

**CROSSWIND TAKEOFF CHART.**

(Figure A3-12)

When the nose gear of the aircraft is raised just prior to takeoff, directional control of the aircraft is entirely dependent upon the use of rudder since nose gear steering is no longer available. Consequently the natural tendency of the aircraft to turn upwind can best be overcome by keeping the nose gear on the runway until sufficient speed is attained to provide an adequate flow of air over the tail surfaces. In some cases, when taking off in a direct crosswind, this may require a sacrifice in takeoff performance since the minimum safe crosswind takeoff speed may be higher than the takeoff speed recommended on the Takeoff Distance charts. In any case, the higher of the two speeds should be used. A higher takeoff speed will result in a longer takeoff ground run distance which can be determined by referring to TAKEOFF ACCELERATION. The Crosswind Takeoff chart (A3-12) provides a convenient means of determining the minimum safe crosswind takeoff speed. Crosswind direction and velocity are represented by a series of arcs and radials emanating from the lower left corner of the chart. The heavy black line that slopes near vertically on the chart, represents the rudder effectiveness at maximum deflection as a function of speed. By selecting a point on the chart at the intersection of a velocity arc and a direction radial, a known crosswind can be resolved into a headwind component and crosswind component on the scales at the left and bottom edges of the chart.

**NOTE**

Relative wind angle is the angle between the runway heading and the wind direction, measured either to the right or left.

Notice that the minimum safe crosswind takeoff speed (on the scale at the right edge of the chart) is determined solely by the crosswind component of the wind, regardless of the actual velocity and direction. The headwind component is useful only in determining the takeoff distance required.

**Use Of The Chart.**

The chart is used to determine the minimum safe crosswind takeoff speed in a given crosswind condition. This should then be compared with the recommended takeoff speed ( $V_{to}$ ) which is tabulated on the Takeoff Distance charts, and the nose gear should not be raised until the higher of the two speeds is reached. If the minimum safe crosswind takeoff speed is greater than rotation speed ( $V_R$ ), takeoff ground run will be increased. The extent of this increase may be determined through the use of the Takeoff Acceleration chart, figure A3-46 and A3-47. To read the Crosswind Takeoff chart, a point is located which represents the wind velocity (with gusts) and direction relative to the runway. This establishes a crosswind component of the wind which is the important factor in determining the minimum safe crosswind takeoff speed. If the point is to the left of the

heavy black line sloping across the chart in the recommended sector, the minimum safe crosswind takeoff speed is determined by moving vertically downward from the point to the sloping line, then horizontally across to the scale at the right edge of the chart to read the minimum safe cross wind takeoff speed at which a crosswind takeoff is recommended. If the point is to the right of the sloping heavy black line and in the gray area or not recommended sector, minimum safe crosswind takeoff speed is determined by moving vertically upward to the sloping line, then horizontally across to the scale at the right edge of the chart to read the minimum safe crosswind speed at which a crosswind takeoff is recommended. The chart is also used to determine headwind component which is necessary when finding takeoff distances. When using the chart to read headwind component, a point is located which represents the wind velocity (without gusts) and the direction relative to the runway. Headwind component is then read by moving horizontally from the point directly to the scale on the left. Although the crosswind component of the wind may be read if desired on the scale at the bottom of the chart, its value is of no use in checking takeoff performance.

**Example.**

**GIVEN:** runway heading  $270^\circ$ , wind direction  $220^\circ$ , wind velocity (with gusts) 17 knots, wind velocity (without gusts) 10 knots.

**FIND:** minimum safe crosswind takeoff speed and headwind component.

1. Select figure A3-12 for this problem and first determine the relative wind angle by finding the difference between the runway heading and the wind direction.

$$270^\circ - 220^\circ = 50^\circ$$

2. Locate a point at the intersection of the 17-knot (with gusts) wind velocity arc and the  $50^\circ$  relative wind angle radial.

3. Move vertically upward from the point until the sloping line is intersected, then horizontally to the speed scale at the right and read 69.5 knots minimum safe crosswind takeoff speed.

4. Locate a point at the intersection of the 10-knot (without gusts) wind velocity arc and the  $50^\circ$  relative wind angle radial.

5. Moving horizontally to the left from the point, read headwind component of 6.5 knots.

**TAKEOFF DISTANCE.**  
(Figures A3-13 through A3-20)

Takeoff performance of the aircraft is expressed in terms of ground run distance to the lift-off point and total distance

to clear a 50-foot obstacle. These distances are significant in that they represent the level, hard surface runway space required to allow the aircraft to accelerate to a takeoff speed ( $V_{to}$ ) high enough to develop the lift necessary to overcome the gross weight. Therefore, any plot of takeoff performance must take into consideration the expected range of takeoff gross weights. Likewise, any other significant factors affecting the lift capability of the aircraft must be included. Among these are density altitude and wing flap setting. Other factors, although having little or no effect on lift, also influence the takeoff performance because of their effect on acceleration and the distance required to reach  $V_{to}$ . The most important of these is engine power which is represented in the charts by torque pressure. Since operation with jet engines has a great effect on rate of acceleration, separate charts are needed to show the effect of this configuration on takeoff distance. Wing flap setting also affects the acceleration of the aircraft by adding to the total drag, although this disadvantage is more than offset by the added lift. The effect of winds upon the takeoff performance always influences the ground run distance as well as the total distance to clear a 50-foot obstacle. Refer to Use Of The Chart below. Another significant factor affecting the takeoff performance of the aircraft is pilot technique. In order to achieve the performance plotted on the chart, maximum power must be applied as specified on the chart, and the aircraft must be flown at  $V_{to}$  (takeoff speed). Furthermore, if clearance over a 50-foot obstacle is required in a specified distance, the takeoff is made at  $V_{to}$  and the immediate climbout over the obstacle is made at  $V_{50}$ . These speeds as well as stalling speeds and rotation speeds are tabulated on the individual charts versus gross weight. These speeds are based on a relationship of the stall speed ( $V_s$ ) which varies as a function of gross weight and flap setting. For standard takeoff performance, minimum run takeoff performance, and assault takeoff, the following relationships have been established:

For standard and minimum run takeoff:

- $V_s$  - zero thrust stall speed
- $V_{to}$  - takeoff speed;  $1.1 V_s$
- $V_{50}$  - obstacle clearance speed;  $1.2 V_s$
- $V_R$  - rotation speed;  $V_{to}$ -10 knots

For assault takeoff:

- $V_s$  - stall speed
- $V_R$  - rotation speed;  $V_{to}$  -10 knots
- Forward C.G., jets operating;
  - $V_{to}$  - takeoff speed;  $1.06 V_s$  power-on +8 knots
- Aft C.G., jets operating;
  - $V_{to}$  - takeoff speed;  $1.06 V_s$  power on +4 knots
- Forward C.G., jets not operating
  - $V_{to}$  - takeoff speed;  $1.06 V_s$  power on +4 knots
- Aft C.G., jets not operating
  - $V_{to}$  - takeoff speed;  $1.06 V_s$  power-on
- $V_{50}$  - obstacle clearance speed;  $1.1 V_s$  zero thrust

**NOTE**

Due to the fact that the speed relationships expressed above apply only to calibrated airspeeds, a slightly different relationship is observed between the indicated airspeeds tabulated on the charts.

Another consideration is that if takeoff speed is increased, takeoff ground run distance will also increase. The increase in takeoff ground run distance can be determined by referring to TAKEOFF ACCELERATION.

**Takeoff Ground Run Distance Correction Factors.**

**Effect Of Runway Surface Covering.**  
(Figures A3-21 and A3-22)

The most ideal condition for a takeoff is a level, dry, hard surface runway with no surface imperfections such as cracks or wrinkles in the paving. The ground run data contained in the Takeoff Distance charts are based on this condition, and consequently are valid without correction at most permanent operating fields. When a hard surface runway is covered with standing water, additional rolling friction is encountered, even though the surface may not be deformed or softened by the water. Consequently, a correction must be applied to the data taken from the charts. Still more rolling friction develops on sod runways or unpaved gravel strips since the wheels tend to sink in and must roll over small obstructions such as stones, grass and surface irregularities. The takeoff ground run correction factors for runway surface covering are found graphically from Takeoff Ground Run Distance Correction Factor For Runway Surface Covering - With Jet Thrust or Takeoff Ground Run Distance Correction Factor For Runway Surface Covering-Without Jet Thrust. The following table of typical rolling coefficients of friction is supplied to aid in using the correction factor charts:

RUNWAY SURFACE COVERING	ROLLING COEFFICIENT OF FRICTION
DRY HARD SURFACE	0.025
WET HARD SURFACE, STANDING WATER	0.080
DRY HARD TURF, SHORT GRASS	0.080
DRY SOFT TURF, SHORT GRASS	0.070
WET TURF	0.100
DRY SOFT GRAVEL, NO GRASS	0.100-0.300

### Effect Of Runway Gradient. (Figure A3-23)

When the runway is not level, the takeoff ground run distance should be increased (uphill denoted as minus) or decreased (downhill denoted as positive) in accordance with the runway gradient (slope). The runway gradient correction factor for takeoff ground run distance is found in figure A3-23, Takeoff Ground Run Distance Correction Factor For Runway Gradient. Once the correction factors are known, the corrected ground distance may be determined through the use of figure A3-24, Corrected Ground Distance. The order of applying the correction factors is unimportant to arrive at the resultant takeoff ground run distances.

### Use Of The Charts.

In order to determine the level takeoff ground run distance required to takeoff in a no wind condition on a dry, hard-surface runway, first select the appropriate Takeoff Distance chart marked with the proper configuration of wing flaps and jet engine operation. Enter the upper left grid of sheet 1 at the bottom with the minimum performance torque pressure and proceed vertically upward to the line corresponding to the proper density altitude.

### NOTE

Normally, takeoff performance should be checked using the minimum performance torque pressure obtained from the Brake Horsepower Available charts, figures A2-22 through A2-27. Urgent missions may be planned on the basis of expected torque pressure at the discretion of the Commander.

### NOTE

These charts adjust for power level by use of torque pressure and altitude and are based on operation in low blower at 2,800 RPM. In low blower operation, these charts must always be entered with the TOP corresponding to 2,800 RPM, regardless of what RPM is to be used on the aircraft. When the aircraft is to be operated in low blower at other than 2,800 RPM, the performance predicted by these charts can be attained only if the torque meters on the aircraft are set to the equivalent torque determined by the equation:

$$\text{Equiv. TOP} = \frac{(\text{TOP @ 2,800 RPM}) 2,800}{\text{Desired RPM}}$$

For operation in high blower, 2,600 RPM, enter the charts with a TOP value equal to 92% of the chartered TOP determined from the BRAKE HORSEPOWER AVAILABLE, HIGH BLOWER, chart in Part 2. The TOP set on the torque meters, in this case, would be the chartered TOP.

From this point read horizontally right to the reference line and follow the guide line slope establishing a tentative guide line. Next, locate the intersection of the gross weight

and torque pressure on the gross weight alignment grid and project vertically upward to the tentative guide line. From that intersection read horizontally to the right until the applicable gross weight line is reached, interpolate visually, if necessary. Vertically below read level takeoff ground run distance (no wind). To determine the effect of wind, continue downward, to the level ground run distance wind grid base line and follow the appropriate wind guide lines to intercept the horizontal line representing the existing wind condition. From this point continue vertically downward and read the level takeoff ground run distance (with wind). To determine total distance to clear 50 feet, enter sheet 2 of the selected chart and follow the same procedure as was followed for level takeoff ground run distance.

### NOTE

The order of applying the correction factors is unimportant to arrive at the resultant takeoff ground run distances.

If the runway is other than a dry, hard-surface runway, the level takeoff ground run distance (with wind) must be corrected to the existing runway surface covering (RSC). Refer to figure A3-21, Takeoff Ground Run Distance Correction Factor For RSC, With Jets, or figure A3-22, Without Jets, and select the rolling coefficient of friction corresponding to the runway surface which is most like the actual runway to be used. Enter the chart at the left bottom with the applicable gross weight and proceed vertically upwards to the appropriate rolling coefficient of friction. Move horizontally right to the reference line and follow the guide lines to the density altitude of the runway. From this point proceed horizontally to the reference line and follow the guide lines to the appropriate torque pressure (TOP). Proceed horizontally right to the reference line and follow the guide lines to the appropriate wind velocity. Continue horizontally right to the reference line or flaps up line. Should the configuration have flaps up, proceed horizontally right and read the correction factor for RSC. Should the configuration have flaps takeoff, proceed vertically down from the reference line, flaps up, to the flaps takeoff line and then horizontally across to read the correction factor for RSC. Refer to figure A3-24, Corrected Ground Distance, and enter the chart at the left edge with the takeoff ground distance (with wind), proceed horizontally right to the correction factor found graphically from figure A3-21 or A3-22, and moving vertically downward read the corrected takeoff ground run distance for RSC.

In order to determine the takeoff ground run distance required on a sloping runway, the level takeoff ground run distance must be corrected by entering figure A3-23, Takeoff Ground Run Distance Correction Factor For Runway Gradient, at the applicable gross weight and runway gradient. Move horizontally right to the reference line and follow the guide lines to the appropriate TOP. Proceed horizontally right to the reference line and follow the guide lines to the density altitude of the runway. From this point, continue to move horizontally right and read the runway gradient correction factor for takeoff ground run distance, with jets at 100% rpm. An additional correction must be made if the jets are not operating. If the jets are

not operating, follow the guide lines to the extreme right and read the runway gradient correction factor for takeoff ground run distance, with jets inoperative. Again refer to figure A3-24 to find the takeoff ground run distance corrected for runway gradient and RSC. Total distance to clear a 50-foot obstacle on a sloping runway exceeds the sloping ground run distance by the same amount as for a level runway.

**Example.**

**GIVEN:** takeoff in a 10-knot headwind from a dry, soft turf, short grass runway on a 2% uphill slope at a density altitude of 900 feet. Gross weight of the aircraft is 64,500 pounds. Use minimum performance torque pressure of 126.1 psi, wing flaps takeoff setting with jets operating at 100% rpm.

**FIND:** takeoff ground run distance with and without wind, total distance to clear a 50-foot obstacle, takeoff speed ( $V_{to}$ ), rotation speed ( $V_R$ ) and obstacle clearance speed ( $V_{50}$ ).

1. Select figure A3-14 for this problem and enter the upper left grid of sheet 1 of 2 at the bottom with a torque pressure of 126.1 psi and proceed vertically upward to the line corresponding to a density altitude of 900 feet.

2. From this intersection point, move horizontally right to the reference line and following the guide lines, establish a tentative intermediate guide line.

3. Locate the intersection of the 64,500-pound gross weight line and the 126.1 psi torque pressure line on the gross weight alignment grid and project vertically above to intersect the tentative intermediate guide line of step 2.

4. From this point, move horizontally to the right until the 64,500-pound gross weight line is reached.

5. Drop vertically downward to the level takeoff ground run distance (no wind) scale and read a level takeoff ground run distance of 2,220 feet.

6. Since a headwind of 10 knots exists, determine the ground run by following the wind guide lines downward and to the left until the horizontal 10-knot headwind line is reached.

7. From this point, drop vertically downward and read 1,880 feet on the level takeoff ground run distance (with wind) scale.

8. To find the total takeoff distance to clear a 50-foot obstacle go to sheet 2 of 2 of the selected chart (figure A3-14) and repeat steps 1 through 7. Read, total takeoff distance to clear a 50-foot obstacle (with wind) of 2,960 feet.

9. From the table of indicated airspeeds, determine the takeoff speed, rotation speed and obstacle clearance speed by interpolation:

$V_{to}$ -	107.5 KIAS	in ground effect
$V_R$ -	97.5 KIAS	in ground effect
$V_{50}$ -	114.5 KIAS	out of ground effect

10. Refer to figure A3-21, Takeoff Ground Run Distance Correction Factor For Runway Surface Covering - Jets 100% rpm. Enter the chart at the bottom of the left grid with 64,500 pounds gross weight and proceed vertically upward to the rolling coefficient of friction of 0.070 for dry, soft turf, short grass runway.

11. From this point, move horizontally right to the reference line and follow the guide lines to a density altitude of 900 feet.

12. Proceed horizontally right to the reference line and follow the guide lines until a torque pressure of 126.1 psi is reached.

13. From this intersection, move horizontally right to the reference line and follow the guide lines upward until a headwind of 10 knots is reached.

14. Continue moving horizontally across to the reference line for 0° wing flap setting and drop vertically downward to the reference line for wing flaps takeoff and continue horizontally to the extreme right and read a level takeoff ground run distance correction factor for runway surface covering of 1.14.

15. Referring to figure A3-24, Corrected Ground Distance, enter the chart at the left with the takeoff ground run distance (with wind) of 1,880 feet. Proceed horizontally to the right to the correction factor of 1.14, and vertically down to read a corrected level takeoff ground run distance of 2,143 feet.

16. To correct for runway gradient, refer to figure A3-23, Takeoff Ground Run Distance Correction Factor For Runway Gradient. Enter the chart at the left grid with a gross weight of 64,500 pounds and proceed vertically upward to an uphill runway slope of -2.0 percent.

17. From this intersection, move horizontally right to the reference line and follow the guide lines to a torque pressure of 126.1 psi.

18. Proceed horizontally right to the reference line and follow the guide lines to the 900-foot density altitude and horizontally right read the takeoff ground run distance correction factor for runway gradient with jets at 100% rpm of 1.094. Had the jets been inoperative, continue to the right following the guide line and read a value of 1.155.

19. Again referring to figure A3-24, Corrected Ground Distance, enter the chart at the left with a level ground distance corrected for RSC of 2,143 feet. Proceed horizontally right to the correction factor line for 1.094, interpolation is necessary, and vertically downward read a takeoff ground run distance corrected for both RSC and runway gradient of 2,344 feet.

20. Determine the air distance to clear a 50-foot obstacle by taking the difference between the total distance to clear a 50-foot obstacle (with wind) and the level ground run distance (with wind).

Air distance = 2,960 feet - 1,880 feet = 1,080 feet.

21. Add the difference to the uphill ground run distance corrected for RSC to determine the corrected total distance to clear 50 feet.

Corrected total takeoff distance = 1,080 feet + 2,344 feet = 3,424 feet

#### CRITICAL FIELD LENGTH. (Figures A3-25 through A3-31)

In considering the possibility of an engine failure during the takeoff run, the critical field length is of importance since it indicates the degree of risk involved in the event of an engine failure on takeoff. The minimum safe condition exists when critical field length is equal to runway length. When this is the case, critical engine failure speed equals refusal speed. The critical engine failure speed for this minimum safe condition can be obtained from the appropriate Refusal Speed chart (figures A3-42 through A3-45).

When the critical field length is less than runway length and an engine failure takes place, the takeoff can be achieved if the speed at engine failure exceeds critical engine failure speed. The aircraft can stop in less than the remaining runway length when engine failure occurs at less than refusal speed.

When critical field length exceeds runway length, the risk is minimum when engine failure occurs prior to reaching refusal speed since the aircraft can still be stopped in the remaining runway. When engine failure occurs after reaching refusal speed, a successful takeoff is not assured but depends on the speed attained at the time of engine failure relative to takeoff speed and on the amount that critical field length exceeds runway length. Since all the possible combinations cannot be taken into account, the final decision to abort or continue takeoff must remain with the pilot. After determining the critical field length, the pilot may either reduce the gross weight to shorten the critical field length or accepts the risk of engine failure occurring between refusal speed and takeoff speed.

Some combinations of gross weight, altitude and TOP are not capable of meeting the minimum rate of climb criteria for takeoff. The requirement to be met is R/C = 100 FPM with maximum power, minimum performance TOP, gear down and at takeoff speed or minimum control speed whichever is higher. The takeoff impossibility is indicated by the shaded areas in the charts. The total distance to 50 feet for a continued takeoff after engine failure at critical engine failure speed is found from figures A3-26, A3-28 and A3-30. The shaded areas on these figures represent conditions where the rate of climb capabilities are less than 100 feet per minute with landing gear down.

## WARNING

When critical field length is longer than available runway length; if engine failure occurs shortly after passing refusal speed, it is probable that neither takeoff nor a complete stop can be accomplished within the remaining runway distance.

#### NOTE

Takeoff speed ( $V_{to}$ ) is equal to the minimum control speed with a feathered propeller or  $1.1 V_s$  (whichever is greater) for engine out takeoff at all gross weights.

Since the critical field length reflects both accelerating and decelerating capability of the aircraft, the Critical Field Length charts are designed to introduce the effects of those variables primarily related to acceleration and deceleration. The effect of engine power on acceleration is represented on each chart by density altitude lines and torque pressure on the bottom scale. Gross weight is represented by a series of lines in the right hand portion, ranging from 35,000 to 70,000 pounds. Since a headwind tends to improve both acceleration and deceleration, the headwind guide lines in the lower right corner of each chart shorten the critical field length.

#### Critical Field Length Correction Factors.

##### Effect Of Runway Gradient. (Figure A3-32)

Whenever the runway is other than level, figure A3-32, Critical Field Length Correction Factor For Runway Gradient, is used to determine the runway gradient correction factor. An uphill runway gradient will tend to lengthen the critical field length while a downhill runway gradient tends to shorten the critical field length. The correction factor for runway gradient found graphically in figure A3-32 must be applied to figure A3-24 for the corrected critical field length due to an uphill or downhill slope.

##### Effect Of Runway Condition Reading. (Figures A3-33 and A3-34)

It should be noted that the Critical Field Length charts are based on the performance obtained while operating on a dry, hard surface runway. When a slippery runway is encountered, the critical field length may be expected to increase considerably since the braking coefficient of friction is much less. This has the effect of lengthening the stopping distance required to abort the takeoff due to less effective braking action. Figures A3-33 and A3-34, Variation of Critical Field Length With Runway Condition Reading (RCR) provide a means of correcting the critical field length to existing runway surface conditions. The Runway Condition Reading (RCR) used to enter the correction

chart is obtained from the field weather report. Should no RCR be available, the following typical readings may be used as a guide for hard surfaced runways.

RUNWAY SURFACE	RCR
Dry (ICAO Good)	23
Wet (ICAO Medium)	12
Icy (ICAO Poor)	05

#### Effect Of Runway Surface Covering. (Figure A3-35)

A rolling coefficient of friction correction factor must also be applied whenever the runway surface condition is other than a dry, hard surface. Critical Field Length Correction Factor For Runway Surface Covering (RSC), figure A3-35, is used to obtain an RSC correction factor. This correction factor is then applied to figure A3-24, Corrected Ground Distance, for the corrected critical field length for RSC.

#### Use Of The Chart.

##### NOTE

These charts adjust for power level by use of torque pressure and altitude and are based on operation in low blower at 2,800 RPM. In low blower operation, these charts must always be entered with the TOP corresponding to 2,800 RPM, regardless of what RPM is to be used on the aircraft. When the aircraft is to be operated in low blower at other than 2,800 RPM, the performance predicted by these charts can be attained only if the torque meters on the aircraft are set to the equivalent torque determined by the equation:

$$\text{Equiv. TOP} = \frac{(\text{TOP @ 2,800 RPM}) 2,800}{\text{Desired RPM}}$$

For operation in high blower, 2,600 RPM, enter the charts with a TOP value equal to 92% of the charted TOP determined from the BRAKE HORSEPOWER AVAILABLE, HIGH BLOWER, chart in Part 2. The TOP set on the torque meters, in this case, would be the charted TOP.

In order to determine the critical field length on a level, dry, hard surface runway, select the appropriate chart, figures A3-25, A3-27, A3-29 or A3-31, and enter the extreme left grid at the bottom with the known minimum performance torque pressure of the engine and proceed upward to the density altitude.

##### NOTE

Normally, takeoff performance should be checked using the minimum performance torque pressure obtained from the Brake Horsepower Available charts (figures A2-22 through A2-27). Urgent missions may be planned on the basis of expected torque pressure at the discretion of the Commander.

From this point read horizontally right to the reference line and follow the guide line slope establishing a tentative guide line. Next, locate the intersection of the gross weight and torque pressure on the gross weight alignment grid and project vertically upward to the tentative guide line. It should be noted that there is no gross weight alignment necessary when the jets are inoperative. From that intersection, move horizontally to the right until the applicable gross weight line is reached, interpolate visually if necessary to the nearest 1000 pounds. Vertically below read, critical field length (no wind). To determine the effect of wind, continue moving downward, following the appropriate wind guide lines to the horizontal line representing the existing wind condition. Again, a visual interpolation will probably be necessary. From this point, drop vertically downward and read critical field length (with wind).

##### NOTE

The order of applying the correction factors is important in order to arrive at the correct result. The proper sequence is to correct for runway slope first, then RCR, and finally RSC.

To determine a critical field length on a sloping runway, the level critical field length must be corrected by entering figure A3-36, Critical Field Length Correction Factor For Runway Gradient, at the left with the applicable gross weight and runway gradient. Move horizontally to the right to the reference line and follow the guide lines to the appropriate torque pressure (TOP). Proceed to the right to the reference line and follow the guide lines to the density altitude of the runway. From this point, continue to move horizontally to the right and read the runway gradient correction factor for jets operating. In the event the jets are not operating, continue moving horizontally right to the reference line for an additional torque pressure correction. Follow the guide lines to the appropriate torque pressure and proceeding horizontally right, read the runway gradient correction factor for critical field length. Refer to figure A3-24, and enter the chart at the left edge with the level critical field length (with wind), proceed horizontally right to the correction factor found graphically from figure A3-36. Read vertically downward for the corrected critical field length for runway gradient.

If the runway is other than a dry, hard surface runway, critical field length must be corrected to the existing runway condition reading (RCR). Obtain the runway condition reading (RCR) or equivalent information from the field weather report, and enter figure A3-33 (jets 100% rpm) or A3-34 (jets inoperative), Variation of Critical Field Length With Runway Condition Reading (RCR), at the left with the critical field length corrected for runway gradient. Follow the guide lines to the applicable runway condition reading (RCR). Horizontally to the right, read the critical field length corrected for runway condition reading (RCR) and runway gradient.

To adjust for runway surface covering (RSC), refer to figure A3-35, Critical Field Length Correction Factor For Runway Surface Covering, enter the chart at the left with the applicable gross weight and the appropriate rolling coefficient of friction listed on the chart. Move horizontally right to the reference line and follow the guide lines to the appropriate torque pressure (TOP). Proceed right to the reference line and follow the guide lines to the density altitude of the runway.

From this point proceed horizontally right. If the configuration has jets at 100% rpm, the correction for RSC may be read directly on the scale at the extreme right edge of the chart. If the jets are not operating, an additional correction factor is necessary. From the point located on the density altitude grid, proceed horizontally right to the reference line and then vertically upward to the jets inoperative line and horizontally across to the scale at the extreme right to read the correction factor for RSC when the jets are not operating.

Refer to figure A3-24, and enter the chart at the left edge with the level critical field length (with wind) already corrected for the sloping runway and RCR and proceed horizontally right to the correction factor found graphically from figure A3-35. Read vertically downward for the critical field length corrected for runway gradient, RCR and RSC.

To determine the total takeoff distance to 50 feet, consider the final corrected value of critical field length to be the ground run distance. Since the Total Distance To 50 Feet For Single Engine Takeoff (figures A3-26, A3-28 and A3-30) are for a level, dry, hard surface runway, the air distance must be calculated by subtracting the critical field length corrected for prevailing wind but uncorrected for runway gradient, RSC and RCR from the value found for total distance to 50 feet for single engine takeoff. This distance is then added to the critical field length corrected for runway slope, RSC and RCR to yield the total takeoff distance to 50 feet.

The procedures for using the total distance to 50 feet for single engine takeoff charts are identical to those for critical field length.

#### Example.

**GIVEN:** takeoff with a 10-knot headwind on a wet hard surface runway with standing water, a 2 percent uphill slope, at a gross weight of 64,500 pounds, with jet thrust, flaps takeoff, a density altitude of 900 feet and using a minimum performance torque pressure of 126.1 psi.

**FIND:** critical field length for a sloping, dry and wet hard surface runway with standing water. Also, should a reciprocating engine be lost after passing the critical engine failure speed, find the distance to 50 feet for a continued single engine takeoff, single engine takeoff speed and single engine speed to clear 50 feet.

1. Enter the left grid (figure A3-27) at the bottom with 126.1 psi torque pressure and proceed vertically upward to the density altitude of 900 feet (interpolate visually).

2. From this point, move horizontally right to the reference line and following the guide lines, establish a tentative guide line. On the gross weight alignment grid at the bottom, locate the intersection of the 64,500 pound gross weight and 126.1 psi torque pressure and project vertically upward to the tentative guide line and from this intersection, continue horizontally right to the 64,500 pound gross weight line.

3. From the intersection with the 64,500 pound gross weight, drop vertically downward to the critical field length (no wind) scale and read 3,120 feet.

4. To correct for headwind, enter the wind grid at the top with the no wind critical field length and follow the headwind guide lines downward and to the left until the horizontal 10-knot headwind line is reached.

5. Drop vertically downward to the critical field length (with wind) scale and read a critical field length of 2,630 feet for a level, dry hard surface runway.

6. To correct for runway gradient, refer to figure A3-32, Critical Field Length Correction For Runway Gradient. Enter the chart at the left grid at the bottom with 64,500 pounds and proceed vertically upward to the runway gradient of -2%.

7. From this point move horizontally right to the reference line and follow the guide lines to 126.1 psi torque pressure.

8. Proceed horizontally right to the reference line. Follow the guide lines to the density altitude of 900 feet and proceed horizontally right and read a correction factor of 1.104 on the scale at the right for runway slope when the jet engines are operative. Had the jets been inoperative, continue to the right, following the guide lines until intersecting a vertical line representing the torque pressure of 126.1 psi. From this intersection, proceed horizontally right and read a correction factor of 1.220 on the scale for jets inoperative.

9. Refer to figure A3-24, Corrected Ground Distance. Enter the chart at the left with a critical field length of 2,630 feet and proceed horizontally right to a correction factor of 1.104 (interpolate visually). Vertically down read a corrected critical field length for runway gradient of 2,904 feet.

10. To adjust for a slippery runway, refer to figure A3-33, Variation In Critical Field Length With Runway Condition Reading (RCR), With Jets. Enter the left edge of the chart at 2,904 feet. Follow the guide lines to the known RCR value (in this case, RCR of 12 for wet runway) and moving horizontally right read a corrected critical field length for runway gradient and RCR of 3,190 feet.

11. To adjust for a wet hard surface runway with standing water, use a rolling coefficient of friction of 0.050. Refer to figure A3-35, Critical Field Length Correction For Runway Surface Covering (RSC). Enter the chart at the left grid at the bottom with 64,500 pounds and proceed vertically upward to the rolling coefficient of friction of 0.050.

12. From this point move horizontally right to the reference line and follow the guide lines to 126.1 psi torque pressure.

13. Proceed horizontally right to the reference line. Follow the guide lines to the density altitude of 900 feet and proceed horizontally right to read a correction factor of 1.105 on the scale for RSC correction factor, jets at 100% RPM. Had the jet engines been inoperative an additional correction is necessary. From the point established on the density altitude grid, proceed horizontally right to the reference line (jets 100% RPM), then vertically upward to the jets inoperative line and then horizontally right to read a correction factor for RSC without jets of 1.17.

14. Again referring to figure A3-24, Corrected Ground Distance, enter the chart at the left with a critical field length of 3,190 feet corrected for runway gradient and RCR and proceed horizontally right to a correction factor of 1.100.

15. Vertically down, read a corrected critical field length for runway gradient, RCR and RSC of 3,510 feet.

16. Should an engine fail after passing the critical engine failure speed, the distance for continued takeoff is found from figure A3-28, Total Distance To 50 Feet For Single Engine Takeoff. Enter at the bottom with 126.1 psi torque pressure and proceed vertically upward to the density altitude of 900 feet (interpolate visually).

17. From this point, move horizontally right to the reference line and following the guide lines, establish a tentative guide line. On the gross weight alignment grid at the bottom, locate the intersection of the 64,500-pound gross weight and 126.1 psi torque pressure and project vertically upward to the tentative guide line and from this intersection, continue horizontally right to the 64,500-pound gross weight line.

18. From the intersection with the 64,500-pound gross weight, drop vertically downward to the total takeoff distance to clear 50 feet (no wind) scale and read 6,500 feet.

19. To correct for headwind, enter the wind grid at the top with the no wind total distance of 6,500 feet and follow the headwind guide lines downward and to the left until the horizontal 10-knot headwind line is reached.

20. Drop vertically downward to the total takeoff distance to clear 50 feet (with wind) scale and read 5,700 feet.

21. The air distance to 50 feet is found by subtracting the critical field length corrected for wind but uncorrected for runway gradient, RCR or RSC, found in step 5 at a value of 2,630 feet from the total takeoff distance to clear 50 feet with wind in step 20 at a value of 5,700 feet.

$$\text{Air distance} = 5,700 - 2,630 = 3,070 \text{ feet}$$

22. The total distance to 50 feet for single engine takeoff is the air distance of 3,070 feet added to the critical field length corrected for runway gradient, RCR and RSC of 3,510 feet from step 15.

$$\text{Total distance} = 3,070 + 3,510 = 6,580 \text{ feet}$$

23. Again referring to figure A3-27, the following speeds are determined by interpolating those shown on the tabulation:

$$V_{to} = 108 \text{ KIAS in ground effect}$$

$$V_{50} = 115 \text{ KIAS out of ground effect}$$

**REFUSAL SPEED.**

(Figures A3-42 through A3-45)

As the name implies, refusal speed is the maximum speed at which the pilot can refuse to take off and still stop the aircraft within the remaining runway length. This, of course, implies that if an engine failure should occur prior to reaching refusal speed, the takeoff should be aborted; and conversely, if it occurs at or beyond refusal speed, the takeoff should be continued (provided critical field length does not exceed runway length). If, however, the runway is so long that the refusal speed is higher than the takeoff speed, then takeoff speed should be used as refusal speed; i.e., if failure occurs before takeoff, the aircraft can and should be stopped. See emergency procedures in Section III. The validity of the refusal speed is dependent upon a normal acceleration of the aircraft. For this reason, it is advisable to check the acceleration at some point prior to reaching refusal speed. This means that the pilot must first check acceleration at a predetermined point on the runway, then use refusal speed to decide whether or not to abort in case of engine failure. (Refer to TAKEOFF ACCELERATION.)

The Refusal Speed charts are based on operation from a level, dry, hard surface runway. Since the length of the runway largely determines the refusal speed, an effective runway length is plotted along the left-hand edge of the charts. By proceeding from this scale to the right through the curves, the effects of wind, density altitude, torque pressure, and gross weight are progressively introduced.

**Effective Runway Length.**

Like critical field length and takeoff distance, conditions of the runway effect refusal speed. The basic charts (figures A3-42 through A3-45) are based on a level, dry, hard surface runway. Any change in runway gradient, RCR or RSC results in an artificial runway length which shortens or lengthens the actual runway length. This artificial runway length is known as the effective runway length and must be used to enter the charts. There is no prescribed order in which these correction factors must be applied and the following sequence is suggested in the order of this presentation.

**Effect of Runway Gradient.**

(Figures A3-36 and A3-37)

When the runway is not level, the effective runway length may tend to shorten due to an uphill slope and thereby reduce the refusal speed or a downhill slope may tend to increase the effective runway length and result in an increased refusal speed. The effective runway length correction factor is found in figures A3-36 and A3-37, Effective Runway Length Correction Factor For Runway Gradient With Jet Thrust and Without Jet Thrust.

**Effect Of Runway Condition Reading.**

(Figures A3-38 and A3-39)

Since braking action is less effective on a slippery runway, the refusal speed is correspondingly lower. Thus, if the Refusal Speed charts are to be used for determining refusal speed on a slippery runway, an effective runway length shorter than actual runway must be used to enter the charts. This effective runway length is found from figures A3-38 and A3-39, Effective Runway Length Correction Factor For Runway Condition Reading (RCR), with or without jet thrust. Notice that as the Runway Condition Reading decreases, the correction factor decreases the effective runway length; consequently, on a slippery runway, the shorter effective runway length will have the effect of lowering the refusal speed. On a level, dry, hard surface runway, effective runway length equals actual runway length.

Should no RCR be available, the following typical readings may be used as a guide for hard surface runways.

RUNWAY SURFACE	RCR
Dry (ICAO Good)	23
Wet (ICAO Medium)	12
Icy (ICAO Poor)	05

**Effect Of Runway Surface Covering.**

(Figures A3-40 and A3-41)

The Refusal Speed charts are based on a dry, hard surface runway with no surface imperfections such as cracks or wrinkles in the paving and consequently are valid without correction at most permanent operating fields. When a hard surface runway is covered with standing water, additional rolling friction is encountered, even though the surface may not be deformed or softened by the water. Consequently, a correction factor must be applied to the runway length which is determined from figures A3-40 and A3-41, Effective Runway Length Correction Factor For Runway Surface Covering (RSC) With Jets at 100% rpm or Without Jet Thrust. Typical values of rolling coefficients of friction have been previously presented in the TAKEOFF DISTANCE section.

Once the correction factors are known, the final effective runway length may be determined from the use of figure A3-24, Corrected Ground Distance.

## Use Of The Charts.

## NOTE

These charts adjust for power level by use of torque pressure and altitude and are based on operation in low blower at 2,800 RPM. In low blower operation, these charts must always be entered with the TOP corresponding to 2,800 RPM, regardless of what RPM is to be used on the aircraft. When the aircraft is to be operated in low blower at other than 2,800 RPM, the performance predicted by these charts can be attained only if the torque meters on the aircraft are set to the equivalent torque determined by the equation:

$$\text{Equiv. TOP} = \frac{(\text{TOP @ 2,800 RPM}) 2,800}{\text{Desired RPM}}$$

For operation in high blower, 2,600 RPM, enter the charts with a TOP value equal to 92% of the charted TOP determined from the BRAKE HORSEPOWER AVAILABLE, HIGH BLOWER, chart in Part 2. The TOP set on the torque meters, in this case, would be the charted TOP.

If other than a level, dry, hard surface runway condition is to be considered, first determine the effective runway length due to a sloping runway by entering figure A3-36 or A3-37, Effective Runway Length Correction Factor For Runway Gradient With or Without Jet Thrust at the left with the appropriate TOP and runway gradient. From this point read horizontally right to the first reference line and follow the guide line slope establishing a tentative guide line. Next, on the gross weight alignment grid below, locate the intersection of the gross weight and runway gradient and project vertically upward to the tentative guide line. From this intersection read horizontally right to the second reference line and follow the guide line slope establishing a second tentative guide line. On the density altitude alignment grid below, locate the intersection of the density altitude and runway gradient and project vertically upward to the second tentative guide line. From the intersection proceed horizontally to the extreme right and read the runway slope correction factor for effective runway length. Refer to figure A3-24 and enter chart on the left with actual runway length. Proceed horizontally to the right until the runway gradient correction factor for effective runway length is reached. Vertically down read effective runway length due to runway gradient.

Next obtain the Runway Condition Reading (RCR) or equivalent information from the field weather report and determine the effective runway length by first entering figure A3-38 or A3-39, Effective Runway Length Correction Factor For Runway Condition Reading (RCR) With or Without Jet Thrust, on the left with the RCR and appropriate torque pressure. Read horizontally right to the reference line, and following the guide lines, establish a tentative guide line. On the gross weight alignment grid below, establish the intersection of the gross weight and RCR and project vertically upward to the tentative guide

line. From that intersection, proceed horizontally right to the next reference line and following the guide lines establish a second tentative guide line. On the density altitude alignment grid below, determine the intersection of the density altitude and RCR and project vertically upward to the second tentative guide line. From that intersection, project horizontally right to the third reference line. Follow the guide lines, upward for a tailwind or downward for a headwind, to the right establishing a third tentative guide line. On the wind alignment grid below, determine the intersection of the prevailing wind and RCR and project vertically upward to the third tentative guide line. From that point, proceed horizontally right and read the correction factor for RCR. Like the correction factor for runway gradient, figure A3-24, Corrected Ground Distance, is then entered to find the effective runway length due to RCR and runway gradient.

Determine the rolling coefficient of friction from figure A3-40 or A3-41, Effective Runway Length Correction Factor For Runway Surface Covering (RSC), With or Without Jet Thrust, and enter the left bottom of this chart at the appropriate gross weight. Proceed vertically upwards to the applicable rolling coefficient of friction. Read horizontally right to the reference line and follow the guide lines to the density altitude of the runway. Proceed horizontally right to the reference line and follow the guide lines to the appropriate wind condition. At this point, read horizontally to the next reference line and follow the guide lines to the applicable torque pressure. Reading horizontally to the right edge of the next grid gives the RSC correction factor for flaps up. If the flap setting is takeoff, proceed horizontally right from the intersection of the applicable torque pressure and guide line to the reference line and vertically down to the flaps takeoff line. Continue horizontally to the right to read the RSC correction factor. Like the correction for both the runway gradient and RCR, figure A3-24, Corrected Ground Distance, is then used to find the effective runway length due to RSC, RCR and runway gradient. The order of application of correction factors for runway slope, RSC, and RCR is unimportant and may be applied in the most convenient sequence.

In order to determine the refusal speed for a given takeoff situation, enter the appropriate refusal speed chart with the effective runway length on the scale at the left and follow the guide lines to the vertical line corresponding to the existing wind condition. From this point move horizontally to the right until the reference line is reached. Then follow the density altitude guide lines up (to the left) or down (to the right) until the corresponding density altitude is reached. From here, continue horizontally to the right until the reference line is reached, then follow the guide lines to the appropriate minimum performance torque pressure.

## NOTE

Normally, takeoff performance should be checked using the minimum performance torque pressure obtained from the Brake Horsepower Available charts,

figures A2-22 through A2-27. Urgent mission may be planned on the basis of expected torque pressure at the discretion of the Commander.

From this point, again move horizontally to the right as far as the appropriate gross weight line and then interpolate visually to read refusal speed. If the final point reached requires crossing the takeoff speed line being considered, the refusal speed will be considered equal to takeoff speed. In this case, the takeoff may be safely aborted at any time prior to becoming airborne, and takeoff should be continued if engine failure occurs after refusal speed.

**Example.**

**GIVEN:** takeoff in a 10-knot headwind on a wet, hard surface runway with standing water (RCR = 12, RSC = .05) and having a 4% uphill slope. The density altitude is 900 feet and the actual runway length is 5,000 feet. The takeoff is at a gross weight of 64,500 pounds using a minimum performance torque pressure of 126.1 psi and jets at 100% rpm. The wing flaps are set in takeoff.

**FIND:** refusal speed.

1. Enter figure A3-36, Effective Runway Length Correction Factor For Runway Gradient at the upper left grid at the bottom with 126.1 psi torque pressure and move vertically upward to a runway gradient of -4%.
2. Move horizontally right to the first reference line and follow the guide lines left to establish a tentative uphill guide line.
3. On the gross weight alignment grid below, establish the intersection of the 4% uphill runway gradient and 64,500 pounds gross weight and project vertically upward to the tentative guide line of step 2.
4. From this intersection, proceed horizontally right to the second reference line and again follow the guide lines left to establish a tentative uphill guide line.
5. On the density altitude alignment grid below, establish the intersection of the 4% uphill runway gradient and 900 feet density altitude and project vertically upward to the tentative guide line of step 4.
6. From this intersection, proceed horizontally to the scale at the extreme right and read a correction factor of 0.95 for the effect of the runway gradient.
7. Entering figure A3-24, Corrected Ground Distance on the left with the actual runway length of 5,000 feet and moving horizontally right to the correction factor of 0.95, results in an effective runway length of 4,795 feet as read on the scale below.
8. Enter figure A3-38, Effective Runway Length Correction Factor For Runway Condition Reading (RCR) With Jet Thrust with a torque pressure of 126.1 psi at the bottom of the grid on the extreme left and move vertically upward to an RCR of 12.
9. Proceed horizontally right to the first reference line and establish a tentative guide line. On the gross weight alignment grid below, establish the intersection of the RCR of 12 and gross weight of 64,500 pounds and project vertically upward to intersect the first tentative guide line.
10. Proceed horizontally right to the second reference line and establish a tentative guide line. On the density altitude alignment grid below, establish the intersection of the RCR of 12 and the density altitude of 900 feet and project vertically upward to intersect the second tentative guide line.
11. Proceed horizontally right to the third reference line and establish a tentative guide line following the headwind guide lines downward and to the right. On the wind alignment grid below, establish the intersection of the RCR of 12 and wind of 10 knots and project vertically upward to intersect the third tentative guide line.
12. From this intersection, move horizontally to the scale at the right and read a correction factor of 0.805 as corrected for an RCR of 12.
13. Enter figure A3-24, Corrected Ground Distance with the effective runway length due to runway gradient of 4,795 feet and proceed horizontally right to the correction factor line of 0.805. Vertically downward read an effective runway length corrected for slope and RCR of 3,860 feet.
14. Enter figure A3-40, Effective Runway Length Correction Factor For Runway Surface Covering (RSC) at the bottom of the grid at the left with a gross weight of 64,500 pounds and proceed vertically upward to the rolling coefficient of friction of 0.05.
15. Proceed horizontally right to the first reference line on the density altitude grid and follow the guide lines to a density altitude of 900 feet.
16. Proceed horizontally right to the next reference line on the wind grid and follow the headwind guide lines to a headwind of 10 knots.
17. Proceed horizontally right to the next reference line on the torque pressure grid and follow the guide lines to a torque pressure of 126.1 psi.
18. Finally, proceed horizontally right to the last reference line which represents wing flaps up then drop vertically down to the flaps takeoff line and horizontally on the scale at the right, read a correction factor of 0.972 for the influence of RSC on effective runway length.
19. Enter figure A3-24, Corrected Ground Distance with the effective runway length due to runway gradient and RCR of 3,860 feet and proceed horizontally right to the correction factor line of 0.972. Vertically downward read an effective runway length corrected for slope, RCR and RSC of 3,752 feet.
20. Enter the appropriate Refusal Speed chart, figure A3-39 on the left with the effective runway length of 3,752 feet and follow the guide lines upward to the right until the 10-knot headwind is reached.
21. Move horizontally right to the reference line (0 feet) on the density altitude grid and follow the guide lines to a density altitude of 900 feet.
22. Again move horizontally right to the reference line on the torque pressure grid and follow the guide lines to a torque pressure of 126.1 psi.

23. From this point read horizontally right to the 64,500-pound gross weight line and read a refusal speed of 101.5 knots in ground effect.

## TAKEOFF ACCELERATION.

(Figures A3-46 and A3-47)

By checking the acceleration of the aircraft prior to reaching refusal speed, the pilot can decide if the takeoff is proceeding satisfactorily. Such data are presented in terms of distance on figure A3-46, Takeoff Acceleration - Distance During Takeoff Ground Run and in terms of time on figure A3-47, Takeoff Acceleration - Time During Takeoff Ground Run. If the distance check is not made too early in the ground run, a second decision at refusal speed is not strictly necessary. The "go no-go" method of checking takeoff performance combines the acceleration check with the refusal speed check so that one decision is made at a selected runway marker. The marker selected is the one that is reached immediately prior to attaining refusal speed and allows for sufficient reaction time. The speed at the marker, is the "go no-go" speed. If the "go no-go" speed is not attained at or before the selected marker is reached, the takeoff should be aborted. The Takeoff Acceleration - Distance During Takeoff Ground Run chart is used to determine the "go no-go" speed. In this chart, indicated airspeed is plotted versus runway distance travelled so that any point on the chart represents a specific average acceleration. The curved lines on the chart connect points of corresponding acceleration; the steep lines representing slow acceleration and the flatter lines representing rapid acceleration. The acceleration time check is accomplished through the use of figure A3-47, Takeoff Acceleration - Time During Takeoff Ground Run. With this method, the time to the "go no-go" marker forms the basis for determining whether the takeoff is proceeding satisfactorily. Sheet 1 of figure A3-47 is entered with the indicated airspeed at the "go no-go" speed, then correct for density altitude and wind to yield the uncorrected time to accelerate to the "go no-go" marker. This value is then corrected for gross weight using sheet 2 of figure A3-47 and serves as the time check for appraising the acceleration to the selected marker.

### Use Of The Chart.

Figure A3-46 (sheet 1 of 2) is entered at the left with the ground run distance corrected for wind, runway slope and RSC and is projected horizontally right to the vertical line corresponding to the prevailing wind condition. From this intersection, the guide lines are followed until the reference line is reached then horizontally right to the acceleration index scale, thereby establishing the acceleration index in a no wind condition but corrected for runway gradient and RSC. Sheet 2 of figure A3-46 is entered with this acceleration index and projected horizontally to the indicated take-

off speed and an acceleration schedule is found through this point following the guide lines. If the "go no-go" concept is to be used, the refusal distance should first be determined by entering sheet 2 of figure A3-46 with the refusal speed, determine the corresponding acceleration index in accordance with the acceleration schedule established by the takeoff speed and distance. Entering sheet 1 of figure A3-46 with the acceleration index and following the procedures in reverse establishes the refusal distance. A runway marker short of the refusal distance is selected and the scale on the left of sheet 1 of figure A3-46 is entered with that value and projected horizontally across to the vertical line corresponding to the prevailing wind. The guide lines are followed to the reference line and then horizontally to the scale at the right, establishing the acceleration index for the "go no-go" marker.

### NOTE

Runway markers are placed 1,000 feet apart to show runway distance remaining (6, 5, 4, etc.). If a runway is an exact multiple of 1,000 feet, the high-numbered marker is placed 1,000 feet from the start of the runway, and each succeeding marker shows exact distance remaining. If the runway is not an exact multiple of 1,000 feet, the distance to the high-numbered marker is 1,000 feet plus half of the spare length. In this case, the other half of the spare length must be added to each marker to obtain the exact distance remaining.

Entering figure A3-46 (sheet 2 of 2) with the acceleration index corresponding to the selected runway marker and proceeding horizontally right to the guide line establishes the "go no-go" speed on the scale vertically below this intersection. An increased takeoff ground run distance due to an increased takeoff speed is found by entering the speed scale at the bottom of (sheet 2 of 2) with that value, then projecting vertically upward to the acceleration guide line and horizontally left establishes the corresponding acceleration index for the increased takeoff speed. The actual increased takeoff distance with wind is found by reentering (sheet 1 of 2) with this acceleration index along the no wind reference line and following the guide lines to the prevailing wind condition and then horizontally to the scale at the left establishes the increased ground run distance with wind.

Figure A3-47 is used for the takeoff acceleration time check. Sheet 1 of 2 is entered at the bottom with indicated airspeed which, depending on the time check desired may be the takeoff speed, refusal speed or "go no-go" speed.

MODEL: C-123K, UC-123K  
**ENGINE FAILURE ON TAKE OFF**

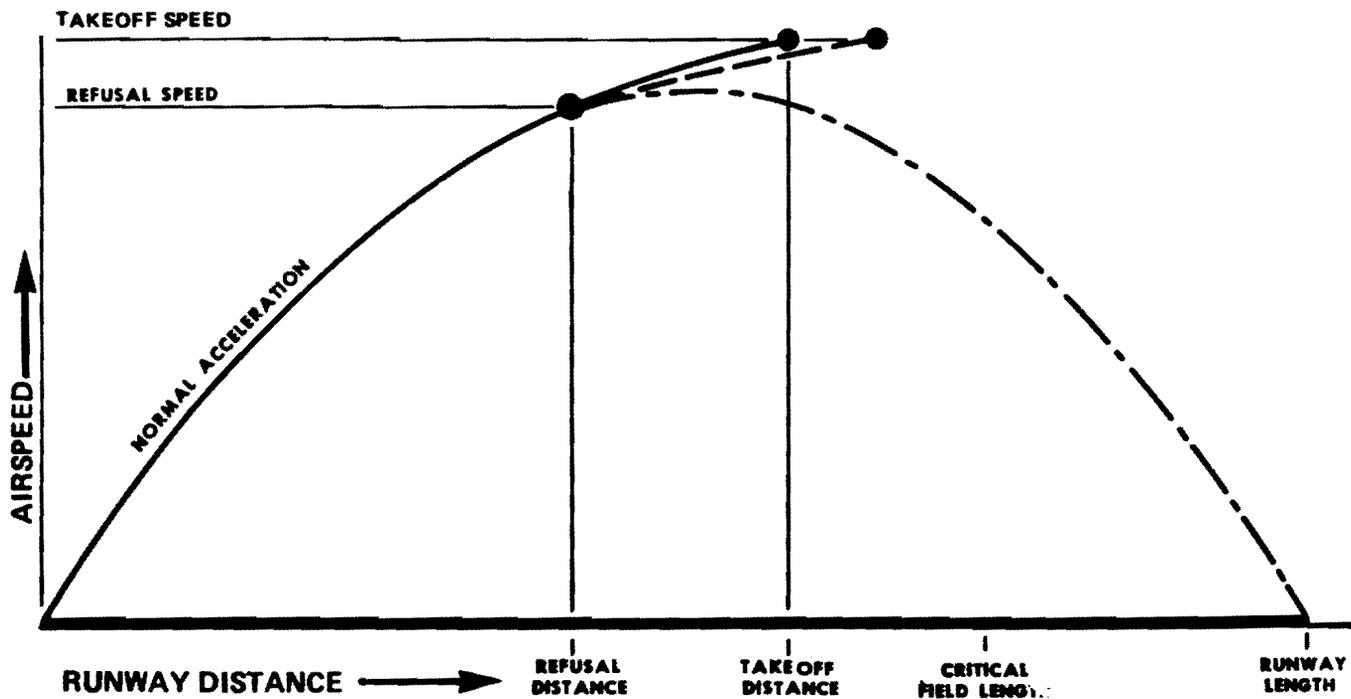
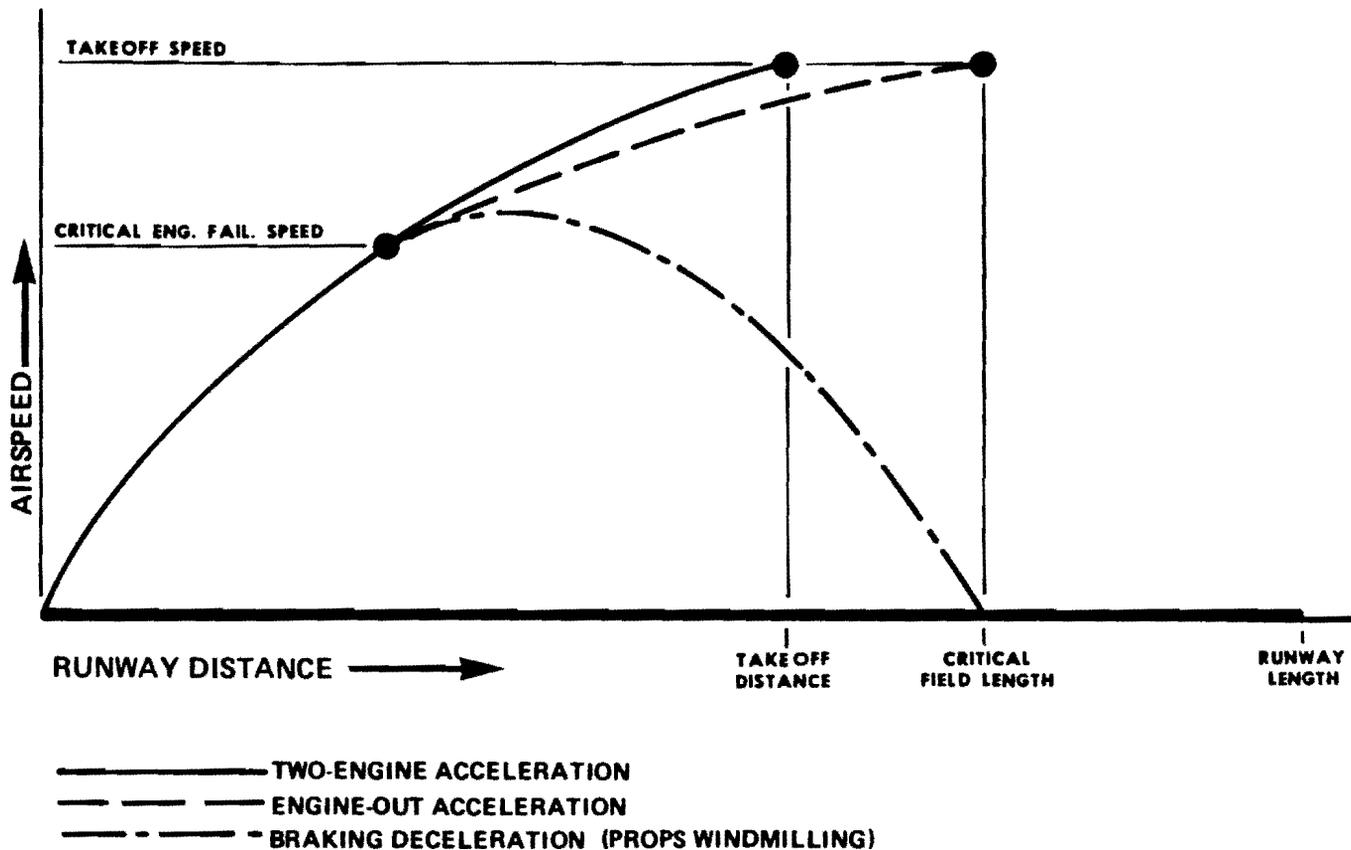


Figure A3-1. Engine Failure On Takeoff

Proceed vertically upward until the horizontal line corresponding to the runway density altitude is reached and follow the guide lines to the reference line. These guide lines are true airspeed conversions and their absolute values are not required in this calculation but presented for reference only. From the intersection with the reference line, proceed vertically upward to the wind grid and follow the guide lines upward and to the left for headwinds or upward and to the right for tailwinds until the value of the prevailing wind is reached. From this point, project vertically upward until the horizontal line representing the distance corresponding to the selected speed is reached and read the acceleration time uncorrected for gross weight. Sheet 2 of 2 must be entered with this value of time on the scale at the left and proceed horizontally to the appropriate gross weight. Vertically below this intersection, read the corrected time for acceleration.

**Example.**

**GIVEN:** takeoff at a gross weight of 64,500 pounds in a 10-knot headwind, ground run distance (corrected for wind, runway gradient and RSC) of 3,080 feet, takeoff speed is 112 KIAS, refusal speed (corrected for wind, runway gradient and RSC) is 115 KIAS and the density altitude is 2,000 feet.

**FIND:** takeoff acceleration distance and time check.

1. Figure A3-46 is first selected for the distance check. Sheet 1 of 2 is entered at the left with the takeoff ground run distance of 3,080 feet. Proceed horizontally right to the vertical line representing the 10-knot headwind.

2. From this point, follow the guide lines to the no wind reference line and horizontally on the scale at the right read an acceleration index of 3.58.

3. Enter figure A3-46 (sheet 2 of 2) on the scale at the left with an acceleration index of 3.58 and proceed horizontally right until the vertical line representing 112 KIAS is intersected. This point of intersection establishes the acceleration schedule.

4. Since the refusal speed is greater than the takeoff speed, the "go no-go" concept is used for the acceleration check and the 2,000-foot marker is chosen for this purpose. The 2,000-foot marker is selected rather than the 3,000-foot marker to allow time to react should the acceleration be other than normal.

5. Sheet 1 of 2 is reentered with the 2,000-foot distance on the left and by the procedures of steps 1 and 2, an acceleration index of 2.40 is determined.

6. Entering (sheet 2 of 2) with an acceleration index of 2.40 and moving horizontally to the right to intersect the acceleration schedule curve of step 3 determines a "go no-go" speed of 98.5 knots as read vertically below on the scale at the bottom of the chart.

7. The time check for the "go no-go" speed and distance is found by entering figure A3-47 (sheet 1 of 2) at the bottom with the "go no-go" speed of 98.5 KIAS determined in step 6 and proceed vertically upward to the density altitude of 2,000 feet.

8. From this intersection, follow the guide lines to the reference line and project vertically upward to the no wind line on the wind grid and follow the headwind guide lines to the prevailing 10-knot wind line.

9. Project vertically upward from this intersection until the acceleration distance of 2,000 feet is reached representing the selected runway marker. Read an acceleration time of 24.3 seconds uncorrected for gross weight.

10. Enter figure A3-47 (sheet 2 of 2) with 24.3 seconds on the scale at the left and project horizontally across to the gross weight of 64,500 pounds, interpolate as necessary. Vertically below read a corrected value of 24.5 seconds as the time check to the "go no-go" speed and distance.

**CLIMBOUT FLIGHT PATH.**  
(Figures A3-48 through A3-56)

A series of charts are presented that permits the pilot to rapidly estimate his height above the takeoff airport elevation, while flying at a constant heading, to establish his clearance with respect to an obstacle of known height above and distance from the takeoff point. For a given horizontal distance, the obstacle height that can be cleared depends upon the climb angle. The climb angle is affected by the same factors that influence rate of climb. Thus it can be expected that increase in engine power and decrease in gross weight will increase the climb angle, while increase in drag, such as caused by extended landing gear, increasing wing flap angle, and opening cowl flaps, will decrease the climb angle.

The charts were constructed under the following conditions and assumptions: the zero point for using the charts is the point at which the aircraft attains a height of 50 feet above the airfield surface. Thus the horizontal distance from standstill to this point must first be determined from the appropriate takeoff distance or critical field length chart. If an engine is lost on takeoff the horizontal distance from standstill is determined from the appropriate critical field length and single engine takeoff chart. The aircraft is then operated at the  $V_{50}$  speed for two engines operating, or the higher of the  $V_{50}$  or minimum control speed should an engine be lost on takeoff. During the initial takeoff climb to 50 feet, the landing gear is totally retracted. The charts are all based on the use of 2,800 rpm and rich mixture, so that it is only necessary to provide a scale of torque pressure in order to account for the effect of engine power.

Achievement of the performance indicated on the charts is therefore dependent upon operation of the aircraft substantially in conformance with the foregoing conditions.

#### NOTE

These charts adjust for power level by use of torque pressure and altitude and are based on operation in low blower at 2,800 RPM. In low blower operation, these charts must always be entered with the TOP corresponding to 2,800 RPM, regardless of what RPM is to be used on the aircraft. When the aircraft is to be operated in low blower at other than 2,800 RPM, the performance predicted by these charts can be attained only if the torque meters on the aircraft are set to the equivalent torque determined by the equation:

$$\text{Equiv. TOP} = \frac{(\text{TOP @ 2,800 RPM}) 2,800}{\text{Desired RPM}}$$

For operation in high blower, 2,600 RPM, enter the charts with a TOP value equal to 92% of the charted TOP determined from the BRAKE HORSEPOWER AVAILABLE, HIGH BLOWER, chart in Part 2. The TOP set on the torque meters, in this case, would be the charted TOP.

Headwind or tailwind does not affect the rate of climb but directly affects the ground speed and thus the climb angle relative to the ground. A headwind decreases ground speed, increases climb angle, and thus shortens the horizontal distance to achieve a given height, while tailwind has the opposite effect. Data derived from these charts are simply modified to the prevailing wind condition by the following expression:

Equivalent Horizontal Distance = Horizontal Distance

$$\text{Available (no wind)} \times \frac{\text{TAS}}{\text{GS}}$$

The ground speed (GS) being the true airspeed (TAS) minus the headwind or plus the tailwind.

#### Use Of The Charts.

The climbout flight path charts may be used in several ways. They may be used to determine whether, while flying at a constant heading, a distant obstacle may be cleared, the horizontal distance necessary to clear an obstacle of known height or the gross weight at which a known obstacle can be cleared. To determine whether a known obstacle can be cleared, the initiating condition of gross weight, torque pressure and density altitude 50 feet above the runway surface must first be selected. The density altitude at the obstacle is assumed to be equal to the density altitude at the

runway plus the obstacle height. The mean climbout torque pressure is then found from the following equation:

Mean Climbout TOP =

$$(\text{TOP}_{\text{start}} + 2 \text{TOP}_{\text{average}} + 3 \text{TOP}_{\text{obstacle}})/6$$

where  $\text{TOP}_{\text{start}}$  is the torque pressure at the density altitude 50 feet above the runway surface;  $\text{TOP}_{\text{obstacle}}$  is the torque pressure at the obstacle density altitude and  $\text{TOP}_{\text{average}}$  is the torque pressure at the average density altitude.

#### NOTE

Normally, climbout performance should be checked using minimum performance torque pressure obtained from the Brake Horsepower Available charts, figures A2-22 through A2-27. Urgent missions may be planned on the basis of expected torque pressure at the discretion of the Commander.

The appropriate Climbout Flight Path chart is entered at the left with the gross weight on the bottom scale and proceed vertically upward to the density altitude corresponding to the average value. From this point, proceed horizontally right to the reference line of the torque pressure grid and follow the guide lines to intersect the vertical line having the value of the mean climbout torque pressure. From this intersection, continue horizontally right to the wing flap reference line. If the wing flaps are in the UP position continue horizontally right, if not, move vertically downward to the wing flaps TAKEOFF line and proceed horizontally to the right and read the altitude increase per 1,000 feet of horizontal distance. It should be noted that due to the limited climbout performance with one reciprocating engine operating without jet thrust and the wing flaps in TAKEOFF, such data are not included on that chart. The horizontal distance available is corrected for the prevailing wind condition thereby determining the effective horizontal distance which when multiplied by the value read for the altitude increase per 1,000 feet of horizontal distance and divided by 1,000 yields the height achieved during climbout.

To use the chart to find the horizontal distance required to clear the obstacle, the procedures are the same as for determining whether or not the obstacle will be cleared up until the step where the increase in altitude per 1,000 feet of horizontal distance is found. This value is converted into an equivalent horizontal distance by dividing it into the climbout vertical distance required and multiplying by 1,000 feet and then converting to the prevailing wind conditions which yields the horizontal distance required from the 50 feet takeoff point.

To use the chart to determine the maximum gross weight at which the obstacle will be cleared, the procedures previously

outlined are followed in a reverse manner based on the characteristics of an assumed gross weight. When a new gross weight is found, the procedures are recycled with the characteristic of takeoff distance to 50 feet and speed particular to the new gross weight.

**Example.**

**GIVEN:** takeoff at a gross weight of 64,500 pounds from an airport at an altitude of 4,000 feet with a prevailing headwind of 10 knots. An obstacle, 1,000 feet above the runway surface, exists directly ahead at a distance of 20,000 feet from the beginning of the runway. Reciprocating engines are at maximum dry power, 2,800 rpm, rich mixture and jet engines are at 100% RPM. Standard atmosphere conditions exist and the aircraft is configured for minimum run takeoff (wing flaps takeoff).

**FIND:** while flying at a constant heading, the three uses of the chart are demonstrated in this problem.

- I. determine whether the obstacle will be cleared.
- II. determine the horizontal distance after takeoff to 50 feet to achieve the obstacle height.
- III. determine the allowable increase in gross weight that is available to clear the obstacle.

1. Considering the obstacle height to be the height attained in climbout, determine the initial conditions.

a. From figure A2-24, find the minimum performance torque pressures at the beginning of the climbout (density altitude 4,050 feet) at the obstacle height (density altitude 5,000 feet) and at the average altitude between these density altitudes (4,525 feet).

TOP @ 4,050 feet = 102.5 psi  
 TOP @ 4,525 feet = 101.0 psi  
 TOP @ 5,000 feet = 100.0 psi

b. From figure A3-14 (sheet 2 of 2), determine the total takeoff distance over 50 feet at a value of 4,370 feet.

c. Determine the mean climbout torque pressure from the equation.

**Mean Climbout TOP**

$$= (TOP_{start} + 2 TOP_{average} + 3 TOP_{obstacle})/6$$

$$= (1,025 + 2 \times 101.0 + 3 \times 100.0)/6 = 101.1 \text{ psi}$$

2. Select figure A3-48, Climbout Flight Path, Two Reciprocating Engines Operating, With Jet Thrust, for this problem. Enter the grid on the extreme left at the bottom with a gross weight of 64,500 pounds and proceed vertically

upward to the average climbout density altitude of 4,525 feet, visually interpolate as necessary.

3. From this intersection proceed horizontally right to the torque pressure reference line and follow the guide lines to the mean climbout torque pressure of 101.1 psi.

4. From this point, continue horizontally right to the reference line for wing flaps up, drop vertically downward to the wing flaps takeoff line to correct for the flap setting and then horizontally across to the scale at the right to read a value of 92 feet as the increment of altitude gained for each 1,000 feet of equivalent horizontal distance available for climbout.

5. Determine the true airspeed at the average altitude of 4,525 feet by first converting the indicated airspeed of 114.6 KIAS, as shown in the tabulation on figure A3-48, to a calibrated airspeed of 114.4 KCAS using the data of figure A1-1. Then referring to figure A1-3, determine the value of  $1/\sqrt{\sigma}$  at 4,525 feet of 1.07 resulting in a true airspeed of 122.4 KTAS.

6. Next, determine the equivalent horizontal distance for climbout by taking the physical distance available, subtracting the total takeoff distance to 50 feet from the known obstacle distance from the beginning of the ground run (20,000 - 4,370 = 15,630 feet) and adjusting this distance for the prevailing 10-knot headwind.

**Equivalent Horizontal Distance =**

$$15,630 \times \frac{122.4}{122.4-10} = 17,021 \text{ feet}$$

7. The vertical distance attained above the runway surface at the obstacle location is:

$$\text{Vertical Distance} = 50 + \frac{92 \times 17,021}{1,000} = 1,616 \text{ feet}$$

Hence there is no problem in clearing the 1,000-foot obstacle.

8. Next determine the horizontal distance required to clear the obstacle. Since from step 4, the increment of altitude gained for each 1,000 feet of equivalent horizontal distance is 92 feet, the amount of equivalent horizontal distance required is the obstacle height less the 50 feet achieved in takeoff divided by the increment of 92 feet per 1,000 feet or:

**Equivalent Horizontal Distance =**

$$\frac{1,000-50}{92} \times 1,000 = 10,326 \text{ feet}$$

9. To calculate the physical distance required from the 50-foot takeoff point, the equivalent horizontal distance must be corrected for prevailing wind or multiplied by the ratio of ground speed to true airspeed.

Horizontal Distance =

$$10,326 \times \frac{122.4-10}{122.4} = 9,482$$

Since from step 1, the total takeoff distance to 50 feet is 4,310 feet, the required horizontal distance from the beginning of the runway is 13,852 feet (4,310 + 9,482 = 13,852 feet).

10. To determine the allowable increase in gross weight, the increment of altitude gained for each 1,000 feet of equivalent horizontal distance as required by the obstacle height and distance from the beginning of the runway are first calculated. Since the takeoff distance to 50 feet and the aircraft speed are a function of the gross weight, the solution is an iteration. Assuming the conditions of the basic example at a gross weight of 64,500 pounds, the increment of altitude gained per 1,000 feet in the available equivalent horizontal distance of 17,021 feet from step 6 is:

$$\frac{(1,000-50) \times 1,000}{17,021} = 55.8 \text{ feet}$$

11. Enter figure A3-48 on the extreme right with the required value of increment of altitude gained per 1,000 feet of horizontal distance of 55.5 feet and proceed horizontally left to the flaps takeoff line and then vertically upward to the reference line.

12. Continue horizontally left to the mean climbout TOP of 113.3 psi and follow the guide lines to the reference line.

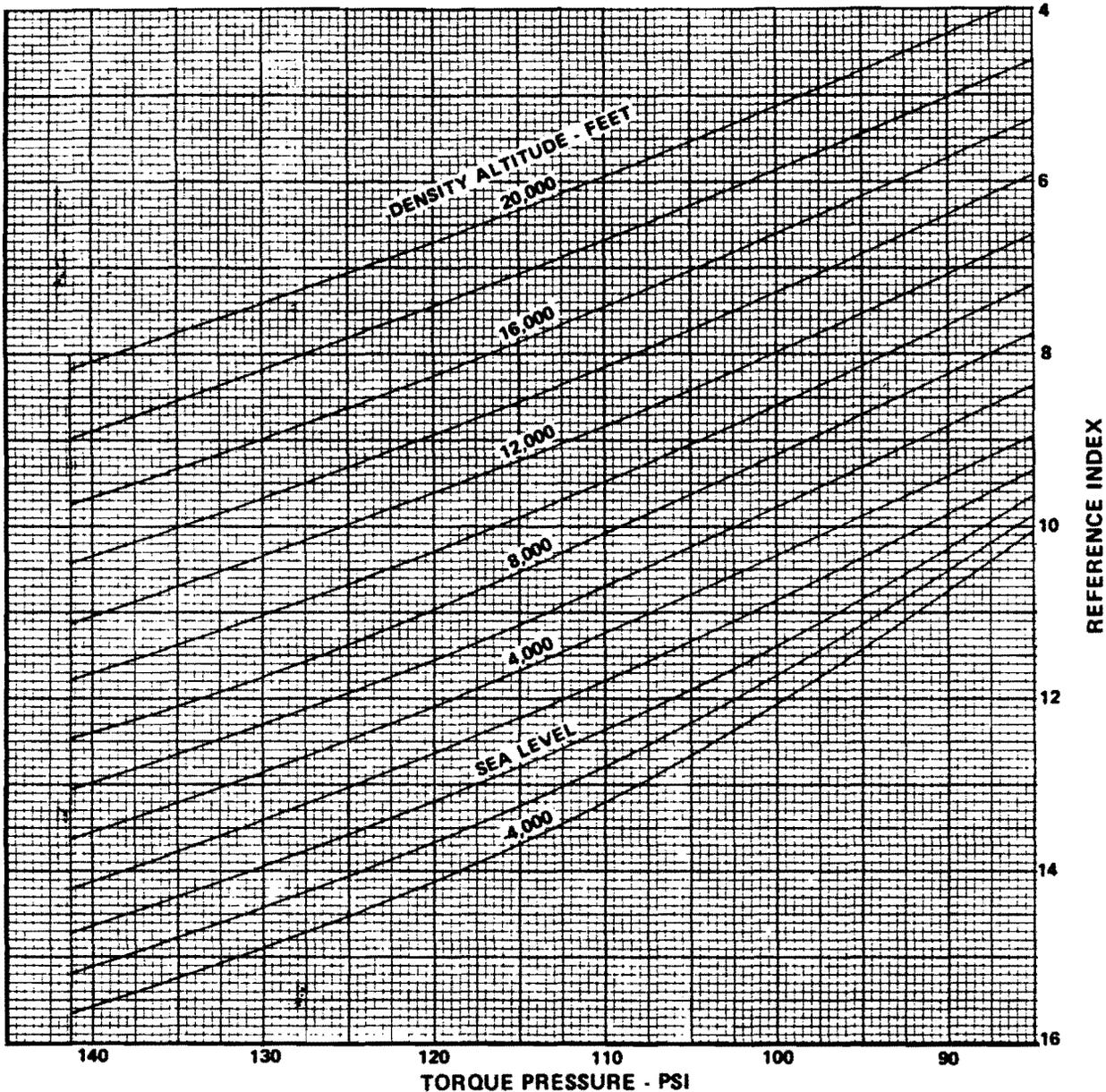
13. Continue horizontally left to the average climbout density altitude of 4,525 feet. For this example, the density altitude curve cannot be intersected indicating that the highest value of gross weight shown on the gross weight grid on the extreme left at a value of 70,000 pounds would be available to satisfactorily clear the obstacle. Had the average climbout density altitude line been intersected within the grid at the extreme left, the new gross weight would be found by projecting vertically downward to the gross weight scale. The problem would then have to be recycled for the takeoff distance to 50 feet and the climbout speed associated with the new gross weight.

MODEL: C-123K  
**TAKEOFF GROSS WEIGHT LIMIT**  
 ENGINES: R2800-99W (1), J85-GE-17 (2)  
 PROPELLERS: 43E60-607

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

MAXIMUM POWER  
 WITH JET THRUST  
 LANDING GEAR UP

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.

Figure A3-2 (Sheet 1 of 2)

MODEL: C-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1), J85-GE-17(2)

PROPELLERS: 43E60-607

MAXIMUM POWER

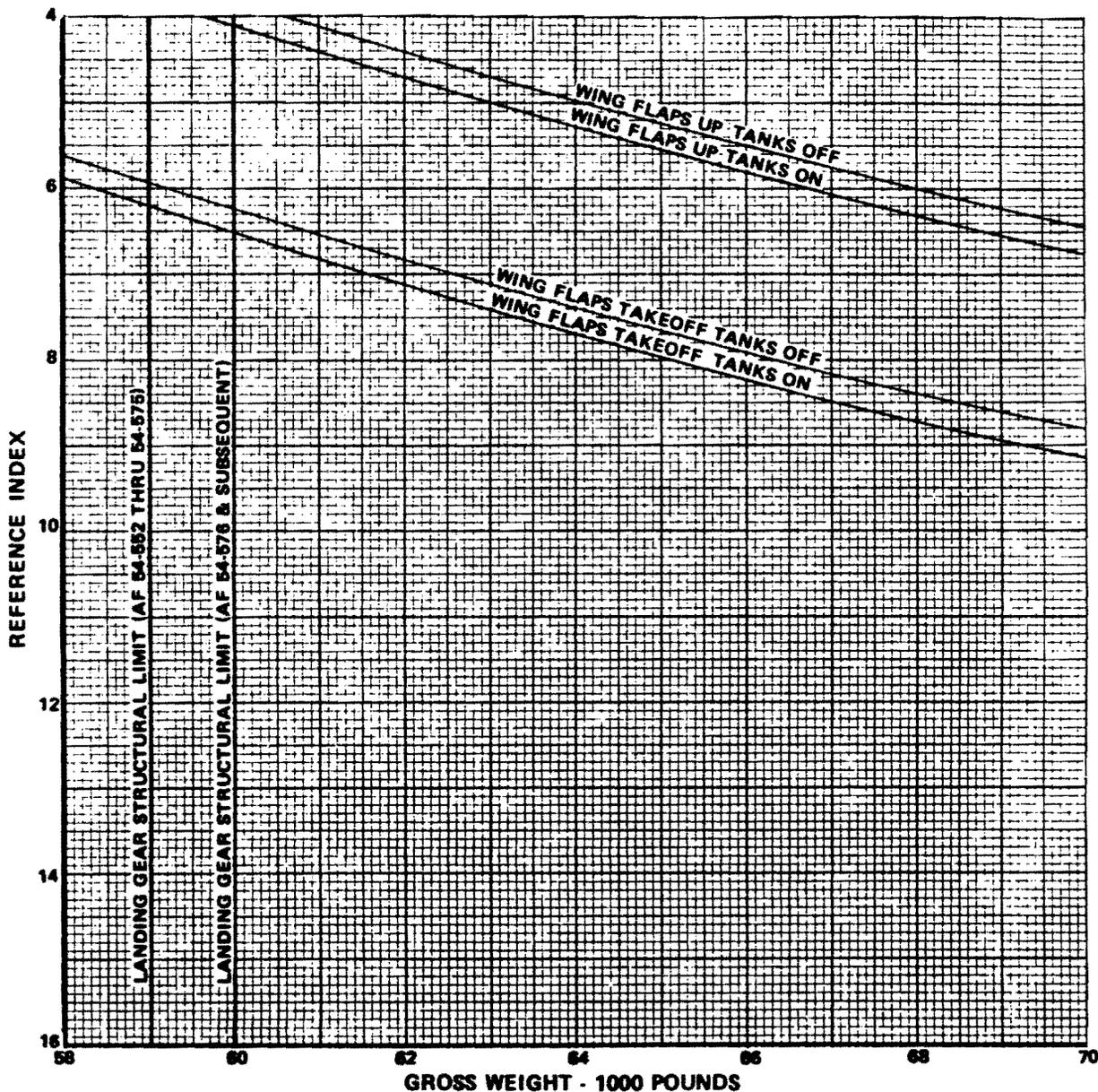
WITH JET THRUST

LANDING GEAR UP

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.

Figure A3-2 (Sheet 2 of 2)

MODEL: C-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)

PROPELLERS: 43E60-607

MAXIMUM POWER

WITHOUT JET THRUST

LANDING GEAR UP

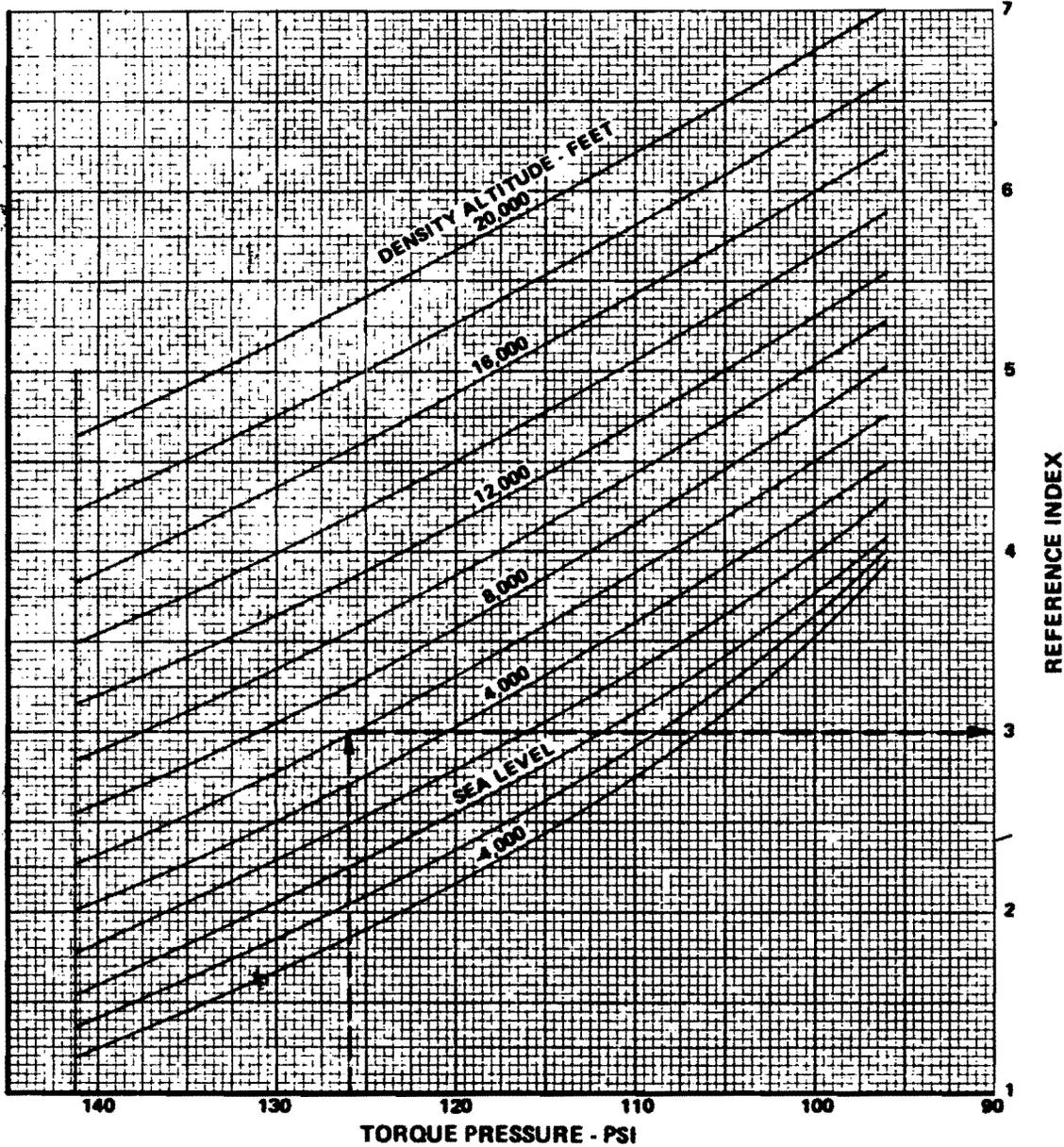
WING FLAPS UP

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.

Figure A3-3 (Sheet 1 of 2)

MODEL: C-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)

PROPELLERS: 43E60-607

MAXIMUM POWER

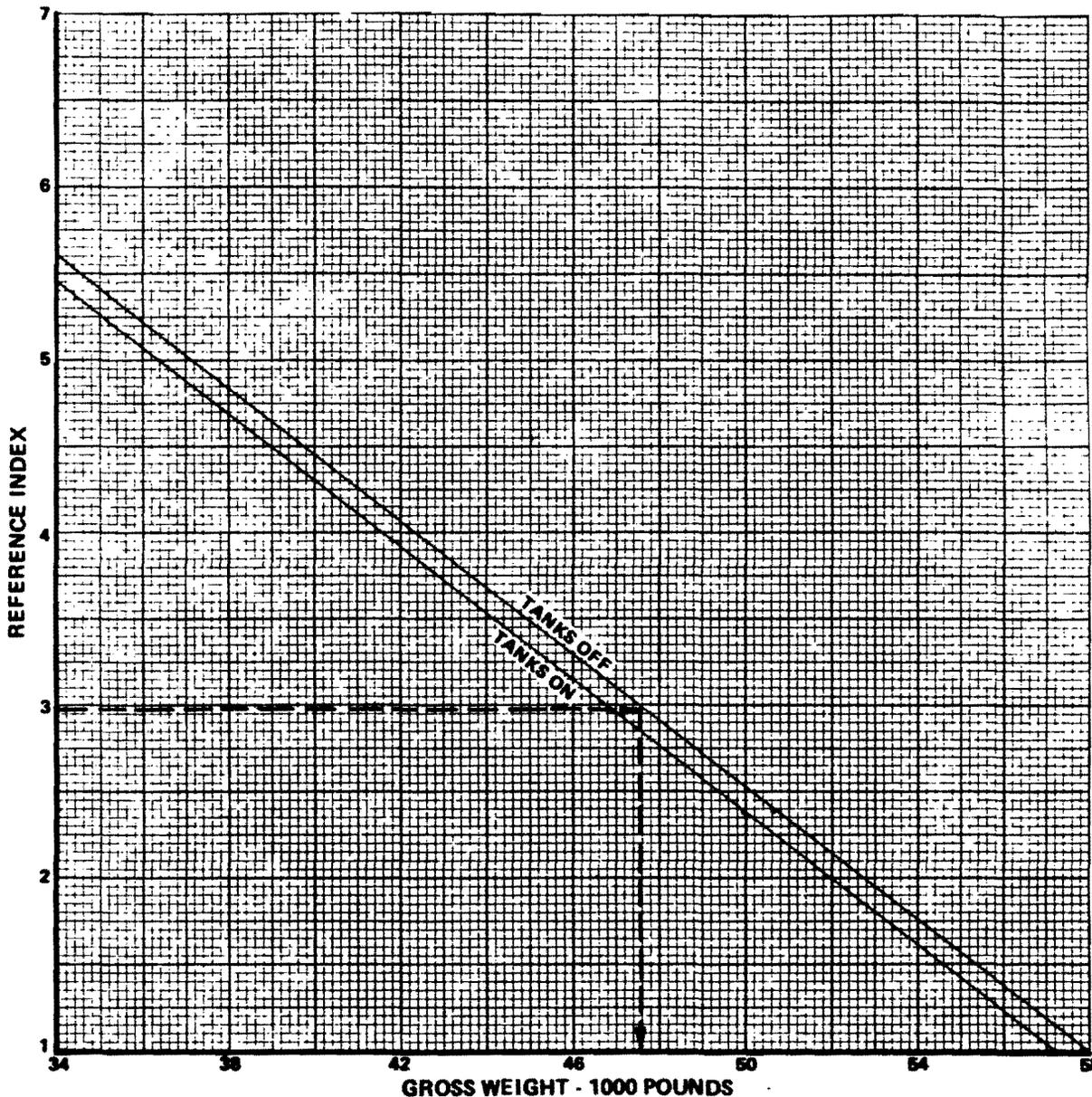
WITHOUT JET THRUST

LANDING GEAR UP

WING FLAPS UP

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.

Figure A3-3 (Sheet 2 of 2)

**MODEL: C-123K  
TAKEOFF GROSS WEIGHT LIMIT**

**ENGINES: R2800-99W (1)**

**PROPELLERS: 43E60-607**

**MAXIMUM POWER**

**WITHOUT JET THRUST**

**LANDING GEAR UP**

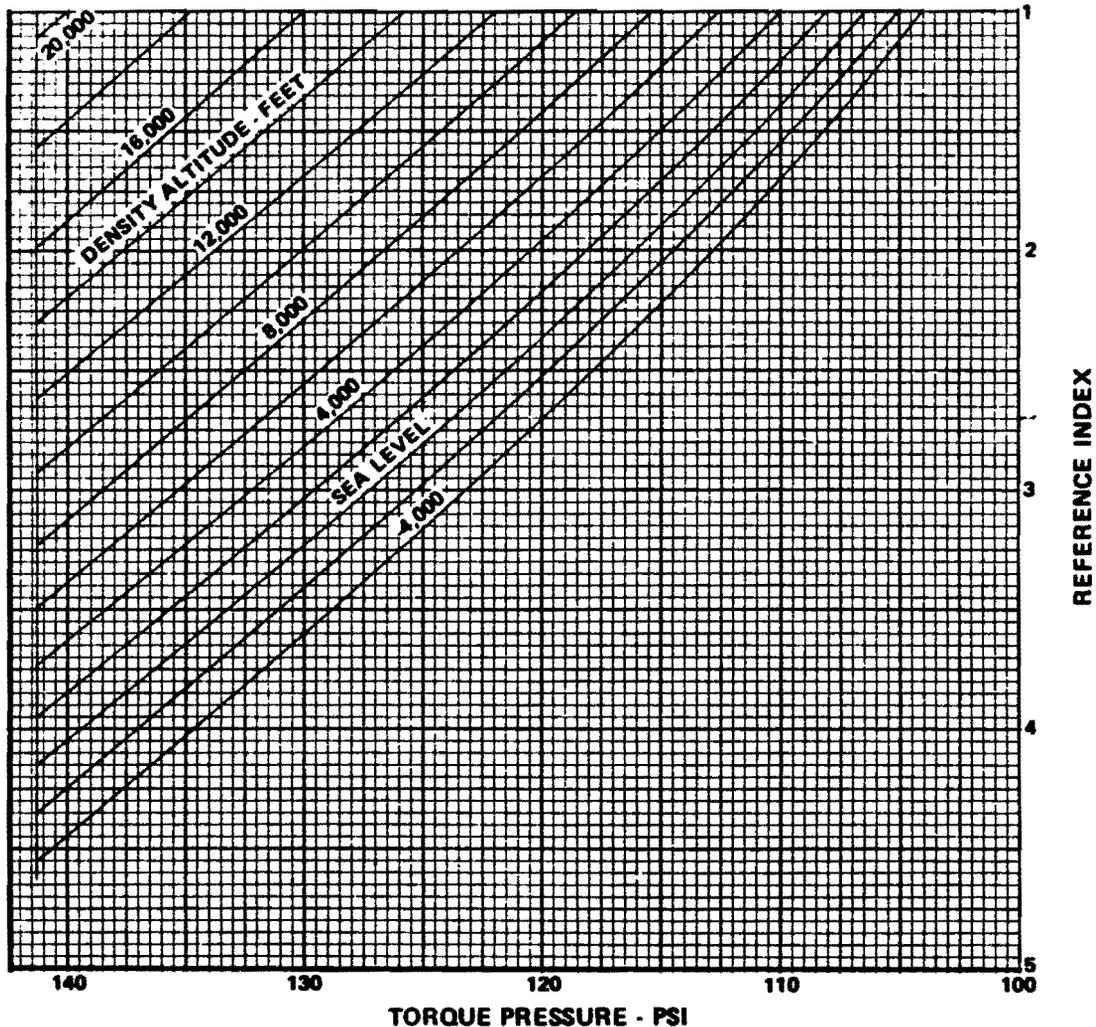
**WING FLAPS TAKEOFF**

**DATA AS OF: SEPTEMBER 15, 1973**

**DATA BASIS: FLIGHT TEST**

**FUEL GRADE: 100/130**

**FUEL DENSITY: 6 LB/GAL**



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.

Figure A3-3A (Sheet 1 of 2)

**MODEL: C-123K  
TAKEOFF GROSS WEIGHT LIMIT**

**ENGINES: R2800-99W (1)**

**PROPELLERS: 43E60-607**

**MAXIMUM POWER**

**WITHOUT JET THRUST**

**LANDING GEAR UP**

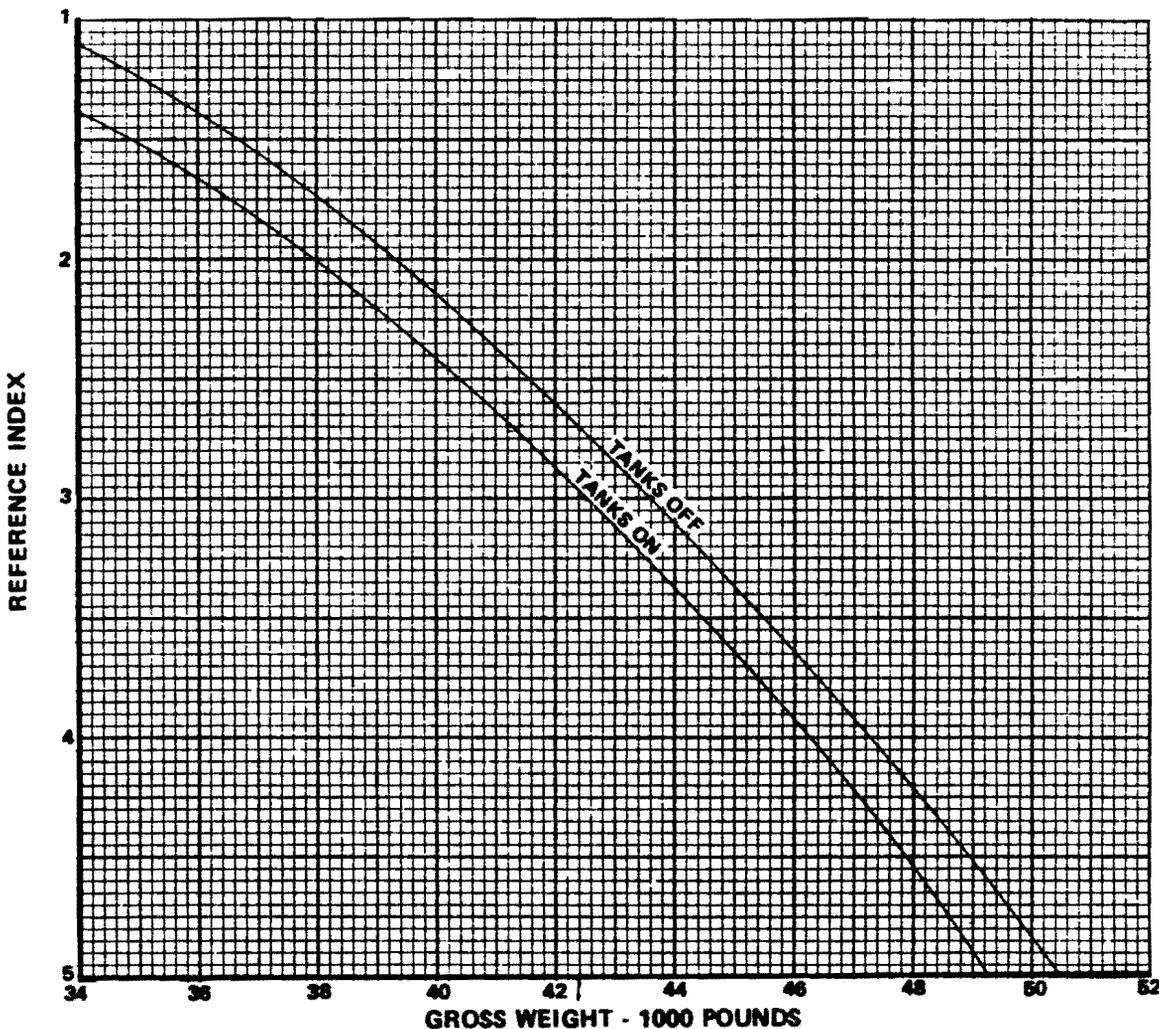
**WING FLAPS TAKEOFF**

**FUEL GRADE: 100/130**

**FUEL DENSITY: 6 LB/GAL**

**DATA AS OF: SEPTEMBER 15, 1973**

**DATA BASIS: FLIGHT TEST**



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.

**NOTE:**

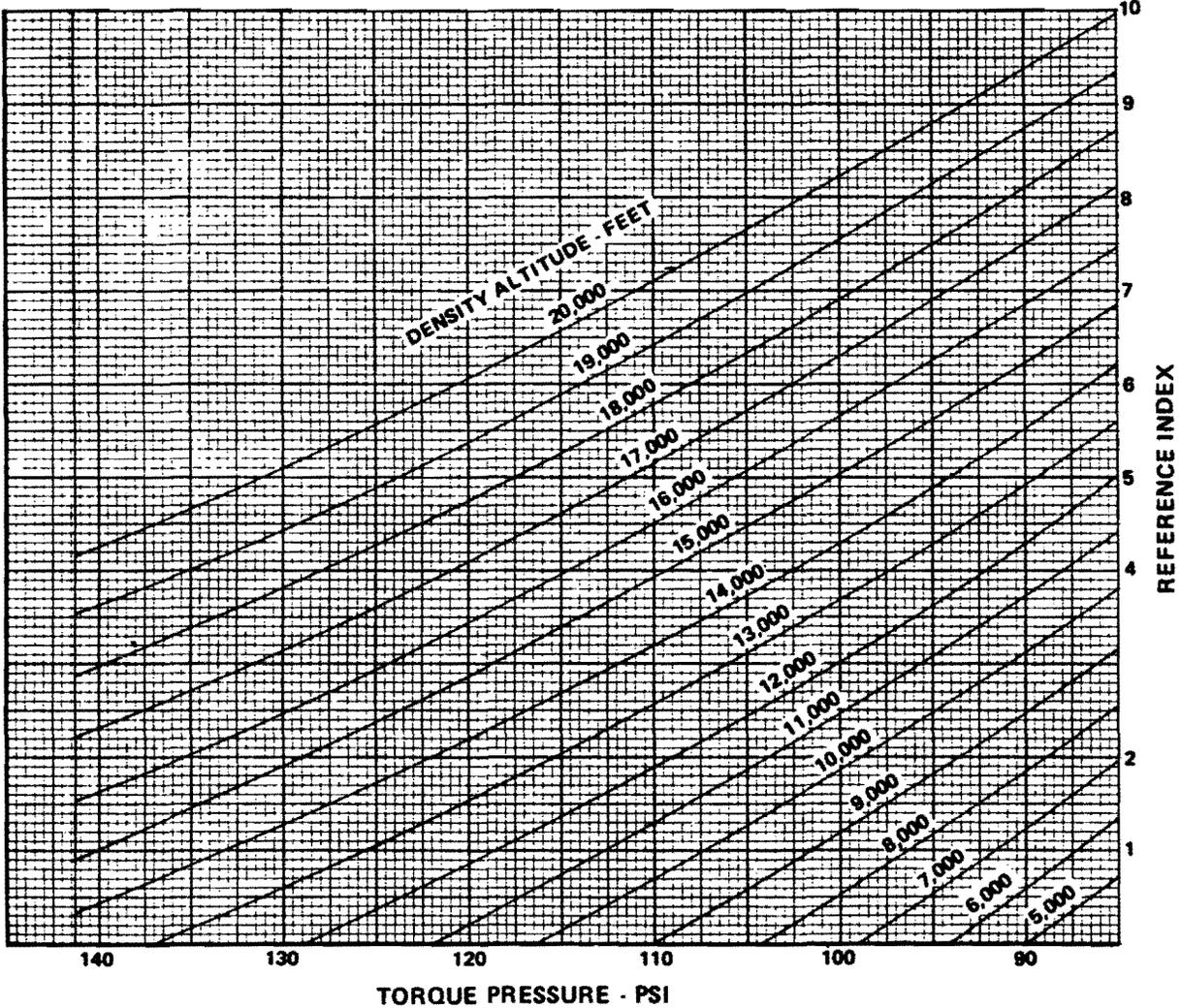
**FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.**

*Figure A3-3A (Sheet 2 of 2)*

**MODEL: C-123K**  
**TAKEOFF GROSS WEIGHT LIMIT**  
**ENGINES: R2800-99W (1), J85-GE-17 (2)**  
**PROPELLERS: 43E60-607**  
**MAXIMUM POWER**  
**WITH JET THRUST**  
**LANDING GEAR DOWN**

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at greater of 1.1  $V_S$  or 107 KIAS
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

**NOTE:**

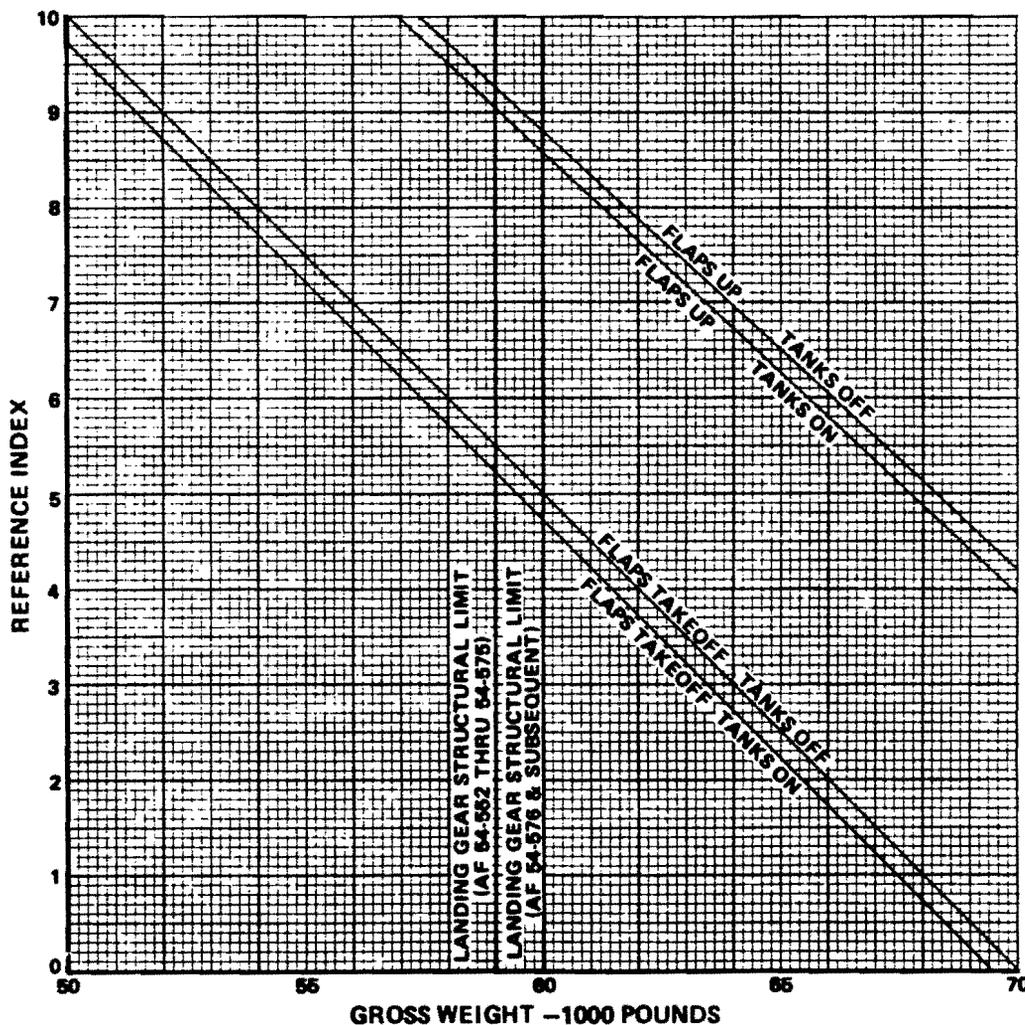
FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.

Figure A3-4 (Sheet 1 of 2)

MODEL: C-123K  
**TAKEOFF GROSS WEIGHT LIMIT**  
 ENGINES: R2800-99W (1), J85-GE-17 (2)  
 PROPELLERS: 43E60-607  
 MAXIMUM POWER  
 WITH JET THRUST  
 LANDING GEAR DOWN

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at greater of 1.1  $V_S$  or 107 KIAS
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF GROSS WEIGHT LIMIT TEXT, THIS SECTION.

Figure A3-4 (Sheet 2 of 2)

MODEL: C-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)  
 PROPELLERS: 43E60-607  
 MAXIMUM POWER  
 WITHOUT JET THRUST  
 LANDING GEAR DOWN

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL

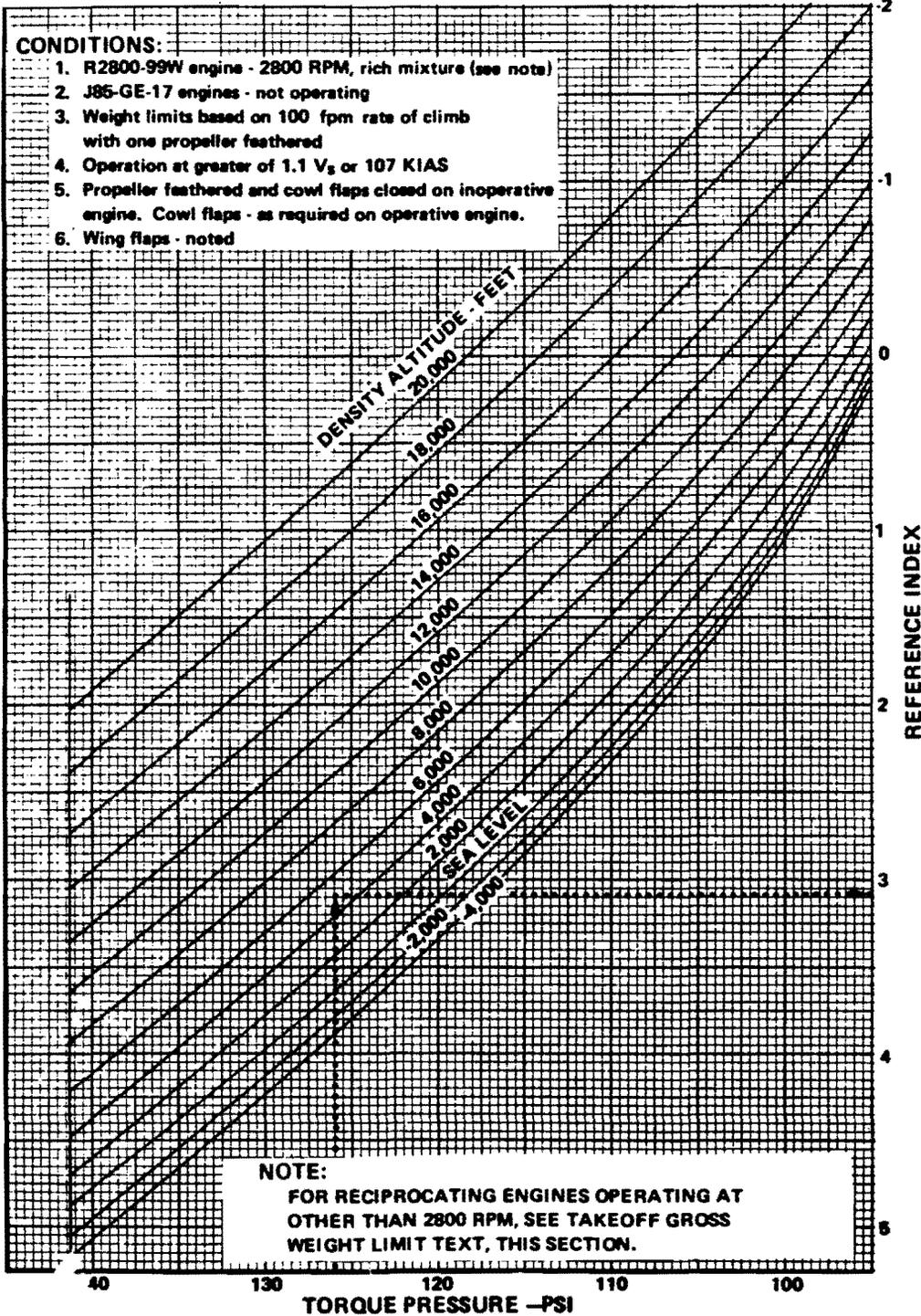


Figure A3-5 (Sheet 1 of 2)

MODEL: C-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)

PROPELLERS: 43E60-607

MAXIMUM POWER

WITHOUT JET THRUST

LANDING GEAR DOWN

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST

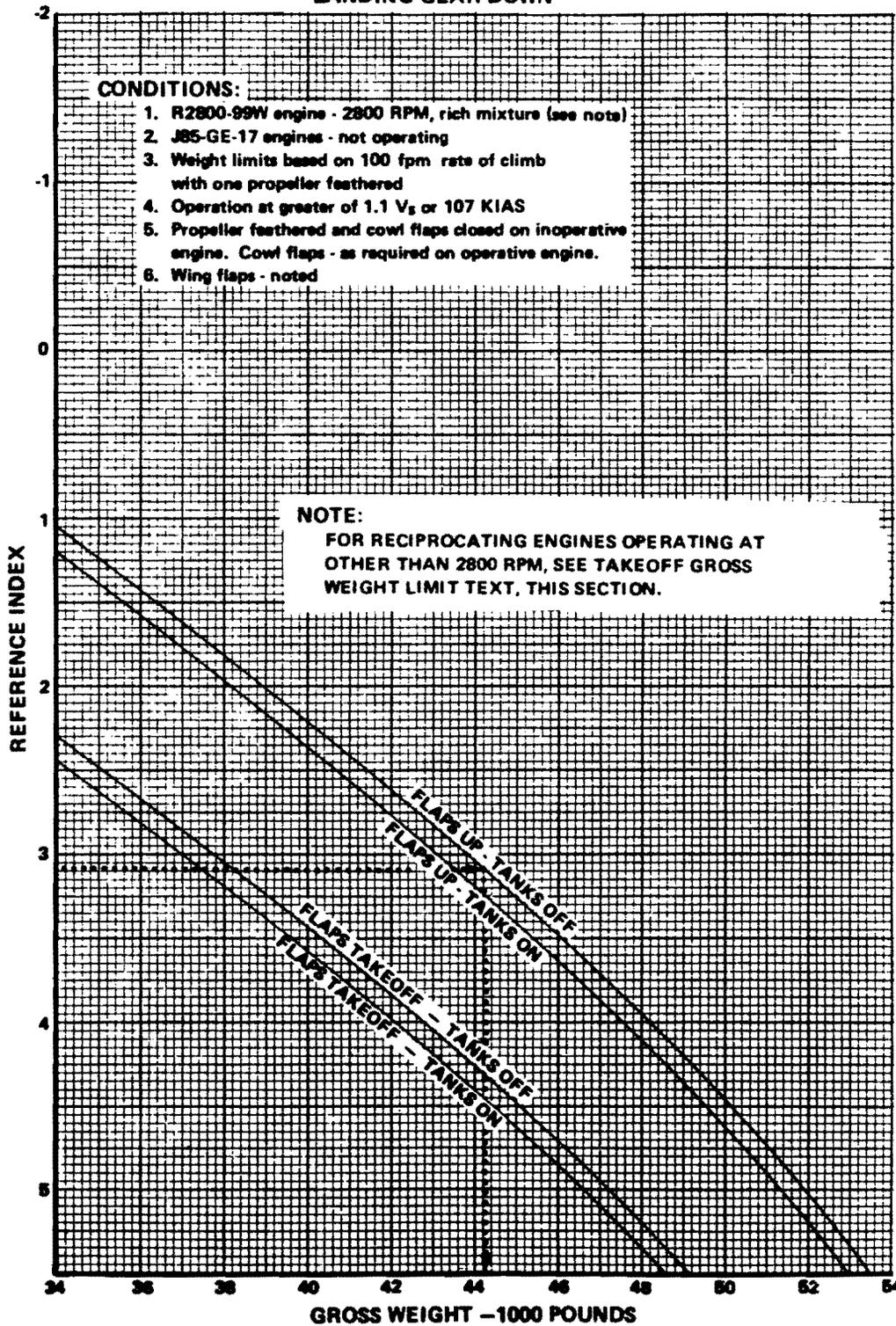


Figure A3-5 (Sheet 2 of 2)

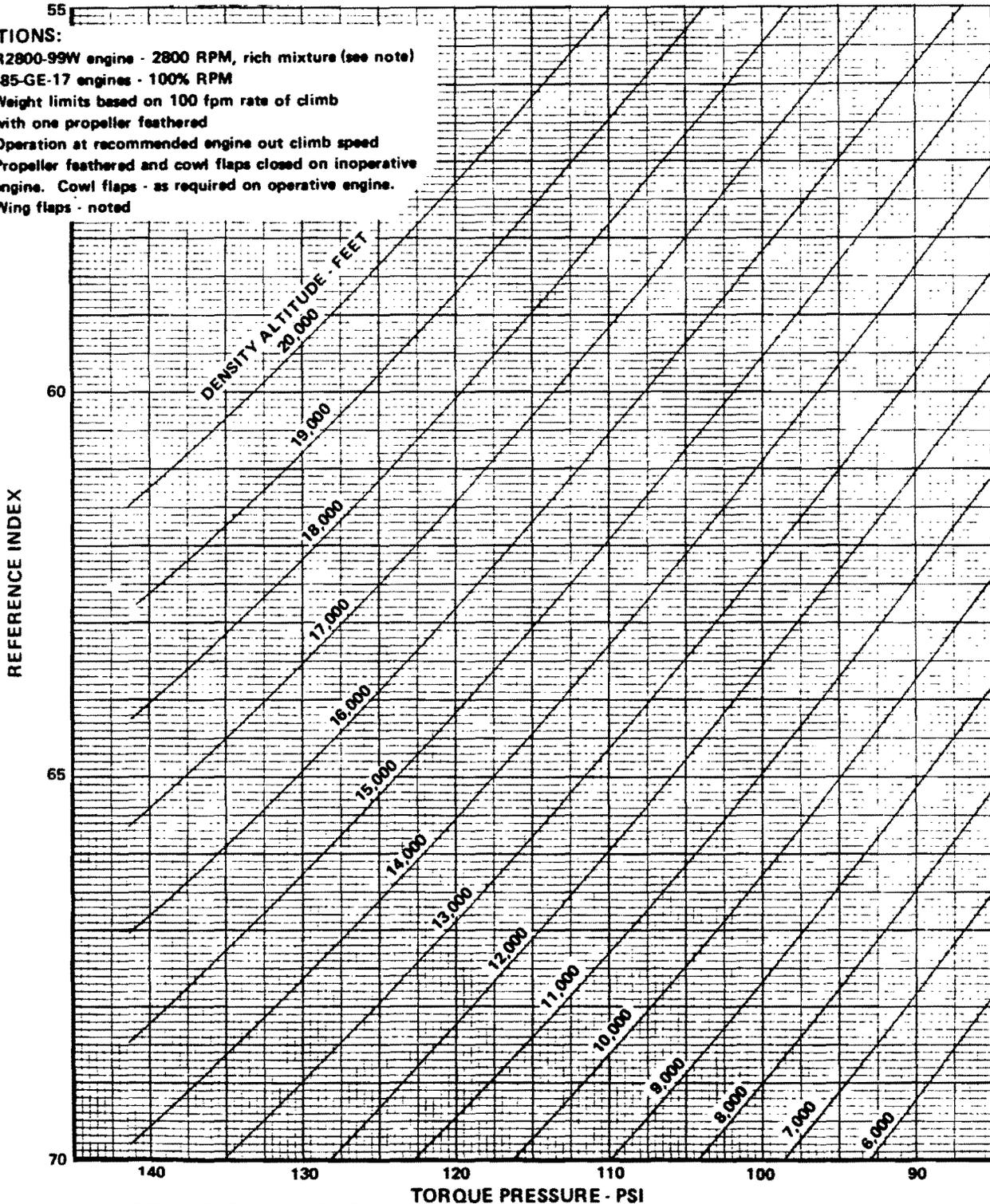
MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**  
ENGINES: R2800-99W (1), J85-GE-17 (2)  
PROPELLERS: 43E60-607  
MAXIMUM POWER  
WITH JET THRUST  
LANDING GEAR UP

DATA AS OF: SEPTEMBER 15, 1973  
DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
FUEL DENSITY: 6 LB/GAL

CONDITIONS:

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted



NOTE:  
FOR RECIPROCATING ENGINES OPERATING AT  
OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE  
TEXT, THIS SECTION.

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1), J85-GE- 17(2)

PROPELLERS: 43E60-607

MAXIMUM POWER

WITH JET THRUST

LANDING GEAR UP

DATA AS OF: SEPTEMBER 15, 1973  
DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

CONDITIONS:

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

NOTE:

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

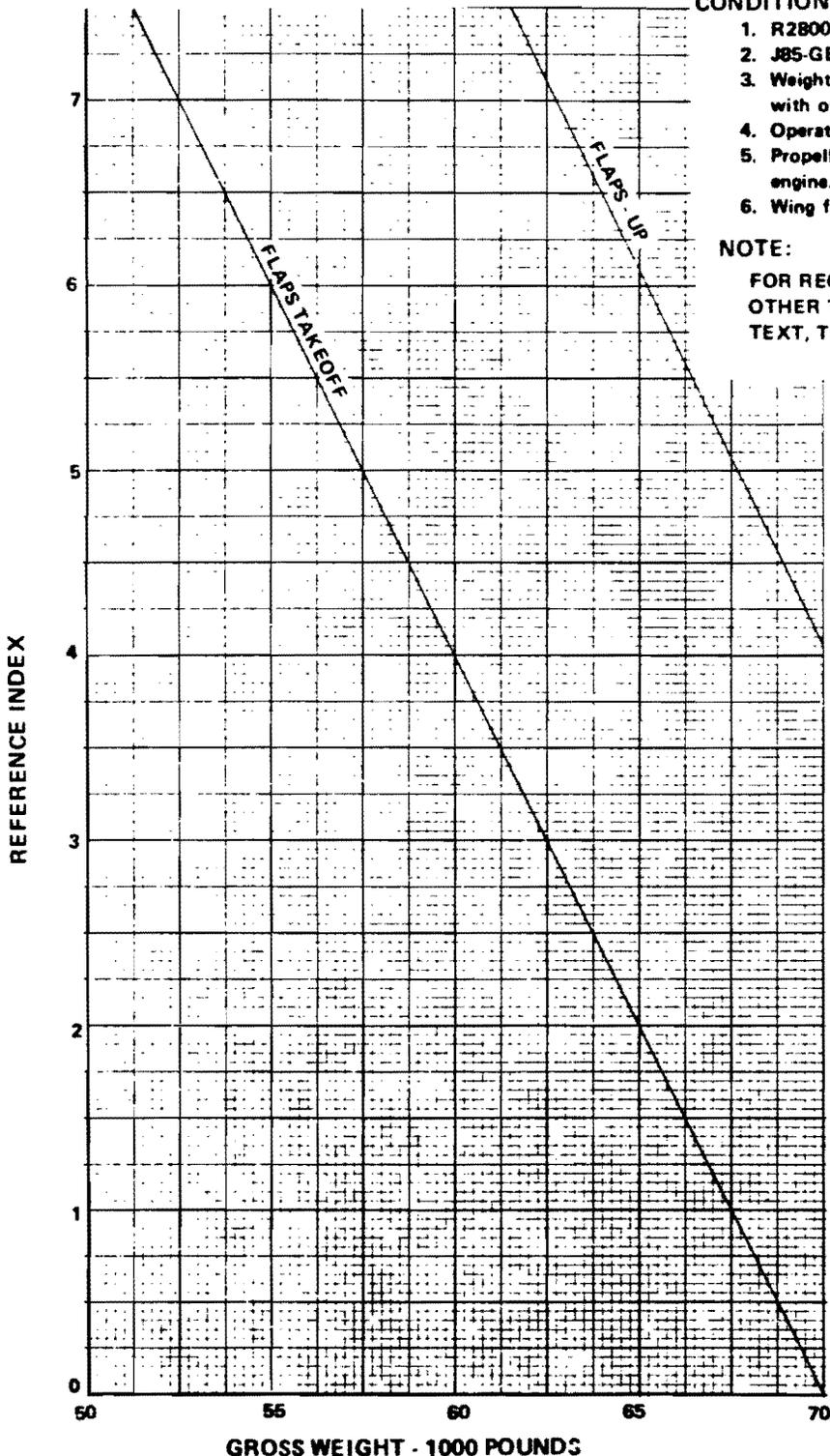


Figure A3-6 (Sheet 2 of 2).

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)

PROPELLERS: 43E60-607

MAXIMUM POWER

WITHOUT JET THRUST

LANDING GEAR UP

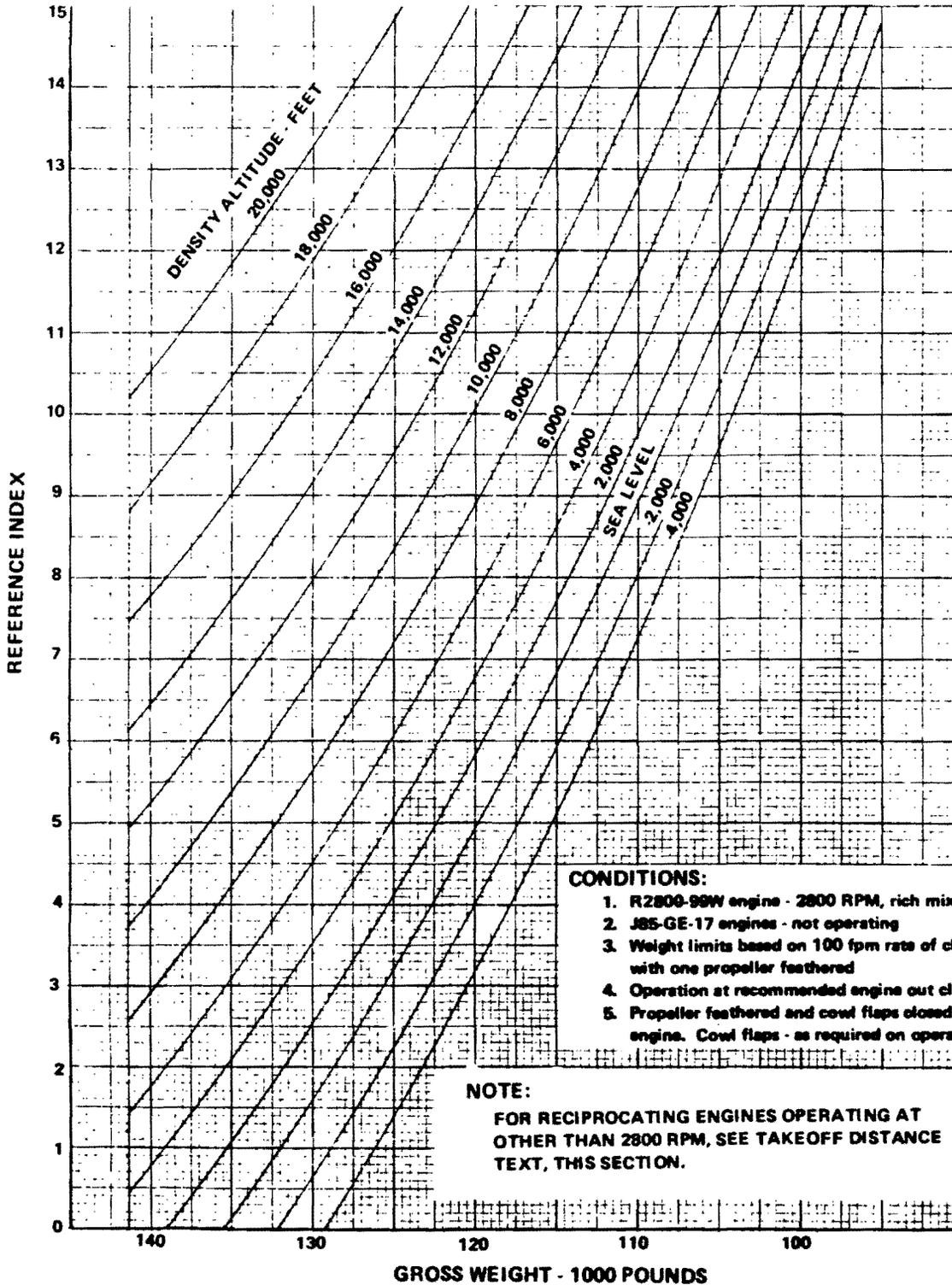
WING FLAPS UP

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST



MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)  
PROPELLERS: 43E60-607  
MAXIMUM POWER  
WITHOUT JET THRUST  
LANDING GEAR UP  
WING FLAPS UP

FUEL GRADE: 100/130  
FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973  
DATA BASIS: FLIGHT TEST

**CONDITIONS:**

- 1. R2800-99W engine - 2800 RPM, rich mixture (see note)
- 2. J85-GE-17 engines - not operating
- 3. Weight limits based on 100 fpm rate of climb with one propeller feathered
- 4. Operation at recommended engine out climb speed
- 5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

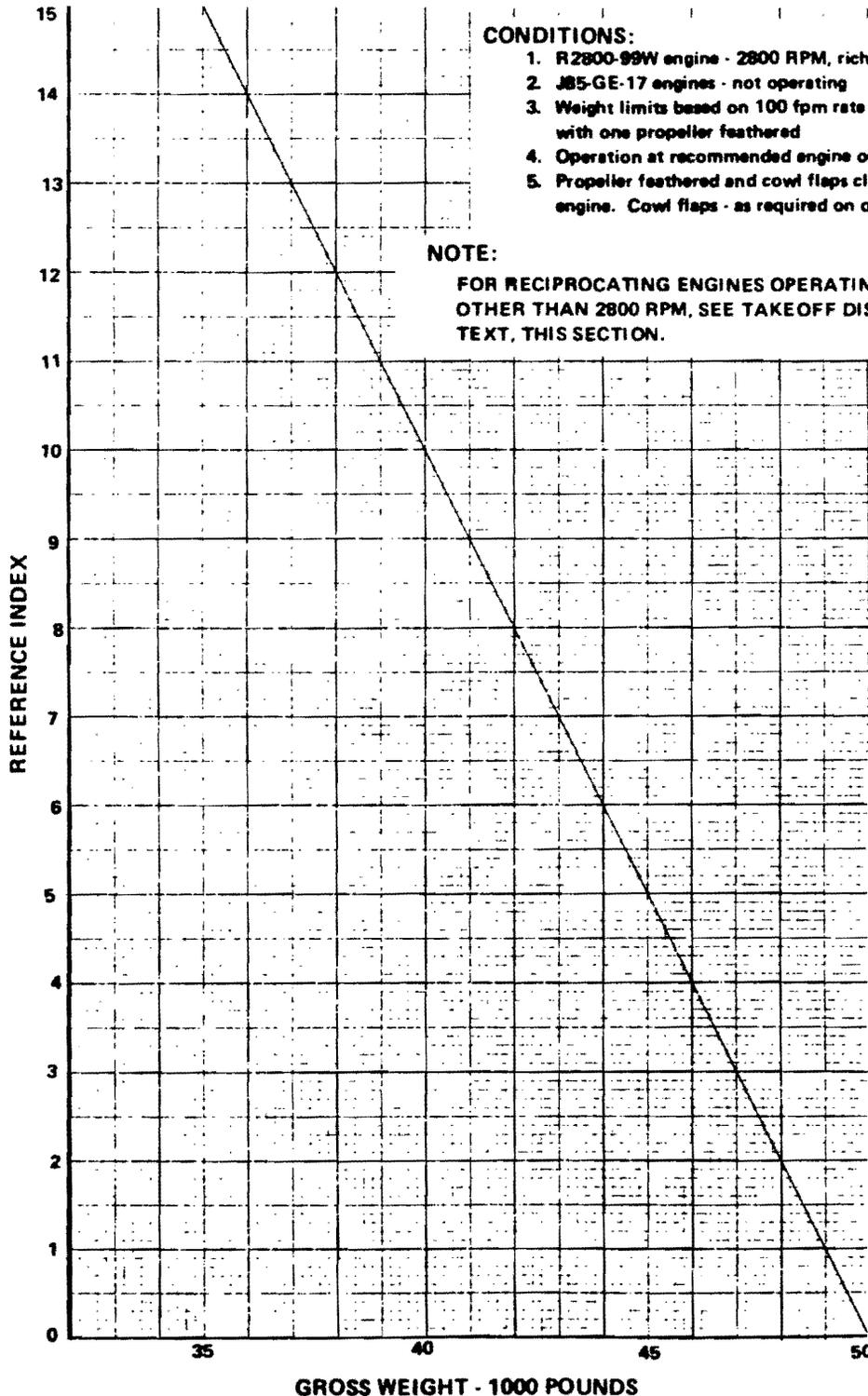


Figure A3-7 (Sheet 2 of 2).

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)

PROPELLERS: 43E60-607

MAXIMUM POWER

WITHOUT JET THRUST

LANDING GEAR UP

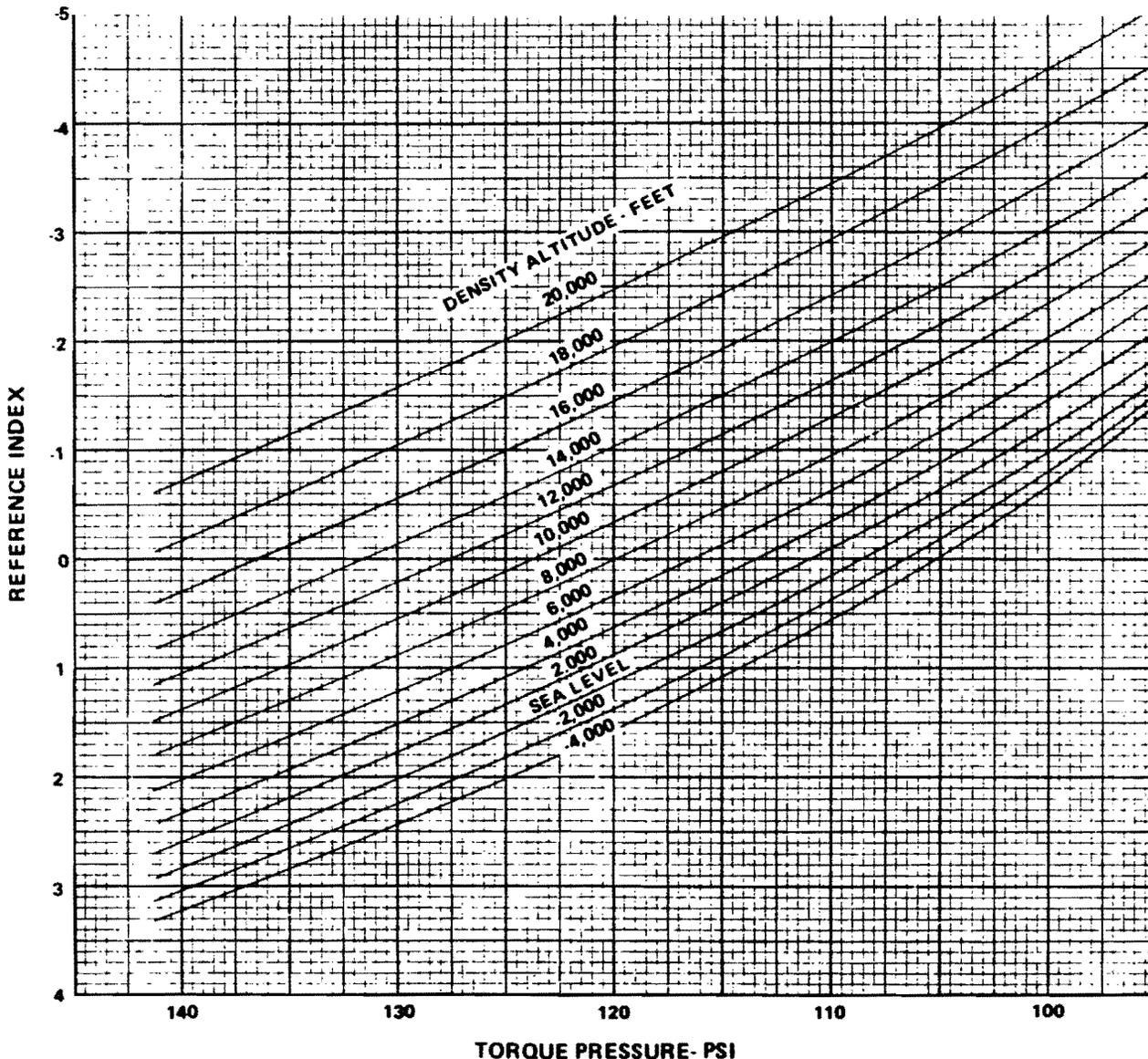
WING FLAPS TAKEOFF

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

Figure A3-8 (Sheet 1 of 2).

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)

PROPELLERS: 43E60-607

MAXIMUM POWER

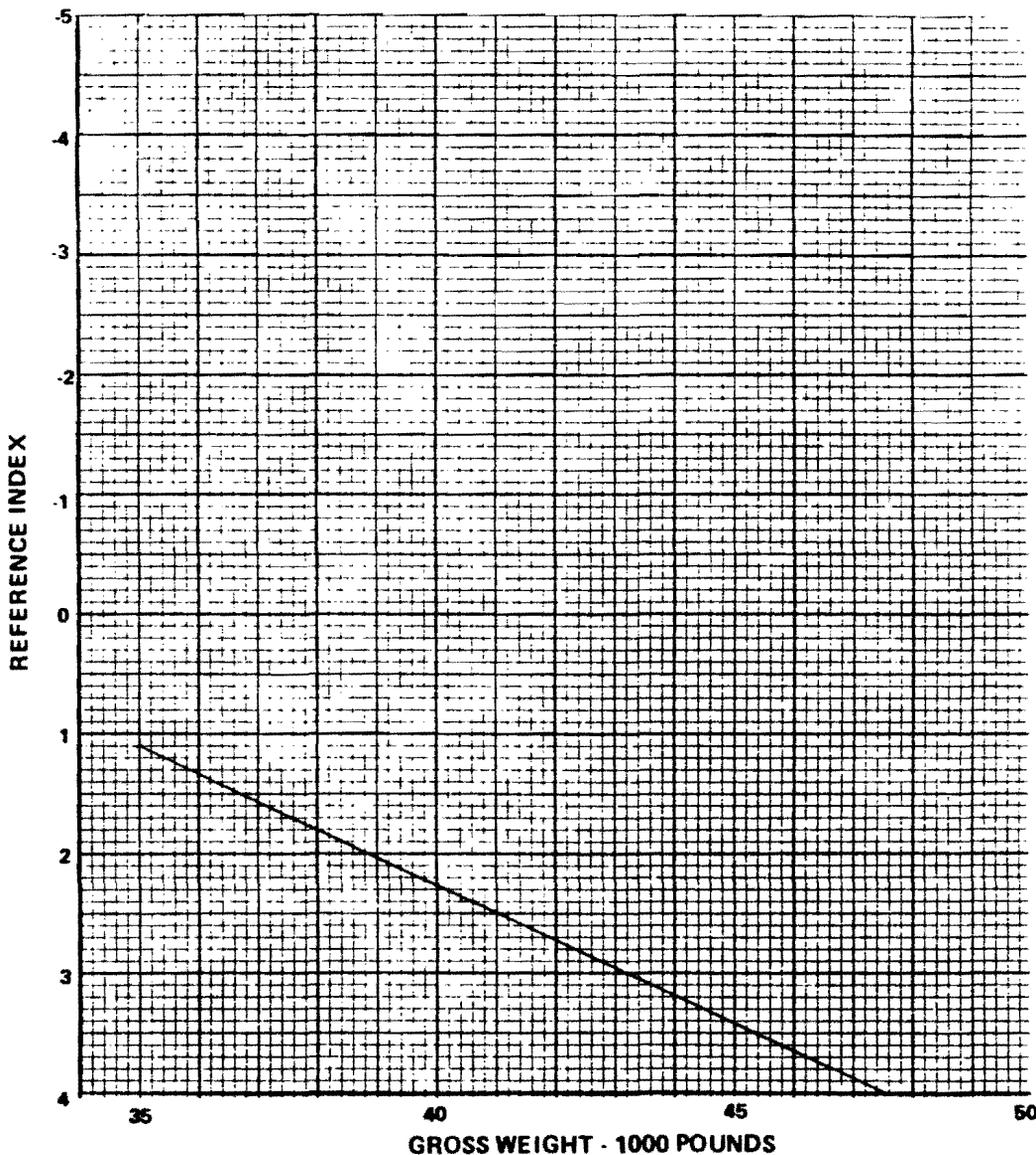
WITHOUT JET THRUST

LANDING GEAR UP

WING FLAPS TAKEOFF

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at recommended engine out climb speed
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

Figure A3-8 (Sheet 2 of 2).

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1), J85-GE-17 (2)

PROPELLERS: 43E60-607

MAXIMUM POWER  
WITH JET THRUST  
LANDING GEAR DOWN  
WING FLAPS UP

DATA AS OF: SEPTEMBER 15, 1973  
DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
FUEL DENSITY: 6 LB/GAL

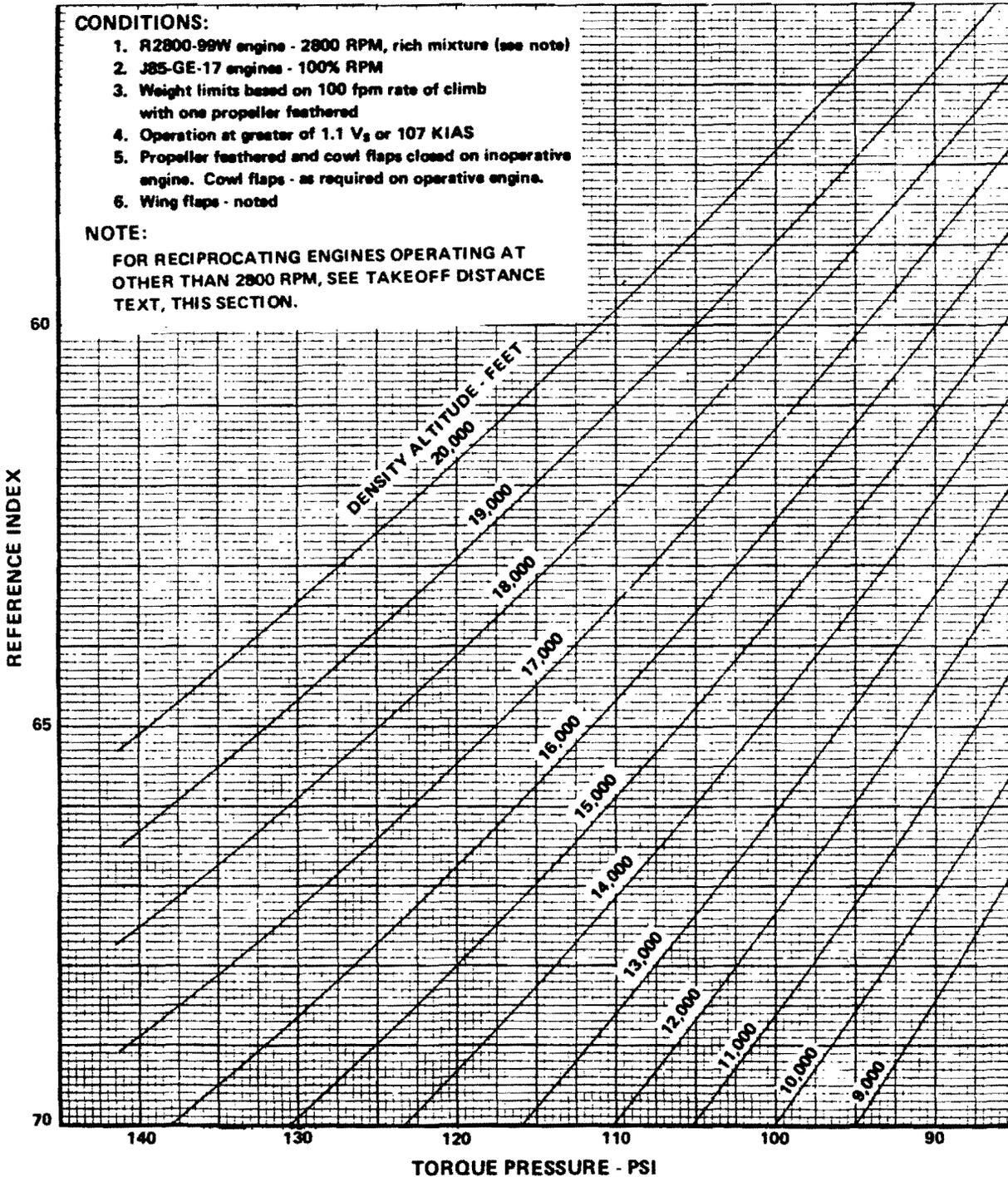


Figure A3-9 (Sheet 1 of 2).

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1), J85-GE-17 (2)

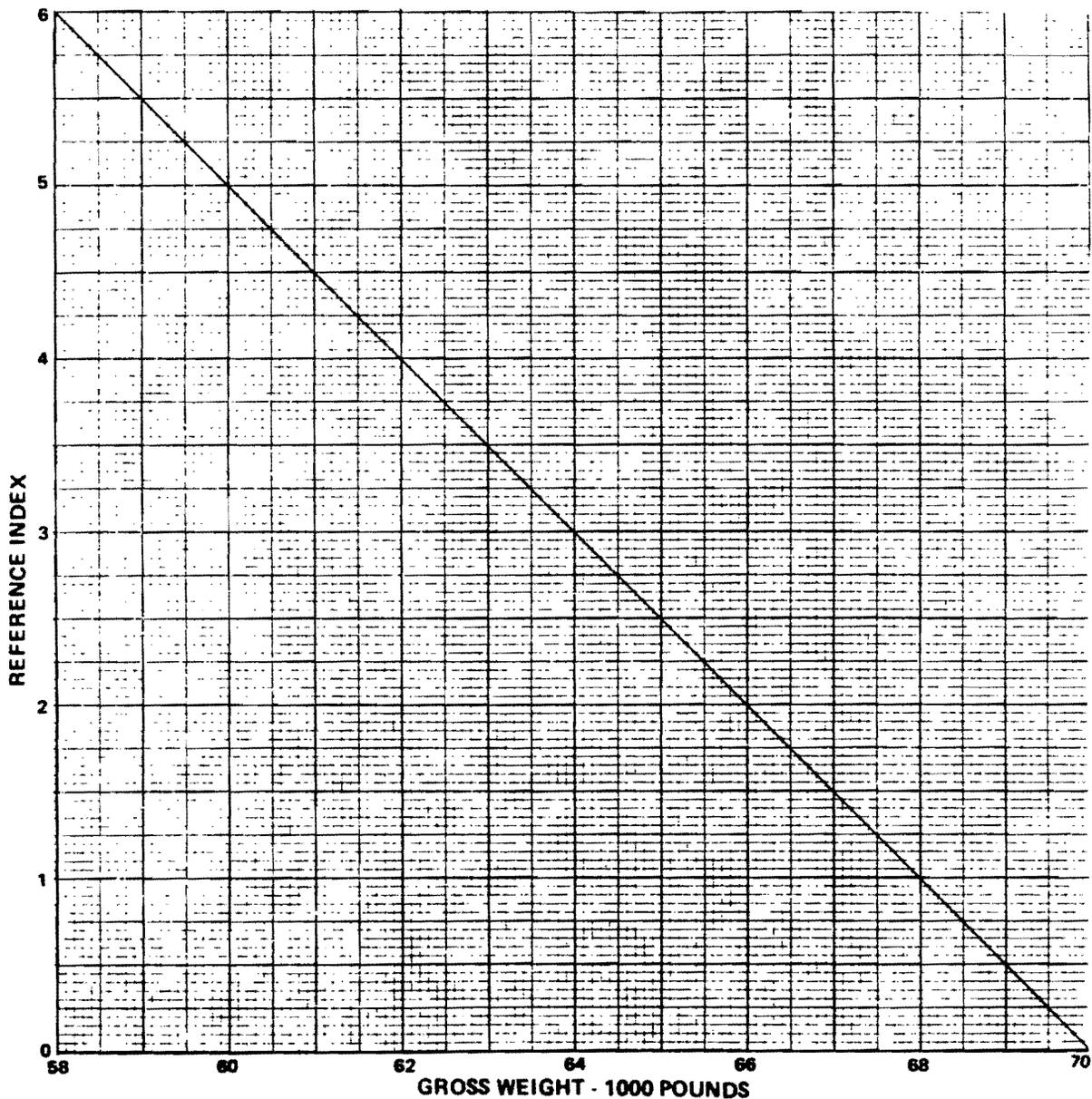
PROPELLERS: 43E60-607

MAXIMUM POWER  
 WITH JET THRUST

LANDING GEAR DOWN  
 WING FLAPS UP

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at greater of 1.1  $V_S$  or 107 KIAS
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

Figure A3-9 (Sheet 2 of 2).

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1), J85-GE-17 (2)

PROPELLERS: 43E60-607

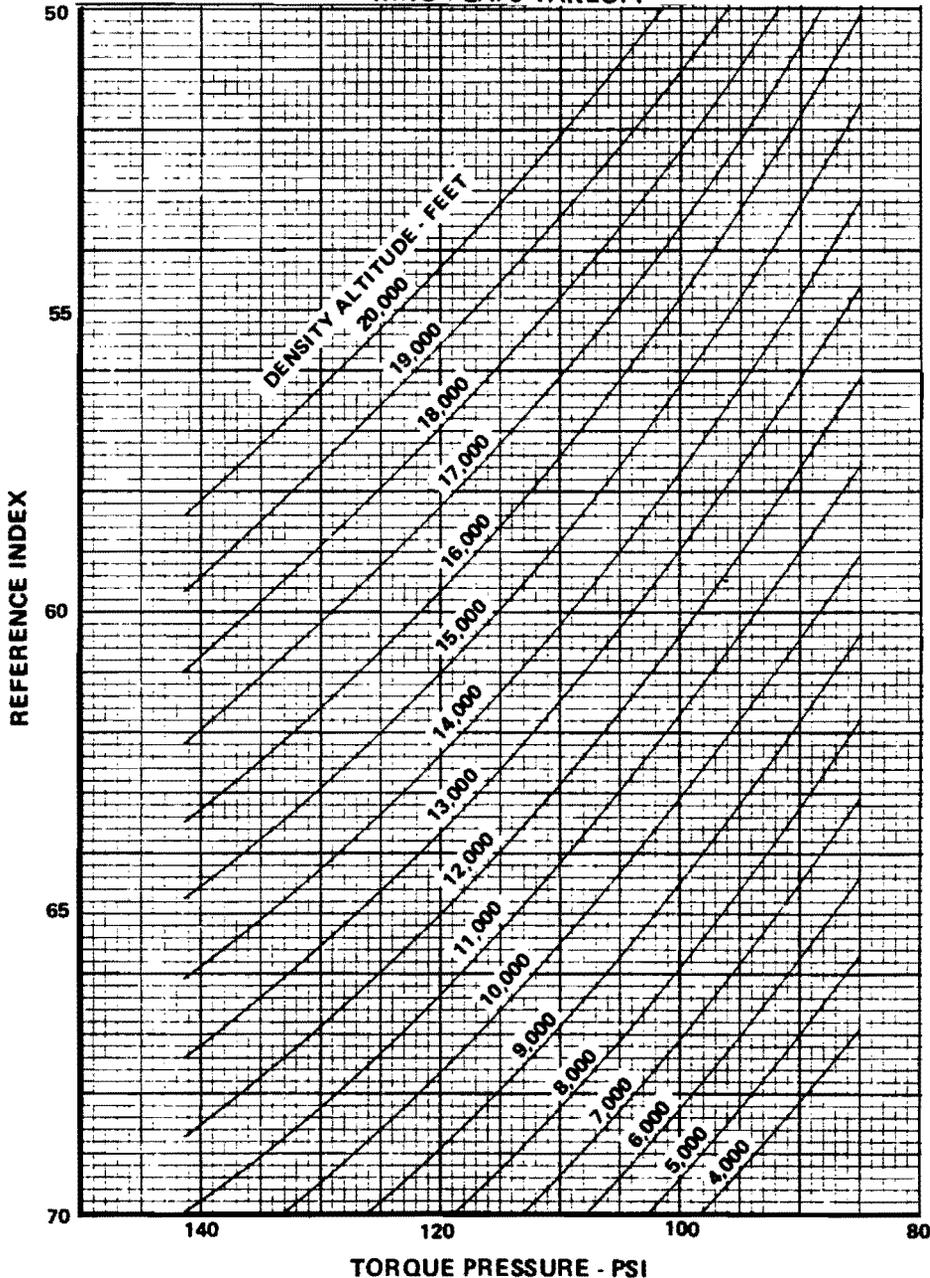
MAXIMUM POWER

DATE AS OF: SEPTEMBER 15, 1973

WITH JET THRUST  
 LANDING GEAR DOWN  
 WING FLAPS TAKEOFF

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL

DATA BASIS: FLIGHT TEST



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at greater of 1.1  $V_s$  or 107 KIAS
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

Figure A3-10 (Sheet 1 of 2).

**MODEL: UC-123K**  
**TAKEOFF GROSS WEIGHT LIMIT**

**ENGINES: R2800-99W (1), J85-GE-17 (2)**

**PROPELLERS: 43E60-607**

**MAXIMUM POWER  
 WITH JET THRUST**

**LANDING GEAR DOWN**

**WING FLAPS TAKEOFF**

**DATE AS OF: SEPTEMBER 15, 1973**

**DATA BASIS: FLIGHT TEST**

**FUEL GRADE: 100/130**

**FUEL DENSITY: 6 LB/GAL**

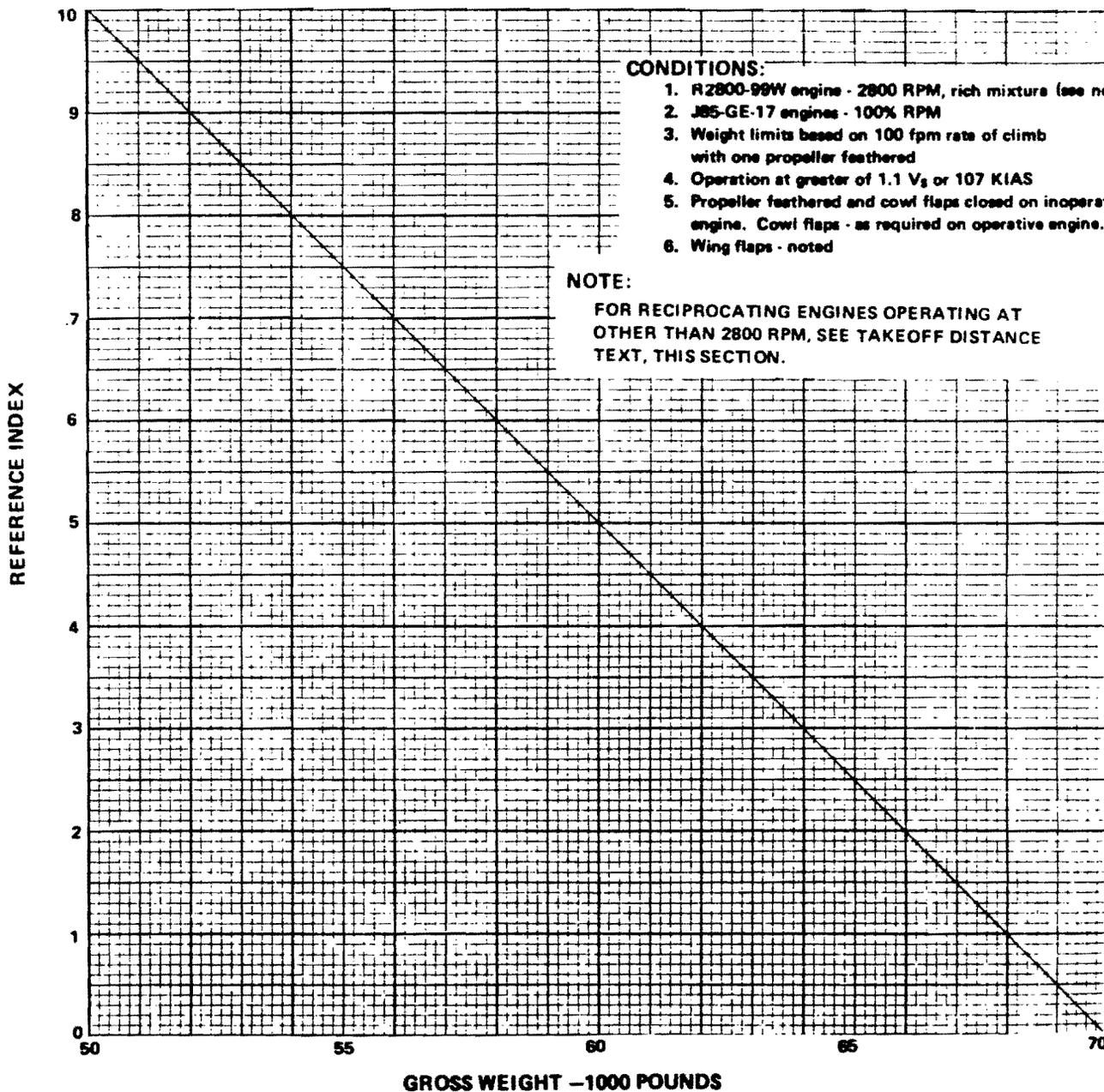


Figure A3-10 (Sheet 2 of 2).

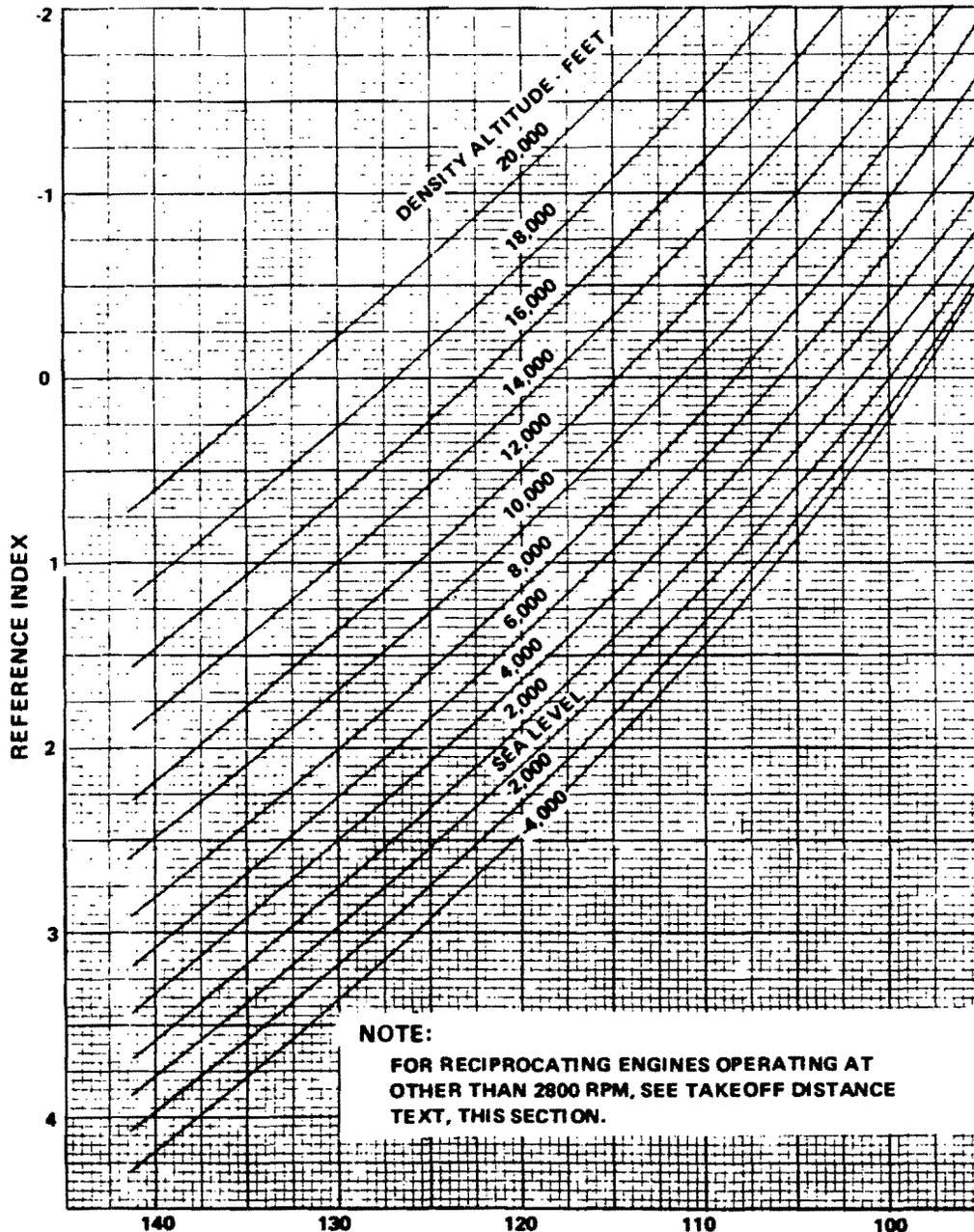
MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)  
 PROPELLERS: 43E60-607

MAXIMUM POWER  
 WITHOUT JET THRUST  
 LANDING GEAR DOWN  
 WING FLAPS UP

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**NOTE:**  
 FOR RECIPROCATING ENGINES OPERATING AT  
 OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE  
 TEXT, THIS SECTION.

**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at greater of 1.1  $V_s$  or 107 KIAS
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

**TORQUE PRESSURE - PSI**

Figure A3-11 (Sheet 1 of 2).

MODEL: UC-123K  
**TAKEOFF GROSS WEIGHT LIMIT**

ENGINES: R2800-99W (1)

PROPELLERS: 43E60-607

MAXIMUM POWER

WITHOUT JET THRUST

LANDING GEAR DOWN

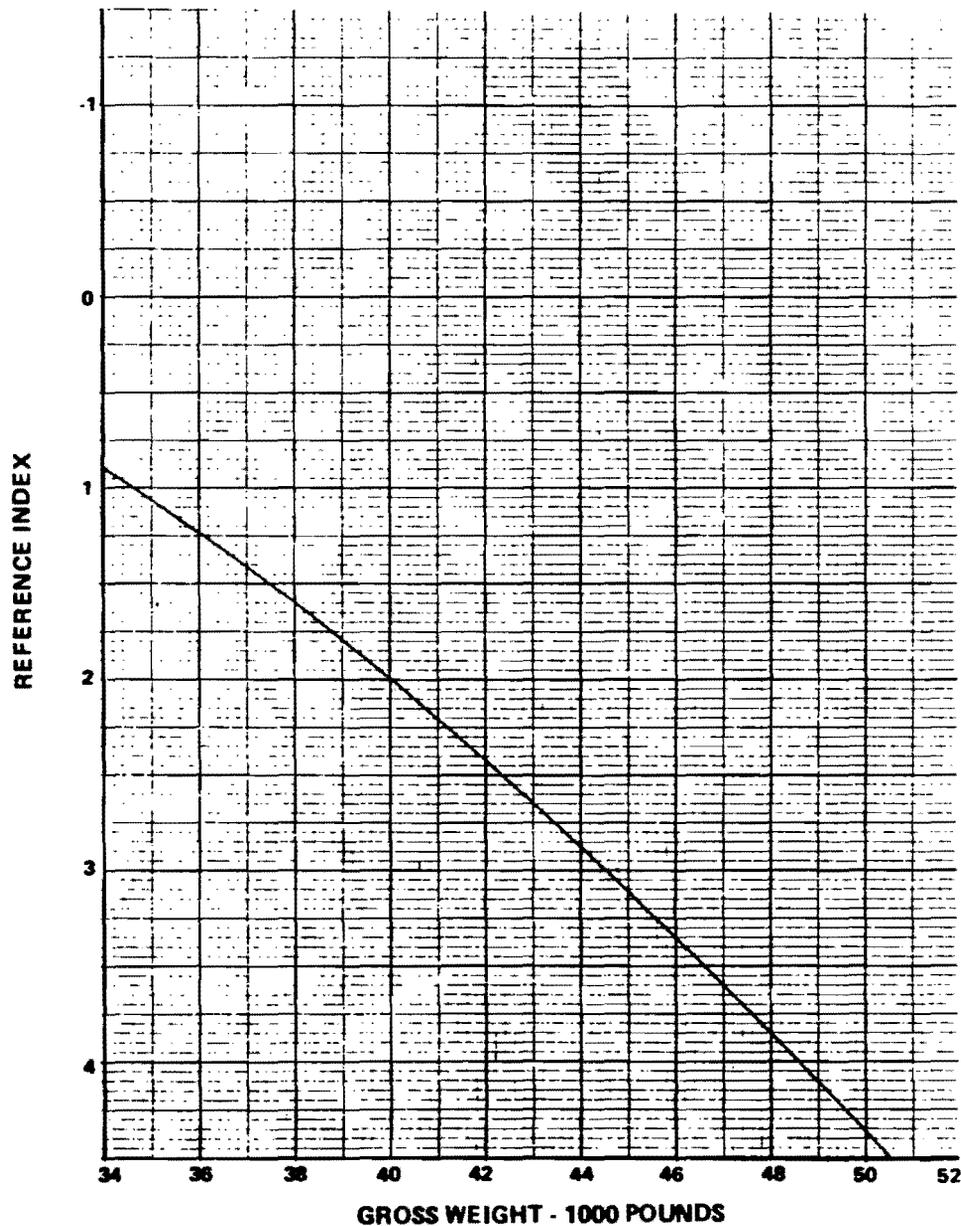
WING FLAPS UP

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engine - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3. Weight limits based on 100 fpm rate of climb with one propeller feathered
4. Operation at greater of 1.1  $V_S$  or 107 KIAS
5. Propeller feathered and cowl flaps closed on inoperative engine. Cowl flaps - as required on operative engine.
6. Wing flaps - noted

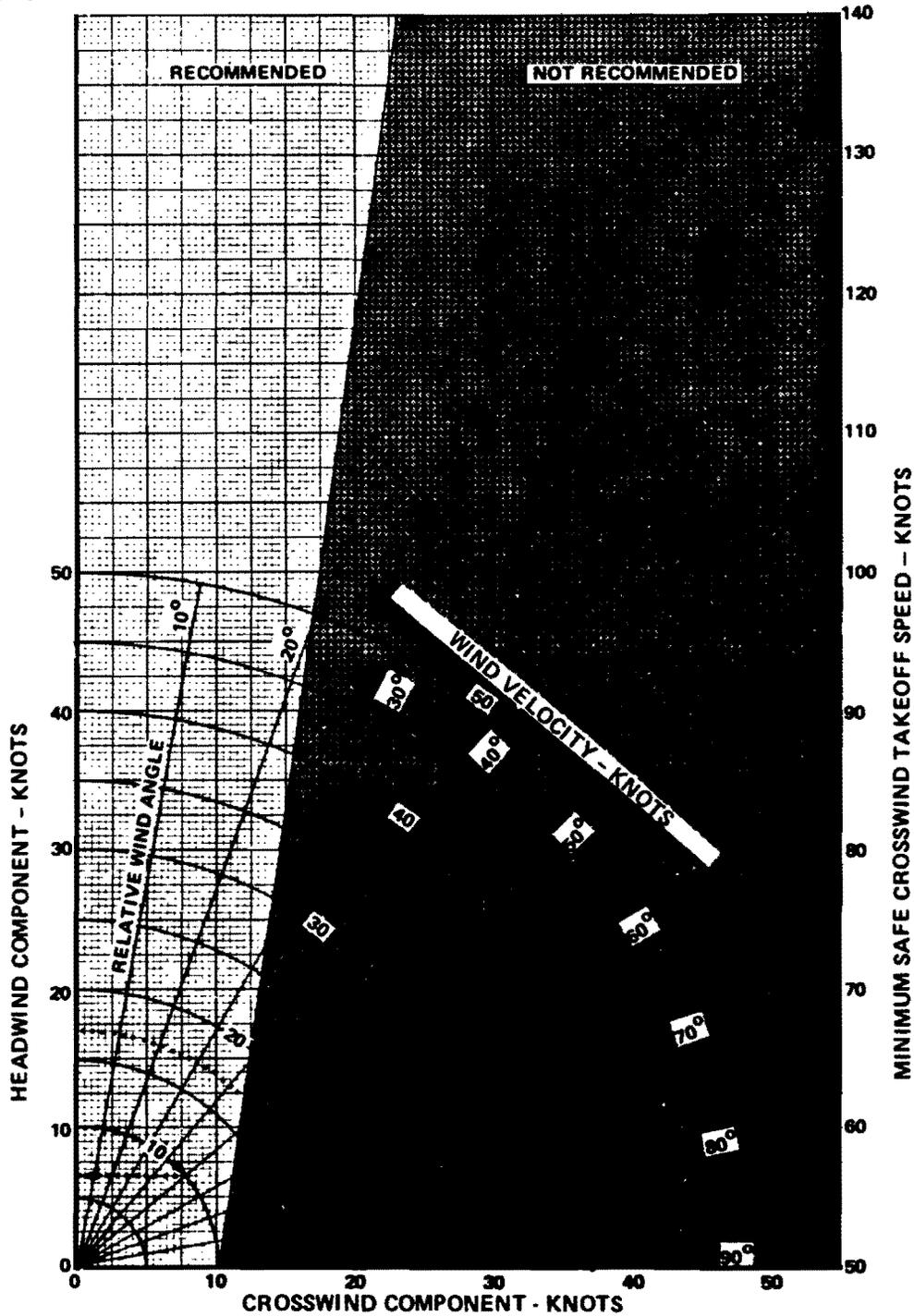
**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

Figure A3-11 (Sheet 2 of 2).

MODEL: C-123K, UC-123K  
**CROSSWIND TAKEOFF**  
SYMMETRICAL POWER OPERATION

DATA AS OF: SEPTEMBER 15, 1973  
DATA BASIS: CALCULATED



**NOTE:**  
FOR CROSSWIND COMPUTATIONS ENTER CHART USING MAXIMUM WIND GUST VELOCITY. FOR OTHER TAKEOFF COMPUTATIONS DETERMINE HEADWIND COMPONENT USING WIND VELOCITY WITHOUT GUSTS.

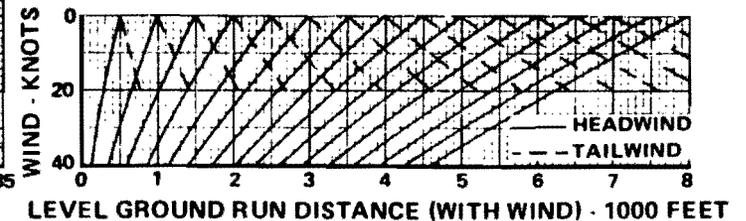
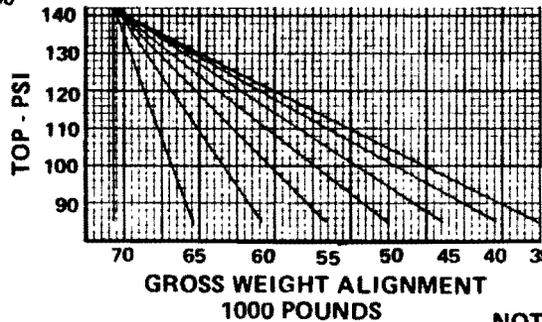
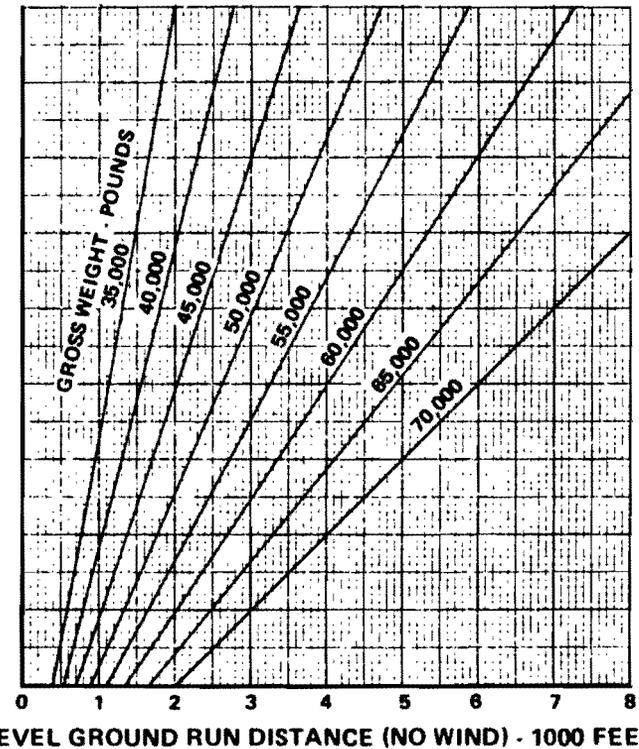
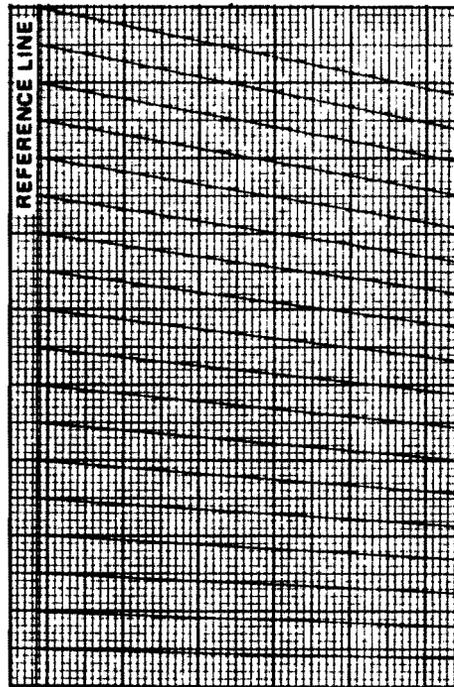
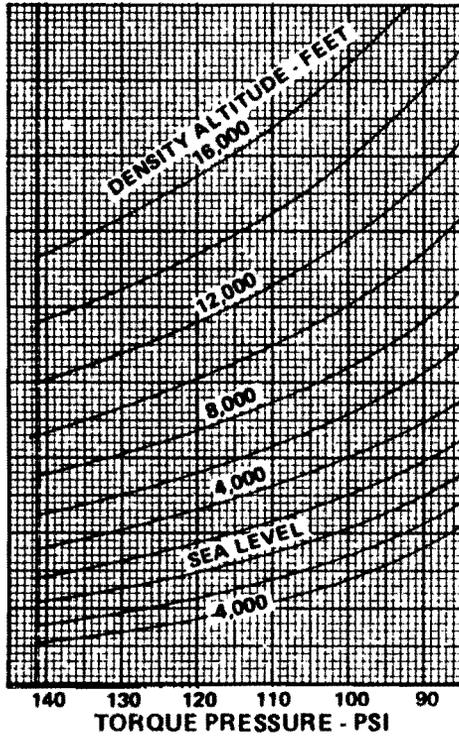
Figure A3-12.

MODEL: C-123K, UC-123K  
**STANDARD TAKEOFF GROUND RUN DISTANCE**

ENGINES: R2800-99W (2), J85-GE-17 (2)  
 PROPELLERS: 43E60-607  
 MAXIMUM POWER  
 WITH JET THRUST  
 WING FLAPS UP

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engines - 2800 RPM, rich mixture. (see note)
2. J85-GE-17 engines - 100% RPM
3.  $V_s$  = Zero thrust stall speed  
 $V_{to}$  = Takeoff speed ( $1.1 V_s$ )  
 $V_{50}$  = Obstacle clearance speed ( $1.2 V_s$ )  
 $V_R$  = Rotation speed ( $V_{to} - 10$  knots)
4. Level, dry, hard surface runway,  $\mu_{rolling} = 0.025$
5. Cowl flaps - takeoff

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

Figure A3-13 (Sheet 1 of 2).

Change 10

A3-43

T. O. 1C-123K-1

MODEL: C-123K, UC-123K  
**STANDARD TOTAL TAKEOFF DISTANCE TO CLEAR 50 FEET**

ENGINES: R2800-99W (2), J85-GE-17 (2)

PROPELLERS: 43E60-607

MAXIMUM POWER  
 WITH JET THRUST  
 WING FLAPS UP

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973

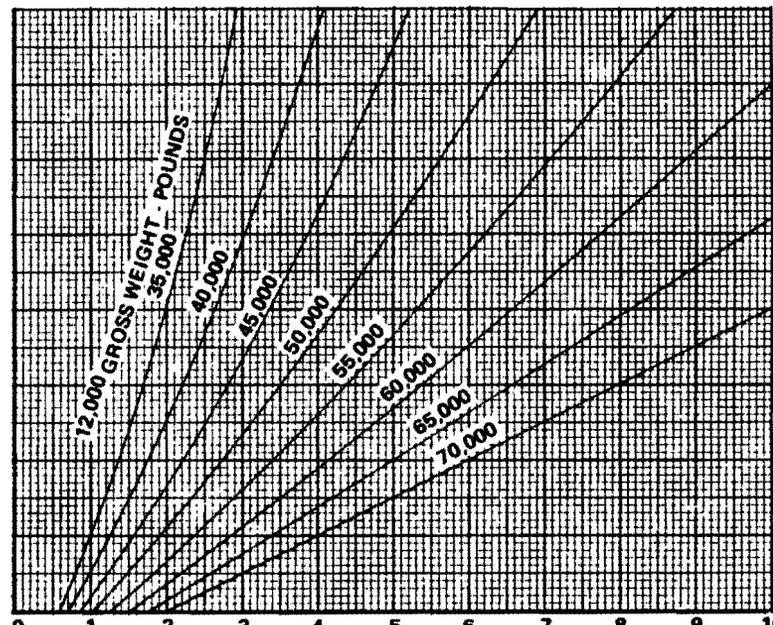
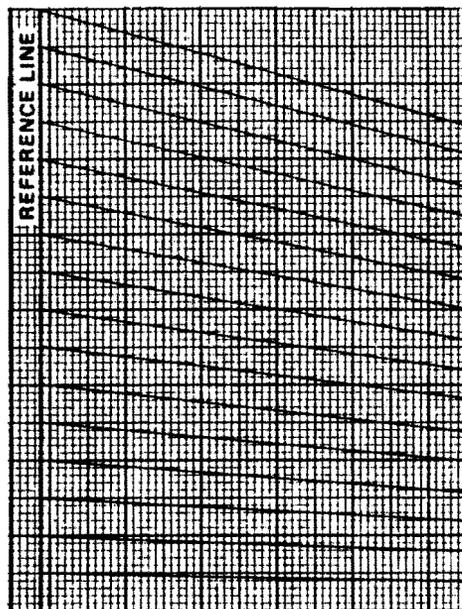
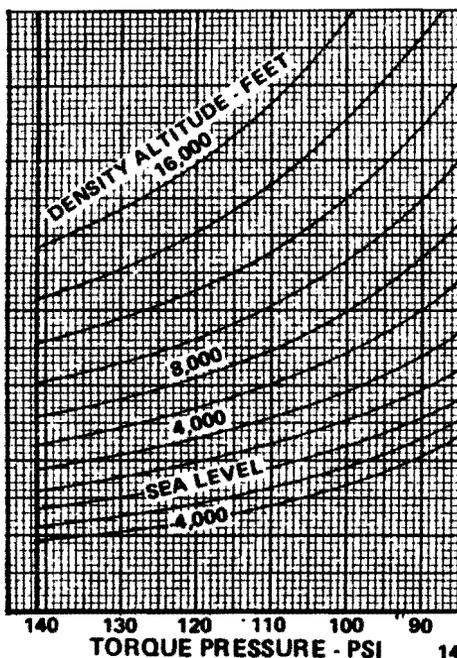
DATA BASIS: FLIGHT TEST

T. O. 1C-123K-1

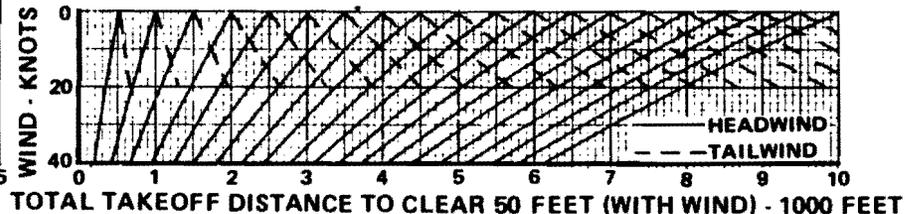
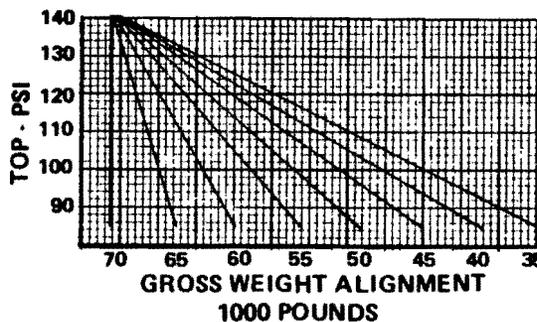
A3-44

Change 10

Figure A3-13 (Sheet 2 of 2)



GROSS WEIGHT POUNDS	IAS KNOTS				
	IN GROUND EFFECT			OUT OF GROUND EFFECT	
	V <sub>s</sub> *	V <sub>R</sub> *	V <sub>to</sub> *	V <sub>s</sub> *	V <sub>50</sub> *
35,000	80	78	88	79	93
40,000	85	83	93	84	100
45,000	90	89	99	89	106
50,000	95	94	104	93	112
55,000	99	99	109	97	117
60,000	104	104	114	102	123
65,000	108	109	119	106	128
70,000	112	113	123	110	133



**CONDITIONS:**

1. R2800-99W engines - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3. V<sub>s</sub> = Zero thrust stall speed  
V<sub>to</sub> = Takeoff speed (1.1 V<sub>s</sub>)

4. Level, dry, hard surface runway,  
μ rolling = 0.025
  5. Cowl flaps - takeoff
- V<sub>50</sub> = Obstacle clearance speed (1.2 V<sub>s</sub>)  
 V<sub>R</sub> = Rotation speed (V<sub>to</sub> - 10 knots)

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

MODEL: C-123K, UC-123K  
**MINIMUM TAKEOFF GROUND RUN DISTANCE**

ENGINES: R2800-99W (2), J85-GE-17 (2)

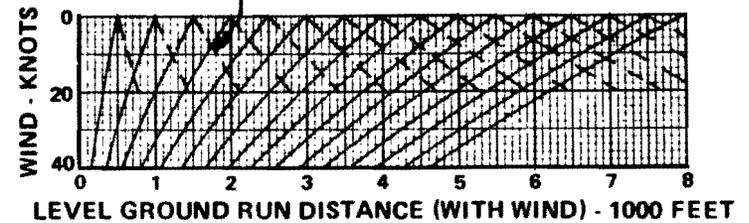
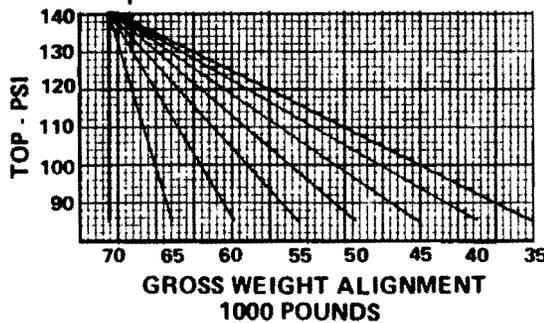
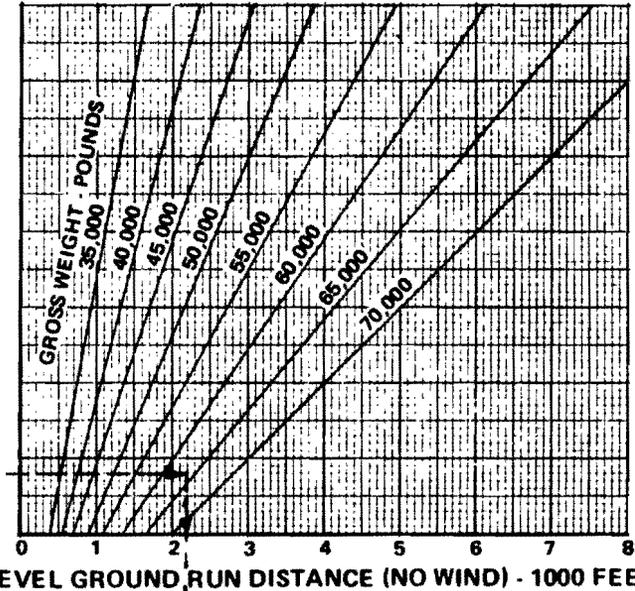
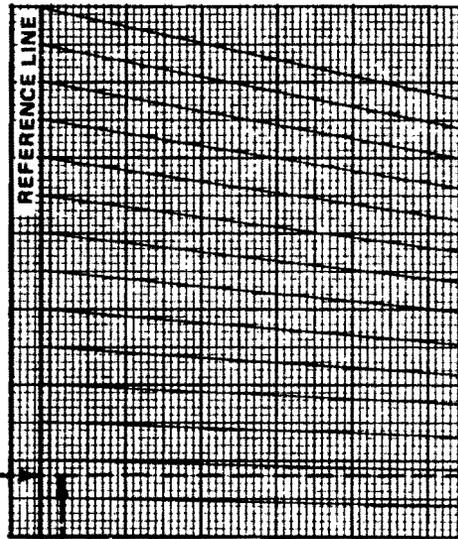
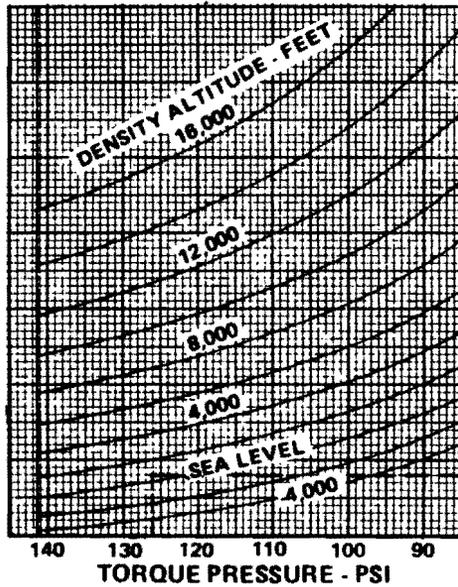
PROPELLERS: 43E60-607

MAXIMUM POWER  
 WITH JET THRUST  
 WING FLAPS TAKEOFF

FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST



**CONDITIONS:**

1. R2800-99W engines - maximum power applied prior to brake release, 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3.  $V_s$  = Zero thrust stall speed  
 $V_{to}$  = Takeoff speed ( $1.1 V_s$ )  
 $V_{50}$  = Obstacle clearance speed ( $1.2 V_s$ )  
 $V_R$  = Rotation speed ( $V_{to} - 10$  knots)
4. Level, dry, hard surface runway,  $\mu_{rolling} = 0.025$
5. Cowl flaps - takeoff

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

—— HEADWIND  
 - - - - TAILWIND

MODEL: C-123K, UC-123K  
**MINIMUM TOTAL TAKEOFF DISTANCE TO CLEAR 50 FEET**

ENGINES: R2800-99W (2), J85-GE-17 (2)

PROPELLERS: 43E60-607

MAXIMUM POWER

WITH JET THRUST

WING FLAPS TAKEOFF

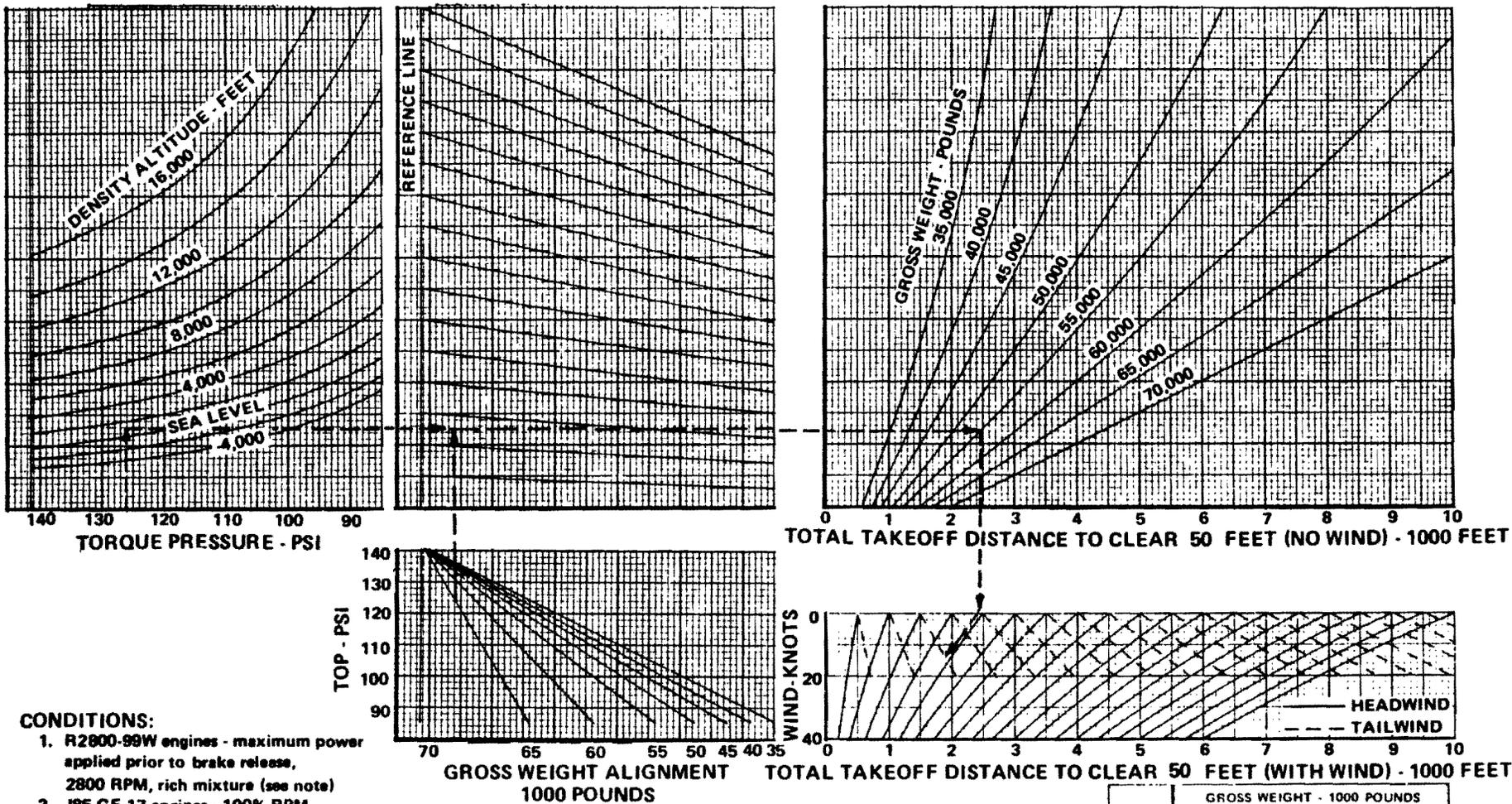
FUEL GRADE: 100/130

FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973

DATA BASIS: FLIGHT TEST

Figure A3-14 (Sheet 2 of 2)



**CONDITIONS:**

1. R2800-99W engines - maximum power applied prior to brake release, 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3.  $V_s$  = Zero thrust stall speed  
 $V_{to}$  = Takeoff speed ( $1.1 V_s$ )  
 $V_{50}$  = Obstacle clearance speed ( $1.2 V_s$ )  
 $V_R$  = Rotation speed ( $V_{to} - 10$  knots)
4. Level, dry, hard surface runway,  $\mu_{rolling} = 0.025$
5. Cowl flaps - takeoff

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

IAS KNOTS	GROSS WEIGHT - 1000 POUNDS							
	35	40	45	50	55	60	65	70
$V_s^*$	73	77	82	86	90	94	98	102
$V_R^*$	72	76	81	85	89	93	96	100
$V_{to}^*$	69	75	80	85	89	93	98	102
$V_{50}^*$	79	85	90	95	99	103	108	112
	85	91	96	101	106	111	115	120

\* IN GROUND EFFECT    \* OUT OF GROUND EFFECT

MODEL: C-123K, UC-123K  
**ASSAULT TAKEOFF GROUND RUN DISTANCE**

C.G. LOCATION FORWARD OF 26% MAC

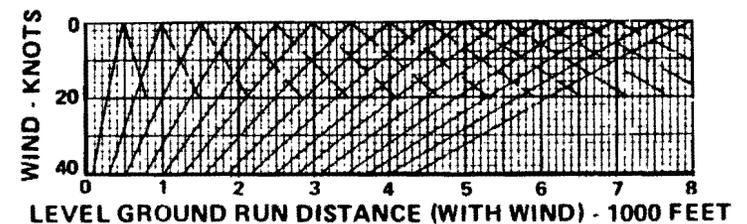
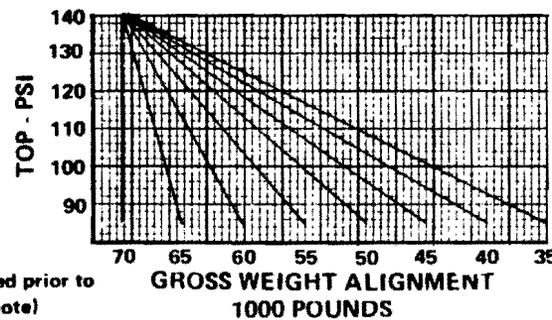
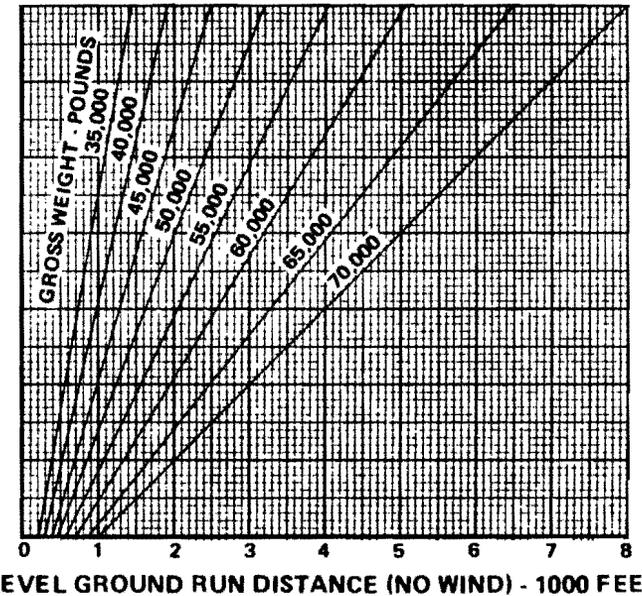
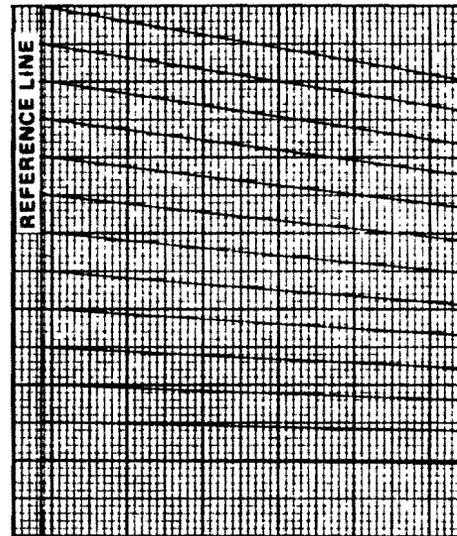
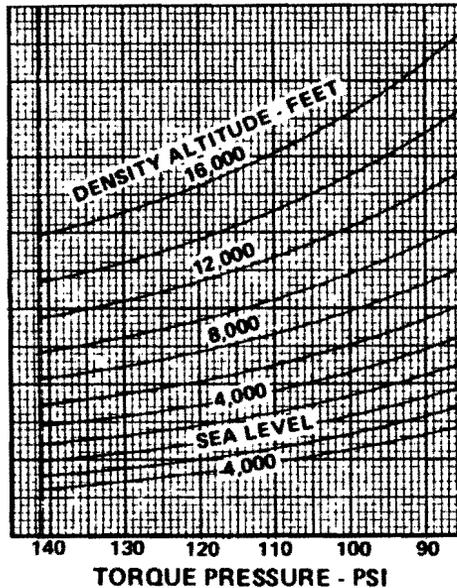
ENGINES: R2800-99W (2), J85-GE-17 (2)

PROPELLERS: 43E60-607

MAXIMUM POWER  
 WITH JET THRUST  
 WING FLAPS TAKEOFF

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engines - maximum power applied prior to brake release, 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3.  $V_s$  = Stall speed  
 $V_{to}$  = Takeoff speed (1.06  $V_s$  power on +8 knots)  
 $V_{50}$  = Obstacle clearance speed (1.1  $V_s$  zero thrust stall speed)  
 $V_R$  = Rotation speed ( $V_{to}$  - 10 knots)
4. Level, dry, hard surface runway,  $\mu_{rolling}$  = 0.025
5. Cowl flaps - takeoff

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

———— HEADWIND  
 - - - - TAILWIND

Figure A3-15 (Sheet 1 of 2).

Change 10

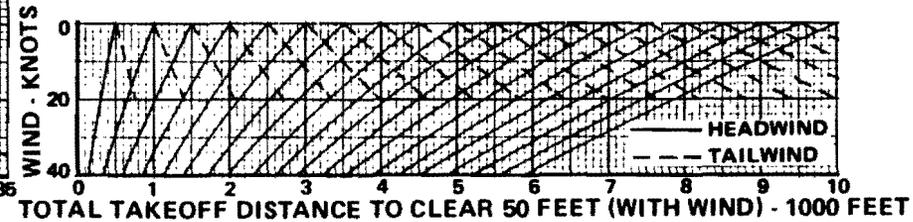
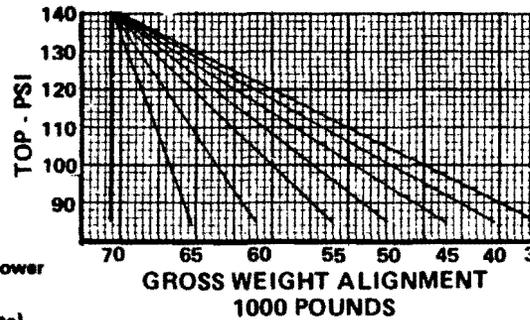
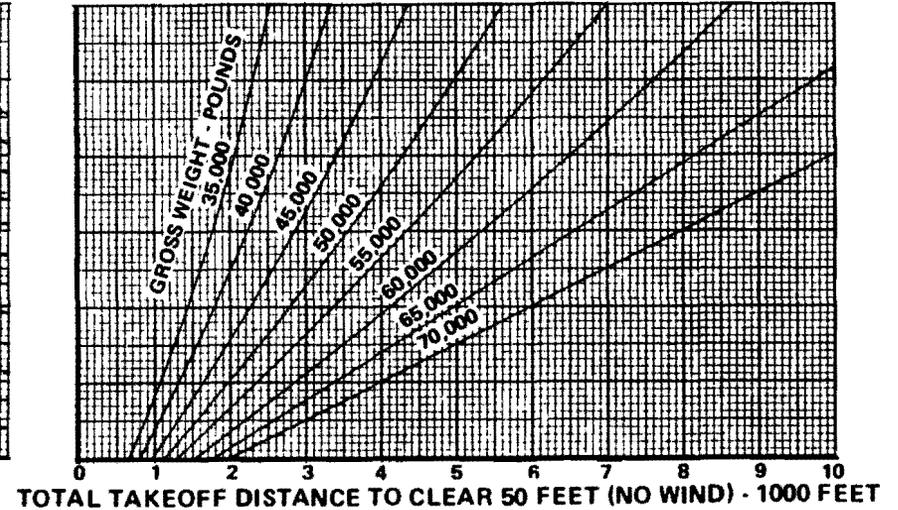
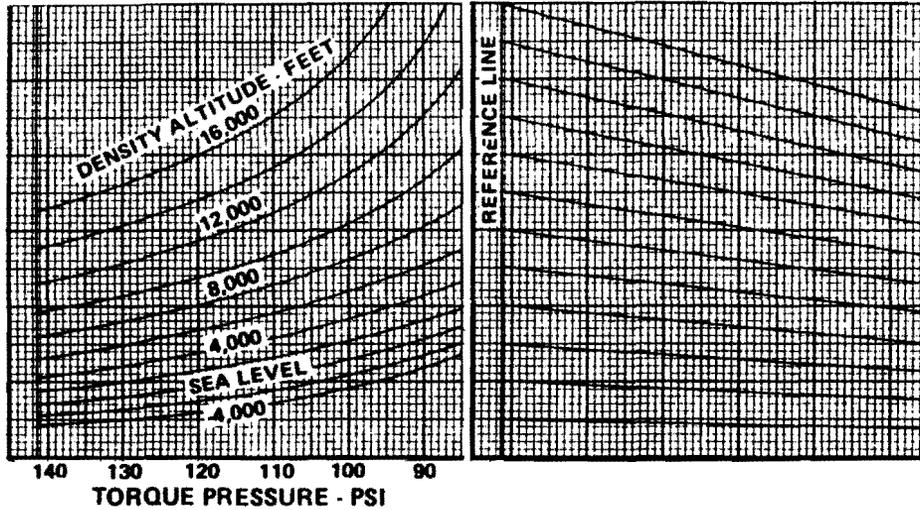
A3-47

T.O. 1C-123K-1

MODEL: C-123K, UC-123K  
**ASSAULT TOTAL TAKEOFF DISTANCE TO CLEAR 50 FEET**  
 C.G. LOCATION FORWARD OF 26% MAC  
 ENGINES: R2800-99W (2), J85-GE-17 (2)  
 PROPELLERS: 43E60-607  
 MAXIMUM POWER WITH JET THRUST  
 WING FLAPS TAKEOFF

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engines - maximum power applied prior to brake release, 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM
3.  $V_s$  = Stall speed  
 $V_{to}$  = Takeoff speed (1.06  $V_s$  power on +8 knots)  
 $V_{50}$  = Obstacle clearance speed (1.1  $V_s$  zero thrust stall speed)  
 $V_R$  = Rotation speed ( $V_{to}$  - 10 knots)
4. Level, dry, hard surface runway,  $\mu$  rolling = 0.025
5. Cowl flaps - takeoff

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

IAS KNOTS	GROSS WEIGHT - 1000 POUNDS							
	35	40	45	50	55	60	65	70
$V_s^*$	59	63	67	71	75	79	83	88
$V_s^+$	59	63	67	71	74	78	82	86
$V_R^*$	60	65	69	73	78	82	86	91
$V_{to}^*$	70	75	79	83	88	92	96	101
$V_{50}^*$	78	83	88	93	97	102	106	110

\* IN GROUND EFFECT + OUT OF GROUND EFFECT

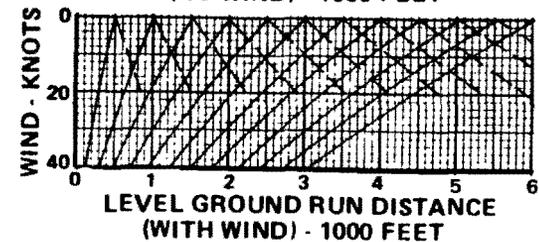
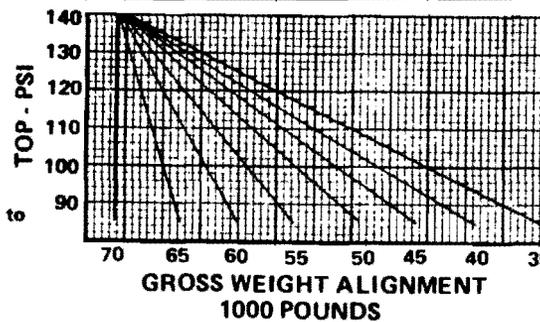
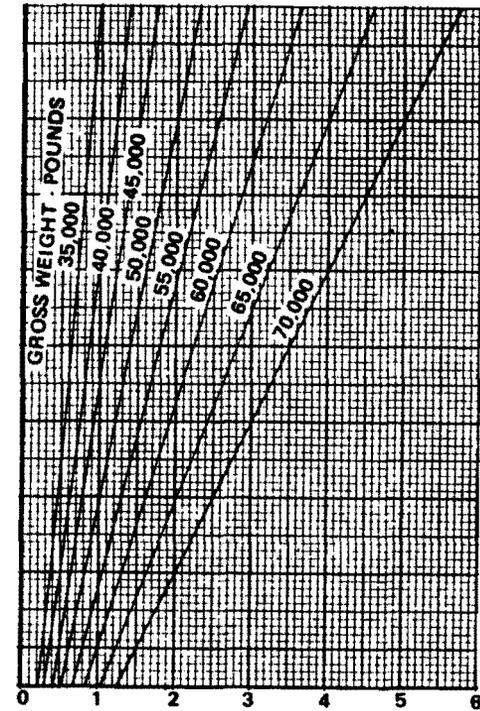
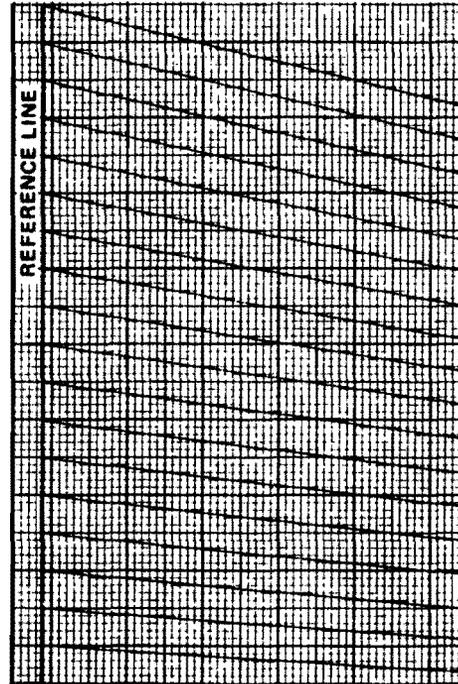
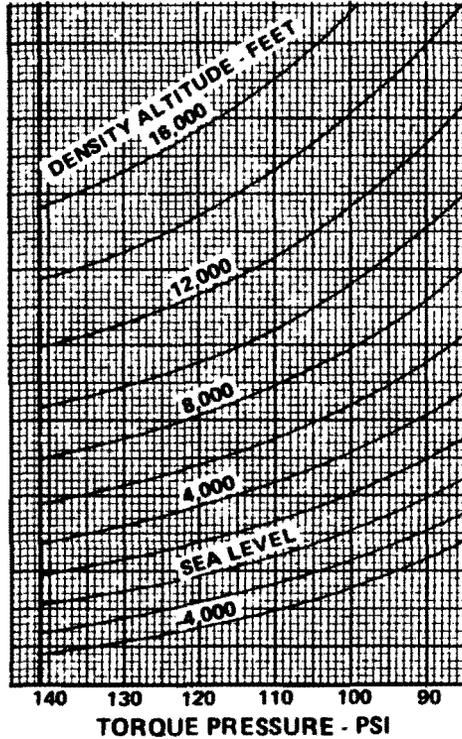
MODEL: C-123K, UC-123K  
**ASSAULT TAKEOFF GROUND RUN DISTANCE**

C.G. LOCATION 26% MAC OR AFT  
 ENGINES: R2800-99W (2), J85-GE-17 (2)  
 PROPELLERS: 43E60-607

MAXIMUM POWER  
 WITH JET THRUST  
 WING FLAPS TAKEOFF

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST



**CONDITIONS:**

1. R2800-99W engines - maximum power applied prior to brake release, 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - 100% RPM.
3.  $V_s$  = Stall speed  
 $V_{to}$  = Takeoff speed (1.06  $V_s$  power on +4 knots)  
 $V_{50}$  = Obstacle clearance speed (1.1  $V_s$  zero thrust stall speed)  
 $V_R$  = Rotation speed ( $V_{to} - 10$  knots)
4. Level, dry, hard surface runway,  $\mu$  rolling = 0.025
5. Cowl flaps - takeoff

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

———— HEADWIND  
 - - - - TAILWIND

Figure A3-16 (Sheet 1 of 2).

Change 10

A3-49

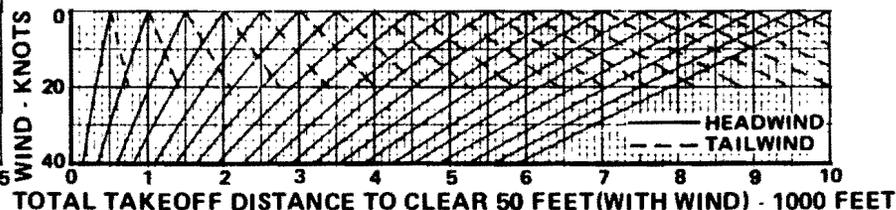
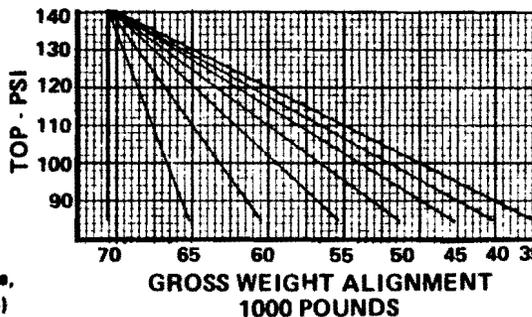
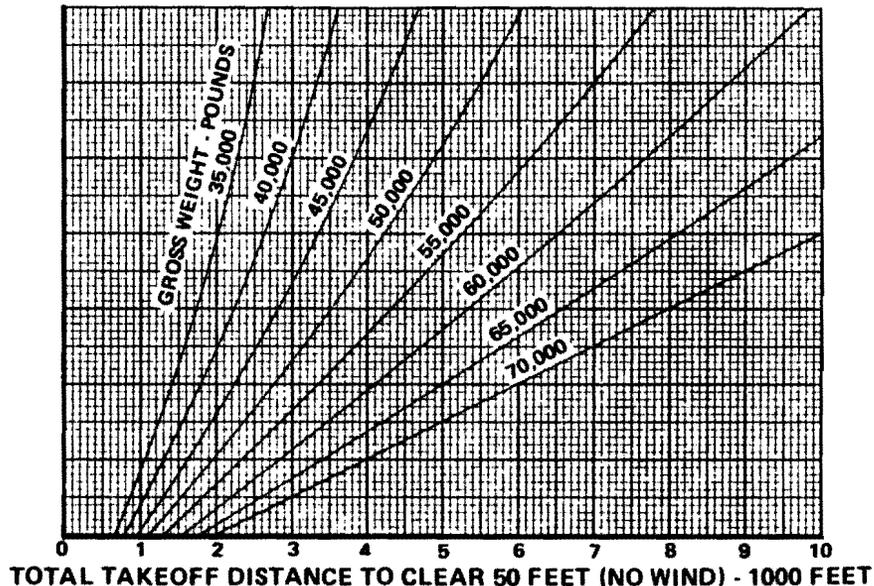
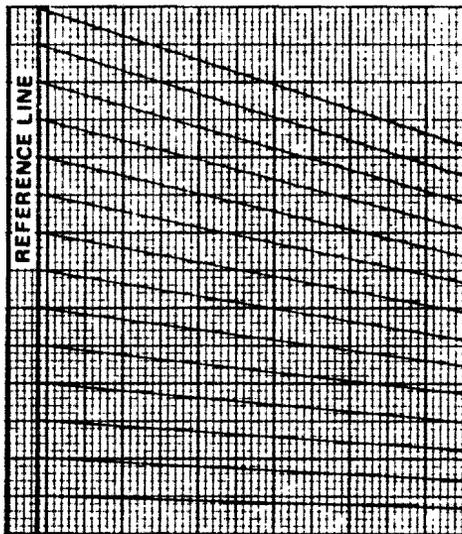
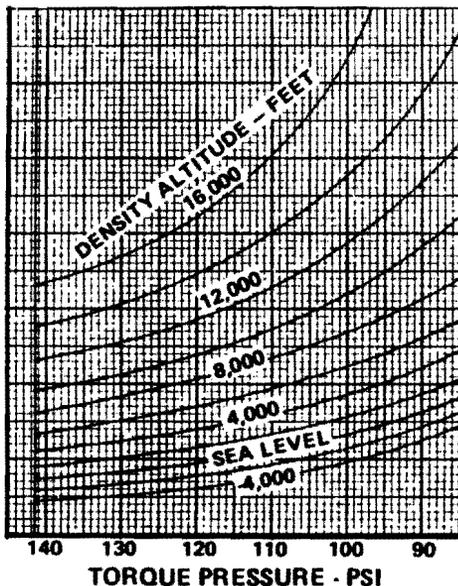
T.O. 1C-123K-1

# MODEL: C-123K, UC-123K ASSAULT TOTAL TAKEOFF DISTANCE TO CLEAR 50 FEET

C.G. LOCATION 26% MAC OR AFT  
ENGINES: R2800-99W (2), J85-GE-17 (2)  
PROPELLERS: 43E60-607  
MAXIMUM POWER  
WITH JET THRUST  
WING FLAPS TAKEOFF

FUEL GRADE: 100/130  
FUEL DENSITY: 6 LB/GAL

DATA AS OF: SEPTEMBER 15, 1973  
DATA BASIS: FLIGHT TEST



**CONDITIONS:**

- R2800-99W engines - maximum power applied prior to brake release, 2800 RPM, rich mixture (see note)
- J85-GE-17 engines - 100% RPM
- $V_s$  = Stall speed  
 $V_{t0}$  = Takeoff speed (1.06  $V_s$  power on +4 knots)  
 $V_{50}$  = Obstacle clearance speed (1.1  $V_s$  zero thrust stall speed)  
 $V_R$  = Rotation speed ( $V_{t0}$  - 10 knots)
- Level, dry, hard surface runway,  $\mu$  rolling = 0.025
- Cowl flaps - takeoff

**NOTE:**

FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

IAS KNOTS	GROSS WEIGHT - 1000 POUNDS							
	35	40	45	50	55	60	65	70
$V_s^*$	59	63	67	71	75	79	83	88
$V_s^+$	59	63	67	71	74	78	82	86
$V_R^*$	56	61	65	69	74	78	82	87
$V_{t0}^*$	66	71	75	79	84	88	92	97
$V_{50}^*$	78	83	88	93	97	102	106	110

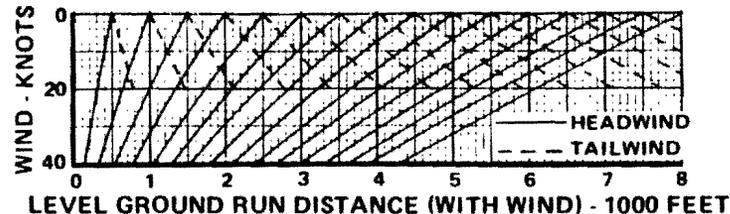
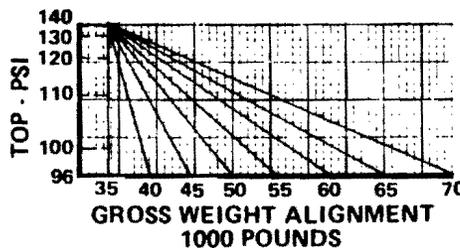
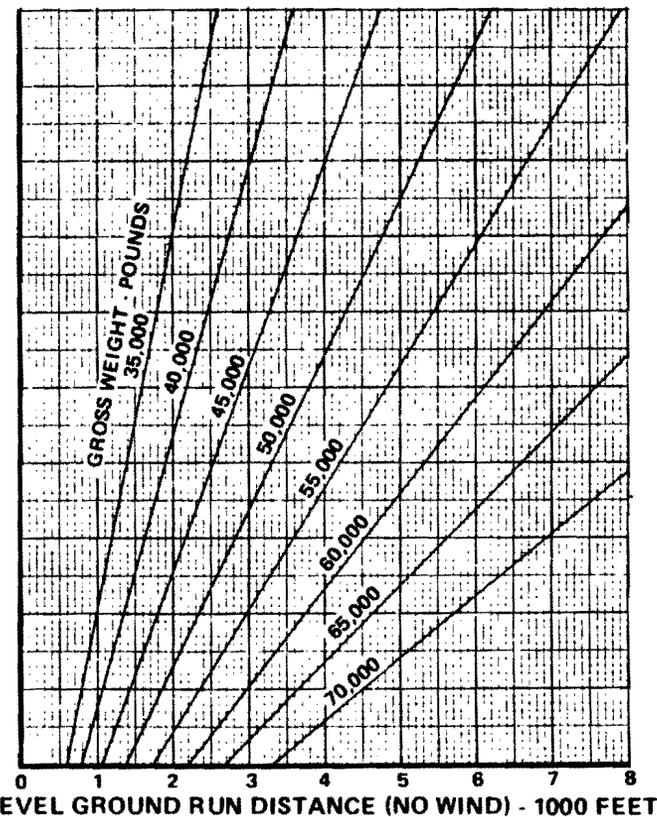
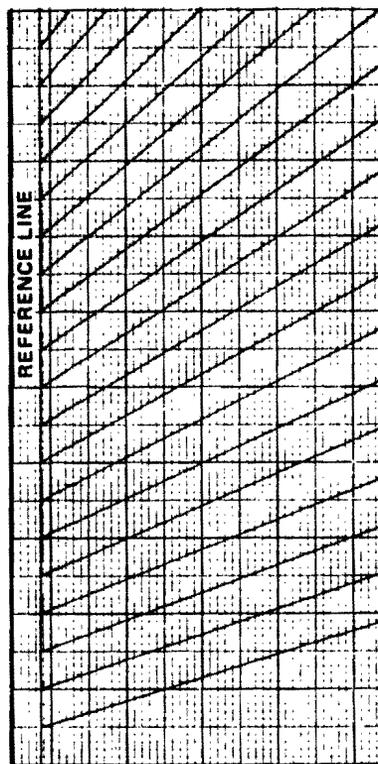
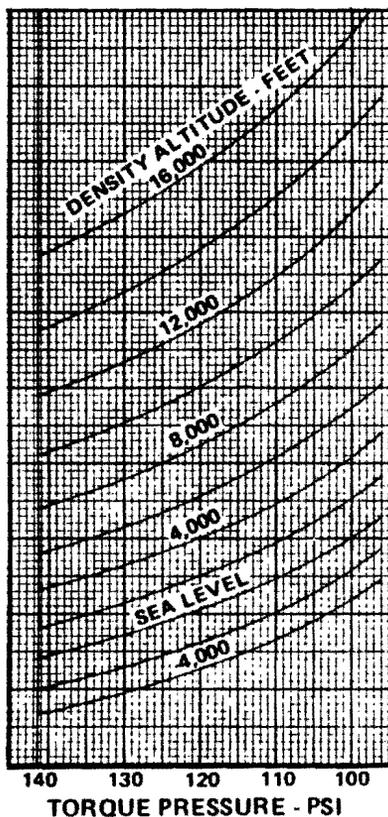
\* IN GROUND EFFECT + OUT OF GROUND EFFECT

MODEL: C-123K, UC-123K  
**STANDARD TAKEOFF GROUND RUN DISTANCE**

ENGINES: R2800-99W (2)  
 PROPELLERS: 43E60-607  
 MAXIMUM POWER  
 WITHOUT JET THRUST  
 WING FLAPS UP

DATA AS OF: SEPTEMBER 15, 1973  
 DATA BASIS: FLIGHT TEST

FUEL GRADE: 100/130  
 FUEL DENSITY: 6 LB/GAL



**CONDITIONS:**

1. R2800-99W engines - 2800 RPM, rich mixture (see note)
2. J85-GE-17 engines - not operating
3.  $V_s$  = Zero thrust stall speed  
 $V_{to}$  = Takeoff speed ( $1.1 V_s$ )  
 $V_{50}$  = Obstacle clearance speed ( $1.2 V_s$ )  
 $V_R$  = Rotation speed ( $V_{to} - 10$  knots)
4. Level, dry, hard surface runway.  $\mu$  rolling = 0.025
5. Cowl flaps - takeoff

NOTE: FOR RECIPROCATING ENGINES OPERATING AT OTHER THAN 2800 RPM, SEE TAKEOFF DISTANCE TEXT, THIS SECTION.

Figure A3-17 (Sheet 1 of 2).

Change 10

A3-51

T.O. 1C-123K-1