1.3 stall speed line (approach) (C). and read up to find IAS of 116 knots (D). For 28° flap deflection enter at gross weight of 38,000 pounds (A) and read up to 28° flap deflection (E). Read across to the 1.2 stall speed line (touchdown) (F), and read up for 99 knots IAS (C).

LANDING GROUND ROLL

Landing ground roll is defined as the distance from touchdown to a stop using normal pilot techniques specified in Section II with brakes only (both propellers windmilling). For a minimum roll landing, it is important to initiate wing flap retraction as soon as possible after the airplane is firmly on the ground. Retracting the wing flaps decreases the wing lift and allows more weight to be applied to the main wheels, thus increasing the braking efficiency and shortening the landing roll. Reverse propeller thrust is recommended since it will appreciably shorten the landing roll. The landing ground roll charts (figure 1A6-2 through 1A6-6) present the landing ground roll distance for gross weight, density altitude, and wind. The charts also present total landing distance over a 50-foot obstacle.

EXAMPLE

Given:

Density altitude = 1800 feet.

Gross weight = 36,000 pounds.

Headwind = 5 knots.

Flap setting = 28°.

Select chart for 28° landing flap (figure 1A6-3). Enter chart at density altitude of 1800 feet (A). Read across to gross weight of 36,000 pounds (B) and read down to wind velocity baseline. Parallel wind guideline to 5 knots headwind (C) and read down to read ground roll distance of 3100 feet (D) and landing distance of 3780 feet (E).

Effects of Unusual Runway Conditions on Landing Ground Roll

The landing ground roll charts (figures 1A6-2 through 1A6-6) are based on landing on a dry, hard surface. The landing ground roll can be corrected for other surface conditions by multiplying the ground roll distance by the stopping factor from the Stopping Capability Chart (figure 1A6-7). To use the chart, obtain the latest runway condition reading (RCR) from the base weather station.

Note

If no RCR is available, use 12 for a wet runway and 5 for an icy runway.

EXAMPLE

Given:

RCR = 14.

Ground roll distance = 3100 feet.

Enter the Stopping Capability Chart (figure 1A6-7) with RCR of 14 (A). Move horizontally to curve (B), then vertically to obtain stopping factor of 1.27 (C). Multiply the dry, hard surface runway ground roll (3100) by the stopping distance factor (1.27) to determine the ground roll on a slippery runway (3100 X 1.27 = 3937 feet).

Effects of Unusual Runway Conditions on Landing Distance Over 50-Foot Obstacle

To correct the landing distance over a 50-foot obstacle, do not apply the stopping distance factor to the total distance. The flight distance from 50 feet to touchdown is unaffected by RCR. The corrected ground roll distance is added to the uncorrected flight distance.

EXAMPLE

Given:

Ground roll distance = 3100 feet

Corrected ground roll distance = 3937 feet

Landing distance over 50-foot obstacle = 3780 feet

Subtract the ground roll distance (3100 feet) from the landing distance over 50-foot obstacle (3780 feet) to determine flight distance (680 feet). Add this flight distance to the corrected ground roll distance (3937 feet) for total corrected landing distance over 50-foot obstacle (680 feet + 3937 feet = 4617 feet).

MODEL: **T-29 A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

APPROACH AND LANDING SPEEDS
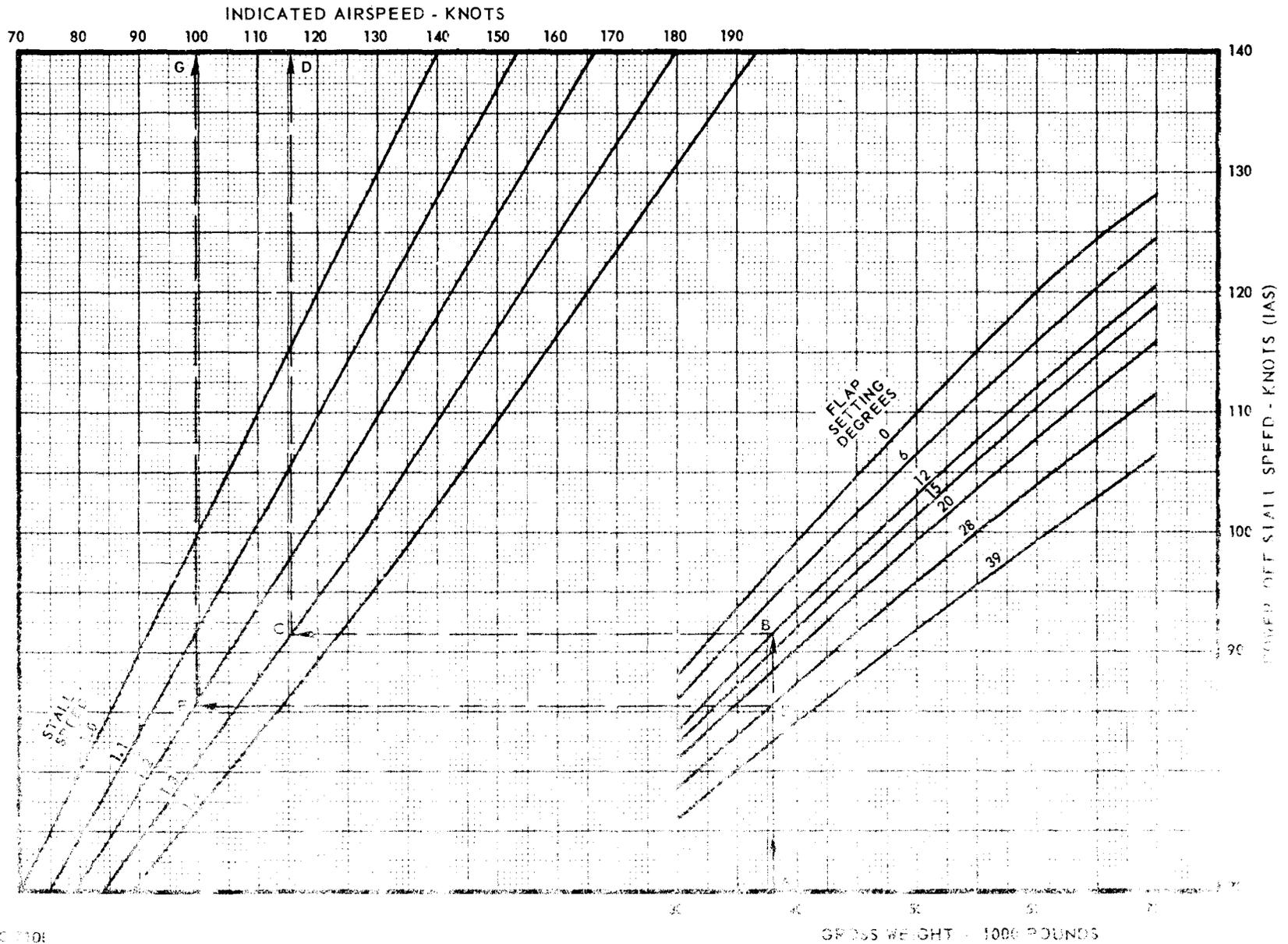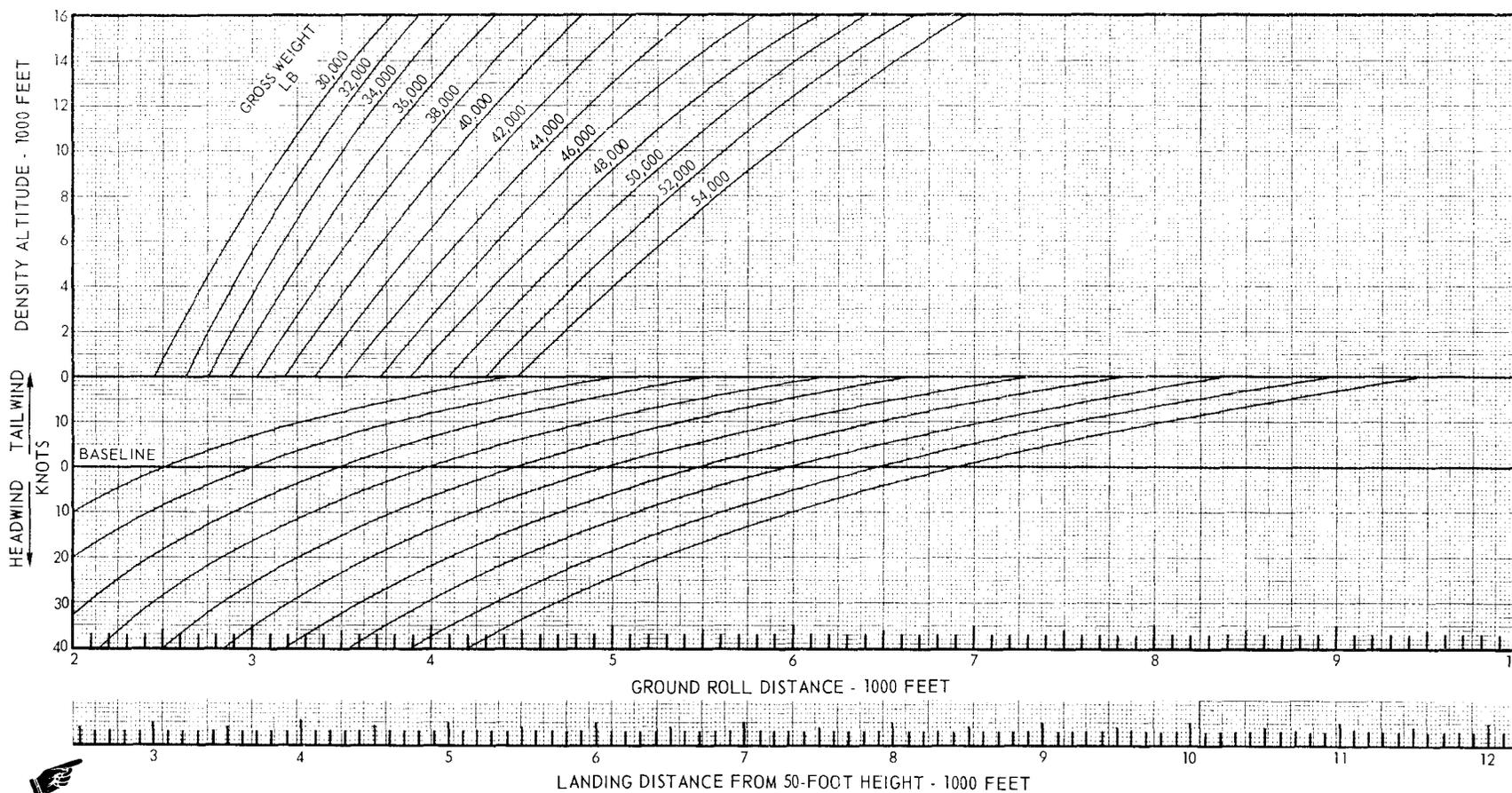
LANDING GEAR DOWN   0° BANK

ENGINES: R2800-97

INDICATED AIRSPEED - KNOTS

FLAP SETTING DEGREES

STALL SPEED

GROSS WEIGHT - 1000 POUNDS

POWER OFF STALL SPEED - KNOTS (IAS)

Figure 1A6-1

T.O. 1T-29A-1

MODEL: T-29A/B

DATE: 15 MARCH 1955

DATA BASIS: **FLIGHT TEST**

LANDING GROUND ROLL (39° FLAP)

APPROACH FLAP - 20°   BRAKES ONLY

ENGINES: R2800-97

Figure 1A6-2

GROUND ROLL DISTANCE - 1000 FEET

LANDING DISTANCE FROM 50-FOOT HEIGHT - 1000 FEET

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) DO NOT EXTEND FLAPS MORE THAN 20° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.2 POWER OFF STALL SPEED.

(5) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.

(6) 100% WIND ACCOUNTABILITY

45,453D

MODEL: T-29A/B

DATE: 15 MARCH 1955

DATA BASIS: FLIGHT TEST

LANDING GROUND ROLL (28° FLAP)

APPROACH FLAP - 12°   BRAKES ONLY

ENGINES: R2800-97

Figure 1A6-3

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) DO NOT EXTEND FLAPS MORE THAN 12° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.2 POWER OFF STALL SPEED.

(5) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.
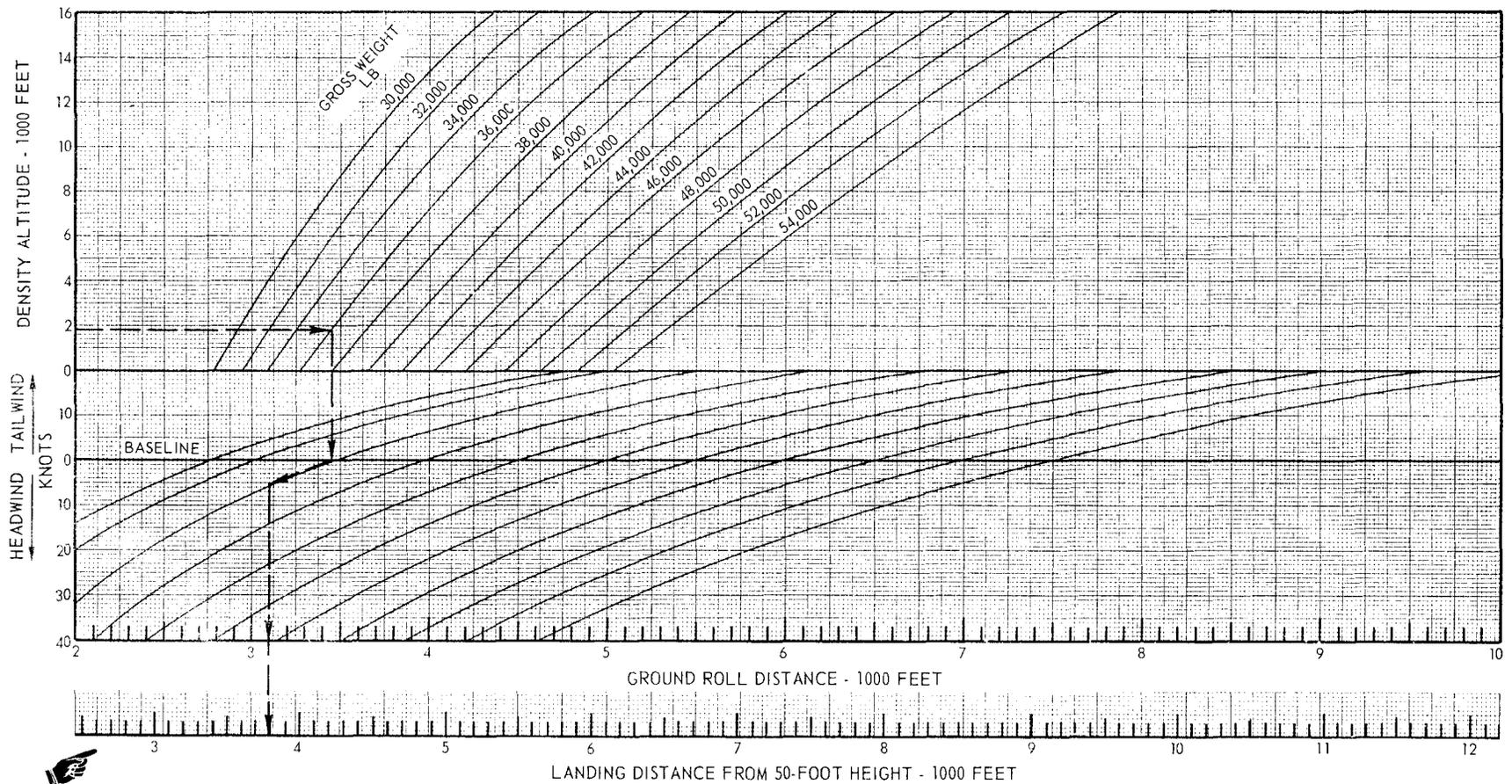
(6) 100% WIND ACCOUNTABILITY.

45,455D

MODEL: T-29A/B

DATE: 15 MARCH 1955

DATA BASIS: **FLIGHT TEST**

LANDING GROUND ROLL (20° FLAP)

APPROACH FLAP 6°   BRAKES ONLY

ENGINES: R2800-97

GROUND ROLL DISTANCE - 1000 FEET

LANDING DISTANCE FROM 50-FOOT HEIGHT - 1000 FEET

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED

(3) DO NOT EXTEND FLAPS MORE THAN 6° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.2 POWER OFF STALL SPEED.

(5) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.
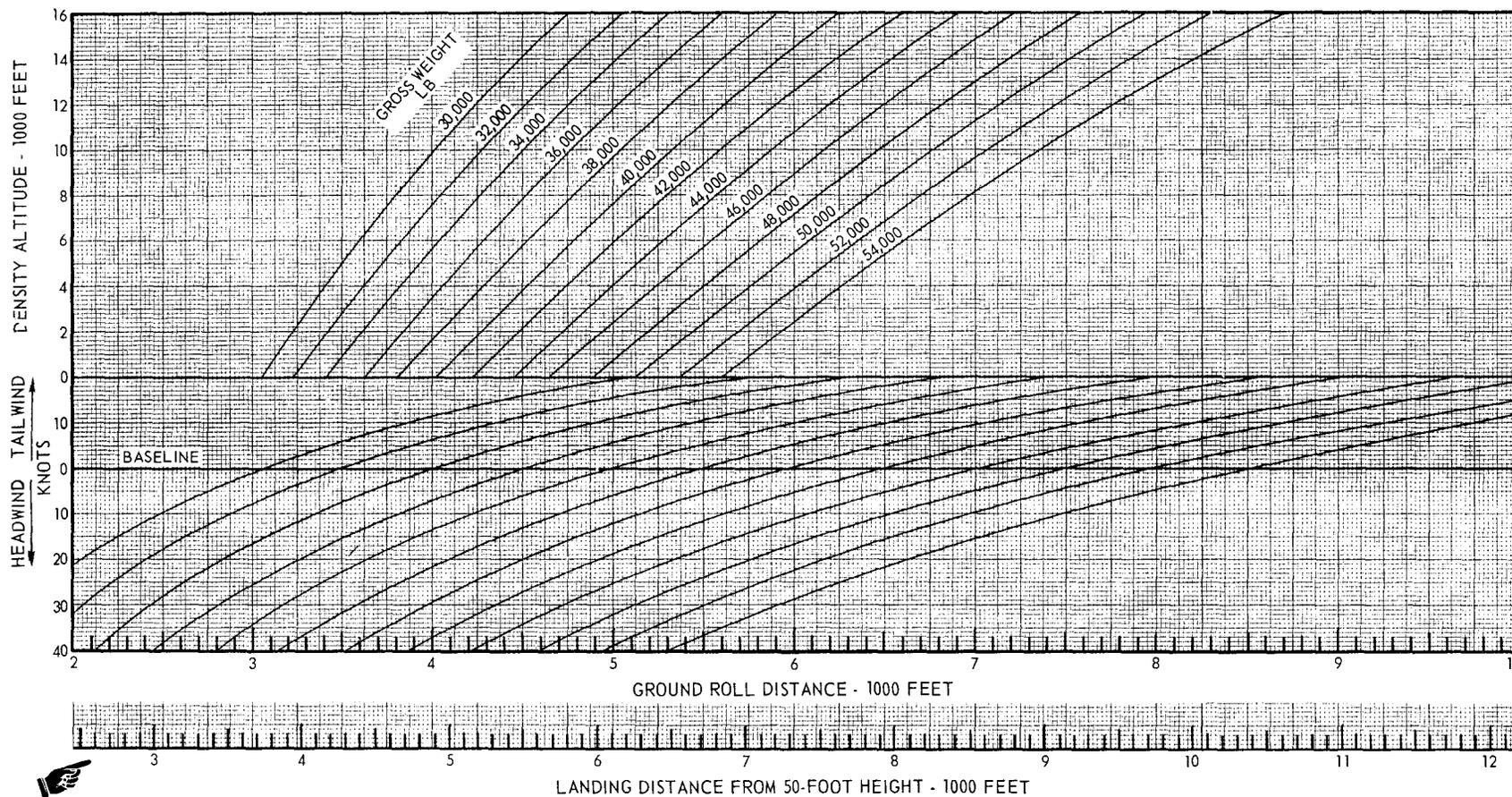
(6) 100% WIND ACCOUNTABILITY.

45,976C

LANDING GROUND ROLL (15° FLAP)

APPROACH FLAP - 0°   BRAKES ONLY
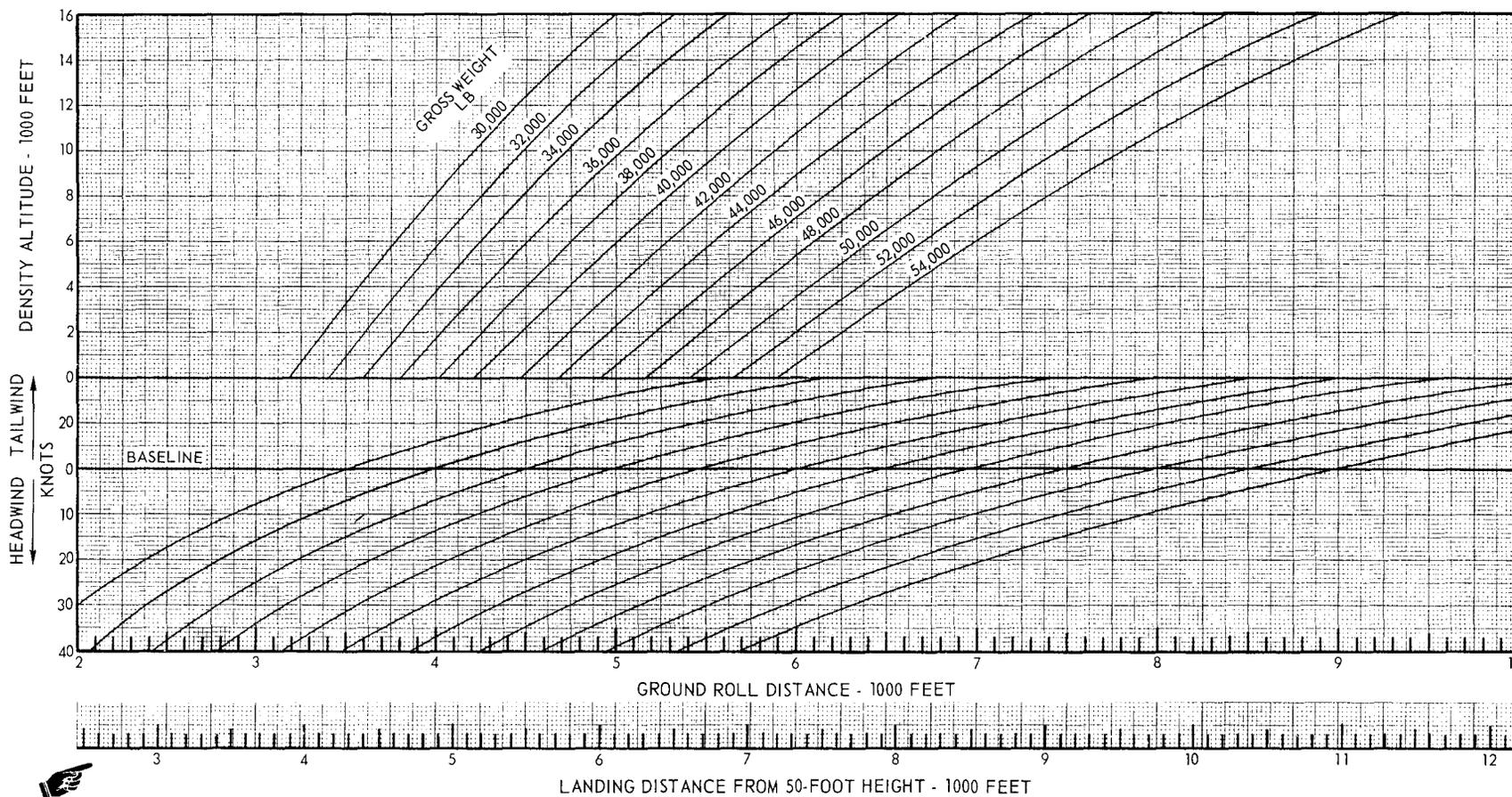
ENGINES: R2800-97

GROUND ROLL DISTANCE - 1000 FEET

LANDING DISTANCE FROM 50-FOOT HEIGHT - 1000 FEET

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) DO NOT EXTEND FLAPS MORE THAN 0° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.2 POWER OFF STALL SPEED.

(5) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.

(6) 100% WIND ACCOUNTABILITY.

45,457D

1A6-8

Change 2

Figure 1A6-6

Appendix I
Part 6

T.O. 1T-29A-1

MODEL: T-29A/B

DATE: 15 MARCH 1955

DATA BASIS: **FLIGHT TEST**

LANDING GROUND ROLL (0° FLAP)

APPROACH FLAP - 0°   BRAKES ONLY

ENGINES: R2800-97

GROUND ROLL DISTANCE - 1000 FEET

LANDING DISTANCE FROM 50-FOOT HEIGHT - 1000 FEET
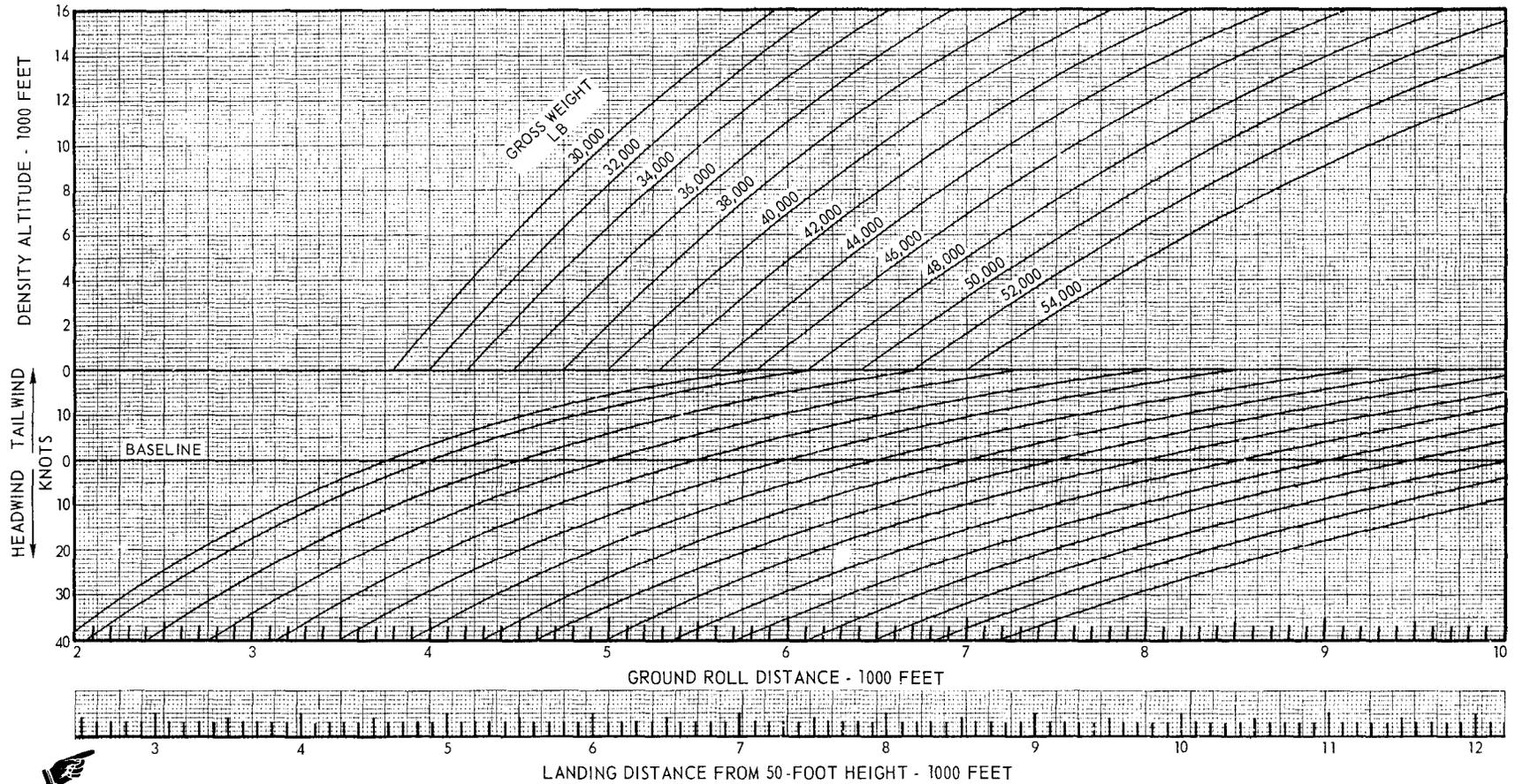
NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLER WINDMILLING. MAXIMUM REVERSE WILL REDUCE THE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON HARD DRY SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) TOUCHDOWN AT 1.2 POWER OFF STALL SPEED.

(4) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.

(5) 100% WIND ACCOUNTABILITY.

45,459D

MODEL: **T-29 A/B**
DATE: 5 DECEMBER 1967
DATA BASIS: **ESTIMATED**

STOPPING CAPABILITY CHART

ENGINES: **R-2800-97**
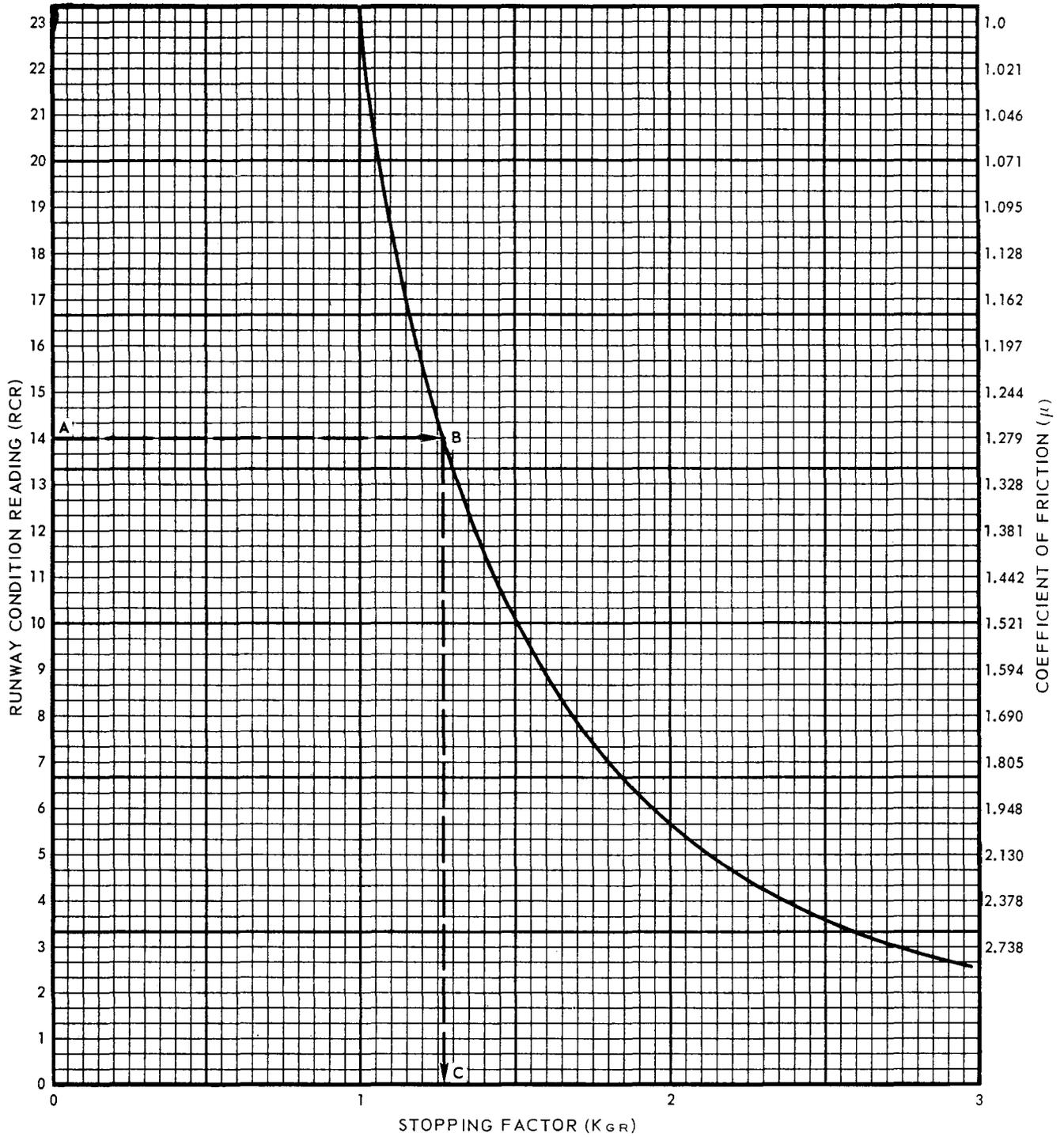
Figure 1A6-7

PART 7 — MISSION PLANNING

Ⓐ   Ⓑ

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MISSION PLANNING

Completion of the Takeoff and Landing Data (TOLD) card (AFTO Form 377) is required for all flights. AFTO Form 377 is available through normal forms distribution channels or may be locally reproduced in emergency situations under provisions of AFM 7-1. Fill out the TOLD card using the operating data in the Appendix or using the precomputed data. To be prepared for an emergency landing immediately after takeoff, complete both the TAKEOFF and LANDING IMMEDIATELY AFTER TAKEOFF portions of the TOLD card using takeoff gross weight. The LANDING portion of the card may be completed at this time or prior to landing at destination.

Note

Acceleration time/distance check data must be computed only when refusal speed is less than takeoff speed.

Adequate planning is an essential part of the successful performance of any mission. The scope of this discussion is limited to considering aircraft performance and associated planning procedures. The procedures suggested by the sample flight problem facilitate safe operation of the aircraft in all phases of the mission. A thorough knowledge of these procedures will provide quicker action in the event of an emergency and will aid in making sound decisions.

CONDITIONS - TAKEOFF - T-29/C-131	
FIELD ELEVATION	GROSS WEIGHT
RUNWAY LENGTH	WIND COMPONENT
OAT CAT °C	DEW POINT °C ° F
PRESSURE ALTITUDE	DENSITY ALTITUDE
RCR	SMOE

TAKEOFF	
MANIFOLD PRESSURE	
EXPECTED TPSI/BMEP	
MINIMUM TPSI/BMEP	
TAKEOFF FLAP SETTING	
TAKEOFF SPEED (1.2)	
CRITICAL FIELD LENGTH	
REFUSAL SPEED	
TAKEOFF GROUND RUN	
SPEED/TIME CHECK	/
DISTANCE/SPEED CHECK	/
SINGLE-ENGINE CLIMB SPEED (1.2 Clean)	
SINGLE-ENGINE ABSOLUTE CEILING (METO)	

LANDING IMMEDIATELY AFTER TAKEOFF	
APPROACH FLAPS °	APPROACH SPEED (1.3) KIAS
GO-AROUND SPEED (1.2 - Approach Flaps)	KIAS
LANDING FLAPS	°
LANDING APPROACH SPEED (1.3)	KIAS
LANDING GROUND ROLL DISTANCE	/

AFTO FORM 377 JAN 70   **T-29/C-131 TOLD CARD**

CONDITIONS - LANDING	
FIELD ELEVATION	GROSS WEIGHT
RUNWAY LENGTH	WIND COMPONENT
OAT RCR °C	DEW POINT ° F
PRESSURE ALTITUDE	DENSITY ALTITUDE

LANDING	
APPROACH FLAPS °	APPROACH SPEED (1.3) KIAS
GO-AROUND SPEED (1.2 - Approach Flaps)	KIAS
GO-AROUND SPEED (1.2 - Clean)	KIAS
LANDING FLAPS	°
LANDING APPROACH SPEED (1.3)	KIAS
LANDING GROUND ROLL/DISTANCE	

T-29 C-131 Takeoff and Landing Data (TOLD) Card

Complete the TOLD card in accordance with the following instructions.

CONDITIONS—TAKEOFF

FIELD ELEVATION. Enter the field elevation.

GROSS WEIGHT. Enter the gross weight at takeoff.

RUNWAY LENGTH. Enter the length of the runway that is available for takeoff.

HEADWIND COMPONENT. Figure 1A3-2, determine the headwind component.

OAT, CAT, DEW POINT. Obtain the outside air temperature (degrees C) and dew point (degrees F) for takeoff time. Carburetor air temperature will be outside air temperature plus one degree C.

PRESSURE ALTITUDE. Obtain the field pressure altitude for takeoff time.

DENSITY ALTITUDE. Figure 1A1-1, determine the density altitude.

TAKEOFF

MANIFOLD PRESSURE, EXPECTED TPSI, MINIMUM TPSI. Figure 1A2-1, determine the manifold pressure to be expected, the expected torque pressure, and the minimum torque pressure. Figure 1A2-2 may be used if dry data is desired.

TAKEOFF FLAP SETTING. Figure 1A3-3, enter at the desired minimum rate of climb and determine the takeoff flap setting. Utilize minimum TPSI (wet) in computations if ADI is available, or use minimum TPSI (dry) if a takeoff without ADI is planned. The approach flap setting may also be determined for landing immediately after takeoff.

TAKEOFF SPEED (1.2). Figure 1A3-7, determine the takeoff speed based on the flap setting to be used. Also determine the single-engine climb speed (clean) and the go-around speed using the 1.2 power-off stall speed line for approach flaps.

CRITICAL FIELD LENGTH. Based on the takeoff flap setting to be used (figures 1A3-8, 1A3-11, 1A3-14, and 1A3-17) determine the critical field length for a dry runway. If necessary, correct the critical field length with RCR correction determined from figure 1A3-20.

REFUSAL SPEED. Based on the takeoff flap setting to be used (figures 1A3-9, 1A3-12, 1A3-15, and 1A3-18) determine the refusal speed for a dry runway. If necessary, correct the refusal speed with the RCR correction determined from figure 1A3-20.

TAKEOFF GROUND RUN. Based on the takeoff flap setting to be used (figures 1A3-10, 1A3-13, 1A3-16, and 1A3-19) determine the takeoff ground roll.

Note

When refusal speed is greater than takeoff speed, use computed takeoff speed and distance for acceleration time/distance check.

ACCELERATION TIME/DISTANCE CHECK. Figure 1A3-6, determine the speed/time data or the distance/speed data for an acceleration check.

SINGLE-ENGINE CLIMB SPEED (1.2 CLEAN). Figure 1A3-7, determine the single-engine climb speed if not previously accomplished.

SINGLE-ENGINE ABSOLUTE CEILING (METO). Figure 1A4-5, determine the absolute ceiling with METO power operation.

LANDING IMMEDIATELY AFTER TAKEOFF

Note

The information for this section will be based on takeoff gross weight.

APPROACH FLAPS. Figure 1A3-3, determine the approach flap setting for landing if not previously accomplished. The landing flap setting may be entered in the LANDING FLAPS space at this time.

APPROACH SPEED (1.3). Figure 1A6-1, determine the 1.3 stall speed for the approach flap setting. The 1.3 stall speed for the landing flap setting may also be determined at this time and entered in LANDING APPROACH SPEED (1.3).

GO-AROUND SPEED (1.2 APPROACH). Figure 1A3-7, determine the go-around speed if not previously accomplished.

LANDING FLAPS. Landing flaps are generally based on the amount of approach flaps used. Consult figures 1A6-2 through 1A6-6 for normal flap pairings.

LANDING APPROACH SPEED (1.3). Figure 1A6-1, determine the approach speed for the landing flap setting if not previously accomplished.

LANDING GROUND ROLL/DISTANCE. Based on the landing flap setting to be used (figures 1A6-2 through 1A6-6) determine the landing ground roll. Determine the landing distance (landing over a 50-foot obstacle). If applicable, correct the ground roll or the ground roll portion of the landing distance over a 50-foot obstacle by applying the RCR stopping factor determined from figure 1A6-7.

CONDITIONS—LANDING AND LANDING

Note

The landing portion of the card may be completed prior to takeoff if weather at destination is available. All items in this section will be completed as previously discussed for like entries.

Sample Flight Problem

To illustrate the use of the charts in this Appendix, a sample flight problem is presented and solved in the following paragraphs.

Note

This example presents a transport mission. Refer to MISSION PLAN- NING, Appendix II, for a radius navigational training mission sample problem.

Weather, Field and Trip Information

Field elevation pressure altitude	5000 ft
Outside air temperature	10°C
Dew point	35°F
Headwind	10 knots
Runway length	7500 ft
Runway slope	1% up
Airplane operating weight	29,858 lb
Trip length	720 n mi

Weather and Field Information at Destination

Field elevation pressure altitude	1250 ft
Outside air temperature	20°C
Dew point	50°F
Headwind	15 knots
Runway length	8100 ft

Determine Density Altitude

Using: (Density Altitude Chart, figure 1A1-1)

Enter chart at OAT	10°C
Proceed vertically to pressure altitude line	5000 ft
Proceed horizontally to density altitude scale	
Read density altitude	5600 ft

Determine Cruise Weight Due to Terrain

The range charts and the climb charts are used to determine the fuel required for the mission. For the purpose of this sample problem a minimum enroute altitude of 10,000 feet will be used. This altitude will allow for a vertical terrain clearance of at least 2000 feet at any point along the flight path.

Using: (Ceiling—One Engine Inoperative Chart, figure 1A4-5)

Enter chart on altitude base line at	10,000 ft
Proceed horizontally to intercep- tion of Meto power curve at absolute ceiling, then proceed vertically to gross weight scale and read gross weight	38,900 lb

Note

It is important to remember that this weight is the weight of the airplane at start of cruise at 10,000 feet. To this weight will be added the neces- sary fuel weight for the climb to the cruise altitude.

Determine Takeoff Weight

Note

The airplane's lift and drag depend primarily upon the density of the air, while the engine power depends upon the pressure of the air, until full throttle is reached. To determine the climb performance under non- standard conditions, one must de- termine the fuel, distance and time to climb using density altitudes and obtain the standard power for that altitude by adjusting the manifold pressures as required.

Using: (Operational Climb—Distance and Fuel, figure 1A4-2)

Note airspeed (IAS)	140 knots
Enter chart at gross weight of	38,900 lb
Proceed vertically to density altitude curve	10,000 ft
Read horizontally to distance	31 n mi
Parallel guide line to fuel con- sumed in climb scale and read	360 lb
Parallel guide lines to density altitude at start of climb	5600 ft
Read: Distance	15 n mi
Fuel	175 lb

Subtract start-of-climb values from end-of-climb values to determine:

Distance in climb	16 n mi
Fuel consumed in climb	185 lb

Add fuel consumed in climb to
weight at end of climb to
determine:

Takeoff weight	39, 085 lb

Note

This weight represents maximum take-
off weight for safe single-engine oper-
ation for enroute terrain clearance.

Determine Ramp Weight

Ramp weight represents a weight greater than max-
imum takeoff weight. The difference is the fuel that
is used for starting, runup, taxiing, and takeoff.
Allow 300 pounds of fuel for initial starting, runup,
taxiing, and takeoff, and 150 pounds for thru-flight
enroute stops. These figures are based on opera-
tional experience.

Using: Initial starting, runup, taxiing,

and takeoff fuel	300 lb
Takeoff gross weight	39, 085 lb
Ramp weight	39, 385 lb

Note

Due to the many and varied operational
requirements, these figures may not
meet all situations. Therefore, it may
be necessary to modify these standard
fuel allowances.

Determine Fuel Used in Cruise

Using: (Long Range Prediction—Distance,
figure 1A5-7)

Enter chart at weight at start of cruise	38, 900 lb
Proceed vertically to density altitude line	10, 000 ft
Read distance at start	2900 n mi
Add required cruise distance (720 n mi trip minus 16 n mi used to climb leaves 704 n mi in cruise), find distance index at end of cruise	3604 n mi
Proceed horizontally to density altitude lines	10, 000 ft
Read weight at end of cruise	35, 900 lb
Subtract weight at end of cruise from weight at start of cruise to find approximate fuel used in 704 n mi cruise (38, 900 - 35, 900)	3000 lb

Determine Reserve Fuel Allowance

The reserve fuel allowance should include fuel for
holding at destination and the possibility of being
diverted to an alternate base, and some additional
fuel for contingencies. For the purpose of this
example the reserve fuel allowance is that required
for 30 minutes holding at airspeeds for long range
at sea level and 5% of trip fuel for contingencies.

Using: (Nautical Miles per Pound of Fuel—Sea
Level, figure 1A5-1)

Enter chart with weight at end of cruise	35, 900 lb
Follow weight line to intersec-tion of long range line, then proceed horizontally to air nautical miles per pound of fuel and read	0.238 n mi/lb
Proceed vertically to true air-speed	157 knots
Divide airspeed by n mi/lb (157 ÷ 0.238)	660 lb/hr
Allowance for 30 minutes holding (660 X 0.5)	330 lb
Contingency reserve (3185 X 0.05)	159 lb
Total reserve fuel	489 lb

Determine Payload

Ramp weight	39, 536 lb
Airplane operating weight	29, 858 lb
Total fuel load	4125 lb
Zero fuel weight (39, 536 - 4125)	35, 411 lb
Allowable payload (35, 411 - 29, 858)	5553 lb

TAKEOFF
Determine the Minimum Performance Torque Pressure

Note

If the actual carburetor temperature rise
of the airplane is unknown, use OAT plus
1°C; it is sufficiently accurate for pre-
flight planning. A correction should be
made when the actual CAT is known.

Using: (Maximum Wet Power Available,
figure 1A2-1)

Enter chart with airplane pressure altitude	5000 ft
Proceed vertically to CAT	11°C
Read MAP	46. 5 in. Hg

Proceed horizontally to base line
of dew point chart, then parallel
the guide line to dew point cor-
rected for altitude   35 °F

Then, proceed horizontallaly to
read:

    Expected TPSI   103.5 psi

    Minimum Performance TPSI   98.5 psi

Also Note:

    Brake horsepower   1830 bhp

    Engine speed   2800 rpm

    Blower speed   LOW

    Water injection   ON

    Mixture position   AUTO RICH

In preflight planning, do not exceed the minimum
performance TPSI limit shown. In operation, do not
exceed the TPSI limit of 135 psi with wet power or
118 psi with dry power. In the event that minimum
performance TPSI is unobtainable before reaching
refusal speed, the takeoff should be aborted.

Determine the Maximum Allowable Takeoff Flap Setting

For the purpose of this sample problem the desired
minimum initial rate of climb is considered to be
150 fpm.

Using: (Takeoff Gross Weight Limited by Climb,
        figure 1A3-3)

    Enter lower left-hand portion of
    chart with density altitude   5600 ft

    Proceed horizontally to desired
    minimum initial rate of climb   150 fpm

    Parallel guide lines to base line
    at sea level density altitude,
    then proceed vertically to mini-
    mum performance torque
    pressure   98.5 psi

    Parallel guide lines to base line
    at 141 psi then proceed verti-
    cally to takeoff weight   39,085 lb

    Read takeoff flap setting   0 °

Note

● For practical operation, limit the final
selection of takeoff flap setting to either
12°, 6°, or 0°. Intermediate positions
should be used only when one of these
flap settings will not provide the re-
quired initial rate of climb and runway
length combination.

● If the takeoff flap setting should come
out as less than zero, with the par-
ticular takeoff atmospheric conditions
available, off-load as necessary to
reduce the takeoff weight to that which
allows the desired initial rate of climb.
Or, if under similar conditions the
takeoff weight cannot be reduced, work
backward from the weight and minimum
flap setting to determine the expected
initial rate of climb and thereby judge
the desirability of taking off.

Determine Takeoff Speed

Using: (Takeoff and Minimum Control Speeds,
        figure 1A3-7)

    Enter chart at gross weight   39,085 lb

    Proceed vertically to 0° flap
    curve, then proceed horizontally
    to IAS scale and read   119 knots

Determine Critical Field Length

Using: (Critical Field Length, 0° Flap, figure
        1A3-17 and Effect of Runway Conditions,
        figure 1A3-20)

    Enter chart with density
    altitude   5600 ft

    Parallel guide lines to minimum
    performance torque pressure   98.5 psi

    Proceed horizontally to takeoff
    weight   39,085 lb

    Proceed vertically to zero run-
    way slope parallel guide lines
    to actual runway slope   1% up

    Proceed vertically to base line
    at zero headwind, parallel guide
    lines to reported headwind   10 knots ▌

    Proceed vertically to Critical
    Field Length (dry, hard surface
    runway)   6300 ft ▌

Note

This field length is that required to
accelerate to the critical engine
failure speed, two engines operating,
have an engine fail, propeller auto-
feather and either (a) proceed to
takeoff or (b) stop. Since the critical
field length (dry, hard surface run-
way) is less than that available, a
safe takeoff is possible. For unusual
runway conditions, proceed as follows:

    Enter Effects of Runway Surface
    Condition Chart (figure 1A3-20)
    with RCR obtained from base
    weather   12

Proceed horizontally to takeoff
weight on critical field length
portion of chart — 39,085 lb

Proceed vertically to KCFL
factor — 1.25

Corrected critical field length =
KCFL X critical field length
from figure 1A3-17 — 7875 ft

Note

Since the corrected critical field length
is more than that available, a safe take-
off is not possible for an RCR of 12.

Determine Refusal Speed

Using: (Refusal Speed, 0° Flap, figure 1A3-18)

Enter chart with available run-
way length — 7500 ft

Proceed horizontally to reported
headwind — 10 knots

Parallel guide line to base line,
then proceed horizontally to
torque pressure — 98.5 psi

Parallel guide line to base line,
then proceed horizontally to
density altitude — 560C ft

Parallel guide line to base line,
then proceed horizontally to
intersection of vertical line
from gross weight — 39,085 lb

Refusal speed (IAS) (dry, hard
surface runway) — 115 knots

Note

If the refusal speed should be greater
than the takeoff speed and since re-
fusal speed is limited to takeoff speed,
then only takeoff speed would need to
be monitored. To correct refusal
speed for unusual runway conditions
proceed as follows:

Enter Effects of Runway Conditions
Chart (figure 1A3-20) with RCR
obtained from base weather — 12

Proceed horizontally to takeoff
weight on refusal speed portion
of chart — 39,085 lb

Proceed vertically to KRS factor — .933

Corrected refusal speed =
KRS X refusal speed from
figure 1A3-18 — 107 knots

Determine Takeoff Ground Run

Using: (Takeoff Ground Run-0° Flap,
figure 1A3-19)

Enter chart with density
altitude — 5600 ft

Parallel guide lines to minimum
performance torque pressure — 98.5 psi

Proceed horizontally to takeoff
weight — 39,085 lb

Proceed vertically to base line
at zero runway slope, then
parallel guide lines to actual
runway slope — 1% up

Proceed vertically to base line
at zero headwind, then parallel
guide lines to reported head-
wind — 10 knots

Proceed vertically to ground
run distance — 3600 ft

**Determine Acceleration Check
Speed/Distance/Time**

Using: (Velocity During Takeoff Ground Run,
figure 1A3-6)

Enter chart with 100% wind
takeoff ground run — 3600 ft

And takeoff speed corrected
for wind (119 - 10) — 109 knots

Draw acceleration curve
through the point of intersec-
tion and parallel to the guide
lines

Re-enter the chart at refusal
speed corrected for wind. (If
unusual runway conditions exist
enter at RCR corrected refusal
speed corrected for wind.)
(115 - 10) — 105 knots

Proceed vertically to new
acceleration check curve and
then horizontally to refusal
distance — 3250 ft

Re-enter chart at 1000 ft marker
from 500 ft to 1500 ft before
refusal distance — 2000 ft

Proceed horizontally to new
acceleration check curve and
read sea level acceleration
time — 29 seconds

Proceed vertically to IAS scale
and read uncorrected acceler-
ation speed — 88 knots

Correct acceleration speed by
adding wind (88 + 10)   98 knots

Find acceleration time for
5600 ft density altitude
$(29 \div 1/\sqrt{\sigma}\,)$ 27 seconds

Find acceleration check time at
an even 10 knot increment from
5 to 15 knots below refusal speed

Determine desired check speed
(115 - 5) IAS   110 knots

Correct check speed for wind
(110 - 10)   100 knots

Enter chart at 100 on IAS
scale and proceed vertically
to new acceleration curve
and read acceleration time   34 seconds

Summary of Preflight Takeoff Data

Engine speed   2800 rpm

MAP   46.5 in. Hg

Minimum Performance TPSI   98.5 psi

Blower speed   LOW

Mixture position   AUTO RICH

Flap setting   0°

Takeoff speed (IAS)   119 knots

Acceleration check
distance/speed   2000 ft/98 knots

Acceleration check
speed/time   110 knots/34 seconds

Takeoff ground run   3600 ft

CLIMB
Determine Power Settings at Start of Climb

Using: (Climb Power Schedule—1400 BHP/
2400 RPM, figure 1A2-5)

Enter table with pressure
altitude   5000 ft

Proceed horizontally to CAT 10°C
for MAP of   37.4 in. Hg

Blower   LOW

Engine speed   2400 rpm

Torque pressure   92 psi

Also note:

Mixture   AUTO RICH

Determine Power Settings at End of Climb

Using: (Climb Power Schedule—1400 BHP, 2400
RPM, figure 1A2-5)

Re-enter table with pressure
altitude   10,000 ft

Proceed horizontally to CAT   0°C

Read MAP   40.3 in. Hg

Blower   HIGH

Engine speed   2400 rpm

Torque pressure   92 psi

Also note:

Mixture   AUTO RICH

CRUISE
Determine Airspeed and Power Settings for Cruise

Using: (Nautical Miles per Pound of Fuel—
10,000 Feet, figure 1A5-3)

Enter at weight at start of
cruise   38,900 lb

Follow weight line to inter-
section of long-range line
and read BHP at start of
cruise   950 bhp

Proceed vertically to calibrated
airspeed   154 knots

Re-enter at weight at end of
cruise   35,900 lb

Follow weight line to inter-
section of long-range line
and read BHP at end of
cruise   900 bhp

Proceed vertically to calibrated
airspeed   152 knots

Using: (Power Schedule—950 BHP, figure 1A2-14)

Enter table at pressure
altitude   10,000 ft

Proceed horizontally to CAT   0°C

Read MAP   30.3 in. Hg

Blower   LOW

Engine speed   2000 rpm

TPSI   75 psi

Also note:

Mixture	AUTO LEAN

Using: (Power Schedule-900 BHP, figure 1A2-13)

Enter table with pressure altitude	10,000 ft
Proceed horizontally to CAT	0°C
Read MAP	29.1 in. Hg
Blower	LOW
Engine speed	2000 rpm
TPSI	71 psi

LANDING

Landing Conditions

Field elevation pressure altitude	1250 ft
Outside air temperature	20°C
Dew point	50°F
Headwind	15 knots
Runway length	8100 ft
Landing weight (takeoff weight less fuel for mission, except total reserve)(39,085 - 3185)	35,900 lb

Determine Power Settings for Emergency Go-Around (if Necessary)

Using: (Maximum Wet Power Available, figure 1A2-1)

Enter chart with pressure altitude	1250 ft
Proceed vertically to CAT	20°C
Read MAP	52.5 in. Hg
Proceed horizontally to dew point chart base line then parallel guide line to reported dew point corrected for altitude	50°F
Then horizontally to minimum performance TPSI	112 psi

Also note:

Engine speed	2800 rpm
Blower speed	LOW
Mixture position	AUTO RICH

Determine Density Altitude at Destination

Using: (Density Altitude Chart, figure 1A1-1)

Density altitude	2200 ft

Determine the Approach and Landing Flap Positions

Note

Each approach flap setting has a corresponding landing flap setting. The approach flap setting is felt to be the more important of the two based on the possibility of a single-engine go-around.

Using: (Takeoff Gross Weight Limited by Climb, figure 1A3-3)

Use same procedure as that outlined in determining maximum allowable takeoff flap setting with 150 fpm desired rate of climb. Final selection of approach flap setting	20°

Determine Approach and Go-Around Speeds

Using: (Approach and Landing Speed Chart, figure 1A6-1)

Enter chart with gross weight	35,900 lb
Proceed vertically to approach flap line	20°
Proceed horizontally to approach speed line (1.3 stall) then vertically to read approach speed (IAS)	108 knots
Repeat procedure for 39° flap to find approach speed (IAS)	100 knots
and landing speed (1.2 stall)	93 knots

Using: (Takeoff and Minimum Control Speeds, figure 1A3-7)

Enter chart with gross weight	35,900 lb
Proceed vertically to 1.2 stall line for approach flaps and then horizontally to read climb speed for go-around (IAS)	102 knots

Determine Landing Ground Roll

Using: (Landing Ground Roll-39° Flap, figure 1A6-2 and Stopping Capability, figure 1A6-7)

Enter chart with density altitude	2200 ft
Proceed horizontally to gross weight curve	35,900 lb

Proceed vertically to base line at 0 headwind and parallel guide lines to reported headwind — 15 knots

Proceed vertically to landing ground roll (dry, hard surface runway) — 2250 ft

Landing distance from 50 ft altitude — 2750 ft

To correct landing ground roll for unusual runway conditions, enter the Stopping Capability Chart (figure 1A6-7) with RCR (obtained from base weather) — 12

Proceed horizontally to curve then vertically to obtain stopping factor — 1.38

Corrected landing ground roll = stopping factor X landing ground roll from figure 1A6-12 — 3105

Summary of Approach and Landing Data

Engine speed	2800 rpm
Minimum performance TPSI	112 psi
MAP	52.5 in. Hg
Blower speed	LOW
Mixture position	AUTO RICH
Approach flap setting	20°
Approach speed (IAS)	108 knots
Landing flap setting	39°
Approach speed (IAS)	100 knots
Go-around speed with approach flaps (IAS)	102 knots

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PERFORMANCE DATA
appendix II

TABLE OF CONTENTS

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PART 1 — INTRODUCTION

Ⓒ Ⓓ

TABLE OF CONTENTS

The symbol * indicates an illustration

SCOPE AND ARRANGEMENT

The charts contained in this Appendix present the performance of the Ⓒ and Ⓓ airplanes in a graphical form. They are based on ICAO standard atmospheric conditions; however, nomograms are provided to allow corrections for non-standard conditions as necessary. The charts are arranged in a logical sequence in seven basic divisions for planning general phases of each flight.

PART 1 — INTRODUCTION

PART 2 — ENGINE DATA

PART 3 — TAKEOFF

PART 4 — CLIMB

PART 5 — CRUISE

PART 6 — APPROACH AND LANDING

PART 7 — MISSION PLANNING

Descriptive text in each part discusses and explains the use of the charts provided. A sample problem at the end of the Appendix shows how the individual performance charts for each phase of a flight can be combined for flight planning purposes.

GLOSSARY OF TERMS AND ABBREVIATIONS

ABSOLUTE CEILING — Maximum altitude at which level flight can be maintained with zero feet per minute rate of climb.

ACCELERATION CHECK SPEED, TIME/ DISTANCE — A means of checking airplane acceleration during takeoff roll using time or distance. The acceleration time check provides the most accurate check of acceleration. With this method, an even 10 knot increment not less than 5 and not more than 15 knots below refusal speed will normally be used as an acceleration check speed. As a secondary procedure, on marked runways the acceleration check may be made at a distance marker. For this method, the acceleration check point will normally be the first 1000 foot marker at least 500 feet but no more than 1500 feet prior to the refusal distance.

AIRSPEED

IAS — Indicated airspeed; observed airspeed corrected for instrument error.

CAS — Calibrated airspeed: IAS corrected for installation error in the pitot system.

EAS — Equivalent airspeed; CAS corrected for compressibility error. For all practical purposes at altitudes below 15,000 feet, the compressibility factor is negligible for this airplane.

TAS — True airspeed; EAS corrected for relative density.

$$TAS = EAS \times \frac{1}{\sqrt{\sigma}}$$

'EST CLIMB SPEED — The airspeed which results in the best angle of climb (climb gradient). Except when minimum control speed is involved, the best climb speed for obstacle clearance is 1.2 stall speed for the gross weight and wing flap setting.

BHP — Brake horsepower.

CAT — Carburetor air temperature.

CRITICAL ALTITUDE — The altitude at which full throttle is required to maintain a given BHP at a set RPM.

CRITICAL ENGINE FAILURE SPEED (Vcrit) — The speed at which failure of one engine permits acceleration to takeoff in the same distance that the airplane may be decelerated to a stop using brakes only.

CRITICAL FIELD LENGTH — The total length of runway required to accelerate on all engines to the critical engine failure speed, lose one engine, and then continue takeoff, or stop.

CRUISE CEILING — Maximum altitude at which a rate of climb of 300 feet per minute can be maintained with METO power.

DENSITY ALTITUDE — Pressure altitude corrected for temperature. When conditions are standard, pressure altitude and density altitude are the same. Consequently, if the temperature is above standard, the density altitude will be higher than the pressure altitude. If the temperature is below standard, the density altitude will be lower than the pressure altitude.

DEWPOINT — The temperature at which, under ordinary conditions, condensation begins in a cooling mass of air. The temperature is used as the basis for calculating the effect produced by humidity on the power output of the engines.

EXPECTED TORQUE PRESSURE — The torque pressure which the engine may be expected to develop when the effects of altitude and atmospheric conditions are considered.

LANDING GROUND ROLL — Distance from touchdown to complete stop, utilizing brakes only, on a dry hard surface with propellers windmilling.

MAP — Engine absolute manifold pressure (in. Hg).

MAXIMUM DRY POWER — The maximum power permissible from the engine when the water injection system is not used; limited to five minutes.

MAXIMUM WET POWER — The maximum power permissible from the engine utilizing the water injection system; limited to five minutes.

METO (MAXIMUM EXCEPT TAKEOFF) POWER — The maximum power at which the engine can be operated continuously without damage.

MILITARY POWER — The same as maximum dry power except that the time limit is 30 minutes. An airplane engine can actually be run continuously under overload conditions of power and speed for much longer periods than those permitted by the ratings. However, the period of reliable operation is thereby reduced to an impractically short time. By imposing a time limit on maximum and military power ratings, the cumulative effect of the overloads is distributed evenly over the period between overhauls and the useful life of the engine accordingly lengthened. When use of military power is absolutely required for longer than 30 minutes, a notation must be made on Form 781.

MINIMUM CONTROL SPEED (V_{mc}) — Speed required to provide sufficient control to enable the airplane to fly a straight flight path over the ground with takeoff configuration, one engine windmilling, maximum power on other engine and no more than 5° bank angle away from the failed engine.

MINIMUM PERFORMANCE TORQUE PRESSURE — 95% of expected torque pressure.

MINIMUM SAFE SINGLE-ENGINE SPEED — Speed that will permit the airplane to maintain a minimum 100 fpm rate of climb in clean configuration (sea level, standard atmosphere) with the propeller on the inoperative engine feathered and maximum power on the operating engine.

OAT (FAT) — Outside or free air temperature; denoted as runway air temperature when observed at the runway.

PRESSURE ALTITUDE — The height or vertical distance from the standard datum plane. This is a theoretical plane where air pressure is equal to 29.92 in. Hg. at 15°C (59°F).

REFUSAL SPEED V_R — The maximum speed to which the airplane can be accelerated and still be stopped on the remaining runway using brakes only.

RUNWAY HEADWIND COMPONENT — Resultant headwind parallel to runway, as a result of wind direction and velocity.

SIGMA (σ) = Density ratio ($\rho/\rho o$). The ratio between ambient density and standard sea level density. $\frac{1}{\sqrt{\sigma}}$ is the correction factor for air density applied to EAS to obtain TAS. Sigma is commonly known as "smoe".

SERVICE CEILING — Maximum altitude at which a rate of climb of 100 feet per minute can be maintained.

STALL SPEED (V_s) — Speed at which the airplane starts to drop because of separation of airflow over the wings due to insufficient airspeed or excessive angle of attack.

STANDARD ATMOSPHERE — An arbitrary variation of air density, pressure, and temperature with altitude used for comparing engine and airplane performance. Standard air at sea level is represented by a barometric pressure of 29.92 in. Hg at 59°F (15°C) and zero humidity.

TAKEOFF DISTANCE — Distance from start of takeoff to takeoff speed with both engines operating.

TAKEOFF SPEED — Speed at which main wheels leave the ground. ($1.2V_s$).

TORQUE PRESSURE (TPSI) — An indication of power being delivered to the propeller shaft by the engine.

WIND ACCOUNTABILITY — The wind correction nomograms on the carts are calculated on the basis of 100% wind accountability.

DISCUSSION OF STANDARD CHARTS

The standard charts (figures 2A1-1 through 2A1-7) are provided for ready reference in determining standard and non-standard atmospheric conditions, and in determining compressibility and position error corrections to airspeed readings. For all normal flight planning compressibility effect on airspeed and altitude indication is negligible. Nevertheless, the airplane commander should study the standard charts and their limitations and be ready to apply them as necessary to satisfy any specific detail problem.

DENSITY ALTITUDE CHART

Density altitude may be found from this chart (figure 2A1-1), for a given temperature and pressure altitude condition.

EXAMPLE

    a.   Outside air temperature = 25°C.

    b.   Pressure altitude = 3500 feet.

    c. $\dfrac{1}{\sqrt{\sigma}}$ = 1.083.

    d.   Density altitude = 5400 feet.

This chart also provided a $\dfrac{1}{\sqrt{\sigma}}$ value necessary to change equivalent airspeed to true airspeed. Enter the chart with the given temperature condition, proceed vertically to the pressure altitude, and read horizontally to the right to obtain the $\dfrac{1}{\sqrt{\sigma}}$ value.
True airspeed (TAS) may then be obtained from

equivalent airspeed (EAS) by multiplying the given EAS by the $\dfrac{1}{\sqrt{\sigma}}$ value.

DENSITY ALTITUDE VERSUS $\dfrac{1}{\sqrt{\sigma}}$

This chart (figure 2A1-2) gives values of $\dfrac{1}{\sqrt{\sigma}}$ accurately for every 100-foot increment in density altitude.

STANDARD ALTITUDE TABLE

A Standard Altitude Table (figure 2A1-3) shows standard atmospheric values as defined by ICAO. The standard atmosphere defined by ICAO represents an approximation to the average atmosphere of the world. The ICAO assumes a temperature of 15°C (59°F) and a pressure of 29.92 in. Hg. for sea level conditions. The temperature variation with height is approximately uniform from 15°C (59°F) at sea level to -56.5°C (-69.7°F) at 36,089 feet. This altitude is assumed to be the beginning of the isothermal region or stratosphere. For all practical purposes the temperature will remain constant as altitude is increased above 36,089 feet. The corresponding pressures and densities are shown on the Standard Altitude Table. ICAO standard atmosphere values have been used in preparation of all performance charts in this Appendix. Data for nonstandard conditions are shown as variations from the ICAO standard atmosphere.

PRESSURE ALTITUDE TABLE

The Pressure Altitude Table (figure 2A1-4) provides the necessary corrections to field elevation to obtain pressure altitude from the altimeter setting. To determine pressure altitude, find the altitude correction (Δ ALT) for the given altimeter setting. Add this correction algebraically to the field elevation to obtain pressure altitude.

TEMPERATURE CONVERSION CHART

The Temperature Conversion Chart (figure 2A1-5) is presented in degrees centigrade versus degrees Fahrenheit to facilitate the conversion of given temperatures as desired.

AIRSPEED CALIBRATION

Airspeed Calibration (figure 2A1-6) for the airspeed system shows indicated airspeed versus calibrated airspeed to account for the location of the static pressure pickup. The effects of airplane attitude are negligible to the position error in terms of wing flap setting, landing gear position, and gross weight.

AIRSPEED COMPRESSIBILITY CORRECTION CHART

This chart (figure 2A1-7) presents calibrated airspeed versus equivalent airspeed to account for the compressibility of the atmosphere.

ALTIMETER POSITION ERROR CORRECTION

Altimeter errors due to static port location are negligible and no correction is necessary.
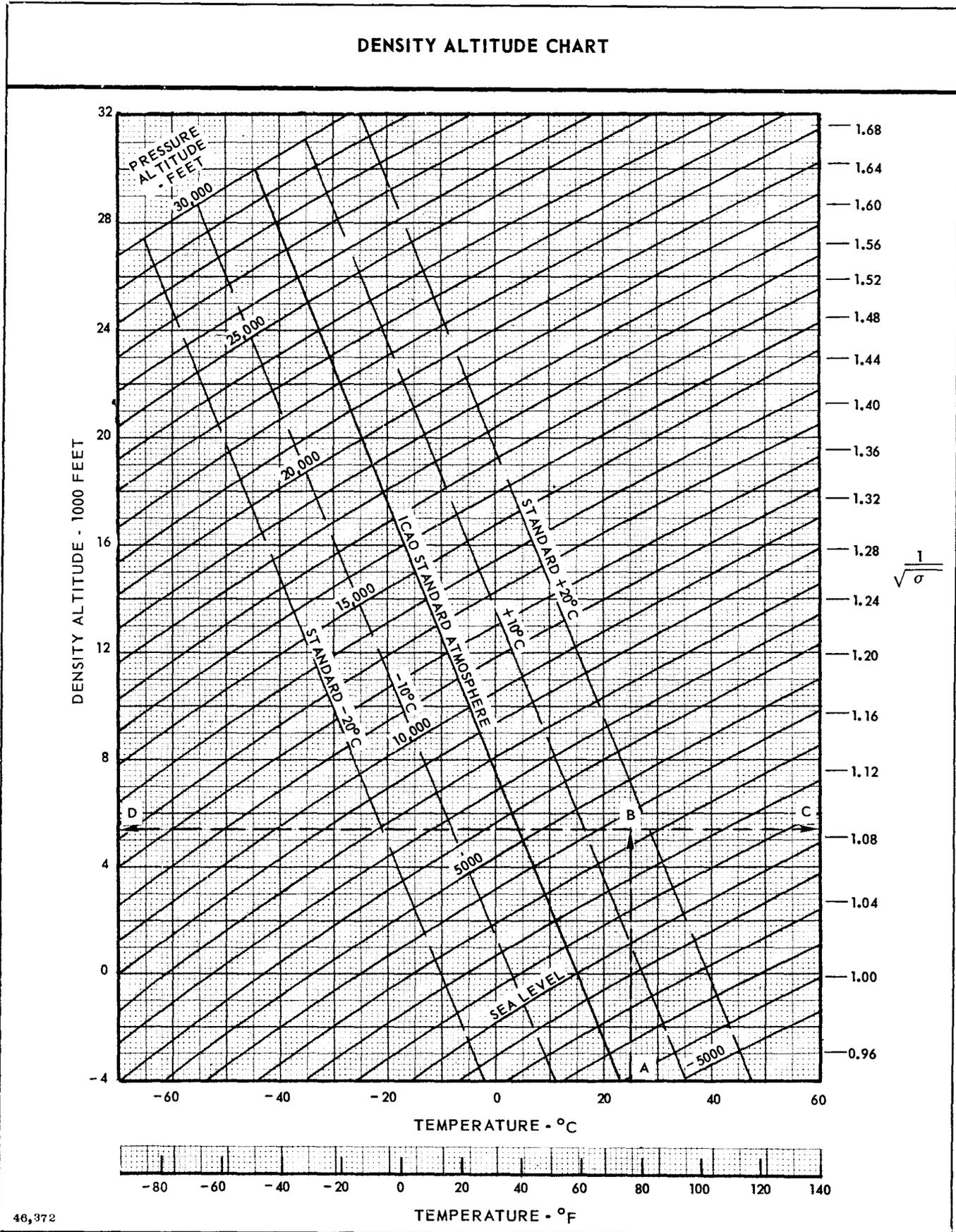
DENSITY ALTITUDE CHART

Figure 2A1-1

DENSITY ALTITUDE VS $\frac{1}{\sqrt{\sigma}}$

TRUE AIRSPEED = EQUIVALENT AIRSPEED $\times \frac{1}{\sqrt{\sigma}}$

DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$
100	1.0014	3300	1.0501	6500	1.1023	9700	1.1582	12900	1.2186	16100	1.2837	19300	1.3541	22400	1.4277
200	1.0029	3400	1.0516	6600	1.1039	9800	1.1600	13000	1.2206	16200	1.2858	19400	1.3564	22500	1.4302
300	1.0044	3500	1.0531	6700	1.1056	9900	1.1618	13100	1.2225	16300	1.2879	19500	1.3587	22600	1.4327
400	1.0059	3600	1.0548	6800	1.1073	10000	1.1637	13200	1.2245	16400	1.2901	19600	1.3609	22700	1.4351
500	1.0074	3700	1.0563	6900	1.1090	10100	1.1655	13300	1.2265	16500	1.2922	19700	1.3632	22800	1.4376
600	1.0088	3800	1.0579	7000	1.1107	10200	1.1674	13400	1.2285	16600	1.2943	19800	1.3655	22900	1.4401
700	1.0103	3900	1.0595	7100	1.1124	10300	1.1692	13500	1.2305	16700	1.2965	19900	1.3678	23000	1.4426
800	1.0118	4000	1.0611	7200	1.1141	10400	1.1711	13600	1.2324	16800	1.2986	20000	1.3701	23100	1.4451
900	1.0133	4100	1.0627	7300	1.1158	10500	1.1729	13700	1.2337	16900	1.3007	20100	1.3724	23200	1.4477
1000	1.0148	4200	1.0643	7400	1.1176	10600	1.1748	13800	1.2364	17000	1.3029	20200	1.3748	23300	1.4502
1100	1.0163	4300	1.0659	7500	1.1193	10700	1.1766	13900	1.2385	17100	1.3050	20300	1.3771	23400	1.4528
1200	1.0178	4400	1.0675	7600	1.1210	10800	1.1785	14000	1.2404	17200	1.3072	20400	1.3795	23500	1.4553
1300	1.0193	4500	1.0692	7700	1.1228	10900	1.1803	14100	1.2424	17300	1.3094	20500	1.3819	23600	1.4579
1400	1.0208	4600	1.0707	7800	1.1245	11000	1.1822	14200	1.2444	17400	1.3116	20600	1.3842	23700	1.4604
1500	1.0223	4700	1.0724	7900	1.1262	11100	1.1841	14300	1.2465	17500	1.3138	20700	1.3866	23800	1.4630
1600	1.0238	4800	1.0704	8000	1.1280	11200	1.1860	14400	1.2485	17600	1.3159	20800	1.3889	23900	1.4656
1700	1.0253	4900	1.0756	8100	1.1297	11300	1.1879	14500	1.2506	17700	1.3181	20900	1.3913	24000	1.4681
1800	1.0268	5000	1.0773	8200	1.1315	11400	1.1893	14600	1.2526	17800	1.3203	21000	1.3937	24100	1.4706
1900	1.0283	5100	1.0789	8300	1.1332	11500	1.1917	14700	1.2546	17900	1.3225	21100	1.3961	24200	1.4732
2000	1.0299	5200	1.0806	8400	1.1350	11600	1.1926	14800	1.2567	18000	1.3247	21200	1.3985	24300	1.4758
2100	1.0314	5300	1.0822	8500	1.1368	11700	1.1955	14900	1.2587	18100	1.3267	21300	1.4009	24400	1.4784
2200	1.0329	5400	1.0839	8600	1.1385	11800	1.1974	15000	1.2608	18200	1.3292	21400	1.4033	24500	1.4810
2300	1.0344	5500	1.0855	8700	1.1403	11900	1.1993	15100	1.2628	18300	1.3314	21500	1.4068	24600	1.4836
2400	1.0360	5600	1.0872	8800	1.1420	12000	1.2012	15200	1.2649	18400	1.3337	21600	1.4082	24700	1.4862
2500	1.0375	5700	1.0888	8900	1.1438	12100	1.2031	15300	1.2670	18500	1.3360	21700	1.4106	24800	1.4888
2600	1.0390	5800	1.0905	9000	1.1456	12200	1.2050	15400	1.2691	18600	1.3382	21800	1.4130	24900	1.4914
2700	1.0406	5900	1.0921	9100	1.1474	12300	1.2070	15500	1.2712	18700	1.3405	21900	1.4154	25000	1.4940
2800	1.0421	6000	1.0936	9200	1.1492	12400	1.2089	15600	1.2732	18800	1.3427	22000	1.4179		
2900	1.0436	6100	1.0954	9300	1.1510	12500	1.2109	15700	1.2753	18900	1.3450	22100	1.4203		
3000	1.0454	6200	1.0971	9400	1.1528	12600	1.2128	15800	1.2774	19000	1.3473	22200	1.4228		
3100	1.0469	6300	1.0988	9500	1.1546	12700	1.2147	15900	1.2795	19100	1.3493	22300	1.4253		
3200	1.0485	6400	1.1005	9600	1.1564	12800	1.2167	16000	1.2816	19200	1.3518				

46,256

Figure 2A1-2

Standard Altitude Table

Standard Sea Level Air:
T = 15° C.   W = .07651 lb/cu. ft. ρ_o = .002378 slugs/cu. ft.
P = 29.921 in. of Hg.   1" of Hg. = 70.732 lb/sq. ft. = 0.4912 lb/sq. in.
                                This table is based on NACA Technical Report No. 218 a_o - 1116 ft./sec.

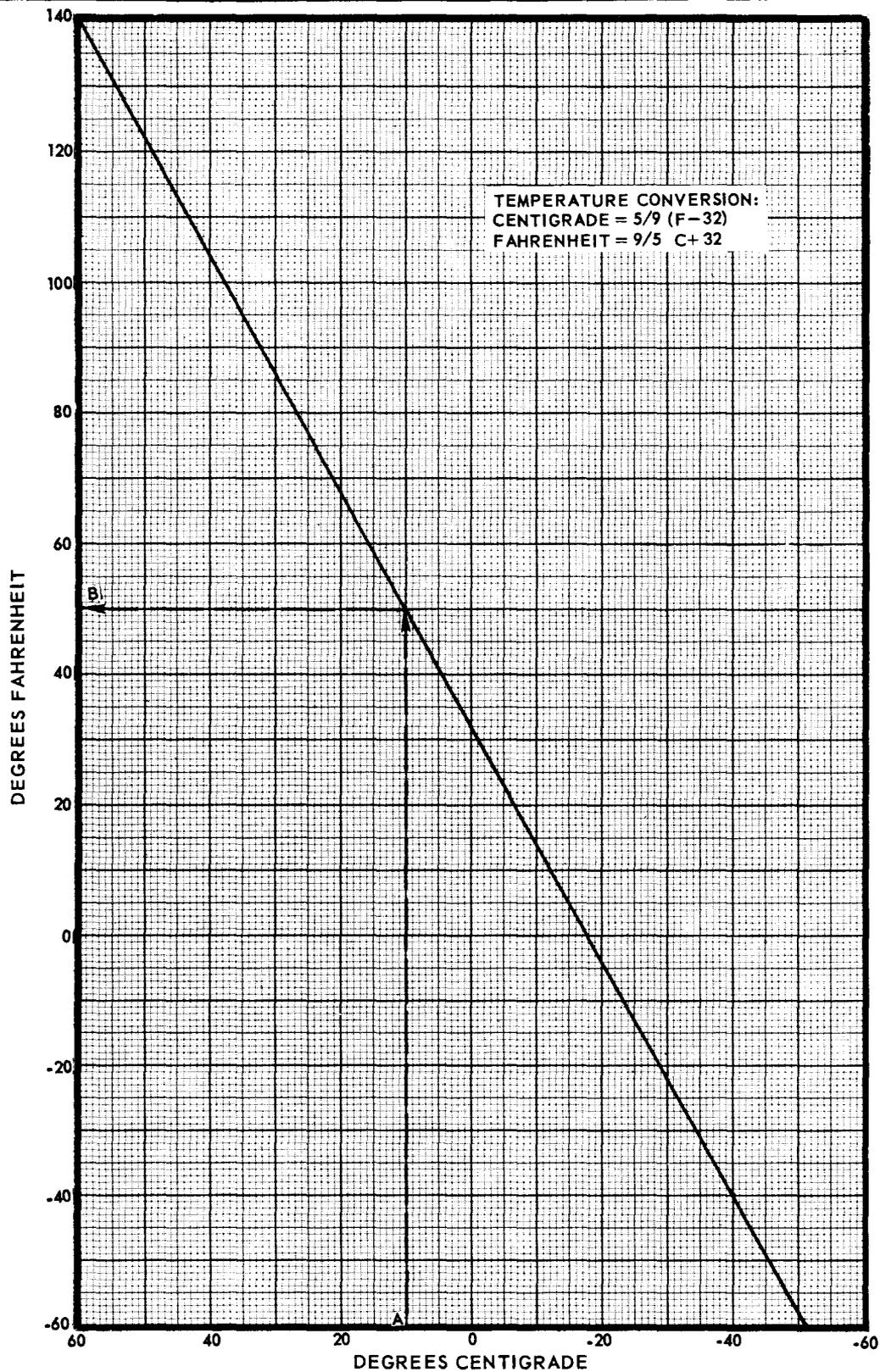| Altitude feet	Density Ratio ρ/ρ_o	$\frac{1}{\sqrt{\sigma}}$	Temperature Deg. C	Temperature Deg. F	Speed of Sound Ratio a/a_o	Pressure In. of Hg.	Pressure Ratio P/Po
0	1.0000	1.0000	15.000	59.000	1.0000	29.92	1.0000
1000	.9710	1.0148	13.019	55.434	.997	28.86	.9644
2000	.9428	1.0299	11.038	51.868	.993	27.82	.9298
3000	.9151	1.0454	9.056	48.301	.990	26.81	.8962
4000	.8881	1.0611	7.075	44.735	.986	25.84	.8636
5000	.8616	1.0773	5.094	41.169	.983	24.89	.8320
6000	.8358	1.0938	3.113	37.603	.979	23.98	.8013
7000	.8106	1.1107	1.132	34.037	.976	23.09	.7716
8000	.7859	1.1280	-0.850	30.471	.972	22.22	.7427
9000	.7619	1.1456	-2.831	26.904	.968	21.38	.7147
10000	.7384	1.1637	-4.812	23.338	.965	20.58	.6876
11000	.7154	1.1822	-6.793	19.772	.962	19.79	.6614
12000	.6931	1.2012	-8.774	16.206	.958	19.03	.6359
13000	.6712	1.2206	-10.756	12.640	.954	18.29	.6112
14000	.6499	1.2404	-12.737	9.074	.950	17.57	.5873
15000	.6291	1.2608	-14.718	5.507	.947	16.88	.5642
16000	.6088	1.2816	-16.699	1.941	.943	16.21	.5418
17000	.5891	1.3029	-18.680	-1.625	.940	15.56	.5202
18000	.5698	1.3247	-20.662	-5.191	.936	14.94	.4992
19000	.5509	1.3473	-22.643	-8.757	.932	14.33	.4790
20000	.5327	1.3701	-24.624	-12.323	.929	13.75	.4594
21000	.5148	1.3937	-26.605	-15.890	.925	13.18	.4405
22000	.4974	1.4179	-28.586	-19.456	.922	12.63	.4222
23000	.4805	1.4426	-30.568	-23.022	.917	12.10	.4045
24000	.4640	1.4681	-32.549	-26.588	.914	11.59	.3874
25000	.4480	1.4940	-34.530	-30.154	.910	11.10	.3709
26000	.4323	1.5209	-36.511	-33.720	.906	10.62	.3550
27000	.4171	1.5484	-38.493	-37.287	.903	10.16	.3397
28000	.4023	1.5768	-40.474	-40.853	.899	9.720	.3248
29000	.3879	1.6056	-42.455	-44.419	.895	9.293	.3106
30000	.3740	1.6352	-44.436	-47.985	.891	8.880	.2968
31000	.3603	1.6659	-46.417	-51.551	.887	8.483	.2834
32000	.3472	1.6971	-48.399	-55.117	.883	8.101	.2707
33000	.3343	1.7295	-50.379	-58.684	.879	7.732	.2583
34000	.3218	1.7628	-52.361	-62.250	.875	7.377	.2465
35000	.3098	1.7966	-54.342	-65.816	.871	7.036	.2352
36000	.2962	1.8374	-55.000	-67.000	.870	6.708	.2242
37000	.2824	1.8818	-55.000	-67.000	.870	6.395	.2137
38000	.2692	1.9273	-55.000	-67.000	.870	6.096	.2037
39000	.2566	1.9738	-55.000	-67.000	.870	5.812	.1943
40000	.2447	2.0215	-55.000	-67.000	.870	5.541	.1852
41000	.2332	2.0707	-55.000	-67.000	.870	5.283	.1765
42000	.2224	2.1207	-55.000	-67.000	.870	5.036	.1683
43000	.2120	2.1719	-55.000	-67.000	.870	4.802	.1605
44000	.2021	2.2244	-55.000	-67.000	.870	4.578	.1530
45000	.1926	2.2785	-55.000	-67.000	.870	4.364	.1458
46000	.1837	2.3332	-55.000	-67.000	.870	4.160	.1391
47000	.1751	2.3893	-55.000	-67.000	.870	3.966	.1325
48000	.1669	2.4478	-55.000	-67.000	.870	3.781	.1264
49000	.1591	2.5071	-55.000	-67.000	.870	3.604	.1205
50000	.1517	2.5675	-55.000	-67.000	.870	3.436	.1149

25,750A

Figure 2A1-3

PRESSURE ALTITUDE TABLE

PRESSURE ALTITUDE = FIELD ELEVATION + △ ALTITUDE

ALTIMETER SETTING IN. HG	△ ALT FT	ALTIMETER SETTING IN. HG	△ ALT FT	ALTIMETER SETTING IN. HG	△ ALT FT	ALTIMETER SETTING IN. HG	△ ALT FT	ALTIMETER SETTING IN. HG	△ ALT FT	ALTIMETER SETTING IN. HG	△ ALT FT	ALTIMETER SETTING IN. HG	△ ALT FT
28.00	1824	28.50	1340	29.00	863	29.50	392	30.00	−73	30.50	−531	31.00	−983
.01	1814	.51	1330	.01	853	.51	382	.01	−82	.51	−540	.01	−992
.02	1805	.52	1321	.02	844	.52	373	.02	−91	.52	−549	.02	−1001
.03	1795	.53	1311	.03	834	.53	364	.03	−100	.53	−558	.03	−1010
.04	1785	.54	1302	.04	825	.54	354	.04	−110	.54	−567	.04	−1019
.05	1776	.55	1292	.05	815	.55	345	.05	−119	.55	−576	.05	−1028
.06	1766	.56	1282	.06	806	.56	336	.06	−128	.56	−585	.06	−1037
.07	1756	.57	1273	.07	796	.57	326	.07	−137	.57	−594	.07	−1046
.08	1746	.58	1263	.08	787	.58	318	.08	−146	.58	−604	.08	−1055
.09	1737	.59	1254	.09	777	.59	308	.09	−156	.59	−613	.09	−1064
28.10	1727	28.60	1244	29.10	768	29.60	298	30.10	−165	30.60	−622	32.00	−1073
.11	1717	.61	1234	.11	758	.61	289	.11	−174	.61	−631		
.12	1707	.62	1225	.12	749	.62	280	.12	−183	.62	−640		
.13	1698	.63	1215	.13	739	.63	270	.13	−192	.63	−649		
.14	1688	.64	1206	.14	730	.64	261	.14	−202	.64	−658		
.15	1678	.65	1196	.15	721	.65	252	.15	−211	.65	−667		
.16	1668	.66	1186	.16	711	.66	242	.16	−220	.66	−676		
.17	1659	.67	1177	.17	702	.67	233	.17	−229	.67	−685		
.18	1649	.68	1167	.18	692	.68	224	.18	−238	.68	−694		
.19	1639	.69	1158	.19	683	.69	215	.19	−248	.69	−703		
28.20	1630	28.70	1148	29.20	673	29.70	205	30.20	−257	30.70	−712		
.21	1620	.71	1139	.21	664	.71	196	.21	−266	.71	−721		
.22	1610	.72	1129	.22	655	.72	187	.22	−275	.72	−730		
.23	1601	.73	1120	.23	645	.73	177	.23	−284	.73	−740		
.24	1591	.74	1110	.24	636	.74	168	.24	−293	.74	−749		
.25	1581	.75	1100	.25	626	.75	159	.25	−303	.75	−758		
.26	1572	.76	1091	.26	617	.76	149	.26	−312	.76	−767		
.27	1562	.77	1081	.27	607	.77	140	.27	−321	.77	−776		
.28	1552	.78	1072	.28	598	.78	131	.28	−330	.78	−785		
.29	1542	.79	1062	.29	589	.79	122	.29	−339	.79	−794		
28.30	1533	28.80	1053	29.30	579	29.80	112	30.30	−348	30.80	−803		
.31	1523	.81	1043	.31	570	.81	103	.31	−358	.81	−812		
.32	1513	.82	1034	.32	560	.82	94	.32	−367	.82	−821		
.33	1504	.83	1024	.33	551	.83	85	.33	−376	.83	−830		
.34	1494	.84	1015	.34	542	.84	75	.34	−385	.84	−839		
.35	1484	.85	1005	.35	532	.85	66	.35	−394	.85	−848		
.36	1475	.86	995	.36	523	.86	57	.36	−403	.86	−857		
.37	1465	.87	986	.37	514	.87	47	.37	−412	.87	−866		
.38	1456	.88	976	.38	504	.88	38	.38	−421	.88	−875		
.39	1446	.89	967	.39	495	.89	29	.39	−431	.89	−884		
28.40	1436	28.90	957	29.40	485	29.90	20	30.40	−440	30.90	−893		
.41	1427	.91	948	.41	476	.91	10	.41	−449	.91	−902		
.42	1417	.92	938	.42	467	.92	1	.42	−458	.92	−911		
.43	1407	.93	929	.43	457	.93	−8	.43	−467	.93	−920		
.44	1398	.94	919	.44	448	.94	−17	.44	−476	.94	−929		
.45	1388	.95	910	.45	439	.95	−26	.45	−485	.95	−938		
.46	1378	.96	900	.46	429	.96	−36	.46	−494	.96	−947		
.47	1369	.97	891	.47	420	.97	−45	.47	−504	.97	−956		
.48	1359	.98	881	.48	410	.98	−54	.48	−513	.98	−965		
.49	1350	.99	872	.49	401	.99	−63	.49	−522	.99	−974		

46,257

Figure 2A1-4

TEMPERATURE
CONVERSION CHART

TEMPERATURE CONVERSION:
CENTIGRADE = 5/9 (F−32)
FAHRENHEIT = 9/5 C+ 32

DEGREES FAHRENHEIT

DEGREES CENTIGRADE

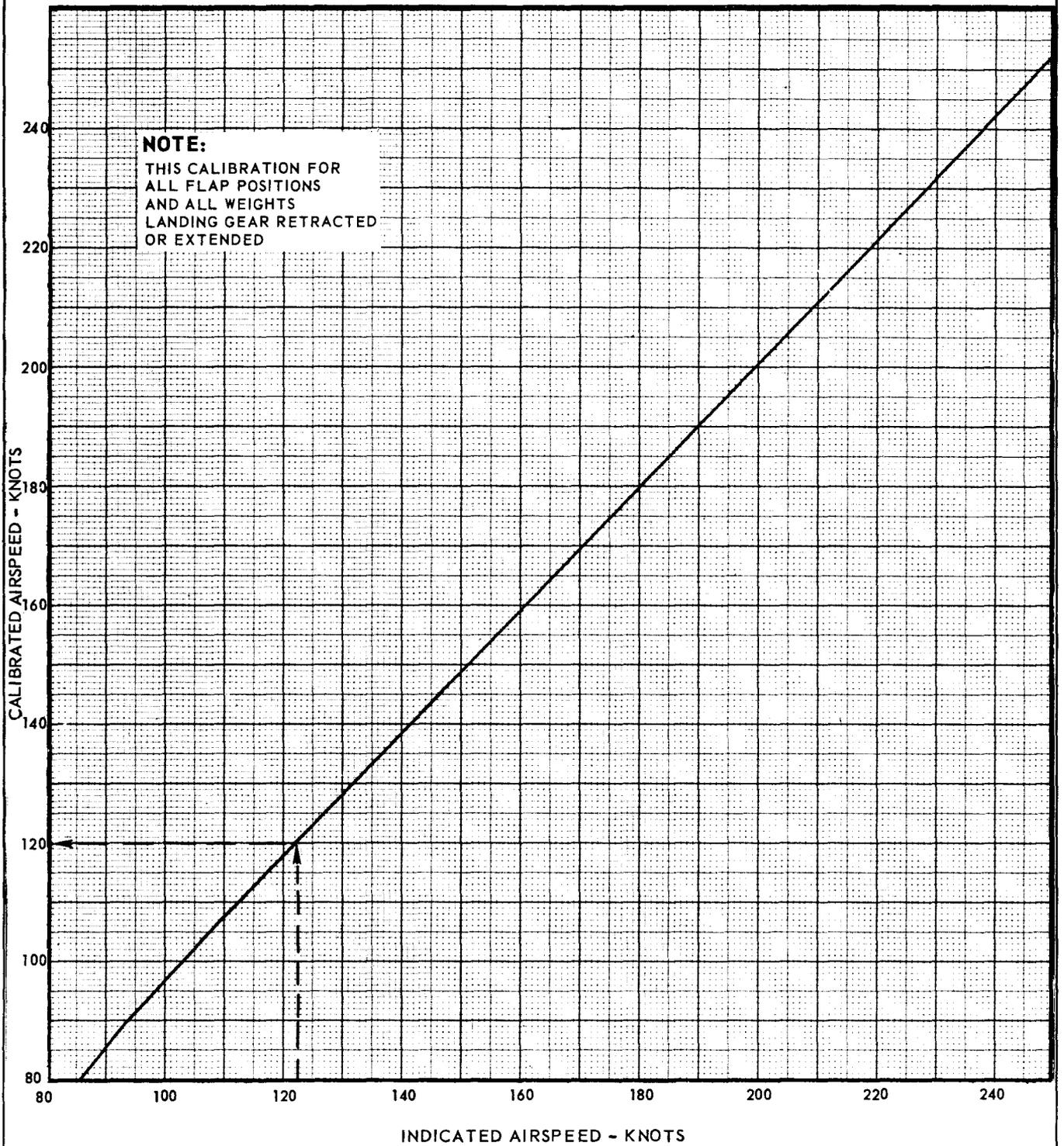46,258A

Figure 2A1-5

MODEL: T-29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

AIRSPEED CALIBRATION

ENGINES: R2800-99W

NOTE:
THIS CALIBRATION FOR
ALL FLAP POSITIONS
AND ALL WEIGHTS
LANDING GEAR RETRACTED
OR EXTENDED

CALIBRATED AIRSPEED - KNOTS

INDICATED AIRSPEED - KNOTS

24,174A

Figure 2A1-6

AIRSPEED COMPRESSIBILITY CORRECTION
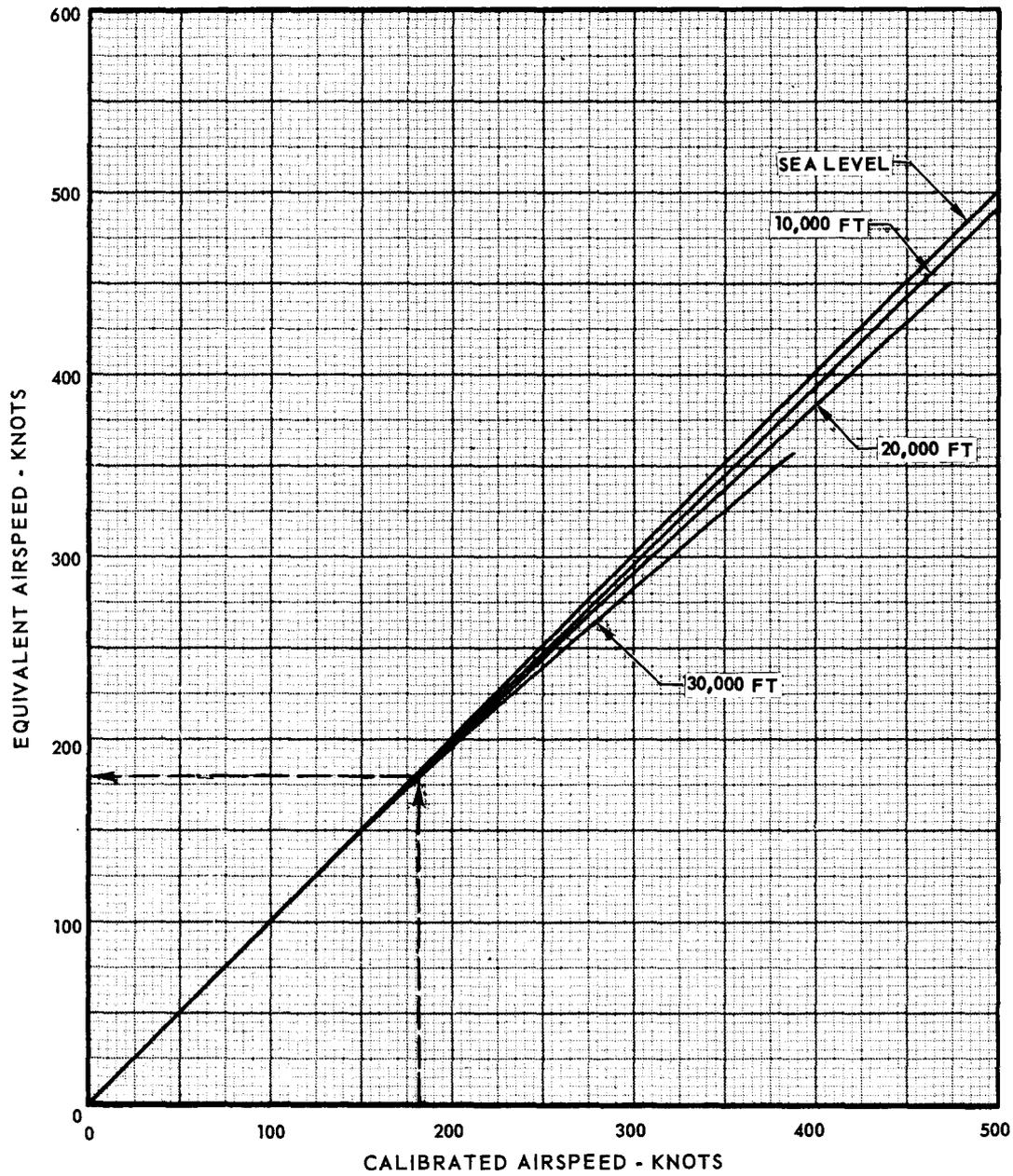
45,502C

Figure 2A1-7

PART 2 – ENGINE DATA

© ℗

TABLE OF CONTENTS

The symbol * indicates an illustration

ENGINE DATA

ENGINE POWER TIME LIMITATIONS

The engines are approved by the manufacturer for
five minutes of operation at maximum wet power,
five minutes at maximum dry power, and 30 minutes
at MILITARY power. There is no time limit for
operations at METO power or less. Maximum power
is determined during the normal preflight planning
by reference to the maximum power available curves.

ENGINE RATINGS, LIMITS, AND THE CONTROL OF POWER

The standard engine ratings are Maximum Wet,
Maximum Dry, Military, and METO. Each is
expressed in terms of power (bhp), engine speed
(rpm) and pressure altitude (ft above sea level). The
operating limits which apply to each rating include
such variables as spark advance, mixture strength,
manifold pressure, torque pressure, carburetor air
temperature, cylinder head temperature, oil inlet
temperature, oil pressure and fuel pressure. These
limits must be observed individually and collectively
to stay within the envelope of conditions which deter-
mines reliable engine performance, and to avoid

malfunction. For power settings below the engine
ratings, such as those used for climb and cruise
flight, the operating limits are conservative from
the viewpoint of engine reliability and are set to
achieve long engine life and economical maintenance.
The control of power is established primarily by
setting rpm and manifold pressure. Power avail-
able curves and power charts show the rpm and
manifold pressure required for the full range of en-
gine performance under specific operating condi-
tions. The charts show a range of carburetor air
temperature and the manifold pressure required to
obtain a selected power corrected to the observed
temperature conditions. This correction for non-
standard conditions of carburetor air temperature
amounts to an increase in manifold pressure of ap-
proximately 1.0 percent for each 5.5°C that the
temperature exceeds standard altitude temperature
(15°C at sea level). If the carburetor air tempera-
ture is colder than standard, a corresponding de-
crease in manifold pressure is shown for accurate
power setting. The rules for application of this
manifold pressure correction vary depending on the
power level and on the operating condition. The
maximum manifold pressure specified in Section V
for each of the engine ratings is regarded as a never-
exceed limit under all operating conditions, except

for the allowable manifold pressure increase to
[illegible] the loss of power due to humidity,
[illegible] in Section V and on the power
available charts. This means that no upward cor-
rection [illegible] manifold pressure is allowed at any of the
standard engine ratings to compensate for power loss
due to hotter than standard temperature conditions.
However [illegible] downward correction to manifold pres-
sure to compensate for power loss due to high
humidity is allowed provided the increase is in
[illegible] on the power
charts. For takeoff in colder than standard con-
ditions (with carburetor air temperatures below 15 C)
and particularly under extremely cold arctic con-
ditions, it is desirable to avoid overpowering the
engine beyond its ratings. Two alternate procedures
for adjusting power at the engine ratings are suggest-
ed under cold weather conditions: (1) Reduce the
takeoff manifold pressure approximately 1.0 inch Hg
for each 10 C below standard carburetor air tempera-
ture (15 C at sea level). (2) Observe both manifold
pressure and torque pressure as a limit, adjusting
the throttle to whichever limit occurs first. The
torque pressure limit established should account for
[illegible] accuracy to torque-meter
instrumentation and should make allowance for engine
accessory power requirements by subtracting this
[illegible] psi for eight engines from the maximum
allowable torque pressure. At lower power levels,
or [illegible] engine ratings, such as at climb and
cruise power settings, manifold pressure has been
corrected either up or down for variation of car-
buretor air temperature from standard altitude air
temperature in accordance with the methods outlined
above. Once the correct manifold pressure is
[illegible] as a maximum
operating limit to avoid the possibility of over-
boosting a malfunctioning engine. At these power
settings, torque pressure can also be used as a
limit in conjunction with manifold pressure.

[illegible] CRUISE OPERATION

It is permissible to use up to METO power for con-
[illegible], this procedure
yields range values that are considerably less than
[illegible]. A detailed study of the power charts and
[illegible] reveals that optimum
cruise performance requires a gradual increase in
cruise altitude as the flight progresses. The opti-
mum cruise [illegible] can be attained by using altitude
and airspeed as the most important cruise para-
meters, utilizing the MAP, TPSI, rpm, and fuel
flow indications only to monitor the engine operation.
For best airplane performance at a given altitude,
[illegible] to adjust for this, a gradual
decrease in power is accomplished. If the pre-
determined BHP, as defined by the cruise charts,
does not give the recommended cruise airspeed,
then the MAP should be adjusted until the correct
airspeed is obtained. Do not exceed engine opera-
ting limits when this adjustment is made.

DISCUSSION OF CHARTS

MAXIMUM POWER AVAILABLE

[illegible] Maximum Power Available Charts (figure 2A2-1
through [illegible] include nomograms correcting en-

gine delivered power to nonstandard conditions both
with and without water-alcohol injection (wet or dry)
for normal fuel grade 115/145 and alternate fuel
grade 100/130. The charts show the maximum
power available for given conditions of pressure
altitude, CAT, and dew point temperature. An
expected TPSI scale is included and a minimum per-
formance TPSI scale which incorporates a 5% mar-
gin for operational use. Allowable torque pressure
gage tolerances vary throughout the instrument
range; therefore, static readings prior to engine
start cannot be applied to computed minimum per-
formance data. The only authorized adjustments to
computed minimum torque are specified in the notes
on the Maximum Power Available charts. The maxi-
mum power available charts are based upon oper-
ation at 2800 rpm and full throttle except where
manifold pressure (MAP) is limited by the engine
manufacturer's recommendations. In operation at
higher elevations, use all available power but do
not exceed limits. An Alternate Maximum Power
Available Chart is based on operation at 2700 rpm
when using alternate fuel grade 100/130.

CAUTION

For takeoff in colder than standard con-
ditions (with carburetor air temperature
below 15°C sea level) avoid overboosting
the engines beyond their ratings. Ob-
serve torque pressure limits during take-
off and reduce manifold pressure approx-
imately 0.5 in. Hg. for each 5° below
standard CAT (15°C sea level). A nomo-
gram above the maximum power limit on
each chart provides the necessary cor-
rection to expected manifold pressure for
colder than standard conditions.

To partially offset the loss of power due to humidity,
the expected MAP for takeoff powers as provided in
the applicable power available chart may be increased
due to the existing water vapor pressure up to a
maximum of 1.5 inches Hg. This correction may
only be made when the combination of pressure alti-
tude and carburetor air temperature indicate that
takeoff power may be developed with less than full
throttle setting. The maximum power available
curves are to be used to determine the minimum per-
formance TPSI for computing takeoff performance.
These computations are to be accomplished as part
of the preflight planning.

EXAMPLE

Given:

CAT (OAT + 1°C) = 20°C.

Pressure altitude = 3500 feet.

Dew point = 55°F.

Power condition = Wet, 2800 rpm, AUTO RICH.

Note

The values of OAT should be obtained
whenever possible from the tower. In-
dicated OAT is less desirable because
of radiation effects when the airplane is
on the ground.

Select the proper power available curve (figure 2A2-1). Enter the chart at pressure altitude of 3500 feet (A) and read up to CAT of 20° (B). Note manifold pressure 58 in. Hg. at full throttle. Read across to dew point base line and parallel guide line to 55°F, corrected for altitude (C). Read across to find expected TPSI 126 (D); and minimum performance TPSI 119 (E).

Note

- If the BHP obtained by the chart is greater than the limiting BHP because of CAT below standard conditions, proceed horizontally to the MAP correction nomogram (A). Parallel the guide lines to the limiting BHP and TPSI (B), then vertically to read MAP correction for low CAT (C).

- When operating at part throttle, a manifold pressure increase may be allowable due to humidity. Determine allowable manifold pressure increase on the separate graph. Proceed horizontally to the correction nomogram baseline (A), parallel the guide lines to the allowable correction (B), then proceed horizontally to BHP and torque pressure.

MANIFOLD PRESSURE LIMITS

A manifold pressure limits curve (figure 2A2-6) is presented to determine the limiting manifold pressure that can be used with any given rpm on a standard day. Curves for manual lean and auto rich operation in high or low blower at various rpm and pressure altitude values are provided. Engine operation above indicated MAP/rpm combinations may result in exceeding torque pressure limits on a standard day. This chart may be used to cross-check MAP settings when power settings are changed during climb or cruise.

CLIMB POWER SCHEDULES

Three climb power schedules (figures 2A2-7, 2A2-8 and 2A2-9) are presented for use in establishing power for two engine operational climb at 1400 BHP/ENG, 1500 BHP/ENG, and METO power. These tables are based on operating with AUTO RICH mixture setting.

Note

METO power is 2700 rpm in low blower and 2500 rpm in high blower. The propellers are restricted in the 2500 to 2700 rpm range (at 30 in. Hg MAP and above) except to pass through this range.

WARNING

High power (30 in. Hg MAP and above) engine operation at speeds between 2500 and 2700 rpm may cause propeller blade fatigue failure induced by resonant vibration stresses.

POWER SCHEDULES

Power schedules (figures 2A2-10 through 2A2-25) are presented in tabular form for a range of cruise powers from 500 BHP to 1700 BHP. Each schedule presents the manifold pressure, blower setting, and rpm necessary to maintain a constant BHP under various conditions of pressure altitude and carburetor air temperature. Tolerance to MAP setting is ± 1.5 inches Hg. In addition, the schedules provide the TPSI and fuel flow which should be obtained when the mixture is manually leaned at cruise power settings of 1200 BHP (low blower) and below. For cruise power settings above 1200 BHP in high blower, the minimum fuel flow figures represent the fuel flow tolerance of the carburetor based on engine manufacturer's data. The desired fuel flow values are based on flight tests and represent the fuel flow obtained by manually adjusting the mixture.

Note

In cases where appreciable power losses are encountered due to carburetors running too rich, the mixture may be manually adjusted to correct the power deficiency. If the mixture is manually adjusted to correct such a power deficiency, the resulting fuel flow must never be less than the applicable minimum fuel flow at the designated power setting.

The power schedules are based upon operating both engines at the same rpm and MAP. This procedure results in slightly different horsepower being delivered to each propeller, and a little less than maximum performance from the airplane, because of the unbalanced accessory loads in the engines. The right engine carries the additional load of the cabin compressor. These effects are small, however, and are not likely to cause a noticeable difference in control or performance. Since any particular combination of blower setting and rpm may be associated with many different manifold pressure values (depending on pressure altitude and carburetor air temperature), a heavy line across the table separates the HIGH and LOW blower positions and light lines are used to separate the different rpm values. To use the schedules, enter the table at the pressure altitude and read the manifold pressure horizontally to the right under the appropriate carburetor air temperature. Then follow the rpm lines and read the blower position, rpm, TPSI, and fuel flow to the right in the same rpm channel.

EFFECT OF RAM. In flight, at a given indicated airspeed, an effective boost is given to the quantity of air received by the induction system. This increase is commonly referred to as ram. The effect is the same as an increase to whatever supercharging is produced by the engine blower. The engine manufacturer's data used in preparing the power schedules do not include the effects of ram. The full throttle settings given in the tables will not be at the full throttle position under flight conditions due to the effect of ram. At a given altitude, rpm and full throttle position, the BHP developed will be increased in proportion to the amount of ram. Also

if the BHP is held constant the effect of ram will increase the altitude at which this power can be developed at the full throttle position.

FUEL FLOW PER ENGINE

Fuel flow per engine charts (figures 2A2-26 and 2A2-27) are presented to determine fuel flow, corresponding to any selected brake horsepower. Curves for manual lean and manual adjust operation in high or low blower at various rpm values are provided. The desired fuel flows on these charts were obtained by flight test and are approximately 5% richer than the engine manufacturer's minimum fuel flow listed on the power schedules.

EXAMPLE

Given:

BHP per engine = 800 bhp.

RPM = 1800.

Blower = LOW.

Enter chart (figure 2A2-26) at 800 bhp (A) and read up to rpm 1800 (B). Read across to the left and read fuel flow 364 pph (C). Note that mixture is manual lean from best power.

MAXIMUM WET POWER AVAILABLE

LOW BLOWER   2800 RPM   AUTO RICH

FUEL GRADE: 115/145

MODEL: T-29 C/D
DATE: 5 DECEMBER 1967
DATA BASIS: ESTIMATED

ENGINE: R2800-99W

2A2-6

Change 3

Figure 2A2-2

Appendix II
Part 2

T.O. 1T-29A-1

MAXIMUM DRY POWER AVAILABLE

MODEL: **T-29 C/D**
DATE: 10 SEPTEMBER 1965
DATA BASIS: **ESTIMATED**

LOW BLOWER   2800 RPM   AUTO RICH
FUEL GRADE: 115 145

ENGINES: **R2800-99W**
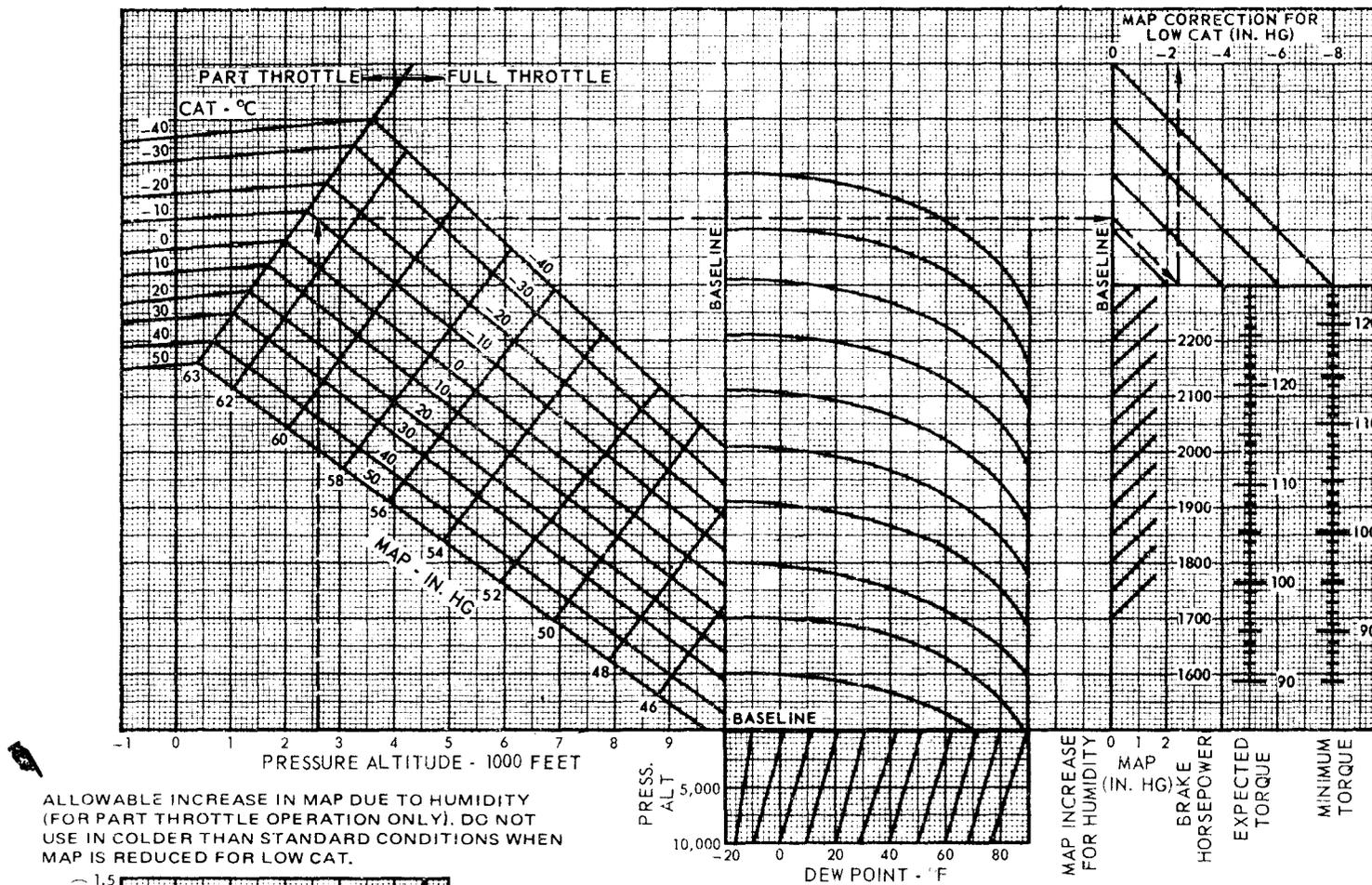
ALLOWABLE INCREASE IN MAP DUE TO HUMIDITY
(FOR PART THROTTLE OPERATION ONLY). DO NOT
USE IN COLDER THAN STANDARD CONDITIONS WHEN
MAP IS REDUCED FOR LOW CAT.
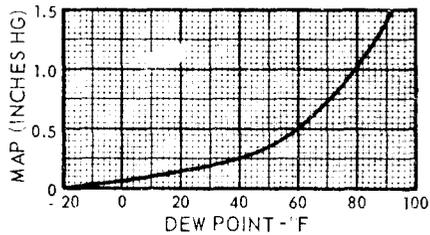
24,175E

NOTES:

(1) CAT EQUALS OAT $+1^\circ$ C.

(2) WHEN USING CABIN PRESSURIZATION, TORQUE PRESSURE
FOR RIGHT ENGINE WILL BE 4.0 PSI LOWER.

(3) CHART BASED ON ZERO AIRSPEED. DO NOT EXCEED MAP
LIMITS DURING TAKEOFF.

(4) FUEL FLOW IS (0.84 × BHP)LB/HR/ENG (APPROXIMATE).

MAXIMUM WET POWER AVAILABLE

LOW BLOWER   2800 RPM   AUTO RICH

FUEL GRADE: 100/130

MODEL: **T-29 C/D**
DATE: 5 DECEMBER 1967
DATA BASIS: **ESTIMATED**

ENGINES: **R2800-99W**

MAP REDUCTION
LOW CAT (IN. HG)

CAT - °C

PART THROTTLE — FULL THROTTLE

BASELINE

MAP - IN. HG

PRESSURE ALTITUDE - 1000 FEET

ALLOWABLE INCREASE IN MAP DUE TO HUMIDITY
(FOR PART THROTTLE OPERATION ONLY). DO NOT
USE IN COLDER THAN STANDARD CONDITIONS WHEN
MAP IS REDUCED FOR LOW CAT.

MAP (INCHES HG)

DEW POINT - °F

PRESS. ALT.

DEW POINT - °F

MAP INCREASE FOR HUMIDITY

MAP (IN. HG)

BRAKE HORSEPOWER

EXPECTED TORQUE

MINIMUM TORQUE

NOTES:

(1) CAT EQUALS OAT + 1°C.

(2) WHEN USING CABIN PRESSURIZATION, TORQUE
PRESSURE WILL BE 4.0 PSI LOWER.

(3) CHART BASED ON ZERO AIRSPEED. DO NOT
EXCEED MAP LIMITS DURING TAKEOFF.

(4) FUEL FLOW IS (0.62 x BHP)LB/HR/ENG
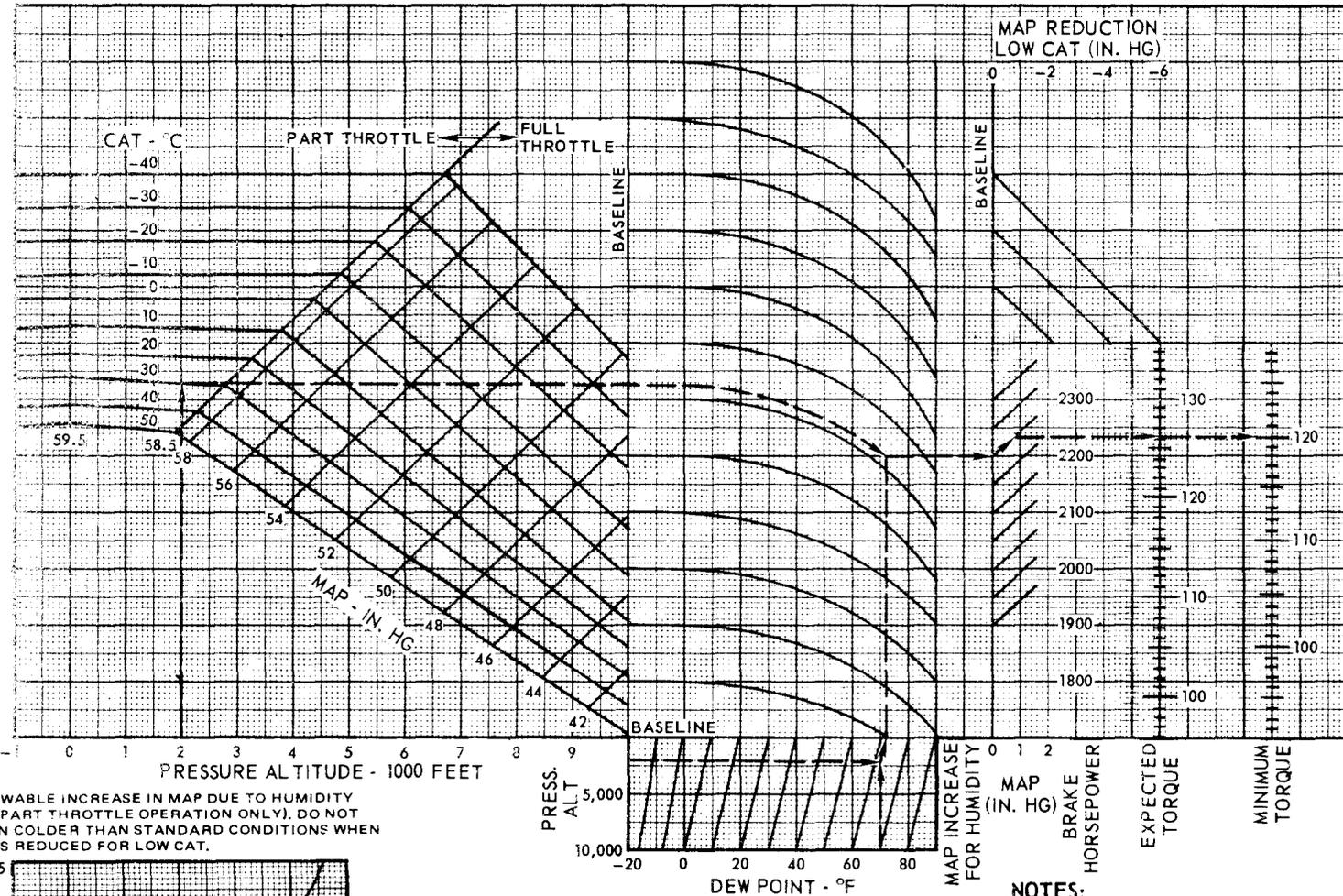(APPROXIMATE).

24,176C

Figure 2A2-4

MAXIMUM DRY POWER AVAILABLE

MODEL: **T-29 C/D**
DATE: 5 DECEMBER 1967
DATA BASIS: **ESTIMATED**

LOW BLOWER   2800 RPM   AUTO RICH
FUEL GRADE 100/130

ENGINES: **R2800-99W**

PRESSURE ALTITUDE - 1000 FEET

CAT - °C

MAP - IN. HG

MAP CORRECTION FOR
LOW CAT (IN. HG)
0 -2 -4 -6 -8

PART THROTTLE   FULL THROTTLE

BASELINE

DEW POINT - °F

MAP
(IN. HG)

BRAKE HORSEPOWER

EXPECTED TORQUE

MINIMUM TORQUE

MAP INCREASE FOR HUMIDITY

ALLOWABLE INCREASE IN MAP DUE TO HUMIDITY (FOR PART
THROTTLE OPERATION ONLY). DO NOT USE IN COLDER THAN
STANDARD CONDITIONS WHEN MAP IS REDUCED FOR LOW CAT.

MAP (INCHES HG)

DEW POINT -°F

24,177D

NOTES:

(1) CAT EQUALS OAT + 1°C.

(2) WHEN USING CABIN PRESSURIZATION, TORQUE
PRESSURE FOR RIGHT ENGINE WILL BE 4.0 PSI LOWER.

(3) CHART BASED ON ZERO AIRSPEED. DO NOT
EXCEED MAP LIMITS DURING TAKEOFF.
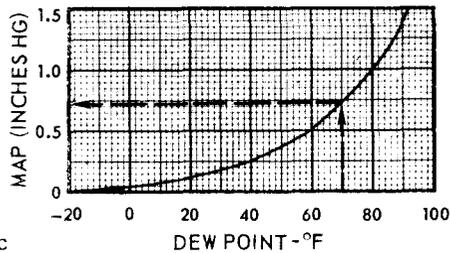
(4) FUEL FLOW IS (0.84 x BHP)LB/HR/ENG (APPROXIMATE).

ALTERNATE MAXIMUM DRY POWER AVAILABLE
LOW BLOWER   2700 RPM   AUTO RICH
FUEL GRADE 100/130
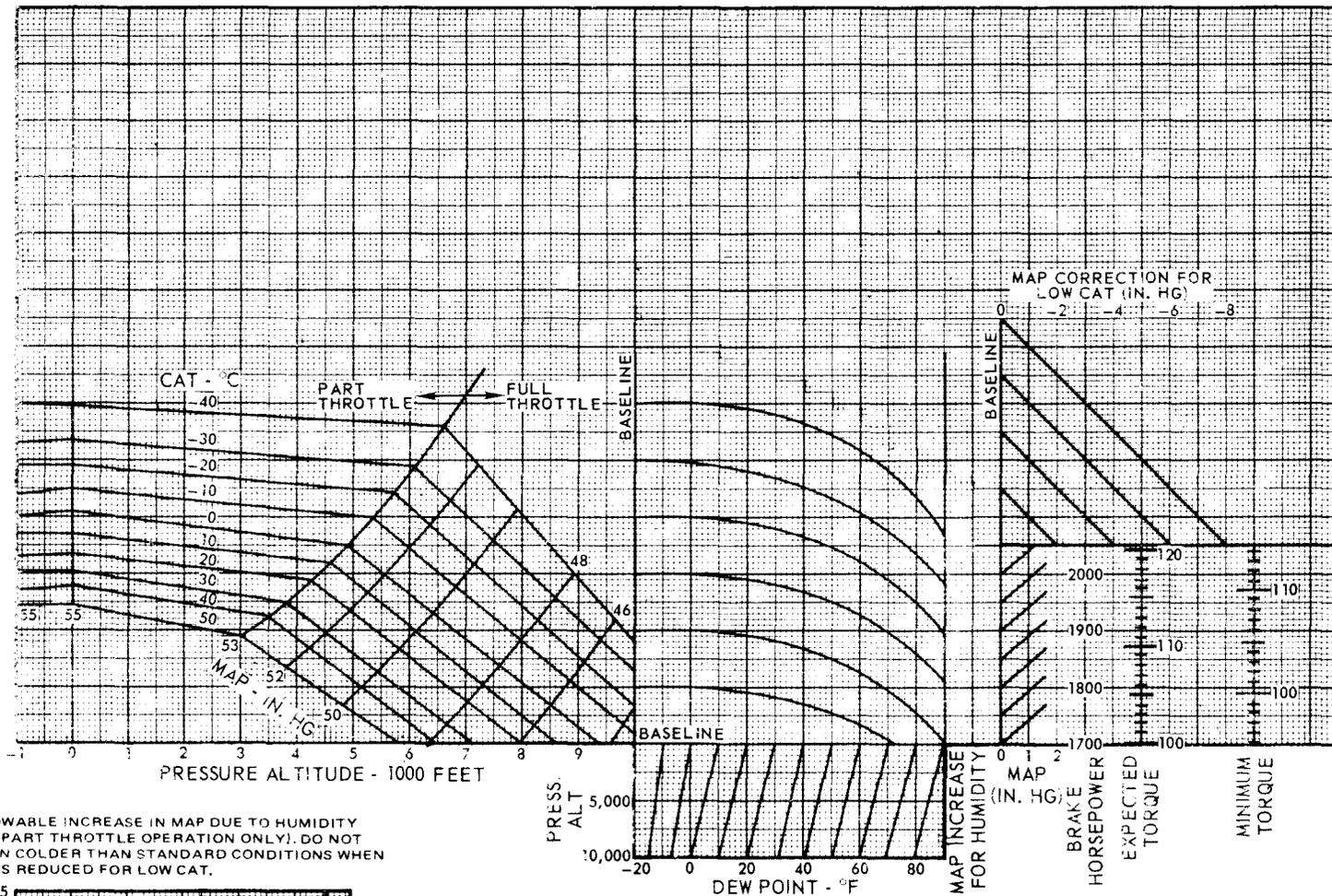
ENGINES: **R 2800-99W**

NOTES:

(1) CAT EQUALS OAT + 1°C.

(2) WHEN USING CABIN PRESSURIZATION, TORQUE PRESSURE WILL BE 4.0 PSI LOWER.

(3) CHART BASED ON ZERO AIRSPEED. DO NOT EXCEED MAP LIMITS DURING TAKEOFF.

ALLOWABLE INCREASE IN MAP DUE TO HUMIDITY (FOR PART THROTTLE OPERATION ONLY). DO NOT USE IN COLDER THAN STANDARD CONDITIONS WHEN MAP IS REDUCED FOR LOW CAT.

MANIFOLD PRESSURE LIMITS

MODEL: T-29 C/D
DATE: 1 APRIL 1957   FUEL GRADE: 115/145   STANDARD ATMOSPHERE
DATA BASIS: ENGINE MANUFACTURER'S DATA   ENGINES: R2800-99W
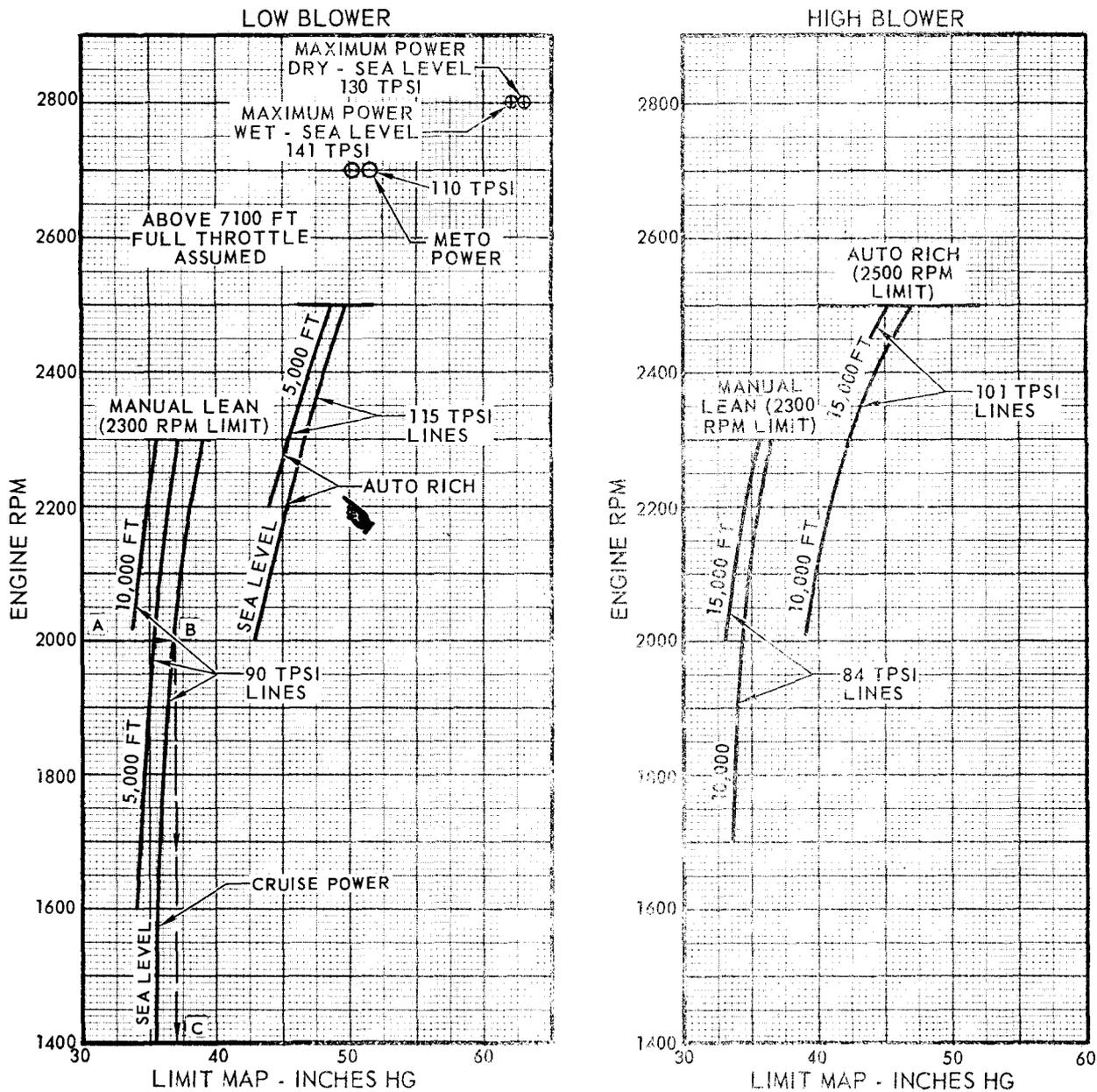
NOTES:

    (1) IN MANUAL LEAN ADD 1/2 INCH MAP FOR EACH 10°C ABOVE STANDARD TEMPERATURE AND SUBTRACT 1/2 INCH MAP FOR EACH 10°C BELOW STANDARD, EXCEPT DO NOT EXCEED MAXIMUM MAP LIMIT

    (2) IN AUTO RICH, ADD 1 INCH MAP FOR EACH 10°C ABOVE STANDARD TEMPERATURE AND SUBTRACT 1 INCH MAP FOR EACH 10°C BELOW STANDARD EXCEPT DO NOT EXCEED MAXIMUM POWER AND METO POWER MAP LIMITS.

    (3) ENGINE OPERATION ABOVE INDICATED MAP/RPM COMBINATIONS MAY RESULT IN EXCEEDING TORQUE PRESSURE LIMITS ON A STANDARD DAY.

45,435E

Figure 2A2-6

MODEL: **T-29C/D**
DATE: 14 OCTOBER 1969
DATA BASIS: **ENGINE MANUFACTURER'S DATA**

CLIMB POWER SCHEDULE
1500 BHP/ENGINE

ENGINES: **R2800-99W**

AUTO RICH MIXTURE

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE							BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
	−30° C	−20° C	−10° C	0° C	+10° C	+20° C	+30° C					
20,000	40.2	40.8										
19,000	40.2	40.9	F.T.									
18,000	39.6	41.0	41.8	F.T.								
17,000	39.6	40.4	41.9	42.6	F.T.	F.T.						
16,000	39.7	40.4	41.2	42.6	43.5	44.5						
15,000	36.2	40.5	41.3	42.0	43.5	44.5		HIGH	2500	95	1110	1145
14,000	36.3	40.5	41.4	42.1	42.8	43.5						
13,000	36.4	37.1	37.8	42.1	42.8	43.5						
12,000	36.5	37.2	37.9	42.2	42.9	43.6		HIGH	2400	99	1040	1045
11,000	36.7	37.3	38.0	38.7	43.0	43.6						
10,000	36.8	37.6	38.4	38.8	39.5	43.7						
9,000	37.0	37.8	38.6	39.2	39.7	40.4						
8,000	37.1	37.9	38.7	39.3	40.0	40.5	41.2					
7,000	37.3	38.0	38.8	39.5	40.2	41.0	41.4	LOW	2400	99	980	1030
6,000	37.5	38.2	39.0	39.7	40.4	41.2	41.8					
5,000	37.6	38.4	39.2	39.9	40.6	41.3	42.0					
4,000	37.8	38.6	39.4	40.1	40.8	41.5	42.2					
3,000	38.0	38.8	39.6	40.3	41.0	41.7	42.4	LOW	2300	103	950	1085
2,000	38.2	39.0	39.8	40.5	41.2	41.9	42.6					
1,000	38.4	39.2	40.0	40.7	41.4	42.1	42.8					
S.L.	38.7	39.5	40.3	41.0	41.7	42.4	43.1					

NOTES:

(1) MINIMUM FUEL FLOW VALUES ARE ENGINE MANUFACTURER'S RECOMMENDED MINIMUMS.

(2) DESIRED FUEL FLOW VALUES ARE OBTAINED BY FLIGHT TEST.

(3) F.T. INDICATES FULL THROTTLE.

(4) NO CABIN PRESSURIZATION LOAD.

(5) NO OPERATION IN HIGH BLOWER ABOVE 15°C C A T 20° C C A T VALUES FOR INTERPOLATION ONLY.

45,970E

Figure 2A2-7

| MODEL: T-29 C/D DATE: 2 MARCH 1966 DATA BASIS: ENGINE MANUFACTURER'S DATA | CLIMB POWER SCHEDULE 2400 RPM - 1400 BHP | ENGINES: R2800-99W |

AUTO RICH MIXTURE

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE							BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
	−30° C	−20° C	−10° C	0° C	+10° C	+20° C	+30° C					
22,000	F.T.											
21,000	36.7	F.T.										
20,000	36.7	37.4	F.T.									
19,000	36.8	37.5	38.2	F.T.	F.T.							
18,000	36.8	37.5	38.2	38.8	39.6							
17,000	36.8	37.5	38.2	38.8	39.6							
16,000	36.8	37.5	38.2	38.8	39.6	SEE NOTE (3)		HIGH	2400	92	960	1110
15,000	33.8	37.5	38.2	38.9	39.7							
14,000	33.9	34.5	38.2	38.9	39.7							
13,000	34.0	34.6	35.3	38.9	39.7							
12,000	34.1	34.7	35.4	36.1	39.7							
11,000	34.2	34.9	35.6	36.2	36.9							
10,000	34.3	35.0	35.7	36.3	37.0	37.6	38.3					
9,000	34.5	35.1	35.8	36.5	37.1	37.8	38.4					
8,000	34.6	35.2	35.9	36.6	37.2	37.9	38.5					
7,000	34.7	35.3	36.0	36.7	37.4	38.1	38.6					
6,000	34.8	35.4	36.1	36.8	37.5	38.2	38.7					
5,000	35.0	35.7	36.4	37.1	37.8	38.5	39.0	LOW	2400	92	920	1065
4,000	35.2	35.9	36.6	37.4	38.0	38.7	39.3					
3,000	35.4	36.1	36.8	37.5	38.2	38.9	39.5					
2,000	35.5	36.2	37.0	37.6	38.3	39.0	39.7					
1,000	35.8	36.5	37.3	37.9	38.6	39.3	40.0					
S.L.	36.1	36.8	37.5	38.2	38.9	39.6	40.2					

NOTES:

(1) F.T. INDICATES FULL THROTTLE.

(2) NO CABIN PRESSURIZATION LOAD.

(3) IF CARBURETOR AIR TEMPERATURE EXCEEDS 15°C, CONTINUE CLIMB IN LOW BLOWER

24,216D

Figure 2A2-8

CLIMB POWER SCHEDULE
METO POWER
MIXTURE AUTO RICH

MODEL: **T-29C/D**
DATE: 1 OCTOBER 1962
DATA BASIS: ESTIMATED

ENGINES: **R2800-99W**

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG.) CARBURETOR AIR TEMPERATURE °C							BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)	BHP
	-30	-20	-10	0	+15	+30	+40						
20,000	40.2	F.T.											
19,000	40.3	41.0	F.T.										
18,000	40.4	41.1	41.8	F.T.									
17,000	42.8	41.2	41.9	42.7	F.T.			HIGH	2500	95	1110	1145	1500
16,000	42.9	43.7	44.6	42.8	43.8								
15,000	41.1	43.8	44.7	42.9	43.9								
14,000	41.3	42.3	44.8	45.5	46.2								
13,000	41.5	42.7	42.9	45.6	46.3	47.0							
12,000	47.5	43.0	43.2	43.6	46.4	47.1		HIGH	2500	101	1210	1230	1600
11,000	48.0	48.5	43.5	43.9	44.8	47.2							
10,000	48.2	48.7	49.0	44.3	44.9	45.3							
9,000	48.5	49.0	49.2	49.4	45.0	45.5	45.7						
8,000	48.5	49.0	49.2	49.7	50.2	45.7	45.9	LOW	2700	100	1240	1300	1700
7,000	48.6	49.1	49.3	49.8	50.4		46.1						
6,000	48.7	49.2	49.5	50.0	50.6		46.3						
5,000	49.0	49.4	49.7	50.2	50.8								
4,000	49.2	49.7	50.0	50.5	51.2								
3,000	49.2	49.7	50.2	50.7	51.3								
2,000	49.5	50.0	50.5	51.0	51.5			LOW	2700	110	1470	1500	1900
1,000	49.7	50.2	50.7	51.2	51.5								
S.L.	49.7	50.2	50.7	51.2	51.5								

NOTES:

(1) F.T. INDICATES FULL THROTTLE.

(2) NO CABIN PRESSURIZATION LOAD

45,972A

Figure 2A2-9

	POWER SCHEDULE	
MODEL: **T-29C/D**		
DATE: 1 APRIL 1957	**500 BHP/ENG**	
DATA BASIS: ENGINE MANUFACTURER'S DATA		ENGINES: **R2800-99W**

MANUAL LEAN FROM BEST POWER

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	–30°C	–20°C	–10°C	0°C	+10°C	+20°C	+30°C	+38°C				
20,000	18.9	19.3	19.0	19.3	19.7	19.4	19.7	20.1	LOW	1900	41	265
19,000	19.7	19.4	19.8	20.2	19.8	20.2	20.5	20.3				
18,000	19.8	20.2	20.0	20.4	20.7	20.4	20.7	21.1	LOW	1800	44	255
17,000	20.6	20.4	20.8	21.2	20.9	21.3	21.6	21.3				
16,000	20.8	21.3	21.0	21.4	21.8	21.5	21.8	22.2	LOW	1700	46	250
15,000	21.0	21.5	21.9	22.4	22.0	22.4	22.8	22.4				
14,000	22.2	21.7	22.1	22.6	23.0	22.6	23.0	23.4	LOW	1600	49	240
13,000	22.4	22.9	23.4	22.8	23.2	23.6	24.0	23.6				
12,000	22.7	23.1	23.6	24.1	23.4	23.8	24.2	24.7	LOW	1500	53	235
11,000	22.9	23.4	23.8	24.3	24.7	25.1	24.4	24.9				
10,000	23.1	23.6	24.1	24.5	25.0	25.4	25.9	25.1				
9,000	23.4	23.9	24.4	24.8	25.3	25.7	26.2	26.6				
8,000	23.7	24.2	24.6	25.1	25.6	26.0	26.4	26.9				
7,000	24.0	24.5	24.9	25.4	25.9	26.3	26.7	27.2				
6,000	24.2	24.7	25.2	25.7	26.2	26.6	27.0	27.5				
5,000	24.5	25.0	25.5	26.0	26.5	27.0	27.4	27.9	LOW	1400	56	230
4,000	24.8	25.3	25.8	26.3	26.8	27.3	27.7	28.2				
3,000	25.2	25.7	26.2	26.7	27.2	27.7	28.2	28.7				
2,000	25.5	26.0	26.5	27.0	27.5	28.0	28.5	28.9				
1,000	25.9	26.4	26.9	27.4	27.9	28.4	28.9	29.3				
S.L.	26.2	26.7	27.2	27.7	28.2	28.7	29.2	29.7				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) NO CABIN PRESSURIZATION LOAD.

24,203C

Figure 2A2-10

POWER SCHEDULE

MODEL: **T-29 C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

600 BHP/ENG

ENGINES: **R2800-99W**

MANUAL LEAN FROM BEST POWER

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
15,000	22.6	23.1	22.9	23.4	23.8	24.2			LOW	1700	56	280
14,000	22.9	23.3	23.7	24.2	24.1	24.5	24.9					
13,000	23.8	23.6	24.1	24.5	25.0	25.4	25.1	25.4				
12,000	24.0	24.5	25.0	24.8	25.3	25.7	26.1	25.6				
11,000	24.8	24.7	25.2	25.7	26.1	25.9	26.3	26.8	LOW	1600	59	270
10,000	25.1	25.7	25.4	25.8	26.3	26.7	26.5	27.0				
9,000	25.4	25.9	26.5	26.9	26.5	27.0	27.5	27.3				
8,000	25.7	26.3	26.8	27.2	27.7	27.2	27.7	28.1	LOW	1500	63	265
7,000	26.0	26.5	27.0	27.5	28.0	28.6	27.9	28.3				
6,000	26.4	26.9	27.4	27.9	28.5	29.0	29.4	28.5				
5,000	26.7	27.2	27.7	28.2	28.7	29.3	29.8	30.2				
4,000	27.0	27.5	28.1	28.7	29.1	29.7	30.2	30.6				
3,000	27.3	27.8	28.4	29.0	29.5	30.0	30.5	31.0	LOW	1400	68	260
2,000	27.6	28.1	28.7	29.2	29.7	30.3	30.8	31.3				
1,000	27.9	28.4	29.0	29.5	30.1	30.6	31.1	31.6				
S.L.	28.3	28.9	29.4	30.0	30.5	31.1	31.6	32.0				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) NO CABIN PRESSURIZATION LOAD.

24,204C

Figure 2A2-11

MODEL: T-29C/D DATE: 1 APRIL 1957 DATA BASIS: ENGINE MANUFACTURER'S DATA	**POWER SCHEDULE** 700 BHP/ENG	ENGINES: R2800-99W

MANUAL LEAN FROM BEST POWER

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
25,000	21.9	22.4	22.8	23.3	23.1	23.5	23.9		HIGH	2200	50	370
24,000	22.9	23.3	22.8	23.2	23.7	23.6	24.0					
23,000	22.9	23.3	23.8	23.3	23.7	24.1	24.0					
22,000	23.0	23.4	23.9	24.3	24.8	24.2	24.6		HIGH	2100	53	360
21,000	23.8	24.3	24.7	24.4	24.8	25.3	24.6					
20,000	23.9	24.4	24.8	24.5	24.9	25.4	25.8		HIGH	2000	55	350
19,000	24.8	25.3	24.9	25.4	25.9	26.3	25.8					
18,000	24.9	25.4	26.0	25.5	26.0	26.4	25.9					
17,000	23.2	25.5	26.1	26.5	27.0	26.5	27.0		HIGH	1900	58	340
16,000	23.5	23.9	26.2	26.7	27.1	27.6	27.1					
15,000	23.7	24.1	24.5	25.0	27.3	27.7	28.2		HIGH	1800	62	330
14,000	24.6	25.0	24.7	25.1	25.6	26.0	28.3					
13,000	24.8	25.3	25.8	26.3	25.9	26.3	26.8					
12,000	25.6	26.1	26.5	26.5	27.0	26.7	27.2	27.5	LOW	1800	62	320
11,000	25.8	26.3	26.9	27.4	27.2	27.7	28.2	27.8				
10,000	26.8	26.6	27.1	27.6	28.2	28.0	28.5	28.9	LOW	1700	66	315
9,000	27.1	27.6	27.3	27.8	28.4	28.8	28.7	29.1				
8,000	27.3	27.9	28.4	28.9	28.6	29.0	29.5	29.4				
7,000	28.4	28.9	28.7	29.3	29.8	30.3	29.7	30.1	LOW	1600	69	310
6,000	28.6	29.2	29.8	30.3	30.0	30.5	31.0	30.3				
5,000	29.0	29.6	30.2	30.7	31.3	30.8	31.3	31.7	LOW	1500	74	305
4,000	29.3	29.9	30.5	31.1	31.7	32.2	31.7	32.1				
3,000	29.7	30.3	30.9	31.5	32.1	32.7	33.3	33.7	LOW	1400	79	295
2,000	30.0	30.7	31.3	31.9	32.4	33.0	33.6	34.0				
1,000	30.4	31.0	31.7	32.3	32.8	33.4	34.0	34.4				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) NO CABIN PRESSURIZATION LOAD

24,205C

Figure 2A2-12

MODEL: **T-29C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE
800 BHP/ENG

ENGINES: **R2800-99W**

MANUAL LEAN FROM BEST POWER

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN.HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
25,000	23.9	24.4	24.9	25.2	25.6	26.1	F.T.		HIGH	2300	55	405
24,000	23.9	24.5	24.9	25.5	25.8	26.2	26.7					
23,000	24.6	25.1	25.6	25.5	25.8	26.3	26.7					
22,000	22.6	23.1	25.7	26.2	25.9	26.3	26.8		HIGH	2200	58	392
21,000	23.2	23.3	23.7	26.4	26.8	27.3	26.8					
20,000	23.3	23.6	23.8	24.3	24.7	27.4	27.9					
19,000	23.9	23.7	24.1	24.6	24.9	25.3	27.9		HIGH	2100	61	384
18,000	24.0	24.4	24.3	24.8	25.2	25.5	26.0					
17,000	24.7	24.5	25.0	25.5	25.3	25.8	26.2	26.5	LOW	2200	58	392
16,000	24.8	25.3	25.2	25.6	26.1	26.0	26.5	26.9	LOW	2100	61	382
15,000	25.0	25.5	26.0	26.5	26.3	26.7	26.7	27.1				
14,000	26.1	25.6	26.1	26.7	27.1	26.9	27.4	27.8	LOW	2000	64	373
13,000	26.3	26.8	27.3	26.9	27.4	27.8	27.5	27.9				
12,000	27.2	27.0	27.5	28.0	28.6	28.0	28.5	28.9	LOW	1900	67	366
11,000	27.4	28.0	28.5	28.2	28.8	29.2	28.7	29.1				
10,000	28.1	28.2	28.7	29.2	29.0	29.5	30.0	30.4	LOW	1800	72	357
9,000	28.3	28.8	29.4	29.4	30.0	30.5	30.2	30.6				
8,000	28.7	29.2	29.8	30.3	30.2	30.7	31.2	30.8				
7,000	29.6	30.2	30.1	30.6	31.2	30.9	31.5	31.9	LOW	1700	74	350
6,000	29.9	30.5	31.1	31.0	31.5	32.0	32.6	32.1				
5,000	30.1	30.7	31.3	31.9	31.7	32.2	32.8	33.2	LOW	1600	79	345
4,000	30.4	31.0	32.6	32.2	32.8	33.4	32.9	33.3				
3,000	30.7	31.2	31.9	32.5	33.1	33.7	34.3	34.7	LOW	1500	85	340
2,000	31.0	31.6	32.3	32.9	33.5	34.0	34.6	35.0				
1,000	31.4	32.0	32.7	33.3	33.9	34.4	35.0	35.4				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) F.T. INDICATES FULL THROTTLE.

(3) NO CABIN PRESSURIZATION LOAD.

24,206C

Figure 2A2-13

MODEL: **T-29 C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE

900 BHP/ENG

ENGINES: **R2800-99W**

MANUAL LEAN FROM BEST POWER

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	–30°C	–20°C	–10°C	0°C	+10°C	+20°C	+30°C	+38°C				
25,000	26.7	27.2	F.T.	F.T.					HIGH	2300	62	452
24,000	26.6	27.2	27.7	28.2	F.T.	F.T.						
23,000	26.7	27.3	27.8	28.2	28.8	29.3	F.T.					
22,000	26.7	27.3	27.8	28.3	28.8	29.2	29.7					
21,000	27.2	27.8	27.9	28.4	28.9	29.3	29.7					
20,000	25.0	27.8	28.3	28.9	28.9	29.4	29.9					
19,000	25.0	25.5	26.1	28.8	29.4	29.9	29.9		HIGH	2200	65	440
18,000	25.5	26.0	26.2	26.7	27.1	30.0	30.5					
17,000	25.6	26.1	26.7	27.2	27.2	27.7	30.6		HIGH	2100	68	430
16,000	26.3	26.8	26.8	27.3	27.7	27.8	28.3					
15,000	26.4	26.9	27.5	27.4	27.9	28.3	28.5	28.9	LOW	2200	65	426
14,000	27.3	27.8	27.6	28.2	28.7	28.5	29.0	29.0				
13,000	27.4	28.0	28.5	28.3	28.8	29.3	29.2	29.6	LOW	2100	68	418
12,000	28.5	28.2	28.7	29.3	28.9	29.5	30.0	29.7				
11,000	28.7	29.3	29.8	29.6	30.1	29.7	30.2	30.6	LOW	2000	72	409
10,000	28.9	29.5	30.0	30.6	30.2	30.7	30.3	30.7				
9,000	29.9	30.5	31.1	30.7	31.3	30.9	31.5	31.9	LOW	1900	75	403
8,000	30.4	31.1	31.3	31.8	31.5	32.0	31.6	32.0				
7,000	30.6	31.2	31.9	32.1	32.7	32.3	32.9	33.3	LOW	1800	80	396
6,000	31.0	31.6	32.2	32.9	32.9	33.5	34.1	33.5				
5,000	31.1	31.8	32.4	33.0	33.6	34.2	34.3	34.7	LOW	1700	84	389
4,000	31.3	31.9	32.5	33.2	33.8	34.4	35.0	35.4				
3,000	31.5	32.1	32.7	33.4	34.0	34.6	35.2	35.6	LOW	1650	86	385
2,000	31.7	32.4	33.0	33.7	34.2	34.8	35.4	35.8				
1,000	32.0	32.6	33.3	33.9	34.5	35.1	35.7	36.1				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) F.T. INDICATES FULL THROTTLE.

(3) NO CABIN PRESSURIZATION LOAD.

24,207D

Figure 2A2-14

POWER SCHEDULE

MODEL: **T-29C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

950 BHP/ENG

ENGINES: **R2800-99W**

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
25,000	28.0	28.5	F.T.									
24,000	28.0	28.5	29.0	F.T.								
23,000	28.1	28.6	29.1	29.4	F.T.	F.T.			HIGH	2300	66	470
22,000	28.0	28.6	29.1	29.7	30.2	30.7						
21,000	28.3	28.9	29.2	29.8	30.2	30.7						
20,000	26.0	29.0	29.5	30.1	30.3	30.8			HIGH	2200	70	460
19,000	26.1	26.6	27.2	30.2	30.6	30.8						
18,000	26.5	27.0	27.3	27.8	30.6	31.1			HIGH	2100	72	450
17,000	26.6	27.1	27.7	27.9	28.3	31.2						
16,000	27.3	27.8	27.9	28.4	28.5	29.0						
15,000	27.5	28.0	28.6	28.5	29.0	29.1	29.3	29.8	LOW	2200	70	445
14,000	28.0	28.6	28.7	29.3	29.3	29.7	29.7	30.0				
13,000	28.2	28.8	29.3	29.5	30.1	29.8	30.3	30.8	LOW	2100	72	436
12,000	29.1	29.7	29.5	30.1	30.2	30.8	30.5	31.0				
11,000	29.3	29.9	30.4	30.2	30.2	31.0	31.5	32.0	LOW	2000	76	430
10,000	30.2	30.0	30.6	31.2	31.0	31.6	31.7	32.2				
9,000	30.4	31.0	30.8	31.3	32.0	31.8	32.3	32.8	LOW	1950	78	425
8,000	30.7	31.3	32.0	31.5	32.1	32.7	32.5	33.0				
7,000	30.9	31.5	32.2	32.7	33.3	32.9	33.4	33.9	LOW	1850	81	420
6,000	31.2	31.8	32.4	33.0	33.6	34.2	33.6	34.1				
5,000	31.3	31.9	32.6	33.2	33.8	34.4	35.0	35.5				
4,000	31.4	32.0	32.7	33.3	33.9	34.5	35.1	35.6				
3,000	31.6	32.2	32.9	33.5	34.1	34.7	35.3	35.8	LOW	1750	86	410
2,000	31.8	32.5	33.1	33.7	34.3	34.9	35.5	35.9				
1,000	32.0	32.6	33.3	33.9	34.5	35.1	35.7	36.1				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) F.T. INDICATES FULL THROTTLE.

(3) NO CABIN PRESSURIZATION LOAD.

24,150A

Figure 2A2-15

MODEL: **T-29C/D**	POWER SCHEDULE
DATE: 1 APRIL 1957	1000 BHP/ENG
DATA BASIS: ENGINE MANUFACTURER'S DATA	ENGINES: **R2800-99W**

MANUAL LEAN FROM BEST POWER

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
23,000	29.1	29.7	F.T.	F.T.					HIGH	2300	69	491
22,000	29.1	29.7	30.3	30.9	F.T.							
21,000	29.2	29.7	30.3	30.9	31.4	F.T.						
20,000	29.5	29.8	30.3	30.9	31.4	32.0	F.T.					
19,000	29.6	30.2	30.7	30.9	31.4	32.0	32.6					
18,000	27.0	27.5	30.8	31.3	31.5	32.0	32.6					
17,000	27.2	27.7	28.3	31.4	31.8	32.0	32.6		HIGH	2200	72	480
16,000	27.8	28.3	28.4	28.9	31.9	32.4	32.6					
15,000	27.9	28.5	29.1	29.0	29.6	32.5	33.0		HIGH	2100	76	468
14,000	28.8	29.4	29.2	29.7	29.7	30.1	33.0					
13,000	28.9	29.5	30.1	29.8	30.4	30.2	30.8	31.2	LOW	2200	72	463
12,000	29.8	30.3	30.2	30.7	30.5	31.1	31.7	31.4				
11,000	30.4	30.6	31.2	30.9	31.4	31.3	31.9	32.3	LOW	2100	76	455
10,000	30.5	31.1	31.3	31.9	31.5	32.1	32.7	32.4				
9,000	30.7	31.3	32.0	32.1	32.6	32.2	32.8	33.2	LOW	2000	79	450
8,000	30.9	31.5	32.1	32.6	32.8	33.4	34.0	33.4				
7,000	31.1	31.7	32.3	32.9	33.5	34.2	34.2	34.6	LOW	1900	83	445
6,000	31.3	31.9	32.5	33.1	33.7	34.3	34.9	35.3				
5,000	31.4	32.1	32.7	33.3	33.9	34.5	35.1	35.5				
4,000	31.6	32.3	32.9	33.6	34.2	34.8	35.4	35.8	LOW	1850	86	440
3,000	31.9	32.5	33.1	33.8	34.3	35.0	35.6	36.0				
2,000	32.0	32.7	33.3	33.9	34.5	35.1	35.7	36.1				
1,000	32.3	32.9	33.6	34.2	34.8	35.4	36.0	36.4				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) F.T. INDICATES FULL THROTTLE

(3) NO CABIN PRESSURIZATION LOAD.

24,208D

Figure 2A2-16

MODEL: **T-29C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE

1050 BHP/ENG

ENGINES: **R2800-99W**

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
23,000	30.6	F.T.	F.T.						HIGH	2300	72	515
22,000	30.4	31.0	31.6	F.T.								
21,000	30.3	30.9	31.7	32.2	F.T.	F.T.						
20,000	30.4	31.0	31.5	32.2	32.8	33.3						
19,000	30.7	31.3	31.6	32.2	32.9	33.4						
18,000	28.2	31.5	31.9	32.3	32.7	33.3			HIGH	2200	76	500
17,000	28.3	28.9	32.1	32.6	32.8	33.4						
16,000	28.8	29.0	29.6	32.7	33.2	33.9			HIGH	2100	80	490
15,000	28.9	29.5	29.7	30.2	33.3	34.0						
14,000	29.8	29.7	30.3	30.3	30.9	31.4			LOW	2200	76	485
13,000	29.9	30.5	30.5	31.0	31.0	31.5						
12,000	30.4	30.7	31.2	31.1	31.7	32.3	32.3	32.7				
11,000	30.6	31.2	31.3	32.0	32.0	32.5	32.5	32.9				
10,000	30.7	31.3	31.9	32.7	32.8	33.2	33.1	33.6	LOW	2100	80	475
9,000	30.8	31.5	32.1	32.7	33.3	33.8	33.8	33.8				
8,000	31.0	31.6	32.3	32.8	33.5	34.0	34.0	34.5	LOW	2000	83	470
7,000	31.2	31.8	32.4	33.0	33.7	34.2	34.8	34.6				
6,000	31.3	32.0	32.6	33.2	33.8	34.4	35.0	35.4	LOW	1950	86	465
5,000	31.5	32.1	32.8	33.4	34.0	34.6	35.2	35.6				
4,000	31.7	32.3	32.9	33.6	34.2	34.8	35.4	35.8				
3,000	31.9	32.5	33.2	33.8	34.4	35.0	35.6	36.0				
2,000	32.1	32.7	33.4	34.0	34.6	35.2	35.8	36.2				
1,000	32.3	32.9	33.6	34.2	34.8	35.4	36.0	36.4				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.
(2) F.T. INDICATES FULL THROTTLE.
(3) NO CABIN PRESSURIZATION LOAD.

24,151A

Figure 2A2-17

POWER SCHEDULE

MODEL: T-29 C/D
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

1100 BHP/ENG

ENGINES: **R2800-99W**

MANUAL LEAN FROM BEST POWER

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
21,000	31.6	32.1	F.T.	F.T.								
20,000	31.6	32.1	32.8	33.4	F.T.							
19,000	31.7	32.1	32.8	33.5	34.0	F.T.			HIGH	2300	76	535
18,000	31.9	32.2	32.9	33.4	34.1	34.6	F.T.					
17,000	32.0	32.4	33.1	33.5	34.0	34.6	35.1					
16,000	29.3	29.9	33.2	33.7	34.1	34.6	35.1					
15,000	30.1	30.1	30.6	33.8	34.3	34.6	35.1		HIGH	2200	79	520
14,000	30.2	30.7	30.7	31.3	34.4	35.1	35.1					
13,000	31.0	30.9	31.5	31.4	32.0	35.2	35.7		HIGH	2100	83	510
12,000	31.1	31.7	31.7	32.2	32.2	32.8	35.7					
11,000	31.2	31.9	32.5	32.3	32.9	33.0	33.6	34.0	LOW	2200	79	505
10,000	31.3	32.0	32.6	33.2	33.0	33.6	34.2	34.1				
9,000	31.5	32.1	32.8	33.4	34.0	33.7	34.3	34.7	LOW	2100	83	495
8,000	31.7	32.3	33.0	33.5	34.2	34.8	35.4	34.9				
7,000	31.9	32.5	33.1	33.7	34.3	35.0	35.6	36.0				
6,000	32.1	32.7	33.4	34.0	34.6	35.2	35.8	36.2				
5,000	32.2	32.8	33.5	34.1	34.7	35.3	35.9	36.3				
4,000	32.3	33.0	33.7	34.3	34.9	35.5	36.1	36.5	LOW	2000	87	490
3,000	32.6	33.3	34.0	34.6	35.2	35.8	36.4	36.8				
2,000	32.7	33.4	34.1	34.7	35.3	35.9	36.5	37.0				
1,000	32.8	33.5	34.2	34.8	35.4	36.0	36.7	37.2				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) F.T. INDICATES FULL THROTTLE.

(3) NO CABIN PRESSURIZATION LOAD.

24,209D

Figure 2A2-18

MODEL: T-29C/D
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE

1150 BHP/ENG

ENGINES: **R2800-99W**

PRESSURE ALTITUDE (FT)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	NOMINAL FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C				
20,000	33.2	F.T.							HIGH	2300	80	533
19,000	33.2	33.8	F.T.									
18,000	33.0	33.6	34.4	F.T.								
17,000	33.0	33.6	34.3	35.1	F.T.							
16,000	33.0	33.6	34.3	34.9	35.6	F.T.						
15,000	32.9	33.6	34.2	34.8	35.5	36.2	F.T.					
14,000	30.7	31.4	32.0	34.8	35.5	36.2	36.7		HIGH	2200	83	539
13,000	30.8	31.4	32.1	32.7	35.4	36.0	36.7					
12,000	31.3	31.9	32.6	32.8	33.3	36.0	36.7					
11,000	31.6	32.2	32.8	33.4	33.5	34.1	34.6	35.0	LOW	2200	83	522
10,000	31.7	32.3	33.0	33.6	34.2	34.2	34.8	35.2				
9,000	31.8	32.4	33.1	33.7	34.3	34.9	35.5	35.3				
8,000	31.9	32.6	33.2	33.8	34.5	35.1	35.7	35.9	LOW	2100	87	513
7,000	32.0	32.7	33.3	33.9	34.6	35.2	35.8	36.0				
6,000	32.2	32.8	33.5	34.1	34.8	35.4	35.9	36.2				
5,000	32.4	33.0	33.7	34.3	34.9	35.5	36.2	36.5				
4,000	32.6	33.2	33.9	34.6	35.2	35.8	36.4	36.8				
3,000	32.8	33.4	34.1	34.8	35.4	36.0	36.6	37.0				
2,000	32.9	33.6	34.3	34.9	35.5	36.1	36.8	37.2				
1,000	33.2	33.9	34.6	35.2	35.8	36.4	37.1	37.5				

NOTES:

(1) MANUAL LEAN MIXTURE SETTING ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) F.T. INDICATES FULL THROTTLE.

(3) NO CABIN PRESSURIZATION LOAD.

24,152

Figure 2A2-19

	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
PRESSURE ALTITUDE (FEET)	–30°C	–20°C	–10°C	0°C	+10°C	+20°C	+30°C	+38°C					
19,000	34.1	F.T.											
18,000	33.9	34.6	F.T.	F.T.									
17,000	33.9	34.6	35.3	36.0	F.T.								
16,000	31.3	34.5	35.2	35.8	36.5	F.T.	F.T.		HIGH	2300	82.5	575	700
15,000	31.3	31.9	35.2	35.8	36.4	37.1	37.7						
14,000	31.7	32.1	32.7	33.3	36.4	37.0	37.6						
13,000	31.8	32.4	32.8	33.4	34.0	37.0	37.6						
12,000	31.9	32.5	33.1	33.7	34.0	34.6	37.6						
11,000	32.0	32.7	33.3	34.0	34.6	34.8	35.4	35.8	LOW	2300	82	555	
10,000	32.2	32.8	33.5	34.1	34.7	35.3	35.4	35.8					
9,000	32.3	33.0	33.7	34.3	34.9	35.5	36.1	36.5					
8,000	32.6	33.2	33.8	34.4	35.1	35.7	36.3	36.7					
7,000	32.7	33.3	34.0	34.6	35.2	35.9	36.5	37.0					
6,000	32.8	33.5	34.2	34.8	35.5	36.1	36.6	37.1					
5,000	33.0	33.7	34.4	35.0	35.6	36.3	36.9	37.3	LOW	2200	87	542	
4,000	33.2	33.9	34.6	35.3	35.9	36.5	37.1	37.6					
3,000	33.4	34.0	34.7	35.4	36.0	36.6	37.2	37.7					
2,000	33.6	34.3	35.0	35.6	36.2	36.8	37.5	38.0					
1,000	33.8	34.5	35.2	35.8	36.4	37.0	37.7	38.2					

MODEL: **T-29C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE
1200 BHP/ENG

ENGINES: **R2800-99W**

NOTES:

(1) MANUAL LEAN MIXTURE SETTING IN LOW BLOWER ESTABLISHED BY 7 PSI TORQUE PRESSURE DROP FROM BEST POWER.

(2) MANUAL ADJUST TO DESIRED FUEL FLOW IN HIGH BLOWER.

(3) F.T. INDICATES FULL THROTTLE.

(4) NO CABIN PRESSURIZATION LOAD.

24,210D

Figure 2A2-20

MODEL: T-29C/D	POWER SCHEDULE
DATE: 5 DECEMBER 1967	1300 BHP/ENG
DATA BASIS: ENGINE MANUFACTURER'S DATA	ENGINES: R2800-99W

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C					
22,000	33.6	F.T.											
21,000	33.7	34.4	F.T.	F.T.	F.T.	F.T.			HIGH	2400	85.6	810	860
20,000	33.8	34.5	35.4	36.2	36.7	F.T.							
19,000	32.7	34.1	35.2	36.0	36.5	36.8							
18,000	32.8	34.2	34.7	35.5	36.2	36.5							
17,000	33.0	34.4	34.8	35.7	36.4	36.9			HIGH	2300	89.5	770	825
16,000	34.0	35.0	35.8	35.9	36.6	37.1							
15,000	34.1	35.1	35.9	36.9	37.4	37.9							
14,000	34.3	35.3	36.2	37.2	37.6	38.2							
13,000	33.3	33.9	34.6	37.3	37.9	38.3			HIGH	2200	93.4	745	800
12,000	33.4	34.1	34.7	35.4	38.0	38.5							
11,000	33.5	34.2	34.9	35.5	36.2	38.8							
10,000	33.6	34.3	35.0	35.6	36.3	36.9							
9,000	33.8	34.4	35.1	35.7	36.4	37.1							
8,000	33.9	34.5	35.2	35.8	36.5	37.2							
7,000	34.0	34.7	35.4	36.0	36.7	37.4							
6,000	34.2	34.8	35.5	36.2	36.9	37.5			LOW	2300	89.5	690	776
5,000	34.3	35.0	35.7	36.4	37.1	37.7							
4,000	34.4	35.2	35.9	36.6	37.3	37.9							
3,000	34.7	35.4	36.1	36.9	37.5	38.2							
2,000	34.9	35.7	36.4	37.1	37.7	38.4							
1,000	35.2	35.9	36.6	37.3	38.0	38.6							

NOTES:

(1) MINIMUM FUEL FLOWS ARE ENGINE MANUFACTURER'S DATA.

(2) DESIRED FUEL FLOWS ARE BASED ON FLIGHT TEST USING MANUAL ADJUST PROCEDURE.

(3) F.T. INDICATES FULL THROTTLE.

(4) NO CABIN PRESSURIZATION LOAD.

(5) MAXIMUM CAT 15°C IN HIGH BLOWER.

24,211E

Figure 2A2-21

| | MODEL: **T-29 C/D** | | | | | | | | | | POWER SCHEDULE | | | | | | |

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
	–30°C	–20°C	–10°C	0°C	+10°C	+20°C	+30°C	+38°C					
22,000	F.T.	F.T.							HIGH	2500	89	1000	1050
20,000	37.3	37.7	F.T.	F.T.	F.T.	F.T.							
18,000	36.7	37.5	38.2	39.4	40.2	40.8							
16,000	36.8	37.5	38.3	38.9	39.6	40.3							
14,000	34.2	37.6	38.3	39.0	39.8	40.3			HIGH	2400	92	920	970
12,000	34.5	35.2	35.9	39.1	39.9	40.6							
10,000	34.7	35.4	36.1	36.7	37.4	40.8			HIGH	2300	96	870	925
8,000	35.0	35.7	36.4	37.1	37.8	38.4	39.0						
6,000	35.3	36.0	36.7	37.4	38.1	38.7	39.3						
4,000	35.6	36.3	37.0	37.8	38.4	39.1	39.7		LOW	2300	96	850	870
2,000	36.0	36.7	37.4	38.1	38.8	39.5	40.2						
SEA LEVEL	36.3	37.0	37.7	38.4	39.2	39.8	40.5						

DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE
1400 BHP/ENG

ENGINES: **R2800-99W**

NOTES:

(1) MINIMUM FUEL FLOWS ARE ENGINE MANUFACTURER'S DATA.

(2) DESIRED FUEL FLOW VALUES ARE BASED ON FLIGHT TEST USING MANUAL ADJUST PROCEDURE.

(3) F.T. INDICATES FULL THROTTLE.

(4) NO CABIN PRESSURIZATION LOAD.

(5) MAXIMUM CAT 15°C IN HIGH BLOWER

24,212D

Figure 2A2-22

MODEL: **T-29 C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE

1500 BHP/ENG

ENGINES: **R2800-99W**

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C					
22,000	F.T.								HIGH	2500	95	1110	1145
20,000	40.2	F.T.	F.T.										
18,000	39.6	41.0	41.8	F.T.	F.T.								
16,000	39.7	40.4	41.2	42.8	43.5	F.T.							
14,000	36.3	40.5	41.4	42.1	42.8	43.5			HIGH	2400	99	1040	1045
12,000	36.5	37.2	37.9	42.2	42.9	43.5							
10,000	36.7	37.4	38.1	38.8	39.5	43.7							
8,000	36.9	37.7	38.4	39.0	39.8	40.5	41.2		LOW	2400	99	980	1030
6,000	37.3	38.0	38.7	39.5	40.2	40.9	41.6						
4,000	37.5	38.3	39.1	39.8	40.5	41.3	41.9						
2,000	37.9	38.7	39.5	40.2	40.9	41.6	42.7						
SEA LEVEL	38.4	39.2	39.9	40.6	41.4	42.1	42.7						

NOTES:

(1) MINIMUM FUEL FLOWS ARE ENGINE MANUFACTURER'S DATA.

(2) DESIRED FUEL FLOW VALUES ARE BASED ON FLIGHT TEST USING MANUAL ADJUST PROCEDURE.

(3) F.T. INDICATES FULL THROTTLE.

(4) NO CABIN PRESSURIZATION LOAD.

(5) MAXIMUM C A T 15°C IN HIGH BLOWER

24,213D

Figure 2A2-23

POWER SCHEDULE

MODEL: **T - 29C/D**
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

1600 BHP/ENG

ENGINES: **R2800 - 99W**

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
	–30°C	–20°C	–10°C	0°C	+10°C	+20°C	+30°C	+38°C					
20,000	F.T.	F.T.	F.T						HIGH	2500	101	1210	1230
18,000	42.8	43.6	44.5	F.T.	F.T.								
16,000	42.9	43.7	44.7	45.4	46.2								
14,000	42.9	43.8	44.7	45.5	46.3								
12,000	38.7	39.5	40.3	45.6	46.4								
10,000	38.9	39.7	40.5	41.2	42.0								
8,000	39.2	40.0	40.8	41.5	42.3	43.0			LOW	2500	101	1110	1170
6,000	39.4	40.2	41.0	41.8	42.6	43.3							
4,000	39.7	40.5	41.4	42.2	42.9	43.7							
2,000	40.3	41.1	41.9	42.7	43.4	44.2							
SEA LEVEL	40.8	41.6	42.4	43.2	44.0	44.7							

NOTES:

(1) AUTO RICH MIXTURE

(2) FUEL FLOW MAY BE MANUALLY ADJUSTED TO MINIMUM FUEL FLOW VALUE IF REQUIRED BY EMERGENCY RANGE CONDITIONS.

(3) F.T. INDICATES FULL THROTTLE.

(4) NO CABIN PRESSURIZATION LOAD.

24,214F

Figure 2A2-24

MODEL: T-29 C/D
DATE: 1 APRIL 1957
DATA BASIS: ENGINE MANUFACTURER'S DATA

POWER SCHEDULE

1700 BHP/ENG

ENGINES: R2800-99W

PRESSURE ALTITUDE (FEET)	MANIFOLD PRESSURE (IN. HG) CARBURETOR AIR TEMPERATURE								BLOWER	RPM	NOMINAL TORQUE PRESSURE (PSI)	MINIMUM FUEL FLOW (PPH)	DESIRED FUEL FLOW (PPH)
	−30°C	−20°C	−10°C	0°C	+10°C	+20°C	+30°C	+38°C					
20,000													
18,000													
16,000	F.T.	F.T.											
14,000	41.2	42.3	F.T.	F.T.					LOW	2700	100	1250	1295
12,000	41.3	42.3	43.2	43.6	F.T.	F.T.							
10,000	41.4	42.3	43.3	43.8	44.7	45.3							
8,000	41.7	42.5	43.4	44.2	44.9	45.7							
6,000	41.9	42.7	43.6	44.5	45.2	46.0							
4,000	42.1	42.9	43.8	44.7	45.4	46.2			LOW	2500	108	1220	1270
2,000	42.3	43.2	44.1	44.9	45.8	46.5							
SEA LEVEL	42.8	43.6	44.5	45.3	46.2	46.9							

NOTES:

(1) AUTO RICH MIXTURE

(2) FUEL FLOW MAY BE MANUALLY ADJUSTED TO MINIMUM FUEL FLOW VALUE IF REQUIRED BY EMERGENCY RANGE CONDITIONS.

(3) F.T. INDICATES FULL THROTTLE.

(4) NO CABIN PRESSURIZATION LOAD.

24,215F

Figure 2A2-25

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

FUEL FLOW PER ENGINE
LOW BLOWER

ENGINES: **R2800-99W**

READ LEFT SCALE FOR
MANUAL LEAN FROM
BEST POWER

ENGINE RPM

ALTERNATE GRADE FUEL
POWER LIMIT

ENGINE RPM

READ RIGHT SCALE FOR
MANUAL ADJUST TO
DESIRED FUEL FLOW

FUEL FLOW - POUNDS PER HOUR

FUEL FLOW - POUNDS PER HOURS

BRAKE HORSEPOWER PER ENGINE

24,218D

Figure 2A2-26

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

FUEL FLOW PER ENGINE
HIGH BLOWER

ENGINES: **R2800 - 99W**

READ LEFT SCALE FOR
MANUAL LEAN FROM
BEST POWER

ENGINE RPM

ENGINE RPM

READ RIGHT SCALE FOR
MANUAL ADJUST TO
DESIRED FUEL FLOW

FUEL FLOW - POUNDS PER HOUR

FUEL FLOW - POUNDS PER HOUR

BRAKE HORSEPOWER PER ENGINE

24,179B

Figure 2A2-27

PART 3 — TAKEOFF

Ⓒ Ⓓ

TABLE OF CONTENTS

The symbol * indicates an illustration

TAKEOFF

DISCUSSION OF TAKEOFF TERMS

The relationship of takeoff terms (figure 2A3-1) illustrates the relationship of the terms used in the takeoff charts. The upper chart represents the sum of the distance required to accelerate on two engines to critical engine failure speed, experience an engine failure and either continue to accelerate on one engine to takeoff speed or stop, using brakes only, in the same distance. On the lower chart Curve A shows the two engine acceleration to takeoff speed and the distance traversed is the round run. Curves B and D show that from the critical engine failure speed point the distance to accelerate on one engine to takeoff speed and the distance to stop are the same. This distance added to the distance required

to reach critical engine failure speed is called the critical field length. Curve C shows that the refusal speed is the highest speed from which the takeoff may be aborted and the aircraft brought to a stop within the remaining runway length. The acceleration check point is a predetermined point, based on time or distance, at which the acceleration check speed must be attained. If runway length and critical field length were equal, Curves C and D would coincide and the refusal speed would be the same as the critical engine failure speed. In this case, the acceleration check speed will be lower than the critical engine failure speed.

Ground Effect

Ground effect, in general, refers to a reduction in the overall drag of an airplane when operated near

the ground. The degree of drag reduction will vary
with distance of the wing or supporting surface from
the ground, being greatest when the wing is at
ground level, and will have disappeared, for all
practical purposes, when the wing is one-half its
span above the ground. The reduction in drag is
also greatest at low velocities and becomes less as
velocity increases. All of the takeoff charts pertaining to the ground run consider the reduction in
drag due to ground effect.

MAXIMUM TAKEOFF GROSS WEIGHT

Safe operation of the aircraft requires that takeoffs
not be attempted at gross weights for which acceleration, rate of climb, or obstacle clearance capability are marginal. There are four primary factors
which must be considered when determining a safe
limit for the takeoff gross weight

1. The ability of the structure to withstand
   taxiing loads and inflight maneuvering loads
   is shown as design takeoff gross weight on
   the Gross Weight Limitation Chart in Section
   V.

2. The ability to takeoff or stop within the available runway is shown on the Critical Field
   Length Charts (figures 2A3-9, 2A3-11,
   2A3-14, and 2A3-17).

3. The ability to have adequate rate of climb
   when airborne is shown on the Gross Weight
   Limited by One-Engine Climb Performance
   Chart (figure 2A3-3).

4. The ability to clear obstacles within the
   takeoff corridor is determined by the Climb
   out Factor Charts and the Climbout Flight
   Path Charts (figures 2A3-24 thru 2A3-32).

For a given set of takeoff conditions, each of these
four considerations will permit a different gross
weight. Any one of the four weights may be the
lowest, depending on the conditions. For this
reason, all four factors must be considered for each
takeoff, even though in many cases one or more of
them may be eliminated after cursory examination.
The lowest weight determined by these factors will
be the maximum takeoff gross weight

TAKEOFF PLANNING

An engine failure, while admittedly rare, remains a
possibility, especially under takeoff (high power)
conditions. If an engine should fail during the early
part of a takeoff run, there is no problem - cut the
remaining engine and stop. However, under certain
conditions of weight, speed, and runway length, it
is desirable to continue the takeoff. One of the purposes of the normal takeoff charts is to provide the
necessary information to determine a desirable
loading and wing flap setting and then to determine
the amount of runway required and the rate of climb
expected if an engine should fail during a late phase
of the takeoff. In flight planning, the larger wing
flap setting should be considered first. This is
because the greater wing flap extensions result in
reduced takeoff speed and reduced takeoff length. The

flap setting will be considered acceptable if (1) the
rate of climb on the gross weight limited by climb
chart is acceptable, and (2) if the critical field
length found is equal to or less than the runway
length under consideration. If the rate of
climb is marginal, a lesser wing flap setting will then
require a re-evaluation of the takeoff field length
after determining the smallest recommended wing
flap setting to obtain an acceptable initial rate of
climb. If it is found that the actual available runway
length is more than that shown on the chart, a
reduction in gross weight is desirable. It is recommended that the airplane not be loaded so that the
critical field length exceeds the available runway
length. From the definition it can be seen that critical engine failure speed is required only when
critical field length is equal to the available runway
length, and since critical engine failure speed and
refusal speed are equal in this case, then refusal
speed is the only speed that need be monitored to
determine whether or not to abort when encountering
engine failure during takeoff. When the available
field length is so much greater than the critical
field length that the refusal speed is higher than
takeoff speed, then the only speed that need be monitored during takeoff run is takeoff speed, and the
decision to abort or continue the takeoff is determined by whether or not the airplane is airborne.
The wind correction nomograms on the charts are
computed on the basis of 100% wind accountability.

TAKEOFF WITH ALLOWANCE FOR
ENGINE FAILURE

Normal takeoff planning procedure allows for the
possibility of an engine failure during takeoff.

WARNING

If critical field length exceeds the runway
available, takeoff will not be attempted
at that gross weight.

When runway available is equal to or greater than the
critical field length, takeoff data is computed using
ground run charts, critical field length charts, refusal speed charts, and the velocity during takeoff
and ground run chart. An acceleration check speed, time
and or distance will be determined to validate proper
acceleration prior to reaching refusal speed. If an
engine fails and the acceleration check speed is low
at the designated acceleration check point, the aircraft is stopped. If an engine fails between the
acceleration check speed and refusal speed, the aircraft is also stopped. If an engine fails after reaching refusal speed, takeoff should be continued.
The following steps outline the action to be taken.

1. Stop (abort takeoff)

   a. If the acceleration check speed is not
   obtained by the time the acceleration
   check speed time or distance is

RELATIONSHIP OF TAKEOFF TERMS

TAKEOFF SPEED

CRITICAL ENG FAIL. SPEED

AIRSPEED

RUNWAY DISTANCE

TAKEOFF
DISTANCE

CRITICAL
FIELD LENGTH

RUNWAY
LENGTH

——————— TWO-ENGINE ACCELERATION
—— —— —— SINGLE-ENGINE ACCELERATION
——· ——·· —— BRAKING DECELERATION (PROPS WINDMILLING)

TAKEOFF SPEED   CURVE A   CURVE B

REFUSAL SPEED

ACCELERATION
CHECK SPEED

CRITICAL ENGINE   CURVE C
FAILURE SPEED

CURVE D

AIRSPEED

RUNWAY DISTANCE   ACCELERATION   GROUND   CRITICAL   RUNWAY
                       CHECK POINT   RUN   FIELD LENGTH   LENGTH

46,353B

Figure 2A3-1

b. If engine failure occurs before acceleration check speed is attained.

c. If an engine failure occurs between the acceleration check speed and refusal speed.

2. Go. (continue takeoff) If an engine failure occurs after reaching refusal speed.

DISCUSSION OF CHARTS

TAKEOFF AND LANDING CROSSWIND CHART

A Takeoff and Landing Crosswind Chart (figure 2A3-2) is provided to determine headwind (or tailwind) components and crosswind components for wind speeds up to 60 knots at crosswind angles of 0 to 90 degrees. The minimum liftoff or touchdown speed can also be determined. Enter the chart with maximum gust velocity to determine crosswind and tailwind components, and with maximum steady wind to determine headwind components. If the crosswind component falls in the Caution area, increase the liftoff or touchdown speed as demonstrated in the sample problem. Use either the gust correction (wind in excess of steady wind velocity) or the increased liftoff or touchdown speed due to crosswind, whichever is greater, but in no case should the correction be greater than 10 knots. Whenever liftoff or touchdown speed is increased for either crosswind or gust correction, the pilot must be prepared to accept a correspondingly longer ground roll. For takeoff, the ground run is corrected on the Velocity during Ground Run Chart (figure 2A3-6) for the increased speed. Refusal speed, distance and time, however, will remain the same. For landing, increased touchdown speed may dictate the selection of an alternate flap setting with a proportionate increase in approach and touchdown speed. Select a flap setting that will give a speed compatible with the minimum touchdown speed after correction for crosswind or gust, and compute the landing ground roll for this flap setting. To compute headwind, tailwind, and crosswind components, a wind angle relative to the takeoff or landing runway must first be determined from the existing surface wind conditions as follows:

1. Subtract the runway heading angle from the magnetic wind direction.

2. If the resultant angle is between 90 and 180 degrees (regardless of sign, + or -), it should be subtracted from 180 to obtain the crosswind angle. If the resultant angle is between 180 and 270 degrees, 180 should be subtracted from the angle. If the resultant angle is between 270 and 360 degrees, it should be subtracted from 360.

3. The Takeoff and Landing Crosswind Chart may then be entered to obtain the headwind, tailwind, and crosswind components.

EXAMPLE

Given: Runway heading = 030

Wind direction = 335 degrees

Steady wind velocity = 20 knots

Gust velocity = 28 knots

Find: Headwind component, crosswind component, and minimum liftoff speed.

1. Determine takeoff speed (from figure 2A3-7) of 103 knots

2. Determine wind angle: 335 - 30 = 305
   360 - 305 = 55 degrees

3. Enter chart with wind angle of 55 degrees and read to maximum gust velocity arc of 28 knots.

4. Read down to find crosswind component of 23 knots.

5. Read vertically to predicted takeoff speed of 103 knots and determine that takeoff is in the Caution zone.

6. Proceed vertically until the Recommended zone (diagonal line) is reached. Read minimum liftoff speed of 111 knots on the right hand scale.

Note

• Normally, takeoff will be made using this minimum liftoff speed or the predicted takeoff speed corrected for gusts (103 knots plus gust increment of 8 knots), whichever is greater. In this example, they are the same, 111 knots.

• Do not increase liftoff or touchdown speed more than 10 knots from the predicted speeds.

7. Determine headwind component by following wind angle line to steady wind velocity arc of 20 knots and reading to the left for a headwind component of 12 knots. (In the event the wind angle results in a tailwind condition, the tailwind component is determined by reading to the left from maximum gust velocity.)

TAKEOFF GROSS WEIGHT LIMITED BY CLIMB

These charts (figures 2A3-3 and 2A3-5) present initial climb performance with one engine inoperative and its propeller feathered, and with continuous two-engine operation. Data are shown for approach flap settings as well as the basic takeoff flap settings. Single-engine rate of climb and two-engine rate of climb with landing gear retracted can be determined with any variable of wing flap setting, gross weight, TPSI, altitude, and temperature. The single-engine chart should be used for preflight planning to assure adequate rate of climb if an engine should fail during takeoff.

EXAMPLE

Given:

Density altitude = 1800 feet

Desired rate of climb = 300 fpm

TPSI = 128 psi

Gross weight = 44,000 pounds

To find the takeoff flap setting, enter the chart
(figure 2A3-3) at density altitude of 1800 feet (A).
Read across to 300 fpm rate of climb (B). Parallel
guide lines to the sea level base line and then read
up to TPSI 128 psi (C). Parallel the guide lines to
the base line and read up to the takeoff gross weight
(D). Read across to find takeoff flap setting of 0°
(E).

Note

- For practical operation, limit the take-
off flap settings to either 12°, 6°, or 0°.
Intermediate positions should be used
only when one of these flap positions will
not provide the required rate of climb
and runway length combination.

- If the takeoff flap setting should come
out as less than 0° under existing con-
ditions, off-load as necessary to reduce
the takeoff weight to that which allows
the desired rate of climb. If the takeoff
weight cannot be reduced, work back-
wards from the weight and minimum flap
setting to determine the rate of climb.

INITIAL RATE OF CLIMB CORRECTION
This chart (figure 2A3-4) may be used to determine
the initial takeoff rate of climb before the landing

gear is retracted. The decrease in rate of climb
obtained is due to the landing gear drag at takeoff.
When takeoff conditions are critical, the rate of
climb correction is applied to the takeoff gross
weight limited by climb (figures 2A3-3 and 2A3-5) to
re-evaluate the allowable gross weight and/or de-
sired rate of climb.

WARNING

This correction applies only during the
initial takeoff until the landing gear is re-
tracted. Landing gear retraction after
takeoff is a normal requirement and is
imperative with one engine inoperative,
high temperatures, or high ground eleva-
tion. Refer to ENGINE FAILURE, Sec-
tion III.

EXAMPLE

Given:

Gross weight = 44,000 pounds

Takeoff flap setting = 0°

Density altitude = 1800 feet

Desired rate of climb (landing gear up) = 300 fpm

Enter the chart at gross weight of 44,000 pounds
(A). Proceed vertically to 0° flap line (B), then
across to the base line of density altitude. Parallel
the guide lines to density altitude 1800 feet (C), then
across to read decrease in rate of climb, -335 feet
(D). This value, when subtracted from 300 fpm rate
of climb used in determining gross weight limited by

climb, results in a -35 feet rate of climb with the landing gear down. To assure a safe takeoff with one engine inoperative, it will be necessary to re-compute the allowable gross weight. Re-enter the takeoff gross weight limited by climb chart (figure 2A3-3) at desired rate of climb of 335 feet (300 + 35) and with the same conditions of density altitude, torque pressure, and flap setting find the adjusted gross weight of 43,000 pounds.

VELOCITY DURING TAKEOFF GROUND RUN

Figure 2A3-6 shows the relationship between dis-tance, time, and speed during the takeoff accelera-tion. It is based on acceleration from brake release on a dry, hard surface runway with two engines operating. Airspeeds used to enter the chart are indicated airspeeds corrected for 100% of reported headwinds and tailwinds. If actual winds during the takeoff run exceed these values, the time to accel-erate to a given checkpoint, and the speed at the checkpoint will be correspondingly higher for head-winds and lower for tailwinds than those computed from the chart. The refusal speed distance, accel-eration check speed and checkpoint may be deter-mined from this chart. To do this, it is necessary first to obtain the ground run for the flap setting used (figures 2A3-10, -13, -16, or -19) and indi-cated takeoff speed (figure 2A3-7). The ground run should be corrected for wind and runway slope. By entering the chart with takeoff speed and takeoff ground run corrected for wind, a contour line is established which is then used to determine the acceleration check speed, time, and distance. From the applicable refusal speed chart (figures 2A3-9, -12, -15, or -18), determine the indicated refusal speed corrected for wind for the available runway and again correct for wind before entering the chart. Following the corrected refusal speed to the contour line previously established will determine the re-fusal distance. Acceleration speed/time is then determined at the intersection of the contour line and the acceleration checkpoint time/distance. This speed is then corrected for wind velocity. Distance, speed, and time relationships for other speeds can also be determined.

The acceleration time check is the most accurate means of checking acceleration. With this method, an even 10 knot increment, not less than 5 and not more than 15 knots below refusal speed, will nor-mally be used as an acceleration check speed. As a secondary procedure, on marked runways the accel-eration check may be made at a distance marker. For this method, the acceleration checkpoint will normally be the first 1000 foot marker at least 500 feet but not more than 1500 feet prior to the refusal distance.

EXAMPLE

Given:

Wind (100% of reported headwind) = 10 knots

Ground run (corrected for headwind and slope) = 3600 feet

Takeoff speed = 119 knots IAS

Refusal speed (corrected for headwind) = 115 knots IAS

Density altitude = 5600 feet

Subtract headwind from takeoff speed to obtain corrected takeoff speed (119 - 10 = 109 knots IAS). Enter chart (figure 2A3-6) with corrected takeoff speed of 109 knots IAS (A) and read up to ground run of 3600 feet (B) and establish a contour line by following the guide lines.

Subtract headwind from the refusal speed to obtain the corrected refusal speed (115 - 10 = 105 knots IAS). Enter the chart with corrected refusal speed of 105 knots IAS (C) and read up to the intersection of contour line (D) to find the refusal distance of 3250 feet.

Enter the chart at the nearest 1000 foot marker at least 500 feet below the refusal distance to determine acceleration check distance of 2000 feet (E). Read across to the intersection of the contour line to find time to accelerate of 29 seconds (F), and read down to find uncorrected acceleration check speed of 88 knots IAS (G).

Correct acceleration check speed by adding head-wind velocity (88 + 10 = 98 knots IAS).

Determine $1/\sqrt{\sigma}$ of 1.087 from the Density Altitude vs $1/\sqrt{\sigma}$ chart (figure 2A1-2) for 5600 feet density altitude. Correct time to accelerate by dividing by this figure. Actual time at the marker will be 29 ÷ 1.087 = 27 seconds.

Note

Since the contour (acceleration) line has been established for the given conditions, time to any speed or distance can be readily determined.

TAKEOFF AND MINIMUM CONTROL SPEEDS

The Takeoff and Minimum Control Speed Chart (figure 2A3-7) is provided to show takeoff speeds and 1.1 minimum control speeds. Takeoff speed is based on 120 percent of power-off stall speed or 110 percent of minimum control speed, whichever is greater. At low gross weights and larger flap set-tings, the minimum control speed becomes greater than the takeoff speed.

EXAMPLE

Given:

Gross weight = 42,000 pounds

Flap setting = 12°

Find takeoff speed by entering chart at gross weight of 42,000 pounds (A), and read up to flap deflection of 12° (B). Read across to find speed of 114 knots (C).

CRITICAL FIELD LENGTH

The critical field length is defined as the total length of runway required to accelerate on both engines to the critical engine failure speed, lose one engine, and then continue takeoff, or stop. Critical engine failure speed is determined by entering the refusal speed chart using critical field length for the runway length and computing speed in the same manner as for refusal speed.

The stopping distance portion of the critical field length has been determined by the use of brakes only. This data also includes a three second reaction time/distance after reaching critical engine failure speed before the remaining engine is cut and brakes are applied. To determine critical field length, refer to figures A3-8, -11, -14, -17.

EXAMPLE

Given:

Density altitude = 1800 feet

TPSI = 126 psi

Gross weight = 44,000 pounds

Runway slope = 1 per cent up

Reported headwind = 10 knots

Flap setting = 12°

Select chart for 12° flap (figure 2A3-11). Enter chart at density altitude 1800 feet (A). Read up guide line to the 126 TPSI line (B). Read across to 44,000 pounds gross weight (C), and then down into the runway slope chart and follow the uphill curve to one percent (D). Read down and into the wind velocity chart. Follow the headwind curve to 10 knots (E), and read down to find the critical field length of 4300 feet (F). For the conditions given above, critical field length, uncorrected for wind, would be 4800 feet. Applying correction for headwind, corrected critical field length would be 4300 feet (F).

REFUSAL SPEED

The Refusal Speed Charts (figures 2A3-9, 2A3-12, 2A3-15, and 2A3-18) provide a means of determining the refusal speed for various conditions of gross weight, density altitude, TPSI, and wind. Refusal speed is the maximum speed at which takeoff may be aborted and the airplane brought to a complete stop within the remaining runway length, using brakes only. If the critical field length and runway available are the same, then refusal speed and critical engine failure speed are identical. If, however, the runway length is greater than critical field length, then the refusal speed may be considerably higher than the critical engine failure speed. For this reason, the refusal speed is of primary importance during takeoff operation. It must be remembered that the validity of the refusal speed is dependent on a normal two engine acceleration of the aircraft. If the acceleration is low, the

aircraft will have used more runway than predicted in reaching the refusal speed, and insufficient runway will remain in which to stop the airplane. For this reason, use of acceleration check speed, time and/or distance is necessary to insure safe takeoff. When corrected refusal speed exceeds takeoff speed, use takeoff speed as refusal speed.

EXAMPLE

Given:

Density altitude = 1800 feet

TPSI = 126 psi

Gross weight = 44,000 pounds

Runway length = 5000 feet

Reported headwind = 10 knots

Flap setting = 12°

Select chart for 12° flap (figure 2A3-12). Enter chart at runway length 5000 feet (A) and read across to reported headwind 10 knots (B). Follow guide line to base line and read across to 126 TPSI (C). Follow guide line to base line and read across to 1800 feet density altitude (D). Follow guide line to base line and read across to intersection of gross weight line from 44,000 pounds (E). Read refusal speed 109 knots IAS (F).

TAKEOFF GROUND RUN

Charts (figures 2A3-10, 2A3-13, 2A3-16, and 2A3-19) are provided to determine the ground run distance required from brake release to the point of takeoff for various conditions of gross weight, density altitude, wind, and TPSI for each takeoff flap setting. Under certain conditions where runway length is not critical but obstacle clearance is, takeoff with zero degrees flap may be utilized.

EXAMPLE

Given:

Density altitude = 1800 feet

TPSI = 126 psi

Gross weight = 44,000 pounds

Runway slope = 1 per cent up

Reported headwind = 10 knots

Flap setting = 12°

Select chart for 12° flap (figure 2A3-13). Enter chart at density altitude 1800 feet (A). Read up guide line to the 126 TPSI line (B). Read across to 44,000 pounds gross weight (C), and then down into the runway slope chart and follow the uphill curve to 1 per cent (D). Read down and into the wind velocity chart. Follow the headwind curve to 10 knots (E), and read down to find corrected ground run of 2900 feet (F).

RUNWAY CONDITION READING (RCR)

Stopping distance depends upon tire-to-runway coefficient of friction, which varies with condition of the runway surface. Runway surface condition will be reported as a Runway Condition Reading (RCR). The RCR is a measure of the coefficient of friction between the tire and the runway surface, as determined by an inspection decelerometer. All charts involving stopping distance are based on dry concrete or asphalt friction coefficients corresponding to an RCR of 23. Slippery runway surfaces will increase stopping distances; increased distances are accounted for by correction charts as a function of RCR. RCR is reported in two-digit numbers between 02 and 26. Many airfields will continue to report braking action in accordance with ICAO documents. This is the GOOD, MEDIUM, and POOR classification of braking action on unusual runway surface condition. In order to relate ther classifications to an RCR, or when RCR values are not available, the following relationship will be used:

RUNWAY CONDITION	ICAO REPORT	RCR
Dry	Good	23
Wet	Medium	12
Icy	Poor	05

EXAMPLE

Given:

Gross weight = 40,000 pounds

Critical field length = 4300 feet

Refusal speed = 109 KIAS

Runway condition = Icy

Enter chart (figure 2A3-20) with a Runway Condition Reading (RCR) of 5 (obtained from base weather) for an icy runway (A). Read across to gross weight in refusal speed portion of chart (B) and read down to find refusal speed correction factor K_{RS} 0.81 (C). Multiply refusal speed by K_{RS} factor to obtain refusal speed for runway condition. Follow same procedure to correct critical field length using the K_{CFL} factor.

RUNWAY SURFACE COVERING (RSC)

Also reported will be Runway Surface Covering (RSC), which will be the average runway surface covering given in depth and type, such as slush, water, or snow. The depth of this covering can cause a significant reduction in takeoff performance due to the retarding effect of the tires displacing the covering, plus the additional drag effect of this material being sprayed and consequently striking the aircraft surfaces. The retarding effect of slush and water puddles increases as the speed increases. However, the retarding effect will vary considerably with varying slush and water depths encountered on the runway due to surface contour. The retarding effect of slush and water puddles will decrease when

the aircraft reaches hydroplaning speed. Hydroplaning occurs because the pressure between the fluid on the runway and the tires increases until the tires are entirely supported on top of the fluid. The speed at which this occurs is called hydroplaning speed and is usually lower than end acceleration check speed. Due to the number of unpredictable conditions which affect performance and various types of runway covering, acceleration check will not be an accurate indication of performance when takeoff is attempted on a certain depth of slush, snow, or water.
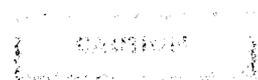
CAUTION

As there is no information given for RSC, the pilot should exercise extreme caution during takeoff planning and ground run on water, slush, or snow covered runways.

CLIMBOUT FACTOR FOR CLIMBOUT FLIGHT PATH

Figures 2A3-21 and 2A3-31 provide the climbout factors for use with the climbout flight path charts. Figure 2A3-21 should be used to determine the climbout factor for use with the takeoff power (2800 rpm) climbout flight path charts, and figure 2A3-31 should be used to determine the climbout factor for use with the METO power climbout flight path chart. The climbout factor chart for takeoff power has engine power corrections in terms of torque pressure. However, power corrections in the climbout factor chart for METO power is in terms of bhp, thus making it possible to use this chart for a range of engine rpm.

WARNING
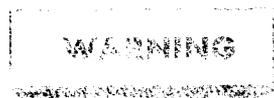
The METO power climbout factor chart was constructed for use with engine rpm's from 2500 to 2700. The charts become increasingly inaccurate at rpm's outside this range.

EXAMPLE (for takeoff power settings)

Given:

Gross weight = 44,000 pounds

Density altitude = 1800 feet

TPSI = 126 psi

Enter the climbout factor chart (figure 2A3-21) at gross weight of 44,000 pounds (A) and read up to density altitude of 1800 feet (B). Read across to 126 psi in the torque pressure curves (C) and then down to find the climbout factor of 6 (D). This factor can be used in any of the takeoff power (2800 rpm) climbout flight path charts, figures 2A3-22 thru 2A3-30.

A climbout factor for use in the METO power climb-out flight path chart can be determined in the same manner by using figure 2A3-31. In this case, the bhp for the corresponding pressure altitude must first be obtained from the METO power climb schedule and then applied at the appropriate spot in the climbout factor chart.

WARNING

The climbout factors obtained for take-off power and the factors for METO power are not interchangeable. Do not use a takeoff power climbout factor on the METO power flight path chart or vice versa.

CLIMBOUT FLIGHT PATH

Climbout flight path charts, figures 2A3-22 thru 2A3-30, and 2A3-32 are provided to determine the distance required to clear a given obstacle. Figures 2A3-22 thru 2A3-26 and 2A3-28 thru 2A3-30 provide all the information needed to determine obstacle clearance capability within the first 11,000 feet horizontal distance or 600 feet altitude after takeoff. Figures 2A3-27 and 2A3-32 are needed to determine extended flight path information beyond 11,000 feet horizontal distance or 600 feet vertical altitude. In this case, the vertical and horizontal distances must be added together to complete the climbout flight path analysis.

Individual charts provide data for two-engine or one-engine operation and for takeoff flap settings of 0, 6, 12, or 24 degrees. All climbout flight path charts are based on a speed of 1.2 stall speed for the particular flap setting.

WARNING

The climbout factor to be applied must be obtained from the appropriate climbout factor chart depending on the flight path chart to be used.

EXAMPLE

Given:

Obstacle height = 5300 feet

Obstacle distance = 63,500 feet (from brake release)

Takeoff gross weight = 44,000 pounds

Engines operating = 2

Torque pressure = 126 psi (2800 rpm)

Takeoff flap setting = 6°

Takeoff ground run = 3675 feet

Flap retraction altitude = 500 feet

Takeoff density altitude = 1800 feet

OAT = 15°C

Reported headwind = 10 knots

Determine initial climbout factor of 6 from figure 2A3-21 for takeoff weight, density altitude, and torque pressure. Enter climbout flight path chart for two-engine, 6° flap operation (figure 2A3-22).

Follow factor line 6 to 500 feet altitude, apply correction for reported headwind and record distance of 4700 feet.

At this point, 500 feet, we will assume that IAS is increased to 1.2 stall speed for 0° flaps, flaps are retracted to 0°, and power is reduced to METO.

Note

The flap retraction, power reduction point is not dictated by any specific require-ment. It may be a function of operating policy, immediate obstacle clearance requirement, or simply pilot preference.

Convert density altitude (1800 + 500 = 2300) to pres-sure altitude (approximately 1900 feet) and determine bhp (1900) from the METO power climb schedule (figure 2A2-9). Note that 1900 bhp can be held for 8100 feet of climb (from 1900 feet pressure altitude) and then METO power drops to 1700 bhp.

Enter METO power climbout factor chart (figure 2A3-31) with 44,000 pounds (ignore fuel usage), 2300 feet density altitude, and 1900 bhp to obtain climbout factor of 6.2.

At this point, compute remaining distance to ob-stacle. 63,500 feet (total distance) - 3675 feet (takeoff run) - 4700 feet (initial climb segment) = 55,125 feet remaining.

Enter METO power climbout flight path chart (figure 2A3-32) with remaining distance (55,125 feet), remove correction for reported headwind (giving a distance of 59,000 feet) and move vertically to intersect the 6.2 factor line. Read altitude of 6000 feet.

Note

If winds aloft are available, use their re-ported value rather than using field el-evation winds for making distance cor-rections.

Add this altitude segment to previous altitude seg-ment (500 + 6000 = 6500 feet). Since this altitude is greater than the obstacle height, the obstacle can be cleared.

Note

It may be necessary in some cases to compute an additional segment of the extended climbout flight path. If the climbout extends through a power reduction point as determined from the METO power climb schedule, compute a new climbout factor for the higher altitude and lower power and re-enter the climbout flight path chart to obtain additional distance and altitude figures.

MAXIMUM EFFORT

For maximum effort planning, the two-engine takeoff gross weight limited by climb, takeoff ground run, and METO power climb charts are used. These data represent maximum possible airplane performance regardless of the risks involved. The takeoff ground run and respective operational gross weights are predicated on the continued operation of both engines. When planning a takeoff using this information, consider the use of the lowest of the flap settings first.

Note

This procedure is the reverse of normal flight planning in which the highest flap setting is considered first. In maximum effort planning it is desirable to obtain the best performance (even though it is substandard) within the runway length available.

This setting will be acceptable if the takeoff ground run distance found on the chart is equal to or less than the length of the runway under consideration. If the required runway length is greater than the distance available, a greater wing flap setting will have to be considered. If, after checking all takeoff flap settings, the available takeoff runway is still too short, the gross weight will have to be reduced in order to operate from the field. A takeoff distance obtained from these charts is the distance from release of brakes to takeoff. In addition, each of the takeoff ground run charts has a correction factor that can be used to determine the distance required to clear a 50-foot obstacle

MODEL: **T-29 C/D**
DATE: 7 DECEMBER 1971
DATA BASIS: **ESTIMATED**

TAKEOFF AND LANDING CROSSWIND CHART

ENGINES: **R2800-99W**
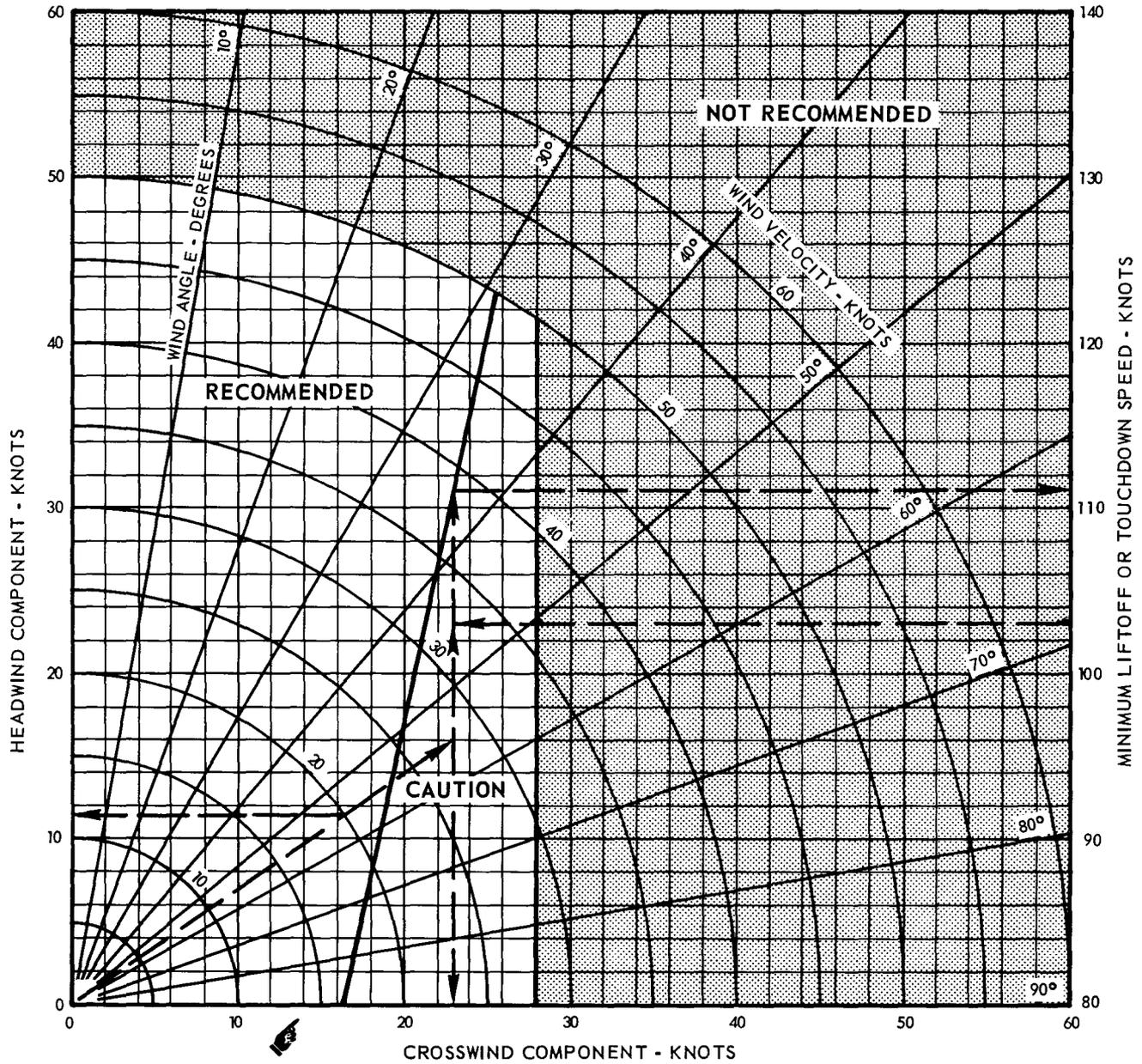
NOTES:

1. ENTER CHART WITH MAXIMUM GUST VELOCITY TO DETERMINE CROSSWIND OR TAILWIND COMPONENT.

2. ENTER CHART WITH MAXIMUM STEADY WIND VELOCITY TO DETERMINE HEADWIND COMPONENT.

3. IF TAKEOFF IS MADE IN THE CAUTION ZONE, A SLIGHT YAW MAY BE EXPECTED BETWEEN ROTATION AND LIFTOFF.

24, 188C

THE TAKEOFF AND LANDING CROSSWIND COMPONENT IS BASED ON IDEAL RUNWAY CONDITIONS. WHEN RUNWAY CONDITIONS ARE OTHER THAN IDEAL, THE RCR SHOULD BE CONSIDERED. THE CROSSWIND COMPONENT FIGURES LISTED HERE ARE SUGGESTED VALUES TO BE USED WITH THE INDICATED RCR'S.

RCR	2	3	4	5	6	7	8	9	10	11	12
CROSSWIND COMP.	0	2	5	7	10	12	15	17	20	22	28

Figure 2A3-2

TAKEOFF GROSS WEIGHT LIMITED BY CLIMB

MODEL: T - 29 C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

IF ONE ENGINE FAILS DURING TAKEOFF
LANDING GEAR UP   2800 RPM

ENGINES: R2800 - 99W

REMARKS:

(1) INOPERATIVE
PROPELLER
FEATHERED

(2) LANDING
GEAR
RETRACTED

(3) NACELLE
FLAPS
OPEN TO
MID-POSITION

(4) CLIMB SPEED -
TAKEOFF
SPEED
(REFER TO
TAKEOFF
CURVES)
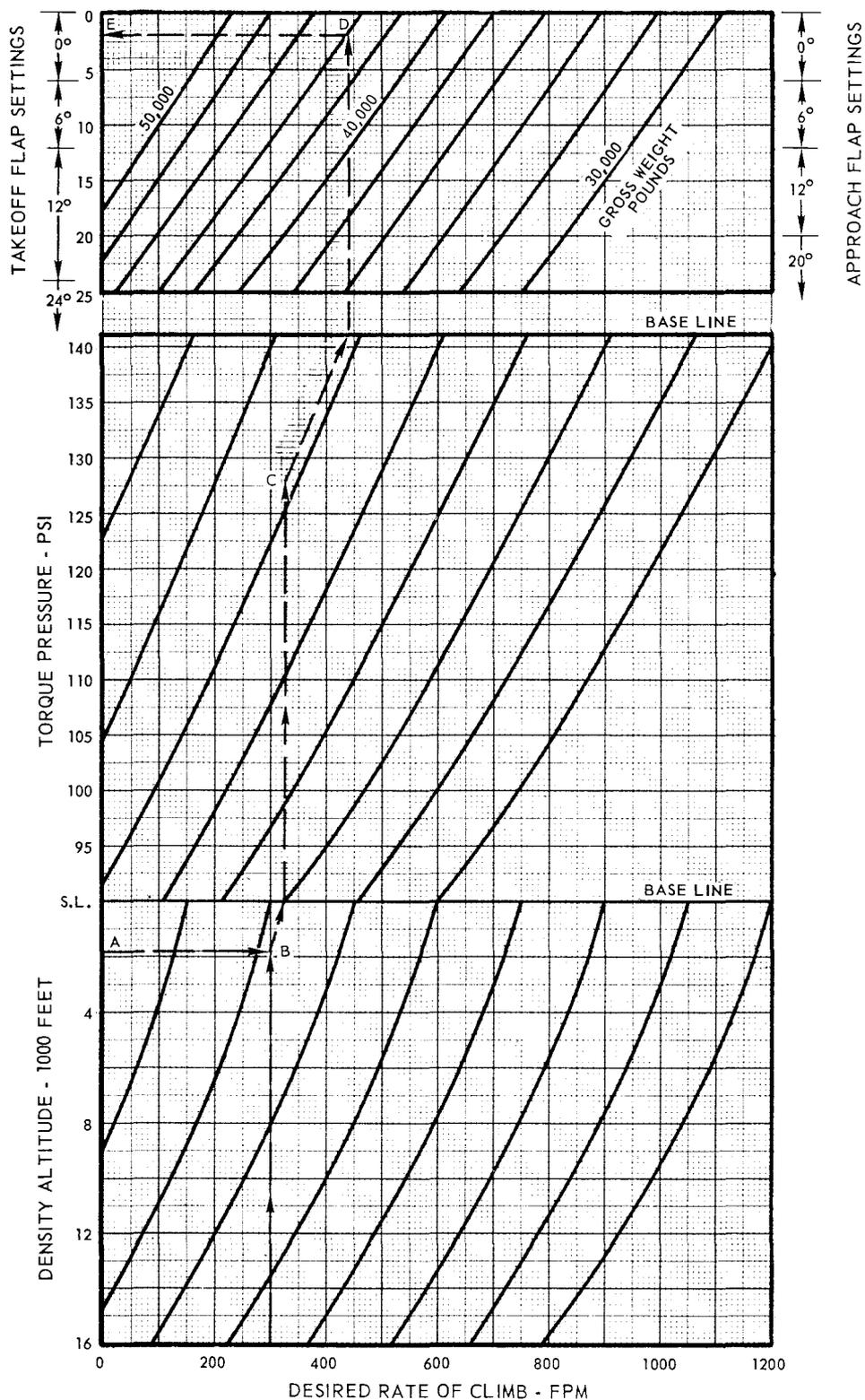
45,971E

Figure 2A3-3

INITIAL RATE OF CLIMB CORRECTION

MODEL: T-29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

LANDING GEAR DOWN   2800 RPM

ENGINES: R2800-99W

BASE LINE

0° FLAP
6° FLAP
12° FLAP
24° FLAP

DECREASE IN RATE OF CLIMB - FPM

GROSS WEIGHT - 1000 POUNDS

DENSITY ALTITUDE - 1000 FEET
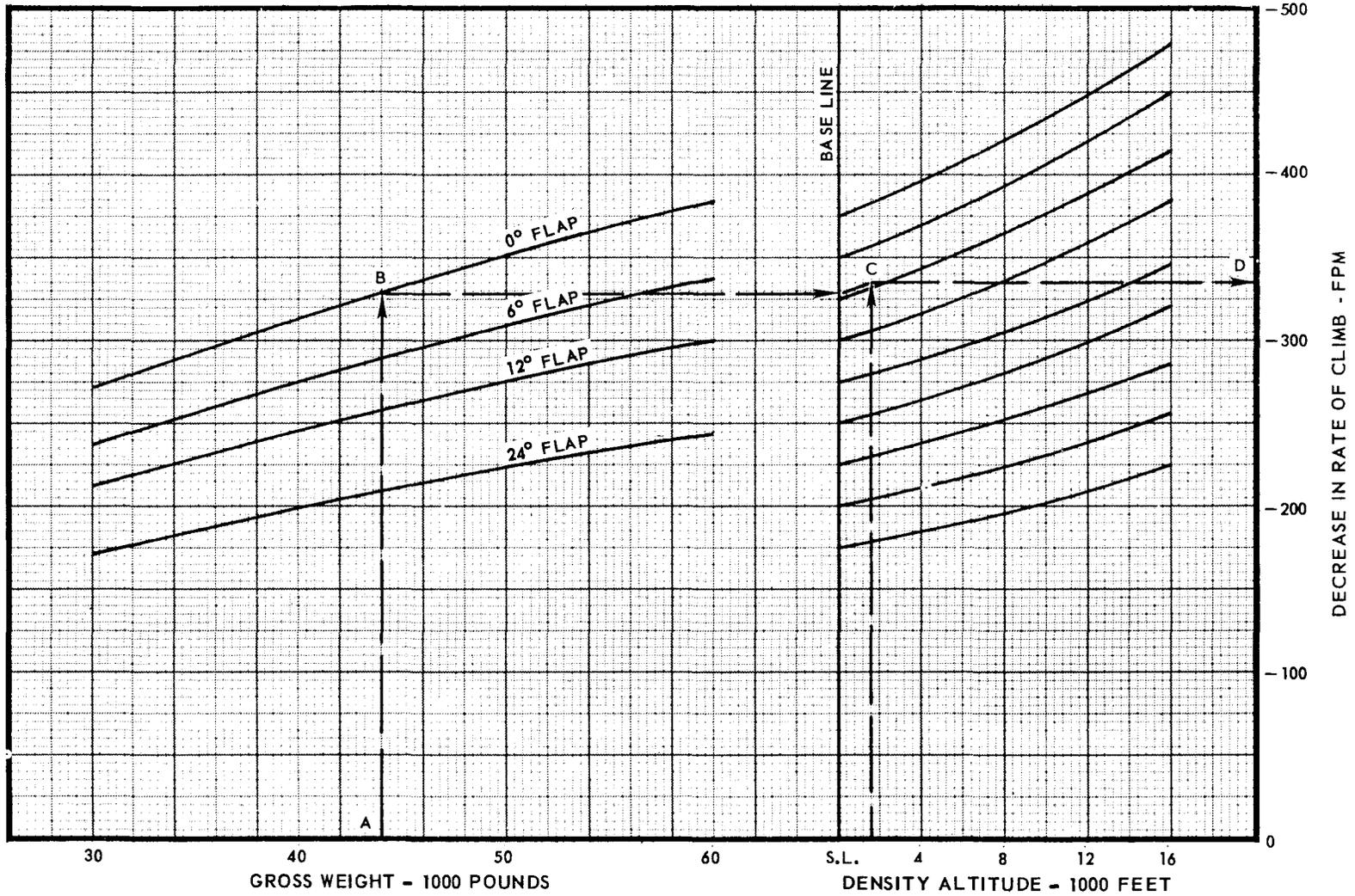
NOTE:
THE DECREASE IN RATE OF CLIMB IS DUE TO LANDING GEAR DRAG AT TAKEOFF.
THE CORRECTION IS APPLICABLE TO THE RATE OF CLIMB FROM THE GROSS WEIGHT
LIMITED BY CLIMB CHARTS, SINGLE ENGINE AND TWO ENGINE.

45,454

MODEL: **T-29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TAKEOFF GROSS WEIGHT LIMITED BY CLIMB
CONTINUOUS TWO ENGINE OPERATION   2800 RPM
LANDING GEAR UP

ENGINES: **R2800-99W**

TAKEOFF FLAP SETTINGS

APPROACH FLAP SETTINGS

GROSS WEIGHT LB 70,000   60,000   50,000   40,000   30,000

BASE LINE

TORQUE PRESSURE - P.S.I.

BASE LINE

DENSITY ALTITUDE - 1000 FEET

DESIRED RATE OF CLIMB - F.P.M.

CONDITIONS:
(1) LANDING GEAR RETRACTED
(2) NACELLE FLAPS OPEN TO MIDPOSITION

(3) CLIMB SPEED = TAKEOFF SPEED
    (REFER TO TAKEOFF CURVES)

45,437B

Figure 2A3-5

MODEL: **T-29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: **FLIGHT TEST**

VELOCITY DURING TAKEOFF GROUND RUN
(FOR ALL WEIGHTS AND FLAP SETTINGS)
2800 RPM

ENGINES: **R-2800-99W**

$$T \times \frac{1}{\sqrt{\sigma}} \text{(SECONDS)}$$

GROUND RUN - 1000 FEET

INDICATED AIRSPEED, MINUS HEADWIND
COMPONENT OR PLUS TAILWIND COMPONENT - KNOTS
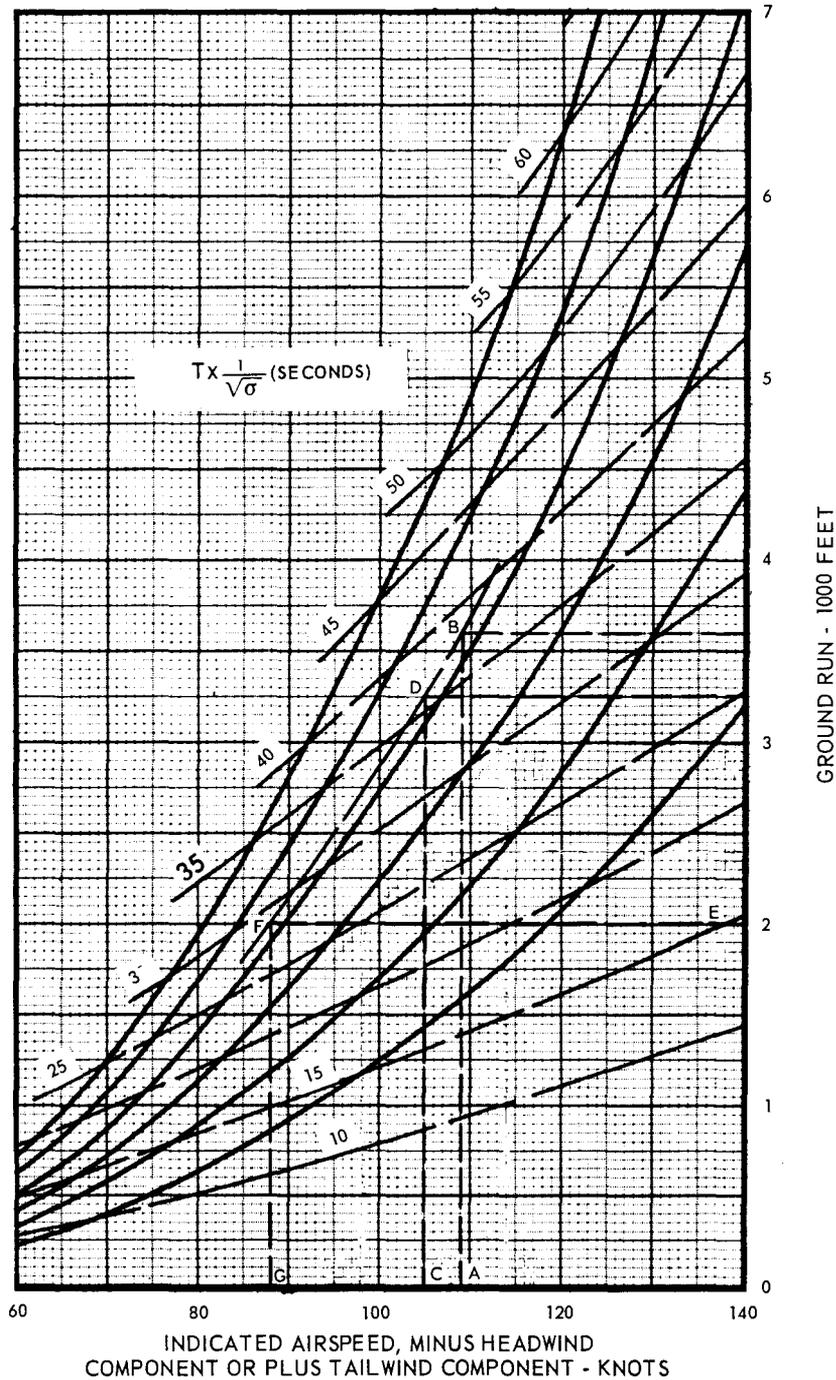
NOTES:

1. 100% WIND ACCOUNTABILITY.
2. TIME LINES ARE FOR SEA LEVEL. STANDARD CONDITIONS. TO OBTAIN TRUE TIME AT DENSITY ALTITUDE, DIVIDE $T \times \frac{1}{\sqrt{\sigma}}$ BY $\frac{1}{\sqrt{\sigma}}$.

45,456A

Figure 2A3-6

Figure 2A3-7

MODEL T - 29 C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TAKEOFF AND MINIMUM CONTROL SPEEDS
LANDING GEAR RETRACTED

ENGINES: R2800 - 99W

TAKEOFF SPEED - KNOTS (IAS)

0° FLAPS
6° FLAPS
12° FLAPS
20° FLAPS
24° FLAPS

1.2 POWER-OFF STALL SPEED

1.1 MINIMUM CONTROL SPEED

DENSITY
ALTITUDE
FEET

S.L.
2000
4000
6000
8000

GROSS WEIGHT - 1000 POUNDS

24,155C

2A3-16

Change 3

Figure 2A3-8

Appendix II
Part 3

T.O. 1T-29A-1
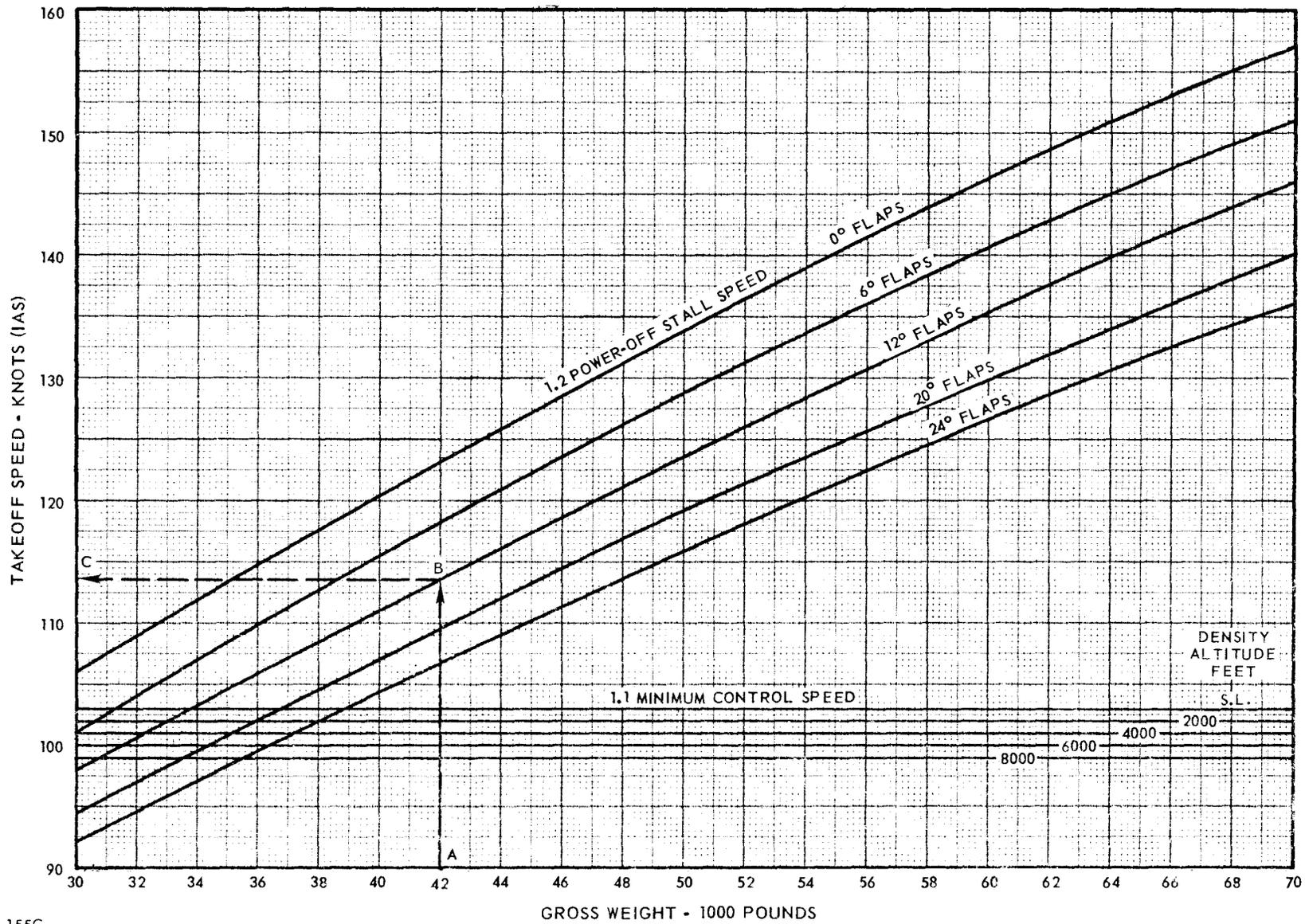
CRITICAL FIELD LENGTH (24° FLAP)

2800 RPM

MODEL: T-29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R2800-99W
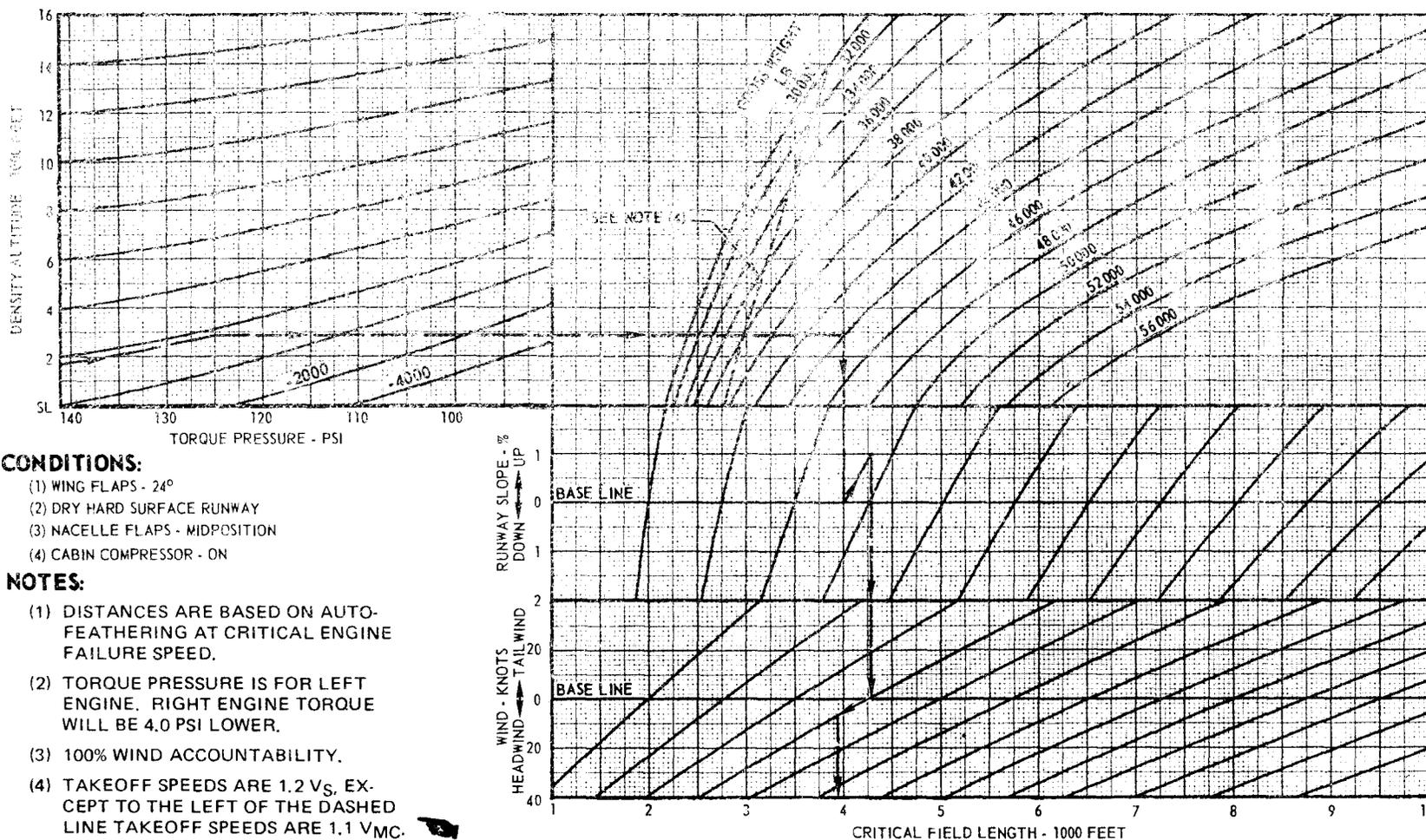
CONDITIONS:

(1) WING FLAPS - 24°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS - MIDPOSITION
(4) CABIN COMPRESSOR - ON

NOTES:

(1) DISTANCES ARE BASED ON AUTO-
FEATHERING AT CRITICAL ENGINE
FAILURE SPEED.

(2) TORQUE PRESSURE IS FOR LEFT
ENGINE. RIGHT ENGINE TORQUE
WILL BE 4.0 PSI LOWER.

(3) 100% WIND ACCOUNTABILITY.

(4) TAKEOFF SPEEDS ARE 1.2 V_S, EX-
CEPT TO THE LEFT OF THE DASHED
LINE TAKEOFF SPEEDS ARE 1.1 V_{MC}.
SEE TAKEOFF AND MINIMUM CON-
TROL SPEEDS CHART.

45,439D

REFUSAL SPEED (24° FLAP)

MODEL: T-29 C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R2800-99W

RUNWAY LENGTH - 1000 FEET

HEADWIND - KNOTS TAILWIND - KNOTS   TORQUE PRESSURE - PSI   DENSITY ALTITUDE - 1000 FEET   GROSS WEIGHT - 1000 POUNDS

TAKEOFF SPEED

REFUSAL SPEED IAS - KNOTS

CONDITIONS:
(1) WING FLAPS AT 24°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES:
(1) TORQUE PRESSURE IS FOR LEFT ENGINE.
    RIGHT ENGINE TORQUE PRESSURE WILL
    BE 4 0 PSI LOWER.
(2) 100% WIND ACCOUNTABILITY
(3) BASED ON PILOT REACTION TIME 6 SECONDS.

45,438D

TAKEOFF GROUND RUN (24° FLAP)

CONTINUOUS TWO ENGINE OPERATION

2800 RPM

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES. **R2800-99W**
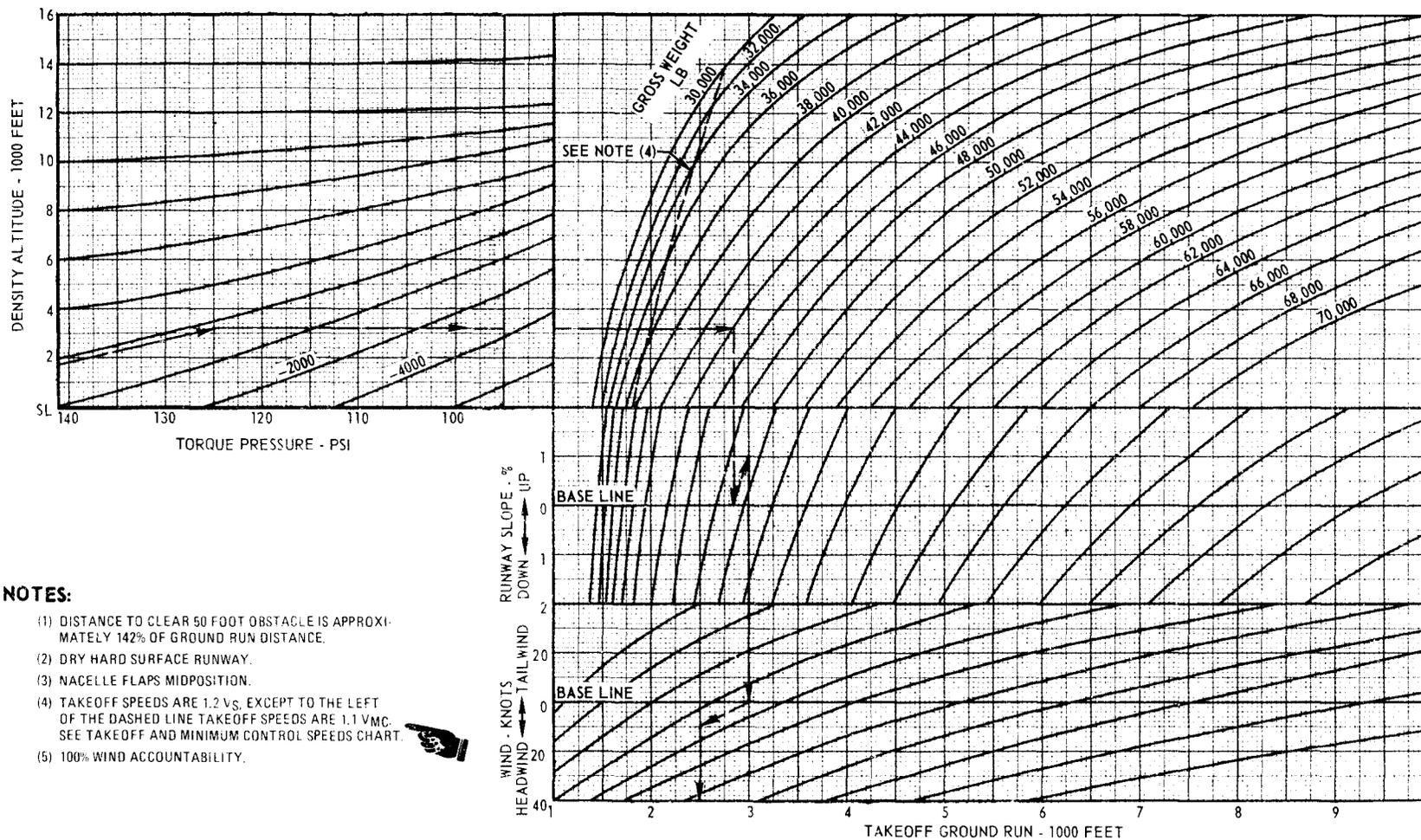
NOTES:

(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS APPROXI-
     MATELY 142% OF GROUND RUN DISTANCE.
(2) DRY HARD SURFACE RUNWAY.
(3) NACELLE FLAPS MIDPOSITION.
(4) TAKEOFF SPEEDS ARE 1.2 V_S, EXCEPT TO THE LEFT
     OF THE DASHED LINE TAKEOFF SPEEDS ARE 1.1 V_{MC}.
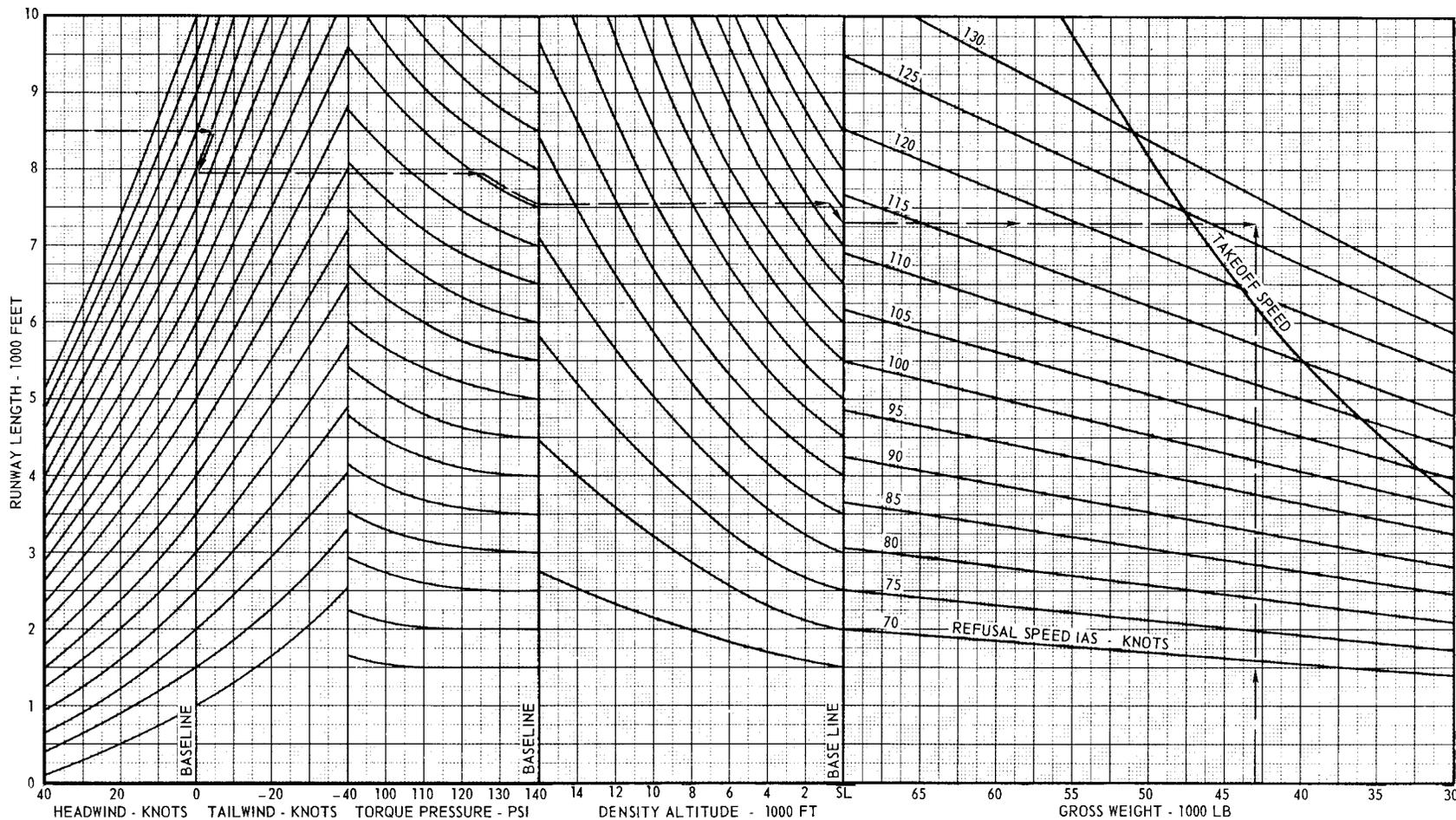   SEE TAKEOFF AND MINIMUM CONTROL SPEEDS CHART.
(5) 100% WIND ACCOUNTABILITY.

45,440D
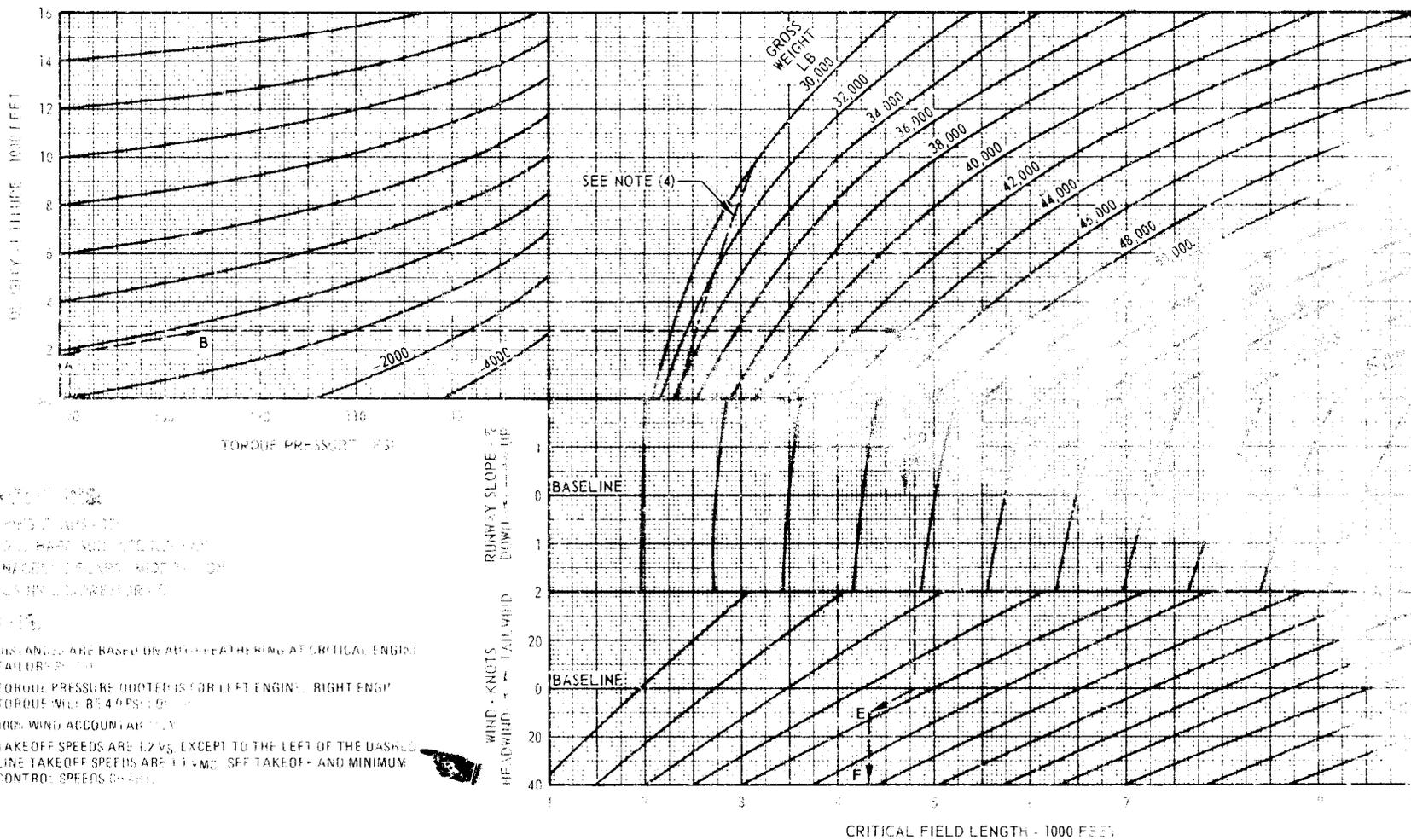
TORQUE PRESSURE - PSI

GROSS WEIGHT
LB
30,000
32,000
34,000
36,000
38,000
40,000
42,000
44,000
46,000
48,000

SEE NOTE (4)

B

2000

4000

RUNWAY SLOPE - %
DOWN

BASELINE

WIND - KNOTS
HEADWIND   TAILWIND

BASELINE

E

F

CRITICAL FIELD LENGTH - 1000 FEET

CONDITIONS:

NOTES:

(1) DISTANCES ARE BASED ON AUTOFEATHERING AT CRITICAL ENGINE FAILURE SPEED

(2) TORQUE PRESSURE QUOTED IS FOR LEFT ENGINE. RIGHT ENGINE TORQUE WILL BE 4.0 PSI LOWER

(3) 100% WIND ACCOUNTABILITY

(4) TAKEOFF SPEEDS ARE 1.2 VS EXCEPT TO THE LEFT OF THE DASHED LINE TAKEOFF SPEEDS ARE 1.1 VMC. SEE TAKEOFF AND MINIMUM CONTROL SPEEDS CHART

MODEL: **T29C /D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

REFUSAL SPEED (12° FLAP)

ENGINES: **R2800 - 99W**
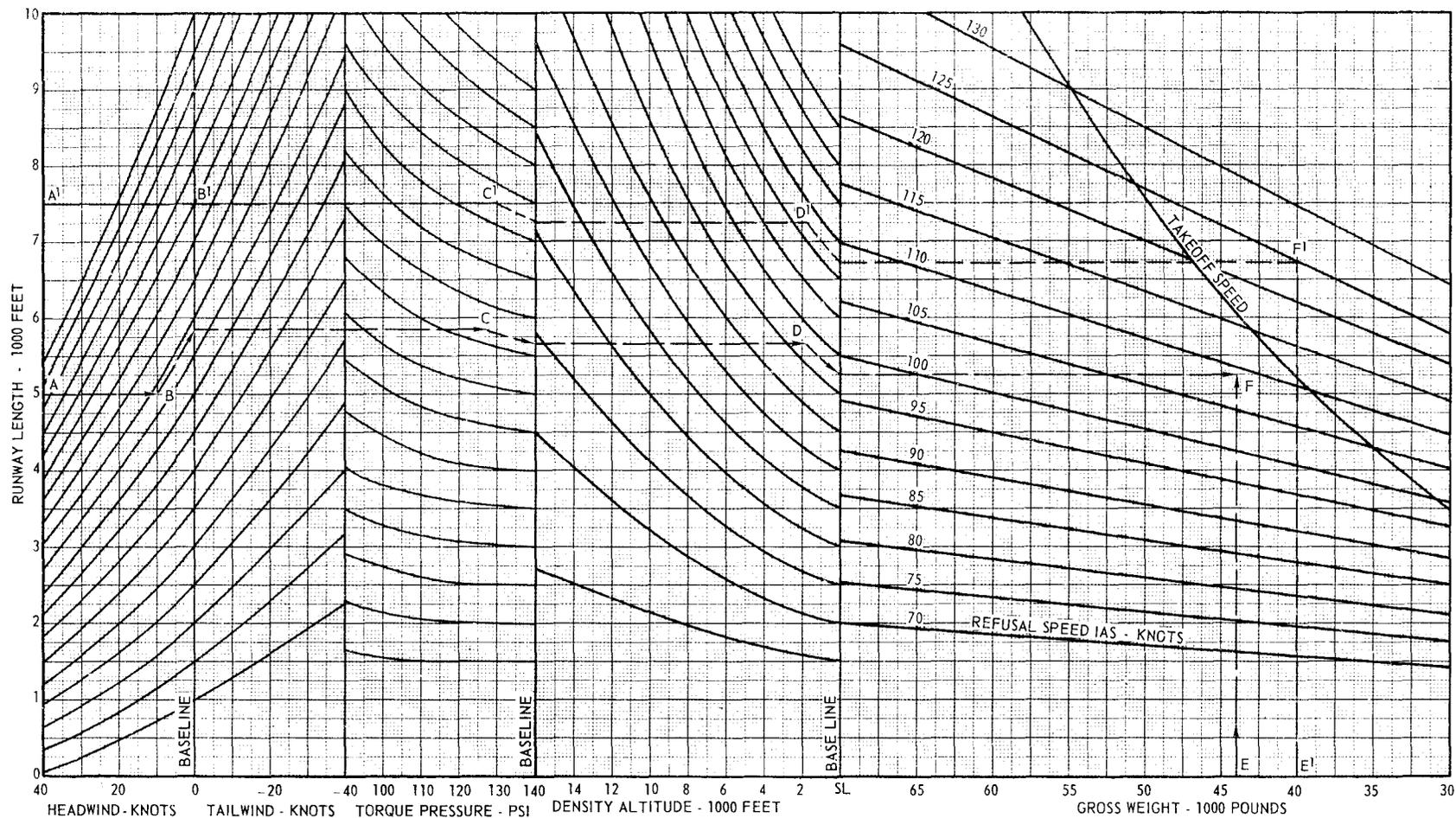
CONDITIONS: (1) WING FLAPS AT 12°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES: (1) TORQUE PRESSURE IS FOR LEFT ENGINE.
RIGHT ENGINE TORQUE PRESSURE WILL BE 4.0 PSI
LOWER.
(2) 100% WIND ACCOUNTABILITY
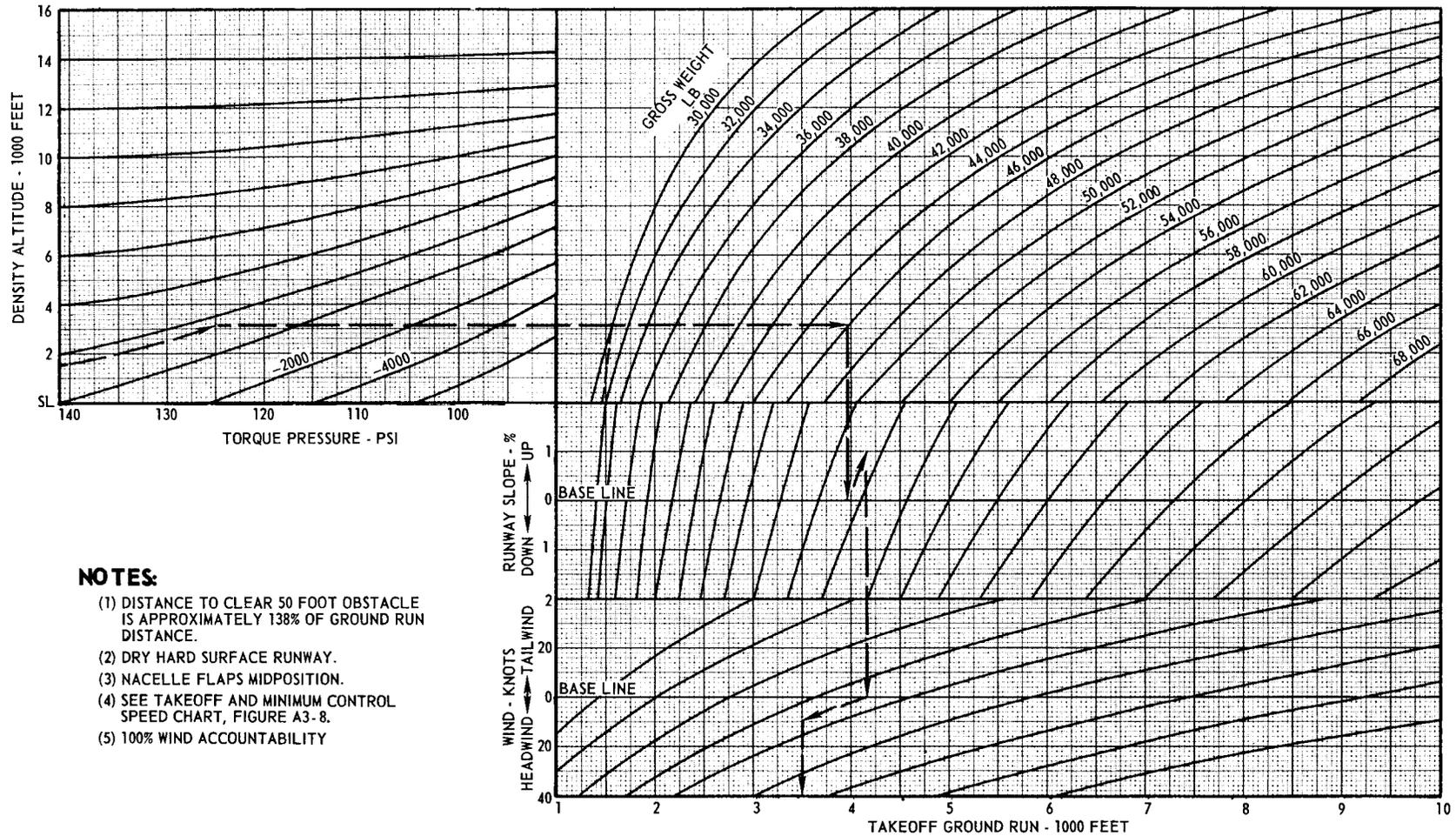(3) BASED ON PILOT REACTION TIME 6 SECONDS.

45,441D

TAKEOFF GROUND RUN (12° FLAP)
CONTINUOUS TWO ENGINE OPERATION
2800 RPM

MODEL: T-29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R2800-99W

NOTES:
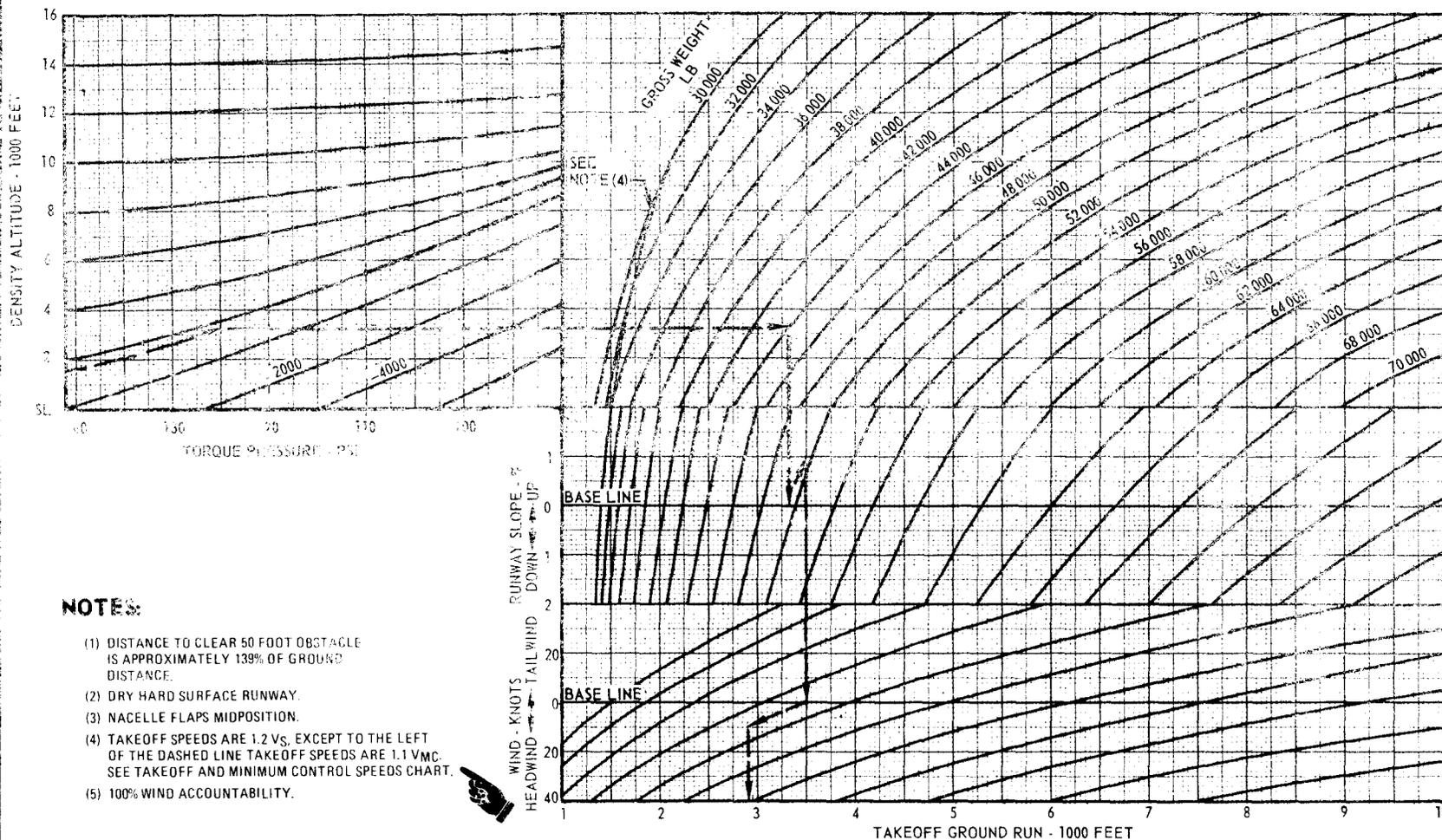
(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS APPROXIMATELY 139% OF GROUND DISTANCE.

(2) DRY HARD SURFACE RUNWAY.

(3) NACELLE FLAPS MIDPOSITION.

(4) TAKEOFF SPEEDS ARE 1.2 V_S, EXCEPT TO THE LEFT OF THE DASHED LINE TAKEOFF SPEEDS ARE 1.1 V_{MC}. SEE TAKEOFF AND MINIMUM CONTROL SPEEDS CHART.

(5) 100% WIND ACCOUNTABILITY.

DENSITY ALTITUDE - 1000 FEET

TORQUE PRESSURE - PSI

RUNWAY SLOPE - % DOWN ← → UP

WIND - KNOTS HEADWIND ← → TAILWIND

GROSS WEIGHT - LB

BASE LINE

SEE NOTE (4)

TAKEOFF GROUND RUN - 1000 FEET

CRITICAL FIELD LENGTH (6° FLAP)

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

2800 RPM

ENGINES: **R2800-99W**
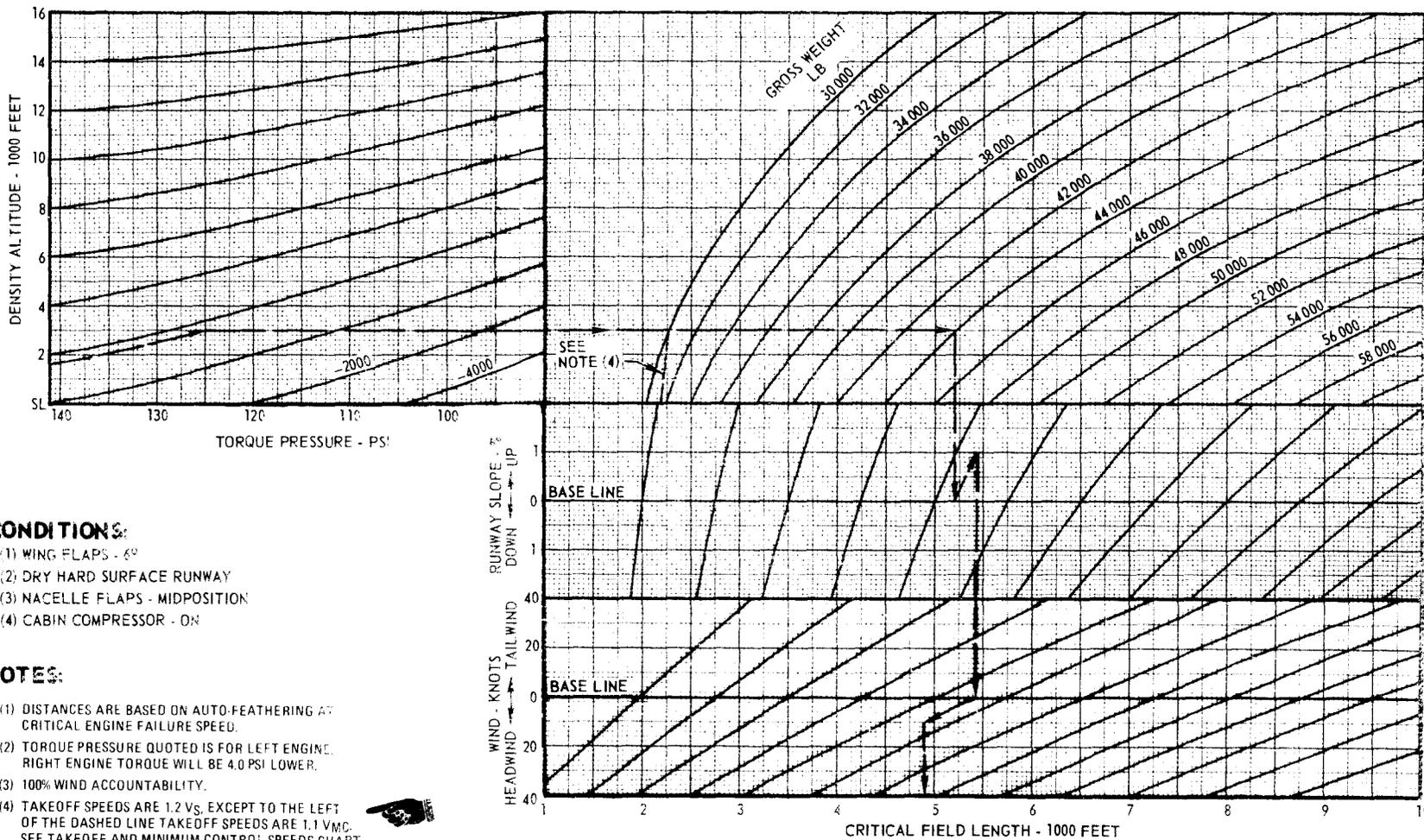
CONDITIONS:

(1) WING FLAPS - 6°

(2) DRY HARD SURFACE RUNWAY

(3) NACELLE FLAPS - MIDPOSITION

(4) CABIN COMPRESSOR - ON

NOTES:

(1) DISTANCES ARE BASED ON AUTO-FEATHERING AT CRITICAL ENGINE FAILURE SPEED.

(2) TORQUE PRESSURE QUOTED IS FOR LEFT ENGINE. RIGHT ENGINE TORQUE WILL BE 4.0 PSI LOWER.

(3) 100% WIND ACCOUNTABILITY.

(4) TAKEOFF SPEEDS ARE 1.2 V_S, EXCEPT TO THE LEFT OF THE DASHED LINE TAKEOFF SPEEDS ARE 1.1 V_{MC}. SEE TAKEOFF AND MINIMUM CONTROL SPEEDS CHART.

45,445D

REFUSAL SPEED (6° FLAP)

MODEL: T29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R2800-99W

HEADWIND - KNOTS   TAILWIND - KNOTS   TORQUE PRESSURE - PSI   DENSITY ALTITUDE - 1000 FT   GROSS WEIGHT - 1000 LB

RUNWAY LENGTH - 1000 FEET

REFUSAL SPEED IAS - KNOTS

TAKEOFF SPEED

CONDITIONS: (1) WING FLAPS AT 6°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES: (1) TORQUE PRESSURE IS FOR LEFT ENGINE.
RIGHT ENGINE TORQUE PRESSURE WILL
BE 4.0 PSI LOWER.
(2) 100% WIND ACCOUNTABILITY
(3) BASED ON PILOT REACTION TIME 6 SECONDS.

45,444D

TAKEOFF GROUND RUN (6° FLAP)
CONTINUOUS TWO ENGINE OPERATION
2800 RPM

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800 - 99W**

DENSITY ALTITUDE - 1000 FEET

TORQUE PRESSURE - PSI

GROSS WEIGHT LB
30,000 32,000 34,000 36,000 38,000 40,000 42,000 44,000 46,000 48,000 50,000 52,000 54,000 56,000 58,000 60,000 62,000 64,000 66,000 68,000

-2000 -4000

RUNWAY SLOPE - %
UP / DOWN

BASE LINE

WIND - KNOTS
HEADWIND / TAILWIND

BASE LINE

TAKEOFF GROUND RUN - 1000 FEET

NOTES:
(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS APPROXIMATELY 138% OF GROUND RUN DISTANCE.
(2) DRY HARD SURFACE RUNWAY.
(3) NACELLE FLAPS MIDPOSITION.
(4) SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A3-8.
(5) 100% WIND ACCOUNTABILITY

45,446C

CRITICAL FIELD LENGTH (0° FLAP)

2800 RPM

ENGINES: R2800-99W

MODEL: T-29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

GROSS WEIGHT
LB

30,000
32,000
34,000
36,000
38,000
40,000

16
14
12

CRITICAL FIELD LENGTH 1000 FEET
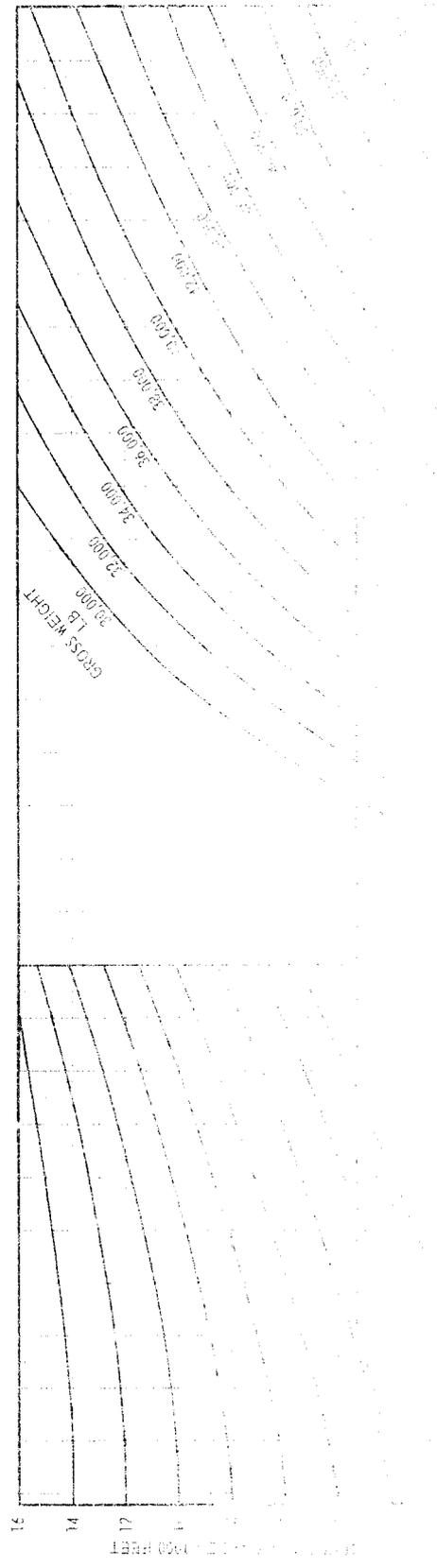
REFUSAL SPEED (0° FLAP)

MODEL: T29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R2800-99W

HEADWIND - KNOTS   TAILWIND - KNOTS   TORQUE PRESSURE - PSI   DENSITY ALTITUDE - 1000 FEET   GROSS WEIGHT - 1000 POUNDS

RUNWAY LENGTH - 1000 FEET

REFUSAL SPEED IAS - KNOTS

TAKEOFF SPEED
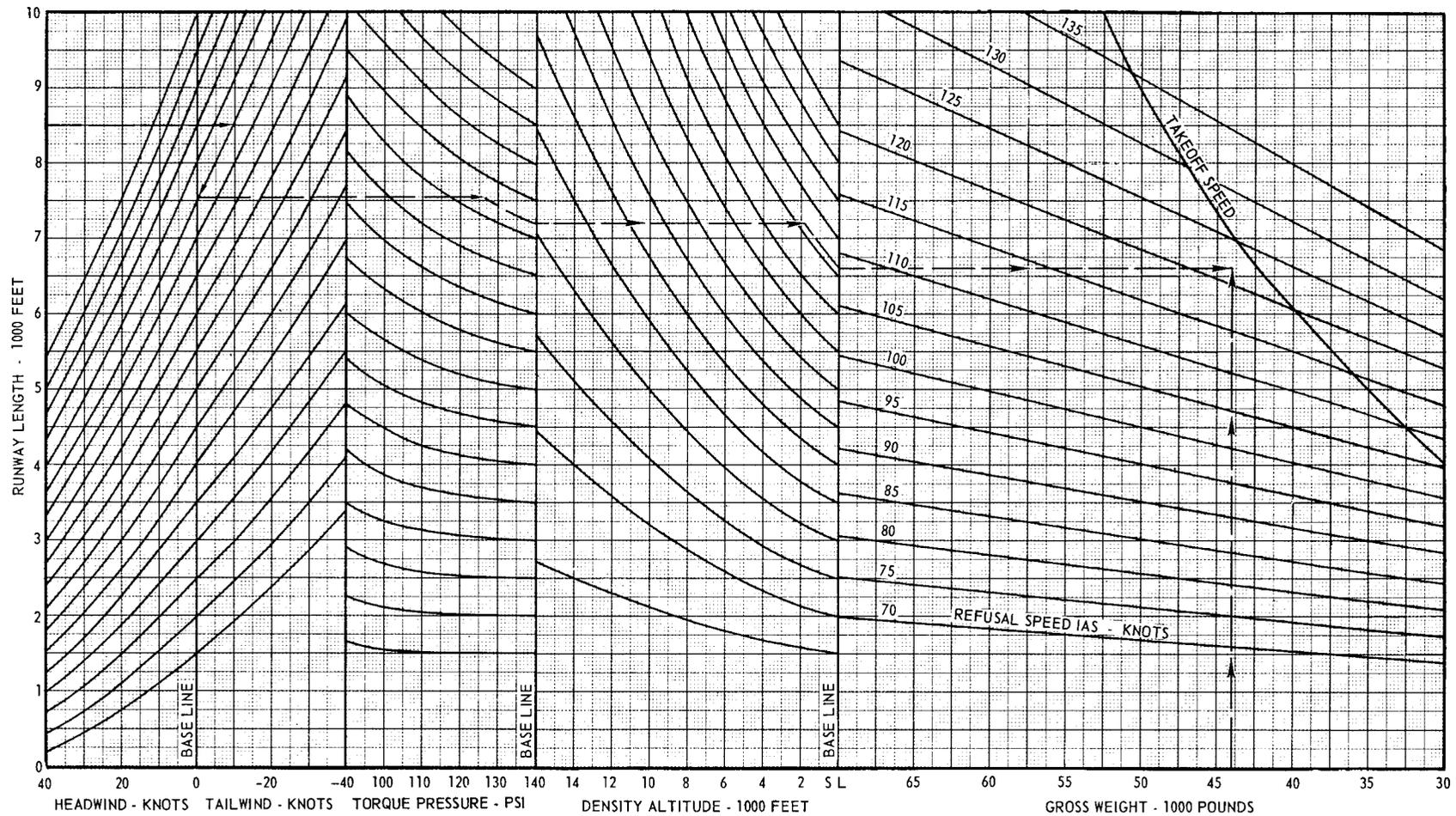
CONDITIONS: (1) WING FLAPS AT 0°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES: (1) TORQUE PRESSURE IS FOR LEFT ENGINE.
RIGHT ENGINE TORQUE PRESSURE WILL BE
4.0 PSI LOWER.
(2) 100% WIND ACCOUNTABILITY
(3) BASED ON PILOT REACTION TIME 6 SECONDS.

45,447D

TAKEOFF GROUND RUN (0° FLAP)

CONTINUOUS TWO ENGINE OPERATION
2800 RPM

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800-99W**

GROSS WEIGHT LB
30,000
32,000
34,000
36,000
38,000
40,000
42,000
44,000
46,000
48,000
50,000
52,000
54,000
56,000
58,000
60,000
62,000
64,000

DENSITY ALTITUDE - 1000 FEET

TORQUE PRESSURE - PSI

—2000
—4000

RUNWAY SLOPE - % UP DOWN

BASE LINE

WIND - KNOTS HEADWIND TAILWIND

BASE LINE

TAKEOFF GROUND RUN - 1000 FEET
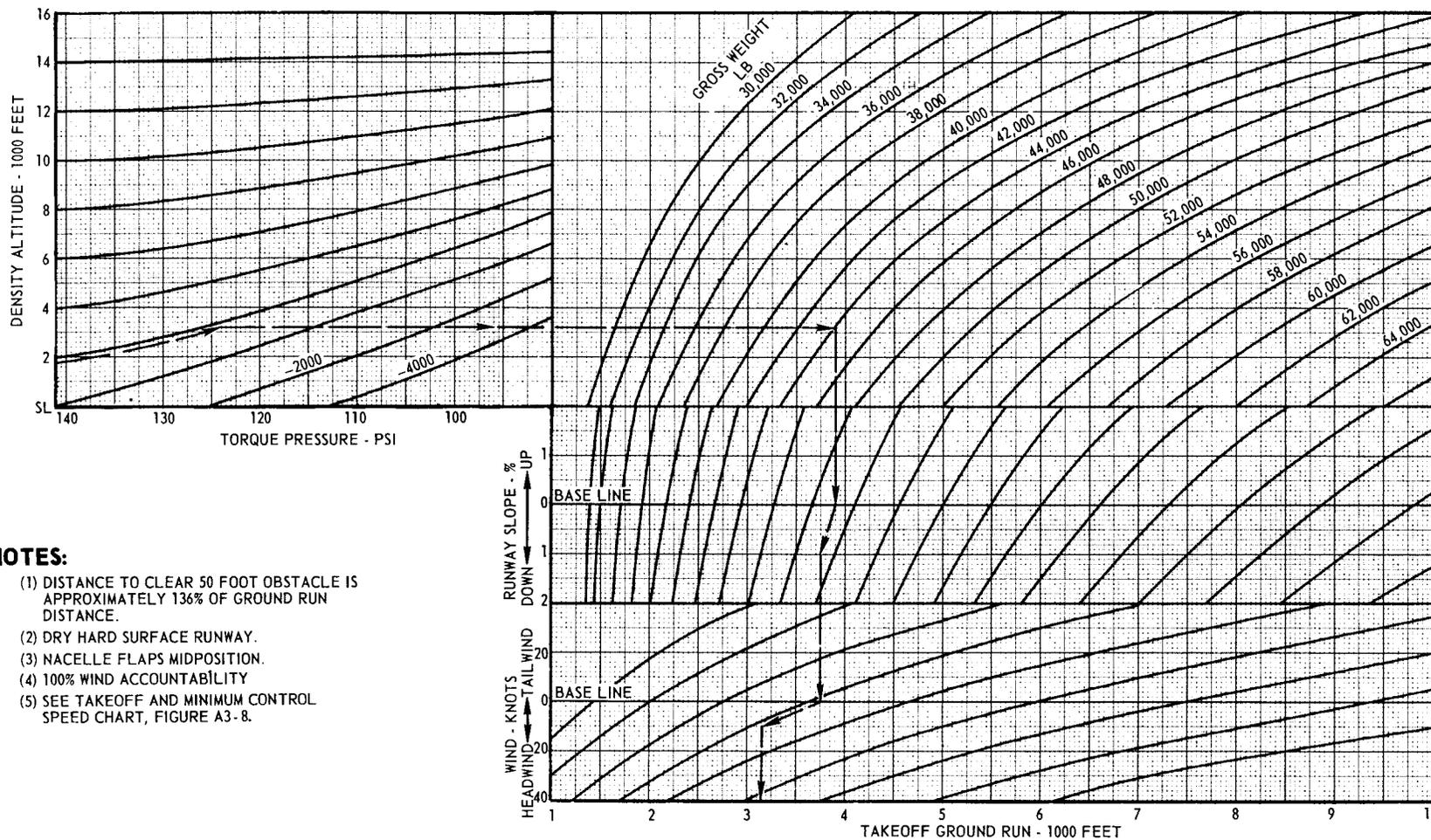
NOTES:

(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS APPROXIMATELY 136% OF GROUND RUN DISTANCE.

(2) DRY HARD SURFACE RUNWAY.

(3) NACELLE FLAPS MIDPOSITION.

(4) 100% WIND ACCOUNTABILITY

(5) SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A3-8.

MODEL: **T - 29C/D**
DATE: 13 JULY 1964
DATA BASIS: ESTIMATED

EFFECT OF RUNWAY SURFACE CONDITIONS
REFUSAL SPEED AND CRITICAL FIELD LENGTH CORRECTIONS
ALL FLAP SETTINGS

ENGINES: **R2800 - 99W**
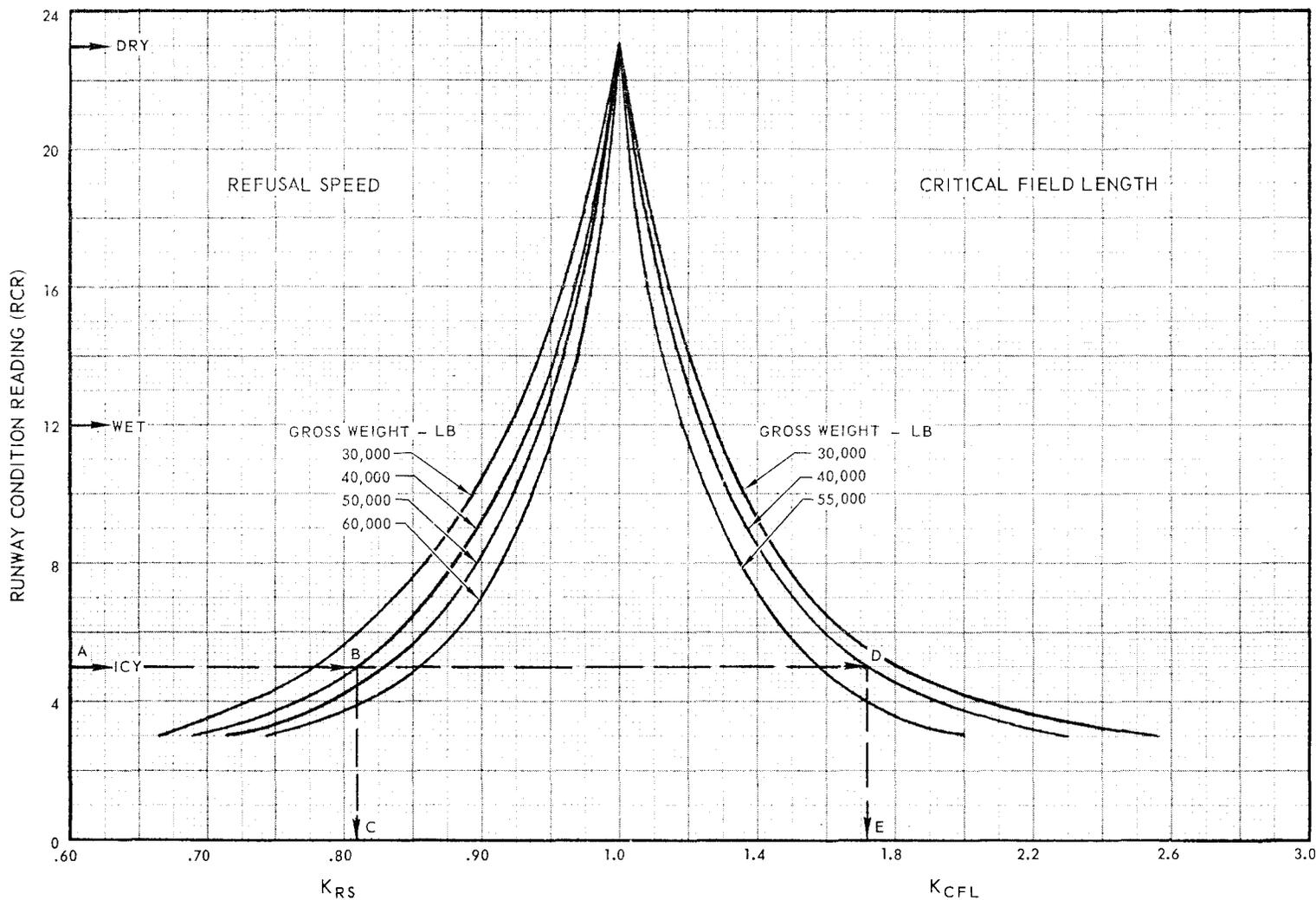
CORRECTED REFUSAL SPEED = K_{RS} × REFUSAL SPEED FROM CHARTS

CORRECTED CRITICAL FIELD LENGTH = K_{CFL} × CRITICAL FIELD LENGTH FROM CHARTS

NOTE: IF NO RCR IS AVAILABLE, USE 12 FOR
WET RUNWAYS AND 5 FOR ICY RUNWAYS.

45,977B

CLIMBOUT FACTOR FOR CLIMBOUT FLIGHT PATH

MODEL: T-29 C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

FOR ALL FLAP SETTINGS

2800 RPM

TWO AND ONE ENGINE OPERATION

ENGINES: R2800-99W

DENSITY ALTITUDE 1000 FEET

TAKEOFF GROSS WEIGHT - 1000 POUNDS

CLIMBOUT FACTOR

CLIMBOUT FLIGHT PATH - TWO ENGINE - 0° FLAP

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE

OBSTACLE HEIGHT 0 - 600 FEET

2800 RPM

ENGINES: **R2800-99W**

OBSTACLE HEIGHT - FEET

CLIMBOUT FACTOR

GEAR UP

BASE LINE

TAILWIND (KNOTS)

HEADWIND (KNOTS)

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET

NOTES:
(1) LANDING GEAR UP IN 6 SECONDS
(2) CLIMB SPEED = TAKEOFF SPEED
(3) 100% WIND ACCOUNTABILITY

45,463

CLIMBOUT FLIGHT PATH - TWO ENGINE - 6° FLAP

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 - 600 FEET

2800 RPM

ENGINES: **R2800-99W**

OBSTACLE HEIGHT - FEET

CLIMBOUT FACTOR

GEAR UP

TAILWIND (KNOTS)

BASE LINE

HEADWIND (KNOTS)

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET
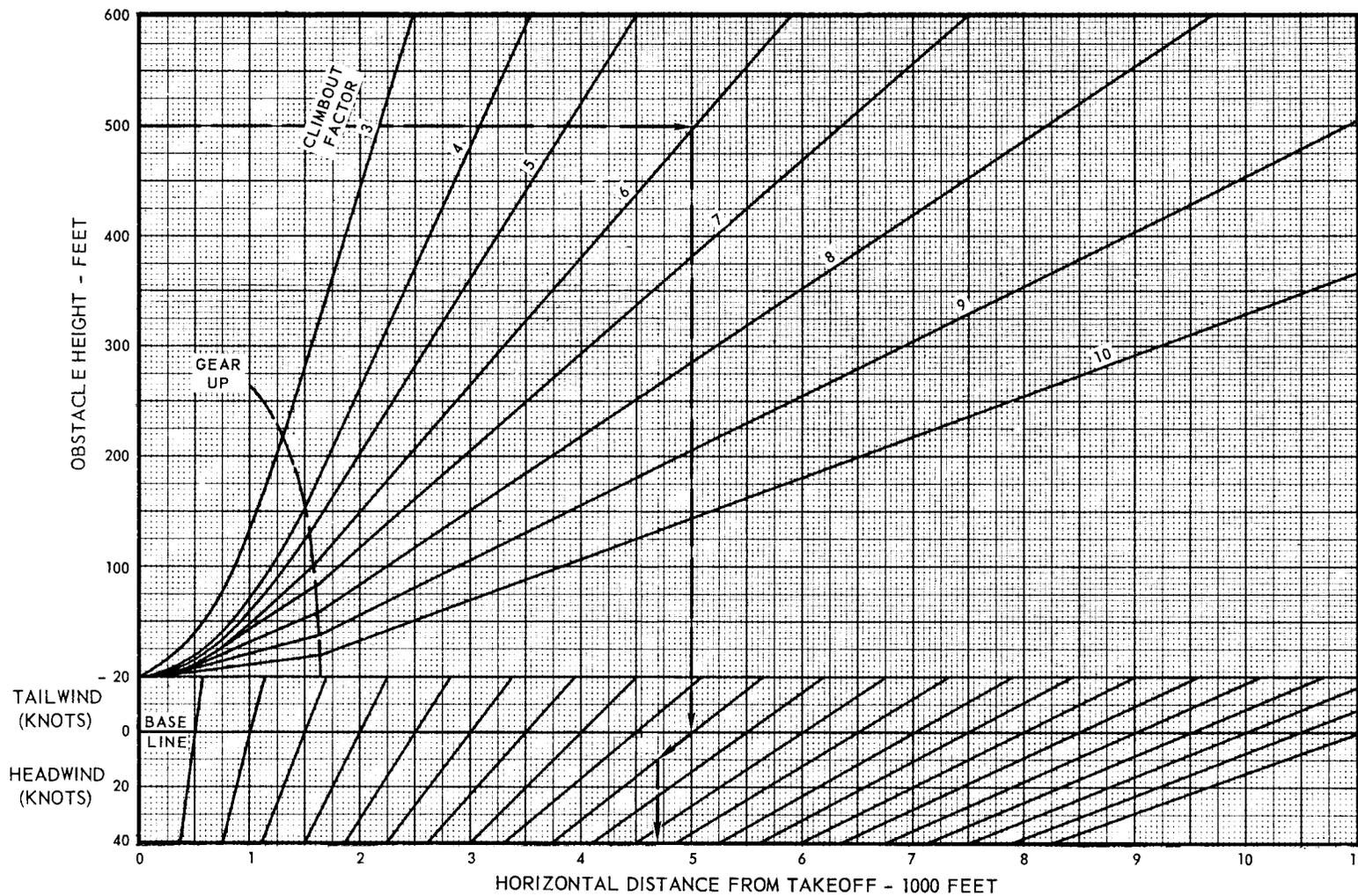
NOTES:

(1) LANDING GEAR UP IN 6 SECONDS

(2) CLIMB SPEED = TAKEOFF SPEED

(3) 100% WIND ACCOUNTABILITY

45,464A

CLIMBOUT FLIGHT PATH - TWO ENGINE - 12° FLAP

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE

2800 RPM

OBSTACLE HEIGHT 0 - 600 FEET

ENGINES: **R2800 - 99W**

NOTES:

(1) LANDING GEAR UP IN 6 SECONDS

(2) CLIMB SPEED = TAKEOFF SPEED

(3) 100% WIND ACCOUNTABILITY
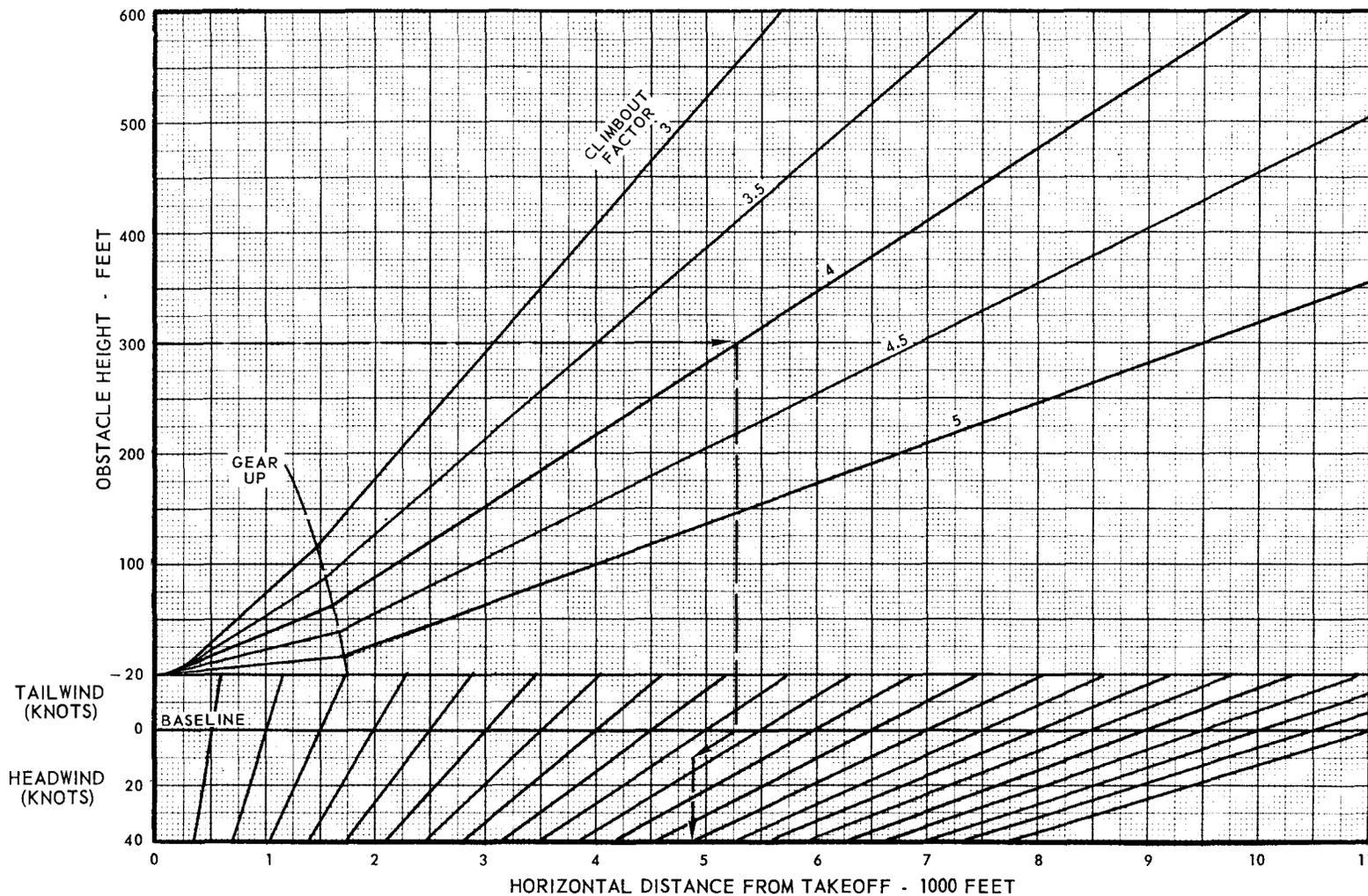
45,465

MODEL: T-29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

CLIMBOUT FLIGHT PATH - TWO ENGINE - 24° FLAP
INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 -600 FEET
2800 RPM

ENGINES: R2800-99W

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET

NOTES:

(1) LANDING GEAR UP IN 6 SECONDS

(2) CLIMB SPEED = TAKEOFF SPEED

(3) 100% WIND ACCOUNTABILITY
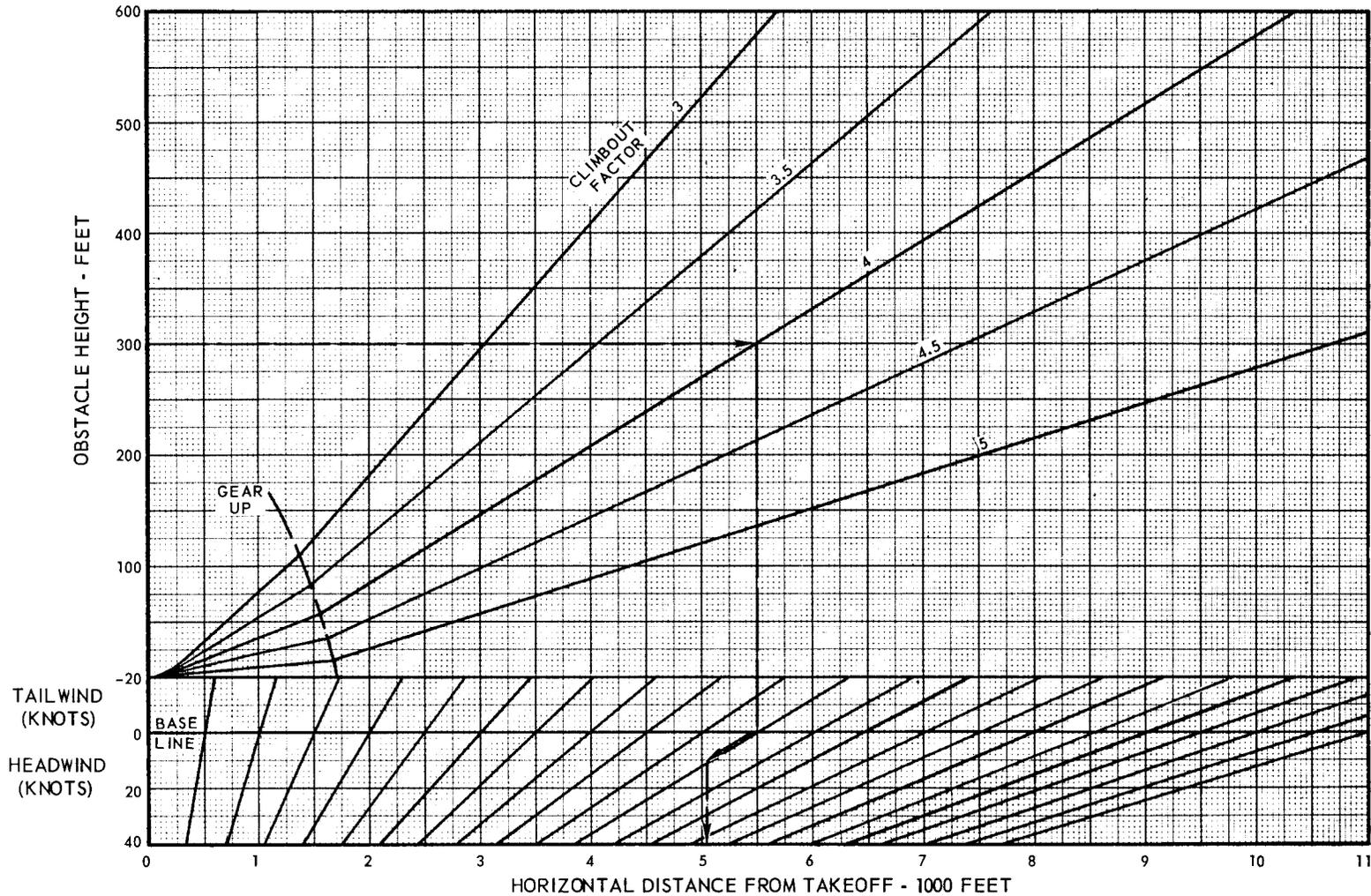
45,466

CLIMBOUT FLIGHT PATH - SINGLE ENGINE - 0° FLAP
INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 - 600 FEET
2800 RPM

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST
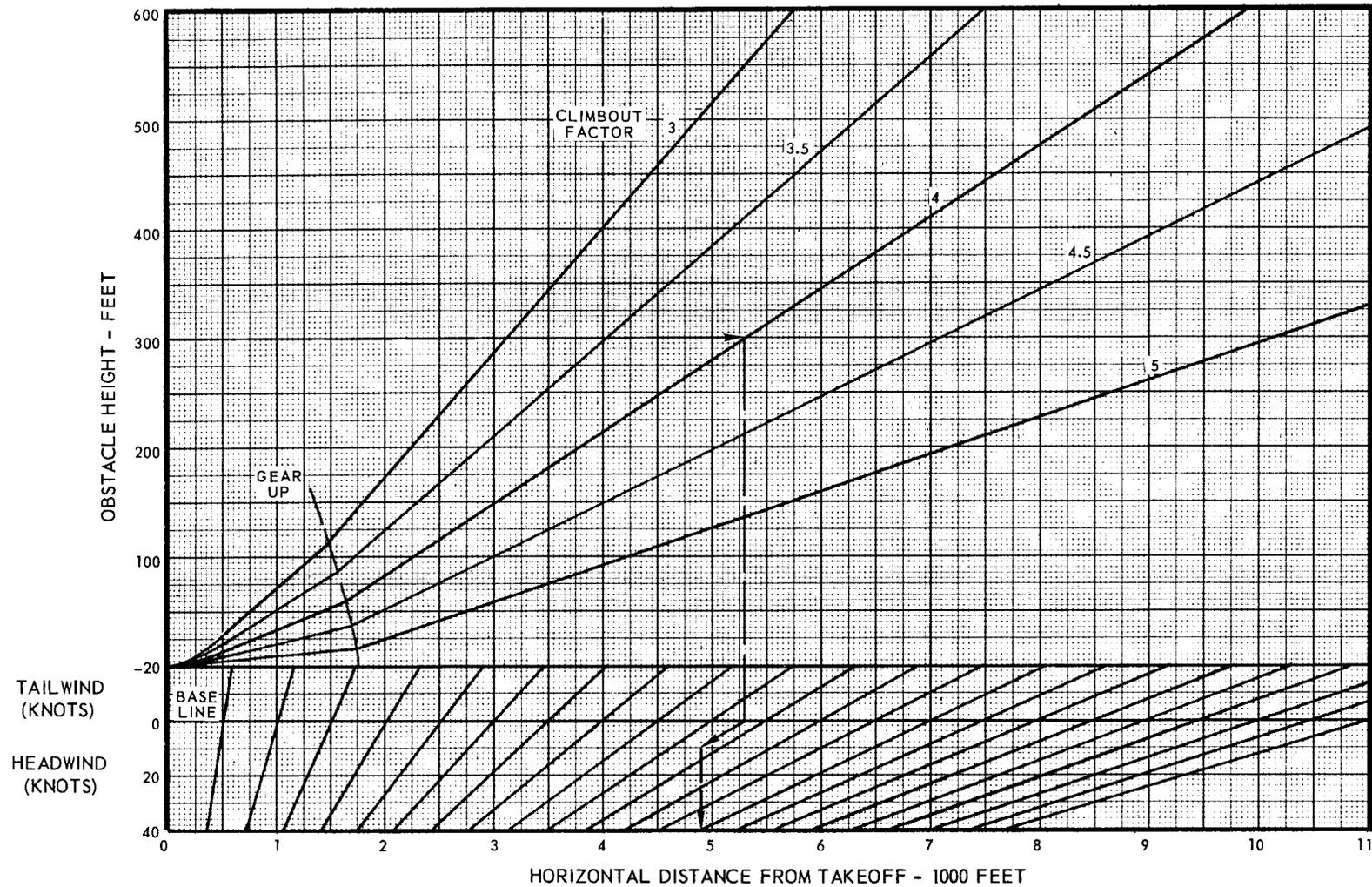
ENGINES: **R2800 - 99W**

OBSTACLE HEIGHT – FEET

CLIMBOUT FACTOR 3   3.5   4   4.5   5

GEAR UP

BASE LINE

TAILWIND (KNOTS)

HEADWIND (KNOTS)

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET

NOTES:
(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

45467A

MODEL: **T-29A/B/C/D**
DATE: 5 DECEMBER 1967
DATA BASIS: **FLIGHT TEST**
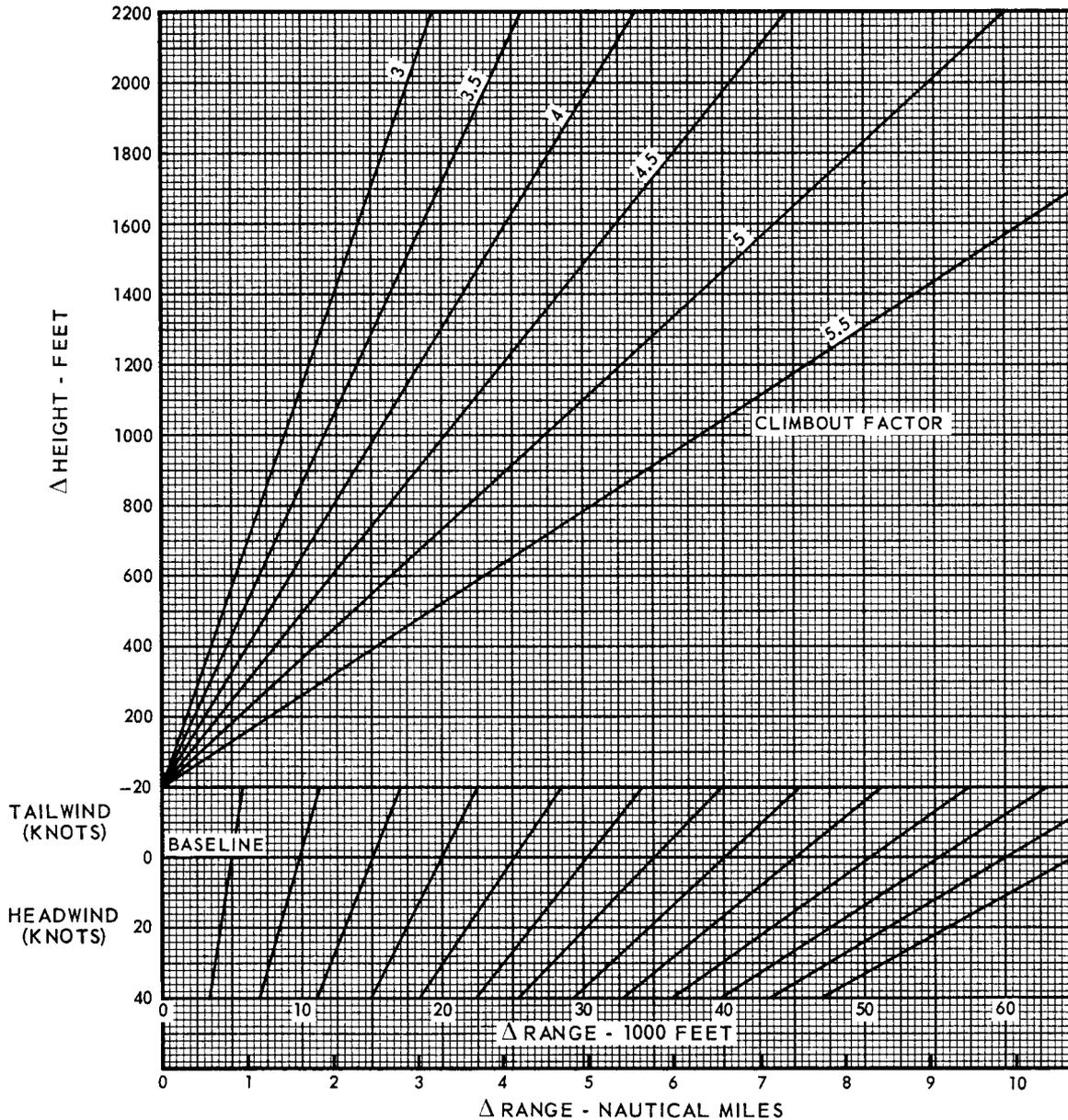
**CLIMBOUT FLIGHT PATH (EXTENDED) -
SINGLE ENGINE - 0° FLAPS**
2800 RPM

ENGINES: **R2800-97/99W**

NOTES:
(1) CLIMB SPEED EQUALS 1.2 STALL SPEED (0° FLAPS).
(2) 100% WIND ACCOUNTABILITY.
(3) CHART ASSUMES THAT CLIMB PATH AND AIRSPEED HAVE BEEN ESTABLISHED
BEFORE CHART IS ENTERED. USE CHART AS EXTENSION OF BASIC CLIMBOUT
FLIGHT PATH CHARTS WHICH INCLUDE TAKEOFF ACCELERATION DATA.
(4) USE CHART WITH CLIMBOUT FACTOR FROM 2800 RPM CLIMBOUT FACTOR
CHART ONLY.

45,601

Figure 2A3-27

MODEL: T-29 C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

CLIMBOUT FLIGHT PATH - SINGLE ENGINE - 6° FLAP
INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 - 600 FEET
2800 RPM

ENGINES: **R2800-99W**

NOTES:
(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
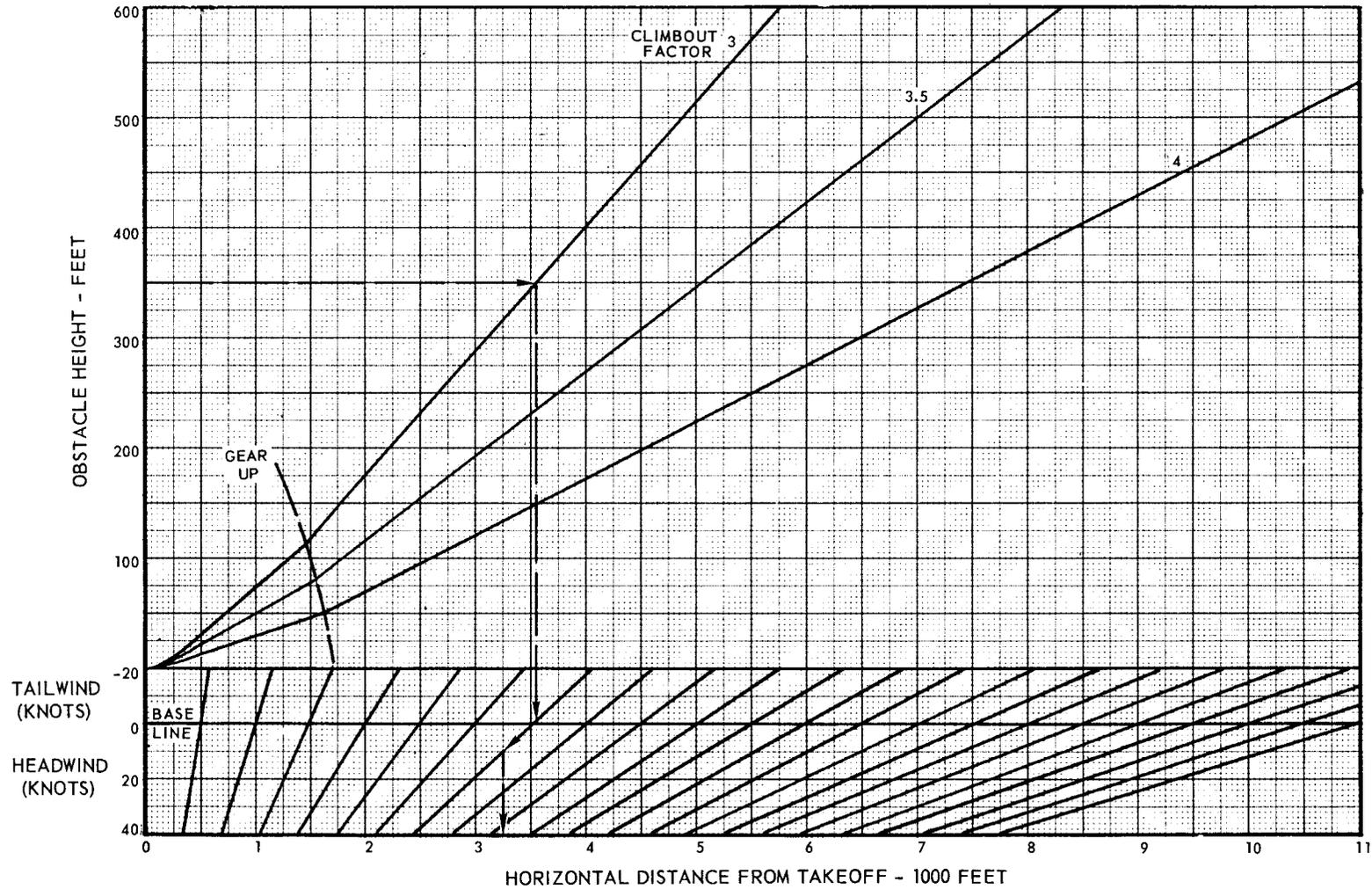(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

45468A

CLIMBOUT FLIGHT PATH - SINGLE ENGINE - 12° FLAP

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE
2800 RPM

OBSTACLE HEIGHT 0-600 FEET

ENGINES: **R2800-99W**

OBSTACLE HEIGHT - FEET

CLIMBOUT FACTOR

3
3.5
4
4.5
5

GEAR UP

TAILWIND (KNOTS)

BASE LINE

HEADWIND (KNOTS)

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET

NOTES:
(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

CLIMBOUT FLIGHT PATH · SINGLE ENGINE · 24° FLAP

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE

OBSTACLE HEIGHT 0 - 600 FEET

2800 RPM

ENGINES: **R2800 - 99W**

HORIZONTAL DISTANCE FROM TAKEOFF – 1000 FEET

NOTES:
(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

45470A

CLIMBOUT FACTOR FOR CLIMBOUT FLIGHT PATH

MODEL: **T-29 C/D**
DATE: 5 DECEMBER 1967
DATA BASIS: **FLIGHT TEST**

FLAPS RETRACTED

METO POWER
(2500 RPM TO 2700 RPM)

TWO ENGINE OPERATION

ENGINES: **R2800-99W**

DENSITY ALTITUDE
1000 FEET

16 12 8 4
S.L.
-4

BRAKE HORSEPOWER

1900
1800
1700
1600
1500
1400

30   40   50   60   3   4   5   6   7   8   9   10

TAKEOFF GROSS WEIGHT - 1000 POUNDS   CLIMBOUT FACTOR

MODEL: T-29C/D
DATE: 5 DECEMBER 1967
DATA BASIS: FLIGHT TEST
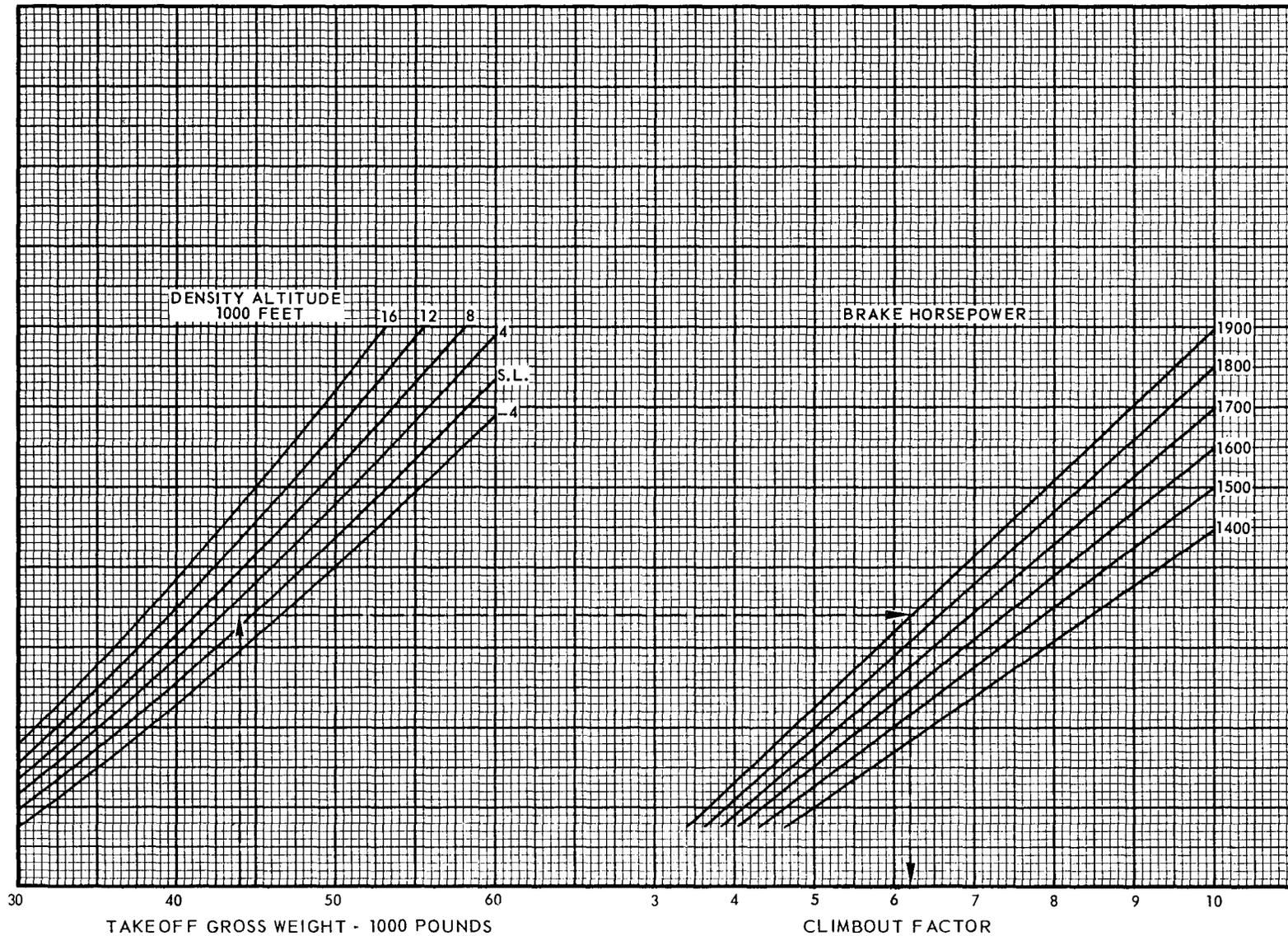
CLIMBOUT FLIGHT PATH (EXTENDED)
TWO ENGINE - 0° FLAPS
METO POWER

ENGINES: R2800-99W
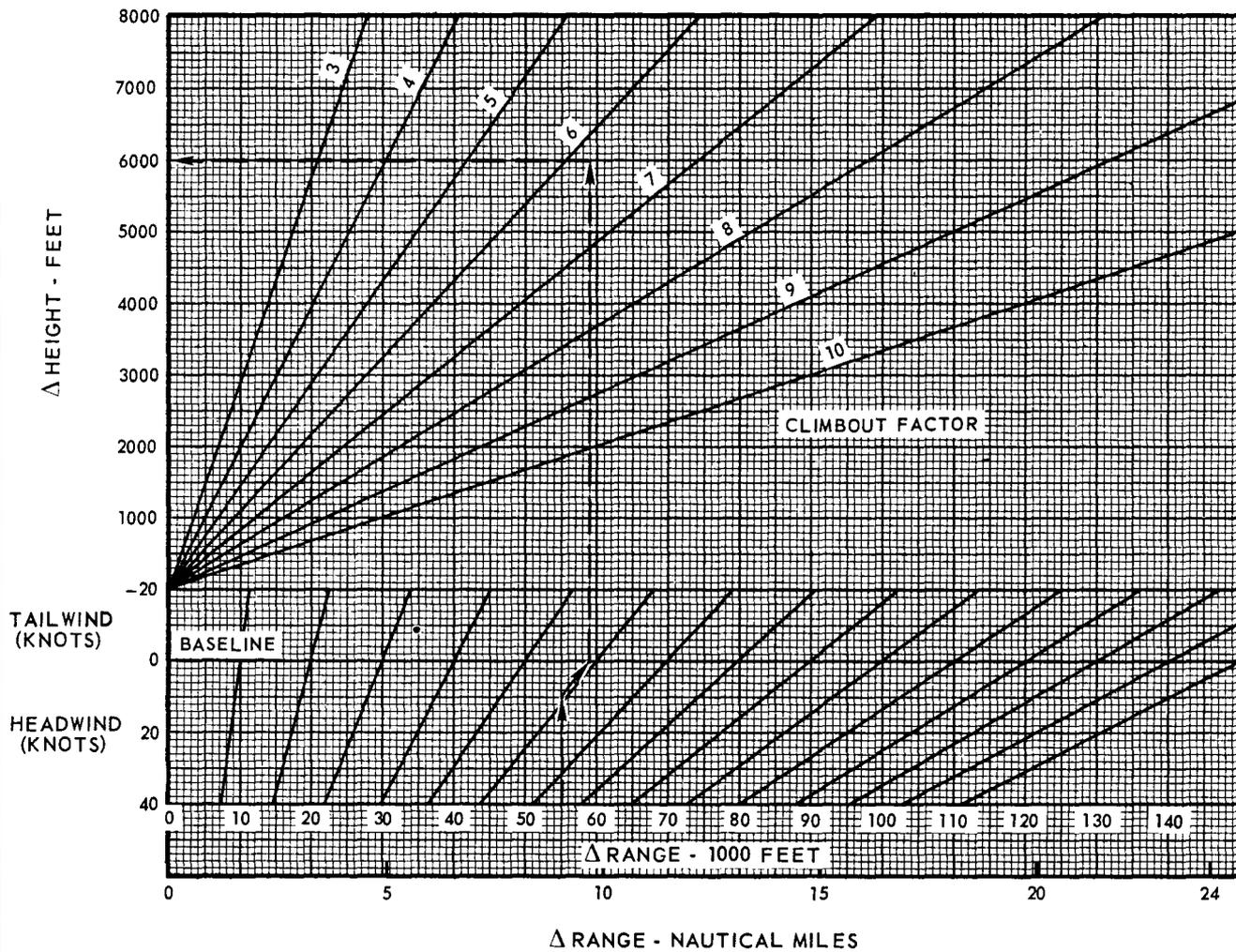
NOTES:
(1) CLIMB SPEED EQUALS 1.2 STALL SPEED (0° FLAPS).
(2) 100% WIND ACCOUNTABILITY.
(3) CHART ASSUMES THAT CLIMB PATH AND AIRSPEED HAVE BEEN ESTABLISHED BEFORE CHART IS ENTERED. USE CHART AS EXTENSION OF BASIC CLIMBOUT FLIGHT PATH CHARTS WHICH INCLUDE TAKEOFF ACCELERATION DATA.
(4) USE CHART WITH CLIMBOUT FACTOR FROM METO POWER CLIMBOUT FACTOR CHART ONLY.

45,606

Figure 2A3-32

PART 4 — CLIMB

Ⓒ Ⓓ

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The symbol * indicates an illustration

OPERATIONAL CLIMB

Operational climb performance is presented in two climb curves for normal two-engine operation (figures 2A4-1 and 2A4-2). One presents time and fuel consumed. The other presents distance and fuel consumed. The data are plotted in a convenient form against weight with guide lines representing the weight variation during a steady climb. The data are based upon recommended climb at 1500 BHP/ENG, in standard atmosphere with flaps and gear up at a constant airspeed. The climb power schedules show power settings to be used. These include manifold pressure, TPSI and blower speed. Fuel flow is based upon operation in the AUTO RICH mixture position. Climb performance in nonstandard atmospheric conditions is the same as that in standard atmospheric conditions if standard powers are obtainable. It is only necessary to determine the comparable density altitude and obtain the standard power for that altitude.

Note

The airplane's lift and drag depend primarily upon the density of the air, while the engine power depends upon the pressure of the air, until full throttle is reached. To determine the climb per-

formance under nonstandard conditions, one must determine the fuel, distance and time to climb using density altitudes and obtain the standard power for pressure altitude by adjusting the manifold pressures as required.

If standard powers are not obtainable, a substantial decrease in climb performances can be expected. Speeds shown are those for best rate of climb consistent with engine cooling. Increasing speeds above those shown will decrease the rate of climb and increase time, distance, and fuel consumed in climb. Data are included to show the service (100 fpm rate of climb) and cruise (300 fpm rate of climb) ceilings.

EXAMPLE

For time to climb (figure 2A4-1) enter chart with gross weight and density altitude at start of climb (A). Parallel guide line to density altitude at end of climb (B). Read across to find time to climb in minutes (C). Gross weight at end of climb may be found by reading across from density altitude at end of climb (B) parallel to fuel lines to fuel used in climb (D) and subtracting this weight from the gross weight at start of climb. For distance and fuel (figure 2A4-2) follow same procedure as for time to climb and read distance in climb (nautical miles) to

the left. Follow guide lines to the right from density altitude at end of climb and read total fuel used in climb.

METO POWER CLIMB

METO power climb performance is presented in two climb curves (figures 2A4-3 and 2A4-4). One presents time and speed. The other presents distance and fuel consumed. Airspeeds shown (IAS vs density altitude) are the same for both charts. The data are plotted in a convenient form against weight and guide lines representing the weight variations during a steady climb. The data are based upon climb at METO power, standard atmosphere with flaps and gear up. The METO power schedule shows power settings to be used. The charts are used in the same manner as the operational climb charts.

CEILING — ONE ENGINE INOPERATIVE

Absolute and service ceilings of the airplane at various weights with METO power under standard conditions are presented in two charts (figures 2A4-5 and 2A4-6). One chart is for normal fuel grade 115/145 and the other for alternate grade fuel 100/130. These charts can be used to find terrain clearance if an engine should fail enroute. Single-engine drift-down altitude can also be determined by these charts. The gross weight refers to the gross weight of the airplane at the time of engine failure.

DRIFT-DOWN

If an engine fails during flight at altitudes above single-engine ceiling, the airplane will drift down; i.e., lose altitude at a decreasing rate until stabilized flight is attained at the absolute ceiling for the power and instantaneous weight conditions. Drift-down performance is presented in figure 2A4-7. For best results operate the remaining engine at METO power and fly the airplane at recommended speed for weight shown on the chart. In cases of emergency at lower altitudes, the use of military power (2800 rpm) for a limited time will reduce the altitude loss. To use the chart, enter with the airplane gross weight at the time of engine failure (A). Proceed vertically to the initial altitude (B). Read the distance traveled during drift-down on the right-hand scale (C). From the initial altitude, parallel the guide lines down to the gross weight scale (D) and read the airplane gross weight at the end of drift-down (final gross weight). With this weight, enter the final gross weight scale in the upper left corner (E). Proceed vertically down to the drift-down curve, then horizontally to the final altitude scale (F).

OPERATIONAL CLIMB - TIME TO CLIMB AND FUEL CONSUMED
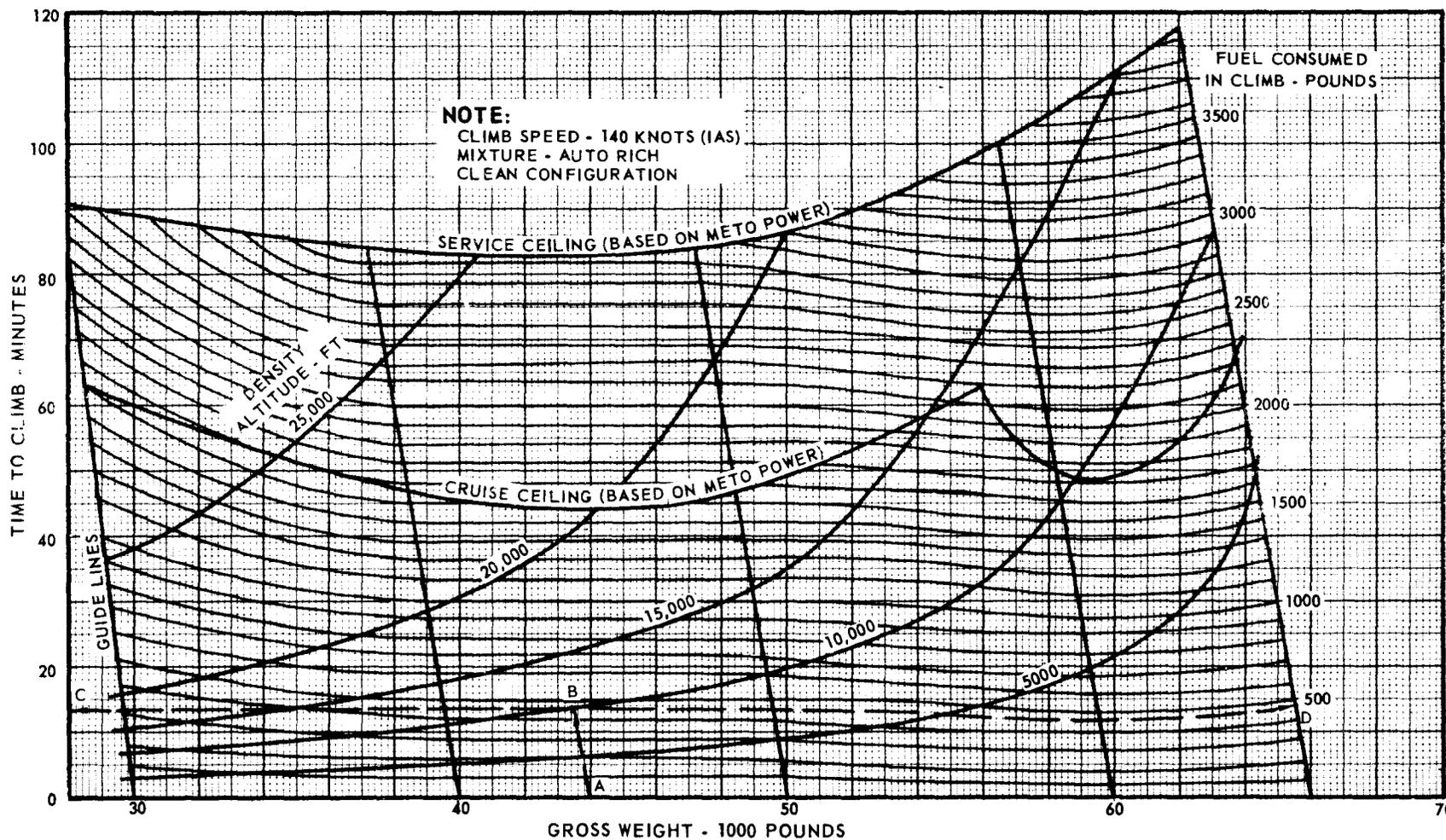
MODEL: T-29C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

1500 BHP/ENG

ENGINES: R2800-99W

NOTE:
CLIMB SPEED - 140 KNOTS (IAS)
MIXTURE - AUTO RICH
CLEAN CONFIGURATION

FUEL CONSUMED
IN CLIMB - POUNDS

SERVICE CEILING (BASED ON METO POWER)

CRUISE CEILING (BASED ON METO POWER)

DENSITY ALTITUDE - FT

25,000

20,000

15,000

10,000

5000

GUIDE LINES

TIME TO CLIMB - MINUTES

GROSS WEIGHT - 1000 POUNDS

2A4-4

Change 1

Figure 2A4-2

Appendix II
Part 4

T.O. 1T-29A-1

OPERATIONAL CLIMB - DISTANCE AND FUEL
1500 BHP/ENG

MODEL: **T-29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800-99W**

NOTE:
CLIMB SPEED - 140 KTS (IAS)
MIXTURE - AUTO RICH
CLEAN CONFIGURATION

45,534D

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

METO POWER CLIMB - TIME AND SPEED

FUEL GRADE 115/145

ENGINES: **R2800-99W**

APPROXIMATE BEST CLIMB SPEED

GROSS WEIGHT POUNDS	IAS KNOTS
30,000	120
32,000	121
34,000	122
36,000	123
38,000	124
40,000	125
42,000	127
44,000	129
46,000	131
48,000	133
50,000	135
52,000	137
54,000	139
56,000	141
58,000	143
60,000	145

NOTE: MIXTURE AUTO RICH

TIME TO CLIMB - MINUTES

GROSS WEIGHT - 1000 POUNDS

FUEL CONSUMED IN CLIMB - POUNDS

SERVICE CEILING

CRUISE CEILING

DENSITY ALTITUDE - FEET

GUIDE LINE

3200, 3000, 2800, 2600, 2400, 2200, 2000, 1800, 1600, 1400, 1200, 1000, 800, 600, 400, 200
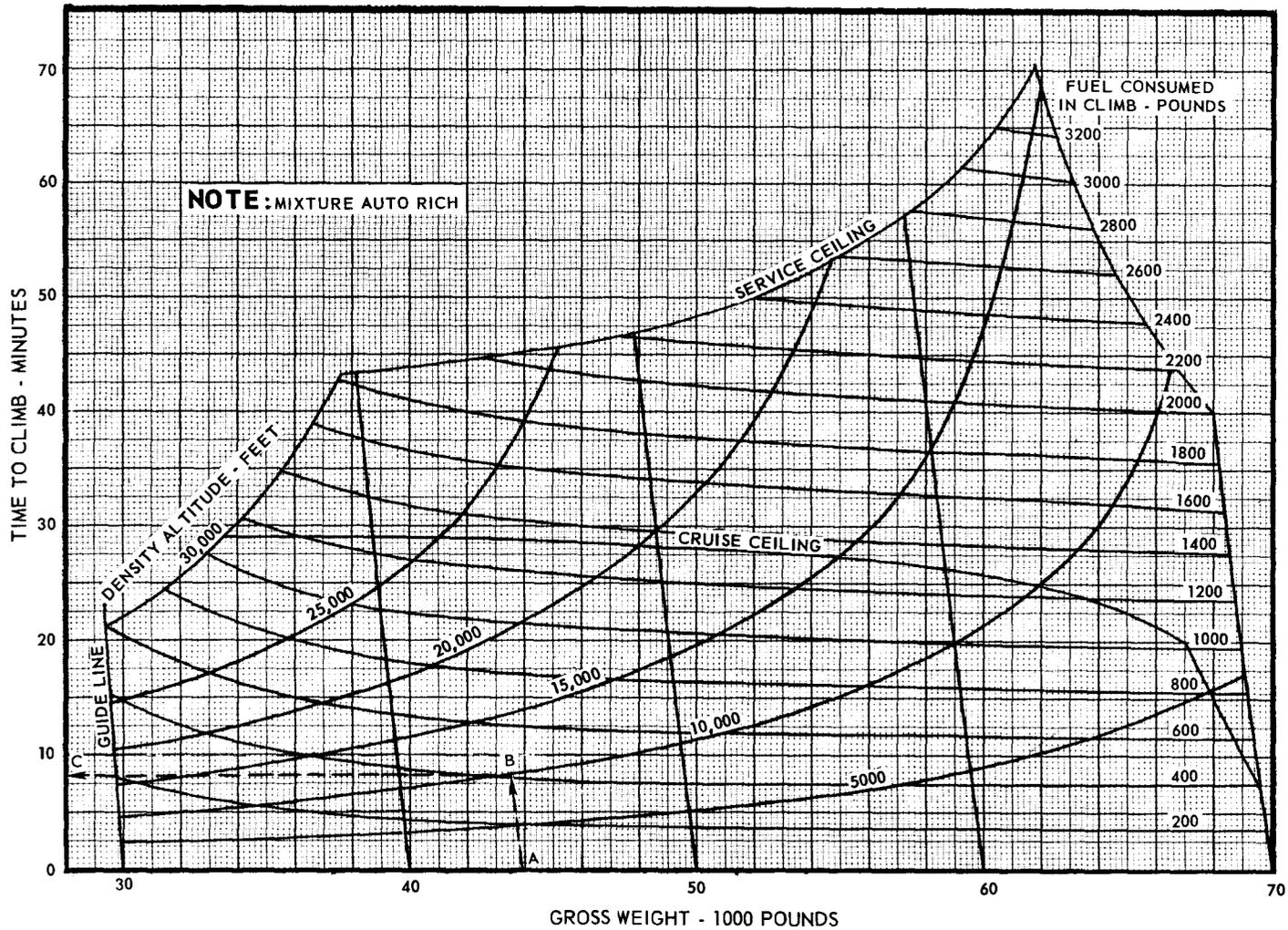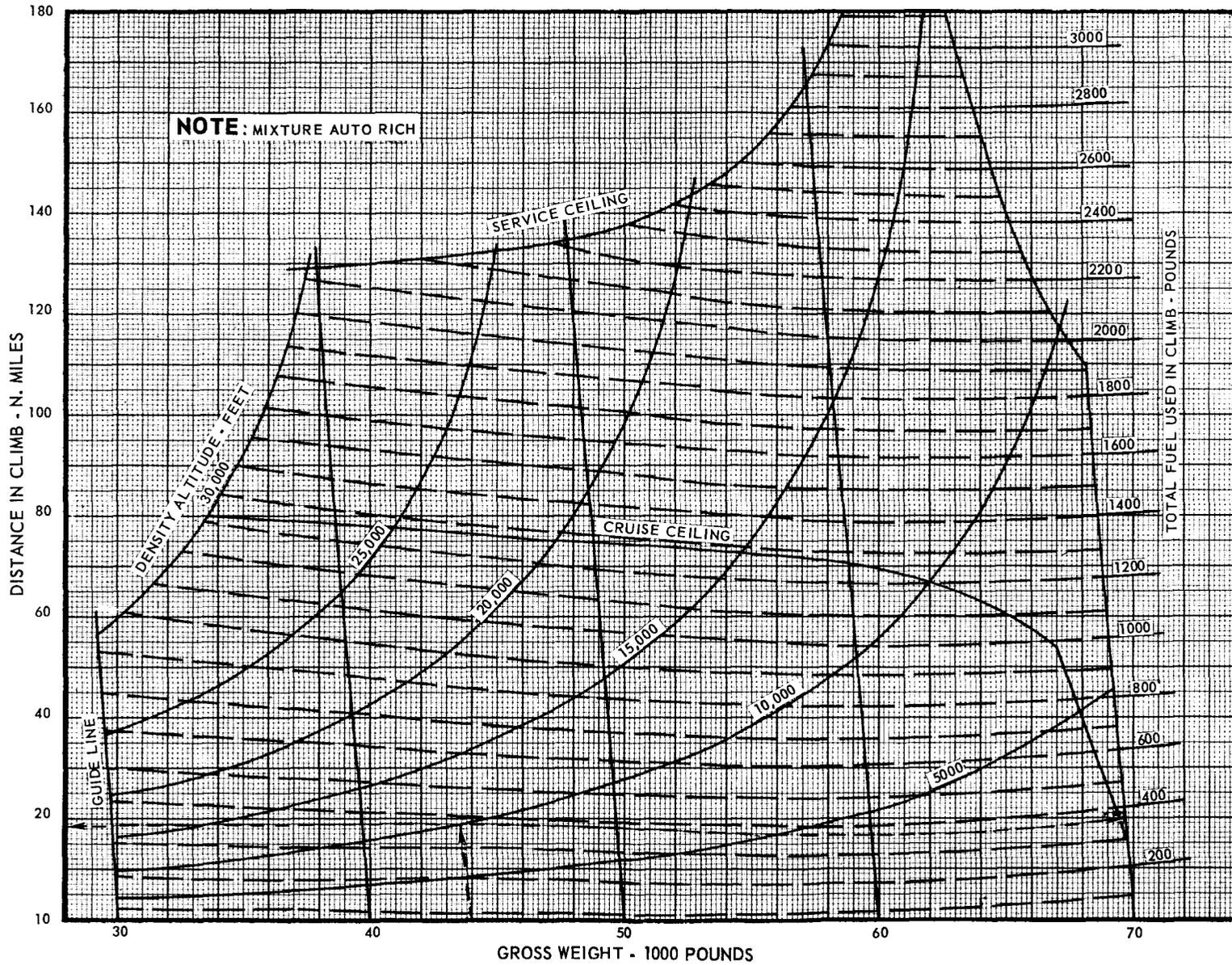
30,000 / 25,000 / 20,000 / 15,000 / 10,000 / 5000

MODEL: T - 29 C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

METO POWER CLIMB - DISTANCE AND FUEL

115 - 145 GRADE FUEL

ENGINES: R2800 - 99W

NOTE: MIXTURE AUTO RICH

SERVICE CEILING

CRUISE CEILING

DENSITY ALTITUDE - FEET
30,000
25,000
20,000
15,000
10,000
5000

GUIDE LINE

DISTANCE IN CLIMB - N. MILES

GROSS WEIGHT - 1000 POUNDS

TOTAL FUEL USED IN CLIMB - POUNDS

3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200

45,570B

CEILING - ONE ENGINE INOPERATIVE

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

FUEL GRADE 115/145   CLEAN CONFIGURATION
STANDARD ATMOSPHERE   PROPELLER FEATHERED

ENGINES: **R2800-99W**

METO POWER
MILITARY POWER

DENSITY ALTITUDE - 1000 FT

SERVICE CEILING (R/C = 100 FPM)
ABSOLUTE CEILING (R/C = 0 FPM)
CRUISE CEILING (R/C = 300 FPM)

GROSS WEIGHT - 1000 LB
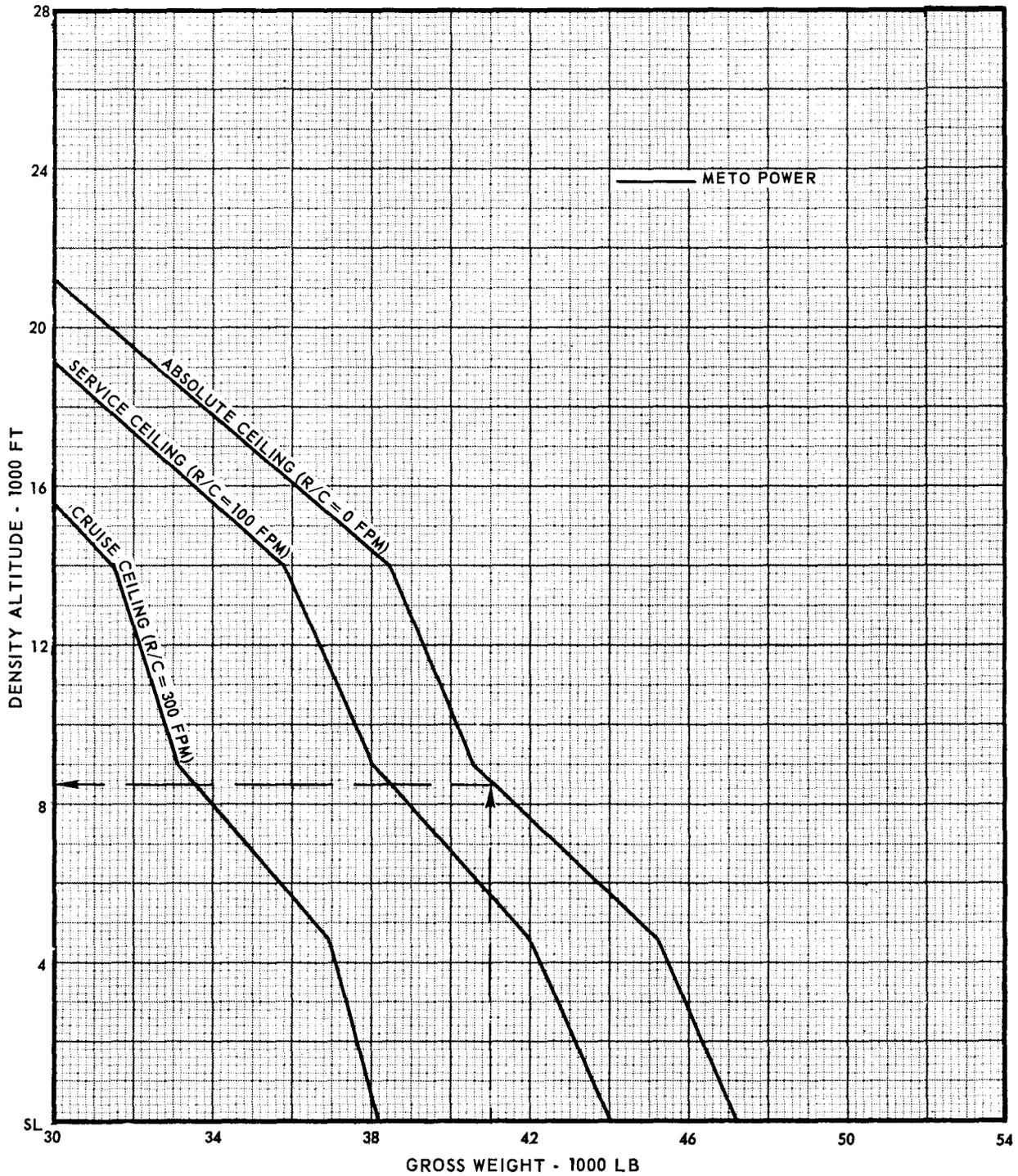
45,450A

Figure 2A4-5

CEILING - ONE ENGINE INOPERATIVE

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

FUEL GRADE 100/130   CLEAN CONFIGURATION
STANDARD ATMOSPHERE   PROPELLER FEATHERED

ENGINES: **R2800-99W**

45,451A

Figure 2A4-6

DRIFTDOWN - ONE ENGINE INOPERATIVE
METO POWER

MODEL: **T-29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R 2800-99W**

FINAL GROSS WEIGHT - 1000 POUNDS

FINAL DENSITY ALTITUDE - 1000 FEET

DISTANCE TRAVELED DURING DRIFTDOWN - KN MILES

DENSITY ALTITUDE - FEET

GROSS WEIGHT POUNDS	RECOMMENDED SPEED-KIAS
30,000	113
32,000	115
34,000	117
36,000	119
38,000	121
40,000	123
42,000	125
44,000	127
46,000	130
48,000	132
50,000	135

TYPICAL DRIFTDOWN PATH

GROSS WEIGHT - 1000 POUNDS

45,460A
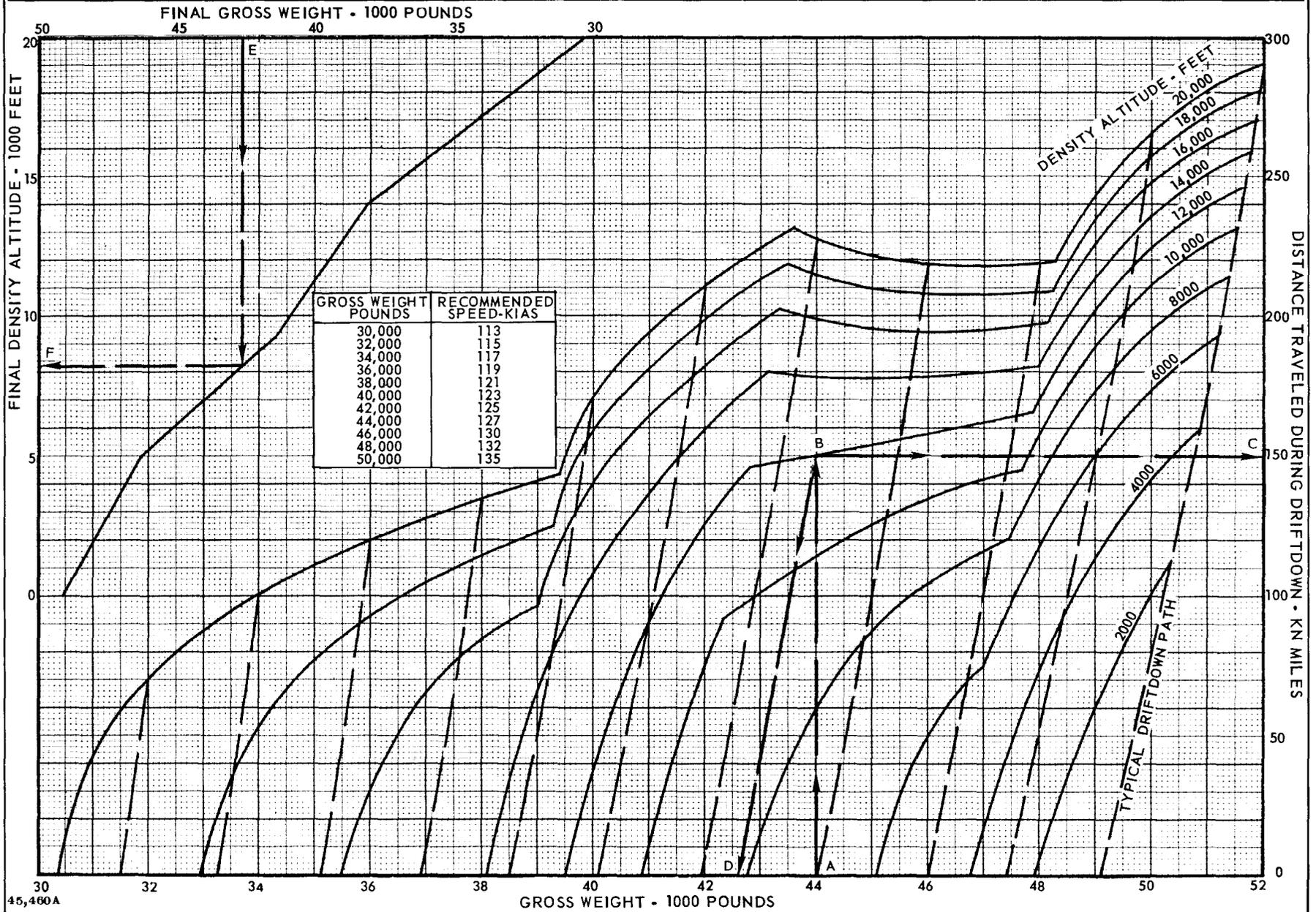
PART 5 — CRUISE

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The symbol * indicates an illustration

CRUISE CONTROL

Cruise performance as used in this Appendix is de-
fined as being that portion of flight wherein the
altitude is held constant, i.e., level flight. The
speeds and powers used are selected to maintain
this condition. Data are shown to determine this
relationship between speed and power throughout the
usable range of the airplane. Power is shown as
BHP per engine. Reference to the power schedules
will show the necessary power settings of MAP,
TPSI and rpm to deliver this BHP per engine.

NAUTICAL MILES PER POUND OF FUEL

Nautical miles per pound of fuel curves (figures
2A5-1 through 2A5-5) are presented for several
density altitudes from sea level to the maximum
usable altitude of the airplane in increments of 5000
feet. The data are based upon fuel flow expected
when mixture controls are adjusted manually to de-
sired fuel flow and by use of manual leaning pro-
cedures as specified in Section VII. The nautical
miles per pound of fuel curves are applicable in any
nonstandard conditions where the powers shown may
be obtained. To simplify selections of speed and
power for long-range cruising, three curves are
shown to represent the powers and speeds to be
selected for flight in wind conditions: for 50-knot
tailwind, zero wind, and 50-knot headwind. Wind
conditions between these lines can be interpolated.
The following examples show the various methods of
using these charts.

EXAMPLE 1. Determine power and speed for long
range cruise.

Given:

Density altitude = 10,000 feet

Gross weight at start of cruise = 42,000 pounds

Gross weight at end of cruise = 38,000 pounds

Enter chart (figure 2A5-3) at weight at start of
cruise 42,000 pounds. Follow weight line to inter-
section of long range line (no wind) and find 1035 bhp
at start of cruise. Proceed vertically to read cali-
brated airspeed of 161 knots at start of cruise.
Repeat the procedure with gross weight at end of
cruise to find 925 bhp and 159 knots CAS at end of
cruise.

Note

This cruise procedure requires changes
in power and airspeed to maintain long-
range conditions. An alternate method
would be to use an average gross weight
for cruise and fly at a constant power and
airspeed for that weight.

EXAMPLE 2. Determine distance, fuel used, and
airspeed for two-hour cruise at 1000 bhp.

Note

Since it is desired to cruise at 1000 bhp
for two hours, a sufficiently accurate
estimate may be made of the fuel flow by
reading nautical miles per pound of fuel
value and a true airspeed value at an
assumed average weight and dividing the
true airspeed by the air nautical miles
per pound of fuel (n mi/hr ÷ n mi/lb =
lb/hr).

Using same altitude and weight as Example 1 and
assuming a fuel flow of 900 pounds per hour, then
average weight for two-hour cruise is 42,000 -
900 = 41,100 pounds. Enter chart (figure 2A5-3) at
average cruise weight and follow weight lines to
intersection of 1000 bhp. Proceed vertically to find
TAS of 185 knots. Proceed horizontally from weight
and power intersection to find 0.22 air nautical
miles per pound. Then fuel used is 185 ÷ 0.22 = 845
pounds per hour.

Note

The fuel used figure of 845 pounds is
close enough to the assumed value of 900
pounds. If it were substantially different,
another estimate should be made.

Weight at end of two-hour cruise is 42,000 - 1690 =
40,310 pounds. Distance in two-hour cruise is 185
knots X 2 hours = 370 nautical miles.

EXAMPLE 3. Interpolation for intermediate
altitudes.

Given:

Density altitude = 13,000 feet

Gross weight at start of cruise = 42,000 pounds

Power and speed for long range cruise at 13,000
feet can be determined by interpolation between
10,000 feet and 15,000 feet. In Example 1, the
power and speed for 42,000 pounds and 10,000 feet
were found to be 1035 bhp and 161 knots CAS. Using
the same procedure with the chart for 15,000 feet
(figure 2A5-4), the power and speed are found to be
1050 bhp and 156 knots CAS. The difference between
1035 bhp and 1050 bhp is 15 bhp for 5000 feet differ-
ence in altitude. Find the difference in BHP for
3000 feet by the following ratio:

$$\frac{BHP}{15} = \frac{3}{5}$$

$$BHP = \frac{3 \text{ X } 15}{5} = 9$$

Then BHP for 13,000 is 1035 + 9 = 1044 bhp. Note
that the difference in calibrated airspeed is 5 knots.

The airspeed for 13,000 feet cruise is $161 - \left(\frac{3}{5} \text{X } 5\right)$

= 158 knots CAS.

MAXIMUM ENDURANCE
Data from the nautical miles per pound of fuel curves
have been replotted in the Maximum Endurance Chart
(figure 2A5-6) for convenient determination of
recommended minimum power and speed. The data
show BHP/ENG, speed, and resulting fuel flow for
gross weight and density altitude.

LONG RANGE PREDICTION
The long range prediction curves (figures 2A5-7 and
2A5-8) present the distance and time as fuel is used
during cruise.

EXAMPLE

Given:

Weight at start of cruise = 42,900 pounds

Density altitude = 5,000 feet

Cruise distance = 350 nautical miles

Enter chart (figure 2A5-7) at gross weight 42,900
pounds (A) and read up to density altitude 5000 feet
(B). Read across to distance and read 2750 nautical
miles (C). Add the cruise distance (2750 + 350 =
3100) and re-enter chart at 3100 nautical miles (D).
Read across to 5000 feet density altitude (E) and
down to find gross weight at end of cruise 41,300
pounds (F). The difference between the weight at
start of cruise and the weight at end of cruise
(42,900 - 41,300 = 1600) is the weight of fuel used
for 350 nautical miles cruise at CAS for long range.
CAS is obtained from the applicable nautical miles
per pound of fuel chart. Determination of time for
cruise is done by the same procedure with the long
range prediction time curve (figure 2A5-8).

Note

These charts can also be used to find the
distance traveled and the elapsed time for
any given amount of fuel used. Enter the
chart at the gross weight at start of
cruise and at end of cruise. Extend lines
from these two points up to the density
altitude line, then across to the distance
at altitude scale. The difference between
the two points of distance is the distance
traveled.

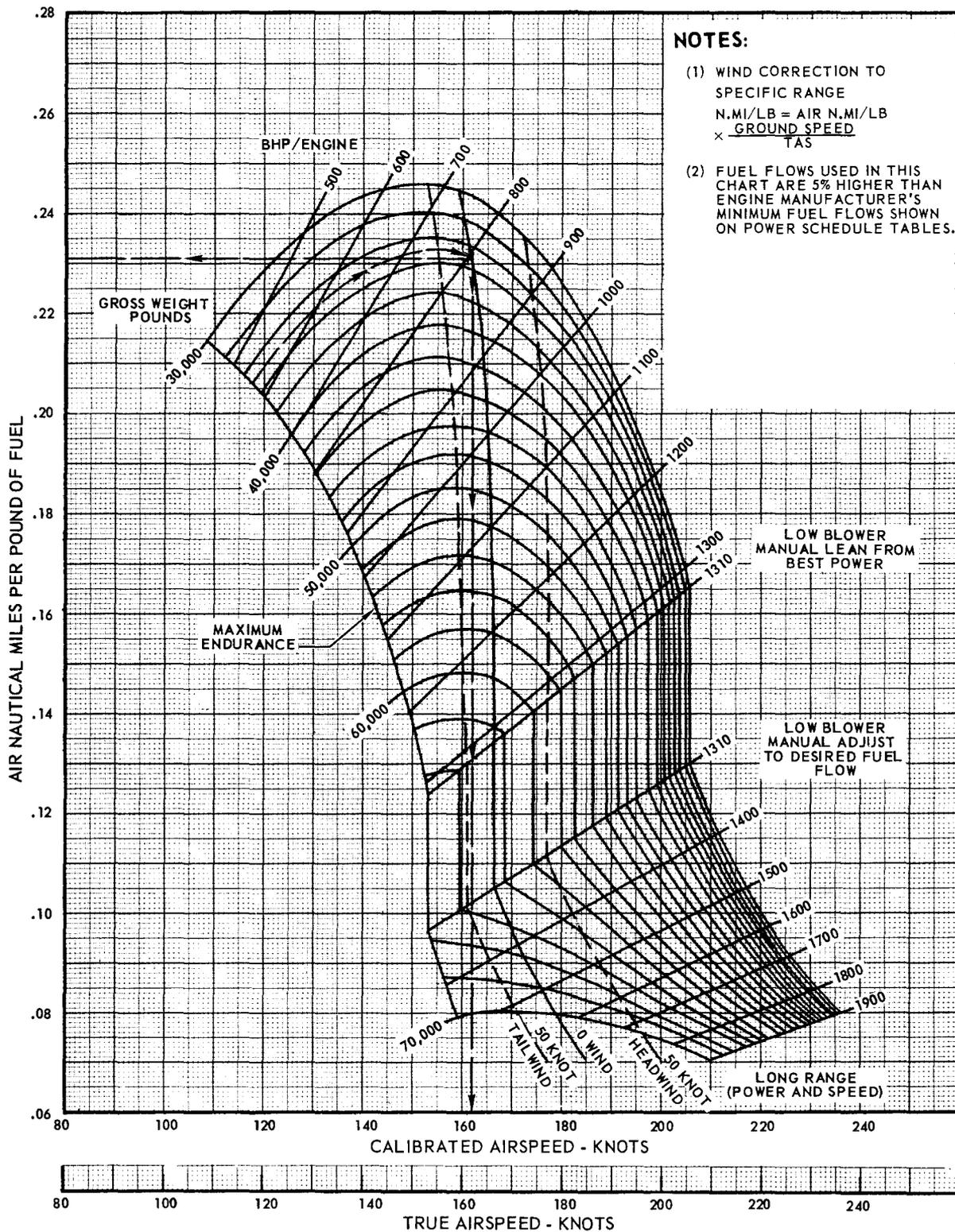## CRUISE CONTROL — ONE ENGINE INOPERATIVE
Nautical miles per pound of fuel data similar to that
presented for normal cruise is presented for cruise
with one engine inoperative, propeller feathered
(figures 2A5-9 through 2A5-12). It is important
that the propeller be feathered; if it is allowed to
windmill, a serious reduction in range will result.

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

NAUTICAL MILES PER POUND OF FUEL - SEA LEVEL
TWO ENGINE CRUISE   STANDARD ATMOSPHERE

ENGINES: **R2800-99W**

NOTES:

(1) WIND CORRECTION TO SPECIFIC RANGE

N.MI/LB = AIR N.MI/LB $\times \dfrac{\text{GROUND SPEED}}{\text{TAS}}$

(2) FUEL FLOWS USED IN THIS CHART ARE 5% HIGHER THAN ENGINE MANUFACTURER'S MINIMUM FUEL FLOWS SHOWN ON POWER SCHEDULE TABLES.

BHP/ENGINE

GROSS WEIGHT POUNDS

AIR NAUTICAL MILES PER POUND OF FUEL

MAXIMUM ENDURANCE

LOW BLOWER MANUAL LEAN FROM BEST POWER

LOW BLOWER MANUAL ADJUST TO DESIRED FUEL FLOW

LONG RANGE (POWER AND SPEED)

CALIBRATED AIRSPEED - KNOTS

TRUE AIRSPEED - KNOTS

45,954B

Figure 2A5-1

NAUTICAL MILES PER POUND OF FUEL - 5000 FEET

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE

STANDARD ATMOSPHERE

ENGINES: **R2800 - 99W**

NOTES:

(1) WIND CORRECTION TO SPECIFIC RANGE

$$N.MI/LB = AIR \ N.MI/LB \times \frac{GROUND \ SPEED}{TAS}$$

(2) FUEL FLOWS USED IN THIS CHART ARE 5% HIGHER THAN ENGINE MANUFACTURER'S MINIMUM FUEL FLOWS SHOWN ON POWER SCHEDULE TABLES.

LOW BLOWER MANUAL LEAN FROM BEST POWER

MAXIMUM ENDURANCE

LOW BLOWER MANUAL ADJUST TO DESIRED FUEL FLOW

LONG RANGE (POWER AND SPEED)

BHP/ENGINE

GROSS WEIGHT POUNDS

AIR NAUTICAL MILES PER POUND OF FUEL

CALIBRATED AIRSPEED - KNOTS

TRUE AIRSPEED - KNOTS

45,955B

Figure 2A5-2

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

NAUTICAL MILES PER POUND OF FUEL - 10,000 FEET

TWO ENGINE CRUISE   STANDARD ATMOSPHERE
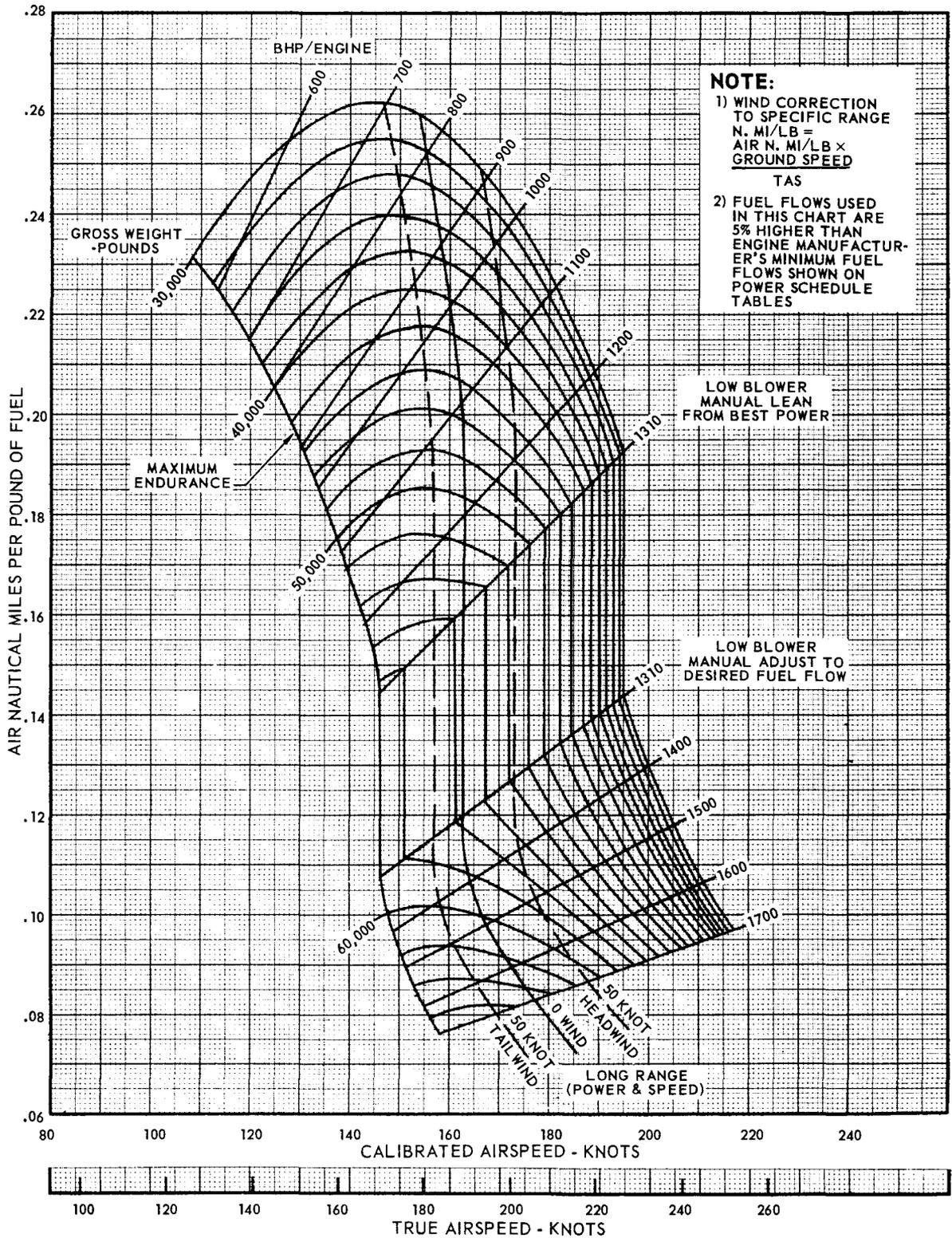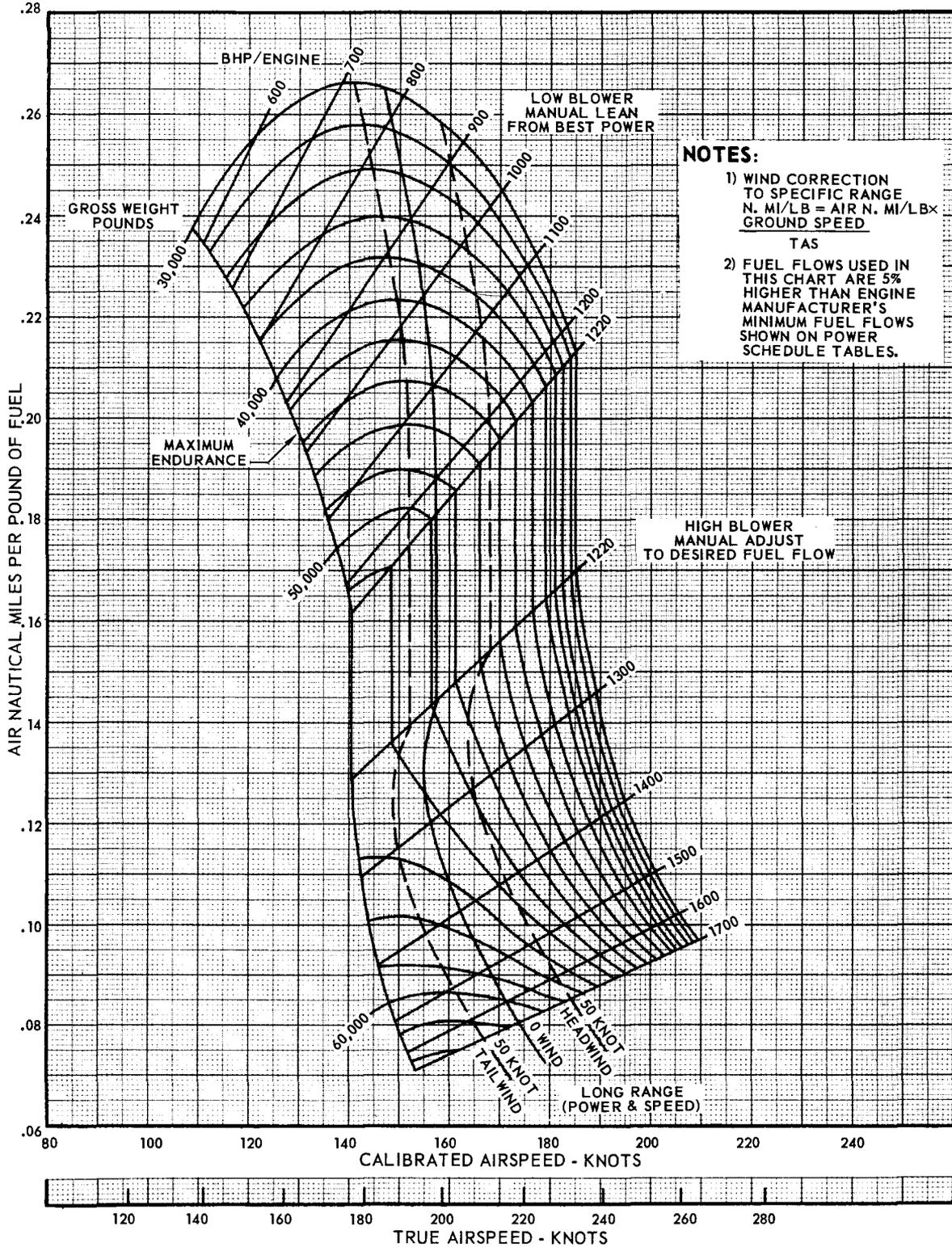
ENGINES: **R2800-99W**

NOTE:
1) WIND CORRECTION TO SPECIFIC RANGE
N. MI/LB = AIR N. MI/LB × $\frac{\text{GROUND SPEED}}{\text{TAS}}$

2) FUEL FLOWS USED IN THIS CHART ARE 5% HIGHER THAN ENGINE MANUFACTURER'S MINIMUM FUEL FLOWS SHOWN ON POWER SCHEDULE TABLES

LOW BLOWER
MANUAL LEAN
FROM BEST POWER

LOW BLOWER
MANUAL ADJUST TO
DESIRED FUEL FLOW

GROSS WEIGHT -POUNDS

MAXIMUM ENDURANCE

BHP/ENGINE

LONG RANGE
(POWER & SPEED)

50 KNOT HEADWIND

0 WIND

50 KNOT TAILWIND

AIR NAUTICAL MILES PER POUND OF FUEL

CALIBRATED AIRSPEED - KNOTS

TRUE AIRSPEED - KNOTS

45,956B

Figure 2A5-3

NAUTICAL MILES PER POUND OF FUEL - 15,000 FEET

MODEL: **T-29C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   STANDARD ATMOSPHERE

ENGINES: **R2800-99W**

NOTES:

1) WIND CORRECTION TO SPECIFIC RANGE
N. MI/LB = AIR N. MI/LB× GROUND SPEED / TAS

2) FUEL FLOWS USED IN THIS CHART ARE 5% HIGHER THAN ENGINE MANUFACTURER'S MINIMUM FUEL FLOWS SHOWN ON POWER SCHEDULE TABLES.

45,957B

Figure 2A5-4

NAUTICAL MILES PER POUND OF FUEL - 20,000 FEET

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   STANDARD ATMOSPHERE

ENGINES: **R2800 - 99W**

Figure 2A5-5

45,958B

MAXIMUM ENDURANCE SUMMARY

TWO ENGINE CRUISE   STANDARD ATMOSPHERE

MODEL: **T - 29 - C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800 - 99W**

NOTE: FUEL FLOWS USED ON THIS CHART ARE 5% HIGHER THAN ENGINE MANUFACTURER'S MINIMUM FUEL FLOWS SHOWN ON POWER SCHEDULE TABLES.

Figure 2A5-6

45,960B

LONG RANGE PREDICTION — DISTANCE

MODEL: T-29 C/D
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   CLEAN CONFIGURATION
STANDARD ATMOSPHERE

ENGINES: R2800-99W

DENSITY ALTITUDE - FT.

SEA LEVEL
5000
10000
15000
20000

NOTE:
BASED ON CAS FOR LONG RANGE

DISTANCE TRAVELED

WEIGHT OF FUEL USED

DISTANCE AT ALTITUDE (NO WIND) — NAUTICAL MILES

GROSS WEIGHT - POUNDS

LONG RANGE PREDICTION - TIME

MODEL: **T - 29 C/D**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   CLEAN CONFIGURATION
STANDARD ATMOSPHERE

ENGINES: **R2800 - 99W**

DENSITY ALTITUDE - FT
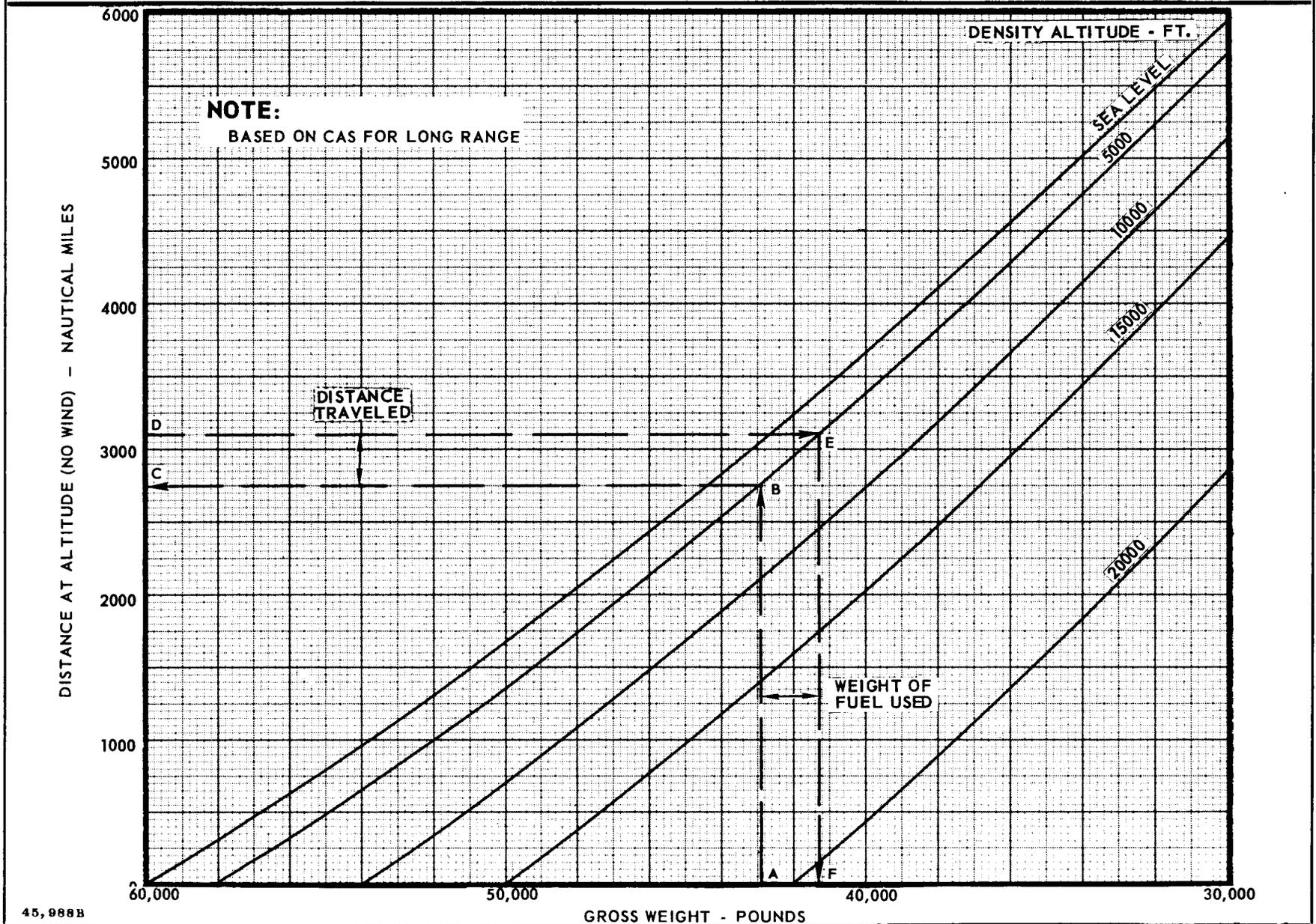
NOTE:
BASED ON CAS FOR LONG RANGE

SEA LEVEL
5000
10,000
15,000
20,000

TIME AT ALTITUDE (NO WIND) – HOURS

ELAPSED TIME

WEIGHT OF FUEL USED

GROSS WEIGHT - POUNDS
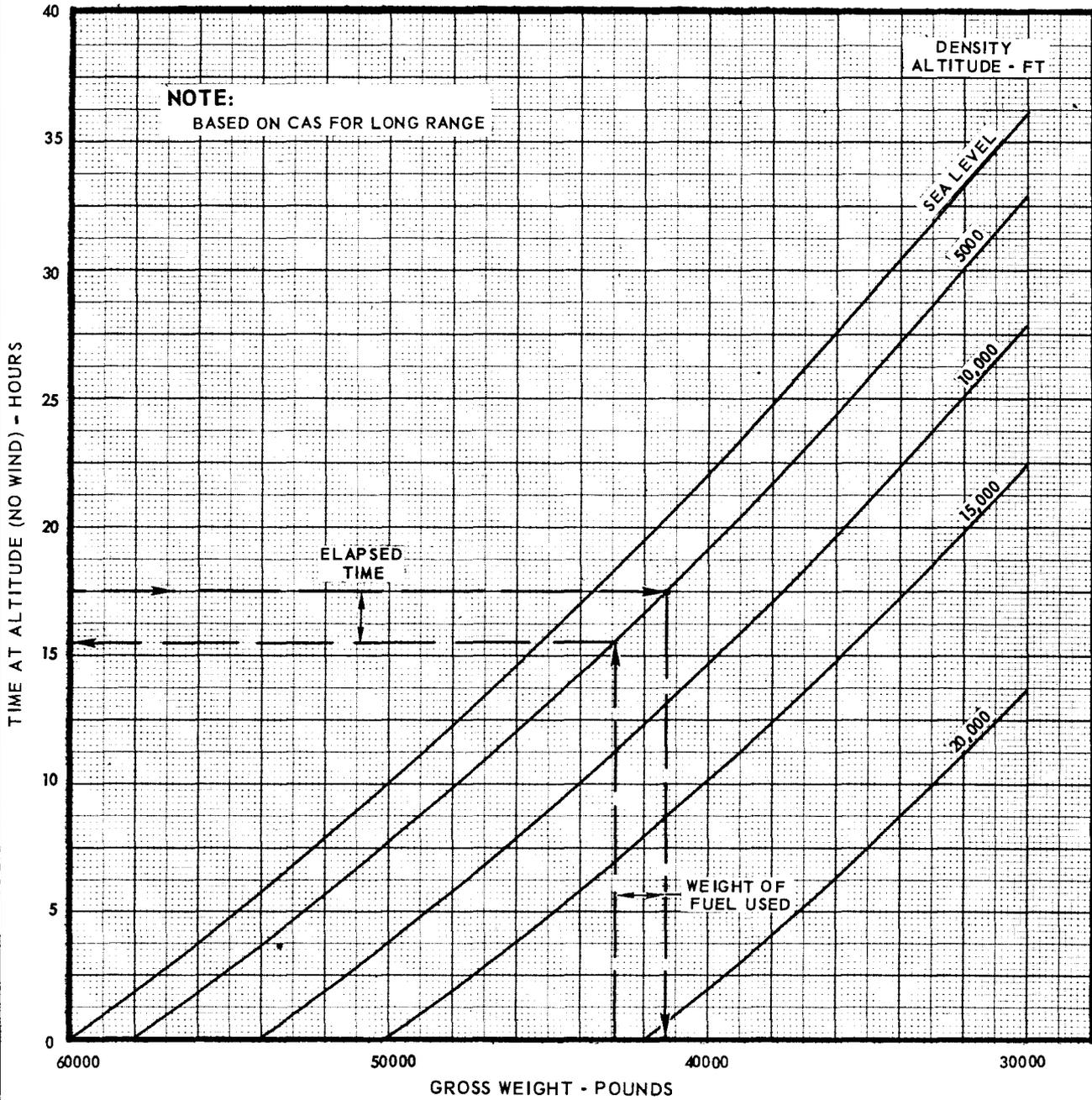
45,989B

Figure 2A5-8

NAUTICAL MILES PER POUND OF FUEL - ONE ENGINE INOPERATIVE
SEA LEVEL

MODEL: T-29C/D
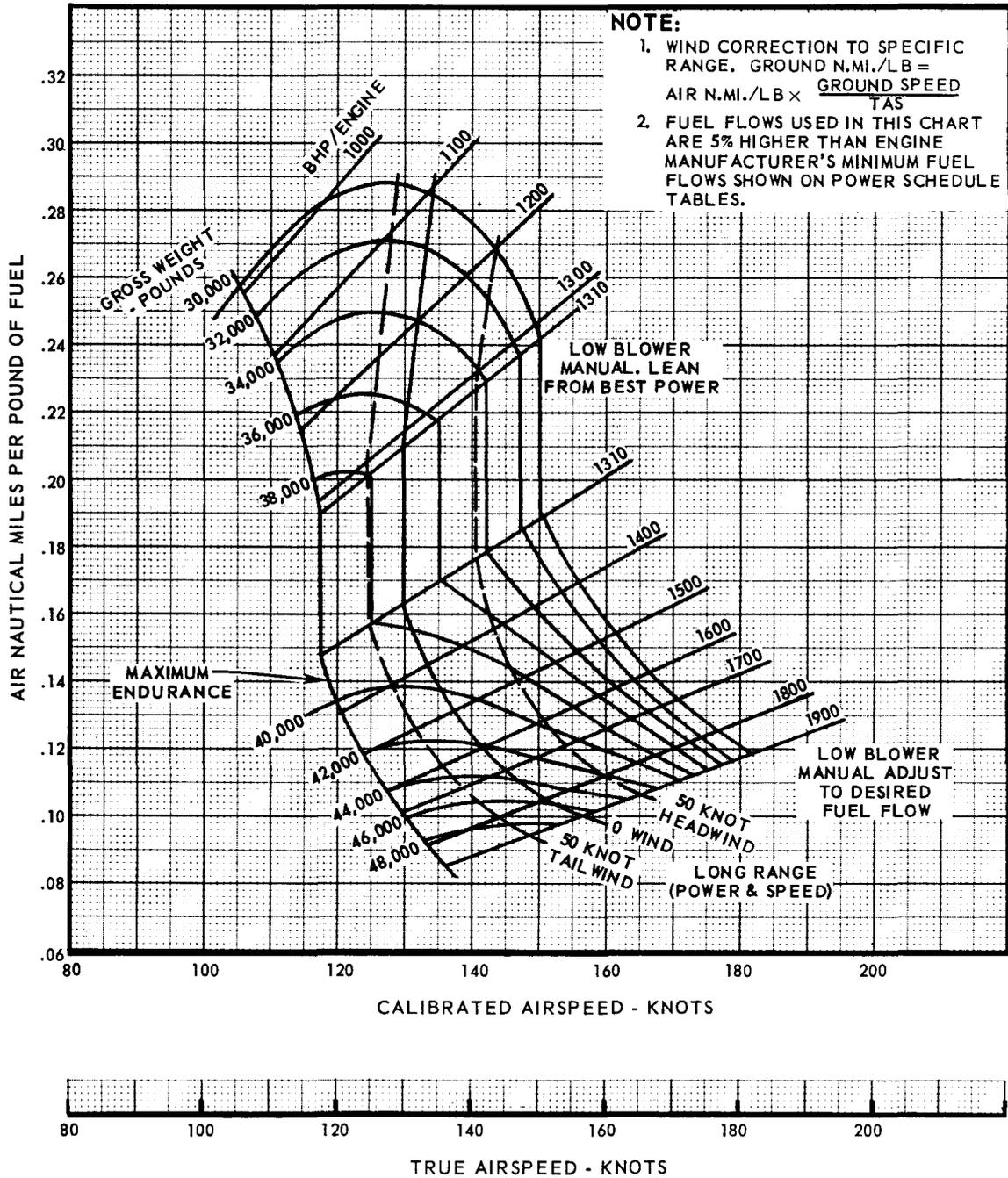DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST   PROPELLER FEATHERED   STANDARD ATMOSPHERE   ENGINES: R2800-99W

NOTE:
1. WIND CORRECTION TO SPECIFIC RANGE. GROUND N.MI./LB =
   $$\text{AIR N.MI./LB} \times \frac{\text{GROUND SPEED}}{\text{TAS}}$$
2. FUEL FLOWS USED IN THIS CHART ARE 5% HIGHER THAN ENGINE MANUFACTURER'S MINIMUM FUEL FLOWS SHOWN ON POWER SCHEDULE TABLES.

CALIBRATED AIRSPEED - KNOTS

TRUE AIRSPEED - KNOTS

45,963B

Figure 2A5-9