

SECTION 6

WEIGHT AND BALANCE

PA-28-181, ARCHER III

MODEL PA-28-181 ARCHER III

Airplane Serial Number 2881622Registration Number N95YR VH - 83BDate 03/21/2023

AIRPLANE BASIC EMPTY WEIGHT

Item	Weight (Lbs)	C.G. Arm (Inches Aft of Datum)	Moment (In-Lbs)
Standard Empty Weight* Computed	Actual 1697.2	89.0616	151155.3
Optional Equipment	95.0	96.3158	9150.0
Basic Empty Weight	1792.2	89.4461	160305.3

*The standard empty weight includes full oil capacity and 2.0 gallons of unusable fuel.

AIRPLANE USEFUL LOAD

(Ramp Weight) - (Basic Empty Weight) = Useful Load

Normal Category (2558 lbs) - (1792.2 lbs) = 765.8 lbs.

Utility Category (2138 lbs) - (1792.2 lbs) = 345.8 lbs.

THIS BASIC EMPTY WEIGHT, C.G. AND USEFUL LOAD ARE FOR THE AIRPLANE AS CERTIFIED AT THE FACTORY. REFER TO APPROPRIATE AIRCRAFT RECORD WHEN ALTERATIONS HAVE BEEN MADE.

WEIGHT AND BALANCE DATA FORM

Figure 6-5

REPORT: VB-2749

ISSUED: December 22, 2017

6.7 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

- (a) Add the weight of all items to be loaded to the basic empty weight.
- (b) Use the Loading Graph (Figure 6-13) to determine the moment of all items to be carried in the airplane.
- (c) Add the moment of all items to be loaded to the basic empty weight moment.
- (d) Divide the total moment by the total weight to determine the C.G. location.
- (e) By using the figures of item (a) and item (d) (above), locate a point on the C.G. range and weight graph (Figure 6-15). If the point falls within the C.G. envelope, the loading meets the weight and balance requirements.

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	1590.0	87.5	139125
Pilot and Front Passenger	340.0	80.5	27370
Passengers (Rear Seats)*	340.0	118.1	40154
Fuel (48 Gallon Maximum)	288.0	95.0	27360
Baggage (200 Lbs. Maximum)*		142.8	
Ramp Weight (2558 Lbs. Normal, 2138 Lbs. Utility Maximum)	2558	91.5	234009
Fuel Allowance For Engine Start, Taxi and Run Up	-8	95.0	-760
Takeoff Weight (2550 Lbs. Normal, 2130 Lbs. Utility Maximum)	2550.0	91.5	233249

The center of gravity (C.G.) of this sample loading problem is at 91.5 inches aft of the datum line. Locate this point (91.5) on the C.G. range and weight graph. Since this point falls within the weight - C.G. envelope, this loading meets the weight and balance requirements.

IT IS THE RESPONSIBILITY OF THE PILOT AND AIRCRAFT OWNER TO ENSURE THAT THE AIRPLANE IS LOADED PROPERLY.

*Utility Category Operation - No baggage or rear passengers allowed.

SAMPLE LOADING PROBLEM (NORMAL CATEGORY)

Figure 6-9

SECTION 6
WEIGHT AND BALANCE

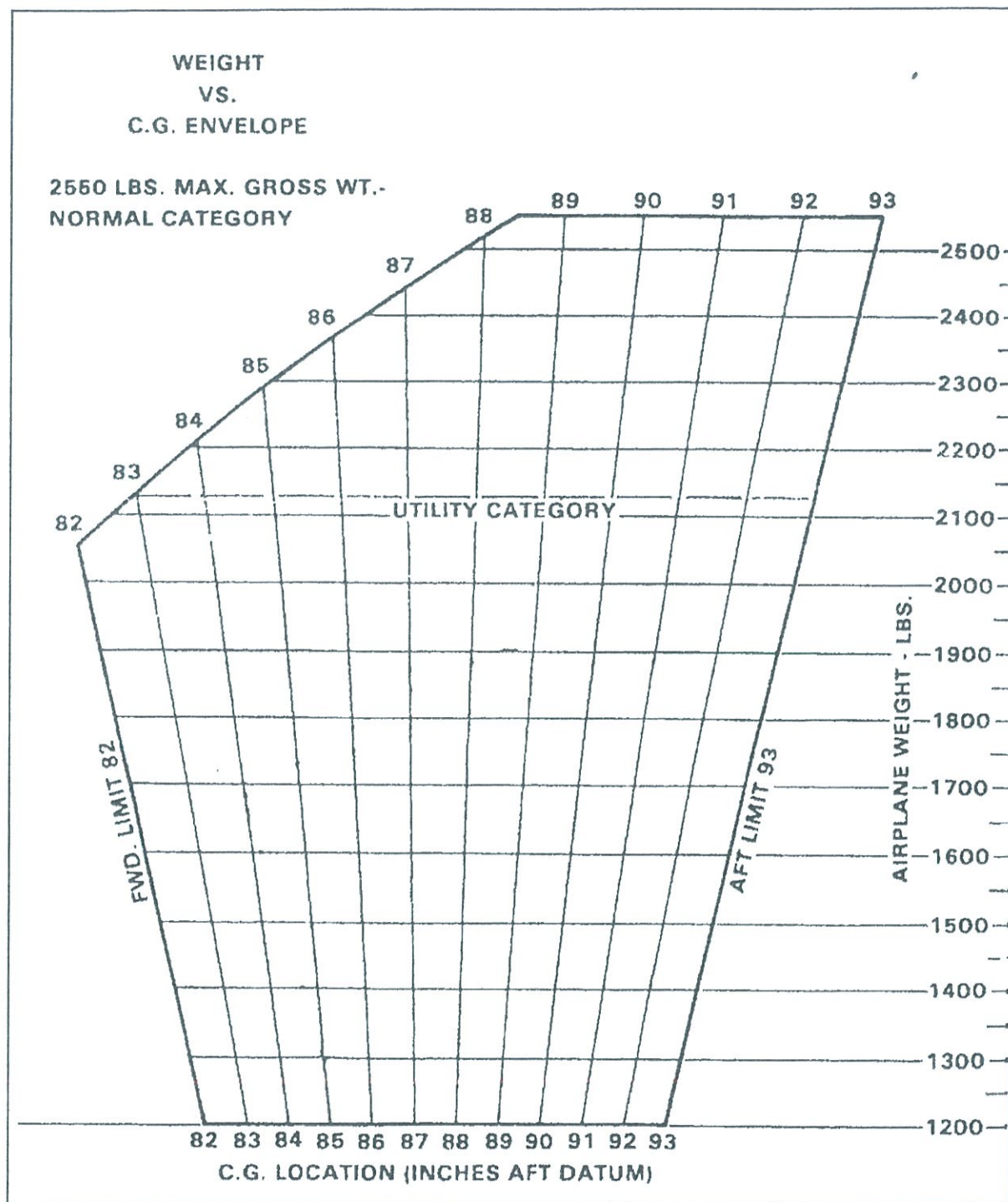
PA-28-181, ARCHER III

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger		80.5	
Passengers (Rear Seats)*		118.1	
Fuel (48 Gallon Maximum)		95.0	
Baggage (200 Lbs. Maximum)*		142.8	
Ramp Weight (2558 Lbs. Normal, 2138 Lbs. Utility Maximum)			
Fuel Allowance For Engine Start, Taxi and Run Up	-8	95.0	-760
Takeoff Weight (2550 Lbs. Normal, 2130 Lbs. Utility Maximum)			

Totals must be within approved weight and C.G. limits. It is the responsibility of the airplane owner and the pilot to ensure that the airplane is loaded properly. The Basic Empty Weight C.G. is noted on the Weight and Balance Data Form (Figure 6-5). If the airplane has been altered, refer to the Weight and Balance Record for this information.

*Utility Category Operation - No baggage or rear passengers allowed.

WEIGHT AND BALANCE LOADING FORM
Figure 6-11



C.G. RANGE AND WEIGHT

Figure 6-15

FLAPS UP TAKEOFF PERFORMANCE

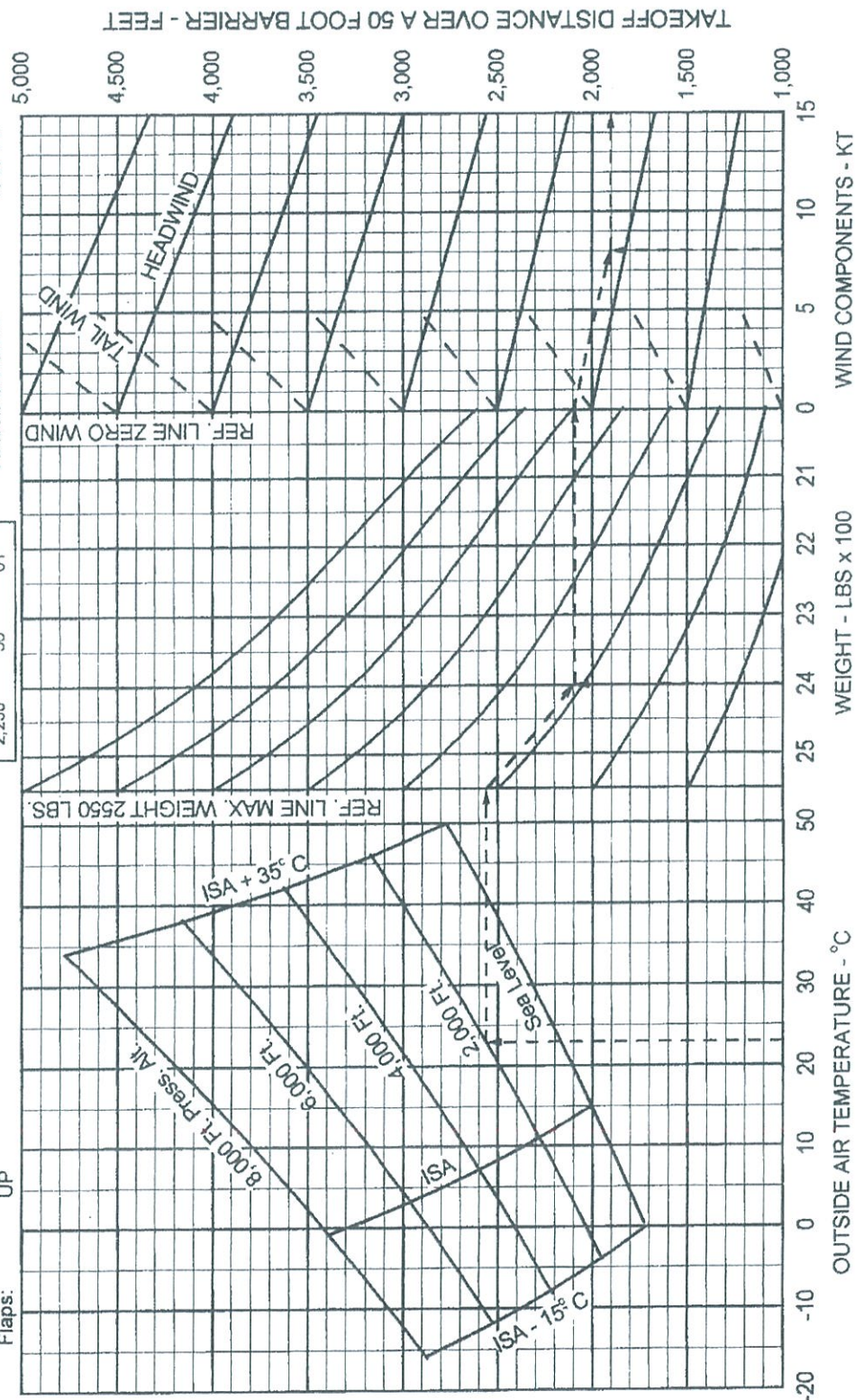
ASSOCIATED CONDITIONS:

Power: FULL THROTTLE BEFORE BRAKE RELEASE
Air Conditioner: OFF
Runway: PAVED, LEVEL, & DRY
Airspeed: REFER TO TABLE AT RIGHT
Propeller: SENSENICH 76EM8S14-0-62
Flaps: UP

EXAMPLE:

Depart Airport Pressure Alt: 2,000 Ft.
Temperature: 23° C
Gross Weight: 2,400 Lb.
Headwind: 8 Kt.
Takeoff Distance: 1907 Ft.

TAKEOFF SPEEDS		KIAS
WT	LIFTOFF	50 FT
2,550	60	65
2,450	58	64
2,350	57	63
2,250	56	61



FLAPS UP TAKEOFF PERFORMANCE

Figure 5-7

FLAPS 25° TAKEOFF PERFORMANCE

ASSOCIATED CONDITIONS
 Power: FULL THROTTLE BEFORE BRAKE RELEASE
 Air Conditioner: OFF
 Runway: PAVED, LEVEL, & DRY
 Airspeed: REFER TO TABLE AT RIGHT
 Propeller: SENSENICH 76EM8S14-0-62
 Flaps: 25°

EXAMPLE

Depart Airport Pressure Alt: 2,000 Ft.
 Temperature: 23° C
 Gross Weight: 2,400 Lb.
 Headwind: 8 Kt.
 Takeoff Distance: 1,674 Ft.

TAKEOFF SPEEDS		KIAS
WT	LIFTOFF	50 FT
2,550	55	60
2,450	55	58
2,350	53	56
2,250	50	54

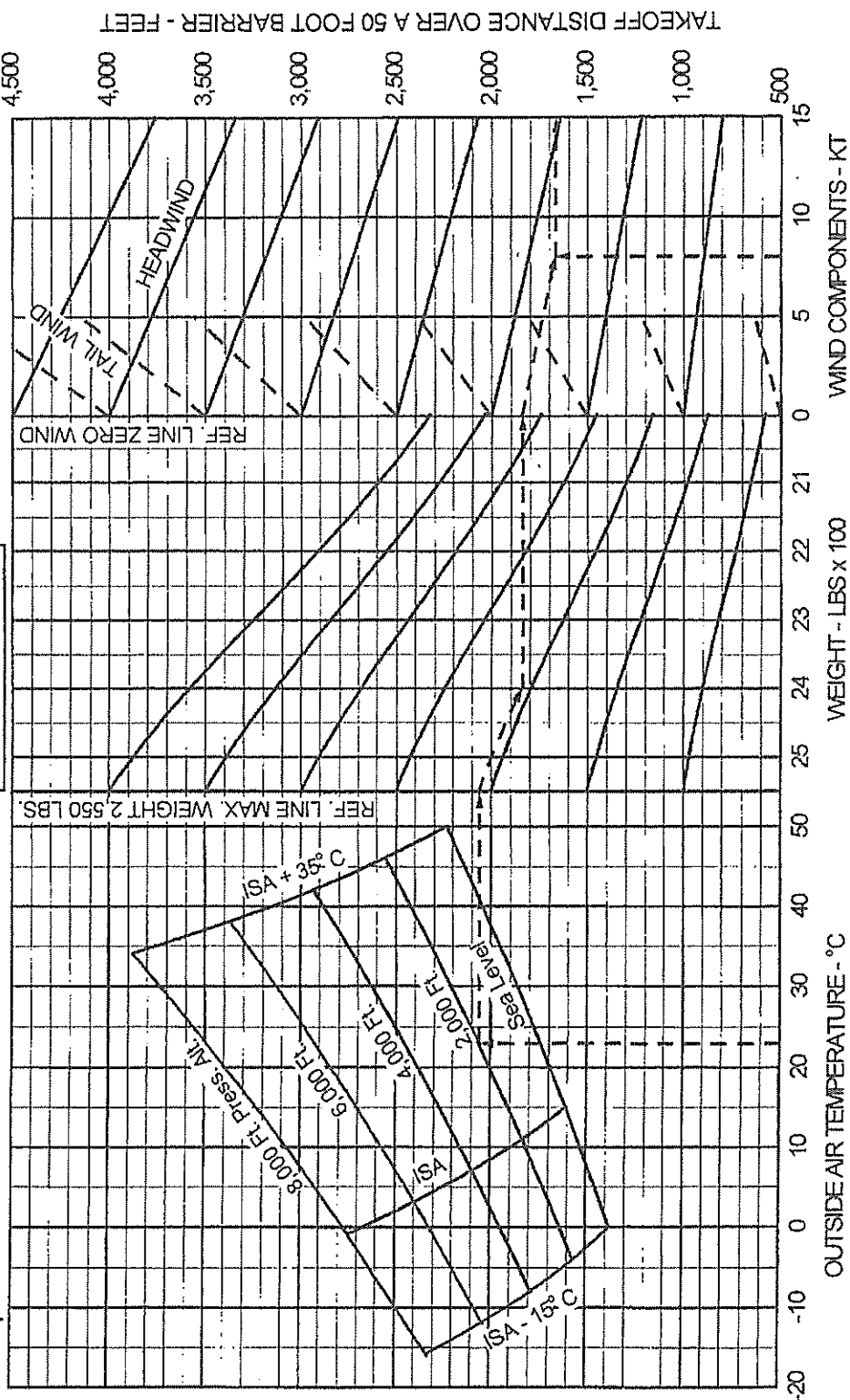
**25° FLAPS TAKEOFF PERFORMANCE**

Figure 5-9

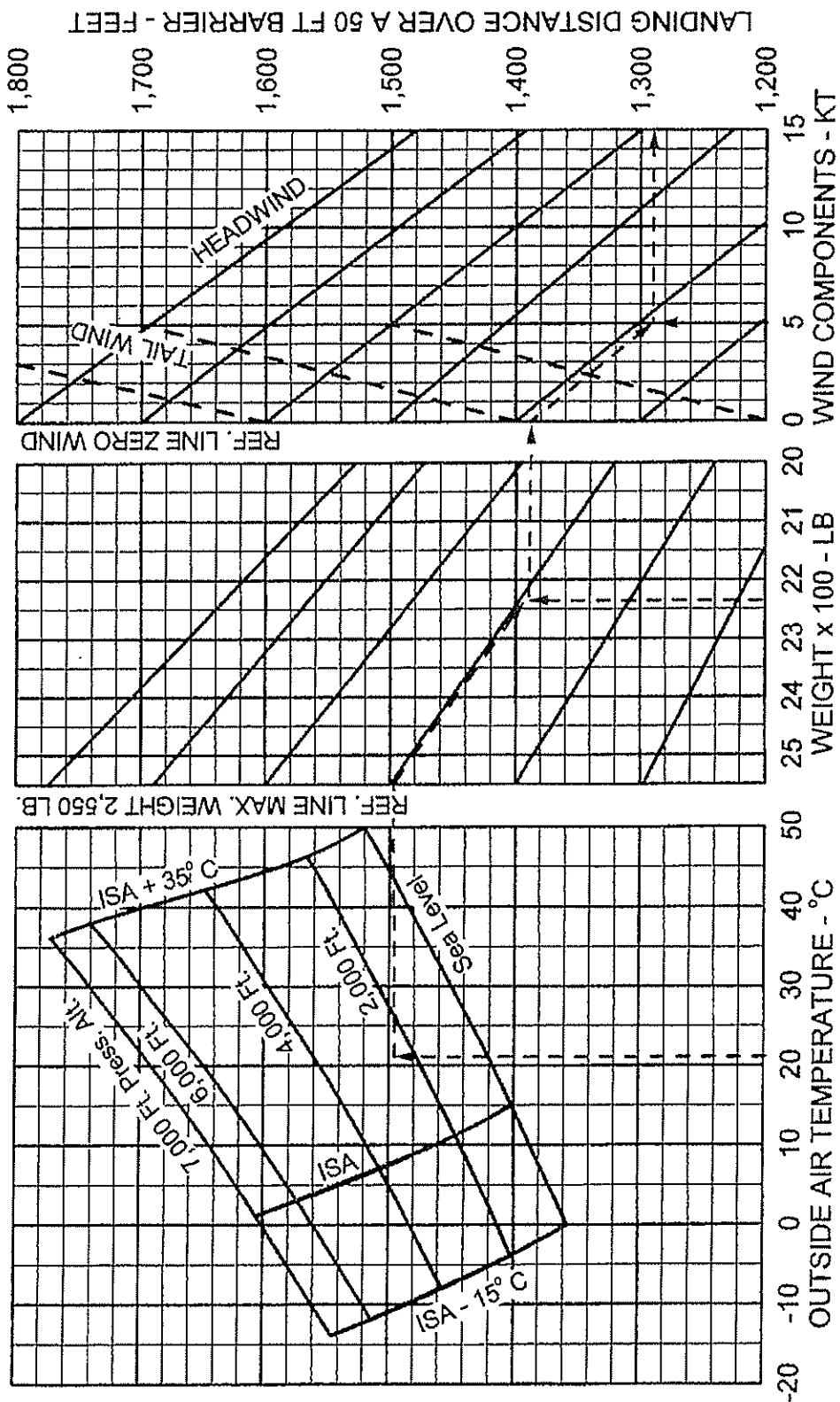
LANDING PERFORMANCE

ASSOCIATED CONDITIONS

Power Off Approach, 40° Flaps, 66 KIAS, Full Stall
Touchdown, Maximum Braking, Paved, Level, Dry Runway

EXAMPLE:

Airport Pressure Altitude: 2,500 FT.
O.A.T.: 21°C
Gross Weight: 2,240 LB.
Headwind: 5 KT.
Landing Distance: 1,290 FT.



LANDING PERFORMANCE

Figure 5-41

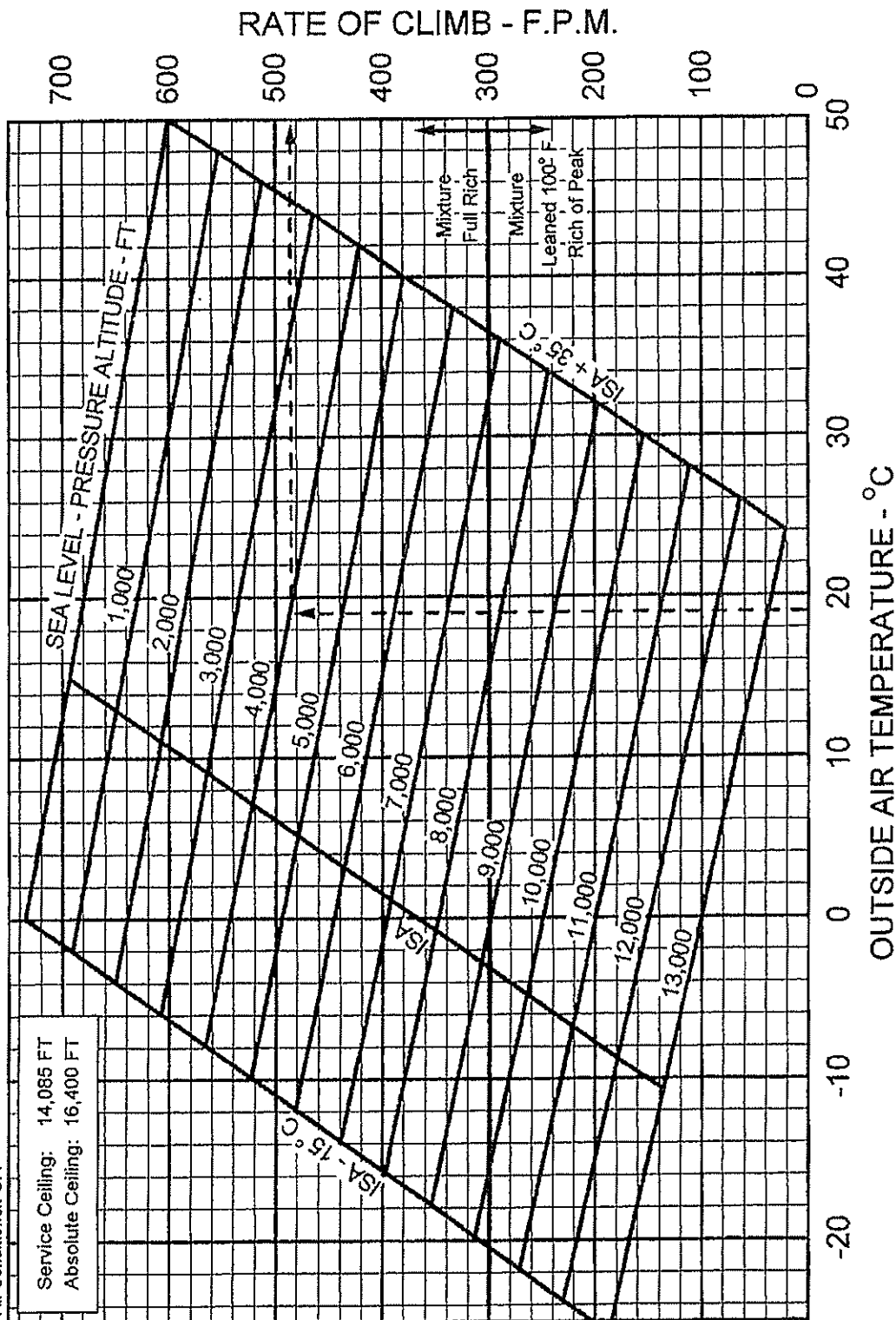
CLIMB PERFORMANCE

ASSOCIATED CONDITIONS:

Gross Weight: 2550 LBS.
Power: FULL THROTTLE
Airspeed: 76 KIAS
Flaps: UP
Air Conditioner: OFF

EXAMPLE:

Climb Pressure Alt. 4000 Ft.
Temperature: 19° C
Rate of Climb: 487 Ft/Min.



CLIMB PERFORMANCE

Figure 5-15

Climb Gradients

1 Take off climb performance (20.7.4 / 7.1)

In the take-off configuration with landing gear extended, an aeroplane must have the ability to achieve a climb gradient of 6% at takeoff safety speed (TOSS), without ground effect, and with all engines operating at take-off power.

2 En-route climb performance (20.7.4 / 8.3)

Single-engined aeroplanes must have the ability to climb at a gradient of 4.5% at an airspeed not less than 1.2Vs at all heights up to 5000ft in standard atmospheric conditions with the engine operating at maximum continuous power, undercarriage (if retractable) and flaps retracted.

3 Landing Climb performance (20.7.4 / 9.1)

In the landing configuration with all engines operating at take-off power an aeroplane must have the ability to climb at a gradient of 3.2% in standard atmospheric conditions at a speed not exceeding 1.3Vs

Formula

$$\text{RoC} = ((\text{GS} \times 6080) / 60) \times (\text{CG} / 100)$$

Or

$$\text{CG} = \frac{\text{ROC}}{(\text{G.S} \times 6080) / 60}$$