

This is the chapter the paper is built on. Nearly every type-specific question is, at heart, a limitation question — a speed, a mass, an RPM, a marking. Learn these tables until you can write them from memory. I've laid them out the way I'd want a cadet to rote-learn them.

7.1 The V-speeds

All speeds are indicated (KIAS).

Speed	Value	What it means
V_{NE}	188	Never exceed — in any operation.
V_{NO}	151	Max structural cruising — above it only in smooth air, with caution.
V_O (manoeuvring)	122 / 119 / 112	122 above 1800 kg; 119 from 1700–1800 kg; 112 up to 1700 kg. No full or abrupt control inputs above it.
V_{FE}	133 (APP) / 113 (LDG)	Max flaps-extended speed for each setting.
V_{LE}	188	Max speed with the gear extended.
V_{LO} extend	188	Max speed to extend the gear.
V_{LO} retract	152	Max speed to retract the gear.
V_{MCA}	76 (UP) / 73 (APP)	Minimum control speed airborne, one engine inoperative.
V_{YSE} (blue line)	85	Best rate of climb, one engine inoperative.

WHY THE BLUE-LINE / RED-LINE GAP MATTERS

V_{YSE} 85 sits *above* V_{MCA} 76 — a 9-knot cushion. On one engine you fly the blue line: it gives you both directional control and the best climb the aeroplane has. Let the speed sag towards the red line and you're trading away the control that keeps the aeroplane pointing straight. That gap is the single most important idea in multi-engine flying.

7.2 Airspeed indicator markings

Marking	Range / value	Meaning
□ White arc	62 – 113 KIAS	Full-flap operating range (V_{SO} to V_{FE} LDG).
■ Green arc	69 – 151 KIAS	Normal operating range.
■ Yellow arc	151 – 188 KIAS	Caution — smooth air only.
■ Blue radial	85 KIAS	Best single-engine rate of climb (V_{YSE}).
■ Red radial	76 KIAS	Minimum control speed (V_{MCA}).
■ Red radial	188 KIAS	Never-exceed (V_{NE}).

7.3 Power-plant limits

Item	Limit
Engines	2 × Austro Engine E4-B
Max take-off RPM	2300 (propeller), 5 min max
Max continuous RPM	2100 (propeller)
Max overspeed	2500 RPM, 20 sec max
Max take-off power	100% (≈ 123.5 kW), 5 min max
Max continuous power	92% (≈ 114 kW)
Max fuel temperature	60 °C

7.4 Mass limits

Mass	Standard limit
Maximum take-off mass	1900 kg (4189 lb)
Maximum landing mass	1805 kg (3979 lb)
Maximum zero-fuel mass	1765 kg (3891 lb)

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A WORD ON THE HIGHER FIGURES

You will meet 1999 kg and 2001 kg quoted for this type. Those apply only to aircraft carrying a specific approved weight-increase modification. For the standard aeroplane — and in the exam unless told otherwise — work to **1900 kg**.

7.5 Centre of gravity, load factors, altitude and crew

The datum plane is 2.196 m forward of the most forward point of the wing root rib. The permitted CG for flight lies between a forward limit that moves aft as mass increases (about 2.350 m at light weight to about 2.418 m at maximum take-off mass) and an aft limit of about 2.480 m. In practice you confirm this with the loading chart in the mass-and-balance chapter — but know that the envelope *narrows at the front as you get heavier*.

Structural load factors	Positive	Negative
Flaps up, at V_O	+3.8 g	-1.52 g
Flaps up, at V_{NE}	+3.8 g	0.0 g
Flaps in APP or LDG position	+2.0 g	not specified

READ THAT TABLE BY COLUMN, NOT BY ROW

The negative limit is **not the same at both speeds**. At the manoeuvring speed V_O you have -1.52 g available; at V_{NE} the negative limit is **0.0 g** — no negative margin at all. Fast and clean, the aeroplane will take 3.8 g *up* and nothing *down*. That is why a bunt, or an abrupt push after a high-speed descent, is a structural event at V_{NE} in a way it is not at V_O . Learn the two speeds as two separate cases; an examiner who asks "negative limit load factor at V_{NE} " is asking exactly this.

Intentional negative-g manoeuvres are not permitted. The maximum operating altitude is **18,000 ft** pressure altitude. Minimum crew is **one**; maximum occupancy is **four**.

THE MUST-KNOW SHORTLIST

V_{NE} 188 · V_{NO} 151 · V_{YSE} (blue) 85 · V_{MCA} (red) 76 · V_{FE} 133/113 · gear retract 152, extend 188 · take-off 2300 RPM (5 min) / continuous 2100 · MTOM 1900 kg · load +3.8/-1.52 at V_O ,

+3.8/0.0 at V_{NE} , +2.0 with flaps · ceiling 18,000 ft · crew 1, occupants 4.

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