

N8538P

1964 Commanche 400

Performance



MSN: 26-119

Prepared by the worldwide aviation specialists at RidgeAire, Inc.

GENERAL

PA-24-400 * 3600 LBS GROSS WEIGHT

AIRFRAME

Manufacturer Piper
Type Designation Comanche PA-24-400
Construction Semi-Monocoque
Serial Number
Registration Number
Year Model

ENGINE

Manufacturer Lycoming
Serial Number
Model IO-720-A
Type Eight-Cylinder / Horizontally Opposed
Ratings (bhp @ rpm) 400/2650
Bore 5.125 in
Stroke 4.375 in
Displacement 722.0 cu in
Compression Ratio 8.7 to 1
TBO 1,800 hr
Fuel Injector Manufacturer Bendix
Model RSA-10AD1

PROPELLER

Manufacturer Hartzell
Serial Number
Hub Model HC-A3VK-4
Blade Model V8433-7
Number of Blades 3
Governor Hartzell F-4-1
Type Constant-Speed / Hydraulically Actuated
Diameter 77 in
Pitch (30 in Station) 13.8 to 37.0 Degrees

AIRFRAME DIMENSIONS

Length 25.7 ft
Height 7.8 ft
Wing Span 36.0 ft
Wheel Base 6.5 ft
Wheel Tread 9.8 ft

CABIN AND ENTRY DIMENSIONS

Cabin Length	9.0 ft
Cabin Height	47 in
Cabin Width	45 in
Cabin Entry Height	32 in
Cabin Entry Width	34 in
Baggage Compartment Entry Height and Width	20 x 20 in
Baggage Compartment Volume	20 cu ft

WING CLASSIFICATION AND SPECIFIC LOADINGS

Wing Type	Laminar Flow
NACA Designation	64 ₂ A215
Wing Dihedral	5 Degrees (Zero Twist)
Wing Aspect Ratio	7.3
Wing Area	178 sq ft
Wing Loading	20.2 lb/sq ft
Power Loading	9.0 lb/bhp

WEIGHTS

Maximum Takeoff Weight	3,600 lb
Maximum Landing Weight	3,600 lb
Standard Empty Weight	2,110 lb
Maximum Useful Load	1,490 lb
Maximum Useful Load - With Basic Fuel and Oil (100 US gal)	890 lb
Maximum Useful Load - With Internal Reserve Fuel (30 US gal)	710 lb

CAPACITIES

Seats	4
Baggage Capacity	200 lb
Basic Fuel Capacity	100 US gal - 94 Usable
Reserve Fuel Capacity	30 US gal - 30 Usable
Fuel Grade	100/130 (green) - 100 LL (blue) Aviation Gasoline
Oil Capacity	17 US qts
Normal Quantity	13-14 US qts
Minimum Safe Quantity	3 US qts
Oil Grade	MIL-L-22851C
Tire Pressure (lbs psi)	Nose 42 - Mains 42

FUEL AND OIL CONSUMPTION

Fuel Flow @ 75% Power	20.0 gph/120.0 pph
Fuel Flow @ 65% Power	18.0 gph/108.0 pph
Fuel Flow @ 55% Power	15.5 gph/ 93.0 pph
Fuel Flow @ 45% Power	13.5 gph/ 81.0 pph
Oil Consumption (Typical)	0.40 to 0.50 US qts/hr

PERFORMANCE

1.) Operating Speeds:

Maximum Speed	223 mph 194 kt
Cruise @ 75% Power @ 8,000 ft	213 mph 185 kt
Cruise @ 65% Power @ 12,000 ft	207 mph 180 kt
Cruise @ 55% Power @ 16,000 ft	198 mph 172 kt
Cruise @ 45% Power @ 12,000 ft	172 mph 149 kt

2.) Endurance/Range 94 Gallons:

At 75% Power	4.2 hr --- 778 nm	895 sm	1,440 km
At 65% Power	4.7 hr --- 846 nm	973 sm	1,566 km
At 55% Power	5.5 hr --- 946 nm	1,089 sm	1,752 km
At 45% Power	6.3 hr --- 942 nm	1,084 sm	1,744 km

3.) Endurance/Range 124 Gallons:

At 75% Power	5.6 hr -- 1,037 nm	1,193 sm	1,920 km
At 65% Power	6.2 hr -- 1,115 nm	1,283 sm	2,064 km
At 55% Power	7.2 hr -- 1,239 nm	1,426 sm	2,294 km
At 45% Power	8.3 hr -- 1,241 nm	1,428 sm	2,298 km

** NOTE **

Range and endurance figures include an allowance for fuel used during start, taxi, takeoff, climb, and descent plus 45 minutes reserve fuel at a reduced power setting to obtain maximum range (V_{IMR}) or maximum endurance (V_{IMD}) as applicable. Mixture setting is best economy cruise.

4.) Rate of Climb:

At 3,600 lbs Gross Weight	1,600 ft/min
At 2,800 lbs Gross Weight	2,190 ft/min

5.) Climb Gradient:

At 3,600 lbs Gross Weight	923 ft/nm
At 2,800 lbs Gross Weight	1,263 ft/nm

6.) Stall Speeds:

Full Flaps and Gear Extended	68 mph 59 kt
Clean	78 mph 68 kt

PERFORMANCE (Cont.)

7.) Short Field Performance:

Takeoff Distance, Ground Run (15 Degrees of Flap)	980 ft
Total Over a 50 ft Obstacle	1,500 ft
Landing Distance, Ground Roll (Full Flaps)	1,180 ft
Total Over a 50 ft Obstacle	1,820 ft

8.) Service Ceiling:

At 3,600 lbs Gross Weight	19,500 ft
At 2,800 lbs Gross Weight	23,000 ft

9.) Absolute Ceiling:

At 3,600 lbs Gross Weight	21,000 ft
At 2,800 lbs Gross Weight	24,500 ft

** NOTE **

The maximum approved altitude for the Comanche 400 is FL 210.

Unless otherwise specified, all performance figures are based on standard day, standard atmosphere, gross weight, sea level, no wind conditions.

LIMITATIONS

PA-24-400 * 3600 LBS GROSS WEIGHT

INTRODUCTION

The limitations included in this section are approved by the Federal Aviation Administration. The Comanche 400 is certified under FAA Type Certificate No. 1A15, approved December 27, 1963.

AIRSPEED LIMITATIONS

V_A - Design Maneuvering Speed / Turbulent Air Penetration Speed

At 3,600 lbs Gross Weight	CAS 160 mph	139 kt
	IAS 159 mph	138 kt
At 2,300 lbs Gross Weight	CAS 130 mph	113 kt
	IAS 128 mph	111 kt

**** NOTE **** Do not make full or abrupt control movements above V_A .

V_{FE} - Flap Extension Speed	CAS 125 mph	108 kt
	IAS 125 mph	108 kt

**** NOTE **** Do not extend flaps or operate with flaps extended above V_{FE} .

V_{LE} - Landing-Gear Extended Speed	CAS 150 mph	130 kt
	IAS 148 mph	129 kt

**** NOTE **** Do not exceed V_{LE} with the landing gear extended.

V_{LO} - Landing-Gear Operation Speed	CAS 150 mph	130 kt
	IAS 148 mph	129 kt

**** NOTE **** Do not extend or retract the landing gear above V_{LO} .

V_{NE} - Never Exceed Speed	CAS 250 mph	217 kt
	IAS 252 mph	219 kt

**** NOTE **** Do not exceed V_{NE} in any operation.

V_{NO} - Normal Operating Speed / Maximum Structural Cruising Speed ...	CAS 210 mph	182 kt
	IAS 212 mph	184 kt

**** NOTE **** Do not exceed V_{NO} except in smooth air and then only with caution.

V_{S0} - Stall Speed (Power Off - Full Flaps and Gear Extended)	CAS 68 mph	59 kt
	IAS 69 mph	60 kt

V_{S1} - Stall Speed (Power Off - Clean)	CAS 78 mph	68 kt
	IAS 79 mph	69 kt

POWER PLANT INSTRUMENT MARKINGS

1.) Tachometer:

Green Arc (Normal Operating Range) 500 to 2650 rpm
Red Line (Maximum Continuous) 2650 rpm

2.) Oil Temperature:

Green Arc (Normal Operating Range) 120-245 Degrees Fahrenheit
Yellow Arc (Caution Range) 60-120 Degrees Fahrenheit
Red Line (Maximum Temperature) 245 Degrees Fahrenheit

3.) Oil Pressure:

Green Arc (Normal Operating Range) 60-90 psi
Yellow Arc (Caution Range) 25-60 and 90-100 psi
Red Line (Minimum psi) 25 psi
Red Line (Maximum psi) 100 psi

4.) Fuel Flow

Green Arc (Normal Operating Range) Zero to 40 gph
Red Line (Maximum Pressure at Sea Level) 13.8 psi

5.) Cylinder Head Temperature:

Green Arc (Normal Operating Range) 200-475 Degrees Fahrenheit
Red Line (Minimum Temperature) 200 Degrees Fahrenheit
Red Line (Maximum Temperature) 475 Degrees Fahrenheit

6.) Instrument Vacuum:

Green Arc (Normal Operating Range) 4.8 to 5.1 in Hg
Red Line (Minimum Suction) 4.8 in Hg
Red Line (Maximum Suction) 5.1 in Hg

AIRSPPEED INDICATOR MARKINGS

**** NOTE **** The airspeed indicator color markings are in CAS values.

Red Line (Never Exceed Speed) 250 mph 219 kt
Yellow Arc (Caution Range) 210-250 mph 182-219 kt
Green Arc (Normal Operating Range) 78-210 mph 68-182 kt
White Arc (Flaps Down) 68-125 mph 59-108 kt

POWER PLANT LIMITATIONS

1.) Engine Operating Limits:

One Lycoming Model: IO-720-A1A

Takeoff Power and MCP 2650 rpm/400 bhp

2.) Propeller Limitations:

One Hartzell Hub Model: HC-A3VK-4
Blade Model: 8433-7

Diameter Maximum 77 5/8 in * Minimum 75 5/8 in
Pitch (30 in Station) Low 13.8 to 14.2 Degrees * High 35.0 to 37.0 Degrees

WEIGHT LIMITS

Maximum Takeoff Weight 3,600 lb
Maximum Landing Weight 3,600 lb
Maximum Baggage Weight 200 lb

CENTER OF GRAVITY LIMITS

Weight Pounds	Arm Forward Limit Inches Aft of Datum	Arm Rearward Limit Inches Aft of Datum
3,600	84.8	
3,300	81.5	90.0
2,500 or Less	77.0	90.0

**** NOTE ****

Straight line variation exists between the points given.

Datum is located 79 inches ahead of wing leading edge at station 65.5 (point of intersection of straight and tapered sections).

STRUCTURAL LOAD FACTORS

Positive Normal Category + 3.80 g
Negative Normal Category - 1.52 g

**** NOTE **** No inverted maneuvers are approved

OPERATIONAL LIMITS

The airplane is approved for the following operations when equipped in accordance with FAR Part 91 or FAR Part 135.

- 1.) VFR day and night
- 2.) IFR day and night

**** WARNING **** Flight into known icing conditions is prohibited

FUEL LIMITATIONS

Main (Inboard) Tanks:

Basic Fuel Capacity (Two Cells, 30 US gal ea.) 60 US gal - 54 Usable

**** NOTE ****

The unusable fuel in this aircraft has been determined to be 3 gallons in each inboard tank in critical flight attitudes.

Auxiliary (Outboard) Tanks:

Reserve Fuel Capacity (Two Cells, 35 US gal ea.) 70 US gal - 70 Usable

**** NOTE **** Minimum fuel grade is (green) 100/130 octane (blue) 100 LL aviation fuel.

WING FLAP LIMITATIONS

Takeoff Zero to 15 Degrees

Landing Zero to 38 Degrees

OTHER LIMITATIONS

1.) Maneuvers:

Normal Category: All intentional aerobatic maneuvers, including spins, are prohibited.

2.) Procedures:

A.) Instructions for emergency extension of landing gear:

- 1.) Reduce power - airspeed not to exceed 100 mph.
- 2.) Place landing gear selector switch in center "OFF" position (if equipped) - or - place landing gear selector switch in "GEAR DOWN LOCKED" position.
- 3.) Disengage motor - raise motor release arm and push forward through full travel.
- 4.) Extend gear emergency handle full length.
- 5.) Rotate handle forward full travel to extend gear.

Green light on panel indicates gear down and locked. When the instrument panel light is turned on the intensity of the gear down light is reduced, and may be invisible during daylight.

CAUTION

- 1.) Do not re-engage motor in flight.
- 2.) Rocking the handle will assist in manually extending the landing gear.

B.) The use of 15 degree flap deflection during takeoff has been approved for this aircraft.

C.) The Stall Warning System is inoperative with the Master Switch off.

D.) The alternator circuit breakers should not be opened under any circumstances without consulting the Service Manual for detailed procedures.

E.) Except as noted above, all operating procedures for this airplane are normal.

OTHER LIMITATIONS (Cont.)

3.) Performance:

Loss of altitude from a power-off stall, gear and flaps retracted, is 250 feet. All other normal stall configurations result in less loss of altitude.

PLACARDS

1.) On Instrument Panel in Full View of the Pilot:

**THIS AIRPLANE MUST BE OPERATED AS A NORMAL CATEGORY
AIRPLANE IN COMPLIANCE WITH THE AIRPLANE FLIGHT MANUAL.
ACROBATIC MANEUVERS (INCLUDING SPINS) PROHIBITED.**

2.) On the Floor at Base of Landing Gear Manual Operating Lever:

EMERGENCY GEAR HANDLE

3.) On Landing Gear Motor Release Arm Access Door:

**EMERGENCY GEAR EXTENSION.
REMOVE COVER.
EXTENSION INSTRUCTIONS
ON REVERSE SIDE.**

4.) On Baggage Compartment Door:

MAXIMUM BAGGAGE 200 POUNDS

5.) On The Instrument Panel Near The Manifold Pressure Gauge:

**DO NOT EXCEED 24 INCH
MP BELOW 2000 RPM.**

6.) On The Instrument Panel:

**WARNING - UNCOORDINATED MANEUVERS, INCLUDING SIDE
SLIPS OF 30 SECONDS OR MORE, FOR ANY REASON, AND FAST
TAXI TURNS JUST PRIOR TO TAKEOFF CAN CAUSE LOSS
OF POWER IF FUEL TANK IN USE IS NOT FULL.**

EMERGENCY PROCEDURES

PA-24-400 * 3600 LBS GROSS WEIGHT

ENGINE POWER LOSS DURING TAKEOFF

If sufficient runway remains for a normal landing: Land straight ahead.

**** NOTE ****

A check should be made early in the takeoff roll for proper engine operation. Any indication of a sluggish or rough running engine is reason to discontinue the takeoff.

**** WARNING ****

Runway length necessary under normal conditions to safely operate within the accelerate-stop distance required for the aircraft is recommended to be no less than 3,000 ft.

If insufficient runway remains:

Airspeed Maintain Safe Airspeed
Landing Gear As Situation Requires
Wing Flaps As Situation Requires

Make only shallow turns to avoid obstacles.

If sufficient altitude has been gained to attempt an engine restart: Initiate **Engine Power Loss During Flight** procedure. (Below)

ENGINE POWER LOSS DURING FLIGHT

Airspeed Establish Best Glide (115 mph or 100 kt @ Full Gross Weight)

**** NOTE **** Best engine-out glide speed decreases as the airplane's gross weight decreases.

Fuel Selector Switch to Tank Containing Fuel
Electric Fuel Pump On
Ignition Switch Check On
Mixture Full Rich
Engine Gauges Check for Indication of Cause of Power Loss

If power is restored:

Electric Fuel Pump Off

If power is not restored: Initiate **Power-Off Landing** procedure. (Page 3-5)

ENGINE ROUGHNESS IN FLIGHT

Mixture Adjust for Maximum Smoothness
Electric Fuel Pump On
Fuel Selector Switch Tanks
Engine Gauges Check for Indication of Cause of Power Loss
Magnetos Check Left, Then Right, Then Both

If operation is satisfactory on one magneto: Continue at reduced power and standard mixture to the nearest airport. Prepare for a **Power Off Landing**. (Page 3-5)

ENGINE FIRE DURING START

Starter Crank Engine

In the interim, while continuing cranking:

Mixture Idle Cut-Off
Throttle Open
Electric Fuel Pump Off
Fuel Selector Off
If Fire Continues Extinguish With Best Available Means

**** NOTE **** Use radio if necessary to call for fire-fighting assistance.

FIRE IN FLIGHT

Determine Source of Fire Electrical or Engine

1.) Electrical Fire: (Or Smoke in Cabin)

Master Switch Off
Vents Open
Door (As Required) Open as an Exhaust
Cabin Heat Off

Land as soon as possible without wing flaps. ($V_{APP} = 100$ mph or 87 kt) Initiate **Manual Gear Extension** procedure @ Part 3. (Page 3-8)

2.) Engine Fire:

Throttle Full Aft - Closed
Mixture Idle Cut-Off
Fuel Selector Off
Electric Fuel Pump Check Off
Heater, and Defroster Off

Initiate **Power-Off Landing** procedure. (Page 3-5)

ELECTRICAL FAILURES

Ammeter Indicates Battery Discharge

Reduce electrical loads to a minimum.

Alternator Main Circuit Breaker Remove Guard - Check On
Alternator Field Circuit Breaker Check and Reset as Required

** CAUTION **

The alternator main circuit breaker should never be operated when the engine is running except in an emergency. The alternator main circuit breaker can be operated safely only when the engine is stopped, the master switch is off, or the 5 ampere field circuit breaker is open.

** NOTE **

Before attempting to reset any circuit breaker, allow for a two to five minute cooling off period, and reset only once.

If circuit breakers are reset (closed):

Master Switch Off

Wait a minimum of 6 seconds for overvoltage relay to reset.

Master Switch On

If alternator returns on line (ammeter indicates battery charging):

Reinstate electrical load.

If alternator output cannot be restored:

Maintain minimum electrical load and land as soon as practical.

** NOTE **

The battery is the only remaining source of power.

If the battery is depleted: Land without wing flaps. ($V_{APP} = 100$ mph or 87 kt)

Initiate Manual Gear Extension procedure @ Part 3. (Page 3-8)

POWER OFF LANDING

Locate a suitable field (preferably with an alternate). Determine wind direction.

Establish Best Glide and Spiral Pattern 115 mph or 100 kt @ Full Gross Weight.
Propeller Control Full Aft to Decrease rpm and Improve Glide

Tune radio to 121.5. Tune transponder to 7700.

While at Altitude, if Time Allows Broadcast Mayday

**** Include: Aircraft Identification - Location - Number On Board ****

1.) Gear-Down Emergency Landing Procedure:

When committed to landing:

ELT Activate Manually
Throttle Full Aft - Closed
Fuel Selector Off
Mixture Idle Cut-Off
Ignition Off
Seat Belt and Harness Tight
Door (Pilot's Discretion) Block Open
Wing Flaps As Required

**** WARNING ****

Glide ratio is reduced radically when gear is lowered. Landing gear down operation time is approximately 7 seconds.

Landing Gear Lower Just Before Touchdown
Master Switch Off

Touchdown should normally be made at the slowest practical airspeed.

2.) Gear-Up Emergency Landing Procedure:

A gear up landing should only be made during an emergency when:

- A.) The surface is too soft or rough for a gear down landing.
- B.) A field is too short. (Pilot's discretion)
- C.) Ditching (A forced water landing) is necessary.

Wing Flaps Up
Throttle Full Aft - Closed
Fuel Selector Off
Mixture Idle Cut-Off
Ignition Off
Seat Belt and Harness Tight
Door (Pilot's Discretion) Block Open
Master Switch Off

HIGH OIL TEMPERATURE

Cowl Flaps Open
Power Reduce
Mixture Enrich
Airspeed Maintain Above 140 mph (122 kt)

Land as soon as possible and investigate cause. Prepare for a **Power Off Landing**. (Page 3-5)

HIGH CYLINDER HEAD TEMPERATURE

Excessive cylinder head temperature may parallel high oil temperature and the procedure for handling it is the same. Refer to **High Oil Temperature** procedure. (Above)

LOSS OF OIL PRESSURE

Land as soon as possible and investigate cause.

Prepare for a **Power Off Landing**. (Page 3-5)

LOSS OF FUEL PRESSURE

** NOTE **

The most common cause of fuel pressure loss is fuel exhaustion due to improper fuel management. In the event of fuel pressure loss:

Fuel Selector Switch to a Tank Containing Fuel
Electric Fuel Pump On
Mixture Enrich

If pressure is not regained:

Electric Fuel Pump Off

Initiate **Power Off Landing** procedure. (Page 3-5)

GYRO SUCTION FAILURE

Suction below 4.8 in Hg

RPM Increase to 2650
Altitude Descend to Maintain 4.8 in Hg

Use electric turn indicator and magnetic compass to monitor artificial horizon and directional gyro.

If adequate gyro suction can not be maintained: Initiate VFR or partial panel IFR procedures as appropriate.

Land as soon as practical and investigate cause.

PROPELLER OVERSPEED

**** NOTE **** The propeller defaults to low pitch (high rpm) if oil pressure fails.

If propeller overspeed occurs:

Oil Pressure Check

If there is a low oil pressure condition: Land as soon as practical and investigate cause.

Prepare for a **Power Off Landing**. (Page 3-5)

If overspeed is due to propeller governor malfunction:

Throttle Retard
Propeller Control Aft - Decrease rpm
Airspeed Reduce
Throttle As Required to Remain Below 2650 rpm

Land as soon as possible and investigate cause.

OPEN DOOR IN FLIGHT

If door latches are not secure, the door will trail slightly open and airspeed will be slightly reduced.

To close door in flight:

Airspeed Below 100 mph (87 kt)
Cabin Vents Close
Storm Window Open
Slip Airplane Facing Door Into Wind
Latch Secure

An open door in flight presents no real danger. However, the high level of noise caused by an open door can give concern to passengers and be distracting to the pilot. If unable to close the door in flight, land as soon as practical.

LANDING GEAR FAILURE AND MANUAL GEAR EXTENSION

1.) Prior To Executing Emergency Procedure:

Master Switch Check On
Landing Gear Circuit Breakers Check and Reset as Required

If breakers are reset (closed): Continue with emergency procedure.

2.) If Landing Gear Operates (As Indicated by Position of Manual Operating Handle) But Green (Gear Down - Locked) Lamp Fails to Illuminate:

**** NOTE ****

If this procedure is due to an electrical failure, landing gear position lights will be inoperative.

Landing gear position lights are automatically dimmed when navigation lights are on.

Navigation Lights Check Off
Landing Gear Indicator Light Replace as Required

3.) If Landing Gear Fails to Operate: Initiate the Following Procedure:

Airspeed Below 100 mph (87 kt)
Landing Gear Switch Center "OFF" Position (if equipped)
or "GEAR DOWN LOCKED" Position
Motor Release Arm Disengage and Push Forward Through Full Travel

Allow landing gear to fall.

Emergency Handle Extend Full Length

Rotate handle forward through FULL travel to extend landing gear.

Green light on panel indicates landing gear is down and locked.

**** CAUTION ****

Do not re-engage landing-gear operating motor in flight. To reduce landing gear side loads to a minimum, avoid a crosswind landing and high speed turns while taxiing.

SPIN RECOVERY

**** WARNING ****

The Comanche is certified as a Normal category airplane. Intentional spins are prohibited

Throttle Idle
Ailerons Neutral
Rudder Full Opposite to Direction of Rotation
Control Wheel Briskly Forward Full Travel
Rudder Neutral When Rotation Stops
Control Wheel Back Pressure to Recover From Dive

EMERGENCY DESCENT

1.) Oxygen System Failure:

**** WARNING ****

Time of useful consciousness in the event of oxygen system failure while operating an aircraft at 21,000 feet is nine minutes.

Seat Belt and Harness	Secure
Throttle	Retard
Propeller Control	Full Forward - Increase rpm
Landing Gear	Down Under 150 mph (130 kt)
Airspeed	Maintain Below 150 mph (130 kt)

**** CAUTION ****

A 2,000 to 3,000 foot per minute descent is adequate to answer the emergency with minimal risk of damage to the engine, and discomfort to the passengers.

Consider elevation of terrain on descent. Initiate recovery procedure at 10,000 feet MSL or 2,000 feet AGL as appropriate.

Landing Gear	Retract
Mixture	Enrich
Throttle	Increase Slowly
Propeller Control	Cruise Setting

Adjust altitude and power setting as appropriate and continue flight to destination airport.

2.) Other Emergency:

In the event of an emergency where thermal shock to the engine and passenger discomfort are overridden by other factors (such as a fire that cannot be extinguished) which requires getting the airplane on the ground as quickly as possible, the additional action of rolling the aircraft to a 40 to 45 degree bank and descending in a spiral destroys a large portion of lift and increases rate of descent substantially.

NORMAL PROCEDURES

PA-24-400 * 3600 LBS GROSS WEIGHT

AIRSPEEDS FOR SAFE OPERATION

The following airspeeds are those which are significant for safe operation of the airplane. The figures are for a standard airplane flown at gross weight under standard sea-level conditions.

V _A - Design Maneuvering Speed / Turbulent Air Penetration Speed	160 mph	139 kt
V _{APP} - Final Approach to Landing Speed	90 mph	78 kt
V _{FE} - Flap Extension Speed	125 mph	108 kt
V _{FE} - Recommended	100 mph	87 kt
V _{LO} - Landing-Gear Operation Speed	150 mph	130 kt
V _{LO} - Recommended	125 mph	108 kt
V _{NE} - Never Exceed Speed	250 mph	217 kt
V _R - Rotation Speed (W/Zero Degrees of Flap)	90 mph	78 kt
V _{SO} - Stall Speed (Power Off - Full Flaps and Gear Extended)	68 mph	59 kt
V _{SI} - Stall Speed (Power Off - Clean)	78 mph	68 kt
V _X - Best Angle-of-Climb Speed (At Sea Level)	92 mph	80 kt
V _Y - Best Rate-of-Climb Speed (At Sea Level)	120 mph	104 kt
Best En Route Rate-of-Climb Speed	138 mph	120 kt
Demonstrated Crosswind Component	20 mph	17 kt

NOISE ABATEMENT

Environmental concerns require that measures be taken to minimize the effect of airplane noise around airports or when operating near the ground. The following is a general guideline.

Many airports have published noise-abatement procedures. Pilots should become familiar with these procedures and conform to them. Pilots should also avoid noise-sensitive areas such as recreational and residential areas.

VFR departure from, and approach to an airport should be made so as to avoid prolonged flight at an altitude lower than 2,000 ft AGL. This procedure would only apply where weather permits. Other factors such as conflict with instructions from Air Traffic Control or the pilot's responsibility to see and avoid other aircraft will override this procedure.

No determination has been made by the Federal Aviation Administration as to whether the noise level of the Comanche is or should be acceptable by any standard for operation at, into, or out of any airport.

PREFLIGHT CHECK

1.) Cabin:

Control Wheel Release Restraint
Avionics Master (Or Radios) Check Off
Ignition Check Off
Landing Gear Selector Down
Master Switch On
Fuel Quantity Gauge Check Each Tank
Wing Flaps Lower
Master Switch Off
Oxygen Quantity (If Equipped and Required) Adequate
Required Papers and Navigation Charts On Board

WALK AROUND INSPECTION

Exterior Check for Damage and Evidence of Fluid Leaks

2.) Right Wing:

Control Surfaces Check for Interference
Wing Tip and Navigation Light Check
Fuel Tanks Check Supply Visually - Adjust and Secure Caps
Fuel Tank Vents and Overflow Drains Open
Tie Down and Wheel Chock Remove
Main Gear Strut Proper Inflation 2-3/4 in
Tire Check for Wear and Proper Inflation

3.) Nose Section:

Windshield Clean
Engine Compartment Check for Fuel and Oil Leaks
Alternator Belt Check Tension
Brake Fluid Check Level
Oil Check Level
Dip Stick and Oil Inspection Cover Secure
Air Inlets Clear
Propeller Check for Nicks
Area Around Propeller Clear of Debris
Nose Gear Strut Proper Inflation 2-3/4 in
Tire Check for Wear and Proper Inflation
Cowling Secure

WALK AROUND INSPECTION (Cont.)

4.) Left Wing:

Fuel Tanks Check Supply Visually - Adjust and Secure Caps
Fuel Tank Vents and Overflow Drains Open
Tie Down and Wheel Chock Remove
Main Gear Strut Proper Inflation 2-3/4 in
Tire Check for Wear and Proper Inflation
Stall Warning Transmitter Switch Free
Pitot Head Cover Removed - Hole Clear
Wing Tip and Navigation Light Check
Control Surfaces Check for Interference

5.) Fuselage and Empennage:

Static Vents Holes Clear
Control Surfaces Check for Interference
Navigation Lights Check
Antennas Check
Dorsal Fin Ventilating Air Inlet Clear
Tie Down Remove
Baggage Door Secure

**** WARNING **** In winter insure that all surfaces are free of ice, frost and snow.

PREFLIGHT CHECK FOR NIGHT OPERATION

If operation of aircraft extends into night:

Master Switch On
Navigation and Landing Lights Check
Panel and Cabin Lights Check
Master Switch Off
Flashlight On Board

BEFORE STARTING ENGINE

Seats Erect
Belts and Harness Fastened and Adjusted
Brakes Set
Fuel Strainer Drain Sample (5 Seconds) and Check Each Tank
Fuel Selector Desired (Inboard Main) Tank
Circuit Breakers Check In
Avionics Master (Or Radios) Check Off
Air Vents, Heater and Defroster As Desired
Alternate Static Source (If Installed) Closed
Controls Free and Correct
Door Latched
Cowl Flaps Open

STARTING ENGINE WHEN COLD

Throttle 1/2 in Open
Propeller Control Full Forward - Increase rpm
Master Switch On
Electric Fuel Pump On
Mixture Full Rich
Fuel Flow Meter Indicates 5 gpm Flow (Engine is Primed)
Mixture Idle Cut-Off

**** CLEAR PROP ****

Starter Engage (Maximum 15 Seconds)
Mixture Advance Slowly to Full Rich
Throttle Adjust
Oil Pressure Check

**** CAUTION ****

If oil pressure is not indicated within 30 seconds, stop engine and determine cause of trouble.

STARTING ENGINE WHEN HOT

Throttle Full Forward - Open
Propeller Control Full Forward - Increase rpm
Master Switch On
Electric Fuel Pump On
Mixture Full Rich to Purge Lines - Then Idle Cut-Off
Electric Fuel Pump Off

**** CLEAR PROP ****

Starter Engage (Maximum 15 Seconds)
Throttle Retard
Mixture Advance to Full Rich
Oil Pressure Check

STARTING ENGINE WHEN FLOODED

Throttle Full Forward - Open
Propeller Control Full Forward - Increase rpm
Master Switch Check On
Mixture Idle Cut-Off
Electric Fuel Pump Off

**** CLEAR PROP ****

Starter Engage (Maximum 15 Seconds)
Throttle Retard
Mixture Advance to Full Rich
Oil Pressure Check

**** CAUTION ****

Starter manufacturers recommend that cranking periods be limited to thirty seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

STARTING WITH EXTERNAL POWER SOURCE

(For an aircraft that is equipped with an auxiliary power receptacle.)

Master Switch
All Electrical Equipment Check Off
Alternate Battery Terminals Check Off
External Power Cable Connect
..... Insert in Fuselage

Initiate appropriate starting procedure.

Throttle Lowest Possible rpm
Oil Pressure Check
External Power Cable Disconnect From Fuselage
Master Switch On
Ammeter Check for Normal Charging

**** NOTE **** Do not attempt flight if battery is not charging properly.

BEFORE TAXIING

Rotating Beacon On
Electric Fuel Pump Off
Wing Flaps Retract
Wing Flap Selector Center "Off" Position
Landing Gear Indicator Light Check Green
Avionics Master (Or Radios) On
Radio Transfer Switches As Required

Flight Instruments:

Artificial Horizon Check Erect and Set
Rate-of-Climb Indicator Check Zero
Altimeter Adjust to Local Barometric Setting and Verify
Field Elevation Reading is Within Acceptable Limits
Clock Wind and Set

**** NOTE **** If flight plan anticipates instrument meteorological conditions:

Pitot Heat On (Check Ammeter Discharge) Then Off

TAXIING

Taxi Area Clear
Throttle Apply Slowly
Brakes Check
Steering Check

ENGINE RUN UP

Brakes Set
Warm Up 2 to 4 Minutes at 800 to 1200 rpm
Mixture Check Rich

** NOTE **

Above 5,000 ft density altitude, mixture should be leaned for takeoff until, and only until, any engine roughness is eliminated.

Propeller Control Check Full Forward - Increase rpm
Throttle 2000 rpm

** CAUTION **

Do not exceed 2200 rpm in a routine static test.

Manifold Pressure 15 in Hg
Magnetos Check Left and Right
Maximum Drop - 175 rpm
Maximum Difference - 50 rpm

** NOTE **

Engine operation on one magneto should not exceed 10 seconds.

Vacuum 5.0 in Hg + .1 or - .2 in
Ammeter Check Charging
Oil Temperature Check
Oil Pressure Check Green
Propeller Cycle as Needed to Circulate Oil and Operate Governor
Normal Drop - 300 to 400 rpm

** CAUTION **

Do not exceed a 500 rpm drop for more than a few seconds at a time.

Throttle Retard

BEFORE TAKEOFF

Fuel Selector Leave on Previously Selected (Inboard Main) Tank
Electric Fuel Pump On
Wing Flaps Set for Takeoff (Zero to 15 Degrees as Desired)
Trim Tab Set for Takeoff (Neutral Position for Most Operations)
Directional Gyro Set Heading
Engine Gauges Normal
Strobe Lights (If Installed) On

** NOTE **

Engine is warm enough for takeoff when throttle can be opened without the engine faltering.

TAKEOFF

Throttle Open Using a Smooth, Steady Movement
Accelerate to V_R 90 mph (78 kt)
Control Wheel Back Pressure to Rotate to Climb Attitude

**** Establish Positive Rate of Climb ****

Area Around Landing Gear Manual Operating Lever Clear
Brakes Tap
Landing Gear Retract
Landing Gear Indicator Amber
Climb Out at V_Y 120 mph (104 kt)

1.) Maximum Performance Climb:

Power Full Throttle and Maximum rpm

2.) Reduced Power Climb:

Full Power Until 1000 ft AGL
Reduce Power to Climb Setting 24-24
Continue Climb at Best En Route Speed 138 mph (120 kt)
Cylinder Head Temperature Maintain in Green

SHORT FIELD TAKEOFF AND OBSTACLE CLEARANCE

Wing Flaps 15 Degrees
Trim Tab Set for Takeoff
Brakes Partial Power Before Brake Release

Release brakes and continue opening throttle using a smooth, steady movement.

Accelerate to 75 to 85 mph (65 to 74 kt) depending on airplane weight.

Control Wheel Back Pressure to Rotate to Climb Attitude

After breaking ground:

Accelerate to V_X 92 mph (80 kt)

Climb past obstacle.

Accelerate to V_Y 120 mph (104 kt)
Landing Gear Retract
Wing Flaps Retract
Power As Required Above 1000 ft AGL
Continue Climb at Best En Route Speed 138 mph (120 kt)

SOFT FIELD TAKEOFF

Wing Flaps 15 Degrees
Trim Tab Set for Takeoff
Control Wheel Full Back Pressure to Relieve Airplane Weight
Throttle Apply Slowly

** NOTE **

Once breakaway is achieved and taxi has begun, maintain airplane momentum to avoid becoming bogged down in soggy terrain.

Accelerate until airplane breaks ground. After breaking ground:

Stay in Ground Effect and Accelerate to V_X 92 mph (80 kt)
Landing Gear Retract

** Establish Positive Rate of Climb **

Accelerate to V_Y 120 mph (104 kt)
Wing Flaps Retract
Power As Required Above 1000 ft AGL
Continue Climb at Best En Route Speed 138 mph (120 kt)

** NOTE **

The figures for V_X and V_Y are based on a 3600 pound gross weight. Both V_X and V_Y decrease approximately one mph for every 100 pounds that the airplane is below maximum allowable gross weight.

V_X increases approximately 0.5 mph for each 1,000 foot increase in density altitude above mean sea level.

V_Y decreases approximately one mph for each 1,000 foot increase in density altitude above mean sea level.

CLIMB

Best Angle-of-Climb Speed (V_X) 92 mph (80 kt)
Best Rate-of-Climb Speed (V_Y) 120 mph (104 kt)
Best En Route Rate-of-Climb Speed 138 mph (120 kt)
Cylinder Head Temperature Maintain in Green
Mixture Adjust With Ascent
Electric Fuel Pump Off at Desired Altitude - Check Fuel Pressure

** NOTE **

Best en route rate-of-climb speed decreases approximately one mph for each 1,000 foot increase in density altitude above mean sea level.

When en route below 5,000 feet MSL, always return mixture to full rich before increasing power settings. Above 5,000 feet MSL, adjust mixture as required as over enriching mixture at high altitude will result in engine roughness.

CRUISING

**** NOTE **** Operation above Flight Level 210 is not approved.

Power Set Per Power Table in Section 5 (Performance)
Normal Maximum Cruise Power 75 Percent
Mixture Adjust to EGT Gauge

100 Degrees Fahrenheit Rich of Peak EGT at 75% Power
50 Degrees Fahrenheit Rich of Peak EGT at 65% Power

Fuel Tanks Rotate Outboard Each Half Hour, Inboard Each Hour

**** WARNING ****

Auxiliary fuel may be used only in level cruise flight

Oxygen is recommended when operating aircraft above 10,000 feet MSL, and required above 12,500 feet MSL. No smoking with oxygen in use.

Engine Gauges Monitor

DESCENT

Propeller Cruise rpm
Manifold Pressure 15 to 17 in Hg
Airspeed Maintain Cylinder Head Temperature in Green
Mixture Enrich With Descent

APPROACH AND LANDING

Seats Erect
Belts and Harness Fasten and Adjust
Electric Fuel Pump On
Fuel Selector Desired (Inboard Main) Tank
Area Around Landing Gear Manual Operating Lever Clear
Landing Gear Selector Down Under 125 mph or 108 kt (Recommended)
Landing Gear Indicator Green
Wing Flaps As Required Under 100 mph or 87 kt (Recommended)
Cowl Flaps Open
Trim Tab Set for Landing
Mixture Enrich as Required
Propeller Control 2400 rpm
GUMP Check On Final
V_{APP} 90 mph (78 kt)

**** NOTE ****

If crosswind component is above 12 kts, use partial or no wing flaps and above normal approach speed.

SHORT FIELD LANDING

Airspeed on Final Coordinate to 90 mph (78 kt)
Throttle Carry Power Until Flare
Wing Flaps Retract Immediately After Touchdown
Control Wheel Full Back Pressure to Put Airplane Weight on Main Landing Gear
Brakes Apply Heavily

SOFT FIELD LANDING

Airspeed on Final Coordinate to 90 mph (78 kt)
Throttle Carry Power Until Flare
Wing Flaps Leave Extended to Maximize Wing Lift
Control Wheel Back Pressure to Relieve Airplane Weight
Brakes Utilize Field Conditions to Slow Airplane, Minimum Braking Application

** NOTE **

The Comanche has been demonstrated safe when operating in and out of rough grass surfaces.

GO AROUND

Throttle Full Forward - Open
Control Wheel Rotate to Climb Attitude

**** Establish Positive Rate of Climb - Move to Right of Runway ****

Area Around Landing Gear Manual Operating Lever Clear
Landing Gear Retract
Landing Gear Indicator Amber
Climb Out at V_Y 120 mph (104 kt)
Wing Flaps Retract
Power As Required Above 1000 ft AGL
Continue Climb at Best En Route Speed 138 mph (120 kt)

AFTER LANDING

(Clear of Runway)

Wing Flaps Retract
Wing Flap Selector Center "Off" Position
Electric Fuel Pump Off
Strobe Lights (If Installed) Off

ENGINE SHUTDOWN

Idle Until a Decided Decrease in CHT is Noted
Tune Comm Radio to 121.5 Check ELT for False Operation
Rotating Beacon Off
Avionics Master (Or Radios) Off
Throttle 1800 rpm
Clear Plugs 15 to 20 Seconds
Throttle Reduce to 1200 rpm
Mixture Idle Cut-Off
Magnetos Off
Master Switch Off

PARKING AND MOORING

Control Wheel Secure Restraint
Wheel Chocks In Place
Tie Downs Secure
Pitot Head Cover
Cabin Fresh Air Inlets Closed
Storm Window Secure
Doors Locked

PERFORMANCE

PA-24-400 * 3600 LBS GROSS WEIGHT

INTRODUCTION

The performance graphs in this section were prepared by Piper Aircraft in accordance with FAA regulations. Test data is corrected to ICAO Standard Day conditions. The information shown is unfactored and does not make any allowance for variations in pilot proficiency and/or mechanical condition of the aircraft.

Effects of conditions not considered in the charts such as a grass runway surface on takeoff and landing performance, or the effect of winds aloft on cruise and range performance must be evaluated by the pilot. Range and endurance can be greatly affected by improper leaning. In-flight fuel flow and quantity checks are therefore recommended.

FLIGHT PLANNING EXAMPLE

The following sample flight problem utilizes information derived from the various charts in this section to determine the predicted performance data for a typical flight. Many of the charts contain an example to show how they are used.

** WARNING **

Performance information is not valid if readings from the charts are obtained by extrapolation beyond the limits shown on the charts.

1.) Aircraft Loading:

Airplane gross weight and center of gravity may be determined by utilizing information provided in Section 6 (Weight and Balance) of this Manual. The following has been provided for the purpose of computing this flight planning example.

Takeoff Weight 3400 lbs
Center of Gravity Within Approved Limits
Usable Fuel 100 US gal/600 lbs

2.) Takeoff:

Takeoff Conditions:

Temperature 60 Degrees F. (15 Degrees C.)
Pressure Altitude 2000 ft MSL
Runway Length Available 4100 ft
Runway Headwind Component 10 kt

When consulting the Takeoff Performance chart it is necessary to keep in mind that the distances shown are based on use of the short field technique. Ground run distance can be expected to be approximately twice the distance shown when making a standard takeoff.

Ground Run (Figure 5-06) 900 ft
Total Distance to Clear a 50 ft Obstacle (Figure 5-07) 1400 ft
Minimum Safe Runway Length Required for Aborted Takeoff 3000 ft

FLIGHT PLANNING EXAMPLE (Cont.)

3.) Climb:

Planned Cruise Altitude 8000 ft MSL
Average Rate of Climb (Figure 5-08) 1350 ft/min
Time to Climb 4.5 min
Fuel Consumption Rate (Figures 5-03 & 5-04) 30.5 gph/183.0 pph
Fuel Consumption 2.3 US gal/14.0 lbs

4.) Cruise:

Cruise Conditions:

Pressure Altitude 8000 ft MSL
Temperature 35 Degrees F. (02 Degrees C.)
Expected Headwind Component En Route None

** NOTE **

Fuel consumption rates are based on best economy mixture setting.

Power Setting 65 Percent
TAS (And Ground Speed) (Figure 5-10) 202 mph 176 kt
Time to Cruise 150 min
Fuel Consumption Rate (Figures 5-03 & 5-04) 18.0 gph/108.0 pph
Fuel Consumption 45.0 US gal/270.0 lbs

5.) Descent:

Average Rate of Descent (Each Inch Decrease in MAP = 100 fpm Descent Rate) . 700 ft/min
Time to Descend 5.7 min
Fuel Consumption Rate (Figure 5-03 & 5-04) 13.5 gph/81.0 pph
Fuel Consumption 1.4 US gal/8.0 lbs

6.) Landing:

Landing Conditions:

Temperature 60 Degrees F. (15 Degrees C.)
Pressure Altitude 4000 ft MSL
Runway Length 5200 ft
Runway Headwind Component 10 kt

When consulting the Landing Performance chart it is necessary to keep in mind that the distances shown are based on use of the short field technique with maximum braking effort. Ground roll distance can be expected to be approximately twice the distance shown on the chart when making a standard landing.

Landing Weight 3108 lbs
Ground Roll (Figure 5-13) 960 ft
Total Distance to Clear a 50 ft Obstacle (Figure 5-14) 1580 ft

FLIGHT PLANNING EXAMPLE (Cont.)

7.) Flight Summary:

Total Flight Time 160 min
Total Range 536 sm
Total Fuel Required 48.7 US gal/292 lbs

FLIGHT PLANNING INFORMATION SUPPLEMENT

Takeoff and landing performance is of primary interest in operating an aircraft because it defines the runway length requirements. In addition to the importance of proper piloting technique, any factor which affects the velocity or acceleration during the takeoff run will affect the takeoff distance. Likewise, any factor which affects the landing velocity or deceleration during the landing roll will affect landing distance. Because not all factors affecting takeoff and landing performance are included in the accompanying charts, the following information is provided.

1.) Factors Addressed in the Performance Charts:

- A.) Ambient Temperature
- B.) Pressure Altitude
- C.) Gross Weight
- D.) Headwind Component

Runway surface: paved, level, dry.

2.) Factors Not Addressed in the Performance Charts:

Percent increase in distance required
for ground roll and total
distance over a 50 ft obstacle.

**** NOTE **** Factors are cumulative and must be added.

A.) Runway Surface:

	Takeoff	Landing
Dry Grass (Short - Less Than 5 in)	20%	20%
Dry Grass (Tall - Greater Than 5 in)	25%	30%
Wet Grass (Short)	25%	30%
Wet Grass (Tall)	30%	40%
Soft Ground or Deep Snow	25% +	25% +

B.) Runway Slope: (Each 2 Degrees) (Uphill) 10% (Downhill) 10%

C.) Tailwind Component: (Equal to 10% of Liftoff Speed) 20% 20%

**** NOTE ****

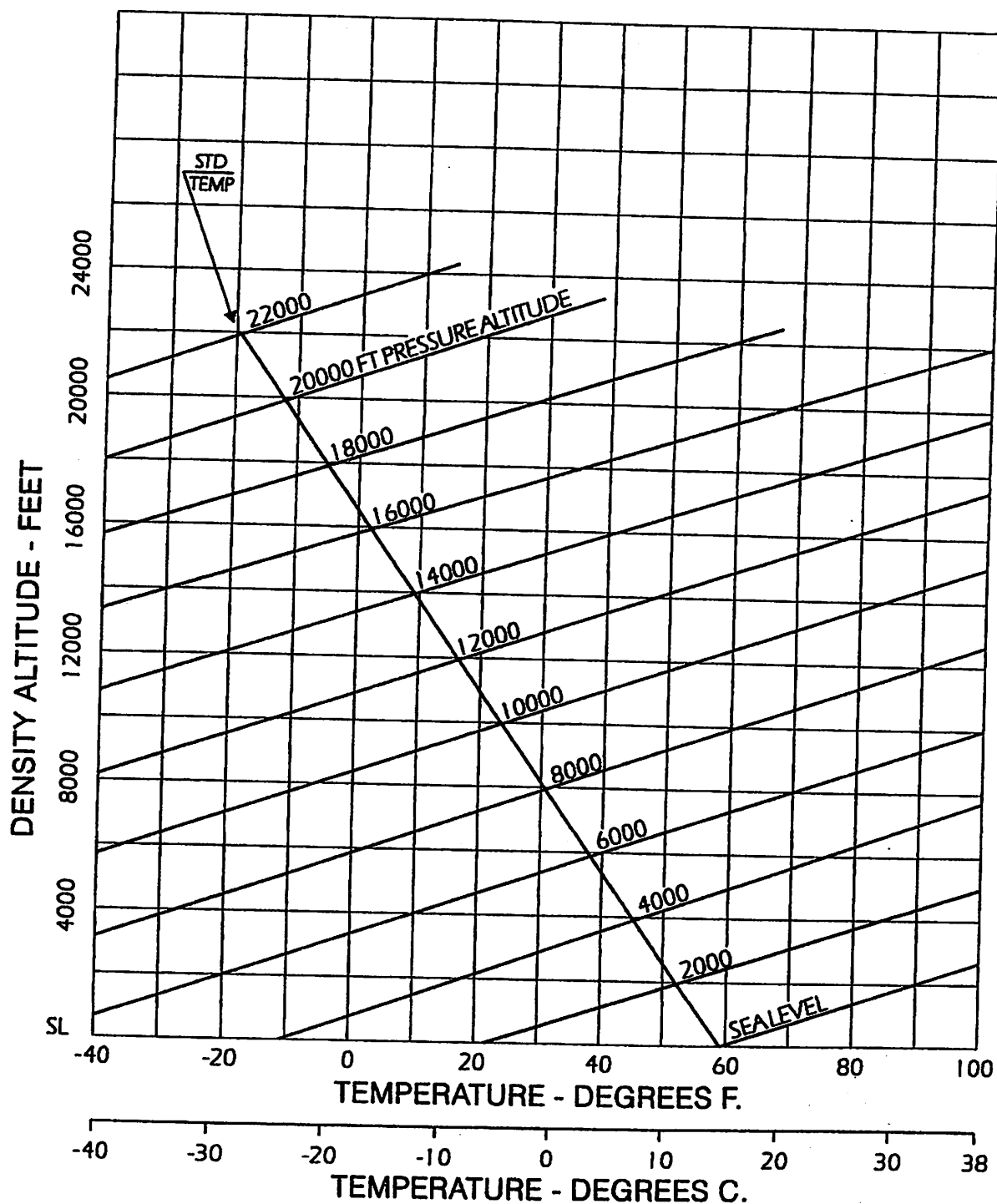
High humidity will reduce engine power as much as 10% and increase takeoff run proportionally. Numerous variables prevent the precise measurement of the effects of runway surface on rolling resistance. Figures related to runway surface are estimates, and can deviate vastly. A wet and/or icy runway, together with the effects of hydroplaning will greatly reduce braking effectiveness and increase stopping distance up to as much as six times normal. Tall grass, soft ground and snow all increase rolling resistance and shorten landing roll, but no set figures are given for their effect.

ALTITUDE CONVERSION CHART

**** NOTE ****

THIS CHART SHOULD BE USED TO DETERMINE DENSITY ALTITUDE FROM EXISTING TEMPERATURE AND PRESSURE ALTITUDE CONDITIONS.

FOR USE WITH THE ACCOMPANYING PERFORMANCE CHARTS.



TEMPERATURE CONVERSION CHART

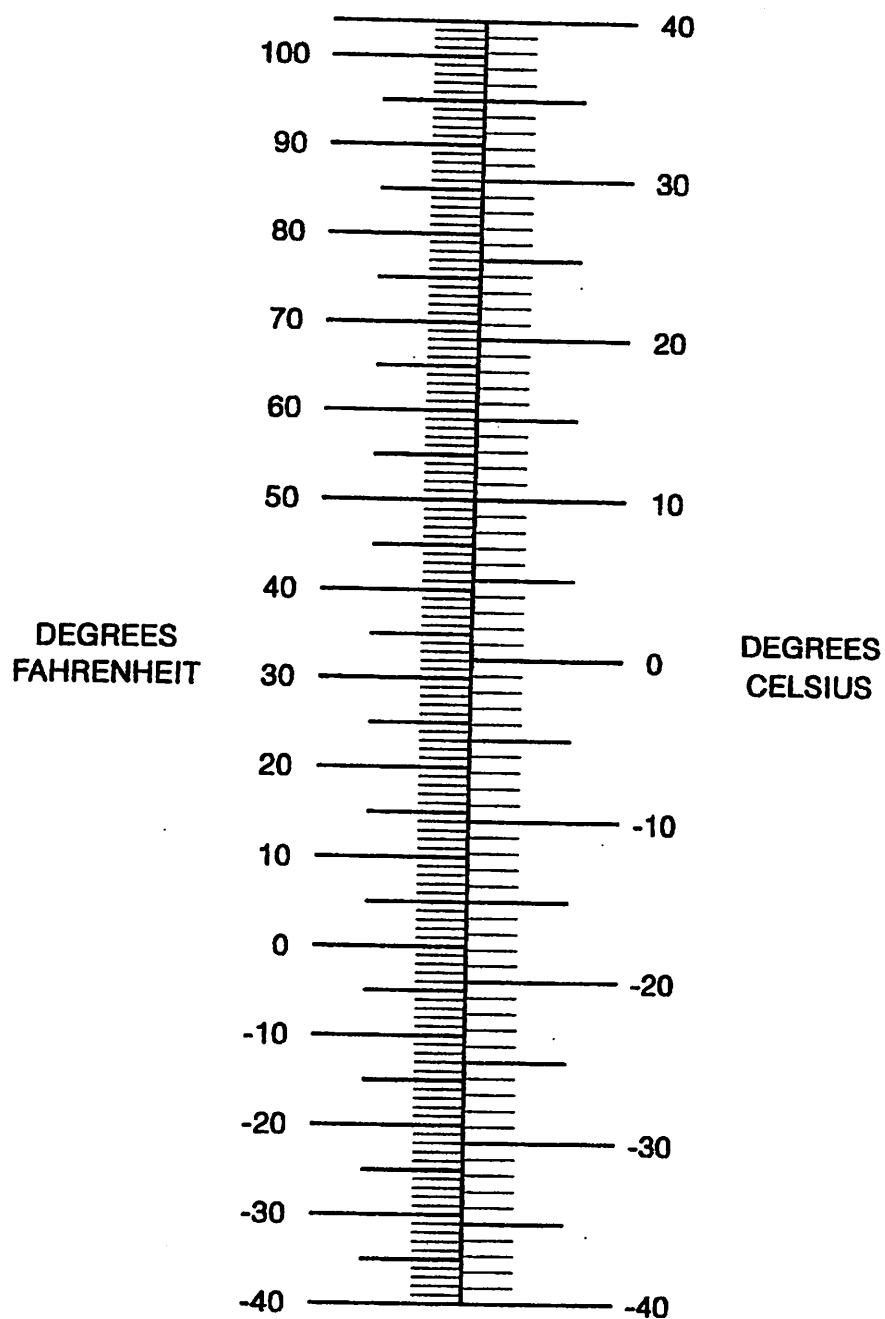


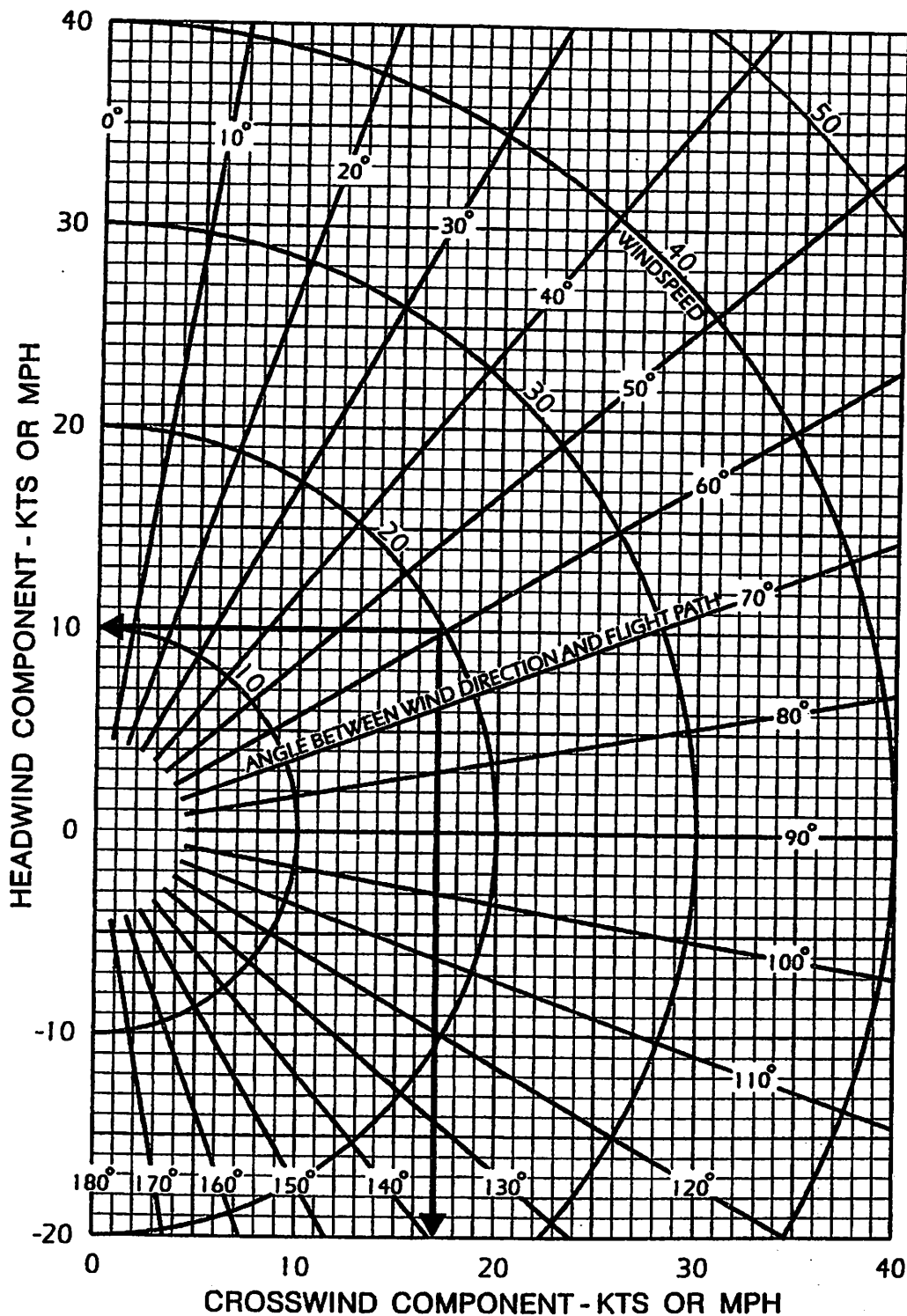
FIGURE 5.1A

CROSSWIND COMPONENT GRAPH

**** NOTE **** DEMONSTRATED CROSSWIND COMPONENT IS 17 KT (20 MPH)

EXAMPLE DEPICTED:

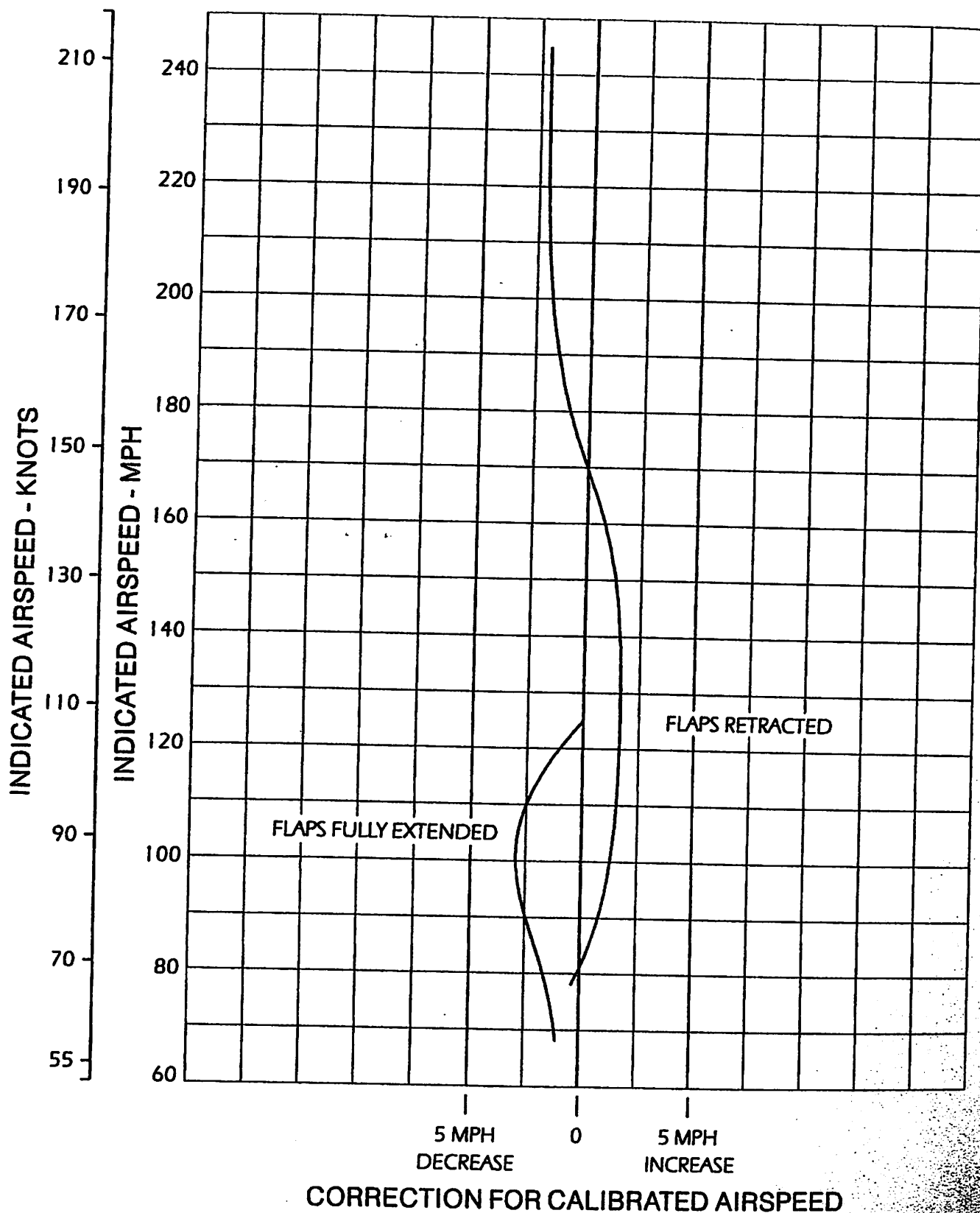
Windspeed:	20 Kt
Angle Between Wind Direction and Flight Path:	60 Degrees
Headwind Component:	10 Kt
Crosswind Component:	17 Kt



AIRSPEED CALIBRATION

PRIMARY PITOT-STATIC SYSTEM

STANDARD PITOT- STATIC HEAD



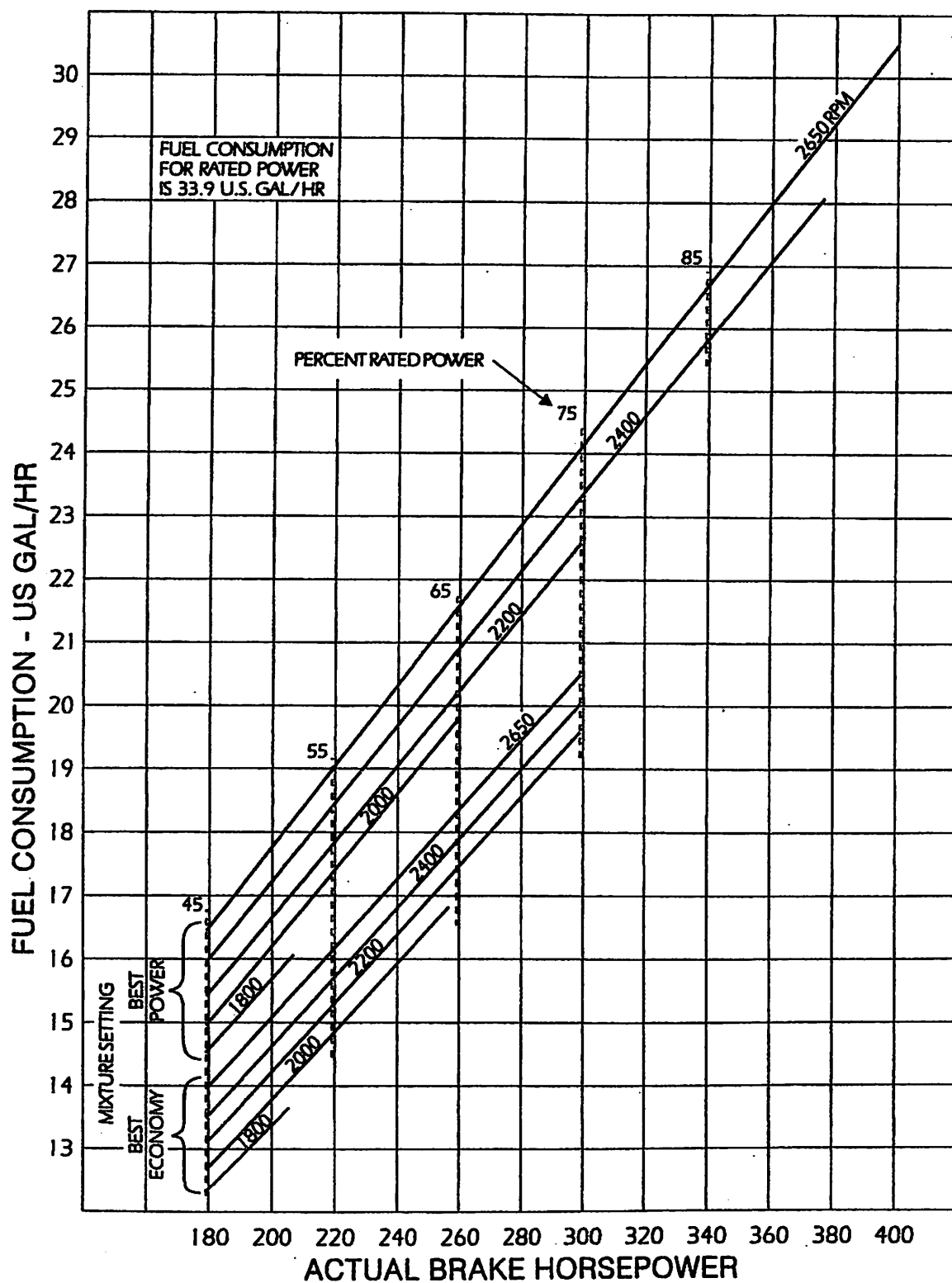
PART THROTTLE FUEL CONSUMPTION

LYCOMING IO-720-A SERIES ENGINE
FUEL INJECTOR: BENDIX RSA-10AD1
STANDARD SEA LEVEL CONDITIONS

COMPRESSION RATIO: 8.7 TO 1
MINIMUM FUEL GRADE: 100/130
MIXTURE: AS NOTED

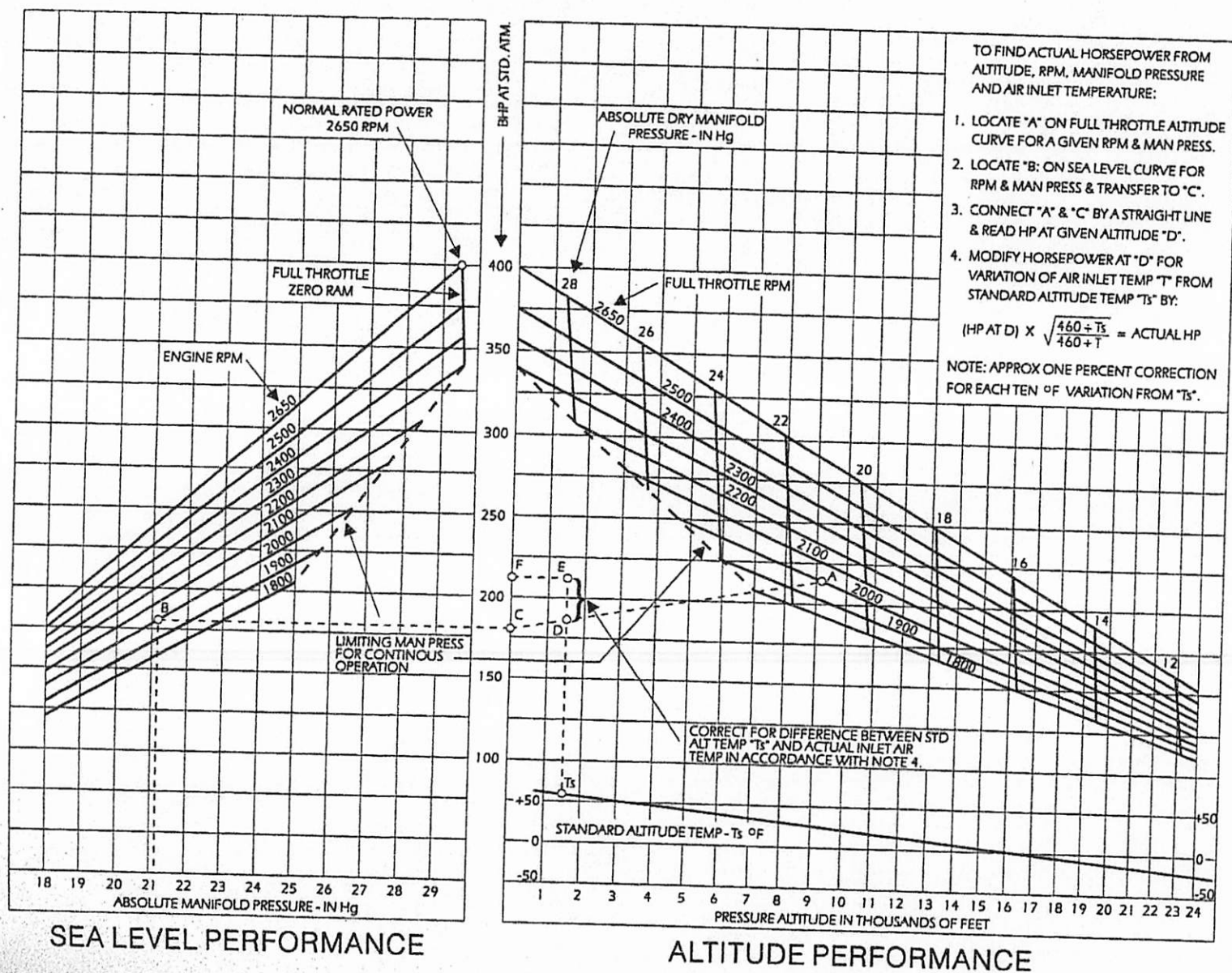
**** NOTE ****

TO OBTAIN FUEL CONSUMPTION AT ALTITUDE, REFER TO ACCOMPANYING
ALTITUDE PERFORMANCE CURVE.



LYCOMING IO-720-A SERIES ENGINE
FUEL INJECTOR: BENDIX RSA-10AD1
STANDARD ATMOSPHERE

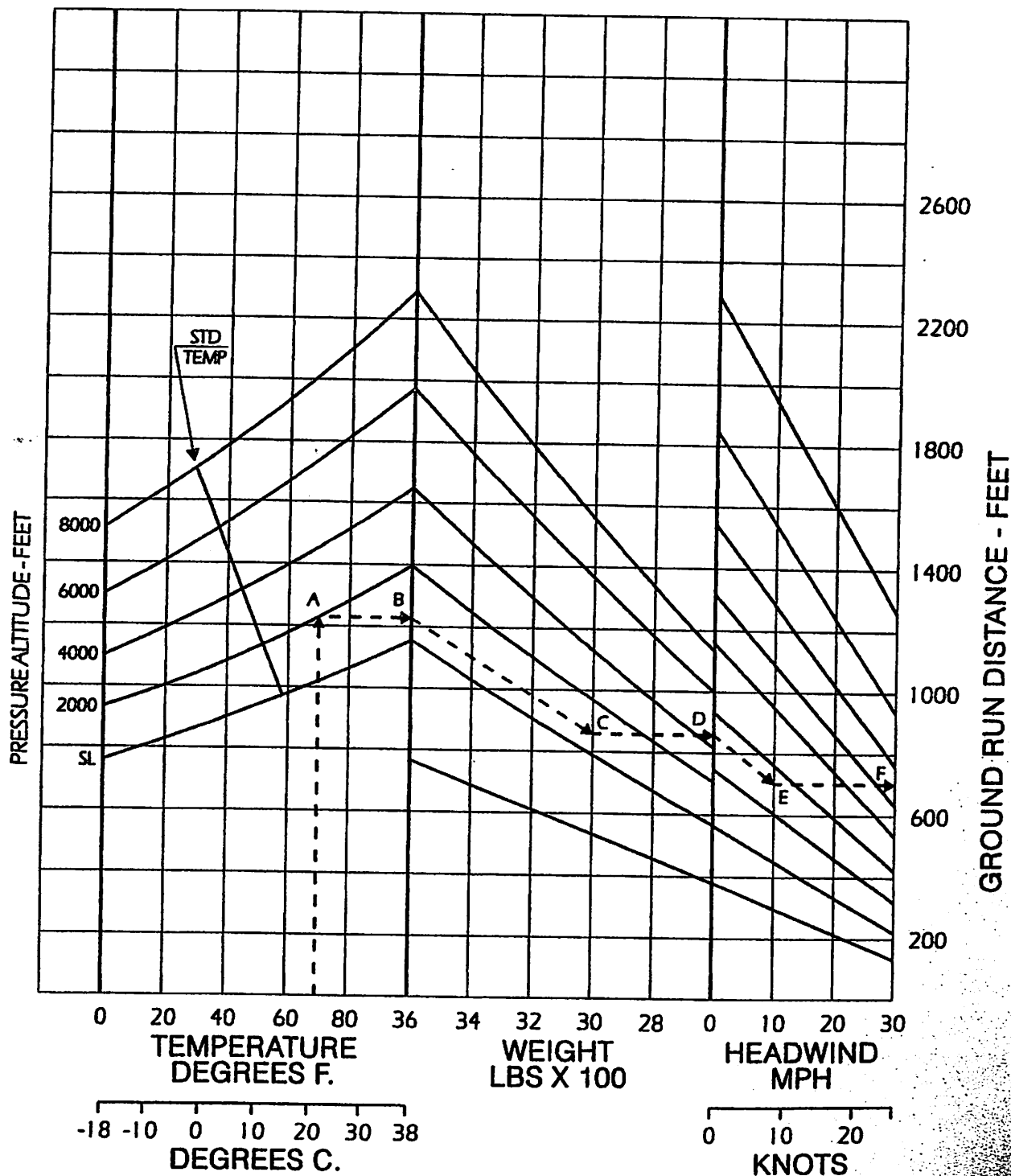
COMPRESSION RATIO: 8.7 TO 1
MINIMUM FUEL GRADE: 100/130
MIXTURE: BEST POWER



TAKEOFF GROUND RUN DISTANCE

WING FLAPS: 15 DEGREES
RUNWAY SURFACE: PAVED, LEVEL, DRY

FULL THROTTLE AND MAX RPM
TAKEOFF SPEED = 80 MPH IAS



TAKEOFF DISTANCE OVER A 50 FT OBSTACLE

WING FLAPS: 15 DEGREES
RUNWAY SURFACE: PAVED, LEVEL, DRY

FULL THROTTLE AND MAX RPM
ATTAIN 100 MPH IAS AT 50 FEET

**** NOTE ****

FIGURES SHOWN IN THIS CHART WERE PREPARED IN ACCORDANCE WITH CAR 3.84

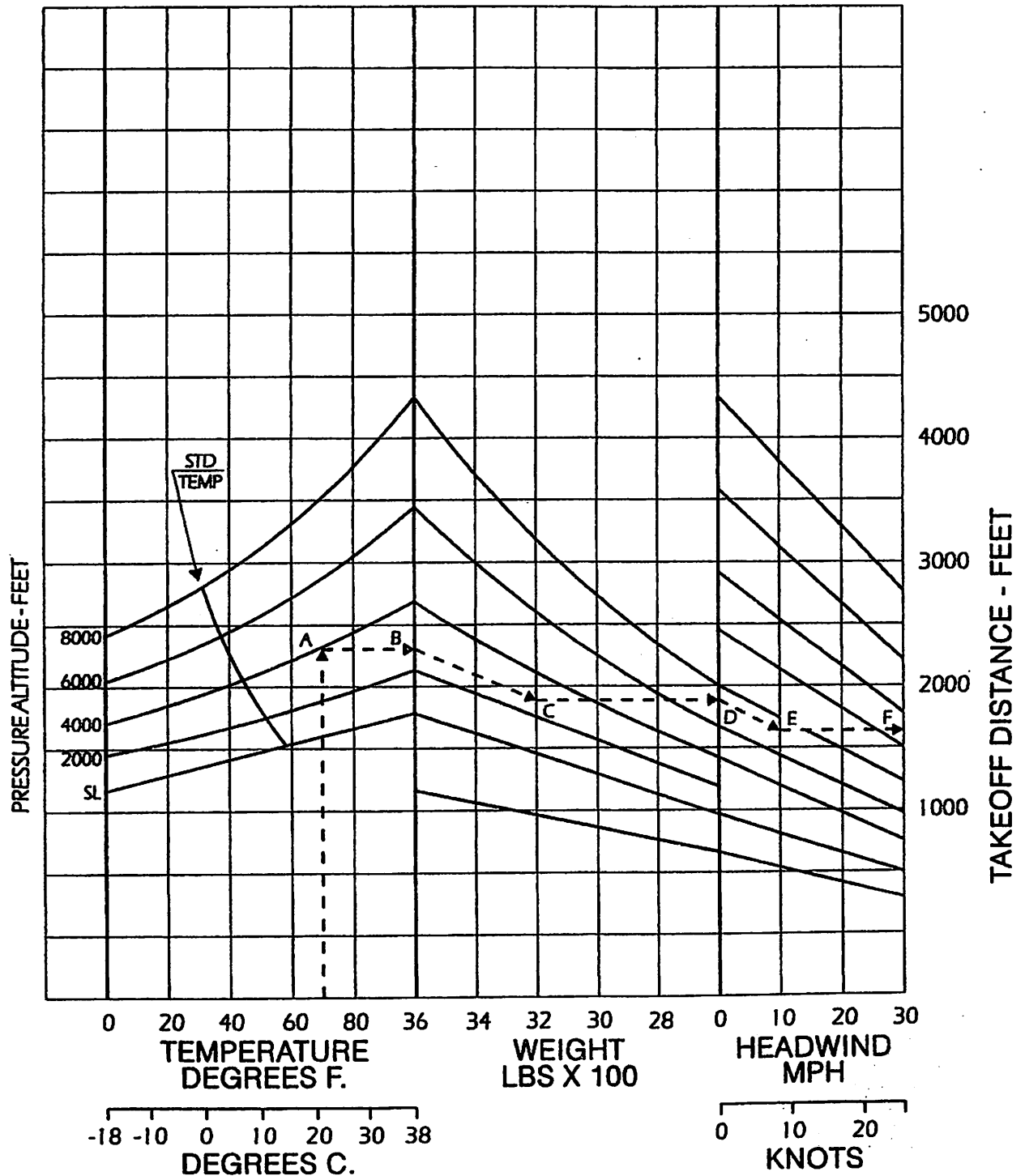
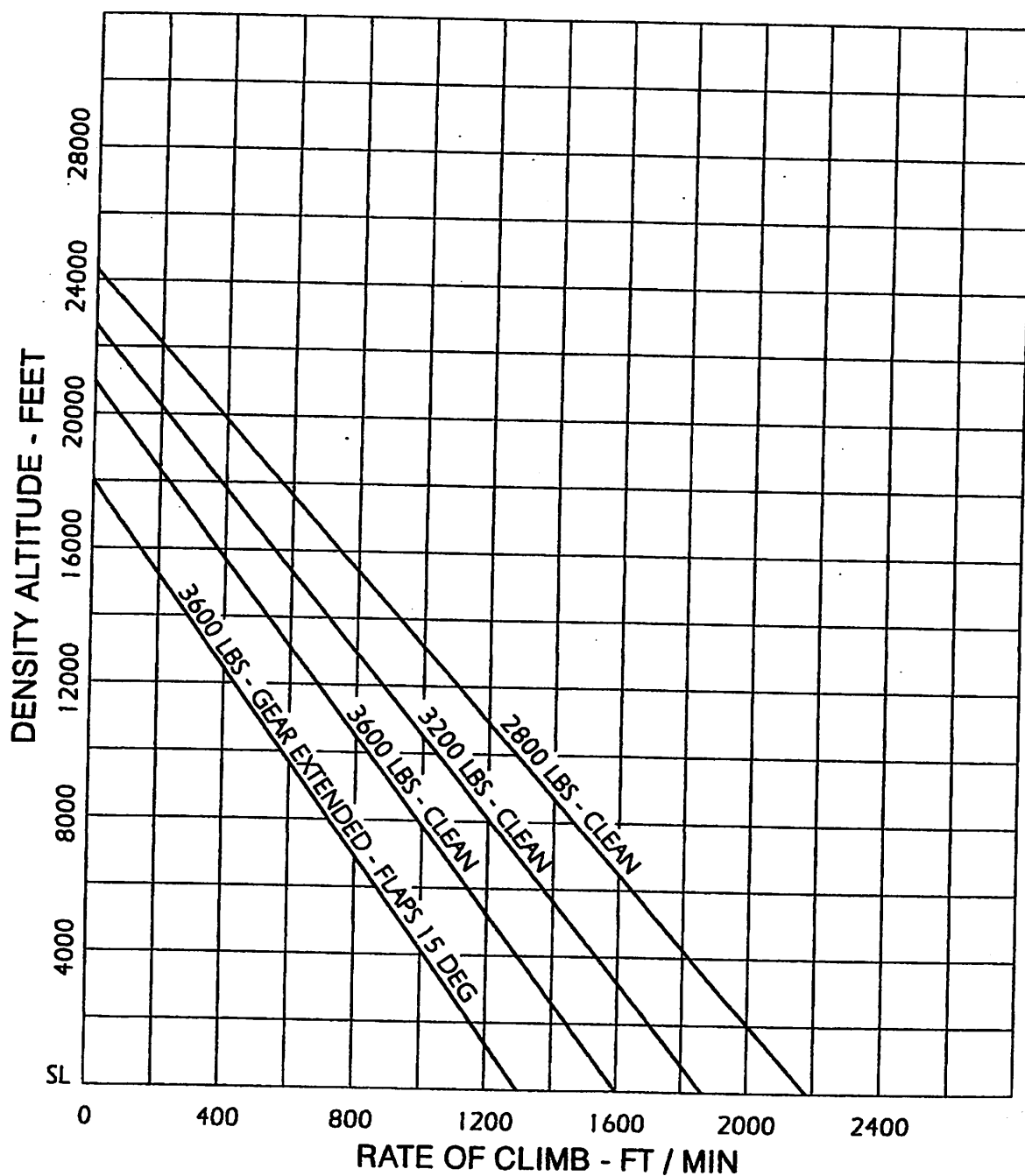


FIGURE 5-07

RATE OF CLIMB VS DENSITY ALTITUDE

LANDING GEAR: AS SHOWN
FULL THROTTLE AND MAX RPM
WING FLAPS: AS SHOWN

MIXTURE: LEAN FOR SMOOTH OPERATION
OPTIMUM AIRSPEED
COWL FLAPS OPEN



V_X AND V_Y VS DENSITY ALTITUDE

LANDING GEAR: AS SHOWN
FULL THROTTLE AND MAX RPM
WING FLAPS: AS SHOWN

MIXTURE: LEAN FOR SMOOTH OPERATION
GROSS WEIGHT: 3600 POUNDS
COWL FLAPS OPEN

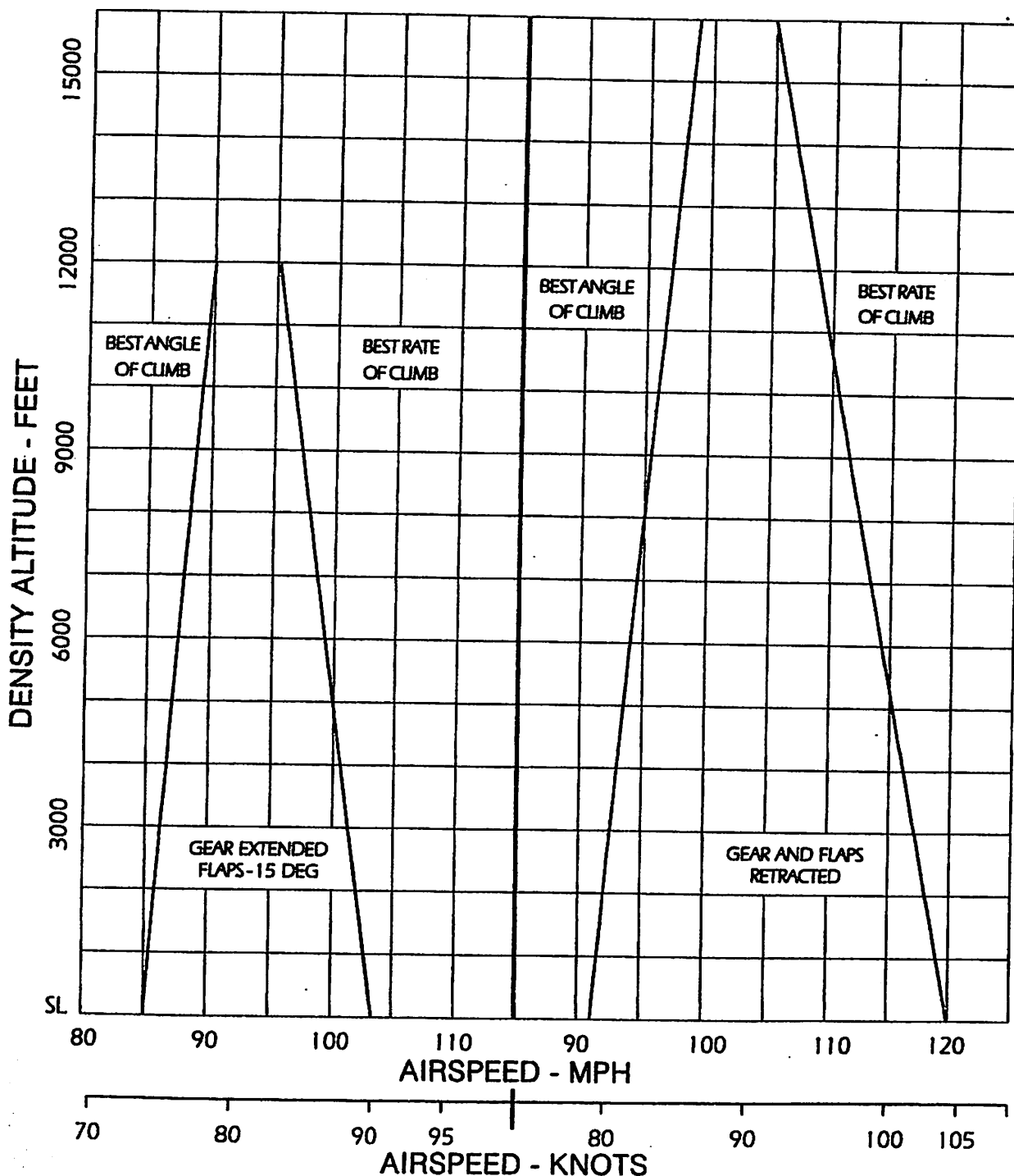
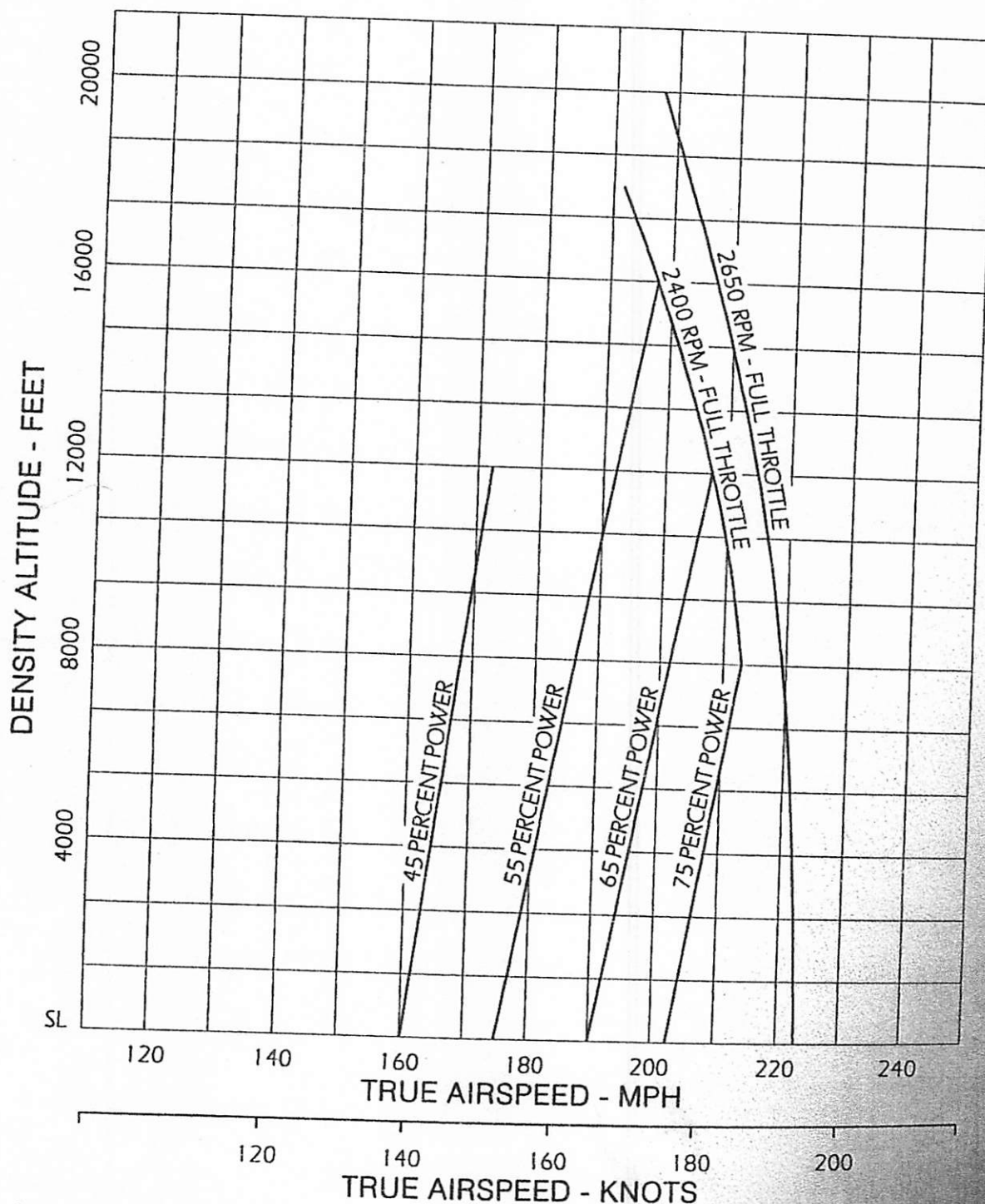


FIGURE 5-09

TRUE AIRSPEED VS DENSITY ALTITUDE

GROSS WEIGHT: 3600 POUNDS
GEAR AND WING FLAPS RETRACTED

MIXTURE: BEST POWER CRUISE
COWL FLAPS CLOSED



RANGE PROFILE

INITIAL FUEL LOAD: AS SHOWN
WEIGHT: 3600 POUNDS AT START

GEAR AND FLAPS RETRACTED
MIXTURE: BEST ECONOMY CRUISE

**** WARNING ****

FIGURES SHOWN IN THIS CHART GIVE NO CONSIDERATION TO WIND OR NAVIGATIONAL ERRORS.
RANGE INCLUDES AN ALLOWANCE FOR FUEL USED IN START, TAXI, TAKEOFF, CLIMB AND
DESCENT PLUS 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER (V_{IMR}).

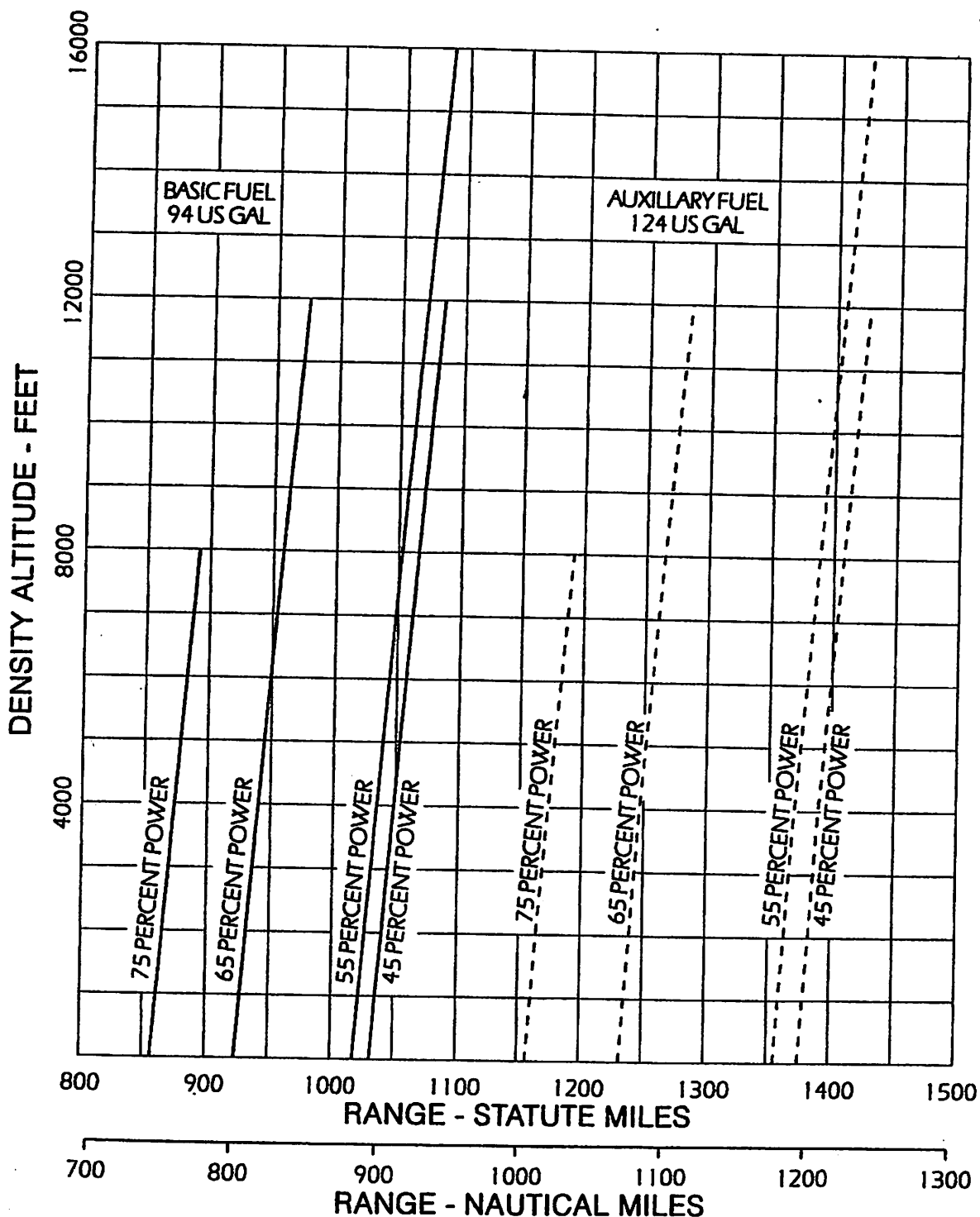


FIGURE 5-11

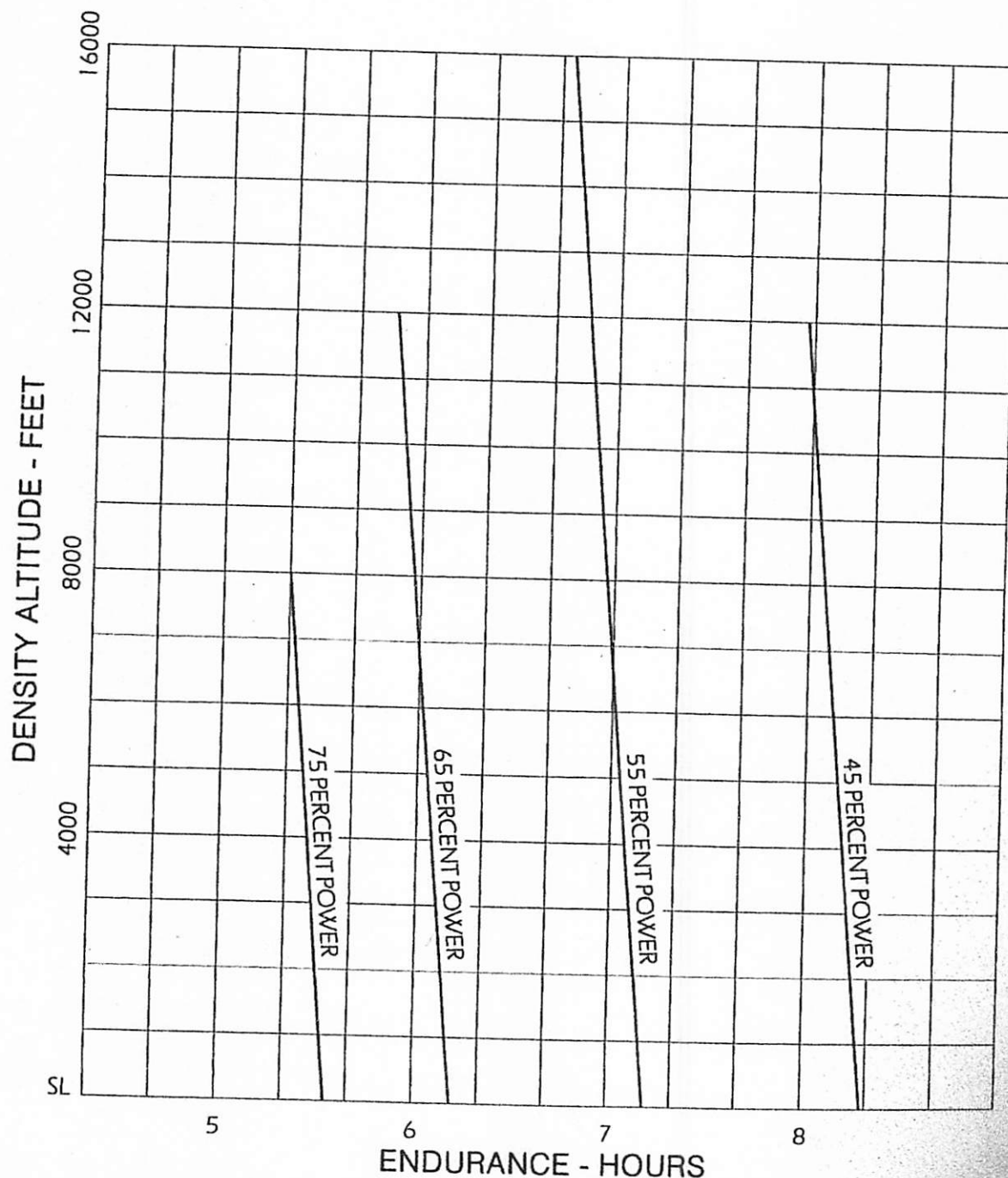
ENDURANCE PROFILE

INITIAL FUEL LOAD: 124 US GALLONS
WEIGHT: 3600 POUNDS AT START

GEAR AND FLAPS RETRACTED
MIXTURE: BEST ECONOMY CRUISE

**** WARNING ****

FIGURES SHOWN IN THIS CHART GIVE NO CONSIDERATION TO WIND OR NAVIGATIONAL ERRORS.
ENDURANCE INCLUDES AN ALLOWANCE FOR FUEL USED IN START, TAXI, TAKEOFF, CLIMB, AND
DESCENT PLUS 45 MINUTES RESERVE FUEL AT MAXIMUM ENDURANCE POWER (V_{IMD}).



LANDING GROUND ROLL DISTANCE

WING FLAPS: 38 DEGREES
RUNWAY SURFACE: PAVED, LEVEL, DRY

MAXIMUM BRAKING EFFORT
TOUCHDOWN SPEED = 76 MPH IAS

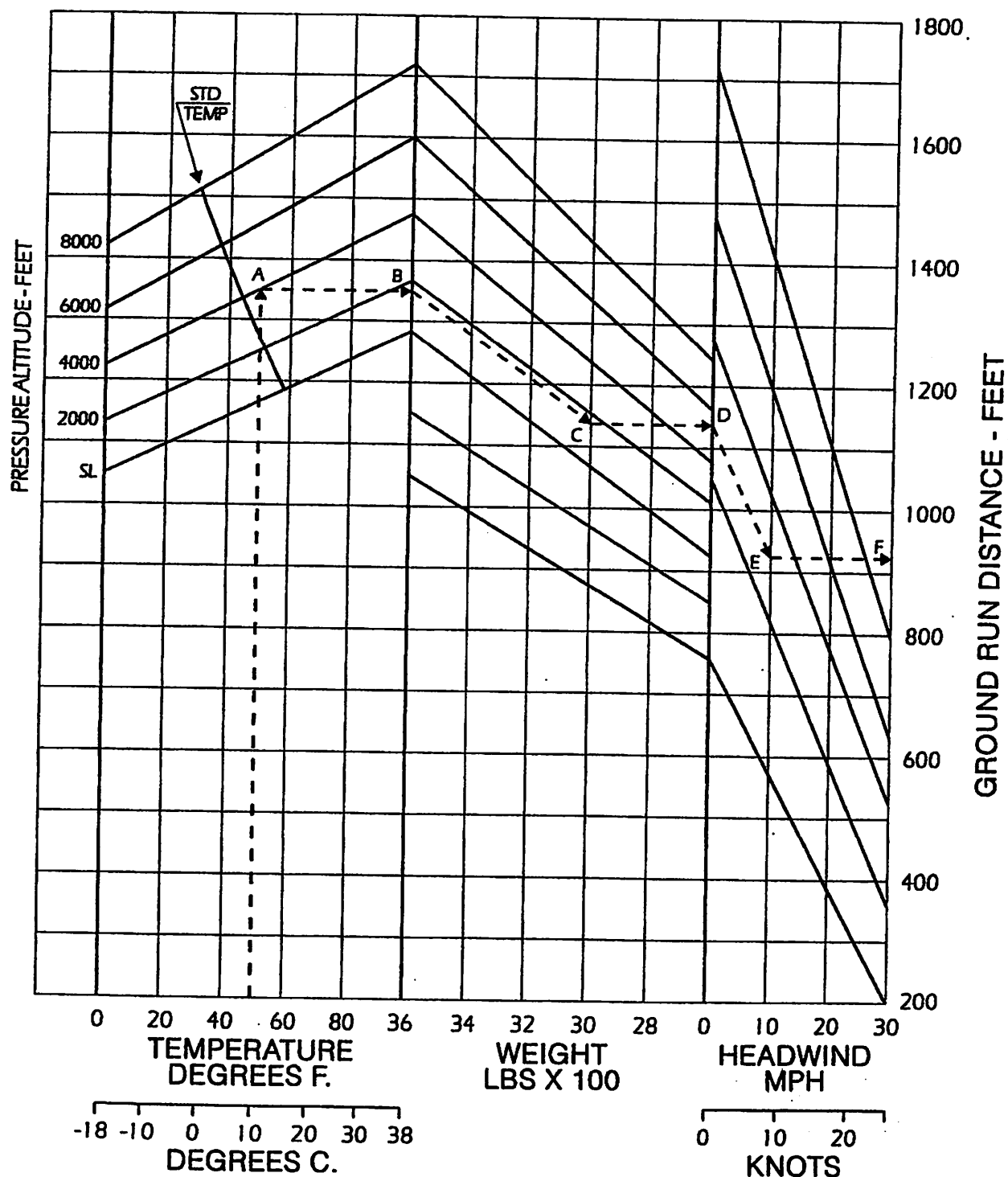


FIGURE 5-12

LANDING DISTANCE OVER A 50 FT OBSTACLE

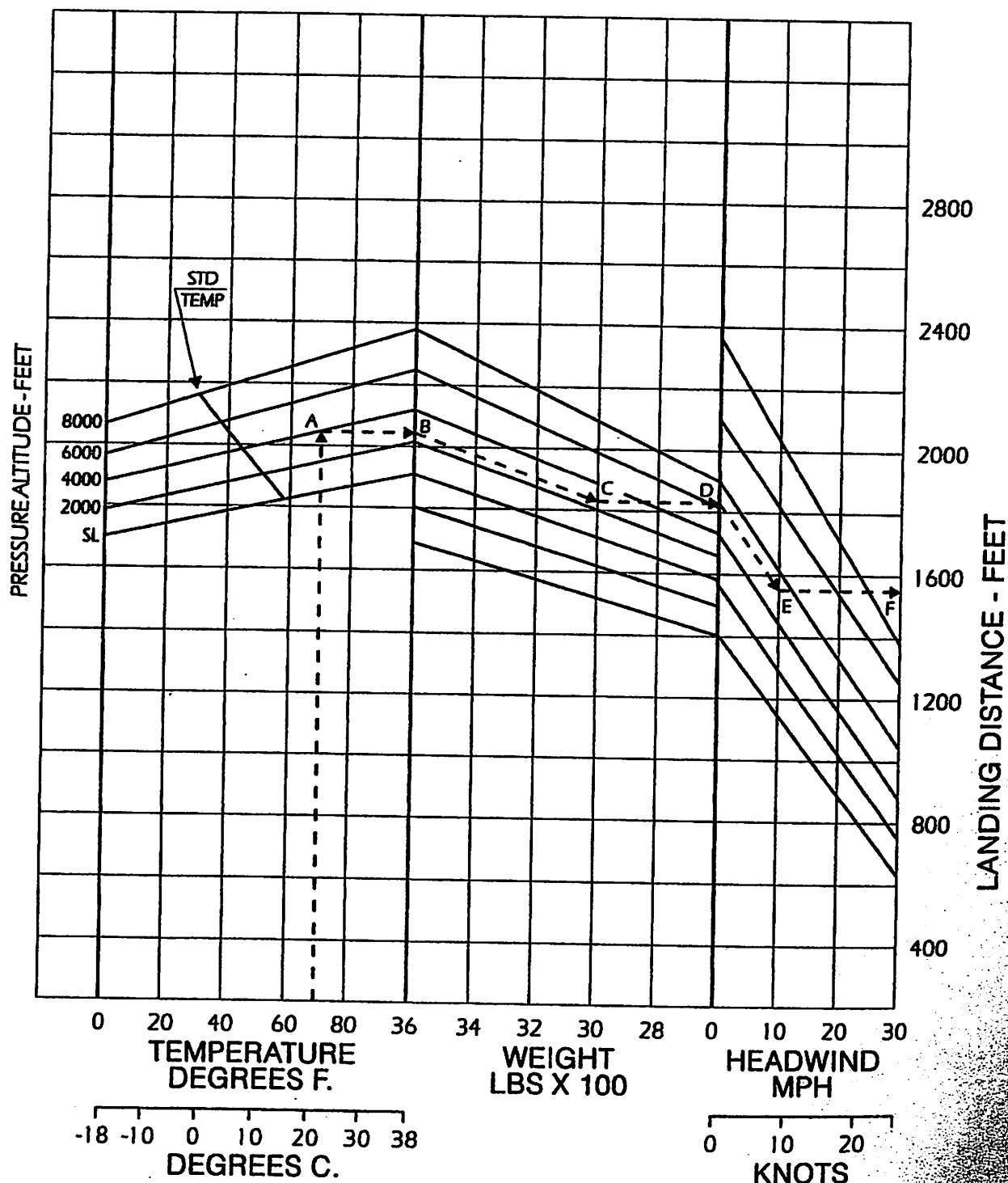
WING FLAPS: 38 DEGREES

RUNWAY SURFACE: PAVED, LEVEL, DRY

MAXIMUM BRAKING EFFORT
APPROACH SPEED = 93 MPH IAS

**** NOTE ****

FIGURES SHOWN IN THIS CHART WERE PREPARED IN ACCORDANCE WITH CAR 3.86



LYCOMING MODEL IO-720-A, 400 H.P. NORMALLY ASPIRATED ENGINE

PRESSURE ALTITUDE	STD AIR TEMP F. C.	220 HP - 55% RATED				260 HP - 65% RATED				300 HP - 75% RATED			
		1. APPROX 15.5 GPH		2. APPROX 18.5 GPH		APPROX 18.0 GPH		APPROX 21.0 GPH		APPROX 20.0 GPH		APPROX 23.5 GPH	
		RPM AND MAN PRESS				RPM AND MAN PRESS				RPM AND MAN PRESS			
		2100	2200	2300	2400	2100	2200	2300	2400	2200	2300	2400	
SEA LEV	59 15	23.1	22.3	21.3	20.6	25.8	25.1	23.9	22.9	28.0	26.4	25.3	
1,000	55 13	22.8	22.0	21.0	20.3	25.5	24.8	23.6	22.6	27.6	26.1	24.9	
2,000	52 11	22.5	21.8	20.8	20.1	25.2	24.5	23.3	22.3	27.2	25.8	24.6	
3,000	48 09	22.2	21.6	20.6	19.8	24.9	24.1	23.0	22.1	26.9	25.5	24.3	
4,000	45 07	22.0	21.3	20.3	19.5	24.6	23.8	22.7	21.8	26.6	25.2	24.0	
5,000	41 05	21.7	21.1	20.1	19.3	24.3	23.5	22.4	21.5	26.3	24.9	23.6	
6,000	38 03	21.5	20.9	19.8	19.0	24.0	23.2	22.1	21.2		24.6	23.3	
7,000	34 01	21.2	20.6	19.6	18.8	23.7	22.9	21.9	21.0		24.3	23.0	
8,000	31 -01	20.9	20.4	19.3	18.5	23.4	22.6	21.6	20.7			22.7	
9,000	27 -03	20.7	20.1	19.1	18.2		22.3	21.3	20.4				
10,000	23 -05	20.4	19.9	18.8	18.0			21.0	20.1				
11,000	19 -07	20.1	19.7	18.6	17.7			20.7	19.8				
12,000	16 -09	19.8	19.4	18.3	17.4				19.5				
13,000	12 -11	19.5	19.1	18.1	17.2								
14,000	09 -13	19.2	18.8	17.8	16.9								
15,000	05 -15			17.5	16.6								

- 1.) BEST ECONOMY CRUISE - PEAK EGT
- 2.) BEST POWER CRUISE - 100 DEGREES FAHRENHEIT RICH OF PEAK EGT

** NOTE **

TO MAINTAIN CONSTANT POWER, CORRECT MANIFOLD PRESSURE APPROXIMATELY 0.14 INCH Hg. FOR EACH 10 DEGREE FAHRENHEIT VARIATION IN INDUCTION AIR TEMPERATURE FROM STANDARD ALTITUDE TEMPERATURE. ADD MANIFOLD PRESSURE FOR TEMPERATURES ABOVE STANDARD; SUBTRACT FOR TEMPERATURES BELOW STANDARD