SECTION 5

PERFORMANCE

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PERFORMANCE

INTRODUCTION

This section provides all necessary data for accurate and comprehensive planning of flight activity from takeoff to landing.
Data reported in graphs and/or tables were determined by using:

- "flight test data" with conditions as prescribed by JAR-VLA
- aircraft and engine in good condition
- average piloting techniques

Each graph or table was determined according to ICAO Standard Atmosphere (ISA - m.s.l.); evaluations of the impact on performance was carried out by theoretical means for:

- airspeed
- external temperature
- altitude
- weight
- type and condition of runway

Sections approved by ENAC are highlighted by the writing *"Approved data"* immediately following the paragraph.

USE OF PERFORMANCE CHARTS

Performance data is presented in tabular or graphical form to illustrate the effect of different variables such as altitude, temperature and weight. Given information is sufficient to plan journey with required precision and safety.
Additional information is provided for each table or graph.

AIRSPEED INDICATOR SYSTEM CALIBRATION

(Approved data)

Graph shows calibrated airspeed V_{CAS} as a function of indicated airspeed V_{IAS}.

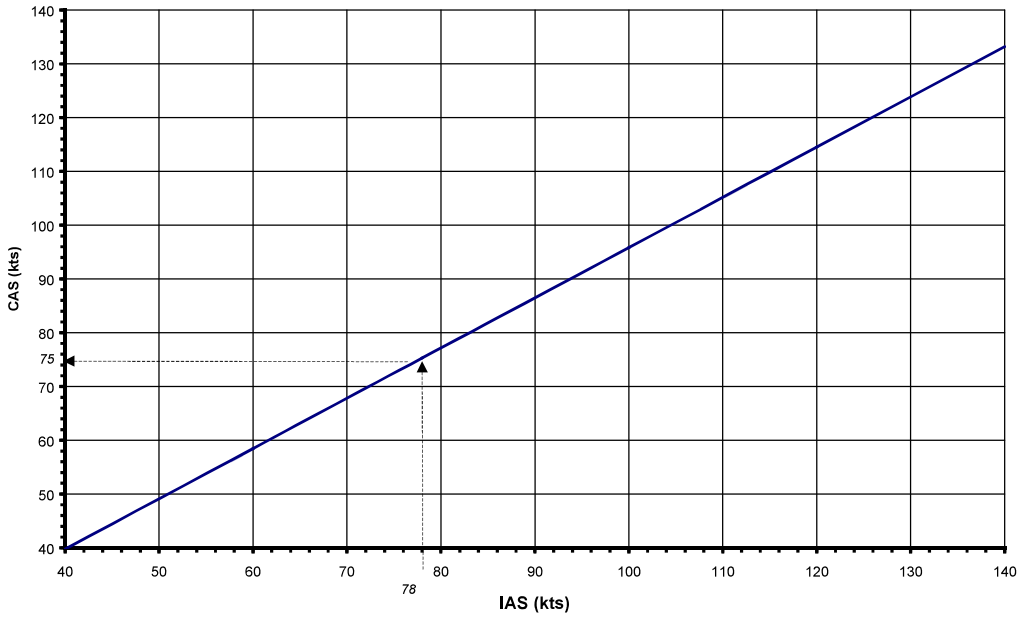


Fig. 5-1. CALIBRATED VS INDICATED AIRSPEED (BOTH MTOW)

⇒ *Example:*

Given	***Find***
V_{IAS} = 78 Kts	V_{CAS} = 75 Kts

NOTE

Indicated airspeed assumes 0 instrument error

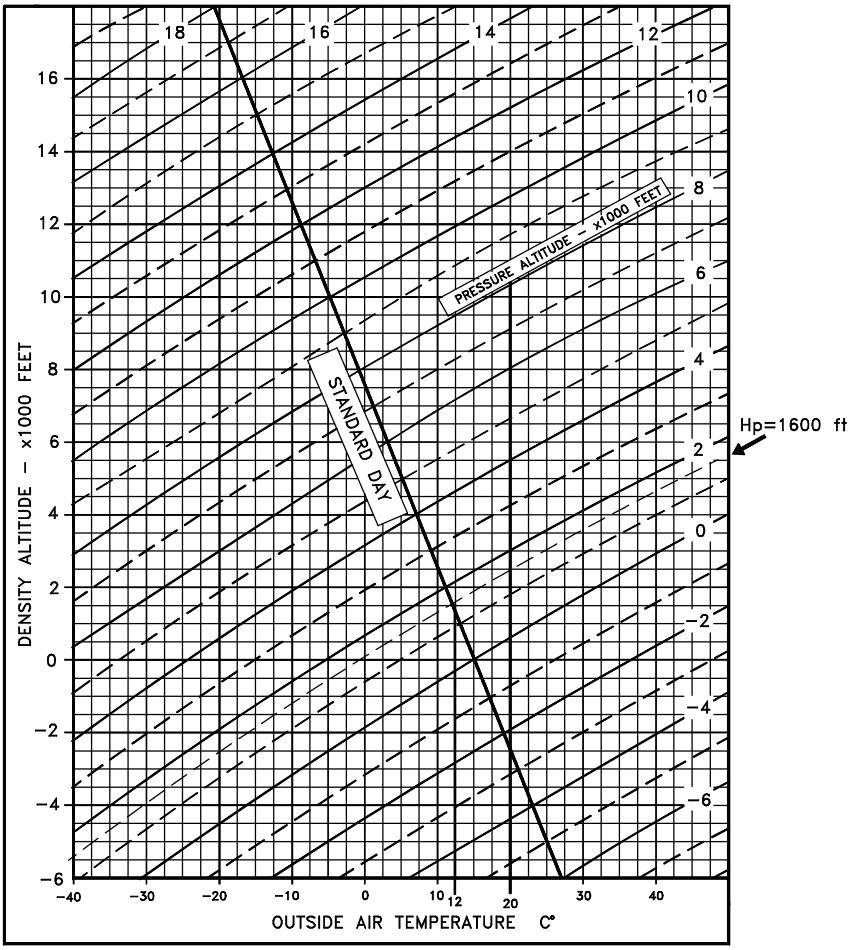


Fig. 5-2. ICAO CHART

⇒ *Example:*

Given	***Find***
Temperature = 20°C	Ts = *12°*
Pressure altitude = 1600 ft	

STALL SPEED *(Approved data)*

CONDITIONS:
- weight 550 kg
- engine idle
- no ground effect

	LATERAL BANKING							
	0°		*30°*		*45°*		*60°*	
FLAPS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
0°	**44**	43	**47**	46	**52**	51	**63**	61
15°	**42**	41	**45**	44	**50**	49	**60**	58
38°	**40**	39	**42**	41	**47**	46	**56**	55

CONDITIONS:
- weight 600 kg
- engine idle
- no ground effect

	LATERAL BANKING							
	0°		*30°*		*45°*		*60°*	
FLAPS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
0°	**46**	45	**49**	48	**54**	53	**66**	64
15°	**44**	43	**47**	46	**52**	51	**63**	61
38°	**41**	40	**44**	43	**49**	48	**58**	56

NOTE

Altitude loss during conventional stall recovery as demonstrated during test flights is approximately 100 ft with banking under 30°.

CROSSWIND

Maximum demonstrated crosswind velocity is 15 Kts

⇒ *Example:*

Given	***Find***
Wind direction = 30°	Headwind = 17.5 Kts
Wind velocity = 20 Kts	Crosswind = 10 Kts

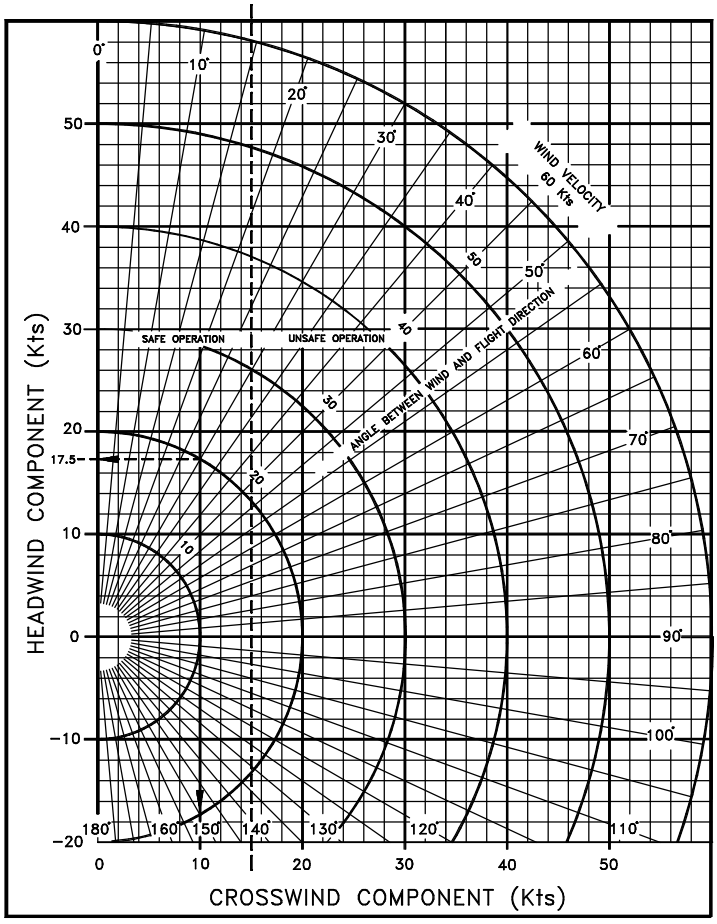


Fig. 5-3. CROSSWIND CHART

TAKEOFF PERFORMANCE *(Approved data)*

TAKEOFF DISTANCE

CONDITIONS:

		MTOW=550kg	MTOW=600kg
- Flaps: 15°			
- Engine: full throttle *(see Sect.4)*	- V_R =	47 KIAS	48 KIAS
- Runway: dry, compact, grass	- V_{obs} =	56 KIAS	58 KIAS
- Slope: 0° Wind: zero	- V_{LO} =	49 KIAS	51KIAS
- R/C ≥ 200 ft/min			

NOTE

1. *Decrease distances by 10% for each 10 Kts of headwind. Increase distances by 20 % for each 10 Kts of tailwind*
2. *For dry and paved runway operation decrease ground run by 6 %*

⇒ *Example:*

Given	***Find***
O.A.T. = 15°C	TOD = 253m
Pressure-altitude = 2900 ft	TOR = 117 m
MTOW = 600kg	
Weight = 450 Kg	

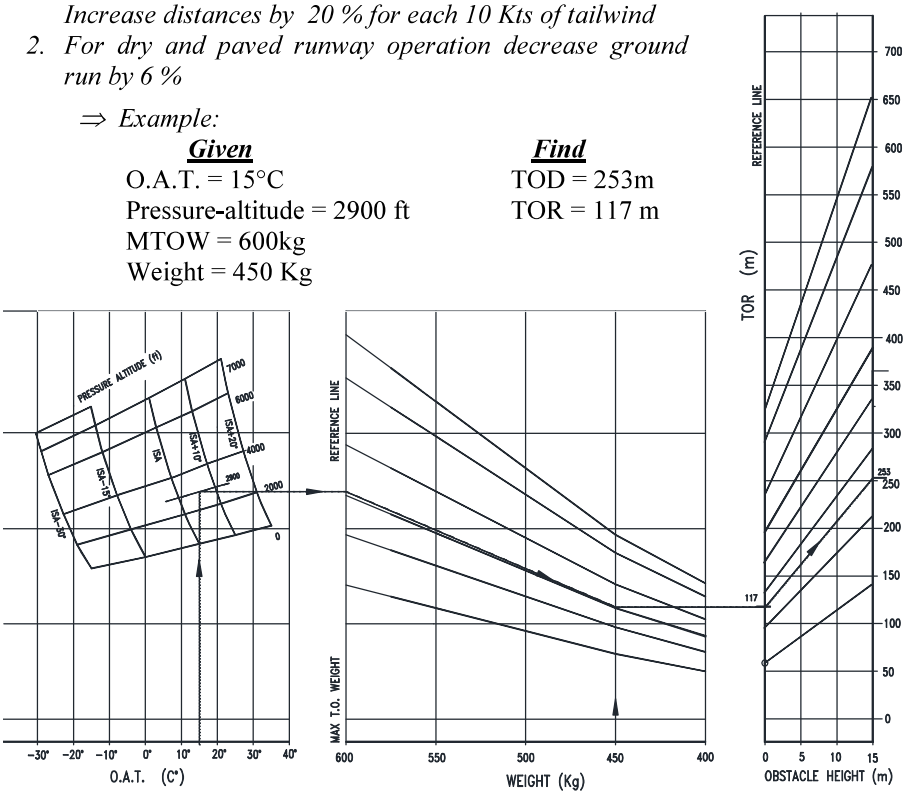


Fig. 5-4. TAKEOFF PERFORMANCE

CLIMB RATE IN TAKEOFF CONFIGURATION *(Approved data)*

CONDITIONS:

	550 kg MTOW	**600 kg MTOW**
- Flaps:	15°	15°
- Engine:	full throttle	full throttle
- V_{obs}:	56 KIAS	58 KIAS

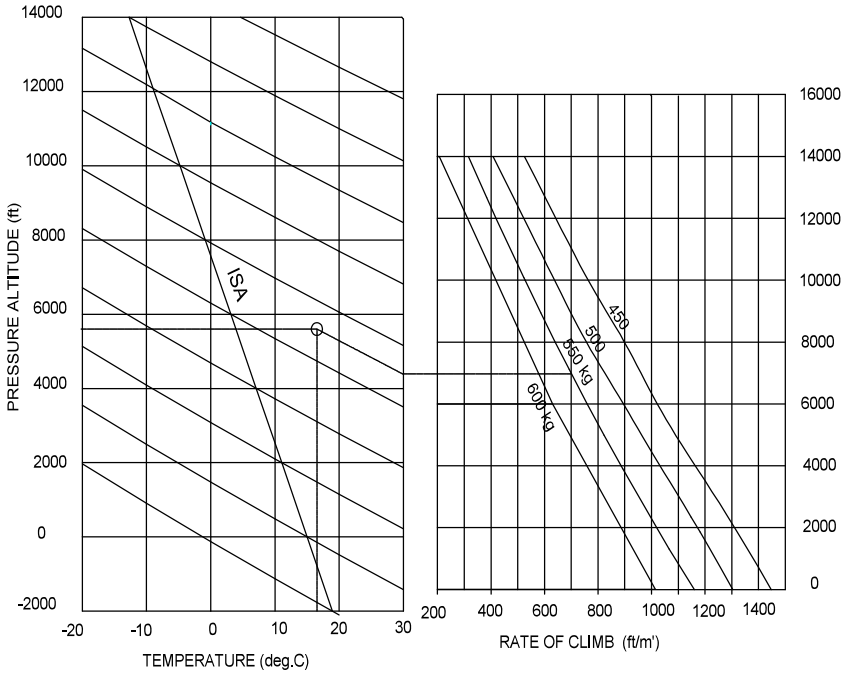
Climb rate in demonstrated ISA s.l. conditions is 850 ft/min at maximum takeoff weight of 550 kg and 750ft/min at maximum takeoff weight of 600 kg.

CLIMB PERFORMANCE

CLIMB RATE IN CLEAN CONFIGURATION

CONDITIONS:

- Flaps: 0°
- Engine: full throttle
- V_Y = 70KIAS for 550kg MTOW
- V_x = 63KIAS for 550kg MTOW
- V_Y = 73KIAS for 600kg MTOW
- V_x = 66 KIAS for 600kg MTOW
- R/C residual 100 ft/min.



⇒ *Example:*

Given

O.A.T. = 17°*C*
Pressure altitude = 5600 *ft*
Weight = 550 *Kg*

Find

Rate of climb = *700 ft/min*

CRUISE

CONDITIONS:

- ISA

- Maximum takeoff weight = for both MTOW

(1) Fuel tanks 2x35 liters (less the unusable fuel)

(2) Fuel tanks 2x45 liters (less the unusable fuel)

Pressure altitude H_P: **0** *ft* *OAT: +15°C*

Propeller RPM		Speed KTAS	Consumption (l/h)	[1] Endurance (hrs)		[1] Range (N.m.)	
				(1)	(2)	(1)	(2)
55%	1900	96	15	4.5	5.8	431	599
65%	2050	102	18	3.7	4.9	382	495
75%	2150	108	20	3.4	4.4	364	472

Pressure altitude H_P: **2000** *ft* *OAT: +11°C*

Propeller RPM		Speed KTAS	Consumption (l/h)	[1] Endurance (hrs)		[1] Range (N.m.)	
				(1)	(2)	(1)	(2)
55%	1950	98	15	4.5	5.8	440	571
65%	2070	106	18	3.7	4.9	397	515
73%	2150	109	19	3.5	4.6	387	501

Pressure altitude H_P: **4000** *ft* *OAT: +7°C*

Propeller RPM		Speed KTAS	Consumption (l/h)	[1] Endurance (hrs)		[1] Range (N.m.)	
				(1)	(2)	(1)	(2)
55%	2020	101	15	4.5	5.8	454	588
60%	2080	105	17	4.0	5.1	416	540
70%	2150	110	18.5	3.6	4.7	401	520

Pressure altitude H_P: **6000** *ft* *OAT: +3°C*

Propeller RPM		Speed KTAS	Consumption (l/h)	[1] Endurance (hrs)		[1] Range (N.m.)	
				(1)	(2)	(1)	(2)
55%	2060	104	15	4.5	5.8	467	606
60%	2150	108	17	4.0	5.1	429	556

[1] Range and endurance are intended approximate and referred to a "zero" wind condition.

Pressure altitude H_P: **8000** *ft* *OAT: -0.8°C*

Propeller RPM		Speed KTAS	Consumption (l/h)	[1] Endurance (hrs) (1)	(2)	[1] Range (N.m.) (1)	(2)
55%	2120	99	15	4.5	5.8	445	578
58%	2150	102	16	4.2	5.4	428	556

Pressure altitude H_P: **10000** *ft* *OAT: -5°C*

Propeller RPM		Speed KTAS	Consumption (l/h)	[1] Endurance (hrs) (1)	(2)	[1] Range (N.m.) (1)	(2)
55%	2150	100	15	4.5	5.8	450	585

Pressure altitude H_P: **12000** *ft* *OAT: -9°C*

Propeller RPM		Speed KTAS	Consumption (l/h)	[1] Endurance (hrs) (1)	(2)	[1] Range (N.m.) (1)	(2)
50%	2150	98	14	4.8	6.2	475	617

[1] Range and endurance are intended approximate and referred to a "zero" wind condition.

BALKED LANDING

RATE OF CLIMB: BALKED LANDING

CONDITIONS:

- Maximum weight = 550 kg | 600kg
- V_{Obs} = 48 KIAS | 50 KIAS
- Flaps: 38°
- Engine: full throttle max 5'

NOTE

During balked landing maneuver, flaps should be retracted immediately after applying full power.

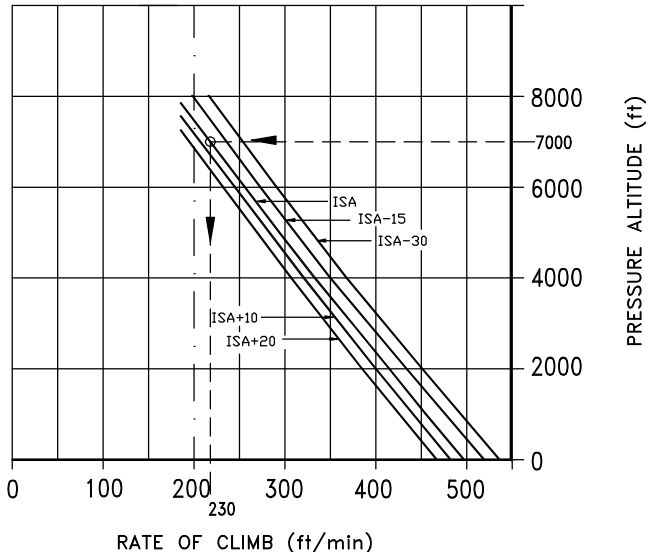


Fig.5-6. BALKED LANDING (MTOW=550KG)

⇒ *Example:*

Given	***Find***
Pressure altitude = 7000 *ft*	Rate of climb = *230 ft/min*
Conditions: ISA	

NOTE

If the maximum takeoff weight is 600 kg, the rate of climb decreases about 10%

LANDING DISTANCE *(Approved data)*

CONDITIONS:

- Maximum weight = 550 kg (600kg)
- Engine: throttle idle
- Brakes: maximum braking
- Runway: dry, compact, grass
- Slope: 0°
- Wind: zero
- Conditions: ISA
- Flaps: 38°

Hp (ft)	*0*	*1000*	*2000*	*3000*	*4000*	*5000*	*6000*	*7000*
GR (m)	100	103	106	109	112	116	119	123
LD (m)	252	256	260	264	268	273	279	282

- Maximum weight = 600kg
- Engine: throttle idle
- Brakes: maximum braking
- Runway: dry, compact, grass
- Slope: 0°
- Wind: zero
- Conditions: ISA
- Flaps: 38°

Hp (ft)	*0*	*1000*	*2000*	*3000*	*4000*	*5000*	*6000*	*7000*
GR (m)	120	124	127	131	134	139	143	148
LD (m)	302	307	312	317	322	328	335	338

NOTE

1. *Decrease distances by 10% for each 10 Kts of headwind. Increase distances by 20 % for each 10 Kts of tailwind;*
2. *For dry and paved runway operation decrease ground run by 10%;*
3. *If it becomes necessary to land without flap extension (flap malfunction), increase approach speed by 10 Kts, increase by 40% distance pertaining to flap setting at 38° and increase V_{obs} to 58 KIAS (61KIAS) for 550 kg MTOW (600 kg);*
4. *V_{obs} (speed over obstacle) is 48 KIAS (50 KIAS) for 550 kg MTOW (600 kg);*

CONSEQUENCES FROM RAIN AND INSECT

Flight tests have demonstrated that neither rain nor insect impact build-up on leading edge have caused substantial variations to aircraft's flight qualities. Such variations fall within JAR-VLA tolerance limits as they are not above: 5 Kts for stalls, 100 ft/min for climb rates and 50 m for takeoff runs.

NOISE DATA

Noise level was determined according to JAR-36 Sub.C Ed.23 May 1997 ICAO/Annex 16 Chap.10 Issue 1993, and results are shown in the following table:

	550 kg MTOW	600 kg MTOW
Noise Level (db)	**63.6**	**65.0**