

PART 2 TAKE-OFF

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1. Unstick speeds

Unstick speeds are given in the relevant Pilot's Notes.

From Fig. 2.2

Airborne distance 1,630 ft

2. Variation of ground run

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

Example

AUW 38,500 lb: airfield height 2,000 ft: OAT 16°C: 20 kt headwind

From Fig. 2.1

Unstick distance 2,700 ft

3. Airborne distance to 50 ft

Airborne distance to 50 ft against weight, temperature and wind is given in Fig. 2.2. 1.1g normal acceleration is assumed.

Example

AUW 38,500 lb: ICAO: zero wind

4. Maximum weight for climb away

The maximum weight at which it is possible to climb away in the event of an engine failure is given in Fig. 2.3.

Example

6,500 ft runway altitude : ICAO + 20°C

From Fig. 2.3

Maximum take-off weight with maximum reheat and flaps up is 44,000 lb.

5. Acceleration to climb-away speed

Data for time, distance and fuel used, in accelerating to a climb-away speed of 450 kts IAS are given in Part 3 sections 3.1 and 3.2.

6. Failure speed (V STOP)

◀ These are given in Figs. 2.4 and 2.6. 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 the live engine is throttled followed by 3 seconds to brake parachute fully effective, brakes applied 1 second after engine is throttled.

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 emergency other than engine failure.

Example

Available distance 10,000 ft: no wind: ICAO + 20°C: runway altitude 4,500 ft: dry runway: one engine failure.

From Fig.2.4

The maximum failure speed for stopping to be possible is 178 kts IAS.

7. Failure speed (V GO)

- ◀ These are given in Figs.2.5 and 2.7. Note that:- ▶
The distances quoted are from wheels rolling and are based on ground roll.

The failed engine is assumed windmilling.

Example

Available distance 5,500 ft: 10 kt tailwind: ICAO + 35°C: sea level:

From Fig.2.5

The minimum failure speed for take-off to be possible is 128 kts IAS.

Note...

In this example the aircraft will just be airborne within the distance shown. If it is desired that the aircraft should be at 50 ft within the available distance, then the distance to 50 ft from Fig.2.2 should be subtracted from the distance available before entering the chart.

8. Use of graphs

Figs.2.1 and 2.2 give total distance to 50 ft under normal circumstances. In the event of a failure, ▶ Figs.2.4 and 2.6 give the maximum speed from which it is possible to stop (V STOP) in the distance available using reasonable delays and maximum braking.

- ◀ Figs.2.5 and 2.7 give the minimum speed from which it is possible to continue take-off on a single engine (V GO) in the remaining distance. However, in some extreme cases it may not be possible to climb away on one engine after take-off, therefore, the maximum weight at which it is possible to climb away on one engine is given in Fig.2.3.

Note...

- (1) Figs.2.3, 2.4 and 2.5 should be used in conjunction with the relevant Pilot's Notes.
(2) In some cases it may not be possible to reach the reference lines when some extrapolation is called for.

Example

8,000 ft available: sea level: ICAO: zero wind: using maximum reheat.

From Fig.2.5

V GO is much less than 90 kts.

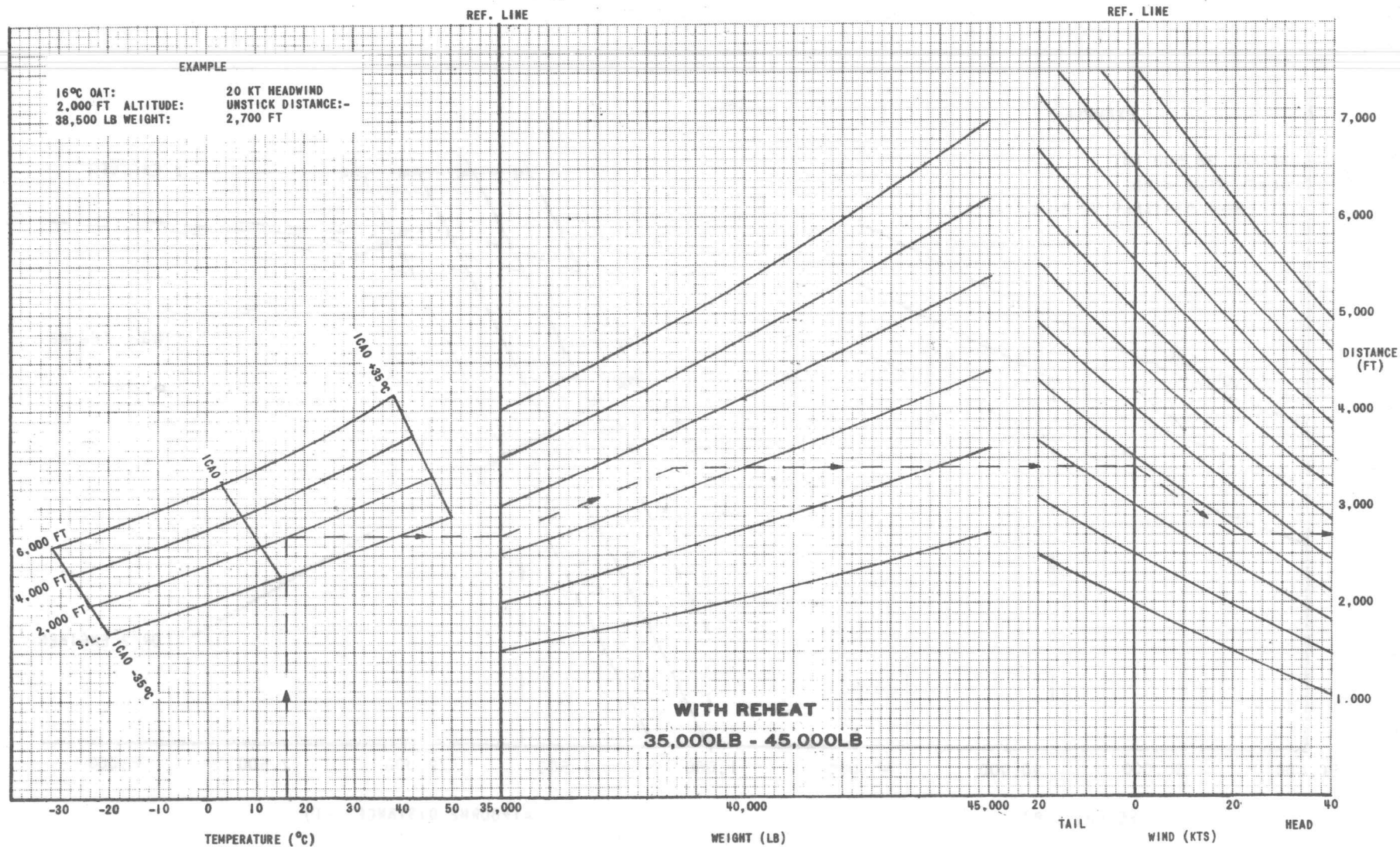
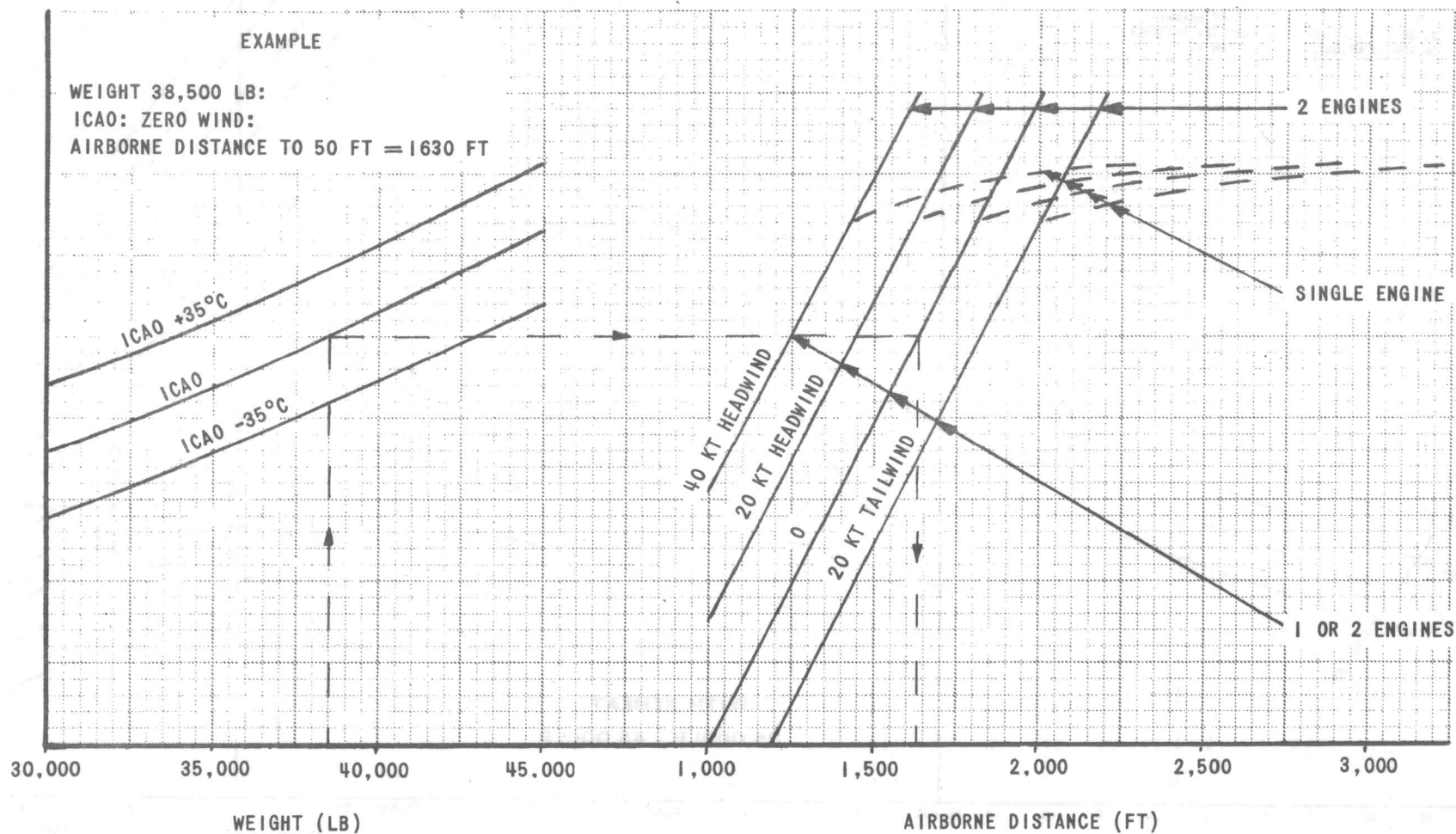


FIG. 2.1 GROUND RUN (BOTH ENGINES OPERATIVE)



WITH REHEAT

FIG.2-2 DISTANCE FROM UNSTICK TO 50FT.

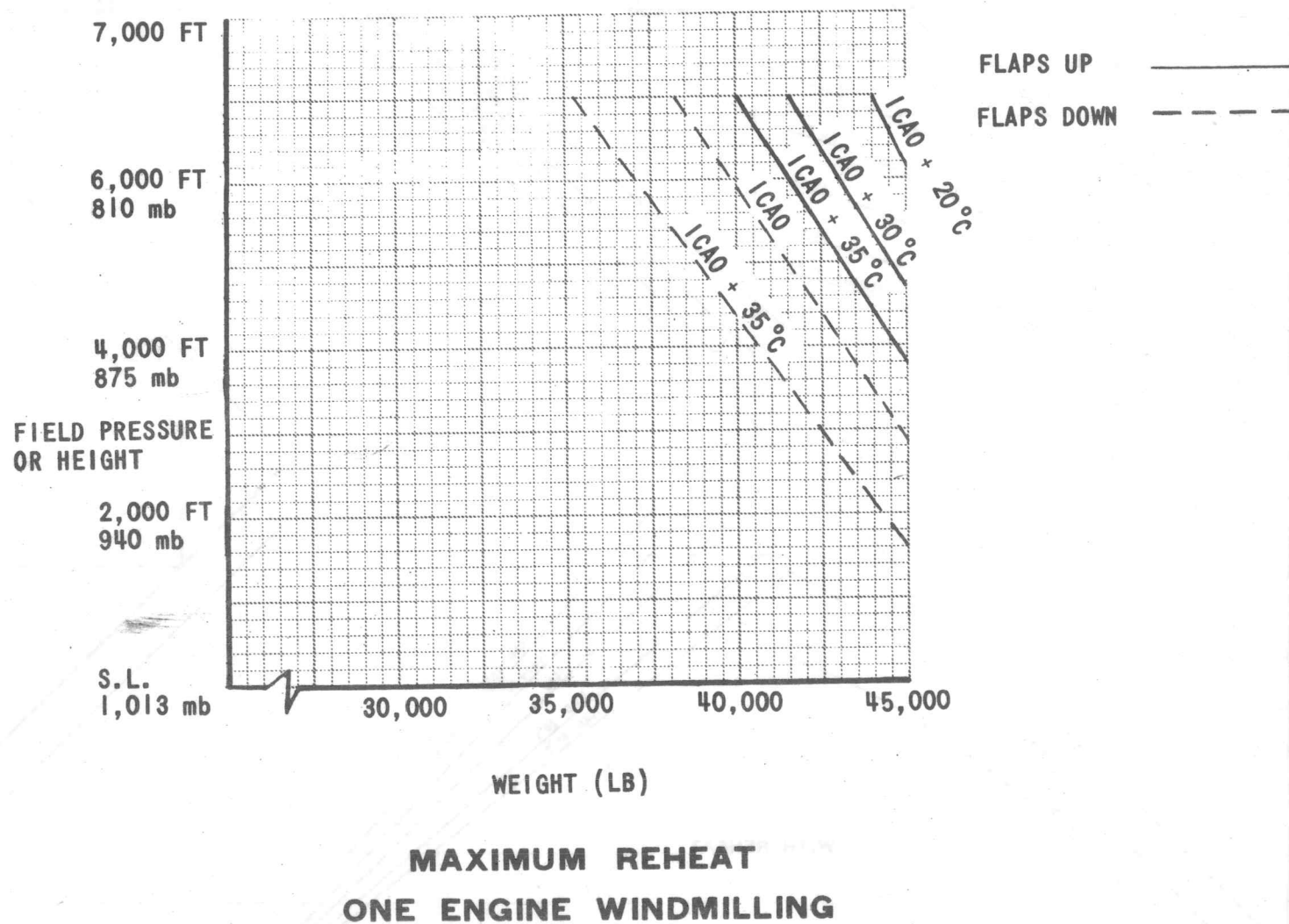


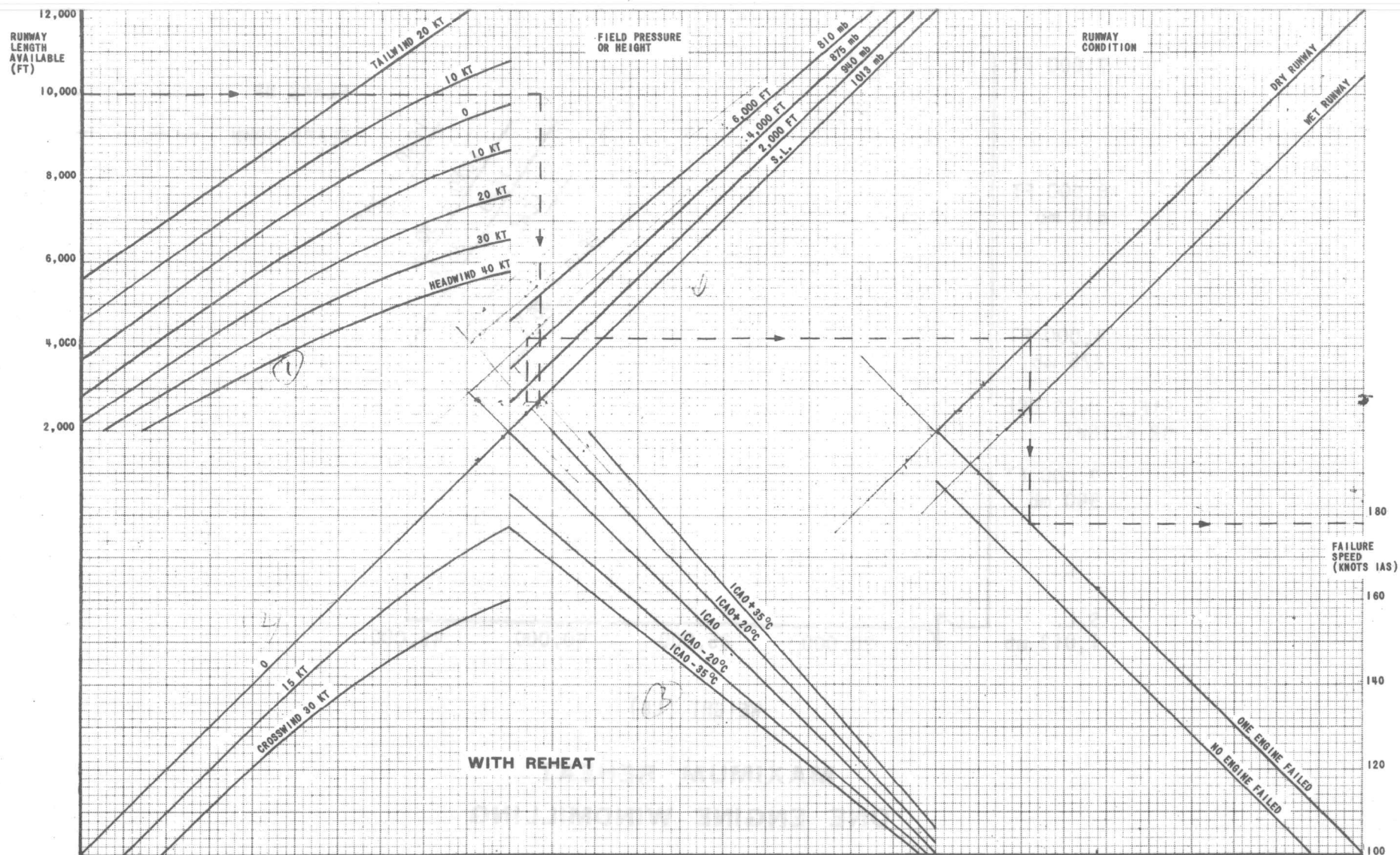
FIG. 2. 3. MAXIMUM WEIGHT FOR CLIMB AT TAKE-OFF



EXAMPLE

10,000 FT AVAILABLE: ZERO WIND:
 RUNWAY HEIGHT 4,500 FT: OAT 26°C = ICAO + 20°C:
 DRY RUNWAY: ONE ENGINE FAILURE:

MAXIMUM FAILURE SPEED
 FOR STOPPING AIRCRAFT
 -178 KNOTS



EXAMPLE

5,500 FT AVAILABLE:
SEA LEVEL: ICAO + 35°C:
10 KT TAILWIND:

MINIMUM FAILURE SPEED FOR
SUCCESSFUL T.O. = 128 KTS IAS

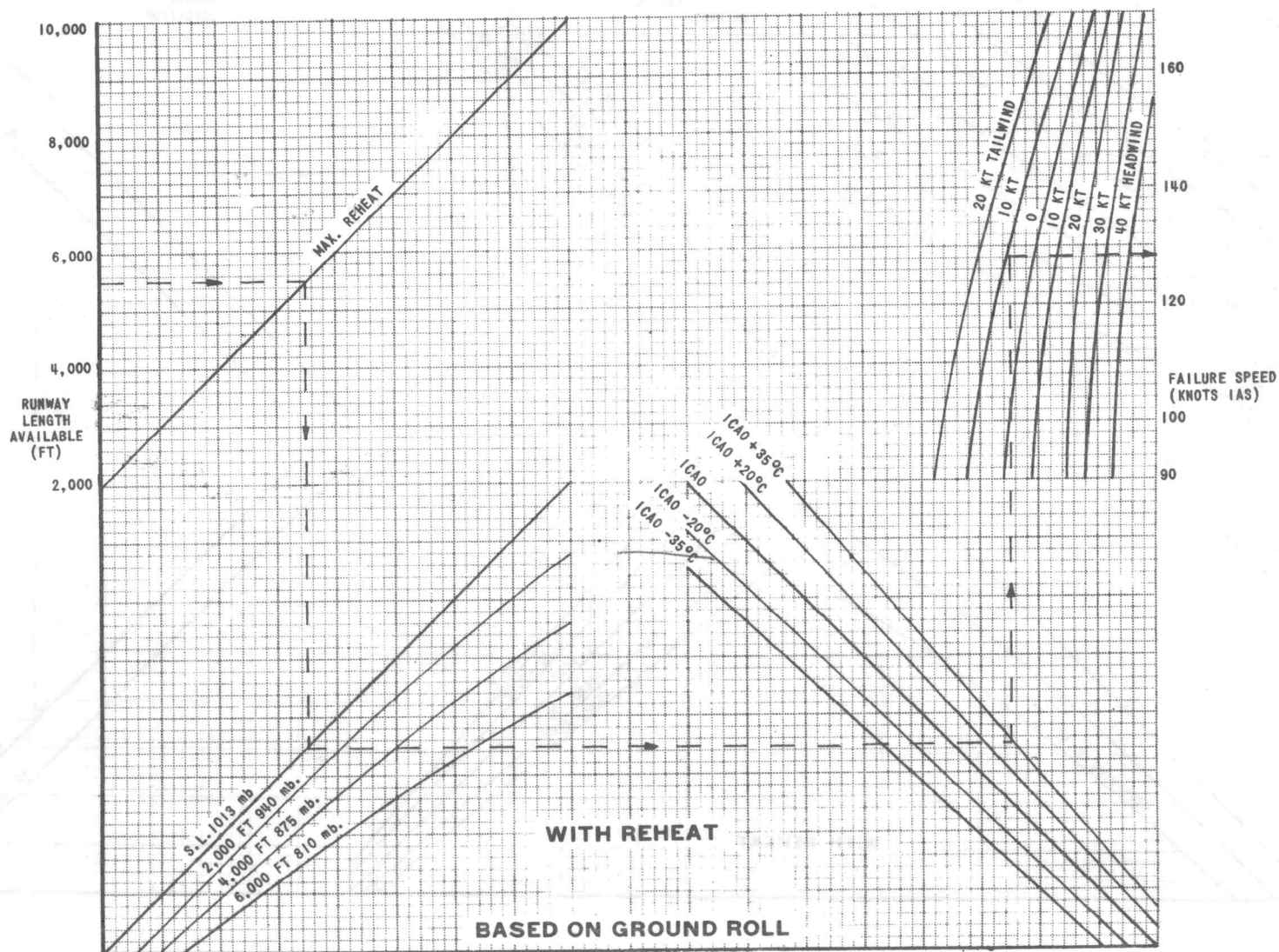
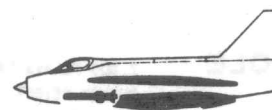


FIG. 2.5 FAILURE SPEED (V GO)
RESTRICTED

**LIGHTNING (2 X AVON 302C)
F MK.53
GROUND ATTACK ROLE**

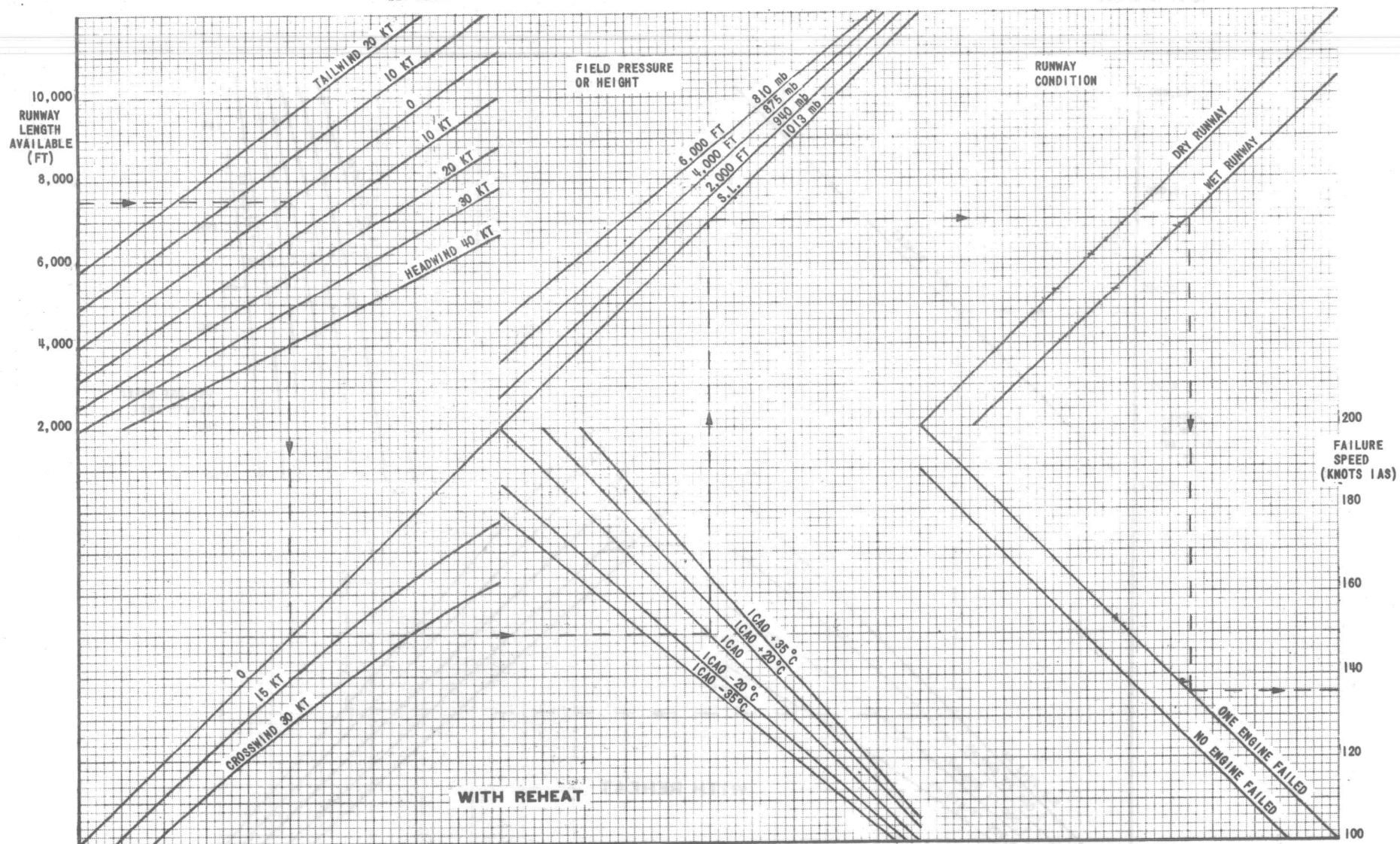
RESTRICTED

F MK.53/T MK.55 O.D.

EXAMPLE

7,500 FT AVAILABLE : ZERO WIND
RUNWAY HEIGHT - SEA LEVEL : O.A.T. ICAD:
WET RUNWAY : ONE ENGINE FAILURE:

MAXIMUM FAILURE SPEED FOR
STOPPING AIRCRAFT - 136 KTS



LIGHTNING (2 X AVON 302C)
F MK.53
GROUND ATTACK ROLE

RESTRICTED

F MK.53/T MK.55 O.D.

EXAMPLE

6,500 FT AVAILABLE :
 6,000 FT: ICAO +20°C :
 30 KT HEADWIND:

MINIMUM FAILURE SPEED FOR
 SUCCESSFUL T.O. = 127 KTS IAS

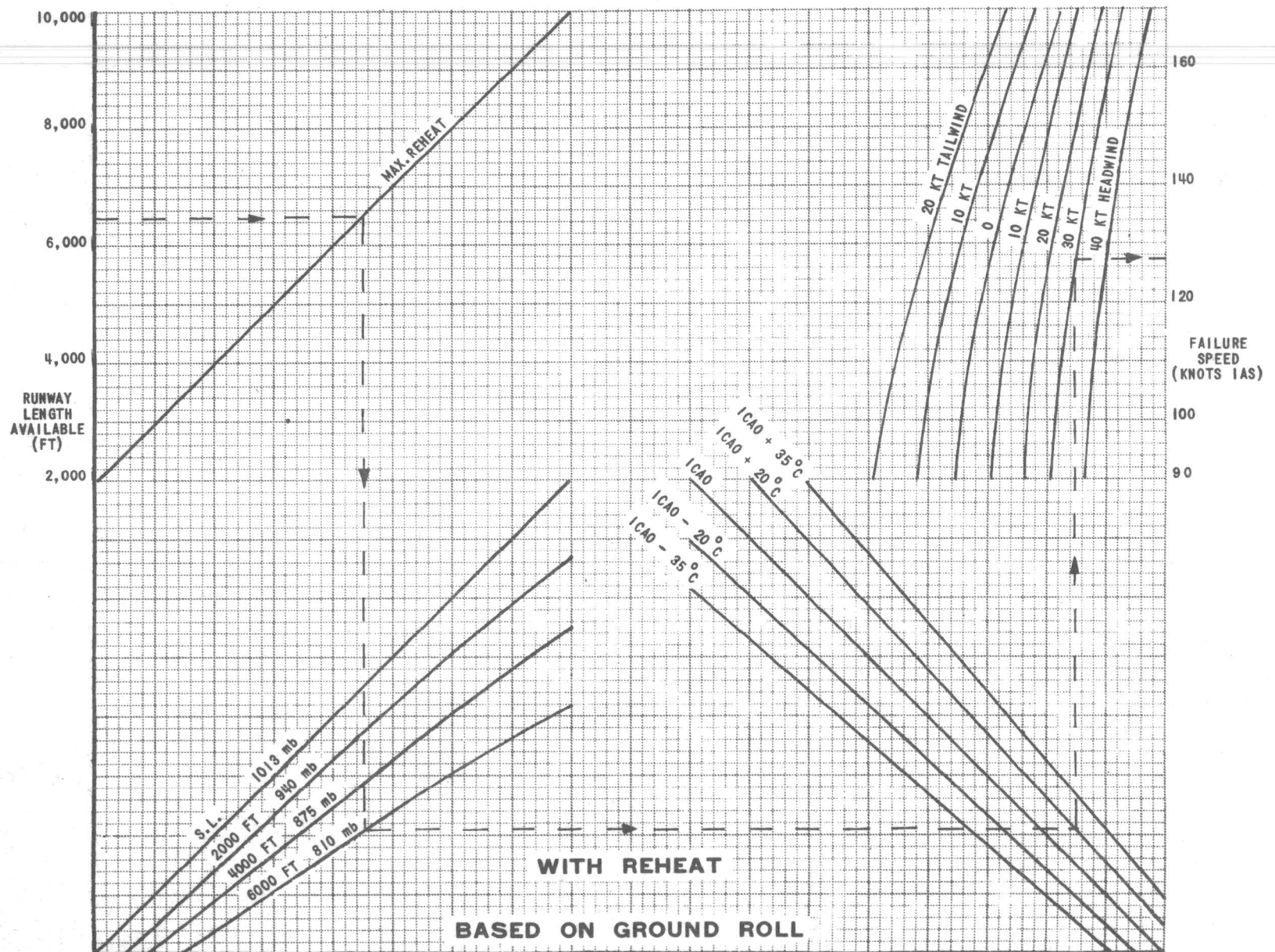


FIG. 2.7 FAILURE SPEED (V GO)
RESTRICTED



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