

CHAPTER 5

PERFORMANCE

	Page
5.1 INTRODUCTION	5-2
5.2 USE OF THE PERFORMANCE TABLES AND DIAGRAMS	5-2
5.3 PERFORMANCE TABLES AND DIAGRAMS	5-3
5.3.1 AIRSPEED CALIBRATION	5-3
5.3.2 TABLE FOR SETTING ENGINE PERFORMANCE	5-4
5.3.3 PRESSURE ALTITUDE - DENSITY ALTITUDE	5-7
5.3.4 STALLING SPEEDS	5-8
5.3.5 WIND COMPONENTS	5-9
5.3.6 TAKE-OFF DISTANCE	5-10
5.3.7 CLIMB PERFORMANCE - TAKE-OFF CLIMB	5-13
5.3.8 CLIMB PERFORMANCE - CRUISE CLIMB	5-14
5.3.9 CRUISING (TRUE AIRSPEED TAS)	5-15
5.3.10 LANDING DISTANCE - FLAPS LDG	5-16
5.3.11 LANDING DISTANCE - FLAPS UP	5-19
5.3.12 GRADIENT OF CLIMB ON GO-AROUND	5-22
5.3.13 APPROVED NOISE DATA	5-22

5.1 INTRODUCTION

The performance tables and diagrams on the following pages are presented so that, on the one hand, you can see what performance you can expect from your airplane, while on the other they allow comprehensive and sufficiently accurate flight planning. The values in the tables and the diagrams were obtained in the framework of the flight trials using an airplane and power-plant in good condition, and corrected to the conditions of the International Standard Atmosphere (ISA = 15 °C/59 °F and 1013.25 hPa/29.92 inHg at sea level).

The performance diagrams do not take into account variations in pilot experience or a poorly maintained airplane. The performances given can be attained if the procedures quoted in this manual are applied, and the airplane has been well maintained.

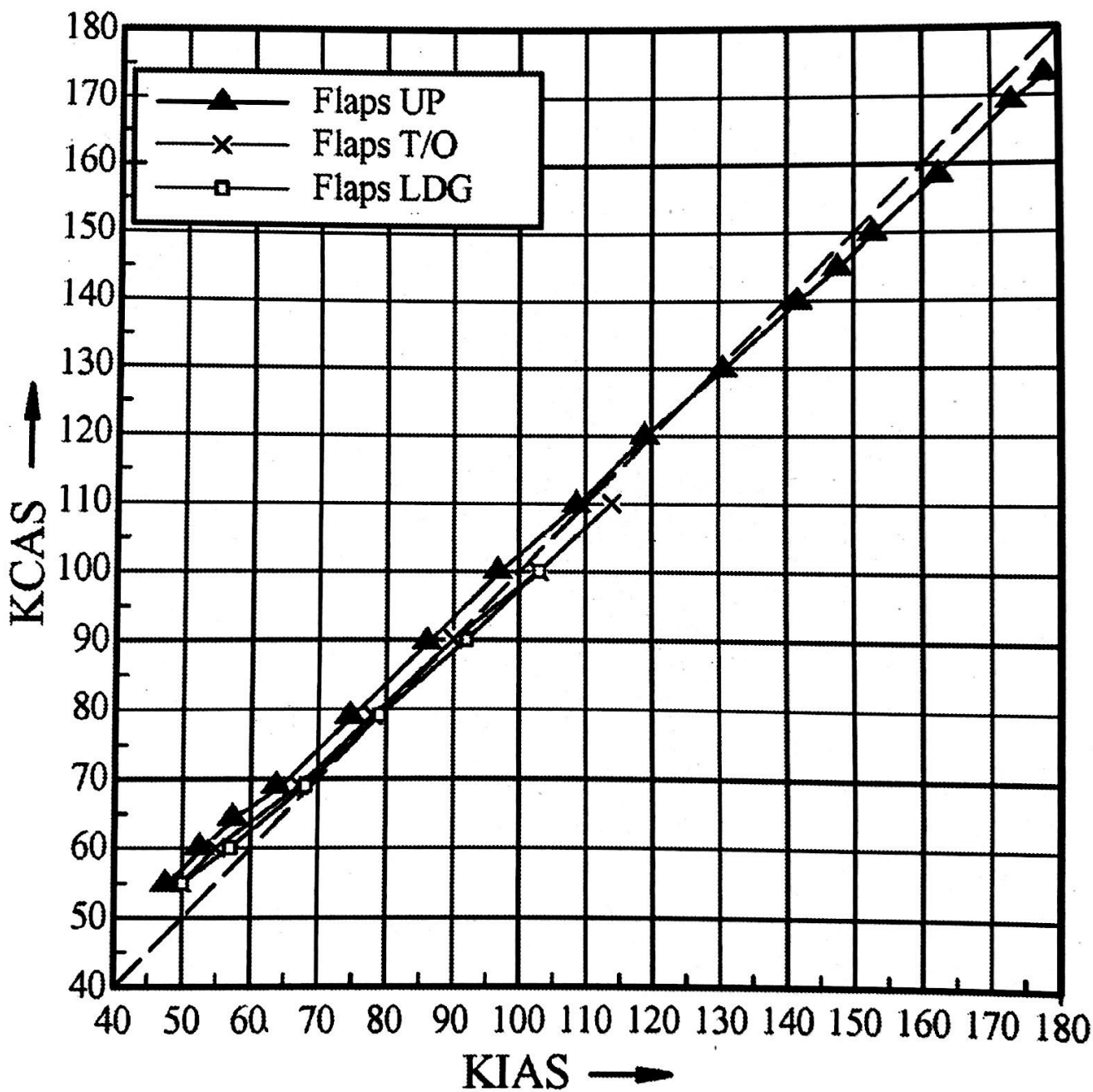
5.2 USE OF THE PERFORMANCE TABLES AND DIAGRAMS

In order to illustrate the influence of a number of different variables, the performance data is reproduced in the form of tables or diagrams. These contain sufficiently detailed information so that conservative values can be selected and used for the determination of adequate performance data for the planned flight.

- Where appropriate, any flight performance degradation resulting from the absence of wheel fairings is given as a percentage.
- The installation of the optional fairings on the main landing gear struts and/or nose landing gear strut has only minor effects on the flight performance of the DA 40. Therefore, no change applies to the performance tables and diagrams.

5.3 PERFORMANCE TABLES AND DIAGRAMS

5.3.1 AIRSPEED CALIBRATION



5.3.2 TABLE FOR SETTING ENGINE PERFORMANCE

NOTE

If the Long Range Tank is installed:

Auxiliary fuel below 3 US gal cannot be indicated by the system. If a fuel indicator shows 16 US gal and the auxiliary fuel indicator reads 0 US gal on the same side, for in-flight fuel consumption / flight planning a fuel quantity available of 16 US gal must be assumed.

			Engine power as % of max. take-off power						
			45 %				55 %		
			RPM		1800	2000	2200	2400	2000
Fuel Flow [US gal/h]	Best Economy		5.8	6	6.3	6.6	7	7.2	7.5
	Best Power		-	-	7.3	7.7	-	8.5	8.7
ISA	[°C]	[°F]	Manifold Pressure (MP) [inHg]						
MSL	15	59	22.7	21.3	20.2	19.0	23.9	22.4	21.2
1000	13	55	22.4	21.0	19.9	18.7	23.6	22.2	21.0
2000	11	52	22.1	20.7	19.6	18.4	23.3	21.9	20.7
3000	9	48	21.8	20.4	19.3	18.2	23.0	21.6	20.4
4000	7	45	21.5	20.2	19.0	17.9	22.7	21.2	20.1
5000	5	41	21.2	19.9	18.7	17.6	22.3	20.9	19.8
6000	3	38	20.9	19.6	18.4	17.4	22.0	20.6	19.5
7000	1	34	20.5	19.3	18.2	17.1	21.7	20.3	19.3
8000	-1	31	20.2	19.0	17.9	16.9	21.3	20.0	19.0
9000	-3	27	19.9	18.7	17.6	16.6	21.1	19.7	18.7
10000	-5	23	19.6	18.4	17.3	16.3	-	19.4	18.4
11000	-7	19	19.3	18.2	17.0	16.1		19.1	18.1
12000	-9	16	-	17.9	16.7	15.8		-	17.8
13000	-11	12		17.6	16.4	15.5			17.6
14000	-13	9		-	16.1	15.3			-
15000	-15	6			15.8	15.0			
16000	-17	2			15.5	14.7			
17000	-19	-2			-	14.5			

			Engine power as % of max. take-off power				
			65 %		75 %		
Fuel Flow [US gal/h]	RPM		2000	2200	2400	2200	2400
	Best Economy	Best Power	7.9	8.2	8.5	9.2	9.5
			-	9.5	9.8	10.7	11
ISA	[°C]	[°F]	Manifold Pressure (MP) [InHg]				
MSL	15	59	26.8	24.9	23.4	27.3	25.8
1000	13	55	26.4	24.5	23.2	26.8	25.5
2000	11	52	26.0	24.2	22.9	26.5	25.2
3000	9	48	25.7	23.8	22.6	26.1	24.8
4000	7	45	25.4	23.5	22.3	-	24.5
5000	5	41	-	23.1	22.0		24.1
6000	3	38		22.8	21.7		-
7000	1	34		22.4	21.4		
8000	-1	31		-	21.0		
9000	-3	27			20.7		
10000	-5	23			-		

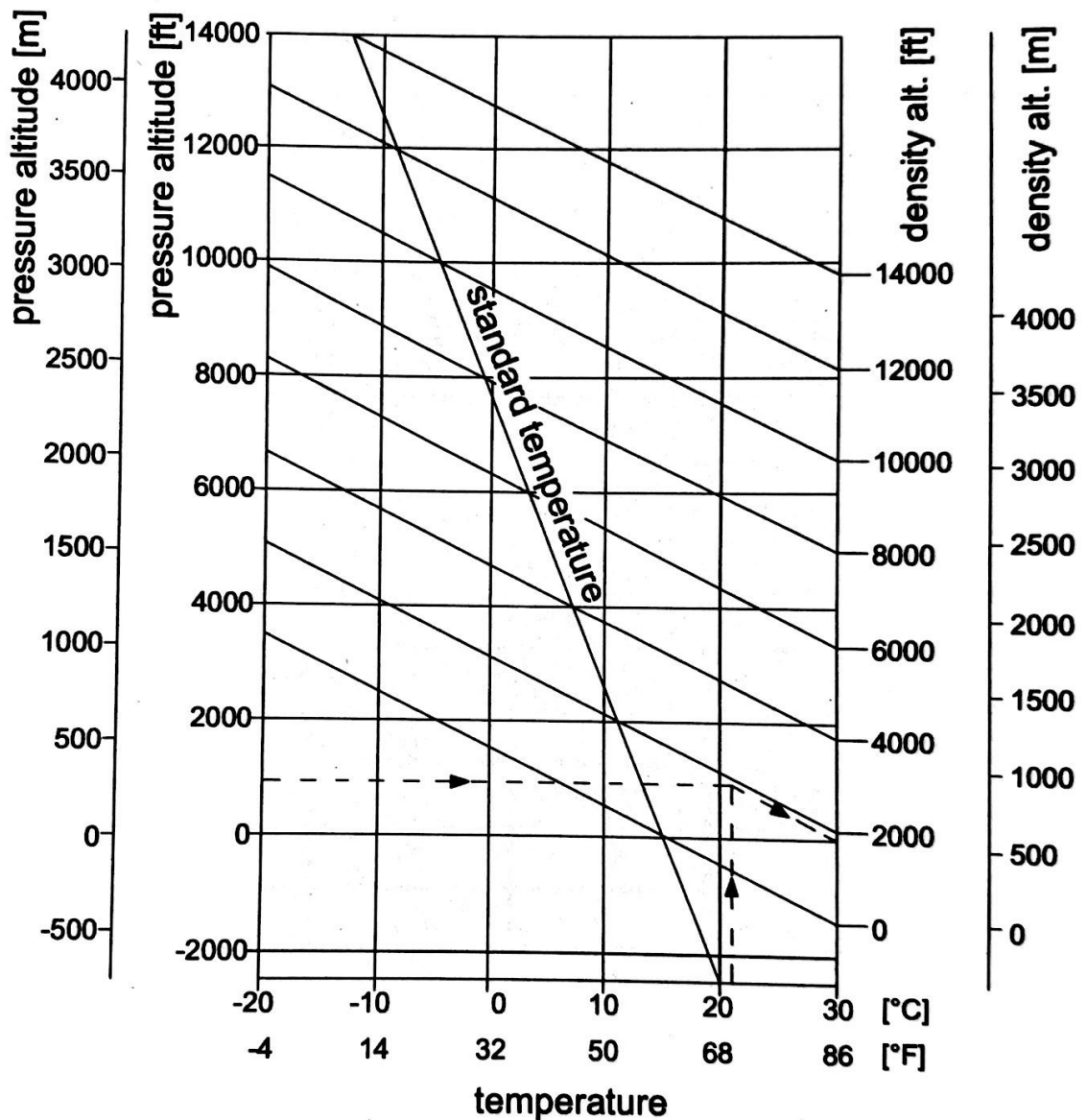
The areas shaded grey under each RPM heading are the recommended bands.

Correcting the table for variation from Standard Temperature

- At ISA + 15 °C (ISA + 27 °F) the performance values fall by approx. 3 % of the power selected according to the above table.
- At ISA - 15 °C (ISA - 27 °F) the performance values rise by approx. 3 % of the power selected according to the above table.

5.3.3 PRESSURE ALTITUDE - DENSITY ALTITUDE

Conversion from pressure altitude to density altitude.



- Example:**
1. Set 1013.25 hPa on altimeter and read pressure altitude (900 ft).
 2. Establish ambient temperature (+21 °C).
 3. Read off density altitude (1800 ft).

Result: From a performance calculation standpoint the airplane is at 1800 ft.

5.3.4 STALLING SPEEDSMass: 980 kg (2161 lb)

Airspeeds in KIAS

980 kg		Bank Angle			
		0°	30°	45°	60°
Flaps	UP	47	52	58	73
	T/O	44	51	58	72
	LDG	42	49	57	71

Mass: 1150 kg (2535 lb)

Airspeeds in KIAS

1150 kg		Bank Angle			
		0°	30°	45°	60°
Flaps	UP	52	57	66	79
	T/O	51	55	64	78
	LDG	49	55	62	76

5.3.4 STALLING SPEEDS

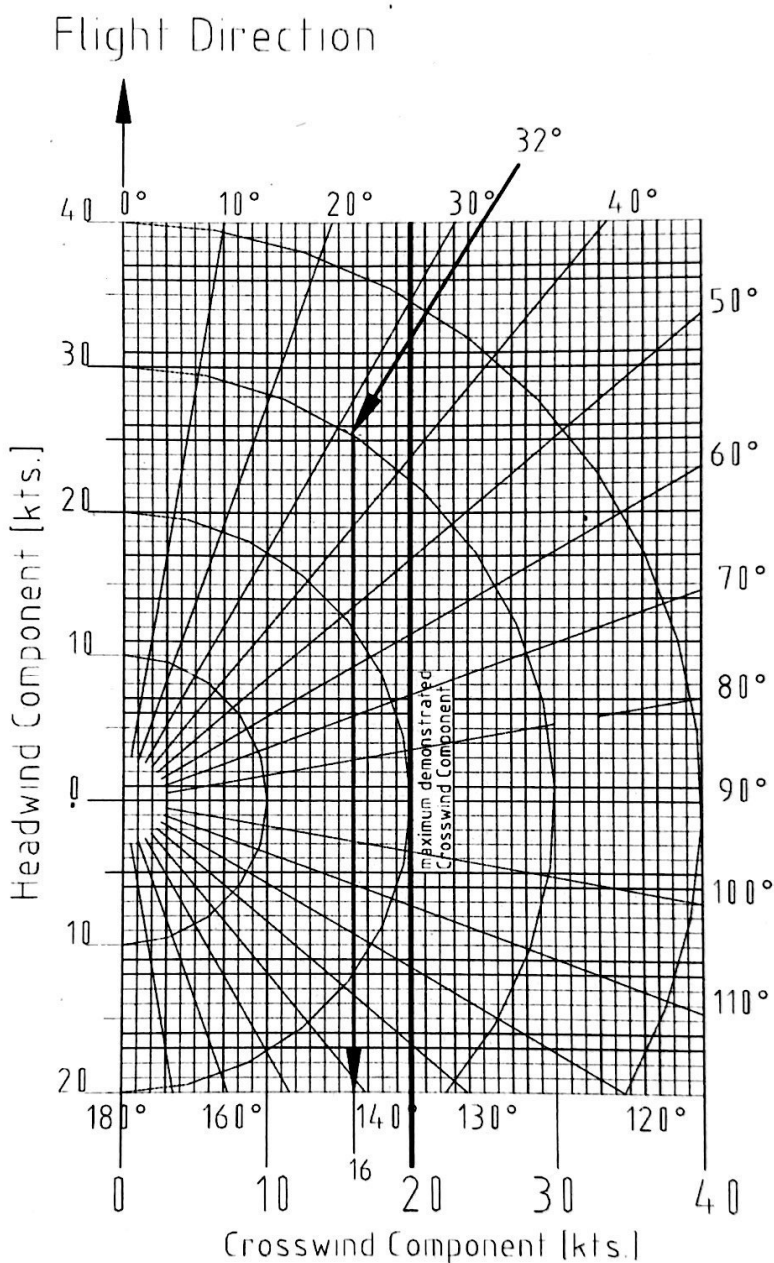
The following table is added:

Mass: 1200 kg (2646 lb) (if MÄM 40-227 is carried out)

Airspeeds in KIAS

1200 kg		Bank Angle			
		0°	30°	45°	60°
Flaps	UP	53	58	68	83
	T/O	52	57	67	81
	LDG	52	57	66	80

5.3.5 WIND COMPONENTS



Example: Flight direction : 360°
 Wind : 32°/30 kts
 Result: Crosswind component : 16 kts
 Max. demonstrated crosswind component : 20 kts

5.3.6 TAKE-OFF DISTANCE

- Conditions:
- Throttle MAX PWR
 - RPM lever 2700 RPM
 - Flaps T/O
 - Lift-off speed approx. 59 KIAS
 - Climb-out speed 66 KIAS (1150 kg, 2535 lb)
60 KIAS (below 1000 kg,
2205 lb)
 - Runway level, asphalt surface

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable external factors (high temperature, rain, unfavorable wind conditions, including cross-wind) will increase the take-off distance.

CAUTION

For a safe take-off the take-off run available (TORA) should be at least equal to the take-off distance over a 50 ft (15 m) obstacle.

5.3.6 TAKE-OFF DISTANCE

The checklist is amended to read:

- Conditions:
- Throttle MAX PWR
 - RPM lever 2700 RPM
 - Flaps T/O
 - Lift-off speed approx. 59 KIAS
 - Climb-out speed 67 KIAS (1200 kg, 2646 lb)
66 KIAS (1150 kg, 2535 lb)
60 KIAS (below 1000 kg, 2205 lb)
 - Runway level, asphalt surface

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the take-off roll may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe take-off.

NOTE

For take-off from dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

- grass up to 5 cm (2 in) long: 10 % increase in take-off roll.
- grass 5 to 10 cm (2 to 4 in) long: 15 % increase in take-off roll.
- grass longer than 10 cm (4 in): at least 25 % increase in take-off roll.
- grass longer than 25 cm (10 in): take-off should not be attempted.

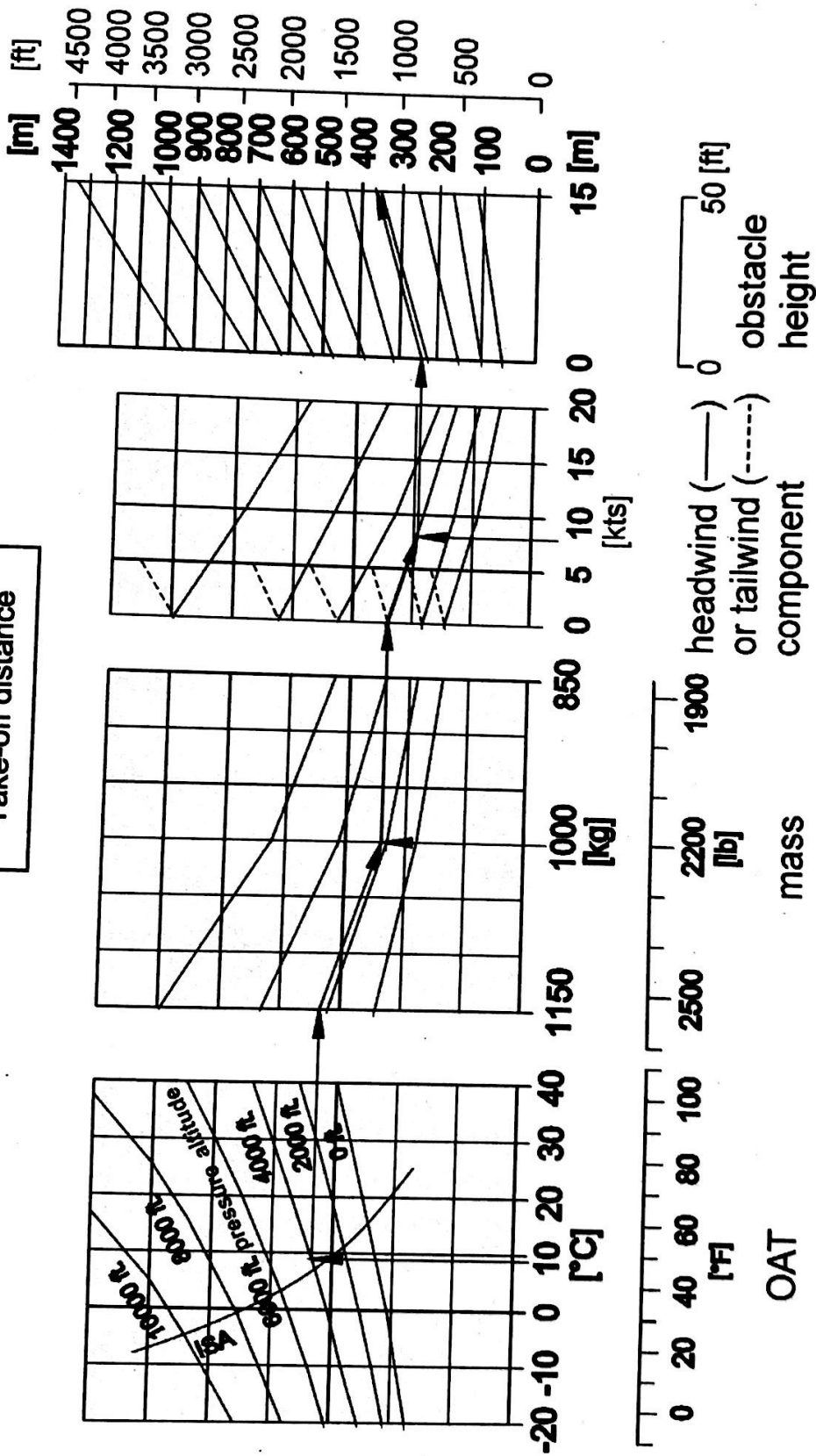
NOTE

On wet grass, a further 10 % increase in take-off roll must be expected.

NOTE

An uphill slope of 2 % (2 m per 100 m, or 2 ft per 100 ft) results in an increase in the take-off distance of approximately 10 %. The effect on the take-off roll can be greater.

Take-off distance



Example:

Pressure altitude : 4000 ft

OAT : 8 °C (46 °F)

Mass : 1000 kg (2205 lb)

Headwind comp. : 8 kts

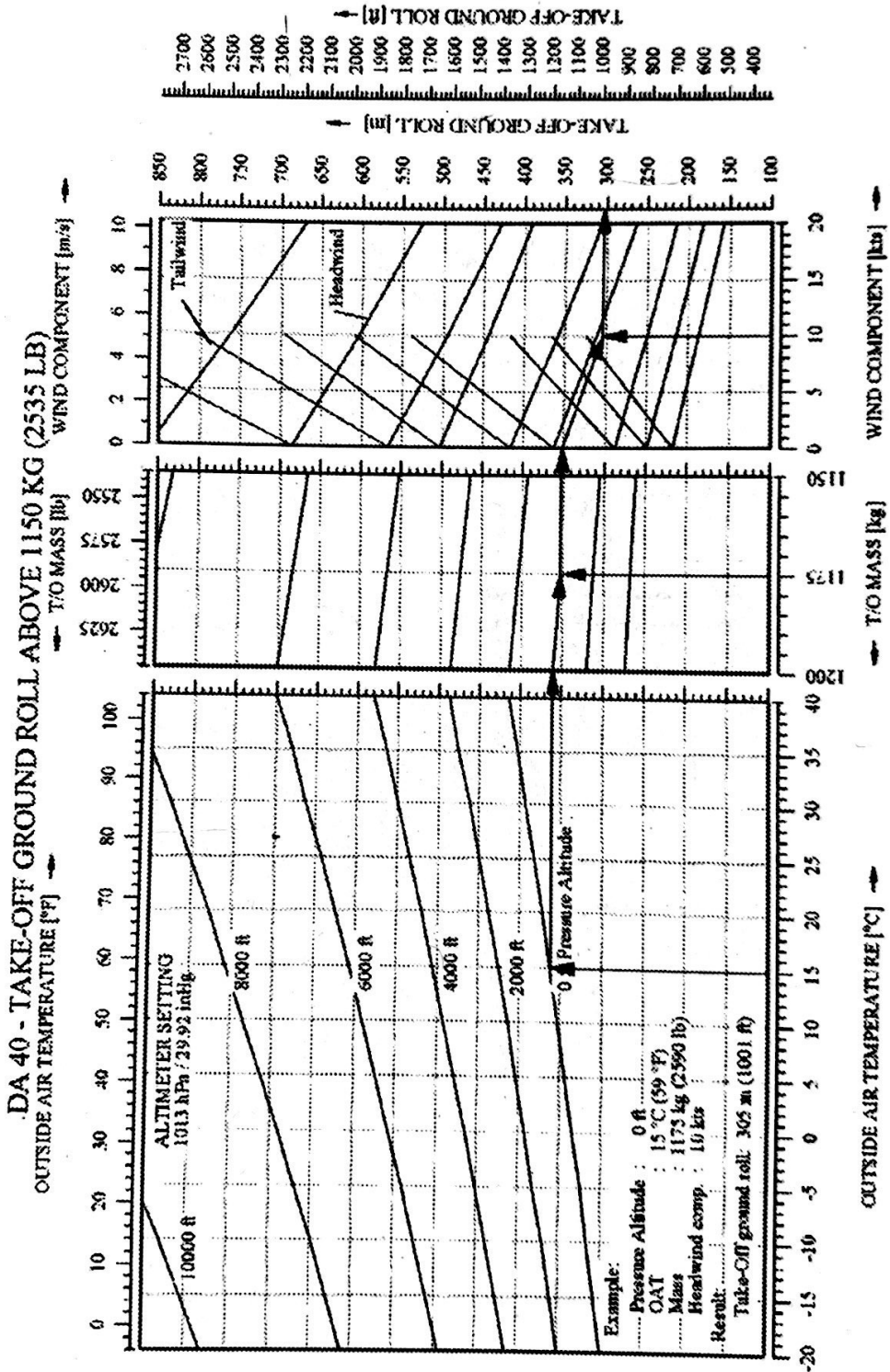
Result:

T/O roll

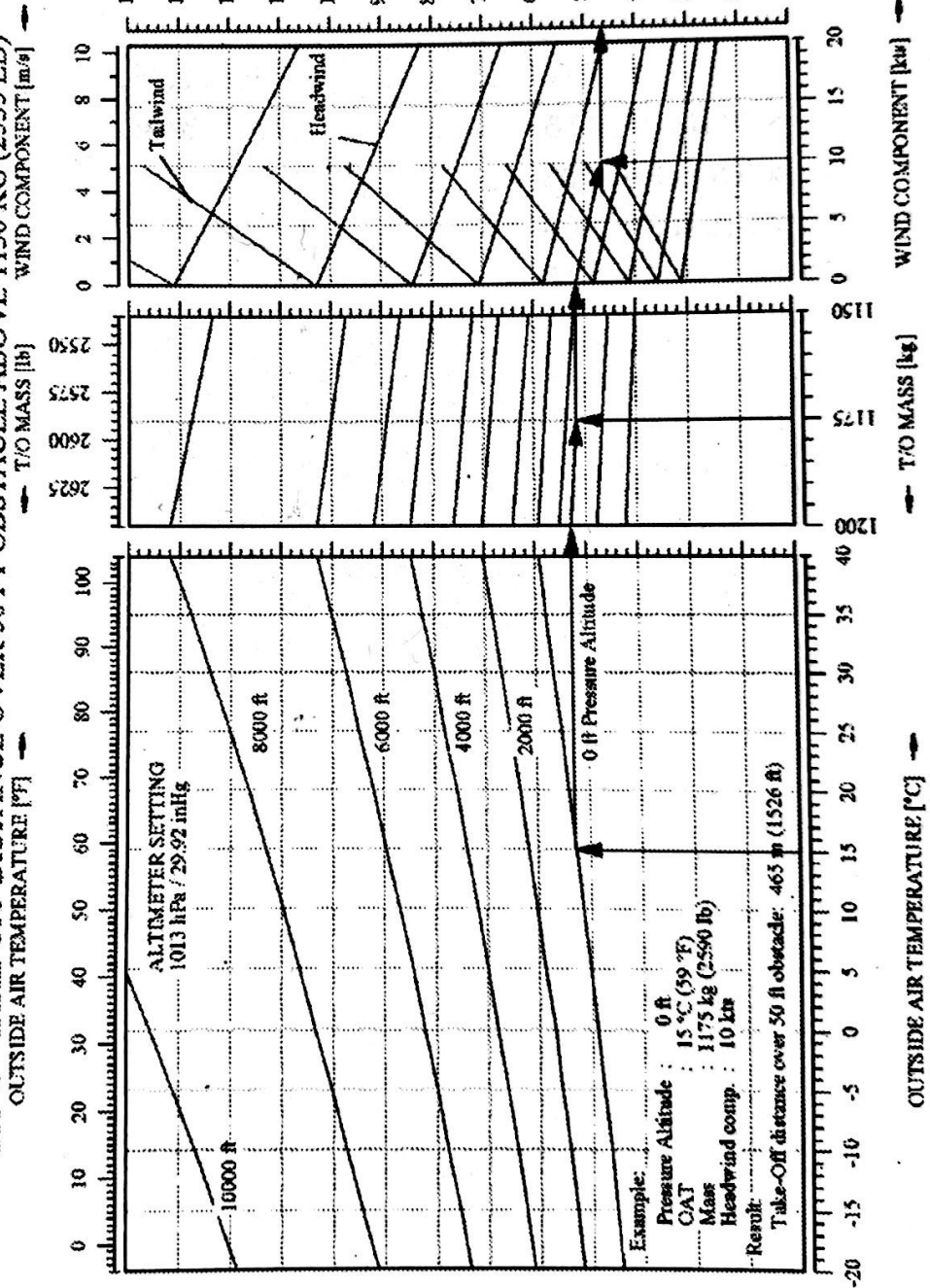
T/O distance over 50 ft obstacle : approx. 370 m (1214 ft)

: approx. 240 m (787 ft)

The performance diagrams are added:



DA 40 - TAKE-OFF DISTANCE OVER 50 FT OBSTACLE ABOVE 1150 KG (2535 LB)



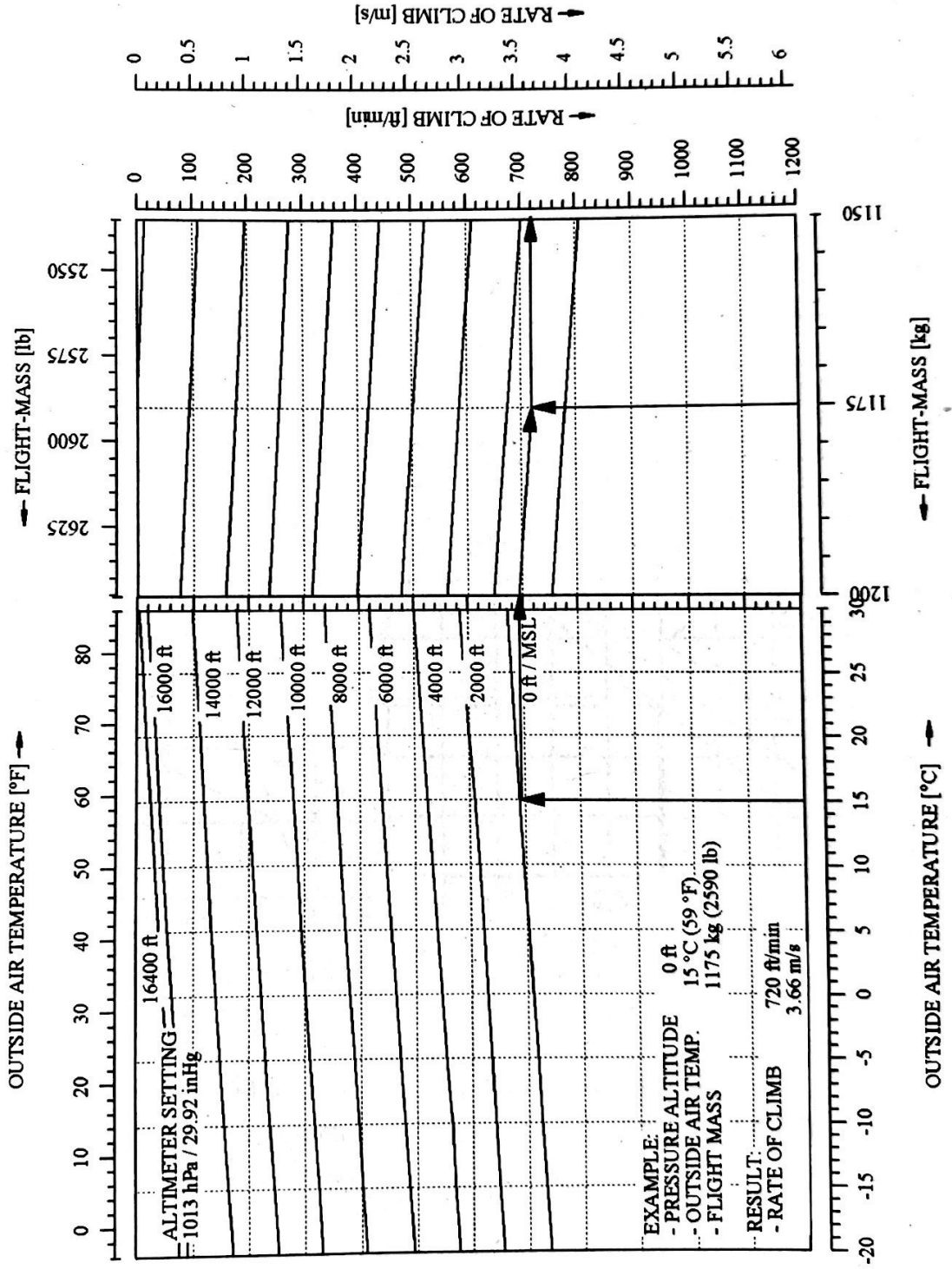
5.3.7 CLIMB PERFORMANCE- TAKE-OFF CLIMB

The checklist is amended to read:

- Conditions:
- Throttle MAX PWR
 - RPM lever 2400 RPM
 - Flaps T/O
 - Airspeed 67 KIAS (1200 kg, 2646 lb)
66 KIAS (1150 kg, 2535 lb)
60 KIAS (1000 kg, 2205 lb)
54 KIAS (850 kg, 1874 lb)

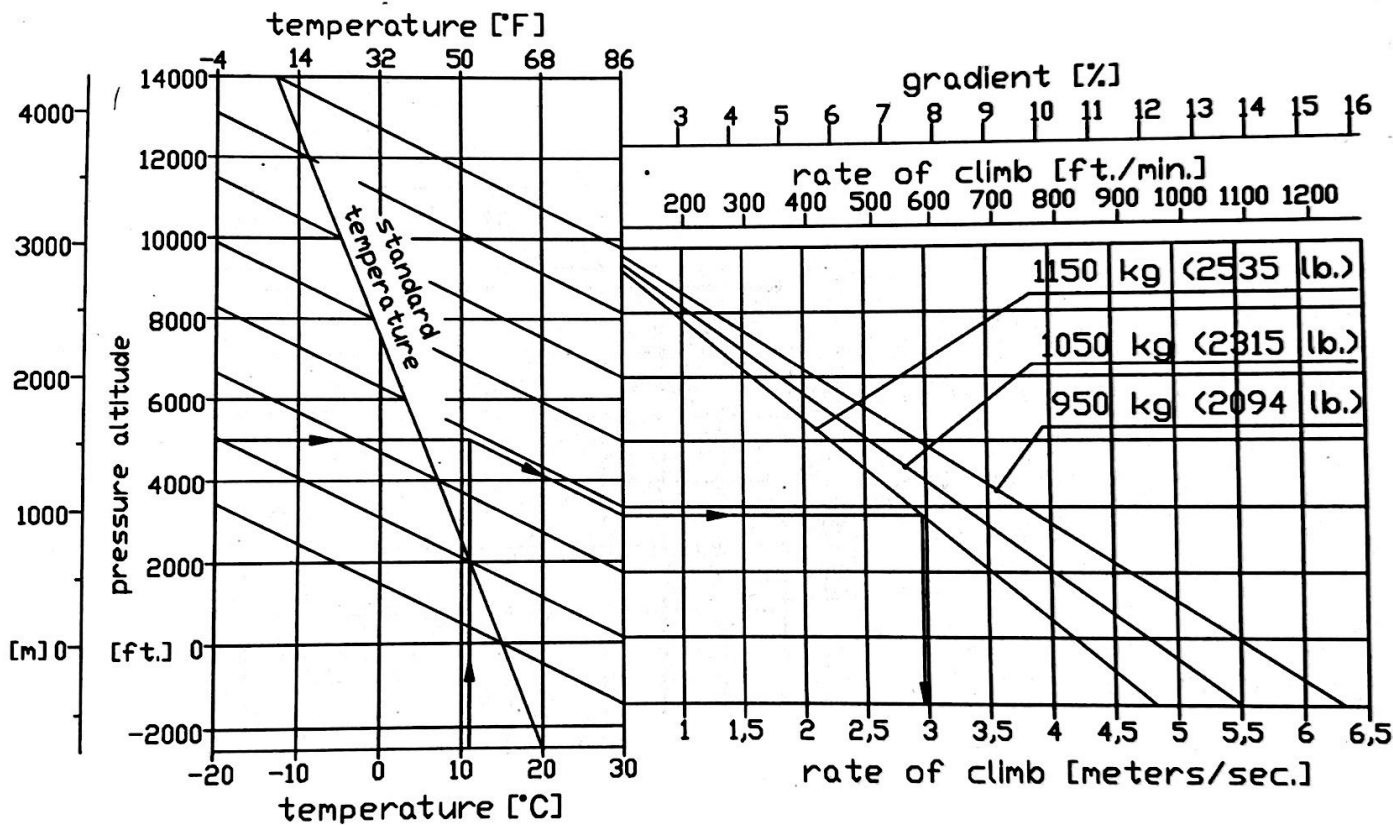
The performance diagram is added:

DA 40 - TAKE-OFF CLIMB PERFORMANCE ABOVE 1150 KG (2535 LB)



5.3.7 CLIMB PERFORMANCE - TAKE-OFF CLIMB

- Conditions:
- Throttle MAX PWR
 - RPM lever 2400 RPM
 - Flaps T/O
 - Airspeed 66 KIAS (1150 kg, 2535 lb)
60 KIAS (1000 kg, 2205 lb)
54 KIAS (850 kg, 1874 lb)

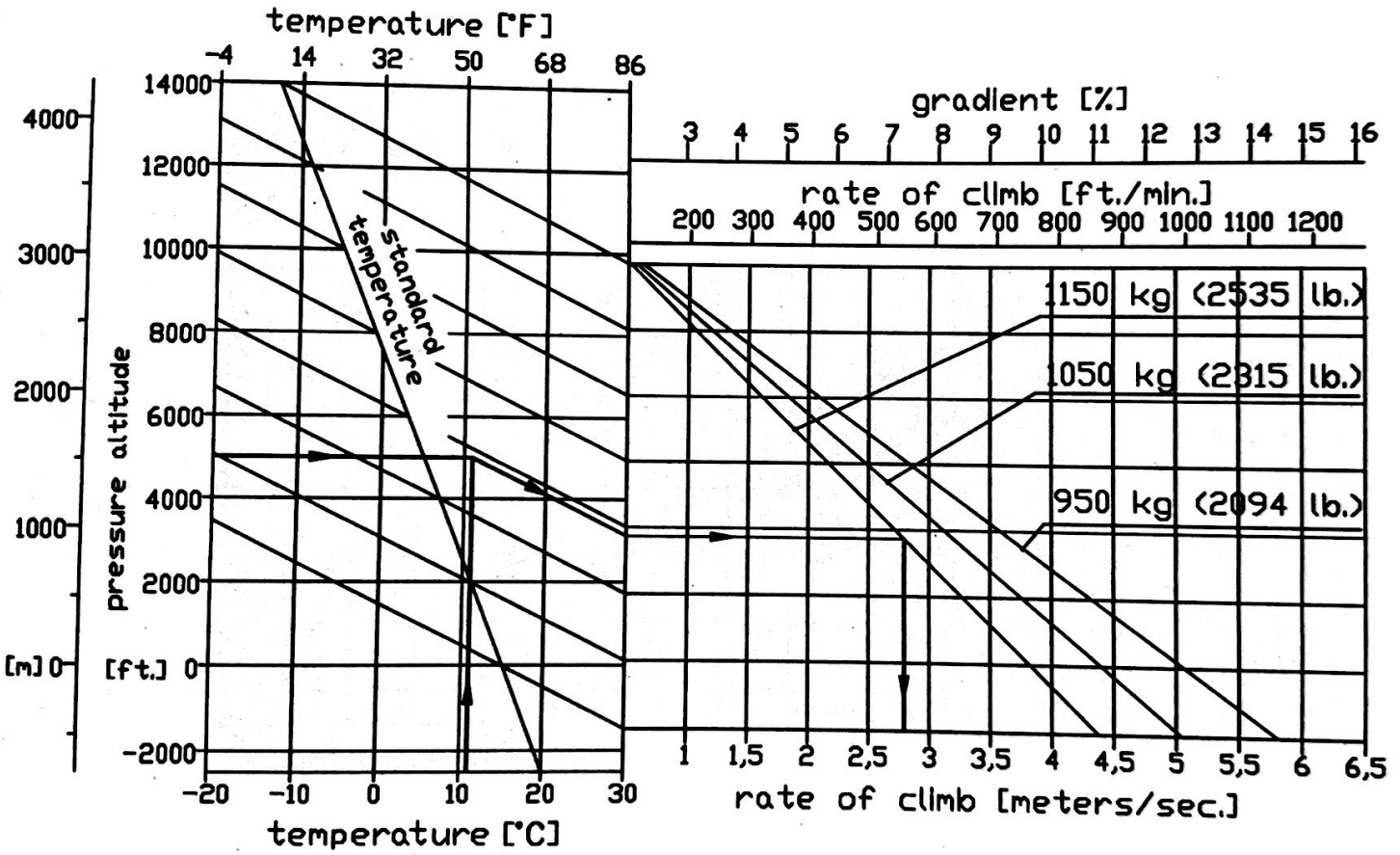


Example: Pressure altitude 5000 ft
 Temperature 12 °C (54 °F)
 Take-off mass 1150 kg (2535 lb)

Result: Rate of climb 3.0 m/s (591 ft/min)

5.3.8 CLIMB PERFORMANCE - CRUISE CLIMB

- Conditions:
- Throttle MAX PWR
 - RPM lever 2400 RPM
 - Flaps UP
 - Airspeed 73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)



Example: Pressure altitude 5000 ft
 Temperature 12 °C (54 °F)
 Take-off mass 1150 kg (2535 lb)

Result: Rate of climb 2.8 m/s (551 ft/min)

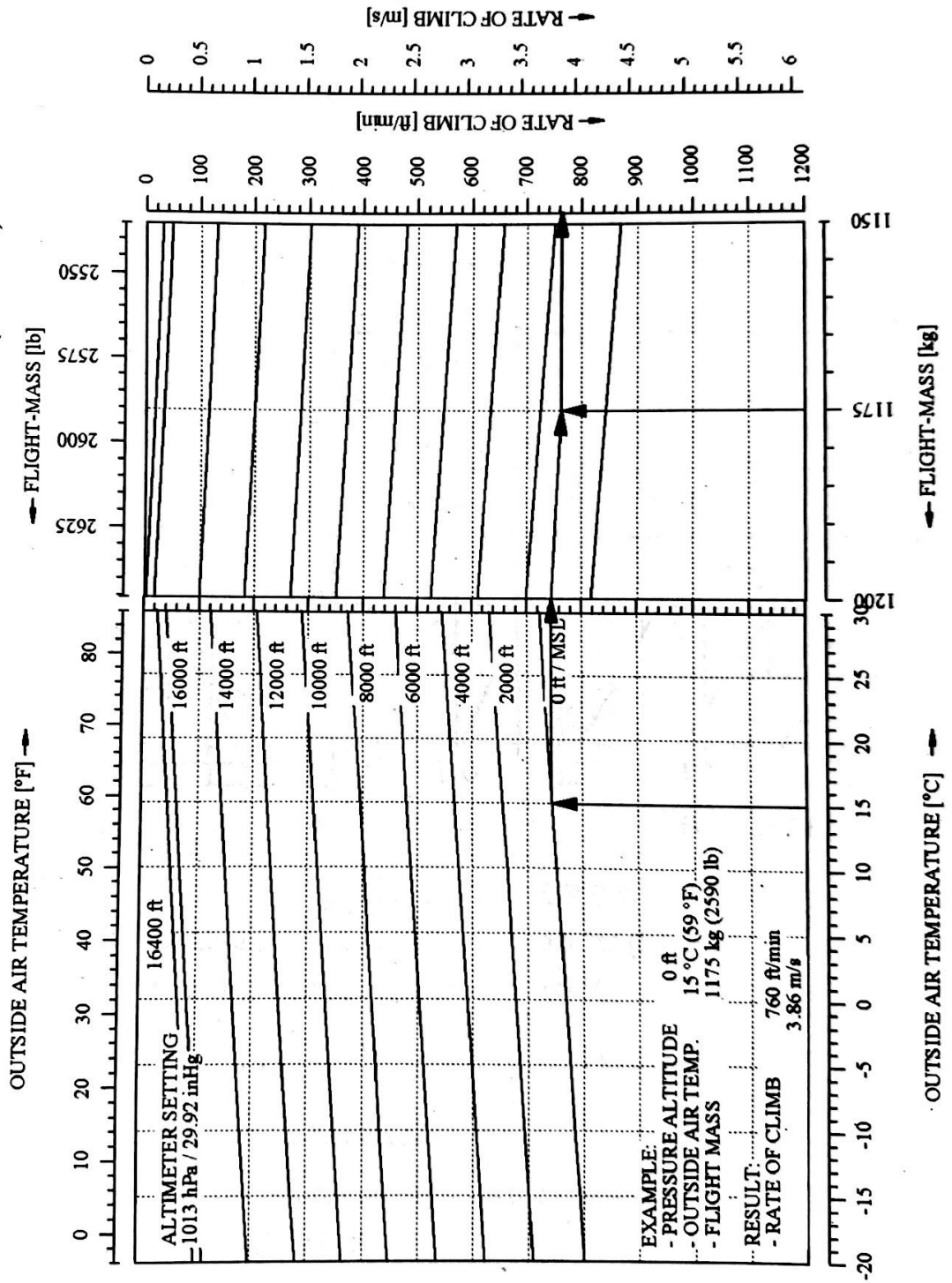
5.3.8 CLIMB PERFORMANCE - CRUISE CLIMB

The checklist is amended to read:

- Conditions:
- Throttle MAX PWR
 - RPM lever 2400 RPM
 - Flaps UP
 - Airspeed 76 KIAS (1200 kg, 2646 lb)
73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)

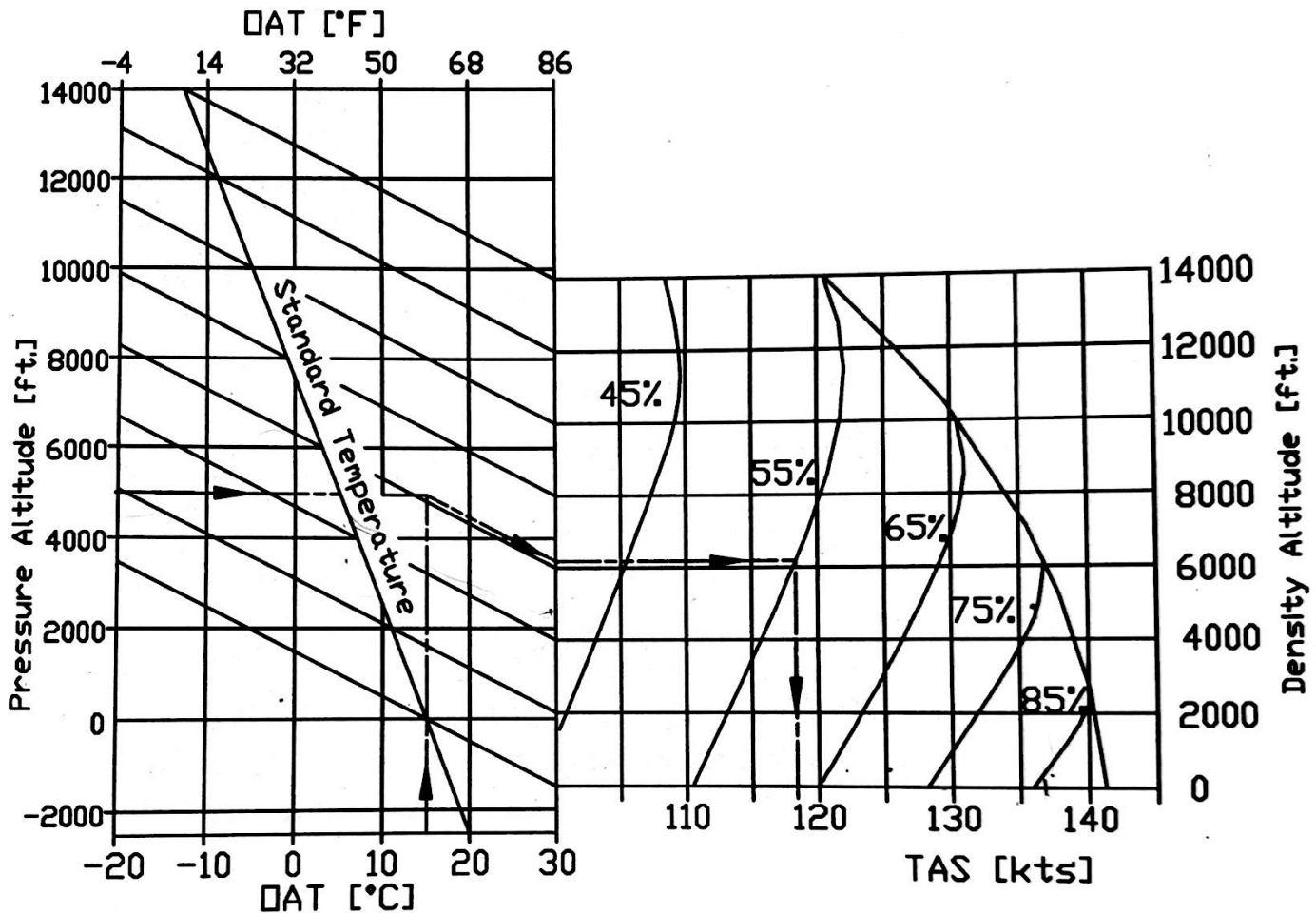
The performance diagram is added:

DA 40 - CRUISE CLIMB PERFORMANCE ABOVE 1150 KG (2535 LB)



5.3.9 CRUISING (TRUE AIRSPEED TAS)

Diagram to establish True Airspeed (TAS) at a given power setting.



Example: Pressure altitude 5000 ft
 Temperature 15 °C (59 °F)
 Power setting 55 %

Result: True Airspeed (TAS) 118 kts

CAUTION

In case of operation without wheel fairings the cruising speed reduces by approximately 5 %.

5.3.10 LANDING DISTANCE - FLAPS LDG

- Conditions:
- Throttle IDLE
 - RPM lever HIGH RPM
 - Flaps LDG
 - Approach speed 71 KIAS (1150 kg, 2535 lb)
63 KIAS (1000 kg, 2205 lb)
58 KIAS (850 kg, 1874 lb)
 - Runway level, asphalt surface

values for ISA and MSL, at 1150 kg (2535 lb)	
Landing distance over a 50 ft (15 m) obstacle	approx. 638 m (2093 ft)
Ground roll	approx. 352 m (1155 ft)

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable external factors (high temperature, rain, unfavorable wind conditions, including cross-wind, etc.) will increase the landing distance.

CAUTION

For a safe landing the landing distance available (LDA) should be at least equal to the landing distance over a 50 ft (15 m) obstacle.

5.3.10 LANDING DISTANCE - FLAPS LDG

The checklist is amended to read:

- Conditions:
- Throttle IDLE
 - RPM lever HIGH RPM
 - Flaps LDG
 - Approach speed 73 KIAS (1200 kg, 2646 lb)
71 KIAS (1150 kg, 2535 lb)
63 KIAS (1000 kg, 2205 lb)
58 KIAS (850 kg, 1874 lb)
 - Runway level, asphalt surface

The NOTE is added in front of the existing table:

NOTE

A landing mass above 1150 kg (2535 lb) up to 1200 kg (2646 lb) will increase the landing distance over a 50 ft (15 m) obstacle and the landing ground roll distance up to 6%.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the landing distance may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe landing.

NOTE

For landings on dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

- grass up to 5 cm (2 in) long: 5 % increase in landing roll.
- grass 5 to 10 cm (2 to 4 in) long: 15 % increase in landing roll.
- grass longer than 10 cm (4 in): at least 25 % increase in landing roll.

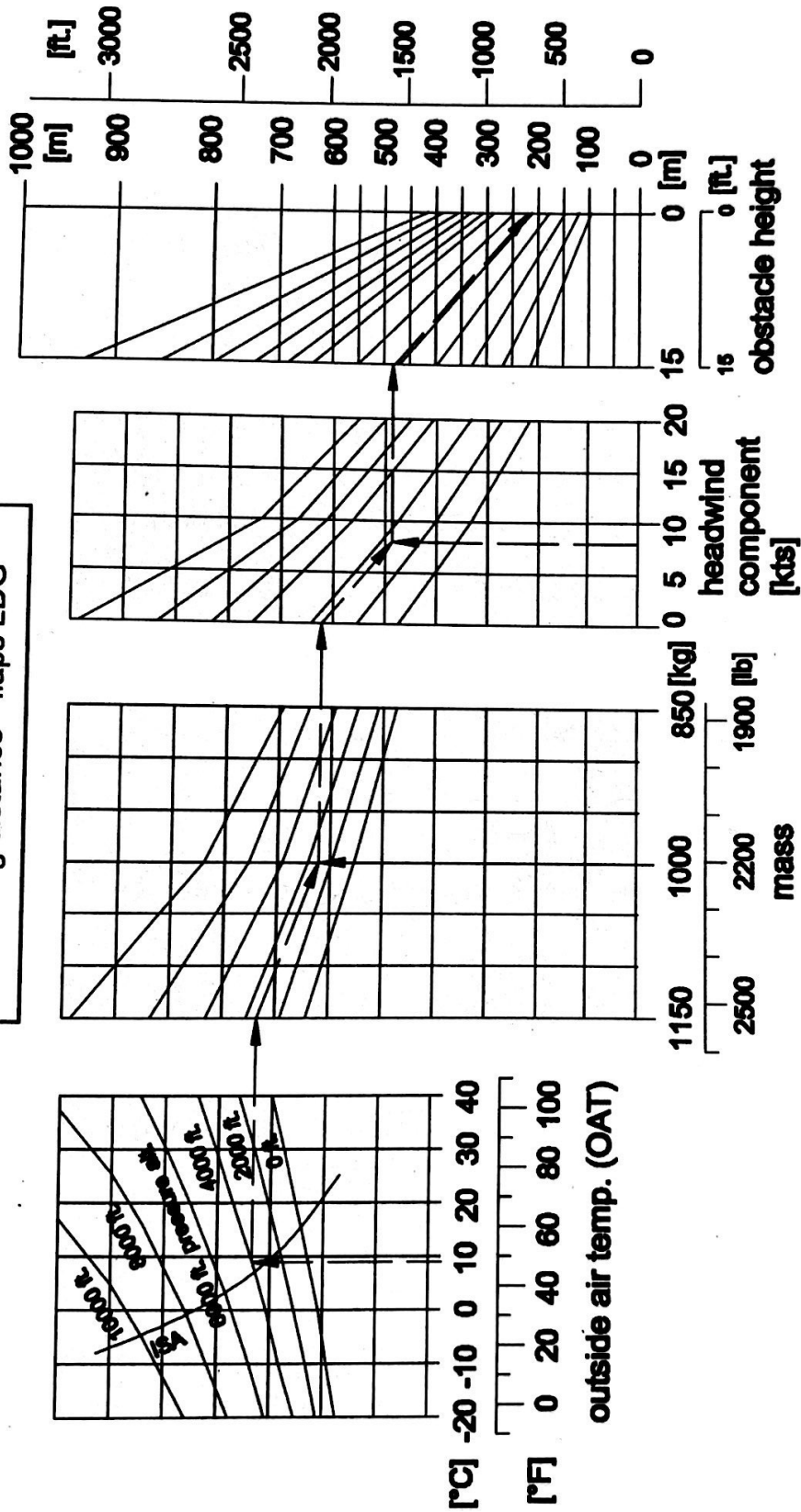
NOTE

On wet grass, a further 10 % increase in landing roll must be expected.

NOTE

A downhill slope of 2 % (2 m per 100 m, or 2 ft per 100 ft) results in an increase in the landing distance of approximately 10 %. The effect on the landing roll can be greater.

Landing distance - flaps LDG



Example:

Pressure altitude : 4000 ft

OAT : 8 °C (46 °F)

Mass : 1000 kg (2205 lb)

Headwind comp. : 8 kts

Result:

Landing distance over 50 ft obstacle : approx. 480 m (1575 ft)

Ground roll : approx. 230 m (755 ft)

5.3.11 LANDING DISTANCE - FLAPS UP

The checklist is amended to read:

- Conditions:
- Throttle IDLE
 - RPM lever HIGH RPM
 - Flaps LDG
 - Approach speed 73 KIAS (1200 kg, 2646 lb)
71 KIAS (1150 kg, 2535 lb)
63 KIAS (1000 kg, 2205 lb)
58 KIAS (850 kg, 1874 lb)
 - Runway level, asphalt surface

The NOTE is added in front of the existing table:

NOTE

A landing mass above 1150 kg (2535 lb) up to 1200 kg (2646 lb) will increase the landing distance over a 50 ft (15 m) obstacle and the landing ground roll distance up to 6%.

5.3.11 LANDING DISTANCE - FLAPS UP

- Conditions:
- Throttle IDLE
 - RPM lever HIGH RPM
 - Flaps UP
 - Approach speed 71 KIAS (1150 kg, 2535 lb)
63 KIAS (1000 kg, 2205 lb)
58 KIAS (850 kg, 1874 lb)
 - Runway level, asphalt surface

values for ISA and MSL, at 1150 kg (2535 lb)	
Landing distance over a 50 ft (15 m) obstacle	approx. 775 m (2543 ft)
Ground roll	approx. 471 m (1545 ft)

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable external factors (high temperature, rain, unfavorable wind conditions, including cross-wind) will increase the landing distance.

CAUTION

For a safe landing the landing distance available (LDA) should be at least equal to the landing distance over a 50 ft (15 m) obstacle.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the landing distance may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe landing.

NOTE

For landings on dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

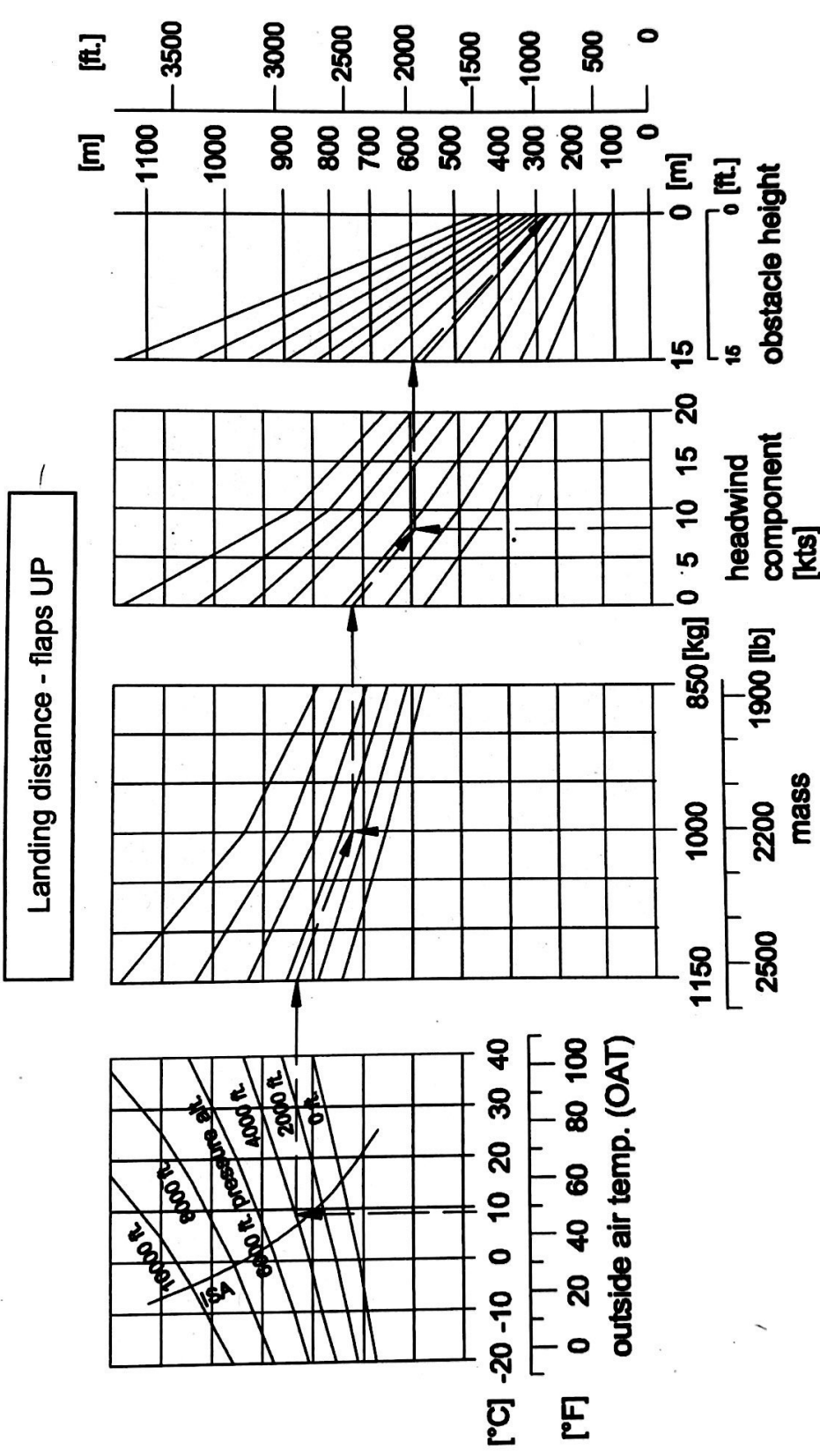
- grass up to 5 cm (2 in) long: 5 % increase in landing roll.
- grass 5 to 10 cm (2 to 4 in) long: 15 % increase in landing roll.
- grass longer than 10 cm (4 in): at least 25 % increase in landing roll.

NOTE

On wet grass, a further 10 % increase in landing roll must be expected.

NOTE

A downhill slope of 2 % (2 m per 100m or 2 ft per 100 ft) results in an increase in the landing distance of approximately 10 %. The effect on the landing roll can be greater.



Result:

Landing distance over 50 ft obstacle : approx. 580 m (1903 ft)
 Ground roll : approx. 270 m (886 ft)

Example:

Pressure altitude : 4000 ft
 OAT : 8 °C (46 °F)
 Mass : 1000 kg (2205 lb)
 Headwind comp. : 8 kts

5.3.12 GRADIENT OF CLIMB ON GO-AROUND

The DA 40 reaches a constant gradient of climb of 7.0 % in the following condition:

- Mass max. flight mass (1150 kg,
2535 lb)
- Power setting Take-off
- Flaps LDG
- Airspeed 70 KIAS
- ISA, MSL

5.3.13 APPROVED NOISE DATA

ICAO Annex 16 Chapter X : 69.28 dB(A)
JAR-36 Subpart C : 69.28 dB(A)

5.3.12 GRADIENT OF CLIMB ON GO-AROUND

The following is added behind the existing text:

- If MÄM 40-227 is carried out:
- The DA 40 reaches a constant gradient of climb of 7 % in the following condition:
 - - Mass max. flight mass
(1200 kg, 2646 lb)
 - - Power setting Take-off
 - - Flaps LDG
 - - Airspeed 73 KIAS
 - - ISA, MSL

5.3.13 APPROVED NOISE DATA

The following is added:

- if MÄM 40-227 is carried out:
- ICAO Annex 16 Chapter X
: 78.4 dB(A)
- JAR-36 Subpart C : 78.4 dB(A)