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HB-PJE

Weight & Balance
Performance Calculations

GVM

Mars 2016

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Table of content

- 1. Weight & Balance**
- 2. TKOF Performance**
- 3. LDG Performance**

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1. WEIGHT & BALANCE

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POH Data

WEIGHT AND BALANCE RECORD
Figure 6-7

PA-32R-301		Serial Number 3246223		Registration Number N3101Q			Page Number	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Weight Change			Running Basic Empty Weight	
				Wt. (Lb.)	Arm (In.)	Moment /100	Wt. (Lb.)	Moment /100
07/08/04		As licensed					2412.4	
18/05/13		Periodic Weighing		2457.399	84.67	208120.714	2457.399	208120.714
20/08/15	186	Flying hours counter	+	0.330	64.05	21.14	2458.33	208141.85

20 août 2015

Basic Empty Weight

2458.33 lbs

Moment:

208141.85 lbs * in

➔ Arm

84.668 in

PA-32R-301, SARATOGA II HP

SECTION 6
WEIGHT AND BALANCE



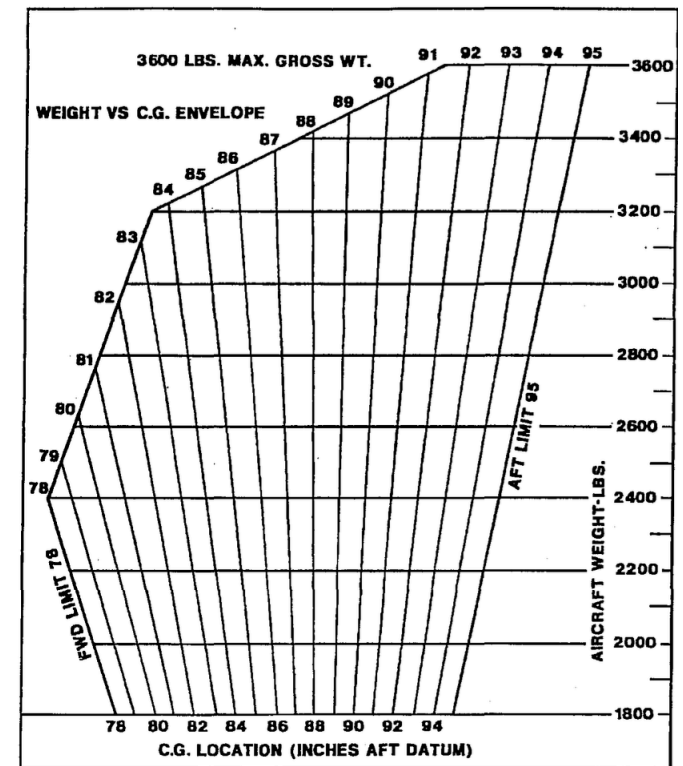
W&B computation method

1. Loading form



2. C.G. Range & Weight

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight			
Pilot and Front Passenger		85.5	
Passengers (Center Seats)		119.1	
Passengers (Rear Seats)		157.6	
Fuel (102 Gallon Maximum)		94.0	
Baggage (Forward) (100 Lb. Limit)		42.0	
Baggage (Aft) (100 Lb. Limit)		178.7	
Ramp Weight (3615 Lbs. Max.)			
Fuel Allowance for Engine Start, Taxi & Runup	-15.0	94.0	-1410
Take-off Weight (3600 Lbs. Max.)			





Example 1 : Question

1 Pilot	80 kg
1 F.I.	95 kg
Fuel	85 USG
Bagage front	0 kg
Bagage rear	15 kg

- ➔ Please fill-in the W&B sheet.
- ➔ Draw the necessary conclusion(s).

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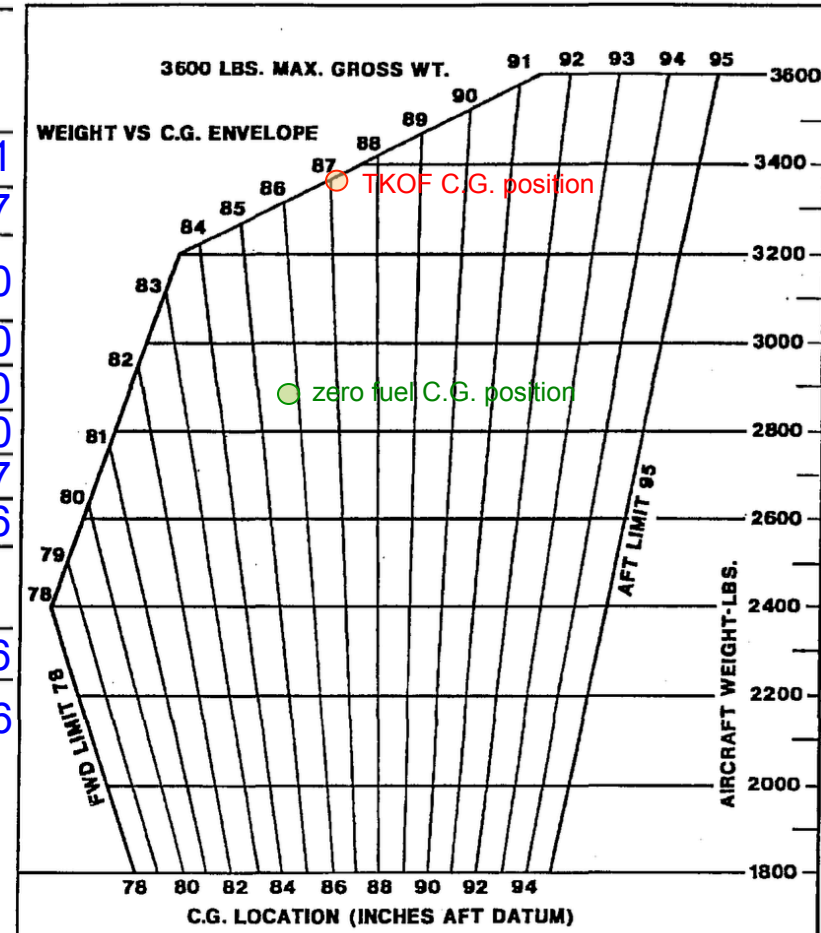
Example 1 : Solution

1. Loading form



2. C.G. Range & Weight

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	2458.3	84.7	208'141
Pilot and Front Passenger	385	85.5	32917
Passengers (Center Seats)	0	119.1	0
Passengers (Rear Seats)	0	157.6	0
Fuel (102 Gallon Maximum) 85 USG	510	94.0	47940
Baggage (Forward) (100 Lb. Limit)	0	42.0	0
Baggage (Aft) (100 Lb. Limit)	33	178.7	5897
Ramp Weight (3615 Lbs. Max.)	3386.3	87.1	294896
Fuel Allowance for Engine Start, Taxi & Runup	-15.0	94.0	-1410
Take-off Weight (3600 Lbs. Max.)	3371.7	87.1	293486
Zero fuel weight	2876.3	85.9	246956





Example 1 : Conclusions

1. With just two people onboard, the **fuel quantity is limited**, also by the C.G. location.
2. In that configuration, use only the aft baggage compartment to maintain C.G. within limits.
3. Burning fuel will bring the C.G. position slightly forward.



Example 2 : Question

1 Pilot	80 kg
1 Front pax	80 kg
2 Center pax	130 kg
2 Rear pax	90 kg
Fuel	?? USG
Bagage front	15 kg
Bagage rear	20 kg

- ➔ Please fill-in the W&B sheet
- ➔ Determine how much fuel you can take
- ➔ Draw the necessary conclusion(s).



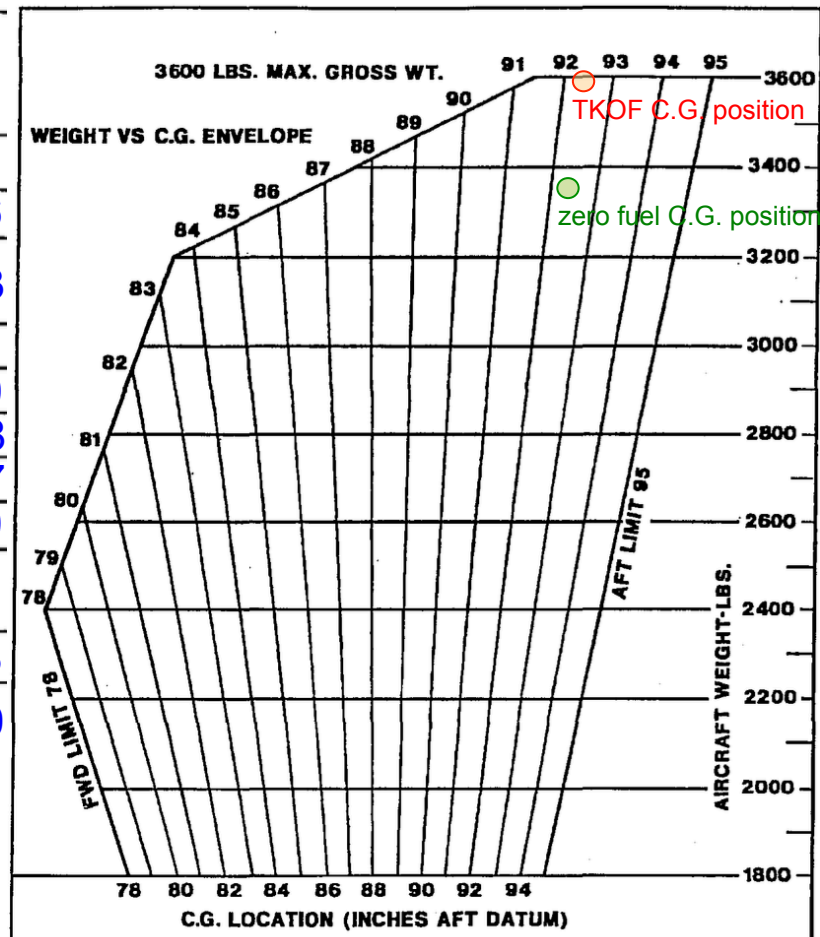
Example 2 : Solution

1. Loading form



2. C.G. Range & Weight

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	2458.3	84.7	208'141
Pilot and Front Passenger	352	85.5	30096
Passengers (Center Seats)	286	119.1	34063
Passengers (Rear Seats)	198	157.6	31205
Fuel (102 Gallon Maximum) 40 USG	240	94.0	22560
Baggage (Forward) (100 Lb. Limit)	44	42.0	1848
Baggage (Aft) (100 Lb. Limit)	33	178.7	5897
Ramp Weight (3615 Lbs. Max.)	3611.3	92.4	333809
Fuel Allowance for Engine Start, Taxi & Runup	-15.0	94.0	-1410
Take-off Weight (3600 Lbs. Max.)	3596.3	92.8	333903
Zero fuel weight	3371.3	92.3	309840





Example 2 : Conclusions

1. With those given pax weights, you can take a maximum of **40 USG** of fuel, which means a bare 2.5 h of flight (1.5 + reserve...)
2. Those pax weight correspond typically to 2 men, 2 women & 2 kids, with little bagage...
3. Balance will be quite aft. But moving load more forward will quickly limit TKOF weight.



Example 3 : Question

1 Pilot	90 kg
1 Front pax	90 kg
No center pax	0 kg
2 Rear pax	170 kg
Fuel	?? USG
Bagage front	15 kg
Bagage rear	15 kg

- ➔ Please fill-in the W&B sheet
- ➔ Determine how much fuel you can take
- ➔ Draw the necessary conclusion(s).



Example 3 : Solution



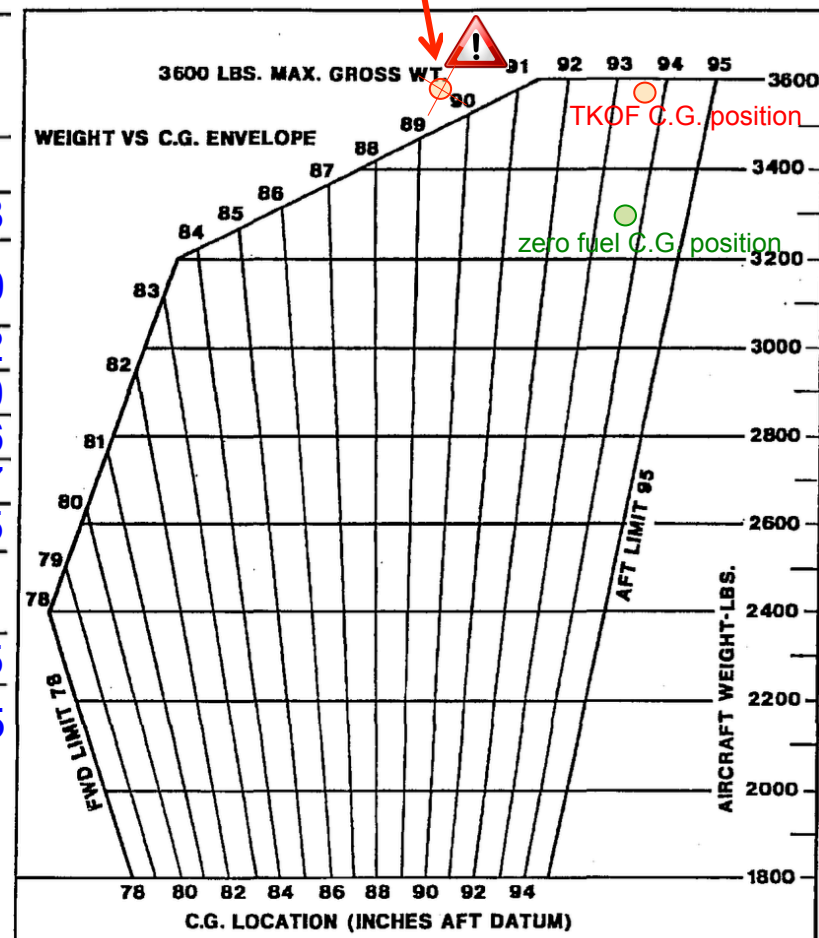
Do NOT sit the rear pax in the center row :
the C.G. position would be outside of
the envelope !

1. Loading form



2. C.G. Range & Weight

	Weight (Lbs)	Arm Aft Datum (Inches)	Moment (In-Lbs)
Basic Empty Weight	2458.3	84.7	208'141
Pilot and Front Passenger	396	85.5	33858
Passengers (Center Seats)	0	119.1	0
Passengers (Rear Seats)	374	157.6	58942
Fuel (102 Gallon Maximum) 50 USG	300	94.0	28200
Baggage (Forward) (100 Lb. Limit)	33	42.0	1386
Baggage (Aft) (100 Lb. Limit)	33	178.7	5897
Ramp Weight (3615 Lbs. Max.)	3594.3	93.6	336425
Fuel Allowance for Engine Start, Taxi & Runup	-15.0	94.0	-1410
Take-off Weight (3600 Lbs. Max.)	3579.3	93.6	335015
Zero fuel weight	3294.3	93.6	306815





Example 3 : Conclusions

1. You can take **50 USG** of fuel
2. Plane will be centered very aft
3. Do **NOT** site the rear pax in the center rows:
This would bring the C.G. of the A/C outside
of the acceptable envelope.



2. TKOF PERFORMANCE



1. Normal procedure TKOF

Conditions:

LSGL	2'000 ft, paved, flat, dry RWY
OAT	30°C
MTOW	3'600 lbs
Wind	calm
Flaps	zero – retracted.
Power	Full, 2'700 rpm
V rotate	86 kts
V (50ft)	86 kts

- ➔ Compute the ground roll
- ➔ Compute the TKOF distance (>50ft)



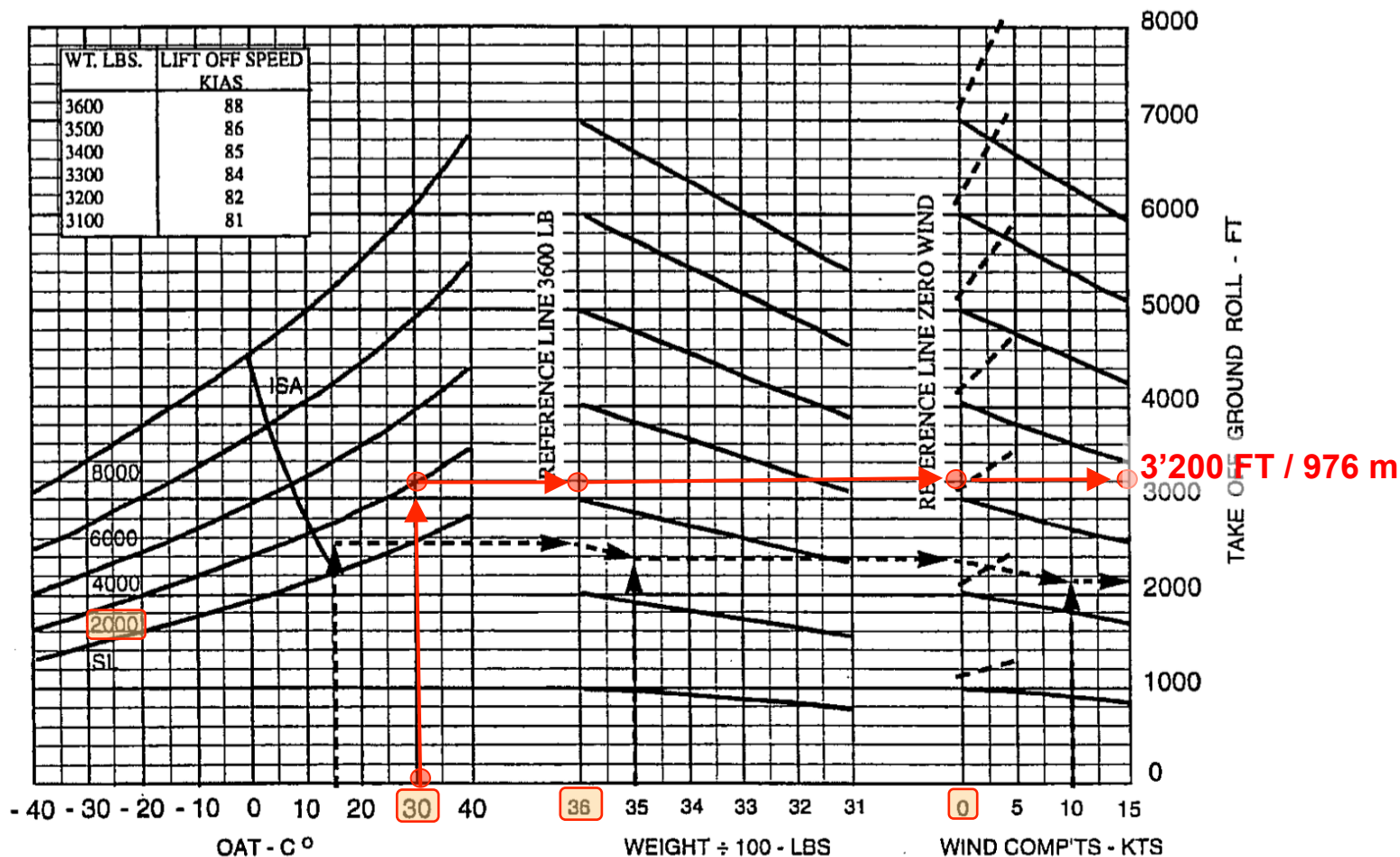
1. Normal procedure TKOF Ground roll

ASSOCIATED CONDITIONS:
2700 RPM AND FULL THROTTLE
BEFORE BRAKE RELEASE
FLAPS 0 DEGREES
PAVED, LEVEL, DRY RUNWAY

NORMAL PROCEDURE TAKEOFF GROUND ROLL

EXAMPLE:

PRESS ALTITUDE: 1200 FT
OAT: 16° C
GROSS WEIGHT: 3480 LBS
WIND: 10 KNOT HEADWIND
TAKE OFF GROUND ROLL: 2186 FT.
LIFTOFF SPEED: 86 KIAS





1. Normal procedure TKOF Distance over 50ft

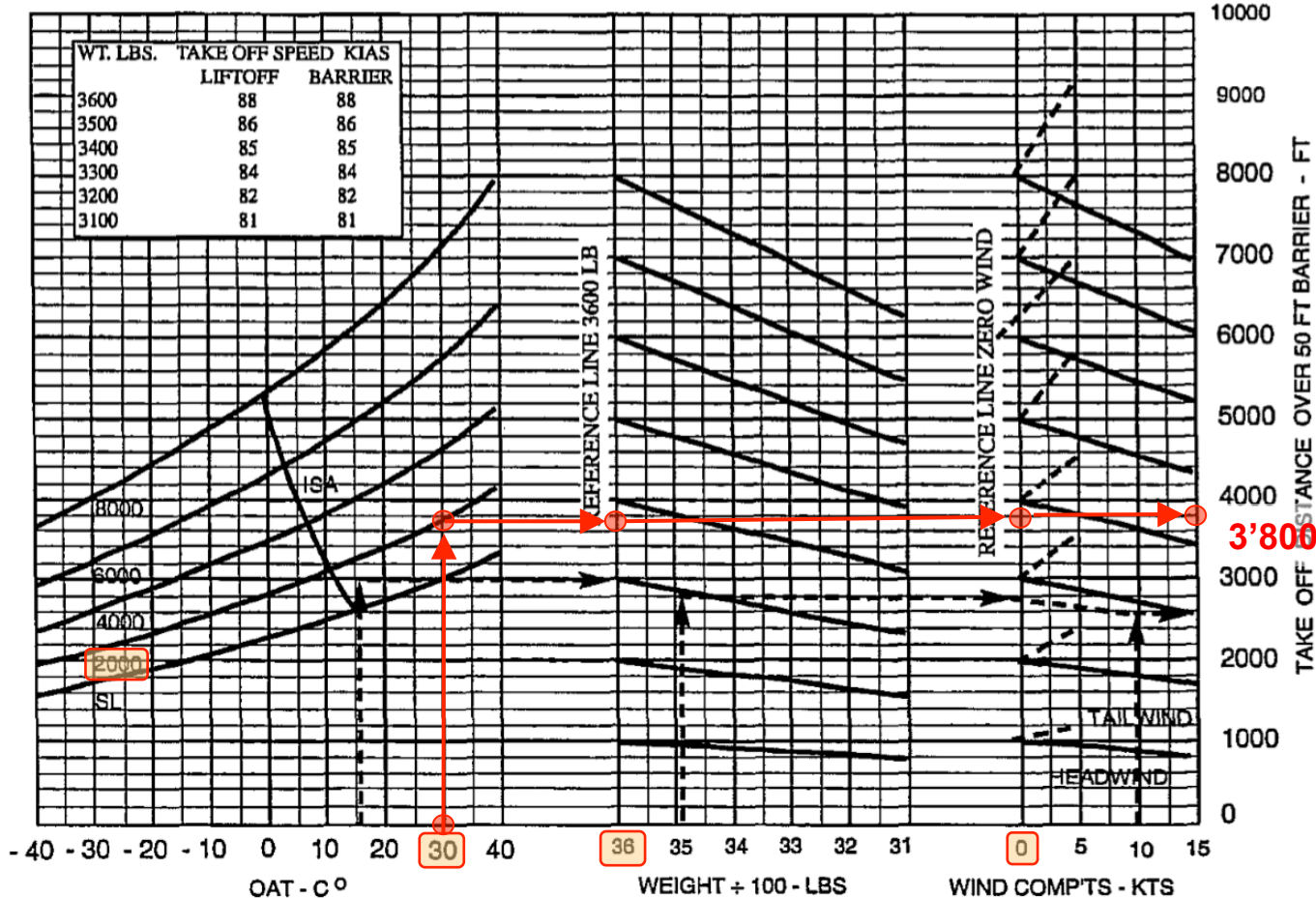
ASSOCIATED CONDITIONS:
2700 RPM AND FULL THROTTLE
BEFORE BRAKE RELEASE
FLAPS 0 DEGREES
PAVED, LEVEL, DRY RUNWAY

NORMAL PROCEDURE TAKEOFF PERFORMANCE

EXAMPLE:

PRESS ALTITUDE: 1200 FT
OAT: 16° C
GROSS WEIGHT: 3480 LBS
WIND: 10 KNOT HEADWIND
TAKE OFF DISTANCE: 2598 FT.
LIFTOFF/BARRIER SPEED: 86 /86 KIAS

NORMAL PROCEDURE TAKEOFF PERFORMANCE
FLAPS 0°





2. Maximum effort TKOF

Conditions:

LSGL	2'000 ft, paved, flat, dry RWY
OAT	30°C
MTOW	3'600 lbs
Wind	calm
Flaps	2 – 25 °
Power	Full, 2'700 rpm
V rotate	72 kts
V (50ft)	77 kts

- ➔ Compute the ground roll
- ➔ Compute the TKOF distance (>50ft)



2. Maximum Effort TKOF Ground roll

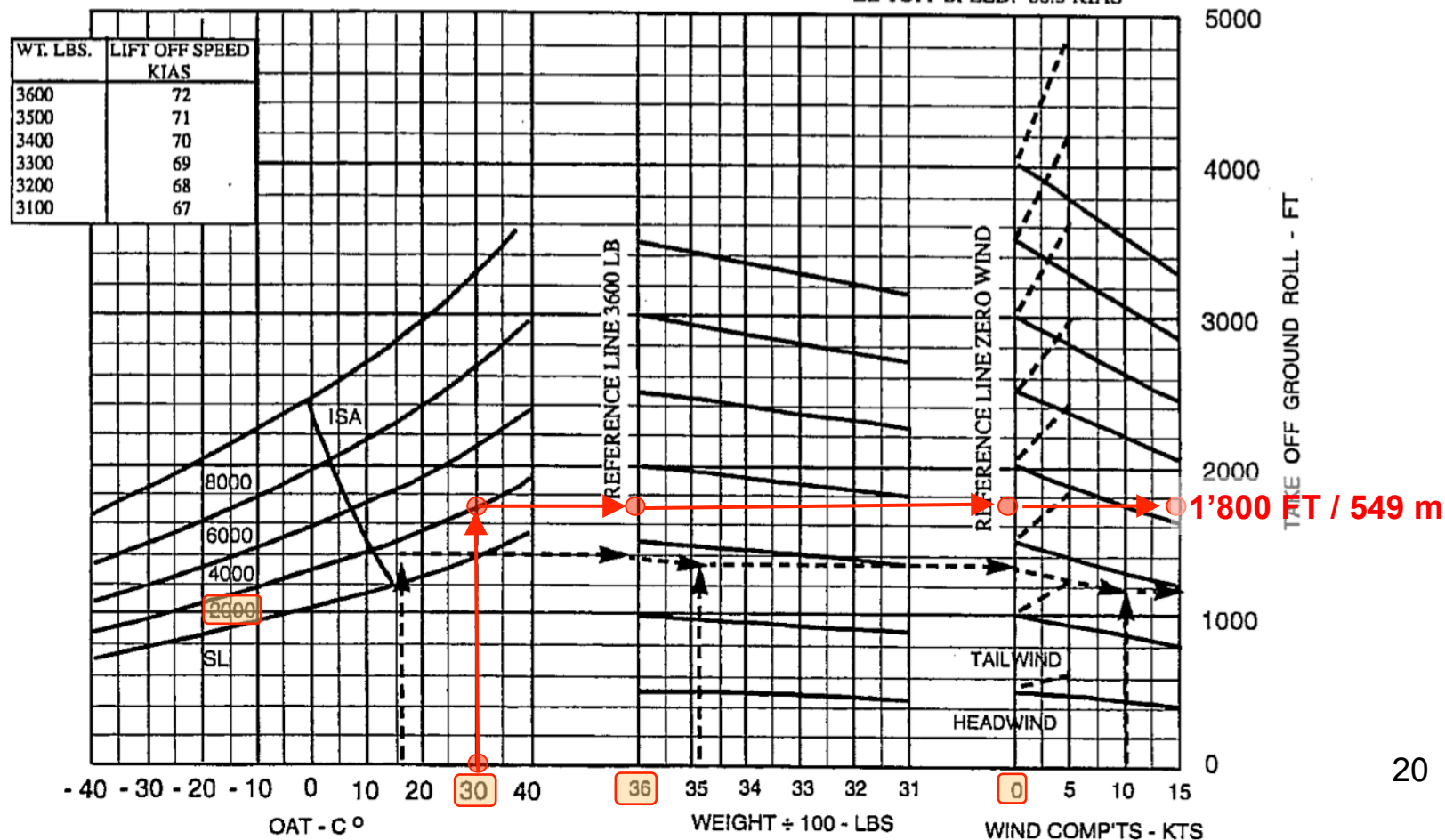
ASSOCIATED CONDITIONS:

2700 RPM AND FULL THROTTLE
BEFORE BRAKE RELEASE
FLAPS 25 DEGREES
PAVED, LEVEL, DRY RUNWAY

MAXIMUM EFFORT TAKEOFF GROUND ROLL FLAPS 25°

EXAMPLE:

PRESS ALTITUDE: 1200 FT
OAT: 16° C
GROSS WEIGHT: 3480 LBS
WIND: 10 KNOT HEADWIND
TAKE OFF GROUND ROLL 1186 FT.
LIFTOFF SPEED: 66.5 KIAS





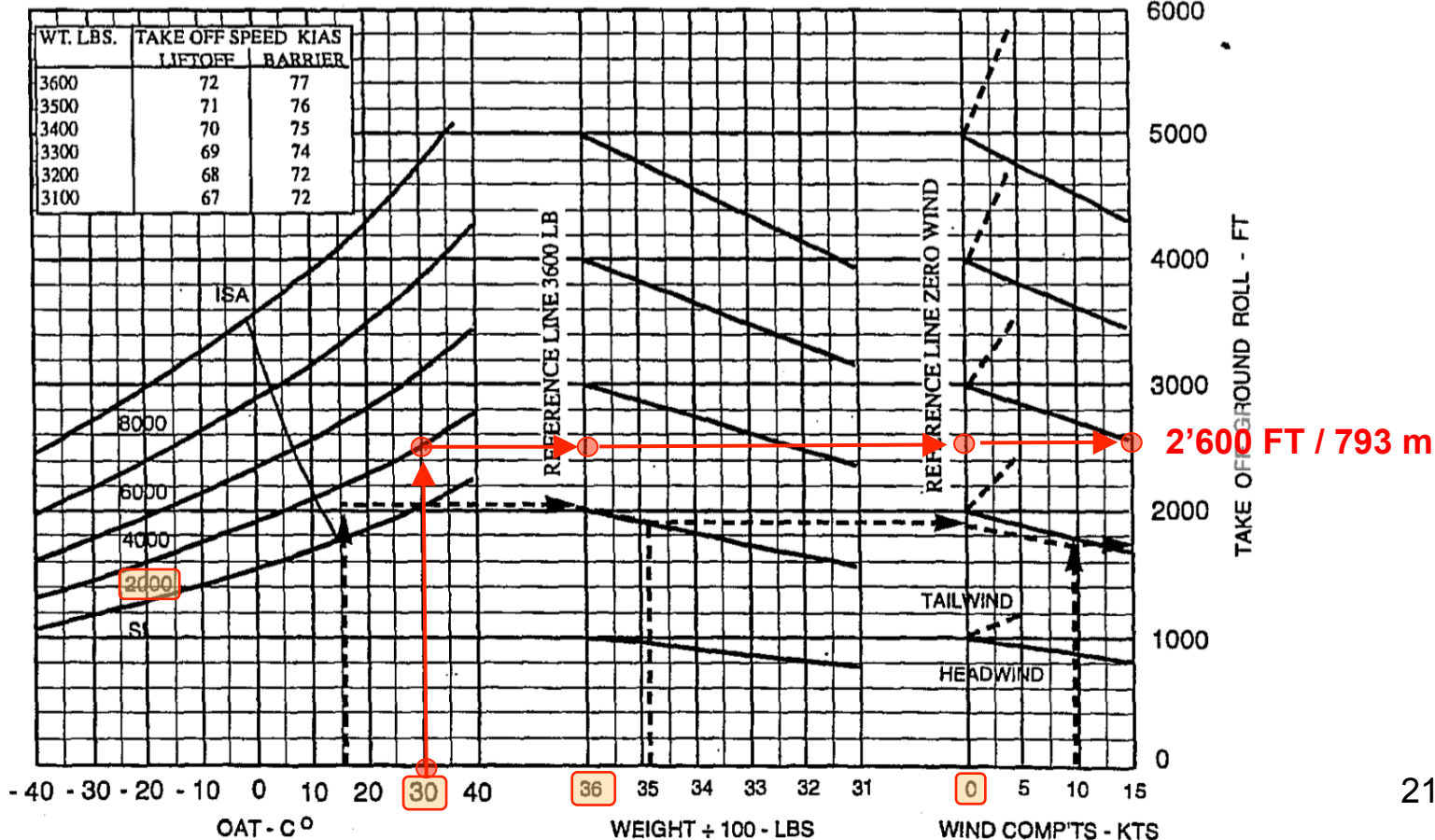
2. Maximum Effort TKOF Distance over 50ft

ASSOCIATED CONDITIONS:
2700 RPM AND FULL THROTTLE
BEFORE BRAKE RELEASE
FLAPS 25 DEGREES
PAVED, LEVEL, DRY RUNWAY

MAXIMUM EFFORT TAKEOFF PERFORMANCE

EXAMPLE:

PRESS ALTITUDE: 1200 FT
OAT: 16° C
GROSS WEIGHT: 3480 LBS
WIND: 10 KNOT HEADWIND
TAKE OFF DISTANCE: 1734 FT.
LIFTOFF / BARRIER SPEED: 71 / 76 KIAS





1. TKOF Summary

	Normal procedure	Maximum effort	Difference
Ground roll	976 m	549 m	+ 78%
TKOF Distance over 50ft	1'158 m	793 m	+ 46%

**1. Normal procedure ground roll exceed LSGL RWY length:
Not possible !!**

2. Huge increase in distance without flaps !



3. LANDING PERFORMANCE



Landing performance

Conditions:

LSGL	2'000 ft, paved, flat, dry RWY
OAT	30°C
MTOW	3'600 lbs
Wind	calm
Flaps	Full – 40°
Power	Full, 2'700 rpm
Full stall touch down	
Maximum braking	

- ➔ Compute the LDG ground roll
- ➔ Compute the LDG distance (>50ft)

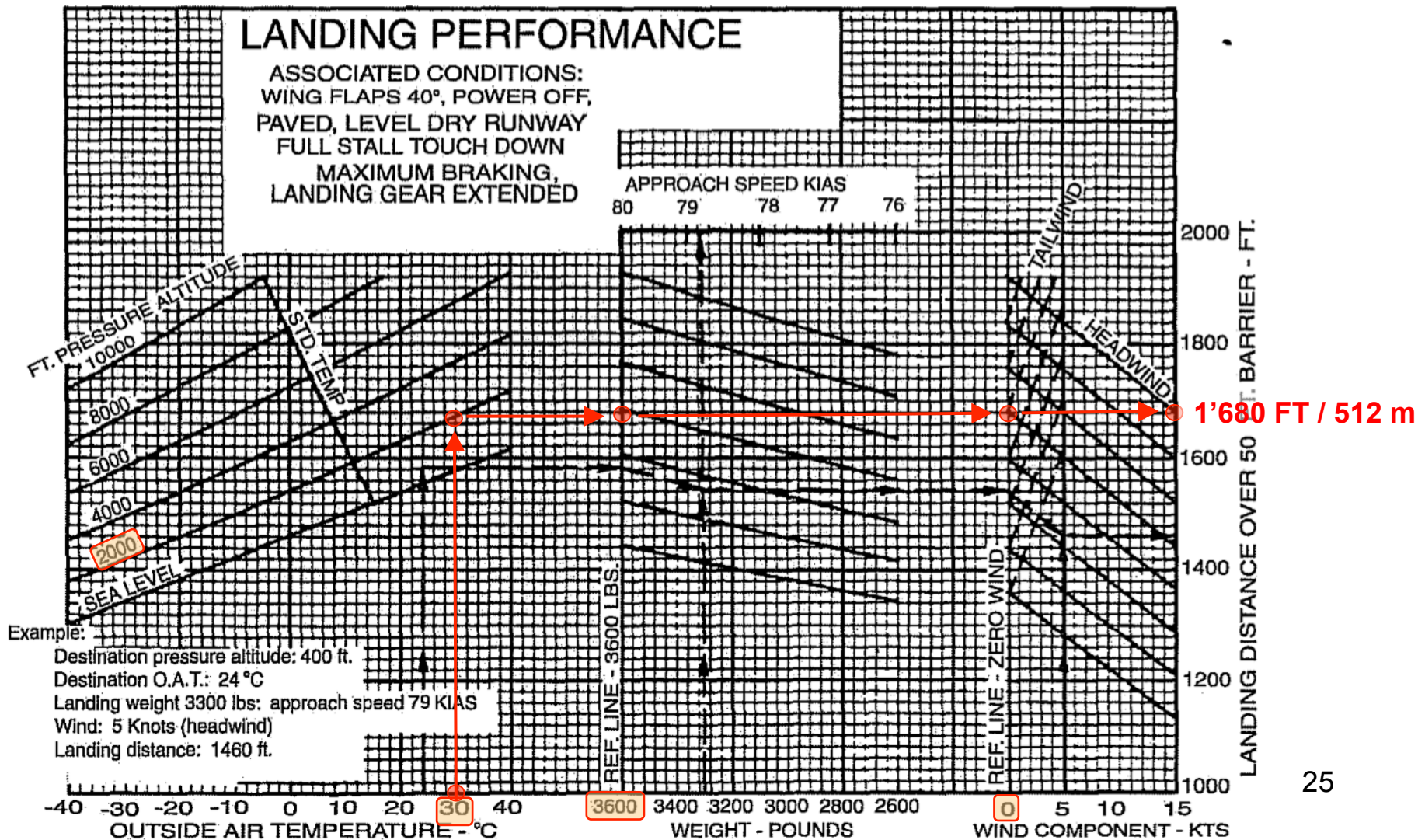


Landing distance over 50ft

PA-32R-301

LANDING PERFORMANCE

ASSOCIATED CONDITIONS:
WING FLAPS 40°, POWER OFF,
PAVED, LEVEL DRY RUNWAY
FULL STALL TOUCH DOWN
MAXIMUM BRAKING,
LANDING GEAR EXTENDED



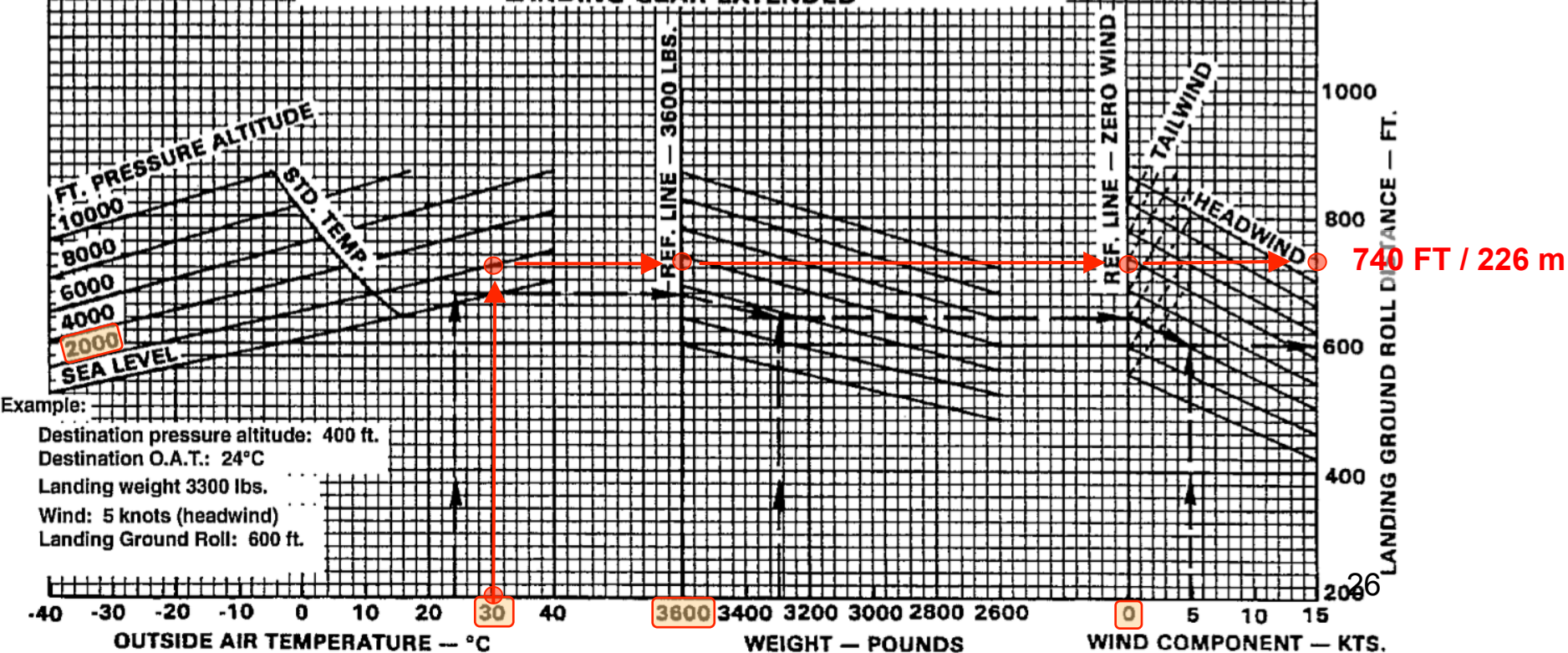
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Landing roll

PA-32R-301 LANDING GROUND ROLL

ASSOCIATED CONDITIONS:
WING FLAPS 40°, POWER OFF, PAVED LEVEL DRY RUNWAY
FULL STALL TOUCHDOWN, MAXIMUM BRAKING
LANDING GEAR EXTENDED



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Bons vols !

