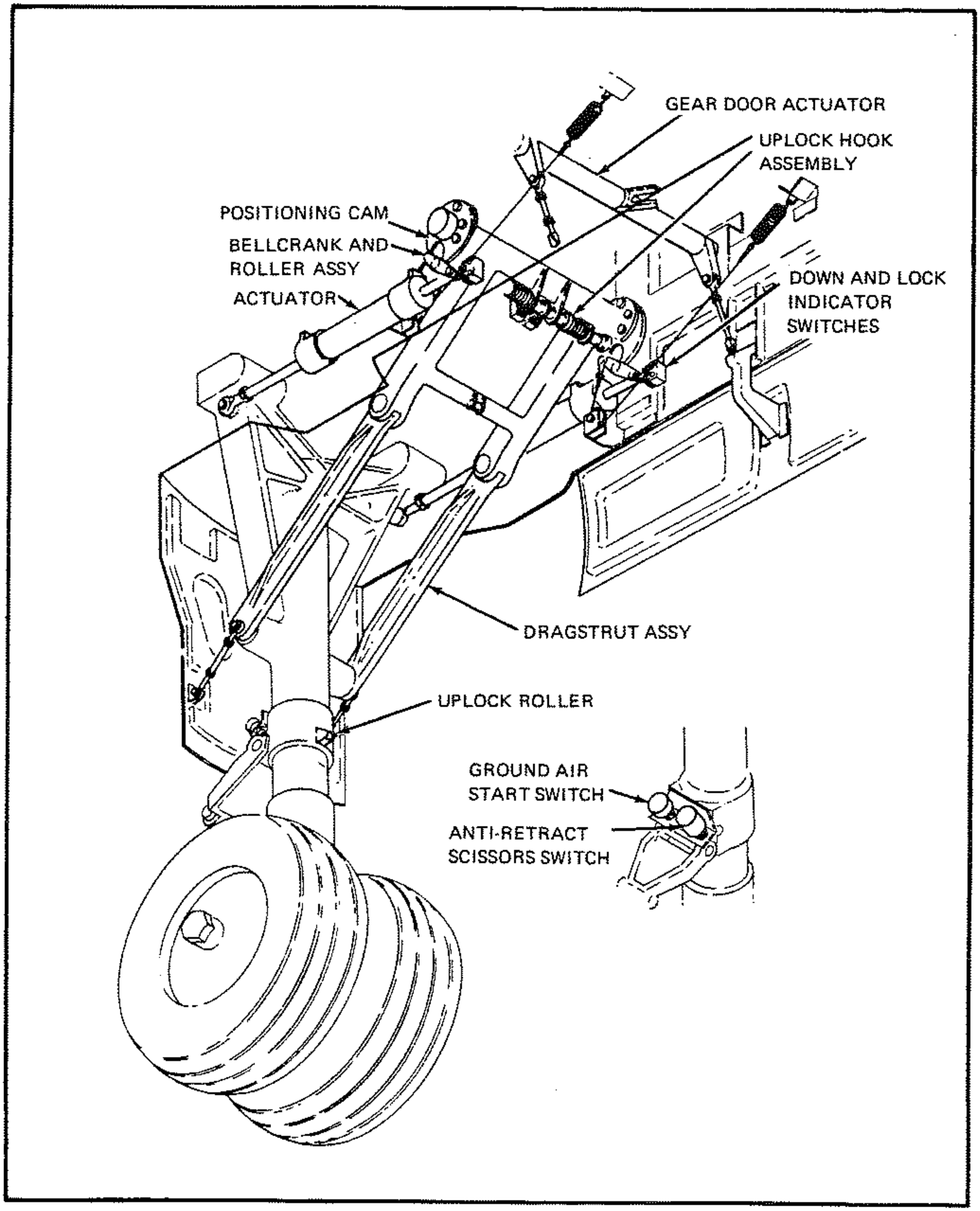
The airplane is equipped with fully retractable tricycle landing gear which incorporates air-oil shock struts and dual wheels. The main landing gear is attached to the wing nacelle structure and is retracted forward into the wheelwell. The nose landing gear is mounted immediately forward of the forward pressure bulkhead and it also retracts forward.

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 either the LH essential bus or the RH essential bus, as selected, to the landing gear selector valve mounted underneath the hydraulic power pack in the LH wheelwell. 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. Hydraulic pressure is directed to the LH actuator on each gear during normal gear extension and, by use of the hand pump, hydraulic pressure (if available) is applied to the RH actuator on each gear during emergency extension of the 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 disconnected from the selector valve. The selector valve moves to the closed (OFF) position, and a hydraulic lock exists in the actuator lines.

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 assembly attached to each actuator cylinder and a cam attached to each side of the dual drag strut. Normal hydraulic pressure, when available, is applied to the down side of the LH 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 selector valve closes, a hydraulic lock is formed. When the emergency hand pump is used, hydraulic pressure is applied to the down side of the RH actuator on each gear. Emergency hand pump pressure is not routed through the selector valve.

Provisions are installed for emergency free fall extension of the landing gear. The free fall can be supplemented by hand pumped hydraulic pressure if fluid is available. There is no provision for emergency retraction of the gear.



MAIN LANDING GEAR
Figure VII-15

MAIN LANDING GEAR STRUTS

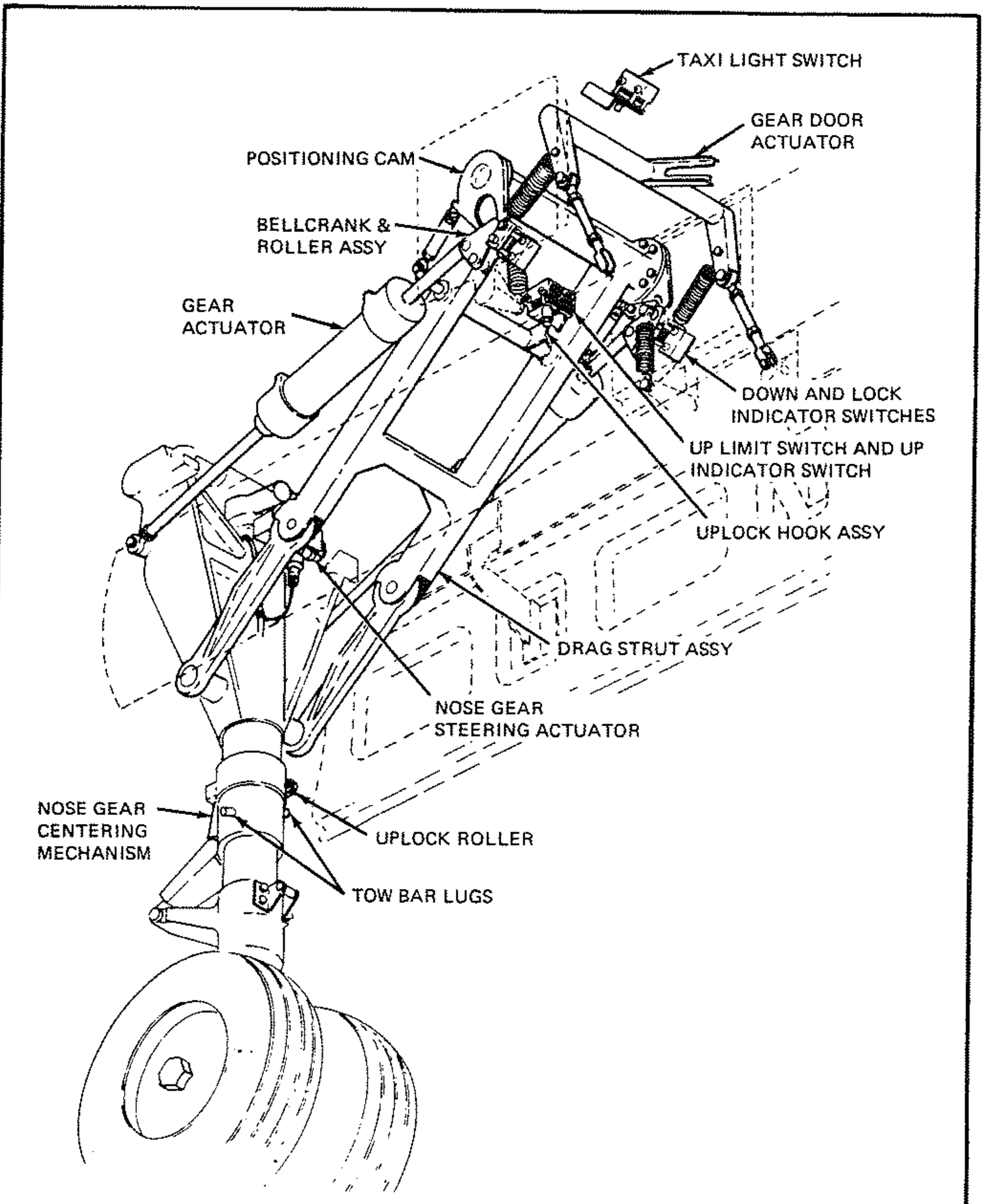
Each main landing gear strut essentially is two telescoping cylinders with enclosed ends. The two cylinders, when assembled together, form an upper and a lower chamber. The chambers are separated from each other by a floating piston. The lower cylinder is serviced with nitrogen and the upper cylinder is serviced with MIL-H-5606 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 and extension of the strut. This metering of the fluid through the orifice, plus the compression of the nitrogen in the lower chamber, provides the absorption and dissipation of the energy transmitted to the strut and controls the rate of vertical motion. Each strut contains a number of 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 shimmy damper, 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.

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 portion of the nose gear to the centered position.



NOSE LANDING GEAR
Figure VII-16

VARIABLE AUTHORITY NOSE WHEEL STEERING

A hydraulically powered, electrically controlled actuator is used for nose wheel steering. Controls for the system include a test switch, an arm switch, and a park button, all installed on the left hand console. A nose wheel steering button is installed on the left hand power lever.

During taxi, the arm switch is moved to the ARM position, the power lever button depressed, and the test switch moved to L or R. The steering should move briefly followed by the NOSE STEERING annunciator light beginning to blink. The blinking light indicates the electrical fault sensing system is operating properly. To test the actuator arming valve, depress the power lever steering button and move the arm switch to the spring-loaded VALVE TEST position. The NOSE STEERING light should illuminate but the steering should not be active.

For normal steering operations, the arm switch is moved to the ARM position, the power lever button is depressed, and the rudder pedals are moved to steer the airplane. Steady illumination of the NOSE STEERING light indicates the system is armed and the direction of the aircraft should respond to rudder pedal deflection. If more steering is required, the park button may be depressed which increases the maximum nose wheel deflection from 10 degrees to 63 degrees left or right. An electrical delay prevents abrupt transition to or from the parking mode. The nose wheel will not respond to rudder pedal deflection when the landing gear squat switches are closed by gear strut extension.

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 the LH essential bus or the RH essential bus via one of the nine bus transfer switches located on the cockpit LH console. Normally, the LH essential bus is selected. If a failure of LH essential bus power occurs, the circuitry should be switched to the RH essential bus. Loss of electrical power from both essential buses or loss of hydraulic pressure will require emergency extension of the gear.

The emergency gear extension system includes provisions for manual release of the mechanical uplocks, manual repositioning of valves to bypass the gear selector valve, and 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.

EMERGENCY EXTENSION OF LANDING GEAR (continued)

Before using the emergency extension procedures, the airplane should be slowed to maximum gear extension speed (176 KCAS) or lower. The landing gear handle should be placed in the DOWN position in case normal gear control returns. The emergency release lever, located on the cockpit floor adjacent to the LH side of the copilot's seat, is then moved counterclockwise to its stop (approximately 90 degrees). This action moves cables to release the mechanical uplock on each gear and also to 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 fall and their own weight plus the force of the airstream carry the gear to the down and locked position. After the gear has been allowed to free fall, hydraulic fluid, if available, is used via the hand pump 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. When this valve is rotated approximately 90 degrees counterclockwise, the hand pump bypass line is closed and the hand pump is unblocked. The hand pump can then be actuated to provide hydraulic pressure to the "down" side of the RH actuator at each landing gear (the LH actuators are used during normal gear extension).

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 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

The standard brake system installed on the airplane is operated manually by depressing the toe brake pedals mounted on the pilot's and copilot's rudder pedals. The force exerted on the brake pedals is transmitted to the respective wheel brakes via the brake hydraulic lines. Fluid for the system is supplied from a small brake system hydraulic reservoir mounted in the nose baggage compartment. The reservoir is serviced via a reservoir cap located on the exterior of the LH side of the nose baggage compartment. MIL-H-83282 hydraulic fluid is used. The hydraulic system for the brakes is completely independent of the main 2,000 psi hydraulic system used for landing gear and wing flap actuation.

The optional anti-skid/power brake system uses hydraulic pressure from the aircraft's hydraulic system. This system's reservoir is located in the nose baggage compartment. It stores enough hydraulic fluid for braking in the event of failure of the aircraft's hydraulic system. The reservoir is serviced via the aircraft's hydraulic system.

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, a rotating beacon, two ice lights, two landing lights, and a taxi light. Strobe lights are optional and, when installed, are powered from the LH essential DC bus. Tel-tail or logo lights are also optional and are powered from the nonessential bus.

All interior 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 right battery relay.

The edge lighted panel lights in the cockpit are powered by 6 VAC which is obtained from a step-down transformer connected to the RH 115 VAC bus. The pilot's flight instrument lights and amp lights are powered from the LH essential bus. The copilot's flight instrument lights are powered from the RH essential bus.

The remaining cockpit lights are powered from the nonessential bus.

LIGHTING SYSTEM—EXTERIOR

Navigation Lights

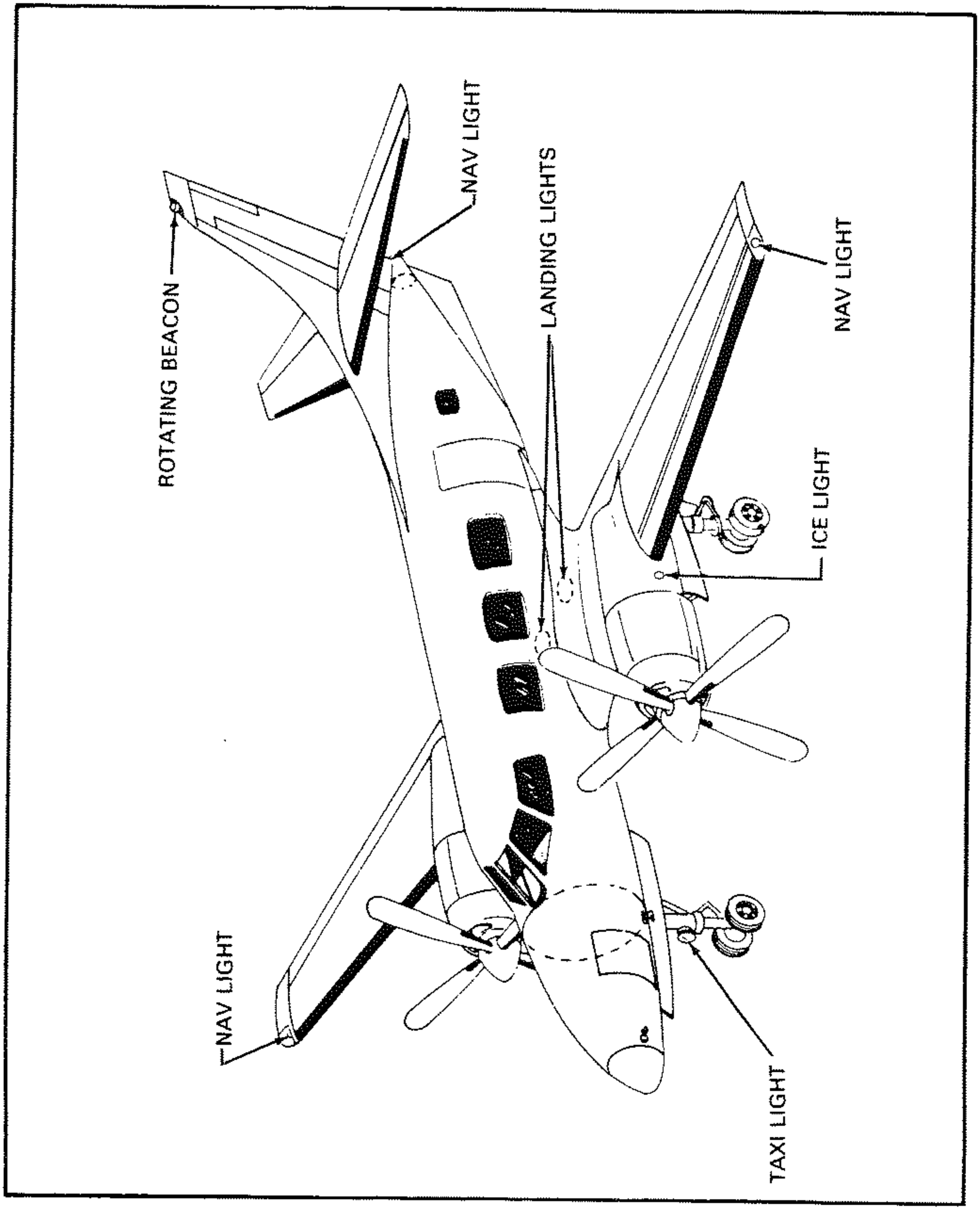
The navigation light circuitry consists of two RH wingtip lights (green), two LH wingtip lights (red), and one tailcone light (white). These lights are powered from the nonessential bus through a switch located on the LH switch panel.

Anytime the navigation lights are turned on, all green lights on the annunciator panel and on the landing gear position indicator are automatically dimmed.

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. Anytime 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.



EXTERIOR LIGHTING
Figure VII-17

Taxi Light (continued)

NOTE

- It is good practice to insure 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 turn 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.

Landing Lights

The landing light circuitry consists of two retractable light assemblies mounted in the center wing section of the aircraft, two relays located under the LH cockpit floor, and a control switch located on the pilot's switch panel.

Each landing light assembly is powered by the nonessential bus through 15 amp circuit breakers. When the landing light switch is selected to the ON position, both relays are energized and 28.5 VDC powers the lights.

Wing Ice Lights

The wing ice 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 5 amp circuit breaker.

Rotary Beacon Light

the rotary beacon is a lightweight, oscillating anti-collision light mounted on top of the vertical stabilizer. It has an aerodynamic shape to reduce drag and is shielded to prevent radio interference. The light is a dual lamp unit with the lamps oscillating 180 degrees out of phase.

The rotary beacon is energized from the nonessential bus through a 5 amp circuit breaker. It is controlled by a switch located on the pilot's switch panel. The beacon flashes at a rate of 60 to 100 flashes per minute.

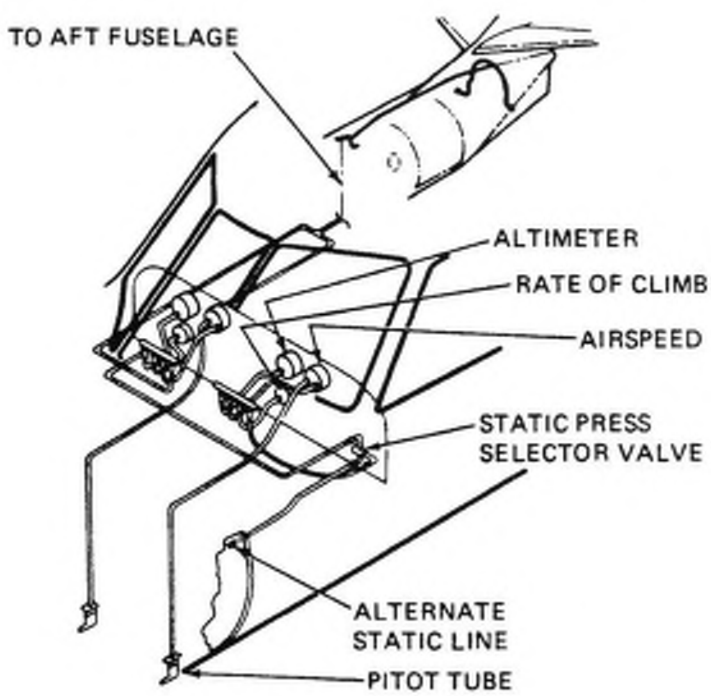
PITOT STATIC SYSTEM

A separate pitot mast is installed on the left and right side of the 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 LH switch panel forward of the pilot's control column. A loadmeter is located on the LH console with a left and right selector switch for checking the individual circuits for proper operation. A common balanced static system provides reference to the pilot's and copilot's rate-of-climb, altimeter, and airspeed indicators. One static reference button is located on each side of the fuselage aft of the passenger 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 LH 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 5 for error correction data when operating from the alternate static source.



PITOT STATIC SYSTEM
Figure VII-18

OXYGEN SYSTEM

The oxygen supply for crew and passengers is stored at 1800 psi in a 22 cubic foot oxygen cylinder located at the forward end of the nose baggage compartment. The system is equipped with a pressure regulator and a manually operated shutoff valve and will supply high pressure oxygen to a fully automatic continuous flow oxygen regulator located on the bottle.

Oxygen is delivered through a low pressure tubing system to flush mounted outlets located at each crew station and at each passenger station.

Diluter-demand masks are provided for the crew through a normal or 100% flow selector, while the passengers are supplied with continuous flow masks. A toggle switch located on the copilot's instrument panel controls a valve which supplies oxygen to the passenger compartment. The pilots have oxygen available regardless of the switch position.

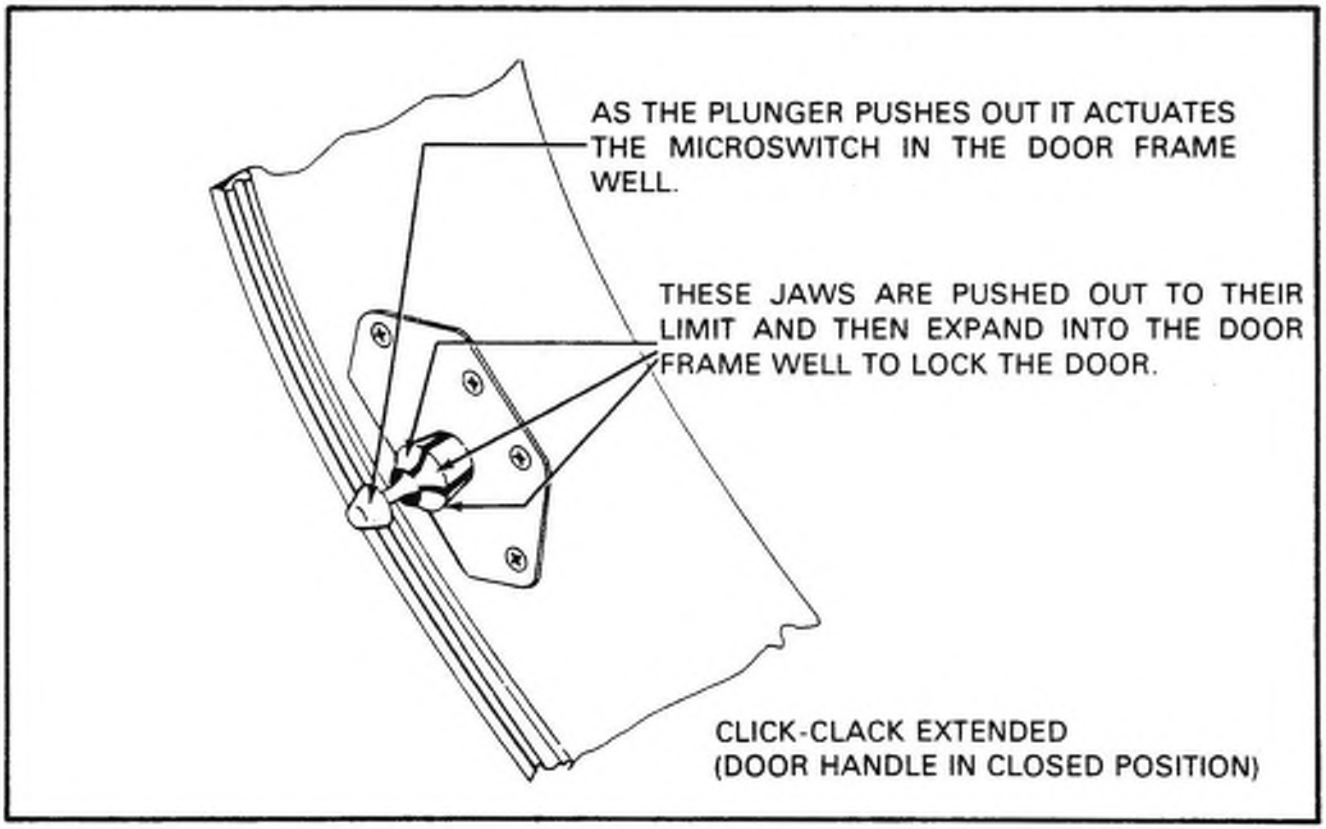
If a passenger mask hose nozzle is plugged into a cabin receptacle and the cockpit toggle switch is open, oxygen will flow through the receptacle and mask until the mask hose is unplugged or the supply valve is closed.

NOTE

- Oxygen will not flow to any of the mask hose receptacles if the manually operated valve at the supply bottle in the nose baggage compartment is in the OFF position.
- When flying at altitudes above 25,000 feet, it is recommended that the pilot wear his oxygen mask in readiness around his neck.
- Figure IV-2 shows the duration of fully charged oxygen systems with two pilots and various numbers of passengers using oxygen.

CABIN DOOR

The passenger entrance door is equipped with seven click-clack latches plus two alignment pins. The latches extend from the door into the door frame receptacles during the initial closing movement of the door handle. Continued movement of the door handle further extends the latches, expands the split barrel around the plunger, and secures each latch firmly into its receptacle in the fuselage door frame. A door warning light microswitch is installed in each receptacle to provide a ground for the warning light until the microswitch is opened by extension of the click-clack. All the microswitches are wired in parallel; hence a ground is provided to the door warning light on the annunciator panel if any one (or more) of the latches has not extended sufficiently to open its respective microswitch.



CLICK-CLACK
Figure VII-19

The latch assembly 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 CLICK-CLACK LATCHES ARE COMPLETELY RETRACTED INTO THE DOOR BEFORE ATTEMPTING TO CLOSE THE DOOR. ATTEMPTING TO CLOSE THE DOOR WITH A LATCH EXTENDED CAN CAUSE SERIOUS DAMAGE TO THE LATCH. 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.

POWER PLANT

The Merlin IIIB is equipped with two Garrett AiResearch TPE331-10U-501G or TPE331-10U-502G fixed-shaft turboprop engines rated at 900 shaft horsepower maximum continuous and takeoff power. At 100% engine RPM, the propeller rotates at 1591 RPM.

The major components of the engine power section consist of a two stage centrifugal compressor, an annular reverse-flow combustion chamber, and a three 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. This air exits the combustion chamber and is directed to the center of the first axial flow turbine. As the air flows outward over the axial flow turbine blades, the turbine 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 propeller gear case, the propeller, and various engine components. Labyrinth seals situated between the various turbine and compressor wheels prevent back flow of hot gases from one stage to another.

PROPELLER AND CONTROL

The propellers on the Merlin IIIB are oil operated, constant speed, full feathering and reversible, and are designed primarily for use with the TPE331 engine. 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, assisted by the blade counterweights, moves the blades from high to low pitch and, when needed, into reverse, and controls the blades in this area. The feathering spring moves the blades to feather when oil pressure is not present or is not greater than spring pressure.

Because the TPE331 engine has a fixed-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 centrifugal-mechanical start lock has been installed on each propeller blade. 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 Section 4 (NORMAL OPERATING PROCEDURES) for the procedure Before Start Propeller Unfeathering.

Feathering the propeller is accomplished by pulling the Engine Stop and Feather control. Unfeathering is accomplished by actuating the electrically driven unfeather pump.

Engine Controls

The engine controls consist of power levers, speed levers, negative torque sensing, single red line computer, and a temperature limiting system.

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-out, 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 lever is placarded Low RPM and High RPM. This lever sets the speed governors. When the power lever is in beta range, engine speed is controlled by the underspeed governor which limits speed between 69% and 96.5% ± .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 which limits speed between 96% and 100% RPM. The speed lever can reset the governor anywhere within this range.

Propeller Synchrophasing

Automatic propeller synchrophasing is provided through a rotary switch located on the left side of the center pedestal. The synchrophaser automatically matches the speed of the two propellers and also allows the pilot to select any desired phase angle relationship between the propellers. The initial clockwise movement of the switch from the OFF position results in synchronizing the propeller speeds. 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 initially turned on, an increase in RPM of up to 0.7% may be observed on both propellers. Further rotation of the control switch results in changing the phase angle relationship between the propellers with a resultant change in the perceived sound level and pitch.

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's should be closely matched by use of the speed levers before engaging the synchrophaser.

NEGATIVE TORQUE SENSING (NTS) SYSTEM

The negative torque sensing system operates automatically requiring no cockpit controls. The operational capability of the system should be checked before the first flight of the day. Negative torque occurs whenever the propeller drives the engine rather than when the engine drives the propeller. When negative torque is sensed, propeller pitch will automatically increase toward feather and reduce the drag of the windmilling propeller.

SINGLE RED LINE (SRL) COMPUTER

The single red line computer receives input information from various sources and provides a single red line that constantly corrects itself for changing conditions. This red line is used for setting maximum power. Its inputs are: compressor and inlet temperature, exhaust gas temperature, airspeed and altitude. With the SRL system, it is no longer necessary to compute power settings before they can be made.

TEMPERATURE LIMITER SYSTEM

The temperature limiter system consists of a temperature limiter control box installed in the nose and a fuel bypass valve installed on the engine. A maximum ET value is set in the control box (approximately 650°C). If engine ET begins to exceed this preset value, the control box supplies a signal to open the fuel bypass valve and reduce ET. A blue FUEL BYPASS OPEN light located near each ET indicator illuminates while the signal is being supplied to the valve. The temperature limiter receives ET 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 light extinguishes. This action should prevent an engine over-temperature condition should the SRL fail.

Temp limiter operation and fuel bypass light illumination operates 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 ET 650°C .... NORMAL OPERATION (FUEL IS BEING BYPASSED TO LIMIT ENGINE TEMPERATURE)
4. Bypass light illuminated in flight at ET 650°C .... NORMAL OPERATION (RETARD POWER LEVER UNTIL LIGHT IS EXTINGUISHED)

ENGINE INDICATING SYSTEMS

Torque Indicating

One torque indicator for each engine is located on the instrument panel. It receives an electrical signal from a transducer mounted near the engine and converts the signal into a percentage value. The torque indicator could be compared to an accurate voltmeter with appropriate face markings to indicate torque.

RPM Indicator

One RPM indicator for each engine is located on the instrument panel and consists of a synchronous motor which runs in synchronization with the tachometer generator. The indicator is independent of the aircraft electrical system.

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 two indicators located on the instrument panel and a pressure transmitter located forward of each main landing gear wheelwell.

Oil Pressure Indicator

Each engine has an oil pressure transmitter and an oil pressure indicator. Oil pressure transmitters are located forward of each main landing gear wheelwell and are conected to the oil pressure sensing port located on the aft LH side of the engine input housing.

Oil Pressure Warning

Each engine is equipped with an oil pressure switch and a low oil pressure warning light located on the annunciator panel. Low pressure switches are located forward of each main landing gear wheelwell and are supplied from the line feeding the oil pressure transmitters. The pressure switches are set to close at 40 psi.

Oil Temperature Indicating

Each engine is equipped with an oil temperature bulb and an oil temperature indicator. The indicators, located on the instrument panel, are hermetically sealed. The oil temperature bulb is a standard resistance type bulb installed in the oil temperature port on the center rear face of the engine input housing assembly.

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 to illuminate for the respective engine alerting the pilot to the existing condition.

ENGINE OIL SYSTEM

The engine oil system provides lubrication and cooling of engine parts and accessories, control of the propeller, and operation of the 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.

Engine oil is contained in a 3.6 U.S. quart tank located on the left side of each engine on the firewall section. An access door is provided on each nacelle for servicing. Each filler neck cap incorporates a dip stick for checking quantity.

One U.S. quart will service the system from the add mark to the full mark on the dip stick. 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 valves close and the oil pumps will return to normal operation allowing oil pressure to be generated.

A clogged oil filter and bypass open is indicated by a pop-out pin located on the left side of the gear box. If the pop-out pin is flush, the filter is operating normally. If the pin is popped out, the filter is being bypassed. After maintenance has corrected the cause of the filter bypass, the pin can be reset by pushing it back in.

IGNITION SYSTEM

The ignition system consists of two igniters in each engine, a capacitor discharge ignition coil, a three position ignition switch, and an amber ignition on light adjacent to each ET indicator.

With the ignition switches positioned to NORM, ignition is only supplied to the engine during the automatic start cycle (between 10% and 60% RPM). This mode is provided for use during normal ground operations. With the switches positioned to CONT, ignition is supplied to the engine continuously as long as main landing gear squat switches are in the ground position. This mode is provided for use during takeoff or landing on wet or slush covered runways when water ingestion is possible. With switches positioned to OVRD, ignition is supplied to the engine continuously regardless of landing gear squat switch position. This mode is provided for use in the event inadvertent icing is encountered during flight. Excessive operation of this system in CONT or OVRD modes will shorten igniter plug life.

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; fuel is directed to the engine mounted fuel pump through a filter to the high pressure pump. The high pressure pump output 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 assemblies 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 RH side of each engine. When the start cycle is completed, the unit is switched to generator mode to provide DC power when selected.

Batteries

The two nickel-cadmium batteries that power the start system are rated at 25 ampere hours each at the 5 hour rate. Both batteries are mounted in the radome.

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 an APU 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.

PILOT'S OPERATING TIPS

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 and demonstrating to pilots to recognize the low speed, single engine, handling qualities and performance of the MERLIN IIIB. 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 depressing the stop button, 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.

Swearingen Aviation Corporation recommends that the inherent safety margins of simulating engine failure rather than actually rendering it inoperative be used during pilot transition and check out.

INTENTIONAL ONE ENGINE INOPERATIVE SPEED (V_{SSE}) (continued)

If it is deemed necessary to intentionally render an engine inoperative for pilot training or check out, the following conditions define the circumstances under which the chosen V_{SSE} is valid.

PRIOR TO INTENTIONAL ENGINE FAILURE

Airport Pressure Altitude . . . . 5,000 FEET MAXIMUM
Minimum Altitude. . . . . 100 FEET ABOVE GROUND
Both Engines. . . . . TAKEOFF POWER
Landing Gear. . . . . RETRACTING OR RETRACTED
Wing Flaps. . . . . TAKEOFF
Gross Weight . . . . 12,500 POUND MAXIMUM
Bleed Air. . . . . ON
Airspeed (V_{SSE}) . . . . 125 KIAS MINIMUM

NOTE

- The right engine is the critical engine and will create the more challenging directional control problem if it is rendered inoperative.
- Retarding the power lever of the inoperative engine aft of the quadrant switch will disable the rudder bias system.
- 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.

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} (SEE FIGURE V–14)

AFTER INTENTIONAL ENGINE FAILURE (continued)

WARNING

AT NEAR MAXIMUM GROSS WEIGHT AND AT HIGH DENSITY ALTITUDES, ALTITUDE MUST BE SACRIFICED TO ACCELERATE FROM V_{MCA} TO V_{YSE}.

CAUTION

- REPEATED INTENTIONAL FLAME OUTS 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

- Provided that the airplane is no lower than 1,000 feet above the ground and that it is light enough to maintain regulatory terrain clearance, it is permissible to slow from V_{SSE} to V_{MCA}.
- 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.

INTENTIONAL ONE ENGINE INOPERATIVE SPEED IS

125 KIAS

REVERSE TAXI OPERATIONS

The propeller pitch control on the −502G engine allows the propeller blades to reach −6° blade angle when operating in maximum reverse thrust. This blade angle permits reverse taxi operations at all ramp weights and provides a ground maneuvering capability that is not attainable with the −2° reverse blade angle available with the propeller pitch control on −501G engines.

At the maximum ramp weight of 12,600 pounds, 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.

ENGINE GROUND STARTS WITH HIGH RESIDUAL ET

When a normal engine ground start is attempted soon after engine shutdown while residual ET is above 200°C, a very rapid increase in ET at light-off, sometimes accompanied by an explosive noise, may occur. In order to avoid such temperature shock to the engine, the following procedure is recommended:

> Prior to depressing the start button, hold the starter test switch until the residual ET is below 200°C or RPM is 15%, whichever occurs first. 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.

ENGINE FLAMEOUT DUE TO ICE SHEDDING FROM PROPELLER SPINNERS

When accumulated ice is shed from the propeller spinners, propeller blades, or from the engine inlet lip, ice entering the engine inlet may cause flameout. Ice shedding can be caused by an excessive build-up causing the ice mass to break away, or when warmer temperatures are encountered. When there is a threat of ice shedding, the following procedures are recommended:

For those airplanes with CONTINUOUS/OVERRIDE ignition installed:

1. Left and Right Ignition Mode Switches.......................................OVRD

> **NOTE**
>
> If ice accumulation on propeller spinners cannot be observed, similar ice accumulations can be seen on the leading edge of the cockpit side windows, windshield, windshield wipers and wing leading edge.

After ice has shed from these areas then proceed as follows:

2. Left Ignition Mode Switch ....NORM

When Continued Left Engine Operation Is Assured:

3. Right Ignition Mode Switch ....NORM

ENGINE FLAMEOUT DUE TO ICE SHEDDING FROM PROPELLER SPINNERS (continued)

If engine flameout should occur due to ice shedding from propeller spinners:

EMERGENCY 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 ABOVE FLIGHT IDLE (WARNING HORN SILENCED)
2. Speed Lever .... APPROXIMATELY 96% RPM
3. Airspeed .... BETWEEN 180 AND 100 KIAS
4. RPM .... BETWEEN 60% AND 10%
5. Engine Start Button .... DEPRESS MOMENTARILY

NOTE

- Hold 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 – ΔP/P switch is in the OFF position.

6. EGT .... MONITOR (770°C MAXIMUM)
7. RPM .... STABILIZED
8. SRL OFF Light .... CHECK OFF
9. Power .... RESET AS REQUIRED

PILOT'S OPERATING TIPS

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.

OPERATIONS WITH STANDING WATER, SLUSH, OR WET SNOW ON THE RUNWAY

Standing water, slush, and wet snow all appear to affect airplane 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 airplane, 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 airplane 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 flame-out.

The results of numerous studied shoe that the speed at which the tire lifts off the pavement and hydroplanes is closely predicted by the relation $V_p = 9 \sqrt{p}$, where Vp is the hydroplaning speed (knots) and p is the tire inflation pressure (psi). For SA226 airplanes equipped with Chine nosewheel tire inflated to 50 psi, nose wheel hydroplaning will start at about 64 knots.

Exact data on the changes in airplane performance caused by runway coverings are not available. The amount of performance deterioration is a function of both runway conditions and airplane configuration. For takeoff, it is recommended that the precautions outlined in FAA Advisory Circular 91–6A be observed, and that the required takeoff runway length be increased by at least 30% for depths up to one inch of standing water, slush, and/or wet snow. When the depth of these coverings extends over an appreciable part of the runway and exceeds one inch, takeoff should not be attempted. For landing, a minimum of 30% additional runway should be allowed for a wet or slippery runway.

NOISE CONTROL

Many people don't enjoy 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. The following procedures will lessen the noise perceived by both those on the ground and your passengers.

Minimum Normal Operating Power (MNOP) is defined as:

98% rpm and
100% torque or 650°C EGT,
whichever is encountered first

TAKEOFF AND CLIMB

1. Maintain T.O. power until reaching 400 ft. AGL and V_Y.
2. Reduce power to max cruise (MNOP).
3. Maintain MNOP until 2,000 ft. AGL. Then continue to climb with MNOP (cruise) power set or increase power to MCP if required/desired for better climb performance.

ENROUTE

When practical, avoid low flight over noise-sensitive areas, and maintain at least 2,000 ft. AGL.

APPROACH

Delay resetting RPM from cruise to 100% (HIGH) until after gear and 1/2 flaps are down. Conditions permitting, delay RPM increase until the flaps are fully extended.

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TABLE OF CONTENTS
HANDLING, SERVICE, AND MAINTENANCE

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FAA APPROVED AIRPLANE FLIGHT MANUAL
REISSUE B
S/N T(B)-276 AND T(B)-292 AND SUBSEQUENT

LIST OF EFFECTIVE PAGES

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INTRODUCTION

The Merlin IIIB is delivered with a full complement of Technical Manuals necessary for maintaining the airplane in an airworthy conditon. Maintenance and servicing should be accomplished by qualified personnel following the prescribed procedures contained in these manuals.

PUBLICATIONS FURNISHED

- Maintenance Manual
- Illustrated Parts Catalog (IPC)
- Service Information Manual
- Structural Repair Manual
- Inspection Procedures Manual
- Wiring Manual
- Component Maintenance Manual
- Service Center Directory
- Flight Manual/Operating Handbook
- Revisions To Manuals

SERIAL NUMBER

The airplane serial number is contained on a placard located on the forward upper rim of the main cabin door.

GROUND HANDLING

Refer to the Maintenance Manual for information on towing, parking, tie down and mooring, jacking and leveling, and prolonged out of service care.

SERVICING

Refer to the Service Information Manual or Maintenance Manual (as applicable) to find information concerning servicing of: fuel, fuel additive, oil, hydraulic, brakes, oxygen, tires, landing gear struts, refreshment facilities, and toilet.

CLEANING AND CARE

Refer to the Service Information Manual or Maintenance Manual (as applicable) for information concerning cleaning or washing of: exterior – painted surfaces, propellers, engines, windshields, shiny part of shock strut; interior – wood surfaces, metal surfaces, cloth surfaces, leather surfaces, plastic trim, carpets, refreshment facilities, and toilet.

RECOMMENDED CLEANING AGENTS

Refer to the Service Information Manual for information concerning cleaning agents.

SERVICE POINTS

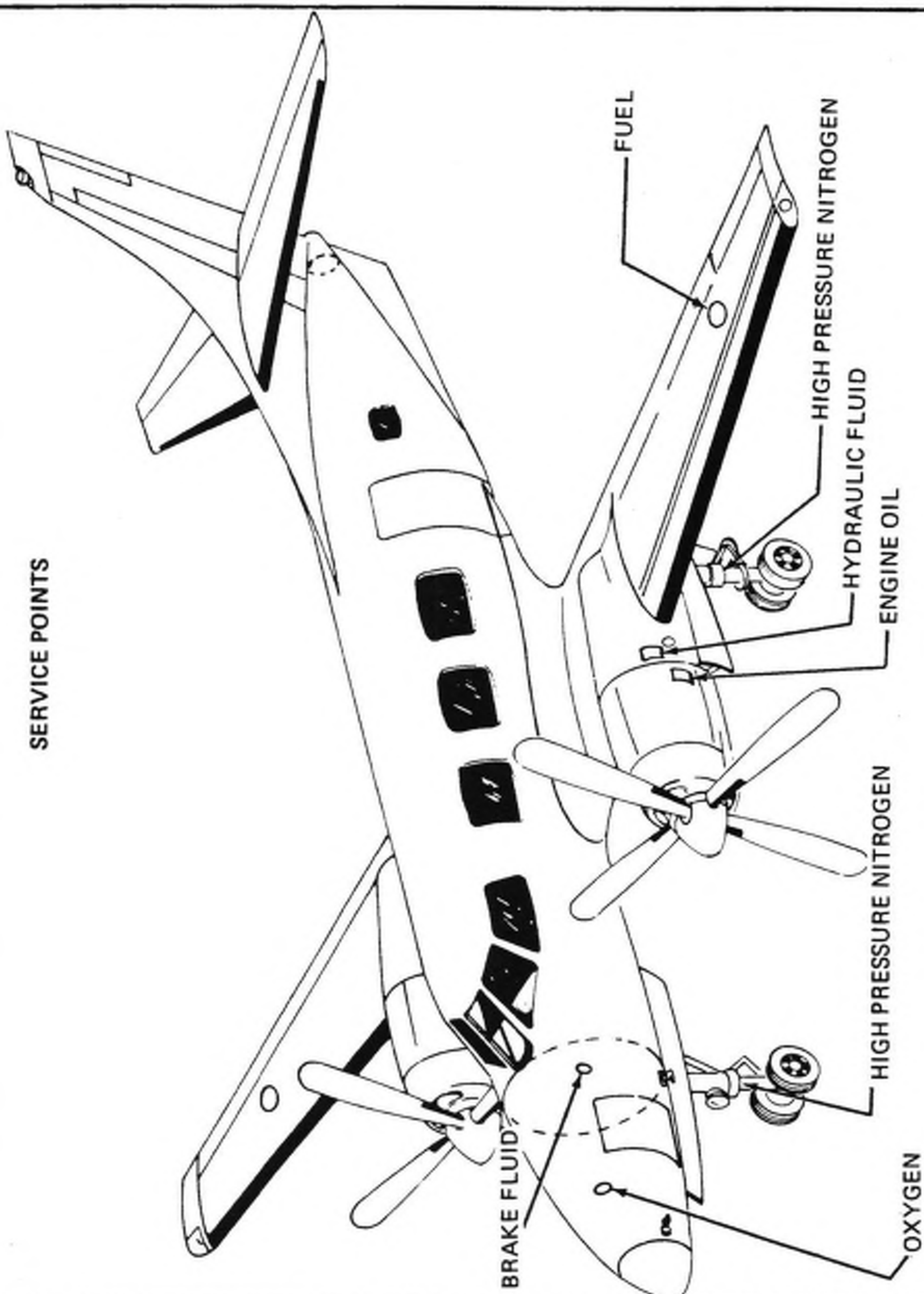

Figure VIII–1

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INTRODUCTION

Section 9 of this manual contains supplements necessary for the safe operation of optional components that may be installed on the basic airplane. 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.

Supplements will be included in this section as they pertain to specific aircraft.

Pages in this section that are FAA approved are so identified.

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Garmin International, Inc.
1200 E. 151st Street
Olathe, Kansas 66062 U.S.A.

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for the
Garmin GTX 33X and GTX 3X5 Transponders with ADS-B
as installed in

Swearingen SA-226T
Make and Model Airplane

Registration Number: N616PS Serial Number: T316

This document serves as an FAA Approved Airplane Flight Manual Supplement or Supplemental Airplane Flight Manual when the GTX 33X or GTX 3X5 with ADS-B is installed in accordance with Supplemental Type Certificate SA01714WI. This document must be incorporated into the FAA Approved Airplane Flight Manual or provided as an FAA Approved Supplemental Airplane Flight Manual.

The information contained herein supplements the FAA approved Airplane Flight Manual. For limitations, procedures, loading and performance information not contained in this document, refer to the FAA approved Airplane Flight Manual, markings, or placards.

FAA Approved By: JR Brownell

JR Brownell
ODA STC Unit Administrator
Garmin International, Inc.
ODA-240087-CE

Date: 6/16/2021

LOG OF REVISIONS				
	Page			
Revision Number	Date	Number	Description	FAA Approved
1	05/01/2013	All	Complete Supplement	*Robert Murray* Robert Murray ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *05/01/2013*
2	03/08/2016	All	New supplement format with GTX 3X5 added.	*Michael Warren* Michael Warren ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *03/08/2016*
3	12/07/2017	All	Updated SW versions and removed section 3.2.3. Updated section 2.2 Corrected PED FAR reference and additional minor corrections.	*Erik Frisk* Erik Frisk ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *12/21/2017*
4	09/09/2019	4, 6, 7, 9, 11, 13, 14, 18	Added GTX diversity units, updated SW versions, expanded allowed remote control panels, and incorporated other minor changes	*JR Brownell* JR Brownell ODA STC Unit Administrator Garmin International, Inc. ODA-240087-CE Date: *09/09/2019*
5	06/16/2021	10, 11, 14, 18	Updated GTX 3X5 Main software to version 2.60, added GI 275 as a control display and GPS 175/GNC 355 as a GPS source	See cover page 1

Table of Contents

Section 1. GENERAL

1.1 GTX 33X

The Garmin GTX 33X family consists of the GTX 330 ES and GTX 33 ES (Non-Diversity Mode S Transponders) and the GTX 330D ES and GTX 33D ES (Diversity Mode S Transponders). The ES option of any of the transponders provides ADS-B extended squitter functionality.

All Garmin GTX 33X transponders are a radio transmitter/receiver that operates on radar frequencies, receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. Each unit is equipped with IDENT capability to initiate the SPI (special position identification) pulse for 18 seconds and will reply to ATCRBS Mode A, Mode C and Mode S All-Call interrogation. Interfaces to the GTX 33X are shown in the following block diagrams.

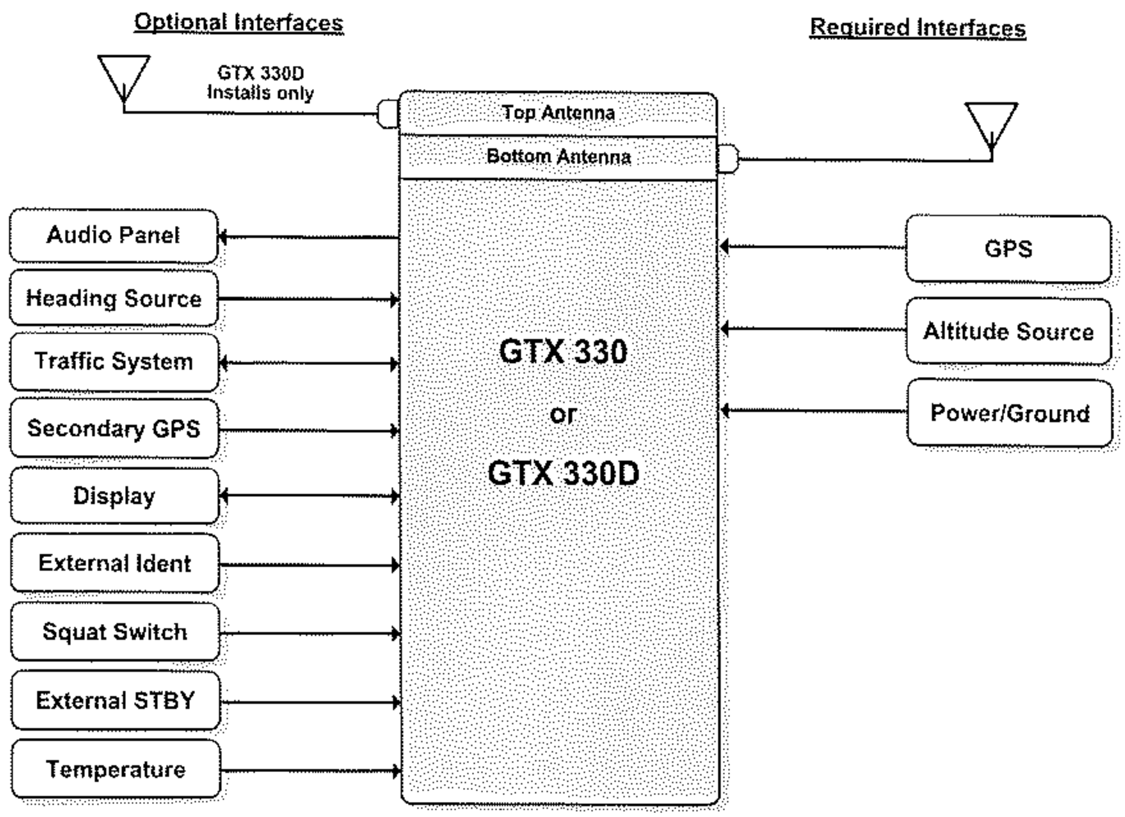

Figure 1 – GTX 330 or GTX 330D Interface Summary

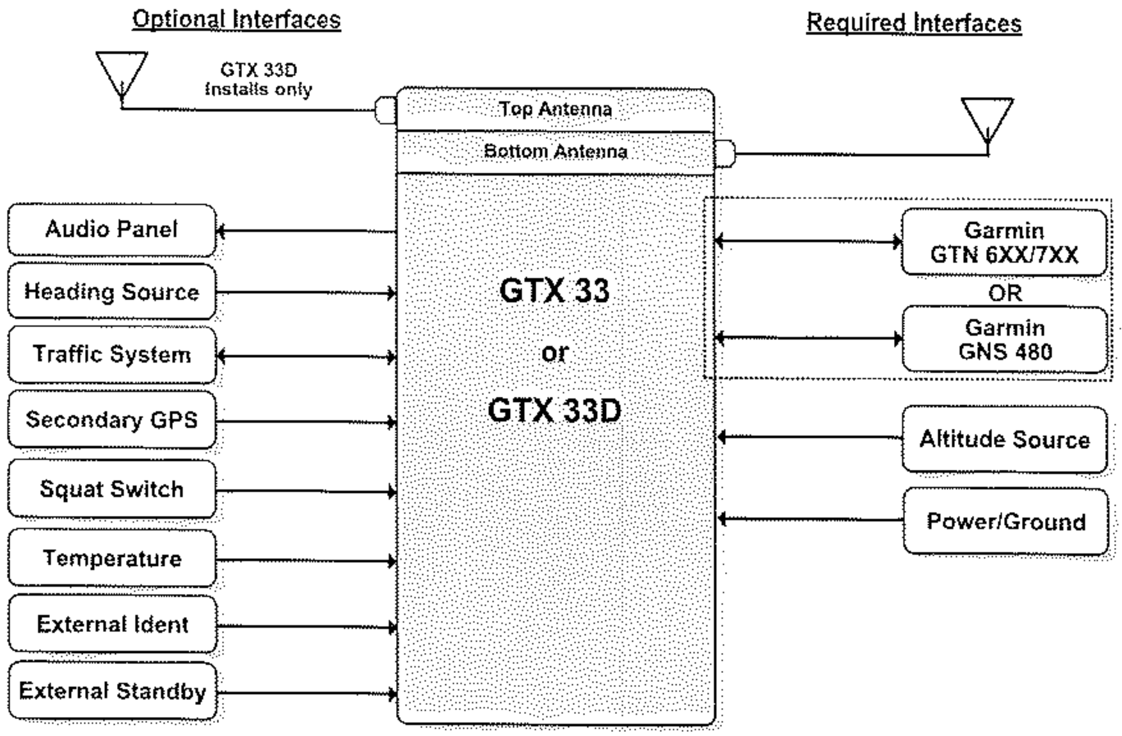

Figure 2 – GTX 33 or GTX 33D Interface Summary

The GTX 33X performs the following functions:

- Transmission of ADS-B out data on 1090 extended squitter (1090 MHz)
    - Integration of data from internal and external sources to transmit the following data per 14 CFR 91.227:
        - GPS Position, Altitude, and Position Integrity
        - Ground Track and/or Heading, Ground Speed, and Velocity Integrity
        - Air Ground Status
        - Flight ID, Call Sign, ICAO Registration Number
        - Capability and Status Information
        - Transponder Squawk Codes between 0000-7777.
        - Emergency Status
        - IDENT - initiates SPI (special position identification) pulse for 18 seconds
    - Pressure Altitude Broadcast Inhibit
- Reception of TIS-A traffic data from a ground station
- Provides TIS-A traffic alerting to the pilot via interfaced display and audio output

1.2 GTX 3X5

The Garmin GTX 3X5 family consists of the GTX 335, 335D, 335R, 335DR, 345, 345D, 345R, and 345DR transponders. The functional differences between each of these transponders are described in Table 1. Transponder models with a "D" designation are diversity capable and support both a top fuselage and bottom fuselage antenna.

Function	GTX 335/ 335D	GTX 335 w/GPS	GTX 335R/ 335DR	GTX 335R w/GPS	GTX 345/ 345D	GTX 345 w/GPS	GTX 345R/ 345DR	GTX 345R w/GPS
Panel mount	x	x			x	x		
Remote mount			x	x			x	x
Mode S	x	x	x	x	x	x	x	x
ADS-B (out)	x	x	x	x	x	x	x	x
ADS-B Traffic					x	x	x	x
FIS-B					x	x	x	x
Internal GPS		x		x		x		x
Bluetooth					x	x	x	x
Optional Garmin Altitude Encoder	x	x	x	x	x	x	x	x

Table 1 – GTX 3X5 Unit Configurations

Interfaces to the GTX 3X5 are shown in Figure 3.

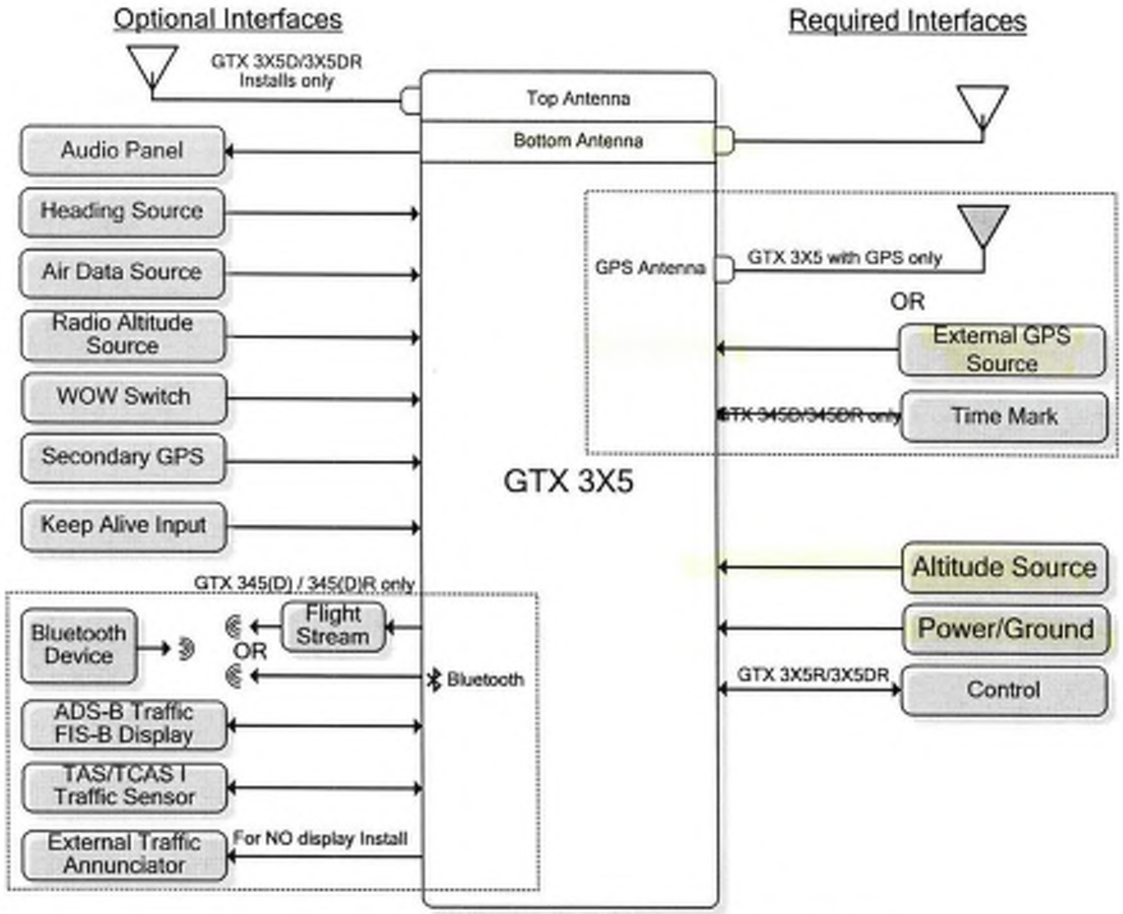

Figure 3 – GTX 3X5 Interface Summary

The GTX 3X5 performs the following functions:

- Transmission of ADS-B out data on 1090 extended squitter (1090 MHz)
  - Integration of data from internal and external sources to transmit the following data per 14 CFR 91.227:
    - GPS Position, Altitude, and Position Integrity
    - Ground Track and/or Heading, Ground Speed, and Velocity Integrity
    - Air Ground Status
    - Flight ID, Call Sign, ICAO Registration Number
    - Capability and Status Information
    - Transponder Squawk Codes between 0000-7777.
    - Emergency Status
    - IDENT - initiates SPI (special position identification) pulse for 18 seconds
  - Pressure Altitude Broadcast Inhibit

The GTX 335 performs the following additional functions:

- Reception of TIS-A traffic data from a ground station
- Provide TIS-A traffic alerting to the pilot via interfaced display and audio output.

The GTX 345 performs the following additional functions:

- Reception of ADS-B In data on 1090 MHz
    - ADS-B (Data directly from another transmitting aircraft)
    - ADS-R (Rebroadcast of ADS-B data from a ground station)
- Reception of ADS-B In data on UAT (978 MHz)
    - ADS-B (Data directly from another transmitting aircraft)
    - ADS-R (Rebroadcast of ADS-B data from a ground station)
    - TIS-B (Broadcast of secondary surveillance radar) (SSR) derived traffic information from a ground station.
    - FIS-B (Broadcast of aviation data from a ground station)
- Provide ADS-B traffic information and alerting to the pilot via an interfaced display
    - Correlation and consolidation of traffic data from multiple traffic sources
    - Aural and visual traffic alerting
- Provide FIS-B data to the pilot via an interfaced display
    - Graphical and textual weather products
        - NEXRAD
        - PIREPs
        - AIRMET/SIGMETs
        - METARs
        - TAFs
        - Winds Aloft
    - Aviation Data
        - TFRs
        - NOTAMs

1.3 Capabilities

The Garmin GTX 33X and GTX 3X5 as installed in this aircraft have been shown to meet the equipment requirements of 14 CFR § 91.227 when operating in accordance with sections 2.1 and 2.2 of this supplement.

1.4 Installation Configuration

This aircraft is equipped with a GTX 33X and/or GTX 3X5 with the following interfaces/ features:

Equipment Installed:

Transponder #1	Transponder #2 (if installed)
☐ GTX 330	☐ GTX 330
☐ GTX 330D	☐ GTX 330D
☐ GTX 33	☐ GTX 33
☐ GTX 33D	☐ GTX 33D
☒ GTX 335	☐ GTX 335
☐ GTX 335D	☐ GTX 335D
☐ GTX 335R	☐ GTX 335R
☐ GTX 335DR	☐ GTX 335DR
☐ GTX 345	☐ GTX 345
☐ GTX 345D	☐ GTX 345D
☐ GTX 345R	☐ GTX 345R
☐ GTX 345DR	☐ GTX 345DR

Interfaced GPS/SBAS Position Source(s):

GPS #1

- ☐ Internal
- ☐ GTN 6XX/7XX Series
- ☒ GNS 400W/500W Series
- ☐ GNS 480
- ☐ GIA 63W
- ☐ GDL 88 (GTX 330 only)
- ☐ GPS 175/GNC 355

GPS #2 (if installed)

- ☐ Internal
- ☐ GTN 6XX/7XX Series
- ☐ GNS 400W/500W Series
- ☐ GNS 480
- ☐ GIA 63W
- ☐ GDL 88 (GTX 330 only)
- ☐ GPS 175/GNC 355

Interfaced Pressure Altitude Source:

Pressure Altitude Source #1

- ☒ Enc. Alt #1
- ☐ Garmin Altitude Encoder

Pressure Altitude Source #2 (if installed)

- ☐ ____________________
- ☐ Garmin Altitude Encoder

Interfaced Remote Control Display (Required for remotely mounted GTX variants):

<u>Transponder #1 Remote Control Display</u>	<u>Transponder #2 Remote Control Display (if installed)</u>
☐ GTN 6XX/7XX	☐ GTN 6XX/7XX
☐ GNS 480	☐ GNS 480
☐ G950/1000 Display	☐ G950/1000 Display
☐ GI 275	☐ GI 275
☐ Gables 7534 Controller	☐ Gables 7534 Controller
☐ Gables 7614 Controller	☐ Gables 7614 Controller
☐ CTL-92 Controller	☐ CTL-92 Controller
☐ CTL-92E Controller	☐ CTL-92E Controller

Interfaced Active Traffic System:

☒ None

☐ TCAD

☐ TAS/TCAS

<u>NOTE</u>

If the system includes all of the following components:

- GTX 345R or GTX 345DR,
- G950/1000 Display, and
- TCAD or TAS/TCAS

Then the aircraft is no longer equipped with a TSO compliant active TCAD, TAS or TCAS system. Any operational requirement to be equipped with such system is no longer met.

1.5 Definitions

The following terminology is used within this document:

ADS-B: Automatic Dependent Surveillance-Broadcast

AFM: Airplane Flight Manual

AFMS: Airplane Flight Manual Supplement

ATCRBS: Air Traffic Control Radar Beacon System

CFR: Code of Federal Regulations

ES: Extended Squitter

GNSS: Global Navigation Satellite System

GNS: Garmin Navigation System

GPS: Global Positioning System

GTX: Garmin Transponder

GTN: Garmin Touchscreen Navigator

ICAO: International Civil Aviation Organization

LRU: Line Replaceable Unit

PABI: Pressure Altitude Broadcast Inhibit

POH: Pilot Operating Handbook

SBAS: Satellite-Based Augmentation System

SW: Software

TCAS: Traffic Collision Avoidance System

TIS: Traffic Information Service

TX: Transmit

Section 2. LIMITATIONS

2.1 Minimum Equipment

The GTX 33X and GTX 3X5 must have the following system interfaces fully functional in order to be compliant with the requirements for 14 CFR 91.227 ADS-B Out operations:

Interfaced Equipment	Number Installed	Number Required
Uncorrected Pressure Altitude Source	1	1
GPS SBAS Position Source	1 or more	1
Remote Control Display (for remotely mounted transponders)	1 or more	1

Table 2 – Required Equipment

2.2 ADS-B Out

The GTX 33X and GTX 3X5 only comply with 14 CFR 91.227 for ADS-B Out when all required functions are operational. When the system is not operational, ADS-B Out transmit failure messages will be present on the remote control display interface, or the GTX 330 or GTX 3X5 panel display. If a Gables 7534 controller or Collins CTL-92/92E controller is being used the ADS-B equipment failure condition will be annunciated on the Gables or Collins display "Transponder Fail" while the ADS-B Out Position failure will be annunciated by the remotely installed "ADS-B POSN FAIL" Annunciator.

2.3 TIS Traffic Display with User Navigation Angle

Display of TIS traffic from a GTX 33/330 or GTX 335 is not permitted with an interfacing display configured for a navigation angle of "user".

2.4 Applicable System Software

This AFMS/AFM is applicable to the software versions shown in Table 3.

The Main GTX software version is displayed on the splash screen during start up for the GTX 330 and GTX 3X5 panel mounted units, and the External LRU or System page on the interfaced remote control display for remotely mounted GTX transponders.

Software Item	**Software Version** *(or later FAA Approved versions for this STC)*
GTX 33X Main SW Version	8.04
GTX 3X5 Main SW Version	2.60

Table 3 - Software Versions

2.5 Pressure Altitude Broadcast Inhibit (PABI)

Pressure Altitude Broadcast Inhibit shall only be enabled when requested by Air Traffic Control while operating within airspace requiring an ADS-B Out compliant transmitter. PABI is enabled by selecting the GTX to ON mode.

2.6 Datalinked Weather Display (GTX 345 Only)

Do not use datalink weather information for maneuvering in, near, or around areas of hazardous weather. Information provided by datalink weather products may not accurately depict current weather conditions.

Do not use the indicated datalink weather product age to determine the age of the weather information shown by the datalink weather product. Due to time delays inherent in gathering and processing weather data for datalink transmission, the weather information shown by the datalink weather product may be significantly older than the indicated weather product age.

Do not rely solely upon datalink services to provide Temporary Flight Restriction (TFR) or Notice to Airmen (NOTAM) information.

2.7 Portable Electronic Devices

This STC does not relieve the operator from complying with the requirements of 91.21 or any other operational regulation regarding portable electronic devices.

Section 3. EMERGENCY PROCEDURES

3.1 Emergency Procedures

No Change.

3.2 Abnormal Procedures

3.2.1 LOSS OF AIRCRAFT ELECTRICAL POWER GENERATION

XPDR Circuit Breaker.. **PULL**

Transponder and ADS-B Out functions will no longer be available.

NOTE

This guidance is supplementary to any guidance provided in the POH or AFM for the installed aircraft for loss of power generation.

3.2.2 LOSS OF GPS/SBAS POSITION DATA

When the GPS/SBAS receiver is inoperative or GPS position information is not available or invalid, the GTX will no longer be transmitting ADS-B Out data.

For GTX 330 installations:

NO ADSB annunciator illuminated:

Interfaced GPS position sources........................... **VERIFY VALID POSITION**

For GTX 3X5 installations:

NO 1090ES TX annunciator illuminated:

Interfaced GPS position sources........................... **VERIFY VALID POSITION**

For GTX 33 and GTX 3X5R installations:

Reference Display Device documentation for applicable annunciation:

Interfaced GPS position sources........................... **VERIFY VALID POSITION**

Section 4. NORMAL PROCEDURES

The procedures described below are specific only to the panel mounted GTX 330 or GTX 3X5 transponders. Cockpit Reference Guides and Pilot Guides for interfaced remote control displays will provide additional operating information specific to the displays or other traffic systems.

ADS-B Out functionality resides within the GTX transponders thereby providing a single point of entry for Mode 3/A code, Flight ID, IDENT functionality and activating or deactivating emergency status for both transponder and ADS-B Out functions. Details on performing these procedures are located in the GTX 330/330D Pilot's Guide and GTX 3X5 Series Transponder Pilot's Guide.

4.1 Unit Power On

For GTX 330 installations:

GTX Mode.. **VERIFY ALT**
NO ADSB.. **CONSIDERED**

For GTX 3X5 installations:

GTX Mode.. **VERIFY ALT**
NO 1090ES TX .... **CONSIDERED**

NOTE

The NO ADS-B or NO 1090ES TX Annunciation (or associated display annunciations) may illuminate as the unit powers on and begins to receive input from external systems, to include the SBAS position source.

4.2 Before Takeoff

For GTX 330 installations:

ADS-B TX..**VERIFY ON**
NO ADSB .... **EXTINGUISHED**

For GTX 3X5 installations:

1090ES TX CTL ....**VERIFY ON**
NO 1090ES TX .... **EXTINGUISHED**

NOTE

The ADS-B TX or 1090ES TX CTL must be turned on and the NO ADS-B or NO 1090ES TX Annunciation (or associated display annunciations) must be **EXTINGUISHED** for the system to meet the requirements specified in 14 CFR 91.227. This system must be operational in certain airspaces after January 1, 2020 as specified by 14 CFR 91.225.

Section 5. PERFORMANCE

No change.

Section 6. WEIGHT AND BALANCE

See current weight and balance data.

Section 7. SYSTEM DESCRIPTION

The Garmin GTX 330 and GTX 3X5 Pilot's Guides, part numbers, and revisions listed below contain additional information regarding GTX system description, control, and function.

Title	Part Number	Revision
GTX 330 Pilot's Guide	190-00207-00	Rev. G (or later)
GTX 3X5 Pilot's Guide	190-01499-00	Rev. A (or later)

Pilot's Guides for interfaced displays, part numbers and revisions listed below, provide additional operating information for the Garmin GTX 33 and GTX 3X5R.

Title	Part Number	Revision
Garmin GTN 725/750 Pilot's Guide	190-01007-03	Rev. E (or later)
Garmin GTN 625/635/650 Pilot's Guide	190-01004-03	Rev. E (or later)
GNS 480 Pilot's Guide	190-00502-00	Rev. D (or later)
GTX 3X5 Series Transponder G1000 Pilot's Guide	190-01499-01	Rev. A (or later)
Garmin GI 275 Pilots's Guide	190-02246-01	Rev. F (or later)
Garmin GPS 175/GNC 355/GNX 375 Pilot's Guide	190-02488-01	Rev. B (or later)

7.1 GTX TIS Behavior

The TIS Standby/Operate controls for GTX 33/330 and GTX 335/335D units only function when the aircraft is airborne.

7.2 GTX 345R/345DR and G950/1000 No Bearing Traffic Alerts

No visual indication is provided for no bearing traffic alerts. Only an aural indication of the no bearing traffic alert is provided. If an aural alert for no bearing traffic has been previously issued, a "no bearing traffic clear" aural indication will be provided once all traffic alerts are resolved.

All aural alerts are inhibited below 500' AGL, therefore a "no bearing traffic clear" aural may not be heard in a landing or touch and go flight scenario.

96-09-16 - Icing conditions

Fairchild Aircraft:

Category - Airframe

Effective Date - 06/11/96 **Recurring** - No

Supersedes - N/A **Superseded by** - N/A

Fairchild Aircraft:

Amendment 39-9592; Docket No. 96-CE-06-AD.

Applicability: Models SA226-T, SA226-T(B), SA226-AT, SA226-TC, SA227-TT, SA227-AT, SA227-AC, SA227-BC, SA227-CC, and SA227-DC airplanes (all serial numbers), certificated in any category.

Note 1: This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (d) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated, unless accomplished previously.

To minimize the potential hazards associated with operating the airplane in severe icing conditions by providing more clearly defined procedures and limitations associated with such conditions, accomplish the following:

(a) Within 30 days after the effective date of this AD, accomplish the requirements of paragraphs (a)(1) and (a)(2) of this AD.

Note 2: Operators must initiate action to notify and ensure that flight crewmembers are apprised of this change.

(1) Revise the FAA-approved Airplane Flight Manual (AFM) by incorporating the following into the Limitations Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

"WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions.

--Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.

--Accumulation of ice on the lower surface of the wing aft of the protected area.

--Accumulation of ice on the propeller spinner farther aft than normally observed.

Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

All icing detection lights must be operative prior to flight into icing conditions at night. [NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL).]"

(2) Revise the FAA-approved AFM by incorporating the following into the Procedures Section of the AFM. This may be accomplished by inserting a copy of this AD in the AFM.

"THE FOLLOWING WEATHER CONDITIONS MAY BE CONDUCIVE TO SEVERE IN-FLIGHT ICING:

Visible rain at temperatures below 0 degrees Celsius ambient air temperature.

Droplets that splash or splatter on impact at temperatures below 0 degrees Celsius ambient air temperature.

PROCEDURES FOR EXITING THE SEVERE ICING ENVIRONMENT:

These procedures are applicable to all flight phases from takeoff to landing. Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present. If the visual cues specified in the Limitations Section of the AFM for identifying severe icing conditions are observed, accomplish the following:

Immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.

Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.

Do not engage the autopilot.

If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.

If an unusual roll response or uncommanded roll control movement is observed, reduce the angle-of-attack.

Do not extend flaps during extended operation in icing conditions. Operation with flaps extended can result in a reduced wing angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.

If the flaps are extended, do not retract them until the airframe is clear of ice.

Report these weather conditions to Air Traffic Control."

(b) Incorporating the AFM revisions, as required by this AD, may be performed by the owner/operator holding at least a private pilot certificate as authorized by section 43.7 of the Federal Aviation Regulations (14 CFR 43.7), and must be entered into the aircraft records showing compliance with this AD in accordance with section 43.11 of the Federal Aviation Regulations (14 CFR 43.11).

(c) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(d) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Small Airplane Directorate, FAA, 1201 Walnut, suite 900, Kansas City, Missouri 64106. The request shall be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Small Airplane Directorate.

Note 3: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Small Airplane Directorate.

(e) All persons affected by this directive may examine information related to this AD at the FAA, Central Region, Office of the Assistant Chief Counsel, Room 1558, 601 E. 12th Street, Kansas City, Missouri 64106.

(f) This amendment (39-9592) becomes effective on June 11, 1996.

FOR FURTHER INFORMATION CONTACT:

Mr. John Dow, Aerospace Engineer, FAA, Small Airplane Directorate, 1201 Walnut, suite 900, Kansas City, Missouri 64106; telephone (816) 426-6934; facsimile (816) 426-2169.

APPENDIX 1

Supplement to the POH/AFM
Fairchild Models SA 226-T, SA 226-T(B)
SA 226-AT, and SA 226-TC Airplanes

"The IGNITION MODE switches shall be selected to AUTO/CONT during all operations in actual or potential icing conditions described herein:

(1) During takeoff and climb out in actual or potential icing conditions.

***(2)** When ice is visible on, or shedding from propeller(s), spinner(s), or leading edge(s).

***(3)** Before selecting ANTI-ICE, when ice has accumulated.

(4) Immediately, any time engine flameout occurs as a possible result of ice ingestion.

(5) During approach and landing while in or shortly following flight in actual or potential icing conditions.

***Note:** If icing conditions are entered in flight without the engine anti-icing system having been selected, switch one ENGINE system to an ENGINE HEAT position. If the engine runs satisfactorily, switch the second ENGINE system to an ENGINE HEAT position and check that the second engine continues to run satisfactorily.

For the purpose of this supplement, the following definition applies:

Potential icing conditions in precipitation or visible moisture meteorological conditions:

(1) Begin when the OAT is plus 5 degrees C (plus 41 degrees F) or colder, and **(2)** End when the OAT is plus 10 degrees C (plus 50 degrees F) or warmer."

The procedures and conditions described in this appendix supersede any other POH/AFM procedures and conditions which may be contradictory.

LIST OF SUPPLEMENTS

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SUPPLEMENT 1

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MERLIN IIIB SA226–T(B)

ANTI-SKID BRAKES

Registration No. ______________________

Serial No. ______________________

This supplement must be attached to the FAA approved Airplane Flight Manual when the anti-skid brake system is installed per Swearingen drawing 27–85016. The information contained herein supplements or supersedes the basic Airplane Flight Manual only in the areas listed. For limitations, procedures, and performance not contained in this supplement, consult the basic manual.

The material presented on pages 1, 3, 4, 5, 6 and 13 of this Supplement has been approved by the Federal Aviation Administration (FAA).

FAA Approved: Wayne J. Barlow

D.P. Watson, Chief (ASW–210)
Engineering & Manufacturing Branch
Federal Aviation Administration
Southwest Region
Fort Worth, Texas

Date: February 15, 1979

Revised: November 2, 1979

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ANTI-SKID BRAKE SYSTEM

SECTION 1 – GENERAL

No change.

SECTION 2 – LIMITATIONS

Use of the anti-skid brake system is prohibited when there has been a hydraulic system failure.

Use of the anti-skid brake system is prohibited when the yellow anti-skid annunciator light fails to extinguish.

Takeoff is prohibited when there is an indication that power brake function is operating without anti-skid protection.

SECTION 3 – EMERGENCY PROCEDURES

If ANTI-SKID light illuminates, switch anti-skid to OFF position and operate the aircraft brake system using manual braking techniques. If loss of braking ability occurs at any time, release pedal pressure momentarily. Select anti-skid OFF, and apply manual braking.

CAUTION

IF THERE IS ANY INDICATION THAT BRAKE POWER IS ON AND THERE IS NO ANTI-SKID PROTECTION, THE PILOT SHOULD USE EXTREME CAUTION DURING LANDING TO AVOID WHEEL LOCK-UP.

AIRCRAFT HYDRAULIC FAILURE

Anti-skid switch . . . . OFF

SECTION 3A – ABNORMAL PROCEDURES

No change.

SECTION 4 – NORMAL PROCEDURES

PREFLIGHT

C. RIGHT WING
- 9a. Anti-skid hub caps and wiring . . . . CONDITION

E. LEFT WING
- 4a. Anti-skid hub caps and wiring . . . . CONDITION

BEFORE STARTING ENGINES

PILOT'S CONSOLE
- 6a. Anti-skid switch . . . . AS REQUIRED

TAXI

- 2a. Anti-skid brake system . . . . CHECK ALL TEST FUNCTIONS (SEE PAGE 5 OF THIS SUPPLEMENT)

NOTE

Parking brake must be off for anti-skid operation.

BEFORE LANDING

- 9a. Anti-skid brake system . . . . CHECK LIGHT OUT

LANDING

CAUTION

ALLOW 2 SECONDS AFTER TOUCHDOWN FOR WHEELS TO SPIN UP PRIOR TO APPLYING BRAKES IN THE ANTI-SKID MODE OF OPERATION.

SECTION 4 – NORMAL PROCEDURES (continued)

SYSTEMS CHECKS

ANTI-SKID BRAKES SYSTEM

The anti-skid brakes system has three major components; the main landing gear wheel speed sensor, power brake valve, and an electronic control box. The power brake valve is supplied with 2,000 psi pressure from the hydraulic system. When the brake pedals are depressed, the master cylinder hydraulic pressure is multiplied by a factor of 2 by the power brake valve prior to reaching the brakes. Wheel speed sensors provide a signal to the electronic control box. When the wheel speed sensor input to the electronic control box indicates wheel skid onset, the hydraulic pressure to the brakes is interrupted by the power brake valve. If brake pedal pressure is maintained the control box will modulate the wheel brake pressure to permit maximum braking action without skidding the tires. Below 10 knots the anti-skid sensor is ineffective.

A two position switch is provided for either manual or anti-skid operations. When the switch is selected ON, the anti-skid system is in operation and the yellow annunciator panel ANTI-SKID light is extinguished. The brake pedals feel significantly more firm in the anti-skid mode. When the switch is selected OFF, the brake system reverts to the manual mode of operation bypassing the power brake valve and the ANTI-SKID light is illuminated. In this mode the pedals should have more travel and feel softer. If the pedals feel the same as in the anti-skid mode, the power brake valve has not returned to the manual mode. If this failure occurs in flight, the pilot should exercise extreme caution during landing to avoid wheel lock-up; the landing distances presented in the basic AFM will be significantly increased.

BEFORE TAXI

Anti-skid Switch .... OFF
Anti-skid Annunciator Light .... ILLUMINATED
Brake Pedals .... DEPRESS AND NOTE TRAVEL AND FEEL
Anti-skid Switch .... ON
Anti-skid Annunciator Light .... OFF
Brake Pedals .... DEPRESS AND NOTE PEDALS HAVE LESS TRAVEL AND FEEL FIRMER

SECTION 5 – PERFORMANCE

Accelerate-stop and landing distances with anti-skid brakes are presented on the following pages.

NOTE

- For maximum braking performance, apply firm continuous pressure. Do not modulate brake pedals.
- When the anti-skid system is not being used, the performance shown in the basic manual applies.

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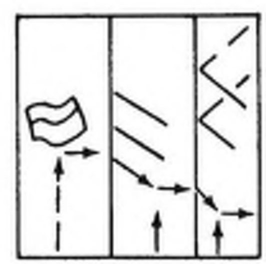
ACCELERATE – STOP
DRY POWER – ANTI SKID ON

ASSOCIATED CONDITIONS:

POWER	1. DRY TAKEOFF POWER SET BEFORE BRAKE RELEASE 2. GROUND IDLE AT ENGINE FAILURE SPEED
ENGINE FAILURE SPEED	V_R OF FIGURE V–12
BLEED AIR	ON
FLAPS	TAKEOFF
BRAKING	MAXIMUM
RUNWAY	PAVED, LEVEL, DRY SURFACE

NOTE

Distances include a failure recognition time of 3 seconds.



ACCELERATE – STOP
DRY – ANTI-SKID ON

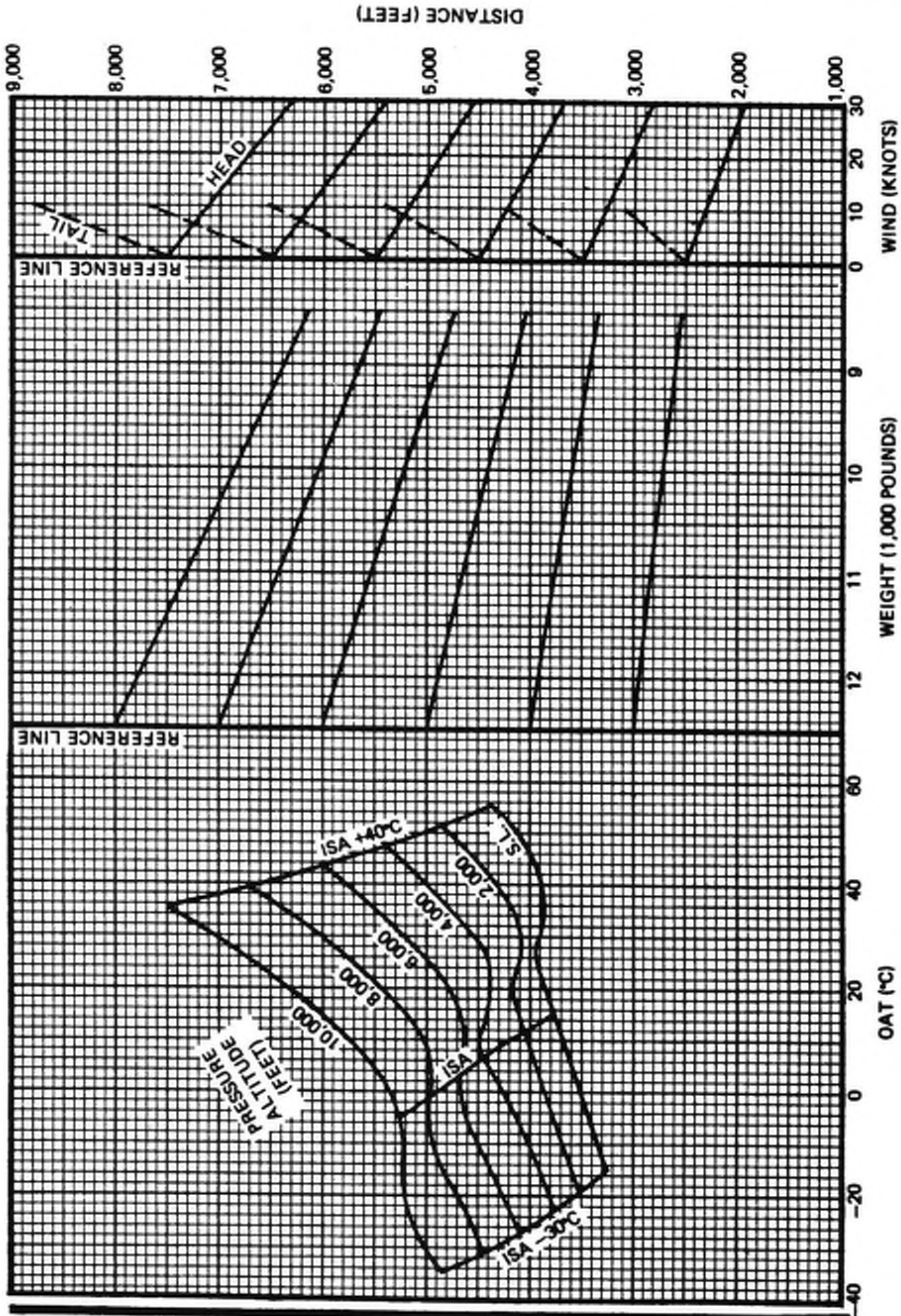


Figure 1

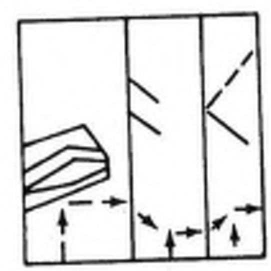
ACCELERATE – STOP
WET POWER – ANTI SKID ON

ASSOCIATED CONDITIONS:

POWER . . . . 1. CONTINUOUS WET TAKEOFF POWER SET BEFORE BRAKE RELEASE
2. GROUND IDLE AT ENGINE FAILURE SPEED
ENGINE FAILURE SPEED . . . . V_R PER SUPPLEMENT 3
BLEED AIR . . . . OFF
FLAPS . . . . TAKEOFF
BRAKING . . . . MAXIMUM
RUNWAY . . . . PAVED, LEVEL, DRY SURFACE

NOTE

Distances include a failure recognition time of 3 seconds



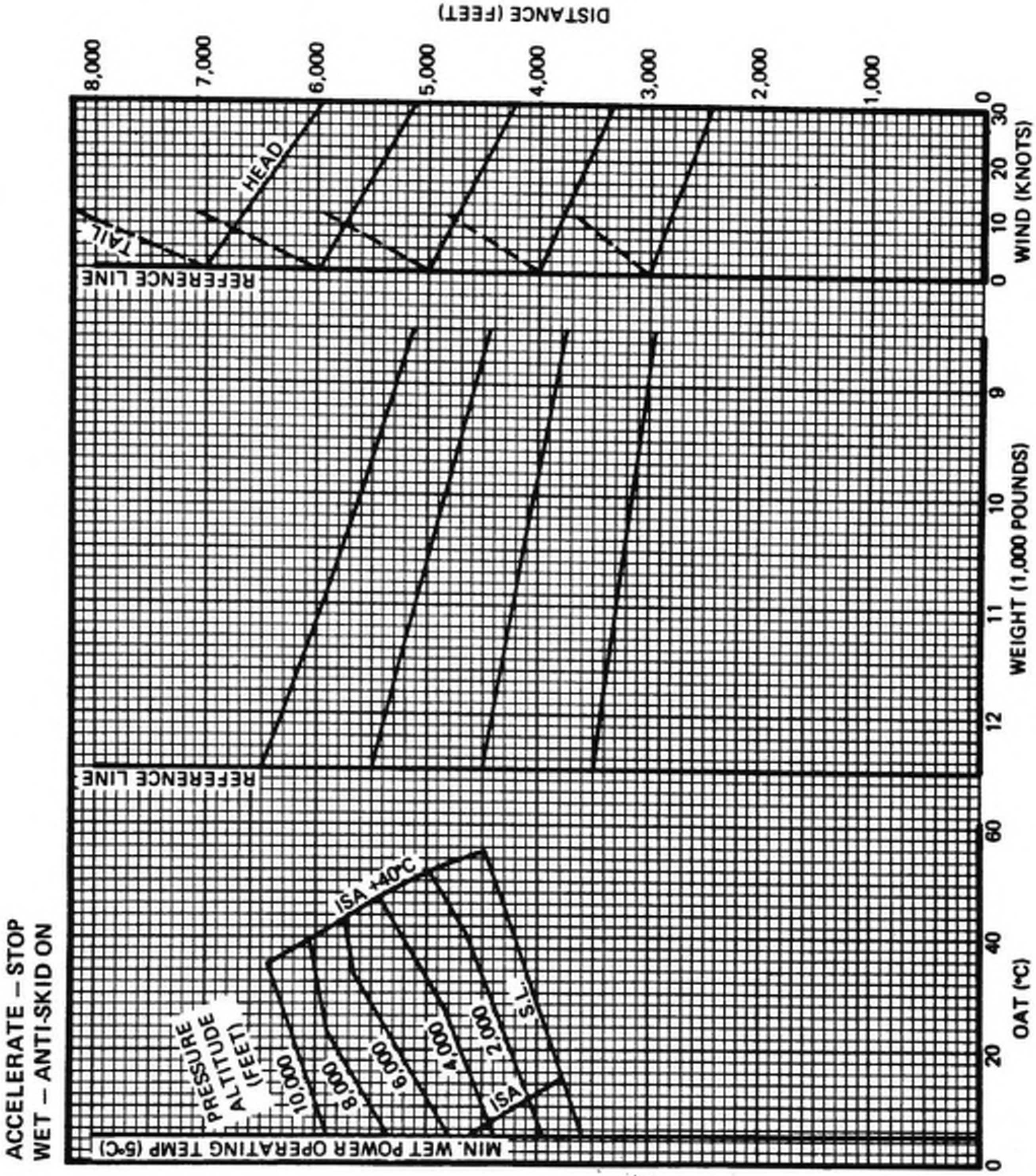

ACCELERATE – STOP
WET – ANTI-SKID ON
DISTANCE (FEET)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
WIND (KNOTS)
0
10
20
30
HEAD
TAIL
REFERENCE LINE
WEIGHT (1,000 POUNDS)
9
10
11
12
REFERENCE LINE
OAT (°C)
0
20
40
60
ISA +40°C
PRESSURE ALTITUDE (FEET)
10,000
8,000
6,000
4,000
2,000
S.L.
ISA
MIN. WET POWER OPERATING TEMP (5°C)

Figure 2

TWO-ENGINE LANDING DISTANCE WITH ANTI-SKID BRAKES

ASSOCIATED CONDITIONS:

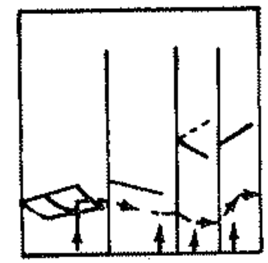
POWER .... FLIGHT IDLE, GROUND IDLE AFTER TOUCHDOWN
APPROACH SPEED .... KIAS AS TABULATED
ANTI-ICE .... ON/OFF
BLEED AIR .... ON/OFF
FLAPS .... DOWN
BRAKING .... MAXIMUM
RUNWAY .... PAVED, LEVEL, DRY SURFACE

NOTE

Do not interpolate for obstacle height below 50 feet.

WEIGHT POUNDS	SPEED AT 50 FEET* (KNOTS) (KCAS)	(KIAS)
12,500	116	114
11,500	110	110
10,500	105	104
9,500	99	97
8,500	93	91

*APPROACH AIRSPEED SHOULD NOT BE LESS THAN V_{MCA} UNTIL LANDING IS ASSURED.



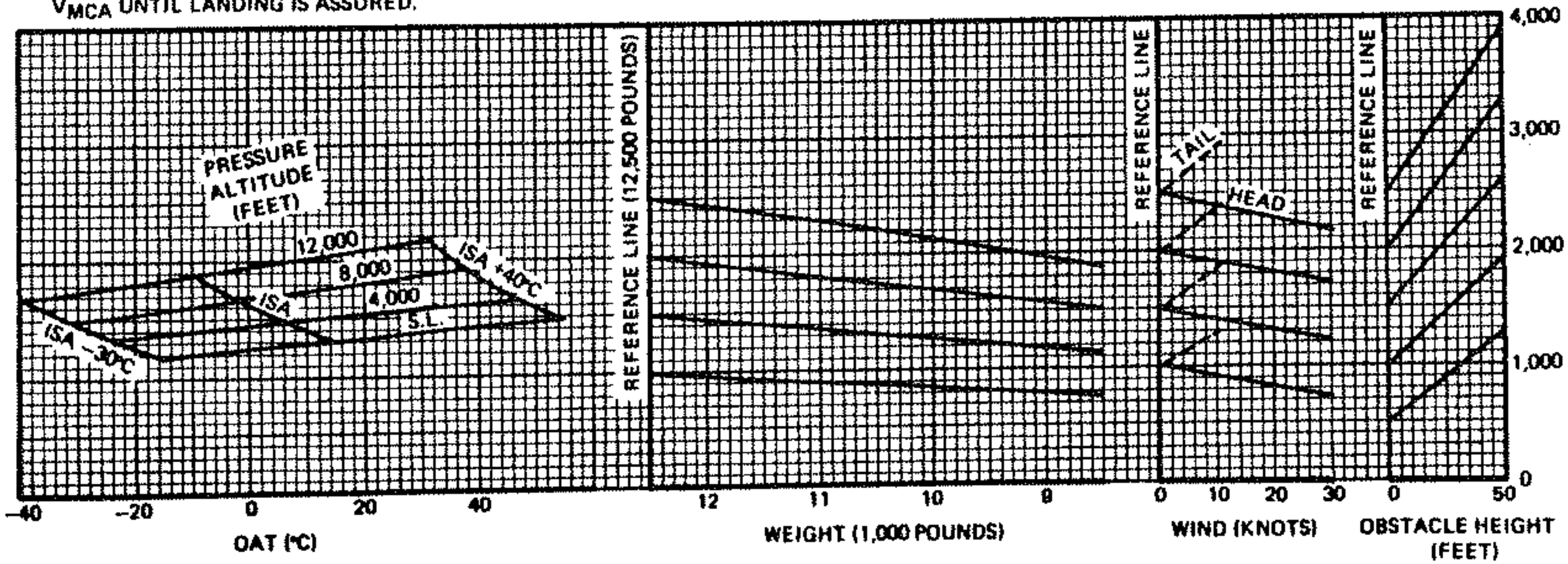


Figure 3

SINGLE-ENGINE LANDING DISTANCE WITH ANTI-SKID BRAKES

ASSOCIATED CONDITIONS:

POWER .... FLIGHT IDLE, GROUND IDLE AFTER TOUCHDOWN
APPROACH SPEED .... KIAS AS TABULATED
ANTI-ICE .... ON/OFF
BLEED AIR .... ON/OFF
FLAPS .... DOWN
BRAKING .... MAXIMUM
RUNWAY .... PAVED, LEVEL, DRY SURFACE

NOTE

- Single engine landing distances are shown and are longer than two engine landing distances.
- Do not interpolate for obstacle height below 50 feet.

WEIGHT (POUNDS)	SPEED AT 50 FEET* (KNOTS) (KCAS)	(KIAS)
12,500	116	114
11,500	110	110
10,500	105	104
9,500	99	97
8,500	93	91

*APPROACH AIRSPEED SHOULD NOT BE LESS THAN V_{MCA} UNTIL LANDING IS ASSURED.

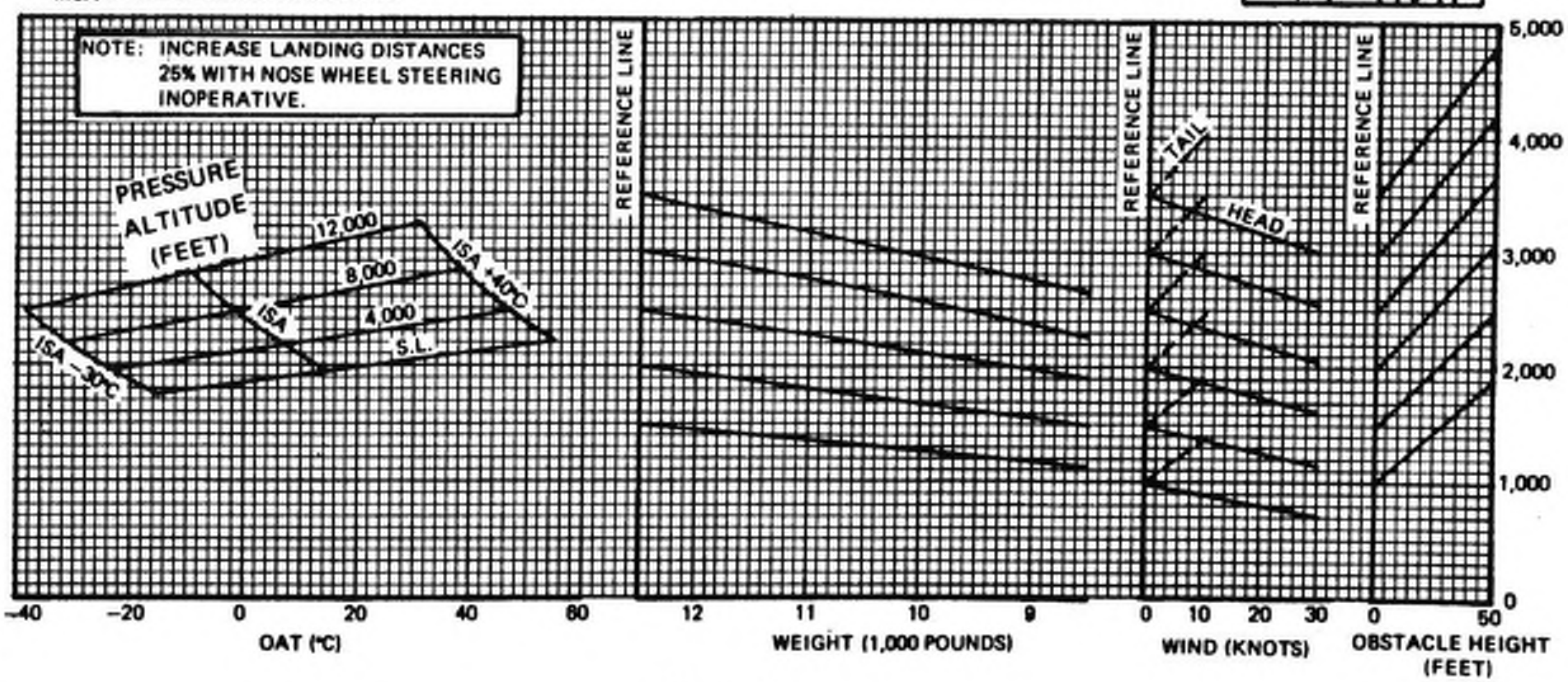


Figure 4

SECTION 6 – WEIGHT AND BALANCE

No change.

SECTION 7 – SYSTEMS DESCRIPTION

No change.

SECTION 8 – HANDLING, SERVICE, AND MAINTENANCE

No change.

SUPPLEMENT 2

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MERLIN IIIB SA226–T(B)

SPEED LEVER NOSE WHEEL STEERING SWITCH

Registration No. ____________________

Serial No. ____________________

This supplement must be attached to the FAA approved Airplane Flight Manual when a nose wheel steering actuation switch has been incorporated in the low rpm position of the right engine speed lever per Swearingen drawing 27-82007 or Swearingen Service Bulletin 32-020. This system was installed in production aircraft S/N T302, 309-999. The information contained herein supplements or supersedes the basic Airplane Flight 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: D. D. Castle

for D.P. Watson, Chief
Engineering & Manufacturing Branch
Federal Aviation Administration
Southwest Region
Fort Worth, Texas

Date: April 26, 1979

Revised: October 23, 1980

SPEED LEVER NOSE WHEEL STEERING SWITCH

SECTION I . . . . . . GENERAL

No change.

SECTION 2 . . . . . . LIMITATIONS

No change.

SECTION 3 . . . . . . EMERGENCY PROCEDURES

Fault protection is provided by circuitry which automatically deactivates the nose wheel steering system if an electrical malfunction occurs. The nose wheel is then free to caster and 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 with rudder, differential braking, and/or differential power.

In the event of a flashing NOSE STEERING light, an unwanted steering deflection, and/or park light illuminated when the PARK button is not depressed:

1. NWS Power Lever Button . . . . RELEASE
2. Right Speed Lever . . . . APPROXIMATELY 1/2 INCH FWD OF LOW
3. Directional Control . . . . MAINTAIN WITH RUDDER, BRAKES, AND/OR POWER
4. Nose Wheel Steering Arm Switch . . . . OFF
5. Nose Wheel Steering Circuit Breaker . . . . PULL

NOTE

It is normal for the park light to remain illuminated, but vary in intensity, during the 4 to 7 second transition time from park mode to normal mode.

SECTION 3A . . . . . . ABNORMAL PROCEDURES

No change.

SECTION 4 . . . . . . NORMAL PROCEDURES

TAXI

6. Nose Wheel Steering System . . . . TEST
(SEE PAGE 3)

LANDING

1. Power Levers . . . . FLIGHT IDLE
2. Power Levers (after touchdown) . . . . GROUND IDLE
3. Brakes . . . . AS REQUIRED
4. Nose Wheel Steering . . . . AS REQUIRED
5. Power Levers . . . . REVERSE (AS REQUIRED)
6. Power Levers . . . . GROUND IDLE
7. Flaps . . . . UP
8. Speed Levers . . . . LOW

CAUTION

DO NOT RETARD THE SPEED LEVERS TO THE FULL AFT (LOW RPM) POSITION UNTIL A NORMAL TAXI SPEED IS REACHED. BECAUSE NOSE WHEEL STEERING IS ACTUATED IMMEDIATELY WHEN THE RIGHT ENGINE SPEED LEVER IS PLACED IN THE FULL AFT POSITION, 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 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 L/H POWER LEVER THUMB BUTTON REMAINS ACTIVE.

9. Ignition Mode Switches . . . . NORM
10. Ice Protection Systems . . . . OFF
11. Stabilizer, Aileron, and Rudder Trim . . . . NEUTRAL

TEST PROCEDURES

1. Nose Wheel Steering Arm Switch .... ARMED
2. NOSE STEERING Light .... STEADY
3. Right Speed Lever .... FORWARD OF LOW
4. Nose Wheel Steering .... NOTE INOPERATIVE
5. NWS Power Lever Button .... DEPRESS. NOTE STEERING, THEN RELEASE
6. Right Speed Lever .... LOW
7. Test Switch L
8. Nose Wheel Steering .... NOTE LEFT TURN FOLLOWED BY AUTO DISENGAGEMENT
9. NOSE STEERING Light .... BLINKING
10. Test Switch .... OFF
11. Rudder Pedals .... CENTER
12. NOSE STEERING Light .... STEADY
13. Repeat Steps 7 through 12 for Right Test
14. Nose Wheel Steering Arm Switch .... VALVE TEST
15. Nose Wheel Steering .... NOTE INOPERATIVE
16. Nose Wheel Steering Arm Switch .... ARMED
17. Park Button .... DEPRESS/NOTE LIGHT ACHIEVES FULL INTENSITY IN APPROXIMATELY 7 SECONDS
18. Park Button .... RELEASE/NOTE LIGHT FADES OUT IN APPROXIMATELY 7 SECONDS

SECTION 5 ...... PERFORMANCE

No change.

SECTION 6 ...... WEIGHT AND BALANCE

No change.

SECTION 7 ...... SYSTEMS DESCRIPTION

VARIABLE AUTHORITY NOSE WHEEL STEERING

Add the following:

An additional nose wheel steering switch is wired in parallel with the NWS button on the left power lever. When the right engine speed lever is moved to the full aft position, this switch closes to bypass the thumb button on the power lever and activate the nose wheel steering.

This new speed lever switch is provided to eliminate the need to depress and hold the power lever NWS button when at normal taxi speed and the speed levers are at low rpm. Whenever the right engine speed lever is forward of the low rpm position, the power lever NWS button must be depressed and held to obtain nose wheel steering.

SECTION VII . . . . . . SYSTEMS DESCRIPTION (continued)

For normal steering during ground operations, the NWS arm switch is placed in the ARMED position and the speed levers are placed at the low rpm position. Steering is then available through rudder pedal deflection. If steering is not desired, the NWS ARM switch must be turned off or the right engine speed lever moved slightly forward of the full aft position. Operation of the PARK button remains unchanged.

SECTION 8 . . . . . . HANDLING, SERVICE, AND MAINTENANCE

No change.

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MERLIN IIIB SA226–T(B)

WITH

CONTINUOUS ALCOHOL-WATER INJECTION (CAWI) SYSTEM

Registration No. ______________________

Serial No. ______________________

This supplement must be attached to the FAA approved Flight Manual when the continuous alcohol-water injection system has been installed in accordance with Swearingen Drawing 27-67030. The information contained herein 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.

The material presented on pages 1 through 13 of this Supplement has been approved by the Federal Aviation Administration (FAA). The approval of performance data is limited to the range sea level to 8,000 feet.

FAA APPROVED: D. D. Castle

for D.P. Watson, Chief
Engineering & Manufacturing Branch
Federal Aviation Administration
Southwest Region
Fort Worth, Texas

Date: August 8, 1979

LIST OF REVISIONS

Revisions to the Airplane Flight Manual provide current information applicable to operation of the SA227-AT 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	Pages Affected	Description	FAA Approved Signature	Date
1	1,4,11,13, 14,17,22,23	Revised or corrected titles and conditions on performance charts.	C L Stoner	11/2/79
2	1,7,27	Revised to reflect correct indicated power changes at CAWI firing.	C L Stoner	10/23/80
3	1,2,3,4,27	Added list of revisions and revised AWI fluid mix.	C L Stoner	12-29-86

CONTINUOUS ALCOHOL-WATER INJECTION (CAWI) SYSTEM

The system described herein permits the pilot to select continuous AWI for increased power during takeoff operations in hot weather and/or high altitude conditions.

SECTION 1 . . . . .GENERAL

No change.

SECTION 2 . . . . .LIMITATIONS

ALCOHOL-WATER MIXTURE COMPOSITION AND RELATED DATA

Maximum Usable AWI Fluid Quantity.....................16 Gallons
Minimum AWI Fluid Quantity For Takeoff.................4 Gallons
(approximately one minute)

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

Mixture Composition By Percent of Volume	Specific Gravity At Temperatures 4°C to 15°C (39°F to 59°F)	Approximate Freeze Point
Methanol 40% (plus 6%, minus 2%) Water 60% (plus 2%, minus 6%)	0.9510 to 0.9390	-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.

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 CONTINUOUS ALCOHOL-WATER INJECTION (CAWI)

Time Limit...5 Minutes
Maximum Torque..100%
Maximum ET..650°C
Minimum Outside Air Temperature for AWI Operation..........+5°C

CAUTION

AWI USE IS LIMITED TO TAKEOFF OPERATIONS ONLY. IN-FLIGHT USE OF AWI MAY RESULT IN EXCEEDING THE ENGINE OPERATING LIMITS.

INSTRUMENT MARKINGS

AWI Quantity Indicator (U.S. Gallons)
Red Radial.........................4.0 Gallons (Minimum Quantity Required for Continuous Wet Takeoff)

WEIGHT AND BALANCE

The preflight loading must be arranged to provide a center of gravity sufficiently forward of the aft limit to prevent exceeding the aft c.g. limit during AWI takeoff operations.

FUELS

The maximum demonstrated fuel imbalance when using the takeoff speed schedule in this supplement is 150 pounds. The maximum imbalance for normal landing is 500 pounds.

SECTION 3 . . . . . . EMERGENCY PROCEDURES

ENGINE FAILURE DURING TAKEOFF – TAKEOFF ABORTED

1. **Power Levers** . . . . GROUND IDLE
2. **Brakes** . . . . AS REQUIRED
3. Nose Wheel Steering . . . . AS REQUIRED
4. Reverse Thrust (operating engine) . . . . AS REQUIRED (BELOW 40 KNOTS)

CAUTION

ON WET OR SLIPPERY SURFACES, USE CAUTION WHEN REVERSING ONLY ONE ENGINE.

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
7. AWI Switch . . . . OFF

ENGINE FAILURE DURING TAKEOFF – TAKEOFF CONTINUED AT OR ABOVE V_R

1. POWER LEVER (operating engine) . . . . SET TAKEOFF POWER

NOTE

- Retarding the power lever of the inoperative engine aft of the quadrant switch will disable the rudder bias system.
- 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.

SECTION 3 ...... EMERGENCY PROCEDURES (continued)

2. LANDING GEAR (after liftoff) .... RETRACT
3. FLAPS .... RETRACT
4. ENGINE STOP AND FEATHER CONTROL (failed engine) .... PULL
5. AIRSPEED .... SINGLE ENGINE BEST RATE OF CLIMB SPEED
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
7. Power Lever (operating engine) .... AS REQUIRED
8. Trim .... AS REQUIRED
9. Generator (operating engine) .... 300 AMPS MAXIMUM
10. Propeller Synchrophaser .... OFF
11. AWI Switch .... AS REQUIRED

SECTION 3A ...... ABNORMAL PROCEDURES

No change.

SECTION 4 ...... NORMAL PROCEDURES

PREFLIGHT

A. COCKPIT .... CHECK AWI QUANTITY GAUGE

D. NOSE SECTION

1. Outside Air Temperature Sensor .... CLEAN
2. Static Sources .... CLEAR
3. Pitot Covers .... REMOVE
4. AWI Tank Sight Gauge .... CHECK QUANTITY

NOTE

If the AWI tank is filled to capacity the AWI fluid level may not be visible at the top of the sight gauge. It may be necessary to open the AWI filler cap to vent the tank in order to visually determine the fluid level in the sight gauge.

5. AWI Tank Filler Cap .... SECURE
6. Baggage Doors .... SECURE
7. Windshield Wipers .... CONDITION
8. Nose Gear, Tires, Wheelwell, and Gear Doors .... CONDITION
9. SAS[2] Vane .... CHECK

SECTION 4 ...... NORMAL PROCEDURES (continued)

BEFORE TAKEOFF CAWI SYSTEM CHECK

1. AWI Quantity Gauge .... CHECK
2. AWI Pump Test Switch .... HOLD IN NUMBER 1 POSITION
3. AWI Number 1 Pump Light .... CHECK ON
4. AWI Number 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.

5. Repeat steps 2 through 4 for Number 2 Pump.

TAKEOFF

1. Speed Levers .... HIGH RPM
2. Engine Speed .... CHECK 96%–97%
3. Ignition Mode Switches .... AS REQUIRED (SEE PAGE 4–15)
4. Power Levers .... SET TO 35% to 45% TORQUE
5. AWI Switch .... CONTINUOUS
6. AWI Pump Lights .... CHECK ON
7. ET .... ET CHECK 32°C ± 3°C RISE
8. Power Levers .... 650°C NOT TO EXCEED 97% TORQUE

NOTE

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

SECTION 4 . . . . . . NORMAL PROCEDURES (continued)

9. Rudder Bias Switch . . . . ON
10. Engine Speed . . . . CHECK 100% RPM
11. Brakes . . . . RELEASE
12. NWS Power Lever Button . . . . DEPRESS/AS DESIRED
13. V_R Speed . . . . ROTATE
14. Landing Gear (after liftoff) . . . . RETRACT
15. Flaps . . . . UP

NOTE

Normal authority steering is available until deactivated by the landing gear squat switches at takeoff.

CLIMB

1. Climb Speed . . . . ATTAIN (SEE PAGE 5–15)
2. AWI Switch . . . . OFF

NOTE

Reduce ET to 600°C or less before retarding speed lever. Set RPM (96% to 100%). Advance power lever to desired ET that does not cause illumination of the FUEL BYPASS OPEN light.

3. Climb Power . . . . NOT TO EXCEED 650° ET OR 100% TORQUE
4. Rudder Bias Switch . . . . OFF
5. Propeller Synchrophaser . . . . ON/ADJUST AS NECESSARY
6. Ice Protection Systems . . . . AS REQUIRED
7. Bleed Air Switches . . . . AS DESIRED
8. Cabin Pressure Scheduling . . . . CHECK
9. No Smoking – Fasten Seat Belt Signs . . . . AS REQUIRED
10. Nose Wheel Steering Switch . . . . OFF
11. Ignition Mode Switches . . . . NORMAL OR AS REQUIRED

SECTION 5 ..... PERFORMANCE

AIRSPEED CALIBRATION – ALTERNATE SYSTEM

NOTE

- Zero instrument error.
- For flaps up, gear is up.
- For flaps down, gear is down.
- The copilot's static pressure instruments are not connected to the alternate static pressure source.
- Do not dump pressurization when using the alternate static pressure source.
- The airspeed calibration shown below is not valid if the dump valve is open.

Example: FLAPS DOWN
Given: Indicated airspeed = 100 KIAS
Find: Calibrated airspeed = 104 KCAS

FLAPS UP	KIAS	100	120	140	160	180	200	220	240	260
	KCAS	104	122	141	160	179	199	218	238	257

FLAPS DOWN	KIAS	80	100	120	140	151
	KCAS	86	104	123	142	153

ALTIMETER CORRECTION – ALTERNATE SYSTEM

NOTE

- IAS and indicated altitude assume zero instrument error.
- For flaps up, gear is up.
- For flaps down, gear is down.
- The copilot's static pressure instruments are not connected to the alternate static pressure source.
- Do not dump pressurization when using the alternate static pressure source.
- The altimeter correction shown below is not valid if the dump valve is open.

Example: FLAPS UP
Given: Indicated airspeed = 220 KIAS
Indicated altitude = 10,000 Feet
Find: Correction = –46
Corrected Altitude = 9,954 Feet

Indicated Altitude (Feet)	FLAPS UP								
	Corrections To Be Added (Feet)								
	KIAS								
	100	120	140	160	180	200	220	240	260
0	37	22	10	0	–10	–21	–34	–47	–63
10,000	50	30	13	0	–13	–29	–46	–64	–85
20,000	69	42	18	0	–19	–40	–63	–89	–118
30,000	98	60	26	0	–26	–57	–90	–127	–168

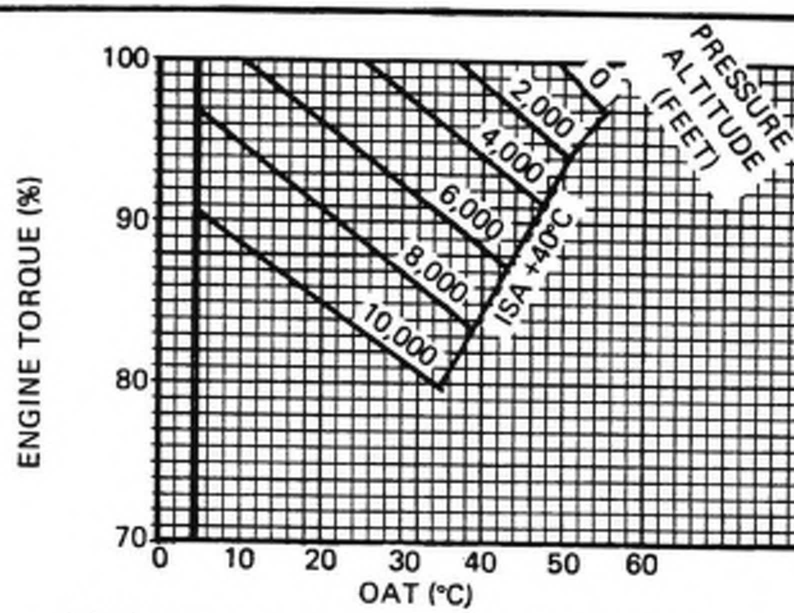
Indicated Altitude (Feet)	FLAPS DOWN			
	Corrections To Be Added (Feet)			
	KIAS			
	80	100	120	140
0	41	37	30	20
10,000	55	50	41	28

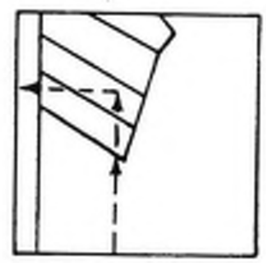
STATIC AWI TAKEOFF POWER CHECK CHART
RPM = 100%
SRL ET = 650°C
INLET ANTI-ICE OFF

BLEED AIR OFF

CAUTION

- DO NOT USE CAWI BELOW +5°C.
- TORQUE MAY NOT EXCEED 100%.





(IOAT's obtained when parked or taxiing may not be accurate.)

Figure 1

WET POWER MINIMUM CONTROL SPEED, V_{MCA} (KCAS)

Pressure Altitude (Feet)	ISA −10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
0	107	107	107	107	107	107
2,000	107	107	107	107	107	107
4,000	107	107	107	107	107	107
6,000	107	107	107	107	107	105
8,000	107	107	107	106	104	102
10,000	107	107	106	104	102	100

TWO ENGINE TAKEOFF DISTANCE
WET POWER

ASSOCIATED CONDITIONS:

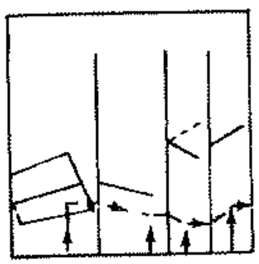
POWER. . . .CONTINUOUS WET TAKEOFF POWER SET BEFORE BRAKE RELEASE (SET AS PER FIGURE 1)
FLAPS . . . . .TAKEOFF; RETRACT AT V_{50}
LANDING GEAR . . . . .RETRACT AFTER LIFT-OFF
RUNWAY . . . . PAVED, LEVEL, DRY SURFACE
BLEED AIR. . . . . OFF
ANTI-ICE . . . . OFF
SPEEDS . . . . .SEE TAKEOFF SPEEDS WITH CAWI
MAXIMUM FUEL IMBALANCE . . . . 150 POUNDS

NOTE

Static takeoff power not to exceed 97% torque.

CAUTION

- AT LIGHTER WEIGHTS, AIRPLANE MAY TEND TO SLIDE WITH FULL STATIC POWER SET.
- DO NOT USE CONTINUOUS WET POWER BELOW 5°C OAT.



TAKEOFF SPEEDS WITH CAWI

ROTATE SPEED, V_R (KCAS = KIAS)

Altitude (Feet)	ISA −30°C	ISA −20°C	ISA −10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
S.L.	DO NOT OPERATE SYSTEM			107	107	107	107	107
2,000				107	107	107	107	107
4,000				107	107	107	107	107
6,000					107	107	107	105
8,000					107	106	104	102
10,000					106	104	102	100

TAKEOFF SPEED AT 50 FOOT HEIGHT, V_{50} (KIAS*)

V_{50} IS THE GREATER OF 1.1 V_{MCA}, OR 1.3 V_{S1}, BUT NOT GREATER THAN 116 KIAS

1.1 V_{MCA}

Altitude (Feet)	ISA −30°C	ISA −20°C	ISA −10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
S.L.	DO NOT OPERATE SYSTEM			115	115	115	115	115
2,000				115	115	115	115	115
4,000				115	115	115	115	115
6,000					115	115	115	113
8,000					115	114	112	110
10,000					115	112	110	108

1.3 V_S, OR 116 KIAS

Weight (Pounds)	8,500	9,500	10,500	11,500	12,500
1.3 V_{S1} or 116 KIAS	102	108	114	116	116

*For KCAS in flight, add 2 KTS. Assumes no instrument error.

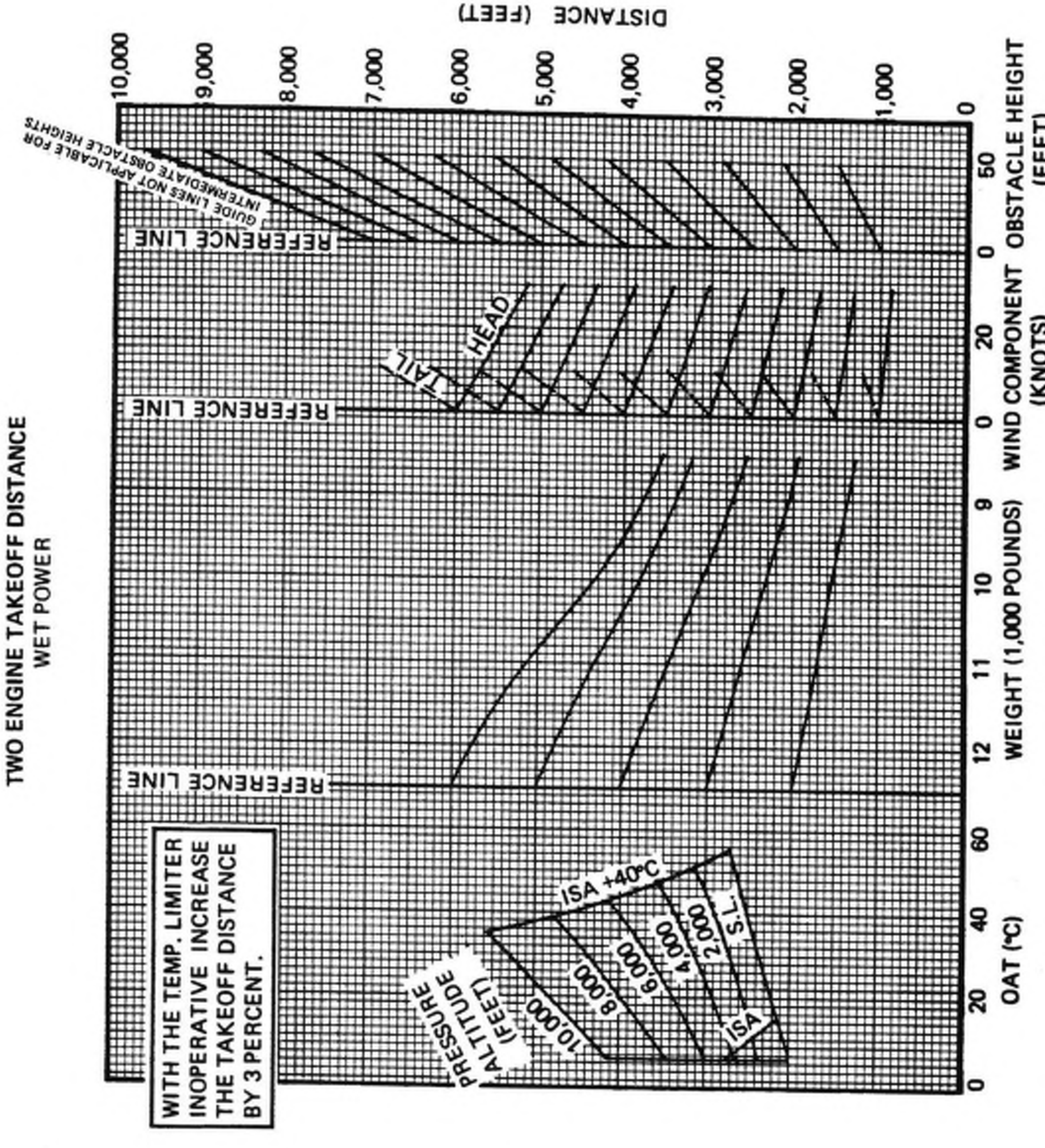

TWO ENGINE TAKEOFF DISTANCE
WET POWER
DISTANCE (FEET)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
GUIDE LINES NOT APPLICABLE FOR INTERMEDIATE OBSTACLE HEIGHTS
REFERENCE LINE
REFERENCE LINE
REFERENCE LINE
TAIL
HEAD
ISA +40°C
ISA
S.L.
2,000
4,000
6,000
8,000
10,000
PRESSURE ALTITUDE (FEET)
WITH THE TEMP. LIMITER INOPERATIVE INCREASE THE TAKEOFF DISTANCE BY 3 PERCENT.
OAT (°C)
0
20
40
60
WEIGHT (1,000 POUNDS)
12
11
10
9
WIND COMPONENT (KNOTS)
0
20
OBSTACLE HEIGHT (FEET)
0
50

Figure 2

TWO ENGINE TAKEOFF DISTANCE WITH FUEL IMBALANCE
WET POWER

ASSOCIATED CONDITIONS:

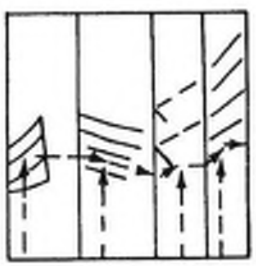
POWER....... CONTINUOUS WET TAKEOFF POWER SET BEFORE BRAKE RELEASE (FIGURE 1)
FLAPS .... TAKEOFF; RETRACT AT V_{50}
LANDING GEAR............ RETRACT AFTER LIFTOFF
RUNWAY.............. PAVED, LEVEL, DRY SURFACE
BLEED AIR .... OFF
ANTI-ICE .... OFF
SPEEDS .... NORMAL SPEED PLUS 10 KNOTS
FUEL IMBALANCE .... 150 TO 500 POUNDS

NOTE

Static takeoff power not to exceed 97% torque.

CAUTION

- AT LIGHTER WEIGHTS, AIRPLANE MAY TEND TO SLIDE WITH FULL STATIC POWER SET.
- DO NOT USE CONTINUOUS WET POWER BELOW 5°C OAT.



TAKEOFF SPEEDS WITH FUEL IMBALANCE
WET POWER
ROTATE SPEED, V_R +10 (KCAS = KIAS)

Altitude (Feet)	ISA -30°C	ISA -20°C	ISA -10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
S.L.	DO NOT OPERATE SYSTEM			117	117	117	117	117
2,000				117	117	117	117	117
4,000				117	117	117	117	117
6,000					117	117	117	115
8,000					117	116	114	112
10,000					116	114	112	110

TAKEOFF SPEED AT 50 FOOT HEIGHT, V_{50} (KIAS*)

V_{50} IS THE GREATER OF 1.1 V_{MCA} +10 OR 1.3 V_{S1}+10, BUT NOT GREATER THEN 126 KIAS

1.1 V_{MCA} +10

Altitude (Feet)	ISA -30°C	ISA -20°C	ISA -10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
S.L.	DO NOT OPERATE SYSTEM			125	125	125	125	125
2,000				125	125	125	125	125
4,000				125	125	125	125	125
6,000					125	125	125	123
8,000					125	124	122	120
10,000					125	122	120	118

1.3 V_{S_1} + 10, OR 126 KIAS

Weight (Pounds)	8,500	9,500	10,500	11,500	12,500
1.3 V_{S1} +10 or 126 KIAS	112	118	124	126	126

*For KCAS in flight, add 2 KTS.
Assumes no instrument error.

TWO ENGINE TAKEOFF DISTANCE WITH FUEL IMBALANCE
WET POWER

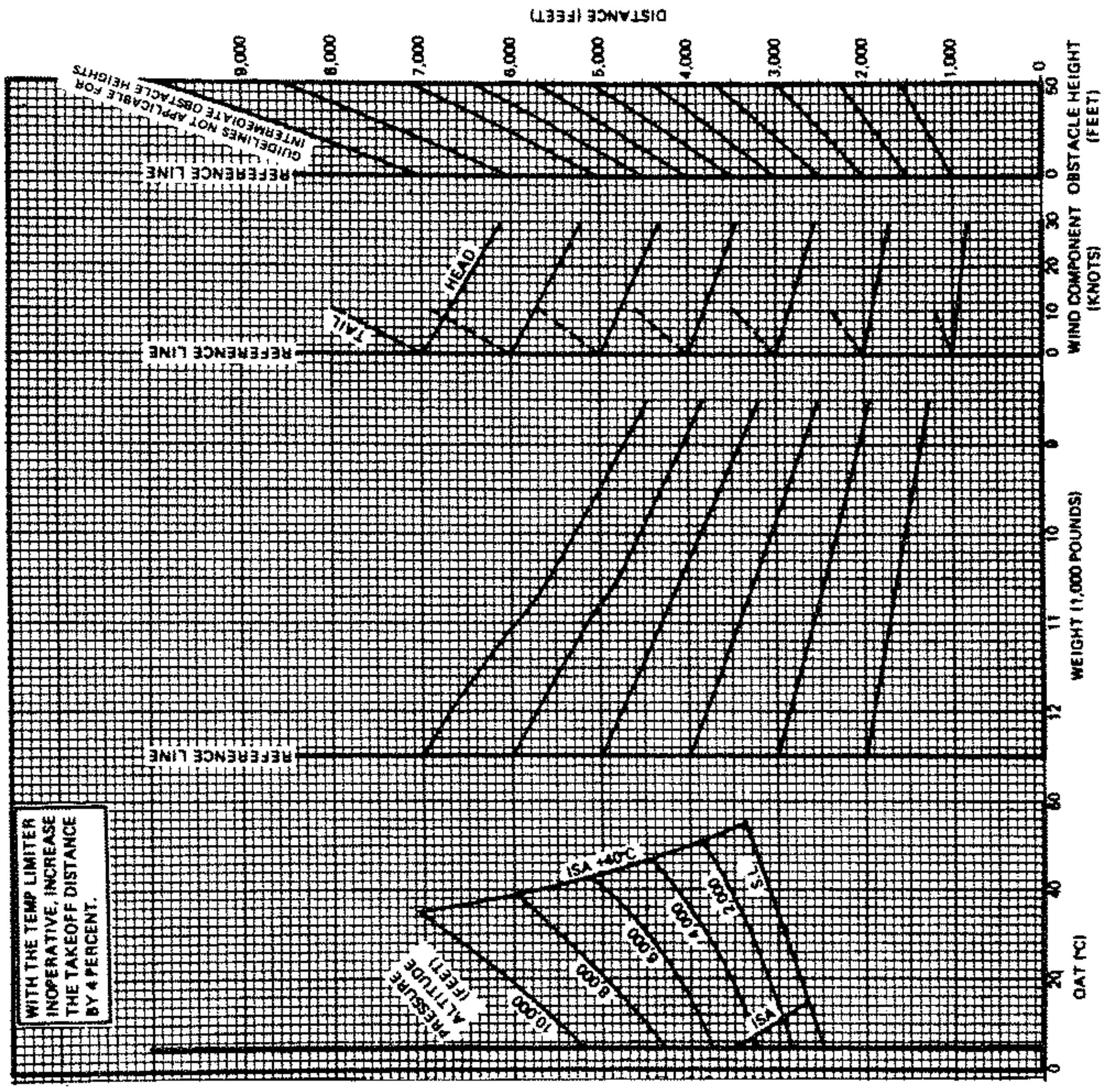
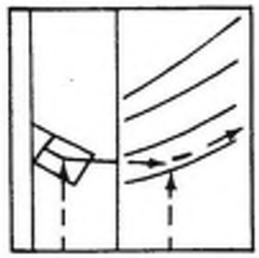


Figure 3

TWO ENGINE TAKEOFF CLIMB GRADIENT
WET POWER

ASSOCIATED CONDITIONS:

POWER .... WET TAKEOFF
LANDING GEAR .... UP
FLAPS .... TAKEOFF
BLEED AIR .... OFF
ANTI-ICE .... OFF
CLIMB SPEED .... V_{50} PER PAGE 12



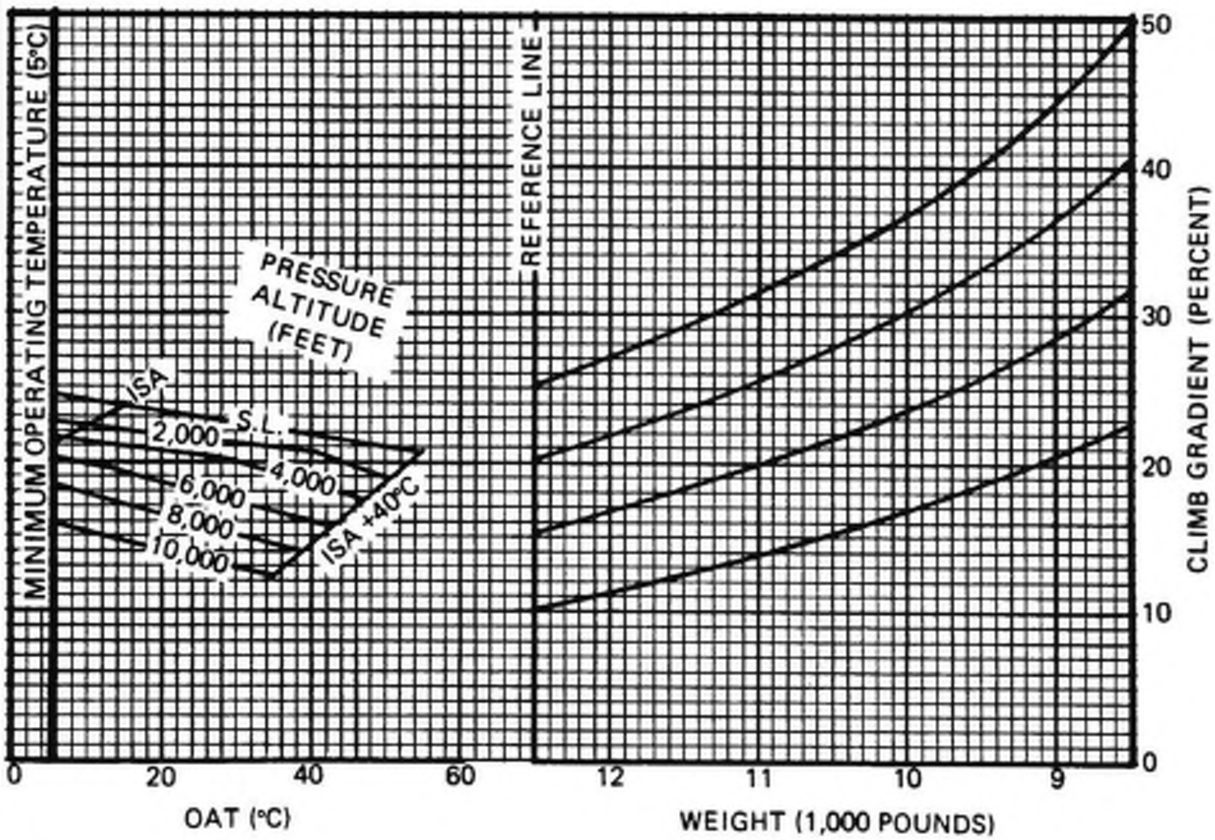


Figure 4

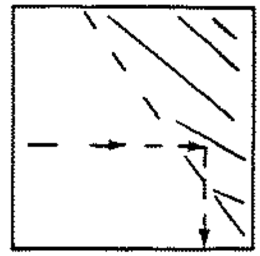
MAXIMUM WEIGHT FOR CONTINUED TAKEOFF AFTER ENGINE FAILURE AT V_R

NOTE

- This chart represents the capability to maintain altitude in the takeoff configuration at V_R with one engine inoperative, propeller in NTS mode; or to climb at 100 FPM, gear-up, dry, at V_{50}, without ground effect in either case.
- To successfully complete a critical single-engine takeoff the landing gear must be retracted as soon as possible after lift-off. Maintain minimum obstacle clearance height until single-engine best rate of climb speed is attained.

ASSOCIATED CONDITIONS:

POWER .... WET TAKEOFF
FLAPS .... TAKEOFF
LANDING GEAR .... DOWN
BLEED AIR .... OFF
ANTI-ICE .... OFF
SPEEDS .... V_R/V_{50} PER PAGE 12



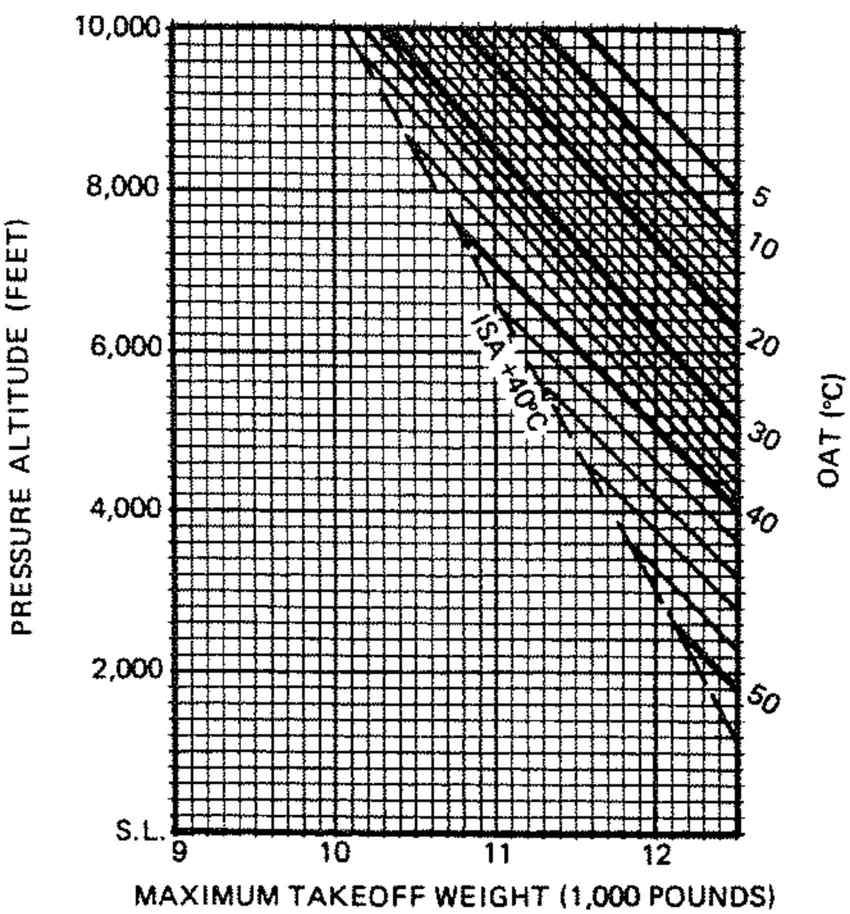


Figure 5

WET POWER ACCELERATE-GO DISTANCE
(ENGINE FAILURE DURING TAKEOFF, TAKEOFF CONTINUED)

ASSOCIATED CONDITIONS:

POWER .... CONTINUOUS WET TAKEOFF POWER SET BEFORE BRAKE RELEASE
FLAPS .... TAKEOFF, RETRACT AT V_{50}
LANDING GEAR .... RETRACT AFTER LIFT-OFF
RUNWAY .... PAVED, LEVEL, DRY SURFACE
BLEED AIR .... OFF
ANTI-ICE .... OFF
SPEEDS .... ENGINE FAILURE ASSUMED AT V_R (SEE SCHEDULE, PAGE 12.)
MAXIMUM FUEL IMBALANCE .... 150 POUNDS

NOTE

- As soon as practical after lift-off (1) retract gear, and (2) feather propeller.
- Avoid over-rotation. Accelerate to best rate of climb speed while maintaining minimum clearance above obstacles.

WET POWER ACCELERATE-GO DISTANCE
(ENGINE FAILURE DURING TAKEOFF, TAKEOFF CONTINUED)

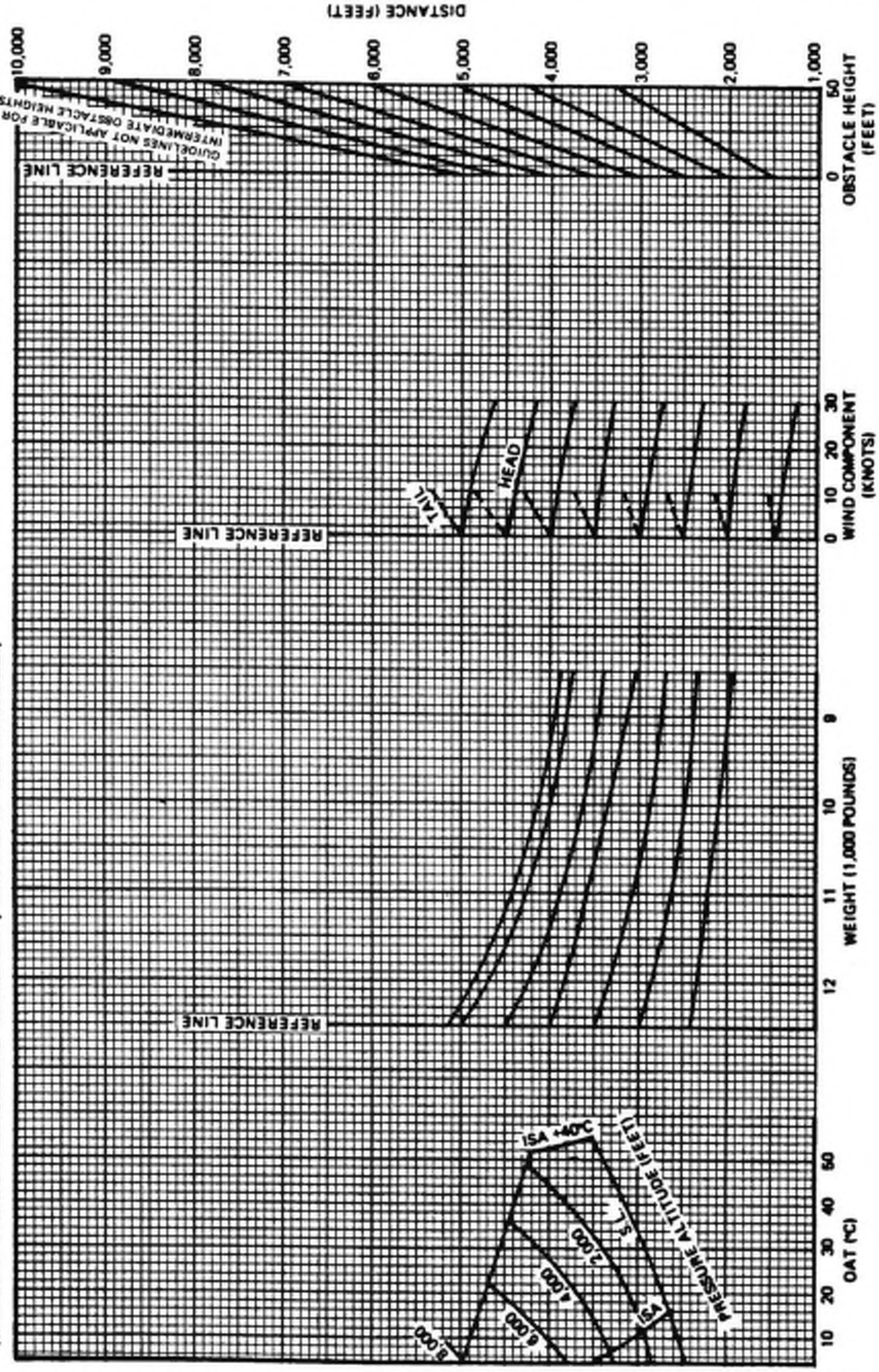


Figure 6

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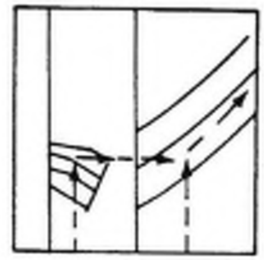
SINGLE ENGINE TAKEOFF CLIMB GRADIENT
WET POWER

ASSOCIATED CONDITIONS:

POWER .... WET TAKEOFF
LANDING GEAR .... UP
FLAPS .... TAKEOFF
BLEED AIR .... OFF
ANTI-ICE .... OFF
INOPERATIVE PROPELLER .... FEATHERED
CLIMB SPEED .... V_{50} PER PAGE 12



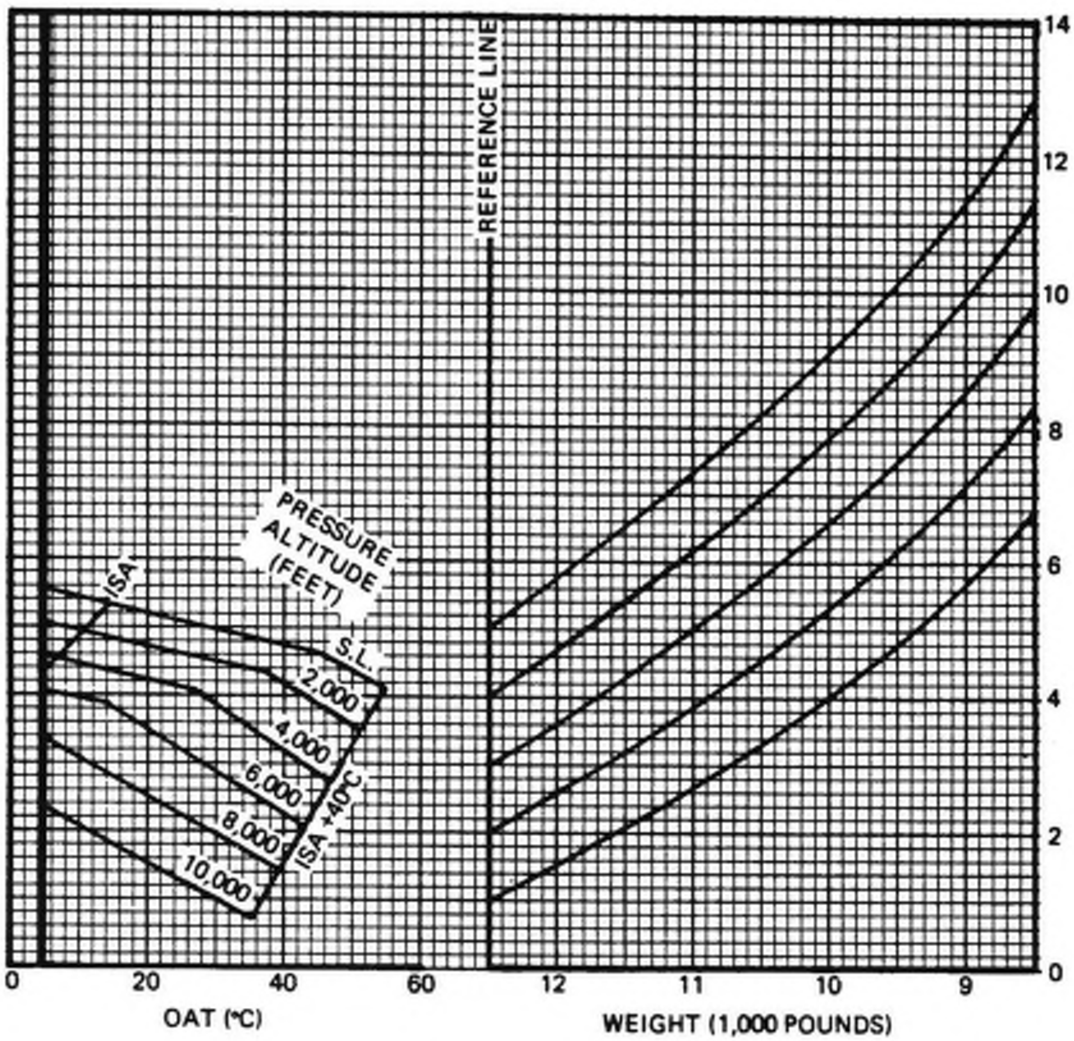


Figure 7

ACCELERATE – STOP DISTANCE
WET POWER

ASSOCIATED CONDITIONS:

POWER . . . . 1. CONTINUOUS WET POWER SET BEFORE BRAKE RELEASE
2. GROUND IDLE AT ENGINE FAILURE SPEED

FLAPS . . . . TAKEOFF

BRAKING. . . . . MAXIMUM

BRAKES . . . . STANDARD (NO ANTI-SKID)

RUNWAY . . . . PAVED, LEVEL, DRY SURFACE

NOTE

Distances include a failure recognition time of 3 seconds.

ENGINE FAILURE SPEEDS (KIAS)

Altitude (Feet)	ISA −30°C	ISA −20°C	ISA −10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
S.L.	DO NOT OPERATE SYSTEM			107	107	107	107	107
2,000				107	107	107	107	107
4,000				107	107	107	107	107
6,000					107	107	107	105
8,000					107	106	104	102
10,000					106	104	102	100

ACCELERATE – STOP DISTANCE
WET POWER

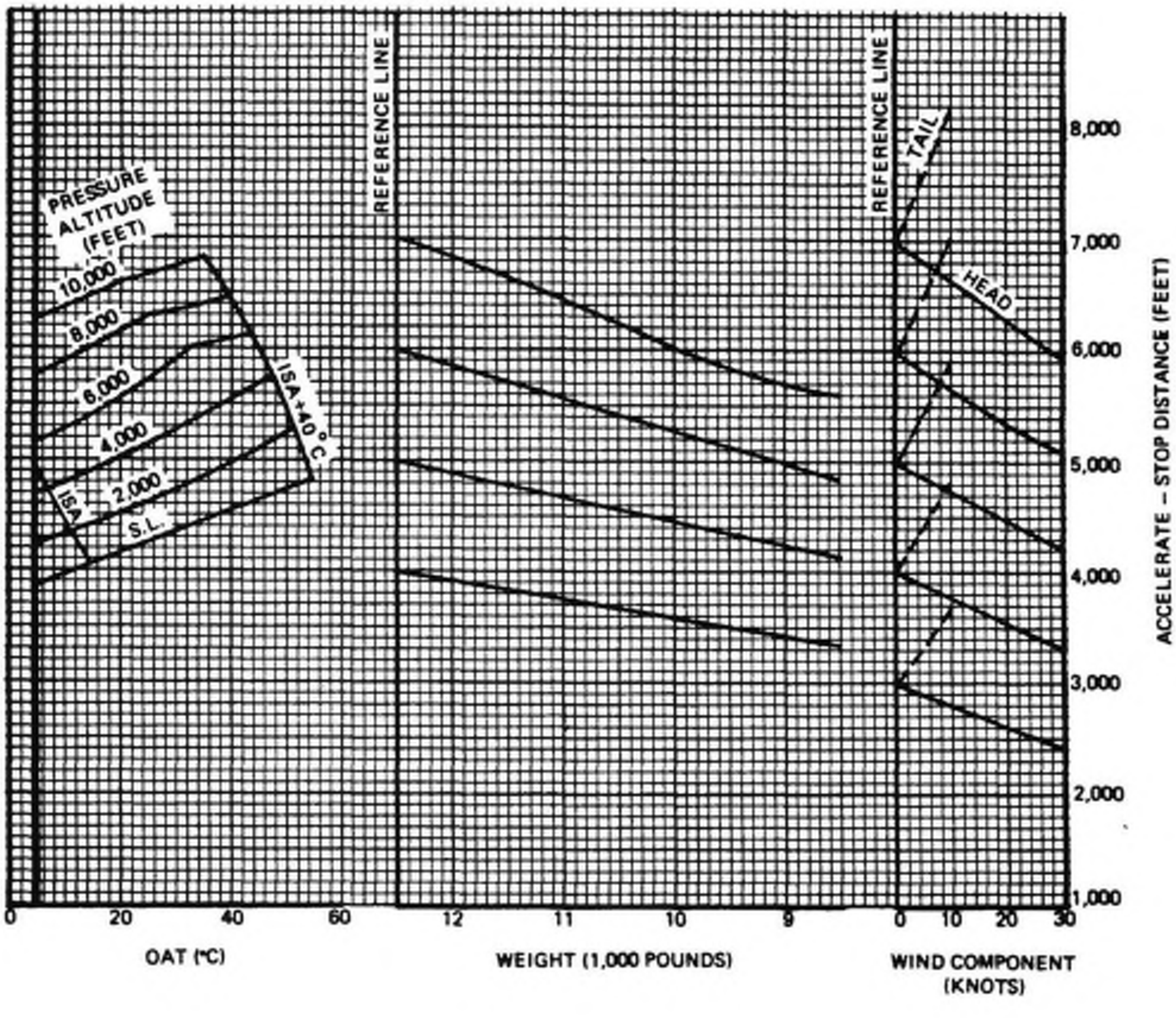


Figure 8

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SECTION 6 ...... WEIGHT AND BALANCE

Add the following information to the equipment list:

QTY. REQ.	ITEM	MARK IF INSTALLED	TOTAL WEIGHT (pounds)	MOMENT ARM (inches)
1	Empty Tank Assembly, Complete, Less Pumps, Swearingen 27–67032		24	20
2	Pumps, Crane 71126		7	37

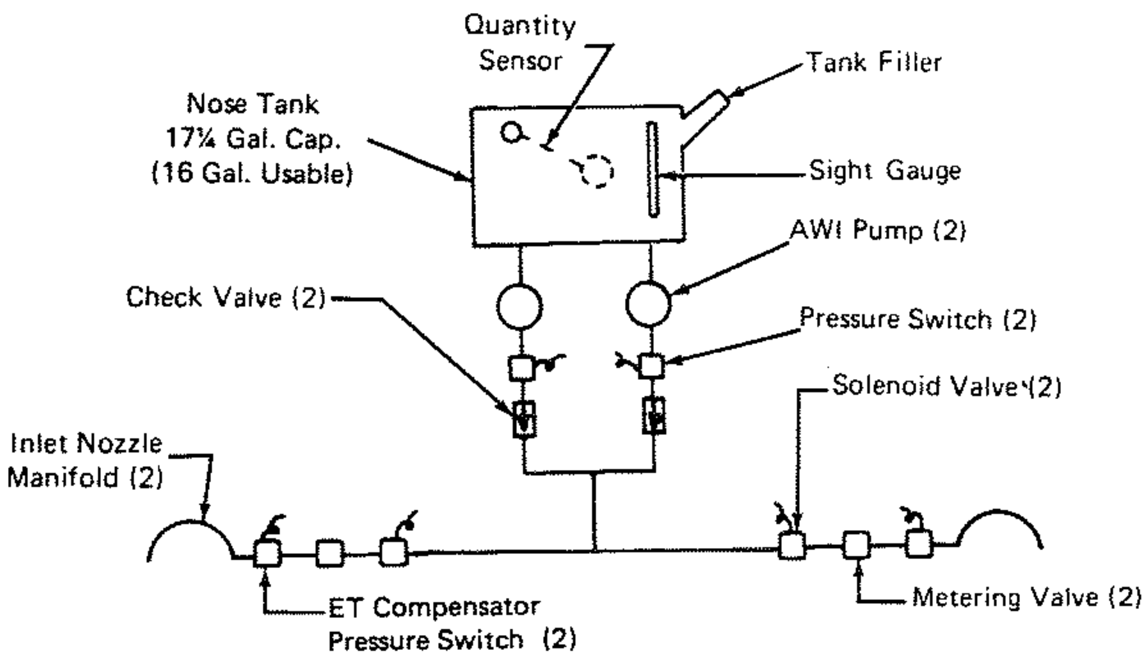
Modify the weight and balance for the effect of the AWI fluid. The existing weight and balance loading forms have provisions for AWI fluid.

	AWI FLUID (gallons)	WEIGHT (pounds)	MOMENT* (inch-pounds/1,000)
UNUSABLE	1.25	9.9	0.2
USABLE	4.0	31.6	0.7
	8.0	63.3	1.3
	12.0	94.9	2.0
	16.0	126.6	2.7

*Based on 7.91 pounds/gallon at F.S. 21.

SECTION 7 .... SYSTEMS DESCRIPTION

This system provides increased engine power by injecting an alcohol-water mixture into the engine inlet. It is used for takeoff in hot weather and/or high altitude conditions. Power output must be limited by the pilot to 650°C ET or 100% torque, whichever occurs first.



CONTINUOUS AWI SYSTEM SCHEMATIC

Figure 9

The AWI fluid is located in the nose baggage compartment and provides 16 gallons of usable fluid. A filler cap is accessible on the right side of the fuselage forward of the nose baggage compartment door. The tank can be drained when the use of AWI is not desired. When the tank is empty, the AWI system circuit breakers should be pulled.

NOTE

- The AWI system should not be used for takeoff if insufficient AWI fluid exists as indicated by the AWI quantity gauge in the cockpit and/or the sight gauge on the AWI tank unless the aircraft is dispatched under DRY performance limitations. Minimum quantity required for operation is 4 gallons.

- The 40/60 alcohol/water mixture normally freezes at ambient temperatures of -24°F and below. Use of the AWI system should not be planned if the AWI fluid has been exposed to excessive cooling for prolonged periods.

AWI SYSTEM OPERATION

When the AWI switch, located on the cockpit pedestal, is placed in continuous (CONT), both AWI pumps are activated. When the pump discharge pressures reach approximately 30 psi, the green AWI NO. 1 PUMP ON and AWI NO. 2 PUMP ON annunciator lights illuminate. As the power levers are advanced beyond flight idle, micro-switches inside the quadrant operate to cause the cabin bleed air to be shut off. Advancing the power lever farther forward to approximately 40% causes the solenoid valves to open and AWI fluid is discharged into the engines via four nozzles at each compressor inlet. A pressure switch near the AWI manifold energizes a second ET compensator installed on the engine. This compensator will raise the ET reading approximately 32°C.

When the AWI is turned on, a rapid ET increase of 32°C accompanied by a torque increase will occur. AWI fluid flow to both engines can be stopped by placing the AWI switch to OFF, or to either engine by retarding the respective power lever to a position corresponding to less than 20% torque. In the event of engine failure, the flow of AWI fluid to the failed engine is automatically interrupted by the corresponding solenoid valve when the faulty engine provides less than 20% torque.

An AWI PUMP TEST switch is also located on the cockpit center pedestal to provide a means of testing the individual CAWI pumps and the opposite check valves. Two pumps are installed to provide a fail-safe system. Even though a single operating pump will provide sufficient fluid flow for all CAWI operations, if the opposite check valve is functioning properly, both pumps should be operating prior to beginning a takeoff. The average fluid flow rate to each engine is two gallons per minute.

SECTION 8 . . . . . . HANDLING, SERVICE, AND MAINTENANCE

No change.

SUPPLEMENT 4

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MERLIN IIIB SA226–T(B)

FUEL QUANTITY PLACARDS

Registration No. ____________________

Serial No. ____________________

This supplement must be attached to the FAA approved Airplane Flight Manual when placards and other devices are installed to protect against unintended overloading with fuel, per Swearingen Engineering Change Proposal (SECP) 291. The information contained herein supplements that of the basic airplane flight manual. For limitations, procedures, and performance information not contained in this supplement, consult the basic manual.

FAA APPROVED: D. D. Castle

for D.P. Watson, Chief
Engineering & Manufacturing Branch
Federal Aviation Administration
Southwest Region
Fort Worth, Texas

DATE: 6-5-80

FUEL QUANTITY PLACARDS

SECTION 1 . . . . . . GENERAL

Fuel Capacity (U.S. Gallons) Total – 554
Usable Fuel (U.S. Gallons) Total – 552

SECTION 2 . . . . . . LIMITATIONS

INSTRUMENT MARKINGS

Fuel Quantity Indicator	
Yellow Arc	1850 to 2200

PLACARDS

Near Fuel Gauges:

> AN OVERWEIGHT CONDITION CAN OCCUR DUE TO FUEL LOAD. REFER TO FLIGHT MANUAL LOADING SCHEDULE PRIOR TO FUELING OPERATION.

SECTION 3. . . . . . EMEGENCY PROCEDURES

No change.

SECTION 3A . . . . . . ABNORMAL PROCEDURES

No change.

SECTION 4 . . . . . . NORMAL PROCEDURES

No change.

SECTION 5 . . . . . . PERFORMANCE

No change.

SECTION 6 . . . . . . WEIGHT AND BALANCE

No change.

SECTION 7 . . . . . . SYSTEM DESCRIPTIONS

FUEL SYSTEM

A full mark at the 277.0 gallon level is provided in each fuel filler neck, to protect against possible overloading of the airplane with fuel.

SECTION 8 . . . . . . HANDLING, SERVICING, AND MAINTENANCE

No change.

RESTRICTED CATEGORY SUPPLEMENT

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MERLIN IIIB SA226–T(B)

14,000 POUNDS TAKEOFF GROSS WEIGHT

RESTRICTED CATEGORY

Registration No. ____________________

Serial No. ____________________

This supplement must be attached to the FAA approved Airplane Flight Manual when the airplane is operated for patrol or aerial photography/survey missions at weights exceeding those approved for normal category operations. The information contained herein supplements or supersedes the basic Airplane Flight Manual only in the areas listed. For limitations, procedures, and performance information not contained in this supplement, consult the basic manual.

The material presented on pages 1 through 19 of this Supplement has been approved by the Federal Aviation Administration (FAA).

FAA Approved: D.P. Watson

D.P. Watson, Chief (ASW–210)
Engineering & Manufacturing Branch
Federal Aviation Administration
Southwest Region
Fort Worth, Texas

Date: July 29, 1980

14,000 POUNDS TAKEOFF GROSS WEIGHT RESTRICTED CATEGORY

SECTION I. . . . . . GENERAL

No change.

SECTION 2 . . . . . . LIMITATIONS

AIRSPEED LIMITS

V_{MO} (Maximum operating speed)
Sea level through 24,000 feet . . . . .265 KCAS (261 KIAS)
Above 24,000 feet. . . . . THIS SPEED APPLIES FROM SEA LEVEL THROUGH 24,000 FEET. FROM 24,000 FEET THROUGH 31,000 FEET, DECREASE BY 5 KNOTS PER 1,000 FEET ABOVE 24,000 FEET.
V_A (Maneuvering speed) . . . . .180 KCAS (177 KIAS)

MANEUVERING LOAD FACTORS

Flaps Up . . . . +2.8 to -1.1g
Flaps Extended . . . . +2.0g

CENTER OF GRAVITY LIMITS

Forward Limit (landing gear down):
155.4 inches aft of datum (11% MAC) at 7,500 pounds
163.4 inches aft of datum (21.5% MAC) at 12,500 pounds
165.6 inches aft of datum (24.4% MAC) at 14,000 pounds

Aft Limit (landing gear down):
168.4 inches aft of datum (28% MAC) at all weights

MAXIMUM WEIGHTS

Maximum Takeoff Weight* . . . . 14,000 POUNDS
Maximum Ramp Weight . . . . 14,100 POUNDS
Maximum Landing Weight** . . . . 12,500 POUNDS
Maximum Zero Fuel Weight . . . . 12,500 POUNDS

SECTION 2 . . . . . . LIMITATIONS (continued)

NOTE

** If operational necessity requires landing at higher weights, hold the touchdown sink rate to the minimum feasible.

** After an overweight landing, conduct a structural inspection of the nacelles in the wing leading edge area, and the fuselage skin adjacent to the nose wheelwell.

* An autopilot, if installed, is not approved for use at gross weights above 12,500 pounds unless the autopilot supplement shows that a higher weight has been certified.

TEMPERATURE LIMITS – ALL ALTITUDES

Maximum Ambient Temperature for Operation above 12,500 lbs. . . . . ISA +35°C

SECTION 3 . . . . . . EMERGENCY PROCEDURES

ENGINE FAILURE DURING TAKEOFF – TAKEOFF CONTINUED AT OR ABOVE V_R

5. AIRSPEED . . . . SINGLE ENGINE BEST RATE OF CLIMB SPEED (SEE FIGURE 5)

SECTION 3A . . . . . . ABNORMAL PROCEDURES

No change.

SECTION 4 . . . . . . NORMAL PROCEDURES

No change.

SECTION 5 . . . . . . PERFORMANCE

Figures 1 through 10 show the calculated influence of gross weight extended to 14,000 pounds. Extended speed schedules are tabulated adjacent to the graphs. Note that the wind effect shown on the takeoff distance graphs accounts for 150% of the tailwind and 50% of the headwind.

FLYOVER NOISE LEVELS

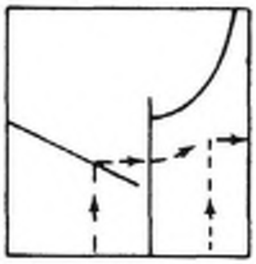
Flyover noise level measured in accordance with Appendix F to FAR 36 is 75.5 dB(A).

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

STALL SPEEDS — ZERO THRUST

NOTE

- Stall speeds are with landing gear down.
- For stall speeds with landing gear up, add 1 1/2 knots to chart speed.



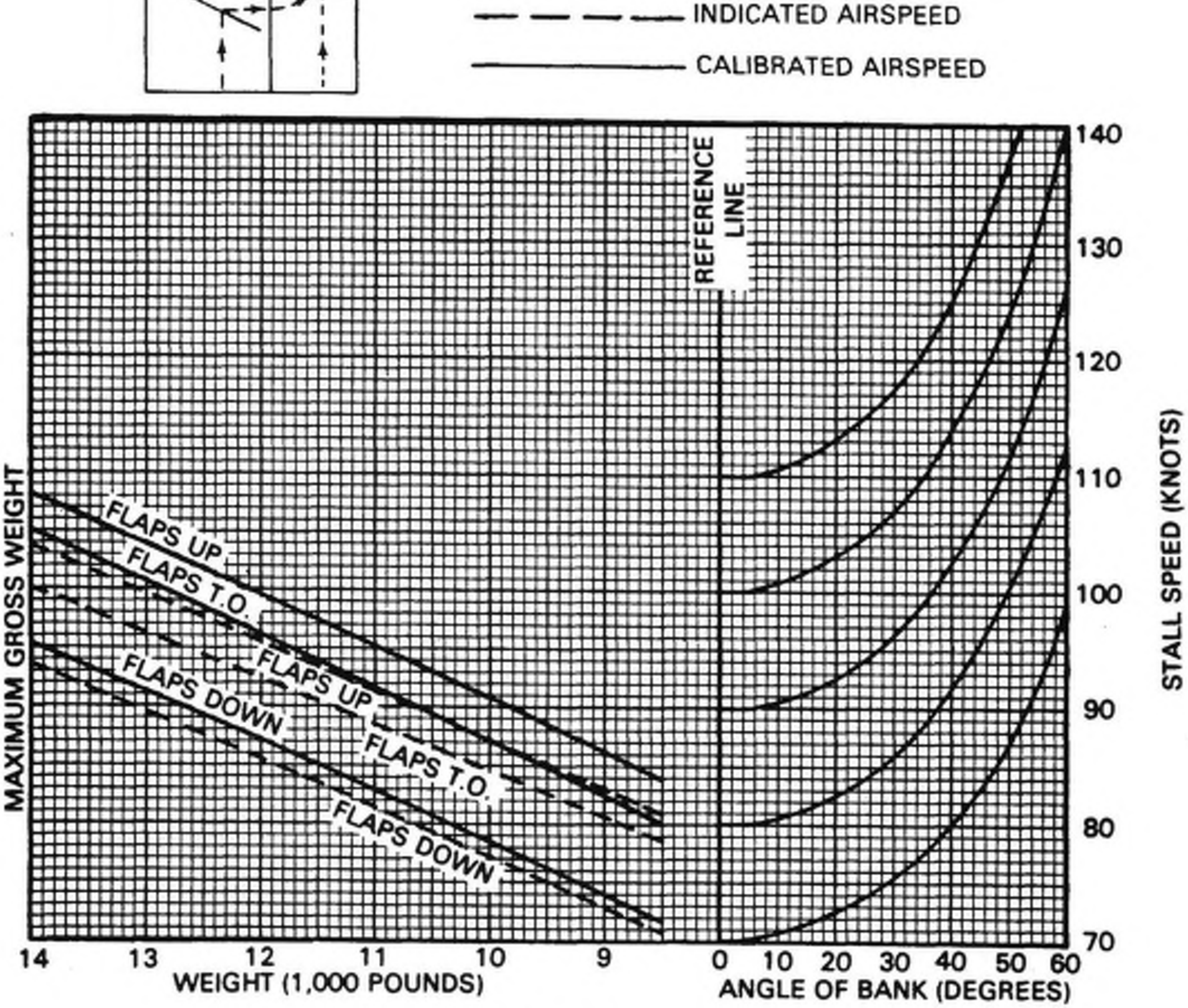


Figure 1

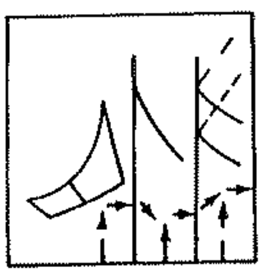
TWO-ENGINE TAKEOFF DISTANCE – BLEED AIR ON

ASSOCIATED CONDITIONS:

POWER . . . . TAKEOFF POWER SET BEFORE BRAKE RELEASE (SEE NOTE BELOW)
FLAPS . . . . TAKEOFF; RETRACT AT V_{50}
LANDING GEAR . . . . . RETRACT AFTER LIFT-OFF
RUNWAY . . . . PAVED, LEVEL, DRY SURFACE
BLEED AIR . . . . ON
ANTI-ICE . . . . OFF
SPEEDS . . . . SEE SCHEDULE
MAXIMUM FUEL IMBALANCE . . . . . . 150 POUNDS

NOTE

- Static takeoff power not to exceed 97% torque.
- It is recommended that heavy gross weight takeoffs be conducted with bleed air OFF. With bleed air OFF, the takeoff distances shown will be conservative.



TAKEOFF SPEEDS

ROTATE SPEED, V_R (KCAS = KIAS) IS THE GREATER OF V_{MCA} OR V_{S1}

V_{MCA}

Altitude (Feet)	ISA −30°C	ISA −20°C	ISA −10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
S.L.	107	107	107	107	107	101	96	92
2,000	107	107	107	107	105	100	95	90
4,000	107	107	107	107	102	98	93	89
6,000	107	107	107	104	100	96	92	88
8,000	107	107	106	102	98	94	90	87

V_{S1} TAKEOFF FLAPS

Gross Weight (Pounds)	12,500	13,000	13,500	14,000
V_{S1} (KCAS)	99	101	103	105

TAKEOFF SPEED AT 50 FOOT HEIGHT, V_{50} (KIAS*)

At Takeoff Weights Of 12,500 Pounds And Greater V_{50} Is Established By 1.2 V_{S1}

1.2 V_{S1} (KIAS)

Weight (Pounds)	12,500	13,000	13,500	14,000
1.2 V_{S1}	116	119	122	124

*For KCAS in flight add 2 KTS.
Assumes no instrument error.

TWO-ENGINE TAKEOFF DISTANCE — BLEED AIR ON

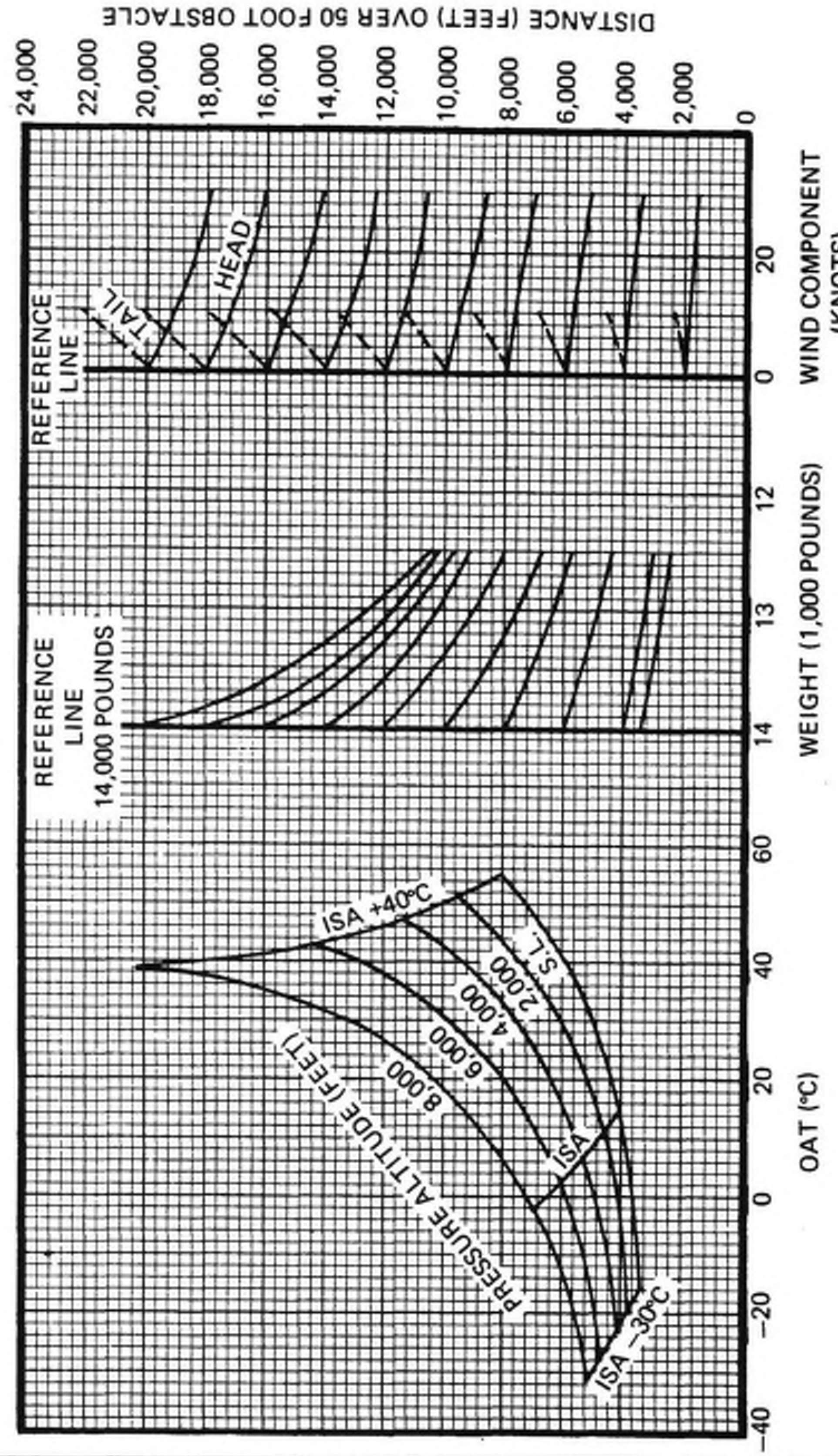


Figure 2

TWO-ENGINE TAKEOFF DISTANCE
WET POWER

ASSOCIATED CONDITIONS:

POWER . . . . .CONTINUOUS WET TAKEOFF POWER SET BEFORE BRAKE RELEASE
FLAPS . . . . TAKEOFF; RETRACT AT V_{50}
LANDING GEAR . . . . .RETRACT AFTER LIFT-OFF
RUNWAY . . . . PAVED, LEVEL, DRY SURFACE
BLEED AIR. . . . . OFF
ANTI-ICE . . . . OFF
SPEEDS . . . . .SEE TAKEOFF SPEEDS WITH CAWI
MAXIMUM FUEL IMBALANCE . . . . 150 POUNDS

NOTE

Static takeoff power not to exceed 97% torque.

CAUTION

DO NOT USE CONTINUOUS WET POWER BELOW 5°C OAT.

TAKEOFF SPEEDS WITH CAWI

ROTATE SPEED, V_R (KCAS = KIAS) IS THE GREATER OF V_{MCA} OR V_{S1}

V_{MCA}

Altitude (Feet)	ISA −30°C	ISA −20°C	ISA −10°C	ISA	ISA +10°C	ISA +20°C	ISA +30°C	ISA +40°C
S.L.	DO NOT OPERATE SYSTEM			107	107	107	107	107
2,000				107	107	107	107	107
4,000				107	107	107	107	107
6,000					107	107	107	105
8,000					107	106	104	102
10,000					106	104	102	100

V_{S1} TAKEOFF FLAPS

Gross Weight (Pounds)	12,500	13,000	13,500	14,000
V_{S1} (KCAS)	99	101	103	105

TAKEOFF SPEED AT 50 FOOT HEIGHT, V_{50} (KIAS*)

At Takeoff Weights Of 12,500 Pounds
And Greater V_{50} Is Established By 1.2 V_{S1}

1.2 V_{S1} (KIAS)

Weight (Pounds)	12,500	13,000	13,500	14,000
1.2 V_{S1} KCAS or KIAS	116	119	122	124

*For KCAS in flight, add 2 KTS.
Assumes no instrument error.

TWO ENGINE TAKEOFF DISTANCE
WET POWER

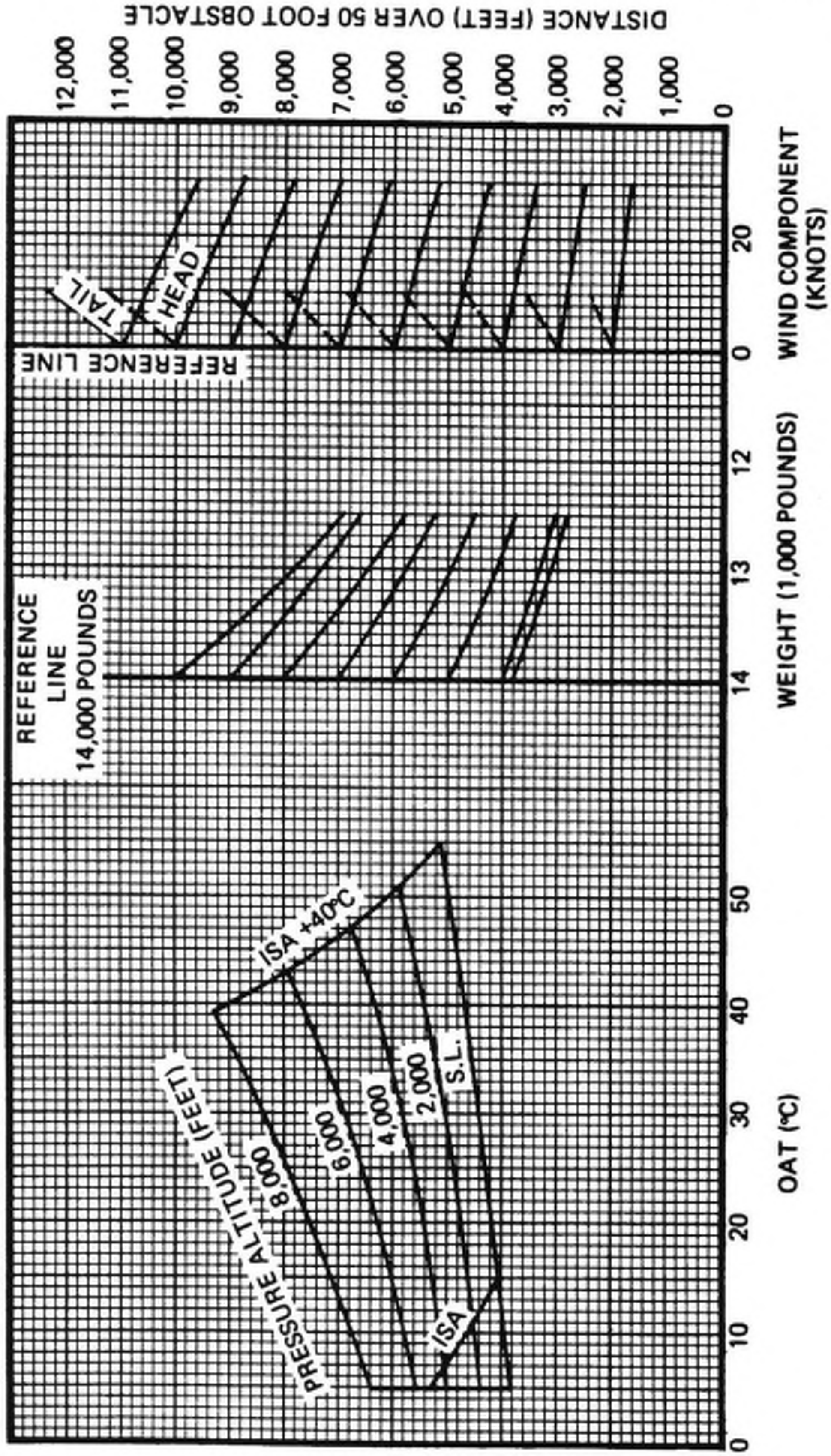


Figure 3

CLIMB SPEEDS

TWO ENGINE BEST ANGLE (V_X) AND BEST RATE OF CLIMB (V_Y) SPEEDS

ASSOCIATED CONDITIONS:

POWER . . . . MAXIMUM CONTINUOUS
FLAPS . . . . UP
LANDING GEAR . . . . UP
ELECTRICAL LOAD . . . . 300 AMPERES (TOTAL)
BLEED AIR. . . . . ON
ANTI-ICE . . . . AS REQUIRED

At 12,500 pounds and lower weights the two-engine best angle of climb speed, V_X, is limited by V_{MCA} (107 KCAS, 105 KIAS) at all altitudes from sea level through 12,000 feet on cold days.

Use 105 KIAS for V_X at all gross weights below 12,500 pounds.

TWO ENGINE BEST ANGLE OF CLIMB SPEEDS V_X (KIAS)*		
Pressure Altitude (Feet)	GROSS WEIGHT (Pounds)	
	12,500	14,000
S.L.	105	109
5,000	105	109
10,000	105	109
15,000	105	111
20,000	107	117
25,000	114	122

*Assumes no instrument error.

TWO ENGINE BEST RATE OF CLIMB SPEEDS V_Y (KIAS)*				
Pressure Altitude (Feet)	GROSS WEIGHT (Pounds)			
	8,500	10,500	12,500	14,000
S.L.	138	139	141	143
5,000	131	134	137	145
10,000	125	129	133	140
15,000	119	124	129	136
20,000	113	119	125	133
25,000	108	114	121	129

*Assumes no instrument error.

Figure 4

CLIMB SPEEDS

SINGLE ENGINE BEST ANGLE (V_{XSE}) AND BEST RATE OF CLIMB (V_{YSE}) SPEEDS

ASSOCIATED CONDITIONS:

POWER. . . . . MAXIMUM CONTINUOUS ON OPERATING ENGINE
FLAPS . . . . .UP
LANDING GEAR . . . . .UP
ELECTRICAL LOAD . . . . 300 AMPERES
BLEED AIR. . . . . OFF
ANTI-ICE . . . . .AS REQUIRED
INOPERATIVE ENGINE . . . . PROPELLER FEATHERED

SINGLE ENGINE BEST ANGLE OF CLIMB SPEEDS V_{XSE} (KIAS)*

Pressure Altitude (Feet)	GROSS WEIGHT (Pounds)			
	8,500**	10,500	12,500	14,000
0	105	107	116	123
5,000	105	108	118	125
10,000	105	110	120	128
15,000	100	111	121	131
20,000	100	113	123	133
25,000	100	114	124	136

*Assumes no instrument error.
**V_{XSE} is limited by V_{MCA} at lower altitudes.

SINGLE ENGINE BEST RATE OF CLIMB SPEEDS V_{YSE} (KIAS)*

Pressure Altitude (Feet)	GROSS WEIGHT (Pounds)			
	8,500	10,500	12,500	14,000
S.L.	123	128	135	135
5,000	118	124	130	134
10,000	115	120	126	131
15,000	110	116	122	128
20,000	106	113	118	126
25,000	102	109	114	123

*Assumes no instrument error.

NOTE

To achieve the published single engine performance, the airplane must be flown with minimum side slip and yaw as determined from the turn and bank indicator. Up to 5° of bank into the operating engine may be required at maximum continuous power and airspeeds near V_{MCA}.

Figure 5

RATE-OF-CLIMB – TWO ENGINE.

ASSOCIATED CONDITIONS:

POWER........................MAXIMUM CONTINUOUS
FLAPS .... UP
LANDING GEAR .... UP
BLEED AIR .... ON
ANTI-ICE .... OFF

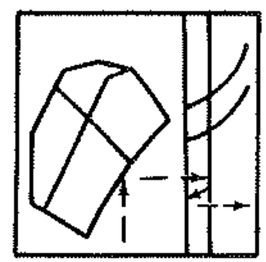
NOTE

With anti-ice on, reduce two engine normal rate-of-climb by 450 fpm.

OBTAIN OAT FROM IOAT Figure V–2, BASIC FLIGHT MANUAL, SECTION 5.

	BEST RATE OF CLIMB SPEEDS, KIAS*			
Pressure Altitude (Feet)	GROSS WEIGHT (POUNDS)			
	8,500	10,500	12,500	14,000
S.L.	138	139	141	143
5,000	131	134	137	145
10,000	125	129	133	140
15,000	119	124	129	136
20,000	113	119	125	133
25,000	108	114	121	129

*Assumes no instrument error.



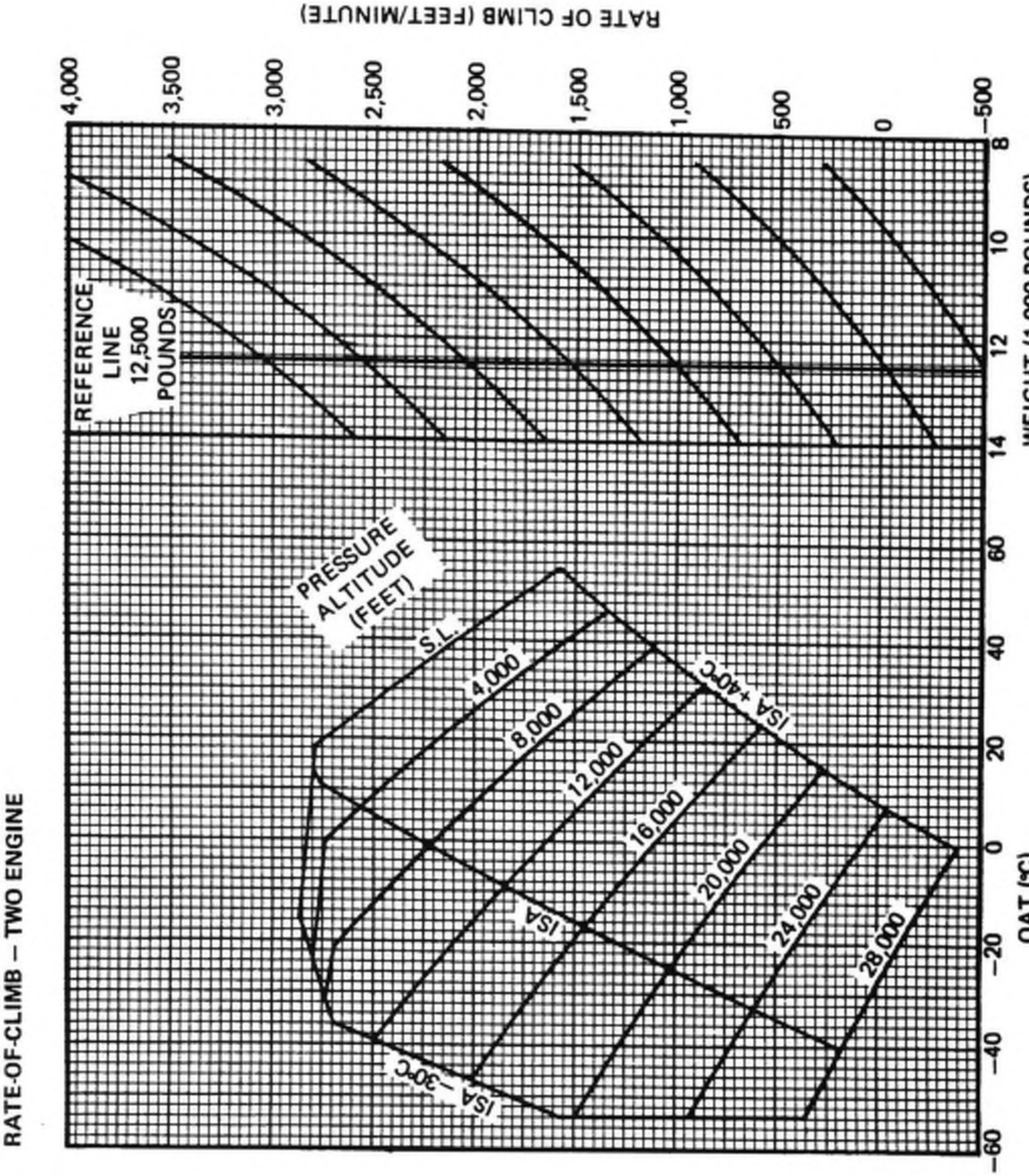

RATE-OF-CLIMB — TWO ENGINE
RATE OF CLIMB (FEET/MINUTE)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
−500
WEIGHT (1,000 POUNDS)
8
10
12
14
REFERENCE LINE 12,500 POUNDS
PRESSURE ALTITUDE (FEET)
S.L.
4,000
8,000
12,000
16,000
20,000
24,000
28,000
ISA +40°C
ISA
ISA −30°C
OAT (°C)
60
40
20
0
−20
−40
−60

Figure 6

RATE-OF-CLIMB – SINGLE ENGINE

ASSOCIATED CONDITIONS:

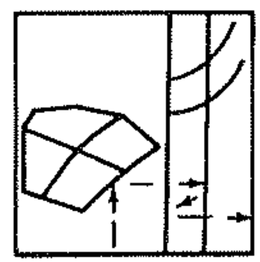
POWER .... MAXIMUM CONTINUOUS
FLAPS .... UP
LANDING GEAR .... UP
BLEED AIR .... ON
ANTI-ICE .... OFF
INOPERATIVE ENGINE .... PROPELLER FEATHERED

NOTE

With anti-ice on, reduce single engine rate-of-climb by 200 fpm.

OBTAIN OAT FROM IOAT Figure V–2, BASIC FLIGHT MANUAL, SECTION 5.

SINGLE-ENGINE BEST RATE-OF-CLIMB SPEEDS, KIAS				
Pr. Alt. (Feet)	GROSS WEIGHT (Pounds)			
	8,500	10,500	12,500	14,000
S.L.	123	128	135	137
5,000	118	124	130	134
10,000	115	120	126	131
15,000	110	116	122	128
20,000	106	113	118	126
25,000	102	109	114	123



RATE-OF-CLIMB – SINGLE ENGINE

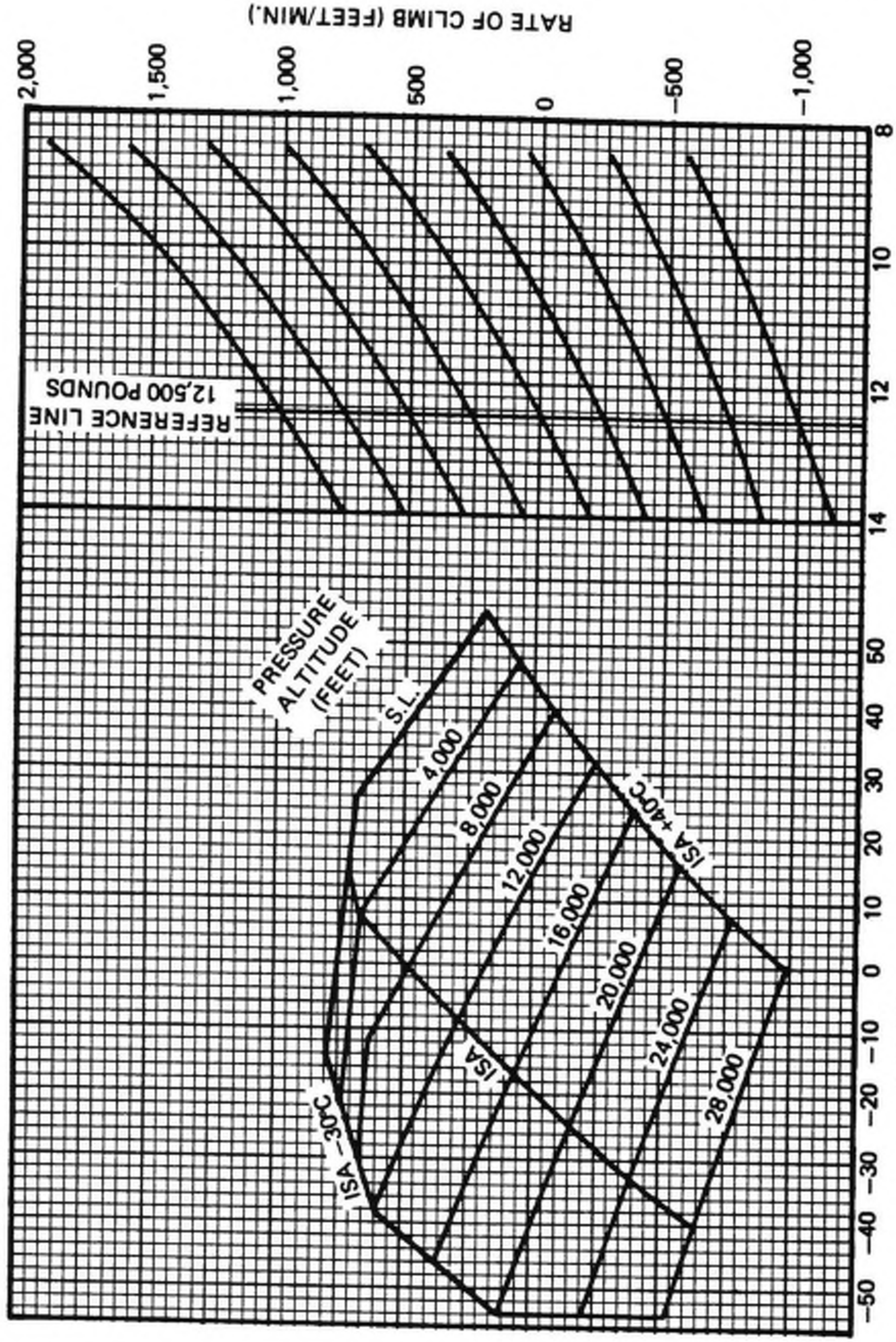


Figure 7

RATE-OF-CLIMB – BALKED LANDING

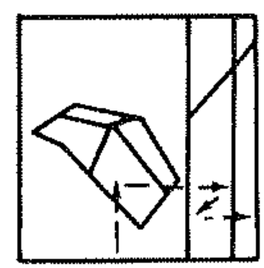
ASSOCIATED CONDITIONS:

POWER	MAXIMUM CONTINUOUS
FLAPS	DOWN
LANDING GEAR	DOWN
BLEED AIR	ON
ANTI-ICE	OFF
CLIMB SPEED	105 KIAS (107 KCAS)

NOTE

With anti-ice on, reduce balked landing rate-of-climb by 300 fpm.

OBTAIN OAT FROM IOAT Figure V–2, BASIC FLIGHT MANUAL, SECTION 5.



RATE-OF-CLIMB – BALKED LANDING

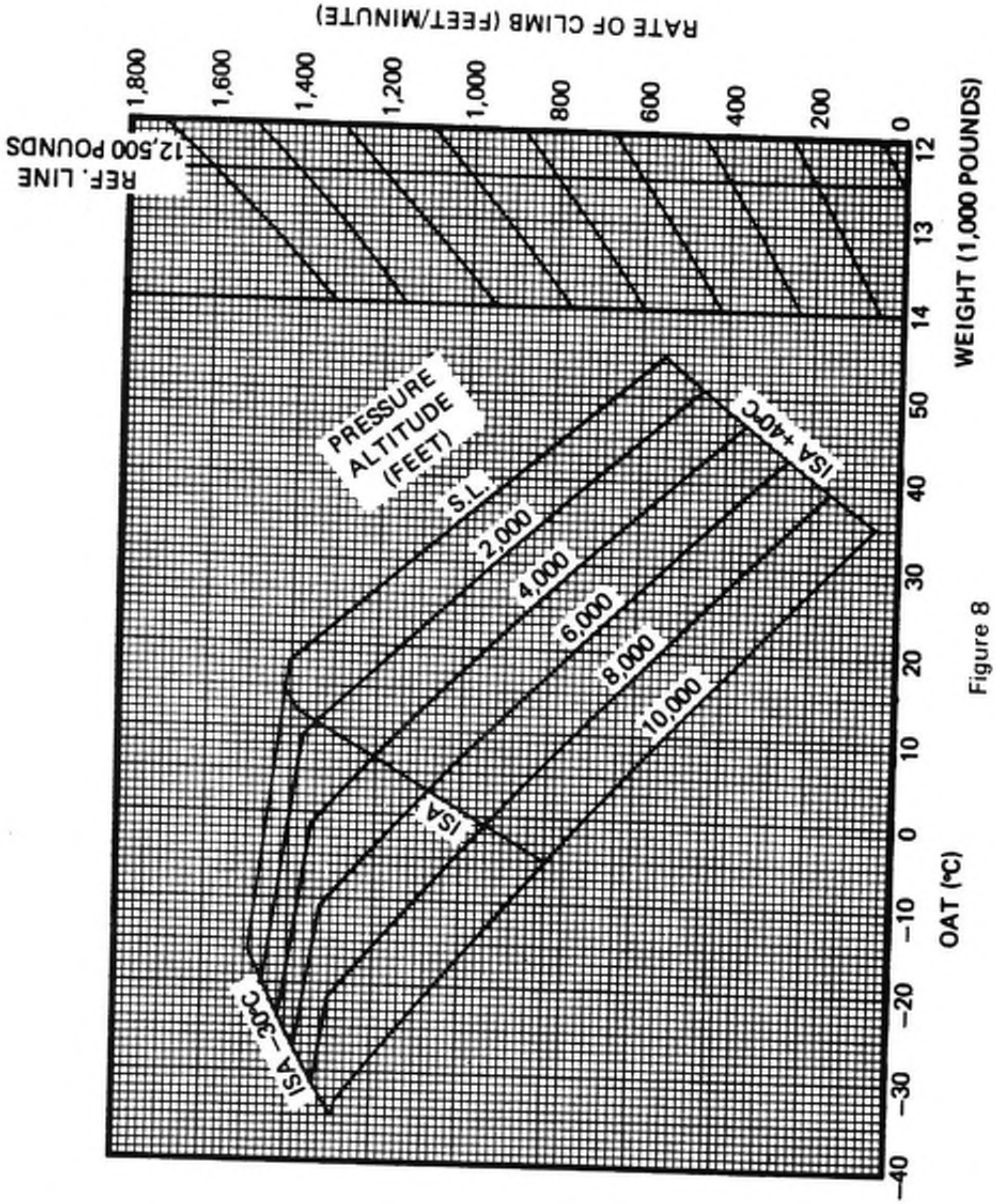


Figure 8

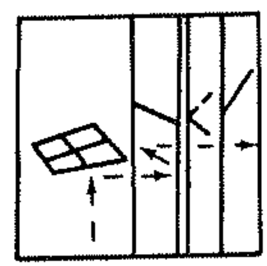
SINGLE ENGINE LANDING DISTANCE WITHOUT REVERSING OR ANTI-SKID BRAKES

ASSOCIATED CONDITIONS:

POWER .... FLIGHT IDLE
FLAPS .... DOWN
RUNWAY .... PAVED, LEVEL, DRY SURFACE
APPROACH SPEED .... $1.3V_S$ AS TABULATED
BRAKING .... MAXIMUM
BLEED AIR .... ON/OFF
ANTI-ICE .... ON/OFF

WEIGHT (POUNDS)	SPEED AT 50 FEET* (KNOTS) (KCAS)	(KIAS)
14,000	124	123
12,500	116	115
11,500	110	109
10,500	105	104
9,500	99	97
8,500	93	91

*APPROACH AIRSPEED SHOULD NOT BE LESS THAN V_{MCA} UNTIL THE LANDING IS ASSURED.



SINGLE ENGINE LANDING DISTANCE WITHOUT REVERSING OR ANTI-SKID

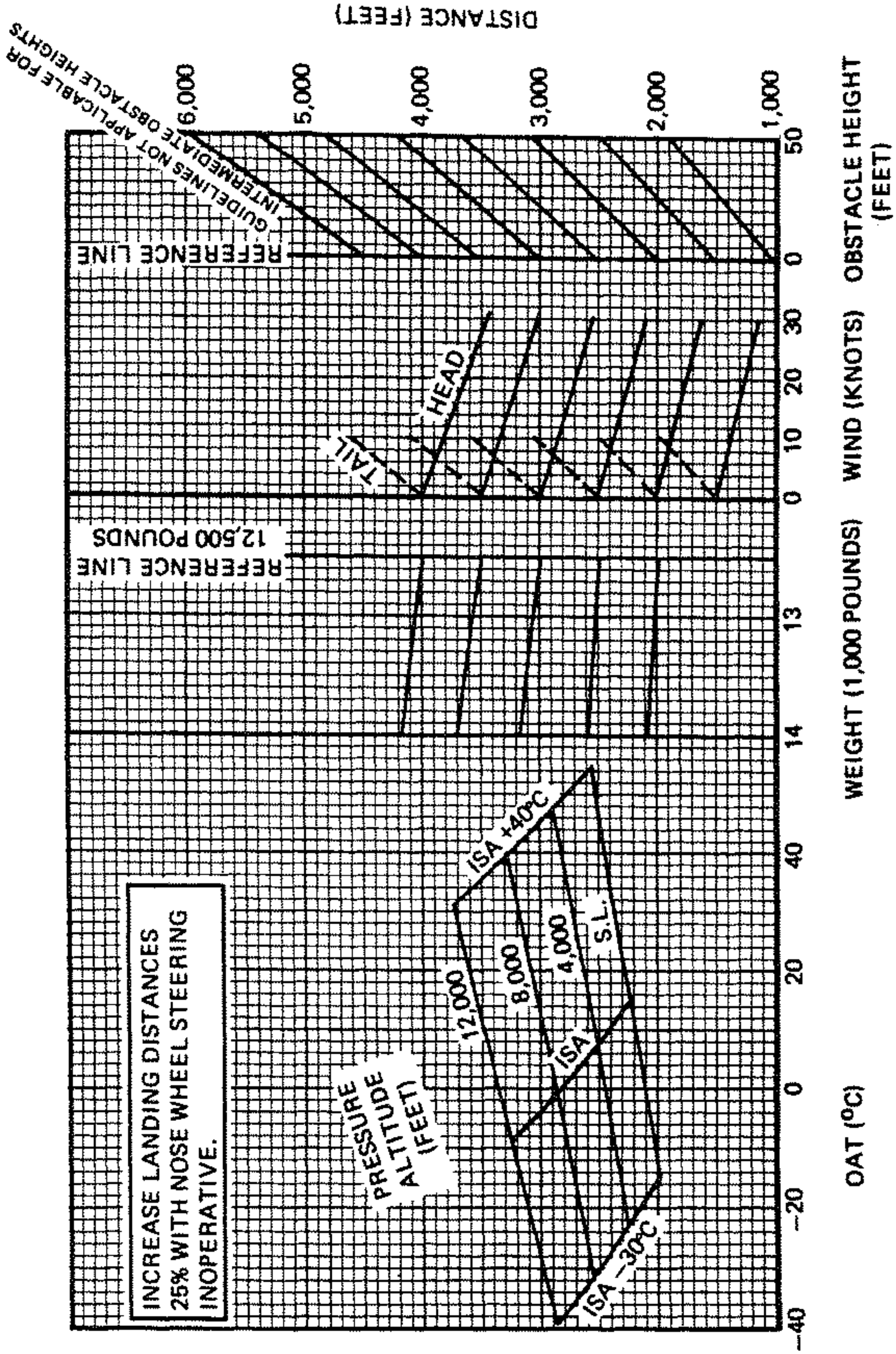


Figure 9

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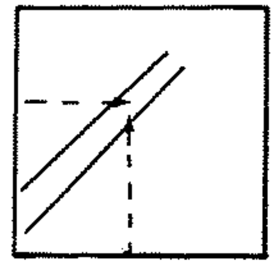
WEIGHT-MOMENT ENVELOPE – GEAR DOWN



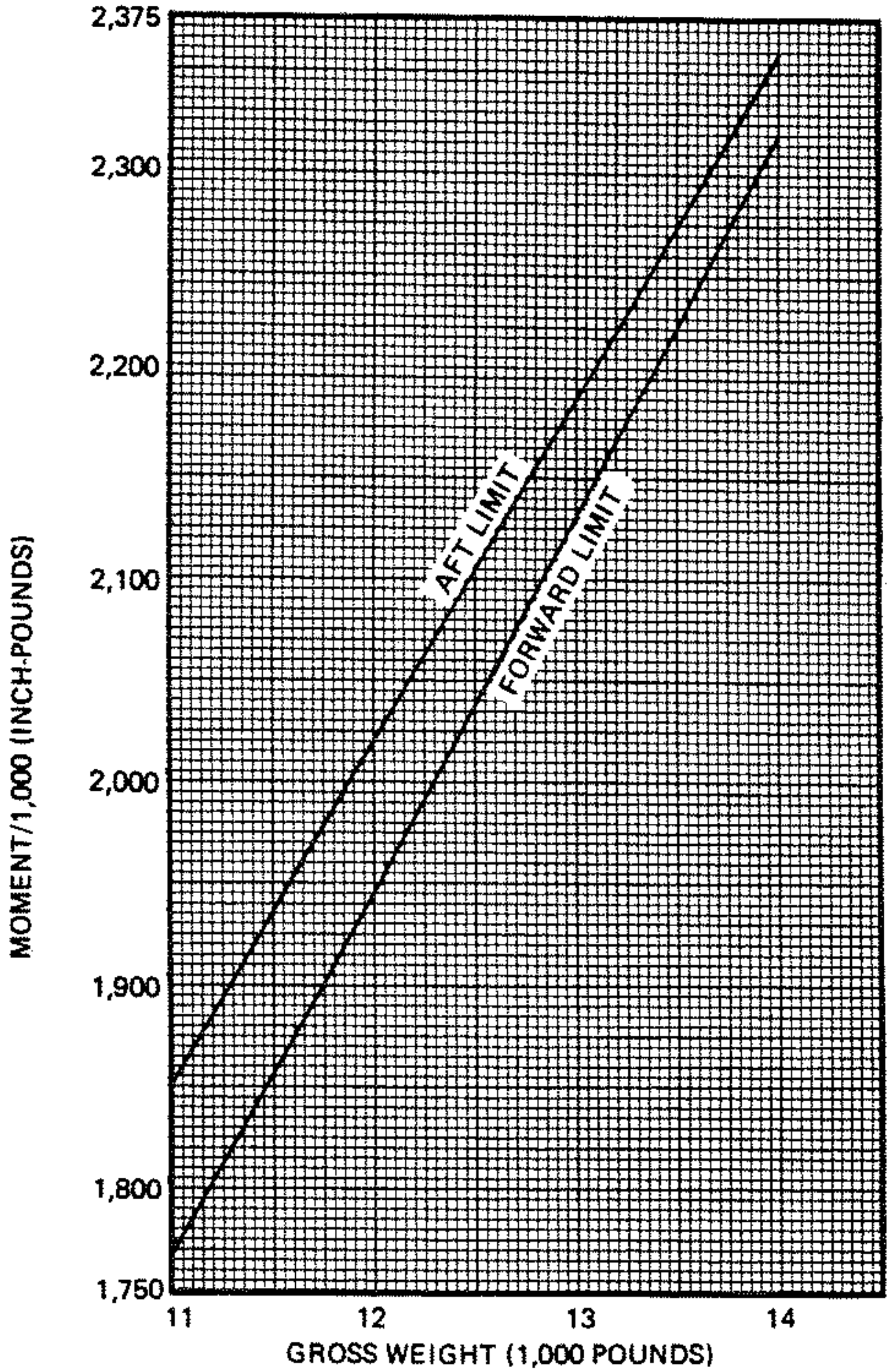


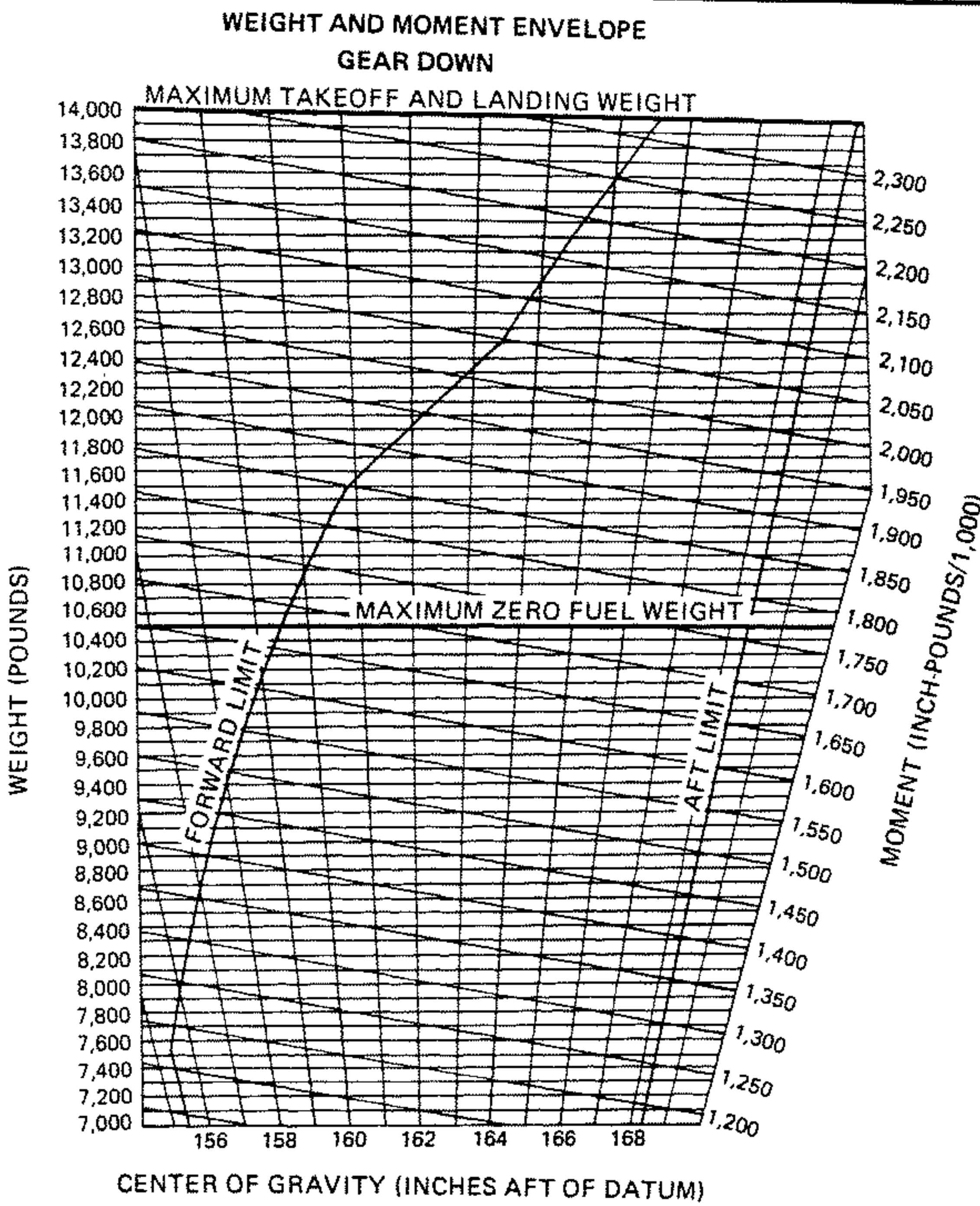
Figure 10

SECTION 7 . . . . . . SYSTEMS DESCRIPTIONS

No change.

SECTION 8 . . . . . . HANDLING, SERVICE, AND MAINTENANCE

No change.



EXAMPLE:

Given: Weight = 8,965 Pounds
Moment = 1,426 Inch-Pounds/1,000

Obtain: C.G. = 159.1 Inches Aft of Datum

NOTE

Landing gear retraction will not shift C.G. beyond limits.

SUPPLEMENT 6

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MERLIN IIIB SA226-T(B)

HARTZELL LT10576B PROPELLERS

Registration No. ______________________

Serial No. ______________________

This supplement must be attached to the FAA approved Airplane Flight Manual when Hartzel HC-B4TN-5KL/LT10576B propellers are installed per Swearingen drawing number 27K62002. The information contained herein supplements or supersedes the basic Airplane Flight Manual only in the areas listed. For limitations, procedures, and performance not contained in this supplement, consult the basic manual.

FAA Approved: D. D. Castle

for D.P. Watson, Chief (ASW-210)
Engineering & Manufacturing Branch
Federal Aviation Administration
Southwest Region
Fort Worth, Texas

Date: November 18, 1980

Revised: ______________________

LOG OF REVISIONS

Revision Number	Revised Pages	Description of Revision	FAA APPROVED	
			Signature	Date

A black bar on a revised page shows the current change

HARTZELL LT10576B PROPELLERS

SECTION 1 . . . . . . GENERAL

SPECIFICATIONS

PROPELLER

Blade Model Number	LT10576B
Hub Model Number	HC-B4TN-5KL

SECTION 2 . . . . . . LIMITATIONS

PROPELLERS

Blade Model Number	LT10576B
Hub Model Number	HC-B4TN-5KL
Blade Angle (at 42 inch station)	
Feathered	81.0 Degrees
Flight Idle	6.8 Degrees
Start Locks	–4.5 Degrees
Full Reverse	–8.7 Degrees (for TPE331-10U-501G)
	–12.7 Degrees (for TPE331-10U-502G)

PROPELLER REVERSING

Propeller reversing is limited to ground operations at speeds below 90 KCAS. Do not use full reverse above 90 knots. Reduce airspeed 1 knot for each 1°F above 90°F prior to using maximum reverse power.

SECTION 3 . . . . . . EMERGENCY PROCEDURES

ENGINE FAILURE DURING TAKEOFF – TAKEOFF ABORTED

4. Reverse Thrust (operating engine) . . . . AS REQUIRED

SINGLE ENGINE LANDING

AFTER TOUCHDOWN

3. Reverse Thrust . . . . AS REQUIRED

SECTION 3A . . . . . . ABNORMAL PROCEDURES

PREPLANNED ENGINE SHUTDOWN IN FLIGHT

ENGINE SHUTDOWN
After item 7.

NOTE

A feathered propeller should not rotate backward at speeds above 110 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.

SECTION 4 . . . . . . NORMAL PROCEDURES

LANDING
After item 5, delete WARNING

CAUTION

DO NOT USE FULL REVERSE ABOVE 90 KNOTS. REDUCE AIRSPEED 1 KNOT FOR EACH 1°F ABOVE 90°F PRIOR TO USING MAXIMUM REVERSE POWER.

SECTION 5 . . . . . . PERFORMANCE

No Change.

SECTION 6 . . . . . . WEIGHT AND BALANCE

EQUIPMENT LIST

PROPELLERS AND PROPELLER ACCESSORIES

Qty. Req.	Item	Mark If Installed	Weight (pounds)	Arm (inches)
2	Propeller and hub assembly 106" diameter Hartzell P/N's HC-B4TN-5KL and LT10576B.		358	69

SECTION 7 . . . . . . SYSTEMS DESCRIPTION

No change.

SECTION 8 . . . . . . HANDLING, SERVICE, AND MAINTENANCE

No change.

SUPPLEMENT 7

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MERLIN IIIB SA226-T(B)

OPERATION WITH SPADE DOORS REMOVED

Registration No. N616PS

Serial No. T-0316

This supplement must be attached to the FAA approved Airplane Flight Manual when the main landing gear spade doors, P/N 27-55001-155, are removed in accordance with SA226 series service bulletin 32-035. The information contained herein supplements or supersedes the basic Airplane Flight Manual only in the areas listed. For limitations, procedures, and performance not contained in this supplement, consult the basic manual and other applicable supplements.

FAA APPROVED: D. D. Castle

D.P. Watson, Chief (ASW-210)
Engineering & Manufacturing Branch
Federal Aviation Administration
Southwest Region
Fort Worth, Texas

Date: 1-11-82

Revised: ____________

LOG OF REVISIONS

Revision Number	Revised Pages	Description of Revision	FAA Approved	
			Signature	Date

A black bar on a revised page shows the current change.

SECTION 1 . . . . . . GENERAL

No Change.

SECTION 2 . . . . . . LIMITATIONS

No Change.

SECTION 3 . . . . . . EMERGENCY PROCEDURES

No Change.

SECTION 3A . . . . . . ABNORMAL PROCEDURES

No Change.

SECTION 4 . . . . . . NORMAL PROCEDURES

No Change.

SECTION 5 . . . . . . PERFORMANCE

Increase landing distance by 5%.

SECTION 6 . . . . . .

No Change.

SECTION 7 . . . . . . SYSTEMS DESCRIPTION

No Change.

SECTION 8 . . . . HANDLING, SERVICE AND MAINTENANCE

No Change.

Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

Number SA2923SW

This certificate, issued to Gen-Aero, Inc.
9623 W. Terminal Dr.
San Antonio, TX 78216

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations.

Original Product—Type Certificate Number: A5SW

Make: Swearingen

Model: SA226-T(B)

Description of Type Design Change: Installation of Collins FCS-80 Flight Control System with dual FDS-84 Flight Director system according to Gen-Aero, Inc. Drawing No. 5-0115-01, Rev. D, dated 3/5/79; Installation of Collins FCS-80 Flight Control system with single FDS-84 Flight Director System according to Gen-Aero, Inc. Drawing No. 5-0116-01, Rev. C, dated 3/5/79. These Collins Service Bulletins are required:

1. APC-80 Autopilot Computer - Service Bulletins 1,2,3,4,5,6,8
2. APA-80 Autopilot Amplifier - Service Bulletins 1, 4
3. 699K-2 Trim Adapter - Service Bulletin 1
4. 562C-8F Yaw Damper Computer - Service Bulletins 1,4,5,6
5. FCC-80A Flight Guidance Computer - Service Bulletins 1,2,3,4,5,6,9,B,D
6. 590A-3J Air Data Controller - Service Bulletins 1,2,5,7,9,10,12,16,17,20

Limitations and Conditions:

FAA Approved Airplane Flight Manual Supplement dated March 5, 1979, is required.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: November 6, 1978

Date of issuance: March 5, 1979

Date reissued:

Date amended:

By direction of the Administrator

Don P. Watson

(Signature)

Don P. Watson
Chief, Engineering and Manufacturing Branch

(Title)

FEDERAL AVIATION ADMINISTRATION

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2 (10-68)

Collins Avionics Group
Rockwell International
400 Collins Road N.E.
Cedar Rapids, Iowa

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

SWEARINGEN SA226T(B) MERLIN IIIB

WITH

COLLINS FCS-80 THREE AXIS FLIGHT CONTROL SYSTEM

AND SINGLE OR DUAL FDS-84 FLIGHT DIRECTOR SYSTEM

Registration No. 616PS

Aircraft S/N T-0316

This supplement must be attached to the FAA Approved Airplane Flight Manual when the Collins FCS-80 Flight Control System is installed in accordance with STC No. SA2923SW. The information contained herein supplements the information of the basic Airplane Flight Manual; for limitations, procedures and performance information not contained in the supplement, consult the basic Airplane Flight Manual.

FAA APPROVED Charles D. Porter
for Don Watson
Chief Engineering & Manufacturing Branch
Department of Transportation
Federal Aviation Administration
Southwest Region
Ft. Worth, Texas 76101

INSTRUCTIONS: The transfer endorsement below may be used to notify the appropriate FAA Regional Office of the transfer of this Supplemental Type Certificate.

The FAA will reissue the certificate in the name of the transferee and forward it to him.

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to *(Name of transferee)* Rockwell International
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(Address of transferee) 400 Collins Road N. E.
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from *(Name of grantor) (Print or type)* Gen-Aero

(Address of grantor) 9623 W. Terminal Drive
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Extent of Authority (if licensing agreement): ______

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Collins Avionics Group
Rockwell International
400 Collins Road N.E.
Cedar Rapids, Iowa

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Collins Avionics Group
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Cedar Rapids, Iowa

SECTION 1 CERTIFICATE LIMITATIONS

1. During autopilot and flight director operations, a pilot must be seated at controls with seat belts fastened.
2. The autopilot is certified for Category I ILS approaches.
3. The autopilot must not be used during take-off or landing.
4. Do not use autopilot if stabilizer trim is inoperative, or when TRIM FAIL annunciators are on.
5. Maximum speed for autopilot operation is VMO/MMO (265 KCAS/0.64)
6. Yaw damper must be checked operative and yaw damper lever must be in the engaged position prior to take-off and inflight.
7. FDS-84 Flight Director Indicators (ADI/HSI) are required.

Collins Avionics Group
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SECTION II NORMAL PROCEDURES

A. PREFLIGHT CHECKS

Make the following checks before the first flight of the day:

1. Check all FCS-80 circuit breakers in. Check aircraft trim selector is to PILOT. Check vertical gyro flag out of view. Position pitch trim to midrange.

2. Center control column. Engage autopilot. Hold AP TRIM TEST switch in TEST. Push forward on control column. Note trim travels nose up. Pull on control column. Note trim travels nose down. Actuate pilots trim switch nose up. Note TRIM FAIL annunciates, trim follows pilot's command and aural trim in motion sounds. Release AP TRIM TEST switch. Actuate pilots trim switch. Note autopilot disengages.

3. Reengage autopilot. Note autopilot disengages from AP DISC button on either control wheel. Position aircraft pitch trim for takeoff.

4. Engage Yaw Damper. Note YAW DAMP FAIL annunciator is out. While taxiing hold YAW TEST switch in TEST. Check rudder pedals move in opposite direction of turn.

SECTION II NORMAL PRODEDURES (cont'd)

B. SYSTEM DESCRIPTION

The Collins FCS-80 is an integrated flight control system which can be functionally divided into four general subsystems.

1. Flight Instrument System (FDS)

   The FDS consists of an Attitude Director Indicator (ADI), a Horizontal Situation Indicator (HSI) and associated sensors and remote panels. The ADI presents attitude data, raw radio information and steering commands. The HSI presents the navigation situation.

2. Flight Guidance System (FGS)

   The FGS consists of a Flight Guidance Computer (FGC), a Flight Guidance Panel (FGP) and a Normal Accelerometer (NAC). The system mode selection and computation of guidance commands for the Autopilot System (APS) and ADI command bars occurs in the FGS.

3. Autopilot System (APS)

   The APS consists of an Autopilot Computer (APC), Yaw Damp Computer, Autopilot Panel (APP), Autopilot Amplifier (APA), and Primary Servo Motors (SVO). The primary function of the APS is to process guidance signals from the FGS and from manual inputs by the pilot to automatically drive the airplane control surfaces. Controls for engagement, disengagement and manual pilot input to the system are made through the APP. The APS provides horizontal stabilizer trim signals into the existing stabilizer trim system.

4. Flight Control Sensors

   The basic flight control system requires a vertical reference, a heading reference and altitude and airspeed sensors.

SECTION II NORMAL PROCEDURES (cont'd)

C. AUTOPILOT MODES

1. The autopilot has three modes of operation: Manual Mode, Guidance Mode, and Autopilot Sync Mode.

2. Manual Mode

   When the autopilot is engaged and no modes are selected on the FGP or with the go-around button, the autopilot is in the manual mode. The autopilot accepts pitch and roll rate commands from the pitch and turn knobs on the APP.

3. Guidance Mode

   When the autopilot is engaged and a lateral and/or vertical mode is selected on the FGP, the autopilot is in the guidance mode and accepts steering commands from the FGC.

4. Autopilot Sync Mode

   Autopilot sync mode is controlled by the SYNC button on the control wheel. With the autopilot engaged in either manual or guidance mode, depressing the SYNC button allows the pilot to manuever the airplane without disengaging the autopilot. When the SYNC button is released, the autopilot maintains the attitude existing at the time the button is released if the manual mode or follows commands from the FGC if in guidance mode.

D. SYSTEM COMPUTED MODES

The flight director system supplies steering commands for the pilot and the autopilot. When the autopilot is engaged, the pilot monitors autopilot performance on the ADI. When the autopilot is not engaged, the pilot flies the airplane manually in response to ADI command bars.

1. 1/2 Bank

   In the 1/2 Bank mode, the bank limit in HDG or VOR/LOC mode is reduced to one-half the normal value. This mode is interlocked so that selection of APPR mode or localizer capture clears 1/2 Bank mode.

SECTION II NORMAL PROCEDURES (cont'd)

D. SYSTEM COMPUTED MODES (cont'd)

2. HDG

When HDG mode is selected, commands are generated to manuever the airplane to the heading set on the HSI HDG marker. To complete a turn of more than 135 degrees, set the HDG marker approximately 135 degrees in the direction of the desired turn. After completing about 120 degrees of the turn, reselect up to 135 additional degrees.

HDG mode is annunciated on the instrument panel and on the FGP.

3. VOR/LOC

To capture and track a VOR radial or localizer course, tune the navigation receiver to the desired frequency and set the HSI course display to the desired VOR radial or published ILS front course. The selected radio frequency will automatically determine whether VOR or LOC computations are used. Select an intercept angle not exceeding 90° with the HSI HDG knob and marker. Select VOR/LOC mode on the FGP. Mode annunciation will be HDG and N/L ARM. As the airplane nears the desired radio course, the FGC will compute a capture point based on deviation from the desired radio course, intercept angle, and rate of closure with the radio course. At the capture point, the HDG and N/L ARM annunciators extinguish, and N/L CAPT will be annunciated. Commands will be generated to turn the airplane and track the selected radio course. Automatic crosswind correction will be computed once established on the radio course. A cone suppression circuit will provide smooth station passage for VOR. Dead reconning (DR) will be annunciated over the VOR station if radio deviation rates become excessive. DR is disabled on LOC courses.

Linearization of VOR deviation is available when a valid DME signal is present and if the LIN DEV switch on the instrument panel is enabled. When this function is used the lateral deviation bar on the HSI presents linear rather than angular deviation. A full scale deflection (2 dots) is equivalent to 10 miles offset from the selected course when in VOR mode or 2 miles offset when conducting a VOR approach in the APPR mode. LIN DEV is annunciated on the instrument panel when VOR deviation is linearized. Linear dev can be disabled by the LIN DEV switch or will automatically be cancelled by loss of DME valid, DME hold or tuning a localizer frequency.

SECTION II NORMAL PROCEDURES (cont'd)

D. SYSTEM COMPUTED MODES (cont'd)

4. Approach Mode (APPR)

VOR approaches will be made in the APPR mode. Use the same procedures as in VOR/LOC mode to intercept, capture and track a VOR approach course. Linear deviation may be used if desired. Annunciation will be the same as in VOR/LOC mode.

ILS approaches will also be made in the APPR mode. Localizer intercept, capture and tracking is identical to the VOR/LOC mode. Selection of APPR mode provides glideslope arm and capture. Altitude or pitch hold may be used prior to glideslope capture. Annunciation will be either ALT or PITCH and GS ARM prior to capture, and GS CAPT after capture. Glideslope capture is independent of localizer capture and can be from above or below the glidepath. Glideslope capture automatically cancels ALT or PITCH hold modes. Guidance is provided to track the ILS beam to certified minimum altitude.

Back localizer approaches will also be made in APPR mode. Use the same proceedures to intercept, capture and track localizer as in ILS approaches except the selected intercept angle should not exceed 75°.

HSI course should be set to the published ILS front course. B/L will be annunciated. Glideslope capture is automatically inhibited in B/L mode. Lateral guidance commands will be generated and displayed to capture and track the localizer back course. Altitude or pitch hold may be used in B/L mode.

NOTE: Full flaps may be used for coupled approaches. However, due to go-around considerations, it is recommended that half flaps be used until landing is assured.

5. Go-Around (GA)

GA mode can be selected anytime by pressing the GA button on the control wheel. This mode is used to abort a VOR, ILS or B/L approach. Selection of GA mode disengages the autopilot and cancels all other modes. Steering commands are generated for wings level, fixed pitch up. By following the commands and executing airplane go-around procedures, the pilot can insure a wings level roll attitude and a positive rate of climb.

SECTION II NORMAL PROCEDURES (cont'd)

D. SYSTEM COMPUTED MODES (cont'd)

The initial fixed pitch up attitude can be changed by pressing the SYNC button on the control wheel. Once established in the go-around attitude, the autopilot can be reengaged. GA is annunciated on the instrument panel and can be cancelled by selecting a lateral mode.

6. Vertical Hold Modes

The vertical hold modes are pitch hold, and altitude hold. These modes are annunciated on the instrument panel as PITCH and ALT. The system will be in pitch hold unless altitude hold has been selected on the FGP. Pitch hold reference can be changed with the SYNC button or with the pitch knob on the APP if the autopilot is engaged.

Altitude hold mode will provide commands to maintain a barometric pressure altitude. Reduce rate of climb or descent to 500 FT/MIN or less before selecting altitude hold. To cancel altitude hold, press SYNC button on control wheel or ALT button on the FGP.

All mode select buttons on the FGP are push on/push off action. The first push will latch the desired mode and cancel any incompatible modes, and causes the gull wing lights above the button to illuminate. The second push will cancel the selected mode and extinguishes the gull wings.

E. YAW DAMPER OPERATION

1. Yaw damper must be checked operational prior to takeoff. Refer to preflight test procedures.
2. Engage YD lever and check YD FAIL annunciator is out. Yaw damper system will automatically engage at lift off.
3. To disengage yaw damper, move engage lever to disengaged position. Yaw damper will automatically disengage at touchdown.

SECTION II NORMAL PROCEDURES (cont'd)

F. SELECTED AUTOPILOT MODES

1. Guidance Mode

With autopilot engaged and modes selected on the flight guidance panel, the autopilot accepts the computed guidance commands and maneuvers the airplane to follow these commands. Selection of guidance modes for the lateral and vertical channels are independent such that one channel may be in guidance mode with the other in manual mode.

2. Manual Roll Mode

The turn knob on the autopilot panel allows the pilot to manually commands turns through the autopilot. Movement of the knob out-of-detent takes command by clearing any lateral guidance mode (except APPR) which has been selected on the flight guidance panel. When the turn knob is returned to detent, a bank attitude is held if above 5 degrees of bank. Heading is held when the turn knob is returned to the detent below 5 degrees of bank. Turn knob is a rate type knob which is spring-loaded to the center detent position. The rate knob commands a roll rate proportional to displacement of the knob from the detent position.

3. Manual Pitch Mode

Manual Pitch mode is available when no vertical guidance mode is selected. Movement of the pitch knob out-of-detent provides a take command function by clearing any vertical mode (except APPR) selected on the flight guidance panel. The pitch knob commands a pitch rate proportional to the amount of knob displacement from the detent. When in detent, the autopilot will hold pitch attitude.

4. Autopilot Sync Mode

The sync buttons on the control wheels are flight director vertical sync buttons when the autopilot is disengaged. When the autopilot is engaged and transferred to the pilot's flight director, the pilot's SYNC button becomes an autopilot sync button. The same applies to the copilot's sync button and flight director. The AP Sync mode is available anytime the autopilot is engaged.

SECTION II NORMAL PROCEDURES (cont'd)

F. SELECTED AUTOPILOT MODES (cont'd)

The mode is selected by holding the SYNC button depressed and moving the control wheel to place the airplane in the desired attitude. The reaction of the autopilot when the SYNC button is released depends on whether the autopilot is in the manual or the guidance mode. In the manual mode the autopilot will hold the airplane in the attitude at which the SYNC button is released. If the roll attitude at the time of release is less than 5°, the autopilot roll axis will revert to heading hold. If the autopilot was in the guidance mode when the SYNC button is depressed, altitude hold will cancel if in use. When the SYNC button is released the autopilot will resume responding to the computed commands. The yaw axis is not affected by AP SYNC.

5. Turb Mode

When the Turb mode is selected, the autopilot gains are reduced to soften the autopilot response in turbulence. Turb mode is disabled in APPR mode. An indicator above the TURB button indicates when Turb is selected. Turb mode is also annunciated on the instrument panel.

6. Autopilot Transfer (Dual FDS-84 Only)

When the AP XFR is selected, the autopilot accepts inputs from the copilot's flight guidance system. An indicator above the button as well as dual remote annunciation of AP XFR is lit when the autopilot is transferred.

7. Engagement

The autopilot is engaged by moving the engage lever toward the engage position. The Yaw Damper may be engaged independent of the autopilot. The autopilot performs a self test sequence during each engage cycle. This takes less than a second and the autopilot will engage only after this test is satisfactorily completed. The airplane Yaw Damper system must be engaged before the autopilot will engage. The YD FAIL annunciator on the instrument panel will illuminate if the YD engage lever on the APP is in the disengaged position or if the yaw computer fails.

SECTION II NORMAL PROCEDURES (cont'd)

F. SELECTED AUTOPILOT MODES (cont'd)

8. Autopilot Trim

When the autopilot is engaged it automatically tri the stabilizer. Should a fault occur in the autopilot trim system, a dual monitor will detect it and annunciate a trim fail condition to the pilot as TRIM FAIL.

When the elevator is out of trim by a prescribed amount, the ELE TRIM annunciator will light. If TRIM FAIL annunciates, disengage autopilot.

When the aileron is out of trim by a prescribed amount, the AIL TRIM annunciator will light. If AIL TRIM annunciates, manually trim ailerons.

9. Disconnecting Autopilot

Press the AP DISC button on the control wheels to disengage the autopilot for transition to manual control.

Autopilot may also be disengaged by placing ENG levers to off, by actuating either pilot's or copilot's electric pitch trim switch, by actuating either pilot's or copilot's GA button, by placing the pilot/copilot trim selector switches on the quadrant to center "off" position or by turning the Rudder Bias on.

NOTE: The pitch axis of the autopilot is kept in the trim by the autopilot. Transition to manual control produces no noticeable change in airplane pitch attitude.

The AP DISC annunciator will light and flash and may be extinguished by pressing the AP DISC button again.

After assuming manual control, fly the airplane using the same HSI and ADI used to monitor autopilot operation prior to assuming manual control.

SECTION II NORMAL PROCEDURES (cont'd)

G. COMPARATOR AND LIMIT MONITORING (DUAL FDS-84 ONLY)

The comparator monitors the difference between the pilot's and copilot's compasses, vertical gyros, localizer and glideslope receivers. The limit deviation sensor monitors the absolute values of the pilot's localizer and glideslope signals.

If the MASTER or any comparator annunciators are lit, press the MASTER to reset. The comparator is now conditioned to monitor any subsequent difference between the monitored parameter. If the following thresholds are exceeded, the MASTER and parameter annunciator will light:

Parameter	Enroute	ILS
Compass	6°	4°
Pitch or Roll	4°	3°
Localizer	—	30 MV (Approx ½ dot)
Glideslope	—	40 MV (Approx ½ dot)

Press the MASTER to acknowledge the warning. The comparator is now conditioned to monitor the remaining parameters.

The deviation limit monitor warns of pilot's localizer deviations more than ½ dot, and pilot's glideslope deviations more than 1 dot on an ILS approach. The limit annunciators are non-latching and will extinguish when the deviations decrease below the prescribed levels.

SECTION III EMERGENCY PROCEDURES

A. AUTOPILOT MALFUNCTION

In the event of an autopilot malfunction, disengagement can be accomplished by one of the following:

1. Pressing pilot's or copilot's AP DISC button on the control wheel.
2. Pressing of either pilot's or copilot's manual electric pitch trim switches.
3. Pressing the GA button on either control wheel.
4. Moving Engage levers on the autopilot controller to disengaged position.
5. Disconnecting airplane Yaw Damper.
6. Selecting the Pilot/Copilot Trim Select switch to the center "off" position.
7. Opening the autopilot circuit breakers.
8. The following conditions will cause the autopilot to disengage automatically:
   (a) Gyro monitor failure
   (b) Autopilot power or circuit failure
   (c) Fault in Engage circuits
   (d) Fault detected in Servo Loop circuits
   (e) Rudder bias armed
   (f) Pilot/Copilot pedestal trim select switch to off position
   (g) Stall warning from SAS^2 system

B. YAW DAMPER MALFUNCTION

1. In the event of a yaw damper malfunction, the yaw damper can be disengaged by:
   (a) Moving the YD engage lever to disengaged position
   (b) Pulling the YAW AC or DC circuit breakers
2. The yaw damper lever will automatically be disengaged by RUDDER BIAS command activation.

SECTION III
OPERATION

3.1 UNIT CONTROLS

A thorough description of operating controls for the KCU 951 and KFS 594 are found in the KHF 950 Pilot's Guide (P/N 006-08343-0000). The KFS 594 Installation/Maintenance Manual (P/N 006-05543-0000) has a description of operating controls for the KFS 594.

3.1.1 KCU 951 CONTROLS

The operating controls of the KCU 951 are described as follows:

A. ON/OFF/VOLUME

Applies power to the unit and controls the audio output level.

B. SQUELCH

Squelch Control - Provides variable squelch threshold control.

C. CLARIFIER

Clarifier Control - Provides up to 250Hz of local oscillator adjustment during the receive mode of operation only. This function is performed by varying the master reference oscillator frequency. Means are provided to disengage the clarifier function by pushing the adjust knob in.

D. MODE

The emission mode switch is a momentary pushbutton that selects AME, USB or optional A3A or LSB. Emissions mode selection is cyclic moving from left to right. This switch is active at all times except transmit. A3A is indicated by displaying the AM and USB messages simultaneously.

E. FREQ/CHAN

This switch transfers the HF System from a direct frequency operation to a channelized form of operation. The switch operates as a two position switch. The depressed position establishes the channelized form of operation.

F. CHANNEL/FREQUENCY SELECT

This selector consists of two concentric knobs that control the channel and frequency digits, plus the lateral position of the cursor. These switches function as increment-decrement switches.

G. CHANNEL CONTROL

The outer knob is not functional when the FREQ/CHAN switch is in the CHAN position. The inner knob will provide channel control from 1 through 99.

H. FREQUENCY CONTROL

The outer concentric knob becomes a cursor (flashing light) control with the FREQ/CHAN switch in the FREQ position. Rotation of the outer knob one step, in a counter-clockwise direction will cause the right digit to flash. The flashing digit can be incremented or decremented with the inner knob with rollover to 0 or 9 or optional automatic carry or borrow to those digits more significant than the cursor digit. A clockwise rotation of the outer knob will cause the cursor (flashing digit) to move in a left to right direction. The Tens megahertz digit cannot be selected. The units digit selects frequencies from 2 to 29MHz in 1MHz steps with rollover from 2 to 29MHz and 29 to 2MHz.

I. PROGRAM (PGM) SWITCH

This switch enables channelized data to be modified. The PGM message will be displayed whenever this switch is depressed.

J. STORE (STO) SWITCH

This switch is used to store the displayed data when programming the preset channels.

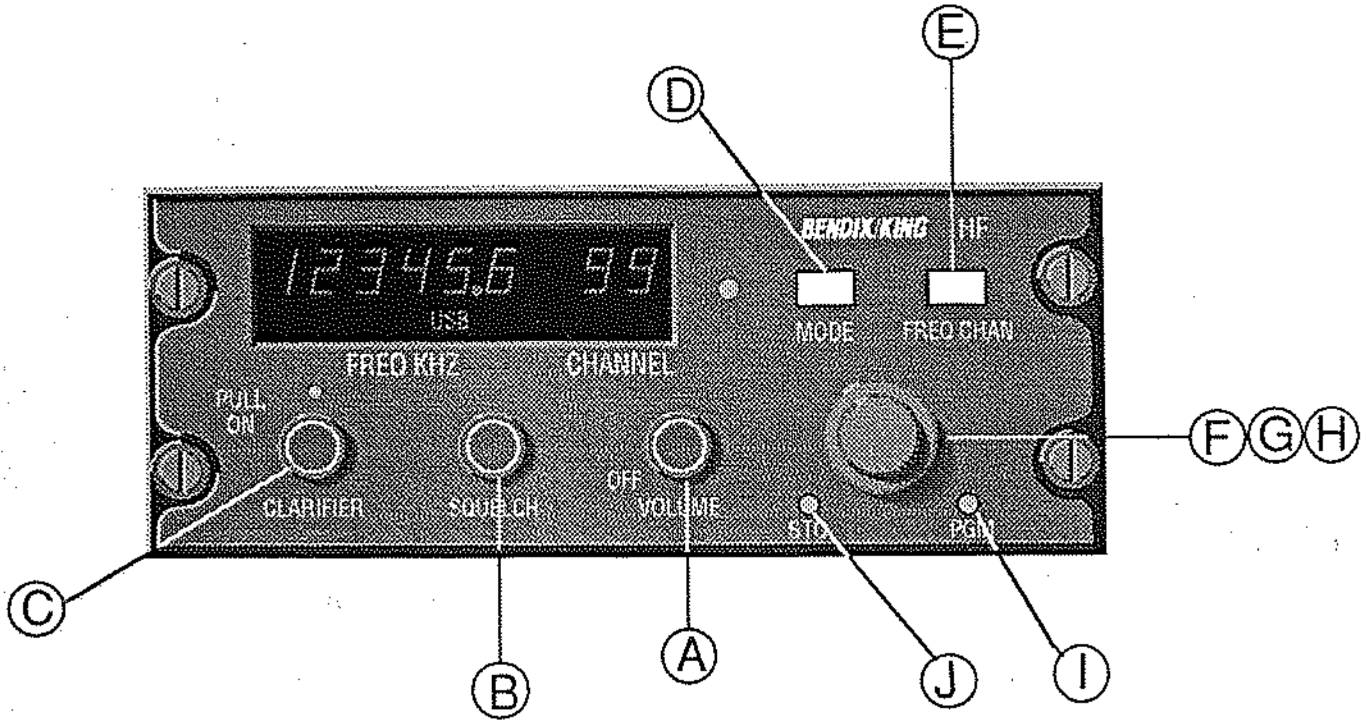


FIGURE 3-1 KCU 951 UNIT CONTROLS AND DISPLAY

3.1.2 KFS 594 CONTROLS

The KFS 594 functions are as follows:

A. ON/OFF/VOLUME CONTROL

The smaller left most knob controls the ON/OFF switch and the volume of the received audio. Clockwise motion of the switch increases volume and turns the unit on.

B. SQUELCH

The large left most knob selects the threshold of the received signal above which the audio shall be enabled. Turn the knob clockwise to reduce this threshold.

C. MODE

The larger right most knob controls the emission modes of the radio. When LSB, USB or AM is selected, the radio is set to the corresponding mode, and the control head displays a directly selectable frequency or one of nineteen user programmable channels. When TEL (A3J) is selected, the radio goes to the corresponding mode, and the control head displays an ITU channel.

D. CURSOR/INC/DEC

When pushed in, the smaller right most knob moves the cursor (a flashing digit) from left to right, and when rotated, serves to increment or decrement the digit selected by the cursor.

E. STO

The STO button performs four functions. First, when in the channel mode and not in program mode (program mode is annunciated by a flashing dash in the space adjacent to the channel number), pressing the STO causes the head to display the letters "TX" and the transmit frequency, while the receiver monitors the transmit frequency. This allows the user to listen for signals on the transmit frequency of a duplex channel. Second, if STO is pushed while the microphone is keyed, a 1000Hz tone will be transmitted. This is used to break the squelch of some stations. Third, pressing the STO while in program mode enters the selected frequency into the channel to be programmed. Fourth, pressing the STO will clear many error conditions, which are annunciated by a flashing "E" being displayed for more than three seconds.

3.2 SYSTEM POWER UP

When power is first applied to the system (by rotating OFF/ON VOL CONTROL clockwise), the active channel will be displayed (systems which employ an older KTR 953 with a crystal oven will experience a 2-4 minute warm up period in which the frequency display will be blanked). The active channel is the last channel used for transmit prior to system being turned off. The automatic antenna coupler is switched to the "bypass" state such that the receiver is connected directly to the antenna.

Depressing the mic key button momentarily will initiate the coupler auto tune sequence. Frequency will again be blanked during the auto tune cycle, the TX message will also flash. Emission mode and channel number will continue to be displayed. Active frequency will reappear upon completion of the coupler tune sequence.

3.3 CHANNEL OPERATION

Channel number, emission mode and active frequency will be displayed. When operating in the optional A3A mode on the KCU 951, the AM and USB messages are both illuminated. When transmitting in the channel mode, the transmit frequency and an added TX message will be displayed. Rotation of the inner control knob causes the channel number to be incremented or decremented. The coupler is switched to the bypass condition when a channel change occurs. Depressing the mic key will initiate the auto tune sequence.

The auto coupler generates a "READY" signal that inhibits the auto coupler tune sequence until a channel change occurs. The auto coupler monitors SWR during transmit. Should the SWR degrade to a ratio greater than 3.6:1 at the end of a transmission, the auto coupler will start a tune cycle synchronized with the next mic key depression.

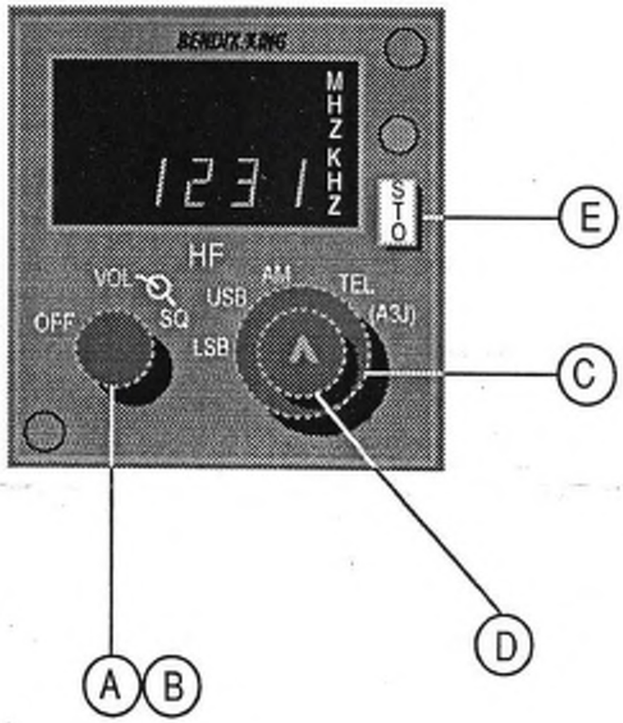


FIGURE 3-2 KFS 594 UNIT CONTROLS AND DISPLAY

If a PA or coupler fault is detected, transmit is inhibited and the frequency digits will flash indicating the fault. Depressing the mic key or a channel change will clear the fault indication.

There are 99 user programmable channels available with the KCU 951, and 19 channels are available with a KFS 594. Channels may be programmed for simplex or semi-duplex as desired. For the case of the semi-duplex channel, the coupler is bypassed in receive to avoid receiver desensitization due to narrow antenna bandwidths.

With a KCU 951 a "receive only" channel may be programmed to allow receive only operation. When a receive only channel is selected, the coupler is bypassed and transmit is inhibited.

3.4 DIRECT FREQUENCY MODE

Operation in the direct frequency mode is similar to channel mode except that the frequency is selected as desired rather than on a preprogrammed basis.

Frequency selection is accomplished by means of cursor/digit increment/decrement switch. No receive only condition applies. Only simplex operation is allowed. Transmit is therefore allowed on any 100Hz frequency increment in the 2-30MHz frequency range (except for systems that employ limited frequency options, Ref: Section 1.2.1).

In normal operation, the frequency, emission mode and TX message is displayed when transmitting. No channel number is displayed.

With a KCU 951, the direct frequency is accessed when the "Freq Chan" button is "out". With a KFS 594, the direct frequency is accessed by selecting "Channel 0".

When the system is transferred from channelized operation to direct frequency control, the initial frequency displayed is the last frequency used for transmit purposes when operating in the direct frequency mode. Previous emission mode is also saved and displayed on a KCU 951.

The coupler is bypassed under the above conditions. Auto tune sequence is initiated with the mic key. Changing any digit on the frequency display (or changing the mode on a KFS 594) will cause a coupler bypass.

The cursor control is the outer concentric knob for the KCU 951 and the inner concentric knob for the KFS 594. Both work in an increment/decrement fashion. Cursor position is annunciated by flashing the active digit. The cursor occupies one of six positions and moves left to right for clockwise knob rotation for the KCU 951 or by pressing the cursor knob for the KFS 594.

The cursor hidden position is a blank space between the least significant digit and the most significant digit. Depressing the mic key will cause the cursor to go to the hidden position.

The KCU 951 has the capability of a borrow/carry type of tuning. This type of tuning is called "rollover" and is enabled in the aircraft wiring harness. This allows ease in continuous tuning up and down the frequencies (in 100Hz steps). For example, if rollover is enabled, and two frequency digits are 89 with the cursor on the 9, one more clockwise rotation of the knob will change the digits to 90. Without rollover, the digits would revert to 80. Normally, pilots may prefer not to have rollover enabled, so that they may select each frequency digit individually without borrowing from or carrying to the next digit.

3.5 KCU 951 PROGRAMMING

The program mode is accessed by depressing the PGM switch.

The program mode must be entered while in the channel configuration (only channels can be programmed). Once in the program mode, the channel number, emission mode and transmit frequency are displayed. Transmit is inhibited. The transmit frequency however, may be examined by depressing the mic key.

NOTE

Aircraft communications are normally conducted in USB mode.
Use LSB only when specifically authorized.

The following information is stored during the program operation:

A. Receiver frequency

B. Transmit frequency

C. Receive only channel logic

D. LSB, AME, USB, A3A logic

To set a <u>receive only</u> frequency on any given channel, perform the following:

A. Depress the PGM switch.

B. Select channel to be set to receive only.

C. Set receive frequency.

D. Select receive mode (LSB, AME, USB, A3A).

E. Depress STO switch once.

F. Release the PGM switch or select and program the next channel as desired.

The above procedure stores the displayed receive frequency and sets the receive only bit.

The "TX" message will flash after the STO actuation to indicate that the transmit frequency would be stored on the next STO actuation. Select the next channel to be programmed or release the program switch to exit the program mode, leaving the transmit frequency unprogrammed.

Setting a <u>simplex</u> channel requires the following steps:

A. Depress the PGM switch.

B. Select channel to be set to simplex.

C. Set receive/transmit frequency.

D. Select emission mode (LSB, AME, USB, A3A).

E. Depress STO switch twice, once to store the receive frequency, and once to store the transmit frequency.

F. Release the PGM switch or select and program the next channel as desired.

Setting a <u>semi-duplex</u> channel requires the following steps:

A. Depress the PGM switch.

B. Select channel to be set to semi-duplex.

C. Set receive frequency.

D. Select emission mode (LSB, AME, USB, A3A)

E. Depress STO switch once.

F. Set transmit frequency.

G. Depress STO switch.

H. Release the PGM switch or select and program the next channel as desired.

3.6 KFS 594 PROGRAMMING

The nineteen user channels are programmed as follows:

1. Select the channel to be programmed.

2. Step the cursor to the frequency digits, and change them to the desired receiver frequency. Changing the displayed frequency of a programmable channel will automatically place the control head in program mode, as shown by the flashing dash adjacent to the channel number.

3. Press STO. When the radio accepts the program of the receive frequency, the flashing "TX" letters will appear in the upper right of the display and the cursor will move to the 10/1MHz digits.

4. If the transmit frequency is different from the receive frequency, change the displayed frequency to the desired transmit frequency, otherwise go to Step 5.

5. Press STO. When the transmit frequency is accepted, the letters "TX" will disappear as will the cursor.

3.7 SYSTEM PERFORMANCE CHECK

This system check is intended to detect problems in the installation that could cause damage to the HF system. Perform the steps in the stated sequence.

These tests will be useful in detecting problems resulting from:

1. Intermittent or improperly connected cables and connectors
2. Defective units
3. Poorly regulated aircraft DC power
4. Poor grounding of the KHF 950 or poor aircraft bonding
5. Audio ground loops
6. RF interference

CAUTION

POWER CARTS MAY REGULATE POORLY WHEN SUBJECTED TO STRONG RF FIELDS. IF MORE THAN 20% FLUCTUATIONS IN POWER CART VOLTAGES ARE NOTED WHEN TRANSMITTING, DO NOT CONTINUE TESTING WITH POWER CART.

Some intermittent conditions may cause output transistors to fail, therefore transmit only after other checks have been successfully completed.

Preliminary Check

A. Assure that keying in KAC 952 power and control connector is correct before applying initial +28V to system.

B. After applying +28V power but before attempting to transmit, flex the cable to KAC 952 and listen for relays to chatter. Chattering relays indicate an intermittent connection. Repeat this check with KCU 951 or KFS 594 frequency set in each of the 6 bands to be sure there are no intermittent connections in the cable.

Bands for the KHF 950 System are defined as follows:

Band #	Frequency
1	2.0000 - 3.0999MHz
2	3.1000 - 4.8999MHz
3	4.9000 - 7.5999MHz
4	7.6000 - 11.8999MHz
5	11.9000 - 18.0999MHz
6	18.1000 - 29.9999MHz

For example, this check could be performed at 3, 4, 6, 8, 12 and 19MHz.

C. As the frequency is changed on the KCU 951 or KFS 594 between 3,4,6,8,12, and 19 MHz, listen to the KAC 952. A relay click should be noted as each of the six bands are selected. (In most installations it will be beneficial to have two people conduct this test, one person to change the frequency, while the other listens to the KAC 952.)

3.7.1 RECEIVER PERFORMANCE CHECK

A. Select on the KCU 951 or KFS 594, using direct frequency mode, a frequency such as 2.5, 5, 10, 15 or 20MHz in order to receive a broadcast station of time and frequency primary standards. Your distance from the broadcast station and propagation conditions will determine which frequency will provide the best reception. (Ref: KHF 950 Pilot's Guide, P/N 006-08343-0000 Section 1)

B. Position squelch full CW so as to not inhibit reception.

C. If using a KCU 951, place clarifier in off position by pushing the clarifier control in.

D. Select AM mode and wait for reference audio tone modulation from the standards station.

E. Note pitch of audio tone received, then change to USB mode. The pitch of the tone should not change significantly. If the tone does change, it indicates that a problem exists in the clarifier wiring or that the reference oscillator in the KTR 953 needs alignment.

F. If using a KCU 951, pull out the clarifier while on USB mode and vary clarification CW noting pitch decrease and then CCW noting pitch increase with mid range pitch about the same as with the clarifier in (off position). If using a KFS 594 go to Step H.

G. When the clarifier control is turned, the clarifier knob should have no effect on the pitch.

H. Perform the following on AM mode at 3, 4, 6, 8, 12 and 19MHz.

I. Disconnect the coax from the KTR 953, turn the volume control up full on the KCU 951 or KFS 594. Note that internally generated noise is muted when the squelch control is rotated CCW 1/3 to 1/2 of its range. Adjust squelch to the verge of unsquelching, then connect the coax to the KTR 953 noting antenna noise pickup that causes squelch breakthrough. Disconnect the coax, the squelch should mute the audio within two seconds. Note: For certain times and locations the antenna reception may not produce enough noise to break minimum squelch at all frequencies. A signal generator can be used to generate a test signal by connecting a length of wire to the signal generator output and setting the signal generator to about 0dBm on the frequency of interest. Be sure the receiver is operational in all bands.

3.7.2 TRANSMITTER PERFORMANCE CHECK

A. Disconnect the coax from the KTR 953.

B. Select a direct frequency mode of 8MHz AM on the KCU 951 or KFS 594.

C. Momentarily key the mic switch.

D. The digits should blink and the TX message should show momentarily, then a flashing fault signal should occur at 2Hz rate indicating insufficient RF excitation to initiate the tuning routine. Momentarily key again to clear the fault.

E. Connect the coax from the KTR 953 to the KAC 952.

F. Remove the KAC 952 BNC jumper fitting which connects the transmitter output to the tuner input.

G. Connect the TX side of SWR/wattmeter (P/N 071-05065-0000) power sensor head to the KAC 952 transmitter output. Connect the ANT side of the power sensor head to a 50Ω resistive load of at least 50 Watts dissipation rating, such as a Bird Model 8085 with 4240-125 BNC connector. Select the 50 Watt range and the AVG mode on the wattmeter. Select 8MHz AM mode on the KCU 951 or KFS 594.

H. Momentarily key the mic switch. While tuning, the power should be between 5 and 10 Watts. Tuning should complete in about 4 seconds showing 1:1 SWR during and after tune. Power after tune should be 37.5 Watts if 28VDC supply voltage is maintained at the KAC 952 connector during transmit. The power output will be reduced to as low as 70% if supply voltage to the KAC 952 connector drops to 22V under load due to battery or wiring limitations. This power reduction is intentionally designed into the ALC to prevent transmitter distortion with a very low battery voltage.

CAUTION

IF THE METER INDICATES MORE THAN 10W DURING TUNE, IT INDICATES THE ALC IS NOT WORKING PROPERLY. TERMINATE THE TESTS TO PREVENT DAMAGE TO POWER TRANSISTORS. DO NOT HOLD THE MIC BUTTON DOWN DURING TUNE. SIMPLY PUSH THE MIC BUTTON MOMENTARILY TO INITIATE THE TUNE.

N616PS New Equipment List

Manufacturer	Unit	Model	Serial #
Shadin	Fuel Air Data	ADC 2000	1052
Garmin	GPS/NAV/COM/TAWS	GNS 530	85200351
Garmin	Antenna	GA 56	59403866

3/11/2005

Repair Station # TK4R547M
Name: Custom Avionics
Address: 418-S Bartow Municipal Airport
Bartow, FL 33830

FAA APPROVED FLIGHT MANUAL SUPPLEMENT GARMIN GNS 530 VHF COMMUNICATIONS TRANSCEIVER / VOR/ILS RECEIVER / GPS RECEIVER

AIRCRAFT MAKE: Swearingen

AIRCRAFT MODEL: SA-226T

AIRCRAFT SERIAL NO.: T316

This document must be carried in the aircraft at all times. It describes the operating procedures for the GARMIN GNS 530 navigation system when it has been installed in accordance with GARMIN Installation Manual 190-00181-02 Rev B (Rev. A or later) and FAA Form 337 dated January 20, 2005.

For aircraft with an FAA Approved Airplane Flight Manual, this document serves as the FAA Approved Flight Manual Supplement for the GARMIN GNS 530. For aircraft that do not have an approved flight manual, this document serves as the FAA Approved Supplemental Flight Manual for the GARMIN GNS 530.

The Information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Airplane Flight Manual.

FAA APPROVED

Date: MAR 2 8 2005

Eloy (Ike) Gray
Principal Avionics Inspector
Federal Aviation Administration
ASO-FSDO-15
City:__________, State: ______

Repair Station # TK4R547M
Name: Custom Avionics
Address: 418-S Bartow Municipal Airport
Bartow, FL 33830

Table of Contents

Repair Station # TK4R547M
Name: Custom Avionics
Address: 418-S Bartow Municipal Airport
Bartow, FL 33830

SECTION I
GENERAL

1. The GNS 530 System is a fully integrated, panel mounted instrument, which contains a VHF Communications Transceiver, a VOR/ILS receiver, and a Global Positioning System (GPS) Navigation computer. The system consists of a GPS antenna, GPS Receiver, VHF VOR/LOC/GS antenna, VOR/ILS receiver, VHF COMM antenna and a VHF Communications Transceiver. The primary function of the VHF Communication portion of the equipment is to facilitate communication with Air Traffic Control. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites, recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.

2. Provided the GARMIN GNS 530's GPS receiver is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications for:

   - VFR/IFR enroute, terminal, and non-precision instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation within the U.S. National Airspace System in accordance with AC 20-138.

   - One of the approved sensors, for a single or dual GNS 530 installation, for North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace in accordance with AC 91-49 and AC 120-33.

   - The system meets RNP5 airspace (BRNAV) requirements of AC 90-96 and in accordance with AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 1, provided it is receiving usable navigation information from the GPS receiver.

Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. Navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.

Repair Station # TK4R547M
Name: Custom Avionics
Address: 418-S Bartow Municipal Airport
Bartow, FL 33830

SECTION II
LIMITATIONS

1. The GARMIN GNS 530 Pilot's Guide, P/N 190-00181-00, Rev. A, dated April 2000 or later appropriate revision must be immediately available to the flight crew whenever navigation is predicated on the use of the system.

2. The GNS 530 must utilize the following or later FAA approved software versions:

Sub-System	Software Version
Main	2.00
GPS	2.00
COMM	1.22
VOR/LOC	1.25
G/S	2.00

The Main software version is displayed on the GNS 530 self-test page immediately after turn-on for 5 seconds. The remaining system software versions can be verified on the AUX group sub-page 2, "SOFTWARE/DATABASE VER".

3. IFR enroute and terminal navigation predicated upon the GNS 530's GPS Receiver is prohibited unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.

4. Instrument approach navigation predicated upon the GNS 530's GPS Receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the GPS equipment database. The GPS equipment database must incorporate the current update cycle.

   (a) Instrument approaches utilizing the GPS receiver must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.

   (b) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for GPS overlay with the GNS 530's GPS receiver is not authorized.

   (c) Use of the GNS 530 VOR/ILS receiver to fly approaches not approved for GPS requires VOR/ILS navigation data to be present on the external indicator.

(d) When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the aircraft must have the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.

(e) VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in normal position to land.

5. If not previously defined, the following default settings must be made in the "SETUP 1" menu of the GNS 530 prior to operation (refer to Pilot's Guide for procedure if necessary):

(a) **dis, spd** .... $^{n}_{m}$ k_t (sets navigation units to "nautical miles" and "knots")
(b) **alt, vs** .... f_t fpm (sets altitude units to "feet" and "feet per minute")
(c) **map datum** .. WGS 84 (sets map datum to WGS-84, see note below)
(d) **posn** .... deg-min (sets navigation grid units to decimal minutes)

NOTE: In some areas outside the United States, datums other than WGS-84 or NAD-83 may be used. If the GNS 530 is authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in the GNS 530 prior to its use for navigation.

SECTION III
EMERGENCY PROCEDURES

ABNORMAL PROCEDURES

1. If GARMIN GNS 530 navigation information is not available or invalid, utilize remaining operational navigation equipment as required.

2. If "RAIM POSITION WARNING" message is displayed the system will flag and no longer provide GPS based navigational guidance. The crew should revert to the GNS 530 VOR/ILS receiver or an alternate means of navigation other than the GNS 530's GPS Receiver.

3. If "RAIM IS NOT AVAILABLE" message is displayed in the enroute, terminal, or initial approach phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the GNS 530's GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the GNS 530's VOR/ILS receiver or another IFR-approved navigation system.

Repair Station # TK4R547M
Name: Custom Avionics
Address: 418-S Bartow Municipal Airport
Bartow, FL 33830

SECTION V
PERFORMANCE

No change.

SECTION VI
WEIGHT AND BALANCE

See current weight and balance data.

SECTION VII
AIRPLANE & SYSTEM DESCRIPTIONS

See GNS 530 Pilot's Guide for a complete description of the GNS 530 system.

SO # 25092
WELLS & WEST VALLEY RIVER LEASING
5/21/07

United States Of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number SA09463AC

This Certificate issued to M7 Aerospace LP
10823 NE Entrance Road
San Antonio, TX 78216

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 *of the* Civil Air *Regulations.*

Original Product Type Certificate Number: A5SW

Make: Fairchild

Model: SA226T, SA226T(B), SA227-TT

Description of Type Design Change.
Installation of Concorde FASRG91STC Sealed Lead-Acid Batteries in accordance with Aerodesign Aircraft Engineering, Inc. Master Drawing List No. 2392-11, Revision IR, dated July 18, 1998, or later FAA approved revision

Limitations and Conditions.
Compatibility of this design change with previously approved modifications must be determined by the installer. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission. An FAA approved Flight Manual Supplement, dated February 12, 1999, or later FAA approved revision is required.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: April 17, 1998

Date of issuance: February 12, 1999

Date reissued: 3/15/02; 8/23/02; 6/6/03

Date amended:

FEDERAL AVIATION ADMINISTRATION

By direction of the Administrator

(Signature)
for Michele M. Owsley, Manager
Airplane Certification Office,
Southwest Region

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both

 This certificate may be transferred in accordance with FAR 21.47

AERODESIGN Aircraft Engineering, Inc.
P.O. Box 201946
Austin, Texas 78720
(512) 219-1794

Document 2392-11 sheet 1
prepared by R. Howard
checked by RH
revision (see below)

MASTER DRAWING LIST

Drawing No.	Description	Rev. Ltr.	Date
AERODESIGN Aircraft Eng., Inc.			
2155101	Battery Box Modification on Fairchild Merlin III ✓	IR	6-10-98
2155102	Battery Installation	IR	6-10-98
Concorde Battery Corporation			
RG-91A	Battery, VRSLA, 24 Volt	IR	3-5-98
9605	Placard, Battery Replacement	B	4-26-95
9672	Label, Fairchild, RG-91A	A	12-11-98
		E	8-3-2001 ?

COPY

Revision IR 7-18-98 RHoward

AERODESIGN Aircraft Engineering, Inc.
P.O. Box 201946
Austin, Texas 78720
(512) 219-1794

Document 2392-3 sheet 1
prepared by R. Howard
checked by RH
revision IR

INSTALLATION INSTRUCTIONS
Fairchild Aircraft Services Battery Replacement STC

1. Refer to AERODESIGN Aircraft Engineering Drawing #2155102 for battery removal and installation. Also refer to Chapter 24-30-10 of the Aircraft Maintenance Manual and the Maintenance Manual Advisory that is supplied with the STC.

2. Remove the existing Ni-Cad batteries, modify the battery support structure per Drawing #2155101, and install the Concorde RG-91A Lead-Acid batteries in accordance with the data in item 1 above. Note that the fittings for the venting are to be removed from the existing batteries and re-installed with the new batteries, or replace with new fittings per the IPC.

3. The temperature sensor connector(s) shall be capped and stowed.

4. The "BATT TEMP" circuit breaker shall be pulled and collared for Model SA227TT. For Model SA226T (for S/N T245, T349 and up), the "BATT OVHT WARN" circuit breaker shall be pulled and collared.

5. The Battery Temperature Indicator shall be removed or the placard supplied with the STC (regarding notification that the batteries have been replaced and the temperature monitoring system has been deactivated) shall be installed (see note 3 of Drawing #2155102), for Model SA227TT.

6. The Flight Manual Supplement supplied with the STC shall be installed into the aircraft.

7. The weight and balance data for the aircraft shall be updated for the difference in weight of the new batteries (- 5.0 lbs. per battery).

8. The equipment list shall be revised to encompass the new batteries.

9. The Maintenance Manual Advisory supplied with the STC shall be incorporated into the Maintenance Manual for the aircraft.

10. File an FAA Form 337 after completing this installation.

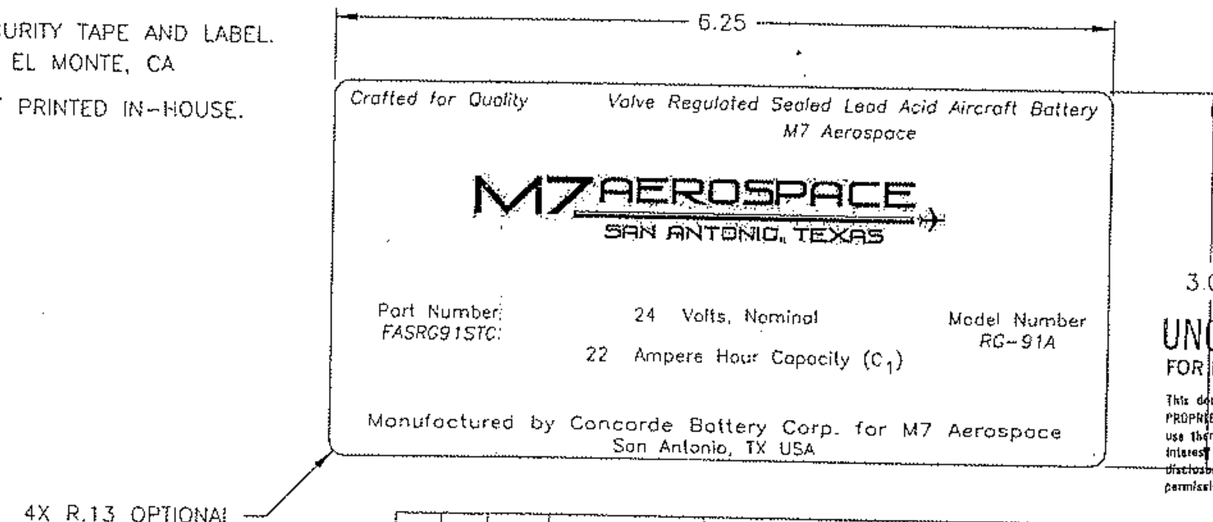
COPY

Revision IR 7-18-98 RHoward

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
E	SEE DCN 9672E	6/18/03	JBT

NOTES: UNLESS OTHERWISE SPECIFIED

1. MATERIAL: .0035 WHITE FLEXIBLE VINYL, OR EQUAL.
2. LAMINATION: .0015 CLEAR POLYPROPYLENE LAMINATION, OR EQUAL.
3. ADHESIVE: S-730 PERMANENT ACRYLIC SOLVENT ADHESIVE OR EQUIVALENT.
4. BACKING: 55 LB SEMIBLEACHED WHITE CRAFT RELEASE PAPER OR EQUIVALENT.
5. TYPE STYLE: LOGO AND ALL LETTERING TO BE BLACK. TYPE STYLES AND HEIGHTS OPTIONAL. LABEL TO BE PRINTED WITH ACID RESISTANT INK.
6. SUGGESTED SOURCE: SECURITY TAPE AND LABEL. SO. EL MONTE, CA
7. DIMENSIONS MAY VARY IF PRINTED IN-HOUSE.



JUN 25 2003

UNCONTROLLED
FOR REFERENCE ONLY

This document contains data which is PROPRIETARY to Concorde Battery Corp. Any use thereof is subject to the proprietary interest of Concorde. No data is to be disclosed to others without the written permission of Concorde Battery Corp.

QTY REQD	CAGE CODE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO.
			LABEL, M7 AEROSPACE, RG-91A	SEE NOTES	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± 1/32; DECIMALS .XX ± .25, .XXX ± .250; ANGLES ± 1°

TREATMENT: NONE
FINISH: SEE NOTES
SIMILAR TO | ACT WT | CALC WT

CONTRACT NO.

APPROVALS		DATE
DRAWN	TIMMONS	10/21/97
CHECKED	AMIII	11/6/97
APPROVED	JBT	11/14/97
ISSUED	A.T.	[illegible]

CONCORDE BATTERY CORPORATION
2009 SAN BERNARDINO RD. W. COVINA, CA 91790

TITLE: LABEL, M7 AEROSPACE, RG-91A

SIZE	CAGE CODE	DWG NO.	REV
B	63017	9672	E

SCALE 1/1 | SHEET 1 OF 1

MAINTENANCE MANUAL ADVISORY

FAIRCHILD SA226T, SA226T(B) WITH CONCORDE MODEL FASRG91STC SEALED LEAD ACID, 22 AMPERE HOUR, 24 VOLT RECOMBINANT AIRCRAFT BATTERY

This document must be inserted in the airplane Maintenance Manual. It describes the maintenance procedures for the Concorde sealed lead-acid battery replacement/modification as installed in accordance with S.T.C. SA09463AC. Reference the manufacturer's instructions or contact CONCORDE BATTERY CORPORATION, West Covina, California for detailed instructions.

The information contained herein supplements or supercedes the basic Maintenance Manual only in those areas listed herein.

PREFACE

This modification replaces two (2) each Fairchild Aircraft P/N 27-21140-001, Nickel Cadmium (Ni-Cad), 24 Volt, 26 Ampere / hour Aircraft Batteries with two (2) each Fairchild Aircraft Services P/N FASRG91STC (CONCORDE BATTERY CORPORATION P/N RG91A) Sealed Lead Acid 24 Volt, 22 Ampere / hour Aircraft Batteries.

Description of the modification is as follows: The Ni-Cad batteries are removed and the Temperature Sensor and associated connector (s) may be removed and / or capped and stowed. The sealed lead acid batteries are installed. The "BAT OVHT WARNING" circuit breaker is pulled and collared. Some models may have after market STC Battery Temperature Indicator installed. If this is installed it can be either removed or placarded.

" THE NICKEL CADMIUM BATTERIES HAVE BEEN REPLACED WITH CONCORDE VALVE REGULATED SEALED LEAD ACID BATTERIES. THE TEMPERATURE MONITORING SYSTEM HAS BEEN DEACTIVATED "

Date: Feb. 12, 1999
Rev. IR

SEALED BATTERY SERVICE REQUIREMENTS

1. Concorde RG Series Batteries are serviced and charged at the factory and should be boost charged every ninety days when in storage. They are not considered airworthy if they are placed in service after two (2) years of their manufacturing date.

2. The Concorde RG Series Batteries should be charged when their open circuit voltage is below 2.08 volts per cell. (12.5 for 12 volt batteries or 28.2 volts for 24 volt batteries).

3. The Concorde RG Series Batteries should be charged with a constant current potential (CP) of constant voltage charger regulated at 2.35 volts per cell (28.2 volts for 24 volt batteries). The battery is fully charged when the charge current stabilizes for one hour.

4. For battery safety and reliability we recommend replacing the RG Series batteries annually or after 600 hours of operation, whichever occurs first, without any maintenance requirement. These initial recommended maintenance cycles may be adjusted with experience in your particular operation.

Once you have established the useful life of the RG Series batteries in your operation, you may operate your replacement RG battery for that duration without any periodic checks.

To ensure airworthiness beyond this period the RG Series battery must me checked periodically. The first check should be done after 12 months or 600 hours of operation and every 90 days or 200 hours of operation after the first check. These initial recommended maintenance cycles may be adjusted with experience in your particular operation.

5. Reserve or emergency capacity test procedure:

   a. Make sure the battery is charged, per paragraph 2a.

   b. With the battery temperature above 59 degrees F, discharge the battery for one hour as follows:

      FASRG91STC MINIMUM CAPACITY TEST RATE = 17.6 AMPERE

The minimum end point after one hour of discharge must be 18 volts for 24-volt batteries. If the battery fails to deliver 80% of its rated ampere / hour capacity it has reached the end life, it is not considered airworthy and must be replaced.

Date: Feb. 12, 1999
Rev. IR

Doc. No. 1M003 FM-001
Issue 980701
S.I.P. Technical Services Inc.
10107 McAllister Freeway
San Antonio, TX 78216

CONCORD LEAD ACID BATTERY
AFM Supplement for
FAIRCHILD
MODEL's SA226T
SA226T(B)

FAA APPROVED FLIGHT MANUAL SUPPLEMENT

CONCORD SEALED CELL LEAD ACID RECOMBINANT AIRCRAFT BATTERY MODEL FASRG91STC

AIRPLANE MAKE: FAIRCHILD

AIRPLANE MODEL: SA226T

AIRPLANE SERIAL NO. T-316

REGISTRATION NO. N616PS

This document must be carried in the airplane at all times. It describes the operating procedures for the Concord Model FASRG91STC Sealed Lead Acid Recombinant Aircraft Batteries installed in accordance with S.T.C. SA09463AC

The information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Airplane Flight Manual.

APPROVED: Michele M Owsley
Michele Owsley, Manager
Airplane Certification Office, ASW-150
Federal Aviation Administration
Ft. Worth, Texas 76193-0150

FAA APPROVED
DATE 2-12-99

LOG OF REVISIONS

REV. NO	DESCRIPTION	REVISED PAGES	APPRD. BY	DATE

TABLE OF CONTENTS

The following sections are covered in this Airplane Flight Manual Supplement. Sections noted by "*" have not been effected with the installation of the Concord Sealed-Cell Lead Acid Recombinant Aircraft Battery modification.

SECTION I OPERATING LIMITATIONS

Reference Basic Airplane Flight Manual page I-12

BATTERY OVERHEAT WARNING SYSTEM- The following replaces the existing limitation.

BATTERY OVERHEAT WARNING SYSTEM

The Battery Overheat Warning System has been deactivated at the "BATT TEMP" circuit breaker. The Battery Temperature Indicator has been removed and/or placarded;

THE NICKEL CADMIUM BATTERIES HAVE BEEN REPLACED WITH CONCORDE VALVE REGULATED SEALED CELL LEAD-ACID BATTERIES. THE TEMPERATURE MONITORING SYSTEM HAS BEEN DEACTIVATED.

Section II NORMAL OPERATING PROCEDURES

<u>Reference Basic Airplane Flight Manual page II-6</u>

ADD

BEFORE TAXI

(1A)-Check battery voltage minimum of 24 Volts

The following replaces the existing Normal Operating Procedure;

(2) DELETED

The Battery Overheat Warning System has been deactivated at the "BATT TEMP" circuit breaker.

<u>Reference Basic Airplane Flight Manual page II-24</u>

The two(2) each existing Nickel-Cadmium (Ni-Cad) aircraft batteries have been replaced with two(2) each Concord Sealed-Cell Lead Acid Recombinant Aircraft Batteries.

The existing battery temperature monitoring system and Battery Temperature Indicator have been deactivated. The BATT TEMP circuit breaker has been "pulled" and "collared".

The Battery Temperature Indicator has been removed and/or placarded;

THE NICKEL CADMIUM BATTERIES HAVE BEEN REPLACED WITH CONCORD VALVE REGULATED SEALED-CELL LEAD-ACID BATTERIES. THE TEMPERATURE MONITORING SYSTEM HAS BEEN DEACTIVATED.

The Concord Sealed-Cell Lead-Acid Recombinant Aircraft Batteries utilize all existing battery controls, indicating and charging system.

The batteries are 24VDC, 22 Ampere/hour Aircraft Batteries installed in the existing battery locations.

Section II NORMAL OPERATING PROCEDURES (cont.)

Reference Basic Airplane Flight Manual page II-26

Battery Disconnect and Overheat Warning System.

The two(2) each existing Nickel-Cadmium (Ni-Cad) aircraft batteries have been replaced with two(2) each Concord Sealed-Cell Lead Acid Recombinant Aircraft Batteries.

The existing battery temperature monitoring system and Battery Temperature Indicator have been deactivated. The BATT TEMP circuit breaker has been "pulled" and "collared".

The Before Taxi Checklist for the Battery Disconnect and Overheat Warning System is no longer applicable.

The Battery Temperature Indicator has been removed and/or placarded;

THE NICKEL CADMIUM BATTERIES HAVE BEEN REPLACED WITH CONCORD VALVE REGULATED SEALED-CELL LEAD-ACID BATTERIES. THE TEMPERATURE MONITORING SYSTEM HAS BEEN DEACTIVATED.

Section III EMERGENCY PROCEDURES

Reference Basic Airplane Flight Manual page III-13

BATTERY OVERHEAT WARNING LIGHT ON DURING FLIGHT

Replace existing procedures with;

The Battery Overheat Warning System has been deactivated at the "BATT TEMP" circuit breaker.

Section IV PERFORMANCE

No change to the Performance section of the basic Airplane Flight Manual are affected with the installation of the Concord Sealed-Cell Recombinant Lead Acid Batteries.

SECTION-V WEIGHT AND BALANCE

- Total weight of two(2) Concord Sealed-Cell Recombinant Lead Acid Batteries is 110 lbs. MAX.
- Weight delta is -10 lbs..
- Subtract 10 lbs with no moment arm change (XXX) to weight and balance.

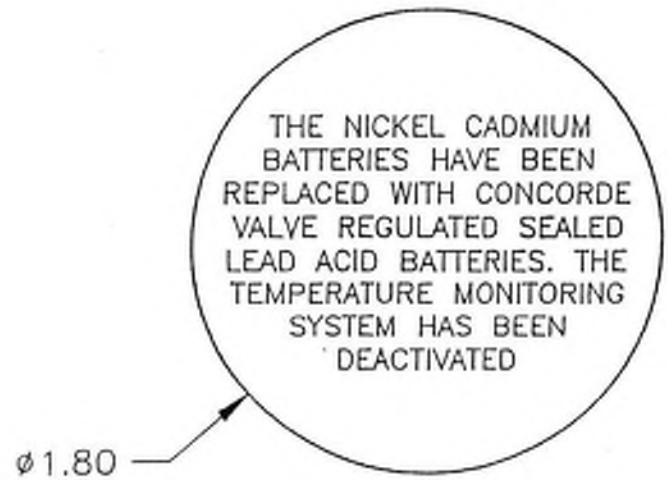
SECTION-VII Supplements

This Airplane Flight Manual supplement is to be placed into the supplements section of the basic airplane flight manual when the Concord Sealed-Cell Recombinant Lead Acid Batteries are installed.

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PRODUCTION RELEASE	4/26/95	DG
B	SEE DCN 0017	4/26/95	DG

NOTES: UNLESS OTHERWISE SPECIFIED

1. MATERIAL: .0038 WHITE VINYL LABEL WITH BLACK LETTERS PER MIL-M-13231, WITH .0015 CLEAR, ACID RESISTANT LAMINATION. FASSON MFG SOLVENT ADHESIVE (ACRYLIC) S-730.
2. LETTER HEIGHT: .075

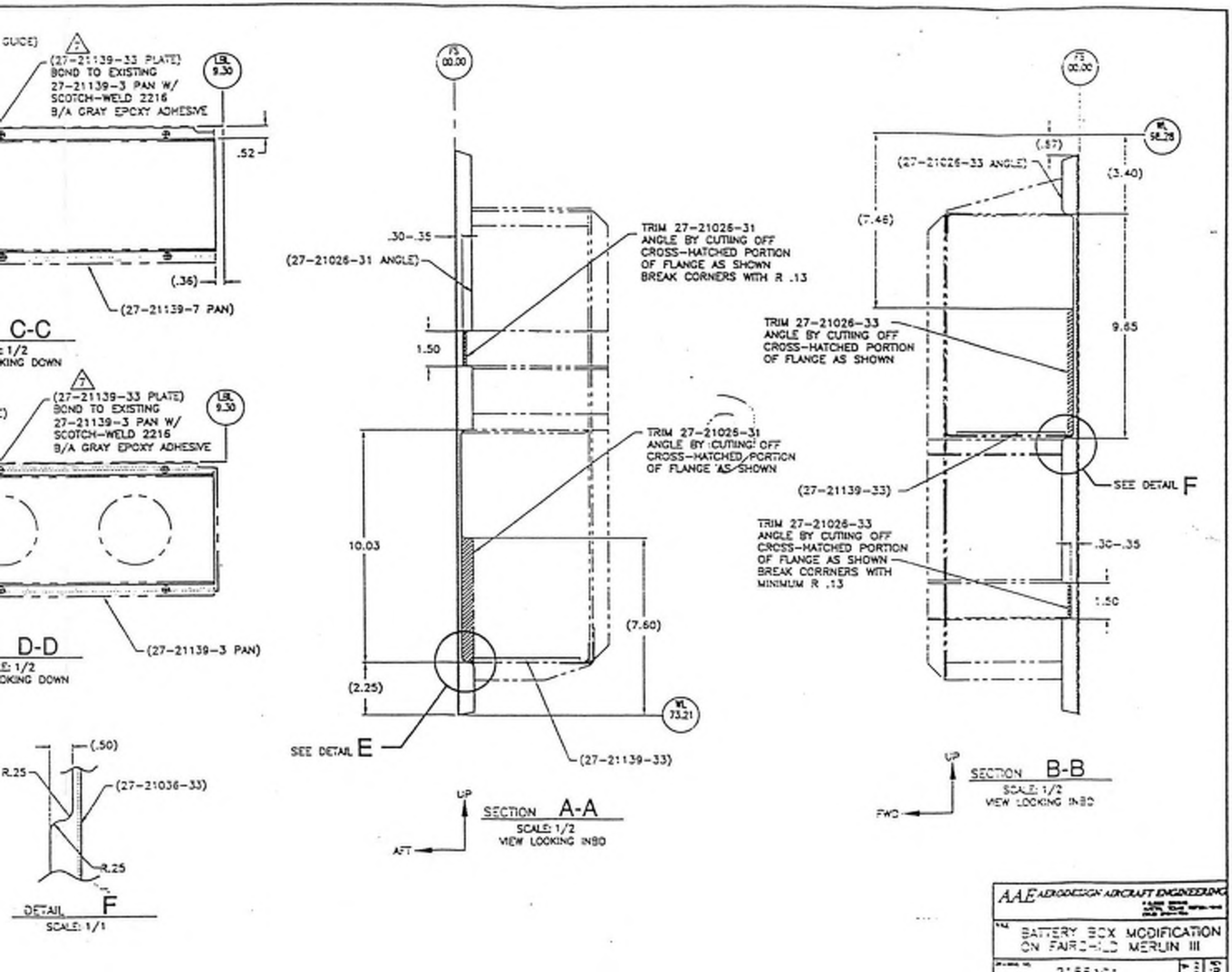


APR 2 7 1995

QTY REQD		FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES .XX ± .03 .XXX ± .010	CONTRACT NO.		CONCORDE BATTERY CORPORATION 2009 SAN BERNARDINO RD, W. COVINA, CA 91790	
	APPROVALS	DATE	TITLE PLACARD, BATTERY REPLACEMENT	
	DRAWN A MISTRETTA	4/26/95		
TREATMENT	CHECKED AMIII	4/26/95		
FINISH	APPROVED DG	4/26/95	SIZE A / FSCM NO. 63017 / DWG. NO. 9605	REV B
SIMILAR TO / ACT WT / CALC WT	ISSUED MK	4/27/95	SCALE 1=.75	SHEET 1 OF 1



(27-21139-33 PLATE) BOND TO EXISTING 27-21139-3 PAN W/ SCOTCH-WELD 2216 B/A GRAY EPOXY ADHESIVE
LBL 9.30
.52
(.36)
(27-21139-7 PAN)
C-C
(27-21139-33 PLATE) BOND TO EXISTING 27-21139-3 PAN W/ SCOTCH-WELD 2216 B/A GRAY EPOXY ADHESIVE
(27-21139-3 PAN)
D-D
(.50)
R.25
(27-21036-33)
R.25
DETAIL F
SCALE: 1/1
FS 00.00
.30-.35
(27-21026-31 ANGLE)
TRIM 27-21026-31 ANGLE BY CUTTING OFF CROSS-HATCHED PORTION OF FLANGE AS SHOWN BREAK CORNERS WITH R .13
1.50
TRIM 27-21026-31 ANGLE BY CUTTING OFF CROSS-HATCHED PORTION OF FLANGE AS SHOWN
10.03
(7.60)
(2.25)
WL 73.21
SEE DETAIL E
(27-21139-33)
UP
AFT
SECTION A-A
SCALE: 1/2
VIEW LOOKING INBD
FS 00.00
WL 56.28
(.87)
(27-21026-33 ANGLE)
(3.40)
(7.46)
TRIM 27-21026-33 ANGLE BY CUTTING OFF CROSS-HATCHED PORTION OF FLANGE AS SHOWN
9.65
(27-21139-33)
SEE DETAIL F
TRIM 27-21026-33 ANGLE BY CUTTING OFF CROSS-HATCHED PORTION OF FLANGE AS SHOWN BREAK CORRNERS WITH MINIMUM R .13
.30-.35
1.50
UP
FWD
SECTION B-B
SCALE: 1/2
VIEW LOOKING INBD
AAE AERODESIGN AIRCRAFT ENGINEERING
BATTERY BOX MODIFICATION ON FAIRCHILD MERLIN III

REV	DESCRIPTION	DATE
IR	INITIAL RELEASE	

...LL ALUMINUM PARTS PER
...FINISH WITH TWO COATS OF
...377, TYPE 1

...NTHESES ARE FOR REFERENCE ONLY.

...ND EDGES ON METAL PARTS W/ MINIMUM R .03

...M SURFACES PER NOTE 1.

...DE AND ITS ATTACHMENT HARDWARE
...SSEMBLY.

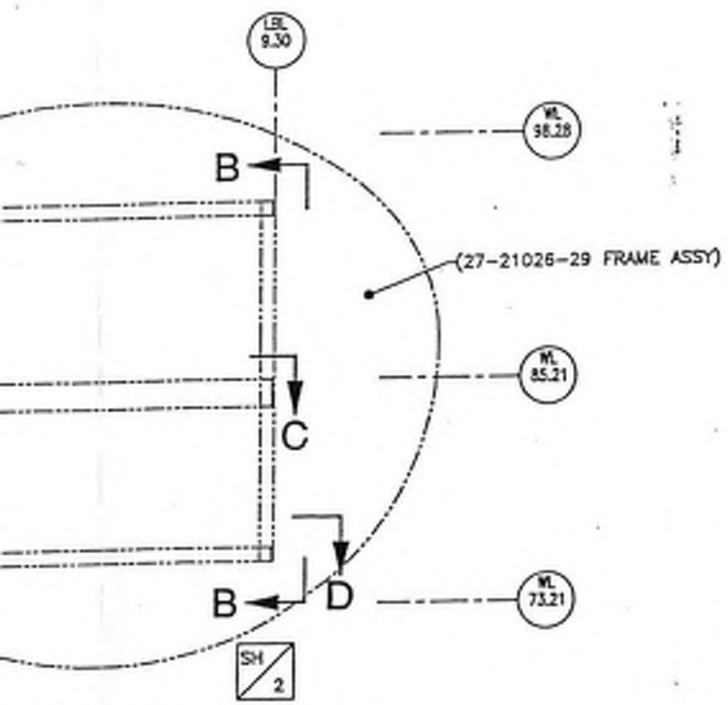
...MSION

...D

... PART.

...PLIED WITH SB 226-24-007.

COPY



BATTERY BOX MODIFICATION
VIEW LOOKING AFT AT BULKHEAD, FS 00.00

AR	3CIOCN-BED 226 B/A GRY	EPOXY ADHESIVE		
	-501	BATTERY BOX MODIFICATION		
QTY PER ASSY	PART NO.	NOMENCLATURE	STOCK SIZE	MATERIAL

S-22771	T1421-999 (8)
S-22678	TB276, 252-419 (8)
S-226T	T245, 240-999 (8)
MODEL	EFFECTIVITY

PROPRIETARY NOTICE

APPROVALS		DATE
DRAWN	D. CHAPMAN	8/26/97
CHECK	P. KELL	–
		–
		–

UNLESS OTHERWISE NOTED ALL DIM ARE IN INCHES

TOLERANCES

DO NOT SCALE DWG

AAE AERODESIGN AIRCRAFT ENGR.

BATTERY BOX MODIFICATI...
ON FAIRCHILD MERLIN III

2155101

REV	DESCRIPTION	DATE	APVD
IR	INITIAL RELEASE	—	—

...RATURE PROBE CONNECTOR FROM
... APPLICABLE.

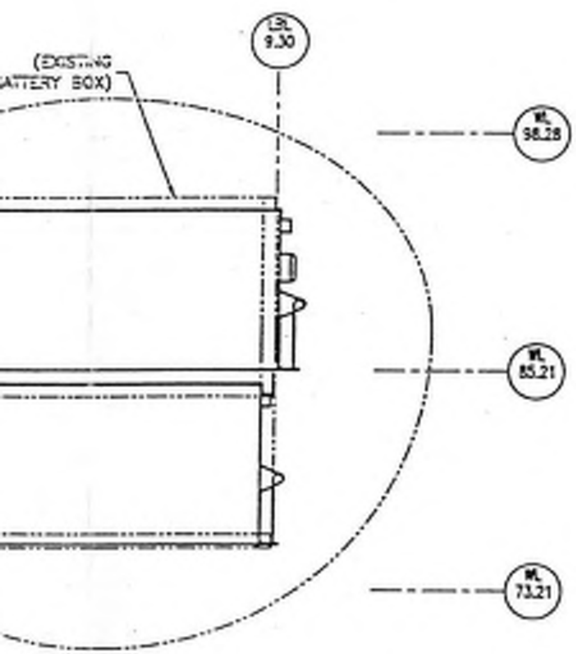
...RY PER MAINTENANCE MANUAL,
...E.

...NCORD BATTERY (PART NO. 9605) IS TO
...ACENT TO OR ON DEACTIVATED BATTERY

...NECESSARY AND REINSTALL PER
...TS CATALOG.

...MPLIED WITH SB 226-24-007.

...P.
...D.



BATTERY INSTALLATION
VIEW LOOKING AFT AT BULKHEAD, FS 00.00

COPY

QTY PER ASSY	PART NO.	NOMENCLATURE	STOCK SIZE	MATERIAL	SPEC/VENDOR	NOTE
2	RG-91A	BATTERY				
	-501	BATTERY BOX INSTALLATION				

MODEL	EFFECTIVITY
SA227TT	TT421-999 (5)
SA226TB	TB276, 282-419 (5)
SA226T	T245, 249-999 (5)
APPLICATION	

PROPRIETARY NOTICE

APPROVALS: DRAWN J.STRICKLAND

AAE AERODESIGN AIRCRAFT ENGINEERING

TITLE: BATTERY INSTALLATION ON FAIRCHILD MERLIN III

A/C MODEL: MERLIN III

SCALE: 1/4

DRAWING NO. 2155102

ALPHABETICAL INDEX

A

ALPHABETICAL INDEX (continued)

ALPHABETICAL INDEX (continued)

ALPHABETICAL INDEX (continued)

ALPHABETICAL INDEX (continued)

ALPHABETICAL INDEX (continued)

ALPHABETICAL INDEX (continued)

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ALPHABETICAL INDEX (continued)

ALPHABETICAL INDEX (continued)

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ALPHABETICAL INDEX (continued)

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FAA APPROVED AIRPLANE FLIGHT MANUAL
REISSUE B
S/N T(B) - 276 AND T(B) - 292 AND SUBSEQUENT

LIST OF EFFECTIVE PAGES

Page	Date	Page	Date
Title	September 14, 1995	vii	June 3, 1980
i	November 2, 1979	viii	March 12, 1981
ii	November 2, 1979	ix	June 21, 1983
iii	November 29, 2005	x	October 16, 1997
iv	June 2, 2000	xi	November 29, 2005
v	November 29, 2005	xii	May 11, 1999
vi	July 14, 1981		

SECTION 1

Page	Date	Page	Date
1-i	November 2, 1979	1-8	November 2, 1979
1-ii	November 2, 1979	1-9	November 2, 1979
1-1	November 2, 1979	1-10	November 2, 1979
1-2	November 2, 1979	1-11	November 2, 1979
1-3	November 2, 1979	1-12	November 2, 1979
1-4	November 2, 1979	1-13	November 2, 1979
1-5	April 15, 1985	1-14	November 2, 1979
1-6	April 9, 1980	1-15	November 2, 1979
1-7	November 2, 1979	1-16	November 2, 1979

SECTION 2

Page	Date	Page	Date
2-i	June 2, 2000	2-9	June 3, 1980
2-ii	November 2, 1979	2-10	October 16, 1997
2-1	June 3, 1980	2-10A	June 2, 2000
2-2	June 21, 1983	2-10B	June 2, 2000
2-3	June 21, 1983	2-11	October 16, 1997
2-4	November 2, 1979	2-12	January 14, 1982
2-5	April 15, 1985	2-13	March 12, 1981
2-6	November 2, 1979	2-14	June 3, 1980
2-7	June 3, 1980	2-15	November 2, 1979
2-8	February 3, 1983	2-16	November 2, 1979

FAA APPROVED AIRPLANE FLIGHT MANUAL
REISSUE B
S/N T(B) - 276 AND T(B) - 292 AND SUBSEQUENT

LIST OF EFFECTIVE PAGES (continued)

SECTION 3

Page	Date	Page	Date
3-i	April 28, 2000	3-10	May 11,1999
3-ii	May 11,1999	3-11	September 13, 1984
3-1	May 11,1999	3-11a	January 28, 1982
3-2	April 28, 2000	3-11b	January 28, 1982
3-3	March 29, 1994	3-12	November 2, 1979
3-4	April 15, 1985	3-13	November 2, 1979
3-5	April 15, 1985	3-14	November 2, 1979
3-6	March 29, 1994	3-15	November 2, 1979
3-6A	May 11,1999	3-16	November 2, 1979
3-6B	May 11,1999	3-17	November 2, 1979
3-7	May 11,1999	3-18	January 14, 1982
3-8	May 11,1999	3-19	January 14, 1982
3-9	May 11,1999	3-20	January 14, 1982

SECTION 3A

Page	Date	Page	Date
3A-i	October 16, 1997	3A-12	October 24, 1980
3A-ii	November 2, 1979	3A-13	March 12, 1981
3A-1	October 24, 1980	3A-14	October 24, 1980
3A-2	February 3, 1983	3A-15	March 12, 1981
3A-3	October 24, 1980	3A-16	October 24, 1980
3A-4	October 24, 1980	3A-17	March 12, 1981
3A-5	October 24, 1980	3A-18	September 14, 1995
3A-6	October 24, 1980	3A-18a	September 14, 1995
3A-7	October 24, 1980	3A-18b	September 14, 1995
3A-8	October 24, 1980	3A-19	October 24, 1980
3A-9	October 24, 1980	3A-20	October 24, 1980
3A-10	October 16, 1997	3A-21	October 24, 1980
3A-10A	June 2, 2000	3A-22	October 24, 1980
3A-10B	October 16, 1997	3A-23	October 24, 1980
3A-11	October 24, 1980	3A-24	October 24, 1980

FAA APPROVED AIRPLANE FLIGHT MANUAL
REISSUE B
S/N T(B) - 276 AND T(B) - 292 AND SUBSEQUENT

LIST OF EFFECTIVE PAGES (continued)

SECTION 4

Page	Date	Page	Date
4-i	April 28, 2000	4-14A	November 29, 2005
4-ii	June 2, 2000	4-14B	March 12, 1981
4-1	April 28, 2000	4-15	October 16, 1997
4-2	November 2, 1979	4-16	October 16, 1997
4-3	April 28, 2000	4-17	November 2, 1979
4-4	April 28, 2000	4-18	November 2, 1979
4-5	April 28, 2000	4-19	November 2, 1979
4-6	October 24, 1980	4-20	November 2, 1979
4-7	October 24, 1980	4-21	September 14, 1995
4-8	October 24, 1980	4-22	September 14, 1995
4-9	September 14, 1995	4-23	March 29, 1994
4-9a	September 14, 1995	4-24	January 14, 1982
4-9b	October 16, 1997	4-24A	June 2, 2000
4-10	October 16, 1997	4-24B	June 2, 2000
4-11	March 29, 1994	4-25	October 19, 1981
4-12	October 30, 1985	4-26	November 2, 1979
4-13	February 3, 1983	4-27	November 2, 1979
4-14	November 29, 2005	4-28	November 2, 1979

FAA APPROVED AIRPLANE FLIGHT MANUAL
REISSUE B
S/N T(B) - 276 AND T(B) - 292 AND SUBSEQUENT

LIST OF EFFECTIVE PAGES (continued)

SECTION 5

Page	Date	Page	Date
5-i	November 2, 1979	5-38	November 2, 1979
5-ii	November 2, 1979	5-39	November 2, 1979
5-1	November 2, 1979	5-40	November 2, 1979
5-2	November 2, 1979	5-41	November 2, 1979
5-3	November 2, 1979	5-42	November 2, 1979
5-5	November 2, 1979	5-43	March 12, 1981
5-5	November 2, 1979	5-44	March 12, 1981
5-6	November 2, 1979	5-45	November 2, 1979
5-7	November 2, 1979	5-46	November 2, 1979
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5-9	November 2, 1979	5-48	November 2, 1979
5-10	November 2, 1979	5-49	November 2, 1979
5-11	November 2, 1979	5-50	November 2, 1979
5-12	November 2, 1979	5-51	November 2, 1979
5-13	November 2, 1979	5-52	November 2, 1979
5-14	November 2, 1979	5-53	November 2, 1979
5-15	November 2, 1979	5-54	November 2, 1979
5-16	November 2, 1979	5-55	November 2, 1979
5-17	November 2, 1979	5-56	November 2, 1979
5-18	November 2, 1979	5-57	November 2, 1979
5-19	November 2, 1979	5-58	November 2, 1979
5-20	November 2, 1979	5-59	November 2, 1979
5-21	November 2, 1979	5-60	November 2, 1979
5-22	November 2, 1979	5-61	November 2, 1979
5-23	November 2, 1979	5-62	November 2, 1979
5-24	November 2, 1979	5-63	November 2, 1979
5-25	November 2, 1979	5-64	November 2, 1979
5-26	November 2, 1979	5-65	July 14, 1981
5-27	November 2, 1979	5-66	November 2, 1979
5-28	November 2, 1979	5-67	November 2, 1979
5-29	November 2, 1979	5-68	November 2, 1979
5-30	March 12, 1981	5-69	November 2, 1979
5-31	November 2, 1979	5-70	November 2, 1979
5-32	March 12, 1981	5-71	November 2, 1979
5-33	November 2, 1979	5-72	November 2, 1979
5-34	November 2, 1979	5-73	November 2, 1979
5-35	March 12, 1981	5-74	November 2, 1979
5-36	March 12, 1981	5-75	November 2, 1979
5-37	November 2, 1979	5-76	November 2, 1979

LOG OF REVISIONS

Revisions to the Pilots Operating Handbook and Airplane Flight Manual provide current information applicable to operation of the SA226–T(B) airplane. Revised pages should be inserted in the flight manual to replace existing pages or to add additional pages, as applicable. The manual is valid only when all current revisions are incorporated. The revised material on each page is identified by a vertical line in the margin.

Reissue B of the flight manual incorporates Revision A1 and A2, revised some procedures, redefined performance data and corrected minor errors. Subsequent revisions will be identified by a combination of the current reissue code letter and the next successive number (e.g., B1, B2, B3, etc.).

Revision Number	Revised Pages	Description of Revision	FAA APPROVED	
			Signature	Date
B–1	iii vii 1–5 2–2 2–3 2–5 6–iii 6–28 7–v 7–49	Additional reverse thrust for improved ground maneuverability.	[illegible]	3-13-80
B–2	iii vii 1–6 2–8 6–iii 6–27	Zero Fuel Weight	D. D. Castle	4-9-80
B–3	iii, vii 2–1 2–7 2–9 2–13 2–14	 Corrected V_{FE} Speeds Corrected AiResearch Installation Manual Number Corrected Maneuvering Load Factors Part 135 Operations with FAA Approved Master Minimum Equipment List (MMEL) Corrected Instrument Markings Corrected Placard	D. D. Castle	6-3-80

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LOG OF REVISIONS

Revision Number	Revised Pages	Description of Revision	FAA APPROVED Signature	Date
B–4	4–5, 4–15	Power Lever Lockout Check	D. D. Castle	7-17-80
B–5	iii, iv, v, viii, 3A–i, 3A–1, 3A–2, 3A–3, 3A–4, 3A–5, 3A–13, 3A–24, 4–i, 4–6, 4–8, 4–9, 7–iv, 7–v, 7–59	Engine ground start with high residual ET. Engine Manual Ground Start Procedure.	D. D. Castle	10-24-80
B–6	iii, iv,v, vi, viii, 1–5 2–2, 2–5 2–13, 3–2 3A–13, 3A–15 3A–17 4–13, 4–14a 4–14b, 4–24 5–29 5–30 5–32 5–35 5–36 5–43 5–44	Airspeed Limitations Propellers Instrument Markings Engine Fire On Ground Engine Fire In Flight SRL Computer Failure ET Limit with SRL Inoperative Preplanned Engine Shutdown Flight In Icing Conditions Rate-of-Climb – Single Engine	D. D. Castle	3-12-81
B–7	iii, viii 2–11	Temperature Limits	D. D. Castle	3-12-81

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA APPROVED Date	FAA APPROVED By
B8	iii, v, ix, x, 4-10, 4-14a	Taxi, Stopping Engines	06/08/81	D. D. Castle
B9	iii, vi, ix, 2-12 5-56	Nose Wheel Steering – Restricted Use	07/14/81	D. A. Tuch
B10	iii, v, ix, 4-ii 4-10, 4-16 4-24, 4-24a 4-25	Auto/Cont Ignition System (if installed)	10/19/81	D. A. Tuch
B11	iii, v, ix, and 4-24	Flight in Icing Conditions	12/18/81	D. A. Tuch
B12	iii, iv, v, IX, 2-12, 3-I, 3-18, 3-19, 3-20 4-11, 4-22, 4-24, 4-24a, 4-24b	Nose Wheel Steering	01/14/82	D. A. Tuch
B13	iii, iv, ix, 3-i, 3-11a, 3-11b	Gear Up Landings	01/28/82	D D Castle
B-14	iii, iv, v, ix, 2-8 3A-2, and 4-13.	Increased Maximum Forward Baggage Compartment Loading to 600 pounds, correct typo ABNORMAL PRO–CEDURES, page 3A-2; revise item 3, BALKED LANDING procedure.	02/03/83	C. S. Stow
B-15	iii, ix, 2-2, 2-3, and 2-5	Engine Addition	06/21/83	D. D. Castle

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA APPROVED Date	FAA APPROVED By
B-16	iii, iv, x, and 3-11	Add note to Landing Gear Emergency Extension	9-13-84	C L Stoner
B-17	iii, iv, x, 1-5, 2-5, 3-i, 3-2, 3-3, 3-4, 3-5 and 3-6	Added Bleed Air (operating engine) and Note to Engine Fire In Flight and Engine Failure During Flight; moved information to follow-on pages and deleted Propeller Hub Model Number.	4-15-85	C L Stoner
B-18	iii, iv, v, x, 2-10, 3A-10, 4-ii, 4-12, 4-24a, 4-24b	Expanded material regarding use of ice protection equipment.	10-30-85	C L Stoner
B-19	iii, iv, v, x, 2-11, 3-3, 3-6, 3-7, 4-ii, 4-11, 4-22 and 4-23	Changed Battery Overheat Warning System, added NOTE to Interior/Exterior Lights, WARNING to Landing Gear (after liftoff) takeoff continued at or above V_1, added Current Limiter Check.	3-29-94	Michele M Owsley
B-20	Cover, iii, iv, v, x, 3A-18 thru 3A-18b, 4-i, 4-9 thru 4-9b, 4-10, 4-21 and 4-22	Corrected art, company name and Ft Worth zip code on Cover page, changed info about Current Limiter Check, corrected editorial errors and added pages 3A-18a, 3A-18b, 4-9a and 4-9b.	9-14-95	[illegible signature]
B-21	iii thru v, x, 2-i, 2-10 thru 2-11, 3A-i, 3A-10 thru 3A-10B, 4-9b, 4-10, 4-15 and 4-16	"Revision B-21 to this Pilot's Operating Handbook/Airplane Flight Manual (AFM) is approved by the Manager of the Small Airplane Directorate as an alternative means of compliance with AD 96-09-16, paragraph (1)(a), approved in FAA letter dated January 1997." Corrected editorial errors. Added four pages: 2-10A, 2-10B, 3A-10A and 3A-10B.	10-16-97	Michele M Owsley

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA APPROVED Date	FAA APPROVED By
B-22	iii, iv, xi, xii, 3-i, 3-ii, 3-1, 3-6A, 3-6B, 3-7 thru 3-10	Added *Double Generator Failure, Double Engine Failure (Restarts/ Relights Unsuccessful), Total Electrical Failure;* and revised *Smoke in Aircraft*, and *Wheelwell and Wing Overheat Warning Light On* and added four pages xi, xii, 3-6A and 3-6B.	5.11.99	Michele M Owsley
B-23	iii thru v, xi, 3-i, 3-2, 4-i, 4-1, 4-3 thru 4-5	Added *Out-of-Trim Warning* info to *Sections 3* and *4*.	4-28-00	Michele M Owsley
B-24	iii thru v, xi, 2-i, 2-10A, 2-10B, 3A-10A, 4-ii, 4-24A and 4-24B	Added *Pneumatic Deicing Boots System* information to comply with AD 2000-06-04.	6.2.00	Michele M Owsley
B-25	iii, v, xi, 4-14 and 4-14A	Added two dot Caution to After Landing on page 4-14. Moved text to 4-14A.	11.29.05	Michele M Owsley

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LIST OF REVISIONS (continued)

Revision Number	Revised Pages	Description of Revision	FAA APPROVED	
			Date	By

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