

PART 2 TAKE-OFF

LIST OF FIGURES

- 2.1 Ground run and distance to 50ft (flaps down, with reheat)
- 2.2 Ground run and distance to 50ft (flaps up with reheat)
- 2.3 Ground run and distance to 50ft (flaps up, no reheat)
- 2.4 Failure speed (VSTOP)
- 2.5 Failure speed (VGO) – (based on distance to 50ft)

1. Unstick speeds

The values of unstick speed are assumed to vary linearly from :-

- 146 kt IAS at 30,000 lb to
- 158 kt IAS at 35,000 lb with flaps down
- 159 kt IAS at 30,000 lb to
- 172 kt IAS at 35,000 lb with flaps up

2. Variation of ground run.

The variation of the ground run to unstick with runway altitude and temperature, weight, and wind along the runway is given in Fig. 2.1. Crosswind has little effect on distance to unstick. The effect of using anti-icing during take-off is to increase the distances by 5.5%.

Example (A):

3. AUW 34,000 lb; airfield height 500 ft; OAT 14°C; 10-kt headwind.

From Fig. 2.1.

Unstick distance, with reheat, flaps down	1820ft
Distance to 50 ft, with reheat flaps down	3300ft

From Fig. 2.2.

Unstick distance, with reheat, flaps up	2050ft
Distance to 50ft, with reheat, flaps up	3650ft

From Fig. 2.3.

Unstick distance, no reheat, flaps up	2900ft
Distance to 50ft no reheat, flaps up	4650ft

4. Acceleration to climb-away speed

Data for time, distance and fuel used in accelerating to a climb-away speed of 450 kt IAS are given in Part 3.

5. Failure speed (VSTOP)

This is given in Fig. 2.4. Note that:

The distances quoted are from wheels rolling.
A failed engine is assumed windmilling.
The delays assumed after engine failure are 2 seconds before (live) engine throttled followed by 3 seconds to parachute streamed, brakes applied 1 second after engine cut.
The data are valid for aircraft with increased braking capability post-mod 4862

Nature of failure:

- One engine failed case – when the take-off is abandoned because of one engine failing.
- No engine failed case – when the take-off is abandoned because of aircraft failure other than engines.

LIGHTNING FMK.3 & TMK.5 (2 x AVON 302)

Example (B):

Available distance 7,500 ft; no wind. ISA; 1.013 mb; dry runway maximum reheat flaps down; one engine failure. The maximum failure speed for stopping to be possible is 159 kt.

6. Failure speed (VGO)

This is given in Fig. 2.5. Note that:

The distances quoted are from wheels rolling.

The failed engine is assumed windmilling.

The airborne distance from unstick to 50ft assumes 1.1g normal acceleration.

7. Maximum weight for climb away

For the current C.A. release maximum take-off weight it is possible, in the event of an engine failure, to climb away on the remaining engine, when reheat is being used, in all climatic conditions up to 6000 ft & I.S.A. + 30°C.

When the take-off is made using zero flap and no reheat the climatic limit is slightly lower i.e. 5,000ft & I.S.A. + 20°.

8. Use of graphs

Figs.2.1, 2.2, 2.3. give total distance to 50 ft under normal circumstances.

In the event of a failure Fig.2.4 gives the maximum speed from which it is possible to stop (VSTOP) in the distance available using reasonable delays and maximum braking.

Fig.2.5 gives the minimum speed from which it is possible to complete the take-off to 50ft on a single engine (VGO) in the remaining distance.

Note. . .

(1) *Fig. 2.4, & 2.5 should be used in conjunction with Pilot's Notes.*

(2) *In some cases it may not be possible to reach the reference lines when some extrapolation is called for.*

Example (C):

8,000 ft available: sea level: I.S.A. zero wind: using maximum reheat and flaps down.

From Fig. 2.5.

VGO is much less than 90 kt.

LIGHTNING F. MK. 3 AND T MK 5 (2 x AVON 302)

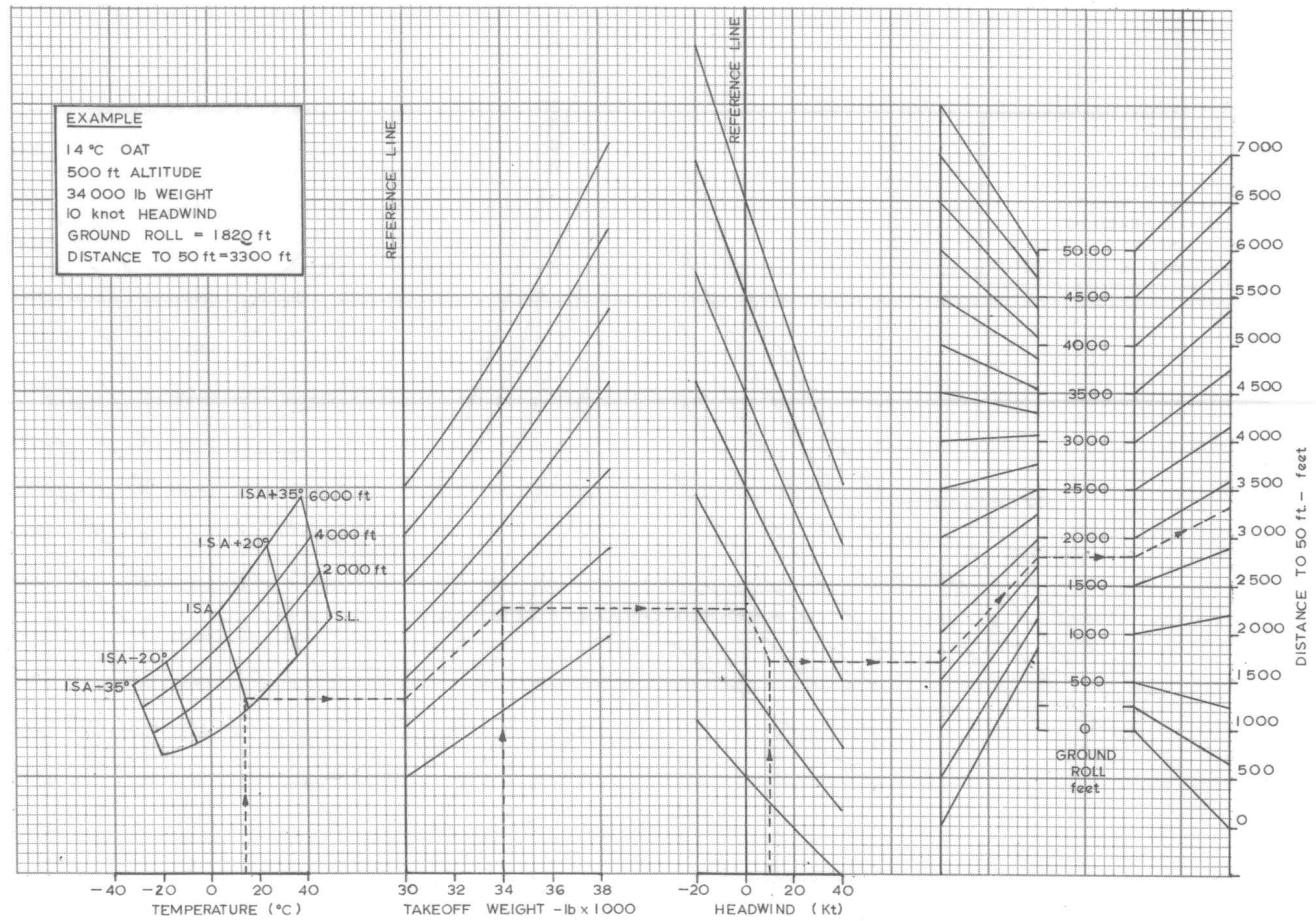


FIG.2.1 GROUND RUN (BOTH ENGINES OPERATING) AND DISTANCE TO 50 ft. flaps down, with reheat case

LIGHTNING F. MK.3 AND T MK 5 (2 x AVON 302)

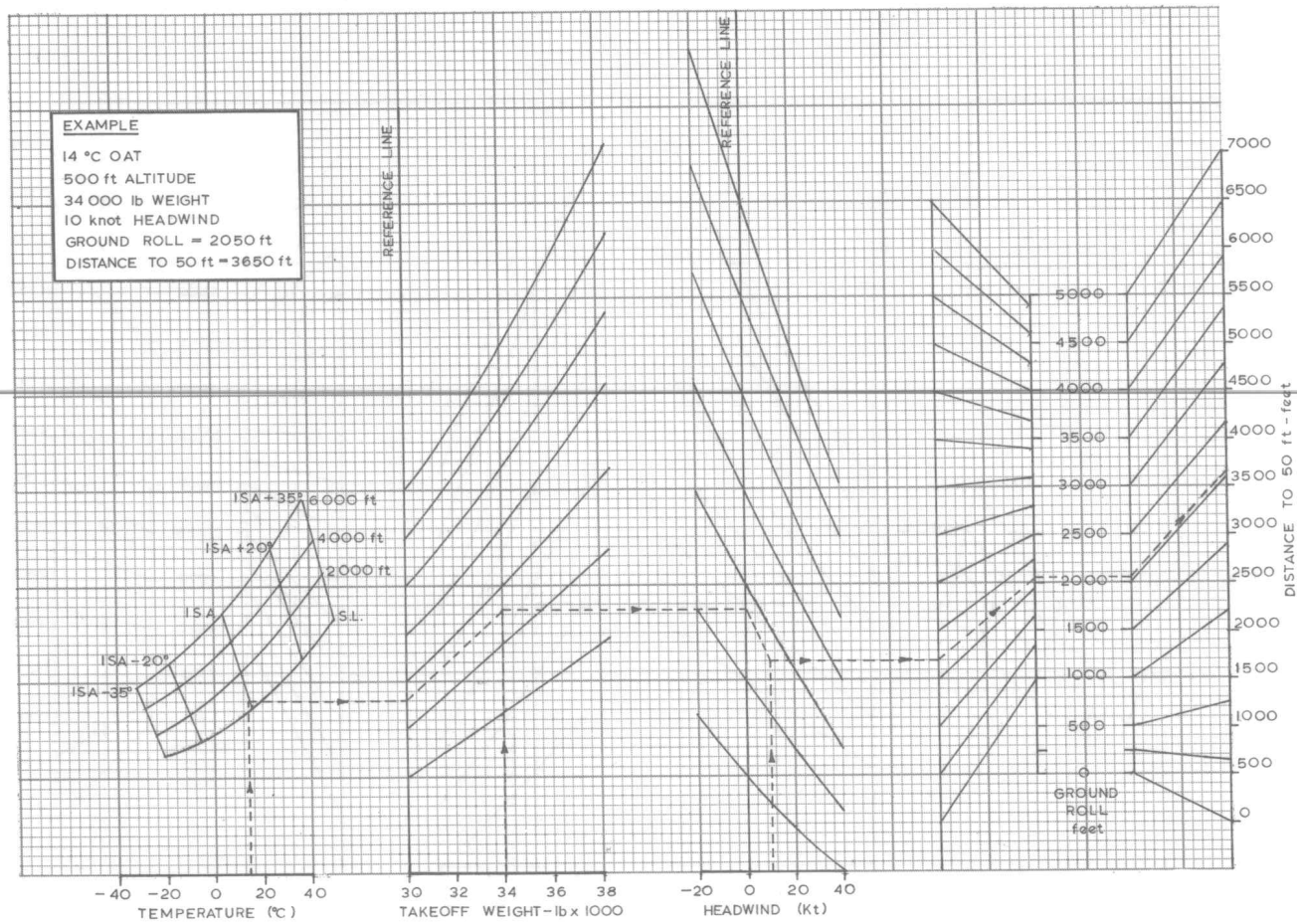


FIG. 2.2 GROUND RUN (BOTH ENGINES OPERATING) AND DISTANCE TO 50 ft. flaps up, with reheat case

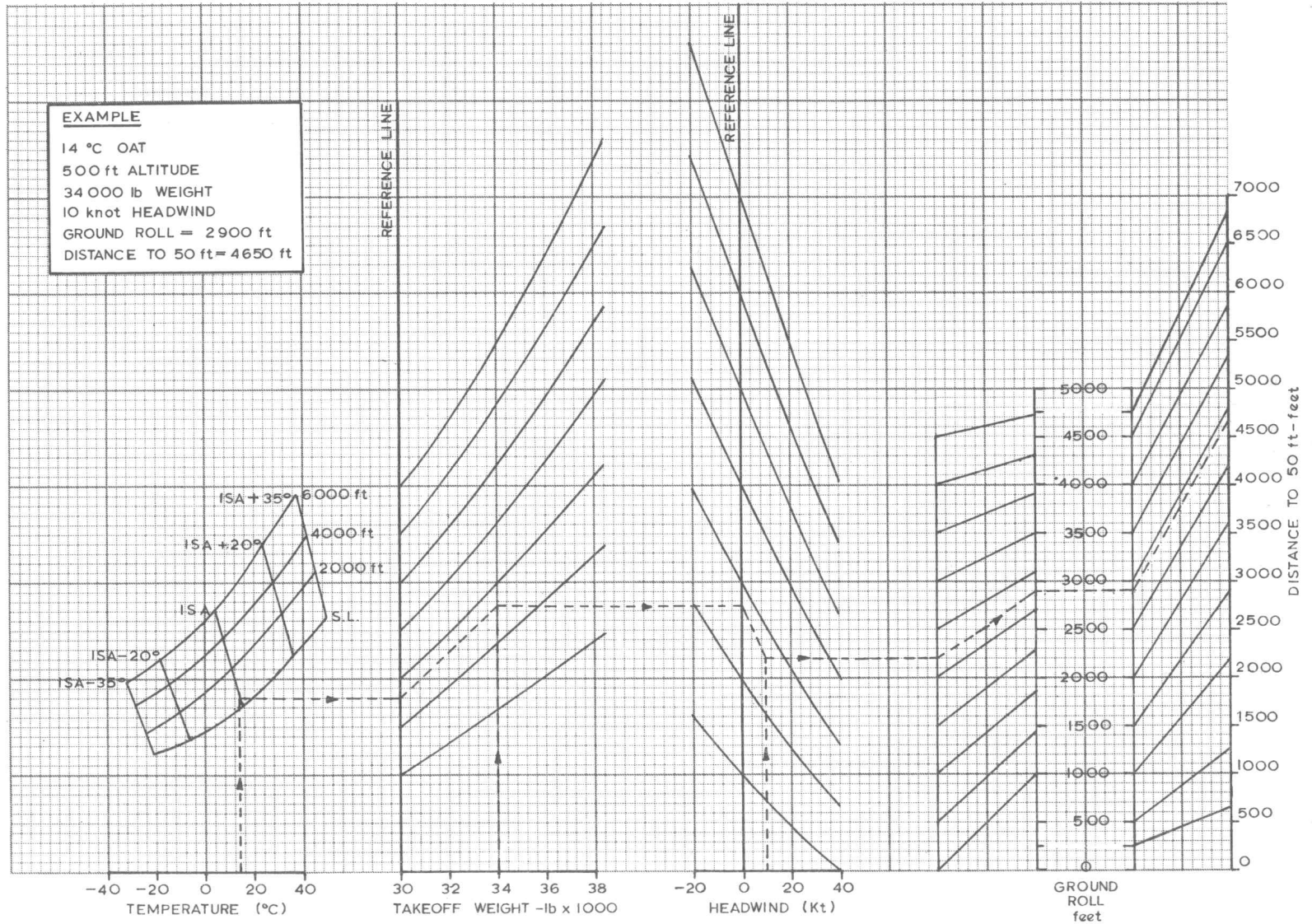


FIG 2.3 GROUND RUN (BOTH ENGINES OPERATING) AND DISTANCE TO 50 ft flaps up, no reheat

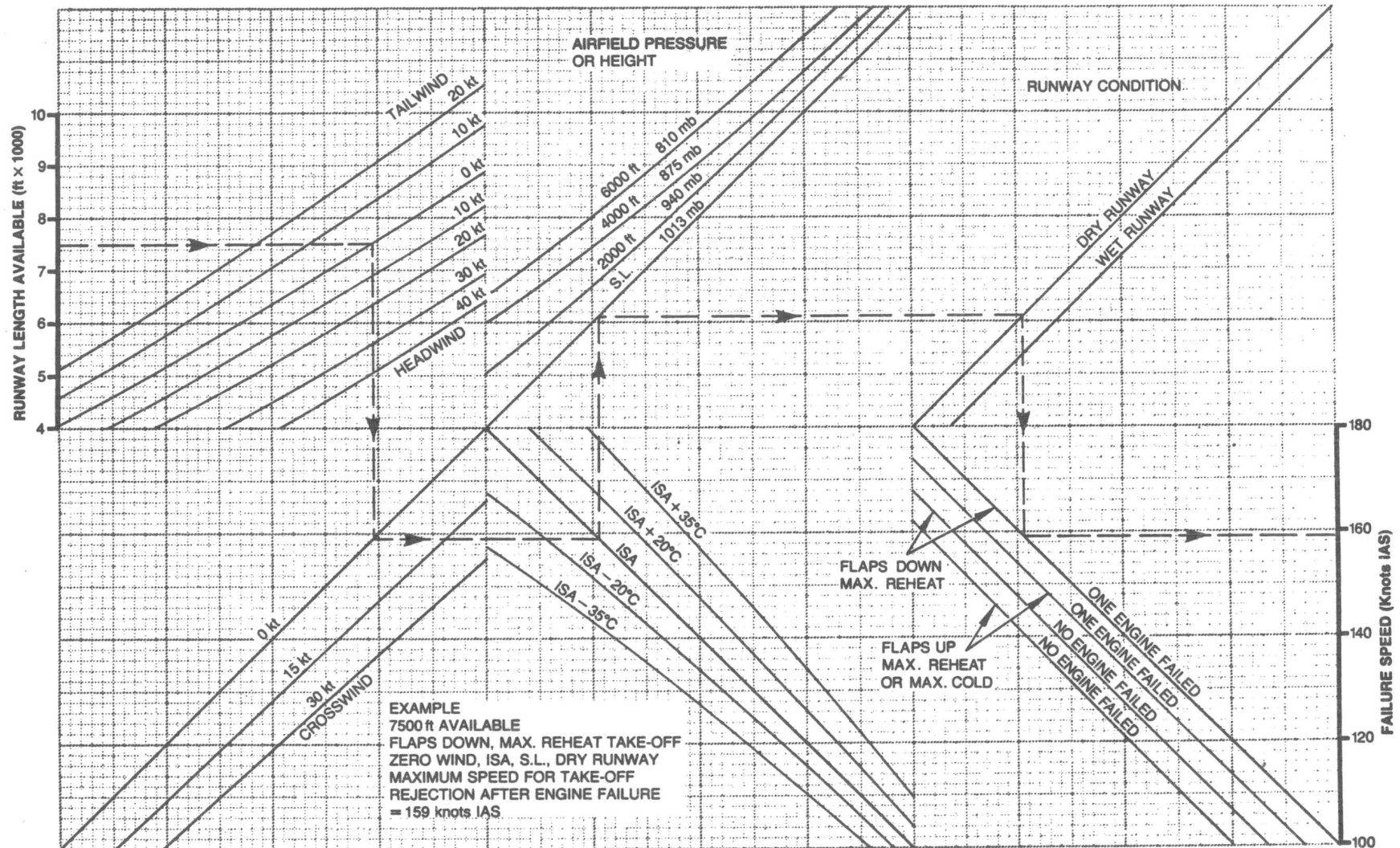


FIG 2.4 FAILURE SPEED (V STOP)
(POST MOD 4862)

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LIGHTNING F. MK. 3 & T. MK. 5 (2x AVON 302) WITH AND WITHOUT RED TOP

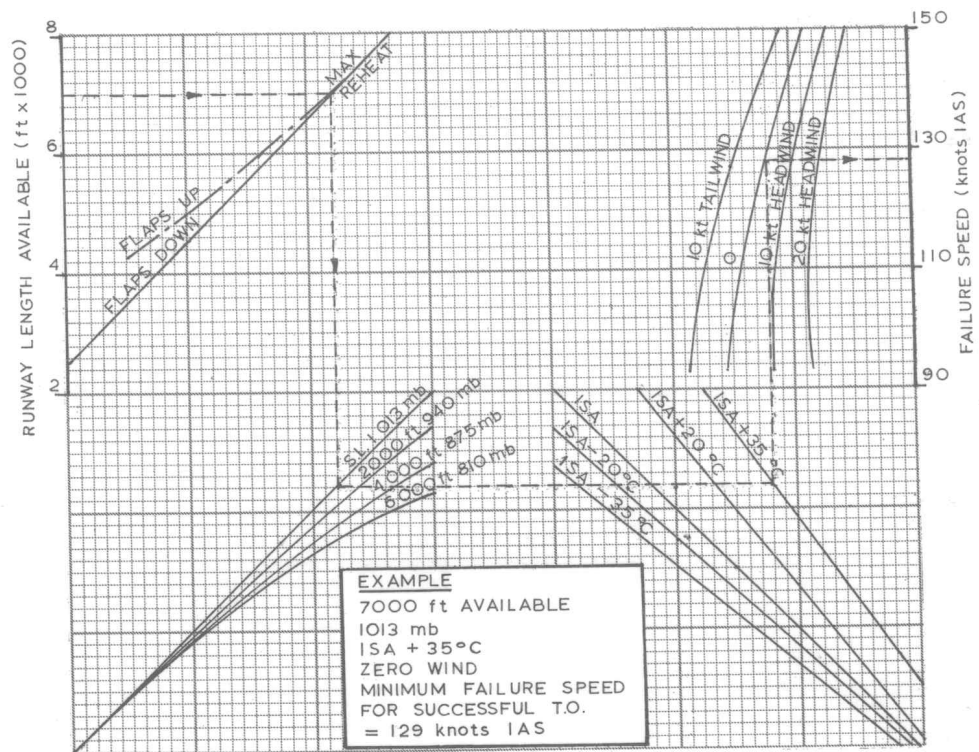


FIG. 2-5 FAILURE SPEED (V_{GO})-(BASED ON DISTANCE TO 50 ft.)

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